

# FORD Escape

## Service Manual



2001-2006



**2003-04 ENGINE COOLING****Specifications & Drive Belt Routing - Escape****ADJUSTMENTS****BELT ADJUSTMENT**

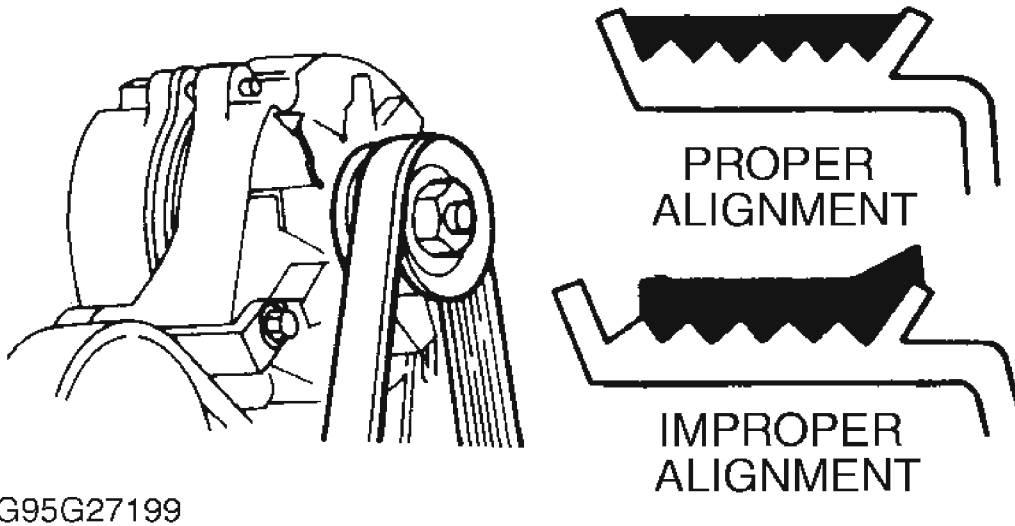
**CAUTION:** Incorrect drive belt installation will cause excessive drive belt wear and may cause the drive belt to come off the drive pulleys.

Inspect belt for fraying. If fraying has occurred, ensure belt and tensioner are aligned properly. See **Fig. 1** . If tensioner has reached its limit of travel, belt is excessively stretched and replacement of belt is required. If excessive noise is noticed from tensioner or idler, check for possible bearing failure. With the engine running, visually observe the grooves in the pulleys (not the pulley flanges or the pulley forward faces) for excessive wobble. Install new components as necessary. Check all accessories, mounting brackets, and the drive belt tensioner for any interference that would prevent the components from mounting correctly. Correct any interference condition and recheck the drive belt tracking. Tighten all accessories, mounting brackets, and the drive belt tensioner retaining hardware to specification. Recheck the drive belt tracking.

Belt tension is controlled by an automatic belt tensioner and is not adjustable. DO NOT apply belt dressing or any other additive to belt(s). Ensure belts are properly installed. The automatic drive belt tensioner can be checked as follows:

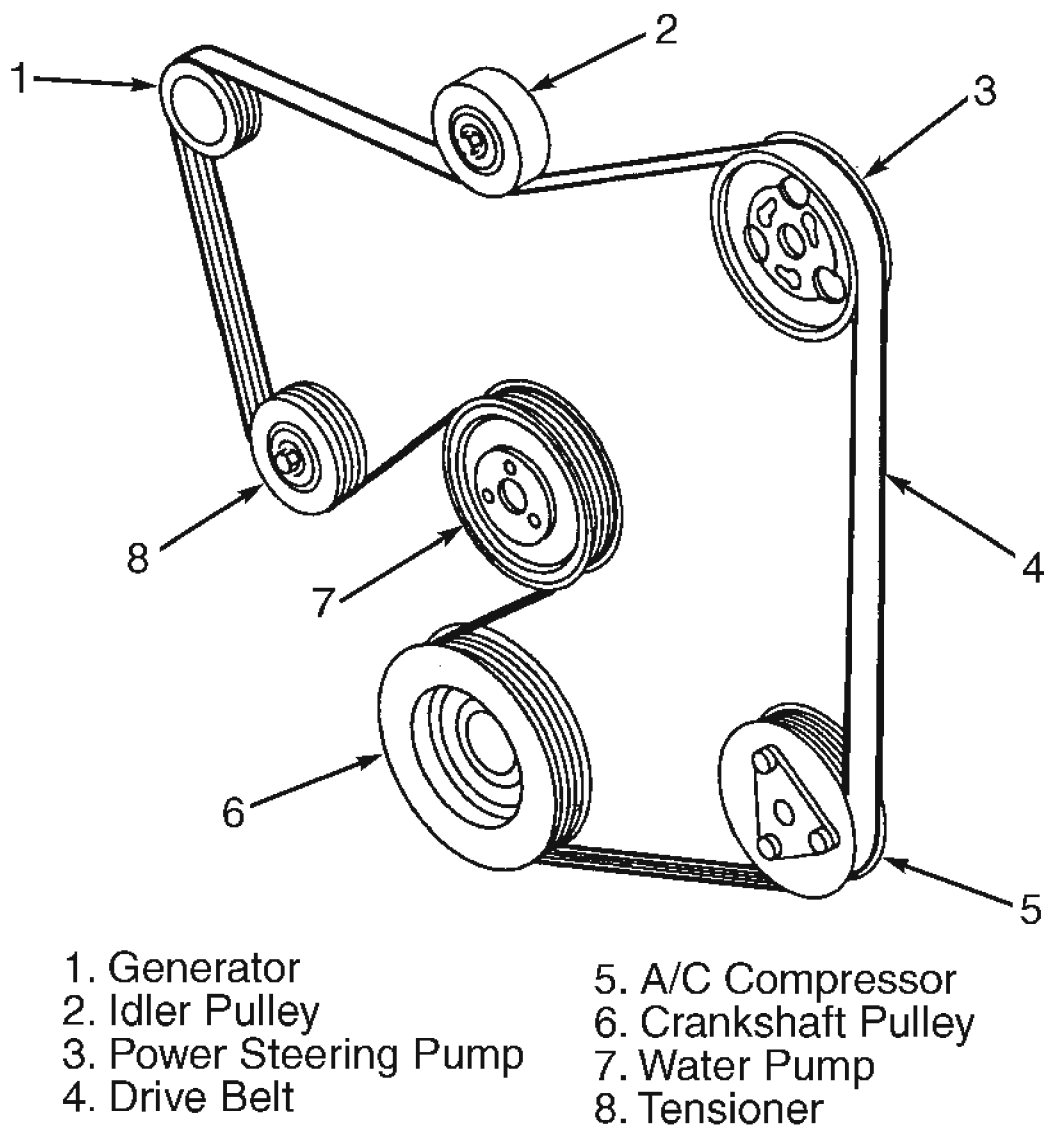
- With the engine running, observe the drive belt tensioner movement. The drive belt tensioner should move (respond) when the A/C clutch cycles or when the engine is accelerated rapidly. If the drive belt tensioner movement is constant without A/C clutch cycling or acceleration, a pulley or shaft is probably bent or a pulley is out of round.





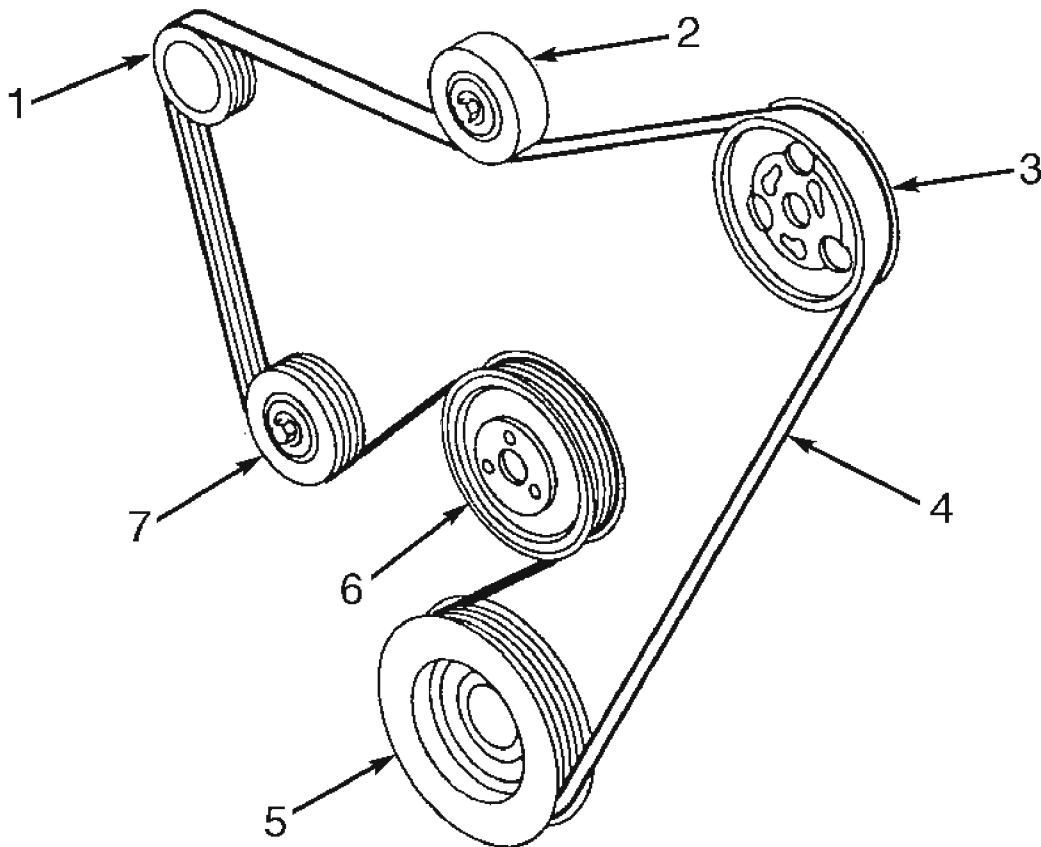
**Fig. 1: Aligning Serpentine Belt**  
Courtesy of FORD MOTOR CO.

## DRIVE BELT ROUTING



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**Fig. 2: Checking Belt Routing (2.0L With A/C)**  
Courtesy of FORD MOTOR CO.

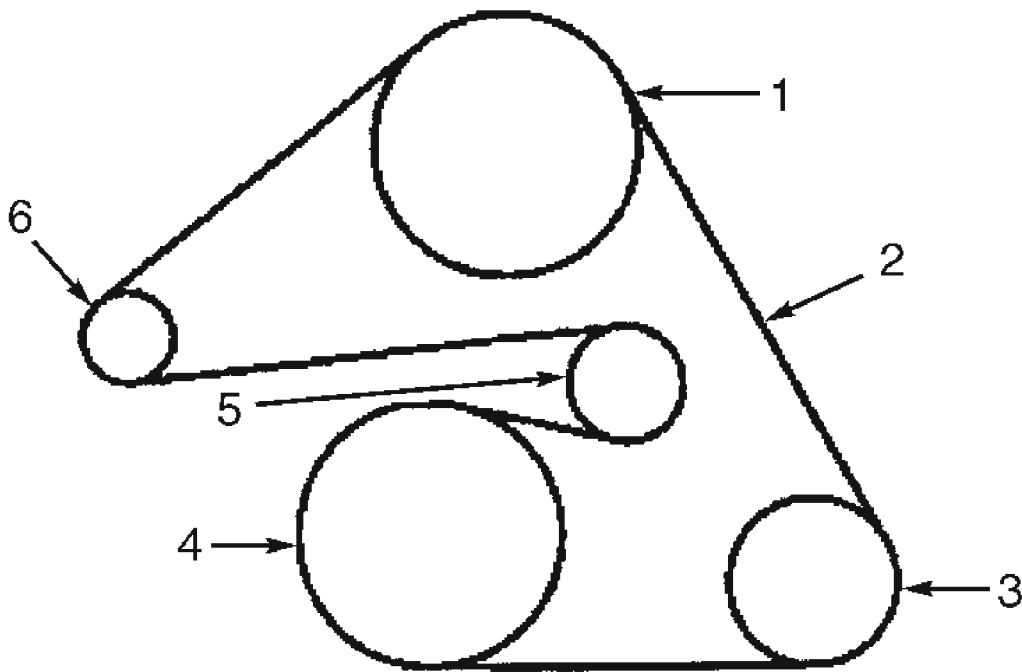


- 1. Generator
- 2. Idler Pulley
- 3. Power Steering Pump
- 4. Drive Belt

- 5. Crankshaft Pulley
- 6. Water Pump
- 7. Tensioner

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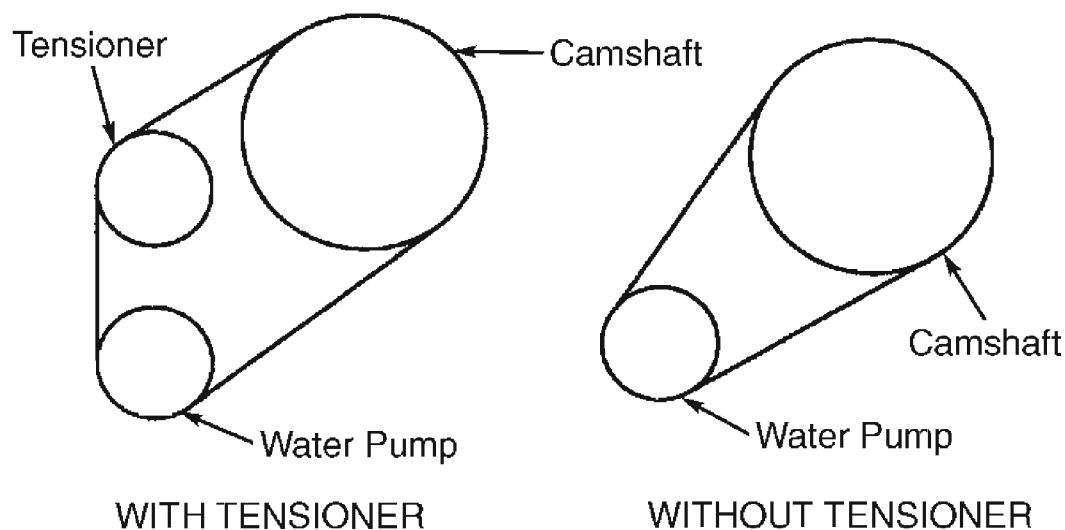
**Fig. 3: Checking Belt Routing (2.0L Without A/C)**  
Courtesy of FORD MOTOR CO.



- |                   |               |
|-------------------|---------------|
| 1. Power Steering | 4. Crankshaft |
| 2. Belt           | 5. Tensioner  |
| 3. A/C Compressor | 6. Generator  |

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**Fig. 4: Checking Belt Routing (3.0L With A/C - 1 Of 2)**  
Courtesy of FORD MOTOR CO.



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**Fig. 5: Checking Belt Routing (3.0L Without A/C - 2 Of 2)**  
 Courtesy of FORD MOTOR CO.

## COOLING SYSTEM SPECIFICATIONS

### COOLANT

**WARNING:** Never remove the radiator cap under any conditions while the engine is operating. Failure to follow these instructions could result in personal injury and/or damage to the cooling system or engine. To avoid having scalding hot coolant or steam blow out of the radiator, use extreme care when removing the radiator cap from a hot radiator. Wait until the engine has cooled, then wrap a thick cloth around the radiator cap and turn it slowly to the first stop. Step back while the pressure is released from the cooling system. When you are certain all the pressure has been released, press down on the radiator cap (with a cloth), turn and remove.

**NOTE:** The addition of Motorcraft Cooling System Stop Leak Pellets (VC-6), darkens Motorcraft Premium Gold Engine Coolant from Yellow to Golden Tan.

When adding engine coolant, use a 50/50 mixture of engine coolant and distilled water. To maintain the integrity of the coolant and the cooling system:

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### 2003-04 ENGINE COOLING Specifications & Drive Belt Routing - Escape

- Add Motorcraft Premium Engine Coolant VC-4-A (in Oregon VC-5, in Canada CXC-10) or equivalent meeting Ford specification ESE-M97B44-A (Green color), Motorcraft Specialty Orange Engine Coolant such as VC-2, meeting Ford specification WSS-M97B44-D or Motorcraft Premium Gold Engine Coolant VC-7-A or equivalent meeting Ford specification WSS-M97B51-A1 (Yellow color). Use the same coolant that was drained from the cooling system. Do not mix coolant types.
- Do not add/mix Orange-colored Motorcraft Specialty Orange Engine Coolant VC-2 or equivalent meeting Ford specification WSS-M97B44-D. Mixing coolants may degrade the coolant's corrosion protection.
- Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
- Do not mix with recycled coolant unless it meets the requirements of Ford specification ESE-M97B44-A or WSS-M97B51-A1. Not all coolant recycling processes meet these Ford specifications. Use of such coolants can harm the engine and cooling system components.

### COOLING SYSTEM SPECIFICATIONS

Application	Specification
Coolant Capacity <sup>(1)</sup>	
2.0L	7.4 Qts. (7.0L)
3.0L	10.5 Qts. (10.0L)
Cooling System Test Pressure	20 psi (141 kPa)
Pressure Relief Cap Opening Pressure	17.4-21.7 psi (120- 150 kPa)
Thermostat Opens	
Starts To Open	
2.0L	194-201°F (90-94°C)
3.0L	194-200°F (90-93°C)
Fully Open	
2.0L	223°F (106°C)
3.0L	223°F (106°C)
(1) Includes degas bottle fluid level between the COOLANT FILL LEVEL lines.	



**FORD****2.0L 4-Cylinder - DOHC - Escape****MANUFACTURER'S SUGGESTED SCHEDULED MAINTENANCE**

The manufacturer recommends the belt be replaced every 120,000 miles.

**REMOVAL & INSTALLATION**

**CAUTION:** This application is an interference engine. Do not rotate camshaft or crankshaft when timing belt is removed, or engine damage may occur.

**TIMING BELT****Removal**

1. Disconnect negative battery cable. Remove accessory drive belt. Remove air cleaner outlet pipe. Disconnect ignition wires from spark plugs. Remove spark plugs. Disconnect throttle cable and cruise control actuator cable. On 2002-04 models, disconnect the catalyst monitor and heated oxygen sensor connectors, and detach the connectors from the bracket. Remove wiring harness anchors from valve cover studs, and position the wiring harness aside. On all models, remove valve cover. See **Fig. 1**.
2. Remove catalytic converter. Remove coolant tube bolt and nut. Position coolant tube to side. Remove right front wheel and tire assembly. Remove right lower splash shield.
3. Rotate crankshaft to just before No. 1 cylinder TDC. See **Fig. 2**. Remove stud and install Crankshaft TDC Timing Peg (303-574). See **Fig. 3**.

**NOTE:** Make sure second notch in pulley is indexed to lower cylinder block. See **Fig. 2**.

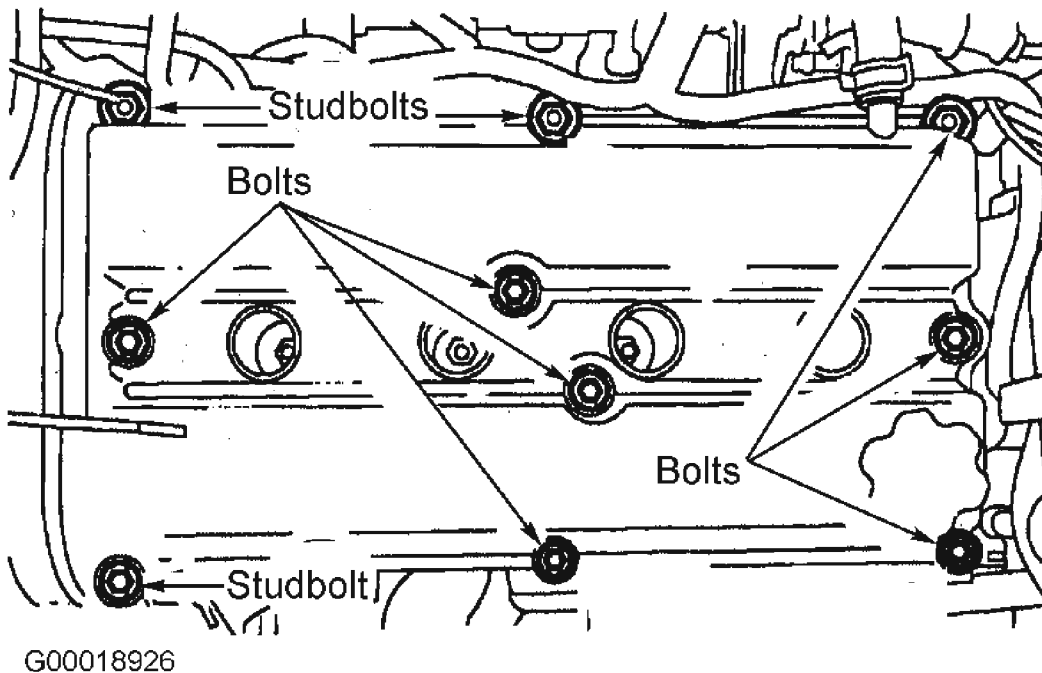
4. Rotate crankshaft clockwise against peg to bring it to TDC. Loosen water pump pulley bolts.
5. Loosen crankshaft pulley bolt. Rotate tensioner and remove accessory drive belt. Remove crankshaft pulley. Remove bolts and lower timing belt cover. See **Fig. 4**. Install Engine Support Bar (303-F072). See **Fig. 5**.
6. Remove ground strap and engine mount upper bracket. See **Fig. 6**. Remove upper timing belt cover studs. Disconnect the knock sensor connector from upper timing cover, if necessary. Remove upper timing belt cover bolts and cover. See **Fig. 7**.

**NOTE:** Installation of Camshaft Alignment Tool (303-465) into exhaust camshaft may require camshafts to be rotated slightly clockwise.

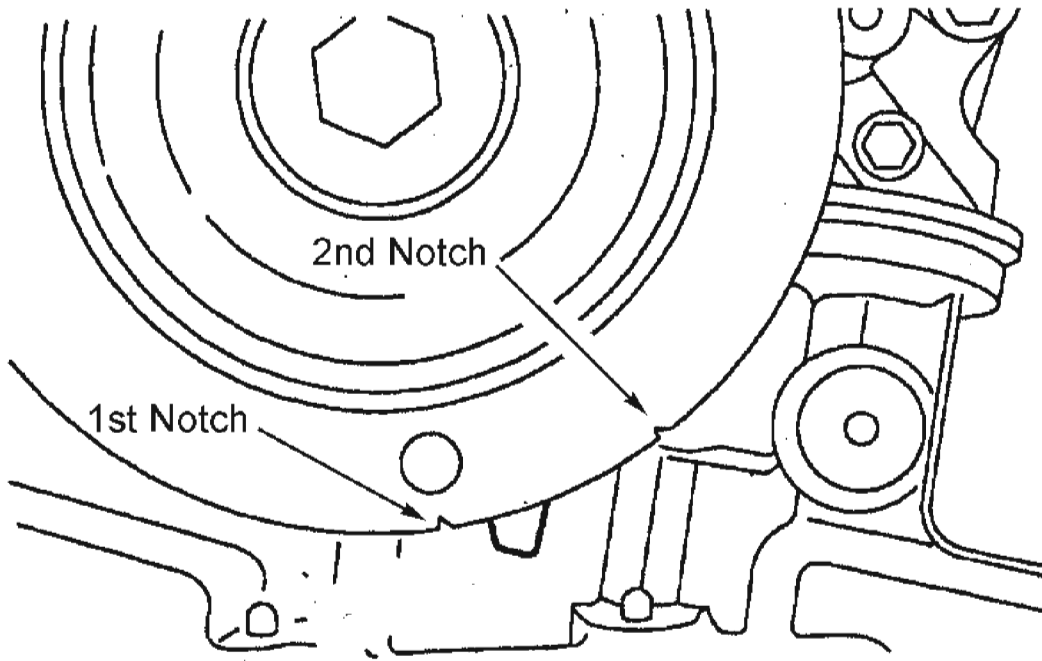
## 2001 Ford Escape

FORD 2.0L 4-Cylinder - DOHC - Escape

7. Remove water pump pulley and accessory drive belt idler pulley. Install Camshaft Alignment Tool (303-465) and align camshafts. See **Fig. 8** .
8. Raise and support vehicle. Remove engine mount lower bracket. See **Fig. 9** .
9. Loosen timing belt tensioner pulley, and allow it to slide down to bottom of its travel. If timing belt is going to be reused, mark direction of rotation for installation reference. Slide timing belt off of camshaft and crankshaft sprockets.



**Fig. 1: Removing Valve Cover**  
Courtesy of FORD MOTOR CO.

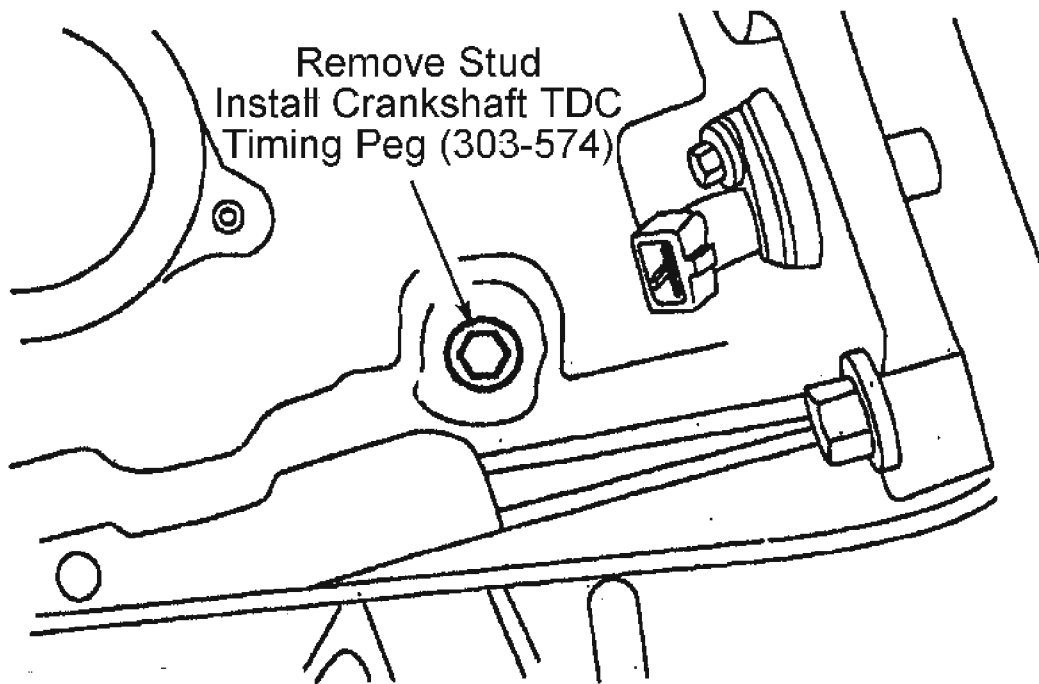


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**Fig. 2: Aligning Crankshaft Timing Marks Before TDC**  
Courtesy of FORD MOTOR CO.

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FORD 2.0L 4-Cylinder - DOHC - Escape

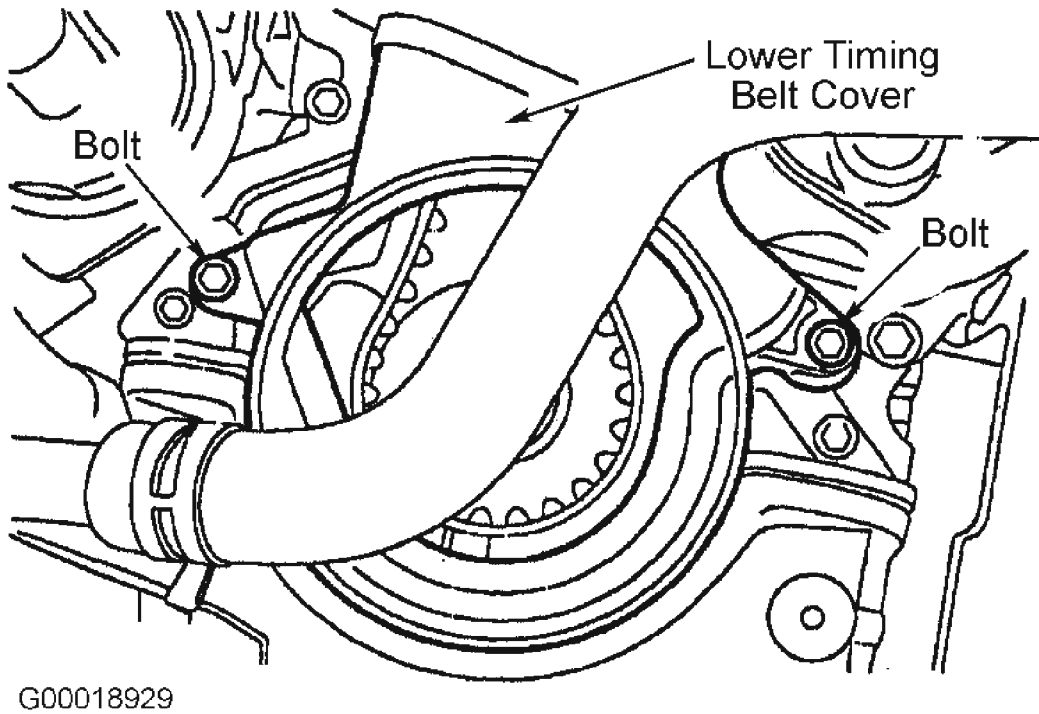


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**Fig. 3: Removing Stud For Installation Of Crankshaft TDC Timing Peg (303-574)**  
Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

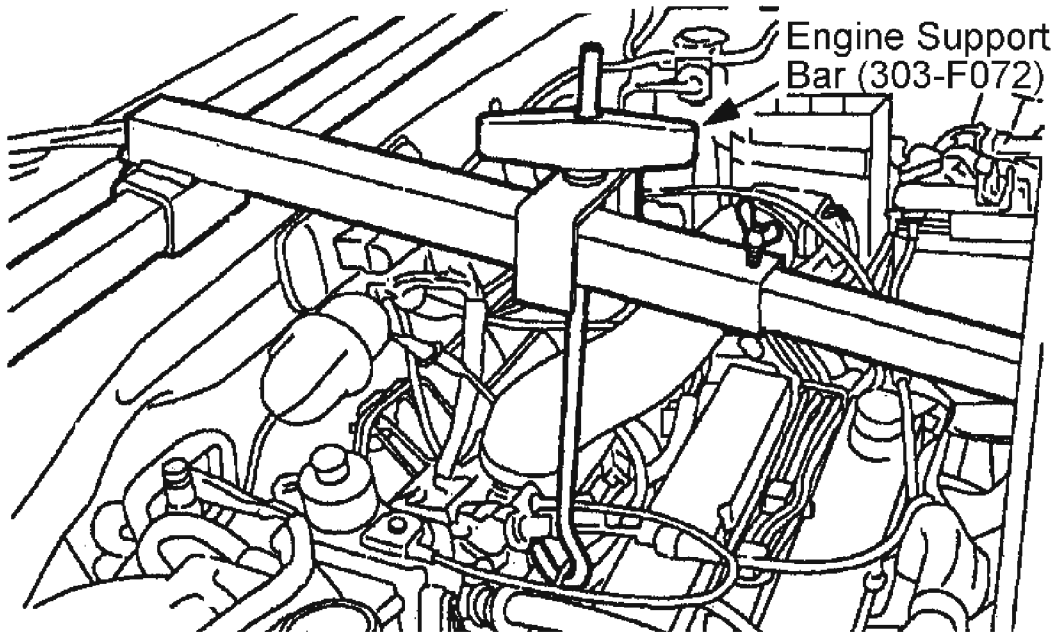
FORD 2.0L 4-Cylinder - DOHC - Escape



**Fig. 4: Removing Lower Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

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FORD 2.0L 4-Cylinder - DOHC - Escape



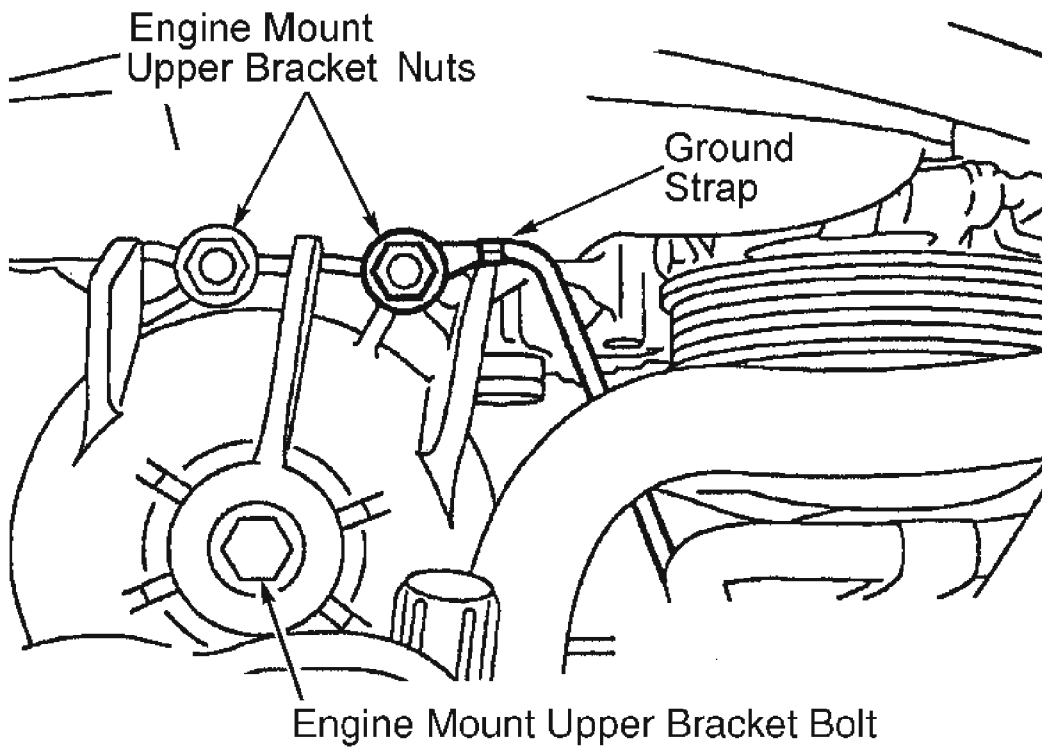
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**Fig. 5: Installing Engine Support Bar (303-F072)**  
Courtesy of FORD MOTOR CO.



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FORD 2.0L 4-Cylinder - DOHC - Escape

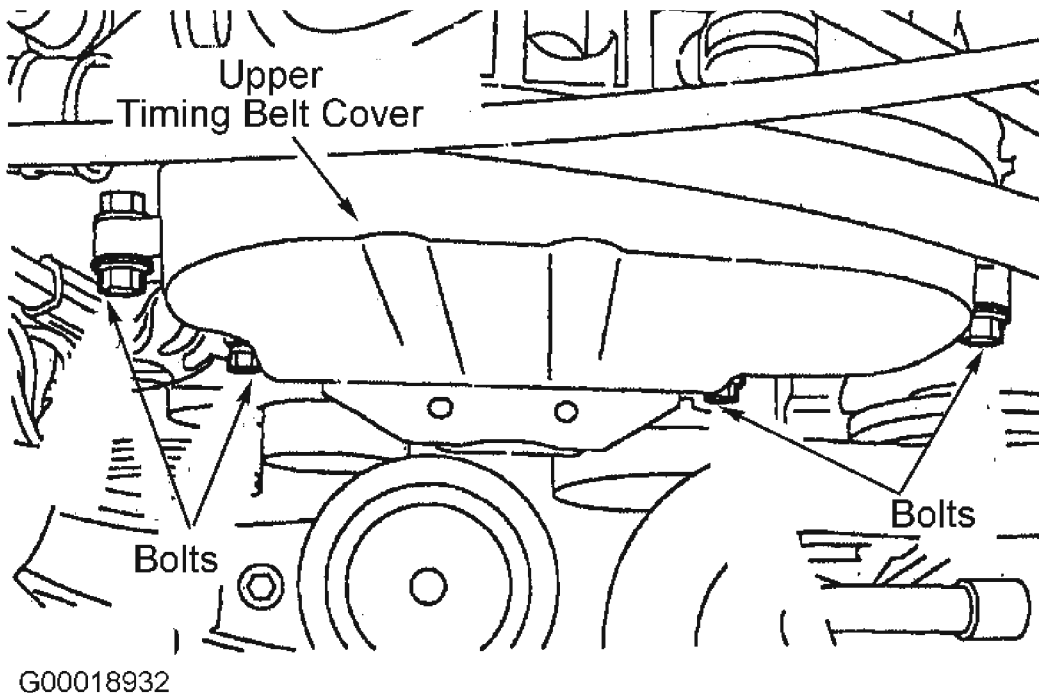


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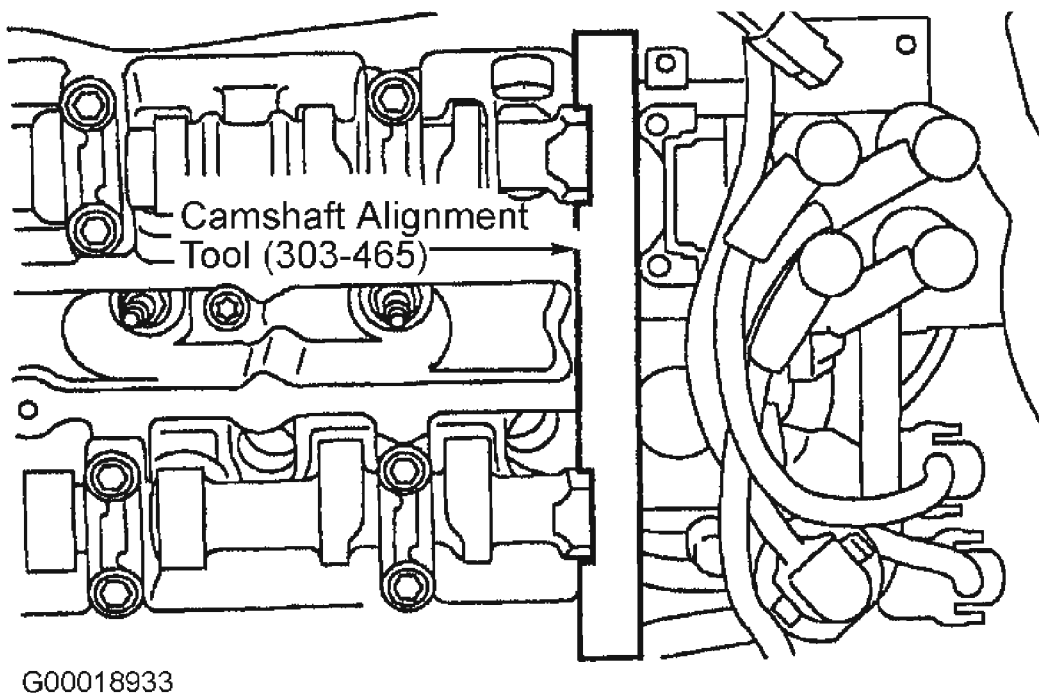
**Fig. 6: Removing Engine Mount Upper Bracket**  
Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

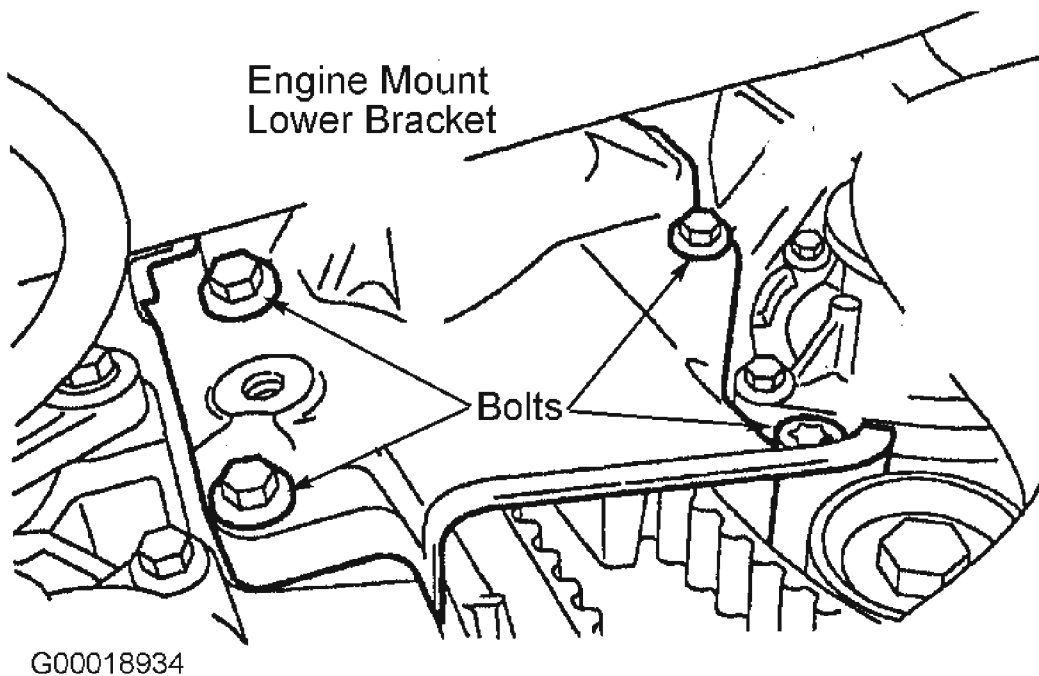
FORD 2.0L 4-Cylinder - DOHC - Escape



**Fig. 7: Removing Upper Timing Belt Cover**  
Courtesy of FORD MOTOR CO.



**Fig. 8: Installing Camshaft Alignment Tool (303-465)**  
Courtesy of FORD MOTOR CO.

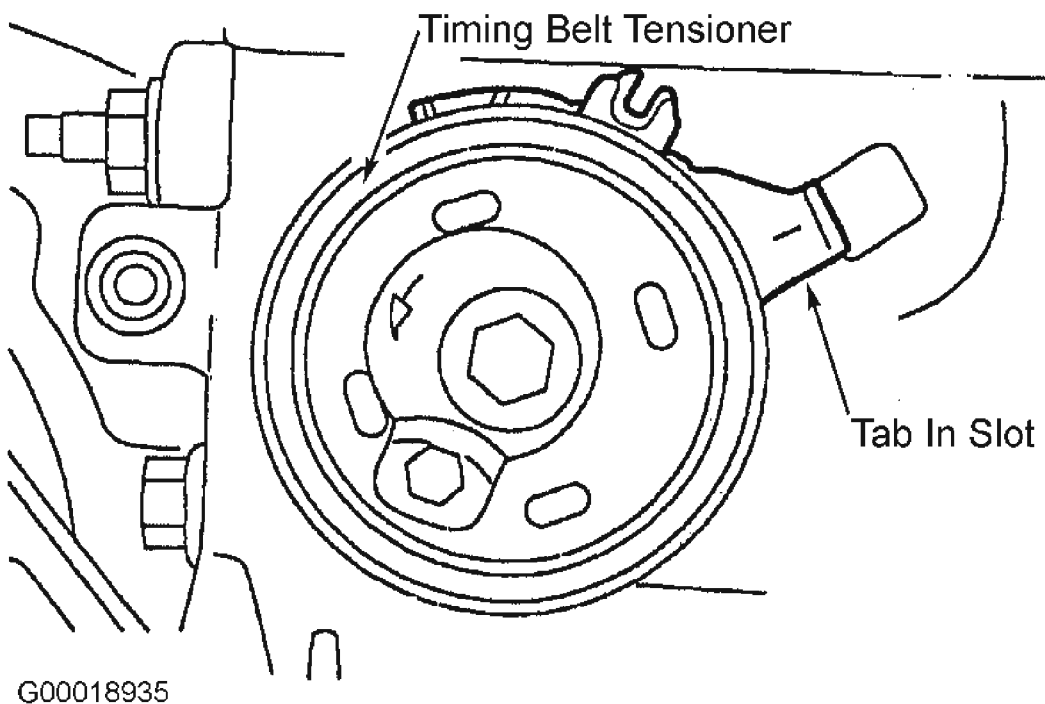


**Fig. 9: Removing Engine Mount Lower Bracket**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Slide crankshaft pulley onto crankshaft. Ensure crankshaft position is at No. 1 TDC by rotating it clockwise against Crankshaft TDC Timing Peg (303-574). Ensure second notch in pulley is indexed to lower cylinder block. See [Fig. 2](#) . Remove crankshaft pulley.
2. Ensure timing belt tensioner is installed correctly with tab positioned in slot in inner timing cover. See [Fig. 10](#) .
3. Starting from the crankshaft timing belt pulley and working counterclockwise, position the timing belt in place while keeping it under tension. Adjust timing belt tensioner by using a 6-mm Allen wrench to rotate adjuster counterclockwise and align marks. See [Fig. 11](#) and [Fig. 12](#) . Tighten tensioner pulley bolt to specification. See **TORQUE SPECIFICATIONS** .
4. Install front engine mount lower bracket. Install accessory drive belt idler pulley. Install water pump pulley, and hand tighten bolts. Install timing belt covers. Install crankshaft pulley. Tighten water pump pulley bolts to specification. See **TORQUE SPECIFICATIONS** .

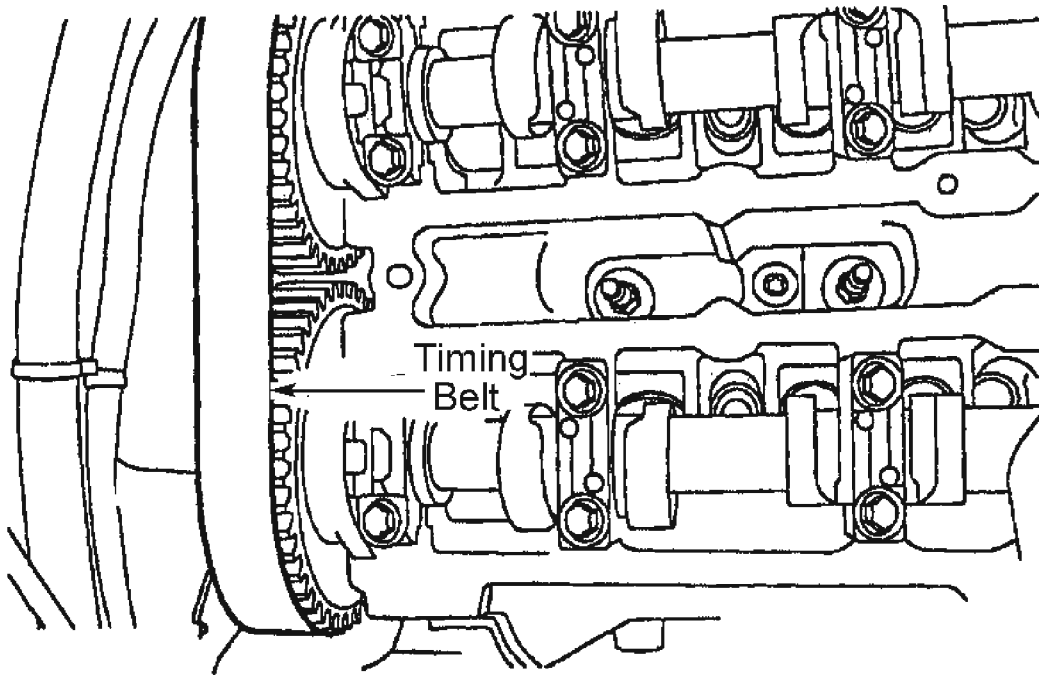
5. Install splash shield, then wheel and tire assembly. Remove Crankshaft TDC Timing Peg (303-574). Install stud. Install engine mount upper bracket and ground strap. Remove Engine Support Bar (303-F072). Install coolant tube and catalytic converter. Remove Camshaft Alignment Tool (303-465).
6. Install valve cover and spark plugs. On 2002-04 models, connect wiring harness anchors to valve cover studs. Install and reconnect the catalyst monitor and heated oxygen sensor connectors. On all models, reconnect accelerator cable and cruise control actuator cable. Install ignition wires, air cleaner outlet pipe and accessory drive belt. Reconnect negative battery cable.



**Fig. 10: Installing Timing Belt Tensioner**  
Courtesy of FORD MOTOR CO.

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FORD 2.0L 4-Cylinder - DOHC - Escape

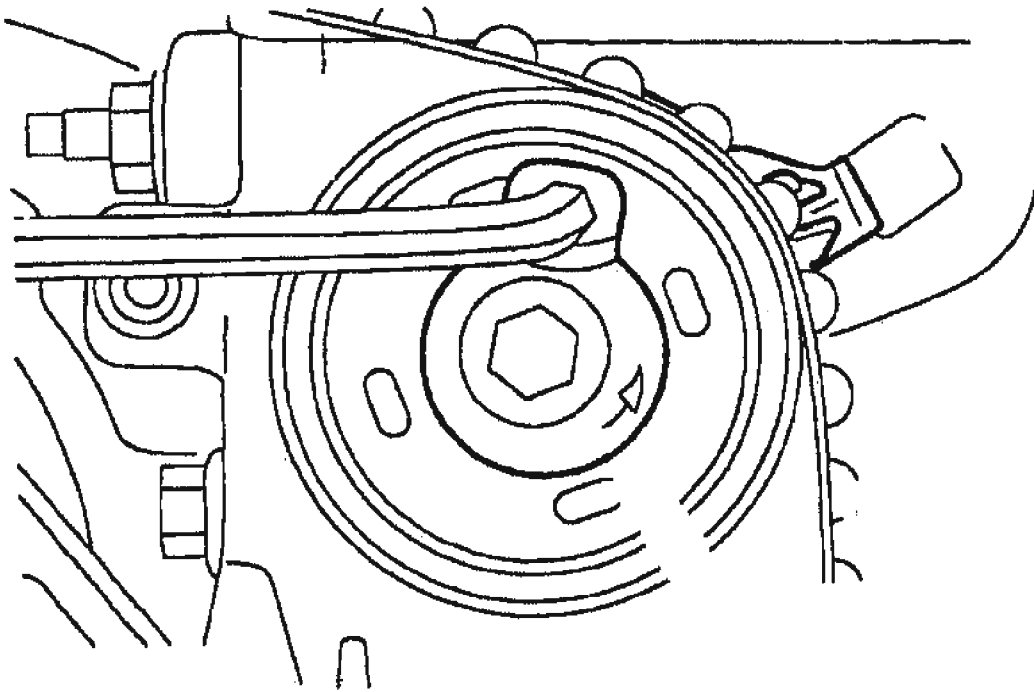


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**Fig. 11: Installing Timing Belt On Sprockets**  
Courtesy of FORD MOTOR CO.

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FORD 2.0L 4-Cylinder - DOHC - Escape



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**Fig. 12: Adjusting Timing Belt Tensioner**  
Courtesy of FORD MOTOR CO.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Accessory Drive Belt Idler Pulley Bolt	35 (45)
Camshaft Sprocket Bolts	50 (68)
Catalytic Converter Bracket Bolts	18 (25)
Coolant Tube Attachments	15 (20)
Crankshaft Pulley Bolt	85 (115)
Engine Mount Lower Bracket Nuts	37 (50)
Engine Mount Upper Bracket	
Bolt	57 (77)
Nuts	72 (98)
Studs	25 (34)
Exhaust Camshaft Center Plug	27 (37)
Ground Strap	25 (34)



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FORD 2.0L 4-Cylinder - DOHC - Escape

Spark Plugs	11 (15)
Stud (For Crankshaft TDC Timing Peg)	18 (25)
Timing Belt Idler Pulley Bolt	18 (25)
Timing Belt Tensioner Bolt	18 (25)
Water Pump Pulley Bolt	18 (25)
Wheel Lug Nuts	98 (133)
<b>INCH Lbs. (N.m)</b>	
Timing Belt Cover Bolts	
Inner	89 (10)
Lower	62 (7)
Upper	71 (8)
Splash Shield Bolts	80 (9)
Valve Cover Bolts	80 (9)

## 2004 Ford Escape

### 2004 ENGINE Accessory Drive - Escape

## 2004 ENGINE

### Accessory Drive - Escape

## SPECIFICATIONS

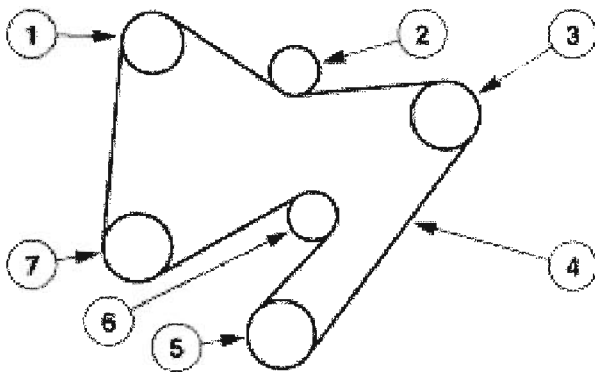
### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Accessory drive belt tensioner bolts-2.0L Zetec	25	18	-
Accessory drive belt tensioner bolt-3.0L (4V)	25	18	-
Belt idler pulley bolt-2.0L Zetec	48	35	-
RH front fender splash shield bolts	9	-	80
Water pump belt tensioner bolt-3.0L (4V)	10	-	89

## DESCRIPTION AND OPERATION

### ACCESSORY DRIVE

#### 2.0L Zetec without A/C



Item	Part Number	Description
1	10344	Generator pulley
2	19A216	Belt idler pulley
3	3A733	Power steering pump pulley
4	6C301	Drive belt
5	6B320	Crankshaft pulley
6	8509	Water pump pulley
7	6A228	Drive belt tensioner

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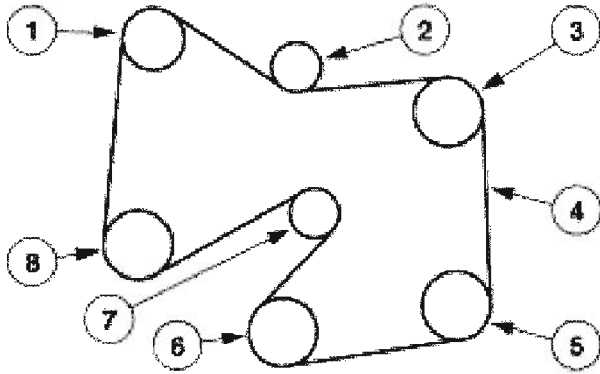
Fig. 1: Identifying Accessory Drive Diagram (2.0L Zetec Without A/C)

## 2004 Ford Escape

### 2004 ENGINE Accessory Drive - Escape

Courtesy of FORD MOTOR CO.

2.0L Zetec with A/C



Item	Part Number	Description
1	10344	Generator pulley
2	19A216	Belt idler pulley
3	3A733	Power steering pump pulley
4	6C301	Drive belt
5	2E884	A/C clutch pulley
6	6B320	Crankshaft pulley
7	8509	Water pump pulley
8	6A228	Drive belt tensioner

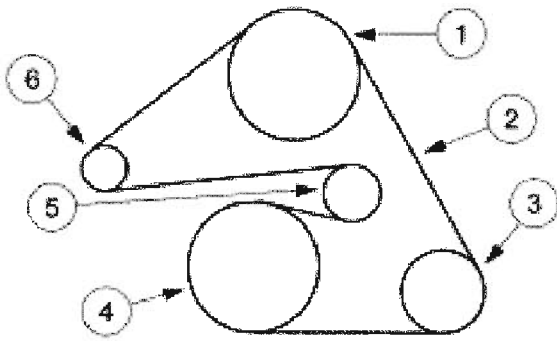
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**Fig. 2: Identifying Accessory Drive Diagram (2.0L Zetec With A/C)**  
Courtesy of FORD MOTOR CO.

3.0L (4V) with A/C

## 2004 Ford Escape

### 2004 ENGINE Accessory Drive - Escape



Item	Part Number	Description
1	3A733	Power steering pump pulley
2	8620	Drive belt
3	2E884	A/C clutch pulley
4	6316	Crankshaft pulley
5	6B209	Drive belt tensioner
6	10344	Generator pulley

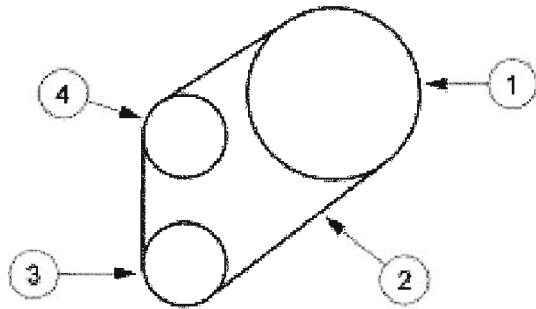
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**Fig. 3: Identifying Accessory Drive Diagram (3.0L (4V) With A/C)**  
Courtesy of FORD MOTOR CO.

Water Pump Drive Belt-3.0L (4V) with Tensioner

## 2004 Ford Escape

### 2004 ENGINE Accessory Drive - Escape



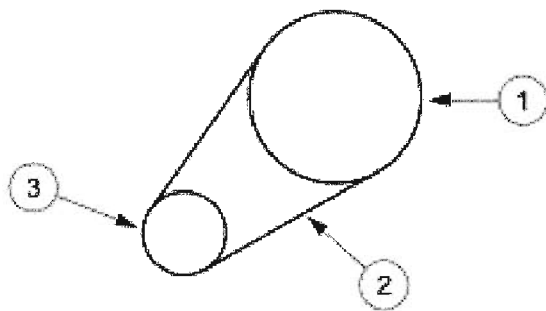
Item	Part Number	Description
1	6A359	Camshaft drive pulley
2	8K543	Drive belt
3	8A528	Water pump pulley
4	8W508	Drive belt tensioner

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**Fig. 4: Identifying Accessory Drive Diagram (Water Pump Drive Belt-3.0L (4V) With Tensioner)**

Courtesy of FORD MOTOR CO.

Water Pump Drive Belt-3.0L (4V) without Tensioner



Item	Part Number	Description
1	6A359	Camshaft drive pulley
2	8K543	Drive belt
3	8A528	Water pump pulley

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**Fig. 5: Identifying Accessory Drive Diagram (Water Pump Drive Belt-3.0L (4V) Without Tensioner)**

**Courtesy of FORD MOTOR CO.**

This vehicle is equipped with:

- a V-ribbed serpentine accessory drive belt.
- an automatic drive belt tensioner.
- a V-ribbed water pump belt.

New drive belts must be of the same type as originally installed.

Check the drive belt condition at 160,934 km (100,000 miles) then after every 24,140 km (15,000 miles).

**DIAGNOSIS AND TESTING****ACCESSORY DRIVE****Inspection and Verification**

**CAUTION:** Under no circumstances should the accessory drive belt, tensioner or pulleys be lubricated as potential damage to the belt material and tensioner damping mechanism will occur. Do not apply any fluids or belt dressing to the accessory drive belt or pulleys.

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical damage.

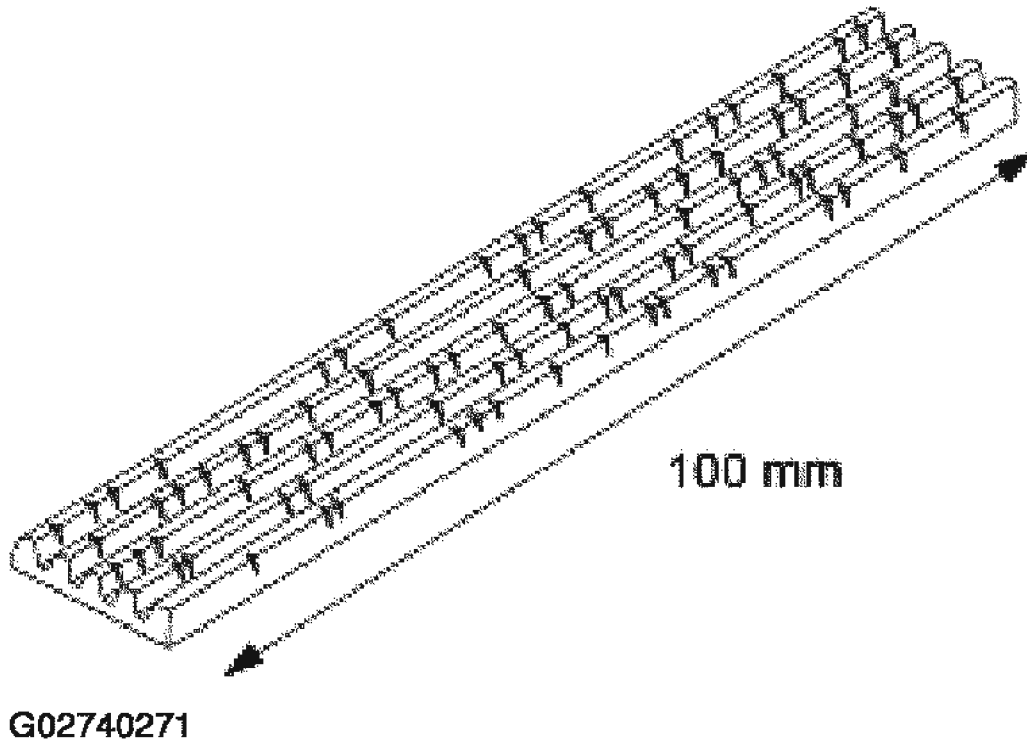
Mechanical
<ul style="list-style-type: none"><li>• Drive belt cracking/chunking/wear</li><li>• Belt/pulley contamination</li><li>• Incorrectly routed belt</li><li>• Pulley misalignment or excessive pulley runout</li><li>• Loose or mislocated hardware</li><li>• Incorrectly routed power steering tubes (rubbing)</li></ul>

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**Fig. 6: Visual Inspection Chart**  
**Courtesy of FORD MOTOR CO.**



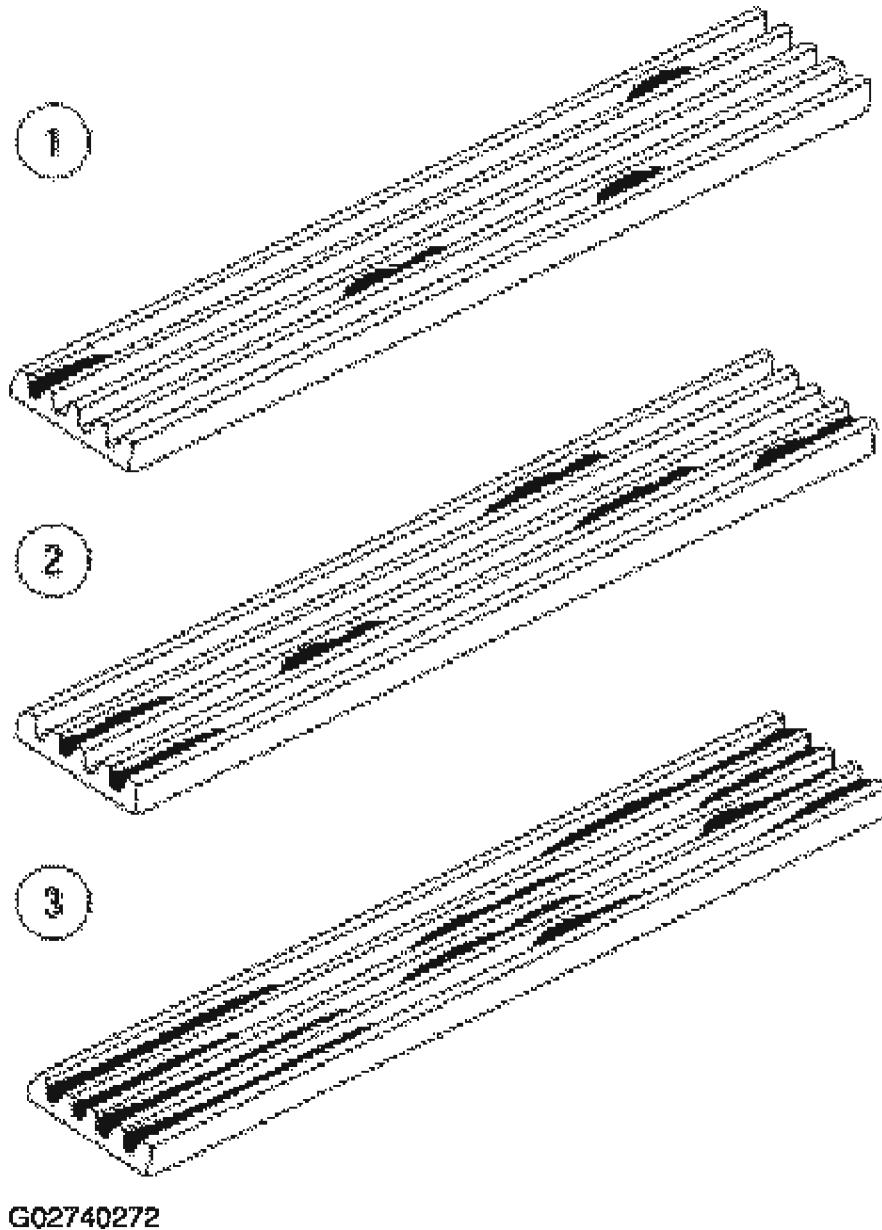
3. Eliminate all other non-belt related noises that could cause belt misdiagnosis, such as A/C compressor engagement chirp, power steering cavitations at low temperatures, variable camshaft timing (VCT) tick or generator whine.
4. If a concern is found, correct the condition before proceeding to the next step.



**Fig. 7: Inspecting V-Ribbed Serpentine Drive Belt With Cracks Across Ribs**  
Courtesy of FORD MOTOR CO.

**NOTE:** Up to 15 cracks in a rib over a distance of 100 mm (4.0 in) can be considered acceptable. If damage exceeds the acceptable limit or any chunks are found to be missing from the ribs, a new belt must be installed.

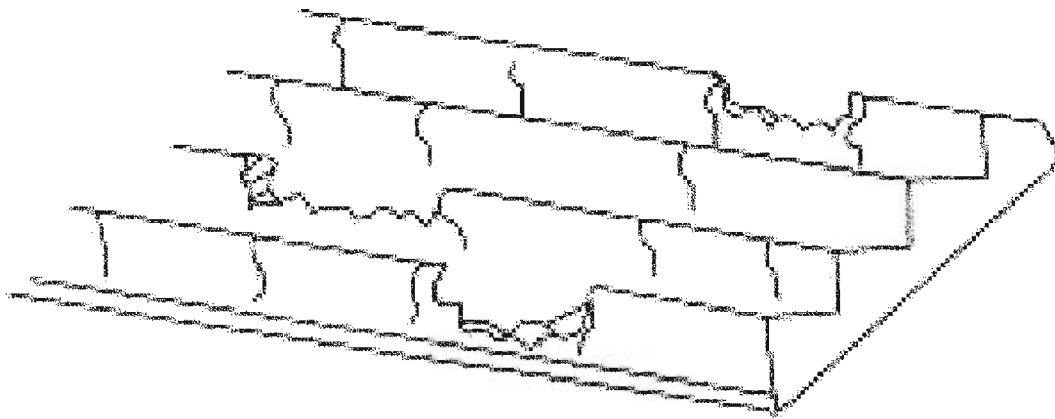
**NOTE:** Piling is an excessive buildup in the V-grooves of the belt.



**Fig. 8: Identifying V-Ribbed Serpentine Belt With Piling**  
Courtesy of FORD MOTOR CO.

5. Check the belt for cracks. Up to 15 cracks in a rib over a distance of 100 mm (4.0 in) can be considered acceptable. If cracks exceed this standard, install a new belt.
6. The condition of the V -ribbed drive belt should be compared against the illustration and appropriate action taken.

1. Small scattered deposits of rubber material. This is not a concern, therefore, installation of a new belt is not required.
2. Longer deposit areas building up to 50 percent of the rib height. This is not considered a concern but it can result in excessive noise. If noise is apparent, install a new belt.
3. Heavy deposits building up along the grooves resulting in a possible noise and belt stability concern. If heavy deposits are apparent, install a new belt.

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**Fig. 9: Inspecting V-Ribbed Serpentine Belt With Chunks Of Rib Missing**  
**Courtesy of FORD MOTOR CO.**

7. There should be no chunks missing from the belt ribs. If the belt shows any evidence of this, install a new accessory drive belt.
8. If the concern is not visually evident, verify the symptom and GO to **SYMPTOM CHART**

Symptom Chart

2004 Ford Escape
2004 ENGINE Accessory Drive - Escape

<http://vnx.su>

**Fig. 10: Problem Symptom Chart**  
**Courtesy of FORD MOTOR CO.**

**Component Tests**

**Drive Belt Noise/Flutter**

Drive belt chirp occurs due to pulley misalignment or excessive pulley runout. It can be the

result of a damaged or an incorrectly aligned grooved pulley.

To correct, determine the area where the noise comes from. Check each of the pulleys in that area with a straightedge to the crankshaft pulley. Look for accessory pulleys out of position in the fore/aft direction or at an angle to the straightedge.

**CAUTION: Do not apply any fluids or belt dressing to the accessory drive belt or pulleys.**

Drive belt squeal may be an intermittent or constant noise that occurs when the drive belt slips on an accessory pulley under certain conditions.

A short intermittent squeal may occur during engine start-up and shut down or during very rapid engine acceleration and decelerations, such as:

- wide open throttle 1-2 and 2-3 shifts or 2-3 and 3-4 back out shifts on automatic transmissions.
- wide open throttle 1-2 and 2-3 shifts and any combination of rapid downshifting on manual transmissions.

These special short-term transient events are expected, and are due to the higher system inertias required to meet the electrical and cooling demands on today's vehicle systems. Constant or re-occurring drive belt squeal can occur under these conditions:

- if the A/C discharge pressure goes above specifications:
  - the A/C system is overcharged.
  - the A/C condenser core airflow is blocked.
- if the A/C OFF equalized pressure (the common discharged and suction pressure that occurs after several minutes) exceeds specifications.
- if any of the accessories are damaged or have a worn or damaged bearing. All accessories should be rotatable by hand in the unloaded condition, if not, inspect the accessory.
- if there is evidence of fluid contamination on the accessory drive belt. When the drive belt has been exposed to fluid contamination during vehicle operation, such as leaks from the power steering system, A/C system or cooling system, clean all pulleys with soap and water, rinse with clean water and install a new accessory drive belt. If the drive belt has been exposed to fluids in a localized area during routine vehicle service, such as replacement of hoses or fluids, the drive belt and pulleys should be washed with soap and water immediately (prior to starting the engine), and rinsed with clean water.
- if the accessory drive belt is too long. A drive belt that is too long will allow the accessory drive belt tensioner arm to go all the way to the arm travel stop under certain load conditions, which will release tension to the drive belt. If the accessory drive belt

tensioner indicator is outside the normal installation wear range window, install a new accessory drive belt.

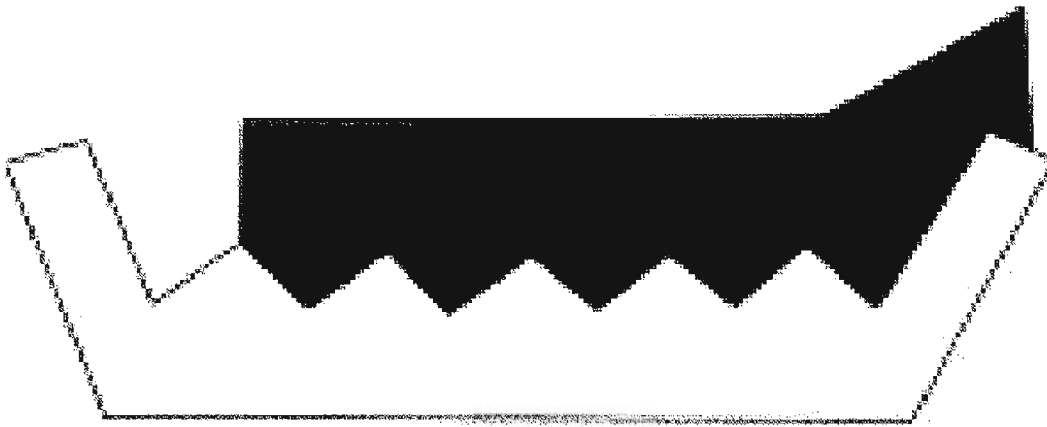
**NOTE:** The accessory drive belt tensioner arm should rotate freely without binding.

- Install a new accessory drive belt tensioner if the drive belt tensioner is worn or damaged.

#### Drive Belt - Incorrect Installation

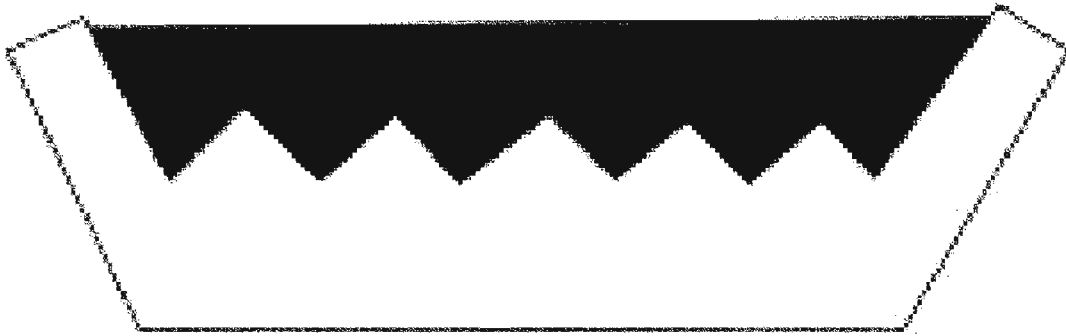
**CAUTION:** Incorrect accessory drive belt installation will cause excessive drive belt wear and can cause the drive belt to come off the pulleys.

Non-standard accessory drive belts can track differently or incorrectly. If an accessory drive belt tracks incorrectly, install a new accessory drive belt to avoid performance failure or loss of the drive belt.



**G02740275**

**Fig. 11: Identifying Incorrect Installation**  
Courtesy of FORD MOTOR CO.



G02740276

**Fig. 12: Identifying Correct Installation**  
Courtesy of FORD MOTOR CO.

With the engine running, check accessory drive belt tracking on all pulleys. If the edge of the accessory drive belt rides beyond the edge of the pulleys, noise and premature wear will occur. Make sure the accessory drive belt rides correctly on the pulley. If an accessory drive belt tracking condition exists, proceed with the following:

- Visually check the accessory drive belt tensioner for damage, especially the mounting pad surface. If the accessory drive belt tensioner is not installed correctly, the mounting surface pad will be out of position. This will result in chirp and squeal noises.
- With the engine running, visually observe the grooves in the pulleys (not the pulley flanges or the pulley forward faces) for excessive wobble. Install new components as necessary.
- Check all accessories, mounting brackets and the accessory drive belt tensioner for any interference that would prevent the component from mounting correctly. Correct any interference condition and recheck the accessory drive belt tracking.
- Tighten all accessories, mounting brackets and accessory drive belt tensioner retaining hardware to specification. Recheck the accessory drive belt tracking.

#### **Belt Tensioner - Mechanical**

The only mechanical check that needs to be made is a check for tensioner stick, grab or bind.

1. With the engine OFF, check routing of the accessory drive belt. For additional information, refer to the graphics in **DESCRIPTION AND OPERATION**.

**NOTE:** The accessory drive belt tensioner spring is very strong and requires substantial force to release.

2. Using a suitable, commercially available serpentine belt tensioner release tool, release

the tension on the belt and detach the accessory drive belt in the area of the tensioner.

3. Using the suitable, commercially available serpentine belt tensioner release tool, move the tensioner from its relaxed position, through its full stroke and back to the relaxed position to make sure there is no stick, grab or bind, and to make sure that there is tension on the tensioner spring.
4. Rotate the tensioner pulley by hand and check for a binding, contaminated or seized condition. Install a new accessory drive belt tensioner if necessary.
5. Inspect the area surrounding the accessory drive belt tensioner for oil leaks or contamination and repair any leaks. Install a new accessory drive belt tensioner as necessary.
6. If the accessory drive belt tensioner meets the above criteria, proceed to testing the tensioner dynamically. If the accessory drive belt tensioner does not meet the above criteria, install a new tensioner.

#### **Belt Tensioner - Dynamics**

The accessory drive belt tensioner can be checked dynamically as follows:

1. With the engine running, observe the accessory drive belt tensioner movement. The accessory drive tensioner should move (respond) when the air conditioning clutch cycles (if equipped), or when the engine is accelerated rapidly. If the accessory drive belt tensioner movement is excessive without air conditioning clutch cycling or engine acceleration, check belt rideout. Excessive belt rideout (uneven depth of grooves in the belt) can cause excessive accessory drive belt tensioner movement. Check rideout condition by installing a new belt. If excessive accessory drive belt tensioner movement still exists, install a new accessory drive belt tensioner.

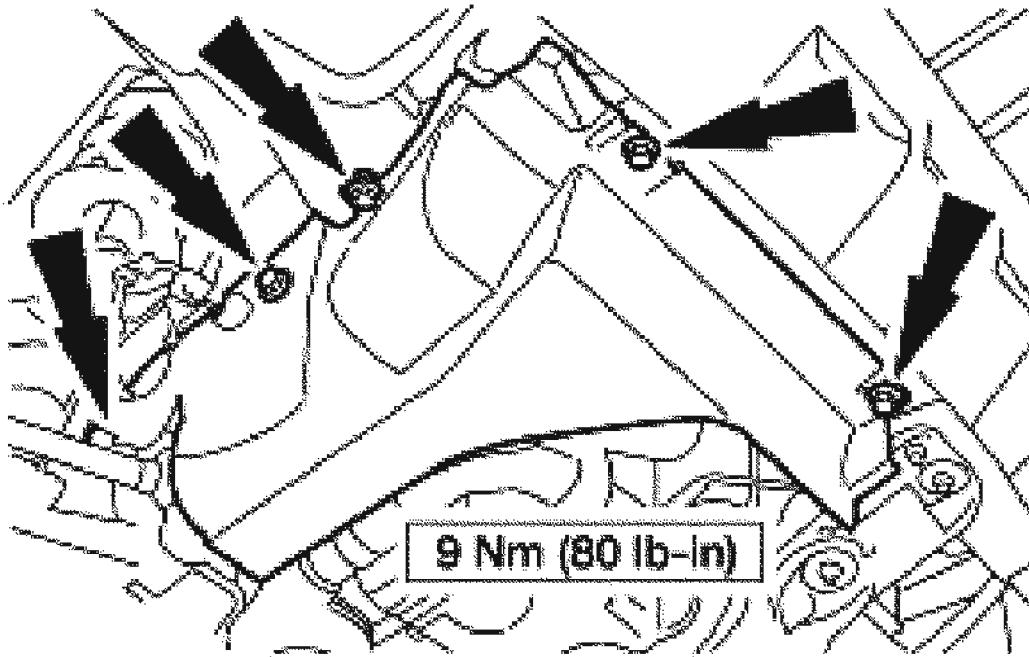
## **REMOVAL AND INSTALLATION**

### **ACCESSORY DRIVE BELT - 2.0L ZETEC**

#### **Removal and Installation**

1. Remove the right front wheel and tire.
2. Remove the bolts and the right front lower splash shield.

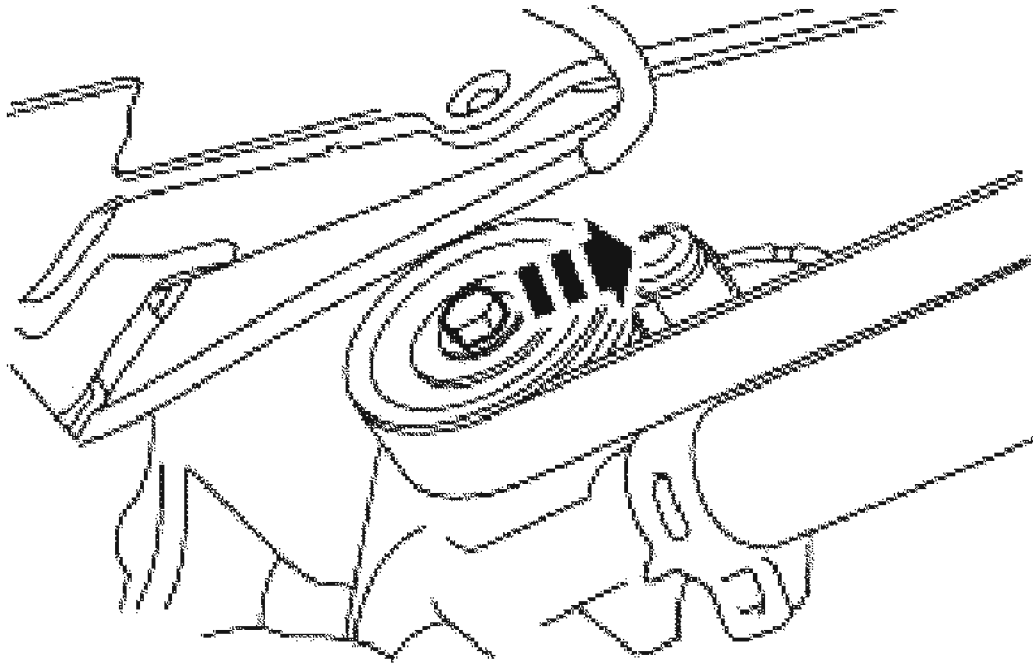




G02740277

**Fig. 13: Removing Right Front Lower Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

3. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.



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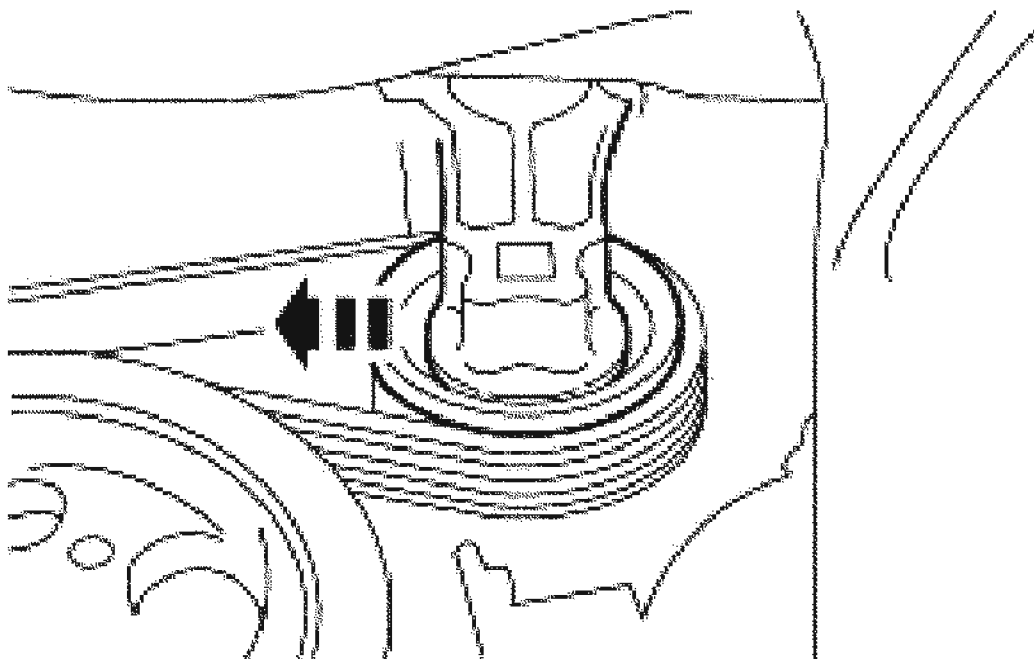
**Fig. 14: Removing Accessory Drive Belt**  
**Courtesy of FORD MOTOR CO.**

4. To install, reverse the removal procedure.

#### **ACCESSORY DRIVE BELT - 3.0L (4V)**

##### **Removal and Installation**

1. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.



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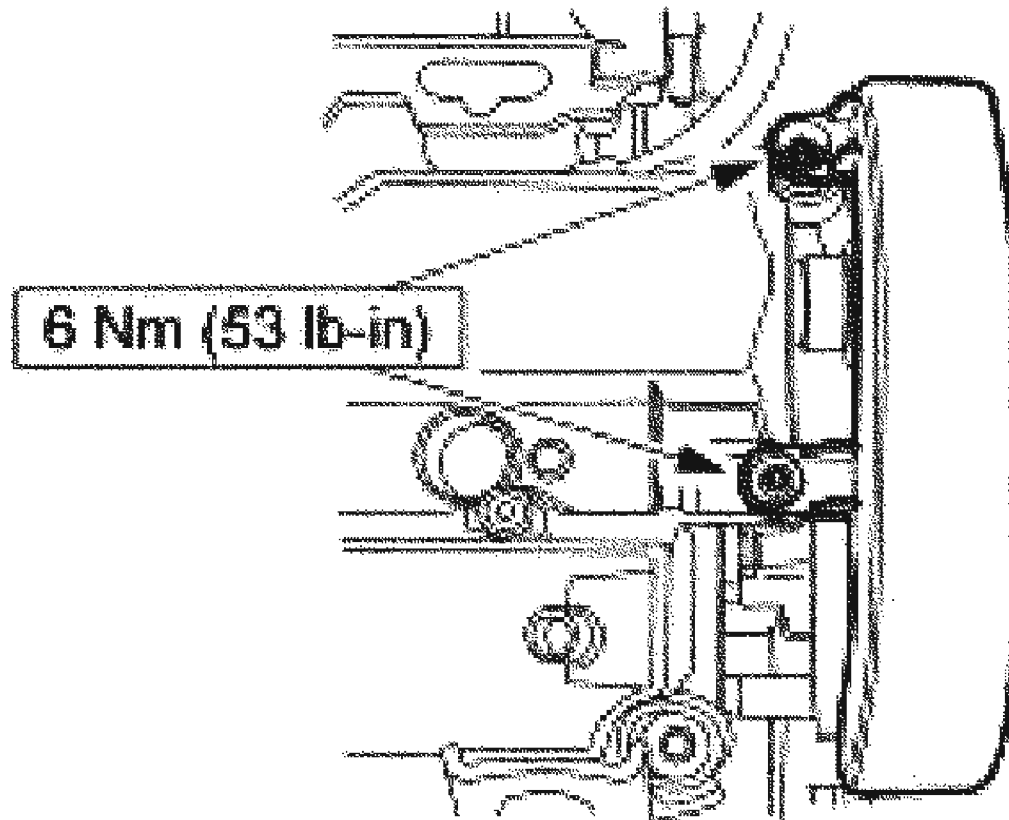
**Fig. 15: Removing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.

#### **WATER PUMP BELT - 3.0L (4V) WITH TENSIONER**

##### **Removal and Installation**

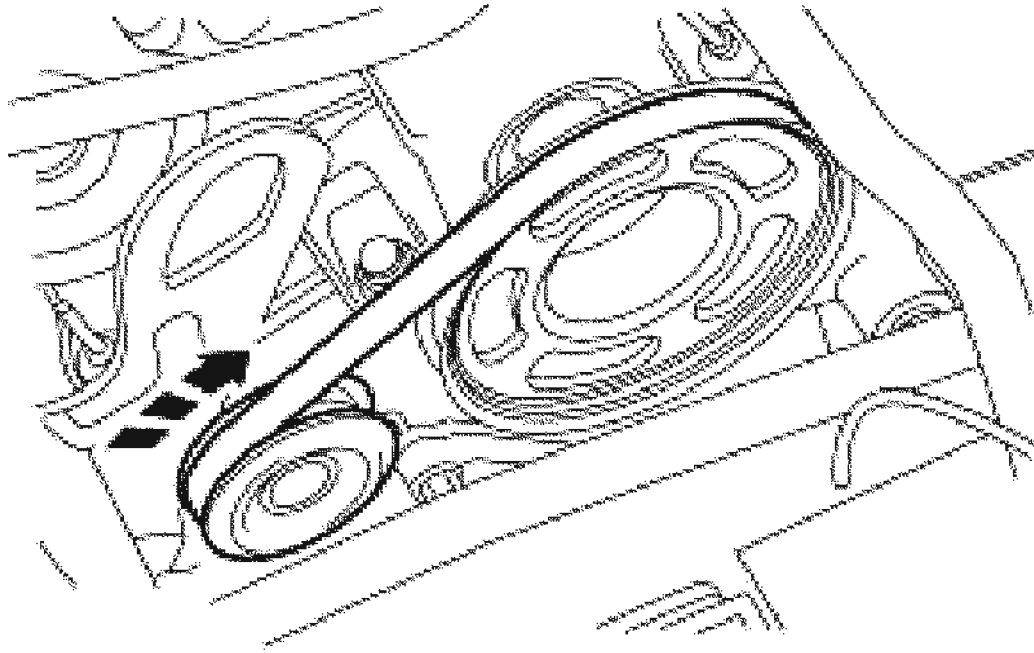
1. Remove the water pump belt cover.



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**Fig. 16: Removing Water Pump Belt Cover Bolts**  
Courtesy of FORD MOTOR CO.

2. Rotate the drive belt tensioner clockwise and remove the water pump belt.



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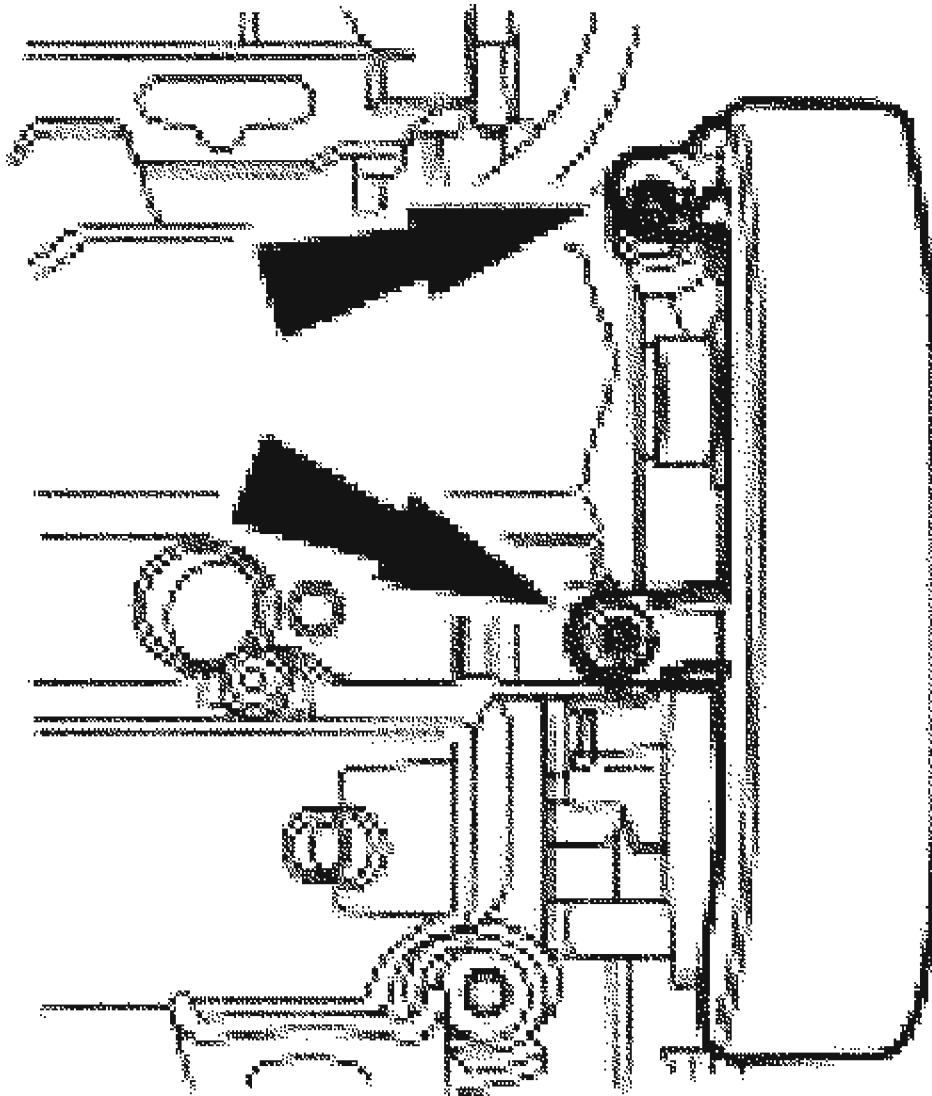
**Fig. 17: Removing Water Pump Belt**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### **WATER PUMP BELT - 3.0L (4V) WITHOUT TENSIONER**

##### **Removal**

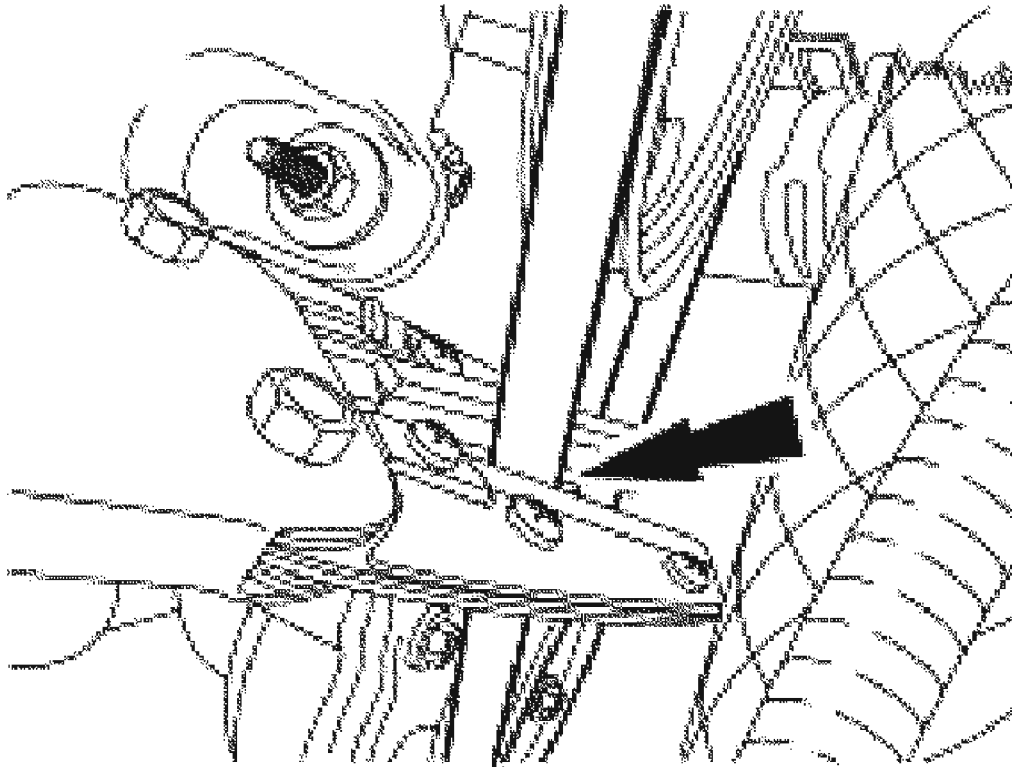
1. Remove the water pump belt cover.



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**Fig. 18: Removing Water Pump Belt Cover Bolts**  
Courtesy of FORD MOTOR CO.

2. Cut and remove the water pump belt. Discard the belt.

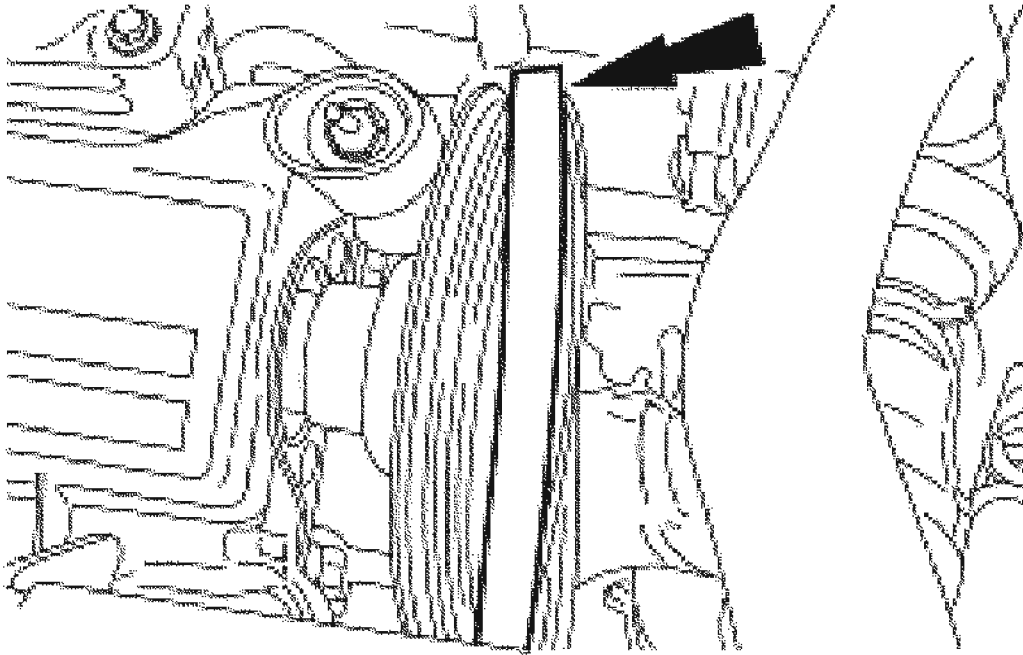


G02740283

**Fig. 19: Removing Water Pump Belt**  
Courtesy of FORD MOTOR CO.

**Installation**

1. Install the belt on the water pump pulley and position it on the camshaft pulley.



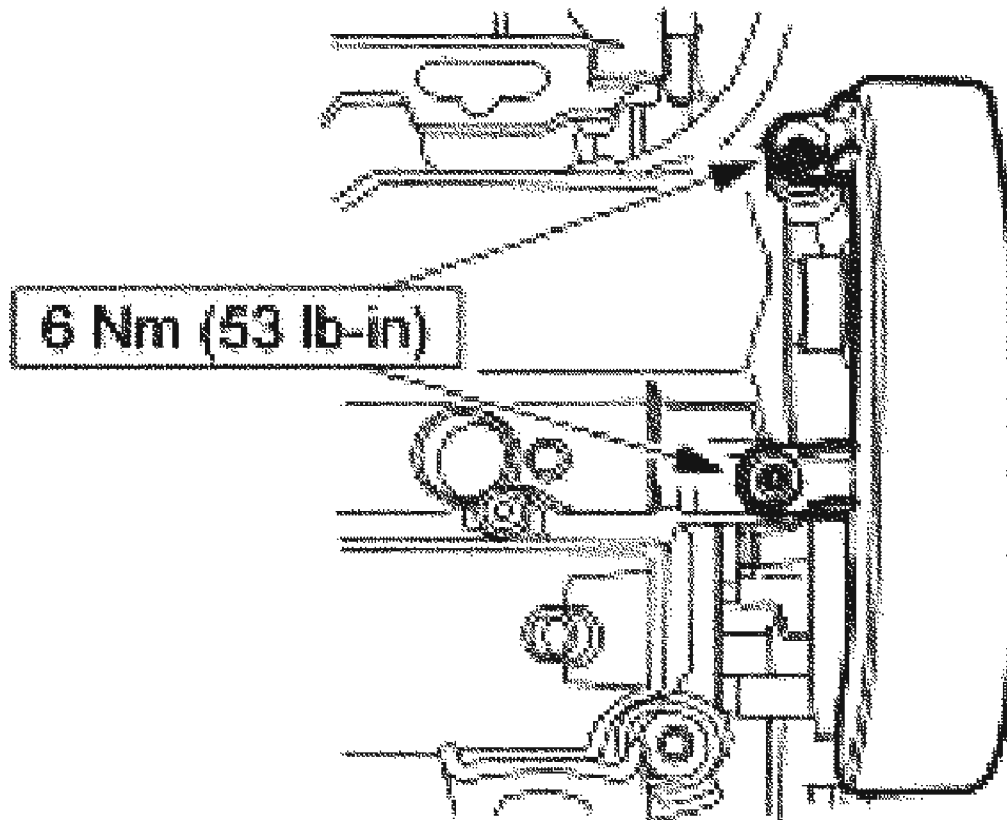
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**Fig. 20: Installing Belt On Water Pump Pulley**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use any screwdrivers, pliers, or other metal objects that could cause damage to the belt or camshaft pulley while installing the belt.

2. Rotate the crankshaft clockwise to seat the belt on the camshaft pulley.
3. Install the water pump belt cover.





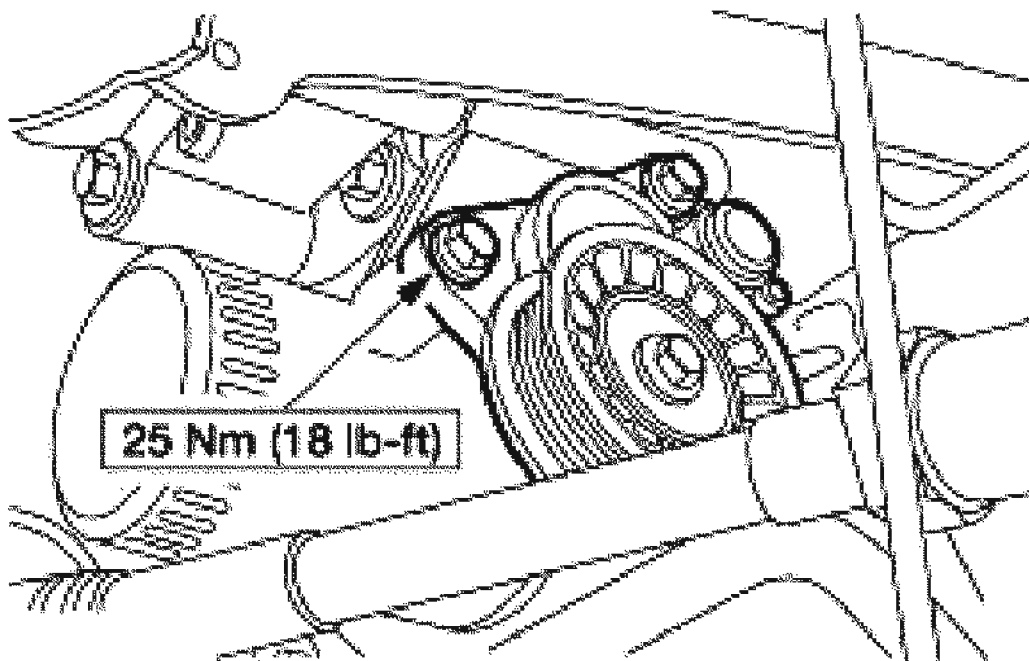
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**Fig. 21: Identifying Water Pump Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

#### ACCESSORY DRIVE BELT TENSIONER - 2.0L ZETEC

##### Removal and Installation

1. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE BELT-2.0L ZETEC** .
2. Remove the bolts and the accessory drive belt tensioner.



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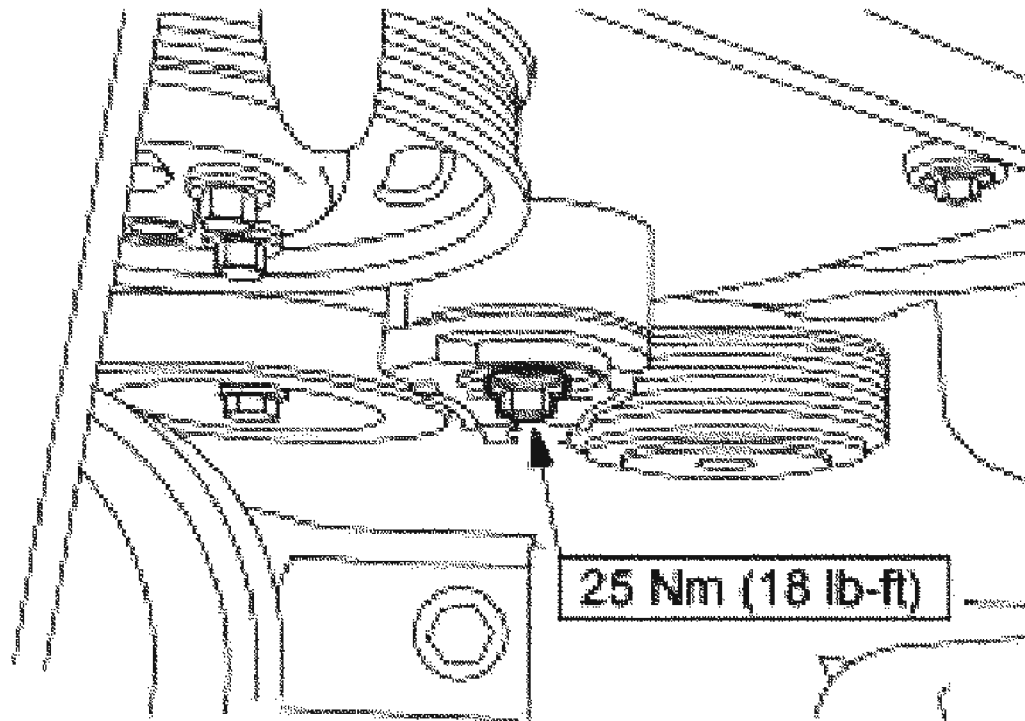
**Fig. 22: Removing Accessory Drive Belt Tensioner Bolts**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### **ACCESSORY DRIVE BELT TENSIONER - 3.0L (4V)**

##### **Removal and Installation**

1. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE BELT- 3.0L (4V)** .
2. Remove the bolt and the accessory drive belt tensioner.



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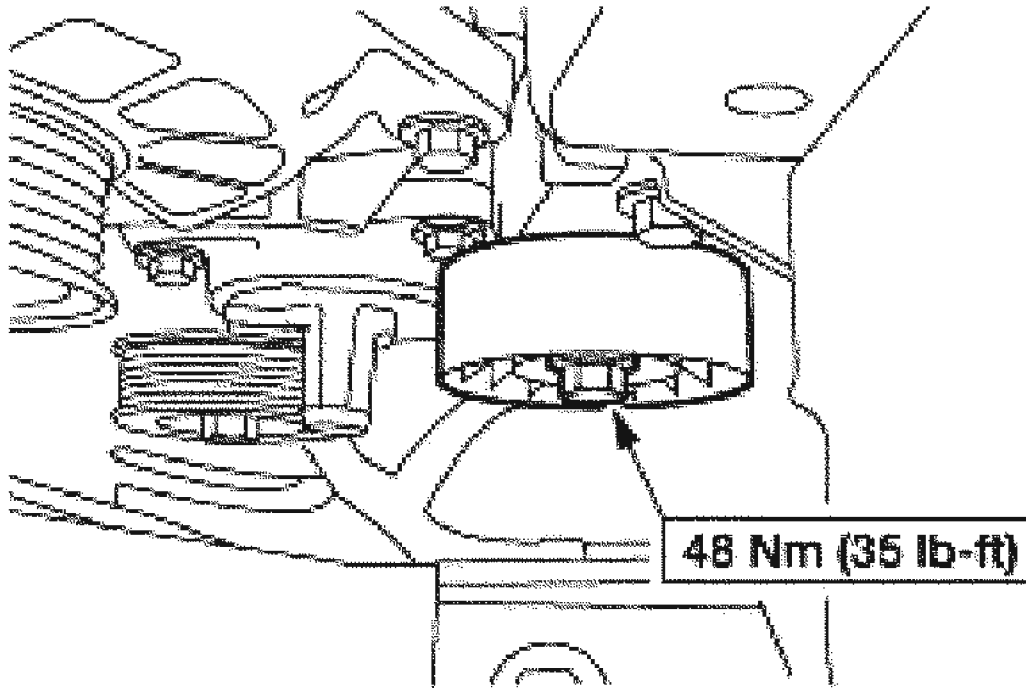
**Fig. 23: Removing Accessory Drive Belt Tensioner Bolt**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### **ACCESSORY DRIVE BELT IDLER PULLEY - 2.0L ZETEC**

##### **Removal and Installation**

1. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE BELT-2.0L ZETEC** .
2. Remove the bolt and the accessory drive belt idler pulley.



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**Fig. 24: Removing Accessory Drive Belt Idler Pulley Bolt**  
Courtesy of FORD MOTOR CO.

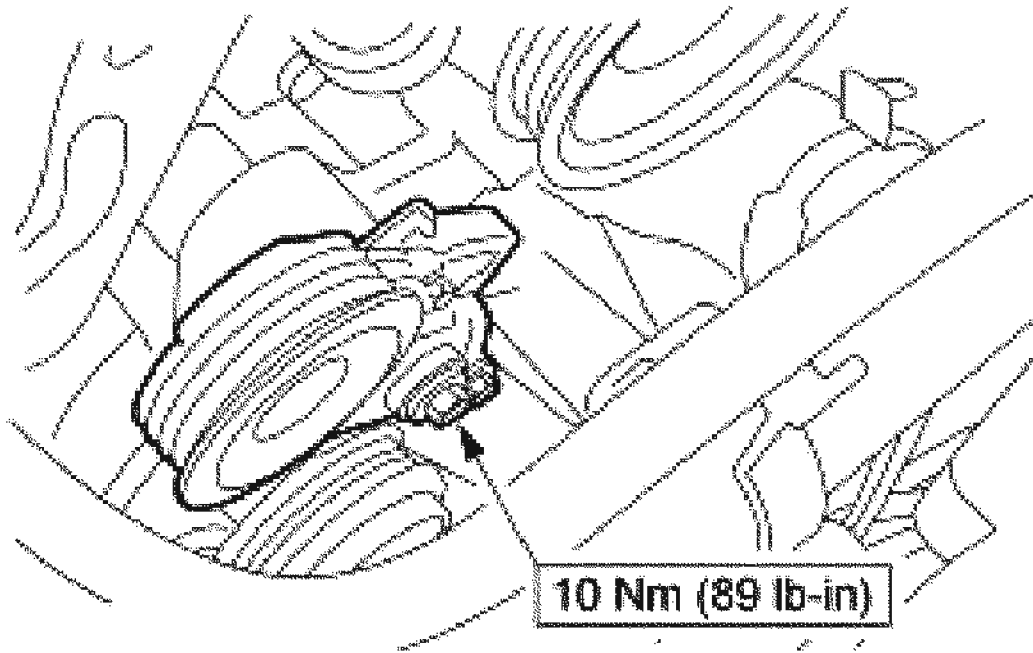
3. To install, reverse the removal procedure.

#### **BELT TENSIONER - WATER PUMP, 3.0L (4V)**

##### **Removal and Installation**

**NOTE:** If equipped with belt tensioner.

1. Remove the water pump belt. For additional information, refer to **WATER PUMP BELT - 3.0L (4V) WITH TENSIONER**.
2. Remove the bolt and the belt tensioner.



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**Fig. 25: Removing Belt Tensioner Bolt**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

### 2004 ENGINE

Engine - 2.0L Zetec - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Lubricants and Sealants</b>	
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Stud and Bearing Mount E0AZ-19554-BA	WSK-M2G349-A1
Gasket Maker F8AZ-19B508-AB	WSK-M2G348-A5
<b>Engine</b>	
Displacement	2.0L (121 cubic inches)
Number of cylinders	4
Bore	84.8 mm (3.34 in)
Stroke	88.0 mm (3.46 in)
Firing order	1-3-4-2
Oil pressure (hot 4,000 rpm)	370-550 kPa (54-80 psi)
Oil capacity (with filter)	4.25 L (4.5 qts)
Compression ratio	9.6:1
<b>Cylinder Head and Valve Train</b>	
Cylinder head gasket surface flatness	0.05/0.520/076 150 x 150
Combustion chamber volume	-
Valve arrangement (front to rear)	-
Valve clearance - intake	0.11-0.18 mm (0.004331-0.007087 in)
Valve clearance - exhaust	0.27-0.34 mm (0.0106299-0.0133858 in)
Valve guide bore diameter (insert counterbore diameter)	6.06 mm (0.23858 in)
Valve stem diameter	6.03 mm (0.23740 in)
Valve stem-to-guide clearance	0.017-0.064 mm (0.000662-0.0025196 in)
Valve head diameter - intake	32.0 mm (1.2598 in)
Valve head diameter - exhaust	28.0 mm (1.10236 in)
Valve face runout	0.035 mm (0.0013779 in)
Valve face angle	45 degrees

**2004 Ford Escape**

2004 ENGINE Engine - 2.0L Zetec - Escape

Valve seat width	-
Valve seat runout	-
Valve seat angle	-
Valve spring free length	43.2 mm (1.701 in)
Valve spring squareness	-
Valve spring compression pressure - intake	365 N (82.1 lb) @ 25.1 mm (0.988 in)
Valve spring compression pressure - exhaust	422 N (94.94 lb) @ 26.1 mm (1.0275 in)
Valve spring installed height	34.2 mm (1.346 in)
Valve spring installed pressure	-
Roller follower ratio	-
<b>Camshaft</b>	
Theoretical valve lift @ 0 lash - intake	9.254 mm (0.3643 in)
Theoretical valve lift @ 0 lash - exhaust	8.6 mm (0.33858 in)
Lobe lift - intake	8.9 mm (0.3504 in)
Lobe lift - exhaust	8.7 mm (0.3425 in)
Allowable lobe lift loss	-
Journal diameter	25.960-25.980 mm (1.0221-1.0227 in)
Camshaft journal bore inside diameter	-
Camshaft journal-to-bearing clearance	-
Runout	-
End play	0.080-0.220 mm (0.00315-0.00866 in)
<b>Cylinder Block</b>	
Cylinder bore diameter - standard	84.807-84.823 mm (3.3389-3.3395 in)
Cylinder bore diameter - oversize	85.060-85.070 mm (3.3488-3.3492 in)
Cylinder bore maximum taper	+0.025 mm (0.0009842 in)-0.013 mm (0.0005118 in) max.
Cylinder bore maximum out-of-round	0.025 mm (0.0009842 in) max.
Main bearing bore inside diameter (bearing caps installed)	58.011 -58.0380 mm (2.28389-2.284956 in)
Main bearing bore inside diameter (bearing caps installed) - bearing caps graded by size	58.008-58.031 mm (2.2837749-2.284680 in)
Head gasket surface flatness	-
<b>Crankshaft</b>	
Main bearing journal diameter	57.980-58.000 mm (2.2826726-2.28346 in)
Main bearing journal maximum taper	-
Main bearing journal maximum out-of-	-

**2004 Ford Escape**

2004 ENGINE Engine - 2.0L Zetec - Escape

round	
Main bearing journal-to-cylinder block clearance	-
Connecting rod journal diameter	46.89-46.91 mm (1.846059-1.850036 in)
Connecting rod journal maximum taper	-
Connecting rod journal maximum out-of-round	-
Crankshaft maximum end play	0.09-0.26 mm (0.0035433-0.010236 in)
<b>Piston and Connecting Rod</b>	
Piston diameter - standard	84.758-84.772 mm (3.3369-3.3375 in)
Piston diameter - oversize	85.008-85.022 mm (3.3468-3.3473 in)
Piston-to-cylinder bore clearance	0.035-0.065 mm (0.0014-0.0025 in)
<b>Piston Ring End Gap</b>	
Piston ring groove width - upper compression ring	1.484 mm (0.058425 in)
Piston ring groove width - lower compression ring	1.734 mm (0.0682675 in)
Piston ring groove width - oil control ring	2.905 mm (1.1143698 in)
Piston ring width - upper and lower compression ring	0.30-0.50 mm (0.011811 -0.019685 in)
Piston ring width - oil control ring	0.40-1.40 mm (0.015748-0.055118 in)
Piston ring-to-groove clearance	-
<b>Piston Pin Bore Diameter</b>	
Piston pin diameter - white	20.662-20.625 mm (0.8134629-0.8120062 in)
Piston pin diameter - red	20.625-20.628 mm (0.8120062-0.8121243 in)
Piston pin diameter - blue	20.628-20.631 mm (0.8121243-0.8122424 in)
Piston pin length	63.00-63.80 mm (2.48031 -2.51181 in)
Piston pin-to-piston fit	0.010-0.015 mm (0.0003937-0.0005905 in)
Piston-to-connecting rod clearance	0.016-0.049 mm (0.0006299-0.0019291 in)
Connecting rod-to-pin clearance	-
Connecting rod pin bore diameter	20.589-20.609 mm (0.810589-0.811376 in)
Connecting rod length	-
Connecting rod maximum allowed bend	-
Connecting rod maximum allowed twist	-



**2004 Ford Escape**

2004 ENGINE Engine - 2.0L Zetec - Escape

Connecting rod bearing bore diameter	46.89-46.91 mm (1.846059-1.846847 in)
Connecting rod bearing-to-crankshaft clearance	0.016-0.070 mm (0.0006299-0.0027559 in)
Connecting rod side clearance	-

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

Description	Nm	lb-ft	lb-in
A/C compressor bracket bolts	24	18	-
A/C compressor bracket nuts	48	35	-
Accessory drive belt idler pulley	45	35	-
Battery cable nut (starter)	12	9	-
Block heater screw	3	-	27
Camshaft cap bolts	19	1	-
Camshaft sprocket bolts	68	50	-
Catalytic converter bracket bolts	24	18	-
Cylinder head bolts <sup>(1)</sup>	-	-	-
Clutch pressure plate bolts <sup>(2)</sup>	24	18	-
Clutch slave cylinder bolts	22	16	-
Coil bracket bolts	20	15	-
Coolant tube bolt/nut	20	15	-
Coolant tube bracket bolt (oil cooler)	10	-	89
Coolant tube stud	24	18	-
Crankcase vent oil separator bolts	10	-	89
Crankshaft rear oil seal housing bolts <sup>(1)</sup>	-	-	-
Crankshaft position sensor bolt	8	-	71
Crankshaft pulley bolt	115	85	-
Cylinder head	10	-	89

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

temperature sensor			
Exhaust gas recirculation (EGR) tube nuts	62	46	-
EGR tube bracket bolt	10	-	89
EGR tube bracket bolt	25	18	-
EGR tube bracket nut (lifting eye)	25	18	-
Engine lifting eye nut (rear)	15	11	-
Engine lifting eye bolt (front)	35	26	-
Engine mount bolts/nut	55	41	-
Engine mount ground wire nut (engine)	9	-	80
Engine mount ground wire nut (body)	10	-	89
Engine mount lower bracket bolts	50	37	-
Engine mount bolts/nut	34	25	-
Engine/transaxle mounting bolts	45	33	-
Exhaust manifold bolts/nuts <sup>(2)</sup>	16	12	-
Flywheel bolts	112	83	-
Front transaxle mount through bolt	90	66	-
Generator bolts	45	33	-
Generator bracket bolt (upper)	24	18	-
Generator bracket bolts/nut (lower)	47	35	-
Generator wire nut	8	-	71
Ground cable bolt (transaxle)	9	-	80
Ground wire bolt (fender)	9	-	80
Ground wire bolt (transaxle bracket)	9	-	80
Inner timing belt cover bolts	10	-	89

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

Intake manifold bolts/nuts <sup>(2)</sup>	18	13	-
Knock sensor nut	20	15	-
LH transaxle mount bolt (engine)	90	66	-
LH transaxle mount bolts (body)	55	41	-
Lower cylinder block bolts <sup>(2)</sup>	30	22	-
Lower engine mount bracket bolts	50	37	-
Lower engine mount bracket studs	34	25	-
Lower timing belt cover bolts	7	-	62
Lower splash shield bolts	9	-	80
Oil cooler bolt	58	43	-
Oil filter	16	12	-
Oil level indicator and tube nut	10	-	89
Oil pan bolts <sup>(1)</sup>	-	-	-
Oil pan drain plug	25	18	-
Oil pressure sender	27	20	-
Oil pump bolts <sup>(1)</sup>	-	-	-
Oil pump screen cover and tube bolts	10	-	89
Powertrain control module (PCM) connector bolt	6	-	53
PCM ground wire bolt	9	-	80
Positive crankcase ventilation tube bolt	10	-	89
Power distribution box cable nuts	12	9	-
Power steering line bracket (pump)	20	15	-
Power steering line bracket bolt (head)	10	-	89

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

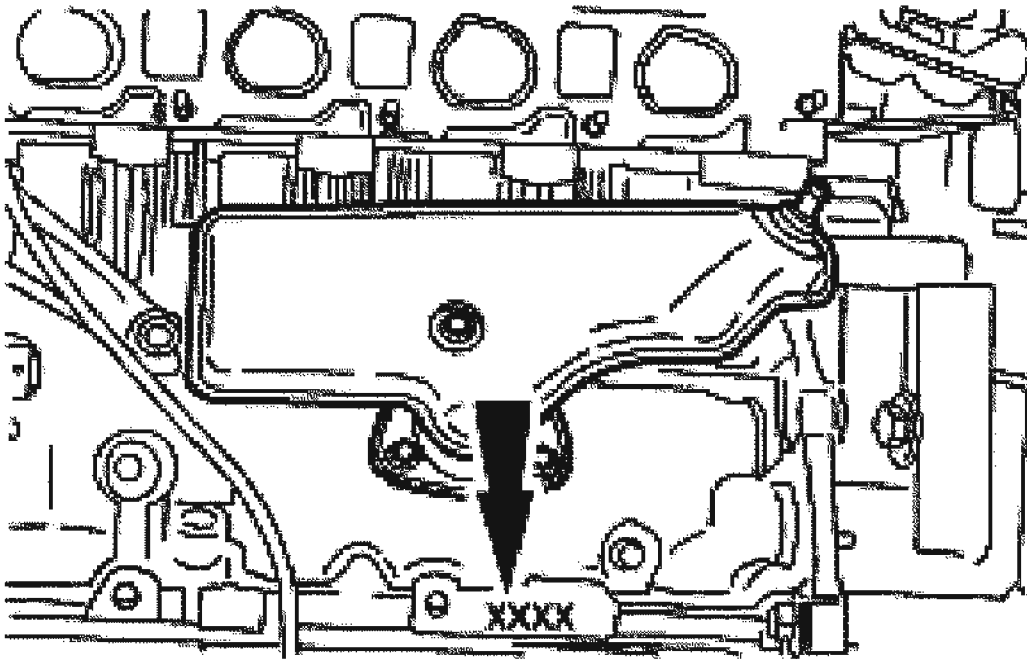
Power steering line bracket bolts (rack)	10	-	89
Power steering line bracket bolts (body)	10	-	89
Power steering pump bolts	25	18	-
Power steering pump bracket bolts	27	20	-
Rear transaxle mount bolts	55	41	-
Shifter shaft bolt/nut	20	15	-
Shifter strut rod bolt	45	33	-
Speed control unit nuts	10	-	89
Starter bolts	25	18	-
Starter control wire nut	5	-	44
Thermostat housing bolts	20	15	-
Timing belt idler pulley bolt	24	18	-
Timing belt tensioner bolt	24	18	-
Upper timing belt cover bolts	8	-	71
Valve cover bolts	9	-	80
Coolant pump adapter bolts	20	15	-
Coolant pump pulley bolts	23	17	-
Wire harness connector bolt	10	-	89
(1) Refer to the procedure for the tightening specifications.			
(2) Refer to the procedure for tightening sequences.			

## DESCRIPTION AND OPERATION

### ENGINE

The 2.0L Zetec engine is a four cylinder in-line engine with double overhead camshafts and 16 valves. The 16 valve cylinder head improves volumetric efficiency, particularly at high engine speeds.

The cylinder head is made of aluminum alloy and the cylinder block is made of cast iron.



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**Fig. 1: Locating Serial Number On Cylinder Block**  
Courtesy of FORD MOTOR CO.

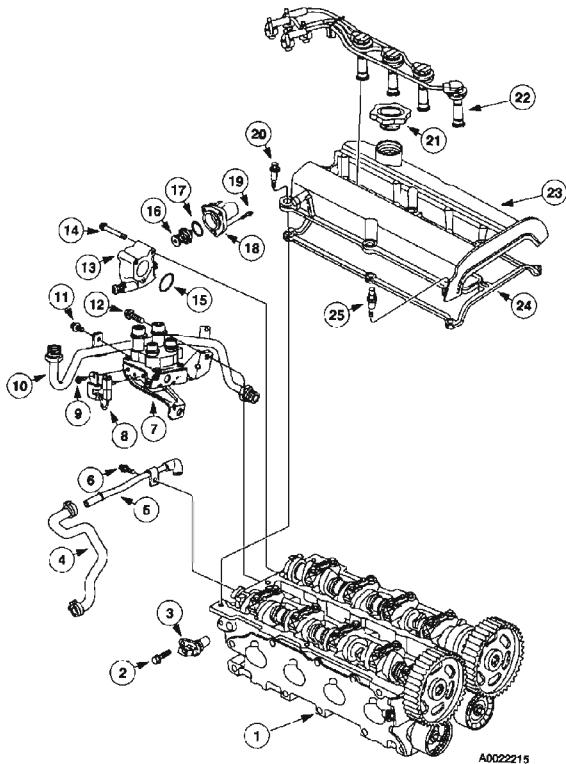
The spark plug is installed in the center of the roof-shaped combustion chamber to ignite the air/fuel mixture in the combustion chamber. The central location of the spark plug causes the flame front to be evenly spread across the combustion chamber, which also reduces spark knock.

Both camshafts are driven by a shared timing belt, and operate four valves per cylinder by means of mechanical valve tappets. One valve spring on each valve is used to close the valve.

#### Upper Engine Components

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape



Item	Part Number	Description
1	6049	Cylinder head
2	W500023	Bolt (1 req'd)
3	12K073	Camshaft position sensor
4	6N664	Oil separator hose
5	6758	Crankcase ventilation tube
6	W700716	Bolt
7	12024	Ignition coil bracket
8	18801	Radio ignition interference capacitor
9	W704176	Bolt
10	9D477	EGR tube
11	W503910	Bolt
12	W700048	Bolt (3 req'd)
13	9K478	Thermostat housing
14	—	Bolt (3 req'd)
15	W703459	Thermostat housing O-ring seal
16	8575	Thermostat
17	W700319	Thermostat O-ring seal
18	8594	Water outlet connection
19	W505976	Bolt (3 req'd)
20	W500302	Bolt (7 req'd)
21	6766	Oil filler cap
22	12280	Ignition wire (4 req'd)
23	6MZ93	Valve cover
24	6584	Valve cover gasket
25	W707016	Stud (3 req'd)

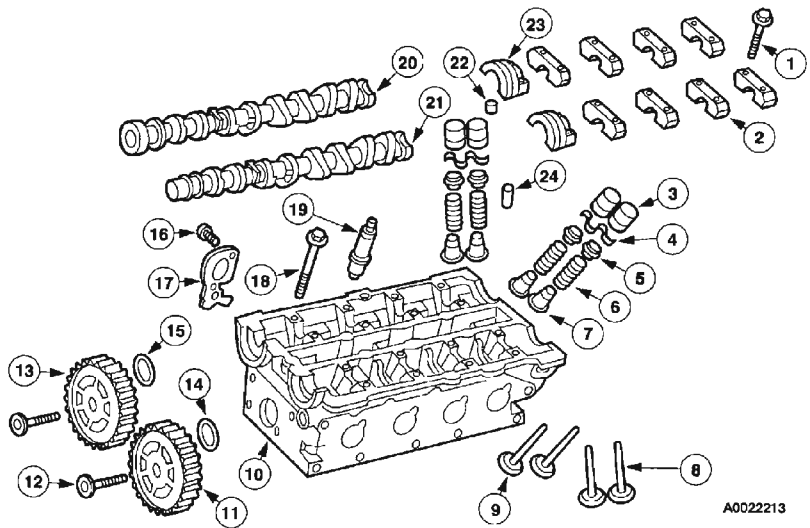
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**Fig. 2: Identifying Upper Engine Components**  
Courtesy of FORD MOTOR CO.

### Cylinder Head Components

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape



A0022213

Item	Part Number	Description
1	W700073	Bolt-camshaft bearing cap
2	6A258	Camshaft bearing cap
3	6500	Valve tappets
4	6518	Valve spring retainer key
5	6A536	Valve spring retainers
6	6513	Valve spring - (color coding: exhaust = blue, intake = green)
7	6571	Valve stem seal
8	6505	Exhaust valves
9	6507	Intake valves
10	6049	Cylinder head
11	6A256	Camshaft sprocket - exhaust
12	W700009	Bolt - camshaft sprocket (2 req'd)
13	6A256	Camshaft sprocket - intake
14	6K292	Exhaust camshaft seal
15	6K292	Intake camshaft seal
16	W702108	Engine lifting eye bolt
17	17A084	Engine lifting eye
18	6065	Cylinder head bolts
19	12405	Spark plugs
20	6A266	Intake camshaft
21	6A269	Exhaust camshaft
22	6L252	Dowel (20 req'd)
23	6A258	Fifth camshaft bearing caps
24	6801	Plug

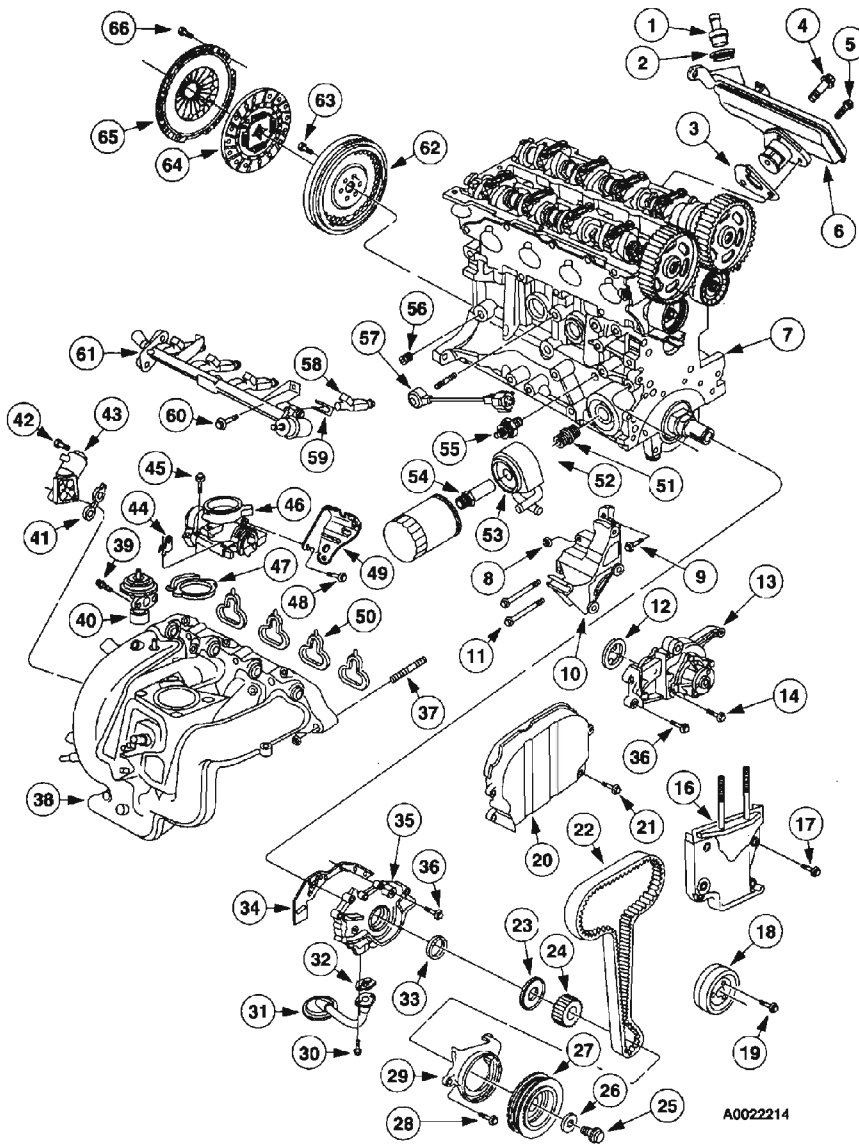
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**Fig. 3: Identifying Cylinder Head Components**  
Courtesy of FORD MOTOR CO.

Lower Engine Components

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape



A0022214

Item	Part Number	Description
1	6A666	Positive crankcase ventilation (PVC) valve
2	W700981	Grommet
3	6B752	Oil separator gasket
4	W500103	Bolt
5	W701178	Bolt (2 req'd)
6	6A785	Oil separator

G02730643

**Fig. 4: Identifying Lower Engine Components (Items 1-6)**  
Courtesy of FORD MOTOR CO.



## 2004 Ford Escape

### 2004 ENGINE Engine - 2.0L Zetec - Escape

7	6010/6015	Cylinder block	37	W701182	Stud (2 req'd)
8	W520103	Nut	38	9424	Intake manifold
9	W704424	Bolt	39	—	Bolt (2 req'd)
10	10039	Generator bracket	40	9D475	Exhaust gas recirculation (EGR) valve
11	W704434	Bolt (2 req'd)	41	9F670	Idle air control valve gasket
12	8507	Water pump housing gasket	42	W500014	Bolt (2 req'd)
13	8501	Water pump	43	9F715	Idle air control valve
14	W500624	Bolt (2 req'd)	44	15A155	Clip
15	W70015	Bolt (2 req'd)	45	W703945	Bolt (4 req'd)
16	6030	Engine mount bracket	46	9E926	Throttle body
17	—	Bolt (2 req'd)	47	9P848	Throttle body gasket
18	8509	Water pump pulley	48	W505522	Bolt
19	W702426	Bolt (3 req'd)	49	9677	Bracket
20	6P073	Timing belt cover—upper	50	9461	Intake manifold gasket (4 req'd)
21	W700005	Bolt (4 req'd)	51	6890	Oil filter fitting
22	6268	Timing belt	52	6L621	Oil cooler gasket
23	6K297	Timing belt guide	53	6B856	Oil cooler
24	6306	Crankshaft sprocket	54	6L626	Oil cooler mounting bolt
25	W700017	Crankshaft pulley bolt	55	9278	Oil pressure sender
26	—	Washer	56	W700081	Plug (5 req'd)
27	6R320	Crankshaft pulley	57	12A699	Knock sensor
28	W700005	Bolt (2 req'd)	58	9F593	Fuel injector (4 req'd)
29	6M016	Timing belt cover—lower	59	9C995	Retainer clip (4 req'd)
30	W700105	Bolt (2 req'd)	60	W500213	Bolt (2 req'd)
31	6K621	Oil pump screen cover and tube	61	9D280	Fuel injection supply manifold
32	6625	Oil pump inlet gasket	62	6K390	Flywheel
33	6700	Crankshaft front seal	63	W701351	Bolt (6 req'd)
34	6659	Oil pump gasket	64	7550	Clutch
35	6600	Oil pump	65	7563	Pressure plate
36	W500500	Bolt (7 req'd)	66	W702426	Bolt (6 req'd)

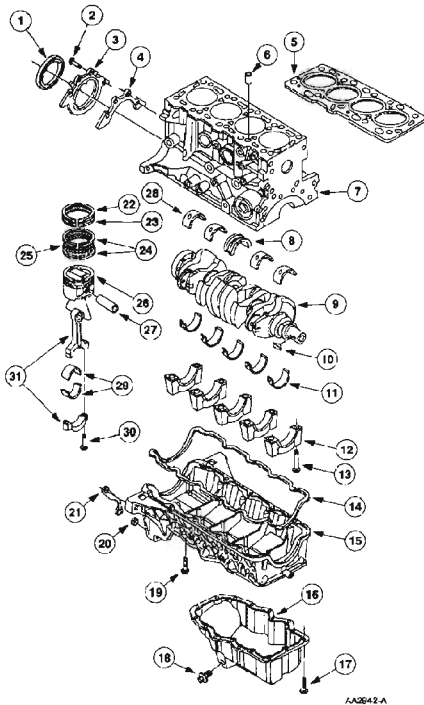
G02738644

**Fig. 5: Identifying Lower Engine Components (Items 7-66)**  
Courtesy of FORD MOTOR CO.

#### Cylinder Block Components

## 2004 Ford Escape

### 2004 ENGINE Engine - 2.0L Zetec - Escape

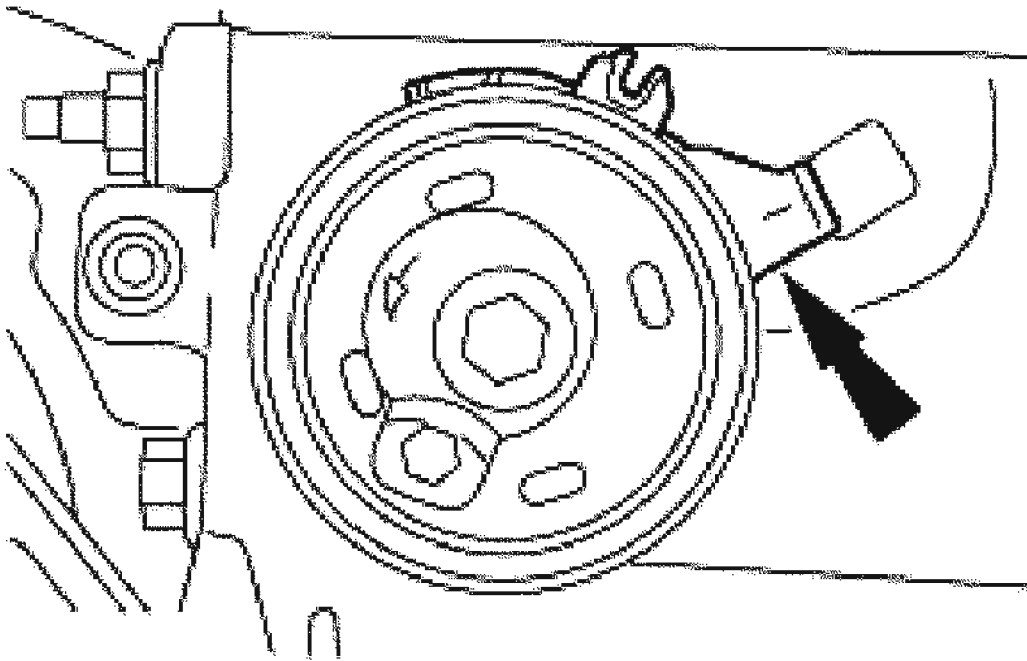


Item	Part Number	Description
1	6701	Crankshaft rear oil seal
2	W500623	Bolt (4 req'd)
3	6K318	Crankshaft rear oil seal retainer
4	6344	Crankshaft rear oil seal retainer gasket
5	6051	Head gasket
6	W802507	Dowel (2 req'd)
7	6010/6015	Cylinder block
8	6337	Crankshaft thrust main bearing - upper
9	6303	Crankshaft
10	W700015	Woodruff key
11	6A338	Crankshaft main bearing - lower (5 req'd)
12	-	Crankshaft main bearing caps (5 req'd)
13	W702427	Bolt (10 req'd)
14	6710	Lower cylinder block gasket
15	6F092	Lower cylinder block
16	6675	Oil pan
17	W500611	Bolt (17 req'd)
18	6730	Oil pan drain plug
19	W500624	Bolt (10 req'd)
20	6C629	Shim (2 if req'd)
21	6C629	Shim (2 if req'd)
22	6150	Piston ring - upper compression
23	6152	Piston ring - lower compression
24	6159	Oil control ring (2 req'd)
25	6161	Oil control ring spacer
26	6110	Piston (4 req'd)
27	6135	Piston pin (4 req'd)
28	6333	Crankshaft main bearing - upper (4 req'd)
29	6211	Connecting rod bearing (4 req'd)
30	6214	Bolt (8 req'd)
31	6200	Connecting rod (4 req'd)

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**Fig. 6: Identifying Cylinder Block Components**  
**Courtesy of FORD MOTOR CO.**

**Automatic Belt Tensioner**



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**Fig. 7: Identifying Automatic Belt Tensioner**  
Courtesy of FORD MOTOR CO.

**CAUTION: Only tension the timing belt counterclockwise.**

An automatic timing belt tensioner makes sure of correct timing belt tension. An additional spring-loaded cam provides proper belt tension during operation. The belt tensioner can operate 30 degrees either side of its central position.

The basic adjustment of the belt tensioner can no longer be controlled after the aligning tools and adjusting pin have been taken out (the spring forces from the valve train exert pressure on the timing belt and alter the position of the belt tensioner).

The 2.0L Zetec engine is equipped with a glass fiber-reinforced plastic intake manifold. The intake manifold ports are designed so the intake paths are the same length for all the cylinders.

- This gives the following advantages:
  - reduced heat transfer to the injectors, thereby avoiding vapor locks
  - lighter weight

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

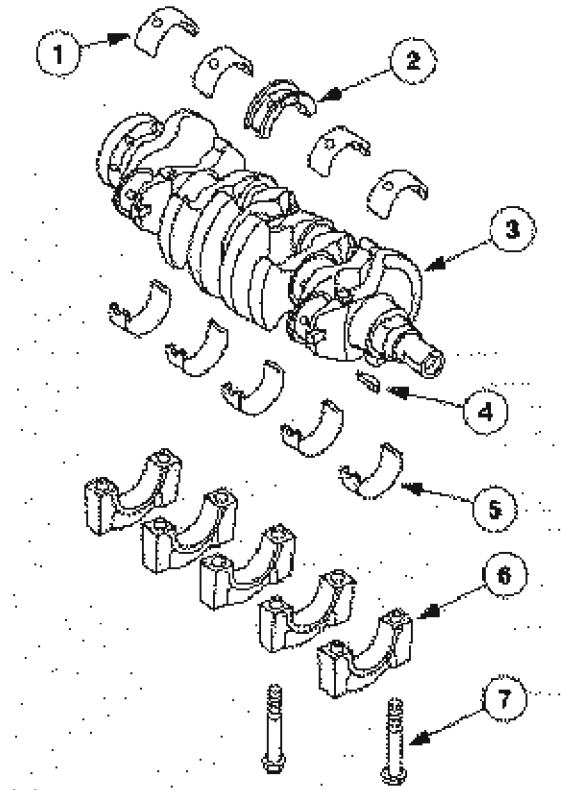
- reduction of fuel deposits on the intake walls during cold starts
- less heating of the intake air when the engine is hot

The crankshaft runs on five bearings and has a counterweight for each cylinder. The central main bearing has two bearing half shells which guide the crankshaft along its axis as well as adjusting the end float.

### Crankshaft Bearings

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape



Item	Part Number	Description
1	6333	Crankshaft main bearing
2	6337	Crankshaft thrust main bearing
3	6303	Crankshaft
4	W700015	Woodruff key
5	6A338	Crankshaft main bearing—lower (5 req'd)
6	—	Crankshaft main bearing cap (5 req'd)
7	W702427	Main bearing cap bolt (2 req'd)

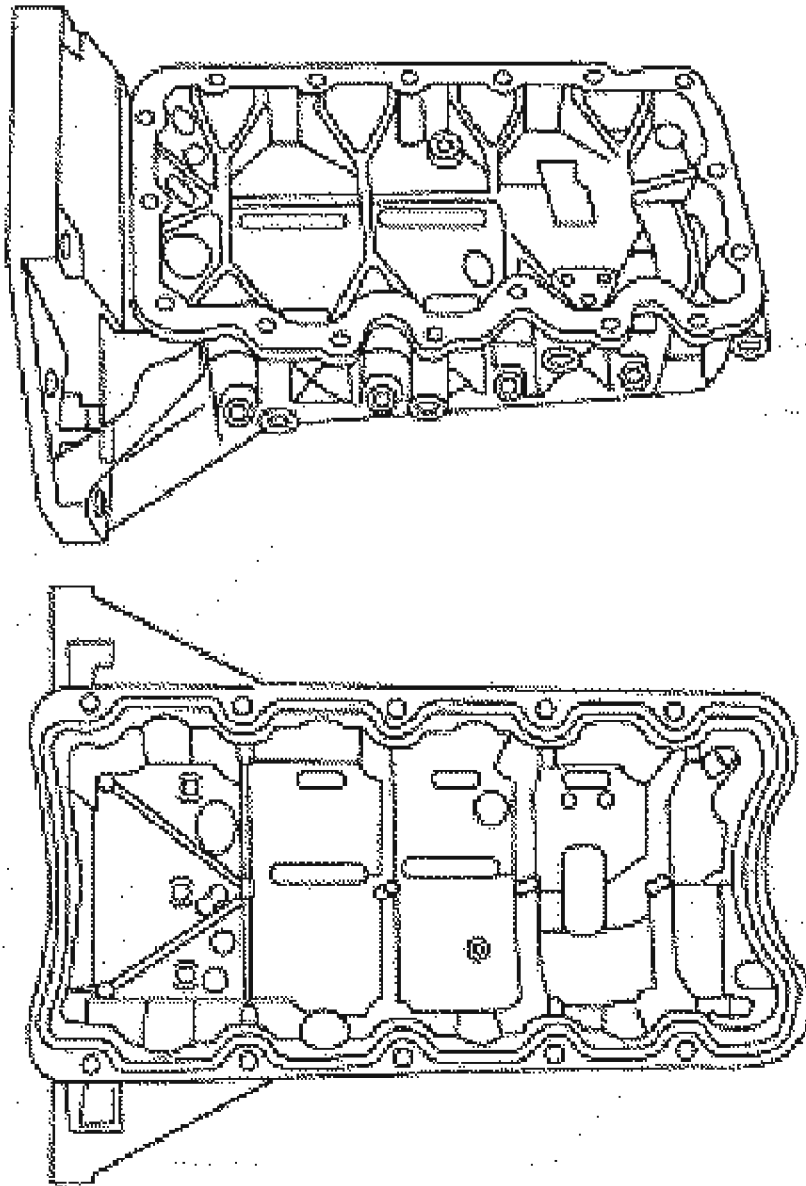
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**Fig. 8: Identifying Crankshaft Bearings**  
Courtesy of FORD MOTOR CO.

The connecting rods are numbered one to four starting at the timing belt end. It is practically impossible to mix up the connecting rod bearing caps and connecting rods since the connecting rod bearing caps are broken away from the connecting rod during production. The fracture profile of a connecting rod bearing cap therefore only fits one of the connecting

rods.

**View Of Lower Crankcase**



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**Fig. 9: Identifying View Of Lower Crankcase**  
Courtesy of FORD MOTOR CO.

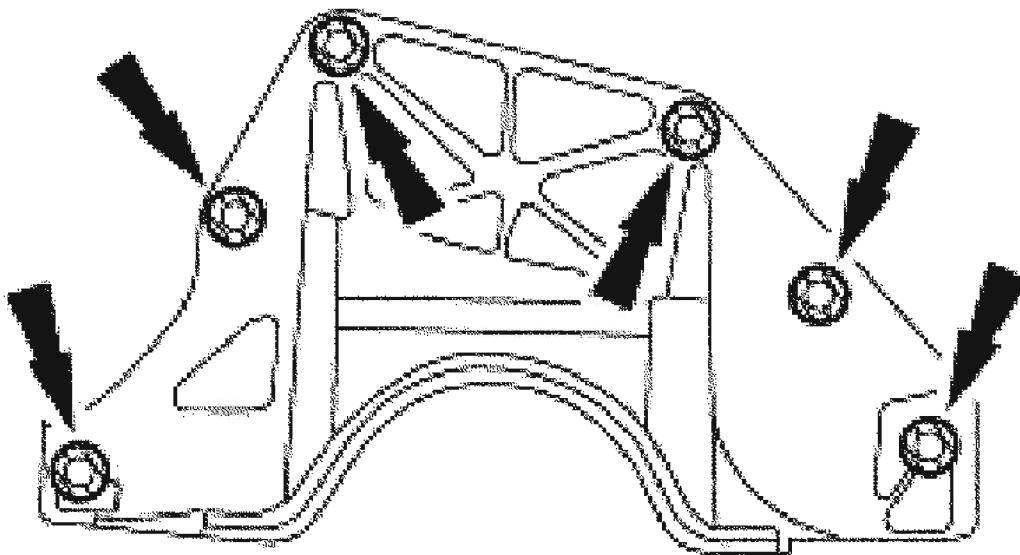
The EEC-V module manages the 2.0L Zetec engine. The module requires a large amount of information about the current operating conditions of the engine and, where appropriate, the automatic transaxle. The EEC-V module obtains this information by means of sensors.

The EEC-V module controls:

- the fully electronic ignition system (EI);
- the sequential electronic fuel injection system (SFI);
- the air conditioning system together with the cooling system.

The purpose of the lower crankcase is to reduce engine vibrations. This further reduces the level of noise inside the vehicle. There is a metal gasket between the lower crankcase and the cylinder block.

#### Lower Crankcase Spacer Shims



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**Fig. 10: Identifying Lower Crankcase Spacer Shims**  
Courtesy of FORD MOTOR CO.

Lower crankcase spacer shims are used to even out any excessively large gaps between the transaxle and the lower crankcase (see Specifications).

The engine is closed off at the bottom with a pressed steel oil pan which is directly attached to the lower crankcase. It is sealed with a 3 mm (0.12 in) wide bead of sealer.

## DIAGNOSIS AND TESTING

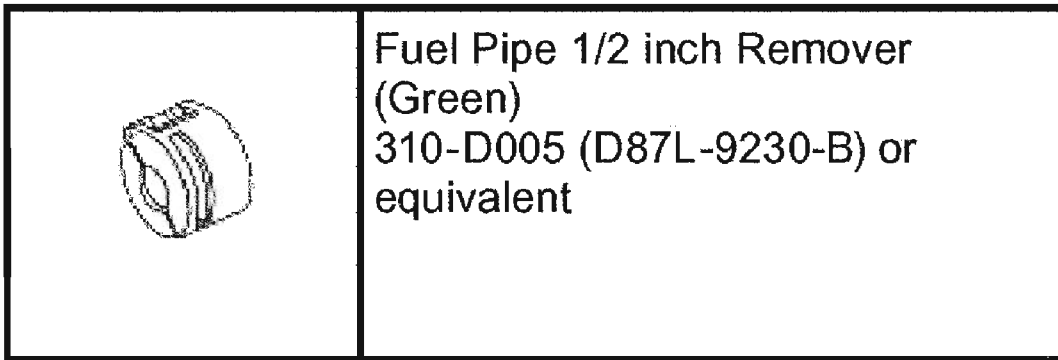
### ENGINE

For mechanical concerns, refer to ENGINE SYSTEM-GENERAL INFORMATION .

For driveability concerns, REFER to INTRODUCTION - CNG, FLEX-FUEL & GASOLINE .

## IN-VEHICLE REPAIR

### INTAKE MANIFOLD



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**Fig. 11: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

### Removal

**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

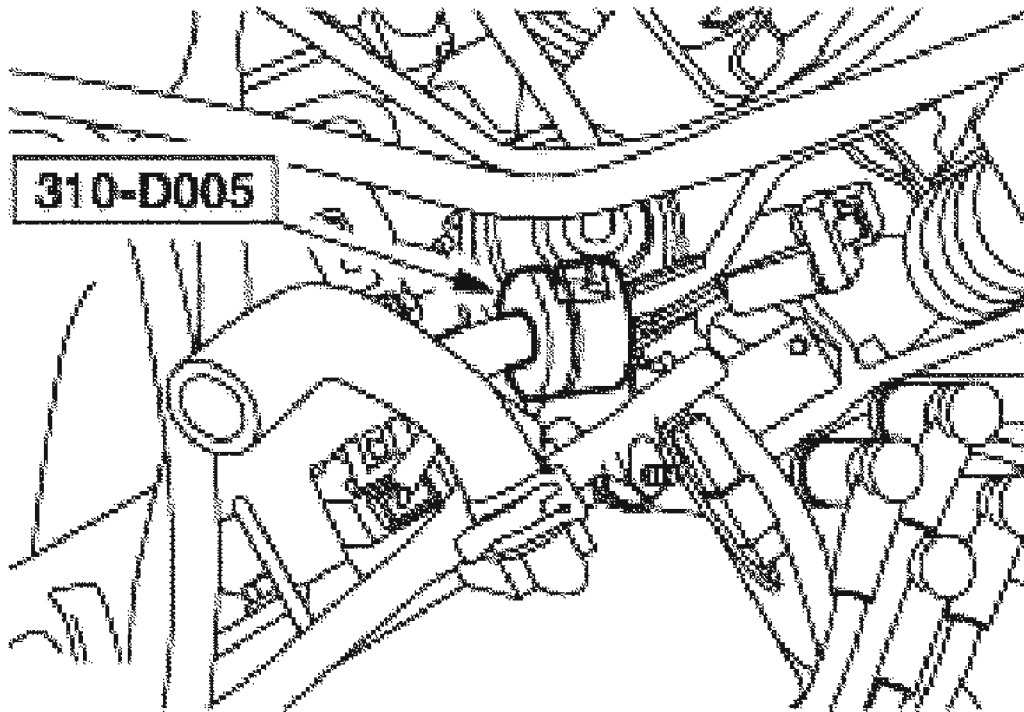
**WARNING:** Fuel in the fuel system remains under high pressure even when the engine is not running. Before working on or disconnecting any of the fuel lines or fuel system components, the fuel system pressure must be relieved. Failure to follow these instructions may result in personal injury.

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM-**



**GENERAL INFORMATION .**

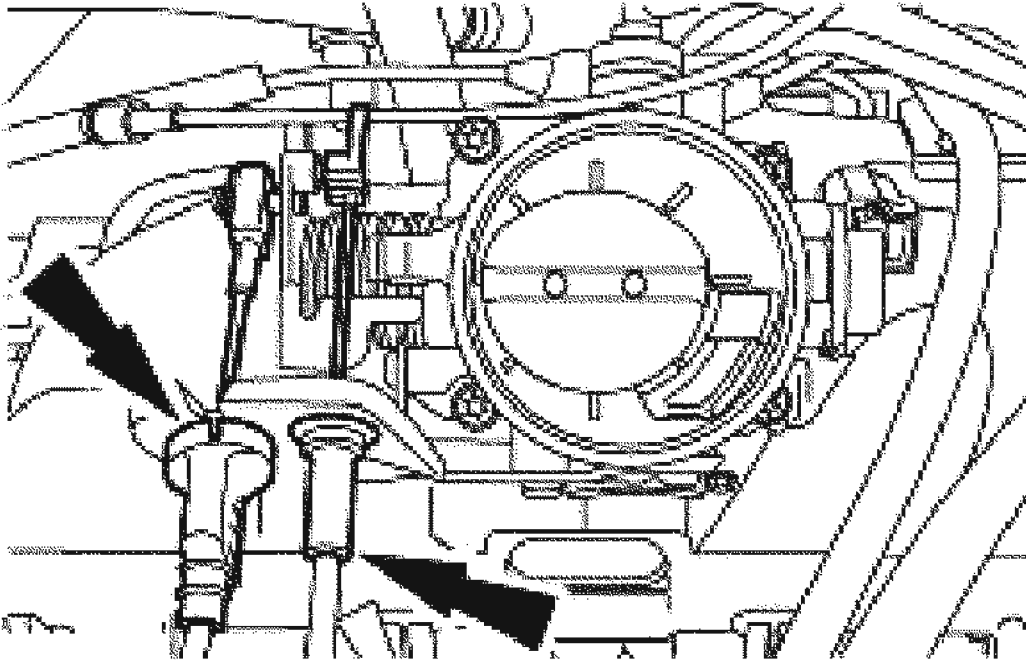
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES .**
3. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING .**
4. Using the special tool, disconnect the fuel tube.



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**Fig. 12: Disconnecting Fuel Tube**  
Courtesy of FORD MOTOR CO.

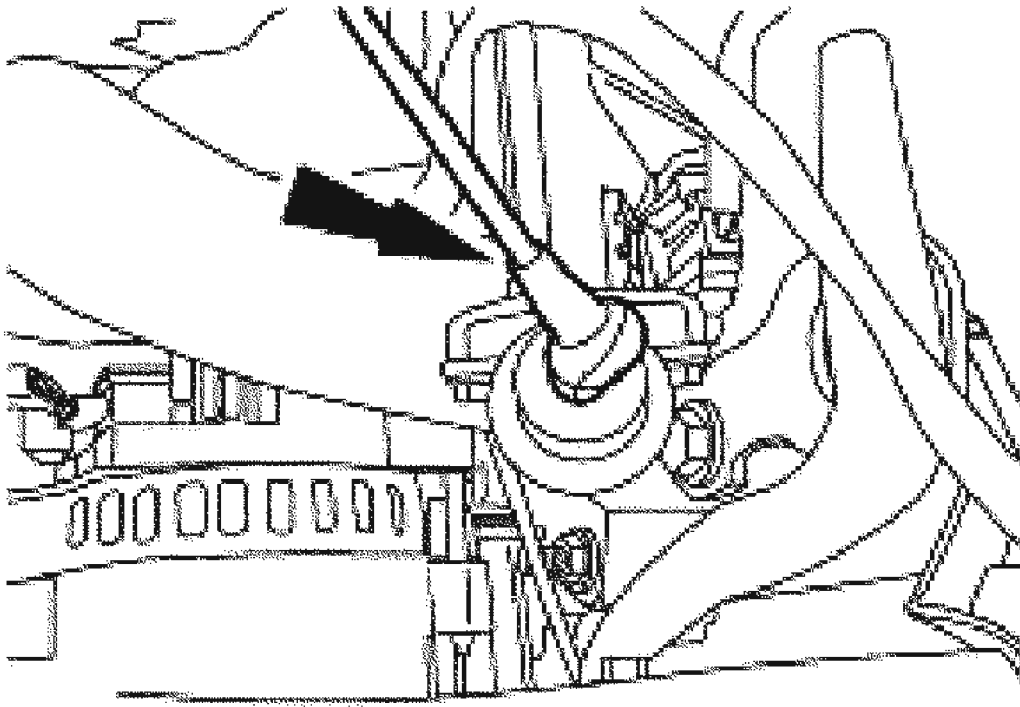
5. Disconnect the accelerator cable and, if equipped, the speed control actuator cable.



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**Fig. 13: Disconnecting Accelerator Cable And Speed Control Actuator Cable**  
Courtesy of FORD MOTOR CO.

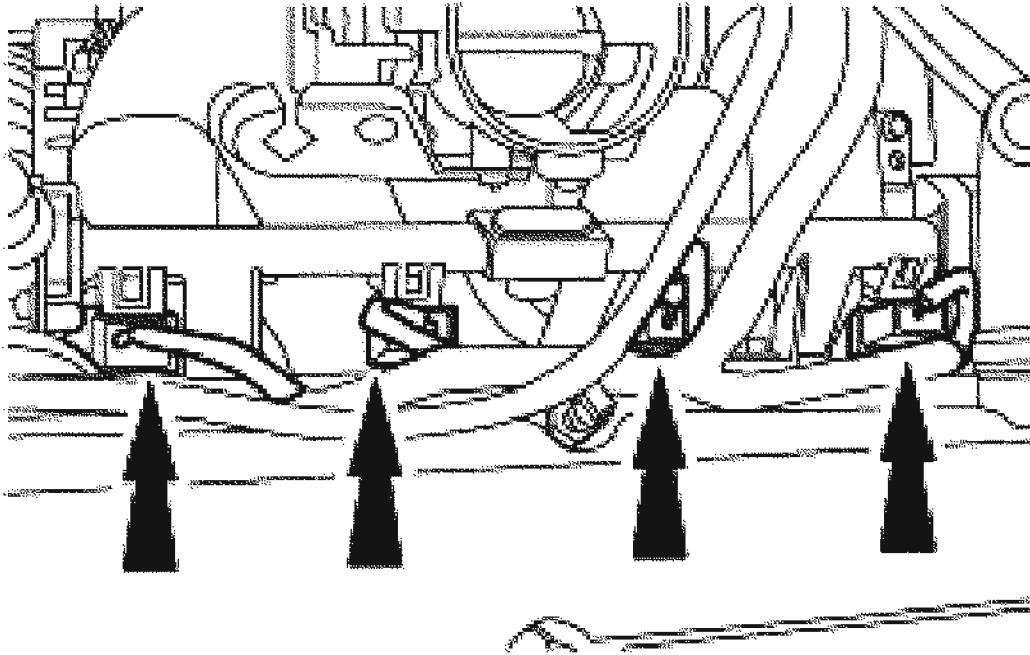
6. Disconnect the fuel pulse damper vacuum hose.



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**Fig. 14: Disconnecting Fuel Pulse Damper Vacuum Hose**  
Courtesy of FORD MOTOR CO.

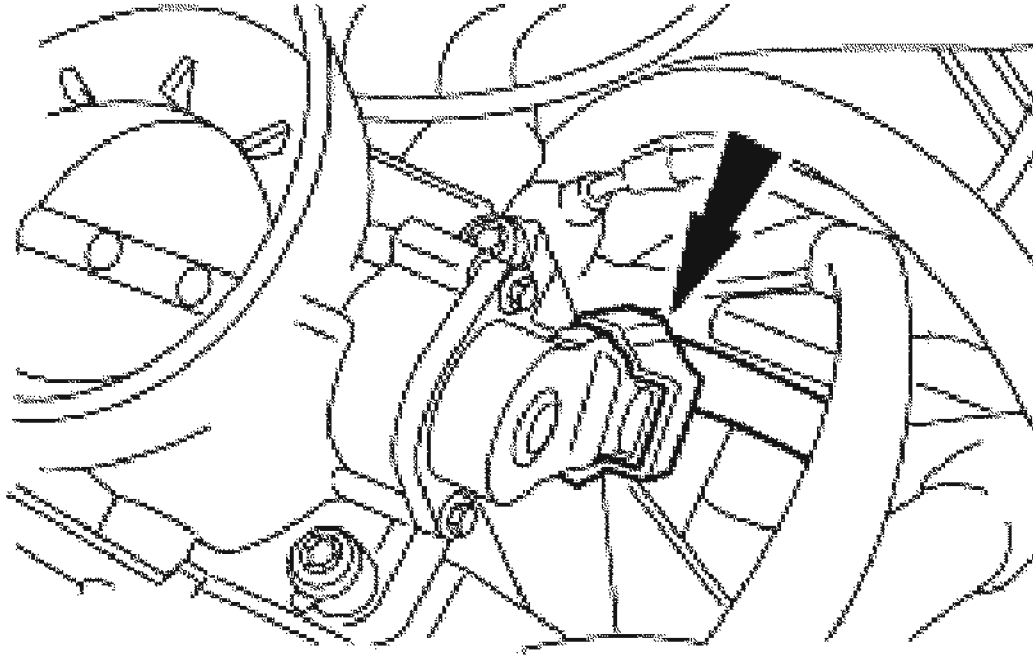
7. Disconnect the fuel injector electrical connectors.
  - Remove the harness from the valve cover stud bolt.



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**Fig. 15: Disconnecting Fuel Injector Electrical Connectors**  
Courtesy of FORD MOTOR CO.

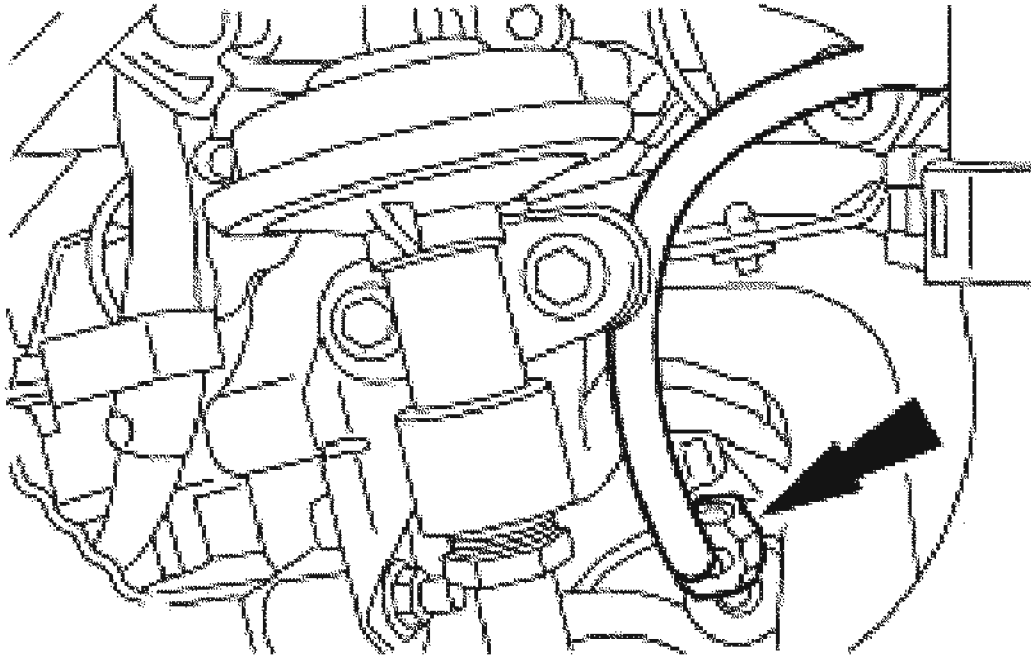
8. Disconnect the throttle position (TP) sensor electrical connector.



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**Fig. 16: Disconnecting Throttle Position (TP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

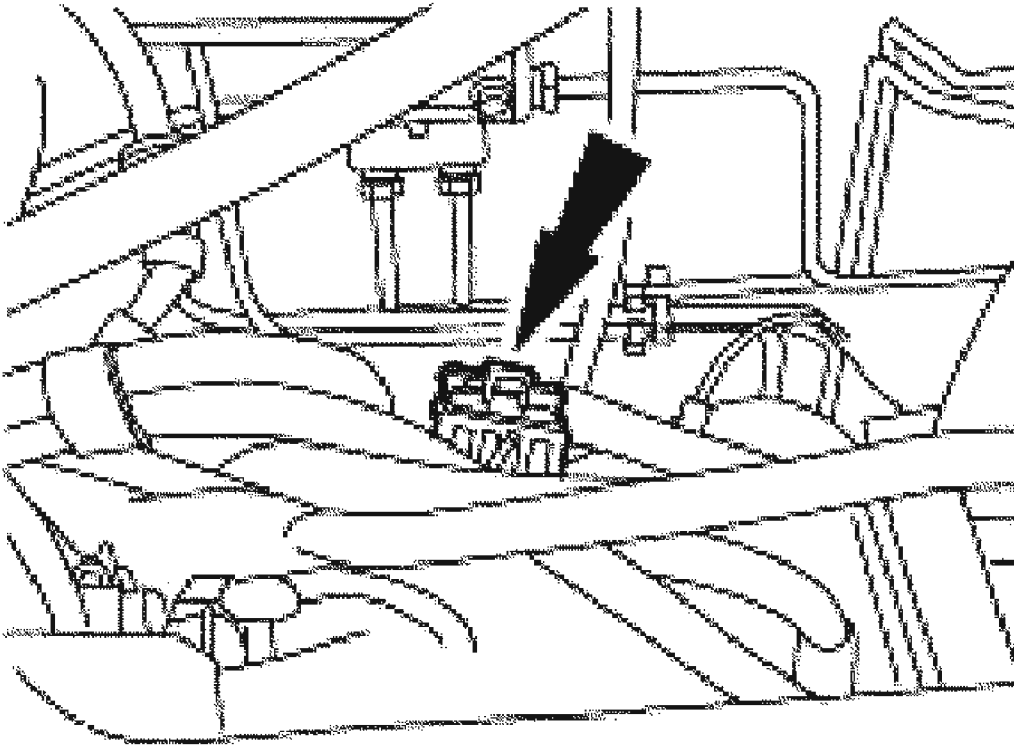
9. Disconnect the idle air control (IAC) electrical connector and unclip the harness from the bracket.



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**Fig. 17: Disconnecting Idle Air Control (IAC) Electrical Connector**  
Courtesy of FORD MOTOR CO.

10. Remove the main engine control sensor wiring connector from the mounting bracket.

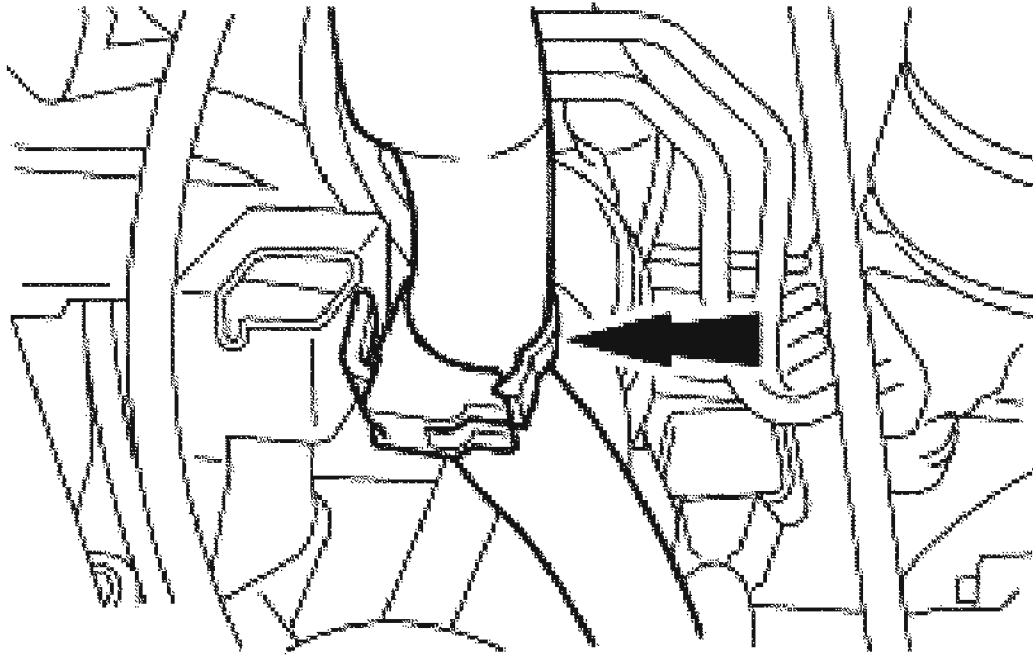


G02738657

**Fig. 18: Removing Main Engine Control Sensor Wiring Connector From Mounting Bracket**

**Courtesy of FORD MOTOR CO.**

11. Disconnect the powertrain control module (PCM) wire harness from the bracket.



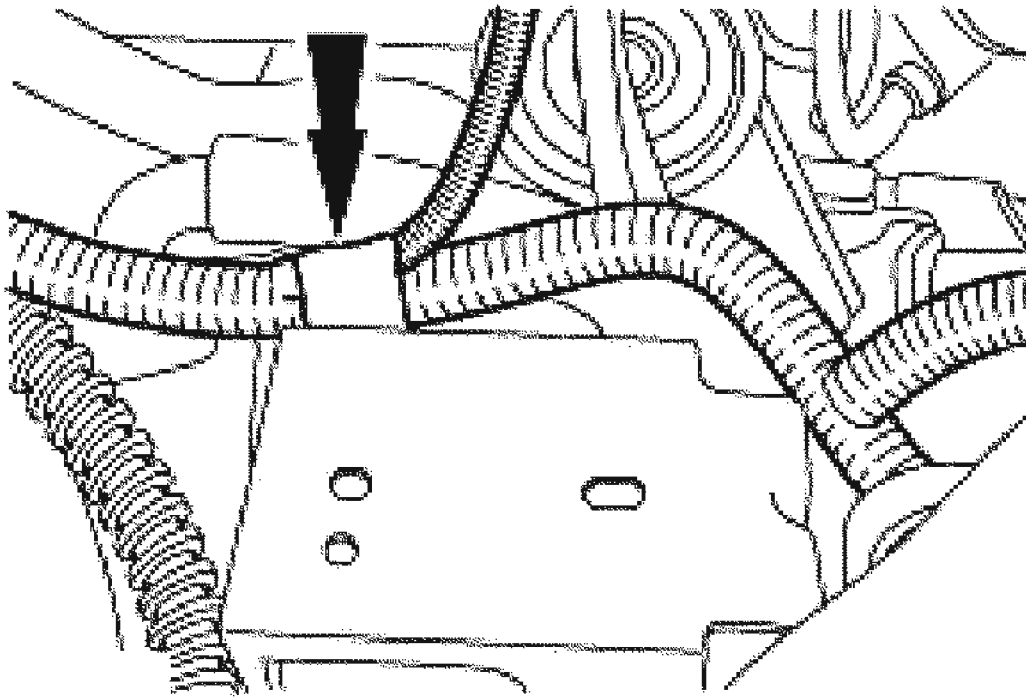
G02738658

**Fig. 19: Disconnecting Powertrain Control Module (PCM) Wire Harness From Bracket**

**Courtesy of FORD MOTOR CO.**

12. Disconnect the heated oxygen sensor (HO2S) wiring harness from the bracket.



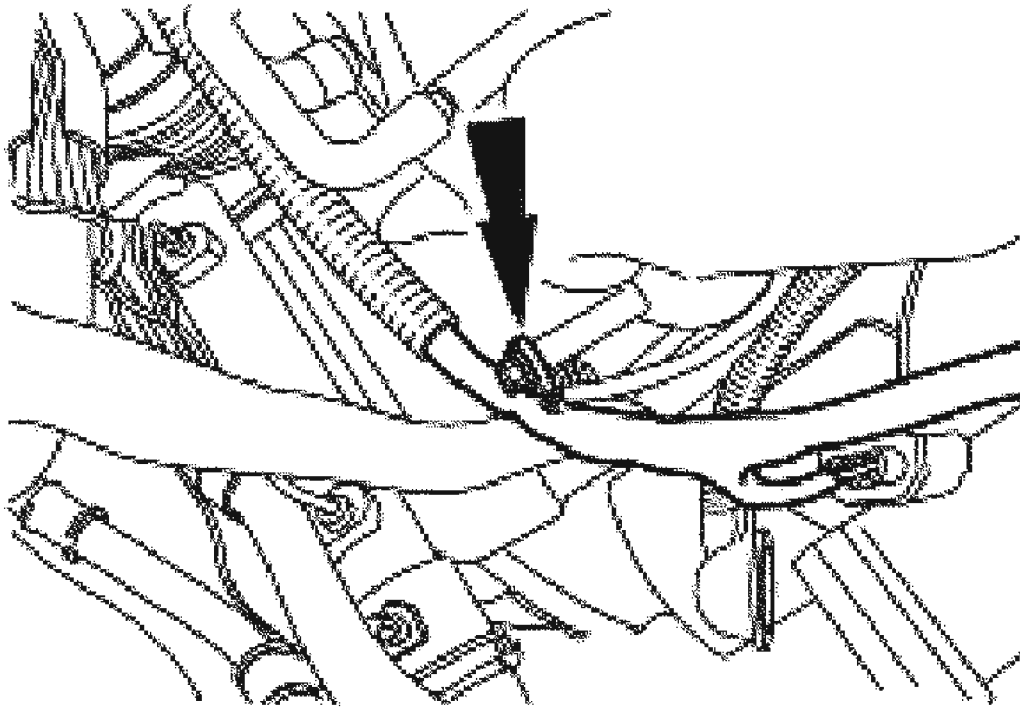


G02738659

**Fig. 20: Disconnecting Heated Oxygen Sensor (HO2S) Wiring Harness From Bracket**

**Courtesy of FORD MOTOR CO.**

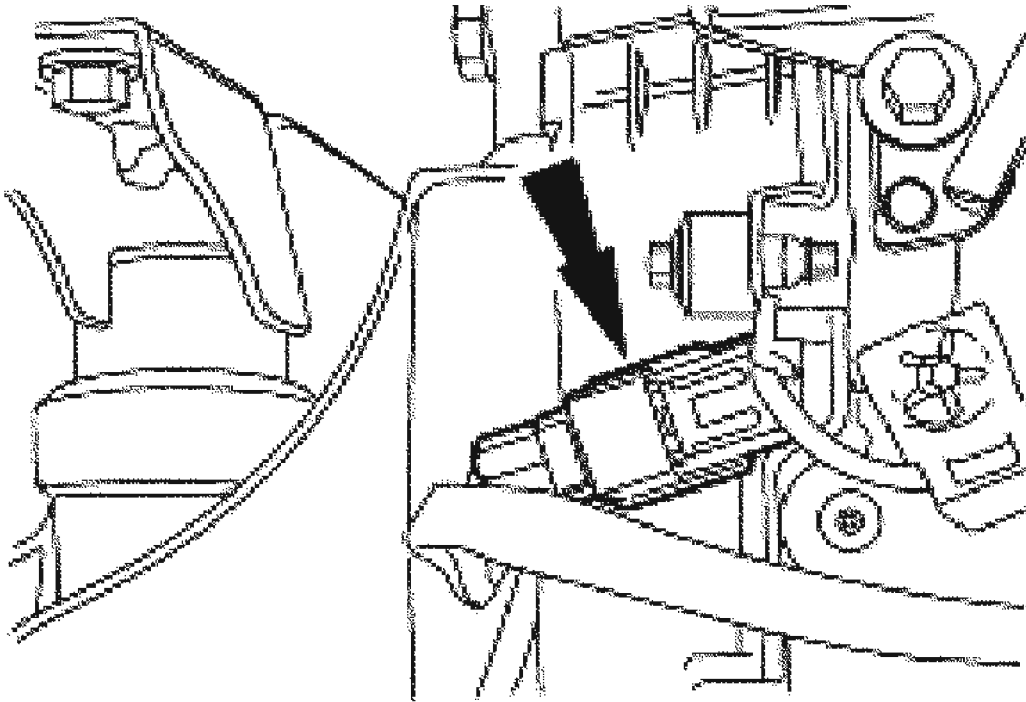
13. Remove the HO2S wiring harness retainer.



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**Fig. 21: Removing HO2S Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

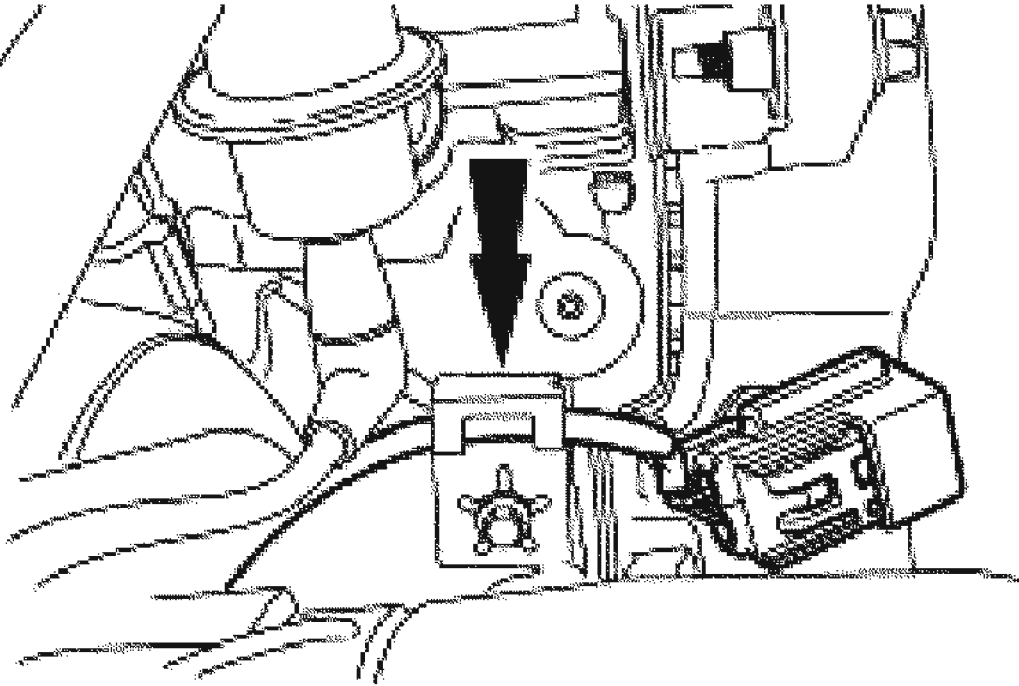
14. Disconnect the cylinder head temperature (CHT) sensor electrical connector.



G02738661

**Fig. 22: Disconnecting Cylinder Head Temperature (CHT) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

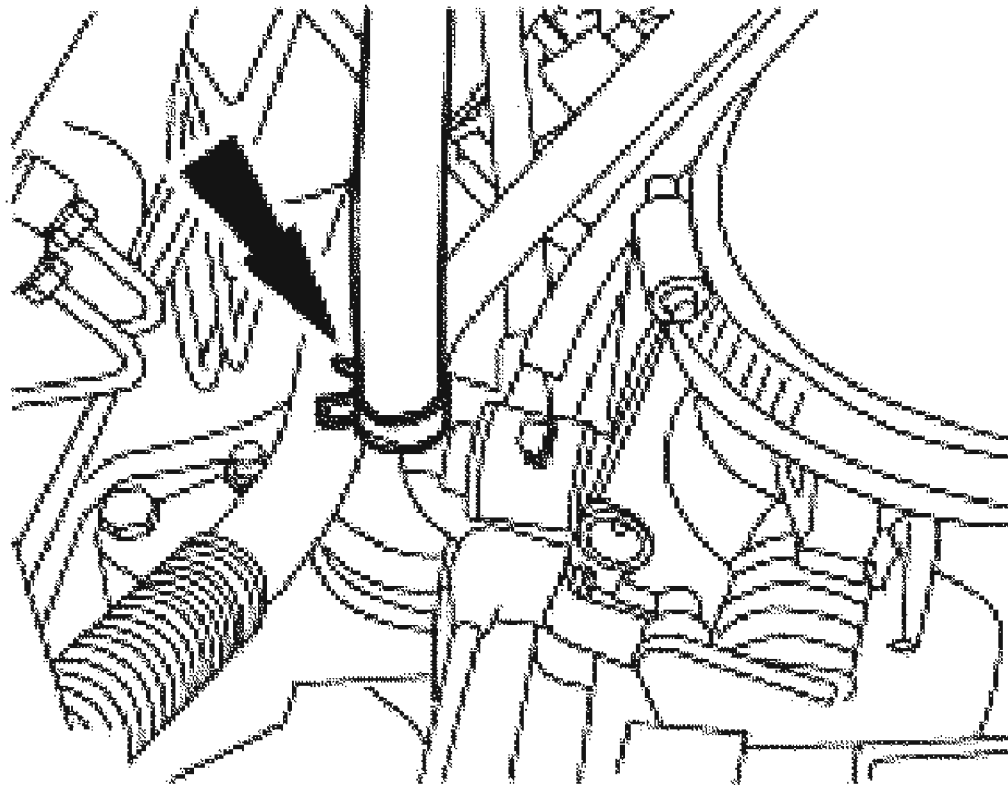
15. Detach the CHT sensor wiring harness from the clip, and remove the clip.



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**Fig. 23: Removing Clip**  
Courtesy of FORD MOTOR CO.

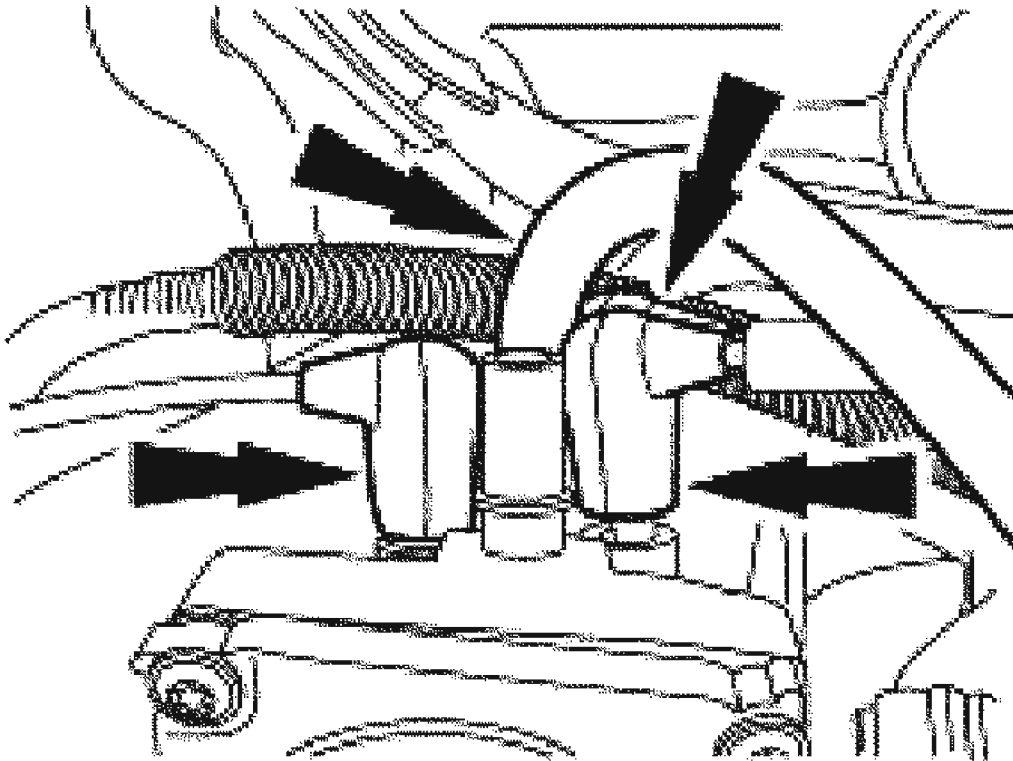
16. Disconnect the brake booster vacuum supply hose.



**G02738663**

**Fig. 24: Disconnecting Brake Booster Vacuum Supply Hose**  
Courtesy of FORD MOTOR CO.

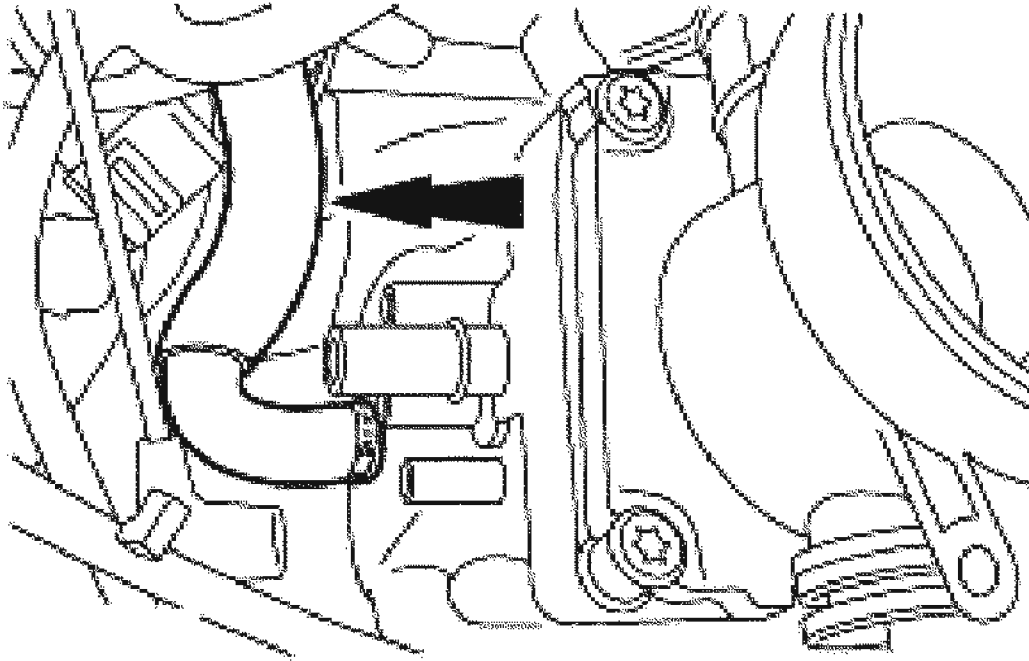
17. Disconnect the four vacuum hoses.



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**Fig. 25: Disconnecting Vacuum Hoses**  
Courtesy of FORD MOTOR CO.

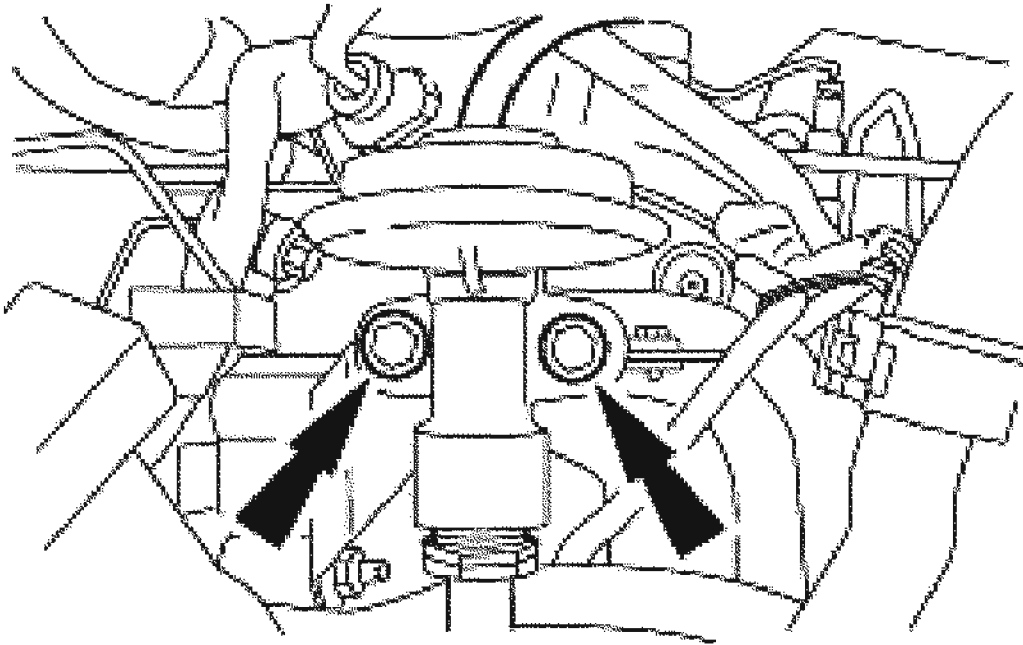
18. Disconnect the positive crankcase ventilation (PCV) vacuum hose.



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**Fig. 26: Disconnecting Positive Crankcase Ventilation (PCV) Vacuum Hose**  
Courtesy of FORD MOTOR CO.

19. Remove the exhaust gas recirculation (EGR) valve bolts.

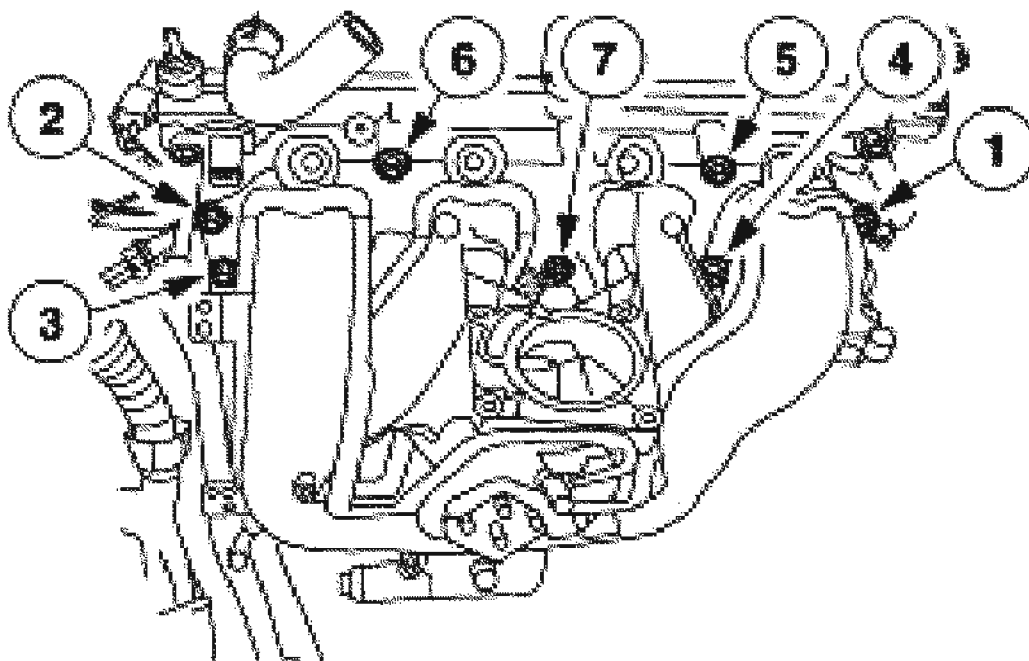


G02738666

**Fig. 27: Removing Exhaust Gas Recirculation (EGR) Valve Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Illustration shown with throttle body removed for clarity.

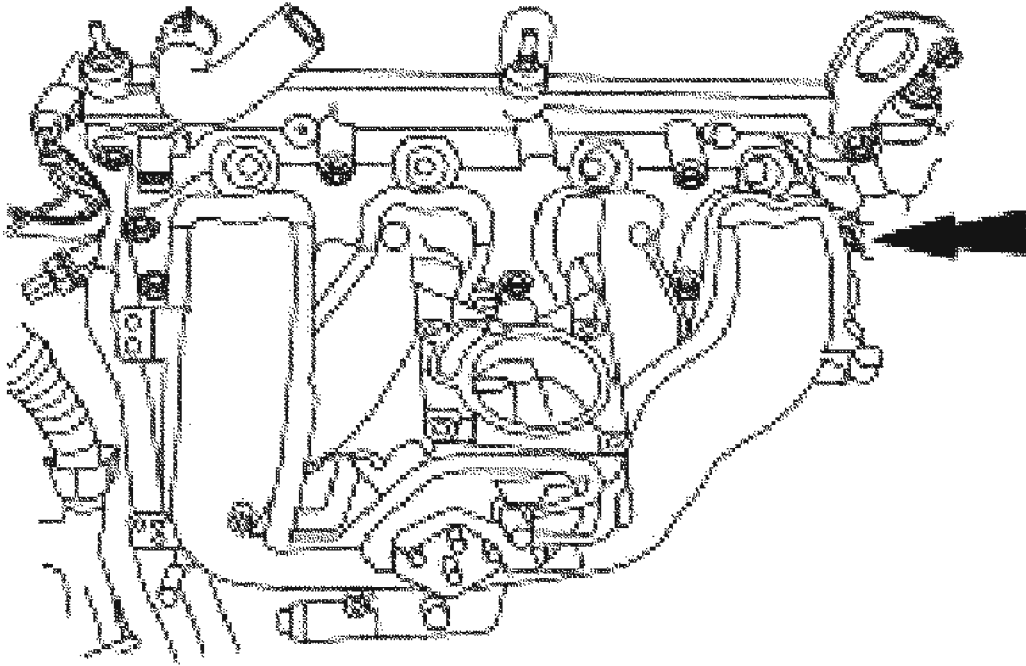




G02738667

**Fig. 28: Removing Intake Manifold**  
Courtesy of FORD MOTOR CO.

20. Remove the intake manifold.
  - Remove the two nuts and five bolts in the sequence shown.
21. Remove the right side intake manifold stud.



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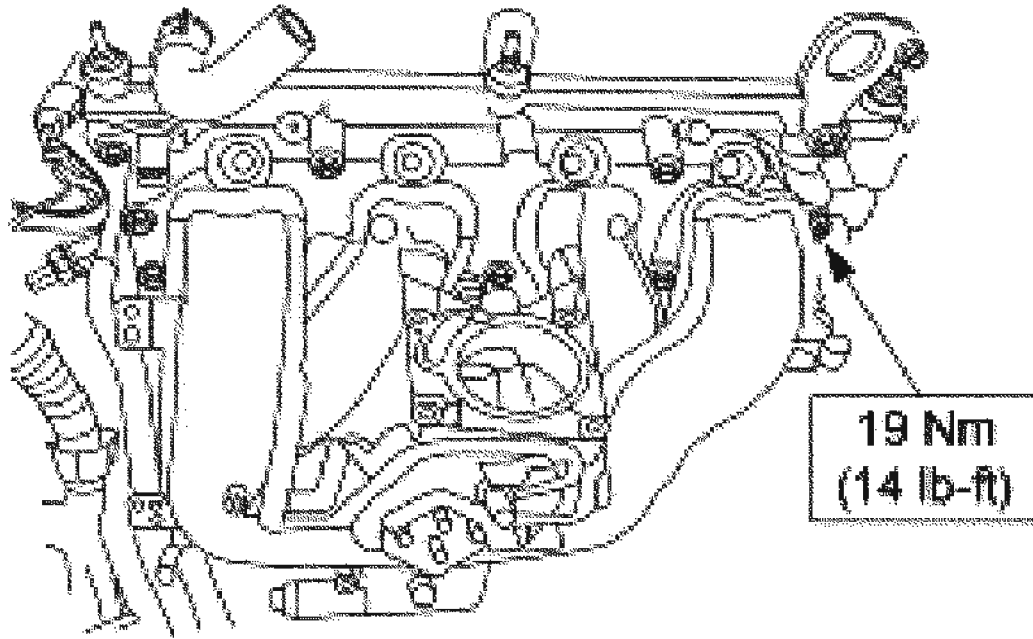
**Fig. 29: Removing Right Side Intake Manifold Stud**  
Courtesy of FORD MOTOR CO.

22. Remove the intake manifold and the gaskets.
  - Inspect the gaskets and discard if damaged.

#### Installation

**NOTE:**      **Install new intake manifold gaskets if damaged.**

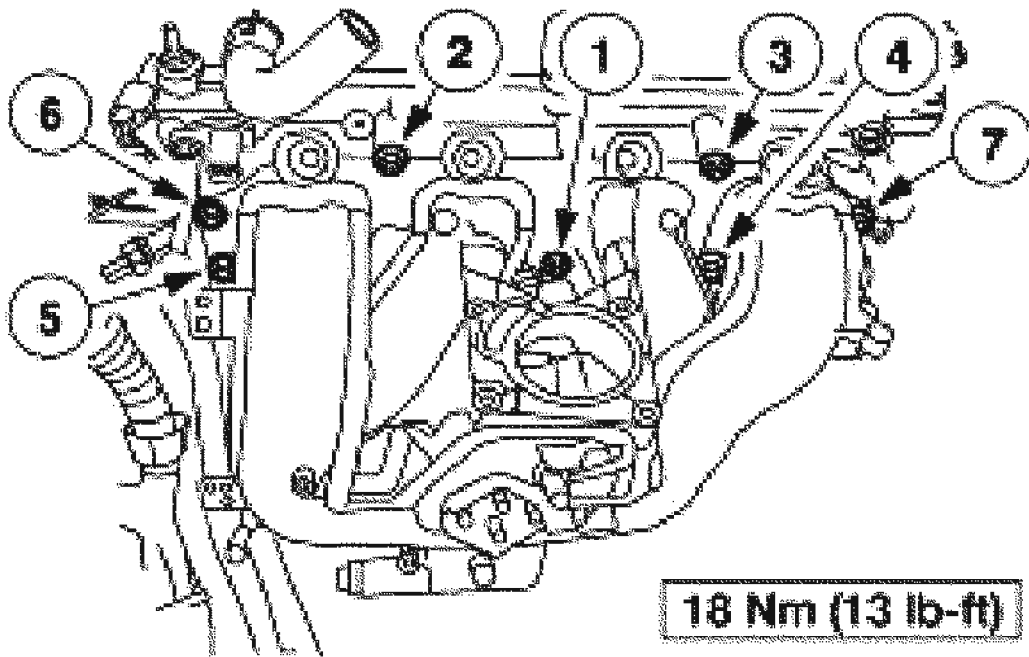
1. Position the intake manifold and gaskets.
2. Install the right side intake manifold stud.



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**Fig. 30: Installing Right Side Intake Manifold Stud**  
Courtesy of FORD MOTOR CO.

**NOTE:** Illustration shown with throttle body removed for clarity.

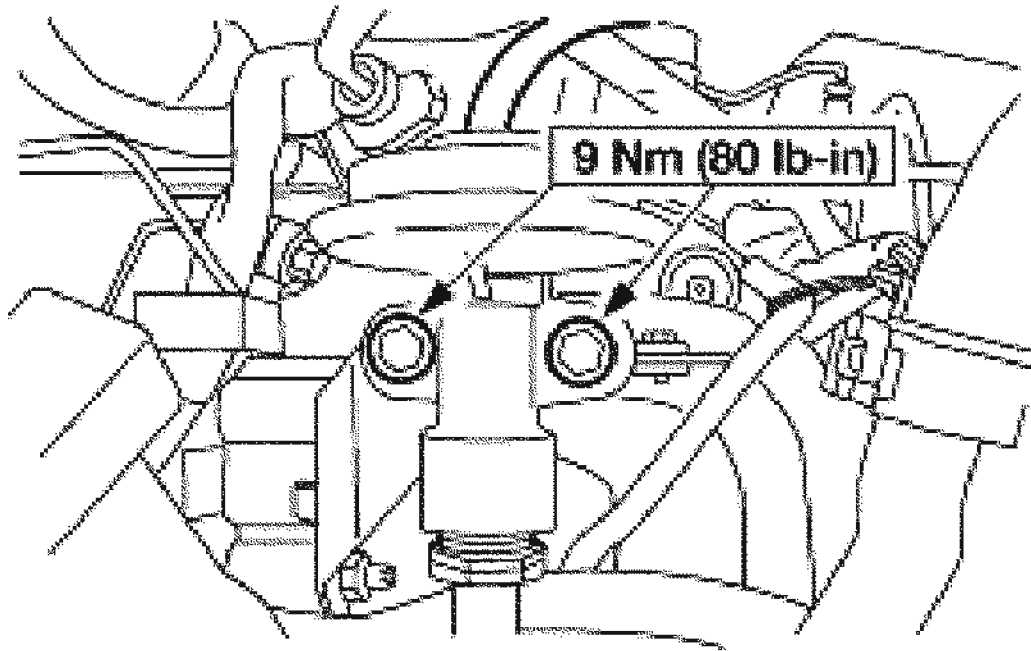


G02738670

**Fig. 31: Identifying Tightening Sequence Of Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

3. Tighten the nuts and bolts using the sequence shown.

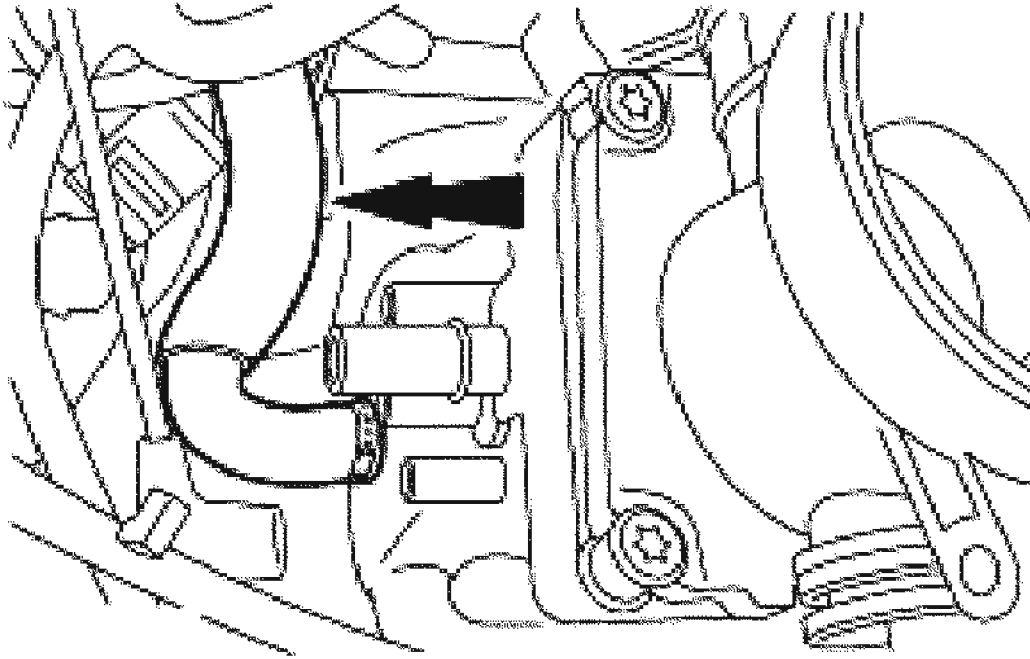
**NOTE:** The EGR valve sealing surfaces are soft metals. Carefully clean all sealing surfaces and install a new EGR valve gasket.



G02738671

**Fig. 32: Installing EGR Valve Bolts**  
Courtesy of FORD MOTOR CO.

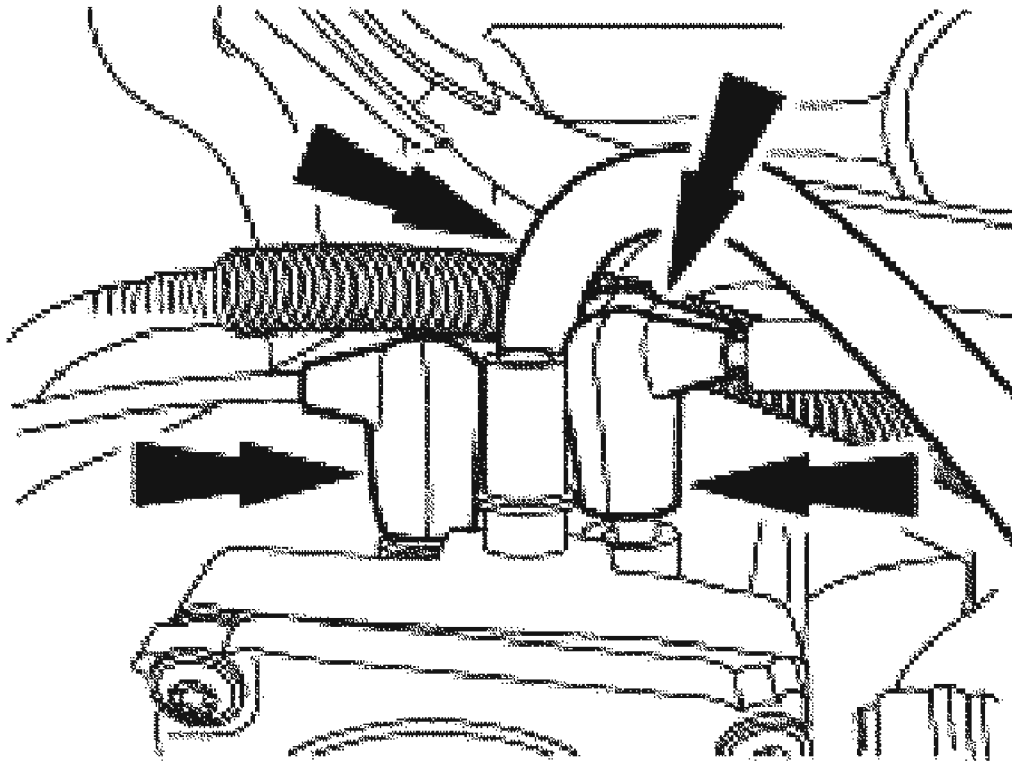
4. Install the EGR valve bolts.
5. Connect the PCV vacuum hose.



G02738672

**Fig. 33: Connecting PCV Vacuum Hose**  
Courtesy of FORD MOTOR CO.

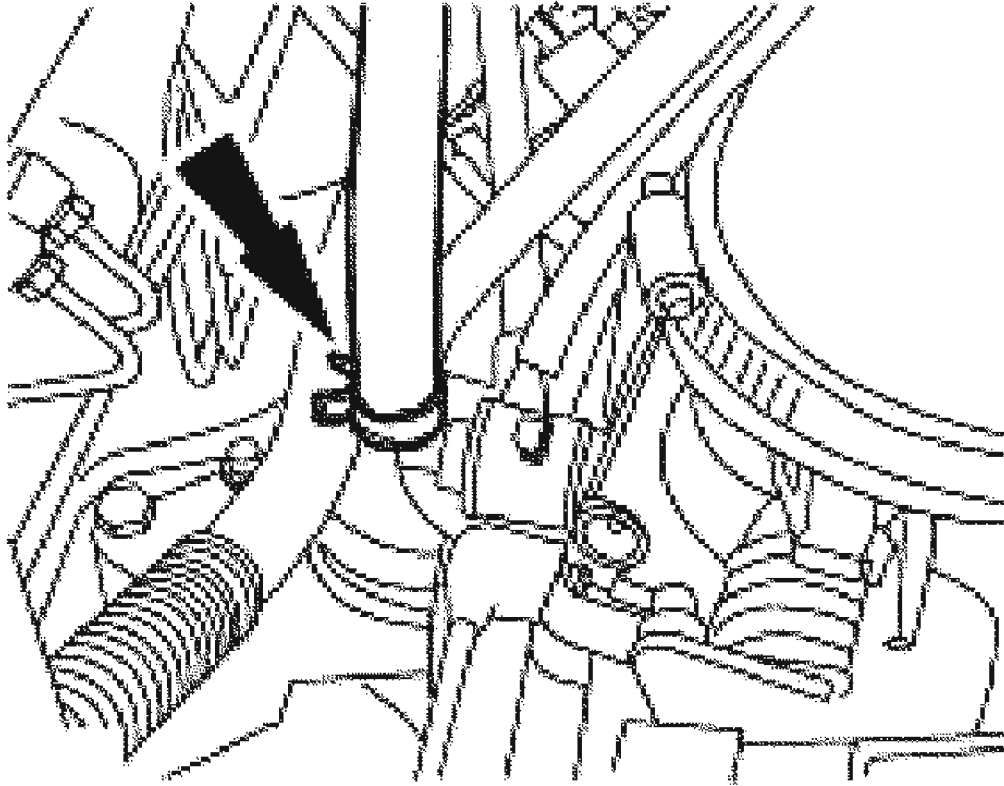
6. Connect the four vacuum hoses.



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**Fig. 34: Connecting Vacuum Hoses**  
Courtesy of FORD MOTOR CO.

7. Connect the brake booster vacuum supply hose to the intake manifold.

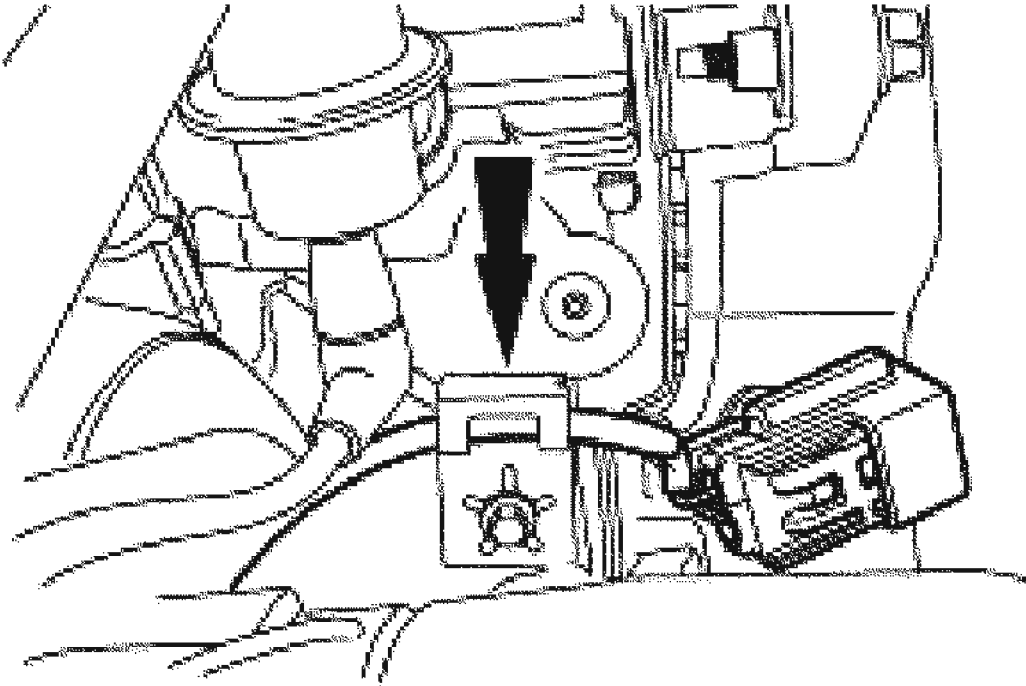


**G02738674**

**Fig. 35: Connecting Brake Booster Vacuum Supply Hose To Intake Manifold**  
**Courtesy of FORD MOTOR CO.**

8. Install the (CHT) sensor wire clip, and attach the CHT wiring harness.

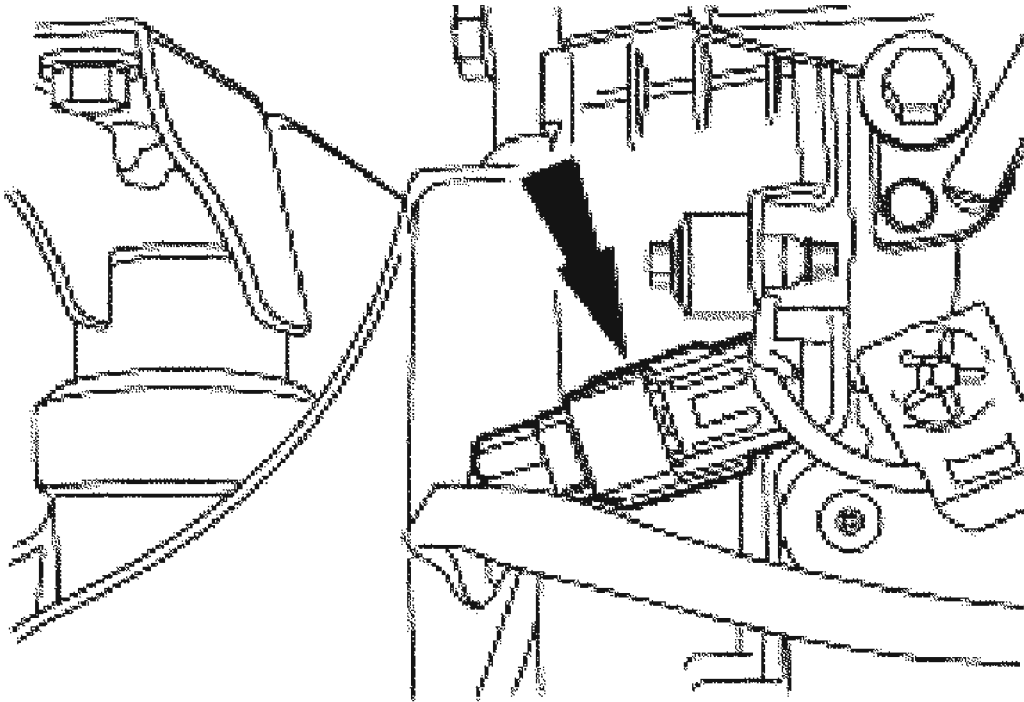




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**Fig. 36: Installing CHT Sensor Wire Clip And Attaching CHT Wiring Harness**  
Courtesy of FORD MOTOR CO.

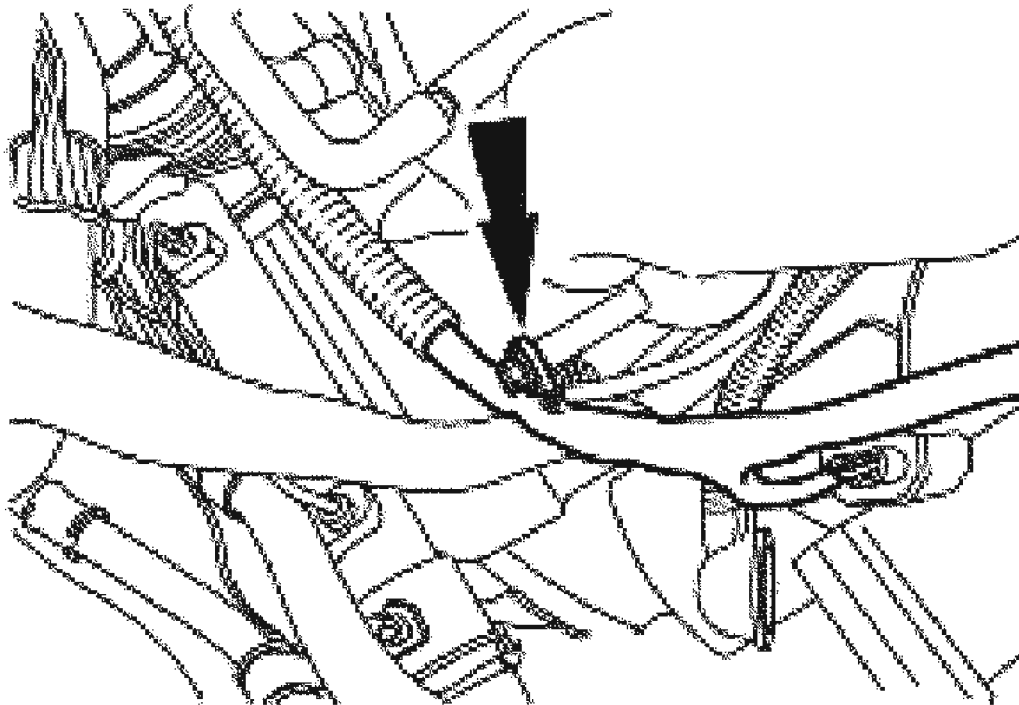
9. Connect the (CHT) sensor.



G02738676

**Fig. 37: Connecting CHT Sensor**  
**Courtesy of FORD MOTOR CO.**

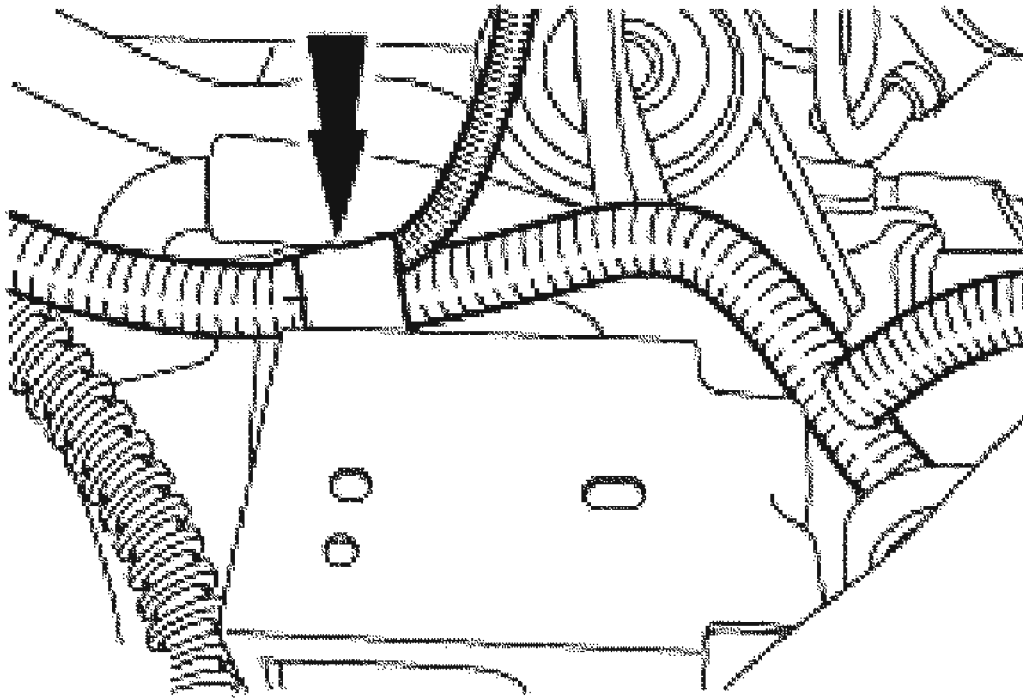
10. Install the retainer for the HO2S wiring harness mount.



G02738677

**Fig. 38: Installing Retainer Of HO2S Wiring Harness Mount**  
Courtesy of FORD MOTOR CO.

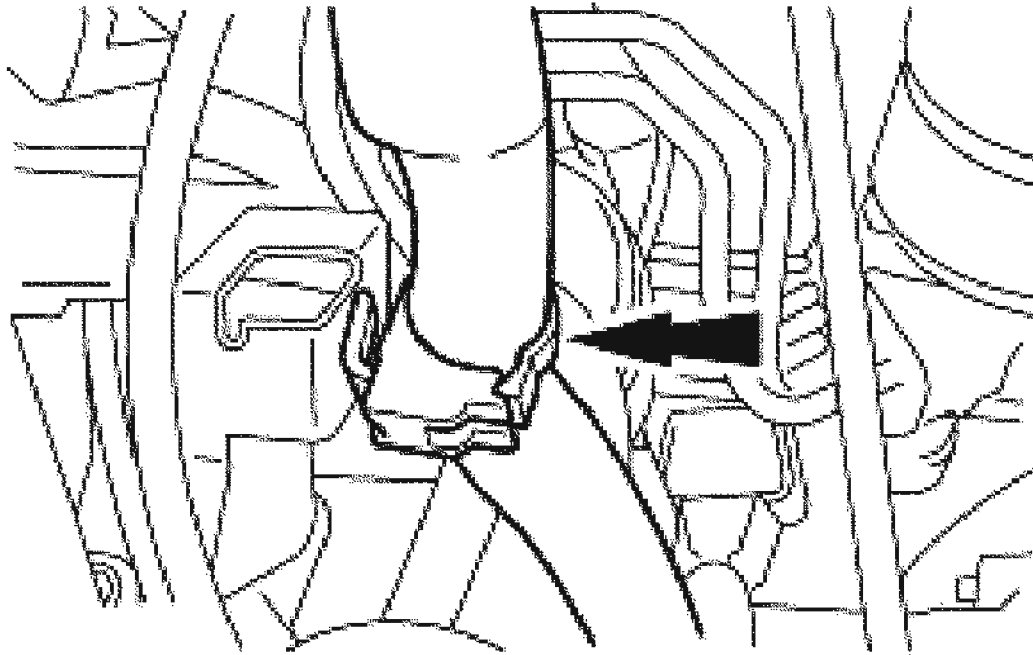
11. Connect the HO2S sensor wiring harness to the bracket.



G02738678

**Fig. 39: Connecting HO2S Sensor Wiring Harness To Bracket**  
Courtesy of FORD MOTOR CO.

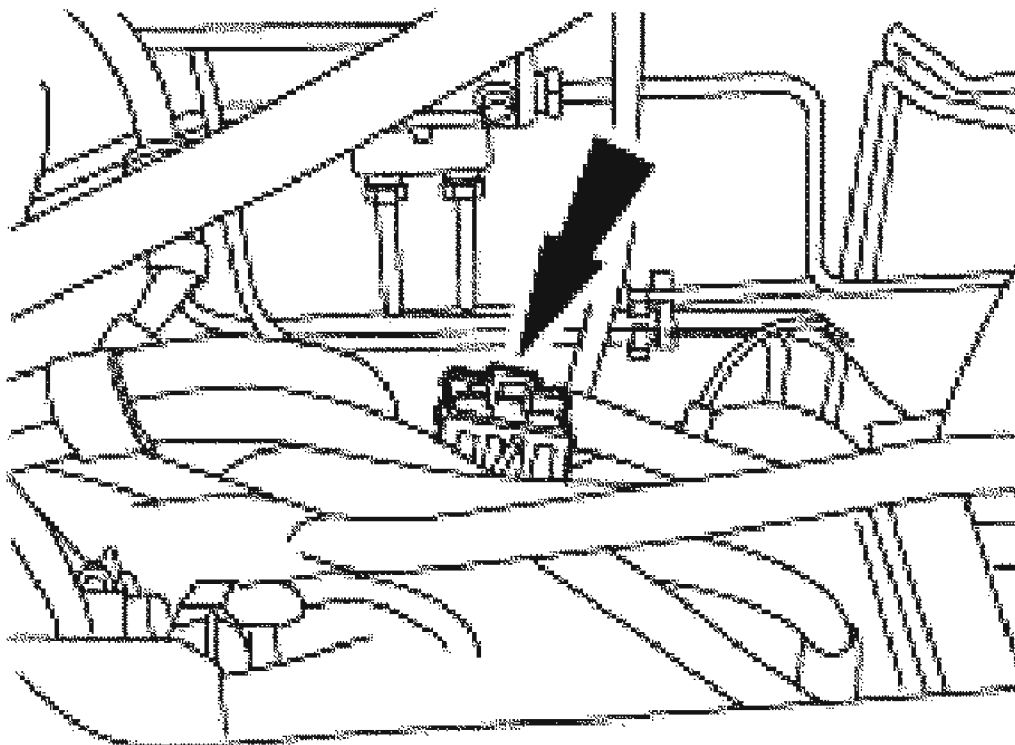
12. Connect the PCM wiring harness to the bracket.



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**Fig. 40: Connecting PCM Wiring Harness To Bracket**  
Courtesy of FORD MOTOR CO.

13. Connect the main engine control sensor wiring connector to the mounting bracket.

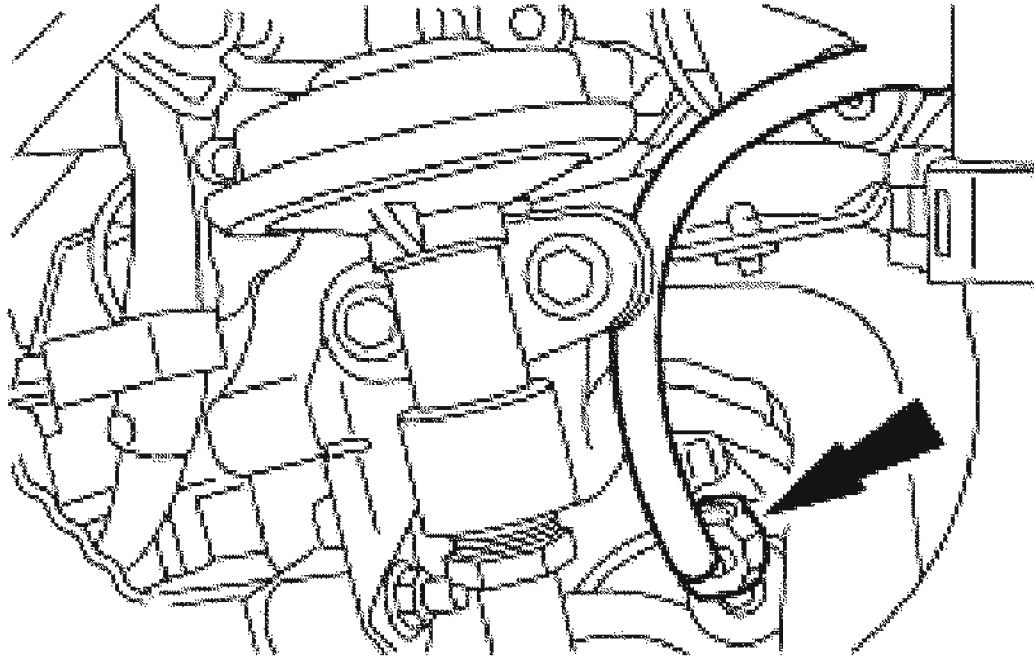


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**Fig. 41: Connecting Main Engine Control Sensor Wiring Connector To Mounting Bracket**

**Courtesy of FORD MOTOR CO.**

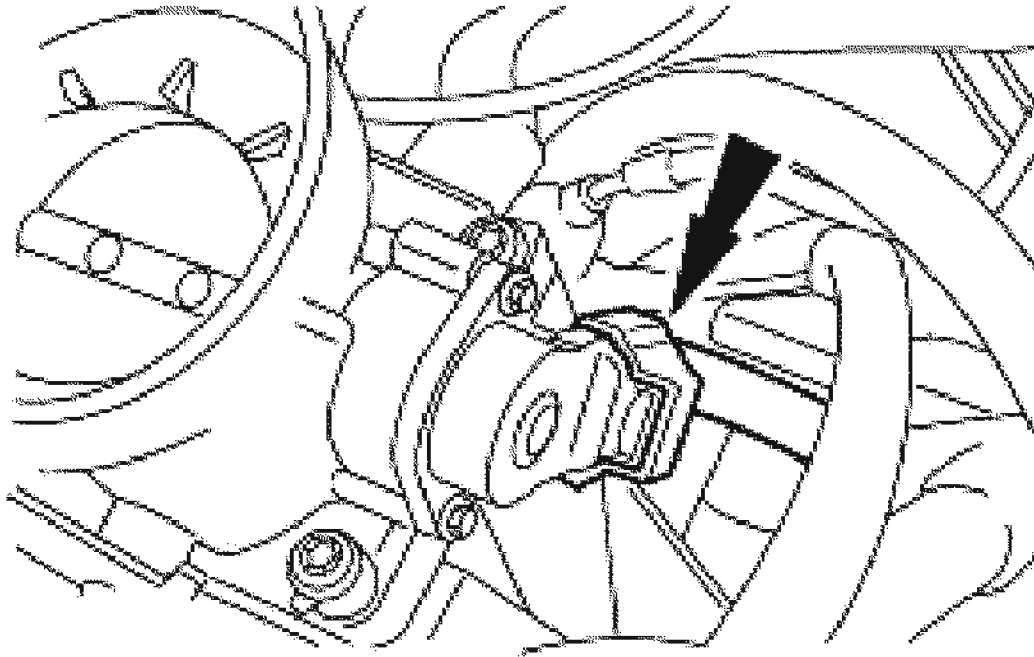
14. Connect the IAC electrical connector and attach the wiring harness to the bracket.



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**Fig. 42: Connecting IAC Electrical Connector**  
Courtesy of FORD MOTOR CO.

15. Connect the TP sensor electrical connector.

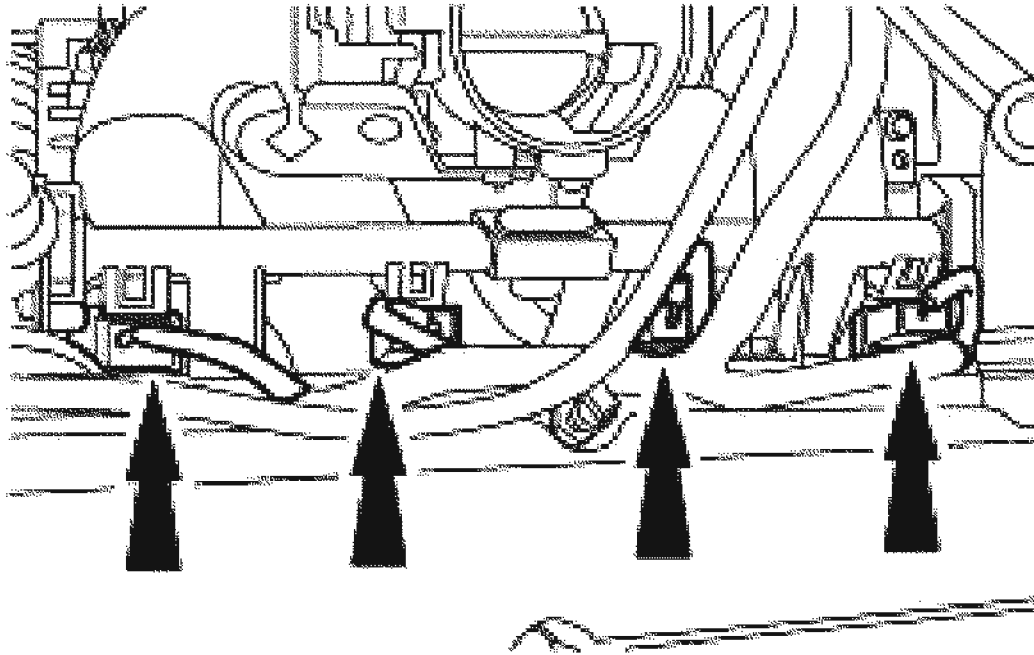


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**Fig. 43: Connecting TP Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

16. Connect the fuel injector electrical connectors.
  - Position the harness back onto the valve cover stud.

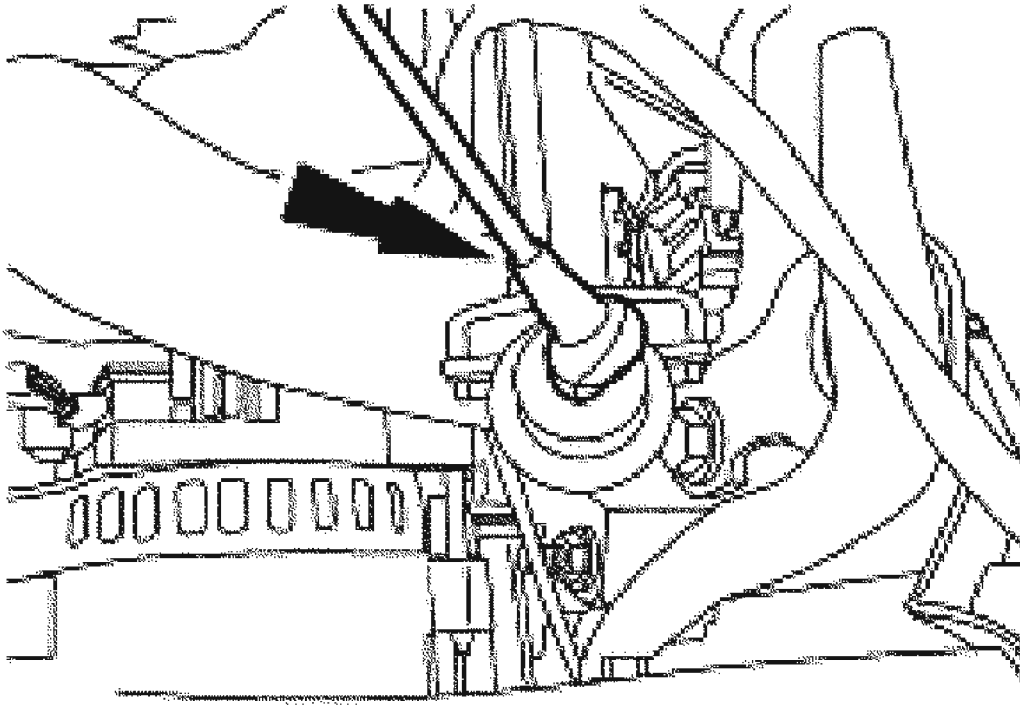




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**Fig. 44: Connecting Fuel Injector Electrical Connectors**  
Courtesy of FORD MOTOR CO.

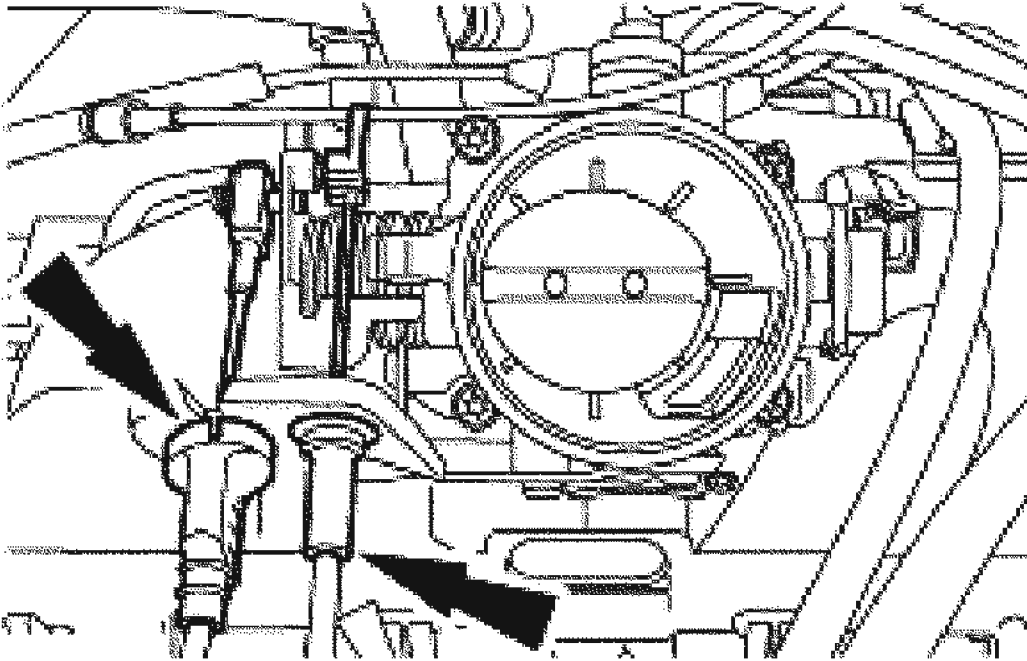
17. Connect the fuel pulse damper vacuum hose.



G02738684

**Fig. 45: Connecting Fuel Pulse Damper Vacuum Hose**  
Courtesy of FORD MOTOR CO.

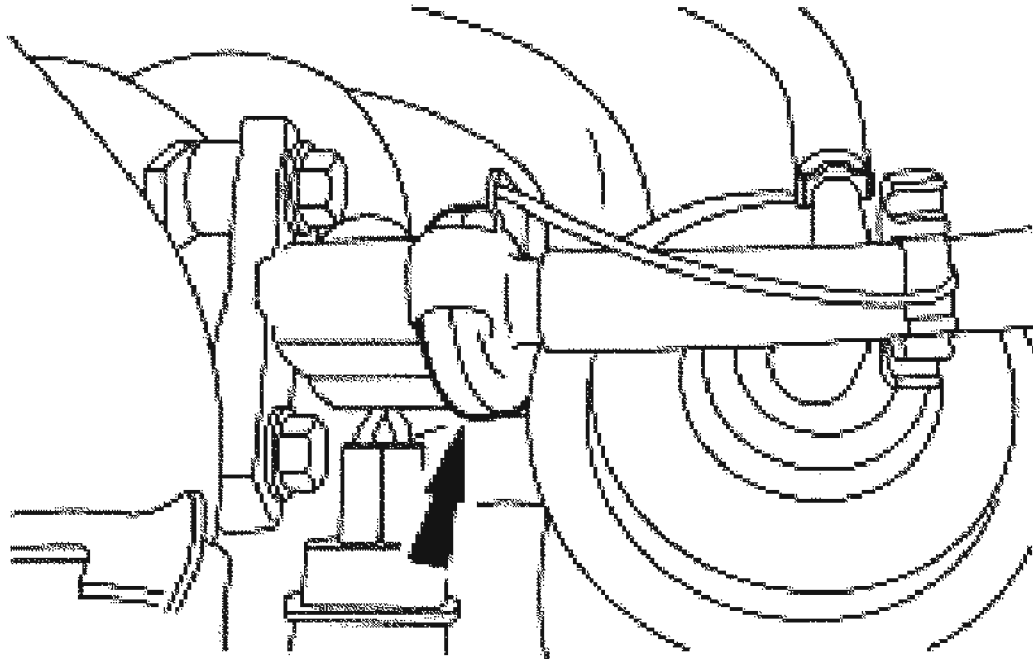
18. Connect the accelerator cable and, if equipped, the speed control actuator cable.



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**Fig. 46: Connecting Accelerator Cable And Speed Control Actuator Cable**  
Courtesy of FORD MOTOR CO.

19. Connect the fuel tube.
  - Install the safety clip.



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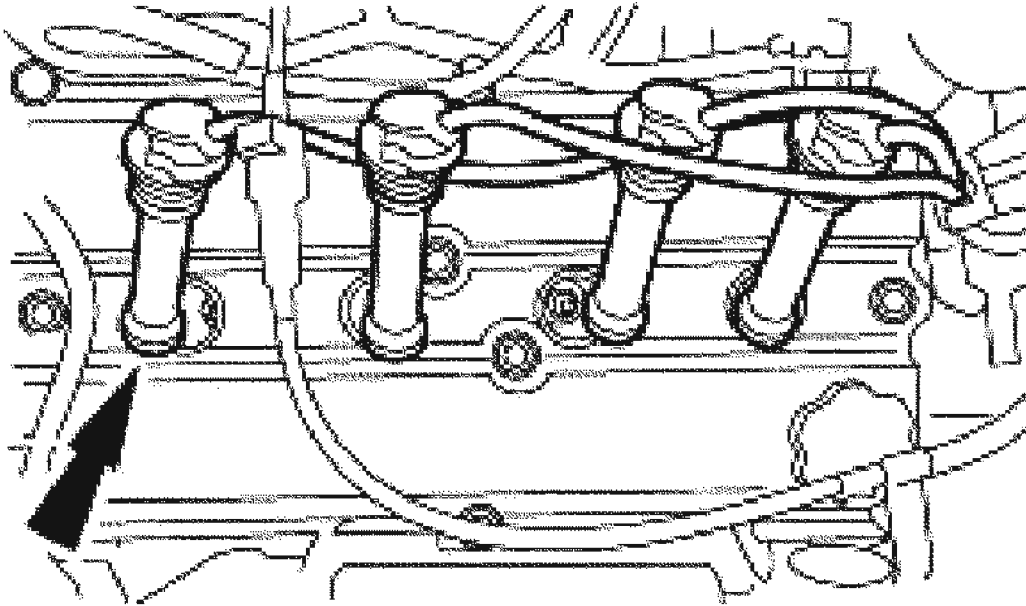
**Fig. 47: Connecting Fuel Tube**  
Courtesy of FORD MOTOR CO.

20. Install the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
21. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .

## VALVE COVER

### Removal And Installation

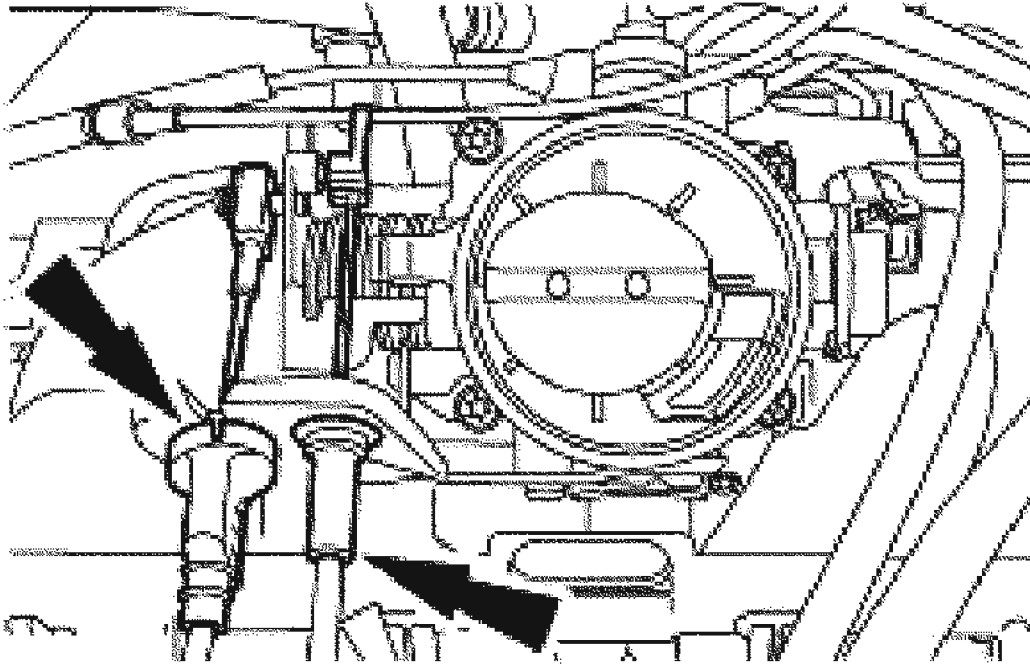
1. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
2. Remove the ignition wires from the spark plugs.



G02738687

**Fig. 48: Removing Ignition Wires From Spark Plugs**  
Courtesy of FORD MOTOR CO.

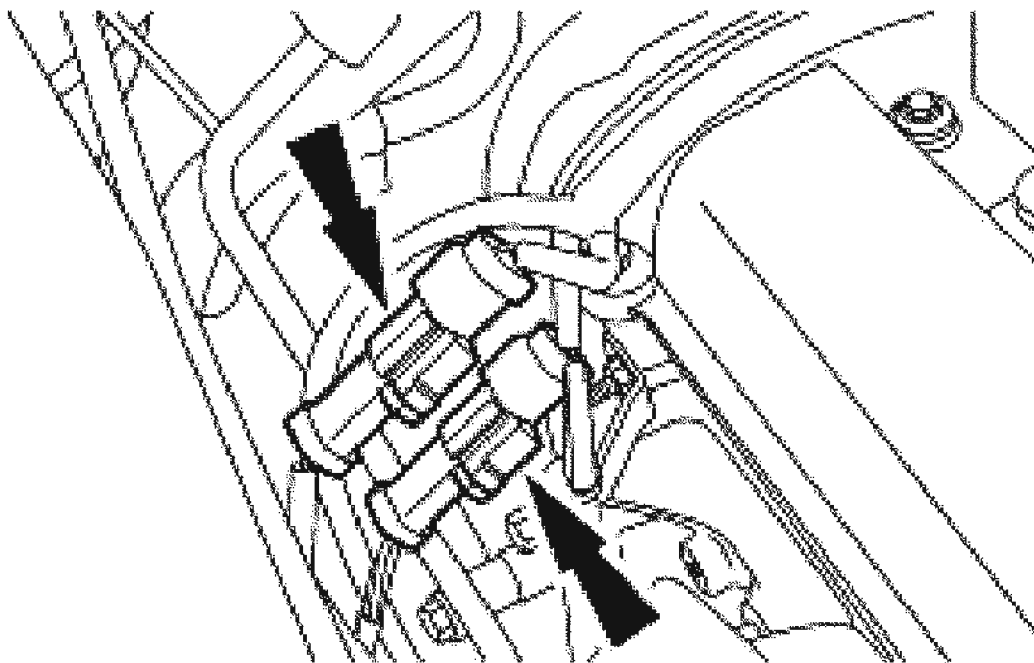
3. Disconnect the throttle cables.
  - Disconnect the speed control actuator cable (if equipped).
  - Disconnect the accelerator cable.



G02738688

**Fig. 49: Disconnecting Throttle Cables**  
Courtesy of FORD MOTOR CO.

4. Disconnect the catalyst monitor and heated oxygen sensor electrical connectors. Detach the electrical connectors from the bracket.

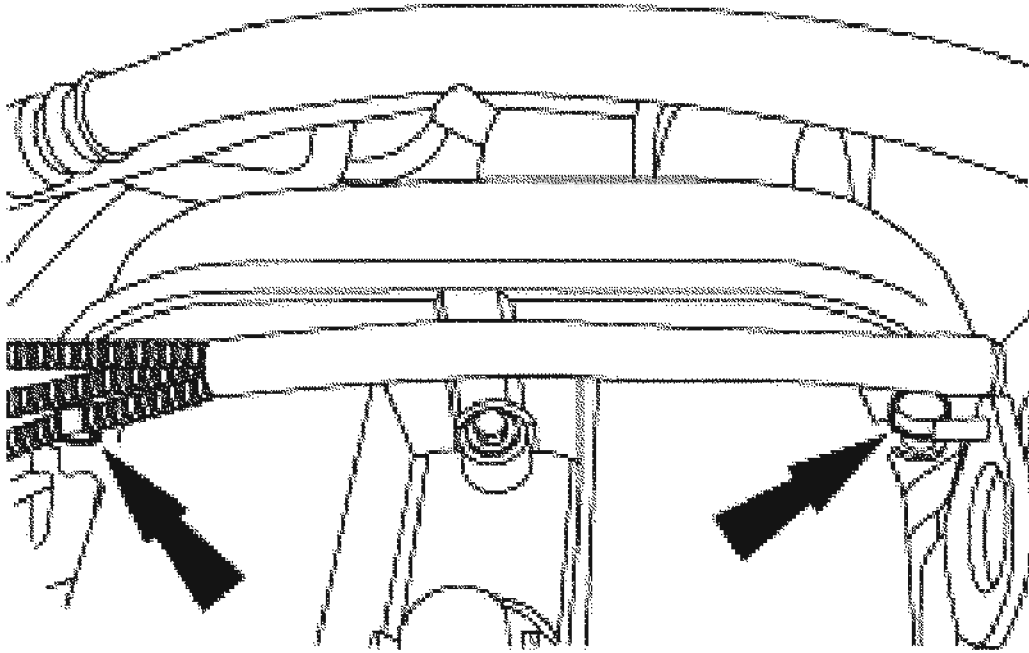


G02738689

**Fig. 50: Disconnecting Catalyst Monitor And Heated Oxygen Sensor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

5. Remove the wiring harness anchors from the valve cover studs and position the wiring harness aside.

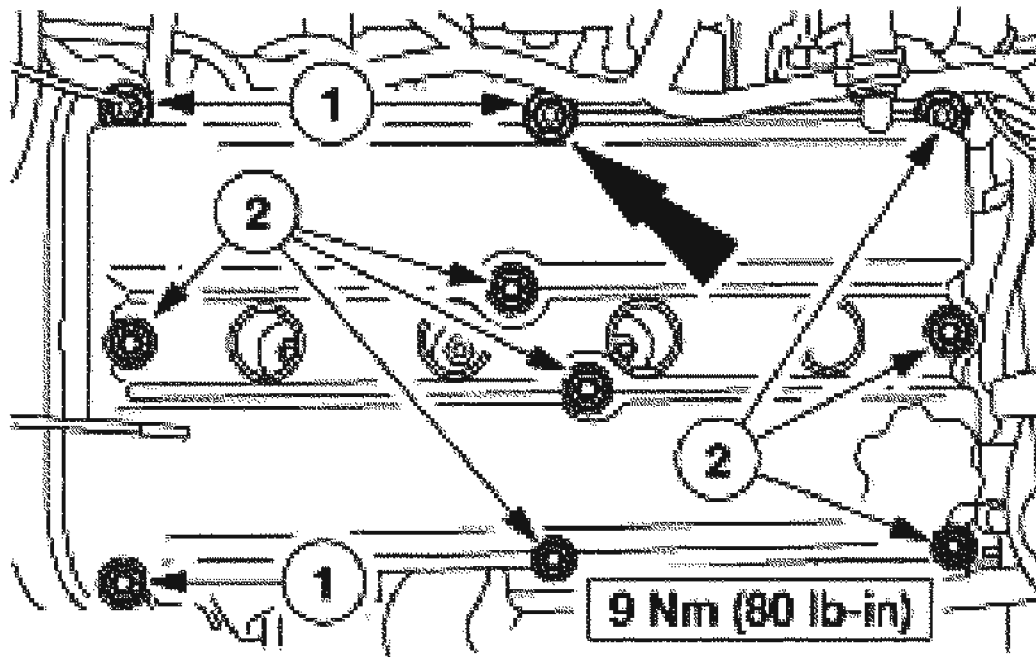


G02738690

**Fig. 51: Removing Wiring Harness Anchors From Valve Cover Studs**  
Courtesy of FORD MOTOR CO.

6. Remove the valve cover.
  1. Remove the stud bolts
  2. Remove the bolts.





G02738691

**Fig. 52: Removing Valve Cover**  
 Courtesy of FORD MOTOR CO.

**CAUTION:** The valve cover sealing surfaces are soft materials. Do not use abrasive grinding discs to remove gasket material; only use manual scrapers. Do not scratch or gouge sealing surfaces or oil leaks may occur.

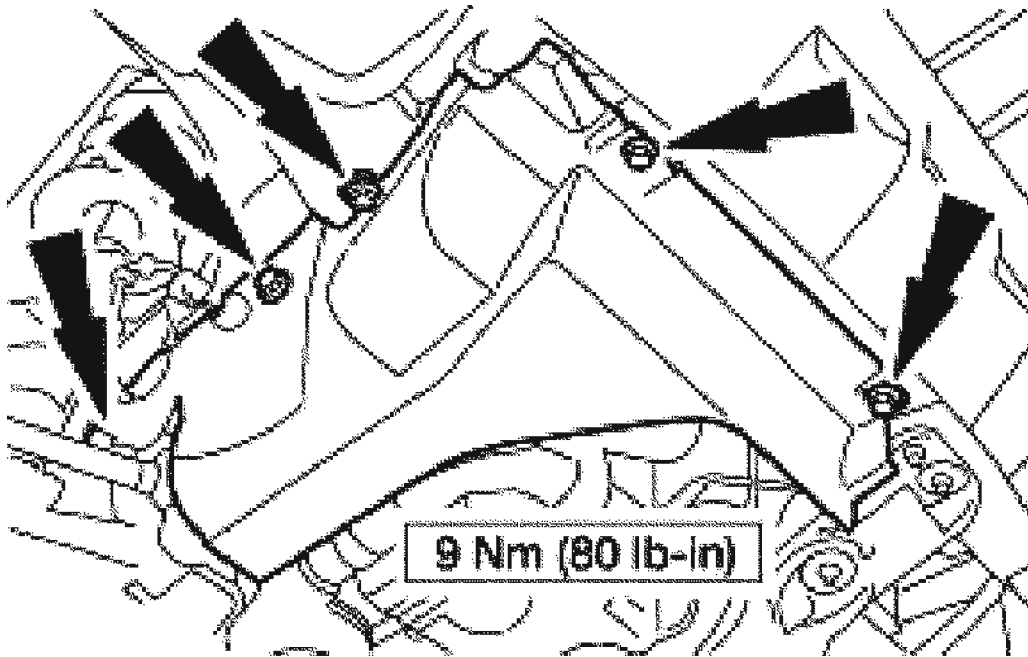
7. Clean and inspect the sealing surfaces of the valve cover and the cylinder head. Both surfaces must be clean and flat.
8. To install, reverse the removal procedure.
  - Install a new valve cover gasket if damaged.

## CRANKSHAFT PULLEY

### Removal And Installation

1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.
2. Remove the RF wheel and tire assembly. For additional information, refer to **FRONT** article in Suspension.

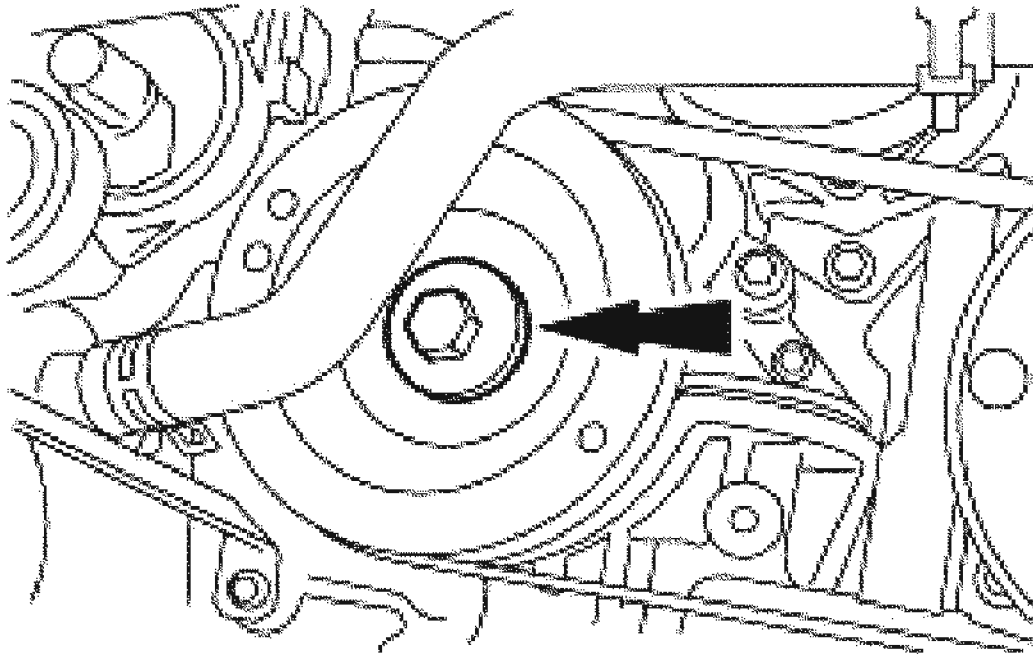
3. Remove the bolts and the RH lower splash shield.



G02738692

**Fig. 53: Removing RH Lower Splash Shield**  
Courtesy of FORD MOTOR CO.

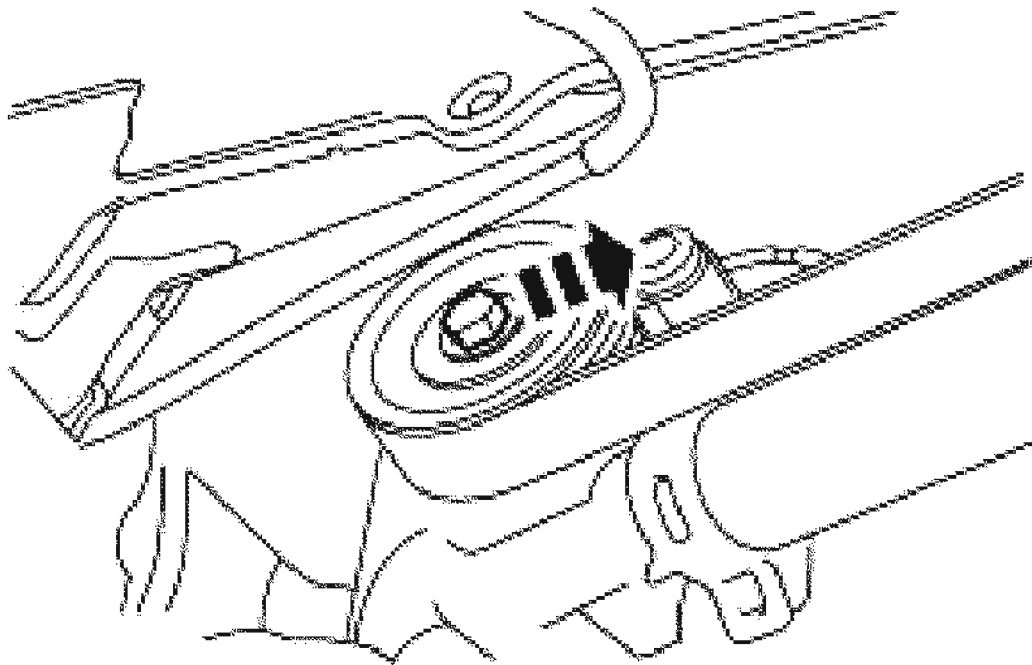
4. Loosen the bolt retaining the crankshaft pulley.



G02738693

**Fig. 54: Removing Bolt Retaining Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

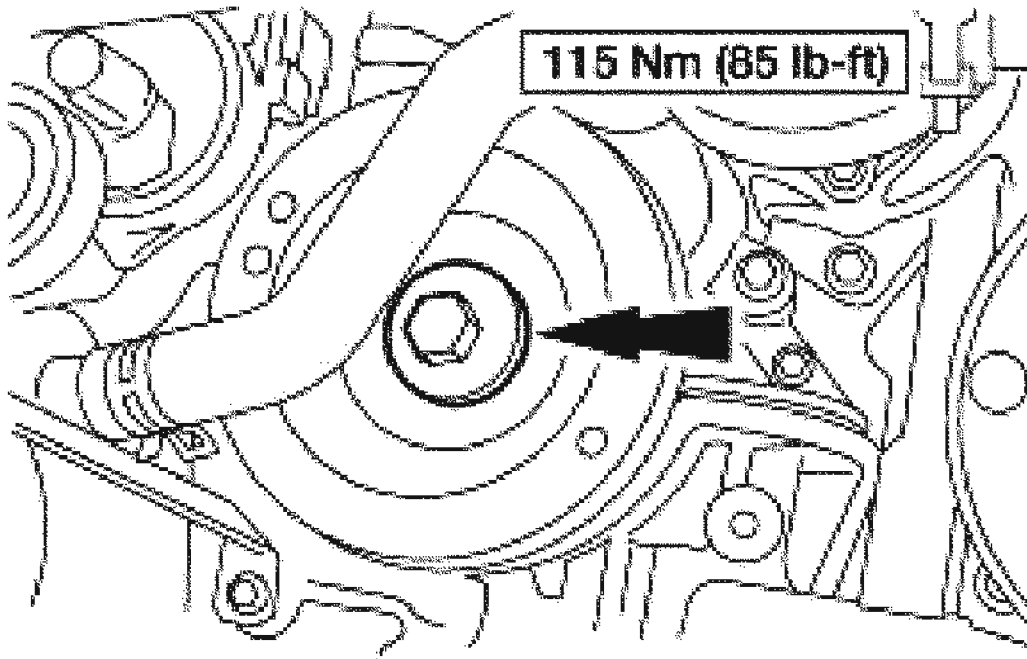
5. Remove the accessory drive belt.



G02738694

**Fig. 55: Removing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

6. Remove the bolt and the crankshaft pulley.



G02738695


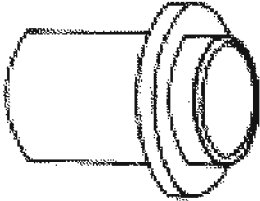
**Fig. 56: Removing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.

#### CRANKSHAFT FRONT OIL SEAL

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

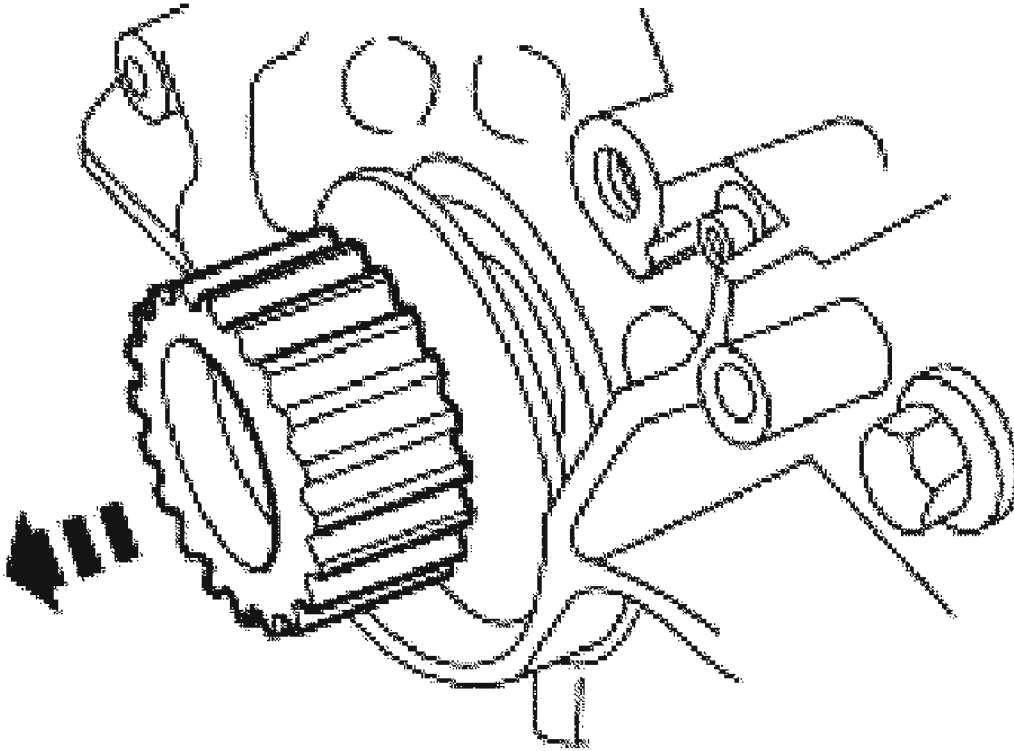
	Seal Remover 303-409 (T92C-6700-CH)
	Oil Seal Replacer 303-164 (T81P-6700-A)

G02738696

**Fig. 57: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal

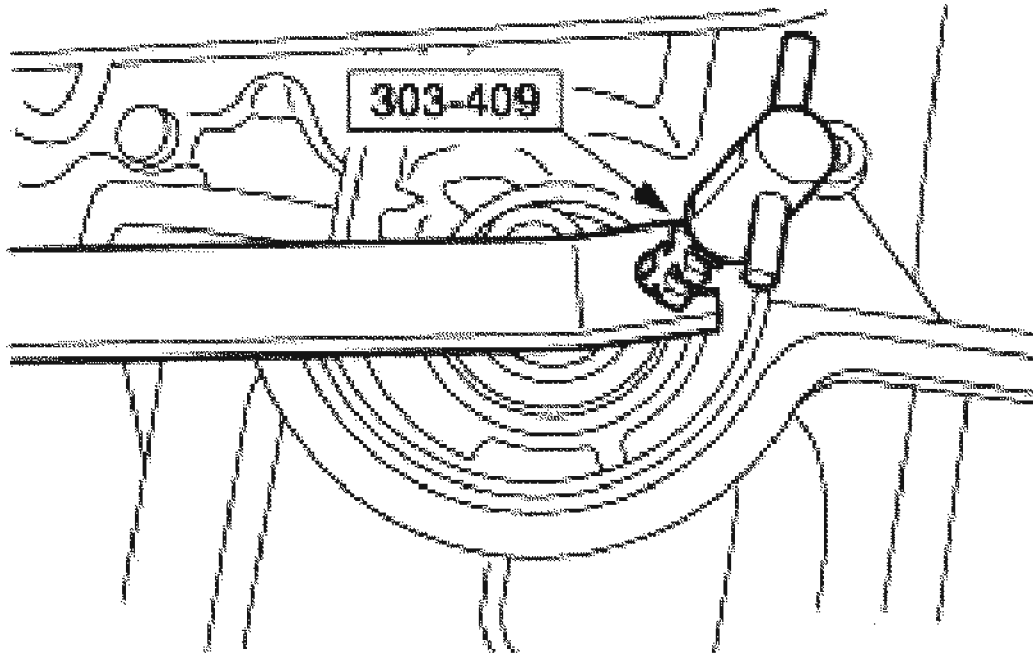
1. Remove the timing belt. For additional information, refer to **TIMING BELT** .
2. Remove the crankshaft sprocket and timing belt guide.



G02738697

**Fig. 58: Removing Crankshaft Sprocket And Timing Belt Guide**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Use care to avoid damaging the crankshaft surface.



G02738698

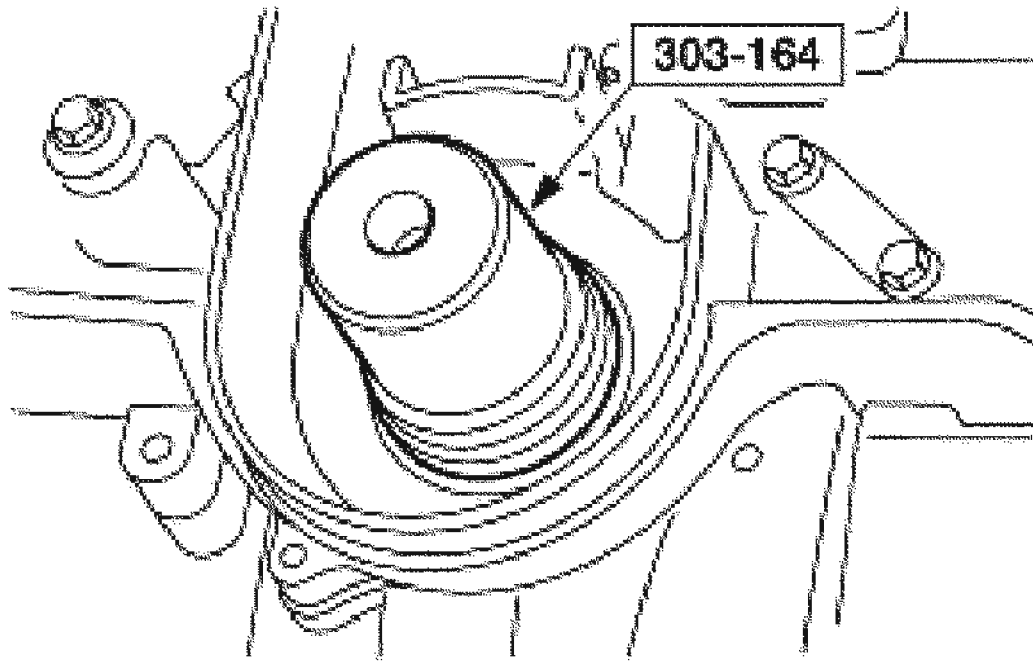
**Fig. 59: Removing Crankshaft Front Seal From Oil Pump**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, remove the crankshaft front seal from the oil pump.

#### Installation

1. Using the special tool, install a new crankshaft front seal.

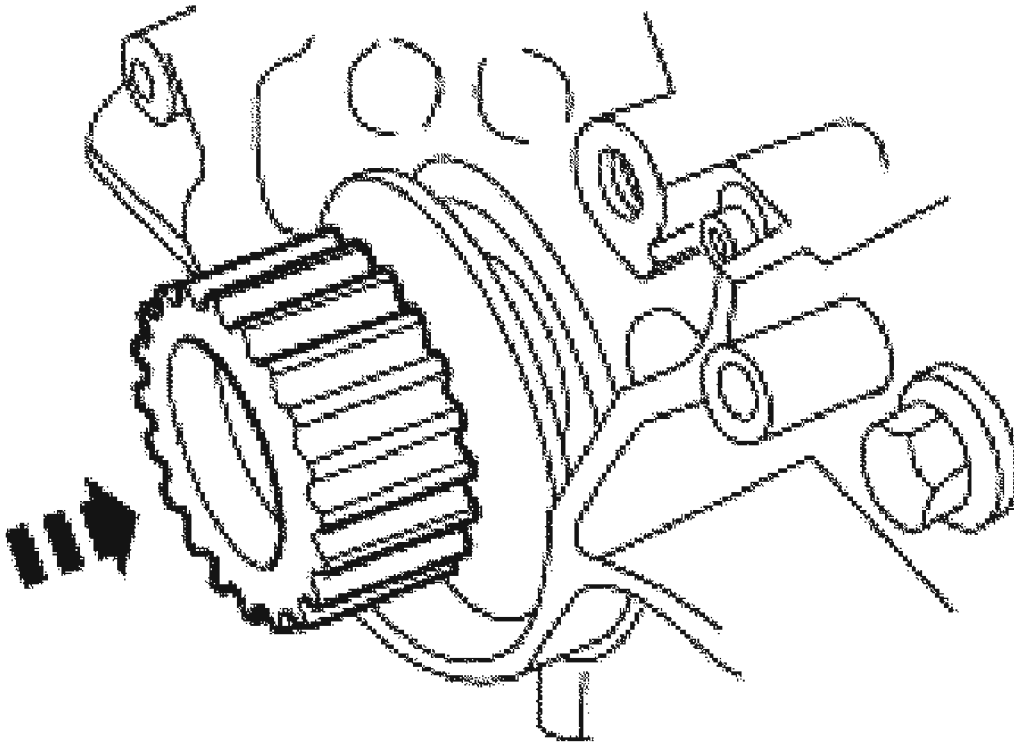




G02738699

**Fig. 60: Installing New Crankshaft Front Seal**  
Courtesy of FORD MOTOR CO.

2. Install the timing belt guide and crankshaft sprocket.

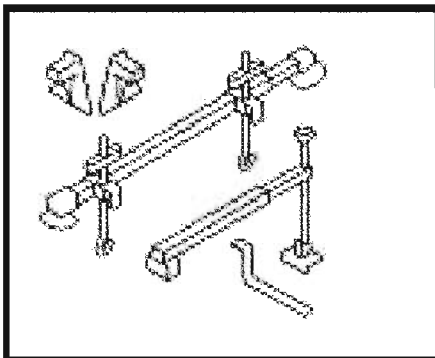


G02738700

**Fig. 61: Installing Timing Belt Guide And Crankshaft Sprocket**  
Courtesy of FORD MOTOR CO.

3. Install the timing belt. For additional information, refer to **TIMING BELT** .

**TIMING BELT COVER - UPPER AND LOWER**



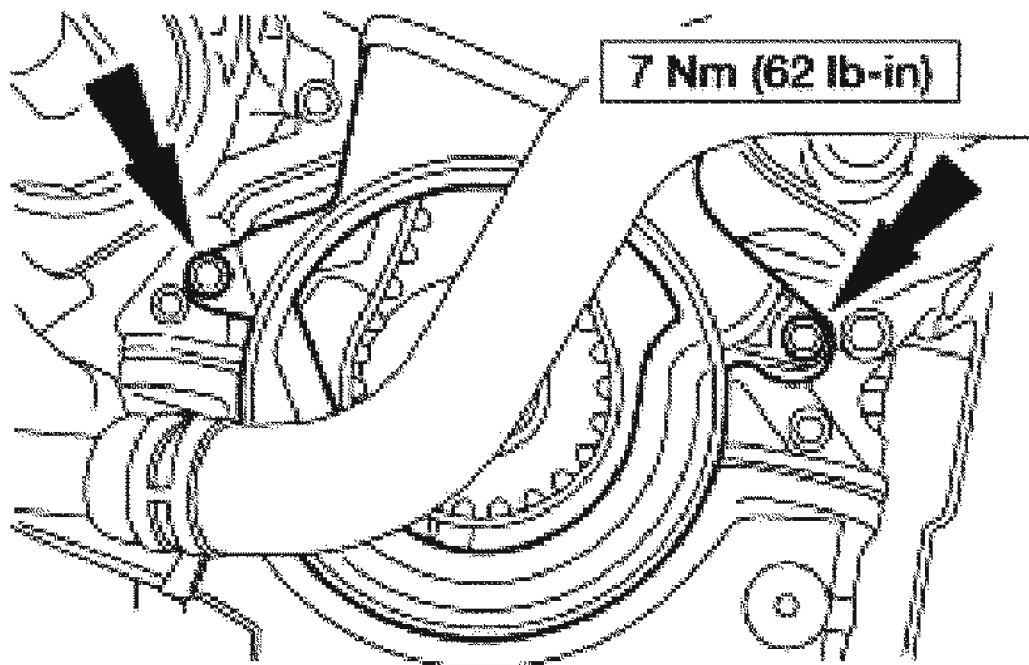
**3 Bar Engine Support Kit**  
**303-F072**

G02738701

**Fig. 62: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal And Installation**

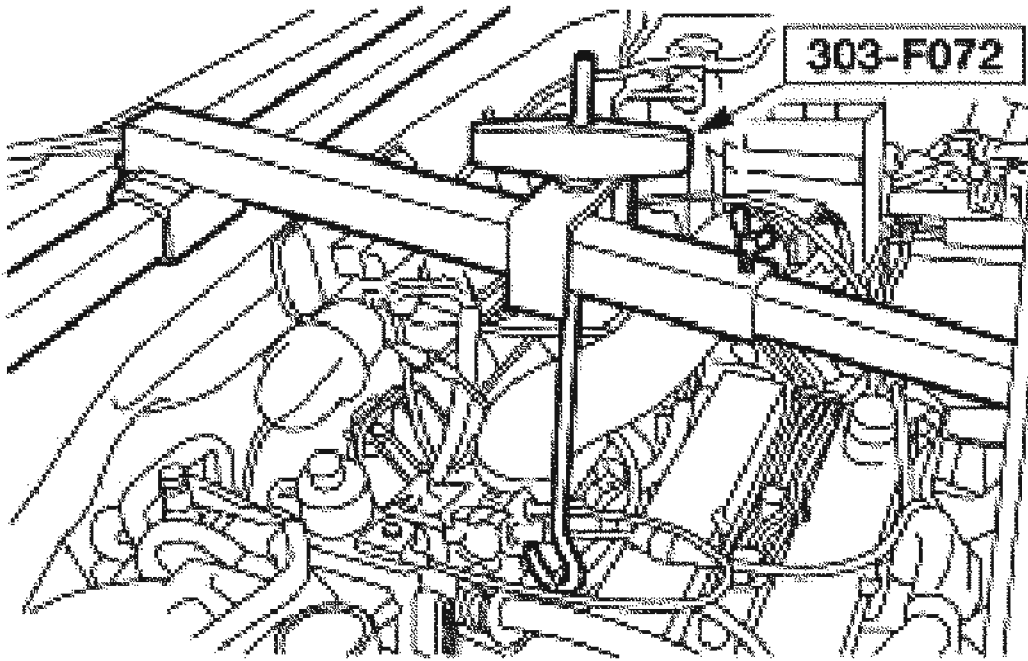
1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
2. Remove the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY** .
3. Remove the bolts and the lower timing belt cover.



**G02738702**

**Fig. 63: Removing Lower Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

4. Lower the vehicle.
5. Install the special tool.



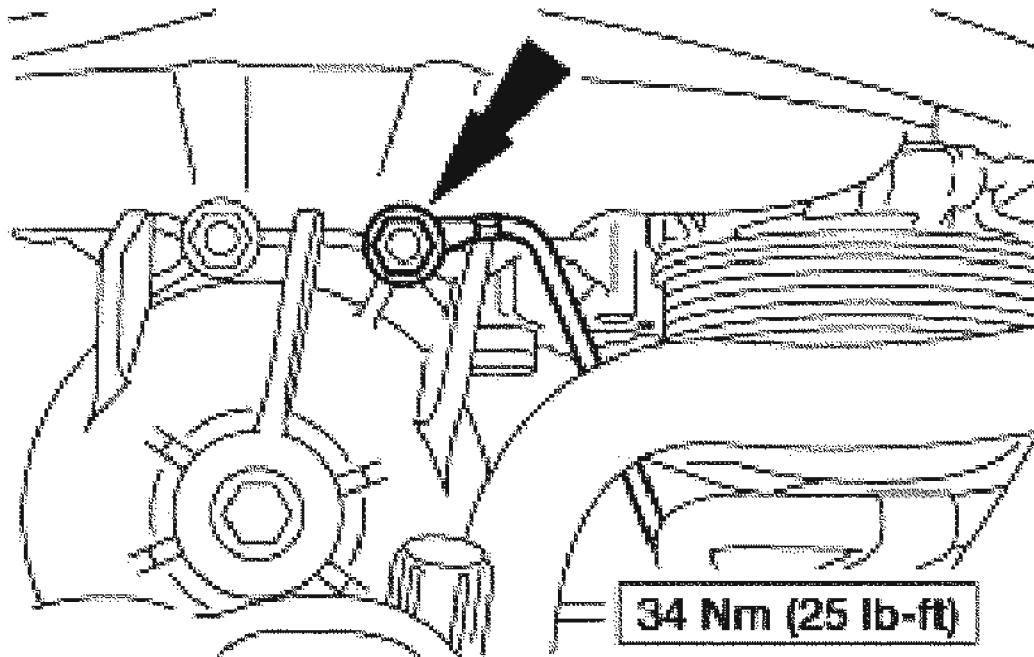
G02738703

**Fig. 64: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

6. Remove the ground strap.

## 2004 Ford Escape

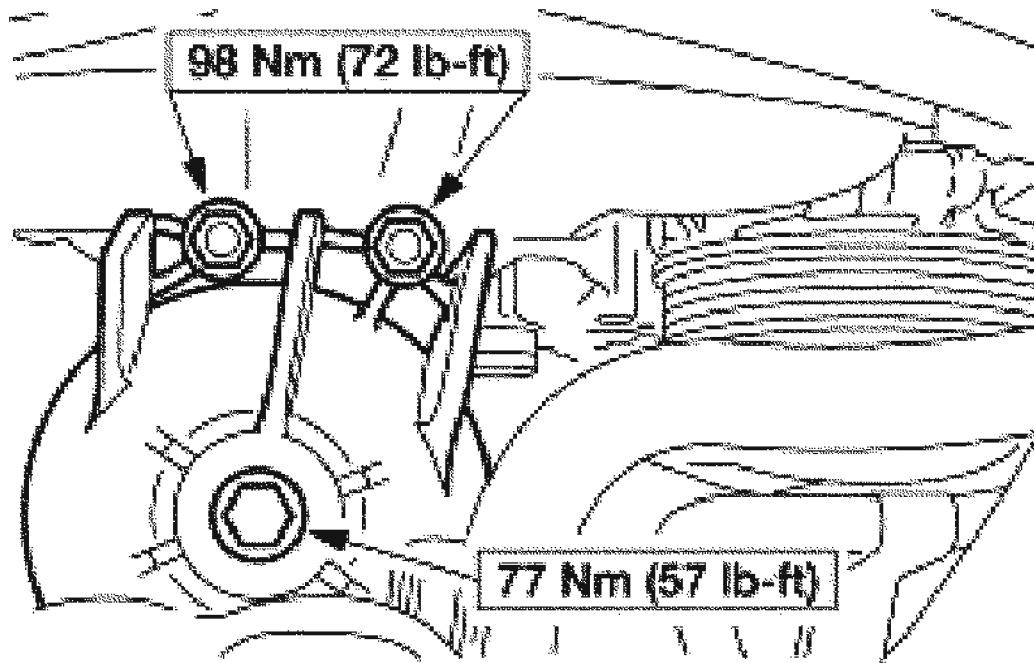
2004 ENGINE Engine - 2.0L Zetec - Escape



G02738704

**Fig. 65: Removing Ground Strap**  
Courtesy of FORD MOTOR CO.

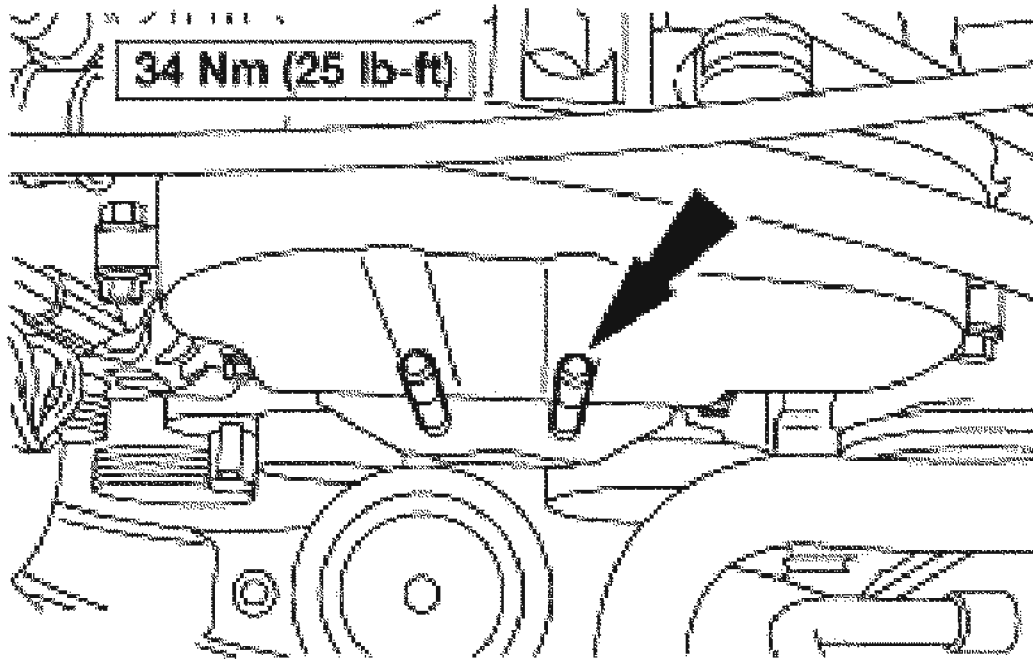
7. Remove the engine mount upper bracket.



G02738705

**Fig. 66: Removing Engine Mount Upper Bracket**  
Courtesy of FORD MOTOR CO.

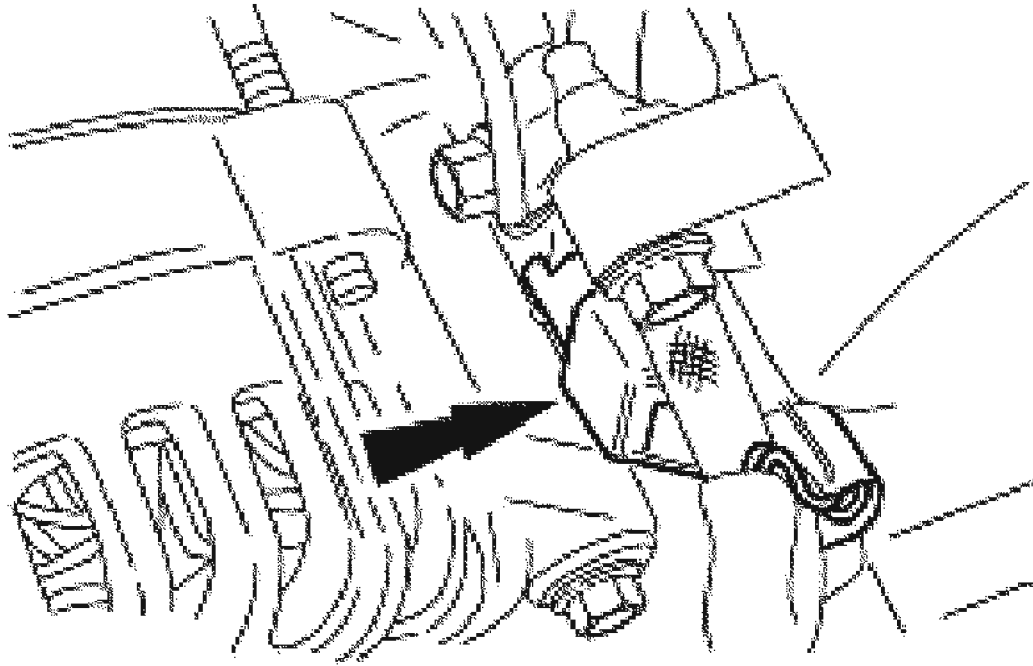
8. Remove the studs.



G02738706

**Fig. 67: Identifying Studs**  
Courtesy of FORD MOTOR CO.

9. Remove the knock sensor connector.

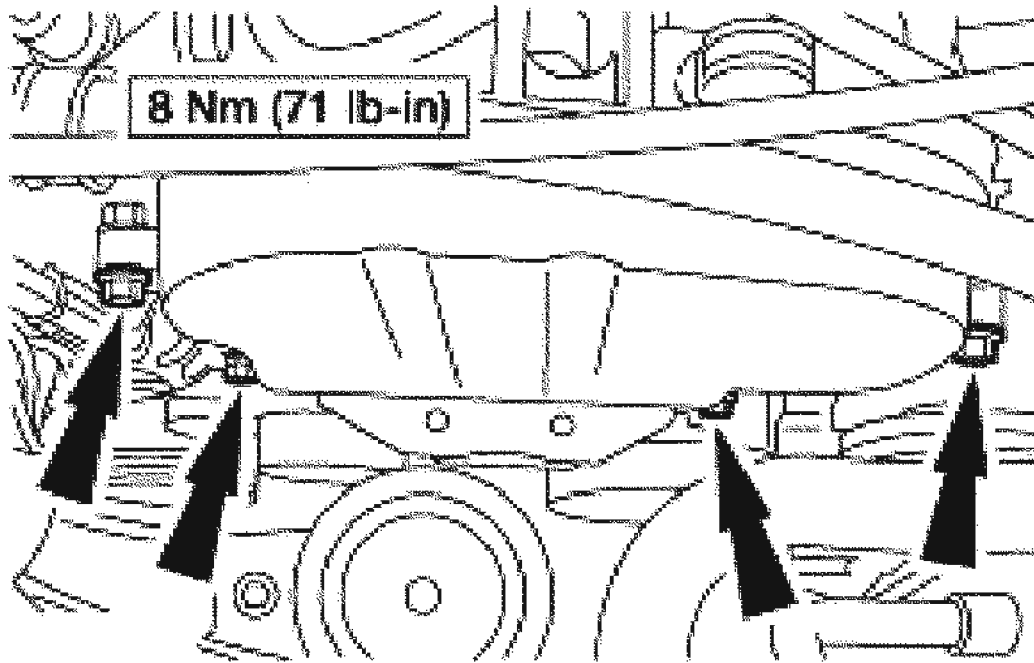


G02738707

**Fig. 68: Removing Knock Sensor Connector**  
Courtesy of FORD MOTOR CO.

10. Remove the bolts and the upper timing belt cover.





G02738708

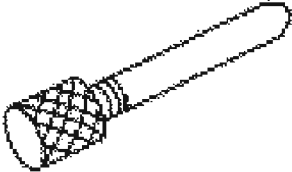

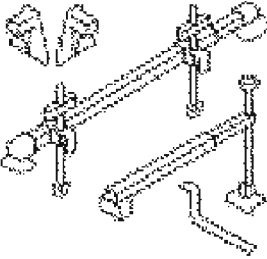
**Fig. 69: Removing Upper Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

11. To install, reverse the removal procedure.

## **TIMING BELT**

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

	Crankshaft TDC Timing Peg 303-574 (T97P-6000-A)
	Camshaft Alignment Timing Tool 303-465 (T94P-6256-CH)
	3 Bar Engine Support Kit 303-F072

G02738709

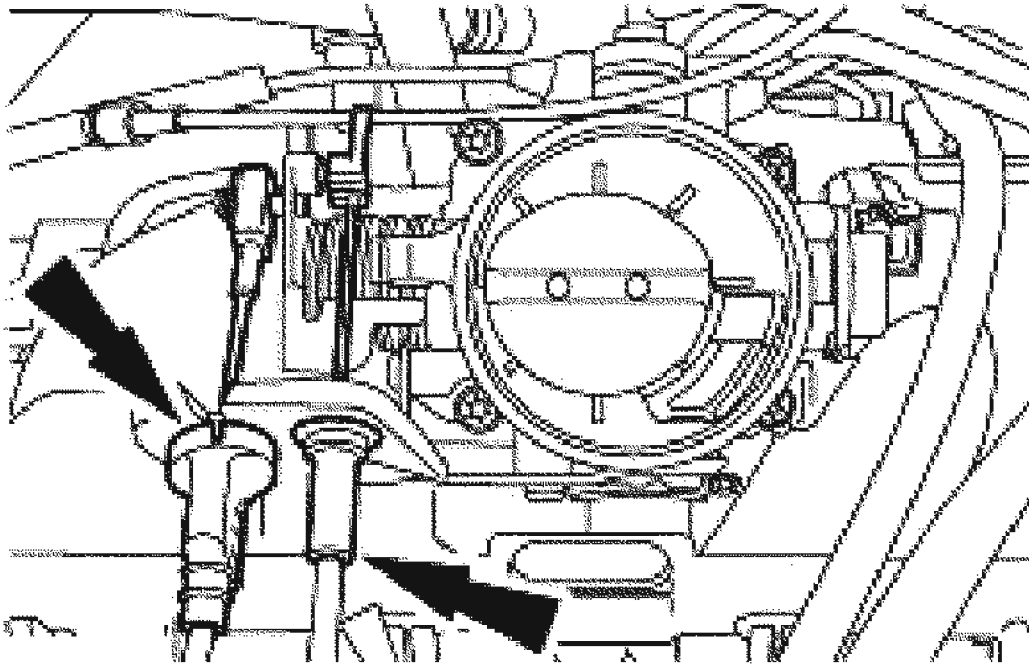
**Fig. 70: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
3. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
4. Remove the spark plugs. For additional information, refer to **ENGINE IGNITION-**

## **2.0L ZETEC .**

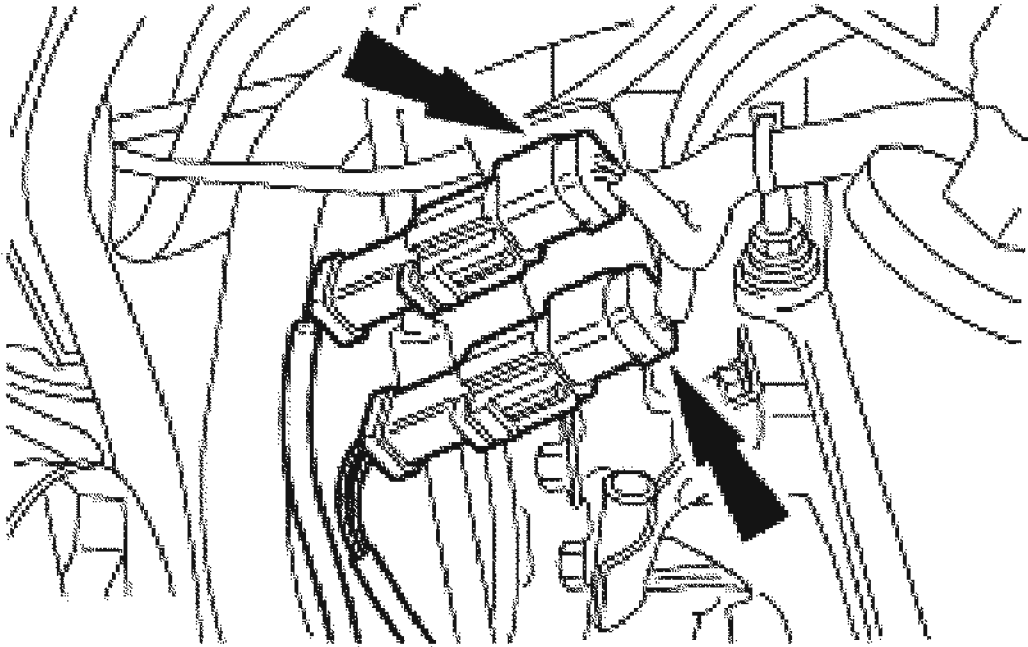
5. Disconnect the throttle cables.
  - If equipped, disconnect the speed control actuator cable.
  - Disconnect the accelerator cable.



G02738710

**Fig. 71: Disconnecting Accelerator Cable**  
Courtesy of FORD MOTOR CO.

6. Disconnect the catalyst monitor and heated oxygen sensor electrical connectors. Detach the electrical connectors from the bracket.

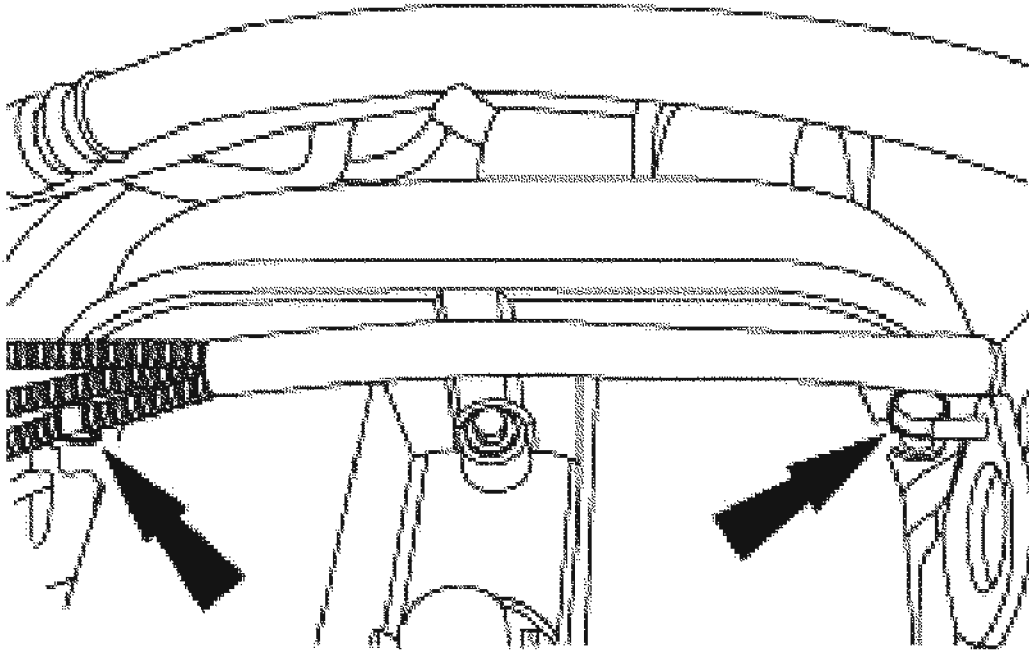


G02738711

**Fig. 72: Disconnecting Catalyst Monitor And Heated Oxygen Sensor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

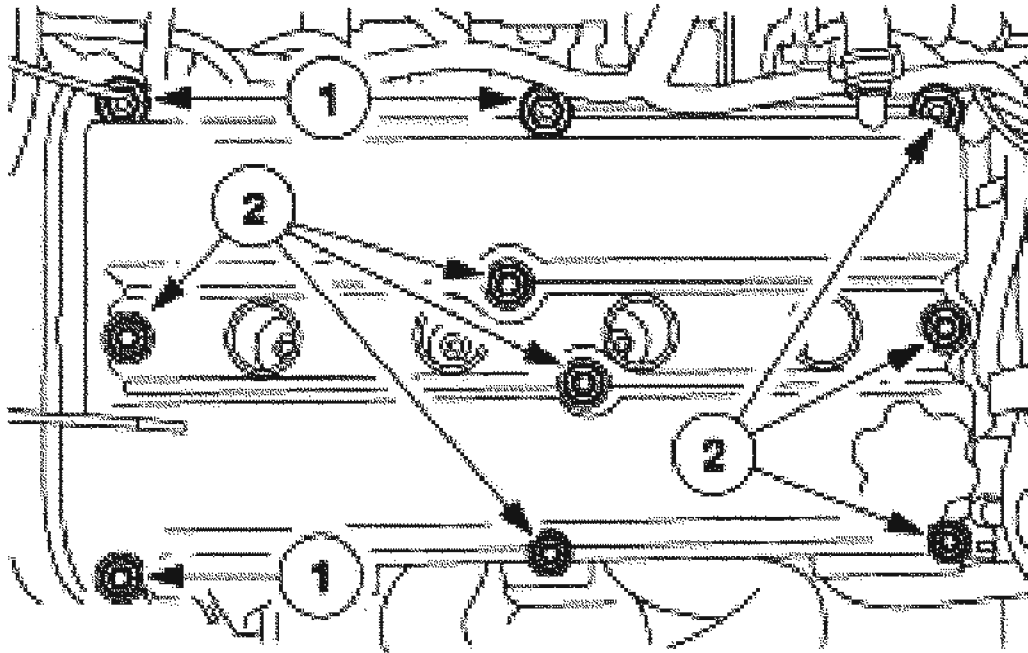
7. Remove the wiring harness anchors from the valve cover studs and position the wiring harness aside.



G02738712

**Fig. 73: Removing Wiring Harness Anchors From Valve Cover Studs**  
Courtesy of FORD MOTOR CO.

8. Remove the valve cover.
  1. Remove the studbolts.
  2. Remove the bolts.

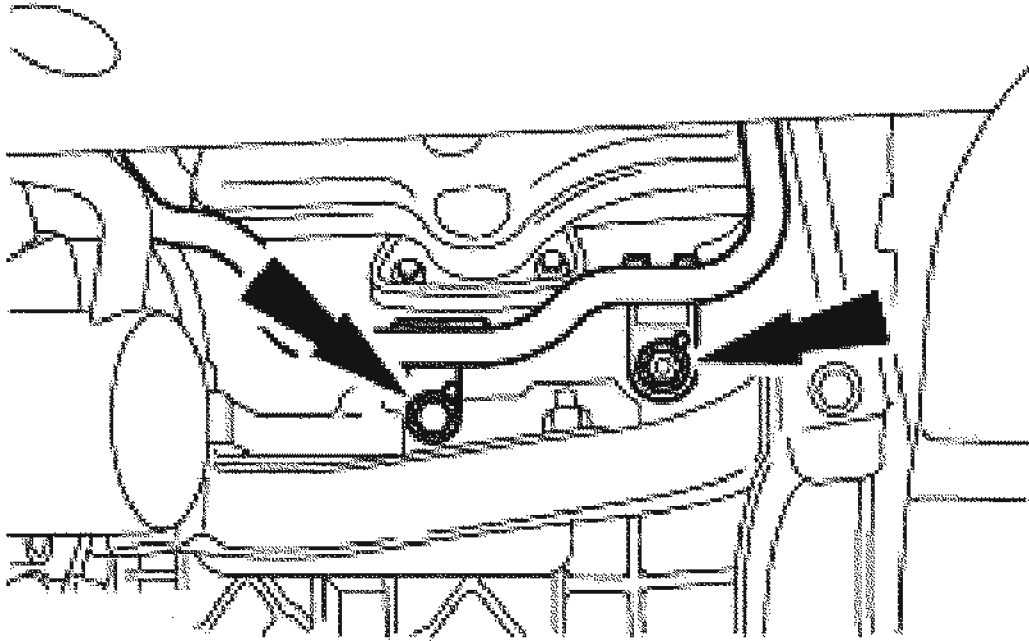


G02738713

**Fig. 74: Removing Valve Cover**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The valve cover sealing surfaces are soft materials. Do not use abrasive grinding discs to remove gasket material. Use only a plastic scraping tool. Do not scratch or gouge sealing surfaces or oil leaks can occur.

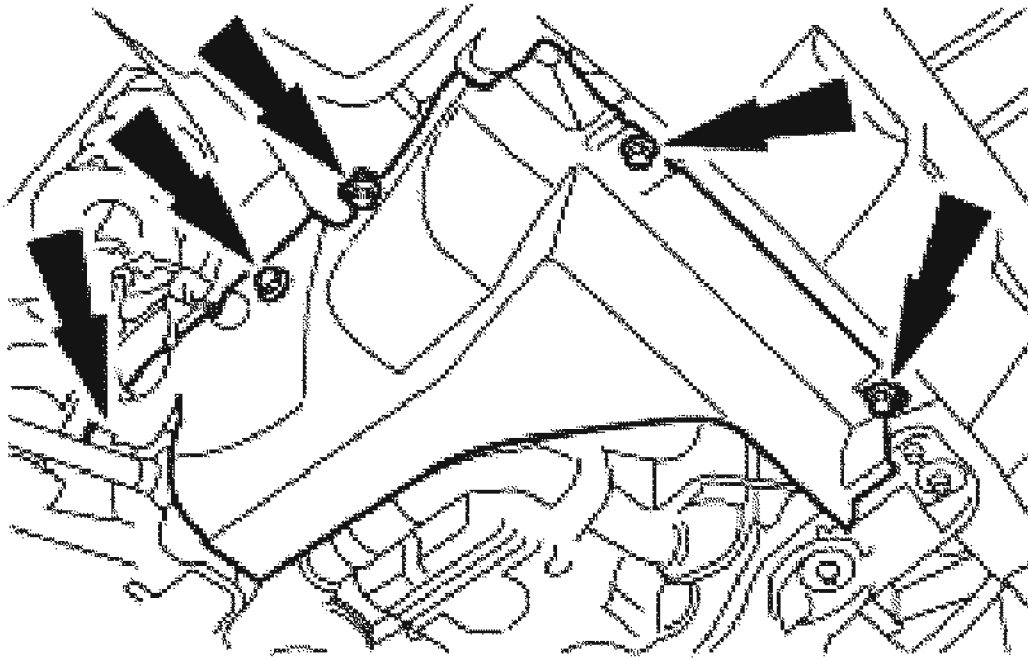
9. Clean and inspect the sealing surfaces of the valve cover and cylinder head. Both surfaces must be clean and flat.
10. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
11. Remove the bolt and nut and position the coolant tube aside.



G02738714

**Fig. 75: Removing Coolant Tube**  
Courtesy of FORD MOTOR CO.

12. Remove the wheel and tire assembly. For additional information, refer to **FRONT** article in Suspension or **REAR** article in Suspension .
13. Remove the RH lower splash shield.

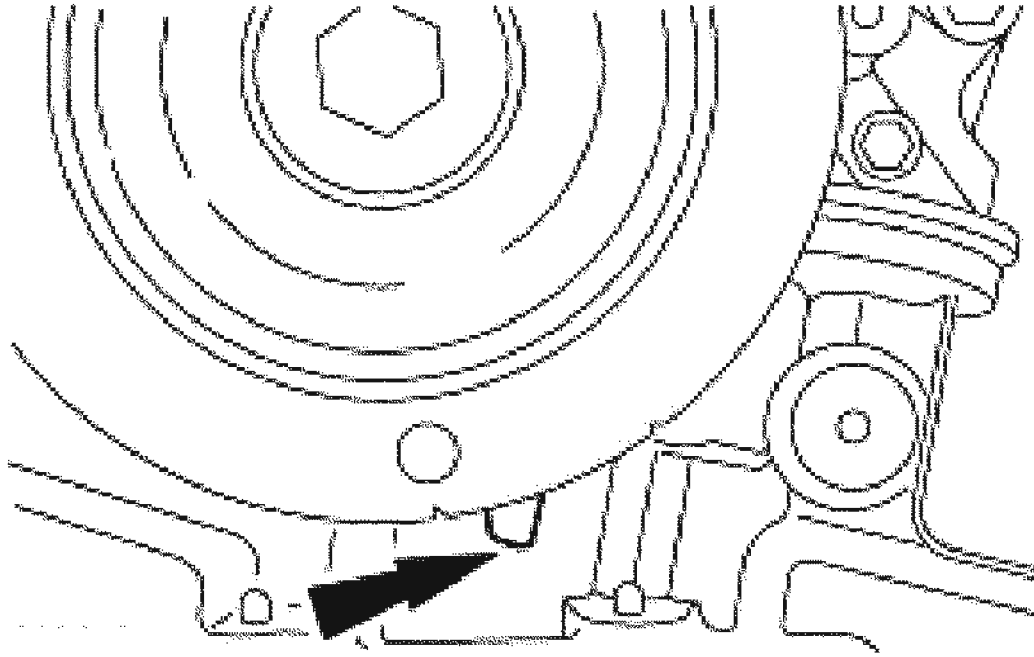


G02738715

**Fig. 76: Removing RH Lower Splash Shield**  
Courtesy of FORD MOTOR CO.

14. Rotate the crankshaft to just before top dead center (TDC) (No. 1 cylinder).

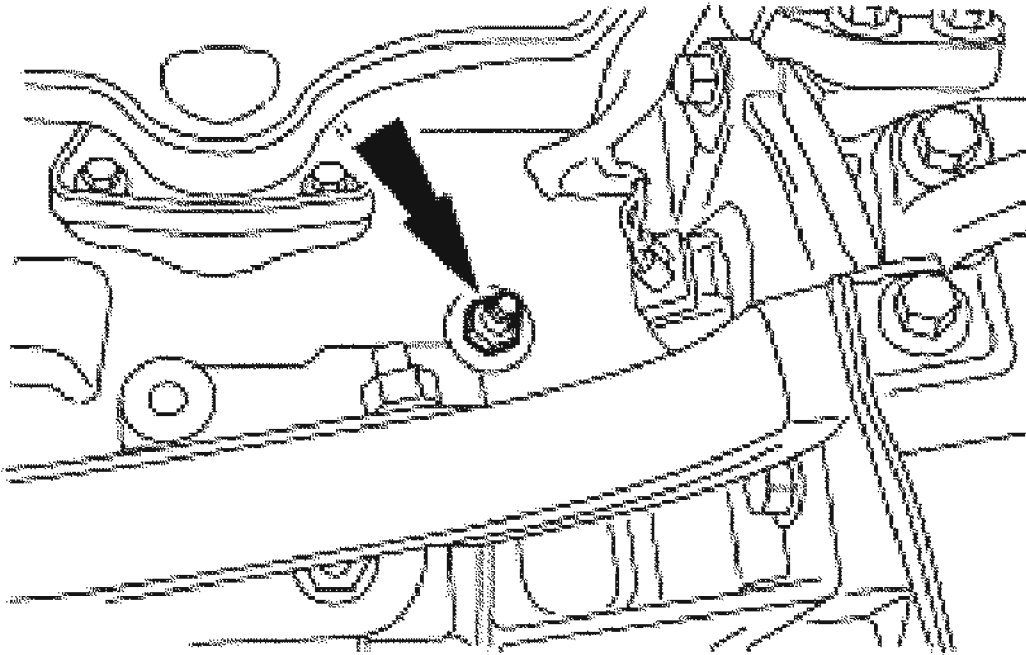




G02738716

**Fig. 77: Rotating Crankshaft To Just Before Top Dead Center (TDC)**  
Courtesy of FORD MOTOR CO.

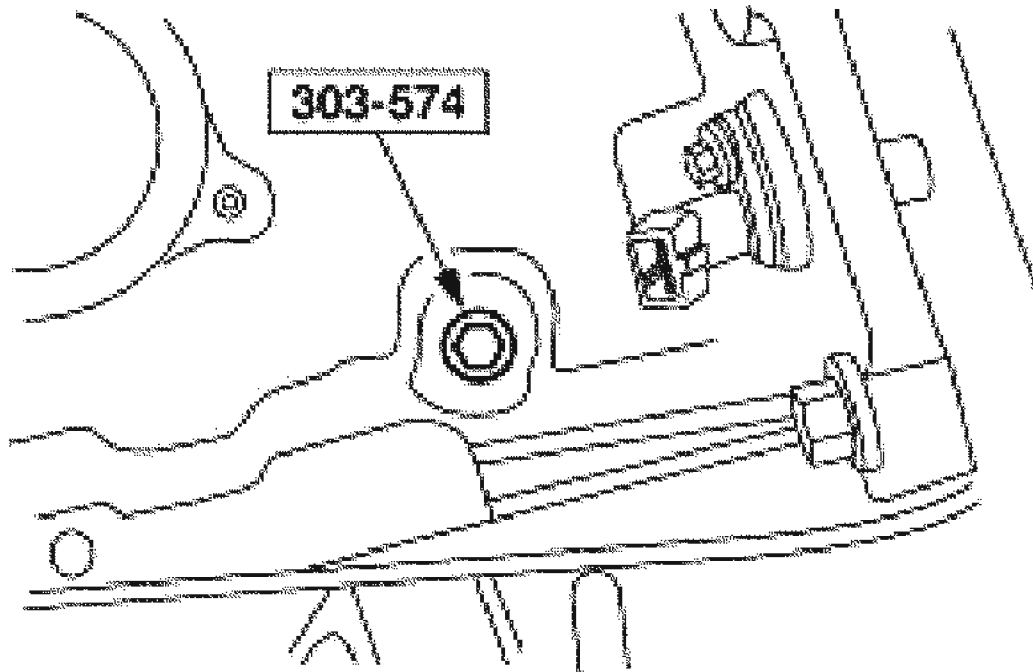
15. Remove the stud.



G02738717

**Fig. 78: Identifying Stud**  
Courtesy of FORD MOTOR CO.

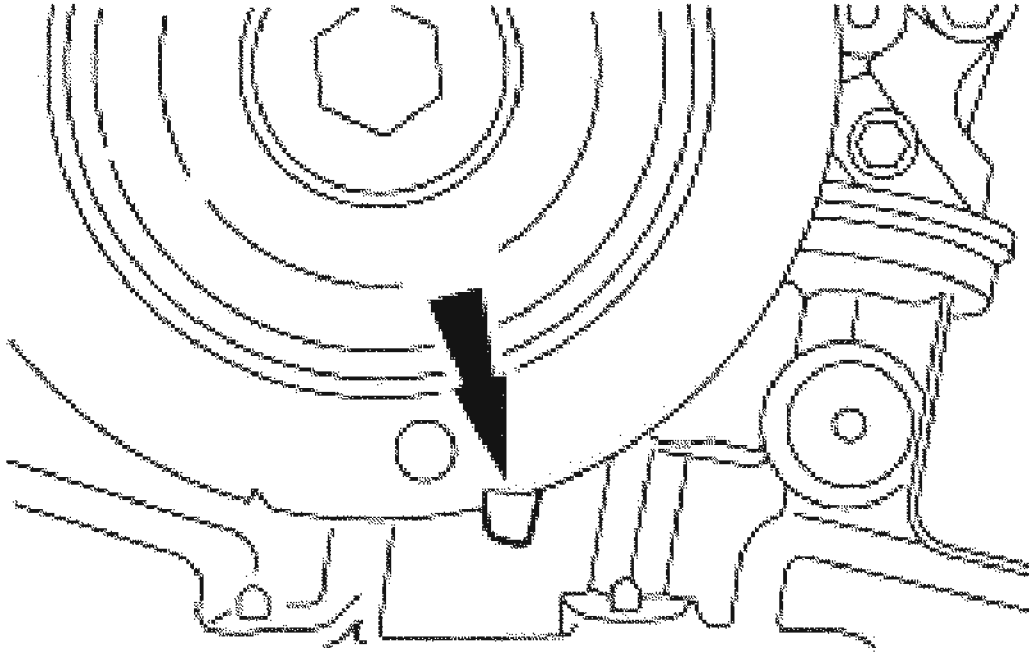
16. Install the special tool.



G02738718

**Fig. 79: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

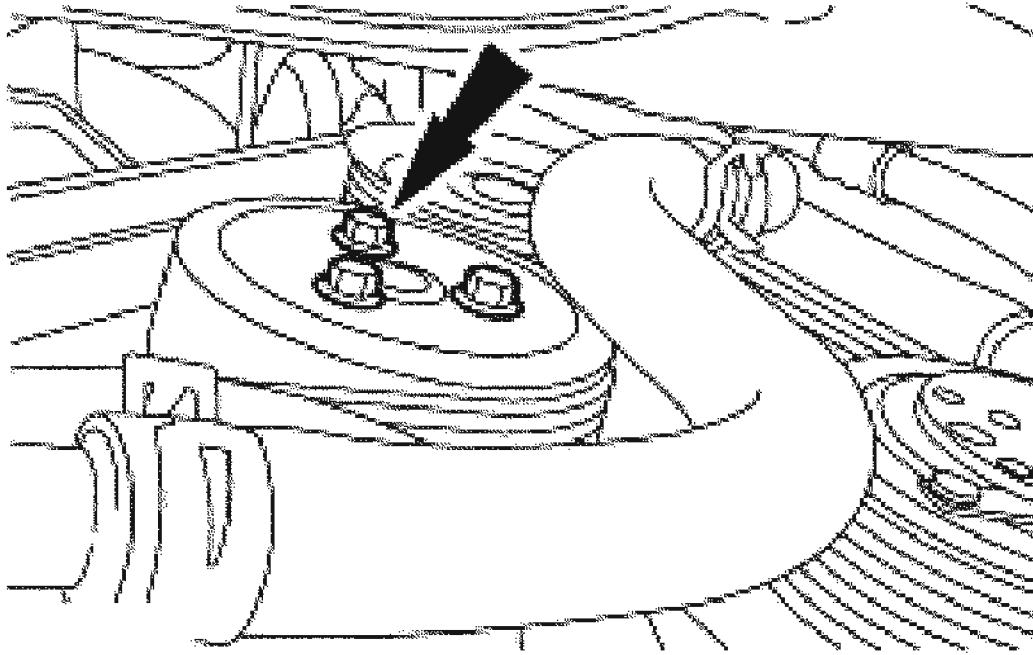
**NOTE:** Make sure the correct (second) notch in the pulley is indexed to the lower cylinder block.



G02738719

**Fig. 80: Rotating Crankshaft Clockwise To TDC**  
**Courtesy of FORD MOTOR CO.**

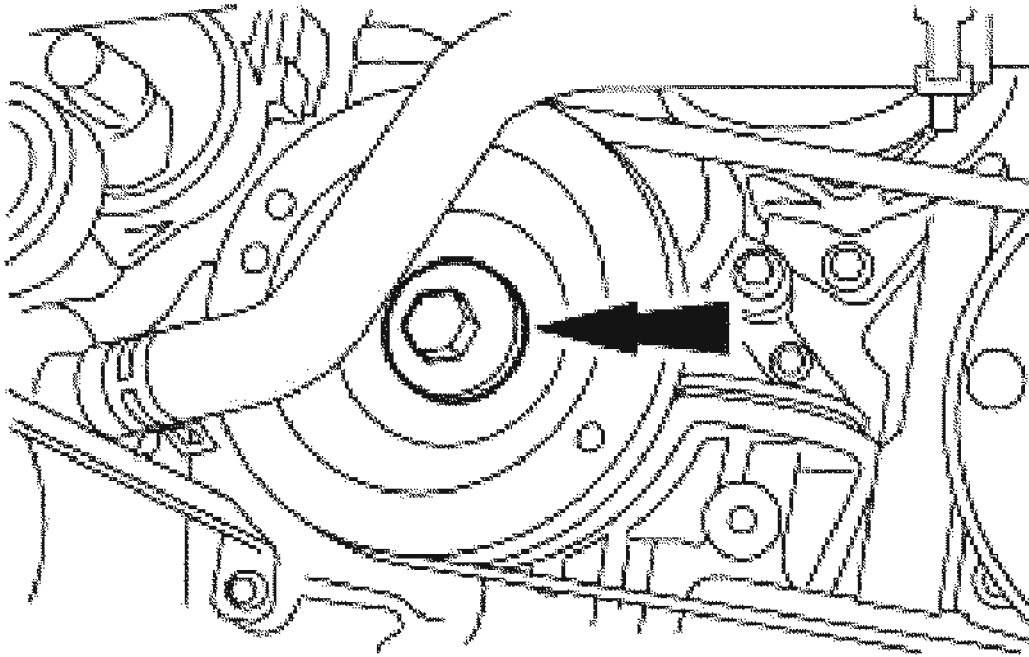
17. Rotate the crankshaft clockwise against the peg to bring it to TDC (No. 1 cylinder).
18. Loosen the coolant pump pulley bolts.



G02738720

**Fig. 81: Removing Coolant Pump Pulley Bolts**  
Courtesy of FORD MOTOR CO.

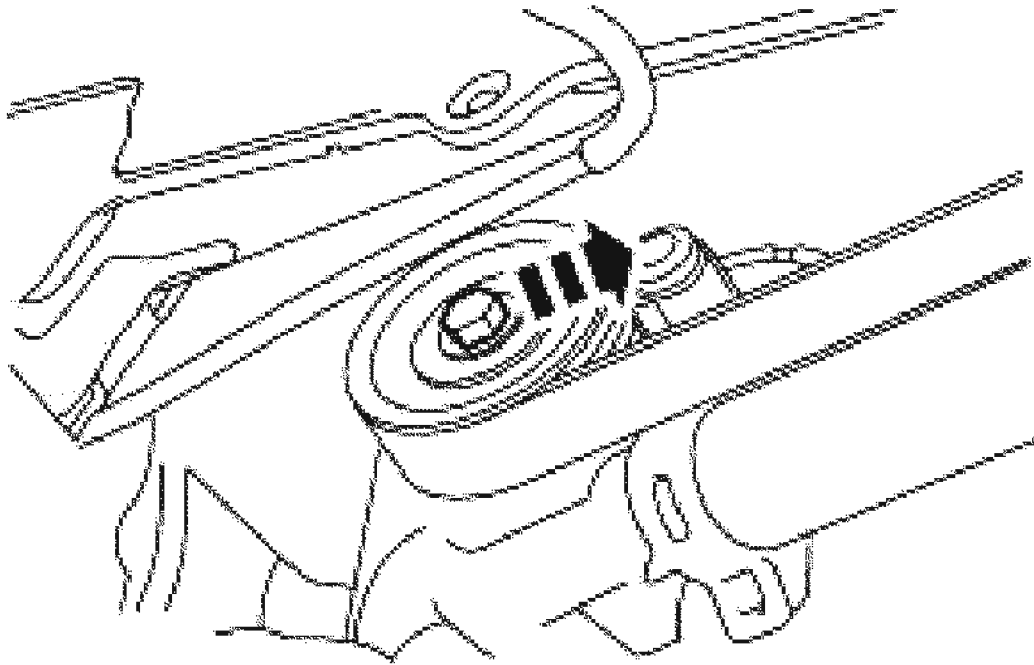
19. Loosen the crankshaft pulley bolt.



G02738721

**Fig. 82: Removing Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

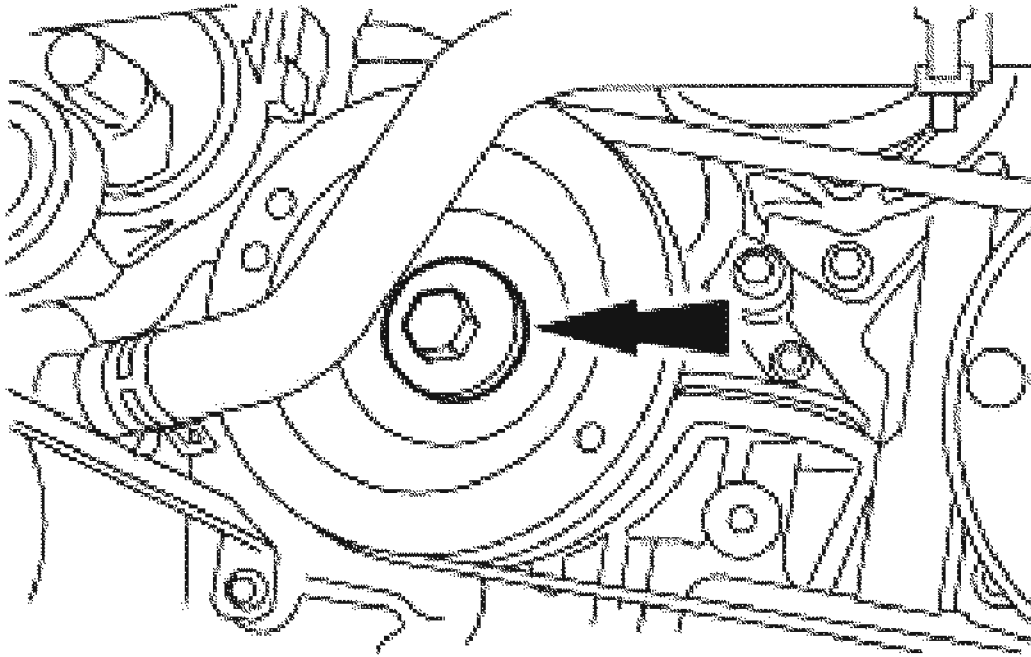
20. Rotate the tensioner and remove the accessory drive belt.



G02738722

**Fig. 83: Removing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

21. Remove the bolt and the crankshaft pulley.

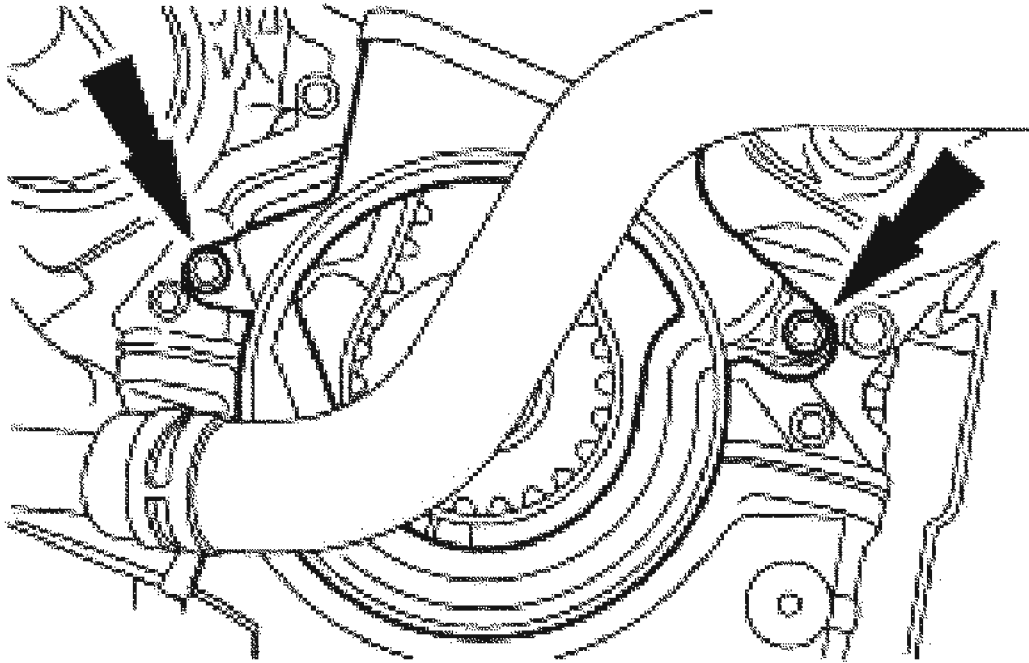


G02738723

**Fig. 84: Removing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

22. Remove the bolts and the lower timing belt cover.

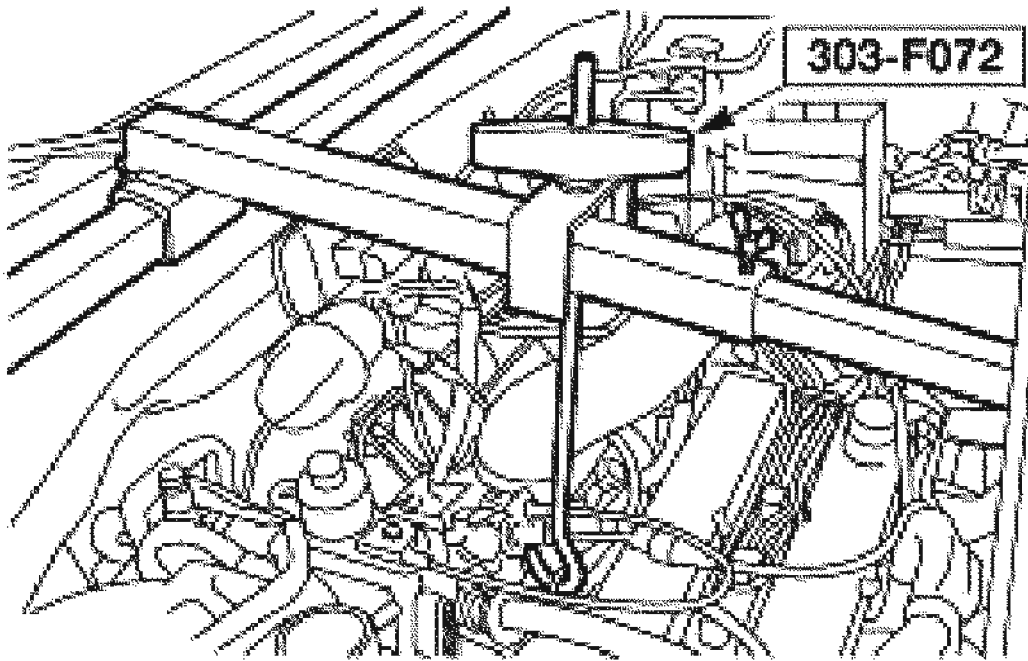




G02738724

**Fig. 85: Removing Lower Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

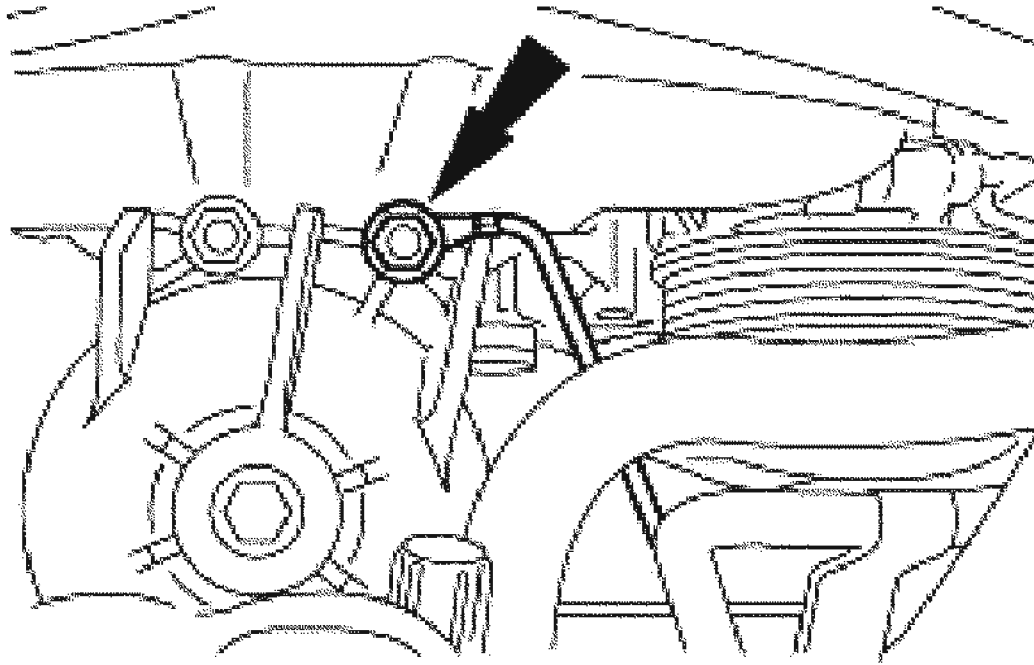
23. Install the special tool.



G02738725

**Fig. 86: Installing Special Tool**  
**Courtesy of FORD MOTOR CO.**

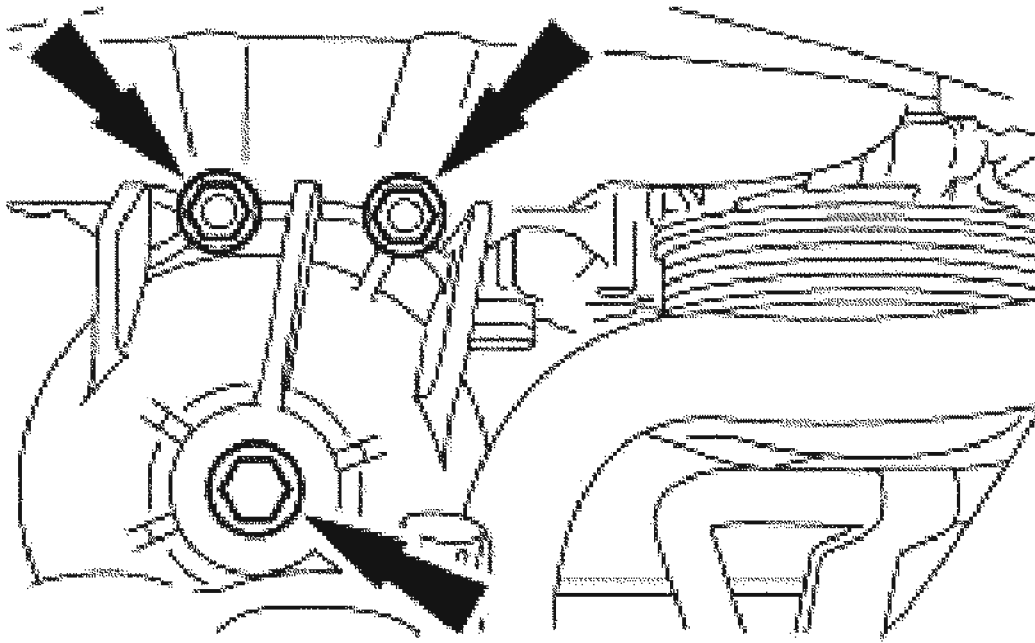
24. Detach the ground strap.



G02738726

**Fig. 87: Removing Ground Strap**  
**Courtesy of FORD MOTOR CO.**

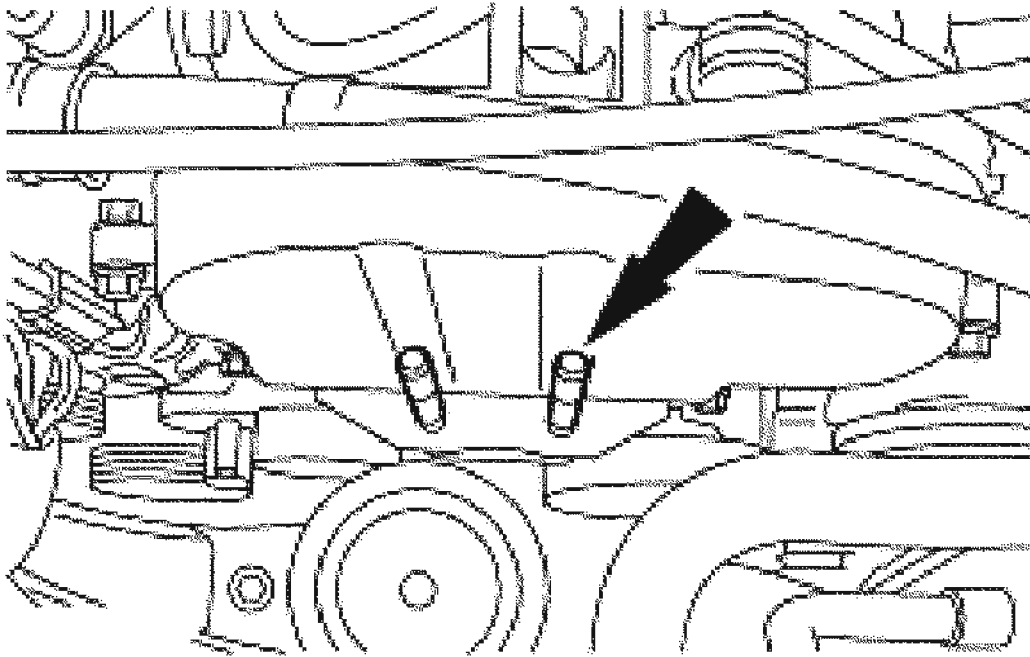
25. Remove the nuts, the bolt and the engine mount upper bracket.



G02738727

**Fig. 88: Removing Engine Mount Upper Bracket**  
Courtesy of FORD MOTOR CO.

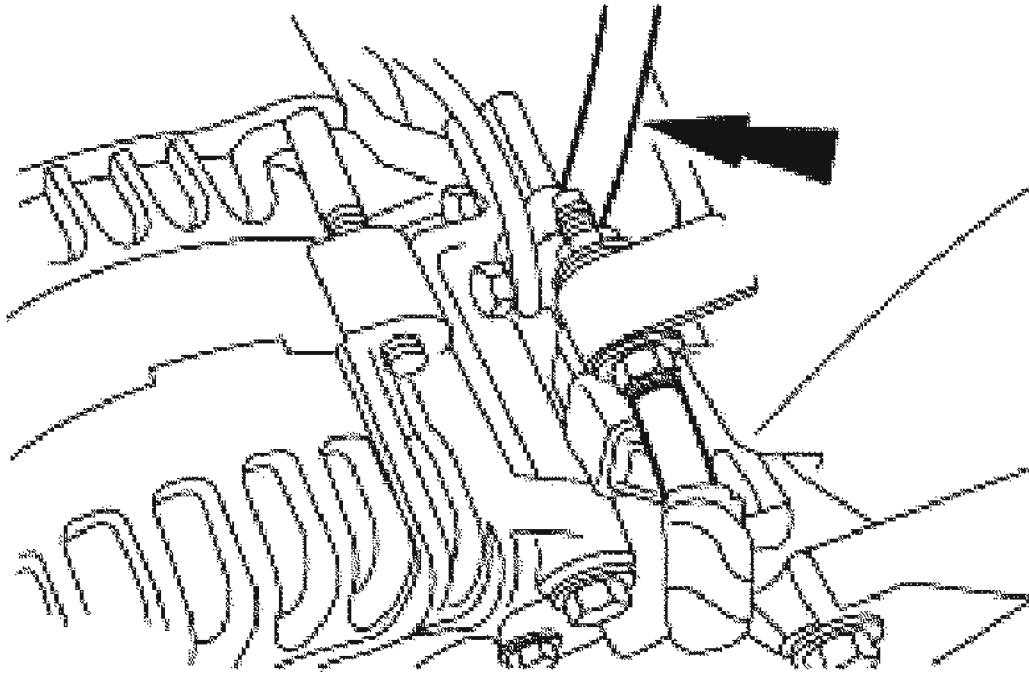
26. Remove the studs.



**G02738728**

**Fig. 89: Identifying Studs**  
**Courtesy of FORD MOTOR CO.**

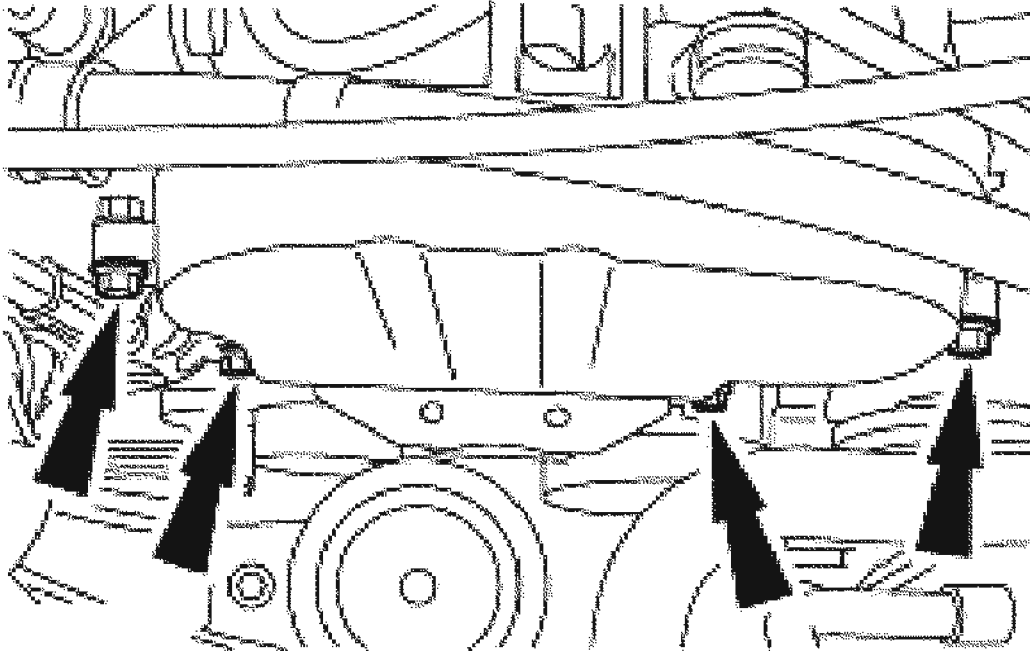
27. Detach the knock sensor electrical connector from the upper timing cover.



G02738729

**Fig. 90: Removing Knock Sensor Electrical Connector From Upper Timing Cover**  
Courtesy of FORD MOTOR CO.

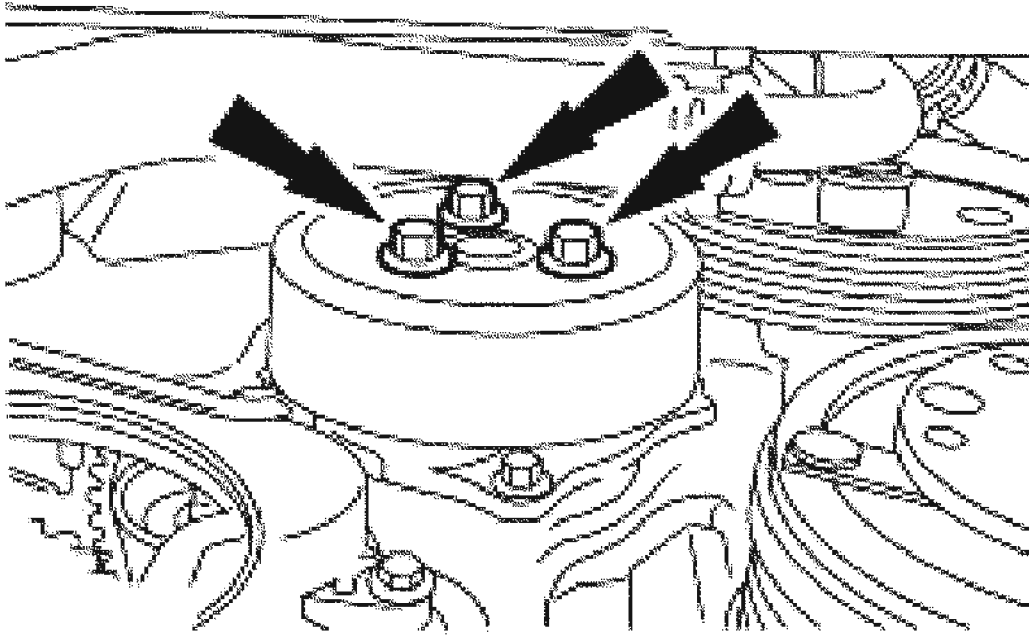
28. Remove the bolts and the upper timing cover.



G02738730

**Fig. 91: Removing Upper Timing Cover**  
Courtesy of FORD MOTOR CO.

29. Remove the coolant pump pulley.

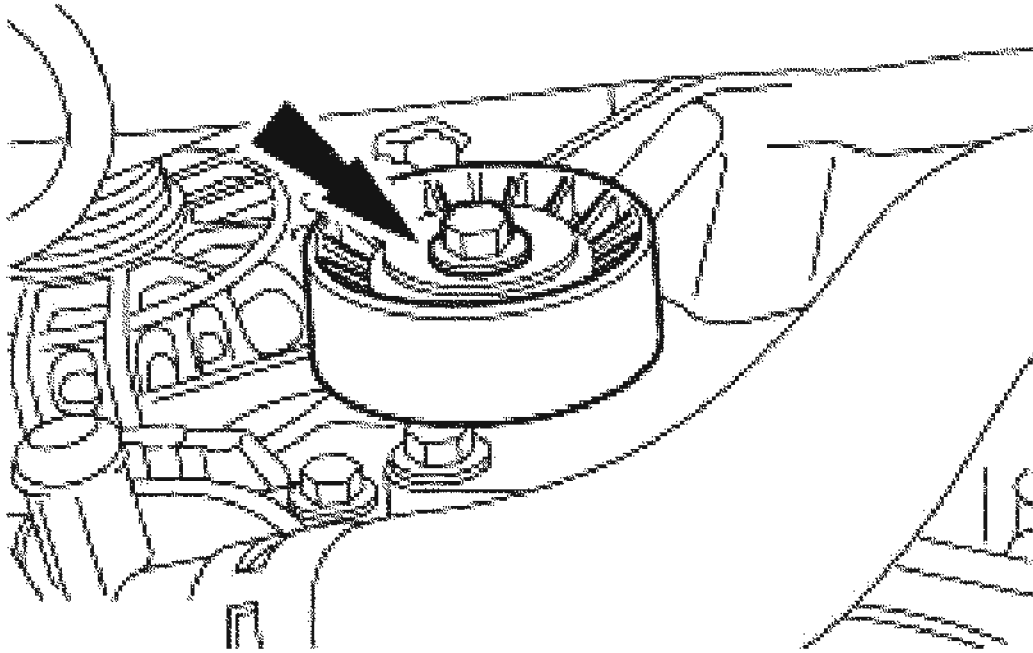


G02738731

**Fig. 92: Removing Coolant Pump Pulley**  
Courtesy of FORD MOTOR CO.

30. Remove the accessory drive belt idler pulley.

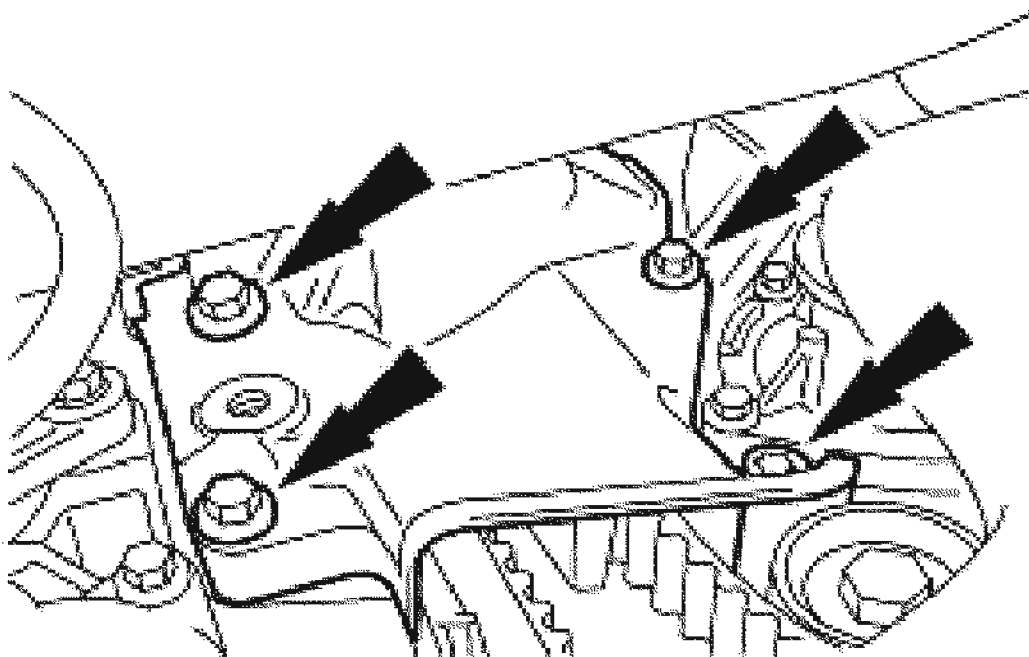




G02738732

**Fig. 93: Removing Accessory Drive Belt Idler Pulley**  
Courtesy of FORD MOTOR CO.

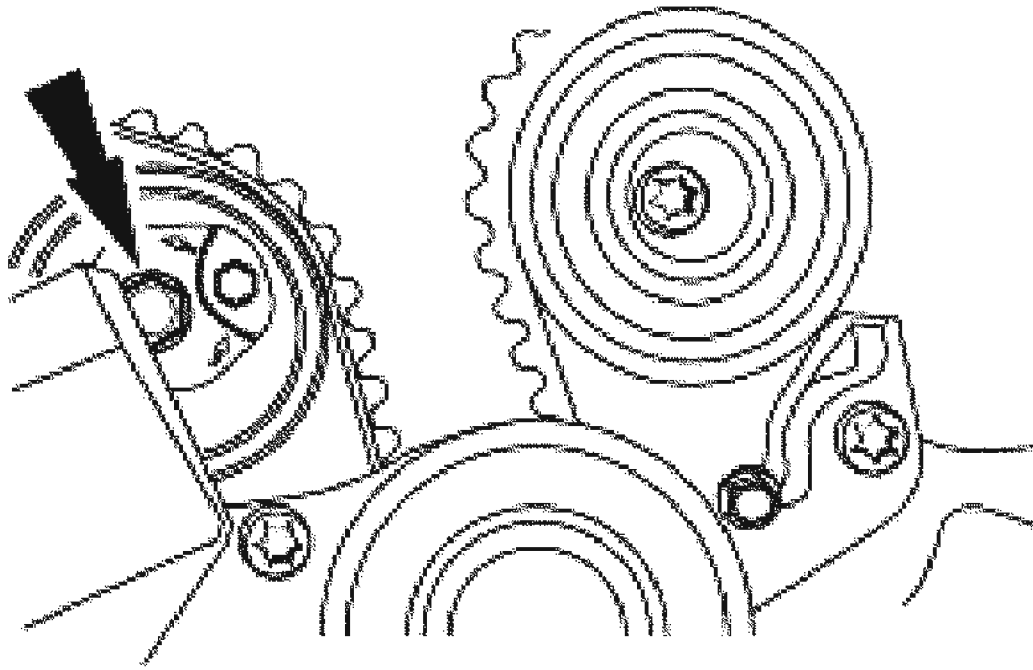
31. Remove the bolts and the engine mount lower bracket.



G02738733

**Fig. 94: Removing Engine Mount Lower Bracket**  
Courtesy of FORD MOTOR CO.

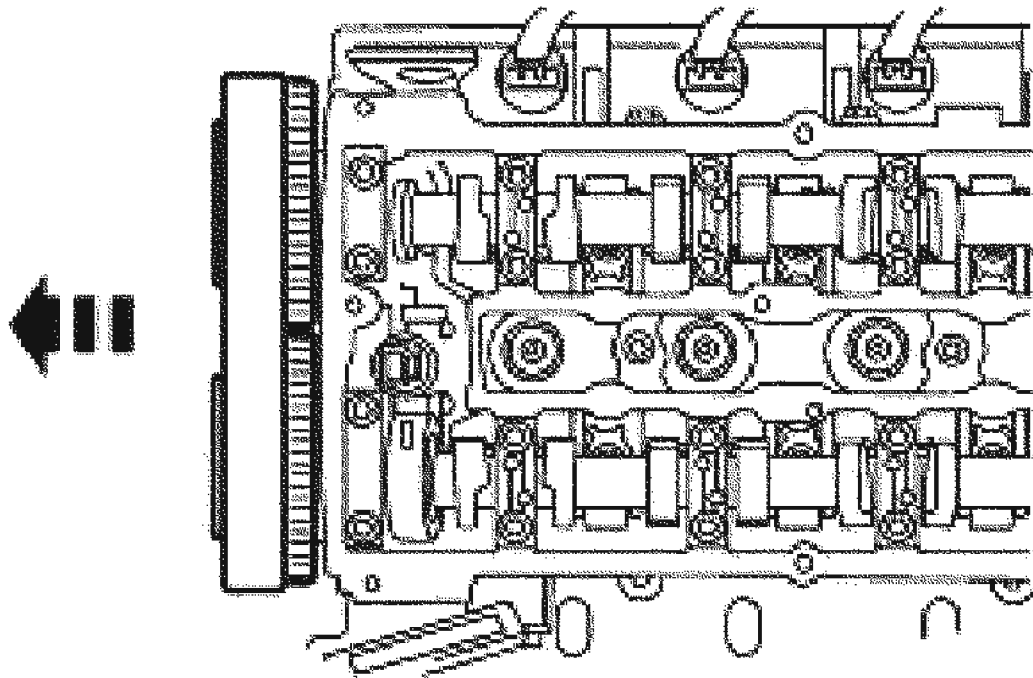
32. Relieve the tension on the timing belt tensioner pulley.
  - Loosen the tensioner pulley bolt.
  - Release the tension on the timing belt by disconnecting the tensioner tab from the timing cover back plate.



G02738734

**Fig. 95: Relieving Tension On Timing Belt Tensioner Pulley**  
Courtesy of FORD MOTOR CO.

33. Remove and discard the timing belt.
  - Slide the timing belt off the camshaft sprockets and the crankshaft sprocket.



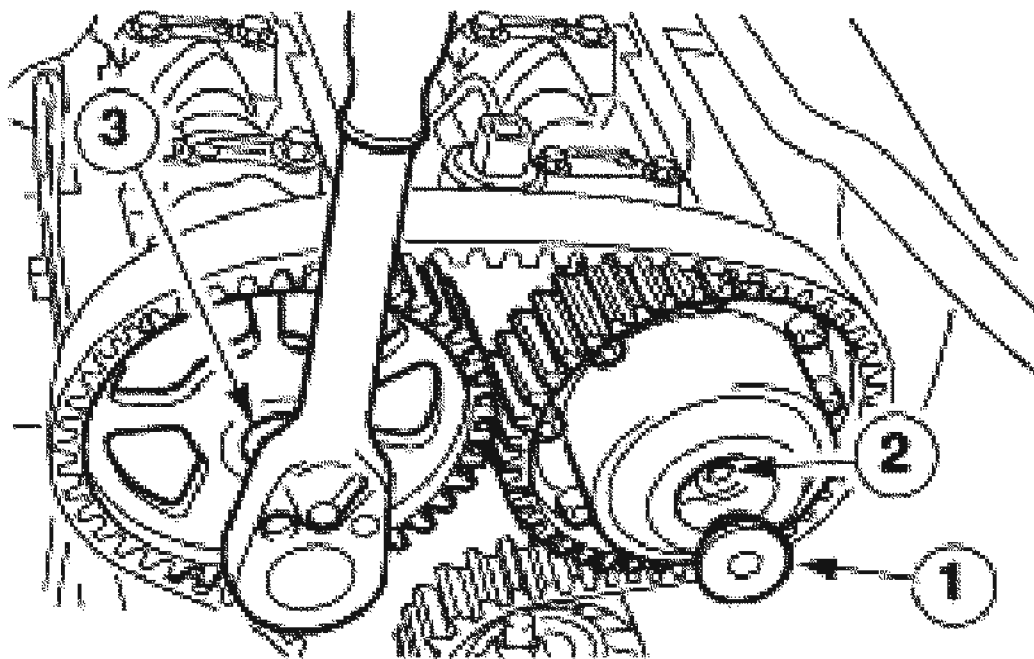
G02738735

**Fig. 96: Removing Timing Belt**  
Courtesy of FORD MOTOR CO.

**Installation**

**CAUTION:** The camshaft must be held stationary at the hexagons with locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

**NOTE:** To loosen the camshaft pulleys, hold the camshafts by the hexagon.

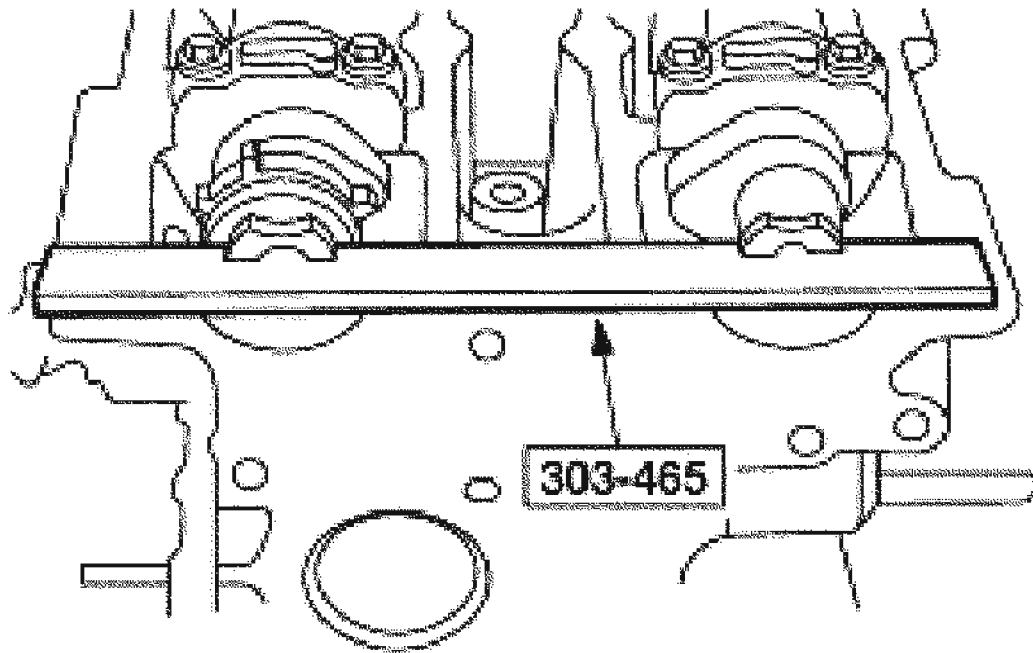


G02738736

**Fig. 97: Removing Camshaft Pulleys**  
Courtesy of FORD MOTOR CO.

1. Loosen the camshaft pulleys.
  1. Remove the blanking plug from the exhaust camshaft pulley.
  2. Loosen the exhaust camshaft pulley bolt.
  3. Loosen the intake camshaft pulley bolt.

**NOTE:** Rotate the camshafts clockwise as necessary.



G02738737

**Fig. 98: Installing Camshaft Alignment Timing Tool On Back Of Camshafts**  
Courtesy of FORD MOTOR CO.

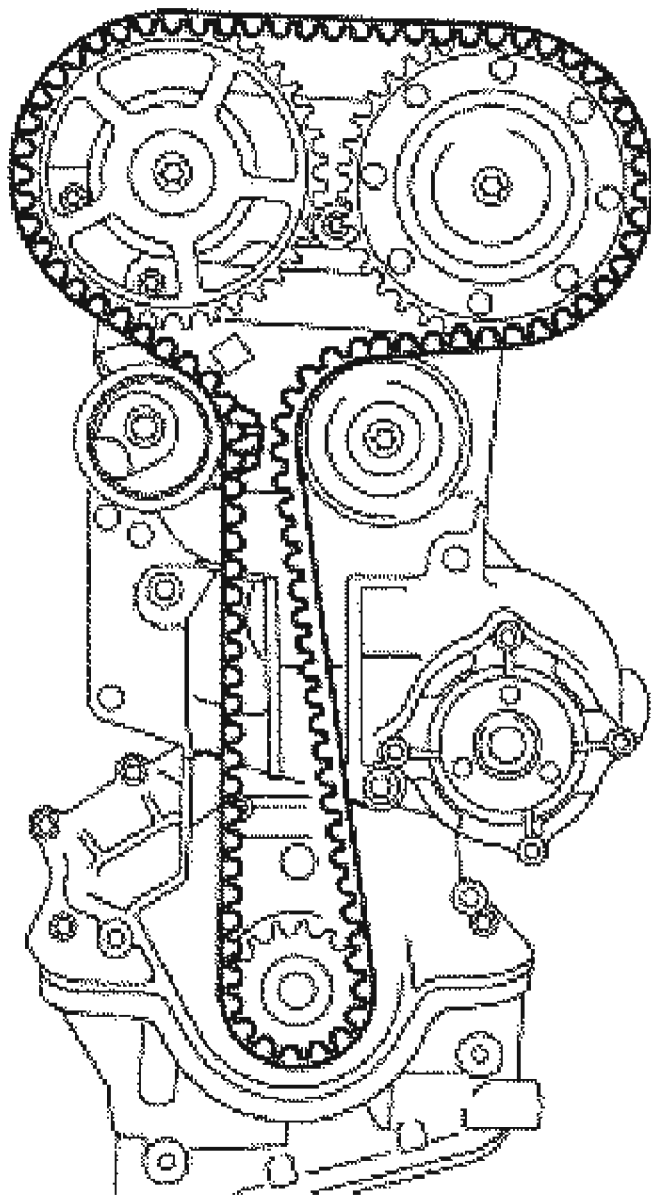
2. Install the camshaft alignment timing tool on the back of the camshafts.

**NOTE:** Cylinder No. 1 is at top dead center (TDC) when the keyway is in the 12 o'clock position.

3. Confirm the crankshaft position is at TDC (No. 1 cylinder) by rotating it clockwise against the alignment peg.

**CAUTION:** Do not rotate the crankshaft; as necessary check that it is still resting against the timing pin.

**NOTE:** The lug of the belt tensioner should not be hooked in the sheet metal cover during timing belt installation.

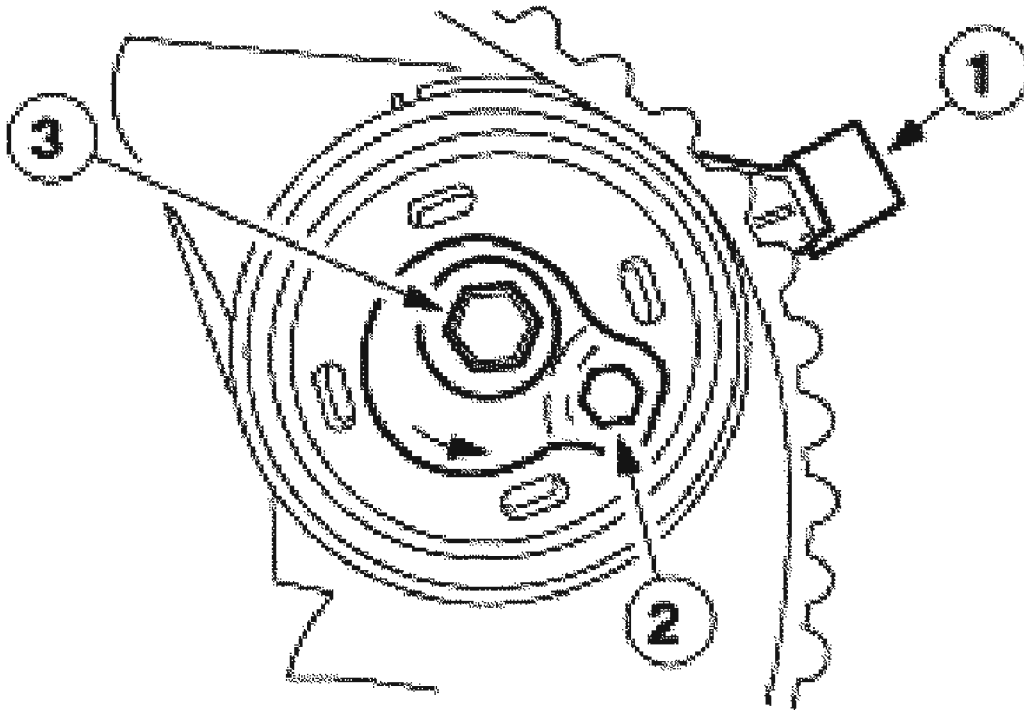


G02738738

**Fig. 99: Installing New Timing Belt**  
Courtesy of FORD MOTOR CO.

4. Position a new timing belt in place.
  - Starting from the crankshaft timing belt pulley and working counterclockwise, position the timing belt in place while keeping it under tension.

**NOTE:** Incorrect timing belt tension will cause incorrect valve timing.



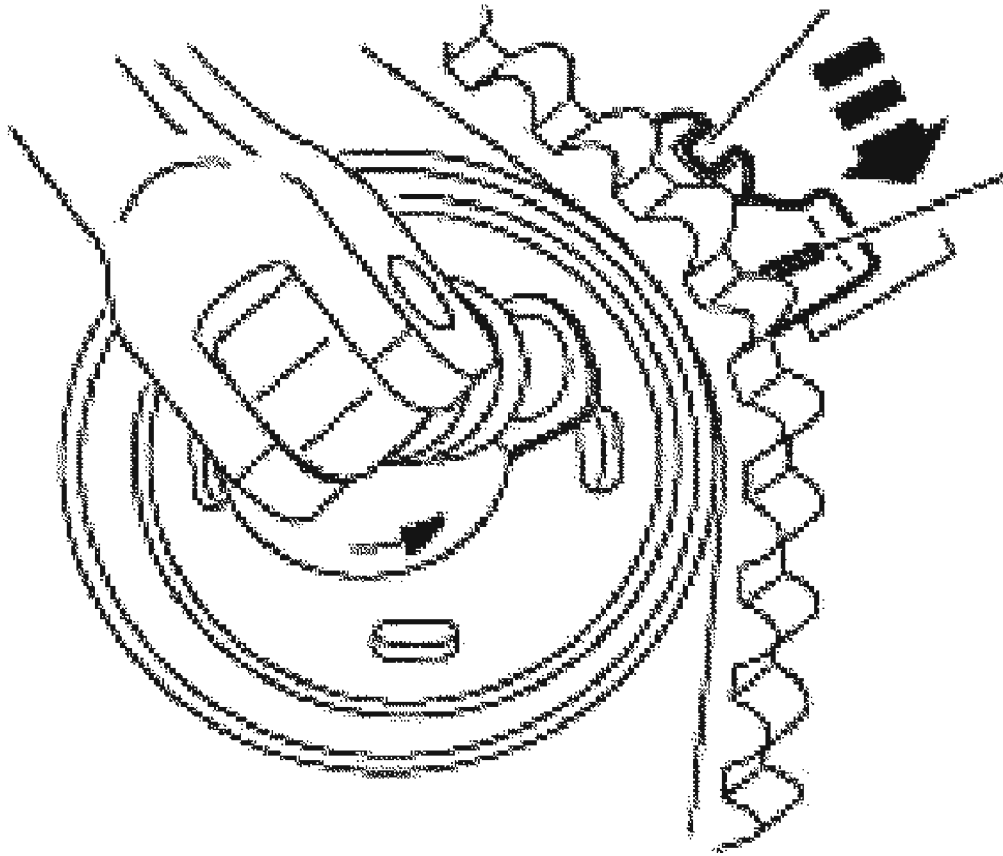
G02738739

**Fig. 100: Pre-Tensioning Timing Belt**  
Courtesy of FORD MOTOR CO.

5. Pre-tension the timing belt.
  1. Rotate the tensioner locating tab counterclockwise and insert the locating tab into the slot in the rear timing cover.
  2. Position the hex key slot in the tensioner adjusting washer to the 4 o'clock position.
  3. Tighten the attaching bolt enough to seat the tensioner firmly against the rear timing cover, but still allow the tensioner adjusting washer to be rotated using a 6 mm hex key.

**CAUTION:** Tension the timing belt, working counterclockwise.

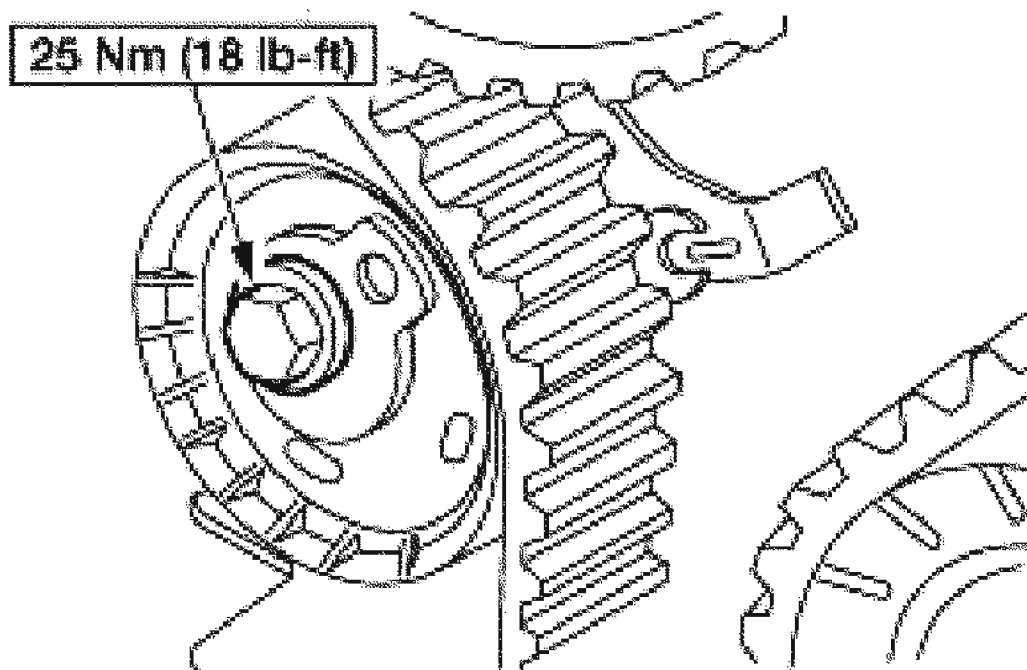




**G02738740**

**Fig. 101: Rotating Adjusting Washer Counterclockwise**  
**Courtesy of FORD MOTOR CO.**

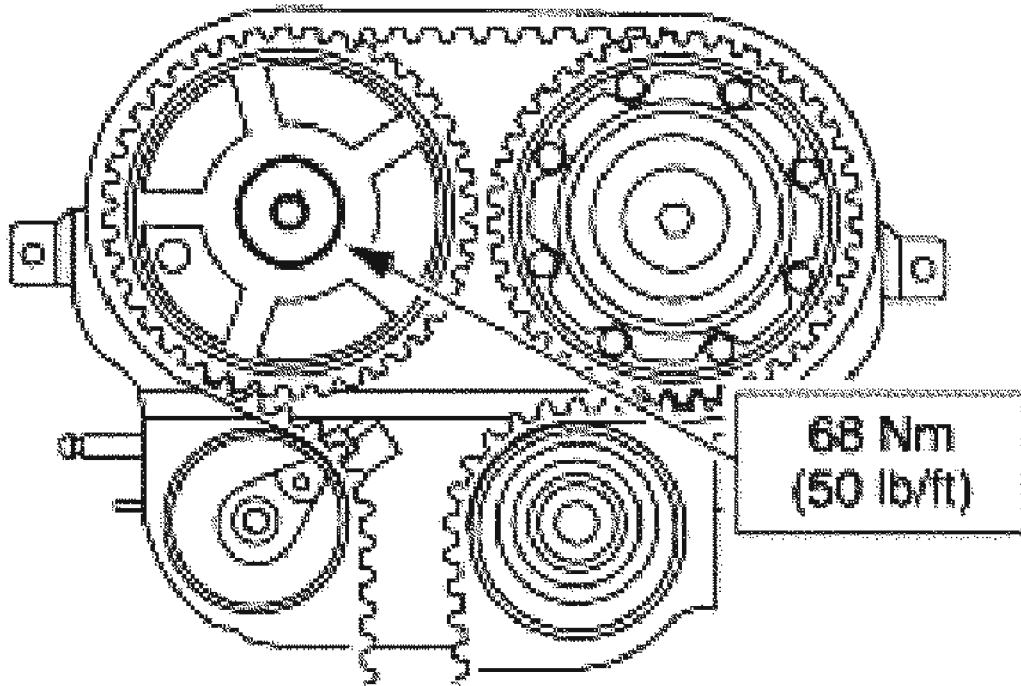
6. Using the hex key, rotate the adjusting washer counterclockwise until the notch in the pointer is centered over the index line on the locating tab (the pointer will move clockwise during adjustment).
7. While holding the adjusting washer in position, tighten the bolt.



G02738741

**Fig. 102: Tightening Adjusting Washer Bolt**  
Courtesy of FORD MOTOR CO.

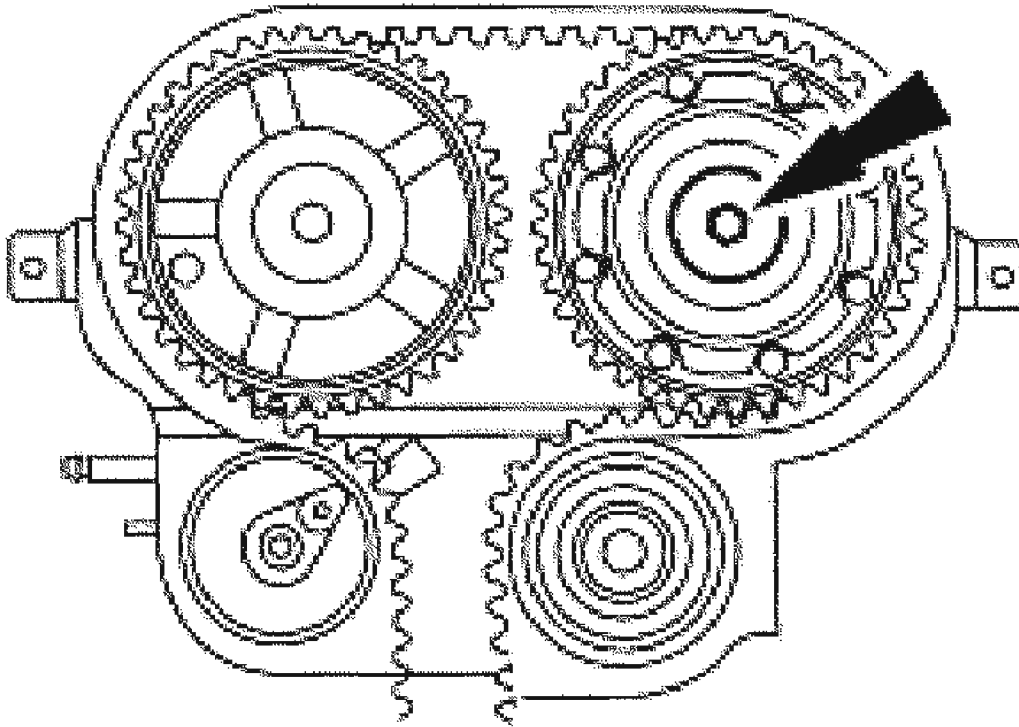
**CAUTION:** The camshaft must be held stationary at the hexagons with locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.



**Fig. 103: Tightening Intake Camshaft Sprocket Bolt**  
Courtesy of FORD MOTOR CO.

8. Tighten the bolt on the intake camshaft sprocket.

**CAUTION:** The camshaft must be held stationary at the hexagons with locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

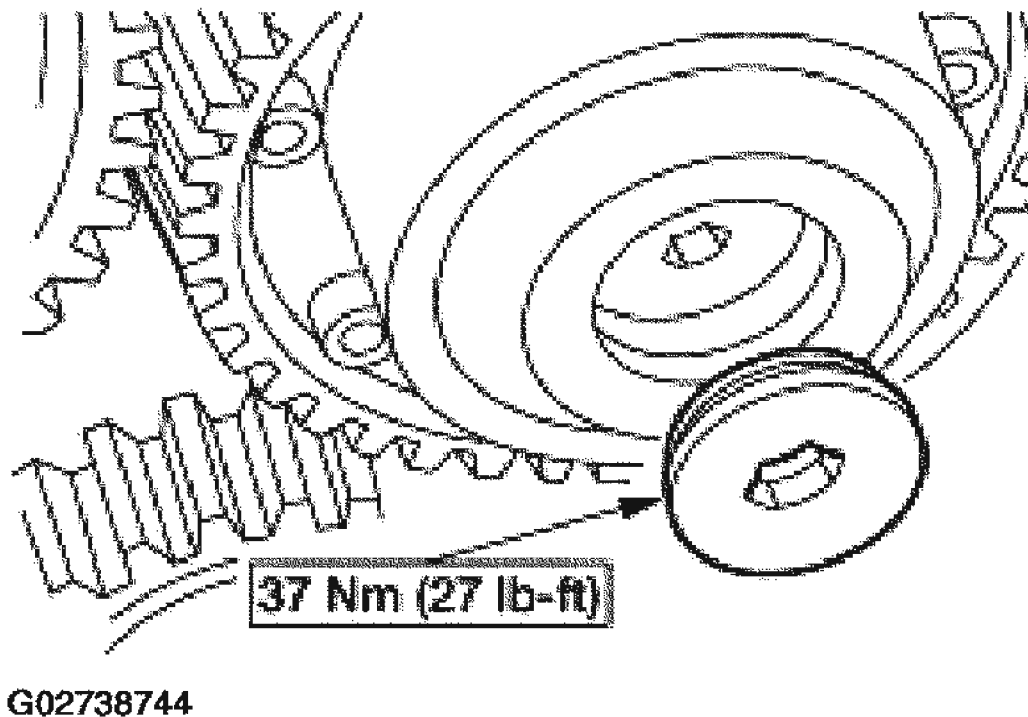


G02738743

**Fig. 104: Tightening Exhaust Camshaft Sprocket Bolt**  
Courtesy of FORD MOTOR CO.

9. Tighten the bolt on the exhaust camshaft sprocket in three stages.
  - Stage 1: Tighten the bolt to 50 Nm (36 lb-ft).
  - Stage 2: Remove the TDC peg and the camshaft alignment timing tool.
  - Stage 3: Tighten the bolt to 115-125 Nm (85-92 lb-ft).

**NOTE:**      **Install a new oil plug seal.**

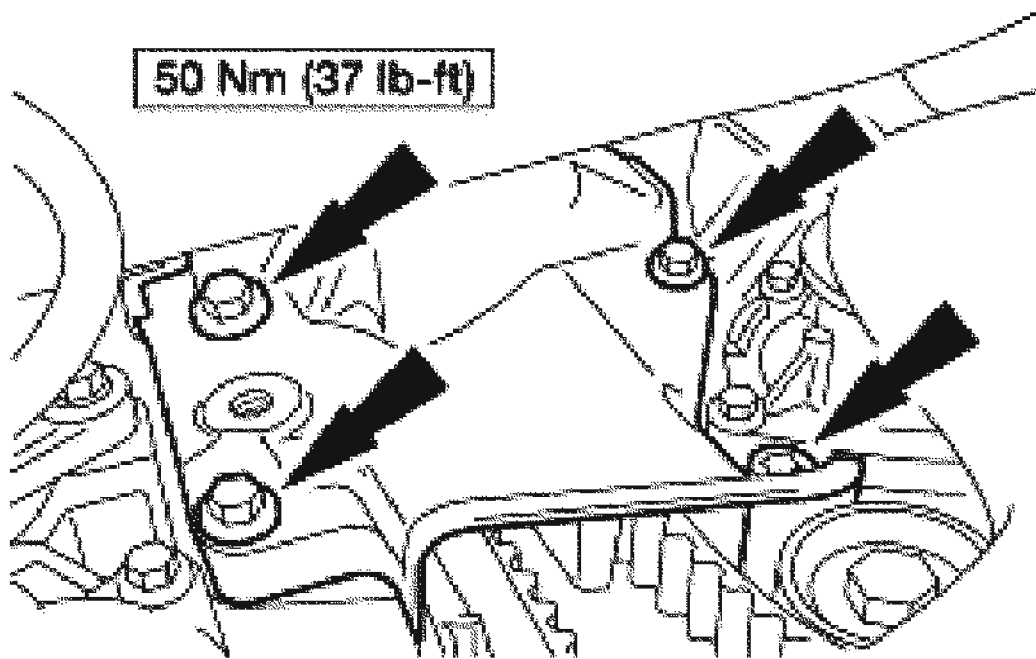


**Fig. 105: Installing New Oil Plug On Variable Camshaft Timing Assembly**  
Courtesy of FORD MOTOR CO.

10. Screw in the new oil plug on the variable camshaft timing assembly.

**NOTE:** Turn the engine two turns in the normal direction of rotation by the crankshaft.

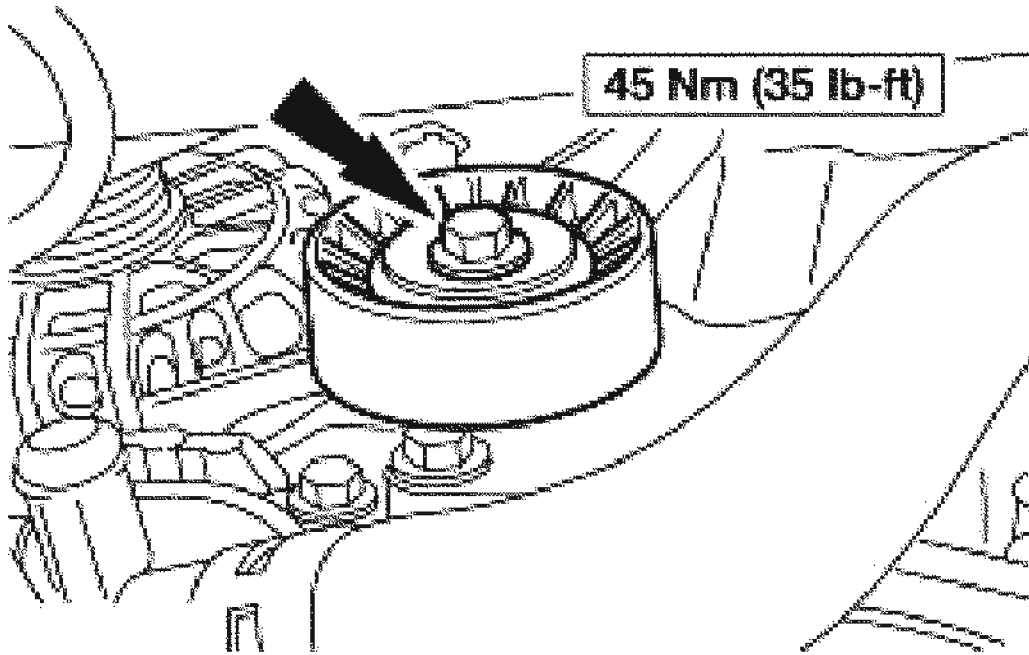
11. Check the valve timing by inserting the special tools and correct the alignment as necessary.
  - Screw in special tool 303-574 and make sure that the crankshaft is resting against the special tool.
  - Insert special tool 303-465 into the camshafts. If necessary loosen the timing pulleys and correct the camshaft alignment.
  - Remove the special tools.
12. Install the front engine mount lower bracket.



G02738745

**Fig. 106: Installing Front Engine Mount Lower Bracket**  
Courtesy of FORD MOTOR CO.

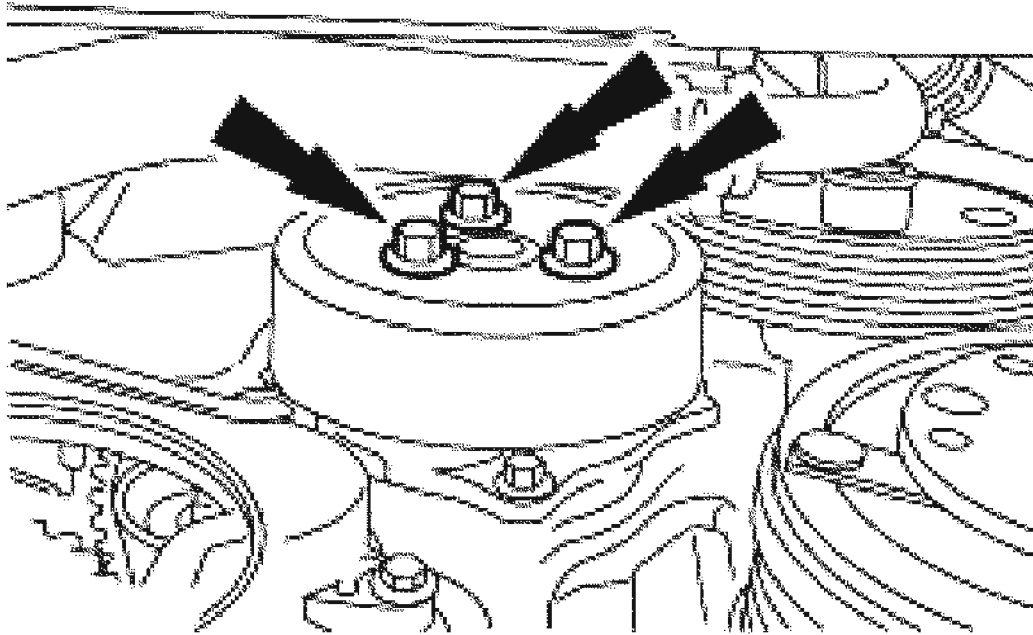
13. Install the accessory drive belt idler pulley.



G02738746

**Fig. 107: Installing Accessory Drive Belt Idler Pulley**  
Courtesy of FORD MOTOR CO.

14. Install the coolant pump pulley.
  - Hand-tighten the bolts.

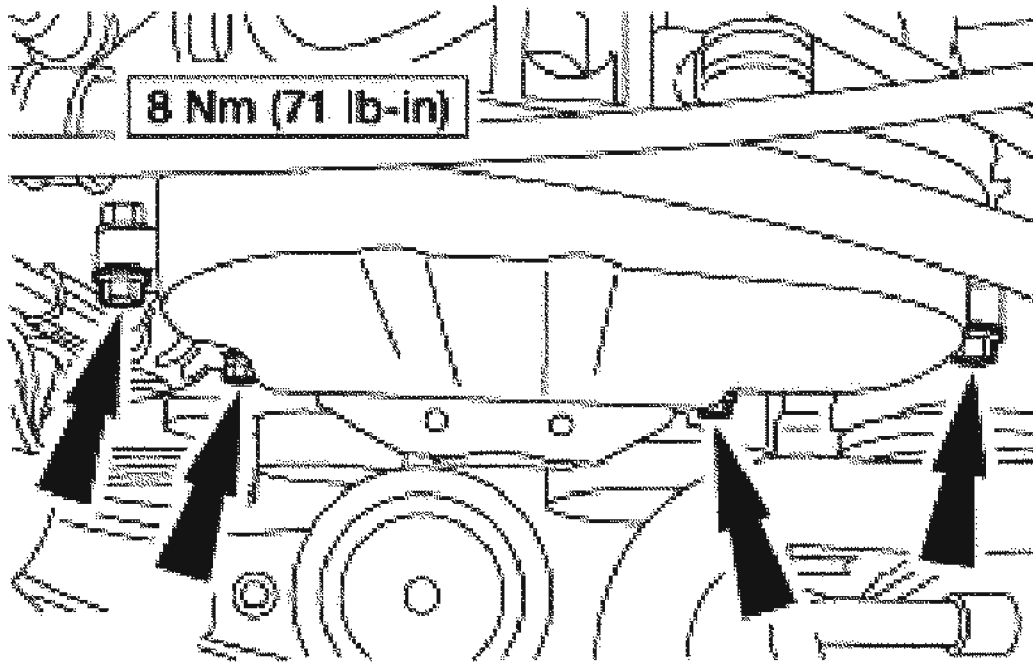


G02738747

**Fig. 108: Installing Coolant Pump Pulley**  
**Courtesy of FORD MOTOR CO.**

15. Position the upper timing belt cover and install the bolts.

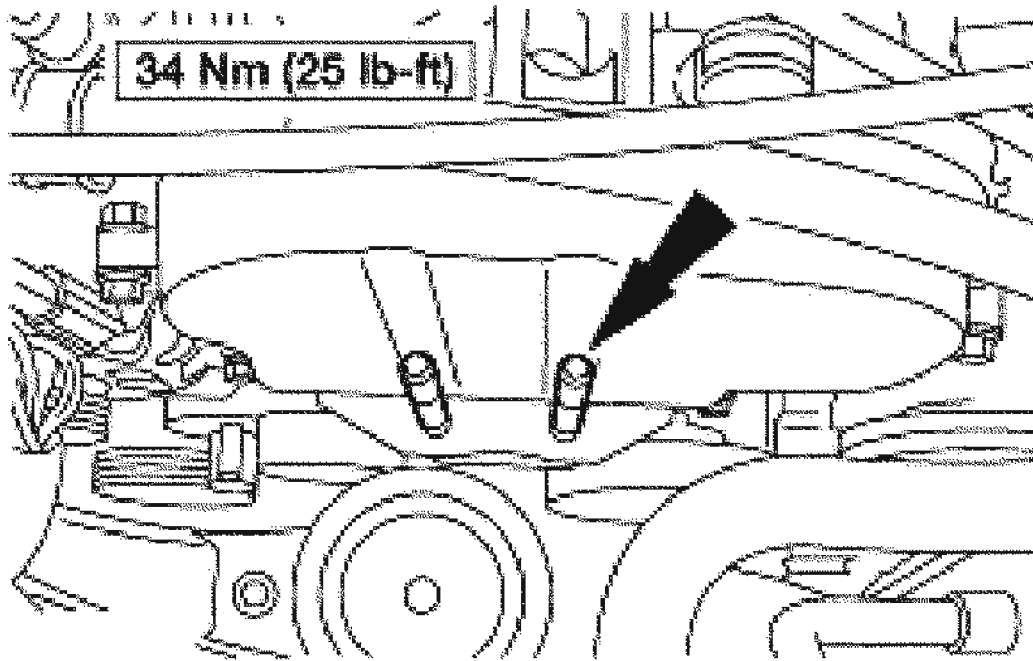




G02738748

**Fig. 109: Installing Upper Timing Belt Cover Bolts**  
**Courtesy of FORD MOTOR CO.**

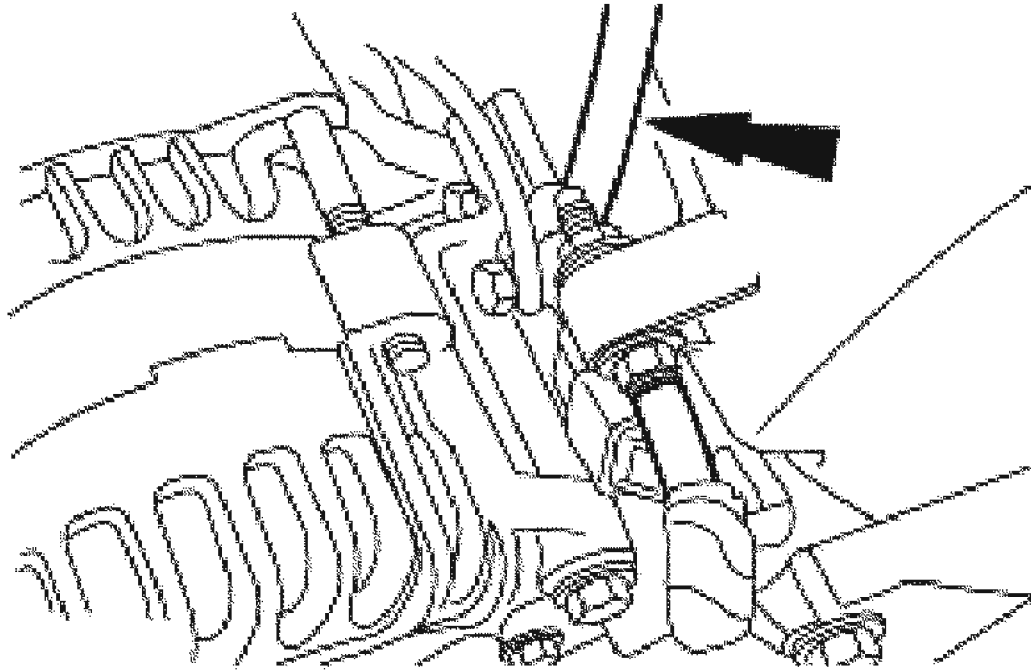
16. Install the studs.



G02738749

**Fig. 110: Installing Studs**  
**Courtesy of FORD MOTOR CO.**

17. Connect the knock sensor electrical connector to the upper timing belt cover.

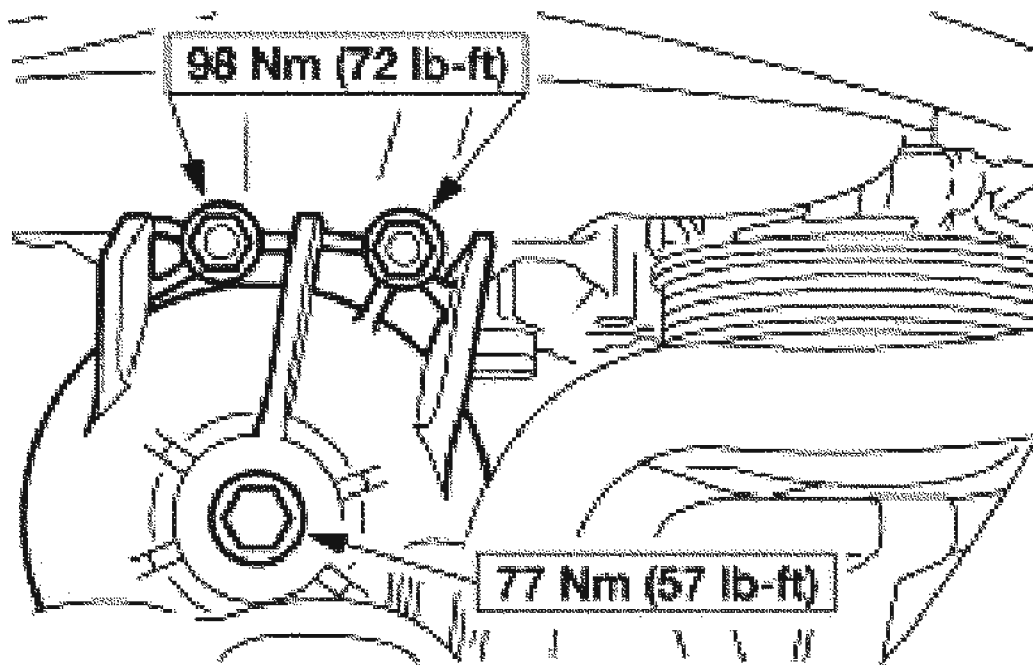


G02738750

**Fig. 111: Connecting Knock Sensor Electrical Connector To Upper Timing Belt Cover**

Courtesy of FORD MOTOR CO.

18. Install the engine mount upper bracket, the nuts and the bolt.

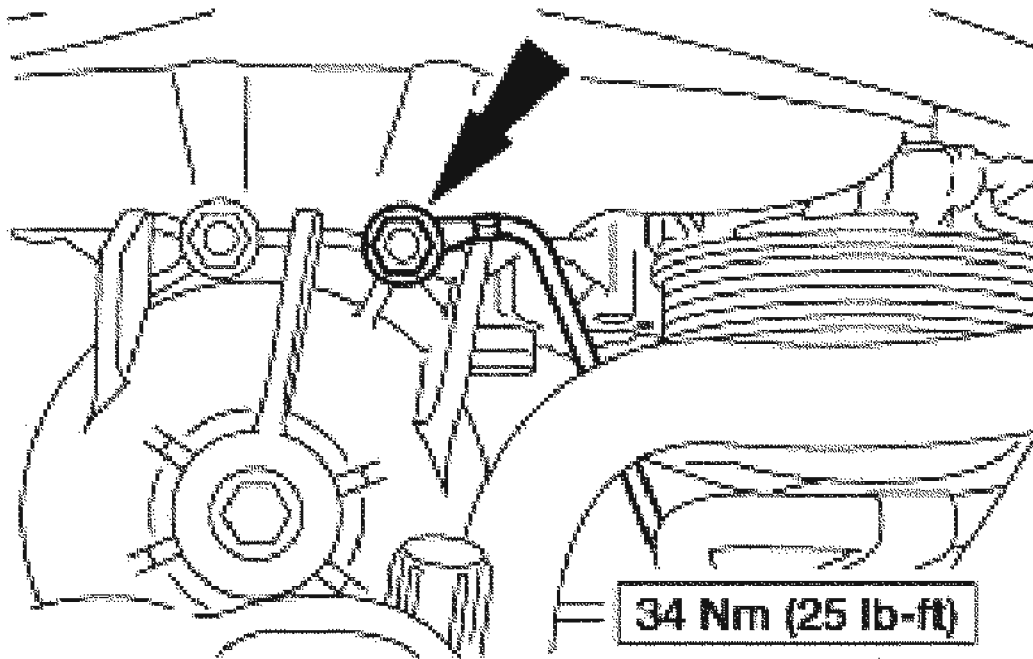


G02738751

**Fig. 112: Identifying Engine Mount Upper Bracket Nuts & Bolt Torque Specifications**

**Courtesy of FORD MOTOR CO.**

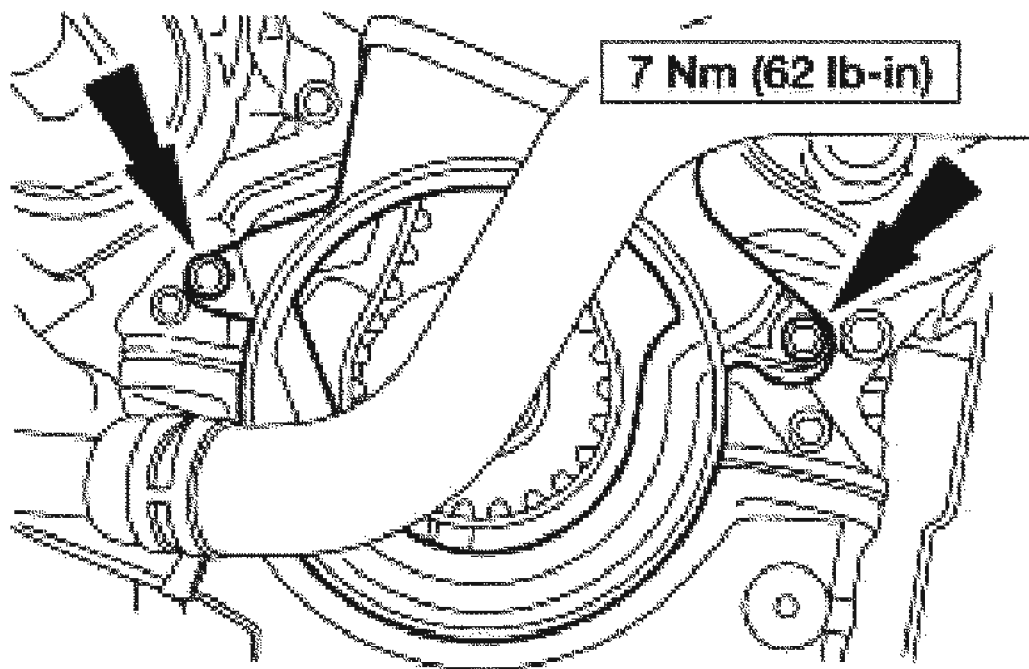
19. Attach the ground strap and install the nut.



G02738752

**Fig. 113: Identifying Ground Strap Nut Torque Specification**  
**Courtesy of FORD MOTOR CO.**

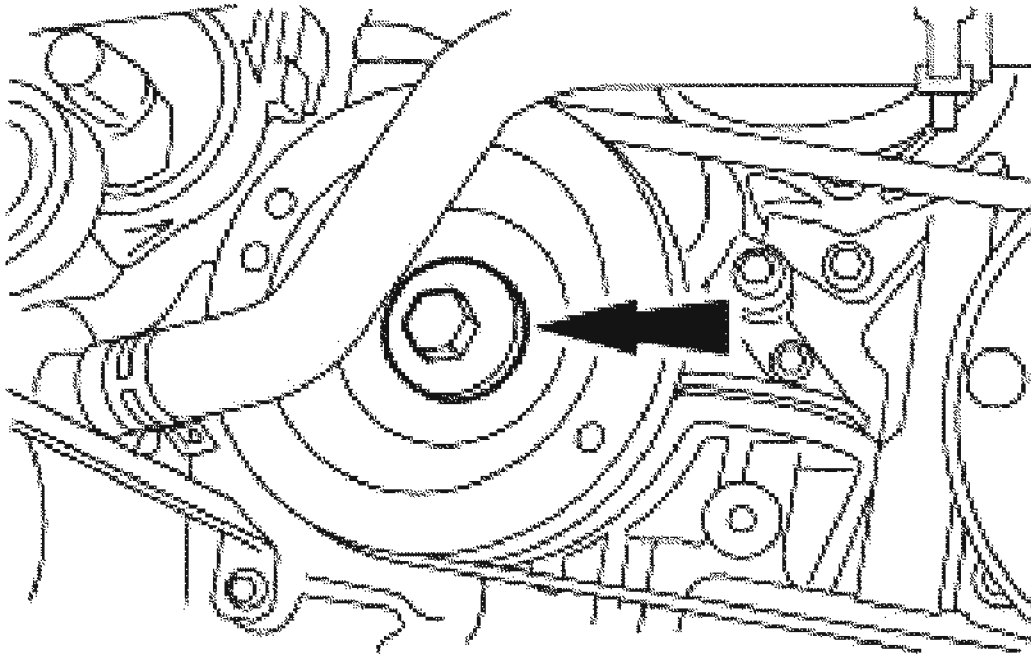
20. Position the lower timing belt cover and install the bolts.



G02738753

**Fig. 114: Identifying Lower Timing Belt Cover Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

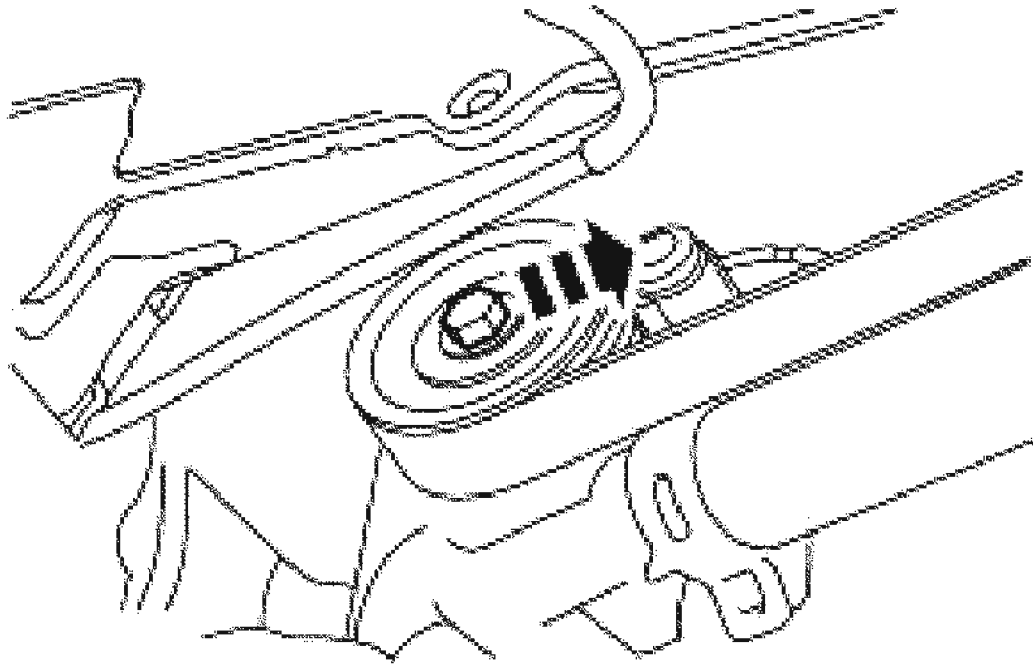
21. Position the crankshaft pulley and install the bolt.
  - Hand-tighten the bolt.



G02738754

**Fig. 115: Identifying Crankshaft Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

22. Rotate the tensioner and install the accessory drive belt.

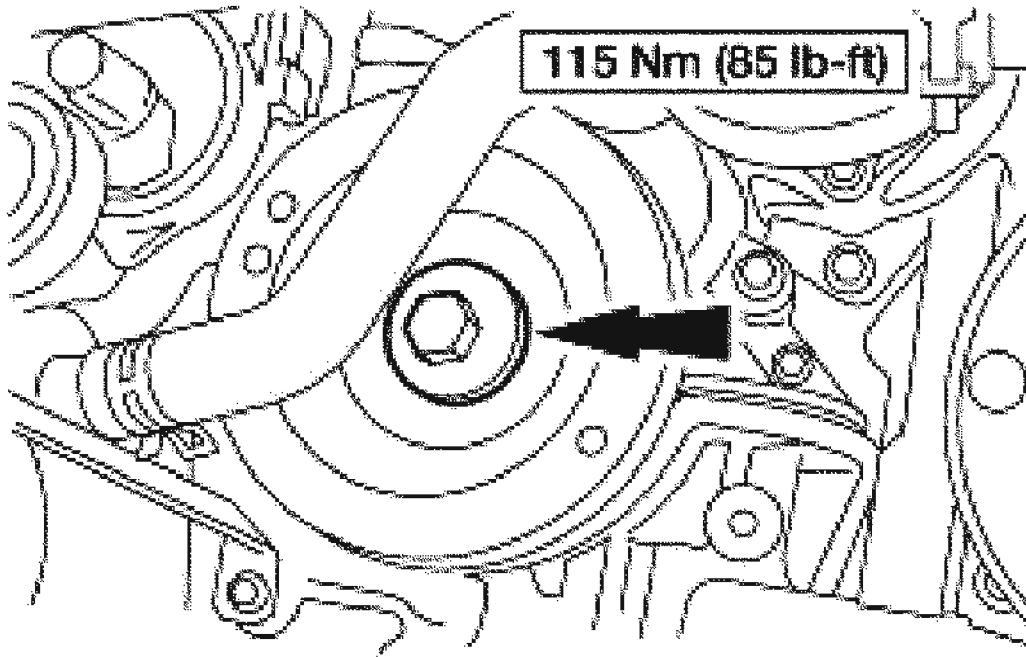


G02738755

**Fig. 116: Installing Accessory Drive Belt**  
**Courtesy of FORD MOTOR CO.**

23. Tighten the crankshaft pulley bolt.

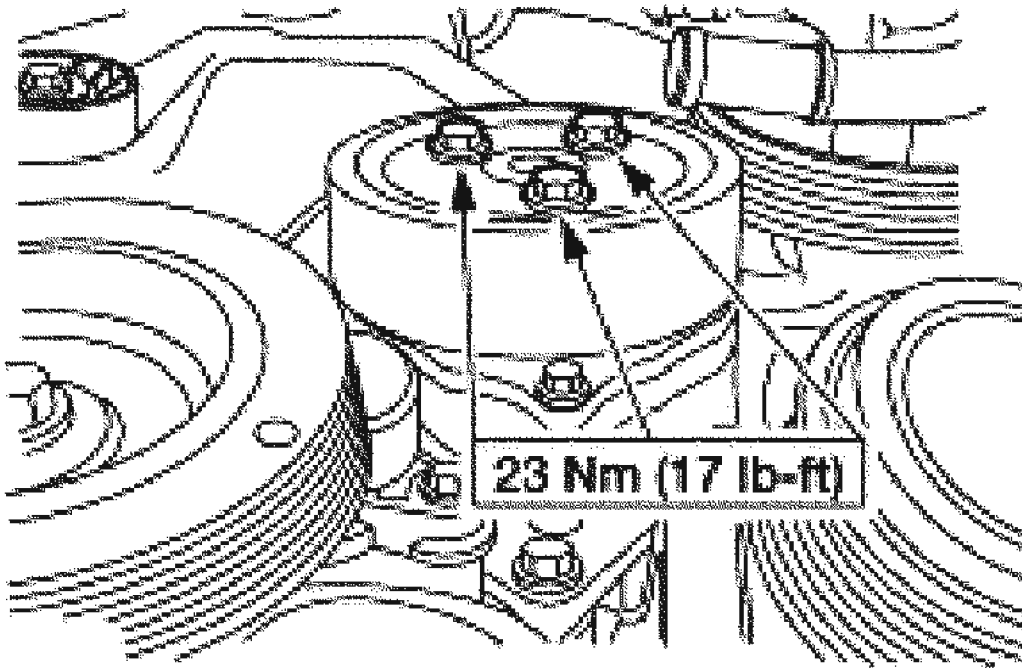




G02738756

**Fig. 117: Identifying Crankshaft Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

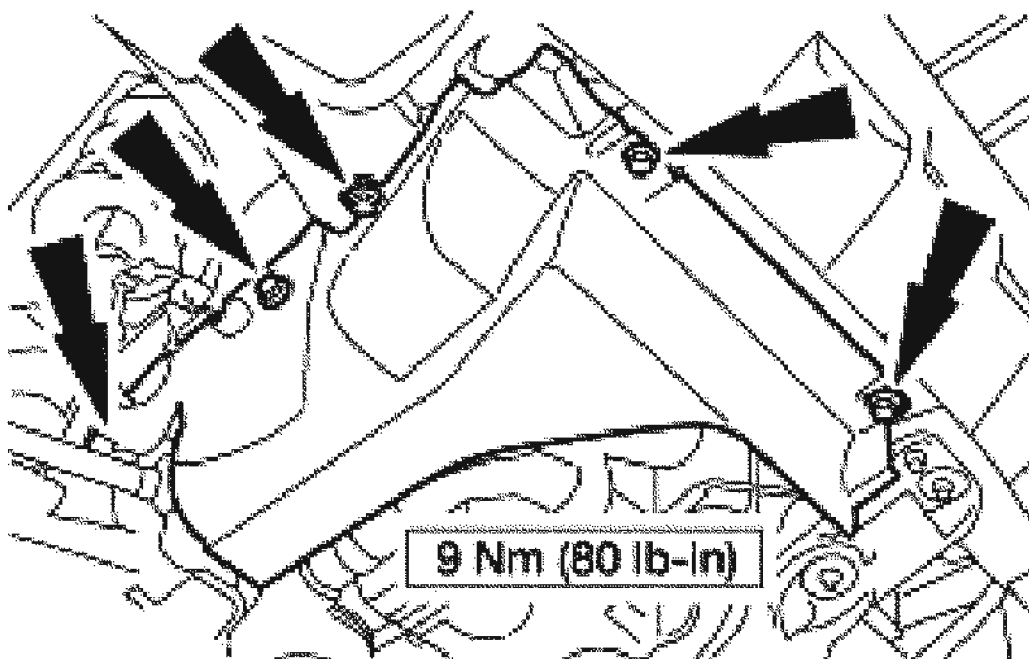
24. Tighten the coolant pump pulley bolts.



G02738757

**Fig. 118: Identifying Coolant Pump Pulley Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

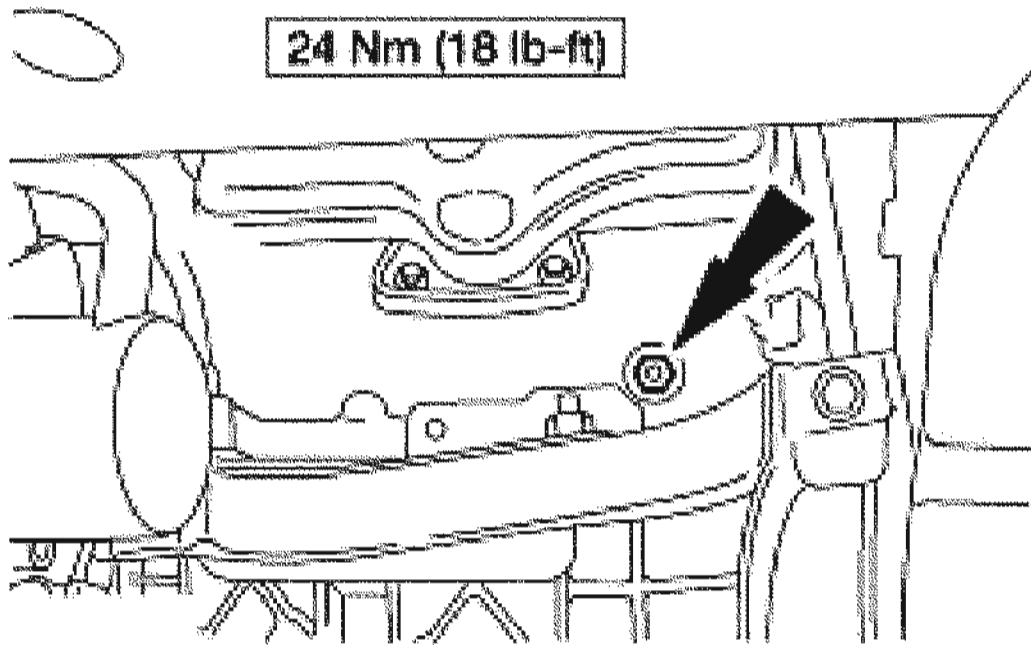
25. Position the RH lower splash shield and install the bolts.



G02738758

**Fig. 119: Identifying RH Lower Splash Shield Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

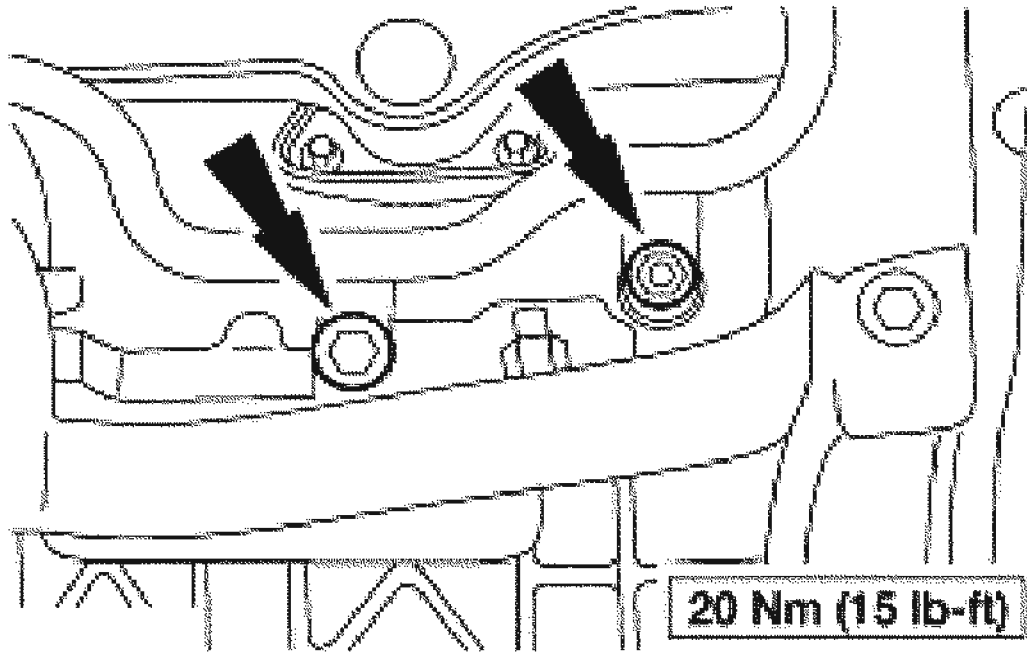
26. Install the wheel and tire assembly. For additional information, refer to **REAR** in Suspension
27. Install the stud.



G02738759

**Fig. 120: Identifying Stud Torque Specification**  
Courtesy of FORD MOTOR CO.

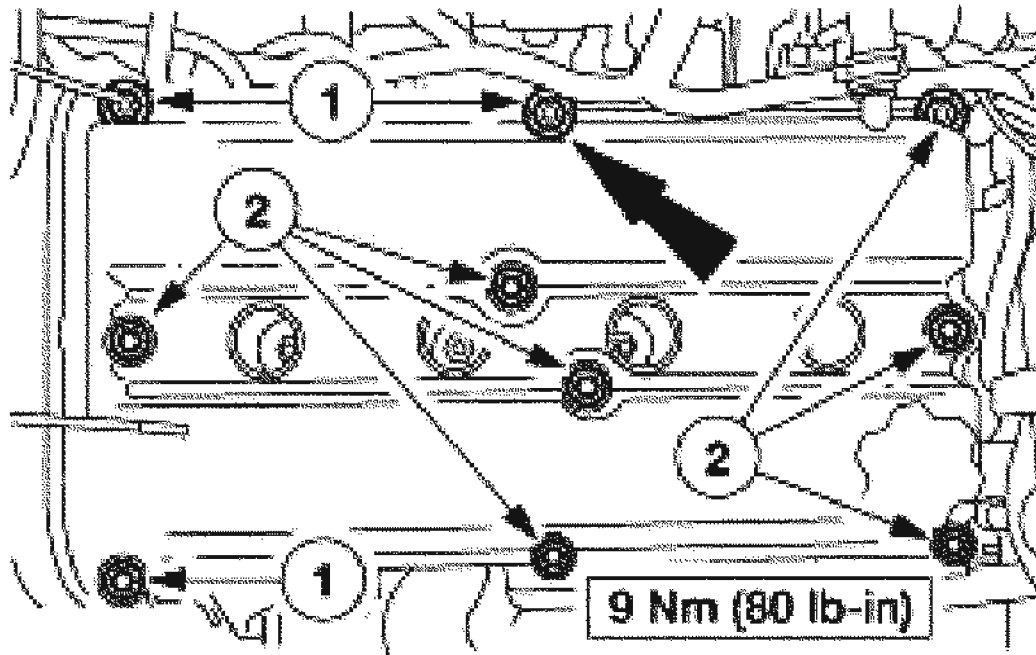
28. Install the coolant tube.



G02738760

**Fig. 121: Identifying Coolant Tube Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

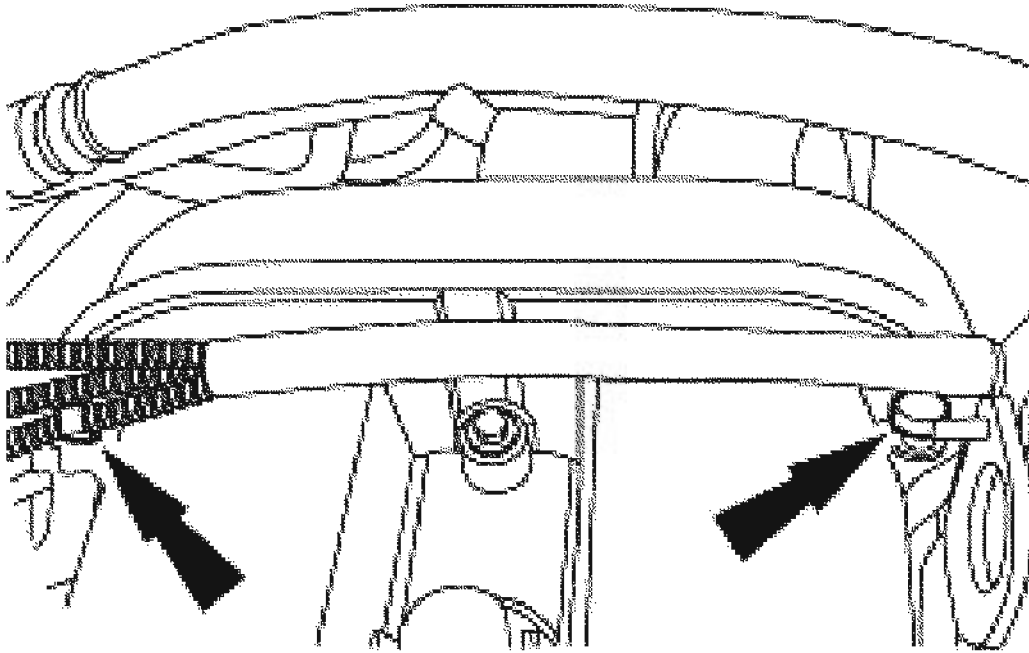
29. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
30. Inspect the valve cover gasket. Install a new gasket, if necessary.
31. Position the valve cover.
  1. Install the studbolts.
  2. Install the bolts.



G02738761

**Fig. 122: Installing Valve Cover**  
Courtesy of FORD MOTOR CO.

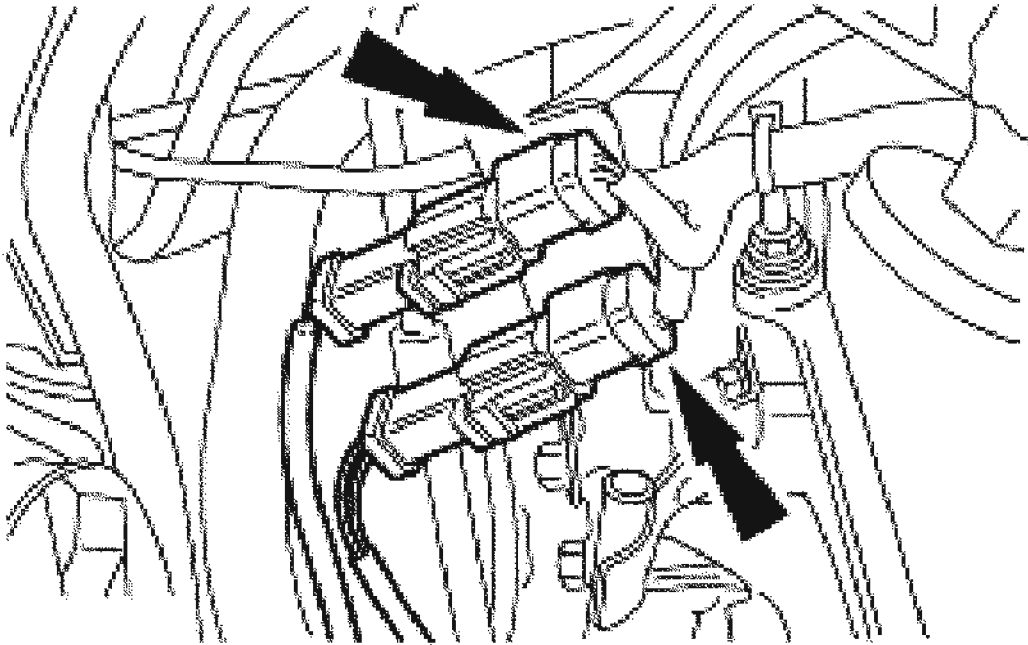
32. Connect the wiring harness anchors to the valve cover studs.



G02738762

**Fig. 123: Connecting Wiring Harness Anchors To Valve Cover Studs**  
Courtesy of FORD MOTOR CO.

33. Attach the catalyst monitor and heated oxygen sensor electrical connectors to the bracket. Connect the electrical connectors.

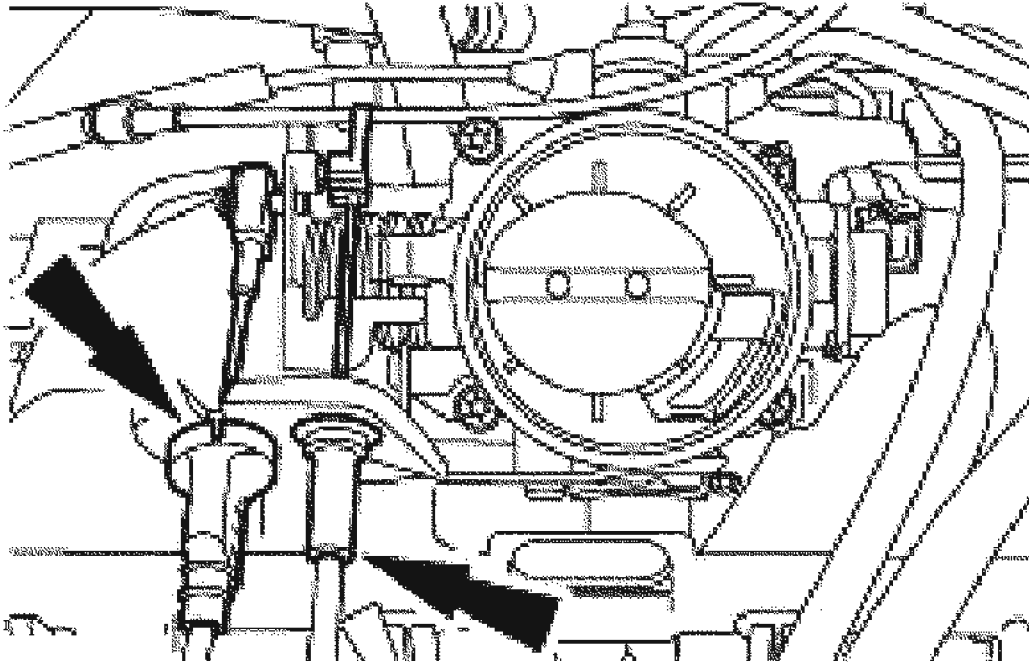


G02738763

**Fig. 124: Connecting Catalyst Monitor And Heated Oxygen Sensor Electrical Connectors To Bracket**  
Courtesy of FORD MOTOR CO.

34. Connect the throttle cables.
  - Connect the accelerator cable.
  - If equipped, connect the speed control actuator cable.





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**Fig. 125: Connecting Throttle Cables**

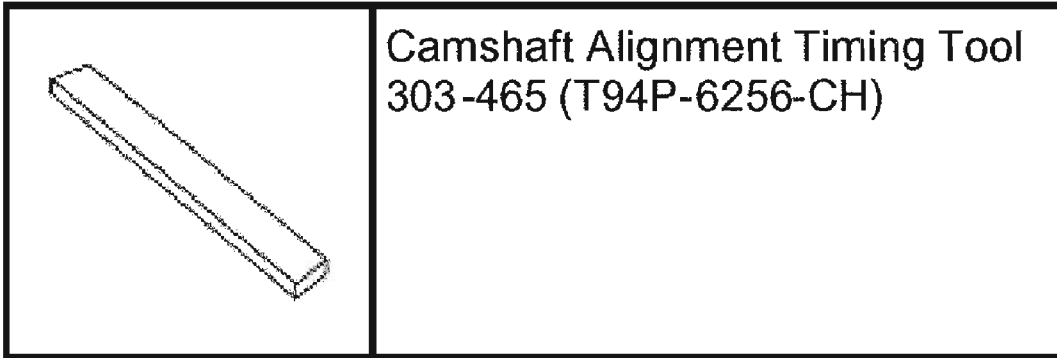
Courtesy of FORD MOTOR CO.

35. Install the spark plugs. For additional information, refer to **ENGINE IGNITION-2.0L ZETEC** .
36. Install the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
37. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .

#### **TIMING DRIVE COMPONENTS - TIMING SPROCKETS**

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape



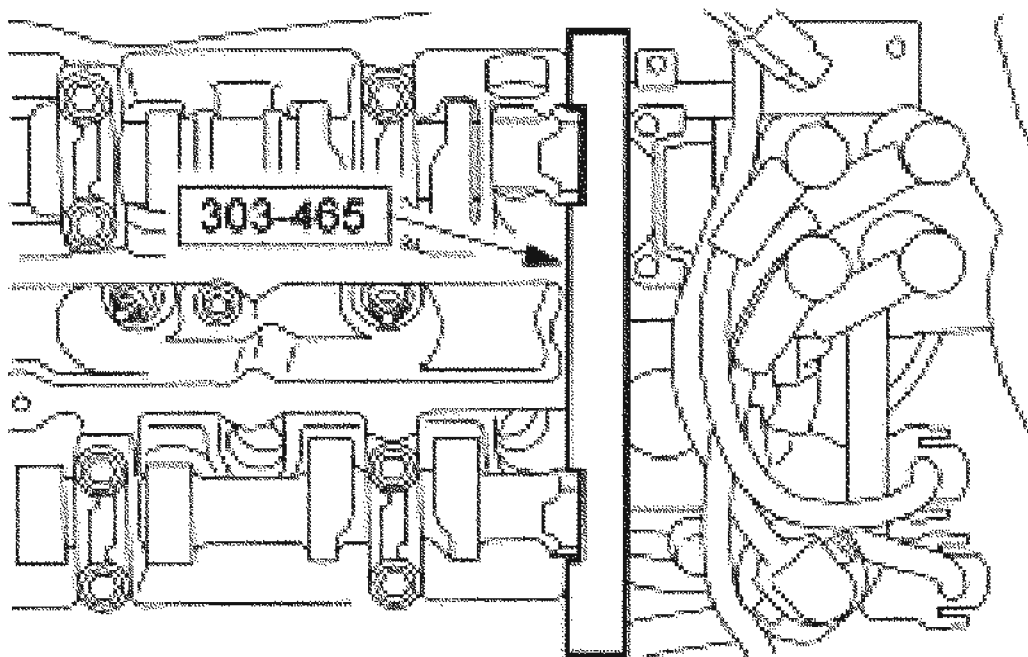
G02738765

**Fig. 126: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

### Removal

1. Remove the timing belt. For additional information, refer to **TIMING BELT** .
2. Lower the vehicle.

**CAUTION:** The camshaft alignment tool is not recommended to hold the camshafts in place when removing or tightening the bolts. Damage to camshaft may result.

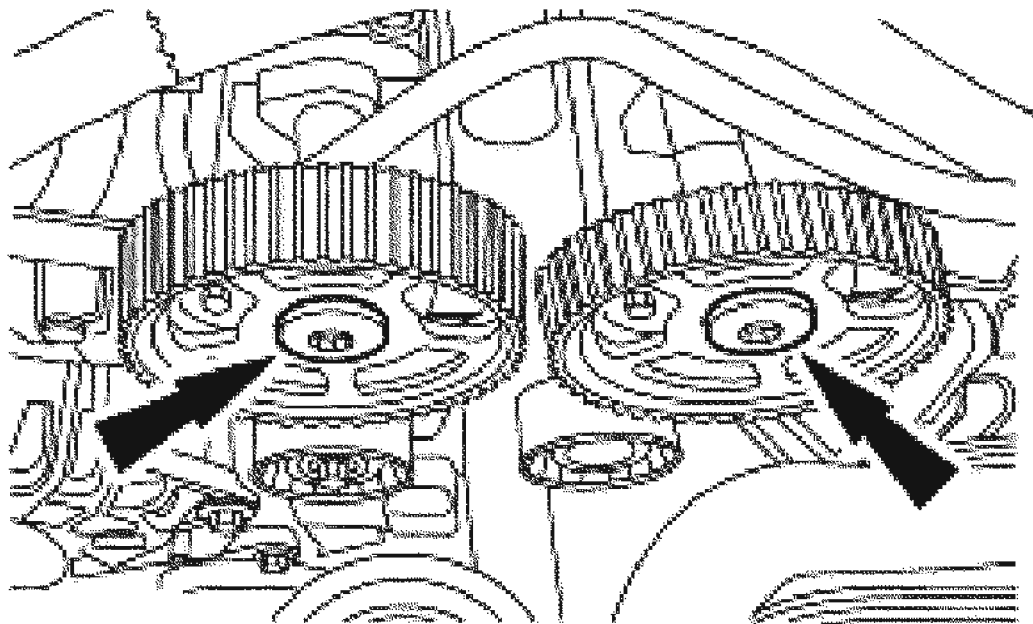


G02738766

**Fig. 127: Removing Special Tool**  
Courtesy of FORD MOTOR CO.

3. Remove the special tool.

**NOTE:** Use an open-end wrench to keep each camshaft from rotating.



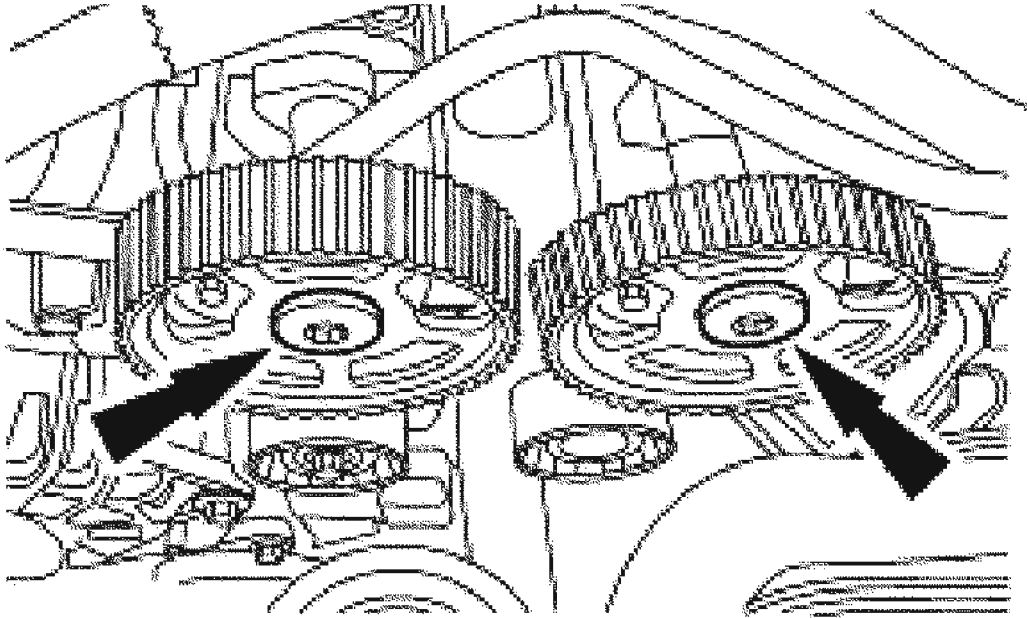
G02738767

**Fig. 128: Removing Camshaft Timing Sprockets**  
Courtesy of FORD MOTOR CO.

4. Remove the bolts and the camshaft timing sprockets.

#### Installation

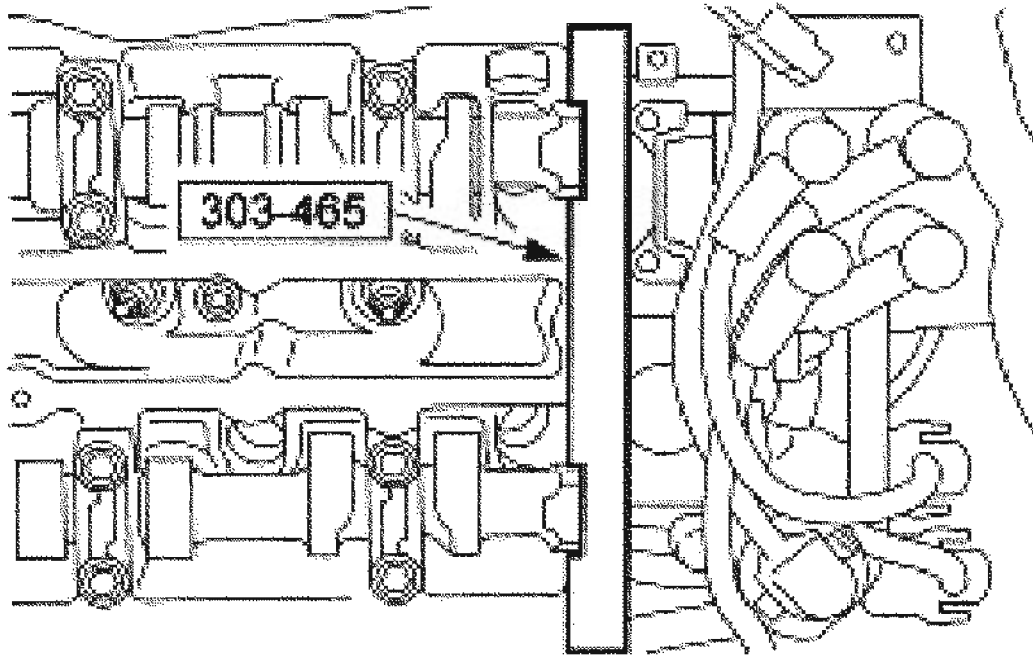
1. Install the camshaft sprockets onto the camshafts and loosely install the bolts.



G02738768

**Fig. 129: Installing Camshaft Sprockets Onto Camshafts**  
Courtesy of FORD MOTOR CO.

2. Install the special tool.



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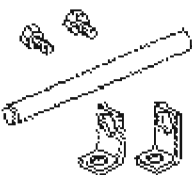


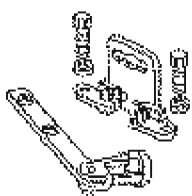
**Fig. 130: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

3. Raise the vehicle.
4. Install the timing belt. For additional information, refer to **TIMING BELT** .

**VALVE - VALVE SPRING, VALVE SPRING RETAINER AND VALVE STEM SEAL**

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

	Impact Hammer 307-005 (T59L-100-B)
	Valve Spring Compressor Set 303-300 (T87C-6565-A)
	Valve Stem Seal Remover 303-468 (T94P-6510-AH)
	Valve Stem Seal Replacer 303-470 (T94P-6510-CH)
	Valve Spring Compressor 303-350 (T89P-6565-A)

G02735770

**Fig. 131: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal

1. Remove the spark plugs. For additional information, refer to **ENGINE IGNITION-**

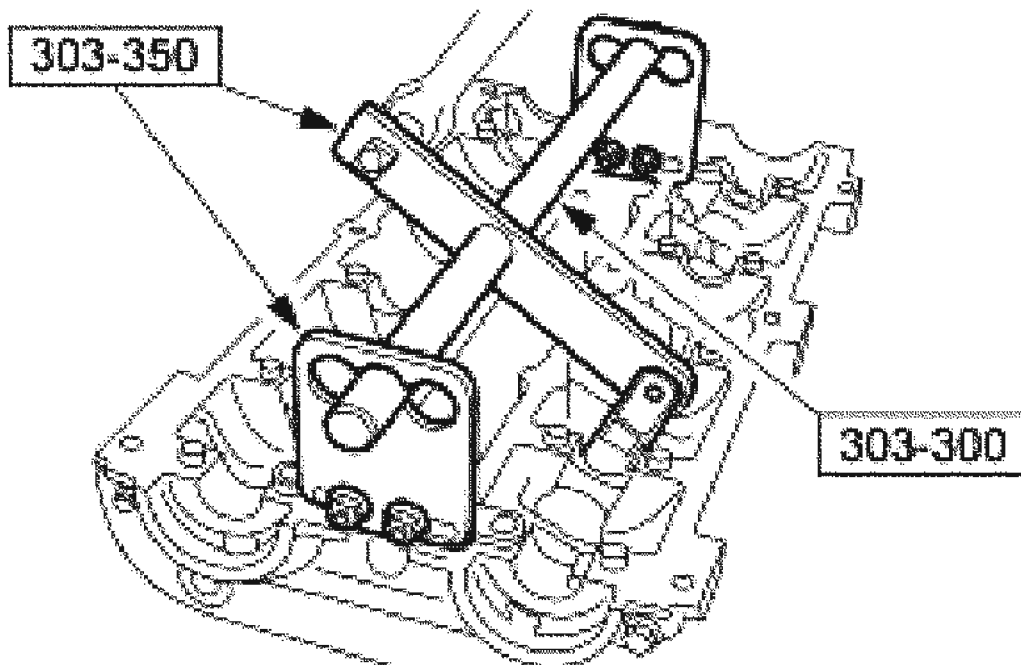
## 2.0L ZETEC .

2. Remove the valve tappets. For additional information, refer to VALVE TAPPETS .

**NOTE:** If the air pressure fails to hold the valves closed while carrying out the following steps, valve or valve seat damage is indicated and the cylinder head must be removed.

**NOTE:** Make sure the applicable piston is at the top of its stroke.

3. Install the air line with an adapter in the spark plug hole and turn on the air supply.
4. Install the special tools, compress the valve spring, and remove the valve spring retainer and valve spring.



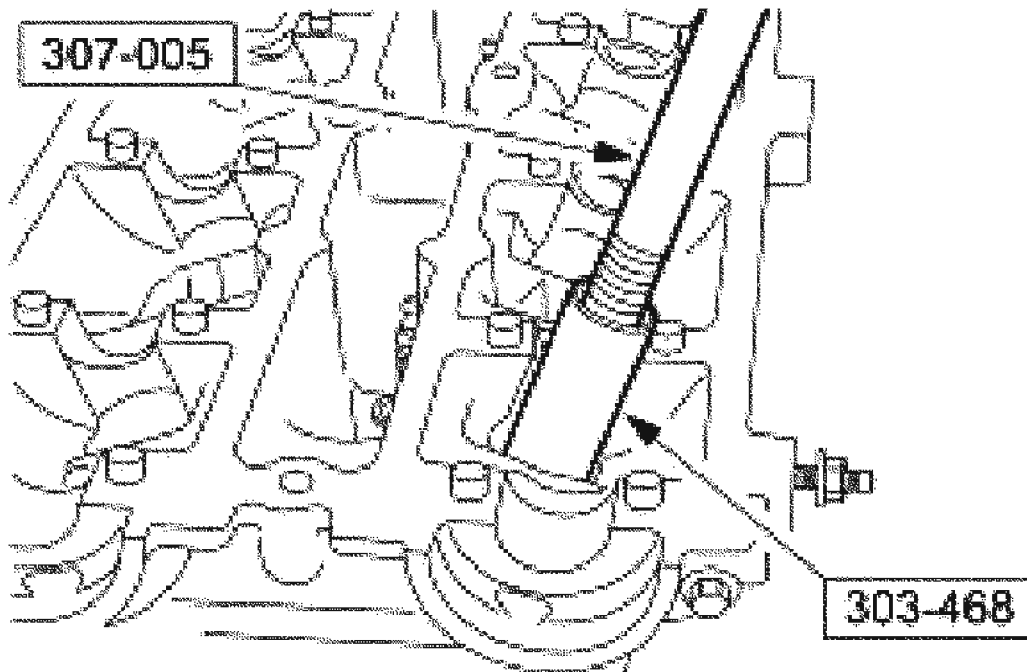
G02738771

**Fig. 132: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

5. Inspect the valve spring, valve spring retainer and valve spring retainer key. For additional information refer to ENGINE SYSTEM-GENERAL INFORMATION . Install new parts as necessary.



**NOTE:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve(s) to fall into the cylinder. A rubber band, tape or string wrapped around the end of the valve stem will prevent this from happening.



G02738772

**Fig. 133: Removing Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

6. Use the special tools to remove the valve stem seal

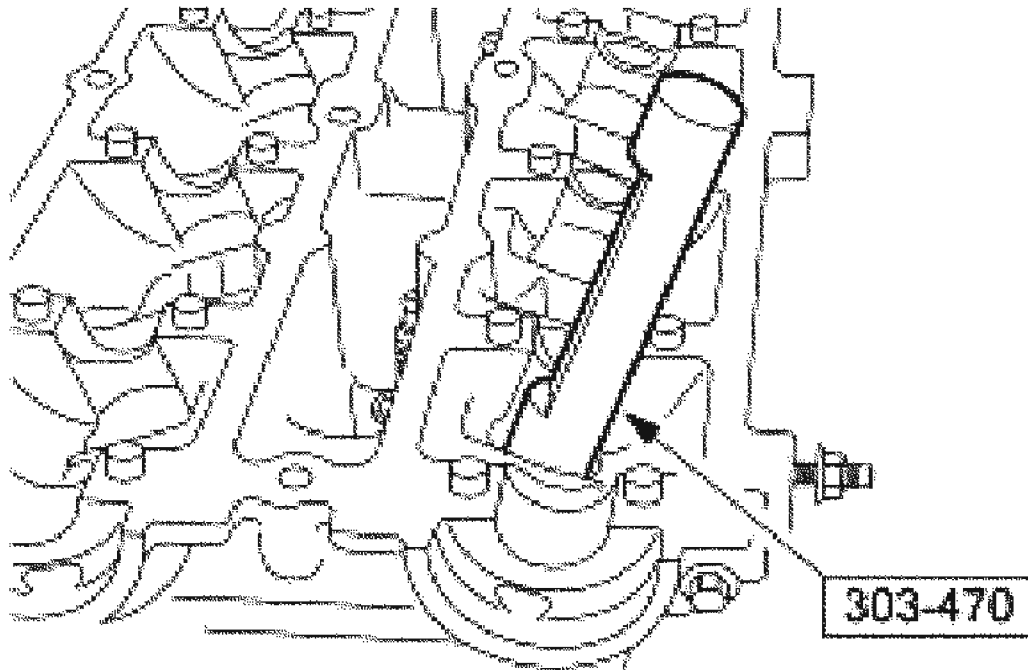
#### Installation

**CAUTION:** If the valve has been damaged, removal will be necessary for repair.

1. Remove the air pressure from the spark plug adapter and inspect the valve for damage. Rotate the valve and check the valve for eccentric movement during rotation. For additional information refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
2. If the condition of the valve is satisfactory, apply Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H to the valve stem and

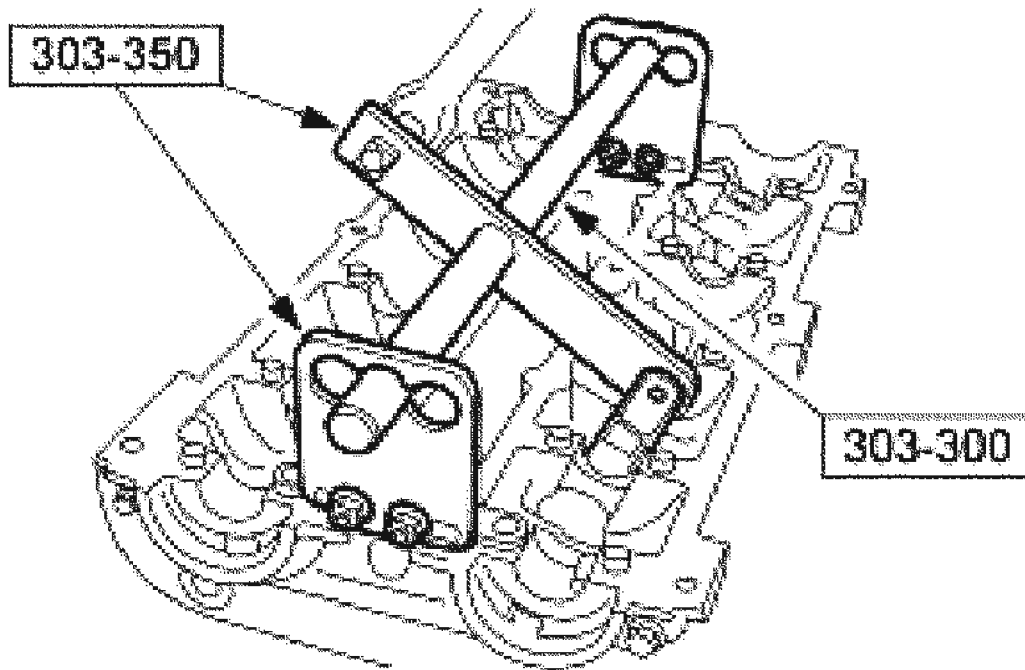
hold the valve closed. Apply the air pressure within the cylinder.

3. Lubricate valve and guides with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H and using the special tool install the valve stem seals onto the cylinder head valve guides.



**Fig. 134: Installing Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

4. Place the valve spring in position over the valve and install the valve spring retainer.
5. Using the special tools compress the valve spring and install the valve spring retainer keys.
  - Remove the special tools.

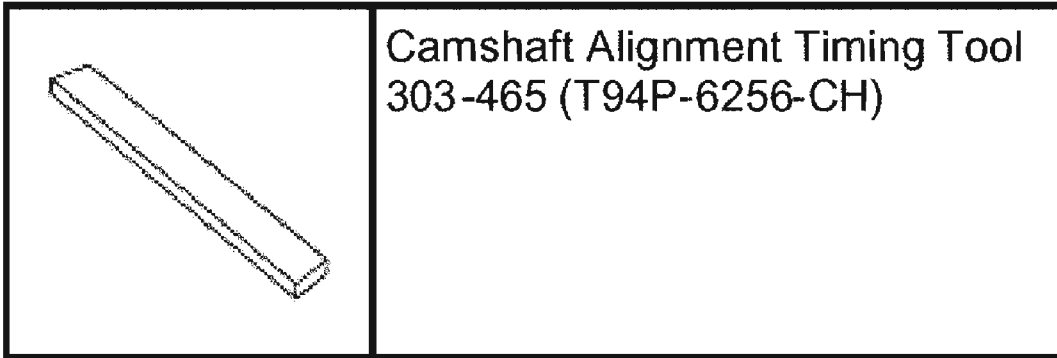


G02738774

**Fig. 135: Compressing Valve Spring And Installing Valve Spring Retainer Keys**  
Courtesy of FORD MOTOR CO.

6. Remove the air pressure.
7. Remove the air line adapter.
8. Install the valve tappets. For additional information, refer to **VALVE TAPPETS** .
9. Install the spark plugs. For additional information, refer to **FUEL CHARGING & CONTROLS-2.0L ZETEC**

**VALVE - VALVE CLEARANCE, ADJUST**

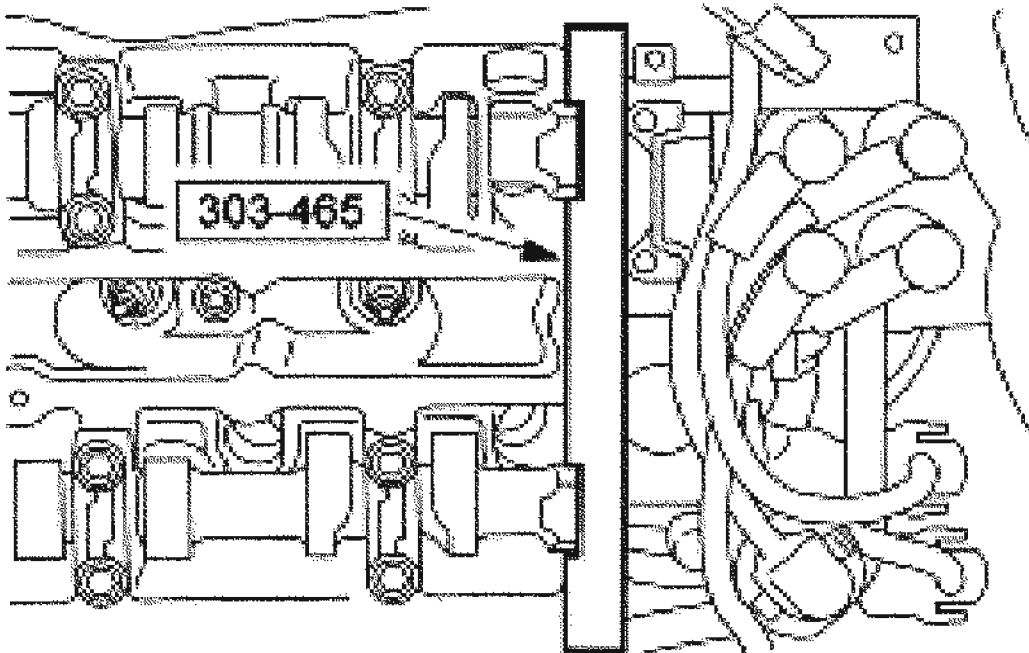


G02738775

**Fig. 136: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal**

1. Remove the timing belt. For additional information, refer to **TIMING BELT**.
2. Remove the camshaft alignment tool.

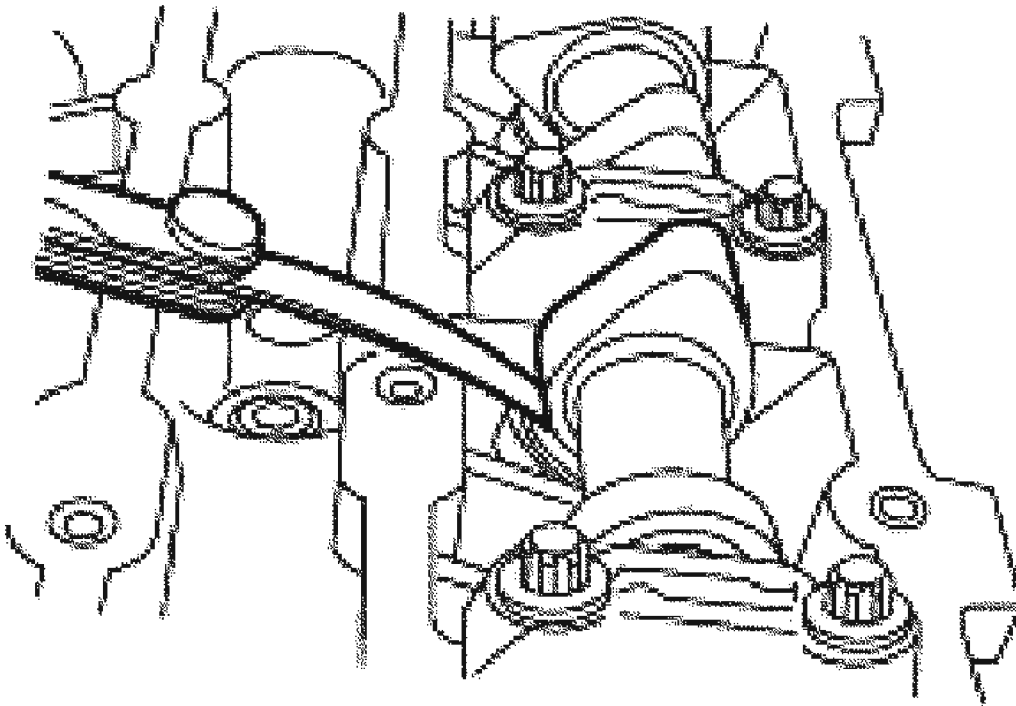


G02738776

**Fig. 137: Removing Camshaft Alignment Tool**

Courtesy of FORD MOTOR CO.

**NOTE:** Measure each valve's clearance at base circle with the lobe pointed away from the tappet, before removing the camshafts. Failure to measure all clearances prior to removing the camshafts will necessitate repeated removal and installation and wasted labor time.

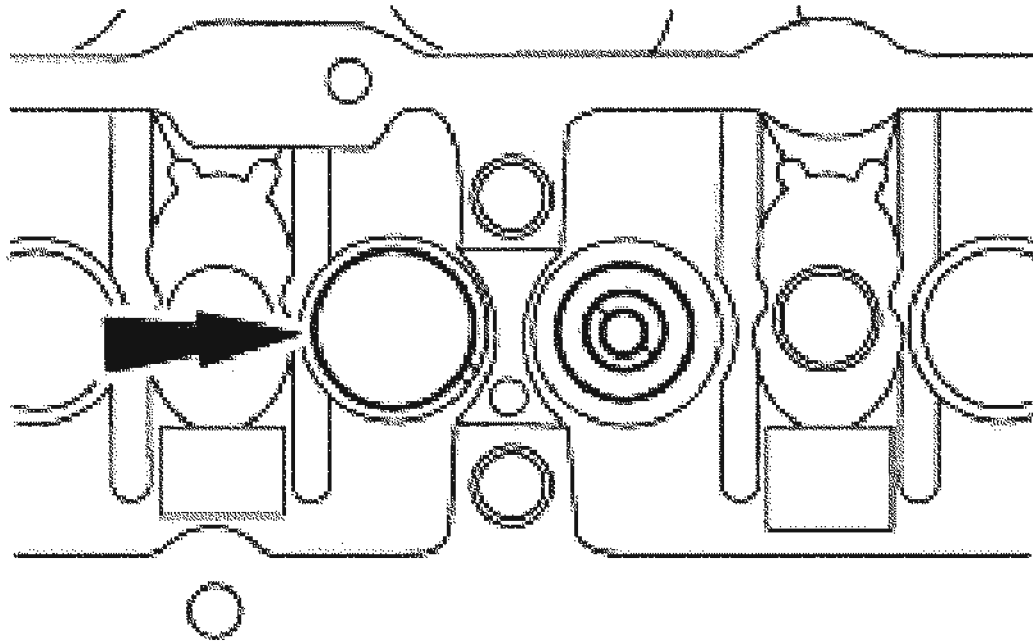


G02738777

**Fig. 138: Measuring Each Valve's Clearance**  
Courtesy of FORD MOTOR CO.

3. Use a feeler gauge to measure each valve's clearance and record its location.
4. Remove the camshafts. For additional information, refer to CAMSHAFTS .

**CAUTION:** If the camshaft and valve tappets are to be reused, mark the location of the valve tappets to make sure that they are assembled in their original positions.



G02738778

**Fig. 139: Removing Valve Tappets From Cylinder Head**  
Courtesy of FORD MOTOR CO.

5. Remove the valve tappets from the cylinder head.

**NOTE:** A midrange clearance is the most desirable:

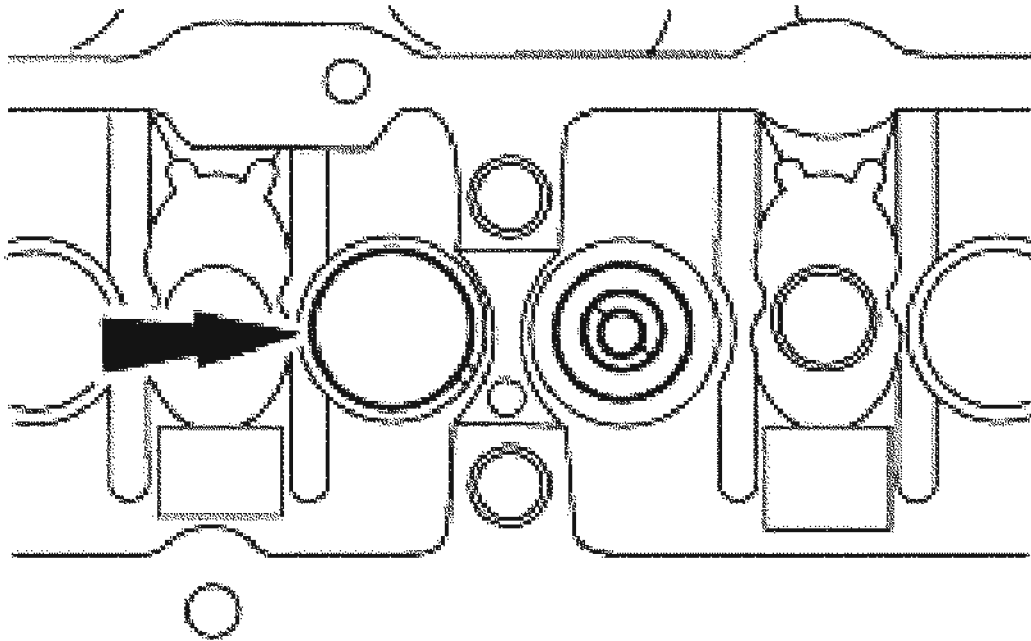
- intake: 0.15 mm (0.006 inch)
- exhaust: 0.3 mm (0.012 inch)

**NOTE:** Select tappets using this formula: tappet thickness = measured clearance plus the base tappet thickness minus most desirable thickness.

6. Select tappets and mark installation location.

#### Installation

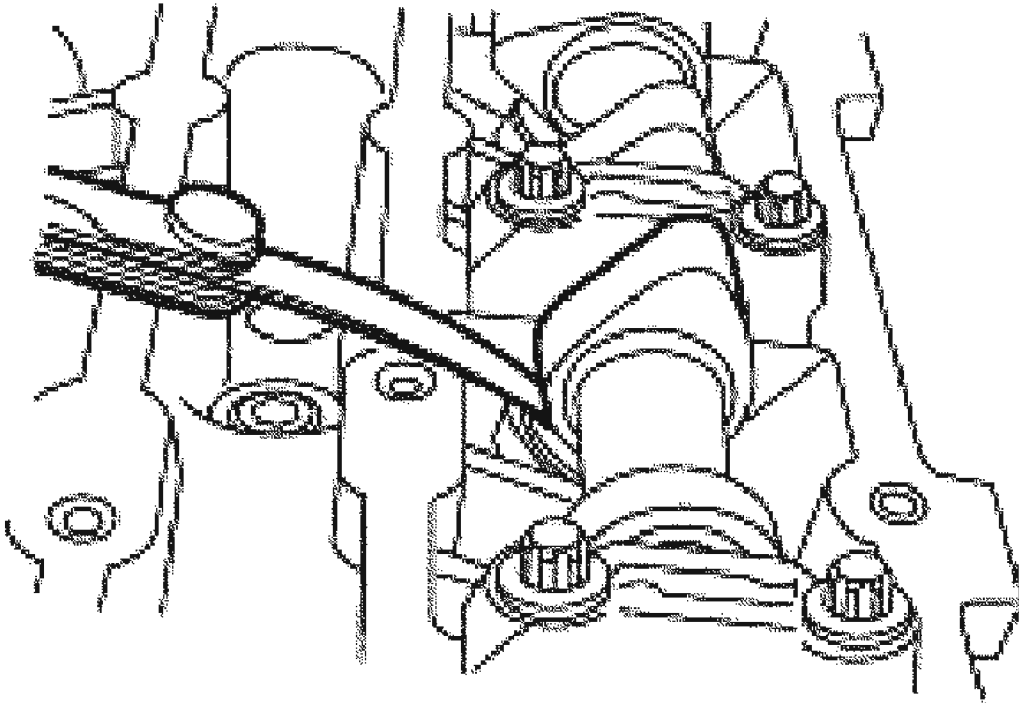
**NOTE:** Lubricate the valve tappets with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.



G02738779

**Fig. 140: Installing Valve Tappets**  
**Courtesy of FORD MOTOR CO.**

1. Install the valve tappets.
2. Install the camshafts. For additional information, refer to **CAMSHAFTS** .
3. Confirm each valve's clearance at base circle with the lobe pointed away from the tappet.

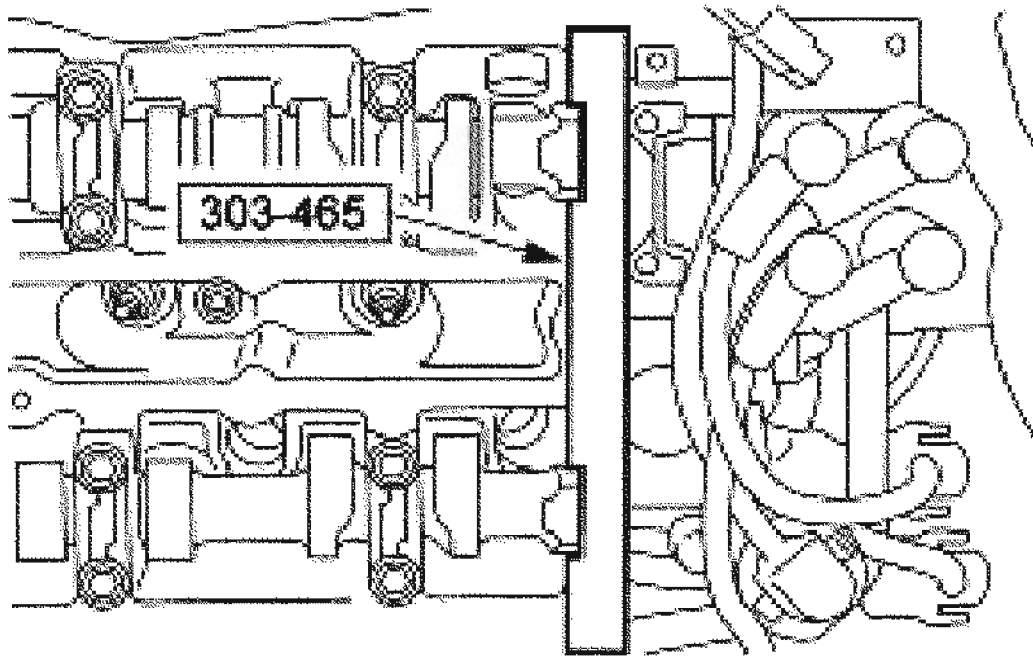


**G02738780**

**Fig. 141: Confirming Each Valve's Clearance At Base Circle With Lobe Pointed Away From Tappet**  
**Courtesy of FORD MOTOR CO.**

4. Install the camshaft alignment tool.





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**Fig. 142: Installing Camshaft Alignment Tool**  
Courtesy of FORD MOTOR CO.

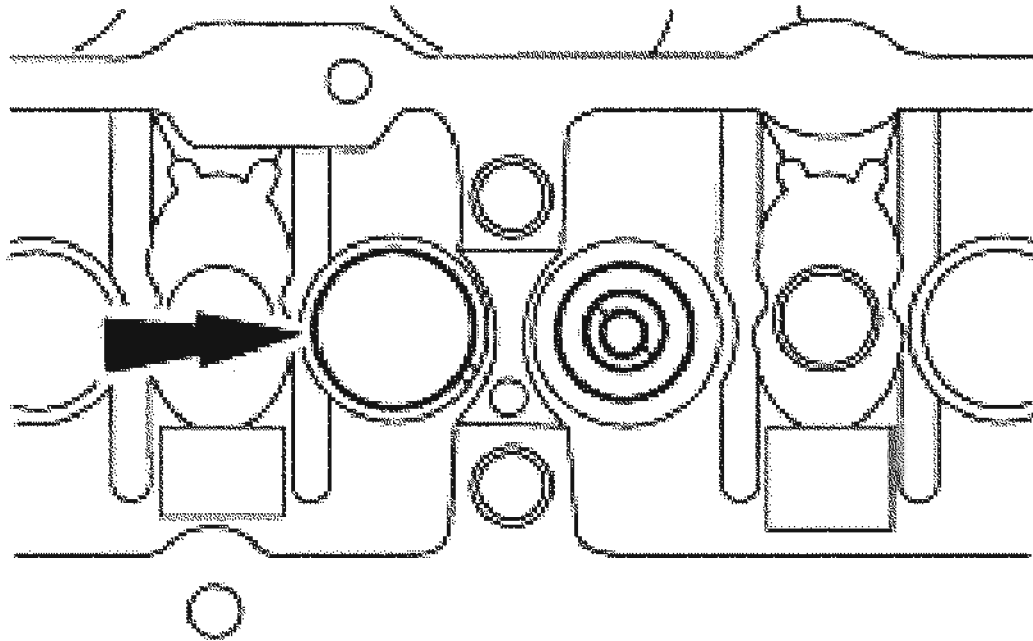
5. Install the timing belt. For additional information, refer to **TIMING BELT** .

## VALVE TAPPETS

### Removal

1. Remove the camshafts. For additional information, refer to **CAMSHAFTS** .

**CAUTION:** If the camshaft and valve tappets are to be reused, mark the location of the valve tappets to make sure that they are assembled in their original positions.



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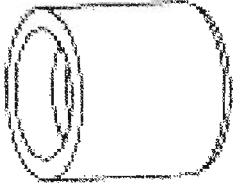
**Fig. 143: Removing Valve Tappets From Cylinder Head**  
Courtesy of FORD MOTOR CO.

2. Remove the valve tappets from the cylinder head.
3. Inspect the valve tappets. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

**NOTE:**      **Make sure the valve tappets are installed in their original locations**

4. To install, reverse the removal procedure.
  - Lubricate the valve tappet with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

## CAMSHAFTS



Camshaft Seal Replacer  
303-160 (T81P-6292-A)

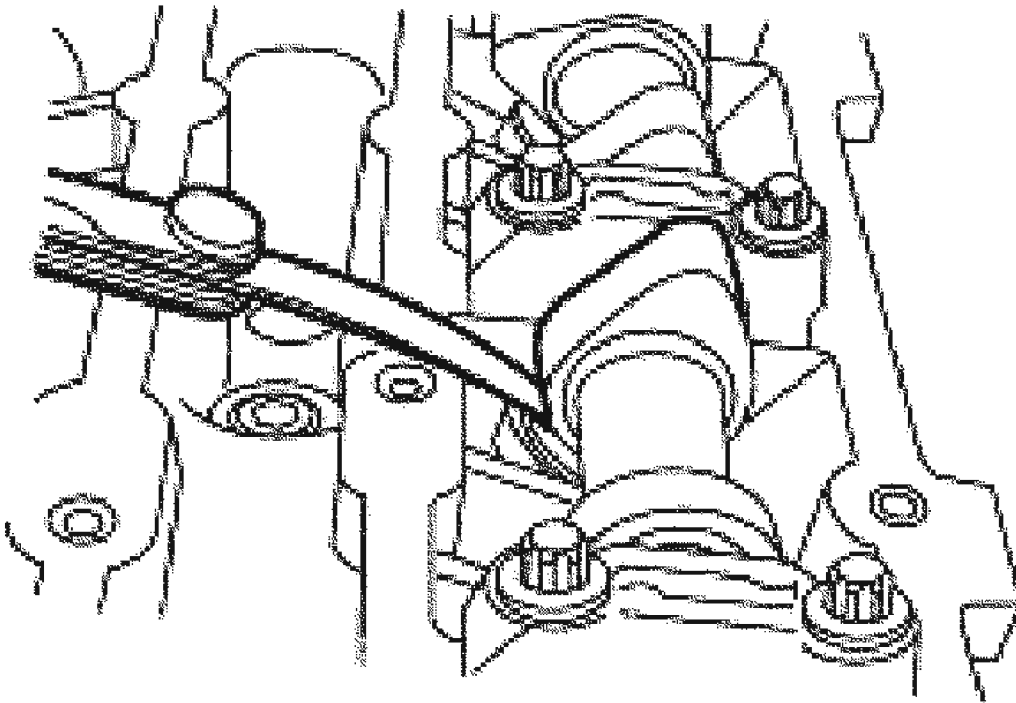
G02738783

**Fig. 144: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal**

1. Remove the camshaft timing sprockets. For additional information, refer to **TIMING DRIVE COMPONENTS - TIMING SPROCKETS** .

**NOTE:** Measure each valve's clearance at base circle with the lobe pointed away from the tappet, before removing the camshafts. Failure to measure all clearances prior to removing the camshafts will necessitate repeated removal and installation and wasted labor time.

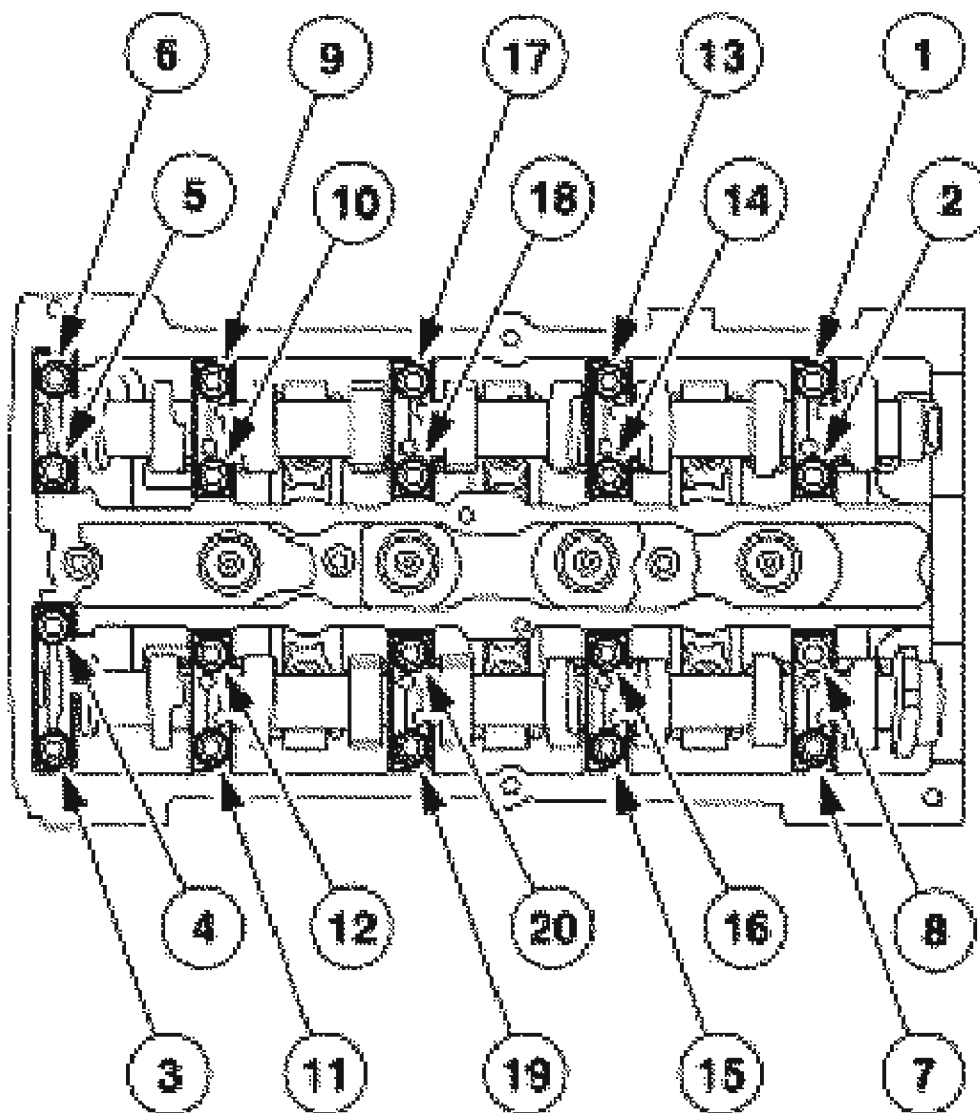


G02738784

**Fig. 145: Measuring Each Valve's Clearance**  
Courtesy of FORD MOTOR CO.

2. Use a feeler gauge to measure each valve's clearance and record its location.

**CAUTION:** Cylinder head camshaft journal caps are numbered on the outside flats to make sure that they are assembled in their original positions. Failure to do so may result in engine damage.



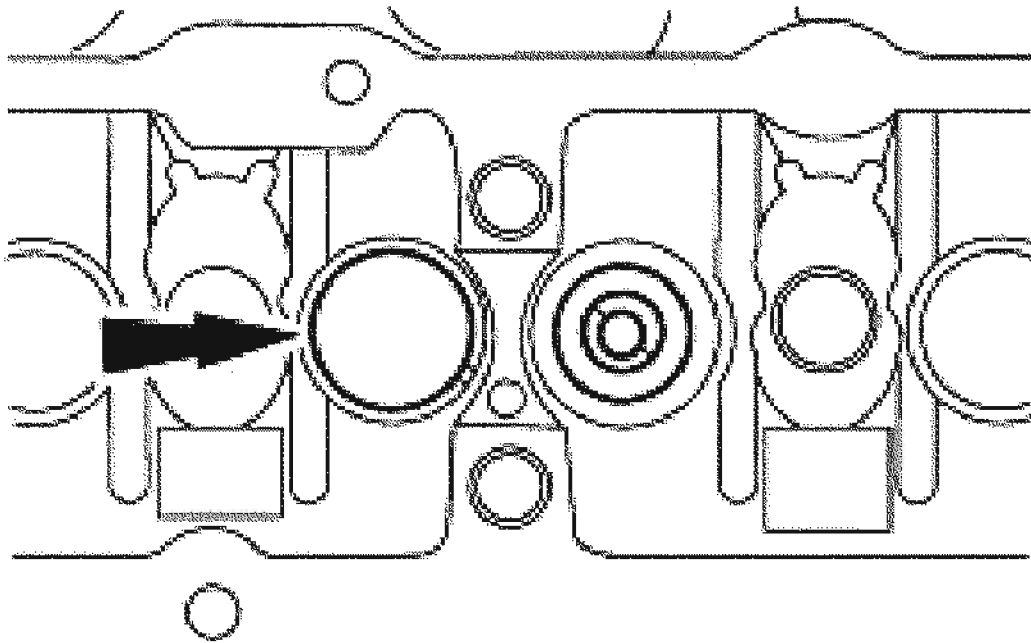
G02738785

**Fig. 146: Removing Camshafts**  
 Courtesy of FORD MOTOR CO.

3. Remove the camshafts.
  - Loosen the camshaft journal cap bolts in several two-turn passes in the sequence shown.
  - Remove the bolts.
  - Remove the caps.

4. Inspect the camshaft runout, lobe lift and journal diameter for wear. For additional information, refer to ENGINE SYSTEM-GENERAL INFORMATION .
  - Discard the oil seals.

**CAUTION:** If the camshaft and valve tappets are to be reused, mark the location of the valve tappets to make sure that they are assembled in their original positions.



G02738786

**Fig. 147: Removing Valve Tappets From Cylinder Head**  
Courtesy of FORD MOTOR CO.

5. Remove the valve tappets from the cylinder head.

**NOTE:** A midrange clearance is the most desirable:

- intake: 0.006 in (0.15 mm)
- exhaust 0.012 in (0.3 mm)

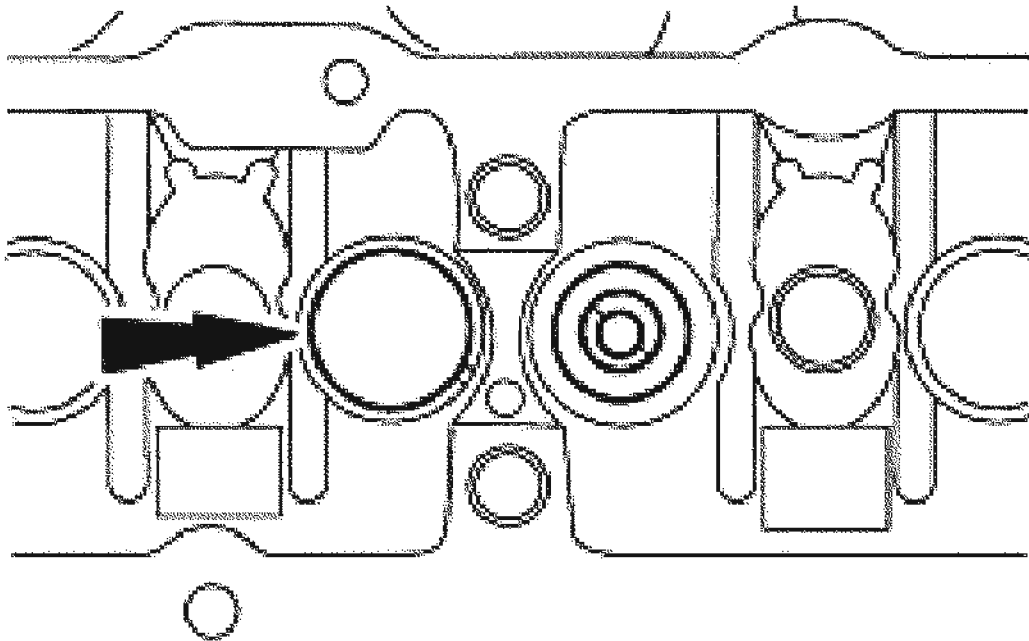
**NOTE:** Select tappets using this formula: tappet thickness = measured clearance plus the base tappet thickness minus

**most desirable thickness.**

6. Select tappets and mark installation location.

**Installation**

**NOTE:** Lubricate the valve tappets with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

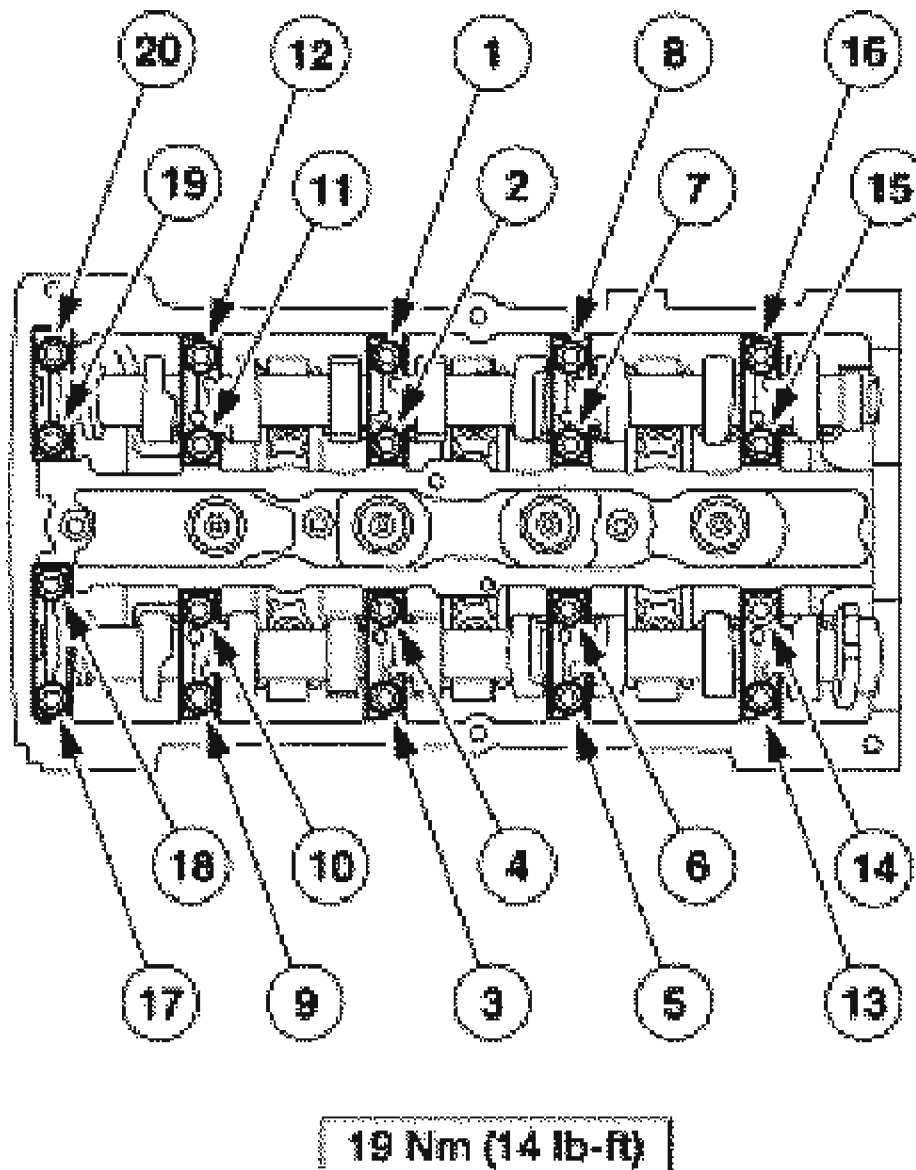


G02738787

**Fig. 148: Installing Valve Tappets**  
Courtesy of FORD MOTOR CO.

1. Install the valve tappets.

**NOTE:** Lubricate the camshaft bearing surfaces with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.



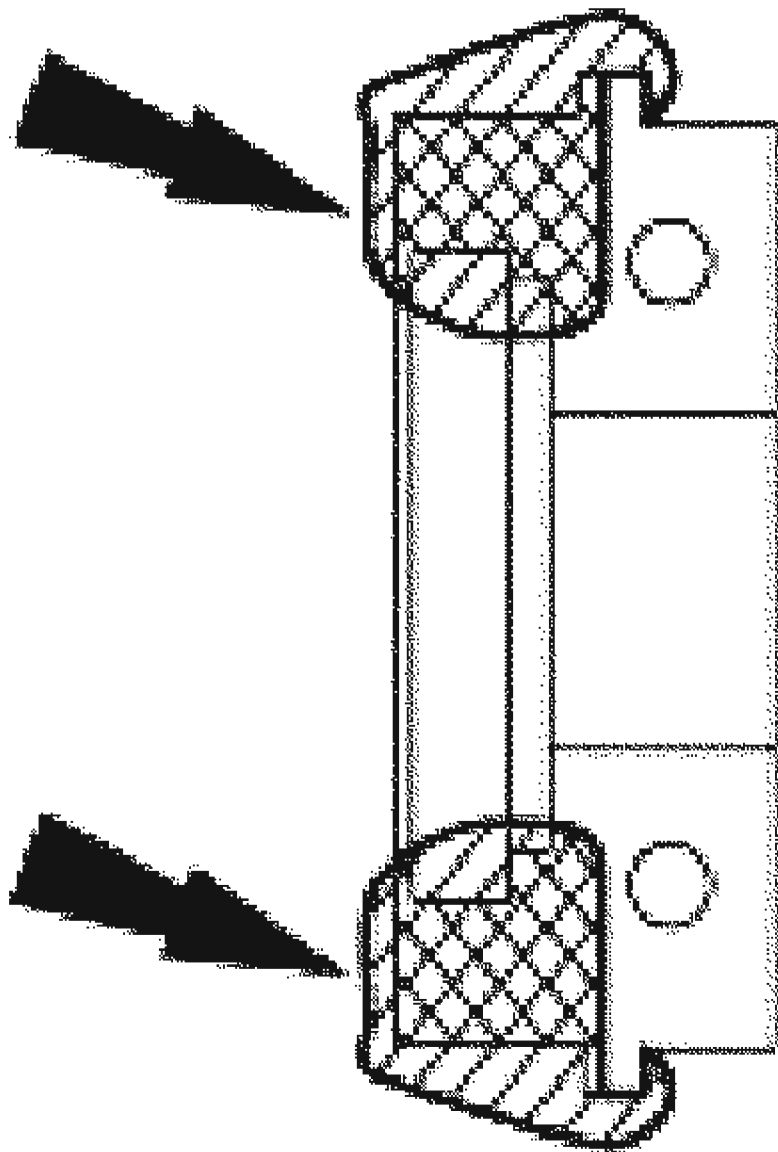
G02738788

**Fig. 149: Installing Camshafts**  
 Courtesy of FORD MOTOR CO.

2. Install the camshafts.
  - Position the camshafts and camshaft journal caps.
  - Install the bolts and tighten the bolts in several two-turn passes using the sequence shown.



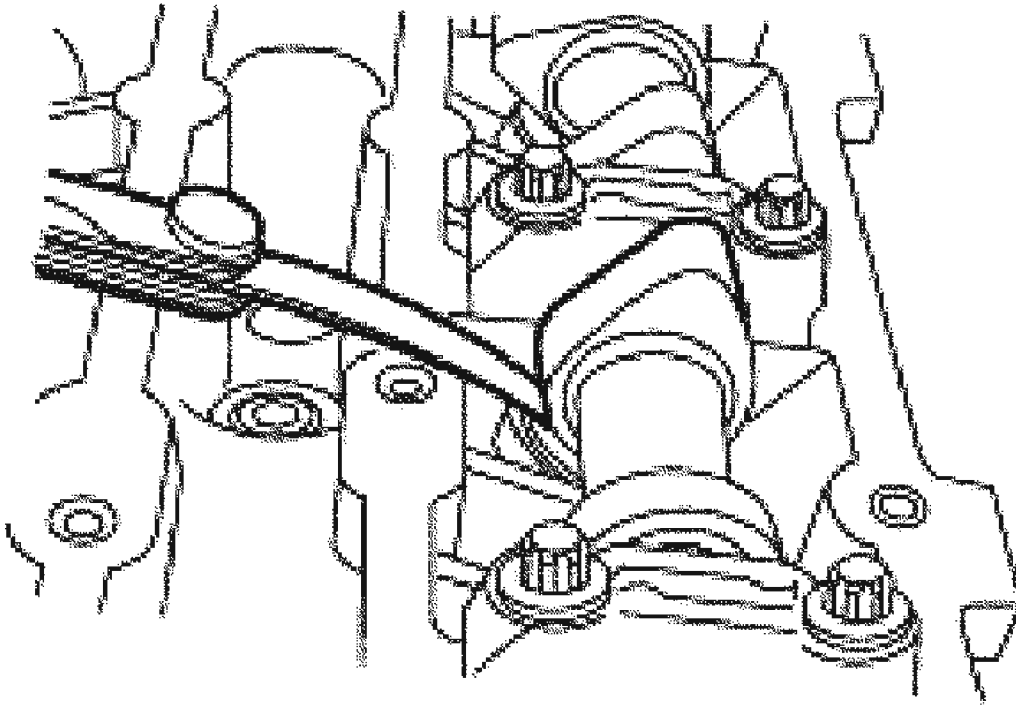
**NOTE:** The front camshaft journal cap must be installed and the bolts tightened to specification within four minutes of sealer application or oil leaks may occur.



G02738789

**Fig. 150: Coating Sealing Surface Of Front Camshaft Journal Cap With Gasket  
Maker F8AZ-19B508-AB  
Courtesy of FORD MOTOR CO.**

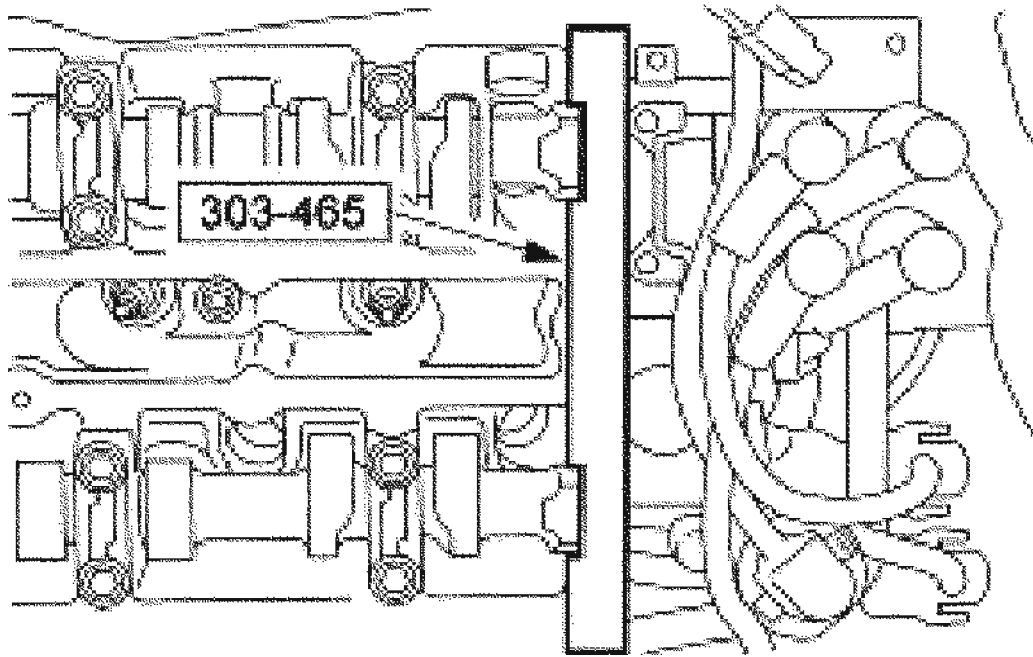
3. Coat the sealing surface of the front camshaft journal cap with Gasket Maker F8AZ-19B508-AB or equivalent meeting Ford specification WSK-M2G348-A5.
4. Confirm each valve's clearance at base circle with the lobe pointed away from the tappet.



G02738790

**Fig. 151: Confirming Each Valve's Clearance At Base Circle With Lobe Pointed Away From Tappet**  
Courtesy of FORD MOTOR CO.

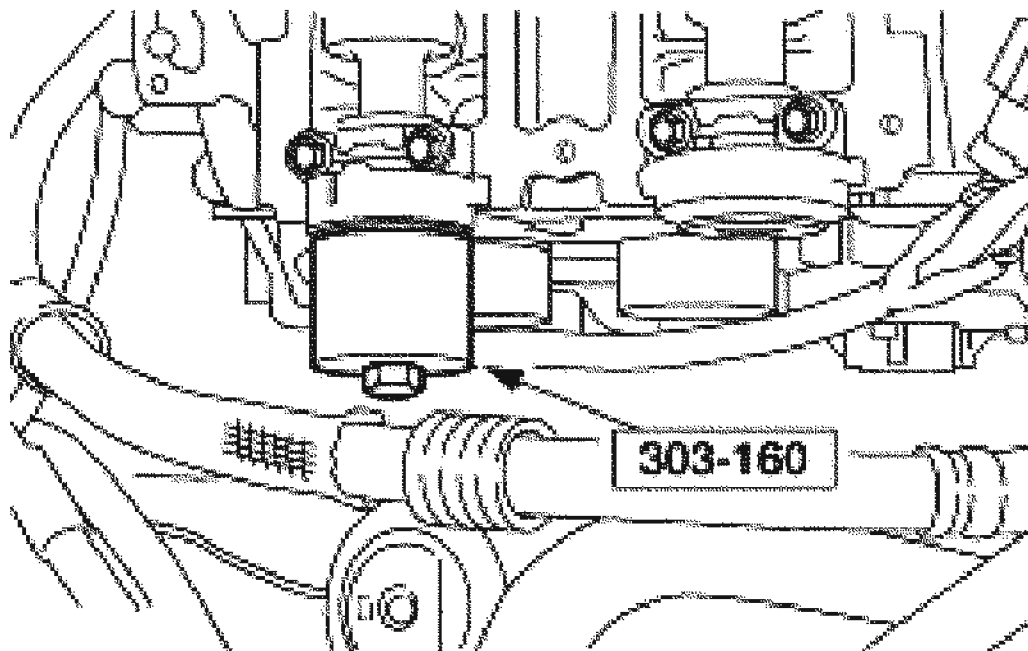
5. Install the camshaft alignment timing tool.



G02738791

**Fig. 152: Installing Camshaft Alignment Timing Tool**  
Courtesy of FORD MOTOR CO.

**NOTE:** The exhaust camshaft oil seal is shown, the intake seal is similar.

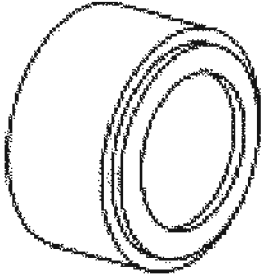



G02738792

**Fig. 153: Installing New Camshaft Front Oil Seals**  
Courtesy of FORD MOTOR CO.

6. Using the special tool, install new camshaft front oil seals.
7. Install the camshaft timing sprockets. For additional information, refer to **TIMING DRIVE COMPONENTS - TIMING SPROCKETS** .

#### **CAMSHAFT OIL SEAL**

	Camshaft Seal Replacer 303-464 (T94P-6256-BH)
	Seal Remover 303-409 (T92C-6700-CH)

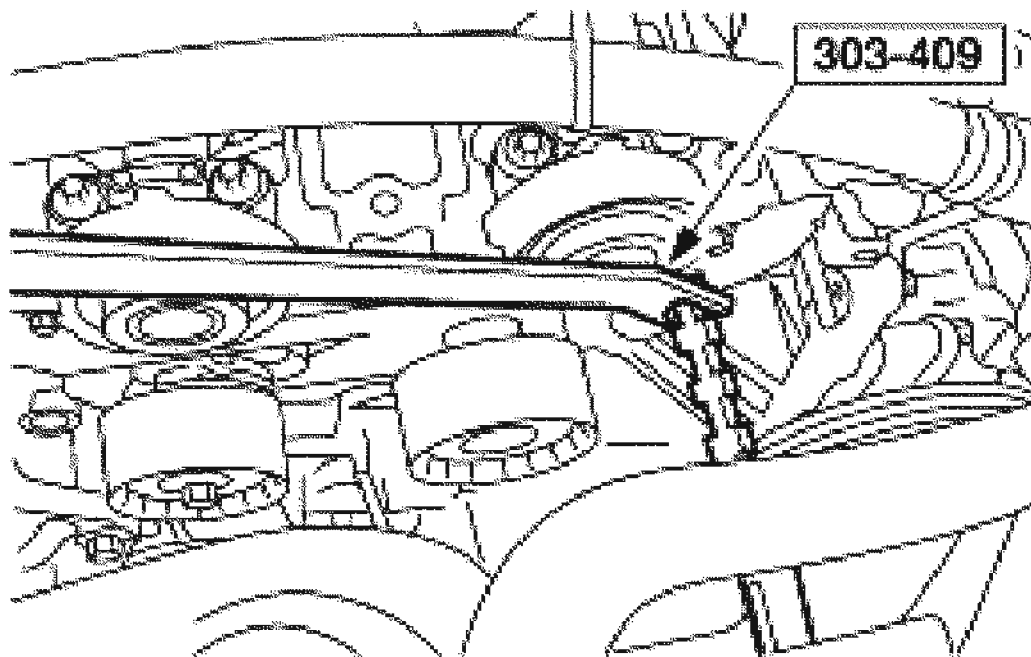
G02738793

**Fig. 154: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

1. Remove the camshaft timing sprockets. For additional information, refer to **TIMING DRIVE COMPONENTS - TIMING SPROCKETS** .

**NOTE:** The exhaust camshaft oil seal is shown, the intake camshaft oil seal is similar.



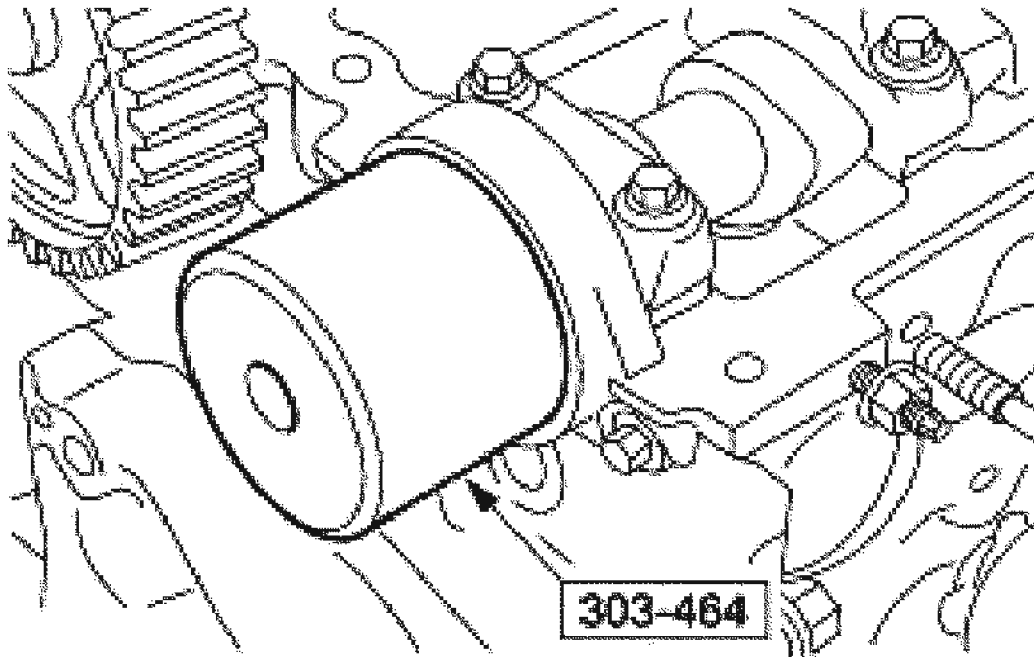
G02738794

**Fig. 155: Removing Camshaft Oil Seals**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, remove the camshaft oil seals.

#### Installation

**NOTE:** The exhaust camshaft oil seal is shown, the intake seal is similar.



G02738795

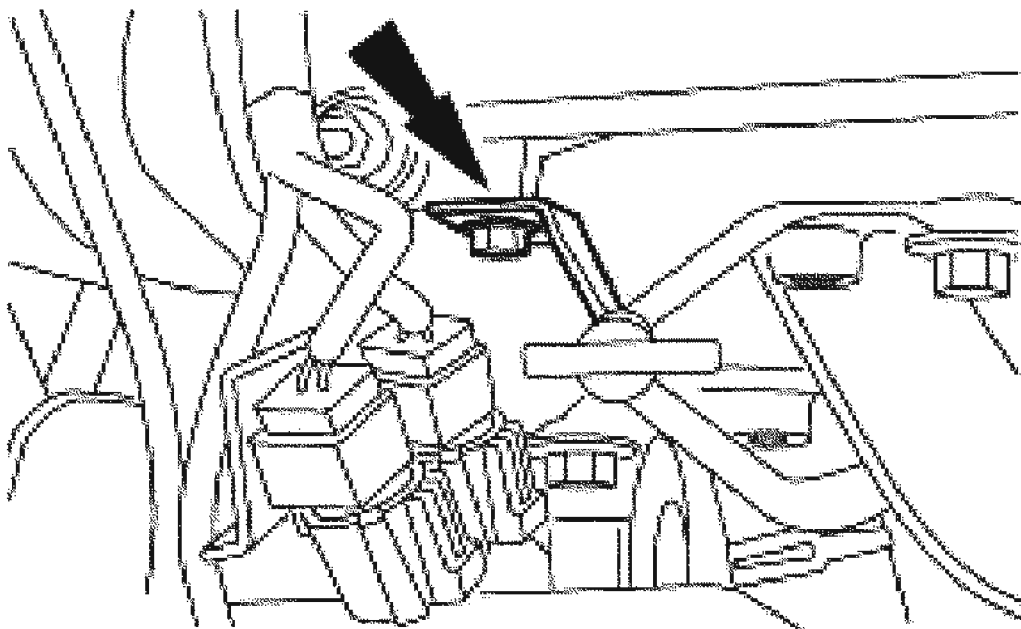
**Fig. 156: Installing New Camshaft Front Oil Seals**  
Courtesy of FORD MOTOR CO.

1. Using the special tool, install new camshaft front oil seals.
2. Install the camshaft timing sprockets. For additional information, refer to **TIMING DRIVE COMPONENTS - TIMING SPROCKETS** .

## **EXHAUST MANIFOLD**

### **Removal**

1. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** .
2. Lower the vehicle.
3. Remove the oil level indicator and tube bracket bolt.

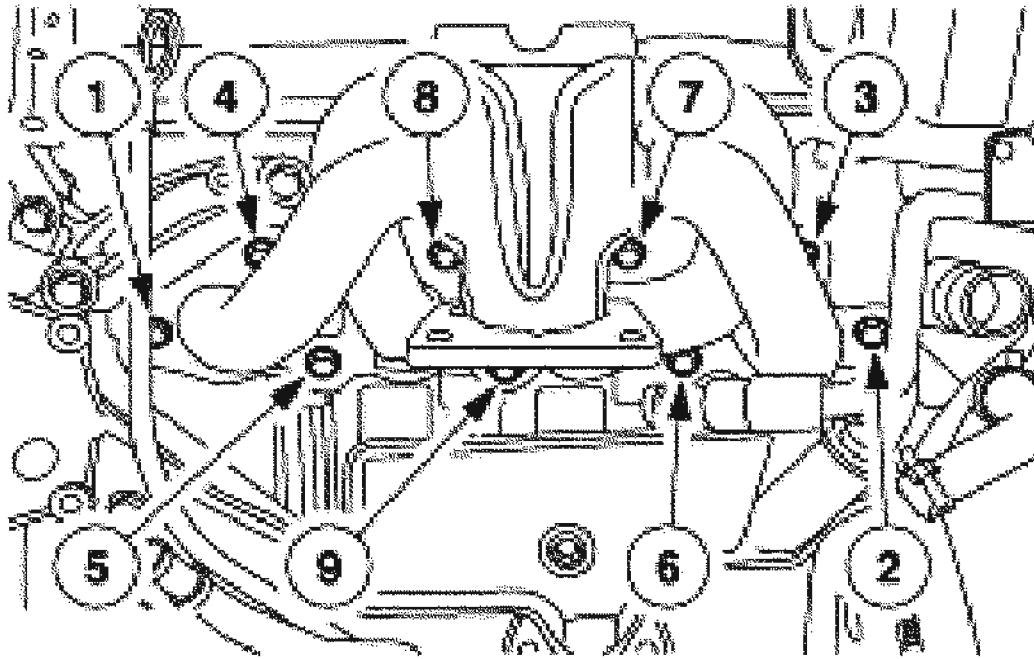


G02738796

**Fig. 157: Removing Oil Level Indicator And Tube Bracket Bolt**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not work on the aluminum engine components until the engine is cold or damage may occur.





G02738797

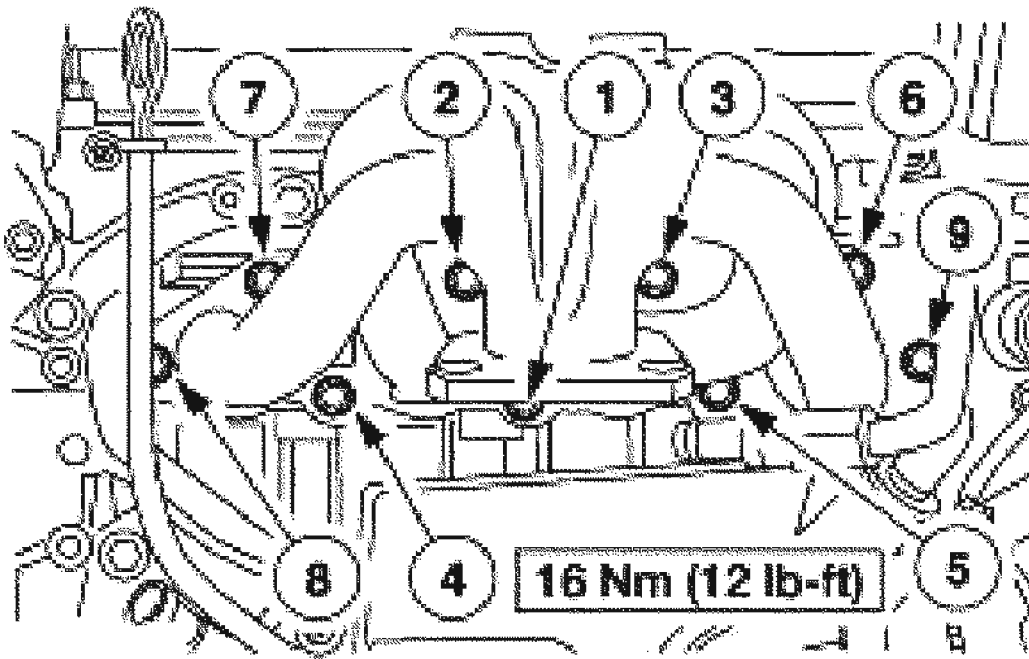
**Fig. 158: Removing Exhaust Manifold Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

4. Remove the six bolts and three nuts and remove the exhaust manifold.
  - Discard the gasket.

#### Installation

**CAUTION:** The exhaust manifold sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material; use only plastic manual scrapers. Do not scratch or gouge the aluminum sealing surfaces.

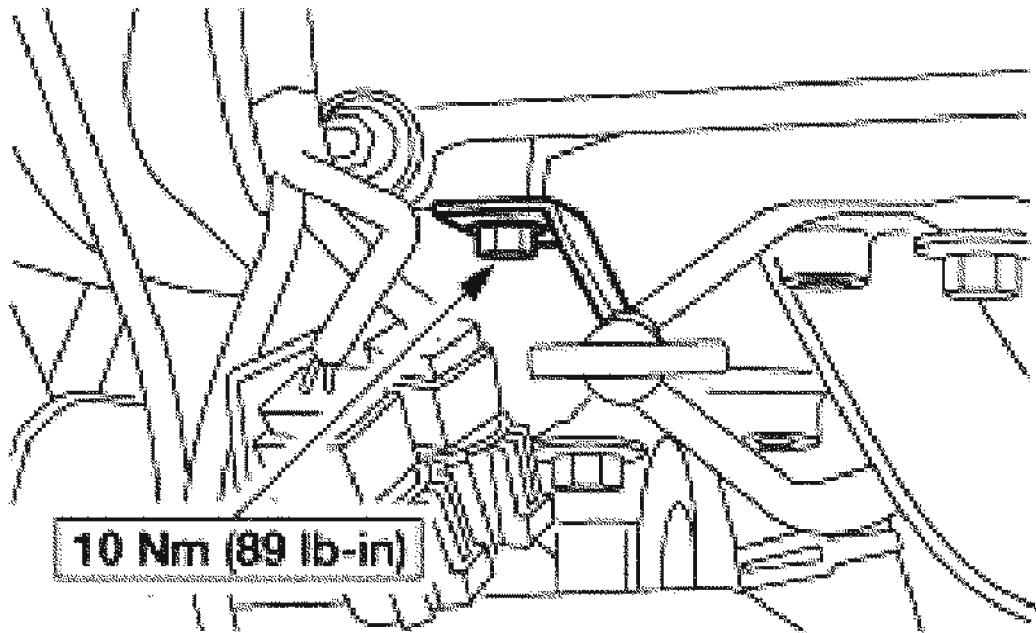
1. Carefully clean both sealing surfaces.
  - Position a new gasket.
2. Install the exhaust manifold and tighten using the sequence shown.



G02738798

**Fig. 159: Identifying Tightening Sequence Of Exhaust Manifold Bolts**  
Courtesy of FORD MOTOR CO.

3. Install the oil level indicator and tube.



G02738799

**Fig. 160: Identifying Oil Level Indicator And Tube Bracket Bolt Torque Specification**

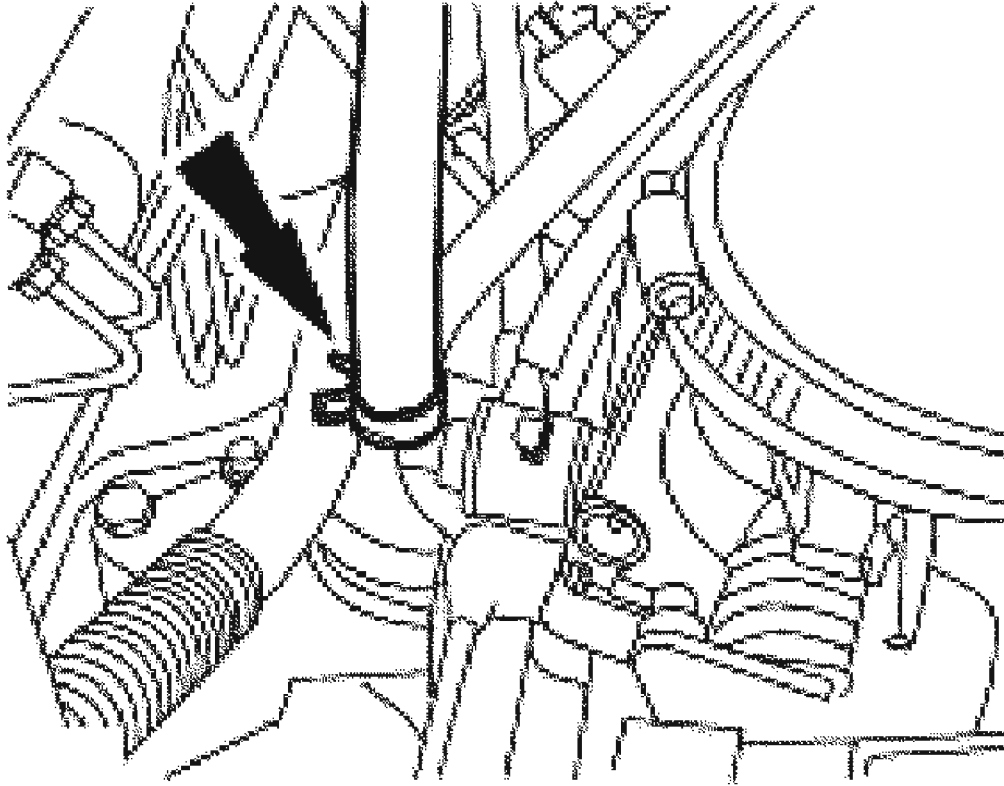
Courtesy of FORD MOTOR CO.

4. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.

## CYLINDER HEAD

### Removal

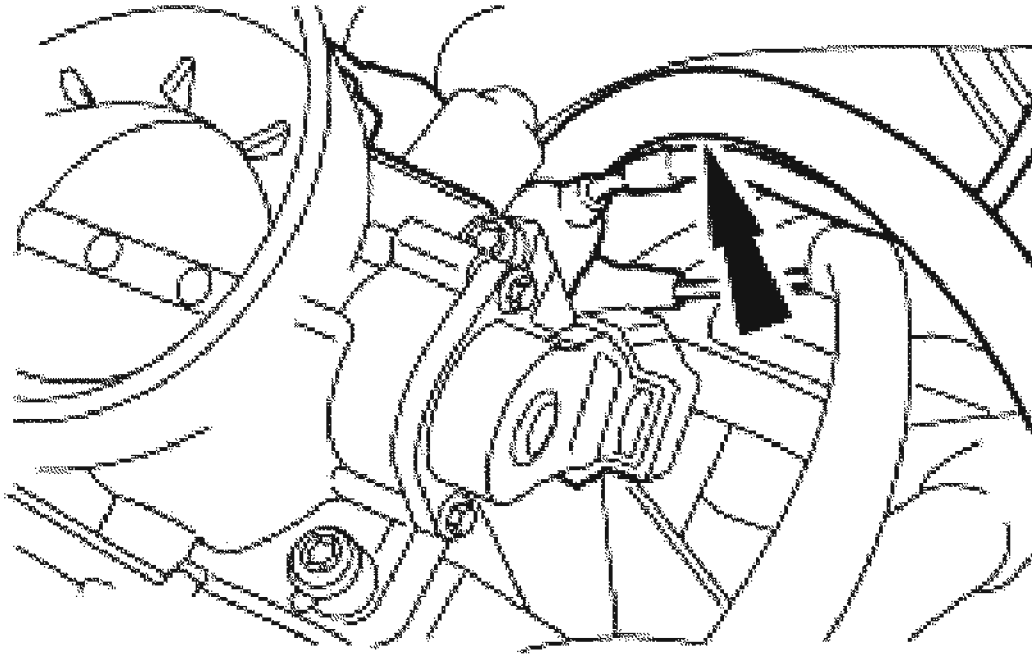
1. Drain the engine coolant. For additional information, refer to **ENGINE COOLING**.
2. Relieve the fuel system pressure. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**.
3. Remove the valve tappets. For additional information, refer to **VALVE TAPPETS**.
4. Remove the generator. For additional information, refer to **GENERATORS & REGULATORS**.
5. Disconnect the vacuum hose.



G02738800

**Fig. 161: Disconnecting Vacuum Hose (1 Of 2)**  
Courtesy of FORD MOTOR CO.

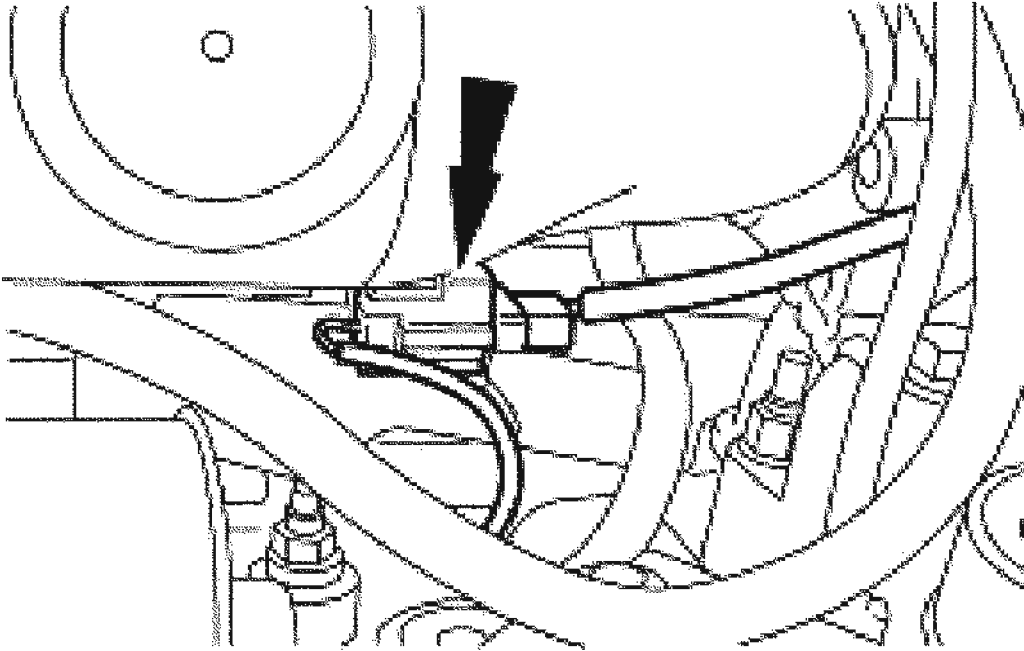
6. Disconnect the vacuum hose.



G02738801

**Fig. 162: Disconnecting Vacuum Hose (2 Of 2)**  
Courtesy of FORD MOTOR CO.

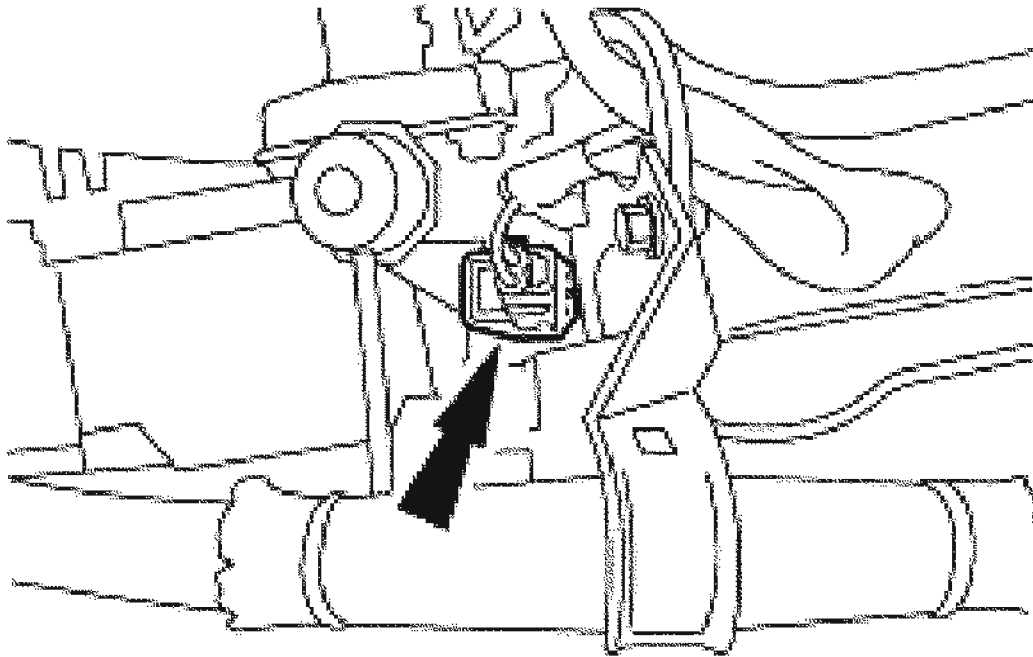
7. Disconnect the knock sensor (KS) electrical connector.



G02738802

**Fig. 163: Disconnecting Knock Sensor (KS) Electrical Connector**  
Courtesy of FORD MOTOR CO.

8. Disconnect the cylinder head temperature (CHT) sensor electrical connector.

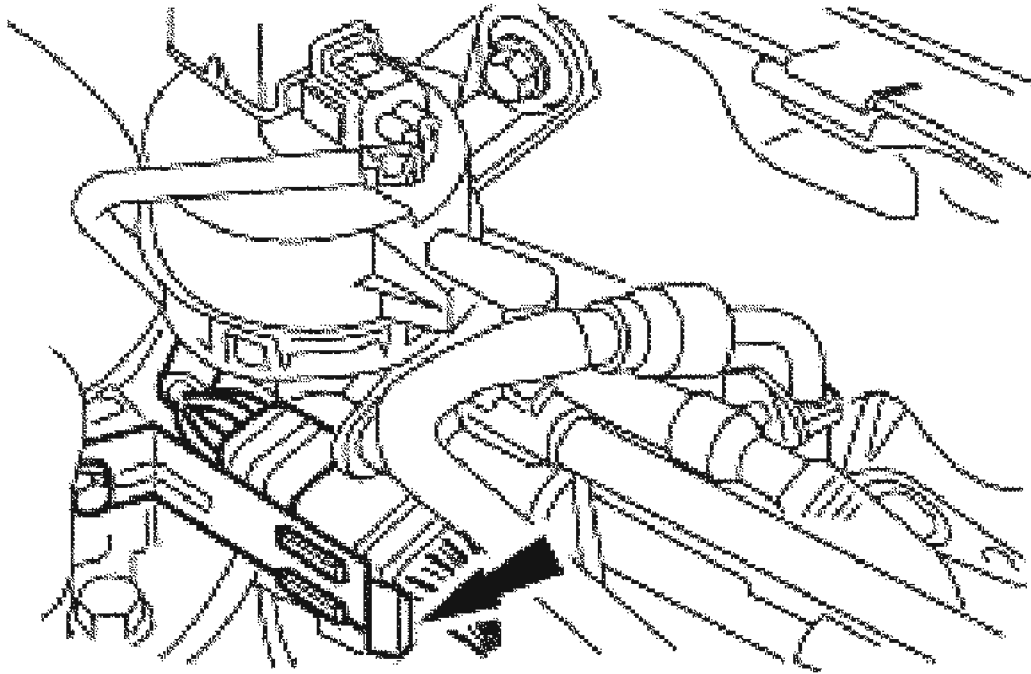


G02738803

**Fig. 164: Disconnecting Cylinder Head Temperature (CHT) Sensor Electrical Connector**

**Courtesy of FORD MOTOR CO.**

9. Detach the fuel charging wiring harness.

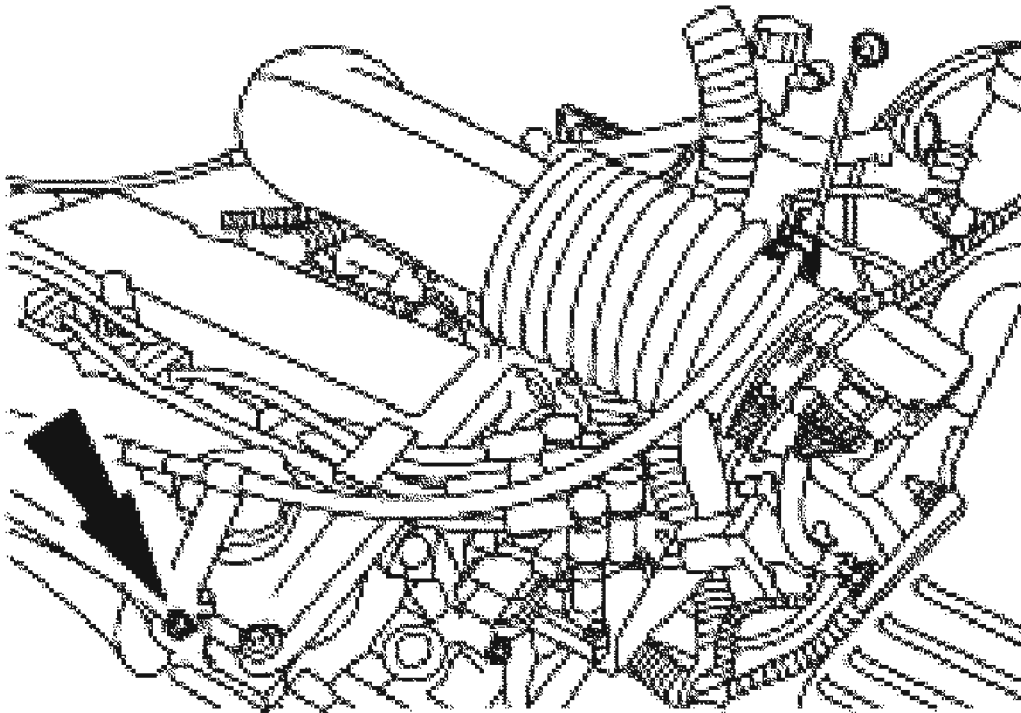


G02738804

**Fig. 165: Removing Fuel Charging Wiring Harness**  
Courtesy of FORD MOTOR CO.

10. Remove the bolt from the accelerator cable support bracket.

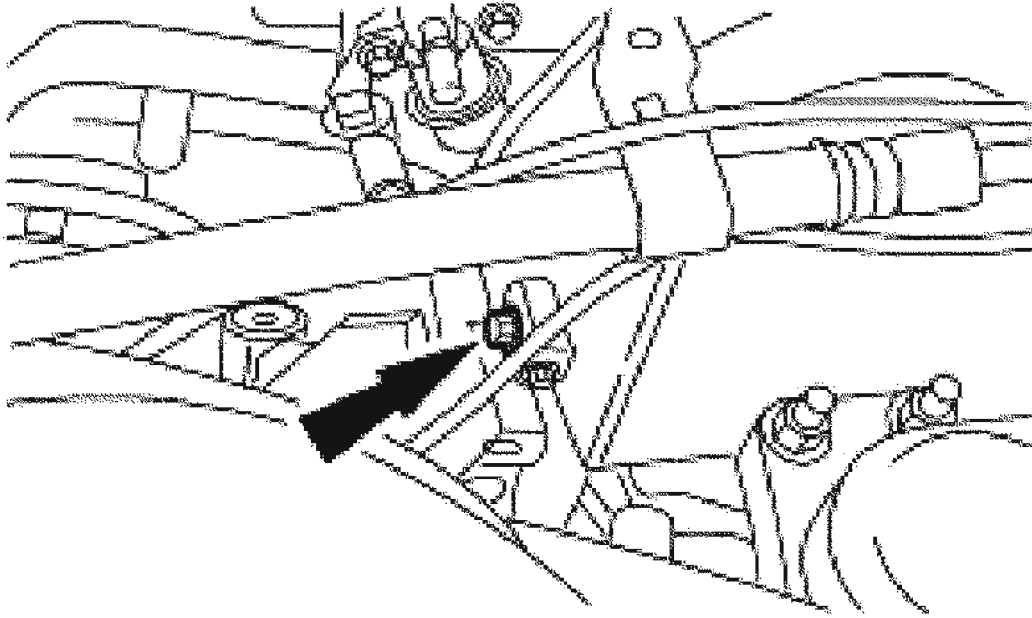




G02738805

**Fig. 166: Removing Bolt From Accelerator Cable Support Bracket**  
Courtesy of FORD MOTOR CO.

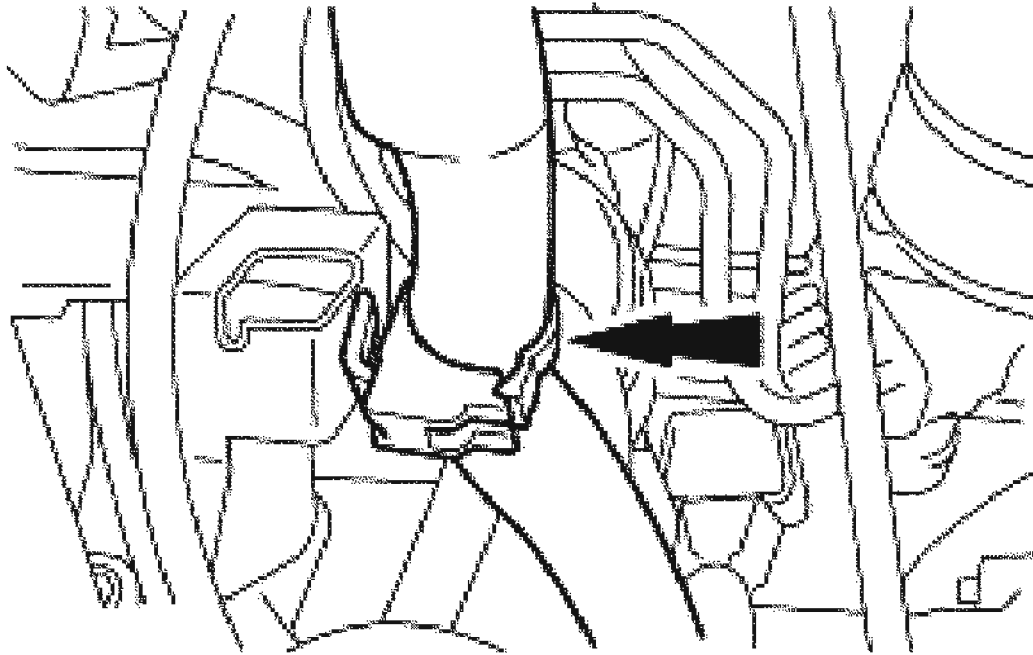
11. Remove the bolt from the generator mounting bracket.



G02738806

**Fig. 167: Removing Bolt From Generator Mounting Bracket**  
Courtesy of FORD MOTOR CO.

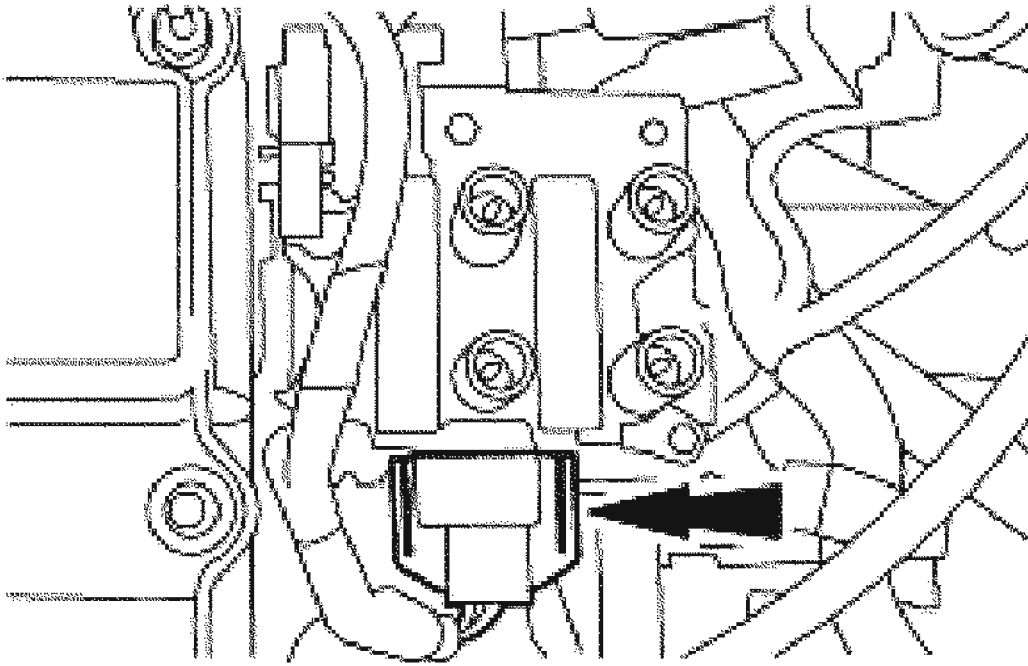
12. Disconnect the wiring harness retainer from the intake manifold.



G02738807

**Fig. 168: Disconnecting Wiring Harness Retainer From Intake Manifold**  
Courtesy of FORD MOTOR CO.

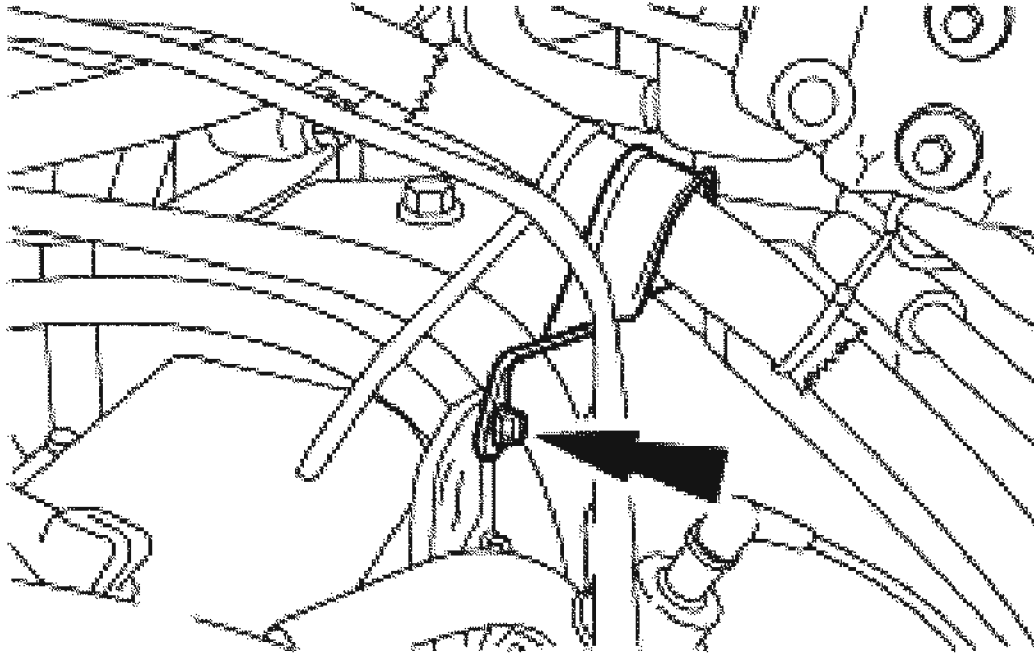
13. Disconnect the ignition coil and the radio interference suppressor electrical connectors.



G02738808

**Fig. 169: Disconnecting Ignition Coil And Radio Interference Suppressor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

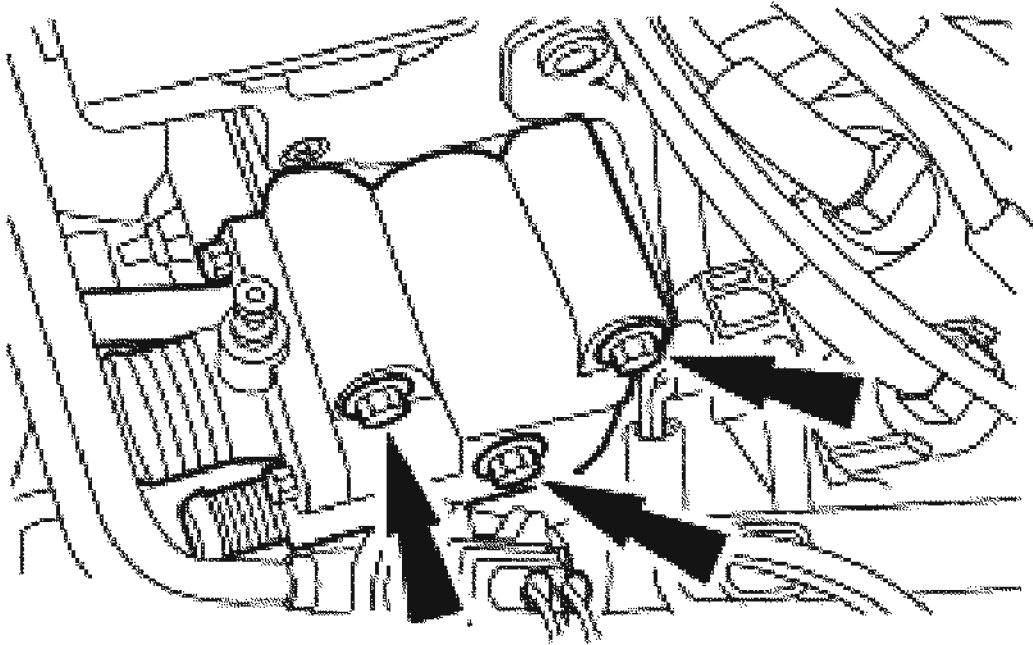
14. Remove the bolt from the power steering pressure hose support bracket.



G02738809

**Fig. 170: Removing Bolt From Power Steering Pressure Hose Support Bracket**  
Courtesy of FORD MOTOR CO.

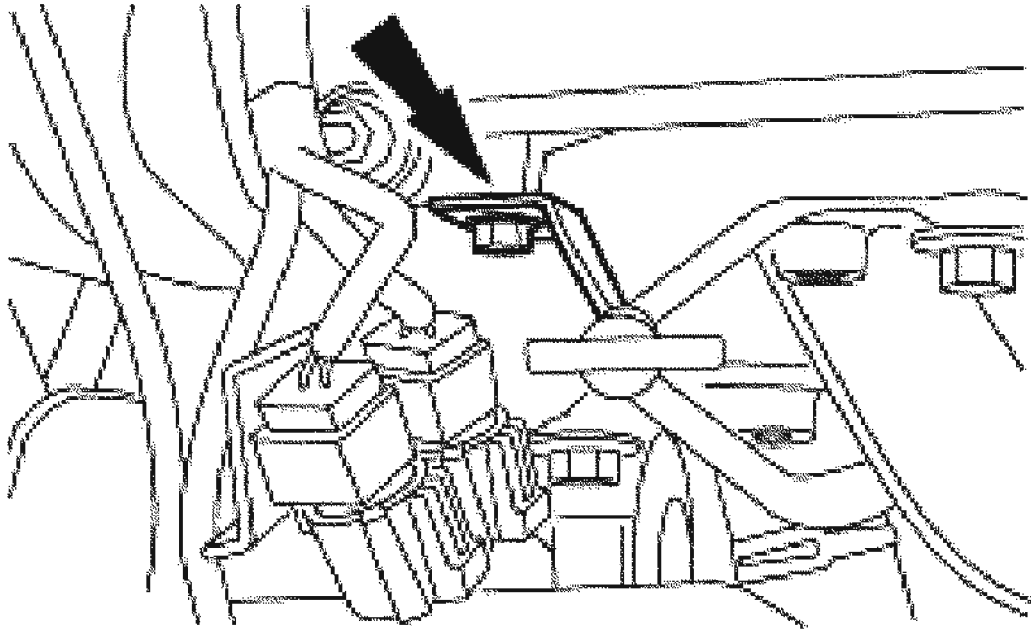
15. Position the thermostat housing aside.
  - Disconnect the electrical harness retainer
  - Remove the bolts.



G02738810

**Fig. 171: Locating Thermostat Housing Bolts**  
Courtesy of FORD MOTOR CO.

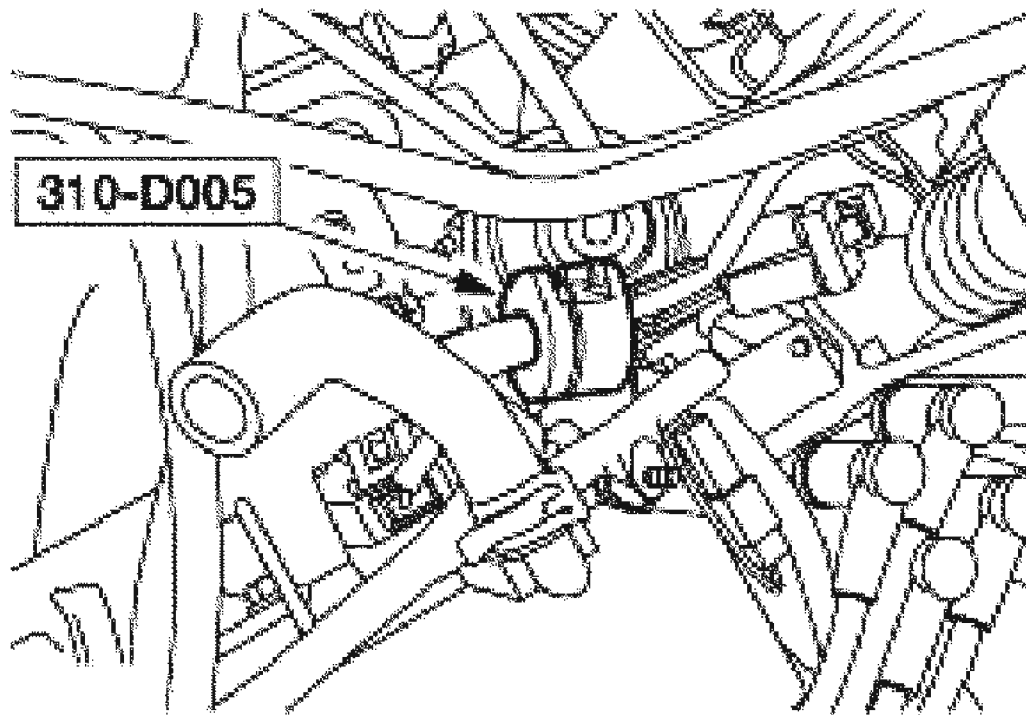
16. Remove the bolt and the oil level indicator tube.



G02738811

**Fig. 172: Locating Oil Level Indicator Tube Bolt**  
Courtesy of FORD MOTOR CO.

17. Using the special tool, disconnect the fuel lines.

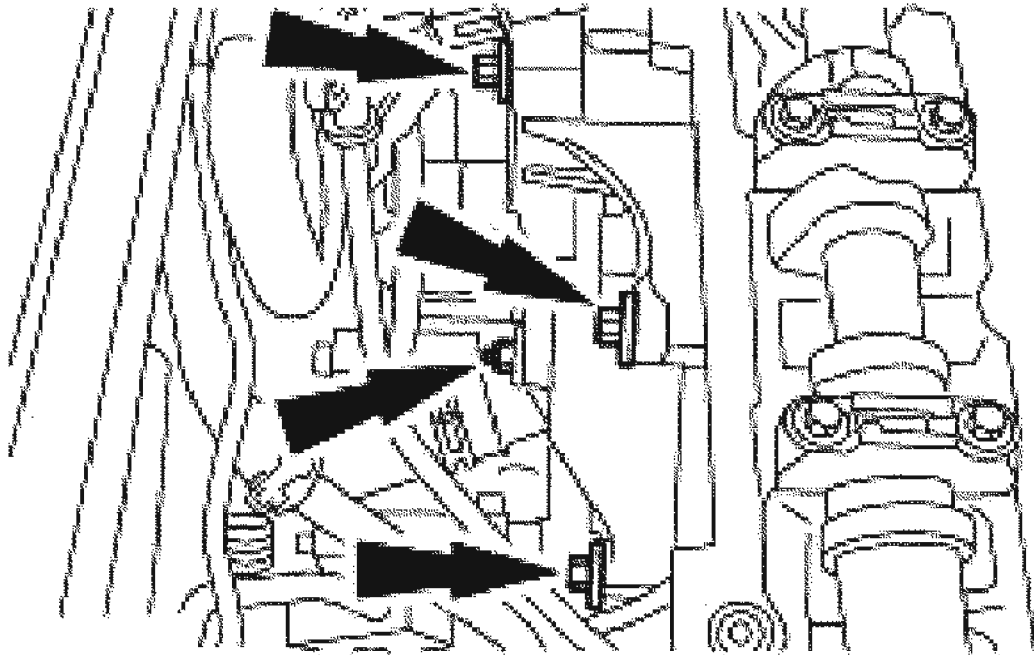


G02738812

**Fig. 173: Disconnecting Fuel Lines**  
Courtesy of FORD MOTOR CO.

18. Remove the power steering bracket retainers and position aside.

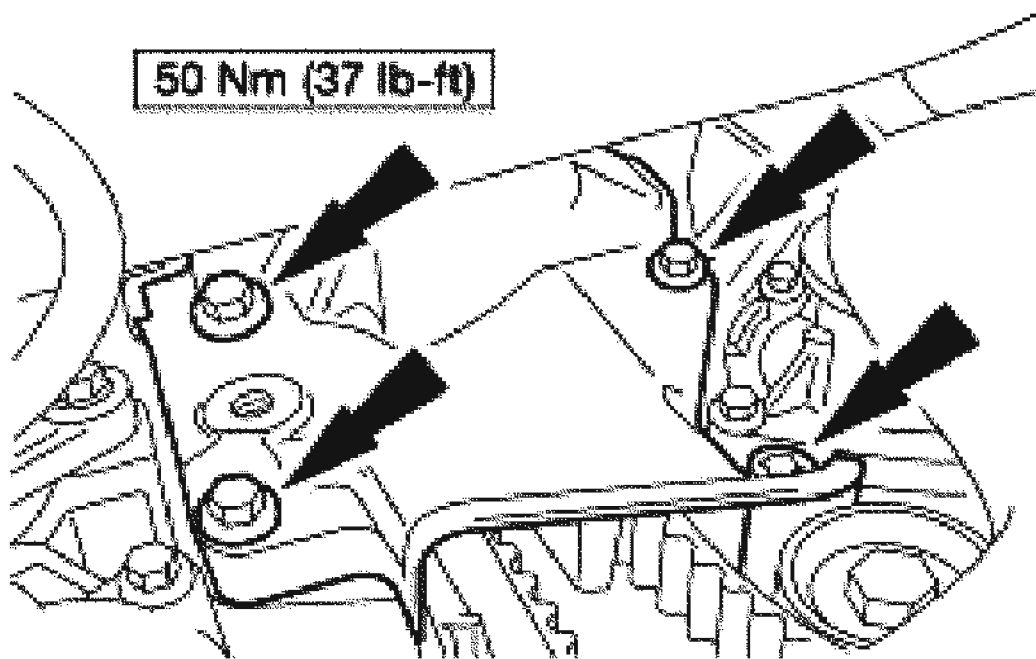




G02738813

**Fig. 174: Removing Power Steering Bracket Retainers**  
**Courtesy of FORD MOTOR CO.**

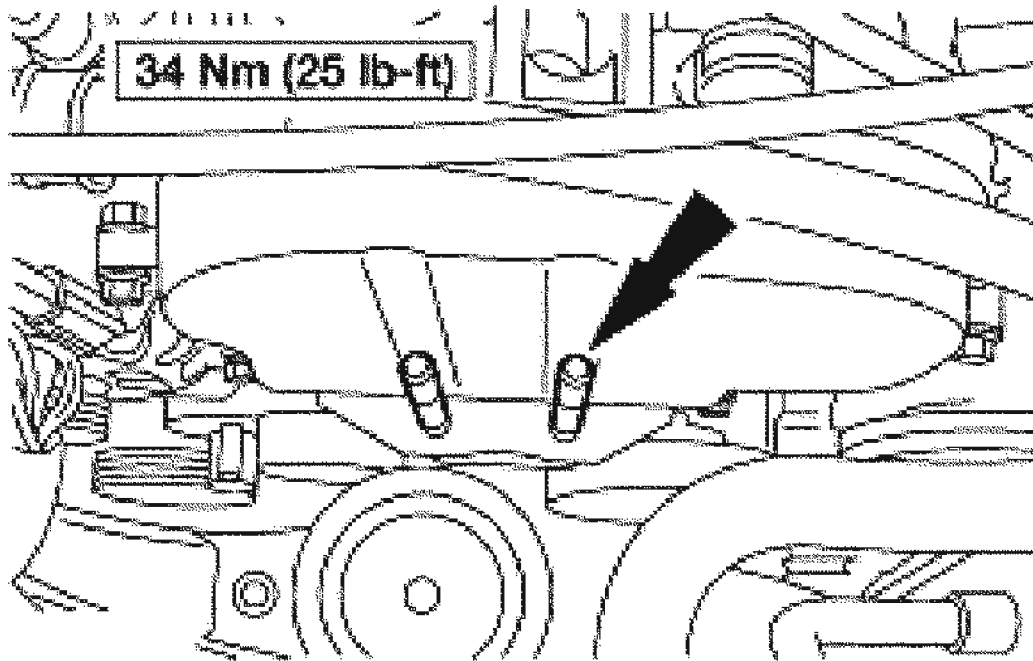
19. Raise the vehicle.
20. Install the engine mount lower bracket.



G02738814

**Fig. 175: Installing Engine Mount Lower Bracket**  
Courtesy of FORD MOTOR CO.

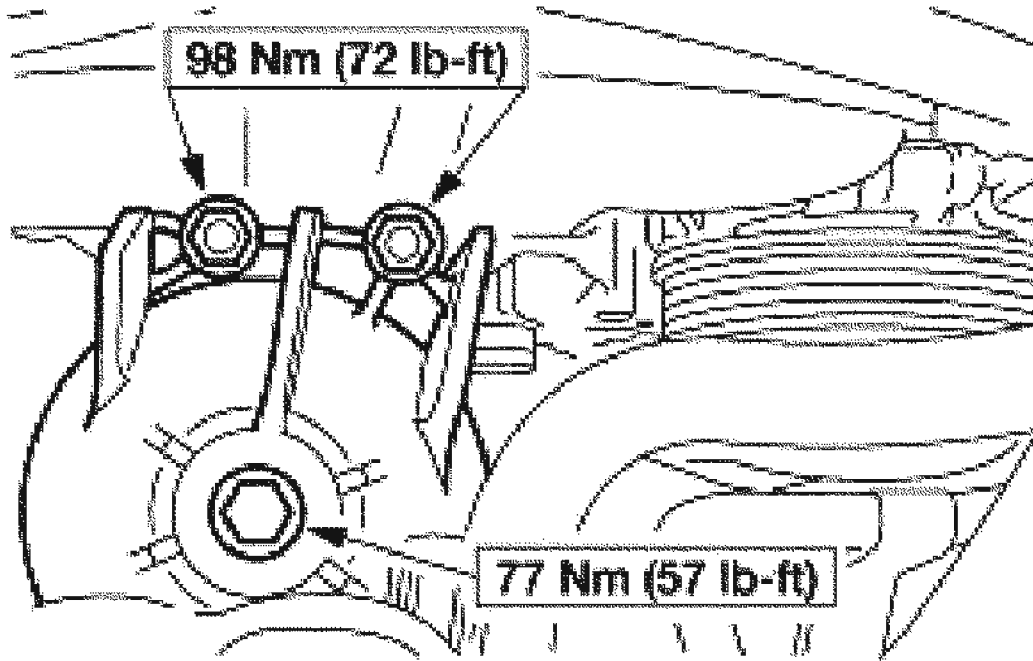
21. Lower the vehicle.
22. Install the studs.



G02738815

**Fig. 176: Identifying Studs Torque Specification**  
Courtesy of FORD MOTOR CO.

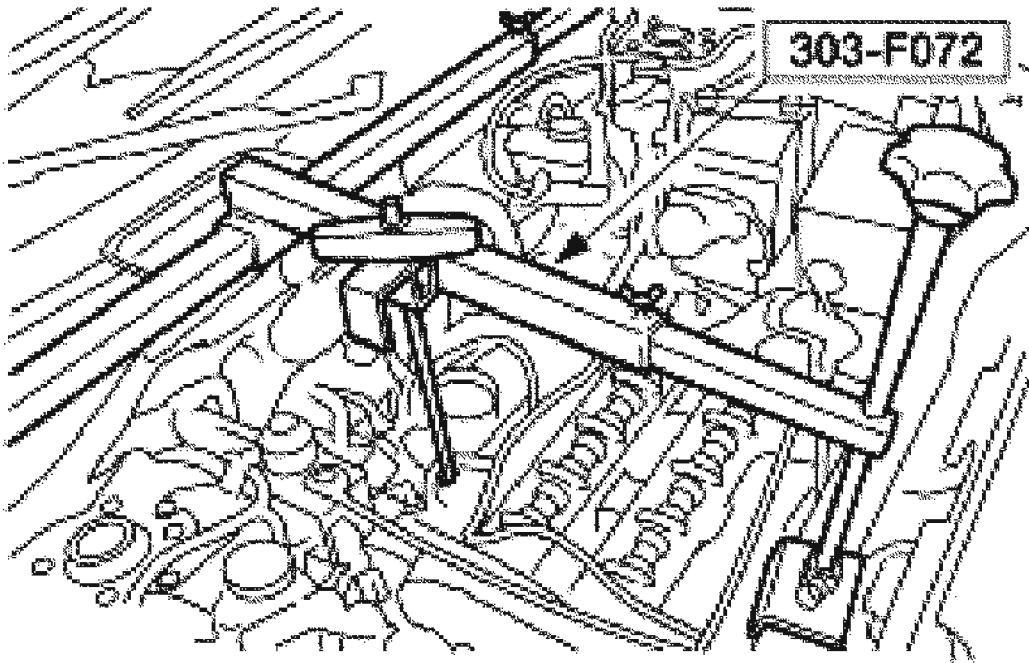
23. Install the engine mount upper bracket.



G02738816

**Fig. 177: Identifying Engine Mount Upper Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

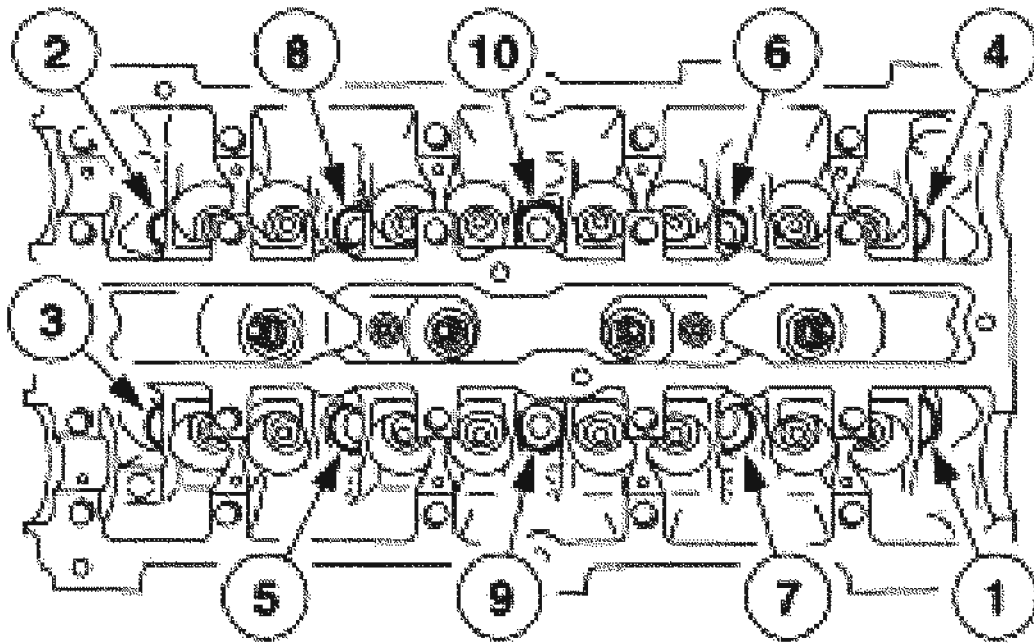
24. Remove the special tool.



G02738817

**Fig. 178: Removing Special Tool**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The bolts are torque-to-yield, new bolts must be installed or engine damage can occur.



G02738818

**Fig. 179: Identifying Removal Sequence Of Cylinder Head Bolts**  
Courtesy of FORD MOTOR CO.

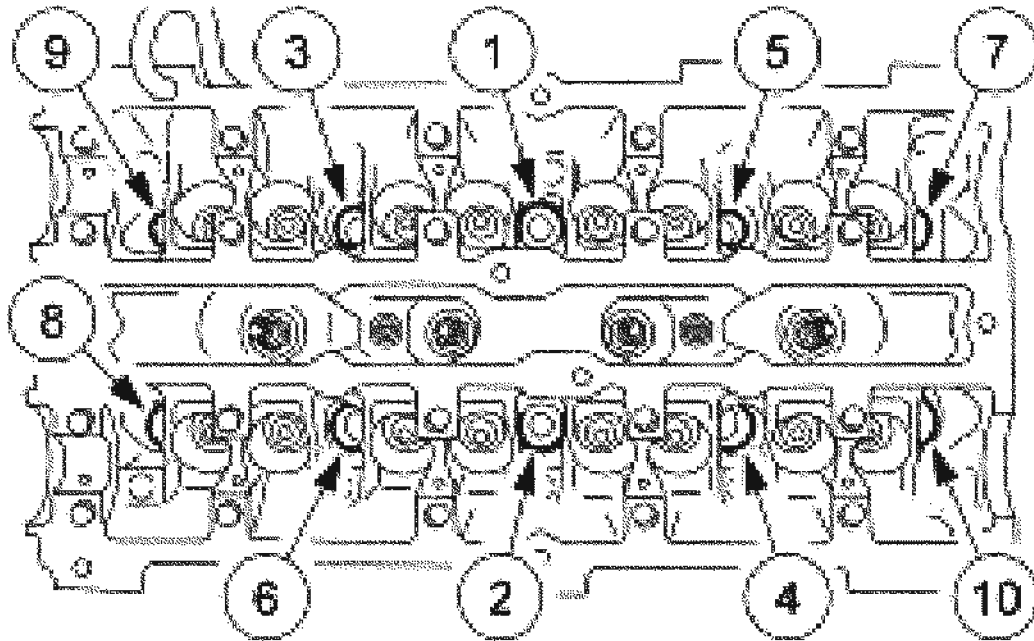
25. Remove the cylinder head bolts in the sequence shown and remove the cylinder head.
- Discard the gasket.
  - Discard the bolts.

#### Installation

**CAUTION:** The cylinder head sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material; use only plastic manual scrapers. Do not scratch or gouge the aluminum sealing surfaces.

1. Clean all gasket material from the mating surfaces on the cylinder head and cylinder block. Clean out the bolt holes in the cylinder block. Inspect the cylinder head for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
2. Install a new head gasket on the cylinder block.

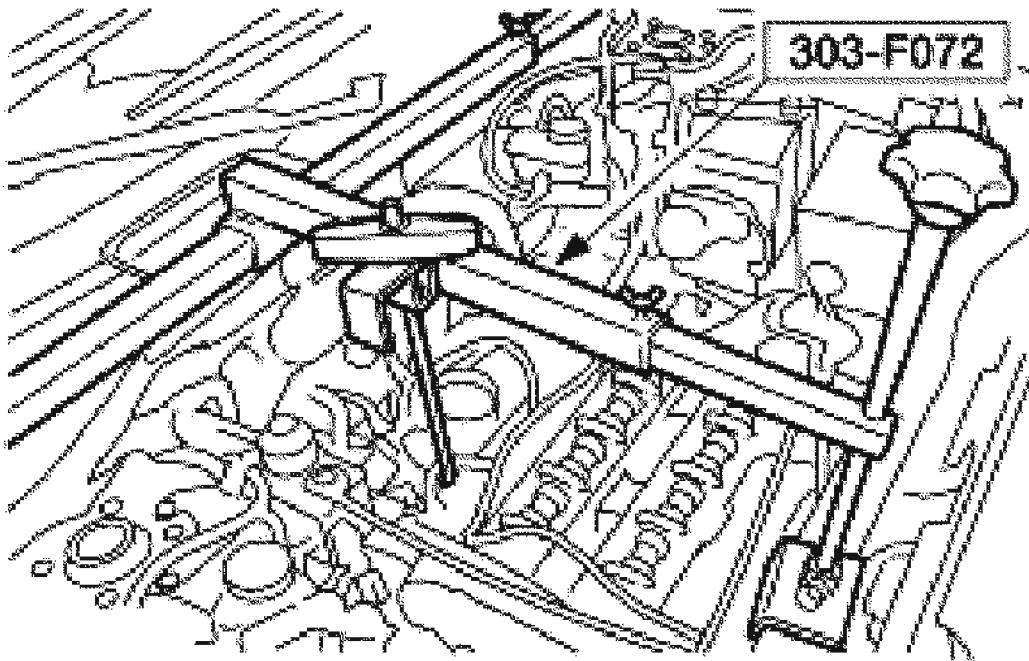
**CAUTION:** The bolts are torque-to-yield, new bolts must be installed or engine damage can occur.



G02738819

**Fig. 180: Identifying Tightening Sequence Of Cylinder Head Bolts**  
Courtesy of FORD MOTOR CO.

3. Install the cylinder head and tighten the bolts in three stages using the sequence shown.
  - Stage 1: Tighten the bolts to 20 Nm (15 lb-ft).
  - Stage 2: Tighten the bolts to 40 Nm (30 lb-ft).
  - Stage 3: Tighten the bolts an additional 90 degrees.
4. Install the special tool.

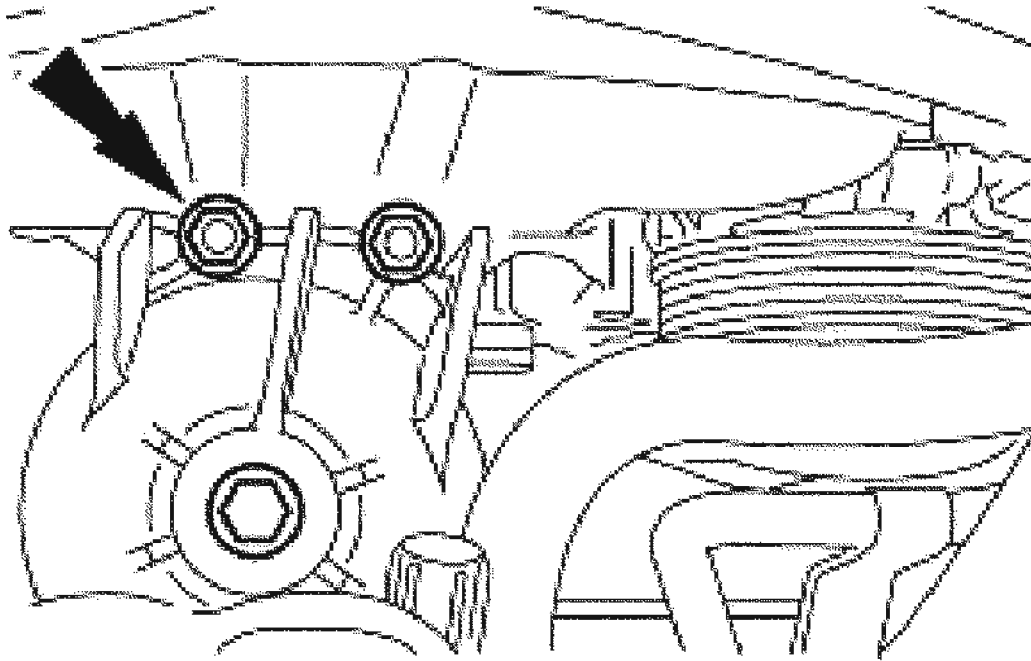


G02738820

**Fig. 181: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

5. Remove the engine mount upper bracket.

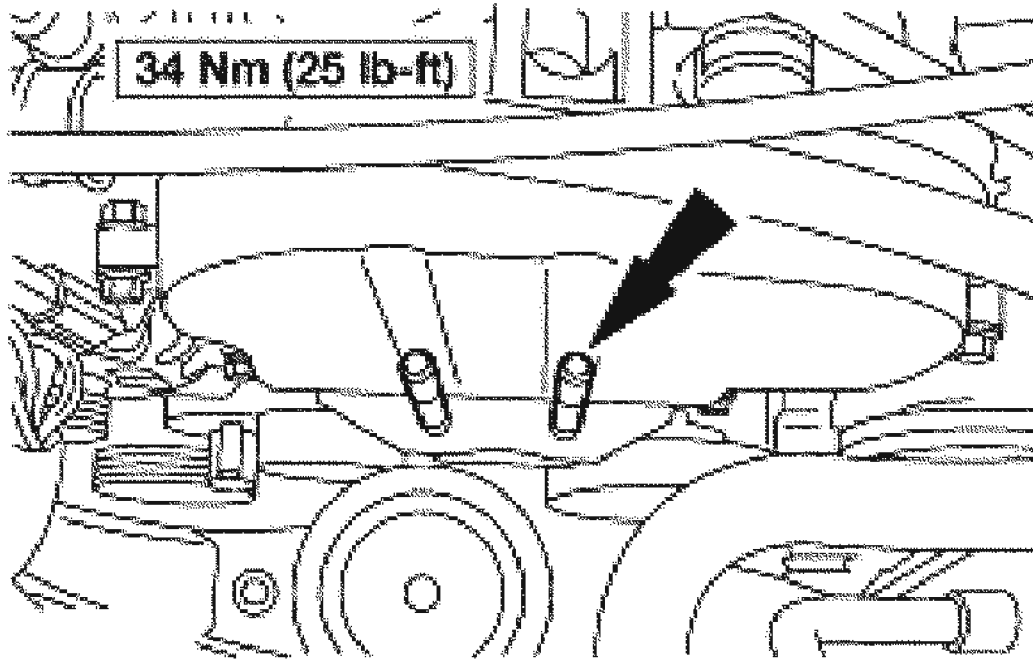




G02738821

**Fig. 182: Removing Engine Mount Upper Bracket**  
**Courtesy of FORD MOTOR CO.**

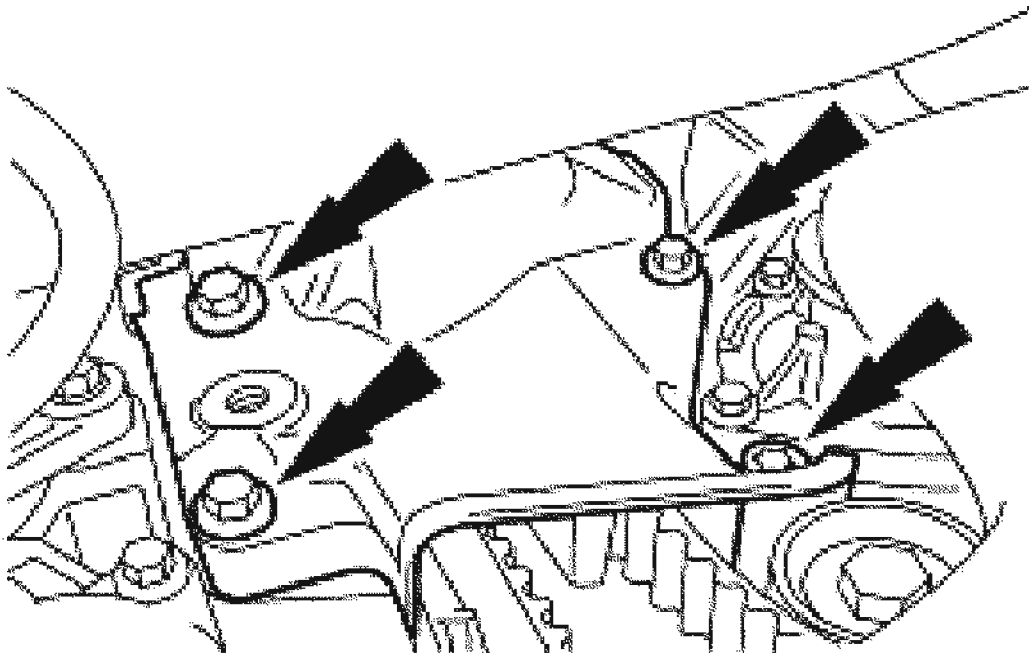
6. Remove the studs.



G02738822

**Fig. 183: Removing Studs**  
Courtesy of FORD MOTOR CO.

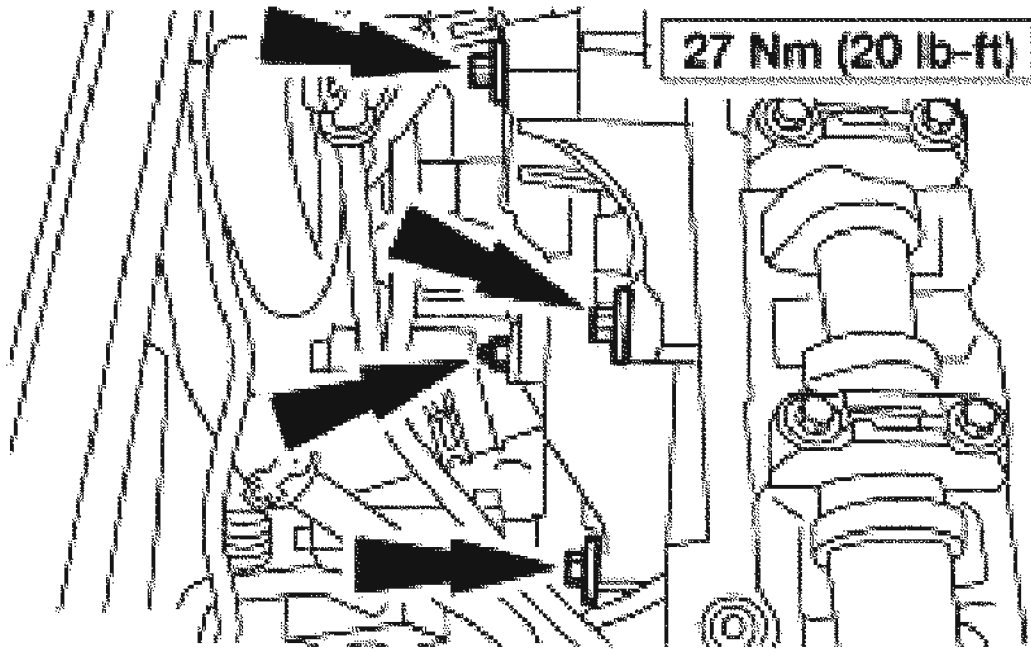
7. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.
8. Remove the engine mount lower bracket.



G02738823

**Fig. 184: Removing Engine Mount Lower Bracket**  
Courtesy of FORD MOTOR CO.

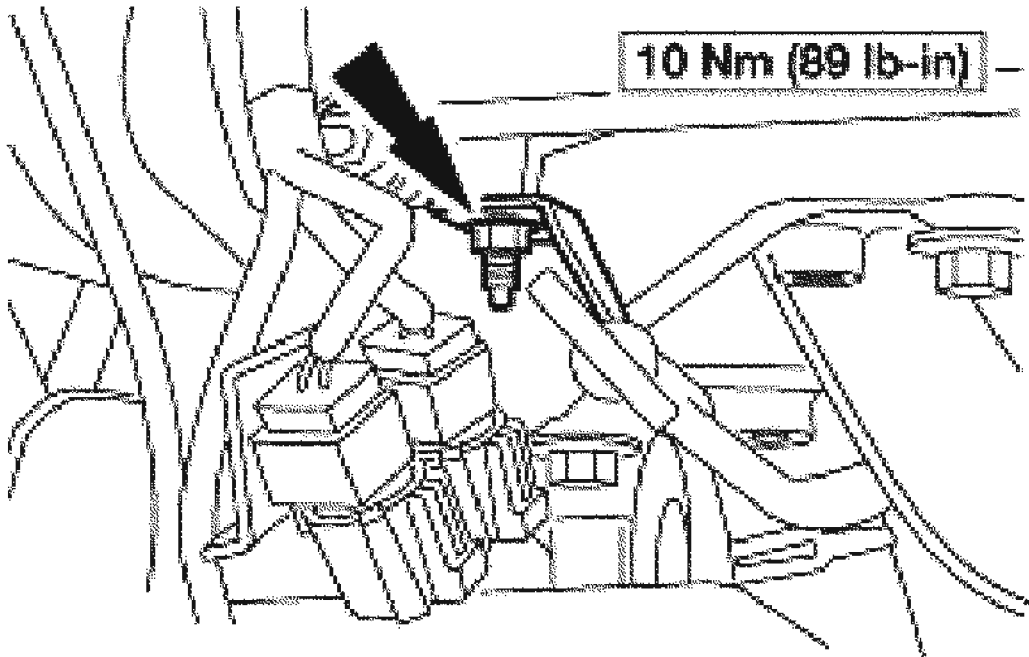
9. Drain the engine oil and install a new oil filter. Fill the crankcase with Super Premium 5W-20 SAE Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.
10. Lower the vehicle.
11. Position the power steering bracket back.



G02738824

**Fig. 185: Identifying Power Steering Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

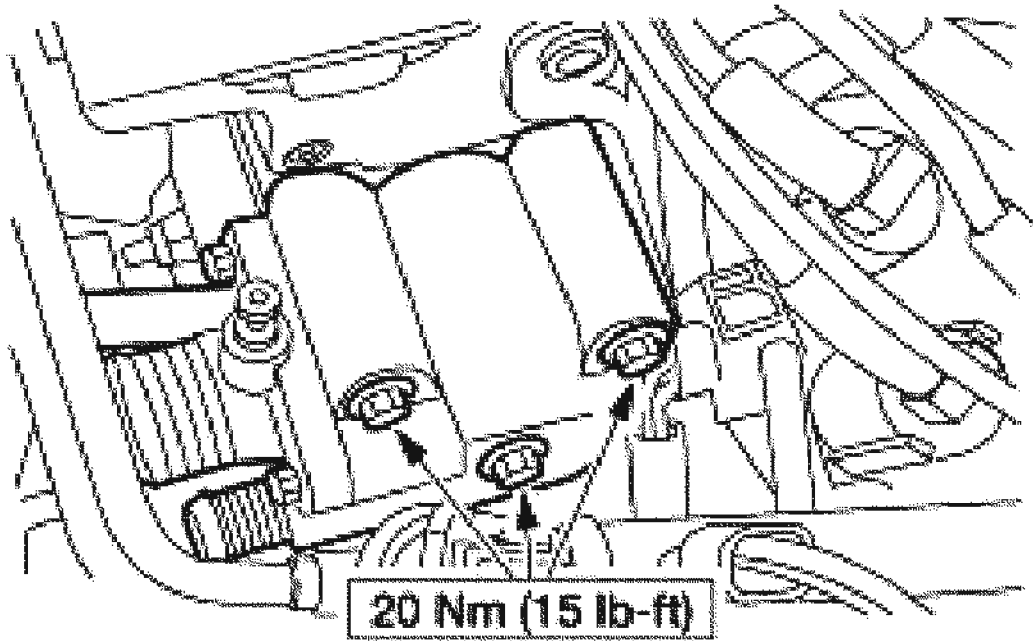
12. Install the oil level indicator tube and the bolt.



G02738825

**Fig. 186: Identifying Oil Level Indicator Tube Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

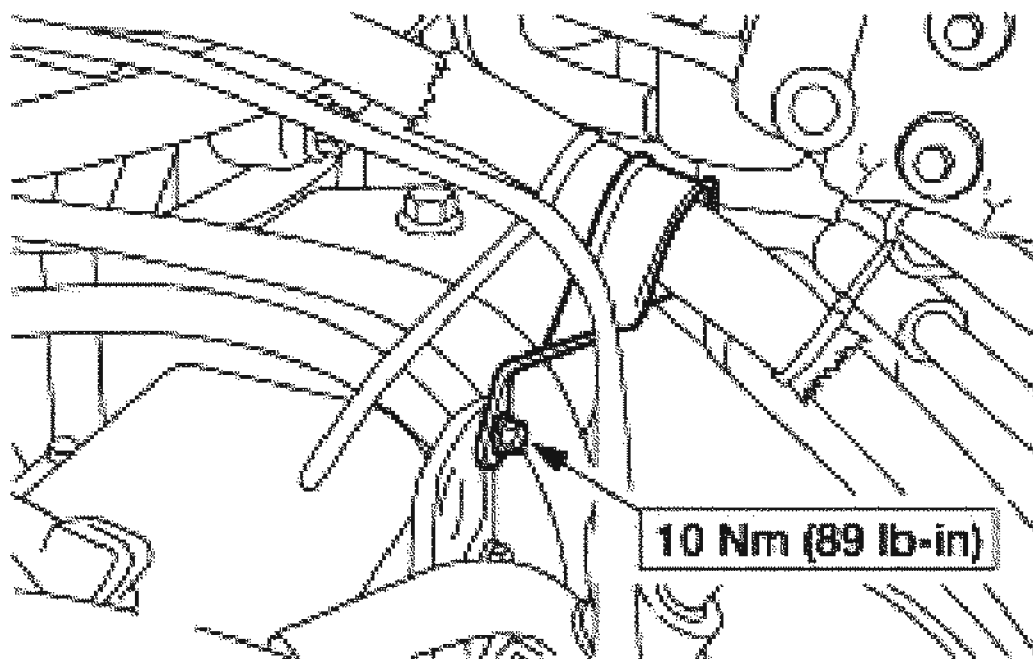
13. Install the thermostat housing and the bolts.



G02738826

**Fig. 187: Identifying Thermostat Housing Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

14. Install the bolt for the power steering pressure hose support bracket.

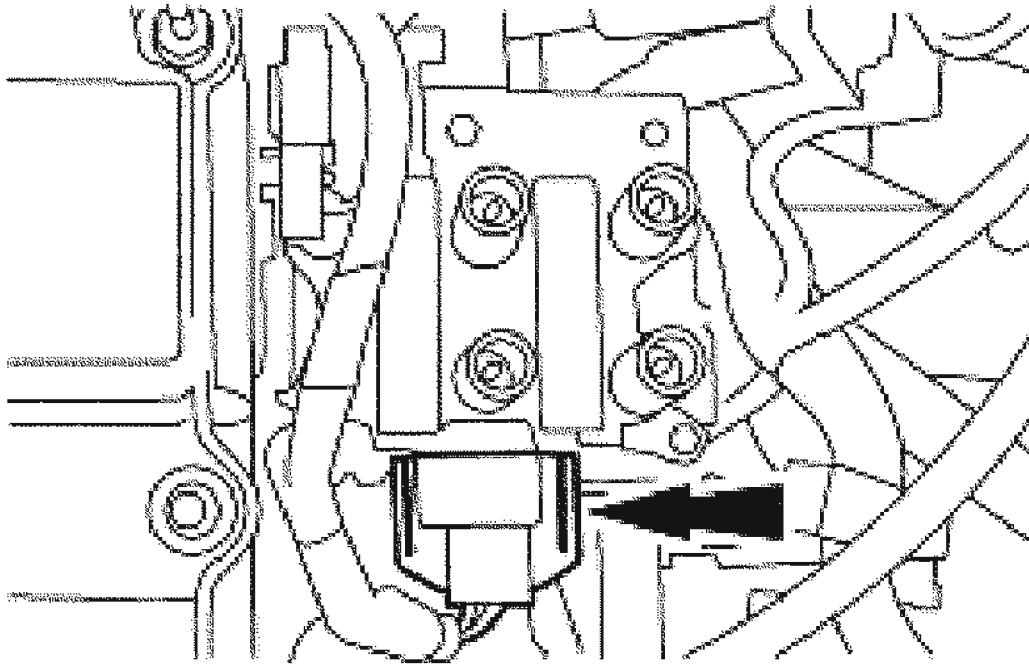


G02738827

**Fig. 188: Identifying Power Steering Pressure Hose Support Bracket Bolt Torque Specification**

Courtesy of FORD MOTOR CO.

15. Connect the ignition coil and the radio interference suppressor electrical connectors.

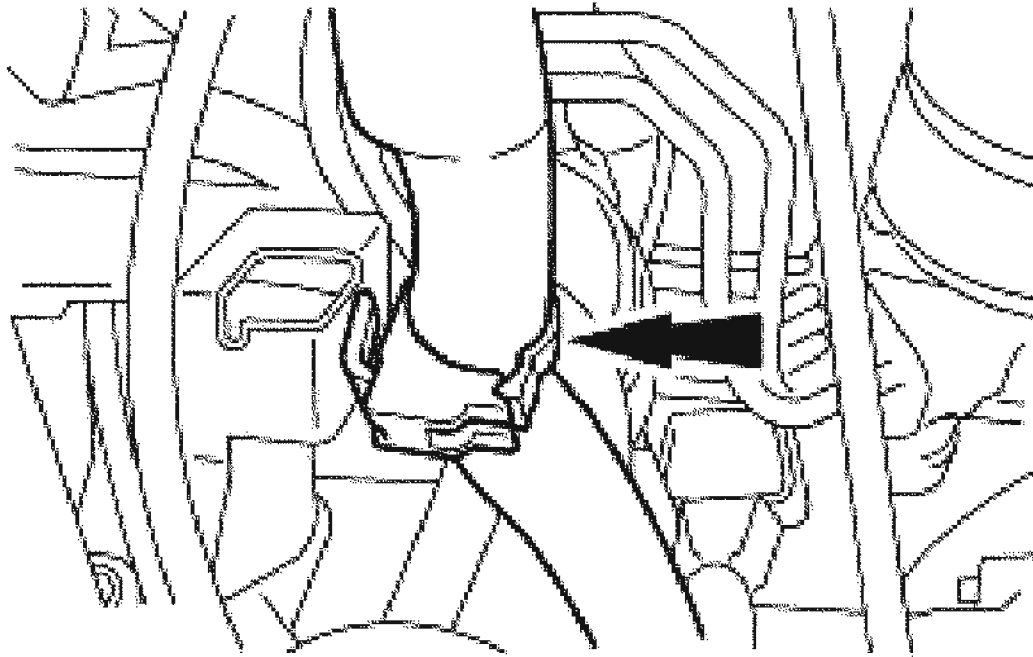


G02738828

**Fig. 189: Connecting Ignition Coil And Radio Interference Suppressor Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

16. Connect the wiring harness retainer to the intake manifold.

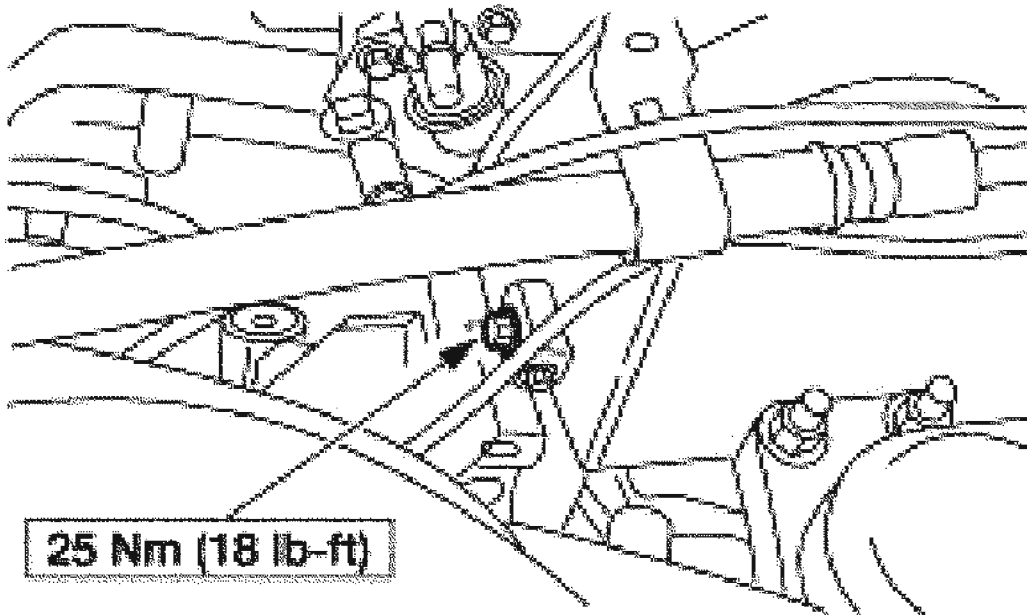




G02738829

**Fig. 190: Connecting Wiring Harness Retainer To Intake Manifold**  
**Courtesy of FORD MOTOR CO.**

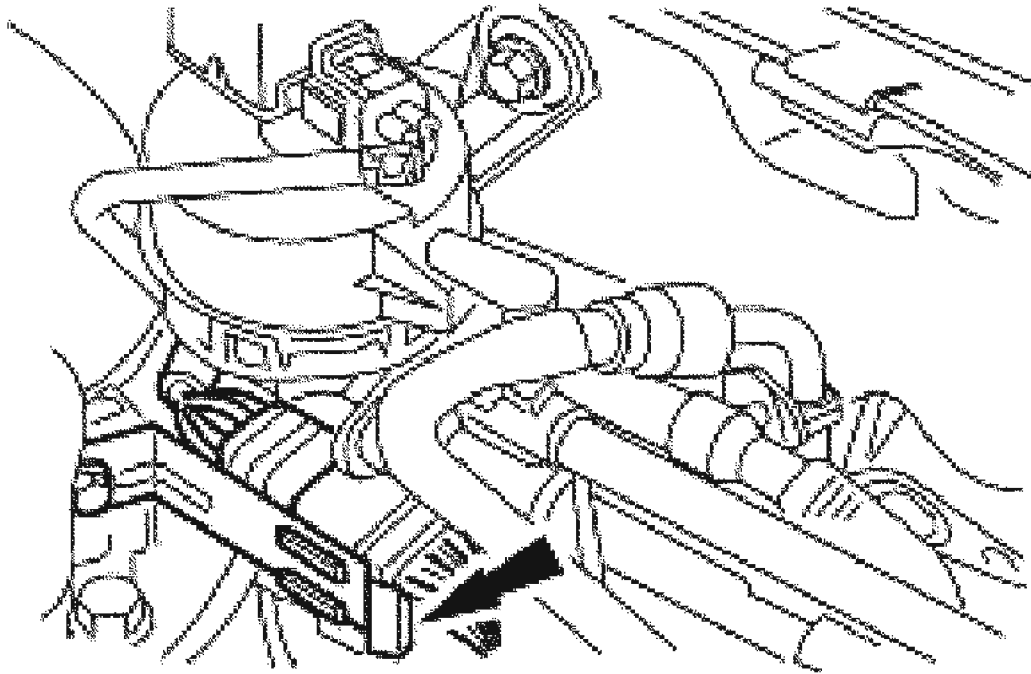
17. Install the bolt in the generator mounting bracket.



G02738830

**Fig. 191: Identifying Generator Mounting Bracket Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

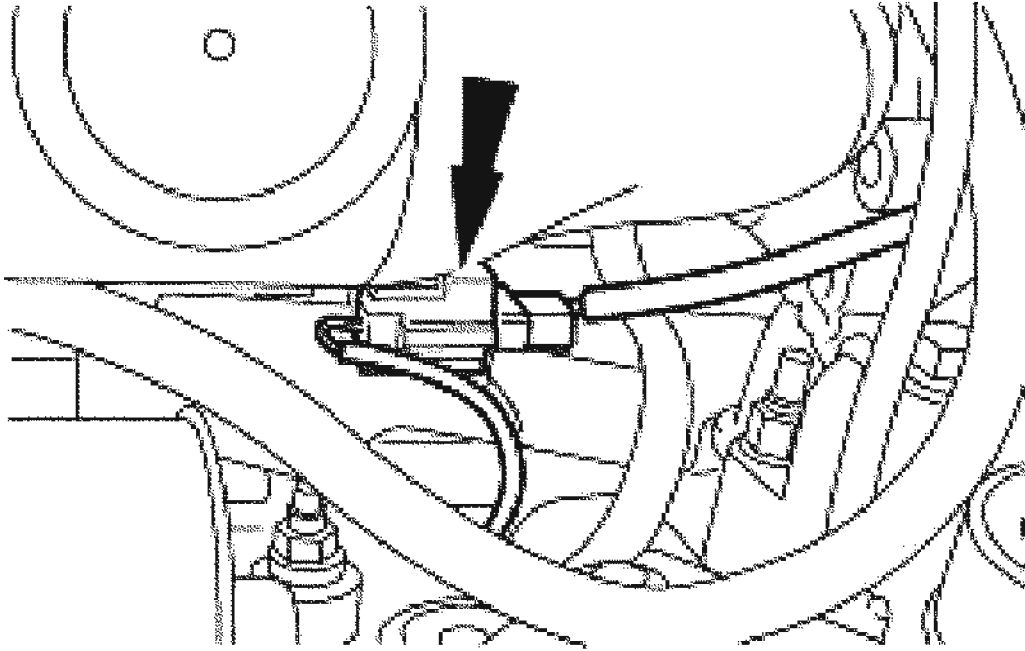
18. Connect the fuel charging wiring harness retainer.



G02738831

**Fig. 192: Connecting Fuel Charging Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

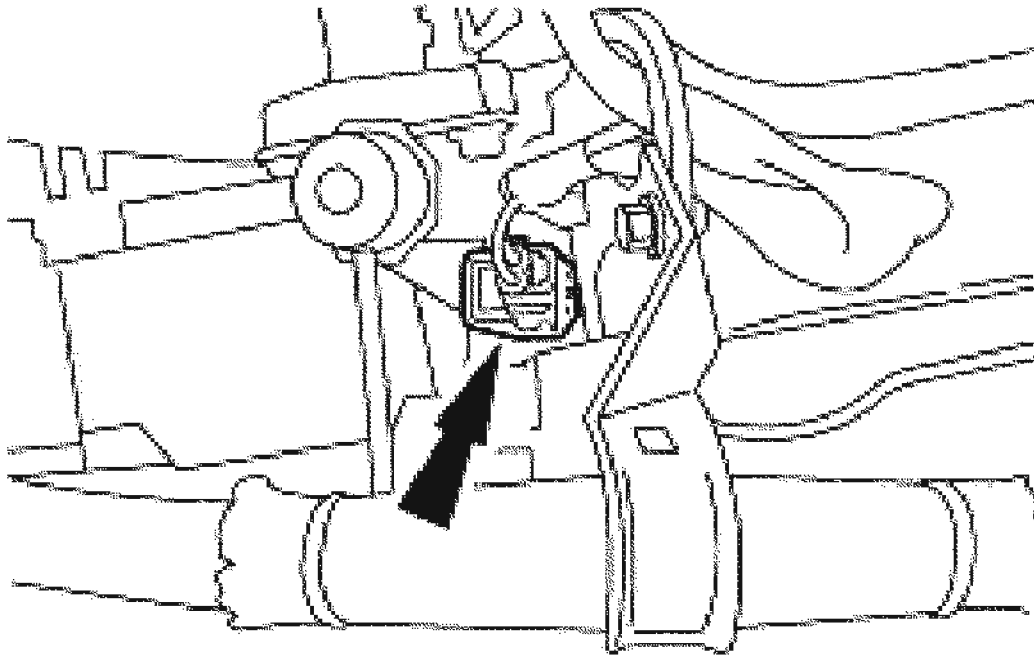
19. Connect the knock sensor (KS) electrical connector.



G02738832

**Fig. 193: Connecting Knock Sensor (KS) Electrical Connector**  
Courtesy of FORD MOTOR CO.

20. Connect the cylinder head temperature (CHT) sensor electrical connector.

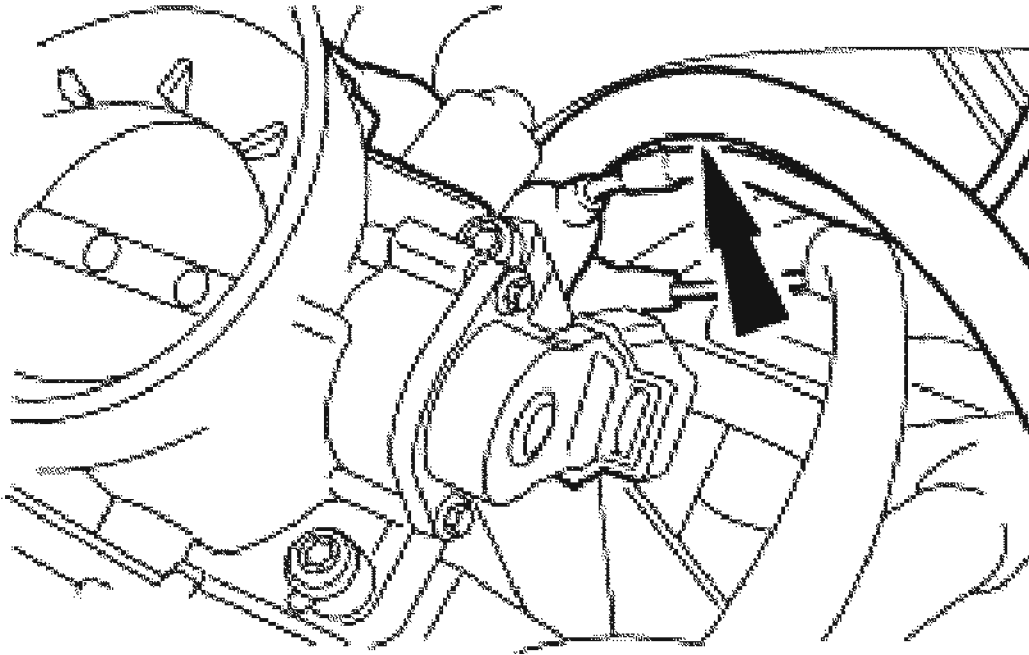


**G02738833**

**Fig. 194: Connecting Cylinder Head Temperature (CHT) Sensor Electrical Connector**

**Courtesy of FORD MOTOR CO.**

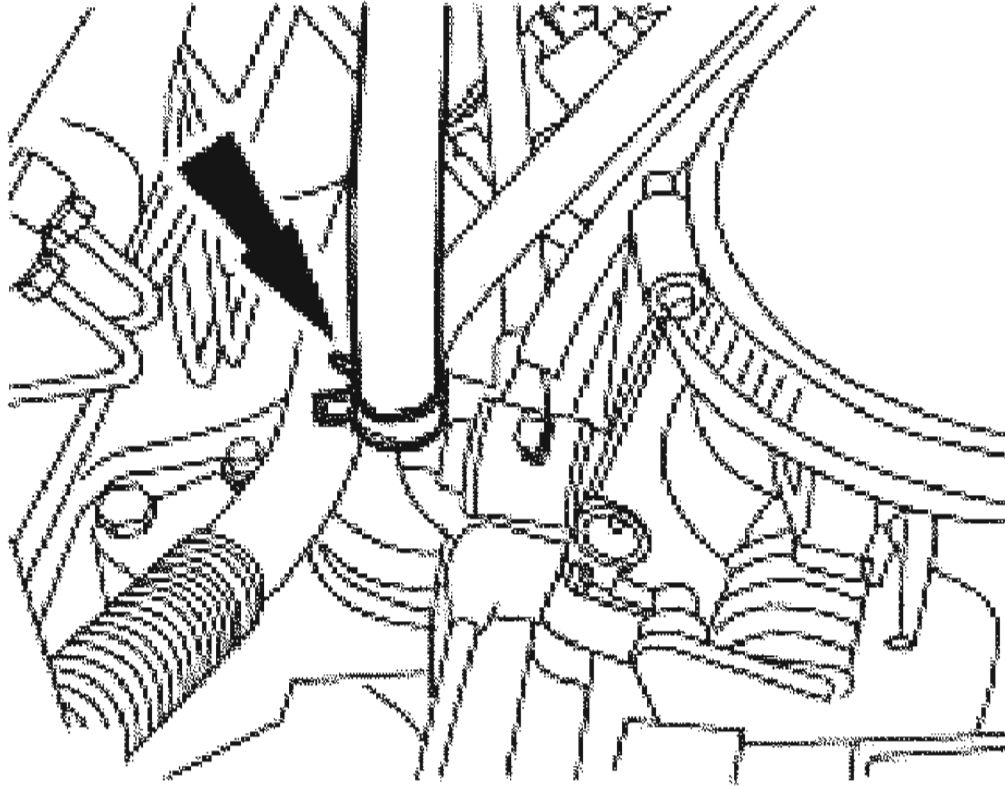
21. Connect the vacuum hose.



G02738834

**Fig. 195: Connecting Vacuum Hose (1 Of 2)**  
**Courtesy of FORD MOTOR CO.**

22. Connect the vacuum hose.

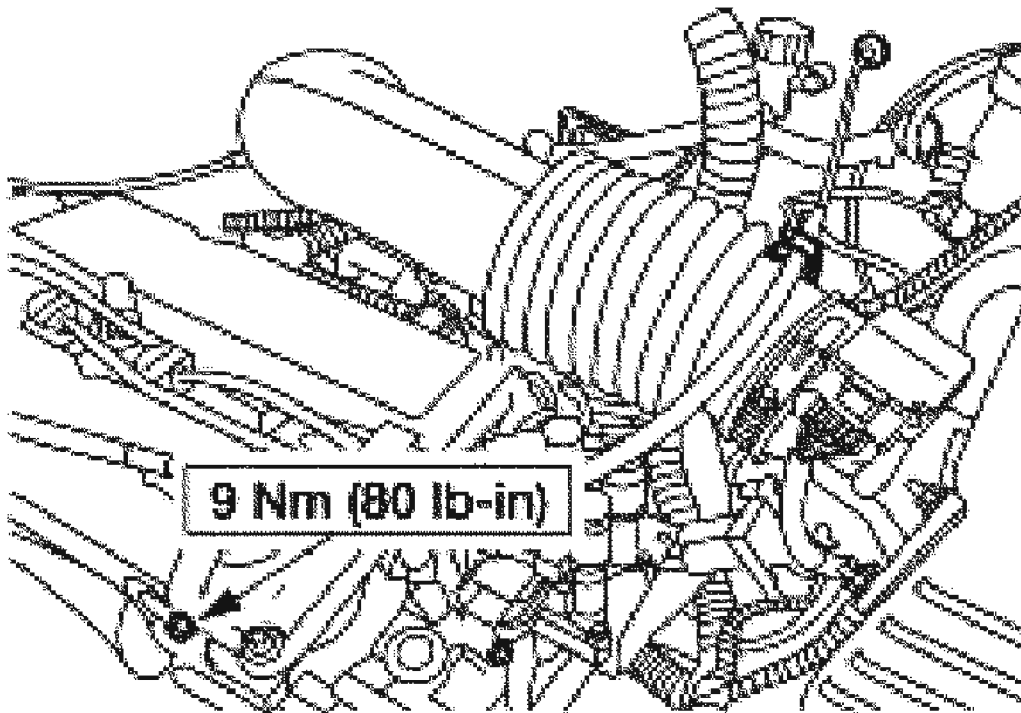


G02738835

**Fig. 196: Connecting Vacuum Hose (2 Of 2)**

**Courtesy of FORD MOTOR CO.**

23. Install the generator. For additional information, refer to **GENERATORS & REGULATORS**
24. Connect the fuel line and safety clip.
25. Install the valve tappets. For additional information, refer to **VALVE TAPPETS** .
26. Install the accelerator control cable support bracket bolt.



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**Fig. 197: Identifying Accelerator Control Cable Support Bracket Bolt Torque Specification**

Courtesy of FORD MOTOR CO.

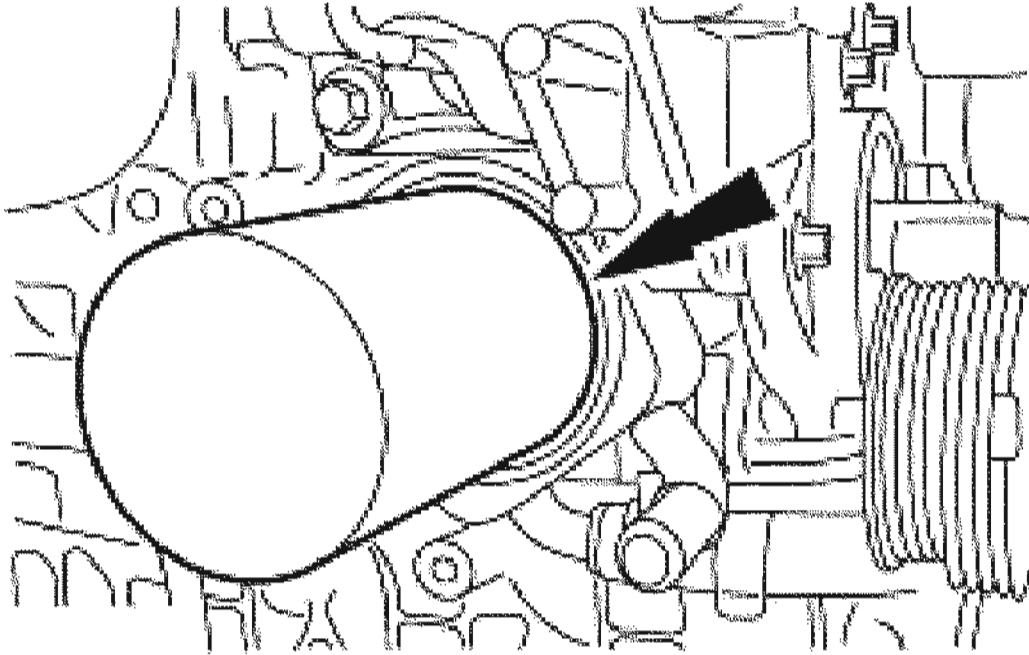
27. Drain the engine oil and fill the engine with clean engine oil.
28. Fill the cooling system. For additional information, refer to **ENGINE COOLING**

## **OIL COOLER**

### **Removal and Installation**

1. Drain the engine coolant. For additional information, refer to **ENGINE COOLING** .
2. Remove the oil filter.

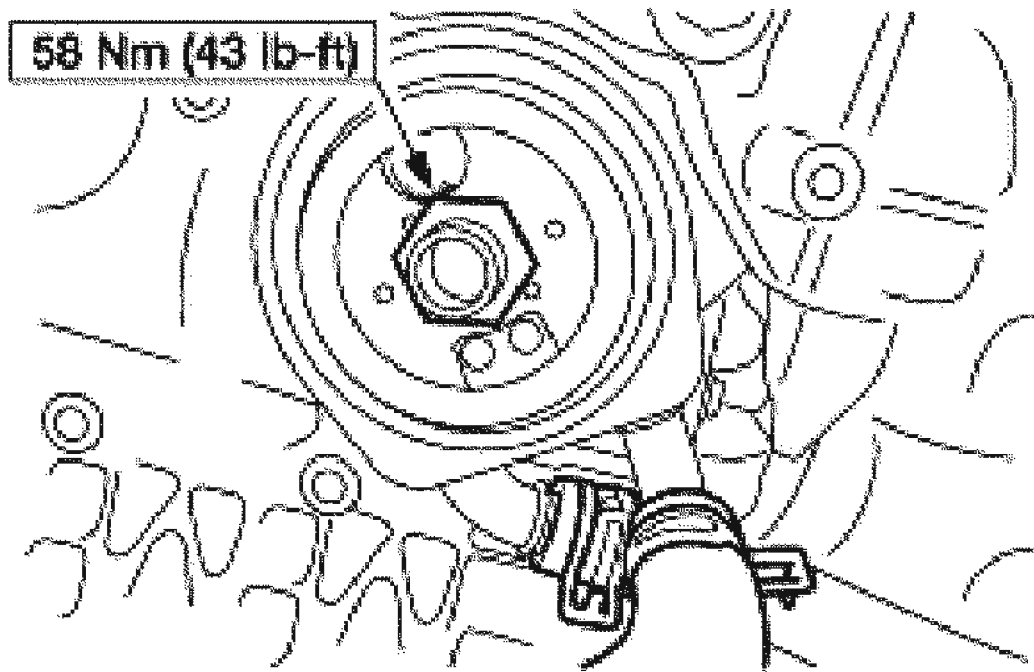




G02738837

**Fig. 198: Removing Oil Filter**  
Courtesy of FORD MOTOR CO.

3. Remove the oil cooler.
  - Disconnect the coolant hoses.
  - Remove the cooler mounting bolt.



G02738838

**Fig. 199: Removing Oil Cooler**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The oil cooler sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material; only use manual scrapers. Do not scratch or gouge sealing surfaces or oil leaks may occur.

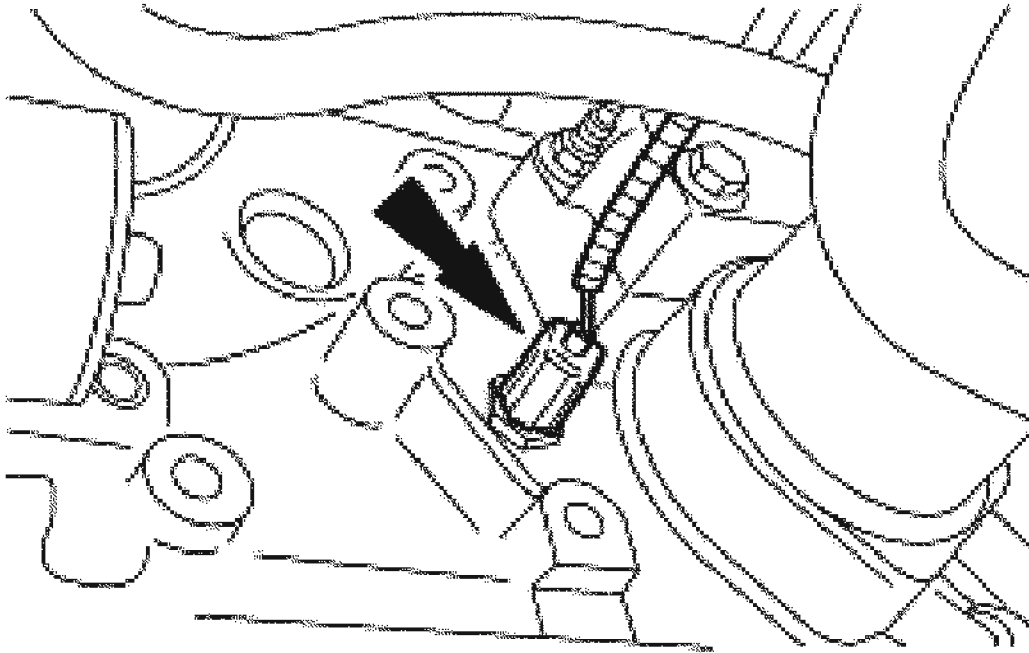
4. Carefully clean the sealing surfaces.
  - Install a new oil filter.
5. To install, reverse the removal procedure.

## OIL PRESSURE SENDER

### Removal and Installation

1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.

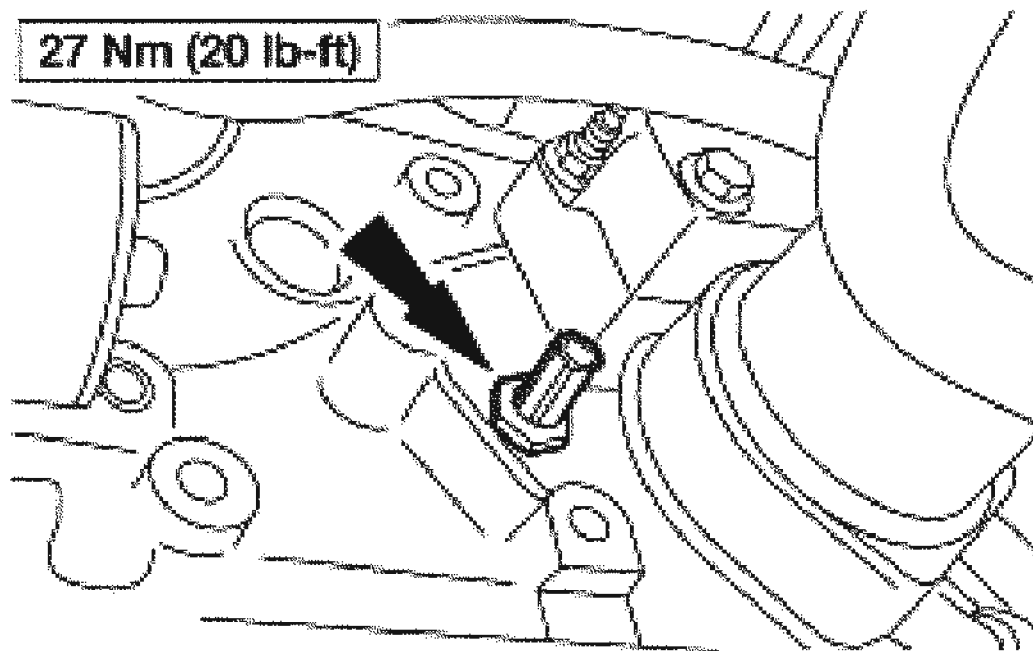
**NOTE:** The halfshaft is removed for clarity.



G02738839

**Fig. 200: Disconnecting Oil Pressure Sender Electrical Connector**  
Courtesy of FORD MOTOR CO.

2. Disconnect the oil pressure sender electrical connector.
3. Remove the oil pressure sender.



G02738840

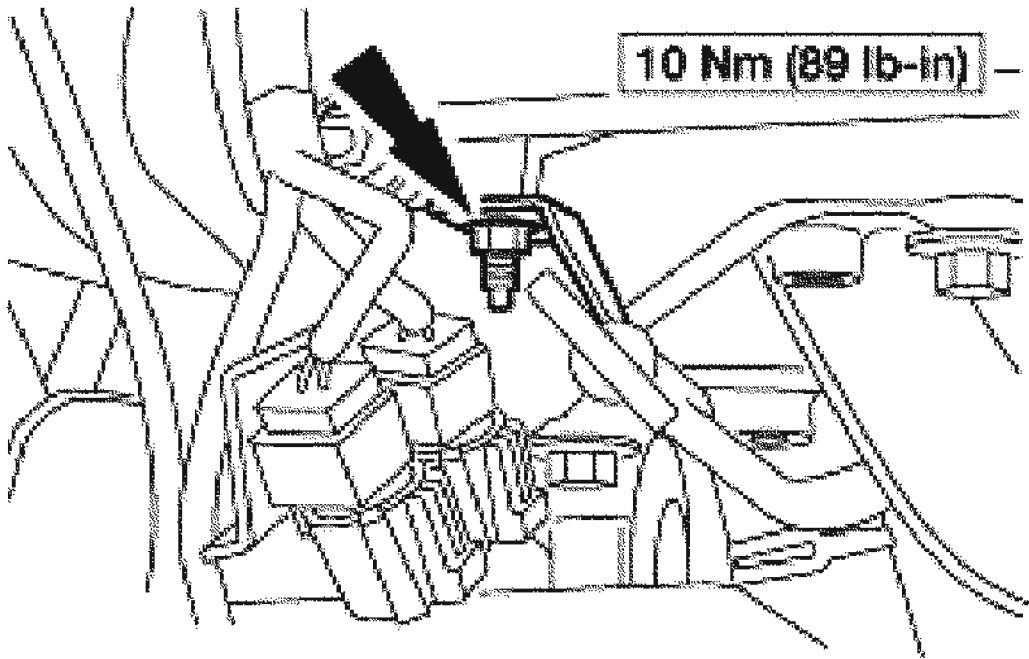
**Fig. 201: Removing Oil Pressure Sender**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## **OIL LEVEL INDICATOR AND TUBE**

### **Removal and Installation**

1. Remove the bolt and the oil level indicator and tube.



G02738841

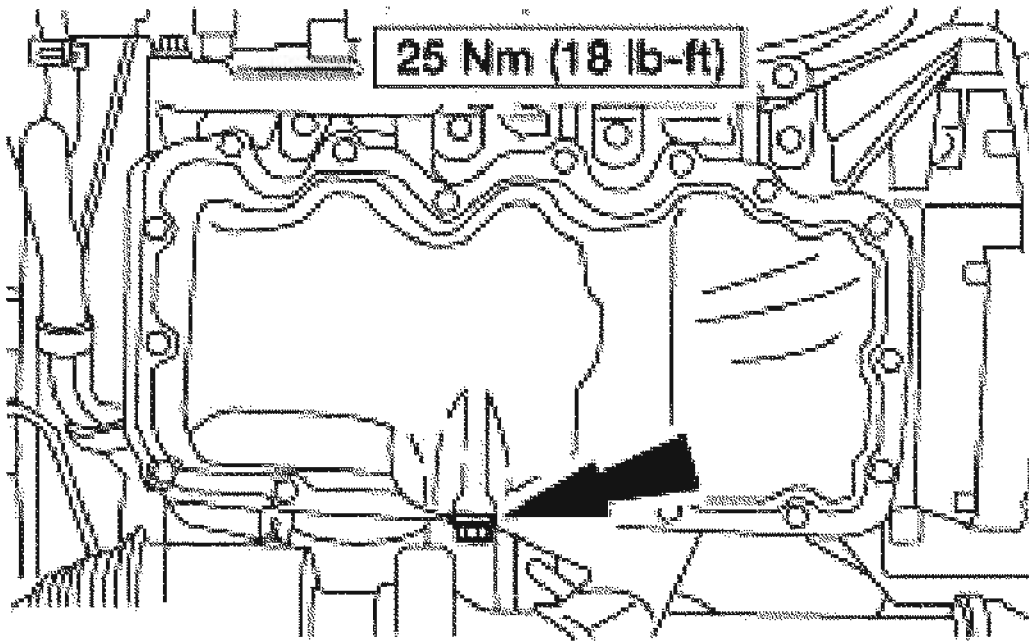
**Fig. 202: Removing Oil Level Indicator And Tube**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.
  - Install a new O-ring seal if damaged.

## OIL PAN

### Removal

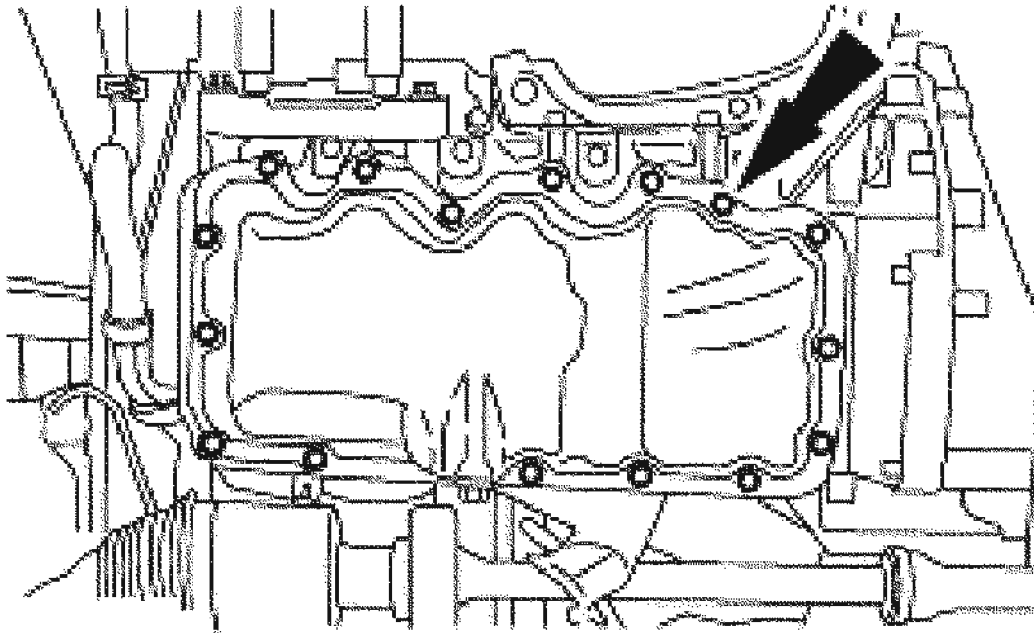
1. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
2. Drain the engine oil.
  - Install the drain plug.



G02738842

**Fig. 203: Identifying Drain Plug Torque Specification**  
Courtesy of FORD MOTOR CO.

3. Remove the 17 bolts and the oil pan.



G02738843

**Fig. 204: Removing Oil Pan**  
Courtesy of FORD MOTOR CO.

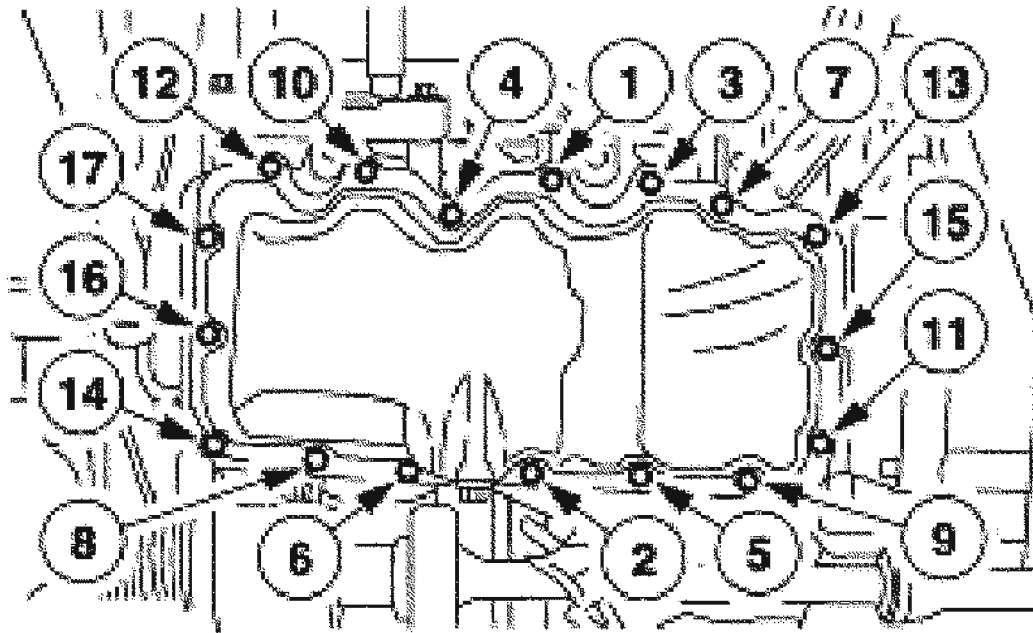
#### Installation

**CAUTION:** The oil pan sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material; use only manual scrapers. Do not scratch or gouge the aluminum sealing surfaces.

1. Clean and inspect the mounting faces of both the oil pan and the cylinder block with Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A. Both surfaces must be flat, clean and dry.

**NOTE:** The oil pan must be installed and the bolts tightened to specification within seven minutes of sealer application or oil leaks may occur.

**NOTE:** Apply a 3 mm (0.1 inch) continuous bead of Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4 to the oil pan.



G02738844

**Fig. 205: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

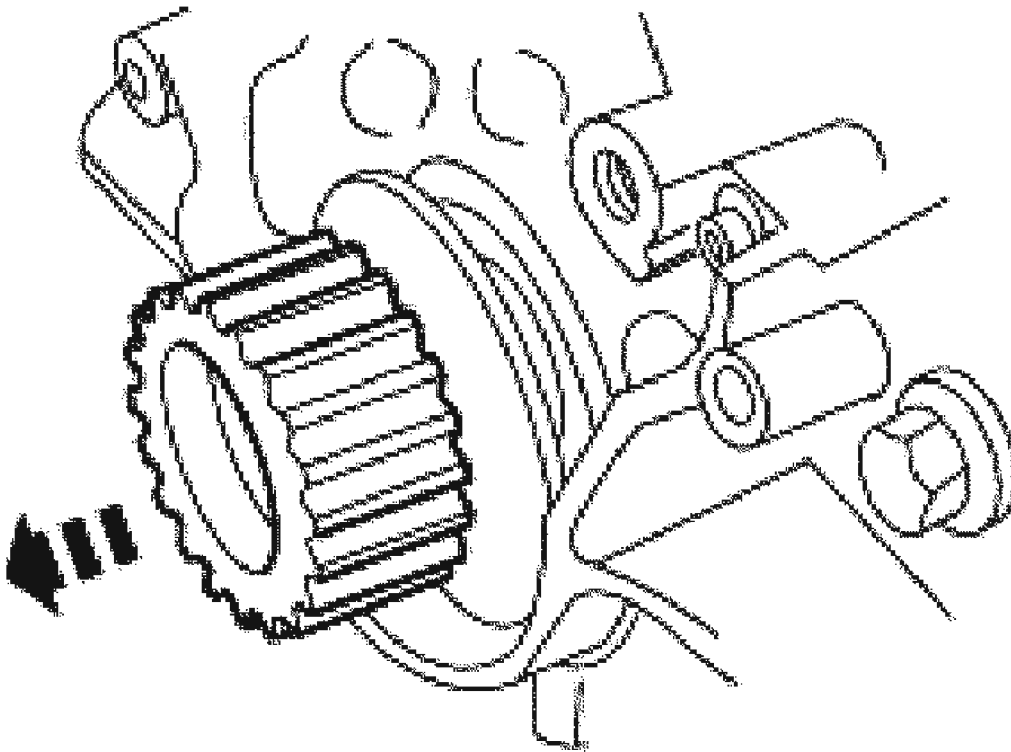
2. Install the oil pan. Tighten the bolts using the sequence shown in two stages:
  - Stage 1: Tighten to 6 Nm (53 lb-in).
  - Stage 2: Tighten 12 Nm (9 lb-in)
3. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
4. Fill the crankcase with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

## OIL PUMP

### Removal

1. Remove the timing belt. For additional information, refer to **TIMING BELT**.
2. Remove the oil pump screen and pickup tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE**.
3. Remove the crankshaft sprocket and the timing belt guide.

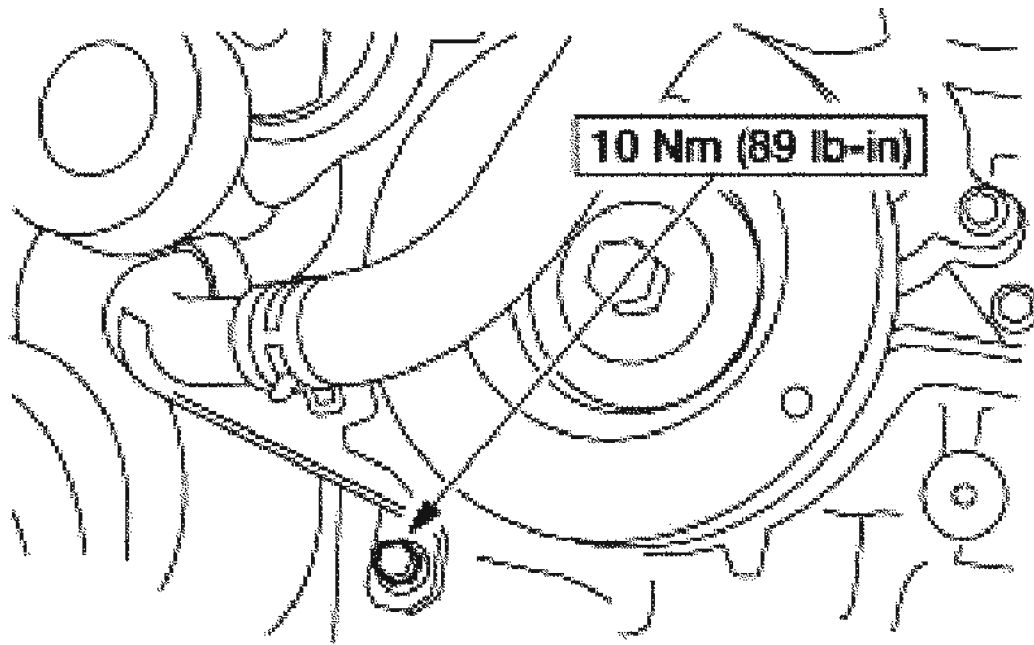




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**Fig. 206: Removing Crankshaft Sprocket And Timing Belt Guide**  
Courtesy of FORD MOTOR CO.

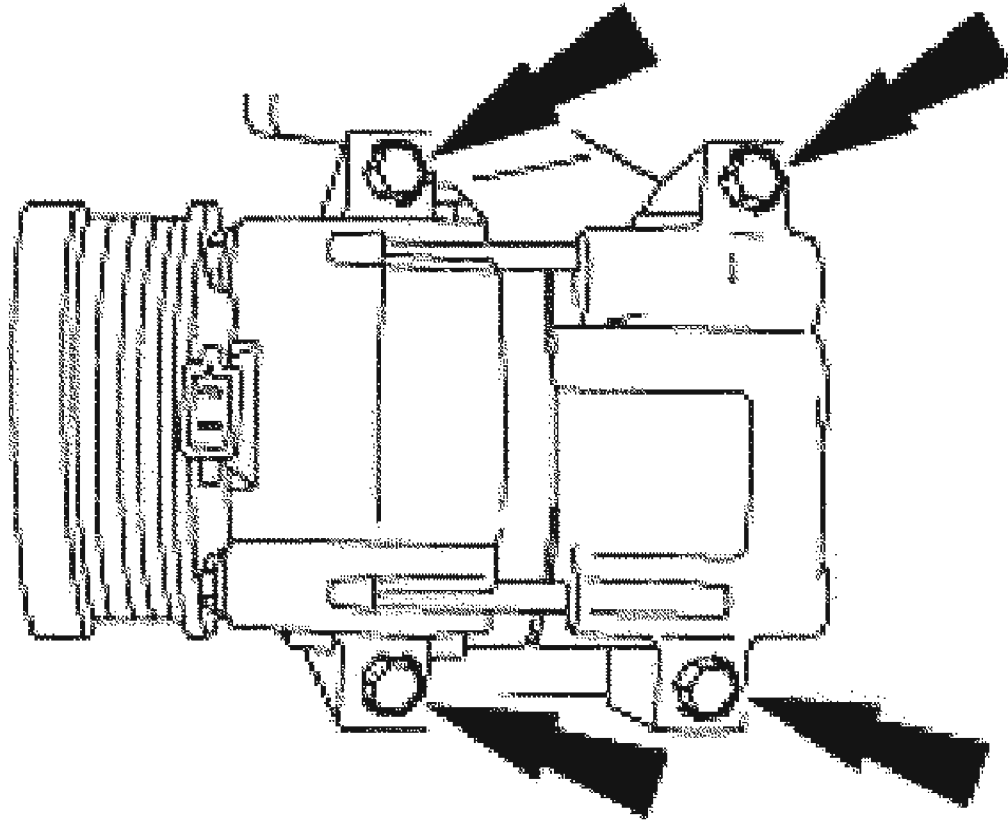
4. Remove the coolant tube bracket bolt.



G02738846

**Fig. 207: Removing Coolant Tube Bracket Bolt**  
Courtesy of FORD MOTOR CO.

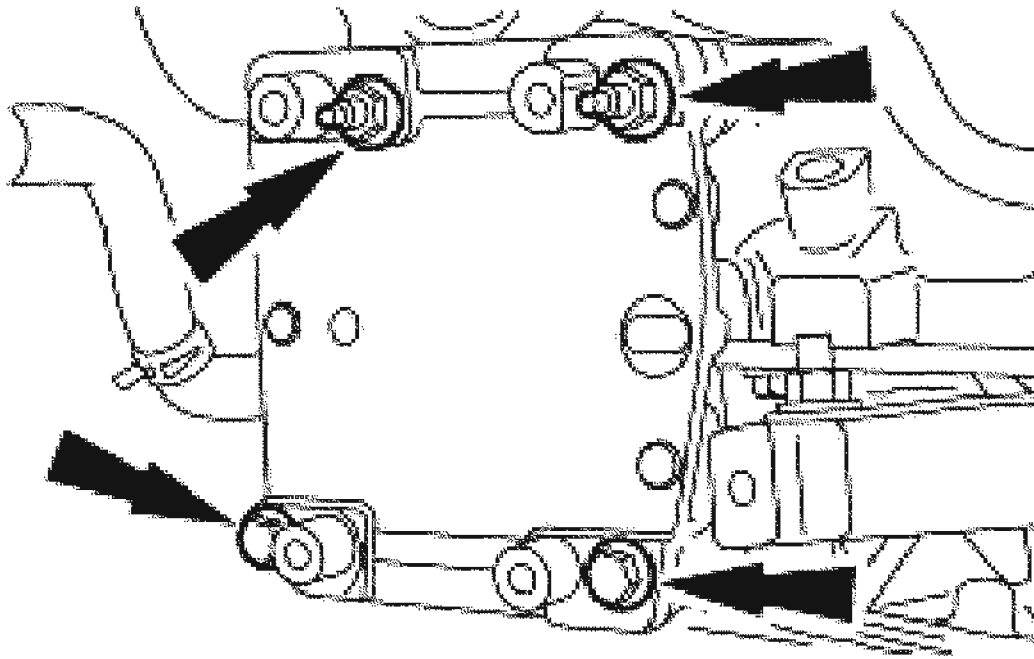
5. Remove the bolts and position the A/C compressor aside.



**G02738847**

**Fig. 208: Removing A/C Compressor**  
**Courtesy of FORD MOTOR CO.**

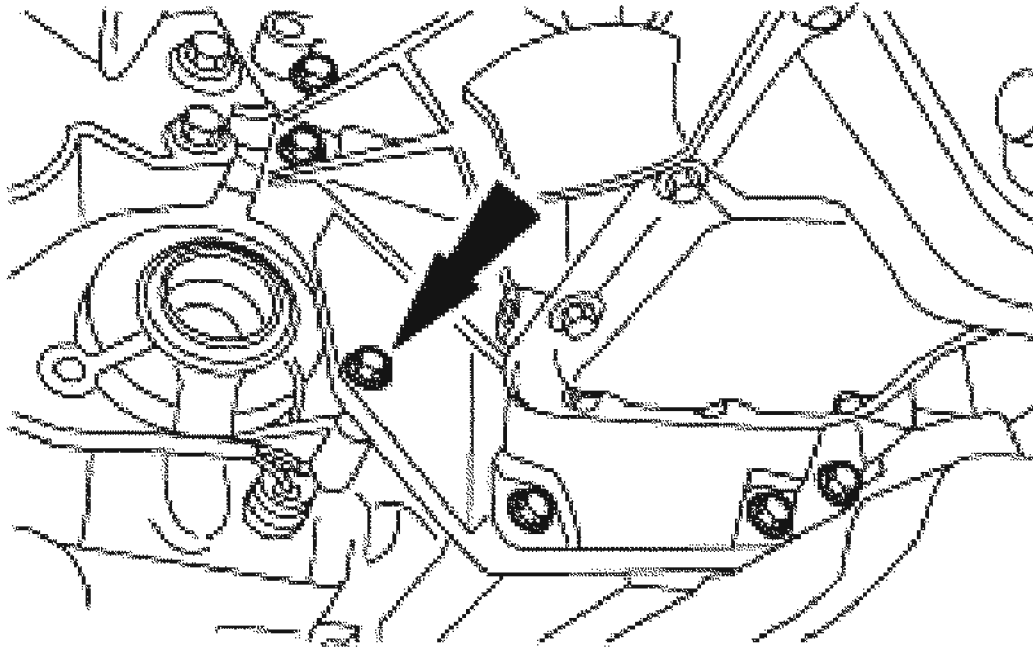
6. Remove the lower A/C bracket bolts.



G02738848

**Fig. 209: Removing Lower A/C Bracket Bolts**  
Courtesy of FORD MOTOR CO.

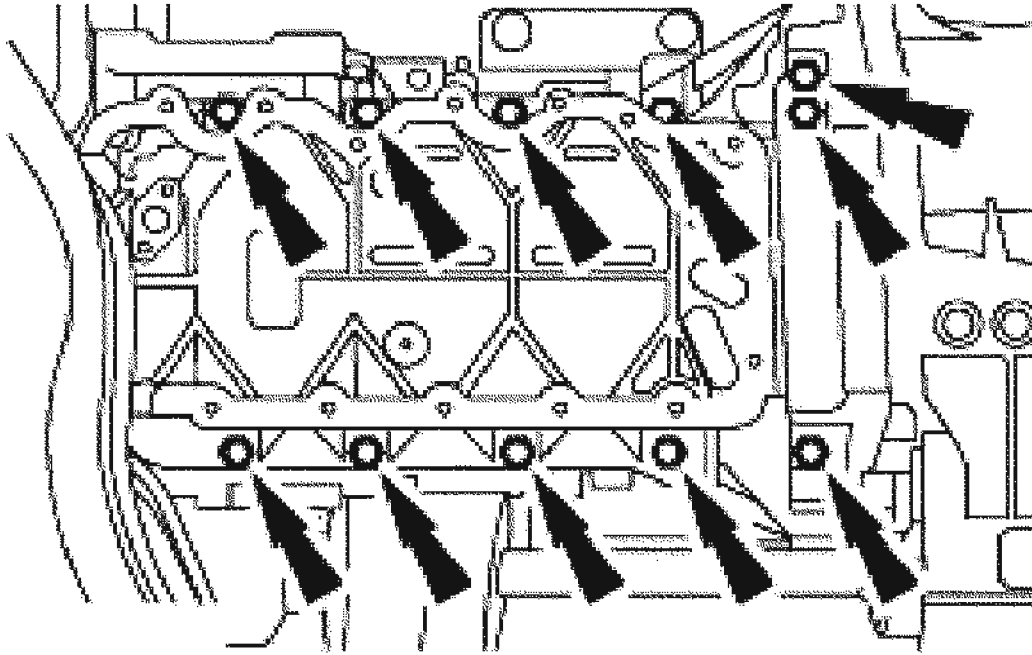
7. Remove the six lower crankcase-to-transmission bolts.



G02738849

**Fig. 210: Removing Lower Crankcase-To-Transmission Bolts**  
Courtesy of FORD MOTOR CO.

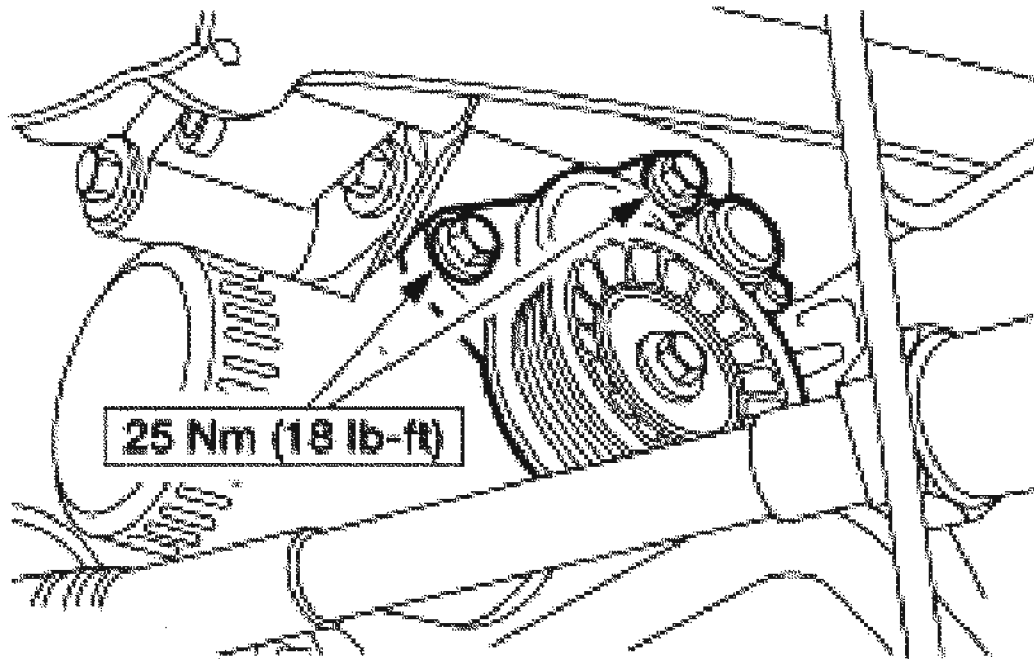
8. Remove the lower crankcase-to-upper crankcase bolts and the lower crankcase.



G02738850

**Fig. 211: Removing Lower Crankcase-To-Upper Crankcase Bolts**  
Courtesy of FORD MOTOR CO.

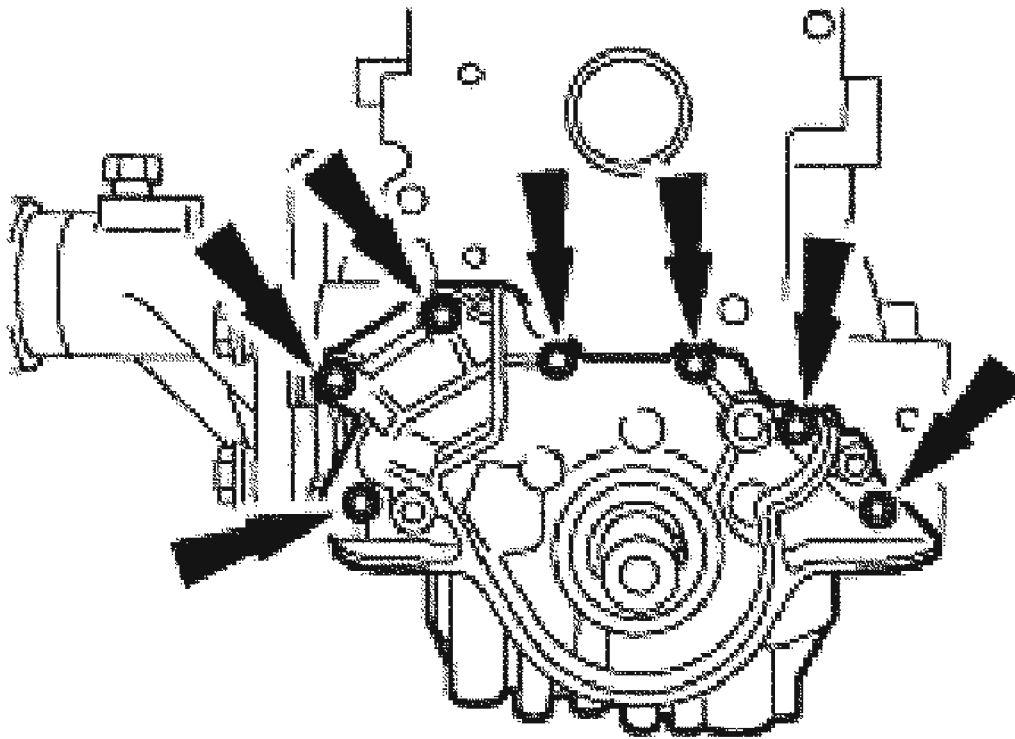
9. Remove the bolts and the accessory drive belt tensioner.



G02738851

**Fig. 212: Removing Accessory Drive Belt Tensioner Bolts**  
Courtesy of FORD MOTOR CO.

10. Remove the bolts and the oil pump.



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**Fig. 213: Removing Oil Pump Bolts**  
Courtesy of FORD MOTOR CO.

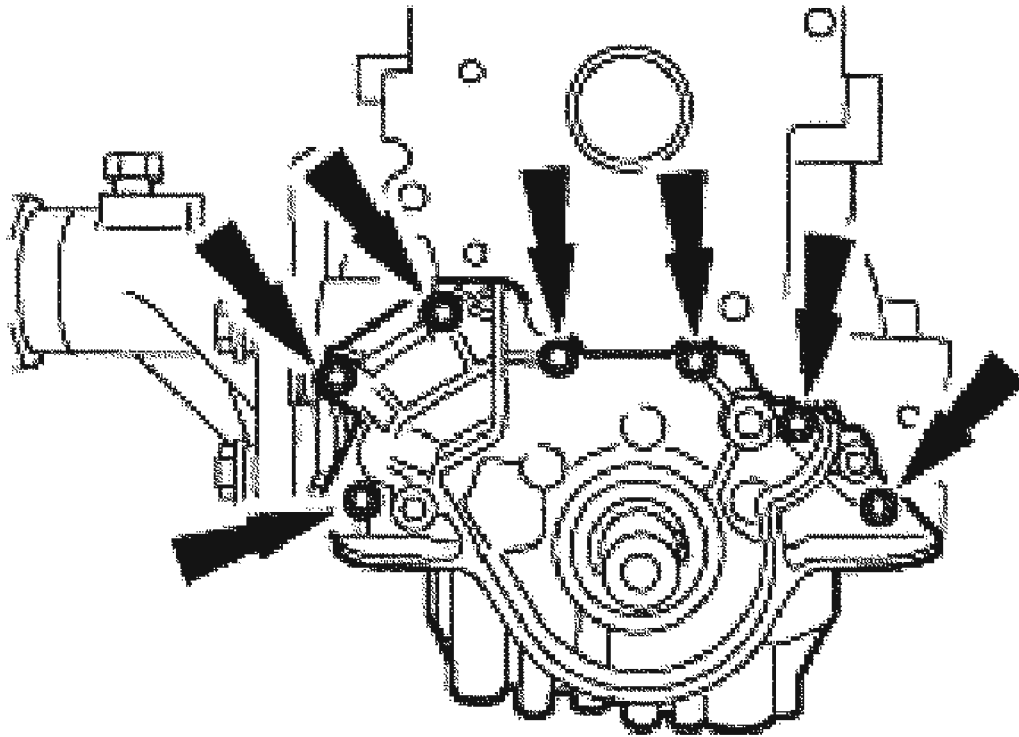
#### Installation

**CAUTION:** Do not use abrasive grinding discs to remove gasket material. Use only a plastic scraper. Do not scratch or gouge aluminum sealing surfaces. Leakage can occur.

1. Clean and inspect the mounting faces of both the oil pump and the cylinder block. Both surfaces must be flat and clean.

**NOTE:** The clearance between the lower cylinder block sealing surface on the oil pump and the cylinder block must be between 0.3-0.8 mm (0.012-0.031 inch).





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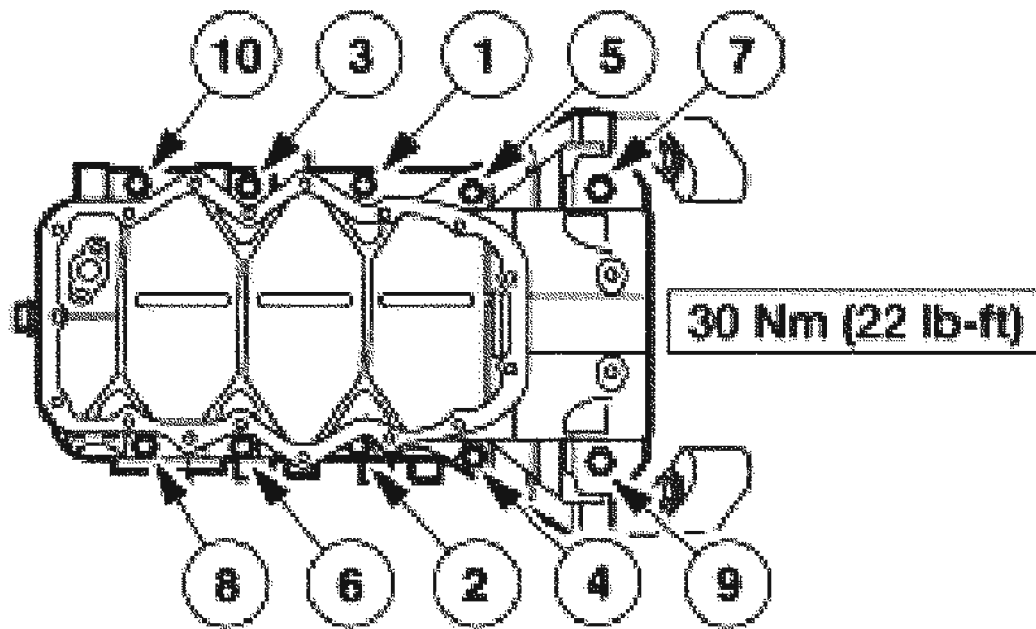
**Fig. 214: Installing Oil Pump Bolts**  
Courtesy of FORD MOTOR CO.

2. Install a new oil pump gasket, the oil pump and the bolts. Tighten the bolts in two stages:
  - Stage 1: Tighten the bolts to 6 Nm (53 lb-in).
  - Stage 2: Tighten an additional 45 degrees.
3. Install a new crankcase front seal.

**CAUTION:** The cylinder block cradle must be installed and the bolts tightened within four minutes of sealant application or leakage can occur.

4. Apply a 3 mm (0.1 inch) bead of silicone gasket and sealant in four places where the oil seal retainers meet the cylinder block.

**NOTE:** Align the lower crankcase so the cylinder block and the lower crankcase are flush.

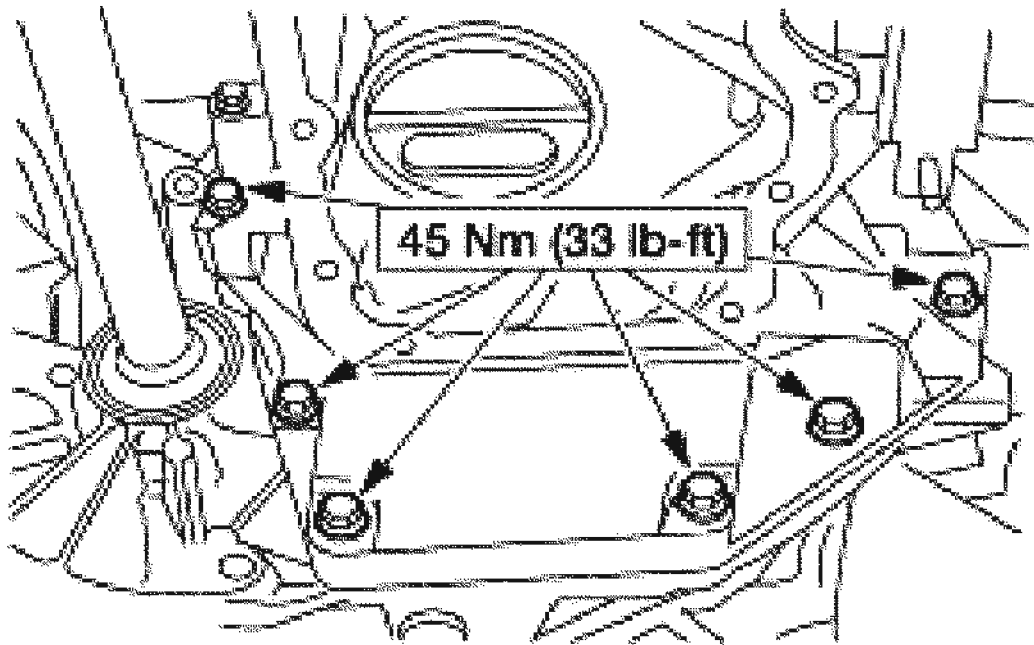


G02738854

**Fig. 215: Identifying Lower Crankcase Bolts Installation Sequence & Torque Specification**

Courtesy of FORD MOTOR CO.

5. Install a new gasket, the lower crankcase and the bolts.
6. Install the lower crankcase-to-transmission bolts.

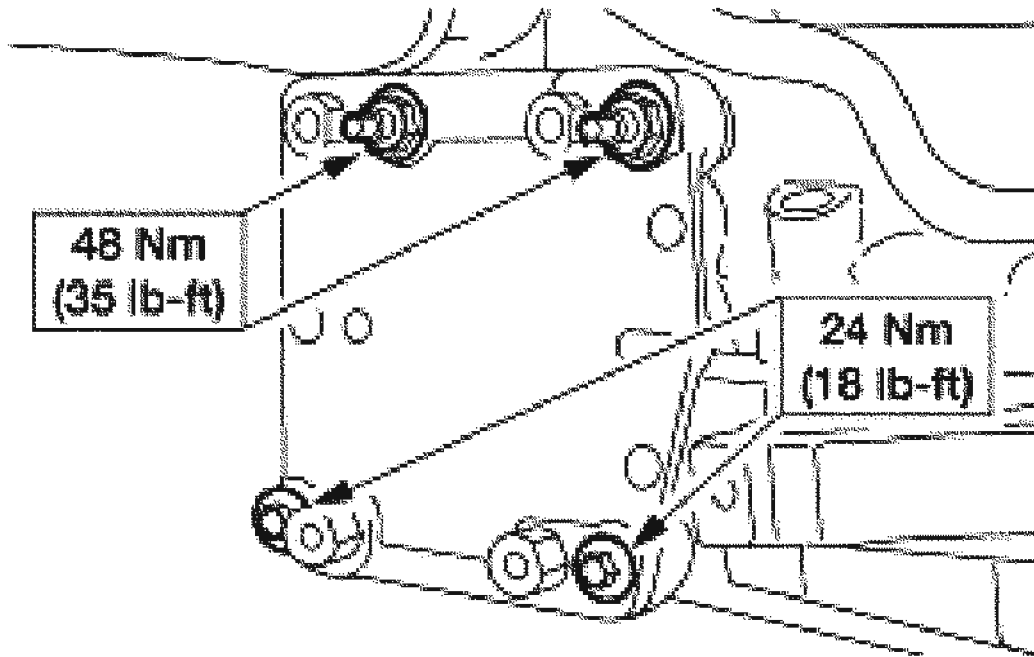


G02738855

**Fig. 216: Identifying Lower Crankcase-To-Transmission Bolts Torque Specification**

Courtesy of FORD MOTOR CO.

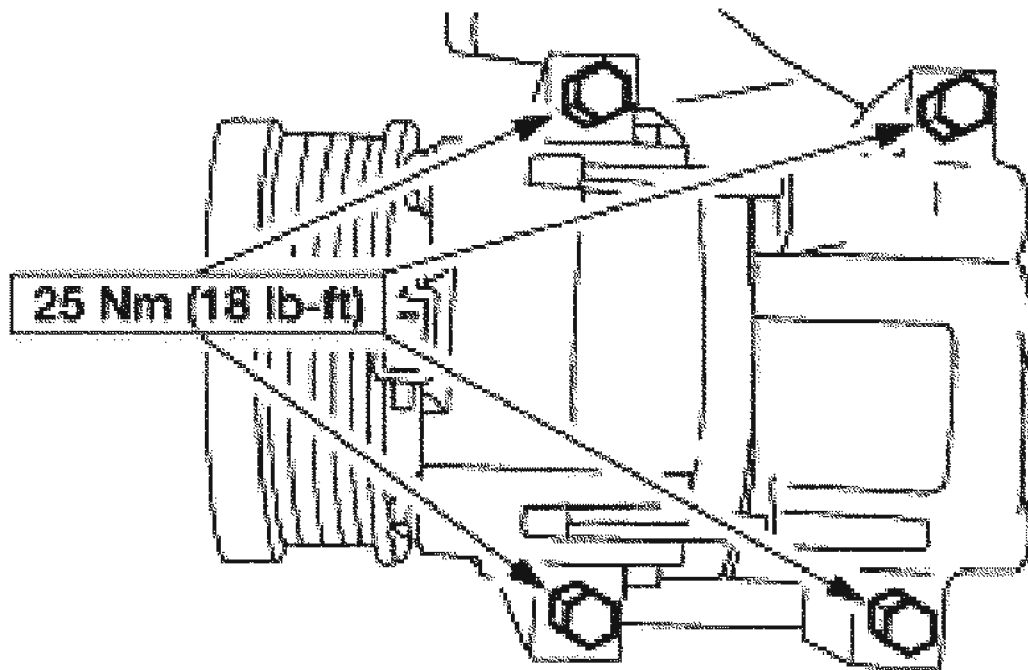
7. Install the lower A/C bracket bolts.



G02738856

**Fig. 217: Identifying Lower A/C Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

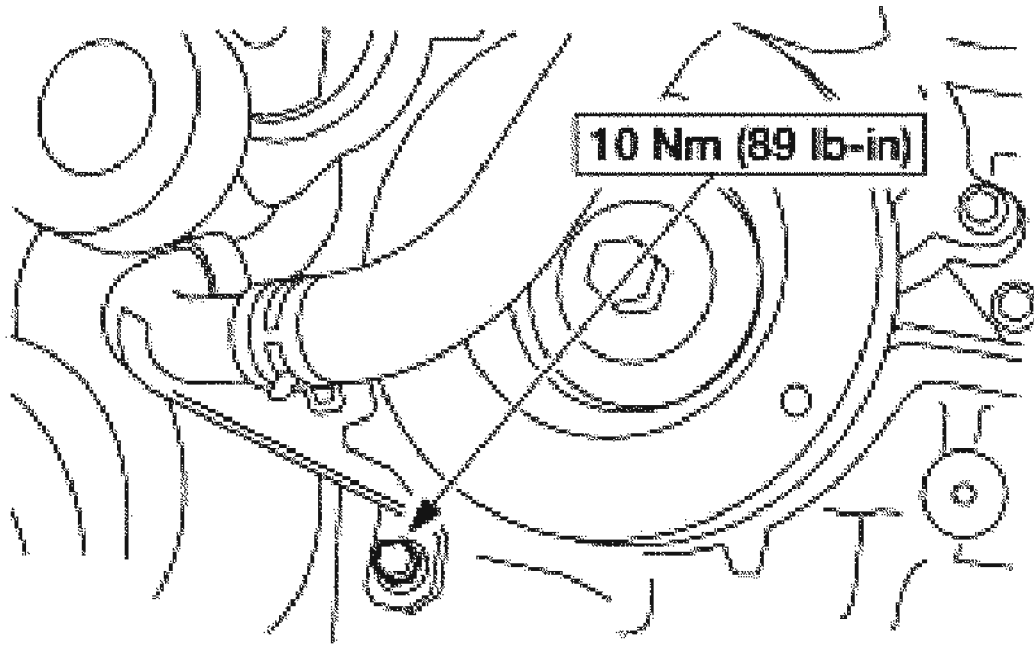
8. Position the A/C compressor and install the bolts.



G02738857

**Fig. 218: Identifying A/C Compressor Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

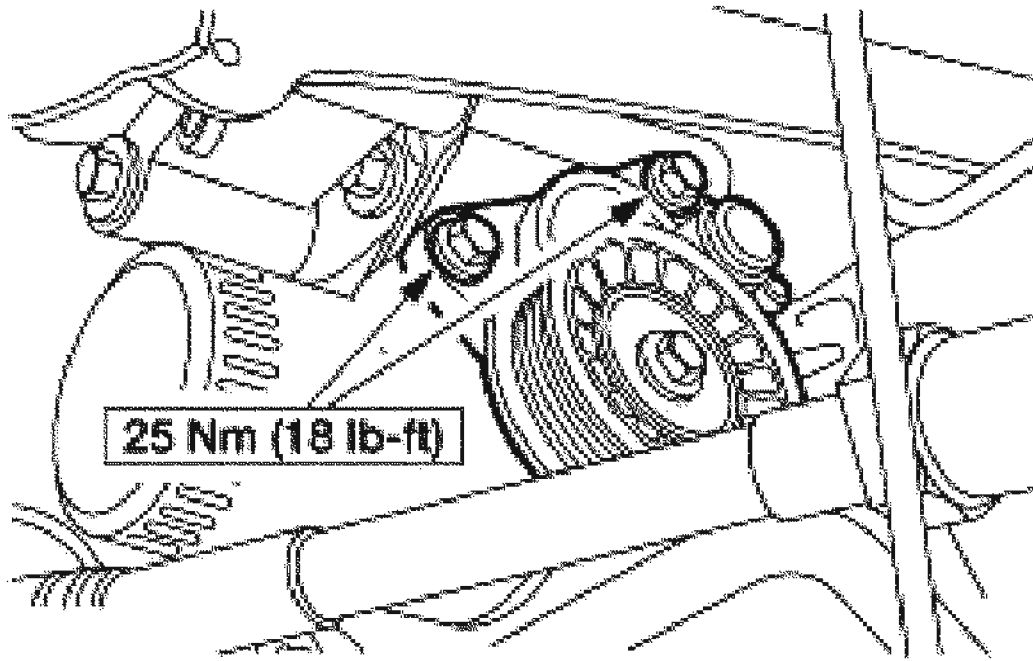
9. Install the coolant tube bracket bolt.



G02738858

**Fig. 219: Identifying Coolant Tube Bracket Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

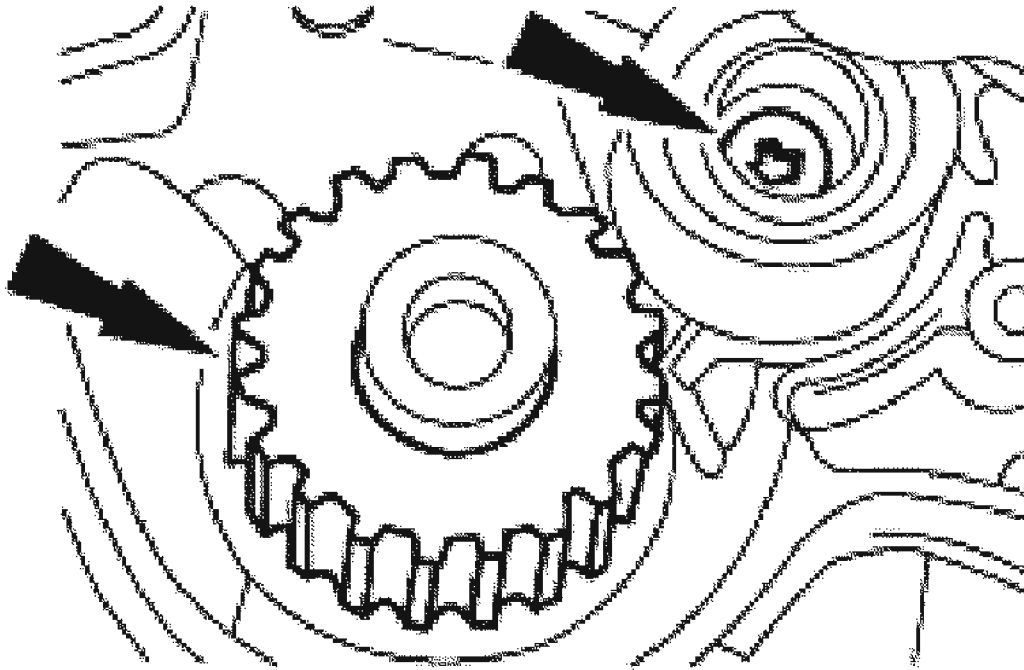
10. Install the accessory drive belt tensioner and the bolts.



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**Fig. 220: Identifying Accessory Drive Belt Tensioner Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

11. Install the crankshaft sprocket and the timing guide.



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**Fig. 221: Installing Crankshaft Sprocket And Timing Guide**  
Courtesy of FORD MOTOR CO.

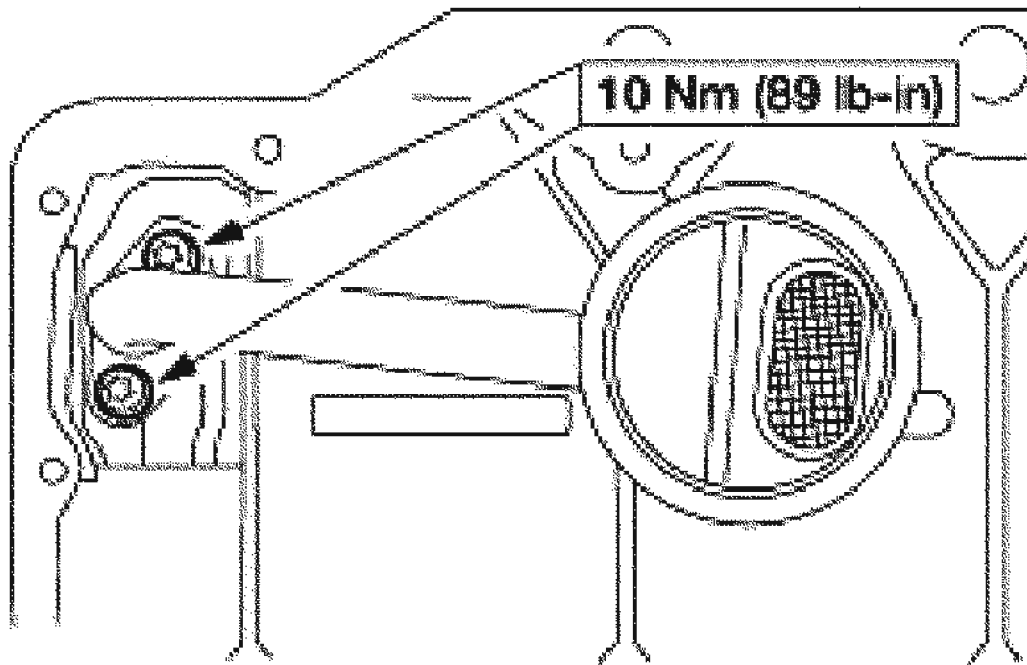
12. Install the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE** .
13. Install the timing belt. For additional information, refer to **TIMING BELT** .

#### **OIL PUMP SCREEN AND PICKUP TUBE**

##### **Removal and Installation**

1. Remove the oil pan. For additional information, refer to **OIL PAN** .
2. Remove the oil pump screen cover and tube.
  - Remove and discard the gasket.





**Fig. 222: Removing Oil Pump Screen Cover And Tube**  
Courtesy of FORD MOTOR CO.

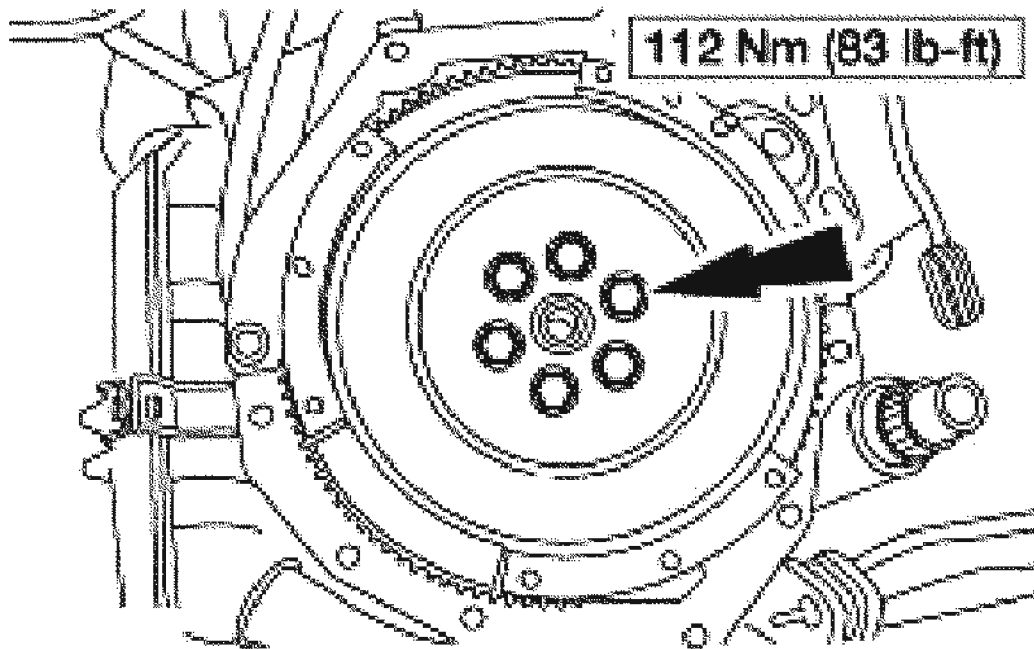
**CAUTION:** The oil pump screen cover and tube sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material; only use manual scrapers. Do not scratch or gouge sealing surfaces.

3. Carefully clean both sealing surfaces.
4. To install, reverse the removal procedure.
  - Install a new gasket.

## FLYWHEEL

### Removal

1. Remove the clutch. For additional information, refer to **CLUTCH**.
2. Remove the bolts and the flywheel.

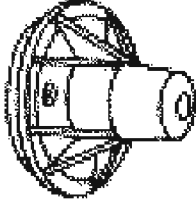
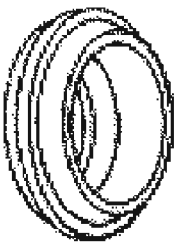



G02738862

**Fig. 223: Removing Flywheel Bolts**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### CRANKSHAFT REAR OIL SEAL

	Rear Oil Seal Replacer 303-328 (T88P-6701-B1)
	Oil Seal Pilot 303-329 (T88P-6701-B2)
	Seal Remover 303-409 (T92C-6700-CH)

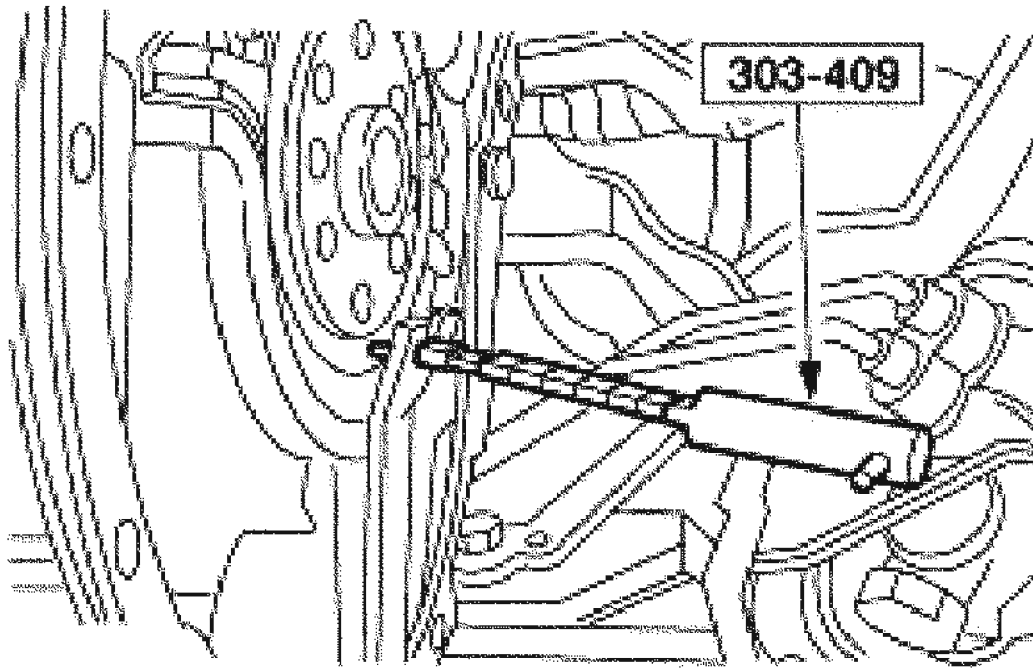
G02738863

**Fig. 224: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

1. Remove the flywheel. For additional information, refer to **FLYWHEEL** .

**CAUTION:** Use care to avoid damaging the crankshaft sealing surface.



G02738864

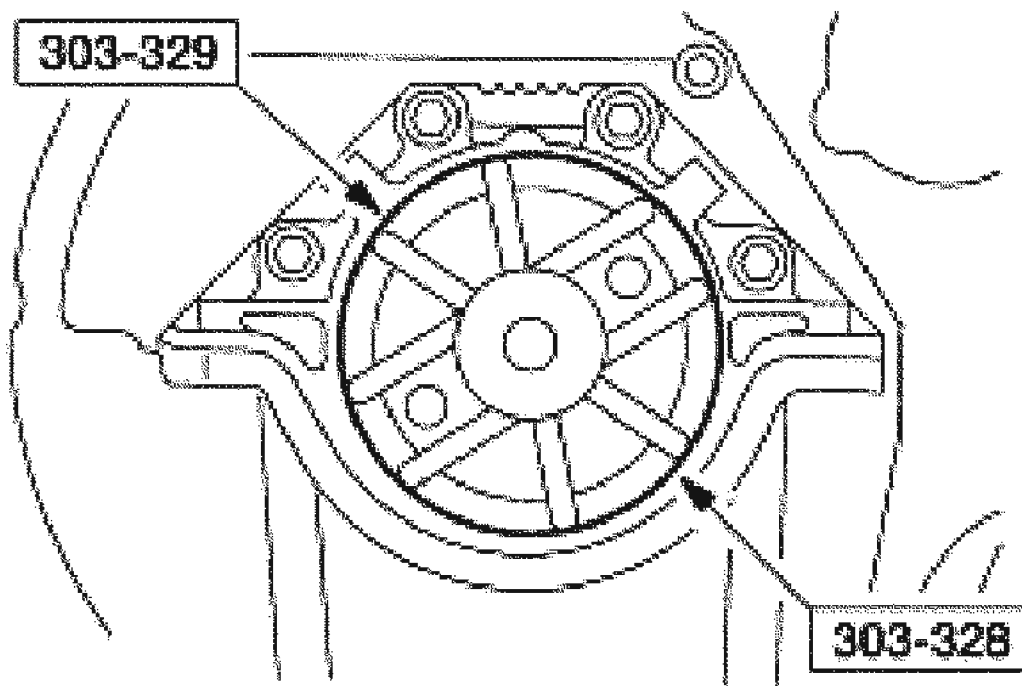
**Fig. 225: Removing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, remove the crankshaft rear oil seal.
3. Inspect the crankshaft rear oil seal area.

#### Installation

**NOTE:** Coat the rear oil seal area and the crankshaft rear oil seal lip with Super Premium SAE 5W -20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

**NOTE:** Make sure the crankshaft rear oil seal is on correctly and that the edges are not rolled over.

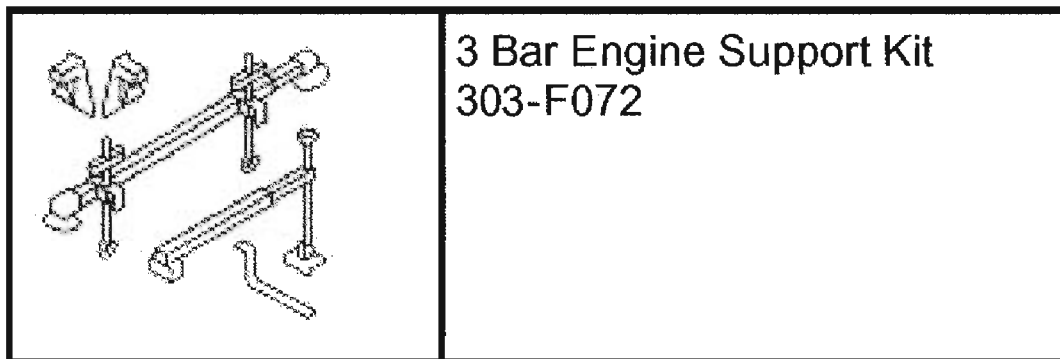


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**Fig. 226: Installing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

1. Using the special tools, install the crankshaft rear oil seal.
2. Install the flywheel. For additional information, refer to **FLYWHEEL**.

#### ENGINE MOUNT

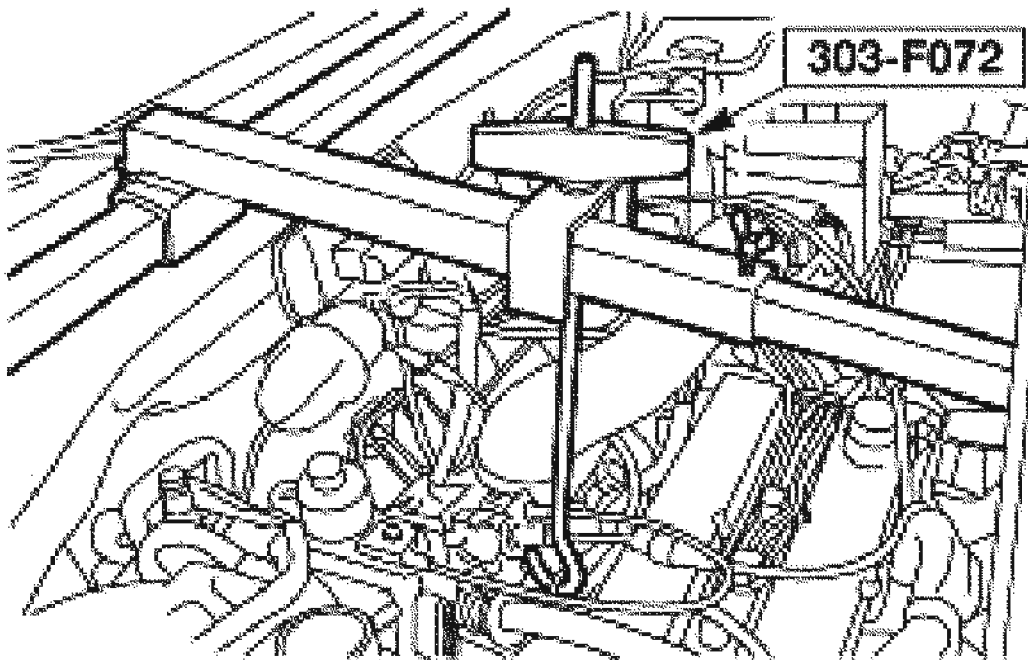


G02738866

**Fig. 227: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal and Installation**

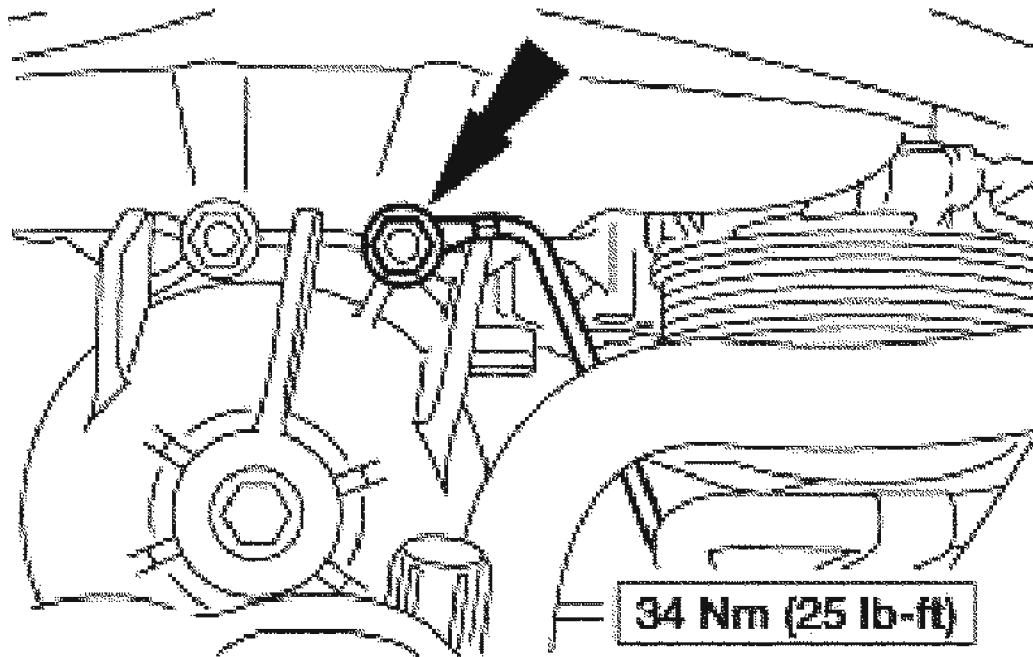
1. Install the special tool.



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**Fig. 228: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

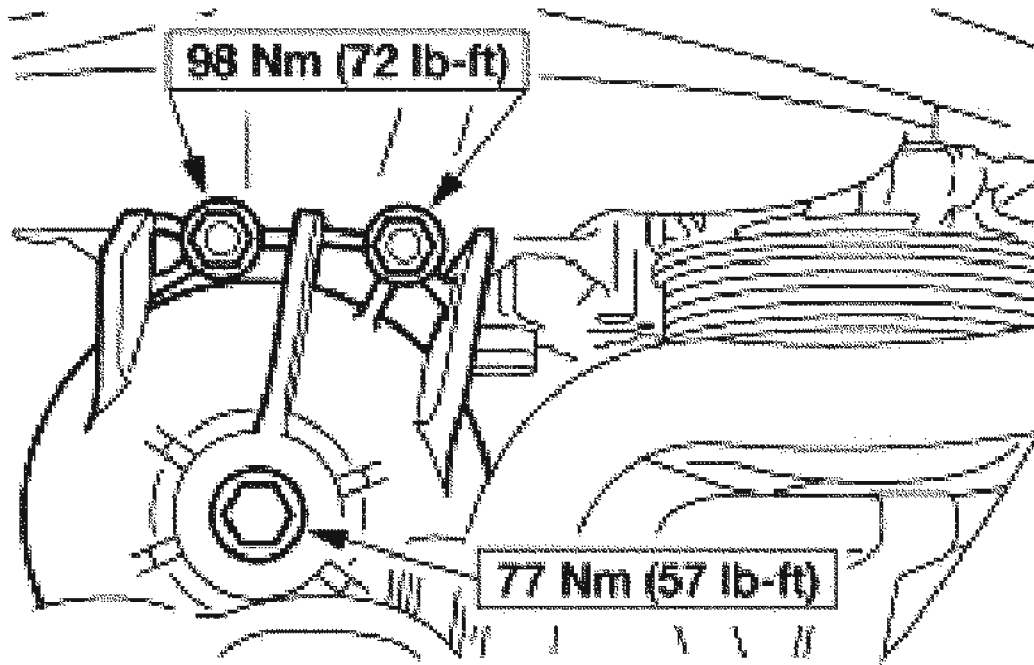
2. Disconnect the ground strap.



G02738868

**Fig. 229: Disconnecting Ground Strap**  
Courtesy of FORD MOTOR CO.

3. Remove the engine mount upper bracket.

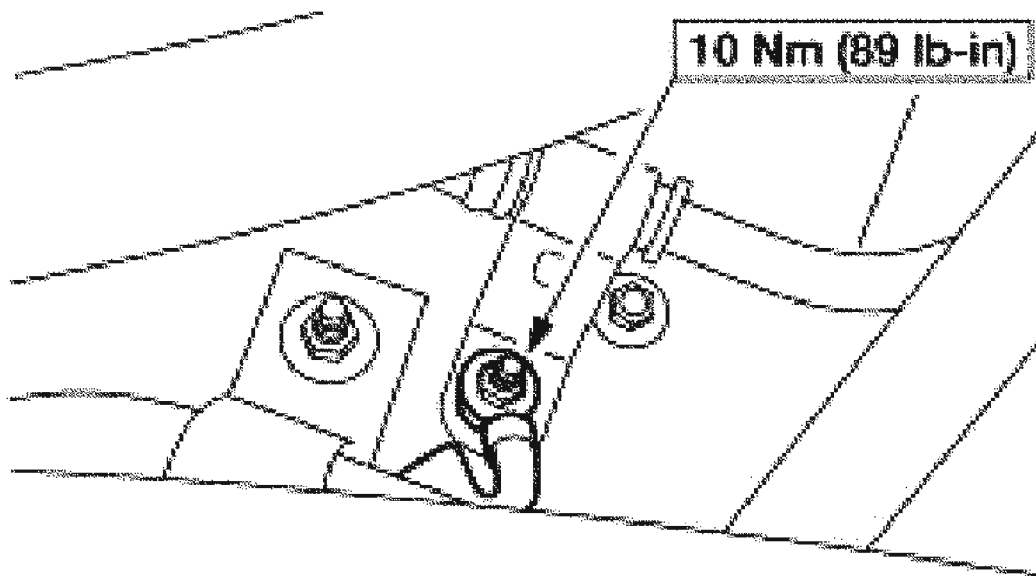


G02738869

**Fig. 230: Removing Engine Mount Upper Bracket**  
Courtesy of FORD MOTOR CO.

4. Disconnect the ground wire.

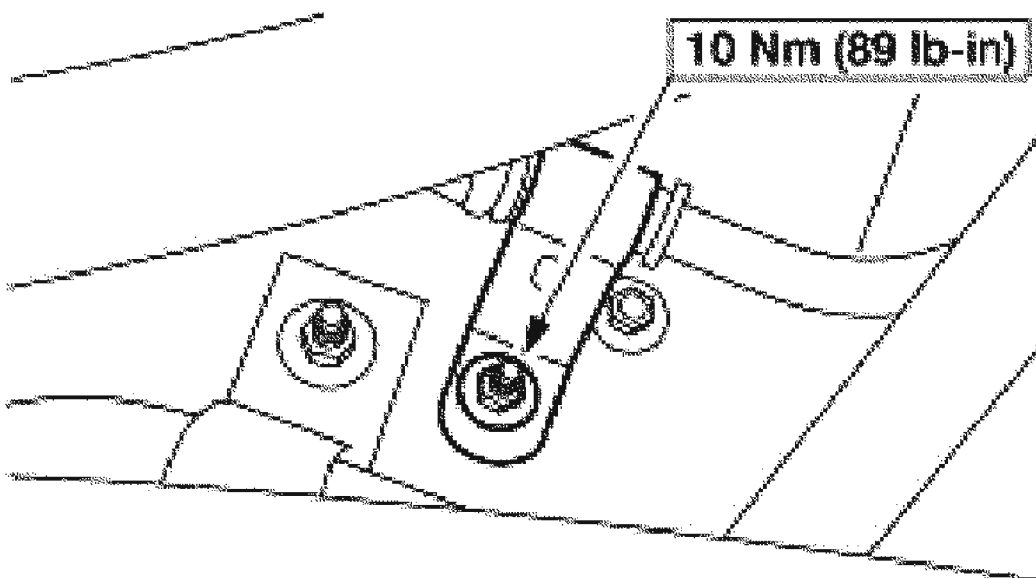




G02738870

**Fig. 231: Disconnecting Ground Wire**  
Courtesy of FORD MOTOR CO.

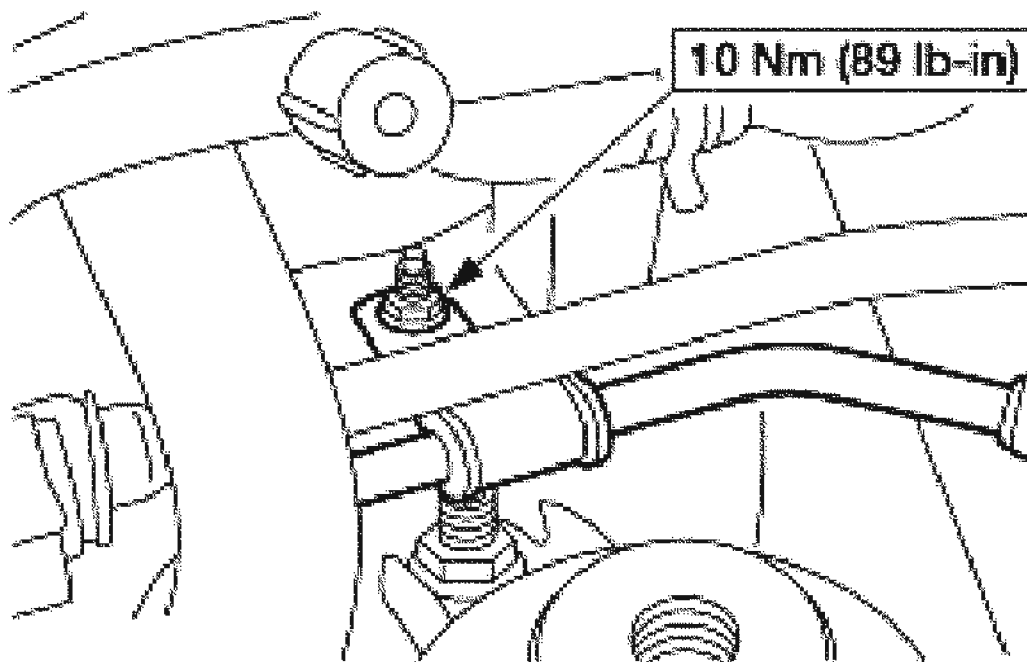
5. Disconnect the power steering line bracket.



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**Fig. 232: Disconnecting Power Steering Line Bracket**  
Courtesy of FORD MOTOR CO.

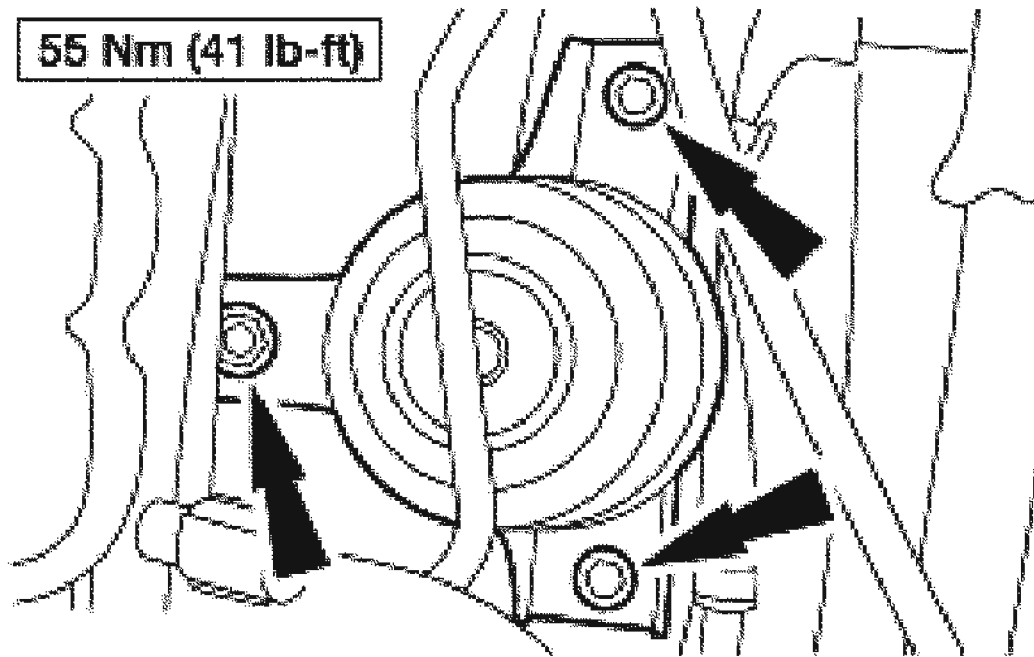
6. Disconnect the power steering line bracket and position the line aside.



G02738872

**Fig. 233: Disconnecting Power Steering Line Bracket**  
Courtesy of FORD MOTOR CO.

7. Remove the engine mount.



G02738873

**Fig. 234: Removing Engine Mount**  
Courtesy of FORD MOTOR CO.


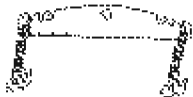


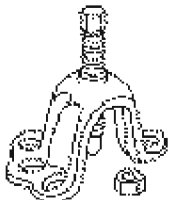
8. To install, reverse the removal procedure.

## REMOVAL

ENGINE - MANUAL TRANSAXLE

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

	Heavy Duty Floor Crane 014-00072 or equivalent
	Spreader Bar 303-D089 (D93P-6001-A3)
	Slide Hammer 100-001(T50T-100-A)
	Front Drive Halfshaft Remover 205-241 (T86P-3514A)
	Front Hub Remover 205-D070 (D93P-1175-B)

G02738874

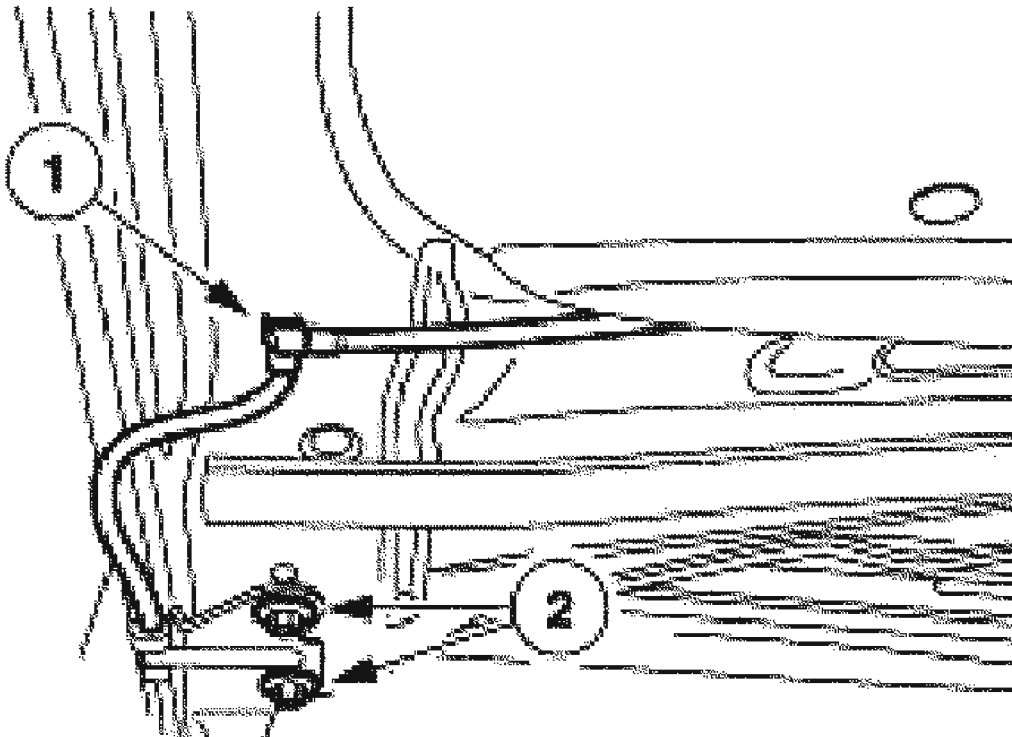
**Fig. 235: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal

1. Place the transmission in neutral.

2. Disconnect the fuel hose spring lock couplings. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**.

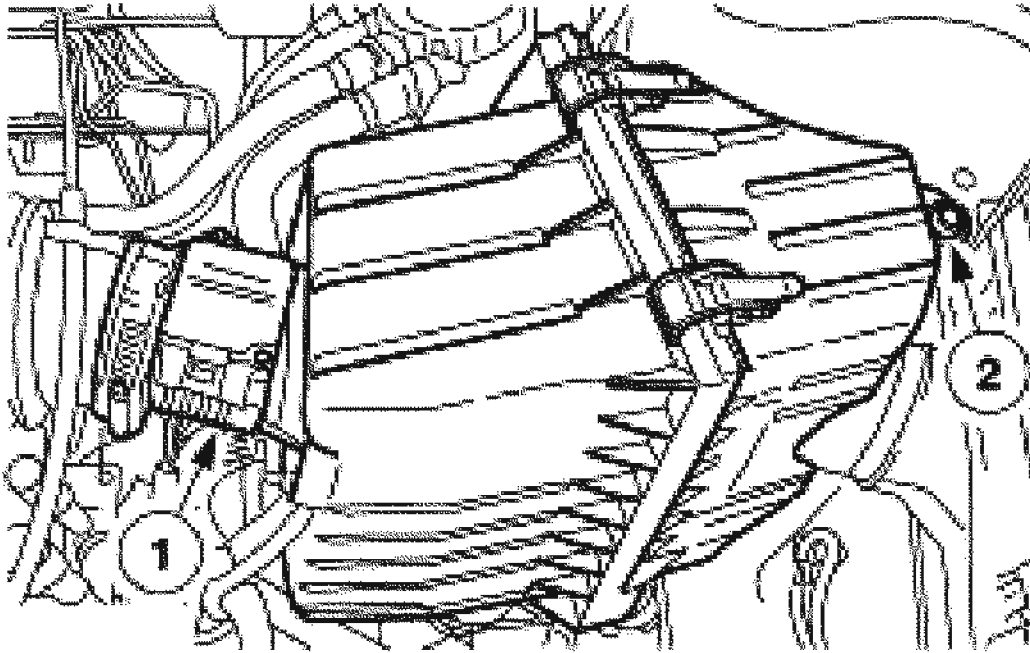
**NOTE:** Make reference marks on the hood to aid in the installation of the hood



**G02738875**

**Fig. 236: Removing Hood**  
Courtesy of FORD MOTOR CO.

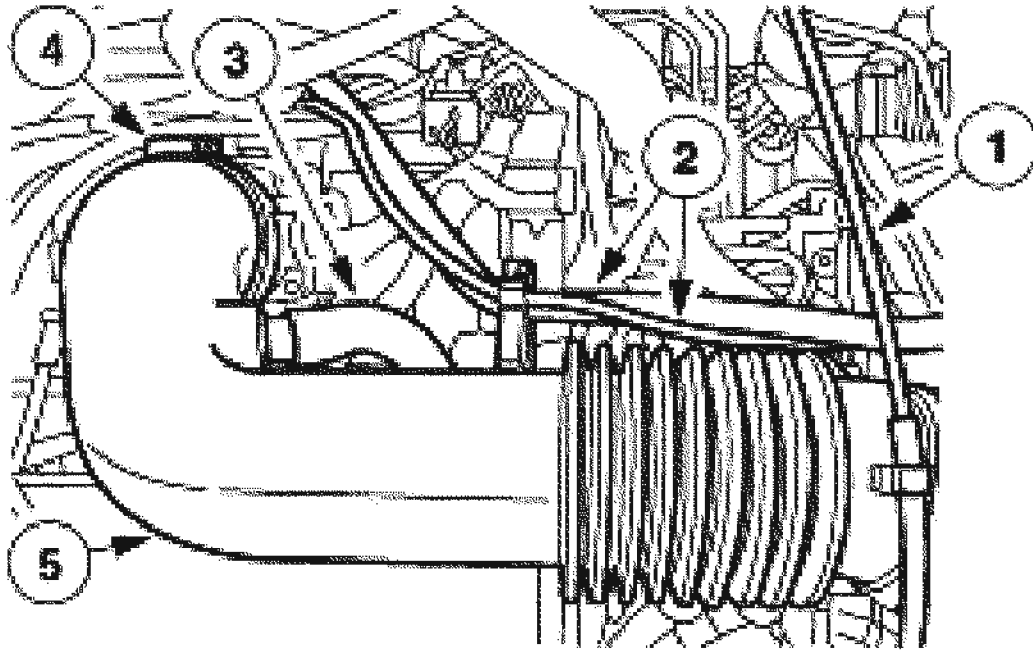
3. Remove the hood.
  1. Disconnect the washer hose.
  2. Remove the four bolts and the hood.
4. Remove the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
5. Remove the air cleaner housing bolt.
  1. Disconnect the mass air flow sensor electrical connector.
  2. Remove the air cleaner housing bolt.



G02738876

**Fig. 237: Removing Air Cleaner Housing Bolt**  
Courtesy of FORD MOTOR CO.

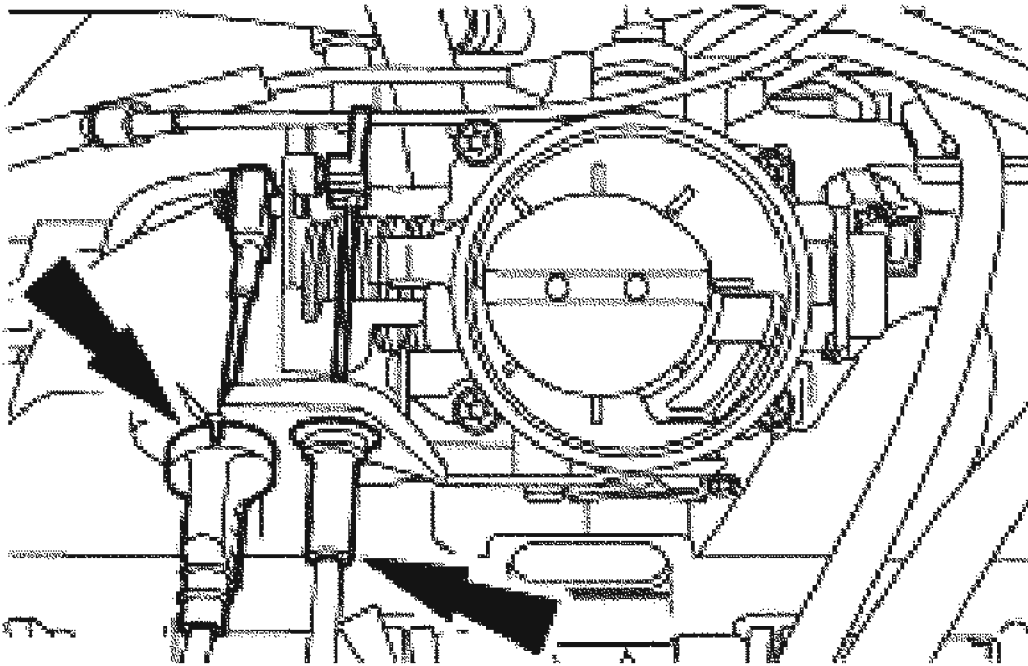
6. Remove the engine air cleaner (ACL) and outlet tube.
  1. Disconnect the accelerator cable.
  2. Disconnect the emission tube and hose.
  3. Disconnect the crankcase ventilation hose.
  4. Loosen the clamp.
  5. Remove the ACL and outlet pipe as an assembly.



G02738877

**Fig. 238: Removing Engine Air Cleaner (ACL) And Outlet Tube**  
**Courtesy of FORD MOTOR CO.**

7. Drain the engine coolant. For additional information, refer to **ENGINE COOLING** .
8. Recover the A/C system refrigerant. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
9. Disconnect the throttle cables and, if equipped, the speed control cable.

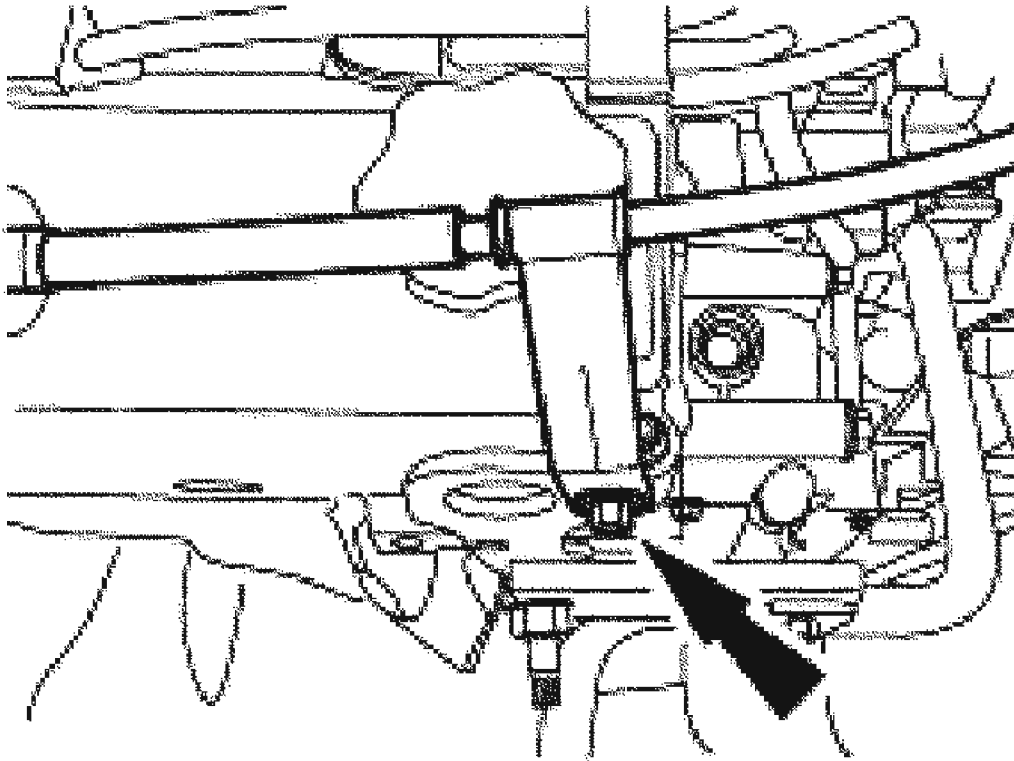


G02738878

**Fig. 239: Disconnecting Throttle Cables And Speed Control Cable**  
Courtesy of FORD MOTOR CO.

10. Remove the throttle cable bracket.

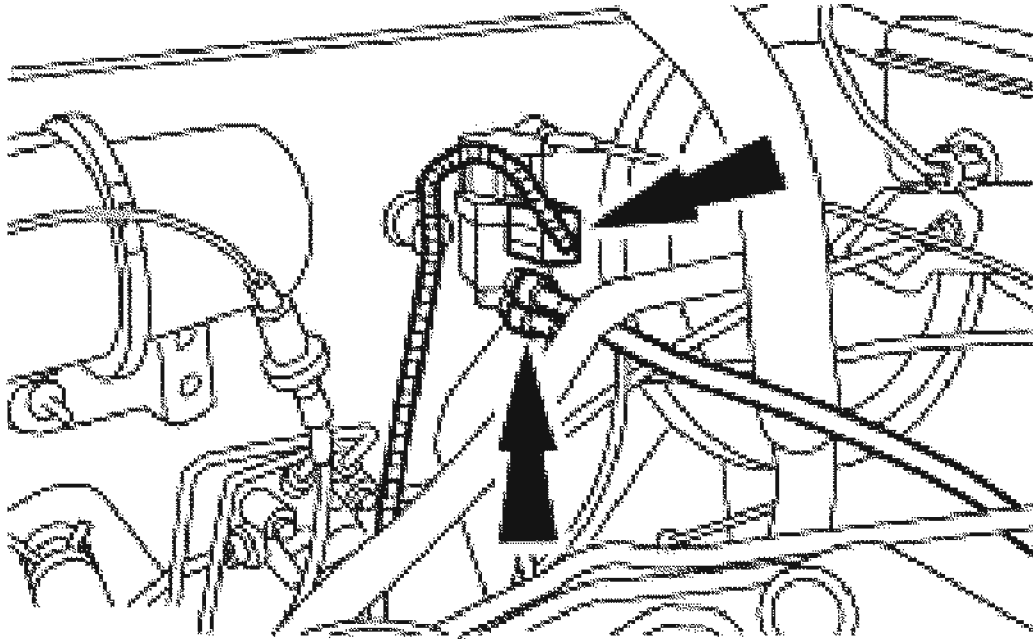




G02738879

**Fig. 240: Removing Throttle Cable Bracket**  
Courtesy of FORD MOTOR CO.

11. Disconnect the exhaust gas recirculation (EGR) vacuum regulator valve.
  - Disconnect the electrical connector.
  - Disconnect the vacuum hoses.

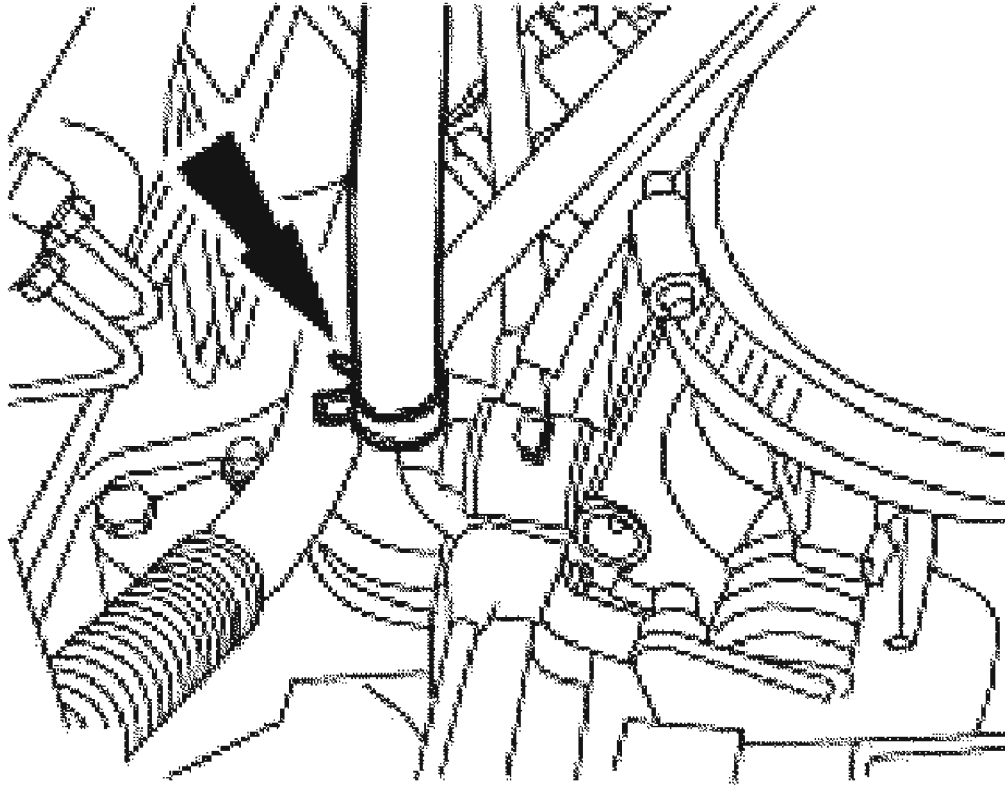


G02738880

**Fig. 241: Disconnecting Exhaust Gas Recirculation (EGR) Vacuum Regulator Valve**

**Courtesy of FORD MOTOR CO.**

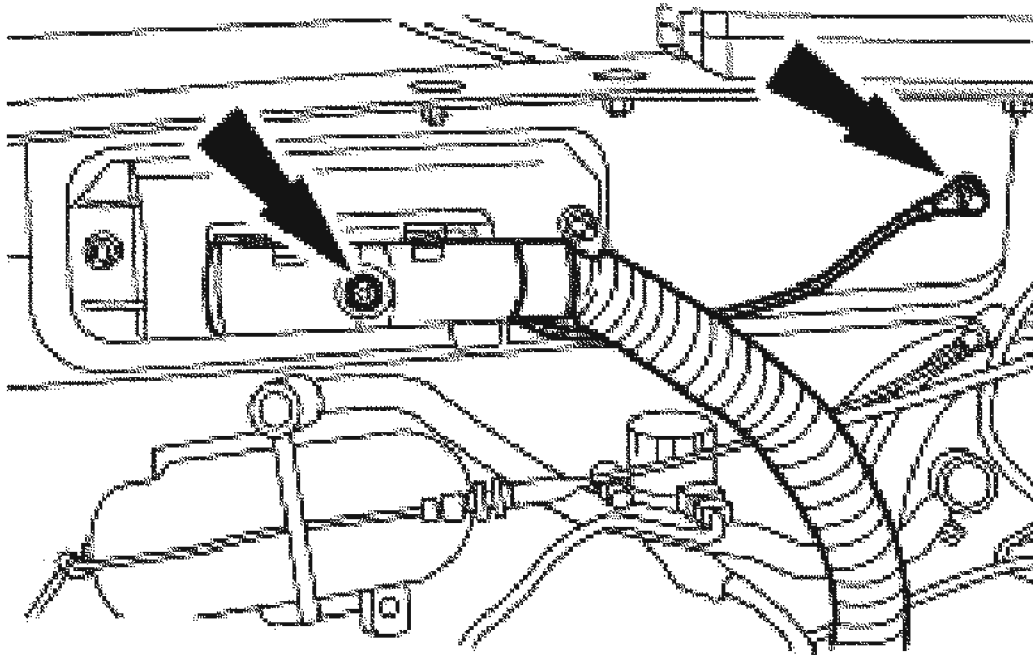
12. Disconnect the brake booster vacuum supply hose.



G02738881

**Fig. 242: Disconnecting Brake Booster Vacuum Supply Hose**  
Courtesy of FORD MOTOR CO.

13. Disconnect the powertrain control module (PCM) wire harness and ground.

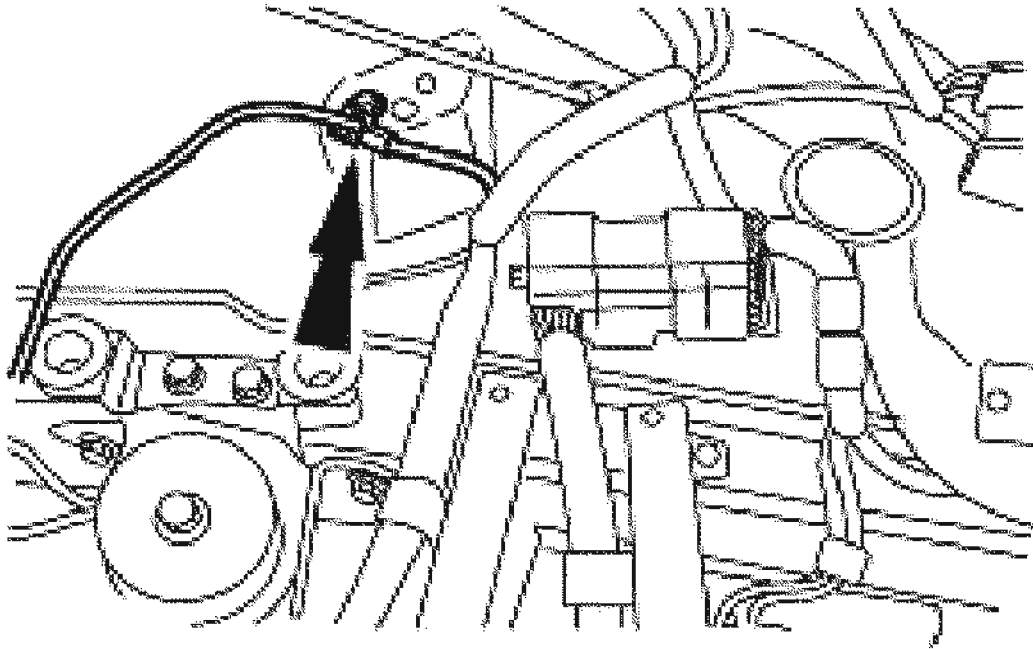


G02738882

**Fig. 243: Disconnecting Powertrain Control Module (PCM) Wire Harness And Ground**

Courtesy of FORD MOTOR CO.

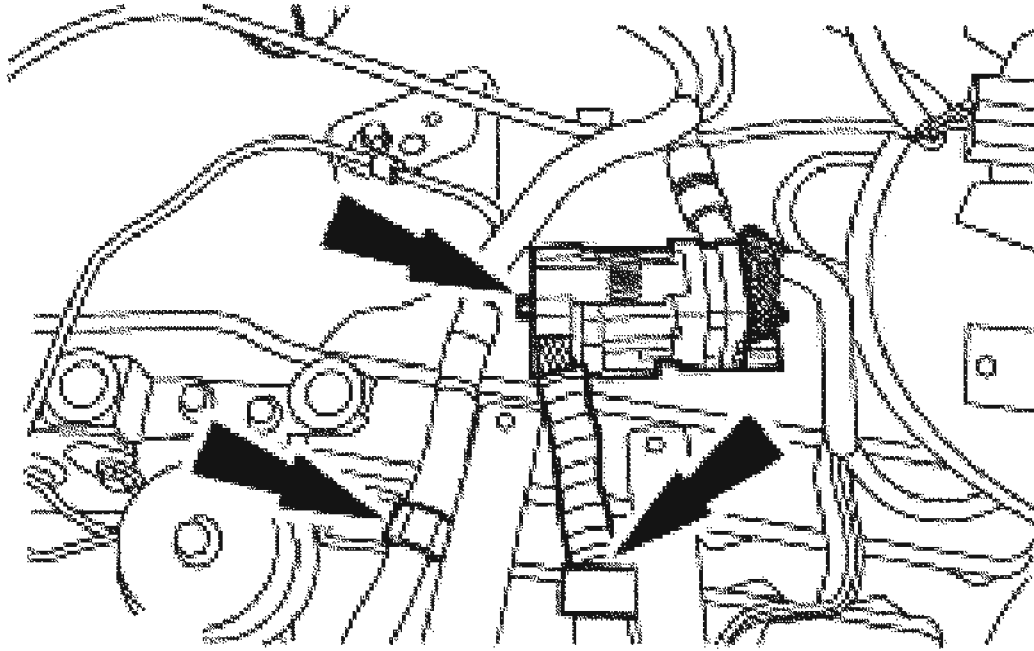
14. Disconnect the ground wire.



G02738883

**Fig. 244: Disconnecting Ground Wire**  
Courtesy of FORD MOTOR CO.

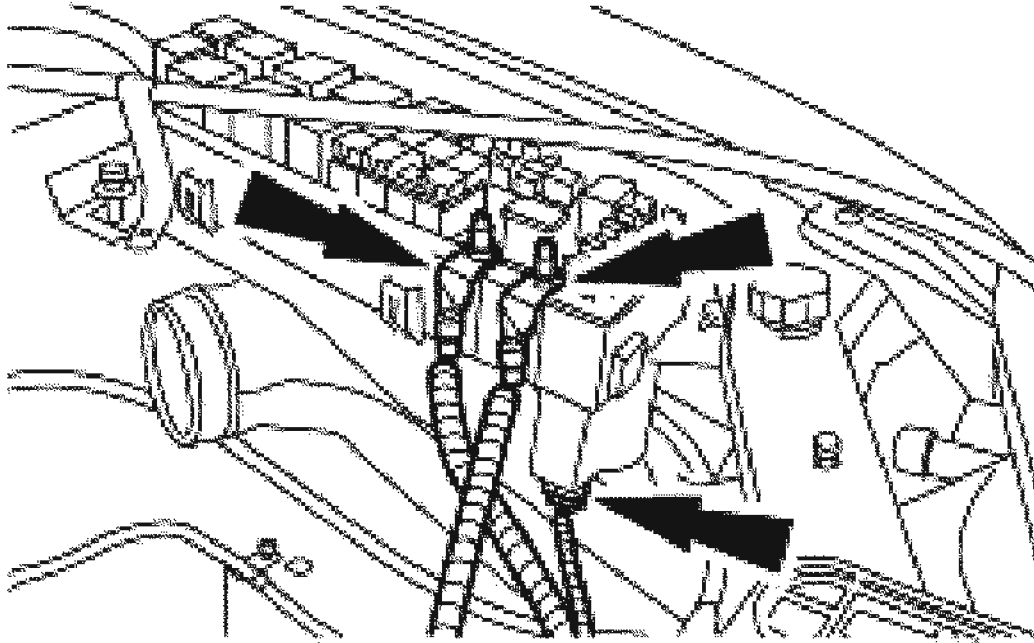
15. Disconnect the wire harness connector and the harness retainer clips.



G02738884

**Fig. 245: Disconnecting Wire Harness Connector And Harness Retainer Clips**  
Courtesy of FORD MOTOR CO.

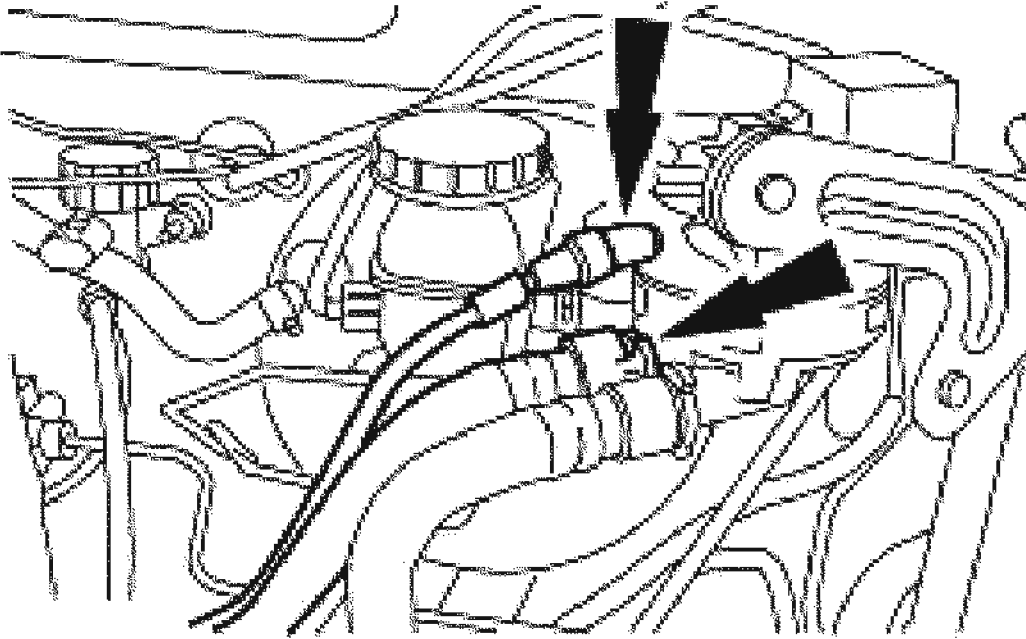
16. Disconnect the power distribution box electrical connectors.



G02738885

**Fig. 246: Disconnecting Power Distribution Box Electrical Connectors**  
Courtesy of FORD MOTOR CO.

17. Disconnect the vacuum lines at the evaporative emission (EVAP) canister.

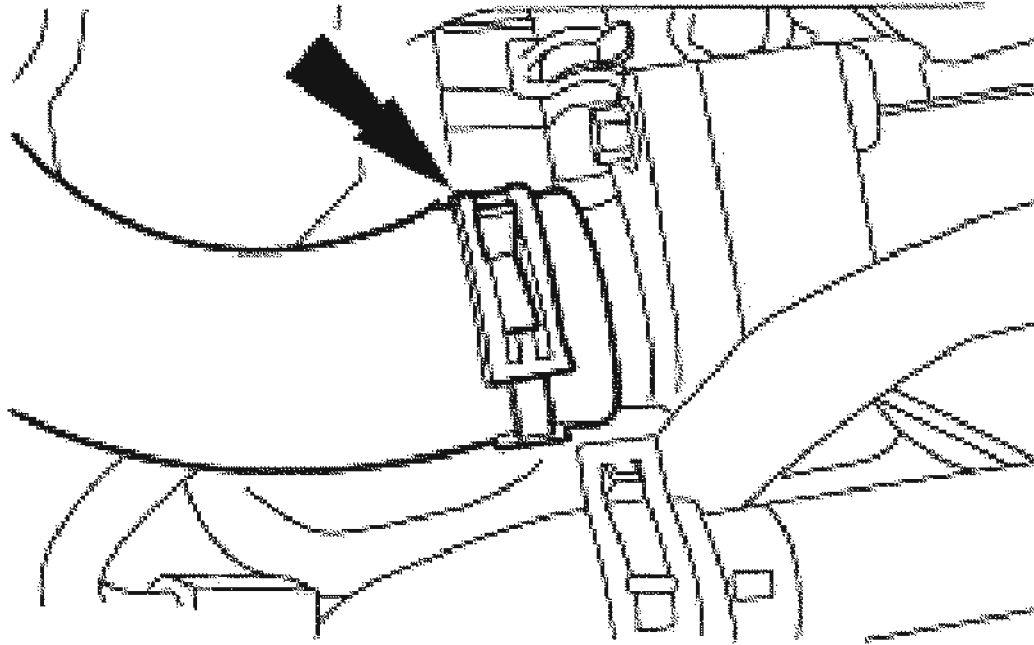


G02738886

**Fig. 247: Disconnecting Vacuum Lines At Evaporative Emission (EVAP) Canister**  
Courtesy of FORD MOTOR CO.

18. Disconnect the upper radiator hose.

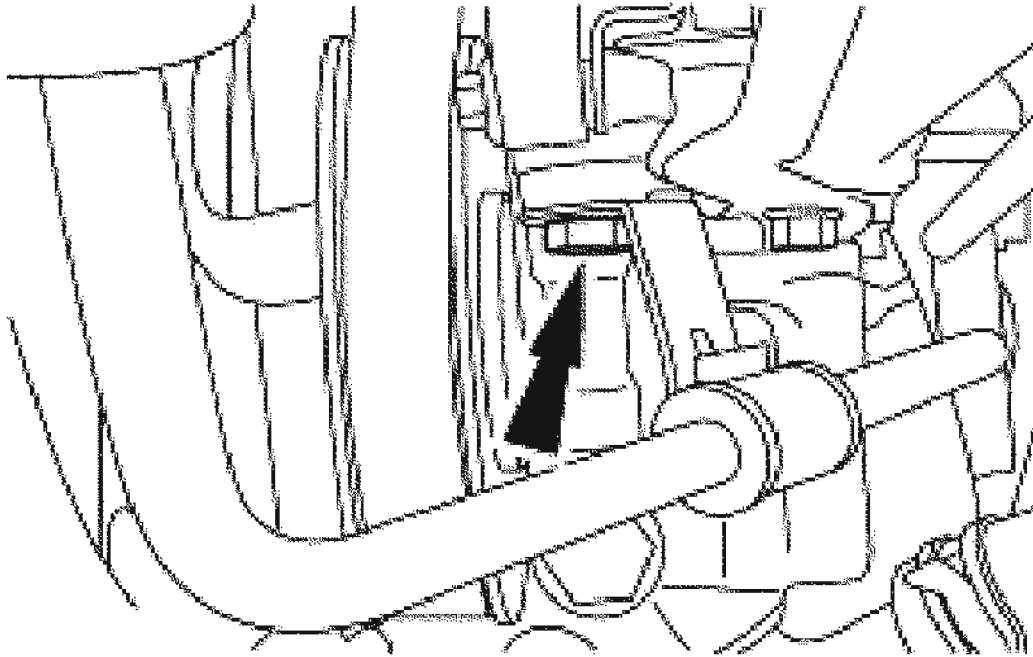




G02738887

**Fig. 248: Disconnecting Upper Radiator Hose**  
Courtesy of FORD MOTOR CO.

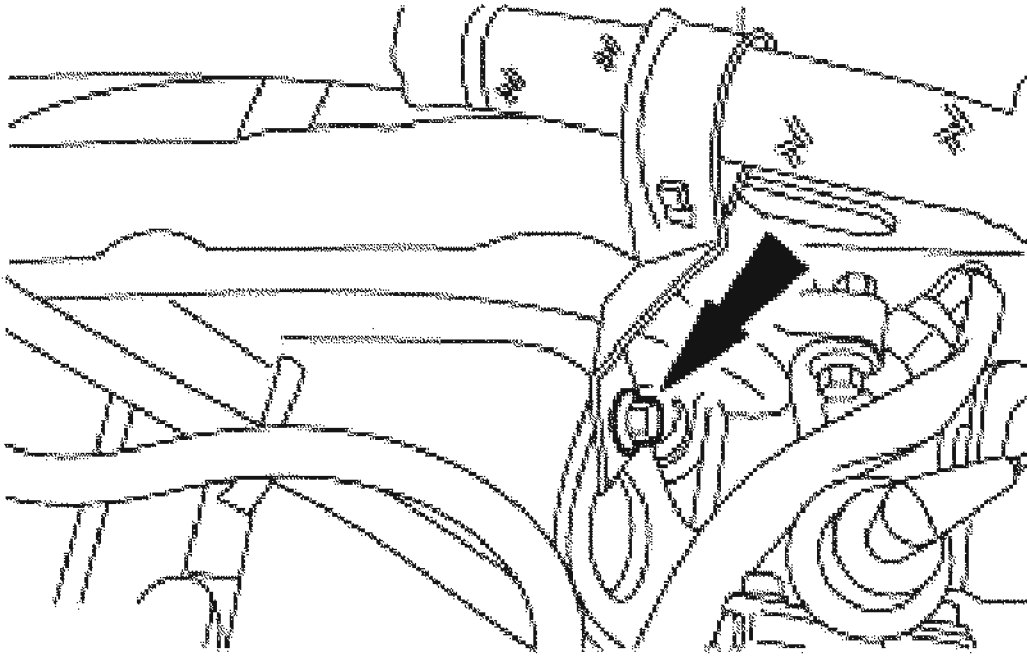
19. Remove the power steering hose bracket bolt.



**G02738888**

**Fig. 249: Removing Power Steering Hose Bracket Bolts (1 Of 2)**  
**Courtesy of FORD MOTOR CO.**

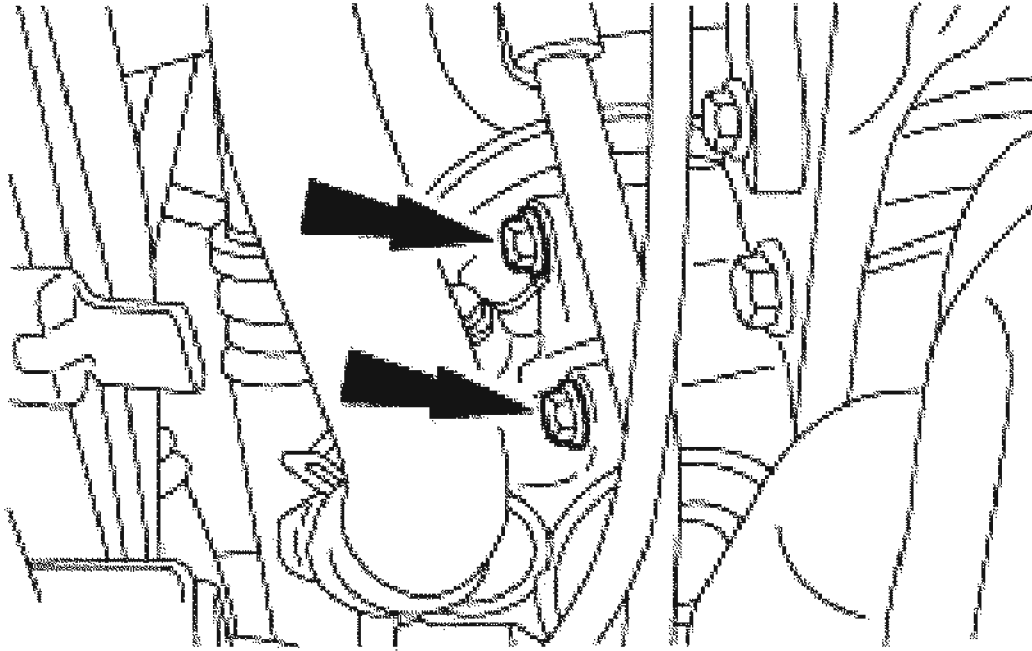
20. Remove the power steering hose bracket bolt.



G02738889

**Fig. 250: Removing Power Steering Hose Bracket Bolts (2 Of 2)**  
Courtesy of FORD MOTOR CO.

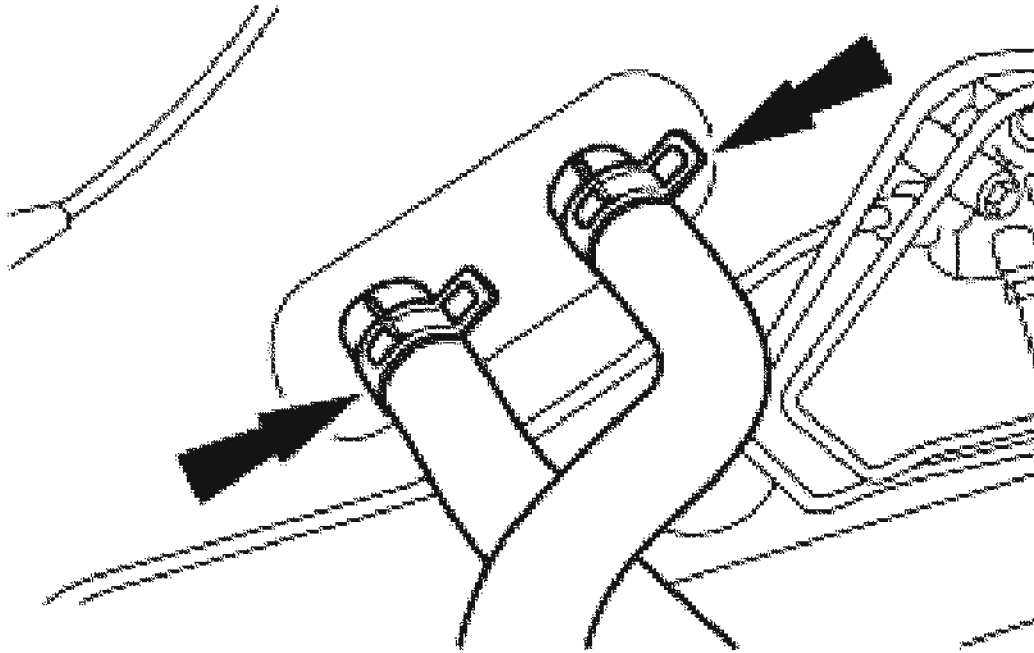
21. Remove the upper power steering pump bolts.



G02738890

**Fig. 251: Removing Upper Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

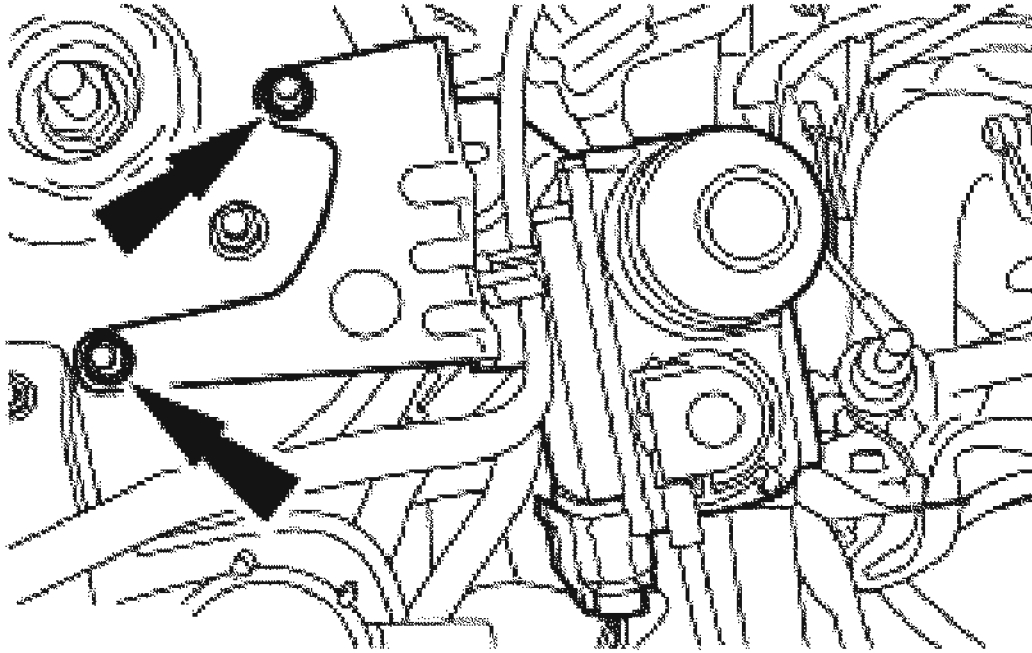
22. Disconnect the heater hoses.



G02738891

**Fig. 252: Disconnecting Heater Hoses**  
Courtesy of FORD MOTOR CO.

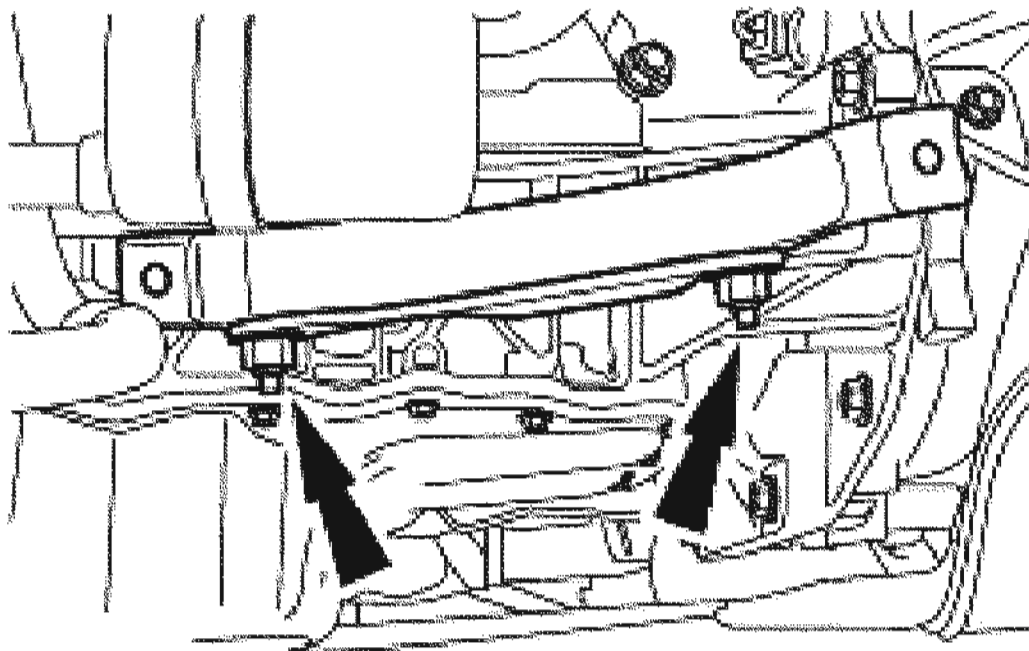
23. Remove the speed control unit (if equipped) and position aside.



G02738892

**Fig. 253: Removing Speed Control Unit**  
Courtesy of FORD MOTOR CO.

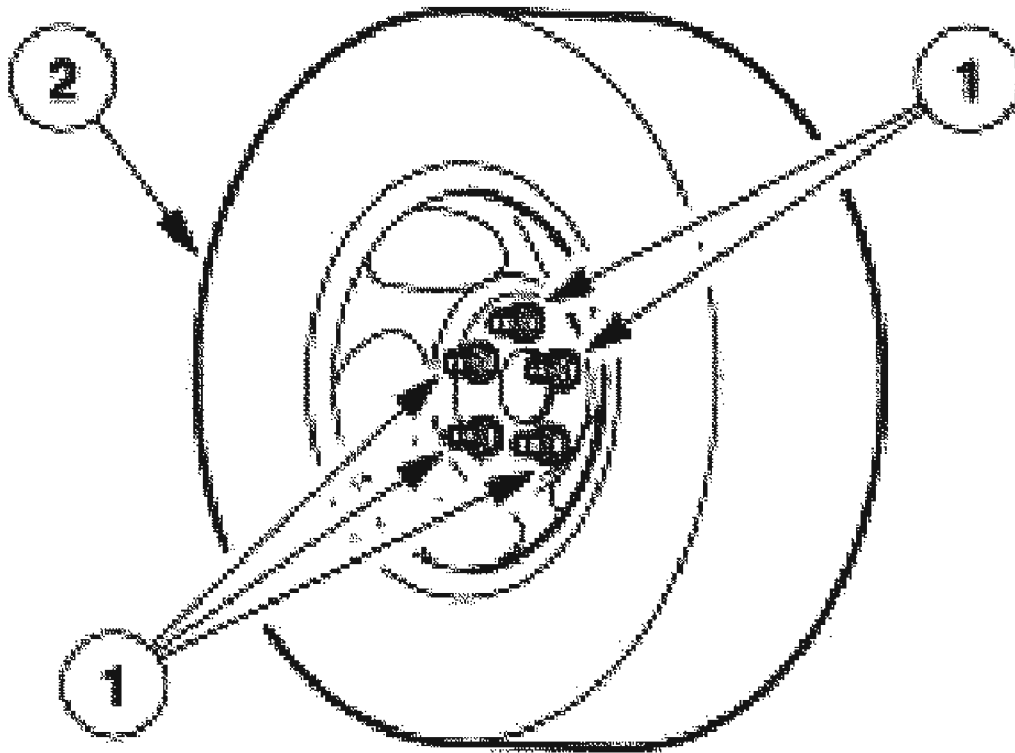
24. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
25. Remove the nuts and the bracket.



G02738893

**Fig. 254: Removing Bracket Nuts**  
Courtesy of FORD MOTOR CO.

26. Remove the wheel center caps, if equipped.
27. Remove the LH and RH wheel and tire assembly.
  1. Remove the wheel nuts.
  2. Remove the wheel and tire assembly.

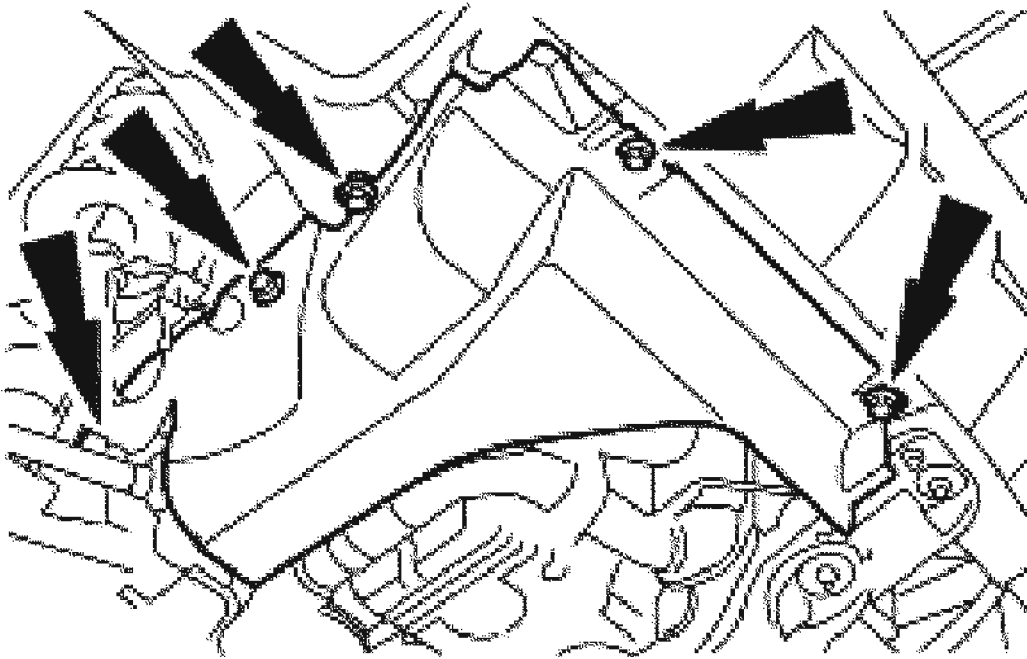


G02738894

**Fig. 255: Removing LH And RH Wheel And Tire Assembly**  
Courtesy of FORD MOTOR CO.

28. Remove the bolts and the right front lower splash shield.

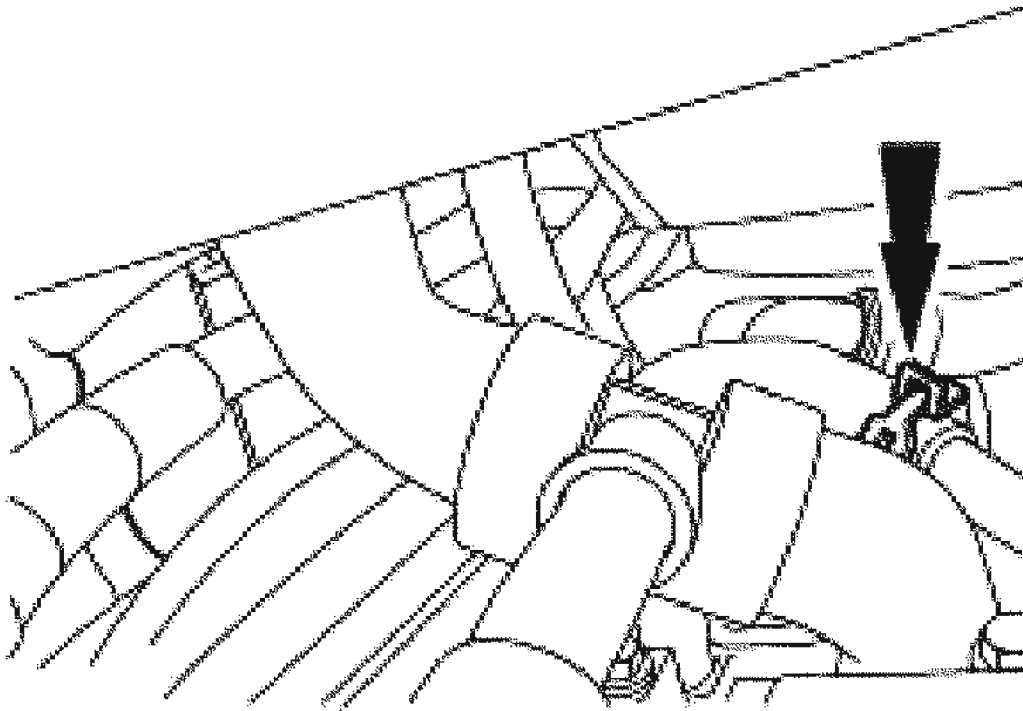




G02738895

**Fig. 256: Removing Right Front Lower Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

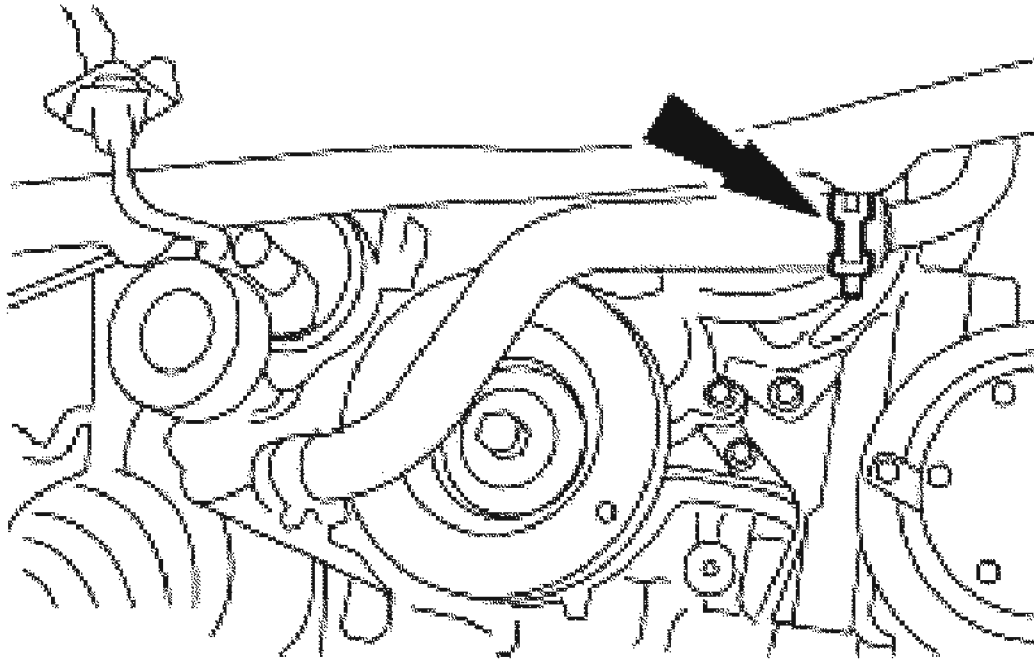
29. Disconnect the coolant hose.



G02738896

**Fig. 257: Disconnecting Coolant Hose (1 Of 2)**  
Courtesy of FORD MOTOR CO.

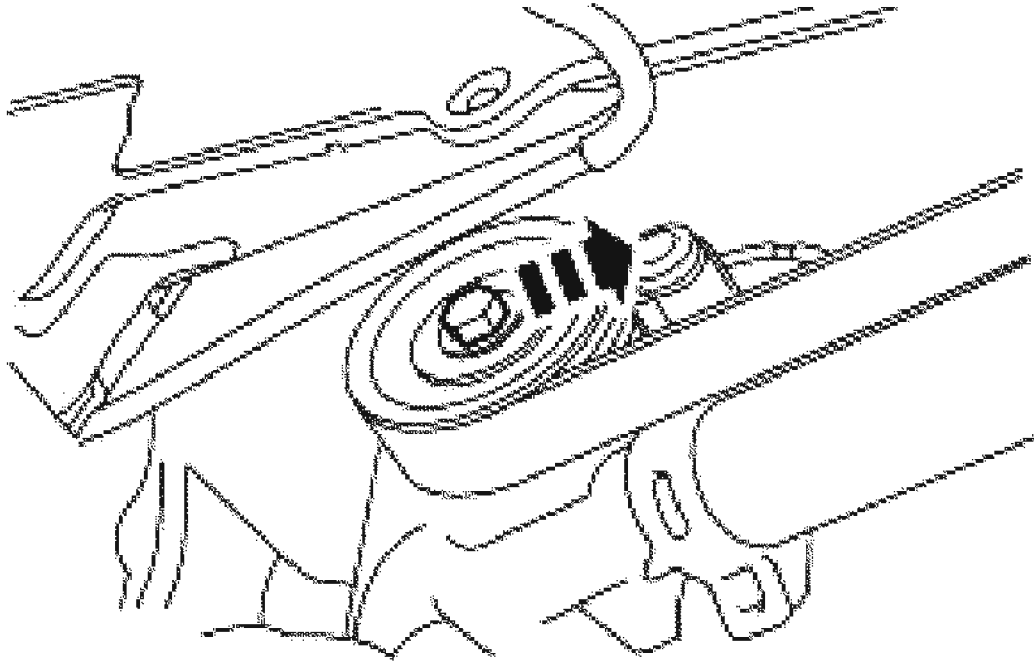
30. Disconnect the coolant hose.



G02738897

**Fig. 258: Disconnecting Coolant Hose (2 Of 2)**  
Courtesy of FORD MOTOR CO.

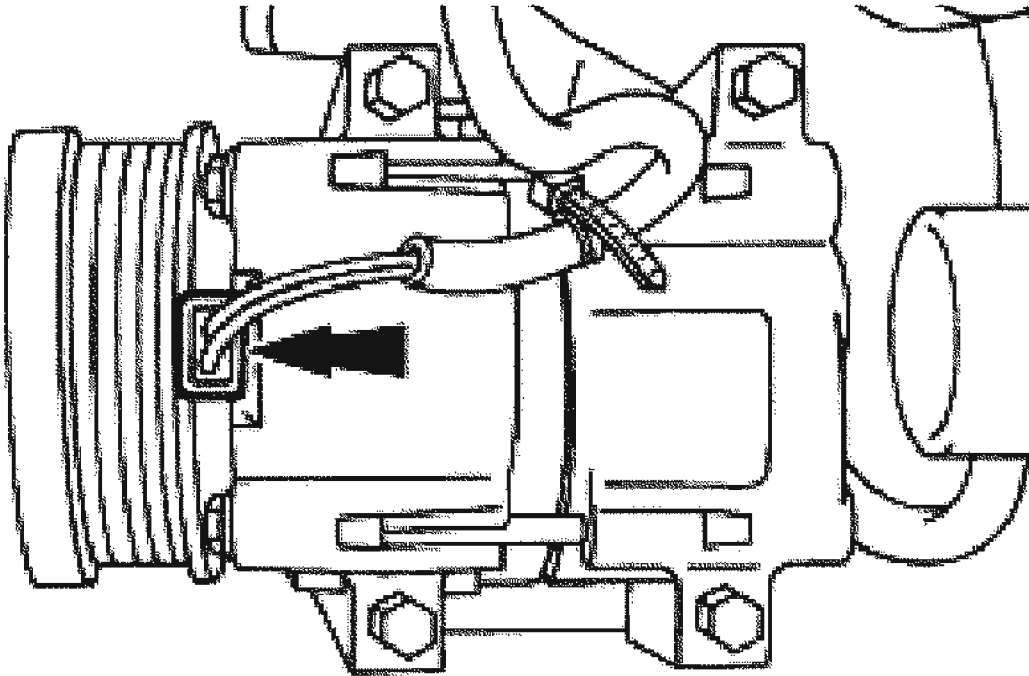
31. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.



G02738898

**Fig. 259: Removing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

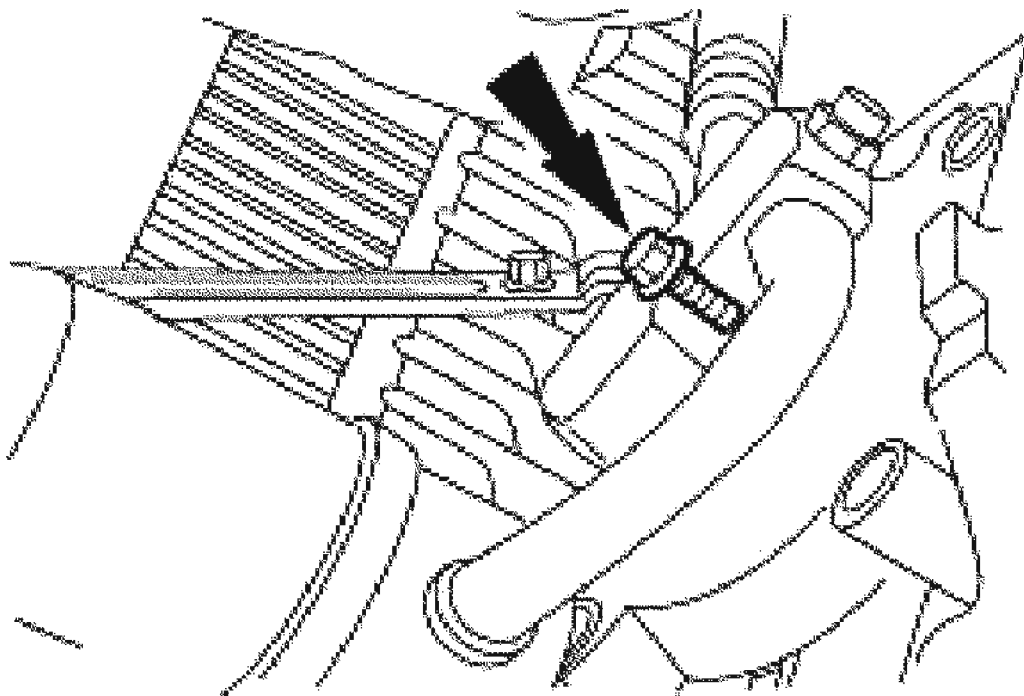
32. Disconnect the A/C clutch field coil electrical connector.



G02738899

**Fig. 260: Disconnecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

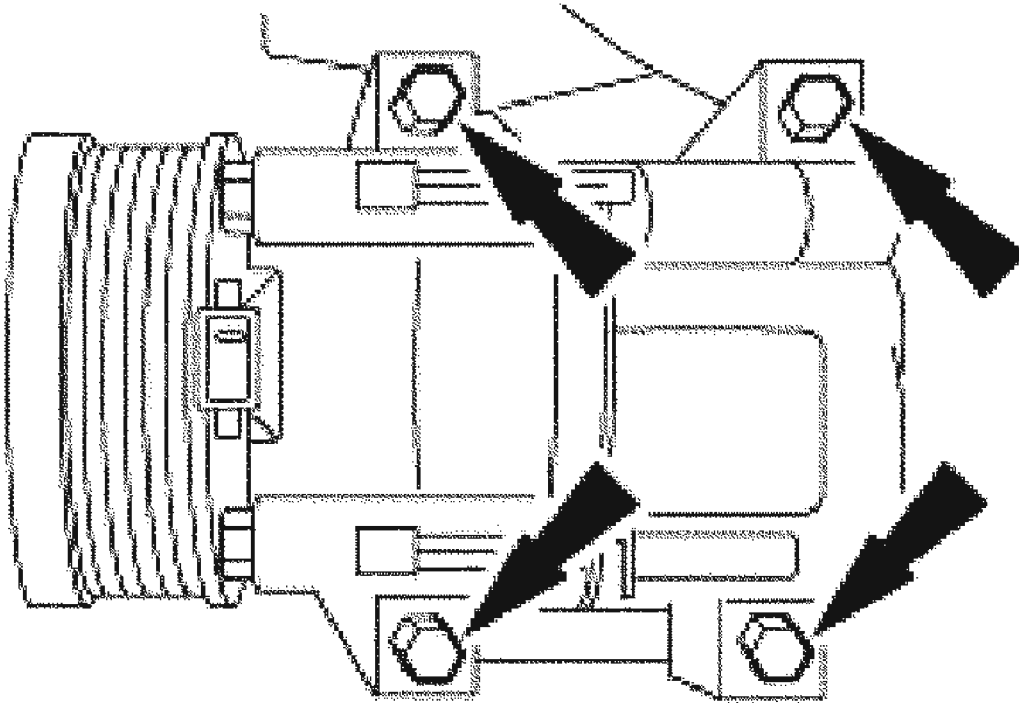
**WARNING:** Plug all ports to prevent contamination from dirt or moisture.



G02738900

**Fig. 261: Removing A/C Manifold And Tube Assembly Bolt**  
Courtesy of FORD MOTOR CO.

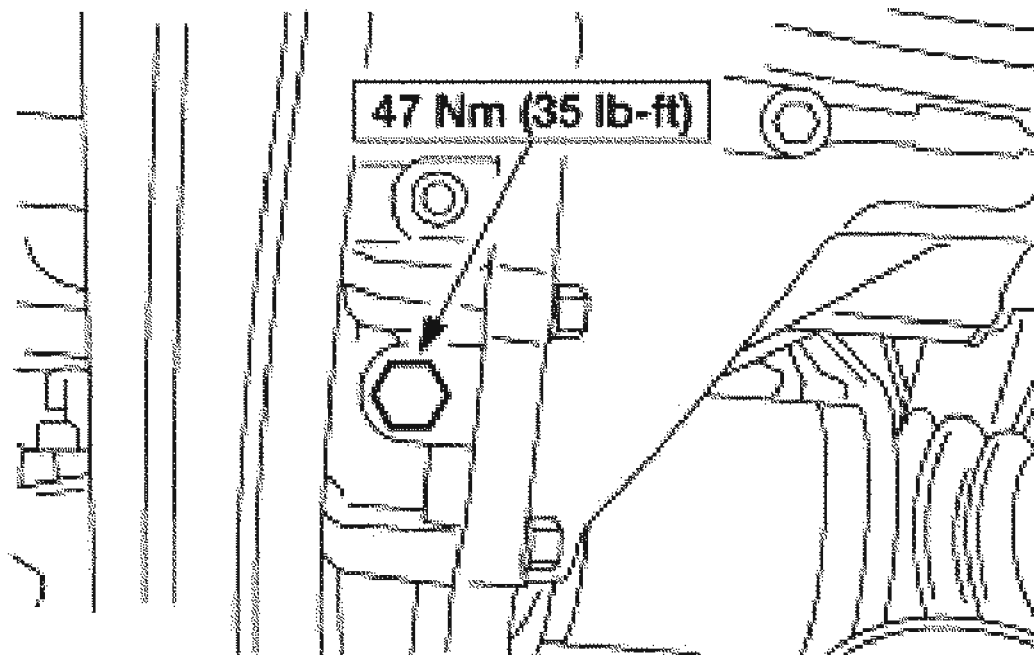
33. Remove the A/C manifold and tube assembly bolt and disconnect the A/C manifold and tube assembly.
34. Remove the bolts and the A/C compressor.



G02738901

**Fig. 262: Removing A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Use a new gasket when installing the drain plug.

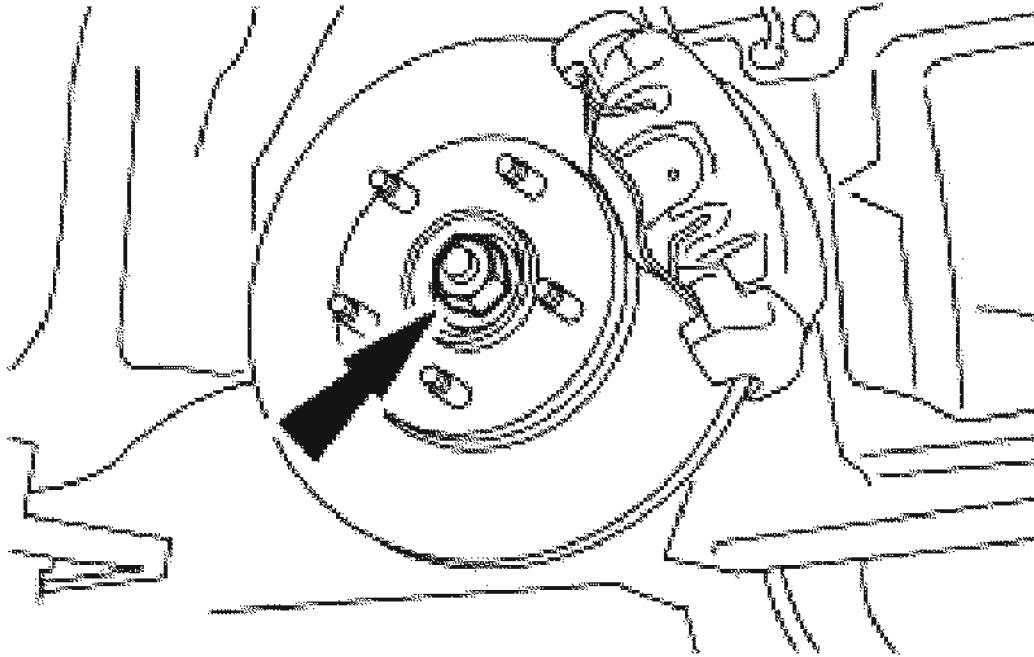


G02738902

**Fig. 263: Identifying Drain Plug Torque Specification**  
Courtesy of FORD MOTOR CO.

35. Drain the transaxle fluid.
  - Install the drain plug when finished.
36. Remove and discard both front axle wheel hub nuts.

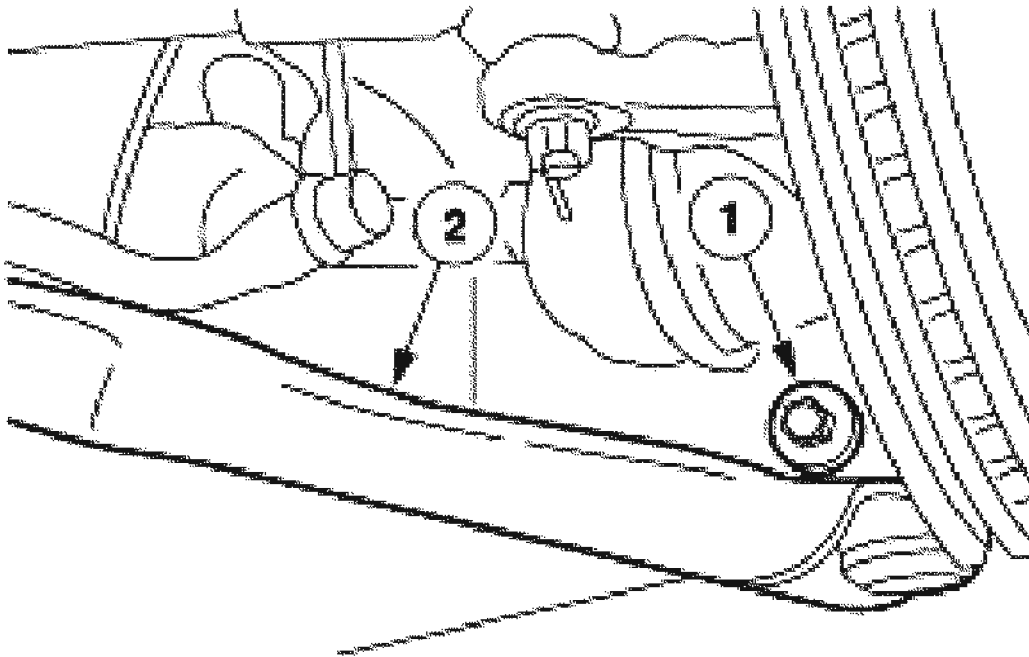




G02738903

**Fig. 264: Removing Front Axle Wheel Hub Nuts**  
Courtesy of FORD MOTOR CO.

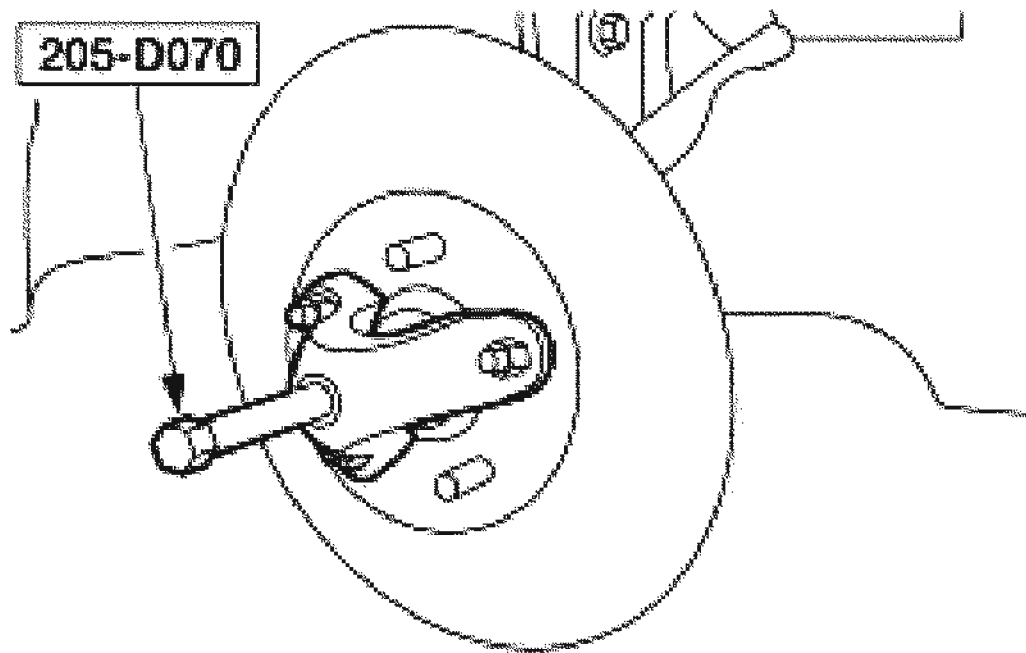
37. Separate the lower control arms from the front wheel knuckles.
  1. Remove the pinch bolts and nuts.
  2. Separate the lower control arms from the front wheel knuckles.



G02738904

**Fig. 265: Removing Lower Control Arms From Front Wheel Knuckles**  
Courtesy of FORD MOTOR CO.

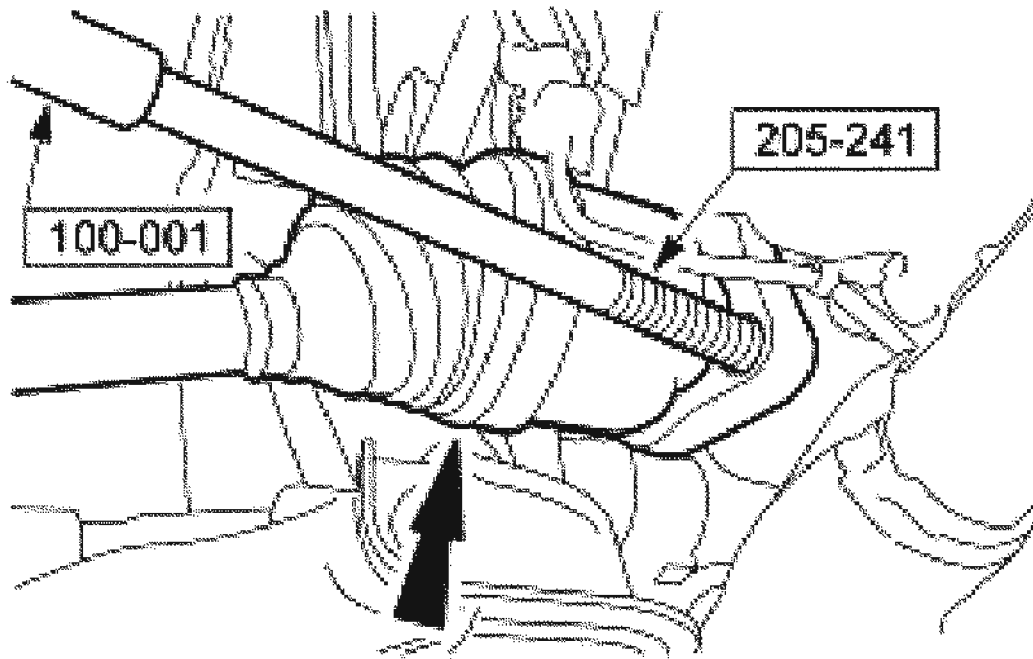
38. Using the special tool, separate the halfshafts from the front wheel knuckles.



G02738905

**Fig. 266: Separating Halfshafts From Front Wheel Knuckles**  
Courtesy of FORD MOTOR CO.

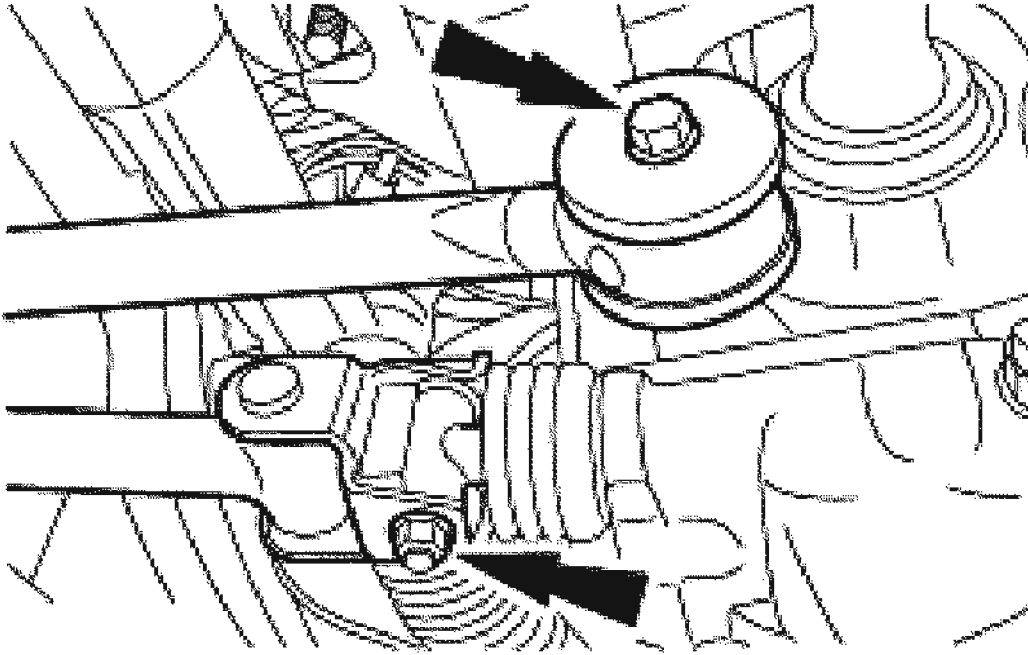
39. Using the special tools, remove the halfshafts.



G02738906

**Fig. 267: Removing Halfshafts**  
Courtesy of FORD MOTOR CO.

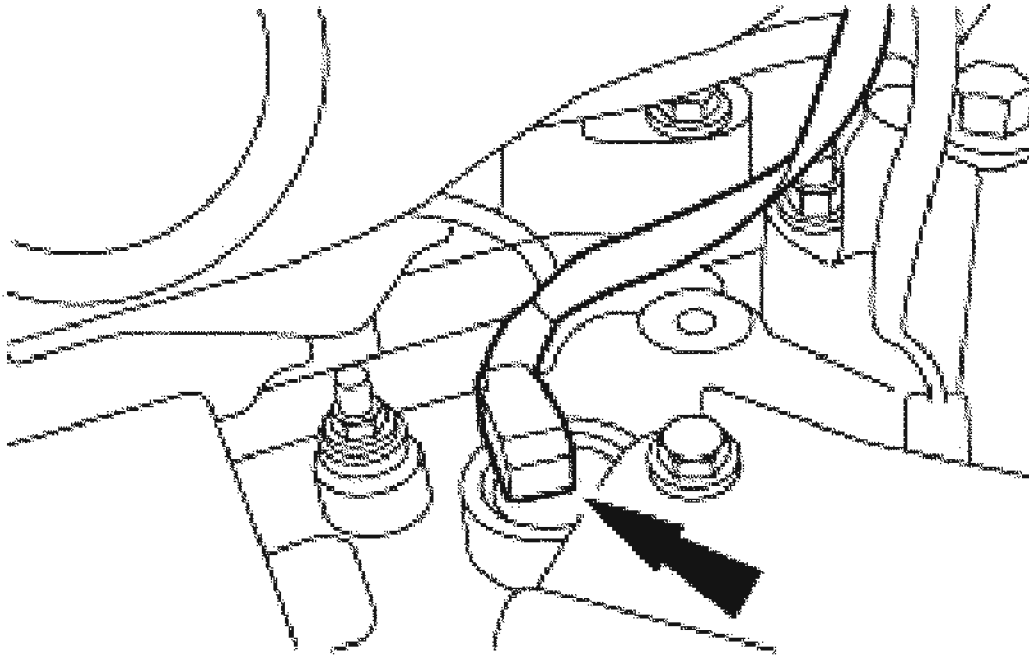
40. Disconnect the shifter linkages.



G02738907

**Fig. 268: Disconnecting Shifter Linkages**  
Courtesy of FORD MOTOR CO.

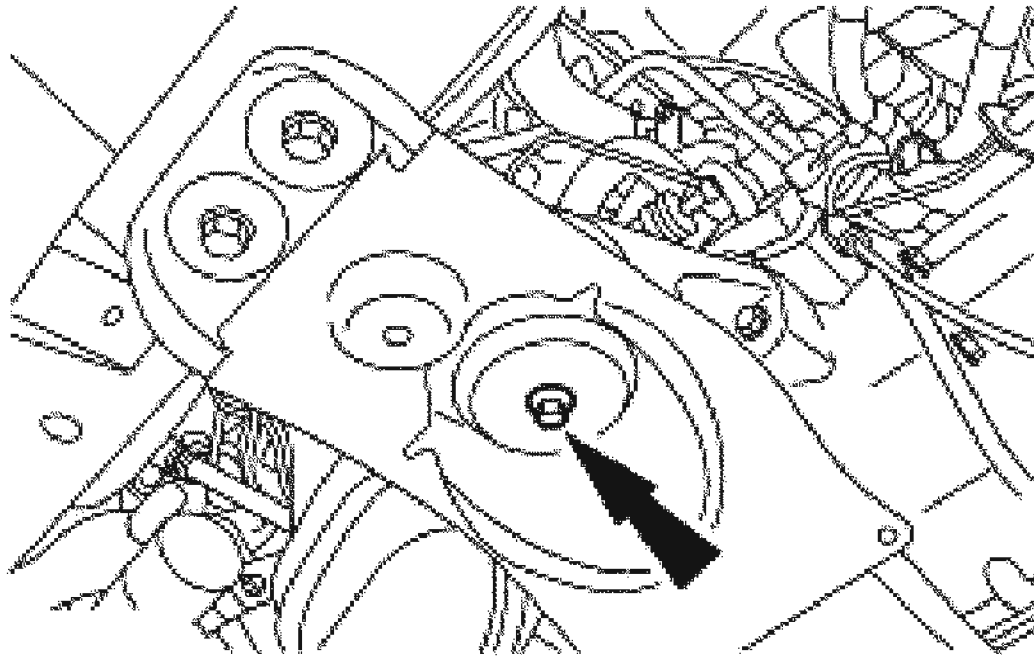
41. If equipped, disconnect the block heater electrical connector.



G02738908

**Fig. 269: Disconnecting Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

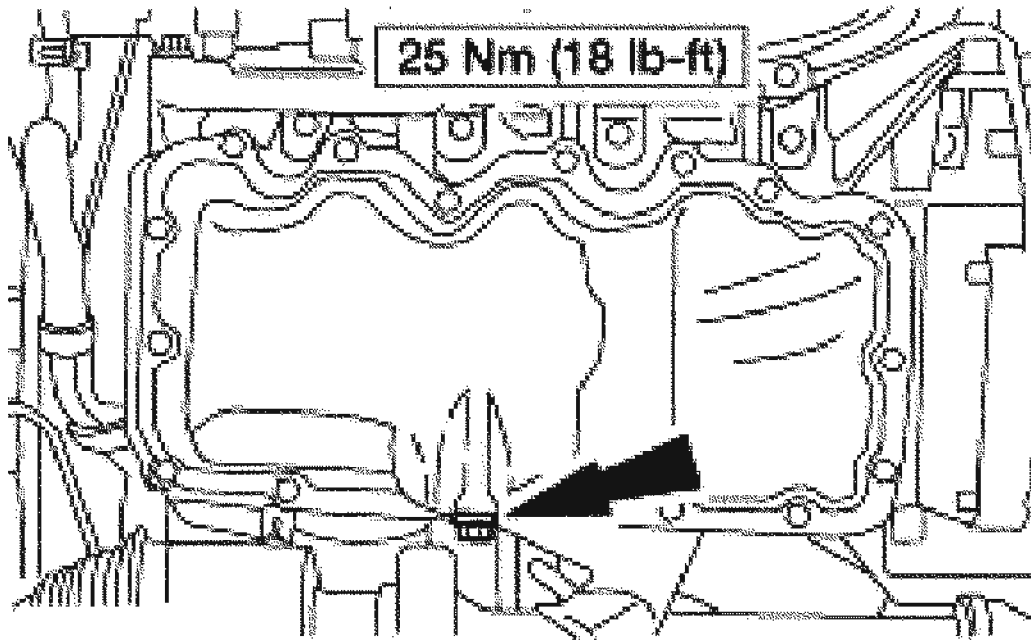
42. Remove the front transaxle mount through bolt.



G02738909

**Fig. 270: Removing Front Transaxle Mount Through Bolt**  
Courtesy of FORD MOTOR CO.

43. Drain the engine oil.

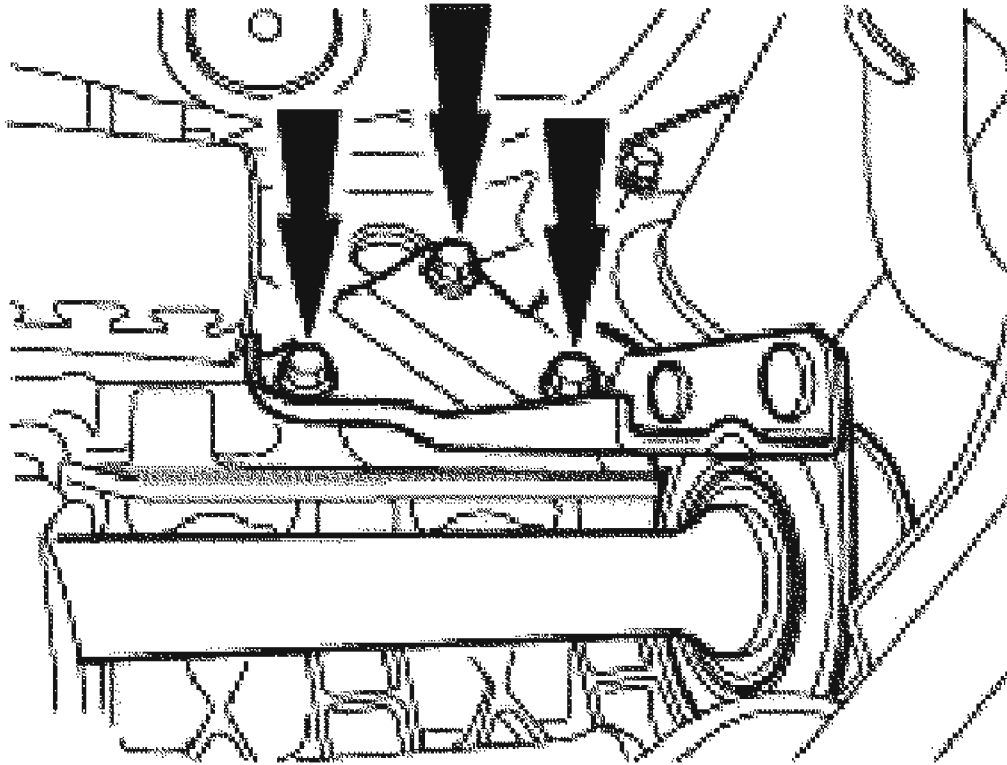


G02738910

**Fig. 271: Removing Drain Plug**  
Courtesy of FORD MOTOR CO.

44. Remove the engine oil filter.
45. Remove the intermediate shaft bracket and the intermediate shaft as an assembly.

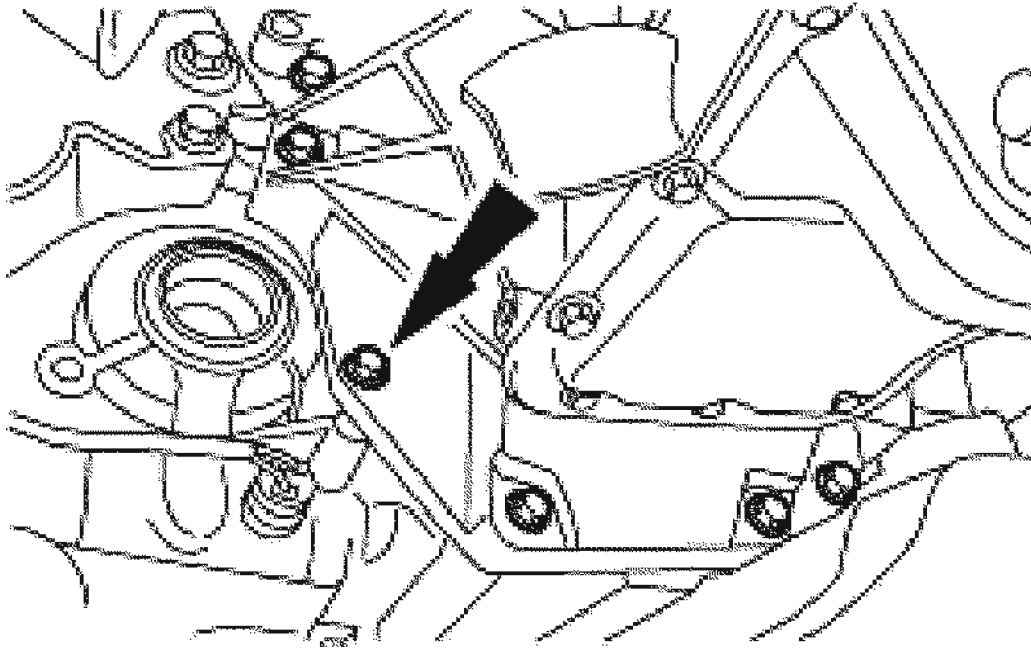




G02738911

**Fig. 272: Removing Intermediate Shaft Bracket Bolts**  
Courtesy of FORD MOTOR CO.

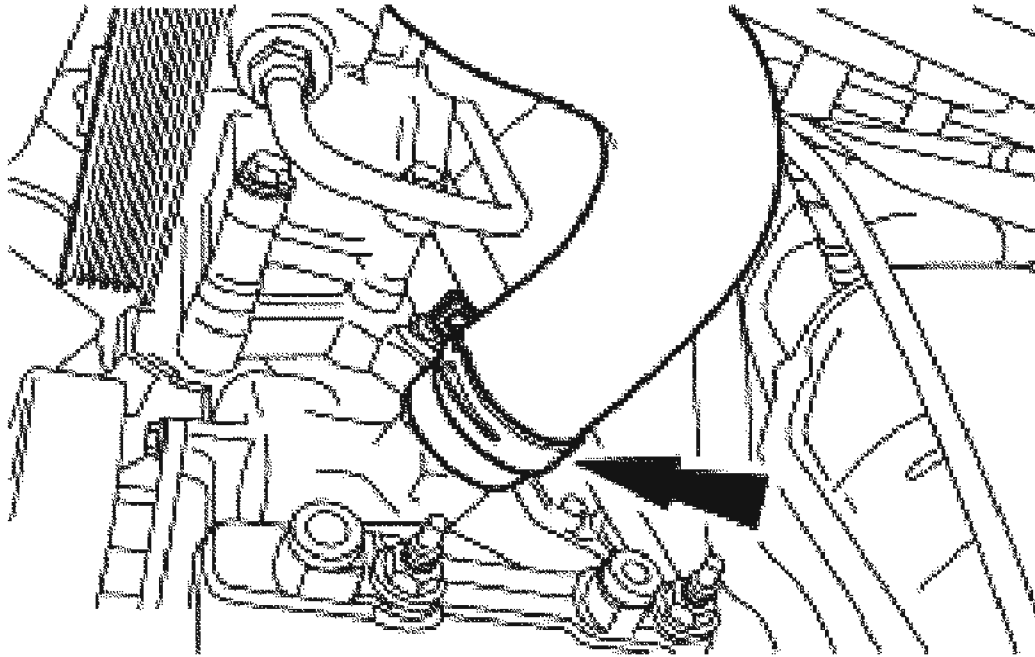
46. Remove the engine to transaxle bolts.



G02738912

**Fig. 273: Removing Engine To Transaxle Bolts**  
Courtesy of FORD MOTOR CO.

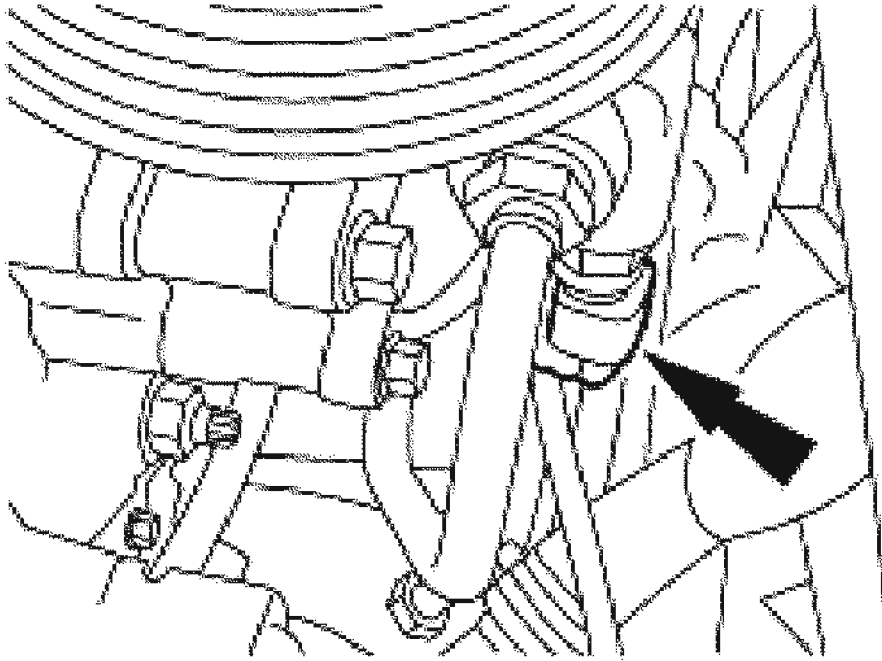
47. Disconnect the lower radiator hose.



G02738913

**Fig. 274: Disconnecting Lower Radiator Hose**  
Courtesy of FORD MOTOR CO.

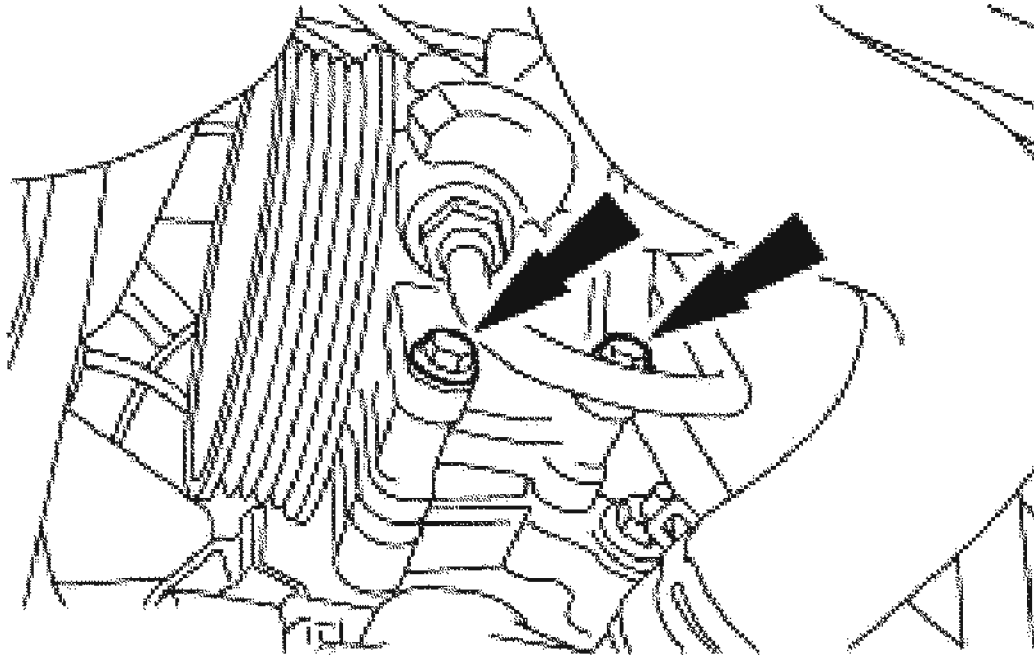
48. Disconnect the power steering pressure sensor.



G02738914

**Fig. 275: Disconnecting Power Steering Pressure Sensor**  
Courtesy of FORD MOTOR CO.

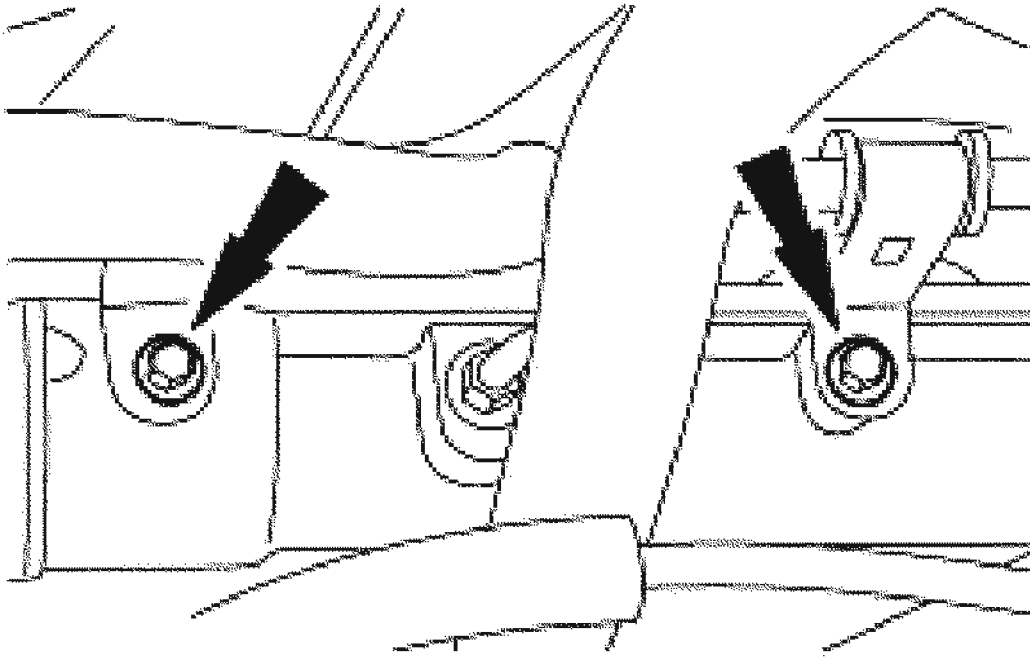
49. Remove the lower power steering pump bolts and position the pump aside.



G02738915

**Fig. 276: Removing Lower Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

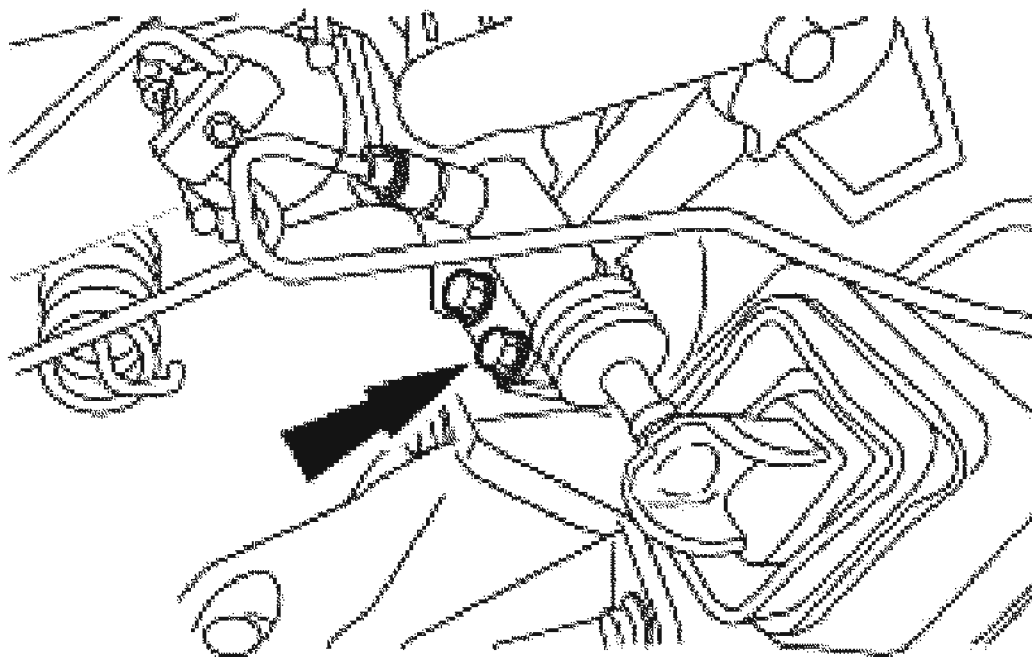
50. Lower the vehicle.
51. Disconnect the power steering hose brackets at the back and position the hoses aside.



G02738916

**Fig. 277: Disconnecting Power Steering Hose Brackets**  
Courtesy of FORD MOTOR CO.

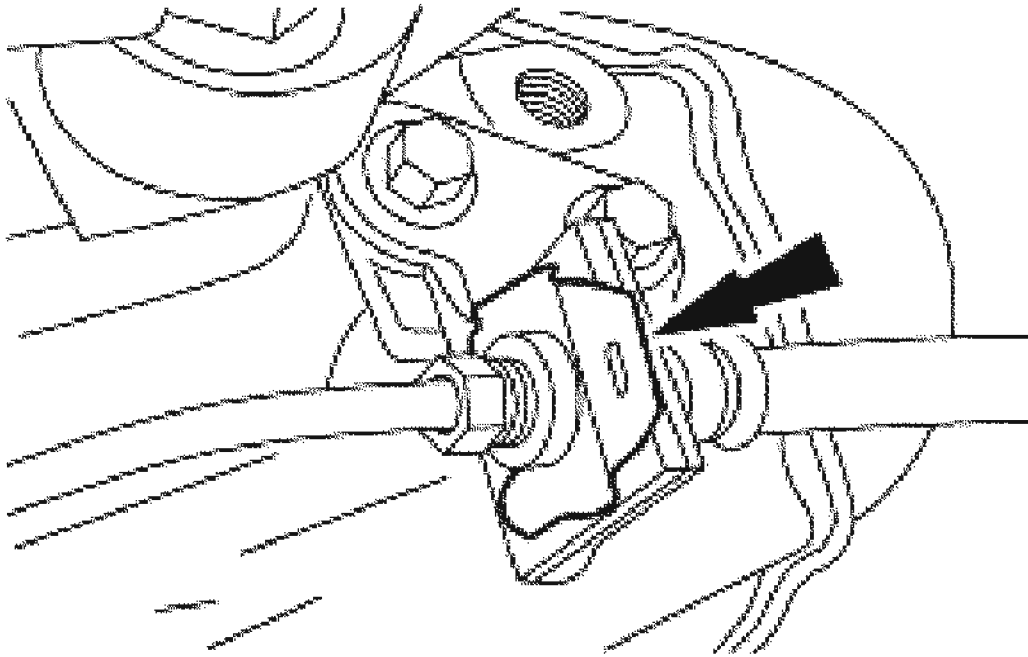
52. Remove the clutch slave cylinder bolts.



G02738917

**Fig. 278: Removing Clutch Slave Cylinder Bolts**  
Courtesy of FORD MOTOR CO.

53. Remove the clutch slave cylinder line from the bracket and position the clutch slave cylinder aside.

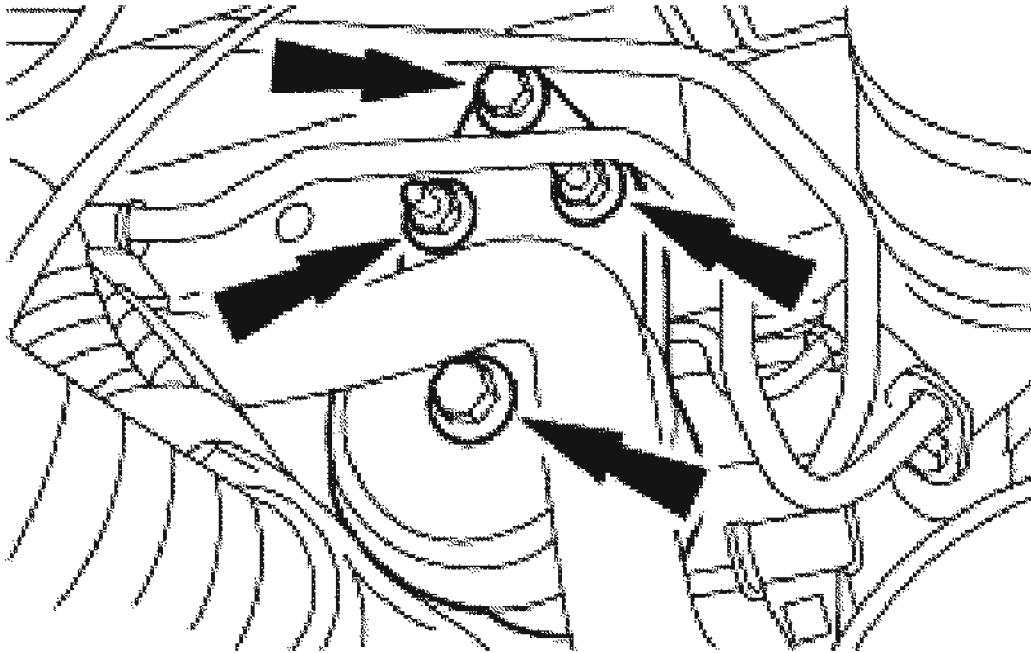


G02738918

**Fig. 279: Removing Clutch Slave Cylinder Line From Bracket**  
Courtesy of FORD MOTOR CO.

54. Support the engine using a suitable lifting device.
55. Remove the rear transaxle mount.

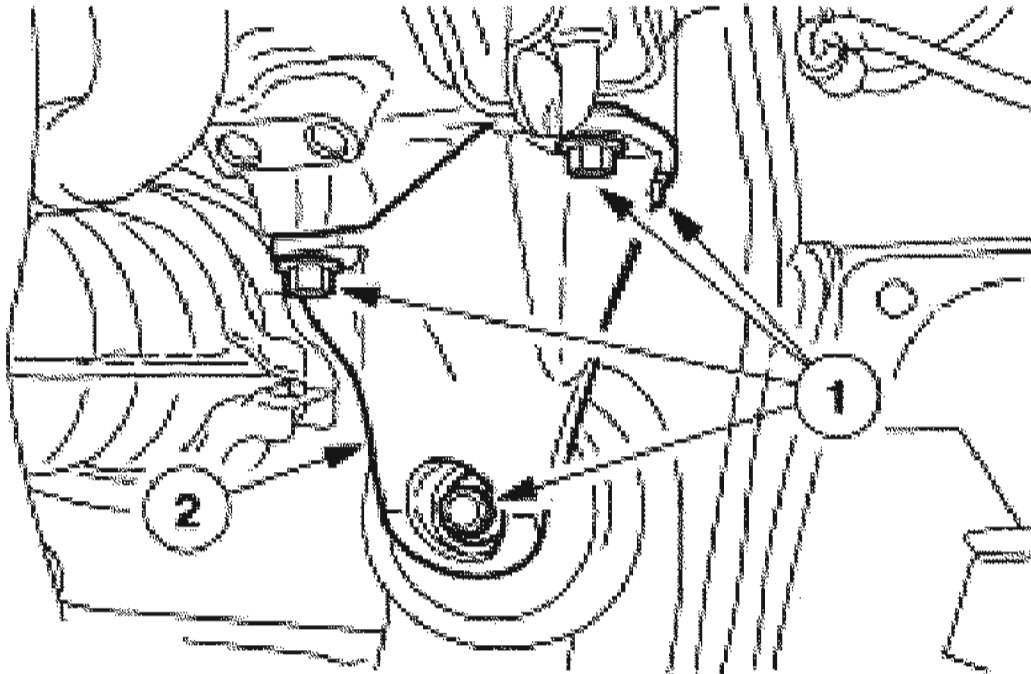




G02738919

**Fig. 280: Removing Rear Transaxle Mount**  
Courtesy of FORD MOTOR CO.

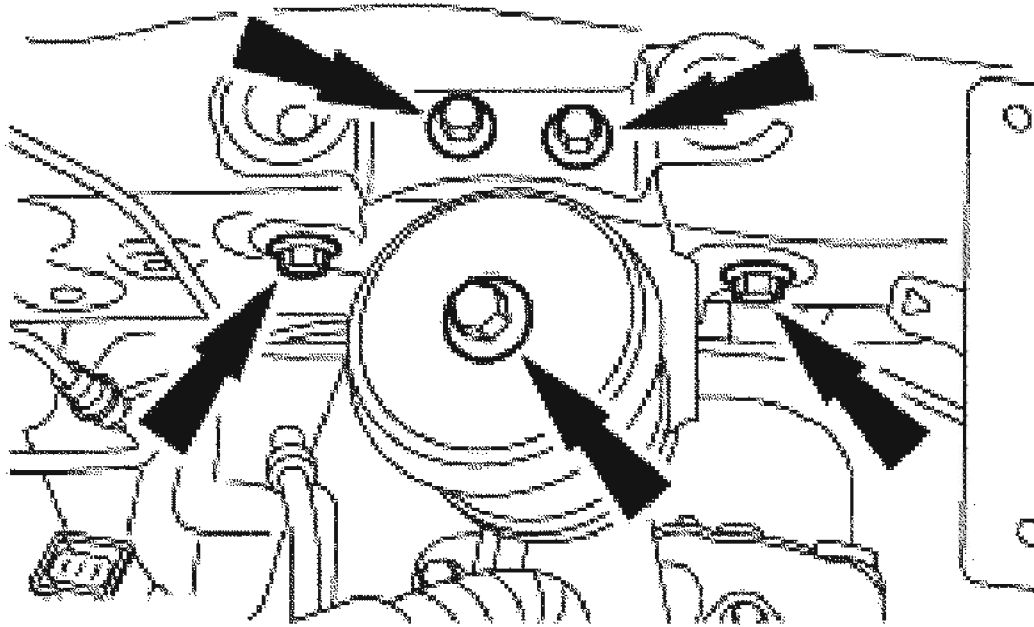
56. Remove the front support insulator and bracket.
  1. Remove the five bolts.
  2. Remove the front support insulator and bracket.



G02738920

**Fig. 281: Removing Front Support Insulator & Bracket**  
Courtesy of FORD MOTOR CO.

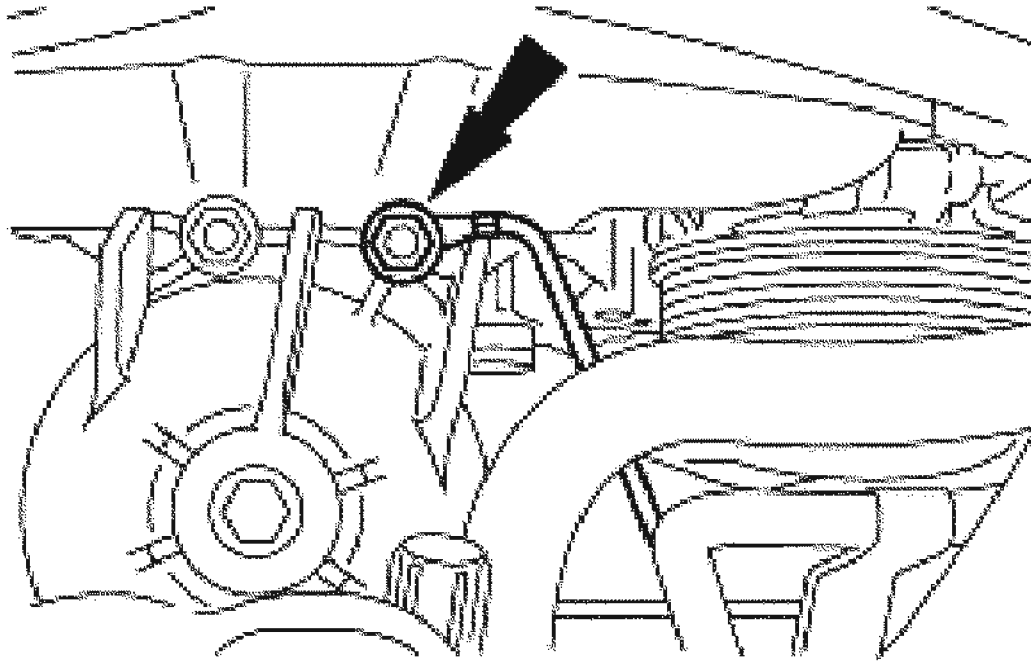
57. Remove the LH transaxle mount.



G02738921

**Fig. 282: Removing LH Transaxle Mount**  
Courtesy of FORD MOTOR CO.

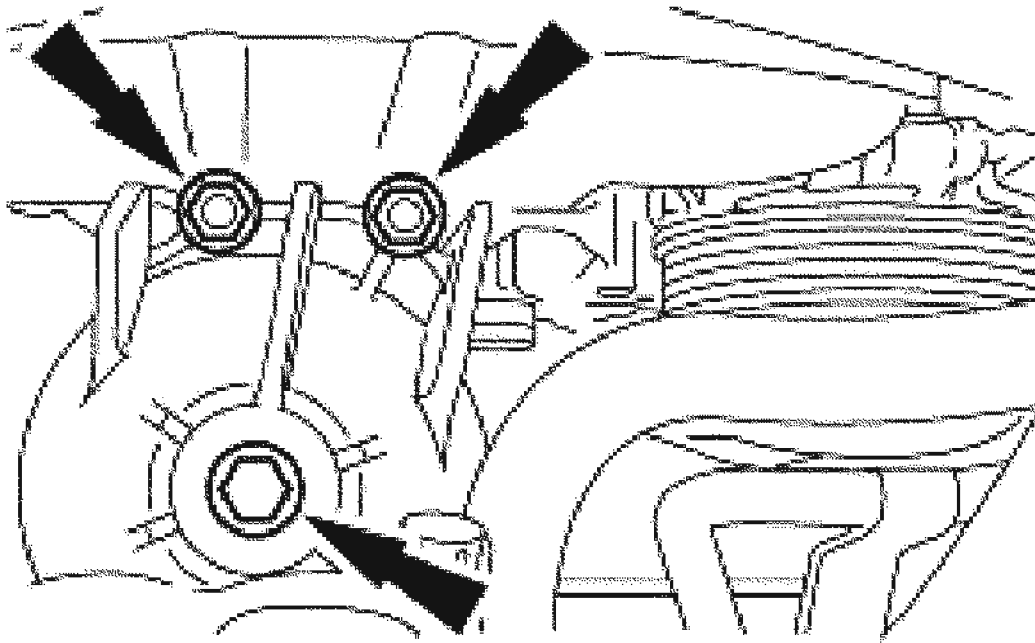
58. Disconnect the ground cable.



G02738922

**Fig. 283: Disconnecting Ground Cable**  
Courtesy of FORD MOTOR CO.

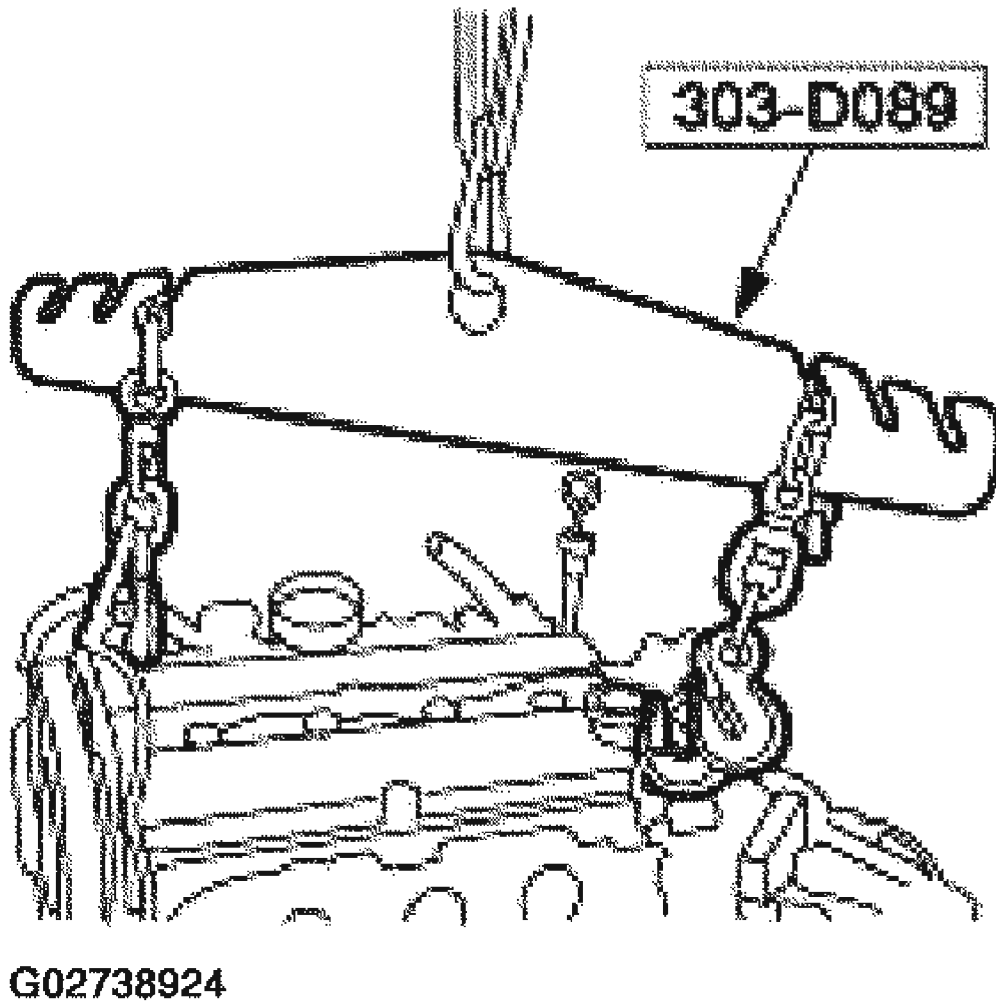
59. Remove the RH engine mount upper bracket.



G02738923

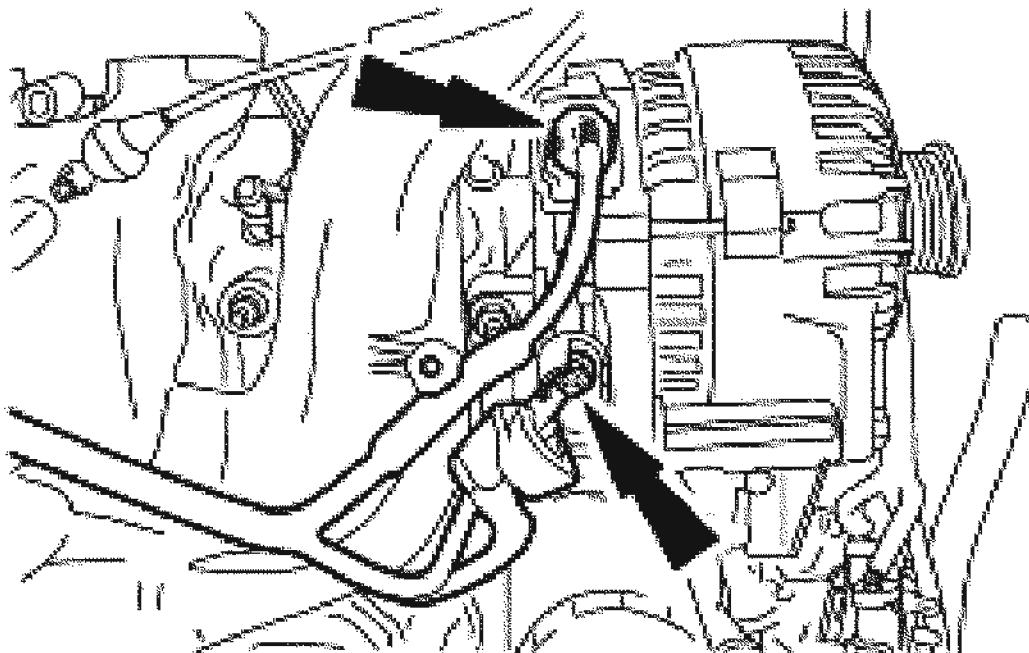
**Fig. 284: Removing RH Engine Mount Upper Bracket**  
Courtesy of FORD MOTOR CO.

60. Install the special tool and a suitable lifting device and remove the engine and transaxle as an assembly.



**Fig. 285: Installing Special Tool And Removing Engine**  
Courtesy of FORD MOTOR CO.

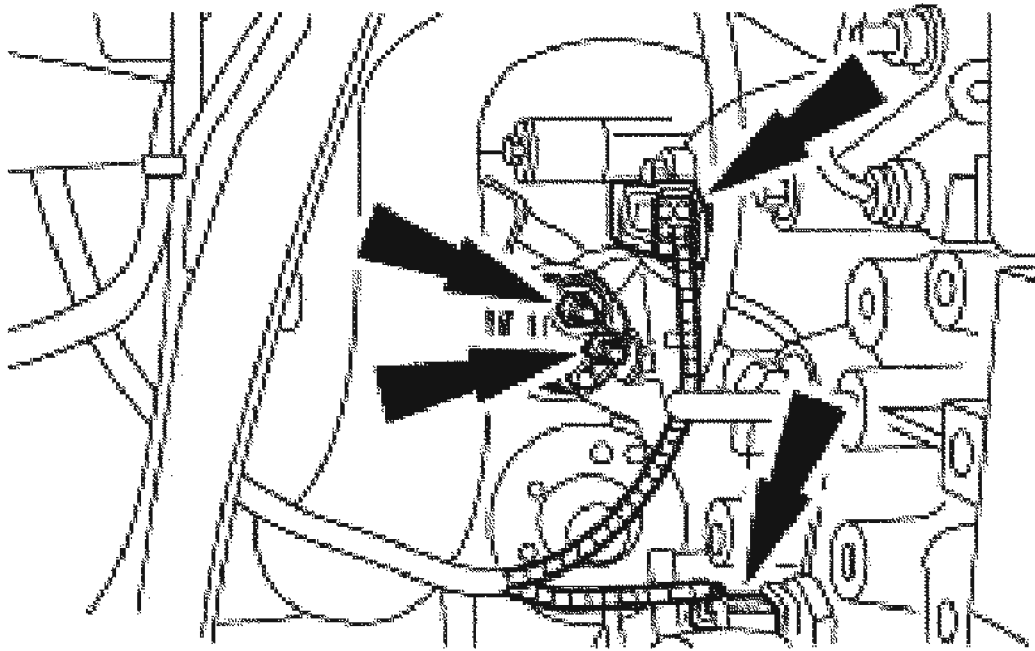
61. Disconnect the generator electrical connectors.



G02738925

**Fig. 286: Disconnecting Generator Electrical Connectors**  
Courtesy of FORD MOTOR CO.

62. Disconnect the electrical connectors.
  - Disconnect the knock sensor electrical connector.
  - Disconnect the oil pressure sender electrical connector.
  - Disconnect the starter electrical connector.

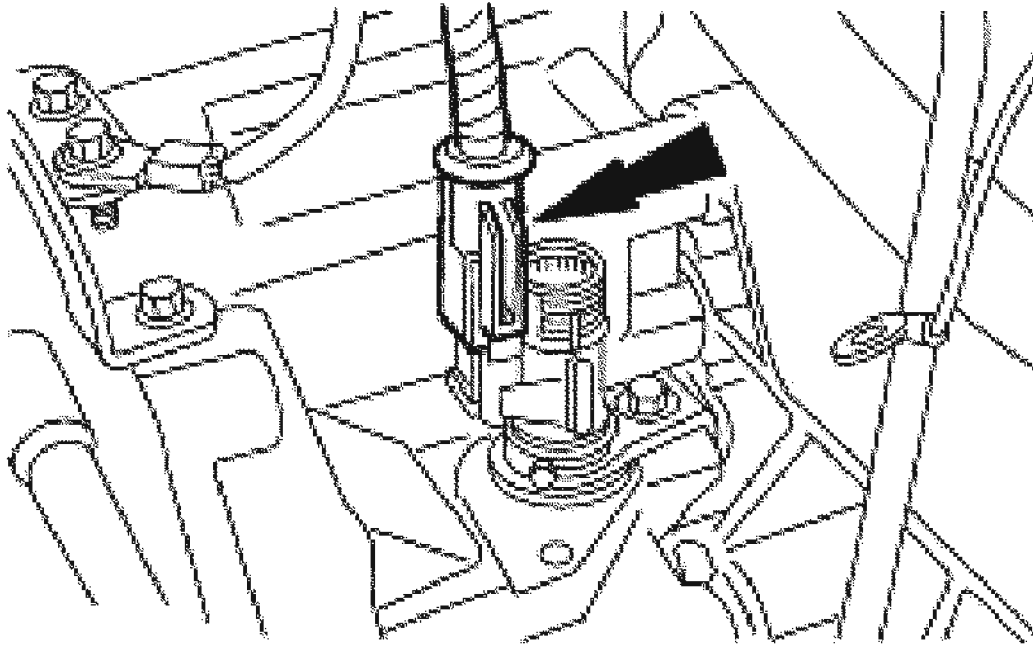


G02738926

**Fig. 287: Disconnecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

63. Disconnect the vehicle speed sensor electrical connector.

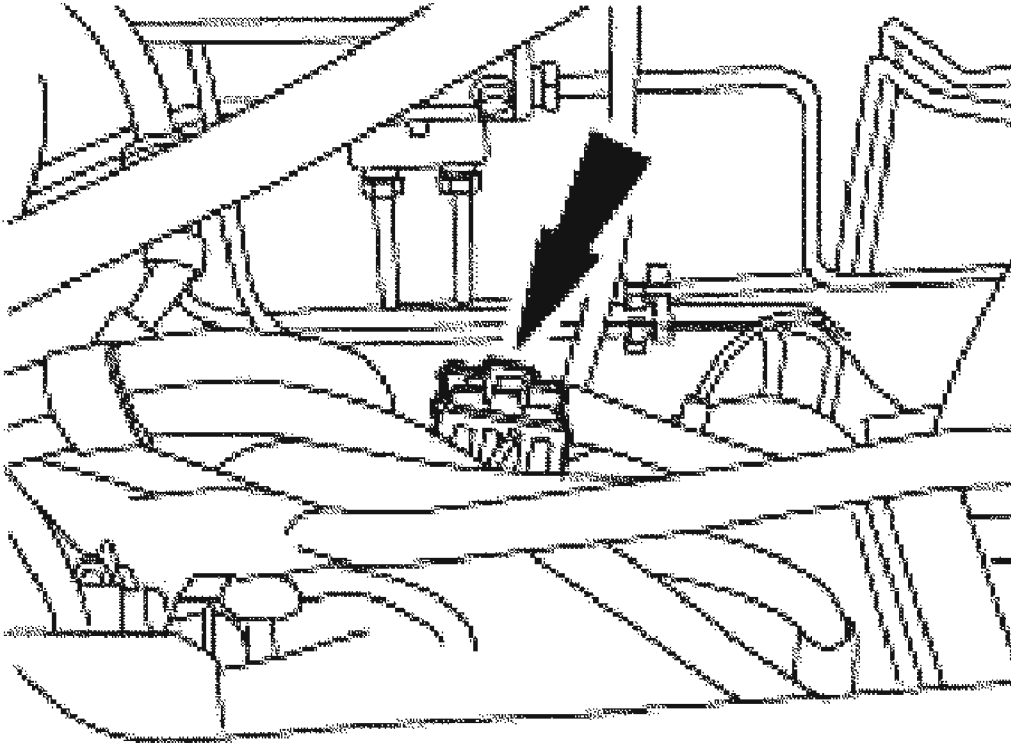




G02738927

**Fig. 288: Disconnecting Vehicle Speed Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

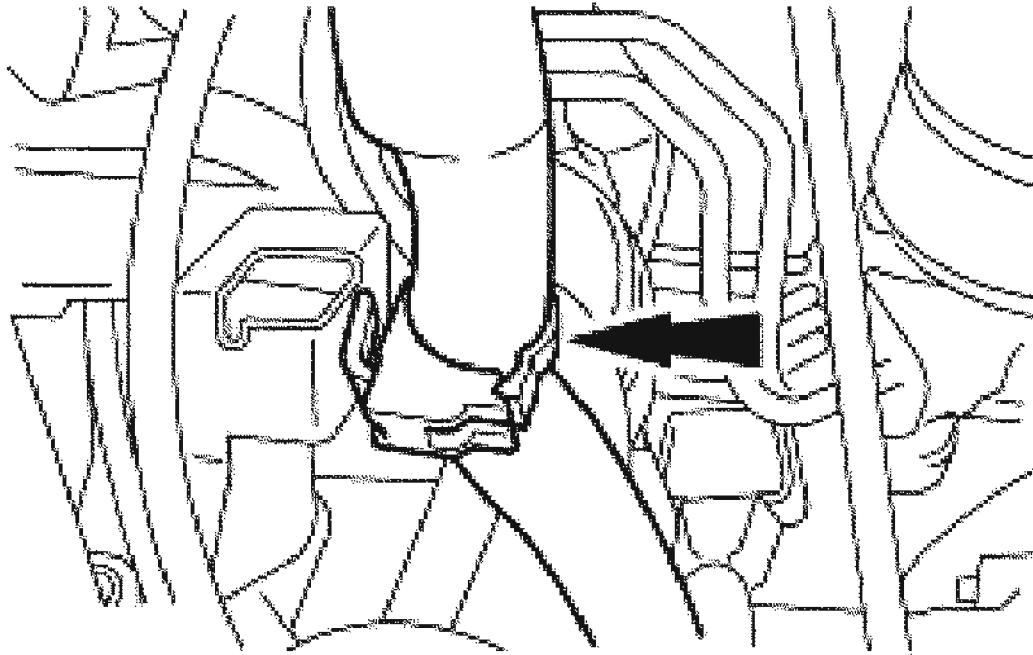
64. Remove the bolt and disconnect the ground wire from the bell housing.
65. Disconnect the crankshaft position (CKP) sensor electrical connector.
66. Disconnect the fuel charging wiring harness electrical connector.



G02738928

**Fig. 289: Disconnecting Fuel Charging Wiring Harness Electrical Connector**  
Courtesy of FORD MOTOR CO.

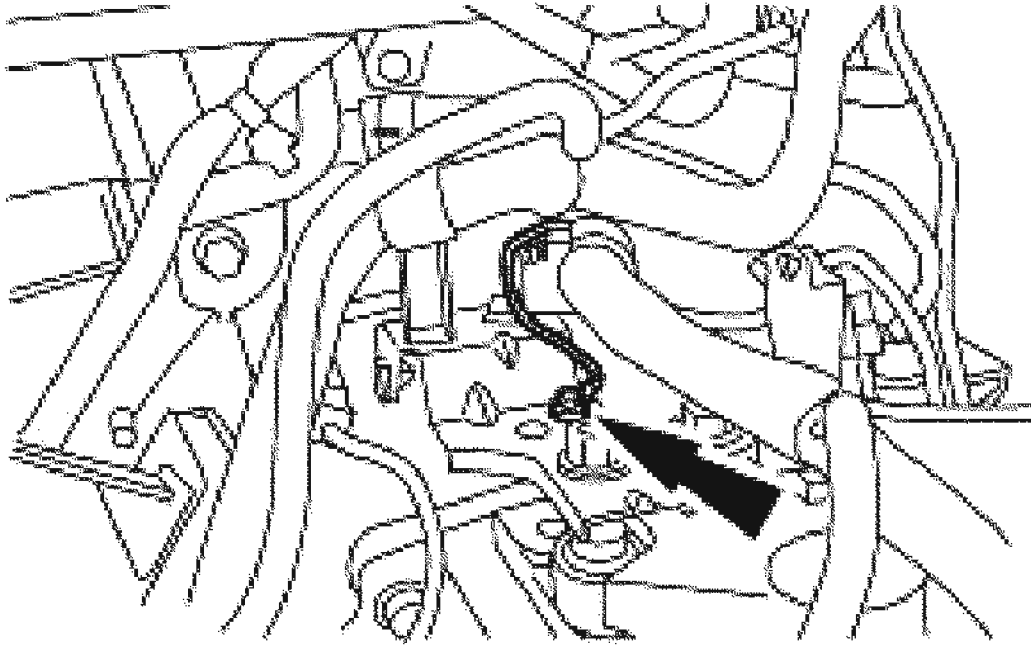
67. Disconnect the PCM wiring harness from the bracket.



G02738929

**Fig. 290: Disconnecting PCM Wiring Harness From Bracket**  
Courtesy of FORD MOTOR CO.

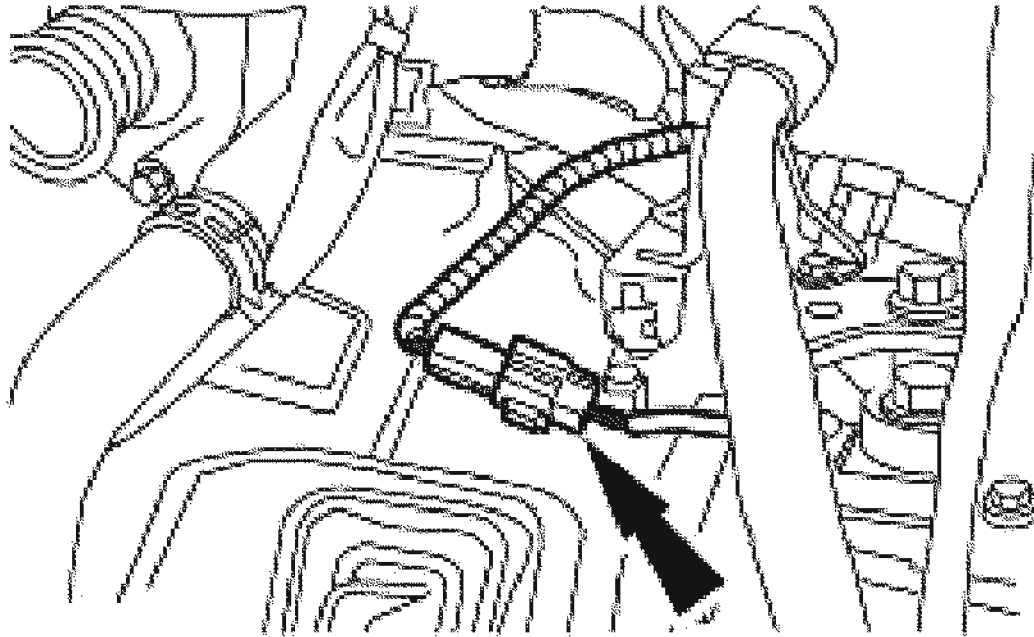
68. Disconnect the ground wire.



G02738930

**Fig. 291: Disconnecting Ground Wire**  
Courtesy of FORD MOTOR CO.

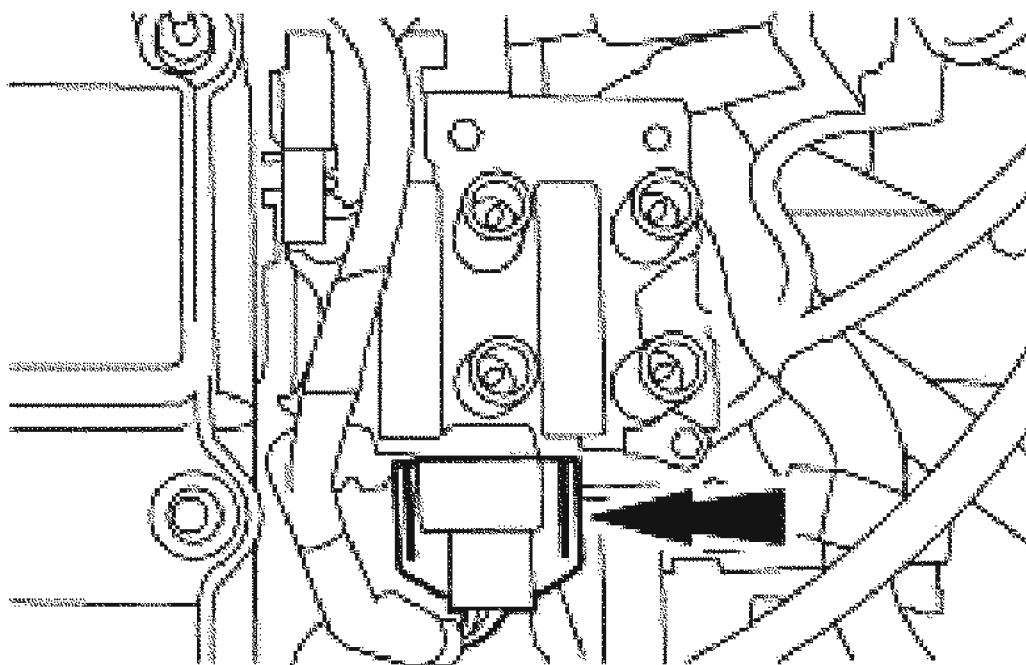
69. Disconnect the reversing lamp switch electrical connector.



G02738931

**Fig. 292: Disconnecting Reversing Lamp Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

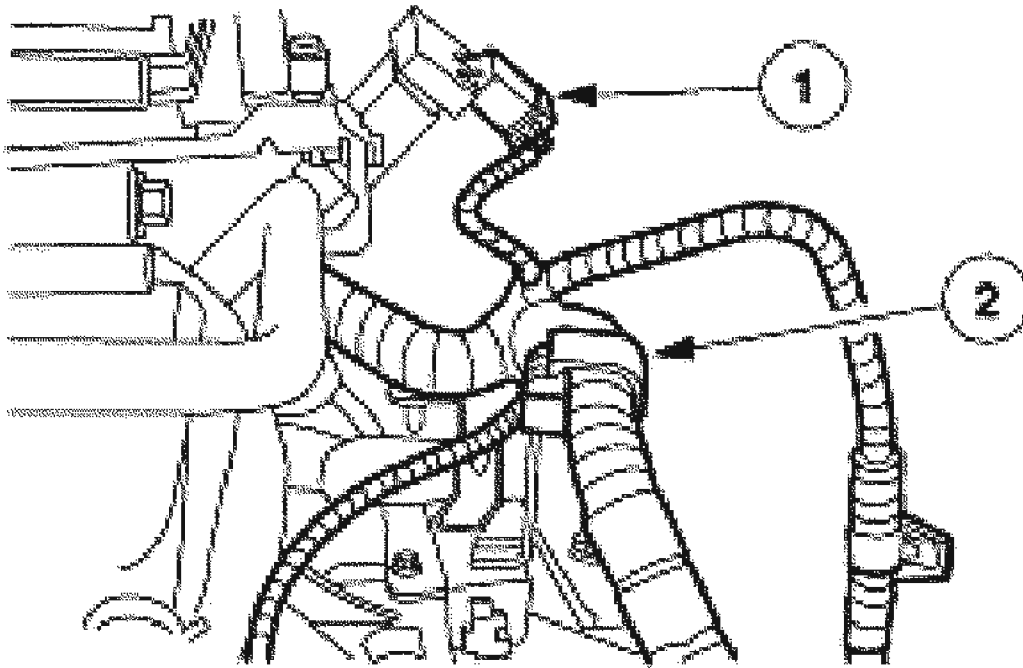
70. Disconnect the ignition coil electrical connector.



G02738932

**Fig. 293: Disconnecting Ignition Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

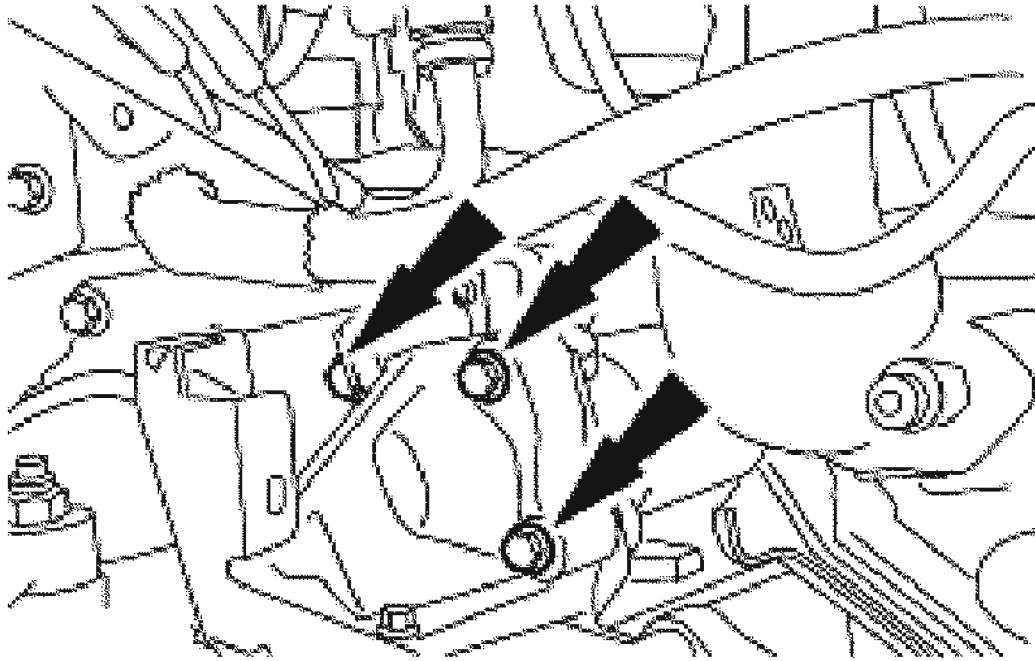
71. Remove the wiring harness.
  1. Disconnect the differential pressure feedback EGR system electrical connector.
  2. Remove the wiring harness from the brackets and remove the harness.



G02738933

**Fig. 294: Removing Wiring Harness**  
Courtesy of FORD MOTOR CO.

72. Remove the bolts and the starter.

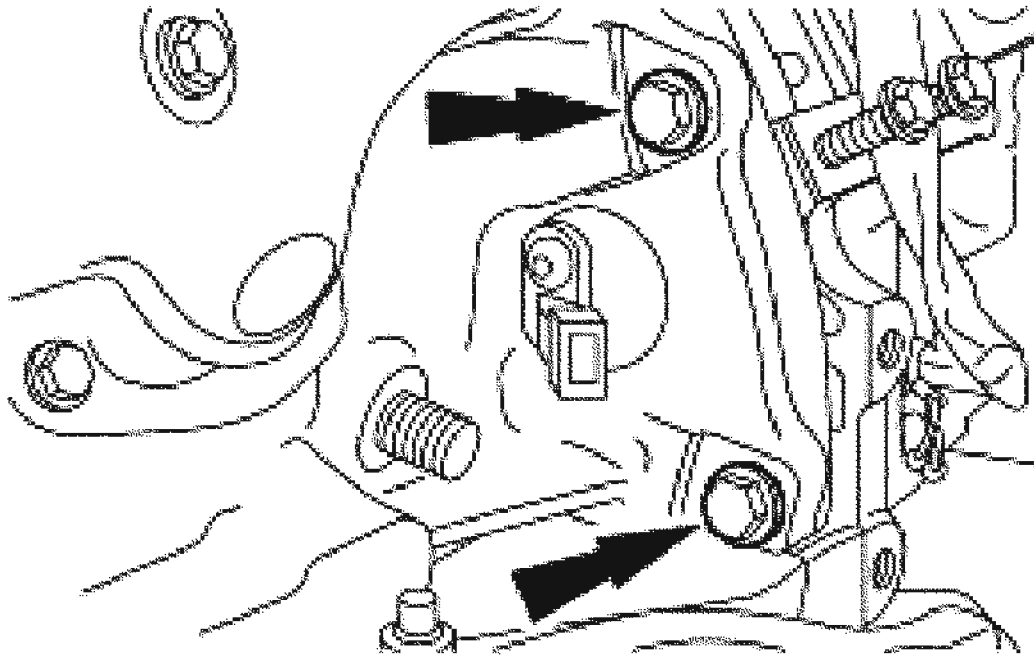


G02738934

**Fig. 295: Removing Starter Bolts**  
**Courtesy of FORD MOTOR CO.**

73. Remove the starter wiring harness.
74. Remove the engine-to-transaxle bolts.

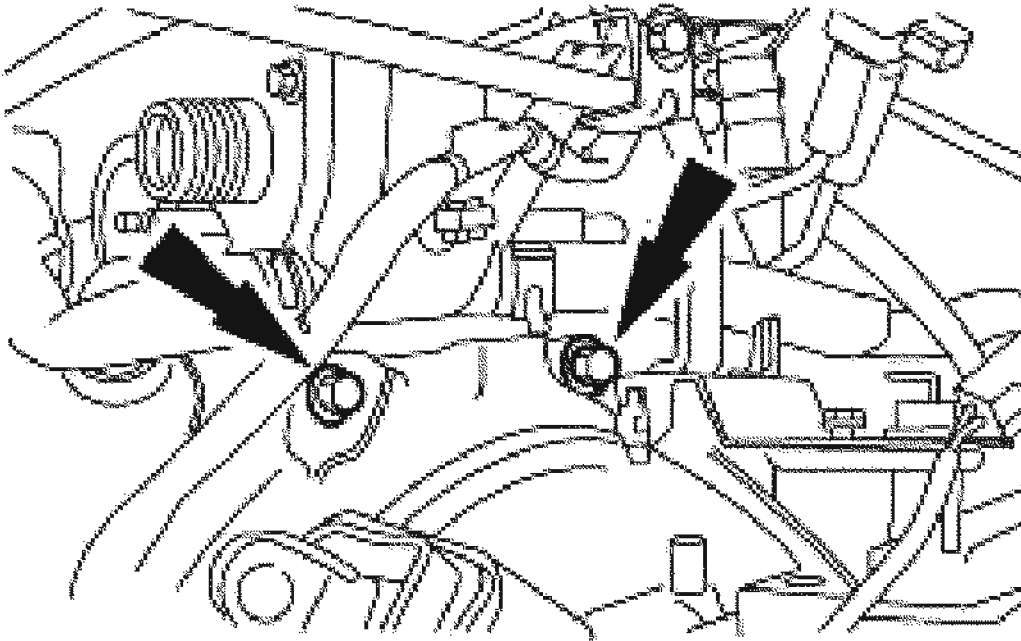




G02738935

**Fig. 296: Removing Engine-To-Transaxle Bolts**  
Courtesy of FORD MOTOR CO.

75. Remove the engine-to-transaxle bolts and remove the transaxle.



G02738936



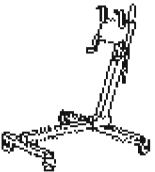

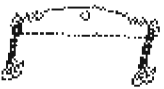

**Fig. 297: Removing Transaxle**  
Courtesy of FORD MOTOR CO.

## DISASSEMBLY

### ENGINE

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

	Puller With Slide Hammer 308-001 (T58L-101-B)
	Heavy Duty Floor Crane 014-00072 or equivalent
	Engine Stand 014-00232 or equivalent
	Flywheel Holding Tool 303-103 (T74P-6375-A)
	Spreader Bar 303-D089 (D93P-6001-A3)
	Seal Remover 303-409 (T92C-6700-CH)

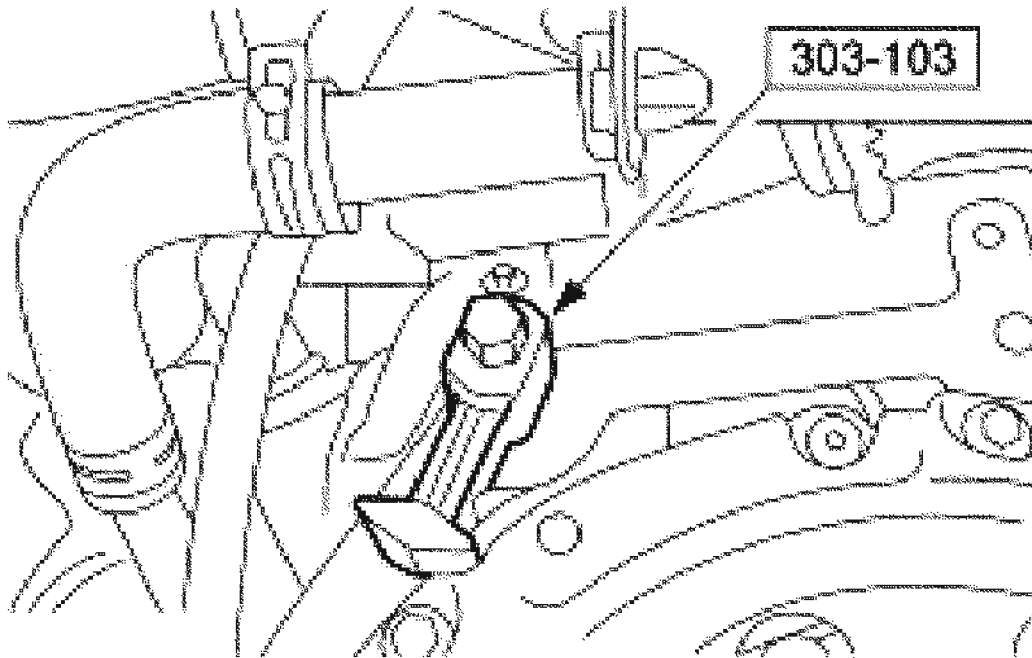
G02738837

**Fig. 298: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The engine sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material, use only

**manual scrapers. Do not scratch or gouge the aluminum sealing surfaces.**

1. Using the special tool, lock the flywheel to the engine.

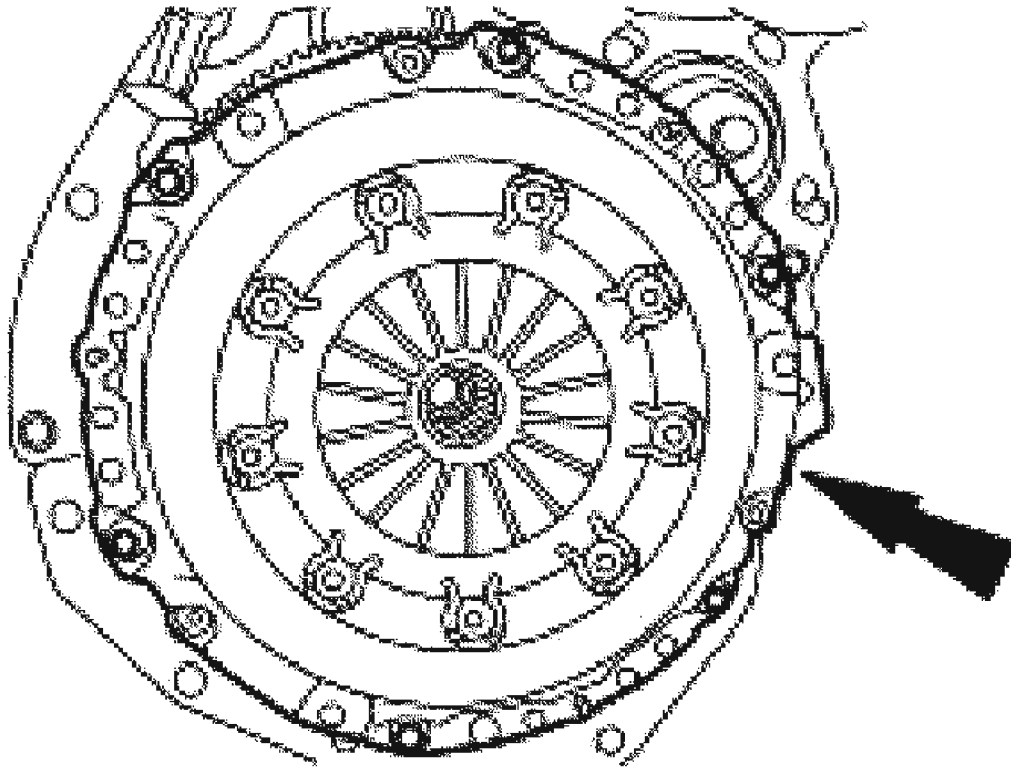


G02738938

**Fig. 299: Locking Flywheel To Engine**  
Courtesy of FORD MOTOR CO.

**WARNING:** The clutch disc and clutch pressure plate are heavy and may fall if not held when the bolts are removed. Failure to follow these instructions may result in personal injury.

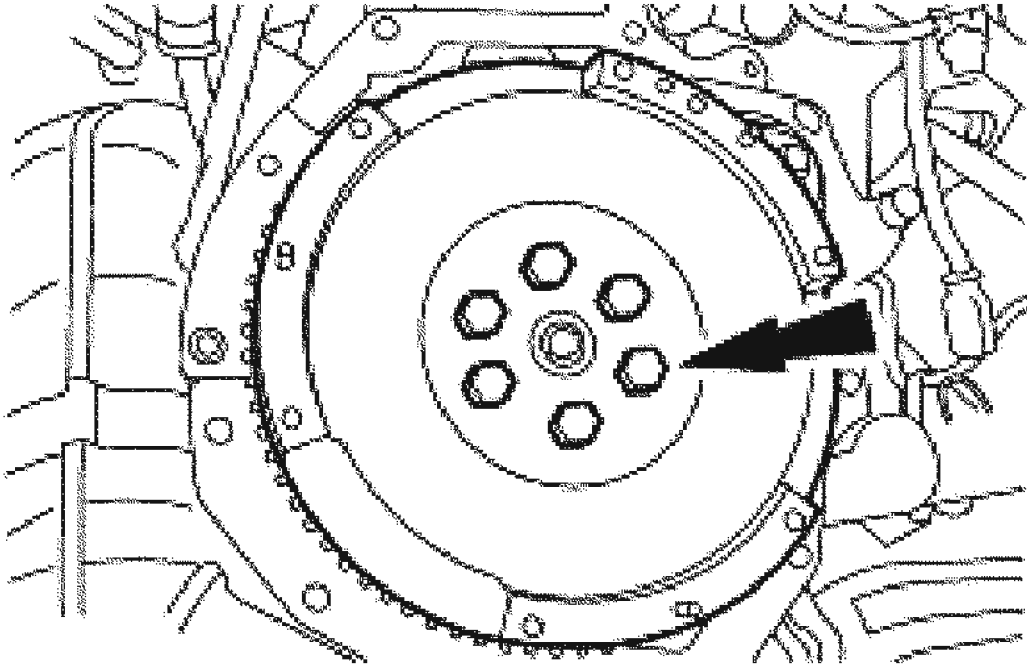
**CAUTION:** Loosen the bolts evenly to prevent pressure plate damage.



G02738939

**Fig. 300: Removing Clutch Pressure Plate And Clutch Disc**  
Courtesy of FORD MOTOR CO.

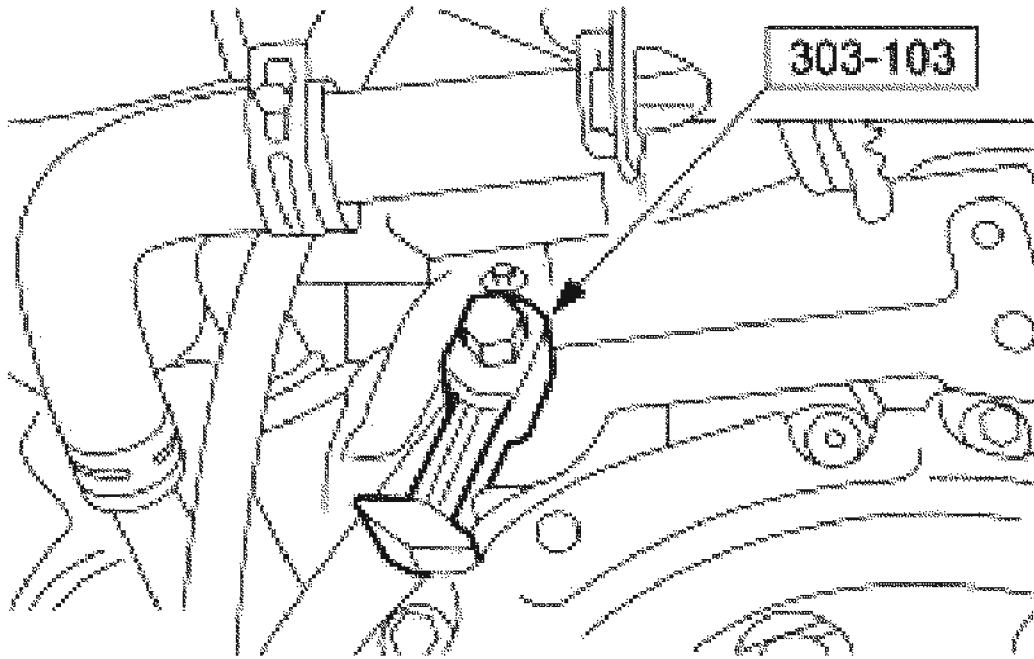
2. Remove the bolts, clutch pressure plate and clutch disc.
3. Remove the flywheel.



G02738940

**Fig. 301: Removing Flywheel**  
Courtesy of FORD MOTOR CO.

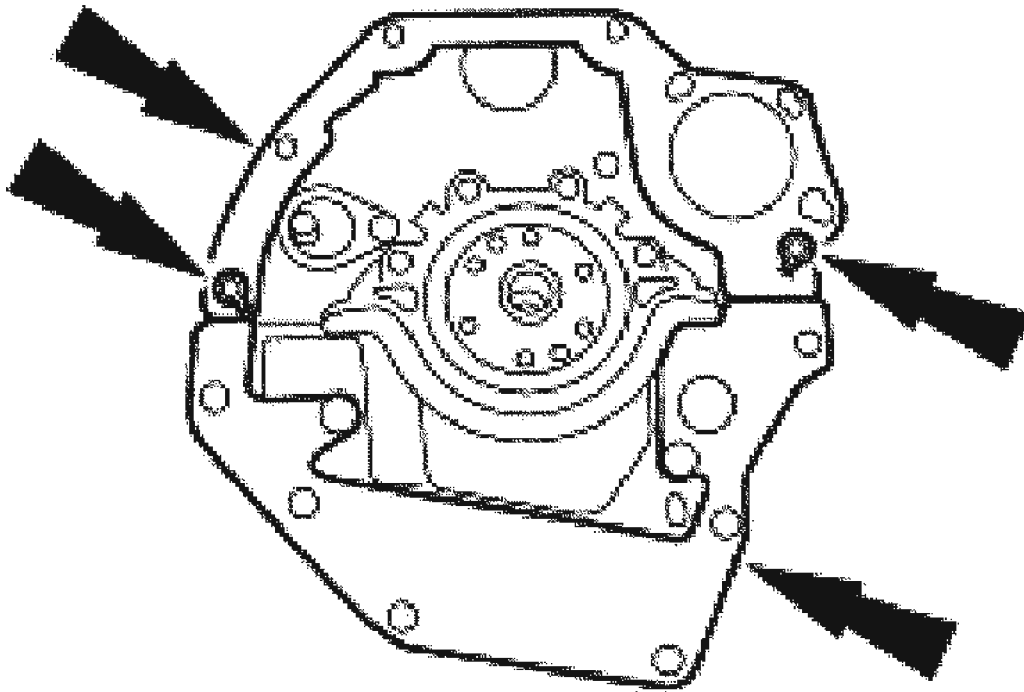
4. Remove the special tool.



G02738941

**Fig. 302: Removing Special Tool**  
Courtesy of FORD MOTOR CO.

5. Remove rear cover plates and dowels.

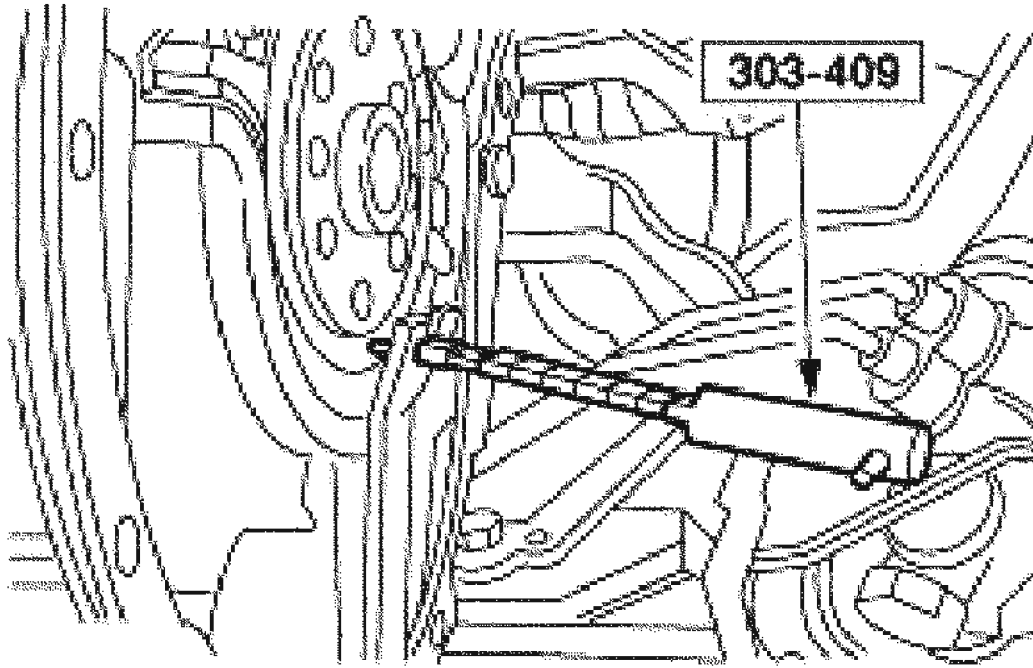


G02738942

**Fig. 303: Removing Rear Cover Plates And Dowels**  
Courtesy of FORD MOTOR CO.

6. Using the special tool, remove the crankshaft rear seal.

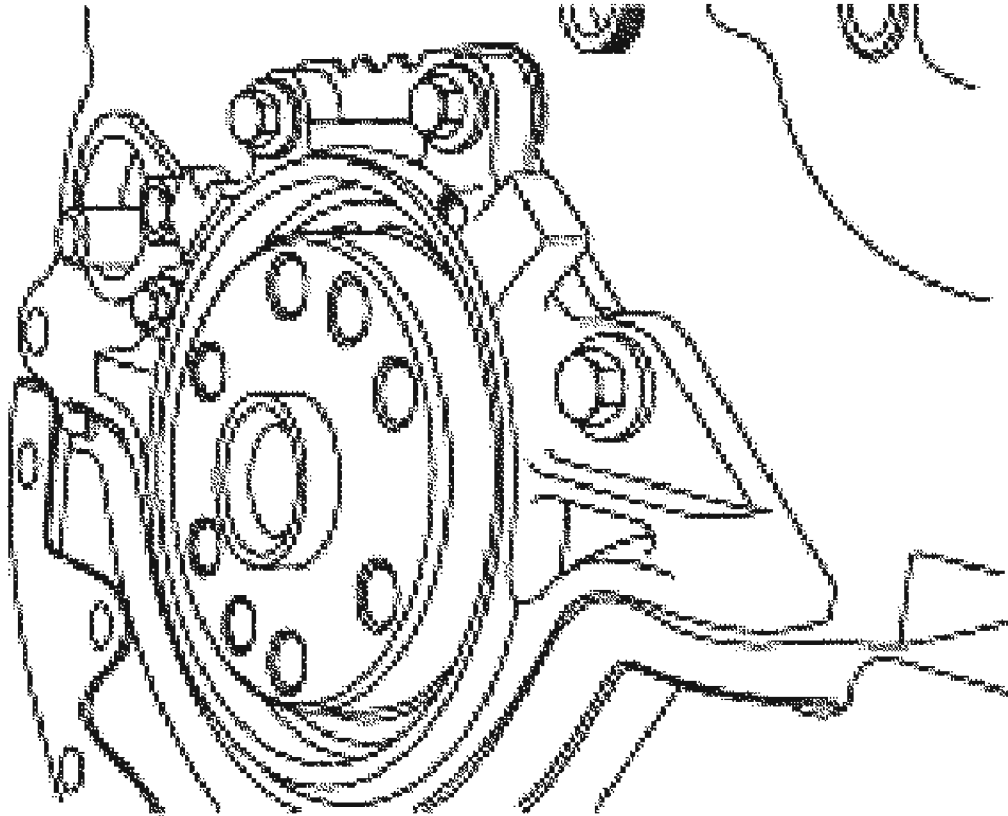




G02738943

**Fig. 304: Removing Crankshaft Rear Seal**  
Courtesy of FORD MOTOR CO.

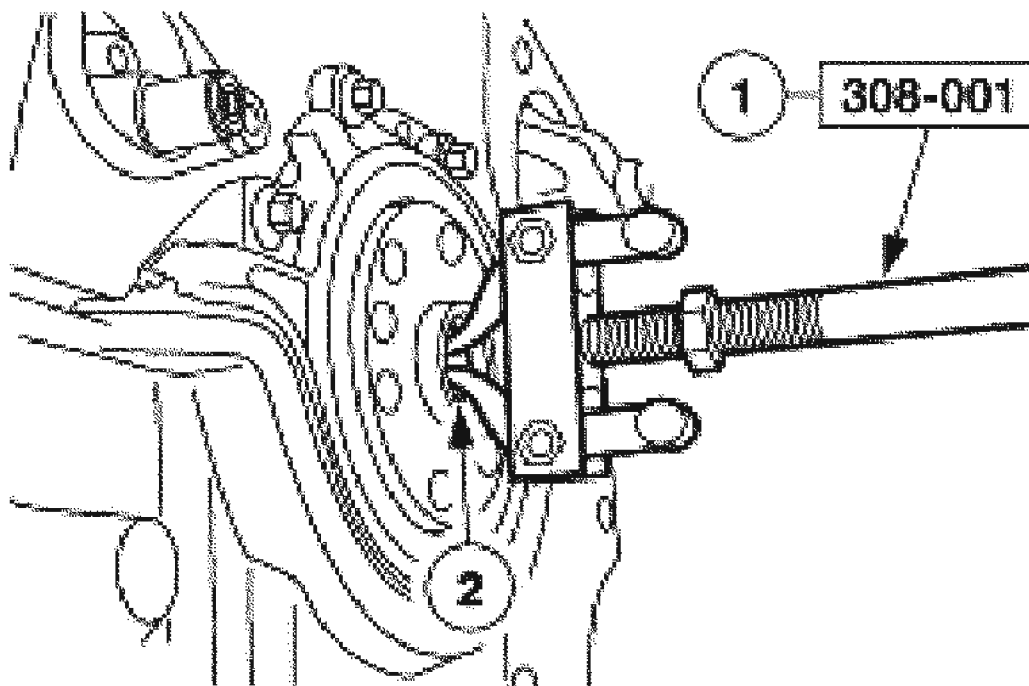
7. Inspect the crankshaft rear oil seal area.



G02738944

**Fig. 305: Identifying Crankshaft Rear Oil Seal Area For Inspection**  
Courtesy of FORD MOTOR CO.

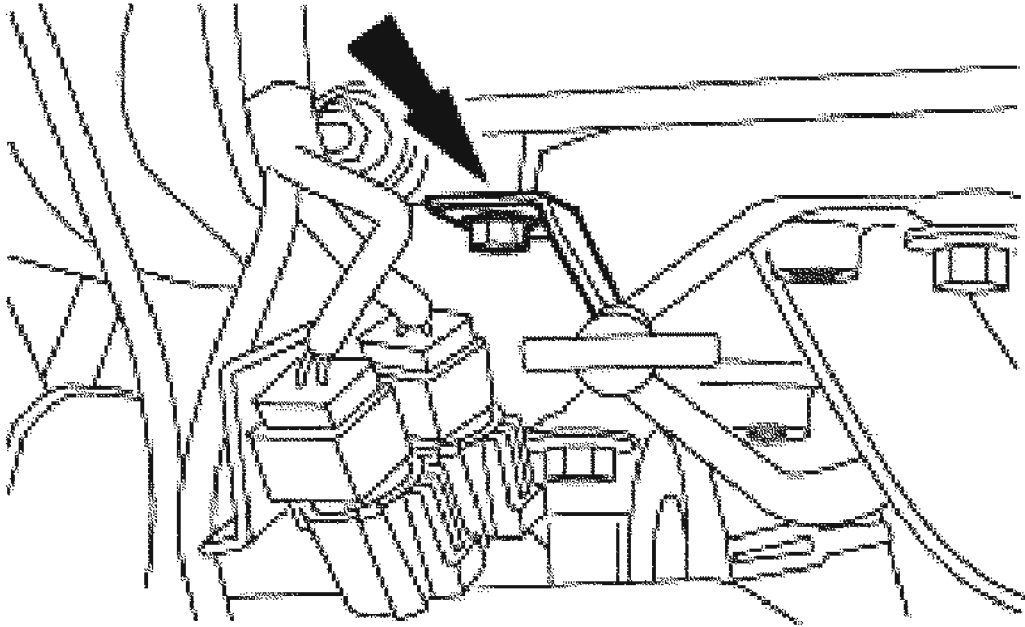
**NOTE:** Install a new pilot bearing only if it is damaged.



G02738945

**Fig. 306: Removing Pilot Bearing**  
Courtesy of FORD MOTOR CO.

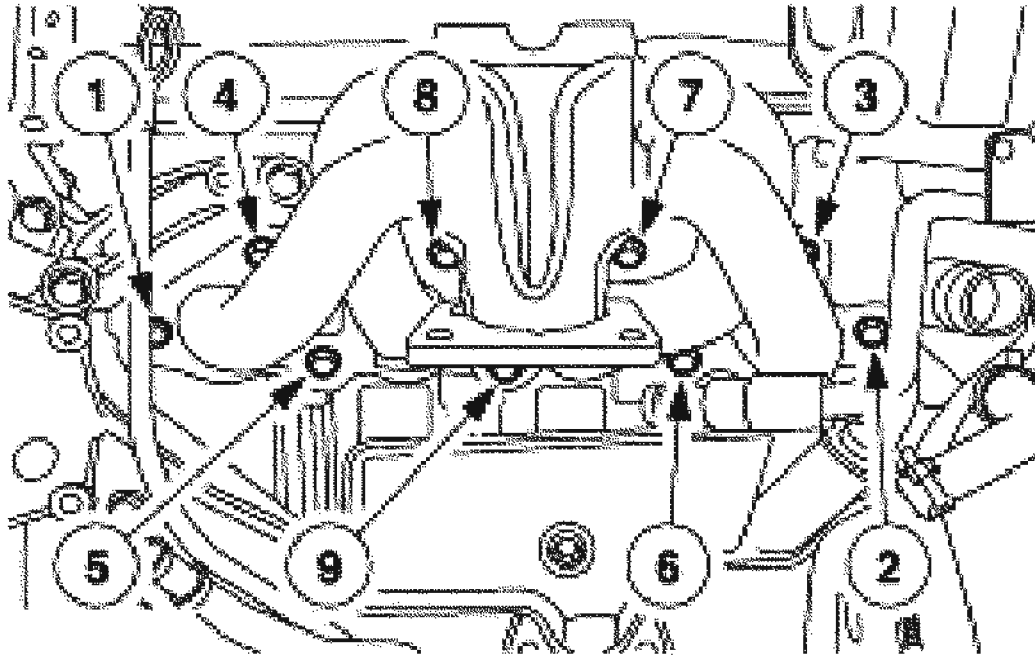
8. Use the special tool to remove the pilot bearing.
  1. Install the special tool.
  2. Remove the pilot bearing.
9. Mount the engine on a suitable engine stand.
10. Remove the bolt and the oil level indicator and tube.



G02738946

**Fig. 307: Removing Oil Level Indicator And Tube**  
Courtesy of FORD MOTOR CO.

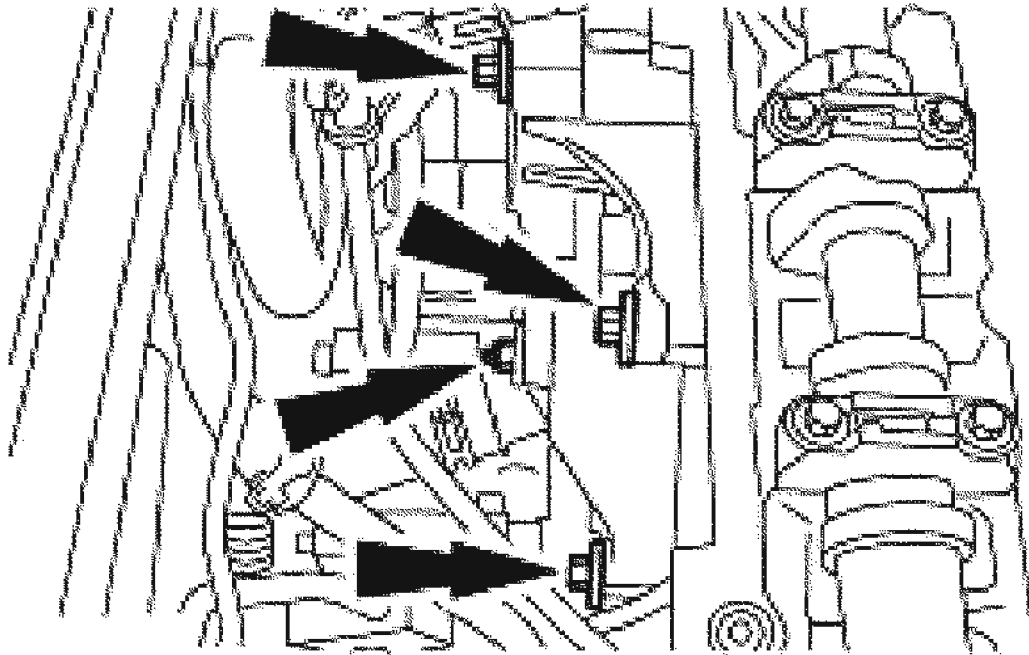
11. Remove the six bolts and three nuts and remove the exhaust manifold.
  - Discard the gasket.



G02738947

**Fig. 308: Removing Exhaust Manifold Bolts & Nuts**  
Courtesy of FORD MOTOR CO.

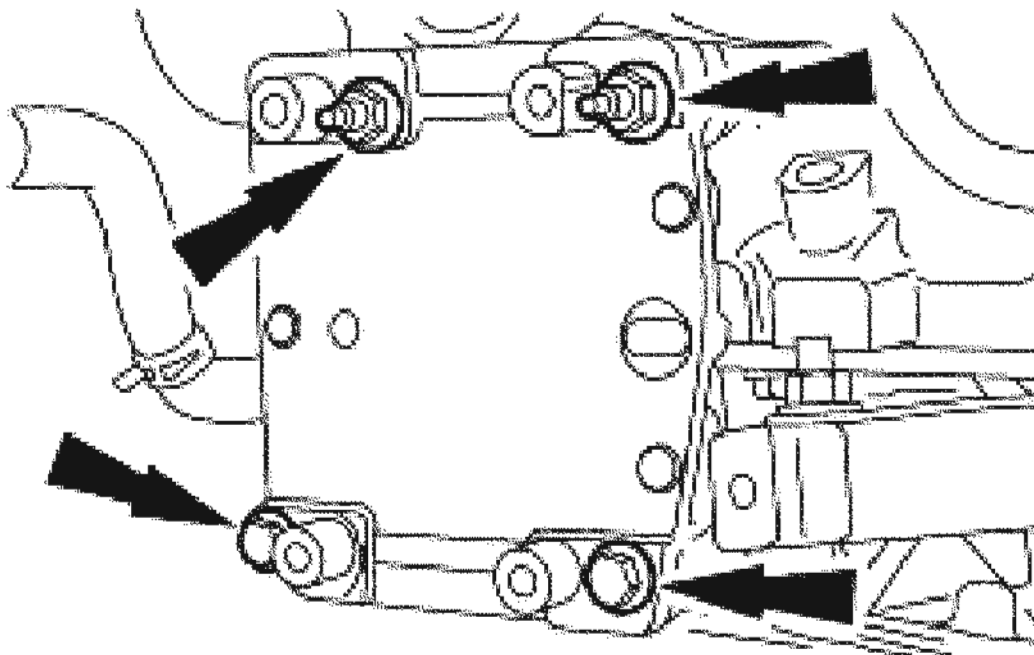
12. Remove the power steering pump bracket.



G02738948

**Fig. 309: Removing Power Steering Pump Bracket**  
Courtesy of FORD MOTOR CO.

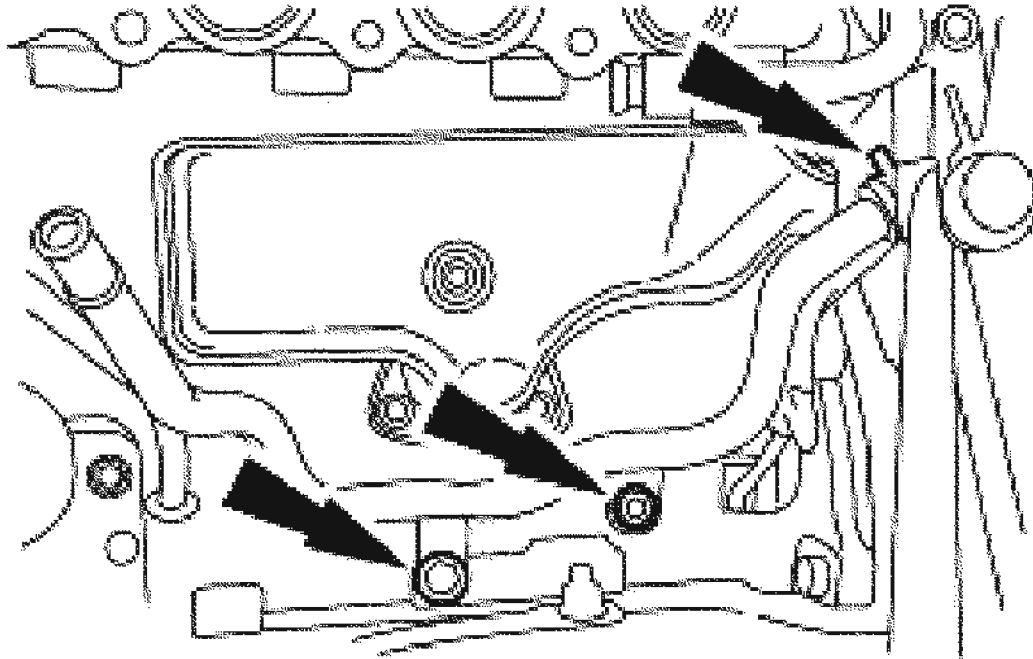
13. Remove the A/C compressor bracket.



G02738949

**Fig. 310: Removing A/C Compressor Bracket**  
Courtesy of FORD MOTOR CO.

14. Remove the coolant tube.
  - Remove the bolt and nut.
  - Disconnect the hose.

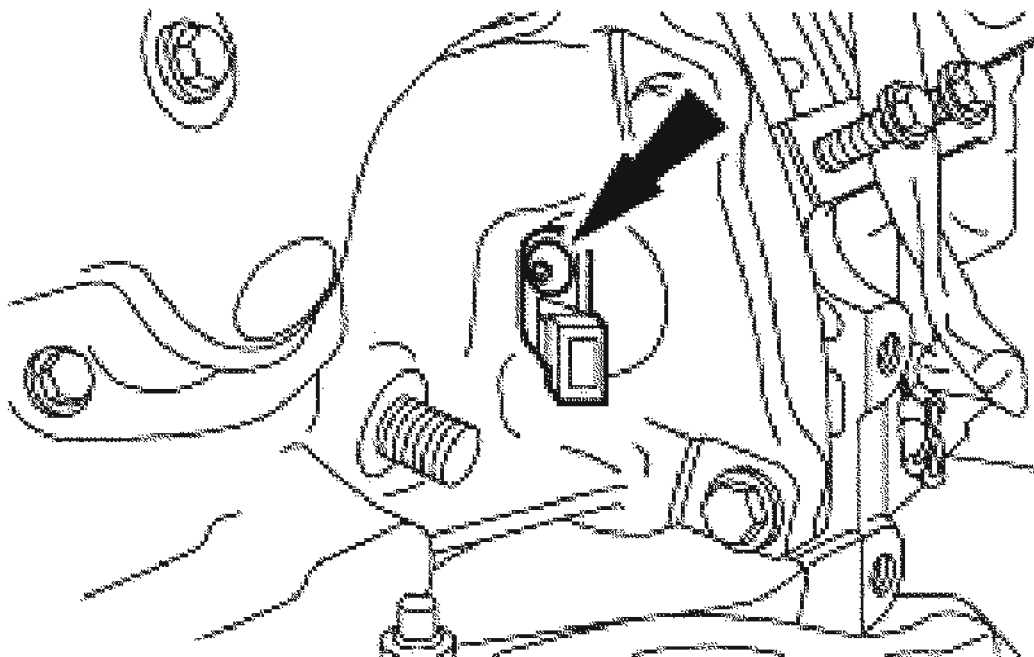


G02738950

**Fig. 311: Removing Coolant Tube**  
Courtesy of FORD MOTOR CO.

15. Remove the crankshaft position (CKP) sensor.

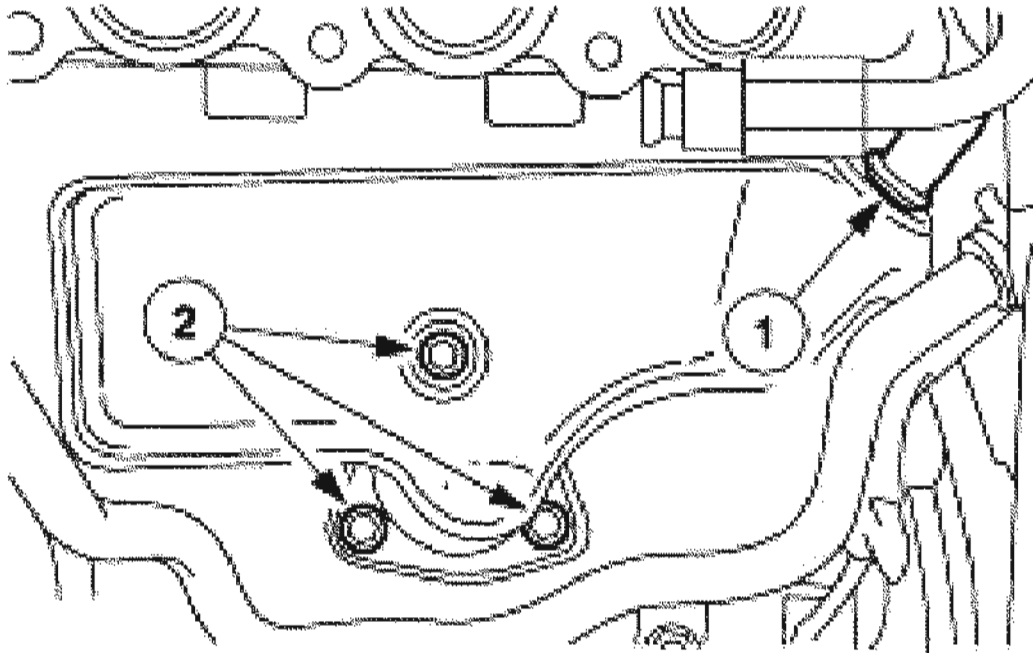




G02738951

**Fig. 312: Removing Crankshaft Position (CKP) Sensor**  
Courtesy of FORD MOTOR CO.

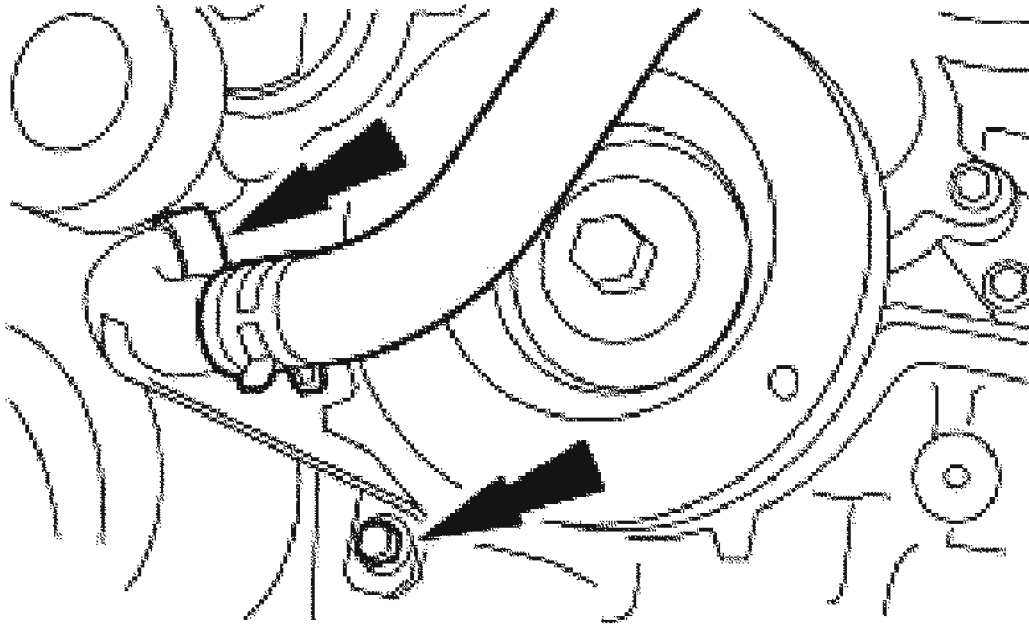
16. Remove the crankcase vent oil separator.
  1. Disconnect the positive crankcase ventilation (PCV) valve.
  2. Remove the bolts and remove the separator.
    - Discard the gasket.



G02738952

**Fig. 313: Removing Crankcase Vent Oil Separator**  
Courtesy of FORD MOTOR CO.

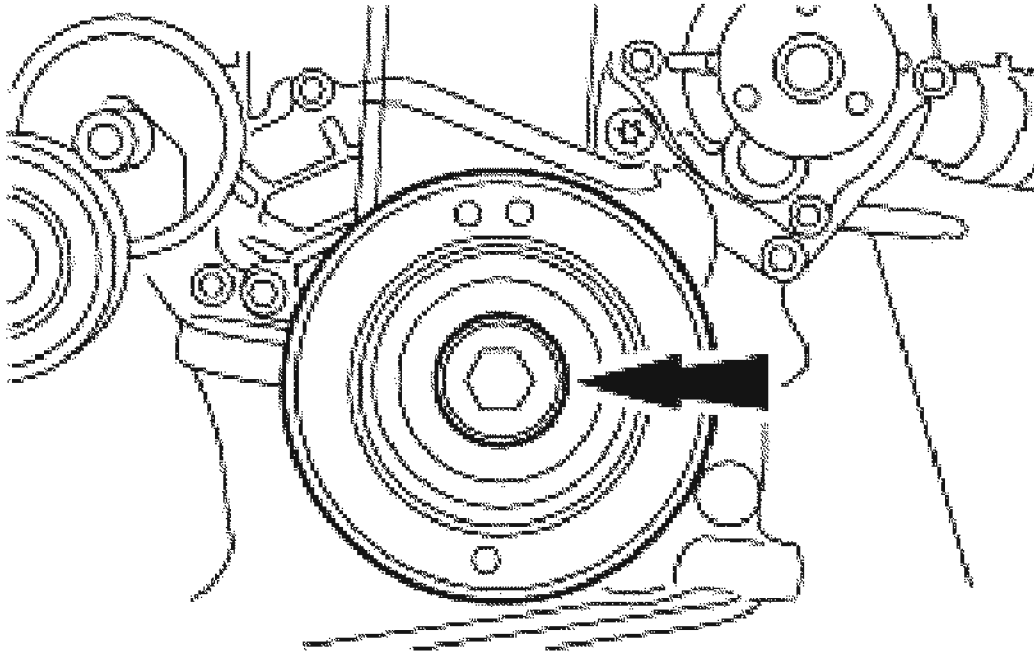
17. Remove the coolant tube.
  - Remove the bolt.
  - Disconnect the hose.



G02738953

**Fig. 314: Removing Coolant Tube**  
Courtesy of FORD MOTOR CO.

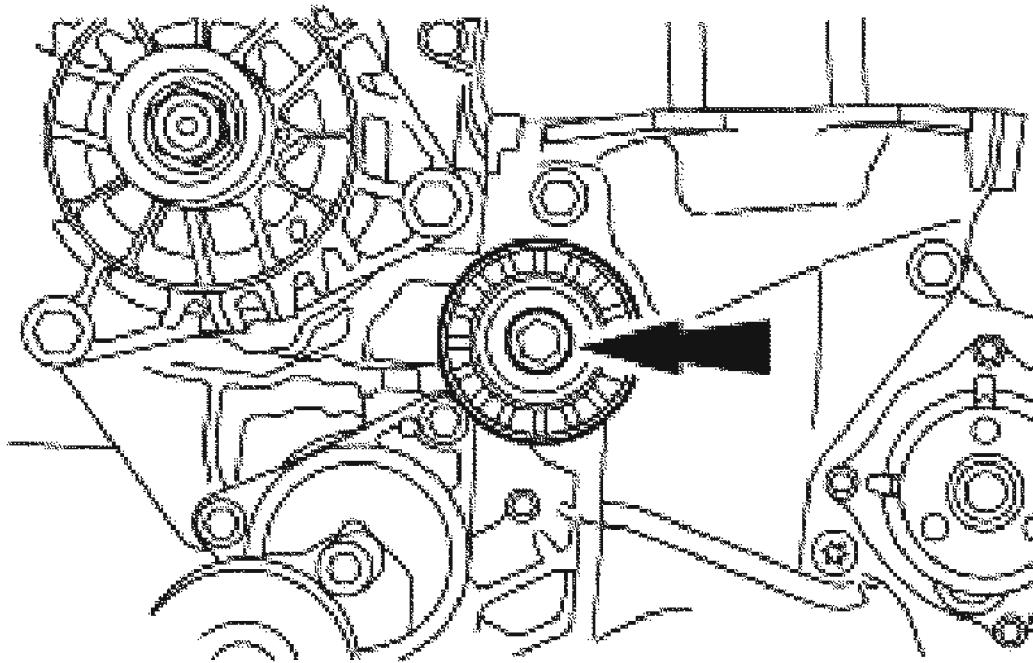
18. Remove the bolt and remove the crankshaft pulley.



G02738954

**Fig. 315: Removing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

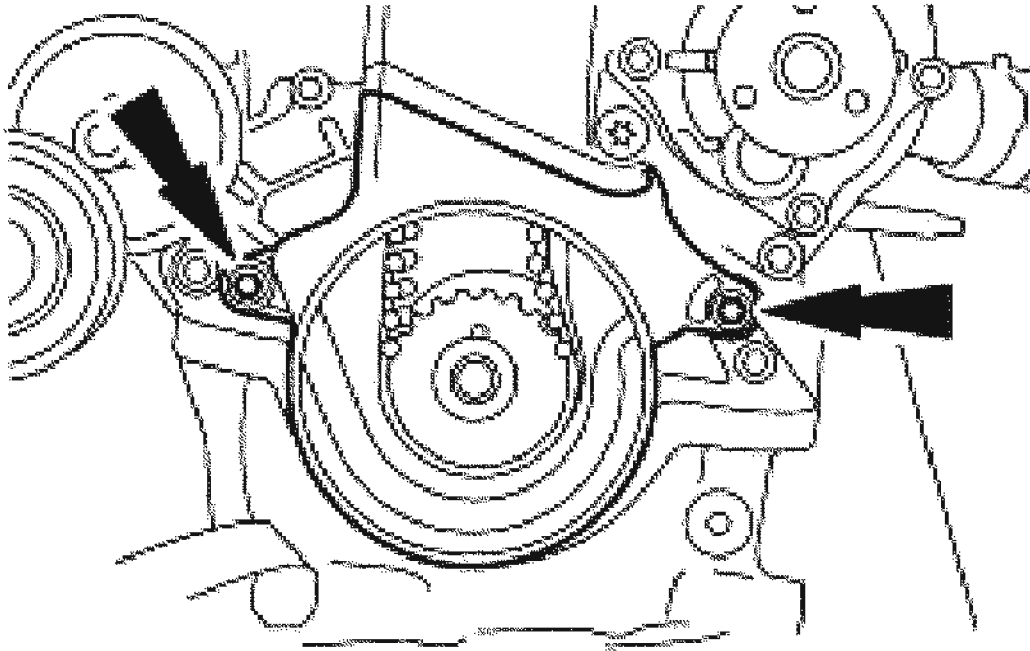
19. Remove the accessory drive belt idler pulley.



G02738955

**Fig. 316: Removing Accessory Drive Belt Idler Pulley**  
Courtesy of FORD MOTOR CO.

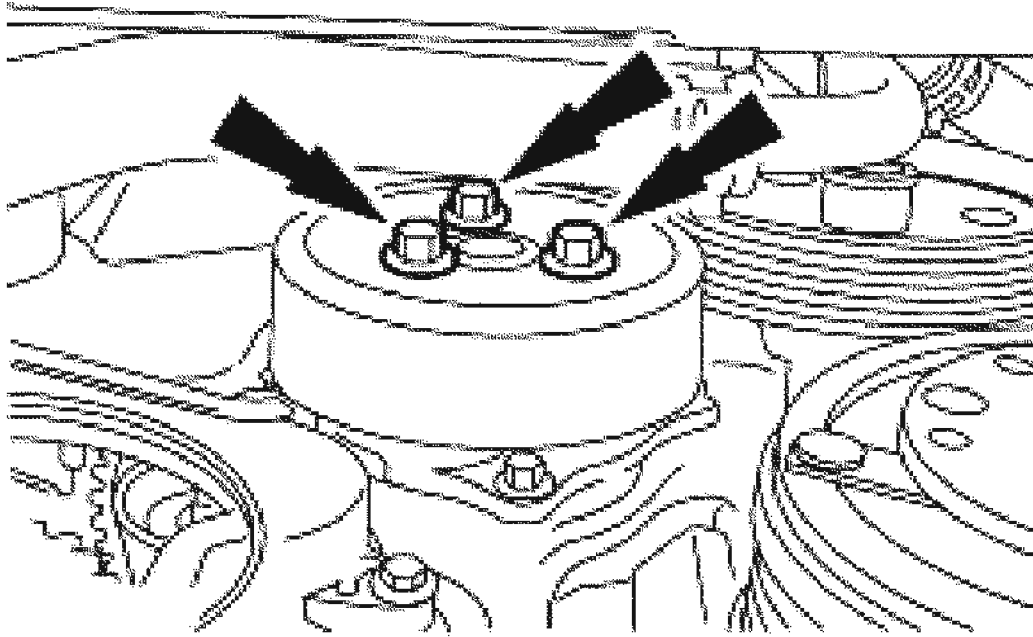
20. Remove the lower timing belt cover.



G02738956

**Fig. 317: Removing Lower Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

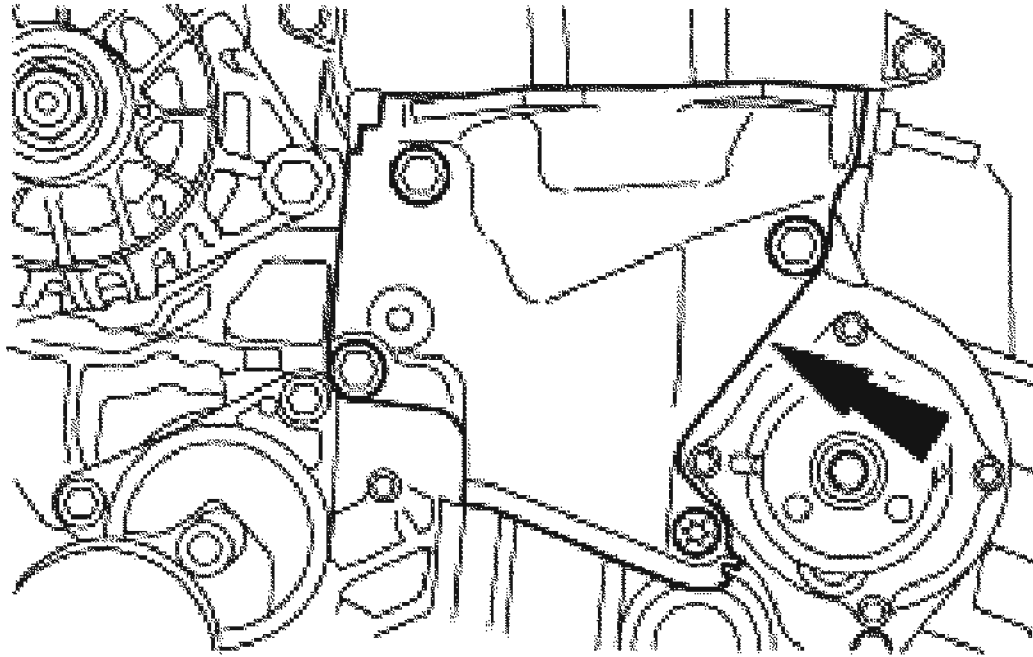
21. Remove the water pump pulley.



G02738957

**Fig. 318: Removing Water Pump Pulley**  
Courtesy of FORD MOTOR CO.

22. Remove the lower engine mount bracket.

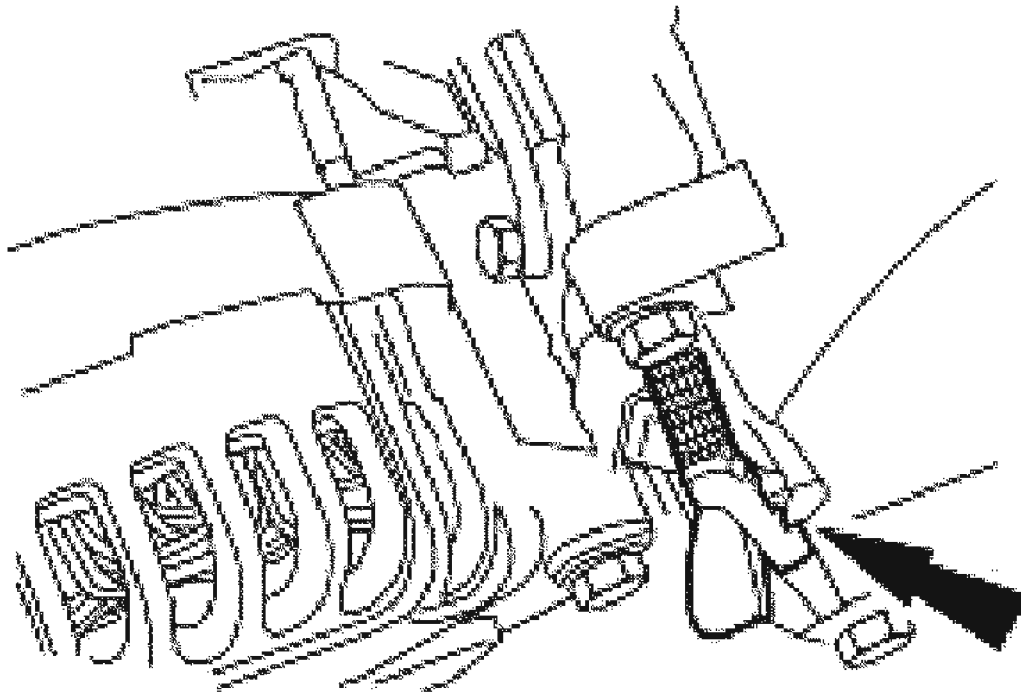


G02738958

**Fig. 319: Removing Lower Engine Mount Bracket**  
Courtesy of FORD MOTOR CO.

23. Disconnect the wire harness.

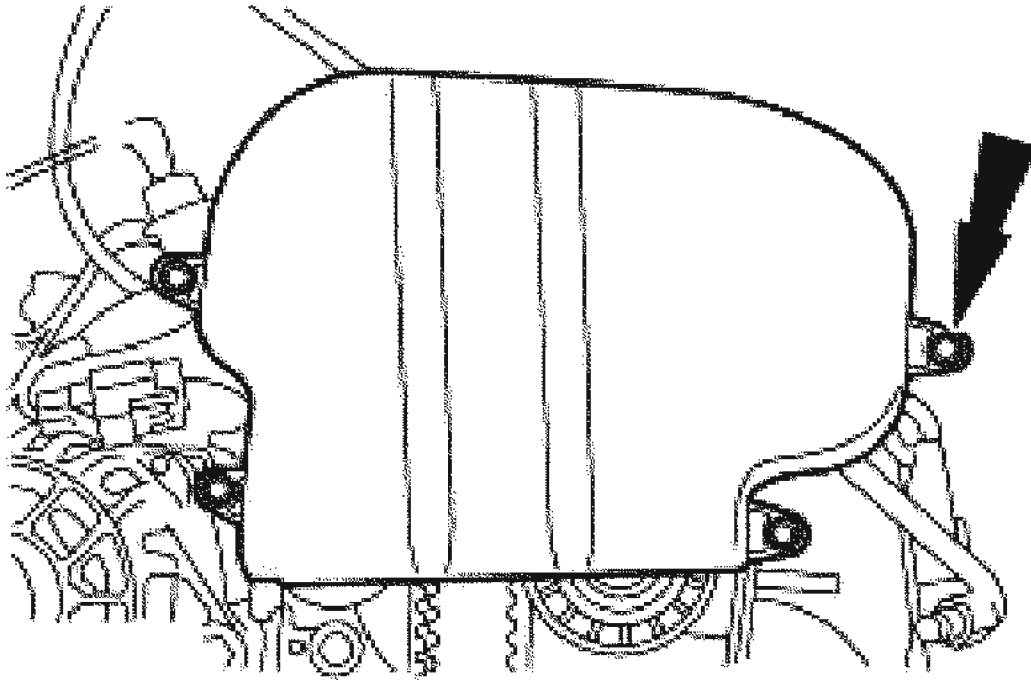




G02738959

**Fig. 320: Disconnecting Wire Harness**  
Courtesy of FORD MOTOR CO.

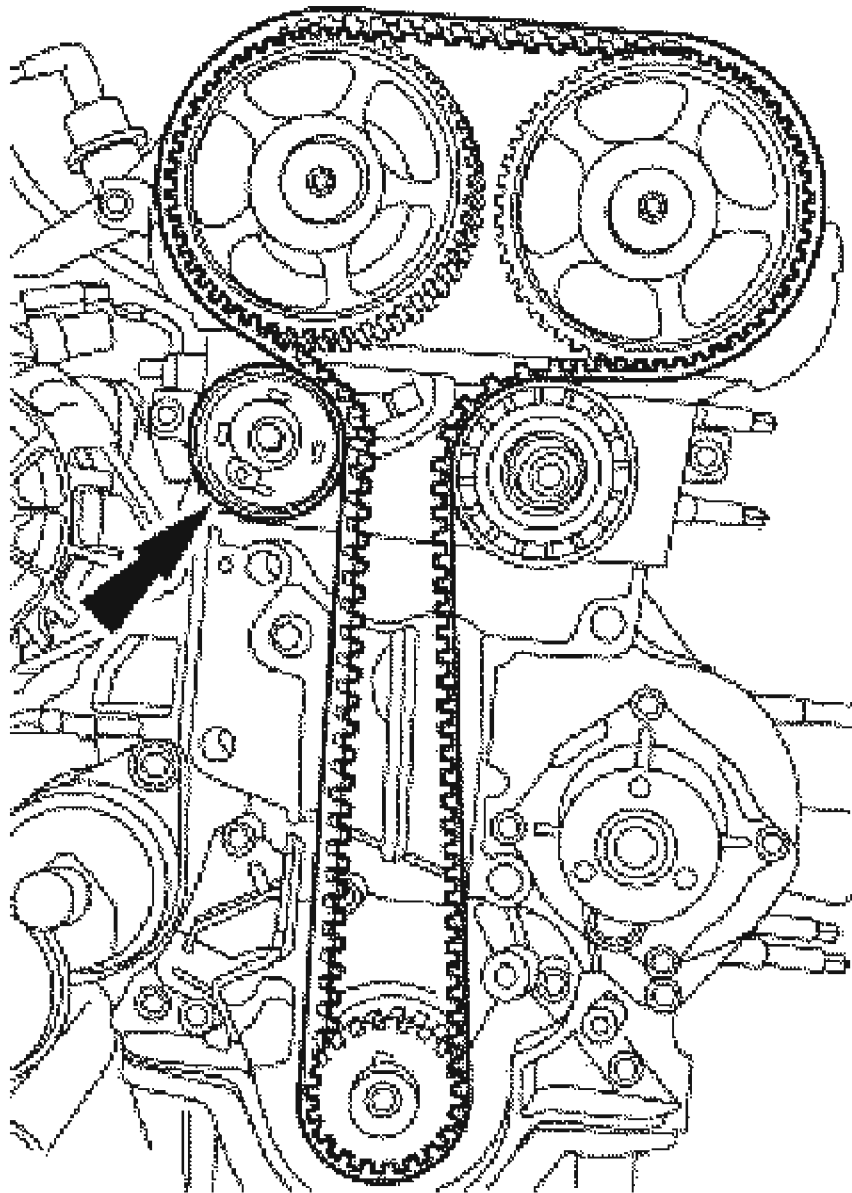
24. Remove the upper timing belt cover.



G02738960

**Fig. 321: Removing Upper Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

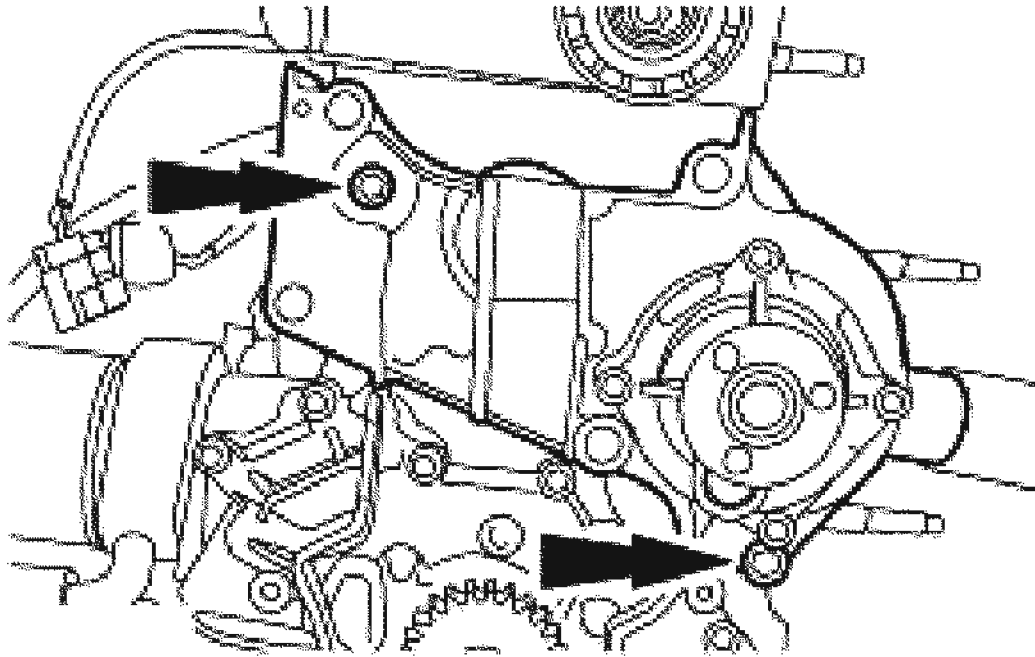
25. Remove the timing belt tensioner and remove and discard the timing belt.



G02738961

**Fig. 322: Removing Timing Belt Tensioner**  
Courtesy of FORD MOTOR CO.

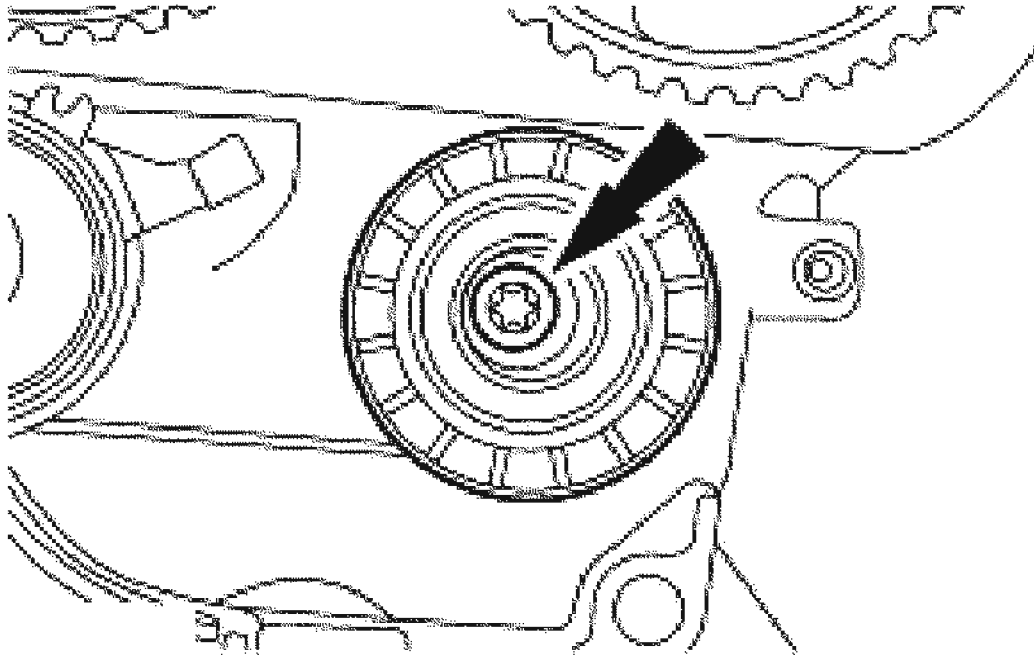
26. Remove the water pump adapter.



G02738962

**Fig. 323: Removing Water Pump Adapter**  
Courtesy of FORD MOTOR CO.

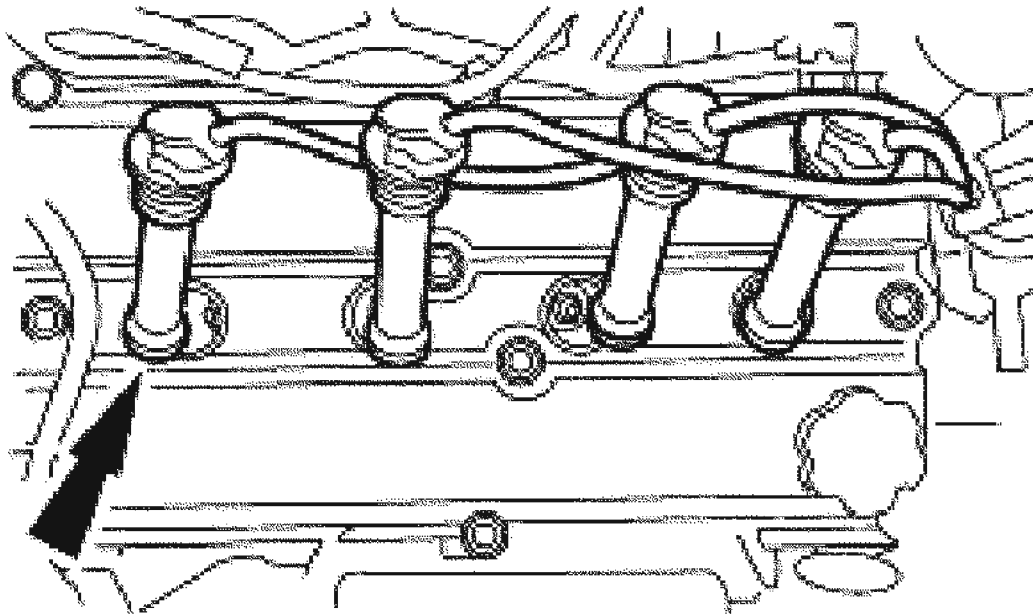
27. Remove the timing belt idler pulley.



G02738963

**Fig. 324: Removing Timing Belt Idler Pulley**  
Courtesy of FORD MOTOR CO.

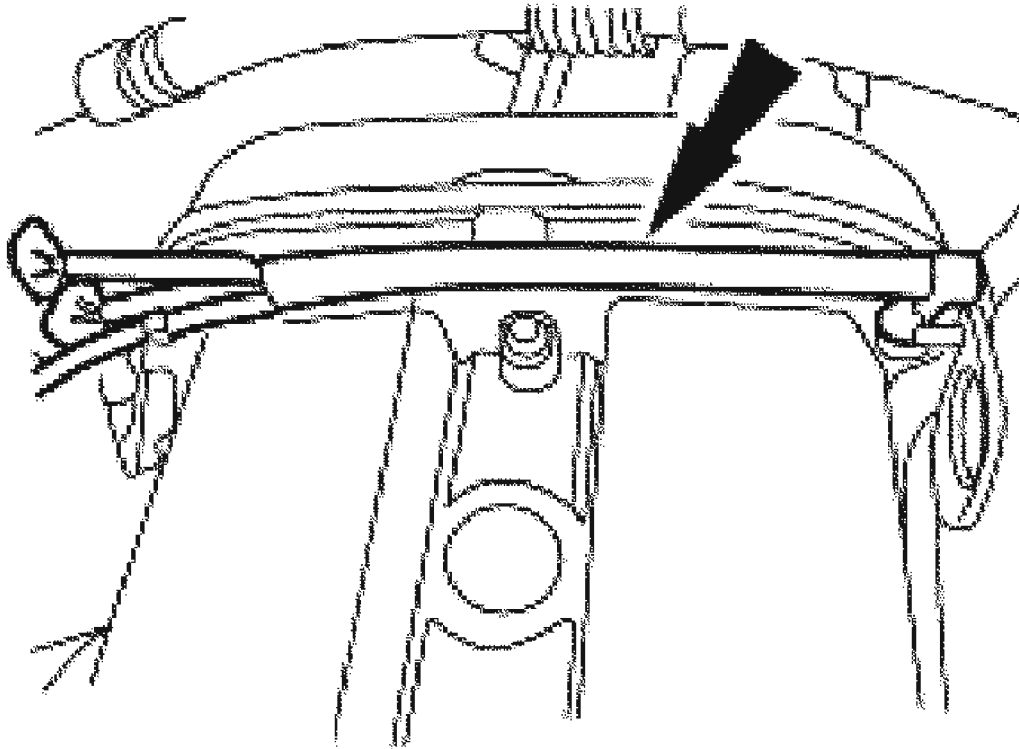
28. Remove the ignition wires from the spark plugs.



G02738964

**Fig. 325: Removing Ignition Wires From Spark Plugs**  
Courtesy of FORD MOTOR CO.

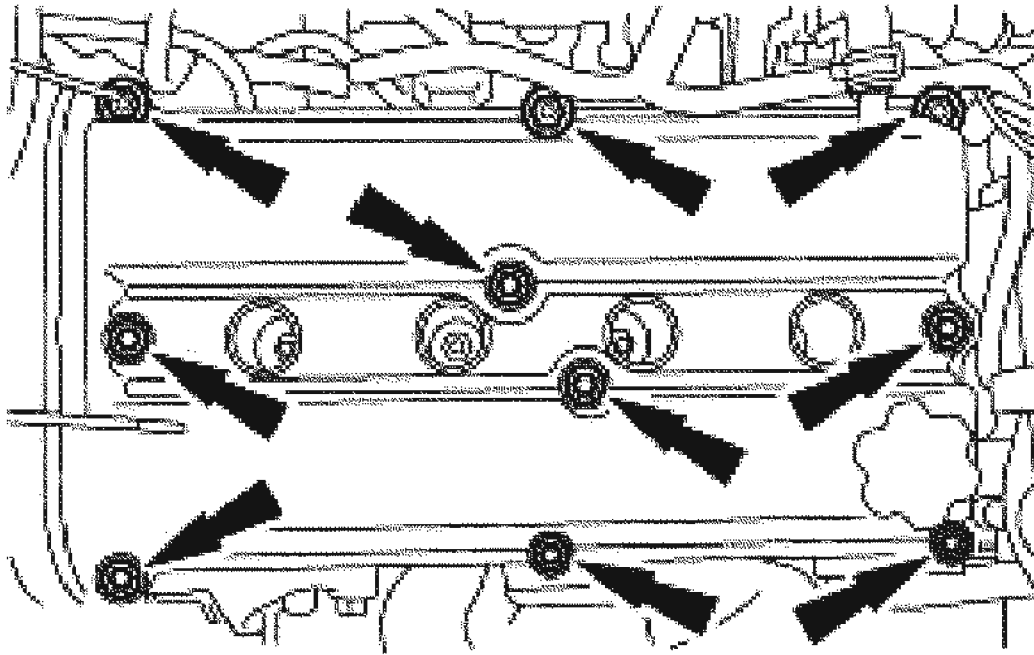
29. Disconnect the wire harness and position aside.



G02738965

**Fig. 326: Disconnecting Wire Harness**  
Courtesy of FORD MOTOR CO.

30. Remove the valve cover.
  - Remove the studbolts.
  - Remove the bolts.



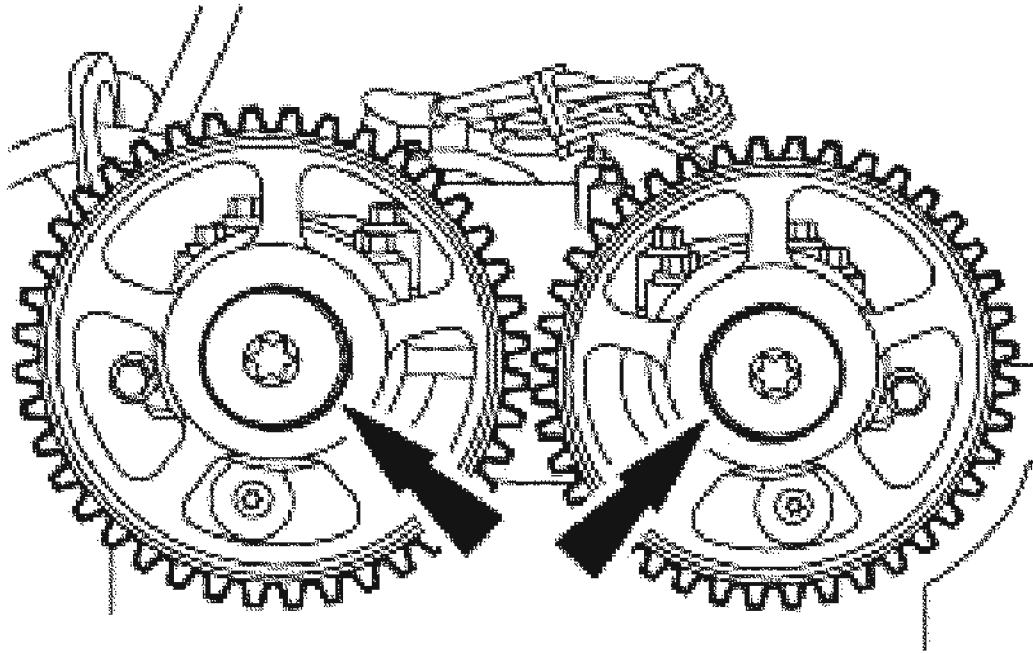
G02738966

**Fig. 327: Removing Valve Cover Studbolts & Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The camshaft alignment tool is not recommended to hold the camshafts in place when removing or tightening the bolts. Damage to camshaft may result.

**NOTE:** Use an open-end wrench to keep each camshaft from rotating.



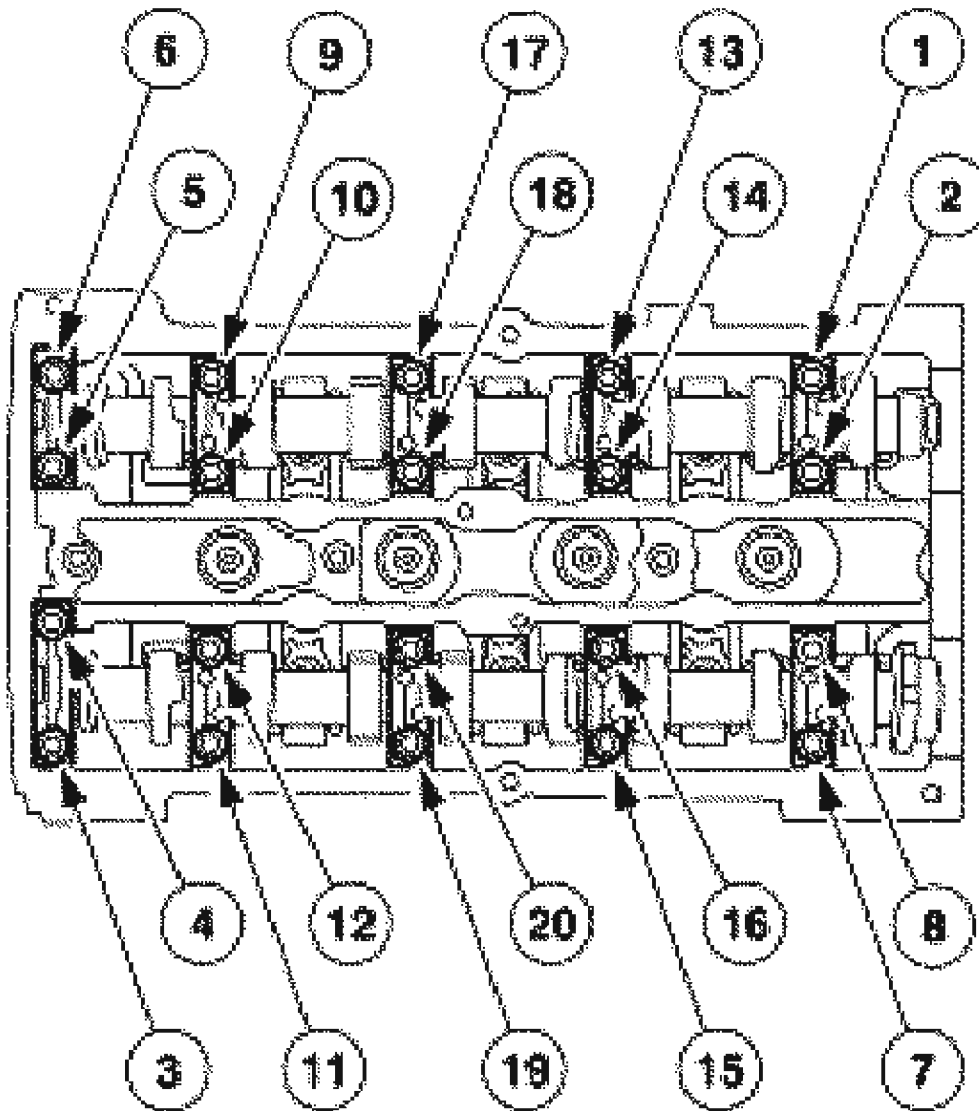


G02738967

**Fig. 328: Removing Camshaft Timing Sprockets**  
Courtesy of FORD MOTOR CO.

31. Remove the bolts and the camshaft timing sprockets.

**CAUTION:** Cylinder head camshaft journal caps are numbered on the outside flats to make sure that they are assembled in their original positions. Failure to do so may result in engine damage.



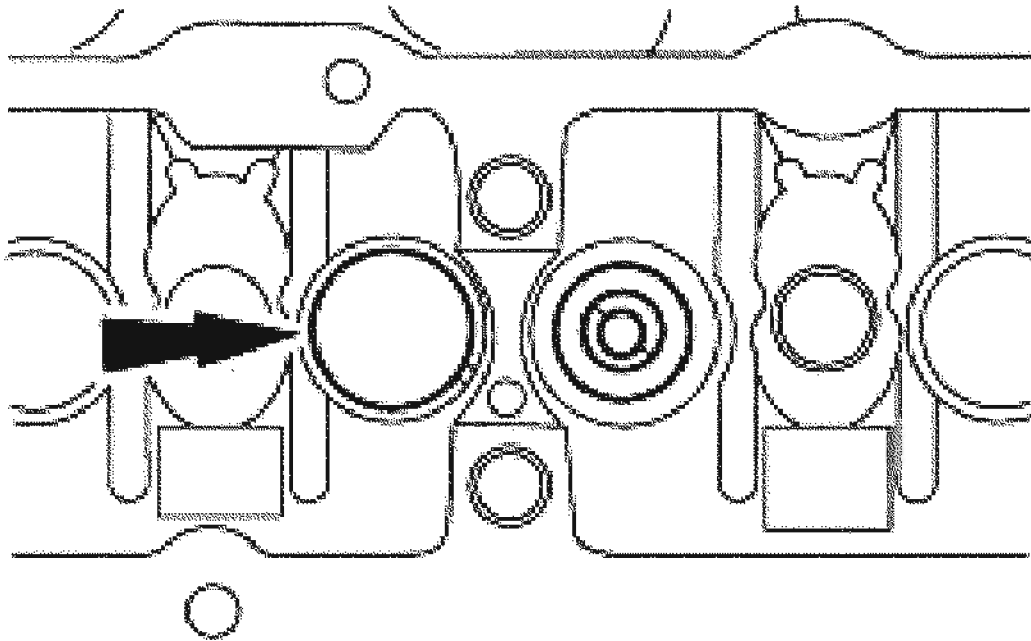
G02738968

**Fig. 329: Identifying Removal Sequence Of Camshaft Journal Cap Bolts**  
 Courtesy of FORD MOTOR CO.

32. Remove the camshafts.

- Loosen the camshaft journal cap bolts in several two-turn passes in the sequence shown.
- Remove the bolts.
- Remove the caps.

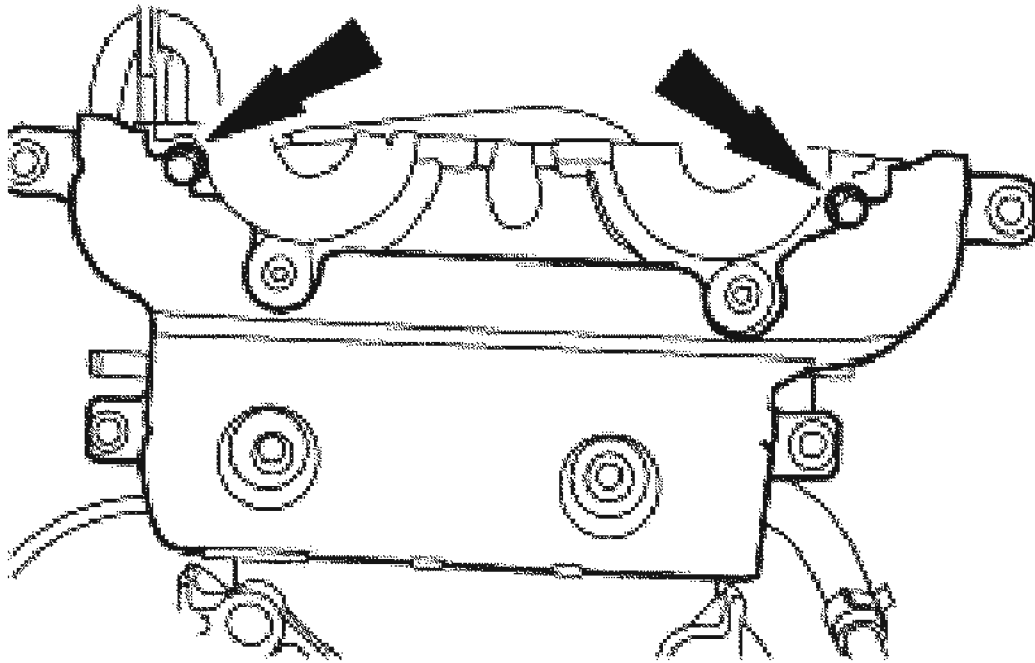
**CAUTION:** If the camshaft and valve tappets are to be reused, mark the location of the valve tappets to make sure that they are assembled in their original positions.



G02738969

**Fig. 330: Removing Valve Tappets From Cylinder Head**  
Courtesy of FORD MOTOR CO.

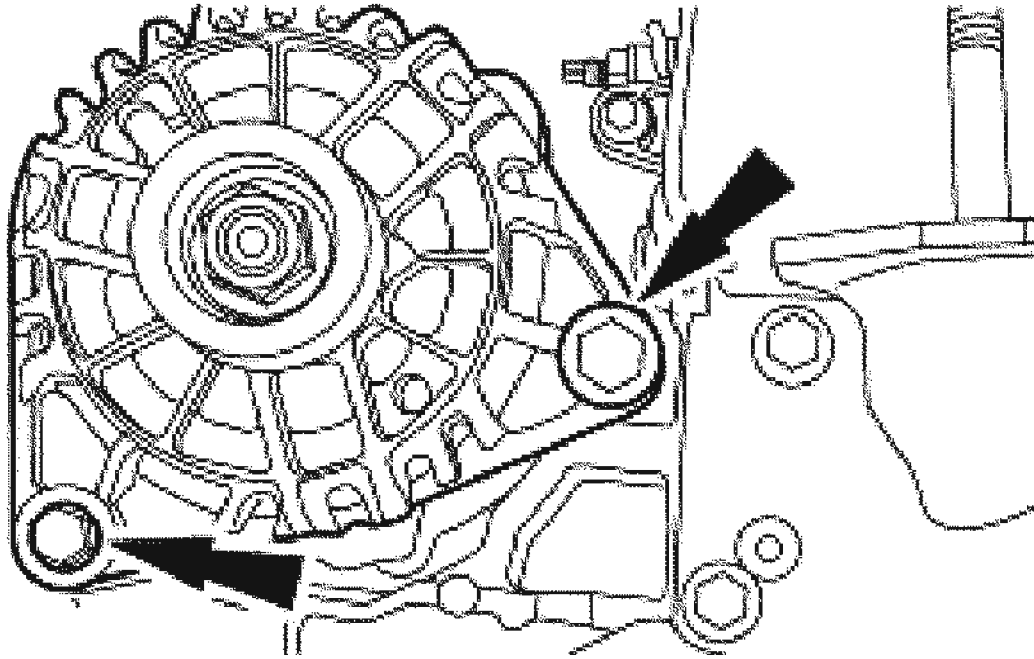
33. Remove the valve tappets from the cylinder head.
34. Remove the inner timing belt cover.



G02738970

**Fig. 331: Removing Inner Timing Belt Cover**  
Courtesy of FORD MOTOR CO.

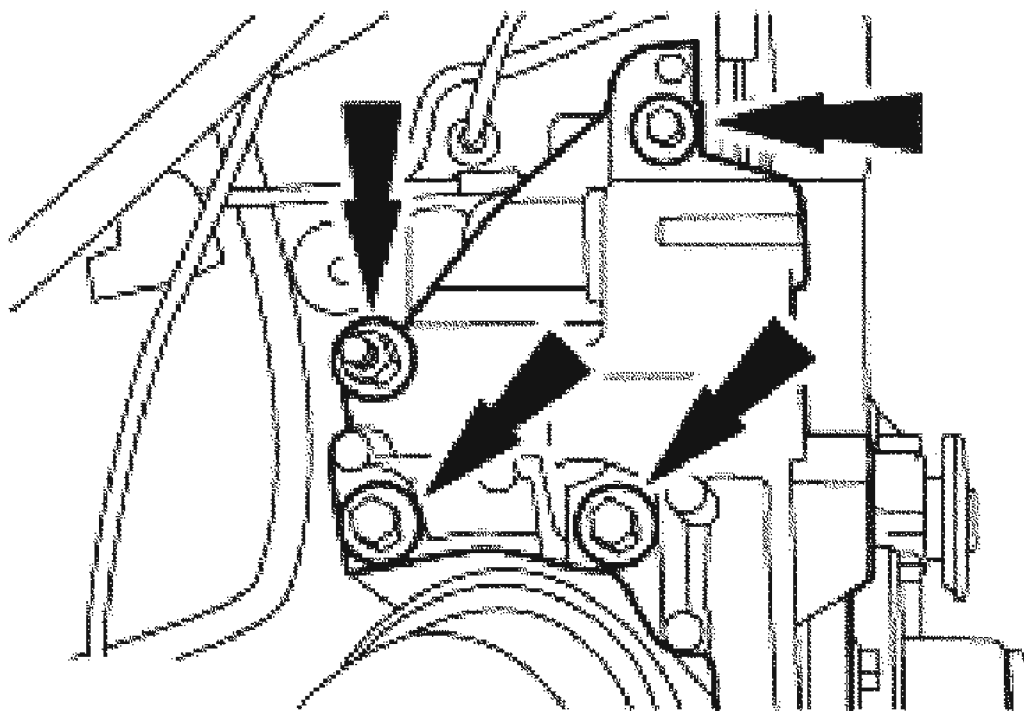
35. Remove the generator.



G02738971

**Fig. 332: Removing Generator**  
Courtesy of FORD MOTOR CO.

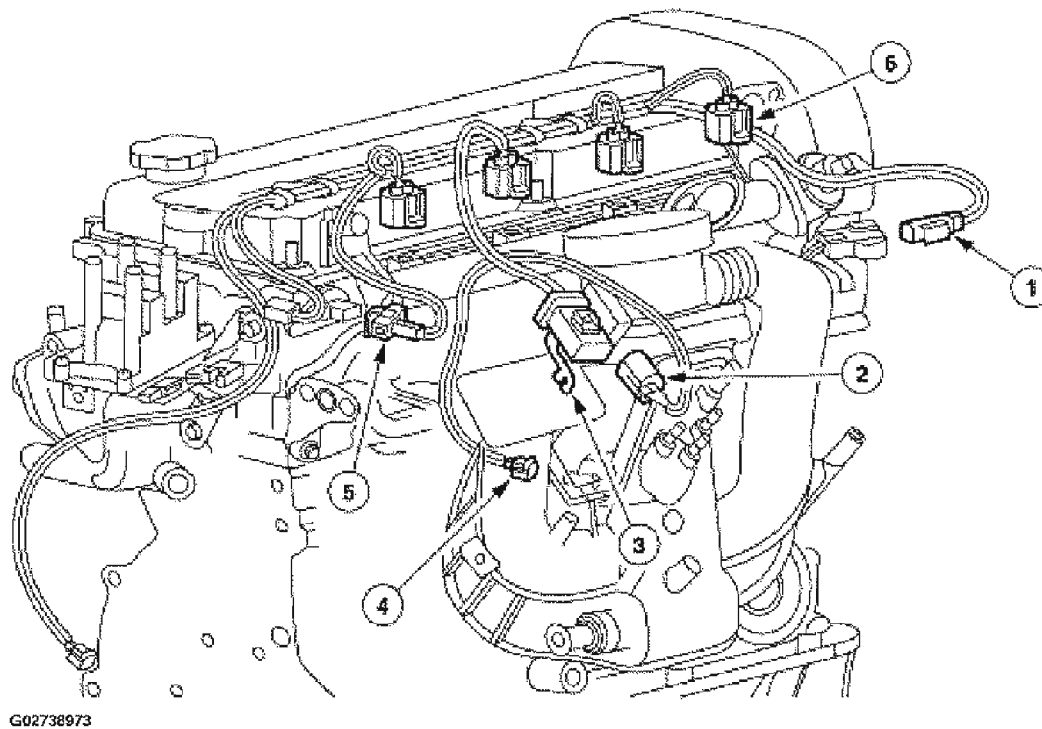
36. Remove the generator bracket.



G02738972

**Fig. 333: Removing Generator Bracket**  
Courtesy of FORD MOTOR CO.

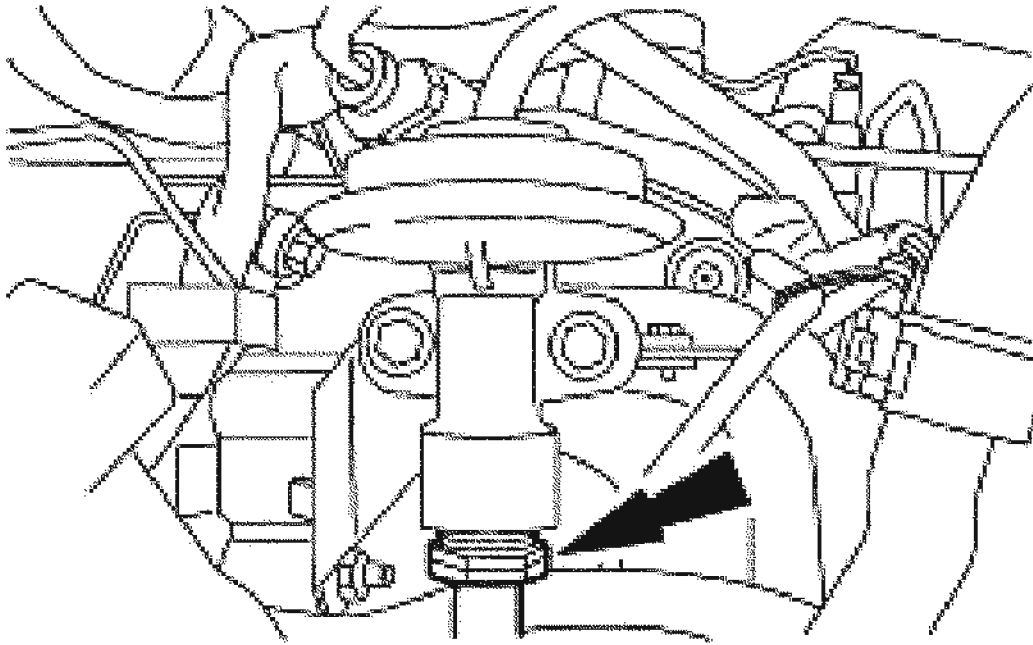
37. Disconnect the following electrical connectors and remove the fuel charging wiring harness from the engine:
1. cylinder temperature sensor
  2. throttle position sensor
  3. wiring harness to vehicle
  4. idle air control valve
  5. camshaft position sensor
  6. fuel injectors



**Fig. 334: Disconnecting Electrical Connectors And Fuel Charging Wiring Harness From Engine**

Courtesy of FORD MOTOR CO.

38. Disconnect EGR tube fitting.

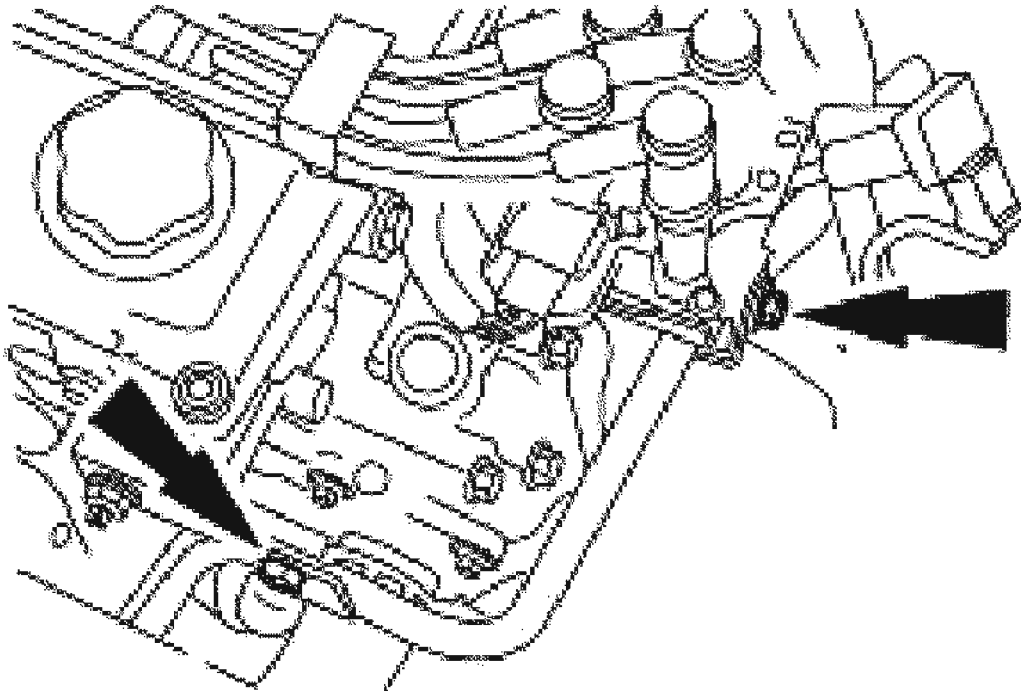


G02738974

**Fig. 335: Disconnecting EGR Tube Fitting**  
Courtesy of FORD MOTOR CO.

39. Remove the EGR tube.

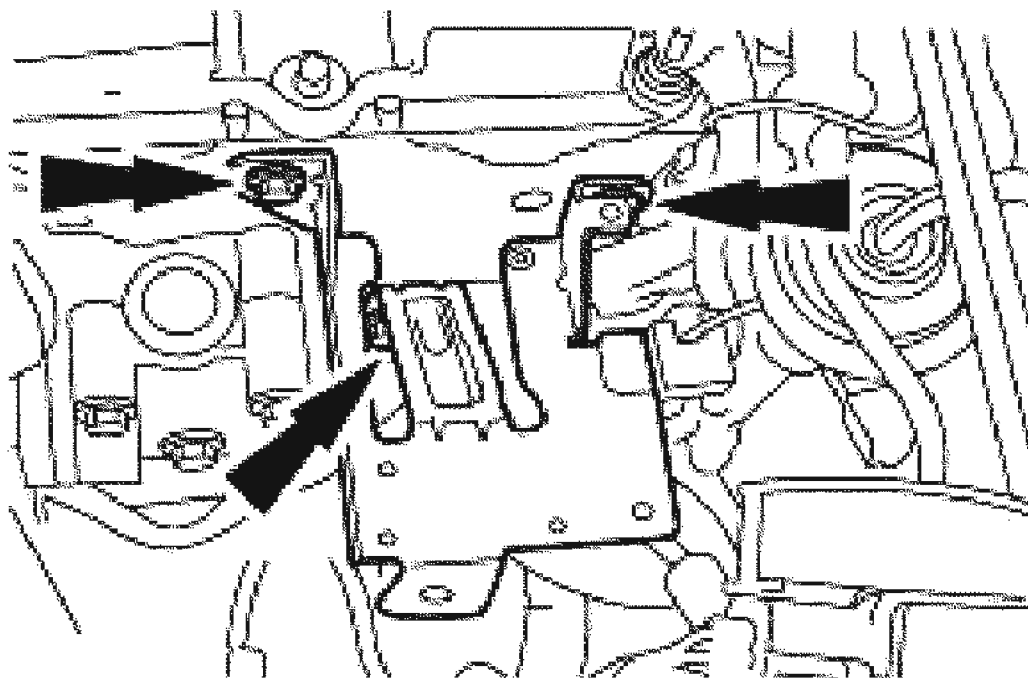




G02738975

**Fig. 336: Removing EGR Tube**  
Courtesy of FORD MOTOR CO.

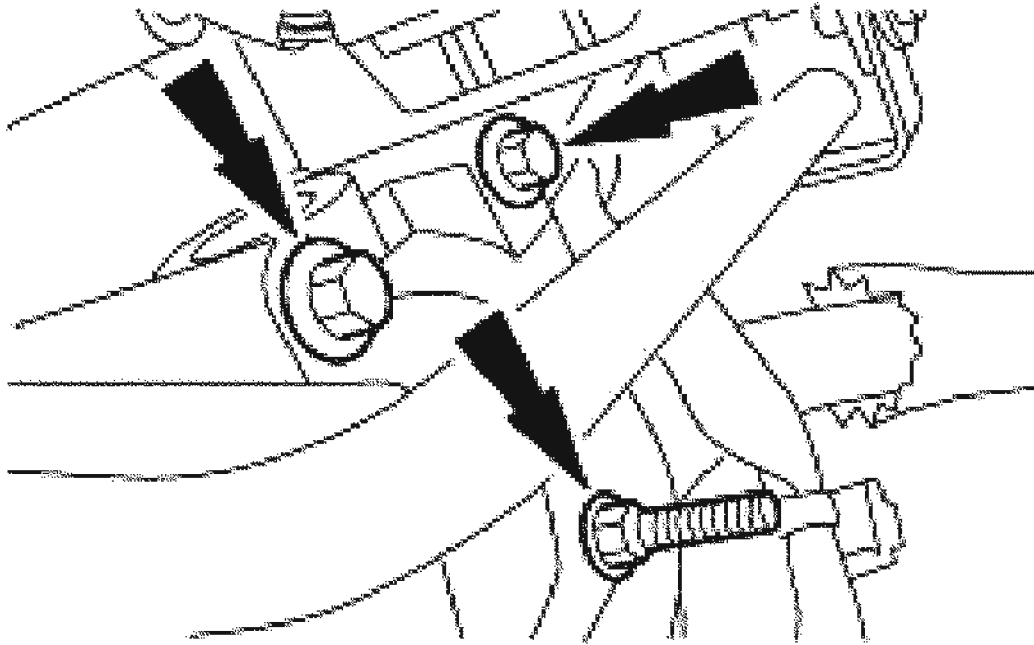
**NOTE:** The coil is removed from the picture for clarity.



G02738976

**Fig. 337: Removing Coil And Bracket Assembly**  
Courtesy of FORD MOTOR CO.

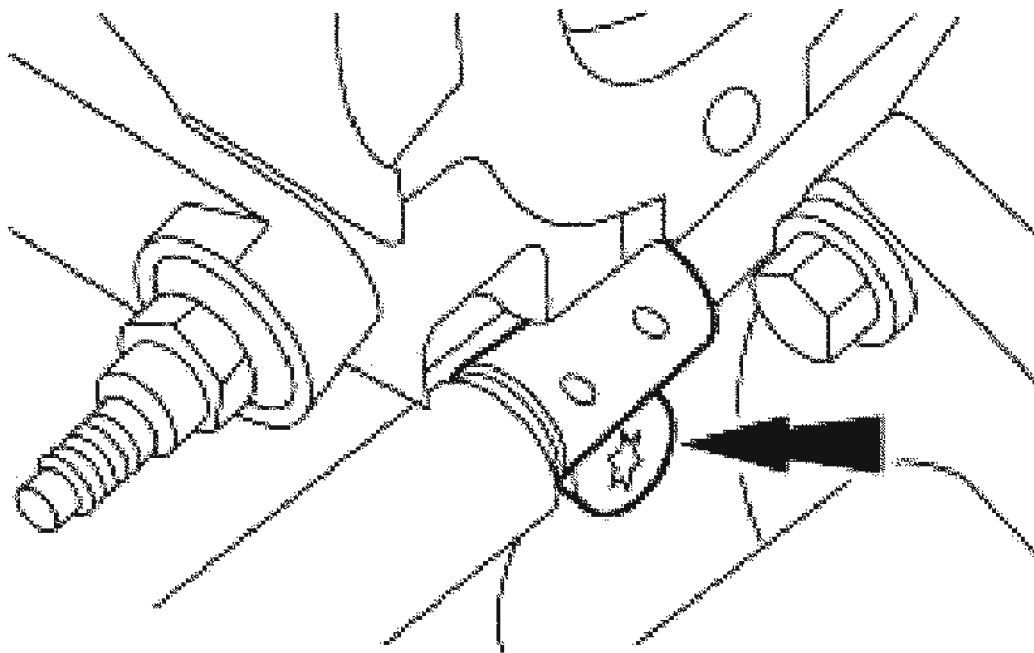
40. Remove the coil and bracket assembly.
41. Remove the thermostat housing.
  - Inspect and install a new O-ring seal if damaged.



G02738977

**Fig. 338: Removing Thermostat Housing**  
Courtesy of FORD MOTOR CO.

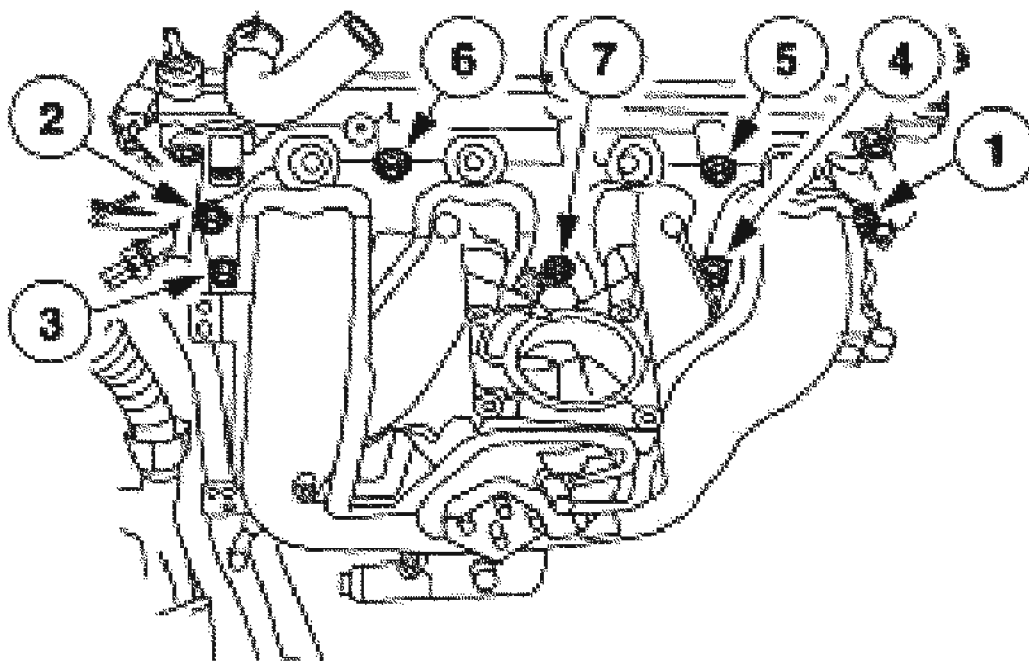
42. Remove the PCV tube.



G02738978

**Fig. 339: Removing PCV Tube**  
Courtesy of FORD MOTOR CO.

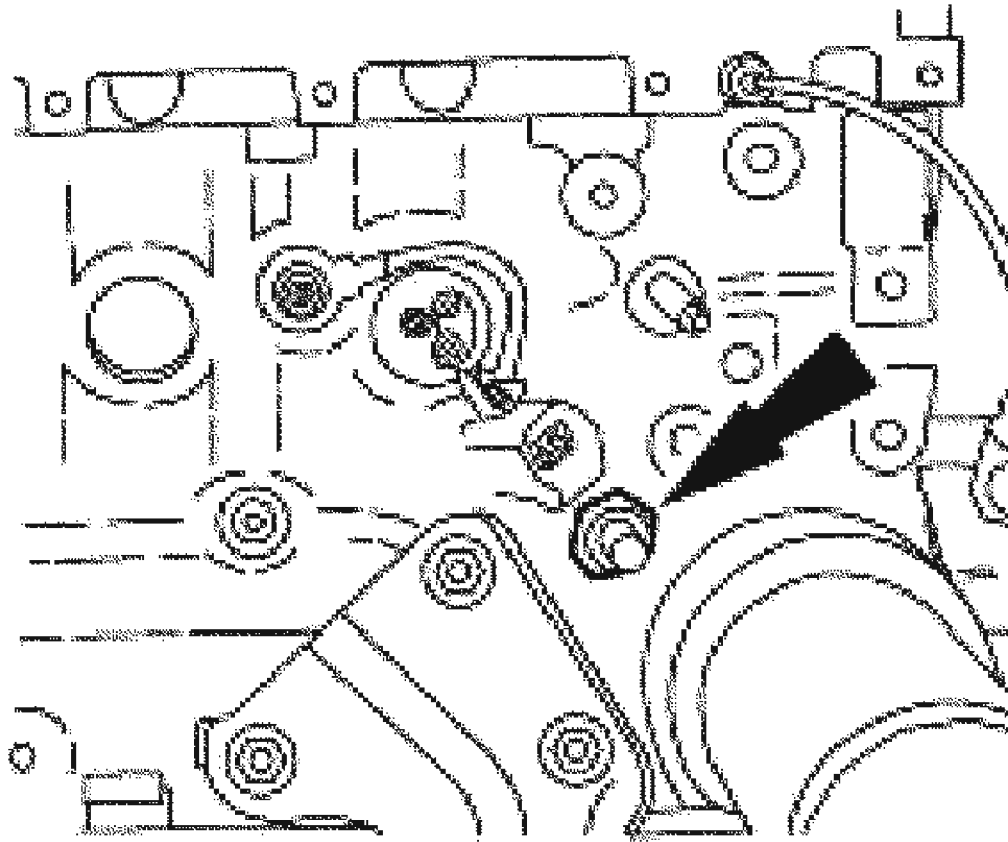
**NOTE:** Illustration shown with throttle body and fuel supply manifold removed for clarity.



G02738979

**Fig. 340: Identifying Removal Sequence Of Intake Manifold Nuts And Bolts**  
Courtesy of FORD MOTOR CO.

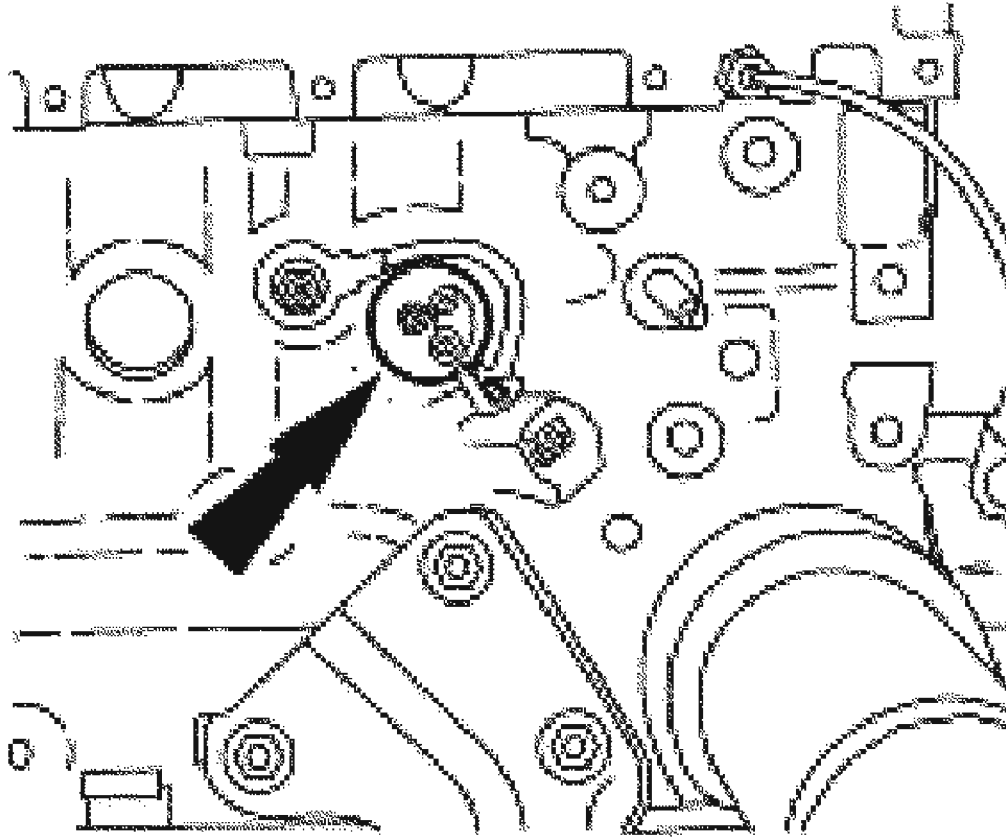
43. Remove the intake manifold.
  - Remove the two nuts and five bolts in the sequence shown.
44. Remove the oil pressure sensor.



G02738980

**Fig. 341: Removing Oil Pressure Sensor**  
Courtesy of FORD MOTOR CO.

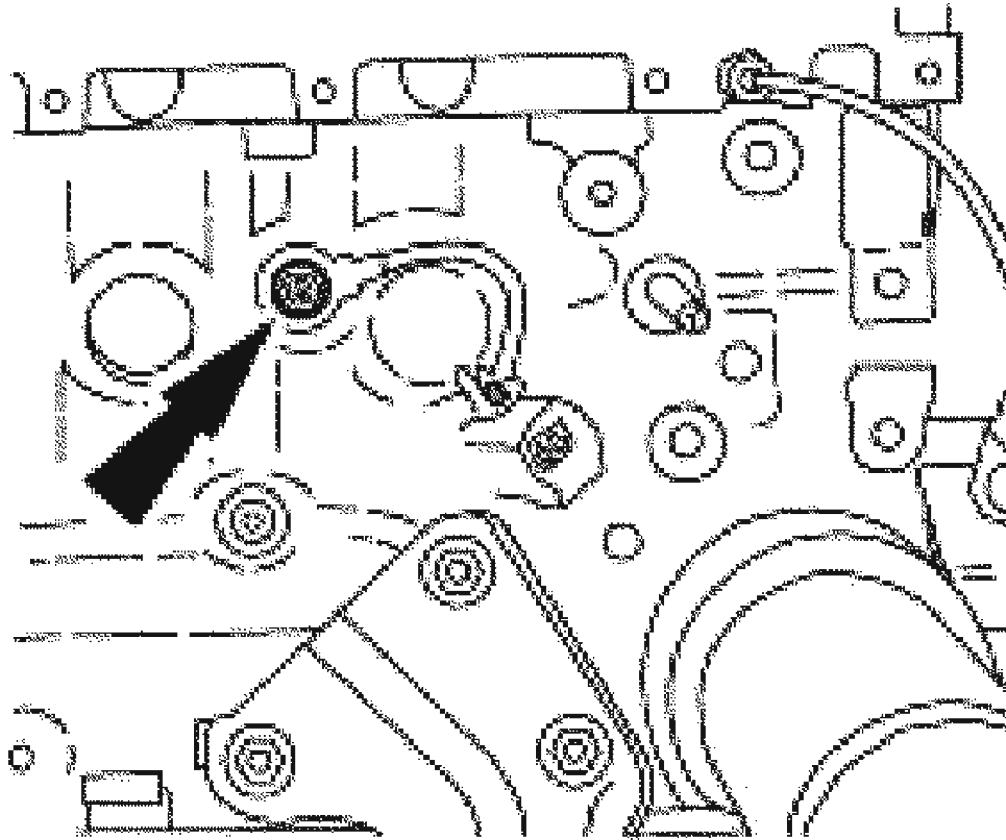
45. Remove the block heater if equipped.



G02738981

**Fig. 342: Removing Block Heater**  
Courtesy of FORD MOTOR CO.

46. Remove the knock sensor.

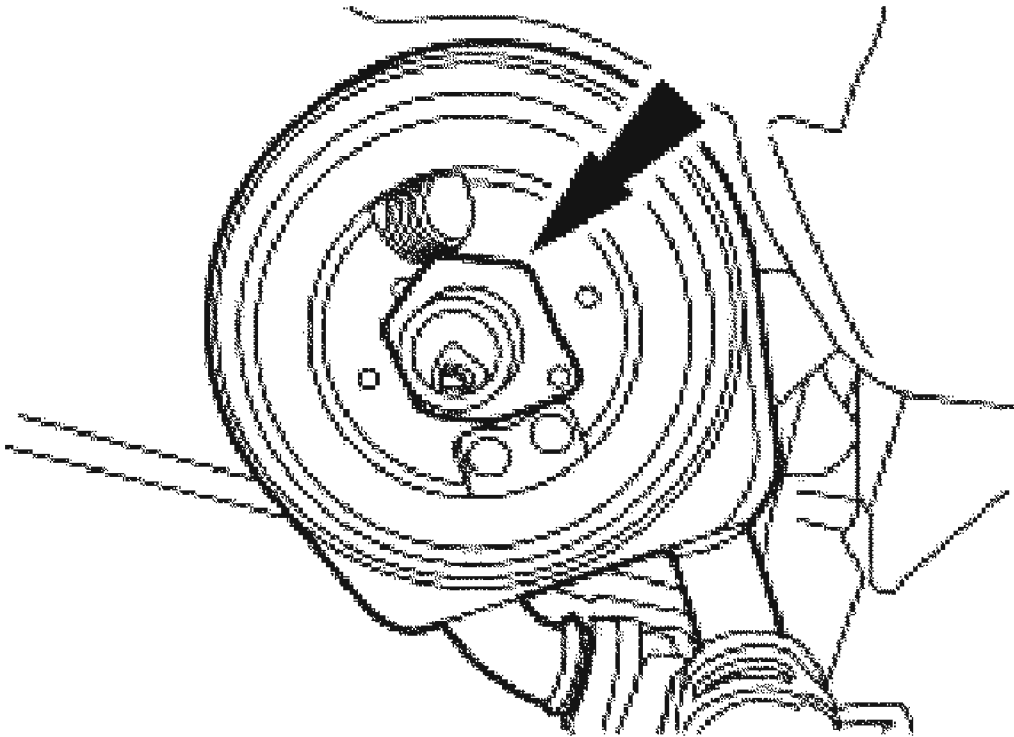


G02738982

**Fig. 343: Removing Knock Sensor**  
Courtesy of FORD MOTOR CO.

47. Remove the oil cooler.

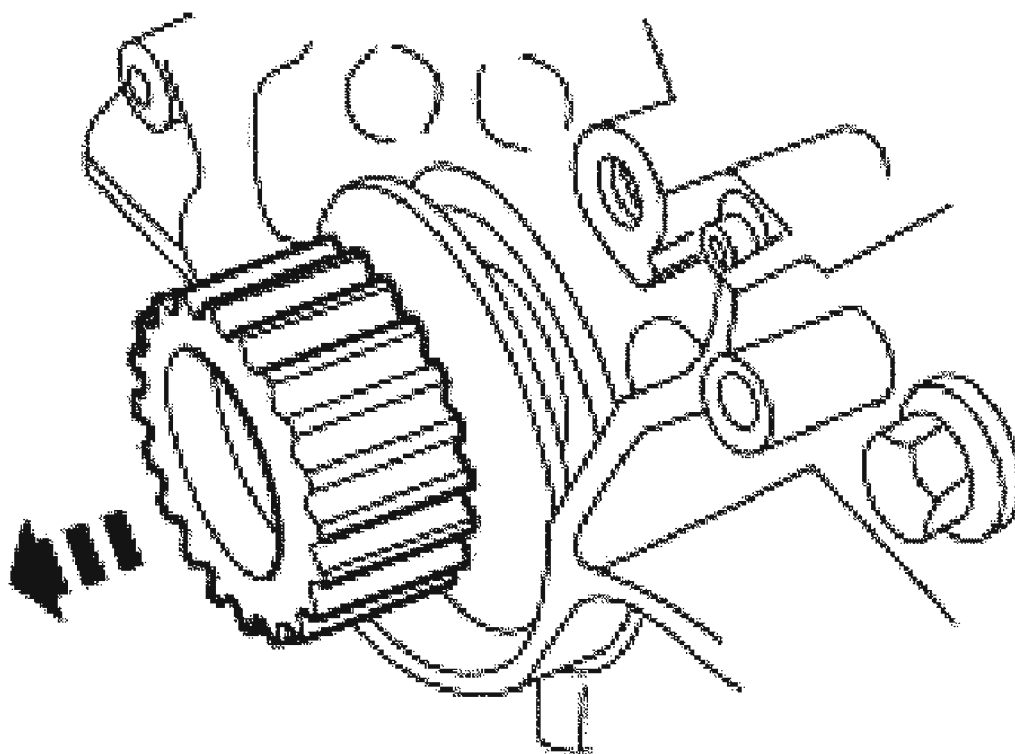




G02738983

**Fig. 344: Removing Oil Cooler**  
Courtesy of FORD MOTOR CO.

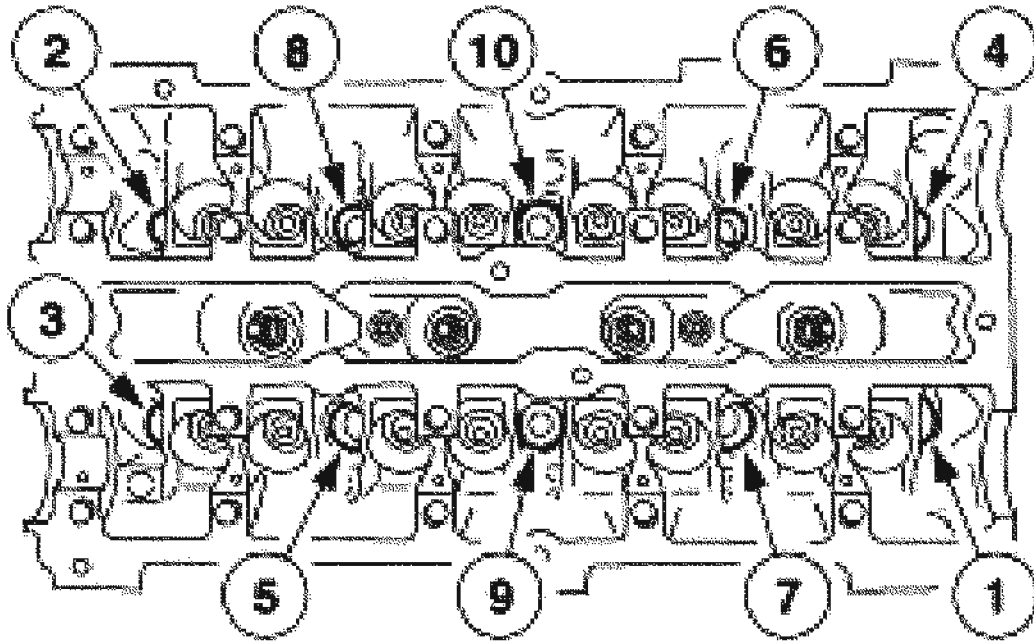
48. Remove the crankshaft sprocket and timing belt guide.



G02738984

**Fig. 345: Removing Crankshaft Sprocket And Timing Belt Guide**  
Courtesy of FORD MOTOR CO.

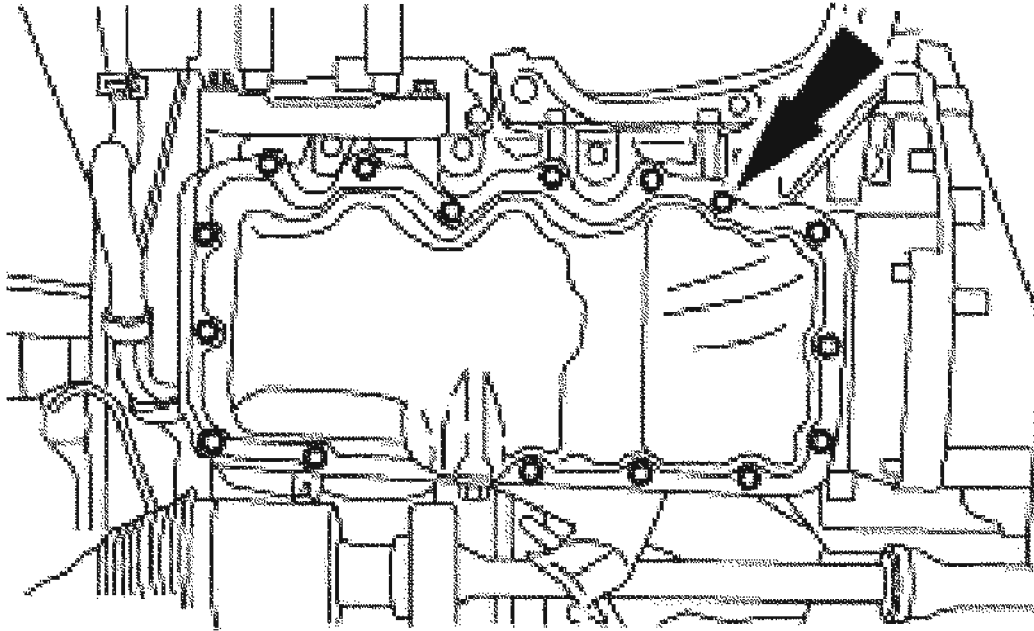
**CAUTION:** The bolts are torque-to-yield, new bolts must be installed or engine damage can occur.



G02738985

**Fig. 346: Identifying Removal Sequence Of Cylinder Head Bolts**  
Courtesy of FORD MOTOR CO.

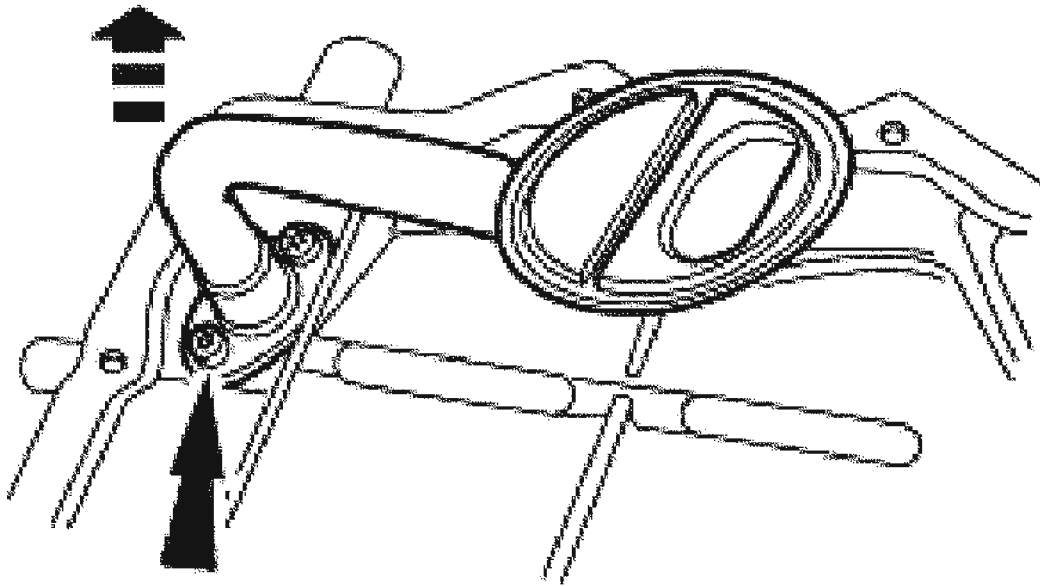
49. Remove the cylinder head using the sequence shown.
  - Discard the gasket.
  - Discard the bolts.
50. Remove the 17 bolts and the oil pan.



G02738986

**Fig. 347: Removing Oil Pan**  
**Courtesy of FORD MOTOR CO.**

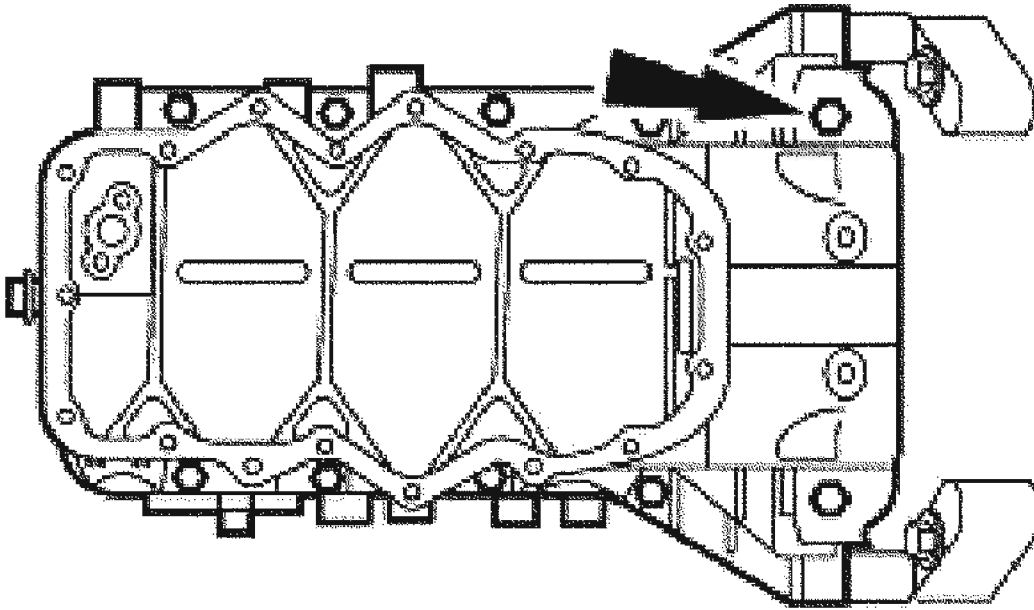
51. Remove the bolts and the oil pump cover and screen.
  - Carefully remove and discard the oil pump inlet tube gasket.



G02738987

**Fig. 348: Removing Oil Pump Cover And Screen**  
Courtesy of FORD MOTOR CO.

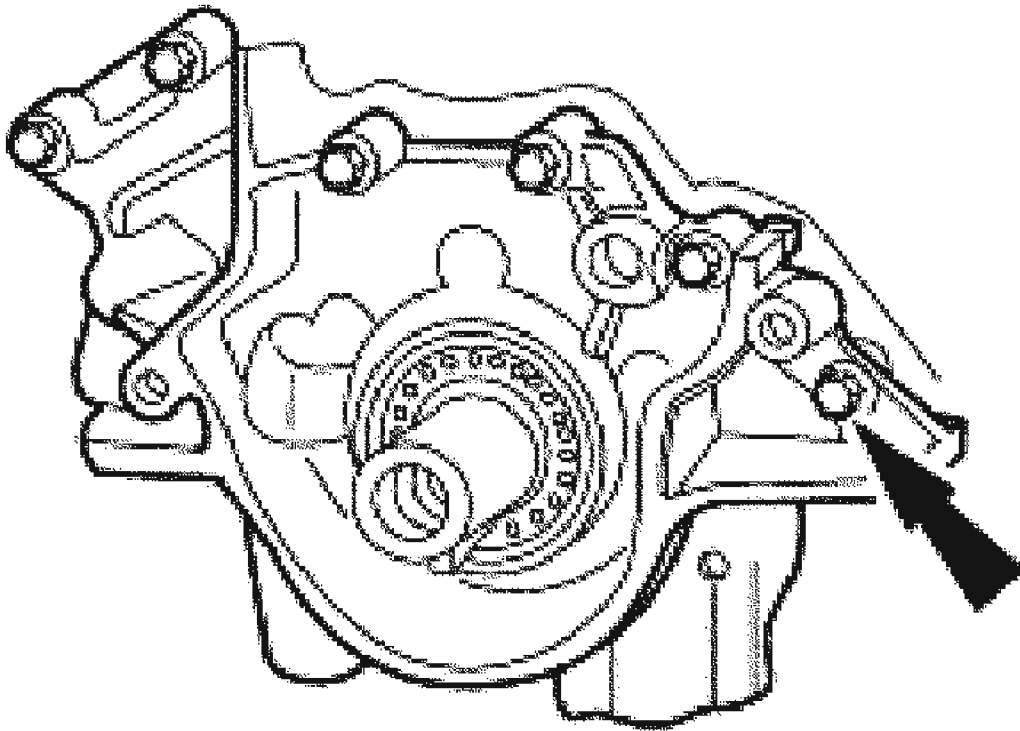
52. Remove the lower cylinder block and the gasket.



G02738988

**Fig. 349: Removing Lower Cylinder Block**  
Courtesy of FORD MOTOR CO.

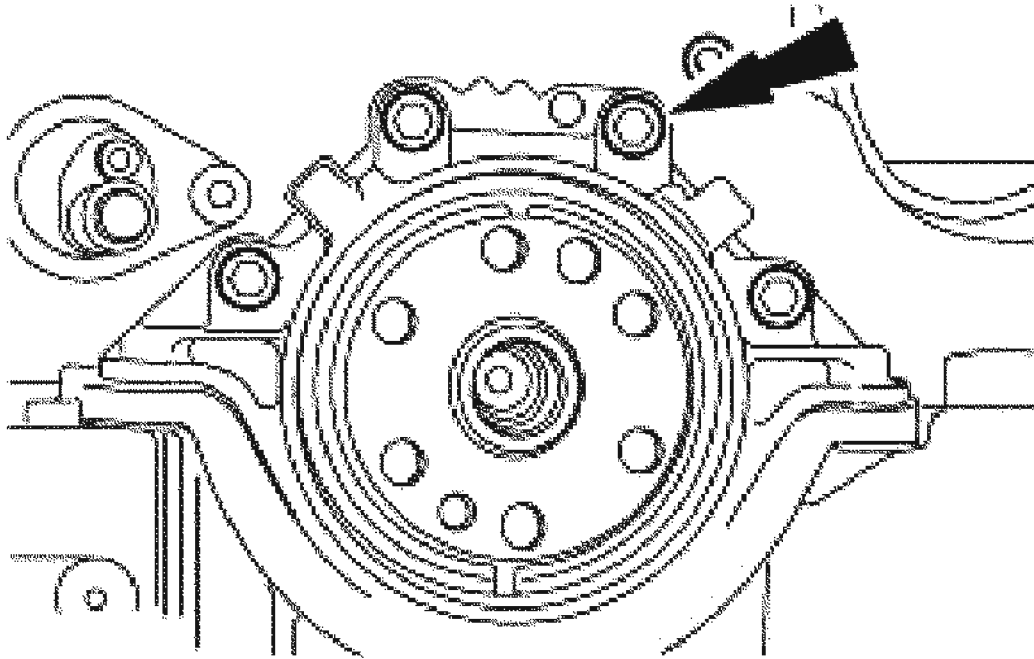
53. Remove the seven bolts and the oil pump.
  - Remove the oil pump to cylinder block gasket.



**G02738989**

**Fig. 350: Removing Oil Pump Bolts**  
**Courtesy of FORD MOTOR CO.**

54. Remove the rear main oil seal retainer assembly and discard the gasket.



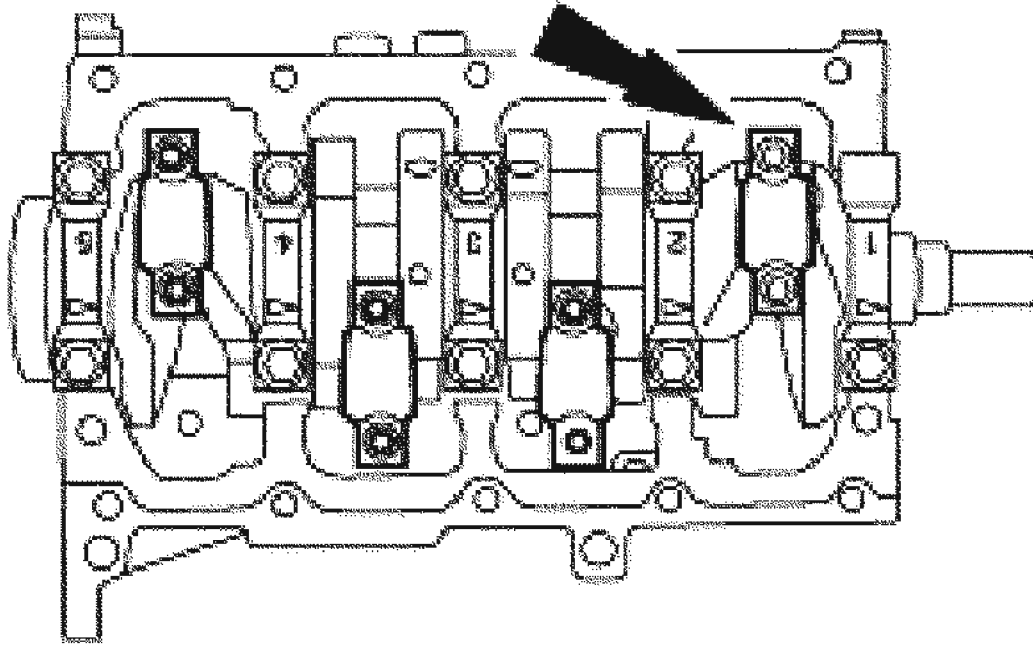
G02738990

**Fig. 351: Removing Rear Main Oil Seal Retainer Assembly**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The connecting rods and connecting rod caps must be correctly oriented and, the interlocking tangs on the same side of the connecting rod or possible engine damage may occur.

**CAUTION:** The connecting rod bolts are torque-to-yield. Discard the connecting rod bolts.

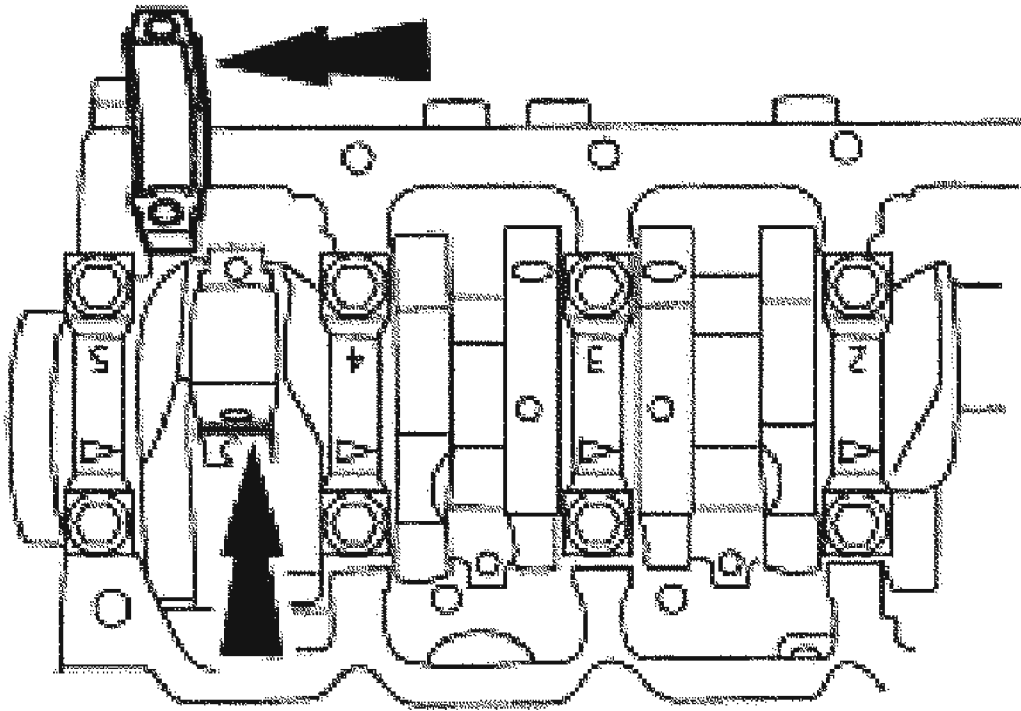




G02738991

**Fig. 352: Removing Connecting Rod Caps**  
Courtesy of FORD MOTOR CO.

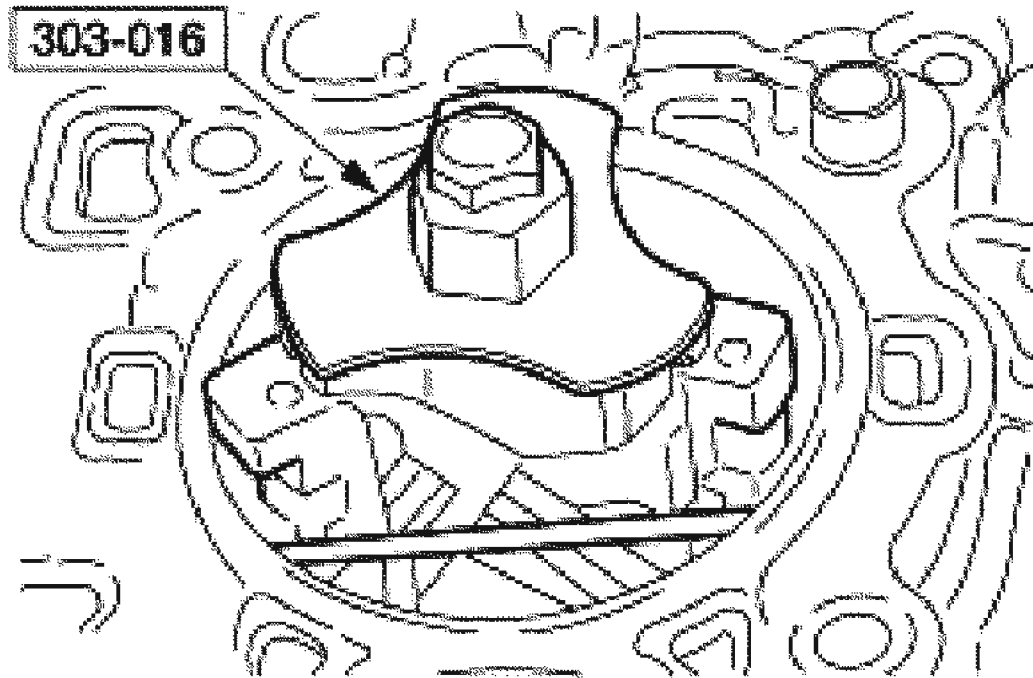
55. Remove the four connecting rod caps.
56. If the connecting rod bearings are to be reused, each one must be identified so that it can be installed in its original location. Remove the four upper and four lower connecting rod bearings.



G02738992

**Fig. 353: Removing Upper And Lower Connecting Rod Bearings**  
Courtesy of FORD MOTOR CO.

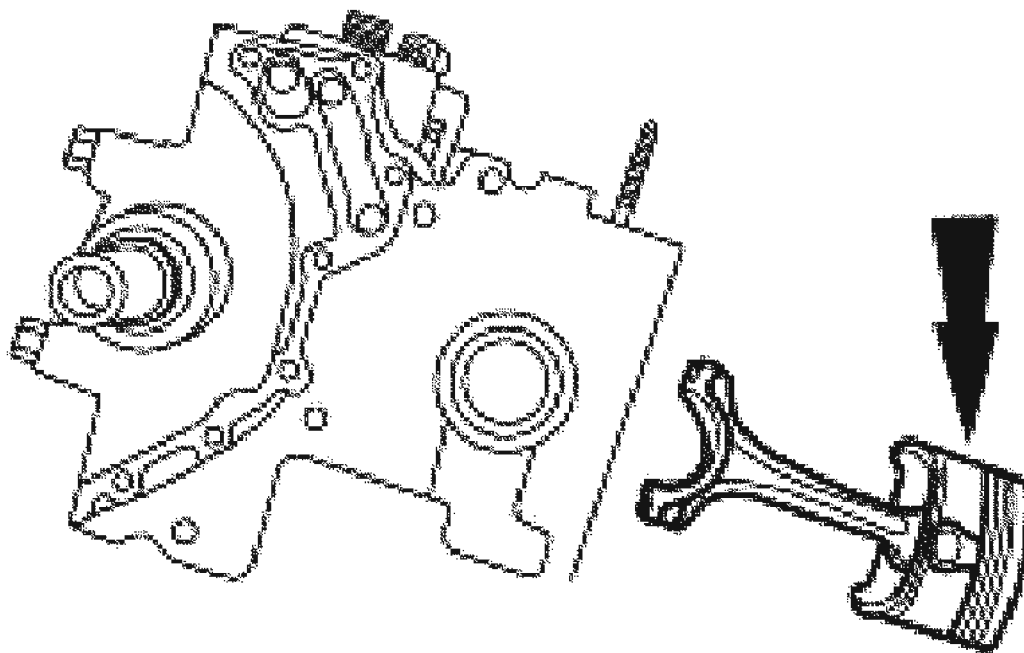
57. Use a suitable tool and remove the cylinder ridge.



G02738993

**Fig. 354: Removing Cylinder Ridge**  
Courtesy of FORD MOTOR CO.

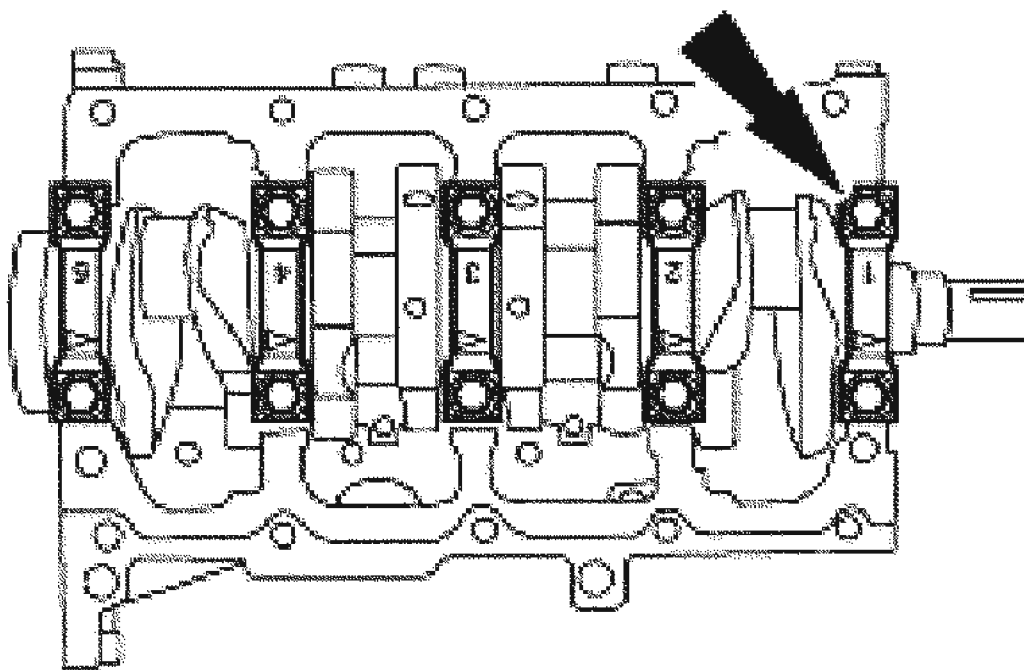
58. Remove the four piston and connecting rod assemblies.



G02738994

**Fig. 355: Removing Piston And Connecting Rod Assemblies**  
Courtesy of FORD MOTOR CO.

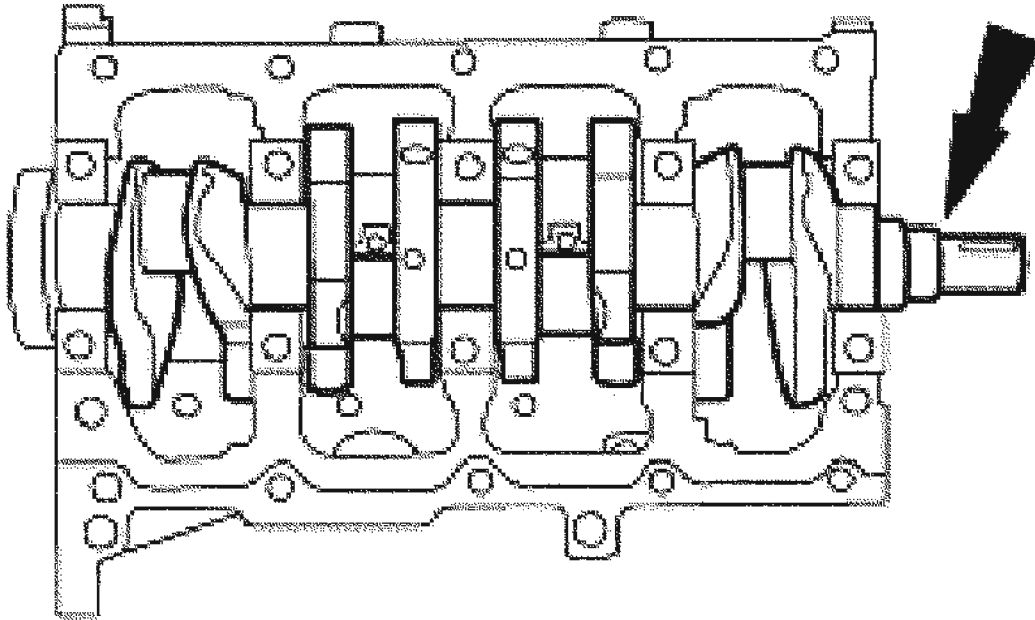
**CAUTION:** Make sure the main bearing caps are installed in their original position or possible engine damage may occur.



G02738995

**Fig. 356: Removing Crankshaft Main Bearing Caps And Bearings**  
Courtesy of FORD MOTOR CO.

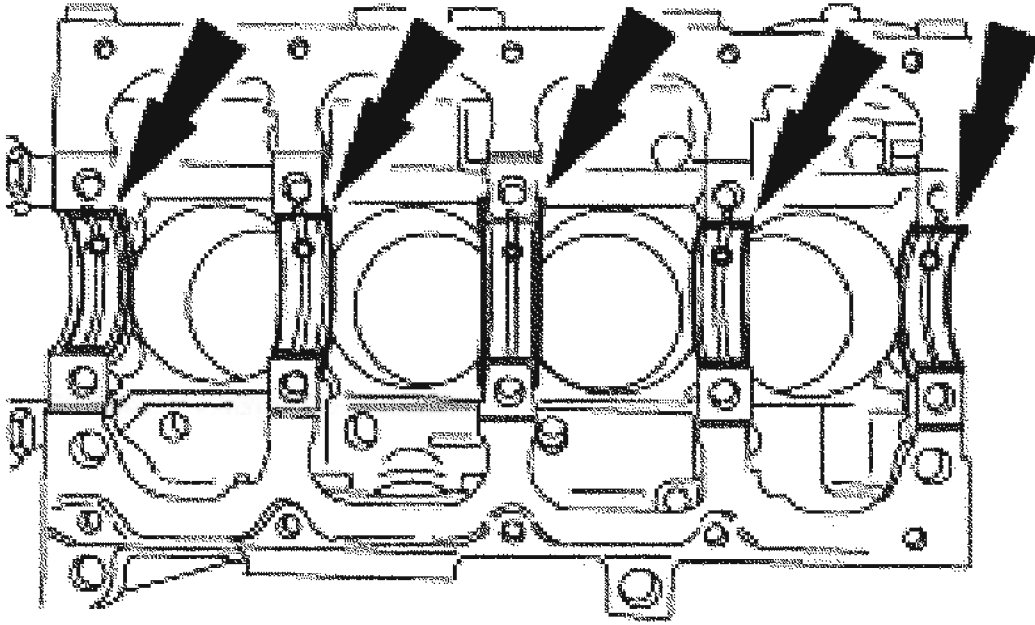
59. Remove the bolts and remove the crankshaft main bearing caps and bearings.
60. Remove the crankshaft.



G02738996

**Fig. 357: Removing Crankshaft**  
Courtesy of FORD MOTOR CO.

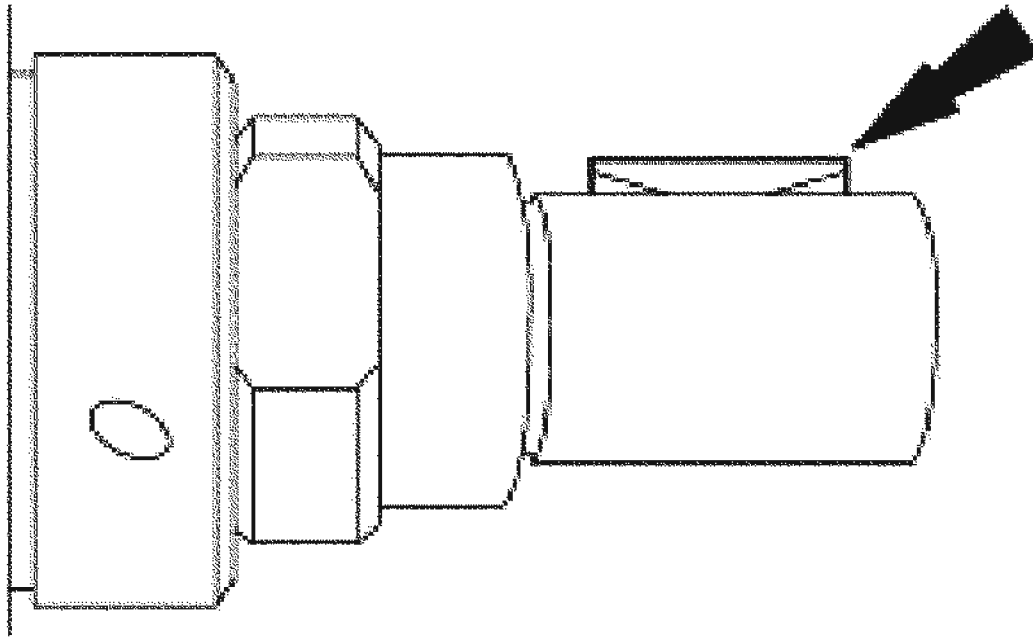
61. Remove the upper crankshaft main bearings.



G02738997

**Fig. 358: Removing Upper Crankshaft Main Bearings**  
Courtesy of FORD MOTOR CO.

62. Remove the Woodruff key.



G02738998

**Fig. 359: Removing Woodruff Key**  
Courtesy of FORD MOTOR CO.


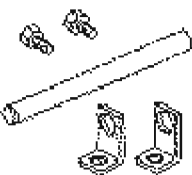


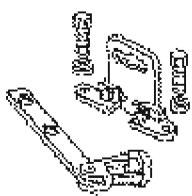
## DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

### CYLINDER HEAD



## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

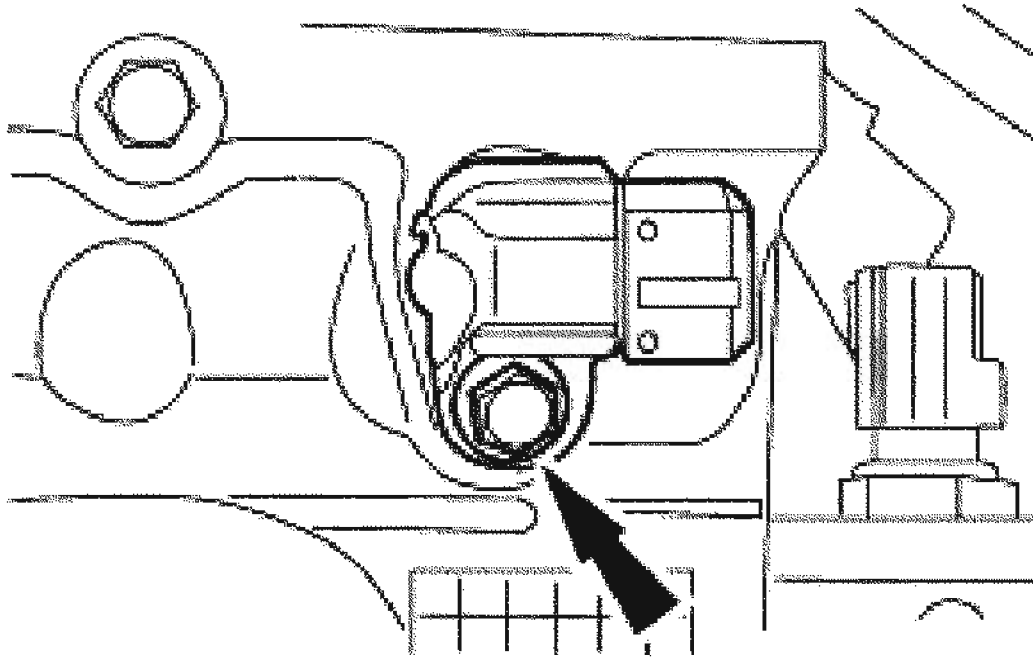
	Impact Hammer 307-005 (T59L-100-B)
	Valve Spring Compressor Set 303-300 (T87C-6565-A)
	Valve Stem Seal Remover 303-468 (T94P-6510-AH)
	Valve Stem Seal Replacer 303-470 (T94P-6510-CH)
	Valve Spring Compressor 303-350 (T89P-6565-A)

GQ2738999

**Fig. 360: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Disassembly

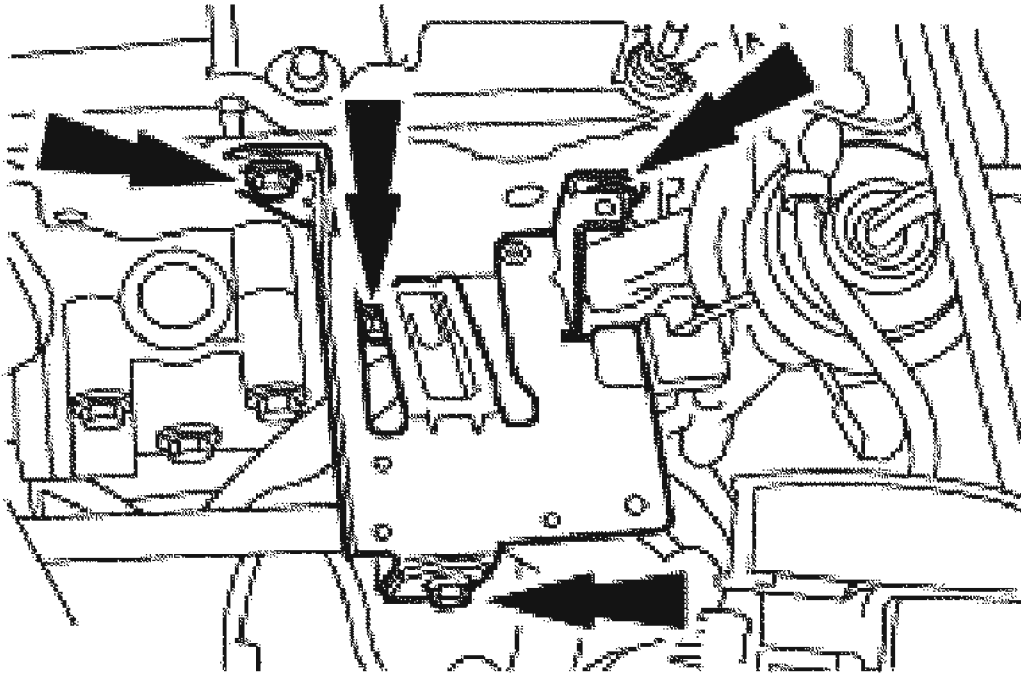
1. Remove the camshaft sensor.



G02739000

**Fig. 361: Removing Camshaft Sensor**  
Courtesy of FORD MOTOR CO.

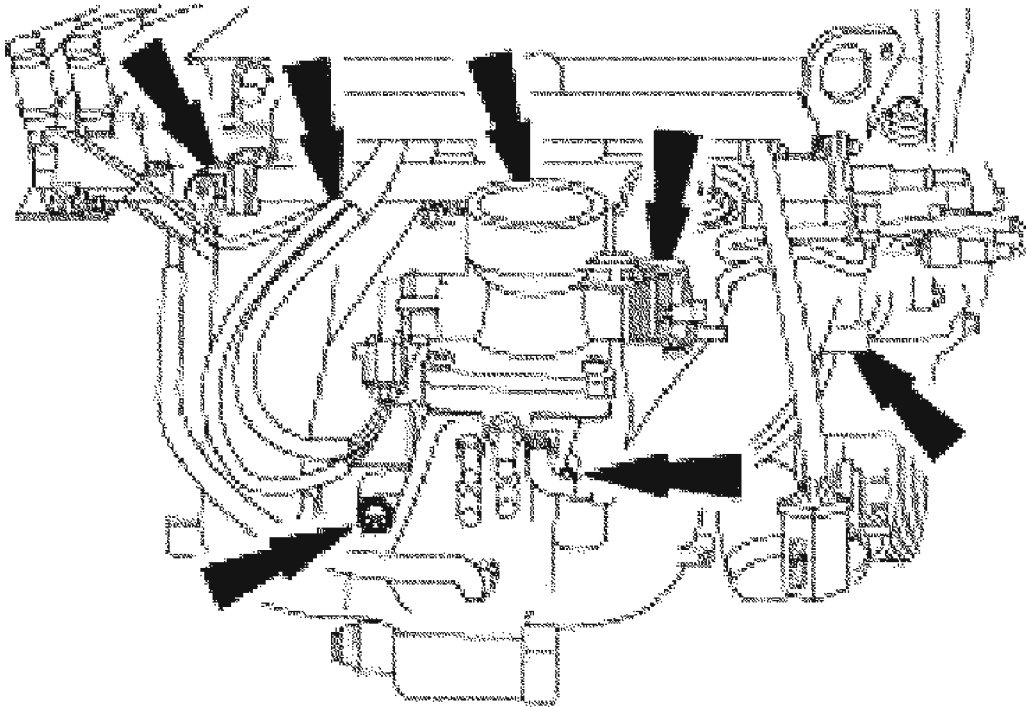
2. Remove the ignition coil bracket.



G02739001

**Fig. 362: Removing Ignition Coil Bracket**  
Courtesy of FORD MOTOR CO.

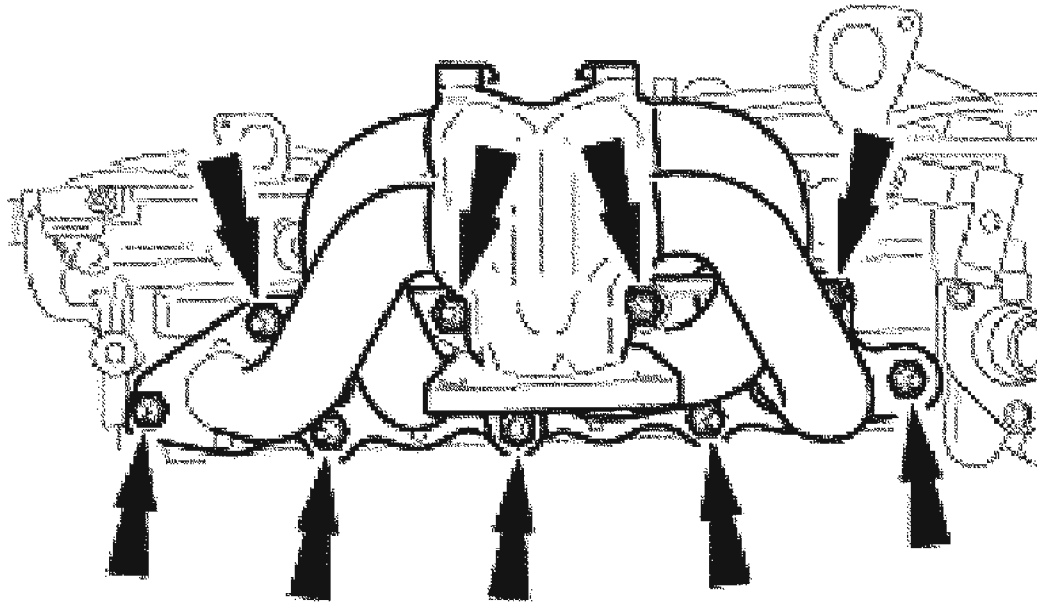
3. Remove the intake manifold.



G02739002

**Fig. 363: Removing Intake Manifold**  
Courtesy of FORD MOTOR CO.

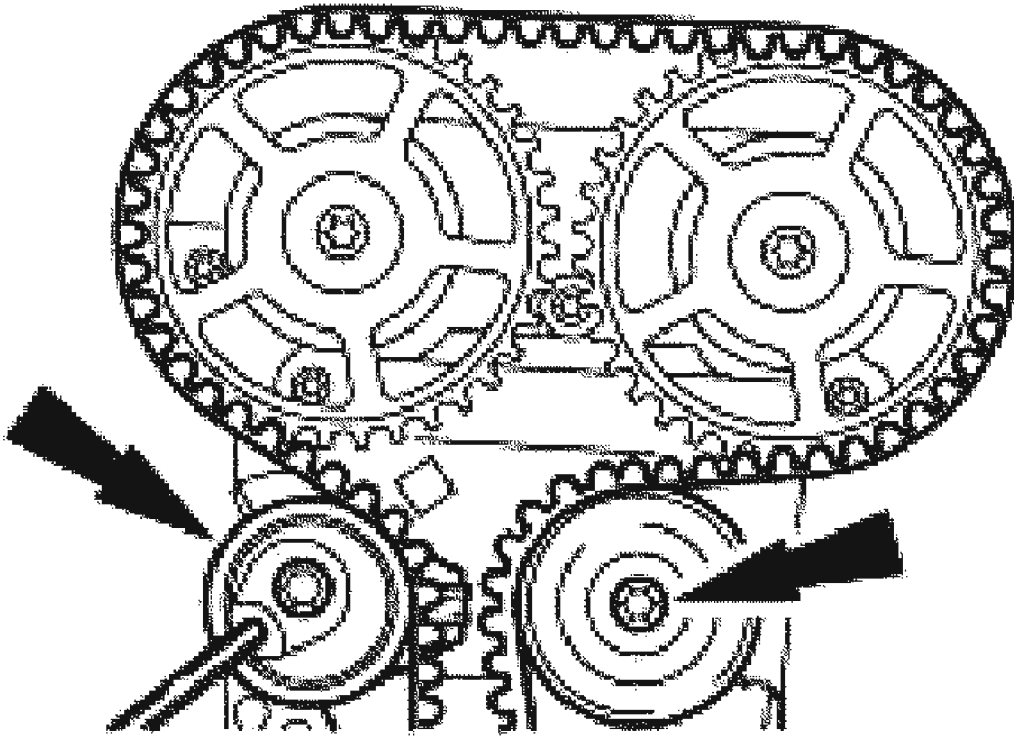
4. Remove the exhaust manifold.



G02739003

**Fig. 364: Removing Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

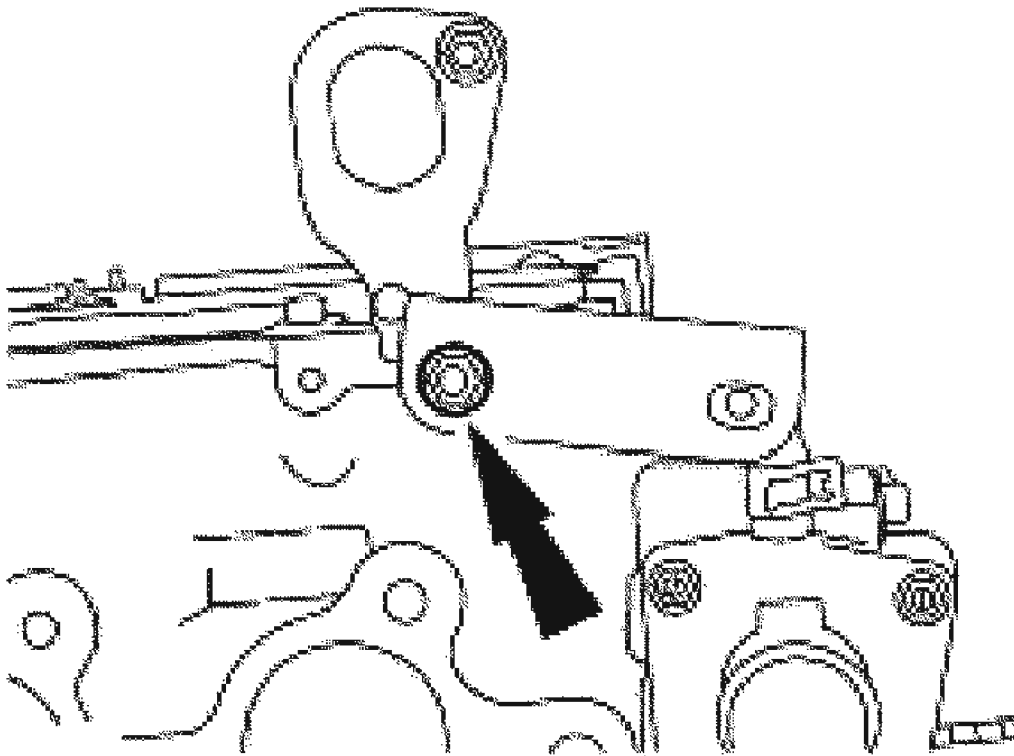
5. Remove the timing belt tensioner and pulley.



G02739004

**Fig. 365: Removing Timing Belt Tensioner And Pulley**  
Courtesy of FORD MOTOR CO.

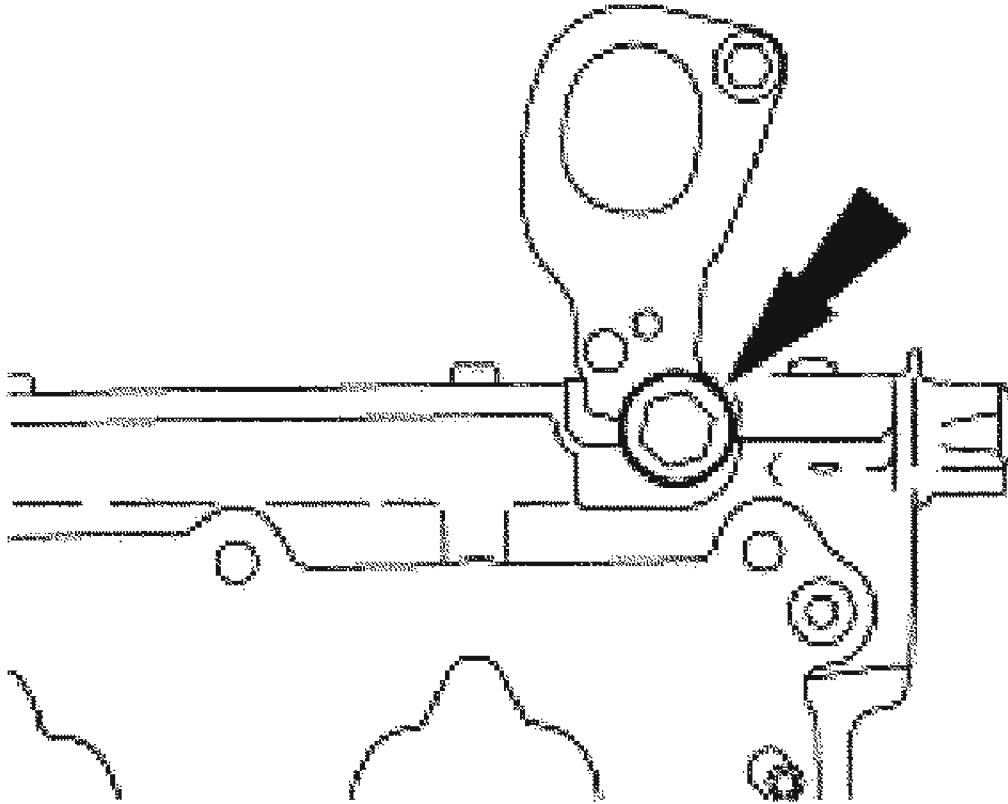
6. Remove the inner timing belt cover.
7. Remove the bracket.



G02739005

**Fig. 366: Removing Bracket**  
Courtesy of FORD MOTOR CO.

8. Remove the rear lifting eye.

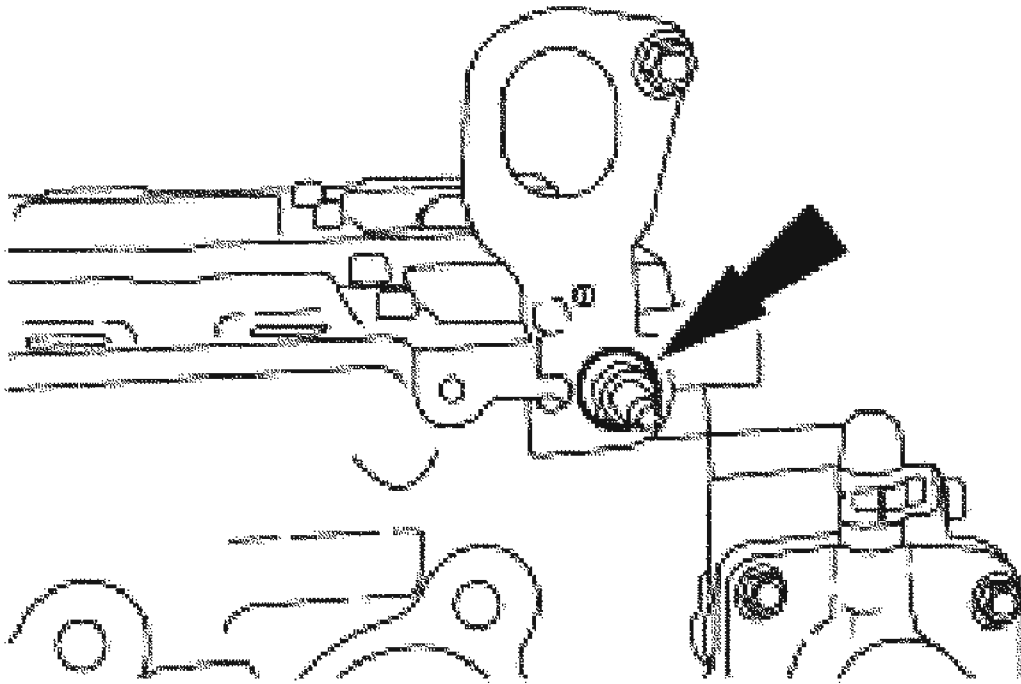


G02739006

**Fig. 367: Removing Rear Lifting Eye**  
Courtesy of FORD MOTOR CO.

9. Remove the front lifting eye.

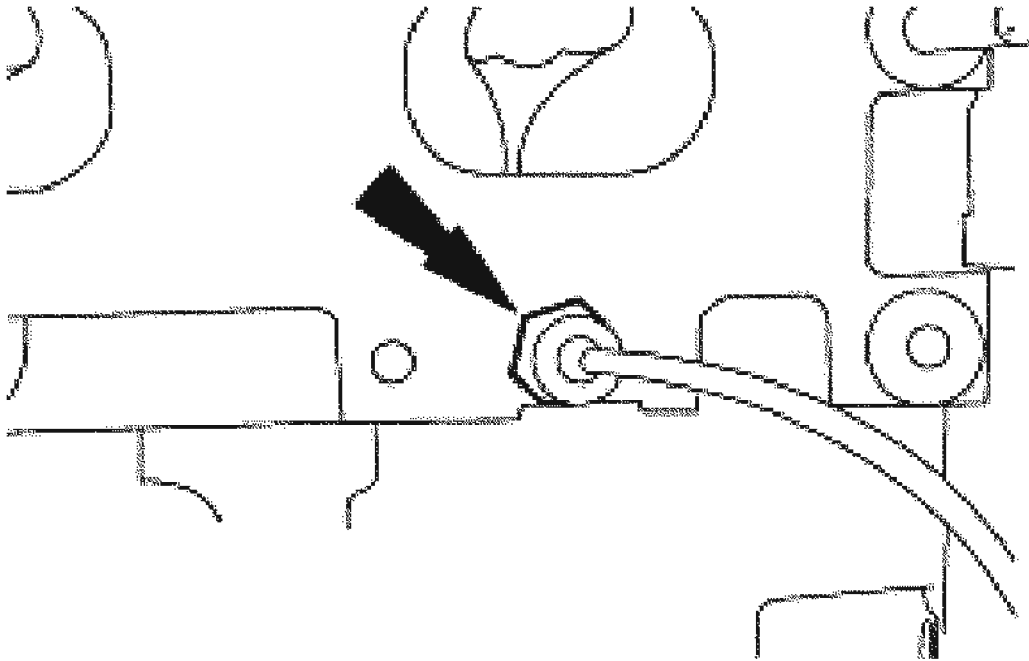




G02739007

**Fig. 368: Removing Front Lifting Eye**  
Courtesy of FORD MOTOR CO.

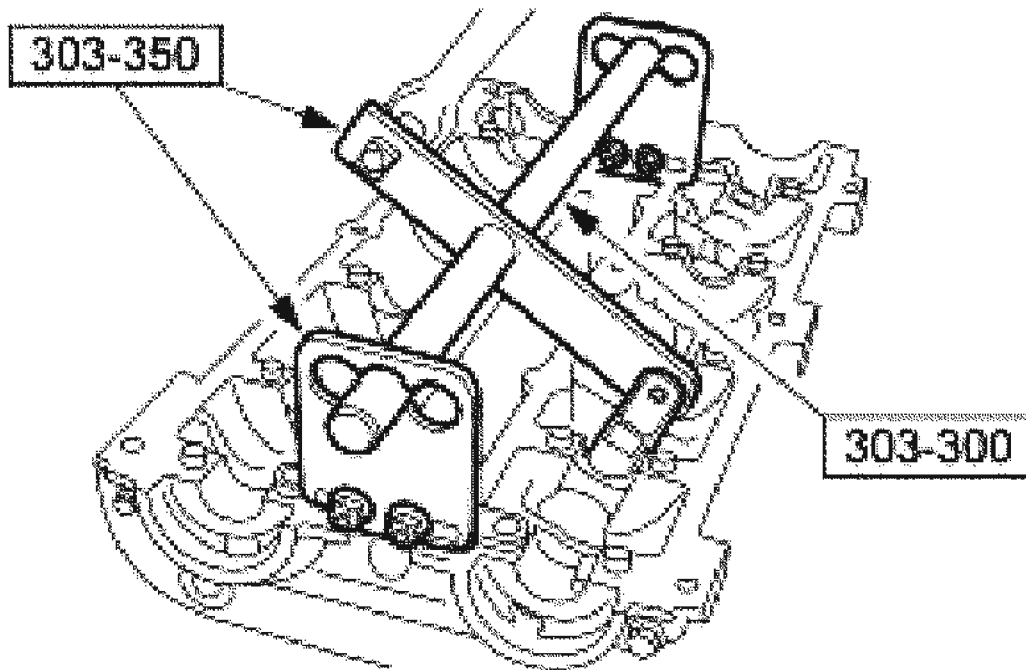
10. Remove the cylinder head temperature (CHT) sensor.



G02739008

**Fig. 369: Removing Cylinder Head Temperature (CHT) Sensor**  
Courtesy of FORD MOTOR CO.

11. Using the special tools, compress the valve spring and remove the valve spring retainer keys, the valve spring retainers, and the valve springs.
  - Remove the special tools.

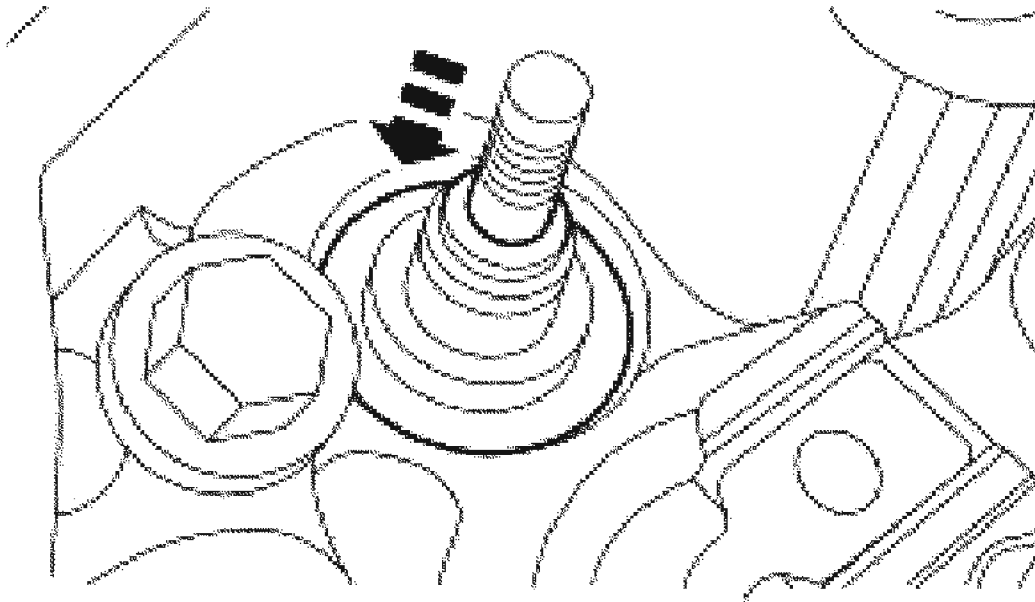


G02739009

**Fig. 370: Removing Valve Spring Retainer Keys, Valve Spring Retainers, And Valve Springs**  
Courtesy of FORD MOTOR CO.

12. Inspect the valve spring, valve spring retainer and valve spring retainer key. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** . Install new parts as necessary.

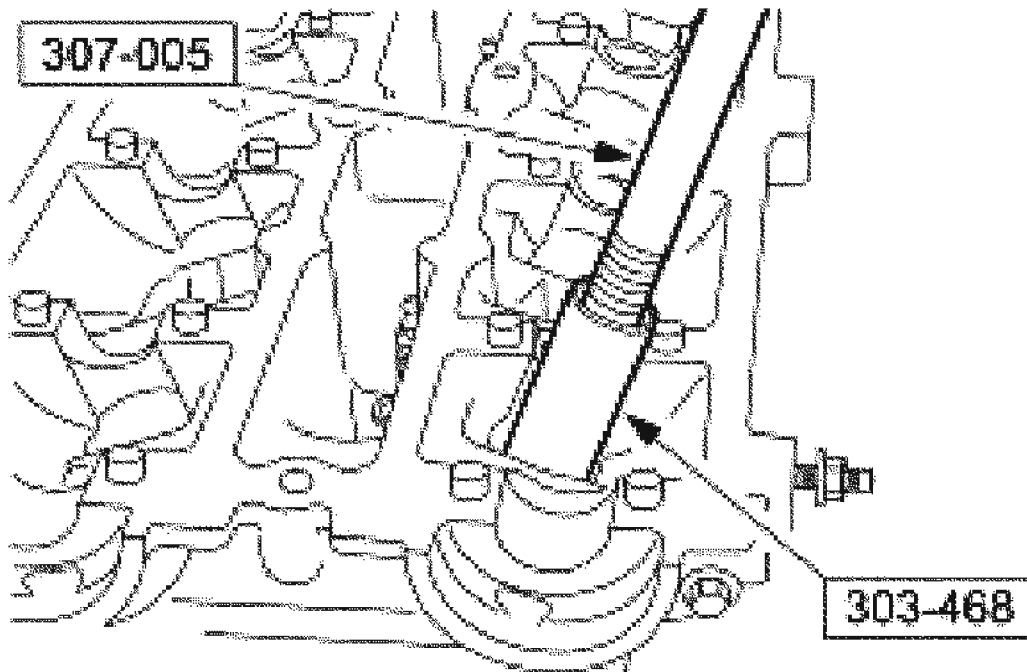
**NOTE:**        **Mark each valve if the original valves are to be used.**



G02739010

**Fig. 371: Removing Valves**  
Courtesy of FORD MOTOR CO.

13. Remove the valves.
14. Using the special tools, remove and discard the valve stem seals.

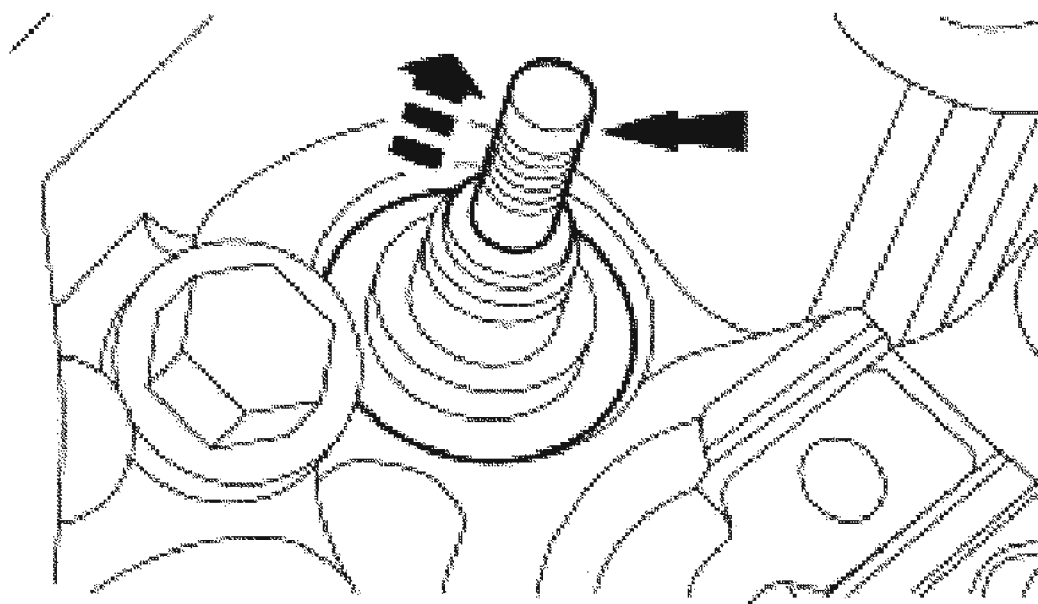


**Fig. 372: Removing Valve Stem Seals**  
Courtesy of FORD MOTOR CO.

15. Inspect the valves. For additional information refer to **ENGINE SYSTEM-GENERAL INFORMATION** . Install new parts as necessary.

**Assembly**

**NOTE:** If installing the original valves, make sure the valves are installed in the position from which they were removed. Coat the valve stems with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

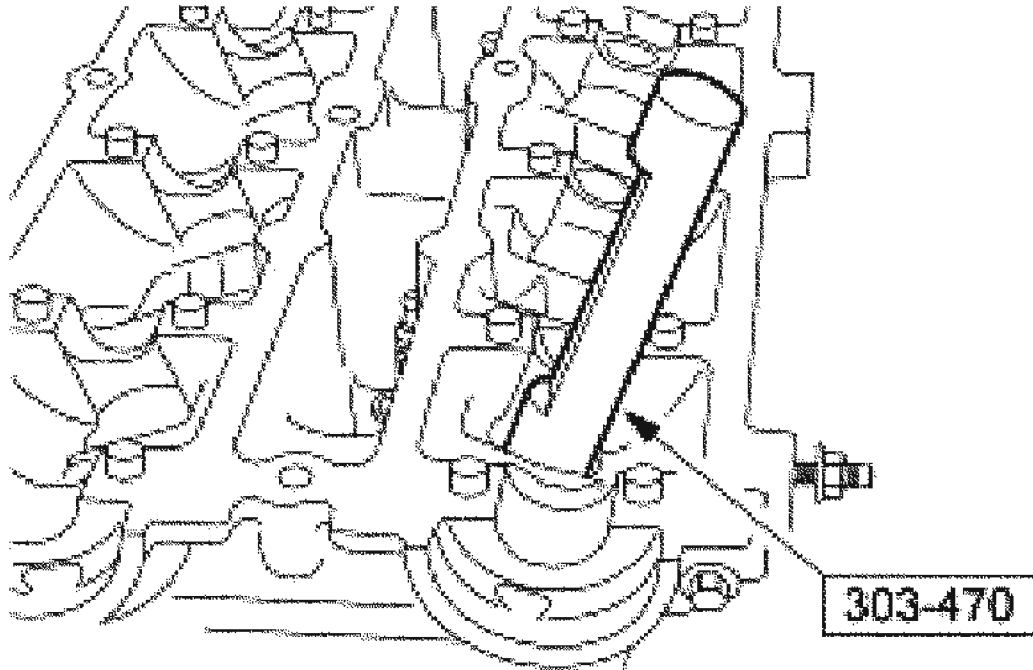


G02739012

**Fig. 373: Installing Valves**  
Courtesy of FORD MOTOR CO.

1. Install the valves.

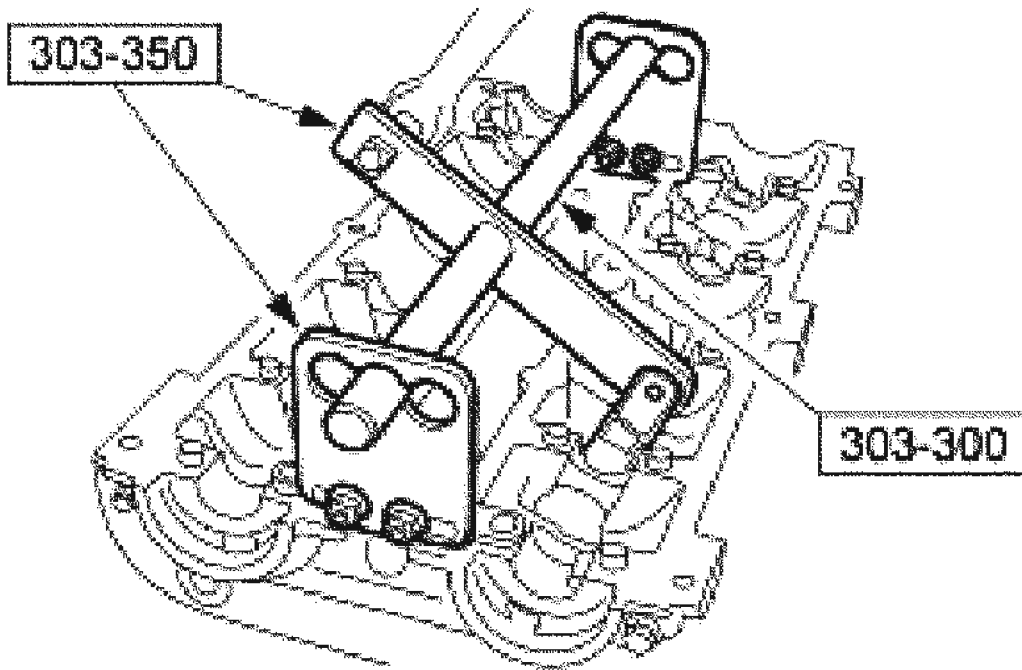
**NOTE:** Use the seal protector provided with the replacement kit to prevent damage to the valve stem seals.



G02739013

**Fig. 374: Installing Valve Stem Seals Onto Cylinder Head Valve Guides**  
Courtesy of FORD MOTOR CO.

2. Lubricate valve and guides with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H and using the special tool install the valve stem seals onto the cylinder head valve guides.
3. Place the valve spring in position over the valve and install the valve spring retainer.
4. Using the special tools, compress the valve spring and install the valve spring retainer keys.
  - Remove the special tools.

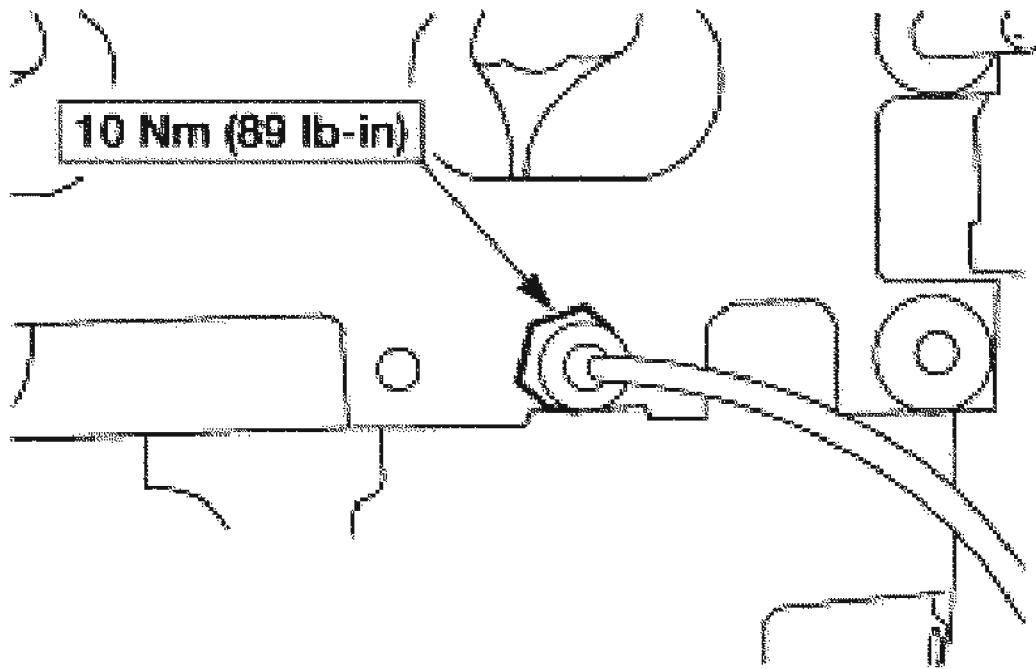


G02739014

**Fig. 375: Installing Valve Spring Retainer Keys**  
Courtesy of FORD MOTOR CO.

5. Install the CHT sensor.

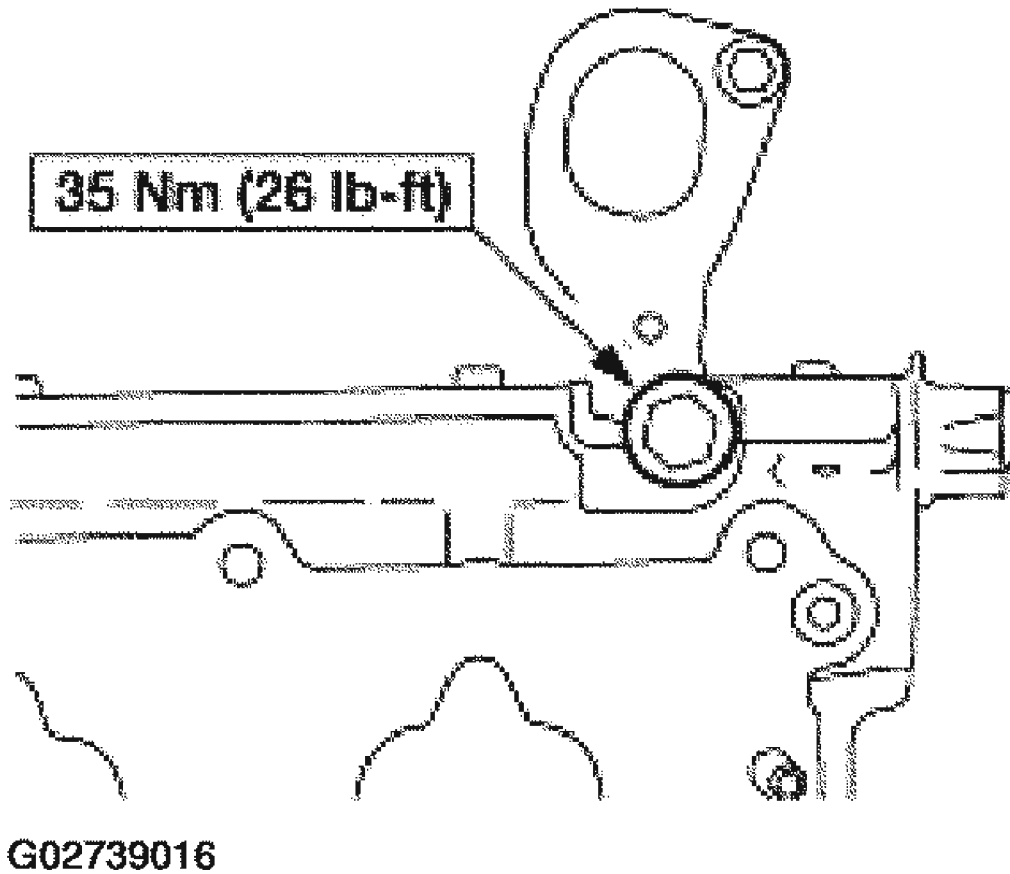




G02739015

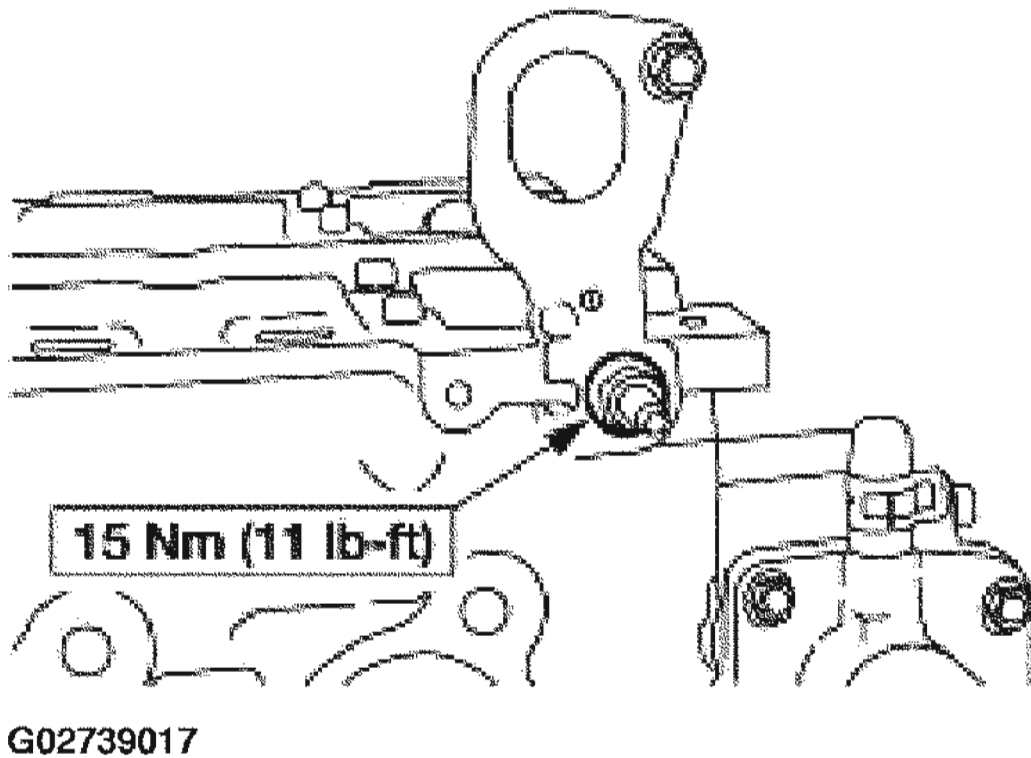
**Fig. 376: Installing CHT Sensor**  
Courtesy of FORD MOTOR CO.

6. Install the front lifting eye.



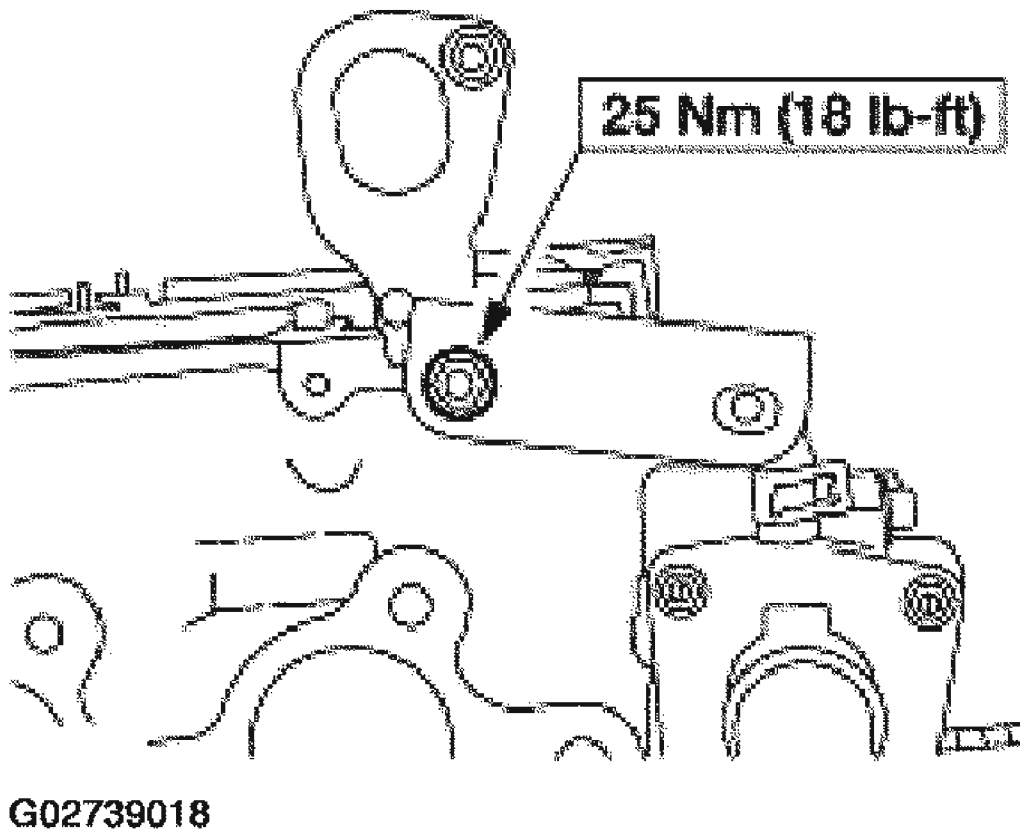
**Fig. 377: Identifying Front Lifting Eye Bolt Torque Specification**  
**Courtesy of FORD MOTOR CO.**

7. Install the rear lifting eye.



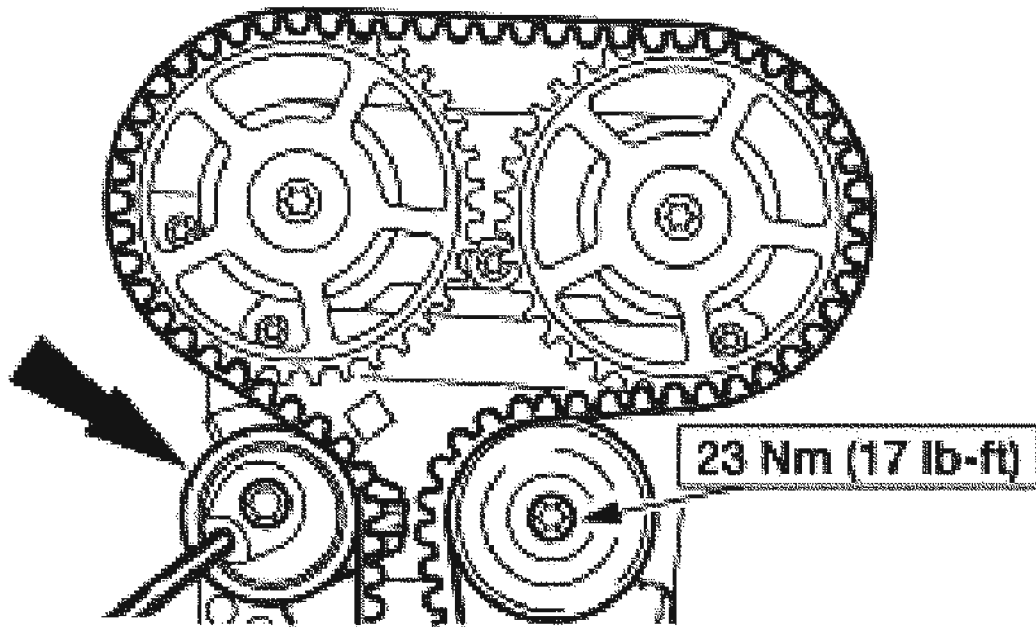
**Fig. 378: Identifying Rear Lifting Eye Torque Specification**  
Courtesy of FORD MOTOR CO.

8. Install the bracket.



**Fig. 379: Identifying Bracket Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

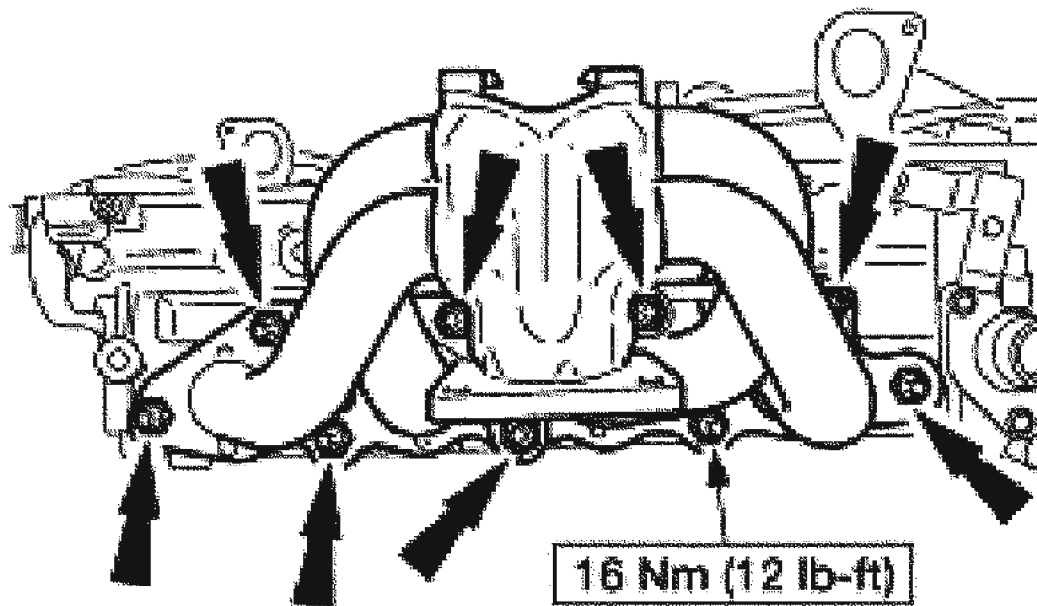
9. Install the inner timing belt cover.
10. Install the timing belt tensioner and pulley.



G02739019

**Fig. 380: Identifying Timing Belt Tensioner And Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

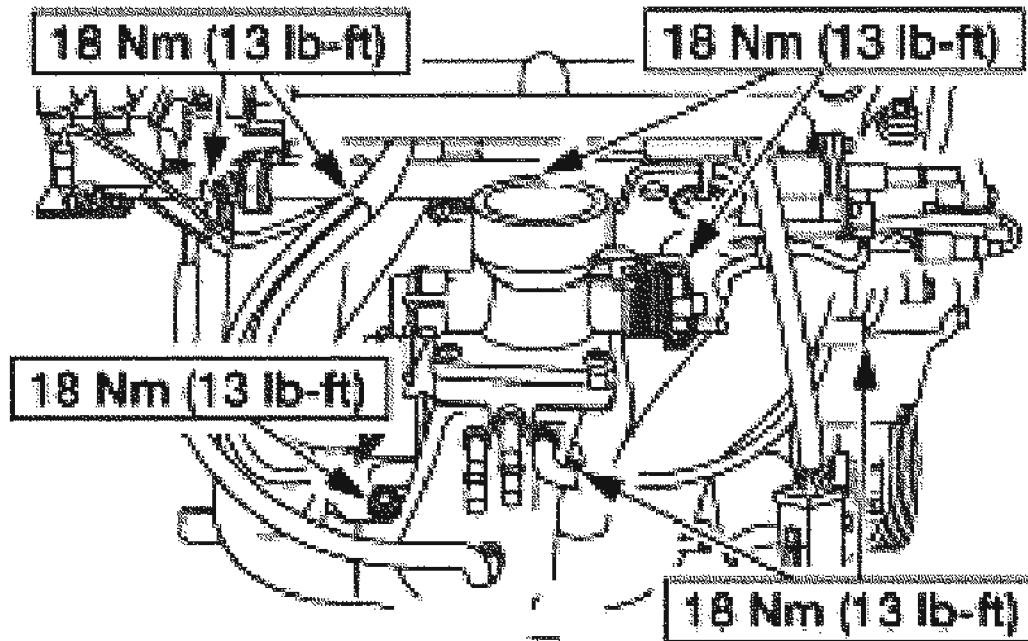
11. Install the exhaust manifold.



G02739020

**Fig. 381: Identifying Exhaust Manifold Bolts Torque Specification**  
**Courtesy of FORD MOTOR CO.**

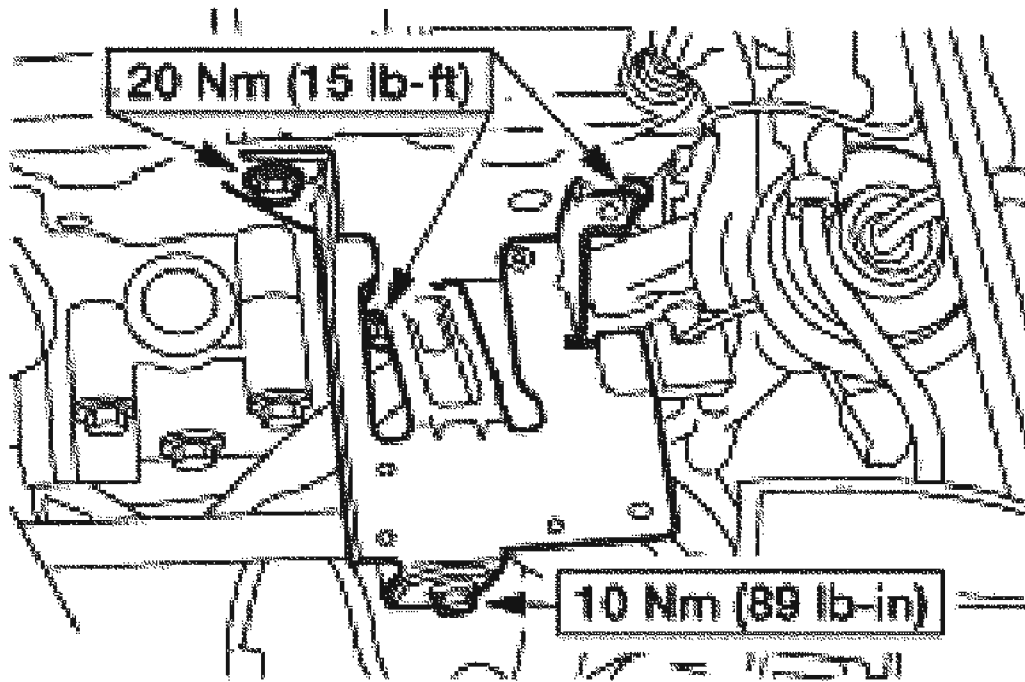
12. Install the intake manifold.



G02739021

**Fig. 382: Identifying Intake Manifold Torque Specification**  
Courtesy of FORD MOTOR CO.

13. Install the ignition coil bracket.

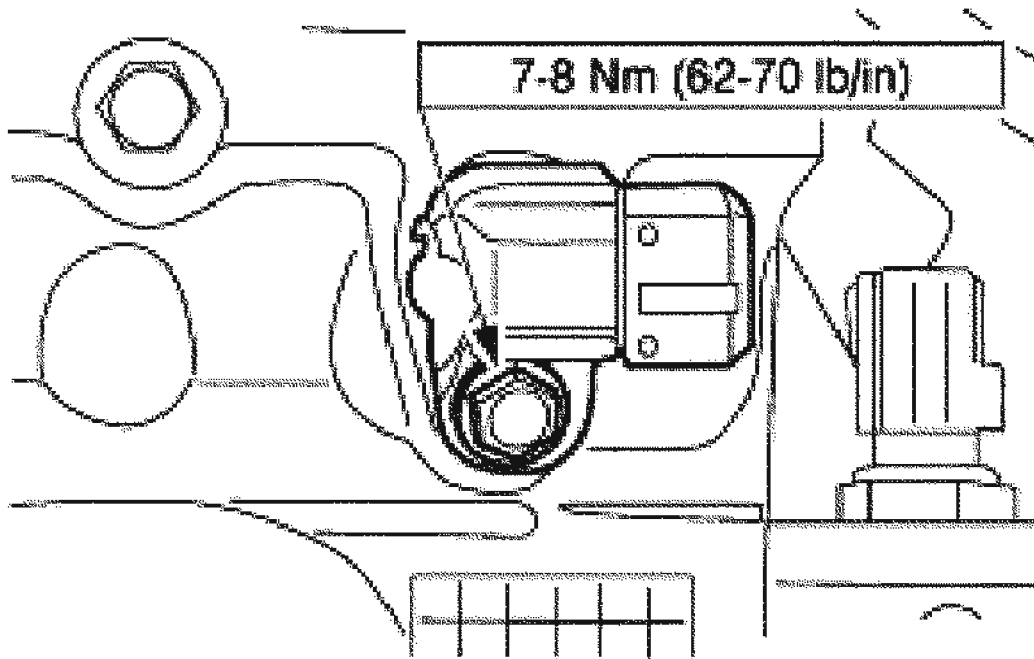


G02739022

**Fig. 383: Identifying Ignition Coil Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

14. Install the camshaft sensor.

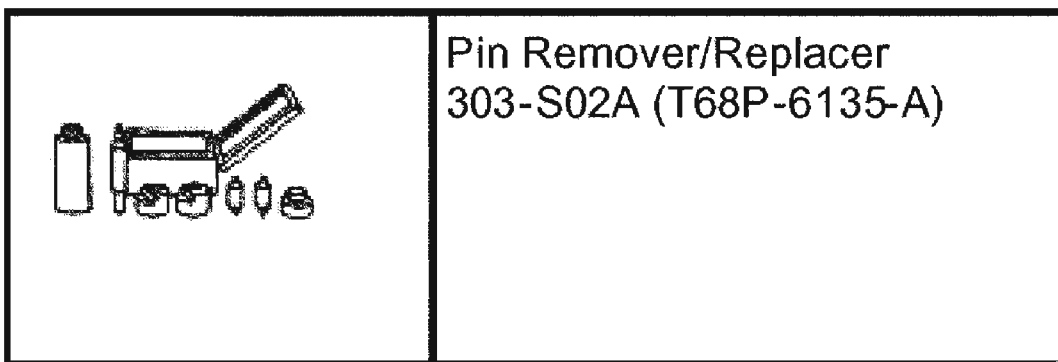




G02739023

**Fig. 384: Identifying Camshaft Sensor Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

PISTON - PIN CONNECTING ROD ASSEMBLY, PRESS FIT

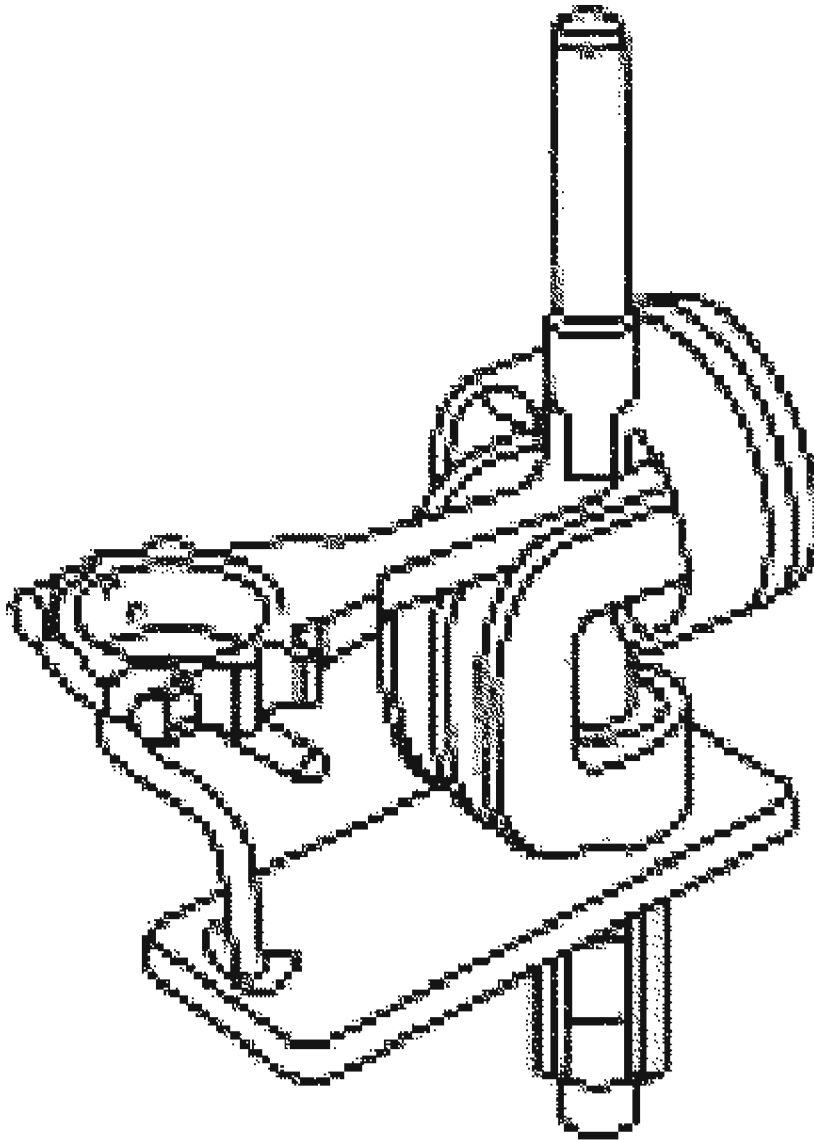


G02739024

**Fig. 385: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

Disassembly

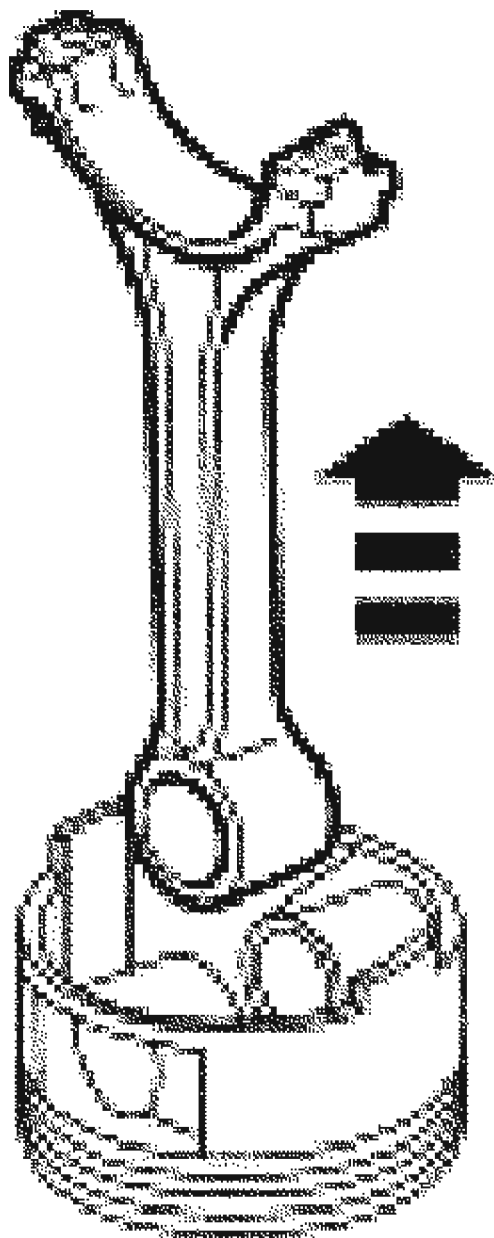
1. Use the Piston Pin Tool to press the piston pin out from the piston assembly and connecting rod.



G02739025

**Fig. 386: Pressing Piston Pin Out From Piston Assembly And Connecting Rod**  
Courtesy of FORD MOTOR CO.

2. Remove the connecting rod and piston ring from the piston.



G02739026

**Fig. 387: Removing Connecting Rod And Piston Ring From Piston**  
Courtesy of FORD MOTOR CO.

3. Clean and inspect the piston, piston pin and connecting rod. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

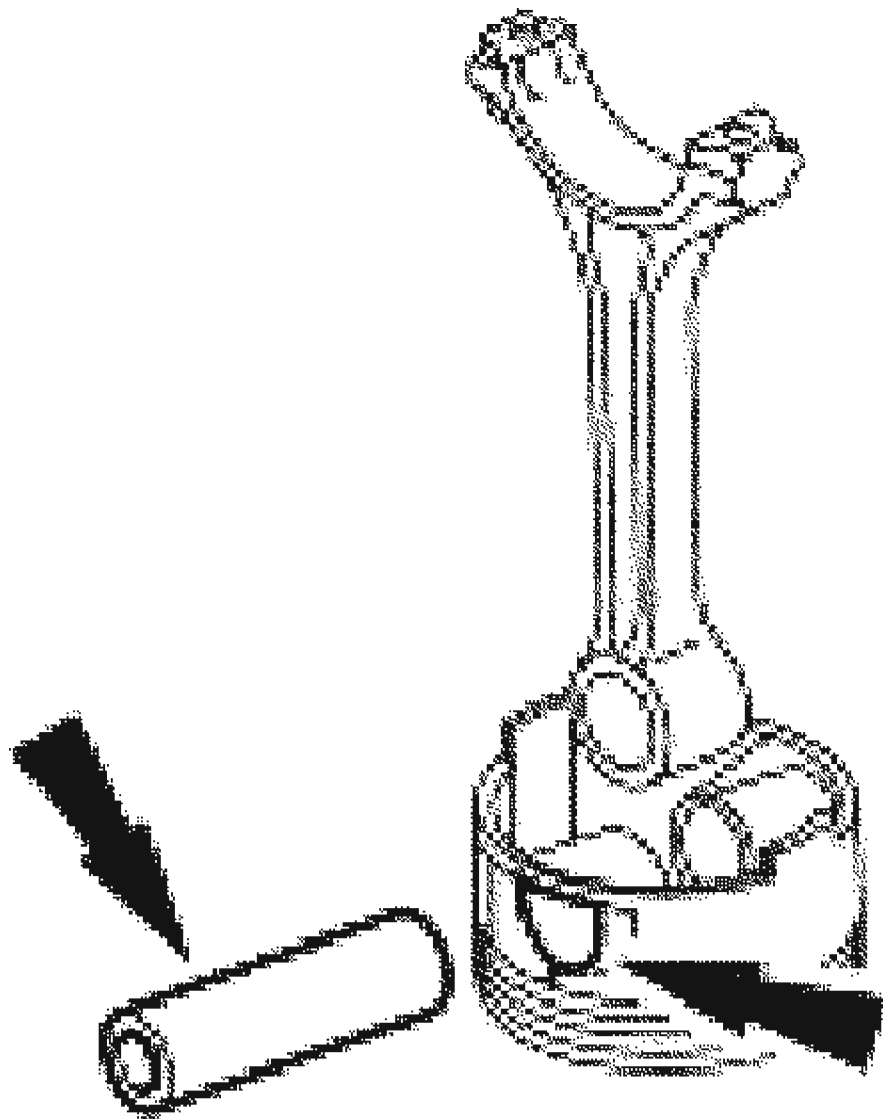
## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

### Assembly

**CAUTION:** PIP mark on piston and squirt groove on connecting rods must be located on the intake side of engine or possible engine damage may occur.

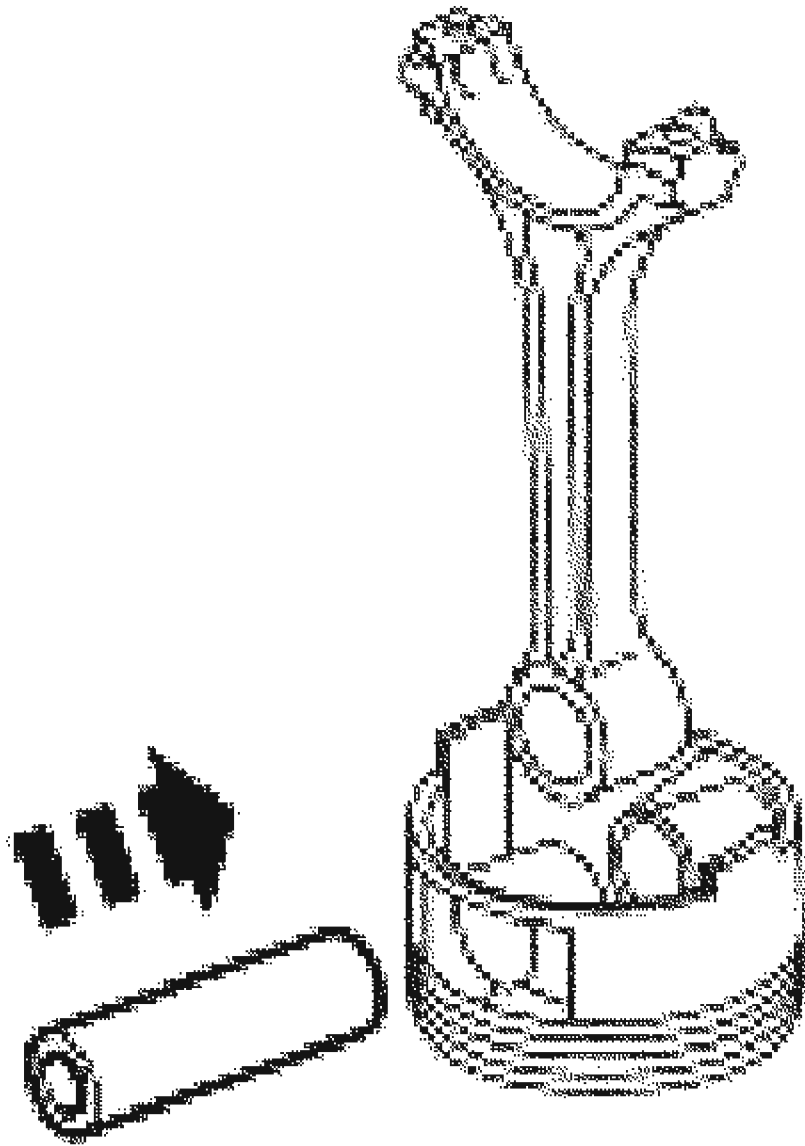
**CAUTION:** The arrow on the piston must point toward the front of the engine or engine damage may occur.



G02739027

**Fig. 388: Identifying Piston Pin And Piston Pin Bore**  
Courtesy of FORD MOTOR CO.

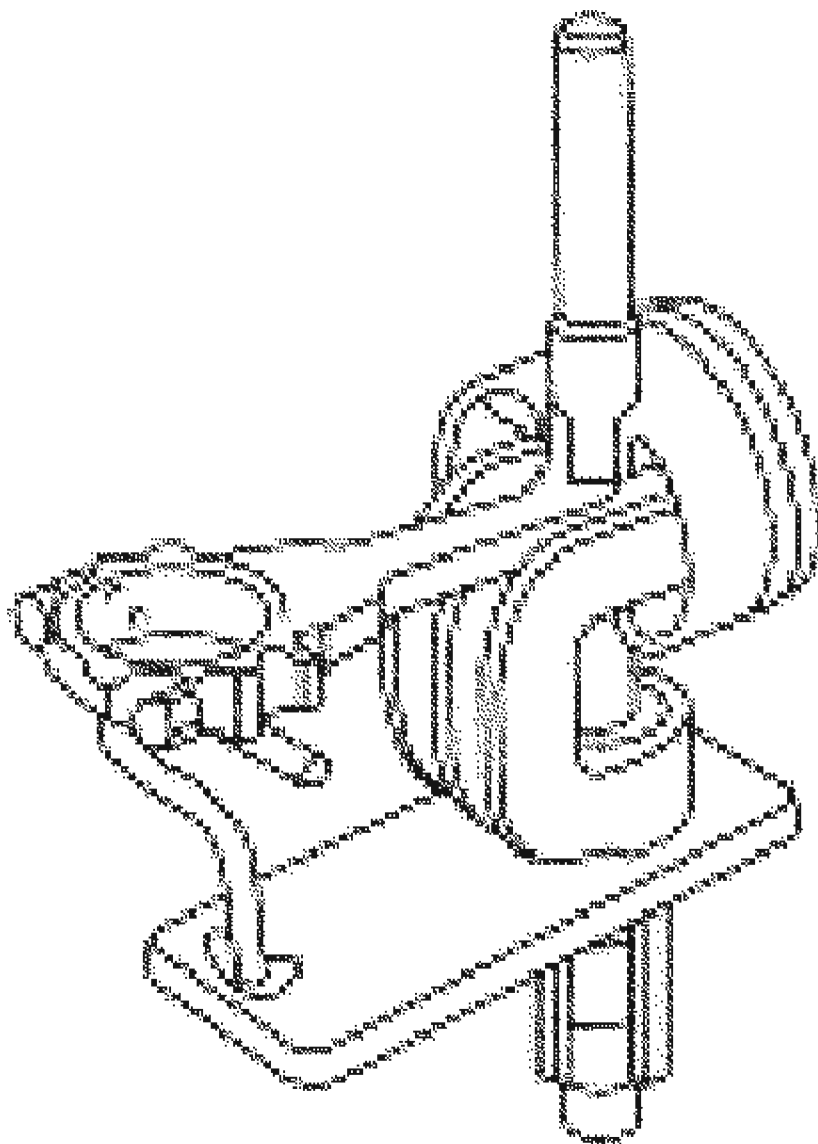
1. Lubricate the piston pin and piston pin bore.
  - Use Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H
2. Position the piston pin in the bore aligned with the connecting rod bore.



G02739028

**Fig. 389: Installing Piston Pin In Bore**  
Courtesy of FORD MOTOR CO.

3. Use the Piston Pin Toll to press the piston pin into the piston and connecting rod assembly.



G02739029

**Fig. 390: Pressing Piston Pin Into Piston And Connecting Rod Assembly**  
Courtesy of FORD MOTOR CO.


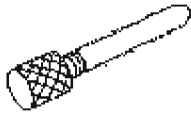
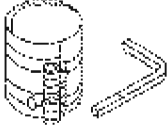

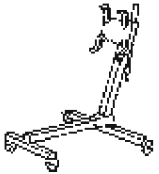

4. Fit and install the piston rings. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

## ASSEMBLY

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

### ENGINE

	Camshaft Alignment Timing Tool 303-465 (T94P-6256-CH)
	Crankshaft TDC Timing Peg 303-574 (T97P-6000-A)
	Piston Ring Compressor 303-D032 (D81L-6002-C)
	Heavy Duty Floor Crane 014-00072 or equivalent
	Engine Stand 014-00232 or equivalent
	Clutch Aligner 308-020 (T74P-7137-K)

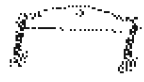
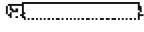


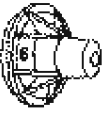
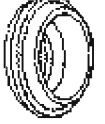

G0273B000

**Fig. 391: Identifying Special Tools (1 Of 2)**  
Courtesy of FORD MOTOR CO.



## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

	Spreader Bar 303-3089 (D93P-6001-A3)
	Handle 205-453 (T80T-4000-W)
	Pilot Bearing Installer 308-457 (T88C-7025-EH)
	Camshaft Seal Replacer 303-464 (T94P-6256-BH)
	Crankshaft Rear Seal Replacer 303-328 (T88P-6701-B1)
	Oil Seal Pilot 303-329 (T88P-6701-B2)
	Oil Seal Replacer 303-164 (T81P-6700-A)

G02729031

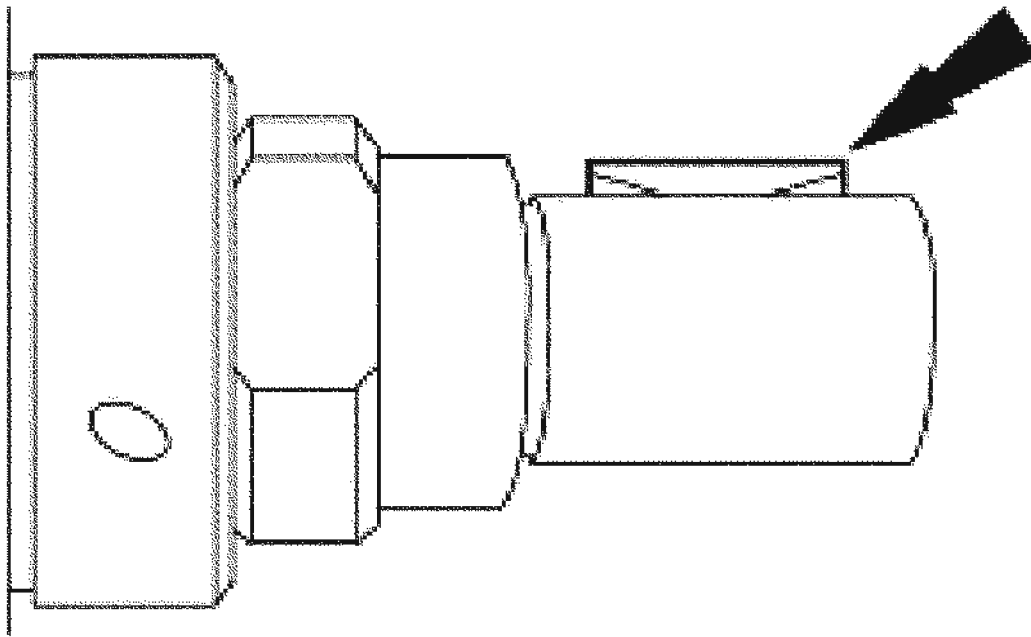
**Fig. 392: Identifying Special Tools (2 Of 2)**  
Courtesy of FORD MOTOR CO.

**WARNING:** Eye protection is required to be worn during use of compressed air. Failure to follow these instructions could

result in possible personal injury.

**CAUTION:** The engine sealing surfaces are soft metals. Do not use abrasive grinding discs to remove gasket material, only use manual scrapers. Do not scratch or gouge sealing surfaces or oil leaks may occur.

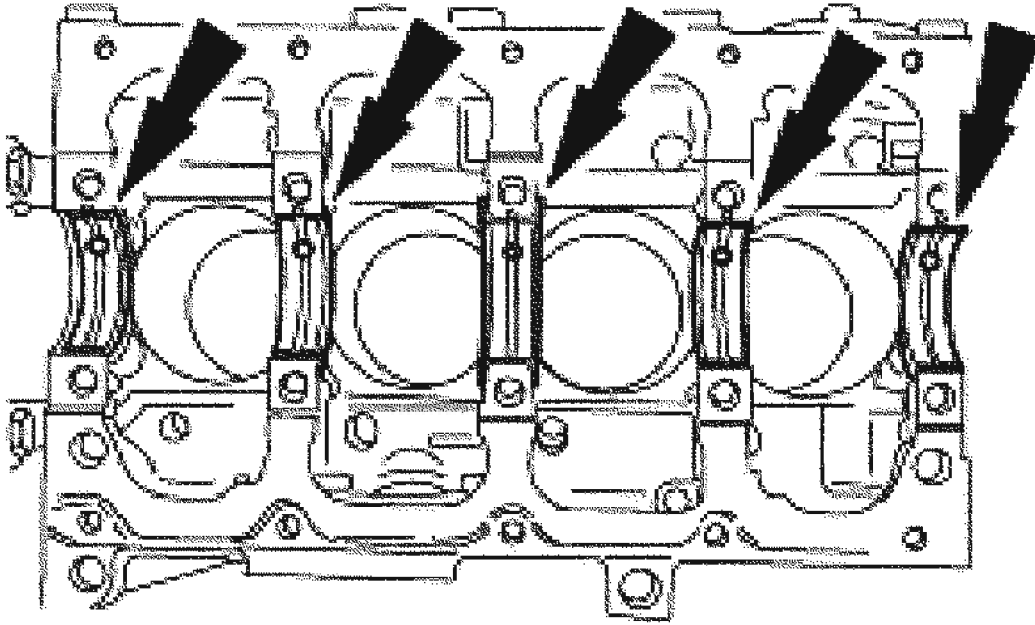
1. Carefully clean and dry the cylinder block.
  - Clean gasket material, dirt and foreign material from the cylinder block.
  - Wash the cylinder block with a suitable soap and water solution.
  - Dry the cylinder block completely using compressed air.
2. Install the Woodruff key.



G02739032

**Fig. 393: Installing Woodruff Key**  
Courtesy of FORD MOTOR CO.

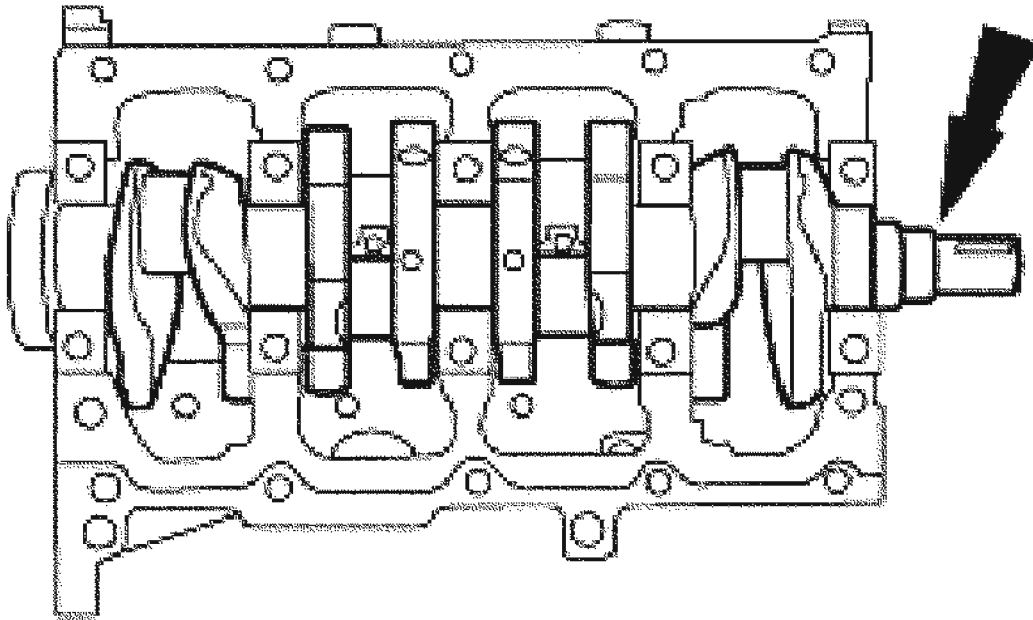
3. Install the upper crankshaft main bearings, the upper crankshaft thrust main bearing and the lower crankshaft main bearings.



G02739033

**Fig. 394: Installing Upper Crankshaft Main Bearings, Thrust Main Bearing And Lower Crankshaft Main Bearings**  
Courtesy of FORD MOTOR CO.

**NOTE:** Apply a light coat of Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H to the crankshaft bearings and journals.



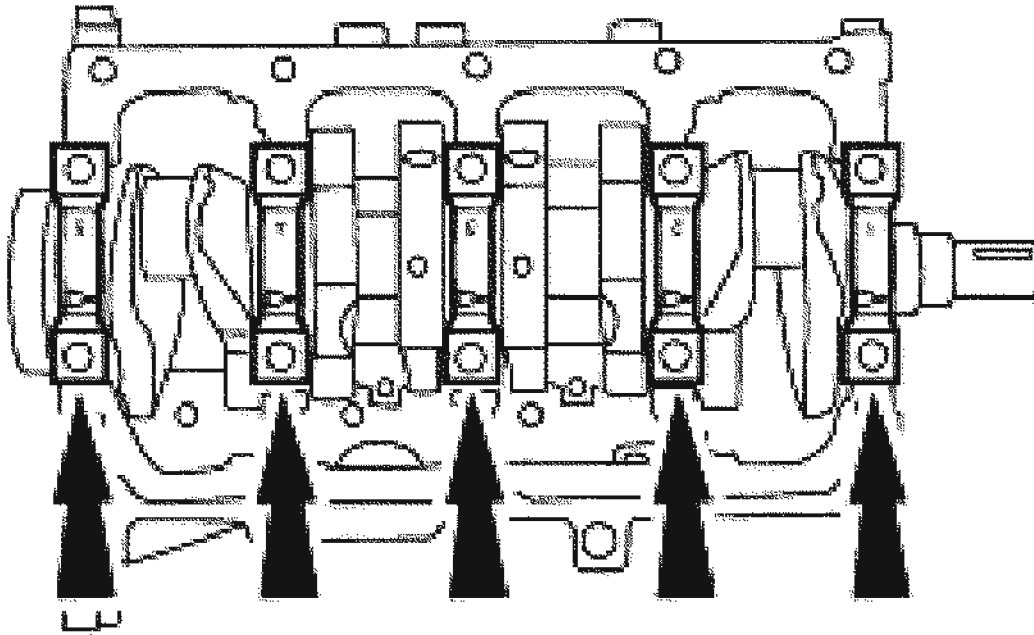
G02739034

**Fig. 395: Installing Crankshaft**  
Courtesy of FORD MOTOR CO.

4. Position the crankshaft.
5. Determine crankshaft main bearing clearance. For additional information, refer to Select Fit Method in **ENGINE SYSTEM-GENERAL INFORMATION**.

**CAUTION:** Make sure the main bearing caps are installed in their original position or engine damage may occur.

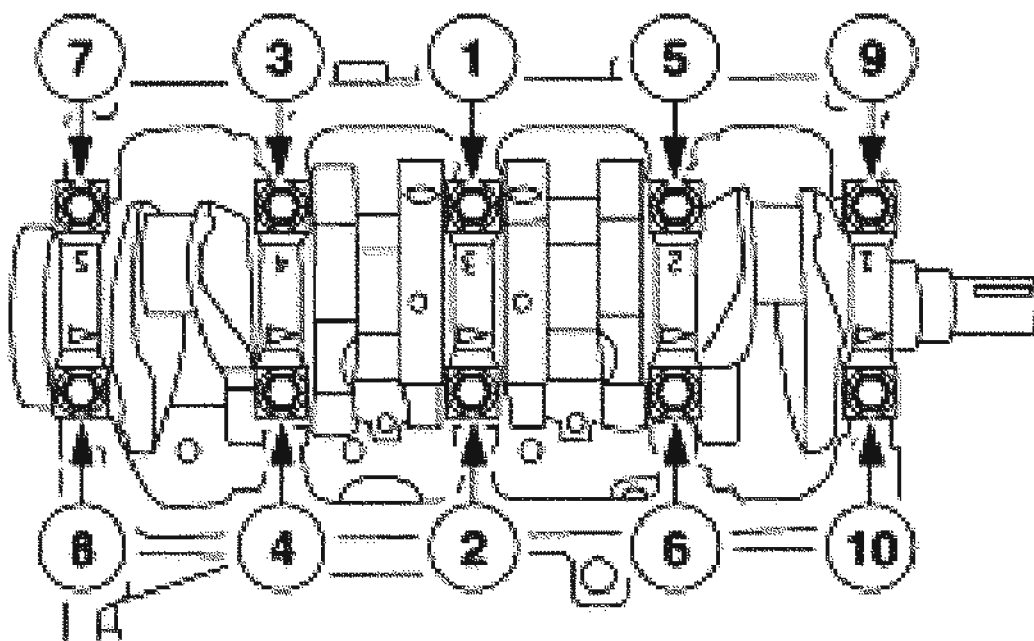
**NOTE:** Apply a light coat of Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H to the crankshaft bearings and journals.



G02739035

**Fig. 396: Installing Main Bearing Caps**  
Courtesy of FORD MOTOR CO.

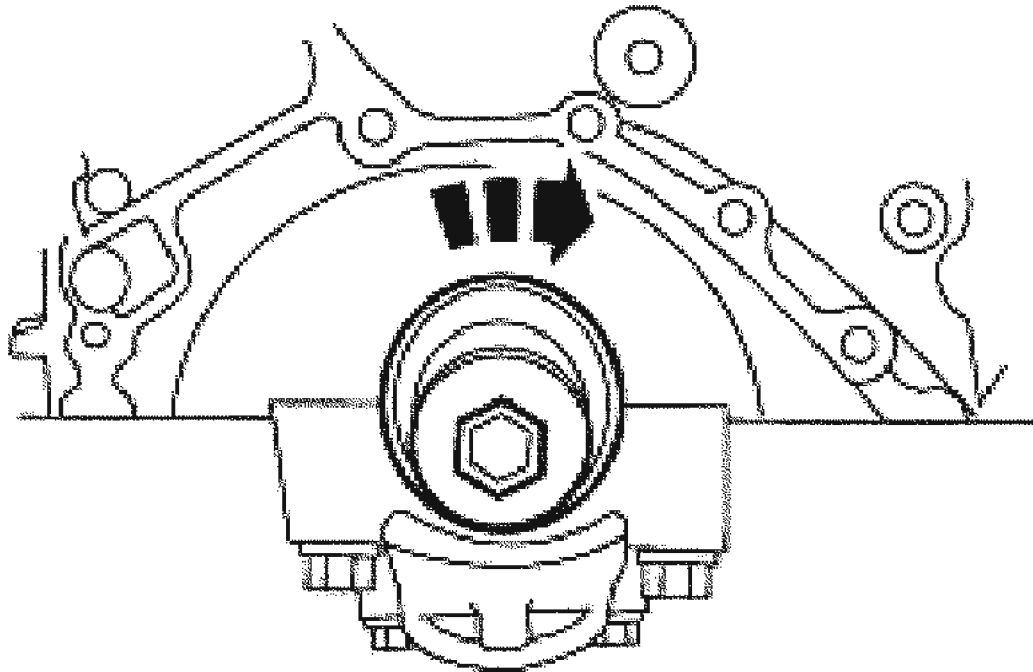
6. Install the main bearing caps.
7. Tighten the bolts using the sequence shown in two stages.
  - Stage 1: Tighten the bolts to 25 Nm (18 lb-ft).
  - Stage 2: Tighten the bolts an additional 60 degrees.



G02739036

**Fig. 397: Identifying Tightening Sequence Of Crankshaft Main Bearing Cap Bolts**  
Courtesy of FORD MOTOR CO.

8. Rotate the crankshaft and inspect for excessive drag or binding.



G02739037

**Fig. 398: Rotating Crankshaft**  
Courtesy of FORD MOTOR CO.

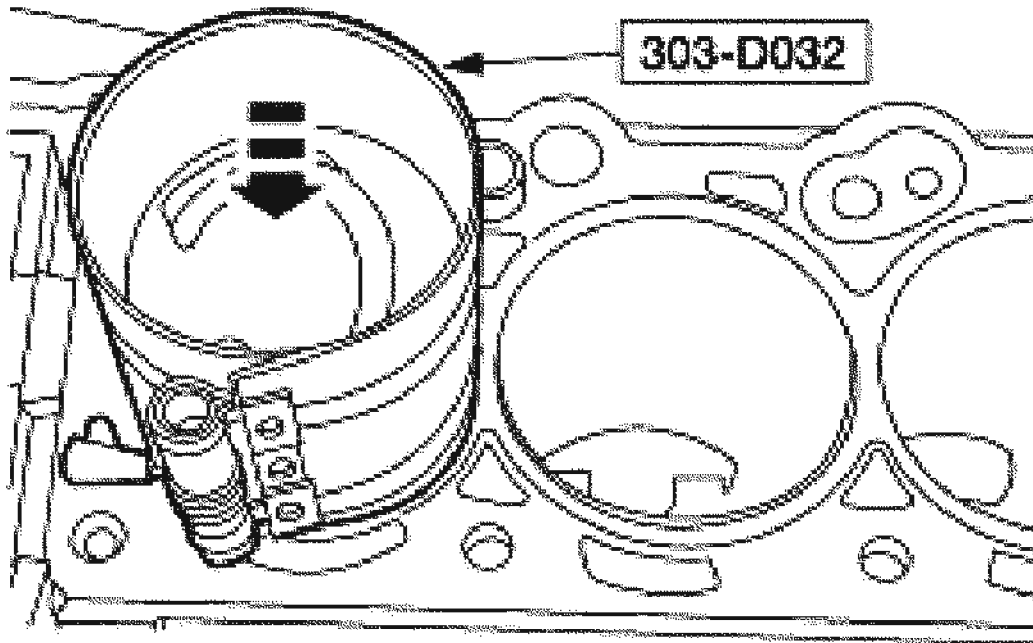
9. Inspect the crankshaft end play. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

**CAUTION:** PIP mark on pistons and squirt groove on connecting rods must be located on the intake side of the engine or possible engine damage may occur.

**CAUTION:** Use care when installing piston and connecting rod assemblies. Do not scratch the cylinder walls or the crankshaft journals or engine damage may occur.

**CAUTION:** The arrow on the piston must point toward the front of the engine or engine damage may occur.

**NOTE:** Lubricate the cylinder block, piston rings and connecting rod prior to installation with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford Specification WSS-M2C153-H.



G02739038

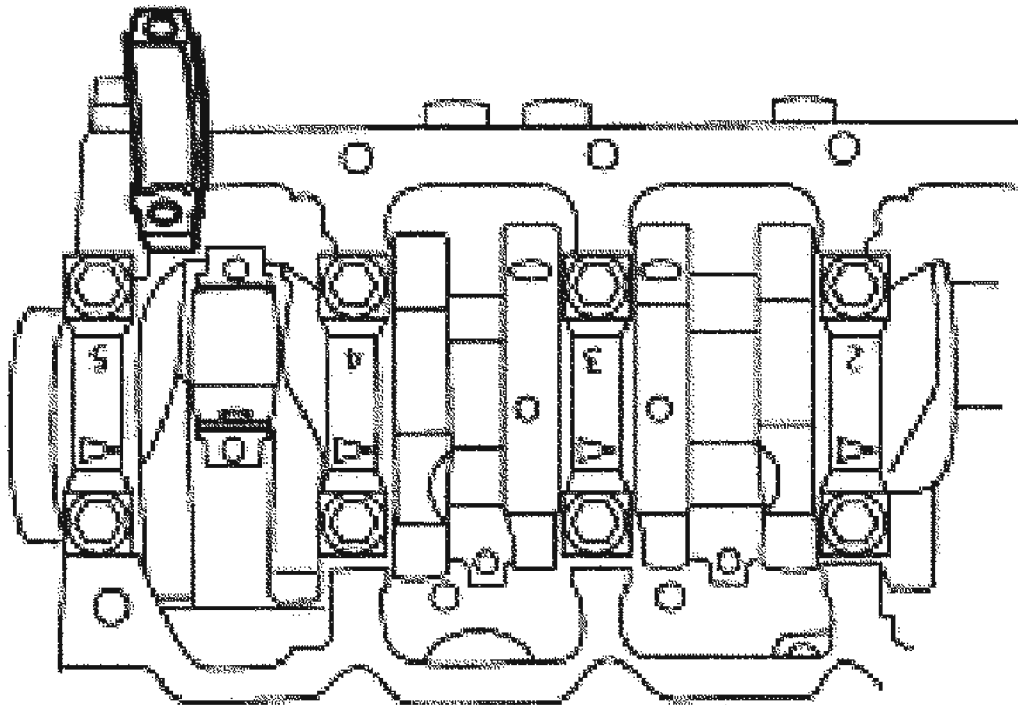
**Fig. 399: Installing Piston And Connecting Rod Assemblies**  
Courtesy of FORD MOTOR CO.

10. Using the special tools, install the four piston and connecting rod assemblies.

**CAUTION:** Connecting rods and connecting rod caps must be correctly oriented, the interlocking tangs on the same side of the connecting rod or possible engine damage may occur.

**NOTE:** Turn the crankshaft each time to install the connecting rod caps.





G02739039

**Fig. 400: Fitting Connecting Rod Bearing**  
Courtesy of FORD MOTOR CO.

11. Fit the connecting rod bearing.

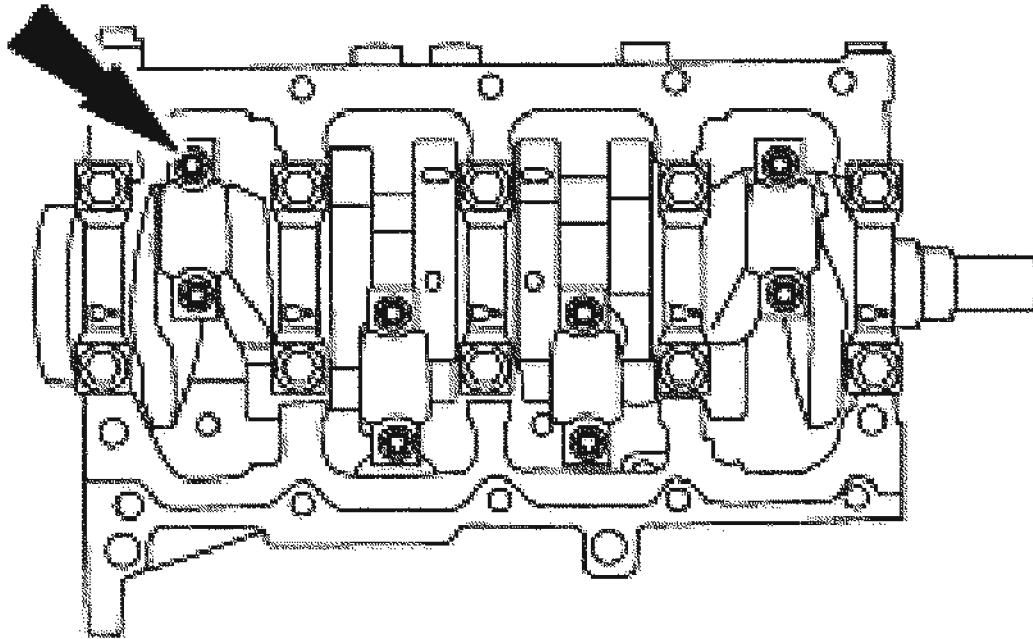
- Install the four upper and the four lower connecting rod bearings.
- Inspect the connecting rod bearing to the crankshaft clearance. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

**CAUTION:** Connecting rods and connecting rod caps must be correctly oriented, and the interlocking tangs on the same side of the connecting rod or possible engine damage may occur.

**NOTE:** Lubricate the connecting rod bearings and the crankshaft journals prior to installation with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

**NOTE:** Rotate the crankshaft after installing each connecting rod

cap and inspect for excess drag or binding.

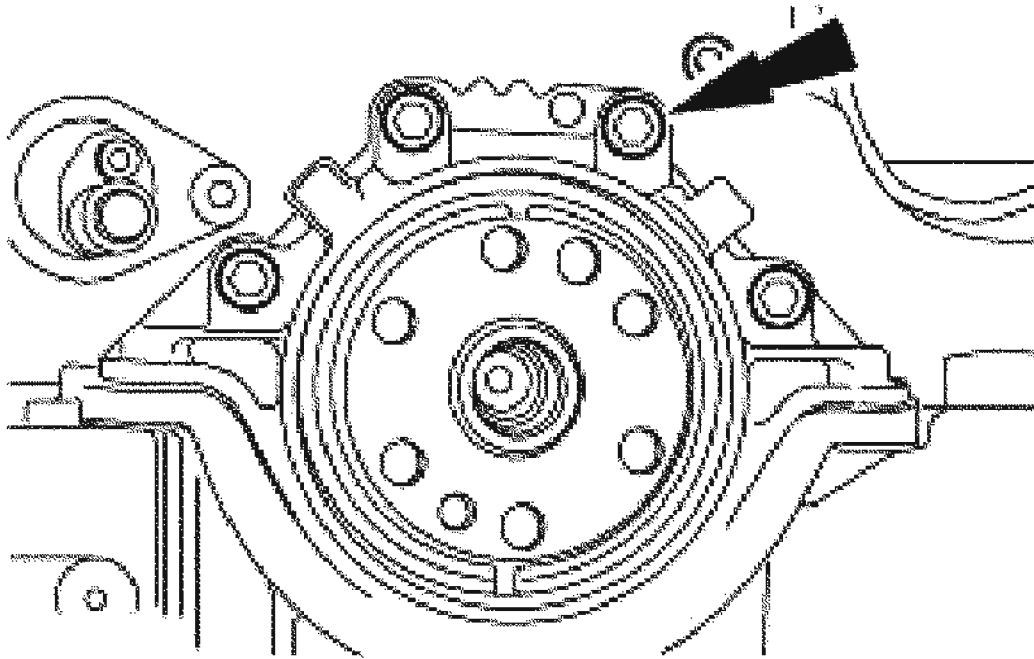


G02739040

**Fig. 401: Installing Connecting Rod Caps**  
Courtesy of FORD MOTOR CO.

12. Install the connecting rod caps.
  - Install new bolts and tighten in two stages:
  - Stage 1: Tighten to 35 Nm (26 lb-ft).
  - Stage 2: Tighten an additional 90 degrees.

**NOTE:** The clearance between the lower cylinder block sealing surfaces on the crankshaft rear oil seal retainer and the crankshaft cannot exceed 0.5 mm (0.02 in).

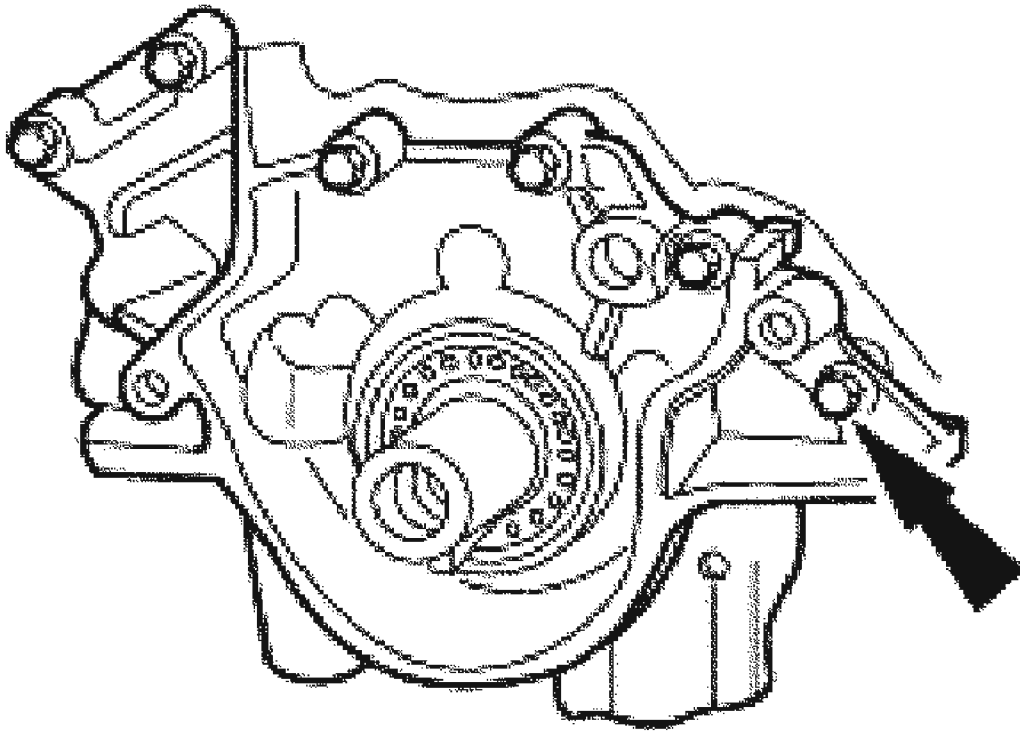


G02739041

**Fig. 402: Installing Crankshaft Rear Oil Seal Retainer Bolts**  
Courtesy of FORD MOTOR CO.

13. Install a new gasket, the crankshaft rear oil seal retainer and tighten the bolts in two stages:
  - Stage 1: Tighten to 12 Nm (9 lb-ft)
  - Stage 2: Tighten an additional 45 degrees.

**NOTE:** The clearance between the lower cylinder block sealing surfaces on the oil pump and the cylinder block cannot exceed 0.8 mm (0.031 in).

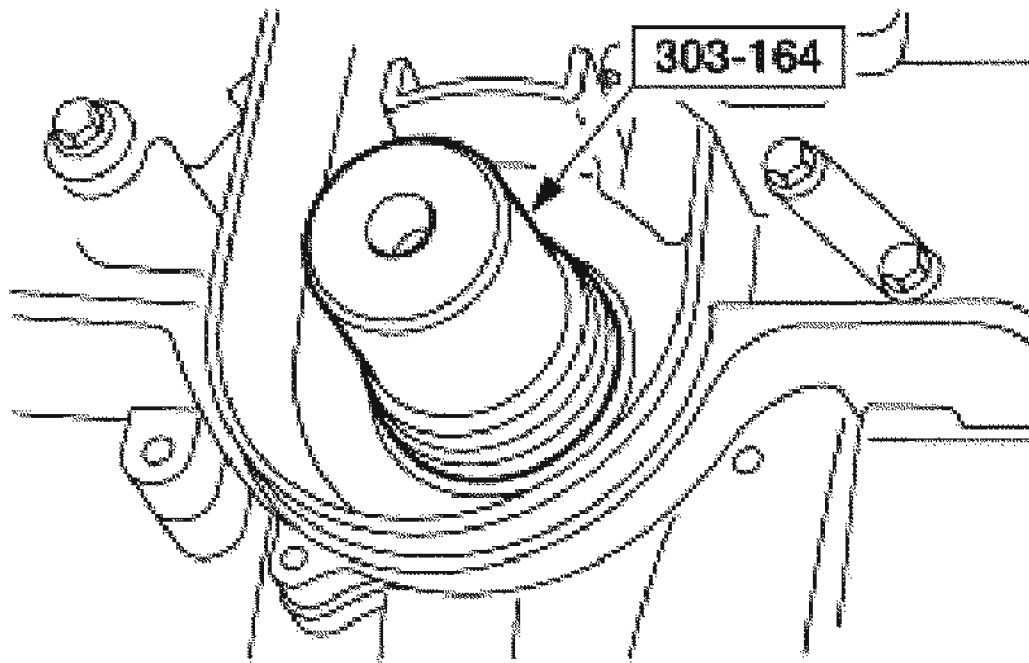


G02739042

**Fig. 403: Tightening Oil Pump Bolts**  
Courtesy of FORD MOTOR CO.

14. Install a new gasket, the oil pump and tighten the bolts in two stages:
  - Stage 1: Tighten to 6 Nm (53 lb-in).
  - Stage 2: Tighten an additional 45 degrees.

**NOTE:** Lubricate the crankcase flange and the crankshaft front oil seal bore with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H prior to installing the crankshaft front seal or damage to the crankshaft front seal may occur.



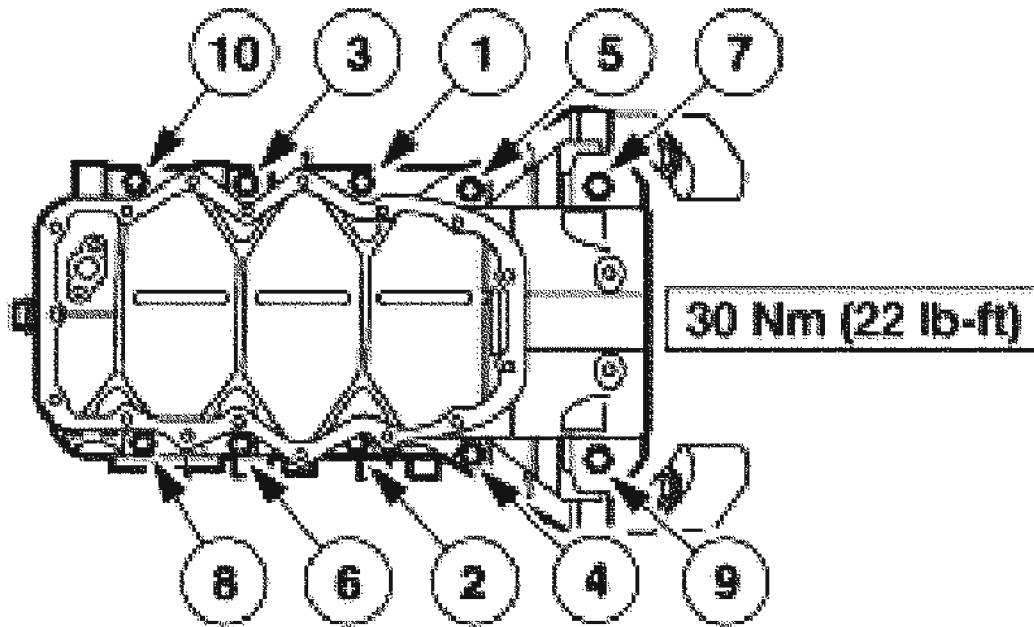
G02739043

**Fig. 404: Installing New Crankshaft Front Seal**  
Courtesy of FORD MOTOR CO.

15. Using the special tool, install a new crankshaft front seal.

**CAUTION:** The lower engine block must be installed and the bolts tightened to specification within four minutes of sealant application or possible leakage may occur.

**NOTE:** Apply a 3 mm (0.1 inch) bead of Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4 sealer in four places where the oil seal retainers meet the cylinder block.

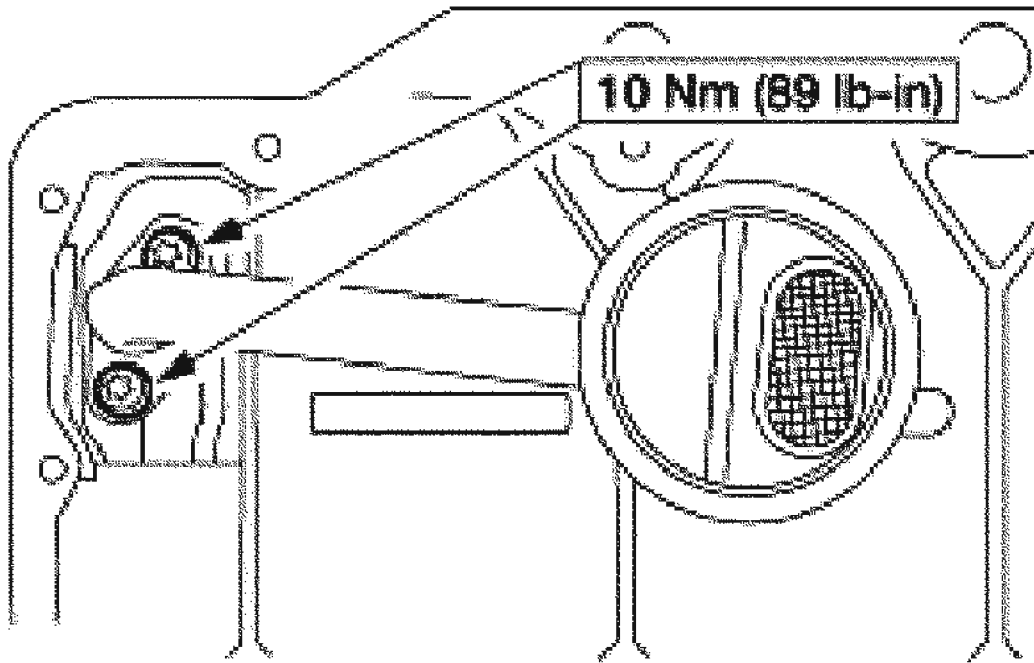


G02739044

**Fig. 405: Identifying Tightening Sequence & Torque Specification Of Lower Cylinder Block Bolts**

Courtesy of FORD MOTOR CO.

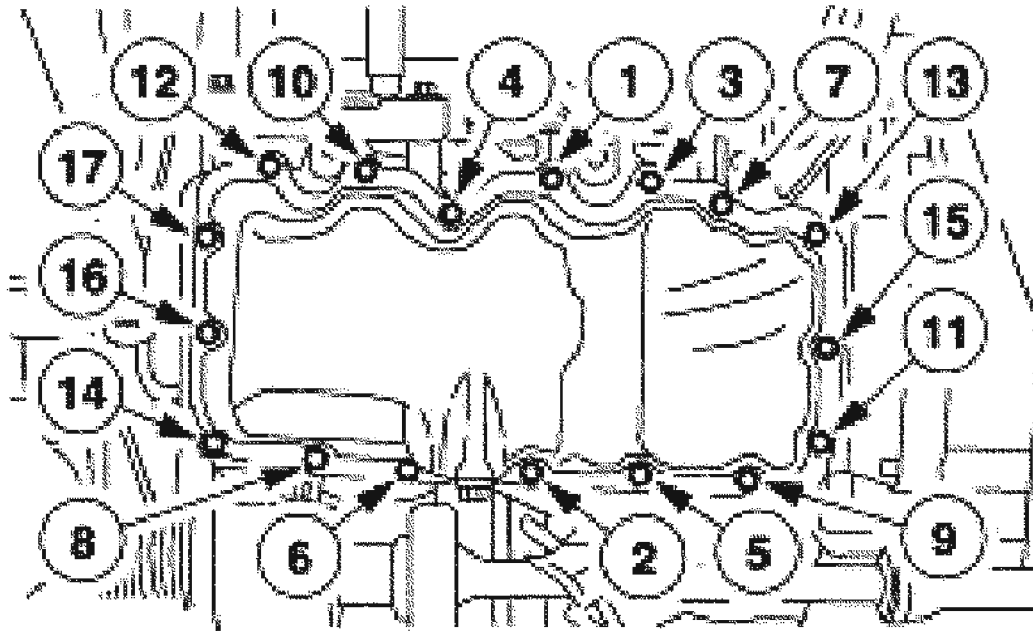
16. Install a gasket and the lower cylinder lock. Tighten the bolts using the sequence shown.
17. Install the oil pump cover and screen.
  - Install new oil pump inlet tube gasket.



G02739045

**Fig. 406: Installing Oil Pump Cover And Screen Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

- NOTE:** The oil pan must be installed and the bolts tightened to specification within seven minutes of sealer application or oil leaks may occur.
- NOTE:** Apply a 3 mm (0.1 inch) continuous bead of Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4 to the oil pan.



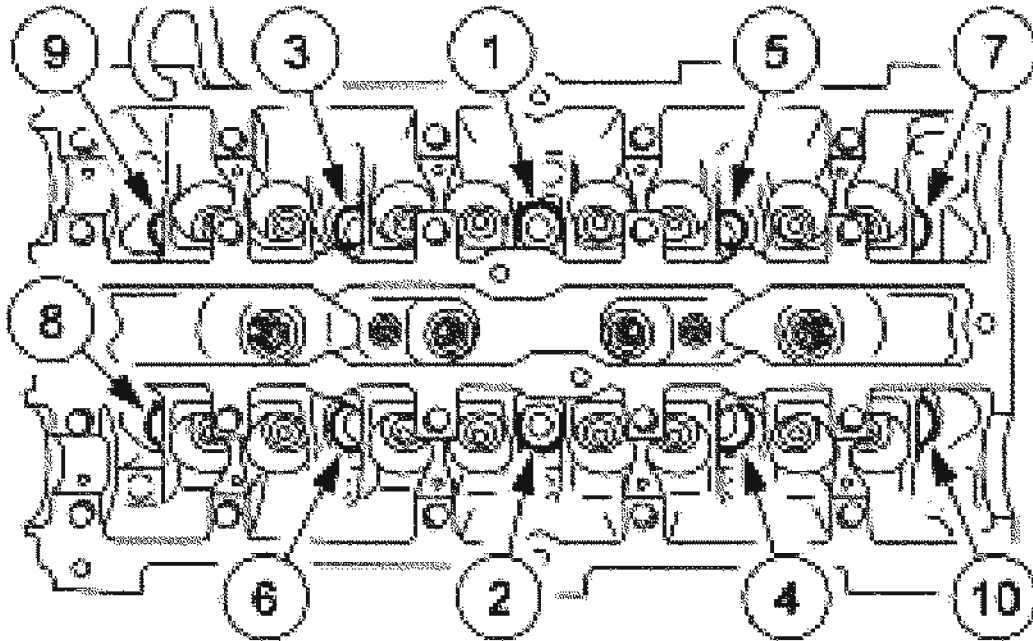
G02739046

**Fig. 407: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

18. Install the oil pan. Tighten the bolts in two stages using the sequence shown.
  - Stage 1: Tighten to 6 Nm (53 lb-in).
  - Stage 2: Tighten to 12 Nm (9 lb-ft).
19. Install a new head gasket on the cylinder block.

**CAUTION:** The bolts are torque-to-yield and new bolts must be installed or engine damage may occur.

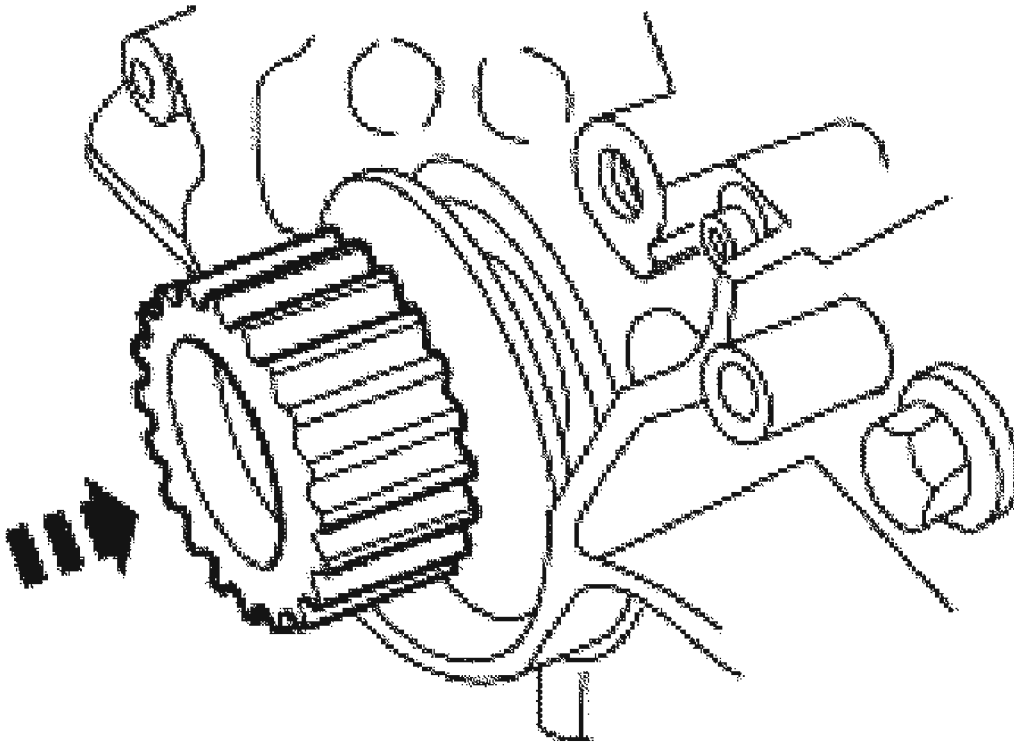




G02739047

**Fig. 408: Identifying Tightening Sequence Of Cylinder Head Bolts**  
 Courtesy of FORD MOTOR CO.

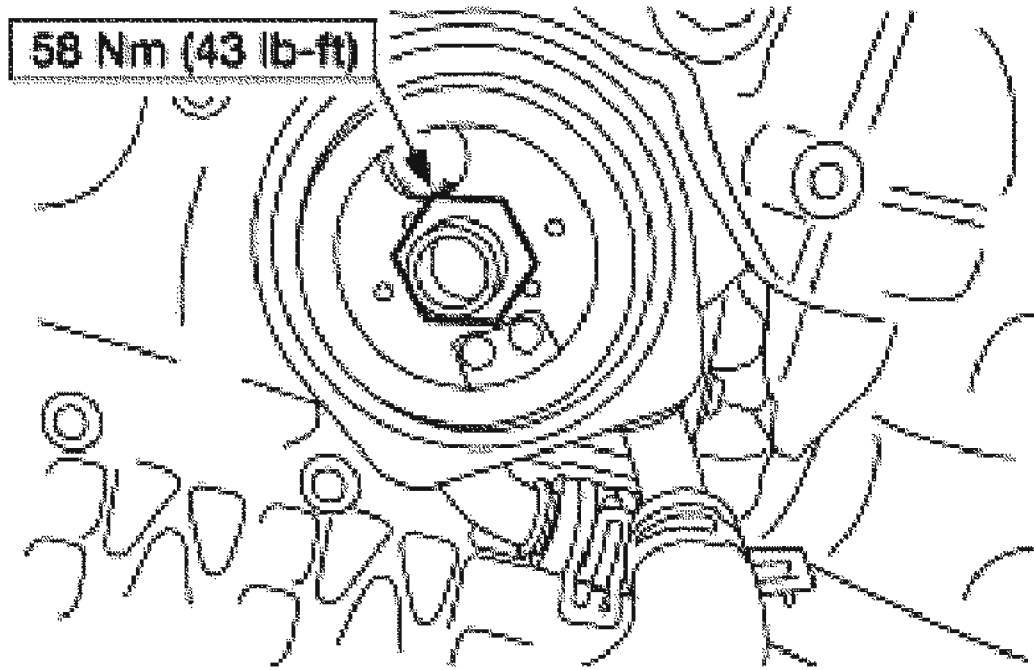
20. Install the cylinder head and tighten the bolts in three stages using the sequence shown.
  - Stage 1: Tighten the bolts to 20 Nm (15 lb-ft).
  - Stage 2: Tighten the bolts to 40 Nm (30 lb-ft).
  - Stage 3: Tighten the bolts an additional 90 degrees.
21. Install the timing belt guide and crankshaft sprocket.



G02739048

**Fig. 409: Installing Timing Belt Guide And Crankshaft Sprocket**  
**Courtesy of FORD MOTOR CO.**

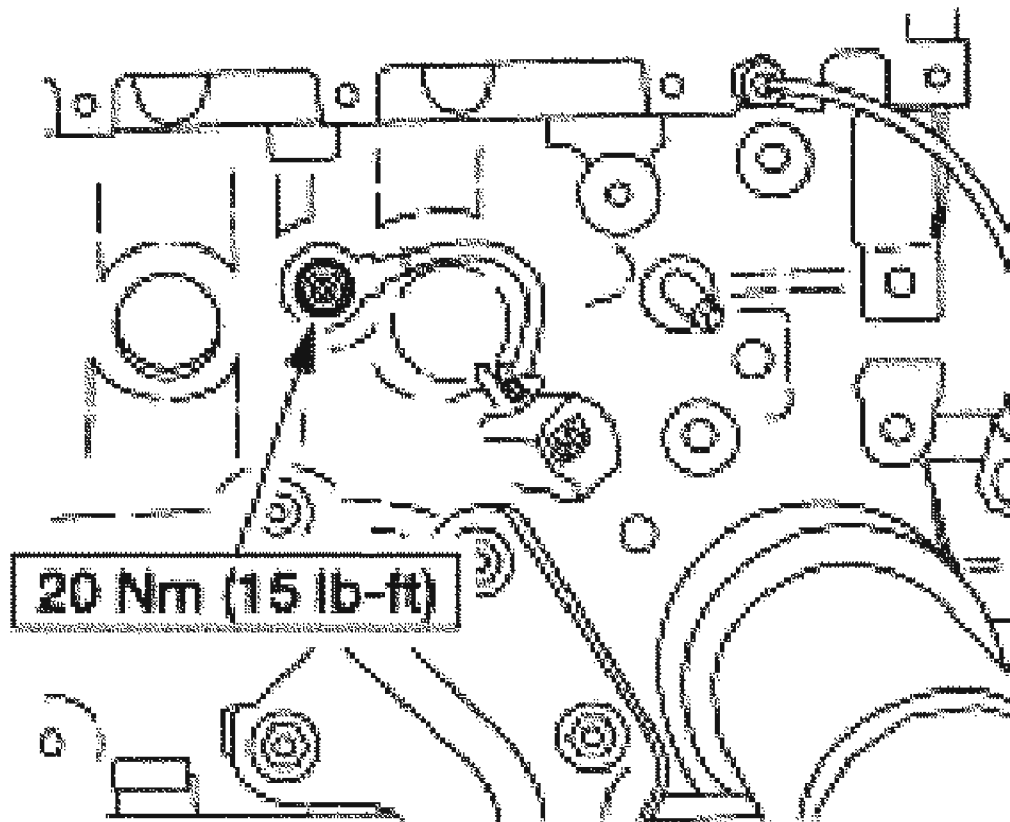
22. Install the oil cooler.
  - Install a new oil cooler gasket.



G02739049

**Fig. 410: Identifying Oil Cooler Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

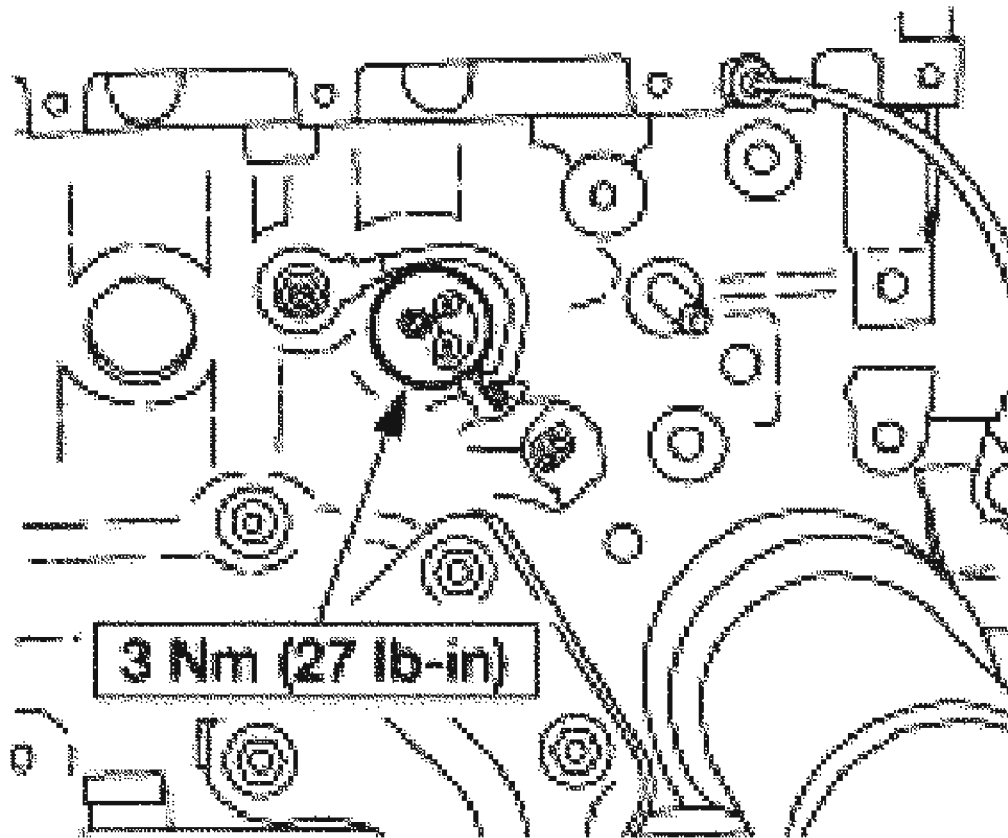
23. Install the knock sensor.



G02739050

**Fig. 411: Identifying Knock Sensor Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

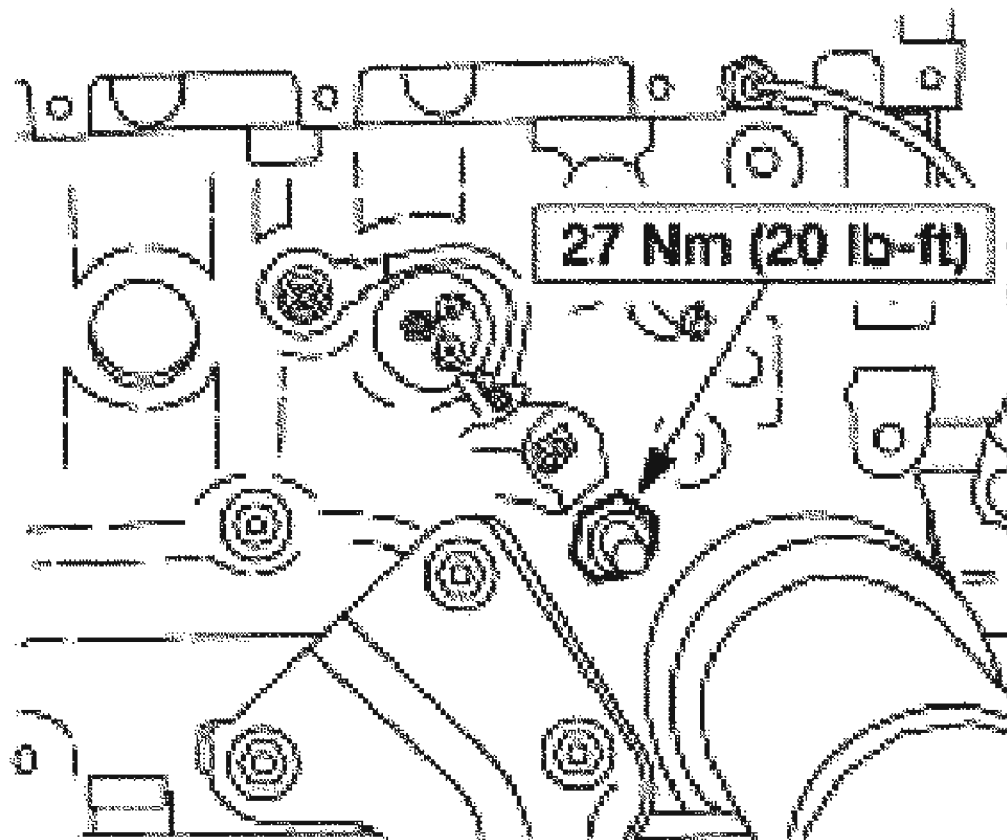
24. Install the block heater if equipped.



G02739051

**Fig. 412: Identifying Block Heater Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

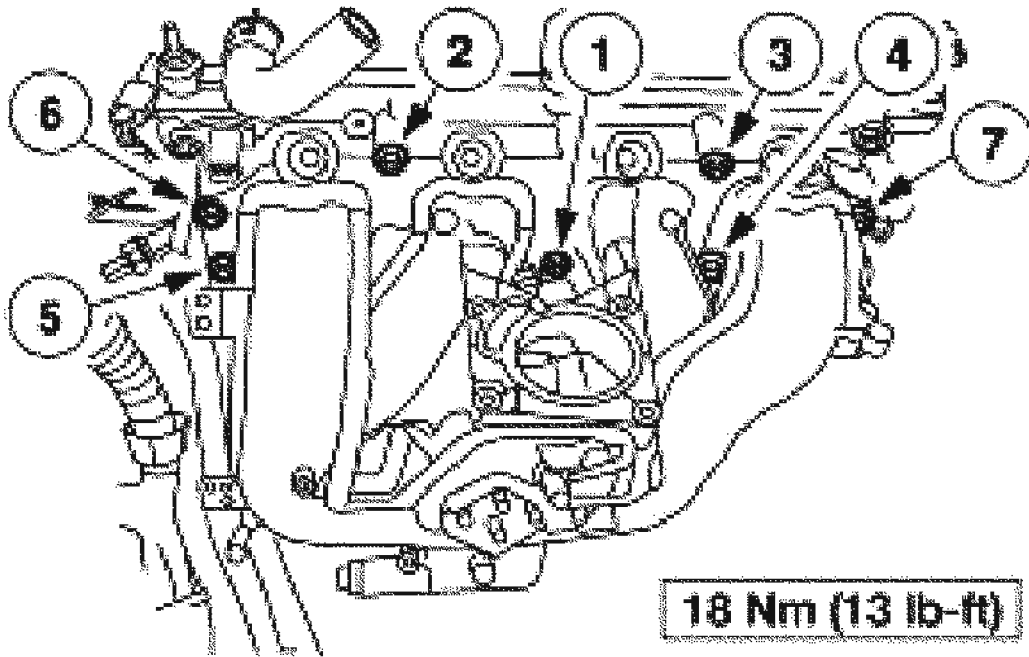
25. Install the oil pressure sensor.



G02739052

**Fig. 413: Installing Oil Pressure Sensor Torque Specification**  
Courtesy of FORD MOTOR CO.

- NOTE:** Illustration shown with throttle body and fuel supply manifold removed for clarity.
- NOTE:** Install new intake manifold gaskets if damaged.

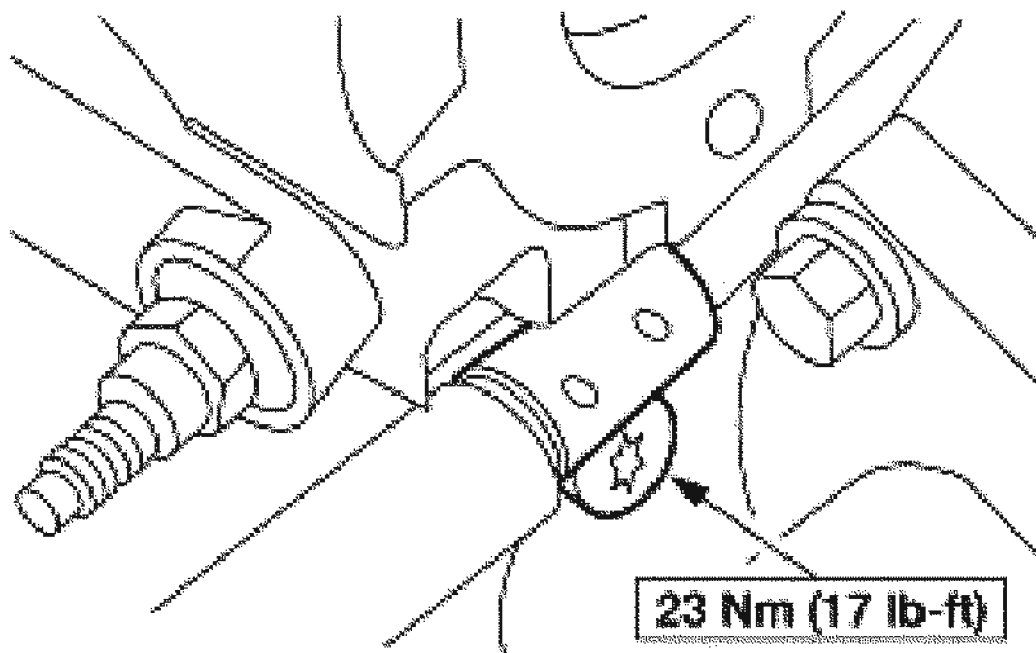


G02739053

**Fig. 414: Identifying Tightening Sequence & Torque Specification Of Intake Manifold Bolts**

**Courtesy of FORD MOTOR CO.**

26. Install the intake manifold and tighten using the sequence shown.
27. Install the positive crankcase ventilation (PCV) tube.



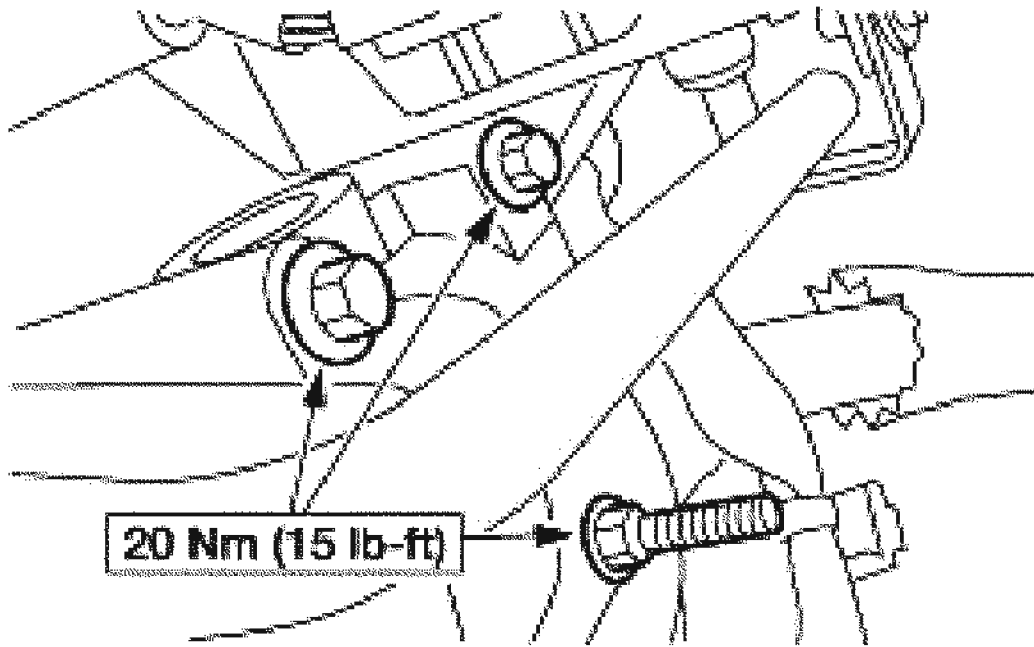
G02739054

**Fig. 415: Identifying Positive Crankcase Ventilation (PCV) Tube Torque Specification**

Courtesy of FORD MOTOR CO.

28. Install the thermostat housing.
  - Install a new O-ring seal if damaged.

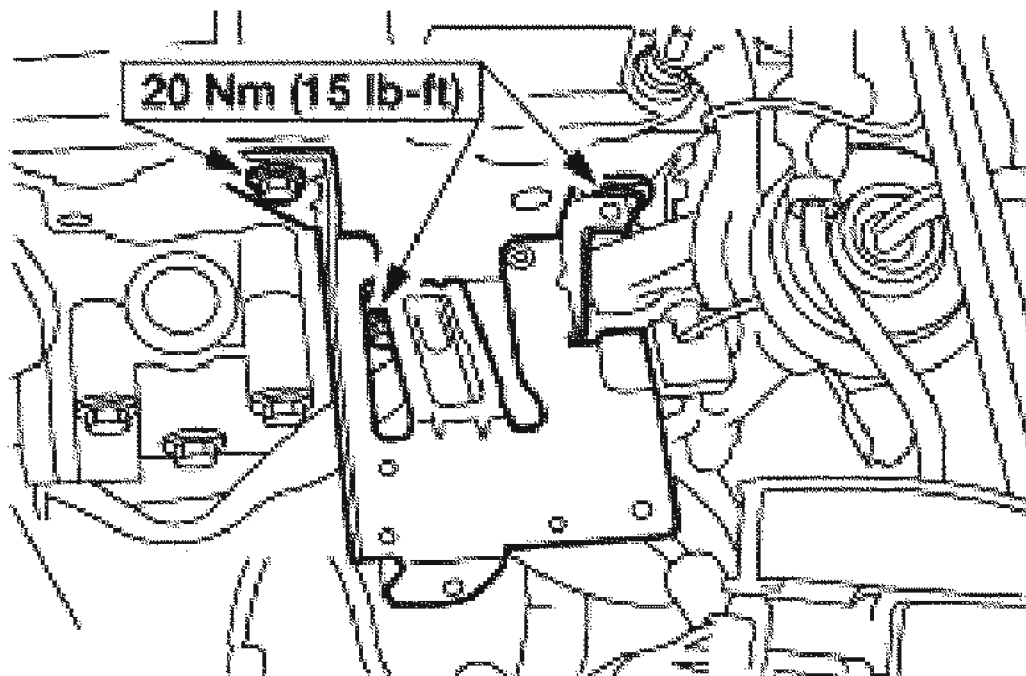




G02739055

**Fig. 416: Installing Thermostat Housing Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

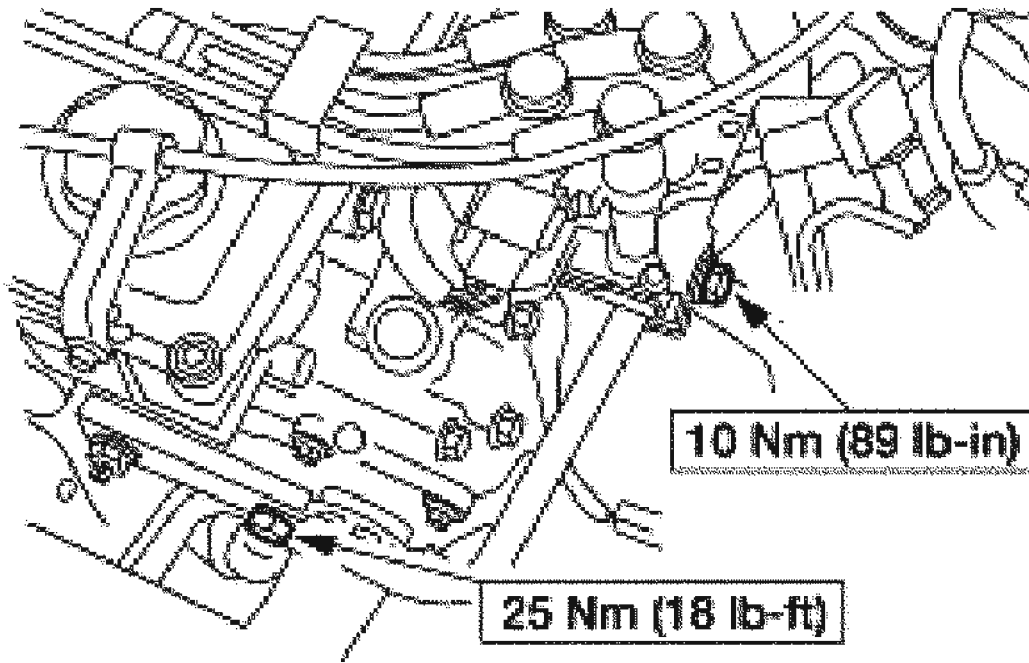
**NOTE:** The coil is shown removed for clarity.



G02739056

**Fig. 417: Identifying Coil And Coil Bracket Assembly Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

29. Install the coil and coil bracket assembly.
30. Install the exhaust gas recirculation (EGR) tube.

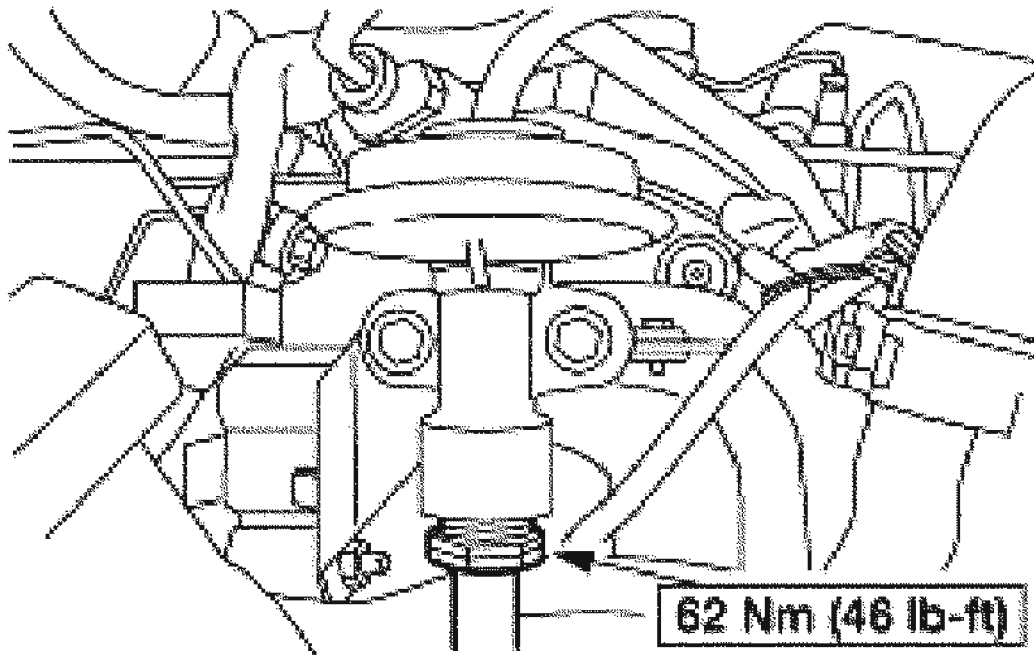


G02739057

**Fig. 418: Installing Exhaust Gas Recirculation (EGR) Tube Bolts Torque Specification**

**Courtesy of FORD MOTOR CO.**

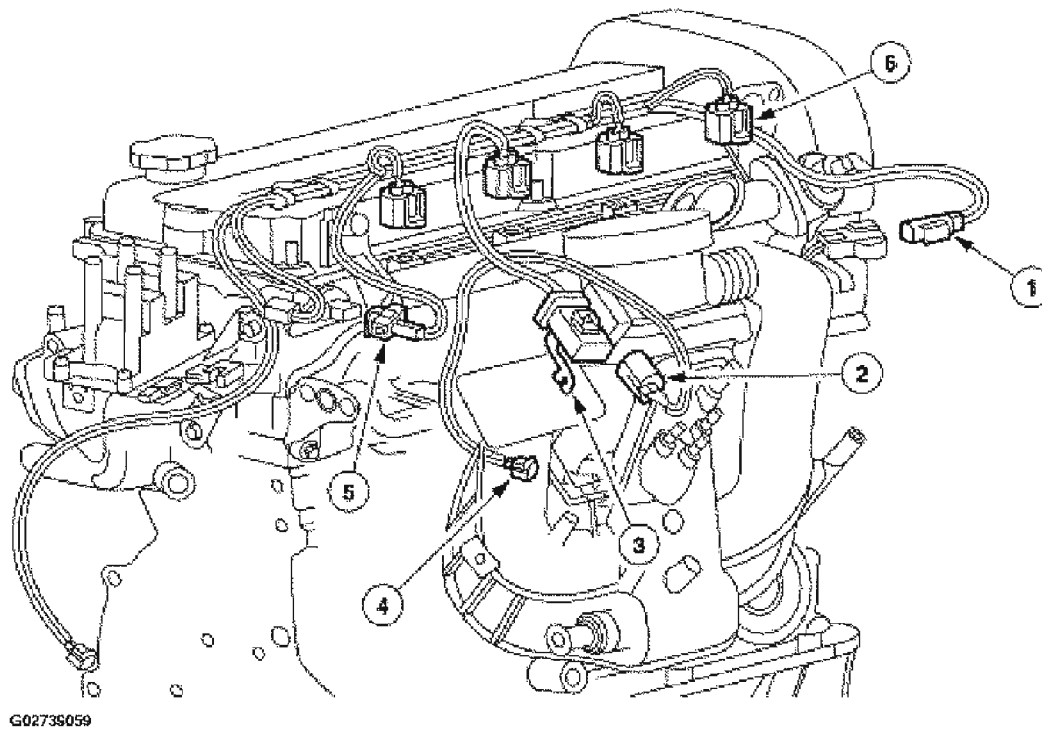
31. Connect the EGR tube fitting.



G02739058

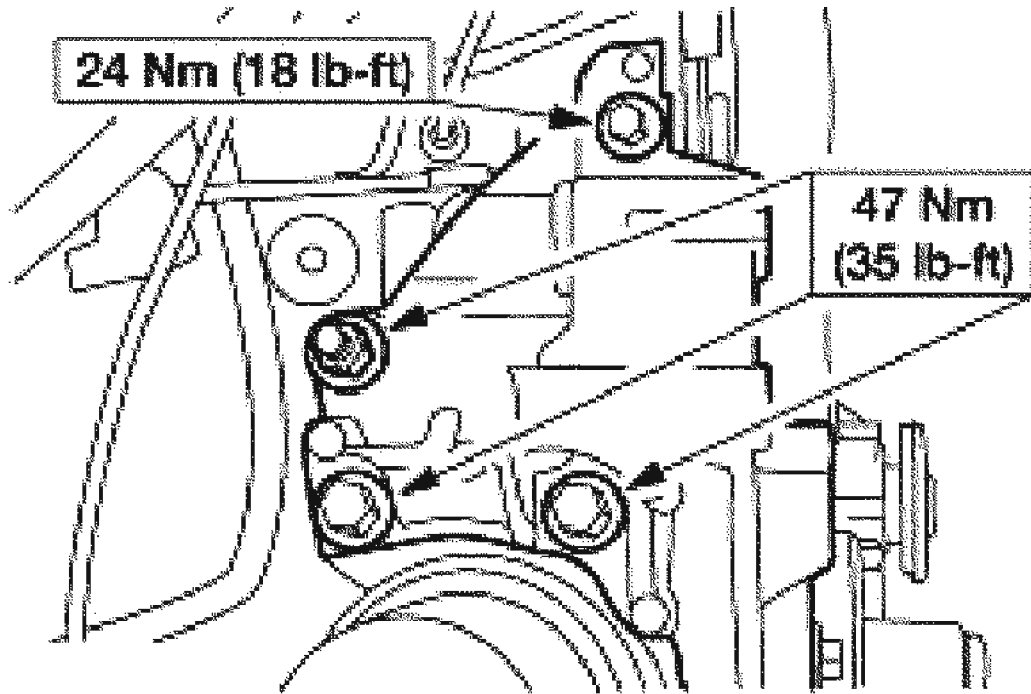
**Fig. 419: Connecting EGR Tube Fitting**  
Courtesy of FORD MOTOR CO.

32. Install the fuel charging wiring harness and connect the following electrical connectors:
1. cylinder temperature sensor
  2. throttle position sensor
  3. wiring harness to vehicle
  4. idle air control valve
  5. camshaft position sensor
  6. fuel injectors



**Fig. 420: Connecting Fuel Charging Wiring Harness And Electrical Connectors**  
Courtesy of FORD MOTOR CO.

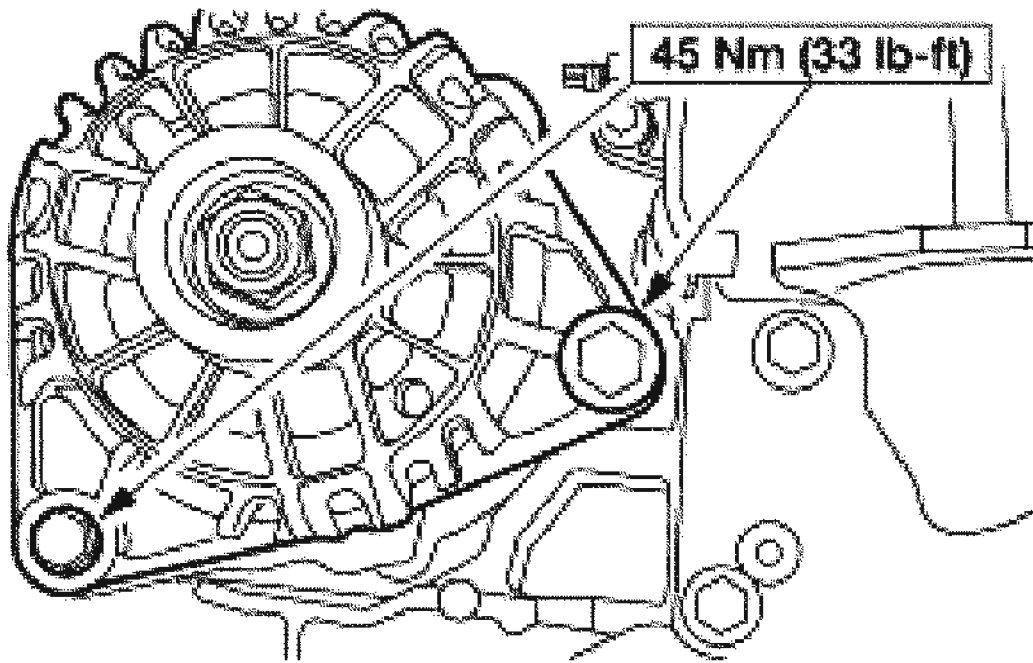
33. Install the generator bracket.



G02739060

**Fig. 421: Identifying Generator Bracket Bolts Torque Specifications**  
Courtesy of FORD MOTOR CO.

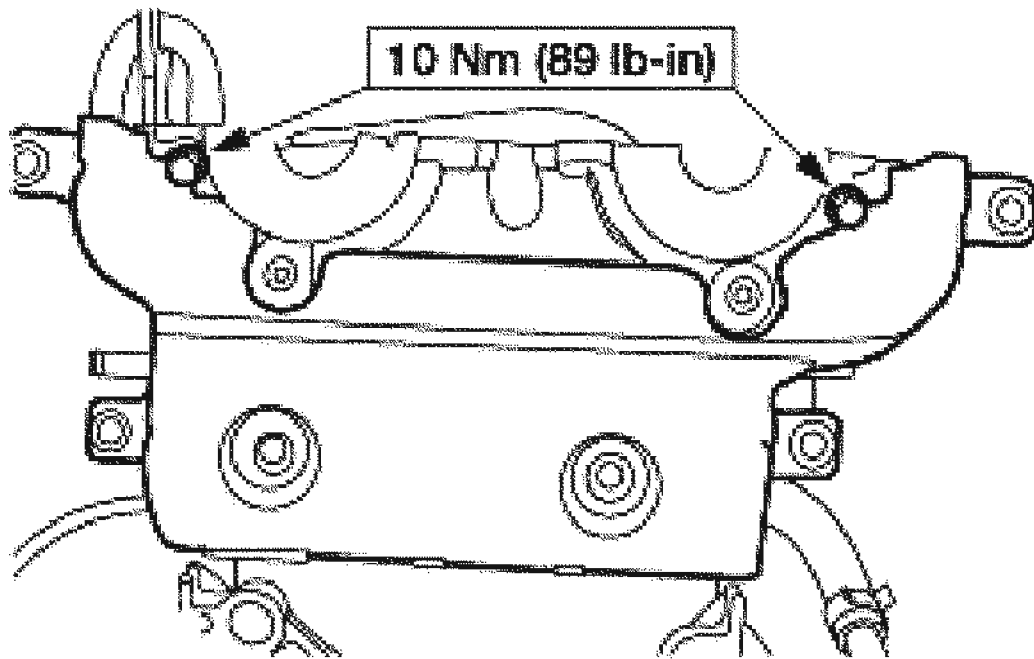
34. Install the generator.



G02739061

**Fig. 422: Identifying Generator Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

35. Install the inner timing belt cover.

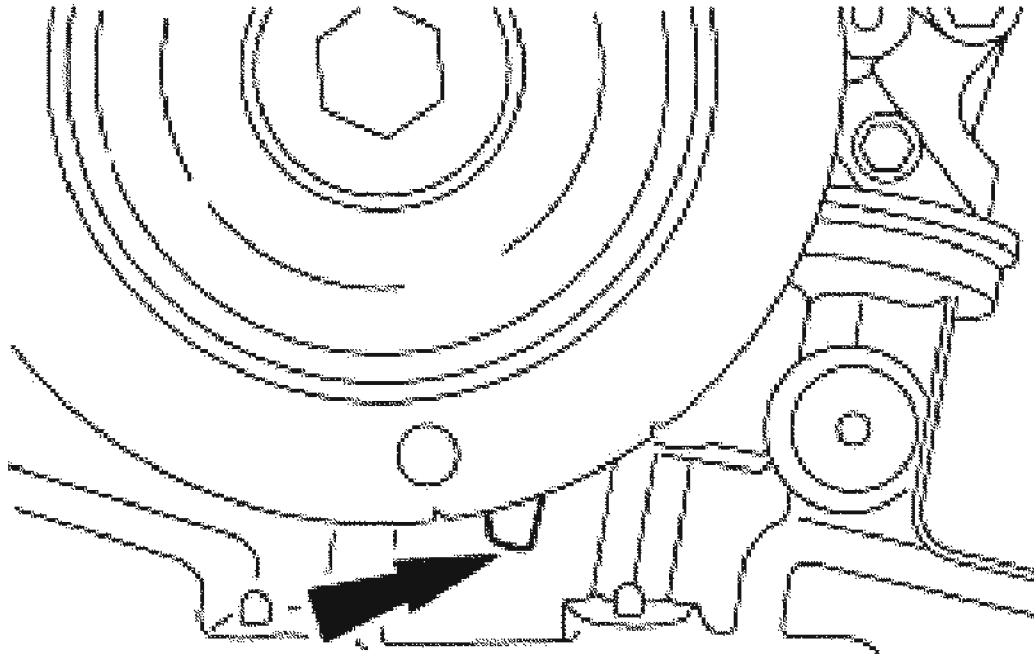


G02739062

**Fig. 423: Identifying Inner Timing Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

36. Loosely install the crankshaft pulley and rotate the crankshaft to just before top dead center (TDC) (No. 1 cylinder).



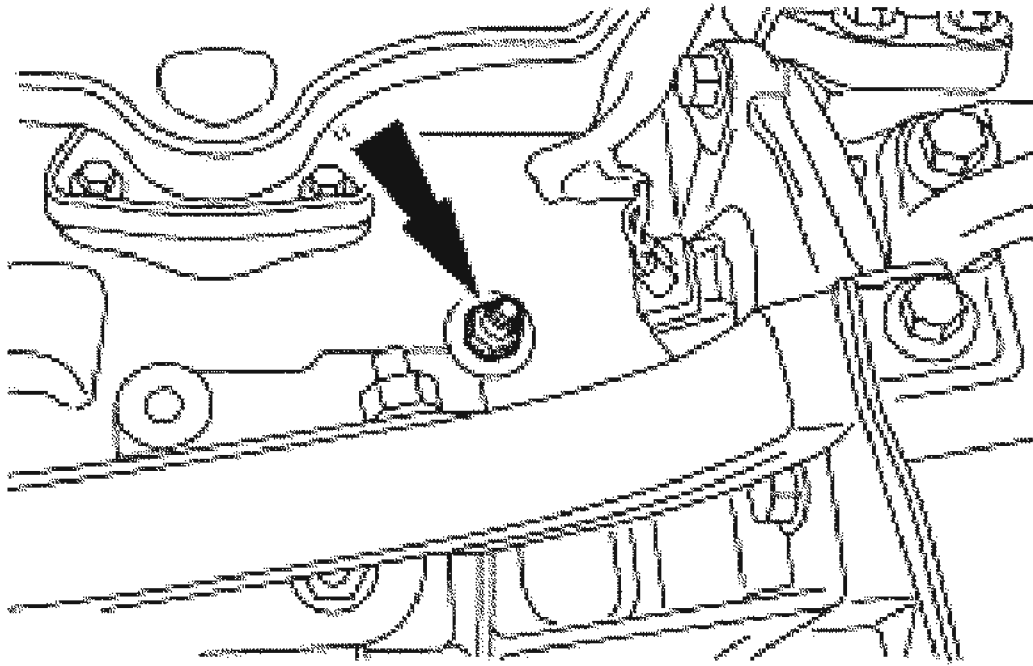


G02739063

**Fig. 424: Rotating Crankshaft To Just Before Top Dead Center (TDC) (No 1 Cylinder**

**Courtesy of FORD MOTOR CO.**

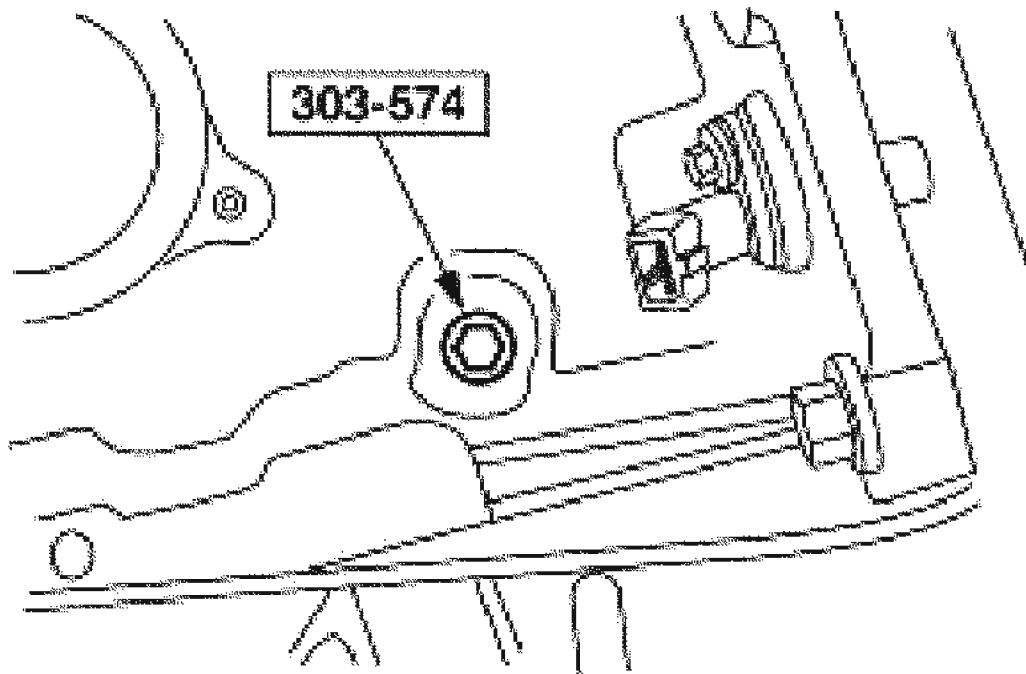
37. Remove the stud.



G02739064

**Fig. 425: Removing Stud**  
Courtesy of FORD MOTOR CO.

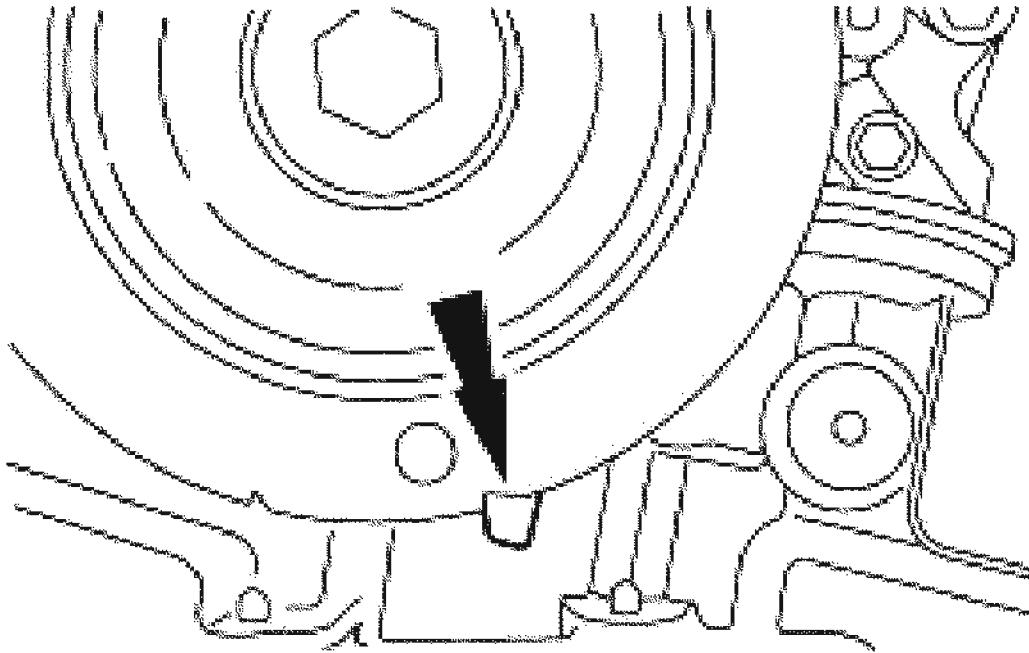
38. Install the special tool.



G02739065

**Fig. 426: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure the correct (second) notch in the pulley is indexed to the lower cylinder block.



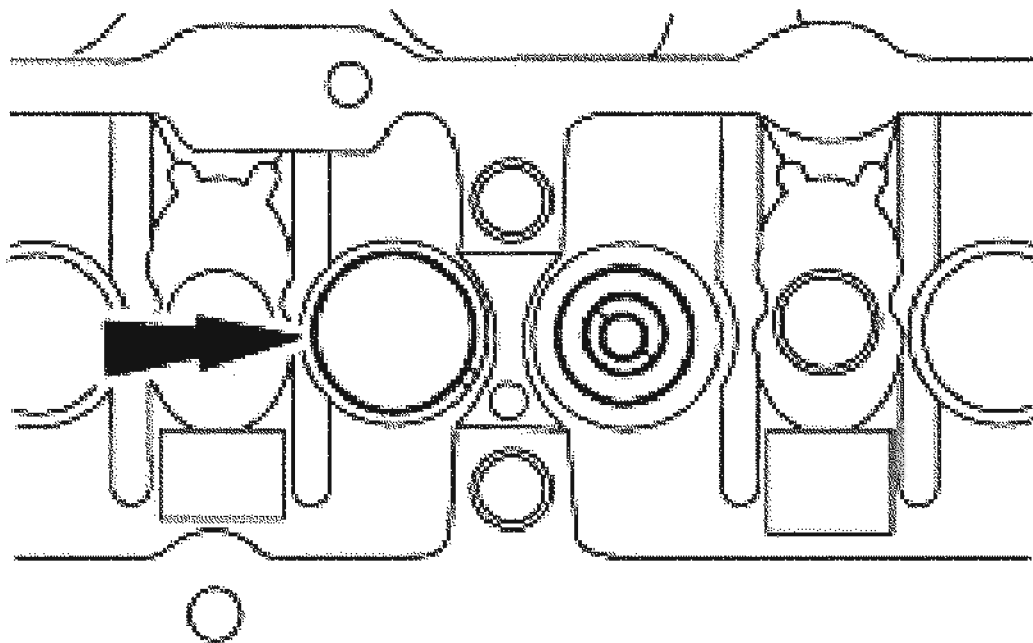
G02739066

**Fig. 427: Rotating Crankshaft Clockwise For Bringing No 1 Cylinder To TDC**  
Courtesy of FORD MOTOR CO.

39. Rotate the crankshaft clockwise against the peg to bring it to TDC (No. 1 cylinder).
- Remove the crankshaft pulley.

**CAUTION:** If valve tappets are being reused, the valve tappet must be installed in its original position or engine damage may occur.

**NOTE:** Lubricate the valve tappets prior to installation with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.

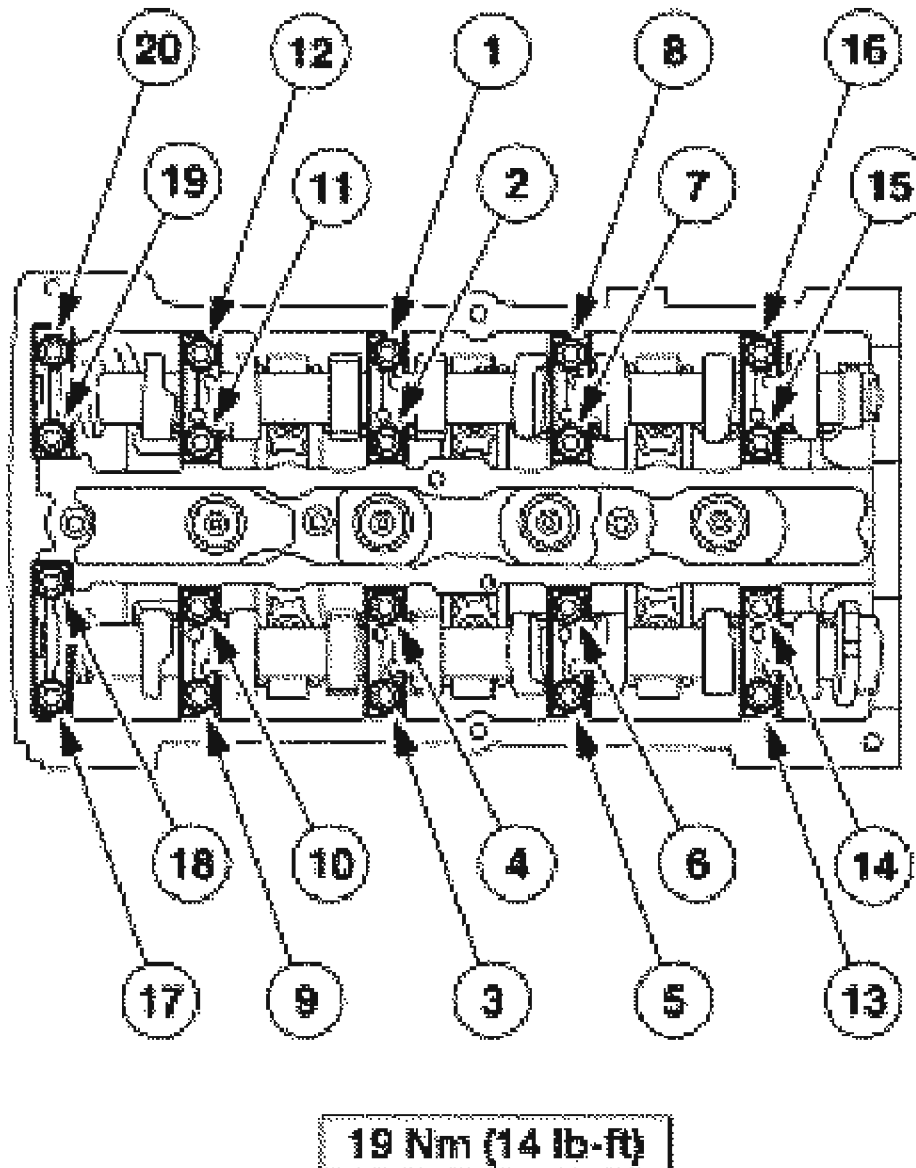


G02739067

**Fig. 428: Installing Valve Tappets**  
Courtesy of FORD MOTOR CO.

40. Install the valve tappets.

**NOTE:** Lubricate the camshaft bearing surfaces with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H.



G02739088

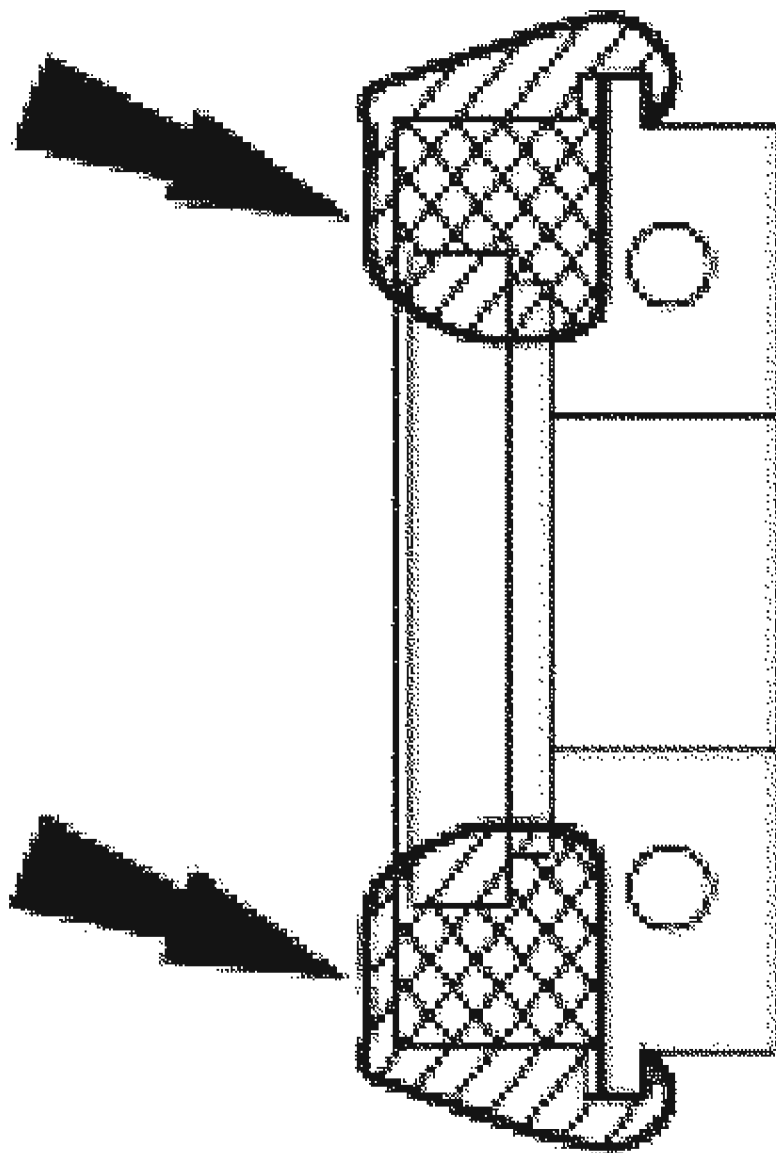
**Fig. 429: Identifying Tightening Sequence & Torque Specification Of Camshaft Journal Caps Bolts**  
Courtesy of FORD MOTOR CO.

41. Install the camshafts.

- Position the camshafts and camshaft journal caps.
- Install the bolts and tighten the bolts in several two-turn passes using the sequence

shown.

**NOTE:** The front camshaft journal cap must be installed and the bolts tightened to specification within four minutes of sealer application or oil leaks may occur.



G02739069

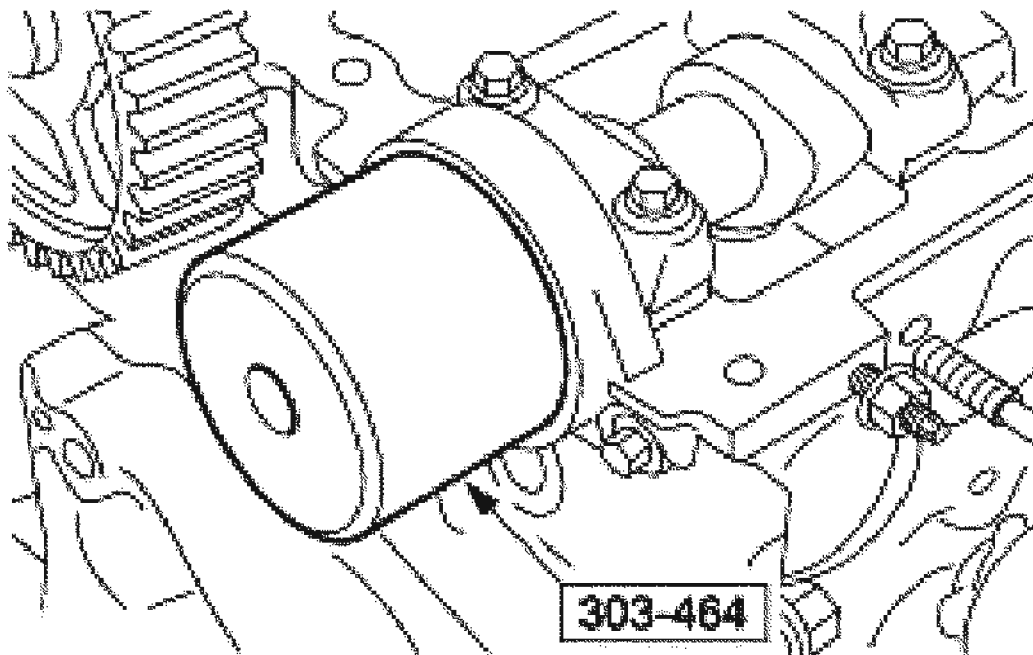
**Fig. 430: Coating Sealing Surface Of Front Camshaft Journal Cap With Gasket**

**Maker F8AZ-19B508-AB**

**Courtesy of FORD MOTOR CO.**

42. Coat the sealing surface of the front camshaft journal cap with Gasket Maker F8AZ-19B508-AB or equivalent meeting Ford specification WSK-M2G348-A5.

**NOTE:** The exhaust camshaft oil seal is shown, the intake seal is similar.



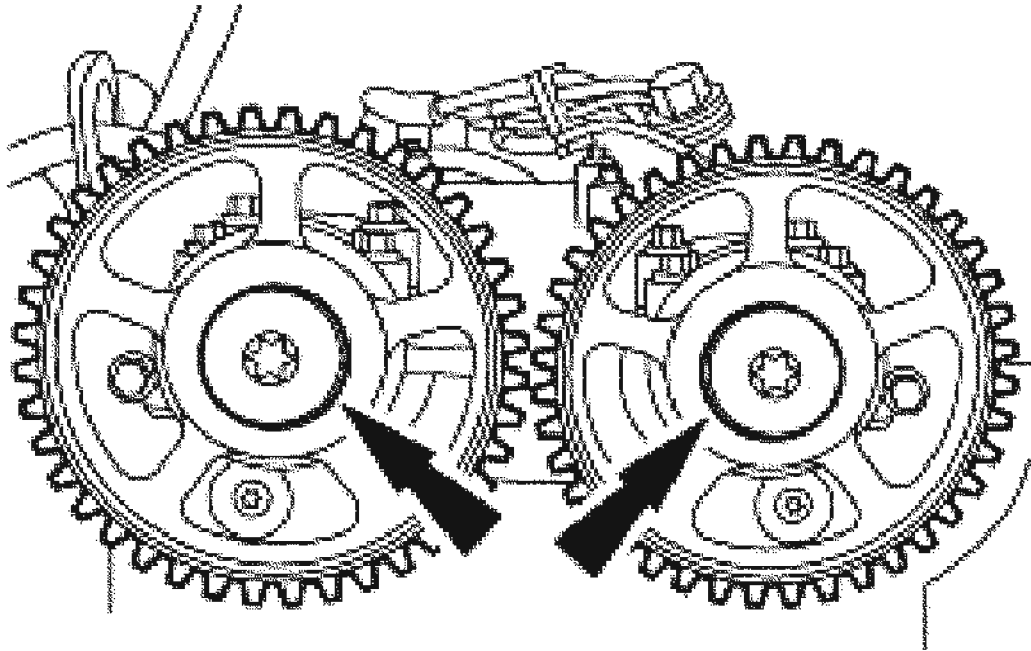
G02739070

**Fig. 431: Installing New Camshaft Front Oil Seals**

**Courtesy of FORD MOTOR CO.**

43. Using the special tool, install new camshaft front oil seals.
44. Install the camshaft sprockets and hand tighten the bolts.
- Rotate the camshafts one full turn and inspect them for binding.





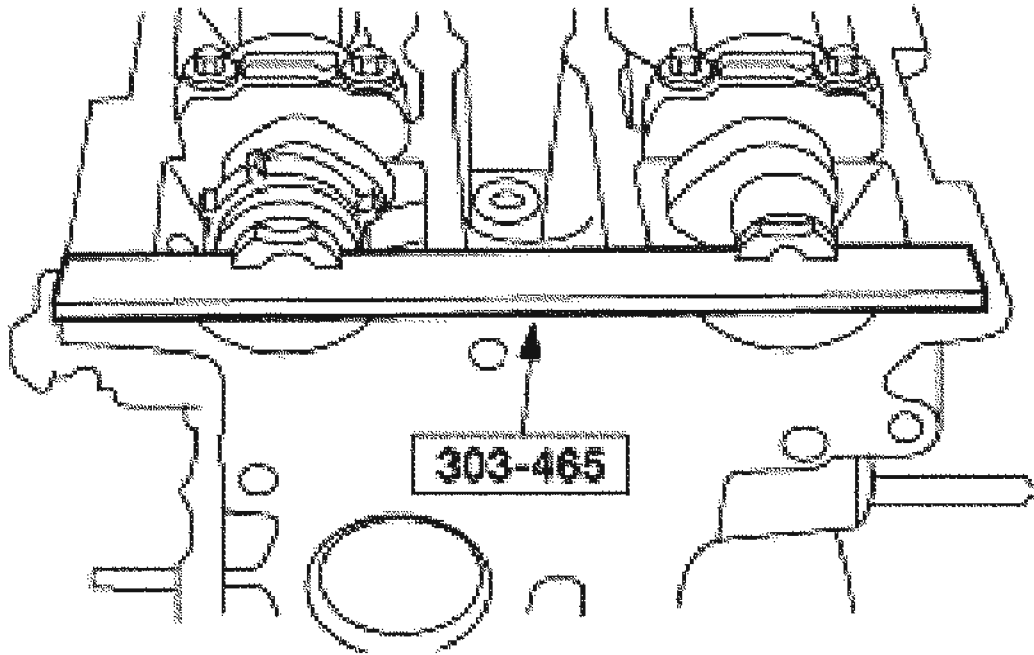
G02739071

**Fig. 432: Installing Camshaft Sprockets**  
Courtesy of FORD MOTOR CO.

45. Verify the valve clearance. For additional information, refer to VALVE - VALVE CLEARANCE, ADJUST.

**CAUTION:** The camshaft alignment tool is not recommended to hold the camshafts in place when removing or tightening the sprocket bolts. Damage to camshaft may result.

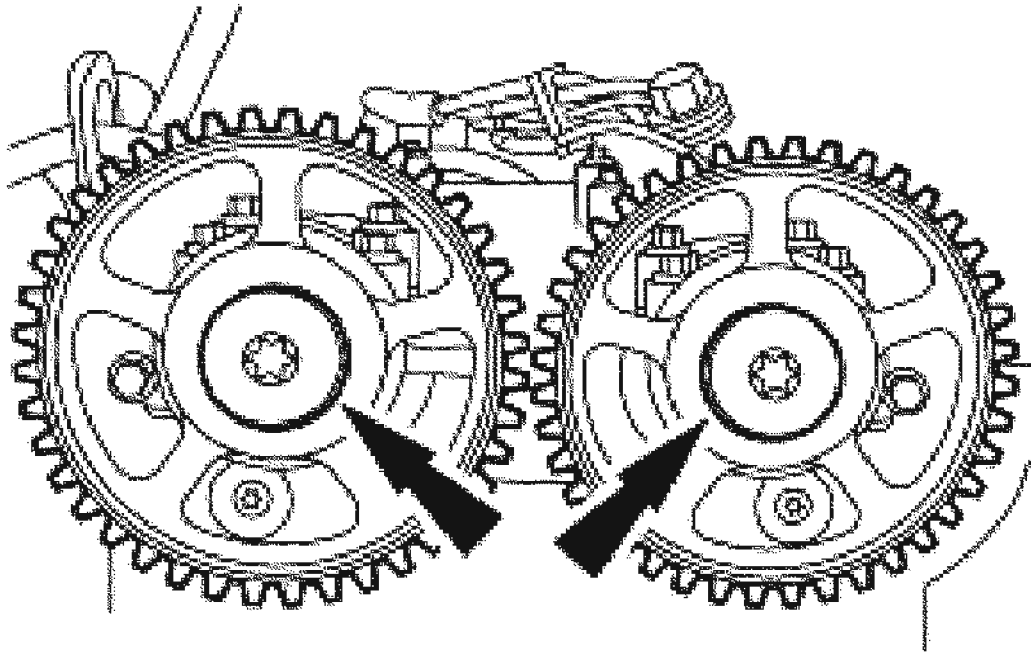
**NOTE:** Installation of the alignment tool into the exhaust camshaft may require the camshaft to be rotated slightly.



G02739072

**Fig. 433: Installing Special Tool Onto Back Of Camshafts**  
Courtesy of FORD MOTOR CO.

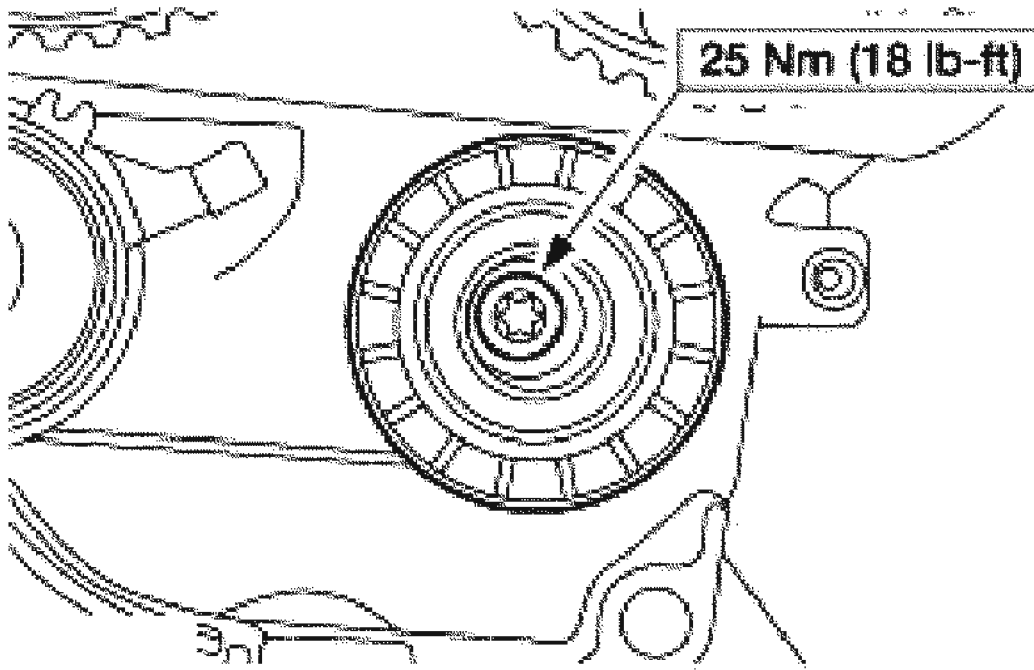
46. Install the special tool onto the back of the camshafts.
47. Loosen the timing sprocket bolts and allow the camshaft sprockets to move freely.



G02739073

**Fig. 434: Loosening Timing Sprocket Bolts**  
Courtesy of FORD MOTOR CO.

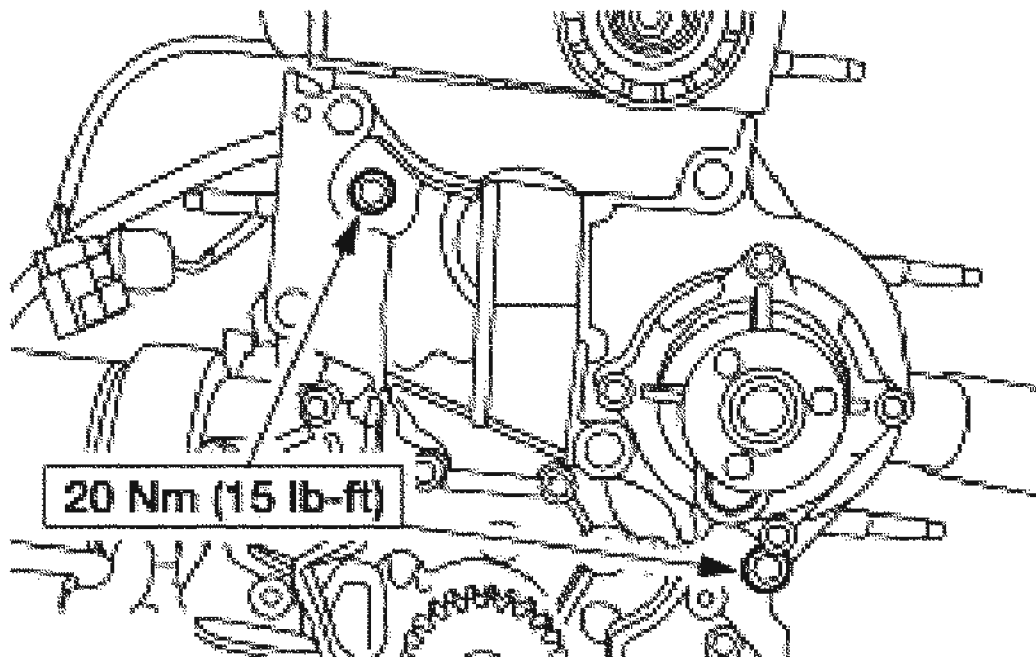
48. Install the timing belt idler pulley.



G02739074

**Fig. 435: Identifying Timing Belt Idler Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

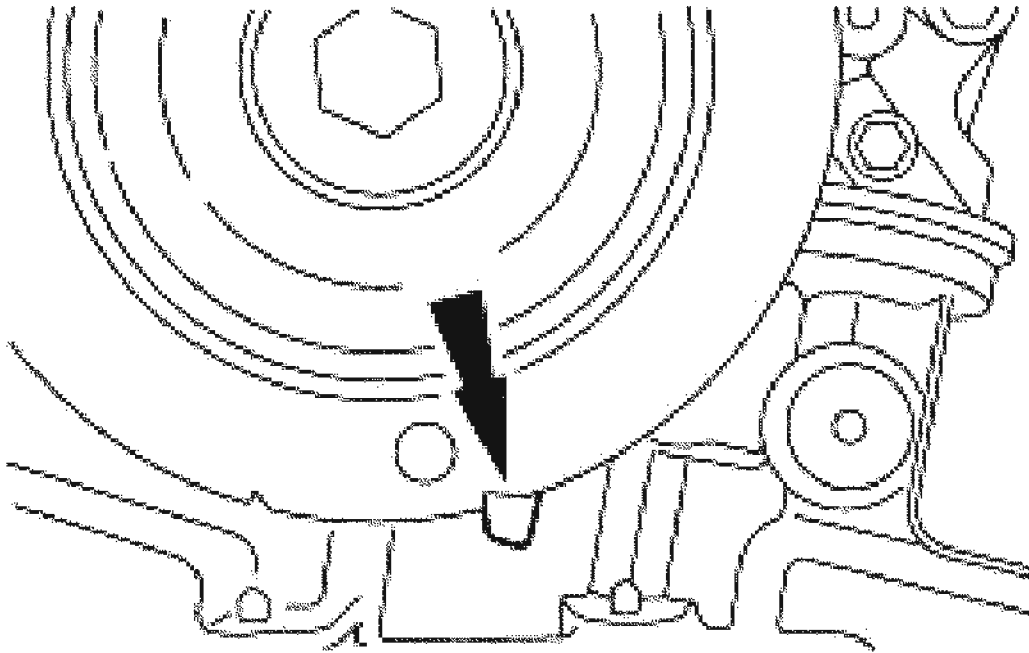
49. Install the coolant pump adapter.
  - Install a new gasket.



G02739075

**Fig. 436: Identifying Coolant Pump Adapter Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure the correct (second) notch in the pulley is indexed to the lower cylinder block.



G02739076

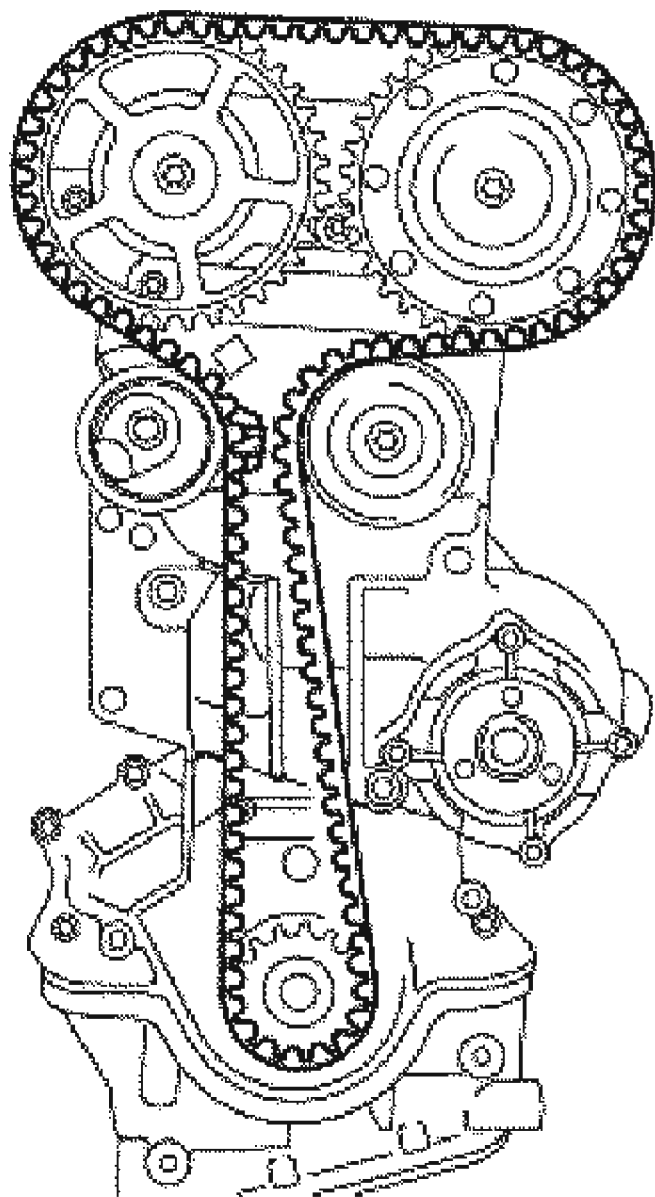
**Fig. 437: Sliding Crankshaft Pulley Onto Crankshaft And Confirming Crankshaft Position At TDC (No. 1 Cylinder)**

**Courtesy of FORD MOTOR CO.**

50. Slide the crankshaft pulley onto the crankshaft and confirm the crankshaft position is at TDC (No. 1 cylinder) by rotating it clockwise against the alignment peg.
  - Remove the crankshaft pulley.

**CAUTION:** Do not rotate the crankshaft; as necessary check that it is still resting against the timing pin.

**NOTE:** The lug of the belt tensioner should not be hooked in the sheet metal cover during timing belt installation.



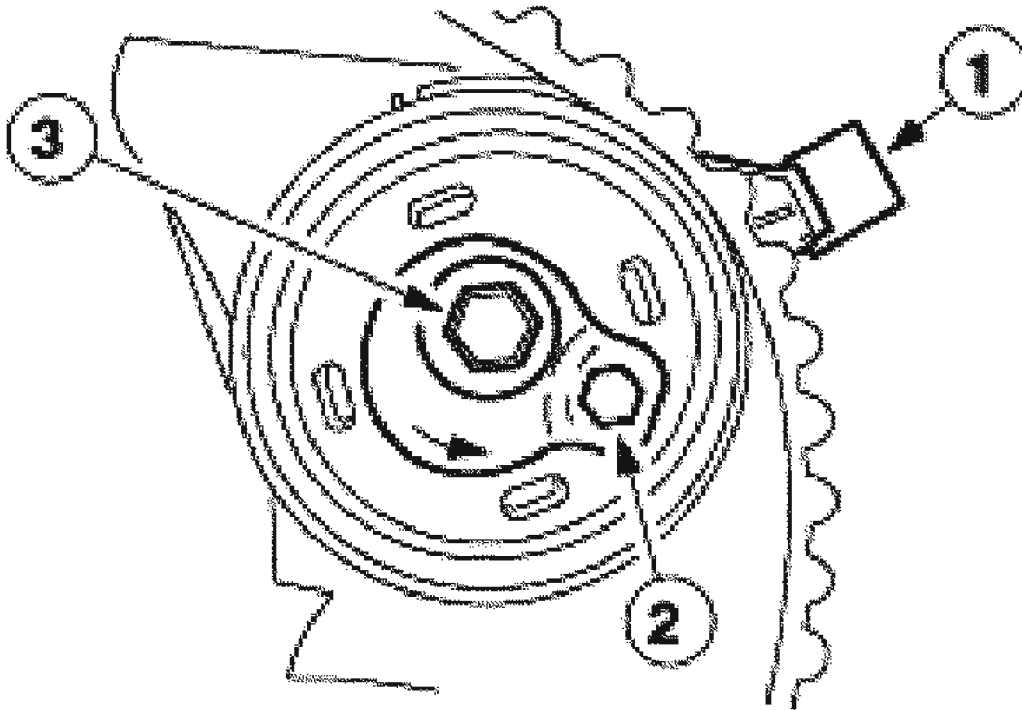
G02739077

**Fig. 438: Installing New Timing Belt**  
Courtesy of FORD MOTOR CO.

51. Position a new timing belt in place.

- Starting from the crankshaft timing belt pulley and working counterclockwise, position the timing belt in place while keeping it under tension.

**NOTE:** Incorrect timing belt tension will cause incorrect valve timing.



G02739078

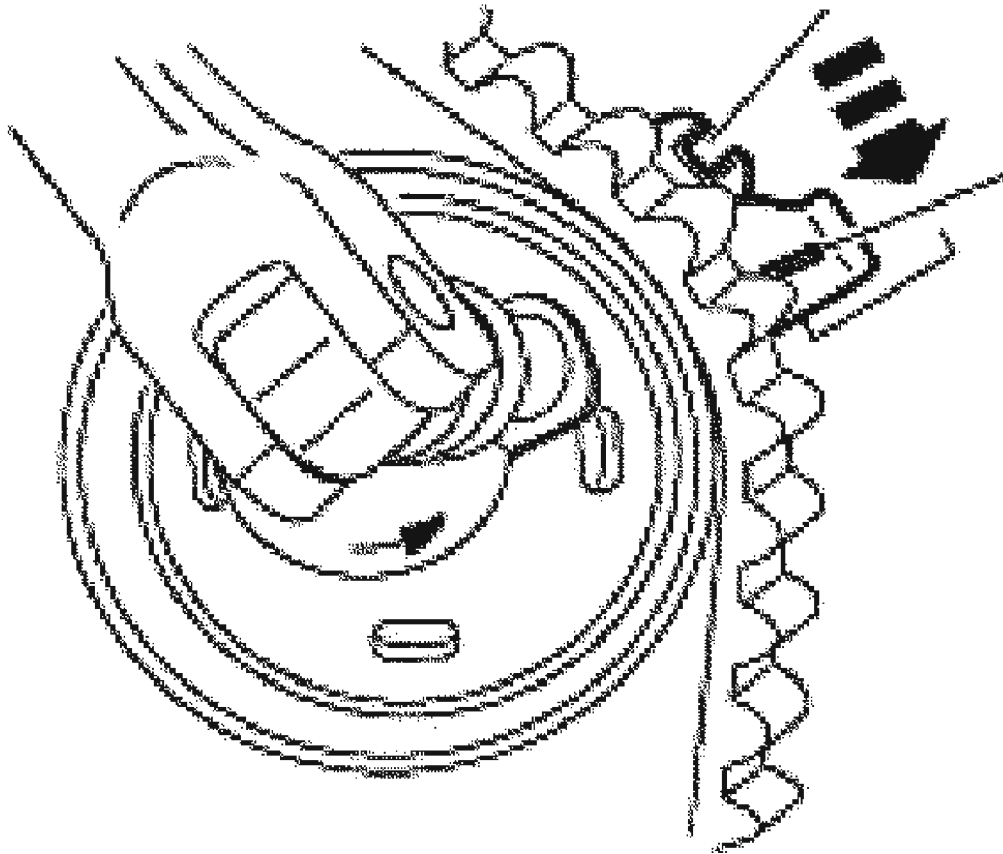
**Fig. 439: Pre-Tensioning Timing Belt**  
Courtesy of FORD MOTOR CO.

52. Pre-tension the timing belt.

1. Rotate the tensioner locating tab counterclockwise and insert the locating tab into the slot in the rear timing cover.
2. Position the hex key slot in the tensioner adjusting washer to the 4 o'clock position.
3. Tighten the attaching bolt enough to seat the tensioner firmly against the rear timing cover, but still allow the tensioner adjusting washer to be rotated using a 6 mm hex key.

**CAUTION:** Tension the timing belt, working counterclockwise.

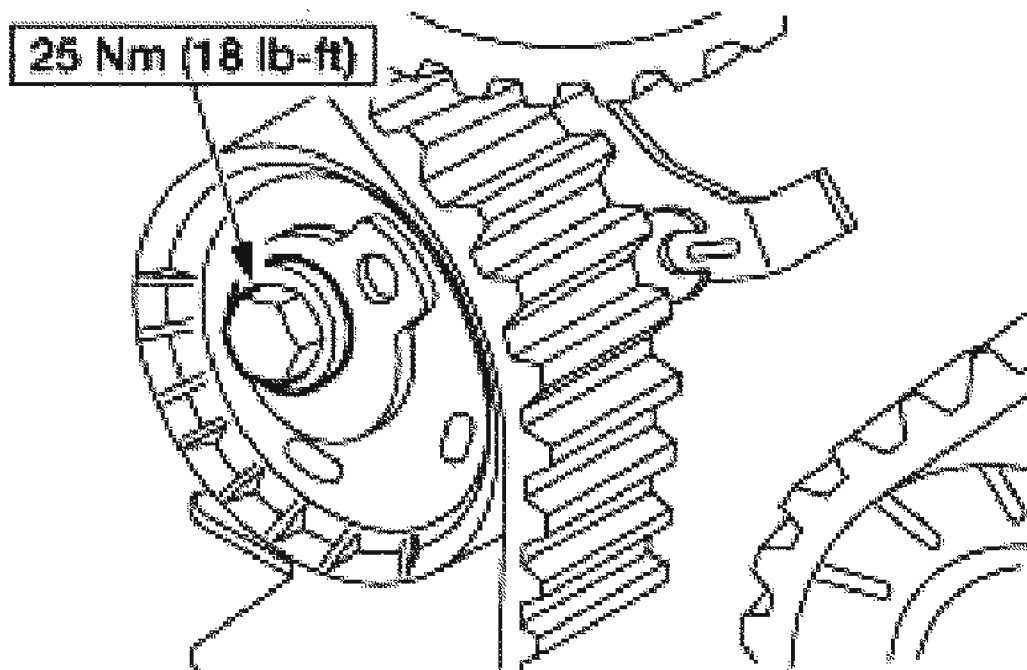




**G02739079**

**Fig. 440: Rotating Adjusting Washer Counterclockwise**  
Courtesy of FORD MOTOR CO.

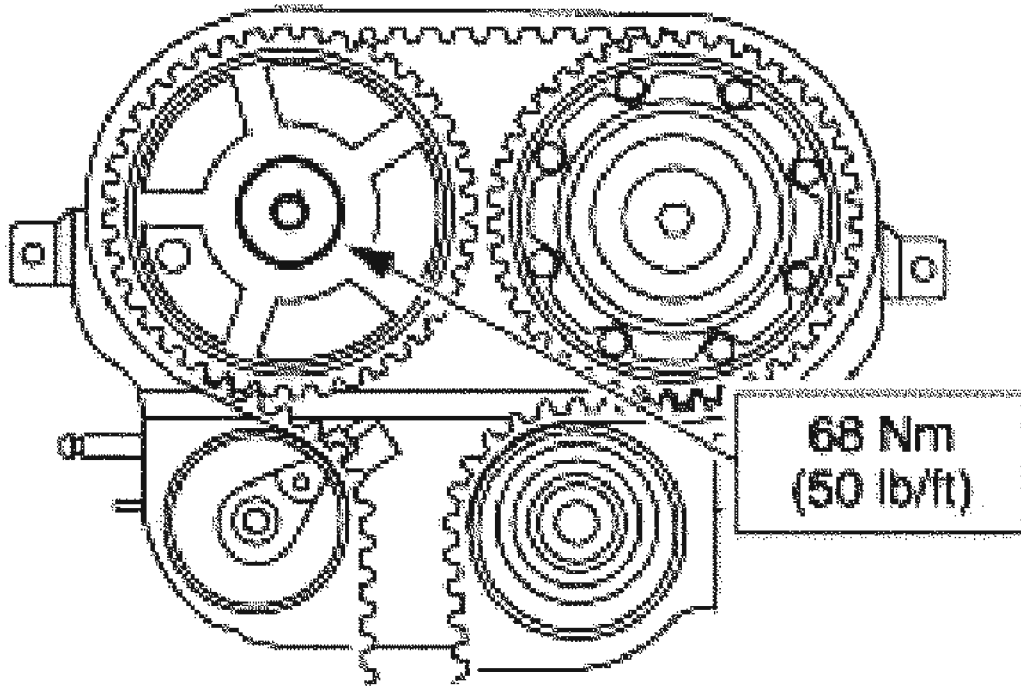
53. Using the hex key, rotate the adjusting washer counterclockwise until the notch in the pointer is centered over the index line on the locating tab (the pointer will move clockwise during adjustment).
54. While holding the adjusting washer in position, tighten the bolt.



G02739080

**Fig. 441: Tightening Bolt**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The camshaft must be held stationary at the hexagons with locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

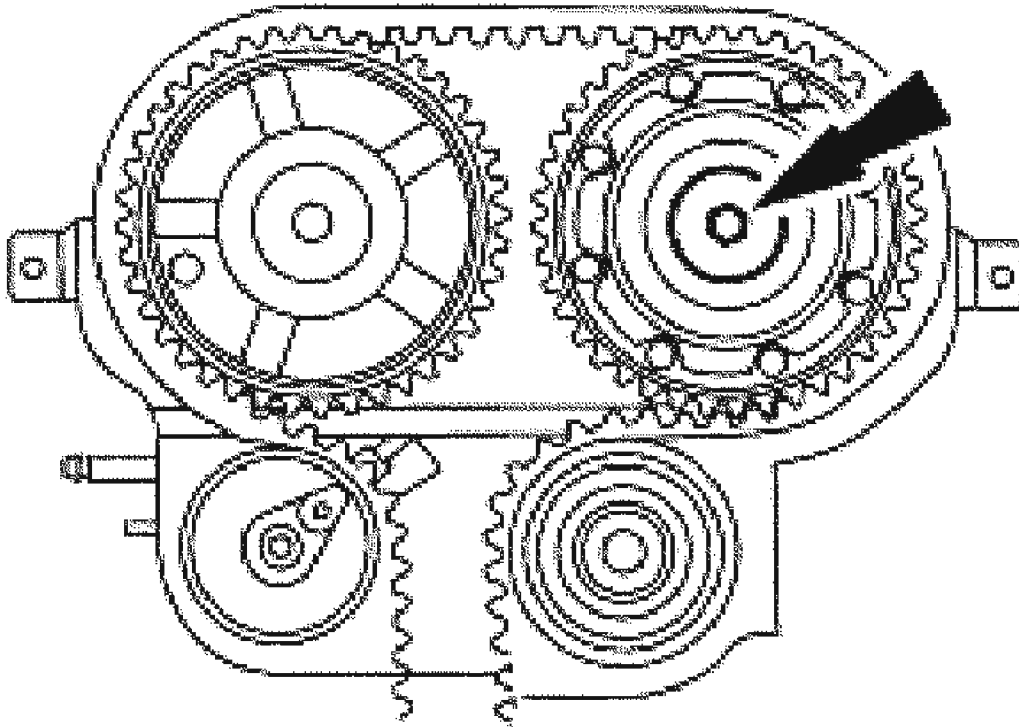


G02739081

**Fig. 442: Identifying Intake Camshaft Sprocket Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

55. Tighten the bolt on the intake camshaft sprocket.

**CAUTION:** The camshaft must be held stationary at the hexagons with locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

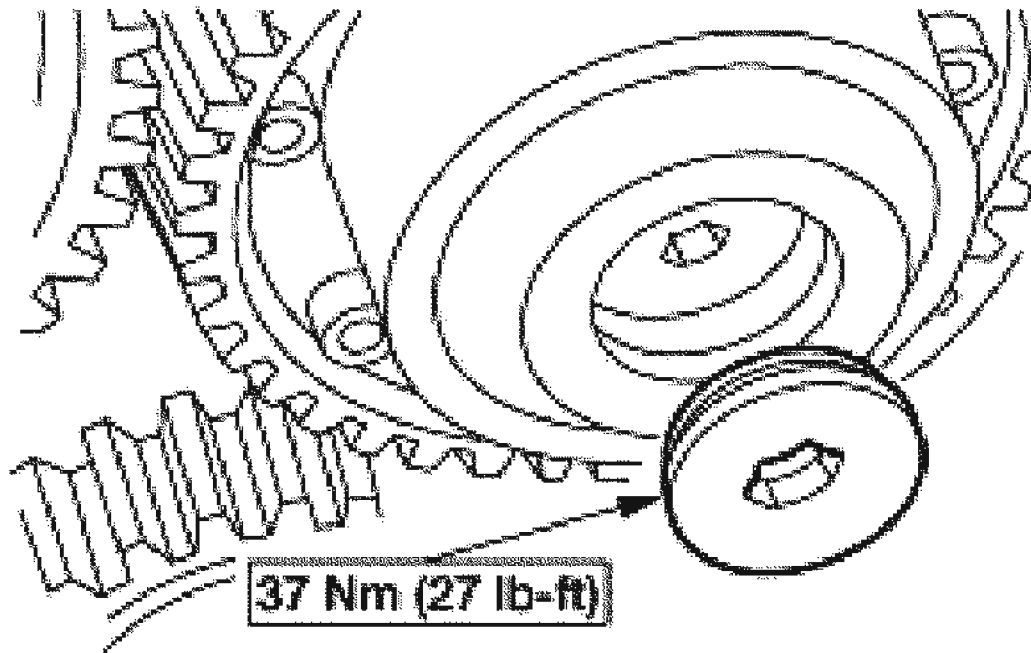


G02739082

**Fig. 443: Tightening Exhaust Camshaft Sprocket Bolt**  
Courtesy of FORD MOTOR CO.

56. Tighten the bolt on the exhaust camshaft sprocket in three stages.
- Stage 1: Tighten the bolt to 50 Nm (36 lb-ft).
  - Stage 2: Remove the TDC peg and the camshaft alignment timing tool.
  - Stage 3: Tighten the bolt to 115-125 Nm (85-92 lb-ft).

**NOTE:**      **Install a new oil plug seal.**



G02739083

**Fig. 444: Installing New Oil Plug On Variable Camshaft Timing Assembly**  
Courtesy of FORD MOTOR CO.

57. Screw in the new oil plug on the variable camshaft timing assembly.

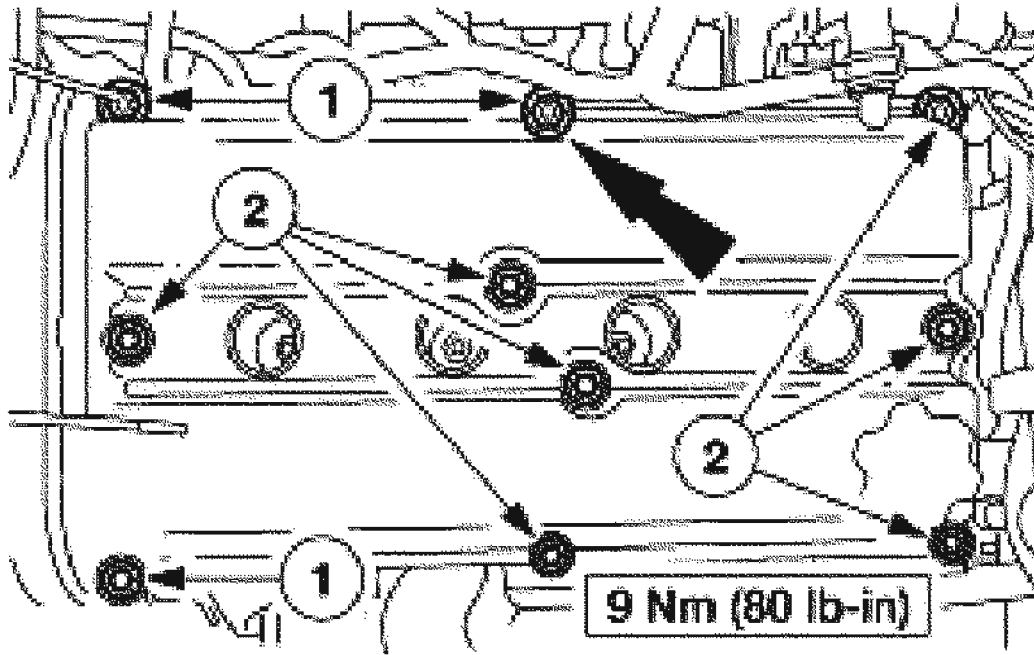
**NOTE:** Turn the engine two turns in the normal direction of rotation by the crankshaft.

58. Check the valve timing by inserting the special tools and correct the alignment as necessary.

- Screw in special tool 303-574 and make sure that the crankshaft is resting against the special tool.
- Insert special tool 303-465 into the camshafts. If necessary loosen the timing pulleys and correct the camshaft alignment.
- Remove the special tools.

59. Install the bolts and the valve cover.

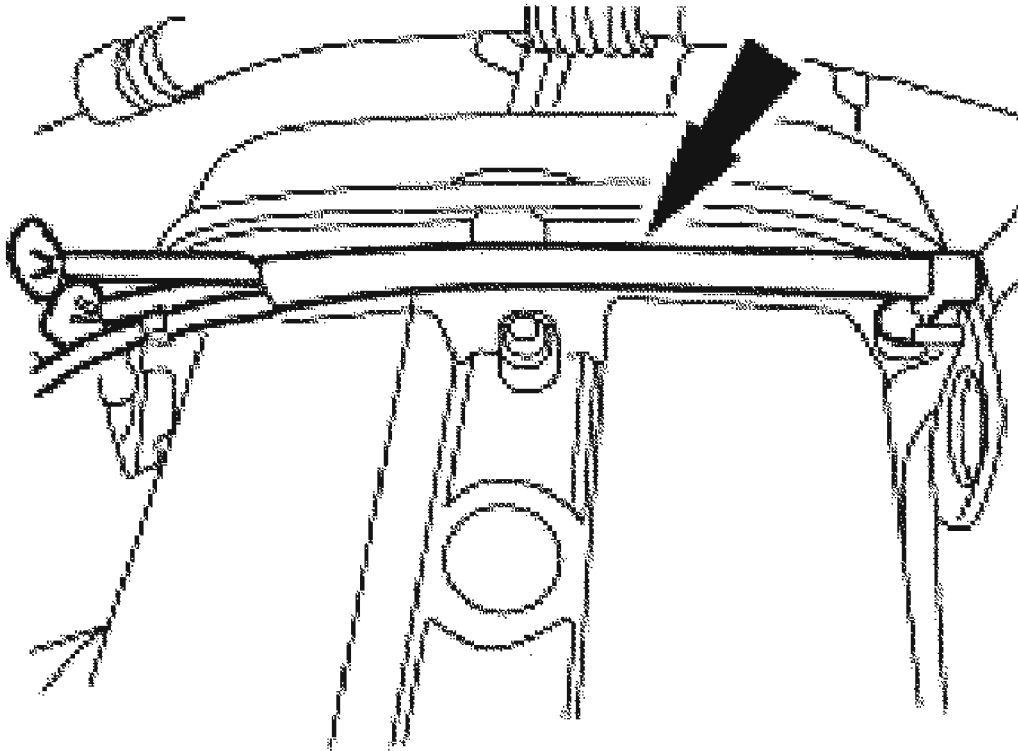
- Install the valve cover gasket.



G02739084

**Fig. 445: Installing Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

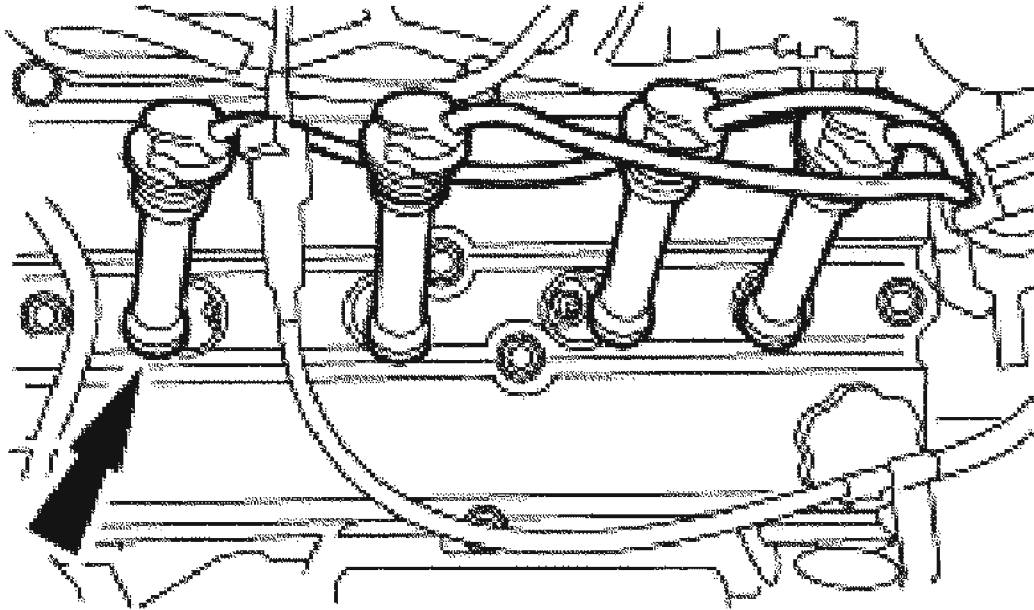
60. Position and connect the wiring harness.



**G02739085**

**Fig. 446: Connecting Wiring Harness**  
**Courtesy of FORD MOTOR CO.**

61. Connect the ignition wires to the correct spark plugs.

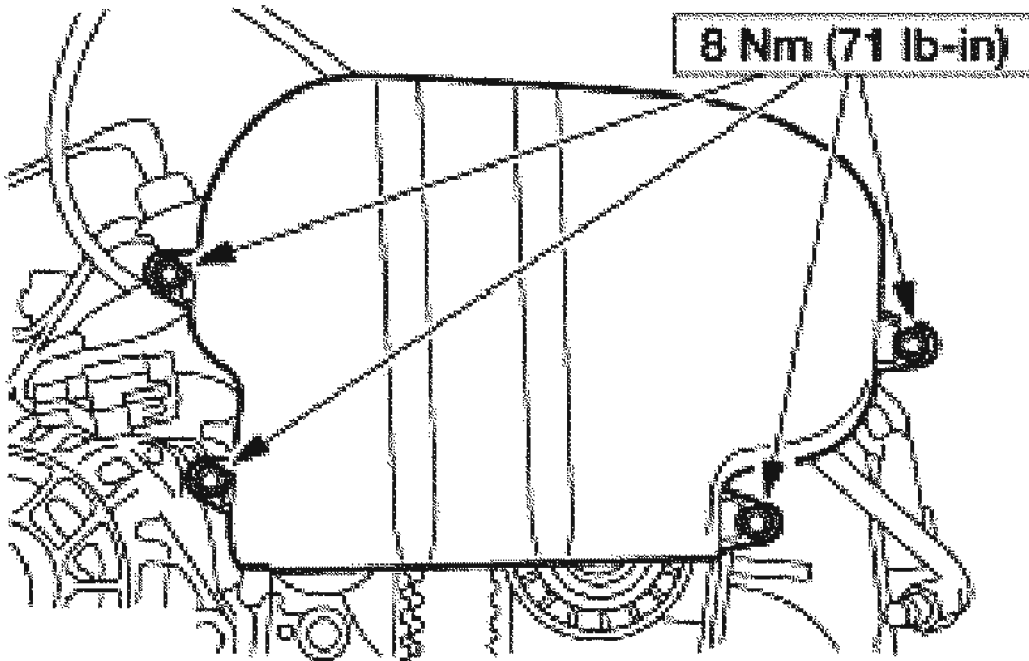


G02739086

**Fig. 447: Connecting Ignition Wires To Correct Spark Plugs**  
Courtesy of FORD MOTOR CO.

62. Install the timing belt upper cover.

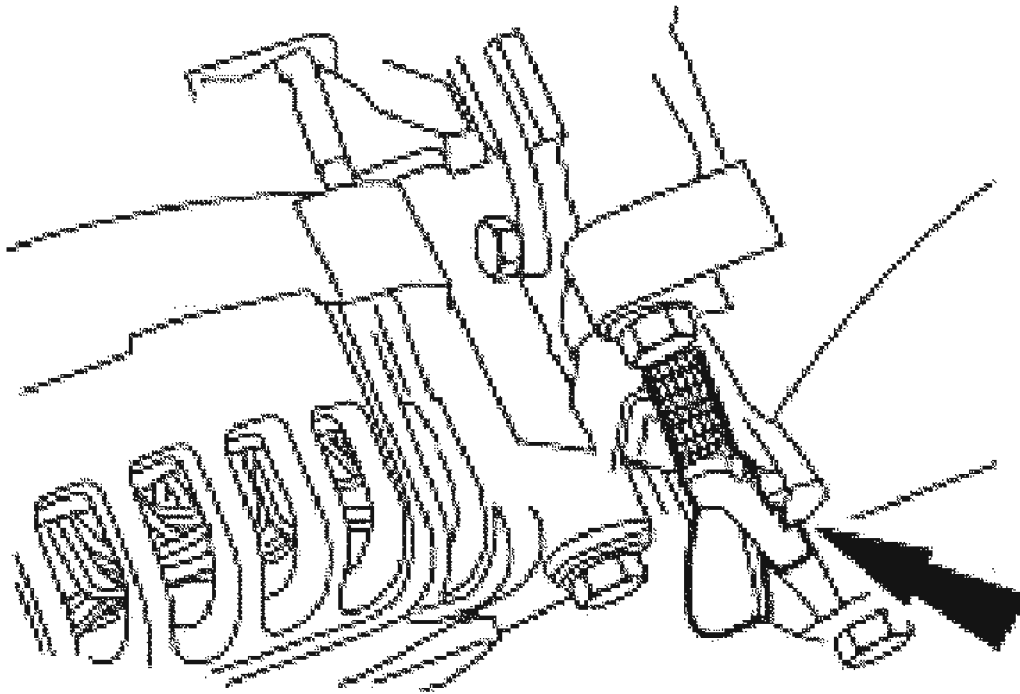




G02739087

**Fig. 448: Identifying Timing Belt Upper Cover Bolts Torque Specification**  
**Courtesy of FORD MOTOR CO.**

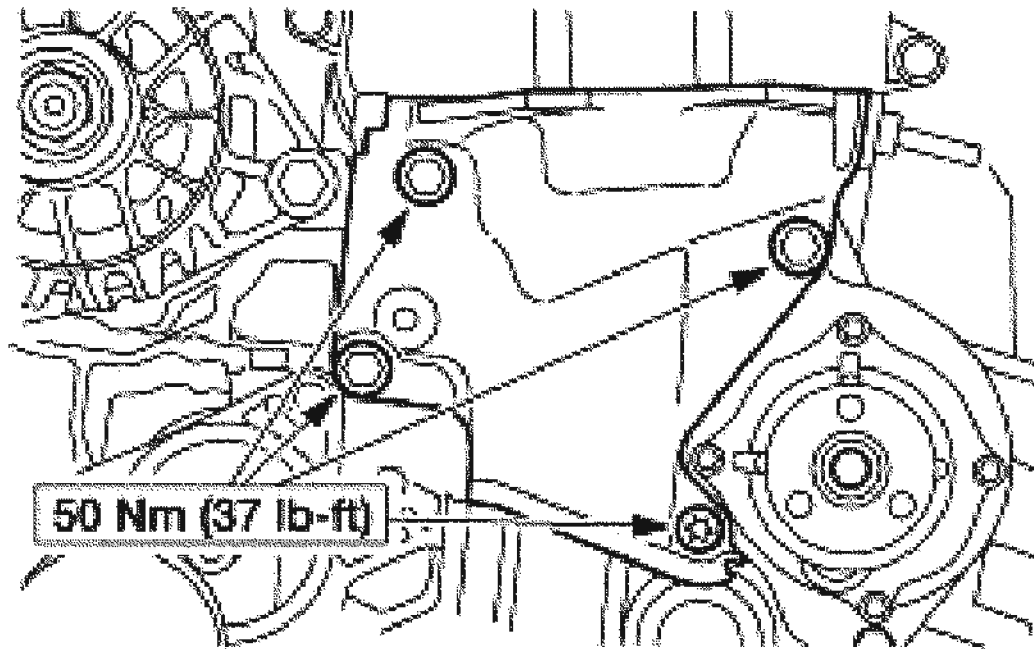
63. Position the wire harness.



**G02739088**

**Fig. 449: Installing Wire Harness**  
**Courtesy of FORD MOTOR CO.**

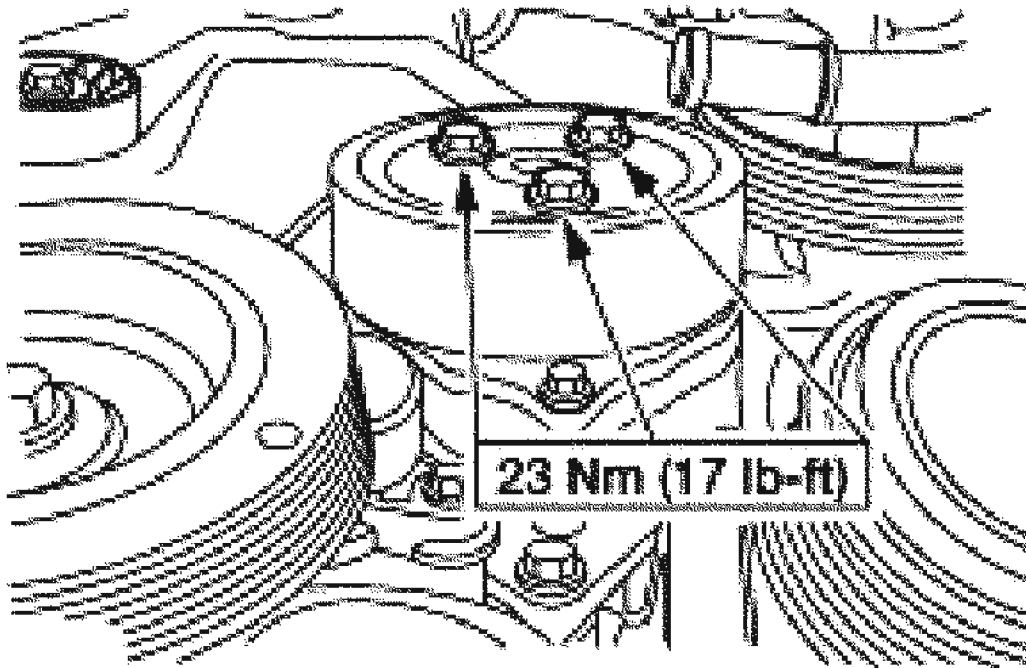
64. Install the lower engine mount bracket.



G02739089

**Fig. 450: Identifying Lower Engine Mount Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

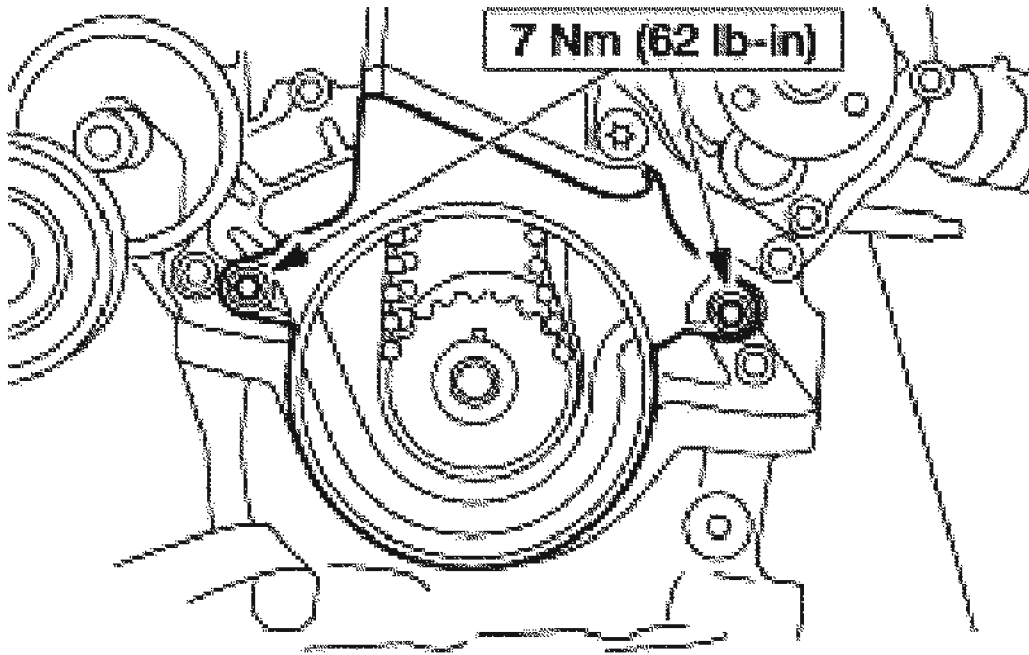
65. Install the coolant pump pulley.



G02739090

**Fig. 451: Identifying Coolant Pump Pulley Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

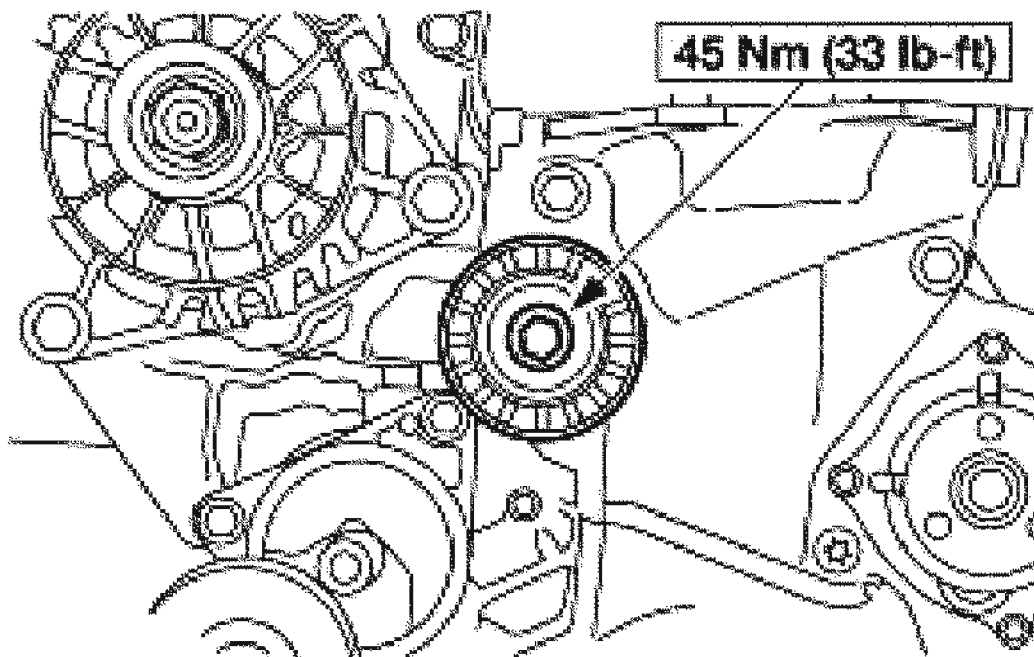
66. Install the lower timing belt cover.



G02739091

**Fig. 452: Identifying Lower Timing Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

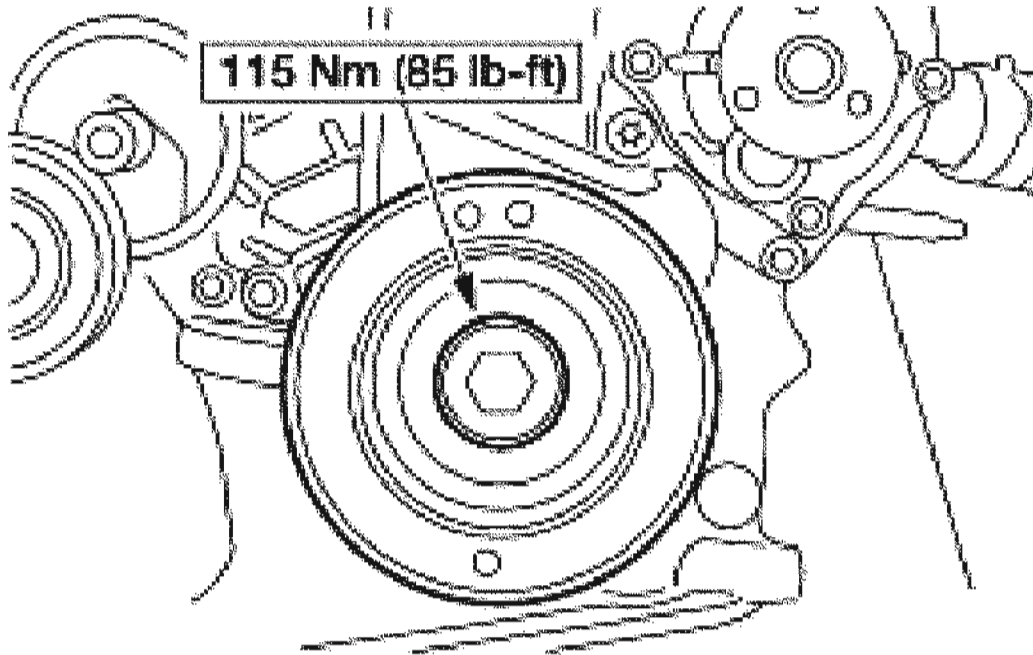
67. Install the accessory drive belt idler pulley.



G02739092

**Fig. 453: Identifying Accessory Drive Belt Idler Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

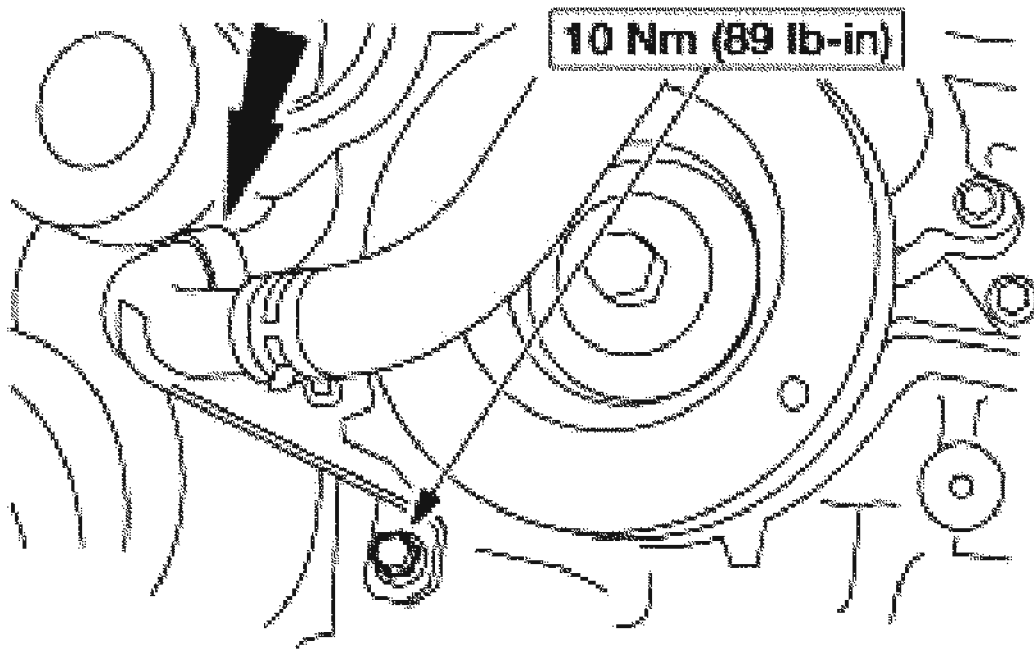
**NOTE:** Apply Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4 to the crankshaft pulley keyway prior to installing the crankshaft pulley.



G02739093

**Fig. 454: Identifying Crankshaft Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

68. Install the crankshaft pulley.
69. Install the coolant tube.
  - Install the bolt.
  - Connect the hose.

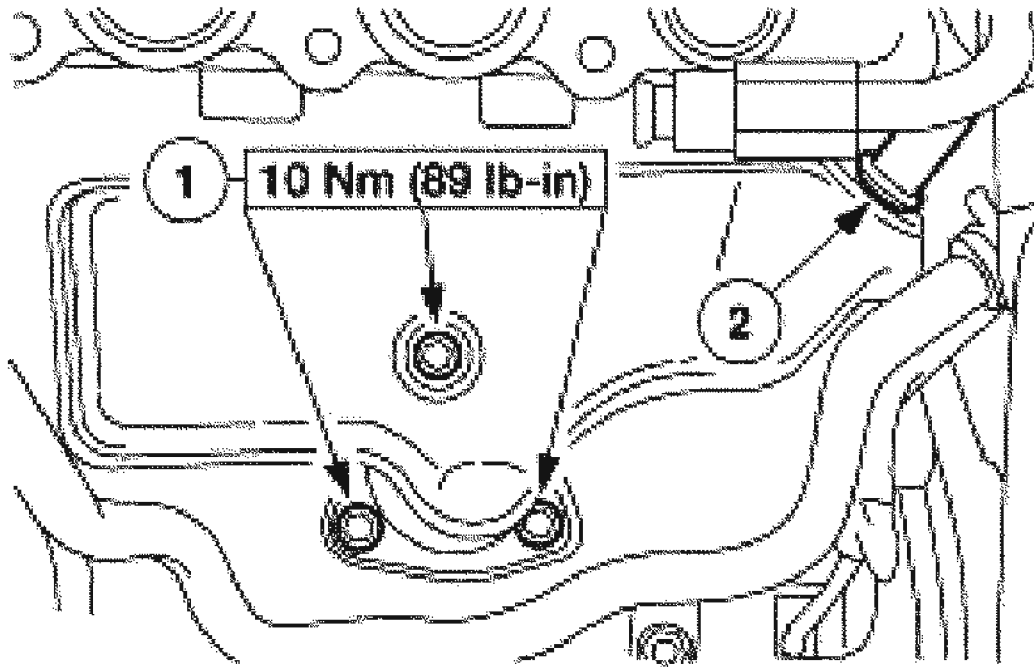


G02739094

**Fig. 455: Identifying Coolant Tube Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

70. Install the crankcase vent oil separator.
  1. Install the bolts.
    - Install a new gasket.
  2. Connect the PCV valve.

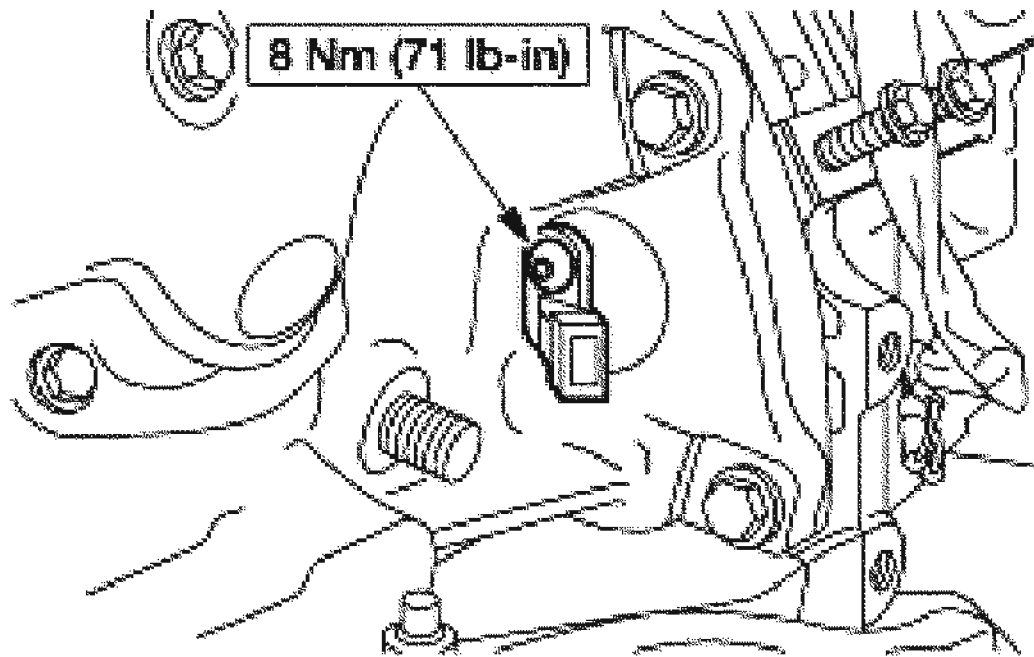




G02739095

**Fig. 456: Installing Crankcase Vent Oil Separator**  
Courtesy of FORD MOTOR CO.

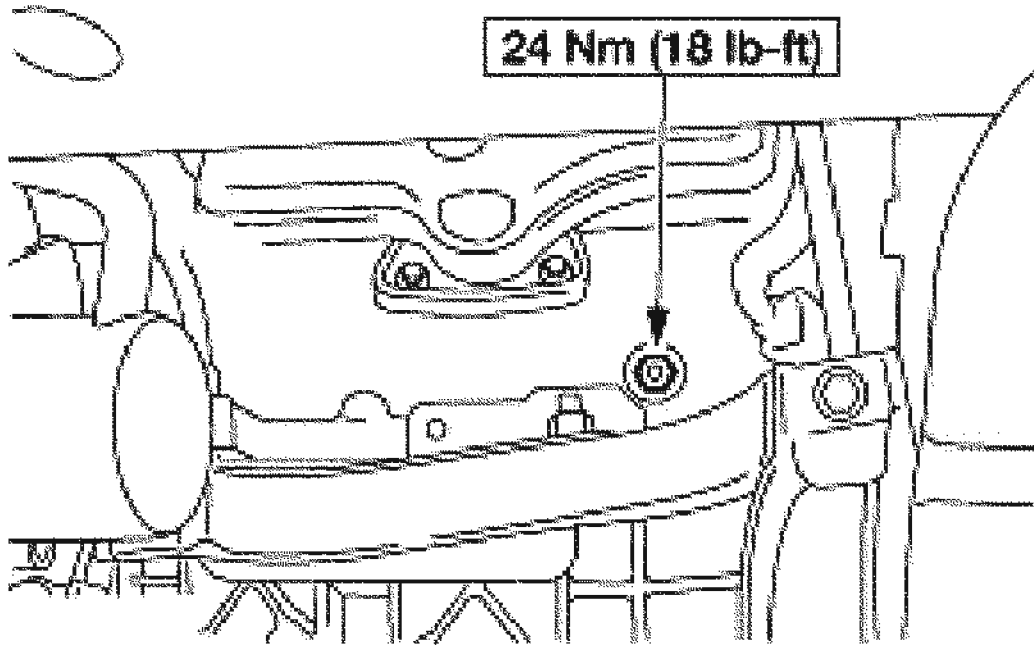
71. Install the crankshaft position sensor and bushing.



G02739096

**Fig. 457: Installing Crankshaft Position Sensor And Bushing**  
Courtesy of FORD MOTOR CO.

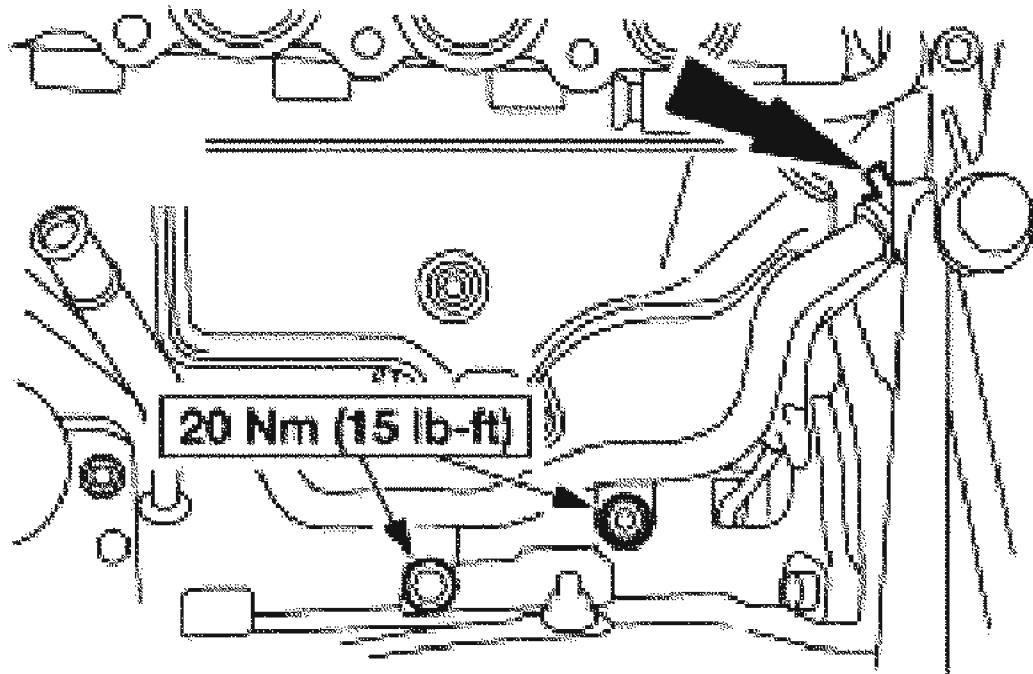
72. Install the stud.



G02739097

**Fig. 458: Identifying Stud Torque Specification**  
Courtesy of FORD MOTOR CO.

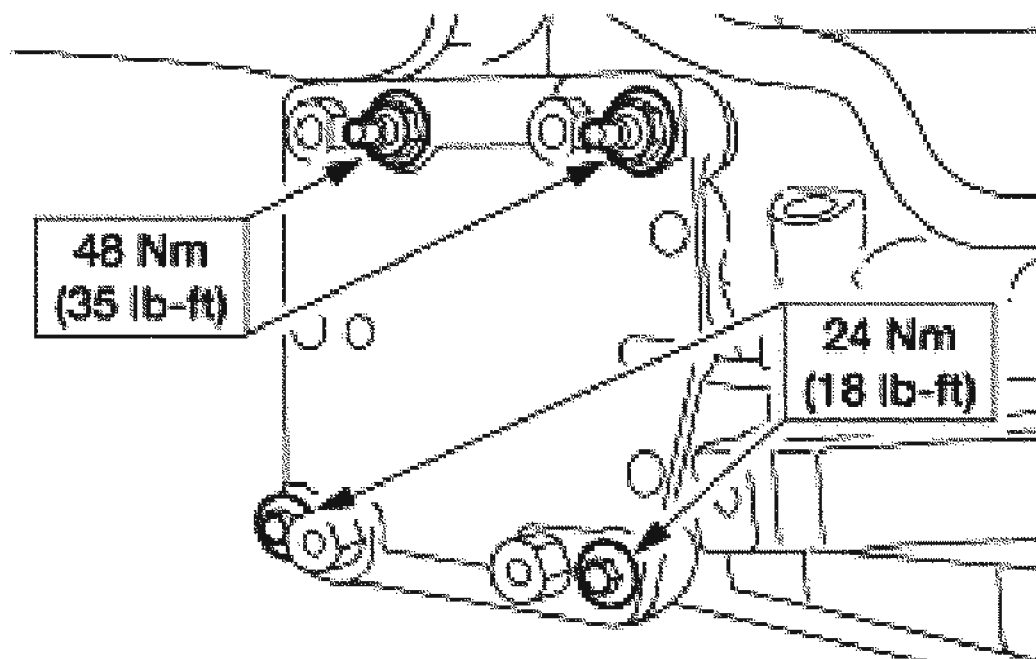
73. Install the coolant tube.
- Install the bolt and nut.
  - Connect the hose.



G02739098

**Fig. 459: Installing Coolant Tube**  
Courtesy of FORD MOTOR CO.

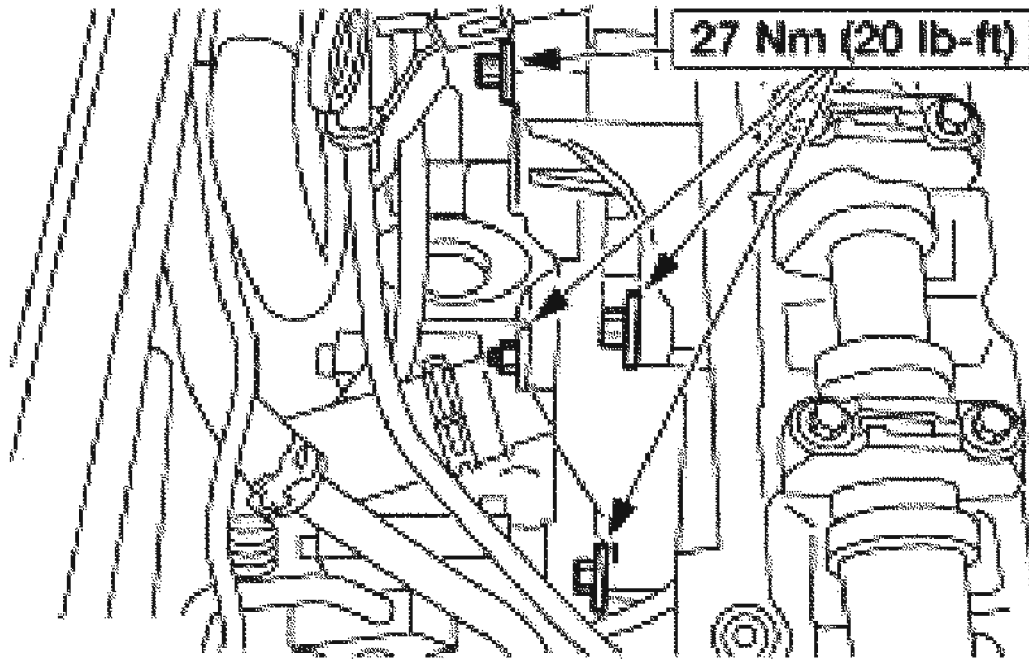
74. Install the A/C compressor bracket.



G02739099

**Fig. 460: Identifying A/C Compressor Bracket Bolts Torque Specifications**  
Courtesy of FORD MOTOR CO.

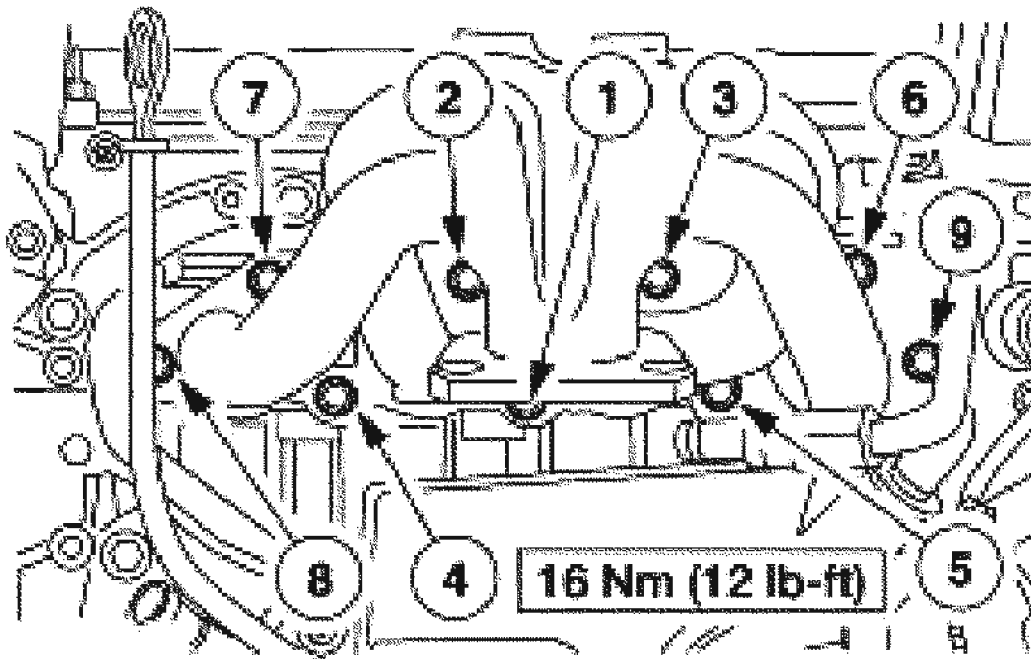
75. Install the power steering pump bracket.



G02739100

**Fig. 461: Identifying Power Steering Pump Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

76. Install the exhaust manifold and tighten using the sequence shown.
- Install a new gasket.

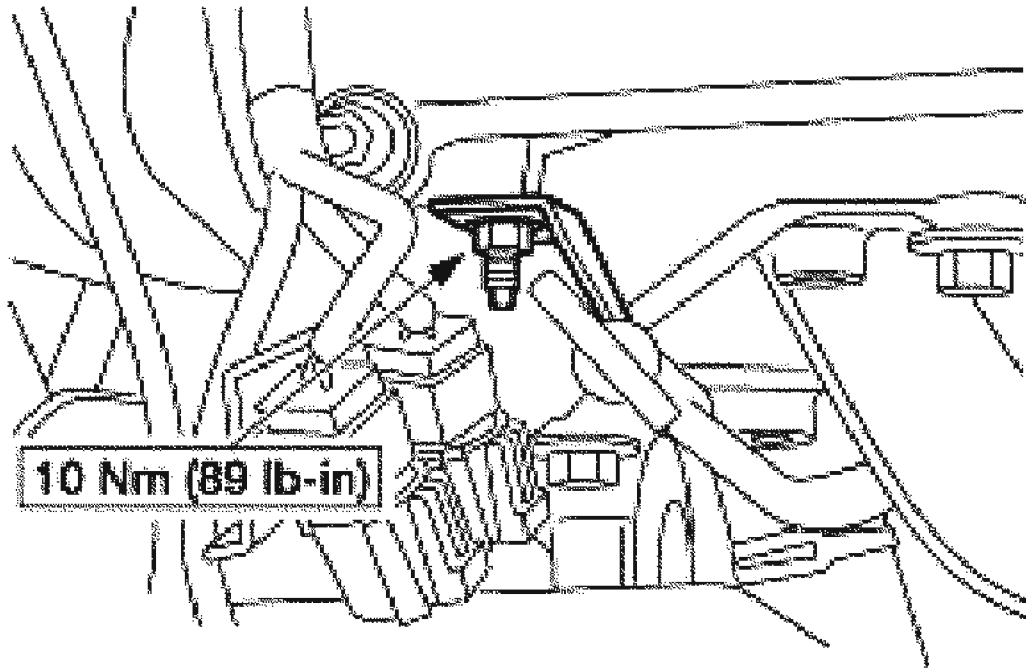


G02739101

**Fig. 462: Identifying Tightening Sequence & Torque Specification Of Exhaust Manifold Bolts**

Courtesy of FORD MOTOR CO.

77. Install the oil level indicator and tube.
  - Install a new O-ring seal if damaged.

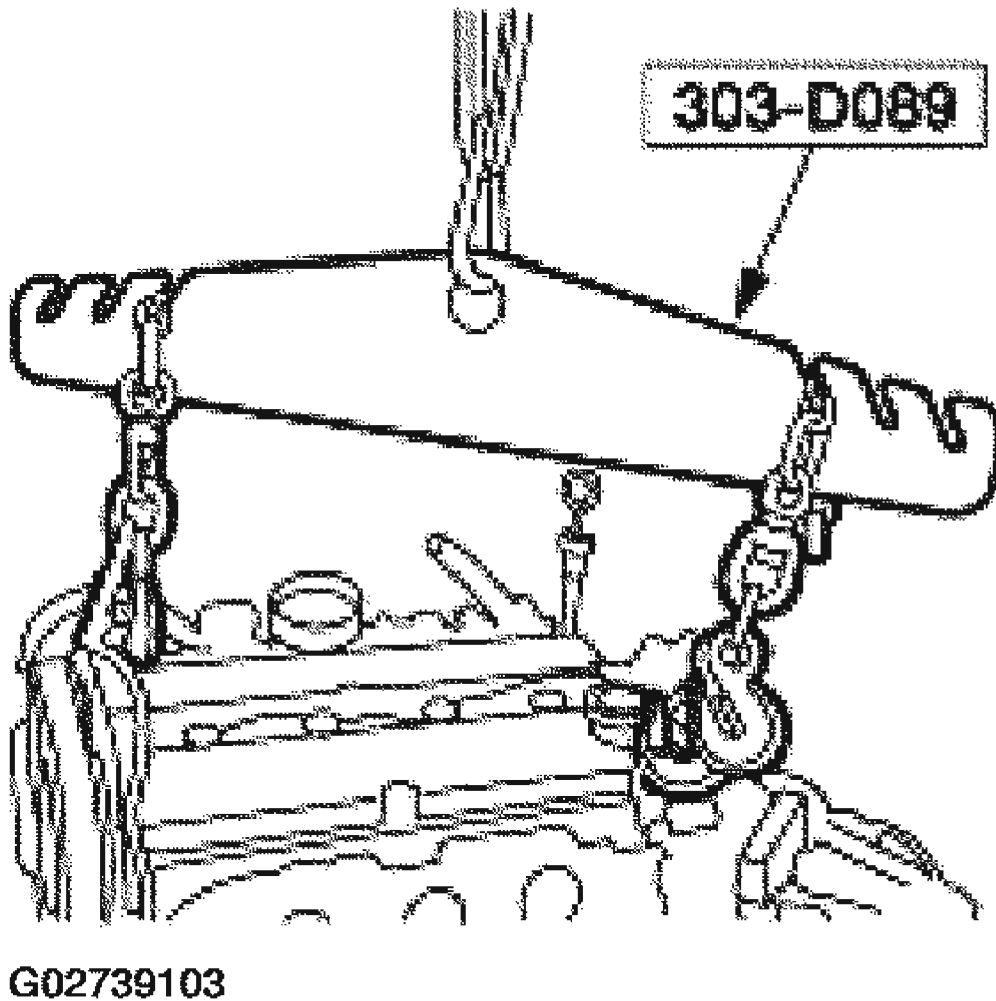


G02739102

**Fig. 463: Identifying Oil Level Indicator And Tube Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

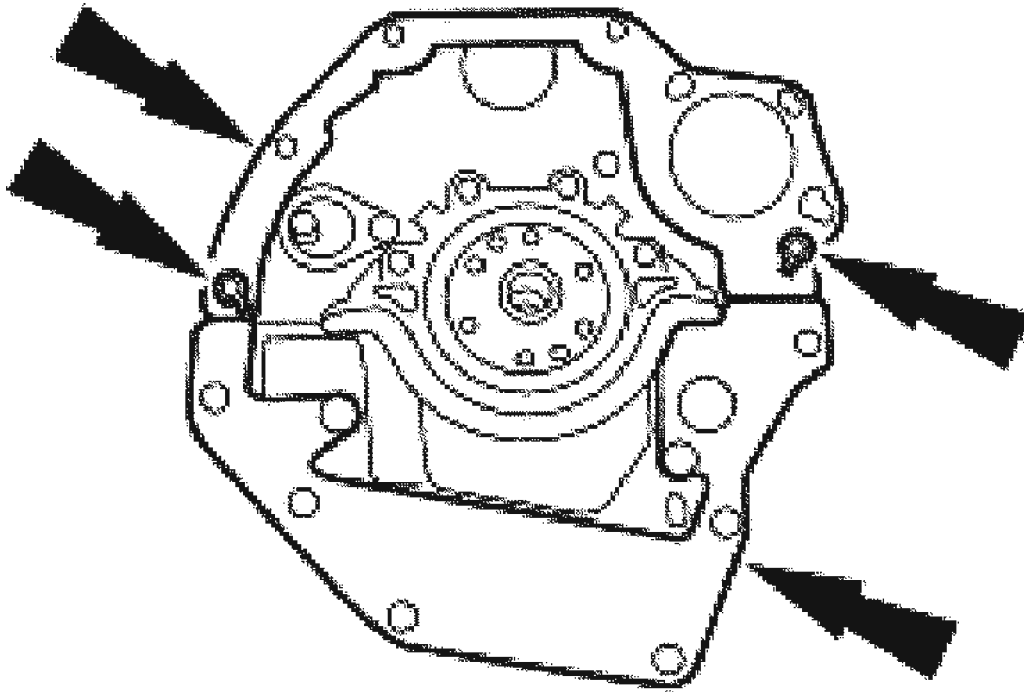
78. Support the engine with a suitable lifting device and remove the engine from the engine stand.





**Fig. 464: Removing Engine From Engine Stand**  
Courtesy of FORD MOTOR CO.

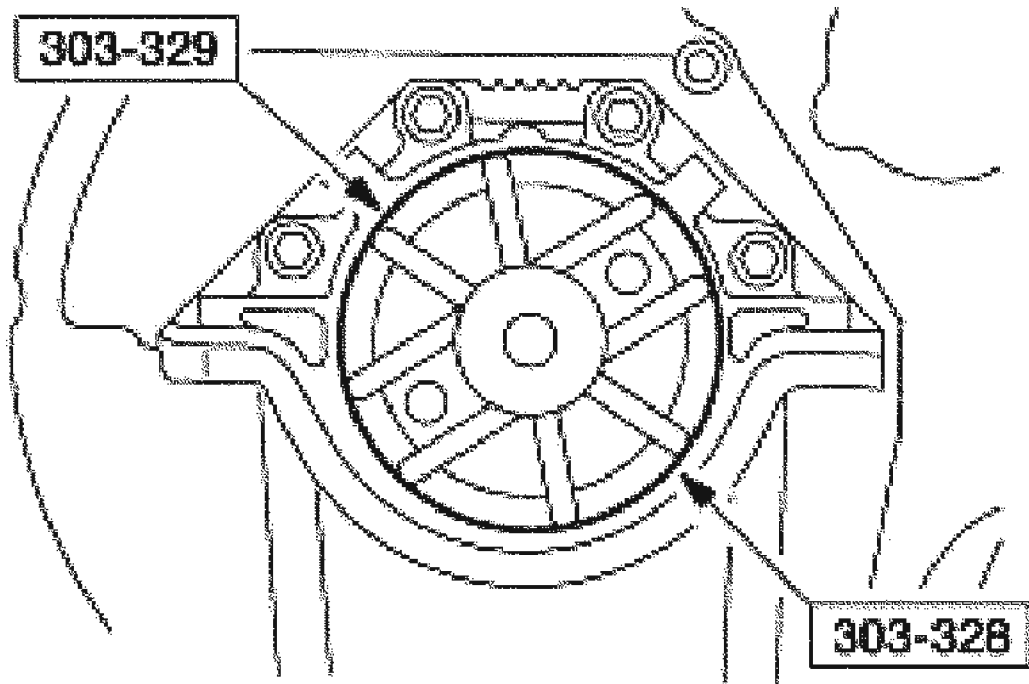
79. Install the rear cover plate and dowels.



G02739104

**Fig. 465: Installing Rear Cover Plate And Dowels**  
Courtesy of FORD MOTOR CO.

**NOTE:** Lubricate the crankcase flange and the crankshaft rear oil seal bore with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2C153-H prior to installing the crankshaft rear seal or damage to the crankshaft rear seal may occur.



G02739105

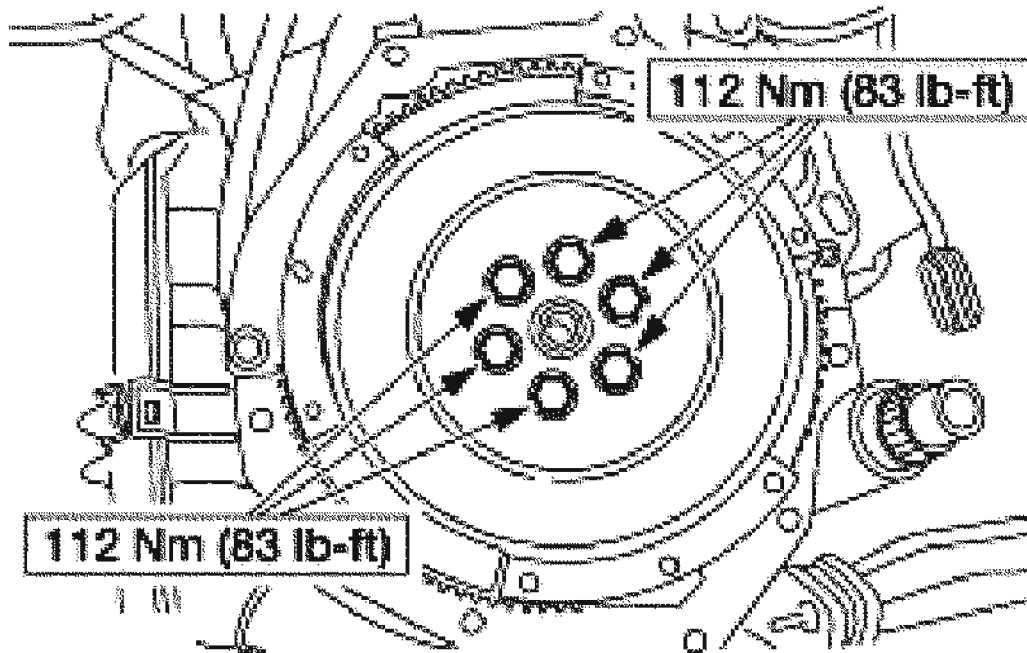
**Fig. 466: Installing New Crankshaft Rear Seal**  
Courtesy of FORD MOTOR CO.

80. Using the special tools, install a new crankshaft rear seal.

**NOTE:**      **Install a new pilot bearing on vehicles equipped with a manual transaxle only if it is damaged.**

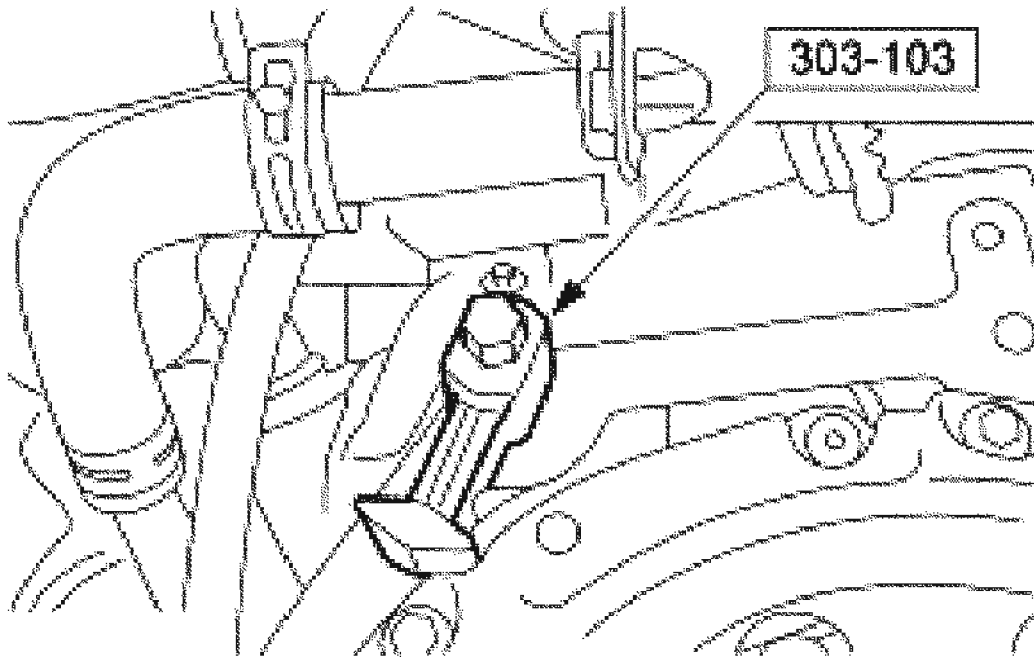
81. Using the special tools, install the pilot bearing.

82. Install the flywheel.



G02739106

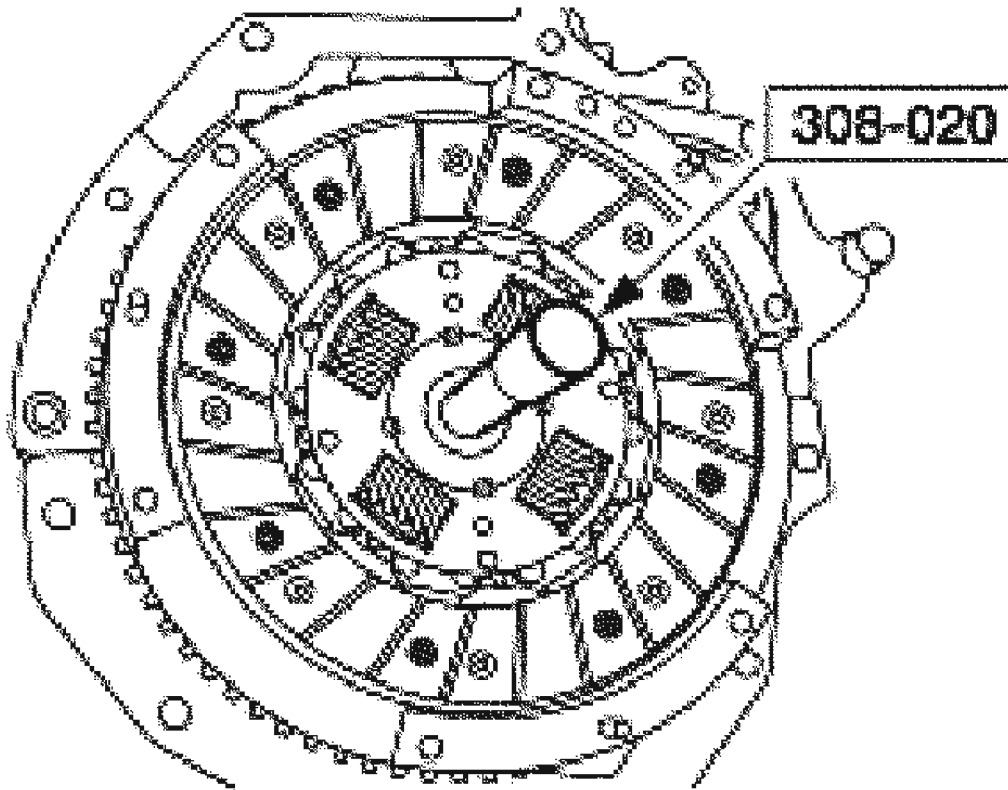
**Fig. 467: Installing Flywheel**  
Courtesy of FORD MOTOR CO.



G02739107

**Fig. 468: Installing Flywheel Holding Tool**  
Courtesy of FORD MOTOR CO.

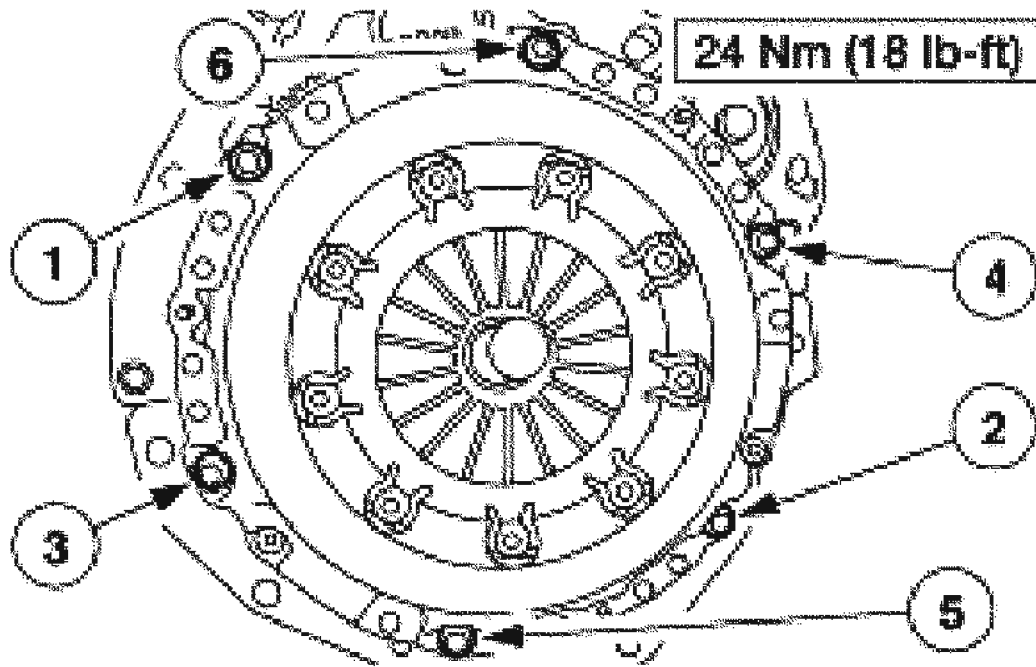
83. Install flywheel holding tool.



G02739108

**Fig. 469: Installing Clutch Disc Onto Flywheel**  
Courtesy of FORD MOTOR CO.

84. Using the special tool, position the clutch disc onto the flywheel.



G02739109

**Fig. 470: Identifying Pressure Plate Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.




85. Position the clutch pressure plate onto the flywheel, install the pressure plate bolts and tighten them using the sequence shown.

## INSTALLATION

ENGINE - MANUAL TRANSAXLE

## 2004 Ford Escape

2004 ENGINE Engine - 2.0L Zetec - Escape

	Spreader Bar 303-D089 (D93P-6001A3)
	Heavy Duty Floor Crane 014-00072 or equivalent
	Installer, Front Wheel Hub 205-D069 (D93P-1175-A)

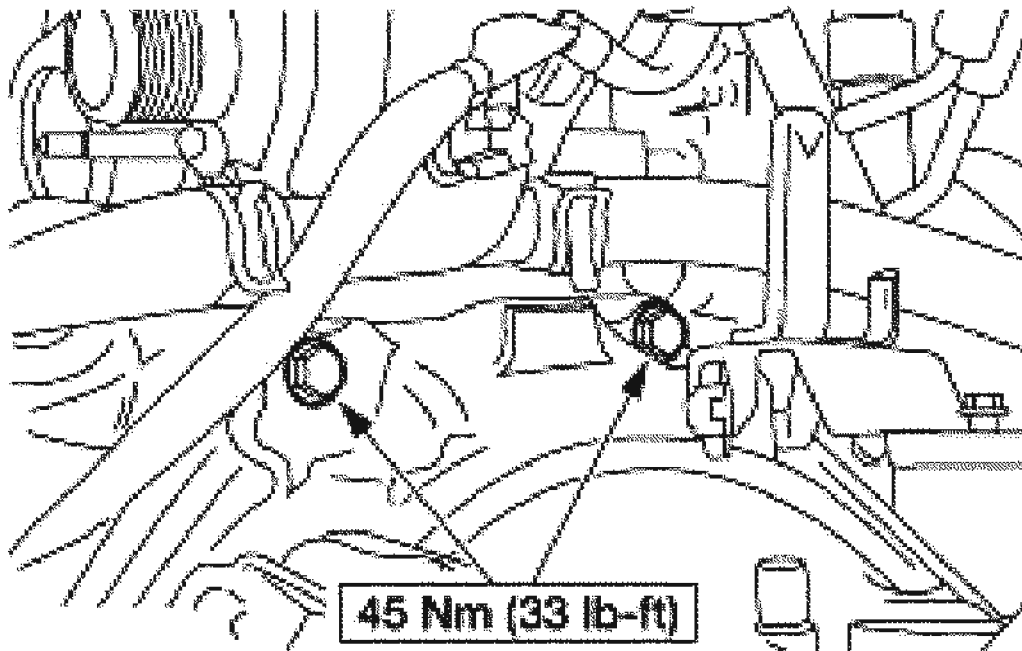
G02739110

**Fig. 471: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Installation

1. Installation the transaxle on the engine and install the bolts.

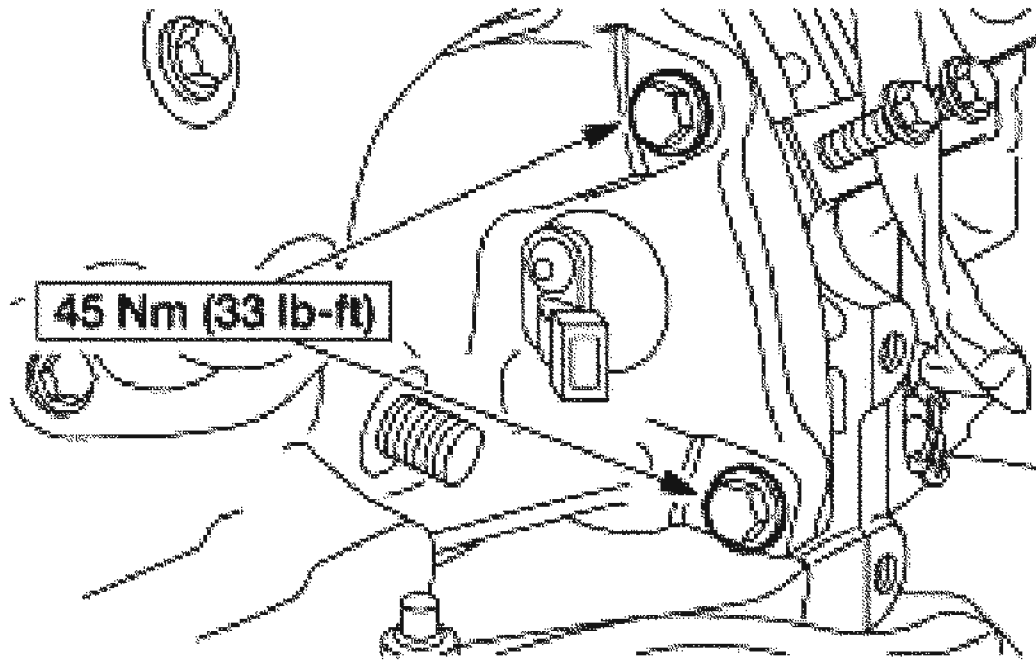




G02739112

**Fig. 472: Identifying Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

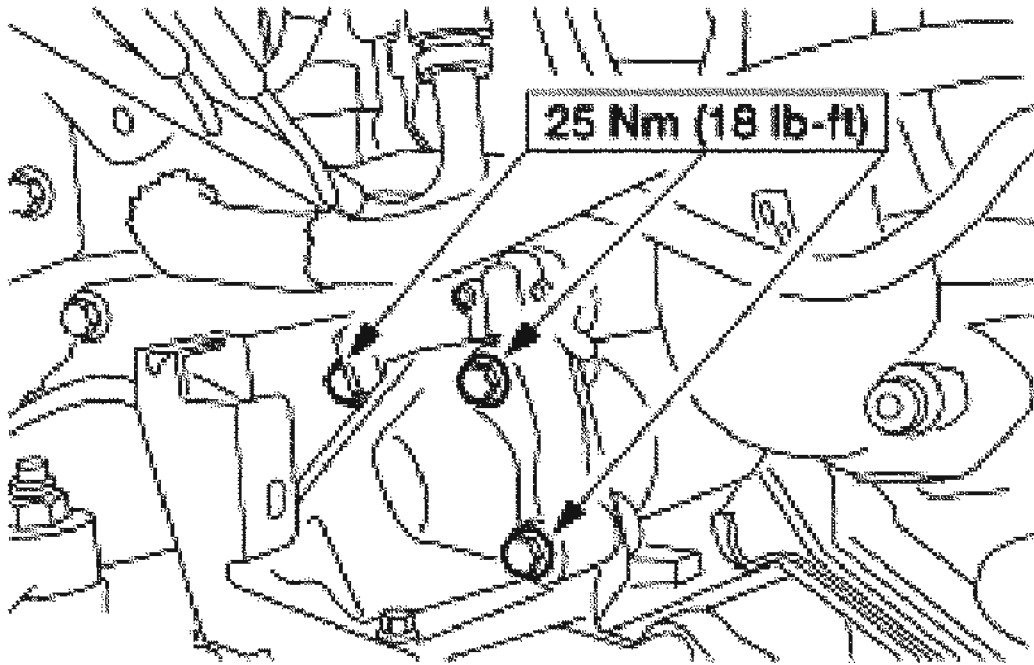
2. Install the bolts



G02739113

**Fig. 473: Installing Bolts**  
Courtesy of FORD MOTOR CO.

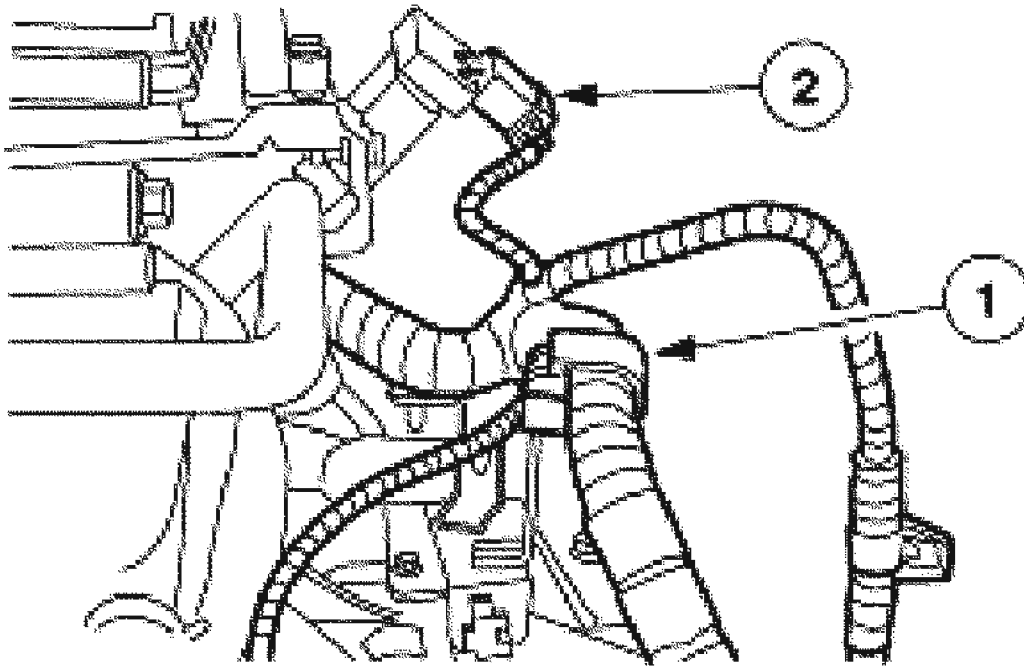
3. Install the starter and the bolts.



G02739114

**Fig. 474: Identifying Starter Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

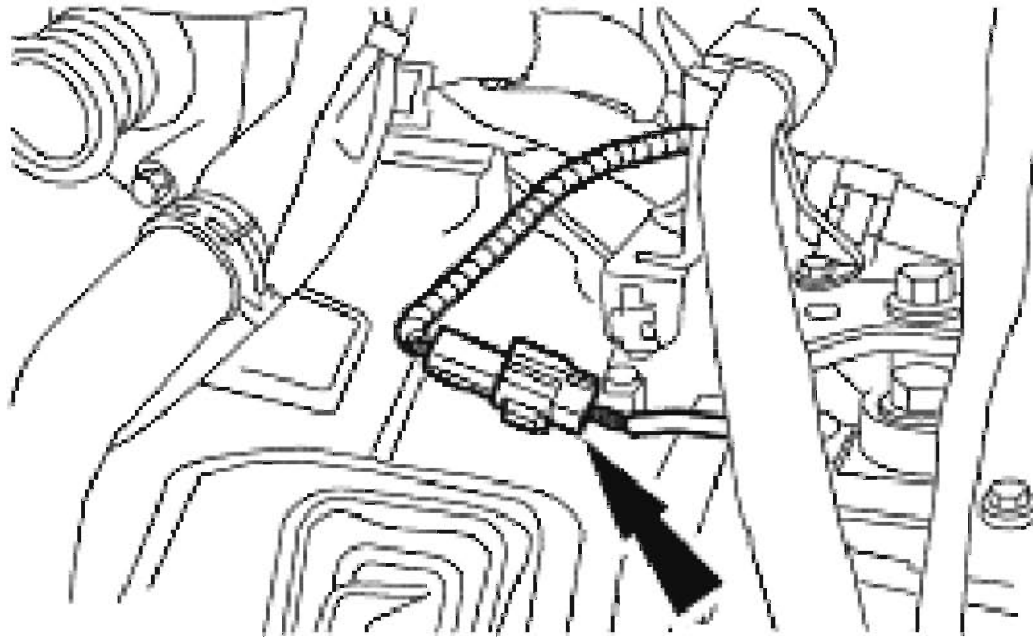
4. Install the starter wiring harness.
5. Install the engine wiring harness.
  1. Attach the wiring harness to the engine/transaxle assembly.
  2. Connect the differential pressure feedback exhaust gas recirculation (EGR) system electrical connector.



G02739115

**Fig. 475: Installing Engine Wiring Harness**  
Courtesy of FORD MOTOR CO.

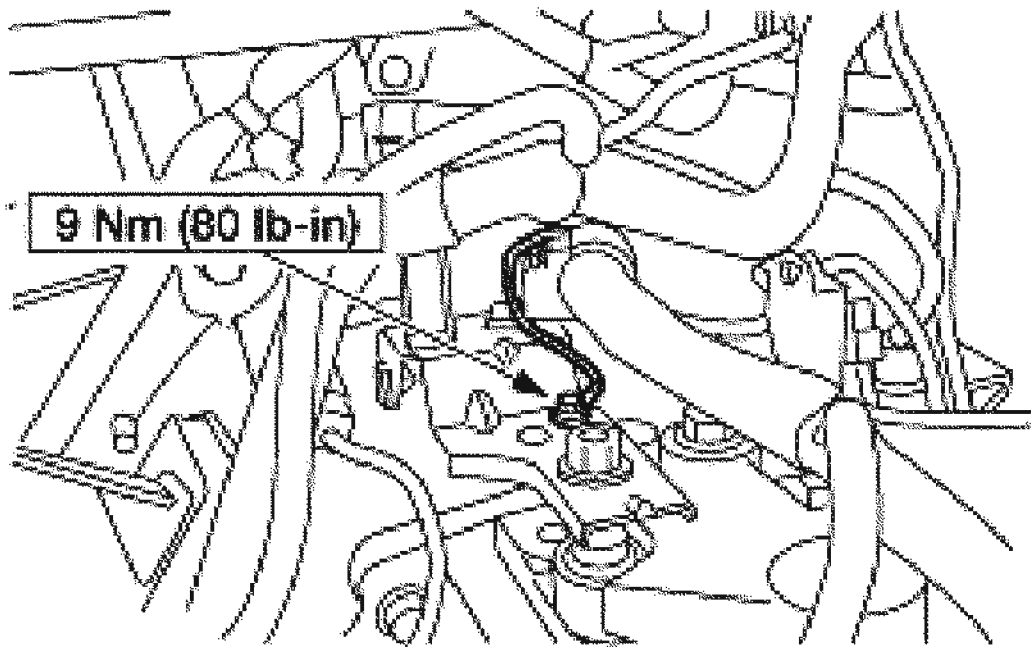
6. Connect the ignition coil electrical connector.
7. Connector the reversing lamb switch electrical connector.



G02739116

**Fig. 476: Connecting Reversing Lamp Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

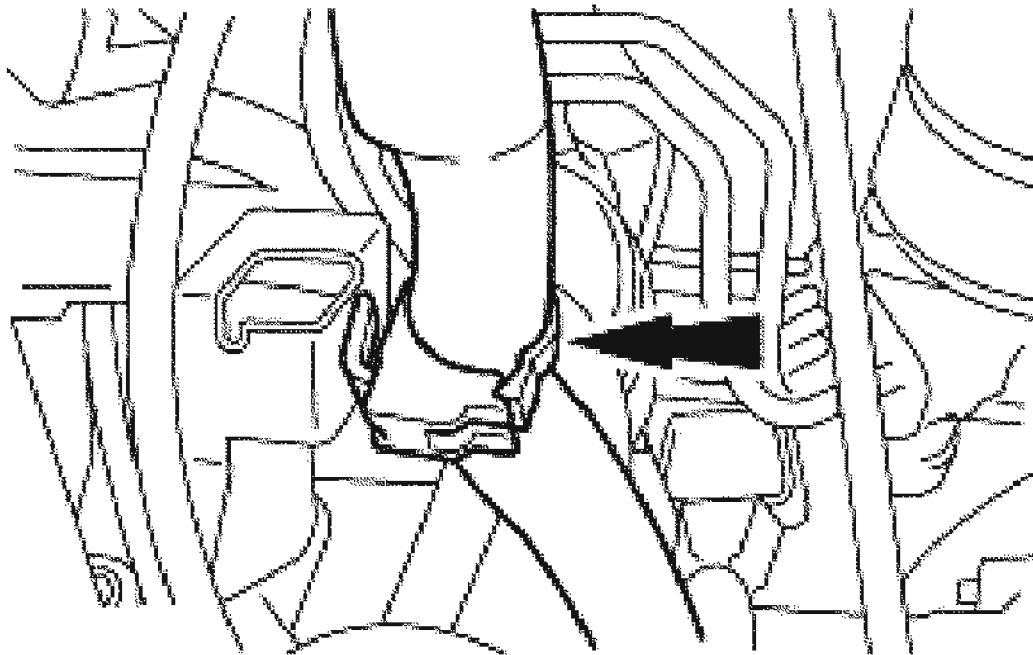
8. Connect the ground wire.



G02739117

**Fig. 477: Connecting Ground Wire**  
Courtesy of FORD MOTOR CO.

9. Connect the powertrain control module (PCM) wiring harness to the bracket.

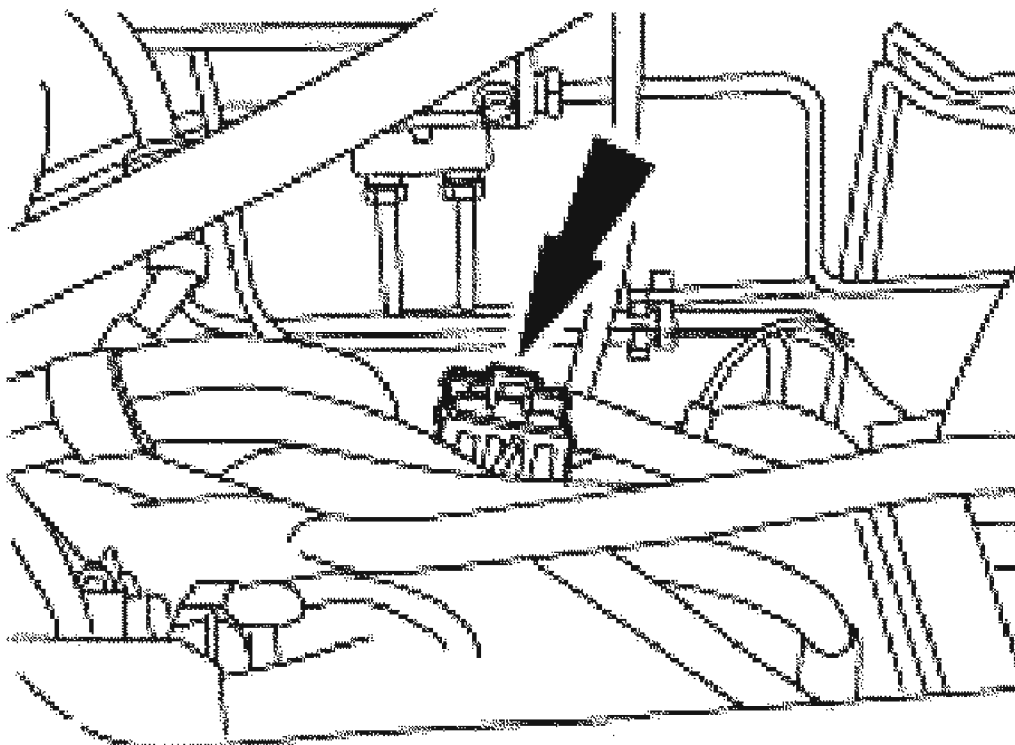


G02739118

**Fig. 478: Connecting Powertrain Control Module (PCM) Wiring Harness To Bracket**

**Courtesy of FORD MOTOR CO.**

10. Connect the fuel charging wiring harness electrical connector.

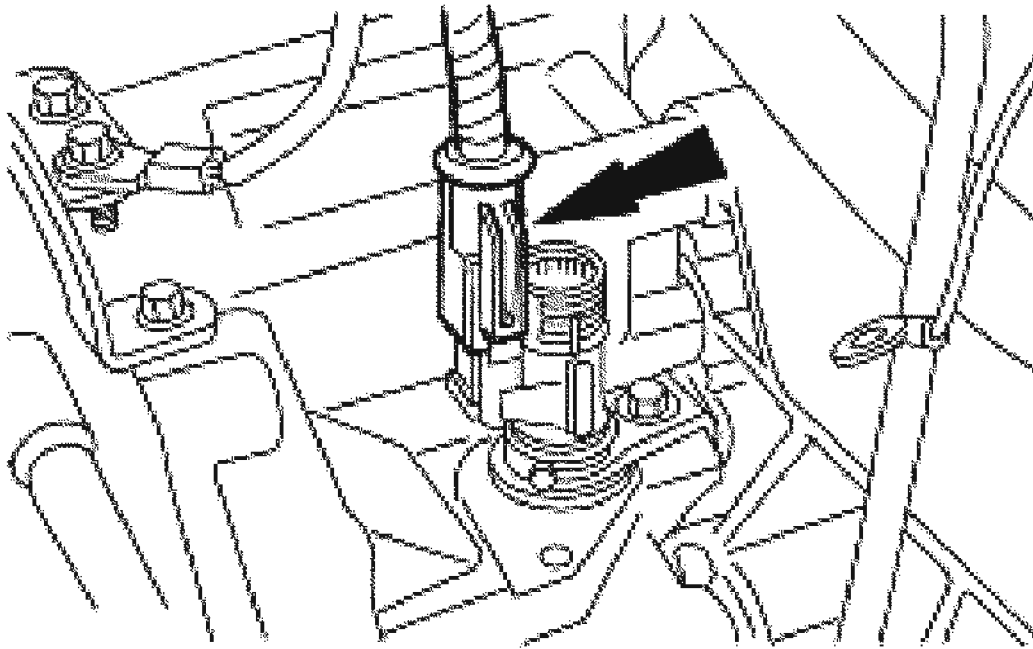


G02739119

**Fig. 479: Connecting Fuel Charging Wiring Harness Electrical Connector**  
Courtesy of FORD MOTOR CO.

11. Install the ground wire and the bolt on the bell housing.
12. Connect the crankshaft position (CKP) sensor electrical connector.
13. Connect the vehicle speed sensor electrical connector.

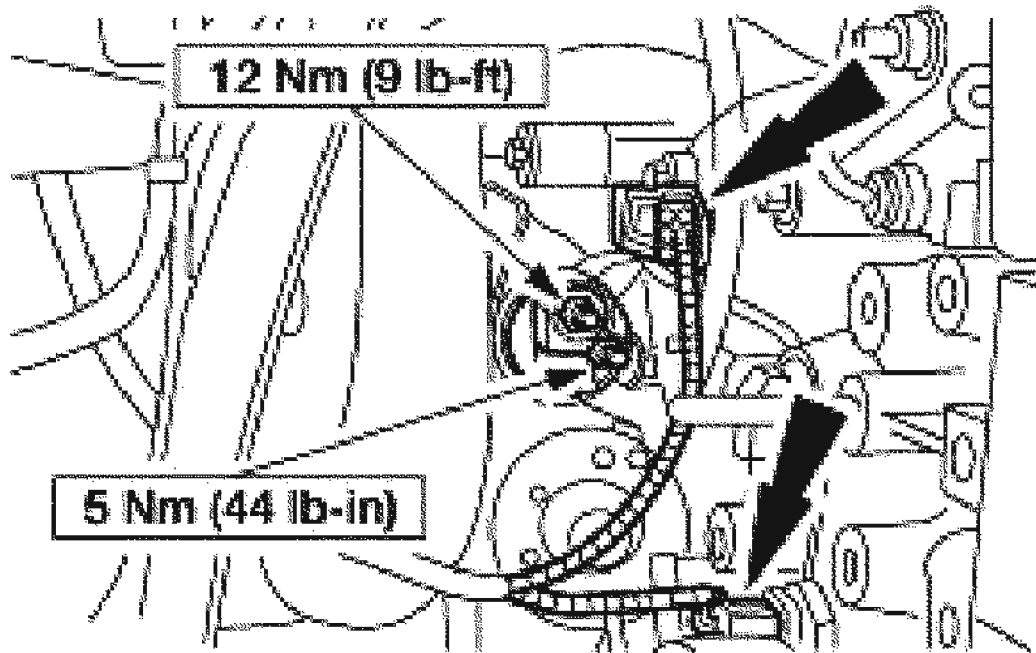




G02739120

**Fig. 480: Connecting Vehicle Speed Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

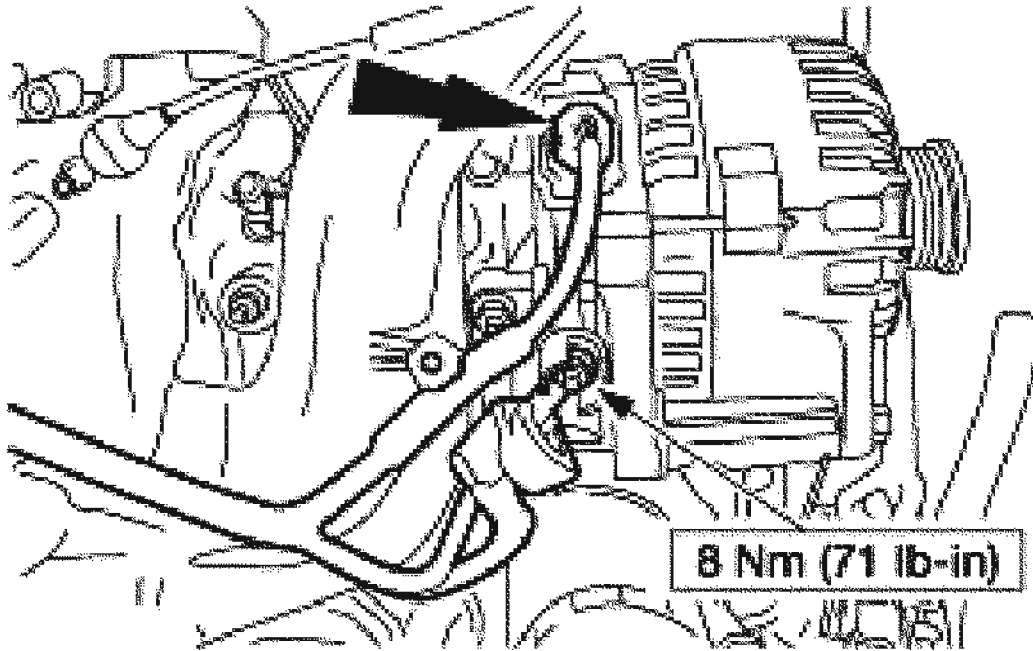
14. Connect the electrical connectors.
  - Connect the knock sensor electrical connector.
  - Connect the oil pressure sender electrical connector.
  - Connect the starter electrical connector.



G02739121

**Fig. 481: Connecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

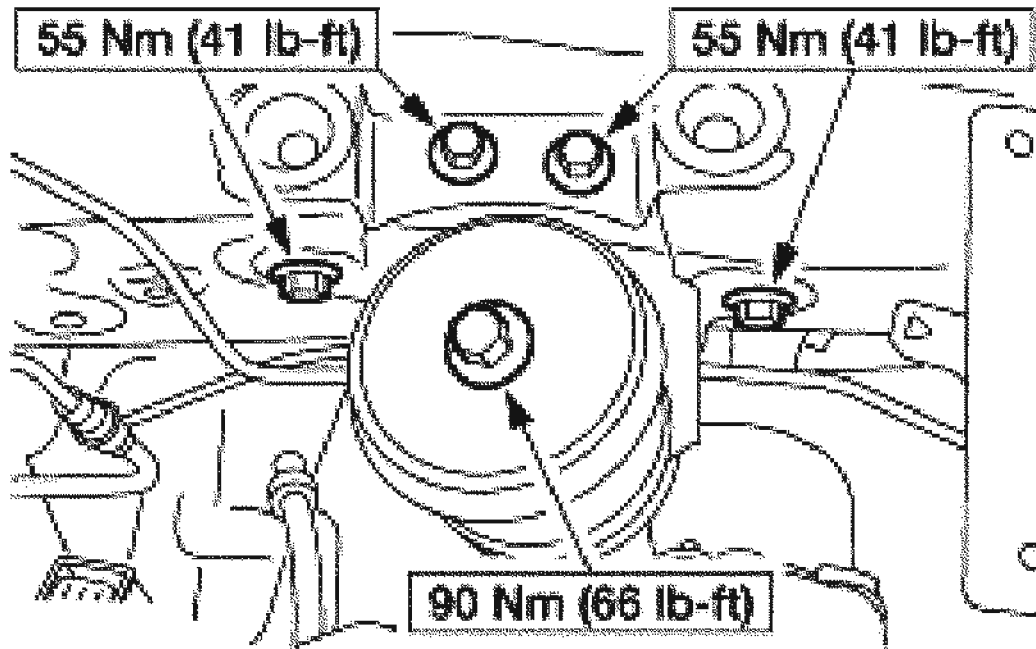
15. Connect the generator electrical connectors.



G02739122

**Fig. 482: Connecting Generator Electrical Connectors**  
Courtesy of FORD MOTOR CO.

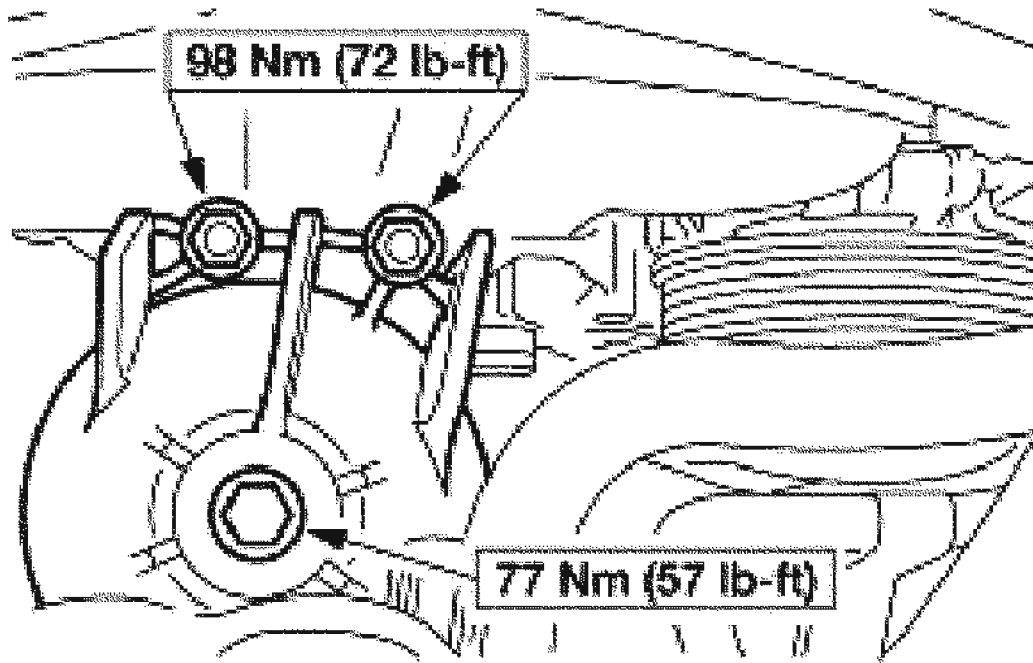
16. Position the engine/transaxle assembly into the vehicle.
17. Install the LH transaxle mount.



G02739123

**Fig. 483: Identifying LH Transaxle Mount Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

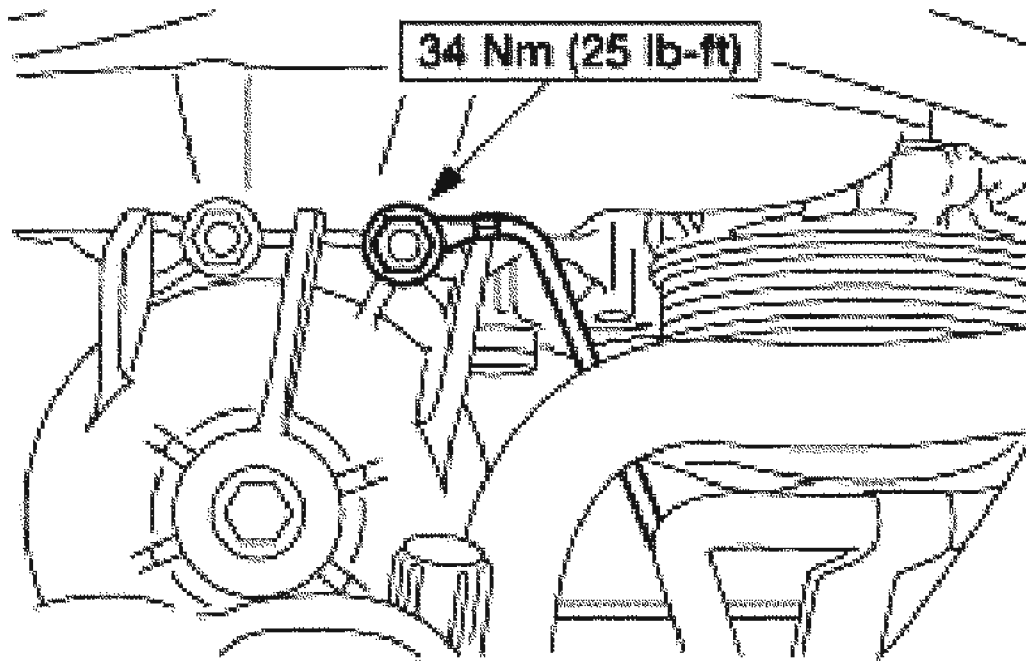
18. Install the engine mount upper bracket.



G02739124

**Fig. 484: Identifying Engine Mount Upper Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

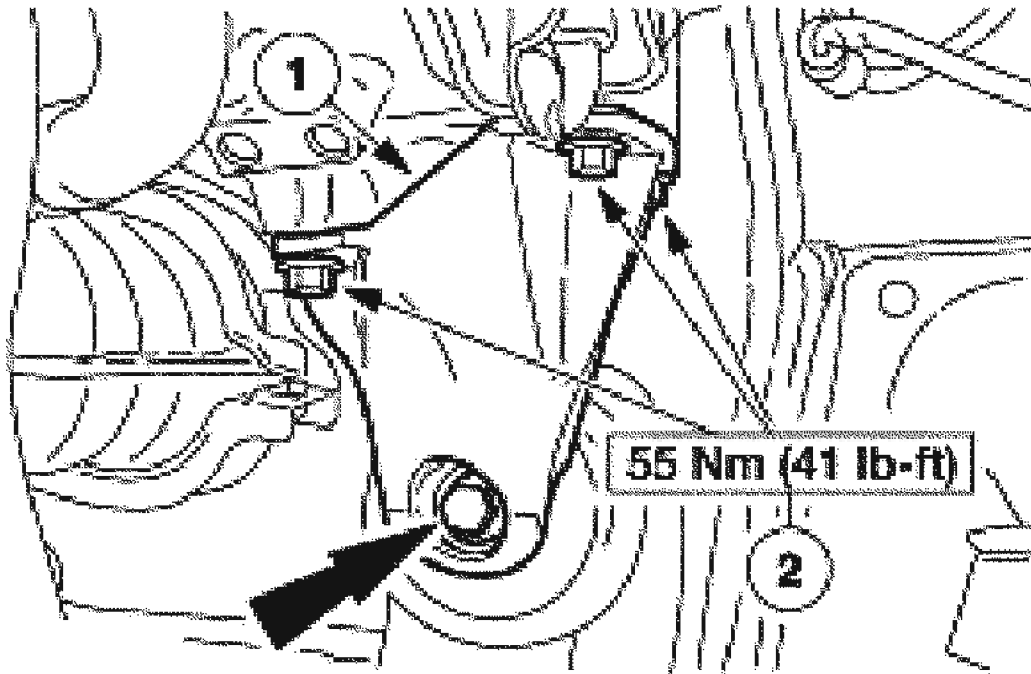
19. Connect the ground wire.



G02739125

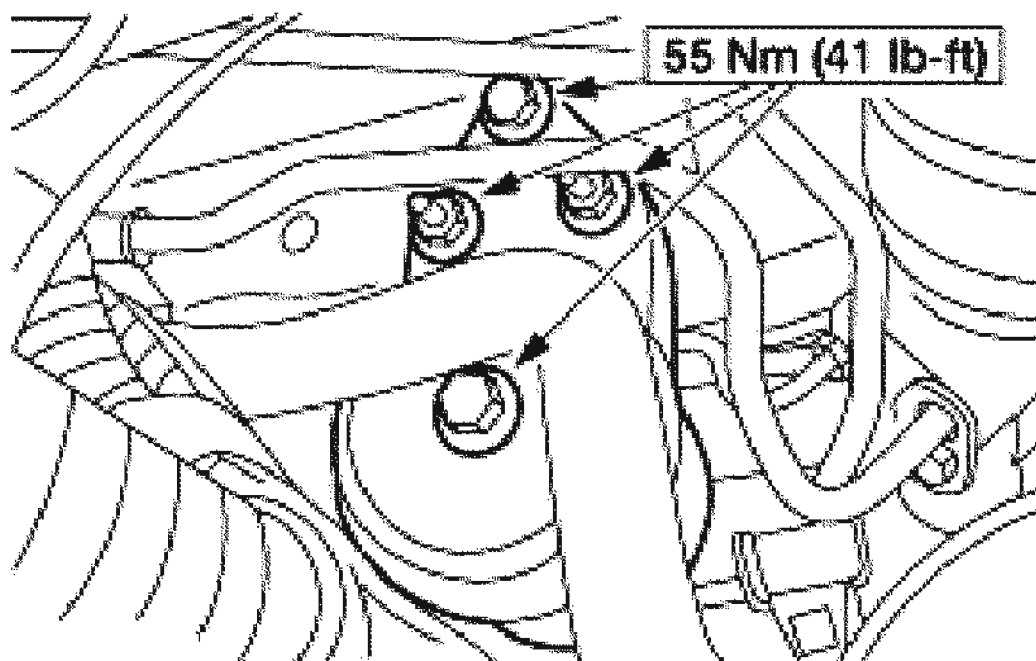
**Fig. 485: Connecting Ground Wire**  
Courtesy of FORD MOTOR CO.

20. Install the front transaxle support insulator and bracket.
  1. Position the front transaxle support insulator.
  2. Install the four transaxle support insulator bracket bolts.
  3. Loosely install the front transaxle support insulator bolt.



**Fig. 486: Installing Front Transaxle Support Insulator And Bracket**  
Courtesy of FORD MOTOR CO.

21. Install the rear transaxle mount.

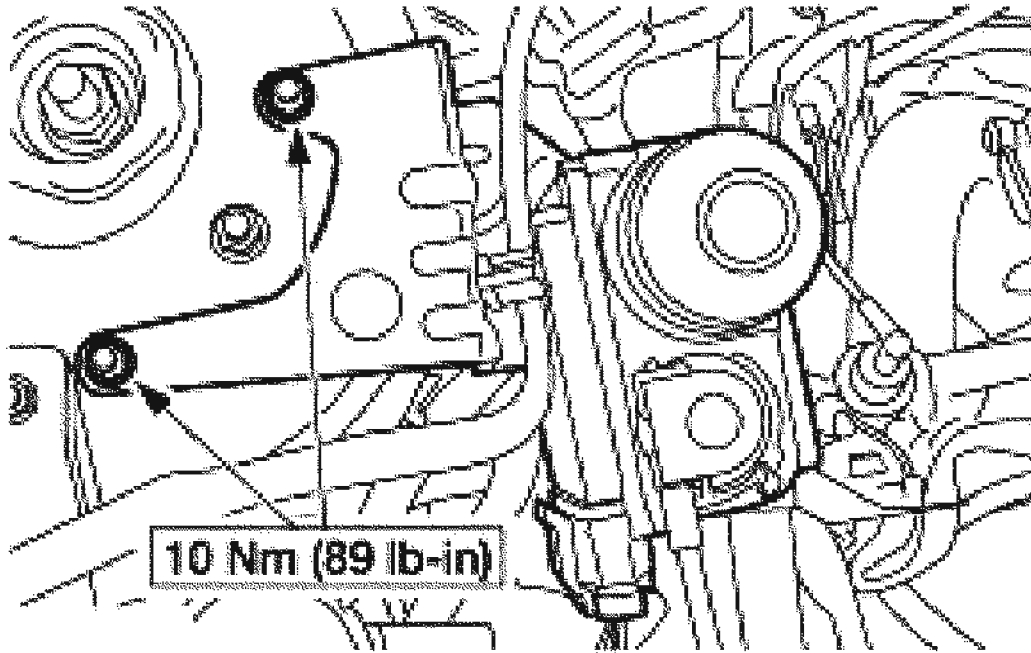


G02739127

**Fig. 487: Identifying Rear Transaxle Mount Torque Specification**  
Courtesy of FORD MOTOR CO.

22. Remove the lifting device.
23. Install the speed control unit (if equipped).

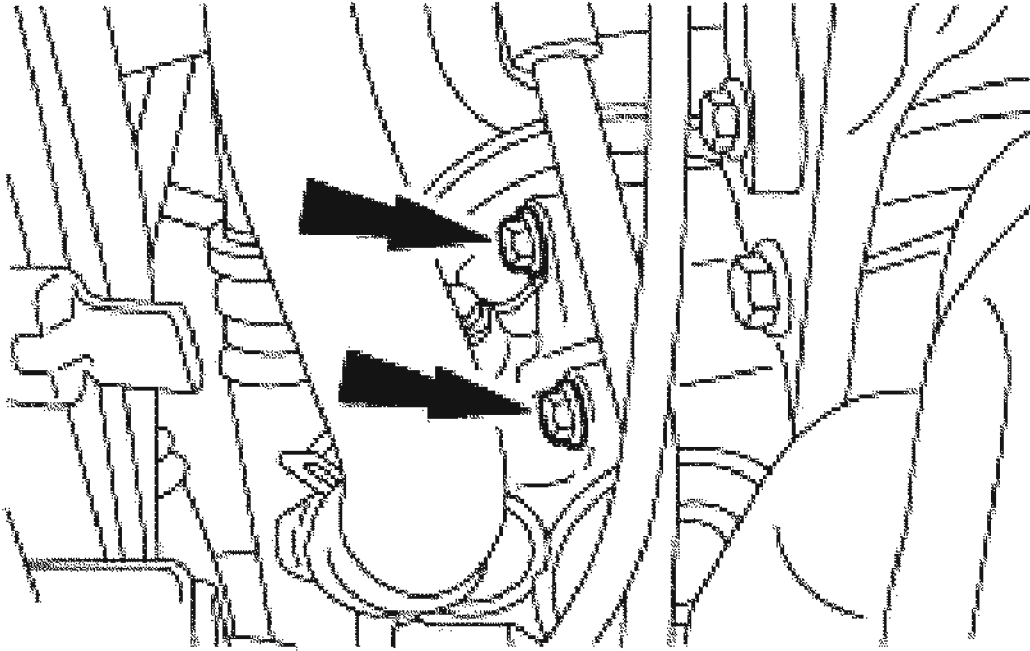




G02739128

**Fig. 488: Identifying Speed Control Unit Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

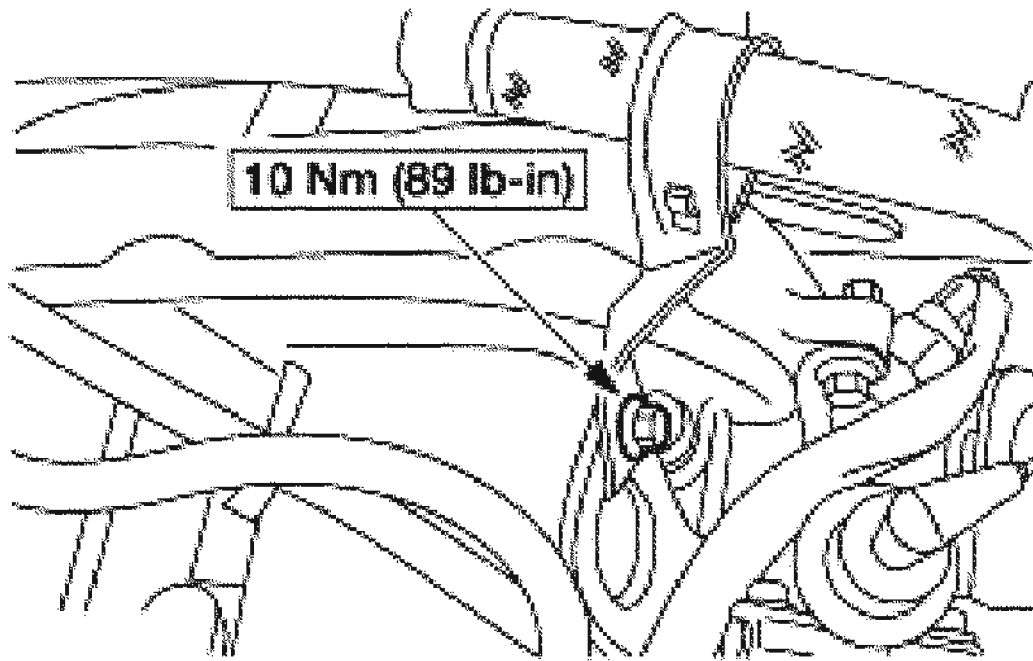
24. Position the power steering pump and loosely install the upper bolts.



G02739129

**Fig. 489: Identifying Power Steering Pump Upper Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

25. Install the power steering hose bracket bolt.

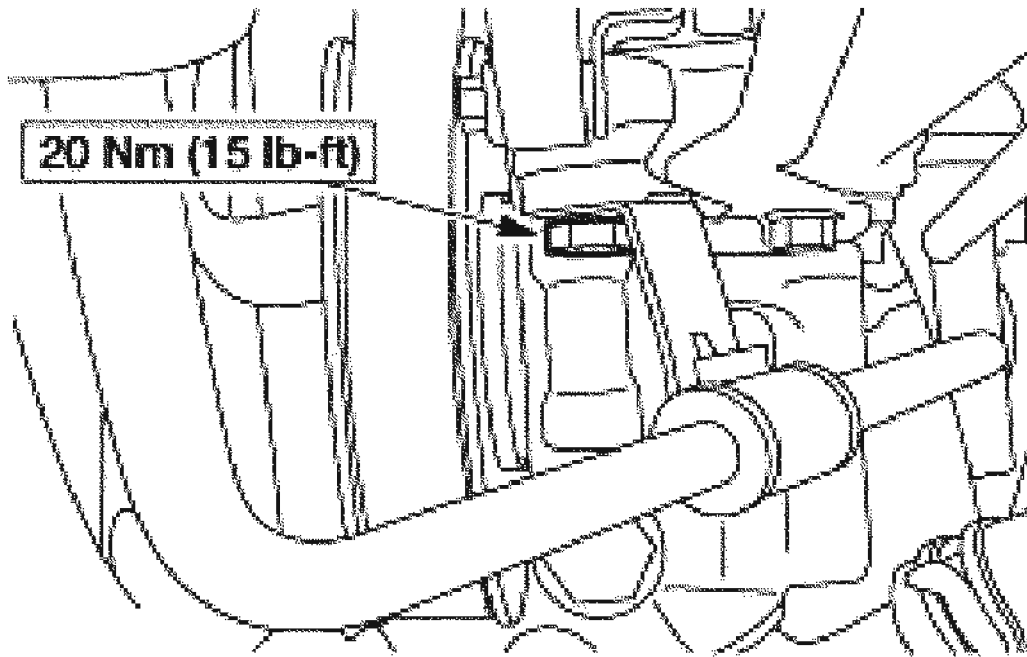


G02739130

**Fig. 490: Identifying Power Steering Hose Bracket Bolt Torque Specification (1 Of 2)**

**Courtesy of FORD MOTOR CO.**

26. Install the power steering hose bracket bolt.

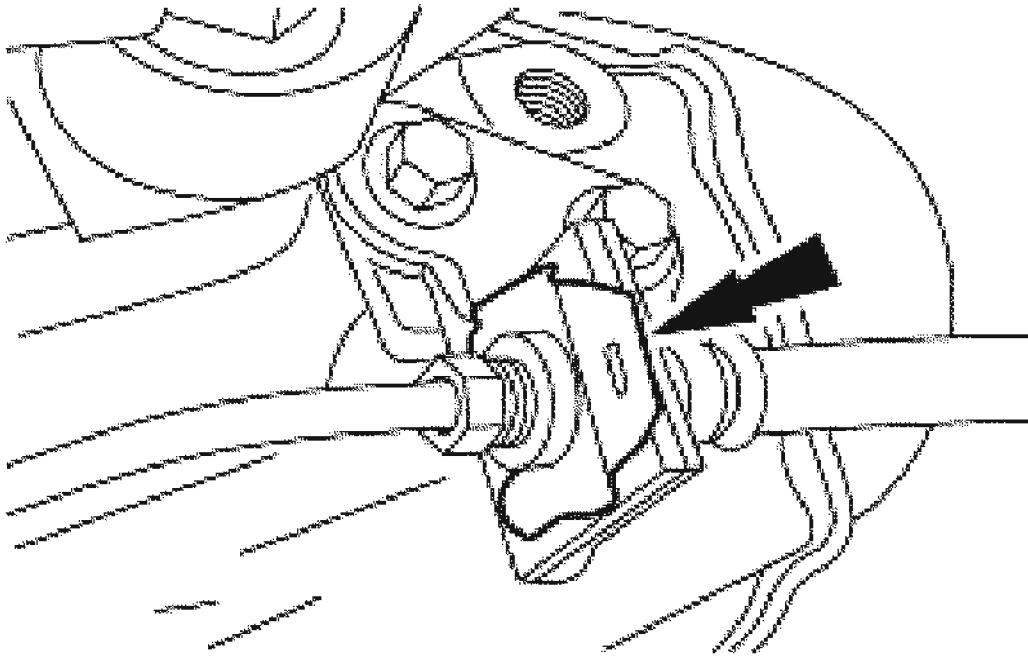


G02739131

**Fig. 491: Identifying Power Steering Hose Bracket Bolt Torque Specification (2 Of 2)**

Courtesy of FORD MOTOR CO.

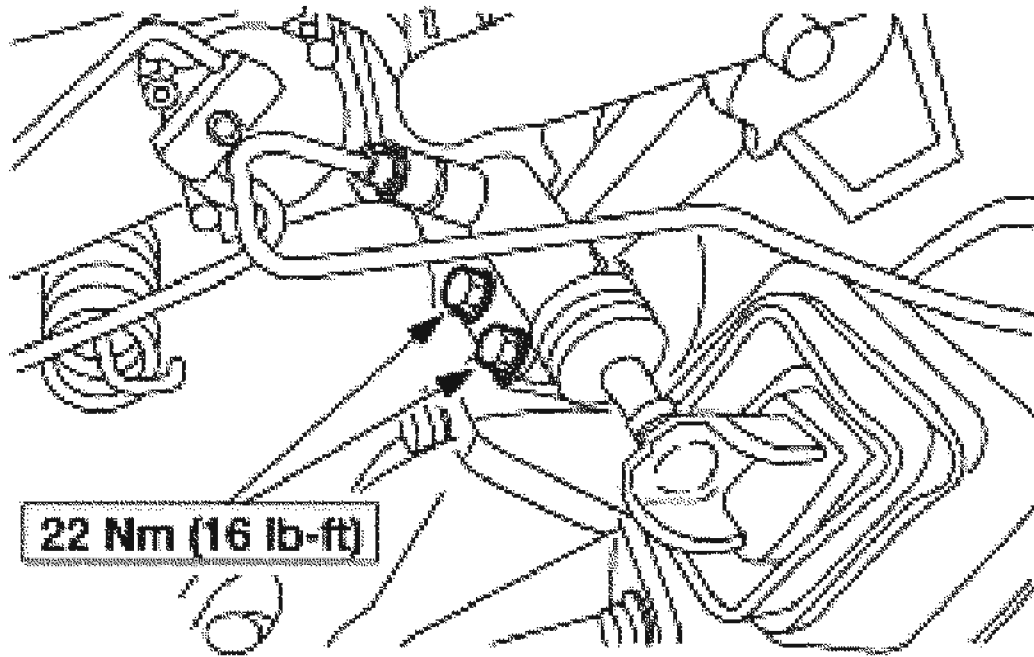
27. Position the slave cylinder line and install the clip.



G02739132

**Fig. 492: Installing Slave Cylinder Line And Clip**  
Courtesy of FORD MOTOR CO.

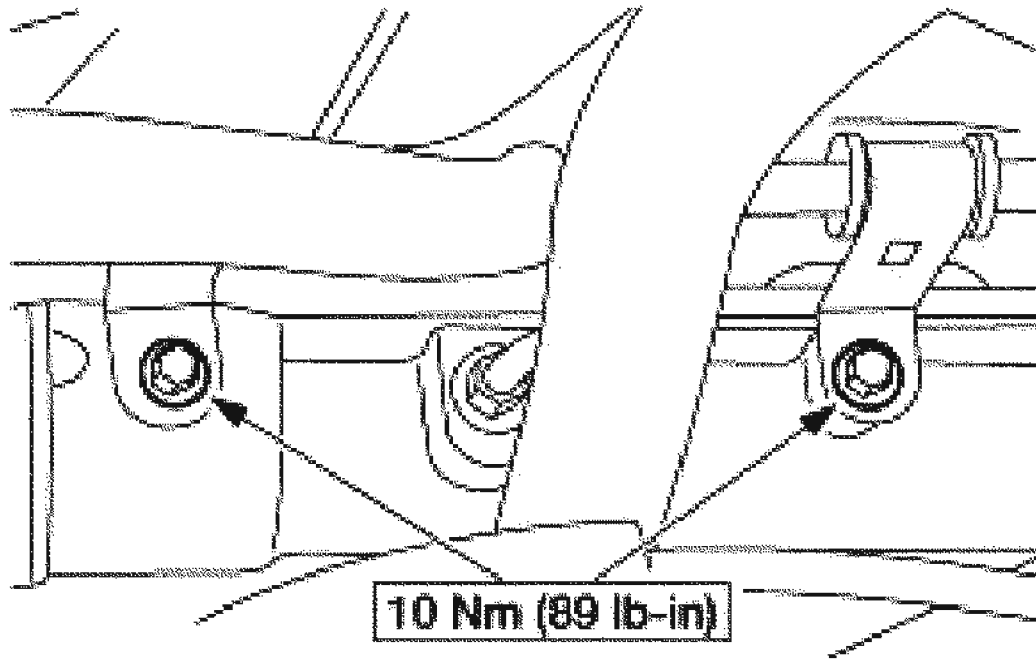
28. Install the clutch slave cylinder bolts.



G02739133

**Fig. 493: Identifying Clutch Slave Cylinder Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

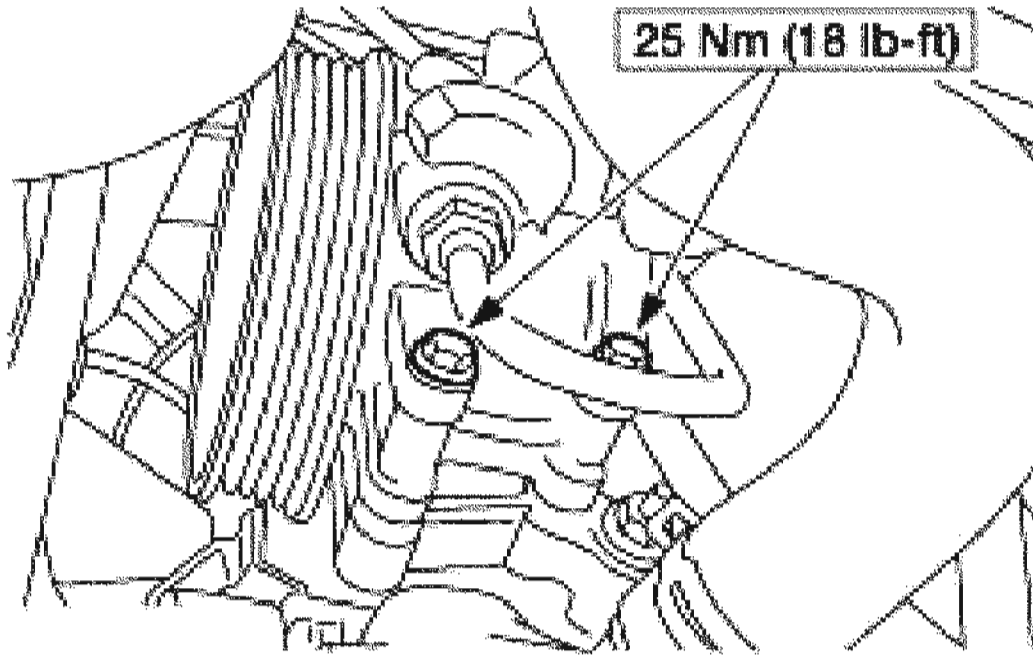
29. Position the power steering hoses and install the bolts.



G02739134

**Fig. 494: Identifying Power Steering Hose Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

30. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.
31. Install the lower power steering bolts.

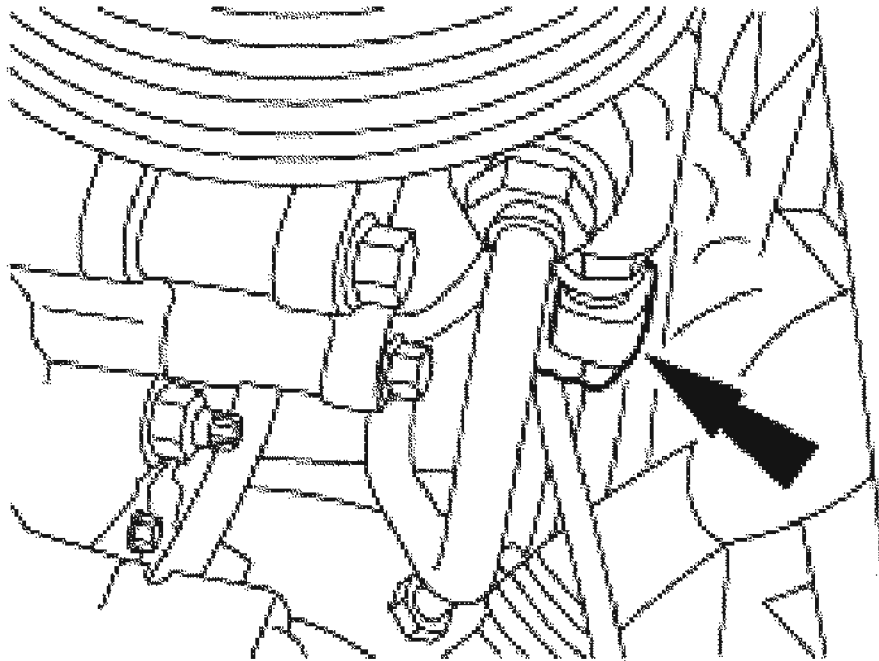


G02739135

**Fig. 495: Identifying Lower Power Steering Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

32. Connect the power steering pressure sensor electrical connector.

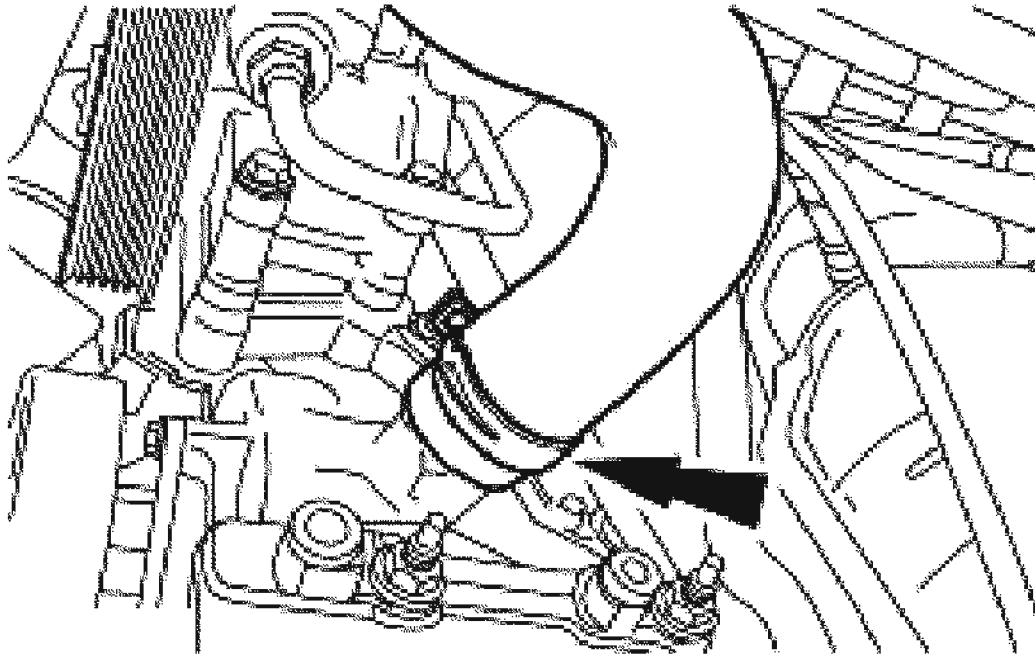




G02739136

**Fig. 496: Connecting Power Steering Pressure Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

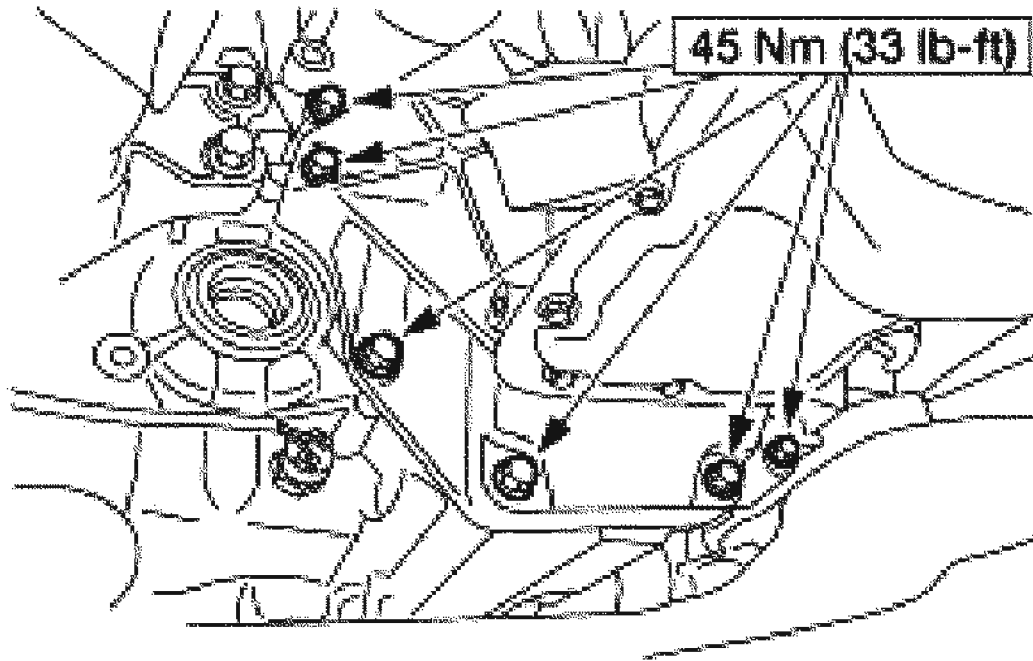
33. Connect the lower radiator hose.



G02739137

**Fig. 497: Connecting Lower Radiator Hose**  
**Courtesy of FORD MOTOR CO.**

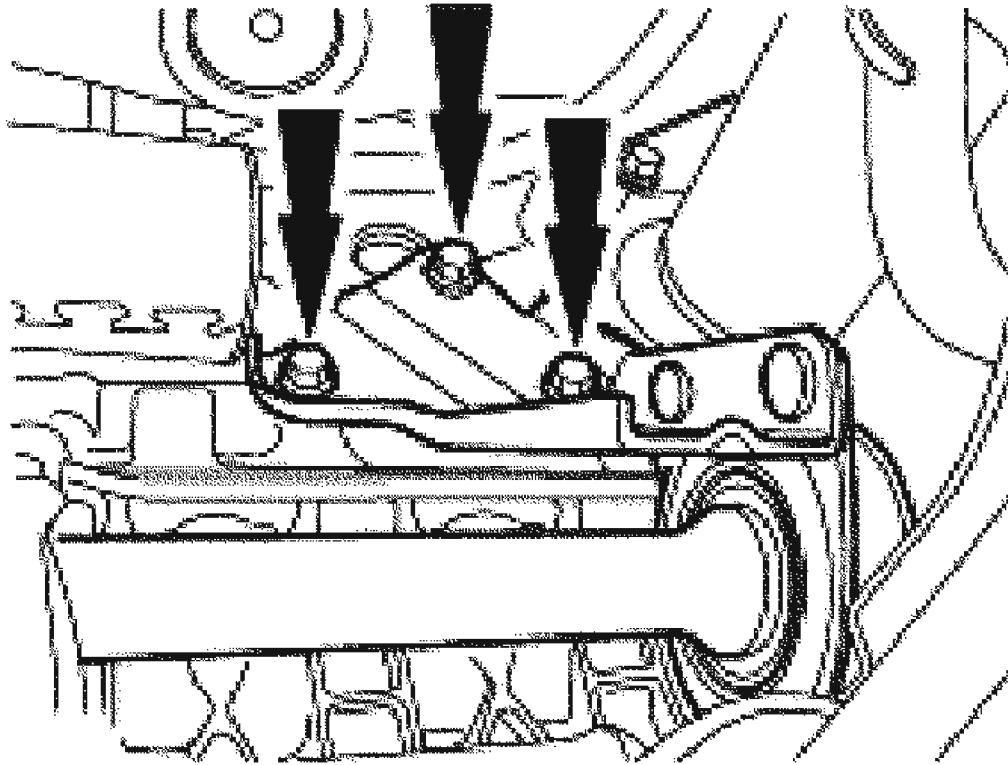
34. Install the engine to transaxle bolts.



G02739138

**Fig. 498: Identifying Engine To Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

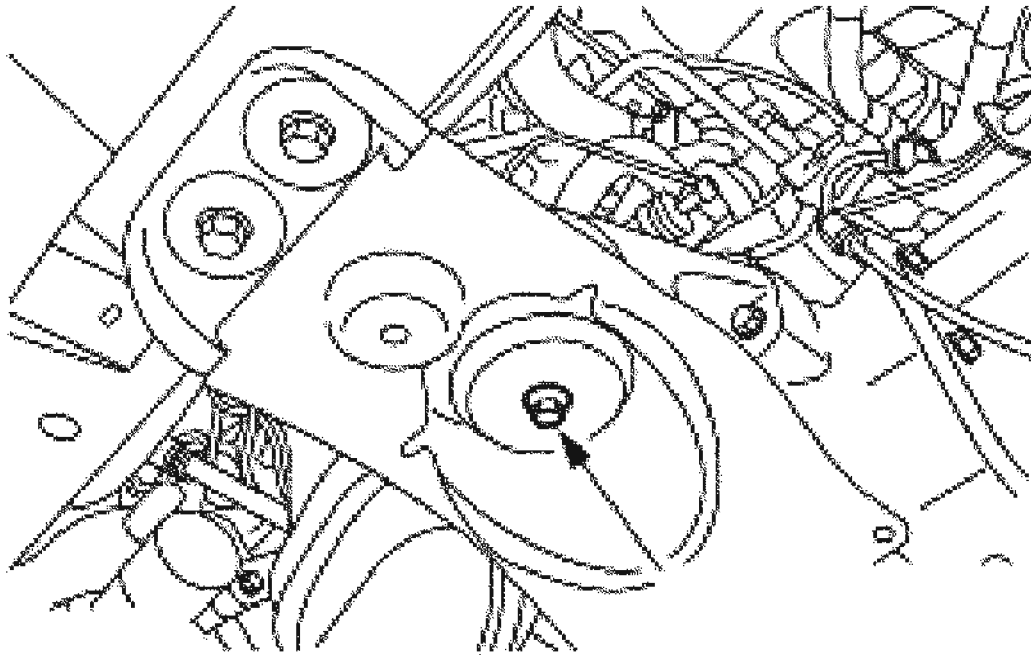
35. Install the intermediate shaft and the bracket as an assembly.



**G02739139**

**Fig. 499: Installing Intermediate Shaft And Bracket**  
**Courtesy of FORD MOTOR CO.**

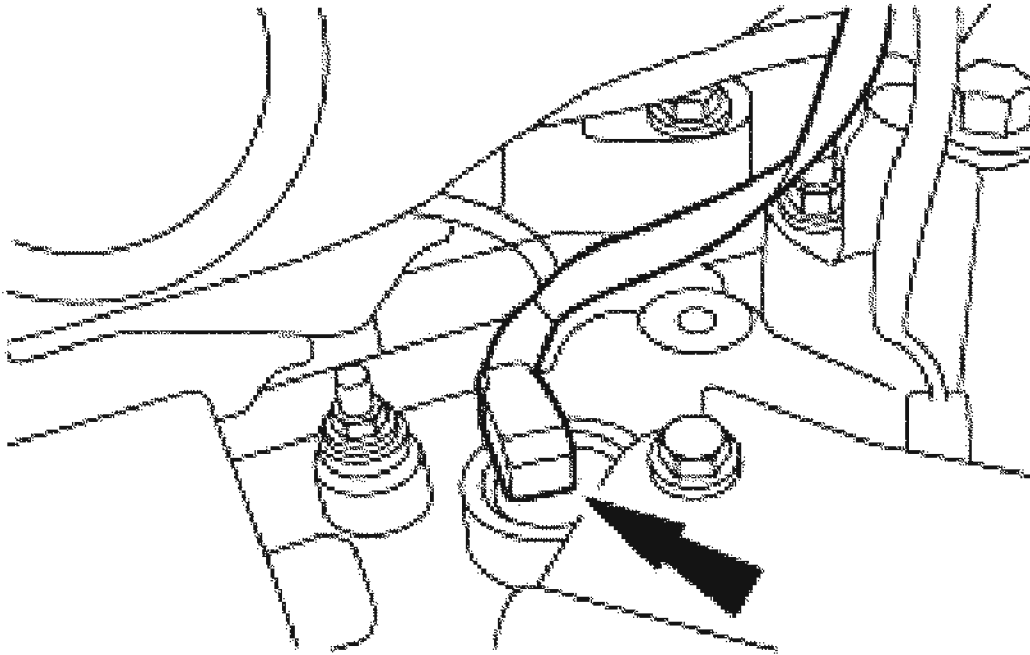
36. Install a new oil filter.
37. Install the front transaxle mount through bolt.



G02739140

**Fig. 500: Installing Front Transaxle Mount Through Bolt**  
Courtesy of FORD MOTOR CO.

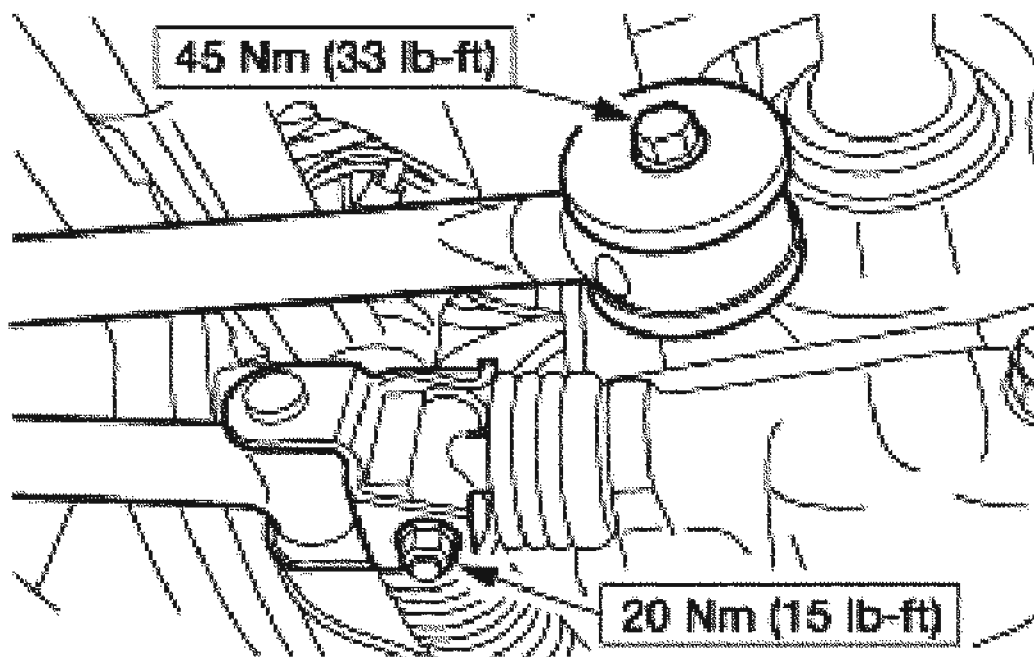
38. If equipped, connect the block heater electrical connector.



G02739141

**Fig. 501: Connecting Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

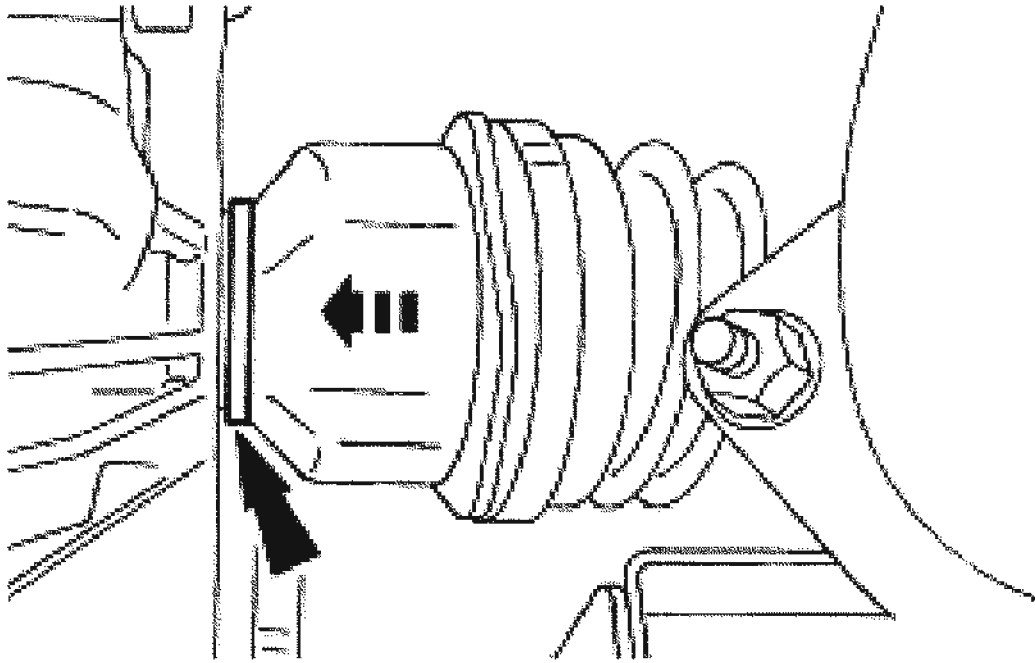
39. Connect the shifter linkages.



G02739142

**Fig. 502: Connecting Shifter Linkages Bolts Torque Specifications**  
Courtesy of FORD MOTOR CO.

**NOTE:** When seated correctly, the driveshaft bearing retainer circlip can be felt as it snaps into the differential side gear groove.

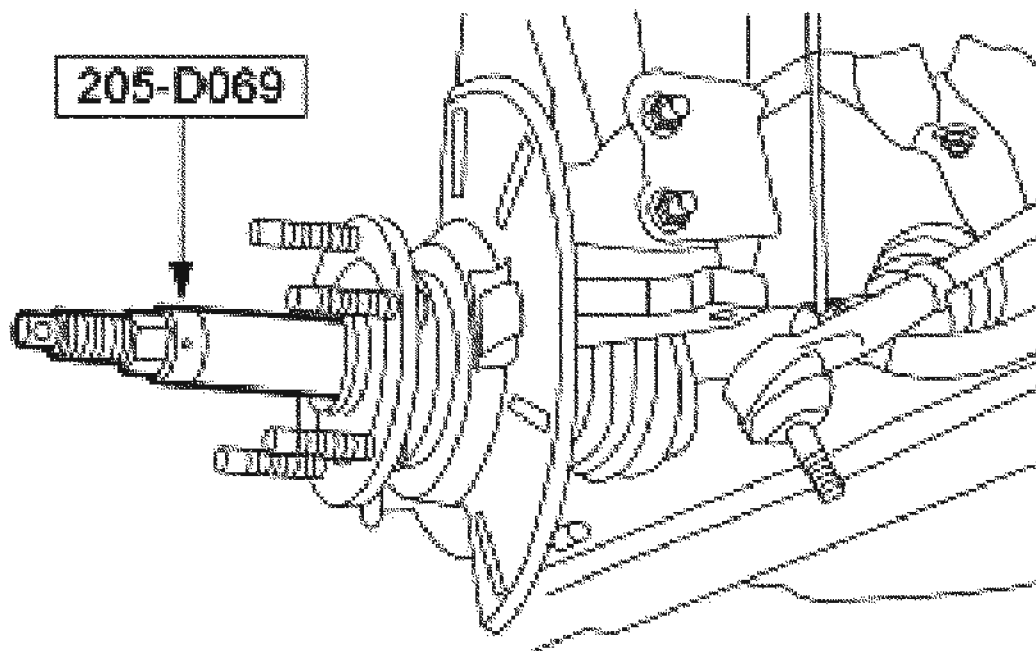


G02739143

**Fig. 503: Installing Driveshafts**  
**Courtesy of FORD MOTOR CO.**

40. Install the driveshafts.
41. Using the special tool, position the halfshaft into the front wheel knuckle.

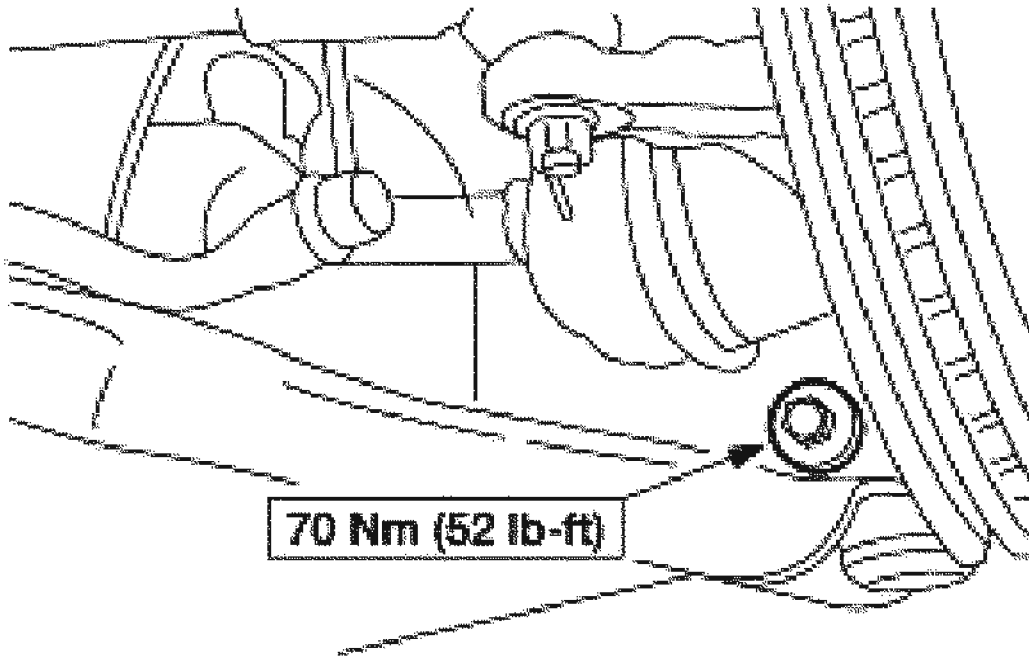




G02739144

**Fig. 504: Installing Halfshaft Into Front Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

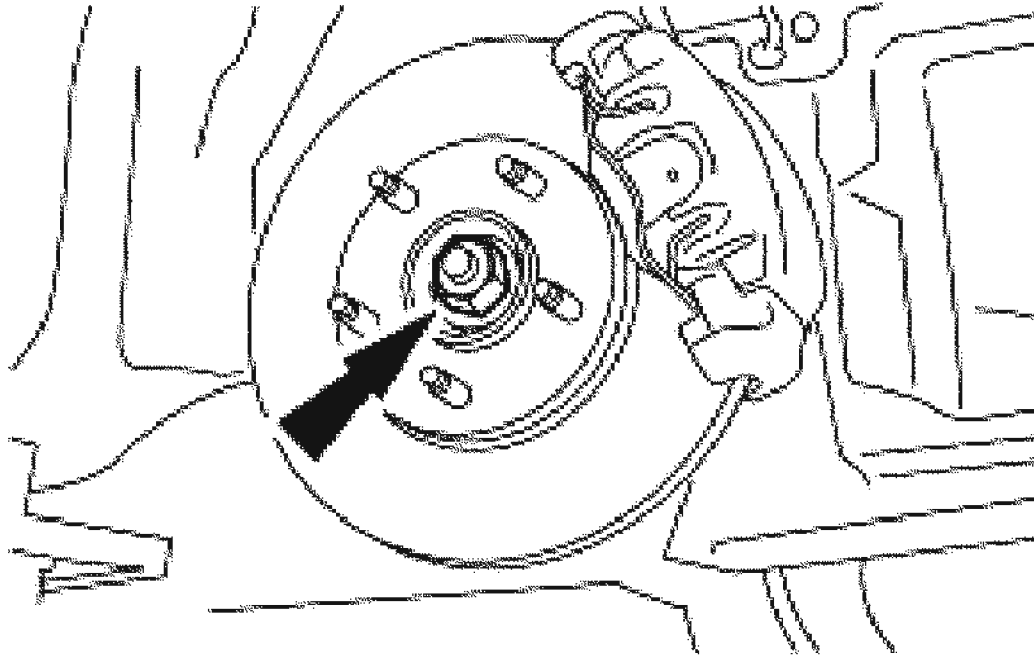
42. Install the lower control arm and the ball joint pinch bolt and nut.



G02739145

**Fig. 505: Installing Lower Control Arm And Ball Joint Pinch Bolt**  
Courtesy of FORD MOTOR CO.

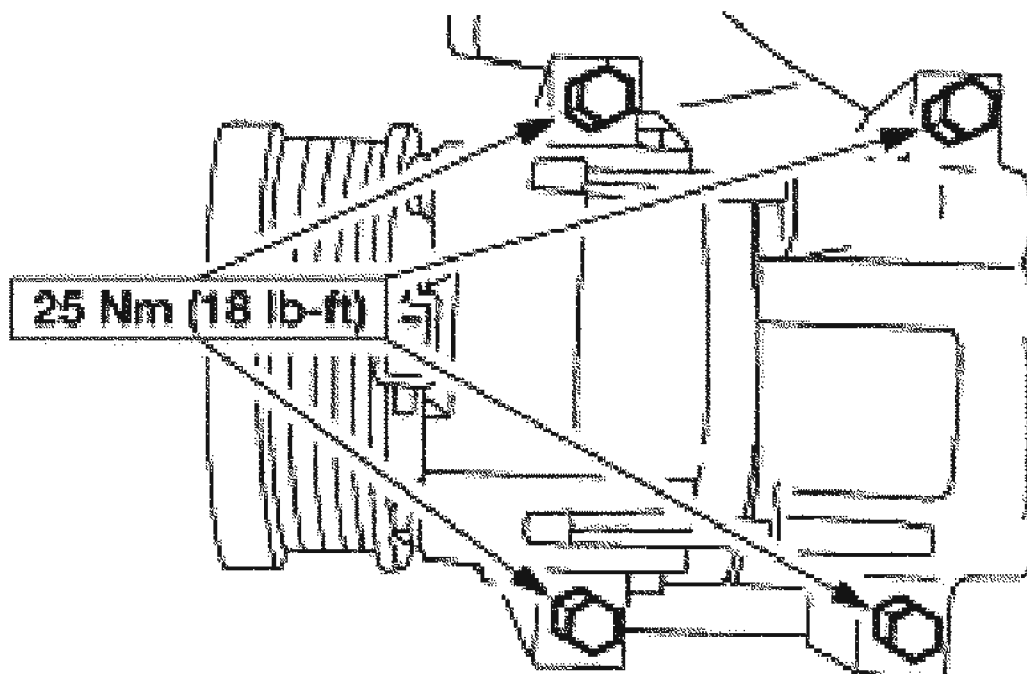
43. Loosely install new front axle wheel hub nuts.



G02739146

**Fig. 506: Installing New Front Axle Wheel Hub Nuts**  
Courtesy of FORD MOTOR CO.

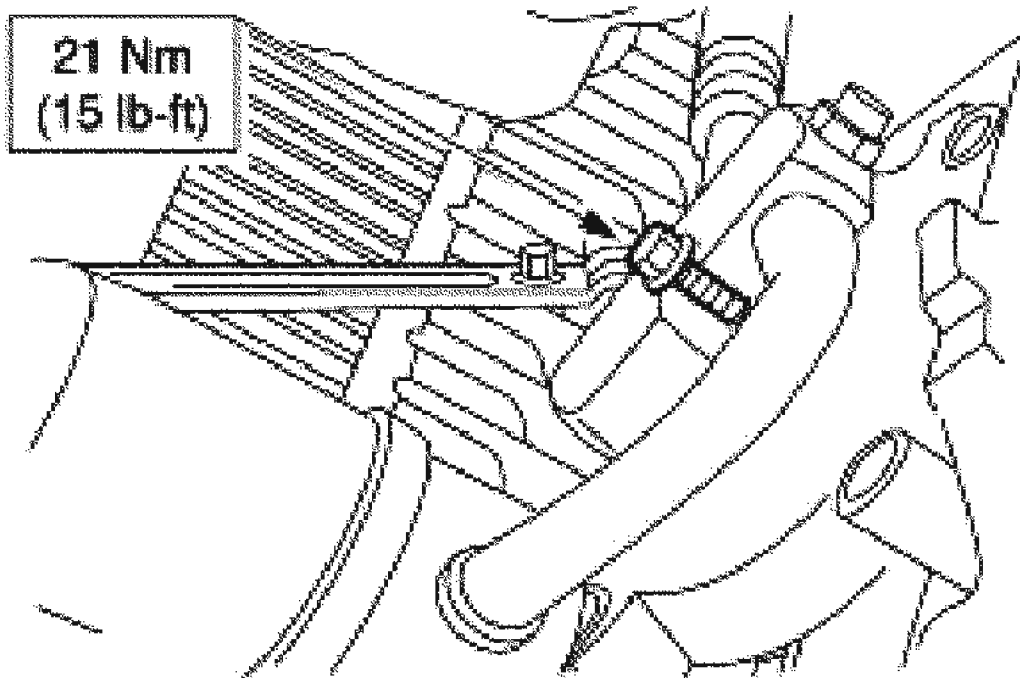
44. Install the A/C compressor.



G02739147

**Fig. 507: Identifying A/C Compressor Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

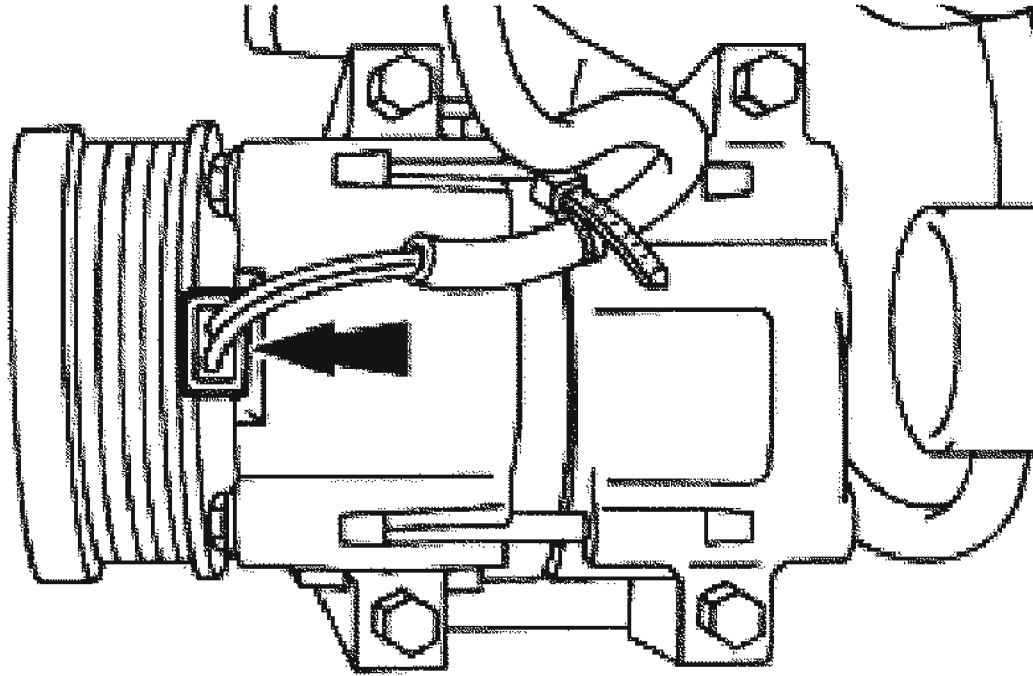
45. Install the A/C manifold and tube assembly bolt.



G02739148

**Fig. 508: Identifying A/C Manifold And Tube Assembly Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

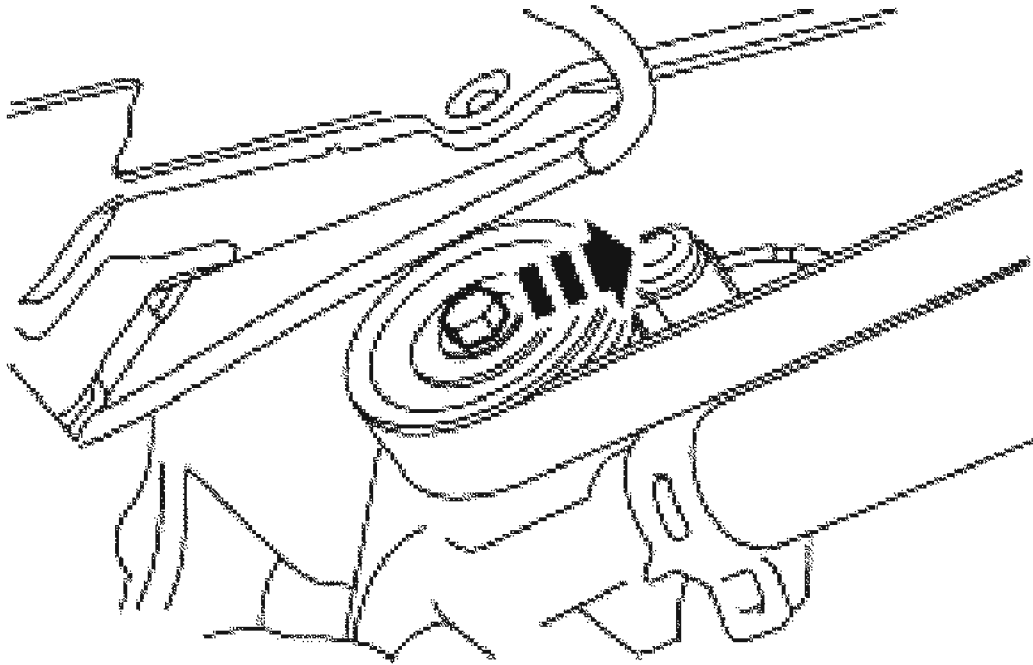
46. Connect the A/C clutch field coil electrical connector.



G02739149

**Fig. 509: Connecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

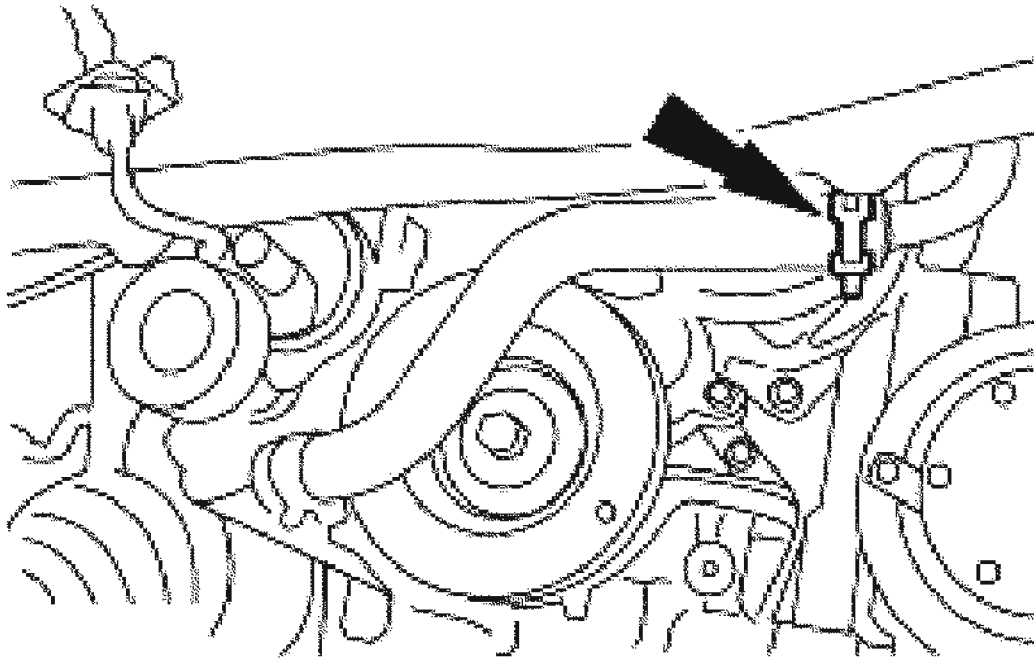
47. Rotate the accessory drive belt tensioner clockwise and install the belt.



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**Fig. 510: Rotating Accessory Drive Belt Tensioner**  
Courtesy of FORD MOTOR CO.

48. Connect the coolant hose.

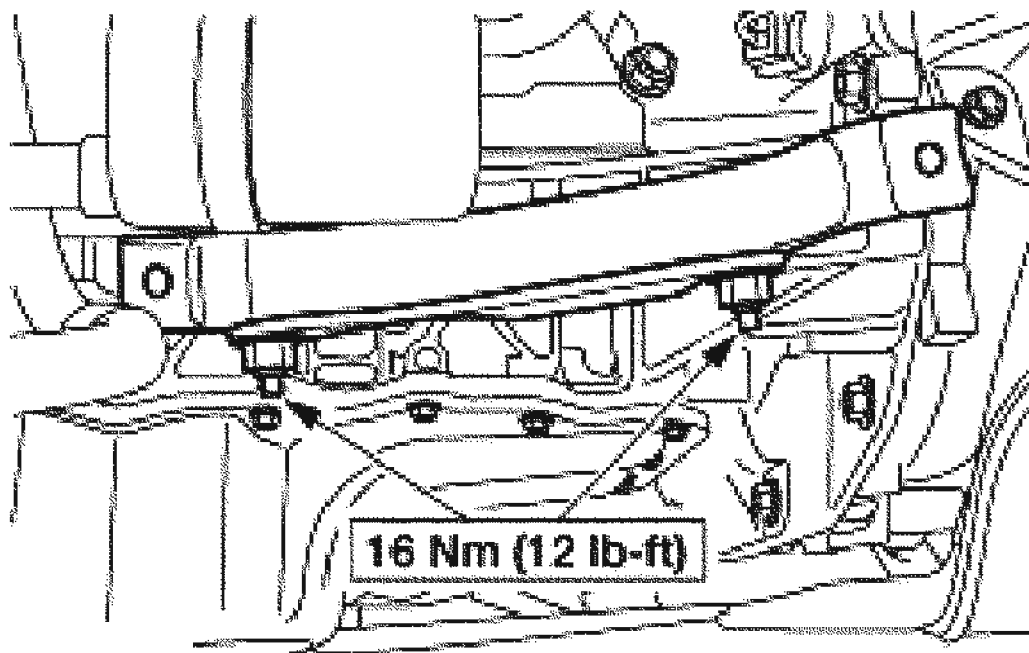


G02739151

**Fig. 511: Connecting Coolant Hose**  
**Courtesy of FORD MOTOR CO.**

49. Install the engine/convertor bracket.

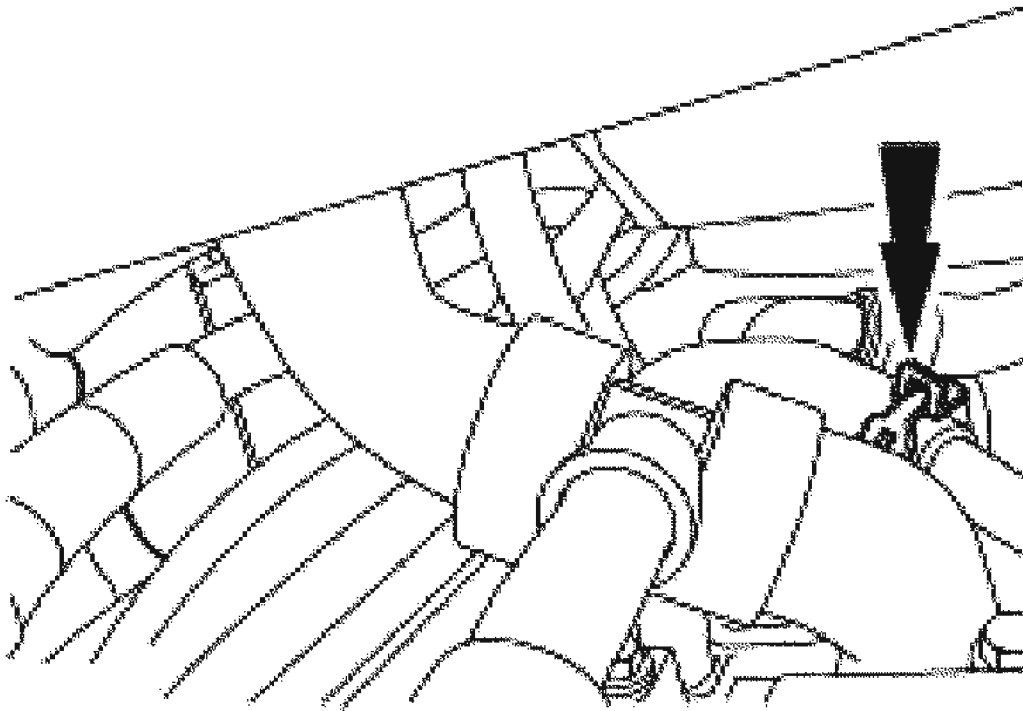




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**Fig. 512: Identifying Engine/Converter Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

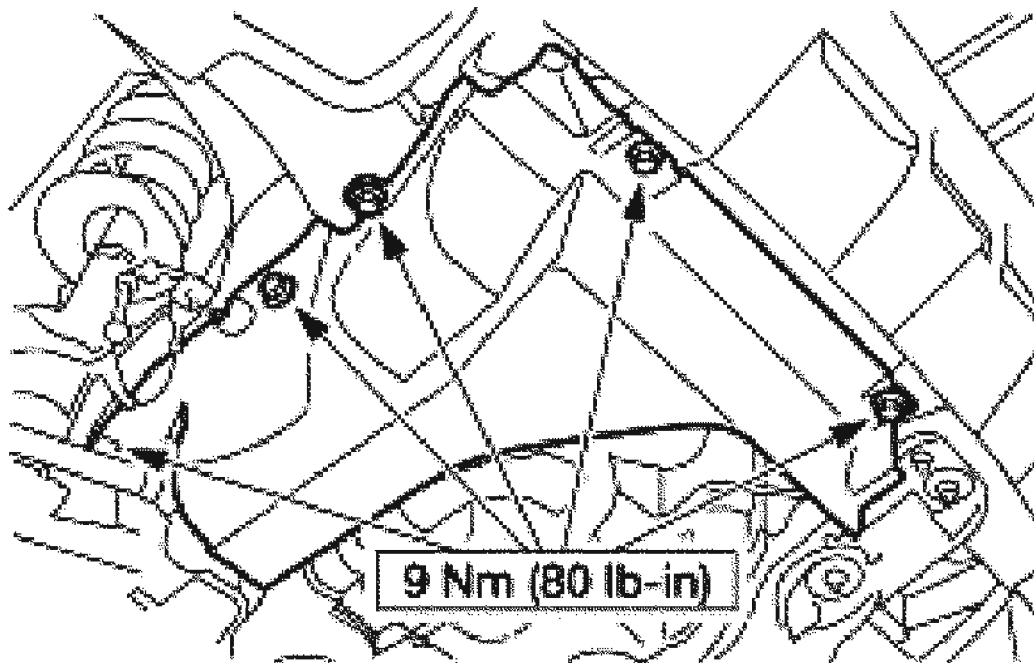
50. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
51. Connect the coolant hose.



G02739153

**Fig. 513: Connecting Coolant Hose**  
Courtesy of FORD MOTOR CO.

52. Install the splash shield and bolts.



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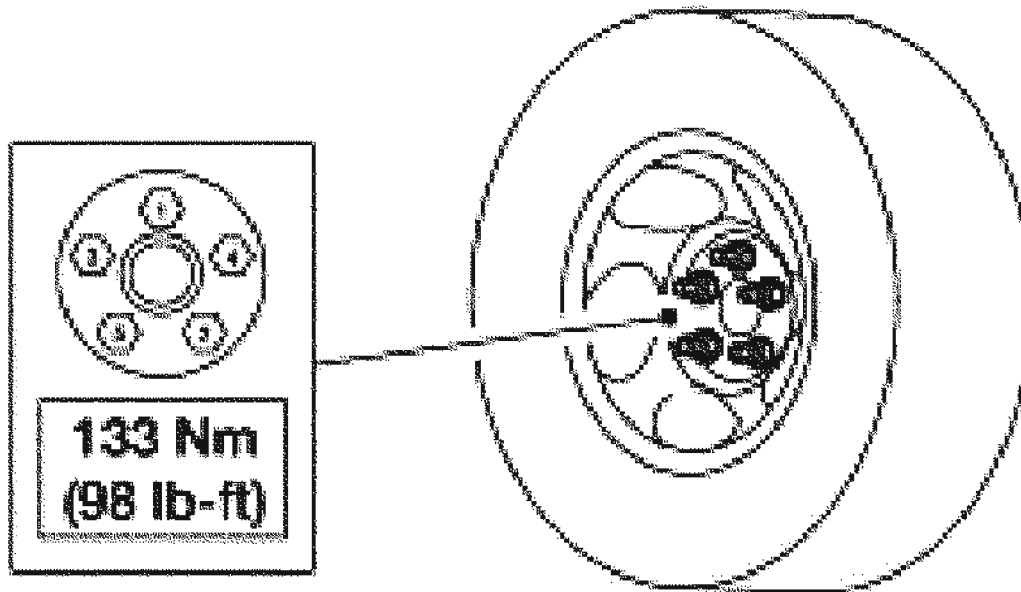
**Fig. 514: Identifying Splash Shield Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

**WARNING:** Whenever a wheel is installed, always remove any corrosion, dirt or foreign material present on the mounting surfaces of the wheel or the surfaces of the wheel hub, brake drum or brake disc that contacts the wheel. Installing wheel without correct metal-to-metal contact at the wheel mounting surfaces can cause the wheel nuts to loosen and the wheel to come off while the vehicle is in motion, causing loss of control. Failure to follow these instructions may result in personal injury.

53. Clean the wheel hub mounting surface and wheel pilot.
54. Install the tire and wheel assembly.
  1. Position the tire and wheel assembly.
    - Install the wheel nuts hand-tight, then lower the vehicle.

**CAUTION:** Failure to tighten the wheel nuts in a star pattern can result in high brake disc runout, which will speed up

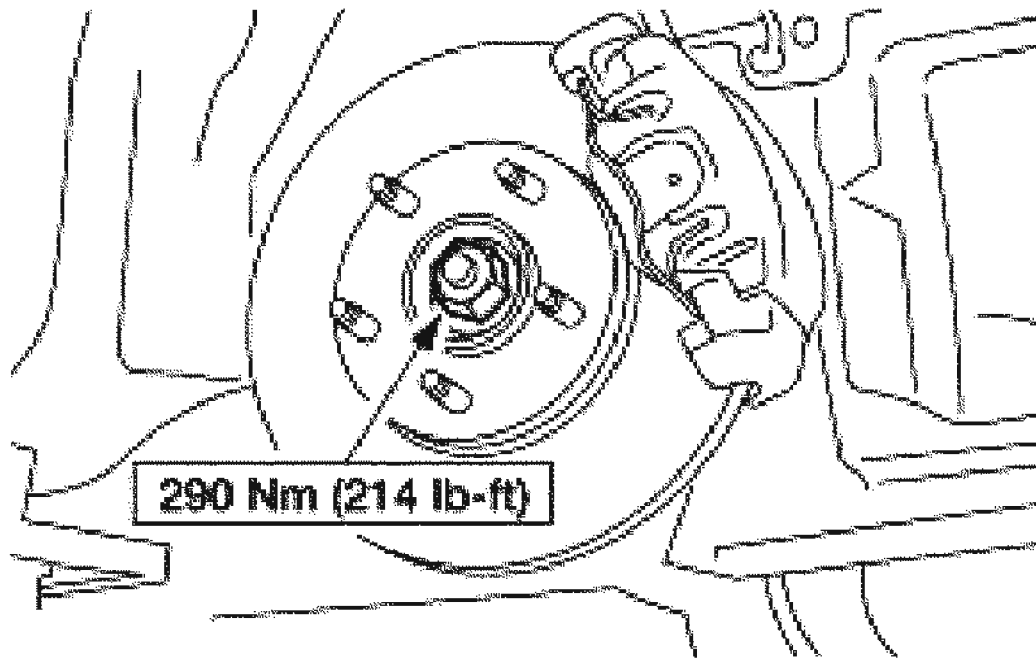
the development of brake roughness, shudder and vibration.



G02739155

**Fig. 515: Identifying Tire And Wheel Assembly Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

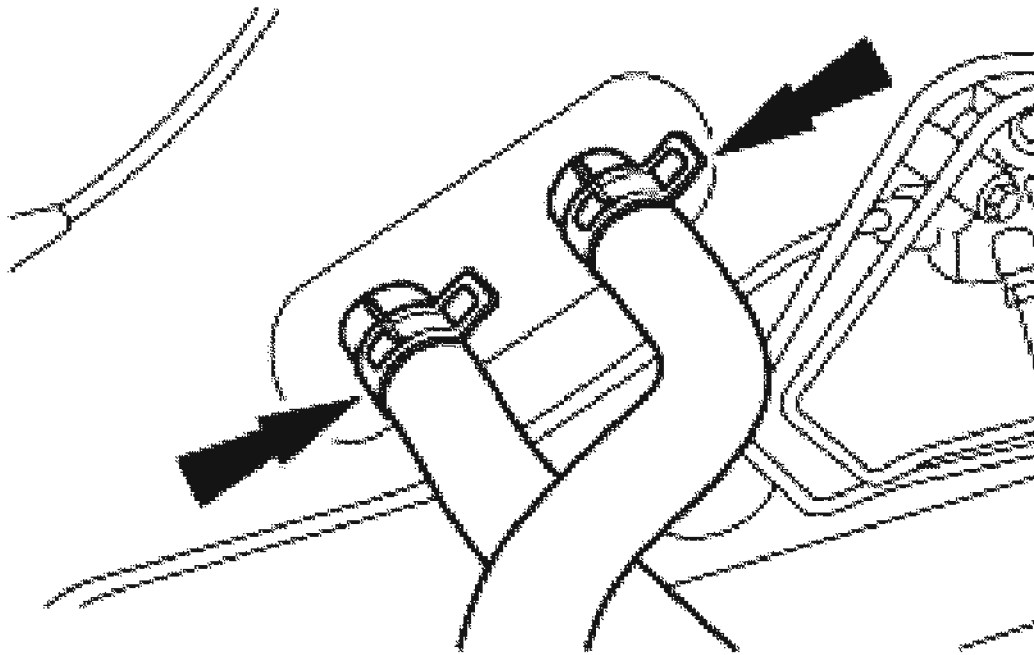
55. Tighten the wheel nuts in the sequence shown.
56. Tighten the LH and RH axle hub nuts.



G02739156

**Fig. 516: Tightening Axle Hub Nut**  
Courtesy of FORD MOTOR CO.

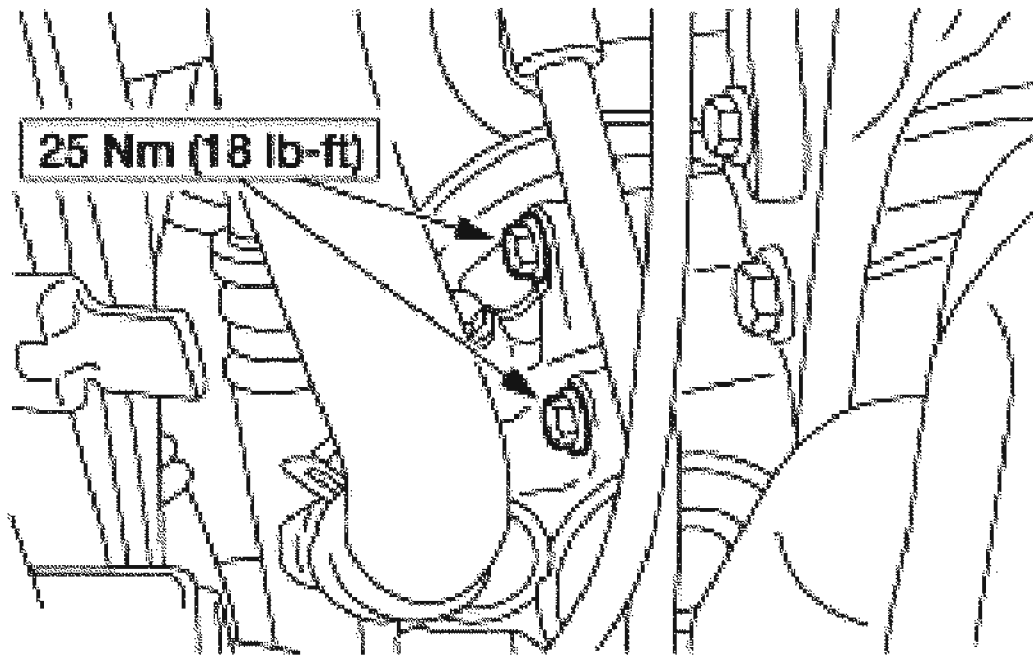
57. Install the center cap.
58. Connect the heater hoses.



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**Fig. 517: Connecting Heater Hoses**  
**Courtesy of FORD MOTOR CO.**

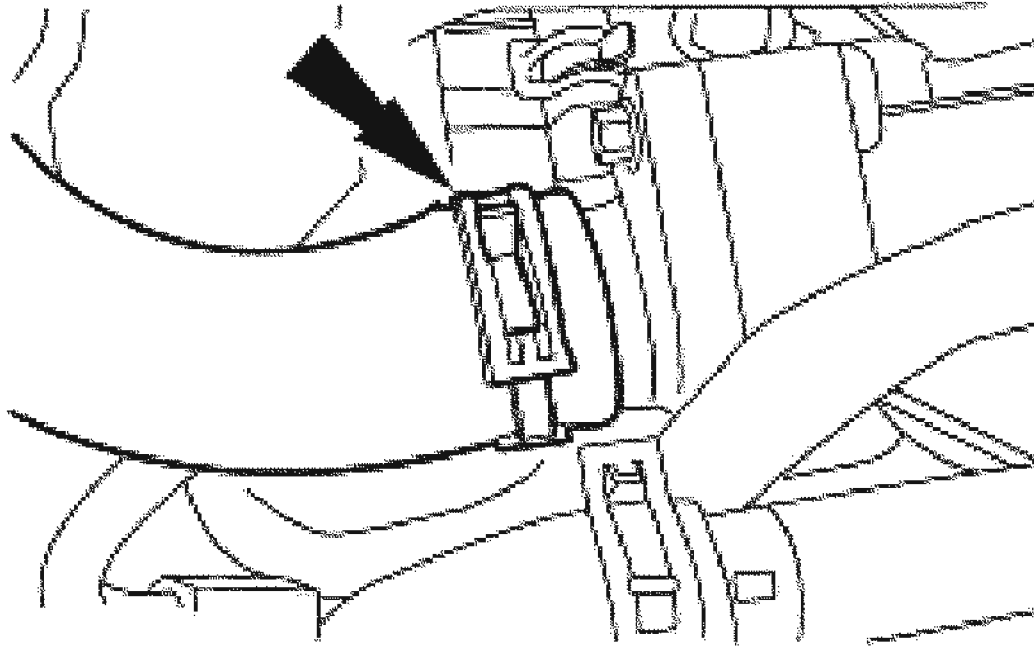
59. Tighten the upper power steering pump bolts to specification.



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**Fig. 518: Tightening Upper Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

60. Connect the upper radiator hose.

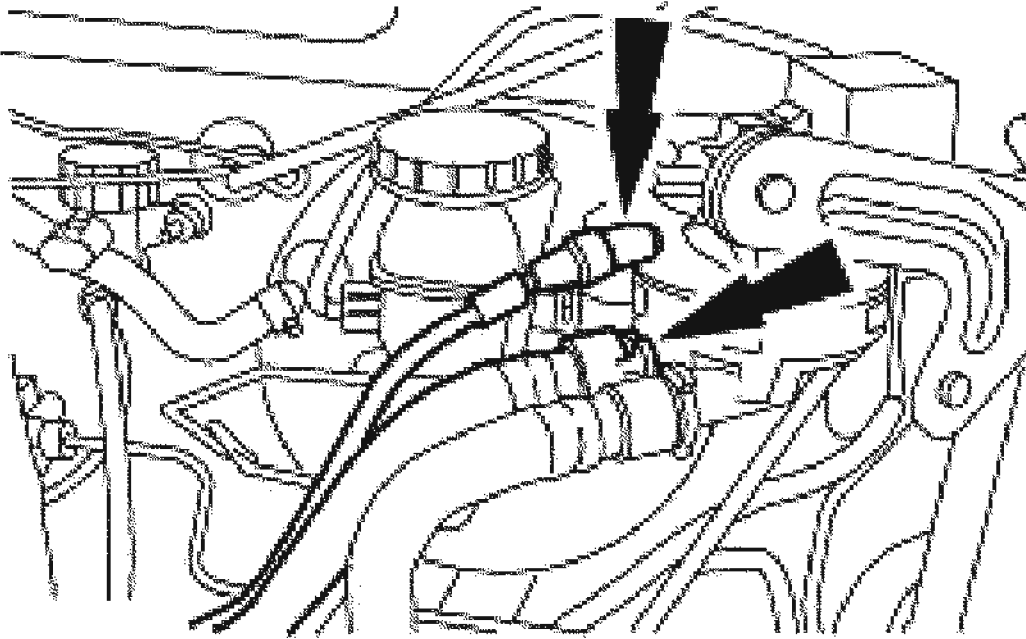


G02739159

**Fig. 519: Connecting Upper Radiator Hose**  
Courtesy of FORD MOTOR CO.

61. Connect the evaporative emission (EVAP) canister vacuum lines.

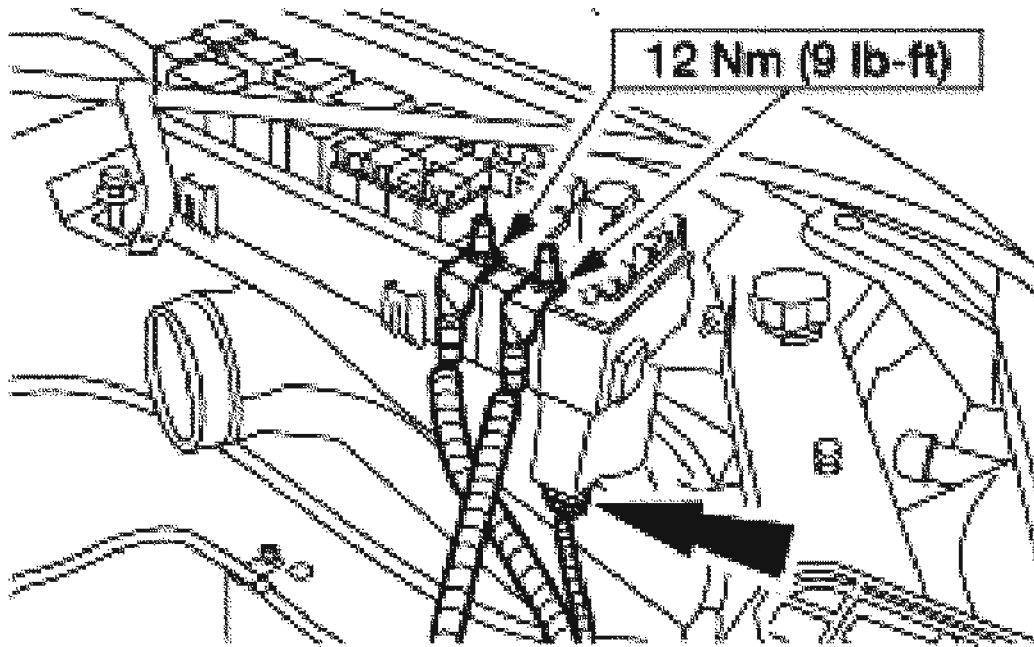




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**Fig. 520: Connecting Evaporative Emission (EVAP) Canister Vacuum Lines**  
Courtesy of FORD MOTOR CO.

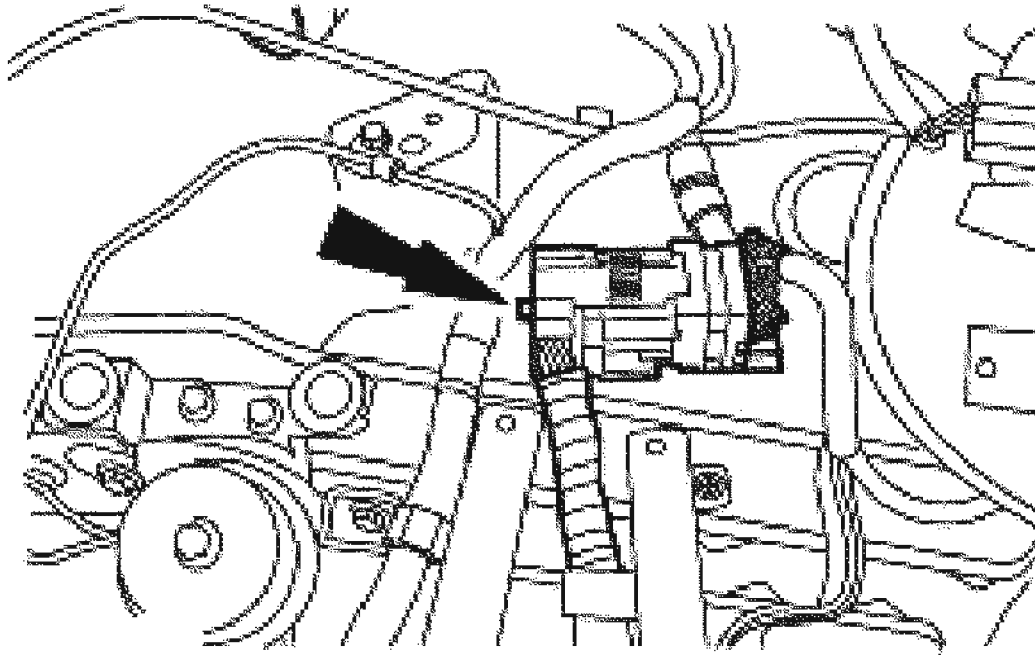
62. Connect the power distribution box electrical connections.



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**Fig. 521: Connecting Power Distribution Box Electrical Connections**  
Courtesy of FORD MOTOR CO.

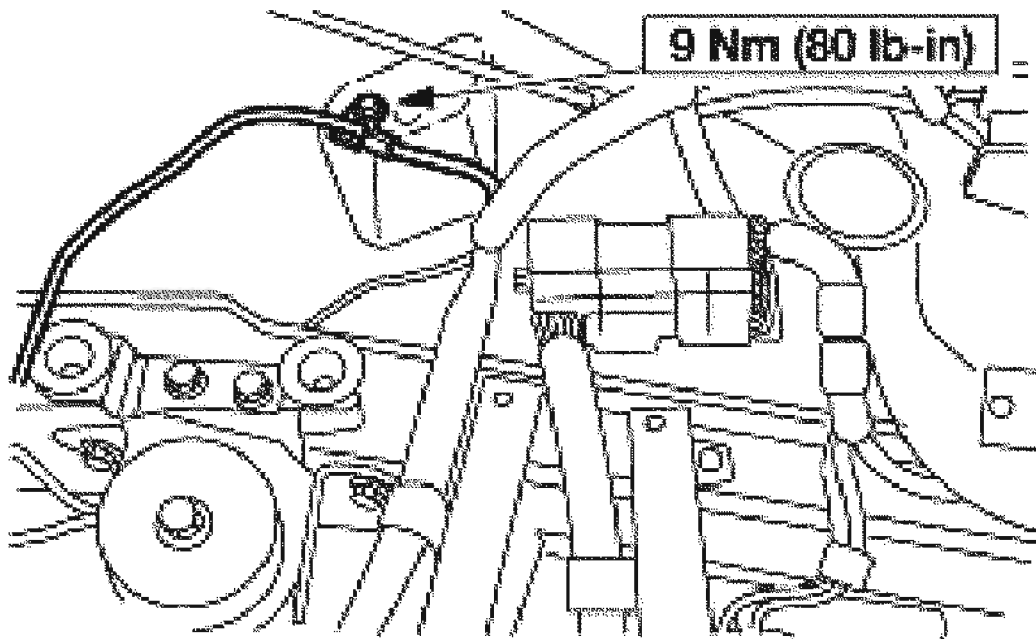
63. Connect the wire harness electrical connector.



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**Fig. 522: Connecting Wire Harness Electrical Connector**  
Courtesy of FORD MOTOR CO.

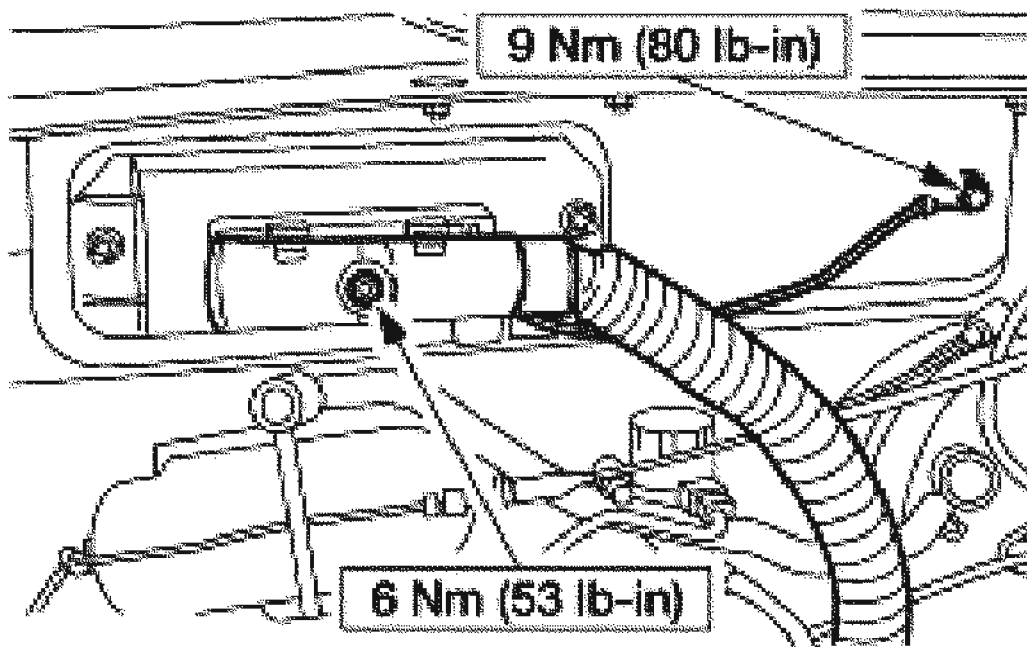
64. Connect the ground wire.



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**Fig. 523: Connecting Ground Wire**  
**Courtesy of FORD MOTOR CO.**

65. Connect the powertrain control module (PCM) wire harness and ground.

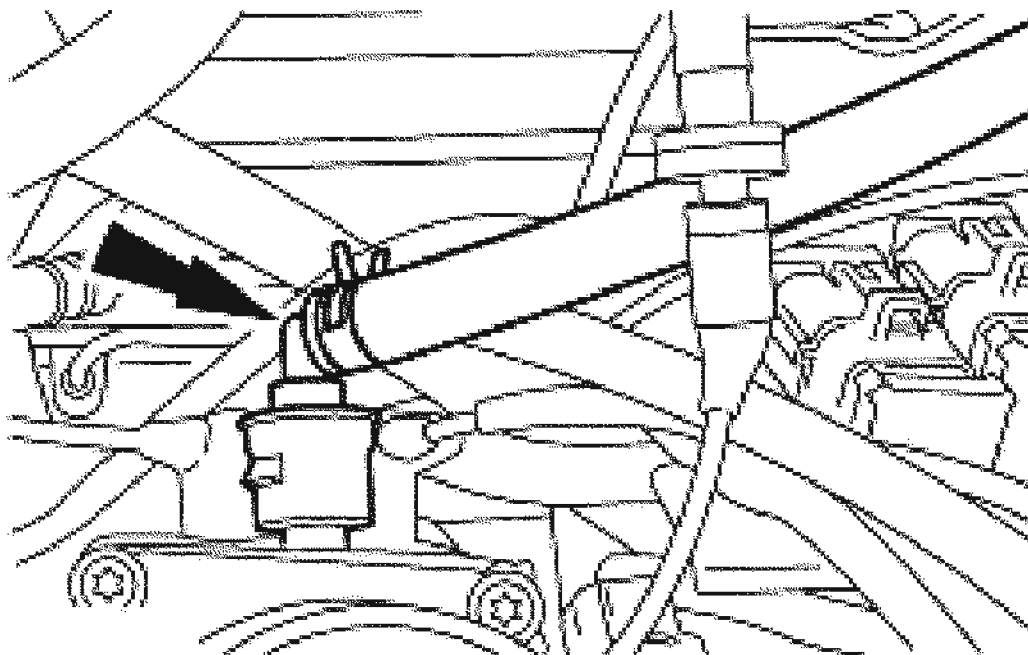


G02739164

**Fig. 524: Connecting Powertrain Control Module (PCM) Wire Harness And Ground**

Courtesy of FORD MOTOR CO.

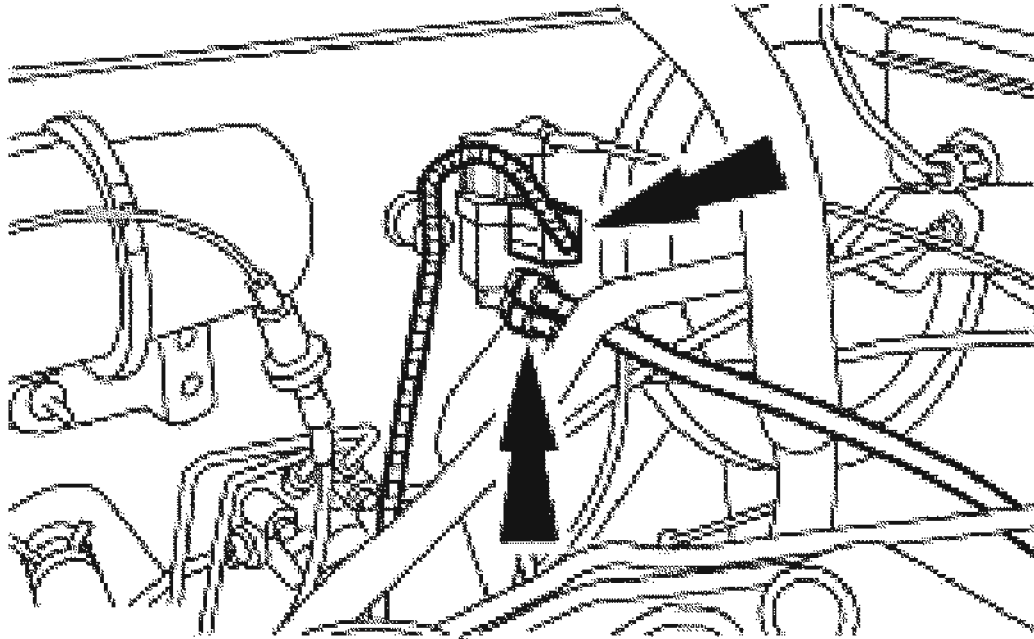
66. Connect the brake booster vacuum supply hose to the intake manifold.



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**Fig. 525: Connecting Brake Booster Vacuum Supply Hose To Intake Manifold**  
Courtesy of FORD MOTOR CO.

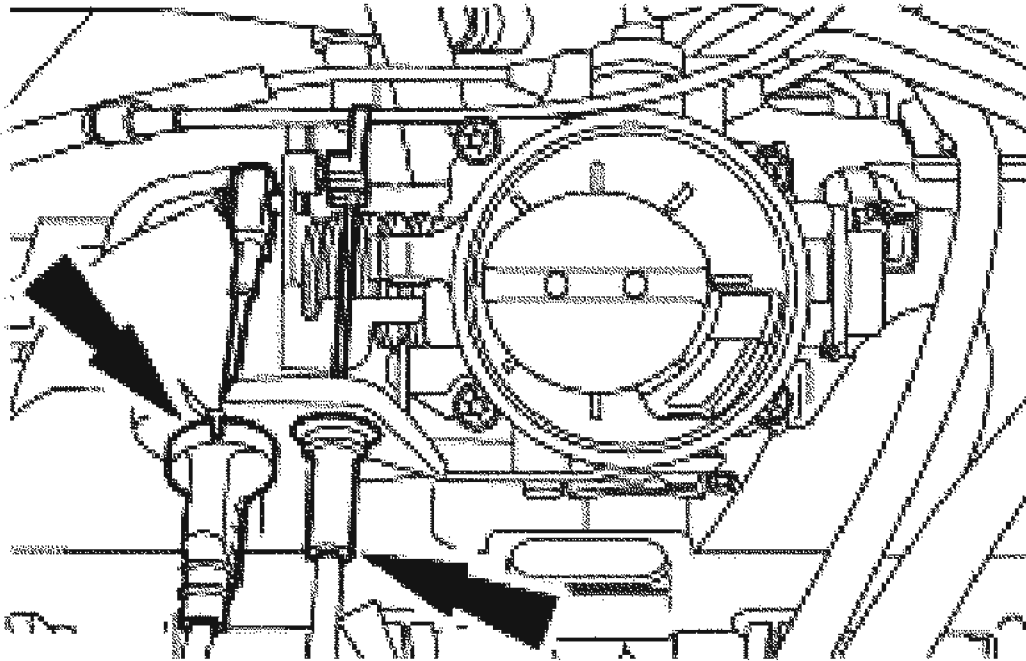
67. Connect the EGR vacuum regulator valve.
  - Connect the electrical connector.
  - Connect the vacuum hoses.



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**Fig. 526: Connecting EGR Vacuum Regulator Valve**  
Courtesy of FORD MOTOR CO.

68. Connect the throttle cables and, if equipped, speed control cable.

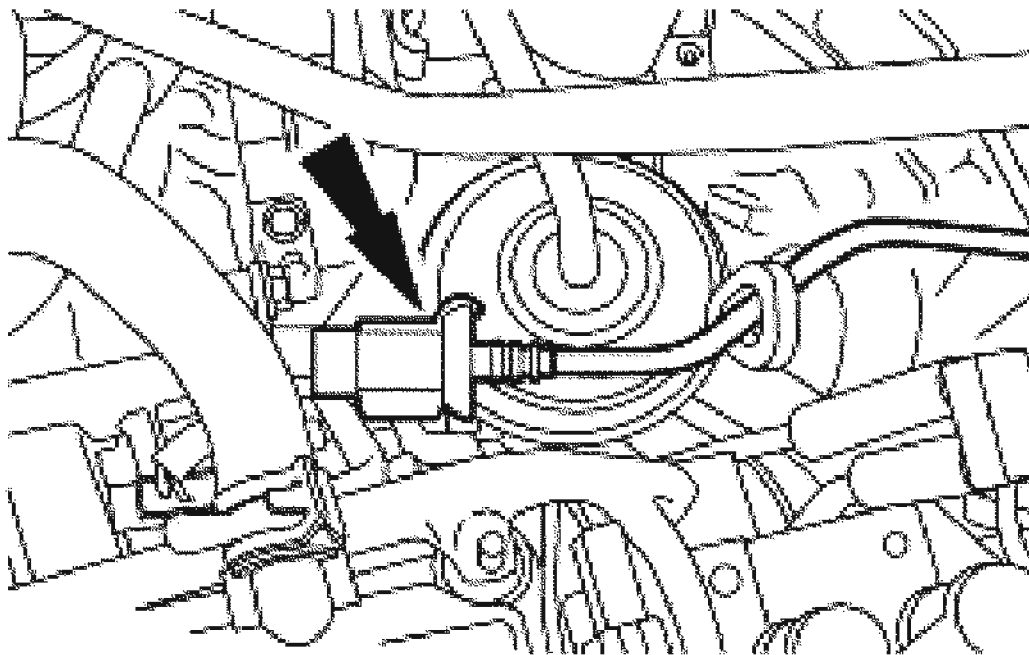


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**Fig. 527: Connecting Throttle Cables And Speed Control Cable**  
Courtesy of FORD MOTOR CO.

69. Connect the fuel hose.

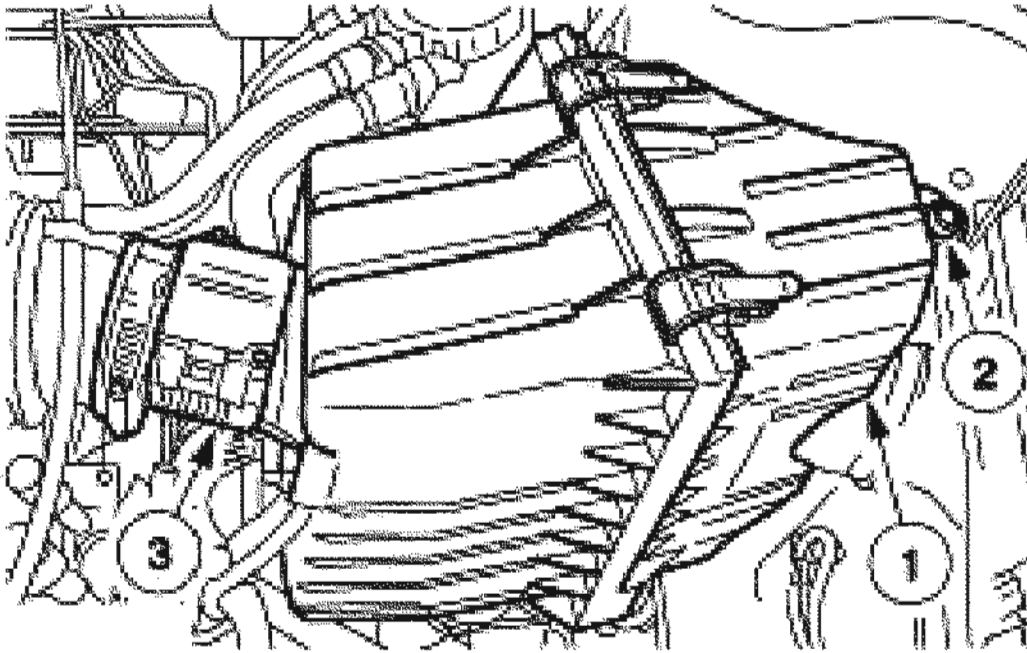




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**Fig. 528: Connecting Fuel Hose**  
**Courtesy of FORD MOTOR CO.**

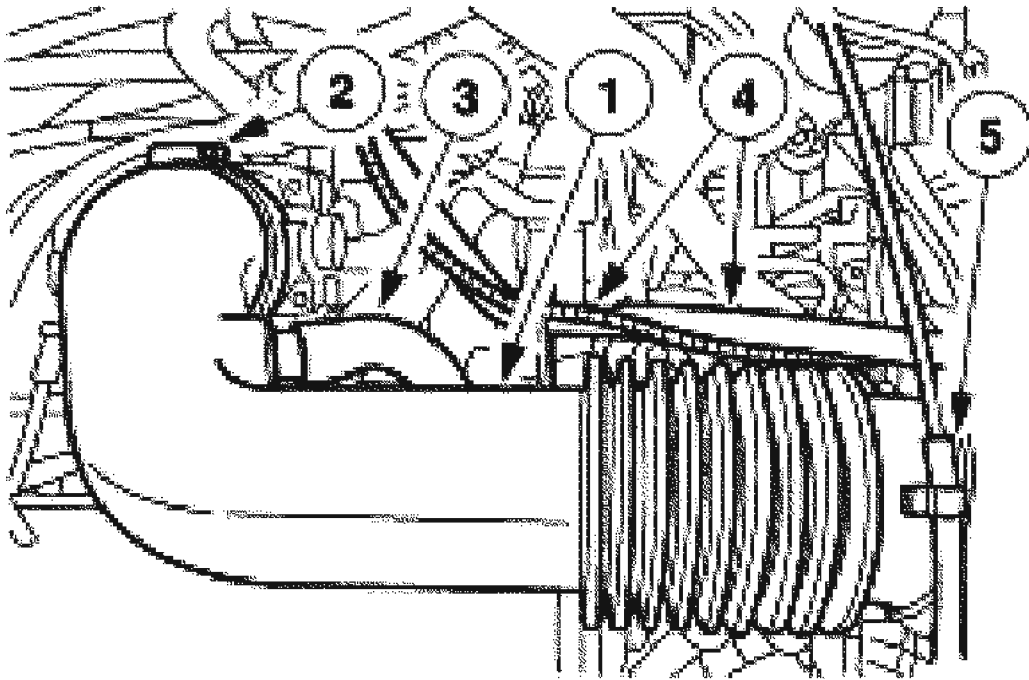
70. Install the air cleaner (ACL) and outlet pipe.
  1. Position the ACL and outlet pipe as an assembly in the vehicle.
  2. Install the bolt.
  3. Connect the mass air flow sensor electrical connector.



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**Fig. 529: Installing Air Cleaner (ACL) And Outlet Pipe**  
Courtesy of FORD MOTOR CO.

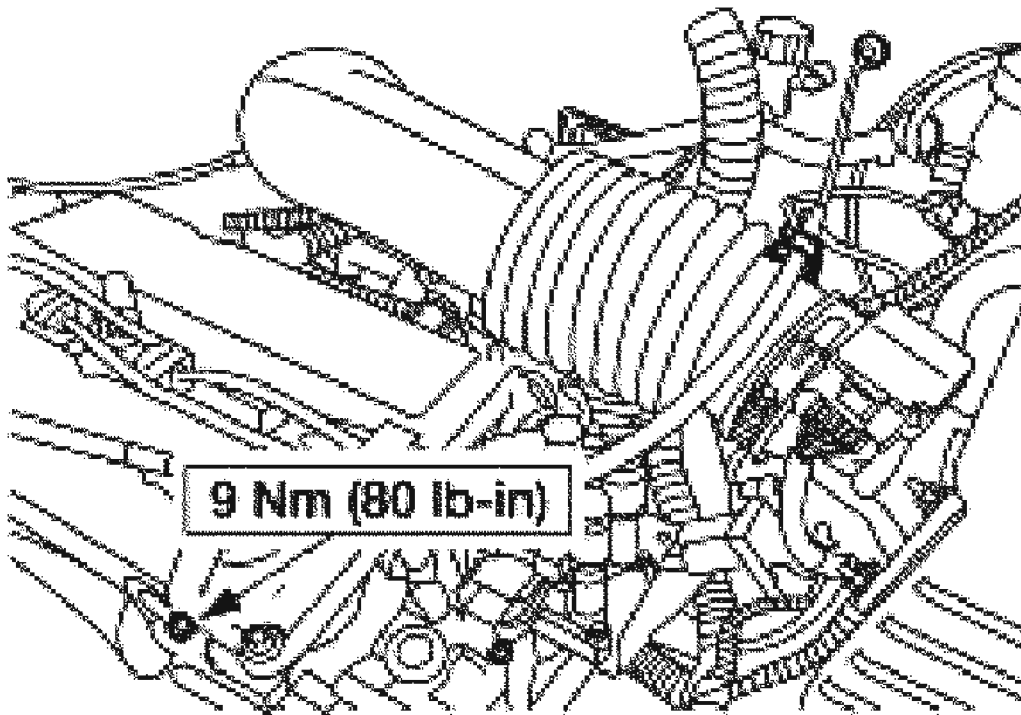
71. Connect the air cleaner outlet tube.
  1. Connect the outlet tube to the throttle body.
  2. Tighten the clamp.
  3. Connect the crankcase ventilation hose.
  4. Attach the emission tube and hose.
  5. Attach the accelerator cable.



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**Fig. 530: Connecting Air Cleaner Outlet Tube**  
Courtesy of FORD MOTOR CO.

72. Install the accelerator control cable support bracket bolt.



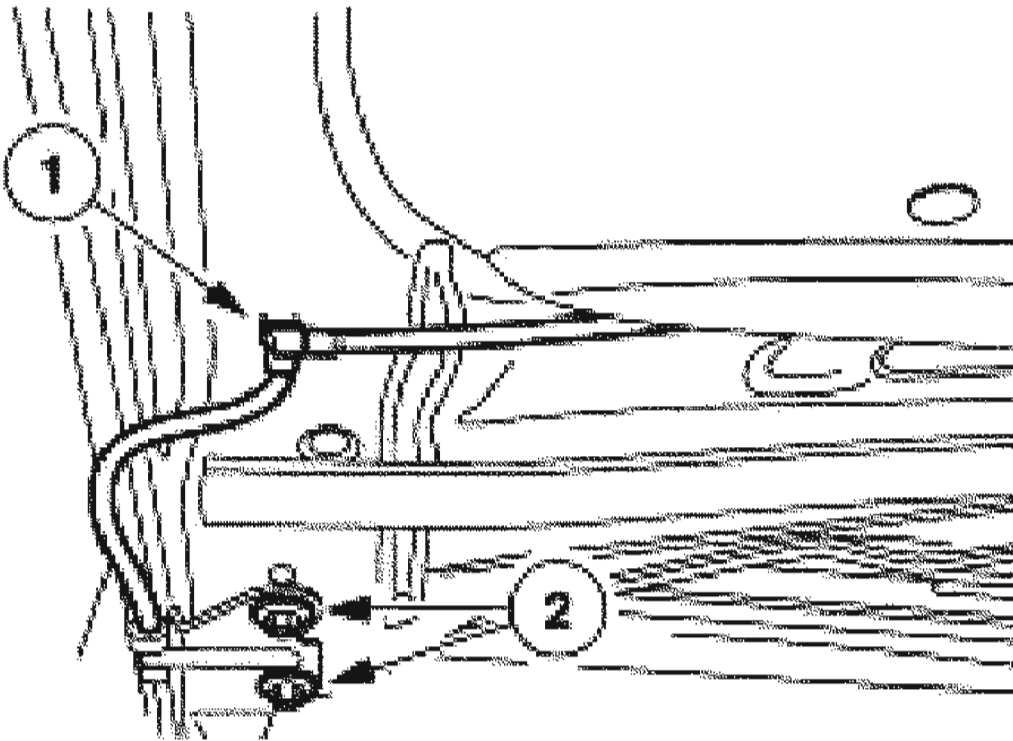
G02739171

**Fig. 531: Identifying Accelerator Control Cable Support Bracket Bolt Torque Specification**

Courtesy of FORD MOTOR CO.

73. Install the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
74. Fill the engine with Super Premium SAE 5W-20 Motor Oil or equivalent meeting Ford specification WSS-M2CH153-H.
75. Fill and bleed the cooling system. For additional information, refer to **ENGINE COOLING**.
76. Charge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
77. Fill the transaxle fluid. For additional information, refer to **MANUAL TRANSAXLE/TRANSMISSION**.

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



G02739172

**Fig. 532: Installing Hood**  
Courtesy of FORD MOTOR CO.

78. Install the hood.
  1. Connect the washer hose.
  2. Install the bolts.

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### 2000-01 ENGINES

2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

## ENGINE IDENTIFICATION

**NOTE:** For repair procedures not covered in this article, see **ENGINE OVERHAUL PROCEDURES** article in **GENERAL INFORMATION**.

Engine model may be identified by eighth character of Vehicle Identification Number (VIN). See **ENGINE IDENTIFICATION CODE** table. VIN is stamped on a plate located on top of instrument panel, near lower left of windshield. VIN is also stamped on Vehicle Certification Label located on left front door pillar.

**NOTE:** VIN Z is an alternative fuel engine. Information on this engine is unavailable from manufacturer.

## ENGINE IDENTIFICATION CODE

Application	VIN
Cougar	3
Escort	3
Escape	B
Focus	3
Mystique	3

For general engine information, see **GENERAL SPECIFICATIONS** table under ENGINE SPECIFICATIONS.

## ADJUSTMENTS

### VALVE CLEARANCE ADJUSTMENT

1. Remove valve covers. Remove timing belt. See **TIMING BELT** . Measure and record clearance of each valve at base circle. Remove camshaft. See **CAMSHAFT** .
2. Remove valve shims. Shims are marked for thickness. Select new shims and mark installation location. Desired clearance is .006" (.15 mm) for intake valves, and .012" (.30 mm) for exhaust valves. Select shim as follows: Shim thickness = measured clearance, plus base shim thickness, minus desired thickness.
3. Replace shims. Install camshaft. Measure new valve clearances and ensure they are within specification. Adjust camshaft timing. See **TIMING BELT** . Install timing belt. Install valve covers.

### TIMING BELT DEFLECTION

Timing belt deflection is automatically adjusted by timing belt tensioner. No adjustment is necessary.

## **TROUBLE SHOOTING**

**NOTE:** For trouble shooting mechanical engine components, see appropriate table in **TROUBLE SHOOTING** article in **GENERAL INFORMATION**.

## **REMOVAL & INSTALLATION**

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

**NOTE:** For reassembly reference, label all electrical connectors, vacuum hoses and fuel lines before removal. Also place mating marks on engine hood and other major assemblies before removal.

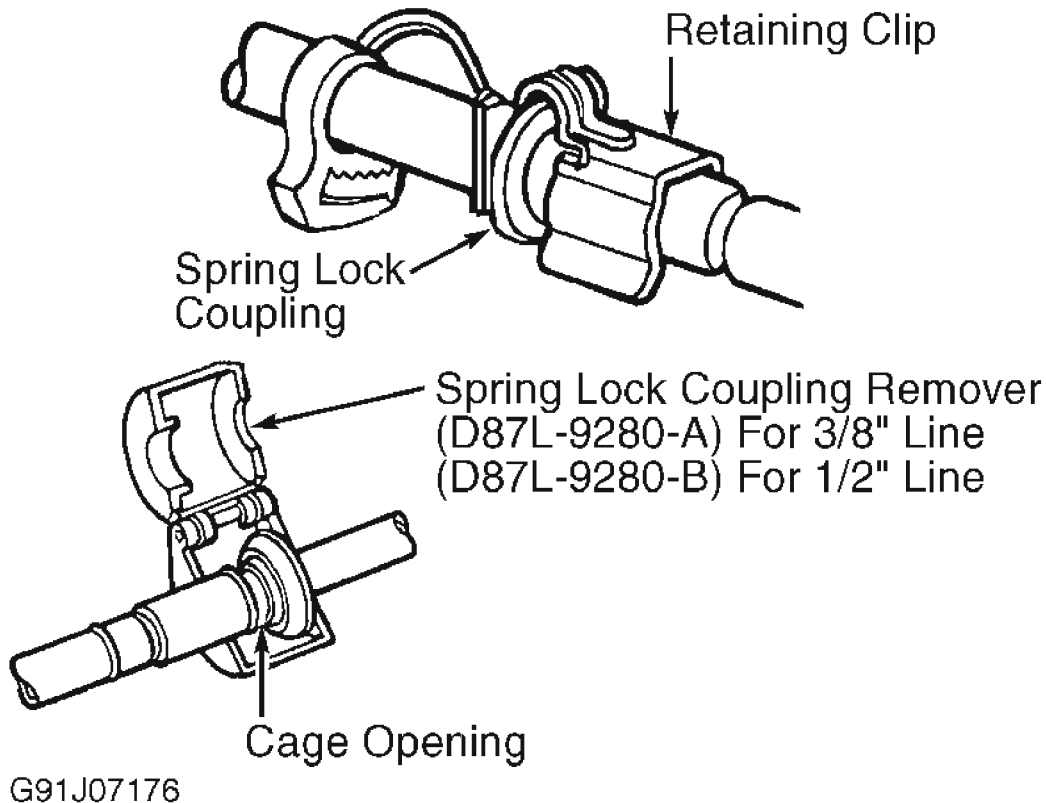
## **FUEL PRESSURE RELEASE & FUEL LINE CONNECTIONS**

**WARNING:** Fuel system is under pressure. Release pressure before servicing fuel system components.

1. Remove air cleaner assembly. Remove fuel cap to release fuel tank pressure. Using EFI Pressure Gauge (T80L-9974-B), release fuel pressure from pressure relief valve on fuel rail. Before disconnecting fuel lines, disconnect negative battery cable.
2. To disconnect fuel lines, remove retaining clip from fuel line coupling. Use Spring Lock Coupling Remover (D87L-9280-A) for 3/8" line and (D87L-9280-B) for 1/2" line. Install spring lock coupling remover on fuel line coupling so it enters cage opening. See **Fig. 1**.
3. Push spring lock coupling remover into cage opening to release female fitting from garter spring. Pull couplings apart. Remove spring lock coupling remover.
4. When installing fuel lines, install NEW "O" rings on fuel lines. Use only specified fuel resistant "O" rings. Before installing, lightly coat "O" rings with clean engine oil. Clean fittings, and replace garter spring (if necessary).
5. Install female fitting to male fitting and push until garter spring snaps over flared end of female fitting. Ensure lines lock together and garter spring is over flared end of female fitting. Install retaining clip. Ensure horseshoe portion of clip is over coupling. DO

NOT install retaining clip over rubber fuel line.

**NOTE:** Install Black retaining clip on fuel supply line and Gray clip on fuel return line.



**Fig. 1: Disconnecting Fuel Lines**  
Courtesy of FORD MOTOR CO.

## ENGINE

### Removal

1. Release fuel pressure, and disconnect fuel lines. See **FUEL PRESSURE RELEASE & FUEL LINE CONNECTIONS**. Disconnect negative and positive battery cables from battery. Place transmission on A/T models in Drive. Release cooling system pressure. Prop open hood. Raise and support vehicle. Remove radiator splash shield. Drain cooling system. Remove lower radiator hose.
2. Remove air cleaner assembly and air intake resonators. Disconnect electrical connectors and vacuum hoses from upper end of engine. Disconnect throttle cable and speed control cable, if equipped. Disconnect starter cable. Discharge A/C system, using



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approved refrigerant recovery/recycling equipment. Remove nuts attaching catalytic converter to exhaust pipe. Remove nuts attaching catalytic converter to exhaust manifold. Remove catalytic converter.

3. Disconnect coolant hoses and remove coolant pipe. Remove accessory drive belt upper guard. Remove starter motor. Remove right side splash shield. Remove accessory drive belt. Disconnect oxygen sensor connector. On M/T models, remove transaxle upper flange bolts. Loosen right side suspension strut nut 5 turns. On all models, remove wheel assemblies. Remove left and right stabilizer bar link cotter pins and retaining nuts. Separate links from stabilizer bar. Remove nuts attaching left and right tie rod ends to steering knuckle. Separate tie rod ends from steering knuckles.
4. Remove left and right ball joint pinch bolts. Separate left and right lower control arms from wheel knuckles. Remove left and right wheel hub retaining nuts from axle shaft ends. Separate left and right axle shafts from wheel knuckles. Remove axle shafts. See appropriate FWD AXLE SHAFTS article in DRIVE AXLES. Remove A/C compressor. Mark and remove vacuum hoses and wire harness connectors as necessary.
5. On A/T models, disconnect torque converter from engine drive plate. Remove plastic cover. Remove left and right transaxle flange bolts. Secure engine with lifting device. On A/T models, remove engine support insulator nuts. Loosen support insulator bolts 2 turns.
6. On M/T models, remove right side engine support insulator center bolt. Remove left and right side engine support insulators. Remove right side engine support insulator bracket. Remove left and right transaxle flange bolts. Remove generator. On A/T models, remove transaxle upper flange bolts. Separate transaxle from engine. Raise engine until power steering pump is accessible. Remove pump bolts, and position pump aside. Remove engine.
7. On M/T models, remove front engine support insulator. On all models, raise engine until power steering pump is accessible. Remove pump bolts, and position pump aside. Place jack under transaxle. Remove transaxle rear support insulator. Remove engine.

### Installation

1. To install, reverse removal procedure. Use NEW nuts on upper engine support bracket and engine/transaxle support.
2. Tighten all remaining bolts/nuts to specification. See **TORQUE SPECIFICATIONS** . Check all fluid levels. Recharge A/C system. Start engine and check for leaks.

### VALVE COVERS

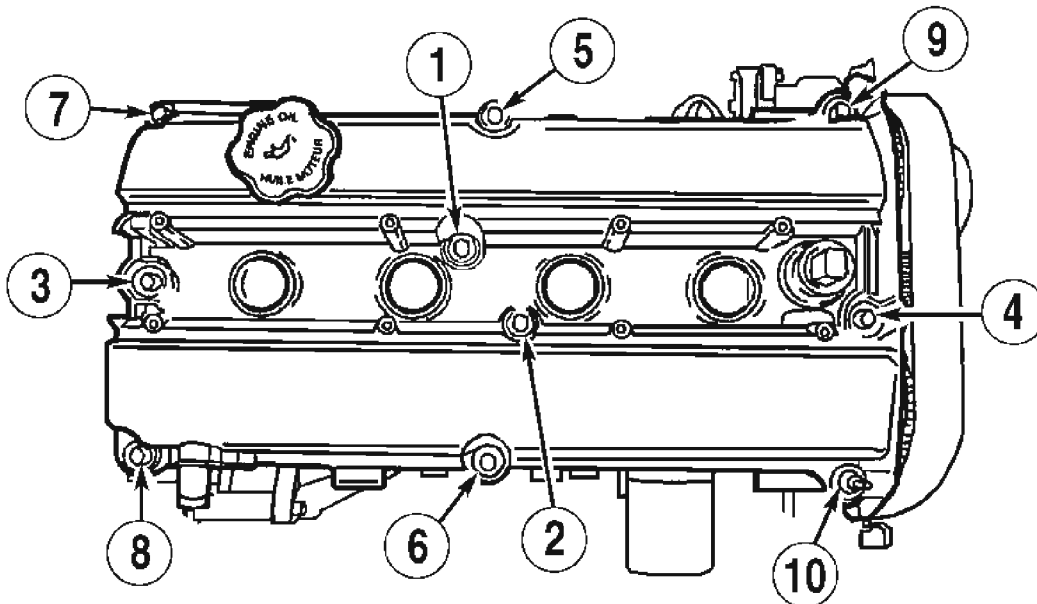
#### Removal & Installation

Disconnect crankcase ventilation hose from fitting on valve cover. Disconnect wiring connector at oil control solenoid. On early production models, remove appearance cover. Position accelerator and speed control cables aside. Remove spark plug wires and brackets from spark plugs. Remove upper timing belt cover. Remove valve cover bolts and remove

## 2001 Ford Escape

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valve cover and gasket. To install, reverse removal procedure. Clean gasket mating surfaces before installing NEW gasket. Install valve cover bolts in proper sequence to specification. See **Fig. 2** . See **TORQUE SPECIFICATIONS** .



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**Fig. 2: Valve Cover Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

### INTAKE MANIFOLD

Removal (Contour, Cougar & Mystique)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE & FUEL LINE CONNECTIONS** . Remove air cleaner outlet pipe. Disconnect negative battery cable. Disconnect fuel inlet and return lines. Remove accelerator cable and speed control actuator from throttle body.
2. Remove fuel rail. Mark and remove vacuum hoses and wire harness connectors as necessary. Remove screws attaching engine control sensor wiring to intake manifold. Remove accessory drive belt.

**NOTE:** Removal of intake manifold may be difficult without removal of generator and mounting bracket. Remove if necessary.

3. Remove retaining bolts, nuts and studs from intake manifold. Remove intake manifold and gasket.

**Installation**

Clean gasket mating surface. Position NEW gasket on intake manifold. Install and tighten bolts/nuts in a crisscross pattern to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

**Removal & Installation (Escort)**

1. Release fuel pressure. See **FUEL PRESSURE RELEASE & FUEL LINE CONNECTIONS** . Disconnect negative battery cable. Remove air cleaner outlet pipe. Disconnect throttle position sensor wiring. Raise vehicle. Drain cooling system. Lower vehicle.
2. Disconnect heater hoses from heater core. Remove main engine control sensor wiring and electrical connectors from engine. Disconnect vacuum supply hoses from intake manifold. Remove timing belt. See **TIMING BELT** in this section. Remove generator, and position aside.
3. Disconnect fuel line from manifold. Remove intake manifold bolts/nuts. Remove intake manifold.
4. To install, clean gasket mating surface. Position NEW gasket on intake manifold. Install and tighten bolts/nuts in a crisscross pattern to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

**Removal & Installation (Focus)**

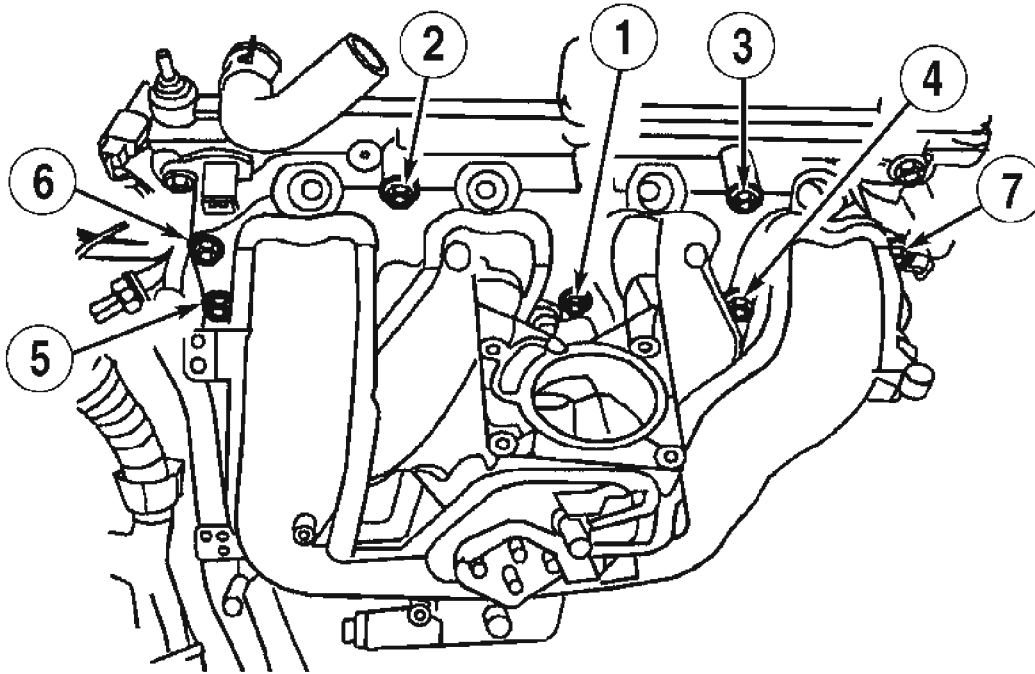
1. Remove cable ties, if necessary. Disconnect battery ground cable. Release fuel pressure. See **FUEL PRESSURE RELEASE & FUEL LINE CONNECTIONS** . Remove air cleaner housing. Remove Mass Airflow (MAF) sensor connector, crankcase ventilation hose, and intake hose. Disconnect accelerator cable and speed control cable, if equipped. Remove EGR valve and EGR pipe bracket.
2. Disconnect vacuum hoses from intake manifold. Disconnect fuel injector wiring and Camshaft Position (CMP) sensor. Remove fuel line. Remove intake manifold studs. Remove intake manifold.
3. To install, clean gasket mating surfaces. Position NEW gasket on intake manifold. Install and tighten bolts/nuts in a crisscross pattern to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

**Removal & Installation (Escape)**

1. Disconnect battery ground cable. Release fuel pressure. See **FUEL PRESSURE RELEASE & FUEL LINE CONNECTIONS** . Disconnect Throttle Position (TP) sensor, Idle Air Control (IAC) electrical connector, main engine control sensor wiring, and Powertrain Control Module (PCM).
2. Disconnect vacuum lines from brake boost and intake manifold. Disconnect Knock Sensor (KS) connector. Lower vehicle. Remove generator, and set aside. Remove

intake manifold.

3. To install, clean gasket mating surfaces. Position NEW gasket on intake manifold. Install and tighten bolts/nuts in proper sequence to specification. See **Fig. 3** . See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.



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**Fig. 3: Intake Manifold Bolt Tightening Sequence (Escape)**  
Courtesy of FORD MOTOR CO.

## EXHAUST MANIFOLD

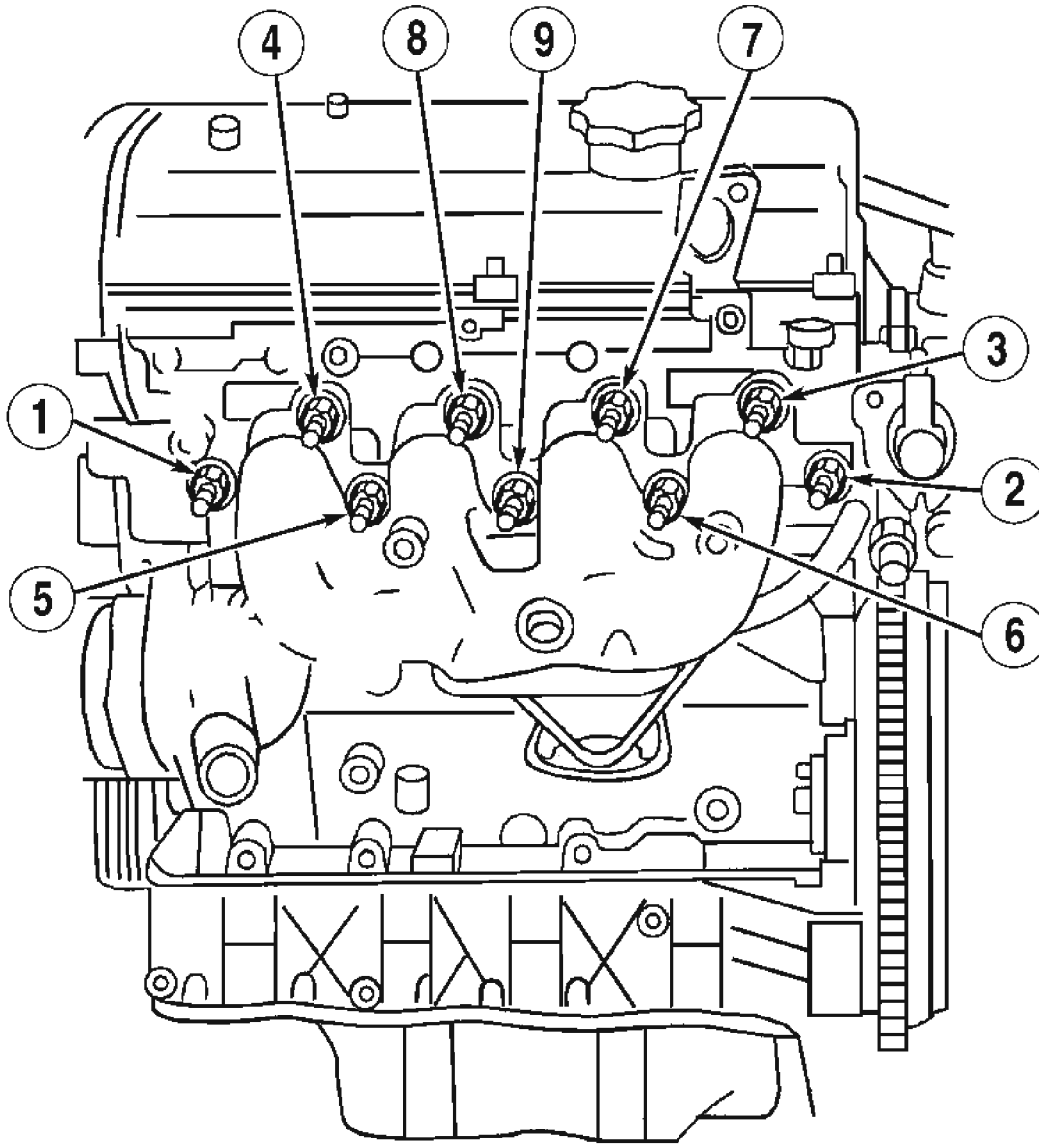
### Removal (Except Escape & Focus)

1. Disconnect negative battery cable. Remove exhaust manifold heat shield. Remove coolant hose bracket and engine lifting eye. Remove oil level indicator tube. Remove lower exhaust manifold bolts. Disconnect oxygen sensor connector. Disconnect catalytic converter from manifold. Raise and support vehicle.
2. Loosen catalytic converter bracket bolt and converter so studs clear exhaust manifold. Lower vehicle. Remove nuts attaching exhaust manifold to cylinder head in sequence. See **Fig. 4** . Remove exhaust manifold and gasket from engine.

### Installation

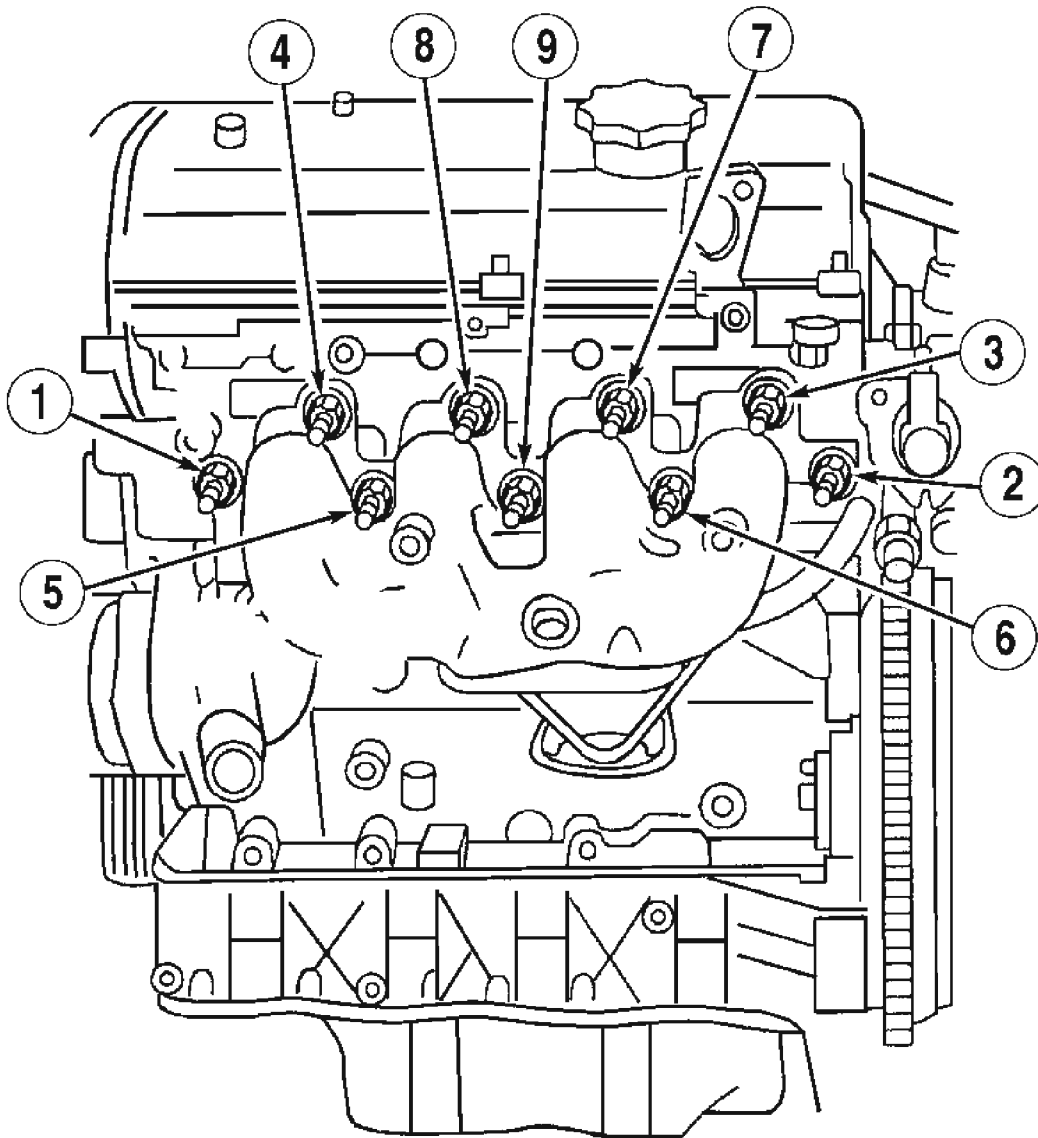
To install, Clean gasket mating surfaces. Install new gasket and exhaust manifold on

cylinder head studs. Tighten manifold nuts in proper sequence to specification. See **Fig. 5** . See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.



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**Fig. 4: Exhaust Manifold Bolt Loosening Sequence (Escort Shown; Escape is Similar)**  
Courtesy of FORD MOTOR CO.



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**Fig. 5: Exhaust Manifold Bolt Tightening Sequence (Escort Shown; Escape Is Similar)**  
Courtesy of FORD MOTOR CO.

#### Removal & Installation (Escape)

1. Disconnect negative battery cable. Remove bolts and heat shield in exhaust manifold. Disconnect O2 sensor connectors. Remove upstream O2 sensor. Remove EGR tube. Remove and discard exhaust manifold-to-catalytic converter nuts. Raise and support vehicle. Remove downstream O2 sensor. Remove catalytic converter support bolts. Remove catalytic converter-to-exhaust pipe nuts and bolts. Discard catalytic converter-to-exhaust pipe nuts. Lower vehicle. Remove oil level indicator and tube bracket. Remove bolts and nuts attaching exhaust manifold to cylinder head in sequence. See

**Fig. 4 .**

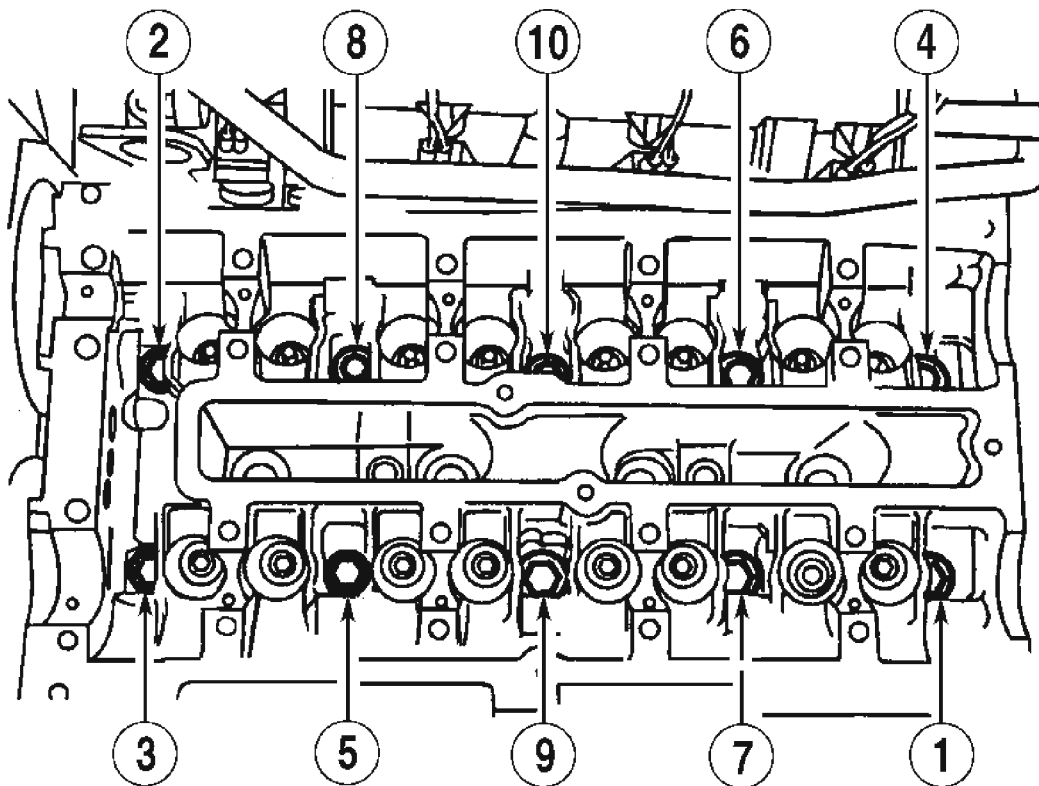
2. To install, clean gasket mating surfaces. Install new gasket and exhaust manifold on cylinder head studs. Tighten manifold nuts in proper sequence to specification. See **Fig. 5** . See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure using NEW catalytic converter nuts.

**Removal & Installation (Focus)**

1. Disconnect negative battery cable. Raise and support vehicle. Remove exhaust manifold bracket. Disconnect HO2S plugs. Lower vehicle. Remove heat shield. Remove air cleaner housing. Disconnect MAF sensor, Position Crankcase Ventilation (PCV) hose, and intake hose.
2. Remove exhaust manifold from catalytic converter. Remove exhaust manifold from cylinder head. To install, clean gasket mating surfaces. Install NEW gasket and exhaust manifold on cylinder head studs. Tighten manifold nuts to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

**CYLINDER HEAD****Removal**

1. Disconnect negative battery cable. Drain cooling system. Remove intake manifold. See **INTAKE MANIFOLD** . Remove exhaust manifold. See **EXHAUST MANIFOLD** . Remove timing belt. See **TIMING BELT** . Remove camshafts and valve tappets. See **CAMSHAFT** .
2. Remove cylinder head retaining bolts in sequence. See **Fig. 6** .



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**Fig. 6: Cylinder Head Bolt Loosening Sequence**  
Courtesy of FORD MOTOR CO.

#### Inspection

Ensure all mating surfaces are clean. Check cylinder block, cylinder head and manifold surfaces for warpage and cracks. See **CYLINDER BLOCK** and **CYLINDER HEAD** tables under ENGINE SPECIFICATIONS.

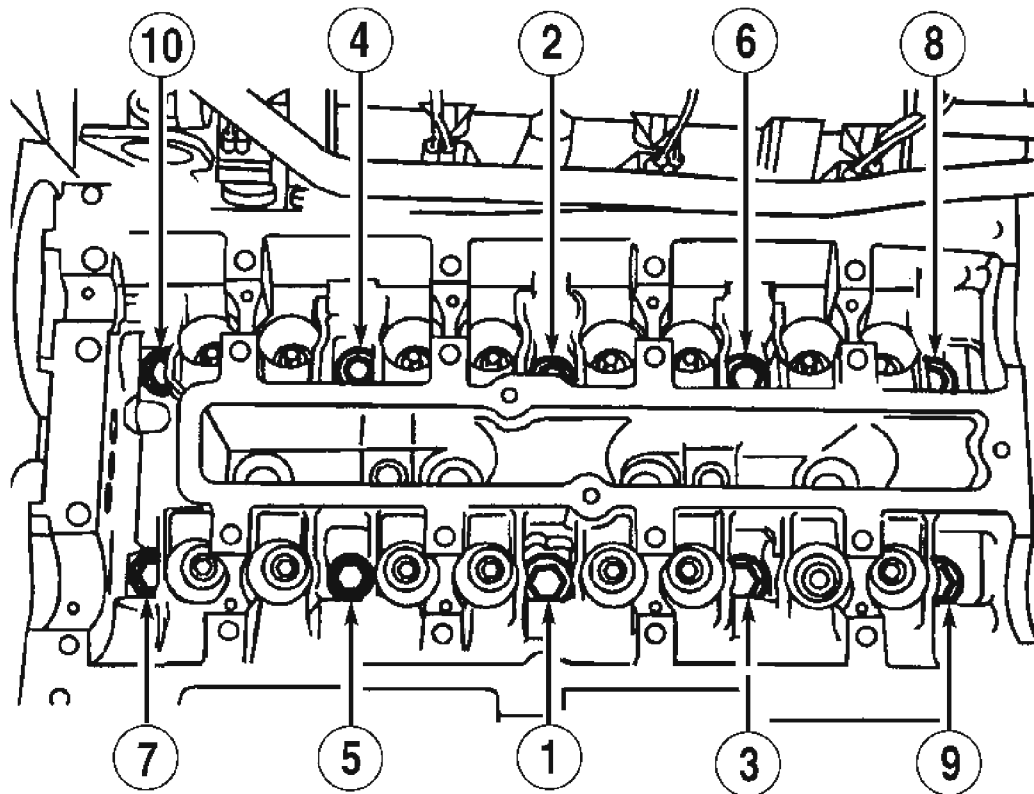
#### Installation

1. To install, reverse removal procedure. Ensure crankshaft timing marks are aligned. See **Fig. 11** . Use Camshaft Alignment Timing Tool (T94P-6256-CH) to ensure alignment of camshafts. Install tool in slots on camshafts at rear of engine. Position NEW cylinder head gasket on cylinder block.
2. Install cylinder head using NEW cylinder head bolts. Tighten bolts in sequence to specification. See **Fig. 7** and **Fig. 8** . See **TORQUE SPECIFICATIONS** .



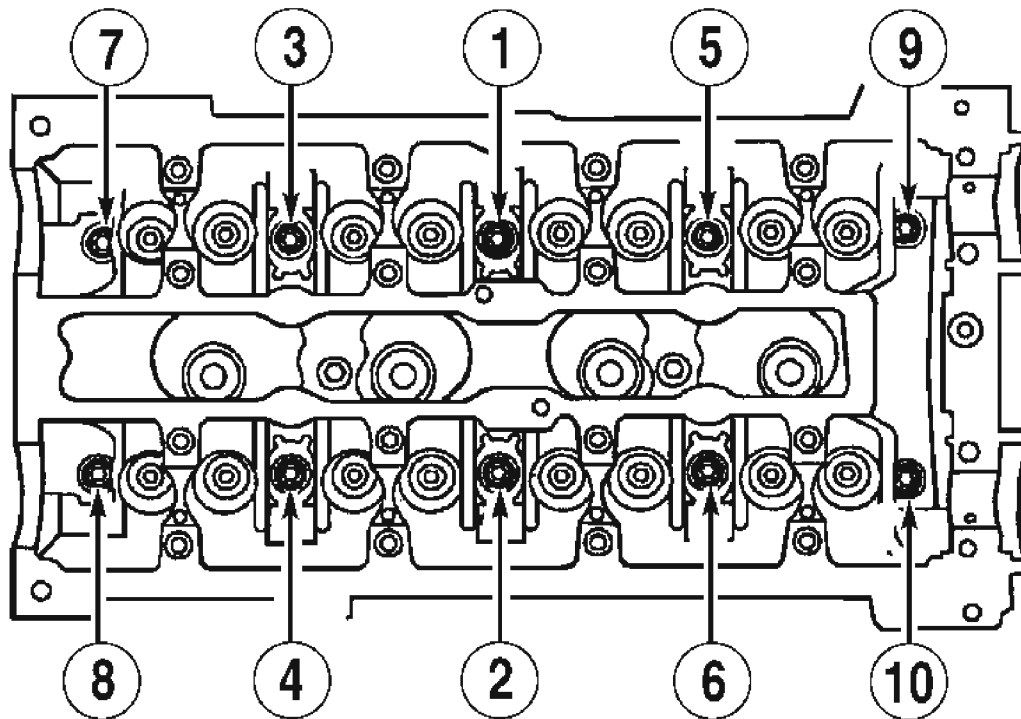
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**Fig. 7: Cylinder Head Bolt Tightening Sequence (Except Focus)**  
Courtesy of FORD MOTOR CO.



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**Fig. 8: Cylinder Head Bolt Tightening Sequence (Focus)**  
Courtesy of FORD MOTOR CO.

3. Install camshafts. See **CAMSHAFT** . Install timing belt. See **TIMING BELT** . To complete installation, reverse removal procedure. Tighten remaining bolts to specification. See **TORQUE SPECIFICATIONS** . Fill or top off fluids. Start engine and check for leaks.

## CRANKSHAFT FRONT OIL SEAL

### Removal

Remove timing belt. See **TIMING BELT** . Remove crankshaft sprocket. Using Seal Remover (T92C-6700-CH), remove oil seal.

### Installation

Apply engine oil to new oil seal. Using Seal Installer (T81P-6700-A or T81P-6710-A), install oil seal. Ensure seal is fully seated. To complete installation, reverse removal procedure.

## TIMING BELT

For timing belt removal and installation procedures, see **TIMING BELT REPLACEMENT** article.

## **CAMSHAFT SEALS**

### **Removal**

**CAUTION: DO NOT rotate crankshaft or camshafts with timing belt removed. Damage to valve/piston may result.**

Remove timing belt and camshaft sprockets. See **TIMING BELT** . Remove camshaft bearing cap No. 5. Remove camshaft oil seals.

### **Installation**

Thinly coat bearing cap No. 5 with sealant. Install NEW exhaust oil seal. Install bearing cap No. 5. Using Camshaft Seal Replacer (T81P-6292-A), install NEW intake camshaft oil seal. Position oil feed ring hole at top. Check exhaust timing belt pulley installation position. Lug on pulley must locate in hole. Lug is centered between oil bores and oil feed hole. Install timing belt pulleys and lightly install bolts. Install timing belt. See **TIMING BELT** . To complete installation, reverse removal procedure. Ensure crankshaft and camshafts are aligned. Tighten remaining bolts/nuts to specification. See **TORQUE SPECIFICATIONS** .

## **CAMSHAFT**

### **Removal**

**CAUTION: DO NOT rotate camshafts with timing belt removed, or engine damage may result.**

Remove timing belt, camshaft sprockets and valve cover. See **TIMING BELT** . Mark camshaft journal caps and cylinder head for installation reference. Remove camshaft journal caps in sequence. See **Fig. 9** and **Fig. 10** . Remove camshafts and camshaft oil seals. See **CAMSHAFT** table under ENGINE SPECIFICATIONS for camshaft specifications.

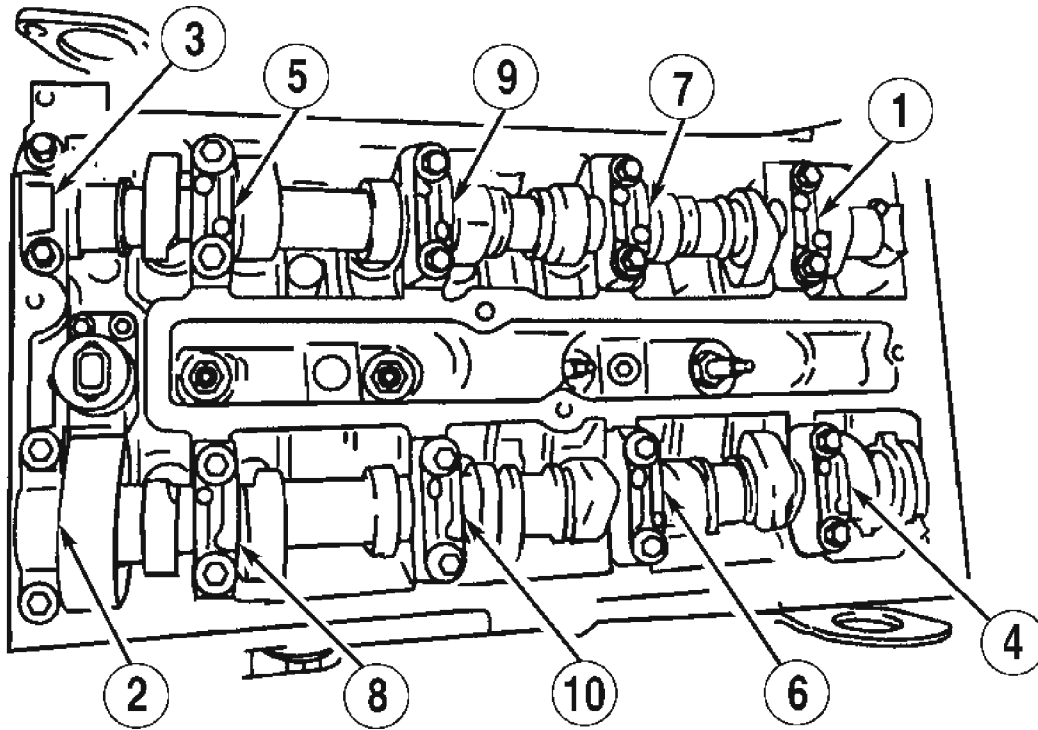
### **Installation**

1. Ensure crankshaft timing marks are aligned. See **Fig. 11** . Install NEW gasket on oil feed flange. Insert oil ring into oil feed flange. Slide components onto exhaust camshaft. Thinly coat bearing cap No. 5 with sealant. Lubricate valve tappets with engine assembly lubricant and insert in proper location. Lubricate camshaft bearings with engine assembly lubricant. Insert intake camshaft. Hold oil feed flange upward when installing exhaust camshaft. Position oil feed ring hole at top. Turn oil feed flange until locating lug on camshaft is in position on cylinder head. Install camshaft bearing caps in original location.
2. Tighten bearing cap bolts in sequence to specification. See **Fig. 12 -Fig. 14** . See

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

**TORQUE SPECIFICATIONS** . Install NEW camshaft oil seals. See **CAMSHAFT SEALS** . Install timing belt. See **TIMING BELT** . To complete installation, reverse removal procedure. Tighten remaining bolts/nuts to specification.

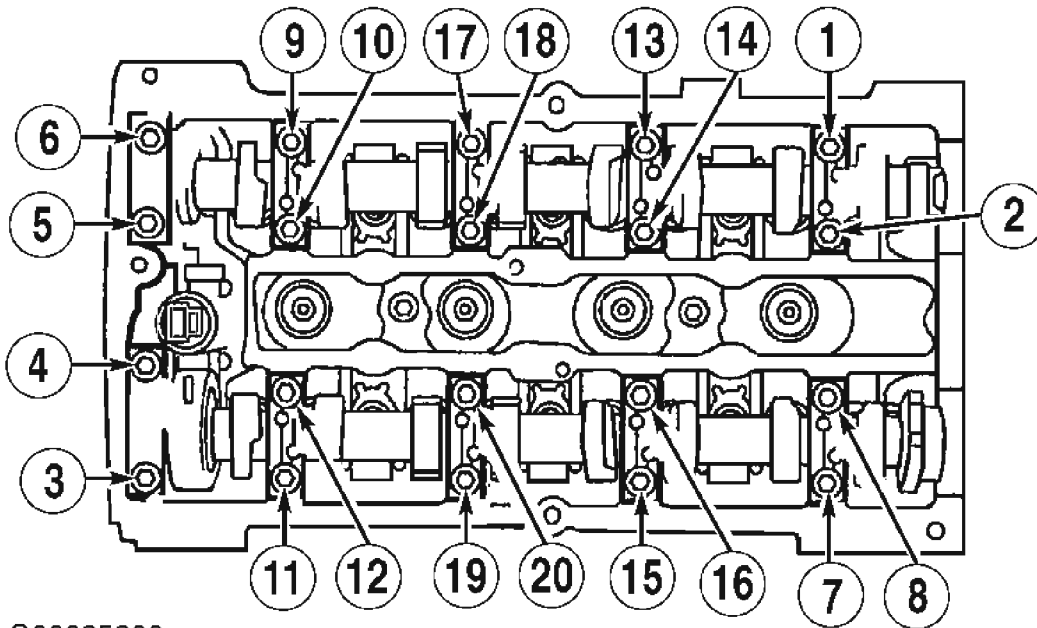


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**Fig. 9: Camshaft Bearing Cap Bolt Removal Sequence (Except Escort & Escape)**  
Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



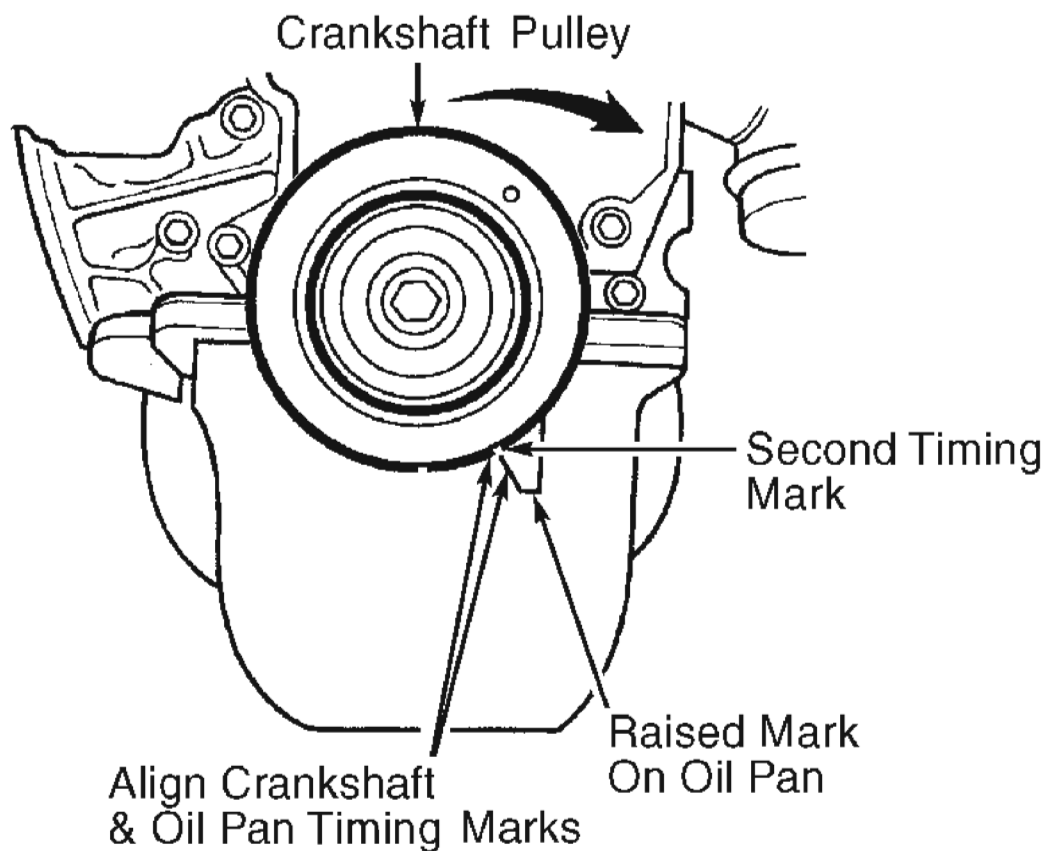
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**Fig. 10: Camshaft Bearing Cap Bolt Removal Sequence (Escort Shown; Escape Is Similar)**

Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

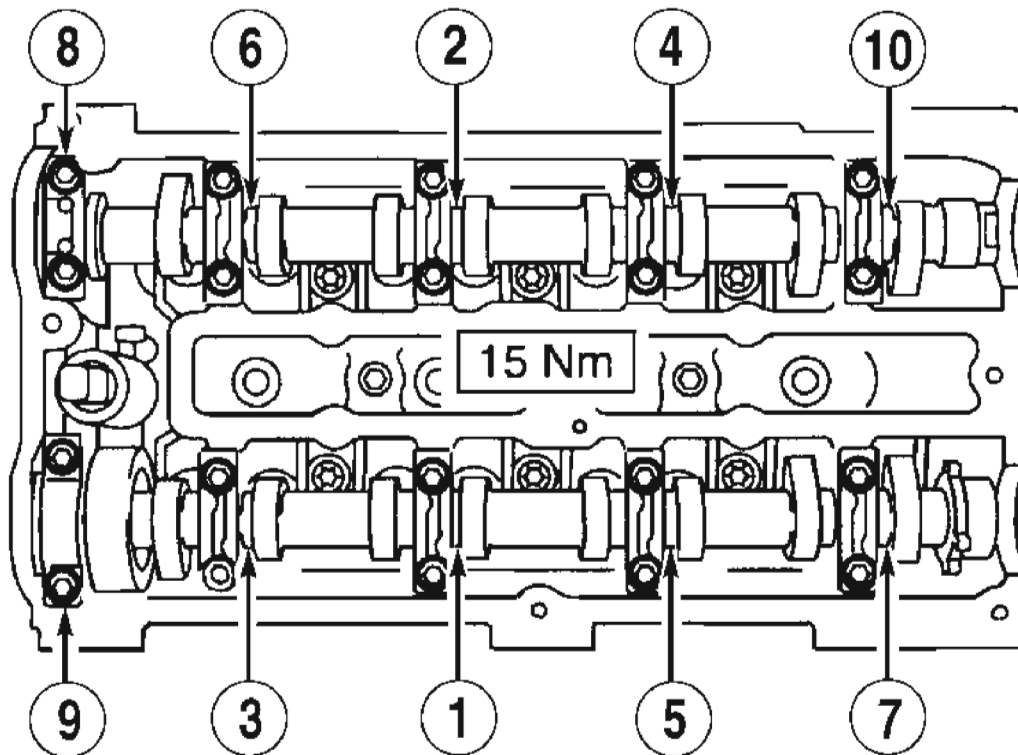


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**Fig. 11: Aligning Crankshaft Timing Marks**  
Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



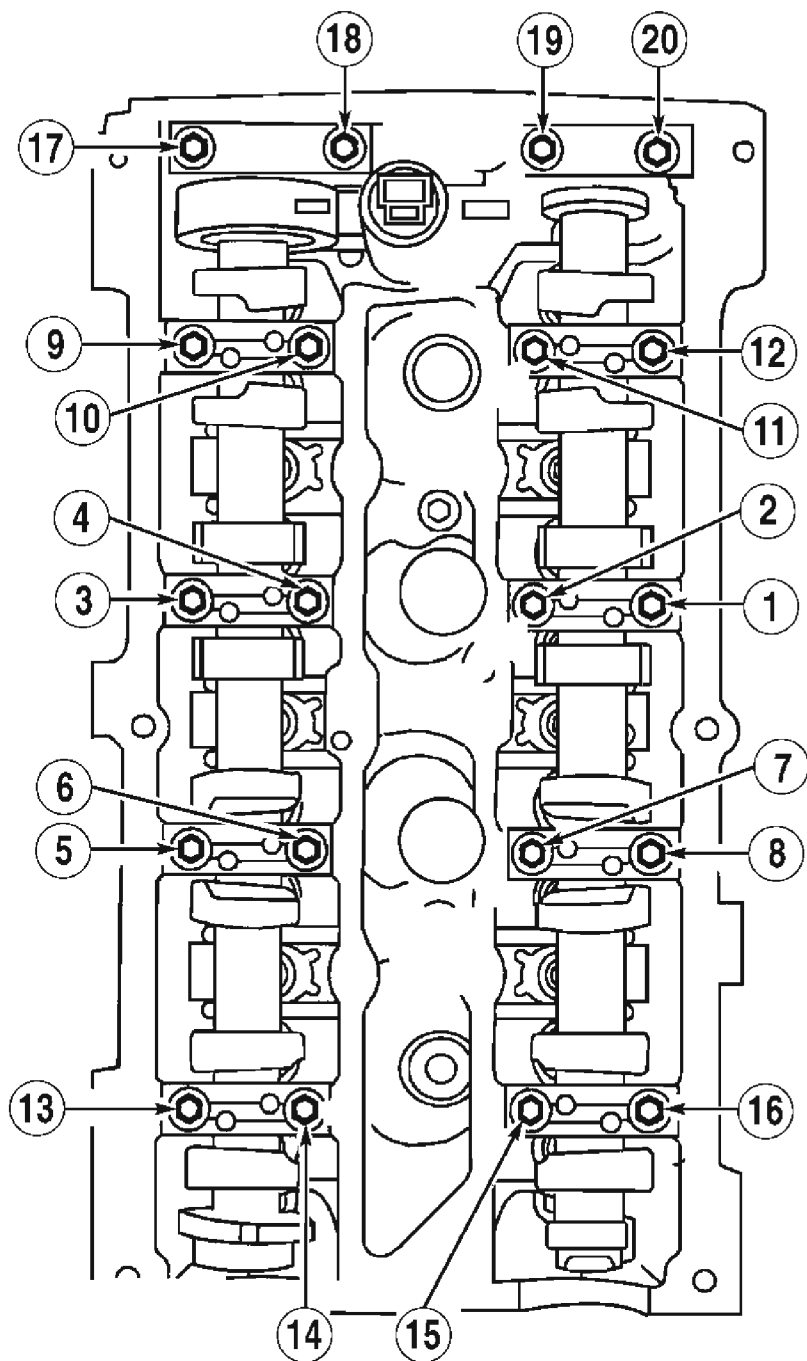
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**Fig. 12: Camshaft Bearing Cap Bolt Tightening Sequence (Contour, Cougar & Mystique)**

Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

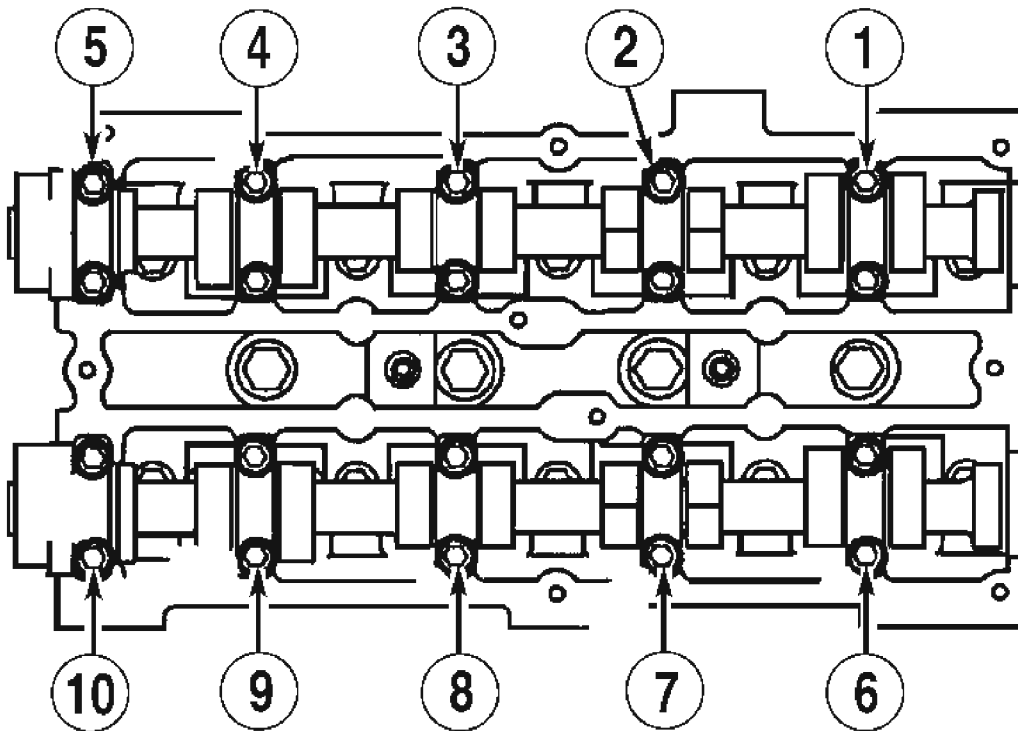


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**Fig. 13: Camshaft Bearing Cap Bolt Tightening Sequence (Escort Shown; Escape Is Similar)**

Courtesy of FORD MOTOR CO.





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**Fig. 14: Camshaft Bearing Cap Bolt Tightening Sequence (Focus)**  
 Courtesy of FORD MOTOR CO.

## CRANKSHAFT REAR OIL SEAL

### Removal

Remove transaxle. For A/T, see appropriate TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. For M/T, see appropriate article in CLUTCHES. Remove flexplate (A/T) or flywheel (M/T). Using Seal Remover (T92C-6700-CH), remove oil seal from rear seal housing. If seal is difficult to remove, remove seal housing and seal.

### Installation

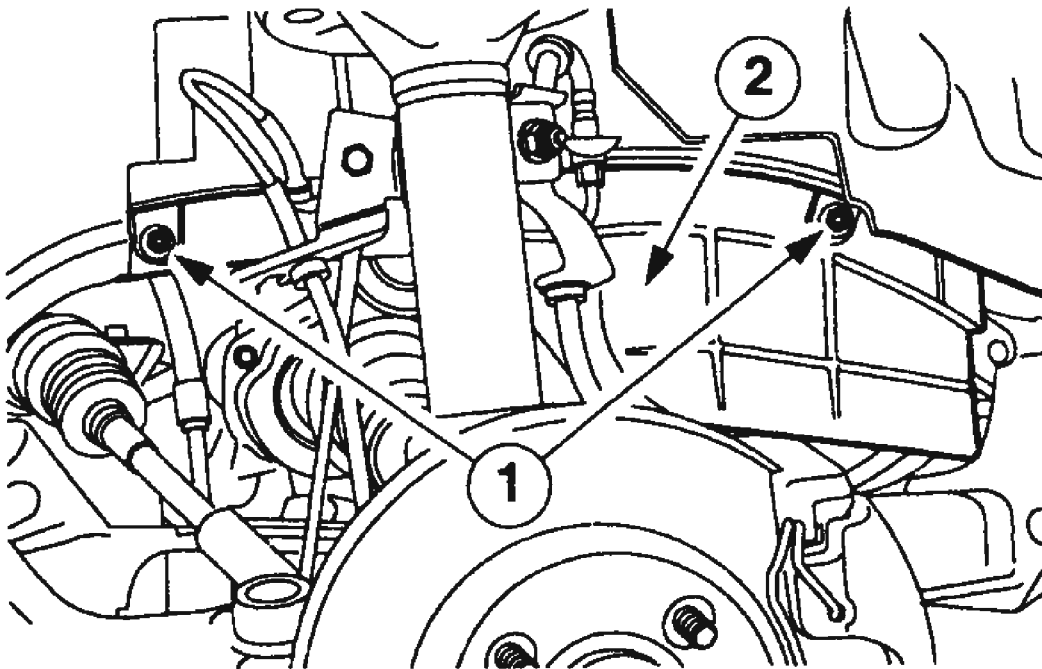
Apply a continuous bead of silicone sealer to rear oil seal housing, and install housing (if removed). Apply engine oil to new oil seal. Using Rear Crankshaft Seal Replacer (T88P-6701-B1) and Crankshaft Rear Seal Pilot (T88P-6701-B2), install rear oil seal. Ensure seal is flush with edge of seal housing. To complete installation, reverse removal procedure. Tighten bolts/nuts to specification. See **TORQUE SPECIFICATIONS**.

## WATER PUMP

### Removal (Contour & Mystique)

**NOTE:** Water pump must be turned 180 degrees to remove from the vehicle.

1. Install memory saver. Disconnect negative battery cable. Drain cooling system.
2. Raise and support vehicle. Remove right wheel. Remove right side lower splash shield. See **Fig. 15** . Lower vehicle. Loosen water pump pulley bolts (do not remove bolts). See **Fig. 16** .
3. Rotate accessory drive belt tensioner, remove accessory drive belt. See **Fig. 17** . Using strap wrench (303-D055) keep crankshaft pulley from turning, remove crankshaft pulley bolt and remove crankshaft pulley. Remove water pump pulley. Remove water pump bolts, remove water pump. See **Fig. 18** . Clean gasket mating surfaces.

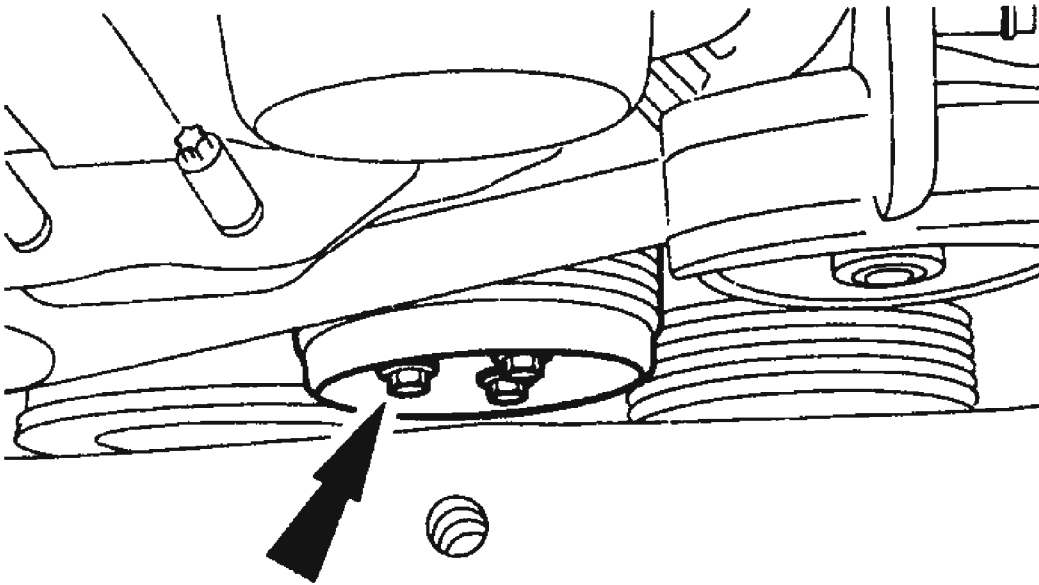


1. Splash Shield Fasteners

2. Splash Shield

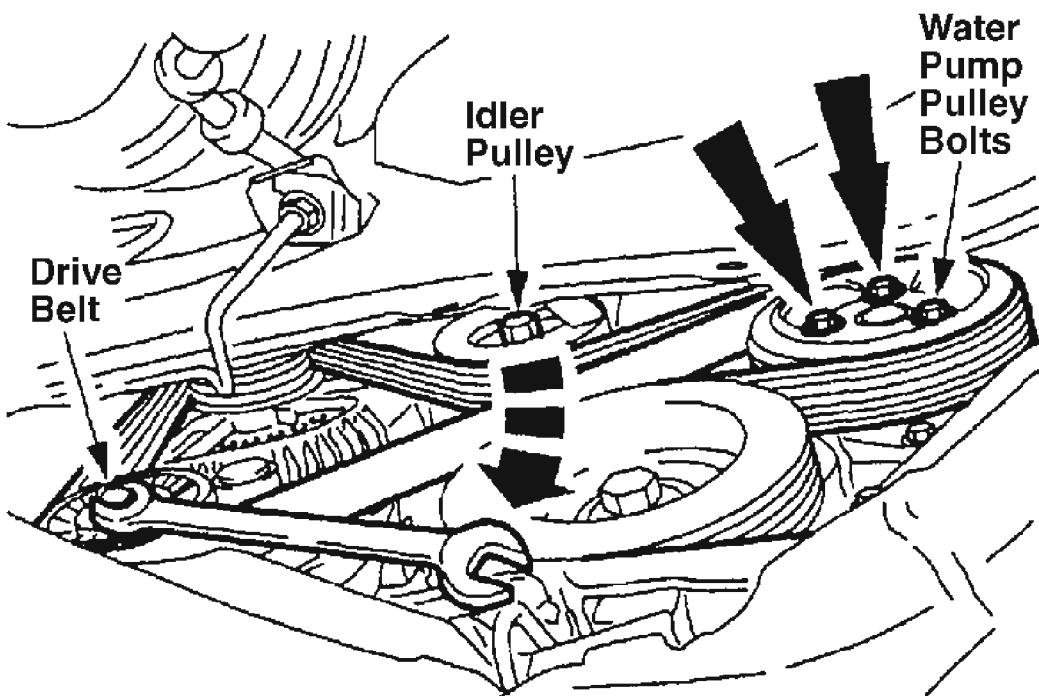
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**Fig. 15: Identifying Right Side Lower Splash Shield**  
Courtesy of FORD MOTOR CO.



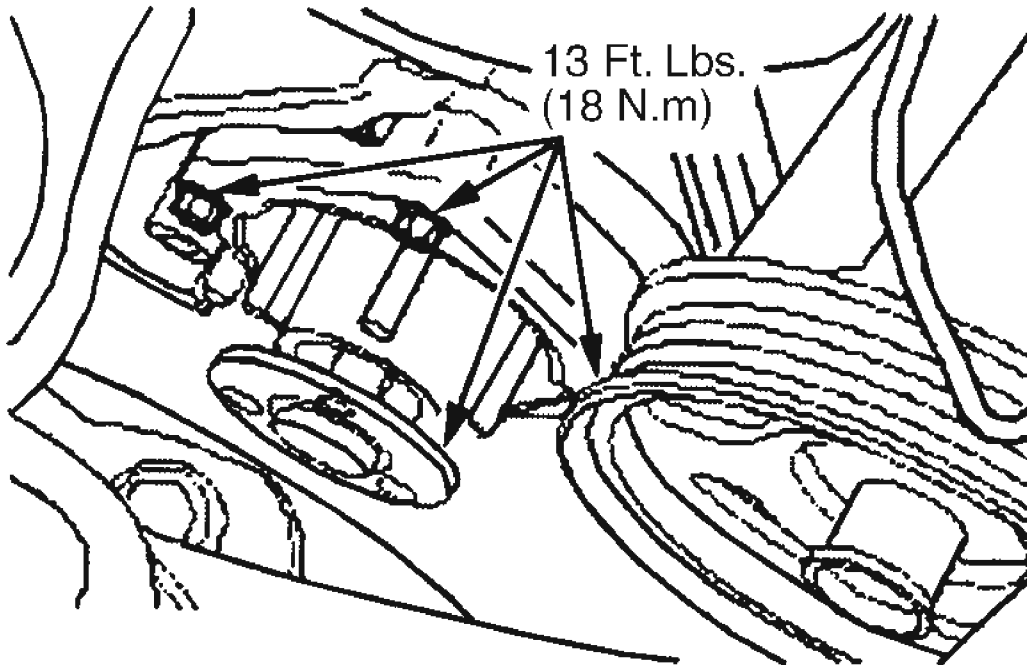
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**Fig. 16: Identifying Water Pump Pulley Bolts**  
Courtesy of FORD MOTOR CO.



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**Fig. 17: Removing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

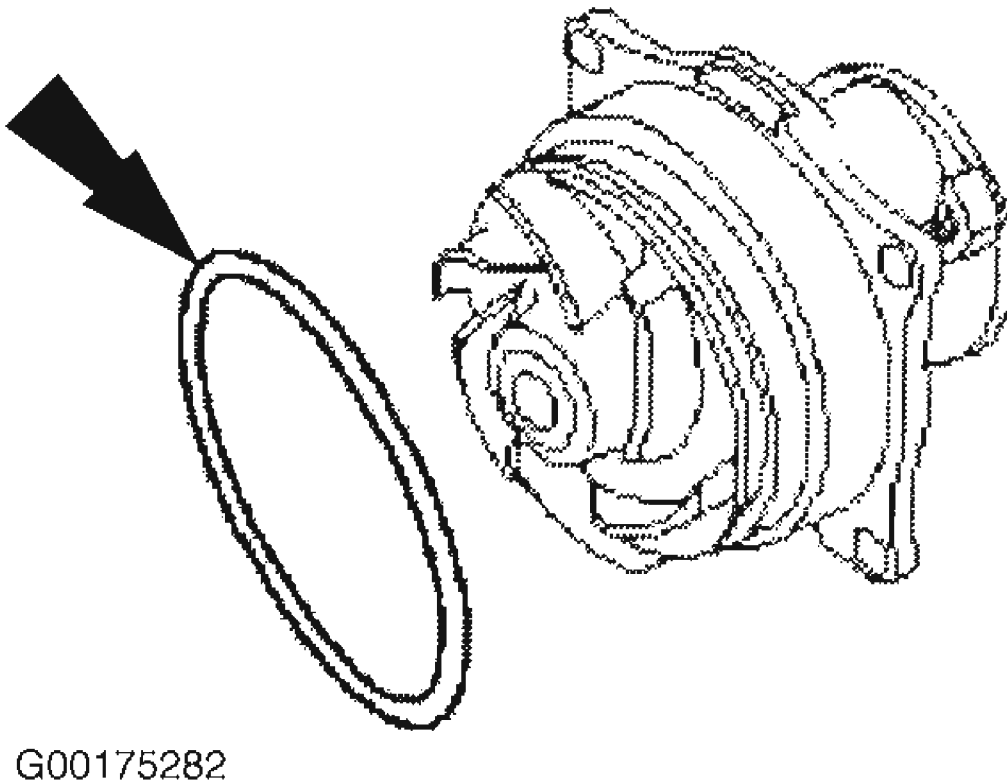


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**Fig. 18: Identifying Water Pump Bolts**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Install NEW "O" ring gasket on water pump. See **Fig. 19** . Install water pump and tighten bolts to specification. Install water pump pulley, tighten bolts hand tight.
2. Using strap wrench (303-D055) install crankshaft pulley bolt and tighten bolt to specification. Install accessory drive belt. Tighten water pump pulley bolts to specification. Install splash shield. Install wheel tighten lug nuts to specification. Ensure all bolts are tightened to specification . See **TORQUE SPECIFICATIONS** . Fill cooling system. Start engine and check for leaks.



**Fig. 19: Installing "O" Ring Gasket Onto Water Pump**  
Courtesy of FORD MOTOR CO.

#### Removal (Cougar)

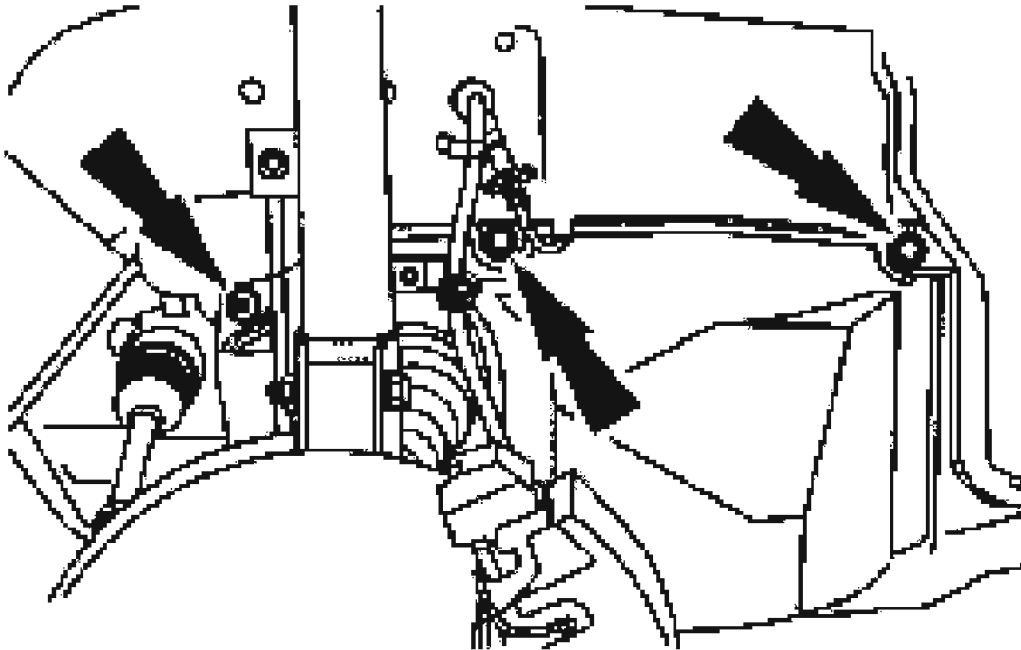
1. Drain cooling system. Raise and support vehicle. Remove right wheel. Remove right side lower splash shield. See **Fig. 15** . Lower vehicle. Loosen water pump pulley bolts (do not remove bolts). See **Fig. 16** .
2. Rotate accessory drive belt tensioner clockwise, remove accessory drive belt. See **Fig. 17** . Remove water pump pulley. Remove water pump bolts, remove water pump. See **Fig. 18** . Clean gasket mating surfaces.

#### Installation

Install NEW "O" ring gasket on water pump. See **Fig. 19** . Install water pump and tighten bolts to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure. Tighten bolts to specification. Fill cooling system. Start engine and check for leaks.

#### Removal & Installation (Escape)

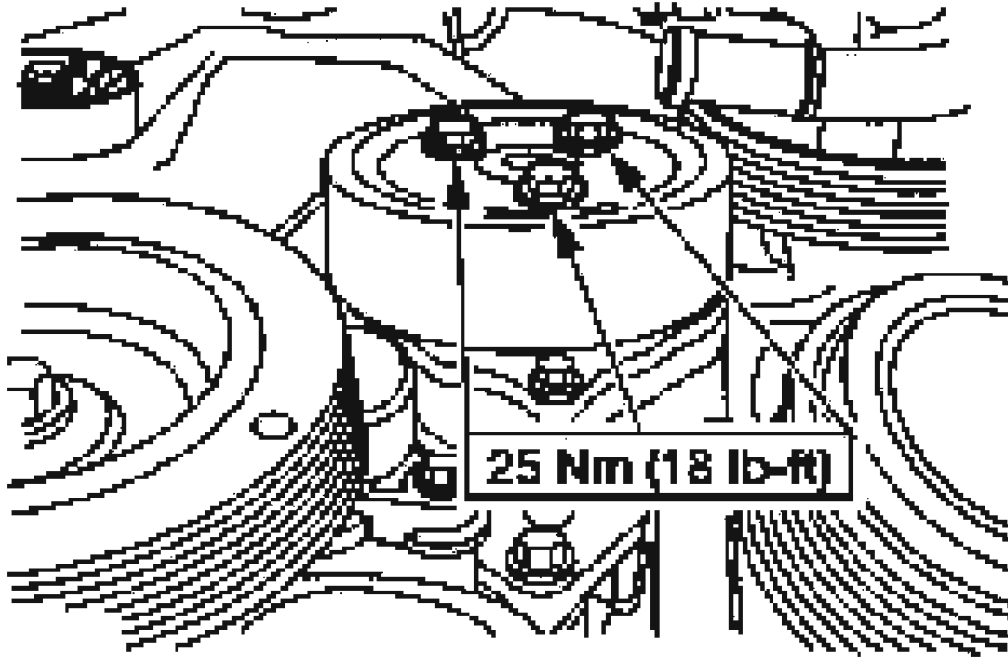
1. Drain the engine cooling system.
2. Remove the right front tire assembly.
3. Remove the splash shield.



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**Fig. 20: Removing Splash Shield**  
Courtesy of FORD MOTOR CO.

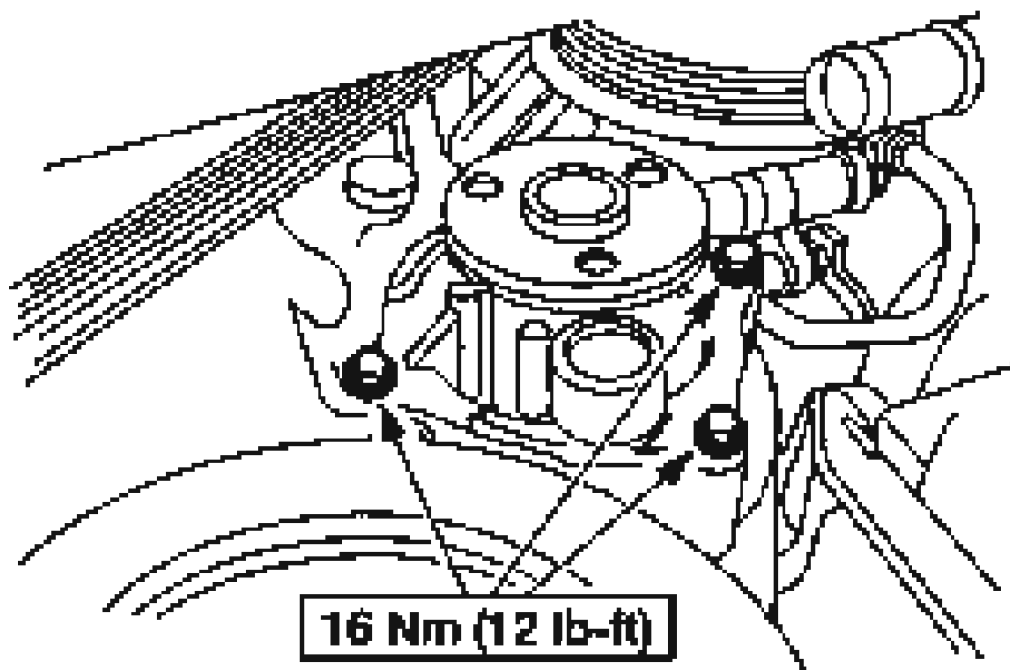
4. Remove the accessory drive belt.
5. Remove the coolant pump pulley.



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**Fig. 21: Removing Coolant Pump Pulley**  
Courtesy of FORD MOTOR CO.

6. Remove the four bolts and the coolant pump.



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**Fig. 22: Removing Four Bolts & Coolant Pump**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean and inspect the sealing surfaces.

7. To install, reverse the removal procedure.

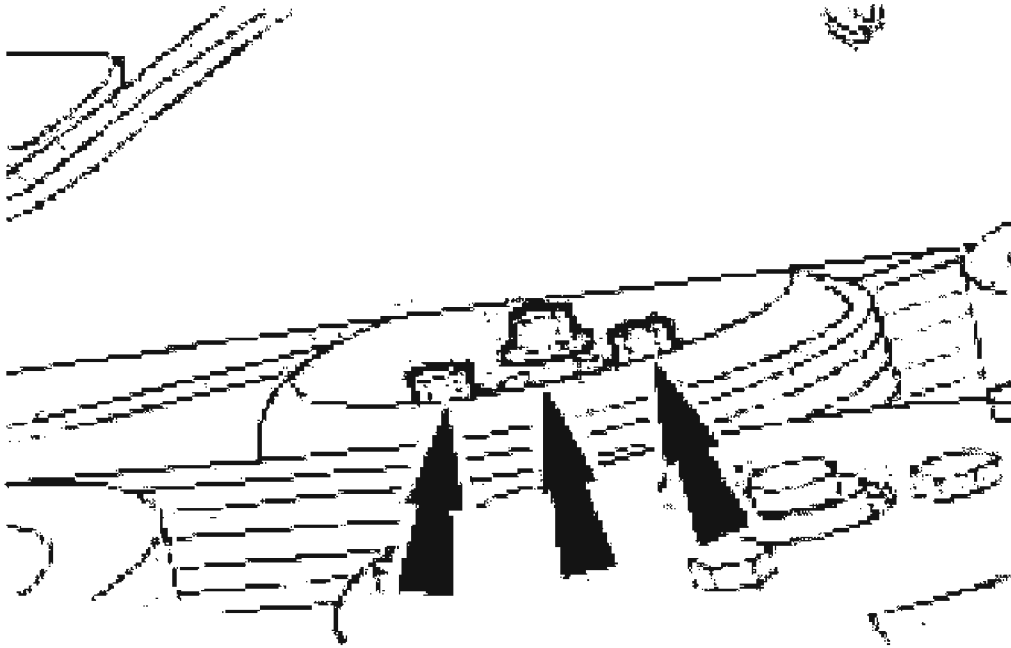
**Removal (Focus)**

1. Disconnect the battery ground cable.
2. Drain the cooling system.
3. Loosen the water pump pulley retaining bolts.



## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



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**Fig. 23: Loosening Water Pump Pulley Retaining Bolts**  
Courtesy of FORD MOTOR CO.

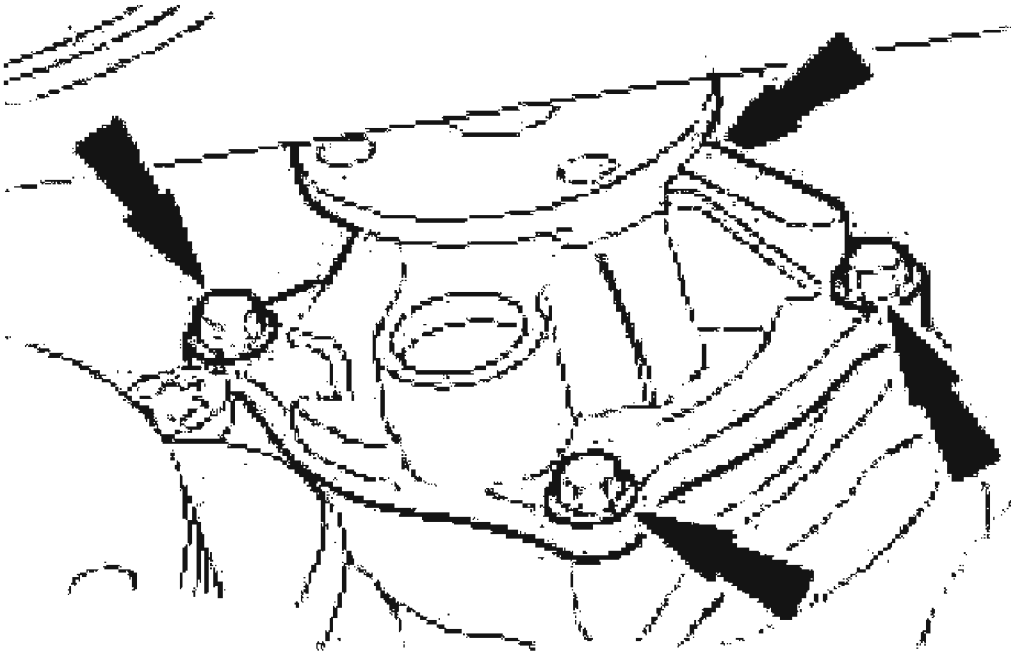
4. Remove the accessory drive belt.
5. Remove the water pump pulley.



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**Fig. 24: Removing Water Pump Pulley**  
**Courtesy of FORD MOTOR CO.**

6. Detach the water pump from the water pump housing.



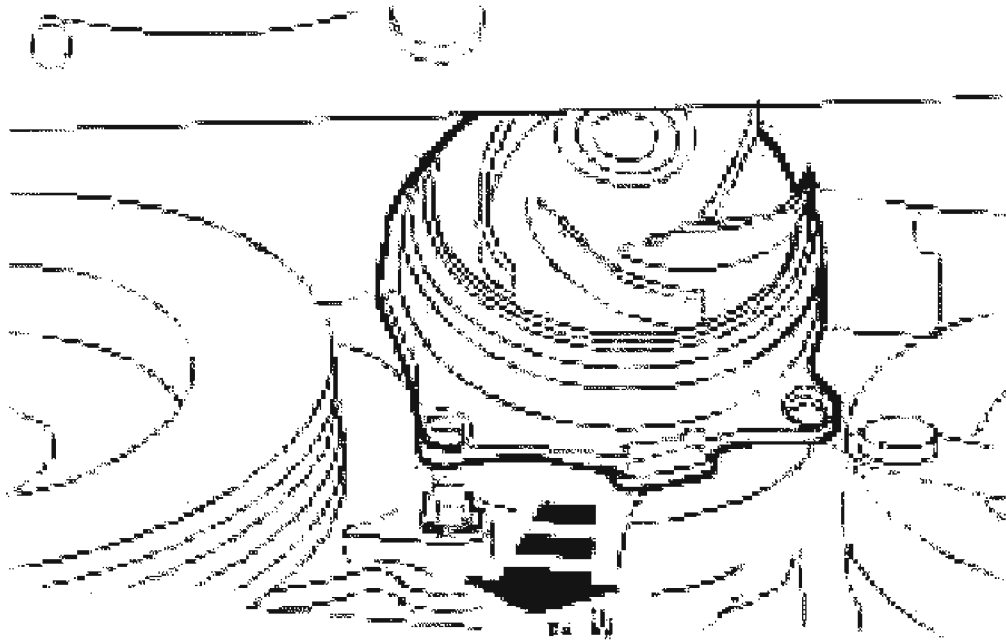
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**Fig. 25: Detaching Water Pump From Water Pump Housing**  
Courtesy of FORD MOTOR CO.

7. Rotate the water pump 180° within the water pump housing and remove it.
  - Discard the sealing ring

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

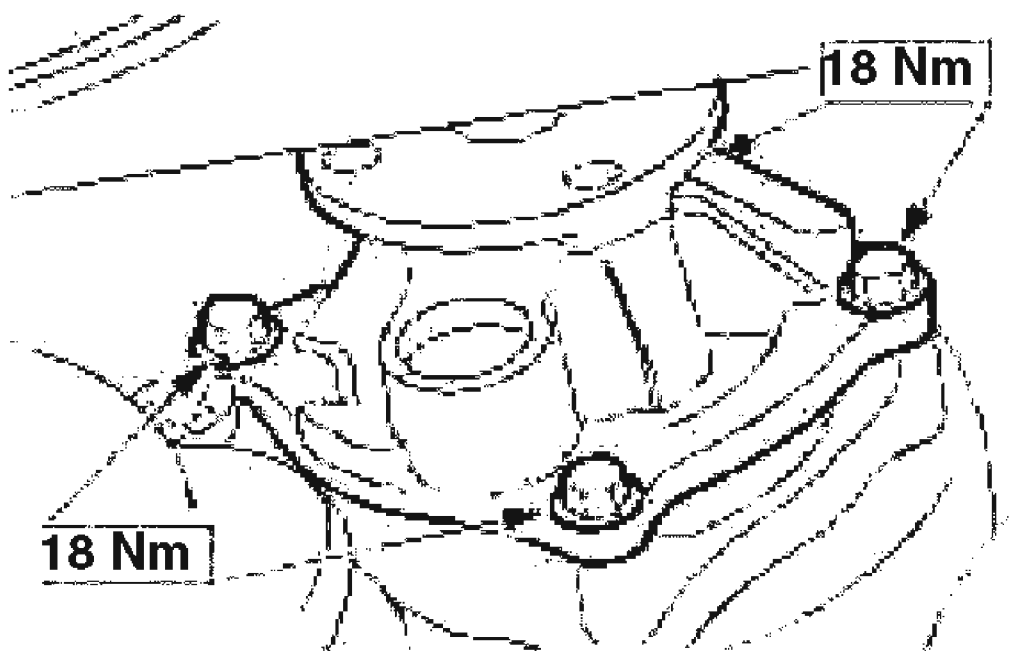


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**Fig. 26: Removing Water Pump**  
Courtesy of FORD MOTOR CO.

### Installation

**NOTE:** Install a new water pump sealing ring.



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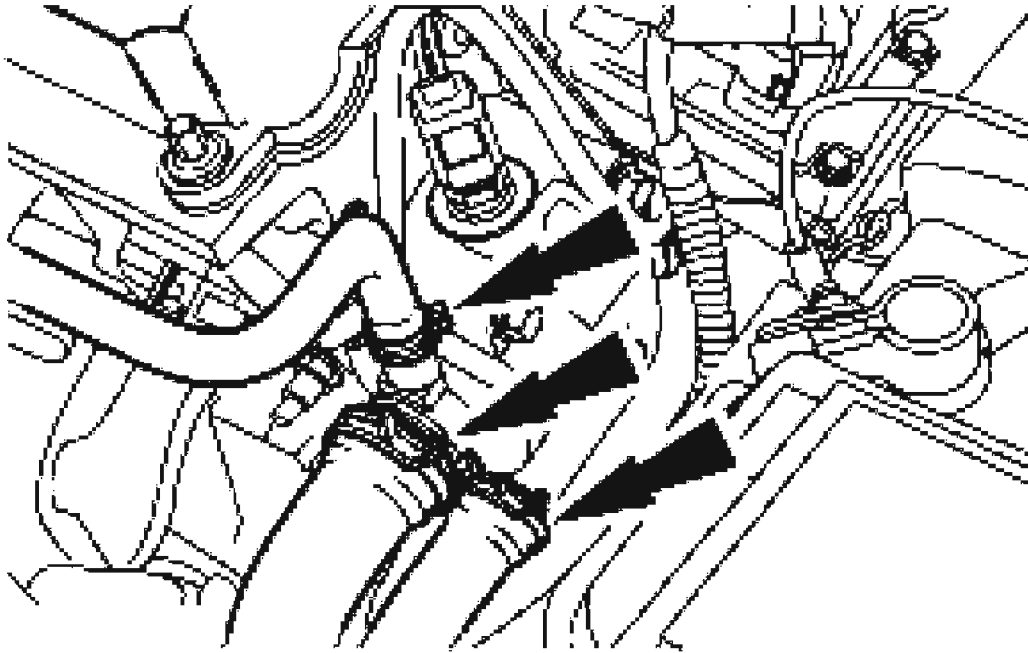
**Fig. 27: Installing Water Pump Housing**  
Courtesy of FORD MOTOR CO.

1. To install, reverse the removal procedure.
2. Fill the cooling system.

## **THERMOSTAT**

### **Removal (Contour, Cougar & Mystique)**

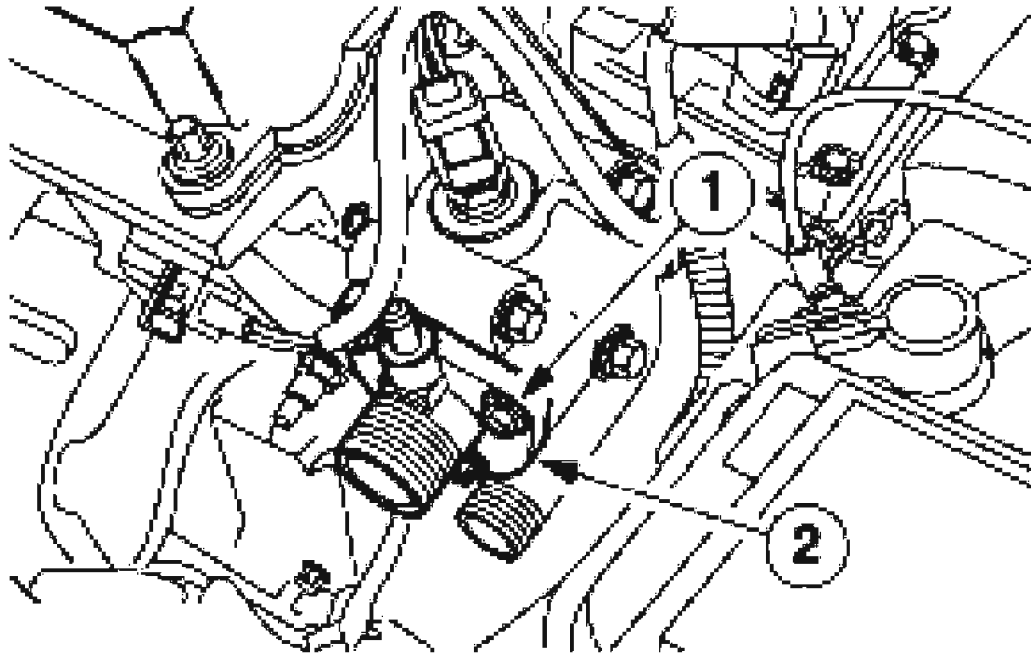
1. Drain the cooling system.
2. Disconnect the thermostat hoses.



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**Fig. 28: Disconnecting Thermostat Hoses**  
Courtesy of FORD MOTOR CO.

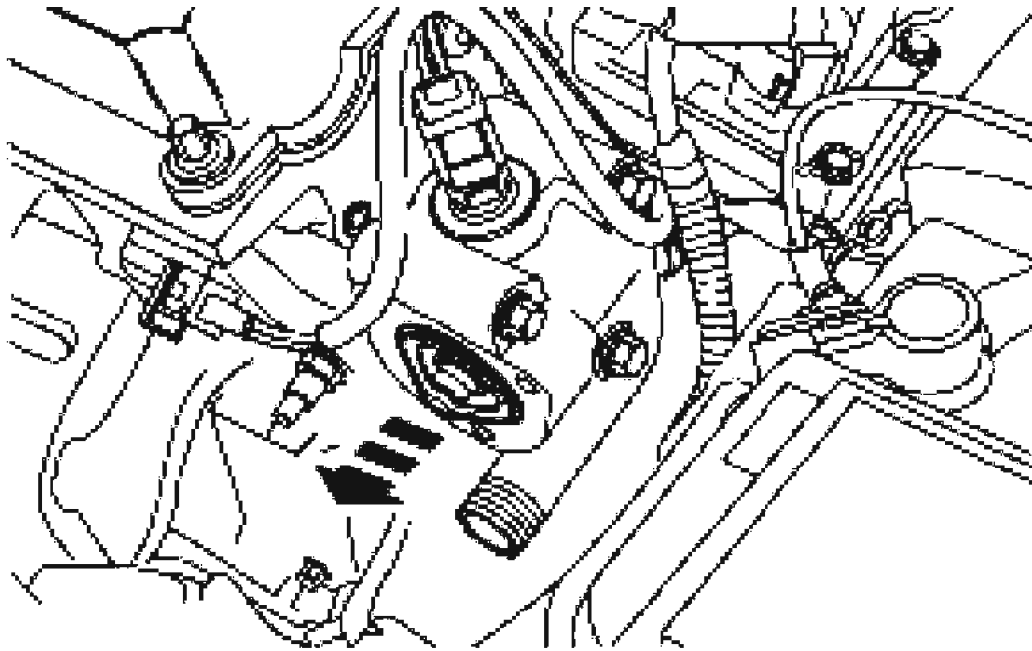
3. Remove the thermostat cover.
  1. Remove the three bolts.
  2. Remove the cover.



G03419433

**Fig. 29: Removing Thermostat Cover**  
Courtesy of FORD MOTOR CO.

4. Remove the thermostat.
  - Discard the O-ring seal.



**G03419434**

**Fig. 30: Removing Thermostat**  
Courtesy of FORD MOTOR CO.

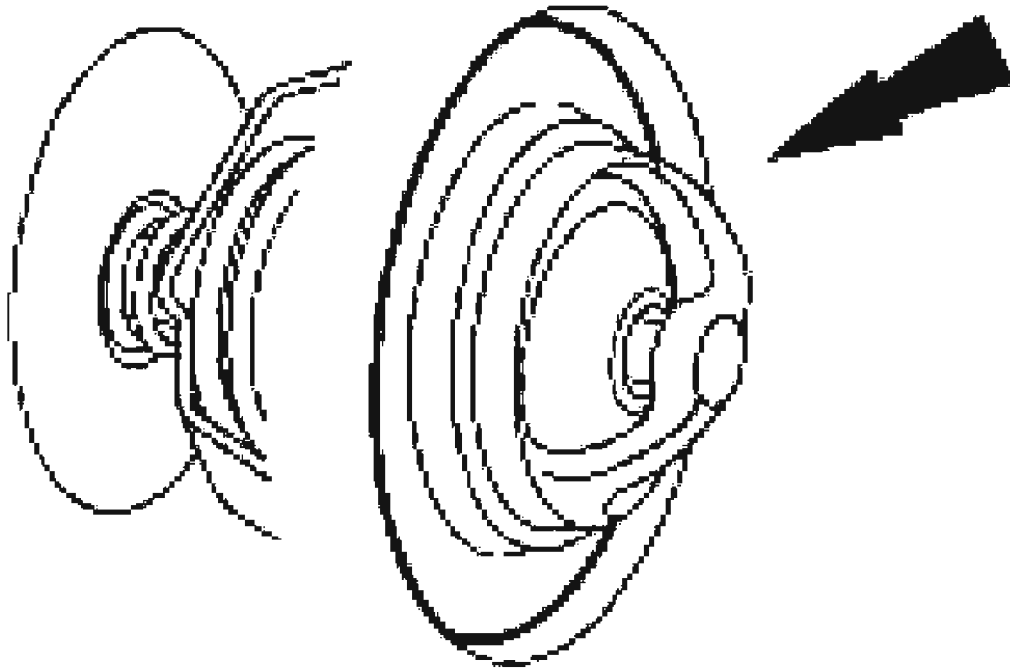
**Installation**

1. To install, reverse the removal procedure.
  - Install a new O-ring seal.



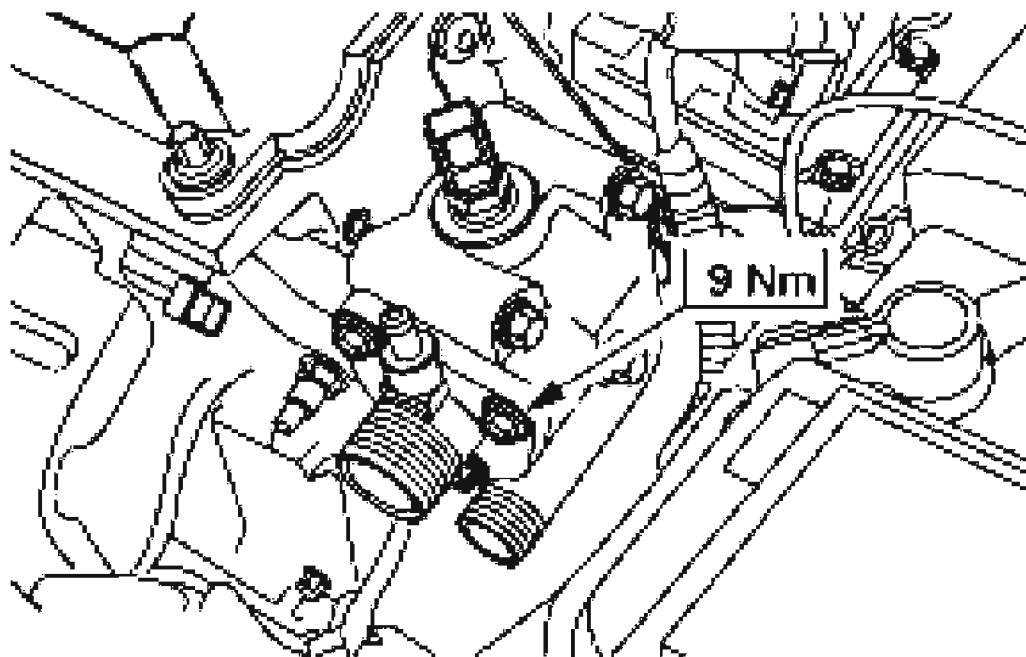
## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



**G03419435**

**Fig. 31: Installing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**



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**Fig. 32: Thermostat Housing Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

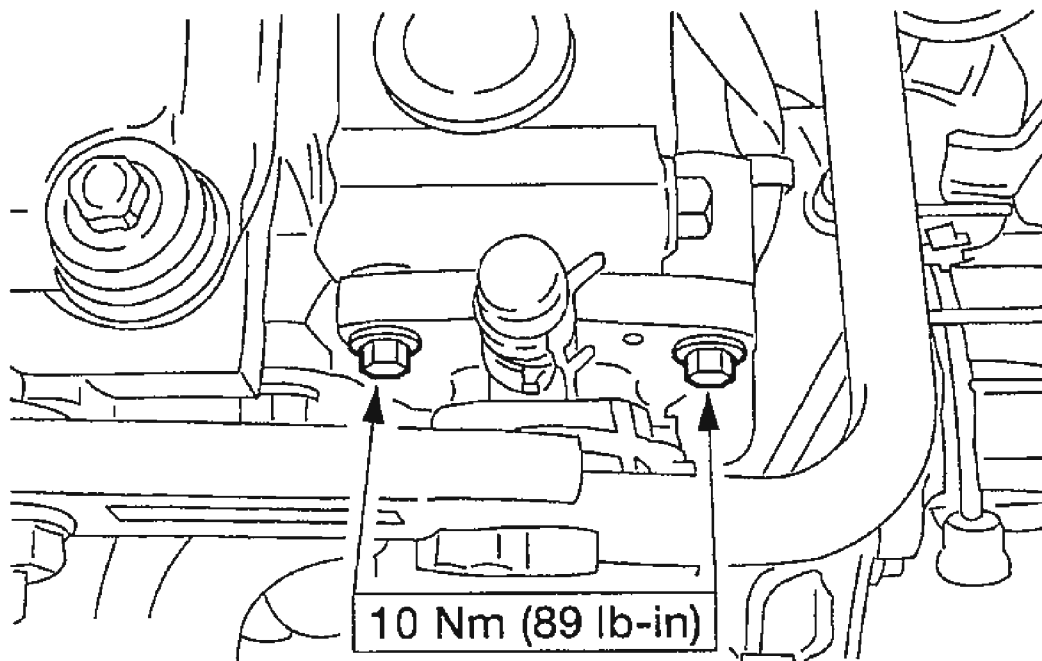
2. Fill the cooling system.

**Removal and Installation (Escape)**

1. Partially drain the engine coolant.
2. Remove the three bolts and separate the coolant outlet adapter from the thermostat housing.

## 2001 Ford Escape

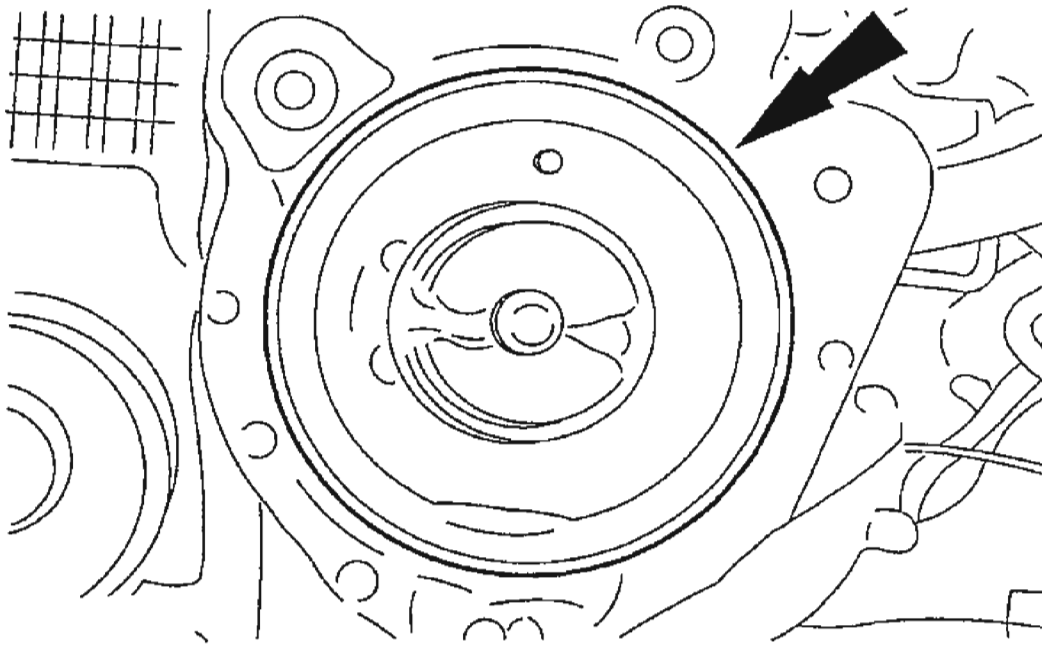
2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



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**Fig. 33: Removing Coolant Outlet Adapter From Thermostat Housing**  
Courtesy of FORD MOTOR CO.

**NOTE:** The thermostat is indexed and must be installed correctly.



G01390212

**Fig. 34: Removing Thermostat & O-Ring Seal**  
Courtesy of FORD MOTOR CO.

3. Remove the thermostat and the O-ring seal.

**NOTE:**      **Clean and inspect the sealing surfaces.**

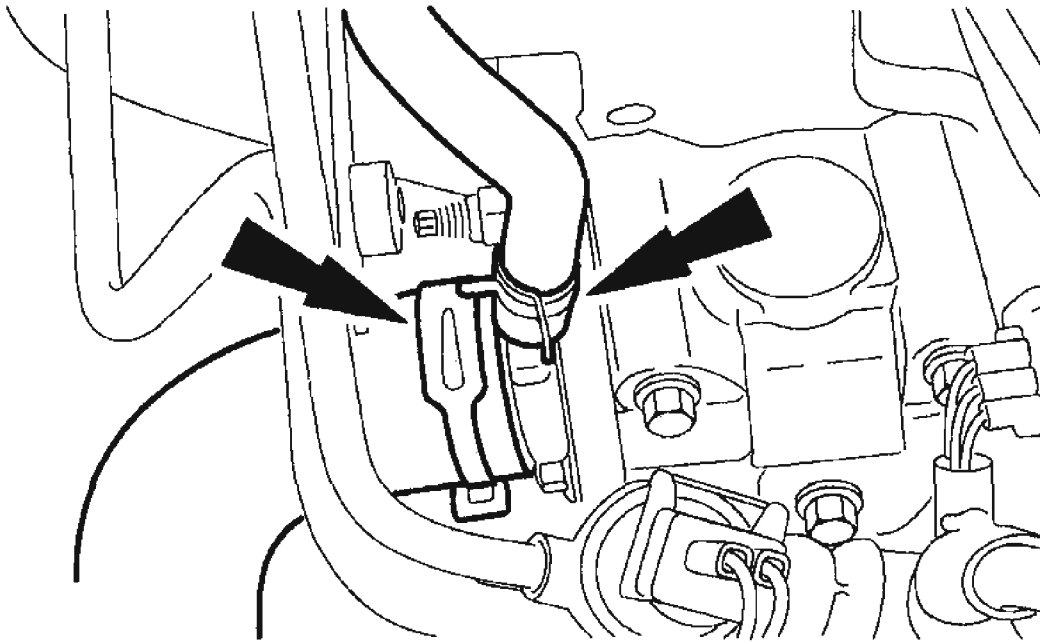
4. To install, reverse the removal procedure.

**Removal (Focus)**

1. Drain the cooling system.
2. Disconnect the coolant hoses.

## 2001 Ford Escape

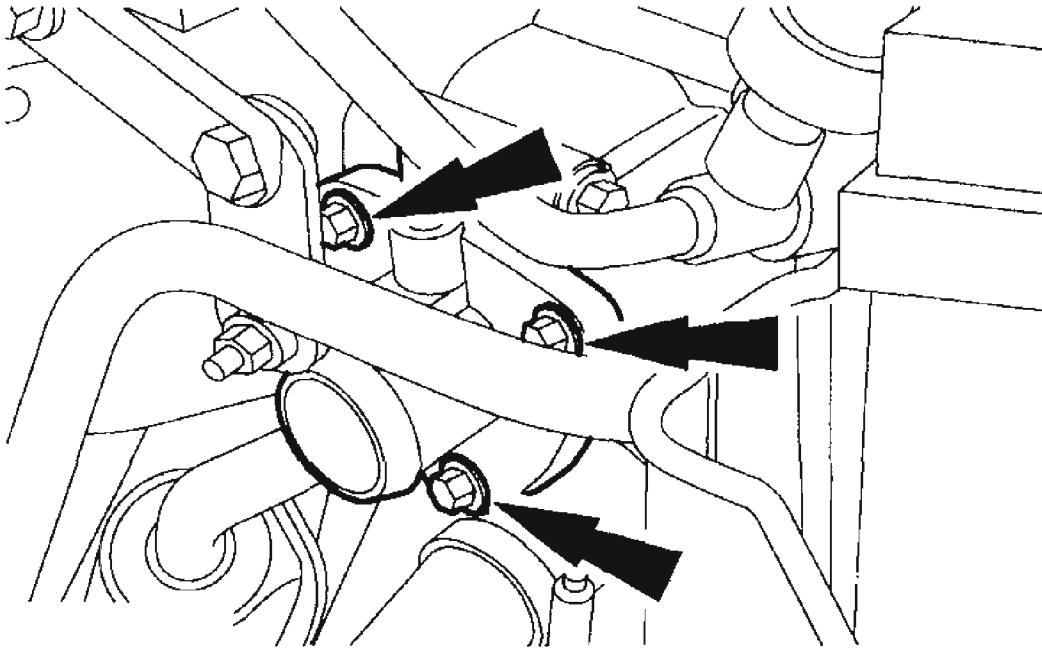
2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



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**Fig. 35: Disconnecting Coolant Hoses**  
Courtesy of FORD MOTOR CO.

3. Remove the thermostat cover bolts.



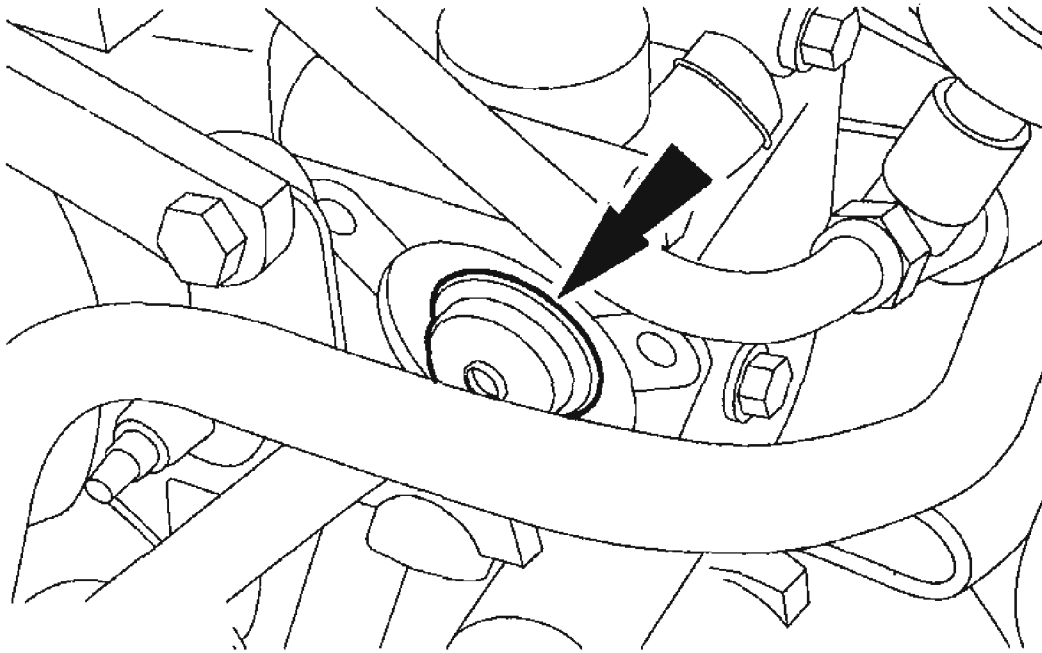
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**Fig. 36: Removing Thermostat Cover Bolts**  
Courtesy of FORD MOTOR CO.

4. Remove the thermostat.

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



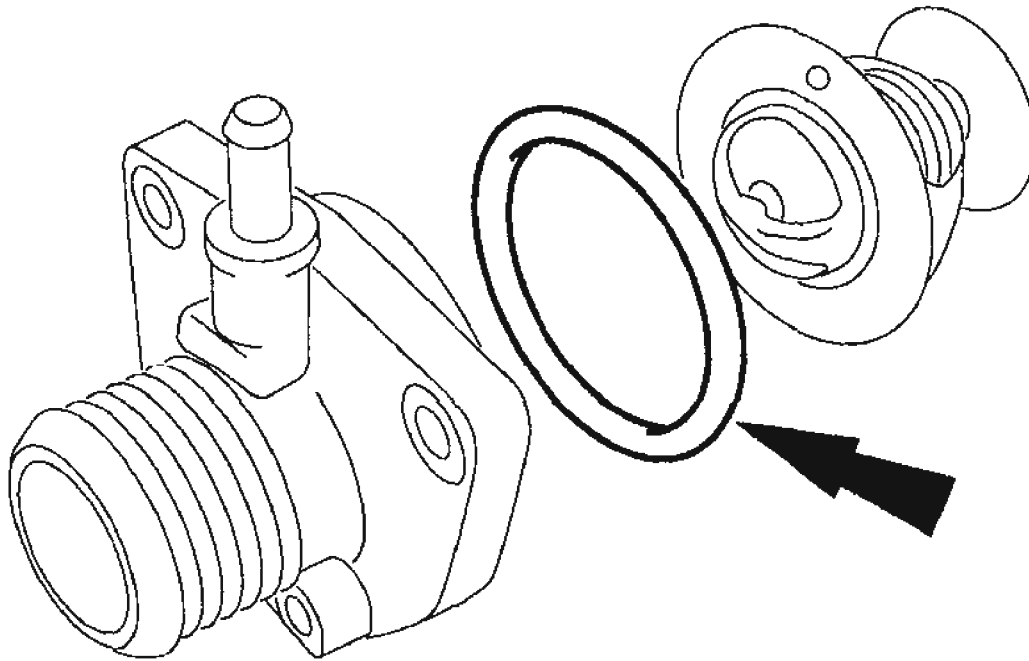
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**Fig. 37: Removing Thermostat**  
Courtesy of FORD MOTOR CO.

5. Remove and discard the rubber seal.

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique



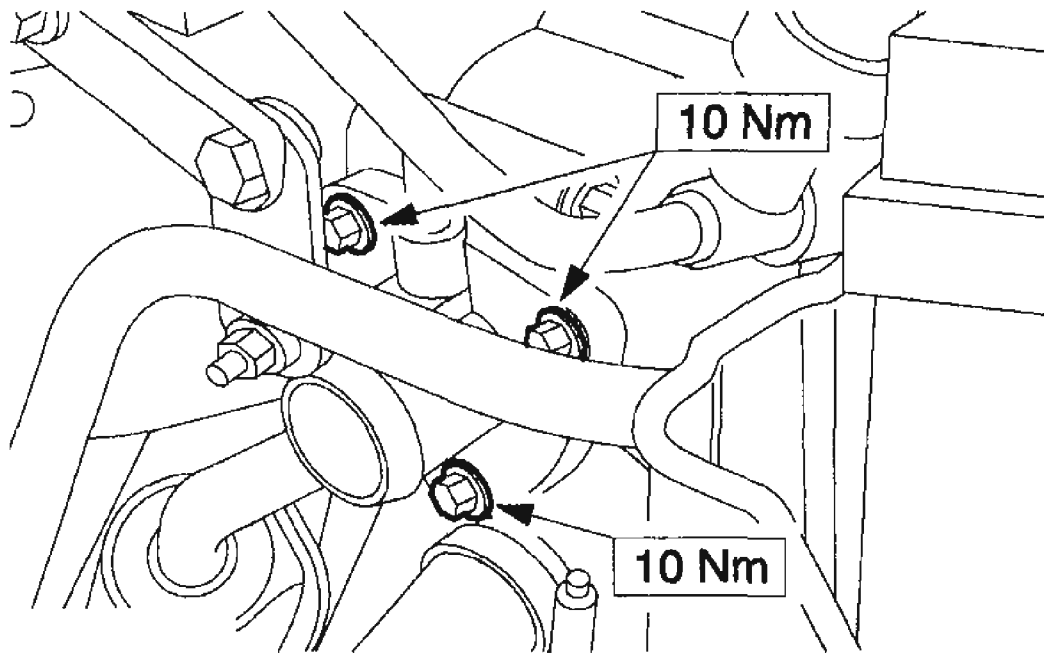
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**Fig. 38: Removing And Discard Rubber Seal**  
Courtesy of FORD MOTOR CO.

### Installation

**NOTE:** Install a new rubber seal.





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**Fig. 39: Installing Thermostat Cover Bolts**  
Courtesy of FORD MOTOR CO.

1. To install, reverse the removal procedure.
2. Fill the cooling system.

## OIL PAN

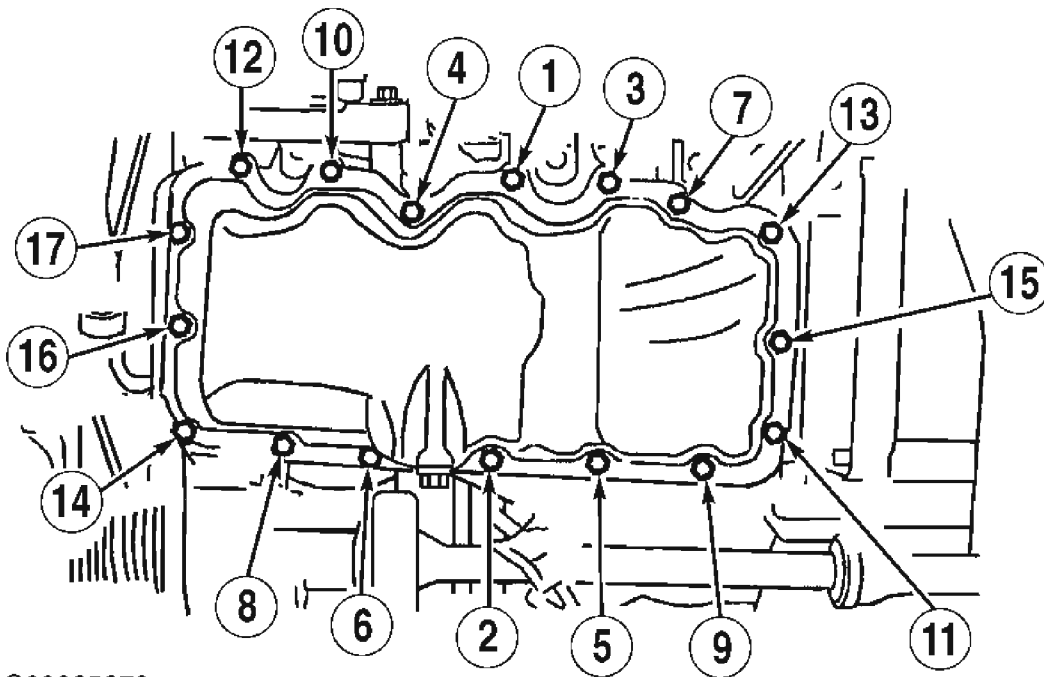
### Removal

1. Disconnect negative battery cable. Remove exhaust manifold heat shield. Remove coolant hose bracket, engine lifting eye and oil dipstick tube. Remove A/C hose bracket. Raise and support vehicle. Remove three-way catalytic converter from exhaust manifold.
2. Drain engine oil. Remove oil pan retaining bolts in crisscross sequence. Remove oil pan and gasket.

### Installation

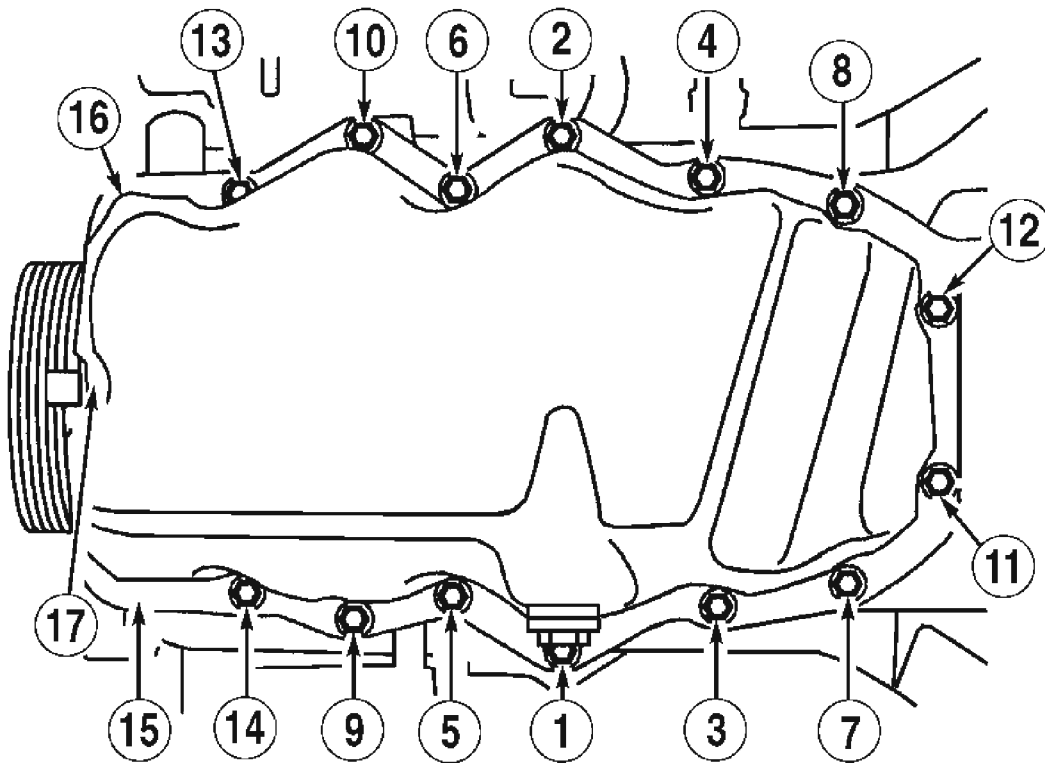
1. Clean all sealant material from oil pan and cylinder block. Apply a continuous bead of silicone sealant to oil pan along inside of bolt holes. Install NEW oil pan gasket. On Escort and Escape, install oil pan and tighten in sequence to specification. See **Fig. 40** and **Fig. 41**. On all other models, tighten bolts in a crisscross pattern. See **TORQUE SPECIFICATIONS**.

2. To complete installation, reverse removal procedure. Tighten remaining bolts/nuts to specification. Fill crankcase with oil. Start engine and check for leaks.



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**Fig. 40: Oil Pan Bolt Tightening Sequence (Escape)**  
Courtesy of FORD MOTOR CO.



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**Fig. 41: Oil Pan Bolt Tightening Sequence (Escort)**  
Courtesy of FORD MOTOR CO.

## OVERHAUL

### CYLINDER HEAD

#### Cylinder Head

Ensure all mating surfaces are clean. Measure cylinder head for warpage. Resurface cylinder head if warpage exceeds specification. Check manifold contact surface for warpage. Resurface manifold surface, or replace cylinder head if warpage exceeds specification. Check cylinder head minimum thickness, replace cylinder head if less than specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

#### Valve Springs

Measure free length of valve springs. Check springs for cracks and out-of-square. If any measurement is not within specification, replace valve springs as necessary. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS.

#### Valve Guide

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

Measure valve guide height from spring seat to top edge of guide. If valve guide height is not within specification, replace valve guide. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Measure valve stem-to-guide clearance. If clearance is not within specification, replace valve and/or valve guide.

**NOTE:** Always reface valve seat after replacing valve guide.

### Valve Seat

1. Inspect valve seat for evidence of roughness or pitting at valve contact surface. Reface seat as necessary. Before refacing valve seats, check valve stem-to-guide clearance. If clearance is not within specification, replace components as necessary. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.
2. Ensure valve seat width is within specification. See **CYLINDER HEAD** table. If servicing valve seats, valves must be serviced or replaced. Valve seat replacement information is not available from manufacturer.

### Valves

Measure valve stem diameter at top, middle and bottom of valve stem. If valve stem is not within specification, replace valve. Measure valve head margin. Replace valve if not within specification. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS.

### Seat Correction Angles

Information is not available from manufacturer.

## VALVE TRAIN

### Hydraulic Valve Tappet

Check contact and sliding surfaces of valve tappet for pitting, scoring or excessive wear. Replace valve tappet if plunger is not free in body. Plunger should fall with own weight when assembled dry.

## CYLINDER BLOCK ASSEMBLY

**NOTE:** Inspect cylinder block for oil seepage or leaks. Porosity or sand hole(s) causing oil seepage can occur in casting process. If leak is attributed to porous condition of cylinder block or sand hole(s), service block using Metallic Plastic (C6AZ-19554-A). DO NOT service cracks with metallic plastic. Follow manufacturer's instructions for servicing cylinder block.

### Piston & Rod Assembly

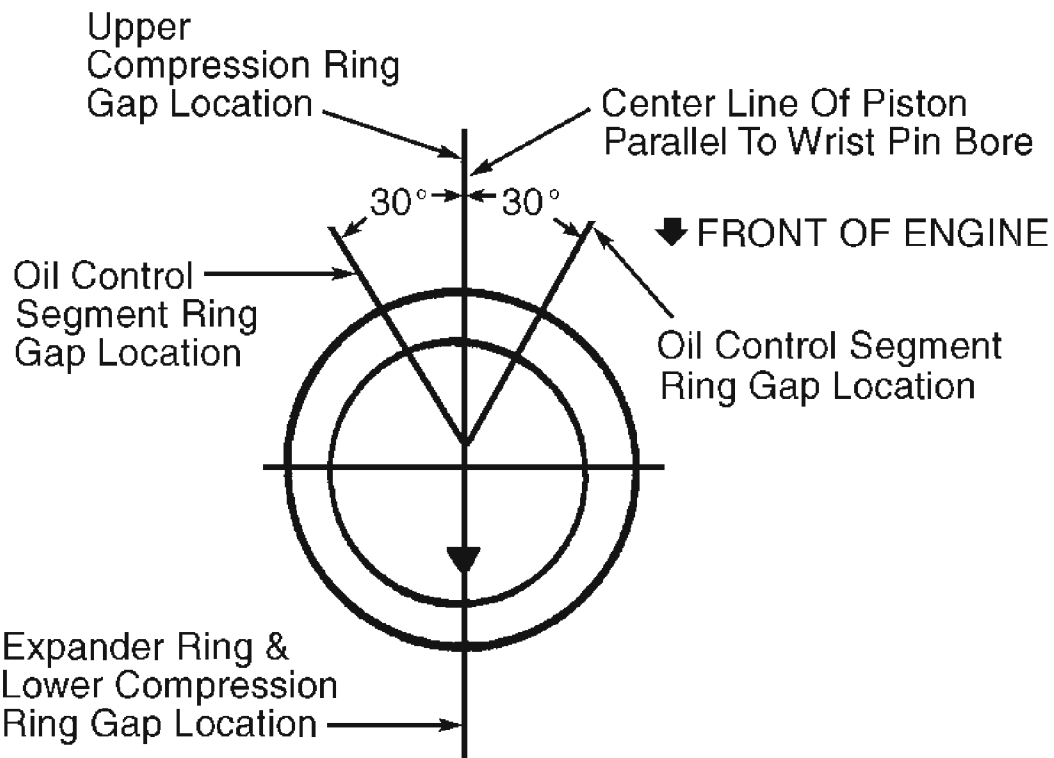
Ensure rod, piston and cap are marked with matching numbers before removing. If removing piston from rod, note rod-to-piston position. Install piston with arrow mark on piston toward front of engine.

### Fitting Pistons

To determine if piston-to-cylinder clearance is within specification, measure piston skirt diameter at 90-degree angle to piston pin. Measure piston diameter 1.62" (42 mm) from top of piston. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Pistons are available in .010" (.25 mm) and .020" (.50 mm) oversize.

### Piston Rings

Inspect piston rings for abnormal wear or breakage. Ensure ring end gap and side clearance are within specification. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Position piston rings at designated areas. See **Fig. 42**.



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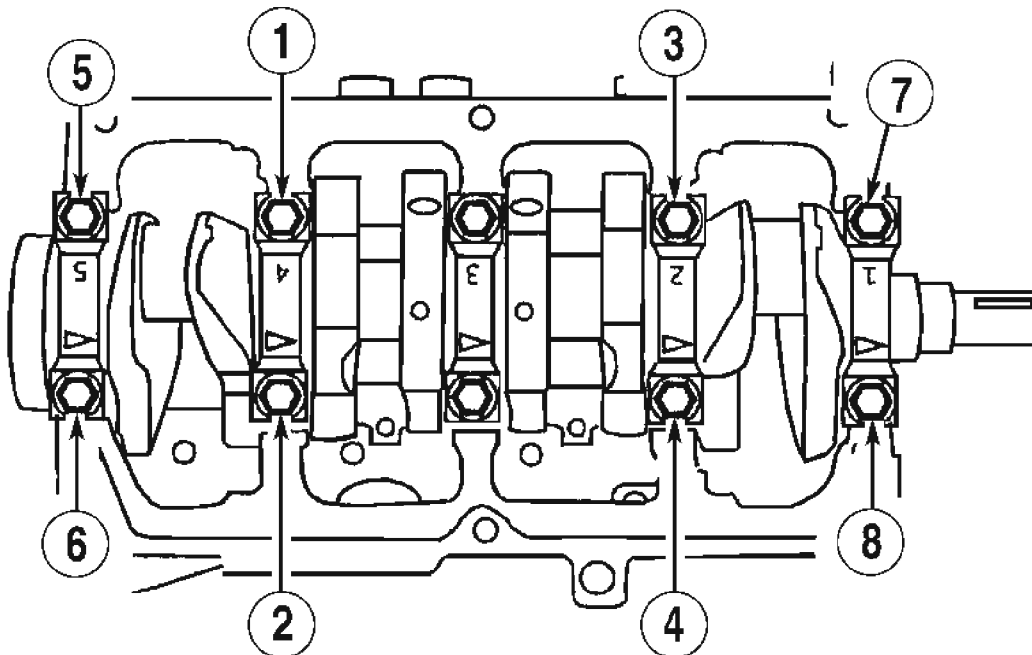
**Fig. 42: Positioning Piston Ring End Gaps**  
Courtesy of FORD MOTOR CO.

### Rod Bearings

1. Ensure connecting rod and cap have matching identification marks. Ensure bearing oil clearance and connecting rod side play are within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** and **CONNECTING RODS** tables under ENGINE SPECIFICATIONS.
2. If any bearing clearance cannot be adjusted to standard specification, grind crankshaft and use undersize bearings. Tighten connecting rod bearing cap nuts to specification. See **TORQUE SPECIFICATIONS**.

### Crankshaft & Main Bearings

1. Ensure main bearing caps are numbered for location. Ensure main bearing journal is within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS. Position crankshaft on "V" blocks. Using a dial indicator, check crankshaft runout. If runout is not within specification, replace crankshaft.
2. If any bearing clearance cannot be adjusted to standard specification, grind crankshaft and use undersize bearings. Install thrust bearing or number 3 bearing last. Install and tighten main bearing cap bolts in sequence to specification. See **Fig. 43**. See **TORQUE SPECIFICATIONS**.



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**Fig. 43: Main Bearing Cap Bolt Tightening Sequence (Escort)**

**Courtesy of FORD MOTOR CO.****Thrust Bearing**

Check crankshaft end play. Replace thrust bearing if crankshaft end play is not within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS. Thrust bearing is center bearing in block. Install thrust bearings with oil groove facing crankshaft cheek.

**Cylinder Block**

1. Using a feeler gauge and straightedge, inspect cylinder block deck surface for warpage. If not within specification, resurface or replace cylinder block. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS. DO NOT remove more than .010" (.25 mm) material from block deck.
2. Measure cylinder bore out-of-round and taper. If out-of-round or taper exceeds specification, rebore cylinder for oversize piston. See **CYLINDER BLOCK** table. If cylinder bore is okay, lightly hone cylinder to a cross-hatch pattern.

**ENGINE OILING****ENGINE LUBRICATION SYSTEM**

Lubrication system is a force-feed type. Oil is supplied under full pressure to crankshaft and connecting rods. A controlled volume of oil flows through the valve tappets to the valve train. Rotor-type oil pump is crankshaft driven and draws oil from oil pan through oil strainer.

**Crankcase Capacity**

Oil capacity is 4.5 qts. (4.3L) with oil filter.

**Oil Pressure**

With engine at normal operating temperature, oil pressure should be 20-45 psi (1.4-3.2 kg/cm<sup>2</sup>) at 1500 RPM.

**OIL PUMP****Removal**

Disconnect negative battery cable. Remove timing belt. See **TIMING BELT** under REMOVAL & INSTALLATION. Remove crankshaft sprocket, idler pulley and spacer. Remove oil pan. See **OIL PAN** under REMOVAL & INSTALLATION. Remove oil filter. Remove oil pump bolts. Remove oil pump and gasket.

**Inspection**

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

Check oil pump housing and gears for damage or excessive wear. Check gears for burrs, nicks or scoring. Small imperfections can be removed with an oil stone. If housing or gears are excessively worn, replace oil pump assembly. Inspect pressure relief valve spring for breakage or weak spring tension. Ensure pressure relief valve piston moves freely in bore. If pressure relief valve spring is worn or damaged, replace pump assembly.

### Installation

To install, reverse removal procedure using new gaskets. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
A/C Compressor Mounting Bolt	18 (24)
Accessory Drive Belt Idler Pulley Bolt	35 (45)
Camshaft Bearing Cap Bolt <sup>(1)</sup>	
Contour, Cougar & Mystique	11 (15)
Escape	14 (19)
Escort	10-12 (13-17)
Focus	
Stage 1	(2)
Stage 2	14 (19)
Camshaft Timing Pulley Bolt	
Intake	50 (68)
Exhaust	
Contour, Cougar & Mystique	44 (60) Then 89 (120)
Escort <sup>(3)</sup>	(4)
Escape & Focus	50 (68)
Connecting Rod Cap Nut	
Step 1	26 (35)
Step 2	Additional 90 Degrees
Crankshaft Pulley Bolt	
Escort	81-89 (110-120)
Except Escort	85 (115)
Cylinder Head Bolt <sup>(5)</sup>	
Contour, Cougar & Mystique (2000)	
Step 1	18 (24)



## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

Step 2	33 (45)
Step 3	Additional 105 Degrees
Cougar (2001)	
Step 1	15 (20)
Step 2	30 (40)
Step 3	Additional 90 Degrees
Escort	
Step 1	12-18 (15-24)
Step 2	26-33 (35-45)
Step 3	Additional 105 Degrees
Escape & Focus	
Step 1	15 (20)
Step 2	30 (40)
Step 3	Additional 90 Degrees
Exhaust Camshaft Sprocket Bolt	
Escape	50 (68)
Except Escape	27 (37)
Exhaust Manifold Nuts	
Cougar	11 (15)
Contour, Escort & Mystique	10-12 (14-17)
Escape	13 (18)
Focus	12 (16)
Flywheel Bolt	
Contour, Cougar & Mystique	81 (110)
Escort	75-85 (102-115)
Escape & Focus	83 (112)
Generator Bracket-To-Cylinder Head Bolt	48 (65)
Generator-To-Bracket Bolt	18 (24)
Idle Roller Bearing - 2001 Cougar	28 (38)
Intake Manifold Bolt/Nut	
Except Escort	13 (18)
Escort	10-12 (14-17)
Main Bearing Cap Bolt <sup>(6)</sup>	
Contour & Mystique	
Stage 1	18 (24)

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

Stage 2	Additional 90 Degrees
Cougar	63 (85)
Escape	
Stage 1	18 (24)
Stage 2	Additional 60 Degrees
Escort <sup>(7)</sup>	59-66 (80-90)
Oil Pan Bolt	15-18 (20-24)
Except Escape & Escort	
Stage 1	(8)
Stage 2	(2)
Escape	
Stage 1	(2)
Stage 2	9 (12)
Escort	15-22 (20-30)
Rear Seal Housing Bolt	13-16 (18-22)
Spark Plug	11 (15)
Starter Bolt	
Escape	18 (24)
Except Escape	35 (48)
Subframe-To-Body Bolt	96 (130)
Timing Belt Tensioner Bolt	18 (24)
Torque Converter Nuts	54-64 (73-87)
Transaxle-To-Engine Bolt	61 (83)
Water Pump Bolt	
Contour & Mystique	8 (11)
Cougar & Focus	13 (18)
Escape	7 (10)
Escort	18 (24)
Water Pump Pulley Bolt	
Contour & Mystique	18 (24)
Cougar	9 (12)
Escape & Escort	17 (23)
Focus	18 (24)
Wheel Lug Nuts	94 (128)
<b>INCH Lbs. (N.m)</b>	

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

Exhaust Manifold Studs	
Contour, Cougar & Mystique	89 (10)
Focus	44 (5)
Intake Manifold Studs	89 (10)
Lower Timing Belt Cover Bolt	
Escape	62 (7)
Except Escape	71 (8)
Oil Pump-To-Block	
Escape	
Stage 1	53 (6)
Stage 2	Additional 45 Degrees
Except Escape	97 (11)
Oil Strainer Bolt	89 (10)
Thermostat Housing Bolt	
Cougar, Contour & Mystique	80 (9)
Escape & Focus	89 (10)
Upper Timing Belt Cover Bolt	
Escape	71 (8)
Except Escape	89 (10)
Valve Cover	
2001 Cougar	
Stage 1	18 (2)
Stage 2	89 (120)
Escape	80 (9)
Except 2001 Cougar & Escape	62 (7)

- (1) Tighten in sequence. See **Fig. 12** .
- (2) Tighten bolts to 89 INCH lbs. (10 N.m).
- (3) Tighten bolt in 3 steps.
- (4) Tighten bolt to 36 ft. lbs. (50 N.m). Remove TDC peg and camshaft alignment timing tool. Tighten bolt to 85-92 ft. lbs. (115-125 N.m).
- (5) Tighten in 3 steps, in sequence. See **Fig. 7** .
- (6) Tighten thrust bearing last.
- (7) Tighten bolt in sequence. See **Fig. 43** .
- (8) Tighten bolts to 53 INCH lbs. (6 N.m).

## 2001 Ford Escape

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape & Mystique

### ENGINE SPECIFICATIONS

#### GENERAL SPECIFICATIONS

Application	Specification
Displacement	122 Cu. In. (2.0L)
Bore	3.35" (85 mm)
Stroke	3.46" (88 mm)
Compression Ratio	
Contour, Cougar & Mystique	10.1:1
Escape	9.6:1
Escort & Focus	9.1:1
Fuel System	SFI

#### CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

Application	In. (mm)
Crankshaft	
End Play	
Standard	.004-.010 (.09-.26)
Service Limit	(1)
Maximum Runout	(1)
Main Bearings	
Journal Diameter	2.282-2.283 (57.98-58.00)
Journal Out-Of-Round	.0003 (.008)
Journal Taper	.0003 (.008)
Oil Clearance	
Standard	.0008-.0021 (.020-.065)
Service Limit	(1)
Connecting Rod Bearings	
Journal Diameter	
Except Cougar	1.7279-1.7287 (43.89-43.91)
Cougar	1.8460-1.8468 (46.89-46.91)
Journal Out-Of-Round	.0003 (.008)
Oil Clearance	
Standard	.0008-.0021 (.020-.065)
Service Limit	(1)

(1) Specification is not available from manufacturer.

**2001 Ford Escape**

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape &amp; Mystique

**CONNECTING RODS**

<b>Application</b>	<b>In. (mm)</b>
Center-To-Center Length	5.193-5.195 (131.905-131.975)
Maximum Bend	(1)
Piston Pin Bore	.8098-.8114 (20.570-20.610)
Piston Pin Bore	
White	.8124-.8125 (20.635-20.638)
Red	.8125-.8126 (20.638-20.641)
Blue	.8126-.8128 (20.641-20.644)
Side Play	
Standard	.0036-.0105 (.092-.268)
Service Limit	(1)
(1) Specification is not available from manufacturer.	

**VALVES & VALVE SPRINGS**

<b>Application</b>	<b>Specification</b>
Intake Valves	
Face Angle	45.6°
Head Diameter	1.53" (39 mm)
Installed Height	(1)
Minimum Margin	(1)
Minimum Refinish Length	(1)
Stem Diameter	.3159-.3166" (8.025-8.043 mm)
Exhaust Valve	
Face Angle	45.6°
Head Diameter	1.33-1.34" (33.91-34.11 mm)
Installed Height	(1)
Minimum Margin	(1)
Minimum Refinish Length	(1)
Stem Diameter	.3148-.3156" (7.996-8.017 mm)

**2001 Ford Escape**

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape &amp; Mystique

Valve Springs	
Free Length	
Standard	1.858" (47.2 mm)
Service Limit	(1)
Installed Height	1.416-1.542" (35.99-39.19 mm)
(1) Specification is not available from manufacturer.	

**CYLINDER BLOCK**

Application	In. (mm)
Cylinder Bore	
Diameter	
Code 1	3.3386-3.3390 (84.800-84.810)
Code 2	3.3390-3.3394 (84.810-84.820)
Code 3	3.3394-3.3398 (84.820-84.830)
Maximum Out-Of-Round	.0009 (.025)
Maximum Taper	.0005 (.013)
Maximum Deck Warpage	(1) .002 (.05)
(1) Replace cylinder block if material removed is more than .010"(.25 mm).	

**PISTONS, PINS & RINGS**

Application	In. (mm)
Pistons	
Clearance	.0008-.0015 (.020-.040)
Service Limit	(1)
Diameter	3.337-3.338 (84.77-84.80)
Pins	
Diameter	.8122-.8126 (20.632-20.641)
Piston-To-Pin Fit	.0003-.0005 (.007-.013)
Rings	
No. 1 (Compression)	
End Gap	
Standard	.0098-.011 (.25-.28)
Service Limit	(1)

**2001 Ford Escape**

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape &amp; Mystique

Side Clearance	
Standard	.0016-.0031 (.040-.080)
Service Limit	(1)
No. 2 (Compression)	
End Gap	
Standard	.0098-.011 (.25-.28)
Service Limit	(1)
Side Clearance	
Standard	.0016-.0035 (.040-.090)
Service Limit	(1)
No. 3 (Oil)	
End Gap	
Standard	.016-.066 (0.40-1.68)
Service Limit	(1)
(1) Specifications are not available from manufacturer.	

**CAMSHAFT**

Application	In. (mm)
End Play	.0008-.008 (.02-.20)
Journal Diameter	1.0220-1.0228 (25.96-25.98)
Journal Out-Of-Round	.003 (.08)
Camshaft Runout	.005 (.127)
Lobe Height	
Intake	
Standard	.245 (6.23)
Service Limit	(1)
Exhaust	
Standard	.245 (6.23)
Service Limit	(1)
Oil Clearance	
Standard	.0013-.0032 (.0335-.0835)
Service Limit	(1)
(1) Specification is not available from manufacturer.	

**2001 Ford Escape**

2000-01 ENGINES 2.0L DOHC 4-Cylinder - Contour, Cougar, Focus, Escape &amp; Mystique

**CYLINDER HEAD**

<b>Application</b>	<b>Specification</b>
Cylinder Head Height	(1)
Maximum Warpage	.008 (.20)
Valve Seats	
Valve Seat Angle	45°
Seat Width	.068-.091 (1.75-2.32)
Valve Guides	
Valve Guide I.D.	.316-.318 (8.063-8.094)
Valve Guide Installed Height	(1)
Valve Stem-To-Guide Oil Clearance	
Intake	.0008-.0027 (.020-.069)
Exhaust	.0018-.0037 (.046-.095)
Valve Tappet-To-Bore Clearance	
Standard	.0009-.0025 (.023-.065)
Maximum	(1)
(1) Specification is not available from manufacturer.	



## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

### 2006 ENGINE

Engine - 2.3L - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Displacement	2.3L
No. of cylinders	4
Bore/stroke	87.5/94.0
Firing order	1-3-4-2
Oil pressure (hot @ 2,000 rpm)	29-39 psi 200-268 kPa
Oil capacity	4.1 qts. + 0.4 qt. with filter
<b>Cylinder Block</b>	
Cylinder bore diameter	87.5-87.53 mm (3.444-3.446 in.)
Cylinder bore maximum out-of-round	0.008 mm (0.0003 in.)
Main bearing bore diameter	57.020-57.038 mm (2.244-2.245 in.)
Head gasket surface flatness	0.1 mm/general 0.05 mm/200 x 200 (0.004 in./general) (0.0019 in./7.87 x 7.87)
<b>Piston</b>	
Diameter (1)	87.5-87.51 mm (3.444-3.445 in.)
Diameter (2)	87.51-87.52 mm (3.4452-3.4456 in.)
Diameter (3)	87.52-87.53 mm (3.445-3.446 in.)
Piston-to-bore clearance	0.025-0.045 mm (0.0009-0.0017 in.)
Ring groove width - top	1.203-1.205 mm (0.0473-0.0474 in.)
Ring groove width - 2nd	1.17-1.19 mm (0.0460-0.0468 in.)
Ring groove width - oil	2.501-2.503 mm (0.0984-0.0985 in.)
Piston skirt coating thickness	0.008-0.020 mm (0.0003-0.0007 in.)
<b>Piston Pin</b>	
Diameter	20.995-21.0 mm (0.8265-0.8267 in.)
Length	59.6-60.4 mm (2.346-2.377 in.)
Piston-to-pin clearance	0.008-0.016 mm (0.0003-0.0006 in.)
<b>Cylinder Head</b>	
Valve lift @ zero lash (exhaust)	7.4 mm (0.29 in.)
Valve lift @ zero lash (intake)	7.9 mm (0.31 in.)

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Valve guide diameter	5.509-5.539 mm (0.216-0.218 in.)
Valve seat width - intake/exhaust	0.99-1.84 mm (0.038-0.072 in.)
Valve seat angle	45 degrees
Valve seat runout	0.075 mm (0.0029 in.)
Valve lash adjuster bore diameter	31.00-31.03 mm (1.220-1.221 in.)
Cam bore diameter	25.015-25.040 mm (0.984-0.985 in.)
<b>Valve</b>	
Valve head diameter - intake	34.85-35.15 mm (1.372-1.383 in.)
Valve head diameter - exhaust	29.85-30.15 mm (1.175-1.187 in.)
Valve stem diameter - intake	5.470-5.485 mm (0.2153-0.2159 in.)
Valve stem diameter - exhaust	5.465-5.480 mm (0.2151-0.2157 in.)
Valve stem-to-guide clearance - intake	0.0027 mm (0.00010 in.)
Valve stem-to-guide clearance - exhaust	0.0029 mm (0.00011 in.)
Valve face runout	0.05 mm (0.0019 in.)
Valve face angle	45 degrees
<b>Valve Spring - Compression Pressure -</b>	
Intake and exhaust (installed)	38.667 lb
Intake (valve open) 8.9 mm (0.35 in.) of lift	97.032 lb
Exhaust (valve open)	7.4 mm of lift 93.338 lb
Free length	44.92 mm (1.768 in.)
Assembled height	37.9 mm (1.492 in.)
<b>Crankshaft</b>	
Main bearing journal diameter	51.980-52.000 mm (2.046-2.047 in.)
Production repair	51.730-51.750 mm (2.036-2.037 in.)
Main bearing clearance	0.019-0.035 mm (0.0007-0.0013 in.)
Connecting rod journal diameter	49.980-50.000 mm (1.967-1.968 in.)
Production repair	49.730-49.750 mm (1.957-1.958 in.)
End play	0.22-0.43 mm (0.008-0.016 in.)
<b>Rings</b>	
Width - top	1.17-1.185 mm (0.0460-0.0466 in.)
Width - 2nd	1.197-1.199 mm (0.0471-0.0472 in.)
Width - oil	2.38-2.45 mm (0.093-0.096 in.)
Ring gap (in bore) - top	0.16-0.31 mm (0.006-0.012 in.)
Ring gap (in bore) - 2nd	0.33-0.48 mm (0.012-0.018 in.)
Ring gap (in bore) - oil	0.2-0.7 mm (0.007-0.027 in.)
<b>Valve Tappet</b>	
Diameter	30.97-30.98 mm (1.2192-1.2196 in.)
Tappet-to-valve clearance - intake	0.22-0.28 mm (0.008-0.011 in.)
Tappet-to-valve clearance - exhaust	0.22-0.28 mm (0.008-0.011 in.)

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	0.27-0.33 mm (0.010-0.013 in.)
Tappet-to-bore clearance	0.02-0.06 mm (0.0007-0.0023 in.)
<b>Camshaft</b>	
Lobe lift - intake	8.24999 mm (0.324 in.)
Lobe lift - exhaust	7.80007 mm (0.307 in.)
Runout (1) <sup>(1)</sup>	0.03 mm (0.001 in.)
Thrust clearance	0.09-0.24 mm (0.003-0.009 in.)
Journal diameter	24.96-24.98 mm (0.982-0.983 in.)
Journal-to-bore clearance	0.035-0.080 mm (0.001-0.003 in.)
<b>Connecting Rod</b>	
Bearing clearance	0.027-0.052 mm (0.001-0.002 in.)
Bearing thickness	1.496-1.520 mm (0.058-0.059 in.)
Crank bore diameter	53.025-53.045 mm (2.087-2.088 in.)
Pin bore diameter	20.965-20.985 mm (0.825-0.826 in.)
Length (center-to-center)	154.8 mm (6.094 in.)
Side clearance	1.95-3.05 mm (0.076-0.120 in.)
Axial clearance	0.14-0.36 mm (0.005-0.014 in.)
(1) No. 3 Journal - Supported by No. 1 and No. 5 journals.	

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

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
High Temperature 4x4 Front Axle and Wheel Bearing Grease E8TZ-19590-A	ESA-M1C198-A
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil	WSS-M2C930-A

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CXO-5W20-LSP12 (Canada); or equivalent	
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1
Multi-Purpose Grease XL-5, XG-4	ESB-M1C93-B
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

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

Description	N.m	lb-ft	lb-in
Camshaft bearing cap bolts <sup>(1)</sup>	-	-	-
Coolant outlet bolts	10	-	89
Oil pan bolts <sup>(1)</sup>	-	-	-
Oil pump-to-engine block bolts <sup>(1)</sup>	-	-	-
Cylinder head bolts <sup>(1)</sup>	-	-	-
Accelerator cable snow shield screws	10	-	89
Accelerator cable bracket nuts W520412-S309 (vehicles built through 10/2005)	9	-	89
Accelerator cable bracket nuts W520412-S440 (vehicles built after 10/2005)	5	-	44
Intake manifold bolts	18	13	-
Flexplate bolts <sup>(1)</sup>	-	-	-
Flywheel bolts <sup>(1)</sup>	-	-	-
Crankshaft pulley bolt <sup>(1)</sup>	-	-	-
Crankshaft position (CKP) sensor bolts <sup>(1)</sup>	-	-	-
Rear crankshaft oil seal retainer bolts <sup>(1)</sup>	-	-	-
A/C compressor mounting bolts	25	18	-
Oil pump sprocket bolt	25	18	-
Knock sensor (KS) bolt	20	15	-
Engine mount bracket bolt (W710824-S439)	115	85	-
42-pin electrical connector bolt	10	-	89
Engine mount bracket nuts (N807144-S440)	115	85	-
Engine mount bolts	55	41	-
Engine roll-restrictor bolts	90	66	-

## 2006 Ford Escape

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Engine-to-bellhousing bolts	48	35	-
Starter motor mounting bolts	25	18	-
Engine support crossmember bolts	90	66	-
Bellhousing-to-engine bolts	48	35	-
Bellhousing-to-oil pan bolts <sup>(1)</sup>	-	-	-
Engine front cover-to-oil pan bolts <sup>(1)</sup>	-	-	-
Upper engine bracket-to-power transfer unit (PTU) bolts	45	33	-
Engine support crossmember nut	175	129	-
Torque converter-to-flywheel nuts	35	26	-
Power steering pressure (PSP) tube nut	20	15	-
Powertrain control module (PCM) wiring connector bolt	6	-	53
Coolant pump bolts	10	-	89
Engine front cover bolts <sup>(1)</sup>	-	-	-
Camshaft sprocket bolt	72	53	-
Valve cover bolts	10	-	89
Exhaust gas recirculation (EGR) valve assembly bolts	20	15	-
Thermostat housing bolts	10	-	89
Oil pump screen and cover assembly bolts	10	-	89
Catalytic converter studs	17	13	-
Catalytic converter-to-cylinder head nuts	47	35	-
Coolant pump pulley bolts	20	15	-
Generator mounting bolts	47	35	-
Power steering pump mounting bolts	25	18	-
Oil level indicator tube bolt	10	-	89
Oil pressure sensor	15	11	-
A/C manifold tube bolt	20	15	-
Oil drain plug	28	21	-
Oil pump chain tensioner bolts	10	-	89
Oil pump chain guide bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain tensioner bolts	10	-	89
Crankcase vent oil separator bolts	10	-	89
Oil filter adapter bolts	25	18	-
Oil cooler bolt	34	25	-
Air cleaner outlet tube clamps	3	-	27
Coil-on-plug retaining stud bolts	10	-	89
Engine plug bolt	20	15	-

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

Belt tensioner bolt	25	18	-
Oil filter cup	33	24	-
Oil pan-to-bellhousing bolts <sup>(1)</sup>	-	-	-
Rear main seal mounting plate bolts	10	-	89
Camshaft position (CMP) sensor bolt	20	15	-
Cylinder head temperature (CHT) sensor	12	9	-
Spark plug	12	9	-
Fuel rail bolts	10	-	89
Pressure plate bolts	32	24	-
(1) Refer to the appropriate procedure for specification.			

## DESCRIPTION AND OPERATION

### ENGINE

The 2.3L (140 CID) 4-cylinder engine has the following features:

- Dual overhead camshaft
- Four valves per cylinder
- Sequential multiport fuel injection (SFI)
- Aluminum cylinder head
- Aluminum cylinder block
- Electronic ignition system with coil-on-plug 4 ignition coils

The 2.3L engine is a 4 valve-per-cylinder, dual overhead camshaft engine. The engine uses a coil-on-plug ignition system. The cylinder block is made of aluminum and the bearing caps are integrated into the ladder assembly. An aluminum oil pan bolts to the bottom of the lower cylinder block and to the transmission to provide greater strength. The camshafts are mounted in the cylinder heads and act against valve tappets to open and close the valves. The camshafts are driven off the front of the cylinder head by one timing chain. The chain is driven by a sprocket that is located on the crankshaft. The piston assembly is an aluminum piston with a cast iron connecting rod. The oil pump is driven by the crankshaft via a dedicated chain that is driven by the same sprocket that drives the timing chain.

### Identification

Always refer to these labels when installation of new parts is necessary, or when checking engine calibrations. The engine parts often differ within a CID family. Verification of the identification codes will make sure that the correct parts are obtained. These codes contain all the pertinent information relating to the dates, optional equipment and revisions. The Ford Master Parts Catalog contains a complete listing of the codes and their application.

**Code Information**

The engine code information label, located on the side of the valve cover and the front side of the valve cover, contains the following:

- Engine build date
- Engine plant code
- Engine code

**Exhaust Emission Control System**

Operation and necessary maintenance of the exhaust emission control devices used on this engine are covered in **INTRODUCTION - GASOLINE** article .

**Induction System**

The sequential multiport fuel injection (SFI) provides the fuel/air mixture needed for combustion in the cylinders. The 4 solenoid-operated fuel injectors:

- are mounted in the intake manifold.
- meter fuel into the air intake stream in accordance with engine demand.
- are positioned so that their tips direct fuel just ahead of the engine intake valves.
- are connected in series with the fuel pressure sensor.
- supply fuel from the fuel tank with a fuel pump mounted in the fuel tank.

A constant fuel pressure is maintained across the fuel injectors by the fuel pressure sensor. The fuel pressure sensor is positioned upstream from the fuel injectors on the fuel injection supply manifold.

**Positive Crankcase Ventilation System**

All engines are equipped with a closed-type positive crankcase ventilation system recycling the crankcase vapors to the intake manifold.

**Lubrication System**

The engine lubrication system operates as follows:

- Oil is drawn into the oil pump through the oil pump screen cover and tube in the sump of the oil pan.
- Oil is pumped through the oil filter on the left front side of the cylinder block.
- Oil enters the main gallery where it is distributed to the crankshaft main journals and to the cylinder head.
- From the main journals, the oil is routed through cross-drilled passages in the

crankshaft to lubricate the connecting rod bearings. Controlled leakage through the crankshaft main bearings and connecting rod bearings is slung radially outward to cool and lubricate the cylinder walls as well as the entire connecting rod, piston and piston ring assembly.

## DIAGNOSIS AND TESTING

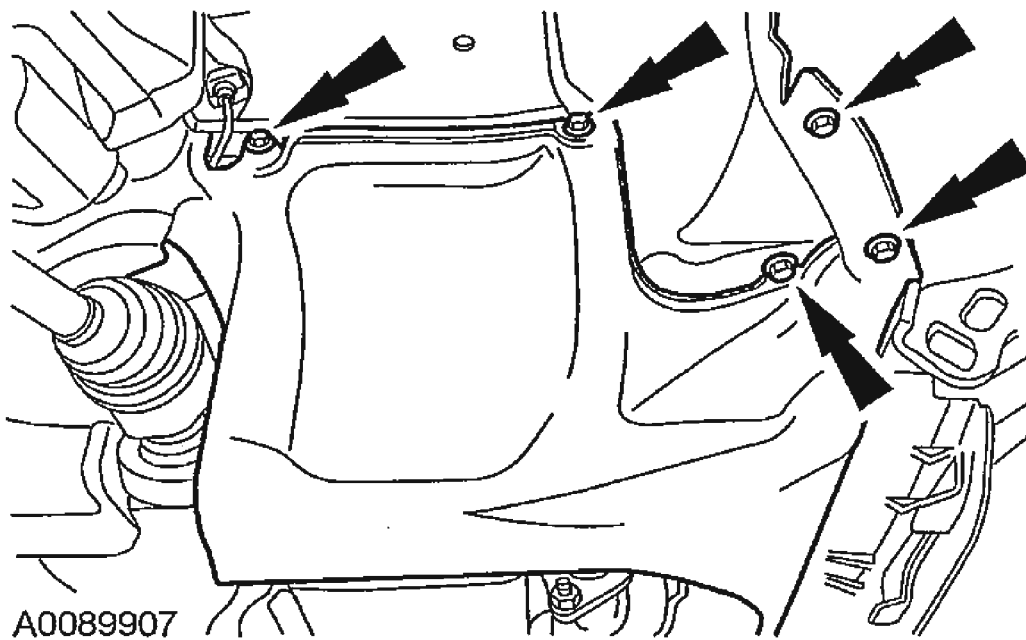
### ENGINE

Refer to **ENGINE SYSTEM-GENERAL INFORMATION** for basic mechanical concerns or refer to **INTRODUCTION - GASOLINE** article for driveability concerns.

## GENERAL PROCEDURES

### VALVE CLEARANCE CHECK

1. Remove the valve cover. For additional information, refer to **VALVE COVER**.
2. Remove the 5 bolts, the pin-type retainer (not shown) and the RH splash shield.
  - To install, tighten to 9 Nm (80 lb-in).



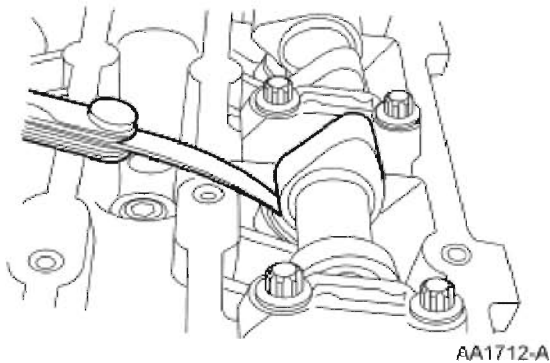
**Fig. 1: Removing RH Splash Shield**  
Courtesy of FORD MOTOR CO.

**NOTE:** Turn the engine clockwise only, and only use the crankshaft



bolt.

**NOTE:** Before removing the camshafts, measure the clearance of each valve at base circle, with the lobe pointed away from the tappet. Failure to measure all clearances prior to removing the camshafts will necessitate repeated removal and installation and wasted labor time.



**Fig. 2: Checking Valve Clearance**  
Courtesy of FORD MOTOR CO.

3. Use a feeler gauge to measure the clearance of each valve and record its location.

**NOTE:** The number on the valve tappet only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

A midrange clearance is the most desirable:

- Intake: 0.22-0.28 mm (0.008-0.011 in)
- Exhaust: 0.27-0.33 mm (0.010-0.013 in)

4. Select tappets using this formula: tappet thickness = measured clearance + the base tappet thickness - most desirable thickness.

Select the tappets and mark the installation location.

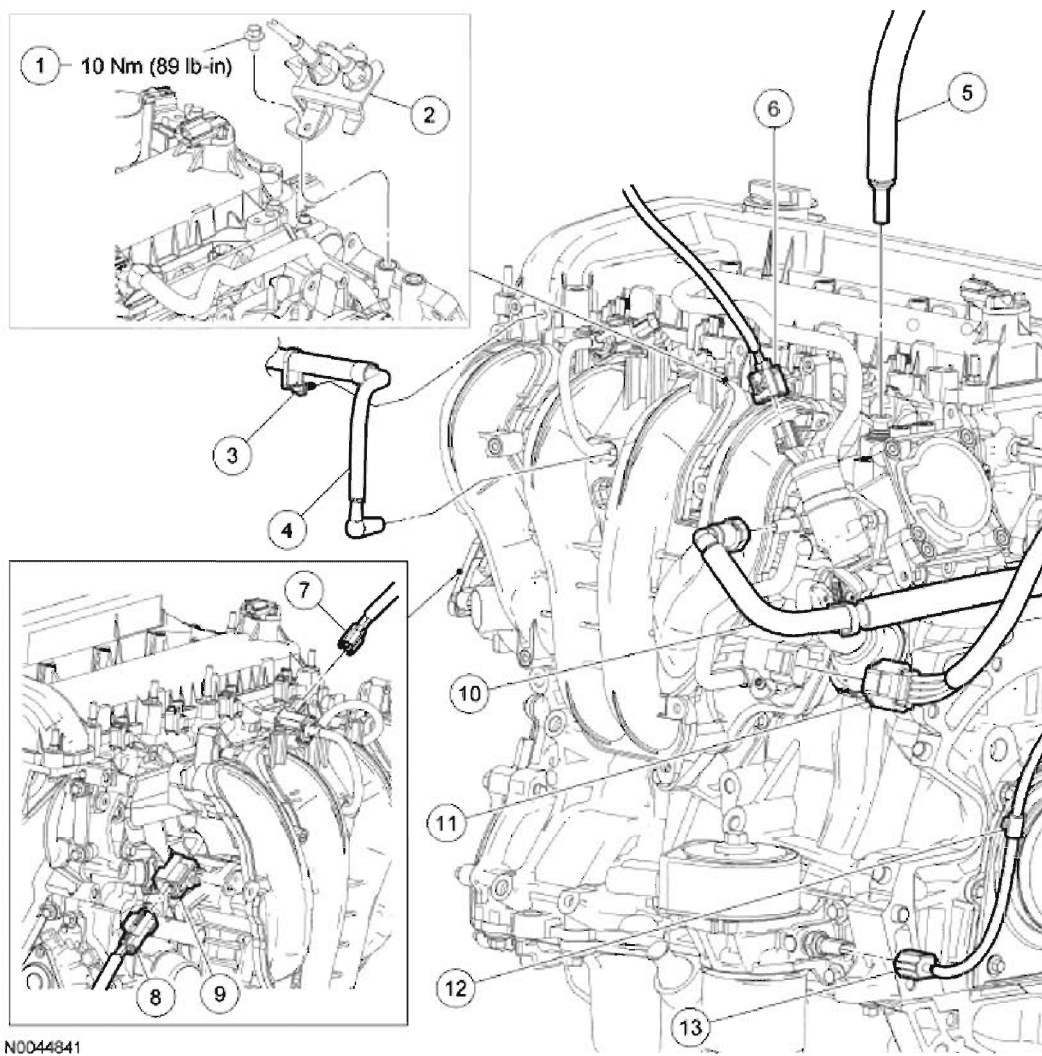
5. If any tappets do not measure within specifications, install new tappets in these locations. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **VALVE TAPPETS**.

## IN-VEHICLE REPAIR

### INTAKE MANIFOLD

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

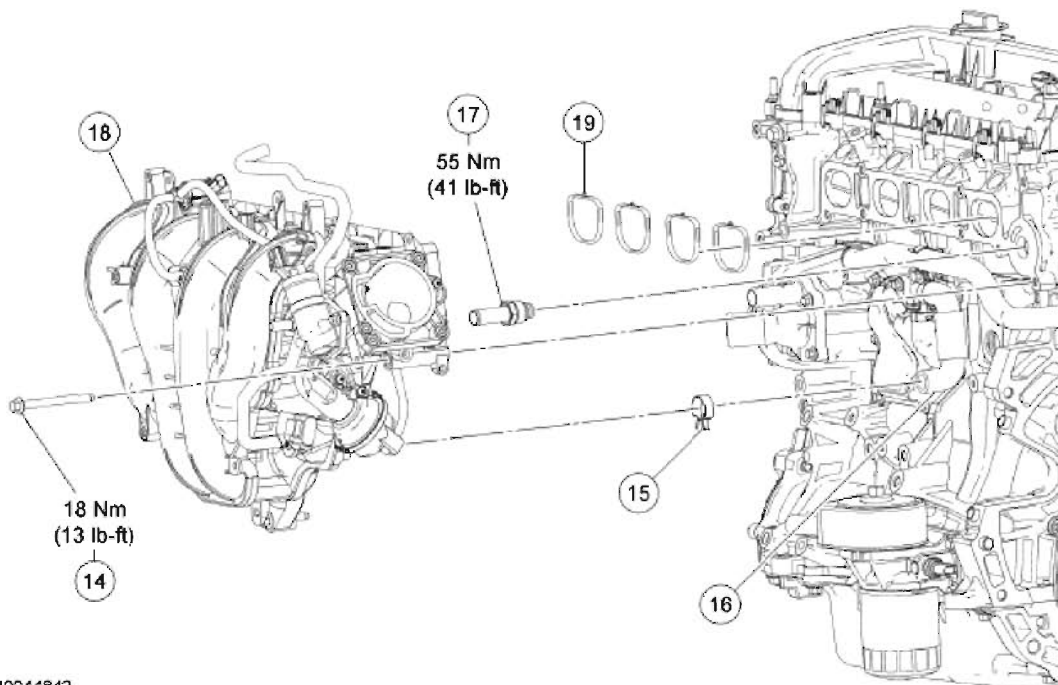


N0044841

Item	Part Number	Description
1	N802358	Accelerator cable bracket bolt (3 required)
2	9278	Accelerator cable bracket
3	—	Vacuum tube retainer (part of 9E498)
4	9E498	Vacuum tube
5	19D848	Vacuum supply hose
6	14A464	Idle air control (IAC) motor electrical connector (part of 12B637)
7	14A464	Swirl control valve electrical connector (part of 12B637)

Item	Part Number	Description
8	14A464	Knock sensor (KS) electrical connector (part of 12B637)
9	14A464	Pin-type retainer (part of 12B637)
10	9D289	Fuel vapor return hose
11	14A464	Temperature manifold absolute pressure (TMAP) sensor electrical connector (part of 12B637)
12	12B637	Engine control wiring harness
13	14A464	Oil pressure sender electrical connector (part of 12B637)

**Fig. 3: Identifying Intake Manifold Components (With Torque Specifications) (1 Of 2)**  
Courtesy of FORD MOTOR CO.



N0044842

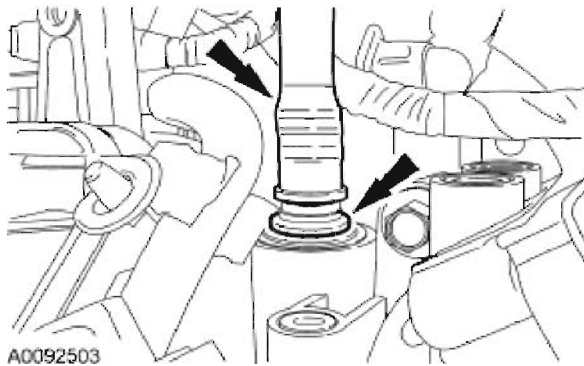
Item	Part Number	Description
14	W500311	Intake manifold bolt (8 required)
15	—	Crankcase vent hose clamp (part of 6758)
16	6758	Crankcase vent hose
17	9E470	Exhaust gas recirculation (EGR) tube
18	9424	Intake manifold
19	9461	Intake manifold gasket

**Fig. 4: Identifying Intake Manifold Components (With Torque Specifications) (2 Of 2)**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation

1. With vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the fuel rail. For additional information, refer to **REMOVAL**.
3. Remove the throttle body. For additional information, refer to **FUEL CHARGING & CONTROLS - 2.3L**.
4. Remove the oil level indicator and tube. For additional information, refer to **OIL LEVEL INDICATOR AND TUBE**.
5. Disconnect the intake manifold vacuum hose and pin-type retainer.
  - Position the vacuum hose aside.
6. Disconnect the power brake booster vacuum tube.
  - Depress the quick release locking ring.

- Pull the vacuum tube out of the quick release fitting.



**Fig. 5: Locating Quick Release Locking Ring**  
Courtesy of FORD MOTOR CO.

7. Disconnect the fuel vapor return hose from the intake manifold.
8. Remove the 3 bolts and position the accelerator cable bracket aside.
  - To install, tighten to 10 N.m (89 lb-in).
9. Disconnect the idle air control (IAC) motor electrical connector.
10. Disconnect the swirl control valve electrical connector.
11. Disconnect the knock sensor (KS) electrical connector.
  - Detach the electrical connector pin-type retainer.
12. Disconnect the temperature manifold absolute pressure (TMAP) sensor electrical connector.
13. Disconnect the oil pressure sender electrical connector.
  - Detach the wiring harness pin-type retainer and position the wiring harness aside.

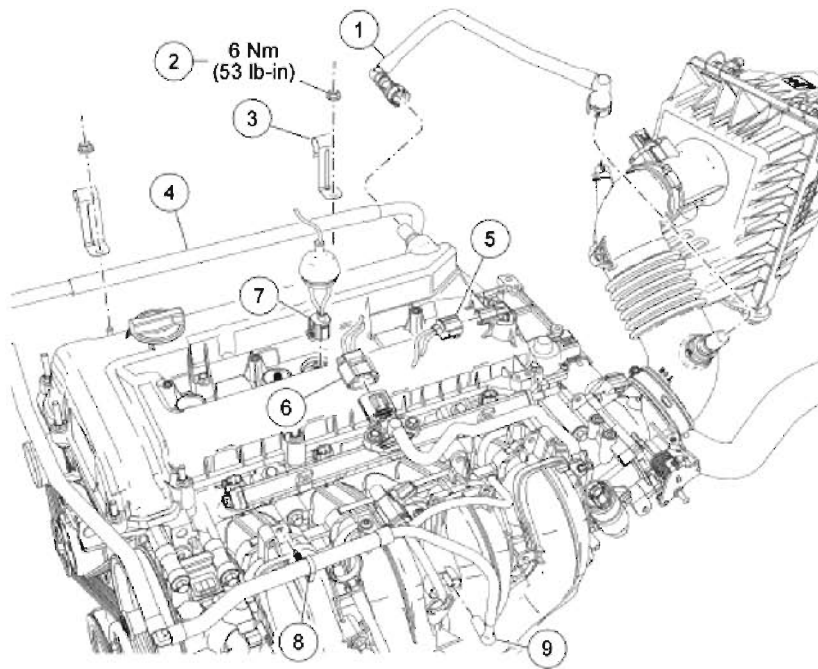
**NOTE:** There are 3 different size bolts used. Mark the location of the bolts to make sure they are installed in the correct location.

14. Remove the 8 bolts and position the intake manifold aside to access the crankcase vent hose clamp and the EGR tube.
  - To install, tighten to 18 N.m (13 lb-ft).
15. Release the clamp and disconnect the crankcase vent hose.
16. Remove the exhaust gas recirculation (EGR) tube.
  - To install, tighten to 55 N.m (41 lb-ft).
17. Remove the intake manifold and gaskets.
18. To install, reverse the removal procedure.
  - Inspect and install new intake manifold gaskets if necessary.

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

### VALVE COVER

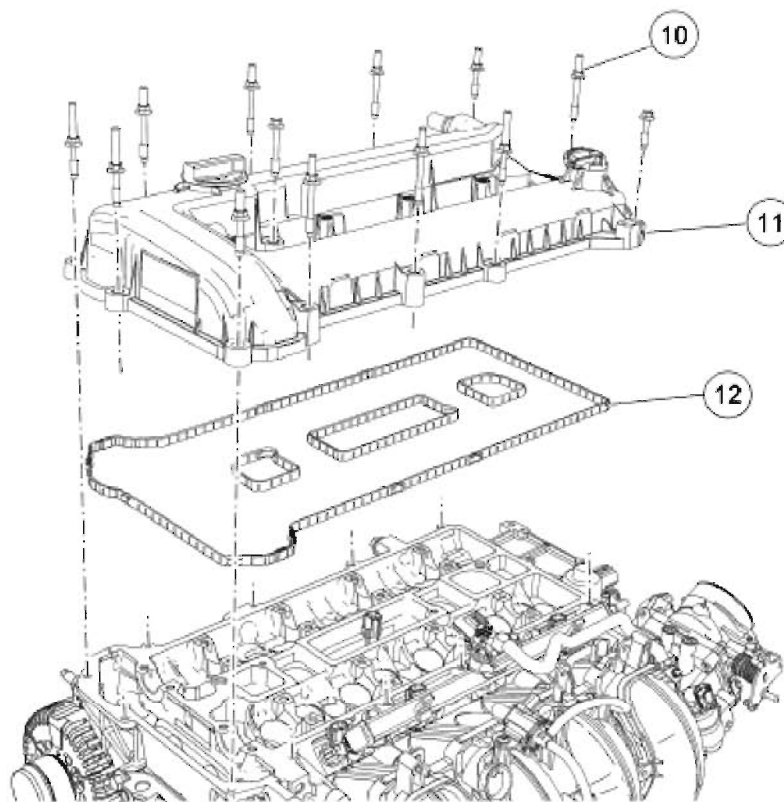


A0103100

Item	Part Number	Description
1	6853	Crankcase vent hose
2	W520412	Coolant vent tube bracket nut (2 required)
3	—	Coolant vent tube bracket (2 required) (part of 3A719)
4	3A719	Coolant vent tube
5	14A464	Camshaft position (CMP) sensor electrical connector (part of 12B637)

Item	Part Number	Description
6	14A464	Fuel rail pressure and temperature sensor electrical connector (part of 12B637)
7	14A464	Cylinder head temperature (CHT) sensor electrical connector (part of 12B637)
8	—	Vacuum tube retainer (part of 9E498)
9	9E498	Vacuum tube

**Fig. 6: Identifying Valve Cover Components (With Torque Specifications) (1 Of 2)**  
Courtesy of FORD MOTOR CO.



A0100096

Item	Part Number	Description
10	W500215	Valve cover retainer (14 required)
11	6582	Valve cover
12	6584	Valve cover gasket

**Fig. 7: Identifying Valve Cover Components (With Torque Specifications) (2 Of 2)**  
 Courtesy of FORD MOTOR CO.

#### Removal

**CAUTION:** During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the ignition coil-on-plugs. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Disconnect the crankcase vent hose.
4. Remove the 2 coolant vent tube bracket nuts.

- Position the vent tube and brackets aside.
- 5. Disconnect the camshaft position (CMP) sensor electrical connector.
- 6. Disconnect the fuel rail pressure and temperature sensor electrical connector.
- 7. Disconnect the cylinder head temperature (CHT) sensor electrical connector.
- 8. Disconnect the vacuum tube from the intake manifold.
  - Detach the pin-type retainer and position the vacuum tube aside.
- 9. Remove the 2 accelerator cable bracket nuts.
  - Position the accelerator cable and brackets aside.
- 10. Remove the power steering tube bracket nut.
  - Position the power steering tube and bracket aside.
- 11. Detach all of the wiring harness retainers from the valve cover studs and position the harness aside.
- 12. Remove the 14 valve cover retainers, the valve cover and gasket.

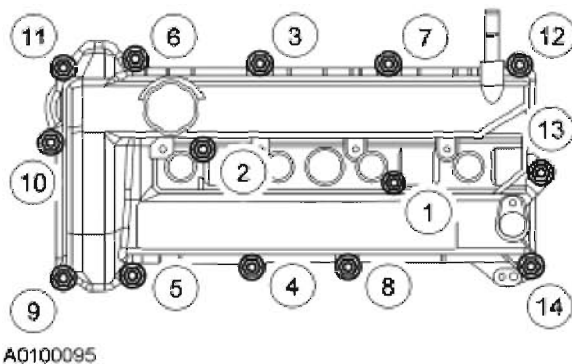
#### Installation

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

1. Clean and inspect the sealing surfaces.

**NOTE:** Clean and inspect the gasket. Install a new gasket, if necessary.

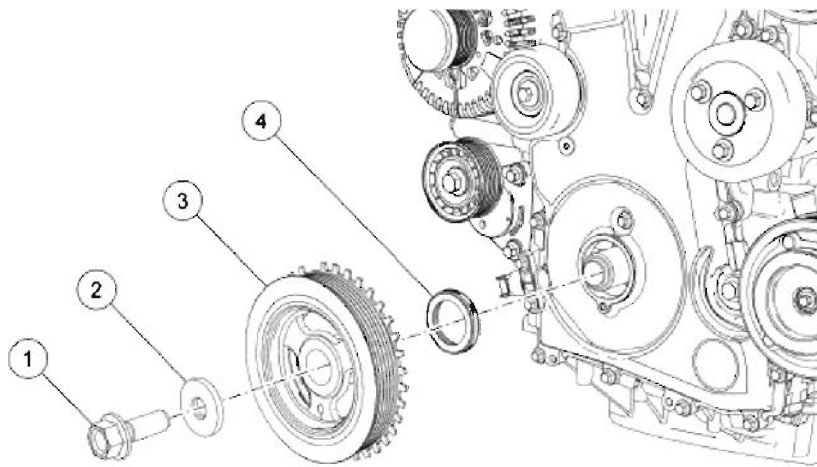
2. Install the valve cover, gasket and retainers.
  - Tighten in the sequence shown to 10 N.m (89 lb-in).



**Fig. 8: Identifying Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

3. Position the wiring harness and attach all of the wiring harness retainers to the valve cover studs.
4. Position the power steering tube and bracket.
  - Tighten to 6 N.m (53 lb-in).
5. Position the accelerator control cable and brackets.
  - Tighten to 6 N.m (53 lb-in).
6. Attach the vacuum tube and the pin-type retainer to the intake manifold.
7. Connect the CHT sensor electrical connector.
8. Connect the fuel rail pressure and temperature sensor electrical connector.
9. Connect the CMP sensor electrical connector.
10. Install the coolant vent tube, brackets and nuts.
  - Tighten to 6 N.m (53 lb-in).
11. Connect the crankcase vent hose.
12. Install the ignition coil-on-plugs. For additional information, refer to **REMOVAL AND INSTALLATION**.

#### LOWER END COMPONENTS - EXPLODED VIEW



A0002600

Item	Part Number	Description
1	6K340	Crankshaft pulley bolt
2	—	Crankshaft pulley washer (part of 6K340)

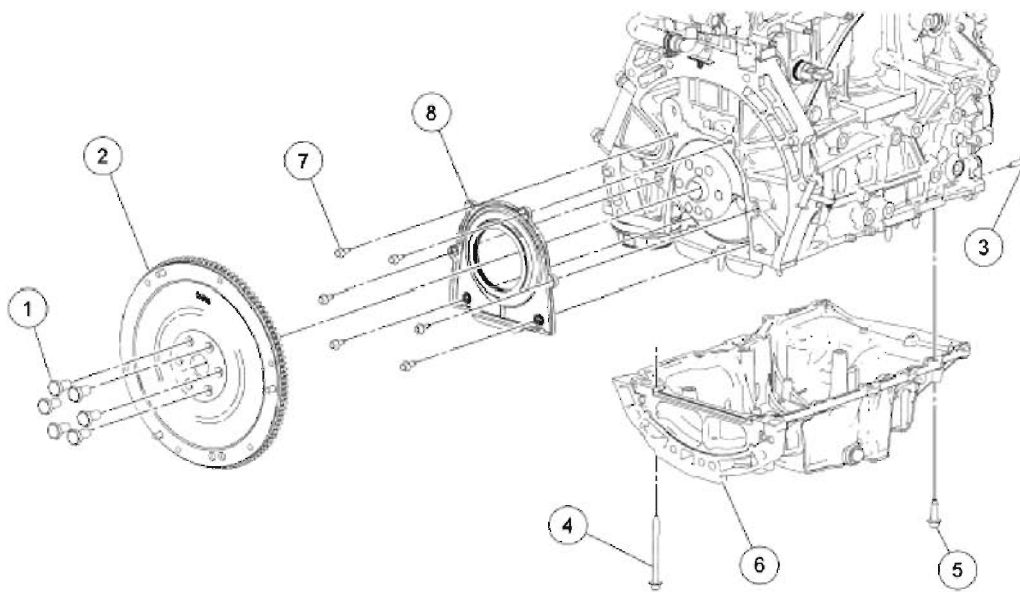
Item	Part Number	Description
3	6316	Crankshaft pulley
4	6700	Crankshaft front seal

**Fig. 9: Identifying Crankshaft Pulley & Crankshaft Front Oil Seal**  
 Courtesy of FORD MOTOR CO.



## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



N0004844

Item	Part Number	Description
1	6379	Flexplate or flywheel bolt (6 required)
2	6477	Flexplate or flywheel
3	W500215	Engine front cover bolt (4 required)
4	W706284	Oil pan bolt (2 required)
5	W500224	Oil pan bolt (11 required)

Item	Part Number	Description
6	6675	Oil pan
7	W500212	Crankshaft rear oil seal with retainer plate bolt (6 required)
8	6K318	Crankshaft rear oil seal with retainer plate

**Fig. 10: Identifying Flexplate, Flywheel & Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the appropriate procedure.

### CRANKSHAFT PULLEY

Special Tool(s)

### SPECIAL TOOL(S)

Alignment Plate, Camshaft  
303-465 (T94P-6256-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



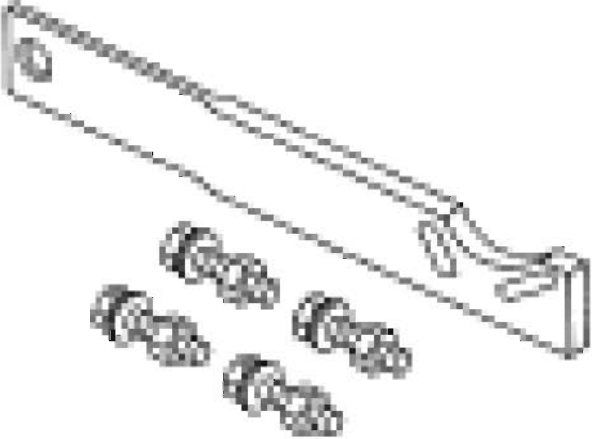
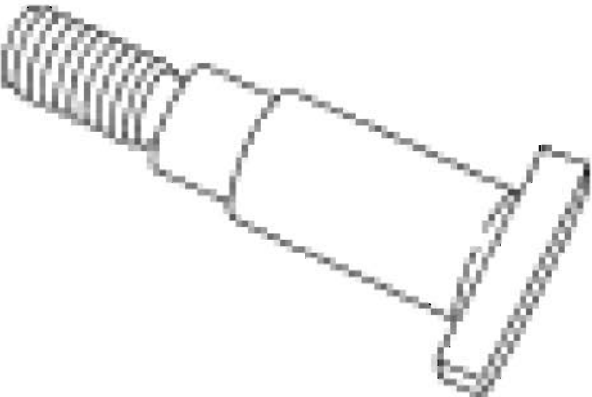
**ST2645-A**



**ST2638-A**

Timing Peg, Crankshaft  
303-507

Holding Fixture, Drive Pinion Flange  
205-126 (T78P-4851-A)

 <b>ST2647-A</b>	
 <b>ST2639-A</b>	Adapter for 205-126 (205-072-02)

Materials

MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

Removal

CAUTION:

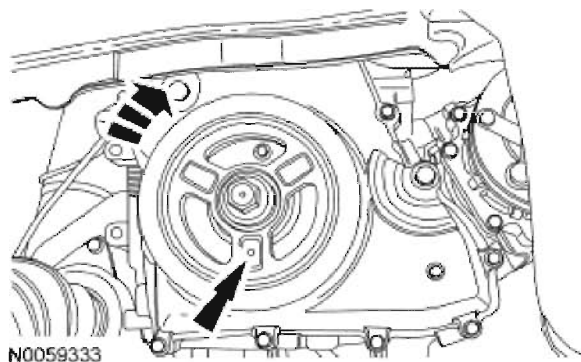
**Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

**During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the accessory drive belt. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Remove the valve cover. For additional information, refer to **VALVE COVER**.

**CAUTION: Failure to position the No. 1 piston at top dead center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.**

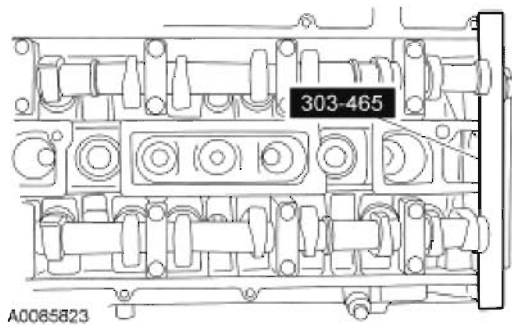
4. Using the crankshaft pulley bolt, turn the crankshaft clockwise to position the No. 1 piston at TDC.
  - The hole in the crankshaft pulley should be in the 6 o'clock position.



**Fig. 11: Locating Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

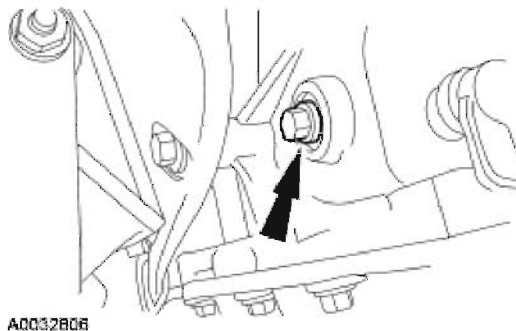
**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

**NOTE:** The camshaft timing slots are offset. If the special tool cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.



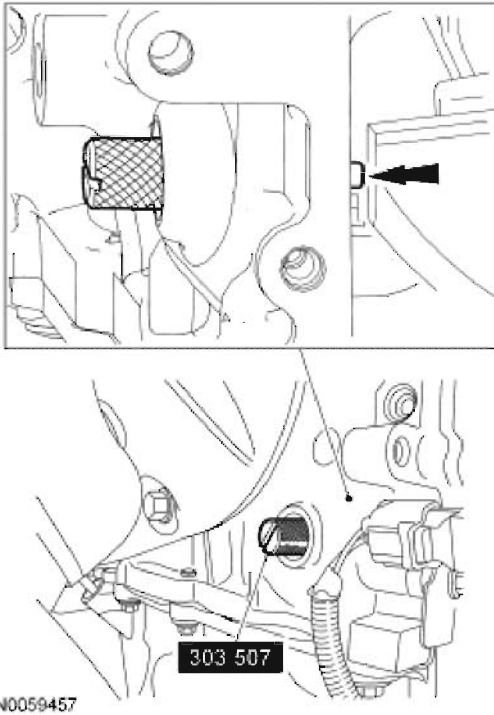
**Fig. 12: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

5. Install the special tool in the slots on the rear of both camshafts.
6. Remove the engine plug bolt.



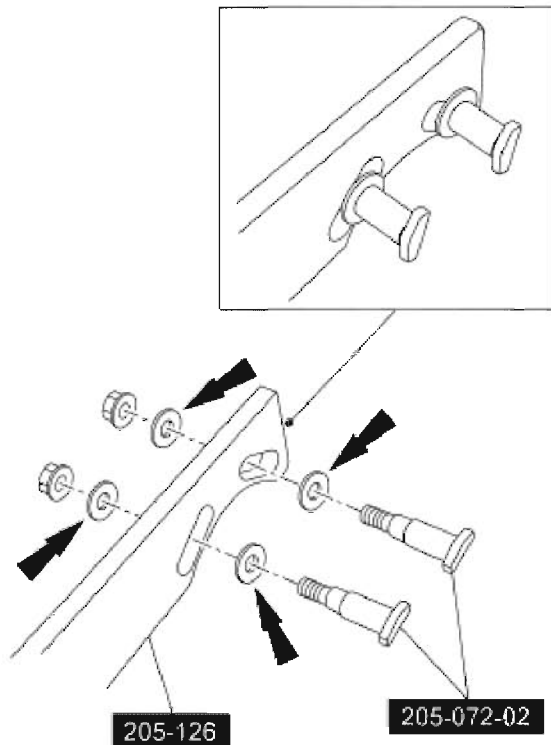
**Fig. 13: Locating Engine Plug Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.



**Fig. 14: Identifying Special Tool (303-507)**  
Courtesy of FORD MOTOR CO.

7. Install the special tool.
8. Assemble the special tools using 4 hardened washers in the locations shown.



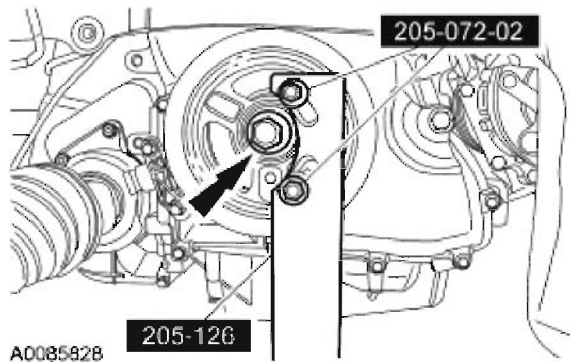
**Fig. 15: Locating Special Tools (205-072-02, 205-126)**  
Courtesy of FORD MOTOR CO.

**CAUTION:**

The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

If the crankshaft sprocket diamond washer comes off with the crankshaft pulley, it must be installed back onto the crankshaft.

9. Using the special tools and an air impact wrench, remove the crankshaft pulley.
- Remove and discard the crankshaft pulley bolt and washer.
  - Remove the crankshaft pulley.

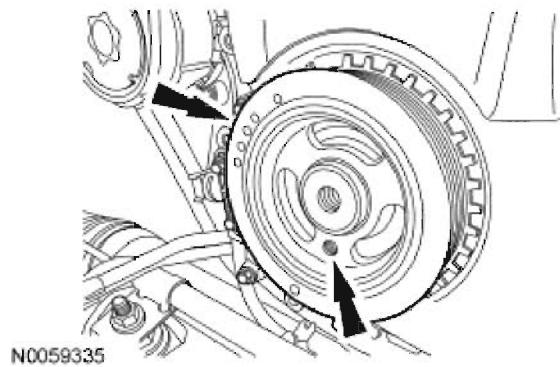


**Fig. 16: Identifying Special Tools Assembly (205-072-02, 205-126) And Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

**Installation**

**CAUTION:** Do not install the crankshaft pulley bolt at this time.

**NOTE:** Apply clean engine oil on the seal area before installing.

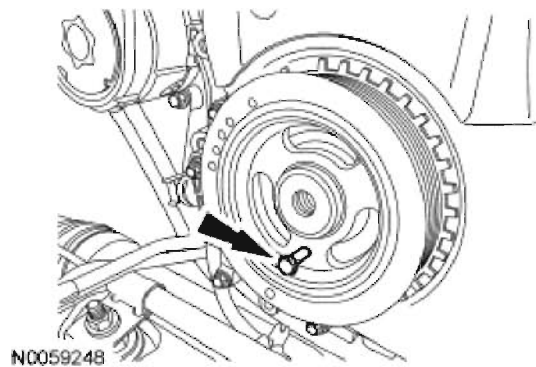


**Fig. 17: Locating Crankshaft Pulley Hole**  
Courtesy of FORD MOTOR CO.

1. Position the crankshaft pulley onto the crankshaft with the hole in the pulley at the 6 o'clock position.

**CAUTION:** Only hand-tighten the 6 mm (0.23 in) bolt or damage to the front cover can occur.

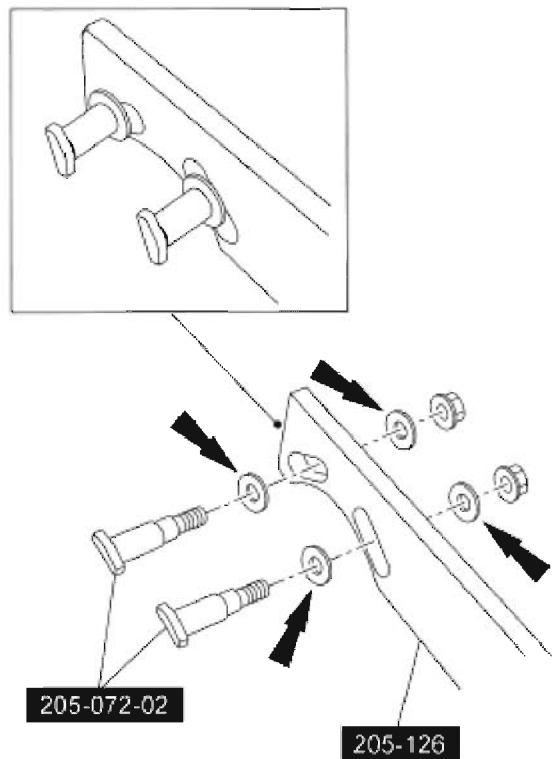
**NOTE:** This step will correctly align the crankshaft pulley to the crankshaft.



**Fig. 18: Locating Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

2. Install a standard 6 mm (0.23 in) x 18 mm (0.7 in) bolt through the crankshaft pulley and thread it into the front cover.
3. Assemble the special tools using 4 hardened washers in the locations shown.





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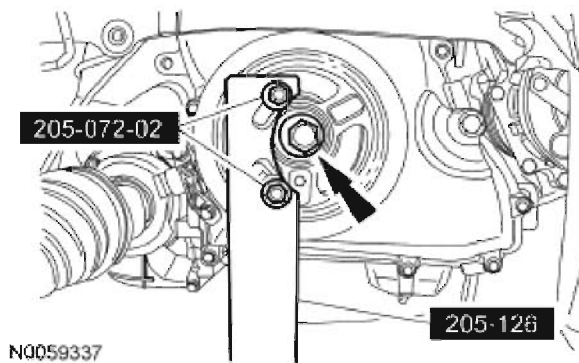
**Fig. 19: Assembling Special Tools (205-072-02 And 205-126)**  
Courtesy of FORD MOTOR CO.

**CAUTION:**

The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool and the bolt should be installed using hand tools only.

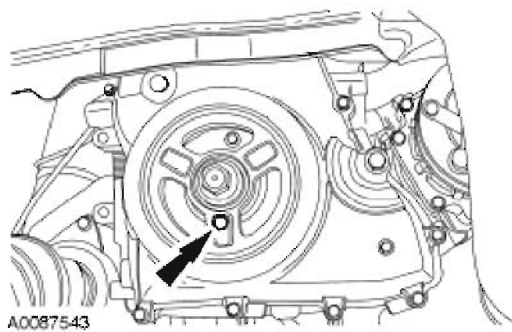
**Do not reuse the crankshaft pulley bolt.**

4. Install a new crankshaft pulley bolt. Using the special tools to hold the crankshaft pulley in place, tighten the crankshaft pulley bolt in 2 stages:
  - Stage 1: Tighten to 100 N.m (74 lb-ft).
  - Stage 2: Tighten an additional 90 degrees (1/4 turn).



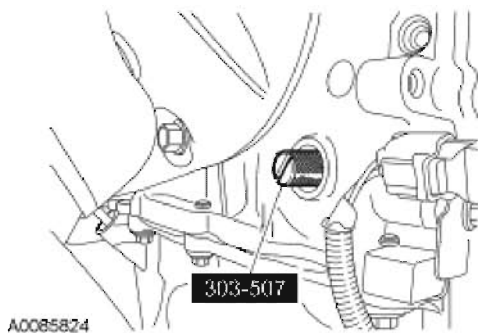
**Fig. 20: Identifying Special Tools Assembly (205-072-02, 205-126) And Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

5. Remove the 6 mm (0.23 in) x 18 mm (0.7 in) bolt.



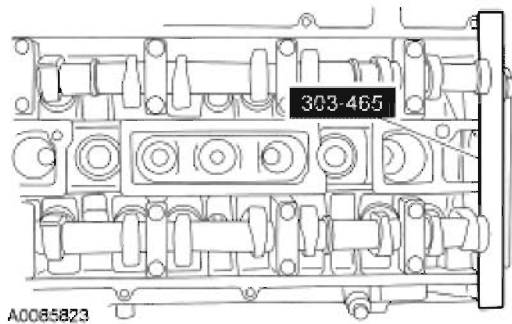
**Fig. 21: Aligning Crankshaft Pulley Bolt Holes**  
Courtesy of FORD MOTOR CO.

6. Remove the special tool.



**Fig. 22: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

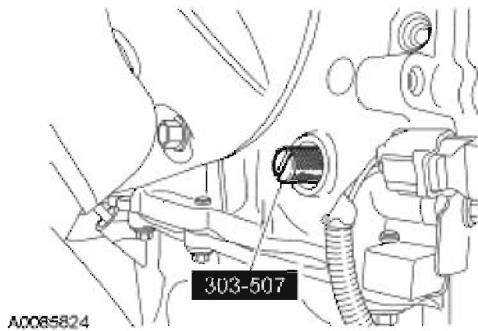
7. Remove the special tool.



**Fig. 23: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

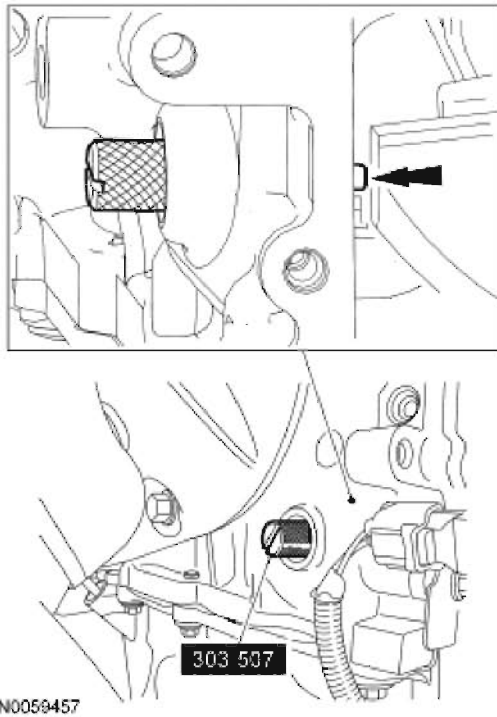
**NOTE:** Only turn the engine in the normal direction of rotation.

8. Turn the crankshaft clockwise 1 and 3/4 turns.
9. Install the special tool.



**Fig. 24: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**NOTE:** Only turn the engine in the normal direction of rotation.

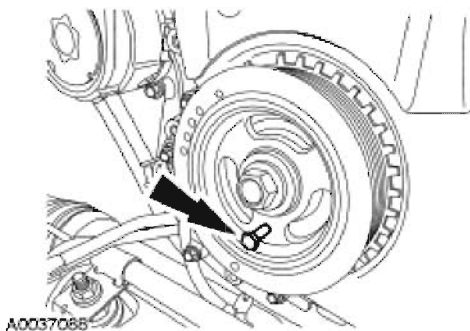


**Fig. 25: Identifying Special Tool (303-507)**  
Courtesy of FORD MOTOR CO.

10. Turn the crankshaft clockwise until the crankshaft contacts the special tool.

**CAUTION: Only hand-tighten the bolt or damage to the front cover can occur.**

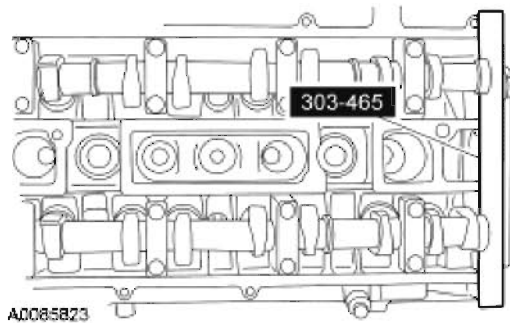
11. Using the 6 mm (0.23 in) x 18 mm (0.7 in) bolt, check the position of the crankshaft pulley.
  - If it is not possible to install the bolt, the engine valve timing must be corrected by repeating this procedure.



**Fig. 26: Installing Bolt Through Crankshaft Pulley And Thread It Into Front Cover**  
Courtesy of FORD MOTOR CO.

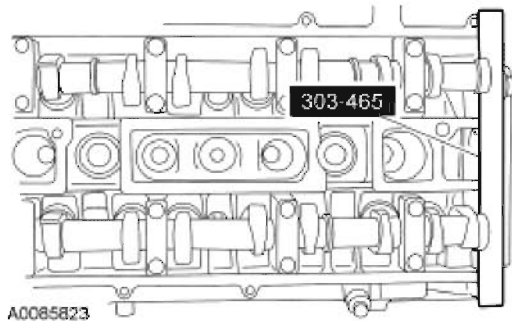
12. Using the special tool, check the position of the camshafts.

- If it is not possible to install the special tool, the engine valve timing must be corrected by repeating this procedure.



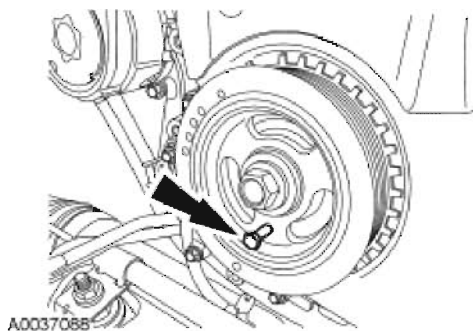
**Fig. 27: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

13. Remove the special tool.



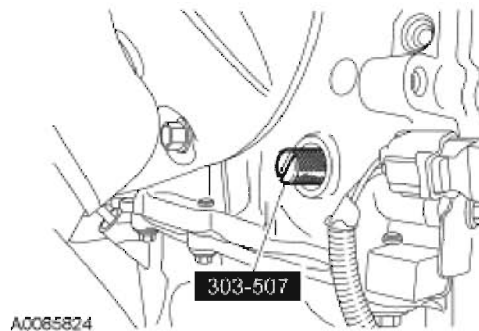
**Fig. 28: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

14. Remove the 6 mm (0.23 in) x 18 mm (0.7 in) bolt.



**Fig. 29: Installing Bolt Through Crankshaft Pulley And Thread It Into Front Cover**  
Courtesy of FORD MOTOR CO.

15. Remove the special tool.



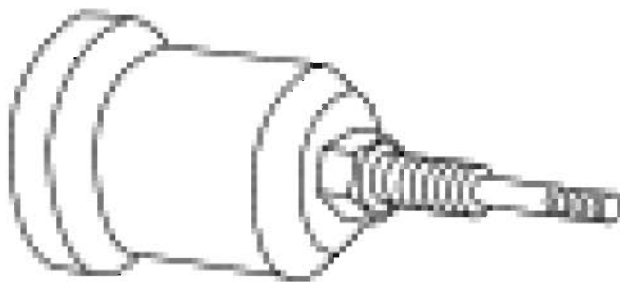
**Fig. 30: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

16. Install the engine plug bolt.
  - Tighten to 20 N.m (15 lb-ft).
17. Install the accessory drive belt. For additional information, refer to **REMOVAL AND INSTALLATION**.
18. Install the valve cover. For additional information, refer to **VALVE COVER**.

## CRANKSHAFT FRONT SEAL

Special Tool(s)

### SPECIAL TOOL(S)



**ST1917-A**

Installer, Front Oil Seal  
303-096 (T74P-6150-A)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



Remover, Oil Seal  
303-409 (T92C-6700-CH)

### Materials

### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

### Removal

#### CAUTION:

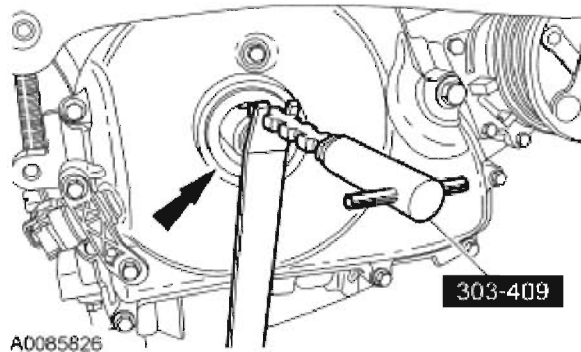
Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the

**oil pan can cause engine failure.**

1. Remove the crankshaft pulley. For additional information, refer to **LOWER END COMPONENTS EXPLODED VIEW** and **CRANKSHAFT PULLEY**.

**CAUTION:** Use care not to damage the engine front cover or the crankshaft when removing the seal.

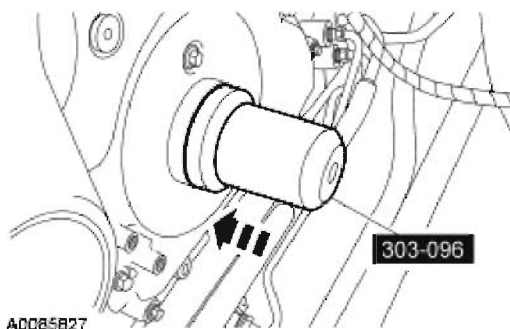


**Fig. 31: Removing Crankshaft Front Oil Seal Using Special Tool (303-409)**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, remove the crankshaft front oil seal.

#### Installation

**NOTE:** Remove the through-bolt from the special tool.  
Lubricate the oil seal with clean engine oil.



**Fig. 32: Installing Crankshaft Front Oil Seal Using Special Tool**  
Courtesy of FORD MOTOR CO.

1. Using the special tool, install the crankshaft front oil seal.
2. Install the crankshaft pulley. For additional information, refer to **LOWER END COMPONENTS - EXPLODED VIEW** and **CRANKSHAFT PULLEY**.



## FLEXPLATE

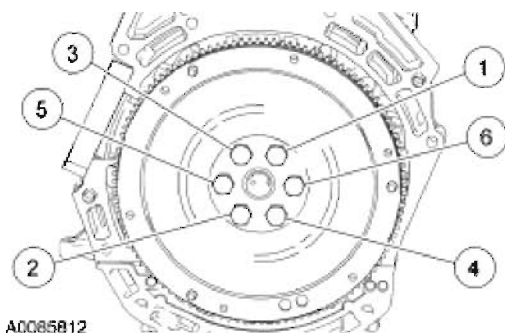
### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the automatic transaxle. For additional information, refer to **AUTOMATIC TRANSAXLE-TRANSMISSION - CD4E** .
3. Remove the 6 bolts and the flexplate.

### Installation

**NOTE:** Special bolts are used for installation. Do not use standard bolts.

1. Install the flexplate and tighten the bolts in the sequence shown in 3 stages.
  - Stage 1: Tighten to 50 N.m (37 lb-ft).
  - Stage 2: Tighten to 80 N.m (50 lb-ft).
  - Stage 3: Tighten to 112 N.m (83 lb-ft).



**Fig. 33: Identifying Flexplate Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

2. Install the automatic transaxle. For additional information, refer to **AUTOMATIC TRANSAXLE-TRANSMISSION - CD4E** .

## FLYWHEEL

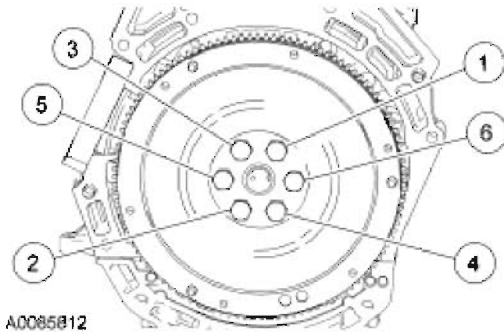
### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the manual transaxle and clutch. For additional information, refer to **CLUTCH** and **MANUAL TRANSAXLE/TRANSMISSION** .
3. Remove the 6 bolts and the flywheel.

## Installation

**NOTE:** Special bolts are used for installation. Do not use standard bolts.

1. Install the flywheel and tighten the bolts in the sequence shown in 3 stages.
  - Stage 1: Tighten to 50 N.m (37 lb-ft).
  - Stage 2: Tighten to 80 N.m (50 lb-ft).
  - Stage 3: Tighten to 112 N.m (83 lb-ft).



**Fig. 34: Identifying Flexplate Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

2. Install the clutch and manual transaxle. For additional information, refer to **CLUTCH** and **MANUAL TRANSAXLE/TRANSMISSION** .

## CRANKSHAFT REAR SEAL

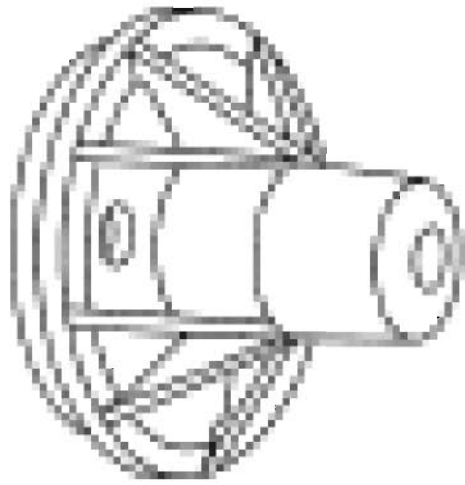
Special Tool(s)

## SPECIAL TOOL(S)

Installer, Crankshaft Rear Main Oil Seal  
303-328 (T88P-6701-B1)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1506-A**

### Materials

### MATERIALS

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323- A4

### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the flexplate or flywheel. For additional information, refer to **FLEXPLATE** or **FLYWHEEL**.
3. Remove the oil level indicator and tube. For additional information, refer to **OIL LEVEL INDICATOR AND TUBE**.

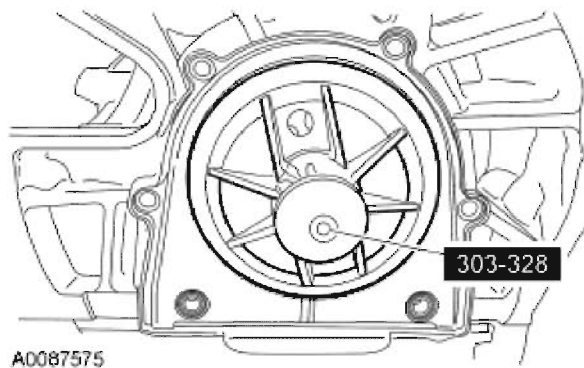
**CAUTION:** If the oil pan is not removed damage to the rear oil seal

**retainer joint can occur.**

4. Remove the 17 bolts and the oil pan.
5. Remove the 6 bolts and the crankshaft rear oil seal with retainer plate.

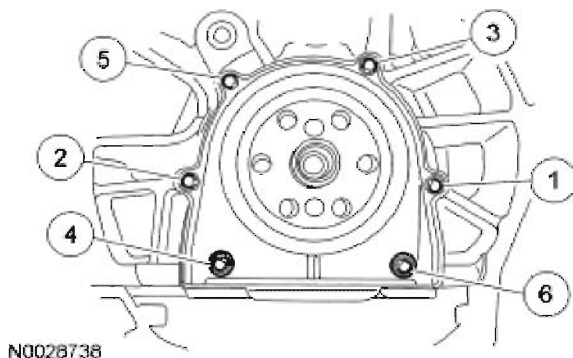
#### **Installation**

1. Using the special tool, position the crankshaft rear oil seal with retainer plate onto the crankshaft.



**Fig. 35: Identifying Special Tool (303-328)**  
Courtesy of FORD MOTOR CO.

2. Install the crankshaft rear oil seal with retainer plate and bolts.
  - To install, tighten in the sequence shown to 10 N.m (89 lb-in).



**Fig. 36: Identifying Crankshaft Rear Oil Seal With Retainer Plate**  
Courtesy of FORD MOTOR CO.

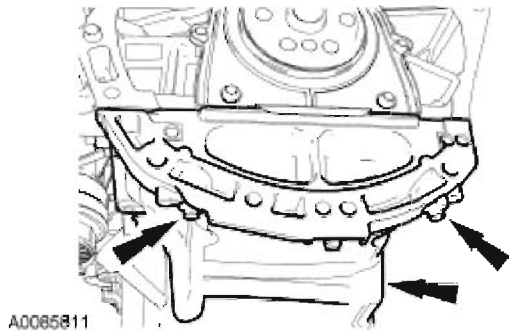
**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

3. Clean and inspect all the oil pan and cylinder block mating surfaces.

**NOTE:**

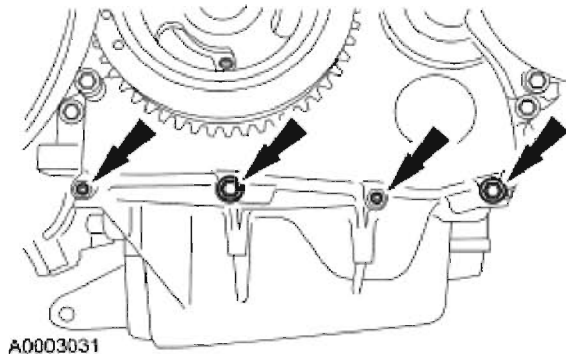
If the oil pan is not secured within 4 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

The oil pan must be installed and the bolts tightened within 4 minutes of applying the silicone gasket and sealant.



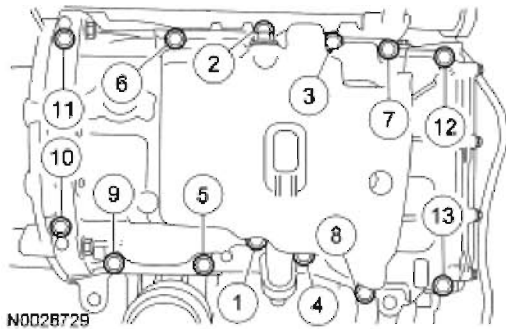
**Fig. 37: Identifying Rear Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

4. Apply a 2.5 mm (0.09 in) bead of silicone gasket and sealant to the oil pan. Install the oil pan. Install the 2 oil pan bolts finger-tight.
5. Install the 4 bolts.
  - To install, tighten to 10 N.m (89 lb-in).



**Fig. 38: Locating Oil Pan Bolts (2 Of 2)**  
Courtesy of FORD MOTOR CO.

6. Install the remaining oil pan bolts and tighten the oil pan bolts in the sequence shown to 25 N.m (18 lb-ft).




**Fig. 39: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

7. Install the oil level indicator and tube. For additional information, refer to **OIL LEVEL INDICATOR AND TUBE**.
8. Install the flexplate or flywheel. For additional information, refer to **FLEXPLATE** or **FLYWHEEL**.

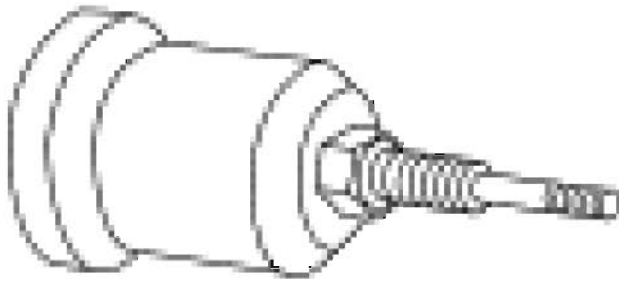
#### ENGINE FRONT COVER

#### SPECIAL TOOL TABLE

 <b>ST1385-A</b>	Remover, Oil Seal 303-409 (T92C-6700-CH)
	Installer, Front Oil Seal 303-096 (T74P-6150-A)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



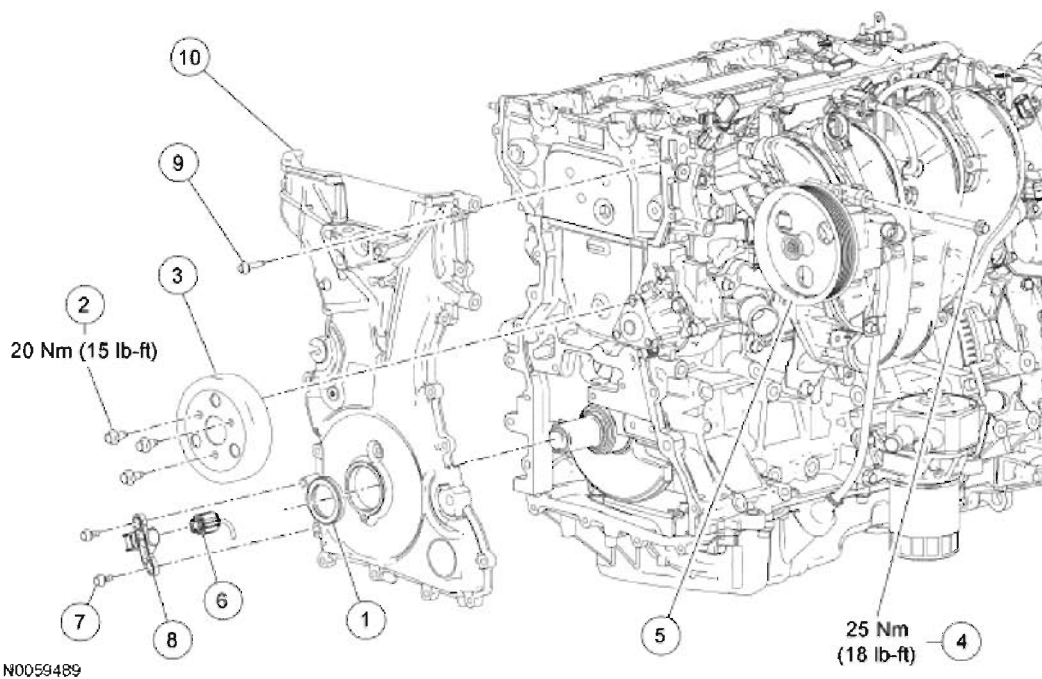
**ST1917-A**

### MATERIAL TABLE

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323- A4

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



Item	Part Number	Description
1	6700	Crankshaft front seal
2	W500221	Coolant pump pulley bolt (3 required)
3	8509	Coolant pump pulley
4	W500315	Power steering pump bolt (4 required)
5	3A696	Power steering pump (position aside)

Item	Part Number	Description
6	14A464	Crankshaft position (CKP) sensor electrical connector (part of 12B637)
7	W701219-S	CKP sensor bolt (2 required)
8	6C315	CKP sensor
9	W500215	Engine front cover bolt (22 required)
10	6019	Engine front cover

**Fig. 40: Identifying Engine Front Cover Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

### Removal

#### CAUTION:

Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

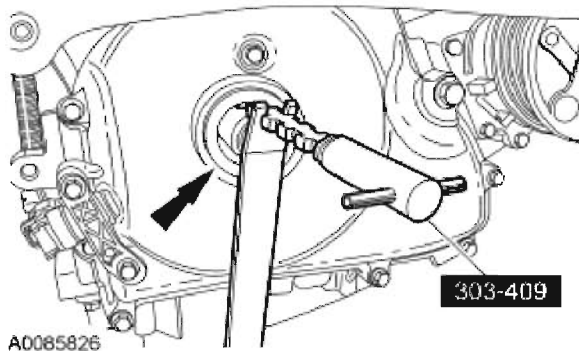
During engine repair procedures, cleanliness is



**extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

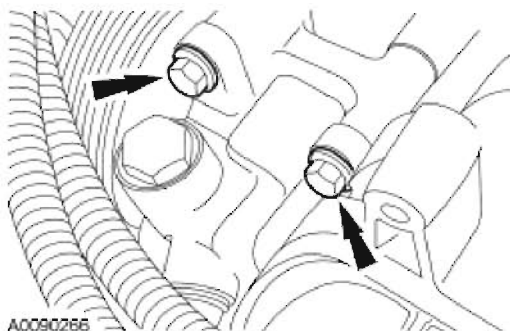
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the accessory drive belt and idler pulleys. For additional information, refer to **REMOVAL AND INSTALLATION - ACCESSORY DRIVE BELT** and **REMOVAL AND INSTALLATION - IDLER PULLEYS** .
3. Remove the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY** .
4. Remove the engine mount. For additional information, refer to **ENGINE MOUNT** .

**CAUTION: Use care not to damage the engine front cover or the crankshaft when removing the seal.**



**Fig. 41: Removing Crankshaft Front Oil Seal Using Special Tool (303-409)**  
Courtesy of FORD MOTOR CO.

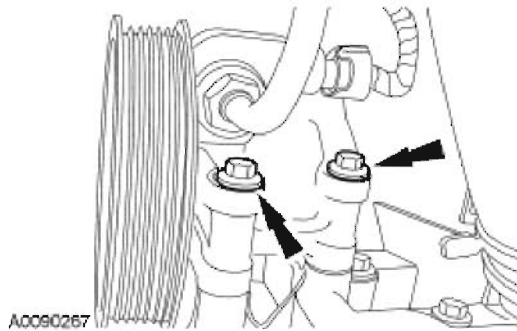
5. Using the special tool, remove the crankshaft front oil seal.
6. Remove the 3 bolts and the coolant pump pulley.
7. Remove the 2 power steering pump bolts.



**Fig. 42: Locating Power Steering Pump Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** The bolt under the power steering pressure tube will remain with the power steering pump.

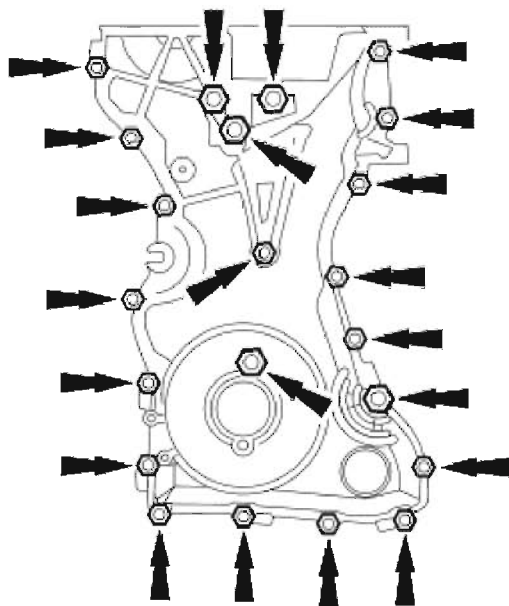


**Fig. 43: Identifying Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

8. Remove the remaining bolts and position the power steering pump aside.
9. Disconnect the crankshaft position (CKP) sensor electrical connector.

**NOTE:** Whenever the CKP sensor is removed, a new one must be installed, using the alignment tool supplied with the new part.

10. Remove and discard the CKP sensor.
11. Remove the bolts and the engine front cover.



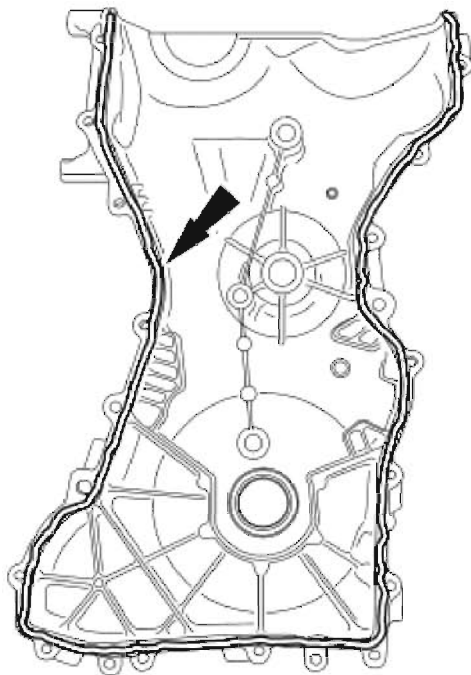
**Fig. 44: Locating Engine Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

**Installation**

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive disks or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

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

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

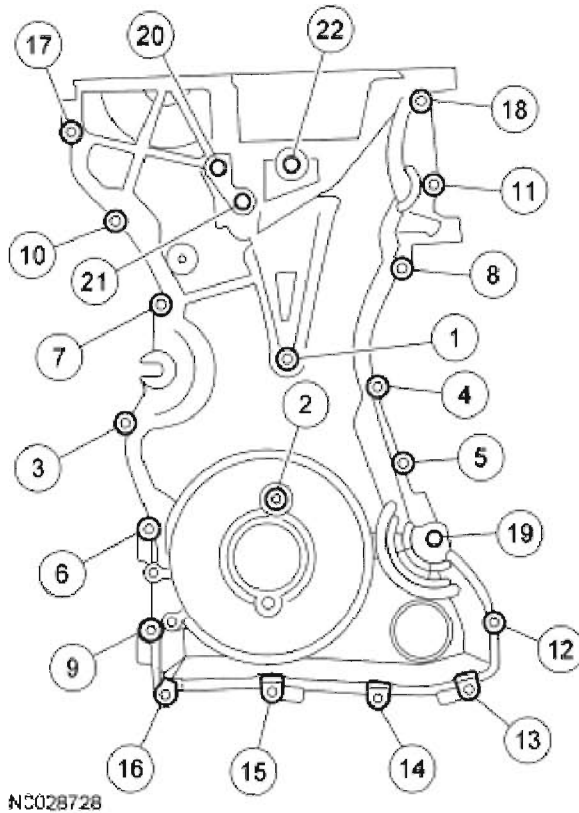


A0032803

**Fig. 45: Locating Silicone Gasket**  
Courtesy of FORD MOTOR CO.

2. Apply a 2.5 mm (0.09 in.) bead of silicone gasket and sealant to the cylinder head and oil pan joint areas. Apply a 2.5 mm (0.09 in.) bead of silicone gasket and sealant to the front cover.
3. Install the engine front cover. Tighten the bolts in the sequence shown, to the following specifications:
  - Tighten the 8 mm bolts to 10 N.m (89 lb-in).

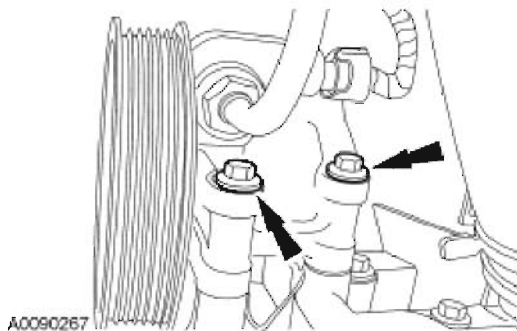
- Tighten the 13 mm bolts to 48 N.m (35 lb-ft).



**Fig. 46: Identifying Engine Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** The bolt under the power steering pressure tube will remain with the power steering pump.

4. Position the power steering pump and install the bolts.
  - Tighten to 25 N.m (18 lb-ft).



**Fig. 47: Identifying Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

5. Install the 2 remaining power steering pump bolts.

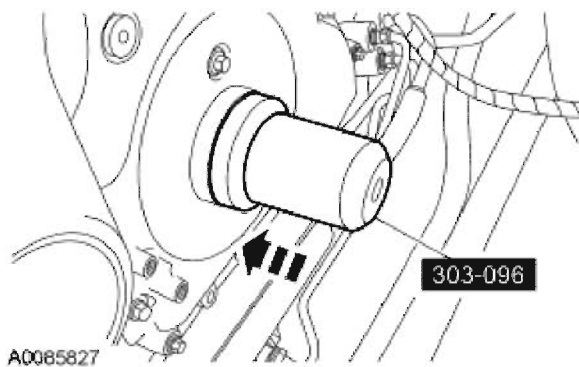
- Tighten to 25 N.m (18 lb-ft).



**Fig. 48: Locating Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

6. Install the coolant pump pulley and bolts.
  - Tighten to 20 N.m (15 lb-ft).

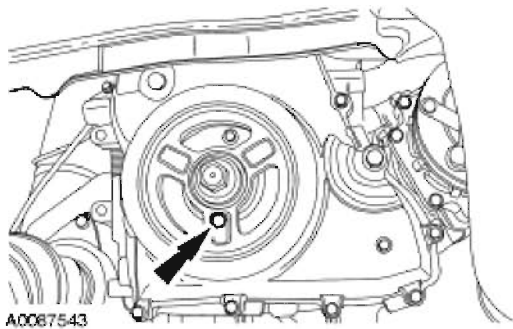
**NOTE:** Remove the through-bolt from the special tool.  
Lubricate the oil seal with clean engine oil.



**Fig. 49: Installing Crankshaft Front Oil Seal Using Special Tool (303-096)**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, install the crankshaft front oil seal.
8. Install the engine mount. For additional information, refer to **ENGINE MOUNT**.
9. Install the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY**.

**CAUTION:** Only hand-tighten the bolt or damage to the front cover can occur.

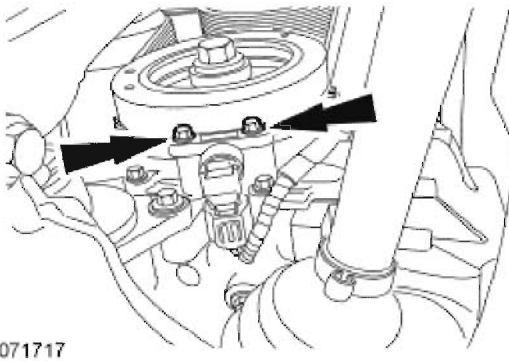


**Fig. 50: Aligning Crankshaft Pulley Bolt Holes**  
Courtesy of FORD MOTOR CO.

10. Install a standard 6 mm (0.23 in.) x 18 mm (0.7 in.) bolt through the crankshaft pulley and thread it into the front cover.

**NOTE:** Whenever the crankshaft position (CKP) sensor is removed, a new one must be installed using the alignment tool supplied with the new part.

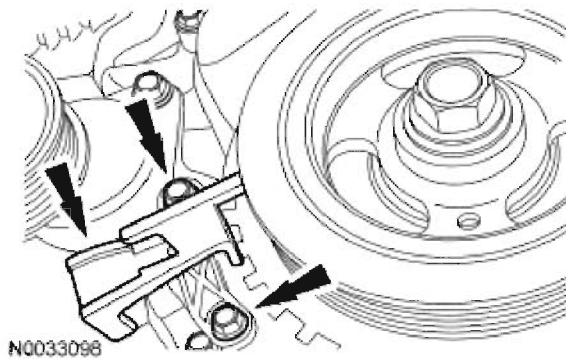
11. Install a new CKP sensor.
  - Do not tighten the bolts at this time.



**Fig. 51: Locating CKP Sensor Bolts (1 Of 2)**  
Courtesy of FORD MOTOR CO.

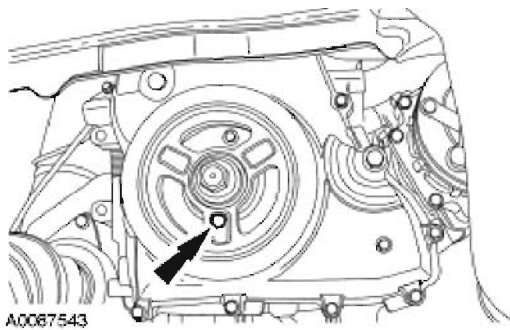
**NOTE:** The CKP sensor alignment tool is supplied with the new sensor and is not available separately.

12. Adjust the CKP sensor with the alignment tool.
  - Tighten the bolts to 7 N.m (62 lb-in).



**Fig. 52: Locating CKP Sensor Bolts (2 Of 2)**  
Courtesy of FORD MOTOR CO.

13. Connect the CKP sensor electrical connector.
14. Remove the 6 mm (0.23 in.) x 18 mm (0.7 in.) bolt.



**Fig. 53: Aligning Crankshaft Pulley Bolt Holes**  
Courtesy of FORD MOTOR CO.

15. Install the accessory drive belt and idler pulleys. For additional information, refer to **REMOVAL AND INSTALLATION - ACCESSORY DRIVE BELT** and **REMOVAL AND INSTALLATION - IDLER PULLEYS**.

## TIMING DRIVE COMPONENTS

### Materials

### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

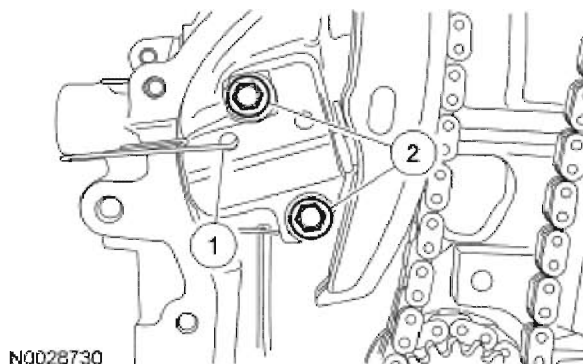
## Removal

**CAUTION:**

Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

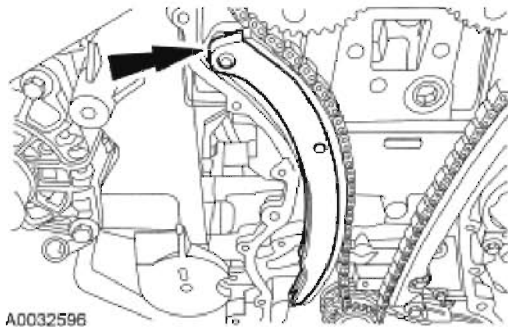
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.
3. Remove the timing chain tensioner.
  1. Compress the timing chain tensioner, and insert a paper clip into the hole to retain the tensioner.
  2. Remove the bolts and timing chain tensioner.



**Fig. 54: Identifying Bolts & Timing Chain Tensioner**  
Courtesy of FORD MOTOR CO.

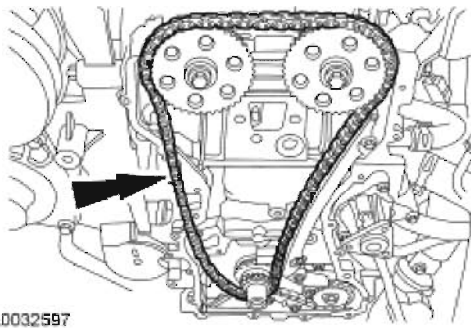


4. Remove the RH timing chain guide.



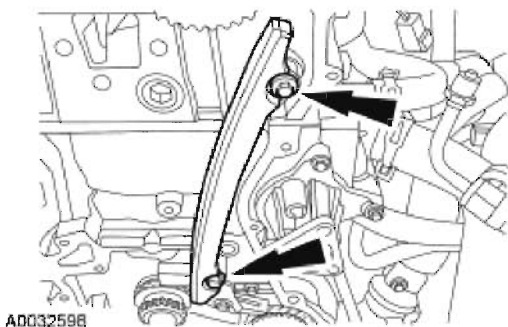
**Fig. 55: Locating RH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

5. Remove the timing chain.



**Fig. 56: View Of Timing Chain**  
Courtesy of FORD MOTOR CO.

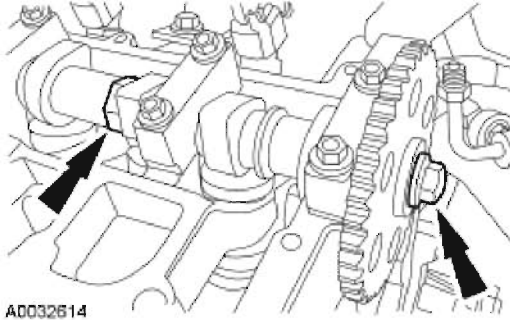
6. Remove the bolts and the LH timing chain guide.



**Fig. 57: Identifying Bolts And LH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

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

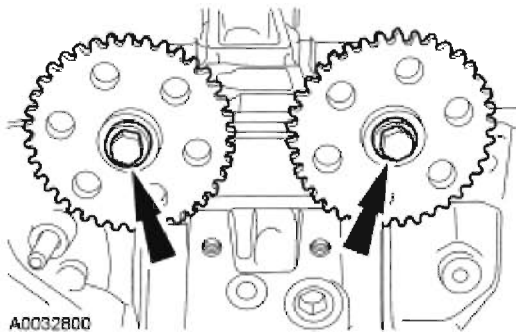
7. Remove the bolts and the camshaft sprockets.
  - Use the flats on the camshaft to prevent camshaft rotation.



**Fig. 58: Locating Cam Holding Area And Sprocket Bolt**  
Courtesy of FORD MOTOR CO.

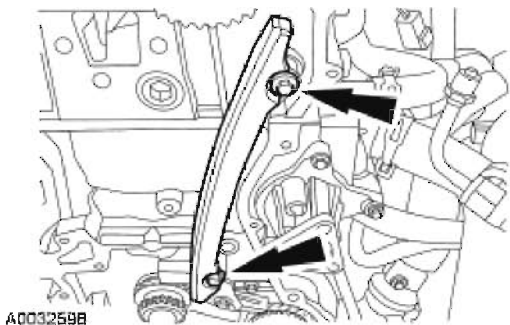
#### Installation

1. Install the camshaft sprockets and the bolts. Do not tighten the bolts at this time.



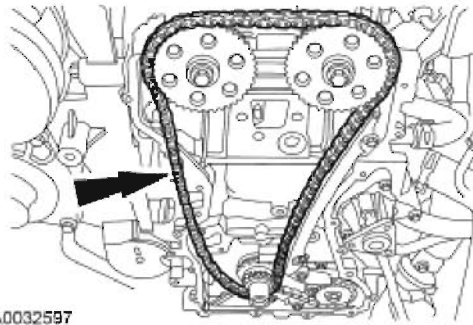
**Fig. 59: Locating Camshaft Sprocket Bolts**  
Courtesy of FORD MOTOR CO.

2. Install the LH timing chain guide and the bolts.
  - To install, tighten to 10 N.m (89 lb-in).



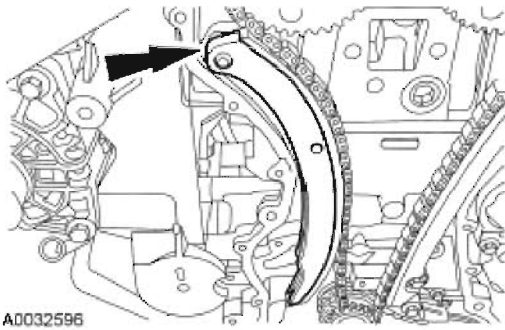
**Fig. 60: Identifying Bolts And LH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

3. Install the timing chain.



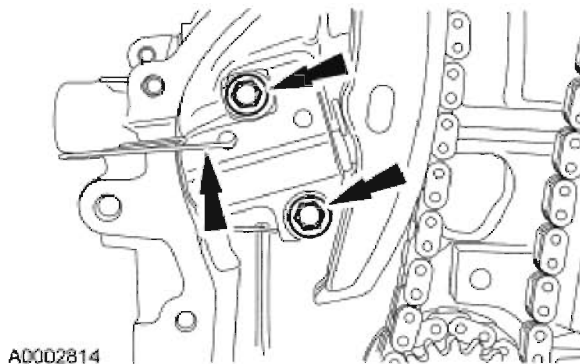
**Fig. 61: View Of Timing Chain**  
Courtesy of FORD MOTOR CO.

4. Install the RH timing chain guide.



**Fig. 62: Locating RH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

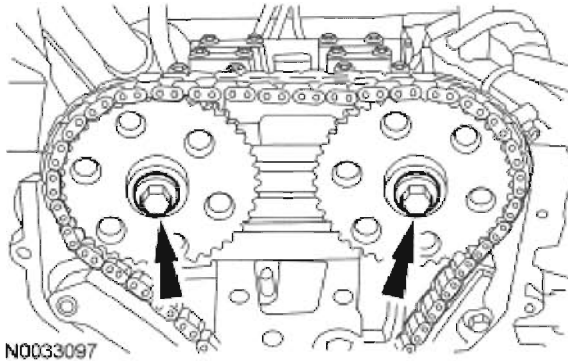
5. Install the timing chain tensioner and the bolts. Remove the paper clip to release the piston.
  - Tighten to 10 N.m (89 lb-in).



**Fig. 63: Locating Timing Chain Tensioner & Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

6. Using the flats on the camshafts to prevent camshaft rotation, tighten the bolts.
  - Tighten to 72 N.m (53 lb-ft).



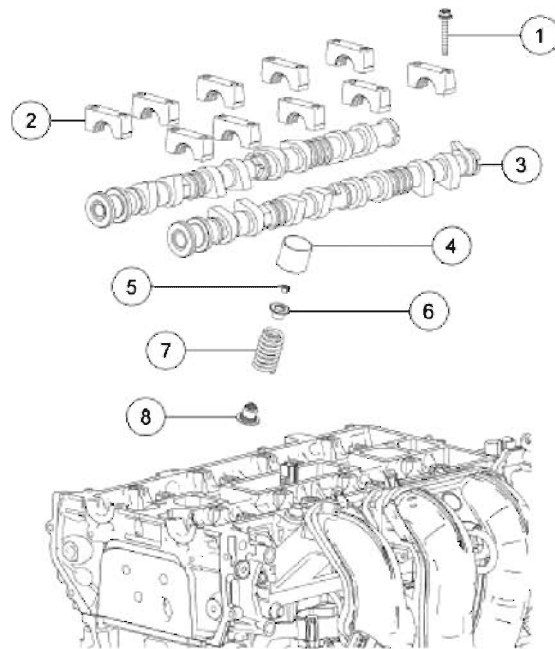
**Fig. 64: Locating Camshafts Bolts**  
Courtesy of FORD MOTOR CO.

7. Install the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.

#### VALVE TRAIN COMPONENTS - EXPLODED VIEW

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



A000511:

Item	Part Number	Description
1	W706283	Camshaft bearing cap bolt (20 required)
2	6A284	Camshaft bearing cap (10 required)
3	6A267	Camshaft (2 required)
4	6500	Valve tappet (16 required)
5	6518	Valve collet (16 required)

Item	Part Number	Description
6	6514	Valve spring retainer (16 required)
7	6513	Valve spring (16 required)
8	6517	Valve seal (16 required)

**Fig. 65: Identifying Valve Train Components**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the appropriate procedure.

### CAMSHAFTS

#### Special Tool(s)

#### SPECIAL TOOL(S)

Alignment Plate, Camshaft  
303-465 (T94P-6256-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST2645-A**



**ST2638-A**

Timing Peg, Crankshaft  
303-507

### Materials

### MATERIALS

Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

### Removal

**CAUTION:**

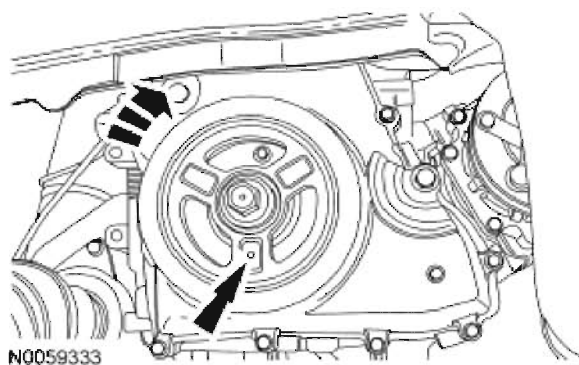
During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

Do not rotate the camshafts unless instructed to in this procedure. Rotating the camshafts or crankshaft with timing components loosened or removed can cause serious damage to the valves and pistons.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
3. Check the valve clearance. For additional information, refer to **VALVE CLEARANCE CHECK**.
4. Remove the accessory drive belt. For additional information, refer to **REMOVAL AND INSTALLATION**.

**CAUTION:** Failure to position the No. 1 piston at top dead center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.

5. Using the crankshaft pulley bolt, turn the crankshaft clockwise to position the No. 1 piston at TDC.
  - The hole in the crankshaft pulley should be in the 6 o'clock position.

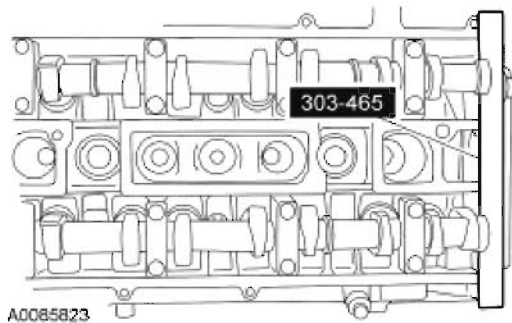


**Fig. 66: Removing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can

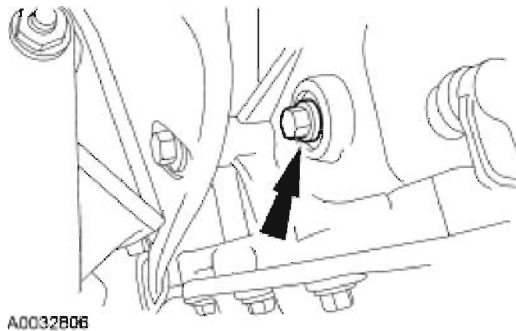
**result in engine damage.**

**NOTE:** The camshaft timing slots are offset. If the special tool cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.



**Fig. 67: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

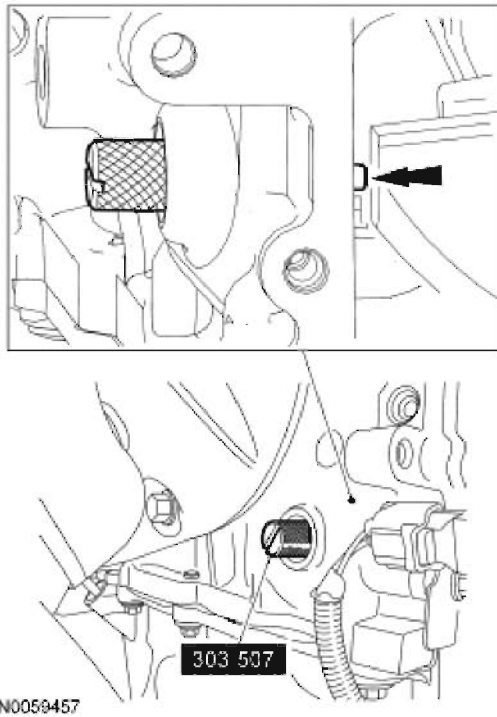
6. Install the special tool in the slots on the rear of both camshafts.
7. Remove the engine plug bolt.



**Fig. 68: Locating Engine Plug Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the camshaft removal and installation.

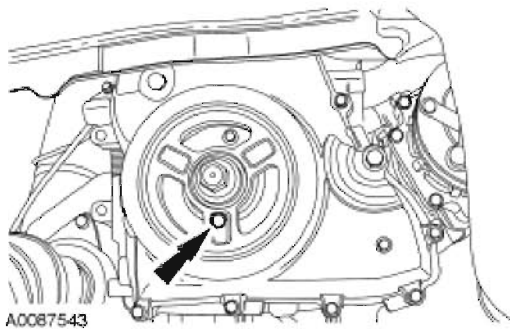




**Fig. 69: Identifying Special Tool (303-507)**  
Courtesy of FORD MOTOR CO.

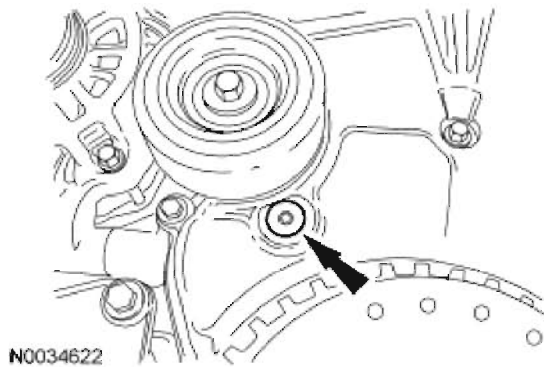
8. Install the special tool.

**CAUTION:** Only hand-tighten the bolt or damage to the front cover can occur.



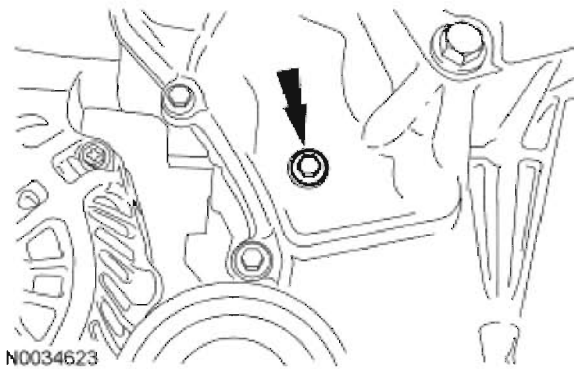
**Fig. 70: Aligning Crankshaft Pulley Bolt Holes**  
Courtesy of FORD MOTOR CO.

9. Install a standard 6 mm (0.23 in.) x 18 mm (0.7 in.) bolt through the crankshaft pulley and thread it into the front cover.
10. Remove the lower front cover timing hole plug from the engine front cover.



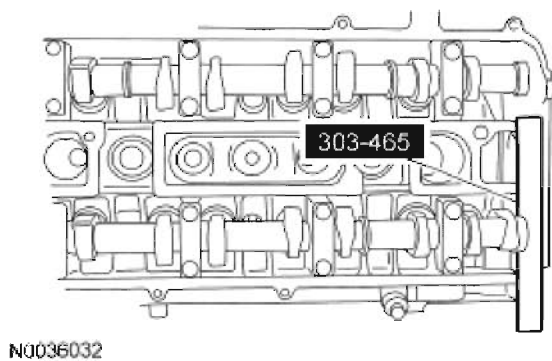
**Fig. 71: Locating Lower Front Cover Timing Hole Plug**  
Courtesy of FORD MOTOR CO.

11. Remove the upper front cover timing hole plug from the engine front cover.



**Fig. 72: Locating Upper Front Cover Timing Hole Plug**  
Courtesy of FORD MOTOR CO.

12. Reposition the special tool to the slot on the rear of the intake camshaft only.

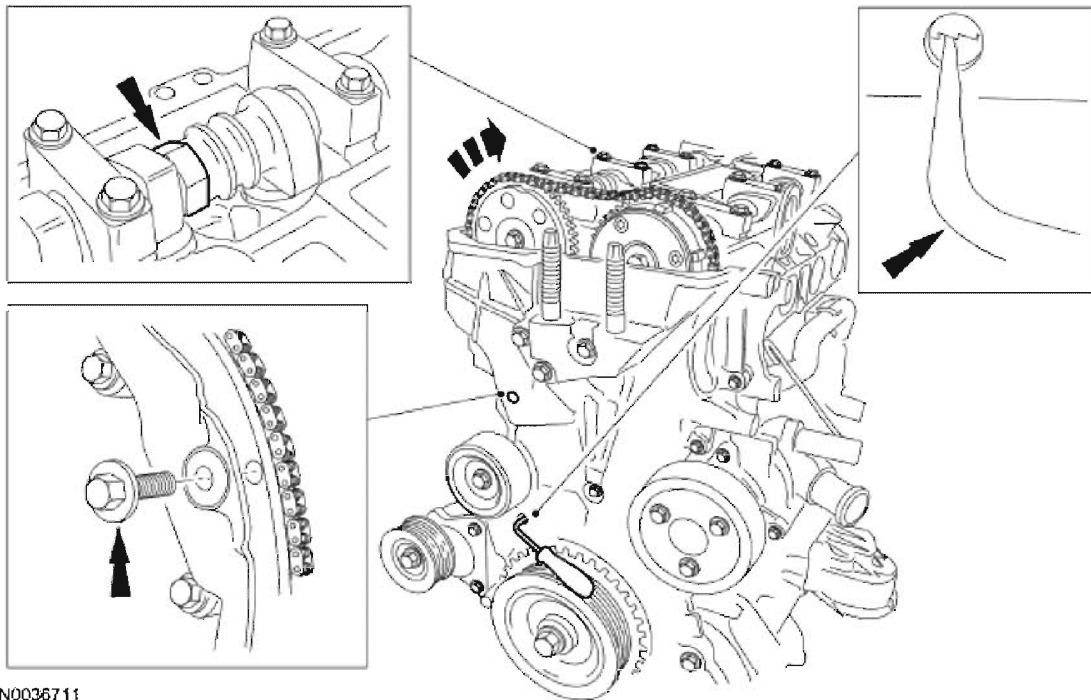


**Fig. 73: Identifying Special Tool (303-465) In Slots On Rear Of Camshafts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Releasing the ratcheting mechanism in the timing chain tensioner allows the plunger to collapse and create slack in

**the timing chain. Installing an M6 x 30 mm (1.18 in) bolt into the upper front cover timing hole will hold the tensioner arm in a retracted position and allow enough slack in the timing chain for removal of the exhaust camshaft gear.**

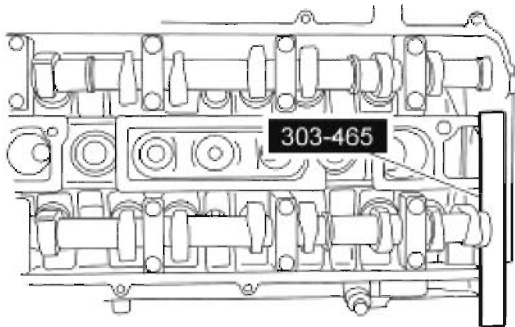
13. Using a small pick tool, unlock the chain tensioner ratchet through the lower front cover timing hole.
  - Using the flats of the camshaft, have an assistant rotate the exhaust camshaft clockwise to collapse the timing chain tensioner plunger.
  - Insert an M6 x 30 mm (1.18 in) bolt into the upper front cover timing hole to hold the tensioner arm in the retracted position.



**Fig. 74: Unlocking Chain Tensioner Ratchet Through Lower Front Cover Timing Hole**

**Courtesy of FORD MOTOR CO.**

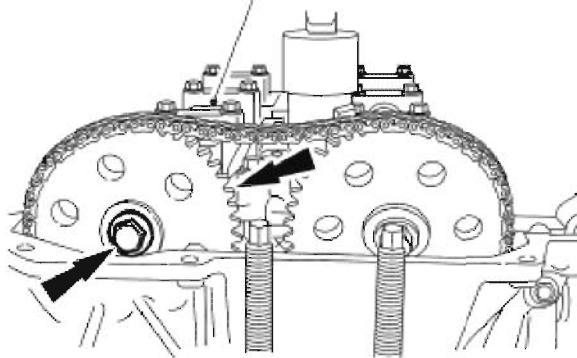
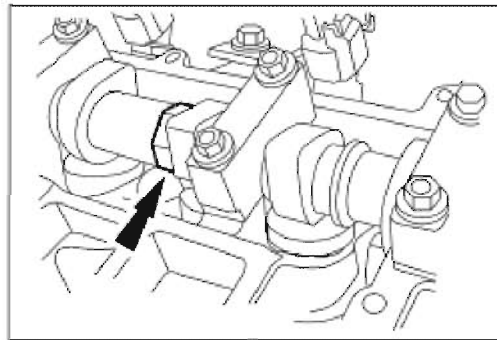
14. Remove the special tool.



N0036032

**Fig. 75: Identifying Special Tool (303-465) In Slots On Rear Of Camshafts**  
Courtesy of FORD MOTOR CO.

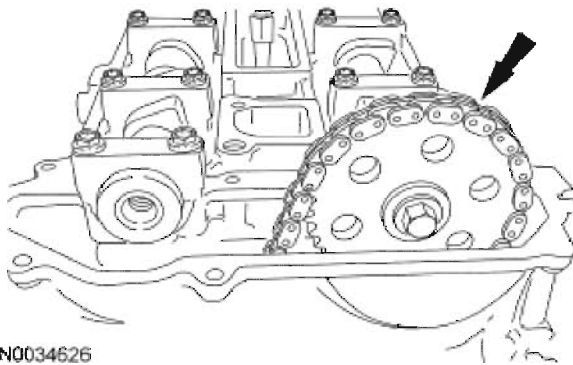
15. Using the flats on the camshaft to prevent camshaft rotation, remove the bolt and exhaust camshaft drive gear.



N0039584

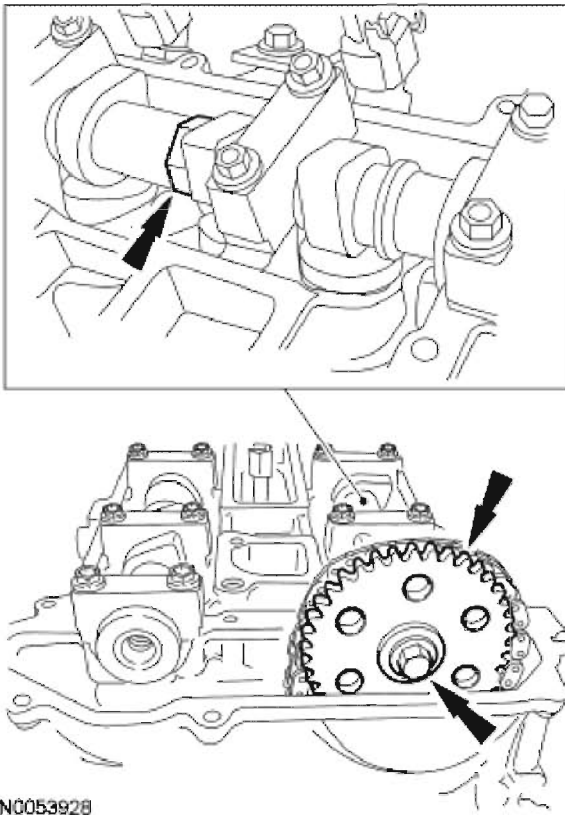
**Fig. 76: Locating Bolt & Exhaust Camshaft Drive Gear**  
Courtesy of FORD MOTOR CO.

16. Remove the timing chain from the intake camshaft drive gear.



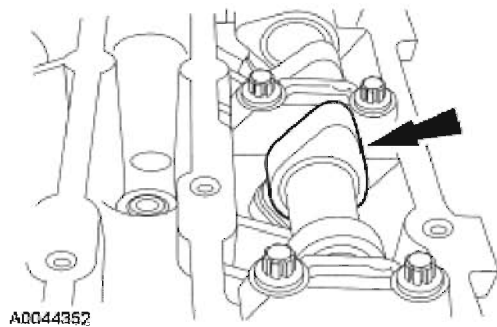
**Fig. 77: Locating Timing Chain**  
Courtesy of FORD MOTOR CO.

17. Using the flats on the camshaft to prevent camshaft rotation, remove the bolt and intake camshaft drive gear.



**Fig. 78: Locating Bolt & Intake Camshaft Drive Gear**  
Courtesy of FORD MOTOR CO.

18. Mark the position of the camshaft lobes on the No. 1 cylinder for installation reference.

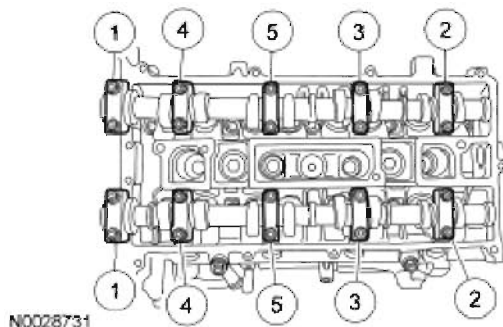


**Fig. 79: Locating Camshaft Lobe**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

19. Remove the camshafts from the engine.

- Loosen the camshaft bearing cap bolts, in sequence, one turn at a time until all tension is released from the camshaft bearing caps.
- Remove the bolts and the camshaft bearing caps.
- Remove the camshafts.



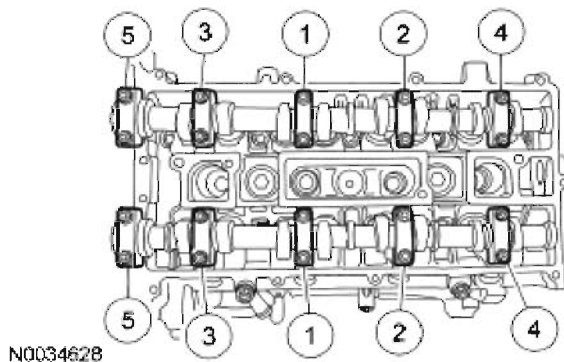
**Fig. 80: Identifying Loosening/Tightening Sequence Of Camshaft Bearing Bolts**  
Courtesy of FORD MOTOR CO.

## Installation

**CAUTION:** Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position can cause severe damage to the valves and pistons.

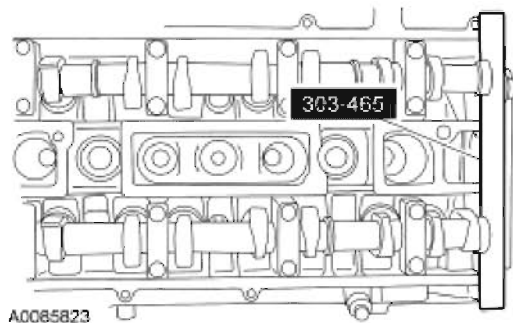
**NOTE:** Lubricate the camshaft journals and bearing caps with clean engine oil.

1. Install the camshafts and bearing caps. Tighten the bearing caps in the sequence shown in 3 stages:
  - Stage 1: Tighten the camshaft bearing cap bolts one turn at a time, until finger tight.
  - Stage 2: Tighten to 7 N.m (62 lb-in).
  - Stage 3: Tighten to 16 N.m (12 lb-ft).



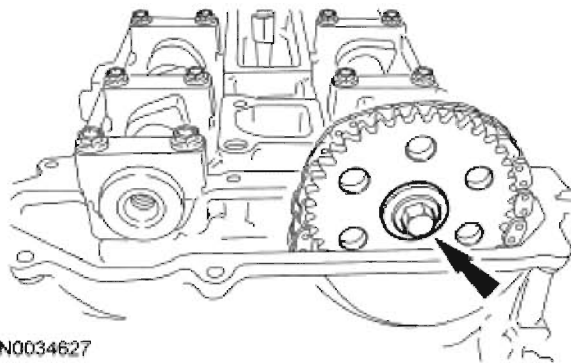
**Fig. 81: Identifying Bolts & Camshaft Bearing Caps**  
Courtesy of FORD MOTOR CO.

2. Install the special tool.



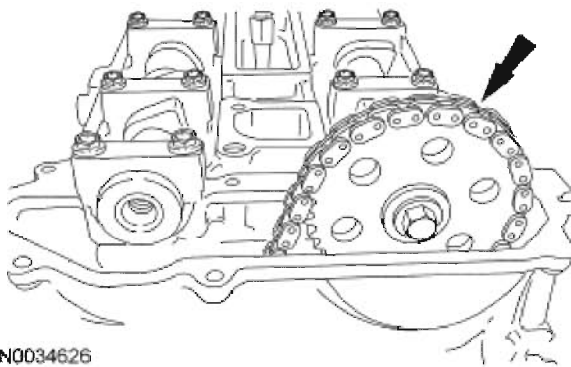
**Fig. 82: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

3. Install the intake camshaft drive gear and hand-tighten the bolt.



**Fig. 83: Identifying Intake Camshaft Drive Gear & Bolt**  
Courtesy of FORD MOTOR CO.

4. Install the timing chain on the intake camshaft drive gear.

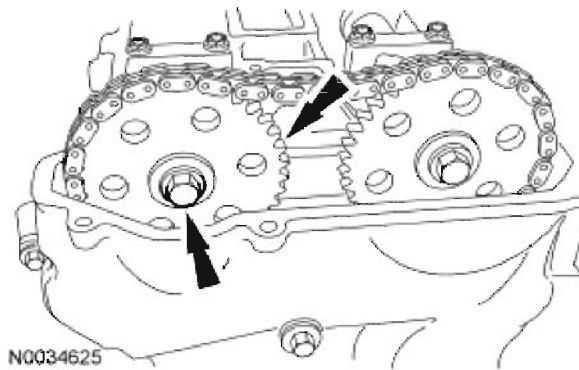


**Fig. 84: Locating Timing Chain On Intake Camshaft Drive Gear**  
Courtesy of FORD MOTOR CO.

**NOTE:** The timing chain must be correctly engaged on the teeth of the crankshaft timing sprocket and the intake camshaft drive gear in order to install the exhaust camshaft drive gear onto the exhaust camshaft.

5. Position the exhaust camshaft drive gear in the timing chain and install the gear and bolt on the exhaust camshaft.
  - Hand-tighten the bolt.





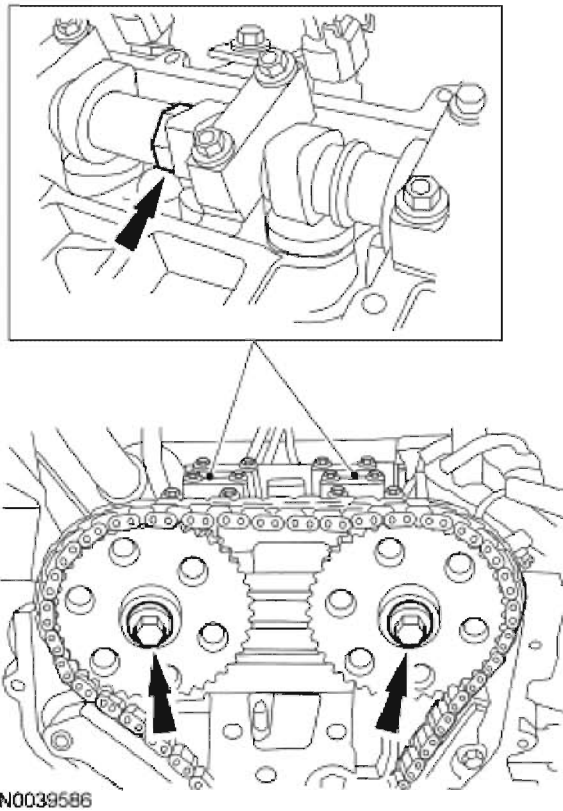
**Fig. 85: Locating Timing Chain Gear & Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** Releasing the tensioner arm will remove the slack from the timing chain release.

6. Remove the M6 x 30 mm bolt from the upper front cover timing hole to release the tensioner arm.

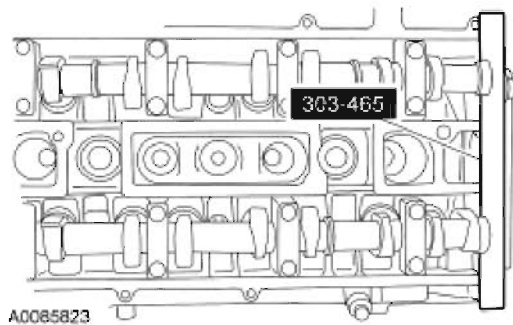
**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

7. Using the flats on the camshafts to prevent camshaft rotation, tighten the bolts.
  - Tighten to 72 N.m (53 lb-ft).



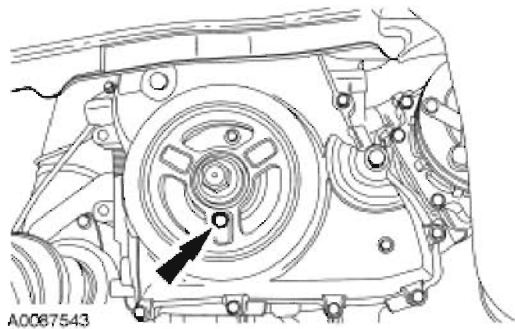
**Fig. 86: Locating Camshaft Bolt**  
Courtesy of FORD MOTOR CO.

8. Remove the special tool.



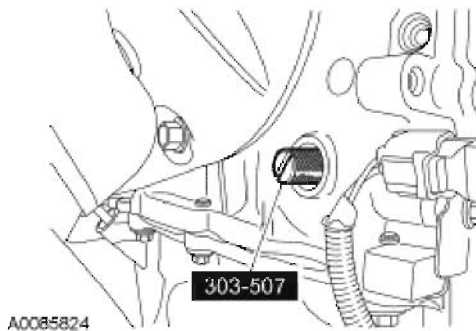
**Fig. 87: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

9. Remove the 6 mm (0.23 in) x 18 mm (0.7 in) bolt.



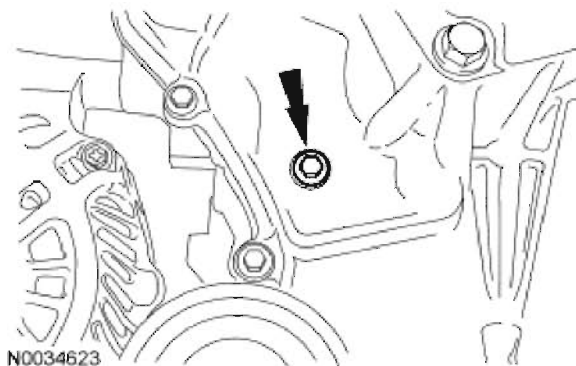
**Fig. 88: Aligning Crankshaft Pulley Bolt Holes**  
Courtesy of FORD MOTOR CO.

10. Remove the special tool.



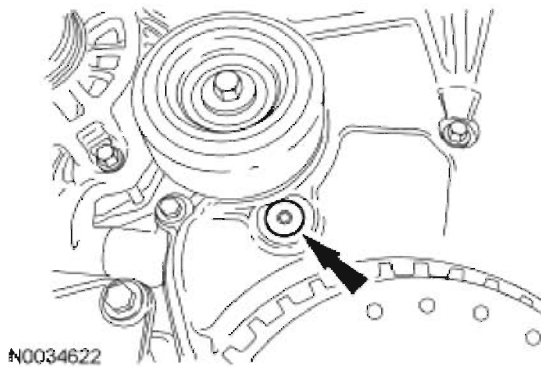
**Fig. 89: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

11. Install the upper front cover timing hole plug.
  - Tighten to 10 N.m (89 lb-in).



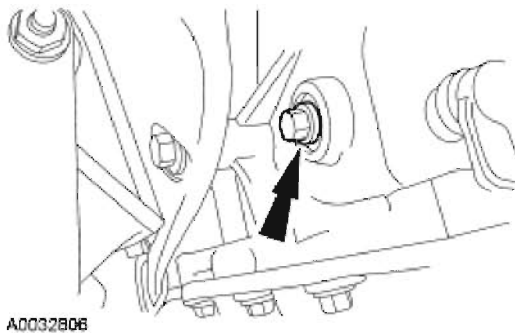
**Fig. 90: Locating Upper Front Cover Timing Hole Plug**  
Courtesy of FORD MOTOR CO.

12. Apply silicone gasket and sealant to the threads of the lower front cover timing hole plug.
  - Install the plug and tighten to 12 N.m (9 lb-ft).



**Fig. 91: Locating Lower Front Cover Timing Hole Plug**  
Courtesy of FORD MOTOR CO.

13. Install the engine plug bolt.
  - Tighten to 20 N.m (15 lb-ft).



**Fig. 92: Locating Engine Plug Bolt**  
Courtesy of FORD MOTOR CO.

14. Install the accessory drive belt. For additional information, refer to **REMOVAL AND INSTALLATION** .
15. Install the valve cover. For additional information, refer to **VALVE COVER**.
16. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .

## VALVE SPRINGS

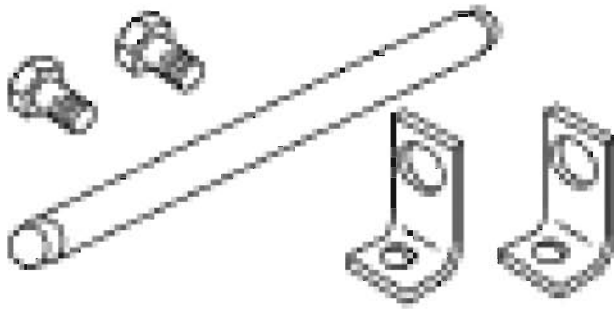
Special Tool(s)

## SPECIAL TOOL(S)

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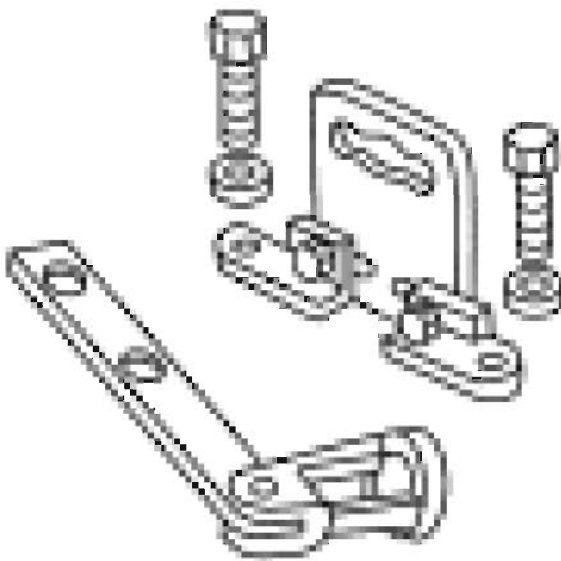
## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1981-A

Compressor, Valve Spring  
303-300 (T87C-6565-A)



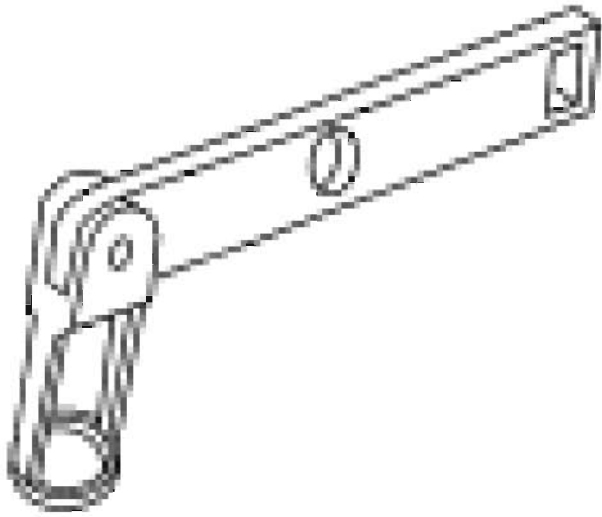
ST1907-A

Compressor, Valve Spring  
303-350 (T89P-6565-A)

Compressor, Valve Spring  
303-472 (T94P-6565-AH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1902-A

### Materials

### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

### Removal

**CAUTION:** During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS**.

### NOTE:

If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they

are assembled in their original positions.

The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

3. Remove and inspect the valve tappets. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .
4. Remove the spark plugs. For additional information, refer to **REMOVAL** .

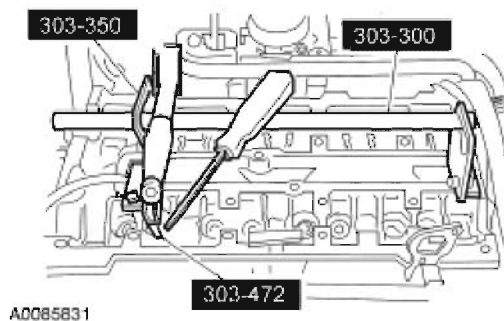
**WARNING:** Always wear protective goggles when working with compressed air. This can prevent injury. Failure to follow these instructions can result in personal injury.

**CAUTION:** Use compressed air at 7 to 10 bars (100-150 psi). Do not disconnect the compressed air from the cylinder until the valve spring, valve spring retainer and valve collet is installed. Any loss of air pressure will allow the valve to fall into the cylinder.

5. Connect the compressed air supply to cylinder No. 1.

**NOTE:** Place all parts in order to one side.

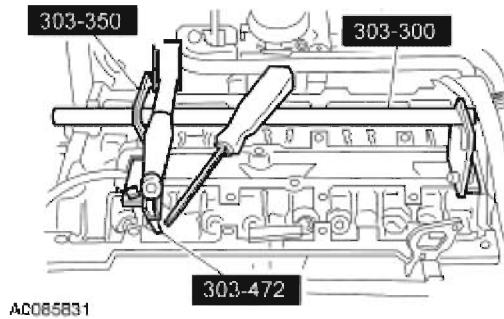
6. Apply compressed air to the cylinder and remove the valve spring.
  - Using the special tools, compress the valve spring and remove the valve collet, using some multi-purpose grease and a small screwdriver.
  - Remove the valve spring retainer and the valve spring.



**Fig. 93: Identifying Special Tools (303-300, 303-350, 303-472)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Check the seating of the valve collet.

1. Using the special tools, install the valve spring.
  - Insert the valve spring and the valve spring retainer.
  - Compress the valve spring and install the valve collet using some multi-purpose grease and a small screwdriver.



**Fig. 94: Identifying Special Tools (303-300, 303-350, 303-472)**  
Courtesy of FORD MOTOR CO.

2. Disconnect the compressed air supply.
3. Repeat the appropriate removal and installation steps for all of the other cylinders.
4. Install the spark plugs. For additional information, refer to **INSTALLATION**.
5. Coat the valve tappets with clean engine oil and insert them.
6. Install the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS**.

## VALVE SEALS

Special Tool(s)

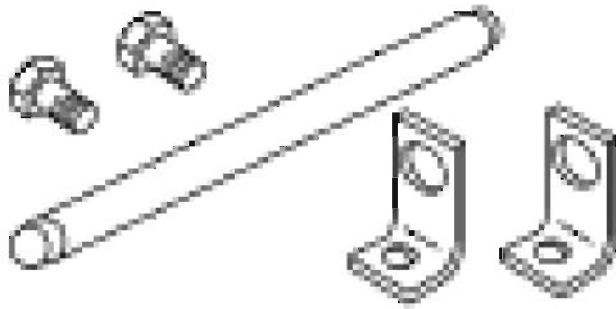
## SPECIAL TOOL(S)

Compressor, Valve Spring  
303-300 (T87C-6565-A)

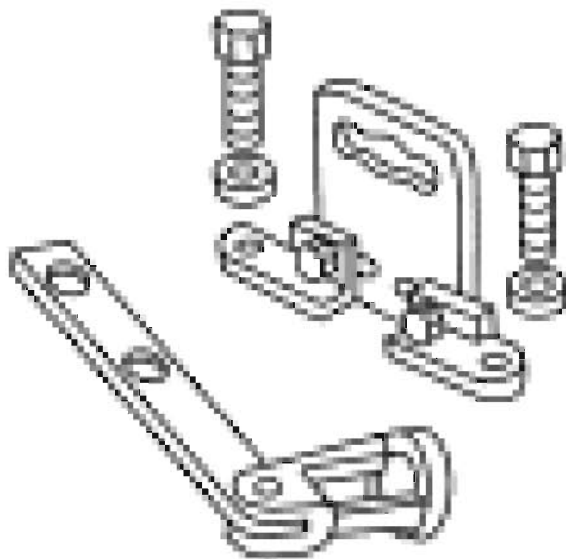


## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1981-A



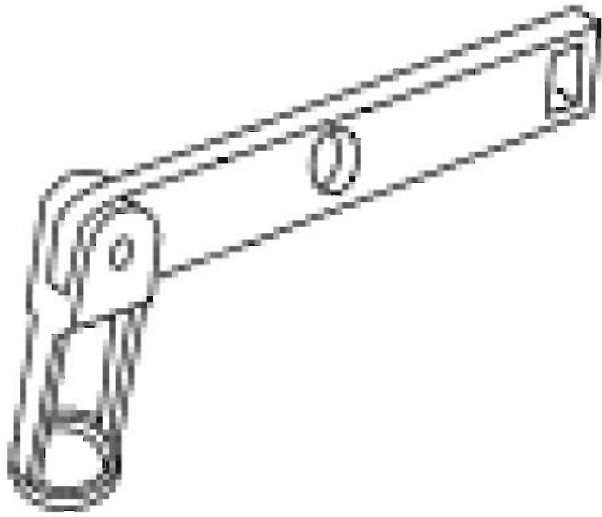
ST1907-A

Compressor, Valve Spring  
303-350 (T89P-6565-A)

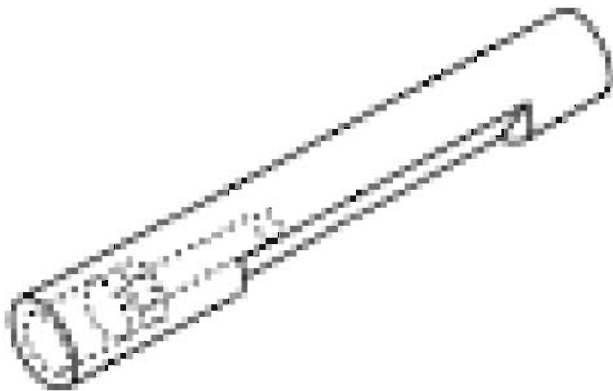
Compressor, Valve Spring  
303-472 (T94P-6565-AH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1902-A**



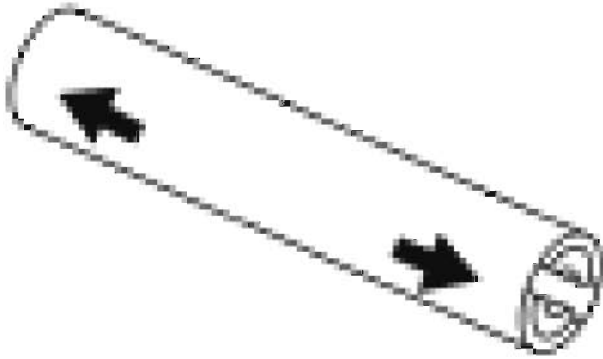
**ST1906-A**

Installer, Valve Stem Oil Seal  
303-470 (T94P-6510-CH)

Remover, Valve Stem Oil Seal  
303-468 (T94P-6510-AH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1904-A



ST1187-A

Slide Hammer  
307-005 (T59L-100-B)

### Materials

### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

### Removal

**CAUTION:** During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material

**created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS** .

**NOTE:**

**If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.**

**The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.**

3. Remove and inspect the valve tappets. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .
4. Remove the spark plugs. For additional information, refer to **REMOVAL** .

**WARNING:** Always wear protective goggles when working with compressed air. This can prevent injury. Failure to follow these instructions can result in personal injury.

**CAUTION:** Use compressed air at 7 to 10 bars (100-150 psi). Do not disconnect the compressed air from the cylinder until the valve spring, valve spring retainer and valve collet is installed. Any loss of air pressure will allow the valve to fall into the cylinder.

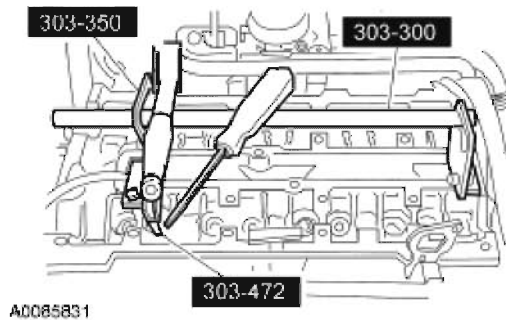
5. Connect the compressed air supply to cylinder No. 1.

**NOTE:** Place all parts in order to one side.

6. Apply compressed air to the cylinder and remove the valve spring.
  - Using the special tools, compress the valve spring and remove the valve collet, using some multi-purpose grease and a small screwdriver.
  - Remove the valve spring retainer and the valve spring.

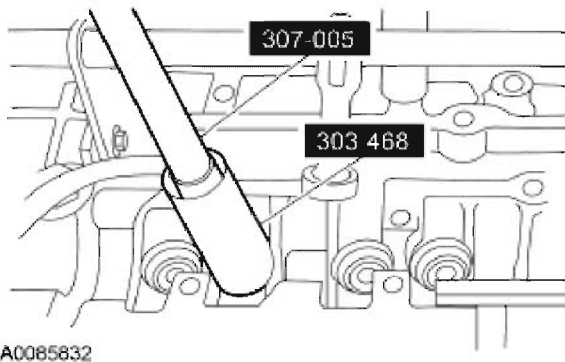
## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**Fig. 95: Identifying Special Tools (303-300, 303-350, 303-472)**  
Courtesy of FORD MOTOR CO.

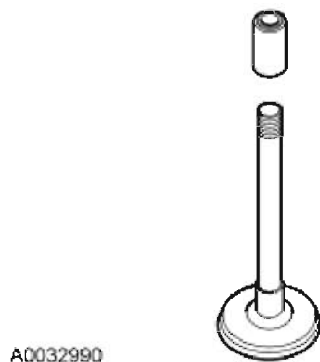
7. Using the special tools, remove and discard the valve seal.



**Fig. 96: Identifying Special Tools (307-005, 303-468)**  
Courtesy of FORD MOTOR CO.

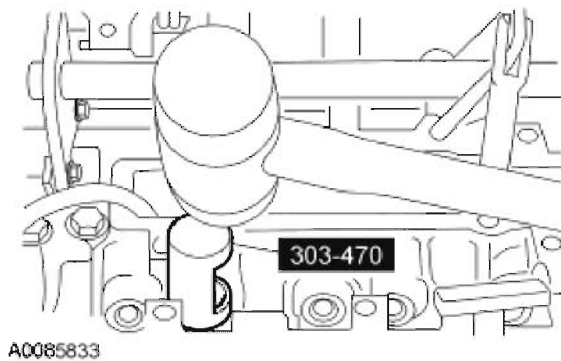
### Installation

1. Install the valve stem seal installation sleeve.



**Fig. 97: Identifying Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

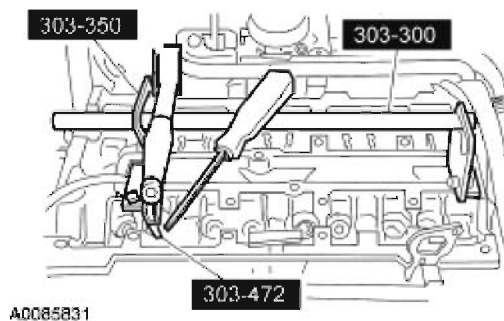
2. Using the special tool, install the valve seal.



**Fig. 98: Installing Valve Seal Using Special Tool (303-470)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Check the seating of the valve collet.

3. Using the special tools, install the valve spring.
  - Insert the valve spring and the valve spring retainer.
  - Compress the valve spring and install the valve collet using some multi-purpose grease and a small screwdriver.



**Fig. 99: Identifying Special Tools (303-300, 303-350, 303-472)**  
Courtesy of FORD MOTOR CO.

4. Disconnect the compressed air supply.
5. Repeat the appropriate removal and installation steps for all of the other cylinders.
6. Install the spark plugs. For additional information, refer to **INSTALLATION**.
7. Coat the valve tappets with clean engine oil and insert them.
8. Install the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS**.

## VALVE TAPPETS

### Materials

## 2006 Ford Escape

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### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

### Removal and Installation

**CAUTION:** During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS**.

**NOTE:** If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

3. Remove and inspect the valve tappets. For additional information refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
4. To install, reverse the removal procedure.
  - Coat the valve tappets with clean engine oil prior to installation.

### CYLINDER HEAD

### SPECIAL TOOL(S)

Alignment Plate, Camshaft  
303-465 (T94P-6256-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST2645-A**

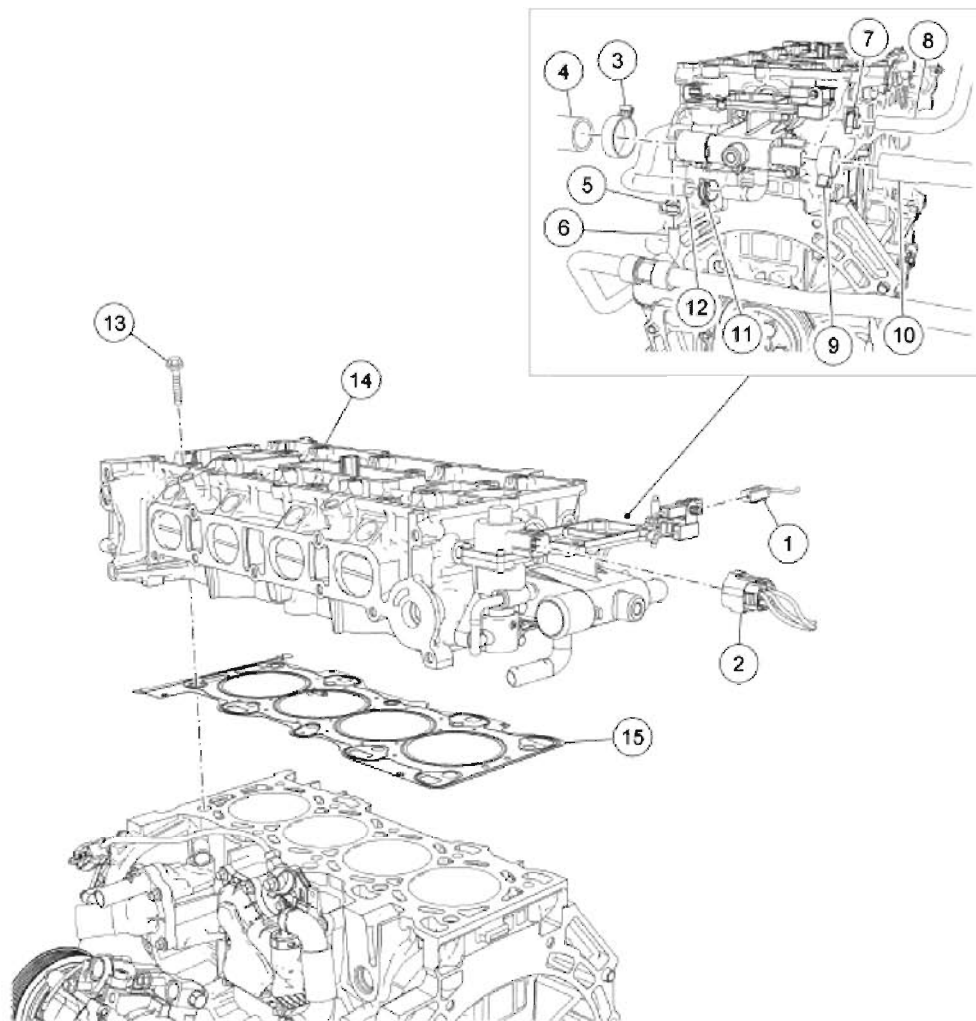
### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4



## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



A0005147

Item	Part Number	Description
1	14489	Radio ignition interference capacitor electrical connector (part of 12B637)
2	14A464	Exhaust gas recirculation (EGR) valve electrical connector (part of 12B637)
3	8287	Upper radiator hose clamp
4	8260	Upper radiator hose
5	W52592	EGR coolant tube clamp
6	18K580	EGR coolant hose (part of heater hose)

Item	Part Number	Description
7	—	Engine coolant vent hose clamp (part of 8W005)
8	8W005	Engine coolant vent hose
9	—	Heater hose clamp (part of 18K580)
10	18K580	Heater hose
11	W525958	Bypass hose clamp
12	8548	Bypass hose
13	6065	Cylinder head bolt (10 required) (F7AZ-19554-EA)
14	6050	Cylinder head
15	6051	Cylinder head gasket

**Fig. 100: Identifying Cylinder Head Components**  
Courtesy of FORD MOTOR CO.

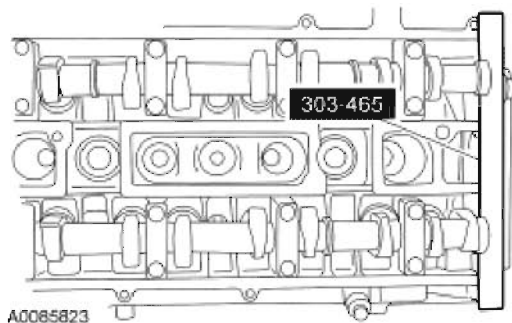
### Removal

**CAUTION:** Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in

this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

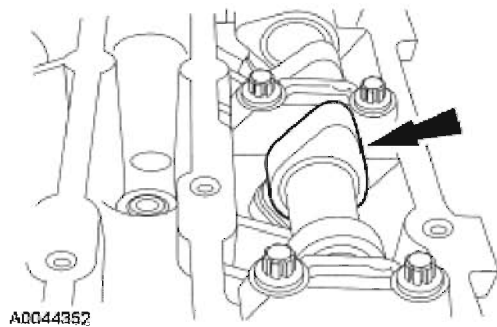
During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE**.
3. Drain the engine cooling system. For additional information, refer to **DRAINING**.
4. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.
5. Remove the special tool.



**Fig. 101: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

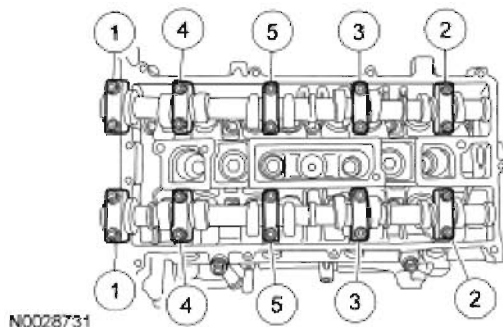
6. Mark the position of the camshaft lobes on the No. 1 cylinder for installation reference.



**Fig. 102: Locating Camshaft Lobe**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

7. Remove the camshafts from the engine.
  - Loosen the camshaft bearing cap bolts, in sequence, one turn at a time until all tension is released from the camshaft bearing caps.
  - Remove the bolts and the camshaft bearing caps.
  - Remove the camshafts.



**Fig. 103: Identifying Loosening/Tightening Sequence Of Camshaft Bearing Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

8. Remove the valve tappets.

**NOTE:** The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

9. Inspect the valve tappets. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .
10. Remove the intake manifold. For additional information, refer to **INTAKE MANIFOLD**.
11. Remove the exhaust manifold. For additional information, refer to **EXHAUST SYSTEM** .
12. Disconnect the radio ignition interference capacitor electrical connector.
13. Disconnect the exhaust gas recirculation (EGR) valve electrical connector.
14. Disconnect the EGR coolant hose from the EGR valve.
15. Disconnect the upper radiator hose, coolant bypass hose, heater hose and coolant vent hose from the engine coolant outlet.
16. Remove the bolts and the cylinder head.
  - Discard the bolts and the cylinder head gasket.

**Installation****CAUTION:**

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

**Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.**

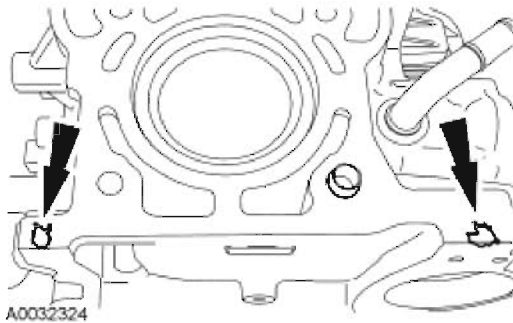
**NOTE:**

**If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.**

1. Clean the cylinder head-to-cylinder block mating surface of both the cylinder head and the cylinder block.
  1. Remove any large deposits of silicone or gasket material with a plastic scraper.
  2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.
  3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
  4. Apply metal surface prep, following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not

attempt to make the metal shiny. Some staining of the metal surfaces is normal.

2. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
3. Inspect the cylinder head for distortion. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
4. Apply silicone gasket and sealant to the locations shown in **Fig. 104**.



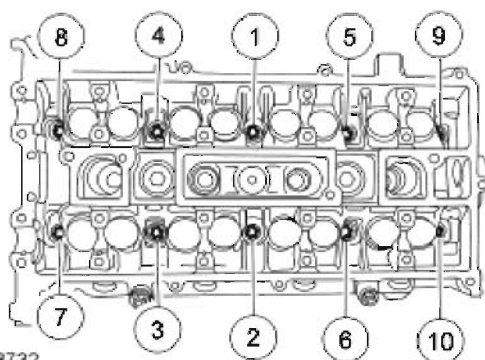
**Fig. 104: Identifying Silicone Gasket And Sealant Location**  
Courtesy of FORD MOTOR CO.

5. Install a new head gasket.

**NOTE:**

**The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed. Lubricate the bolts with clean engine oil prior to installation.**

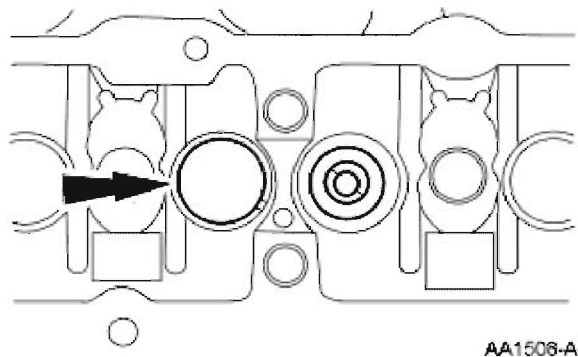
6. Install new cylinder head bolts. Tighten the bolts in the sequence shown in 5 stages:
  - Stage 1: Tighten to 5 N.m (44 lb-in).
  - Stage 2: Tighten to 15 N.m (11 lb-ft).
  - Stage 3: Tighten to 45 N.m (33 lb-ft).
  - Stage 4: Turn 90 degrees.
  - Stage 5: Turn an additional 90 degrees.



**Fig. 105: Identifying Cylinder Head Bolts**  
Courtesy of FORD MOTOR CO.

7. Connect the upper radiator hose, coolant bypass hose, heater hose and coolant vent hose to the engine coolant outlet.
8. Connect the EGR coolant hose to the EGR valve.
9. Connect the exhaust gas recirculation (EGR) valve electrical connector.
10. Connect the radio ignition interference capacitor electrical connector.
11. Install the exhaust manifold. For additional information, refer to **EXHAUST SYSTEM**.
12. Install the intake manifold. For additional information, refer to **INTAKE MANIFOLD**.

**NOTE:** Lubricate the valve tappets with clean engine oil.



**Fig. 106: Locating Intake Manifold**  
Courtesy of FORD MOTOR CO.

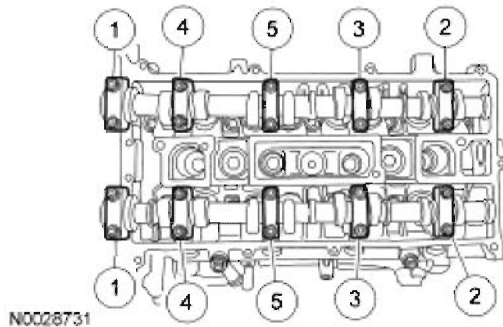
13. Install the valve tappets in their original positions.

**CAUTION:** Install the camshafts with the alignment notches in the camshafts lined up so the camshaft alignment plate can be installed. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal procedure. Failure to follow this procedure can cause severe damage to the valves and pistons.

**NOTE:** Lubricate the camshaft journals and bearing caps with clean engine oil.

14. Install the camshafts and bearing caps. Tighten the bolts in the sequence shown in 3 stages.

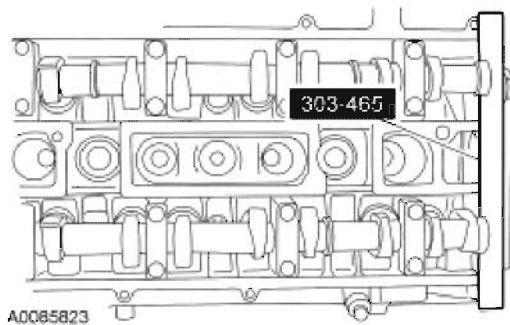
- Stage 1: Tighten the camshaft bearing cap bolts, one turn at a time, until finger tight.
- Stage 2: Tighten the bolts to 7 N.m (62 lb-in).
- Stage 3: Tighten the bolts to 16 N.m (12 lb-ft).



**Fig. 107: Identifying Loosening/Tightening Sequence Of Camshaft Bearing Bolts**

**Courtesy of FORD MOTOR CO.**

15. Install the special tool.



**Fig. 108: Identifying Special Camshaft Tool (303-465)**

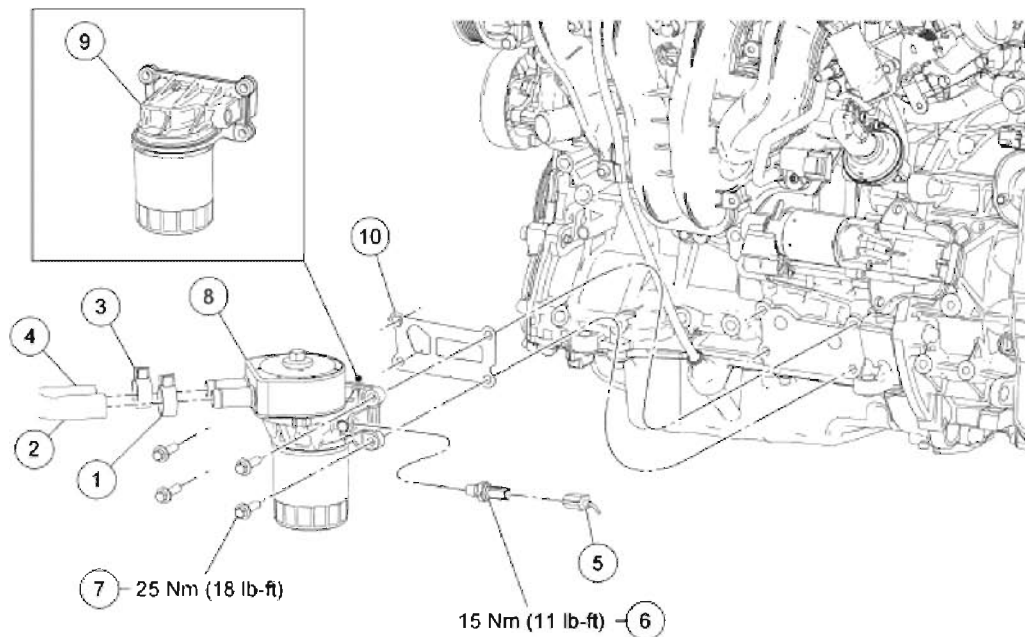
**Courtesy of FORD MOTOR CO.**

16. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.
17. Fill and bleed the engine cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

## **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW**

## 2006 Ford Escape

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N0047206

Item	Part Number	Description
1	—	Heater hose clamp (part of 18K580) (early build)
2	18K850	Heater hose (early build)
3	8287A	Coolant hose clamp (early build)
4	8A593	Coolant hose (early build)
5	14A464	Oil pressure sender electrical connector (part of 12B637)

Item	Part Number	Description
6	9278	Oil pressure sender
7	W500225	Oil filter adapter bolt (4 required)
8	6884	Oil filter adapter (early build)
9	6881	Oil filter adapter (late build)
10	6A636	Oil filter adapter gasket

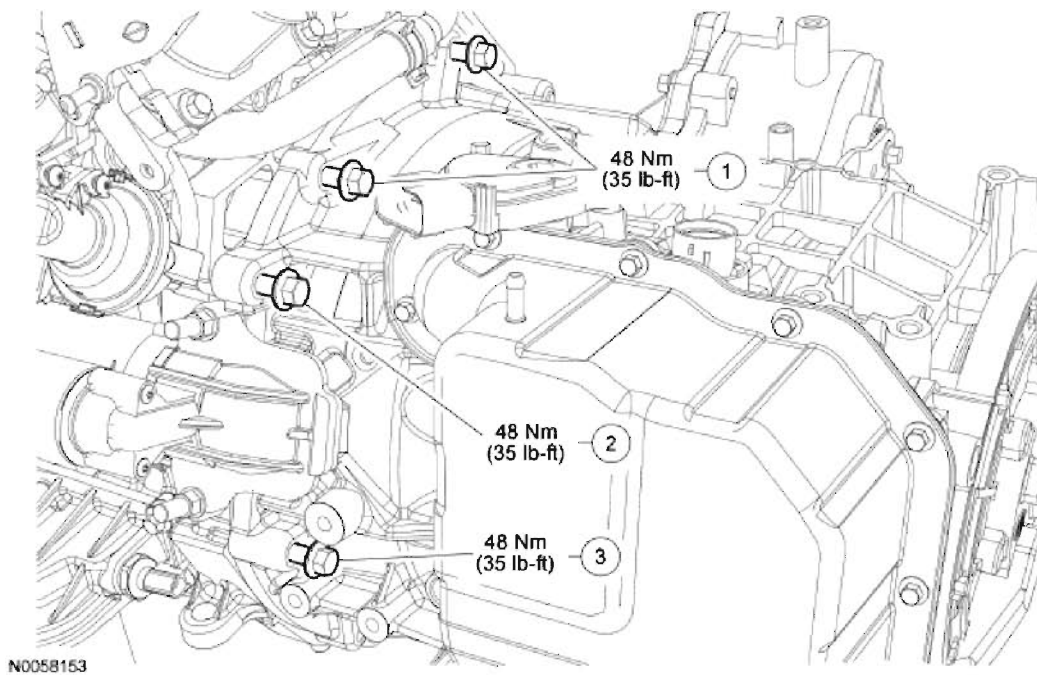
**Fig. 109: Identifying Oil Filter Adapter & Oil Pressure Sender Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Automatic transmission shown, manual transmission similar.



## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



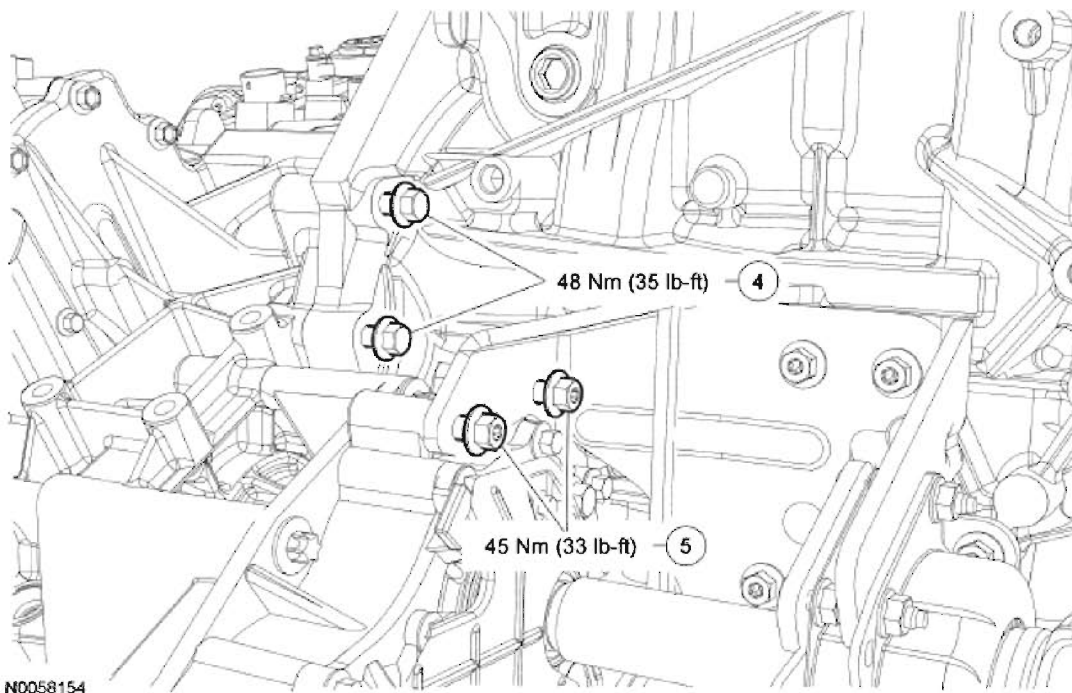
Item	Part Number	Description
1	W500121	Upper bellhousing-to-engine bolts
2	W500121	Front lower bellhousing-to-engine bolt

Item	Part Number	Description
3	W500125	Front lower bellhousing-to-engine bolt

**Fig. 110: Identifying Oil Pan, Oil Pump Screen & Pickup Tube (FWD) Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

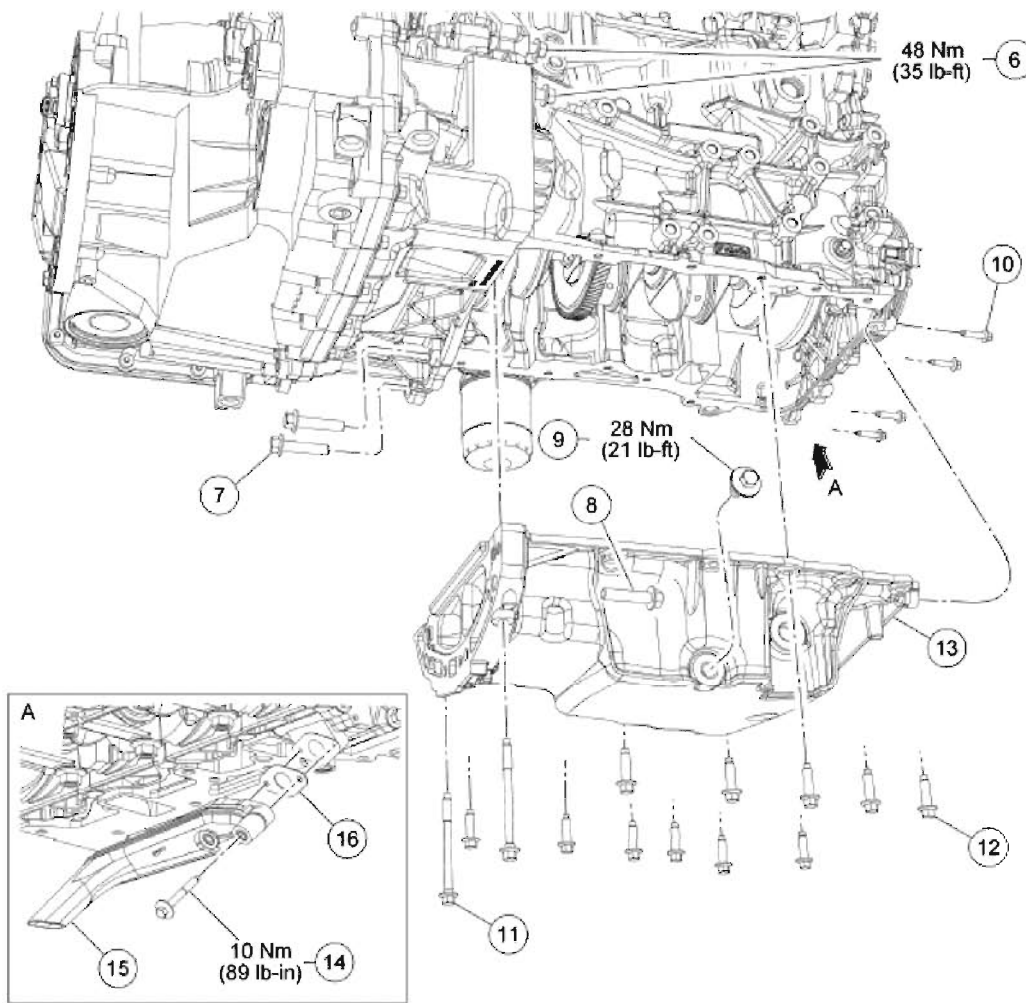


Item	Part Number	Description
4	W500125	Rear lower engine-to-bellhousing bolts
5	W707386	Upper engine bracket-to-power transfer unit (PTU) bolts

**Fig. 111: Identifying Oil Pan, Oil Pump Screen & Pickup Tube (AWD) Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

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N0058155

Item	Part Number	Description
6	W500120	Rear lower engine-to-bellhousing bolts
7	W500121	Bellhousing-to-oil pan bolt (2 required)
8	W500121	Oil pan-to-bellhousing bolt (2 required)
9	6730	Oil pan drain plug
10	W500215	Engine front cover-to-oil pan bolt (4 required)

Item	Part Number	Description
11	W706284	Oil pan bolt (2 required)
12	W500224	Oil pan bolt (11 required)
13	6675	Oil pan
14	W706282	Oil pump screen and pickup tube bolt (2 required)
15	6622	Oil pump screen and pickup tube
16	6625	Oil pump screen and pickup tube gasket

**Fig. 112: Identifying Oil Pan, Oil Pump Screen & Pickup Tube (FWD) Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the appropriate procedure.

### OIL FILTER ADAPTER

#### Removal and Installation

**All vehicles**

## 2006 Ford Escape

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1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the 5 bolts and the RH splash shield.
  - To install, tighten to 9 N.m (80 lb-in).

### Early build vehicles

3. Drain the engine cooling system. For additional information, refer to **DRAINING** .
4. Disconnect the 2 coolant hoses from the oil cooler.

### All vehicles

5. Disconnect the oil pressure sender electrical connector.

**NOTE:**      **Discard the gasket.**

6. Remove the 4 bolts and the oil filter adapter.
  - To install, tighten to 25 N.m (18 lb-ft).
7. To install, reverse the removal procedure.

### Early build vehicles

8. Fill and bleed the engine cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

## ENGINE OIL PRESSURE (EOP) SWITCH

### Materials

### MATERIALS

Item	Specification
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the 5 bolts and the RH splash shield.
  - To install, tighten to 9 N.m (80 lb-in).
3. Disconnect the oil pressure sender electrical connector.
4. Remove the oil pressure sender.

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

- To install, tighten to 15 N.m (11 lb-ft).
5. To install, reverse the removal procedure.
    - Apply thread sealant to the oil pressure sender threads.

### OIL PAN

#### Materials

### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A

#### Removal

##### All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION** .

**CAUTION:** To prevent damage to the transmission, do not loosen the transmission-to-engine bolts more than 5 mm (0.19 in).

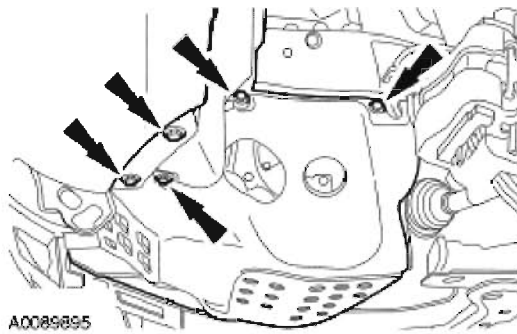
3. Loosen the 2 top bellhousing-to-engine bolts 5 mm (0.19 in).

##### All wheel drive (AWD) vehicles

4. Working from the top of the vehicle, loosen the 2 rear lower engine-to-bellhousing bolts 5 mm (0.19 in).
5. Working from under the vehicle, loosen the 2 upper engine bracket-to-power transfer unit (PTU) bolts 5 mm (0.19 in).

##### All vehicles

6. Remove the 7 retainers and the LH splash shield.



**Fig. 113: View Of LH Splash Shield And Retainers**  
**Courtesy of FORD MOTOR CO.**

7. Remove the oil level indicator and tube. For additional information, refer to **OIL LEVEL INDICATOR AND TUBE**.
8. Loosen the 2 front lower bellhousing-to-engine bolts 5 mm (0.19 in).

#### **Front wheel drive (FWD) vehicles**

9. Loosen the 1 (manual transmission) and 2 (automatic transmission) rear lower engine-to-bellhousing bolt 5 mm (0.19 in).

#### **All vehicles**

10. Remove the 2 oil pan-to-bellhousing bolts.
11. Remove the 2 bellhousing-to-oil pan bolt.
12. Slide the transmission rearward 5 mm (0.19 in).
13. Drain the engine oil.
  - Install the drain plug.
  - To install, tighten to 28 N.m (21 lb-ft).
14. Remove the 4 engine front cover-to-oil pan bolts.
15. Remove the 13 bolts and the oil pan.

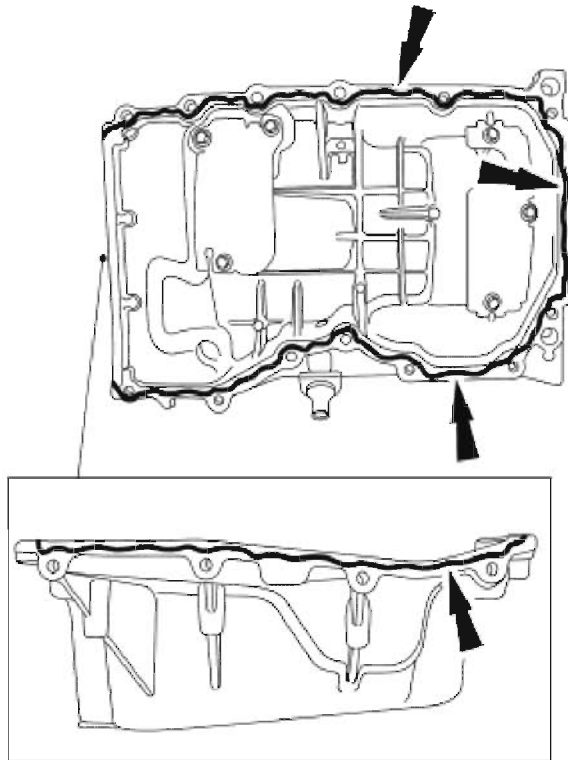
#### **Installation**

#### **All vehicles**

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

1. Clean and inspect all mating surfaces.

**NOTE:** If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.



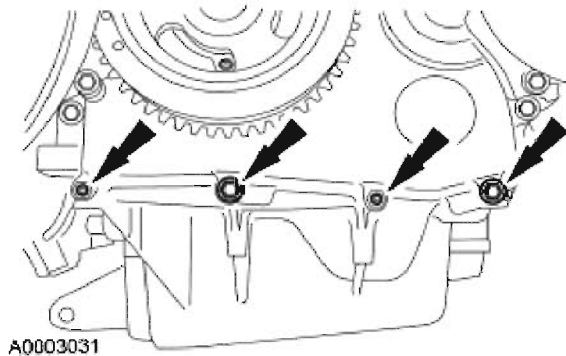
N00594C2

**Fig. 114: Locating Silicone Gasket**  
Courtesy of FORD MOTOR CO.

2. Apply a 2.5 mm (0.09 in) bead of silicone gasket and sealant to the oil pan-to-engine block and to the oil pan-to-engine front cover mating surface.
3. Position the oil pan onto the engine and install the oil pan bolts finger-tight.

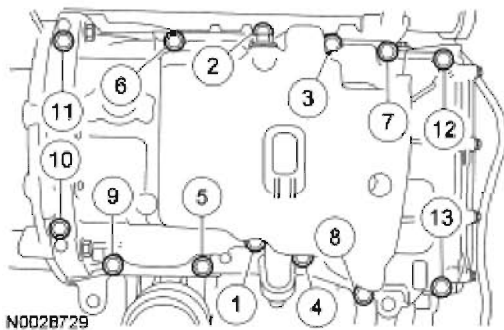
**CAUTION:** The engine front cover-to-oil pan bolts must be tightened first to align the front surface of the oil pan flush with the front surface of the engine block.

4. Install the 4 engine front cover-to-oil pan bolts.
  - Tighten to 10 N.m (89 lb-in).



**Fig. 115: Locating Engine Front Cover-To-Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

5. Tighten the oil pan bolts in the sequence shown in **Fig. 116**.
  - Tighten to 25 N.m (18 lb-ft).



**Fig. 116: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

### **FWD vehicles**

6. Alternate tightening the 1 front and 1 rear lower bolts to slide the transmission and engine together.
  - Tighten to 48 N.m (35 lb-ft).
7. Tighten the remaining front lower bolt and rear lower bolt (automatic transmission).
  - Tighten to 48 N.m (35 lb-ft).

### **AWD vehicles**

8. Alternate tightening the 1 upper engine-to-PTU bracket bolt and 1 front lower bolt to slide transmission and engine together.
  - Tighten the PTU bracket bolt to 45 N.m (33 lb-ft).
  - Tighten the front lower bolt to 48 N.m (35 lb-ft).
9. Tighten the remaining upper engine-to-PTU bracket bolt.
  - Tighten to 45 N.m (33 lb-ft).



10. Tighten the remaining front lower bolt.

- Tighten to 48 N.m (35 lb-ft).

### **All vehicles**

11. Install the 2 bellhousing-to-oil pan bolts.

- Tighten to 48 N.m (35 lb-ft).

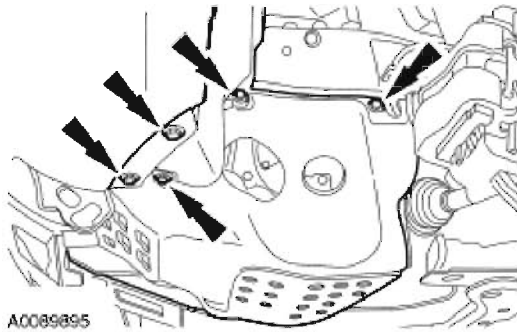
12. Install the 2 oil pan-to-bellhousing bolts.

- Tighten to 48 N.m (35 lb-ft).

13. Install the oil level indicator and tube. For additional information, refer to **OIL LEVEL INDICATOR AND TUBE**.

14. Install the LH splash shield and the 7 retainers.

- Tighten to 9 N.m (80 lb-in).



**Fig. 117: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

### **AWD vehicles**

15. Working from the top of vehicle, tighten the 2 rear lower engine-to-bellhousing bolts.

- Tighten to 48 N.m (35 lb-ft).

### **All vehicles**

16. Tighten the 2 top bellhousing-to-engine bolts.

- Tighten to 48 N.m (35 lb-ft).

17. Install the air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION**.

18. Fill the engine with clean engine oil.

## **OIL PUMP SCREEN AND PICKUP TUBE**

### **Removal and Installation**

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the oil pan. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PAN**.

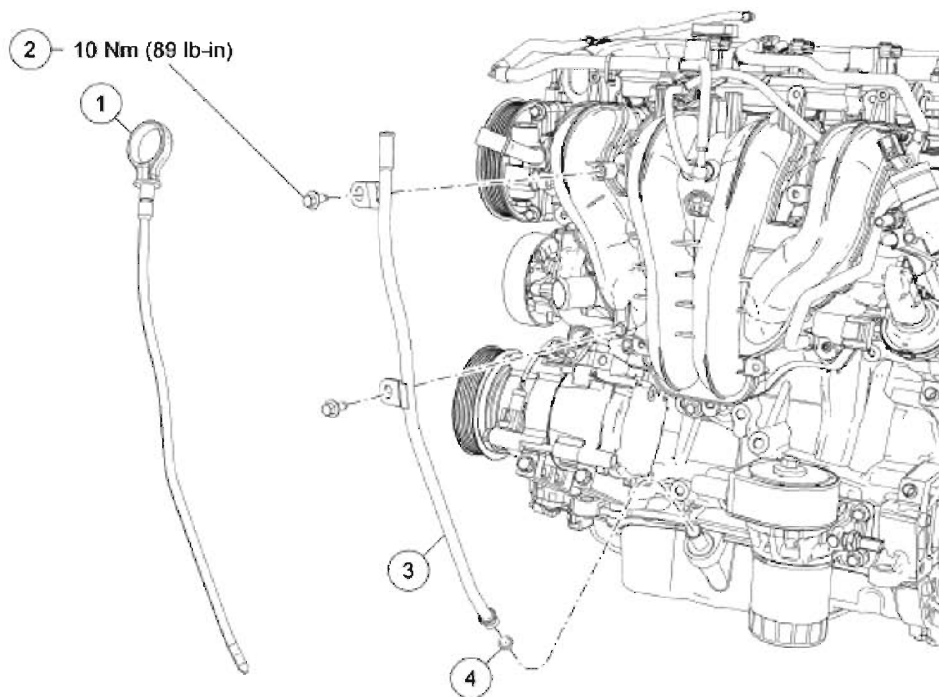
**NOTE:**      **Discard the gasket and clean and inspect the gasket mating surfaces.**

3. Remove the 2 bolts and the oil pump screen and pickup tube.
  - To install, tighten to 10 N.m (89 lb-in).
4. To install, reverse the removal procedure.

### OIL LEVEL INDICATOR AND TUBE

### MATERIALS

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930- A



A0005170

Item	Part Number	Description
1	6750	Oil level indicator
2	W50581	Oil level indicator tube bolt (2 required)
3	6754	Oil level indicator tube
4	6754-B	Oil level indicator tube O-ring seal

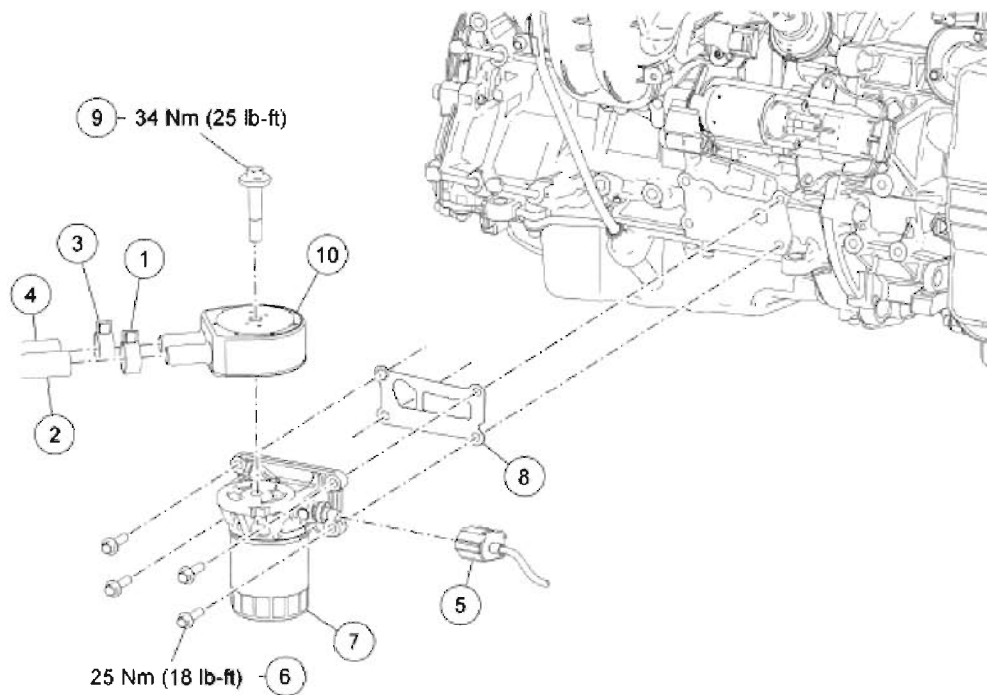
**Fig. 118: Identifying Oil Level Indicator & Tube Components (With Torque Specifications)**

Courtesy of FORD MOTOR CO.

#### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the 5 bolts and the RH splash shield.
  - To install, tighten to 9 N.m (80 lb-in).
3. Remove the oil level indicator.
4. Remove the 2 bolts and the oil level indicator tube.
  - To install, tighten to 10 N.m (89 lb-in).
5. Remove and discard the oil level indicator tube O-ring seal.
6. To install, reverse the removal procedure.
  - Lubricate a new O-ring seal with clean engine oil.

#### OIL COOLER



A0005183

Item	Part Number	Description
1	—	Heater hose clamp (part of 18K580)
2	18K850	Heater hose
3	8287A	Coolant hose clamp
4	8A593	Coolant hose
5	14A464	Oil pressure sender electrical connector (part of 12B637)
6	W500225	Oil filter adapter bolt (4 required)
7	6884	Oil filter adapter
8	6A636	Oil filter adapter gasket
9	W706487	Oil cooler bolt
10	6A642	Oil cooler

**Fig. 119: Identifying Oil Cooler Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the 5 bolts and the RH splash shield.
  - To install, tighten to 9 N.m (80 lb-in).
3. Remove the oil drain plug and drain the engine oil.
  - To install, tighten to 28 N.m (21 lb-ft).
4. Remove and discard the oil filter.
  - To install, tighten 3/4 of a turn after the filter gasket makes contact with the oil

filter adapter.

5. Drain the engine cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
6. Disconnect the 2 coolant hoses from the oil cooler.
7. Disconnect the oil pressure sender electrical connector.

**NOTE:**      **Discard the gasket.**

8. Remove the 4 bolts and the oil filter adapter.
  - To install, tighten to 25 N.m (18 lb-ft).

**CAUTION:** If metal or aluminum material is present in the oil cooler, mechanical concerns exist. To diagnose mechanical concerns, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

9. Position the oil filter adapter in a vise and remove the oil cooler bolt and oil cooler.
  - Inspect the oil cooler.
  - To install, tighten to 34 N.m (25 lb-ft).
10. To install, reverse the removal procedure.
11. Fill and bleed the engine cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
12. Fill the engine with clean engine oil.

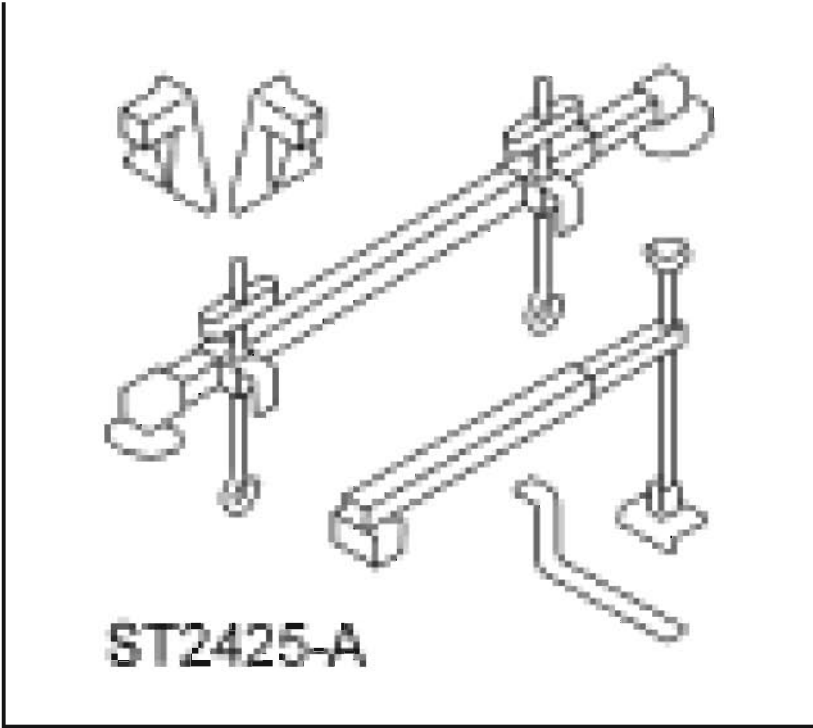
#### **ENGINE MOUNT**

#### **SPECIAL TOOL(S)**

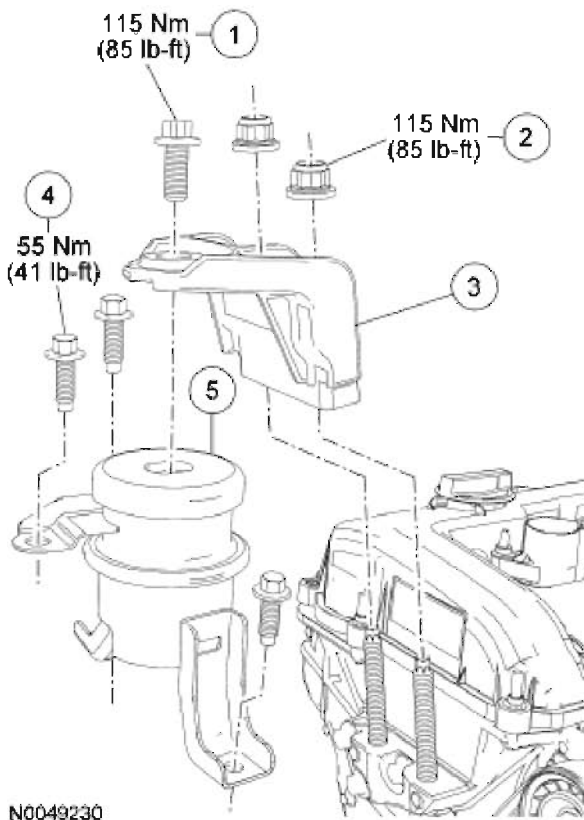
	Three-Bar Engine Support Kit 303-F072
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2006 Ford Escape
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2006 ENGINE Engine - 2.3L - Escape & Mariner
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<http://vnx.su>

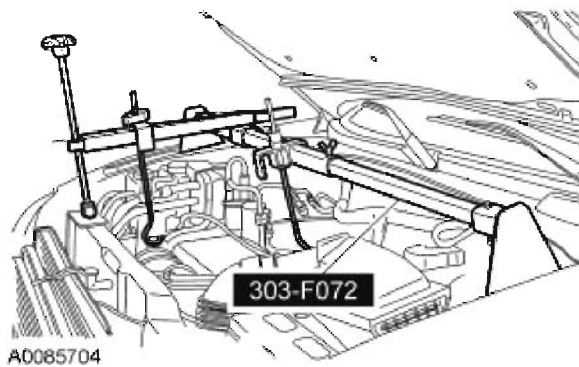


Item	Part Number	Description
1	W710824-S439	Engine mount bracket bolt
2	N807144-S440	Engine mount bracket nut (2 required)
3	6A094	Engine mount bracket
4	W500232	Engine mount bolt (3 required)
5	6068	Engine mount

**Fig. 120: Identifying Engine Mount Components (With Torque Specifications)**  
 Courtesy of FORD MOTOR CO.

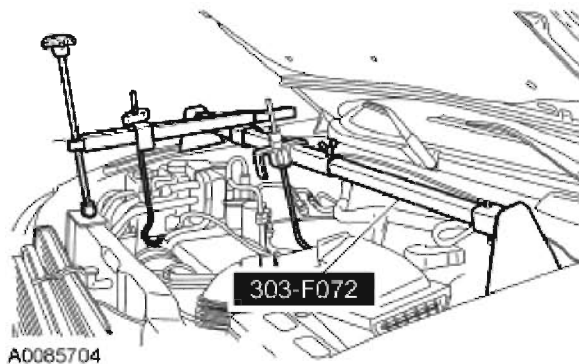
#### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the engine coolant degas bottle. For additional information, refer to **REMOVAL AND INSTALLATION ALL VEHICLES**.
3. Install the special tool.



**Fig. 121: Using Special Tool (303-F072) To Raise Engine**  
Courtesy of FORD MOTOR CO.

4. Remove the engine mount bracket bolt.
  - To install, tighten to 115 N.m (85 lb-ft).
5. Use the special tool to raise the engine 25 mm (0.98 in).



**Fig. 122: Using Special Tool (303-F072) To Raise Engine**  
Courtesy of FORD MOTOR CO.

6. Remove the 2 nuts and the engine mount bracket.
  - To install, tighten to 115 N.m (85 lb-ft).
7. Remove the 3 bolts and the engine mount.
  - To install, tighten to 55 N.m (41 lb-ft).
8. To install, reverse the removal procedure.

## REMOVAL

### ENGINE - AUTOMATIC TRANSAXLE

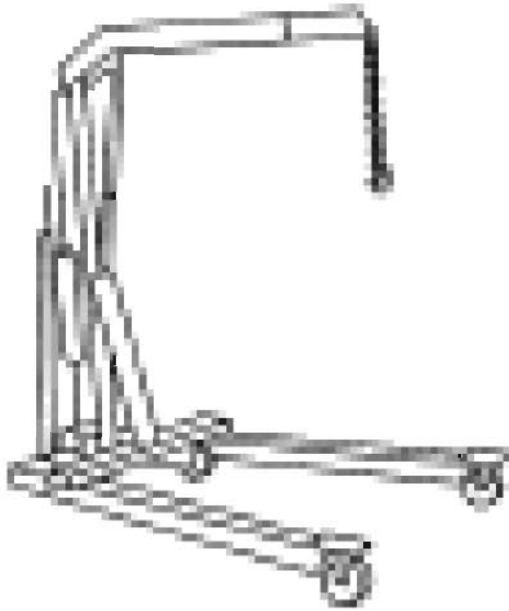
### SPECIAL TOOL(S)

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## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1341-A**

Heavy Duty Floor Crane  
014-00071 or equivalent

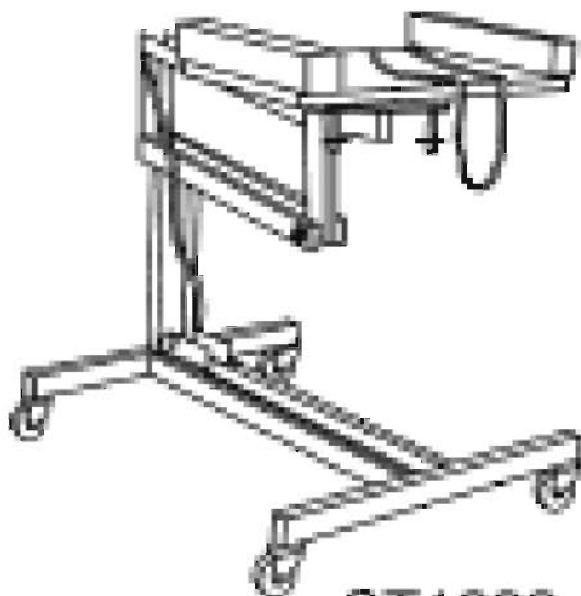


**ST1602-A**

Spreader Bar  
303-D089 (D93P-6001-A3) or  
equivalent

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1293-A

Powertrain Lift  
014-00765



ST2743A

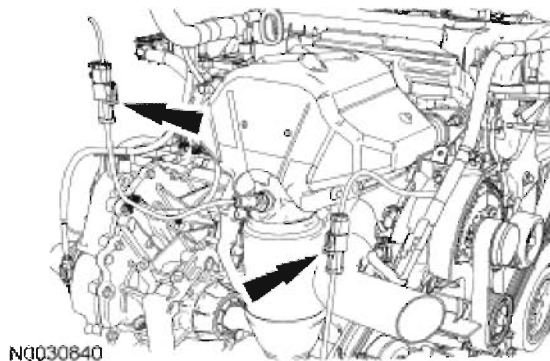
Universal Adapter Brackets  
014-0001  
Lifting Bracket Set, Engine 303-  
D095 (D94L-6001-A) or equivalent

**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always

**present and may be ignited. Failure to follow these instructions may result in personal injury.**

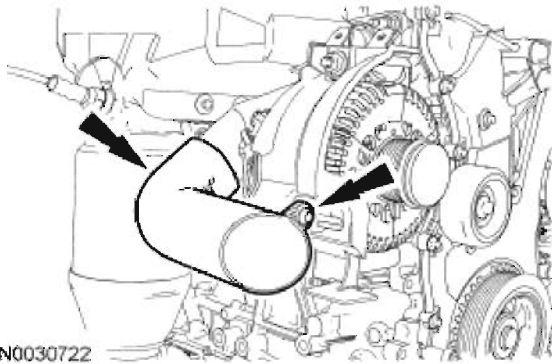
### **All vehicles**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE** .
3. Remove the engine air cleaner and air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION - AIR CLEANER** and **REMOVAL AND INSTALLATION - AIR CLEANER OUTLET PIPE** .
4. Remove the battery tray. For additional information, refer to **REMOVAL AND INSTALLATION** .
5. Drain the engine oil.
6. Drain the cooling system. For additional information, refer to **DRAINING** .
7. Remove the starter. For additional information, refer to **STARTING SYSTEM** .
8. Remove the exhaust flexible pipe. For additional information, refer to **REMOVAL AND INSTALLATION** .
9. Disconnect the heated oxygen sensor (HO2S) and the catalyst monitor sensor electrical connectors.



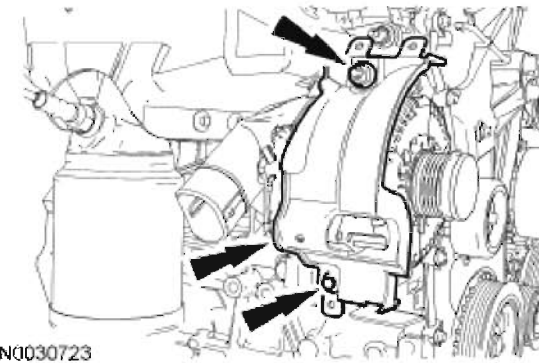
**Fig. 123: Locating Heated Oxygen Sensor (HO2S) & Catalyst Monitor Sensor Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

10. Remove the accessory drive belt tensioner. For additional information, refer to **REMOVAL AND INSTALLATION** .
11. Remove the bolt and press the locking tab to release the lower air duct from the upper air duct.



**Fig. 124: Locating Bolt & Lower Air Duct**  
Courtesy of FORD MOTOR CO.

12. Detach the wire retainers from the generator shield and remove the nut and pin-type retainer and remove the generator shield.



**Fig. 125: Locating Nut & Pin-Type Retainer**  
Courtesy of FORD MOTOR CO.

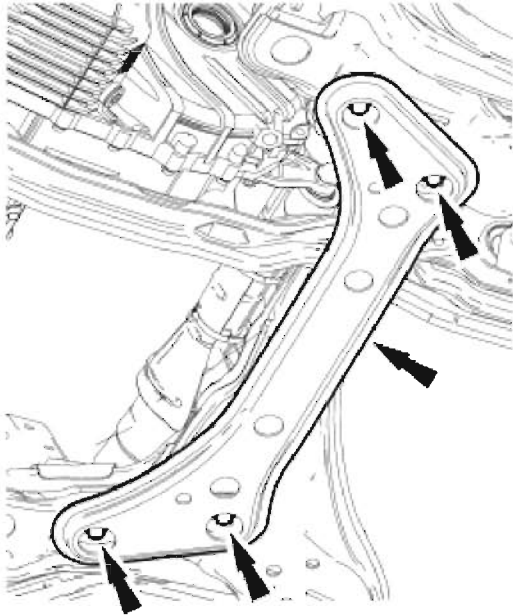
13. Remove the LH front drive halfshafts. For additional information, refer to **REMOVAL** .

**All wheel drive (AWD) vehicles**

14. Remove the transfer case. For additional information, refer to **TRANSFER CASE-POWER TRANSFER UNIT (PTU)** .

**Front wheel drive (FWD) vehicles**

15. Remove the bolts and the lateral support crossmember.



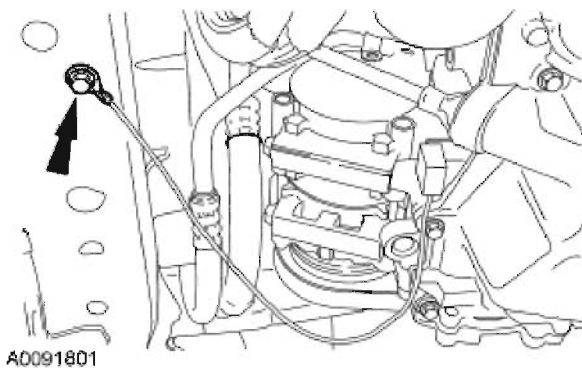
A0087403

**Fig. 126: Identifying Lateral Support Crossmember And Bolts**  
Courtesy of FORD MOTOR CO.

16. Remove the front drive intermediate halfshaft. For additional information, refer to **REMOVAL AND INSTALLATION**.

**All vehicles**

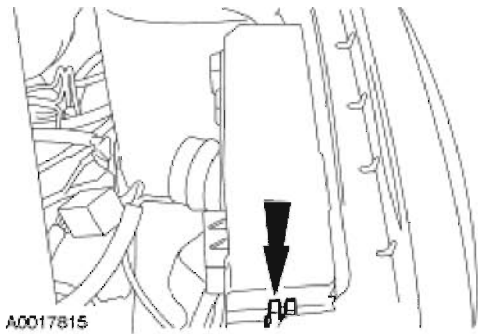
17. If equipped, remove the bolt and ground eyelet.



A0091801

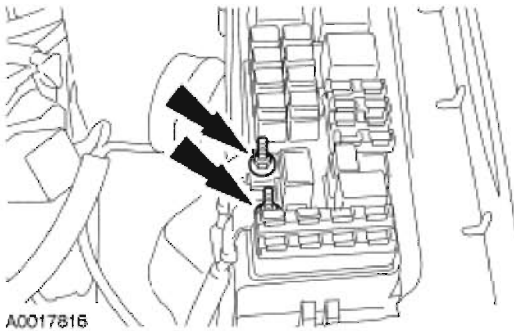
**Fig. 127: Locating Bolt & Ground Eyelet**  
Courtesy of FORD MOTOR CO.

18. Remove the power distribution box cover.



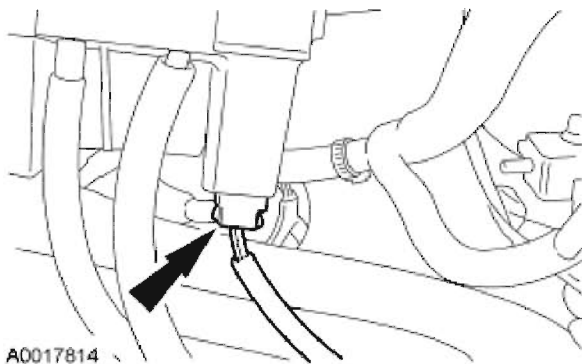
**Fig. 128: Locating Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

19. Remove the nuts and disconnect the cables.



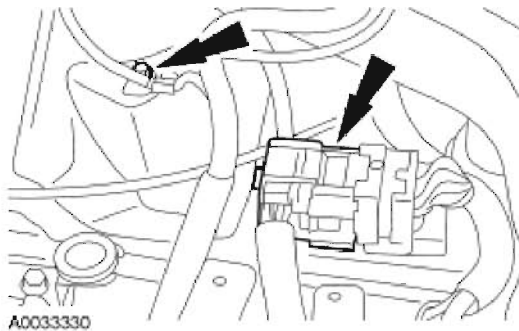
**Fig. 129: Locating Cables & Nuts**  
Courtesy of FORD MOTOR CO.

20. Disconnect the electrical connector from the power distribution box.



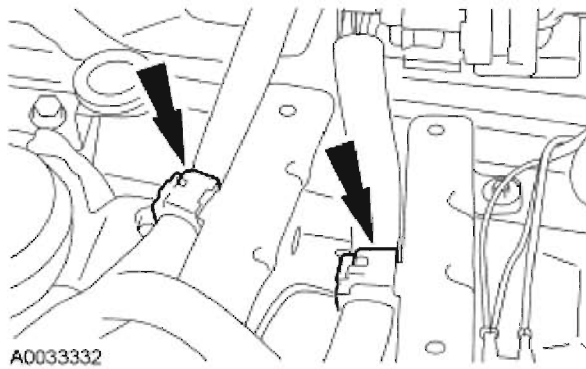
**Fig. 130: Locating Electrical Connector**  
Courtesy of FORD MOTOR CO.

21. Remove the bolt and disconnect the ground strap. Loosen the bolt and disconnect the 42-pin electrical connector.



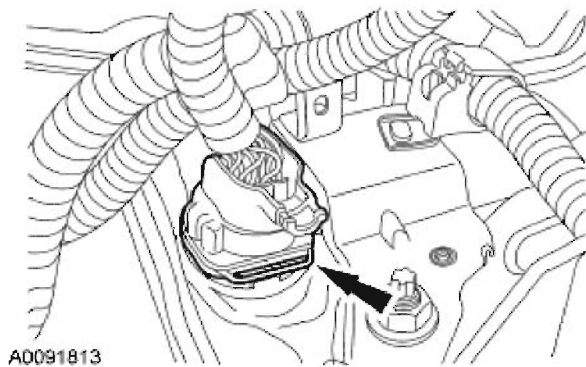
**Fig. 131: Locating Ground Strap & Electrical Connector**  
Courtesy of FORD MOTOR CO.

22. Detach the wiring harness retainers from the battery tray bracket and position the wiring harness aside.



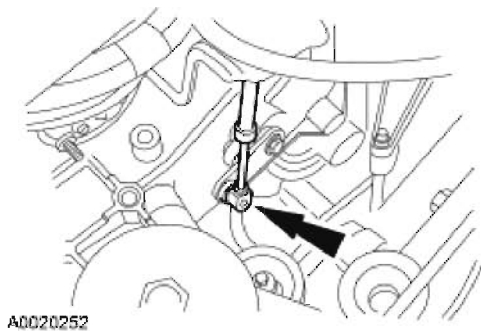
**Fig. 132: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

23. Disconnect the transaxle electrical connector.



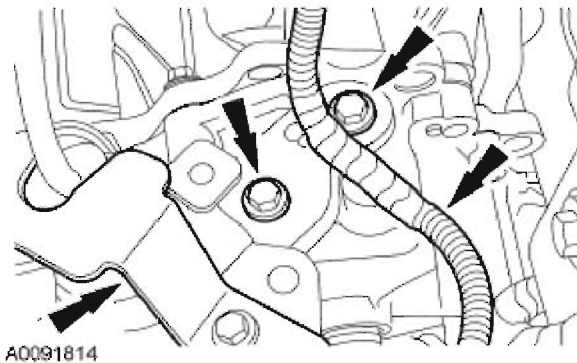
**Fig. 133: Locating Transaxle Electrical Connector**  
Courtesy of FORD MOTOR CO.

24. Disconnect the shift cable from the transaxle manual lever.



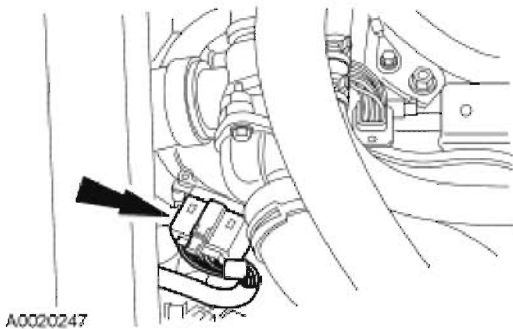
**Fig. 134: Locating Shift Cable End At Manual Lever**  
Courtesy of FORD MOTOR CO.

25. Position the transaxle control cable and bracket aside.
- Detach the wiring harness pin-type retainer.
  - Remove the bolts and position the cable and bracket aside.



**Fig. 135: Locating Transaxle Control Cable & Bolts**  
Courtesy of FORD MOTOR CO.

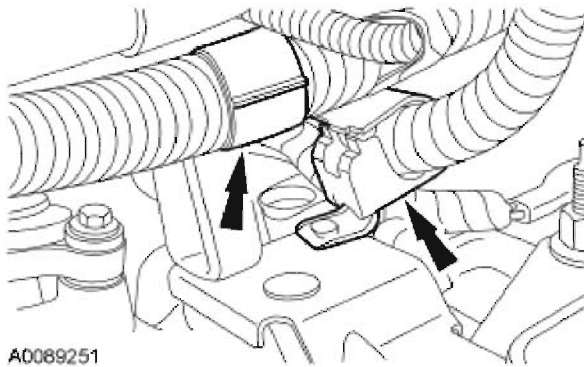
26. Disconnect the transmission range (TR) sensor electrical connector.



**Fig. 136: Locating Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

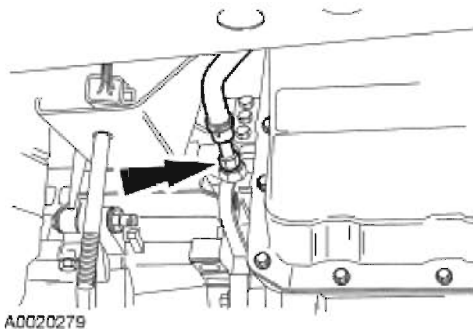
27. Detach the transaxle control harness from the brackets.





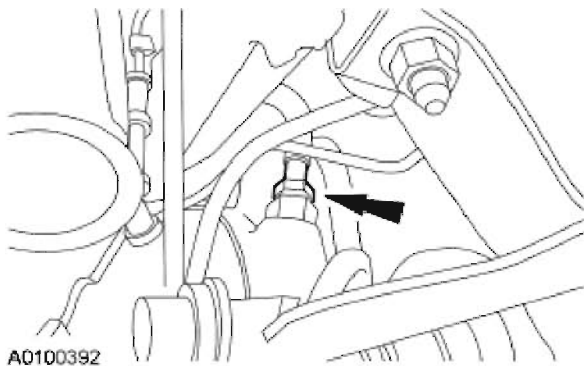
**Fig. 137: Locating Transaxle Control Harness**  
Courtesy of FORD MOTOR CO.

28. Disconnect the front transmission fluid cooler tube.



**Fig. 138: Locating Transmission Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

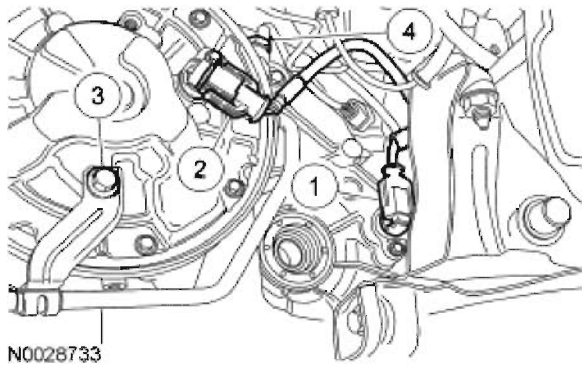
29. Disconnect the rear transmission fluid cooler tube.



**Fig. 139: Locating Rear Transmission Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

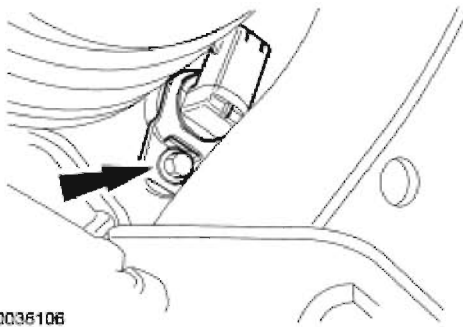
30. Position the fluid cooler tube aside.
1. Disconnect the output shaft speed (OSS) sensor electrical connector (black).
  2. Disconnect the turbine shaft speed (TSS) sensor electrical connector (white)

- connector).
3. Remove the transmission fluid cooler retaining bracket bolt.
  4. Position the fluid cooler tube aside.



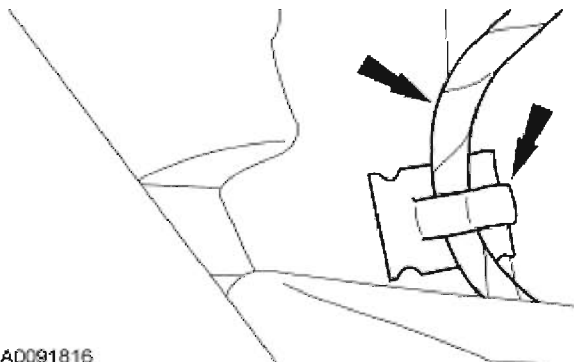
**Fig. 140: Identifying Fluid Cooler Tube Aside**  
Courtesy of FORD MOTOR CO.

31. Remove the bolt and the OSS sensor.



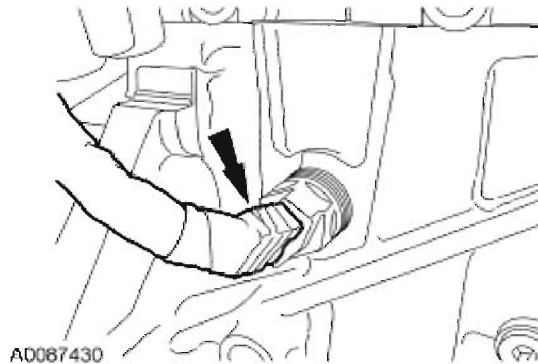
**Fig. 141: Locating OSS Sensor Bolt**  
Courtesy of FORD MOTOR CO.

32. Detach the transaxle control harness from the retaining clip.



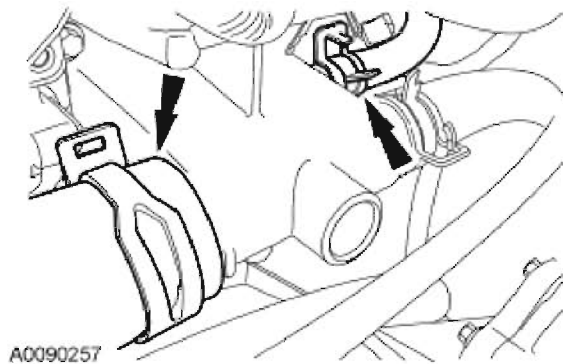
**Fig. 142: Locating Transaxle Control Harness From Retaining Clip**  
Courtesy of FORD MOTOR CO.

33. If equipped, disconnect the block heater electrical connector. Detach all the block heater wiring harness retainers and position the wiring harness aside.



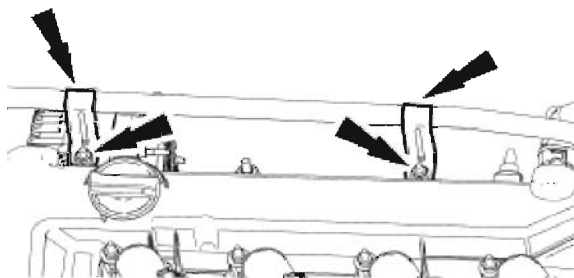
**Fig. 143: Locating Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

34. Disconnect the upper radiator and coolant vent hoses.



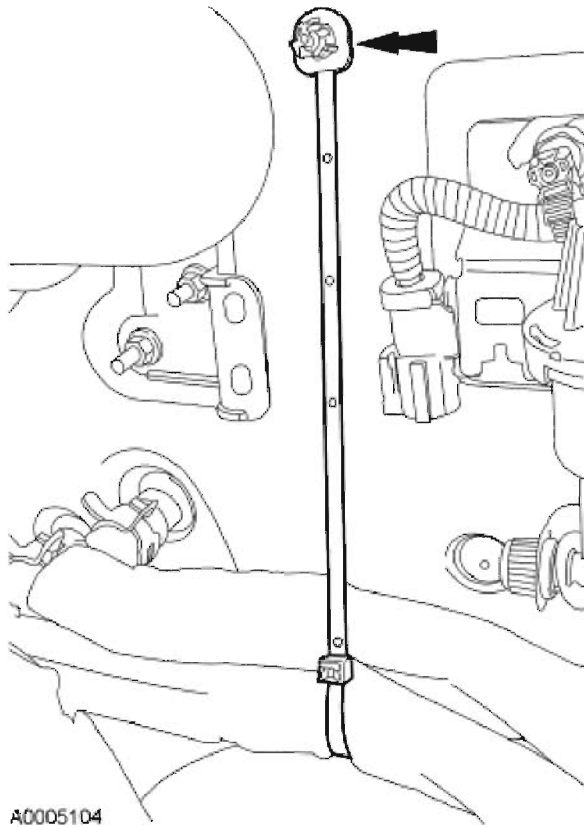
**Fig. 144: Locating Upper Radiator & Coolant Vent Hoses**  
Courtesy of FORD MOTOR CO.

35. Remove the nuts and the coolant vent hose brackets. Position the coolant vent hose aside.



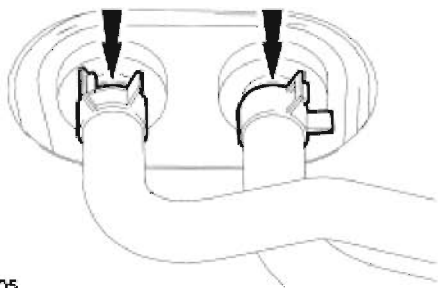
**Fig. 145: Locating Nuts & Coolant Vent Hose Brackets**  
Courtesy of FORD MOTOR CO.

36. Detach the heater hose support strap from the stud.



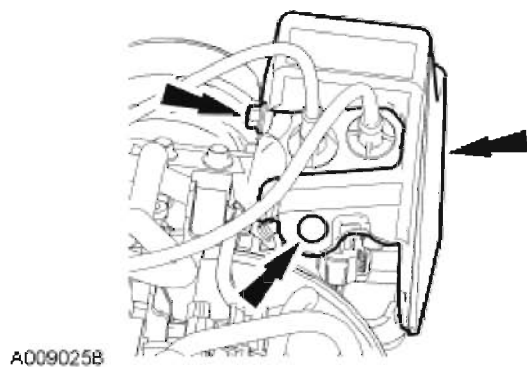
**Fig. 146: Locating Heater Hose Support Strap From Stud**  
Courtesy of FORD MOTOR CO.

37. Disconnect the heater hoses from the heater core.



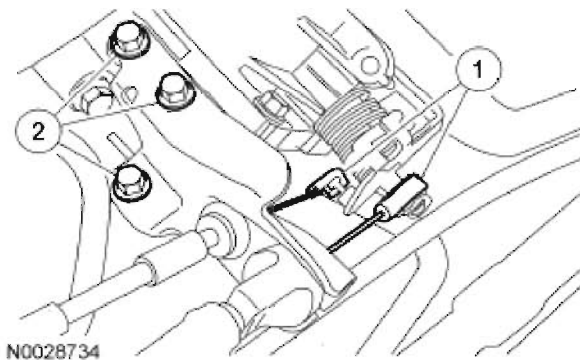
**Fig. 147: Locating Heater Hoses**  
Courtesy of FORD MOTOR CO.

38. Remove the retainers and the accelerator cable snow shield.



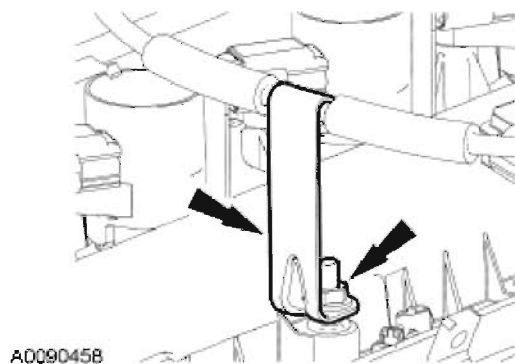
**Fig. 148: Locating Retainers & Accelerator Cable Snow Shield**  
Courtesy of FORD MOTOR CO.

39. Disconnect the accelerator cable and speed control cable (if equipped).
1. Disconnect the accelerator and speed control cable (if equipped) from the throttle body.
  2. Remove the bolts from the accelerator cable bracket.



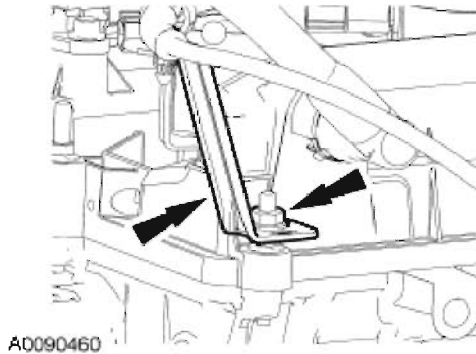
**Fig. 149: Identifying Accelerator Cable Bracket Bolts**  
Courtesy of FORD MOTOR CO.

40. Remove the nut from the accelerator control cable bracket.



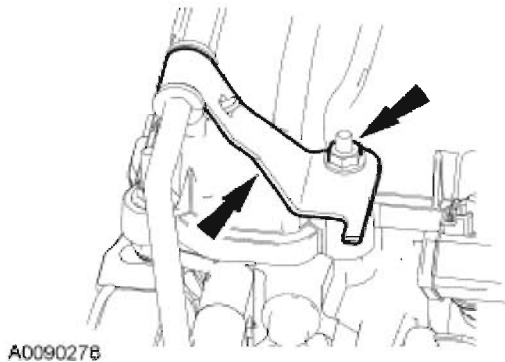
**Fig. 150: Locating Accelerator Control Cable Bracket Nut (1 Of 2)**  
Courtesy of FORD MOTOR CO.

41. Remove the nut from the accelerator control cable bracket and position the accelerator control cable and bracket assembly aside.



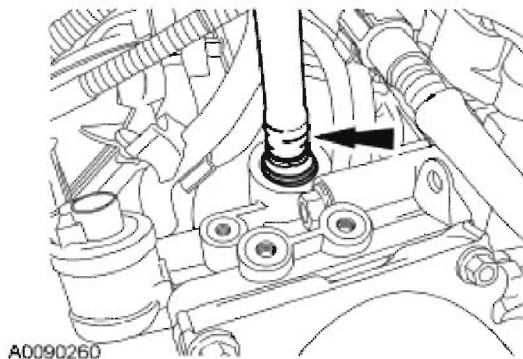
**Fig. 151: Locating Accelerator Control Cable Bracket Nut (2 Of 2)**  
Courtesy of FORD MOTOR CO.

42. Remove the nut and position the power steering tube and bracket aside.



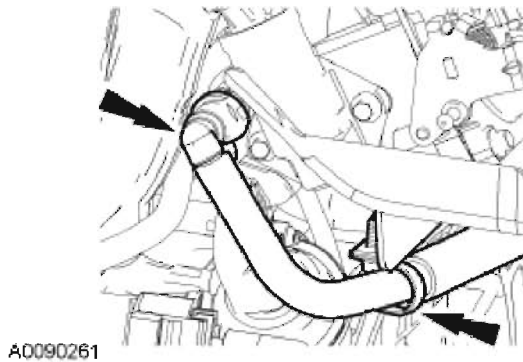
**Fig. 152: Locating Power Steering Tube & Bracket Aside**  
Courtesy of FORD MOTOR CO.

43. Disconnect the vacuum supply tube and position aside.



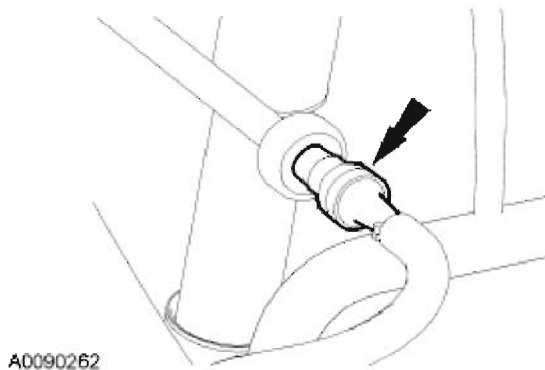
**Fig. 153: Locating Vacuum Supply Tube & Position Aside**  
Courtesy of FORD MOTOR CO.

44. Disconnect the fuel vapor return tube and retainer and position aside.



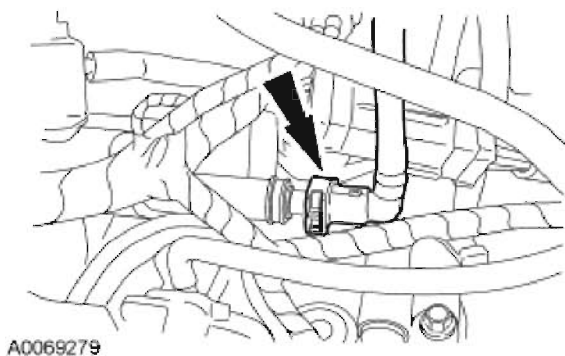
**Fig. 154: Locating Fuel Vapor Return Tube & Retainer**  
Courtesy of FORD MOTOR CO.

45. Disconnect the vacuum reservoir tube and position aside.



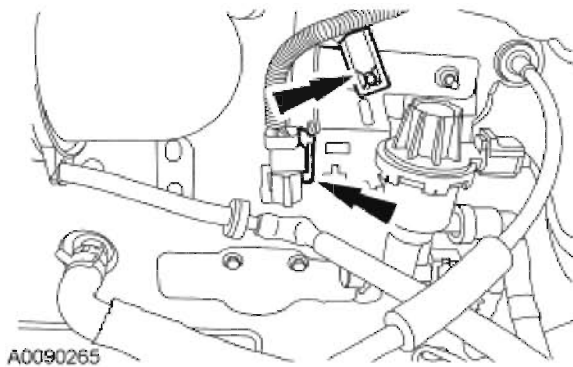
**Fig. 155: Locating Vacuum Reservoir Tube & Position Aside**  
Courtesy of FORD MOTOR CO.

46. Disconnect the fuel supply tube and position aside.



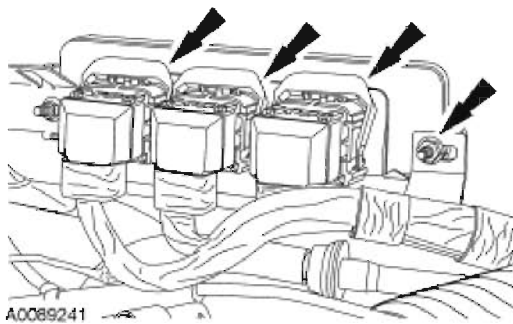
**Fig. 156: Locating Fuel Supply Tube & Position Aside**  
Courtesy of FORD MOTOR CO.

47. Detach the electrical connector retainers.



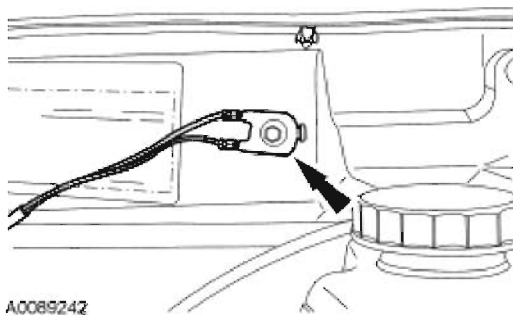
**Fig. 157: Locating Electrical Connector Retainers**  
Courtesy of FORD MOTOR CO.

48. Disconnect the powertrain control module (PCM) electrical connectors. Remove the nut and position the harness aside.



**Fig. 158: Locating Powertrain Control Module (PCM) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

49. Remove the bolt and detach the ground wire.



**Fig. 159: Locating Ground Wire & Bolt**  
Courtesy of FORD MOTOR CO.

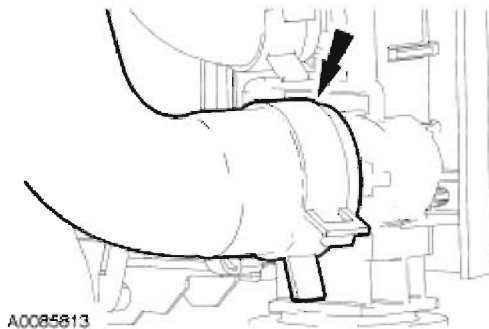
50. Remove the 2 power steering pump bolts.





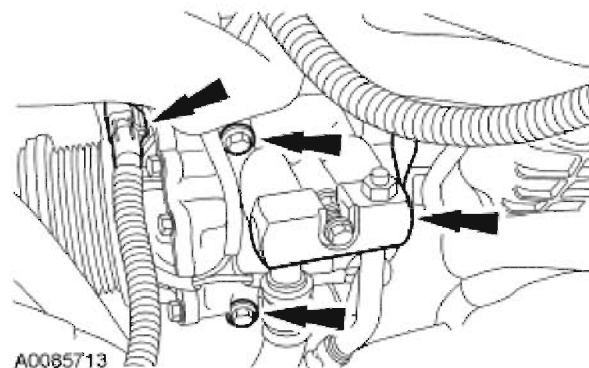
**Fig. 160: Locating Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

51. Disconnect the lower radiator hose from the radiator.



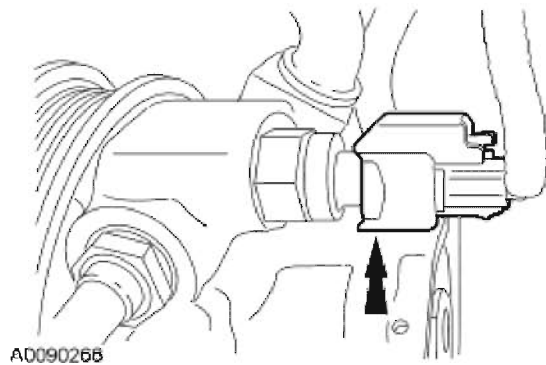
**Fig. 161: Locating Lower Radiator Hose**  
Courtesy of FORD MOTOR CO.

52. Disconnect the A/C compressor electrical connector and remove the 4 bolts. Position the A/C compressor aside and support the compressor with a length of mechanic's wire.



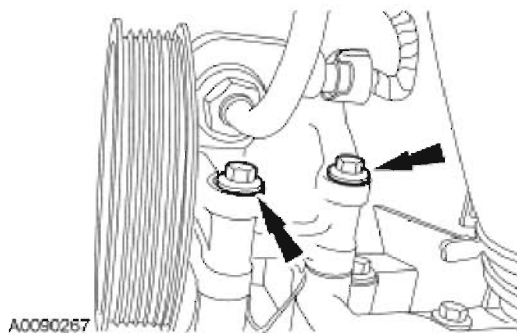
**Fig. 162: Locating A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

53. Disconnect the power steering pressure (PSP) sensor electrical connector.



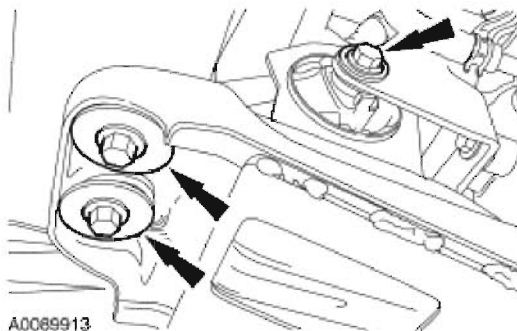
**Fig. 163: Locating Power Steering Pressure (PSP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** The bolt under the power steering pressure tube will remain with the power steering pump.



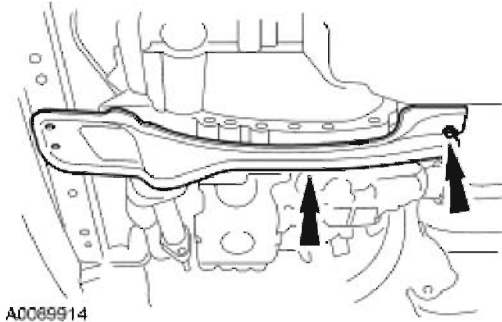
**Fig. 164: Identifying Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

54. Remove the bolts and position the power steering pump aside.
55. Remove the front roll restrictor bolt and the 2 bolts for the engine support crossmember.



**Fig. 165: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**  
Courtesy of FORD MOTOR CO.

56. Remove the rear nut and the engine support crossmember.
- Discard the nut.



**Fig. 166: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

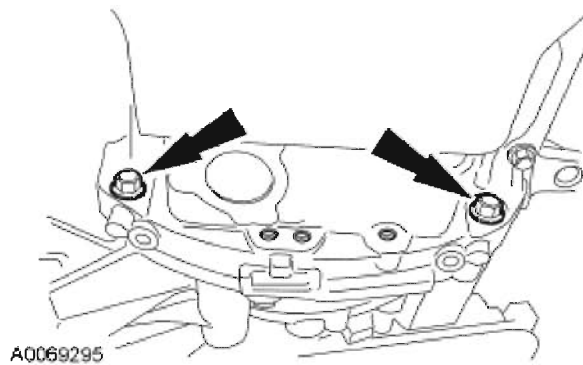
**NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.



**Fig. 167: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

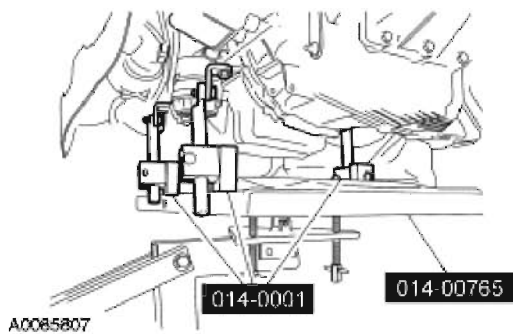
57. Remove the 2 transaxle-to-engine bolts.

**NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.



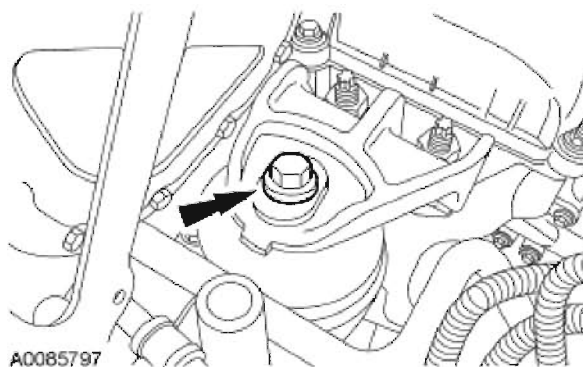
**Fig. 168: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

58. Remove the 2 transaxle-to-engine bolts.
59. Using the special tools, secure the engine to the lift table.



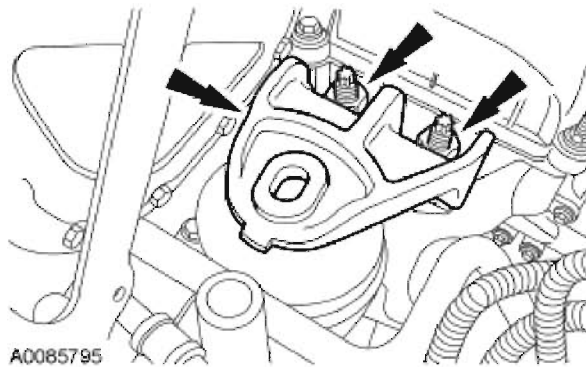
**Fig. 169: Securing Engine To Lift Table Using Special Tool (014-0001, 014-00765)**  
Courtesy of FORD MOTOR CO.

60. Remove the engine mount bracket bolt.



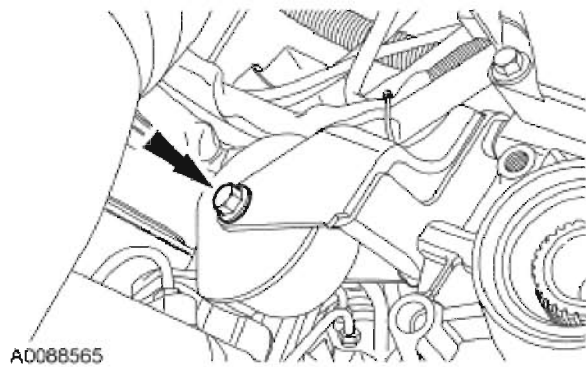
**Fig. 170: Locating Engine Mount Bracket Bolt**  
Courtesy of FORD MOTOR CO.

61. Remove the nuts and the engine mount bracket.



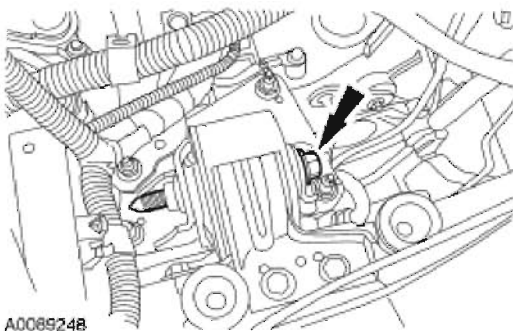
**Fig. 171: Locating Nuts & Engine Mount Bracket**  
Courtesy of FORD MOTOR CO.

62. Remove the bolt from the transaxle rear mount.



**Fig. 172: Locating Bolt From Transaxle Rear Mount**  
Courtesy of FORD MOTOR CO.

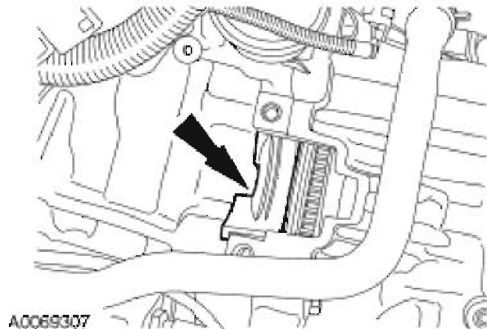
63. Remove the bolt from the LH transaxle mount.



**Fig. 173: Locating Transaxle Mount Bolt**  
Courtesy of FORD MOTOR CO.

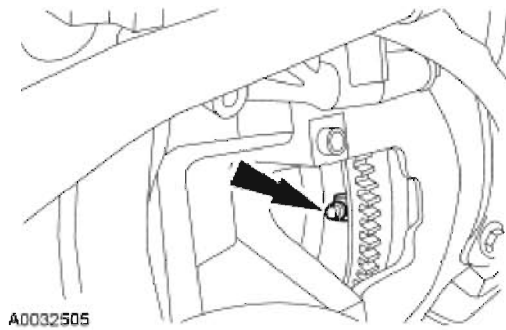
64. Lower the engine and transaxle from the vehicle.  
65. Using the engine crane and spreader bar, remove the engine and transaxle from the lift table.

66. Remove the starter motor isolator.



**Fig. 174: Identifying Starter Motor Isolator**  
Courtesy of FORD MOTOR CO.

67. Remove and discard the 4 torque converter nuts.



**Fig. 175: Locating Torque Converter Nut**  
Courtesy of FORD MOTOR CO.

**NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.

68. Remove the remaining 6 engine-to-transaxle bolts and separate the engine and transaxle.

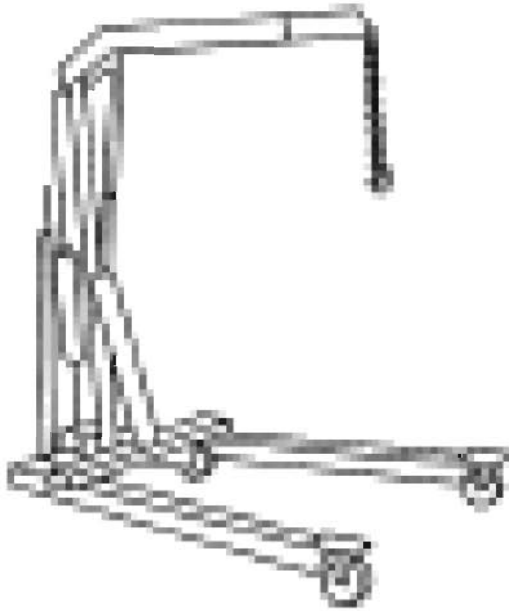
#### ENGINE - MANUAL TRANSAXLE

#### SPECIAL TOOL(S)

--	--

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1341-A**

Heavy Duty Floor Crane  
014-00071 or equivalent



**ST1602-A**

Spreader Bar  
303-D089 (D93P-6001-A3) or  
equivalent

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1293-A

Powertrain Lift  
014-00765



ST2743A

Universal Adapter Brackets  
014-0001  
Lifting Bracket Set, Engine  
303-D095 (D94L-6001-A) or  
equivalent

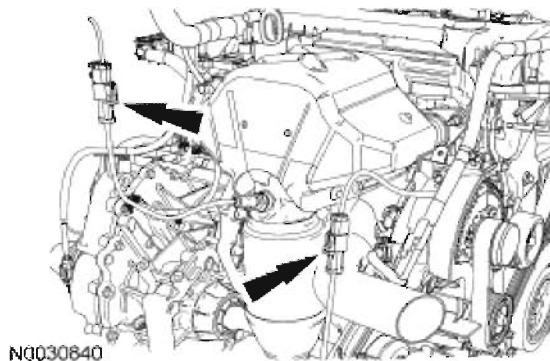
**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always



**present and may be ignited. Failure to follow these instructions may result in personal injury.**

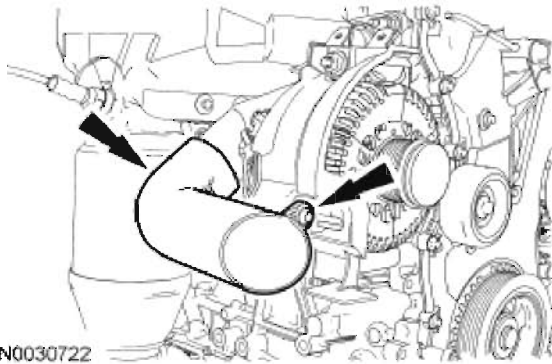
### **All vehicles**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE** .
3. Remove the engine air cleaner and air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION - AIR CLEANER** and **REMOVAL AND INSTALLATION - AIR CLEANER OUTLET PIPE** .
4. Remove the battery tray. For additional information, refer to **REMOVAL AND INSTALLATION** .
5. Drain the engine oil.
6. Drain the cooling system. For additional information, refer to **DRAINING** .
7. Remove the starter. For additional information, refer to **STARTING SYSTEM** .
8. Remove the exhaust flex pipe. For additional information, refer to **REMOVAL AND INSTALLATION** .
9. Disconnect the heated oxygen sensor (HO2S) and the catalyst monitor sensor electrical connectors.



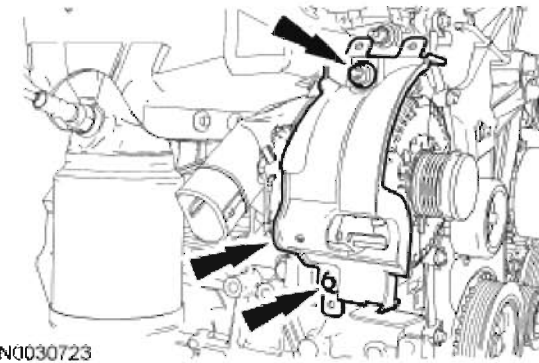
**Fig. 176: Locating Heated Oxygen Sensor (HO2S) & Catalyst Monitor Sensor Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

10. Remove the accessory drive belt tensioner. For additional information, refer to **REMOVAL AND INSTALLATION** .
11. Remove the bolt and press the locking tab to release the lower air duct from the upper air duct.



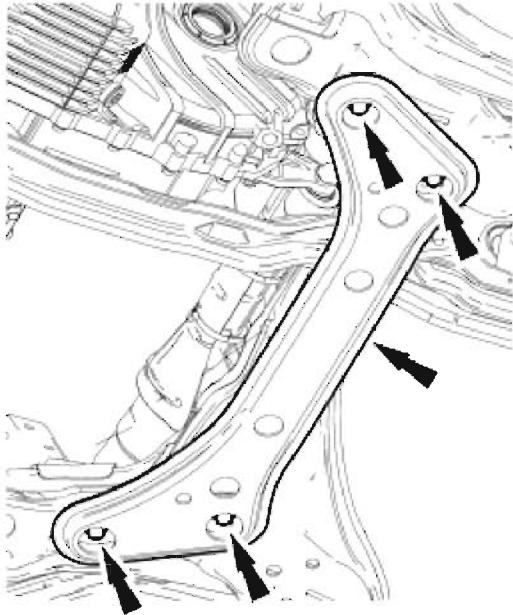
**Fig. 177: Locating Bolt & Lower Air Duct**  
Courtesy of FORD MOTOR CO.

12. Detach the wire retainers from the generator shield and remove the nut and pin-type retainer and remove the generator shield.



**Fig. 178: Locating Nut & Pin-Type Retainer**  
Courtesy of FORD MOTOR CO.

13. Remove the bolts and the lateral support crossmember.



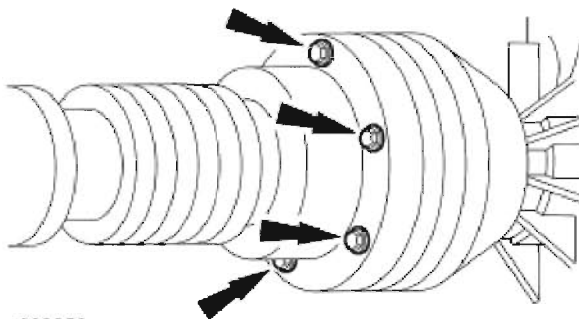
A0087403

**Fig. 179: Identifying Lateral Support Crossmember And Bolts**  
Courtesy of FORD MOTOR CO.

14. Remove the LH front drive halfshaft. For additional information, refer to **REMOVAL**.
15. Remove the front drive intermediate halfshaft. For additional information, refer to **REMOVAL**.

**All wheel drive (AWD) vehicles**

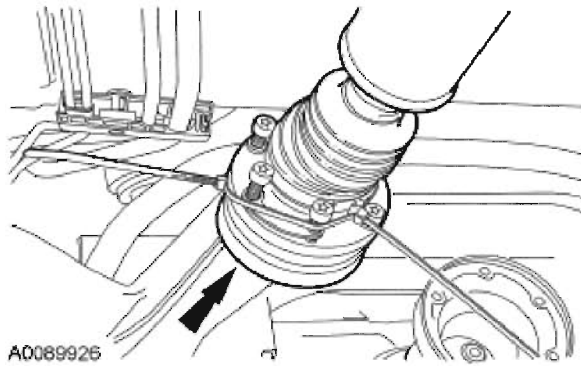
16. Remove the 6 bolts holding the driveshaft to the transfer case.



A0088564

**Fig. 180: Locating Driveshaft Bolts**  
Courtesy of FORD MOTOR CO.

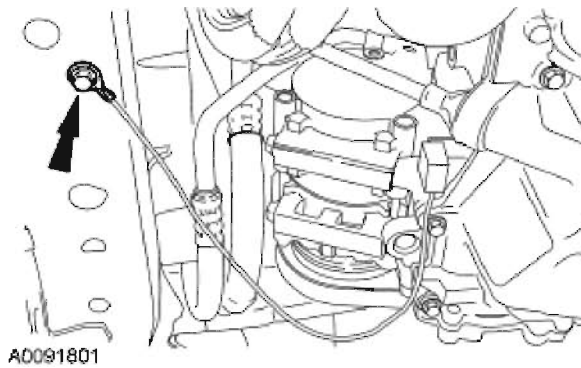
17. Position the driveshaft aside.



**Fig. 181: Locating Driveshaft Aside**  
Courtesy of FORD MOTOR CO.

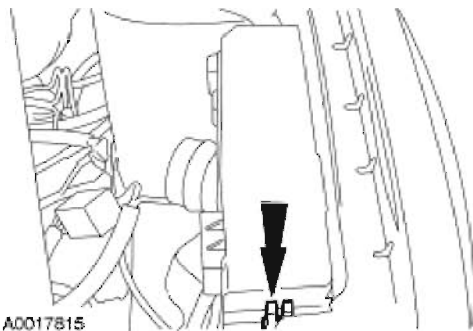
**All vehicles**

18. If equipped, remove the bolt and ground eyelet.



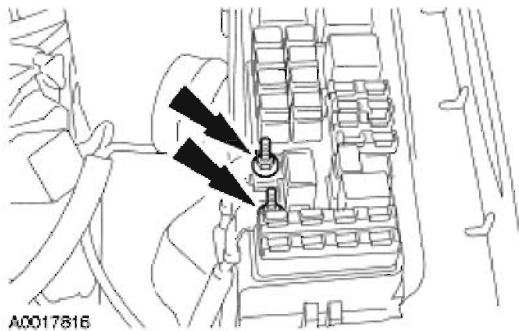
**Fig. 182: Locating Bolt & Ground Eyelet**  
Courtesy of FORD MOTOR CO.

19. Remove the power distribution box cover.



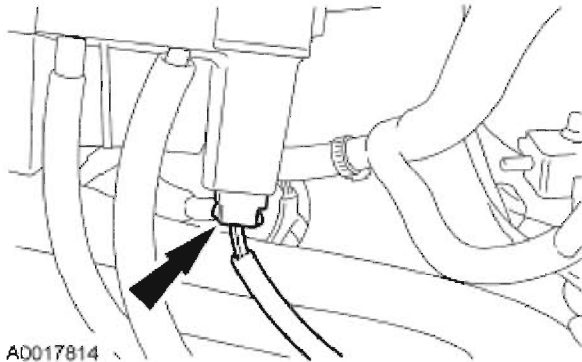
**Fig. 183: Locating Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

20. Remove the nuts and disconnect the cables.



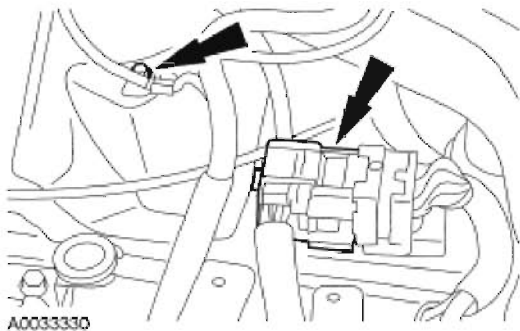
**Fig. 184: Locating Cables & Nuts**  
Courtesy of FORD MOTOR CO.

21. Disconnect the electrical connector from the power distribution box.



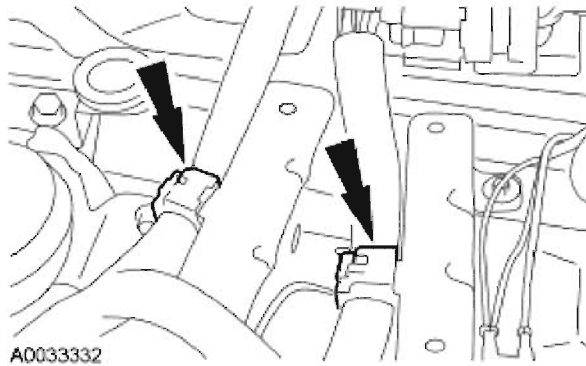
**Fig. 185: Locating Electrical Connector**  
Courtesy of FORD MOTOR CO.

22. Remove the bolt and disconnect the ground strap. Loosen the bolt and disconnect the 42-pin electrical connector.



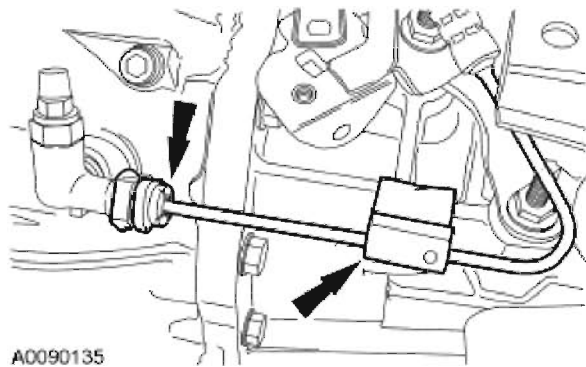
**Fig. 186: Locating Ground Strap & Electrical Connector**  
Courtesy of FORD MOTOR CO.

23. Detach the wiring harness retainers from the battery tray bracket and position the wiring harness aside.



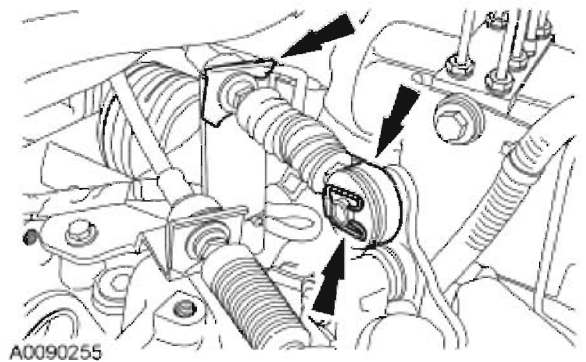
**Fig. 187: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

24. Disconnect the clutch hydraulic tube fitting. Remove the clutch hydraulic tube mounting bolt, detach the spring clip and position the tube aside.



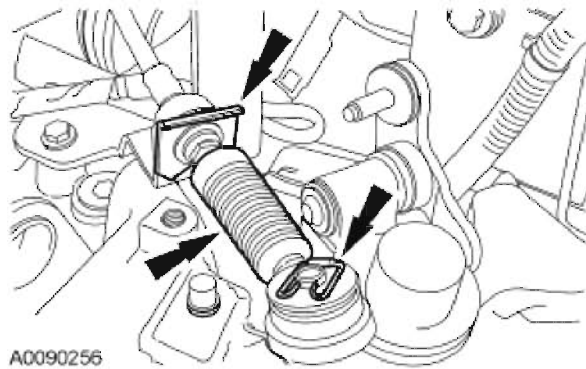
**Fig. 188: Locating Clutch Hydraulic Tube Fitting**  
Courtesy of FORD MOTOR CO.

25. Remove the retaining clips and disconnect the transaxle control cable.



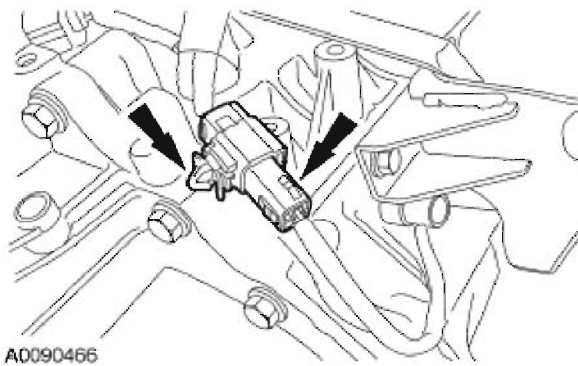
**Fig. 189: Locating Transaxle Control Cable (1 Of 2)**  
Courtesy of FORD MOTOR CO.

26. Remove the retaining clips and disconnect the transaxle control cable.



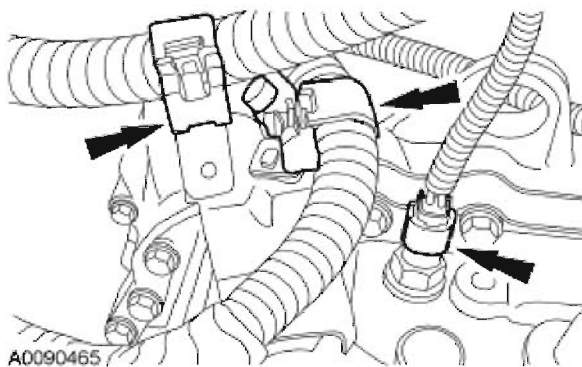
**Fig. 190: Locating Transaxle Control Cable (2 Of 2)**  
Courtesy of FORD MOTOR CO.

27. Disconnect the vehicle speed sensor (VSS) electrical connector and pin-type retainer.



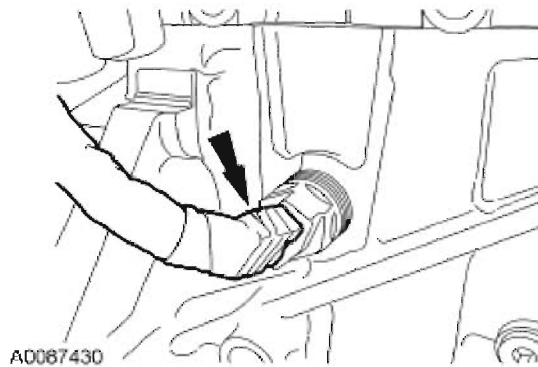
**Fig. 191: Locating Vehicle Speed Sensor (VSS) Electrical Connector**  
Courtesy of FORD MOTOR CO.

28. Disconnect the reversing lamp indicator switch and detach the wiring harness retainers.



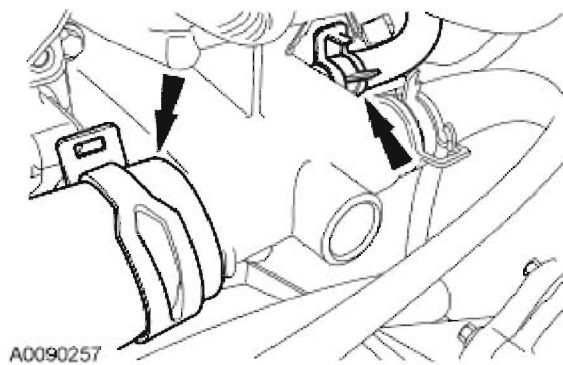
**Fig. 192: Locating Reversing Lamp Indicator Switch**  
Courtesy of FORD MOTOR CO.

29. If equipped, disconnect the block heater electrical connector. Detach all the block heater wiring harness retainers and position the wiring harness aside.



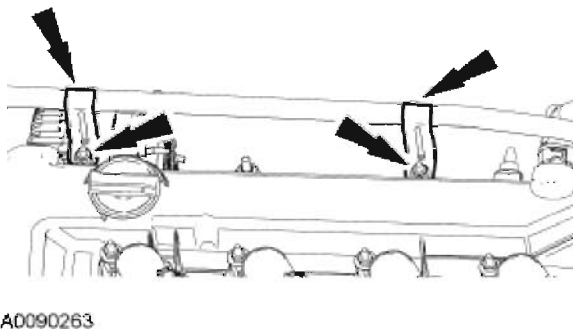
**Fig. 193: Locating Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

30. Disconnect the upper radiator and coolant vent hoses.



**Fig. 194: Locating Upper Radiator & Coolant Vent Hoses**  
Courtesy of FORD MOTOR CO.

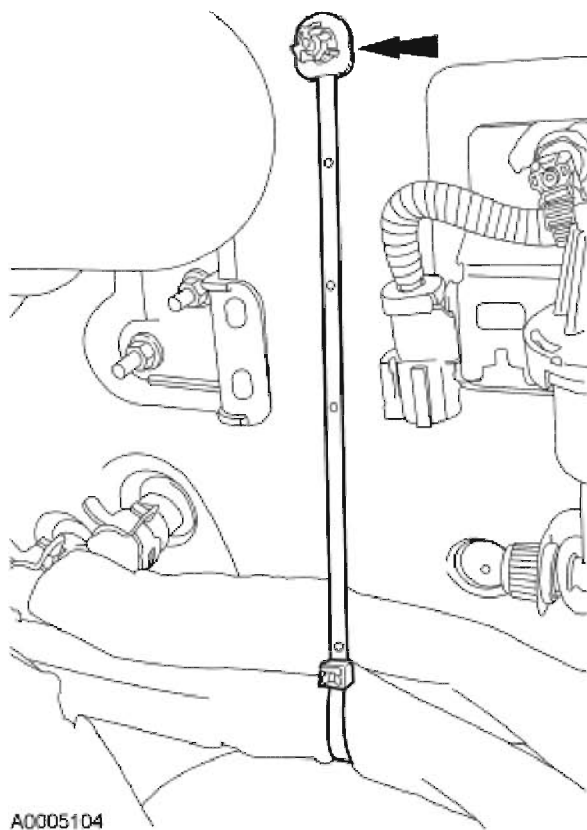
31. Remove the nuts and the coolant vent hose brackets. Position the coolant vent hose aside.



**Fig. 195: Locating Nuts & Coolant Vent Hose Brackets**  
Courtesy of FORD MOTOR CO.

32. Detach the heater hose support strap from the stud.

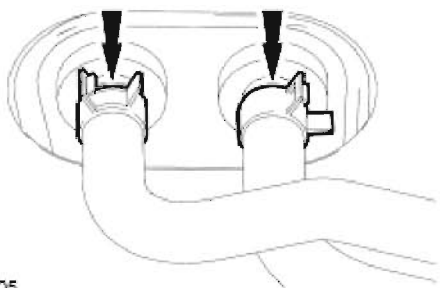




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**Fig. 196: Locating Heater Hose Support Strap From Stud**  
Courtesy of FORD MOTOR CO.

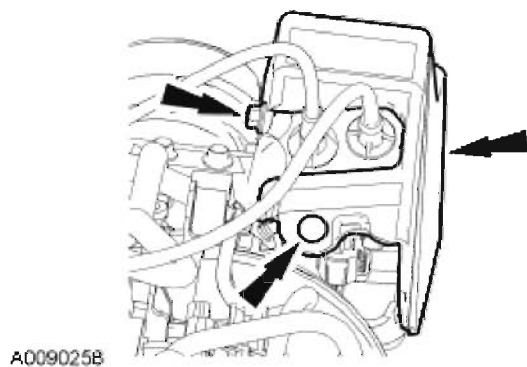
33. Disconnect the heater hoses from the heater core.



A0065705

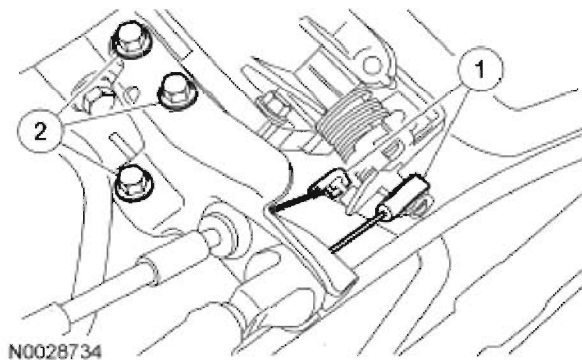
**Fig. 197: Locating Heater Hoses**  
Courtesy of FORD MOTOR CO.

34. Remove the retainers and the accelerator cable snow shield.



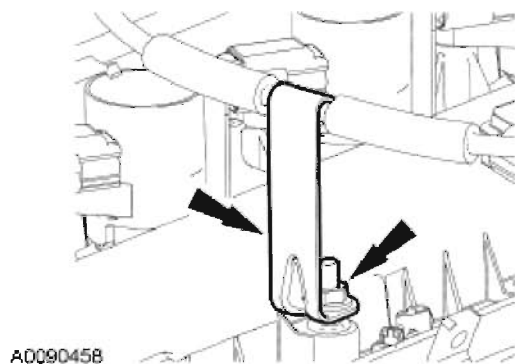
**Fig. 198: Locating Retainers & Accelerator Cable Snow Shield**  
Courtesy of FORD MOTOR CO.

35. Disconnect the accelerator cable and speed control cable (if equipped).
1. Disconnect the accelerator and speed control cable (if equipped) from the throttle body.
  2. Remove the bolts from the accelerator cable bracket.



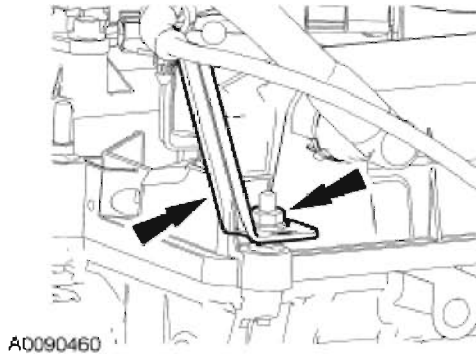
**Fig. 199: Identifying Accelerator Cable Bracket Bolts**  
Courtesy of FORD MOTOR CO.

36. Remove the nut from the accelerator control cable bracket.



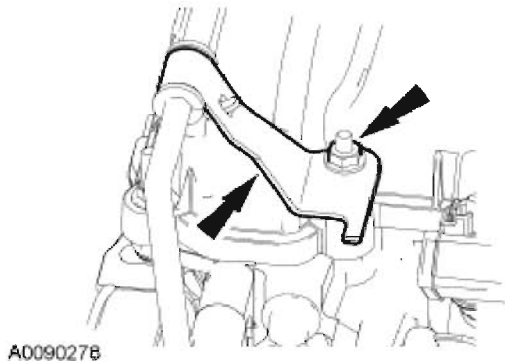
**Fig. 200: Locating Accelerator Control Cable Bracket Nut (1 Of 2)**  
Courtesy of FORD MOTOR CO.

37. Remove the nut from the accelerator control cable bracket and position the accelerator control cable and bracket assembly aside.



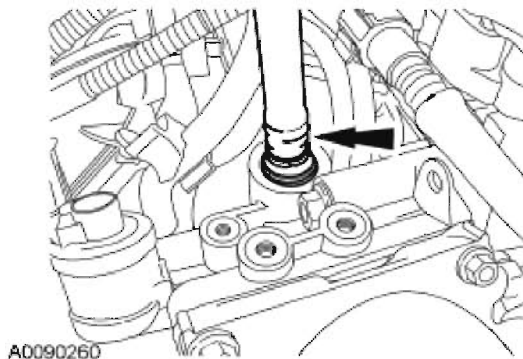
**Fig. 201: Locating Accelerator Control Cable Bracket Nut (2 Of 2)**  
Courtesy of FORD MOTOR CO.

38. Remove the nut and position the power steering tube and bracket aside.



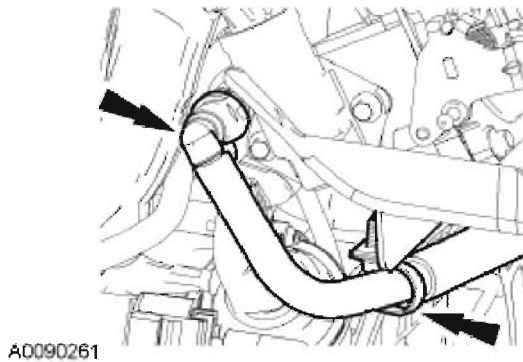
**Fig. 202: Locating Power Steering Tube & Bracket Aside**  
Courtesy of FORD MOTOR CO.

39. Disconnect the vacuum supply tube and position aside.



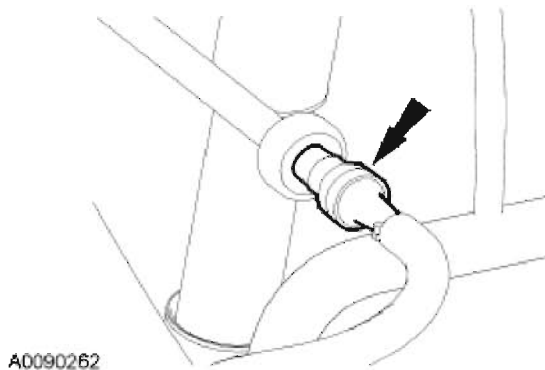
**Fig. 203: Locating Vacuum Supply Tube**  
Courtesy of FORD MOTOR CO.

40. Disconnect the fuel vapor return tube and position aside.



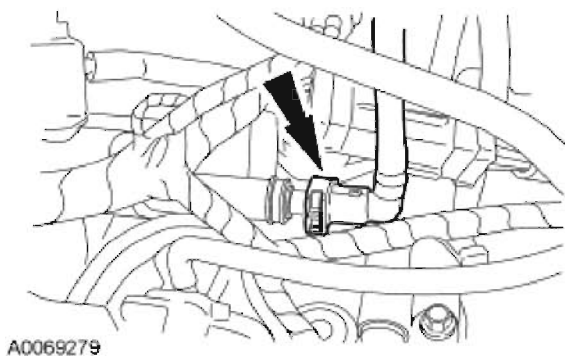
**Fig. 204: Locating Fuel Vapor Return Tube**  
Courtesy of FORD MOTOR CO.

41. Disconnect the vacuum reservoir tube and position aside.



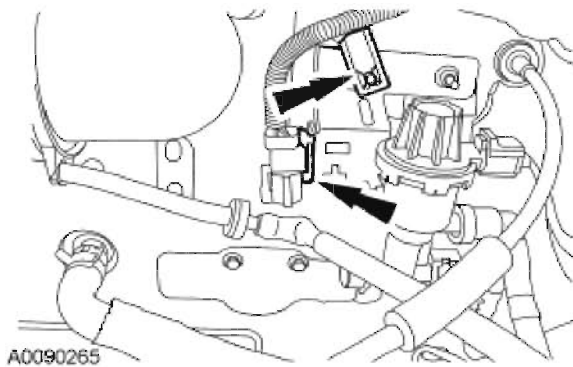
**Fig. 205: Locating Vacuum Reservoir Tube**  
Courtesy of FORD MOTOR CO.

42. Disconnect the fuel supply tube and retainer and position aside.



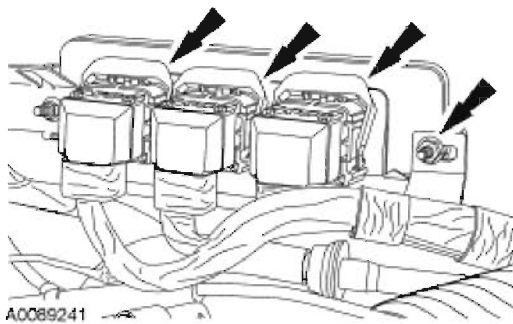
**Fig. 206: Locating Fuel Supply Tube & Retainer**  
Courtesy of FORD MOTOR CO.

43. Detach the electrical connector retainers.



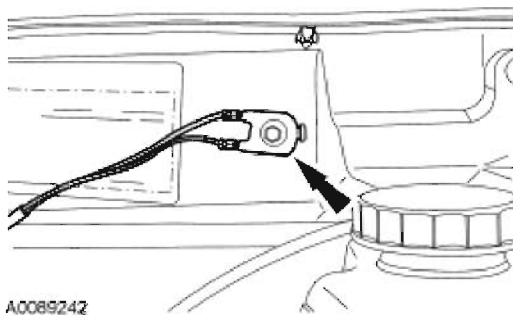
**Fig. 207: Locating Electrical Connector Retainers**  
Courtesy of FORD MOTOR CO.

44. Disconnect the powertrain control module (PCM) electrical connectors. Remove the nut and position the harness aside.



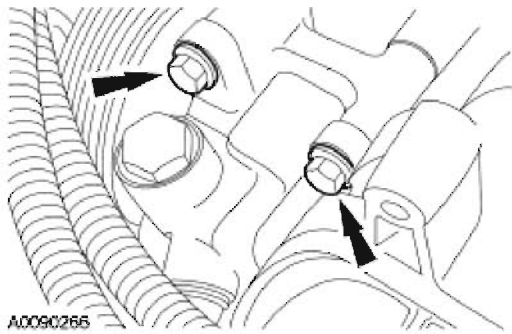
**Fig. 208: Locating Powertrain Control Module (PCM) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

45. Remove the bolt and detach the ground wire.



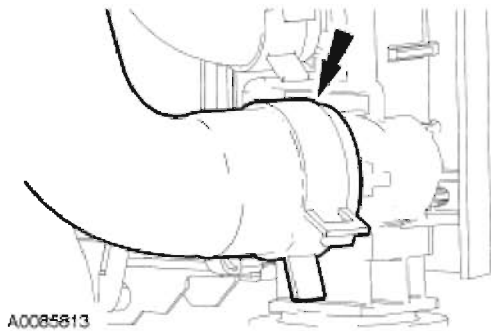
**Fig. 209: Locating Ground Wire & Bolt**  
Courtesy of FORD MOTOR CO.

46. Remove the 2 power steering pump bolts.



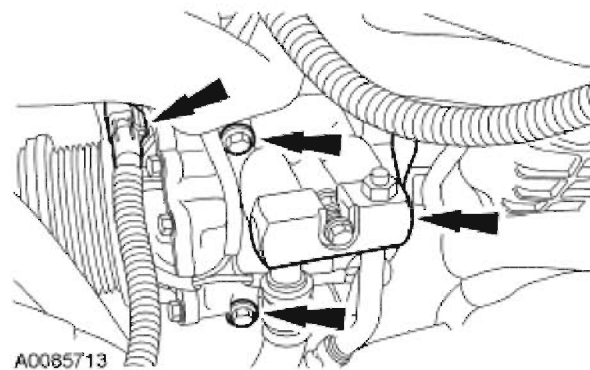
**Fig. 210: Locating Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

47. Disconnect the lower radiator hose from the radiator.



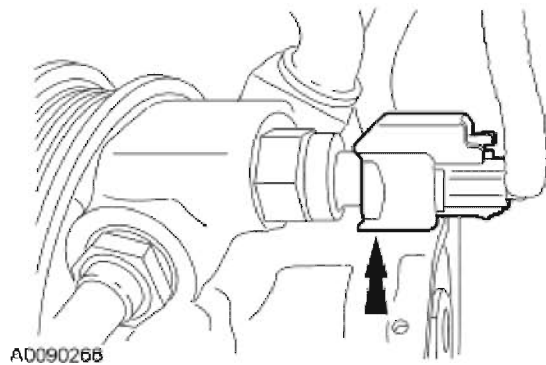
**Fig. 211: Locating Lower Radiator Hose**  
Courtesy of FORD MOTOR CO.

48. Disconnect the A/C compressor electrical connector and remove the 3 bolts. Position the A/C compressor aside and support the compressor with a length of mechanic's wire.



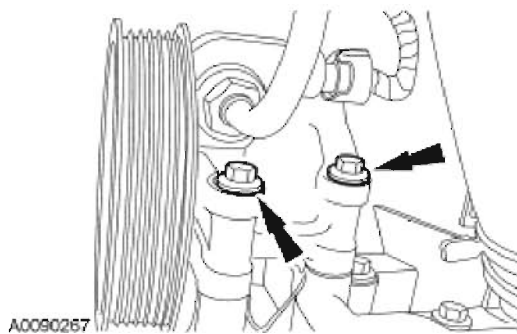
**Fig. 212: Locating A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

49. Disconnect the power steering pressure (PSP) sensor electrical connector.



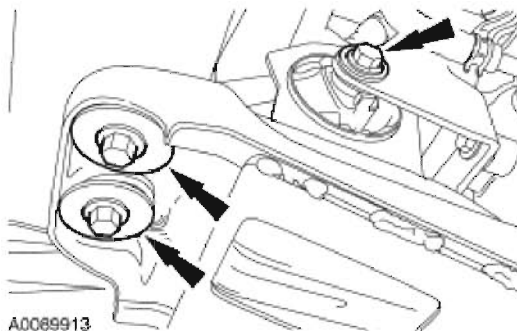
**Fig. 213: Locating Power Steering Pressure (PSP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** The bolt under the power steering pressure tube will remain with the power steering pump.



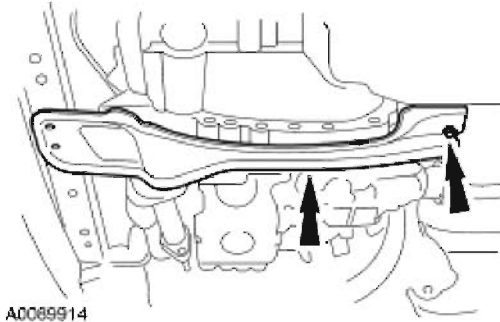
**Fig. 214: Identifying Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

50. Remove the bolts and position the power steering pump aside.
51. Remove the front roll restrictor bolt and the 2 bolts for the engine support crossmember.



**Fig. 215: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**  
Courtesy of FORD MOTOR CO.

52. Remove the rear nut and the engine support crossmember.
- Discard the nut.



**Fig. 216: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

**NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.

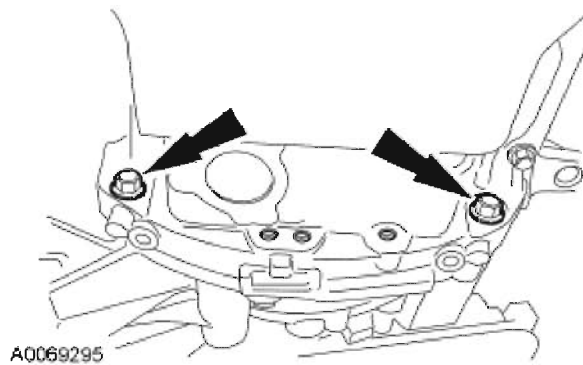


**Fig. 217: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

53. Remove the 2 transaxle-to-engine bolts.

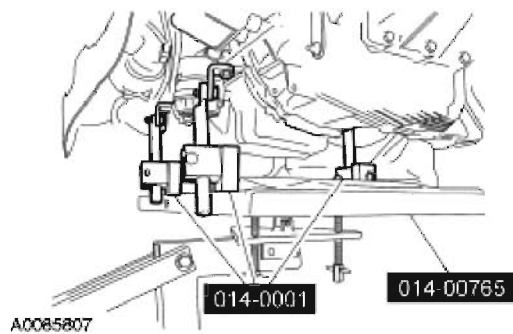
**NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.





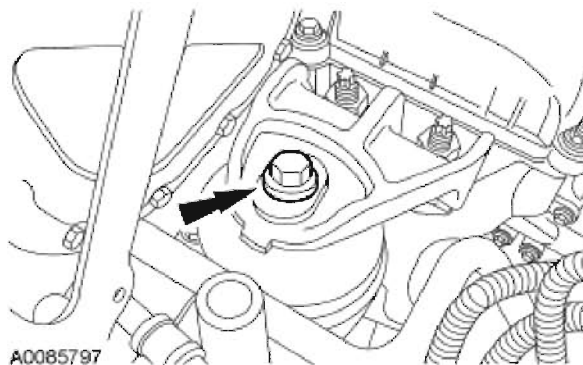
**Fig. 218: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

54. Remove the 2 transaxle-to-engine bolts.
55. Using the special tools, secure the engine to the lift table.



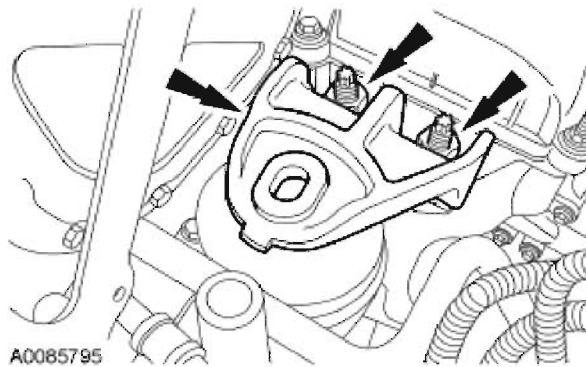
**Fig. 219: Securing Engine To Lift Table Using Special Tool (014-0001, 014-00765)**  
Courtesy of FORD MOTOR CO.

56. Remove the engine mount bracket bolt.



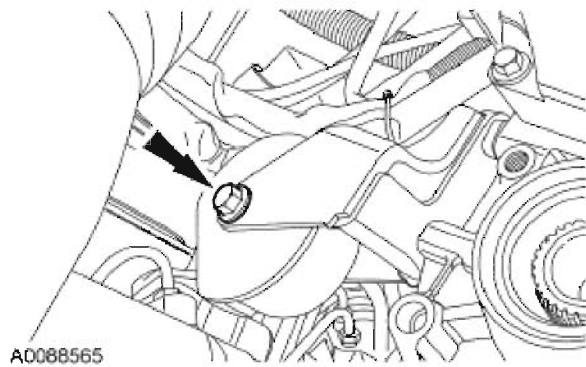
**Fig. 220: Locating Engine Mount Bracket Bolt**  
Courtesy of FORD MOTOR CO.

57. Remove the nuts and the engine mount bracket.



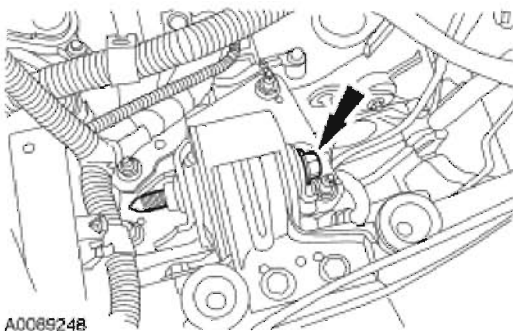
**Fig. 221: Locating Nuts & Engine Mount Bracket**  
Courtesy of FORD MOTOR CO.

58. Remove the bolt from the transaxle rear mount.



**Fig. 222: Locating Transaxle Rear Mount Bolt**  
Courtesy of FORD MOTOR CO.

59. Remove bolt from the LH transaxle mount.



**Fig. 223: Locating Transaxle Mount Bolt**  
Courtesy of FORD MOTOR CO.

60. Lower the engine and transaxle from the vehicle.
61. Using the engine crane and spreader bar, remove the engine and transaxle from the lift table.

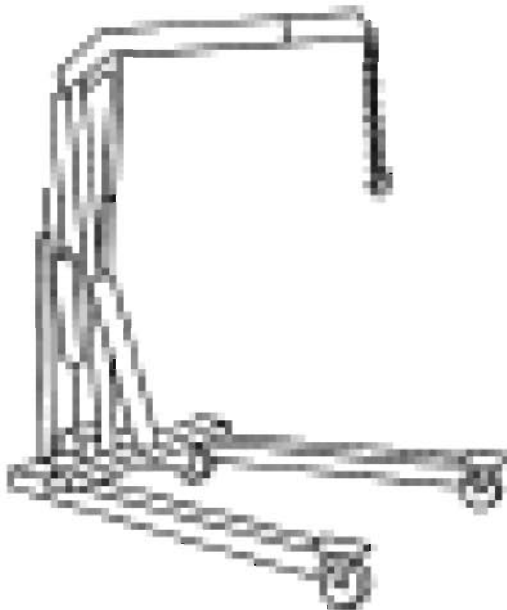
**NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.

62. Remove the remaining 6 engine-to-transaxle bolts and separate the engine and transaxle.

## DISASSEMBLY

### ENGINE

### SPECIAL TOOL(S)



**ST1341-A**

Heavy Duty Floor Crane  
014-00071 or equivalent

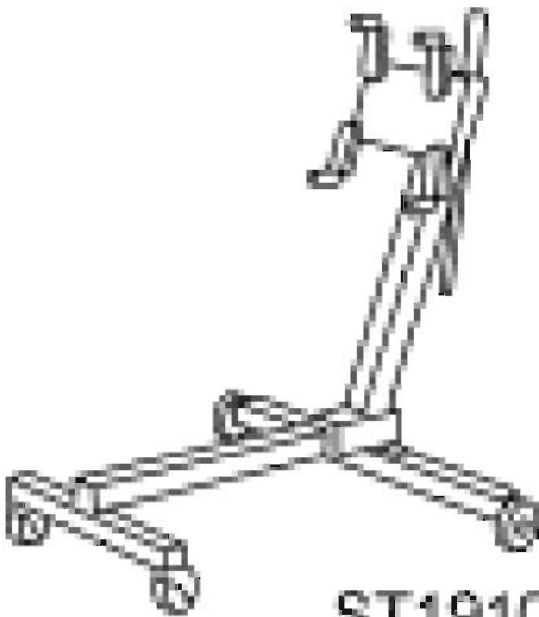
Spreader Bar  
303-D089 (D93P-6001-A3) or  
equivalent

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1602-A**



**ST1910-A**

Engine Stand  
014-00232 or equivalent

Alignment Plate, Camshaft  
303-465 (T94P-6256-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST2645-A**



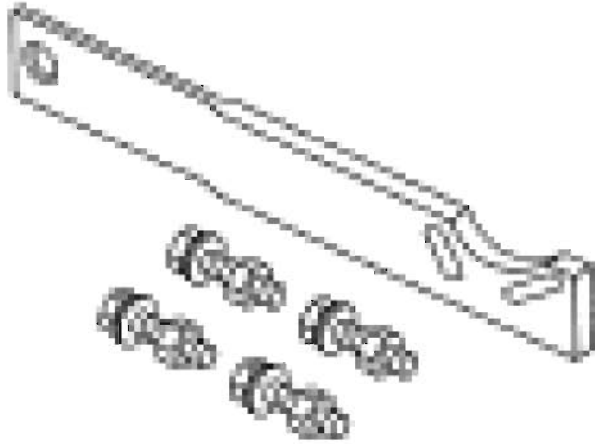
**ST2638-A**

Timing Peg, Crankshaft  
303-507

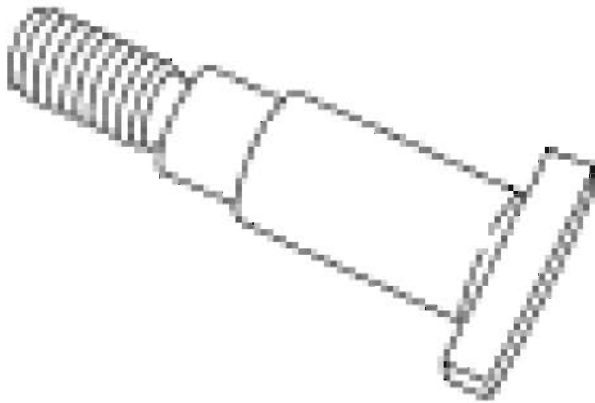
Holding Fixture, Drive Pinion Flange  
205-126 (T78P-4851-A)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST2647-A**



**ST2639-A**

Adapter for 205-126  
(205-072-02)

Remover, Oil Seal  
303-409 (T92C-6700-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1385-A**

### CAUTION:

Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

Due to the precision fit and timing of the balancer shaft assembly, it cannot be removed from the engine block.

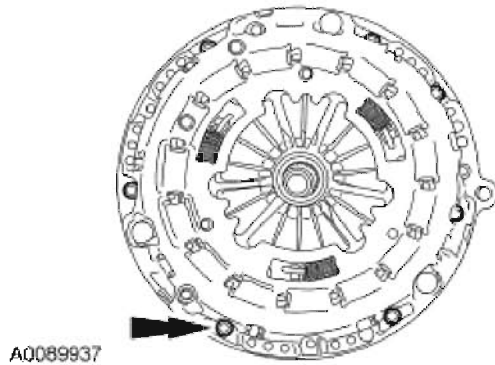
**NOTE:** For additional information, refer to the exploded views under the engine assembly procedure .

Vehicles with manual transaxle

**WARNING:** The clutch disc and clutch pressure plate are heavy

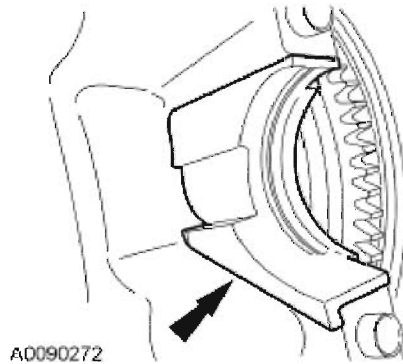
and may fall if not held when the bolts are removed.  
Failure to follow these instructions may result in  
personal injury.

**CAUTION:** Loosen the bolts evenly to prevent pressure plate  
damage.



**Fig. 224: Locating Bolts, Clutch Pressure Plate & Clutch Disc**  
Courtesy of FORD MOTOR CO.

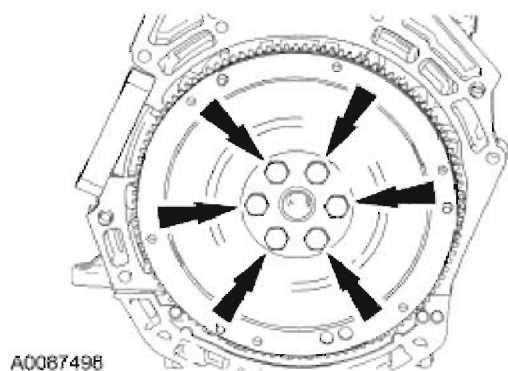
1. Remove the bolts, clutch pressure plate and clutch disc.
2. Remove the starter motor isolator.



**Fig. 225: Locating Starter Motor Isolator**  
Courtesy of FORD MOTOR CO.

3. Remove the bolts and the flywheel.

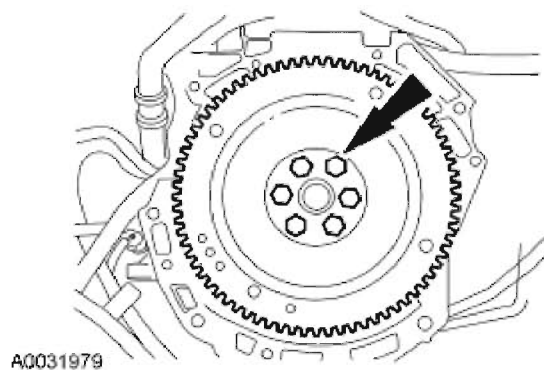




**Fig. 226: Locating Bolts & Flywheel**  
Courtesy of FORD MOTOR CO.

**Vehicles with automatic transaxle**

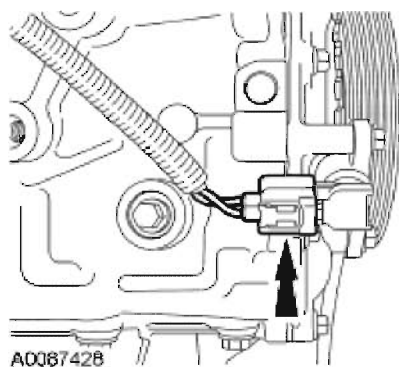
4. Remove the bolts and the flexplate.



**Fig. 227: Locating Bolts & Flexplate**  
Courtesy of FORD MOTOR CO.

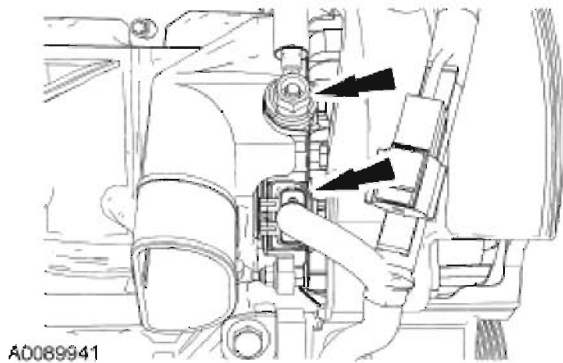
**All vehicles**

5. Mount the engine on a suitable stand.
6. Disconnect the crankshaft position (CKP) sensor electrical connector.



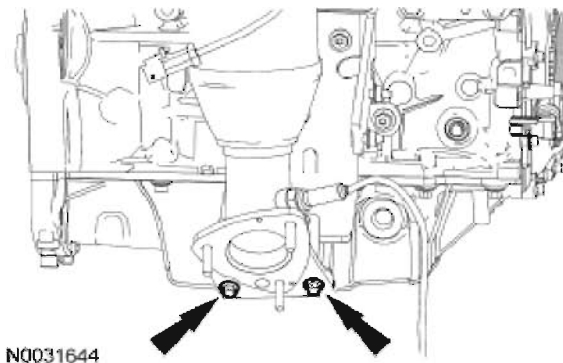
**Fig. 228: Locating Crankshaft Position (CKP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

7. Remove the nut and disconnect the generator electrical connections.



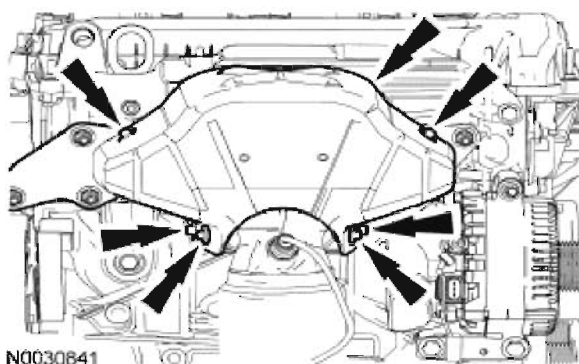
**Fig. 229: Locating Nut & Generator Electrical Connections**  
Courtesy of FORD MOTOR CO.

8. Remove the 2 lower catalytic converter bolts.



**Fig. 230: Locating Lower Catalytic Converter Bolts**  
Courtesy of FORD MOTOR CO.

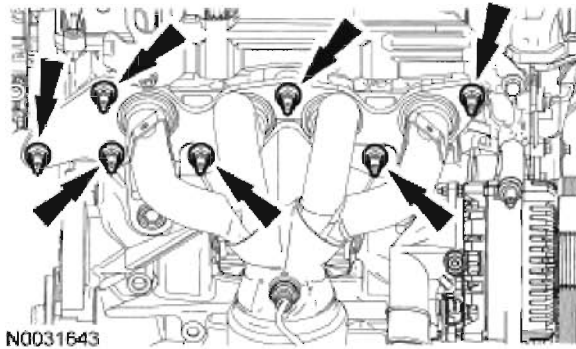
9. Remove the 6 heat shield bolts and the heat shield.



**Fig. 231: Locating Heat Shield Bolts & Heat Shield**

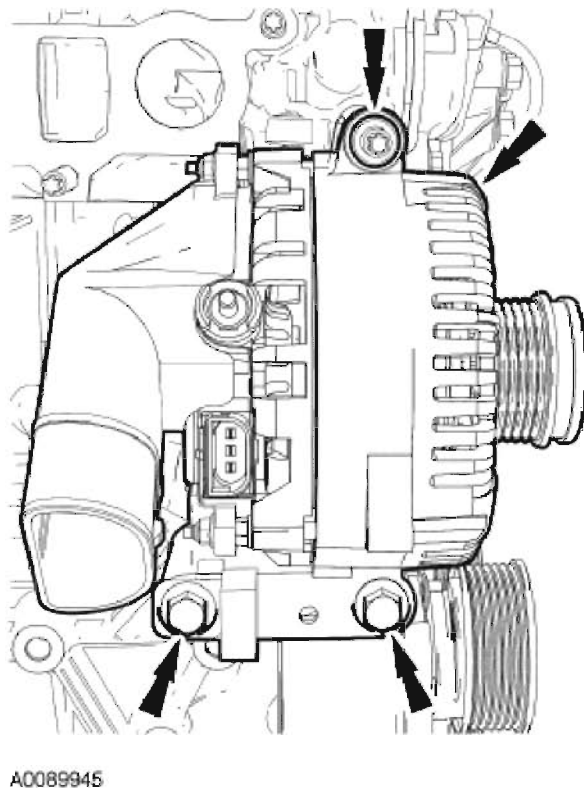
Courtesy of FORD MOTOR CO.

10. Remove and discard the 7 exhaust manifold nuts.



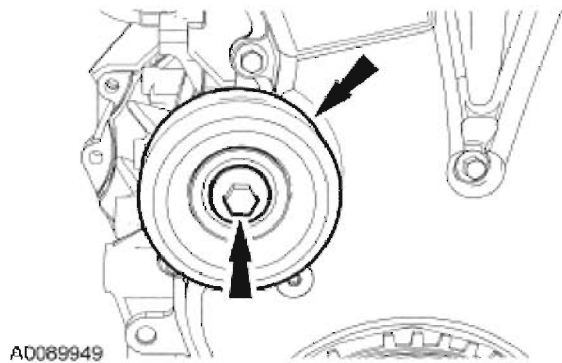
**Fig. 232: Locating Exhaust Manifold Nuts**  
Courtesy of FORD MOTOR CO.

11. Remove the catalytic converter and discard the exhaust manifold gasket.
12. Remove the bolts and the generator.



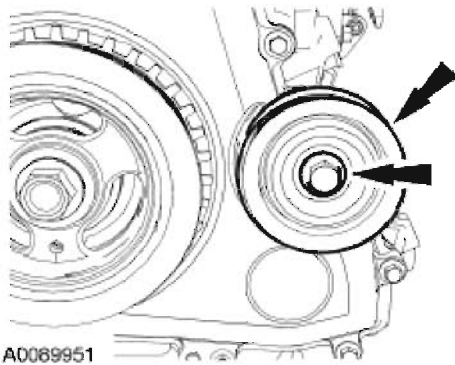
**Fig. 233: Locating Bolts & Generator**  
Courtesy of FORD MOTOR CO.

13. Loosen the bolt and remove the accessory drive belt idler pulley.



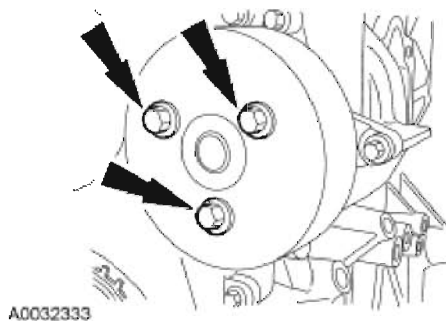
**Fig. 234: Locating Accessory Drive Belt Idler Pulley Bolt**  
Courtesy of FORD MOTOR CO.

14. If equipped, loosen the bolt and remove the accessory drive belt idler pulley.



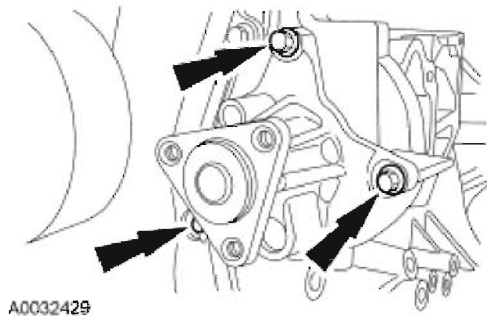
**Fig. 235: Locating Bolt & Accessory Drive Belt Idler Pulley**  
Courtesy of FORD MOTOR CO.

15. Remove the bolts and the coolant pump pulley.



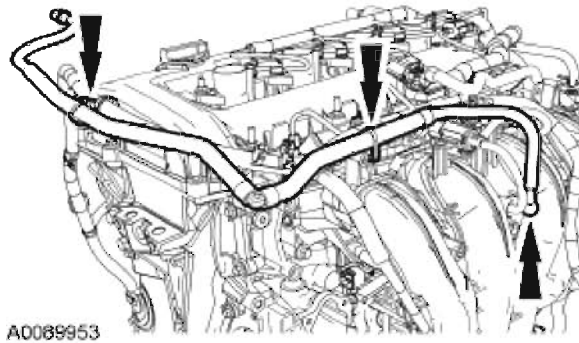
**Fig. 236: Locating Coolant Pump Pulley Bolts**  
Courtesy of FORD MOTOR CO.

16. Remove the bolts and the coolant pump.



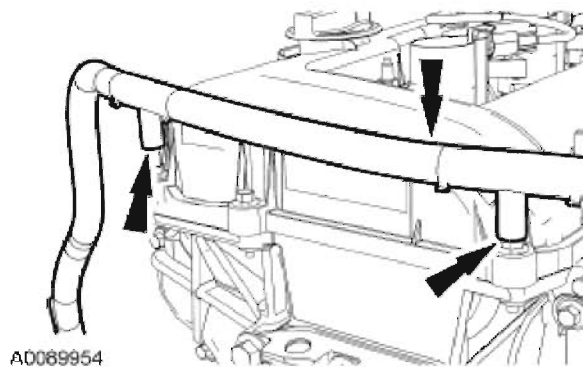
**Fig. 237: Locating Coolant Pump Bolts**  
Courtesy of FORD MOTOR CO.

17. Remove the engine vacuum tube.
  - Detach the 2 engine vacuum tube retainers.
  - Disconnect and remove the engine vacuum tube.



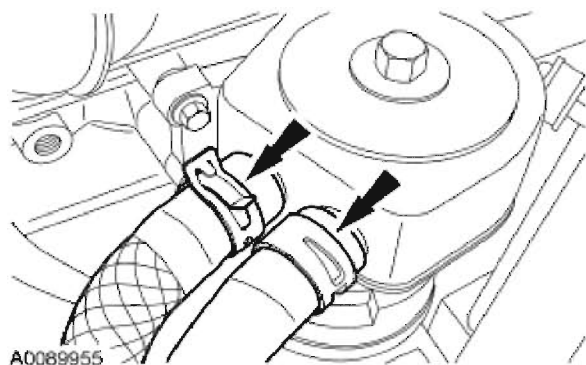
**Fig. 238: Locating Engine Vacuum Tube**  
Courtesy of FORD MOTOR CO.

18. Detach the 2 wiring harness retainers and position the harness aside.



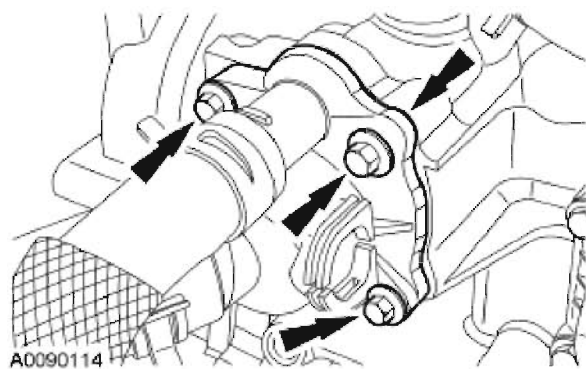
**Fig. 239: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

19. If equipped, disconnect the oil cooler hoses.



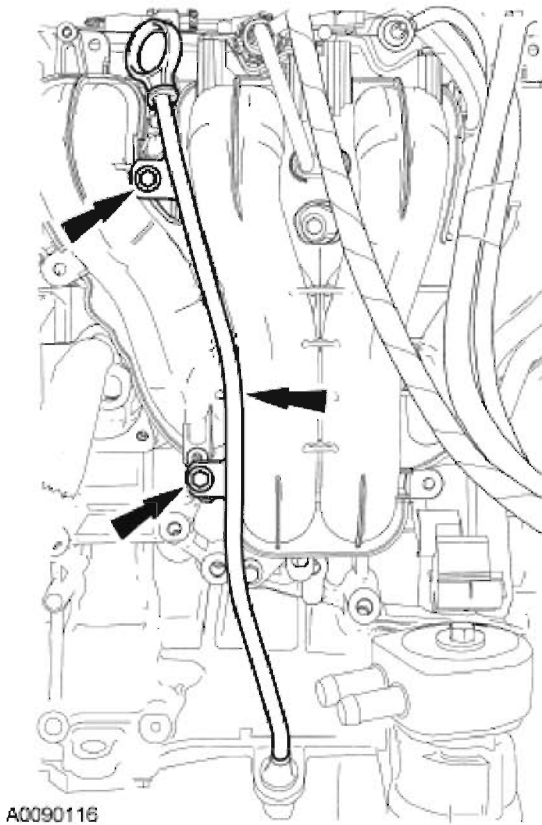
**Fig. 240: Locating Oil Cooler Hoses**  
Courtesy of FORD MOTOR CO.

20. Remove the bolts and the thermostat housing assembly.



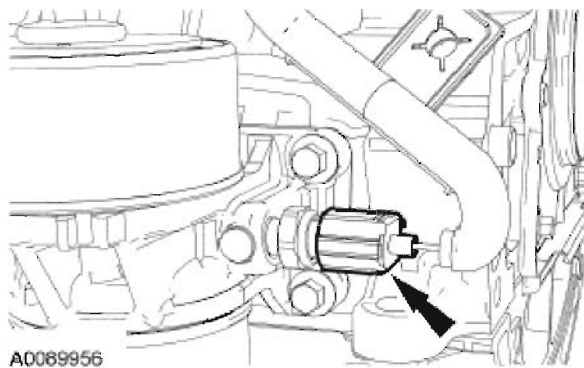
**Fig. 241: Locating Bolts & Thermostat Housing Assembly**  
Courtesy of FORD MOTOR CO.

21. Remove the bolts and the oil level indicator.



**Fig. 242: Locating Bolts & Oil Level Indicator**  
Courtesy of FORD MOTOR CO.

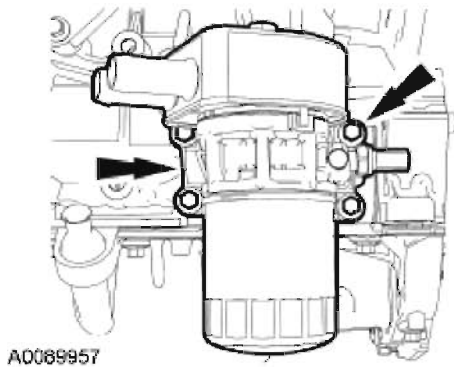
22. Disconnect the oil pressure sensor electrical connector.



**Fig. 243: Locating Oil Pressure Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** Early build with oil cooler shown, late build without oil cooler similar.

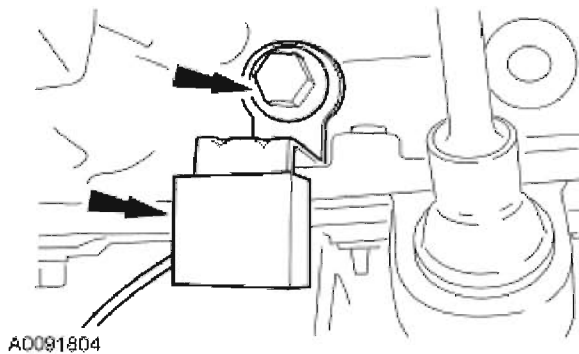
23. Remove the oil filter, 4 bolts and the oil filter adapter.
- Discard the oil filter and gasket.



**Fig. 244: Locating Oil Filter, Bolts & Oil Filter Adapter**  
Courtesy of FORD MOTOR CO.

**CAUTION: A new oil cooler must be installed or severe damage to the engine can occur.**

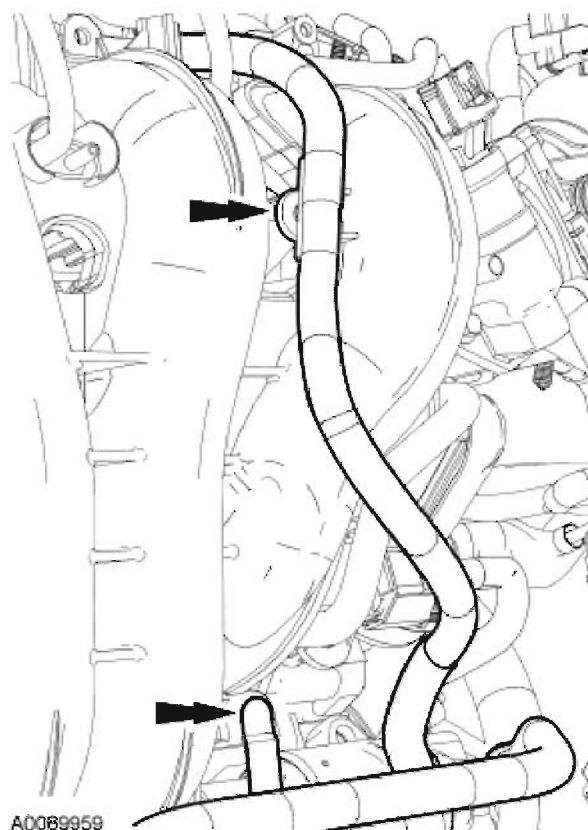
24. Position the oil filter adapter in a vise and remove the oil cooler bolt and oil cooler.
  - Discard the oil cooler.
25. If equipped, remove the bolt and capacitor.



**Fig. 245: Locating Bolt & Capacitor**  
Courtesy of FORD MOTOR CO.

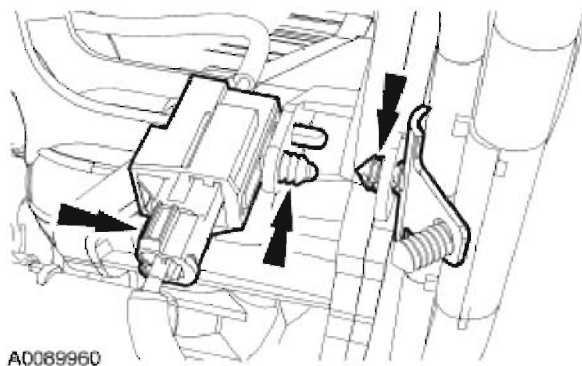
26. Detach the 2 wiring harness retainers.





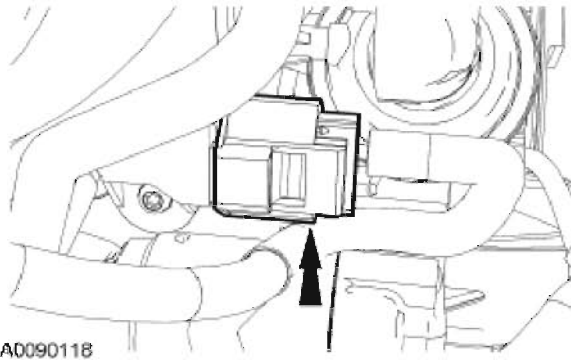
**Fig. 246: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

27. Disconnect the knock sensor (KS) and detach the 2 wiring harness retainers.



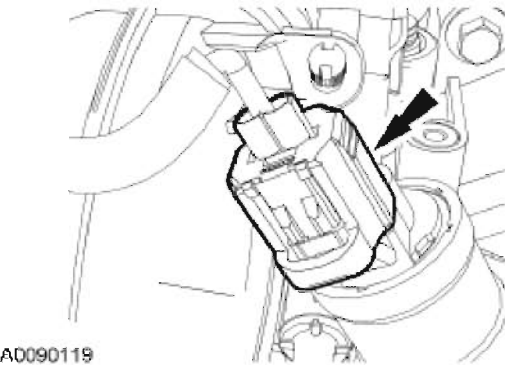
**Fig. 247: Locating Knock Sensor (KS) & Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

28. Disconnect the temperature manifold absolute pressure (TMAP) electrical connector.



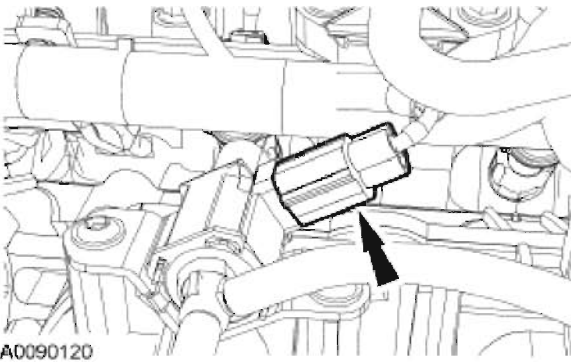
**Fig. 248: Locating Temperature Manifold Absolute Pressure (TMAP) Electrical Connector**  
Courtesy of FORD MOTOR CO.

29. Disconnect the idle air control (IAC) motor electrical connector.



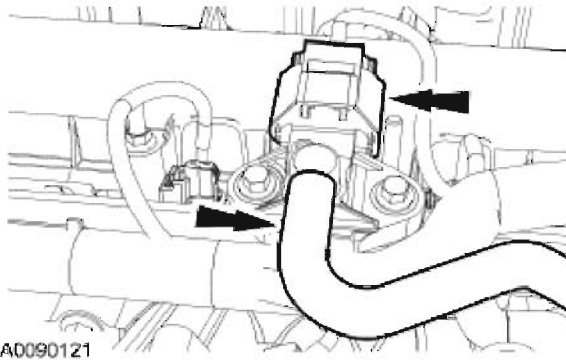
**Fig. 249: Locating Idle Air Control (IAC) Motor Electrical Connector**  
Courtesy of FORD MOTOR CO.

30. Disconnect the swirl control valve electrical connector.



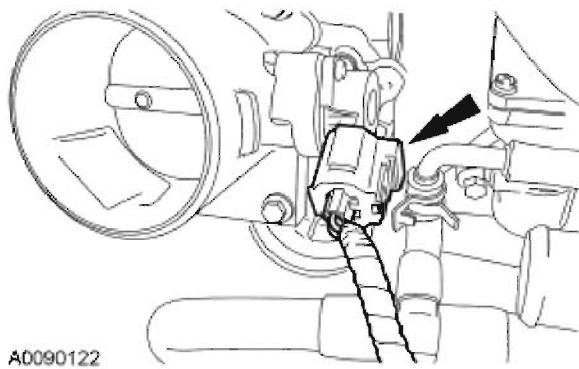
**Fig. 250: Locating Swirl Control Valve Electrical Connector**  
Courtesy of FORD MOTOR CO.

31. Disconnect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.



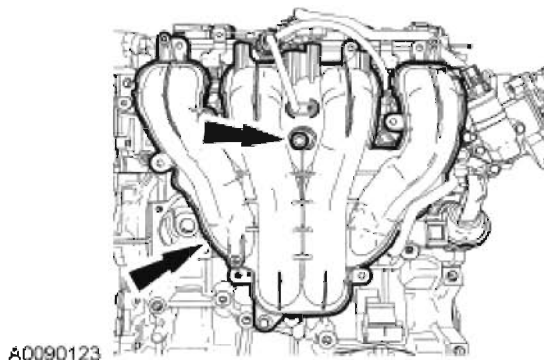
**Fig. 251: Locating Fuel Rail Pressure & Temperature Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

32. Disconnect the throttle position (TP) sensor electrical connector.



**Fig. 252: Locating Throttle Position (TP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

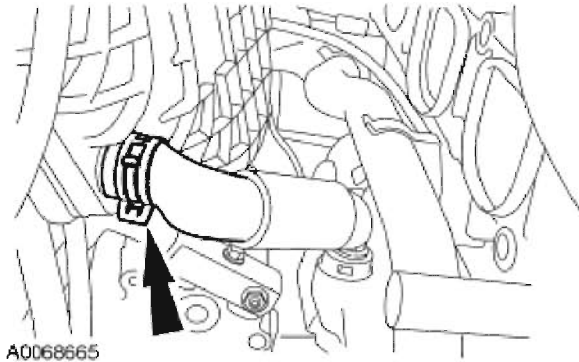
**NOTE:** There are 3 different size bolts used. Mark the location of the bolts to ensure installation in the correct locations.



**Fig. 253: Locating Intake Manifold Aside & Bolt**  
Courtesy of FORD MOTOR CO.

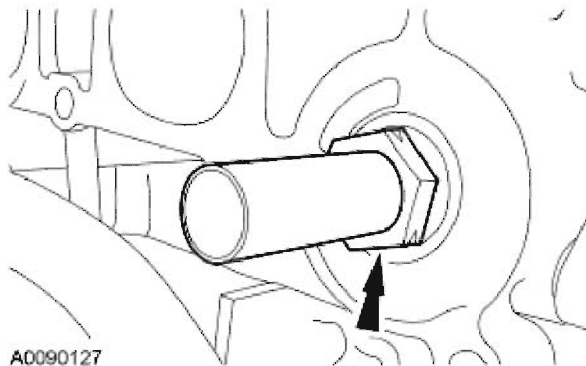
33. Remove the bolts and position the intake manifold aside.

34. Disconnect the positive crankcase ventilation (PCV) hose and remove the intake manifold.



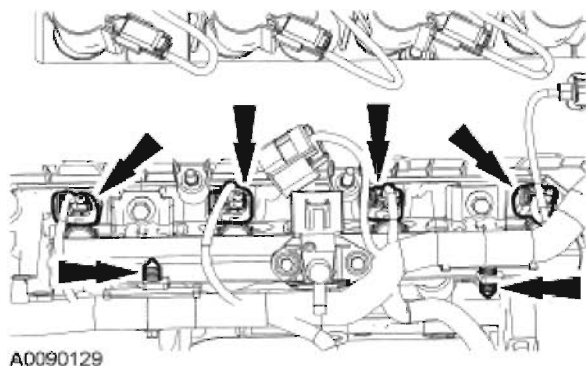
**Fig. 254: Locating Positive Crankcase Ventilation (PCV) Hose**  
Courtesy of FORD MOTOR CO.

35. Remove the exhaust gas recirculation (EGR) tube.



**Fig. 255: Locating Exhaust Gas Recirculation (EGR) Tube**  
Courtesy of FORD MOTOR CO.

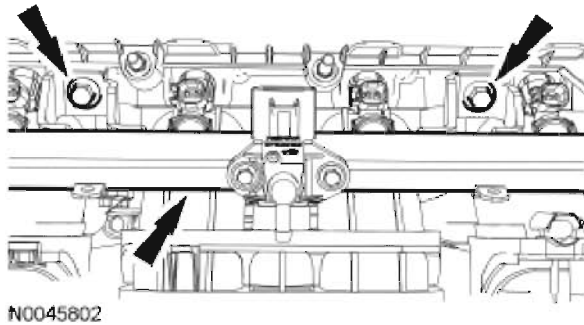
36. Disconnect the 4 fuel injector electrical connectors. Detach the 2 wiring harness retainers.



**Fig. 256: Locating Fuel Injector Electrical Connectors**

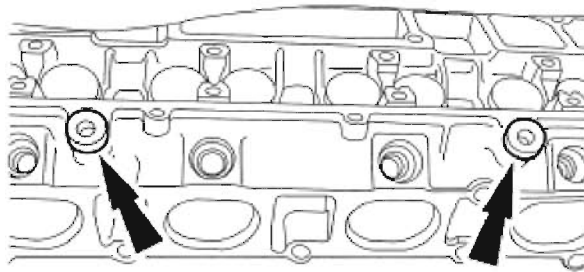
Courtesy of FORD MOTOR CO.

37. Remove the 2 bolts and the fuel rail with the fuel injectors.



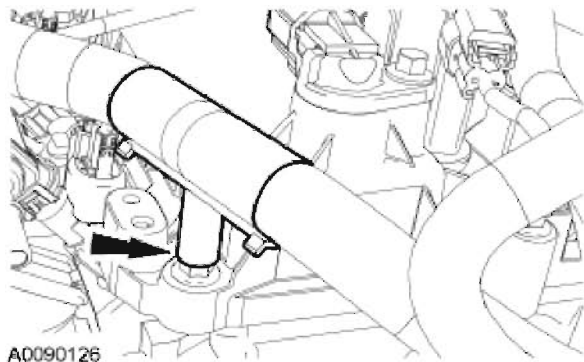
**Fig. 257: Locating Bolts & Fuel Rail With Fuel Injectors**  
Courtesy of FORD MOTOR CO.

38. If equipped, remove the fuel rail spacers.



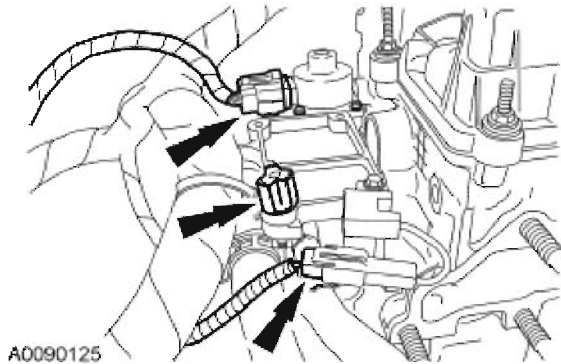
**Fig. 258: Locating Fuel Rail Spacers**  
Courtesy of FORD MOTOR CO.

39. Detach the wiring harness retainer.



**Fig. 259: Locating Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

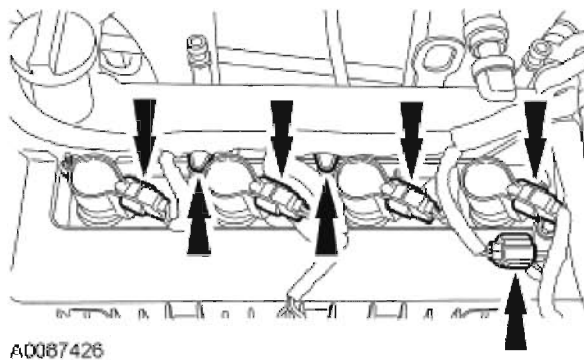
40. Disconnect the EGR valve and radio interference capacitor electrical connectors. Detach the wiring harness retainer.



**Fig. 260: Locating EGR Valve & Radio Interference Capacitor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

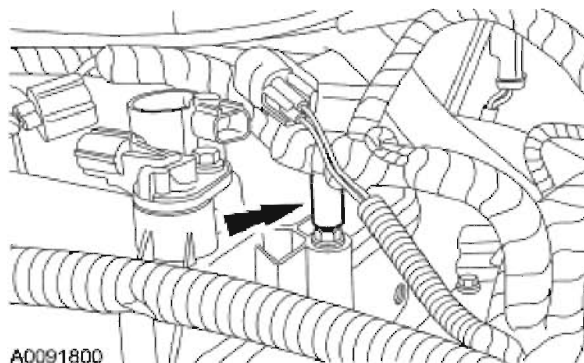
41. Disconnect the coil-on-plug and camshaft position (CMP) sensor electrical connectors.



**Fig. 261: Locating Coil-On-Plug & Camshaft Position (CMP) Sensor Electrical Connectors**

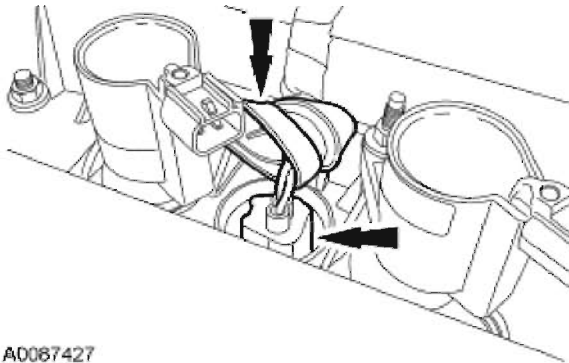
**Courtesy of FORD MOTOR CO.**

42. Detach the wiring harness retainer.



**Fig. 262: Locating Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

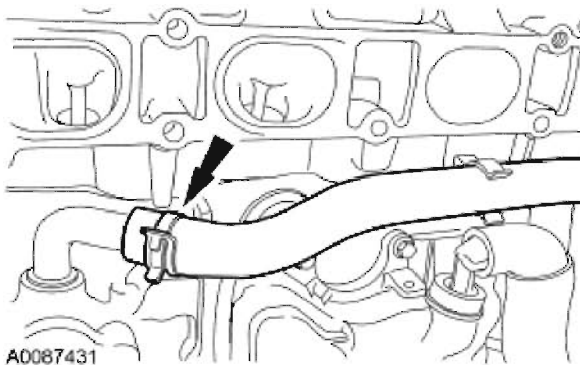
43. Position the rubber boot aside and disconnect the cylinder head temperature (CHT) sensor electrical connector. Remove the wiring harness from the engine.



A0087427

**Fig. 263: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

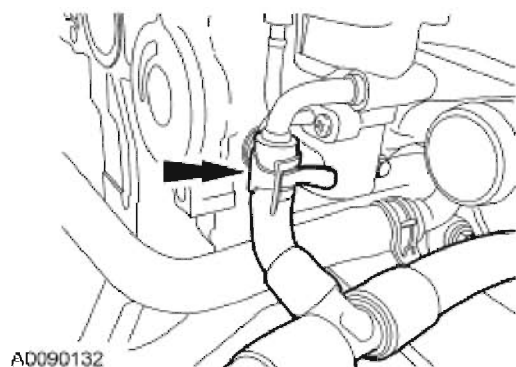
44. Disconnect the coolant hose.



A0087431

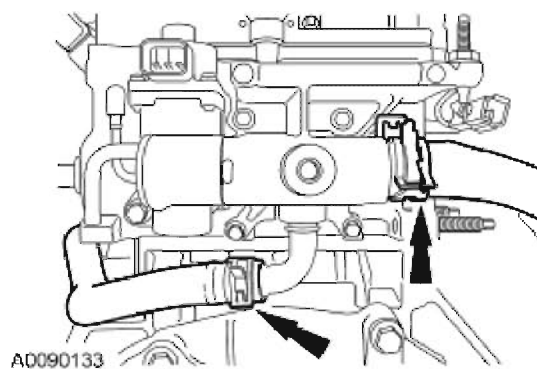
**Fig. 264: Locating Coolant Hose (1 Of 3)**  
Courtesy of FORD MOTOR CO.

45. Disconnect and remove the coolant hose.



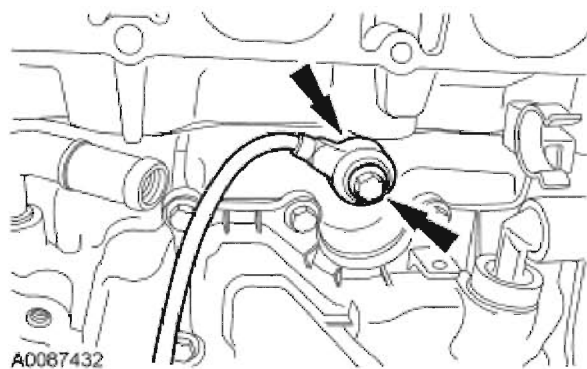
**Fig. 265: Locating Coolant Hose (2 Of 3)**  
Courtesy of FORD MOTOR CO.

46. Disconnect and remove the coolant hoses.



**Fig. 266: Locating Coolant Hose (3 Of 3)**  
Courtesy of FORD MOTOR CO.

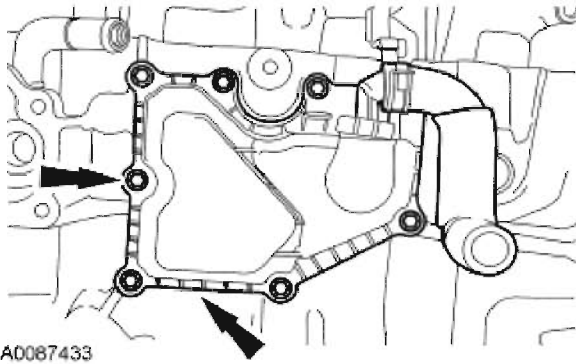
47. Remove the bolt and the KS.



**Fig. 267: Locating Bolt & KS**  
Courtesy of FORD MOTOR CO.

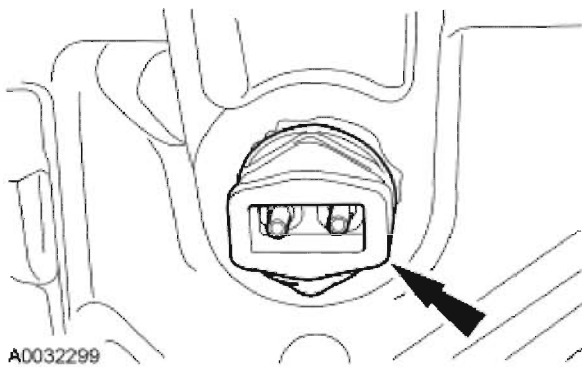
48. Remove the bolts and the crankcase vent oil separator.





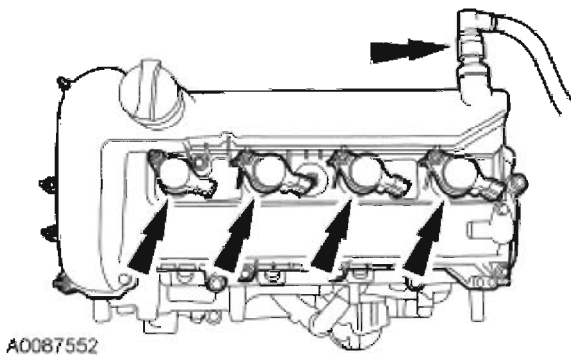
**Fig. 268: Locating Bolts & Crankcase Vent Oil Separator**  
Courtesy of FORD MOTOR CO.

49. If equipped, remove the block heater.



**Fig. 269: Locating Block Heater**  
Courtesy of FORD MOTOR CO.

50. Remove the crankcase vent tube and the coil-on-plugs.

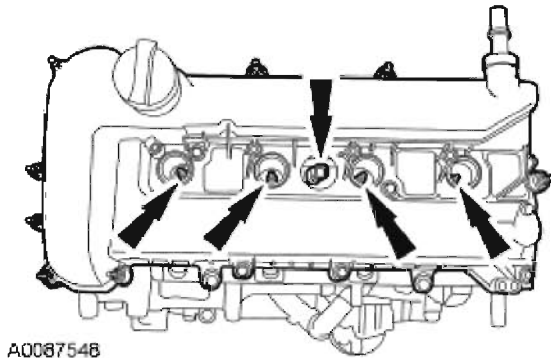


**Fig. 270: Locating Crankcase Vent Tube & Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

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

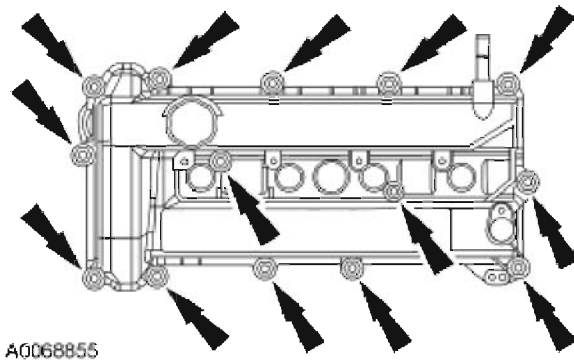
**spark plug.**

51. Remove the spark plugs and the CHT sensor.
- Discard the CHT.



**Fig. 271: Locating Spark Plugs & CHT Sensor**  
Courtesy of FORD MOTOR CO.

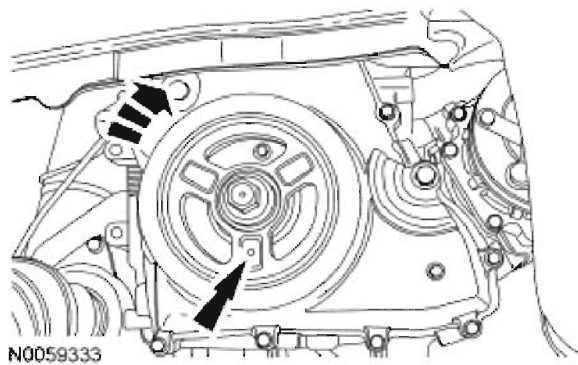
52. Remove the bolts and the valve cover.



**Fig. 272: Locating Bolts & Valve Cover**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Failure to position the No. 1 piston at top dead center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.

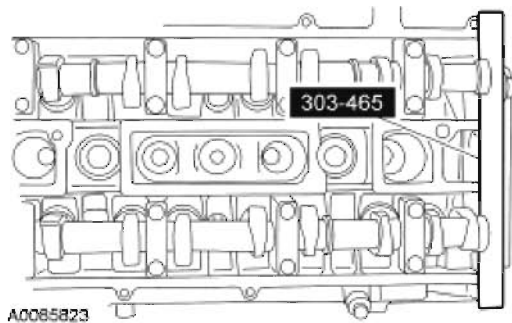
53. Using the crankshaft pulley bolt, turn the crankshaft clockwise to position the No. 1 piston at TDC.
- The hole in the crankshaft pulley should be in the 6 o'clock position.



**Fig. 273: Locating Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

**NOTE:** The camshaft timing slots are offset. If the special tool cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.



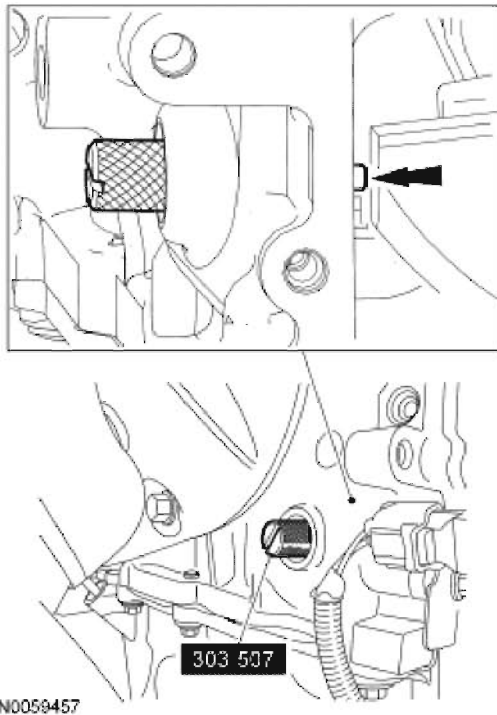
**Fig. 274: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

54. Install the special tool in the slots on the rear of both camshafts.
55. Remove the engine plug bolt.



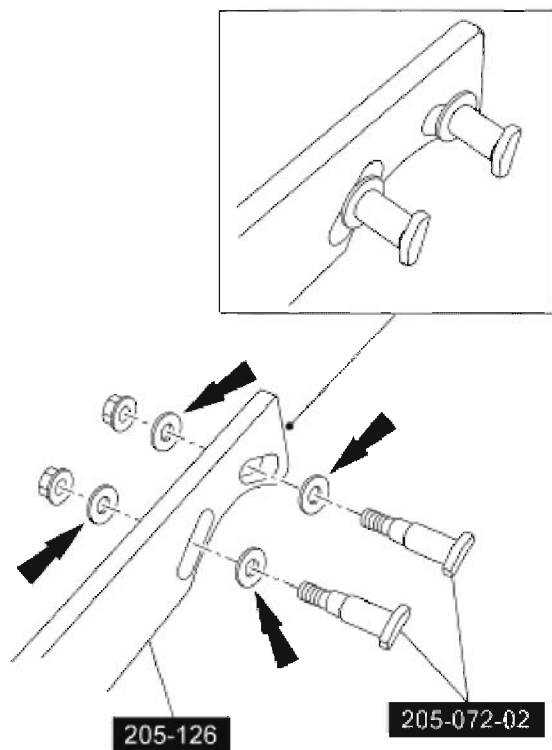
**Fig. 275: Locating Engine Plug Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the disassembly.



**Fig. 276: Identifying Special Tool (303-507)**  
Courtesy of FORD MOTOR CO.

56. Install the special tool.
57. Assemble the special tools using 4 hardened washers in the locations shown in **Fig. 277**.



N0059334

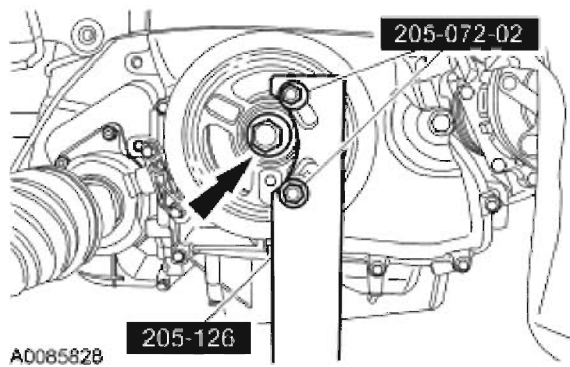
**Fig. 277: Assembling Special Tools (205-072-02, 205-126)**  
Courtesy of FORD MOTOR CO.

**CAUTION:**

The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

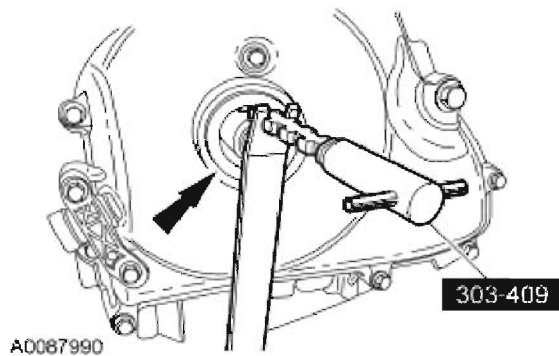
If the crankshaft sprocket diamond washer comes off with the crankshaft pulley, it must be installed back onto the crankshaft.

58. Using the special tools and an air impact wrench, remove the crankshaft pulley.
- Remove and discard the crankshaft pulley bolt and washer.
  - Remove the crankshaft pulley.



**Fig. 278: Identifying Special Tools Assembly (205-072-02/205-126) And Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

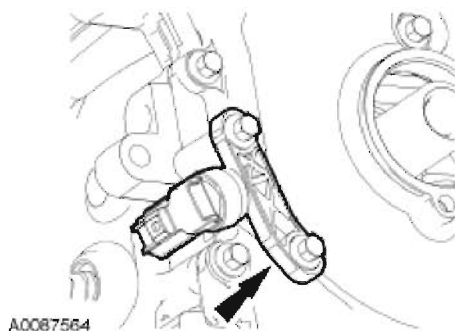
**CAUTION:** Use care not to damage the engine front cover or the crankshaft when removing the seal.



**Fig. 279: Removing Crankshaft Front Oil Seal Using Special Tool (303-409)**  
Courtesy of FORD MOTOR CO.

59. Using the special tool, remove the crankshaft front oil seal.

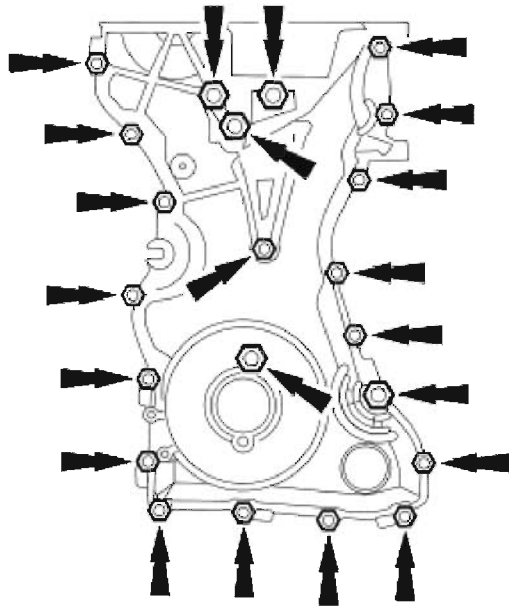
**NOTE:** Whenever the CKP sensor is removed, a new one must be installed using the alignment jig supplied with the new part.



**Fig. 280: Locating CKP Sensor**

Courtesy of FORD MOTOR CO.

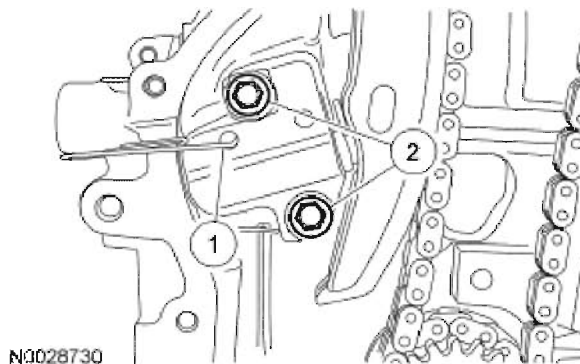
60. Remove and discard the CKP sensor.
61. Remove the bolts and the engine front cover.



A0087412

**Fig. 281: Locating Engine Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

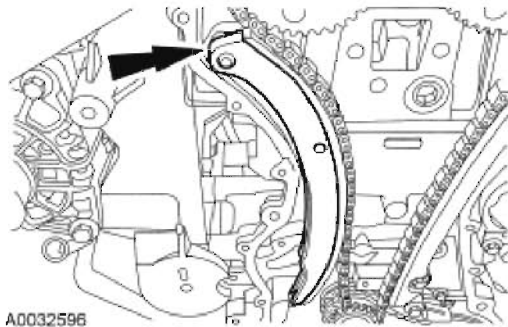
62. Remove the timing chain tensioner.
  1. Compress the timing chain tensioner, and insert a paper clip into the hole to retain the tensioner.
  2. Remove the bolts and timing chain tensioner.



N0028730

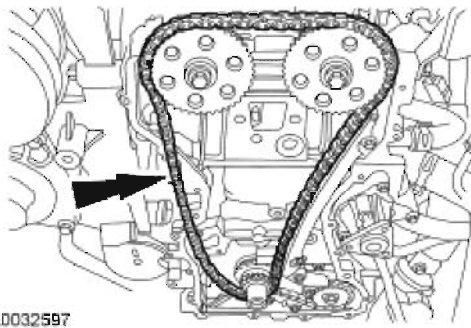
**Fig. 282: Locating Timing Chain Tensioner Bolt**  
Courtesy of FORD MOTOR CO.

63. Remove the RH timing chain guide.



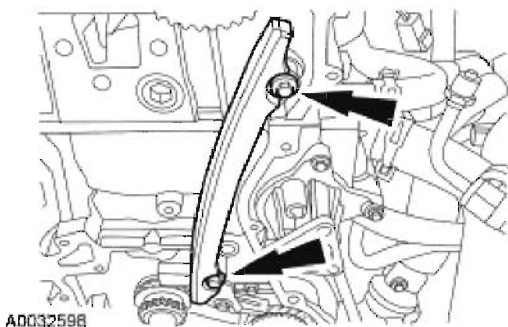
**Fig. 283: Locating RH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

64. Remove the timing chain.



**Fig. 284: View Of Timing Chain**  
Courtesy of FORD MOTOR CO.

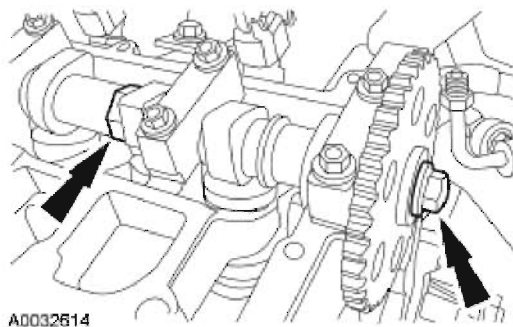
65. Remove the bolts and the LH timing chain guide.



**Fig. 285: Identifying Bolts And LH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

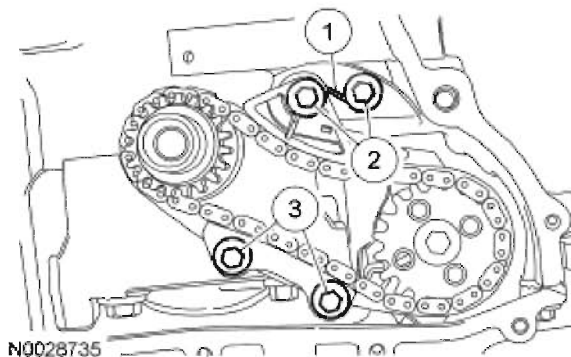
**CAUTION:** Do not rely on the Camshaft Alignment Plate to prevent camshaft rotation. Damage to the tool or the camshaft can occur.





**Fig. 286: Locating Cam Holding Area And Sprocket Bolt**  
Courtesy of FORD MOTOR CO.

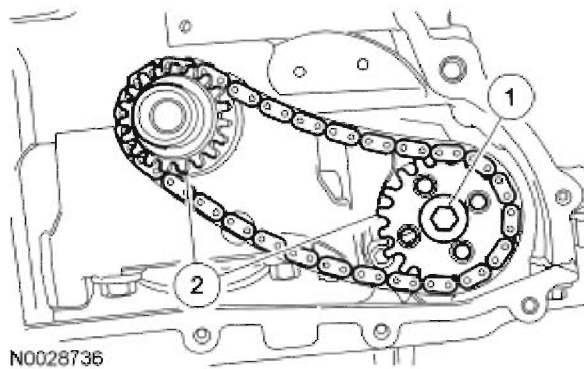
66. Using the flats on the camshaft to prevent camshaft rotation, remove the bolts and the camshaft sprockets.
67. Remove the oil pump chain tensioner and guide.
  1. Release the tension on the tensioner spring.
  2. Remove the tensioner and the shoulder bolt.
  3. Remove the guide



**Fig. 287: Identifying Tensioner & Shoulder Bolt**  
Courtesy of FORD MOTOR CO.

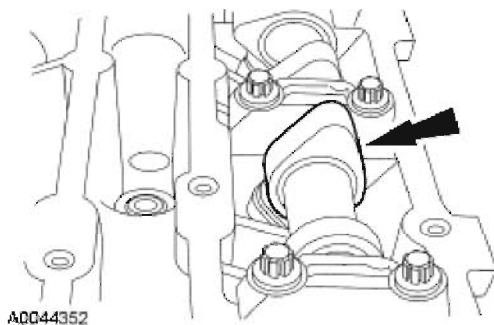
**NOTE:** Remove the crankshaft sprocket diamond washers located in front of and behind the crankshaft sprocket. The oil pump chain sprocket must be held in place.

68. Remove the oil pump chain and sprockets.
  1. Remove the bolt.
  2. Remove the chain and sprockets.



**Fig. 288: Identifying Chain & Sprockets**  
Courtesy of FORD MOTOR CO.

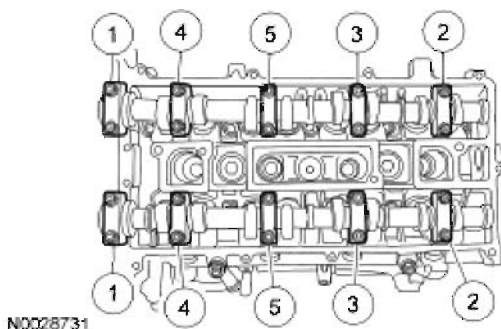
69. Mark the position of the camshaft lobes on the No. 1 cylinder for assembly reference.



**Fig. 289: Locating Camshaft Lobe**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

70. Remove the camshafts from the engine.
- Loosen the camshaft bearing bolts in the sequence shown in **Fig. 290**, one turn at a time. Repeat until all the tension is released.
  - Remove the camshaft bearing caps.
  - Remove the camshafts.

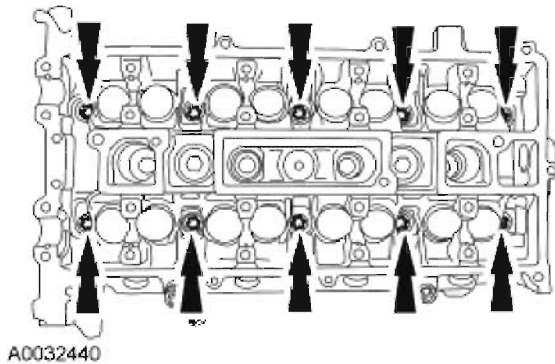


**Fig. 290: Identifying Loosening/Tightening Sequence Of Camshaft Bearing Bolts**

Courtesy of FORD MOTOR CO.

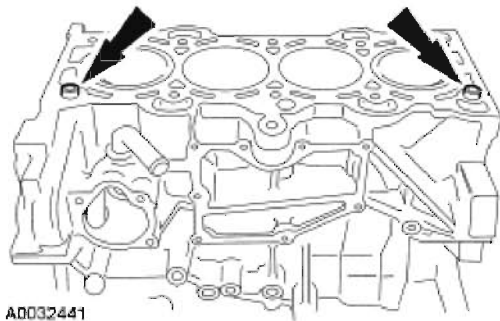
71. Remove the cylinder head.

- Remove and discard the cylinder head bolts.
- Remove the cylinder head.
- Remove and discard the cylinder head gasket.

**Fig. 291: Locating Cylinder Head Bolts**

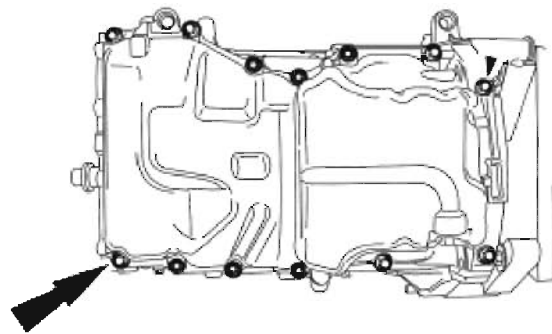
Courtesy of FORD MOTOR CO.

72. Remove the cylinder head alignment dowels.

**Fig. 292: Identifying Cylinder Head Alignment Dowels**

Courtesy of FORD MOTOR CO.

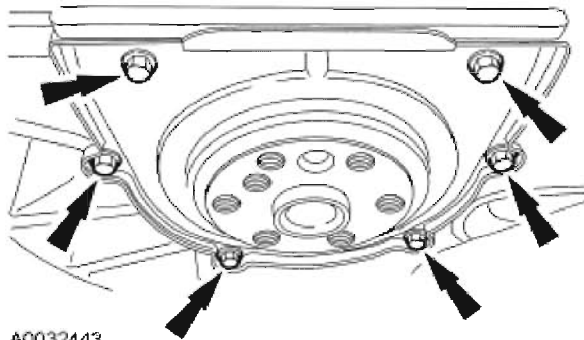
73. Remove the bolts and the oil pan.



A0043114

**Fig. 293: Locating Bolts & Oil Pan**  
Courtesy of FORD MOTOR CO.

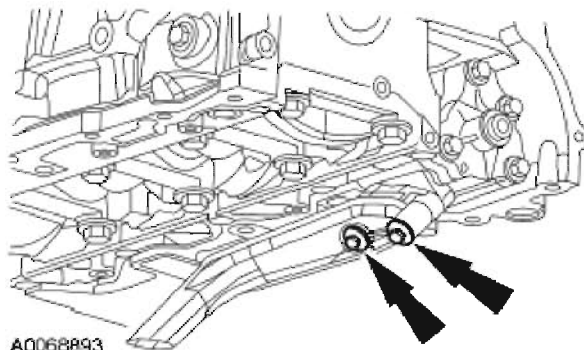
74. Remove the bolts and the rear crankshaft seal.



A0032443

**Fig. 294: Locating Bolts & Rear Crankshaft Seal**  
Courtesy of FORD MOTOR CO.

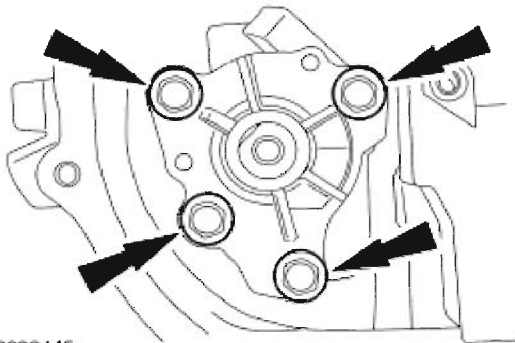
75. Remove the bolts, oil pump pickup tube and gasket.



A0068893

**Fig. 295: Locating Bolts, Oil Pump Pickup Tube & Gasket**  
Courtesy of FORD MOTOR CO.

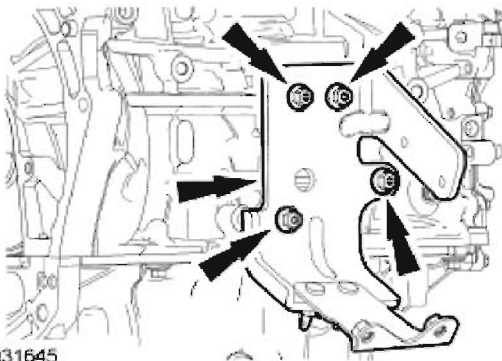
76. Remove the bolts and the oil pump.



A0032445

**Fig. 296: Locating Bolts & Oil Pump**  
Courtesy of FORD MOTOR CO.

77. If necessary, remove the bolts and halfshaft support bracket.



N0031645

**Fig. 297: Locating Bolts & Halfshaft Support Bracket**  
Courtesy of FORD MOTOR CO.

## DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

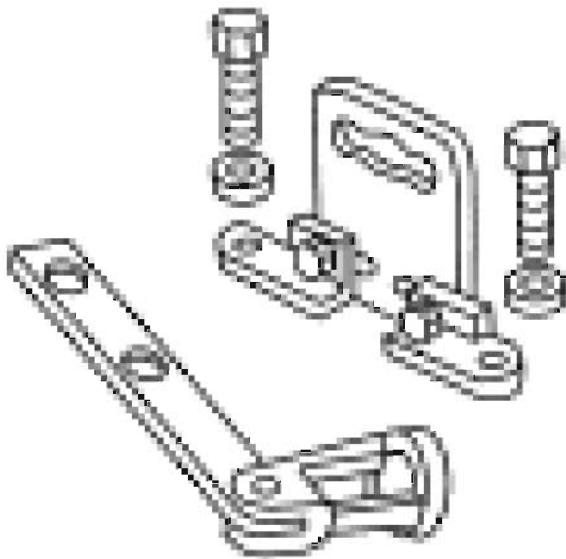
### CYLINDER HEAD

#### SPECIAL TOOL(S)

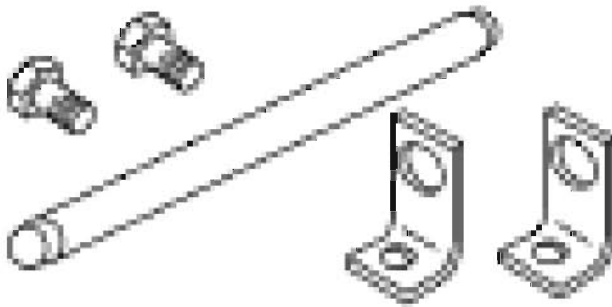
Compressor, Valve Spring  
303-350 (T89P-6565-A)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1907-A**



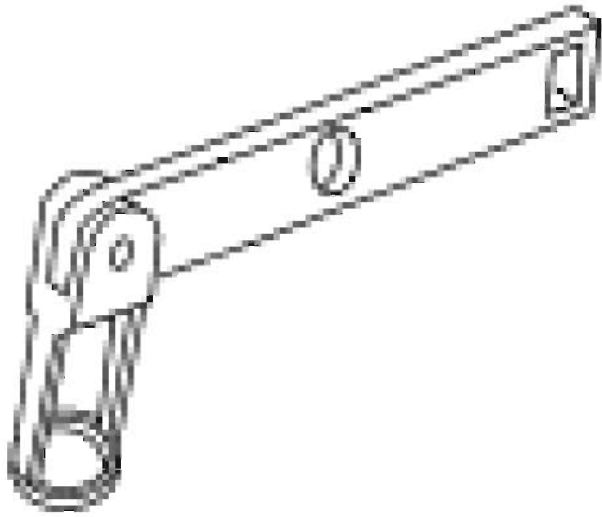
**ST1981-A**

Compressor, Valve Spring  
303-300 (T87C-6565-A)

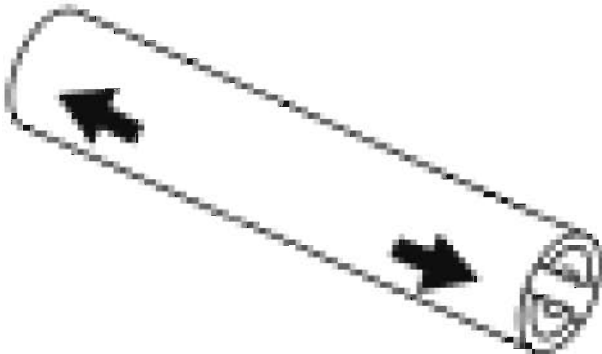
Compressor, Valve Spring  
303-472 (T94P-6565-AH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1902-A**



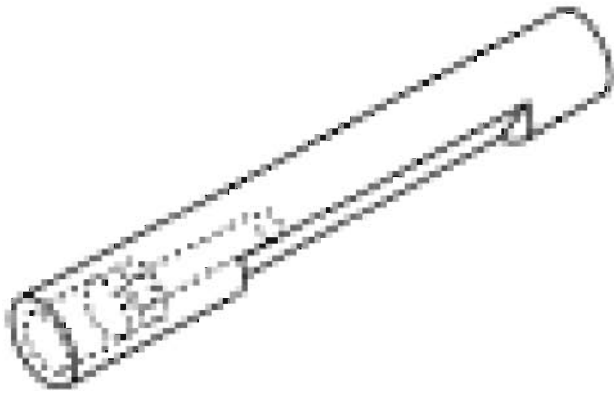
**ST1904-A**

Remover, Valve Stem Oil Seal  
303-468 (T94P-6510-AH)

Installer, Valve Stem Oil Seal  
303-470 (T94P-6510-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1906-A**



**ST1187-A**

Slide Hammer  
307-005 (T59L-100-B)

<http://vnx.su>

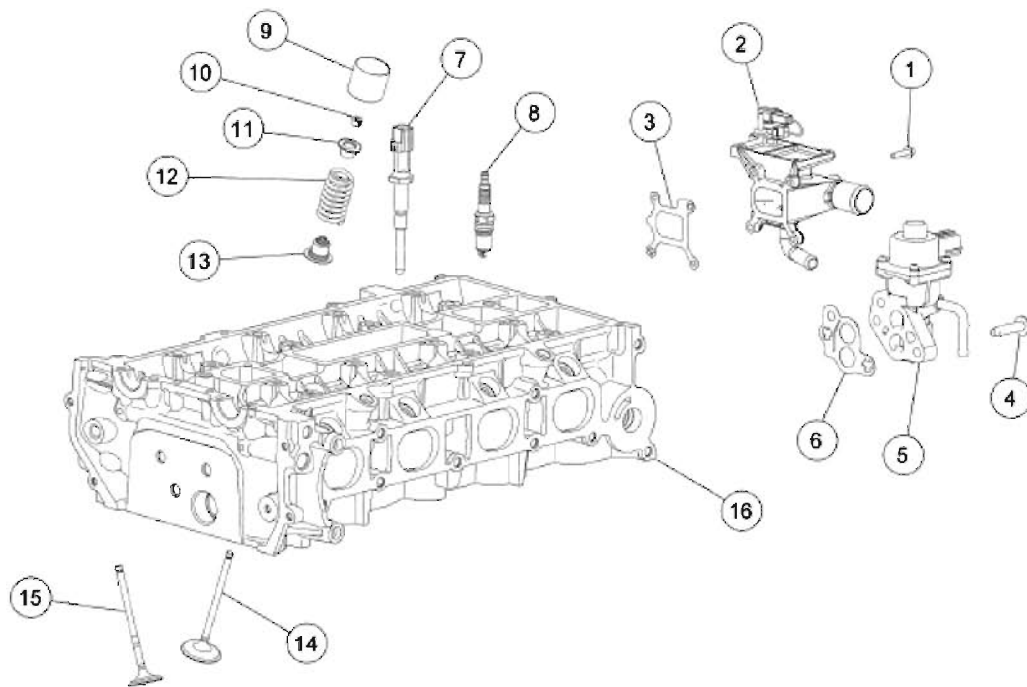
### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B



## 2006 Ford Escape

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A0090273

Item	Part Number	Description
1	W500015	Coolant outlet bolt (4 required)
2	8K556	Coolant outlet
3	8255	Coolant outlet gasket
4	W500225	Exhaust gas recirculation (EGR) valve bolts (2 required)
5	9D475	EGR valve
6	9D476	EGR valve gasket
7	6G004	Cylinder head temperature (CHT) sensor
8	12405	Spark plug (4 required)
9	6500	Valve tappet (16 required)
10	6518	Valve collet (16 required)
11	6514	Valve spring retainer (16 required)
12	6513	Valve spring (16 required)
13	6517	Valve seal (16 required)
14	6505	Intake valve (8 required)
15	6507	Exhaust valve (8 required)
16	6049	Cylinder head

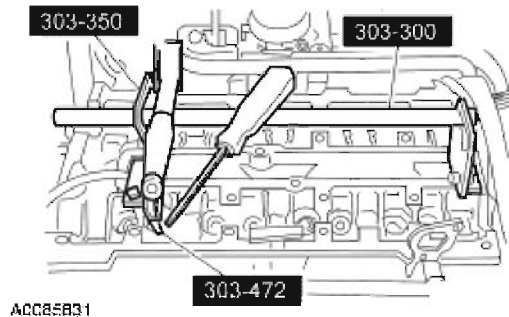
**Fig. 298: Identifying Cylinder Head Components**  
Courtesy of FORD MOTOR CO.

### Disassembly

**CAUTION:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components removed for locations.

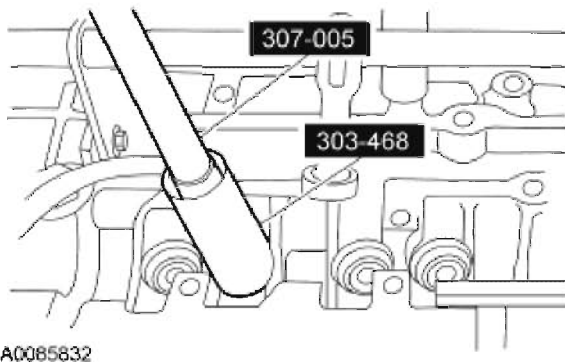
1. Remove the 4 bolts and the coolant outlet.
  - Discard the gasket.
2. Remove the 2 bolts and the exhaust gas recirculation (EGR) valve.
  - Discard the gasket.
3. Remove and discard the cylinder head temperature (CHT) sensor.
4. Remove the spark plugs.
5. Remove the valve tappets.

**NOTE:** Use a small screwdriver and grease to remove the valve collets.



**Fig. 299: Identifying Special Tools (303-300, 303-350, 303-472)**  
Courtesy of FORD MOTOR CO.

6. Using the special tools, compress the valve springs and remove the valve collets, valve spring retainers and the valve springs.
7. Inspect the components, if necessary. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .
8. Remove the valves.
9. Using the special tools, remove and discard the valve seals.



**Fig. 300: Removing Valve Seals Using Special Tools (307-005, 303-468)**  
Courtesy of FORD MOTOR CO.

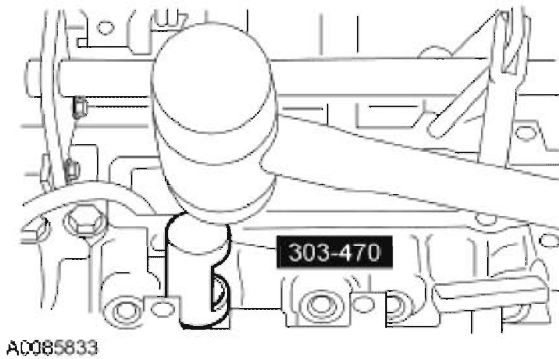
10. Inspect the valves. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** . Install new parts, as necessary.

Assembly

**NOTE:** Coat the valve stems with clean engine oil.

1. Install the valves.

**NOTE:** Use the protector provided with the replacement kit to prevent damage to the valve seals. Lubricate the valve stems and guides with clean engine oil.

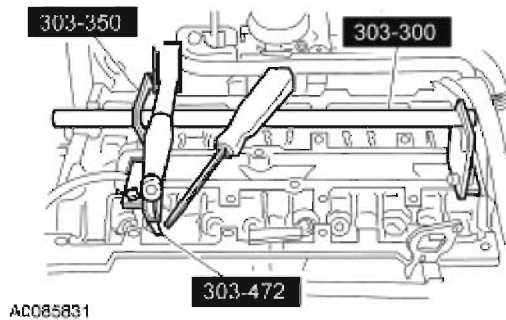


**Fig. 301: Installing Valve Seal Using Special Tool (303-470)**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the valve seals.

**NOTE:** Check the seating of the valve collets.

3. Using the special tools, install the valve springs.
  - Insert the valve springs and the valve spring retainers.
  - Compress the valve springs and install the valve collets, using grease and a small screwdriver.



**Fig. 302: Identifying Special Tools (303-300, 303-350, 303-472)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Coat the valve tappets with clean engine oil.

4. Install the valve tappets.
5. Install the spark plugs.
  - Tighten to 12 N.m (9 lb-ft).
6. Install a new CHT sensor.
  - Tighten to 12 N.m (9 lb-ft).
7. Install the EGR valve, using a new gasket.
  - Tighten to 20 N.m (15 lb-ft).
8. Using a new gasket, install the coolant outlet and bolts.
  - Tighten to 10 N.m (89 lb-in).

## ASSEMBLY

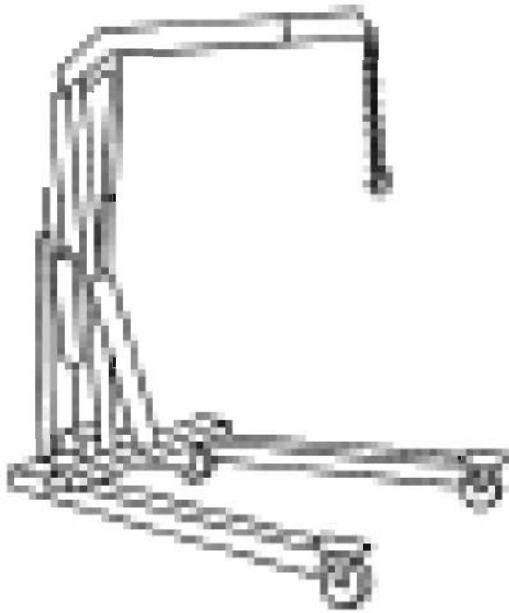
### ENGINE

### SPECIAL TOOL(S)

Heavy Duty Floor Crane  
014-00071 or equivalent

## 2006 Ford Escape

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**ST1341-A**



**ST1602-A**

Spreader Bar  
303-D089 (D93P-6001-A3) or  
equivalent

Alignment Plate, Camshaft  
303-465 (T94P-6256-CH)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST2645-A**



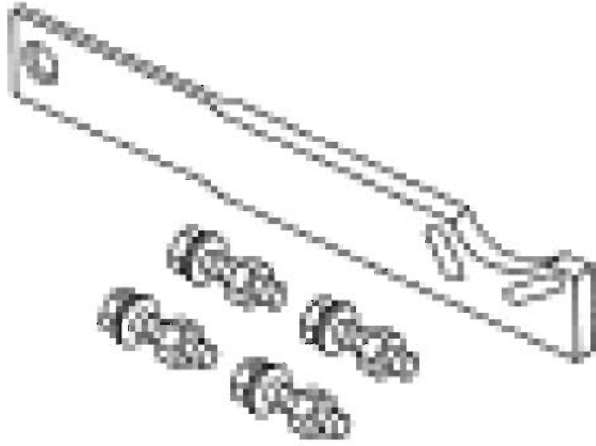
**ST2638-A**

Timing Peg, Crankshaft  
303-507

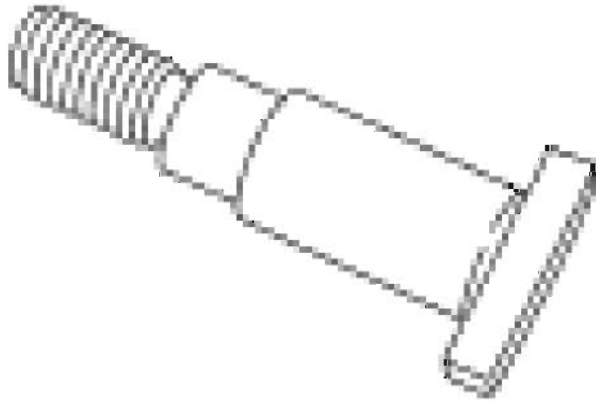
Holding Fixture, Drive Pinion Flange  
205-126 (T78P-4851-A)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST2647-A**



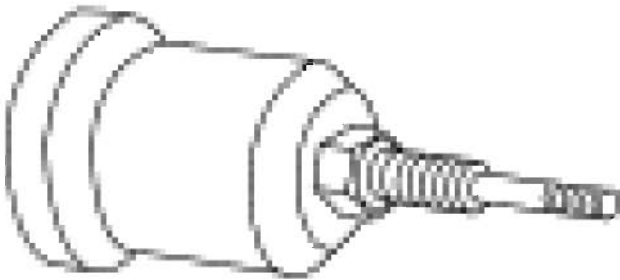
**ST2639-A**

Adapter for 205-126  
(205-072-02)

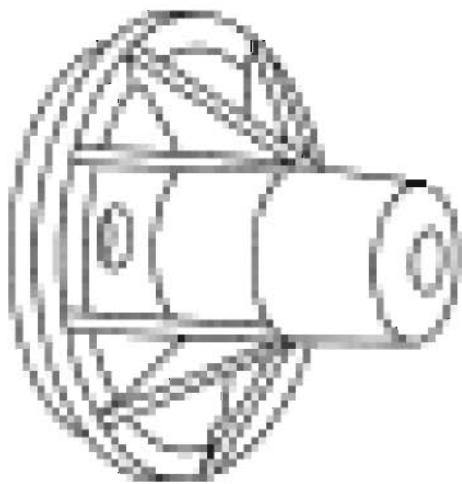
Installer, Front Oil Seal  
303-096 (T74P-6150-A)

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1917-A**



**ST1506-A**

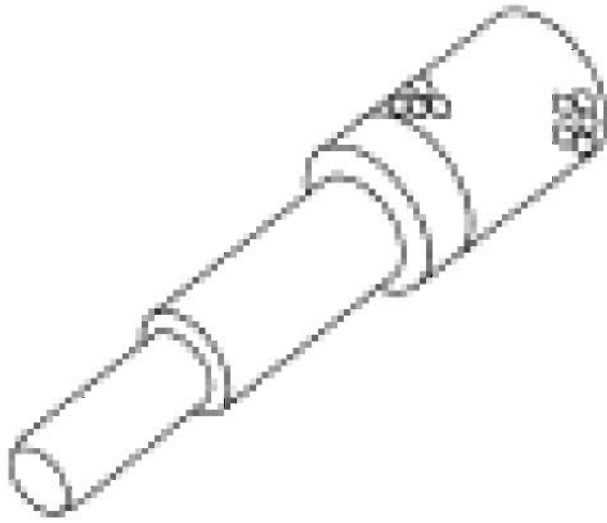
Installer, Crankshaft Rear Main Oil Seal  
303-328 (T88P-6701-B1)

Aligner, Clutch Disc  
308-006 (T71P-7137-H)



## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



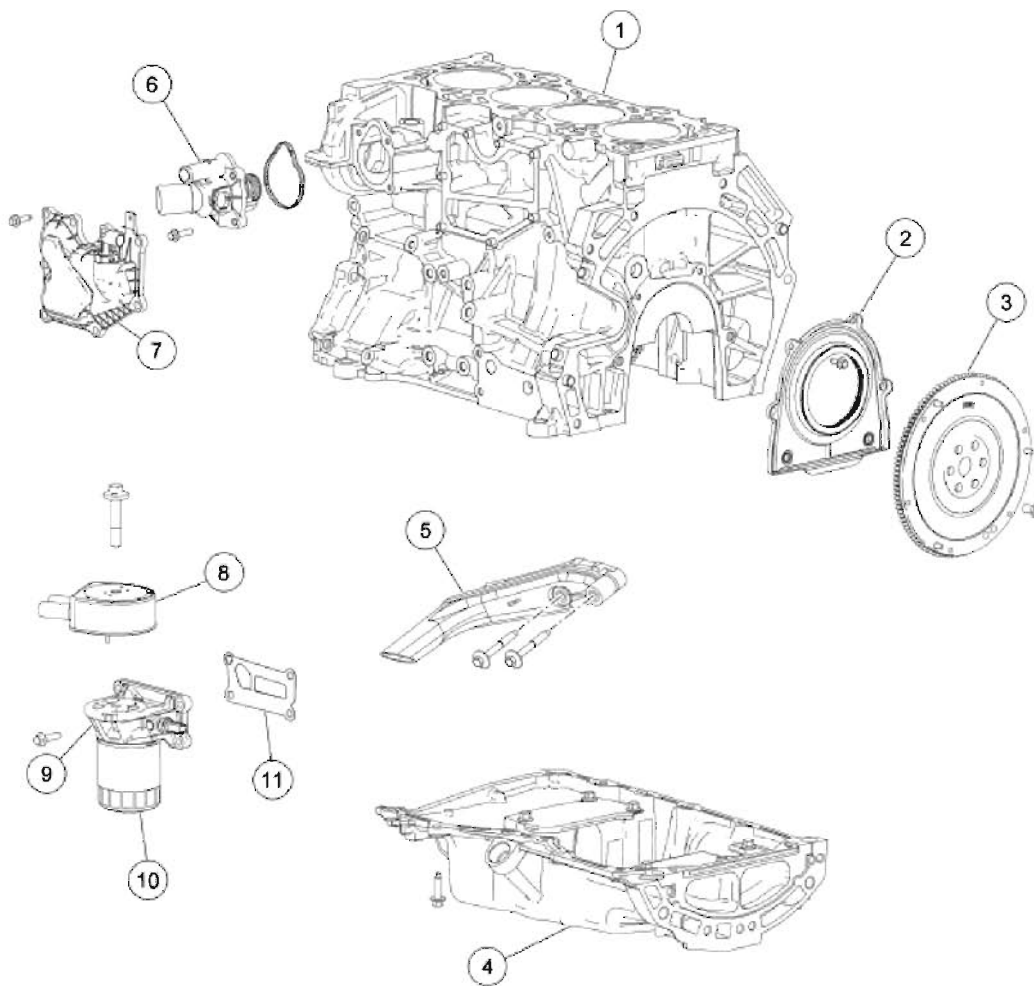
**ST1751-A**

### MATERIALS

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1
High-Temp 4x4 Front Axle and Wheel Bearing Grease E8TZ-19590-A	ESA-M1C198-A

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



A0090479

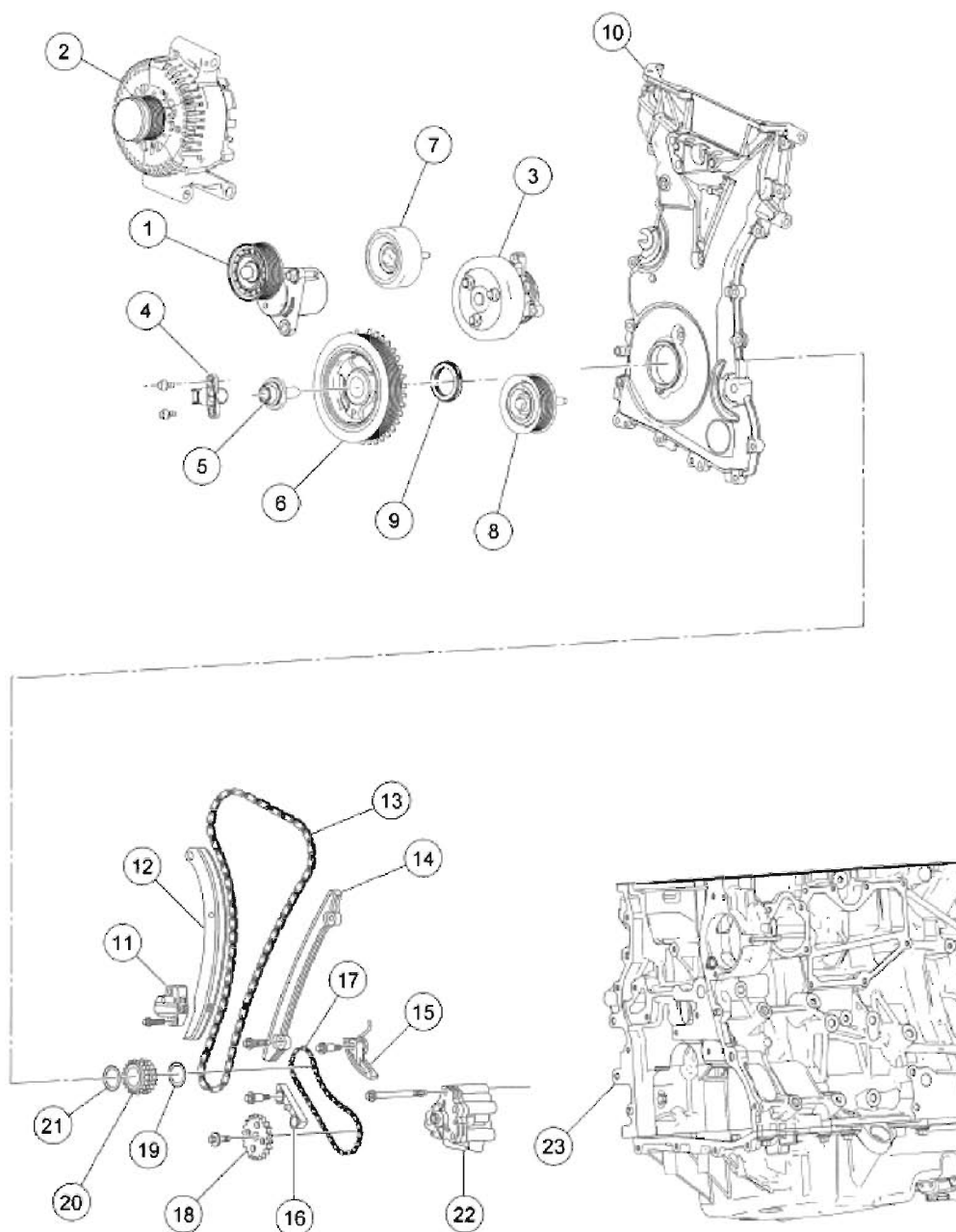
Item	Part Number	Description
1	6010	Cylinder block
2	6K318	Crankshaft rear oil seal and retainer
3	6477	Flywheel
4	6675	Oil pan
5	6622	Oil pump screen and pickup tube

Item	Part Number	Description
6	8575	Thermostat assembly
7	6A785	Crankcase vent oil separator
8	6A642	Oil cooler (if equipped)
9	6884	Oil filter adapter
10	6714	Oil filter
11	6A636	Oil filter adapter gasket

**Fig. 303: Identifying Lower Engine Block Components**  
 Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

### 2006 ENGINE Engine - 2.3L - Escape & Mariner



A0092328

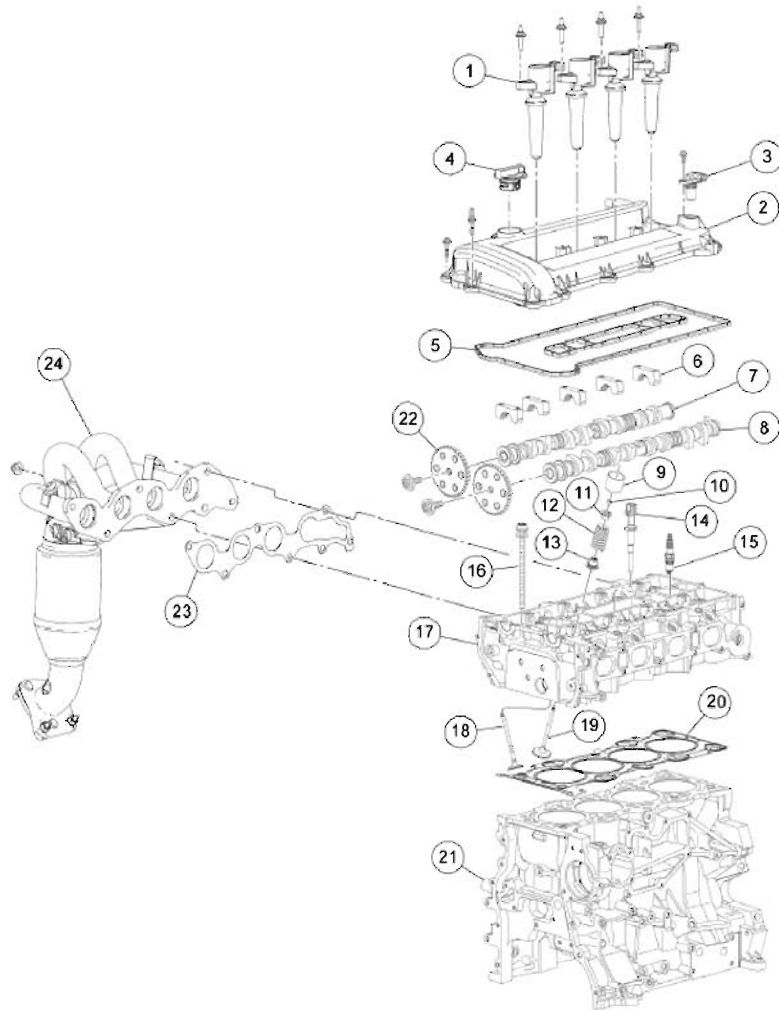
Item	Part Number	Description
1	6B209	Accessory drive belt tensioner
2	10300	Generator
3	8501	Coolant pump and pulley
4	6C315	Crankshaft position (CKP) sensor
5	6A340	Crankshaft pulley bolt
6	6316	Crankshaft pulley
7	6C348	Idler pulley
8	6C348	Idler pulley (without A/C only)
9	6700	Crankshaft front seal
10	6019	Engine front cover
11	6K254	Timing chain tensioner

Item	Part Number	Description
12	6K255	Timing chain tensioner arm
13	6268	Timing chain
14	6K297	Timing chain guide
15	6C271	Oil pump chain tensioner
16	6M256	Oil pump chain guide
17	6A895	Oil pump chain
18	6652	Oil pump drive gear
19	6378	Diamond washer
20	6306	Crankshaft sprocket
21	6378	Diamond washer
22	6600	Oil pump
23	6010	Cylinder block

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

**Fig. 304: Identifying Front Engine Block Components**  
Courtesy of FORD MOTOR CO.



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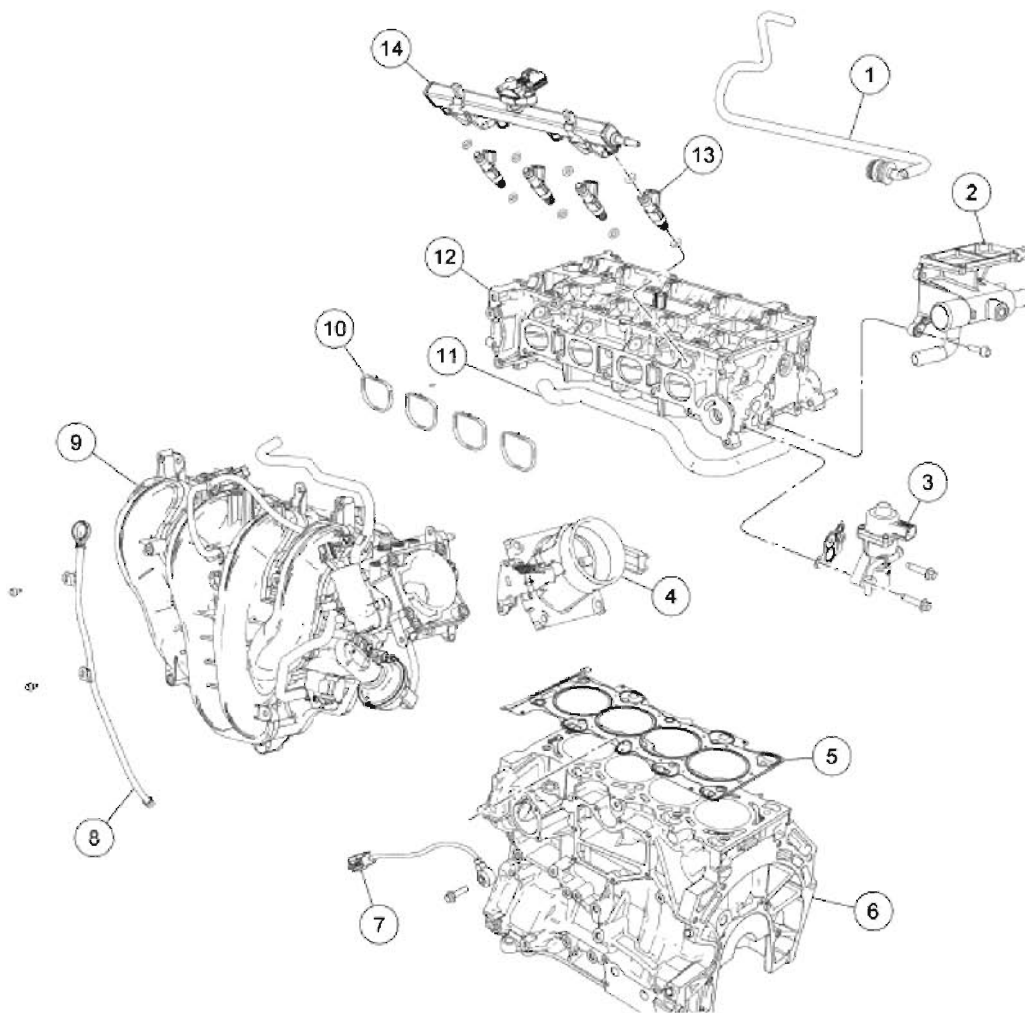
Item	Part Number	Description
1	12A366	Coil-on-plug assembly (4 required)
2	6M293	Valve cover
3	12K073	Camshaft position (CMP) sensor
4	6766	Oil filler cap
5	6M293	Valve cover gasket
6	6A284	Camshaft bearing caps
7	6A272	Camshaft (exhaust)
8	6A271	Camshaft (intake)
9	6500	Valve tappet (16 required)
10	6518	Valve collet (16 required)
11	6514	Valve spring retainer (16 required)
12	6513	Valve spring (16 required)

Item	Part Number	Description
13	6A517	Valve stem seal (16 required)
14	6G004	Cylinder head temperature (CHT) sensor
15	12405	Spark plug (4 required)
16	6065	Cylinder head bolt (10 required)
17	6049	Cylinder head
18	6505	Exhaust valve (8 required)
19	6507	Intake valve (8 required)
20	6051	Head gasket
21	6010	Cylinder block
22	6C251	Camshaft sprocket (2 required)
23	9448	Catalytic converter gasket
24	5E211	Catalytic converter

**Fig. 305: Identifying Cylinder Head Components**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



A0100122

Item	Part Number	Description
1	9288	Fuel supply tube
2	8K556	Coolant outlet
3	9D475	Exhaust gas recirculation (EGR) valve
4	9F991	Throttle body
5	6051	Cylinder head gasket
6	6010	Cylinder block
7	12A699	Knock sensor (KS)

Item	Part Number	Description
8	6754	Oil level indicator and tube assembly
9	9424	Intake manifold
10	9439	Intake manifold gasket
11	8A582	Coolant hose
12	6049	Cylinder head
13	9F593	Fuel injector (4 required)
14	9H487	Fuel rail

**Fig. 306: Identifying Intake Manifold Components**  
Courtesy of FORD MOTOR CO.

### CAUTION:

Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each

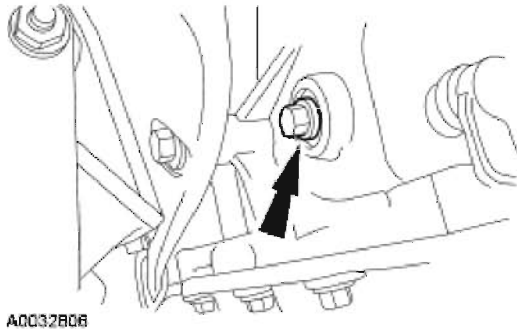
part. For that reason, the crankshaft sprocket is also unfastened if you loosen the pulley bolt. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

#### All vehicles

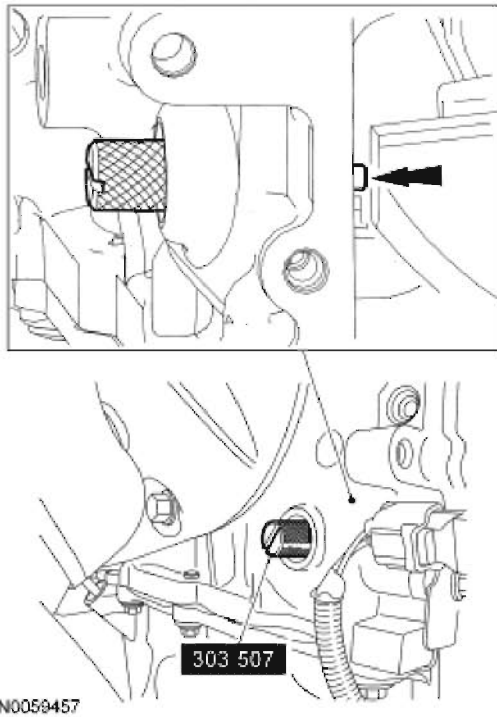
**WARNING:** Failure to position the No. 1 piston at top dead center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.

1. Turn the crankshaft clockwise to position the No. 1 piston at TDC.
2. Remove the engine plug bolt.



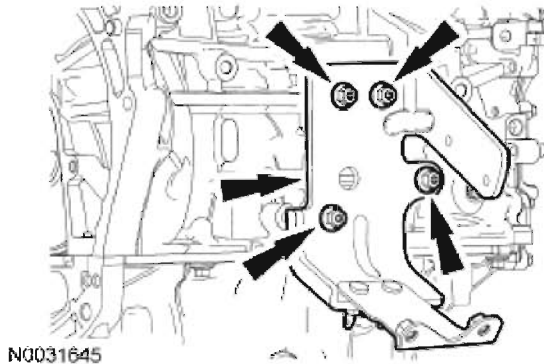
**Fig. 307: Locating Engine Plug Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position until the timing drive components and crankshaft pulley are installed.



**Fig. 308: Identifying Special Tool (303-507)**  
Courtesy of FORD MOTOR CO.

3. Install the special tool.
4. If removed, install the halfshaft support bracket and bolts.
  - Tighten to 40 N.m (30 lb-ft).

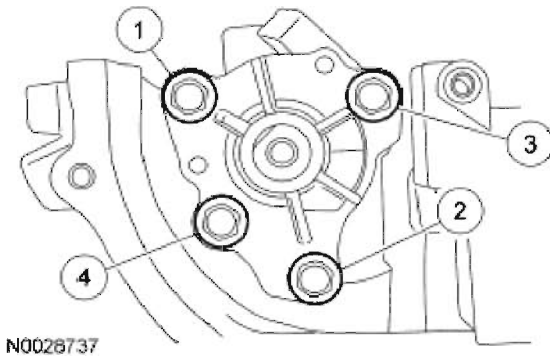


**Fig. 309: Locating Halfshaft Support Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean the oil pump and cylinder block mating surfaces with metal surface cleaner.

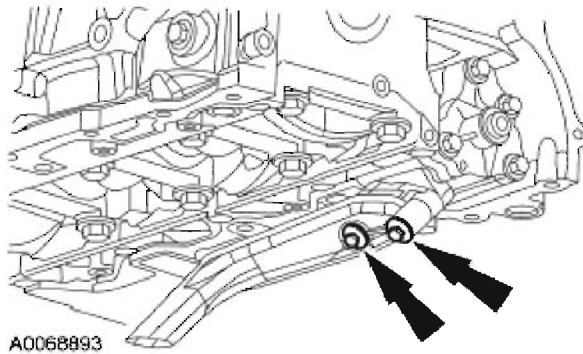
5. Install the oil pump assembly. Tighten the bolts in the sequence shown in 2 stages:
  - Stage 1: Tighten to 10 N.m (89 lb-in).

- Stage 2: Tighten to 20 N.m (15 lb-ft).



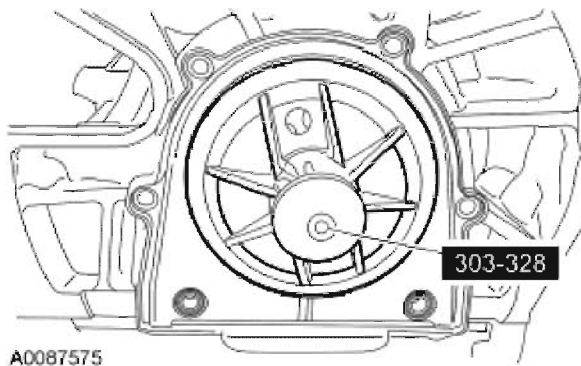
**Fig. 310: Identifying Oil Pump Assembly Bolts**  
Courtesy of FORD MOTOR CO.

6. Install a new oil pump pickup tube gasket and the pickup tube.
  - Tighten to 10 N.m (89 lb-in).



**Fig. 311: Locating Pickup Tube & Bolts**  
Courtesy of FORD MOTOR CO.

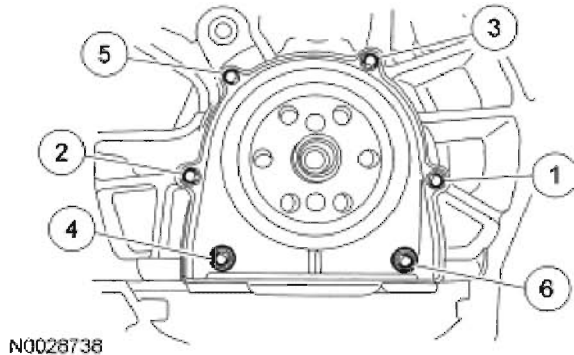
7. Using the special tool, install the crankshaft rear main oil seal.



**Fig. 312: Identifying Special Tool (303-328)**  
Courtesy of FORD MOTOR CO.



8. Tighten the crankshaft rear main oil seal bolts in the sequence shown in **Fig. 313**.
- To install, tighten to 10 N.m (89 lb-in).

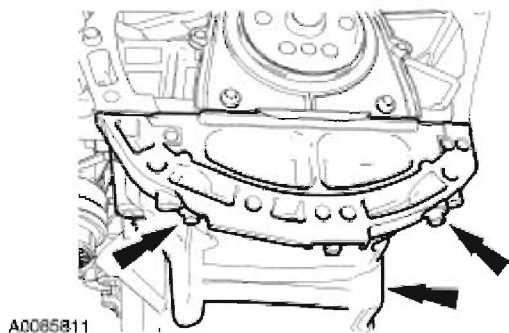


**Fig. 313: Identifying Crankshaft Rear Main Oil Seal Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

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

9. Clean and inspect all mating surfaces.

**NOTE:** If the oil pan is not secured within 4 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

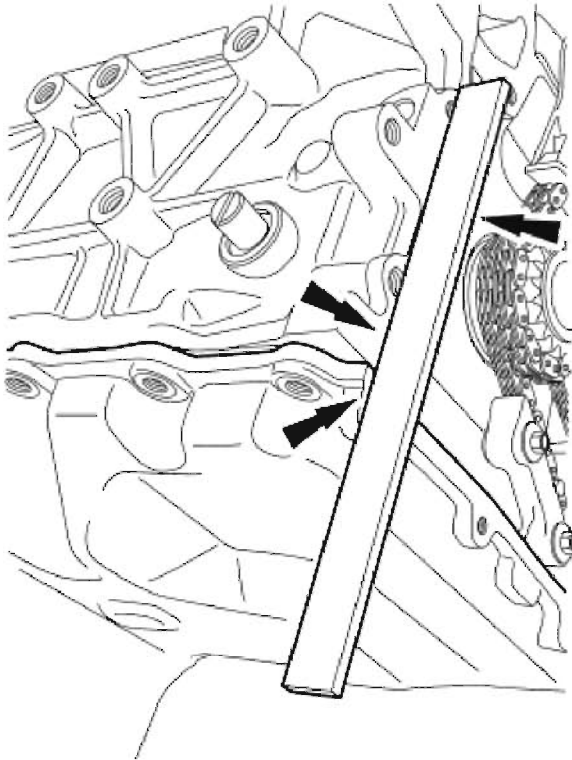


**Fig. 314: Identifying Rear Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

10. Apply a 2.5 mm (0.09 in.) bead of silicone gasket and sealant to the oil pan. Install the

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

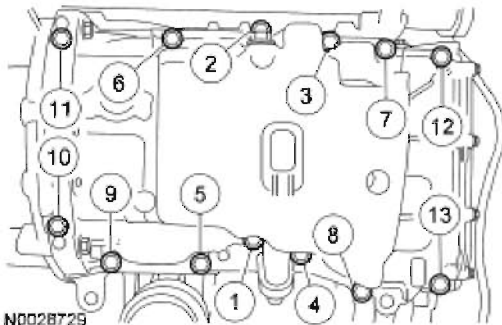
11. Using a suitable straight edge, align the front surface of the oil pan flush with the front surface of the engine block.



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**Fig. 315: Locating Straight Edge**  
Courtesy of FORD MOTOR CO.

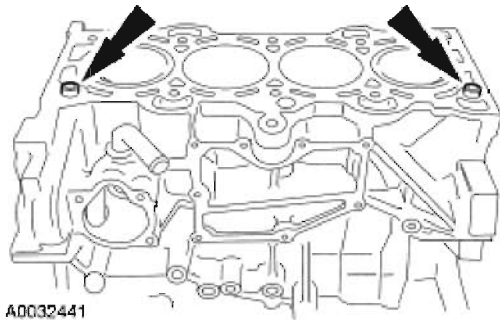
12. Install the remaining oil pan bolts and tighten the oil pan bolts in the sequence shown.
  - Tighten to 25 N.m (18 lb-ft).



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**Fig. 316: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

13. Install the cylinder head alignment dowels. Dowels must be fully seated in the cylinder block.



**Fig. 317: Identifying Cylinder Head Alignment Dowels**  
Courtesy of FORD MOTOR CO.

**CAUTION:**

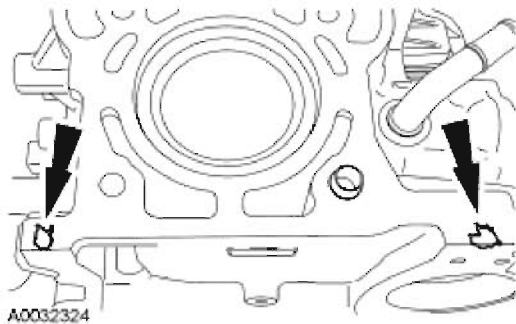
Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

**NOTE:**

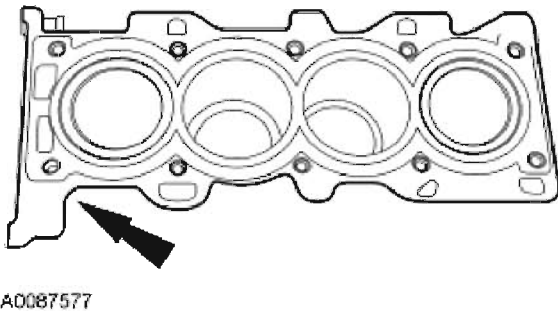
If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

14. Clean the cylinder head-to-cylinder block mating surface of both the cylinder head and the cylinder block.
  1. Remove any large deposits of silicone or gasket material with a plastic scraper.
  2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.
  3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
  4. Apply metal surface prep, following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.
15. Apply silicone gasket and sealant to the locations shown in **Fig. 318**.



**Fig. 318: Identifying Silicone Gasket And Sealant Location**  
Courtesy of FORD MOTOR CO.

16. Install a new head gasket.



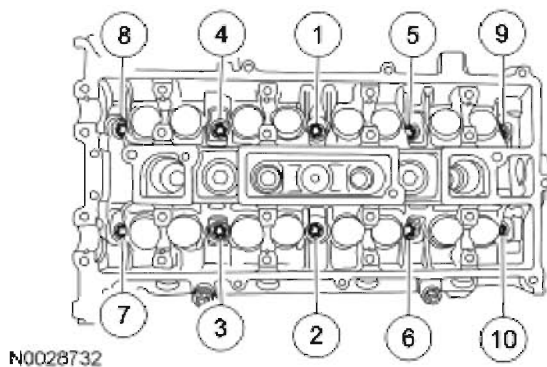
**Fig. 319: Locating Head Gasket**  
Courtesy of FORD MOTOR CO.

**NOTE:**

The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed. Lubricate the bolts with clean engine oil prior to installation.

17. Install new cylinder head bolts. Tighten the bolts in the sequence shown in 5 stages:

- Stage 1: Tighten to 5 N.m (44 lb-in).
- Stage 2: Tighten to 15 N.m (11 lb-ft).
- Stage 3: Tighten to 45 N.m (33 lb-ft).
- Stage 4: Turn 90 degrees.
- Stage 5: Turn an additional 90 degrees.

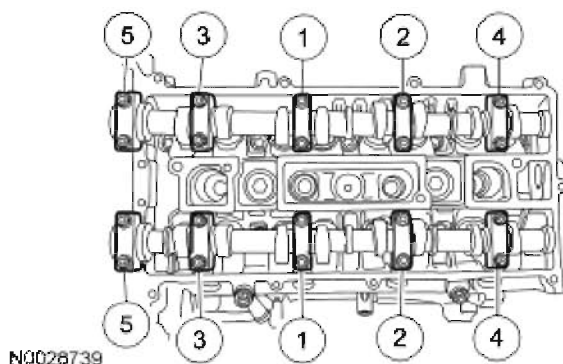


**Fig. 320: Tightening Sequence Of Cylinder Head Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the disassembly procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position, can cause severe damage to the valves and pistons.

**NOTE:** Lubricate the camshaft journals and bearing caps with clean engine oil.

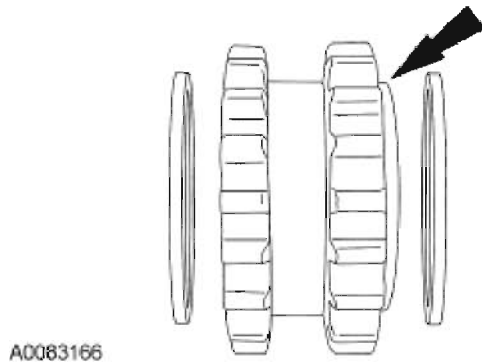
18. Install the camshafts and bearing caps. Tighten the bolts in the sequence shown in 3 stages:
- Stage 1: Tighten the camshaft bearing cap bolts one at a time until finger tight.
  - Stage 2: Tighten to 7 N.m (62 lb-in).
  - Stage 3: Tighten to 16 N.m (12 lb-ft).



**Fig. 321: Tightening Sequence Of Camshaft Bearing Cap Bolts**  
Courtesy of FORD MOTOR CO.

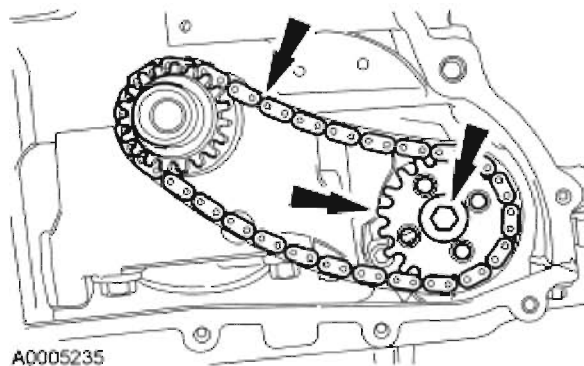
**NOTE:**      **Install a crankshaft sprocket diamond washer on both sides of the crankshaft sprocket.**

19. Install the crankshaft sprocket, crankshaft sprocket diamond washers, oil pump chain and oil pump sprocket.
- The crankshaft sprocket flange must be facing away from the engine block.



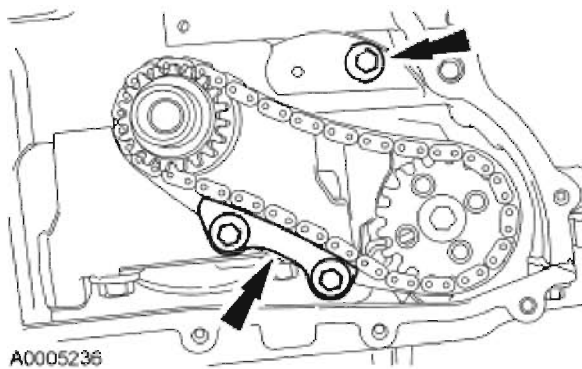
**Fig. 322: Locating Crankshaft Sprocket Flange**  
Courtesy of FORD MOTOR CO.

20. Install the oil pump chain, sprocket and bolt.
- Tighten to 25 N.m (18 lb-ft).



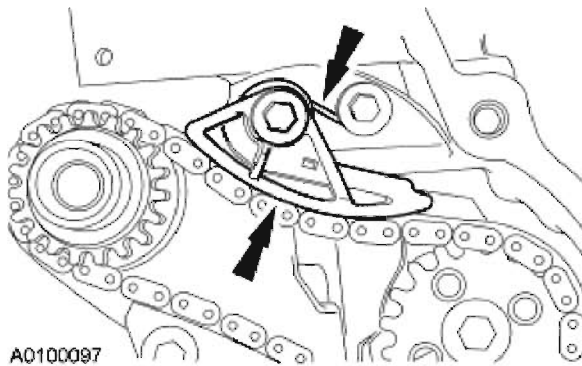
**Fig. 323: Locating Oil Pump Chain, Sprocket & Bolt**  
Courtesy of FORD MOTOR CO.

21. Install the oil pump chain guide and the shoulder bolts.
- Tighten to 10 N.m (89 lb-in).



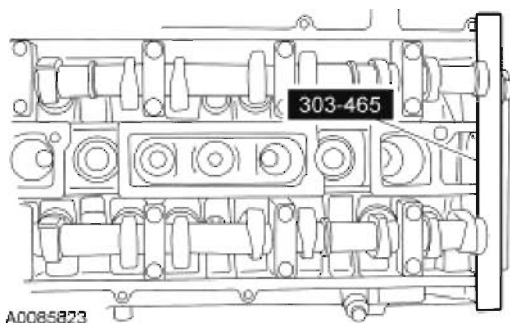
**Fig. 324: Locating Oil Pump Chain Guide & Shoulder Bolts**  
Courtesy of FORD MOTOR CO.

22. Install the oil pump chain tensioner. Hook the tensioner spring around the shoulder bolt.
- Tighten to 10 N.m (89 lb-in).



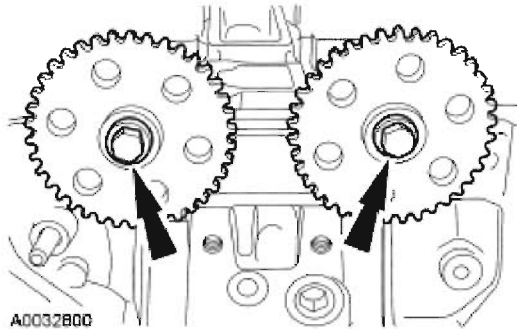
**Fig. 325: Locating Oil Pump Chain Tensioner**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.



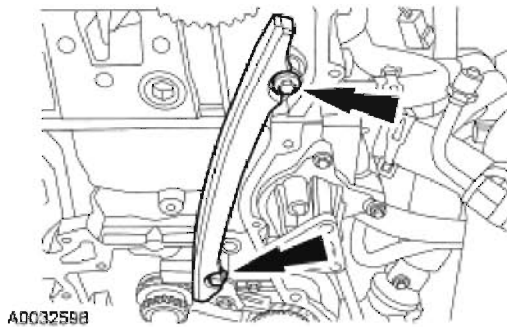
**Fig. 326: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

23. Install the special tool in the slots on the rear of both camshafts.
24. Install the camshaft sprockets and the bolts. Do not tighten the bolts at this time.



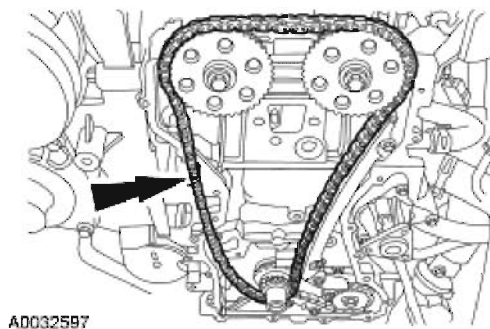
**Fig. 327: Locating Camshaft Sprocket Bolts**  
Courtesy of FORD MOTOR CO.

25. Install the LH timing chain guide and the bolts.
  - Tighten to 10 N.m (89 lb-in).



**Fig. 328: Identifying Bolts And LH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

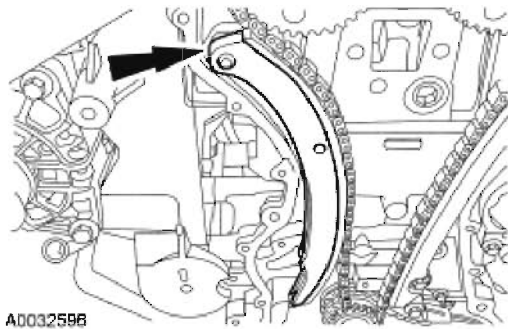
26. Install the timing chain.



**Fig. 329: View Of Timing Chain**  
Courtesy of FORD MOTOR CO.

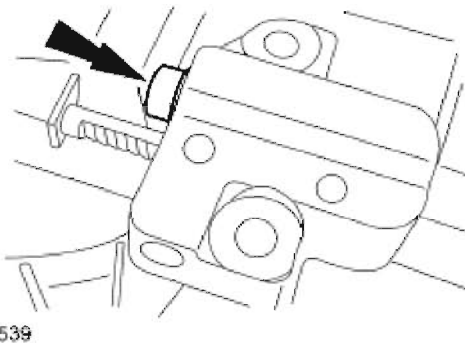
27. Install the RH timing chain guide.





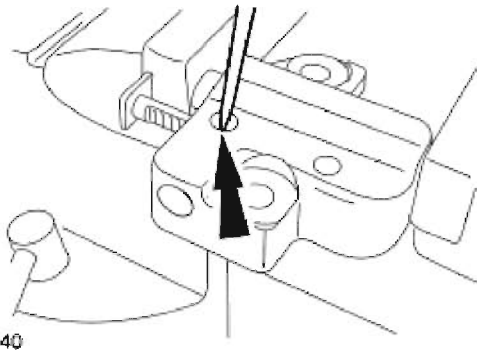
**Fig. 330: Locating RH Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not compress the ratchet assembly. This will damage the ratchet assembly.



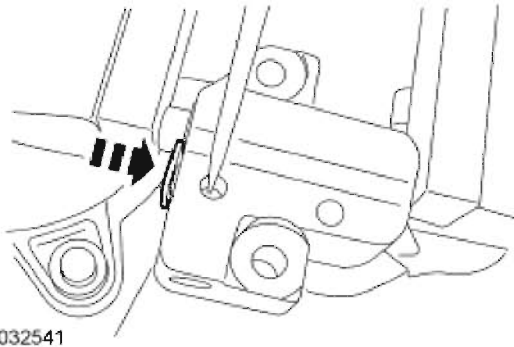
**Fig. 331: Locating Timing Chain Tensioner Plunger**  
Courtesy of FORD MOTOR CO.

28. Using the edge of a vise, compress the timing chain tensioner plunger.
29. Using a small pick, push back and hold the ratchet mechanism.



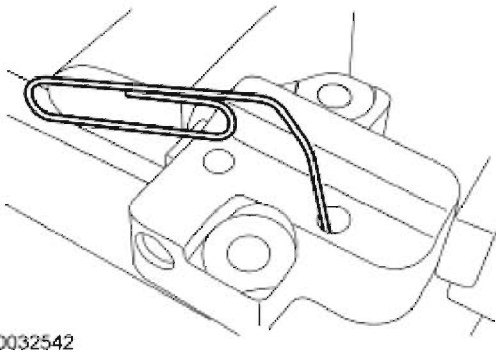
**Fig. 332: Identifying Ratchet Mechanism**  
Courtesy of FORD MOTOR CO.

30. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



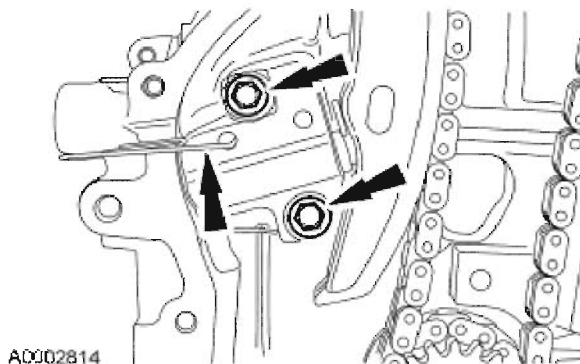
**Fig. 333: Pushing Ratchet Arm Back Into Tensioner Housing**  
Courtesy of FORD MOTOR CO.

31. Install a paper clip into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.



**Fig. 334: Identifying Paper Clip Into Hole In Tensioner Housing**  
Courtesy of FORD MOTOR CO.

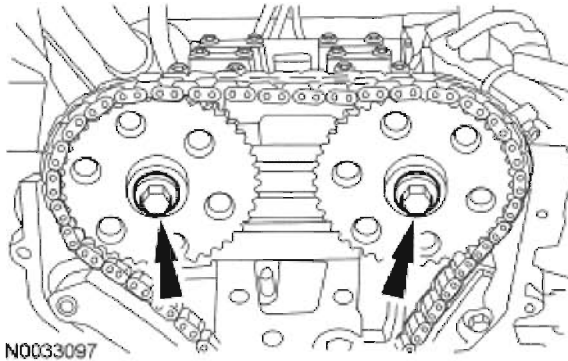
32. Install the timing chain tensioner and the bolts. Remove the paper clip to release the piston.
- Tighten to 10 N.m (89 lb-in).



**Fig. 335: Locating Timing Chain Tensioner & Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The special tool 303-465 is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

33. Using the flats on the camshafts to prevent camshaft rotation, tighten the bolts.
- To install, tighten to 72 N.m (53 lb-ft).

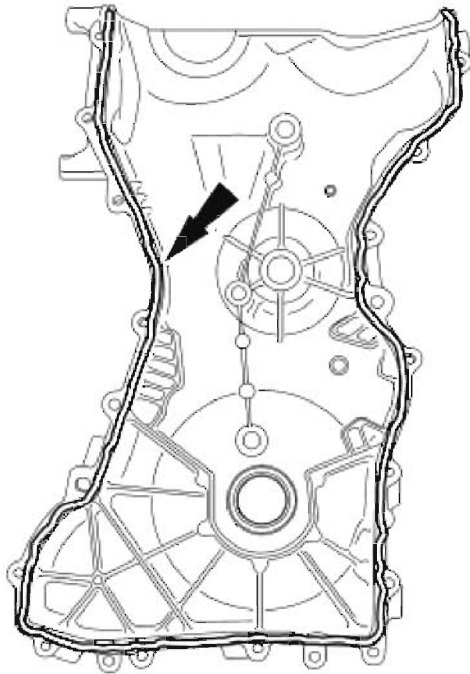


**Fig. 336: Locating Camshaft Sprocket Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive disks or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

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

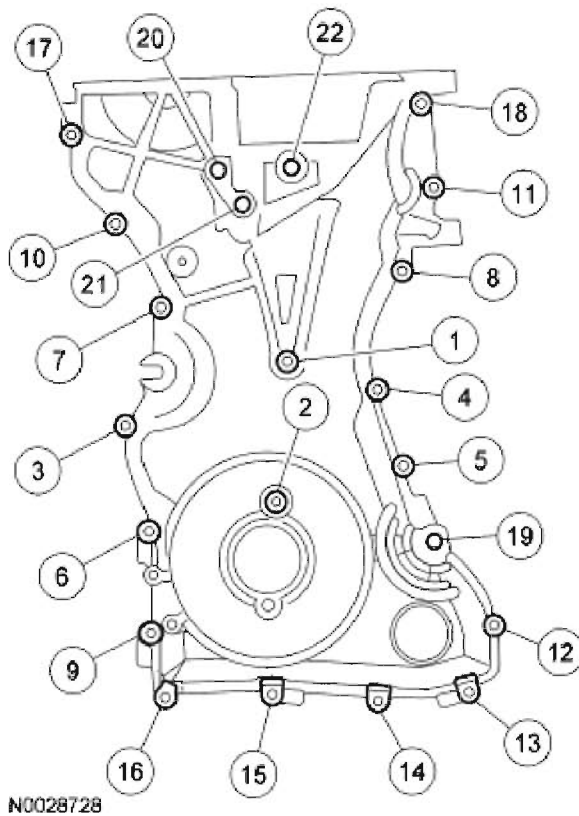
**NOTE:** The engine front cover must be installed and the bolts tightened within 4 minutes of applying the silicone gasket and sealant.



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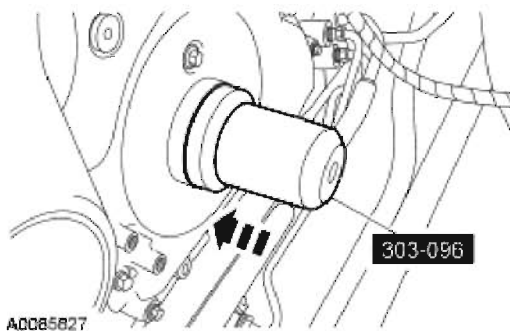
**Fig. 337: Locating Silicone Gasket**  
**Courtesy of FORD MOTOR CO.**

35. Apply a 2.5 mm (0.09 in.) bead of silicone gasket and sealant to the cylinder head and oil pan joint areas. Apply a 2.5 mm (0.09 in.) bead of silicone gasket and sealant to the front cover.
36. Install the engine front cover. Tighten the bolts in the sequence shown, to the following specifications:
  - Tighten the 8 mm bolts to 10 N.m (89 lb-in).
  - Tighten the 13 mm bolts to 48 N.m (35 lb-ft).



**Fig. 338: Tightening Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

**NOTE:** Remove the through-bolt from the special tool.  
Lubricate the oil seal with clean engine oil.

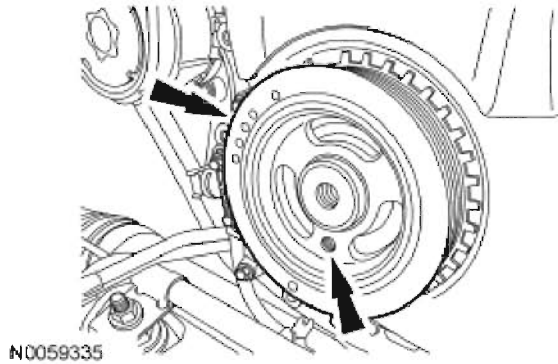


**Fig. 339: Installing Crankshaft Front Oil Seal Using Special Tool**  
Courtesy of FORD MOTOR CO.

37. Using the special tool, install a new crankshaft front oil seal.

**CAUTION:** Do not install the crankshaft pulley bolt at this time.

**NOTE:** Apply clean engine oil on the seal area before installing.

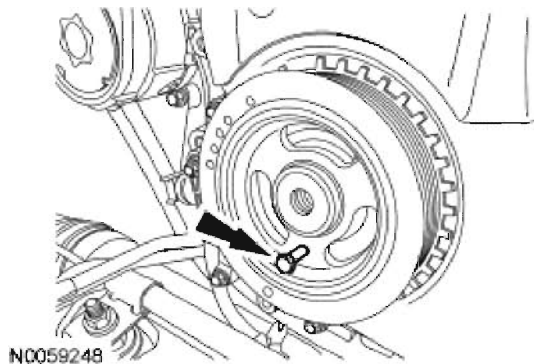


**Fig. 340: Locating Crankshaft Pulley & Hole**  
Courtesy of FORD MOTOR CO.

38. Position the crankshaft pulley onto the crankshaft with the hole in the pulley at the 6 o'clock position.

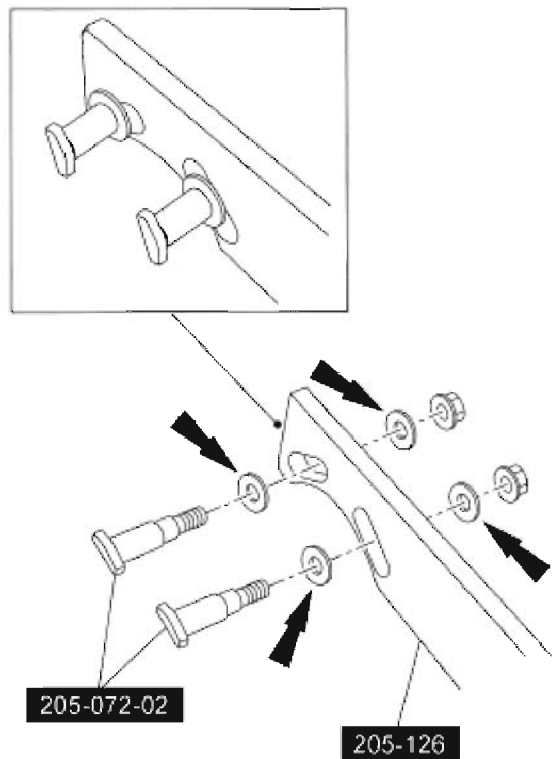
**CAUTION:** Only hand-tighten the 6 mm (0.23 in) bolt or damage to the front cover can occur.

**NOTE:** This step will correctly align the crankshaft pulley to the crankshaft.



**Fig. 341: Locating Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

39. Install a standard 6 mm (0.23 in) x 18 mm (0.7 in) bolt through the crankshaft pulley and thread it into the front cover.
40. Assemble the special tools using 4 hardened washers in the locations shown.



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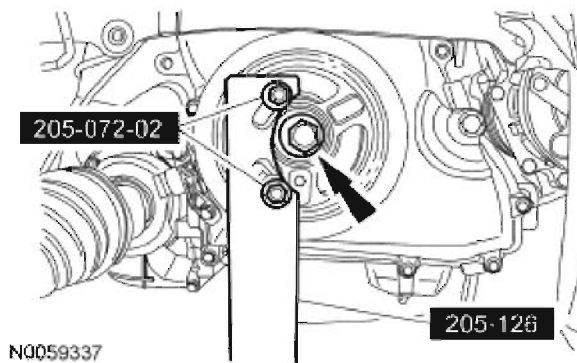
**Fig. 342: Assembling Special Tools (205-072-02 And 205-126)**  
 Courtesy of FORD MOTOR CO.

**CAUTION:**

The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool and the bolt should be installed using hand tools only.

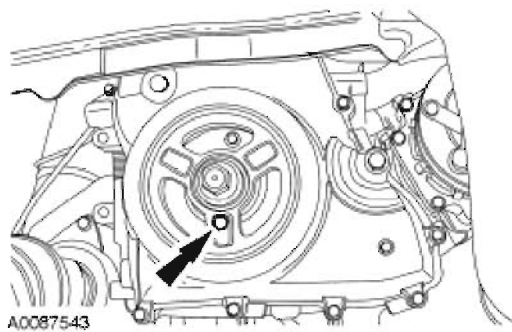
**Do not reuse the crankshaft pulley bolt.**

41. Install a new crankshaft pulley bolt. Using the special tools to hold the crankshaft pulley in place, tighten the crankshaft pulley bolt in 2 stages:
  - Stage 1: Tighten to 100 N.m (74 lb-ft).
  - Stage 2: Tighten an additional 90 degrees (1/4 turn).



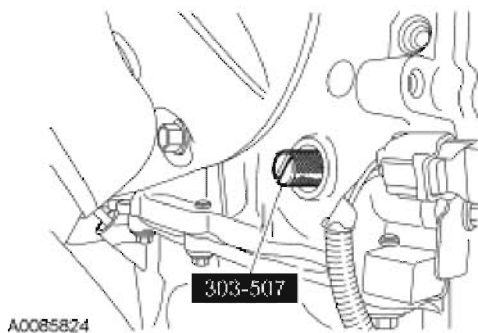
**Fig. 343: Identifying Special Tools Assembly (205-072-02, 205-126) And Crankshaft Pulley Bolt**  
Courtesy of FORD MOTOR CO.

42. Remove the 6 mm (0.23 in) x 18 mm (0.7 in) bolt.



**Fig. 344: Aligning Crankshaft Pulley Bolt Holes**  
Courtesy of FORD MOTOR CO.

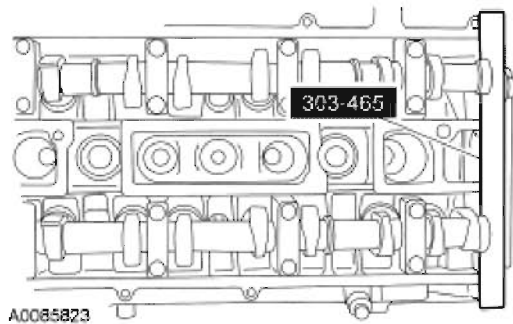
43. Remove the special tool.



**Fig. 345: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

44. Remove the special tool.

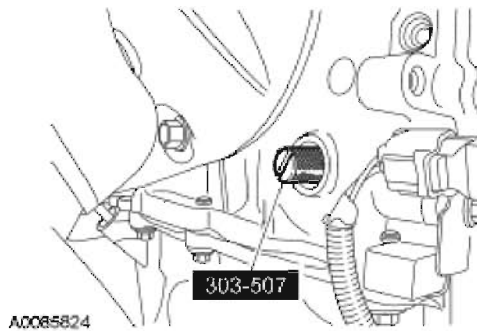




**Fig. 346: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

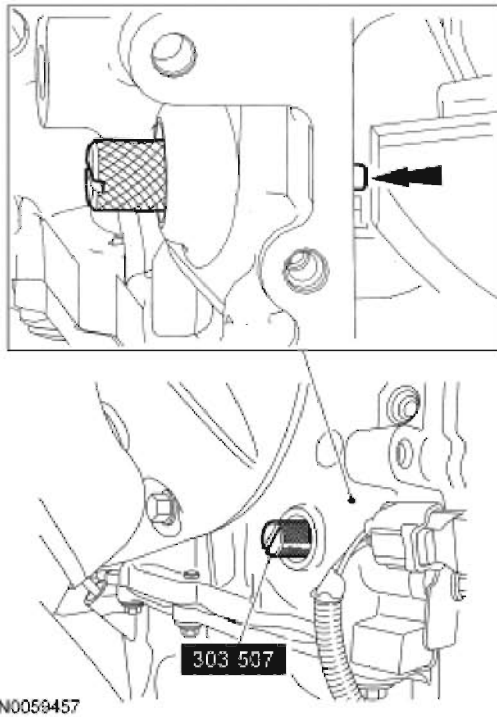
**NOTE:** Only turn the engine in the normal direction of rotation.

45. Turn the crankshaft clockwise 1 and 3/4 turns.
46. Install the special tool.



**Fig. 347: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**NOTE:** Only turn the engine in the normal direction of rotation.

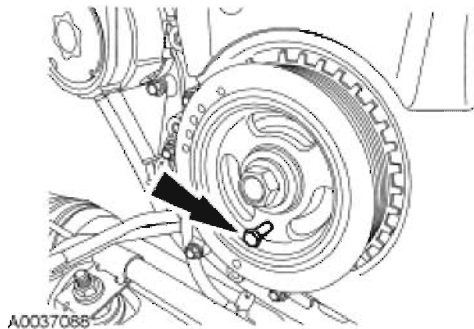


**Fig. 348: Identifying Special Tool (303-507)**  
Courtesy of FORD MOTOR CO.

47. Turn the crankshaft clockwise until the crankshaft contacts the special tool.

**CAUTION: Only hand-tighten the bolt or damage to the front cover can occur.**

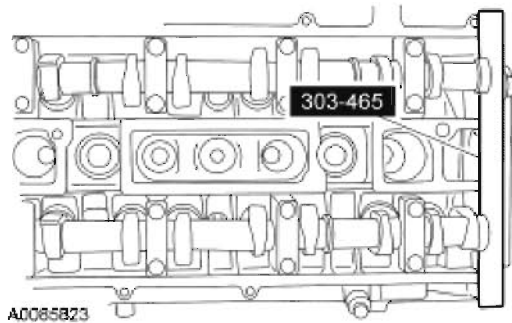
48. Using the 6 mm (0.23 in) x 18 mm (0.7 in) bolt, check the position of the crankshaft pulley.
- If it is not possible to install the bolt, the engine valve timing must be corrected.



**Fig. 349: Installing Bolt Through Crankshaft Pulley And Thread It Into Front Cover**  
Courtesy of FORD MOTOR CO.

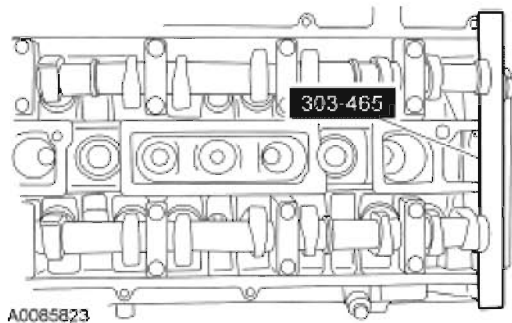
49. Using the special tool, check the position of the camshafts.

- If it is not possible to install the special tool, the engine valve timing must be corrected.



**Fig. 350: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

50. Remove the special tool.

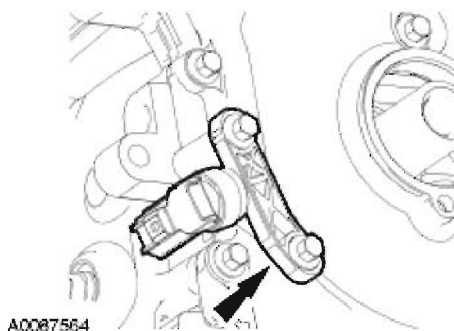


**Fig. 351: Identifying Special Camshaft Tool (303-465)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Whenever the crankshaft position (CKP) sensor is removed, a new one must be installed using the alignment tool supplied with the new part.

51. Install a new CKP sensor.

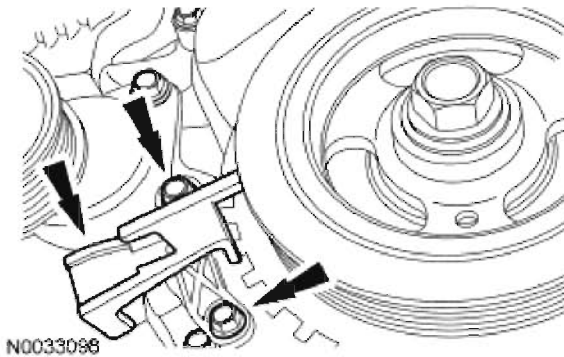
- Do not tighten the bolts at this time.



**Fig. 352: Locating CKP Sensor**  
Courtesy of FORD MOTOR CO.

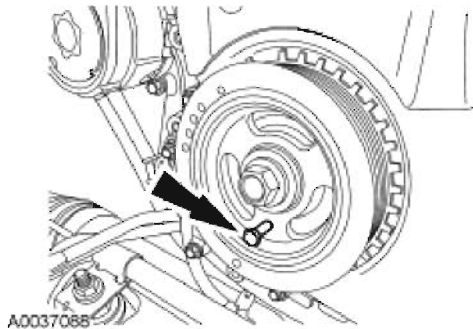
**NOTE:** The CKP sensor alignment tool is supplied with the new sensor and is not available separately.

52. Adjust the CKP sensor alignment tool and tighten the bolts.
- Tighten to 7 N.m (62 lb-in).



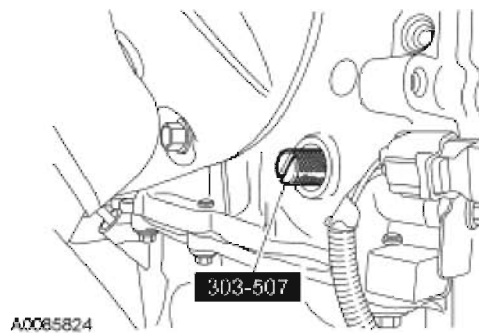
**Fig. 353: Locating CKP Sensor Bolts**  
Courtesy of FORD MOTOR CO.

53. Remove the 6 mm (0.23 in) x 18 mm (0.7 in) bolt.



**Fig. 354: Installing Bolt Through Crankshaft Pulley And Thread It Into Front Cover**  
Courtesy of FORD MOTOR CO.

54. Remove the special tool.



**Fig. 355: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

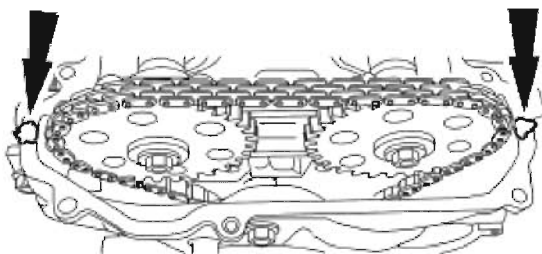
55. Install the engine plug bolt.
- Tighten to 20 N.m (15 lb-ft).



**Fig. 356: Locating Engine Plug Bolt**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

56. Clean the valve cover gasket surface with metal surface cleaner.
57. Apply silicone gasket and sealant to the locations shown in **Fig. 357**.

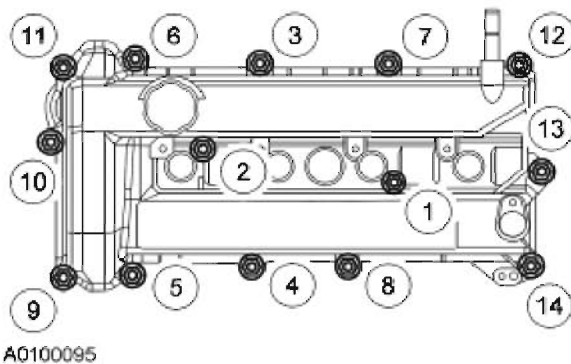


**Fig. 357: Locating Silicone Gasket Locations**  
Courtesy of FORD MOTOR CO.

**NOTE:** The valve cover must be secured within 4 minutes of silicone gasket application. If the valve cover is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner.

58. Install the valve cover.

- Tighten the bolts in the sequence shown to 10 N.m (89 lb-in).

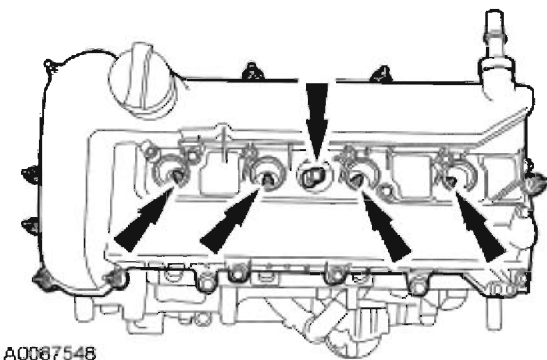


**Fig. 358: Tightening Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

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

59. Install a new cylinder head temperature (CHT) sensor and the spark plugs.

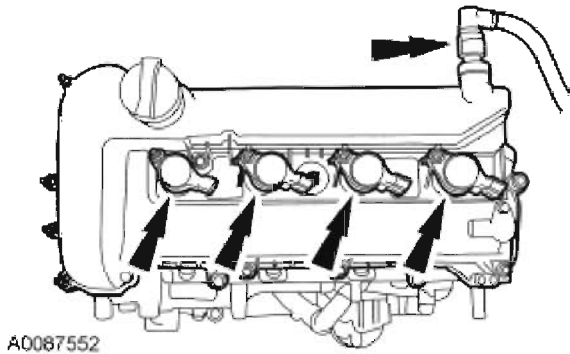
- Tighten the CHT sensor to 12 N.m (9 lb-ft).
- Tighten the spark plugs to 12 N.m (9 lb-ft).



**Fig. 359: Locating Cylinder Head Temperature (CHT) Sensor & Spark Plugs**  
Courtesy of FORD MOTOR CO.

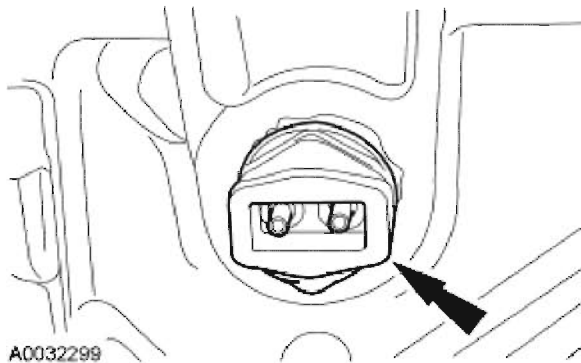
**NOTE:** Apply dielectric compound to the inside of the coil-on-plug boots.

60. Install the coil-on-plugs, bolts and the crankcase vent tube.
- Tighten to 10 N.m (89 lb-in).



**Fig. 360: Locating Coil-On-Plugs, Bolts & Crankcase Vent Tube**  
Courtesy of FORD MOTOR CO.

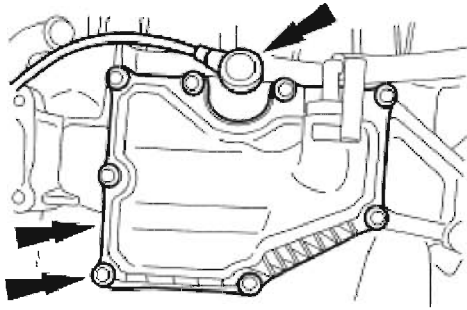
61. If equipped, install the block heater.
- Tighten to 21 N.m (15 lb-ft).



**Fig. 361: Locating Block Heater**  
Courtesy of FORD MOTOR CO.

**NOTE:** The knock sensor (KS) must not touch the crankcase vent oil separator.

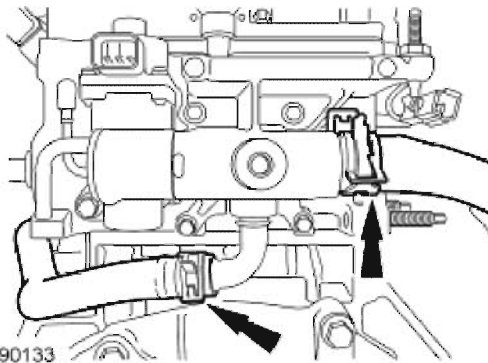
62. Install the crankcase vent oil separator and the KS.
- Tighten the oil separator bolts to 10 N.m (89 lb-in).
  - Tighten the KS to 20 N.m (15 lb-ft).



A0100094

**Fig. 362: Locating Crankcase Vent Oil Separator & KS**  
Courtesy of FORD MOTOR CO.

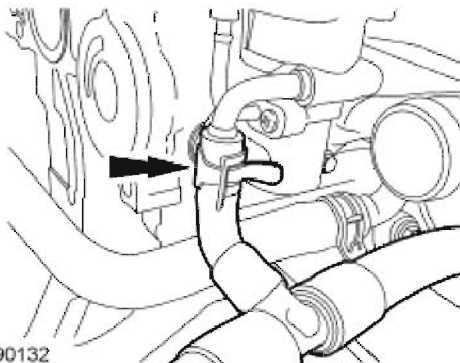
63. Install the coolant hoses.



A0090133

**Fig. 363: Locating Coolant Hoses (1 Of 3)**  
Courtesy of FORD MOTOR CO.

64. Install the coolant hose.

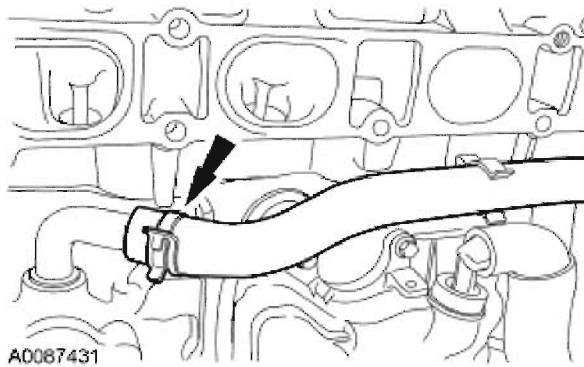


A0090132

**Fig. 364: Locating Coolant Hoses (2 Of 3)**  
Courtesy of FORD MOTOR CO.

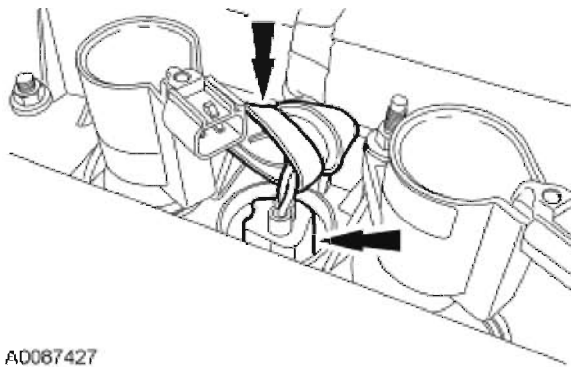
65. Install the coolant hose.





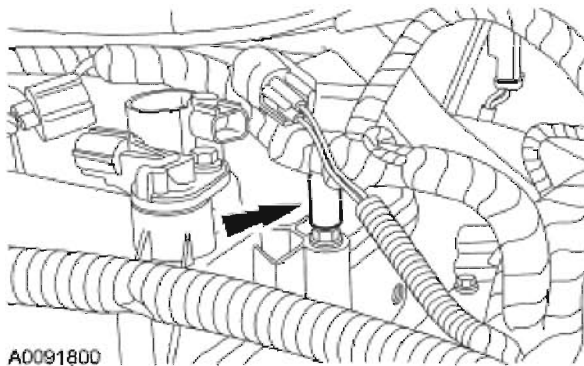
**Fig. 365: Locating Coolant Hoses (3 Of 3)**  
Courtesy of FORD MOTOR CO.

66. Position the engine control wiring harness on the engine and connect the CHT sensor and install the rubber boot.



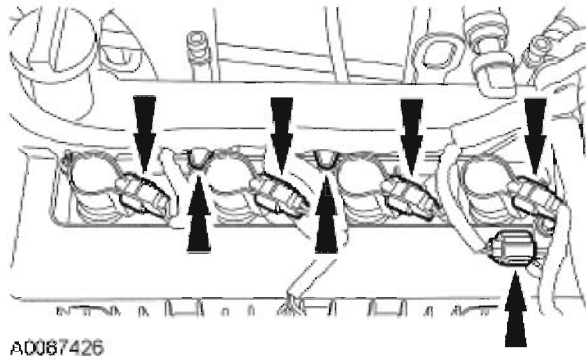
**Fig. 366: Locating Rubber Boot**  
Courtesy of FORD MOTOR CO.

67. Attach the wiring harness retainer.



**Fig. 367: Locating Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

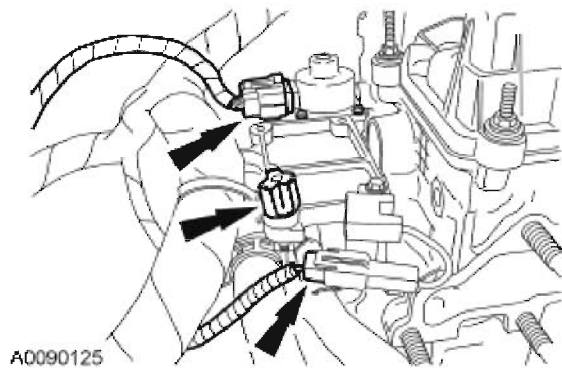
68. Connect the coil-on-plug and camshaft position (CMP) sensor electrical connectors.



**Fig. 368: Locating Coil-On-Plug & Camshaft Position (CMP) Sensor Electrical Connectors**

Courtesy of FORD MOTOR CO.

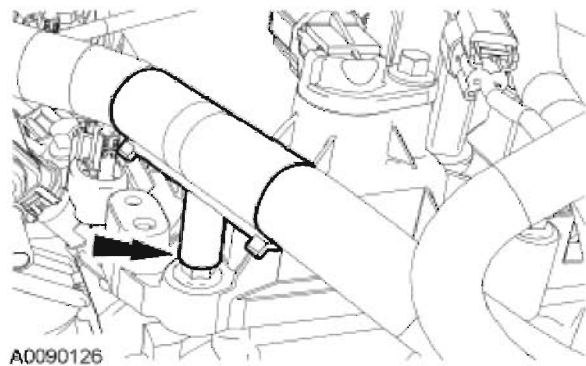
69. Connect the exhaust gas recirculation (EGR) valve and radio interference capacitor electrical connectors. Attach the wiring harness retainer.



**Fig. 369: Locating Exhaust Gas Recirculation (EGR) Valve & Radio Interference Capacitor Electrical Connectors**

Courtesy of FORD MOTOR CO.

70. Attach the wiring harness retainer.



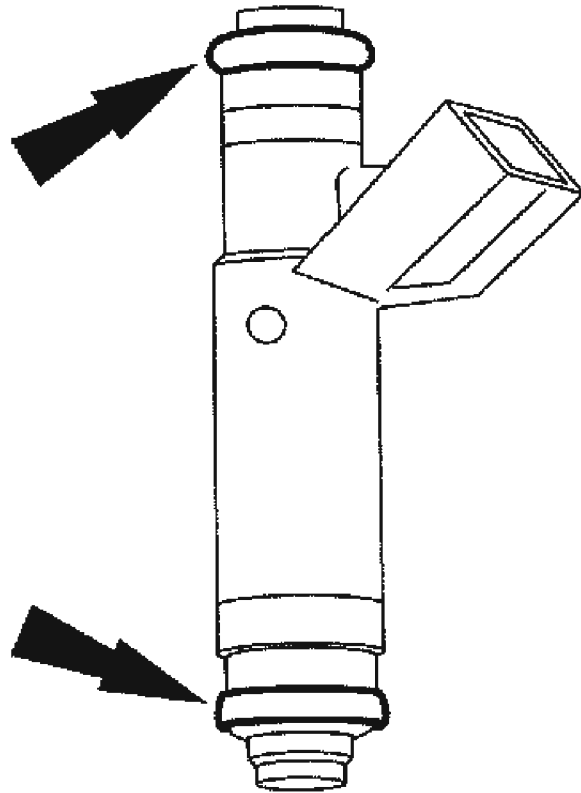
**Fig. 370: Locating Wiring Harness Retainer**

Courtesy of FORD MOTOR CO.

**CAUTION: Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-rings can cause the fuel system to leak. Do not reuse the O-ring seals.**

71. Install new fuel injector O-rings.

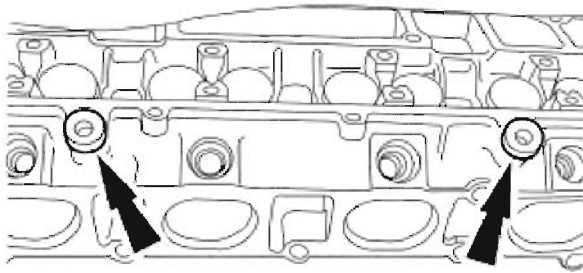
- Separate the fuel injectors from the fuel rail.
- Remove and discard the fuel injector O-rings.
- Install new O-rings and lubricate with clean engine oil.
- Install the fuel injectors onto the fuel rail.



AV1418-A

**Fig. 371: Locating Fuel Injector O-Ring Seals**  
Courtesy of FORD MOTOR CO.

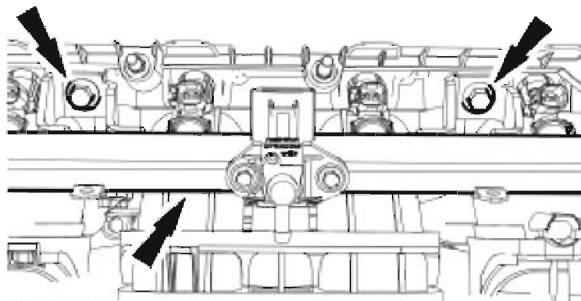
72. If originally equipped, position the fuel rail spacers.



A0032736

**Fig. 372: Locating Fuel Rail Spacers**  
Courtesy of FORD MOTOR CO.

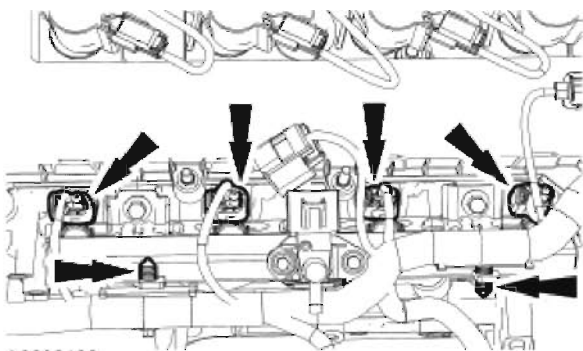
73. Install the fuel rail with the fuel injectors and bolts.
- Tighten to 25 N.m (18 lb-ft).



N0045802

**Fig. 373: Locating Fuel Rail With Fuel Injectors & Bolts**  
Courtesy of FORD MOTOR CO.

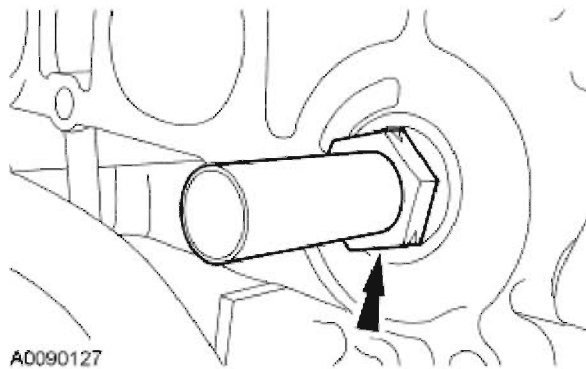
74. Connect the 4 fuel injector electrical connectors. Attach the 2 wiring harness retainers.



A0090129

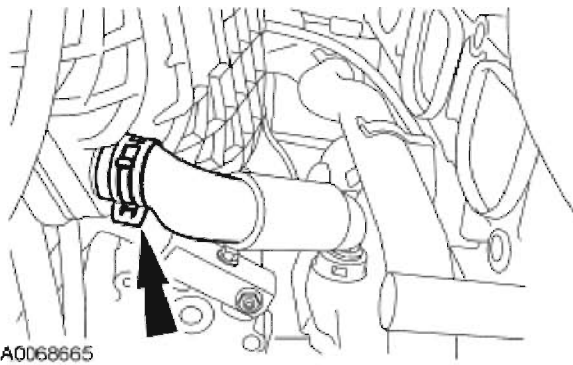
**Fig. 374: Locating Fuel Injector Electrical Connectors**  
Courtesy of FORD MOTOR CO.

75. Install the EGR tube.
- Tighten to 55 N.m (41 lb-ft).



**Fig. 375: Locating EGR Tube**  
Courtesy of FORD MOTOR CO.

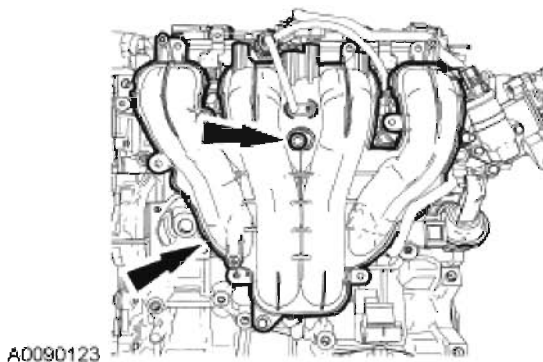
76. Position the intake manifold and connect the positive crankcase ventilation hose.



**Fig. 376: Locating Positive Crankcase Ventilation Hose**  
Courtesy of FORD MOTOR CO.

**NOTE:**      **Inspect and install new intake manifold gaskets, if necessary.**

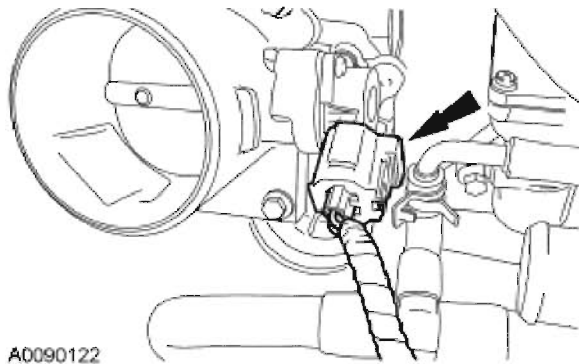
77. Install the intake manifold gaskets and intake manifold.
- Tighten the bolts to 18 N.m (13 lb-ft).



**Fig. 377: Locating Intake Manifold Gaskets & Intake Manifold**

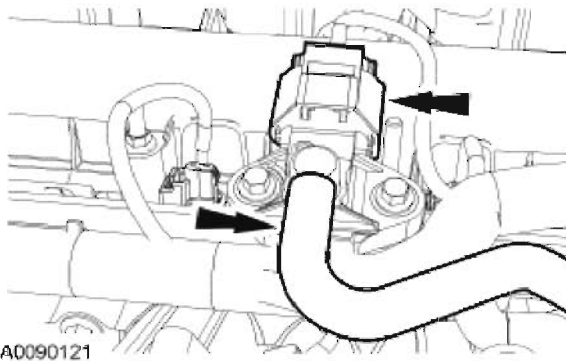
Courtesy of FORD MOTOR CO.

78. Connect the throttle position (TP) sensor electrical connector.



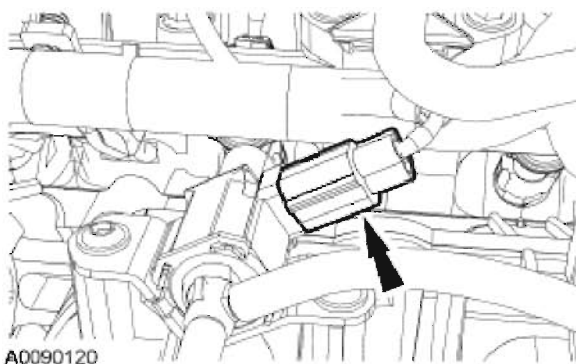
**Fig. 378: Locating Throttle Position (TP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

79. Connect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.



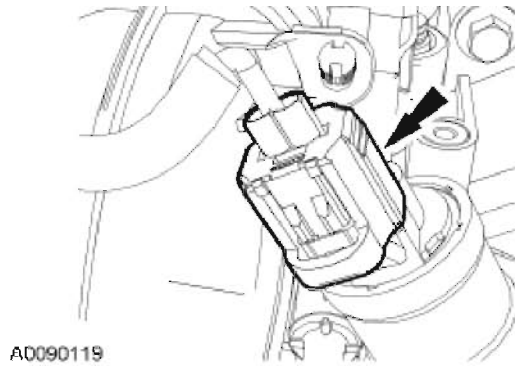
**Fig. 379: Locating Fuel Rail Pressure, Temperature Sensor Electrical Connector & Vacuum Tube**  
Courtesy of FORD MOTOR CO.

80. Connect the swirl control valve electrical connector.



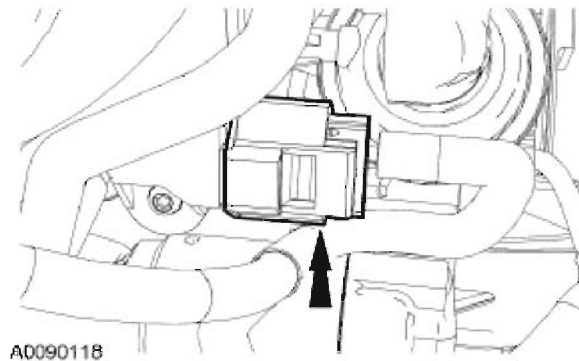
**Fig. 380: Locating Swirl Control Valve Electrical Connector**  
Courtesy of FORD MOTOR CO.

81. Connect the idle air control (IAC) motor electrical connector.



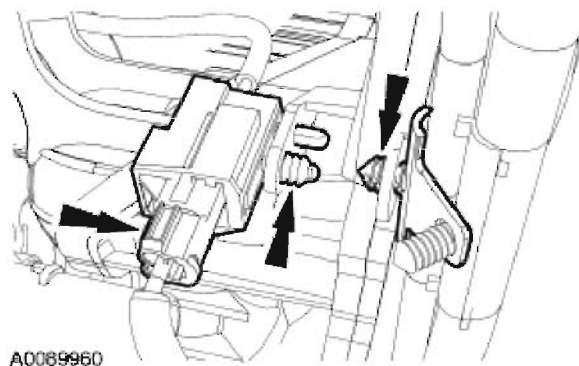
**Fig. 381: Locating Idle Air Control (IAC) Motor Electrical Connector**  
Courtesy of FORD MOTOR CO.

82. Connect the temperature manifold absolute pressure (TMAP) electrical connector.



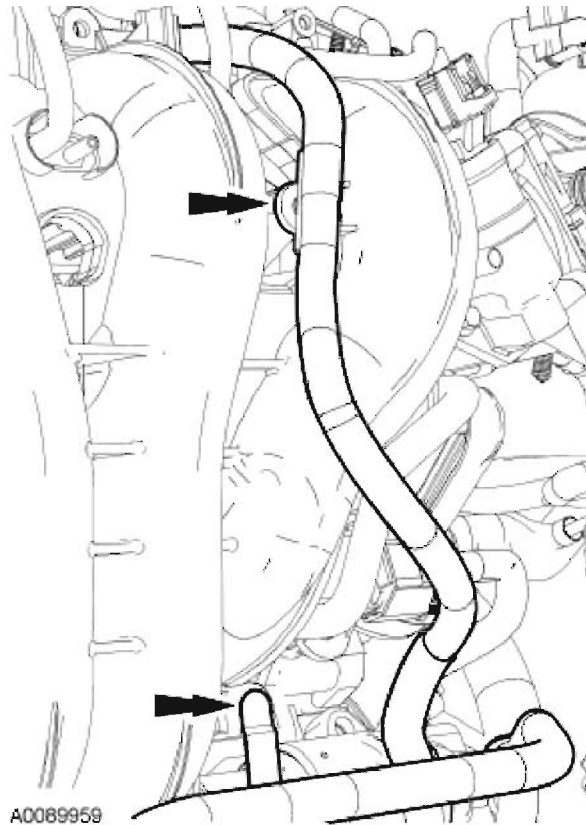
**Fig. 382: Locating Temperature Manifold Absolute Pressure (TMAP) Electrical Connector**  
Courtesy of FORD MOTOR CO.

83. Connect the KS and attach the 2 wiring harness retainers.



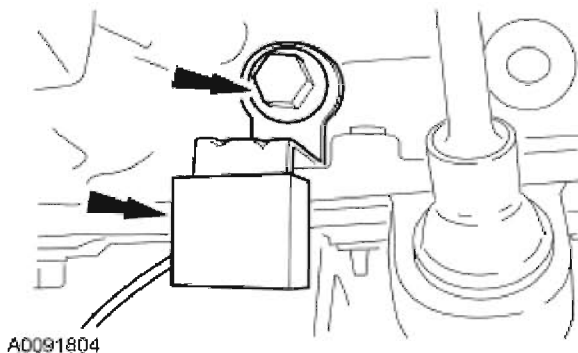
**Fig. 383: Locating Wiring Harness Retainers (1 Of 2)**  
Courtesy of FORD MOTOR CO.

84. Attach the 2 wiring harness retainers.



**Fig. 384: Locating Wiring Harness Retainers (2 Of 2)**  
Courtesy of FORD MOTOR CO.

85. If removed, install the capacitor and bolt.
- Tighten to 20 N.m (15 lb-ft).



**Fig. 385: Locating Capacitor & Bolt**  
Courtesy of FORD MOTOR CO.

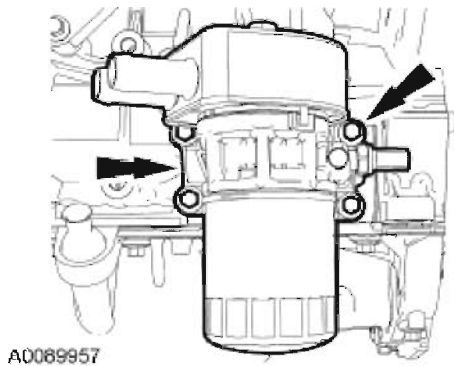


**CAUTION: A new oil cooler must be installed or severe damage to the engine can occur.**

86. Position the oil filter adapter in a vise and install the oil filter, new oil cooler and oil cooler bolt.
- Tighten the oil cooler bolt to 34 N.m (25 lb-ft).
  - Tighten the oil filter 3/4 turn after the oil filter gasket makes contact with the oil filter adapter.

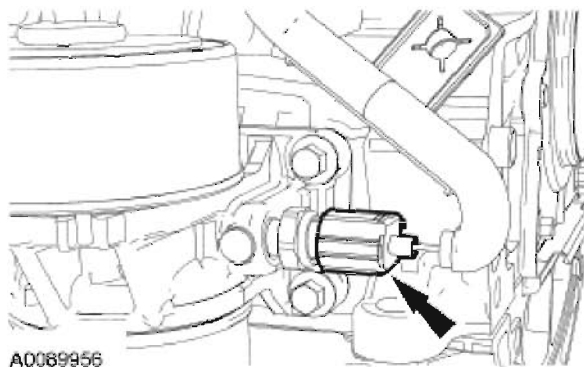
**NOTE:**                      **Early build with oil cooler shown, late build without oil cooler similar.**  
**Clean the gasket mating surfaces with metal surface cleaner.**

87. Install the oil filter adapter with a new gasket and bolts.
- Tighten to 25 N.m (18 lb-ft).



**Fig. 386: Locating Oil Filter Adapter**  
**Courtesy of FORD MOTOR CO.**

88. Connect the oil pressure sensor electrical connector.

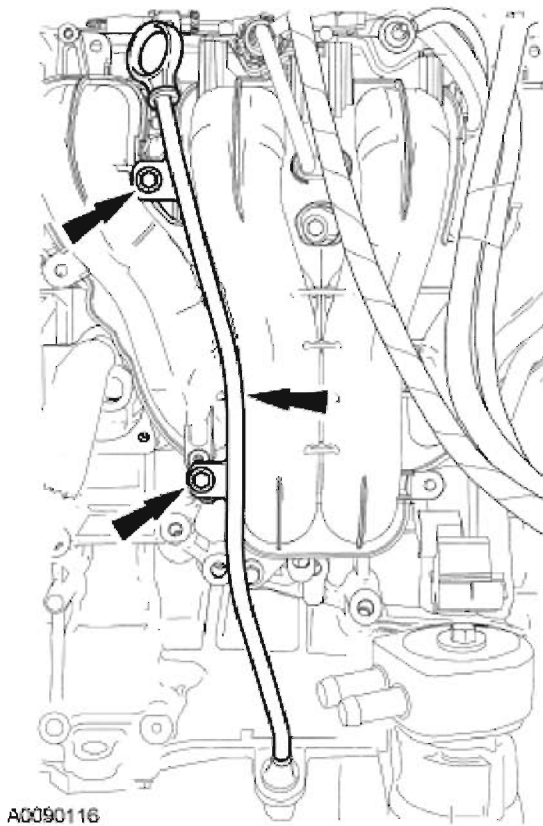


**Fig. 387: Locating Oil Pressure Sensor Electrical Connector**

Courtesy of FORD MOTOR CO.

**NOTE:** Install a new O-ring seal on the oil level indicator tube and lubricate with clean engine oil prior to installing.

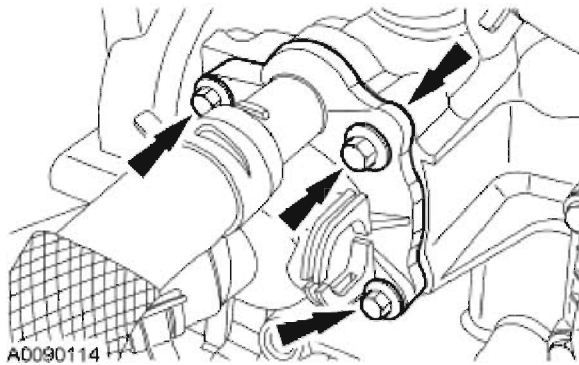
89. Install the oil level indicator and bolts.
- Tighten to 10 N.m (89 lb-in).



**Fig. 388: Locating Oil Level Indicator & Bolts**  
Courtesy of FORD MOTOR CO.

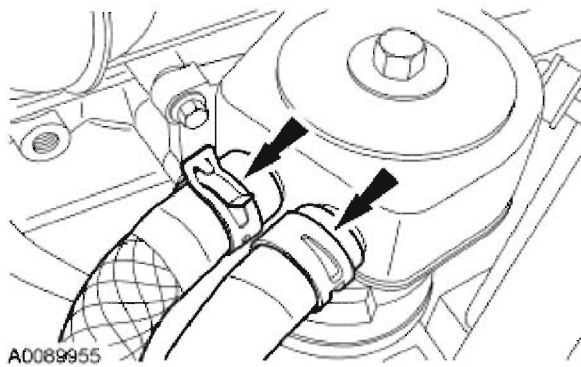
**NOTE:** Clean and inspect the thermostat housing gasket. Install a new gasket, if necessary.

90. Install the thermostat housing and bolts.
- Tighten to 10 N.m (89 lb-in).



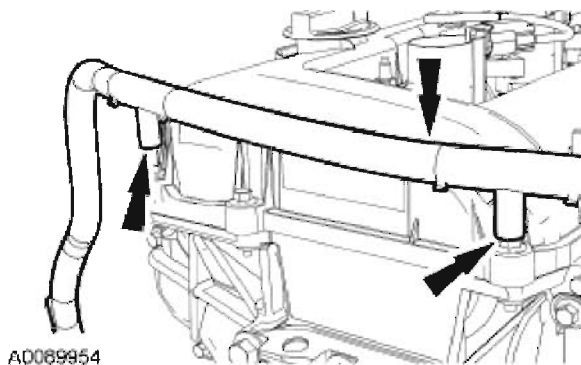
**Fig. 389: Locating Thermostat Housing & Bolts**  
Courtesy of FORD MOTOR CO.

91. If equipped, connect the oil cooler hoses.



**Fig. 390: Locating Oil Cooler Hoses**  
Courtesy of FORD MOTOR CO.

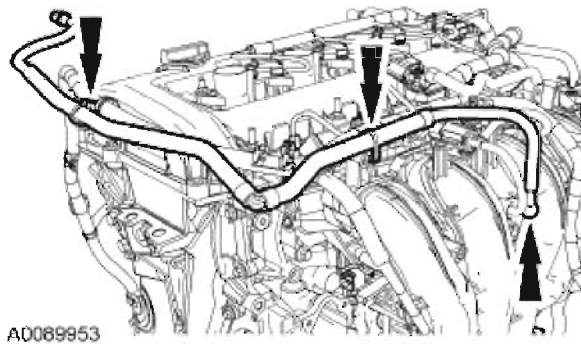
92. Attach the 2 wiring harness retainers.



**Fig. 391: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

93. Install the engine vacuum tube.
- Connect the engine vacuum tube.

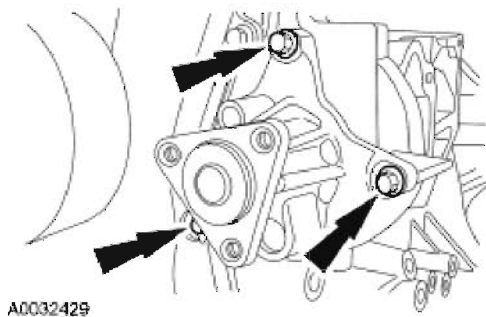
- Attach the 2 engine vacuum tube retainers.



**Fig. 392: Locating Engine Vacuum Tube**  
Courtesy of FORD MOTOR CO.

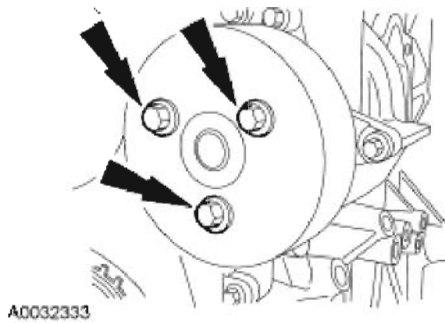
**NOTE:** Clean the coolant pump mating surface with metal surface cleaner.  
Lubricate the coolant pump O-ring with clean engine coolant.

94. Install the coolant pump and bolts.
- Tighten to 10 N.m (89 lb-in).



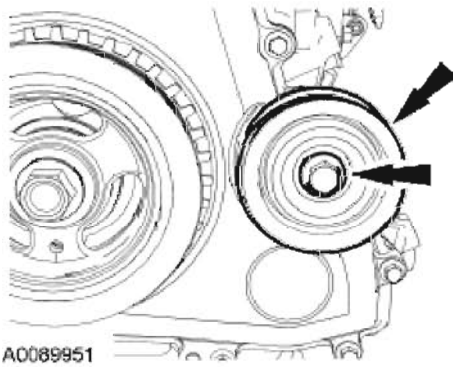
**Fig. 393: Locating Coolant Pump Bolts**  
Courtesy of FORD MOTOR CO.

95. Install the coolant pump pulley and bolts.
- Tighten to 20 N.m (15 lb-ft).



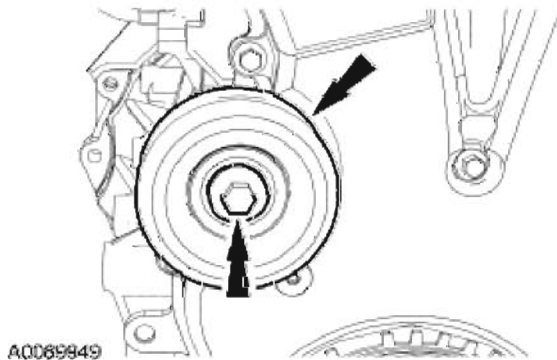
**Fig. 394: Locating Coolant Pump Pulley Bolts**  
Courtesy of FORD MOTOR CO.

96. If equipped, install the accessory drive belt idler pulley.
- Tighten to 25 N.m (18 lb-ft).



**Fig. 395: Locating Accessory Drive Belt Idler Pulley (1 Of 2)**  
Courtesy of FORD MOTOR CO.

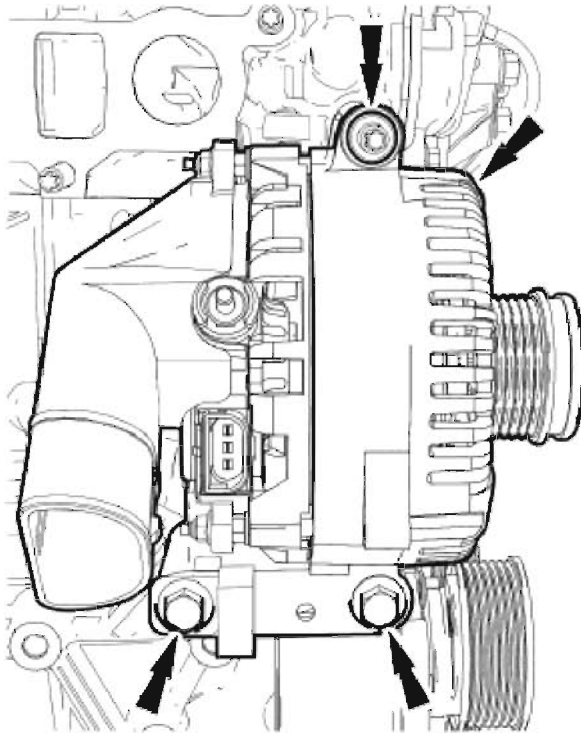
97. Install the accessory drive belt idler pulley.
- Tighten to 25 N.m (18 lb-ft).



**Fig. 396: Locating Accessory Drive Belt Idler Pulley (2 Of 2)**  
Courtesy of FORD MOTOR CO.

98. Install the generator and bolts.

- Tighten to 47 N.m (35 lb-ft).



A0089945

**Fig. 397: Locating Generator & Bolts**  
Courtesy of FORD MOTOR CO.

99. Position a new exhaust manifold gasket on the engine.

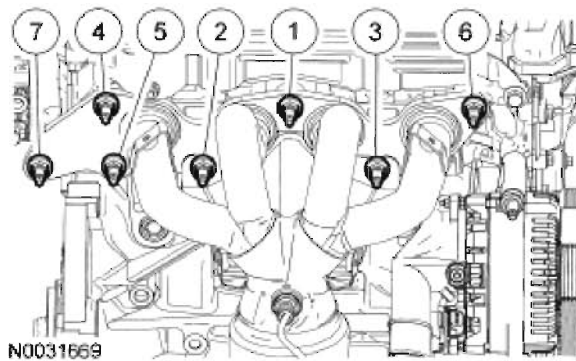
**CAUTION:**

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

Failure to tighten the catalytic converter nuts to specification a second time will cause the converter to develop an exhaust leak.

**NOTE:** Make sure to tighten the nuts in the sequence in 2 stages.

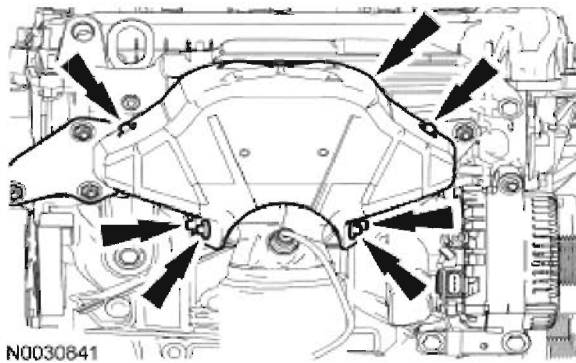
100. Position the catalytic converter and tighten the 7 exhaust manifold nuts in the sequence shown.
- Stage 1: Tighten to 47 N.m (35 lb-ft).
  - Stage 2: Tighten to 47 N.m (35 lb-ft).



**Fig. 398: Tightening Exhaust Manifold Nuts In Sequence**  
Courtesy of FORD MOTOR CO.

101. Install the heat shield and the 6 bolts.

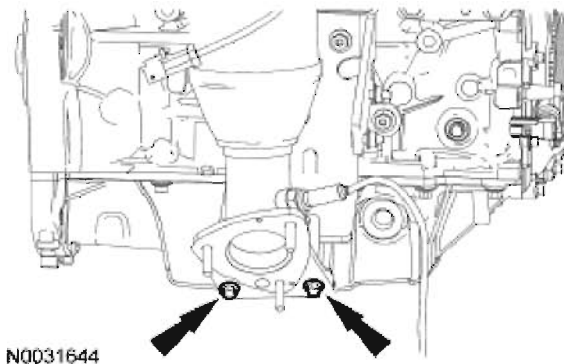
- Tighten to 10 N.m (89 lb-in).



**Fig. 399: Locating Heat Shield & Bolts**  
Courtesy of FORD MOTOR CO.

102. Install the 2 catalytic converter bracket bolts.

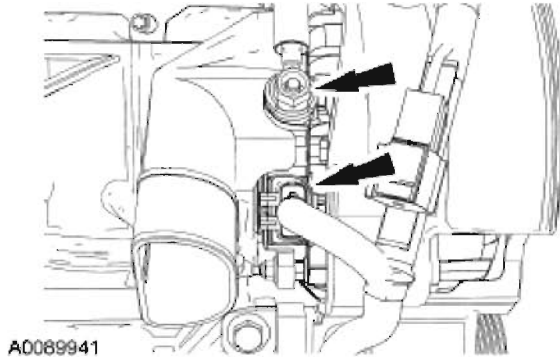
- Tighten to 25 N.m (18 lb-ft).



**Fig. 400: Locating Catalytic Converter Bracket Bolts**  
Courtesy of FORD MOTOR CO.

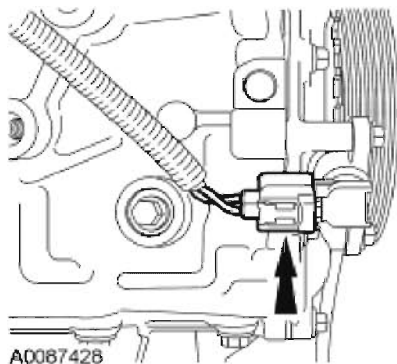
103. Connect the generator electrical connections and install the nut.

- Tighten to 6 N.m (53 lb-in).



**Fig. 401: Locating Generator Electrical Connections**  
Courtesy of FORD MOTOR CO.

104. Connect the CKP sensor electrical connector.



**Fig. 402: Locating CKP Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

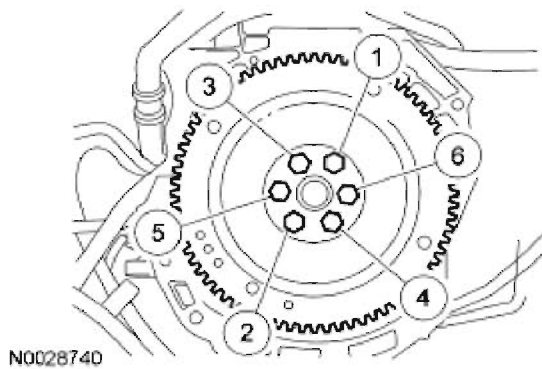
105. Using the heavy duty floor crane and spreader bar, remove the engine from the engine stand.

### **Vehicles with automatic transaxle**

106. Install the flexplate and the bolts. Tighten the bolts in the sequence shown in 3 stages:

- Stage 1: Tighten to 50 N.m (37 lb-ft).
- Stage 2: Tighten to 80 N.m (50 lb-ft).
- Stage 3: Tighten to 112 N.m (83 lb-ft).

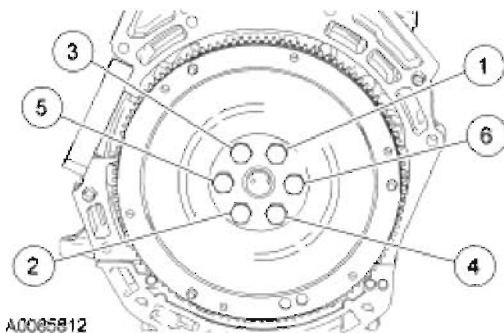




**Fig. 403: Identifying Flexplate & Bolts**  
Courtesy of FORD MOTOR CO.

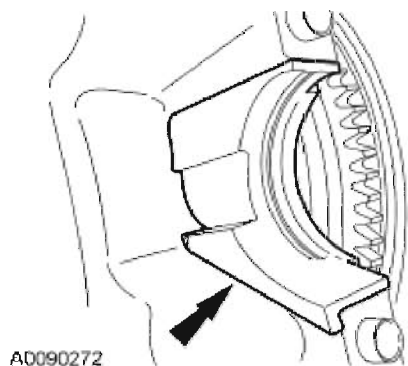
### Vehicles with manual transaxle

107. Install the flywheel and the bolts. Tighten the bolts in the sequence shown in 3 stages:
- Stage 1: Tighten to 50 N.m (37 lb-ft).
  - Stage 2: Tighten to 80 N.m (50 lb-ft).
  - Stage 3: Tighten to 112 N.m (83 lb-ft).



**Fig. 404: Identifying Flexplate Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

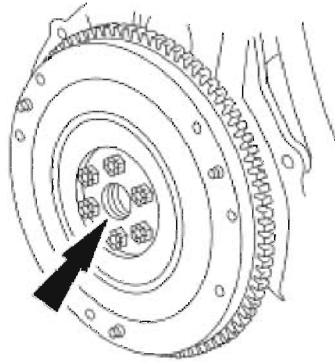
108. Install the starter motor isolator.



**Fig. 405: Locating Starter Motor Isolator**

Courtesy of FORD MOTOR CO.

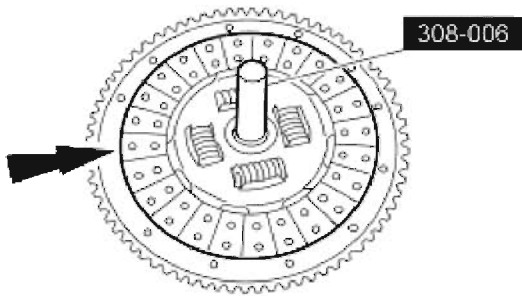
109. Lubricate the transaxle input shaft pilot bearing with front axle grease.



A0027749

**Fig. 406: Locating Transaxle Input Shaft Pilot Bearing**  
Courtesy of FORD MOTOR CO.

110. Using the special tool, position the clutch disc on the flywheel.



A0090134

**Fig. 407: Positioning Clutch Disc On Flywheel Using Special Tool (308-006)**  
Courtesy of FORD MOTOR CO.

**NOTE:** If reusing the clutch pressure plate and flywheel, align the marks made during removal.

111. Position the clutch pressure plate and install the bolts.

- Tighten to 27 N.m (20 lb-ft) in a star pattern sequence.

## INSTALLATION

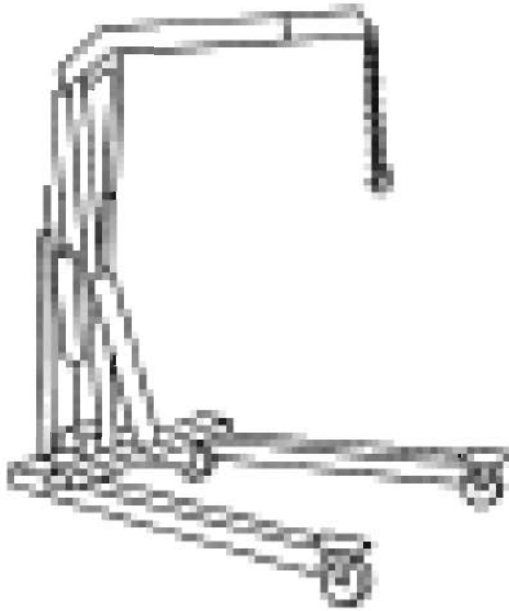
ENGINE - AUTOMATIC TRANSAXLE

### SPECIAL TOOL(S)

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## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1341-A**

Heavy Duty Floor Crane  
014-00071 or equivalent



**ST1602-A**

Spreader Bar  
303-D089 (D93P-6001-A3) or  
equivalent

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1293-A

Powertrain Lift  
014-00765



ST2743A

Universal Adapter Brackets  
014-0001  
Lifting Bracket Set, Engine  
303-D095 (D94L-6001-A) or  
equivalent

<http://vnx.su>

### MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil	

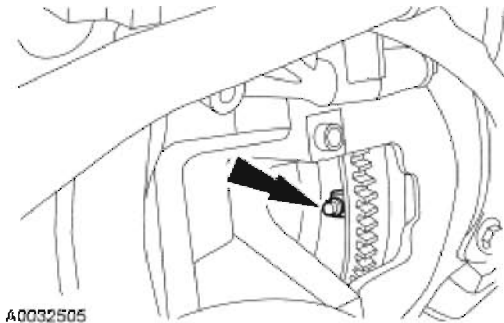
XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent

WSS-  
M2C930-A

**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

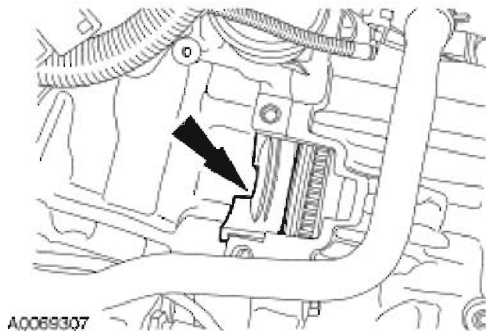
### All vehicles

1. Using the engine crane and spreader bar, position the engine and transaxle together. Install the 6 transaxle-to-engine bolts.
  - Tighten to 48 N.m (35 lb-ft).
2. Install new torque converter nuts.
  - Tighten to 35 N.m (26 lb-ft).



**Fig. 408: Locating Torque Converter Nut**  
Courtesy of FORD MOTOR CO.

3. Install the starter motor isolator.

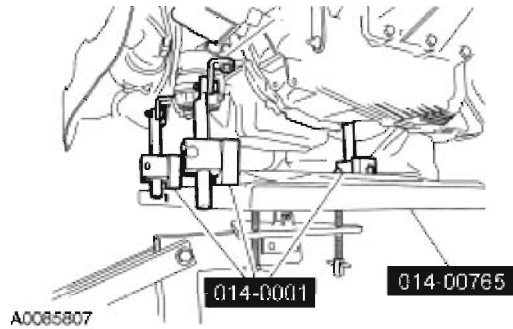


**Fig. 409: Identifying Starter Motor Isolator**  
Courtesy of FORD MOTOR CO.

4. Using the engine crane and spreader bar, position the engine and transaxle onto the lift

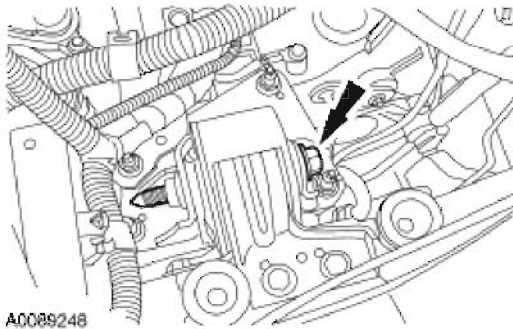
table.

5. Using the special tools, secure the engine to the lift table.



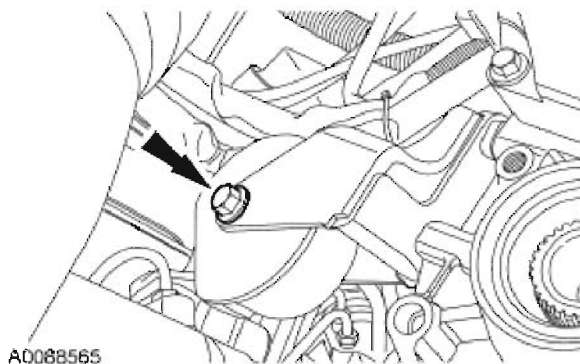
**Fig. 410: Securing Engine To Lift Table Using Special Tool (014-0001, 014-00765)**  
Courtesy of FORD MOTOR CO.

6. Raise the engine and transaxle into the vehicle.
7. Install the bolt in the LH transaxle mount.
  - Tighten to 103 N.m (76 lb-ft).



**Fig. 411: Locating Transaxle Mount Bolt**  
Courtesy of FORD MOTOR CO.

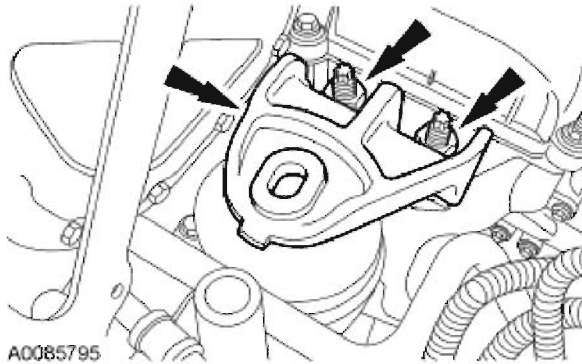
8. Install the bolt in the rear transaxle mount.
  - Tighten to 115 N.m (85 lb-ft).



**Fig. 412: Locating Rear Transaxle Mount Bolt**

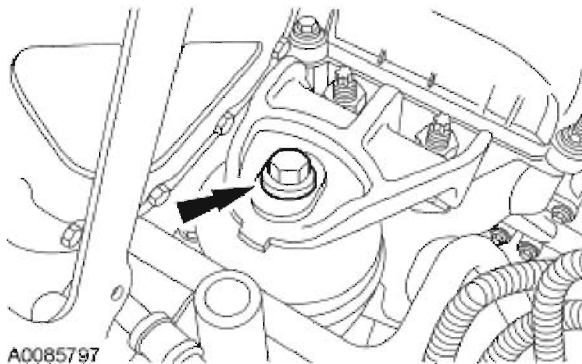
Courtesy of FORD MOTOR CO.

9. Install the engine mount bracket.
  - Tighten to 115 N.m (85 lb-ft).



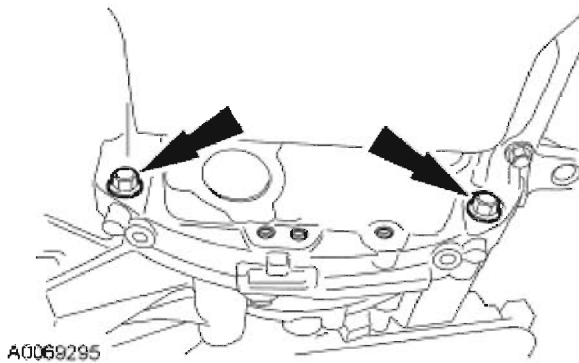
**Fig. 413: Locating Engine Mount Bracket**  
Courtesy of FORD MOTOR CO.

10. Install the engine mount bracket bolt.
  - Tighten to 115 N.m (85 lb-ft).



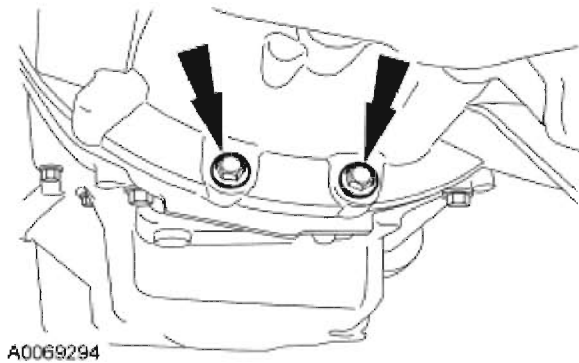
**Fig. 414: Locating Engine Mount Bracket Bolt**  
Courtesy of FORD MOTOR CO.

11. Install the 2 transaxle-to-engine bolts.
  - Tighten to 48 N.m (35 lb-ft).



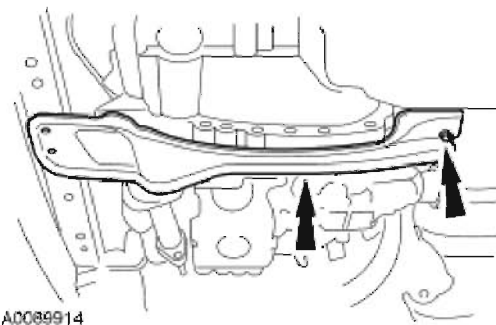
**Fig. 415: Locating Transaxle-To-Engine Bolts (1 Of 2)**  
Courtesy of FORD MOTOR CO.

12. Install the 2 transaxle-to-engine bolts.
  - Tighten to 48 N.m (35 lb-ft).



**Fig. 416: Locating Transaxle-To-Engine Bolts (2 Of 2)**  
Courtesy of FORD MOTOR CO.

13. Install the engine support crossmember and new nut.
  - Tighten to 175 N.m (129 lb-ft).

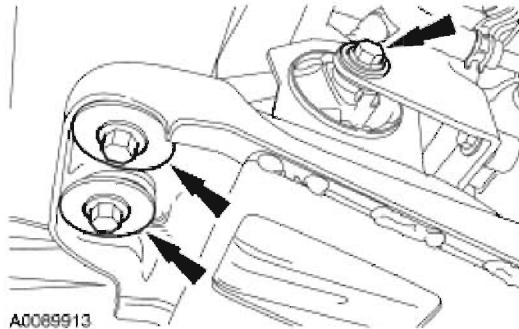


**Fig. 417: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

14. Install the 2 bolts for the engine support crossmember and the front roll restrictor bolt.



- Tighten the engine support crossmember bolts to 90 N.m (66 lb-ft).
- Tighten the front roll restrictor bolt to 115 N.m (85 lb-ft).

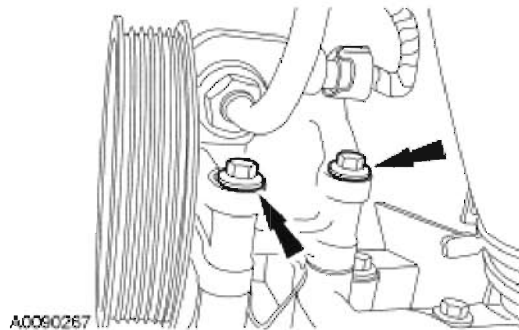


**Fig. 418: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**

Courtesy of FORD MOTOR CO.

**NOTE:** The bolt under the power steering pressure tube will remain with the power steering pump.

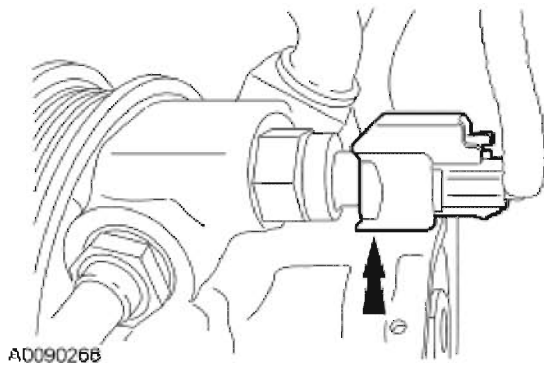
15. Position the power steering pump and install the bolts.
  - Tighten to 25 N.m (18 lb-ft).



**Fig. 419: Identifying Power Steering Pump Bolts**

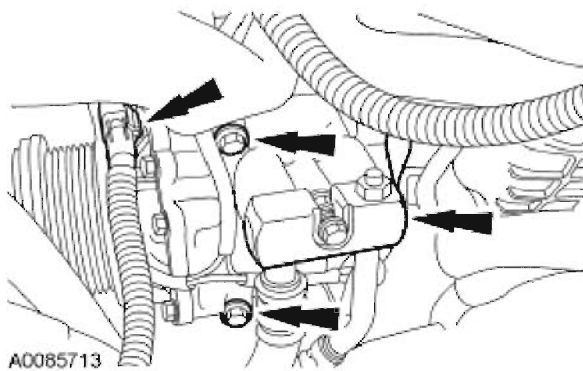
Courtesy of FORD MOTOR CO.

16. Connect the power steering pressure (PSP) sensor electrical connector.



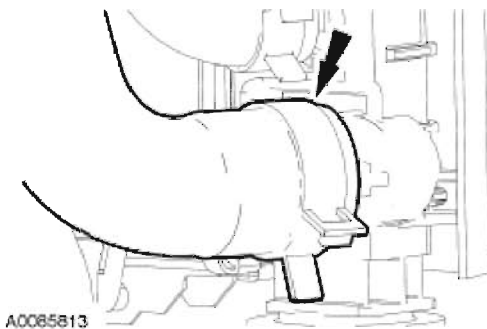
**Fig. 420: Locating Power Steering Pressure (PSP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

17. Install the A/C compressor and connect the A/C compressor electrical connector.
  - Tighten the bolts to 25 N.m (18 lb-ft).



**Fig. 421: Locating A/C Compressor & Bolts**  
Courtesy of FORD MOTOR CO.

18. Connect the lower radiator hose to the radiator.



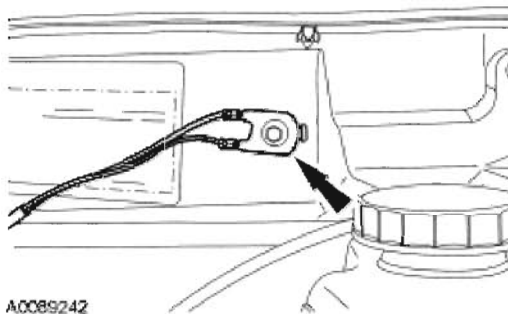
**Fig. 422: Locating Lower Radiator Hose**  
Courtesy of FORD MOTOR CO.

19. Install the 2 power steering pump bolts.
  - Tighten to 25 N.m (18 lb-ft).



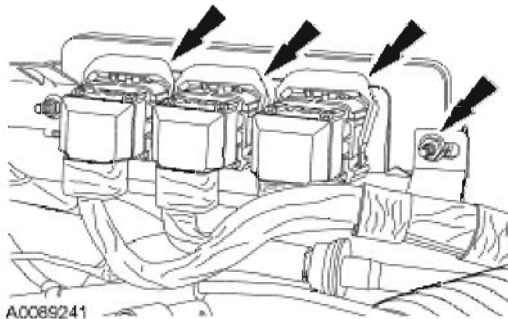
**Fig. 423: Locating Power Steering Pump Bolts**  
Courtesy of FORD MOTOR CO.

20. Install the ground wire and bolt.
- Tighten to 10 N.m (89 lb-in).



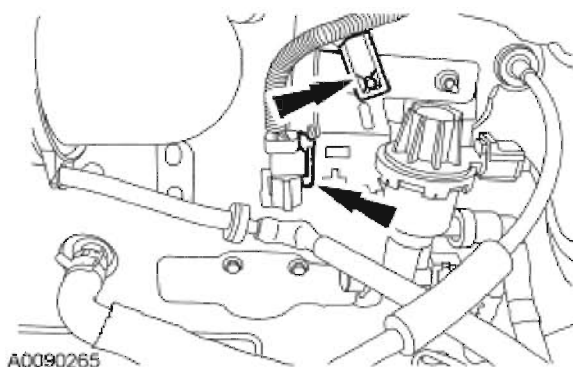
**Fig. 424: Locating Ground Wire & Bolt**  
Courtesy of FORD MOTOR CO.

21. Connect the powertrain control module (PCM) electrical connectors. Position the harness and install the nut.
- Tighten to 8 N.m (71 lb-in).



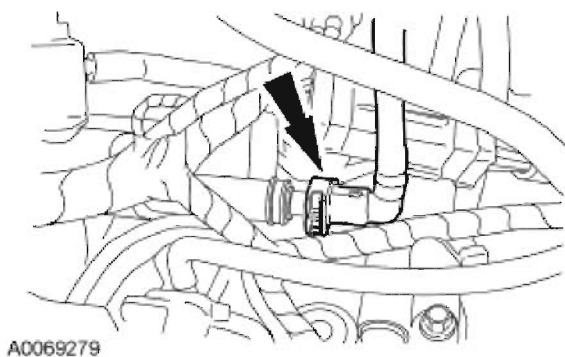
**Fig. 425: Locating Powertrain Control Module (PCM) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

22. Attach the electrical connector retainers.



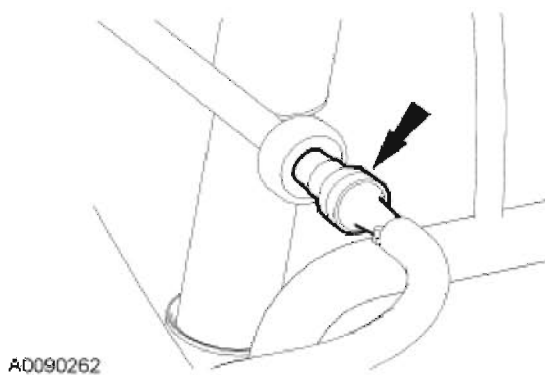
**Fig. 426: Locating Electrical Connector Retainers**  
Courtesy of FORD MOTOR CO.

23. Connect the fuel supply tube.



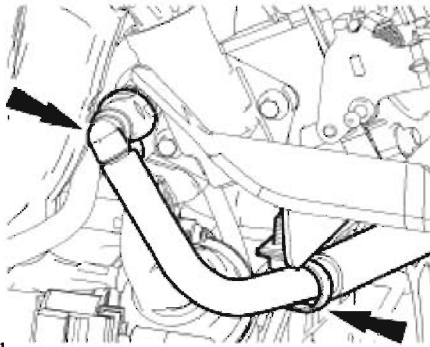
**Fig. 427: Locating Fuel Supply Tube**  
Courtesy of FORD MOTOR CO.

24. Connect the vacuum reservoir tube.



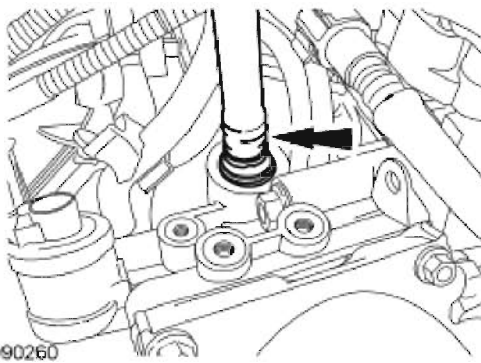
**Fig. 428: Locating Vacuum Reservoir Tube**  
Courtesy of FORD MOTOR CO.

25. Connect the fuel vapor return tube and retainer.



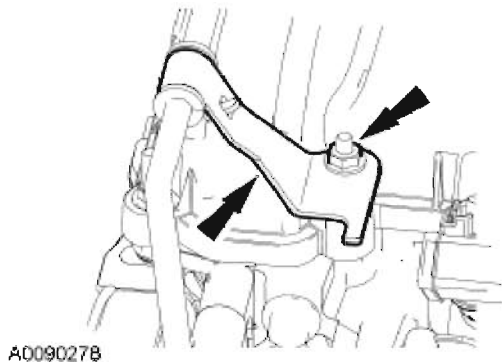
**Fig. 429: Locating Fuel Vapor Return Tube & Retainer**  
Courtesy of FORD MOTOR CO.

26. Connect the vacuum supply tube.



**Fig. 430: Locating Vacuum Supply Tube**  
Courtesy of FORD MOTOR CO.

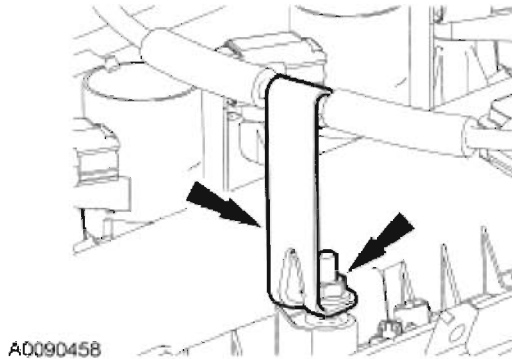
27. Install the power steering tube, bracket and nut.
- Tighten to 6 N.m (53 lb-in).



**Fig. 431: Locating Power Steering Tube, Bracket & Nut**  
Courtesy of FORD MOTOR CO.

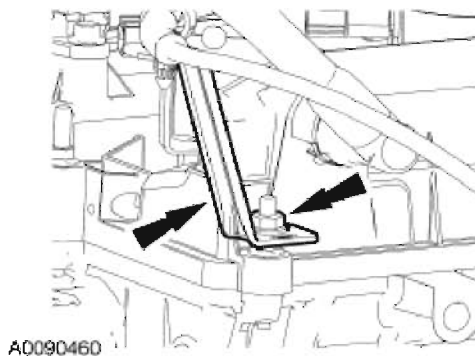
28. Position the accelerator control cable and bracket and install the nut.

- Tighten to 9 N.m (80 lb-in) (vehicles built through 10/2005).
- Tighten to 5 N.m (44 lb-in) (vehicles built after 10/2005).



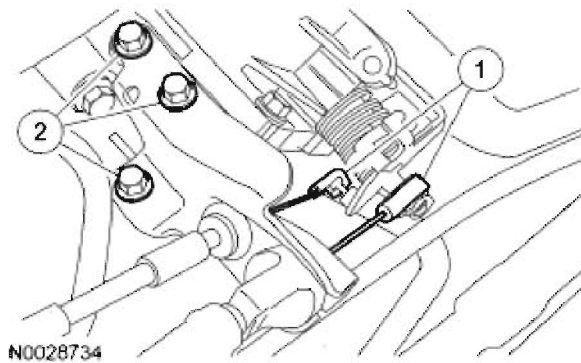
**Fig. 432: Locating Accelerator Control Cable & Bracket**  
Courtesy of FORD MOTOR CO.

29. Install the accelerator control cable and bracket and nut.
- Tighten to 9 N.m (80 lb-in) (vehicles built through 10/2005).
  - Tighten to 5 N.m (44 lb-in) (vehicles built after 10/2005).



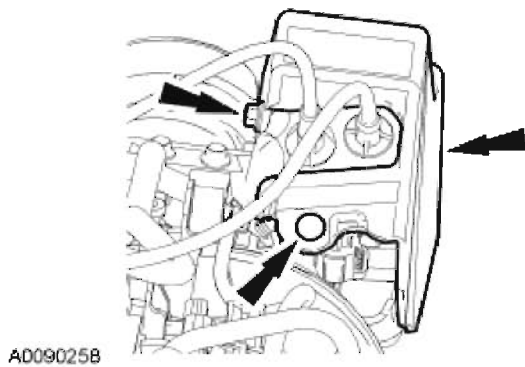
**Fig. 433: Locating Accelerator Control Cable, Bracket & Nut**  
Courtesy of FORD MOTOR CO.

30. Install the accelerator cable and speed control cable (if equipped).
1. Connect the accelerator and speed control cable (if equipped) to the throttle body.
  2. Install the accelerator cable bracket and bolts.
    - Tighten to 10 N.m (89 lb-in).



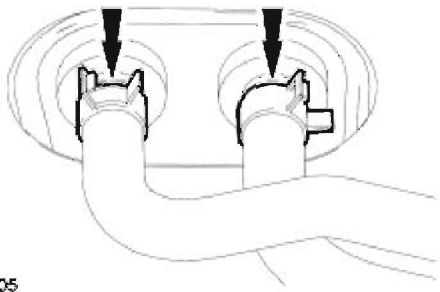
**Fig. 434: Identifying Accelerator Cable Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

31. Install the accelerator cable snow shield and retainers.
- Tighten to 10 N.m (89 lb-in).



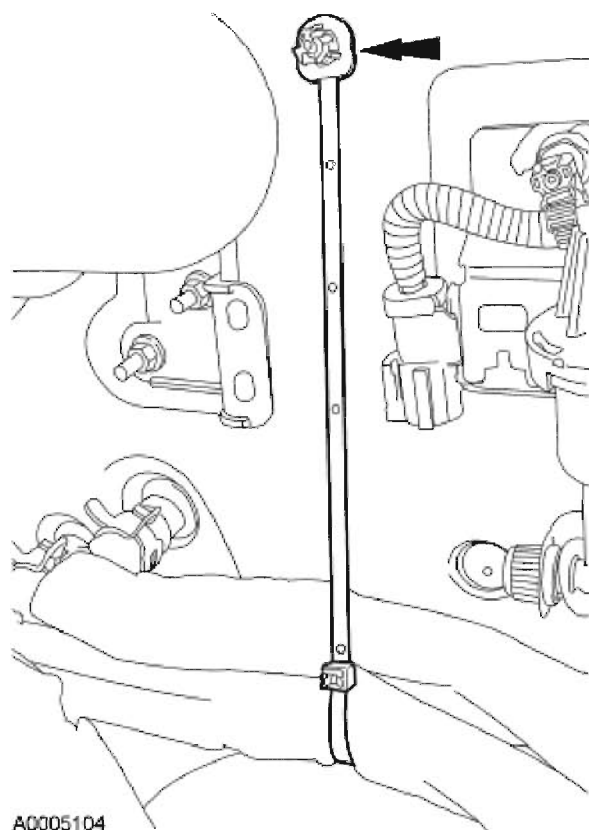
**Fig. 435: Locating Accelerator Cable Snow Shield & Retainers**  
Courtesy of FORD MOTOR CO.

32. Connect the heater hoses to the heater core.



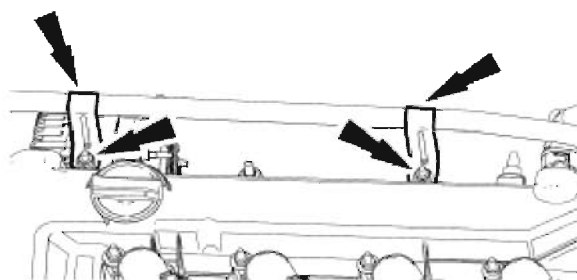
**Fig. 436: Locating Heater Hoses**  
Courtesy of FORD MOTOR CO.

33. Attach the heater hose support strap to the stud.



**Fig. 437: Locating Heater Hose Support Strap**  
Courtesy of FORD MOTOR CO.

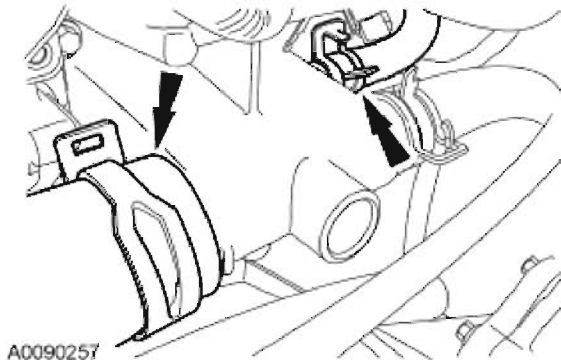
34. Position the coolant vent hose and install the coolant vent hose brackets and nuts.
- Tighten to 10 N.m (89 lb-in).



**Fig. 438: Locating Coolant Vent Hose**  
Courtesy of FORD MOTOR CO.

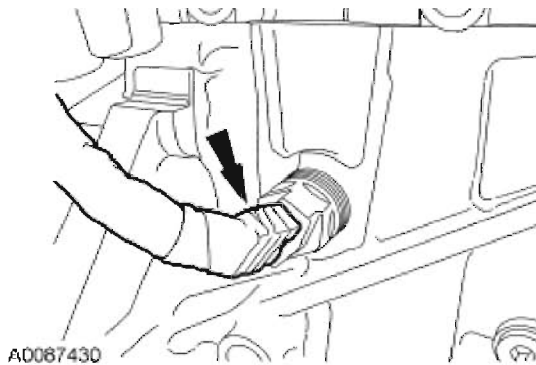
35. Connect the upper radiator and coolant vent hoses.





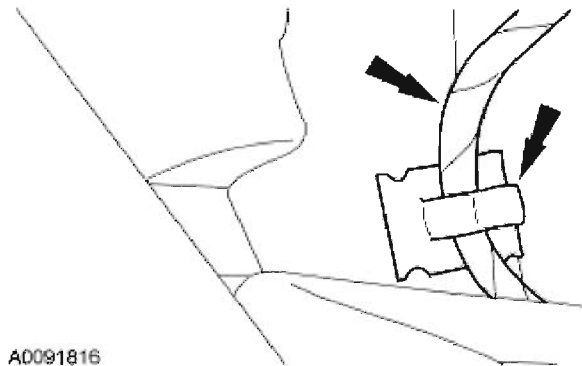
**Fig. 439: Locating Upper Radiator & Coolant Vent Hoses**  
Courtesy of FORD MOTOR CO.

36. If equipped, route the block heater wiring harness and attach all retainers. Connect the block heater electrical connector.



**Fig. 440: Locating Block Heater Wiring Harness**  
Courtesy of FORD MOTOR CO.

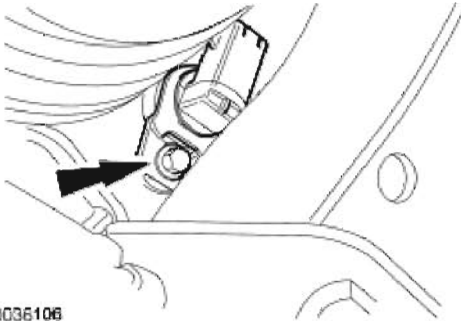
37. Attach the transaxle control harness to the retaining clip.



**Fig. 441: Locating Transaxle Control Harness**  
Courtesy of FORD MOTOR CO.

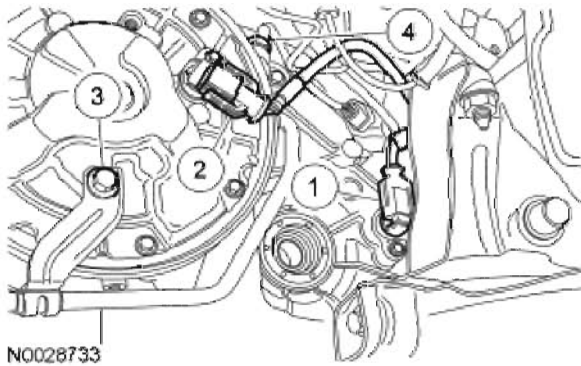
38. Install the output shaft speed (OSS) sensor and bolt.

- Tighten to 13 N.m (10 lb-ft).



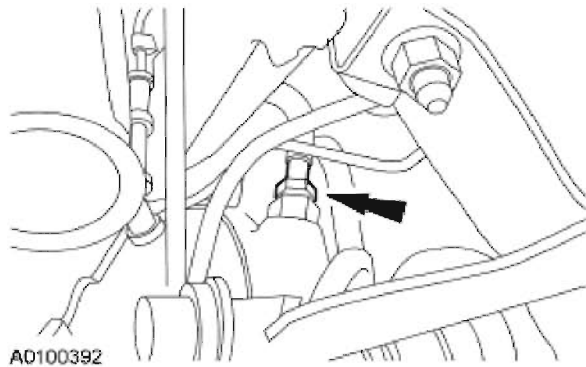
**Fig. 442: Locating OSS Sensor Bolt**  
Courtesy of FORD MOTOR CO.

39. Install the fluid cooler tube.
1. Connect the OSS sensor.
  2. Connect the turbine shaft speed (TSS) sensor (white connector).
  3. Position the bracket and install the bolt.
    - Tighten 13 N.m (10 lb-ft).
  4. Position the fluid cooler tube.
    - Tighten to 23 N.m (17 lb-ft).



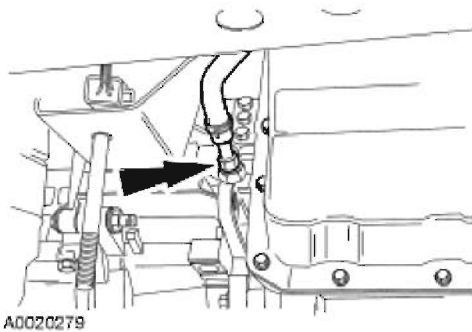
**Fig. 443: Locating Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

40. Connect the rear transmission fluid cooler tube.



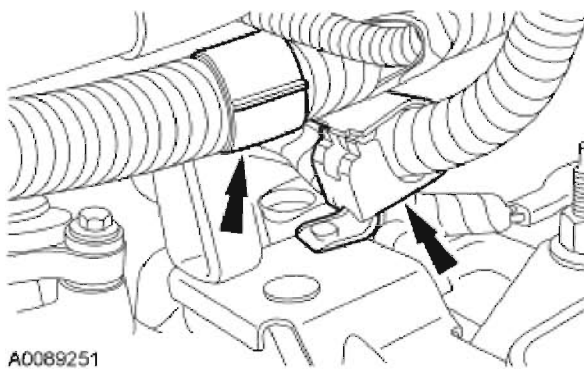
**Fig. 444: Locating Rear Transmission Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

41. Connect the front transmission fluid cooler tube.
  - Tighten to 23 N.m (17 lb-ft).



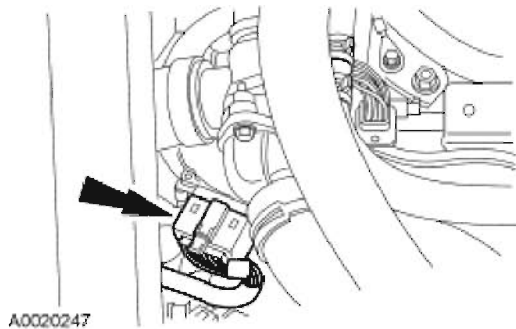
**Fig. 445: Locating Transmission Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

42. Attach the transaxle control harness to the brackets.



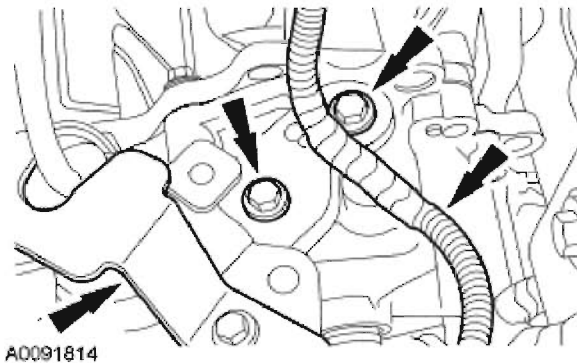
**Fig. 446: Locating Transaxle Control Harness**  
Courtesy of FORD MOTOR CO.

43. Connect the transmission range (TR) sensor electrical connector.



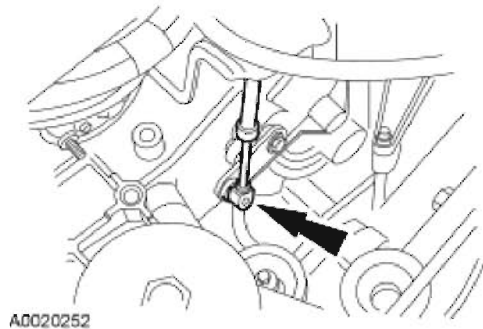
**Fig. 447: Locating Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

44. Install the transaxle control cable, bracket and bolts.
- Tighten to 19 N.m (14 lb-ft).
  - Attach the wiring harness pin-type retainers.



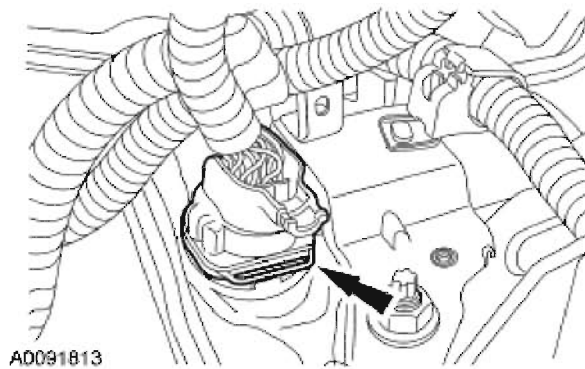
**Fig. 448: Locating Transaxle Control Cable, Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

45. Connect the shift cable to the transaxle manual lever.



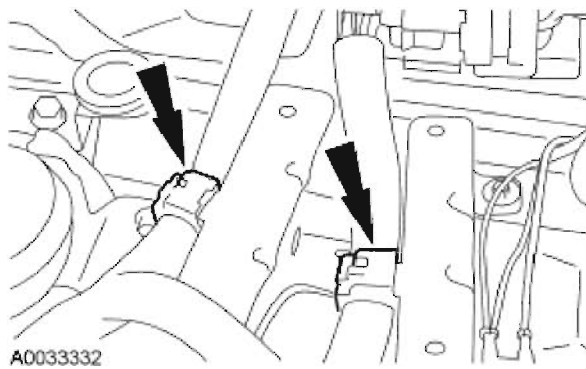
**Fig. 449: Locating Shift Cable End At Manual Lever**  
Courtesy of FORD MOTOR CO.

46. Connect the transaxle electrical connector.



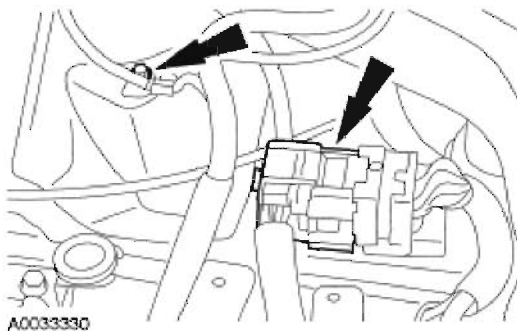
**Fig. 450: Locating Transaxle Electrical Connector**  
Courtesy of FORD MOTOR CO.

47. Attach the wiring harness retainers to the battery tray bracket.



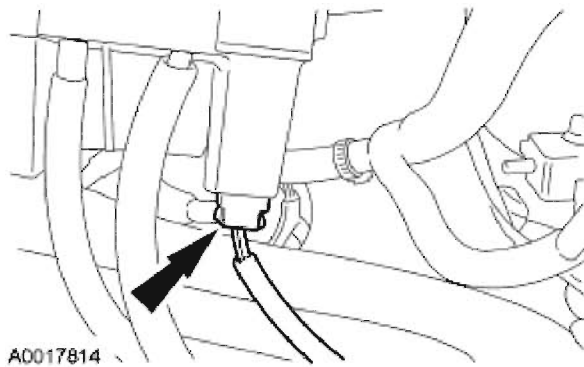
**Fig. 451: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

48. Connect the 42-pin electrical connector and tighten the bolt. Install the ground strap and bolt.
- Tighten to 10 N.m (89 lb-in).



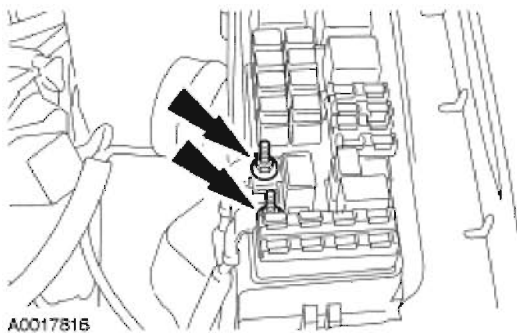
**Fig. 452: Locating Ground Strap & Electrical Connector**  
Courtesy of FORD MOTOR CO.

49. Connect the electrical connector to the power distribution box.



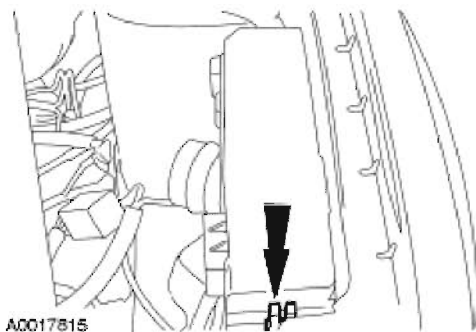
**Fig. 453: Locating Electrical Connector**  
Courtesy of FORD MOTOR CO.

50. Connect the cables and install the nuts.
- Tighten to 12 N.m (9 lb-ft).



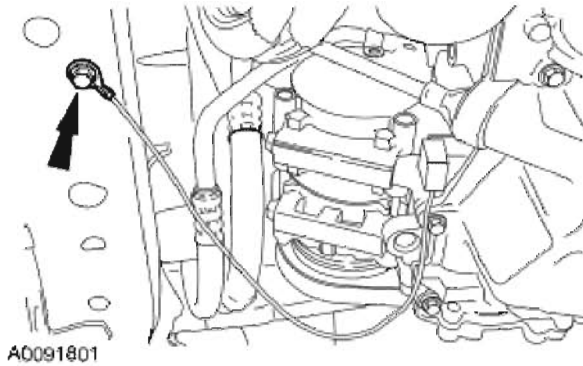
**Fig. 454: Locating Cables & Nuts**  
Courtesy of FORD MOTOR CO.

51. Install the power distribution box cover.



**Fig. 455: Locating Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

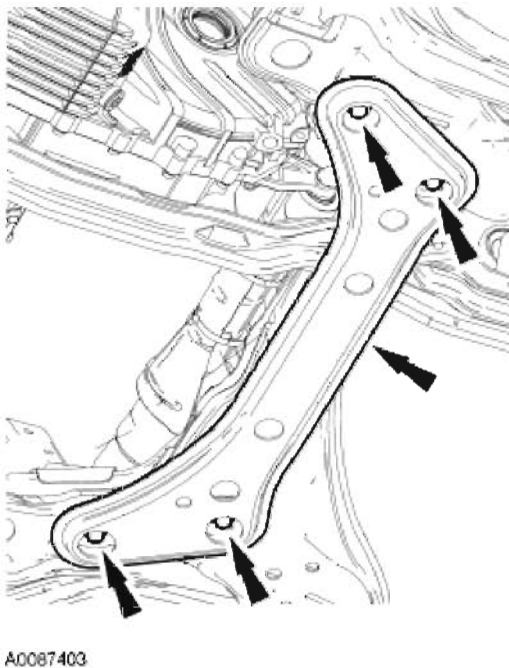
52. If equipped, install the ground eyelet and bolt.
- Tighten to 10 N.m (89 lb-in).



**Fig. 456: Locating Ground Eyelet & Bolt**  
Courtesy of FORD MOTOR CO.

#### 4x2 vehicles

53. Install the front drive intermediate halfshaft. For additional information, refer to **INSTALLATION** .
54. Install the lateral support crossmember and bolts.
  - Tighten to 115 N.m (85 lb-ft).



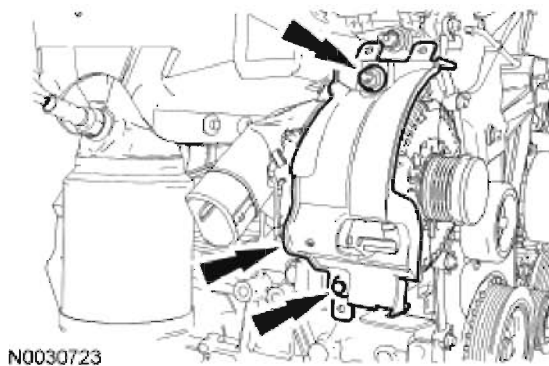
**Fig. 457: Identifying Lateral Support Crossmember And Bolts**  
Courtesy of FORD MOTOR CO.

#### 4x4 vehicles

55. Install the transfer case. For additional information, refer to **TRANSFER CASE-**

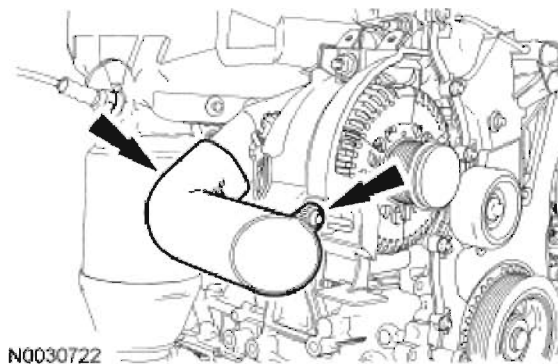
**POWER TRANSFER UNIT (PTU) .****All vehicles**

56. Install the LH front drive halfshaft. For additional information, refer to **INSTALLATION** .
57. Install the generator shield and the nut and the pin-type retainer and attach the wire retainers.
  - Tighten to 20 N.m (15 lb-ft).



**Fig. 458: Locating Generator Shield & Nut**  
Courtesy of FORD MOTOR CO.

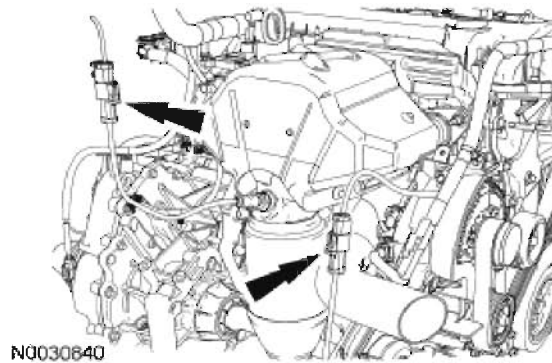
58. Install the lower air duct and install the bolt.
  - Tighten to 4 N.m (35 lb-in).



**Fig. 459: Locating Lower Air Duct & Bolt**  
Courtesy of FORD MOTOR CO.

59. Install the accessory drive belt tensioner. For additional information, refer to **REMOVAL AND INSTALLATION** .
60. Connect the heated oxygen sensor (HO2S) and the catalyst monitor sensor electrical connectors.





**Fig. 460: Locating Heated Oxygen Sensor (HO2S) & Catalyst Monitor Sensor Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

61. Install the exhaust flexible pipe. For additional information, refer to **REMOVAL AND INSTALLATION** .
62. Install the starter. For additional information, refer to **STARTING SYSTEM** .
63. Install the battery tray and battery. For additional information, refer to **REMOVAL AND INSTALLATION - BATTERY TRAY** and **REMOVAL AND INSTALLATION - BATTERY** .
64. Install the engine air cleaner and air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION - AIR CLEANER** and **REMOVAL AND INSTALLATION - AIR CLEANER OUTLET PIPE** .
65. Fill the engine with clean engine oil.
66. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

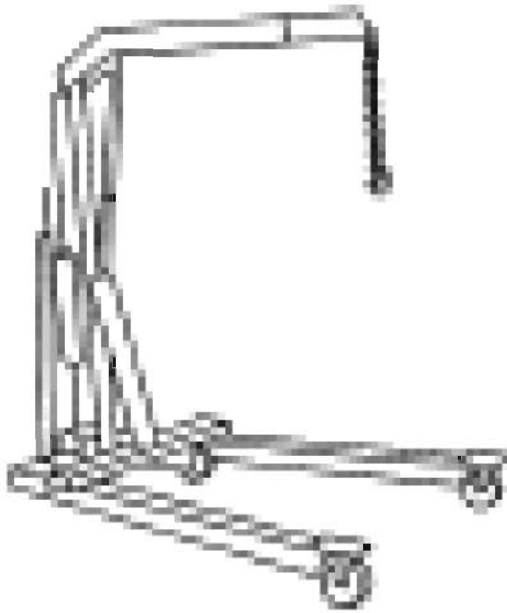
#### ENGINE - MANUAL TRANSAXLE

#### SPECIAL TOOL(S)

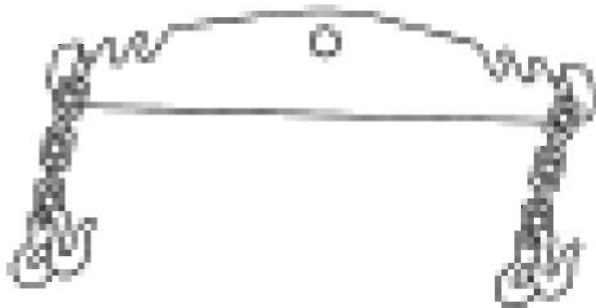
	<p>Heavy Duty Floor Crane  014-00071 or equivalent</p>
--	--

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



**ST1341-A**



**ST1602-A**

Spreader Bar  
303-D089 (D93P-6001-A3) or  
equivalent

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner



ST1293-A

Powertrain Lift  
014-00765



ST2743A

Universal Adapter Brackets  
014-0001  
Lifting Bracket Set, Engine  
303-D095 (D94L-6001-A) or  
equivalent

<http://vnx.su>

## MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil	

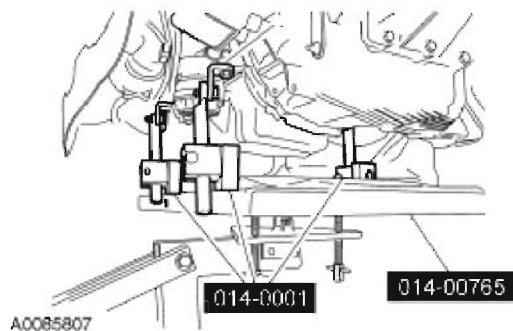
XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent

WSS-  
M2C930-A

**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

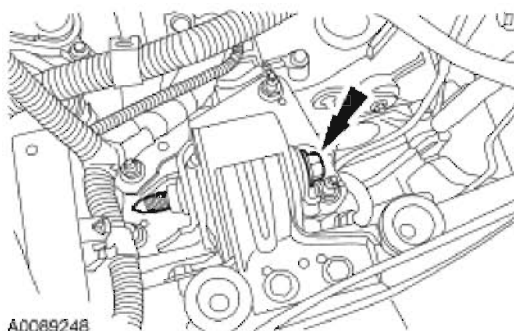
### All vehicles

1. Using the engine crane and spreader bar, position the engine and transaxle together. Install the 6 transaxle-to-engine bolts.
2. Using the engine crane and spreader bar, position the engine and transaxle onto the lift table.
3. Using the special tools, secure the engine to the lift table.



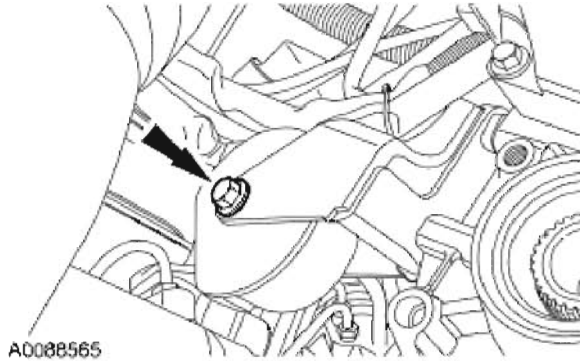
**Fig. 461: Securing Engine To Lift Table Using Special Tool (014-0001, 014-00765)**  
Courtesy of FORD MOTOR CO.

4. Raise the engine and transaxle into the vehicle.
5. Install the bolt in the LH transaxle mount.
  - Tighten to 103 N.m (76 lb-ft).



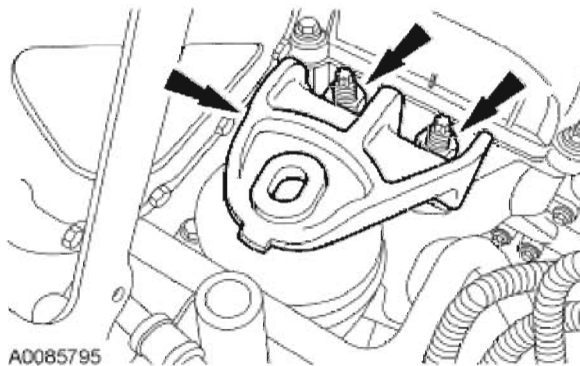
**Fig. 462: Locating Transaxle Mount Bolt**  
Courtesy of FORD MOTOR CO.

6. Install the bolt in the rear transaxle mount.
  - Tighten 115 N.m (85 lb-ft).



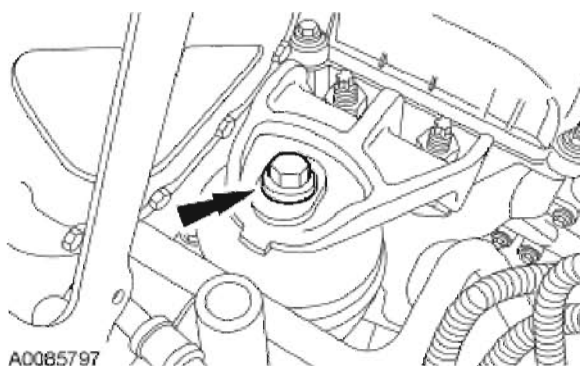
**Fig. 463: Locating Rear Transaxle Mount Bolt**  
Courtesy of FORD MOTOR CO.

7. Install the engine mount bracket and nuts.
  - Tighten 115 N.m (85 lb-ft).



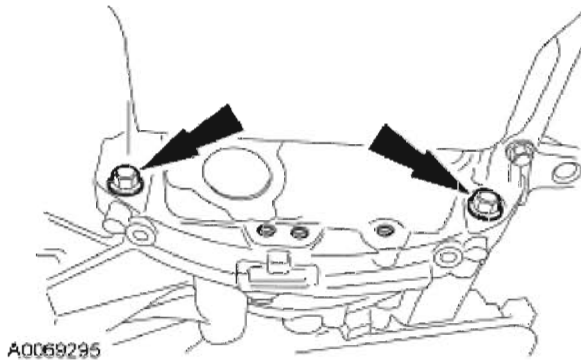
**Fig. 464: Locating Engine Mount Bracket & Nuts**  
Courtesy of FORD MOTOR CO.

8. Install the engine mount bracket bolt.
  - Tighten to 115 N.m (85 lb-ft).



**Fig. 465: Locating Engine Mount Bracket Bolt**  
Courtesy of FORD MOTOR CO.

9. Install the 2 transaxle-to-engine bolts.
  - Tighten to 48 N.m (35 lb-ft).



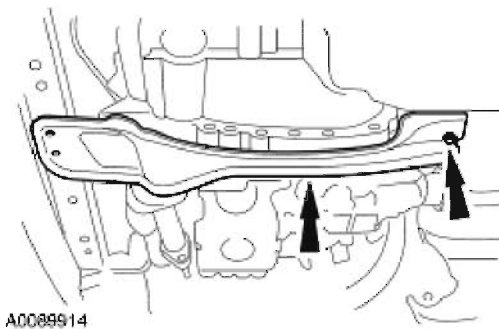
**Fig. 466: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

10. Install the 2 transaxle-to-engine bolts.
  - Tighten to 48 N.m (35 lb-ft).



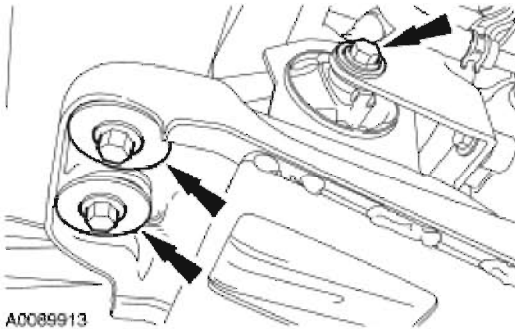
**Fig. 467: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

11. Install the engine support crossmember and new nut.
  - Tighten to 175 N.m (129 lb-ft).



**Fig. 468: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

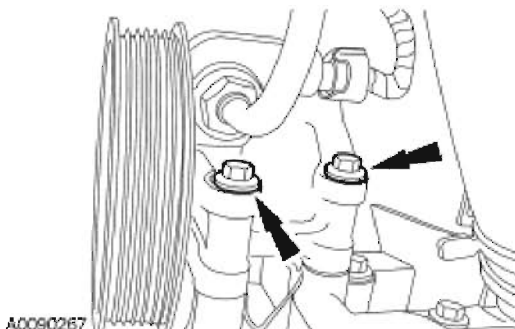
12. Install the 2 bolts for the engine support crossmember and the front roll restrictor bolt.
  - Tighten the engine support crossmember bolts to 90 N.m (66 lb-ft)
  - Tighten the front roll restrictor bolt to 115 N.m (85 lb-ft).



**Fig. 469: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**  
Courtesy of FORD MOTOR CO.

**NOTE:** The bolt under the power steering pressure tube will remain with the power steering pump.

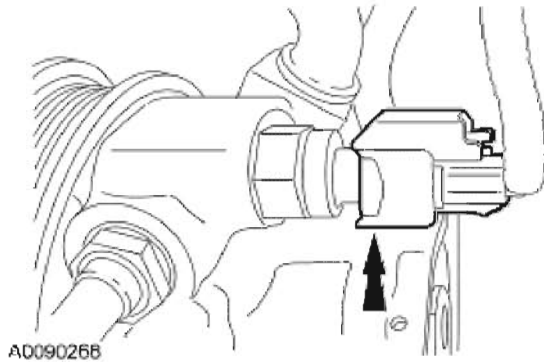
13. Position the power steering pump and install the bolts.
  - Tighten to 25 N.m (18 lb-ft).



**Fig. 470: Identifying Power Steering Pump Bolts**

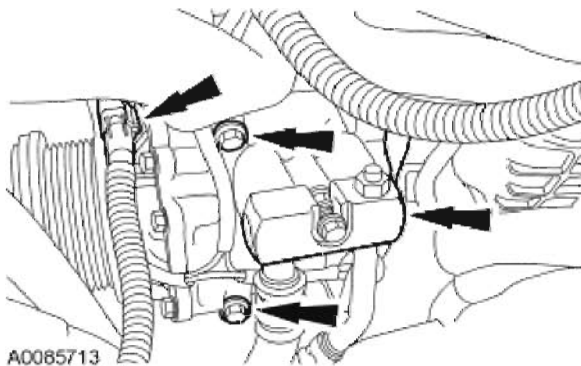
Courtesy of FORD MOTOR CO.

14. Connect the power steering pressure (PSP) sensor electrical connector.



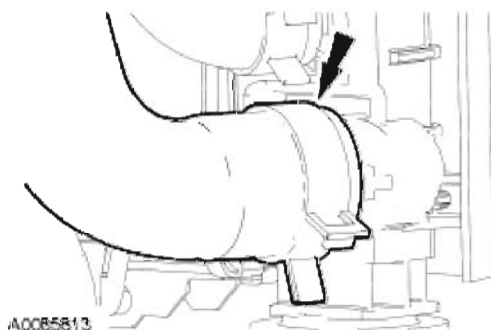
**Fig. 471: Locating Power Steering Pressure (PSP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

15. Install the A/C compressor and connect the A/C compressor electrical connector.
  - Tighten the bolts to 25 N.m (18 lb-ft).



**Fig. 472: Locating A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

16. Connect the lower radiator hose to the radiator.

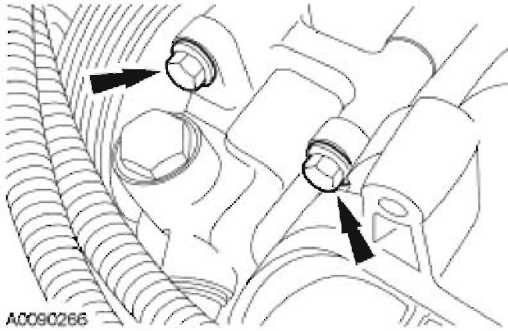


**Fig. 473: Locating Lower Radiator Hose**



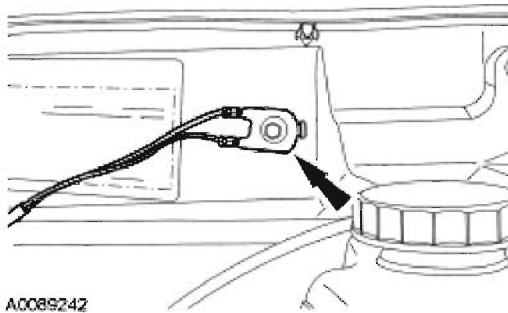
**Courtesy of FORD MOTOR CO.**

17. Install the 2 power steering pump bolts.
  - Tighten to 25 N.m (18 lb-ft).



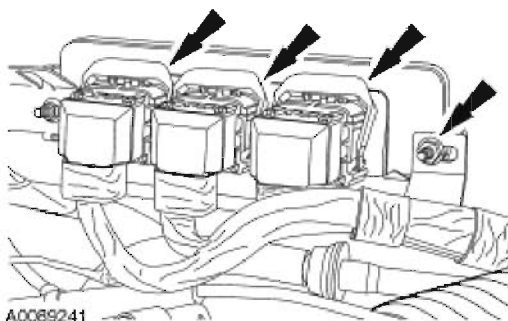
**Fig. 474: Locating Power Steering Pump Bolts**  
**Courtesy of FORD MOTOR CO.**

18. Install the ground wire and bolt.
  - Tighten to 10 N.m (89 lb-in).



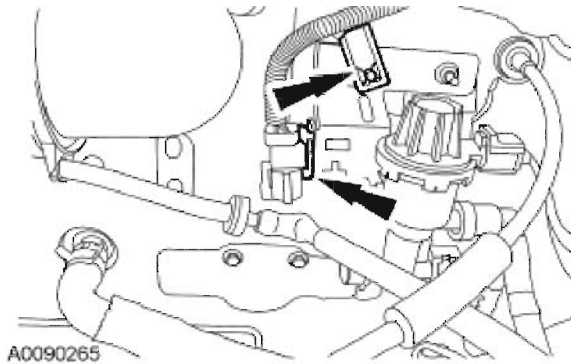
**Fig. 475: Locating Ground Wire & Bolt**  
**Courtesy of FORD MOTOR CO.**

19. Connect the powertrain control module (PCM) electrical connectors. Position the harness and install the nut.
  - Tighten to 8 N.m (71 lb-in).



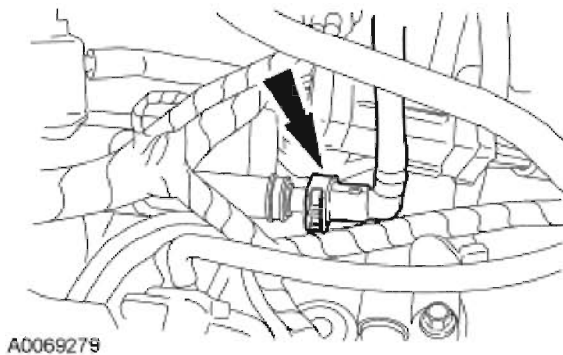
**Fig. 476: Locating Powertrain Control Module (PCM) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

20. Attach the electrical connector retainers.



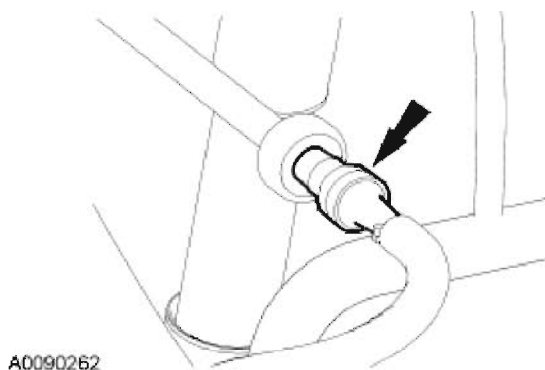
**Fig. 477: Locating Electrical Connector Retainers**  
Courtesy of FORD MOTOR CO.

21. Connect the fuel supply tube.



**Fig. 478: Locating Fuel Supply Tube**  
Courtesy of FORD MOTOR CO.

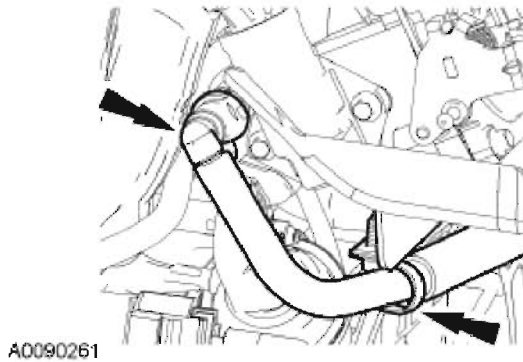
22. Connect the vacuum reservoir tube.



**Fig. 479: Locating Vacuum Reservoir Tube**

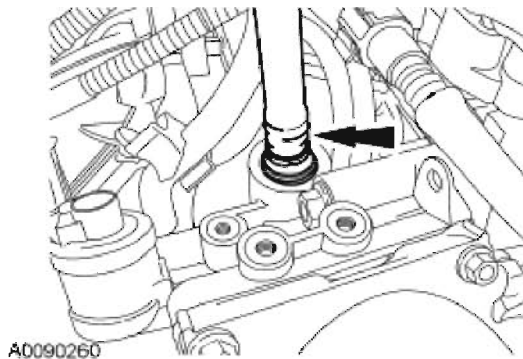
Courtesy of FORD MOTOR CO.

23. Connect the fuel vapor return tube and retainer.



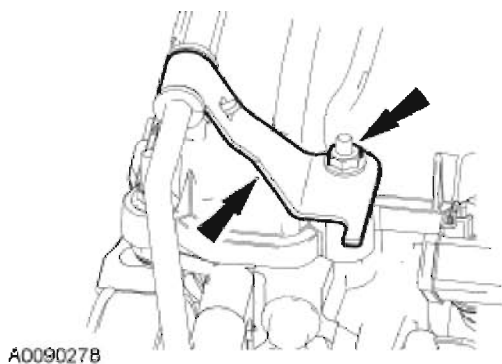
**Fig. 480: Locating Fuel Vapor Return Tube & Retainer**  
Courtesy of FORD MOTOR CO.

24. Connect the vacuum supply tube.



**Fig. 481: Locating Vacuum Supply Tube**  
Courtesy of FORD MOTOR CO.

25. Install the power steering tube, bracket and nut.
- Tighten to 6 N.m (53 lb-in).

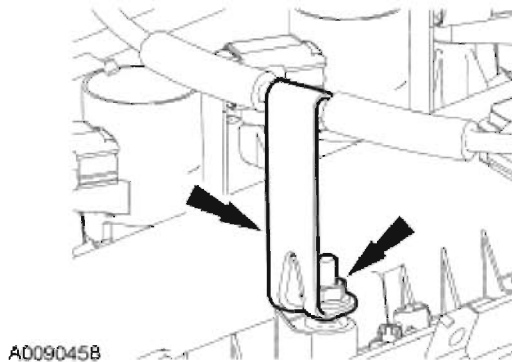


**Fig. 482: Locating Power Steering Tube, Bracket & Nut**

**Courtesy of FORD MOTOR CO.**

26. Position the accelerator control cable and bracket and install the nut.

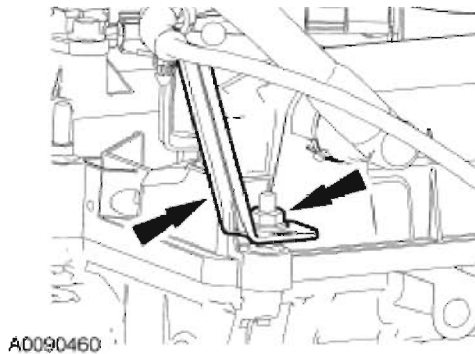
- Tighten to 9 N.m (80 lb-in) (vehicles built through 10/2005).
- Tighten to 5 N.m (44 lb-in) (vehicles built after 10/2005).



**Fig. 483: Locating Accelerator Control Cable & Bracket**  
**Courtesy of FORD MOTOR CO.**

27. Install the accelerator control cable and bracket and nut.

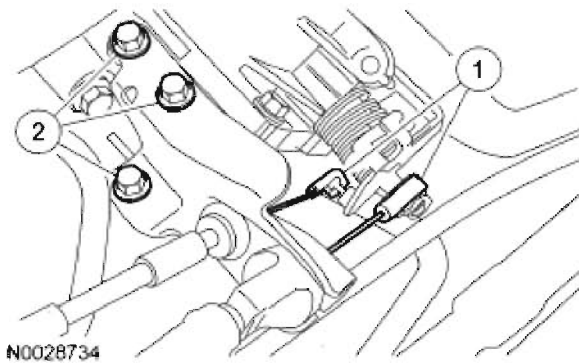
- Tighten to 9 N.m (80 lb-in) (vehicles built through 10/2005).
- Tighten to 5 N.m (44 lb-in) (vehicles built after 10/2005).



**Fig. 484: Locating Accelerator Control Cable, Bracket & Nut**  
**Courtesy of FORD MOTOR CO.**

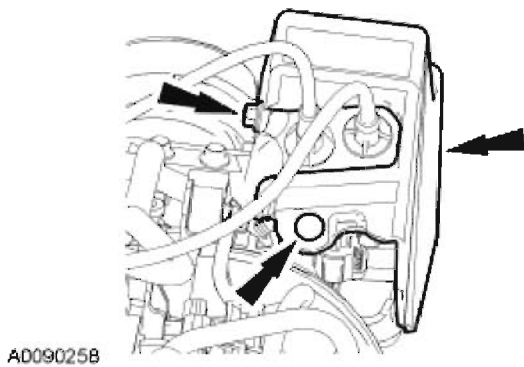
28. Install the accelerator cable and speed control cable (if equipped).

1. Connect the accelerator and speed control cable (if equipped) to the throttle body.
2. Install the accelerator cable bracket and bolts.
  - Tighten to 10 N.m (89 lb-in).



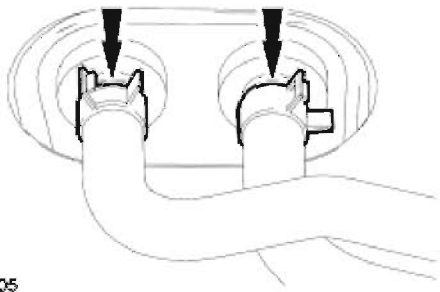
**Fig. 485: Locating Accelerator Cable Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

29. Install the accelerator cable snow shield and retainers.
- Tighten to 10 N.m (89 lb-in).



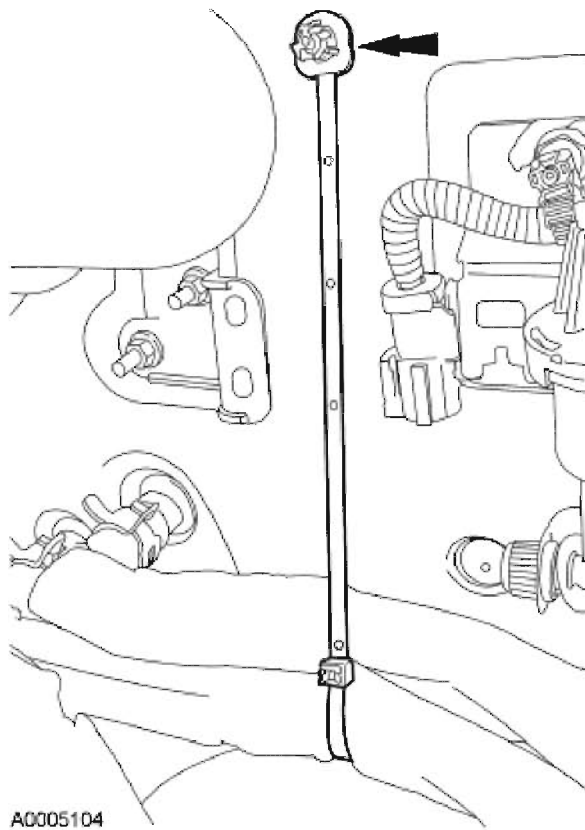
**Fig. 486: Locating Accelerator Cable Snow Shield & Retainers**  
Courtesy of FORD MOTOR CO.

30. Connect the heater hoses to the heater core.



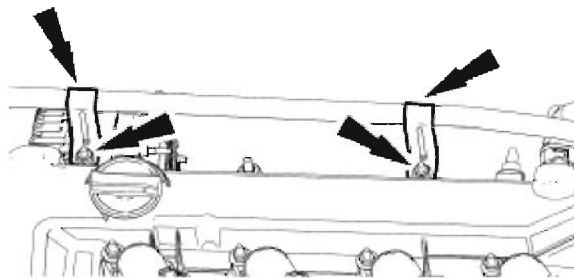
**Fig. 487: Locating Heater Hoses**  
Courtesy of FORD MOTOR CO.

31. Attach the heater hose support strap to the stud.



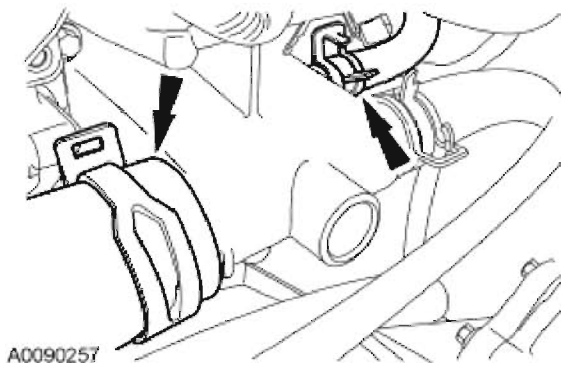
**Fig. 488: Locating Heater Hose Support Strap**  
Courtesy of FORD MOTOR CO.

32. Position the coolant vent hose and install the coolant vent hose brackets and nuts.
- Tighten to 10 N.m (89 lb-in).



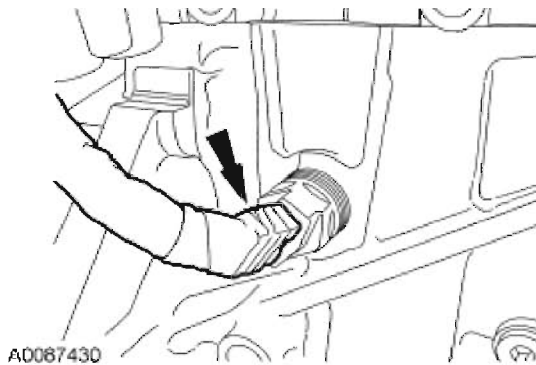
**Fig. 489: Locating Coolant Vent Hose**  
Courtesy of FORD MOTOR CO.

33. Connect the upper radiator and coolant vent hoses.



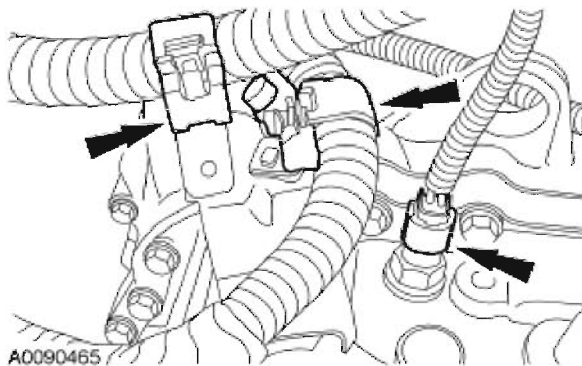
**Fig. 490: Locating Upper Radiator & Coolant Vent Hoses**  
Courtesy of FORD MOTOR CO.

34. If equipped, route the block heater wiring harness and attach all retainers. Connect the block heater electrical connector.



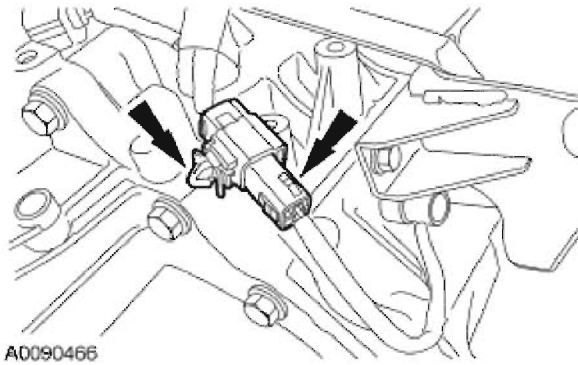
**Fig. 491: Locating Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

35. Connect the reversing lamp indicator switch and attach the wiring harness retainers.



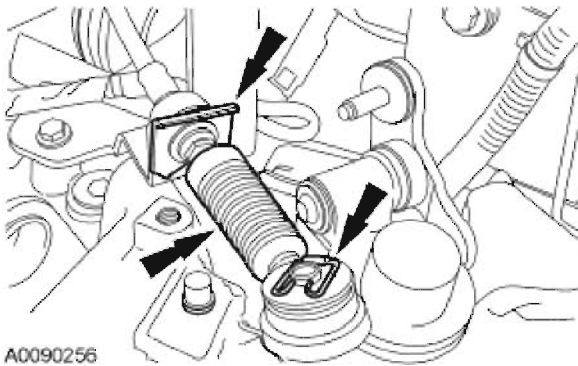
**Fig. 492: Locating Reversing Lamp Indicator Switch & Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

36. Connect the vehicle speed sensor (VSS) electrical connector and pin-type retainer.



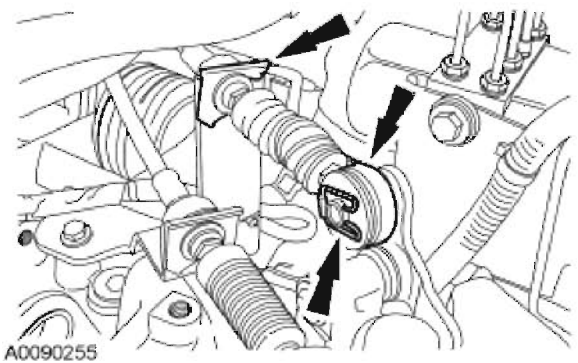
**Fig. 493: Locating Vehicle Speed Sensor (VSS) Electrical Connector**  
Courtesy of FORD MOTOR CO.

37. Connect the transaxle control cable and install the retaining clips.



**Fig. 494: Locating Transaxle Control Cable (1 Of 2)**  
Courtesy of FORD MOTOR CO.

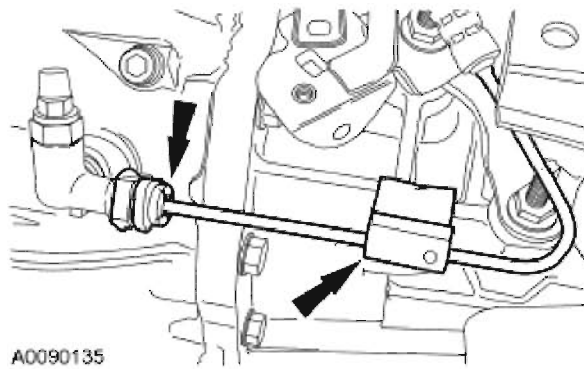
38. Connect the transaxle control cable and install the retaining clips.



**Fig. 495: Locating Transaxle Control Cable (2 Of 2)**  
Courtesy of FORD MOTOR CO.

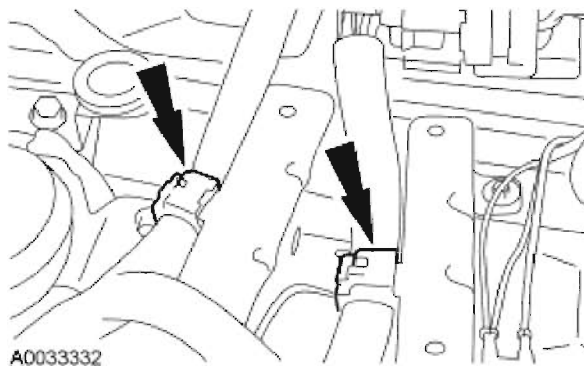
39. Connect the clutch hydraulic tube fitting. Position the clutch hydraulic tube, attach the spring clip and tighten the mounting bolt to 3 Nm (27 lb-in).





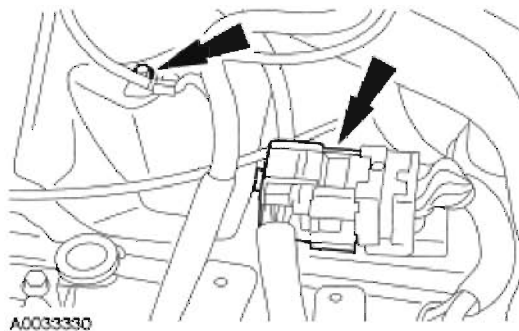
**Fig. 496: Locating Clutch Hydraulic Tube Fitting**  
Courtesy of FORD MOTOR CO.

40. Attach the wiring harness retainers to the battery tray bracket.



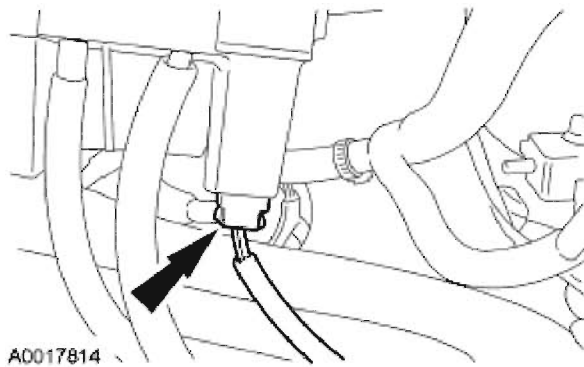
**Fig. 497: Locating Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

41. Connect the 42-pin electrical connector and tighten the bolt. Install the ground strap and bolt.
- Tighten to 10 N.m (89 lb-in).



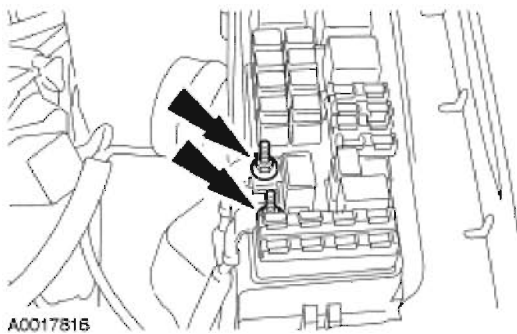
**Fig. 498: Locating Ground Strap & Electrical Connector**  
Courtesy of FORD MOTOR CO.

42. Connect the electrical connector to the power distribution box.



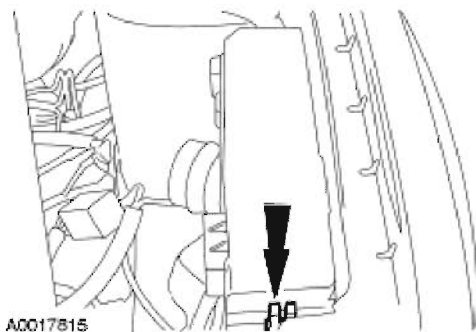
**Fig. 499: Locating Electrical Connector**  
Courtesy of FORD MOTOR CO.

43. Connect the cables and install the nuts.
  - Tighten to 12 N.m (9 lb-ft).



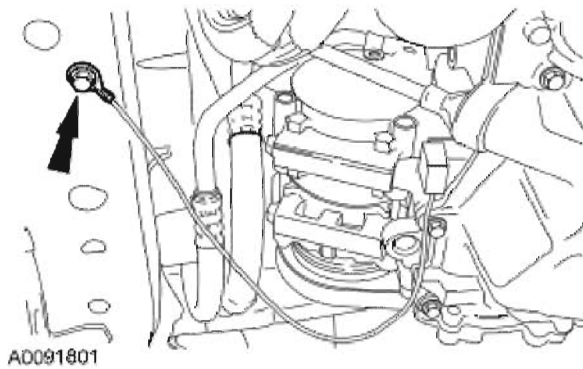
**Fig. 500: Locating Cables & Nuts**  
Courtesy of FORD MOTOR CO.

44. Install the power distribution box cover.



**Fig. 501: Locating Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

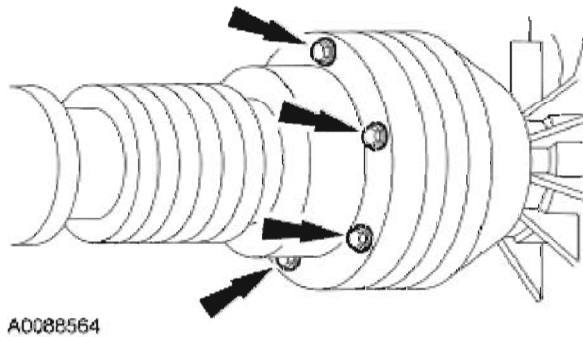
45. If equipped, install the ground eyelet and bolt.
  - Tighten to 10 N.m (89 lb-in).



**Fig. 502: Locating Ground Eyelet & Bolt**  
Courtesy of FORD MOTOR CO.

**All wheel drive (AWD) vehicles**

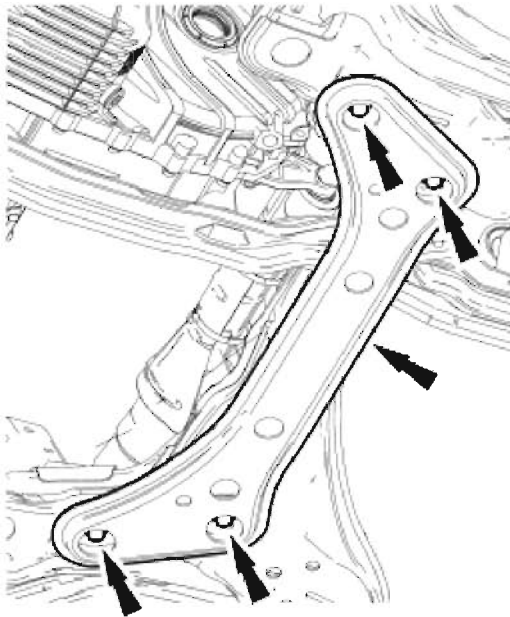
46. Install the driveshaft and bolts.
  - Tighten to 20 N.m (15 lb-ft).



**Fig. 503: Locating Driveshaft & Bolts**  
Courtesy of FORD MOTOR CO.

**All vehicles**

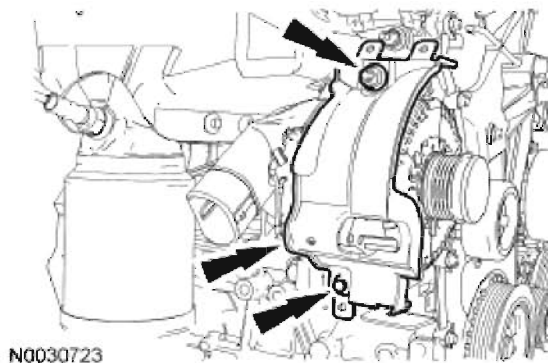
47. Install the front drive intermediate halfshaft. For additional information, refer to **INSTALLATION**.
48. Install the LH front drive halfshaft. For additional information, refer to **INSTALLATION**.
49. Install the lateral support crossmember and bolts.
  - Tighten to 115 N.m (85 lb-ft).



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**Fig. 504: Identifying Lateral Support Crossmember And Bolts**  
Courtesy of FORD MOTOR CO.

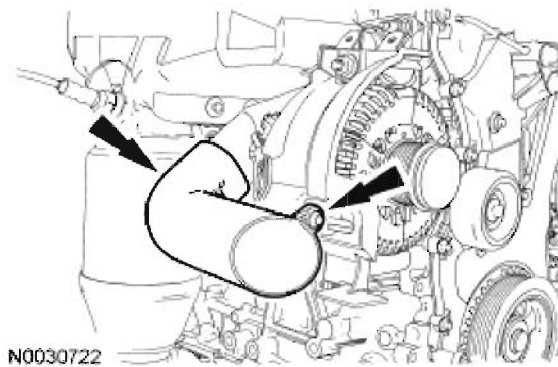
50. Install the generator shield and the nut and the pin-type retainer and attach the wire retainers.
- Tighten to 20 N.m (15 lb-ft).



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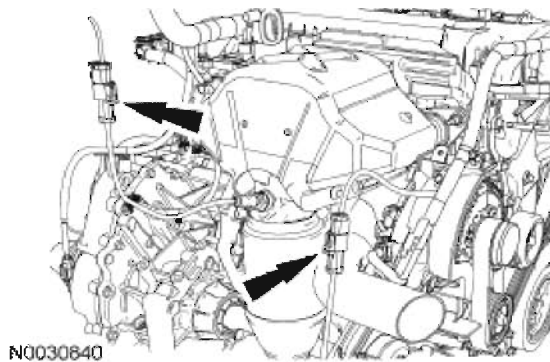
**Fig. 505: Locating Generator Shield & Nut**  
Courtesy of FORD MOTOR CO.

51. Install the lower air duct and install the bolt.
- Tighten to 4 N.m (35 lb-in).



**Fig. 506: Locating Lower Air Duct**  
Courtesy of FORD MOTOR CO.

52. Install the accessory drive belt tensioner. For additional information, refer to **REMOVAL AND INSTALLATION** .
53. Connect the heated oxygen sensor (HO2S) and the catalyst monitor sensor electrical connectors.



**Fig. 507: Locating Heated Oxygen Sensor (HO2S) & Catalyst Monitor Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

54. Install the exhaust flex pipe. For additional information, refer to **REMOVAL AND INSTALLATION** .
55. Install the starter. For additional information, refer to **STARTING SYSTEM** .
56. Install the battery tray and battery. For additional information, refer to **REMOVAL AND INSTALLATION - BATTERY TRAY** and **REMOVAL AND INSTALLATION - BATTERY** .
57. Install the engine air cleaner and air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION - AIR CLEANER** and **REMOVAL AND INSTALLATION - AIR CLEANER OUTLET PIPE** .
58. Fill the engine with clean engine oil.
59. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

## 2006 Ford Escape

2006 ENGINE Engine - 2.3L - Escape & Mariner

60. Bleed the clutch system. For additional information, refer to **CLUTCH SYSTEM BLEEDING** .

**2004 Ford Escape**

2004 ENGINE Engine - 3.0L (4V) - Escape

**2004 ENGINE****Engine - 3.0L (4V) - Escape****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
<b>Lubricants and Sealants</b>	
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A221 -A	ESE-M1C171 -A
<b>Engine</b>	
Displacement	3.0L (4V) (182 CID)
No. cylinder	6
Bore/stroke	89.0 x 79.5 (3.5 x 3.13 in)
Fire order	1-4-2-5-3-6
Oil pressure (Minimum at 1,500 RPM with engine warmed up after 10 minutes of idling.)	76 kPa (11 psi)
Spark plug	AWSF-32F (F35E-12405-EA) Gap = 1.30-1.40 (.052-0.56 inch)
<b>Cylinder Head/Valve Train</b>	
Cylinder head flatness	(1)
Combustion chamber volume	52 cc (3.17 CI)
Valve seat width - intake	1.1-1.4 mm (0.043-0.055 in)
Valve seat width - exhaust	1.4-1.7 mm (0.055-0.066 in)
Valve seat angle	44.75 degrees
Valve seat runout (T.I.R.)	0.04 mm (0.001 in)
<b>VALVE ARRANGEMENT (FRONT TO REAR)</b>	
LH intake	S-P-S-P-S-P
LH exhaust	E-E-E-E-E-E
RH intake	P-S-P-S-P-S
RH exhaust	E-E-E-E-E-E
Valve stem guide clearance Intake	0.020-0.069 mm (0.0007-0.0027 in)

**2004 Ford Escape**

2004 ENGINE Engine - 3.0L (4V) - Escape

Exhaust	0.045-0.094 mm (0.0017-0.037 in)
Valve head diameter Intake	35 mm (1.38 in)
Exhaust	30 mm (1.18 in)
Gauge diameter	31 and 24.5 mm (1.22 and 0.96 in)
Valve face runout (limit)	0.05 mm (0.001 in)
Valve face angle	45.5 degrees
Valve stem diameter (std) Intake	5.975-5.995 mm (0.2350-0.2358 in)
Exhaust	5.950-5.970 mm (0.2343-0.2350 in)
Valve spring compression pressure Intake (n @ spec. length)	680 N @ 30.19 mm (153 lbs @ 1.18 in)
Exhaust (n @ spec. length)	680 N @ 30.19 mm (153 lbs @ 1.18 in)
Valve spring free length (approximate) Intake	46.8 mm (1.84 in)
Exhaust	46.8 mm (1.84 in)
Valve spring installed pressure (n @ spec. length) Intake	228 N @ 39.99 mm (51 lbs @ 1.57 in)
Exhaust	228 N @ 39.99 mm (51 lbs @ 1.57 in)
Valve springs installed pressure (n @ spec. length - service limit)	10% Pressure loss @ 30.09
Valve springs - out of square limit	1%
Roller follower ratio	1.8:1
<b>Hydraulic Valve Tappet</b>	
Diameter (std)	16-15.988 mm (0.6290-0.6294 in)
Clearance to bore	0.018-0.069 mm (0.0007-0.0027 in)
Service limit	0.016 mm (0.0006 in)
Hydraulic leakdown rate <sup>(2)</sup>	5-25 seconds
Collapsed valve tappet gap-desired	0.50-1.11 mm (0.019-0.043 in)
<b>Camshaft</b>	
Lobe lift Intake (primary)	4.79 mm (0.188 in)
Intake (secondary)	4.79 mm (0.188 in)
Exhaust	4.79 mm (0.188 inch)
Lobe lift - allowable lift loss	0.76 mm (0.03 in)
Valve lift @ zero lash Intake (primary)	9.80 mm (0.388 in)
Intake (secondary)	9.80 mm (0.388 in)
Exhaust	9.80 mm (0.388 inch)
Camshaft end play	0.027-0.190 mm
Standard	0.025-0.165 mm (0.001-0.0064 in)
Service limit	0.190 mm (0.00748 in)
Journal-to-bearing clearance Standard	0.025-0.076 mm (0.001-0.0029 in)



## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Service limit	0.121 mm (0.0047 in)
Journal diameters (all)	26.962-26.936 mm (1.061 -1.060 in)
Journal inside diameter (cap assembled)	27.012-26.987 mm
Bearing inside diameter (all)	27.012-26.987 mm (1.063 -1.062 in)
<b>Cylinder Block</b>	
Head gasket surface flatness	0.50 mm (0.02 in) for 150 x 150 mm (5 x 5 in) area 0.25 mm (0.01 in) for 25 x 25 mm (1 x 1 in) area 0.120 mm (0.005 in) overall
Head gasket thickness	1.0 mm (0.40 in)
Main bearing bore diameter	67.998-68.022 mm (2.677-2.6780 in)
Cylinder bore	
Diameter	(3)
Out-of-round limit	0.015 mm (.0005 in)
Out-of-round service limit	0.020 mm (.0007 in)
Taper service limit	0.020 mm (0.0008 in)
<b>Crankshaft</b>	
Main bearing journal diameter	62.968-62.992 mm (2.479-2.480 in)
Connecting rod journal diameter	49.970-49.990 mm (1.967 -1.968 in)
Crankshaft free end play	0.110-0.232 mm (.004-.009 in)
Crankshaft runout to rear face of cylinder block	0.050 mm (in) max (0.001 in)
Connecting rod bearings Clearance to crankshaft	0.028-0.066 mm (0.001-0.0025 in)
Bearing wall thickness (std) <sup>(4)</sup>	1.503 mm (.059 in)
Main bearings Clearance to crankshaft - desired	0.025-0.045 mm (0.0009-0.0017 in)
Clearance to crankshaft-allowable 0.025-0.050 mm	(0.0009-0.0019 in)
Bearing wall thickness - grade 1	2.497 mm (0.0983 in)
Bearing wall thickness - grade 2	2.501 mm (0.0985 in)
Bearing wall thickness - grade 3	2.505 mm (0.0986 in)
<b>Connecting Rod</b>	
Piston pin bore diameter	21.017-21.031 mm (0.827 -0.828 in)
Crankshaft bearing bore diameter	53.015-53.035 mm (2.0872-2.0879 in)
Length (center to center)	138.06-138.14 mm (5.435-5.438 in)
Alignment (bore to bore max difference) <sup>(5)</sup> Twist	0.050 mm per 25 (0.0019 per 0.984 in)
Bend	0.038 mm per 25 (0.0014 per 0.984 in)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Side clearance (assembled to crank) Standard	0.100-0.30 mm (0.0039-0.0118 in)
Service limit	0.35 mm (0.0013in) max
<b>Piston</b>	
Piston diameter	(6)
Coated grade 1	88.990-89.010 mm (3.5035-3.5043 in)
Coated grade 2	88.998-89.022 mm (3.5039-3.5048 in)
Coated grade 3	89.010-89.030 mm (3.5043-3.5051 in)
Uncoated grade 1	88.970-88.980 mm (3.50275-3.50314 in)
Uncoated grade 2	88.978-88.992 mm (3.50306-3.50362 in)
Uncoated grade 3	89.010-89.030 mm (3.50432-3.50511 in)
Piston-to-bore clearance	0.012 to 0.022 mm (0.0005-0.0009 in)
Pin bore diameter (piston)	21.008-21.012 mm (0.8270-0.8272 in)
Ring groove width Compression (top)	1.230-1.245 mm (0.0484-0.0490 in)
Compression (bottom)	1.530-1.545 mm (0.0602-0.0608 in)
Oil ring	3.030-3.055 mm (0.1192-0.1203 in)
Piston pin Length	60.51 -60.08 mm (2.382-2.365 in)
Diameter	21.011-21.013 mm (0.0013 in)
Pin-to-piston clearance	-0.005 to +0.001 mm (0.0001 -0.00003 in)
Pin-to-rod clearance Standard	0.004-0.020 mm (0.0001 -0.0007 in)
Service limit	0.035 mm (0.0013 in)
<b>Piston Ring-To-Groove Clearance</b>	
Compression (top)	0.040-0.075 mm (0.0015-0.0029 in)
Compression (bottom)	0.040-0.085 mm (0.0015-0.0033 in)
Oil ring	Snug Fit
Piston ring gap <sup>(7)</sup> Compression (top) - gauge diameter	0.100-0.250 mm (0.0039-0.0098 in)
Compression (bottom) - gauge diameter	0.27-0.42 mm (0.0106-0.0165 in)
Oil ring (steel rail) - gauge diameter	0.15-0.65 mm (0.0059-0.0255 in)
Compression (top) - service limit	0.50 mm (0.0196 in) max
Compression (bottom) - service limit	0.65 mm (0.0255 in) max
Oil ring (steel rail) - service limit	0.90 mm (0.0354 in) max
<b>Lubrication System</b>	
Oil capacity <sup>(8)</sup>	5.5 Quarts 5.2 Liters
<b>Drive Belt Tension</b>	
Note: Drive belts have different tension specifications depending on whether they are newly installed	(9)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Drive belt type 6 rib front end accessory drive

Automatic Tensioners

- (1) Refer to the procedure for specifications.
- (2) Time required for plunger to leak down 1.6 mm of travel with 222 N force and leak down fluid in tappet.
- (3) Cylinder Bore Diameter Grade 1: 89.000-89.010 mm (3.50393-3.504323 inch)  
Grade 2: 89.010-89.020 mm (3.504323-3.504717 inch) Grade 3: 89.020-82.030 mm (3.504717-3.50511 inch)
- (4) 0.250 mm Undersize - Add 0.125 mm to standard or grade 2 thickness.
- (5) Pin bore and crank bearing bore must be parallel and in same vertical plane within the specified total difference when measured at the ends of a 203 mm bar, 101.5 mm on each side of rod centerline.
- (6) Measured at 50 mm (1.9685 inch) from outer perimeter top of piston to the pin axis.
- (7) Specification 82.4 mm (3.2441 inch) diameter gauge.
- (8) With filter change.
- (9) Newly installed refers to the condition of the "new" drive belt before the engine has made no more than one rotation and before the drive belt has had a chance to stretch or seat into the pulley grooves.

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
A/C compressor bolts	25	18	-
A/C compressor bracket bolts	(1)	-	-
A/C line nut	8	-	71
A/C to water pump bracket bolts	25	18	-
Accessory drive belt tensioner bolt	25	18	-
Camshaft cap bolts	10	-	89

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Camshaft oil seal retainer bolts	10	-	89
Camshaft position sensor bolt	10	-	89
Cooler tube bracket bolt	28	18	-
Crankshaft damper bolt	(1)	-	-
Crankshaft position sensor bolt	10	-	89
Crankshaft pulley	(1)	-	-
Crankshaft pulley bracket nuts	25	18	-
Cylinder head bolts	(1)	-	-
Exhaust gas recirculation (EGR) tube nuts	40	30	-
EGR valve bolts	25	18	-
EGR valve nuts	(1)	-	-
Engine front cover bolts and studs	(1)	-	-
EGR vacuum regulator tube nuts	6	-	53
Exhaust bracket nut	40	30	-
Flexplate bolts	80	59	-
Ball joint nuts	80	59	-
Front splash shield bolts	7	-	62
Fuel charging harness nut	6	-	53
Fuel rail bolts	10	-	89
Generator bolts and studs	48	35	-
Ground strap bolt	15	11	-
Halfshaft nuts	258	191	-
Halfshaft bracket bolts	48	35	-
Heater hose bracket nuts	7	-	62
Ignition coil-on-plug bolts	6	-	53
LH engine support insulator bolts	70	52	-
LH engine support insulator nut	90	66	-
LH exhaust manifold nuts	20	15	-
Lower cylinder block bolts and studs	(1)	-	-
Water pump belt cover	6	-	53
Lower intake manifold bolts	10	-	89
Motor mount bracket bolts/nuts	103	76	-
Oil level indicator and tube stud	10	-	89
Oil pan baffle nuts	(1)	-	-
Oil pan bolts and studs	25	18	-
Oil pan to transaxle bolts	40	30	-

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Oil pressure sensor	14	10	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube bolts	A	-	-
Oil separator bolts	10	-	89
Outer tie rod end nuts	55	41	-
Power steering pump bolts	25	18	-
Power steering pressure tube bracket nut	10	-	89
Power steering pressure tube nut	37	27	-
Powertrain control module (PCM) electrical connector bolt	6	-	53
Power distribution box cable nuts	12	9	-
Radiator fan bolt	10	-	89
RH engine support insulator nut	90	66	-
RH engine support insulator through bolt and nut	120	89	-
RH exhaust manifold nuts	20	15	-
RH radio ignition interference capacitor nut	10	-	89
Shifter cable nut	17	13	-
Starter motor ground cable bolt	25	18	-
Starter cable positive nut	12	9	-
Steering shaft pinch bolt	40	30	-
Strut to knuckle bolts	115	85	-
Subframe bolts	200	148	-
Subframe nuts	150	111	-
Transaxle mount bolts	55	41	-
Transaxle mount through bolt	90	66	-
Sway bar end link nuts	48	35	-
Throttle body bolt and stud	10	-	89
Timing chain guide bolts	25	18	-
Timing chain tensioner bolts	25	18	-
Torque converter-to-flexplate nuts	40	30	-
Transaxle-to-oil pan bracket bolt	25	18	-
Transaxle to oil pan bracket nuts	10	-	89
Upper intake manifold bolts	10	-	89
Valve cover bolts and studs	10	-	89
Water pump bolts	25	18	-
Wire harness bolt	5	-	44
Y-pipe nuts	40	30	-
Y-pipe-to-exhaust manifold nuts	40	30	-

(1) Multiple step sequence. See procedure.

## DESCRIPTION AND OPERATION

### ENGINE

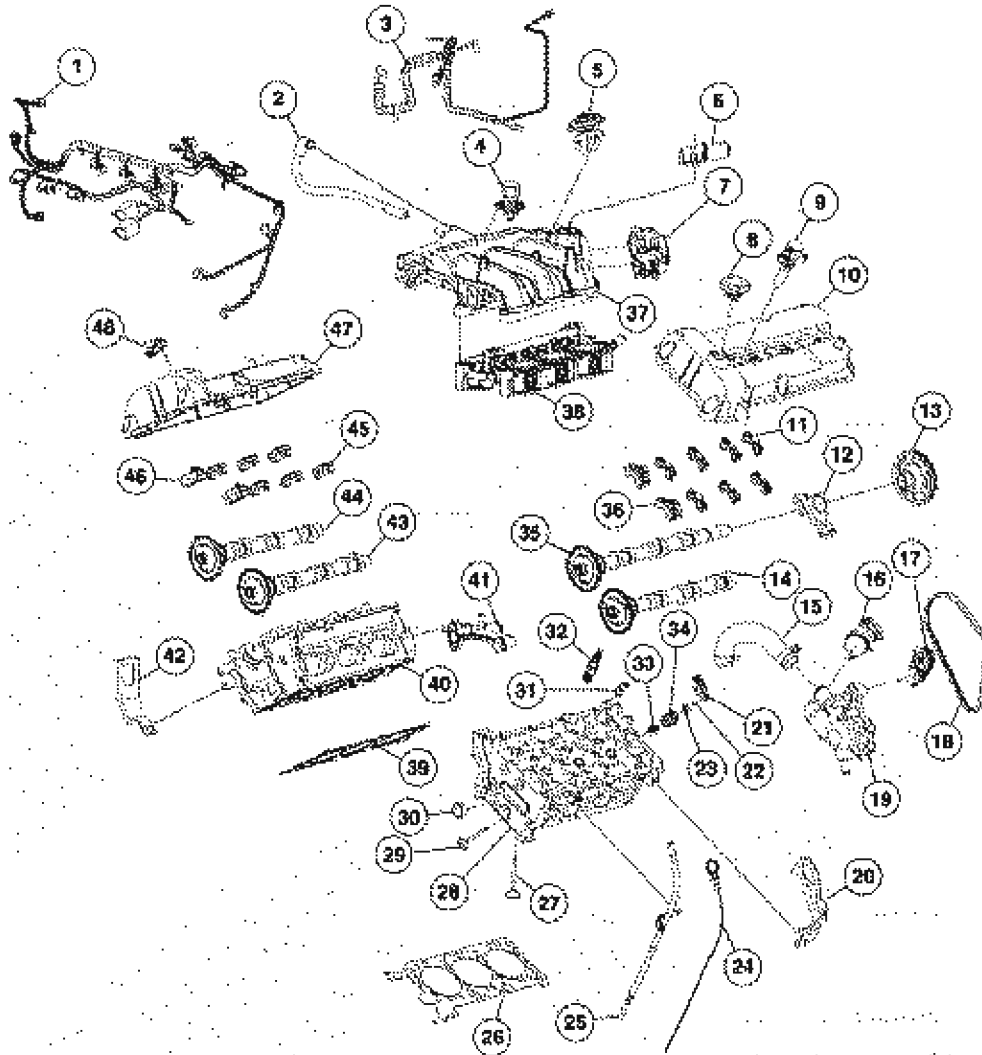
The 3.0L Duratec is a four-valve-per-cylinder, dual overhead camshaft engine. The engine uses a distributorless ignition system with a separate coil located above each spark plug. The cylinder block is a two-piece design with the upper portion housing the cylinders, and a separate lower cylinder block containing the main bearing caps. Both sections are made of aluminum, with inserts for the bearing areas and caps. An aluminum oil pan bolts to the bottom of the lower cylinder block and to the transaxle to provide greater strength.

The camshafts are mounted in the cylinder heads and act against a roller follower to open and close the valves. A hydraulic lash adjuster is located on one side of the roller follower and the valve tip on the opposite end. The camshafts are driven off the front of each cylinder head by two chains (one each side). Both of the chains are driven by a single sprocket that is located on the crankshaft, just in front of the oil pump.

### Upper Engine Components

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



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**Fig. 1: Identifying Upper Engine Components**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Part Number	Description
1	9H589	Engine control sensor and fuel charging wiring harness
2	6C658	Evaporative emissions tube
3	9E498	Vacuum harness
4	9J472	Exhaust gas recirculation (EGR) vacuum regulator
5	9D460	EGR valve
6	9F715	Idle air control (IAC) valve
7	9E926	Throttle body
8	6766	Oil fill cap
9	12A366	Coil-on-plug
10	6A505	Valve cover
11	6A258	Camshaft journal caps
12	6B293	Camshaft oil seal retainer
13	6A359	Pulley
14	6A269	Exhaust camshaft
15	8A577	Water pump outlet hose
16	8501	Water pump inlet hose
17	8W608	Belt tensioner (if equipped)
18	8K543	Belt
19	8501	Water pump
20	17A084	Lifting bracket
21	8529	Camshaft follower
22	6518	Valve spring retainer key
23	6514	Valve spring retainer
24	6750	Oil level indicator
25	6754	Oil level indicator tube
26	6083	Cylinder head gasket
27	6507	Exhaust valve
28	6050	LH cylinder head
29	6505	Intake valve
30	W701501	Cup plug
31	6C501	Hydraulic lash adjuster
32	12405	Spark plug
33	6A517	Valve stem seal
34	6513	Valve spring
35	6A267	Intake camshaft
36	6B280	Camshaft bearing thrust cap
37	9424	Upper intake manifold
38	9J447	Lower intake manifold
39	6051	Head gasket
40	6049	RH cylinder head
41	8548	Thermostat housing
42	17A084	Lifting bracket
43	6A266	Intake camshaft
44	6A266	Exhaust camshaft
45	6A258	Camshaft journal cap
46	6B280	Camshaft bearing thrust cap
47	6582	Valve cover
48	18801	Radio ignition interference capacitor

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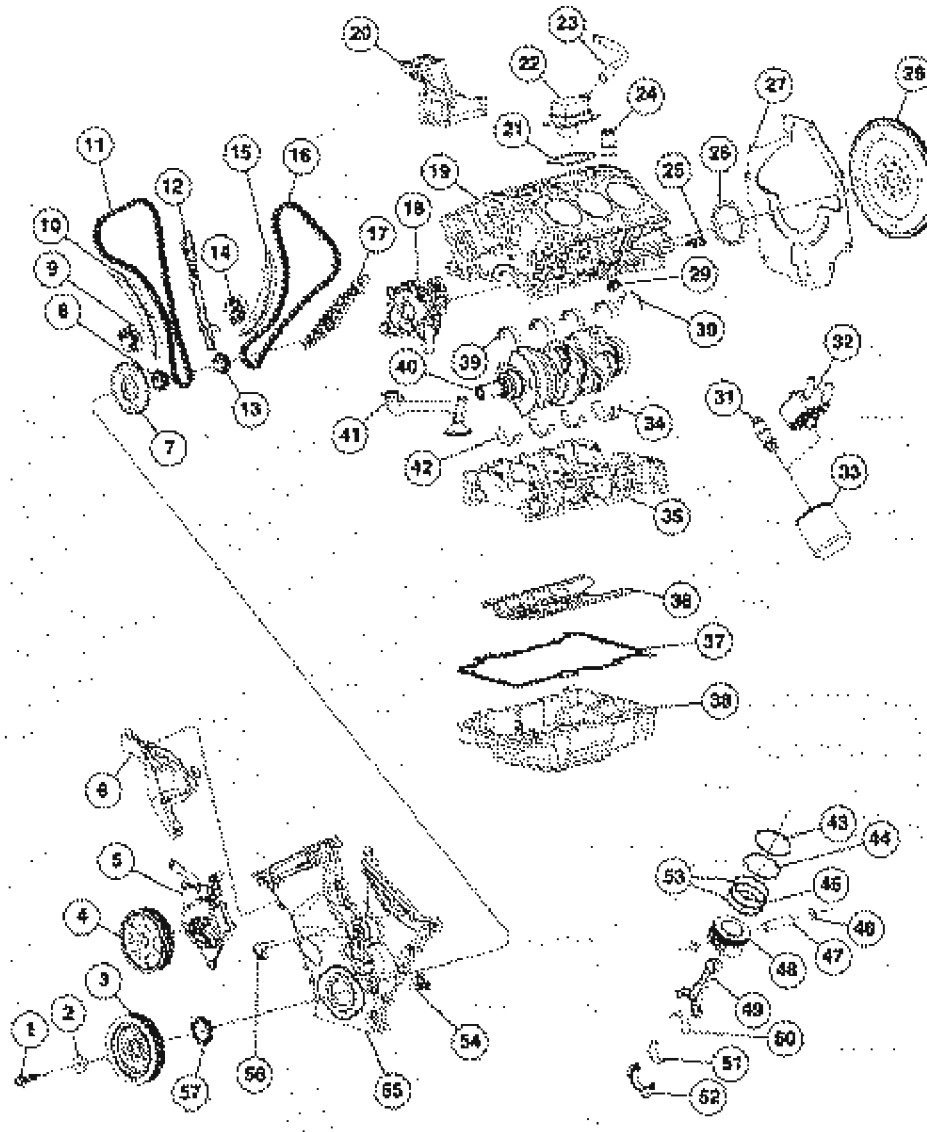
**Fig. 2: Upper Engine Component Description Table**  
Courtesy of FORD MOTOR CO.

#### Lower Engine Components



## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



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**Fig. 3: Identifying Lower Engine Components**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Part Number	Description
1	W701512	Crankshaft vibration damper bolt
2	W701511	Crankshaft vibration damper washer
3	6316	Crankshaft vibration damper
4	3A733	Power steering pump pulley
5	3D639	Power steering pump
6	10239	Generator bracket
7	12A227	Ignition pulse wheel
8	6306	Crankshaft sprocket
9	6L266	R/H timing chain tensioner
10	6K255	R/H timing chain guide
11	6268	R/H timing chain
12	6M256	R/H timing chain guide
13	6306	Crankshaft sprocket
14	6L266	L/H timing chain tensioner
15	6K255	L/H timing chain guide
16	6268	L/H timing chain
17	6B274	L/H timing chain guide
18	6621	Oil pump
19	6010	Engine block
20	3K738	Bracket
21	6B752	Oil separator gasket
22	6B673	Oil separator
23	6K817	Crankcase emission hose
24	8A505	Water inlet tube
25	9278	Oil pressure switch
26	6701	Crankshaft rear oil seal
27	6A373	Engine separator plate
28	6375	Flywheel
29	W701548	Plug
30	6A341	Crankshaft thrust washer
31	6890	Oil filter insert
32	6A642	Oil cooler
33	6714	Oil filter
34	6A339	Crankshaft thrust bearing
35	6F095	Lower cylinder block
36	6687	Oil pan baffle
37	6710	Oil pan gasket
38	6675	Oil pan
39	6333	Crankshaft main bearings
40	6303	Crankshaft
41	6622	Oil pickup tube and screen
42	6A338	Crankshaft main bearings
43	6150	Upper compression ring
44	6152	Lower compression ring
45	6161	Oil control ring spacer
46	6140	Piston pin clip
47	6135	Piston clip
48	6110	Piston
49	6200	Connecting rod
50	6211	Connecting rod bearings
51	6211	Connecting rod bearings
52	6205	Connecting rod bearing cap
53	6159	Oil control rings
54	6C315	Crankshaft position sensor
55	6019	Front cover
56	6B288	Camshaft position sensor
57	6700	Crankshaft front seal

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**Fig. 4: Lower Engine Component Description Table**  
Courtesy of FORD MOTOR CO.

## DIAGNOSIS AND TESTING

### ENGINE

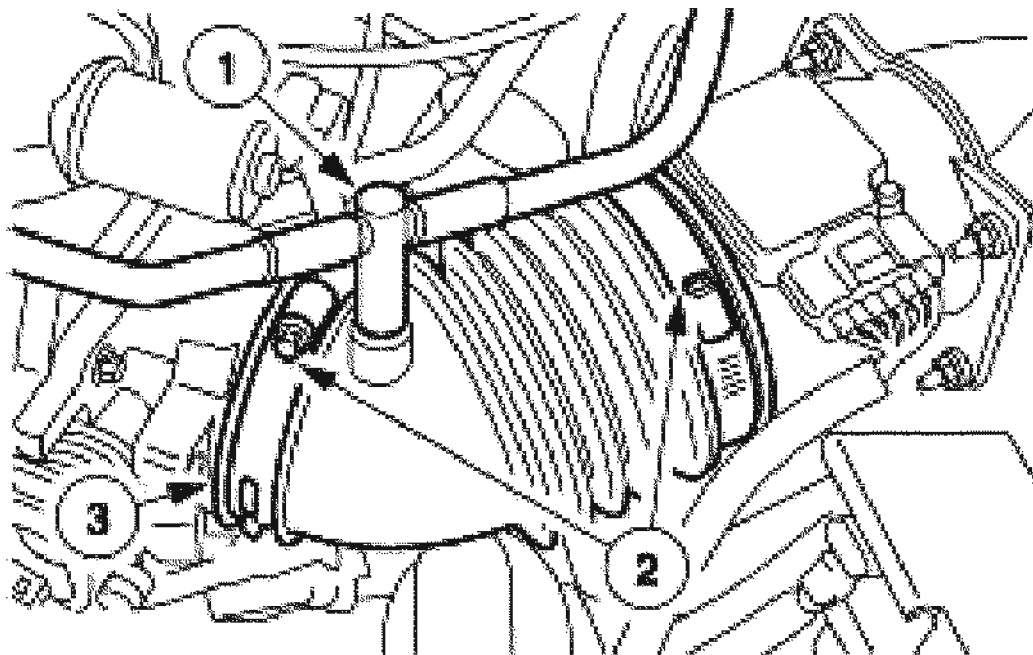
Refer to **ENGINE SYSTEM-GENERAL INFORMATION** for basic mechanical concerns. Refer to the appropriate **INTRODUCTION - CNG, FLEX-FUEL & GASOLINE** article for driveability concerns.

## IN-VEHICLE REPAIR

### UPPER INTAKE MANIFOLD

#### Removal

1. Remove the air cleaner outlet tube.
  1. Remove the crankcase ventilation tube.
  2. Loosen the clamps.
  3. Remove the air cleaner outlet tube.

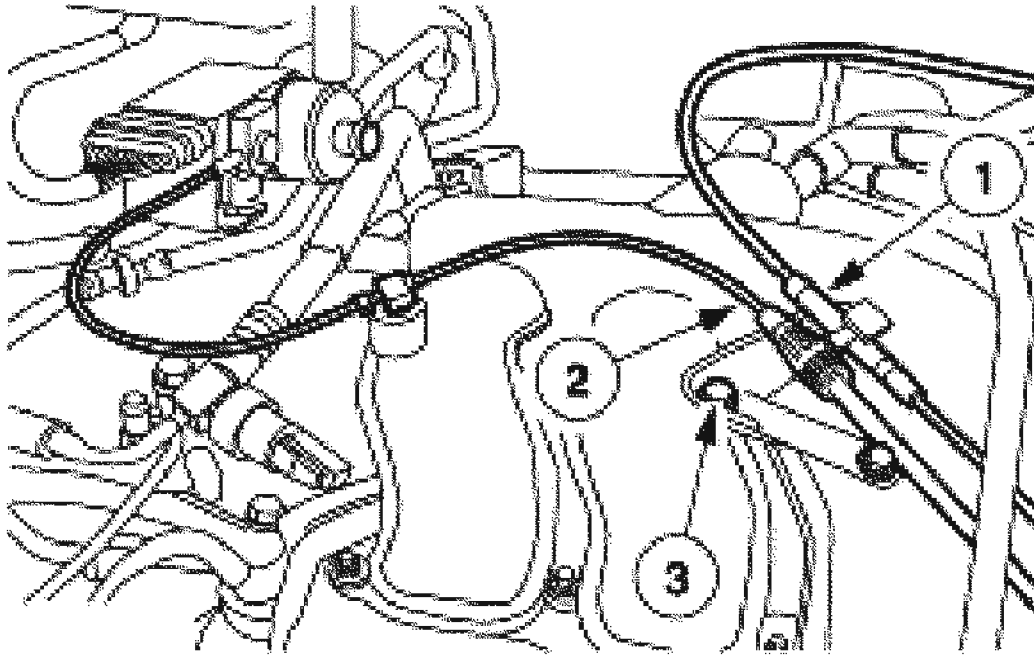


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**Fig. 5: Removing Air Cleaner Outlet Tube**  
Courtesy of FORD MOTOR CO.

2. Disconnect the cables.
  1. Disconnect the throttle cable.
  2. If equipped, disconnect the speed control cable.

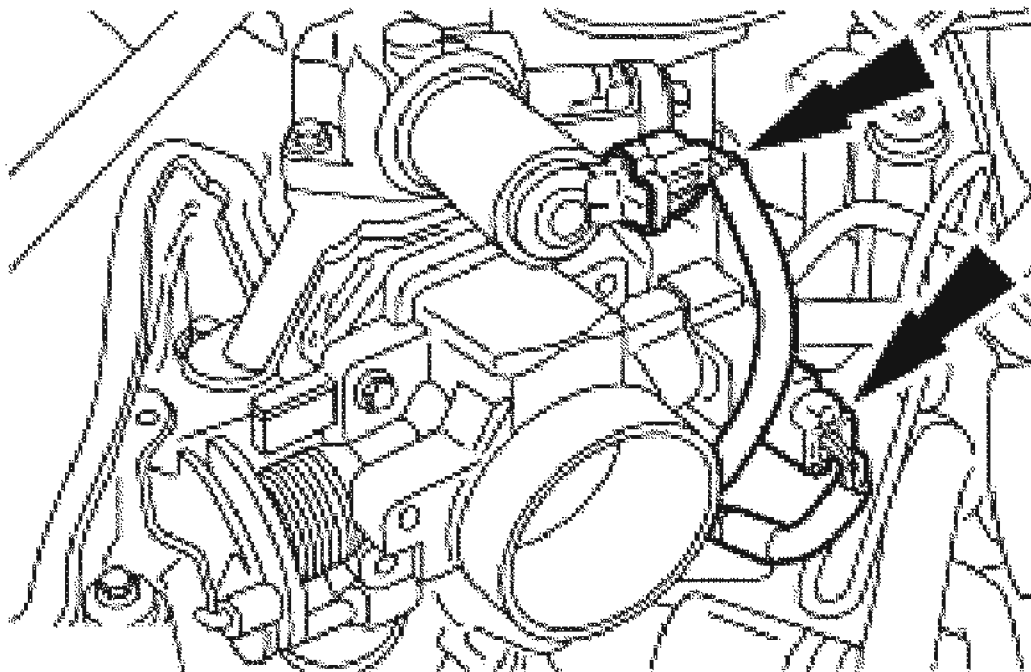
3. Remove the throttle cable bracket bolts.



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**Fig. 6: Disconnecting Cables**  
Courtesy of FORD MOTOR CO.

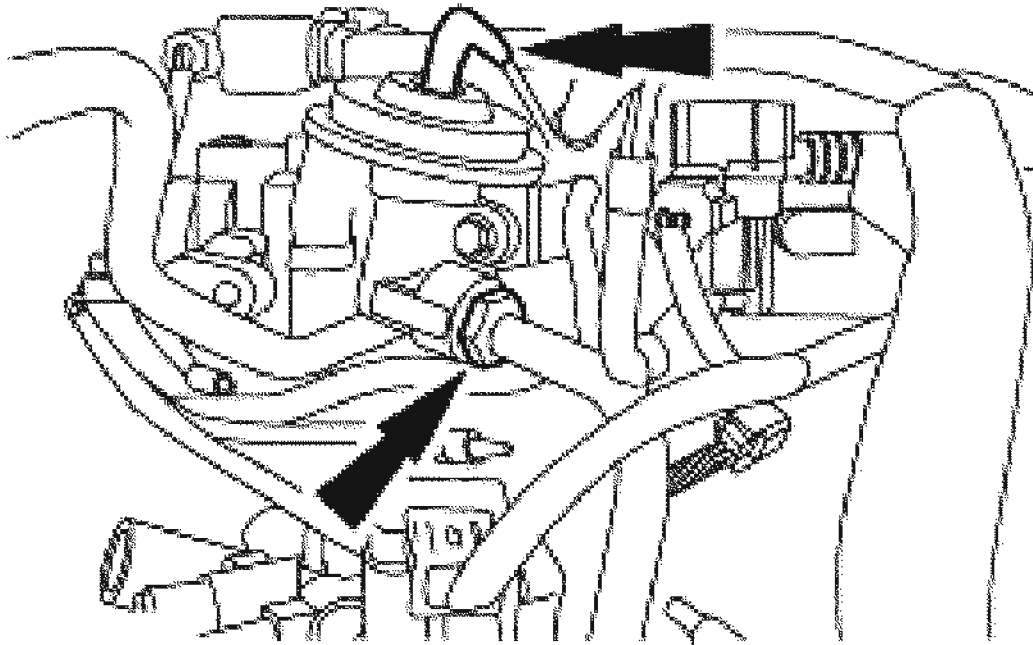
3. Disconnect the throttle position (TP) sensor and idle air control (IAC) electrical connectors.



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**Fig. 7: Disconnecting Throttle Position (TP) Sensor And Idle Air Control (IAC) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

4. Disconnect the exhaust gas recirculation (EGR) valve vacuum hose and EGR tube nut.

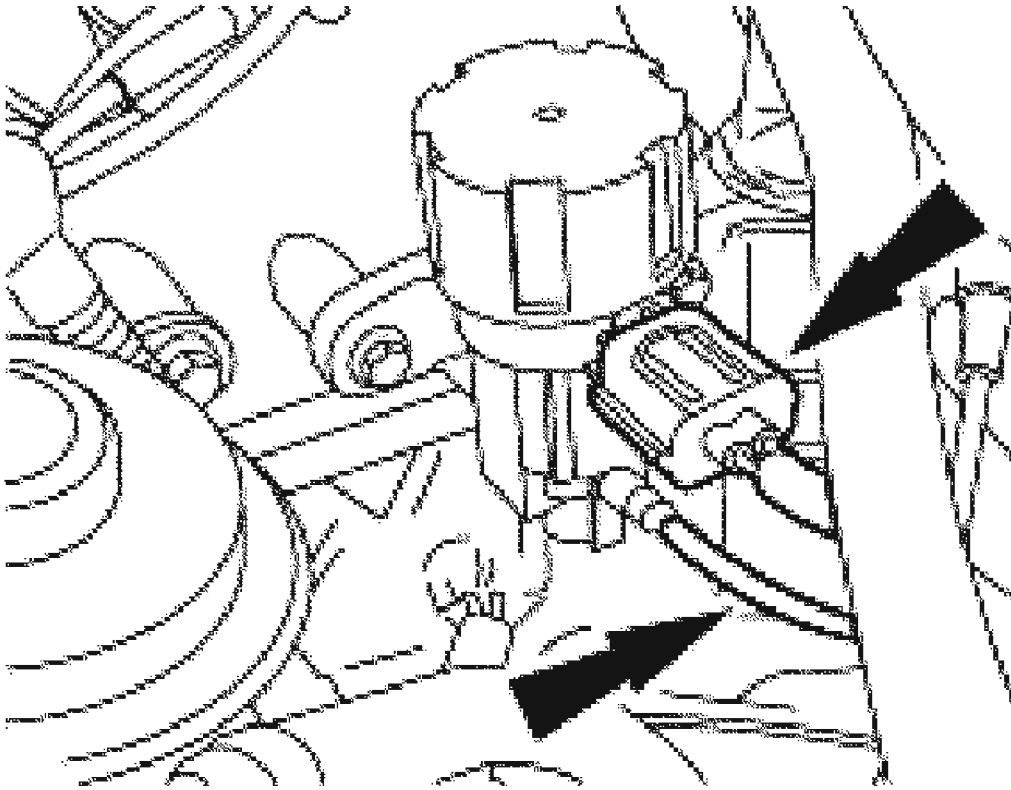


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**Fig. 8: Disconnecting Exhaust Gas Recirculation (EGR) Valve Vacuum Hose And EGR Tube Nut**

**Courtesy of FORD MOTOR CO.**

5. Disconnect the EGR vacuum regulator solenoid electrical connector and vacuum hose.

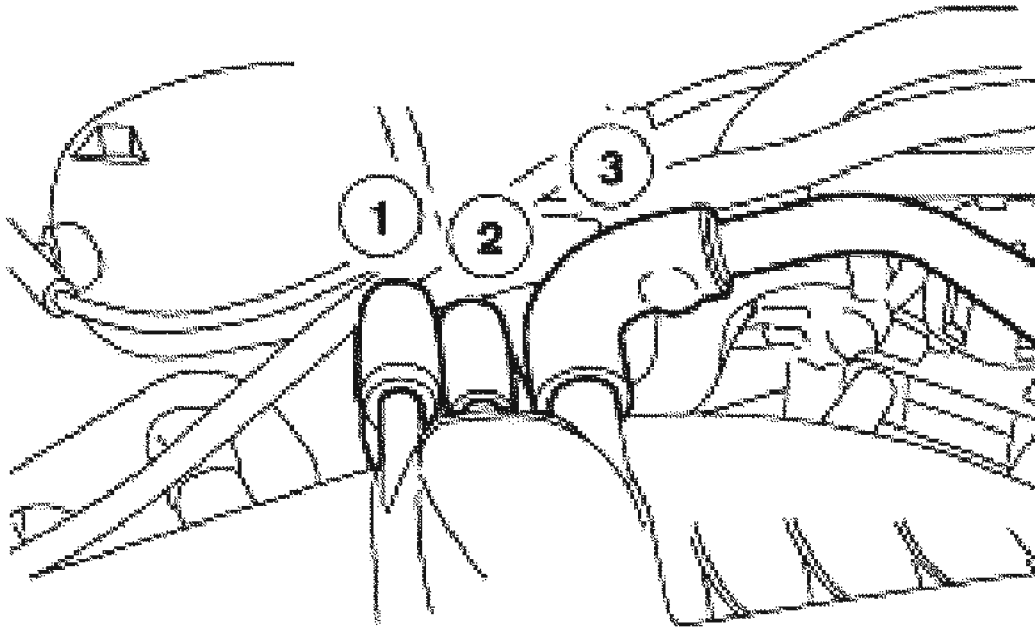


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**Fig. 9: Disconnecting EGR Vacuum Regulator Solenoid Electrical Connector And Vacuum Hose**

**Courtesy of FORD MOTOR CO.**

6. Disconnect the three vacuum hoses on the back of the intake manifold.
  1. Disconnect the chassis vacuum hose.
  2. Disconnect the engine vacuum hose.
  3. Disconnect the positive crankcase ventilation (PCV) hose.

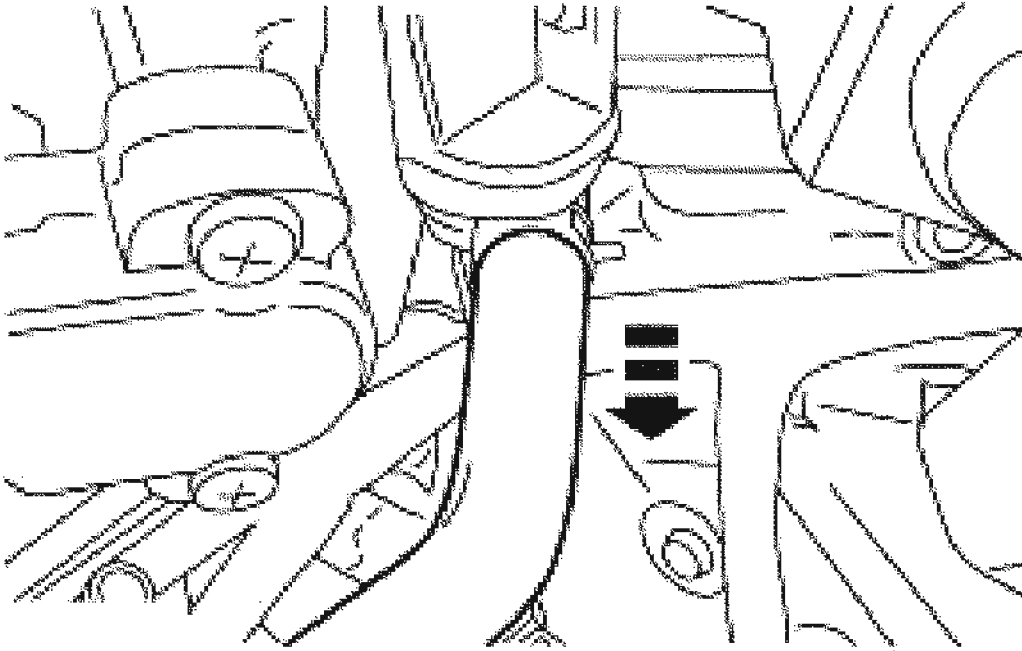


G02739183

**Fig. 10: Disconnecting Vacuum Hoses**  
Courtesy of FORD MOTOR CO.

7. Disconnect the vapor management valve (VMV) vacuum hose.

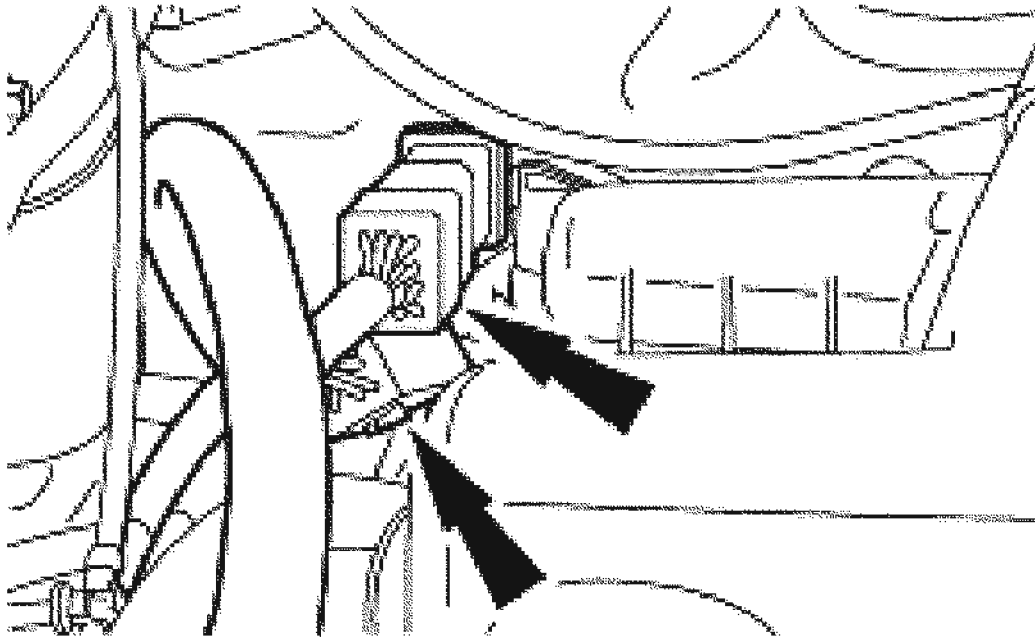




G02739184

**Fig. 11: Disconnecting Vapor Management Valve (VMV) Vacuum Hose**  
Courtesy of FORD MOTOR CO.

8. Disconnect the two electrical connectors attached to the left side of the upper intake manifold.

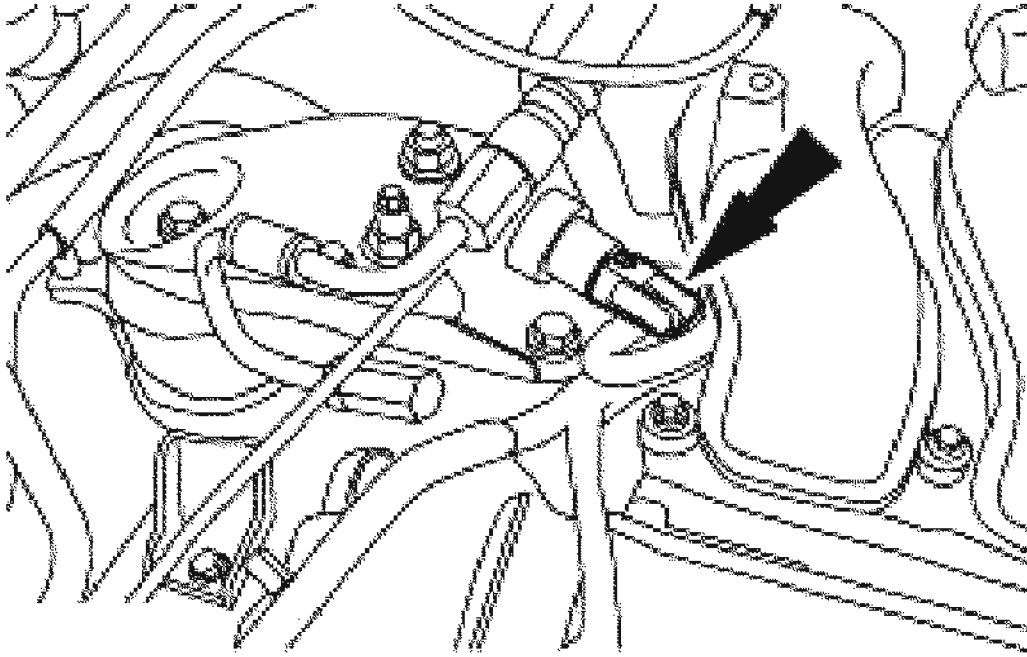


G02739185

**Fig. 12: Disconnecting Electrical Connectors Attached To Left Side Of Upper Intake Manifold**

**Courtesy of FORD MOTOR CO.**

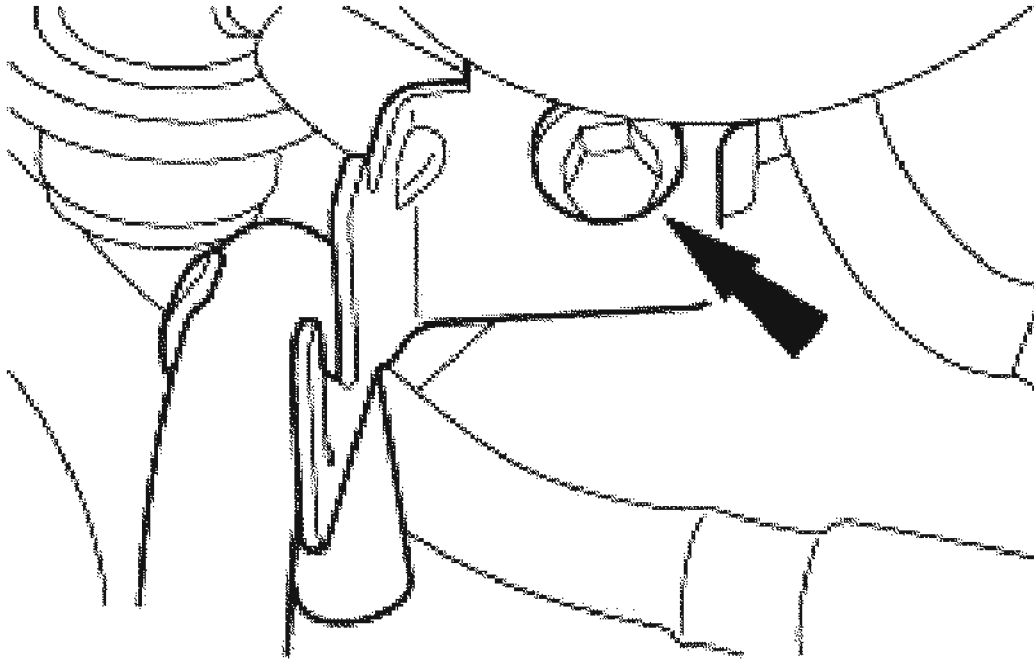
9. Disconnect the power steering pressure (PSP) sensor electrical connector.



G02739186

**Fig. 13: Disconnecting Power Steering Pressure (PSP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

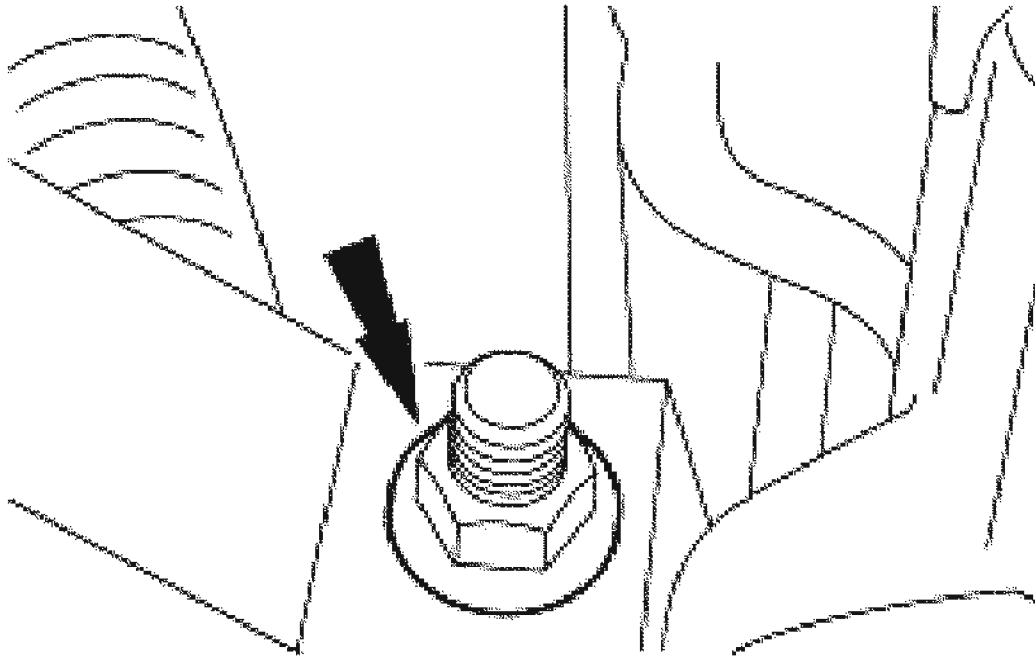
10. Remove the bolt and position the transmission vent hose and bracket aside.



G02739187

**Fig. 14: Locating Bolt**  
Courtesy of FORD MOTOR CO.

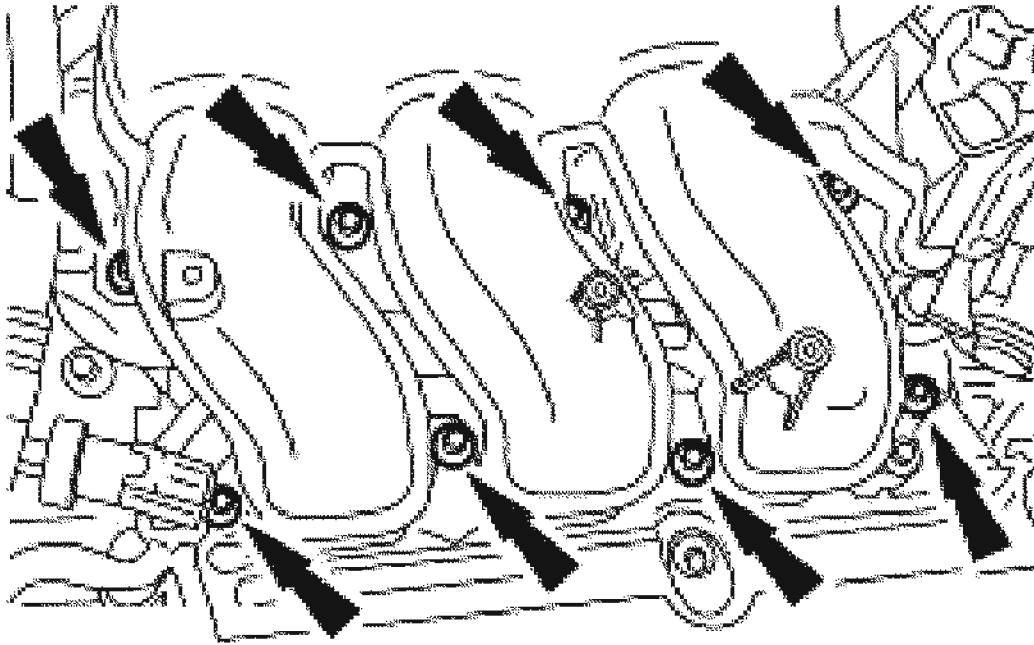
11. Remove the nut from the wire harness.



G02739188

**Fig. 15: Removing Nut From Wire Harness**  
Courtesy of FORD MOTOR CO.

12. Remove the eight bolts and the upper intake manifold.
  - Remove and discard the gaskets.
  - Clean all sealing surfaces.

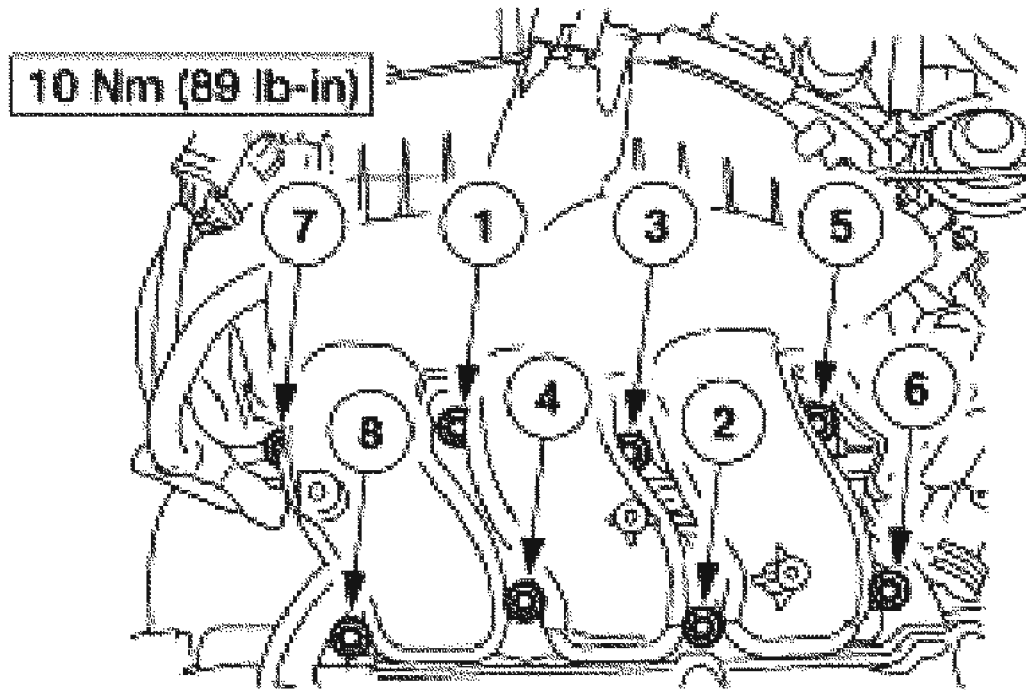


G02739189

**Fig. 16: Removing Bolts And Upper Intake Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

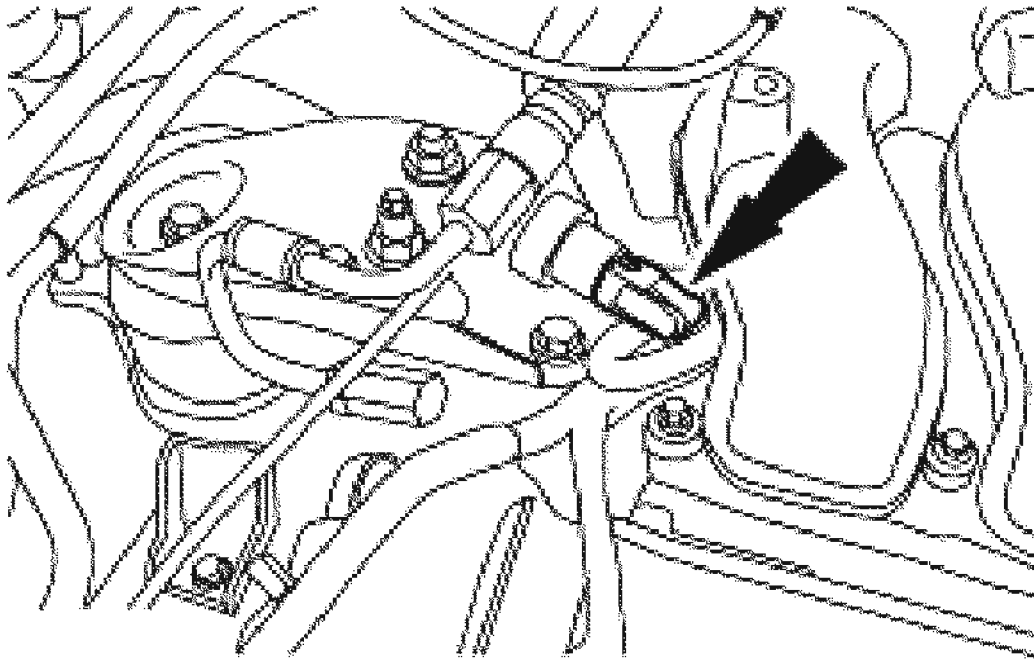
1. Install new gaskets in the upper intake manifold.
2. Position the upper intake manifold and tighten the bolts in the sequence shown.



G02739190

**Fig. 17: Identifying Tightening Sequence And Torque Specification Of Upper Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

3. Connect the PSP electrical connector.

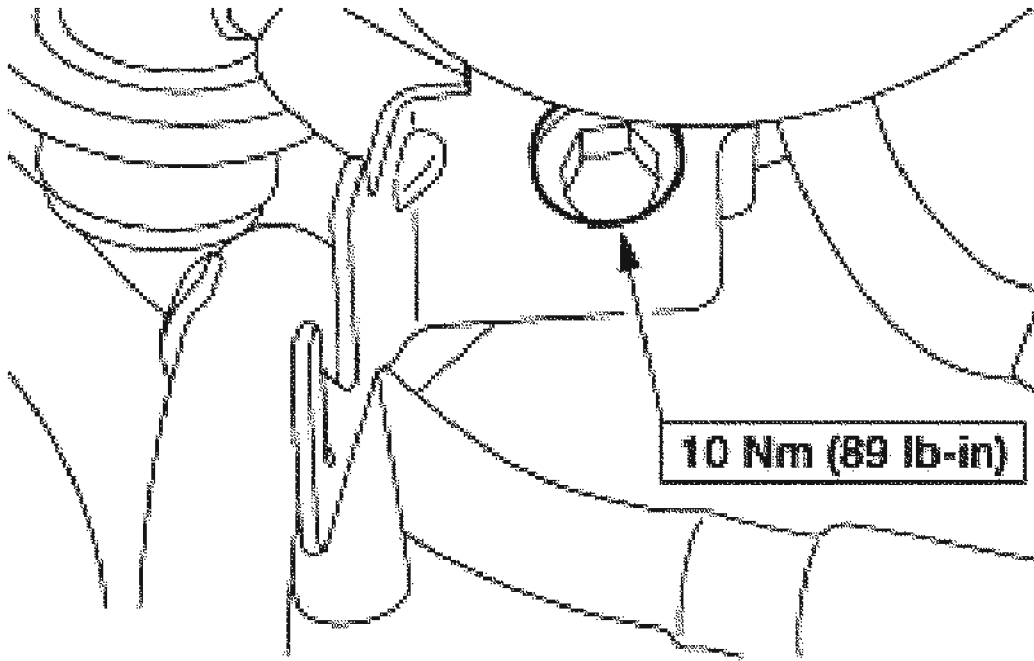


G02739191

**Fig. 18: Connecting PSP Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

4. Position the transmission vent tube and bracket and install the bolt.



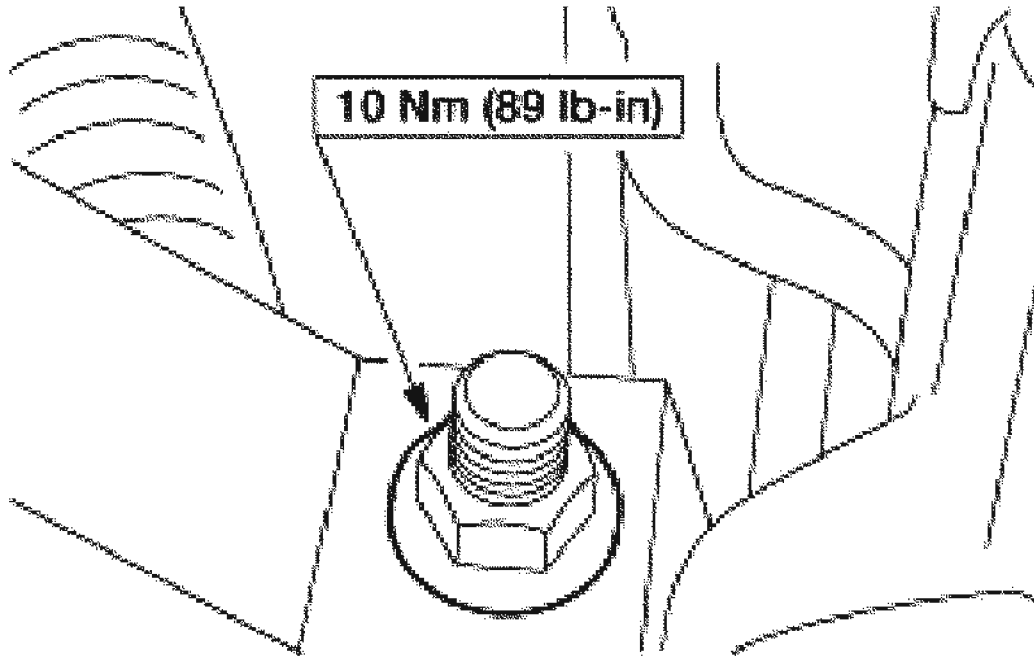


G02739192

**Fig. 19: Identifying Transmission Vent Tube And Bracket Bolt Torque Specification**

**Courtesy of FORD MOTOR CO.**

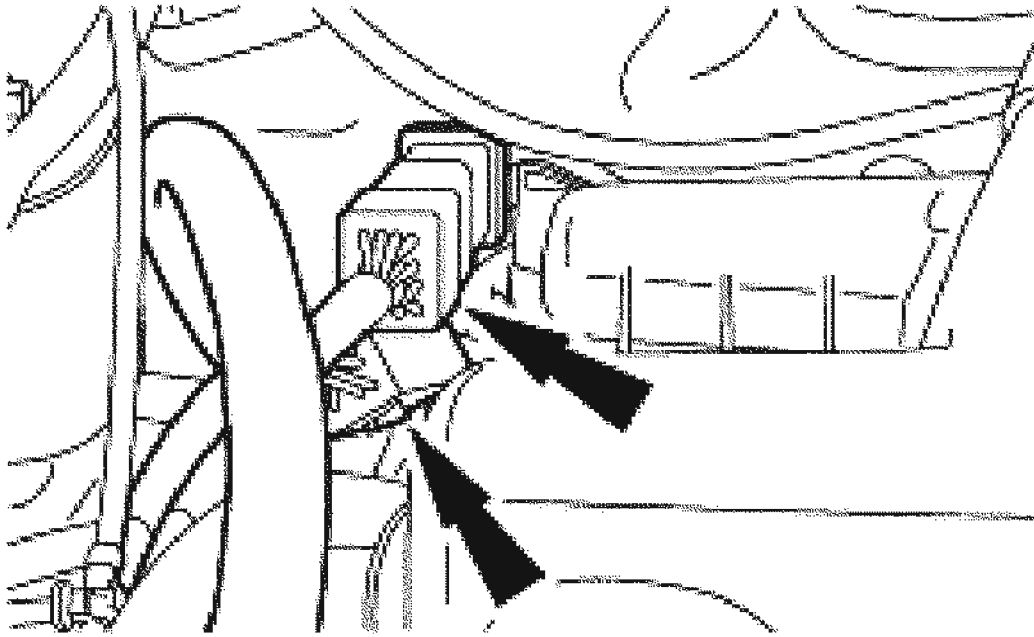
5. Position the wire harness and install the nut.



G02739193

**Fig. 20: Identifying Wire Harness Nut Torque Specification**  
Courtesy of FORD MOTOR CO.

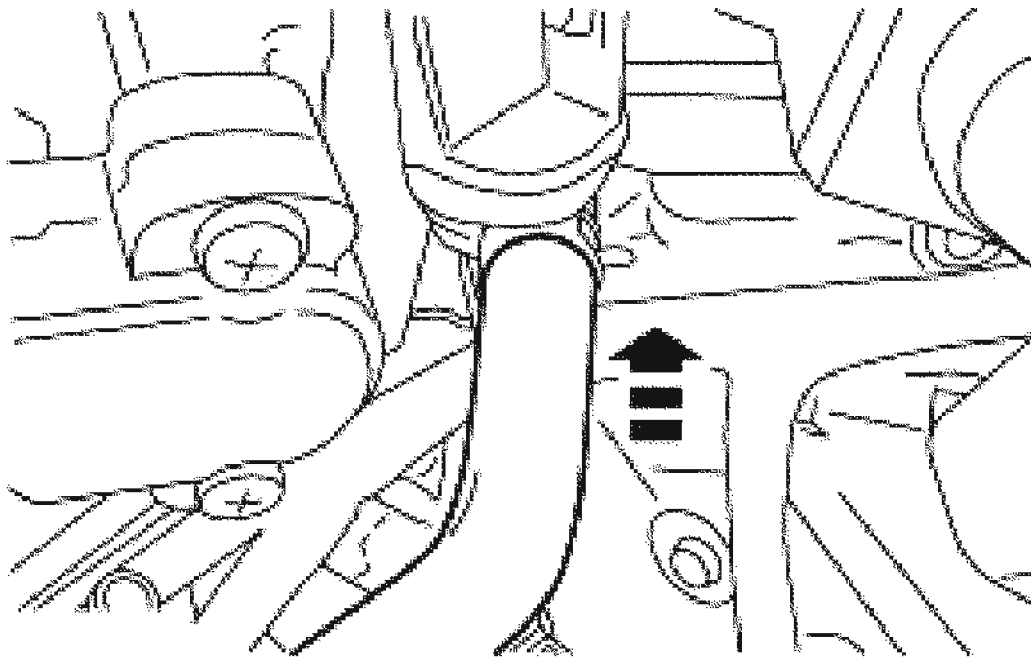
6. Install the two electrical connectors on the left side of the intake manifold.



G02739194

**Fig. 21: Installing Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

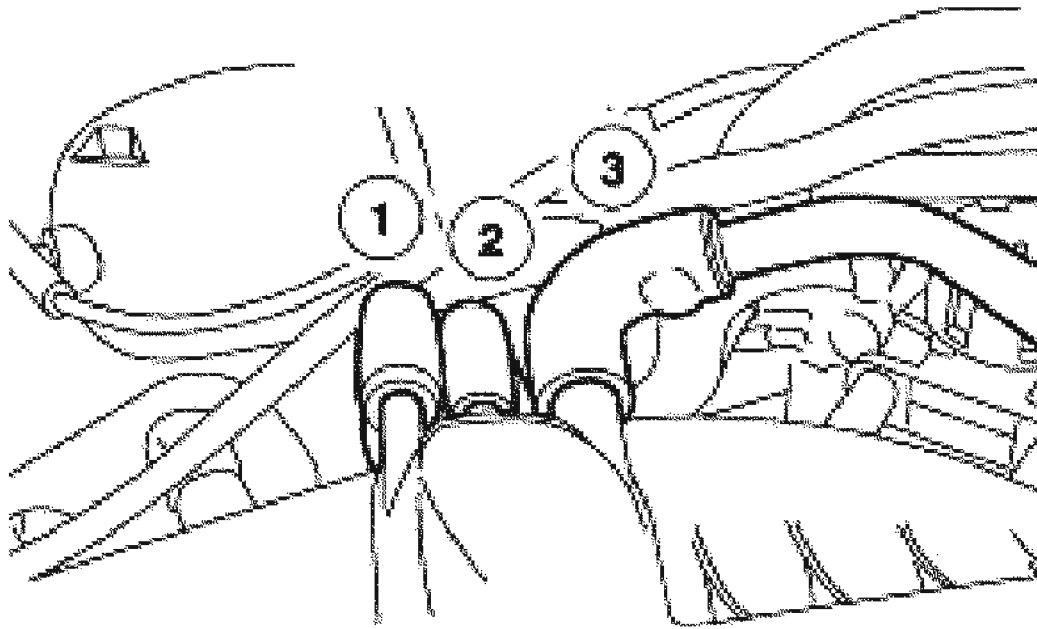
7. Install the vapor management valve (VMV) vacuum hose.



G02739195

**Fig. 22: Installing Vapor Management Valve (VMV) Vacuum Hose**  
Courtesy of FORD MOTOR CO.

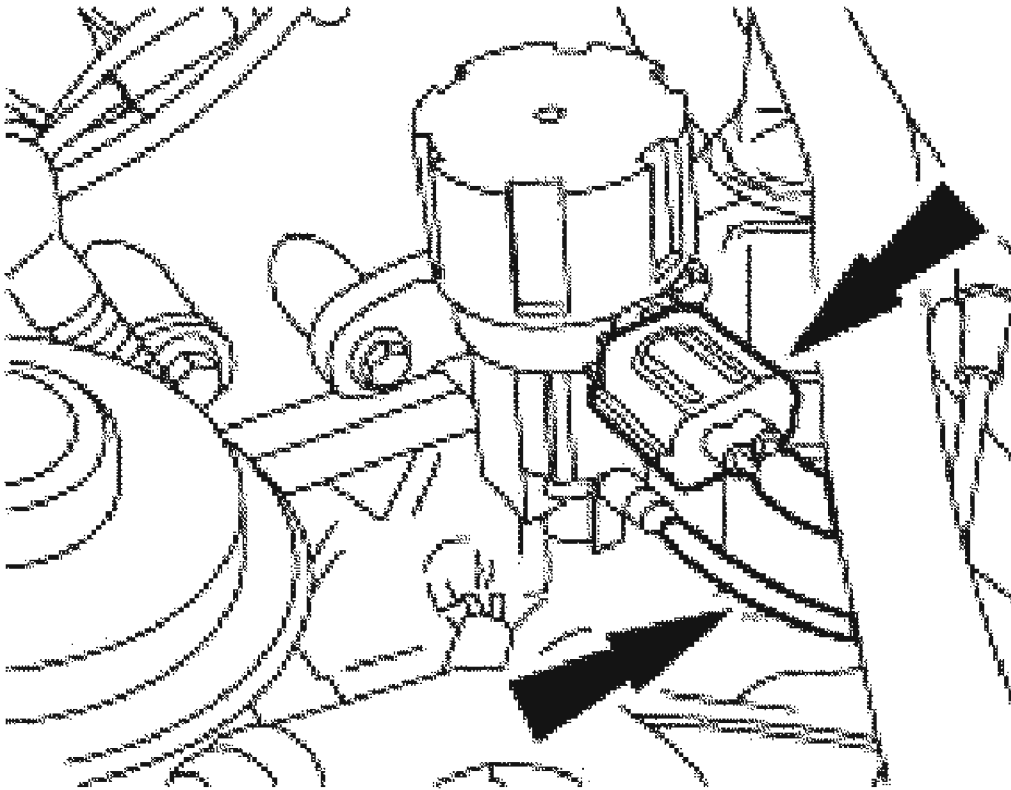
8. Connect the three vacuum hoses on the back of the upper intake manifold.
  1. Connect the chassis vacuum hose.
  2. Connect the engine vacuum hose.
  3. Connect the PCV hose.



G02739196

**Fig. 23: Connecting Vacuum Hoses**  
Courtesy of FORD MOTOR CO.

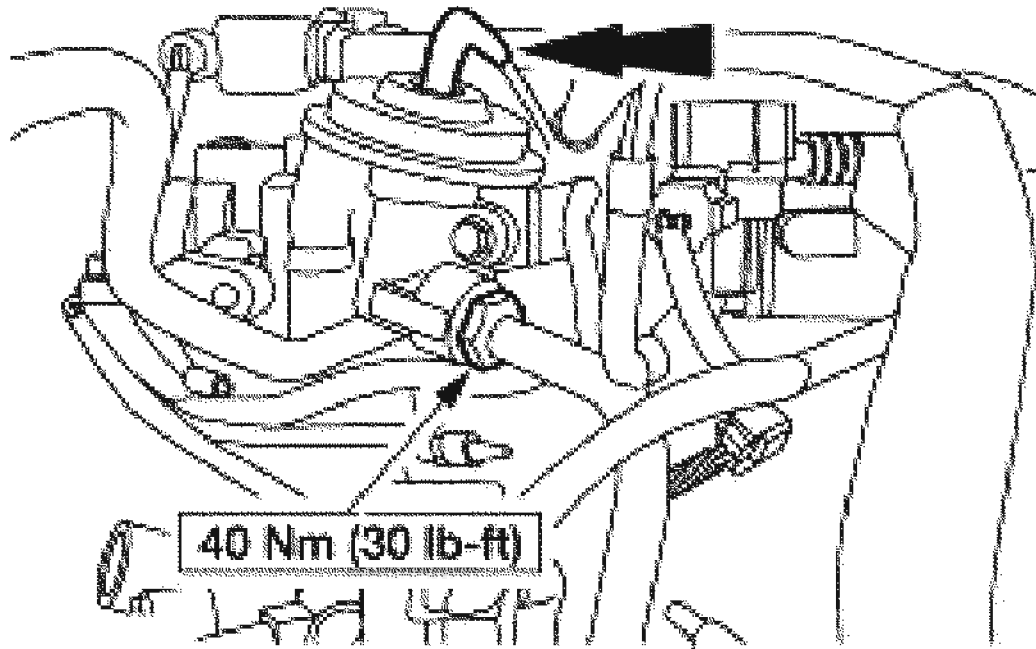
9. Connect the EGR vacuum regulator solenoid electrical connector and the vacuum hose.



G02739197

**Fig. 24: Connecting EGR Vacuum Regulator Solenoid Electrical Connector**  
Courtesy of FORD MOTOR CO.

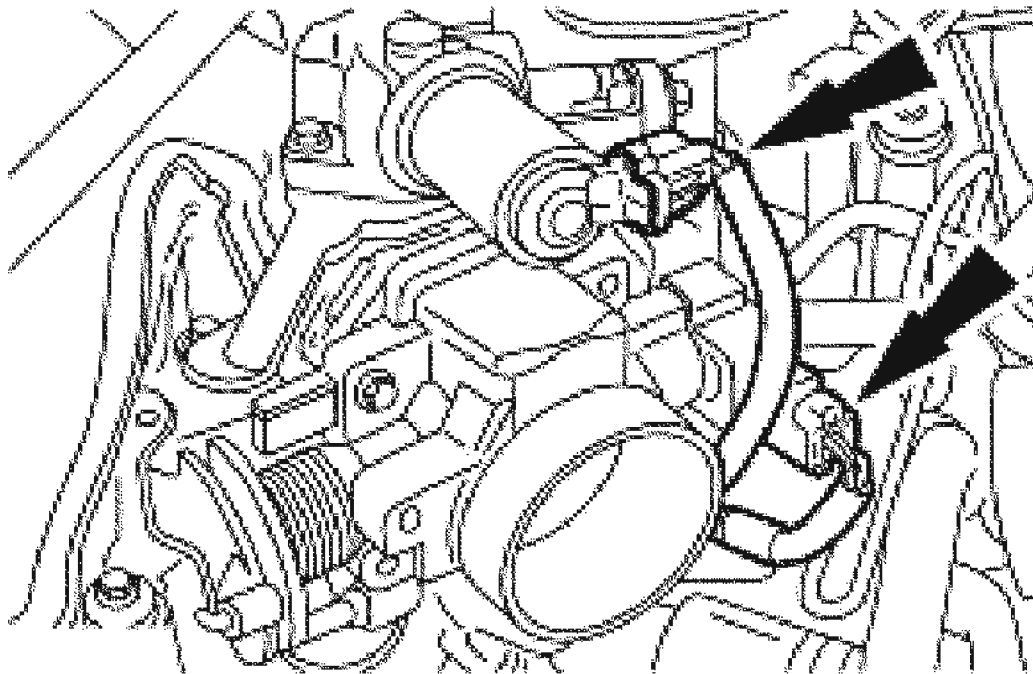
10. Install the EGR valve vacuum hose and EGR tube nut.



G02739198

**Fig. 25: Installing EGR Valve Vacuum Hose And EGR Tube Nut**  
Courtesy of FORD MOTOR CO.

11. Connect the TP sensor and IAC electrical connectors.

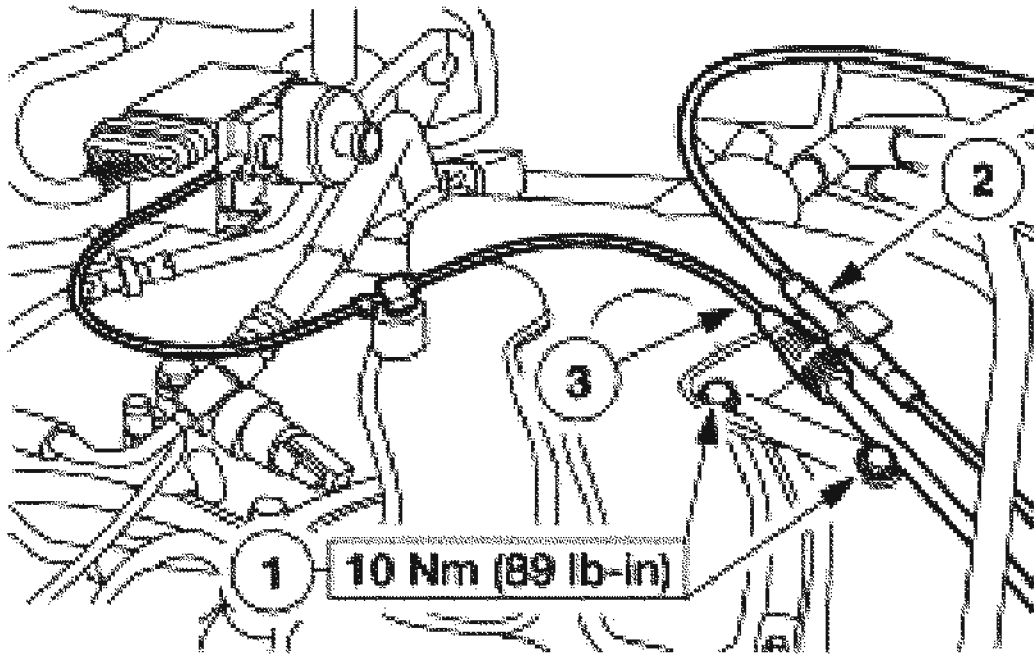


G02739199

**Fig. 26: Connecting TP Sensor & IAC Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

12. Connect the throttle cables.
  1. Install the throttle cable bracket bolts.
  2. Connect the throttle cable.
  3. If equipped, connect the speed control cable.

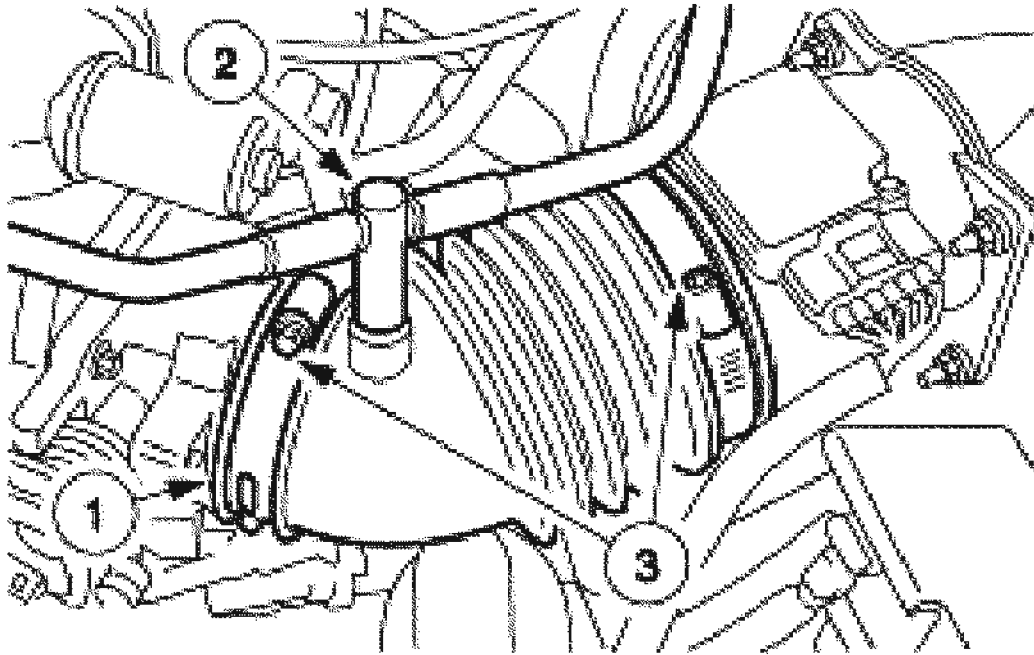




G02739200

**Fig. 27: Connecting Throttle Cables**  
Courtesy of FORD MOTOR CO.

13. Install the air cleaner outlet tube.
  1. Position the air cleaner outlet tube.
  2. Install the hoses.
  3. Install the clamps.



G02739201

**Fig. 28: Installing Air Cleaner Outlet Tube**  
Courtesy of FORD MOTOR CO.

## LOWER INTAKE MANIFOLD

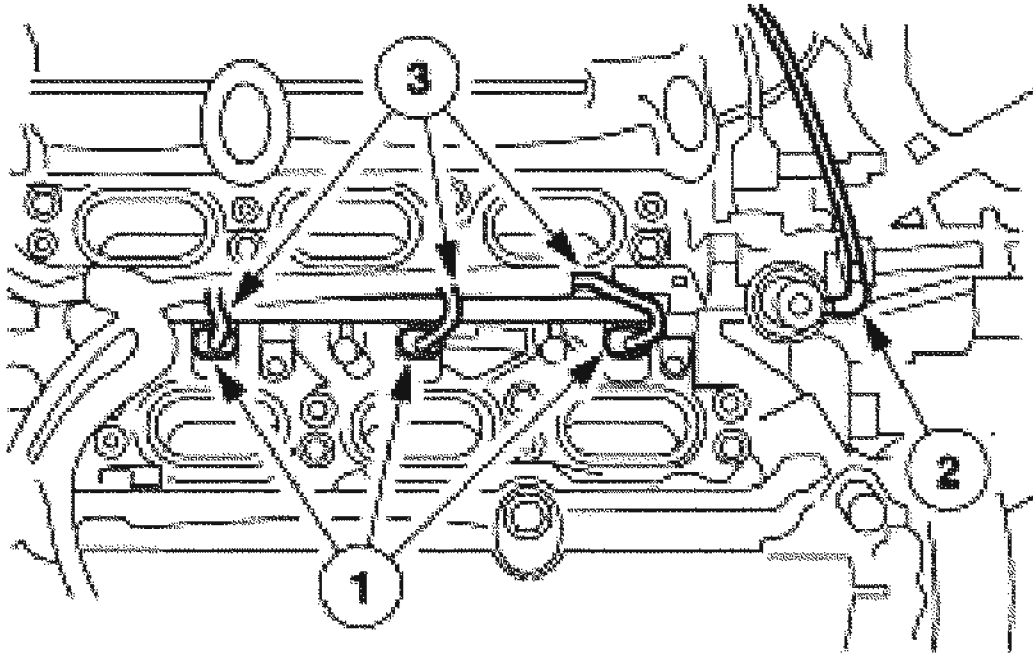
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal

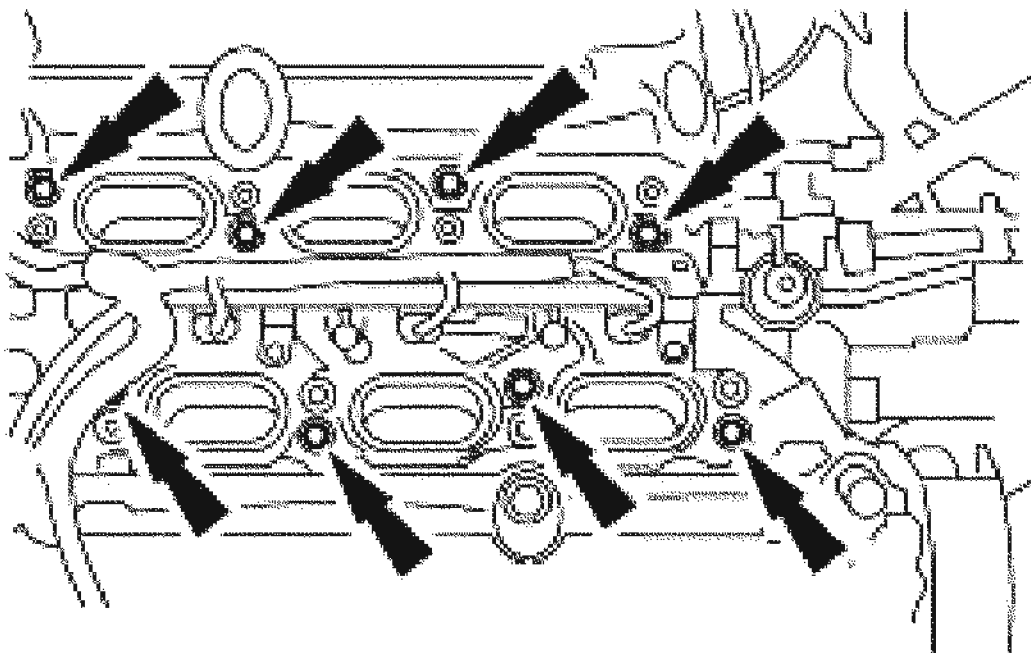
1. Disconnect the fuel hose spring lock coupling. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION** .
2. Remove the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .
3. Disconnect the fuel rail.
  1. Disconnect the six fuel injector electrical connectors and wire harness locators.
  2. Disconnect the fuel pressure damper vacuum hose.
  3. Release the wire harness retainers from the fuel injection supply manifold.



G02739202

**Fig. 29: Disconnecting Fuel Rail**  
Courtesy of FORD MOTOR CO.

4. Remove the bolts and the lower intake manifold. Remove and discard the gaskets.

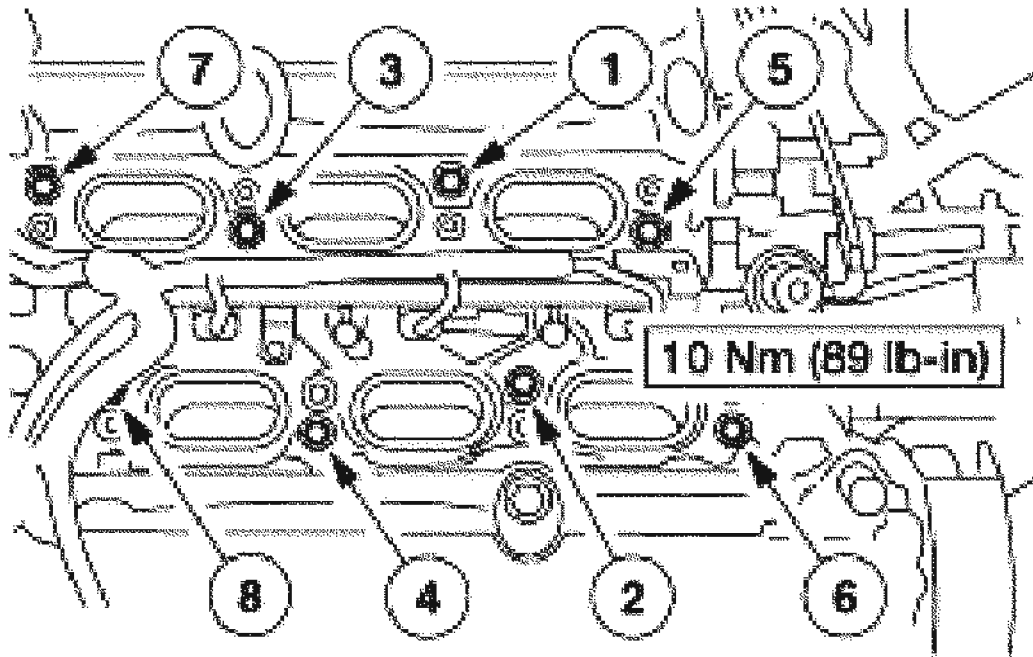


G02739203

**Fig. 30: Removing Bolts And Lower Intake Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Clean and inspect all mating surfaces.
2. Install new gaskets in the lower intake manifold.
3. Install the lower intake manifold assembly and tighten the bolts in the sequence shown.

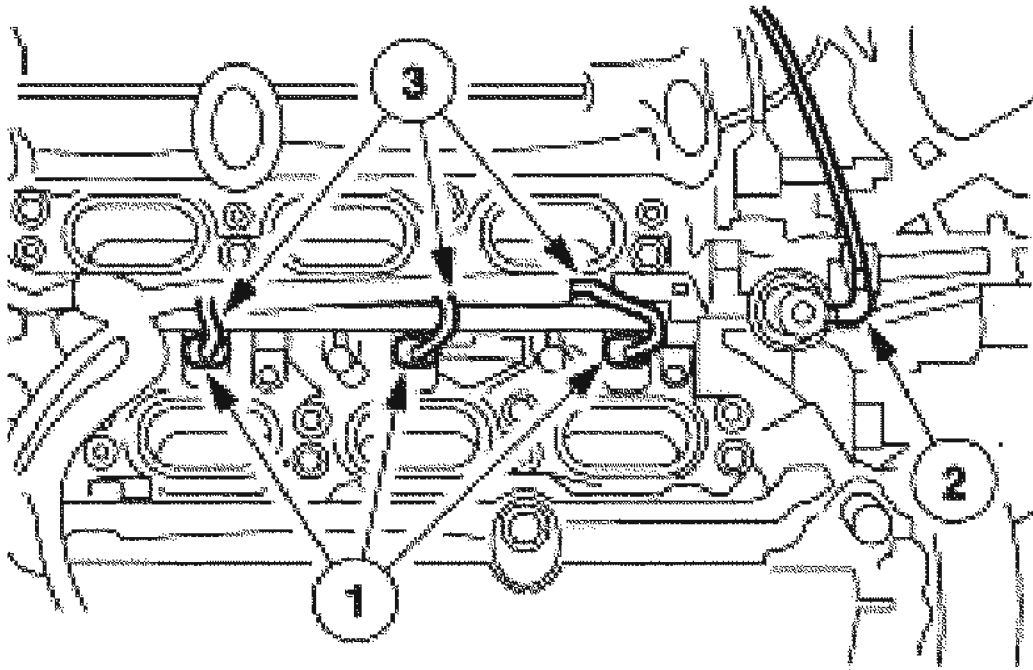


G02739204

**Fig. 31: Identifying Tightening Sequence & Torque Specification Of Lower Intake Manifold Assembly Bolts**

**Courtesy of FORD MOTOR CO.**

4. Connect the fuel rail.
  1. Position the wire harness locators and connect the six fuel injector electrical connectors.
  2. Connect the fuel pressure damper vacuum hose.
  3. Connect the fuel injection harness to the fuel supply manifold.



G02739205

**Fig. 32: Connecting Fuel Rail**  
Courtesy of FORD MOTOR CO.

5. Install the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .
6. Connect the fuel hose spring lock coupling. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION** .

## ENGINE FRONT COVER

### Material

### MATERIAL SPECIFICATION

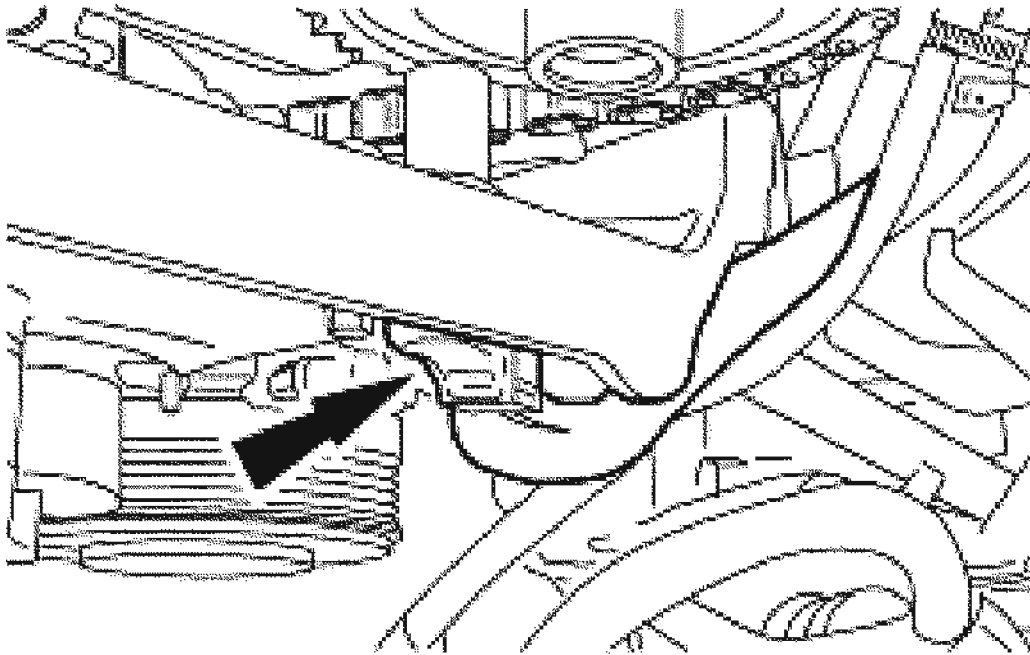
Item	Specification
Motocraft Metal Surface Cleaner ZC - 21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE -M4G323 -A4

### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY**,

### **MOUNTING AND CABLES .**

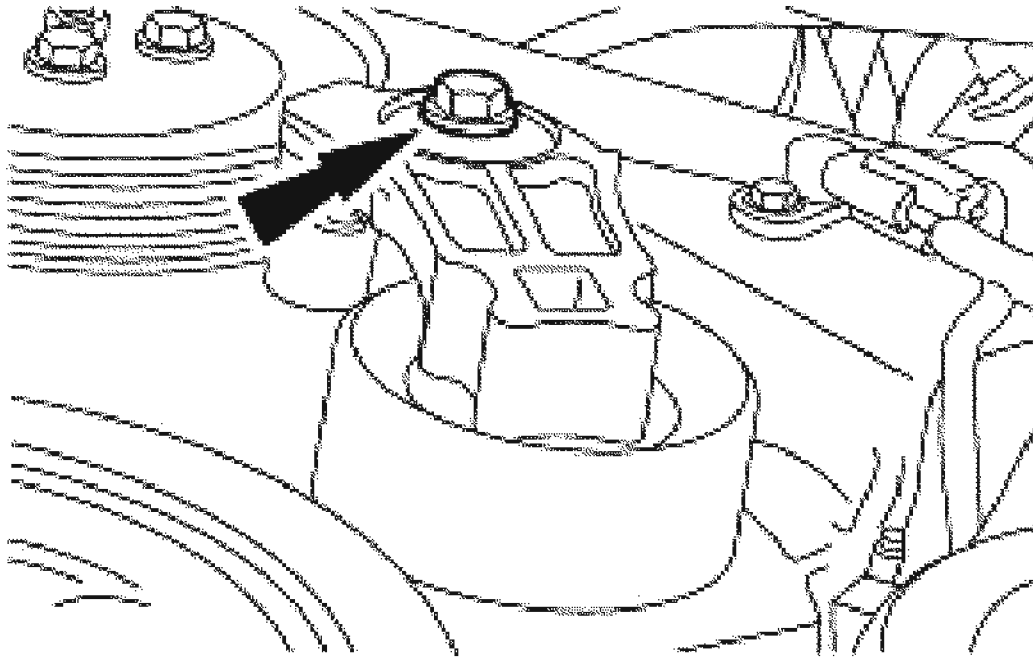
3. Remove the RH and LH valve covers. For additional information, refer to **VALVE COVER LH** and **VALVE COVER RH** .
4. Remove the generator. For additional information, refer to **GENERATORS & REGULATORS** .
5. Remove the front engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS - FRONT, RH** .
6. Remove the bolt and the camshaft position (CMP) sensor.



G02739206

**Fig. 33: Removing Bolt And Camshaft Position (CMP) Sensor**  
Courtesy of FORD MOTOR CO.

7. Remove the power steering pump. For additional information, refer to **POWER STEERING** .
8. Remove the bolt and remove the belt tensioner.

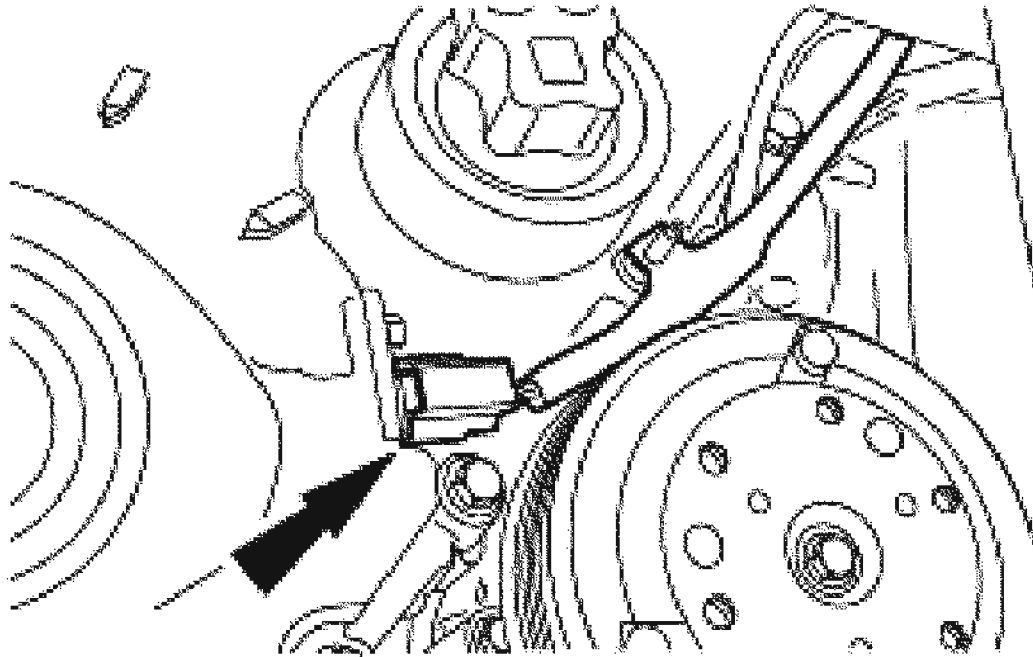


G02739207

**Fig. 34: Removing Power Steering Pump Bolt**  
Courtesy of FORD MOTOR CO.

9. Remove the crankshaft front seal. For additional information, refer to **CRANKSHAFT FRONT OIL SEAL** .
10. Remove the crankshaft position (CKP) sensor.
  - Disconnect the electrical connector.
  - Remove the bolt and the sensor.

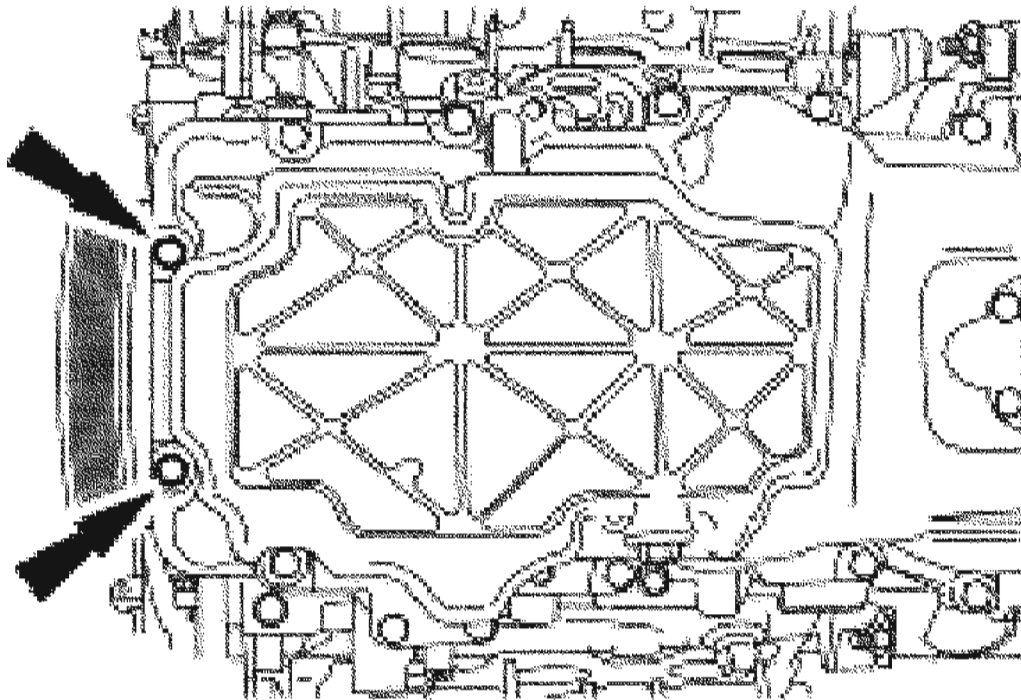




G02739208

**Fig. 35: Removing Crankshaft Position (CKP) Sensor**  
Courtesy of FORD MOTOR CO.

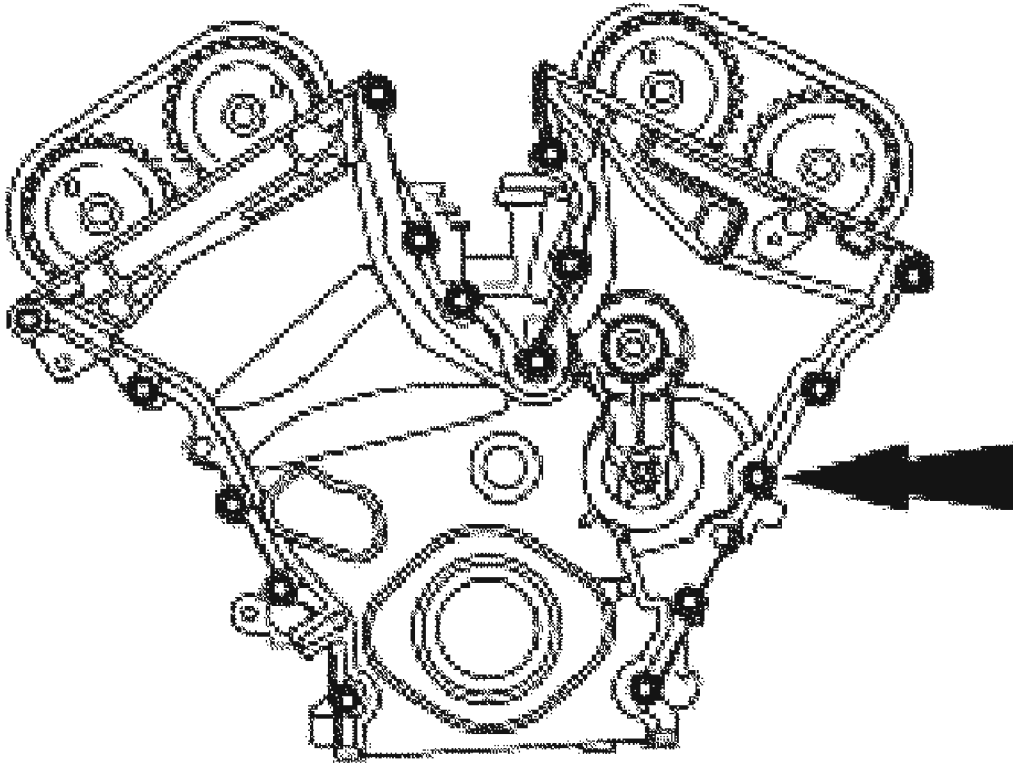
11. Remove the 2 oil pan-to-front cover bolts.



G02739209

**Fig. 36: Removing Oil Pan-To-Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

12. Remove the bolts, studs and the engine front cover.
  - Remove and discard the front cover gaskets.



G02739210

**Fig. 37: Removing Engine Front Cover**  
Courtesy of FORD MOTOR CO.

#### Installation

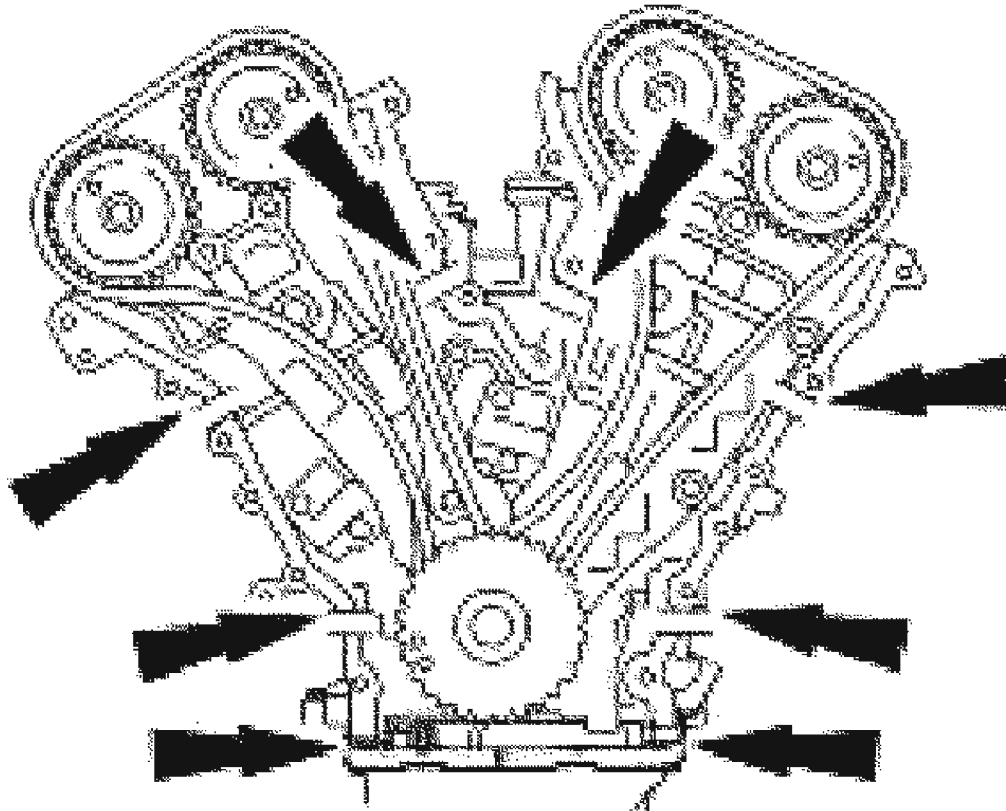
**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surface. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove all traces of sealant.

**CAUTION:** Do not damage the oil pan gasket while cleaning the sealant from the lower cylinder block-to-oil pan joint.

1. Clean all sealing surfaces with metal surface cleaner.
2. Install 3 new gaskets in the front cover.

**NOTE:** The engine front cover must be installed and the bolts

tightened within 4 minutes of applying the sealant.

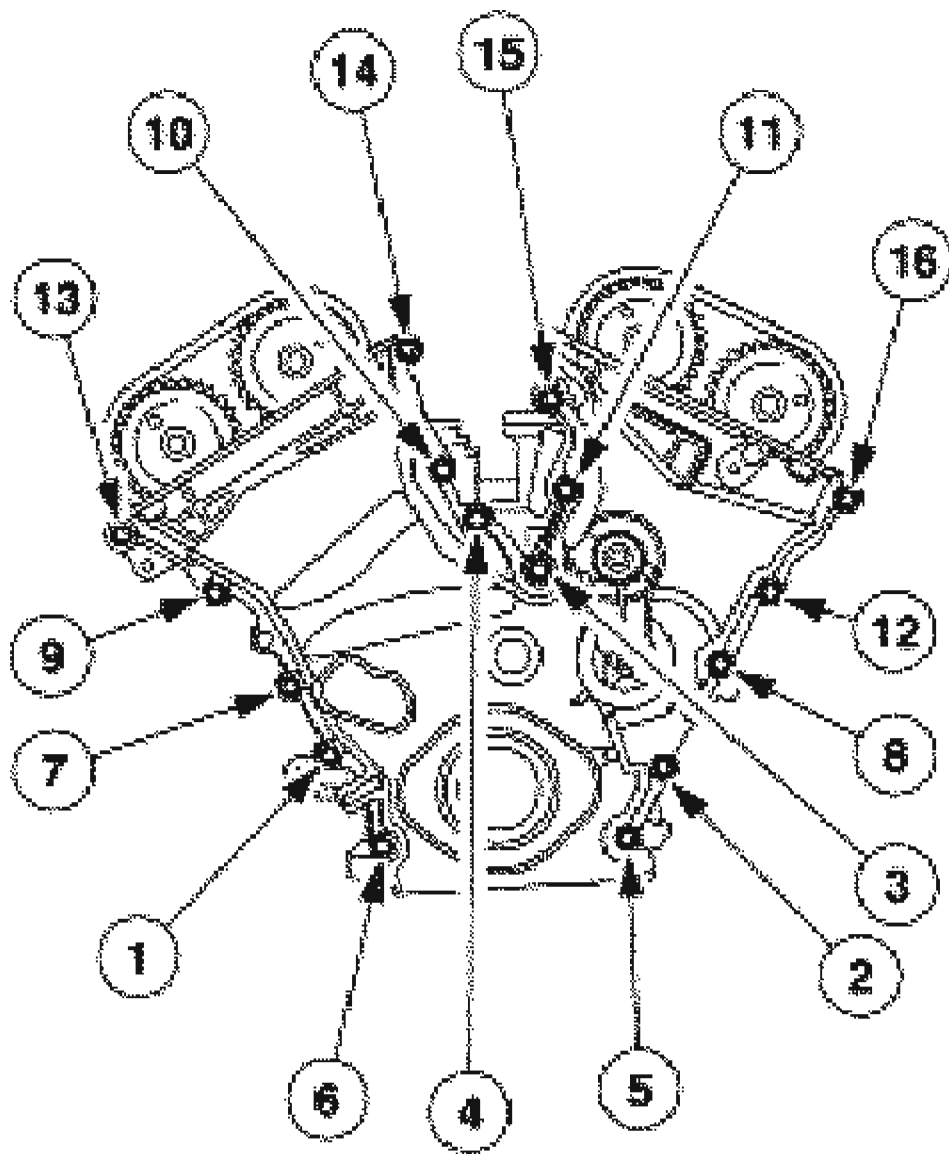


G02739211

**Fig. 38: Applying Silicone Gasket & Sealer**  
Courtesy of FORD MOTOR CO.

3. Apply a 6 mm (0.24 in) diameter dot of silicone gasket and sealer to the cylinder block, lower cylinder block, cylinder head and oil pan mating surfaces.

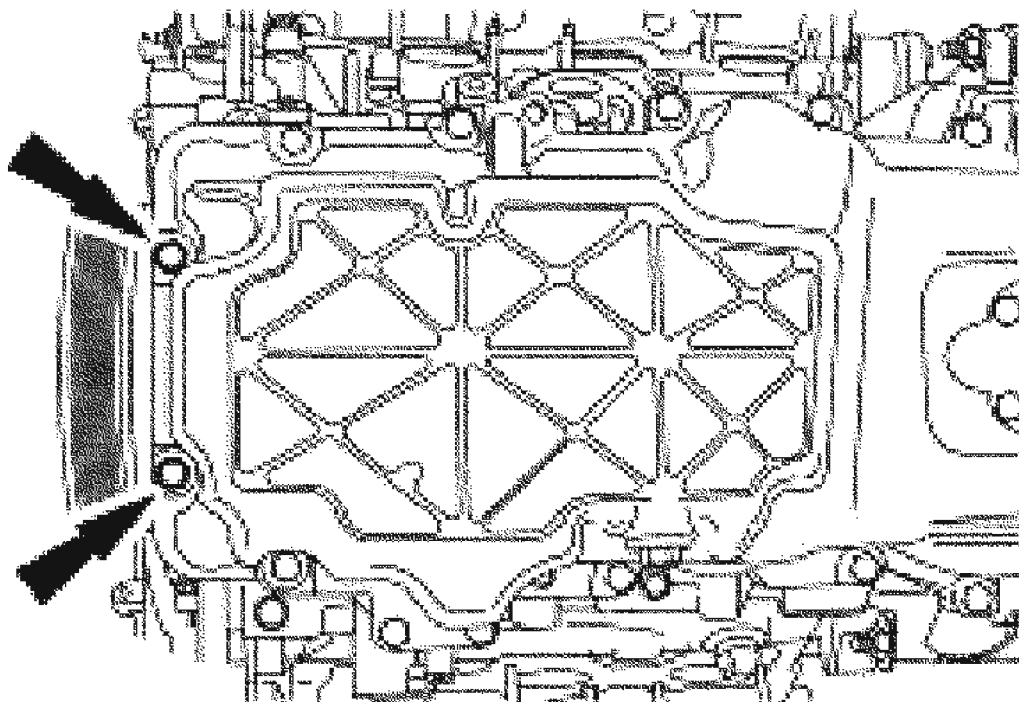
**NOTE:** Fasteners 1, 3, 4, 8, 10, 11, 14, 15 and 16 are studs.



G02739212

**Fig. 39: Identifying Front Cover Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

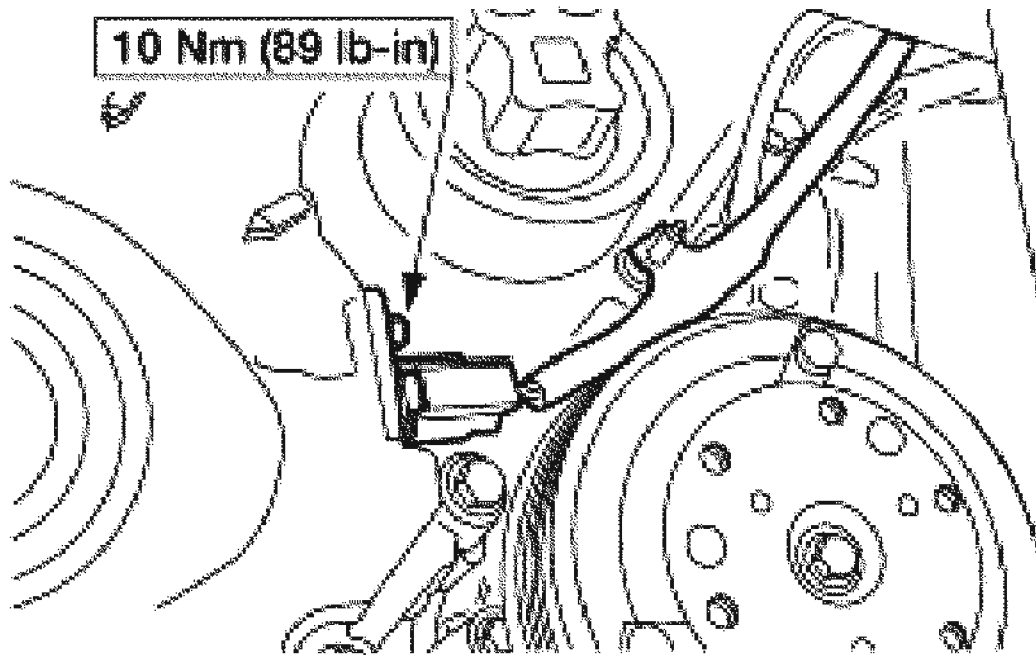
4. Position the cover and install the studs and bolts in the sequence shown.
5. Install the 2 oil pan-to-front cover bolts.
  - Tighten to 25 Nm (18 lb-ft).



G02739213

**Fig. 40: Installing Oil Pan-To-Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

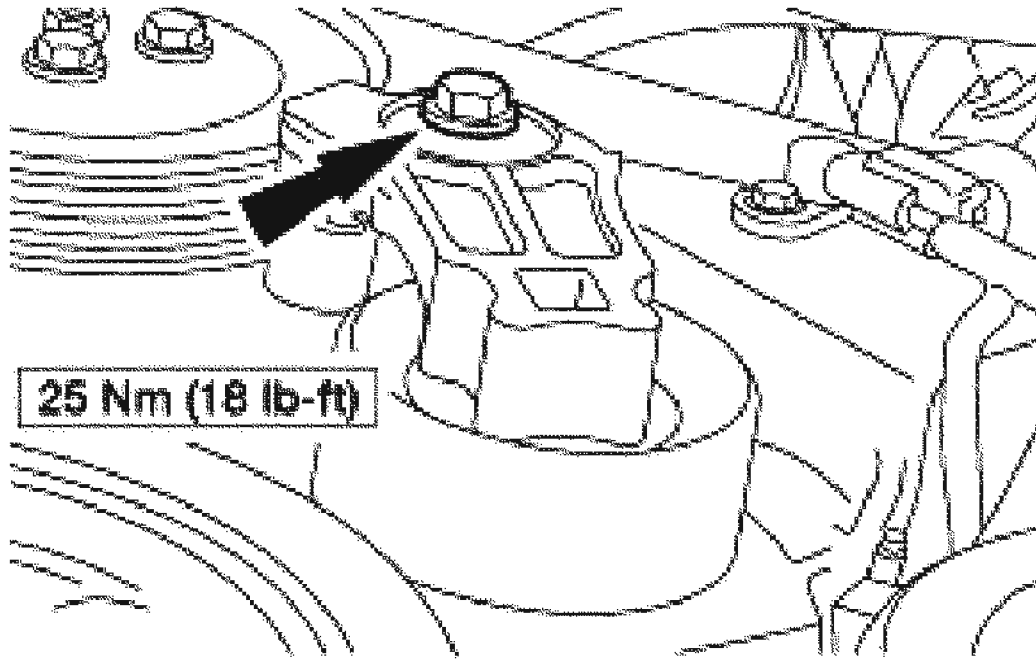
6. Remove the oil pan plug and drain the engine oil.
  - Install the plug and tighten to 26 Nm (19 lb-ft).
7. Install the (CKP) sensor and connect the electrical connector.



G02739214

**Fig. 41: Installing (CKP) Sensor**  
Courtesy of FORD MOTOR CO.

8. Install the crankshaft front seal. For additional information, refer to **CRANKSHAFT FRONT OIL SEAL** .
9. Install the tensioner and bolt.

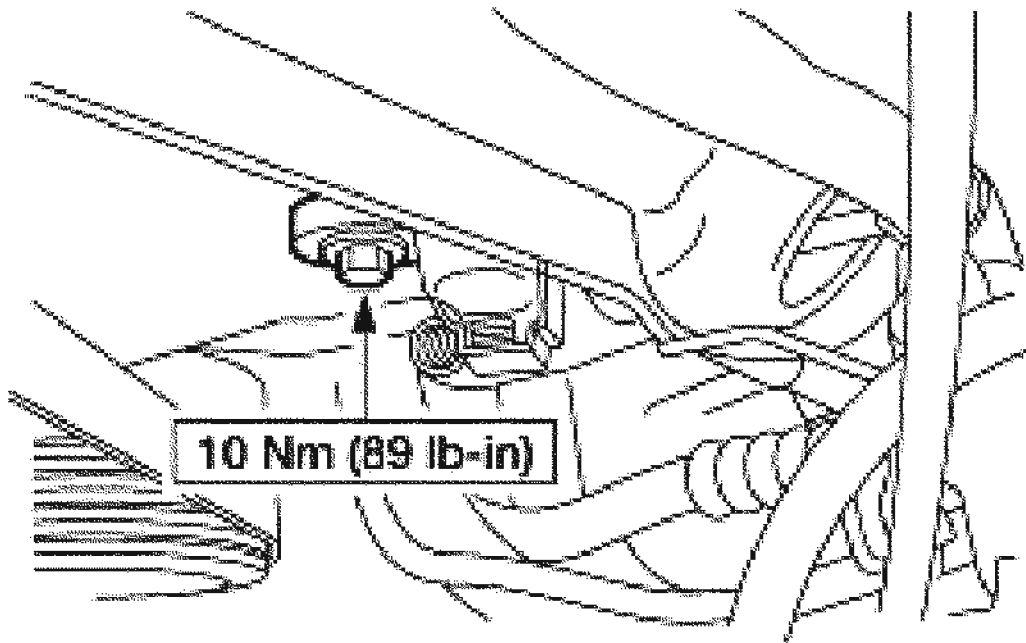


G02739215

**Fig. 42: Identifying Tensioner Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

10. Install the CMP and the bolt.
  - Connect the electrical connector.





G02739216

**Fig. 43: Identifying CMP Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

11. Install the power steering pump. For additional information, refer to **POWER STEERING** .
12. Install the front engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS - FRONT, RH** .
13. Install the generator. For additional information, refer to **GENERATORS & REGULATORS** .
14. Install the RH and LH valve cover. For additional information, refer to **VALVE COVER RH** and **VALVE COVER LH** .
15. Fill the engine with clean engine oil.
16. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
17. Fill and bleed the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .

## VALVE COVER LH

### Material

## MATERIAL SPECIFICATION

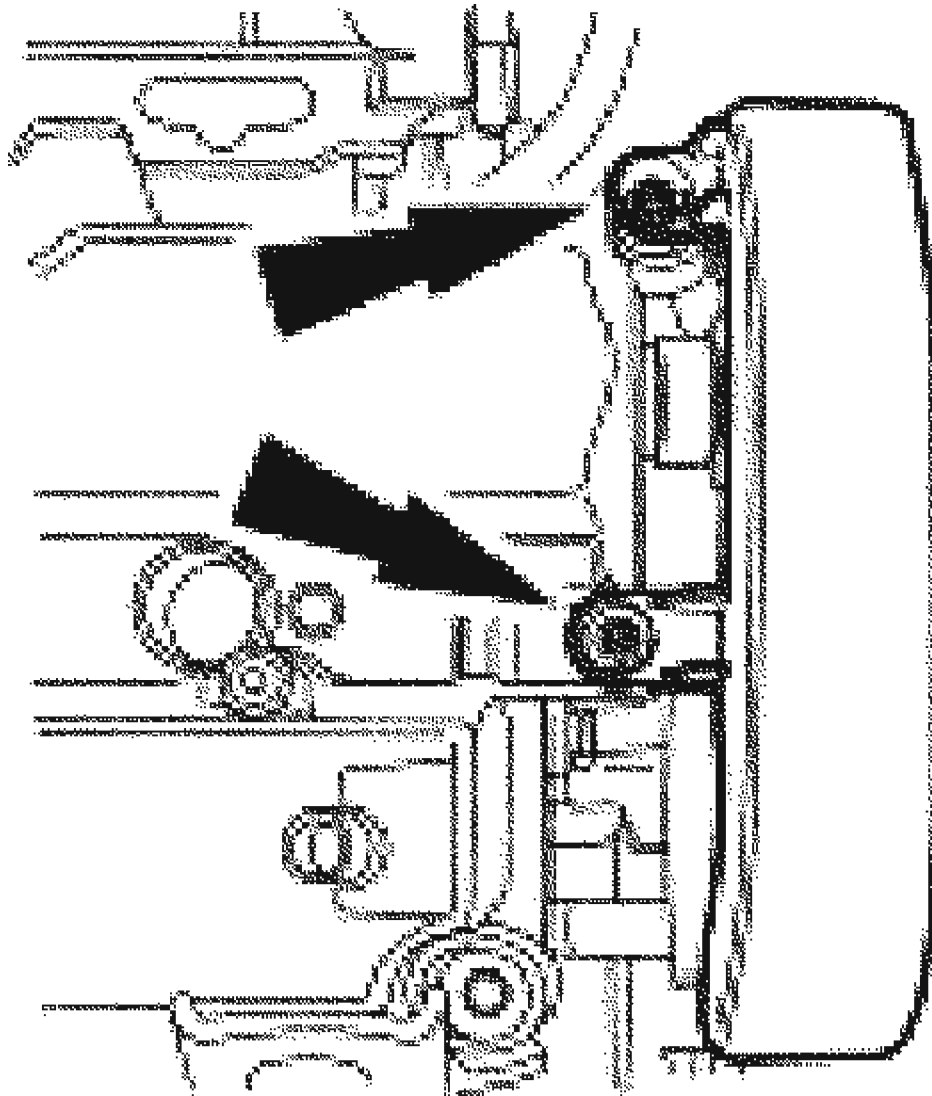
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A	ESE-M1C171-A
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

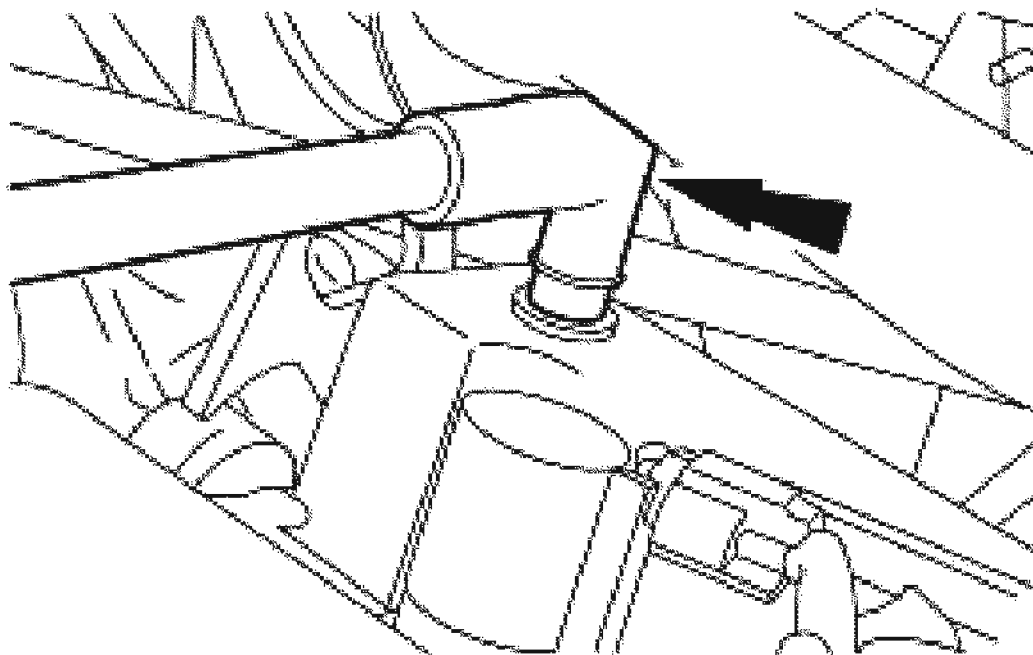
1. Remove the water pump belt cover.



G02739217

**Fig. 44: Removing Water Pump Belt Cover**  
Courtesy of FORD MOTOR CO.

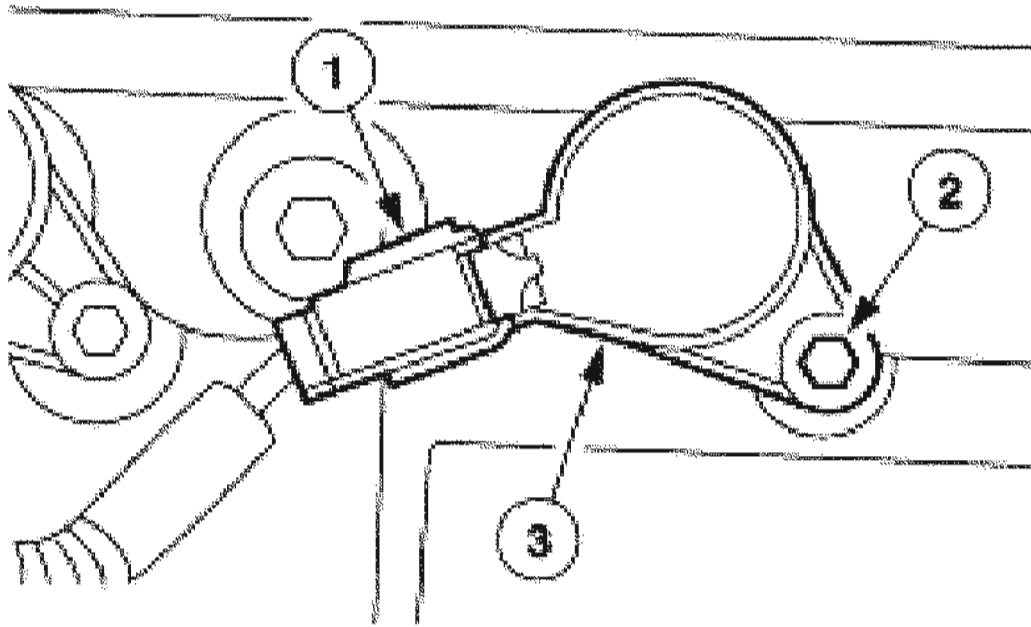
2. Disconnect the crankcase ventilation tube from the valve cover.



G02739218

**Fig. 45: Disconnecting Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

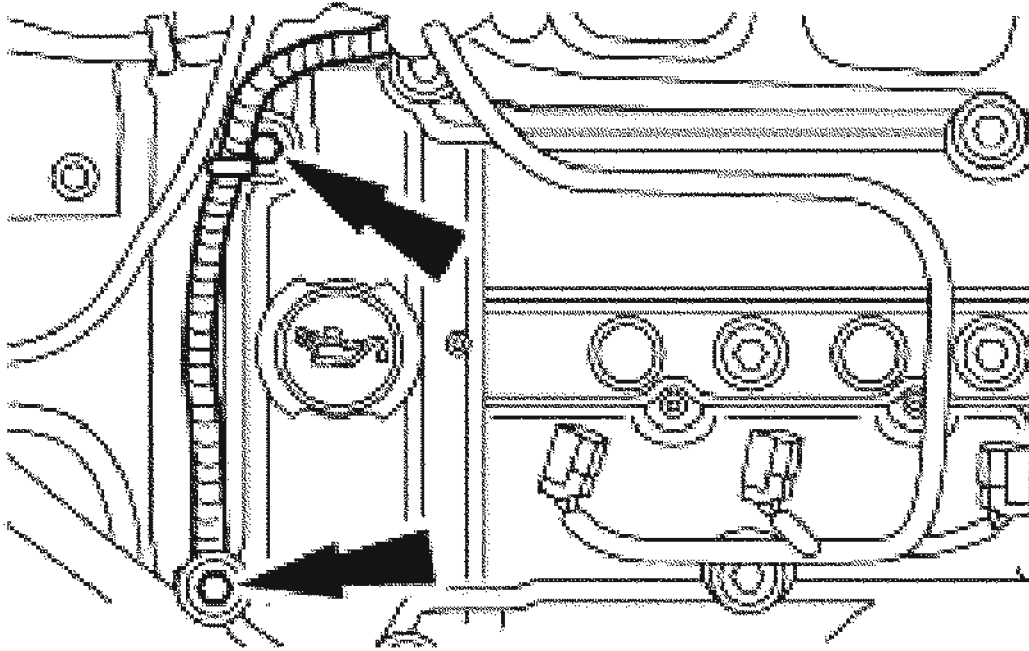
**CAUTION:** When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.



G02739219

**Fig. 46: Removing Three LH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

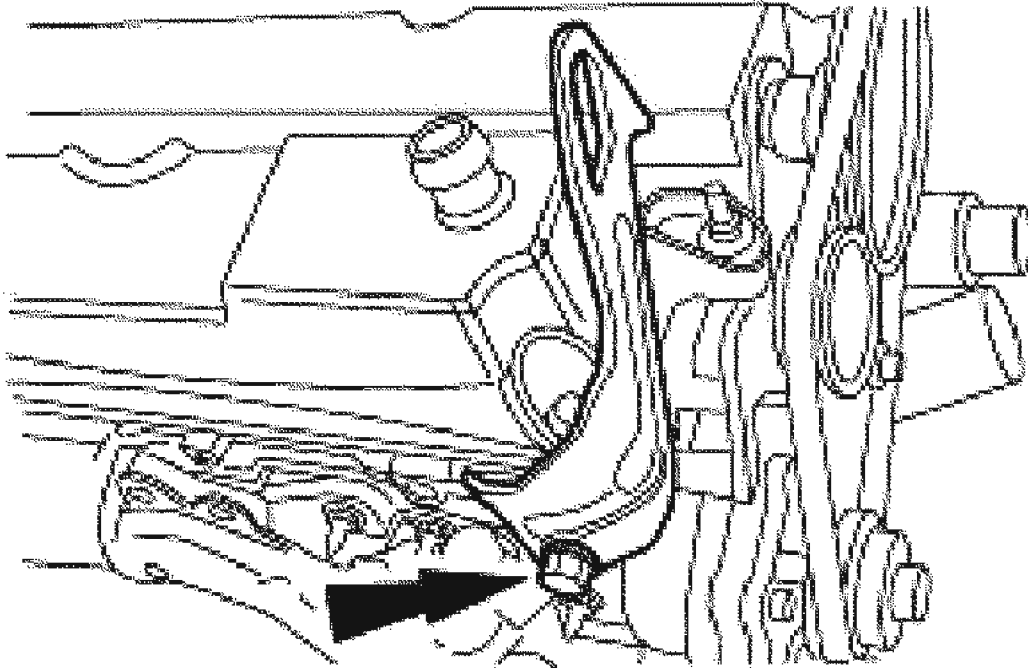
3. Remove the three LH coil-on-plugs.
  1. Disconnect the electrical connectors.
  2. Remove the bolts.
  3. Remove the coils.
4. Disconnect the wiring harness from the valve cover studs.



G02739220

**Fig. 47: Disconnecting Wiring Harness From Valve Cover Studs**  
Courtesy of FORD MOTOR CO.

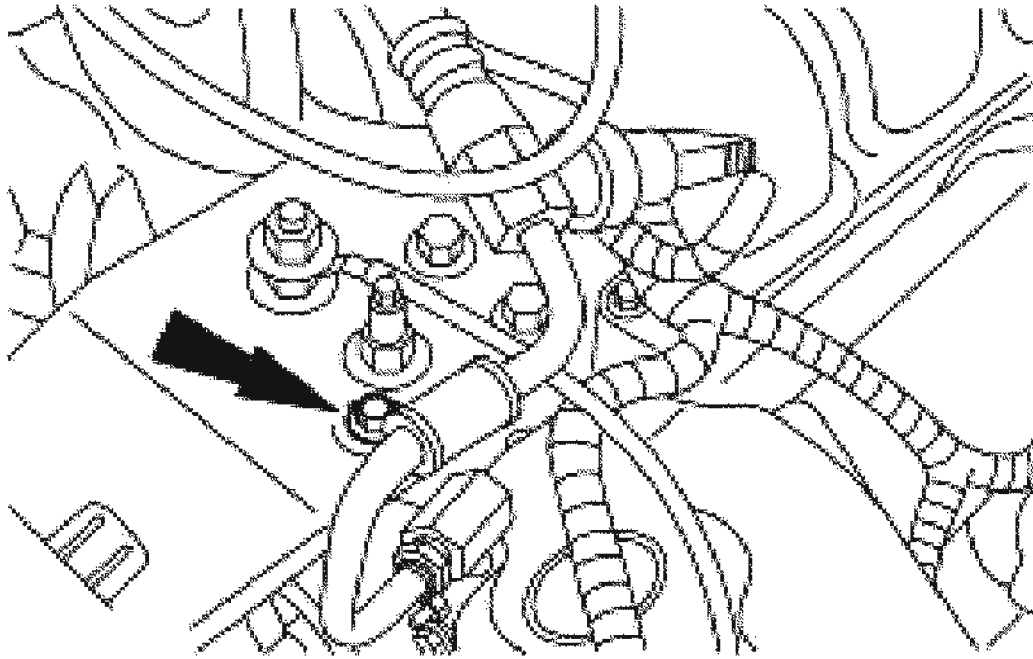
5. Remove the engine lift bracket.



G02739221

**Fig. 48: Removing Engine Lift Bracket**  
Courtesy of FORD MOTOR CO.

6. Position the power steering hose aside.
  - Remove the bolt.



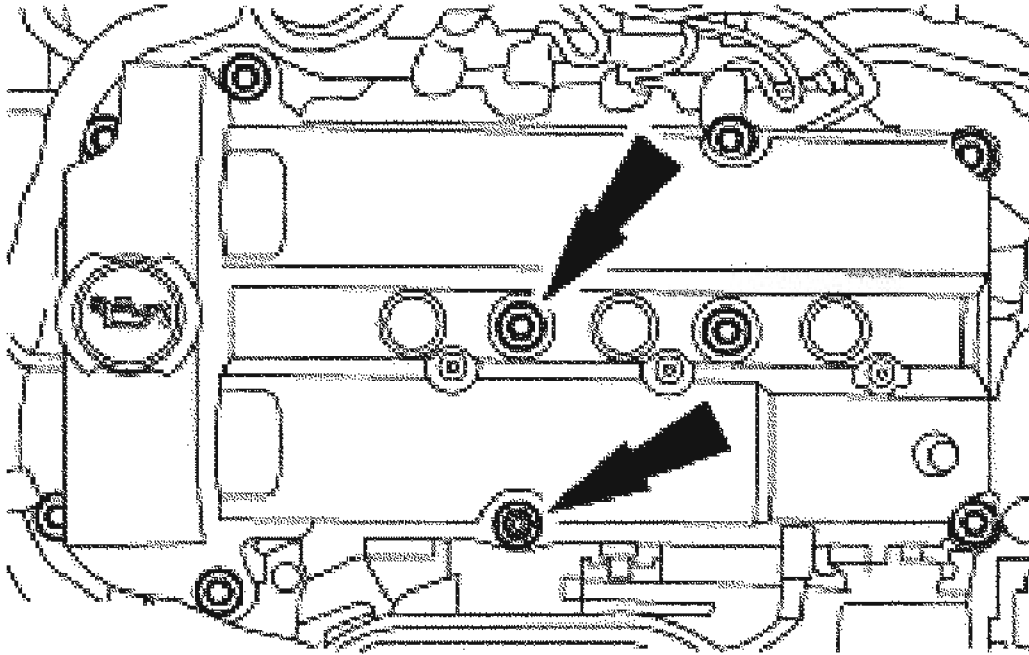
G02739222

**Fig. 49: Locating Bolt**

Courtesy of FORD MOTOR CO.

7. Remove the bolts, studs and the LH valve cover.
  - Remove and discard the gasket.





G02739223

**Fig. 50: Removing Bolts, Studs And LH Valve Cover**  
Courtesy of FORD MOTOR CO.

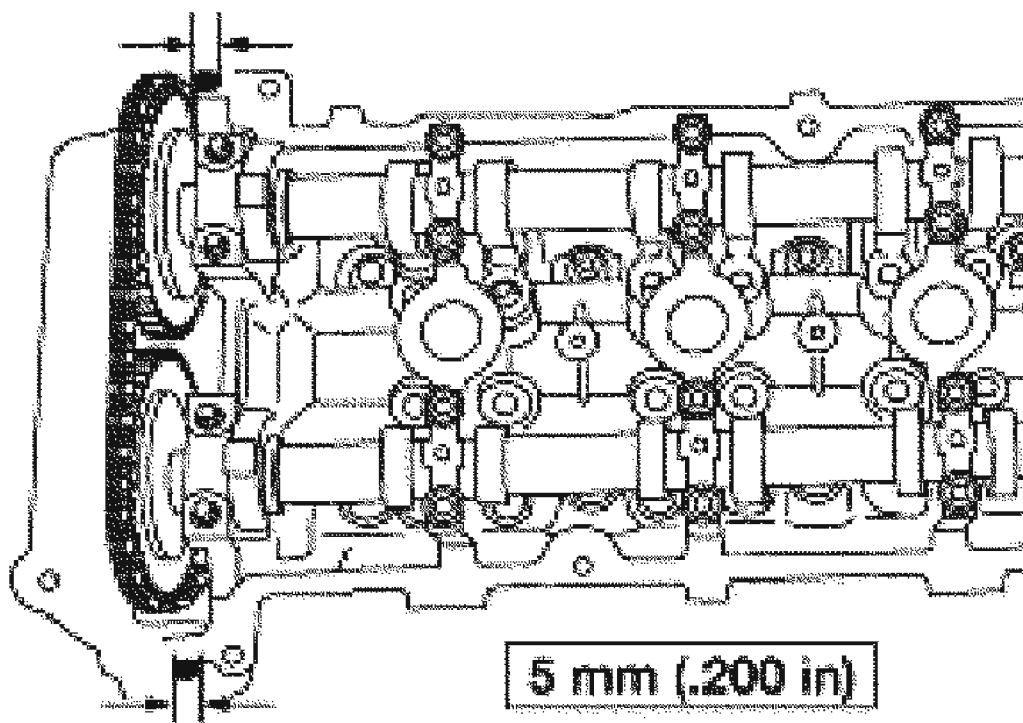
#### Installation

**NOTE:** Clean the valve cover sealing area before installing a new gasket.

1. Install a new gasket on the valve cover.

**NOTE:** Clean the head and the front cover sealing surfaces using metal surface cleaner before applying silicone gasket and sealant.

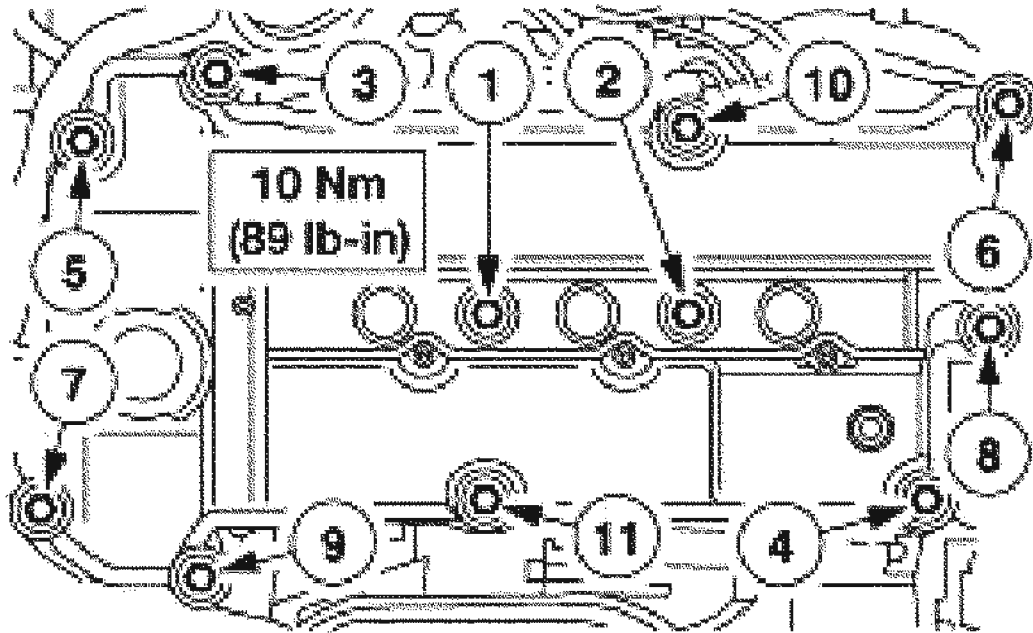
**NOTE:** The valve cover must be installed and the bolts tightened within four minutes of applying the sealant.



G02739224

**Fig. 51: Identifying Silicon Gasket Gap**  
Courtesy of FORD MOTOR CO.

2. Apply a 5 mm dot of silicone gasket sealant to the front cover to cylinder head joints.
3. Position the valve cover and install the studs and the bolts in the sequence shown.

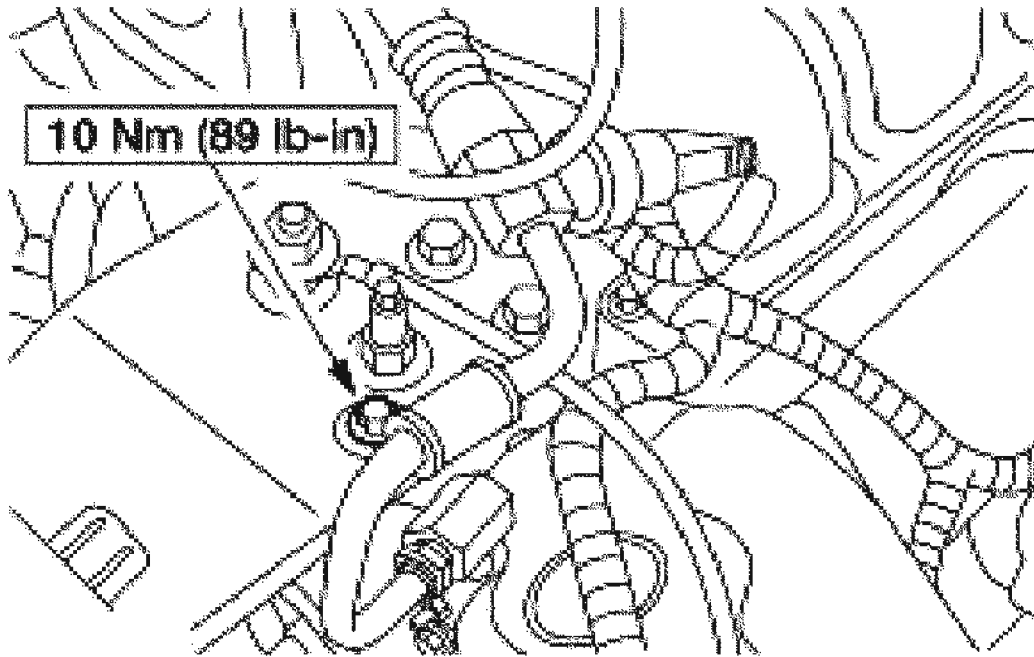


G02739225

**Fig. 52: Identifying Tightening Sequence & Torque Specification Of Valve Cover Studs & Bolts**

Courtesy of FORD MOTOR CO.

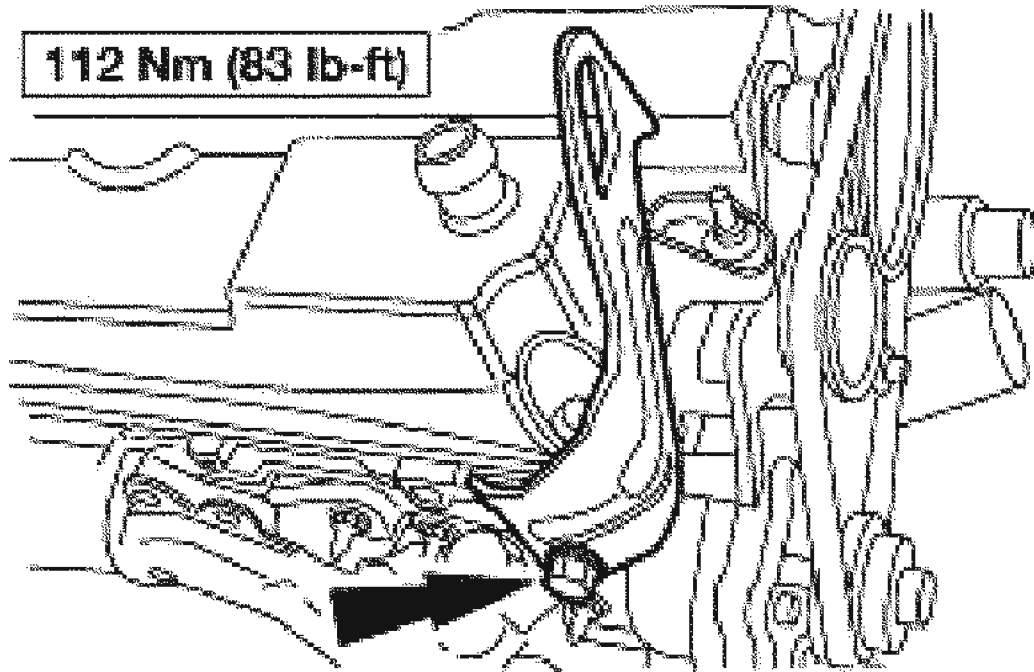
4. Position the power steering hose and install the bolt.



G02739226

**Fig. 53: Identifying Power Steering Hose Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

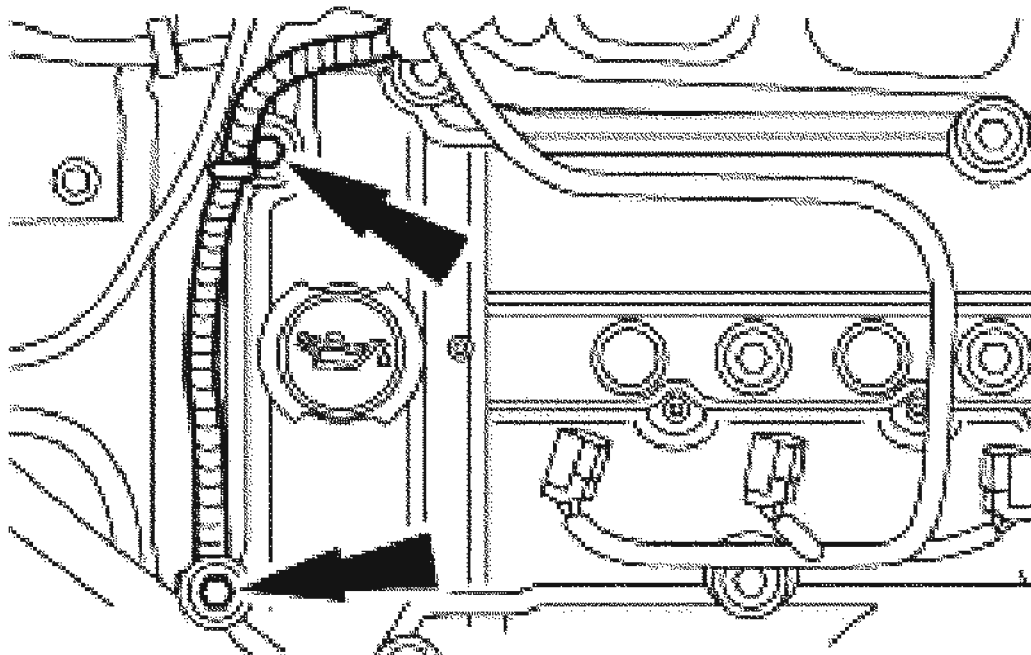
5. Position the engine lift bracket and install the bolt.



G02739227

**Fig. 54: Identifying Engine Lift Bracket Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

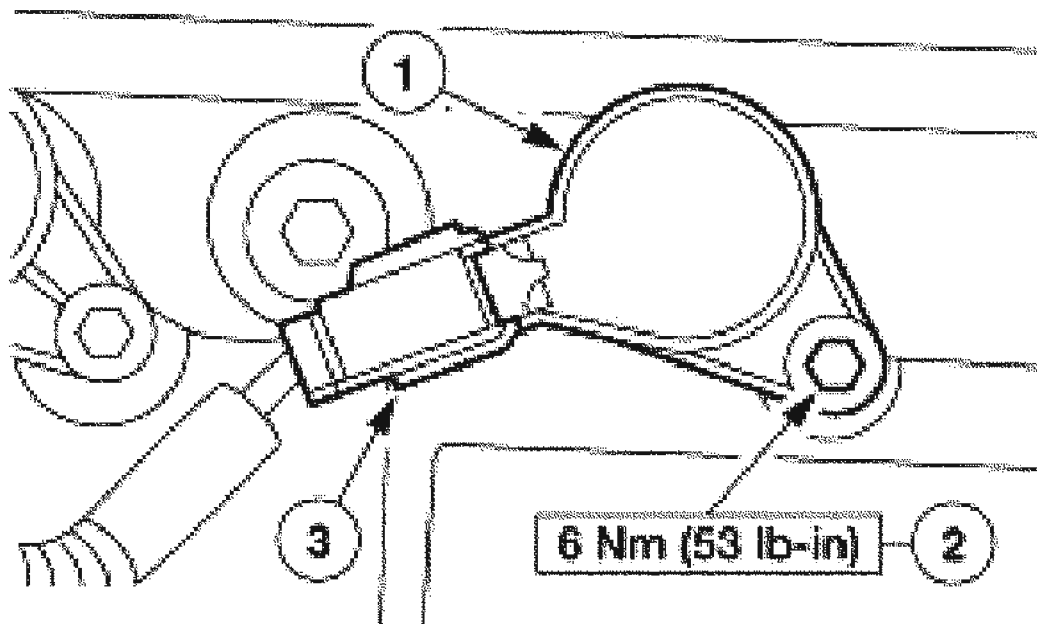
6. Connect the wiring harness to the valve cover studs.



G02739228

**Fig. 55: Connecting Wiring Harness**  
Courtesy of FORD MOTOR CO.

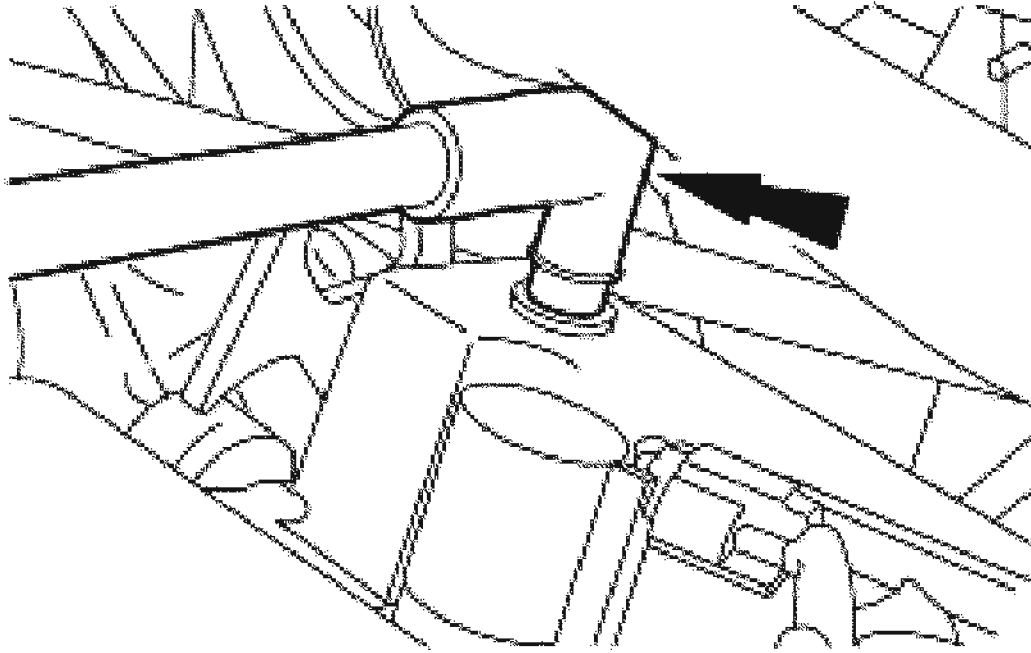
**NOTE:** Apply a light film of brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.



G02739229

**Fig. 56: Installing LH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

7. Install the three LH coil-on-plugs.
  1. Position the coils.
  2. Install the bolts.
  3. Connect the electrical connectors.
8. Connect the crankcase ventilation tube to the valve cover.



G02739230

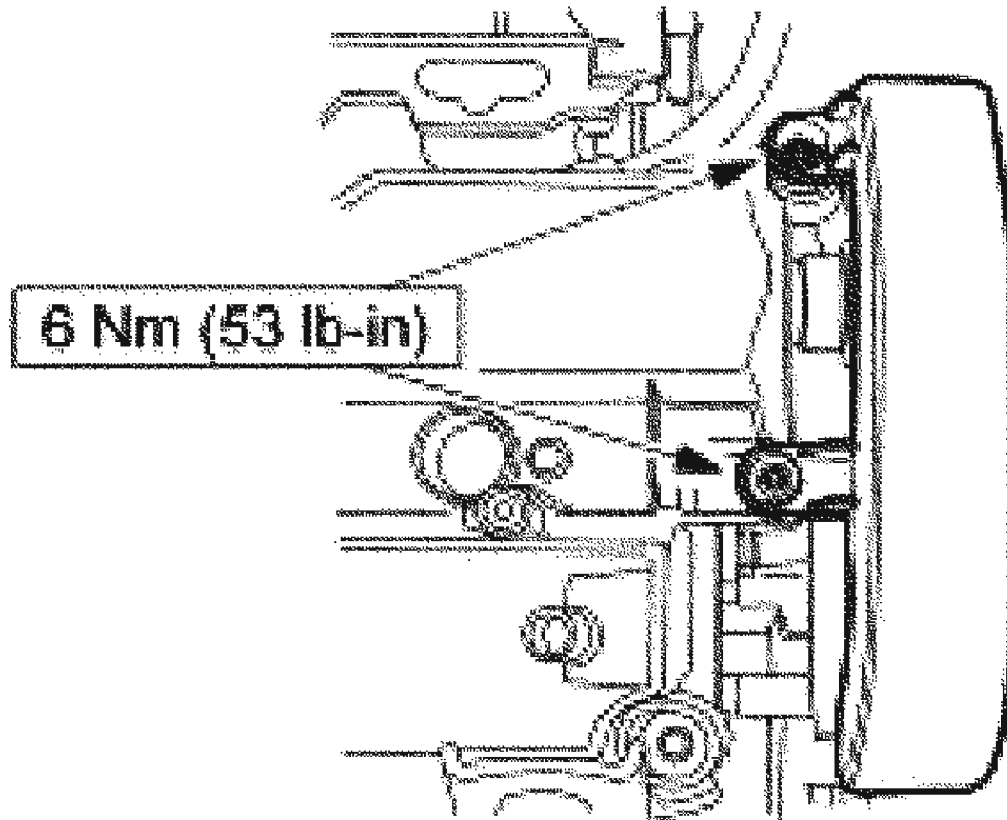
**Fig. 57: Identifying Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

9. Install the water pump belt cover.



## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739231

**Fig. 58: Identifying Water Pump Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

### VALVE COVER RH

#### Material

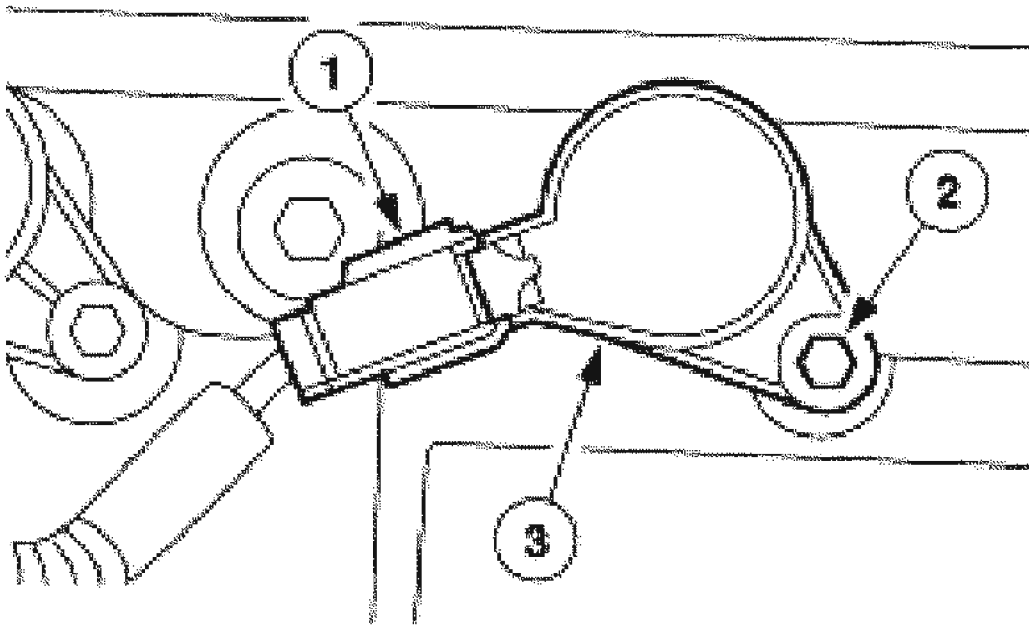
#### MATERIAL SPECIFICATION

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A ESE-M1C171-A	ESC-M1C171-A
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4

#### Removal

1. Remove the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .

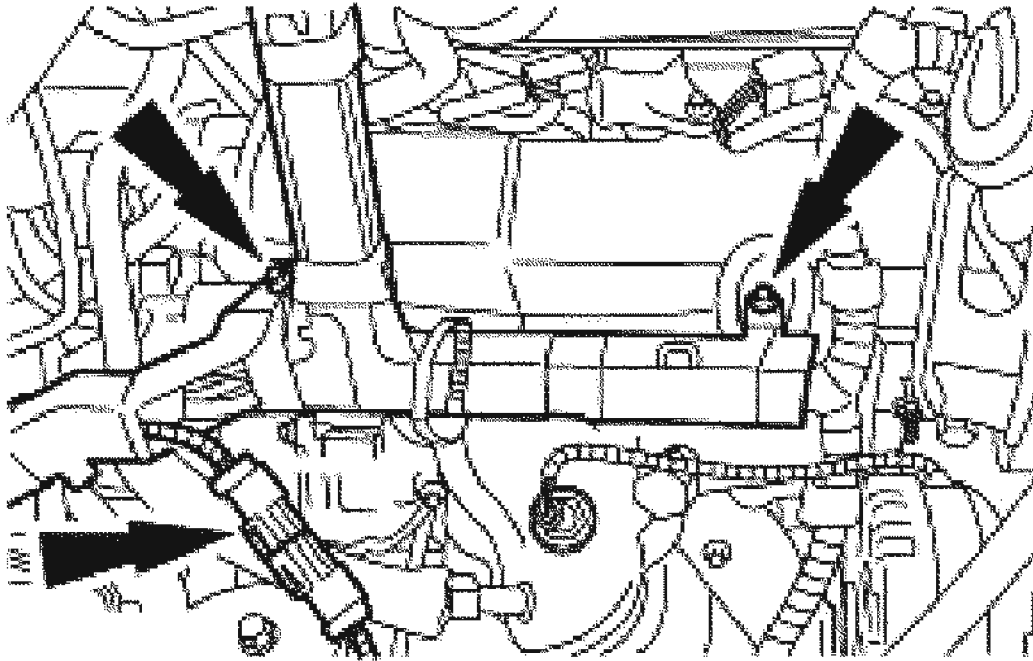
**CAUTION:** When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.



G02739232

**Fig. 59: Removing RH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

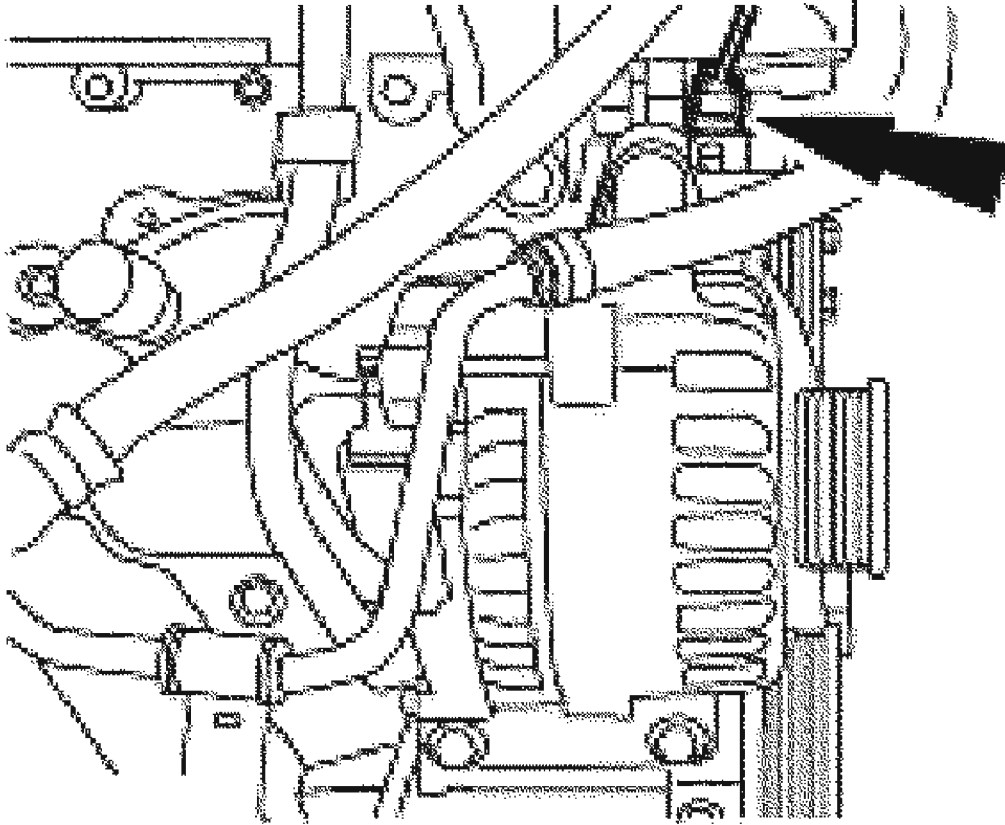
2. Remove the three RH coil-on-plugs.
  1. Disconnect the electrical connectors.
  2. Remove the bolts.
  3. Remove the coils.
3. Remove the wiring harness nuts and disconnect the oxygen sensor electrical connectors.



G02739233

**Fig. 60: Removing Wiring Harness Nuts**  
Courtesy of FORD MOTOR CO.

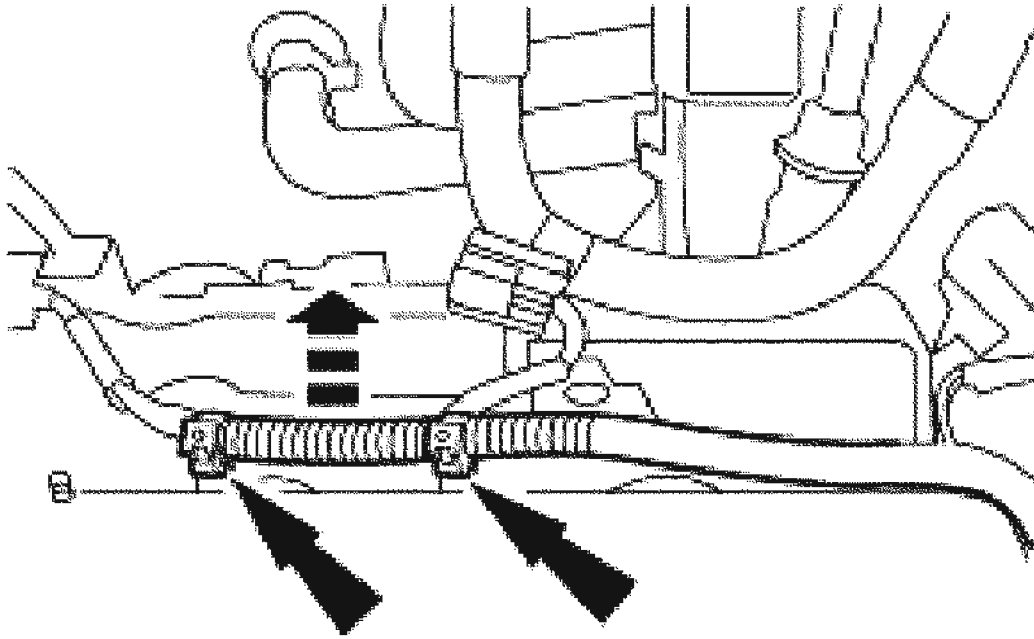
4. Remove the radio ignition interference capacitor.



**G02739234**

**Fig. 61: Removing Radio Ignition Interference Capacitor**  
Courtesy of FORD MOTOR CO.

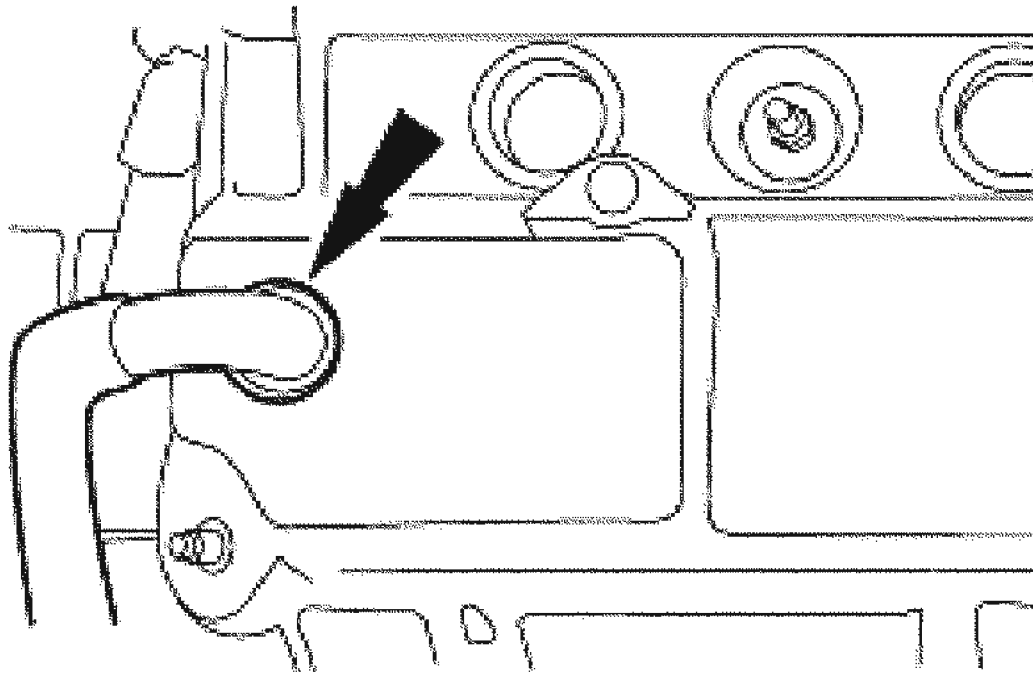
5. Separate the harness from the center locating pins and position aside.



G02739235

**Fig. 62: Separating Harness From Center Locating Pins**  
Courtesy of FORD MOTOR CO.

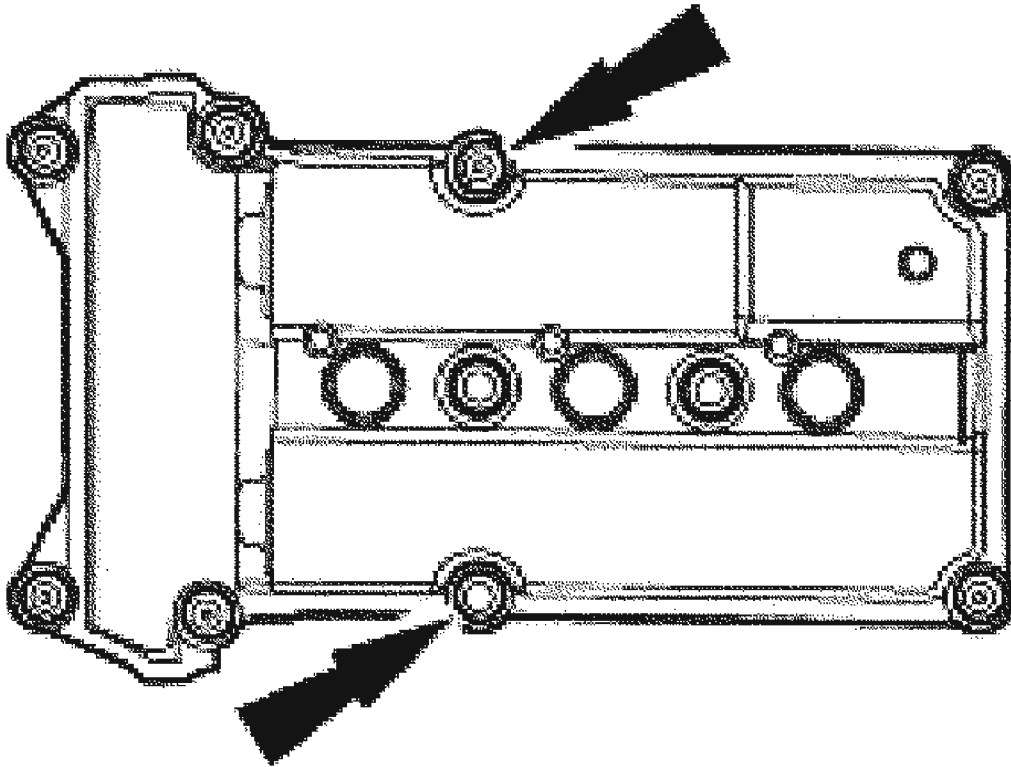
6. Disconnect the crankcase ventilation tube from the valve cover.



G02739236

**Fig. 63: Disconnecting Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

7. Remove the bolts, studs and the RH valve cover.
  - Remove and discard the gasket.



G02739237

**Fig. 64: Removing Bolts, Studs And RH Valve Cover**  
Courtesy of FORD MOTOR CO.

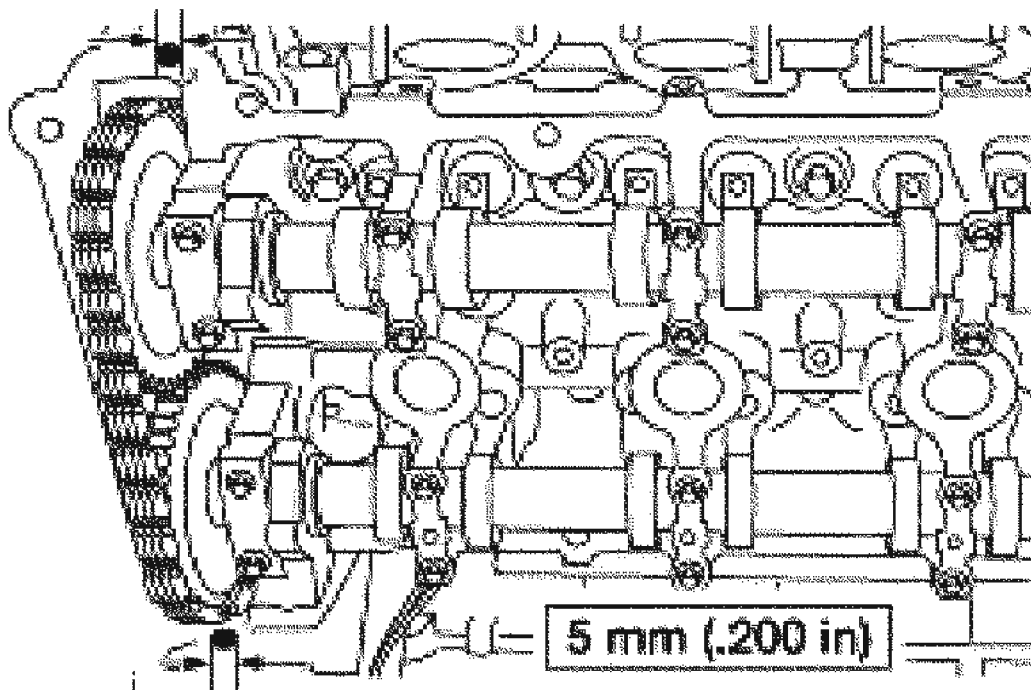
#### Installation

**NOTE:** Clean the valve cover sealing area before installing a new gasket.

1. Install a new valve cover gasket.

**NOTE:** Clean the head and front cover sealing surfaces using metal surface cleaner before applying silicone gasket and sealant.

**NOTE:** The valve cover must be installed and the bolts tightened within four minutes of applying the sealant.



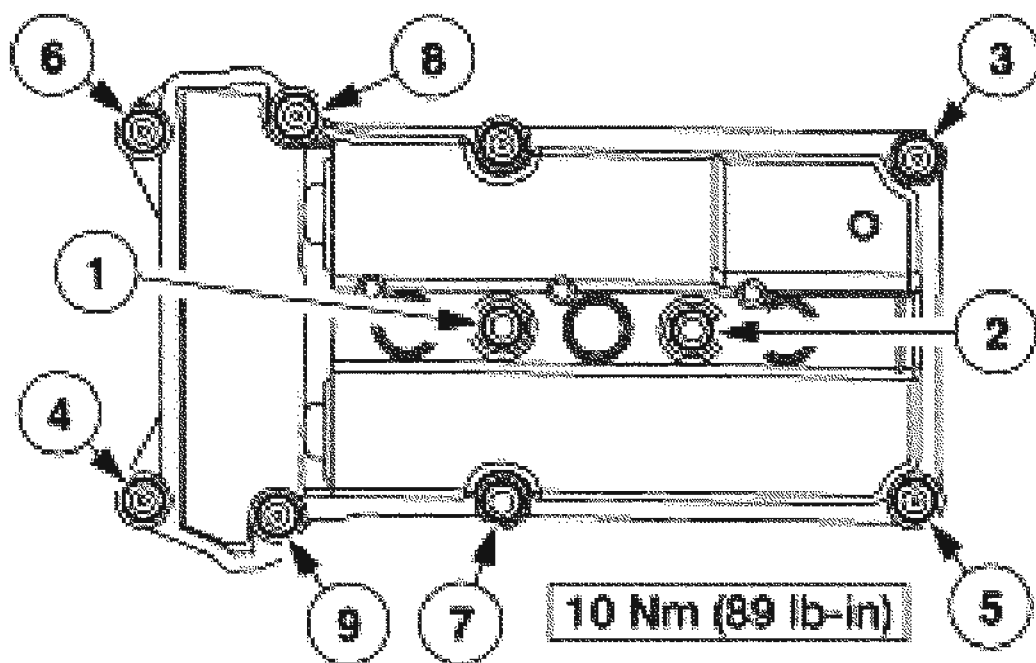
G02739238

**Fig. 65: Applying Silicone Gasket Sealant To Front Cover To Cylinder Head Joints**

Courtesy of FORD MOTOR CO.

2. Apply a 5 mm dot of silicone gasket sealant to the front cover to cylinder head joints.
3. Position the valve cover and install the bolt and the studs in the sequence shown.



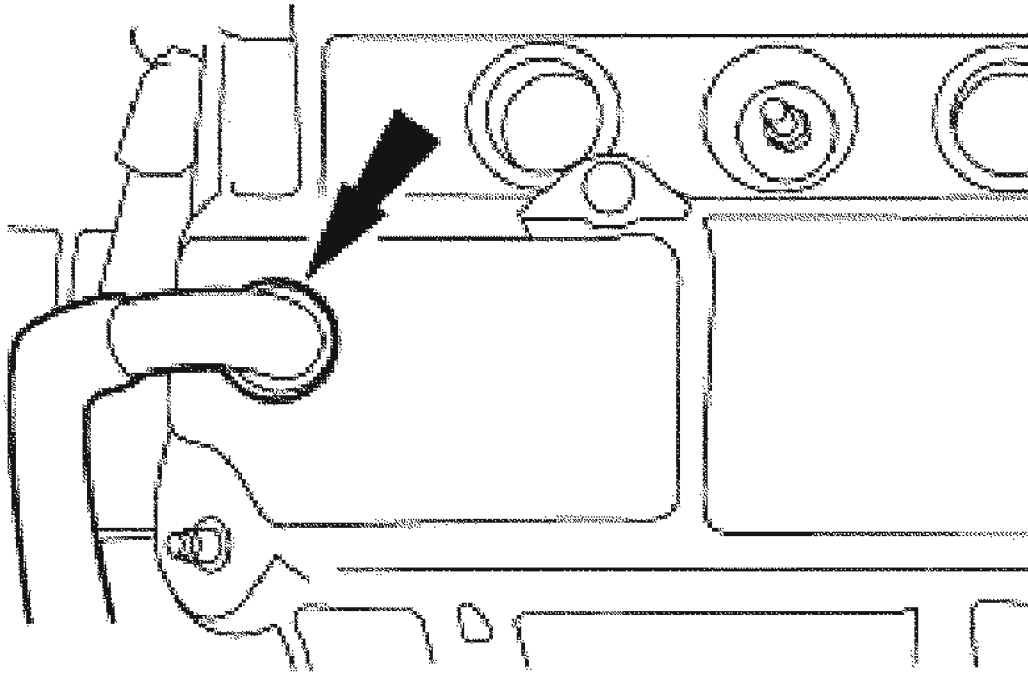


G02739239

**Fig. 66: Identifying Tightening Sequence & Torque Specification Of Valve Cover Bolt & Studs**

Courtesy of FORD MOTOR CO.

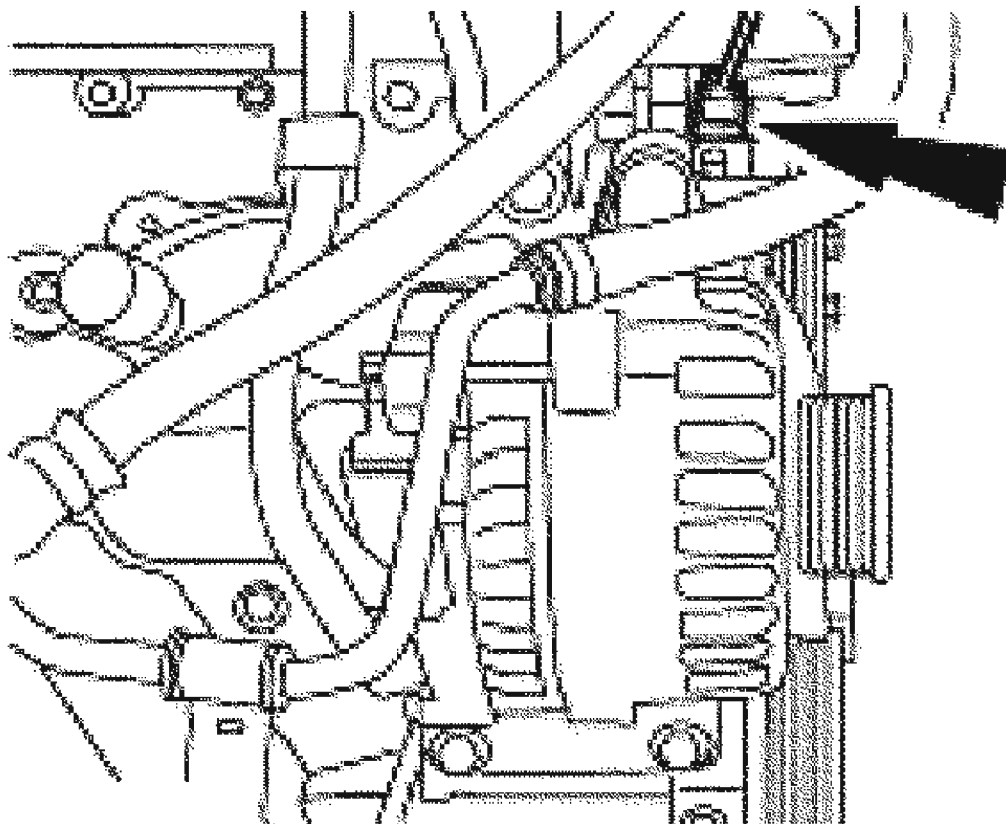
4. Connect the crankcase ventilation tube to the valve cover.



G02739240

**Fig. 67: Connecting Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

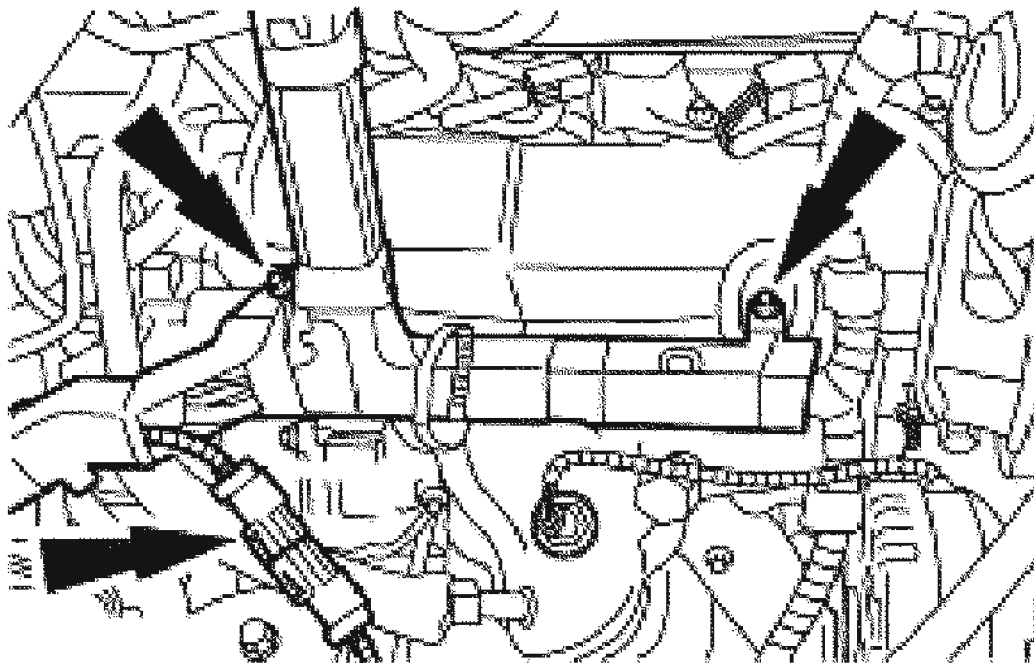
5. Connect the radio ignition interference capacitor.



**G02739241**

**Fig. 68: Connecting Radio Ignition Interference Capacitor**  
Courtesy of FORD MOTOR CO.

6. Connect the O2 sensor electrical connectors and wiring harness to the RH valve cover stud.

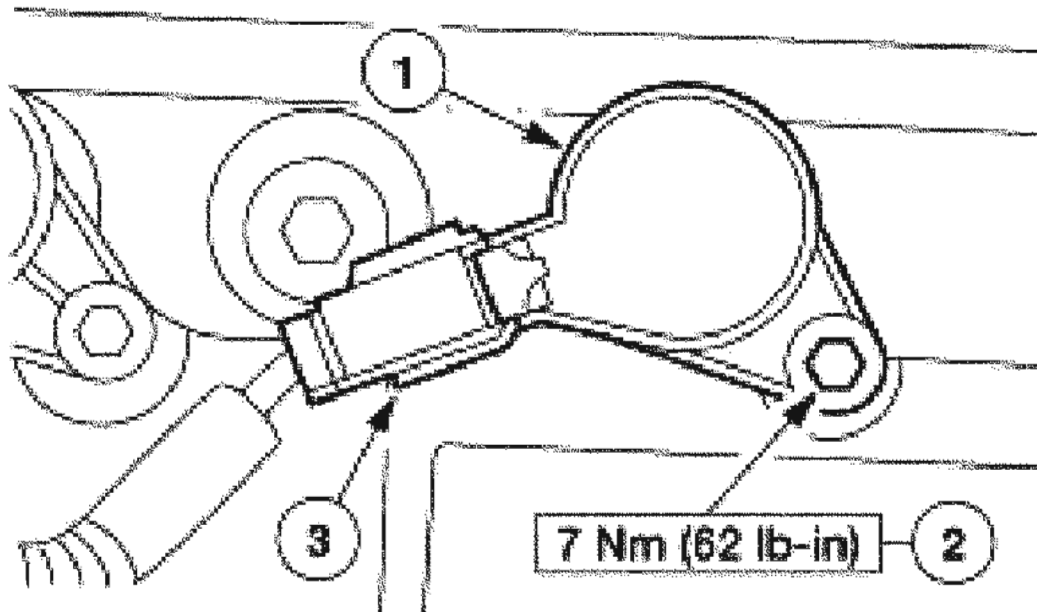


G02739242

**Fig. 69: Connecting O2 Sensor Electrical Connectors And Wiring Harness To RH Valve Cover Stud**

Courtesy of FORD MOTOR CO.

**NOTE:** Apply a light film of brake caliper and grease compound to the interior of the spark plug boot prior to installation.



G02739243







**Fig. 70: Identifying RH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

7. Install the three RH coil-on-plugs.
  1. Position the coils.
  2. Install the bolts.
  3. Connect the electrical connectors.
8. Install the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .

**CAMSHAFTS LH**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Service Set, Water Pump Pulley 303-S455 (T94P-6312-AH)
	Remover, Crankshaft Vibration Damper 303-009 (T58P-6316-D)
	Remover, Oil Seal 303-409 (T92C-6700-CH)
	Installer, Camshaft Oil Seal 303-464 (T94P-6256-BH)
	Protector, Camshaft Oil Seal 303-463 (T94P-6256-AH)
	Installer, Power Steering Pump Pulley 211-185 (T91P-3A733-A)

G0273B244

**Fig. 71: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

Material

**MATERIAL SPECIFICATION**

## 2004 Ford Escape

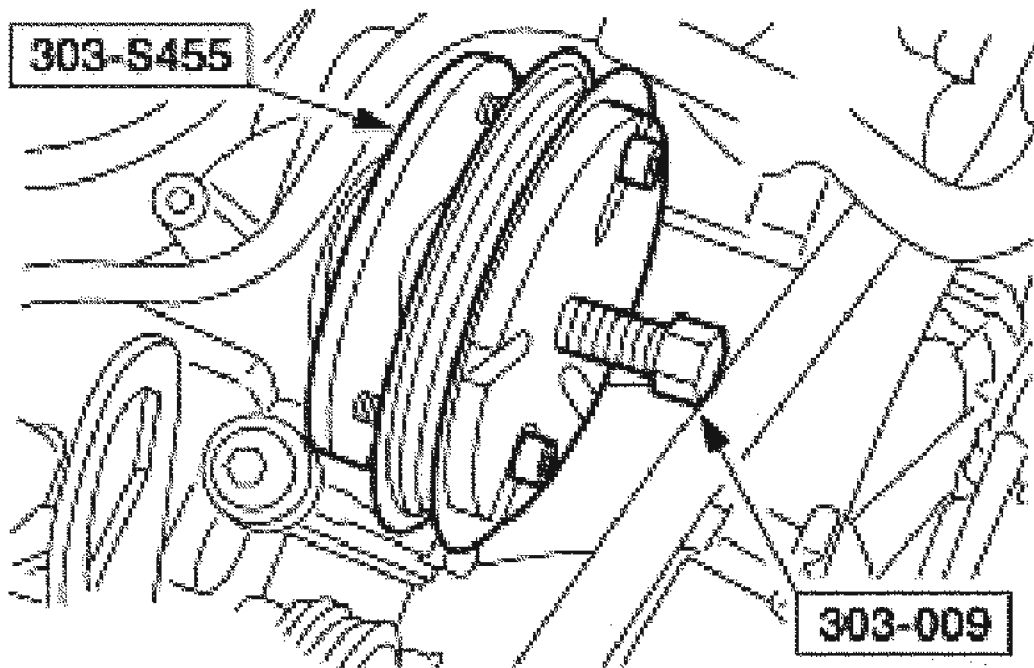
2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the water pump belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. The service pulley is pressed on flush to the end of the camshaft.



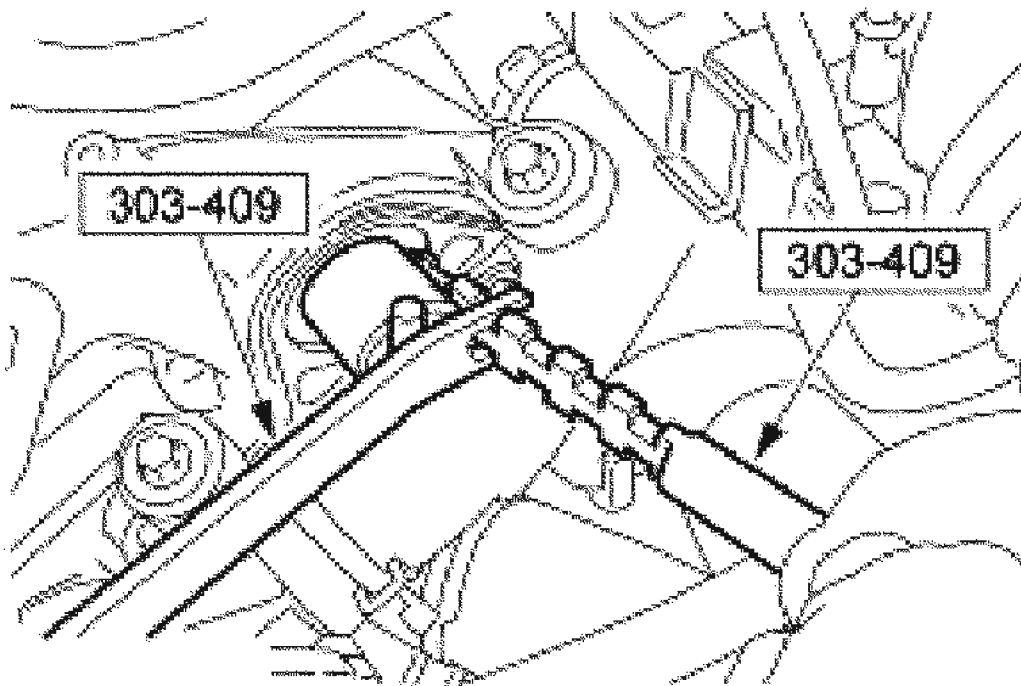
G02739245

**Fig. 72: Removing Water Pump Drive Pulley Using Special Tool**  
Courtesy of FORD MOTOR CO.

2. Using the special tools, remove the water pump drive pulley and discard.
3. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

**NOTE:** To make sure of correct sealing, do not scratch the

camshaft.

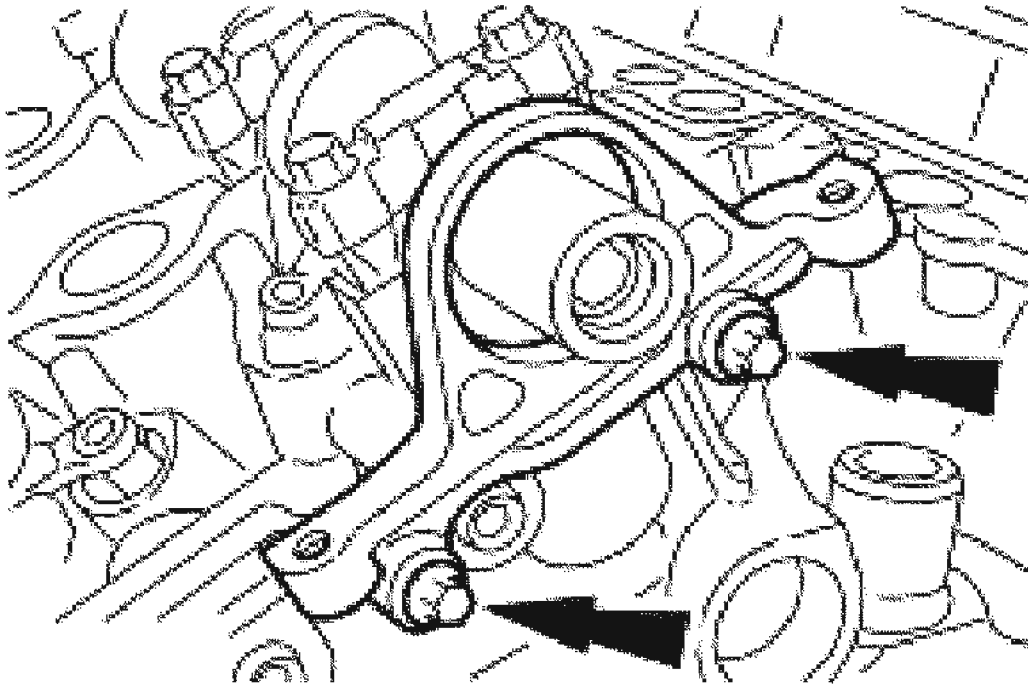


G02739246

**Fig. 73: Removing Camshaft Oil Seal Using Special Tool**  
Courtesy of FORD MOTOR CO.

4. Using the special tools, remove the camshaft oil seal and discard.
5. Remove the bolts, the camshaft oil seal retainer and discard the press-in-place gasket.

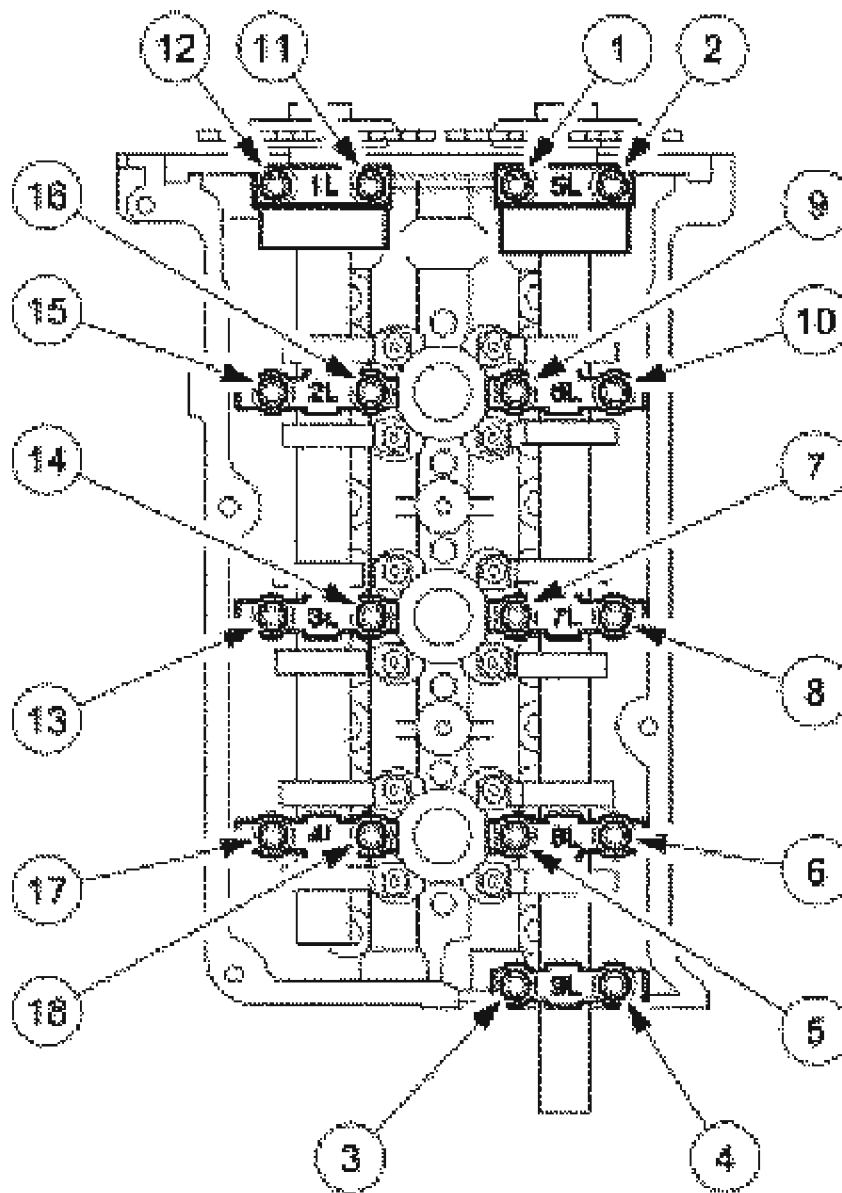




G02739247

**Fig. 74: Removing Camshaft Oil Seal Retainer**  
Courtesy of FORD MOTOR CO.

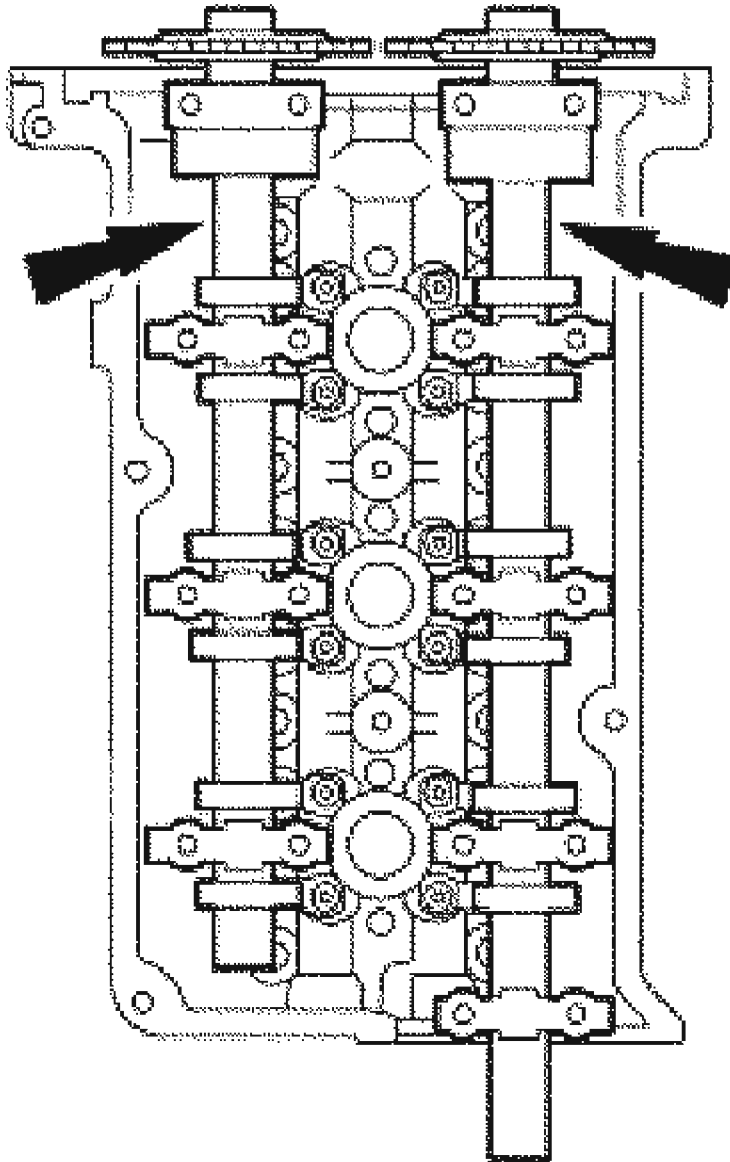
**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled in their original positions.



G02739248

**Fig. 75: Identifying Camshaft Journal Caps Loosening Sequence**  
Courtesy of FORD MOTOR CO.

6. Loosen the LH camshaft cap bolts evenly in the sequence shown to allow the camshafts to rise from the cylinder head and remove the caps.
7. Remove the camshafts.

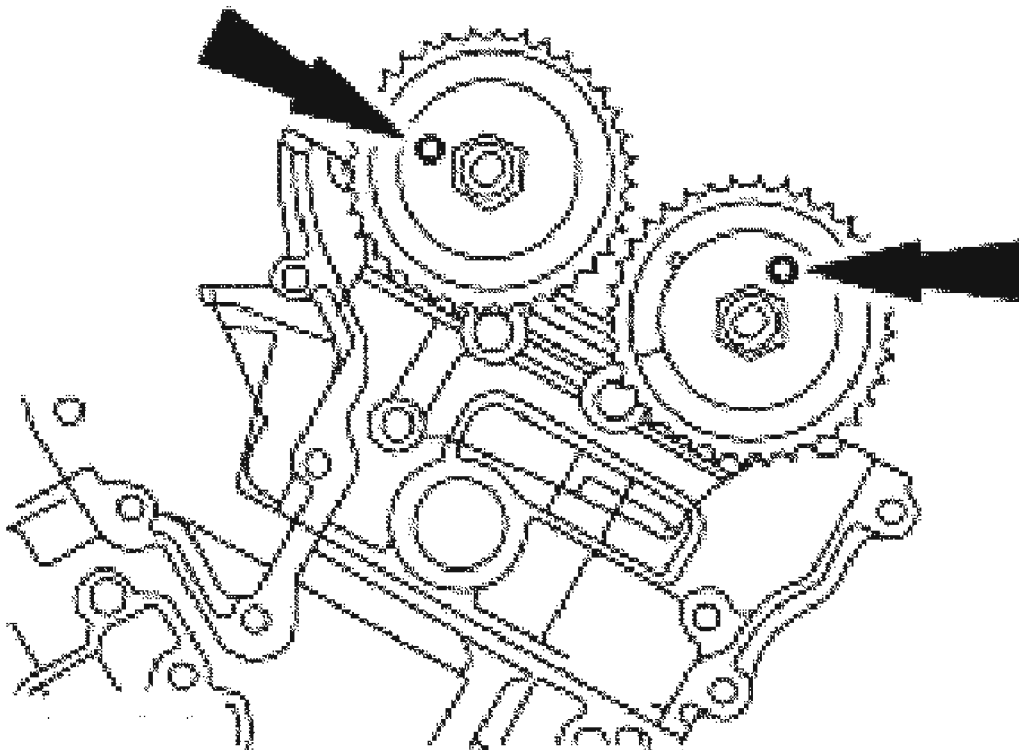


G02739249

**Fig. 76: Removing Camshafts**  
Courtesy of FORD MOTOR CO.

#### Installation

**NOTE:** Be sure camshaft bearing caps are installed in the original positions.

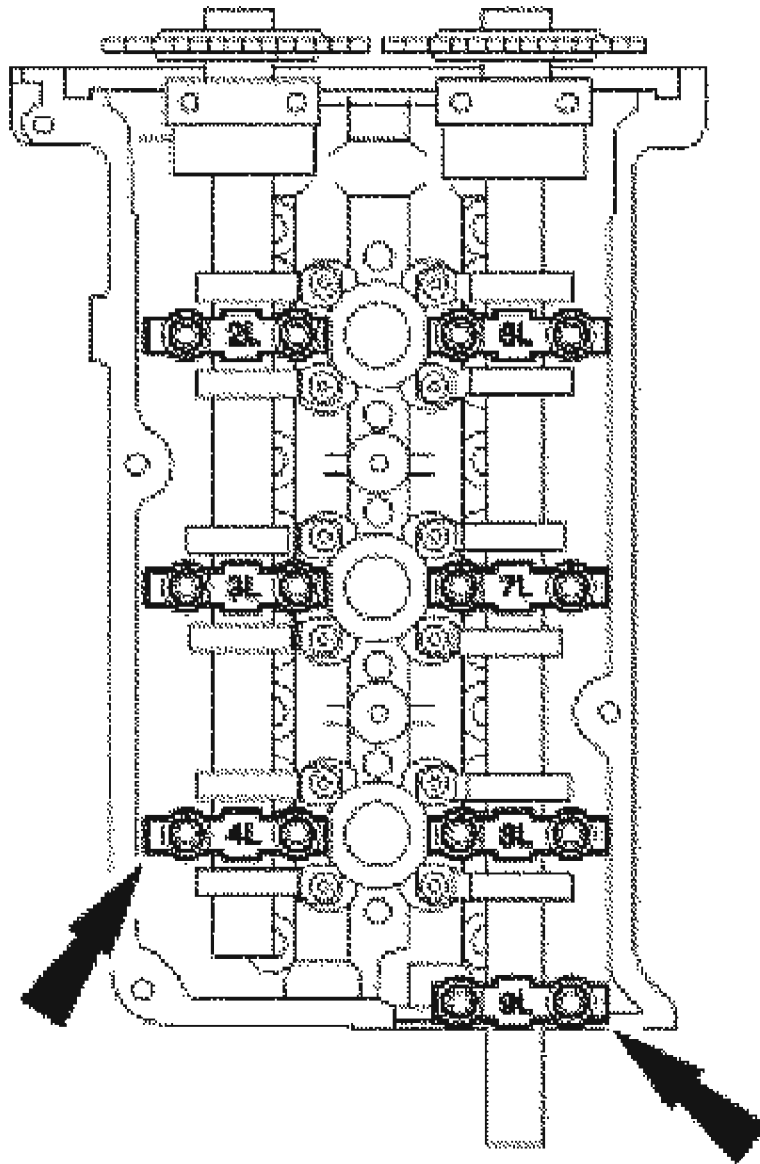


G02739250

**Fig. 77: Aligning Camshafts**  
Courtesy of FORD MOTOR CO.

1. Lubricate camshafts with clean engine oil and carefully position the camshafts into the cylinder head.
  - Align the camshafts as shown.

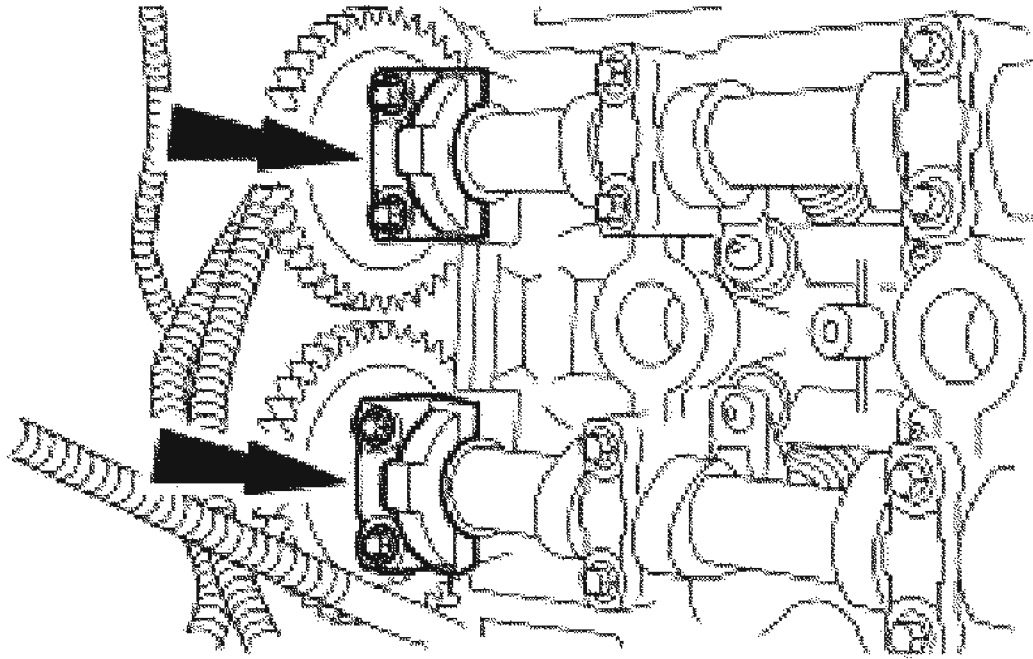
**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps can occur.



G02739251

**Fig. 78: Lubricating Bearing Surfaces**  
Courtesy of FORD MOTOR CO.

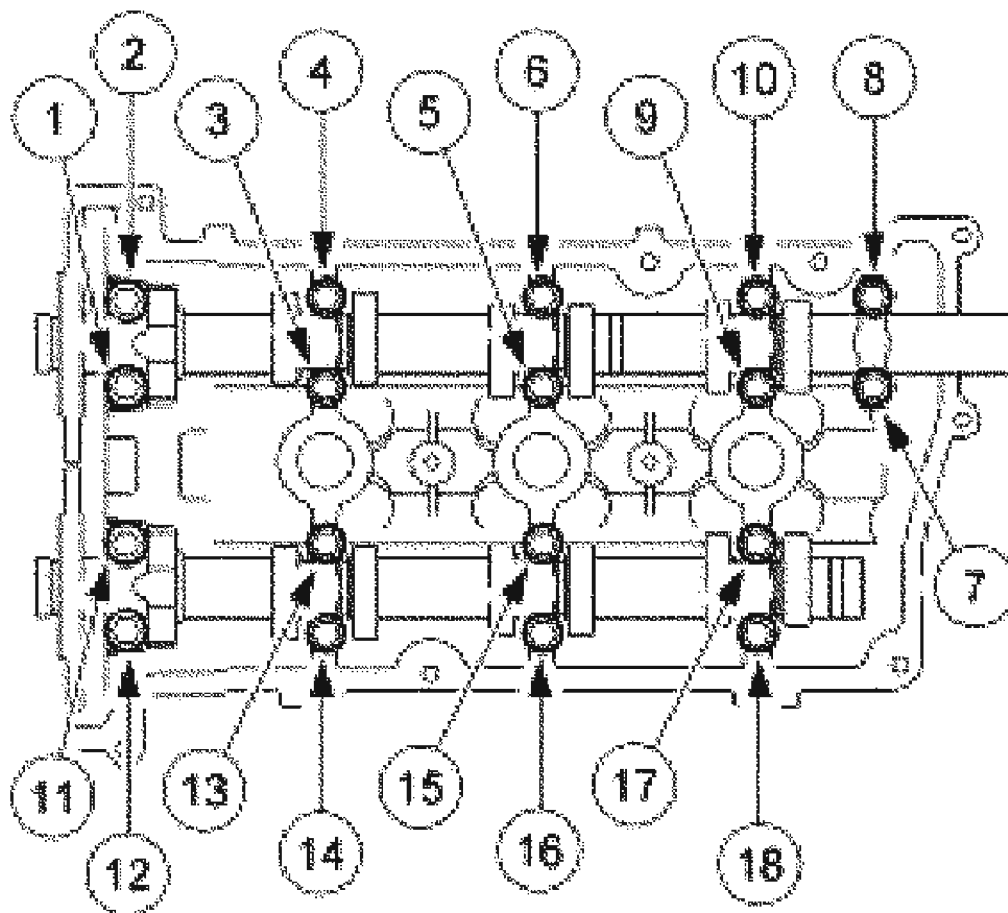
2. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil. Install the bearing caps and loosely install the bolts.
3. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil. Install the bearing thrust caps and loosely install the bolts.



G02739252

**Fig. 79: Installing Bearing Thrust Caps**  
Courtesy of FORD MOTOR CO.

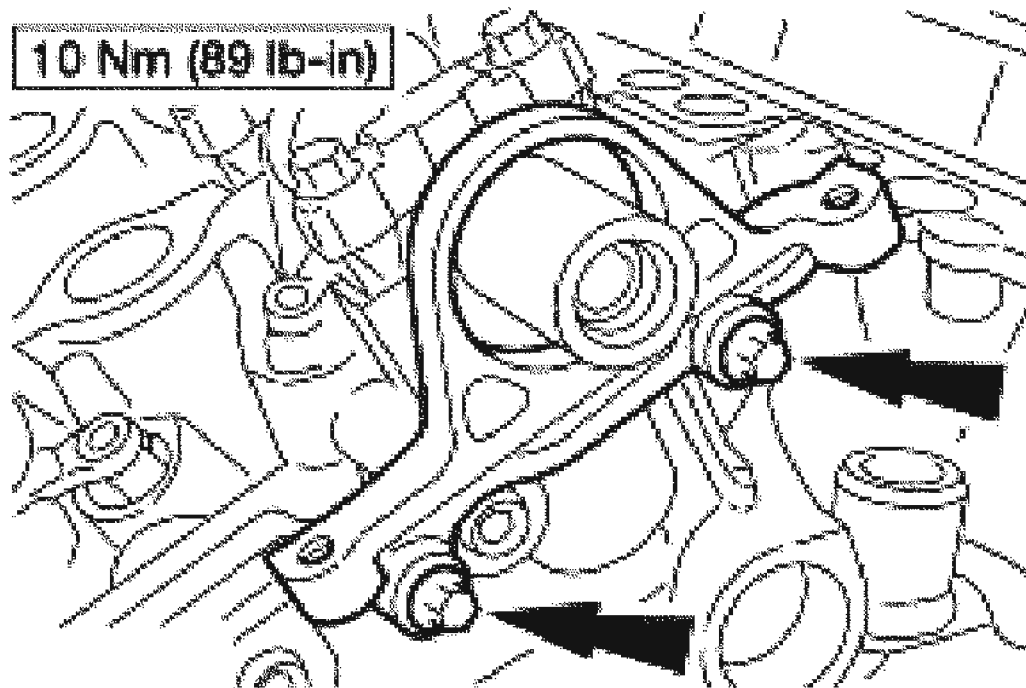
4. Tighten the bolts in the sequence shown.



G02739253

**Fig. 80: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean and degrease the sealing surfaces with metal surface cleaner.



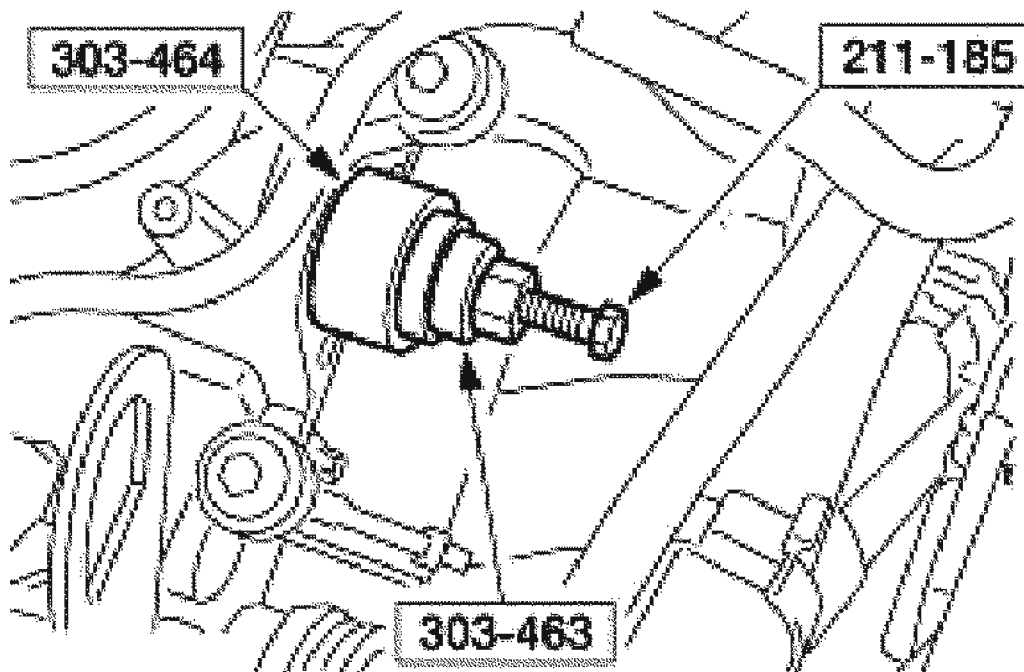
G02739254

**Fig. 81: Identifying Camshaft Oil Seal Retainer Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

5. Install a new press-in-place gasket and install the camshaft oil seal retainer.
6. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** .

**NOTE:**      Lubricate the camshaft oil seal with clean engine oil.

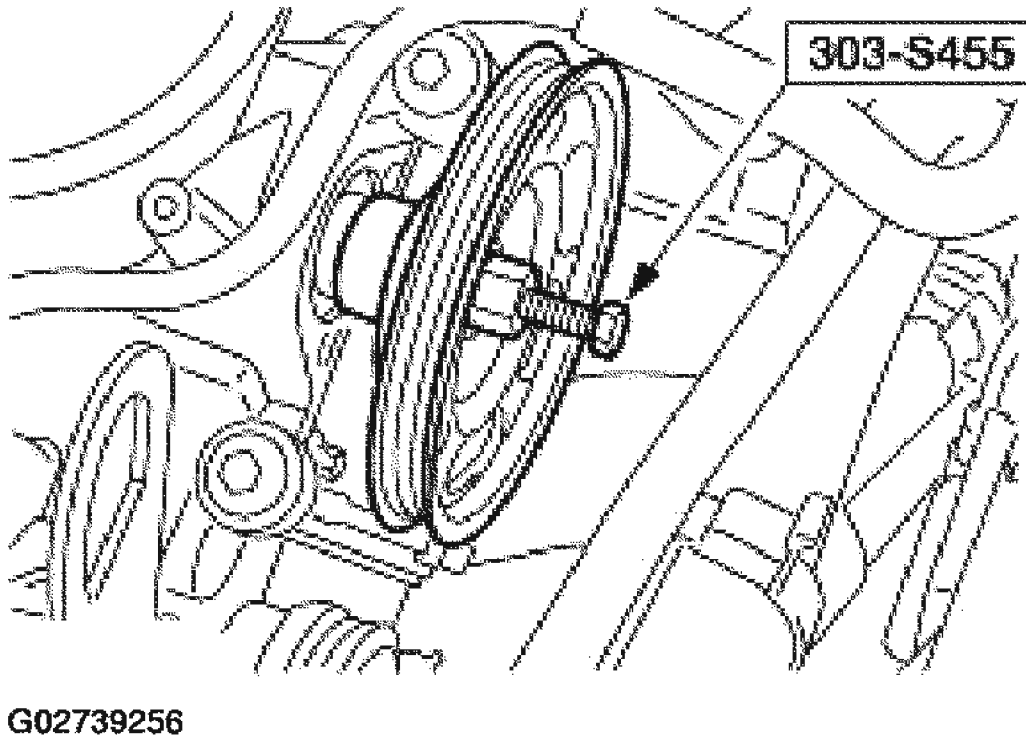




**Fig. 82: Installing Camshaft Oil Seal**  
Courtesy of FORD MOTOR CO.

7. Using special tools, install a new camshaft oil seal.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the camshaft. The service pulley is pressed on flush to the end of the camshaft.



**Fig. 83: Installing Service Water Pump Drive Pulley**  
Courtesy of FORD MOTOR CO.

8. Using the special tool, install a new service water pump drive pulley.
9. Install the water pump belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING** .

## CAMSHAFTS RH

### Material

## MATERIAL SPECIFICATION

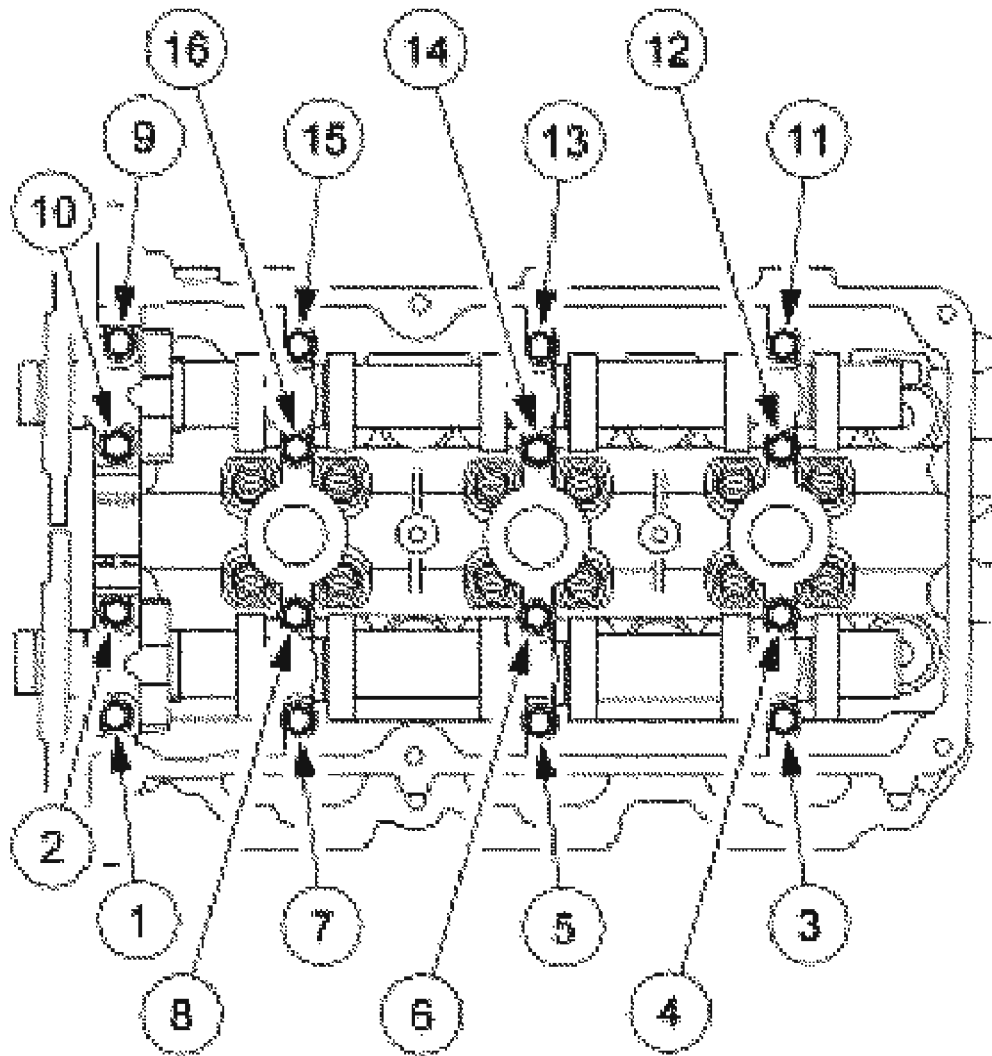
Item	Specification
SAE 5W - Premium Synthetic Blend Motor Oil W XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** .

**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled

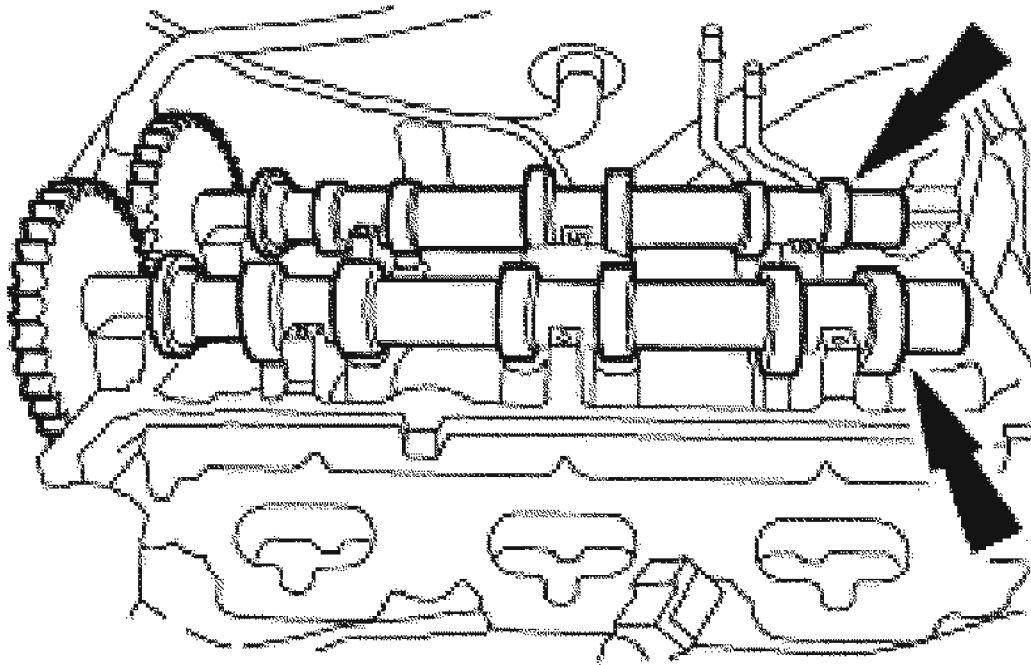
in their original positions.



G02739257

**Fig. 84: Identifying RH Camshaft Cap Bolts Loosening Sequence**  
Courtesy of FORD MOTOR CO.

2. Loosen the RH camshaft cap bolts evenly in the sequence shown to allow the camshafts to rise from the cylinder head and remove the caps.
3. Remove the camshafts.

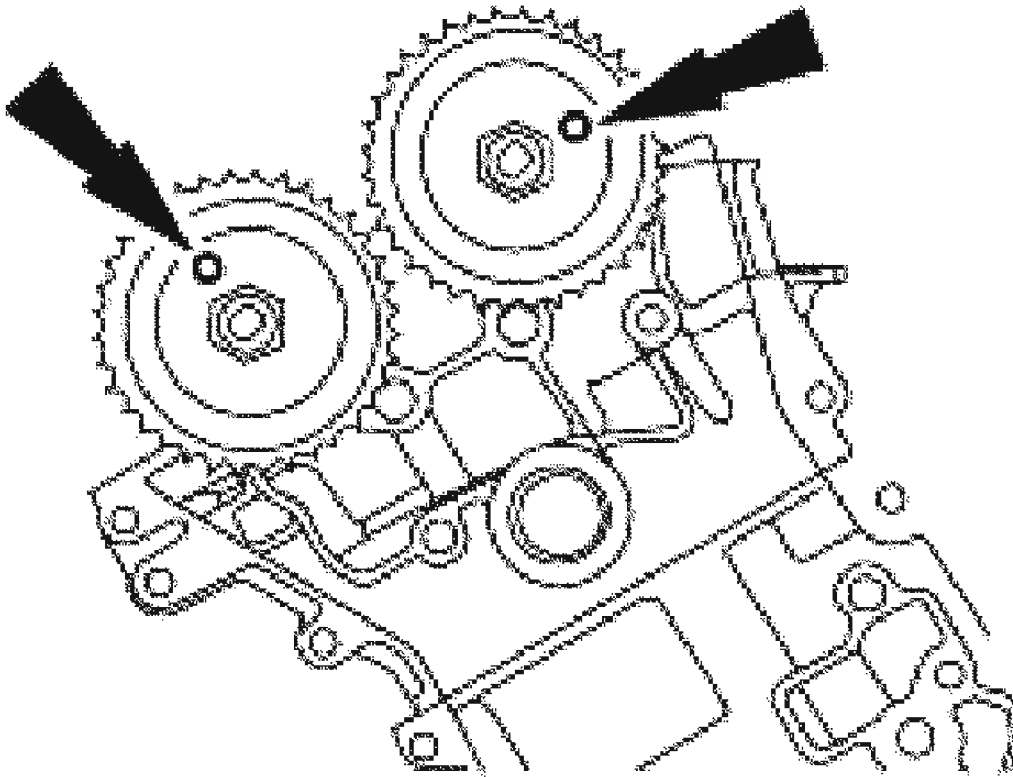


G02739258

**Fig. 85: Removing Camshafts**  
Courtesy of FORD MOTOR CO.

**Installation**

**NOTE:** Be sure camshaft bearing caps are installed in the original positions.

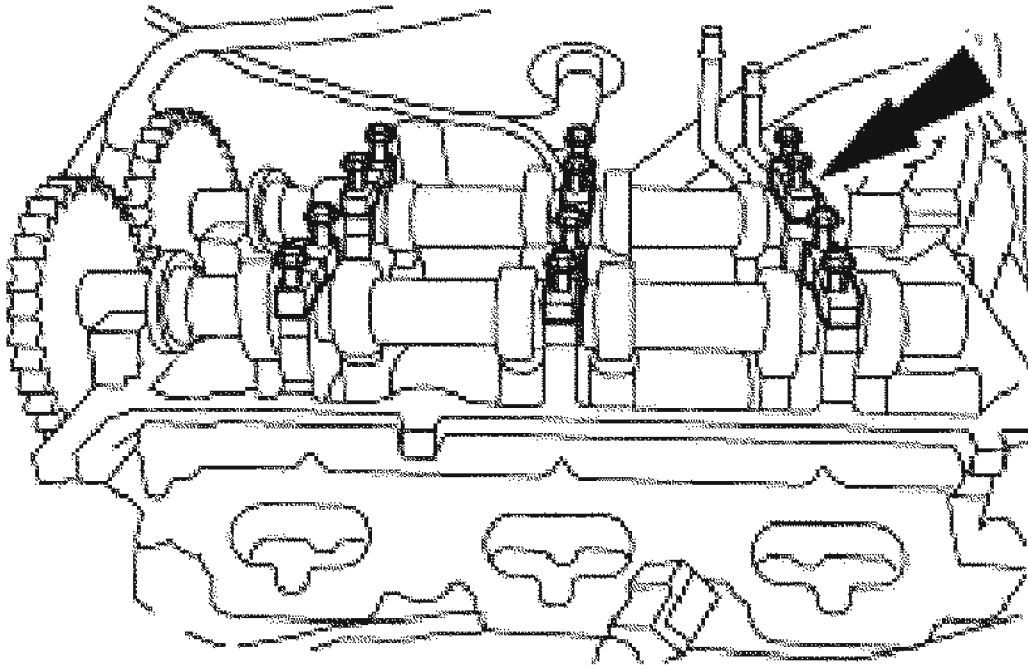


G02739259

**Fig. 86: Aligning Camshafts**  
Courtesy of FORD MOTOR CO.

1. Lubricate camshafts with clean engine oil and carefully position the camshafts into the cylinder head.
  - Align the camshafts as shown.

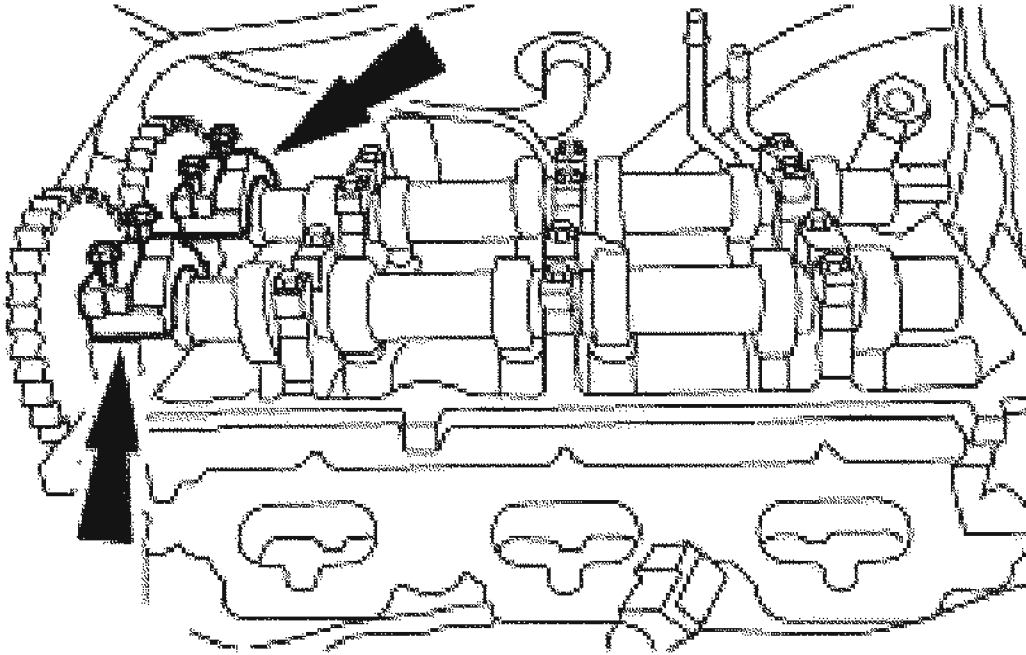
**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.



G02739260

**Fig. 87: Lubricating Bearing Surfaces Of Camshaft Bearing Caps**  
Courtesy of FORD MOTOR CO.

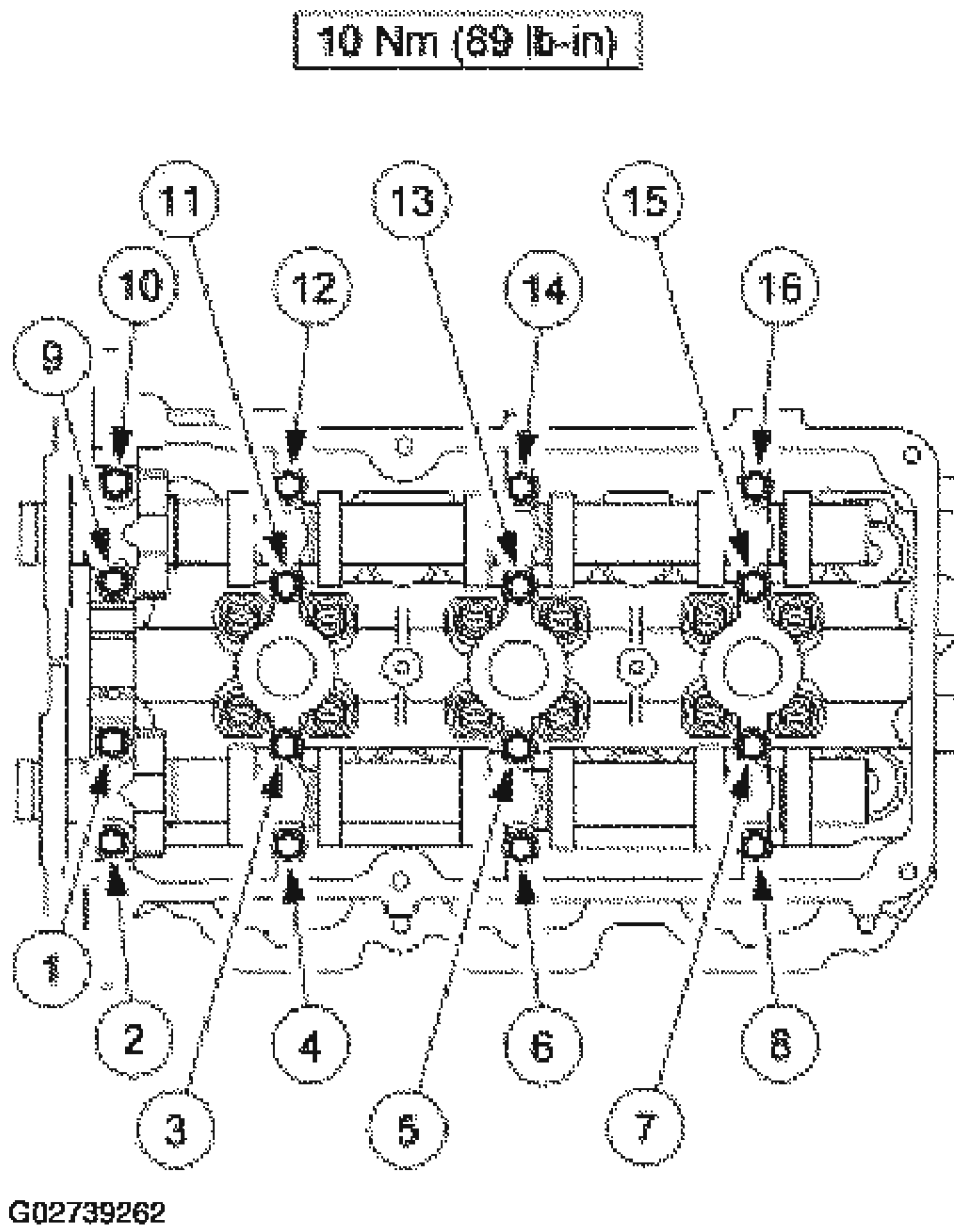
2. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil and install the bearing caps and loosely install the bolts.
3. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil. Install the bearing thrust caps and loosely install the bolts.



G02739261

**Fig. 88: Installing Bearing Thrust Caps**  
Courtesy of FORD MOTOR CO.

4. Tighten the bolts in the sequence shown.



**Fig. 89: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

5. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

#### **TIMING DRIVE COMPONENTS**

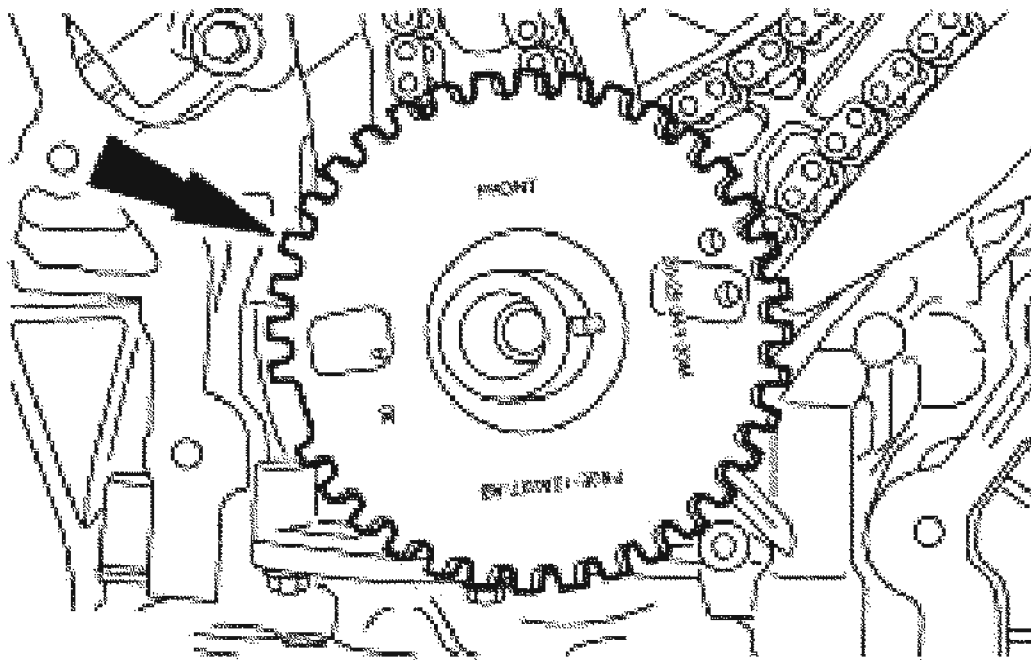


## Removal

**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.

1. Remove the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.

**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "20-25-34Y-30M" (color blue).



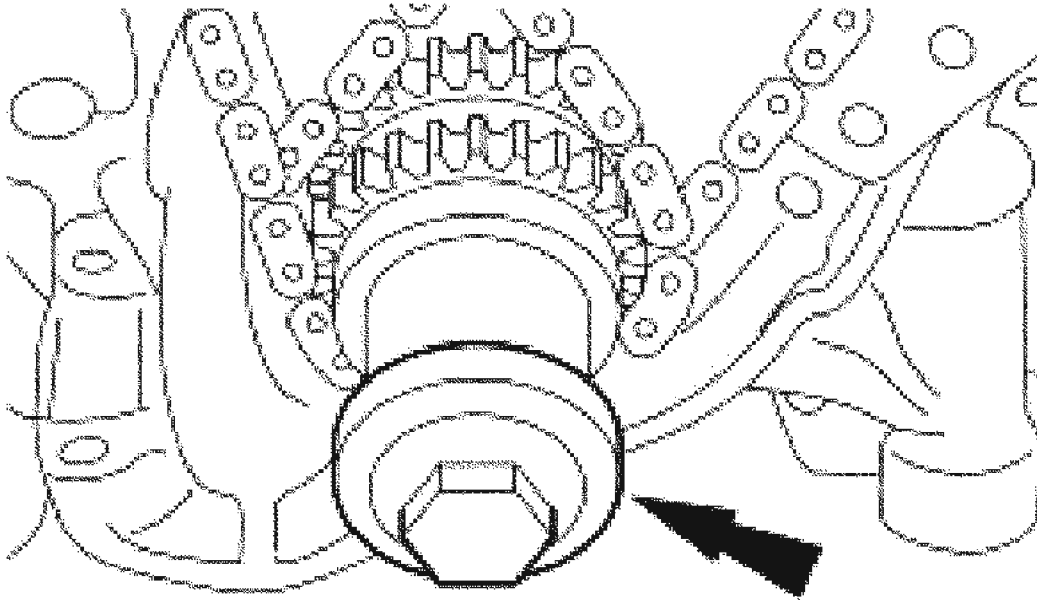
G02739263

**Fig. 90: Identifying Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

2. Remove the ignition pulse wheel.
3. Install the damper bolt.

## 2004 Ford Escape

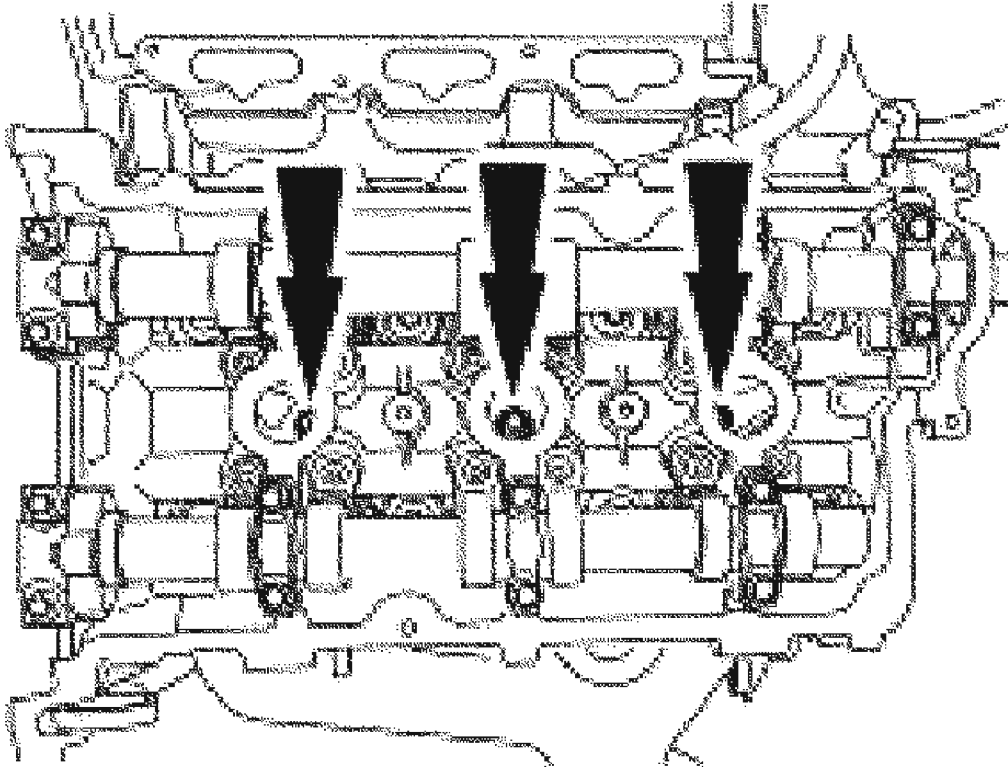
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739264

**Fig. 91: Installing Damper Bolt**  
Courtesy of FORD MOTOR CO.

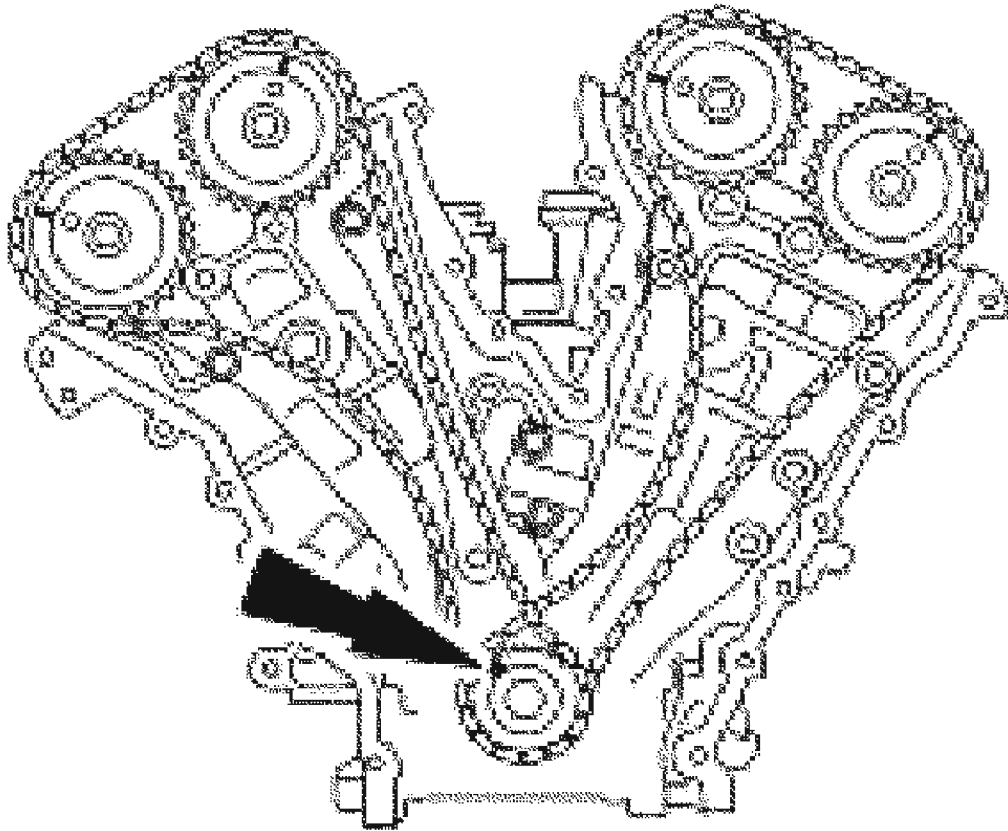
**NOTE:** LH shown, RH  
similar.



G02739265

**Fig. 92: Locating LH And RH Spark Plugs**  
Courtesy of FORD MOTOR CO.

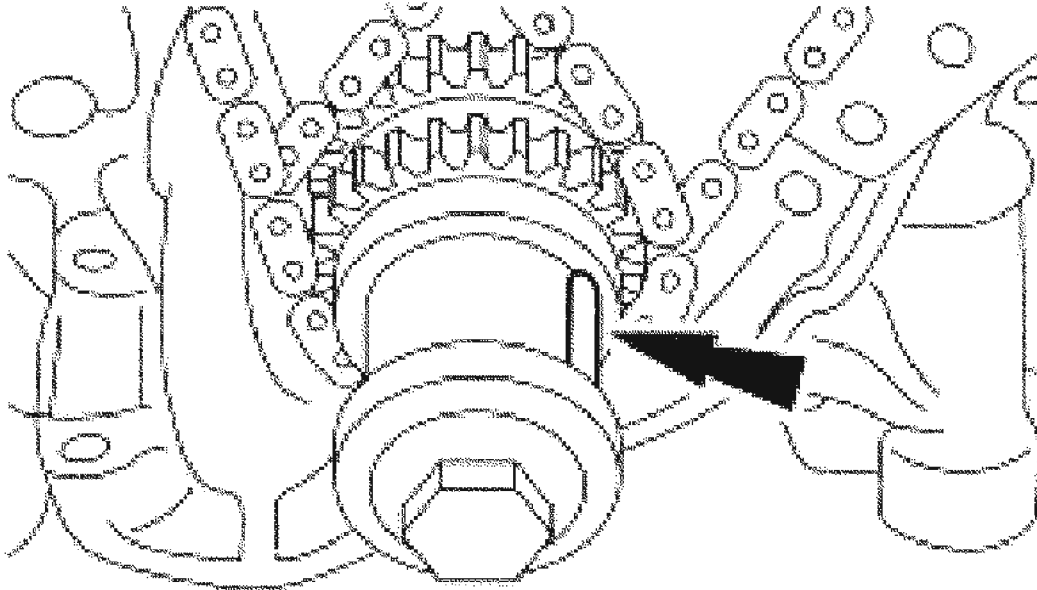
4. Remove the LH and the RH spark plugs.
5. Rotate the crankshaft clockwise to position the crankshaft keyway in the 11 o'clock position and position the camshafts in the correct position. This will position the number 1 cylinder at top dead center (TDC).
  - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.



G02739266

**Fig. 93: Locating Camshaft Pulley**  
Courtesy of FORD MOTOR CO.

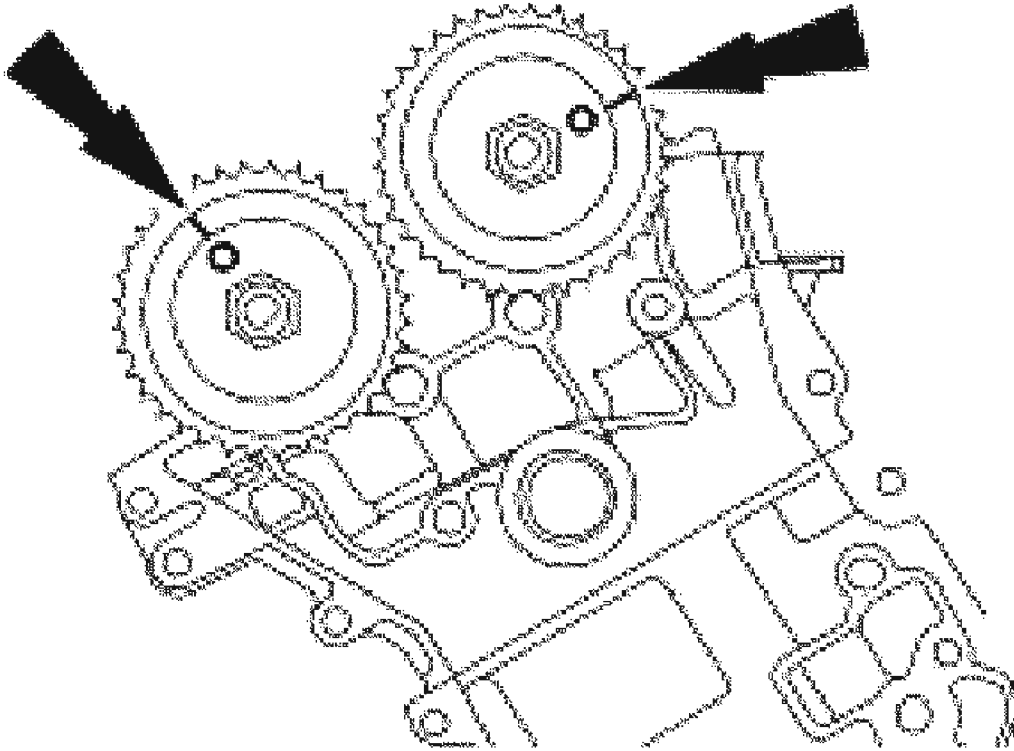
6. Rotate the crankshaft clockwise 120 degrees to the 3 o'clock position to locate the RH camshafts in the neutral position.



G02739267

**Fig. 94: Identifying Camshaft Aligning Mark**  
Courtesy of FORD MOTOR CO.

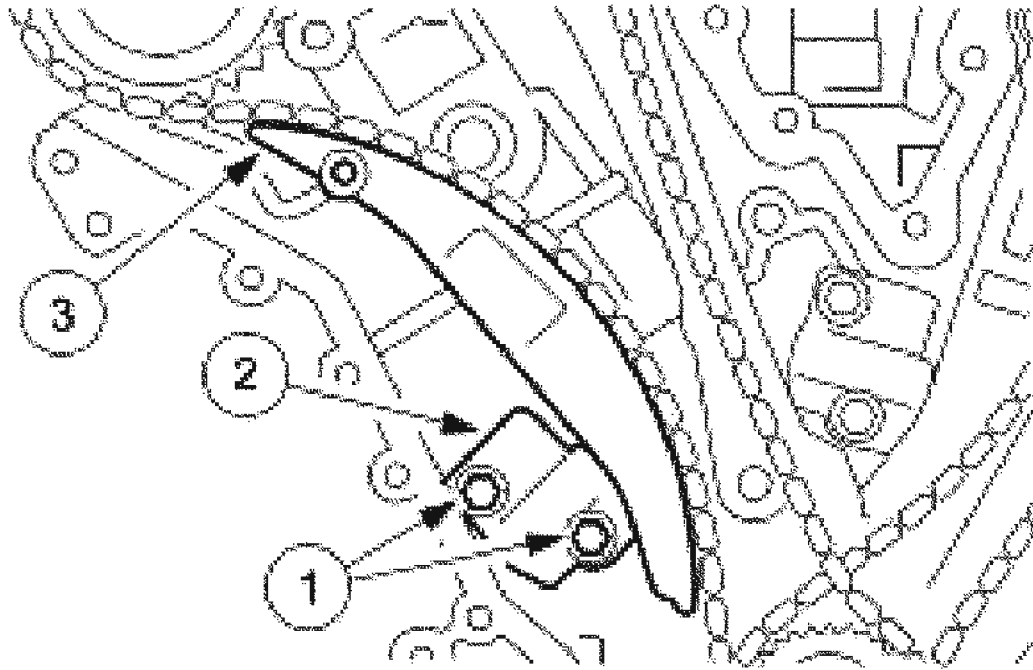
7. Verify that the RH camshafts are in the neutral position.



G02739268

**Fig. 95: Identifying RH Camshafts Are In Neutral Position**  
Courtesy of FORD MOTOR CO.

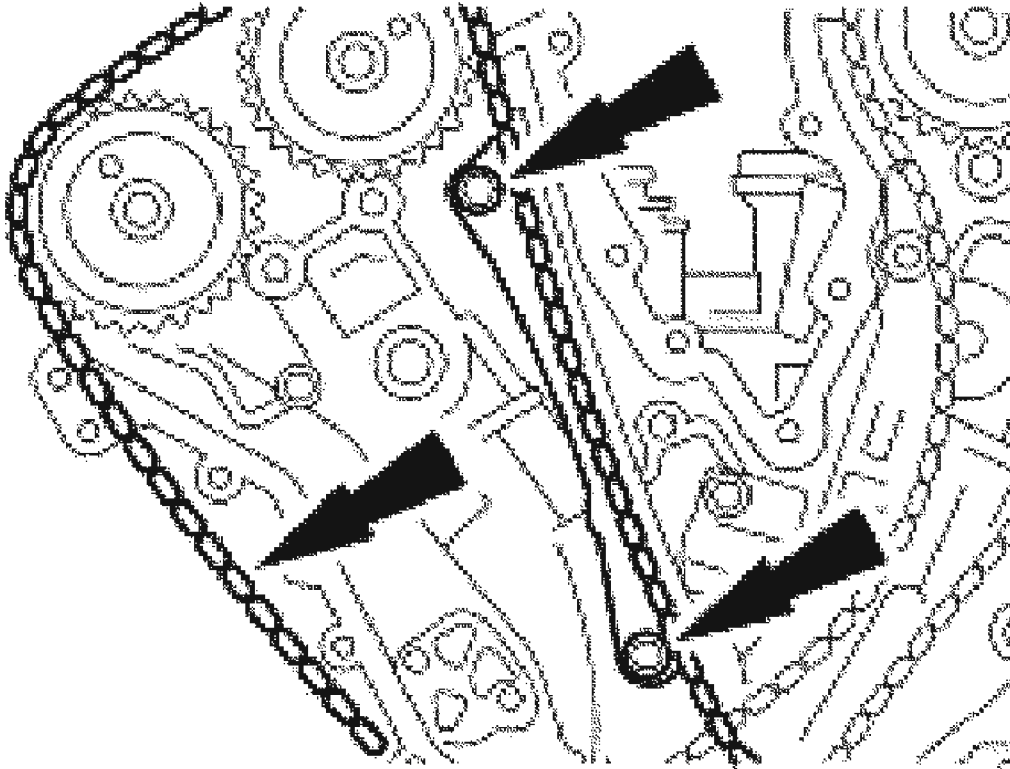
8. Remove the RH timing chain and tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.



G02739269

**Fig. 96: Removing RH Tensioner Arm**  
Courtesy of FORD MOTOR CO.

9. Remove the bolts, RH timing chain guide and the timing chain.

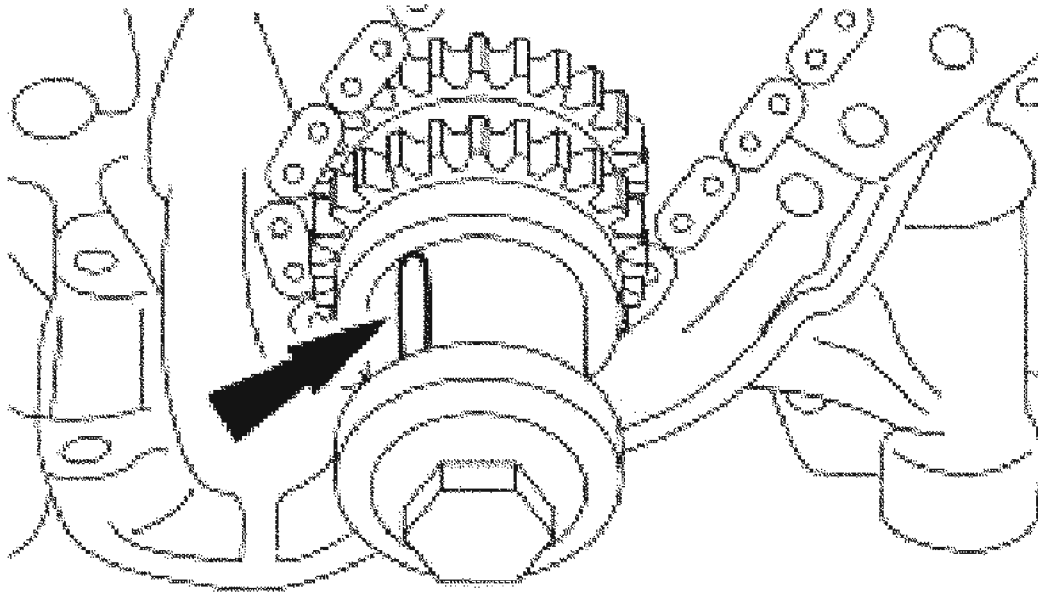


G02739270

**Fig. 97: Removing Bolts, RH Timing Chain Guide & Timing Chain**  
Courtesy of FORD MOTOR CO.

10. Rotate the crankshaft clockwise 600 degrees (1 -2/3 times) to position the crankshaft keyway in the 11 o'clock position. This will position the LH camshafts in the neutral position.

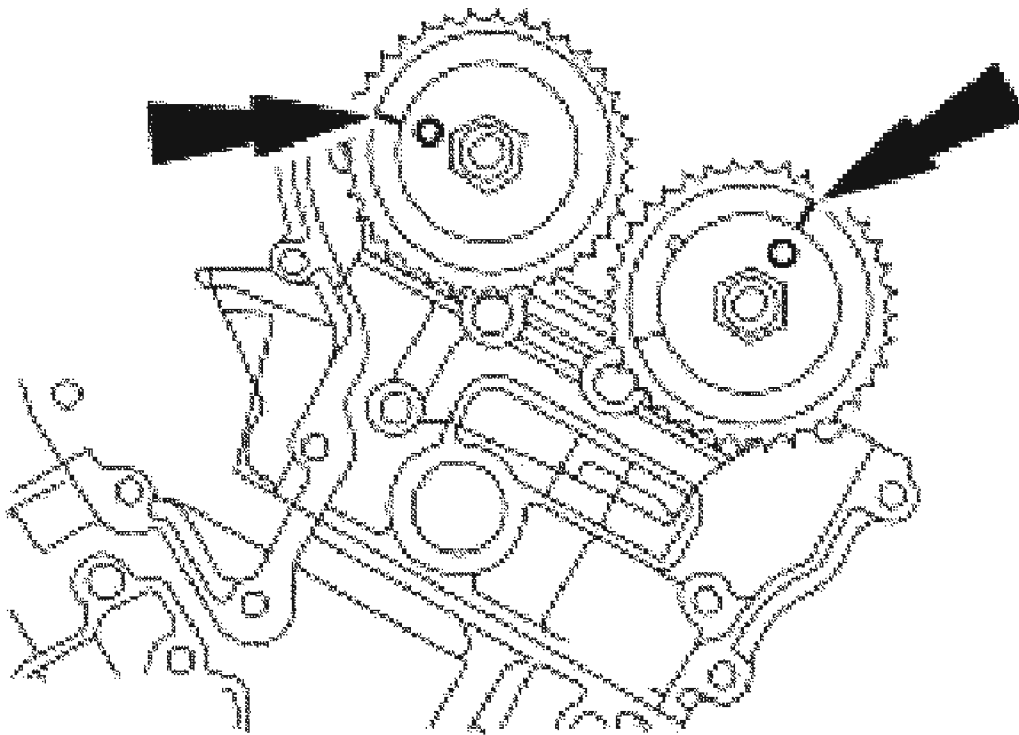




G02739271

**Fig. 98: Identifying Crankshaft Aligning Mark**  
Courtesy of FORD MOTOR CO.

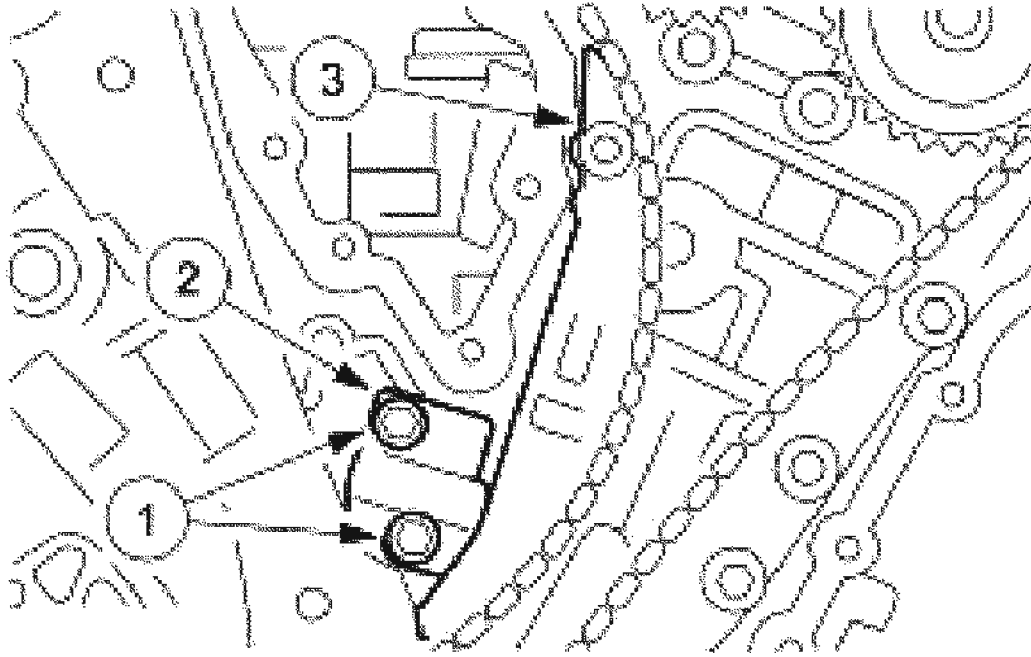
11. Verify that the LH camshafts are in the neutral position.



G02739272

**Fig. 99: Identifying LH Camshafts Are In Neutral Position**  
Courtesy of FORD MOTOR CO.

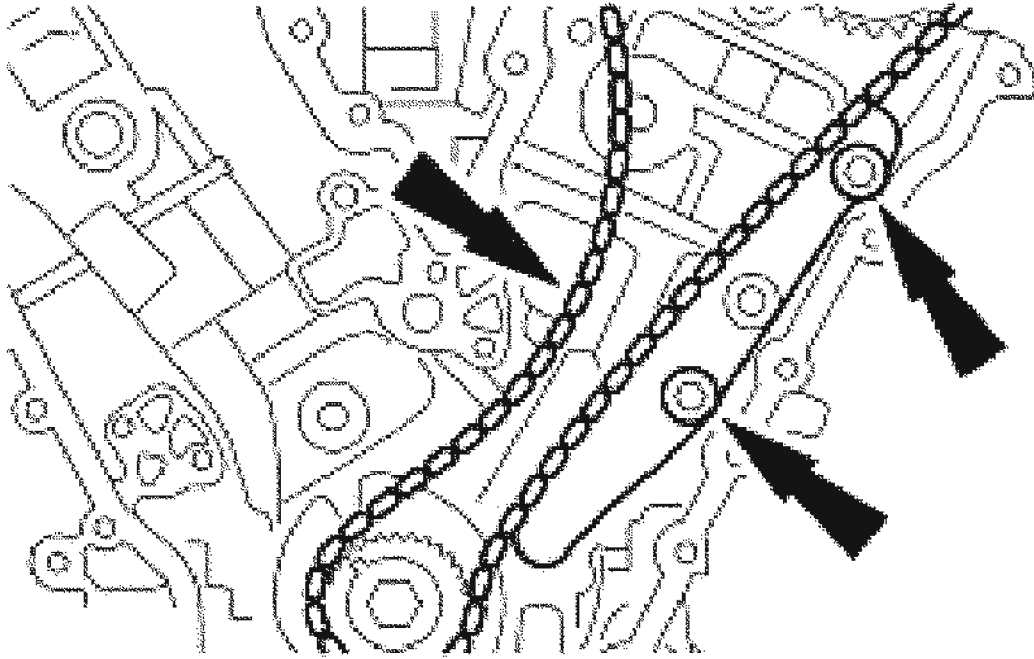
12. Remove the LH timing chain and tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.



G02739273

**Fig. 100: Removing LH Timing Chain And Tensioner Arm**  
Courtesy of FORD MOTOR CO.

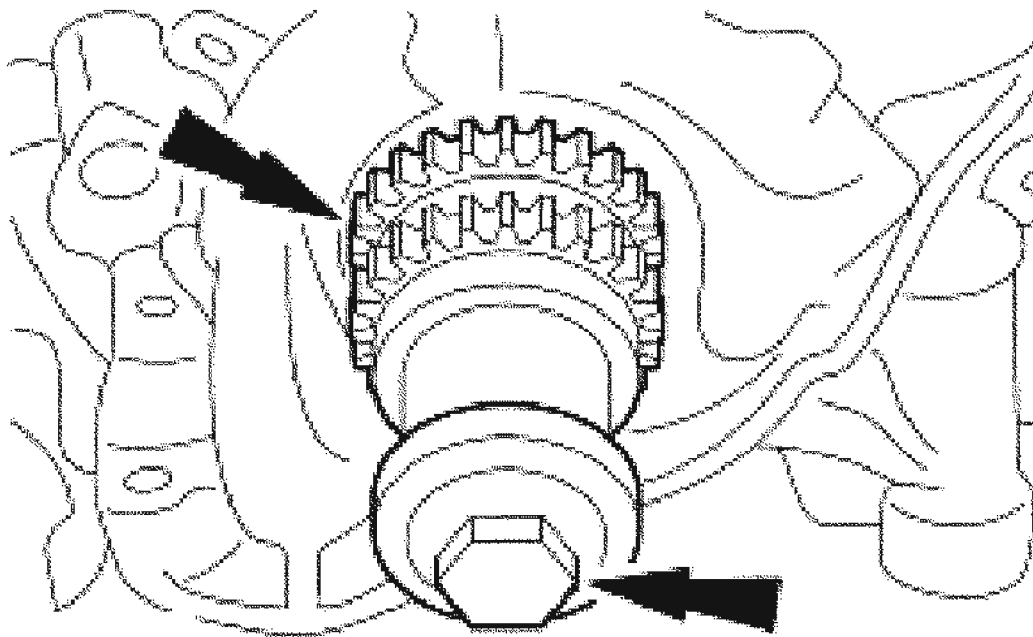
13. Remove the LH timing chain and the timing chain guide.



G02739274

**Fig. 101: Removing LH Timing Chain And Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

14. Remove the damper bolt and the crankshaft sprockets.



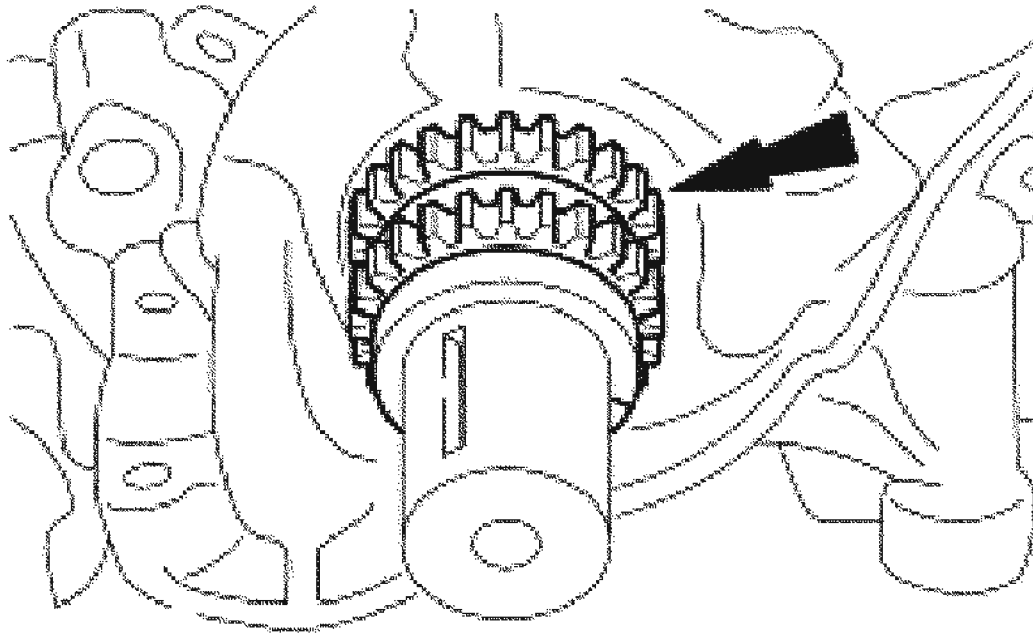
G02739275

**Fig. 102: Removing Damper Bolt And Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

#### Installation

**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.

**NOTE:** Install the sprockets with the timing marks out.

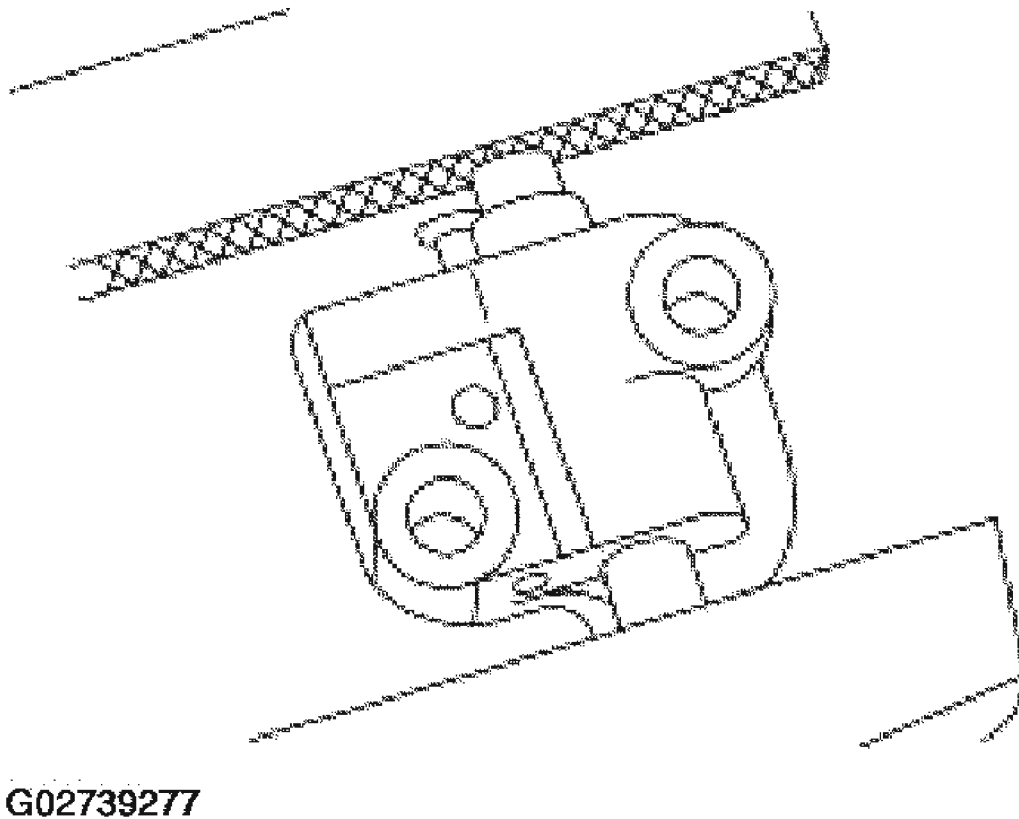


G02739276

**Fig. 103: Installing Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

1. Install the crankshaft sprockets.

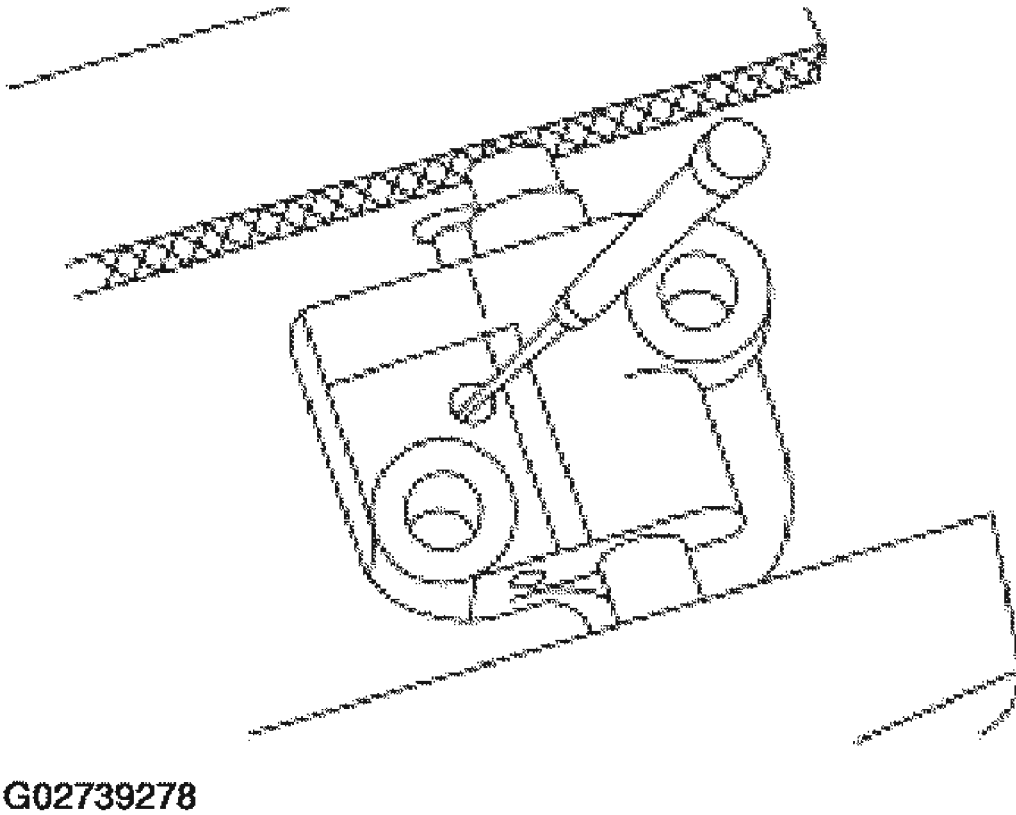
**NOTE:** LH shown, RH similar.



**Fig. 104: Positioning Chain Tensioner In A Soft-Jawed Vise**  
Courtesy of FORD MOTOR CO.

2. Position the chain tensioner in a soft-jawed vise.

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



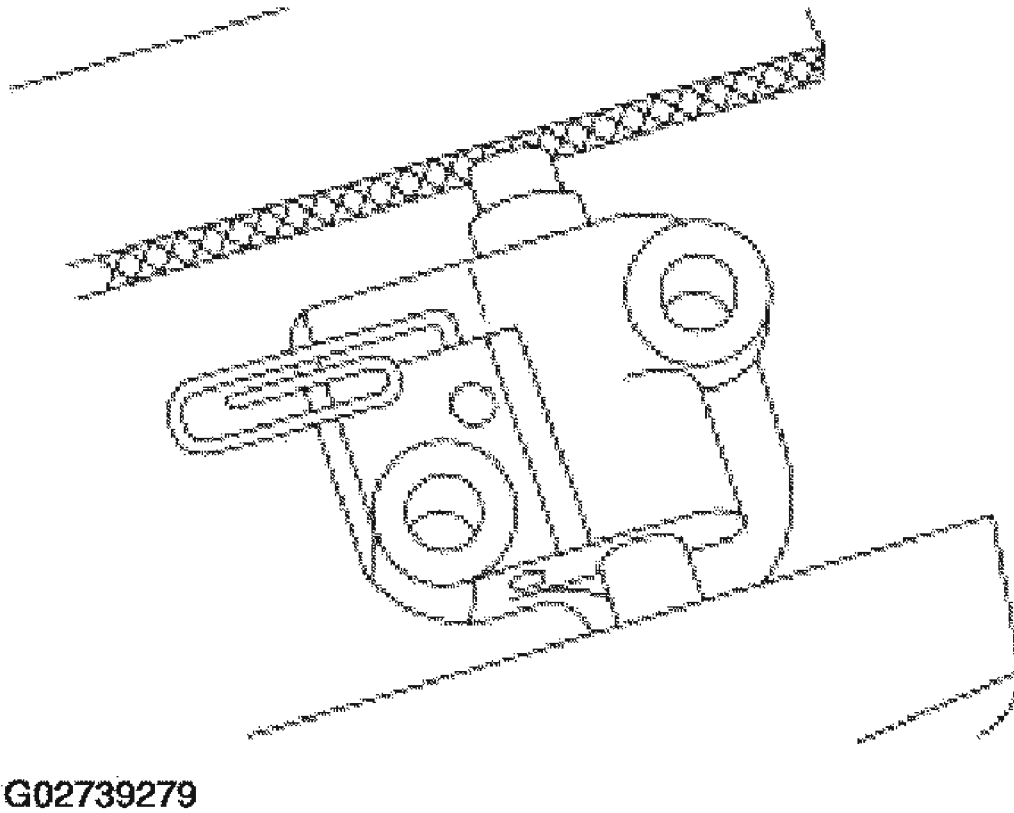
**Fig. 105: Holding Chain Tensioner Ratchet Lock Mechanism**  
Courtesy of FORD MOTOR CO.

3. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem with a small pick.

**CAUTION:** During tensioner compression, do not release the ratchet stem until the tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

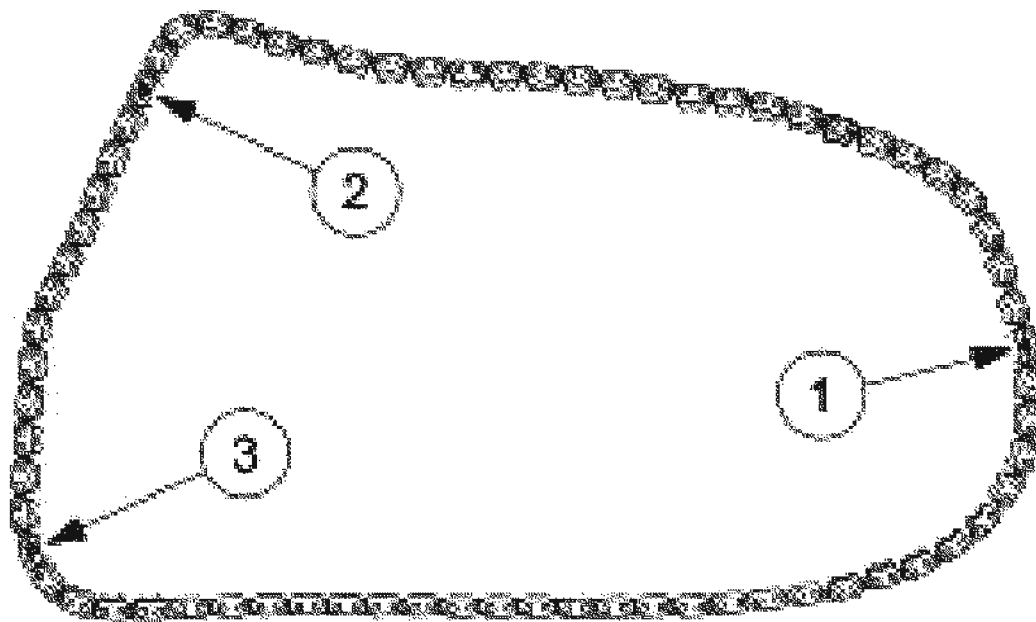
4. Slowly compress the timing chain tensioner.
5. Retain the tensioner piston with a 1.5 mm (0.06 in) wire or paper clip.





**Fig. 106: Retaining Tensioner Piston**  
Courtesy of FORD MOTOR CO.

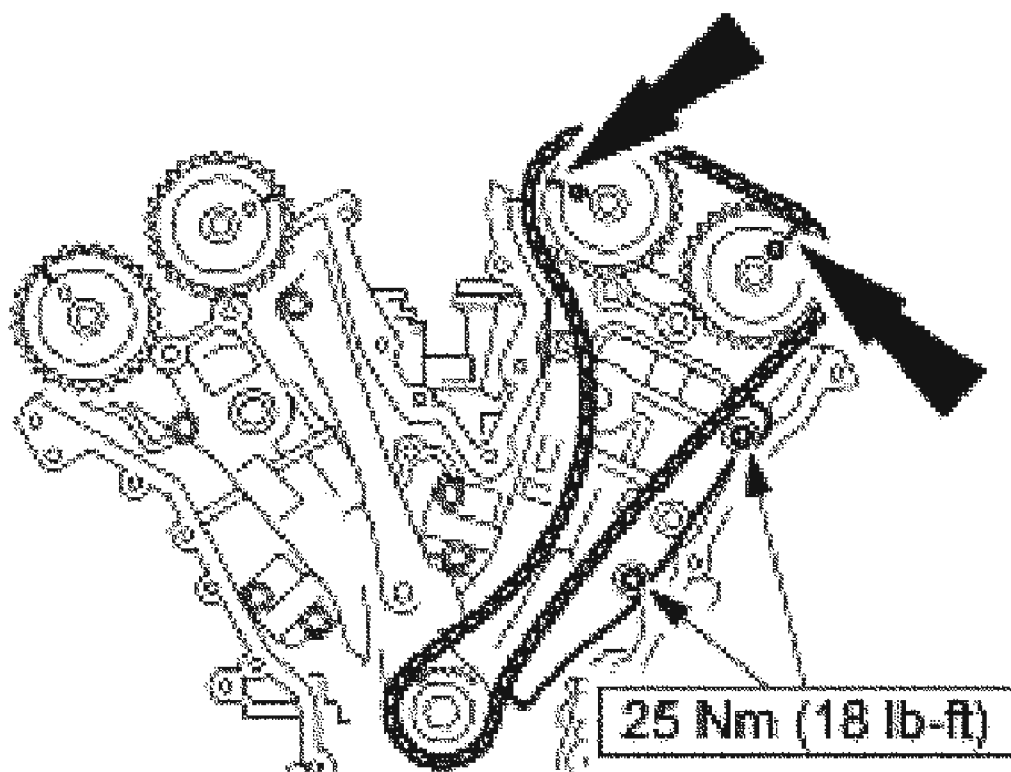
6. If the timing marks on the timing chains are not evident, use a permanent-type marker to mark on the LH and the RH timing chains.
  1. Mark any link to use as the crankshaft timing mark.
  2. Starting with the crankshaft timing mark, count 29 links and mark the link.
  3. Continue counting to 42 and mark the link.



G02739280

**Fig. 107: Identifying Timing Chain**  
Courtesy of FORD MOTOR CO.

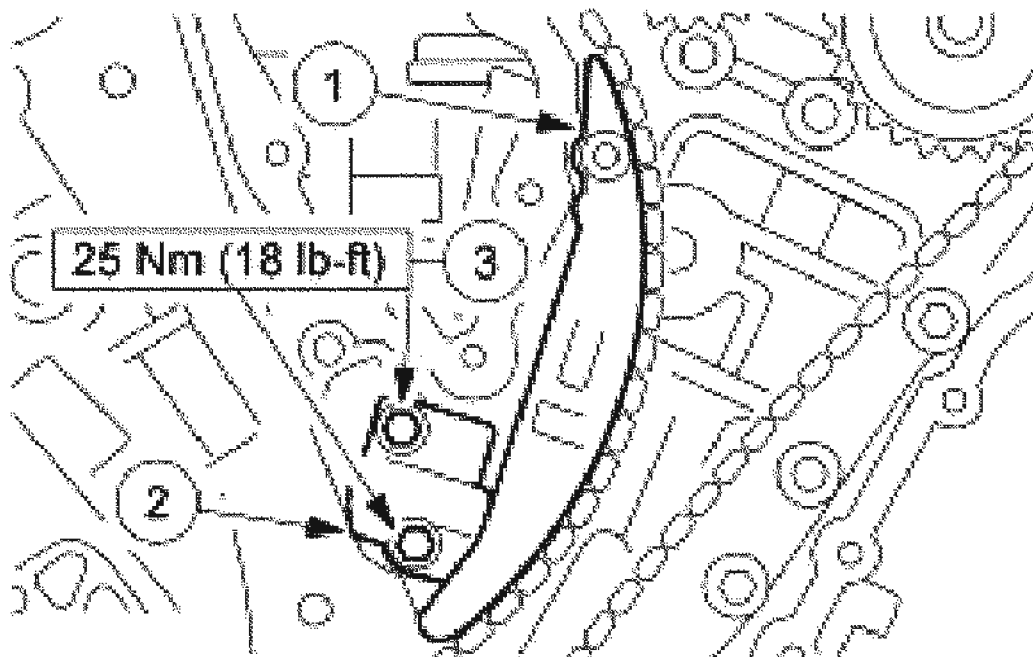
7. Position the LH timing chain and guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.



G02739281

**Fig. 108: Installing LH Timing Chain**  
Courtesy of FORD MOTOR CO.

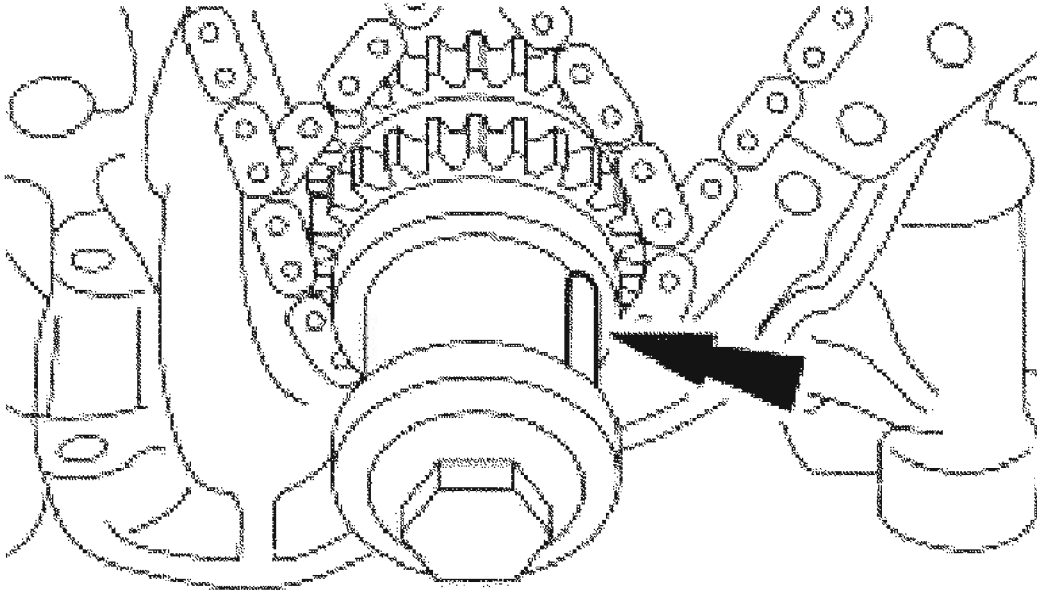
8. Install the LH timing chain tensioner and tensioner arm.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.



G02739282

**Fig. 109: Installing LH Timing Chain Tensioner & Tensioner Arm**  
Courtesy of FORD MOTOR CO.

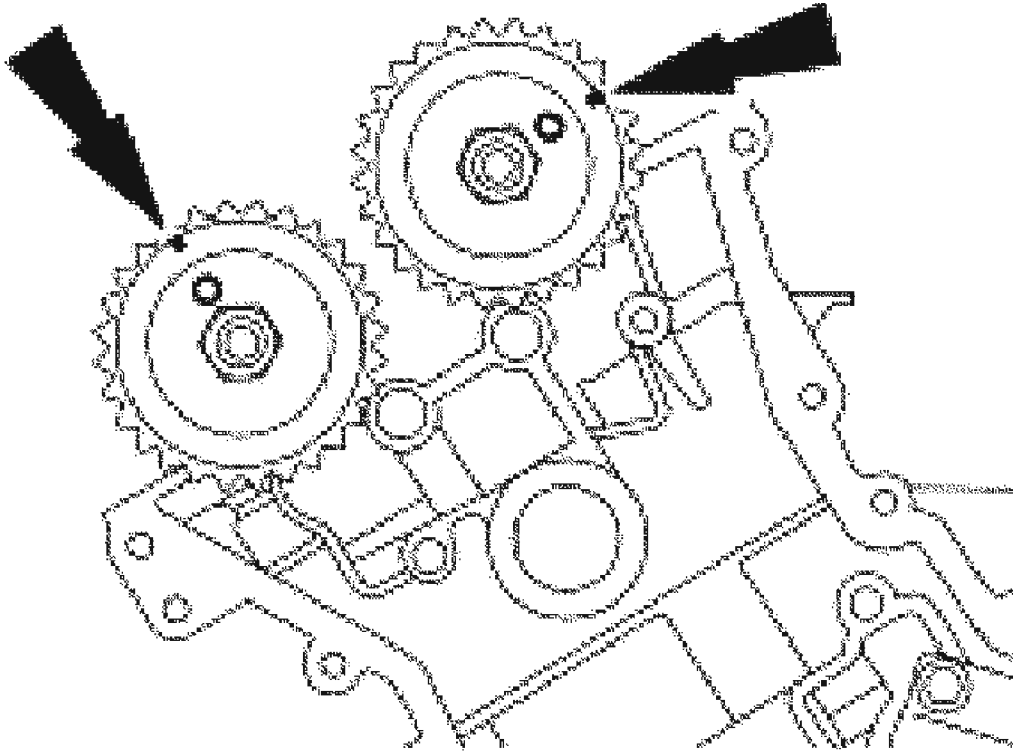
9. Install the crankshaft damper bolt and rotate the crankshaft clockwise 120 degrees until the crankshaft keyway is in the 3 o'clock position.



G02739283

**Fig. 110: Identifying Crankshaft Keyway**  
Courtesy of FORD MOTOR CO.

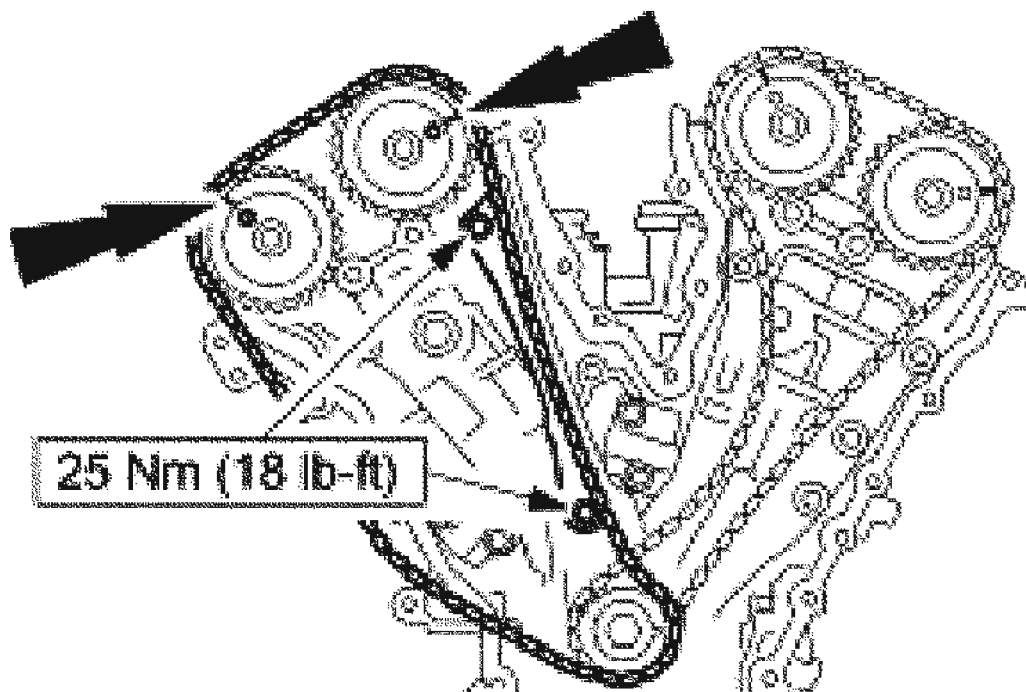
10. Verify that the RH camshafts are correctly positioned.



**G02739284**

**Fig. 111: Identifying RH Camshafts Position**  
**Courtesy of FORD MOTOR CO.**

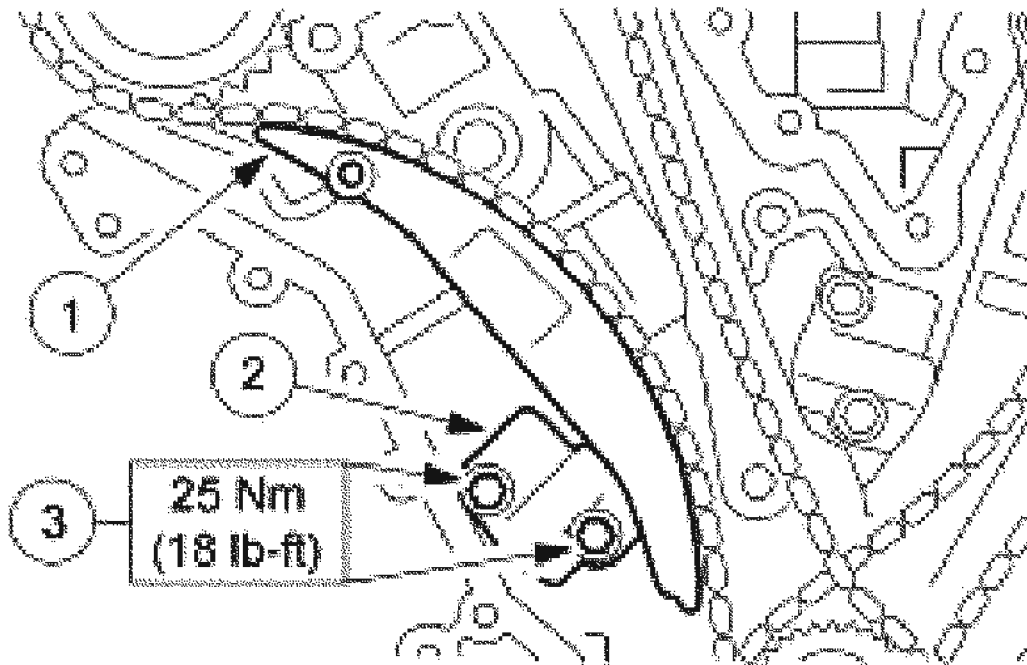
11. Position the RH timing chain and chain guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.



G02739285

**Fig. 112: Aligning Marks On Timing Chain**  
Courtesy of FORD MOTOR CO.

12. Install the RH timing chain tensioner and tensioner arm.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.



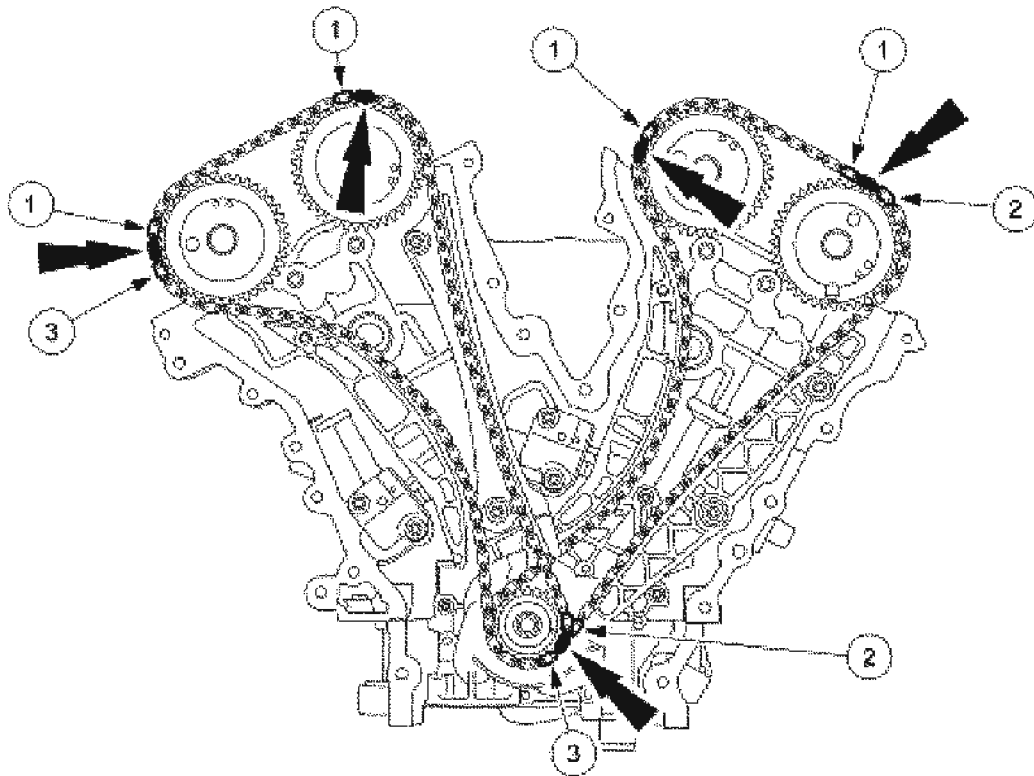
G02739286

**Fig. 113: Installing RH Timing Chain Tensioner & Tensioner Arm**  
Courtesy of FORD MOTOR CO.

13. Remove the LH and RH timing chain tensioner piston retaining wires.
14. Rotate the crankshaft counterclockwise 120 degrees to top dead center (TDC).

**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.

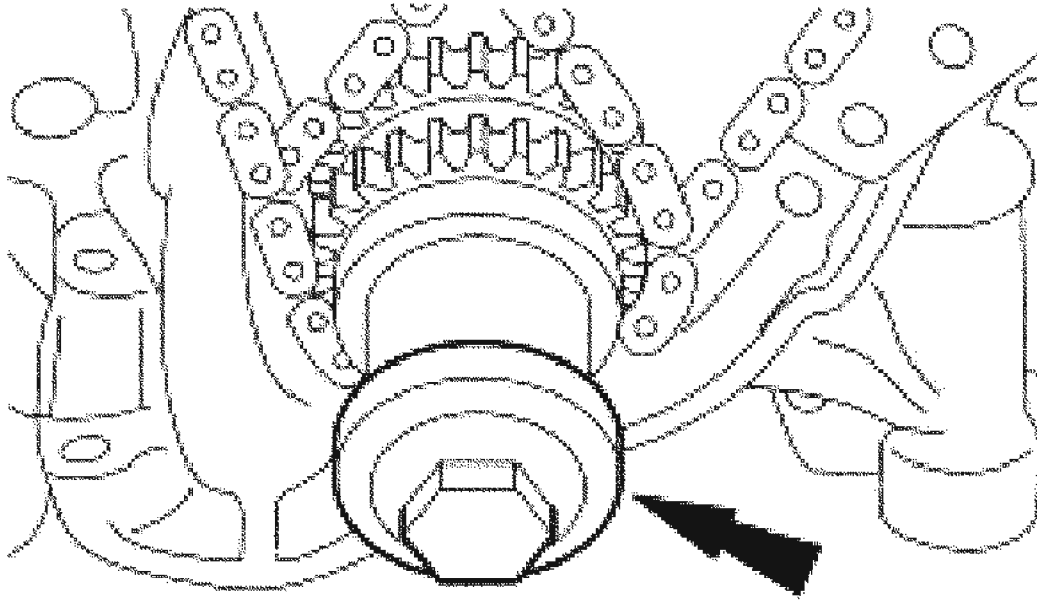




G02739287

**Fig. 114: Checking Timing Chain**  
Courtesy of FORD MOTOR CO.

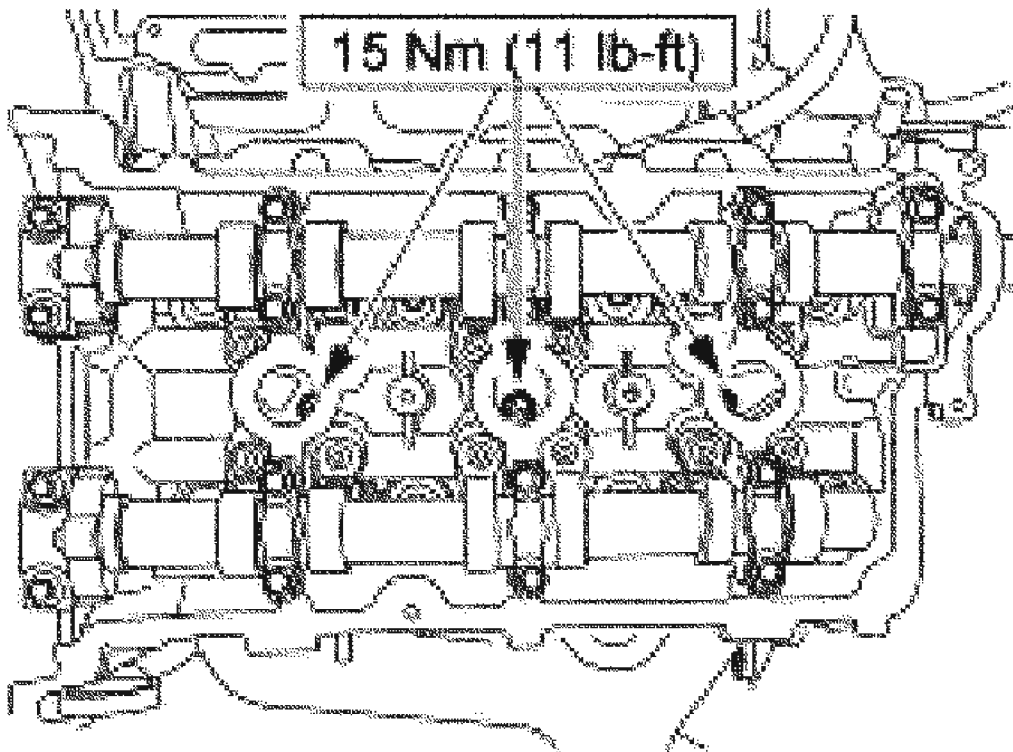
15. Verify the timing with the following steps.
  1. There should be 12 chain links between the front camshaft timing marks.
  2. There should be 27 chain links between the camshaft and crankshaft timing marks.
  3. There should be 30 chain links between the camshaft and crankshaft timing marks.
16. Remove the crankshaft damper bolt.



G02739288

**Fig. 115: Removing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

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

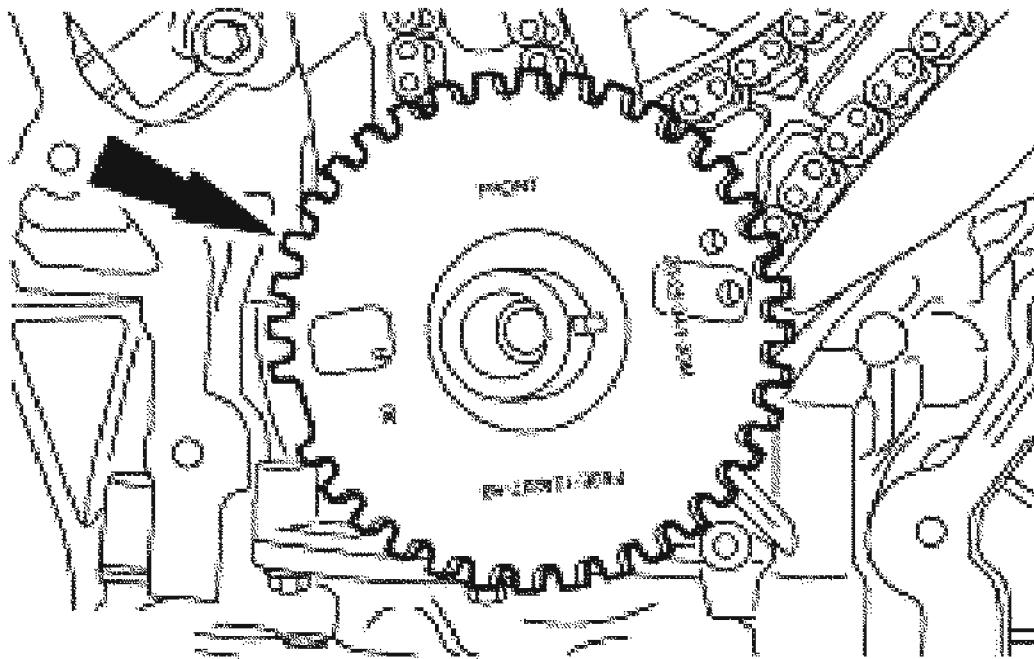


G02739289

**Fig. 116: Identifying Spark Plug Torque Specification**  
Courtesy of FORD MOTOR CO.

17. Install the LH and RH spark plugs.

**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "20-25-34Y-30M" (color blue).



G02739290

**Fig. 117: Installing Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

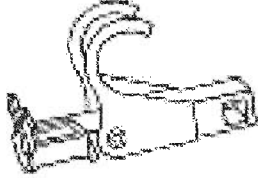
18. Install the ignition pulse wheel.
19. Install the engine front cover. For additional information, refer to **ENGINE FRONT COVER** .

## ROLLER FOLLOWERS

### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



Compressor, Valve Spring  
303-473 (T94P-6565-BH)

G02739291

**Fig. 118: Identifying Roller Followers Special Tool**  
Courtesy of FORD MOTOR CO.

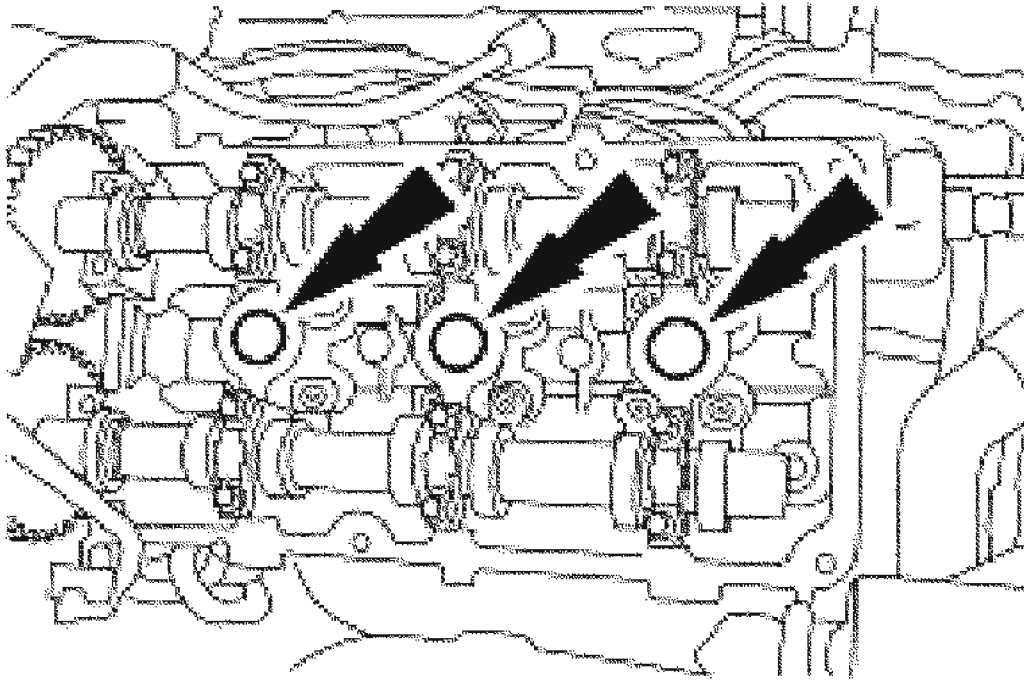
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

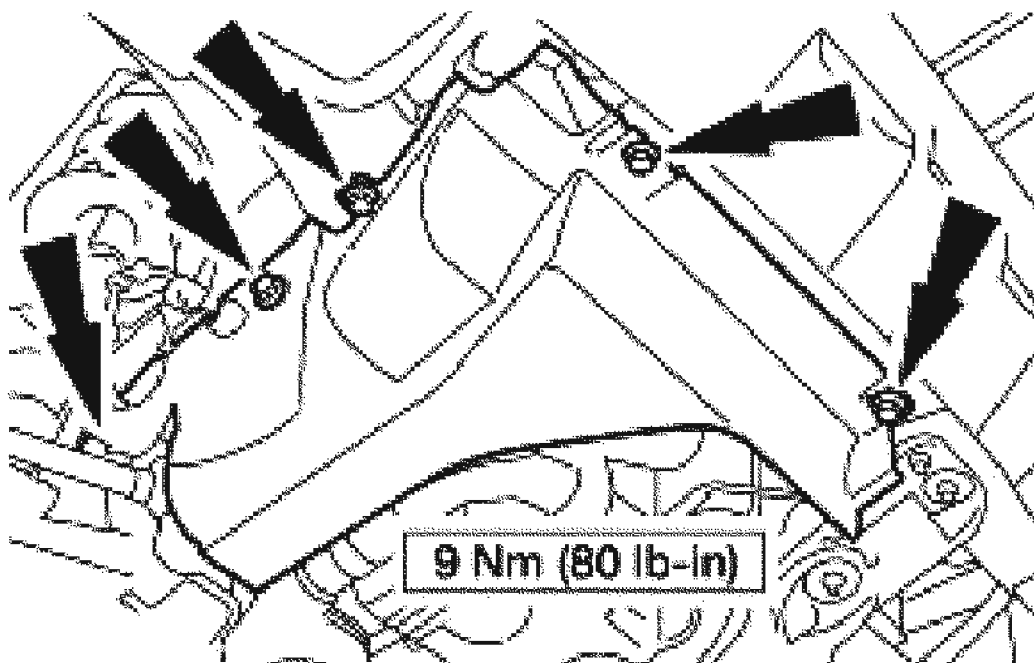
1. Remove the LH and RH valve covers. For additional information, refer to **VALVE COVER LH** and **VALVE COVER RH** .
2. Remove the LH and RH spark plugs.



**G02739292**

**Fig. 119: Removing LH And RH Spark Plugs**  
**Courtesy of FORD MOTOR CO.**

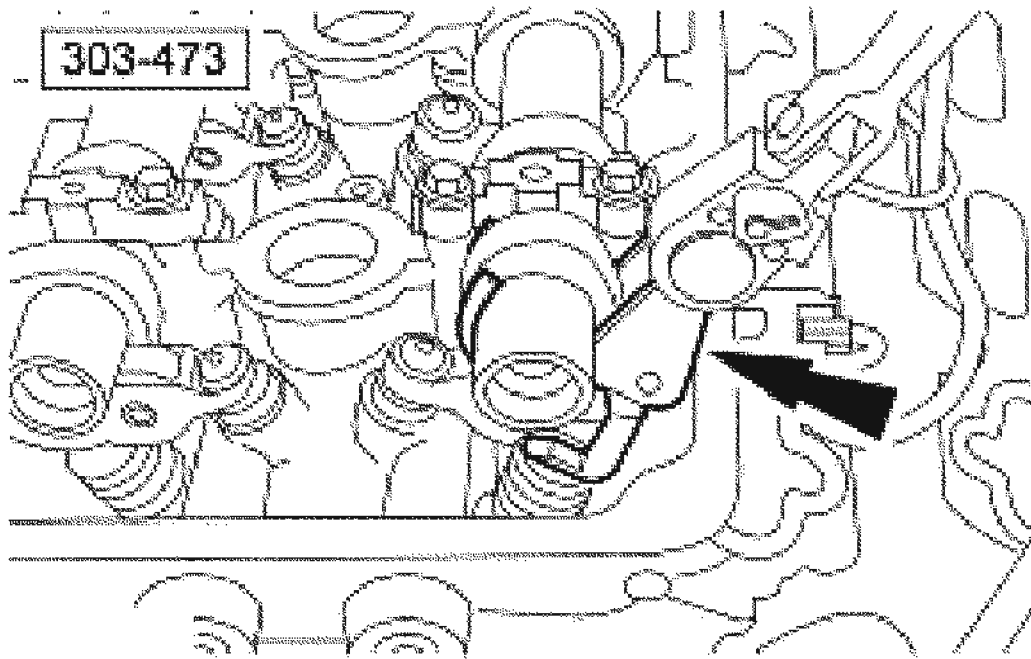
3. Remove the RH front wheel.
4. Remove the splash shield.



G02739293

**Fig. 120: Removing Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

5. Rotate the crankshaft until the camshaft lobe is pointing directly away from the follower.
6. Using the special tool, remove the followers.



G02739294

**Fig. 121: Removing Followers**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.
  - Lubricate the camshaft followers with clean engine oil.

## HYDRAULIC LASH ADJUSTERS

### Material

## MATERIAL SPECIFICATION

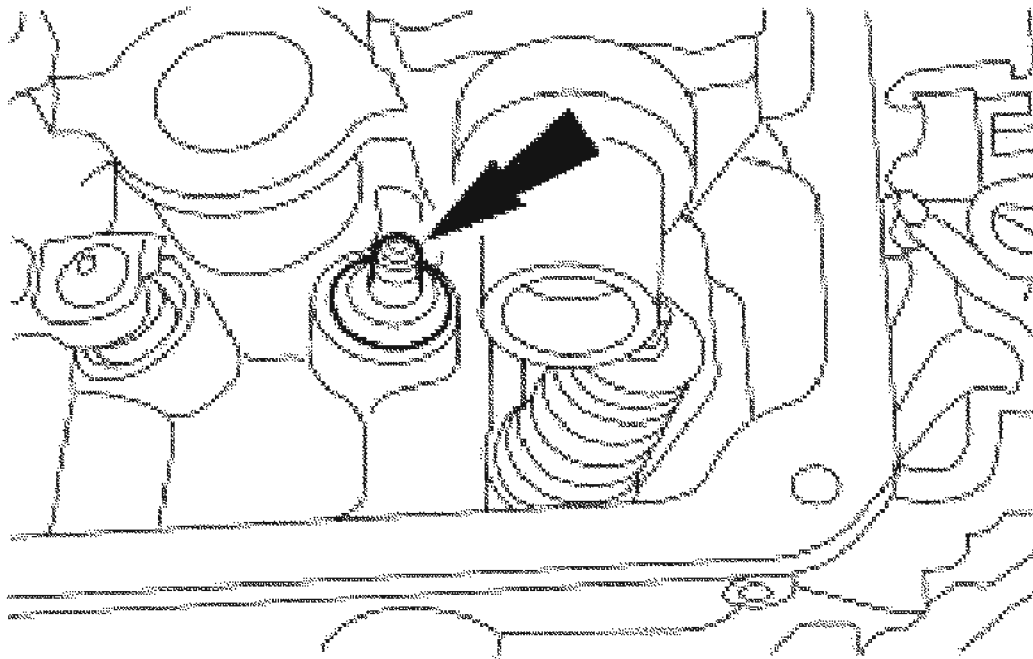
Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

1. Remove the camshaft followers. For additional information, refer to **ROLLER FOLLOWERS**.

**NOTE:** Mark the positions of the hydraulic lash adjusters to make sure they are assembled in their original positions.





G02739295

**Fig. 122: Removing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

2. Remove the hydraulic lash adjusters.

**NOTE:**      **Inspect the hydraulic lash adjusters for scoring marks and uneven wear in the bore. Install new lash adjusters if necessary.**

3. To install, reverse the removal procedure.
  - Lubricate the hydraulic lash adjusters with clean engine oil.

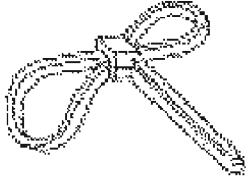

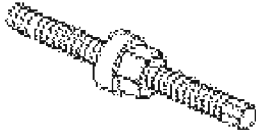
## CRANKSHAFT PULLEY

### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

<http://vnx.su>

	Strap Wrench 303-D055 (D85L-6000-A), or equivalent
	Remover, Crankshaft Vibration Damper 303-009 (T58P-6316-D)
	Installer, Crankshaft Vibration Damper 303-102 (T74P-6316-B)

G02739296

**Fig. 123: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

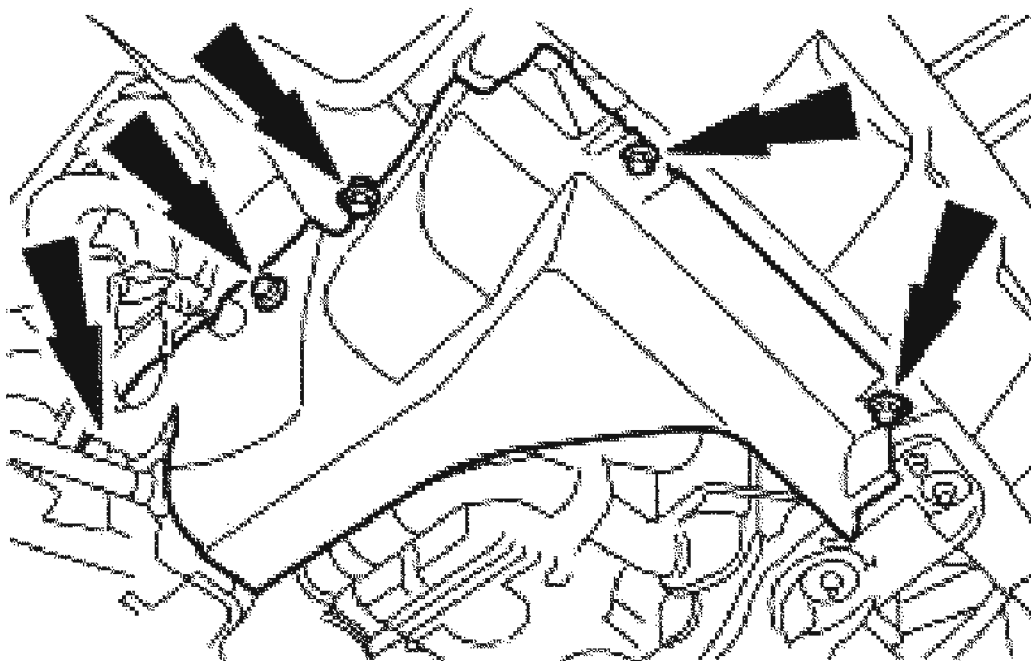
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal and Installation

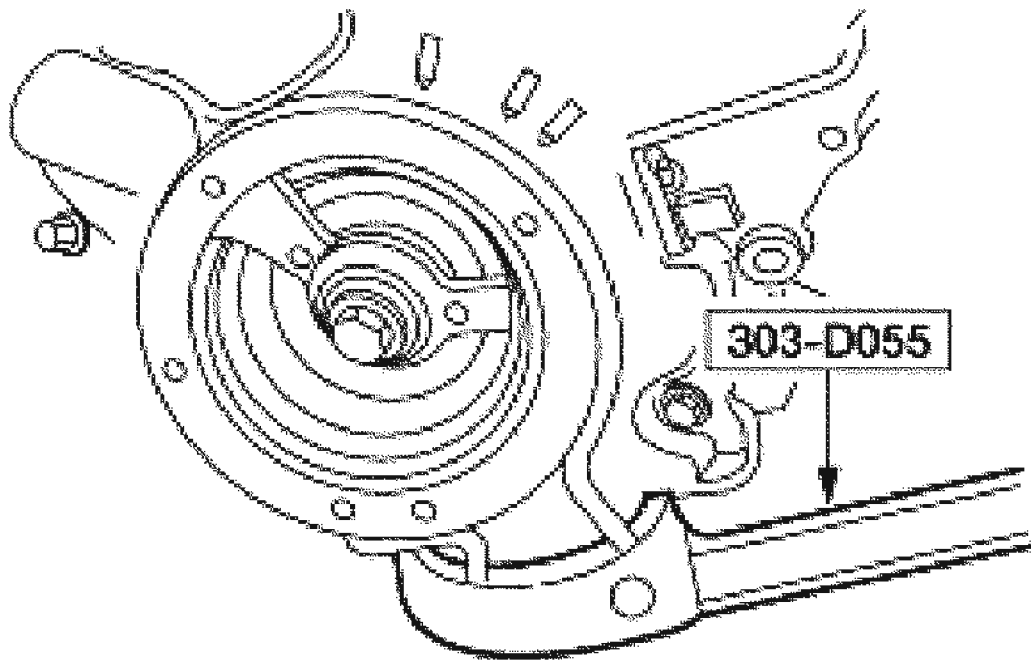
1. Remove the accessory drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING** .
2. Remove the splash shield.



G02739297

**Fig. 124: Removing Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

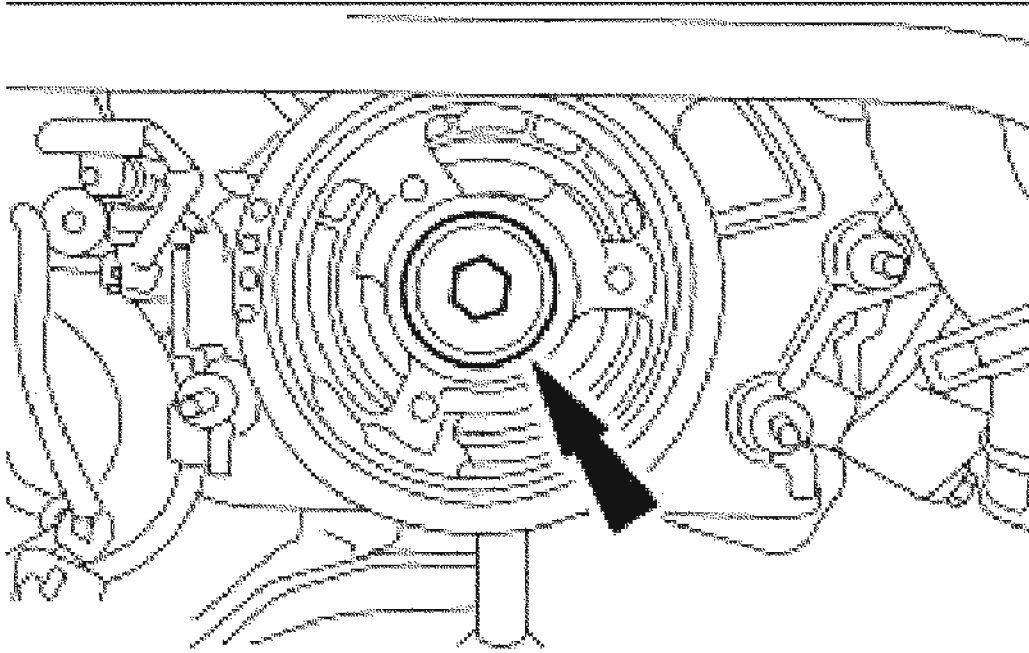
3. Install the special tool.



G02739298

**Fig. 125: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

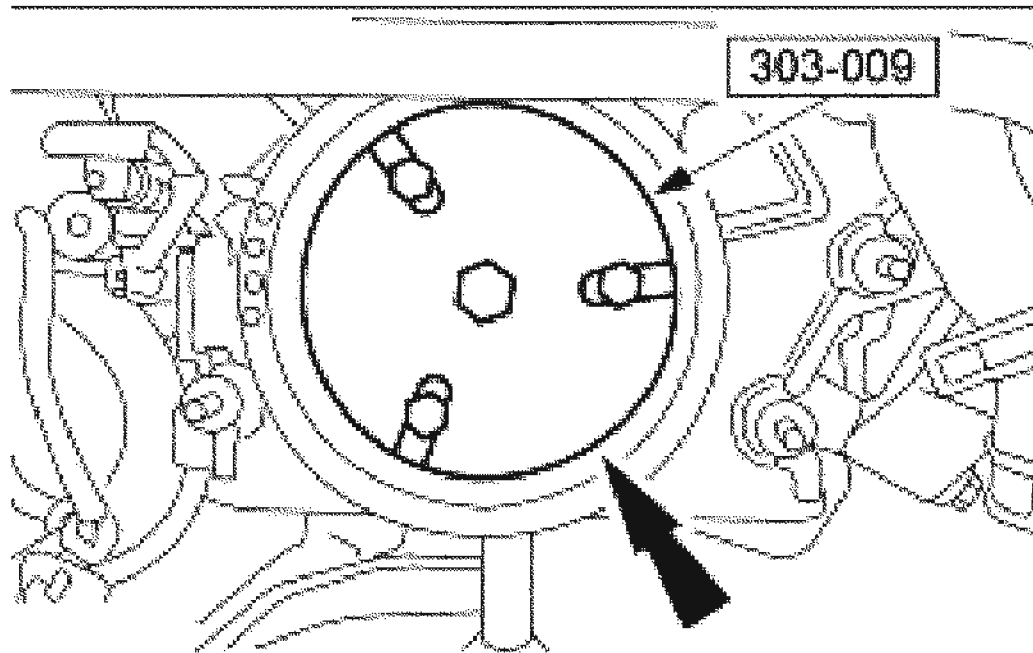
4. Remove the crankshaft pulley bolt and washer.



G02739299

**Fig. 126: Removing Crankshaft Pulley Bolt And Washer**  
Courtesy of FORD MOTOR CO.

5. Using the special tool, remove the crankshaft pulley.

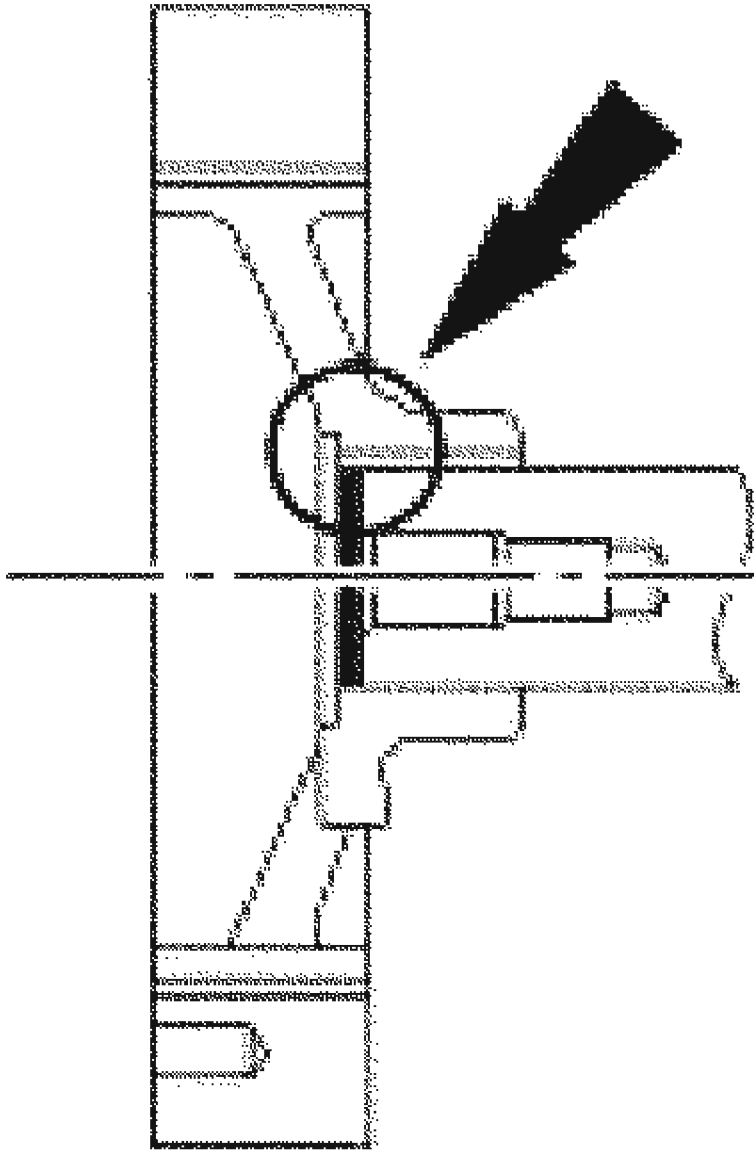


G02739300

**Fig. 127: Removing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

#### Installation

- NOTE:** Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealer.
- NOTE:** Seal surfaces must be free of dirt and oil.
- NOTE:** The crankshaft pulley must be installed within four minutes of applying the silicone gasket and sealer.

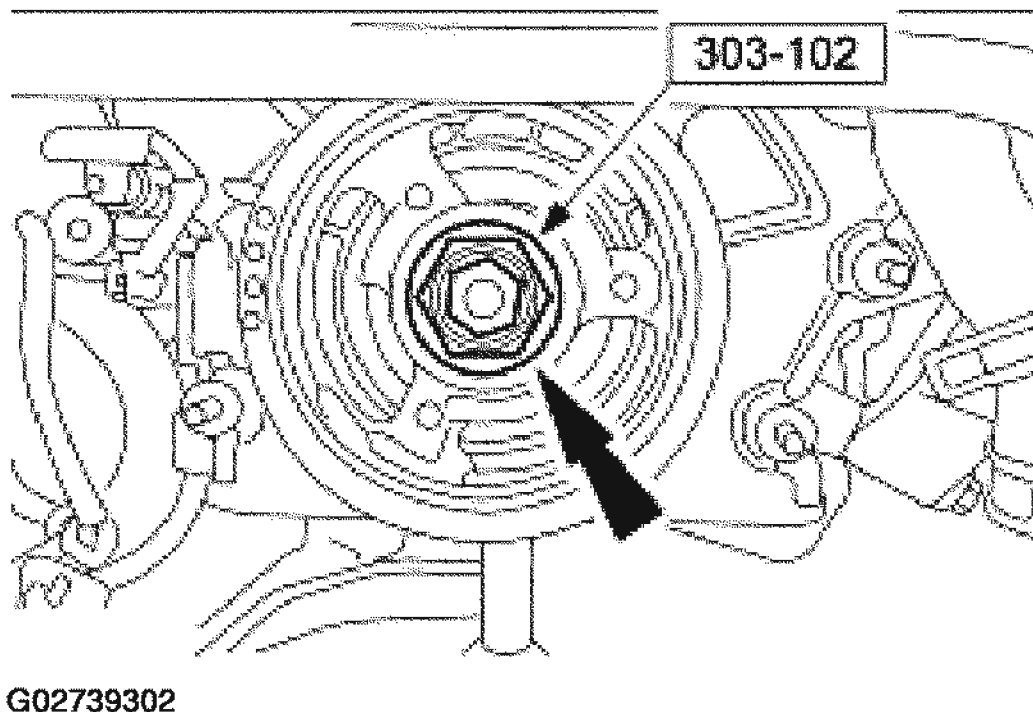


G02739301

**Fig. 128: Identifying End Of Keyway Slot**  
Courtesy of FORD MOTOR CO.

1. Apply silicone gasket and sealant to the end of the keyway slot.

**NOTE:** Lubricate the outside diameter sealing surface of the crankshaft pulley with clean engine oil.

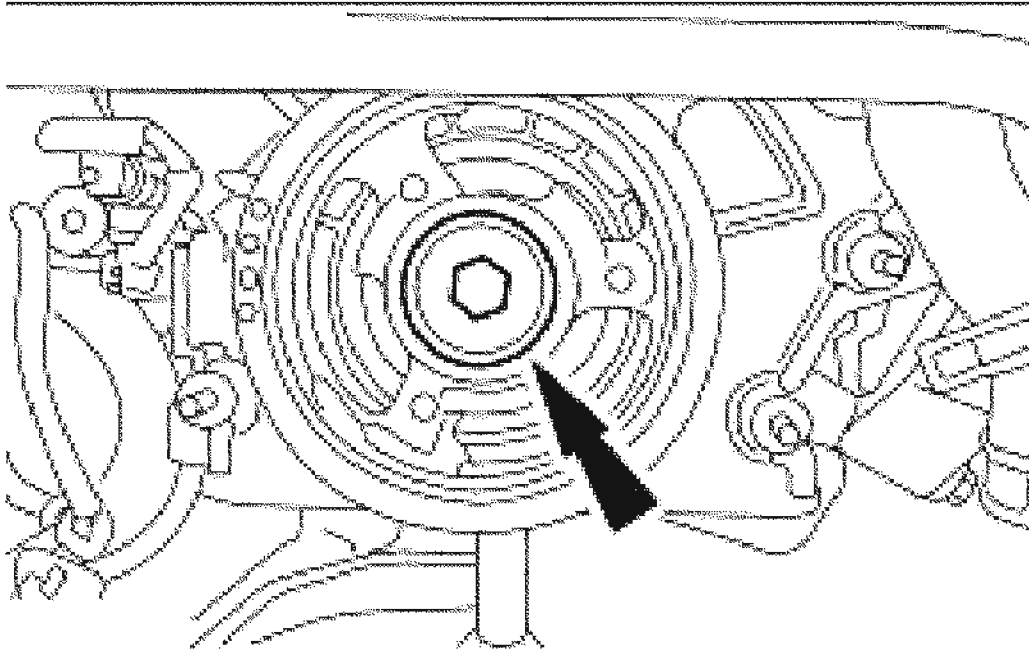


**Fig. 129: Installing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the crankshaft pulley.

**NOTE:** Use an appropriate strap wrench to hold the crankshaft pulley.

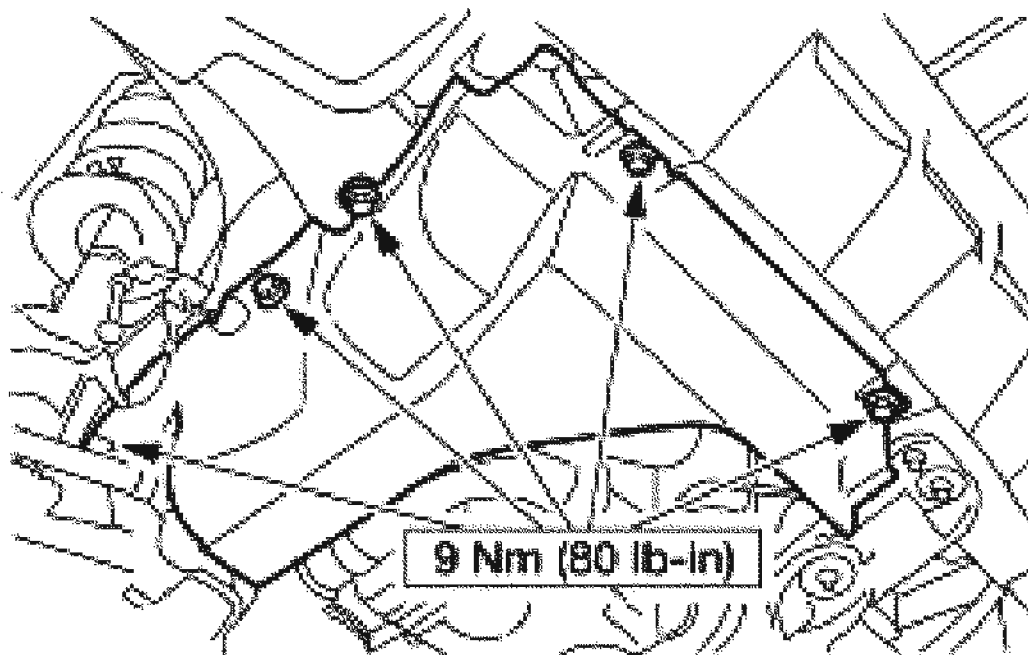




G02739303

**Fig. 130: Installing Bolt And Washer**  
Courtesy of FORD MOTOR CO.

3. Install the bolt and the washer and tighten in four stages.
  - Stage 1: Tighten to 120 Nm (86 lb-ft).
  - Stage 2: Loosen 360 degrees.
  - Stage 3: Tighten to 50 Nm (37 lb-ft).
  - Stage 4: Tighten an additional 90 degrees.
4. Install RH front inner splash shield.



G02739304

**Fig. 131: Identifying RH Front Inner Splash Shield Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

5. Install the accessory drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**.

#### CRANKSHAFT FRONT OIL SEAL

Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739305

**Fig. 132: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

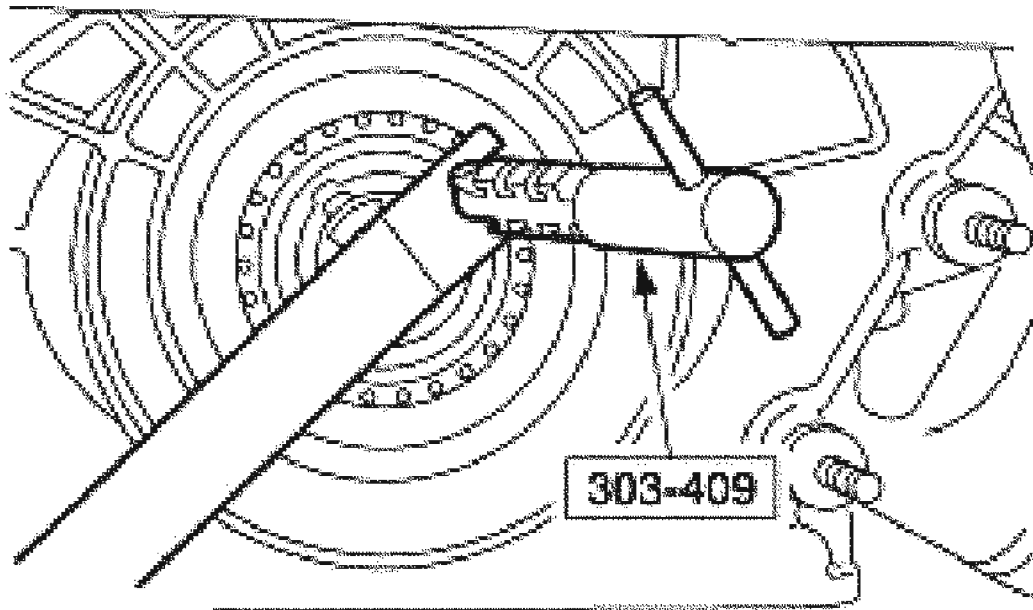
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY** .
2. Using the special tool, remove the crankshaft front oil seal and discard.



G02739306

**Fig. 133: Removing Crankshaft Front Oil Seal**  
Courtesy of FORD MOTOR CO.

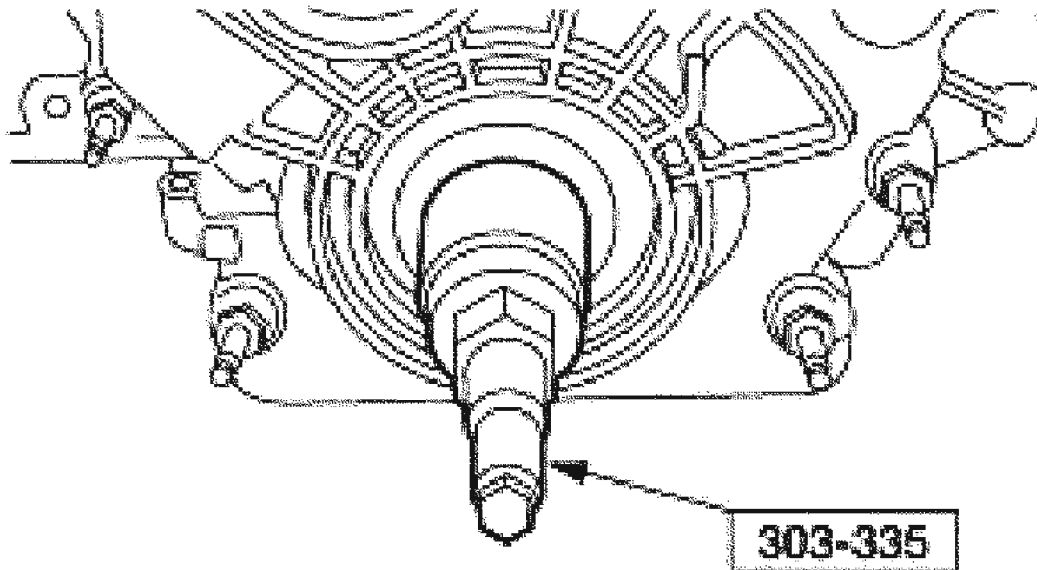
#### Installation

**NOTE:** Clean all sealing surfaces with metal surface cleaner.

1. Apply clean engine oil to the seal before installing the seal.
2. Using the special tool, install the crankshaft front oil seal.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



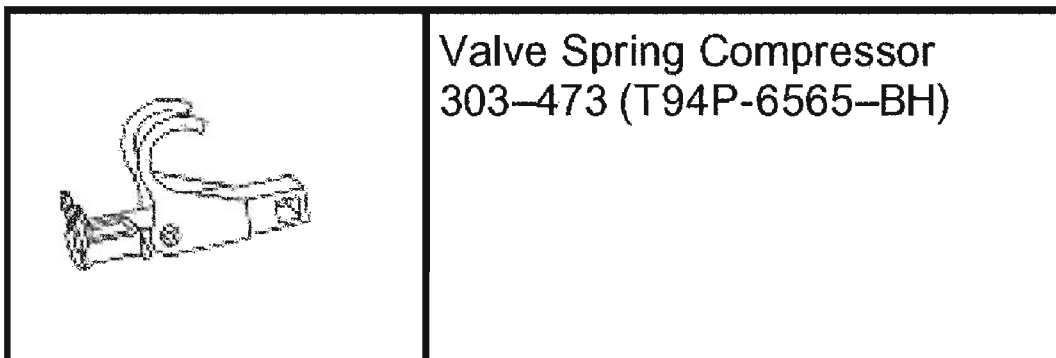
G02739307

**Fig. 134: Installing Crankshaft Front Oil Seal**  
Courtesy of FORD MOTOR CO.

3. Install the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY**.

### VALVE SPRING

#### Special Tool(s)



G02739308

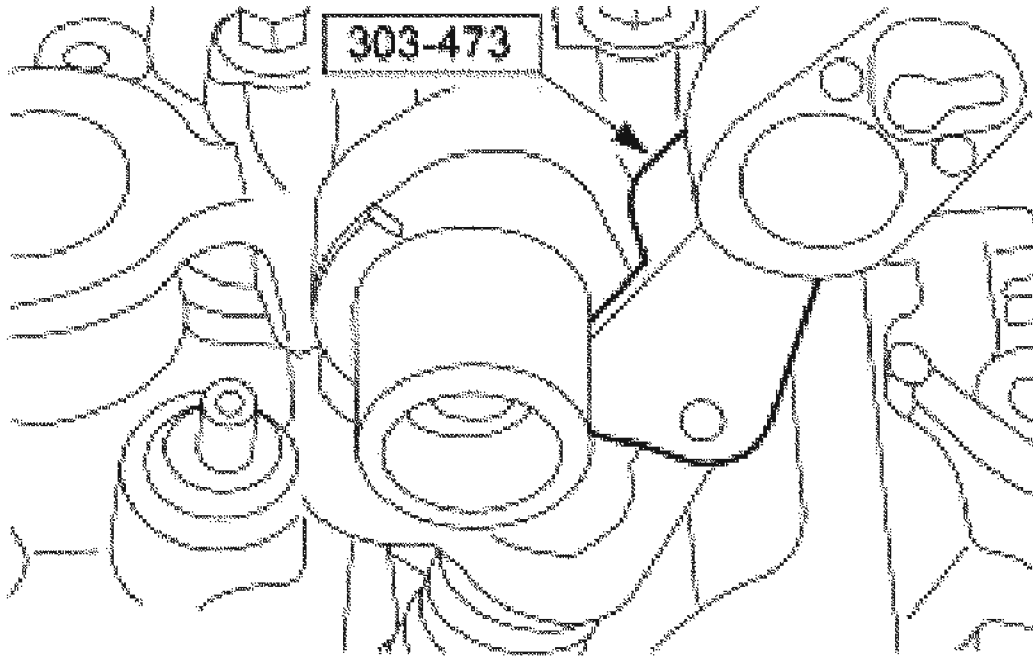
**Fig. 135: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal and Installation**

1. Remove the roller followers. For additional information, refer to **ROLLER FOLLOWERS**.

**NOTE:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve(s) to fall into the cylinder. A rubber band, tape or string wrapped around the end of the valve stem will prevent this from happening.

2. Pressurize the cylinder using compressed air.
3. Using the special tool, remove the key, retainer, and valve spring.

**G02739309**

**Fig. 136: Removing Key, Retainer, And Valve Spring**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

**VALVE SEALS****Special Tool(s)**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



Installer, Valve Stem Oil Seal  
303-470 (T94P-6510-CH)

G02739310

**Fig. 137: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

### Material

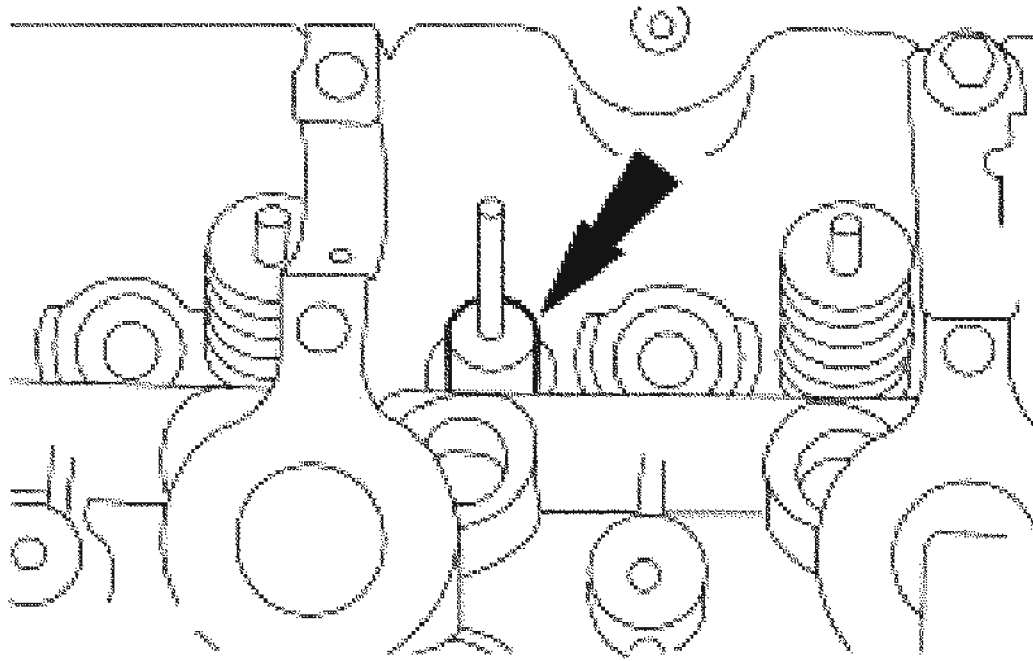
### MATERIAL SPECIFICATION

Item	Specification
SAE5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Remove the valve spring. Refer to VALVE SPRING .

**NOTE:** Camshaft removed for clarity.



G02739311

**Fig. 138: Removing Valve Seal**  
Courtesy of FORD MOTOR CO.

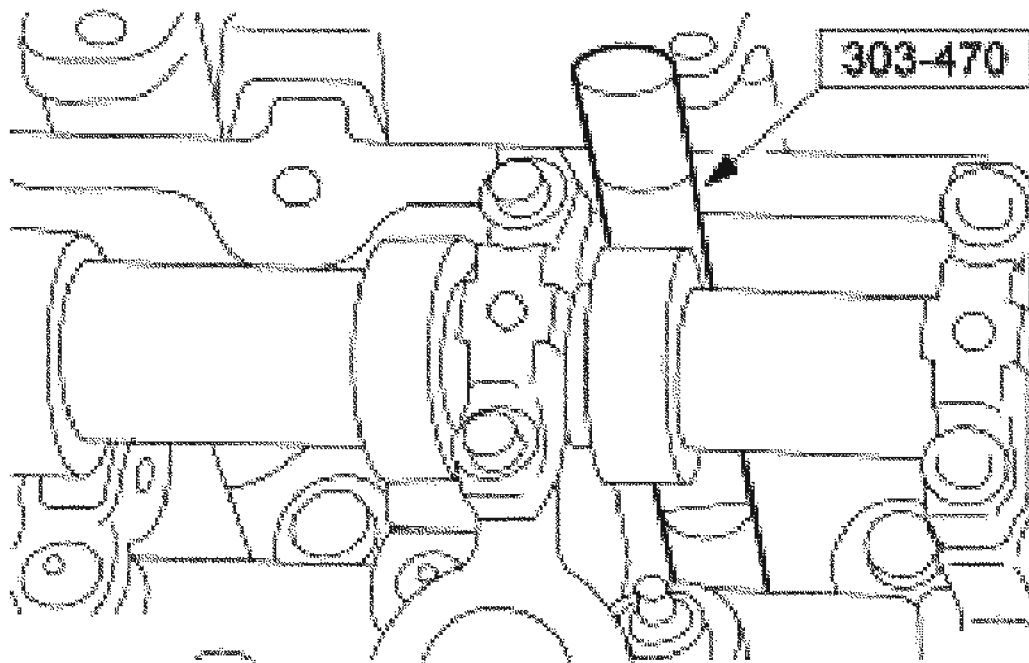
2. Remove the valve seal.

#### Installation

**NOTE:** Lubricate the valve guide with clean engine oil.

1. Using the special tool, install the valve seal.





G02739312

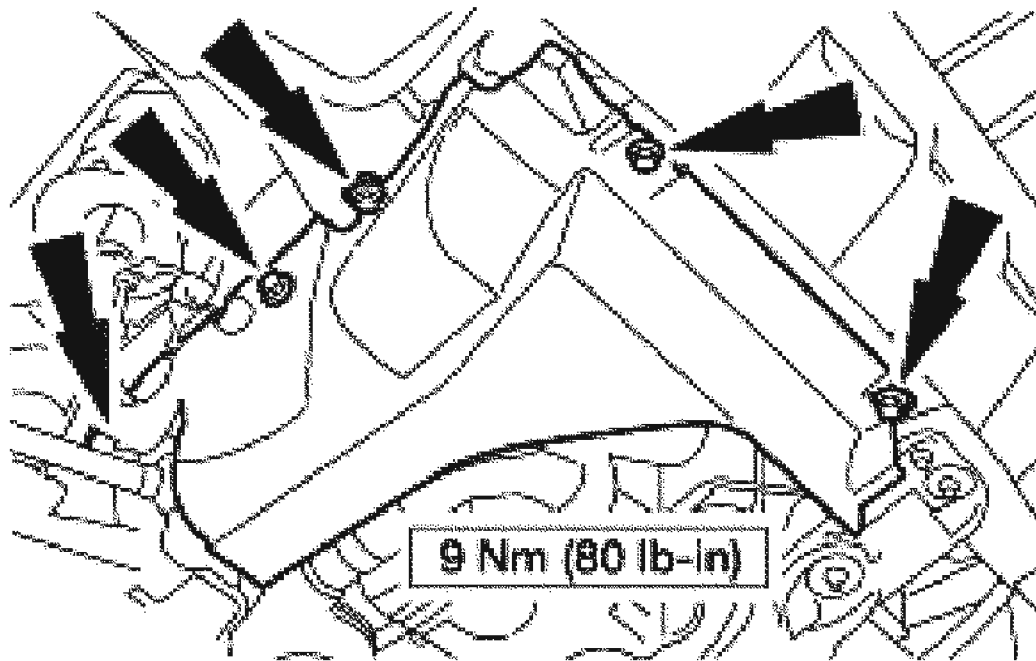
**Fig. 139: Installing Valve Seal**  
Courtesy of FORD MOTOR CO.

2. Install the valve spring. Refer to VALVE SPRING .

## EXHAUST MANIFOLD LH

### Removal

1. Remove the LH heated oxygen sensor (HO2S) and the LH catalyst monitor. For additional information, refer to ELECTRONIC ENGINE CONTROLS .
2. Remove the bolts and the splash shield.



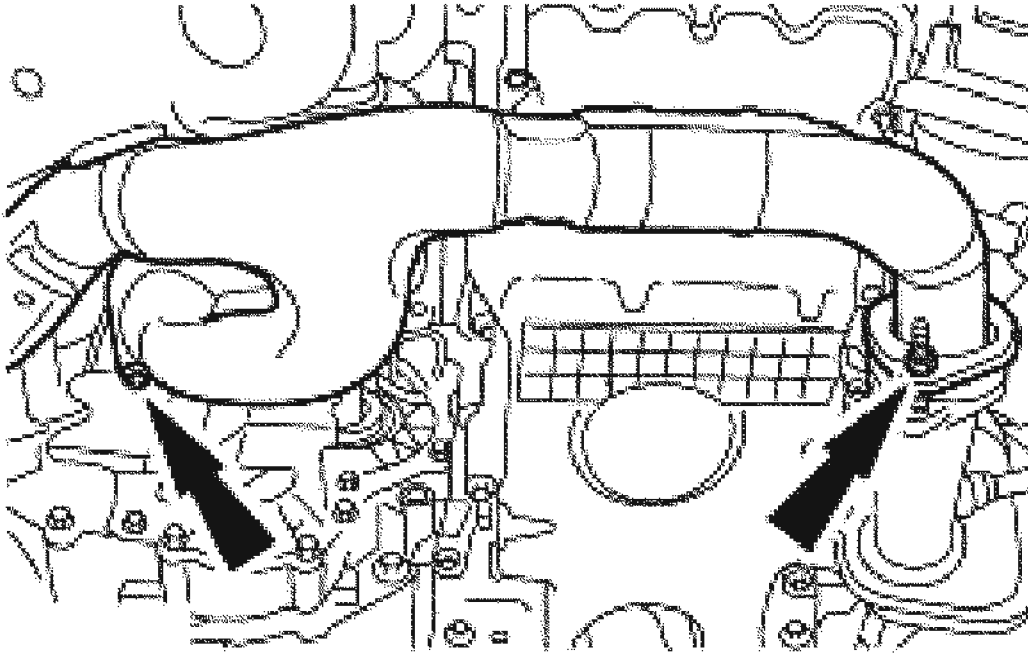
G02739313

**Fig. 140: Removing Bolts And Splash Shield**  
**Courtesy of FORD MOTOR CO.**

3. Remove the nuts and position the exhaust crossover aside.

## 2004 Ford Escape

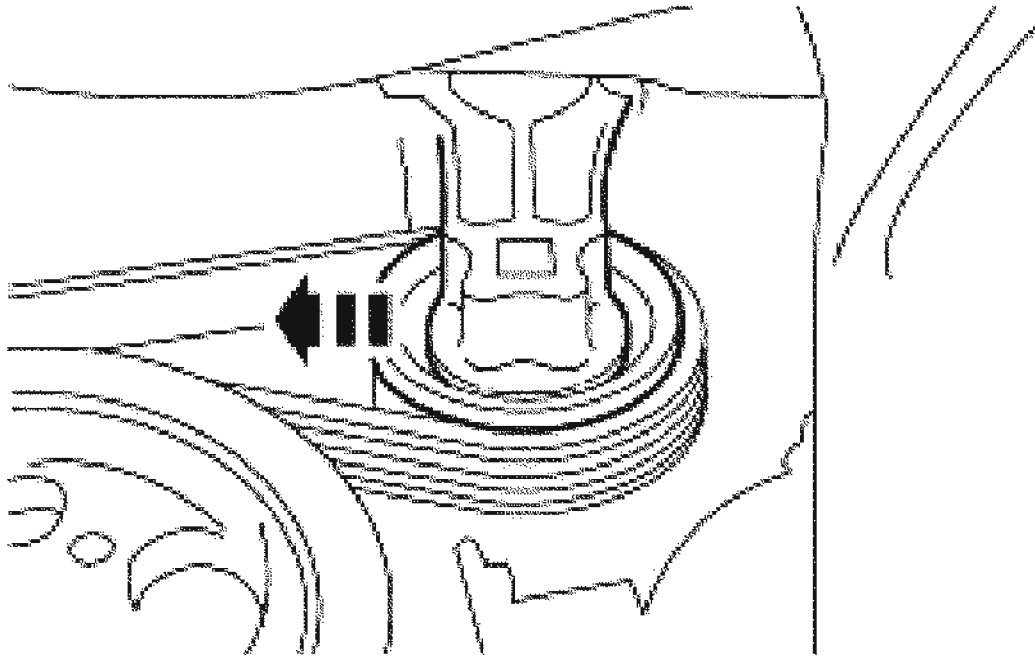
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739314

**Fig. 141: Removing Nuts And Positioning Exhaust Crossover Aside**  
Courtesy of FORD MOTOR CO.

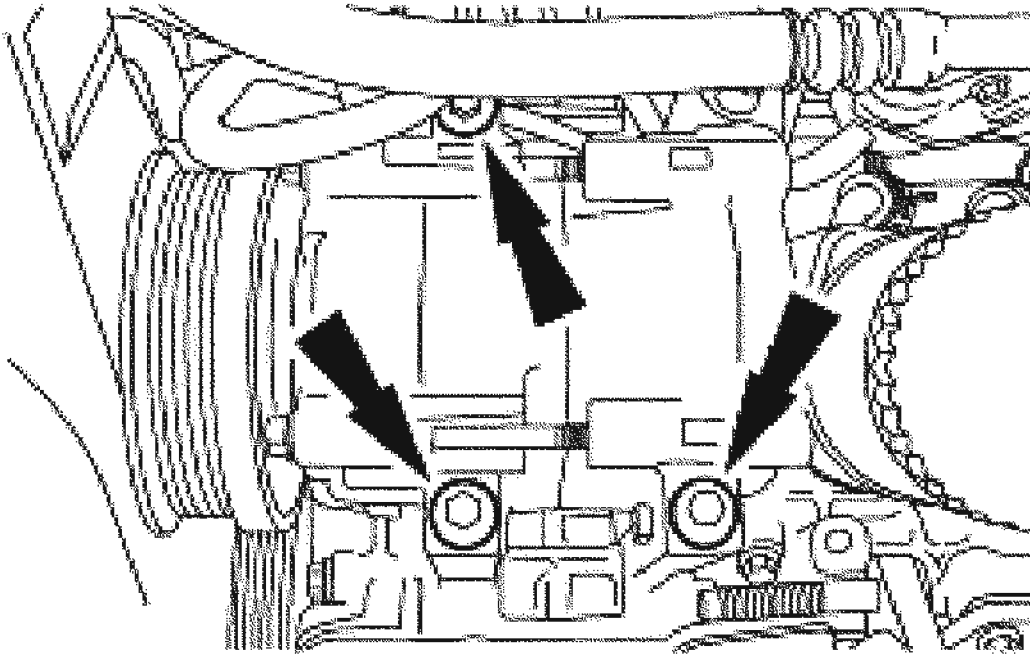
4. Rotate the accessory drive belt tensioner clockwise, and remove the belt.



G02739315

**Fig. 142: Rotating Accessory Drive Belt Tensioner Clockwise**  
Courtesy of FORD MOTOR CO.

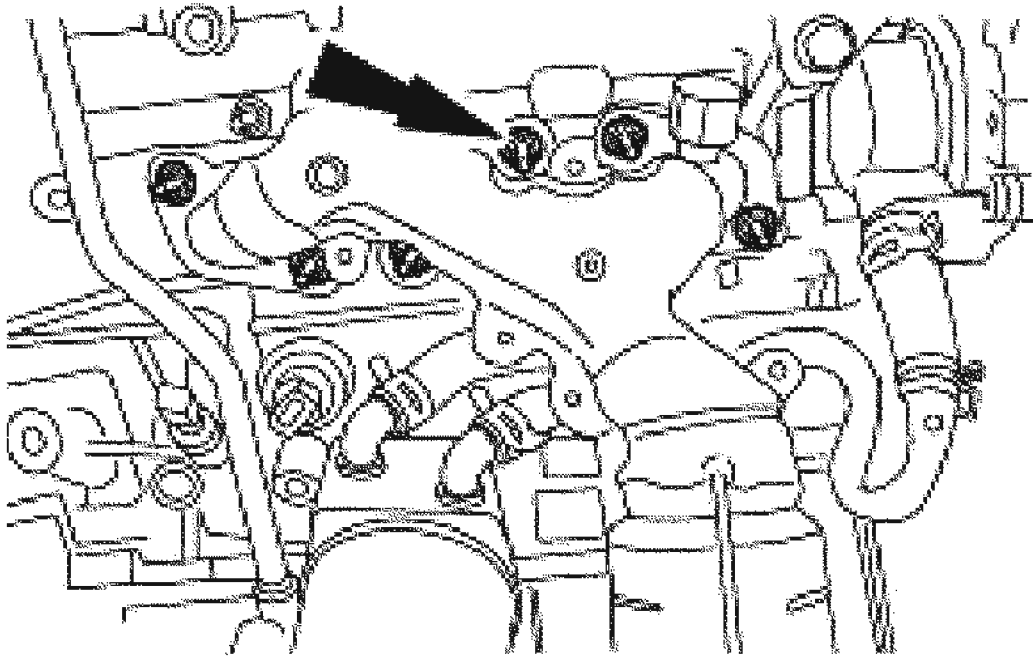
5. Remove the A/C compressor bolts and position aside.



G02739316

**Fig. 143: Removing A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

6. Remove the nuts and LH exhaust manifold and discard the gasket.

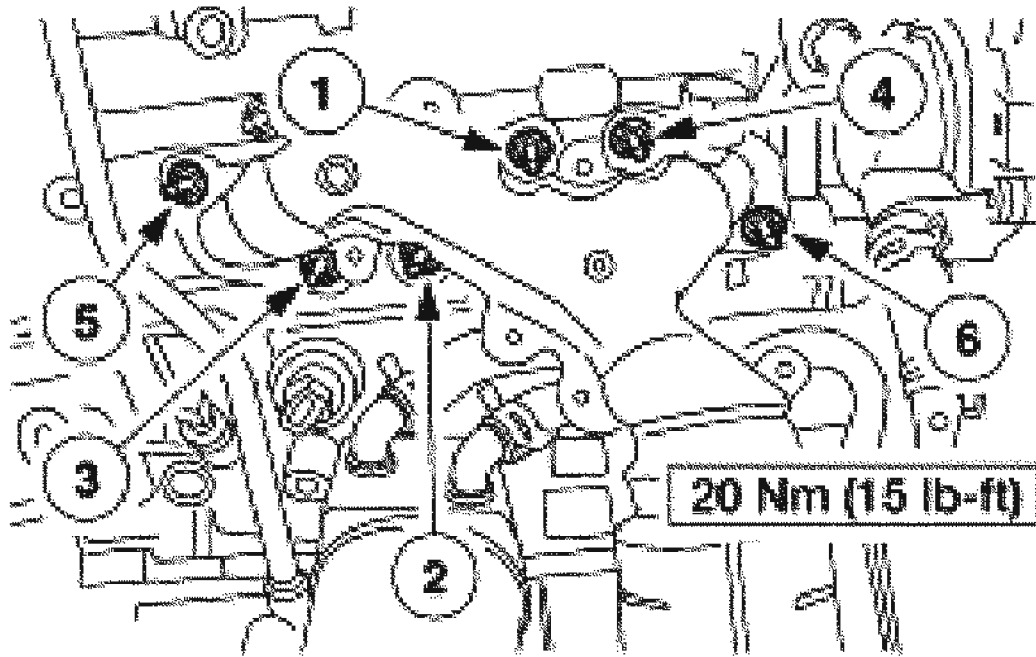


G02739317

**Fig. 144: Removing Nuts And LH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Position a new gasket and tighten the exhaust manifold in the sequence shown.

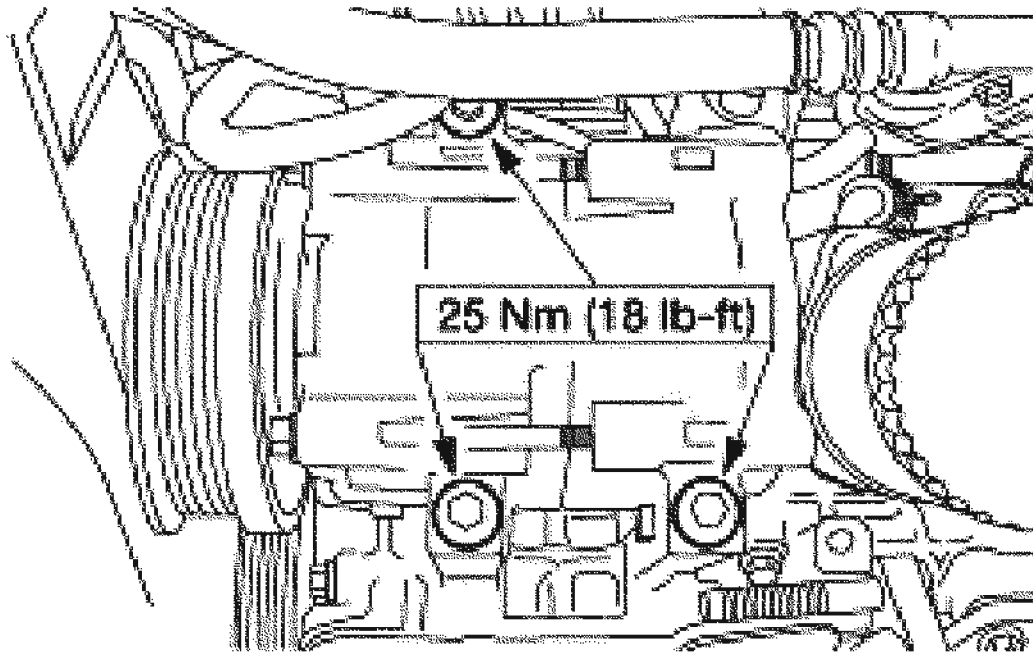


G02739318

**Fig. 145: Identifying Tightening Sequence & Torque Specification Of Exhaust Manifold Bolts**

**Courtesy of FORD MOTOR CO.**

2. Position the A/C compressor and install the bolts.

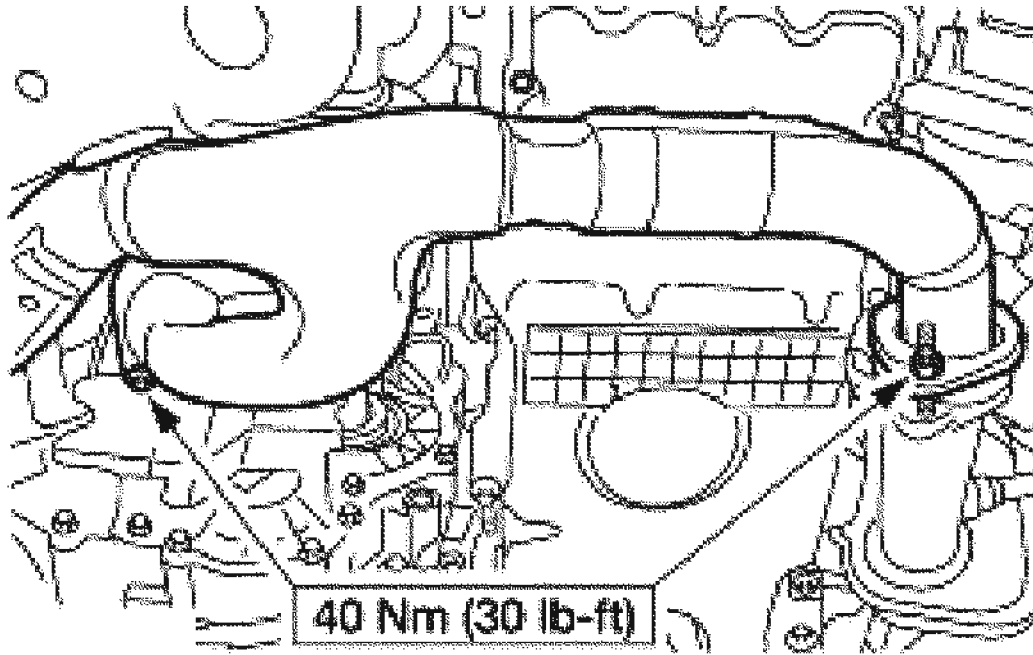


G02739319

**Fig. 146: Identifying A/C Compressor Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

3. Rotate the accessory drive belt tensioner clockwise and install the belt. For correct drive belt installation, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**.
4. Position the exhaust crossover, and install the nuts.

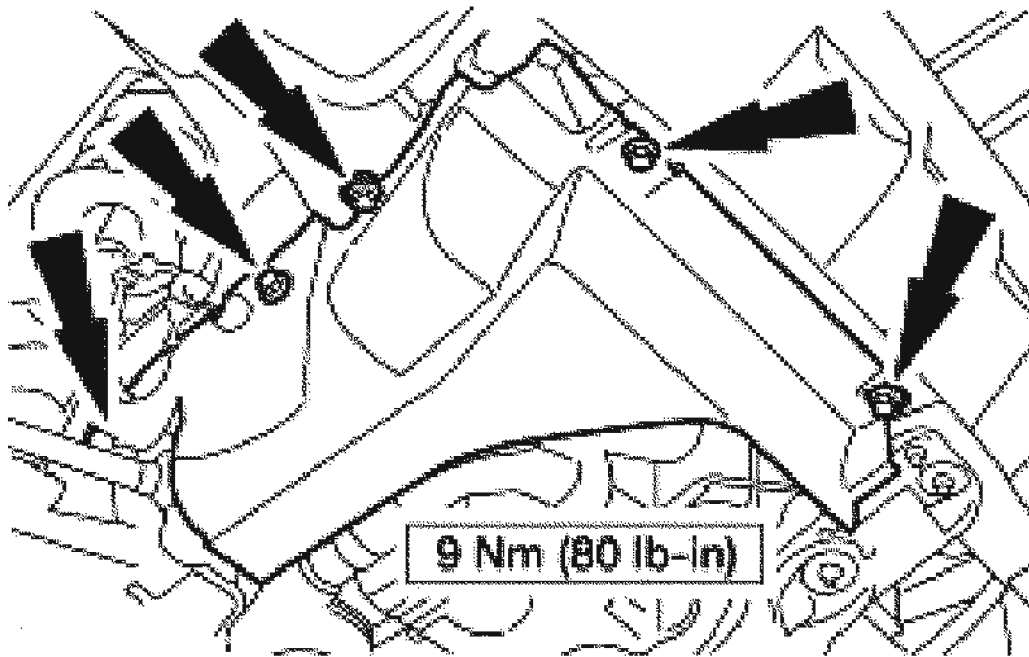




G02739320

**Fig. 147: Identifying Exhaust Crossover Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

5. Install the splash shield.



G02739321

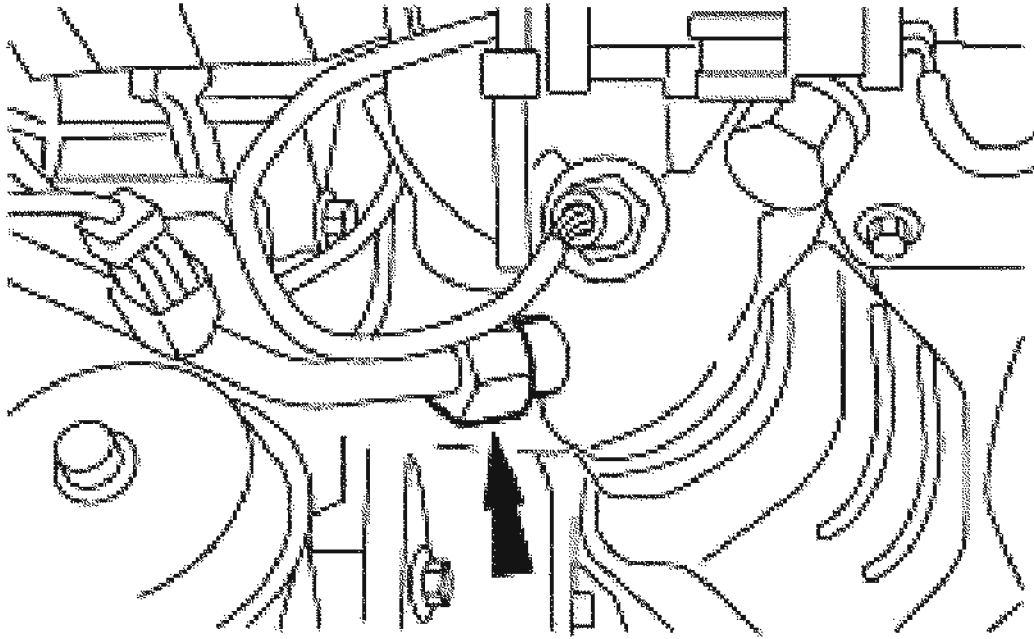
**Fig. 148: Identifying Splash Shield Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Install the LH HO2S and the LH catalyst monitor. For additional information, refer to **ELECTRONIC ENGINE CONTROLS** .

## **EXHAUST MANIFOLD RH**

### **Removal**

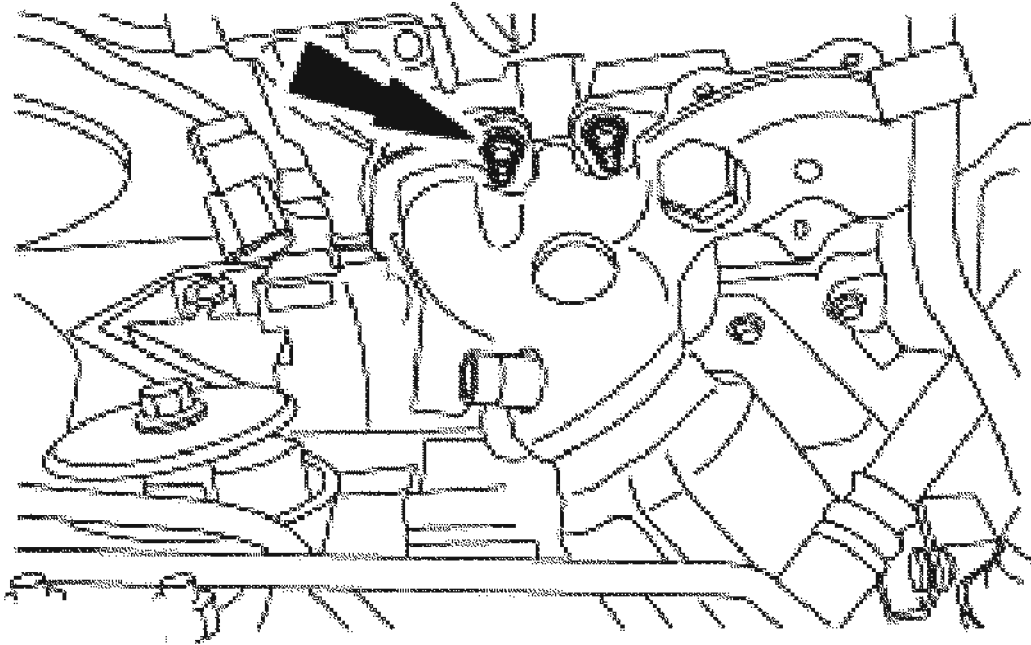
1. Remove the generator. For additional information, refer to **GENERATORS & REGULATORS** .
2. Remove the exhaust flexible pipe. For additional information, refer to **EXHAUST SYSTEM** .
3. Disconnect the RH heated oxygen sensor (HO2S) electrical connector.
4. Disconnect the exhaust gas recirculation (EGR) tube nut to the exhaust manifold.



G02739322

**Fig. 149: Disconnecting Exhaust Gas Recirculation (EGR) Tube Nut**  
Courtesy of FORD MOTOR CO.

5. Remove the RH manifold.
  - Discard the gasket.

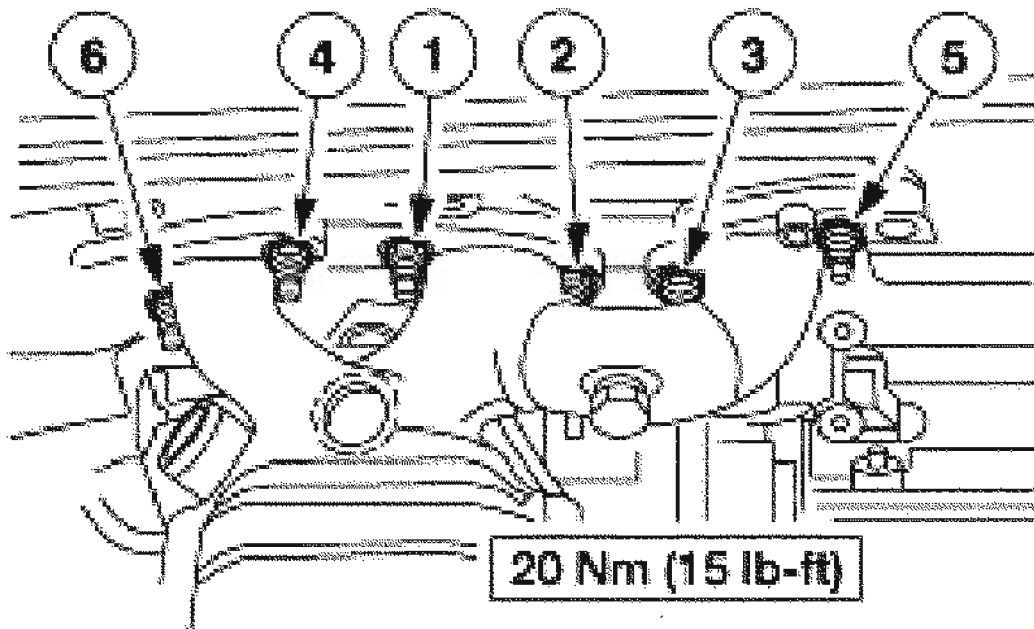


G02739323

**Fig. 150: Removing RH Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Position a new gasket and install the exhaust manifold nuts in the sequence shown.

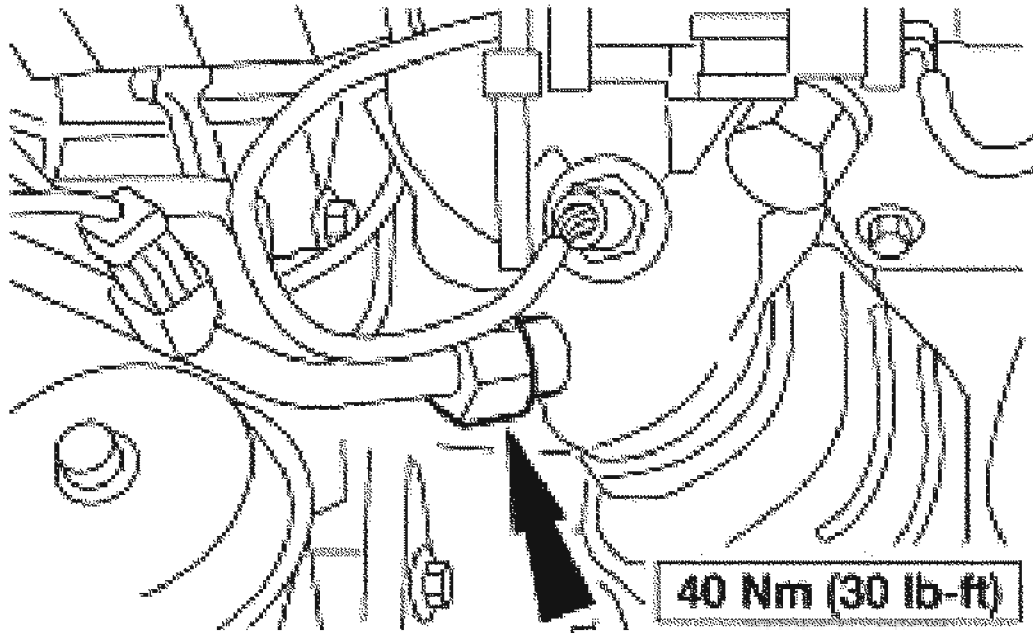


G02739324

**Fig. 151: Identifying Exhaust Manifold Nuts Installing Sequence & Torque Specification**

**Courtesy of FORD MOTOR CO.**

2. Connect the EGR tube nut to the exhaust manifold.



G02739325

**Fig. 152: Identifying EGR Tube Nut Torque Specification**  
 Courtesy of FORD MOTOR CO.

3. Connect the RH HO2S electrical connector.
4. Install the exhaust flexible pipe. For additional information, refer to **EXHAUST SYSTEM**.
5. Install the generator. For additional information, refer to **GENERATORS & REGULATORS**.

## CYLINDER HEAD LH

### Material

### MATERIAL SPECIFICATION

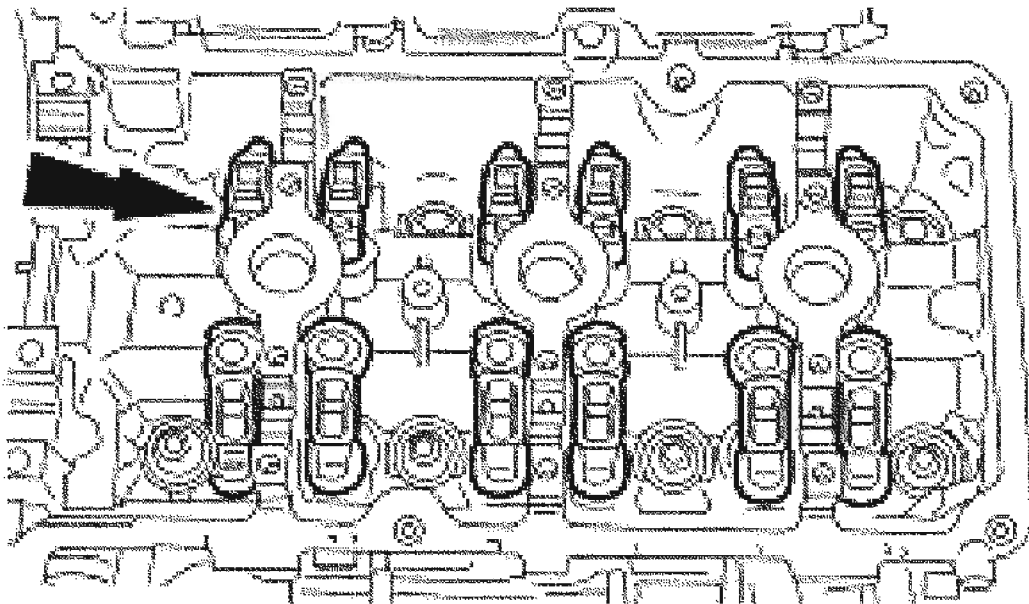
Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.

2. Remove the coolant bypass tube. For additional information, refer to **ENGINE COOLING**.
3. Remove the LH camshafts. For additional information, refer to **CAMSHAFTS LH** in this section.

**CAUTION:** The camshaft followers must be installed in their original position.

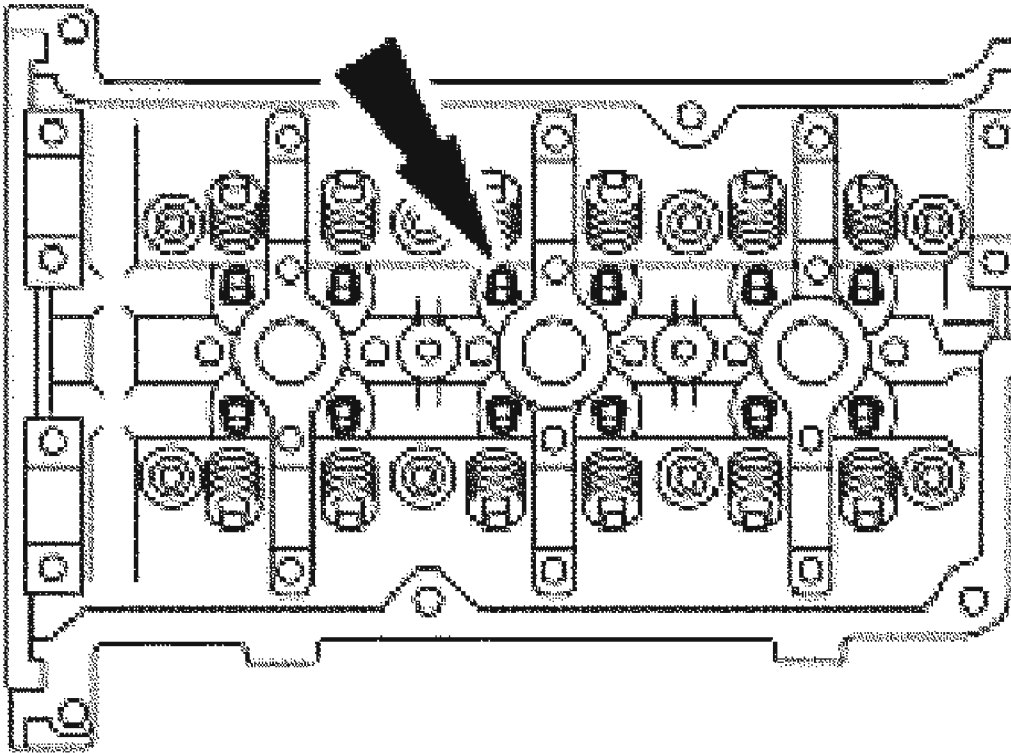


G02739326

**Fig. 153: Removing Camshaft Followers**  
Courtesy of FORD MOTOR CO.

4. Remove the camshaft followers.

**CAUTION:** The hydraulic lash adjusters must be installed in their original position.

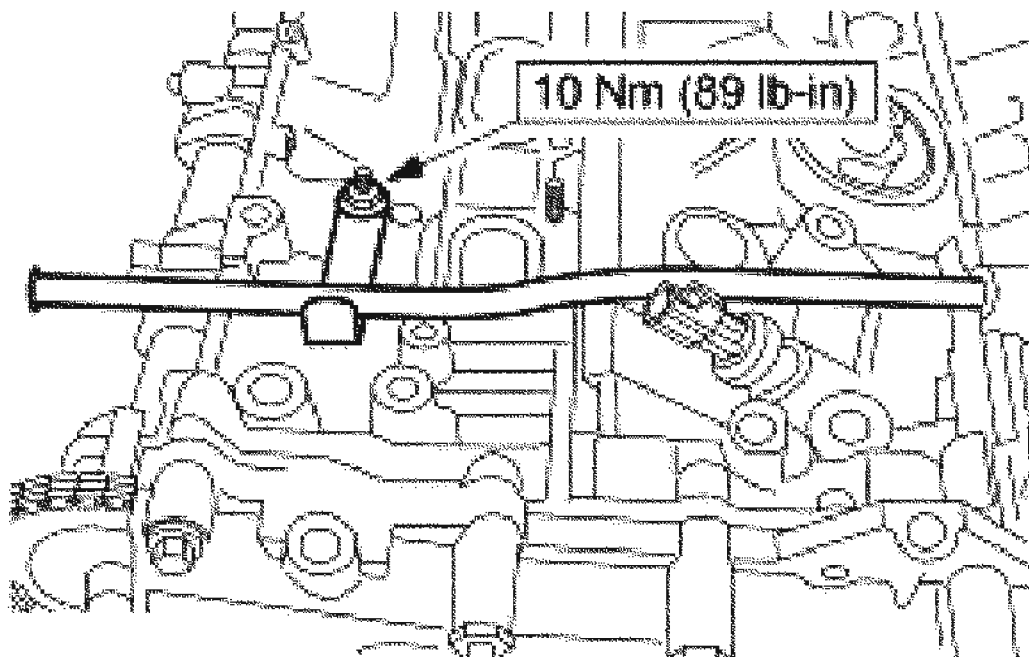


G02739327

**Fig. 154: Removing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

5. Remove the hydraulic lash adjusters.
6. Position the water pump and housing aside. For additional information, refer to ENGINE COOLING .
7. Raise and support the vehicle on a hoist. For additional information, refer to JACKING & LIFTING .
8. Remove the LH exhaust manifold. For additional information, refer to EXHAUST MANIFOLD LH .
9. Remove the oil level indicator tube stud bolt.





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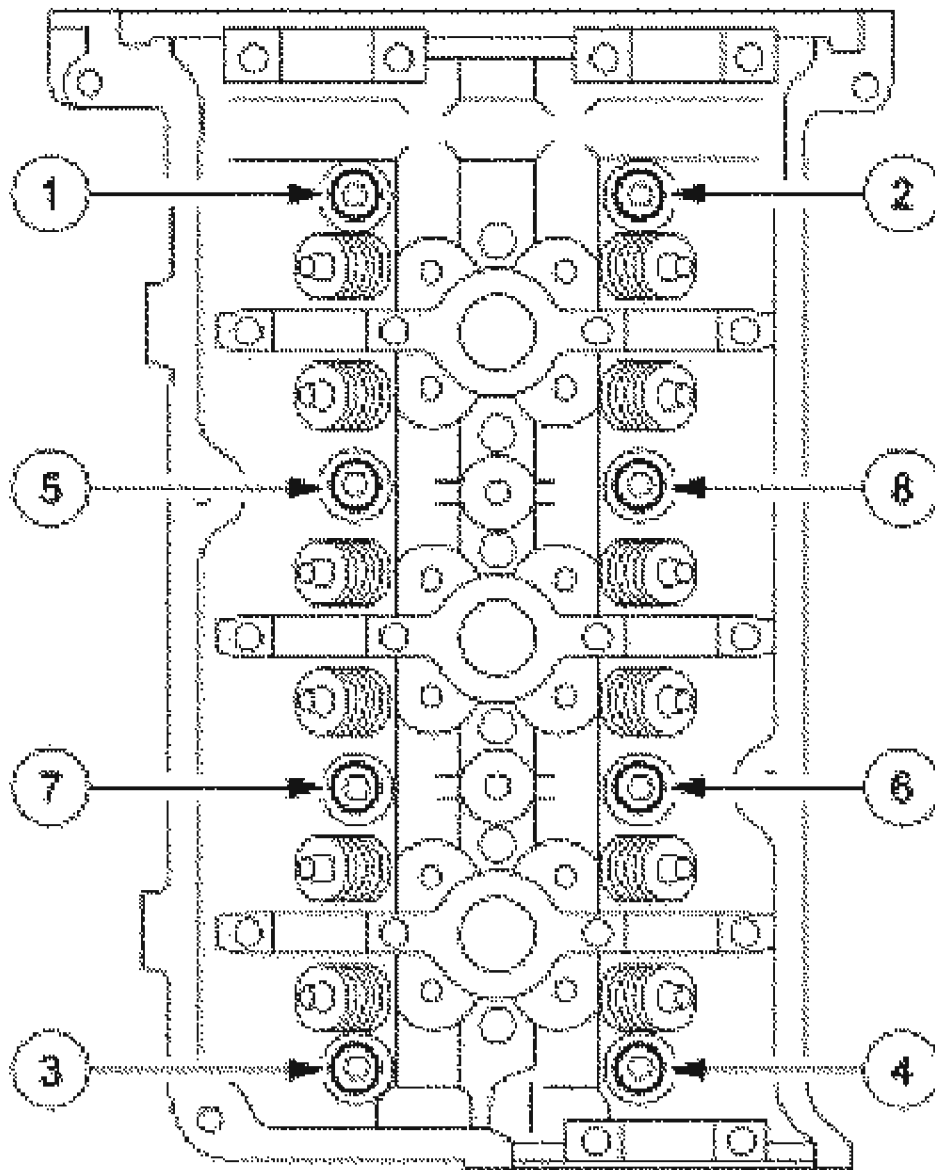
**Fig. 155: Removing Oil Level Indicator Tube Stud Bolt**  
Courtesy of FORD MOTOR CO.

10. Lower the vehicle.

**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739329

**Fig. 156: Identifying Bolt Removal Sequence**  
Courtesy of FORD MOTOR CO.

11. Remove the bolts in the sequence shown and remove the cylinder head.
  - Discard the gasket and the bolts.

**NOTE:** The straightedge used must be flat within 0.0051 mm (0.0002

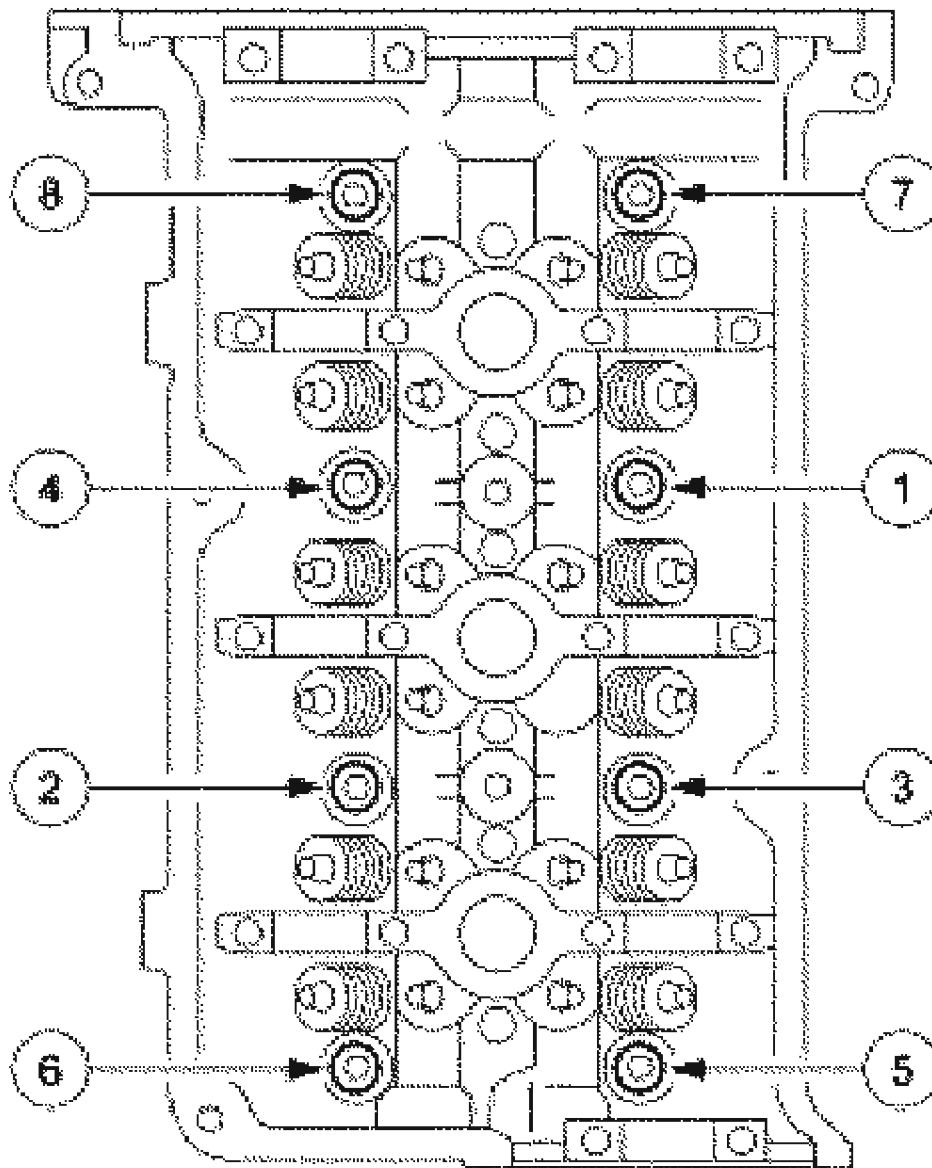
**in) per foot of tool length.**

12. Support the cylinder head on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in) deep.

**Installation**

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of the head gasket. Clean all sealing surfaces with metal surface cleaner.

**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.

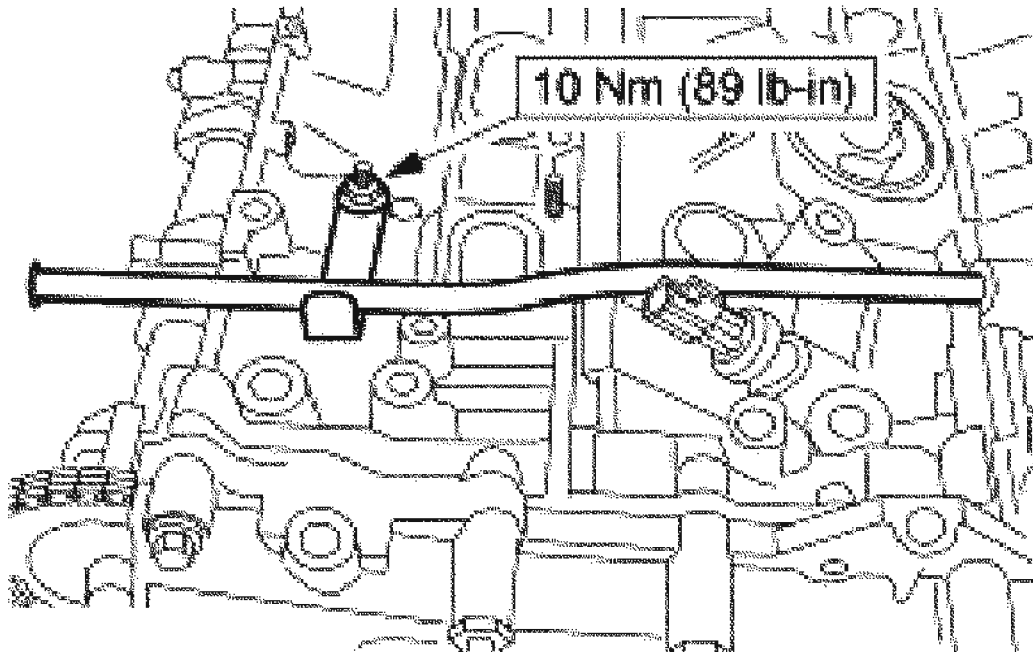


G02739330

**Fig. 157: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

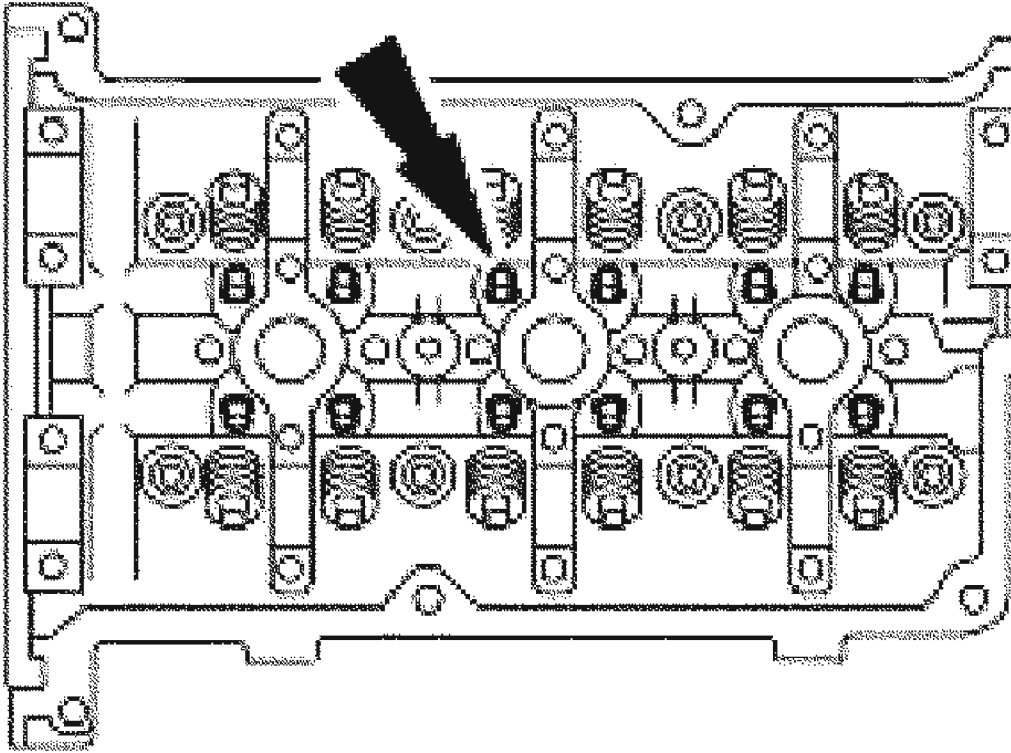
1. Position the LH cylinder head and gasket and install the bolts. Tighten the bolts in six stages, in the sequence shown:
  - Stage 1: Tighten to 40 Nm (30 lb-ft).
  - Stage 2: Tighten bolts 90 degrees.

- Stage 3: Loosen one full turn.
  - Stage 4: Tighten to 40 Nm (30 lb-ft).
  - Stage 5: Tighten 90 degrees.
  - Stage 6: Tighten 90 degrees.
2. Install the water pump. For additional information, refer to **ENGINE COOLING** .
  3. Raise the vehicle.
  4. Install the stud bolt.

**G02739331**

**Fig. 158: Identifying Stud Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

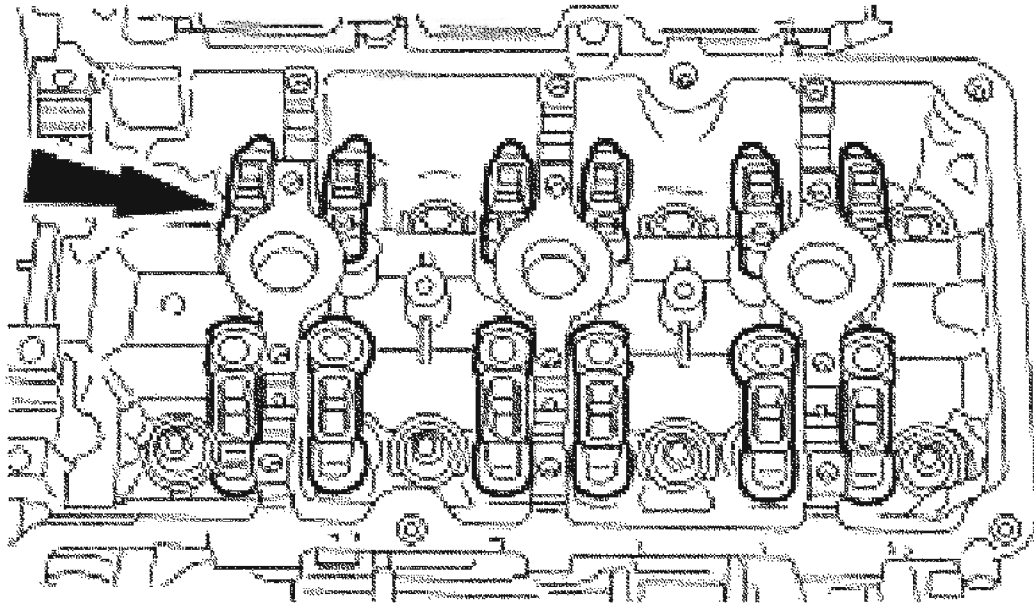
5. Install the LH exhaust manifold. For additional information, refer to **EXHAUST MANIFOLD LH** .
6. Lower the vehicle.
7. Install the hydraulic lash adjusters.
  - Lubricate the hydraulic lash adjusters with clean engine oil.



G02739332

**Fig. 159: Installing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

8. Install the camshaft followers.
  - Lubricate the camshaft followers with clean engine oil.



G02739333

**Fig. 160: Installing Camshaft Followers**  
 Courtesy of FORD MOTOR CO.

9. Install the LH camshafts. For additional information, refer to **CAMSHAFTS LH**.
10. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING**.
11. Install the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.

## CYLINDER HEAD RH

### Material

### MATERIAL SPECIFICATION

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

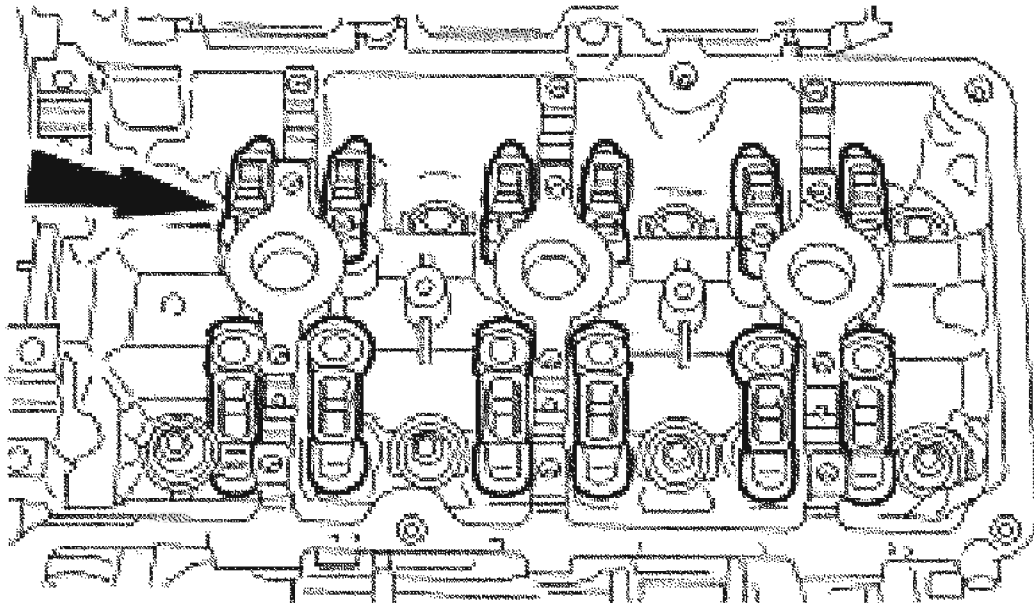
### Removal

1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD** in this section.
2. Remove the coolant bypass tube. For additional information, refer to **ENGINE**

**COOLING .**

3. Remove the exhaust gas recirculation (EGR) tube. For additional information, refer to **ENGINE EMISSION CONTROL .**
4. Remove the RH camshafts. For additional information, refer to **CAMSHAFTS RH .**

**CAUTION: The camshaft followers must be installed in their original positions.**



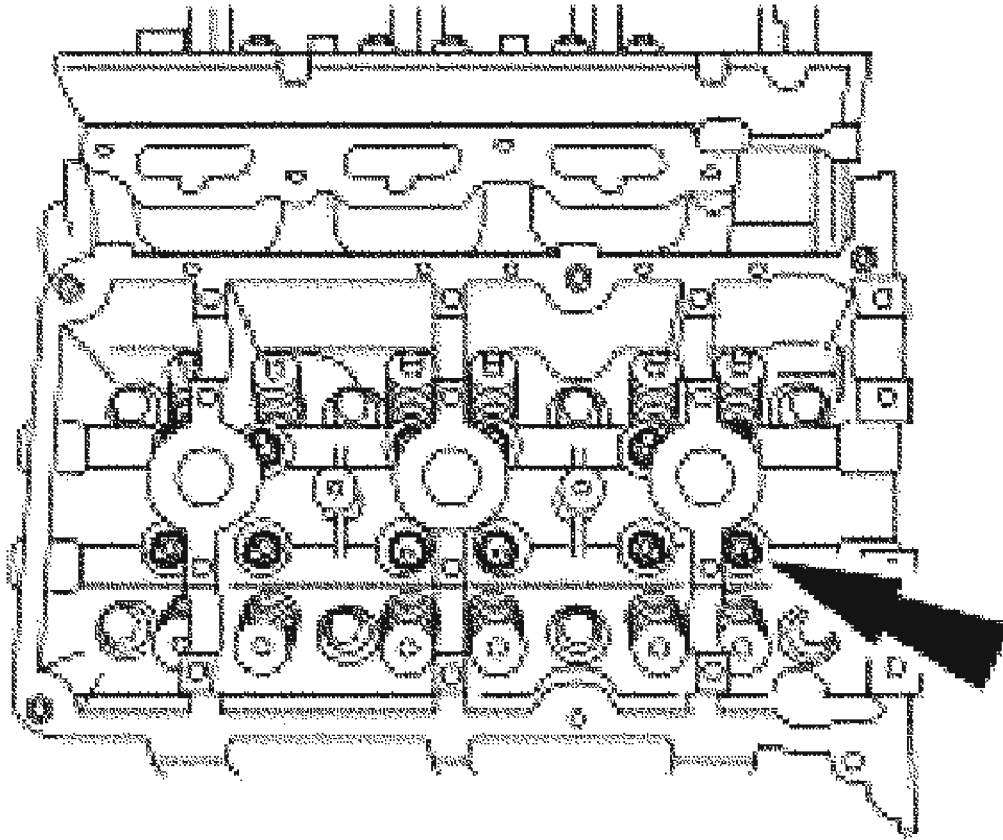
G02739334

**Fig. 161: Removing Camshaft Followers**  
**Courtesy of FORD MOTOR CO.**

5. Remove the camshaft followers.

**CAUTION: The hydraulic lash adjusters must be installed in their original position.**

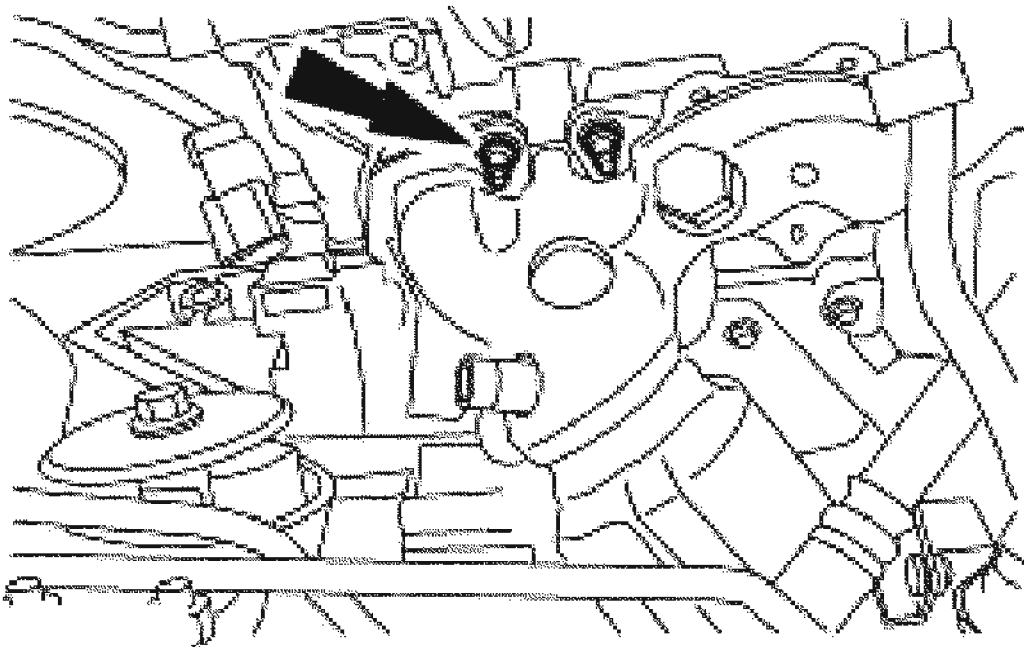




G02739335

**Fig. 162: Removing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

6. Remove the hydraulic lash adjusters.
7. Raise and support the vehicle on a hoist. For additional information, refer to **JACKING & LIFTING**.
8. Remove the six nuts from the RH exhaust manifold.

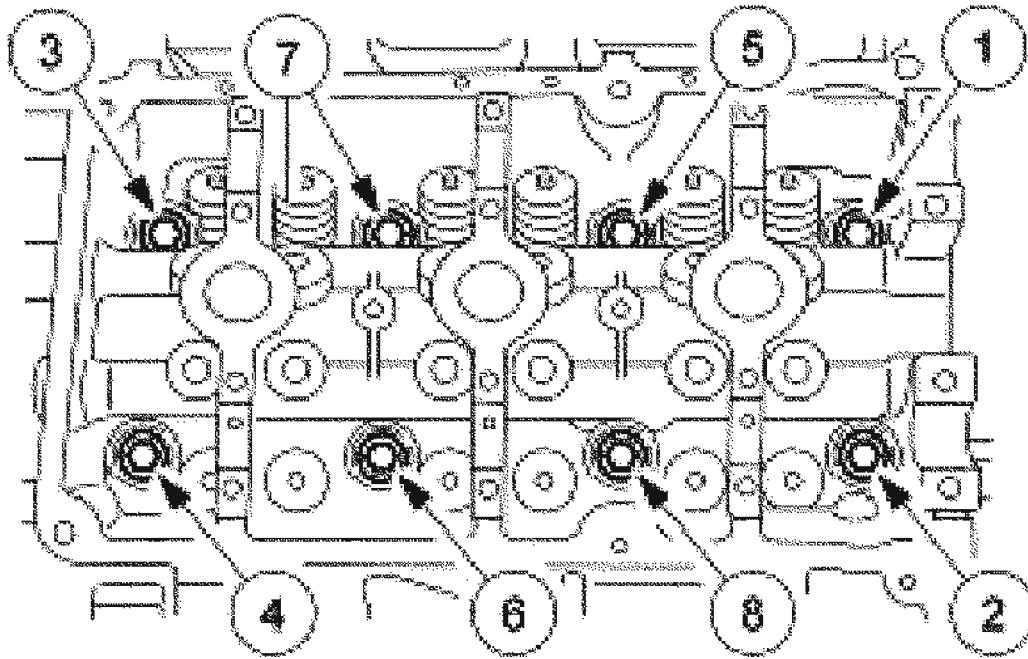


G02739336

**Fig. 163: Removing Nuts From RH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

9. Lower the vehicle.

**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.



G02739337

**Fig. 164: Identifying Bolt Removal Sequence**  
 Courtesy of FORD MOTOR CO.

10. Remove the bolts in the sequence shown and remove the cylinder head.
  - Discard the gasket and the bolts.

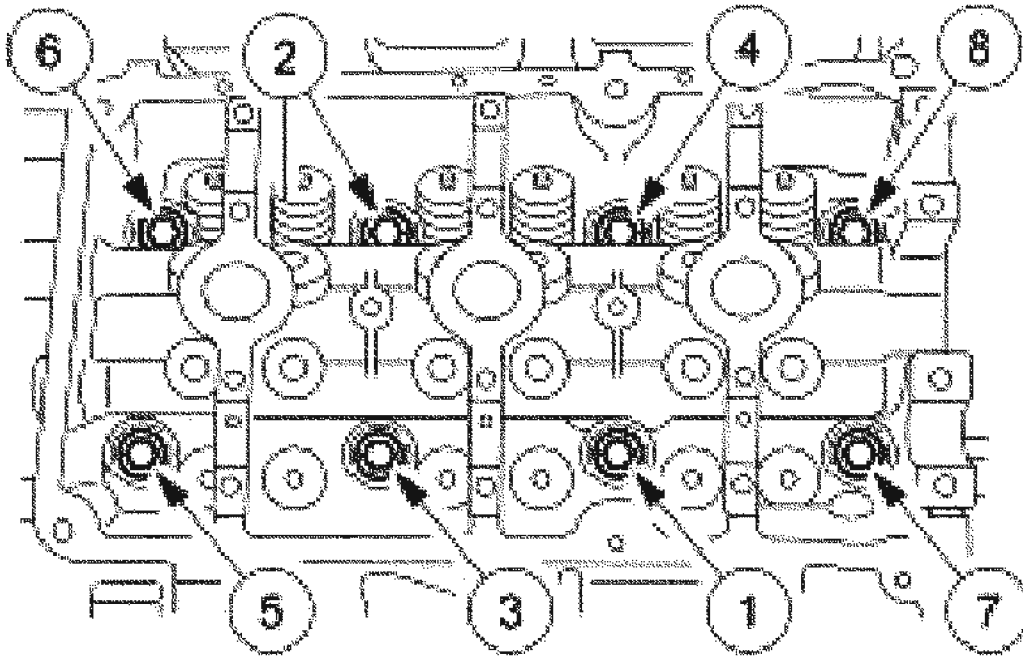
**NOTE:** The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

11. Support the cylinder head on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in) deep.

#### Installation

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of the head gasket. Clean all sealing surfaces with metal surface cleaner.

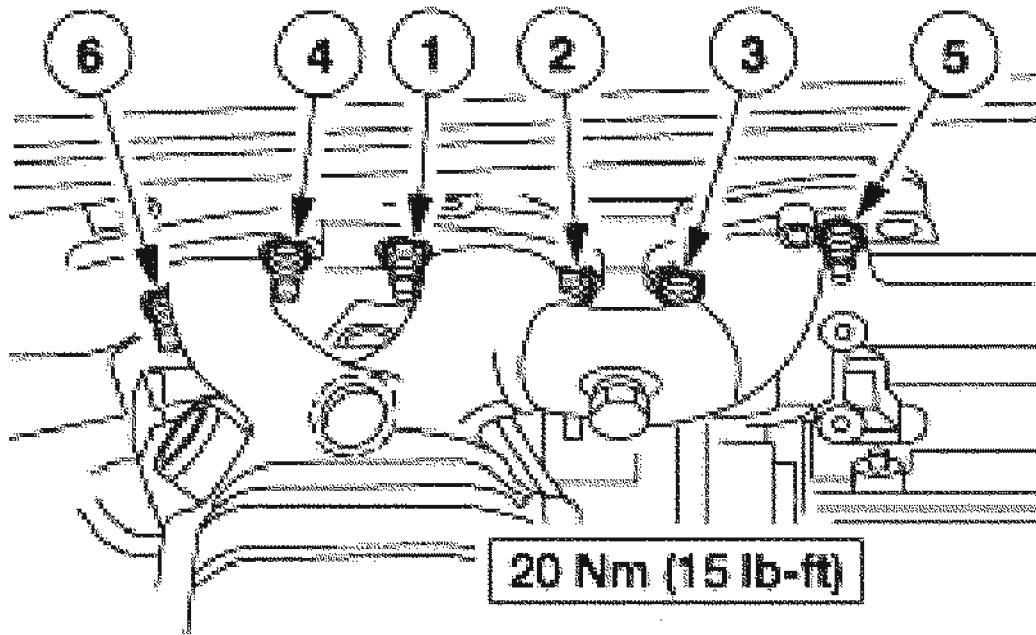
**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.



G02739338

**Fig. 165: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

1. Position the RH cylinder head and gasket and install the bolts. Tighten the bolts in six stages, in the sequence shown:
  - Stage 1: Tighten to 40 Nm (30 lb-ft).
  - Stage 2: Tighten bolts 90 degrees.
  - Stage 3: Loosen one full turn.
  - Stage 4: Tighten to 40 Nm (30 lb-ft).
  - Stage 5: Tighten 90 degrees.
  - Stage 6: Tighten 90 degrees.
2. Raise the vehicle on a hoist. For additional information refer to **JACKING & LIFTING**.
3. Install RH exhaust manifold nuts in the sequence shown.

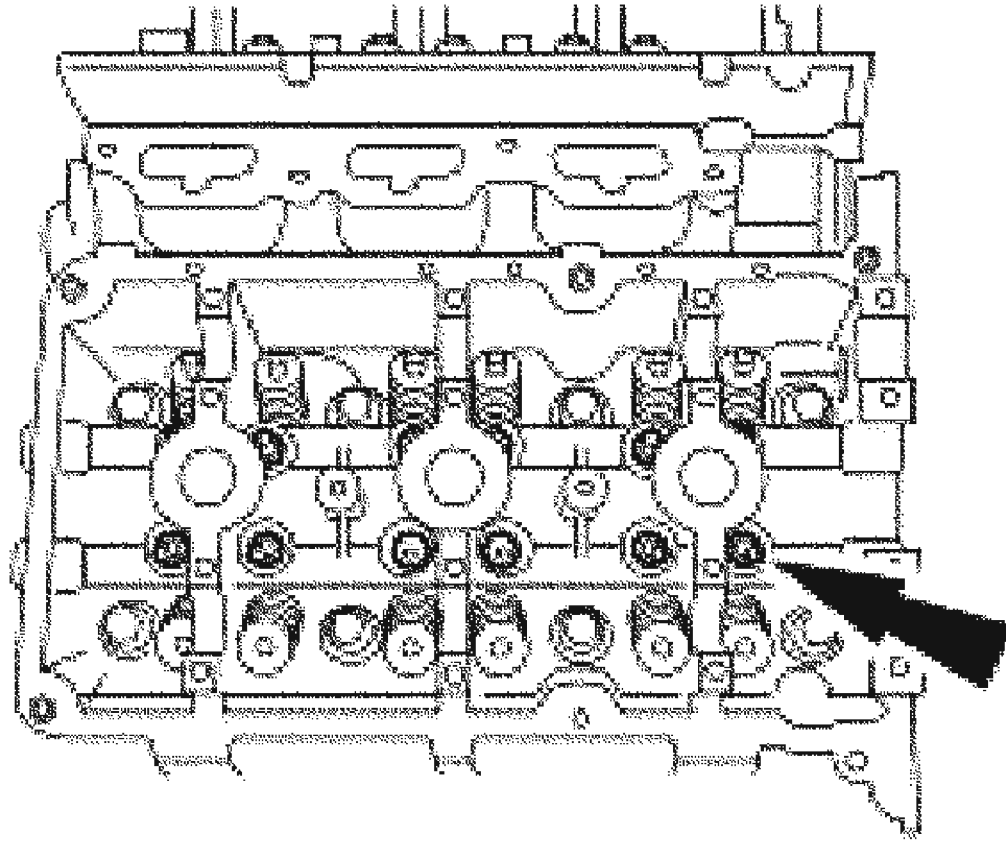


G02739339

**Fig. 166: Identifying Tightening Sequence & Torque Specification Of RH Exhaust Manifold Nuts**

Courtesy of FORD MOTOR CO.

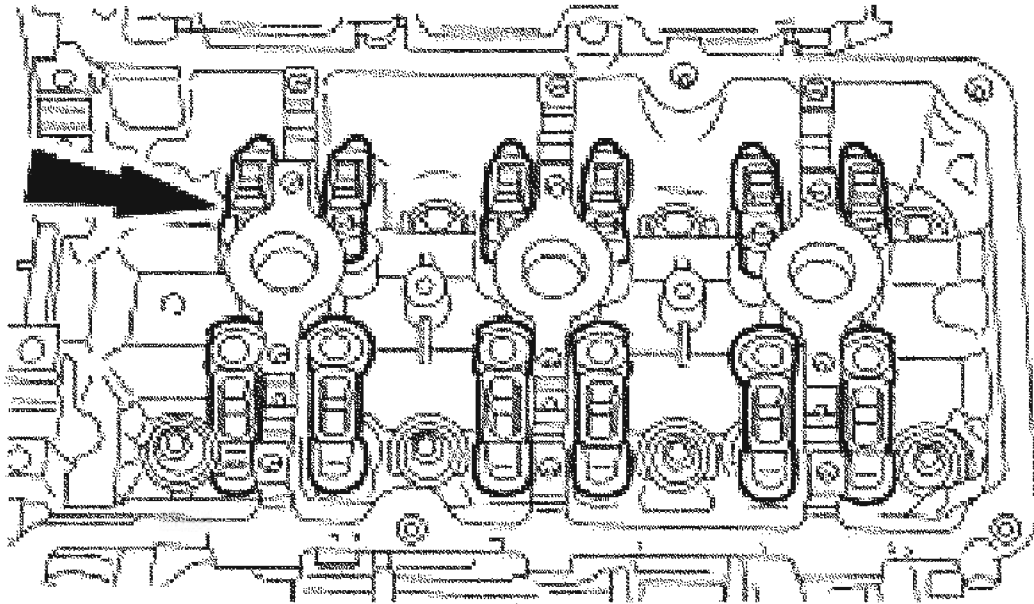
4. Lower the vehicle.
5. Install the hydraulic lash adjusters.
  - Lubricate the hydraulic lash adjusters with clean engine oil.



G02739340

**Fig. 167: Installing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

6. Install the camshaft followers.
  - Lubricate the camshaft followers with clean engine oil.



G02739341

**Fig. 168: Installing Camshaft Followers**  
Courtesy of FORD MOTOR CO.

7. Install the RH camshafts. For additional information, refer to **CAMSHAFTS RH** .
8. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING** .
9. Install the exhaust gas recirculation (EGR) tube. For additional information, refer to **ENGINE EMISSION CONTROL** .
10. Install the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD** .

## OIL COOLER

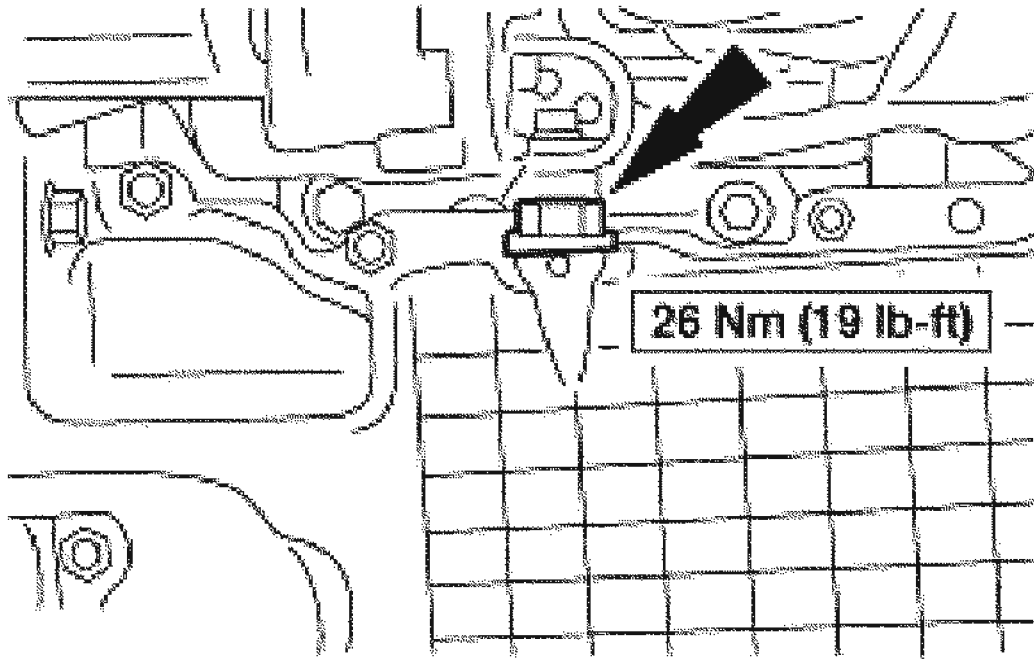
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

1. Drain the engine coolant. For additional information refer to **ENGINE COOLING** .
2. Remove the oil pan drain bolt and drain the engine oil.

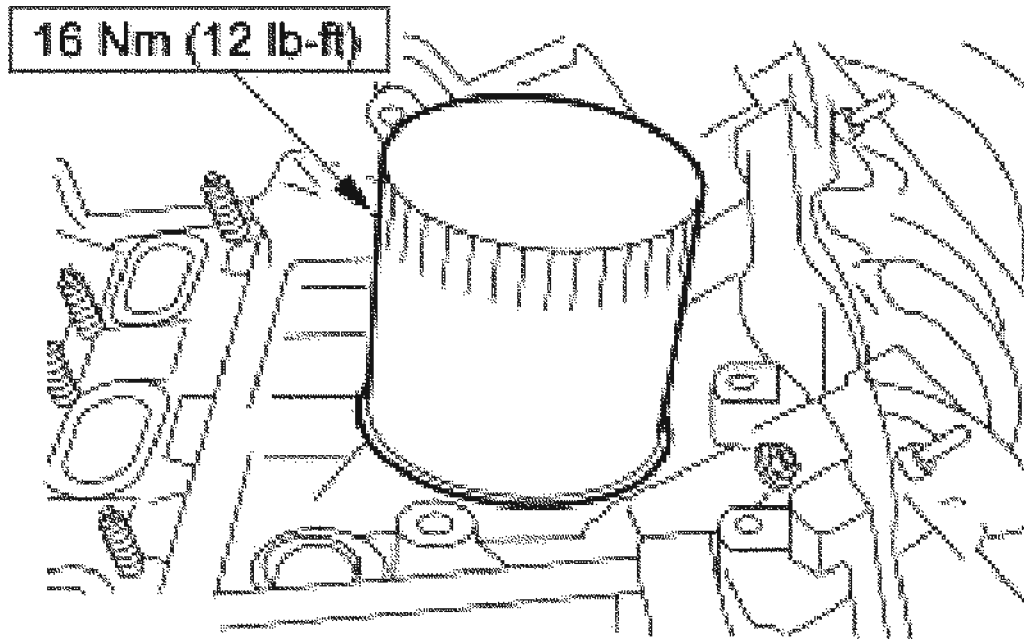


G02739342

**Fig. 169: Removing Oil Pan Drain Bolt**  
Courtesy of FORD MOTOR CO.

3. Remove and discard the oil filter.

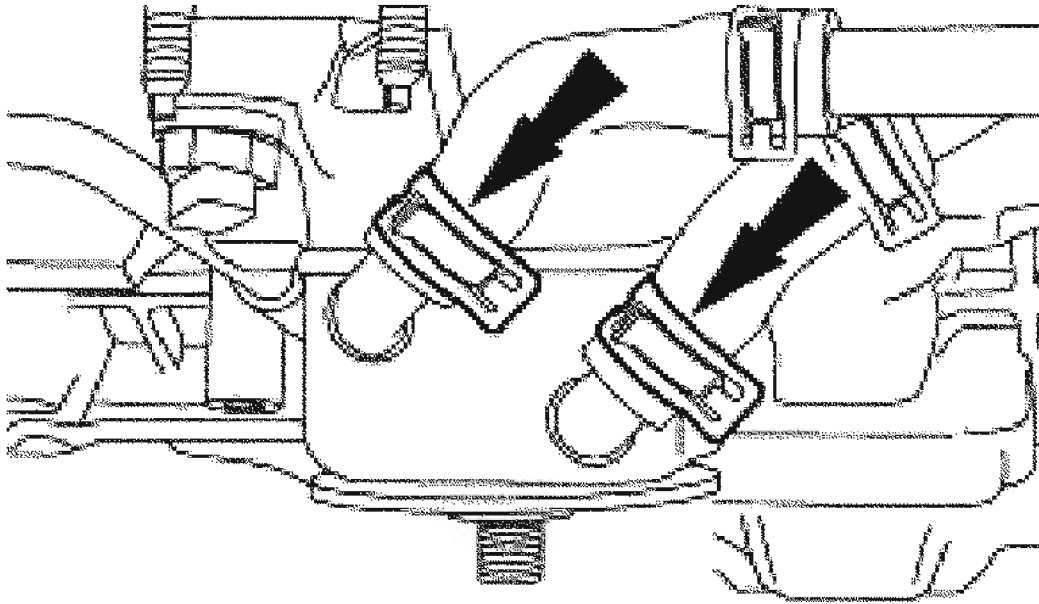




G02739343

**Fig. 170: Removing Filter**  
Courtesy of FORD MOTOR CO.

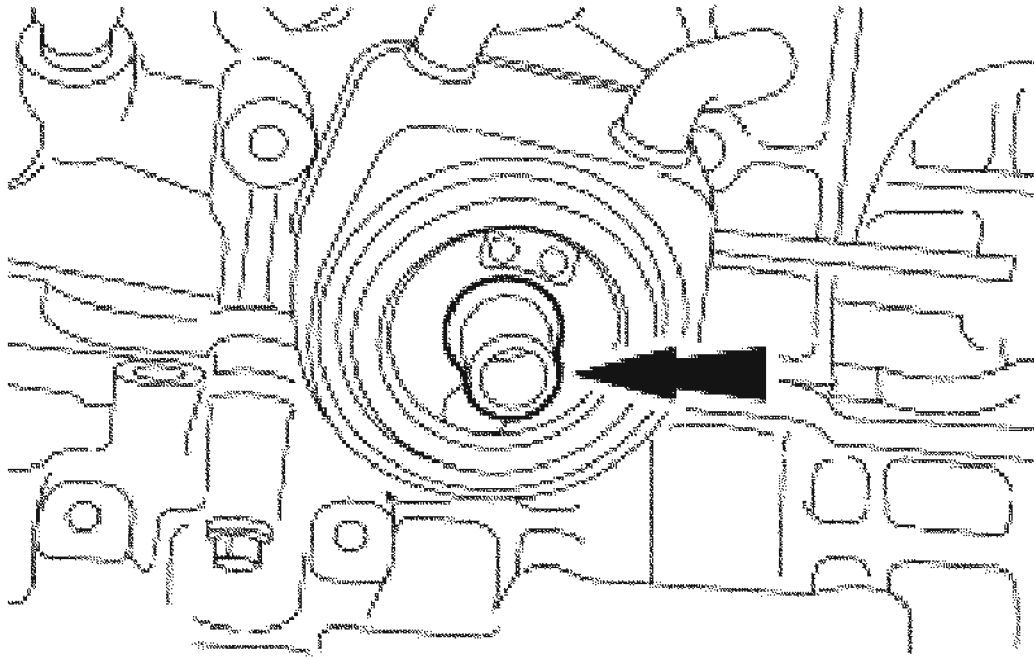
4. Disconnect the coolant hoses at the cooler.



G02739344

**Fig. 171: Disconnecting Coolant Hoses**  
Courtesy of FORD MOTOR CO.

5. Remove and discard the oil cooler.



G02739345

**Fig. 172: Removing Oil Cooler**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.
  - Install a new oil cooler.
  - Fill the crankcase with clean engine oil.

## OIL LEVEL INDICATOR AND TUBE

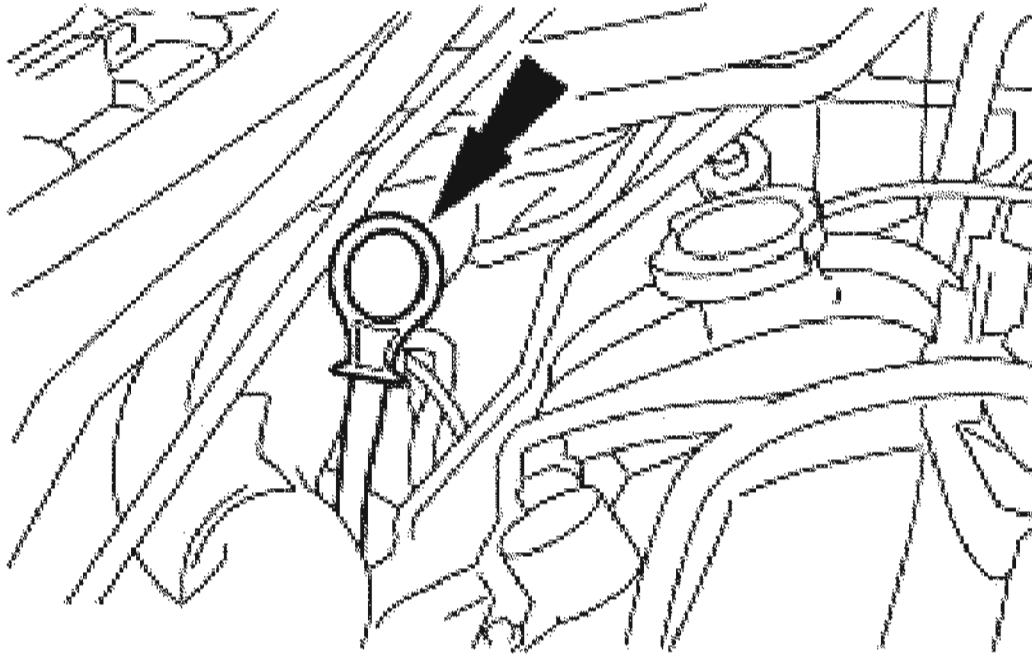
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

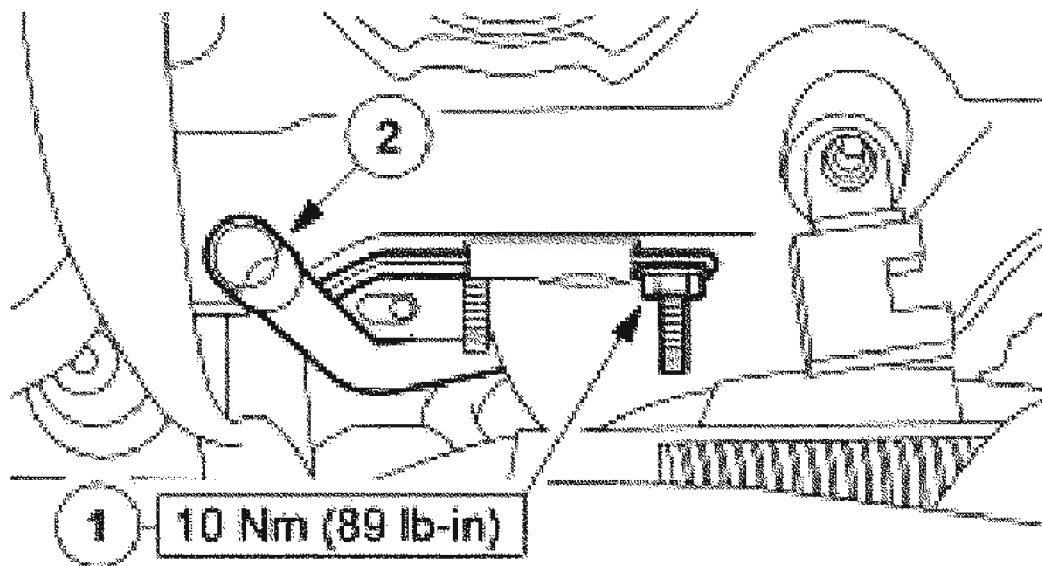
1. Release the push-pin securing the top radiator hose to the radiator core support and position the hose aside.
2. Remove the oil level indicator.



G02739346

**Fig. 173: Removing Oil Level Indicator**  
**Courtesy of FORD MOTOR CO.**

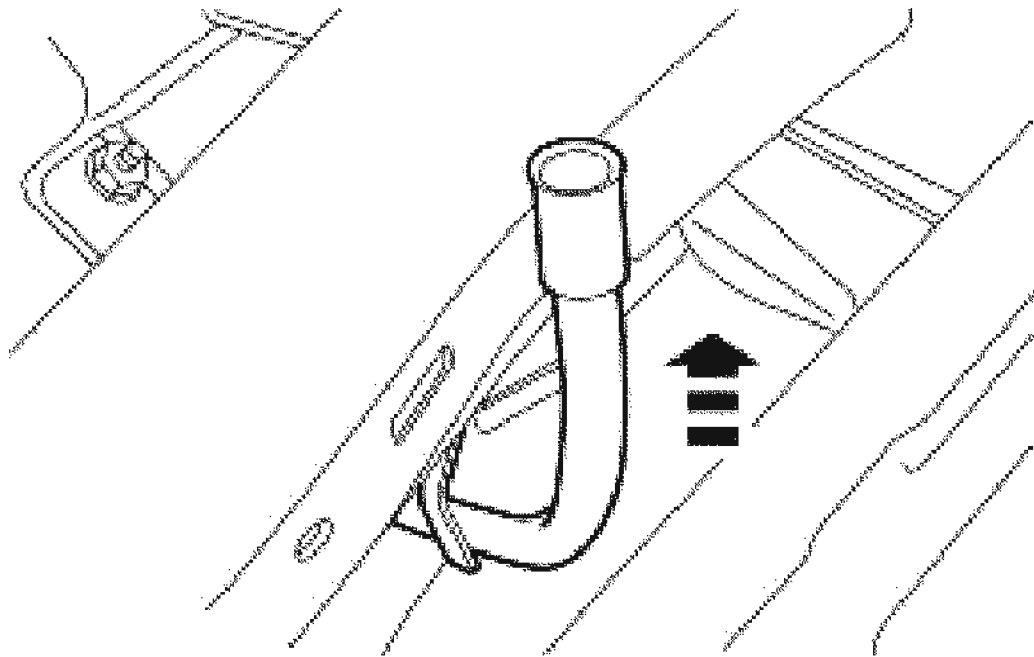
3. Remove the oil level indicator tube.
  1. Remove the stud bolt.
  2. Remove the oil level indicator tube from the engine.



G02739347

**Fig. 174: Removing Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

4. Remove the oil level indicator tube from the vehicle by guiding it between the radiator core support and the front grille.



G02739348

**Fig. 175: Identifying Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** Installation of the oil level indicator may require the assistance of a second technician to align the tube with the orifice.

5. To install, reverse the removal procedure.
  - Install a new O-ring seal and lubricate with clean engine oil.

## OIL PAN

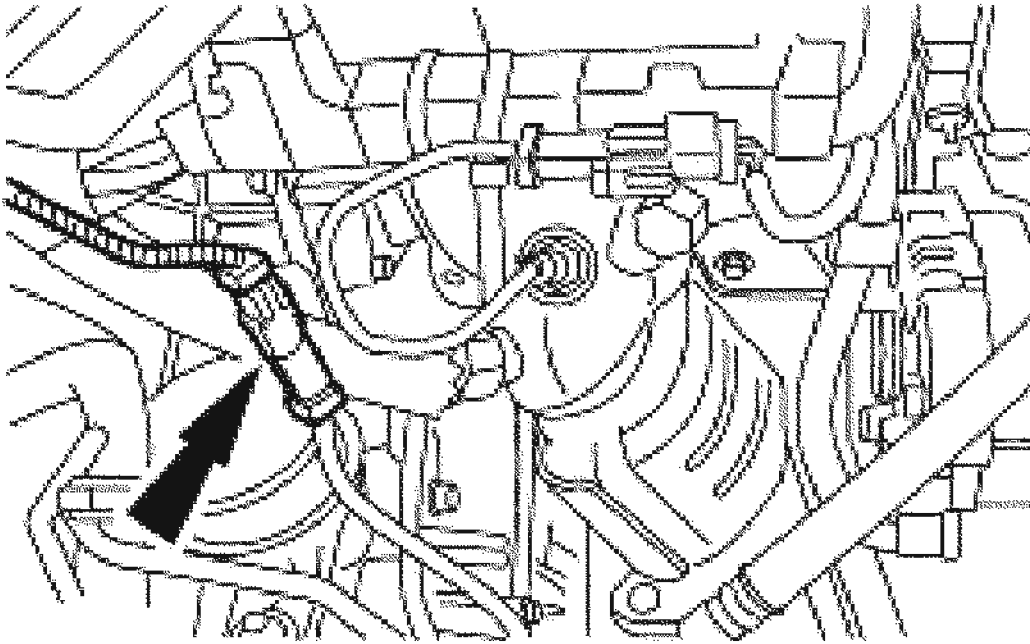
### Material

### MATERIAL SPECIFICATION

Item	Specification
Metal Surface Cleaner F4AZ - 19A536-RA	WSE-M5B392-A
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO - 5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ - 19554 - EA	WSE -M4G323-A4

## Removal

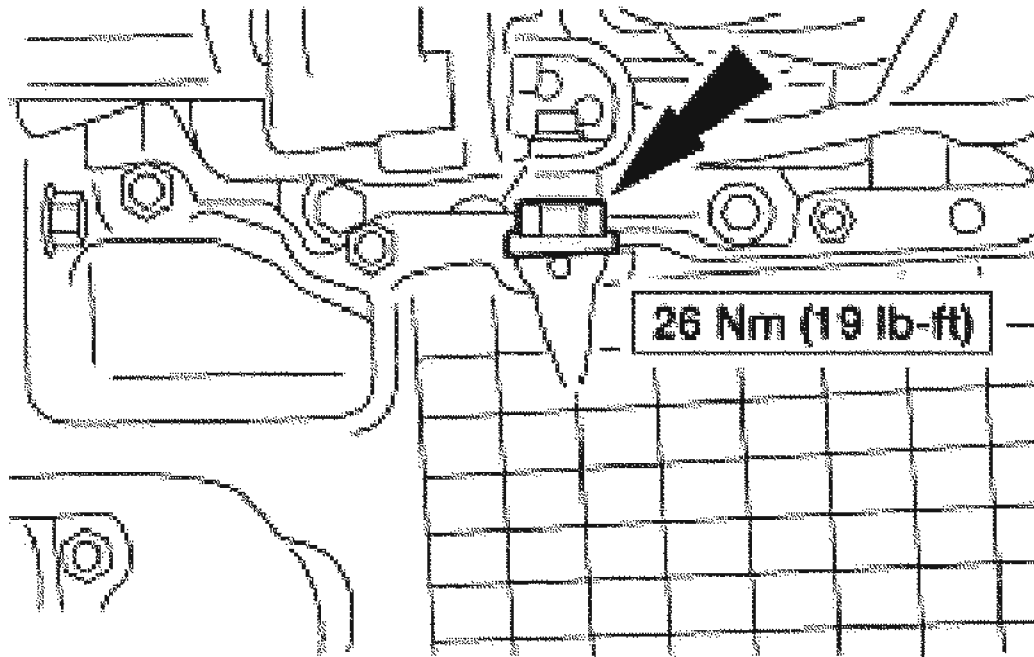
1. Remove the flexible exhaust pipe. For additional information, refer to **EXHAUST SYSTEM**.
2. Discount the downstream catalyst monitor sensor.



G02739349

**Fig. 176: Disconnecting Downstream Catalyst Monitor Sensor**  
Courtesy of FORD MOTOR CO.

3. Drain the Oil.
4. Install the drain plug.

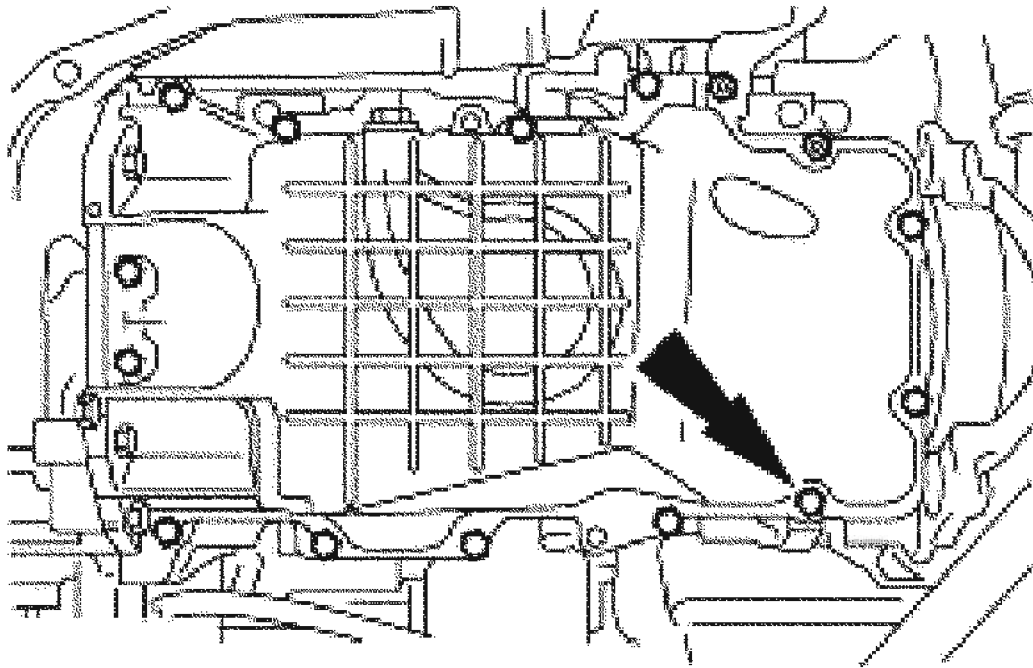


G02739350

**Fig. 177: Identifying Drain Plug Torque Specification**  
Courtesy of FORD MOTOR CO.

5. Remove and discard the oil filter.
6. Remove the 15 bolts.

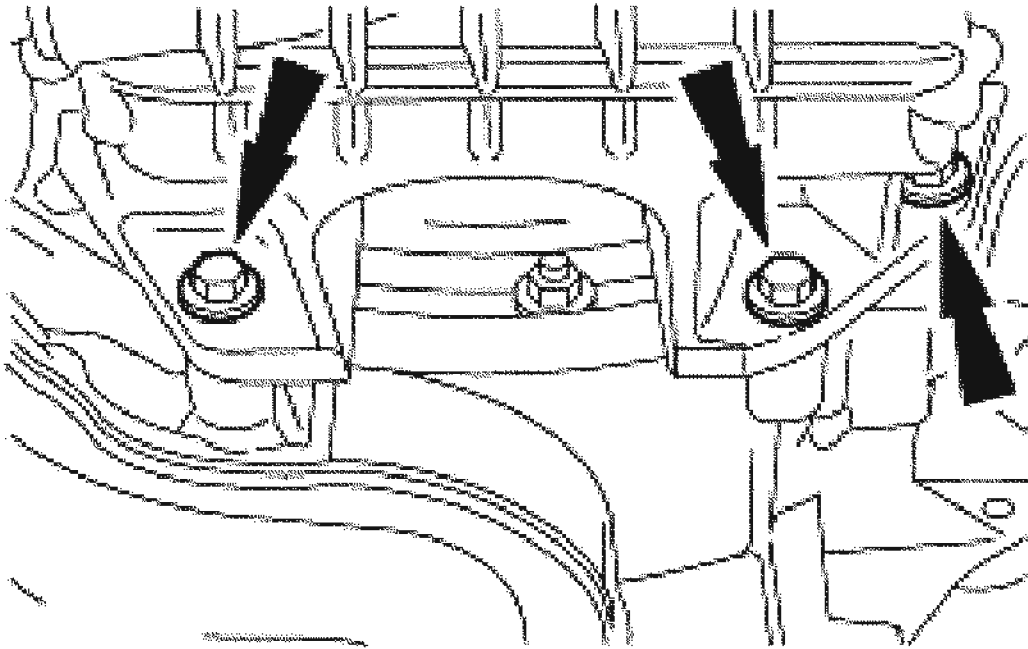




G02739351

**Fig. 178: Removing Oil Filter**  
Courtesy of FORD MOTOR CO.

7. Remove the three bolts and the oil pan.



G02739352

**Fig. 179: Removing Oil Pan**  
Courtesy of FORD MOTOR CO.

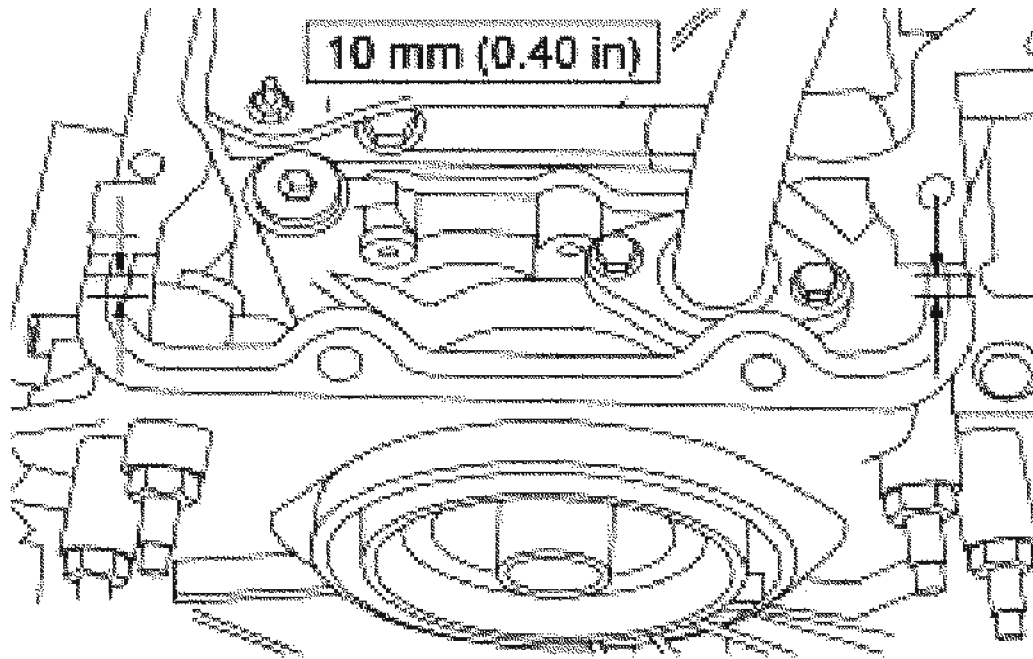
#### Installation

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

1. Clean all sealing surfaces on the engine and the oil pan with metal surface cleaner.
2. Position a new gasket on the oil pan.

**NOTE:** Clean and degrease all sealing surfaces with metal surface cleaner.

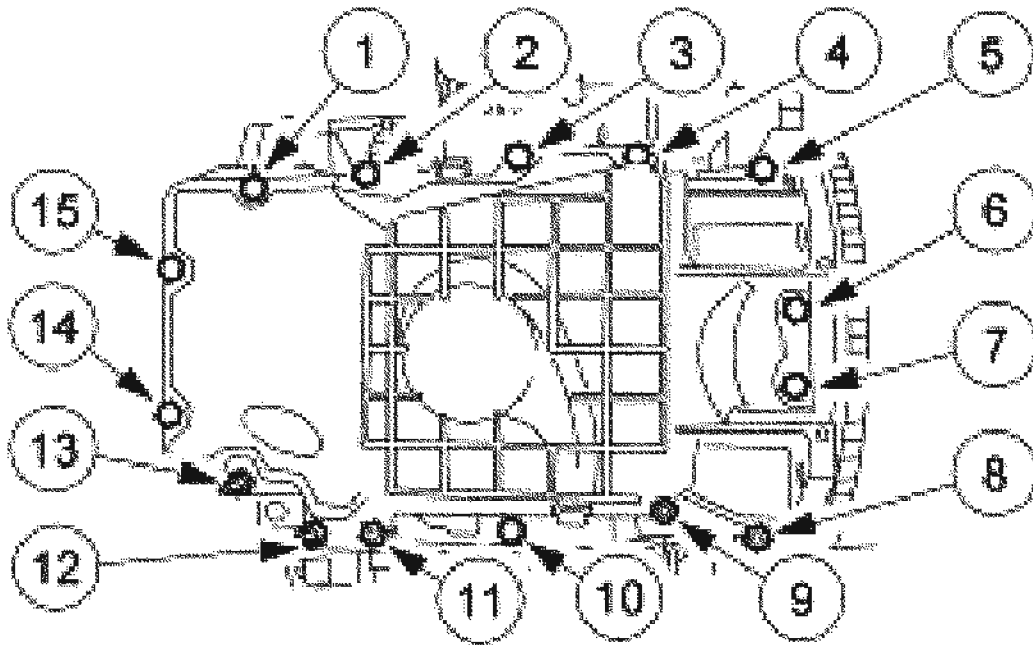
**NOTE:** The oil pan must be installed and the bolts tightened with in four minutes of sealant application.



G02739353

**Fig. 180: Applying Silicone Gasket**  
Courtesy of FORD MOTOR CO.

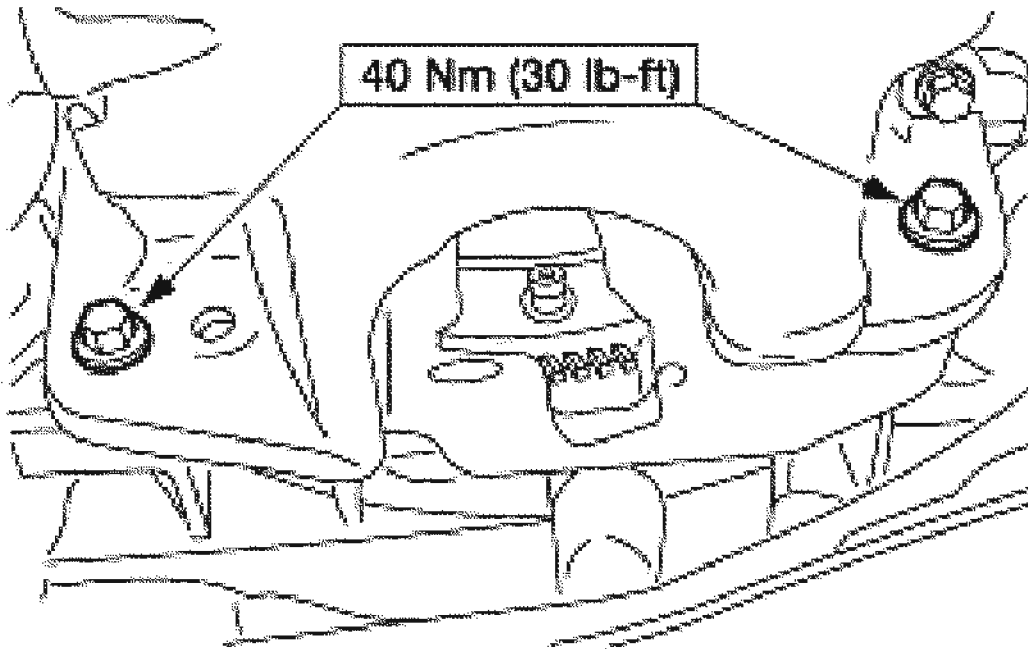
3. Apply a 10 mm (0.40 in) diameter dot of silicone gasket and sealer to the areas indicated.
4. Position the oil pan and gasket and loosely install the bolts in the sequence shown.



G02739354

**Fig. 181: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

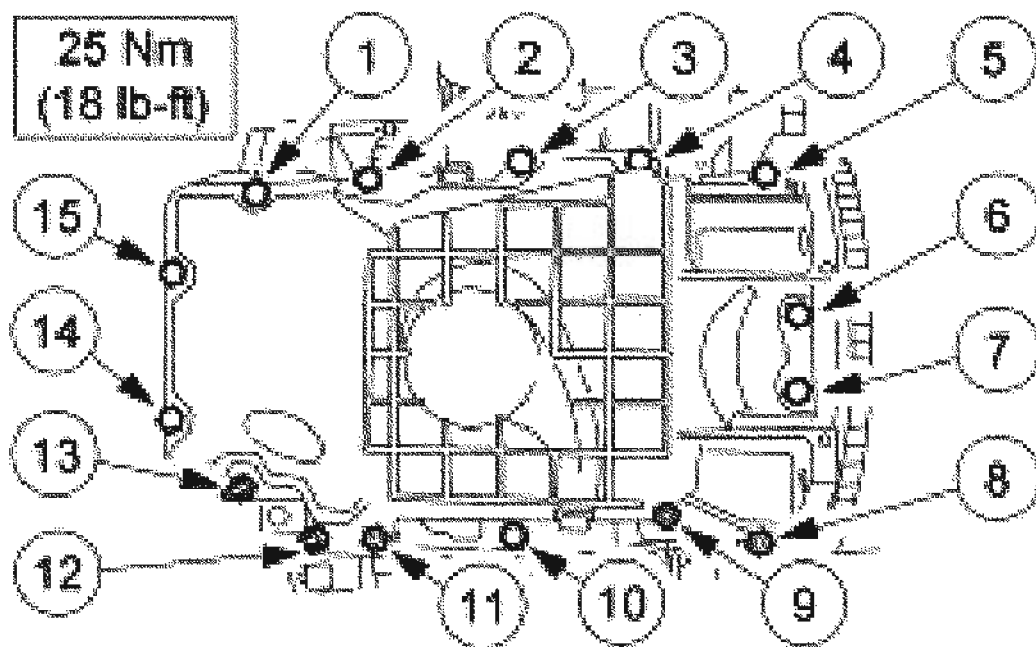
5. Install the oil pan-to-transaxle bolts.



G02739355

**Fig. 182: Identifying Oil Pan-To-Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Tighten the oil pan bolts in the sequence shown.

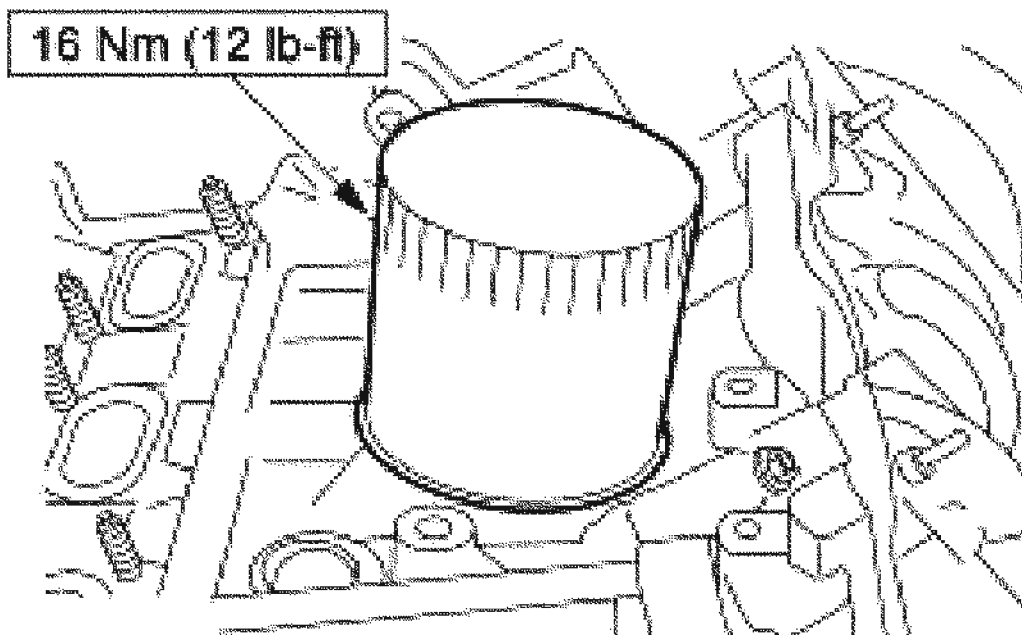


G02739356

**Fig. 183: Identifying Tightening Sequence & Torque Specification Of Oil Pan Bolts**

Courtesy of FORD MOTOR CO.

7. Lubricate the oil filter O-ring with clean engine oil and install the oil filter.



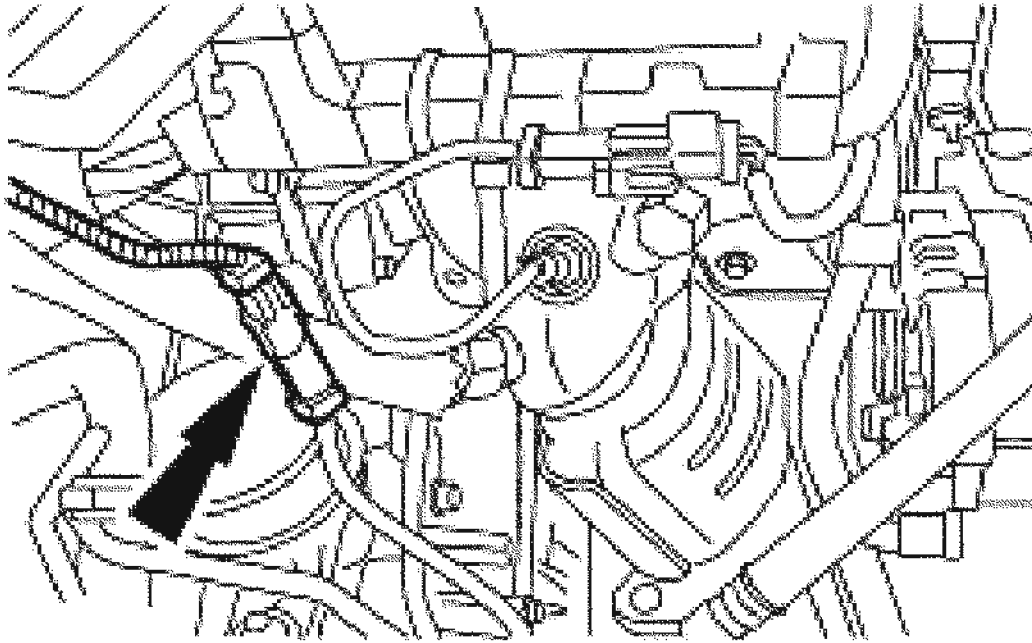
G02739357

**Fig. 184: Installing Oil Filter**  
Courtesy of FORD MOTOR CO.

8. Install the exhaust flexible exhaust pipe. For additional information, refer to **EXHAUST SYSTEM**.
9. Connect the downstream catalyst monitor.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739358

**Fig. 185: Connecting Downstream Catalyst Monitor**  
Courtesy of FORD MOTOR CO.

10. Lower the vehicle.
11. Fill the crankcase with clean engine oil.

### OIL PUMP SCREEN AND PICKUP TUBE

#### Material

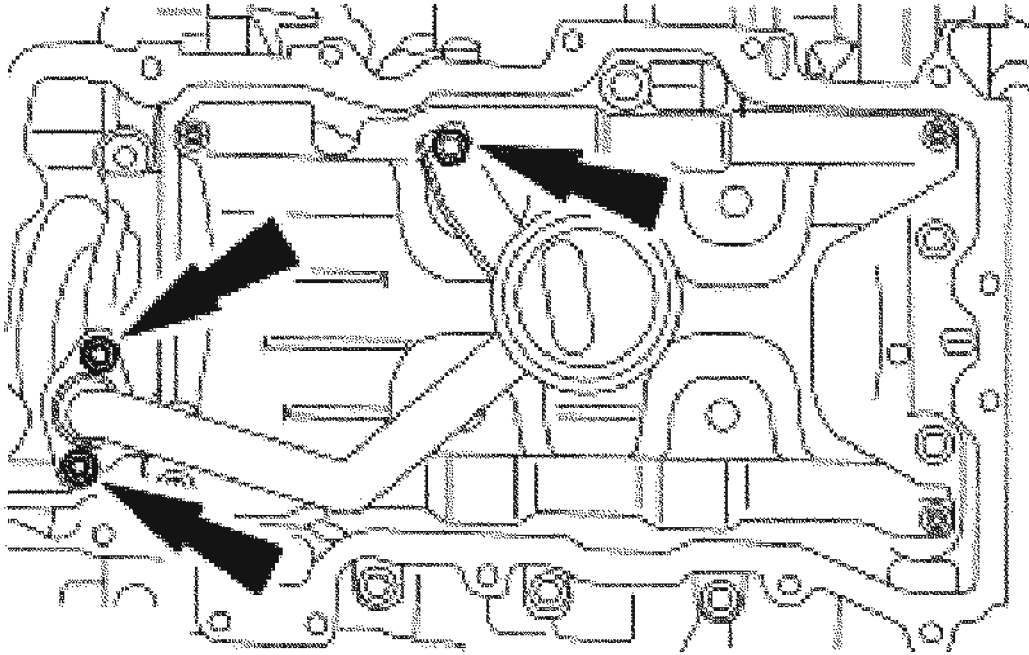
#### MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

#### Removal

1. Remove the oil pan. For additional information, refer to **OIL PAN**.
2. Remove the nut, bolts and the oil pump screen and pickup tube.

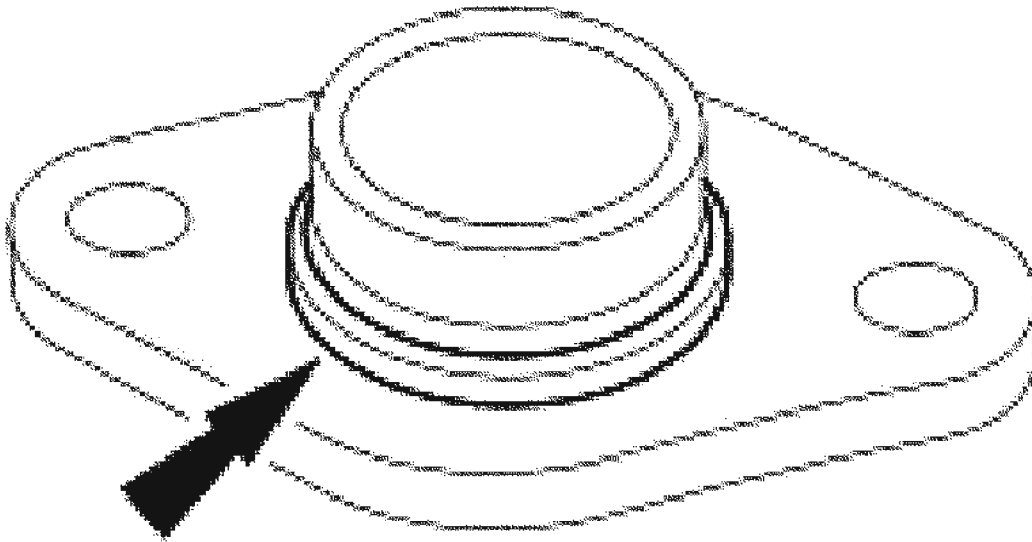




G02739359

**Fig. 186: Removing Nut, Bolts, Oil Pump Screen And Pickup Tube**  
Courtesy of FORD MOTOR CO.

3. Remove and discard the O-ring seal.

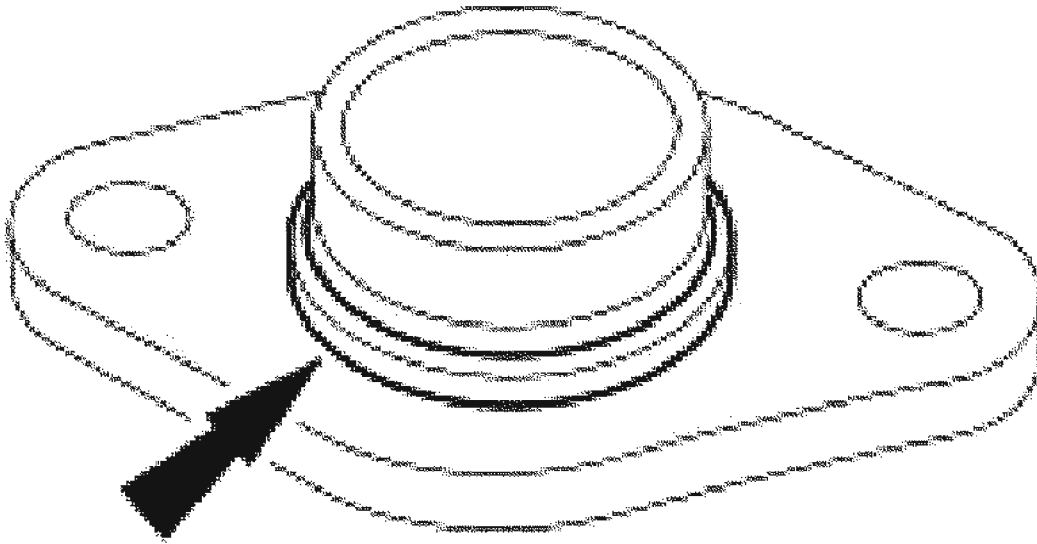


**G02739360**

**Fig. 187: Removing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

**Installation**

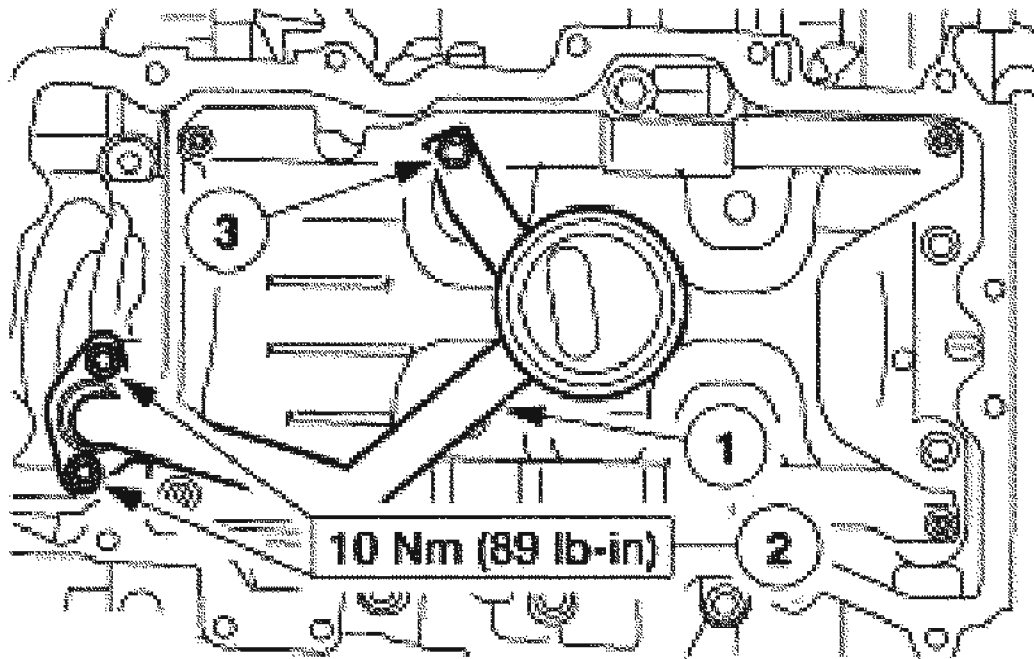
1. Install a new O-ring seal and lubricate with clean engine oil.



**G02739361**

**Fig. 188: Installing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

2. Install the oil pump screen and pickup tube.
  1. Position the oil pump screen and pickup tube.
  2. Install the bolts.
  3. Install the nut.
    - Tighten the nut in two stages.
    - Stage 1: Tighten to 5 Nm (44 lb-in).
    - Stage 2: Tighten 45 degrees.



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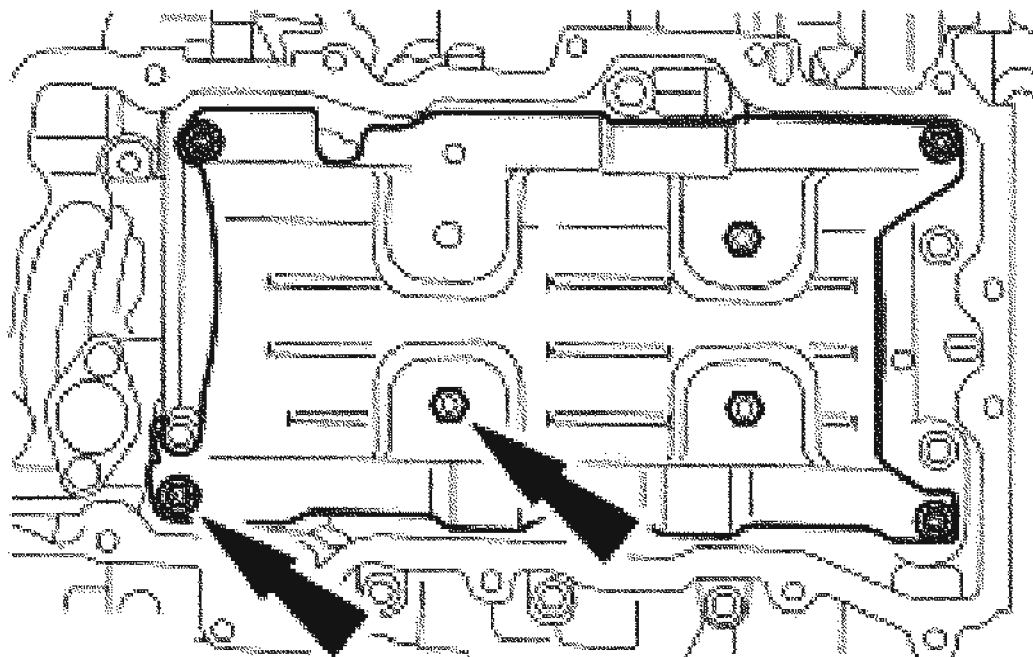
**Fig. 189: Installing Oil Pump Screen And Pickup Tube**  
Courtesy of FORD MOTOR CO.

3. Install the oil pan. For additional information, refer to **OIL PAN** .

#### **OIL PAN BAFFLE**

##### **Removal**

1. Remove the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE** .
2. Remove the nuts and the oil pan baffle.

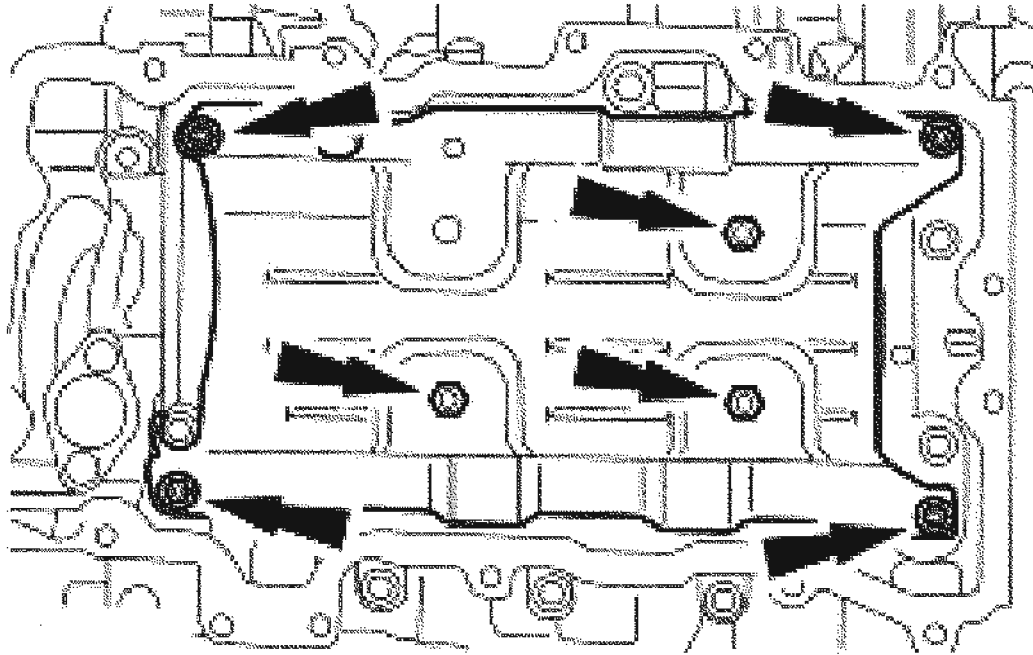


G02739363

**Fig. 190: Removing Nuts And Oil Pan Baffle**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Position the oil pan baffle and install the nuts.
  - Tighten the nuts in two stages.
  - Stage 1: Tighten to 5 Nm (44 lb-in).
  - Stage 2: Tighten 45 degrees.



G02739364

**Fig. 191: Installing Oil Pan Baffle And Nuts**  
Courtesy of FORD MOTOR CO.

2. Install the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE** .

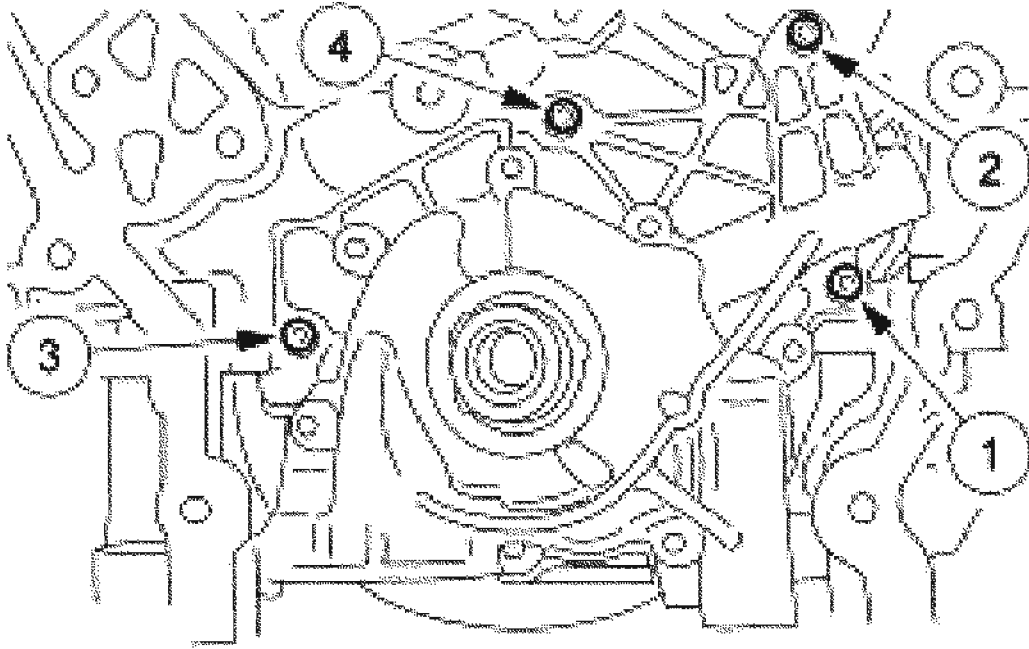
## **OIL PUMP**

### **Removal**

1. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** .
2. Remove the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE** .
3. Remove the bolts in the indicated sequence and remove the oil pump.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

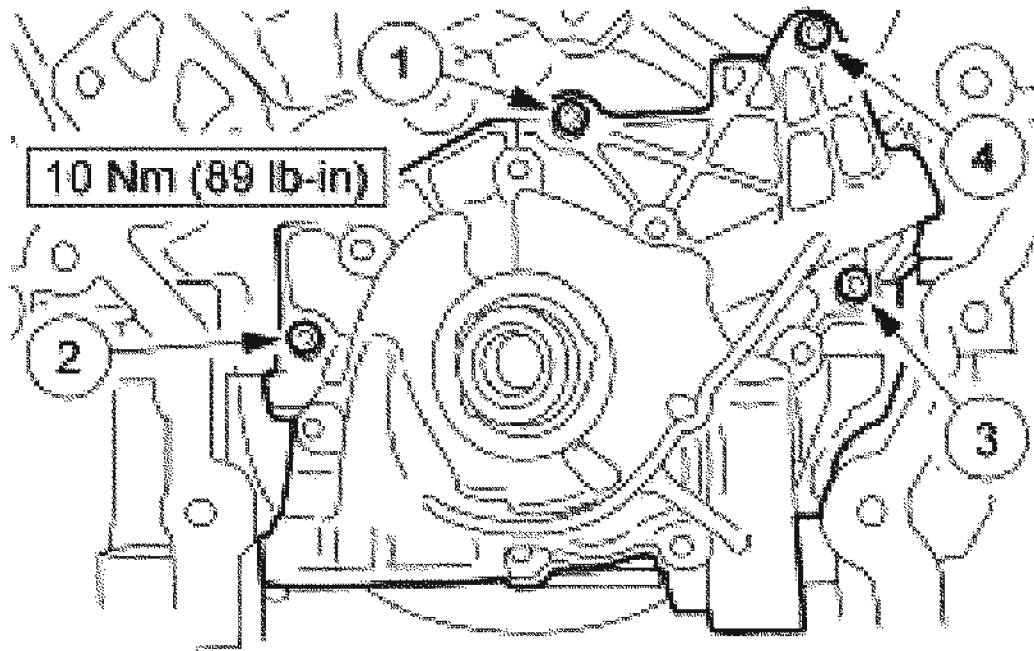


G02739365

**Fig. 192: Identifying Bolt Removal Sequence**  
Courtesy of FORD MOTOR CO.

### Installation

1. Position the oil pump and install the bolts in the sequence shown.



G02739366

**Fig. 193: Identifying Bolt Tightening Sequence & Torque Specification**  
Courtesy of FORD MOTOR CO.

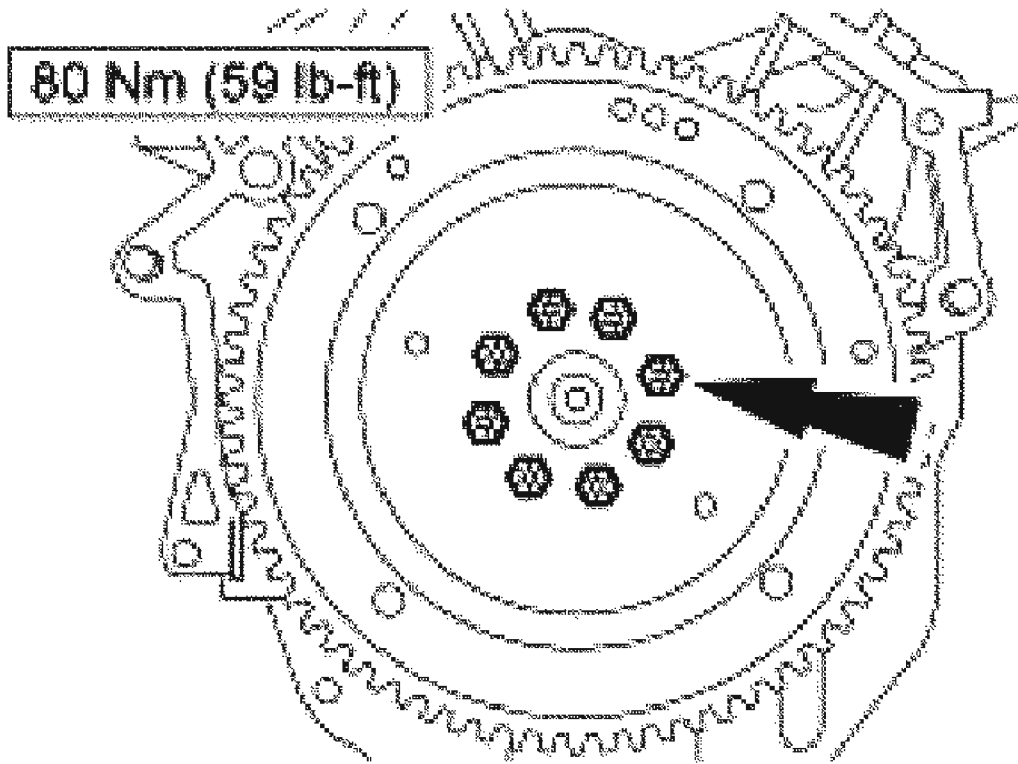
2. Install the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE**.
3. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

## **FLEXPLATE**

### **Removal and Installation**

1. Remove the transaxle. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION**.
2. Remove the bolts and the flexplate.





**G02739367**

**Fig. 194: Removing Bolts And Flexplate**  
**Courtesy of FORD MOTOR CO.**


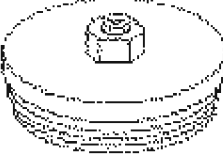

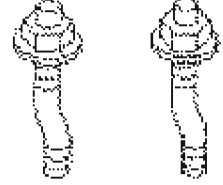
3. To install, reverse the removal procedure.

#### **CRANKSHAFT REAR OIL SEAL**

#### **Special Tool(s)**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Slide Hammer 307-005 (T59L-100-B)
	Remover Crankshaft Rear Oil Seal 303-519 (T95P-6701-EH)
	Installer, Crankshaft Rear Main Oil Seal 303-178 (T82L-6701-A)
	Installer Bolts, Crankshaft Rear Main Oil Seal 303-384 (T91P-6701-A)

G02739388

**Fig. 195: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

Material

### MATERIAL SPECIFICATION

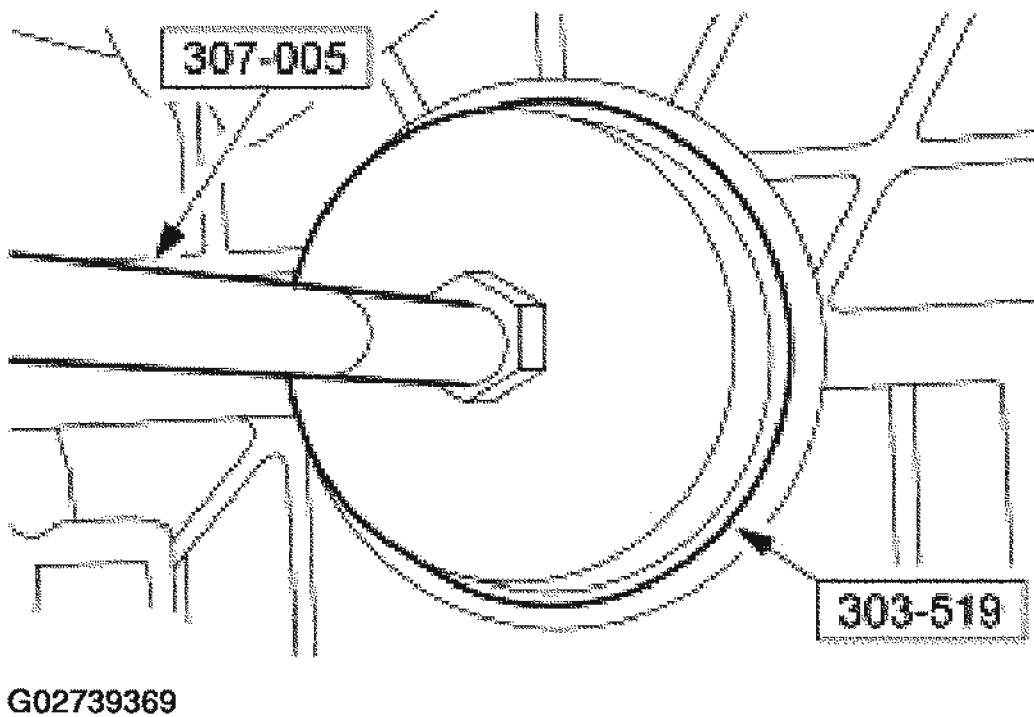
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the flexplate. For additional information, refer to **FLEXPLATE** .
2. Using the special tools, remove the crankshaft rear oil seal and discard.

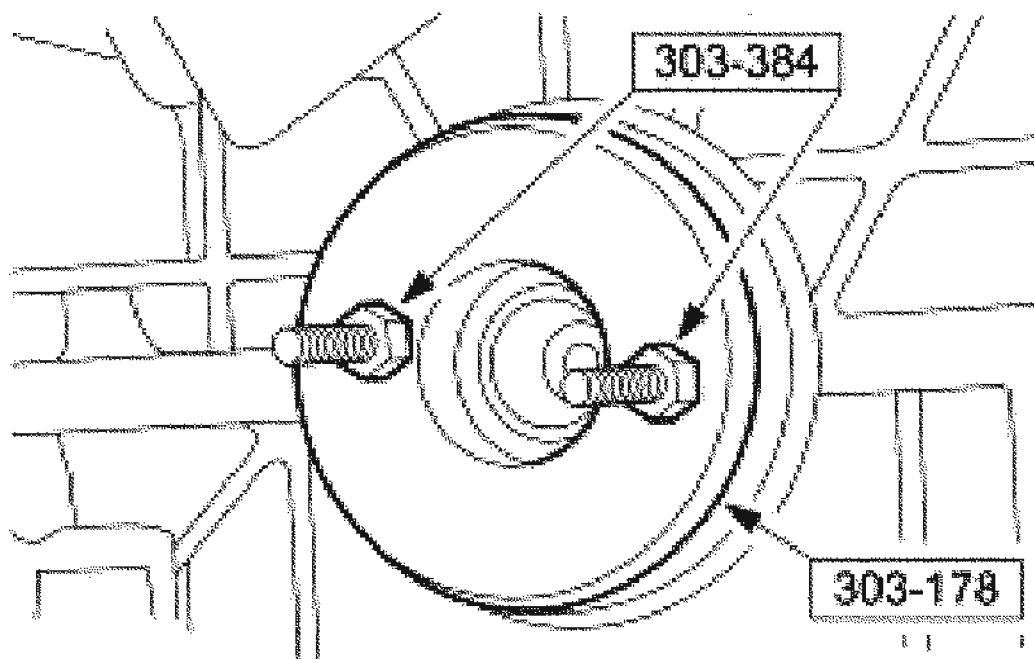


**Fig. 196: Removing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

### Installation

**NOTE:** Clean all sealing surfaces with metal surface cleaner.

**NOTE:** Lubricate the crankshaft rear oil lips with clean engine oil.



G02739370

**Fig. 197: Installing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

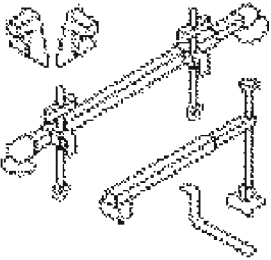
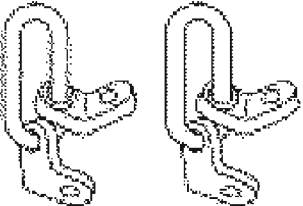

1. Using the special tools, install the crankshaft rear oil seal.
2. Install the flexplate. For additional information, refer to **FLEXPLATE**.

**ENGINE SUPPORT INSULATORS - FRONT, RH**

**Special Tool(s)**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

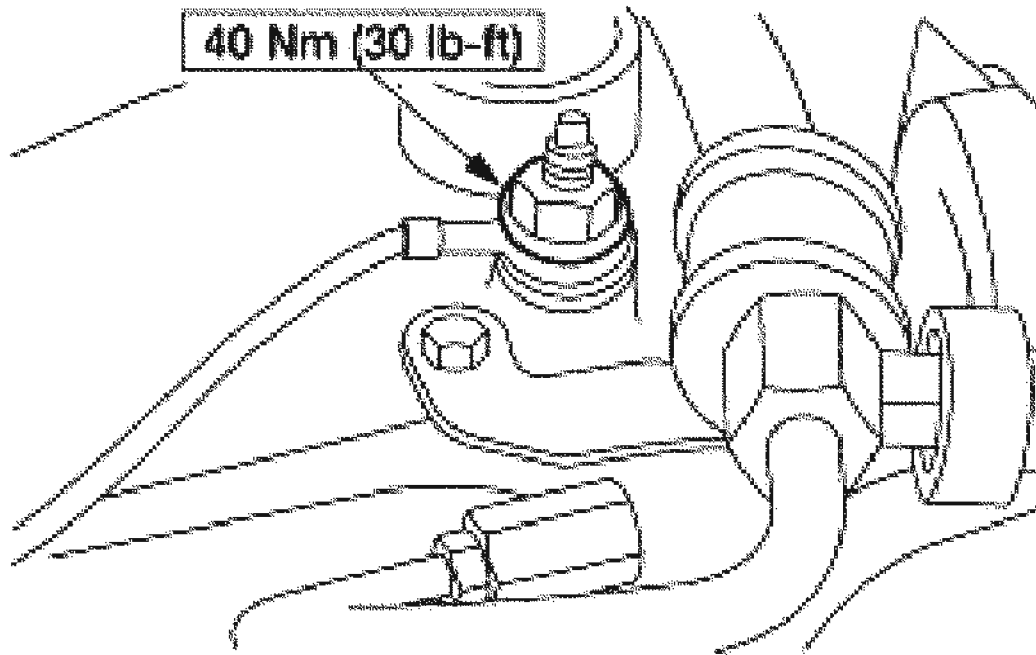
	3-Bar Engine Support Kit 303-F072
	Engine Lifting Bracket 303-050 (T70P-6000)
	Universal Adapter Brackets 014-0001

G02739371

**Fig. 198: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal and Installation

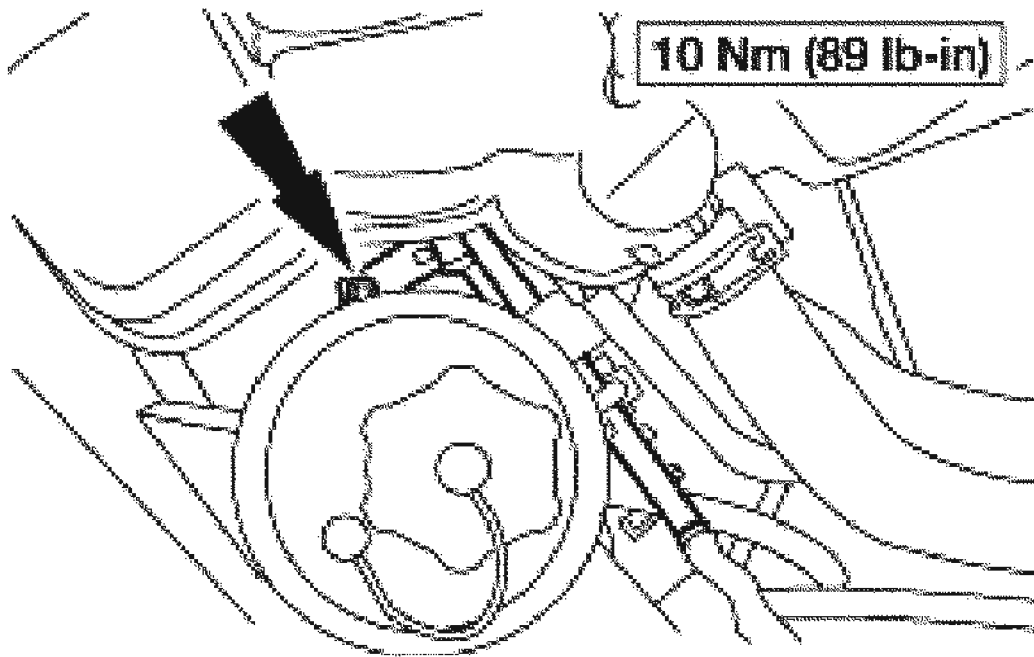
1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD** .
2. Remove the engine ground wire.



G02739372

**Fig. 199: Removing Engine Ground Wire**  
Courtesy of FORD MOTOR CO.

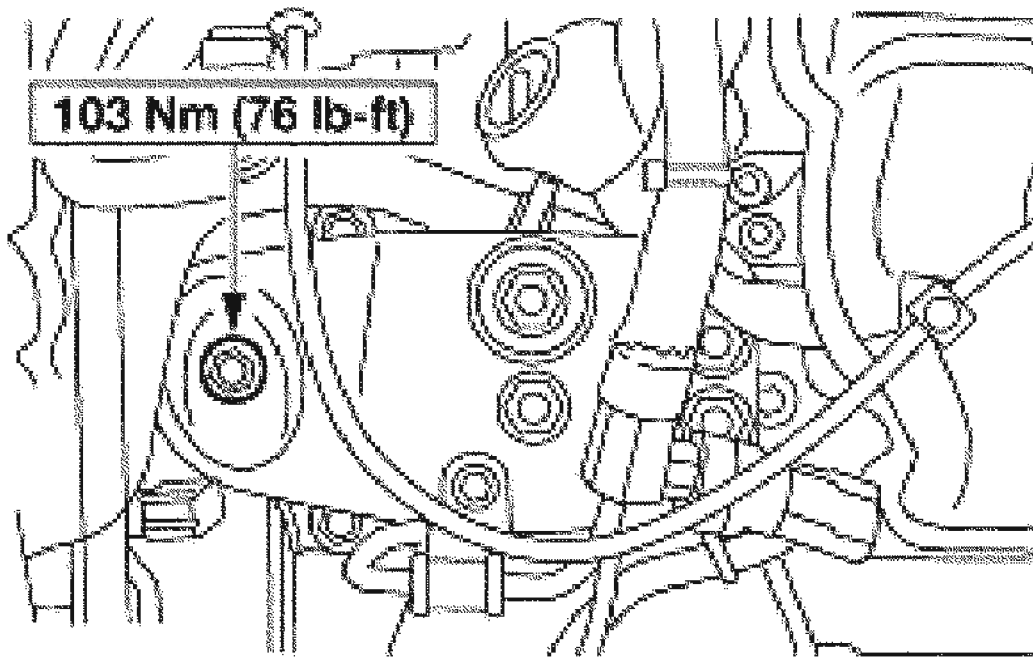
3. Remove the A/C line bracket bolt and position the A/C lines out of the way.



G02739373

**Fig. 200: Removing A/C Line Bracket Bolt**  
Courtesy of FORD MOTOR CO.

4. Remove the engine support insulator bolt.

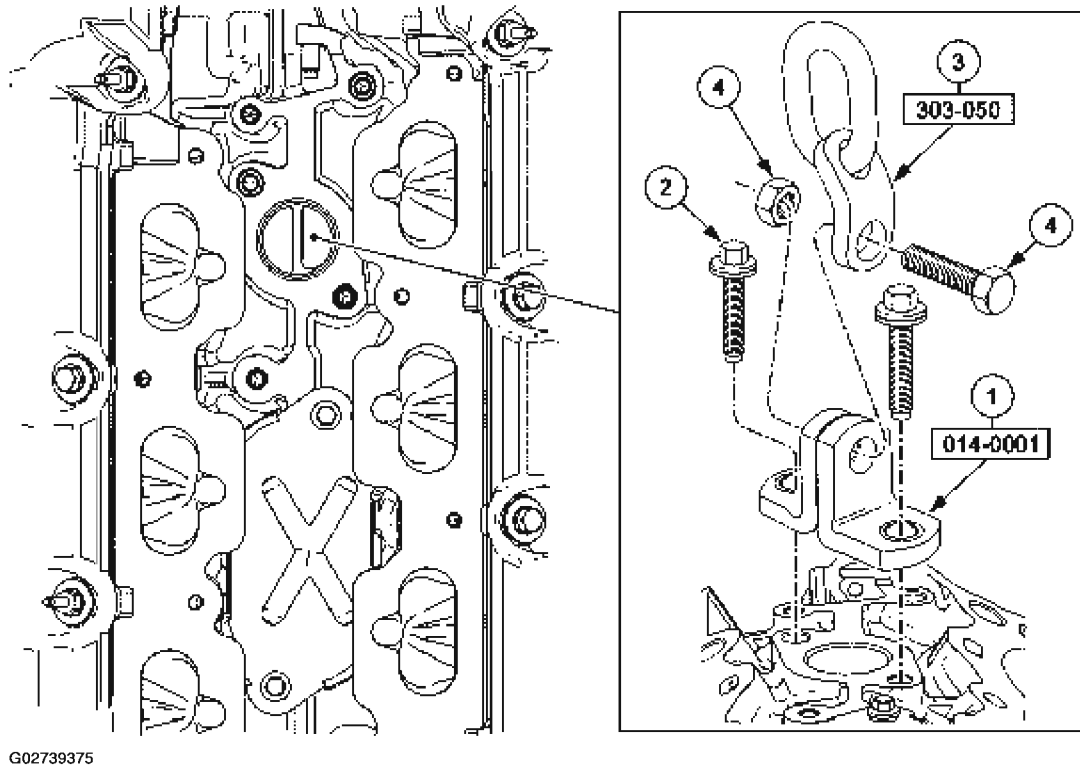


G02739374

**Fig. 201: Removing Engine Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

5. Install the special tools.
  1. Position the 2 universal adapter brackets on top of the cylinder block.
  2. Install 2 M8 X 1.25 X 36 mm (1.41 in) bolts and tighten to 10 Nm (89 lb-in).
  3. Position the universal lifting bracket onto the 2 universal adapter brackets.
  4. Fasten the universal lifting bracket to the 2 universal adapter brackets with a suitable nut and bolt.



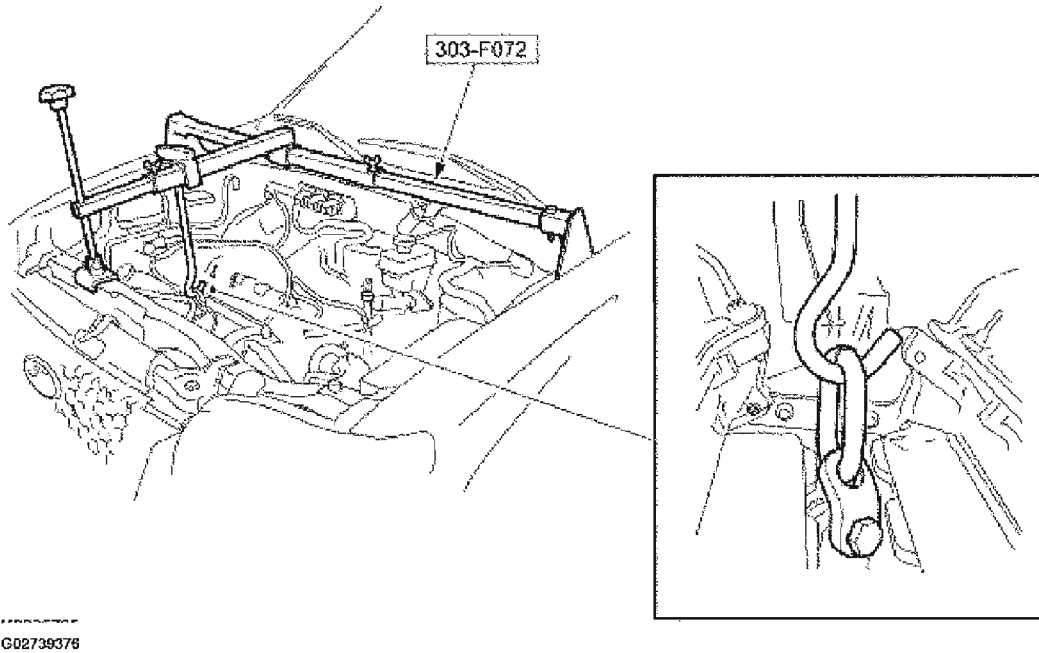


**Fig. 202: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

6. Using the special tools, lift the engine 12 mm (0.47 in).

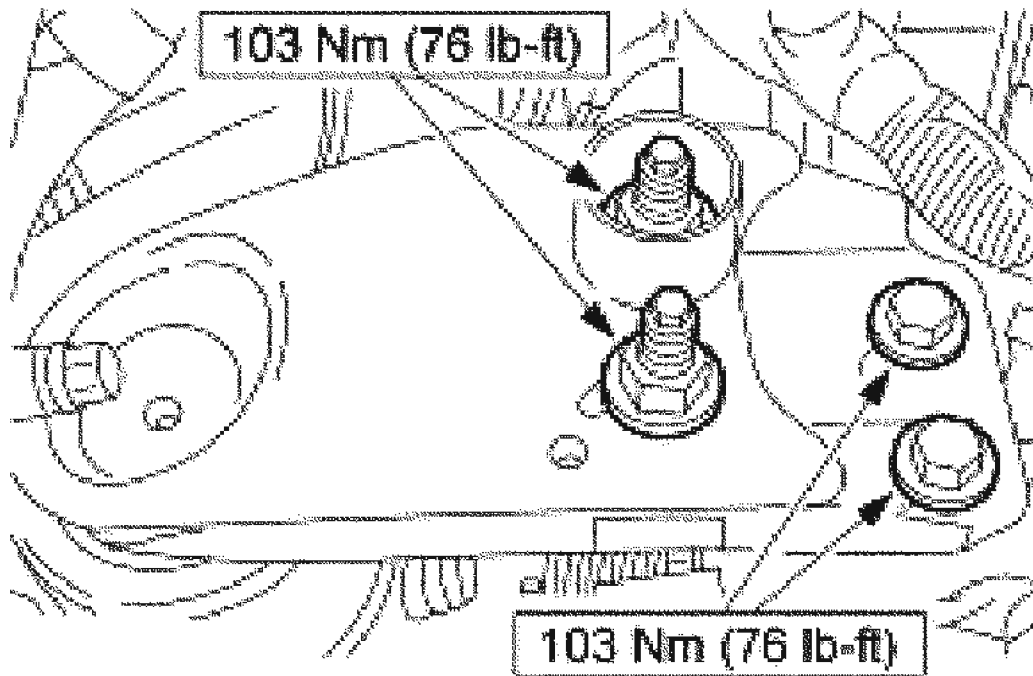
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



**Fig. 203: Lifting Engine Using Special Tool**  
Courtesy of FORD MOTOR CO.

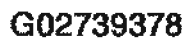
7. Remove the bolts, nuts and the engine support insulator bracket.



G02739377

**Fig. 204: Removing Bolts, Nuts And Engine Support Insulator Bracket**  
Courtesy of FORD MOTOR CO.

8. Remove the engine support insulator.
  1. Remove the nut.
  2. Remove the bolts and insulator.



<http://vnx.su>

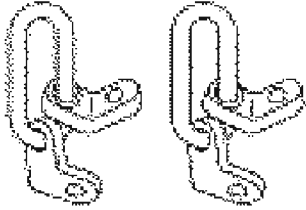
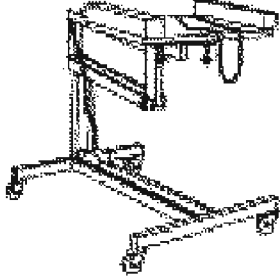

- ## REMOVAL

## ENGINE

### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Lifting Brackets, Engine 303-050 (T70P-6000)
	Powertrain Lift with Tilting Plate 014-00765
	Spreader Bar 303-D089 (D93P-6001-A3) or Equivalent

G02739379

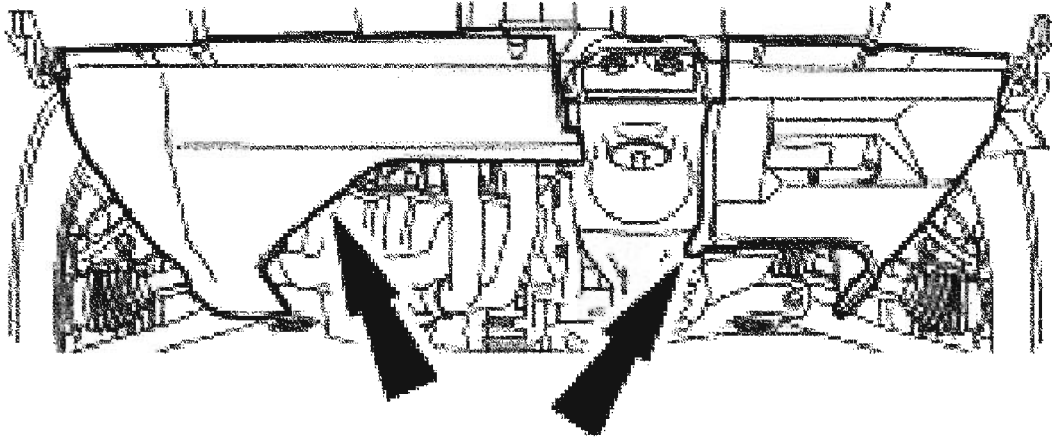
**Fig. 206: Identifying Engine Special Tool**  
Courtesy of FORD MOTOR CO.

### Removal

1. Remove the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**
2. Remove the air cleaner outlet pipe and air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**
3. Recover the A/C refrigerant. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**
4. Raise and support the vehicle. For additional information, refer to **CLIMATE**

## **CONTROL SYSTEM-GENERAL INFORMATION**

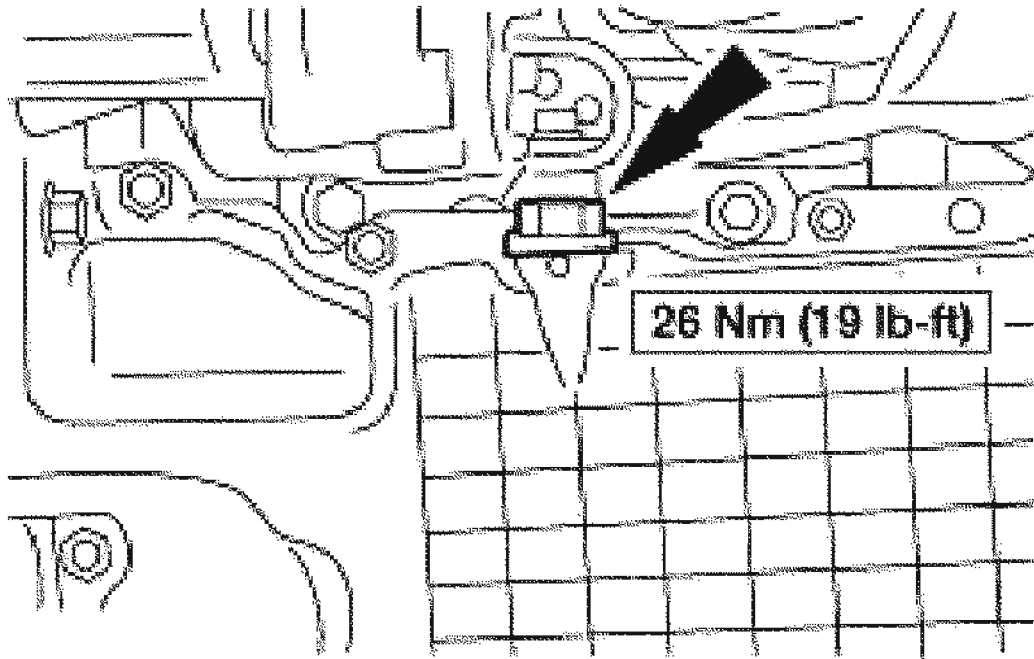
5. Remove the lower radiator air deflectors.



**G02739380**

**Fig. 207: Removing Lower Radiator Air Deflectors**  
Courtesy of FORD MOTOR CO.

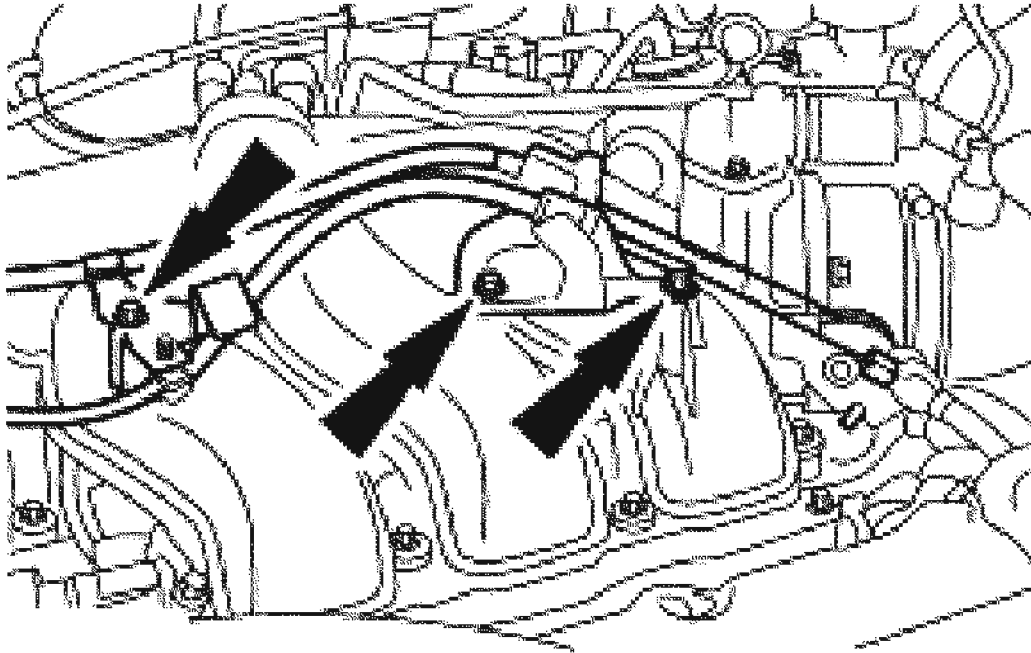
6. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING**
7. Drain the engine oil.
  - Install the drain plug.



G02739381

**Fig. 208: Identifying Drain Plug**  
Courtesy of FORD MOTOR CO.

8. Lower the vehicle.
9. Disconnect the fuel hose spring lock coupling. For additional information, refer to **FUEL TANK & LINES**
10. Remove the water pump drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**
11. Disconnect the accelerator cable and, if equipped, the speed control actuator cable.

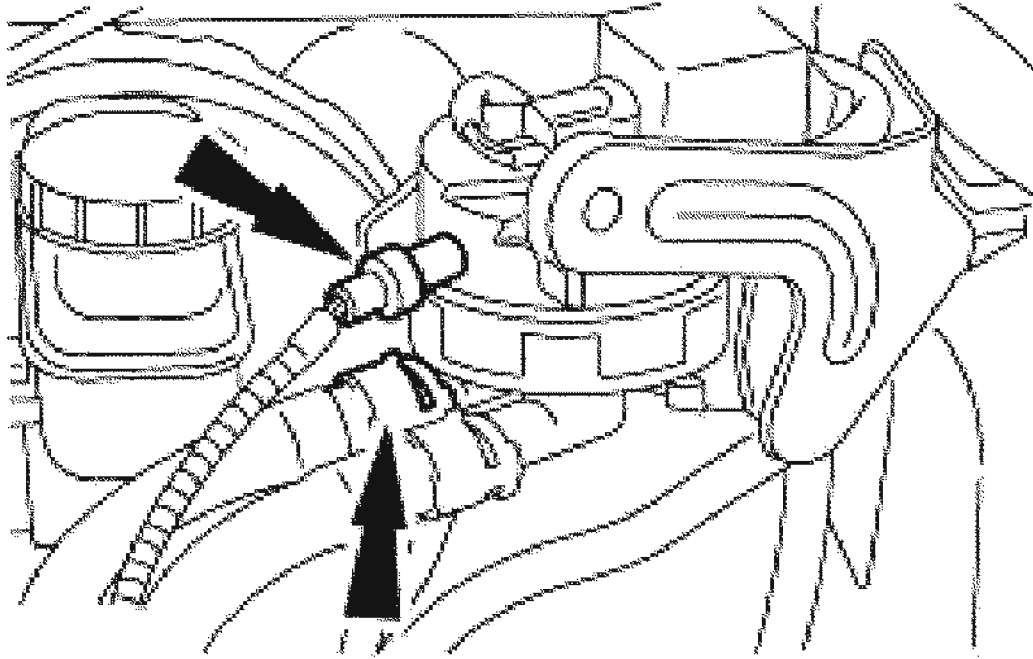


G02739382

**Fig. 209: Disconnecting Accelerator Cable & Speed Control Actuator Cable**  
Courtesy of FORD MOTOR CO.

12. Disconnect the vapor management valve (VMV) connectors.





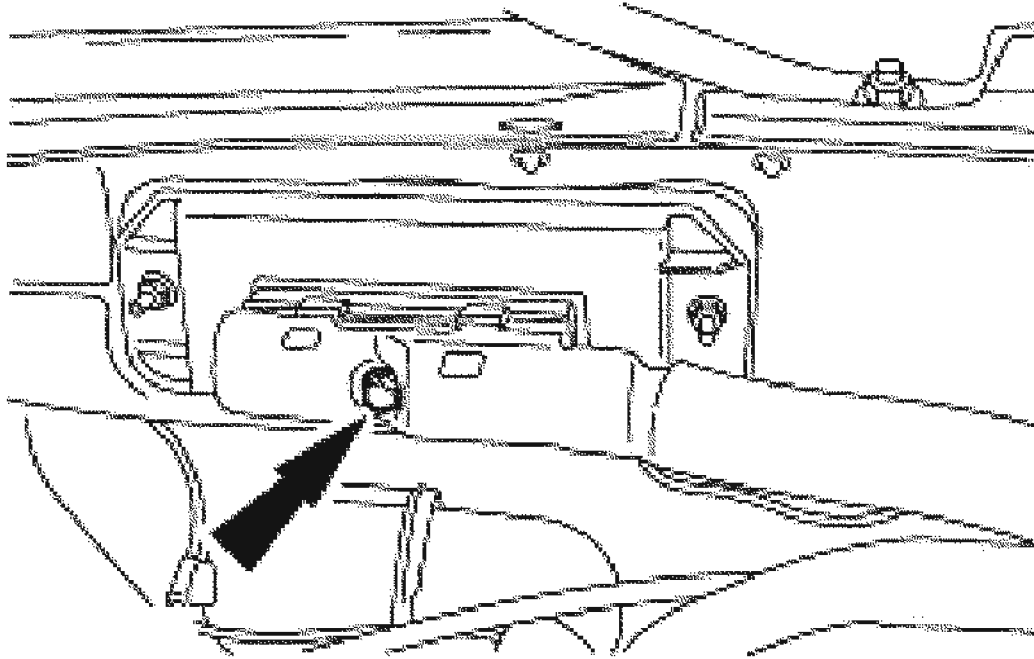
G02739383

**Fig. 210: Disconnecting Vapor Management Valve (VMV) Connectors**  
Courtesy of FORD MOTOR CO.

13. Disconnect the powertrain control module (PCM) electrical connector.

## 2004 Ford Escape

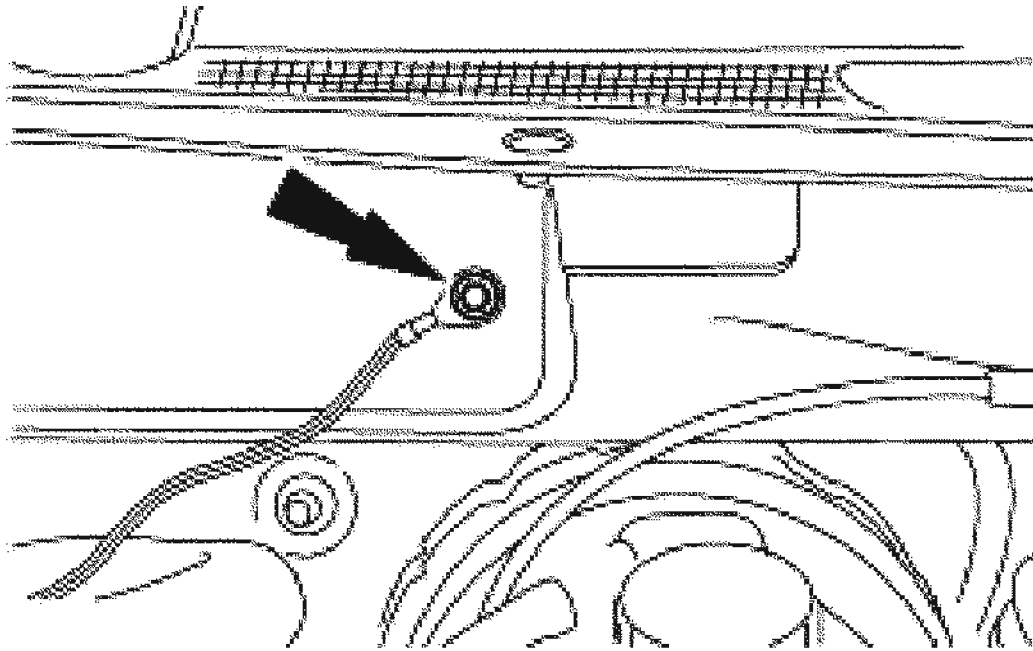
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739384

**Fig. 211: Disconnecting Powertrain Control Module (PCM) Electrical Connector**  
Courtesy of FORD MOTOR CO.

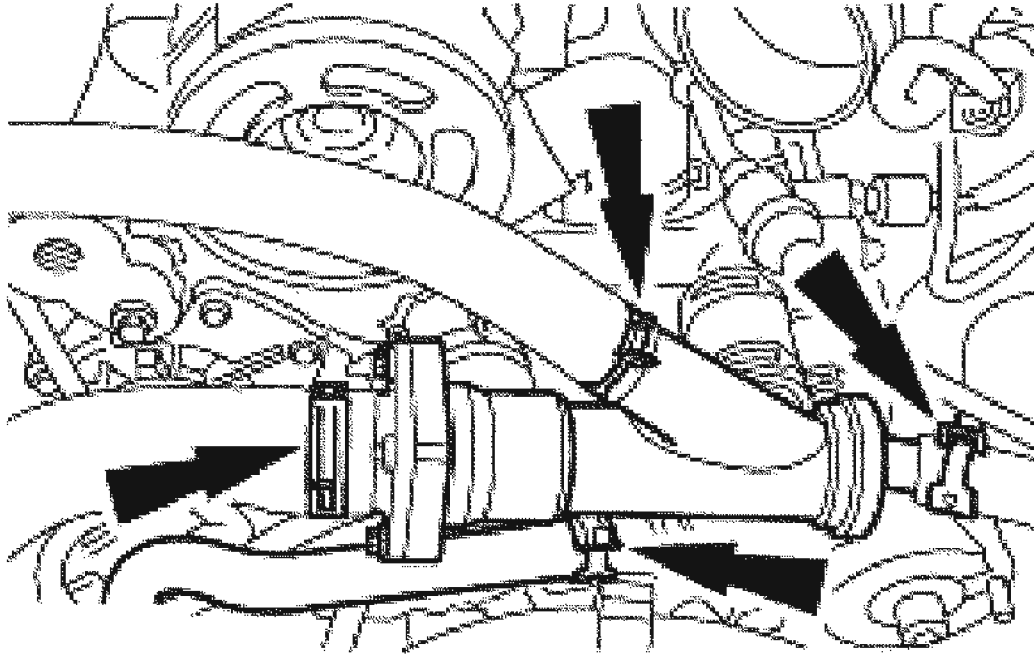
14. Disconnect the ground wire.



G02739385

**Fig. 212: Disconnecting Ground Wire**  
Courtesy of FORD MOTOR CO.

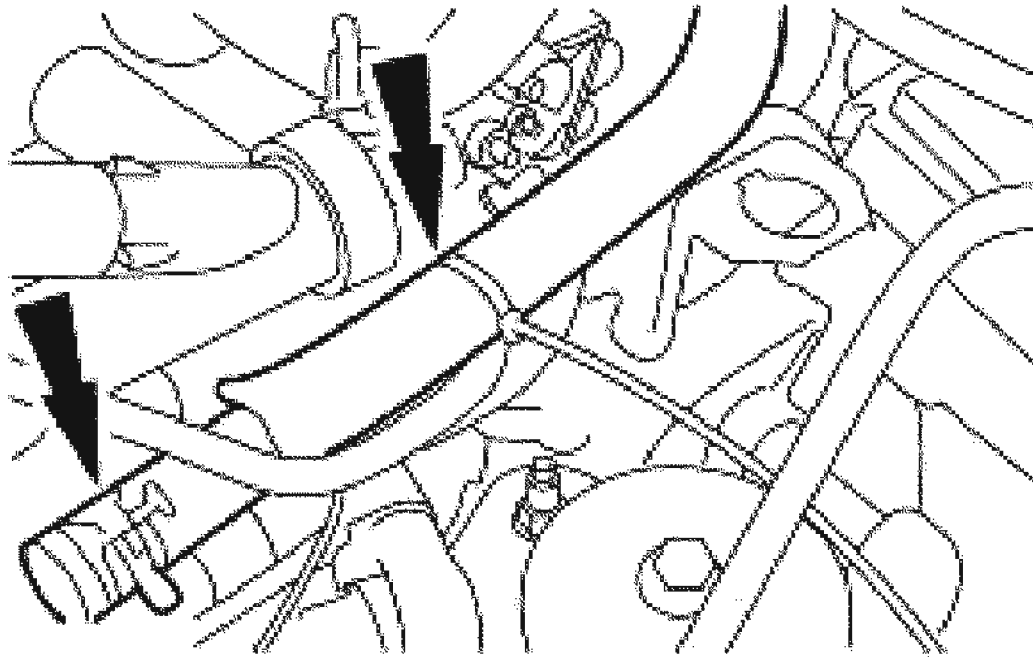
15. Disconnect the hoses.



G02739386

**Fig. 213: Disconnecting Hoses**  
Courtesy of FORD MOTOR CO.

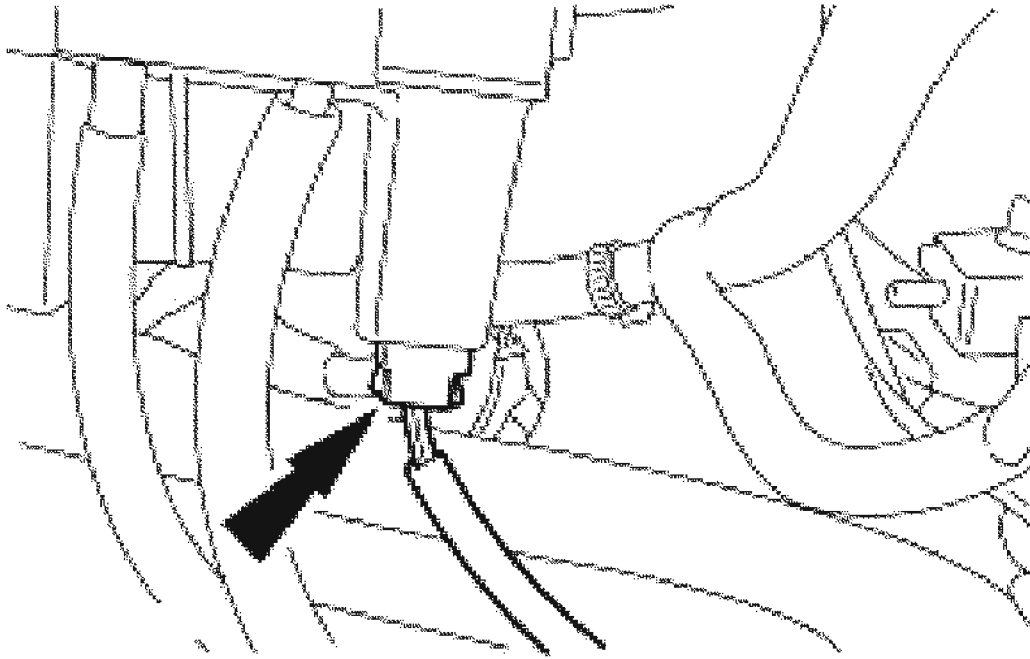
16. Remove the tie-strap and disconnect the heater hose.



G02739387

**Fig. 214: Removing Tie-Strap And Disconnecting Heater Hose**  
Courtesy of FORD MOTOR CO.

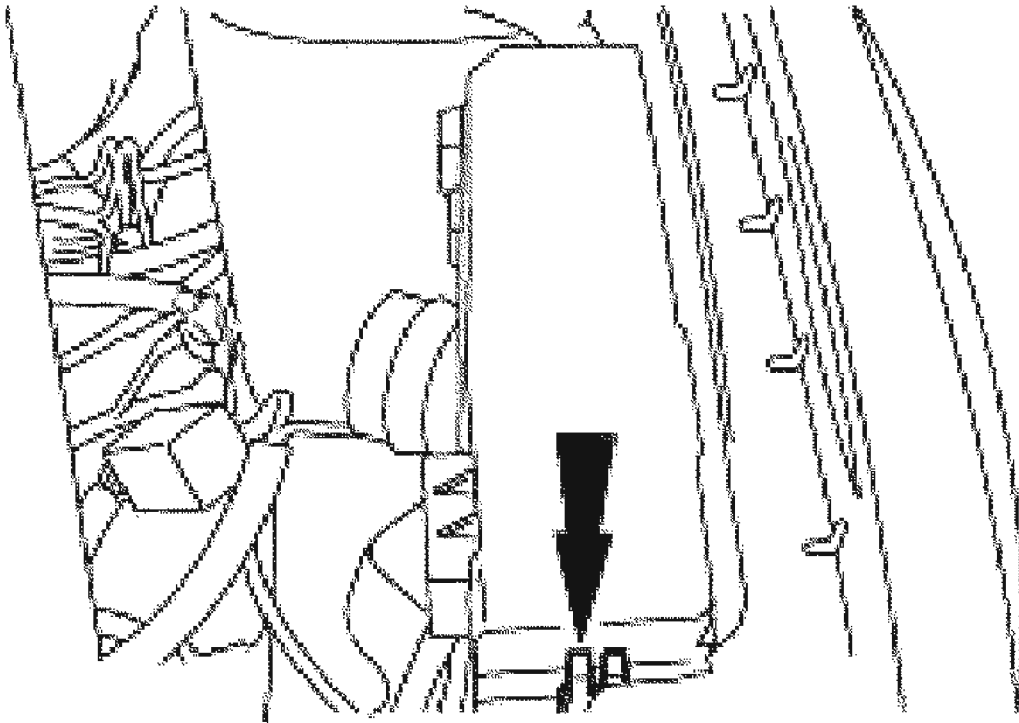
17. Disconnect the electrical connector from the power distribution box.



**G02739388**

**Fig. 215: Disconnecting Electrical Connector**  
Courtesy of FORD MOTOR CO.

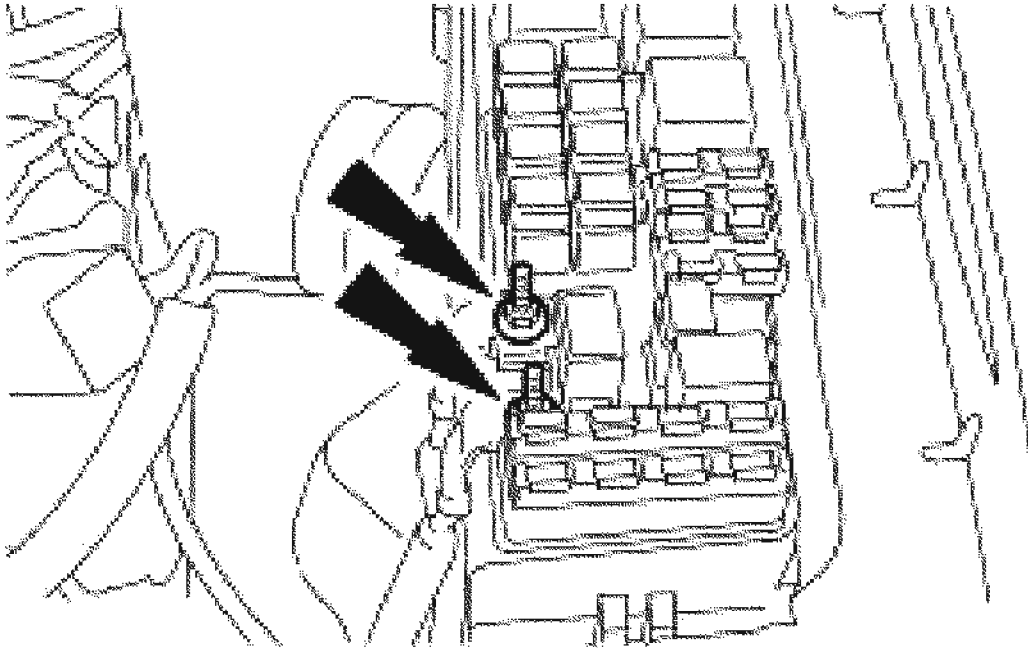
18. Remove the power distribution box cover.



G02739389

**Fig. 216: Removing Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

19. Remove the nuts and the cables.

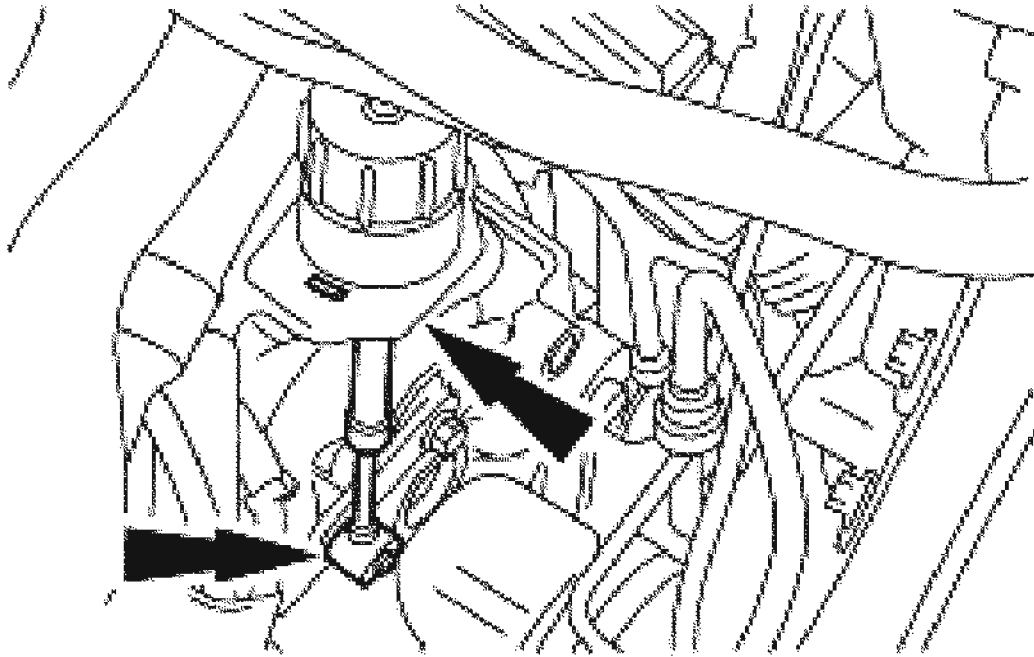


G02739390

**Fig. 217: Removing Nuts And Cables**  
**Courtesy of FORD MOTOR CO.**

20. Disconnect the transaxle linkage.

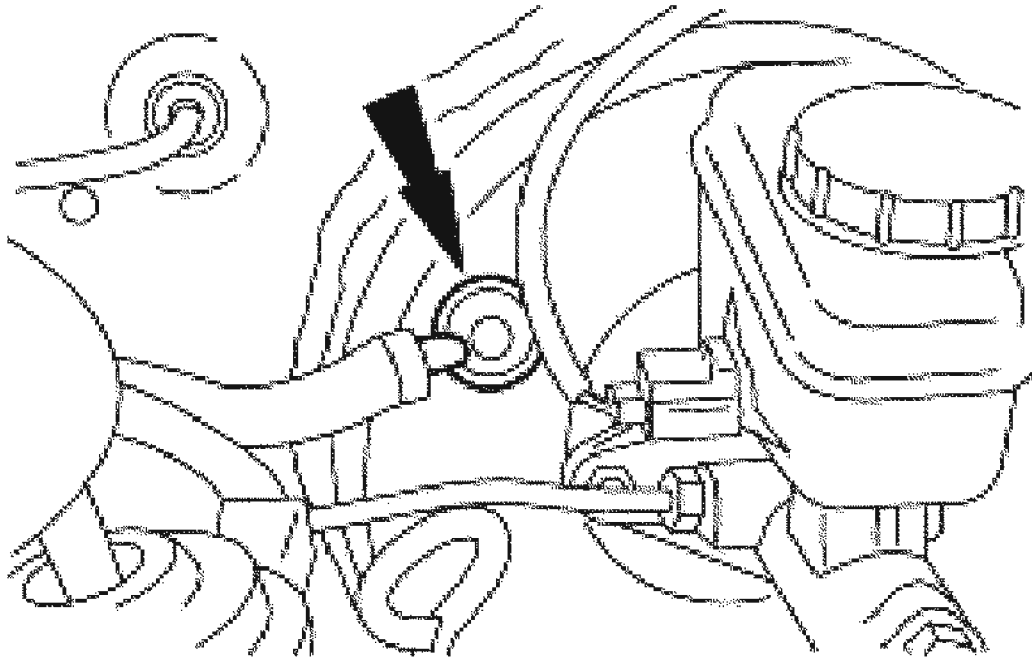




G02739391

**Fig. 218: Disconnecting Transaxle Linkage**  
Courtesy of FORD MOTOR CO.

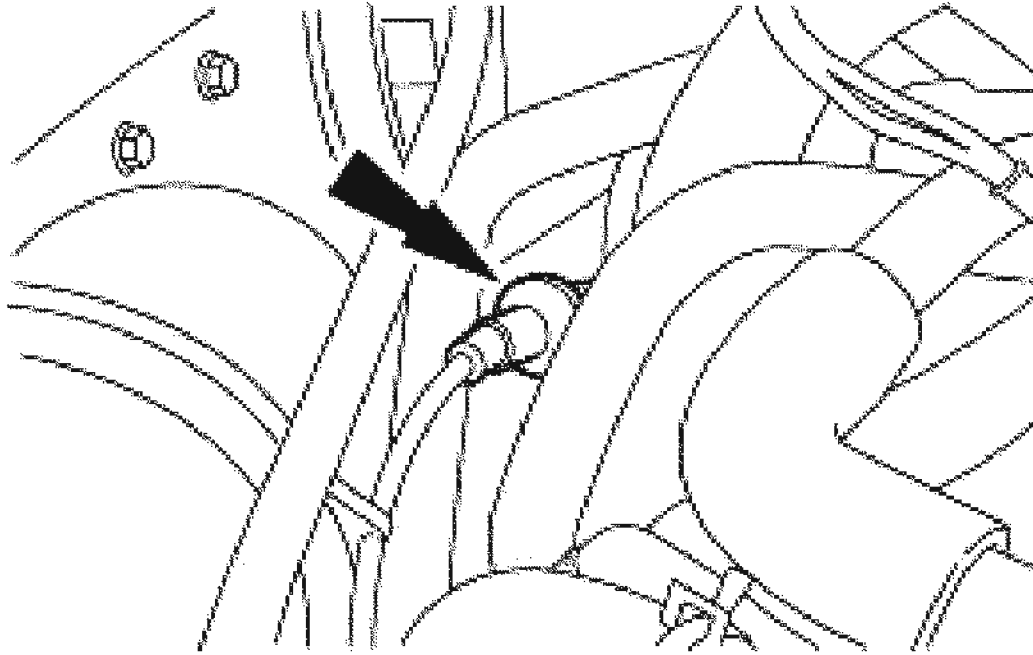
21. Disconnect the brake booster vacuum hose.



G02739392

**Fig. 219: Disconnecting Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

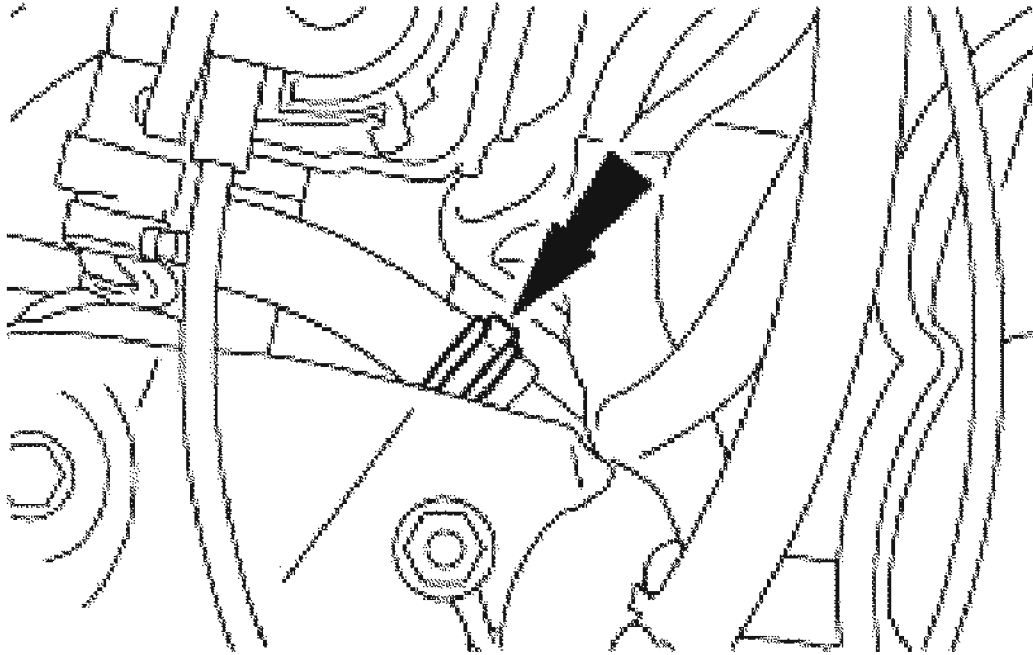
22. Disconnect the vacuum hose at the vacuum reservoir check valve.



G02739393

**Fig. 220: Disconnecting Vacuum Hose**  
Courtesy of FORD MOTOR CO.

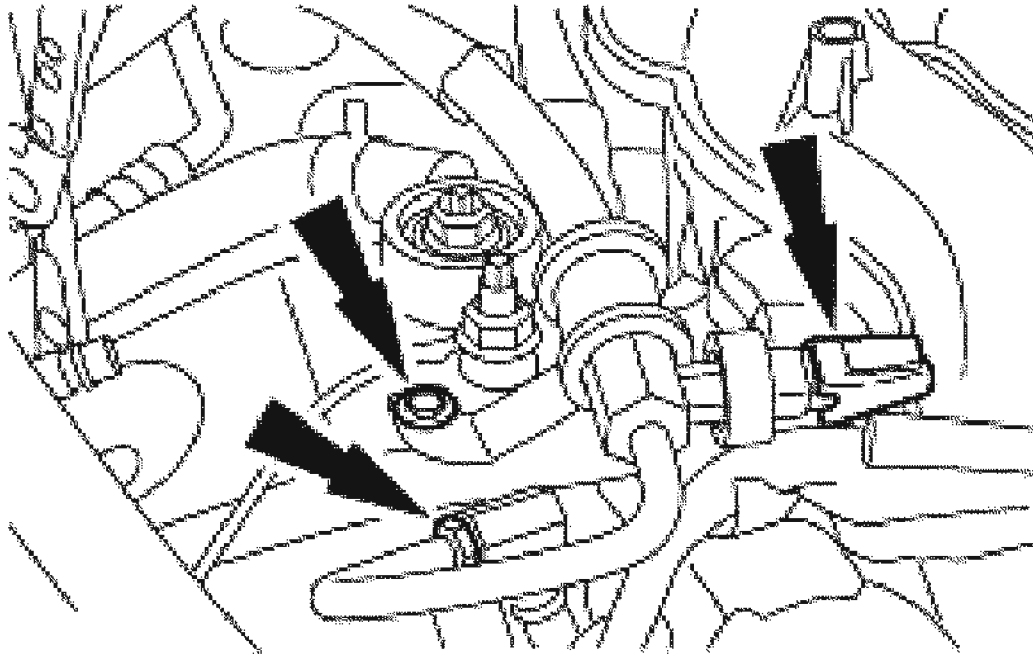
23. Disconnect the power steering return tube.



G02739394

**Fig. 221: Disconnecting Power Steering Return Tube**  
Courtesy of FORD MOTOR CO.

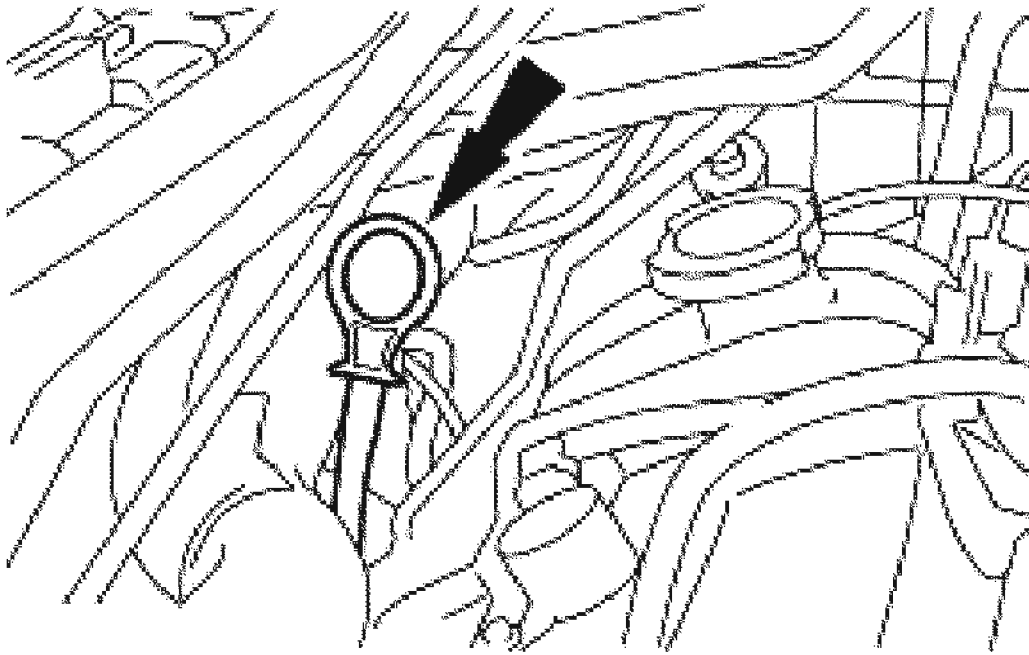
24. Disconnect the power steering hose.
  - Disconnect the power steering pressure (PSP) switch electrical connector.
  - Remove the bracket bolt.
  - Disconnect the power steering hose.



G02739395

**Fig. 222: Disconnecting Power Steering Hose**  
Courtesy of FORD MOTOR CO.

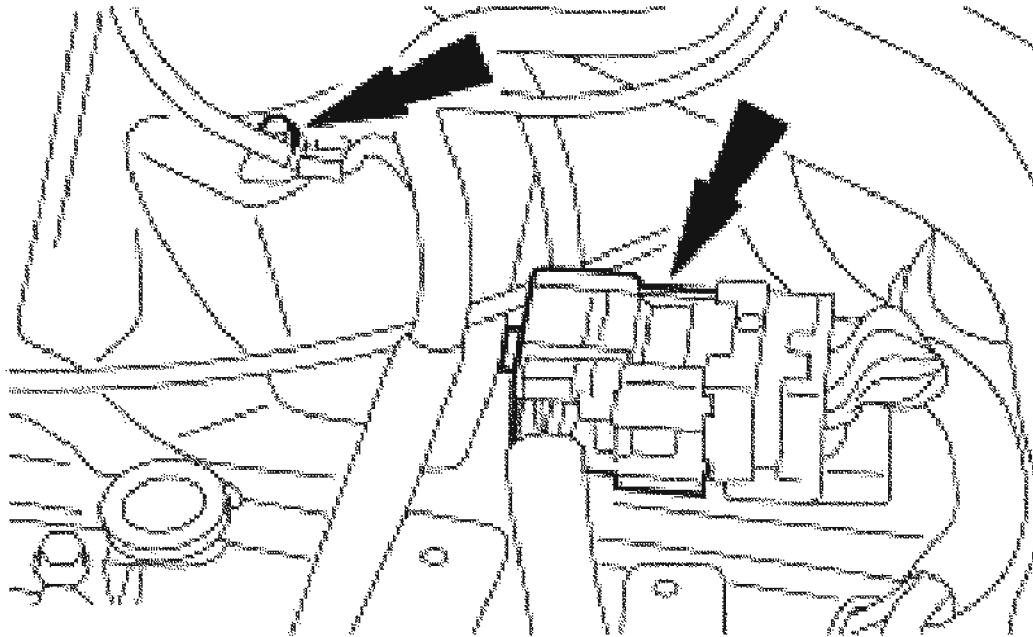
25. Remove the oil level indicator.



G02739396

**Fig. 223: Removing Oil Level Indicator**  
Courtesy of FORD MOTOR CO.

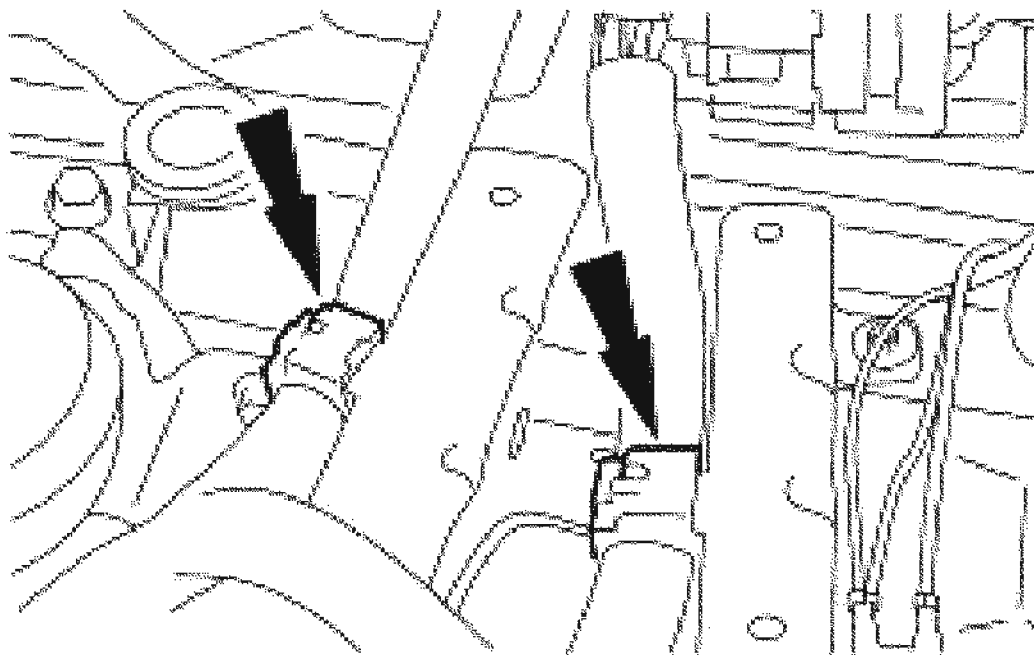
26. Disconnect the ground strap and the connector.



G02739397

**Fig. 224: Disconnecting Ground Strap And Connector**  
Courtesy of FORD MOTOR CO.

27. Remove the wiring harness retainers and position the wiring harness out of the way.

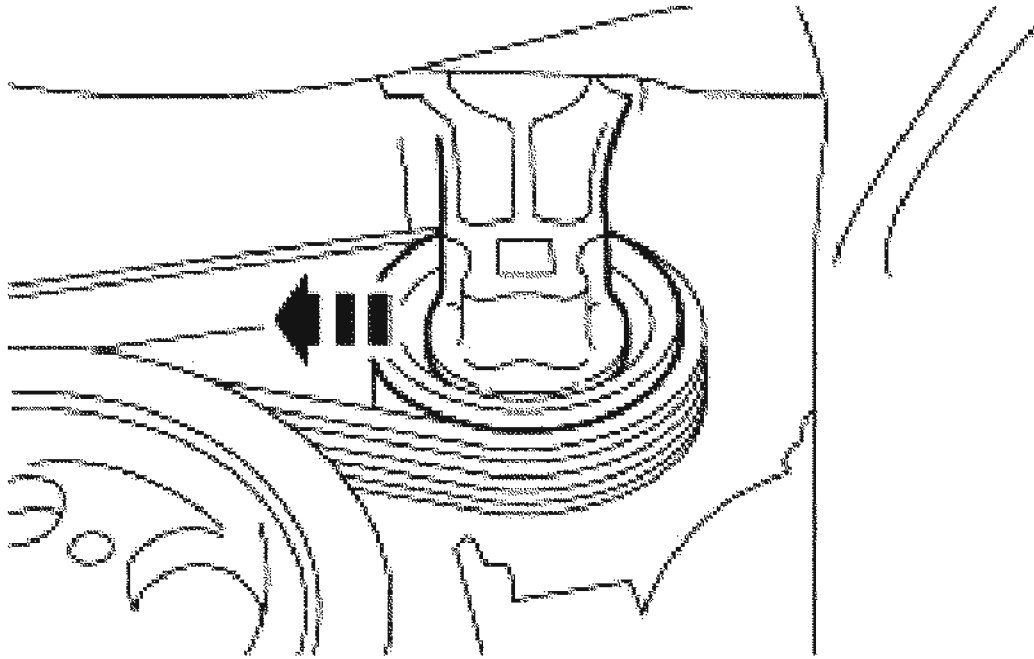


G02739398

**Fig. 225: Removing Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

28. Remove the flex pipe. For additional information, refer to **EXHAUST SYSTEM**
29. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.

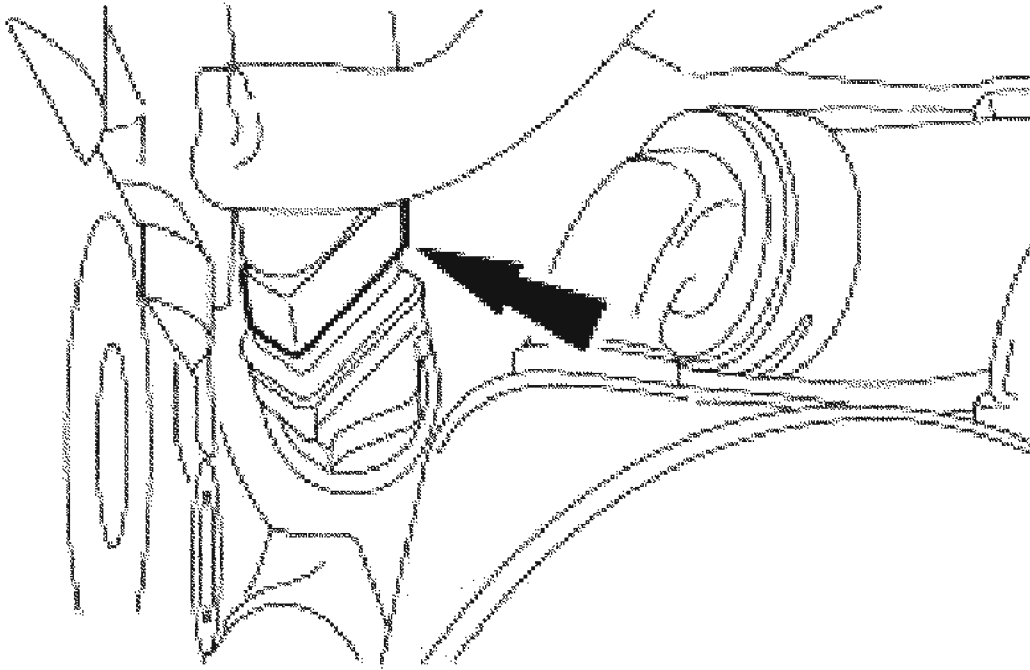




G02739399

**Fig. 226: Identifying Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

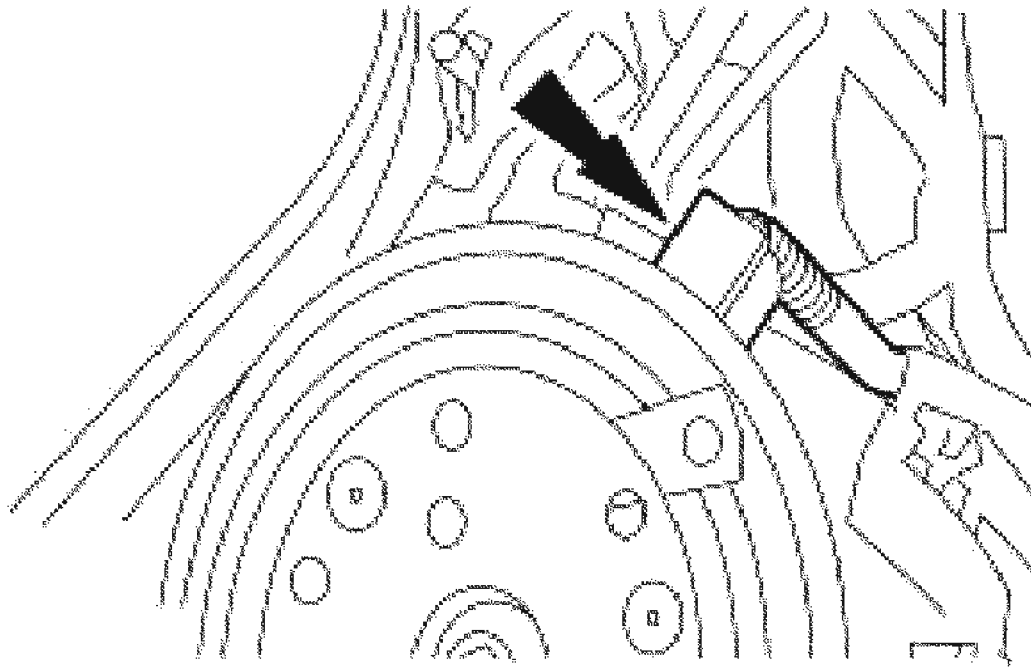
30. If equipped, disconnect the engine block heater electrical connector.



**G02739400**

**Fig. 227: Disconnecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

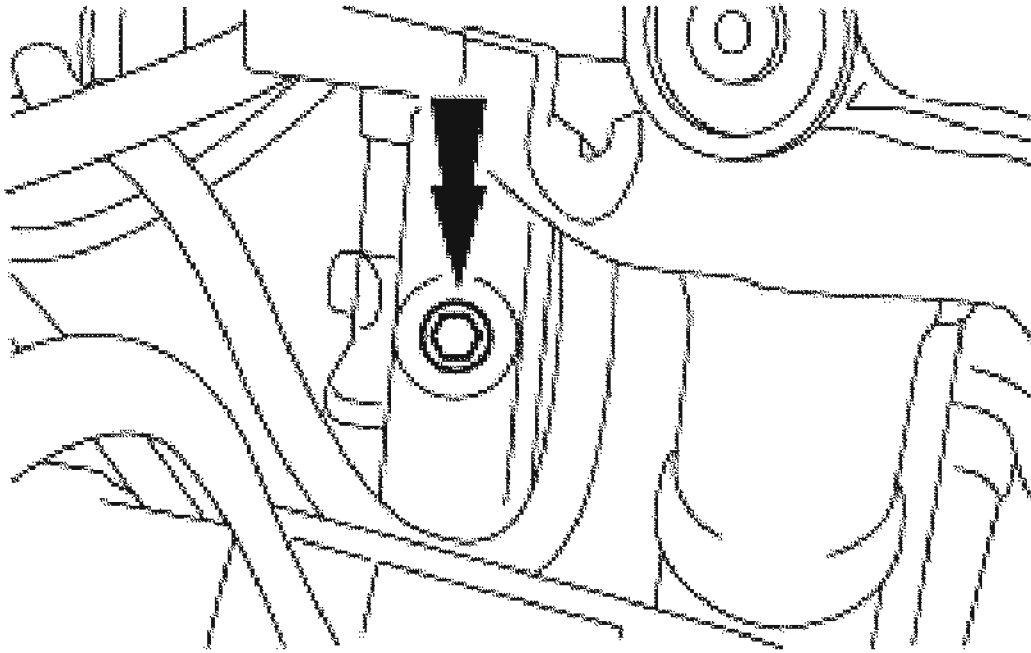
31. Disconnect the A/C clutch field coil electrical connector.



G02739401

**Fig. 228: Disconnecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

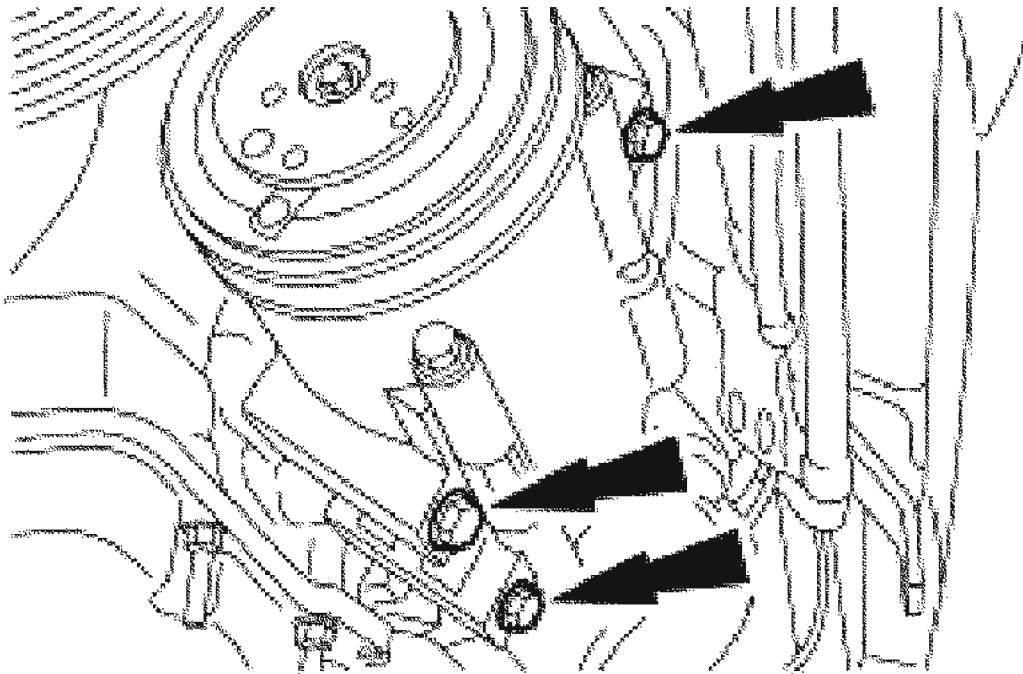
**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.



G02739402

**Fig. 229: Removing A/C Manifold & Tube Assembly Bolt**  
Courtesy of FORD MOTOR CO.

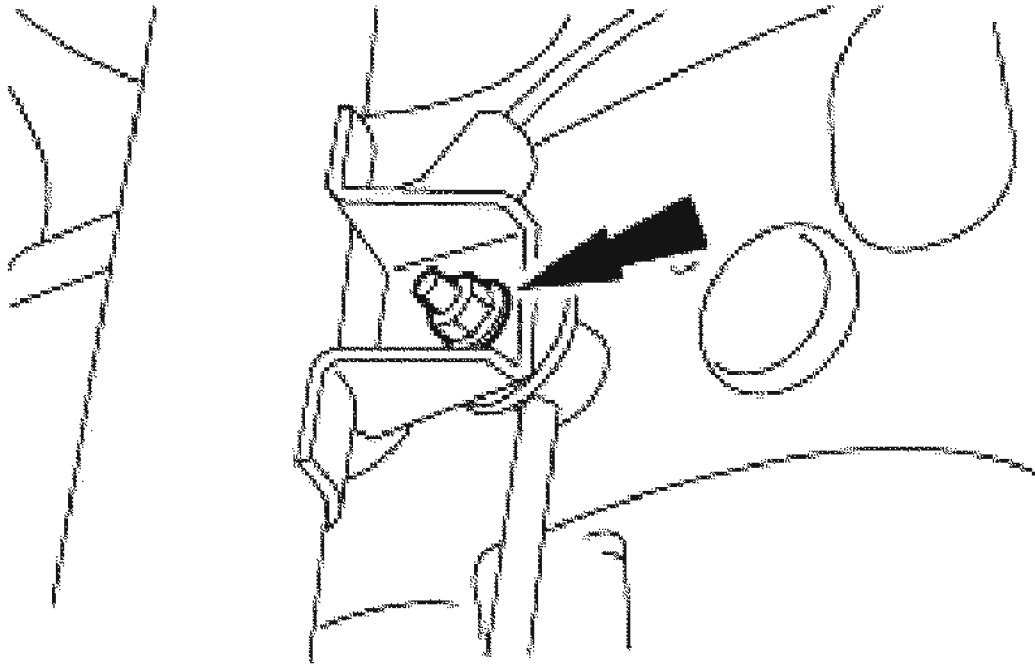
32. Remove the A/C manifold and tube assembly bolt from the top of the A/C compressor and disconnect the A/C manifold and tube assembly.
33. Remove the bolts and the A/C compressor.



G02739403

**Fig. 230: Removing Bolts And A/C Compressor**  
Courtesy of FORD MOTOR CO.

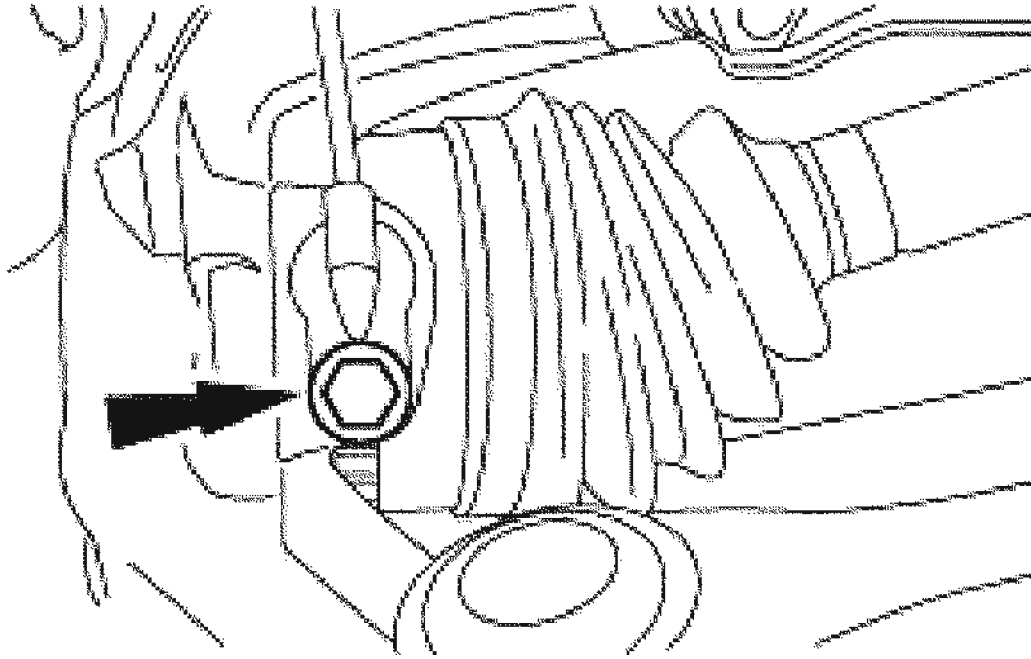
34. Remove both front wheel and tire assemblies.
35. If equipped, remove the intermediate driveshaft. For additional information, refer to **DRIVESHAFT**
36. Separate the LH and RH stabilizer bar links from the strut mount.



G02739404

**Fig. 231: Identifying LH And RH Stabilizer Bar**  
**Courtesy of FORD MOTOR CO.**

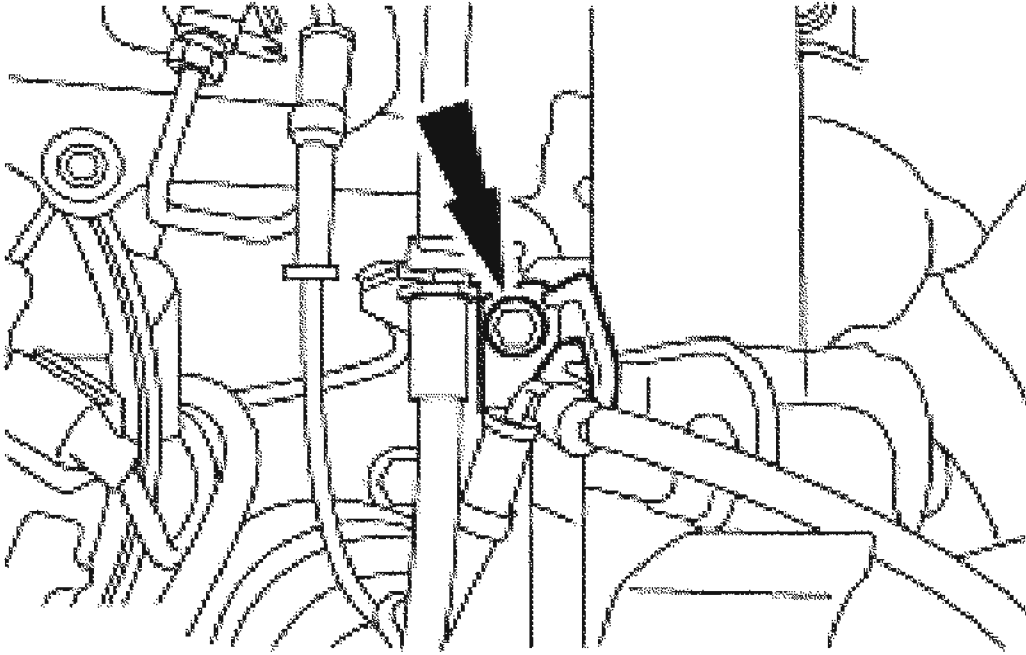
37. If equipped, remove the bolt and position aside the LH and RH wheel speed sensors.



G02739405

**Fig. 232: Identifying Bolt**  
Courtesy of FORD MOTOR CO.

38. If equipped, remove the LH and RH wheel speed sensor brackets.

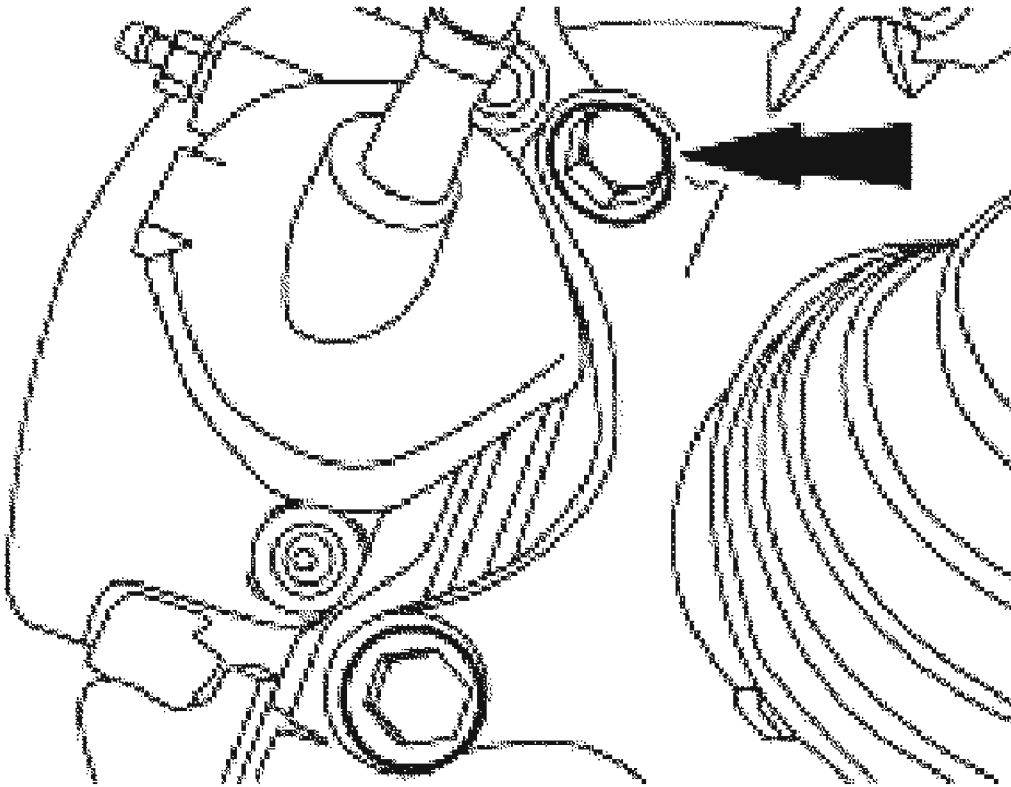


G02739406

**Fig. 233: Removing LH And RH Wheel Speed Sensor Brackets**  
Courtesy of FORD MOTOR CO.

39. Remove the LH and RH brake calipers from the steering knuckles and support them on the struts.

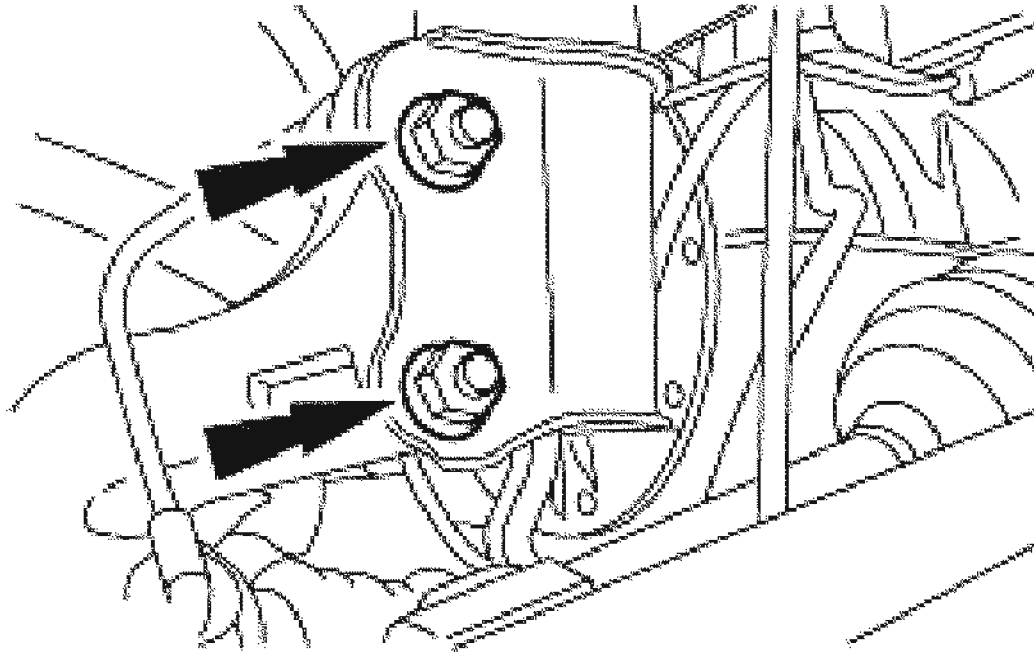




**G02739407**

**Fig. 234: Removing LH And RH Brake Calipers**  
**Courtesy of FORD MOTOR CO.**

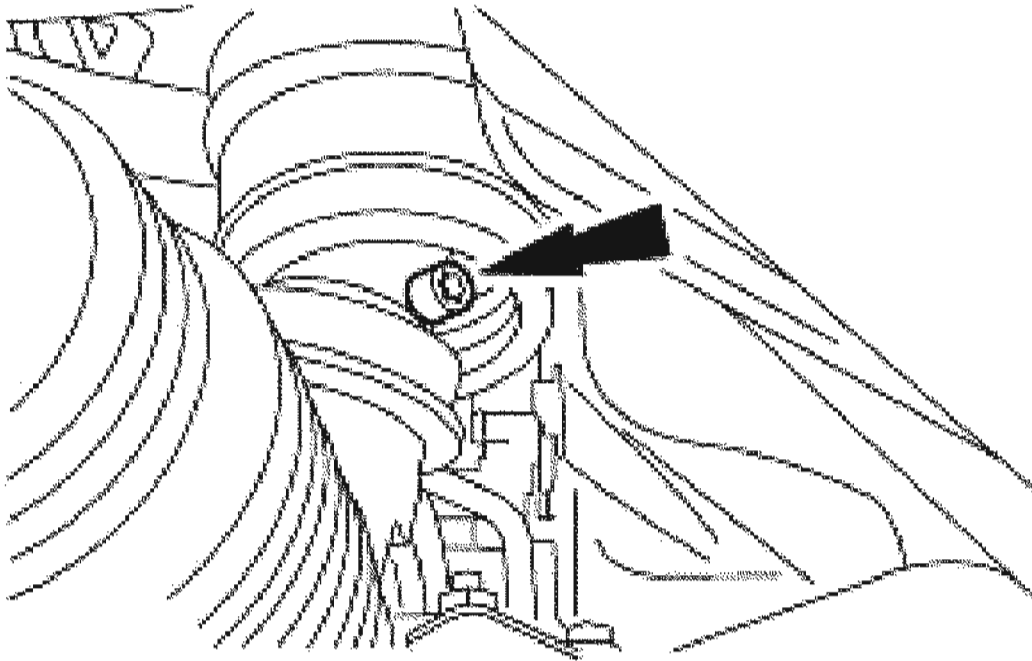
40. Remove the nuts and bolts and separate the struts from the LH and RH steering knuckles.



G02739408

**Fig. 235: Removing Nuts And Bolts**  
Courtesy of FORD MOTOR CO.

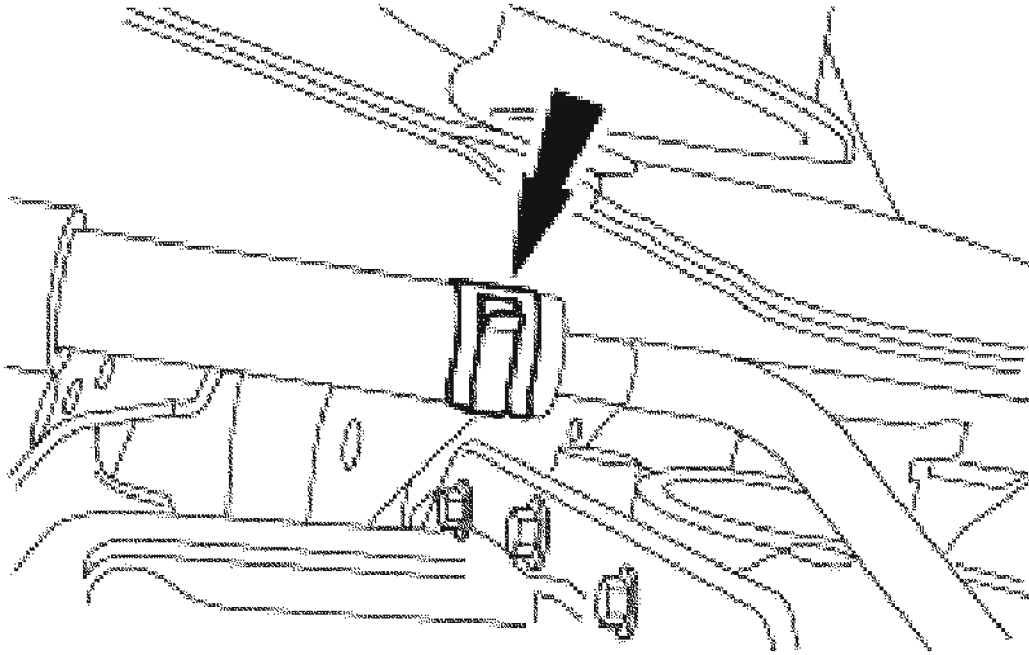
41. Remove the bolt and separate the steering shaft from the rack.



G02739409

**Fig. 236: Removing Bolt And Separate Steering Shaft From Rack**  
Courtesy of FORD MOTOR CO.

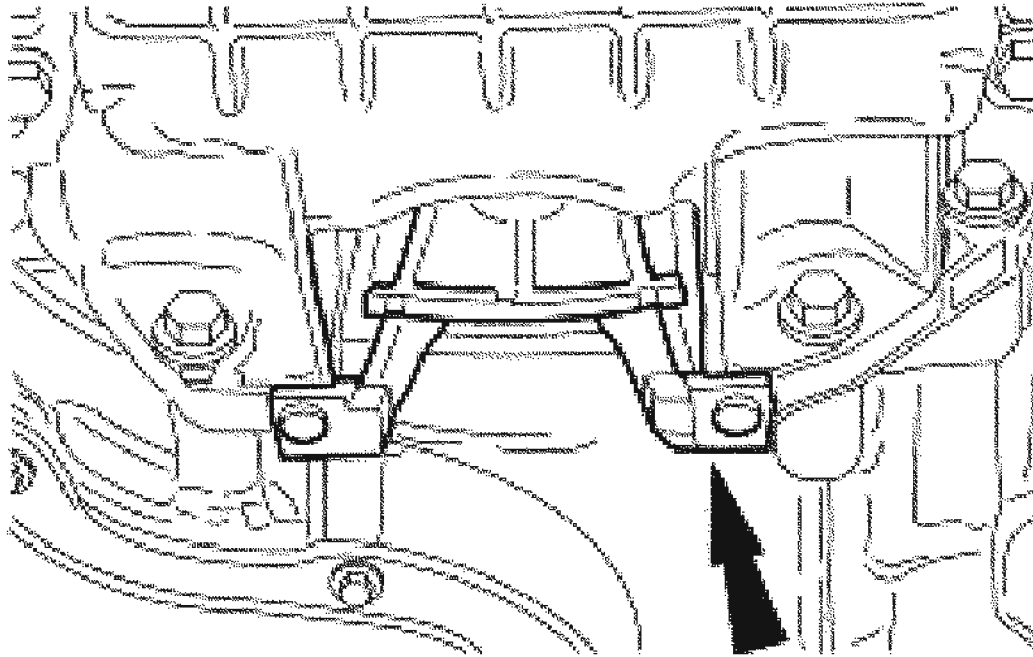
42. Disconnect the two transmission cooler tubes.



G02739410

**Fig. 237: Disconnecting Transmission Cooler Tubes**  
Courtesy of FORD MOTOR CO.

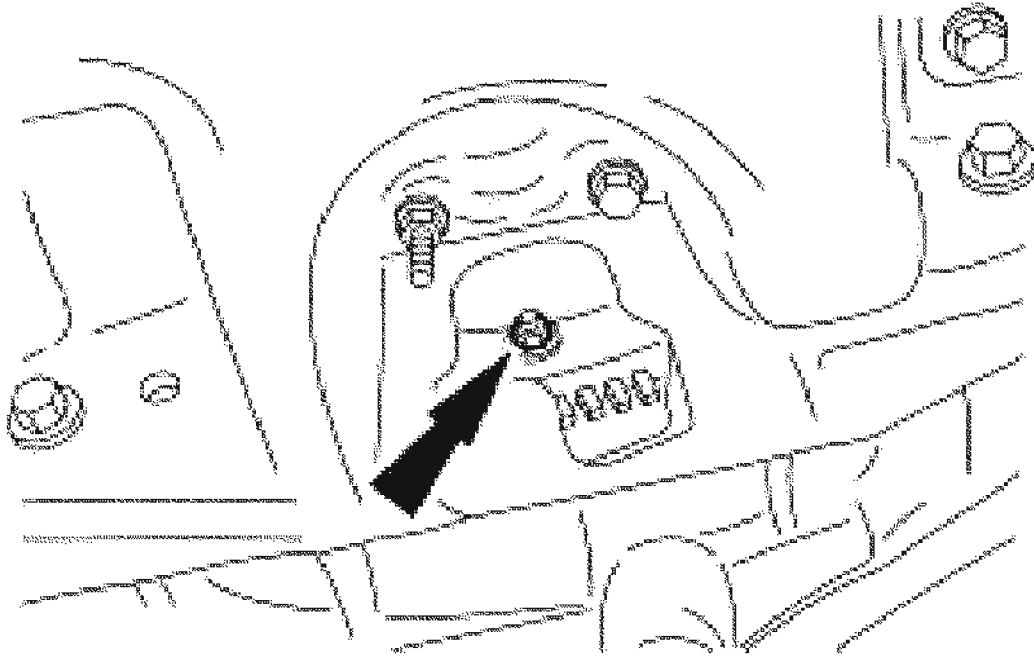
43. Remove the torque converter inspection cover.



G02739411

**Fig. 238: Removing Torque Converter Inspection Cover**  
Courtesy of FORD MOTOR CO.

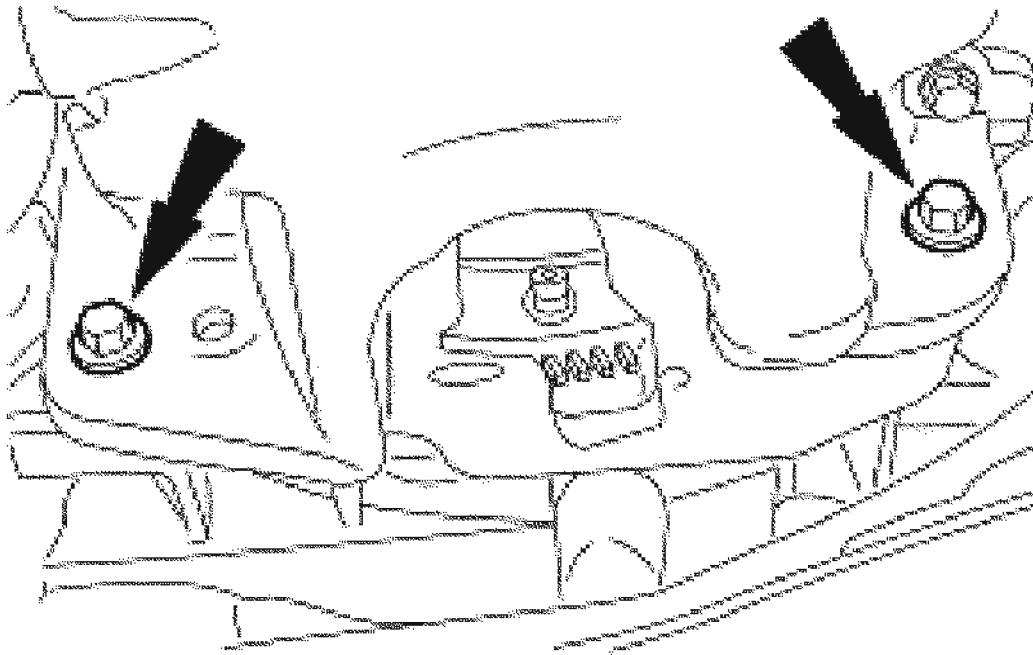
44. Remove the four torque converter nuts.



G02739412

**Fig. 239: Removing Torque Converter Nuts**  
**Courtesy of FORD MOTOR CO.**

45. Remove the four bolts.



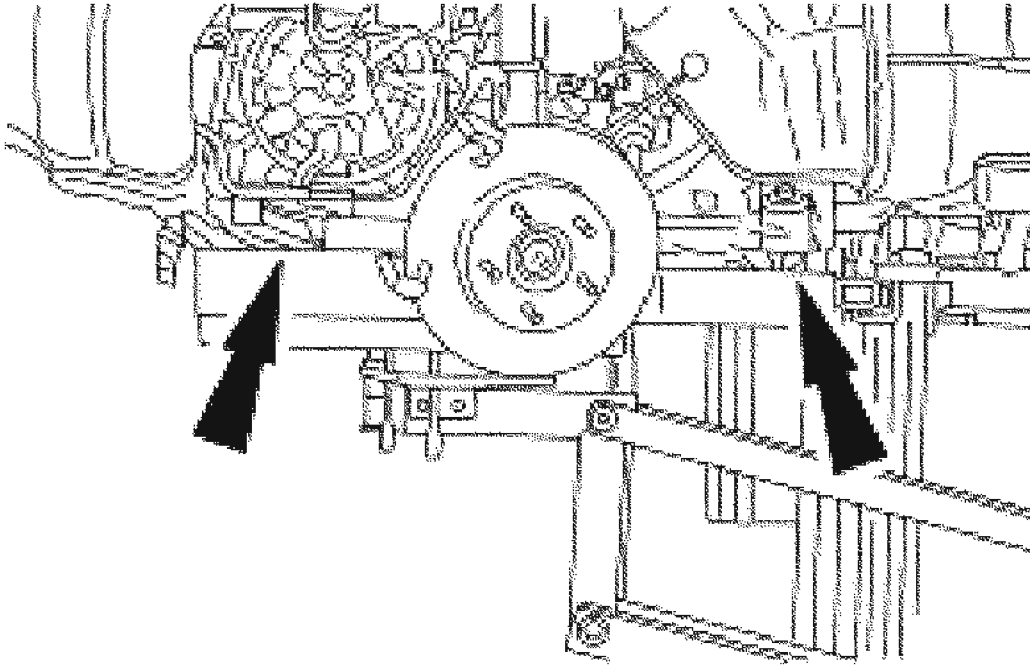
G02739413

**Fig. 240: Locating Bolt**  
Courtesy of FORD MOTOR CO.

46. Position the universal powertrain lift.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

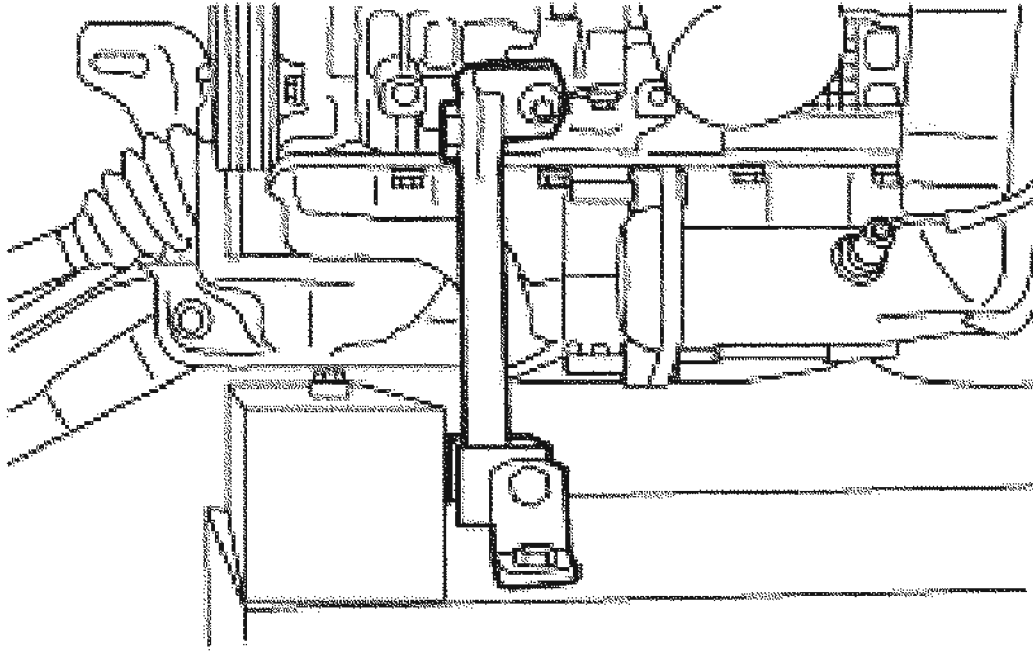


G02739414

**Fig. 241: Positioning Universal Powertrain Lift**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not allow the engine oil pan to rest on the powertrain lift.



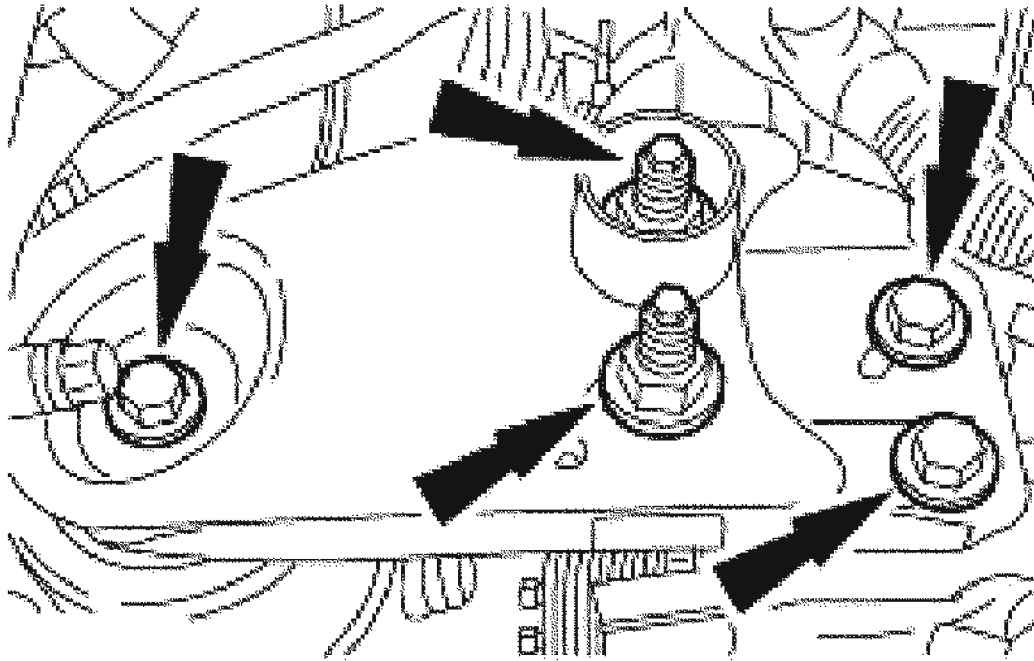


G02739415

**Fig. 242: Supporting Front Of Engine Using Engine Stand**  
Courtesy of FORD MOTOR CO.

**NOTE:** The next seven steps must be carried out with the vehicle raised and the universal powertrain lift in position.

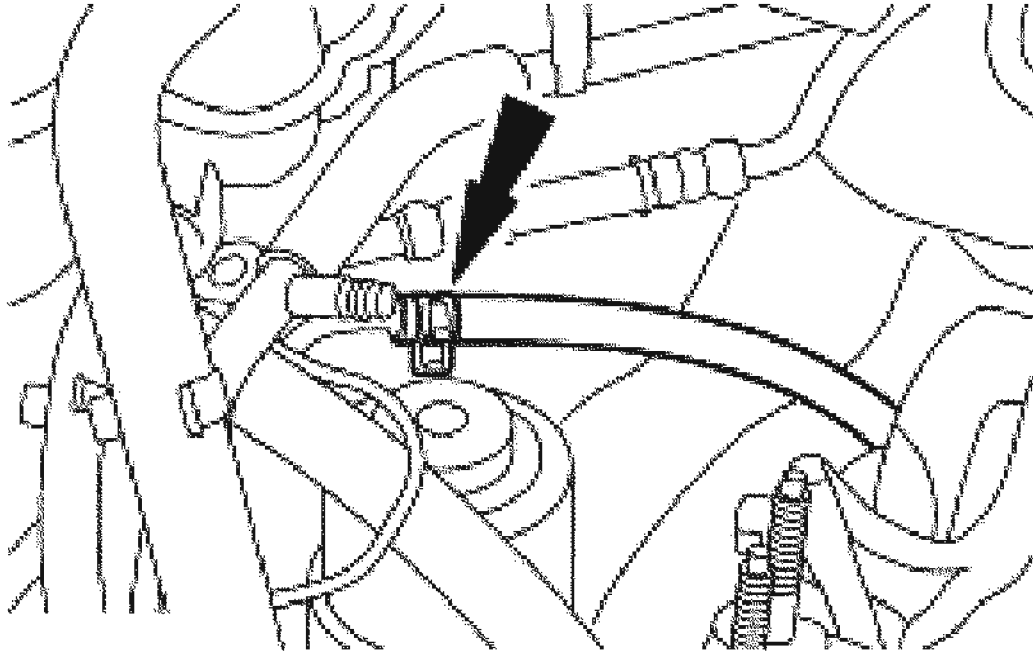
47. Using a bracket from a heavy-duty engine stand, support the front of the engine.
48. Remove the bolts and the nuts, remove the engine support bracket.



G02739416

**Fig. 243: Removing Engine Support Bracket**  
Courtesy of FORD MOTOR CO.

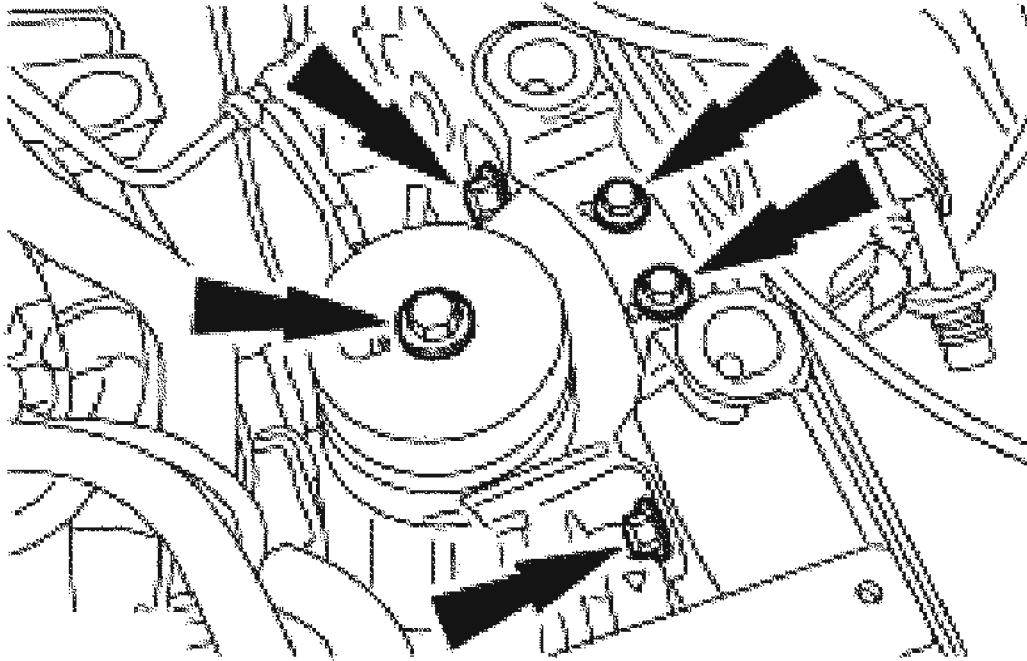
49. Disconnect the power steering return hose.



G02739417

**Fig. 244: Disconnecting Power Steering Return Hose**  
Courtesy of FORD MOTOR CO.

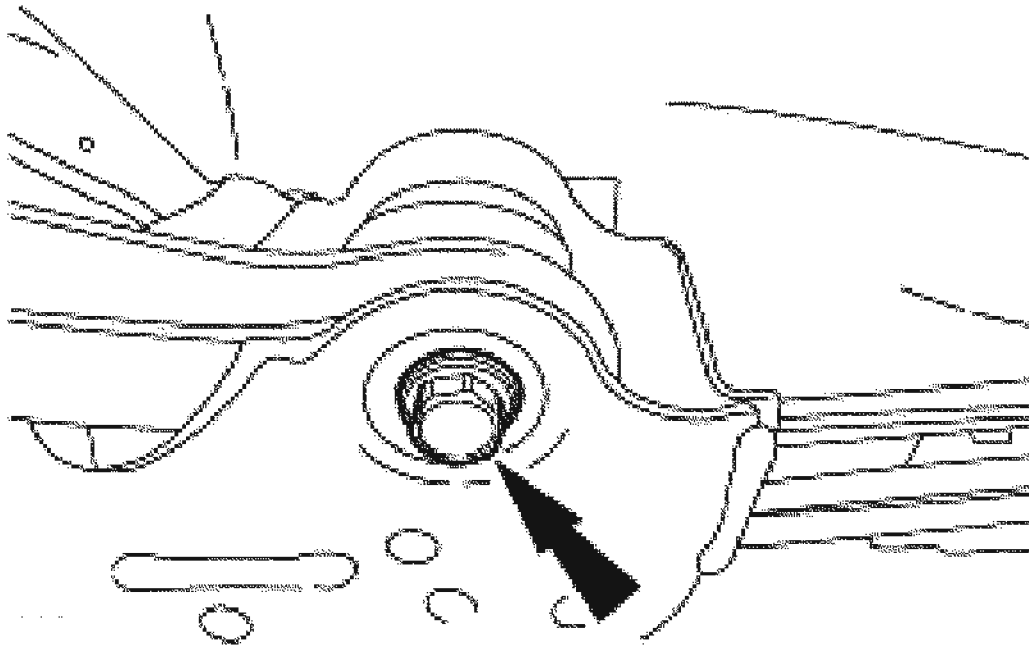
50. Remove the bolts and the transaxle support.



G02739418

**Fig. 245: Removing Bolts And Transaxle Support**  
Courtesy of FORD MOTOR CO.

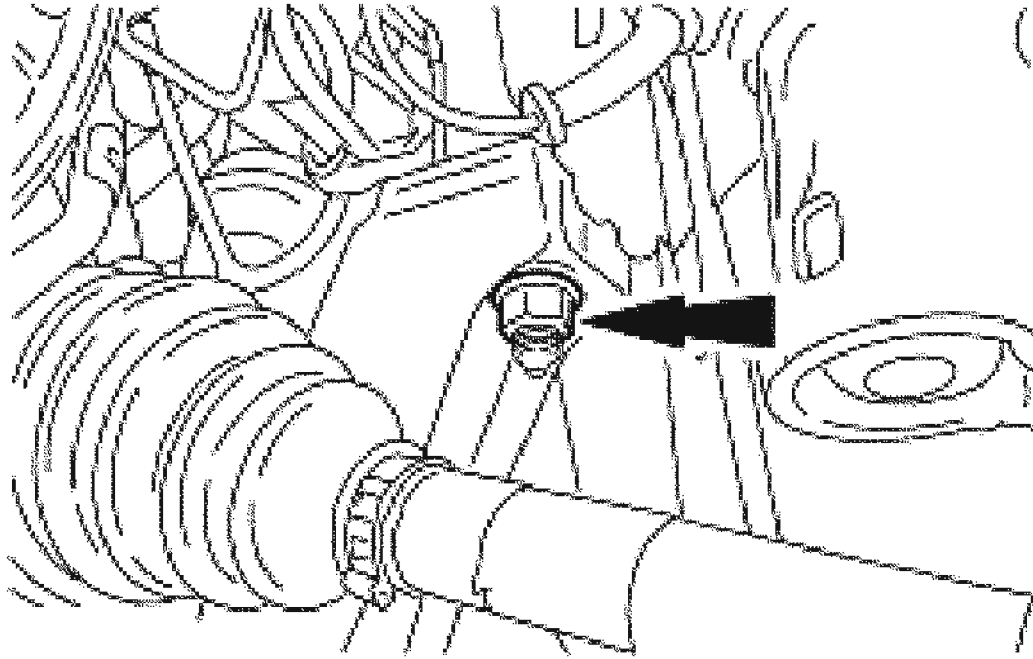
51. Remove two rear subframe bolts.



G02739419

**Fig. 246: Removing Rear Subframe Bolts**  
Courtesy of FORD MOTOR CO.

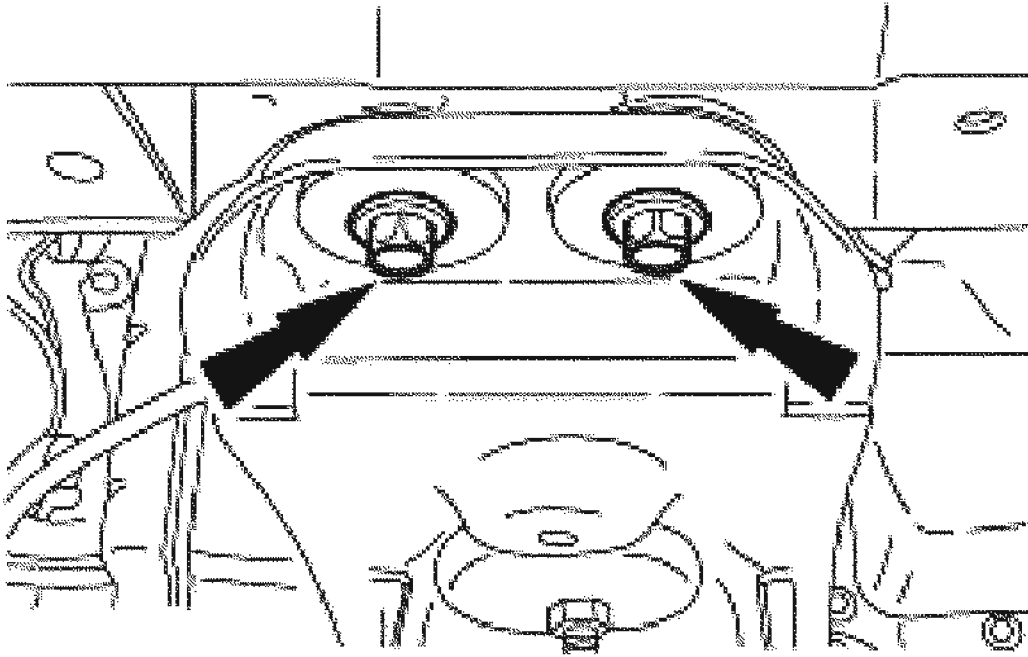
52. Remove the two subframe side nuts.



G02739420

**Fig. 247: Removing Subframe Side Nuts**  
Courtesy of FORD MOTOR CO.

53. Remove the two bolts from the motor mount support.



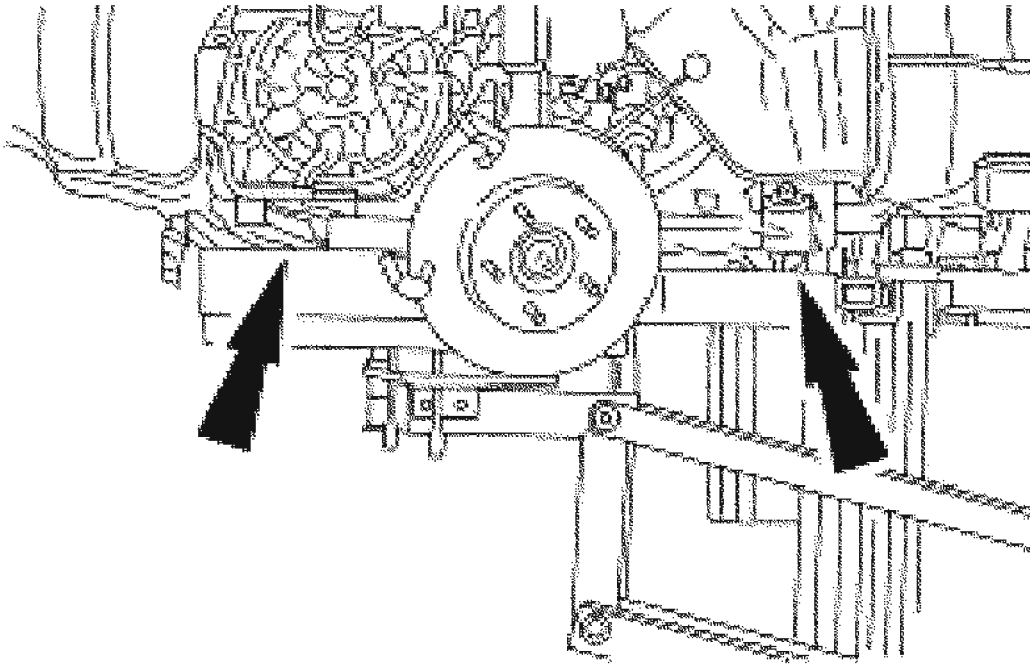
G02739421

**Fig. 248: Removing Bolts From Motor Mount Support**  
Courtesy of FORD MOTOR CO.

54. Remove the powertrain from the vehicle.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

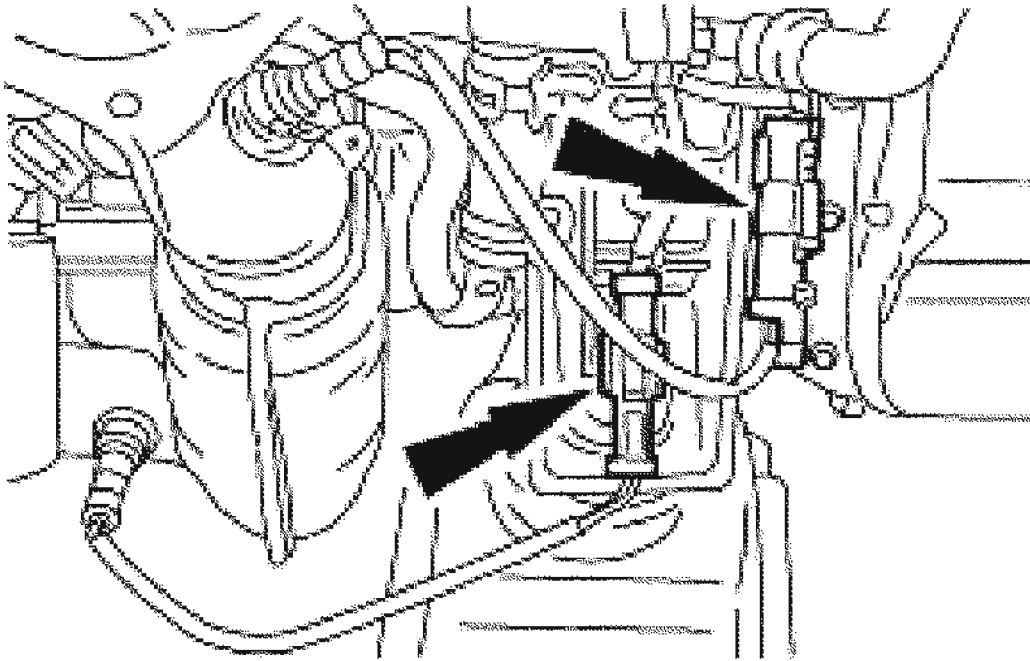


G02739422

**Fig. 249: Removing Powertrain From Vehicle**  
Courtesy of FORD MOTOR CO.

55. Disconnect the heated oxygen sensor electrical connectors.

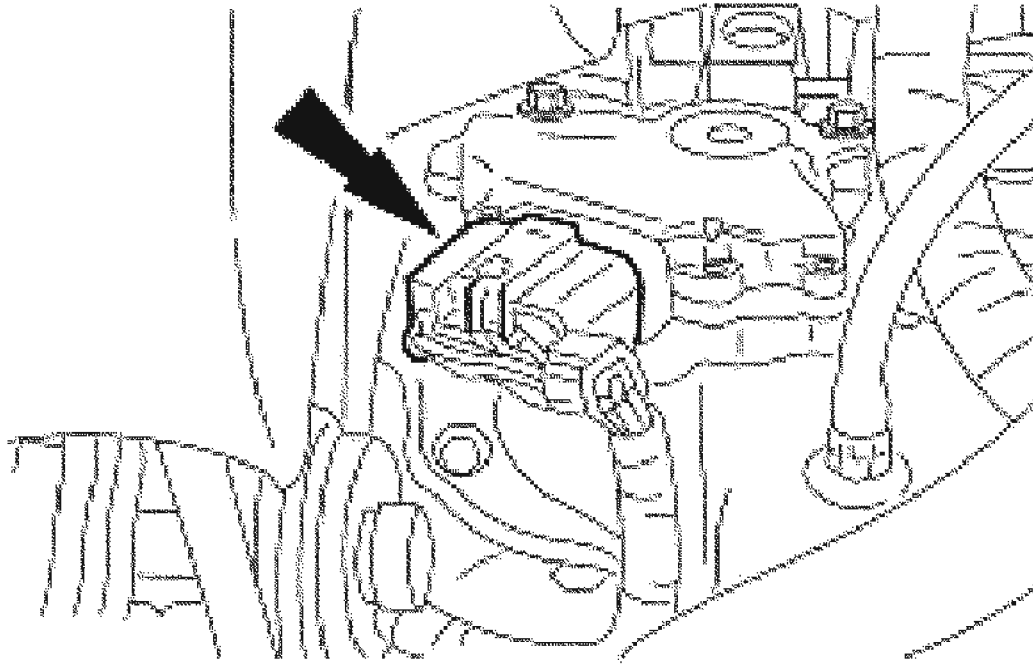




G02739423

**Fig. 250: Disconnecting Heated Oxygen Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

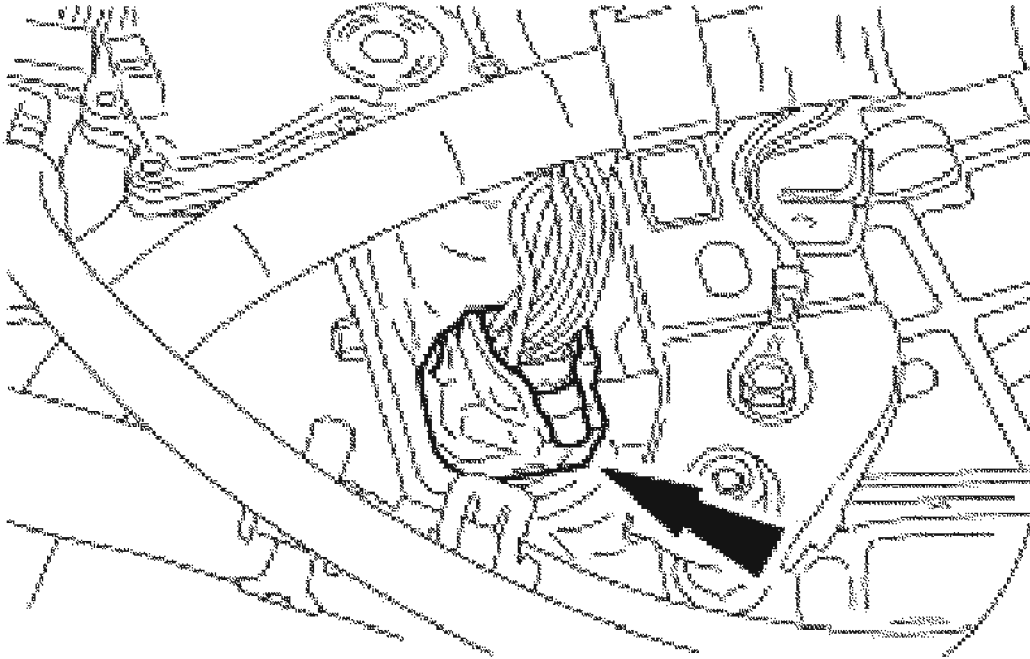
56. Disconnect the transmission range (TR) sensor electrical connector.



G02739424

**Fig. 251: Disconnecting Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

57. Disconnect the transaxle wiring harness electronic control switch electrical connector.

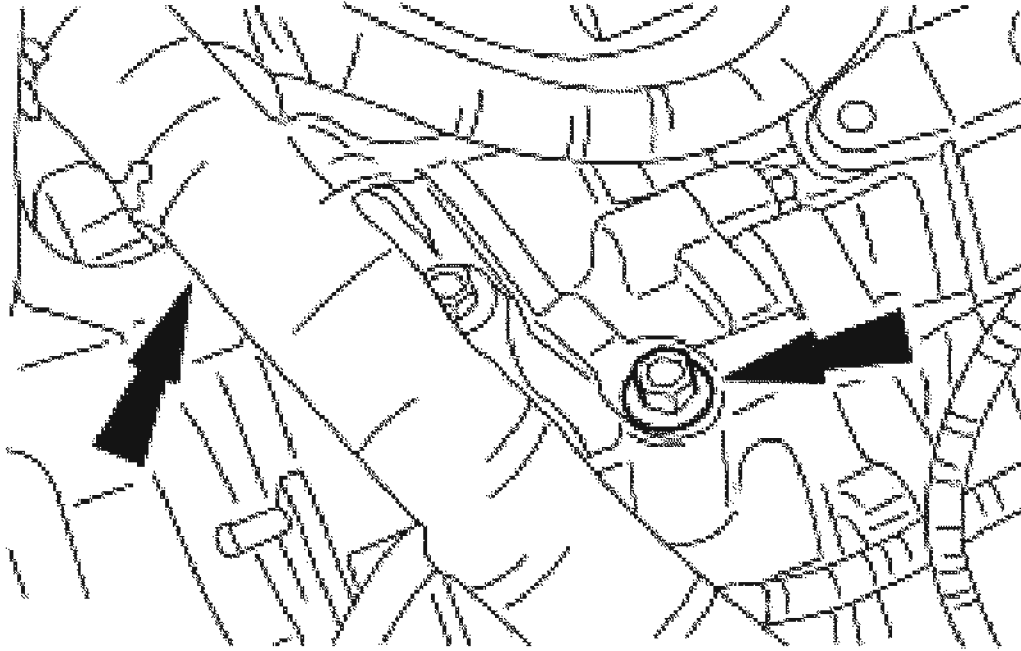


G02739425

**Fig. 252: Disconnecting Transaxle Wiring Harness Electronic Control Switch Electrical Connector**

**Courtesy of FORD MOTOR CO.**

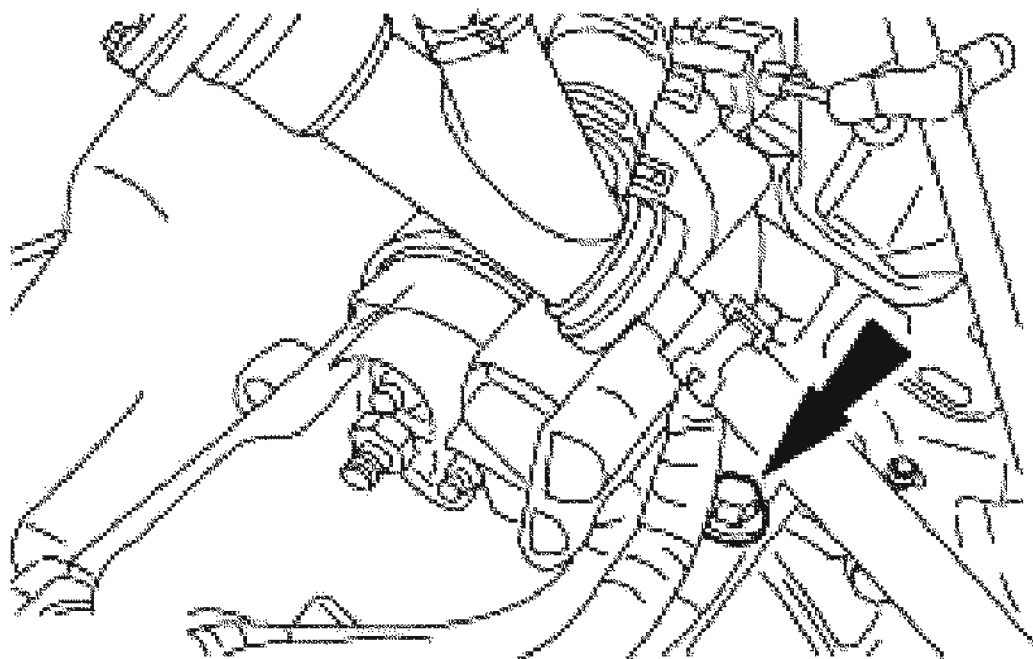
58. Remove the bolt and separate the transaxle control harness from the bracket.



G02739426

**Fig. 253: Separating Transaxle Control Harness From Bracket**  
Courtesy of FORD MOTOR CO.

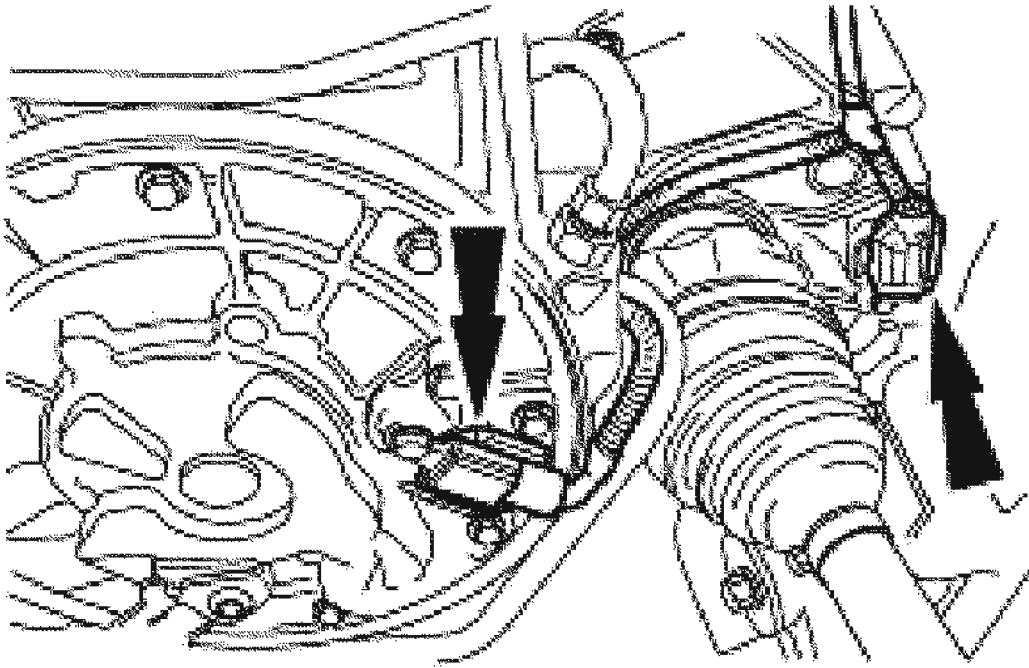
59. Remove the two bolts, the starter and the wiring harness as an assembly.



G02739427

**Fig. 254: Removing Bolts, Starter And Wiring Harness As An Assembly**  
**Courtesy of FORD MOTOR CO.**

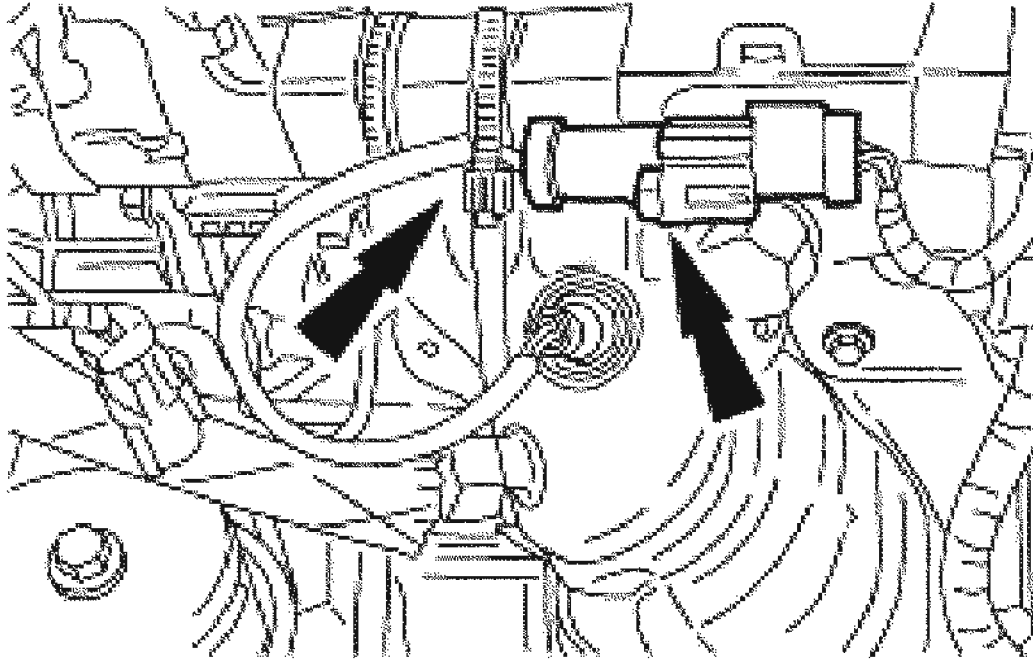
60. Disconnect the output shaft speed (OSS) sensor and the turbine speed sensor (TSS) electrical connectors.



G02739428

**Fig. 255: Disconnecting Output Shaft Speed (OSS) Sensor And Turbine Speed Sensor (TSS) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

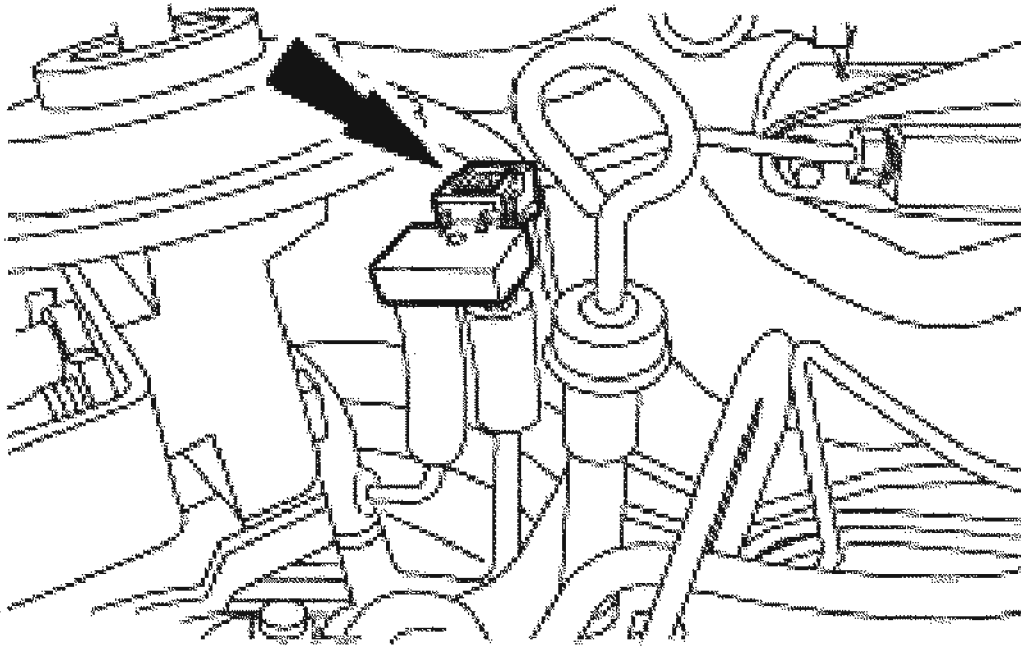
61. Remove the tie-strap and disconnect the HO2S sensor.



G02739429

**Fig. 256: Removing Tie-Strap And Disconnecting HO2S Sensor**  
Courtesy of FORD MOTOR CO.

62. Disconnect the differential pressure feedback EGR system electrical connector.



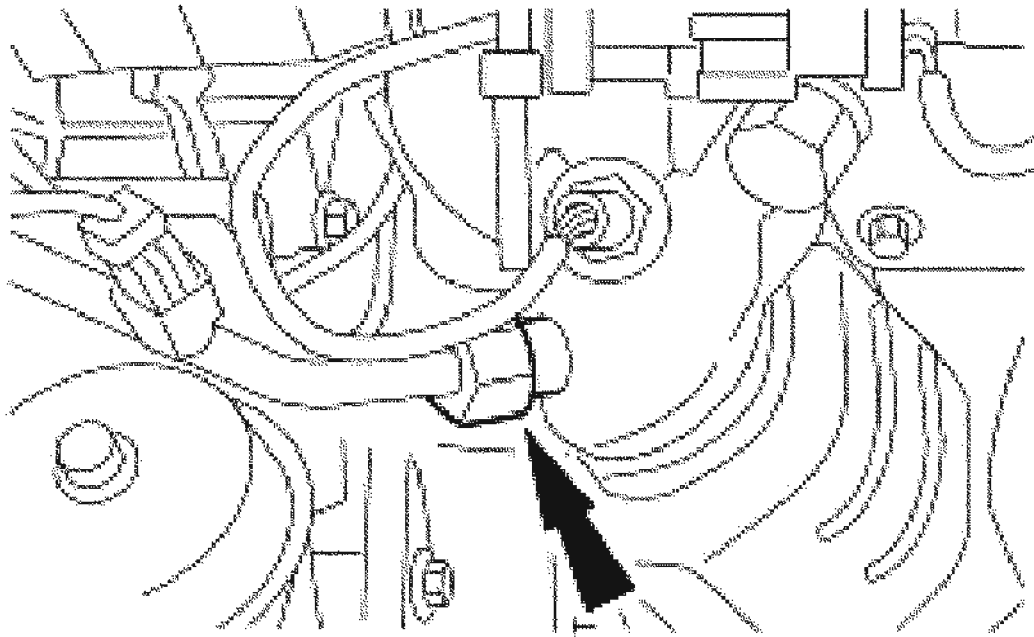
G02739430

**Fig. 257: Disconnecting Differential Pressure Feedback EGR System Electrical Connector**

**Courtesy of FORD MOTOR CO.**

63. Disconnect the EGR tube nut at the manifold connector.

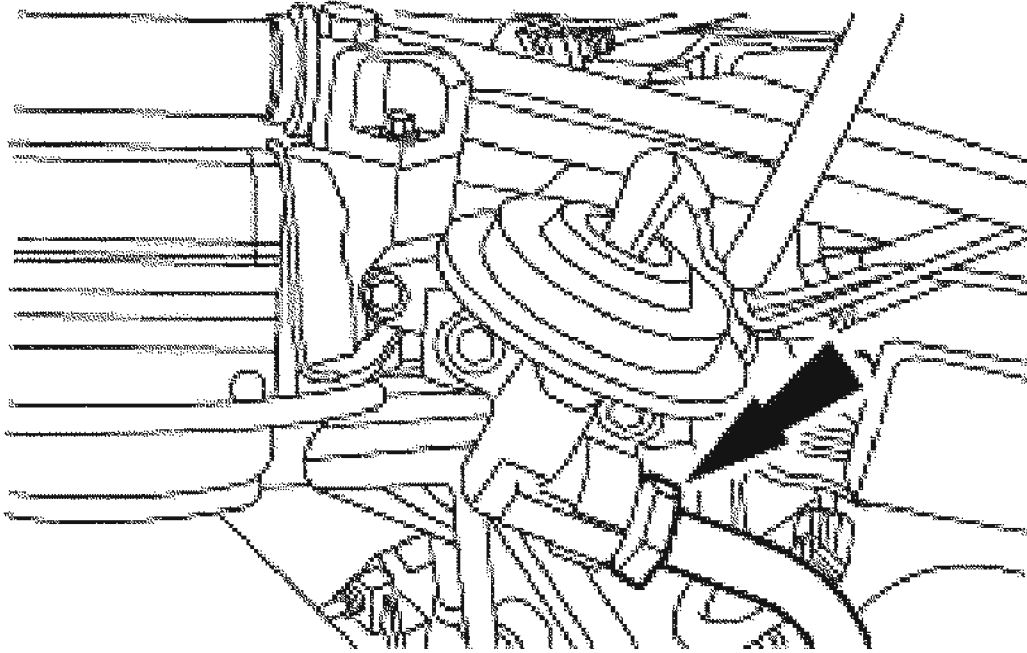




G02739431

**Fig. 258: Disconnecting EGR Tube Nut At Manifold Connector**  
Courtesy of FORD MOTOR CO.

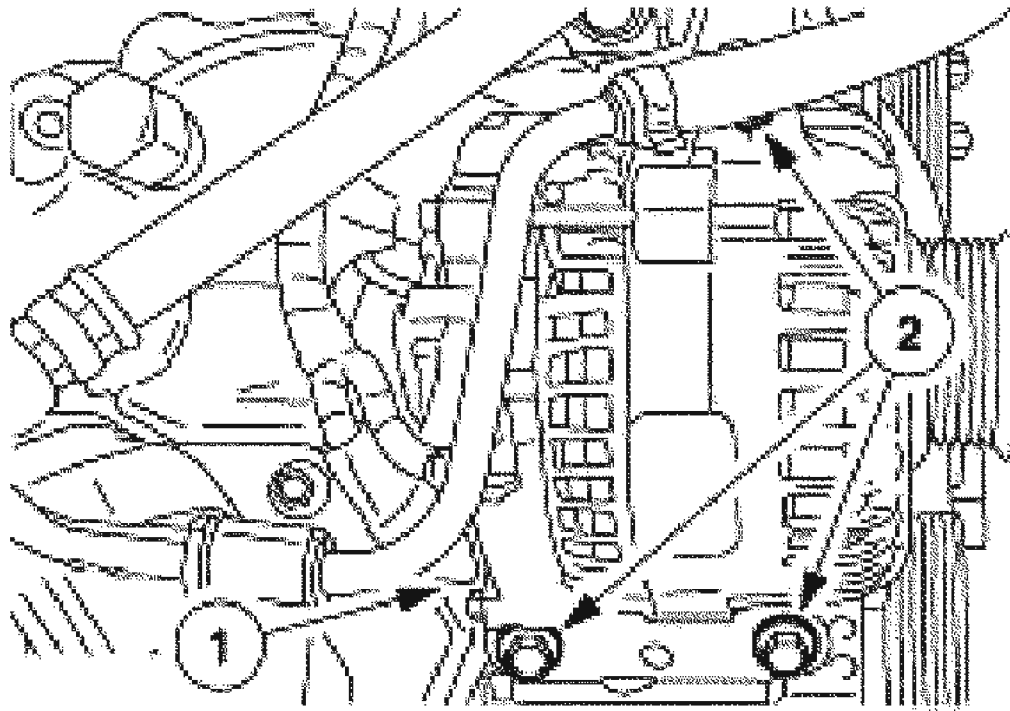
64. Disconnect the EGR tube fitting and remove the EGR tube.



G02739432

**Fig. 259: Disconnecting EGR Tube Fitting And Removing EGR Tube**  
Courtesy of FORD MOTOR CO.

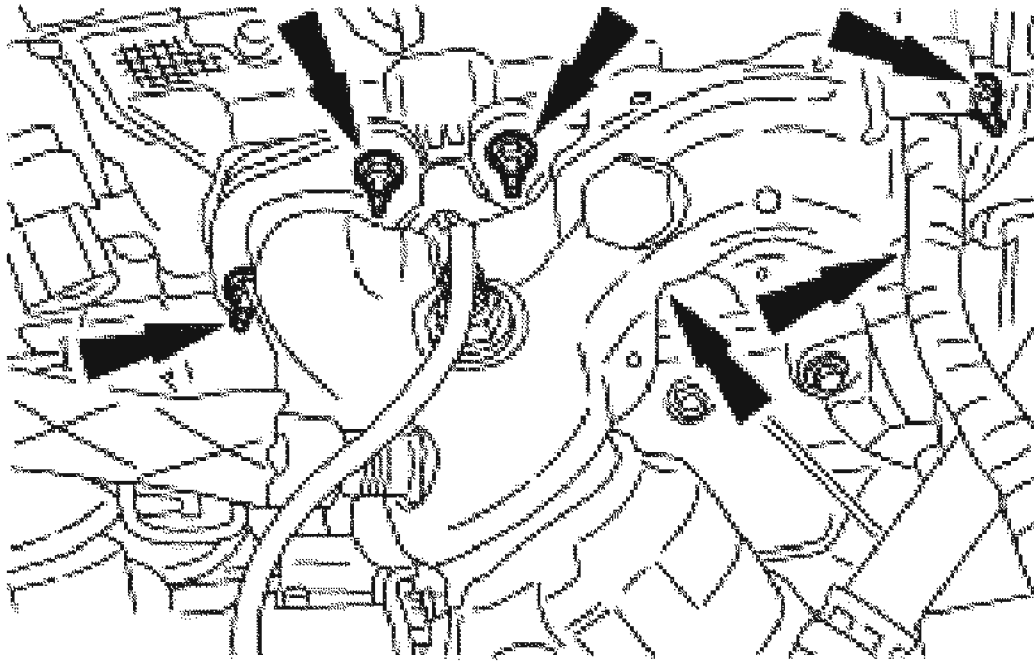
65. Remove the generator.
  1. Disconnect the electrical connector.
  2. Remove the bolts.



G02739433

**Fig. 260: Removing Generator**  
Courtesy of FORD MOTOR CO.

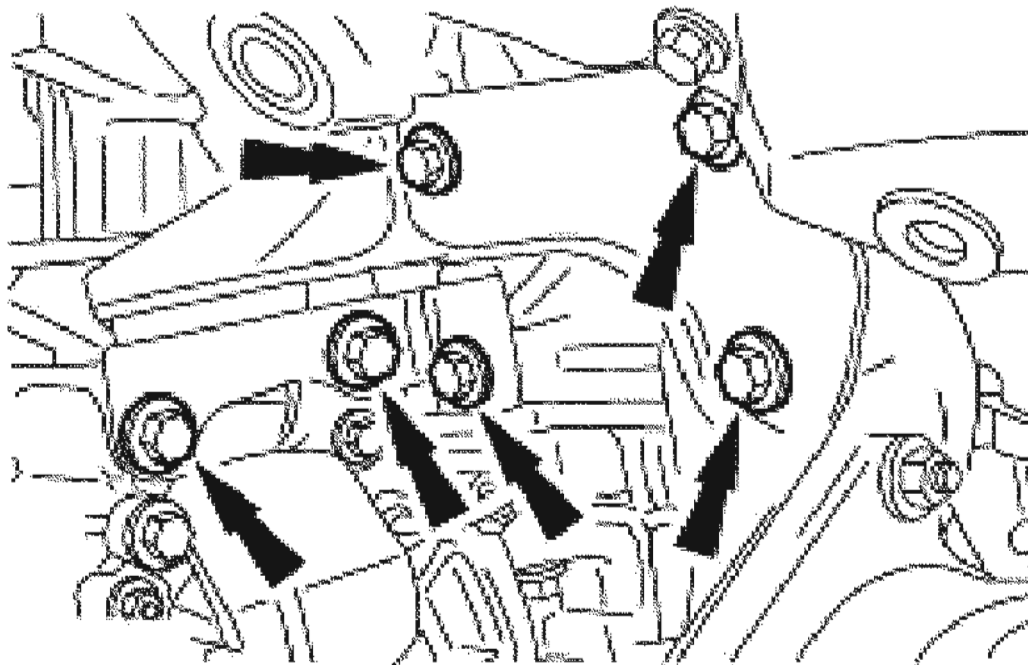
66. Remove the six RH exhaust manifold nuts and the gasket.



G02739434

**Fig. 261: Removing RH Exhaust Manifold Nuts And Gasket**  
**Courtesy of FORD MOTOR CO.**

67. Remove the bolts and position the halfshaft support bracket out of the way.



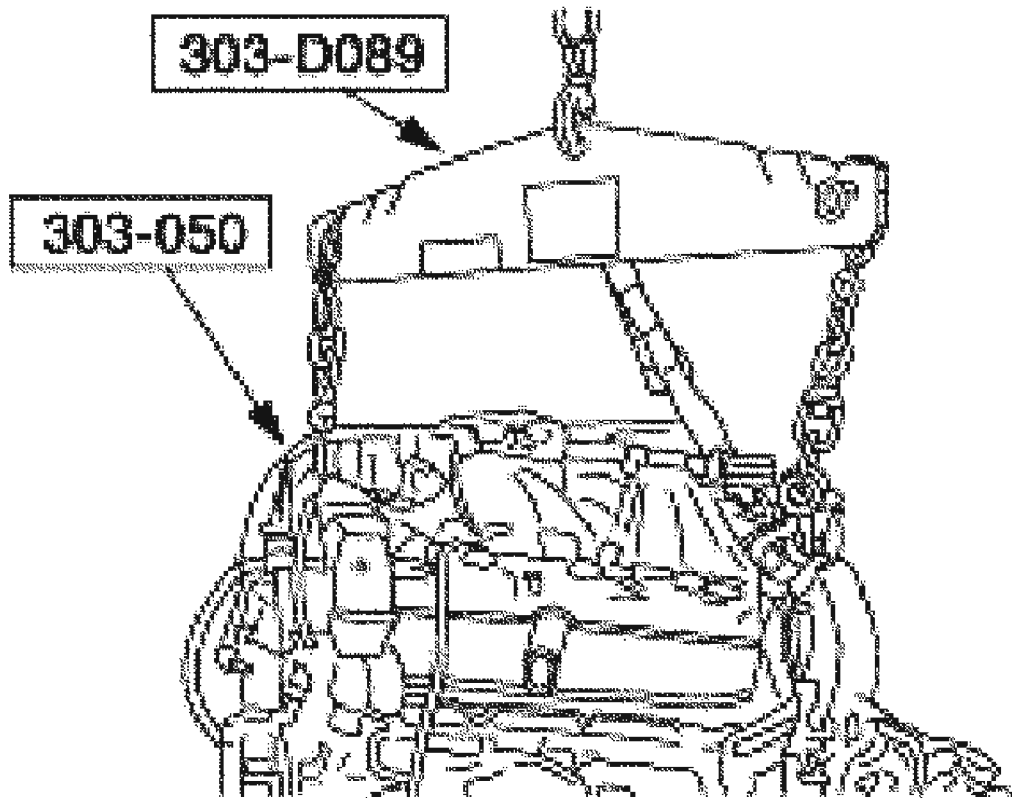
G02739435

**Fig. 262: Removing Bolts And Positioning Halfshaft Support Bracket Out Of Way**  
Courtesy of FORD MOTOR CO.

**NOTE:** Once the engine is supported by the engine crane, remove the bracket supporting the front of the engine.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

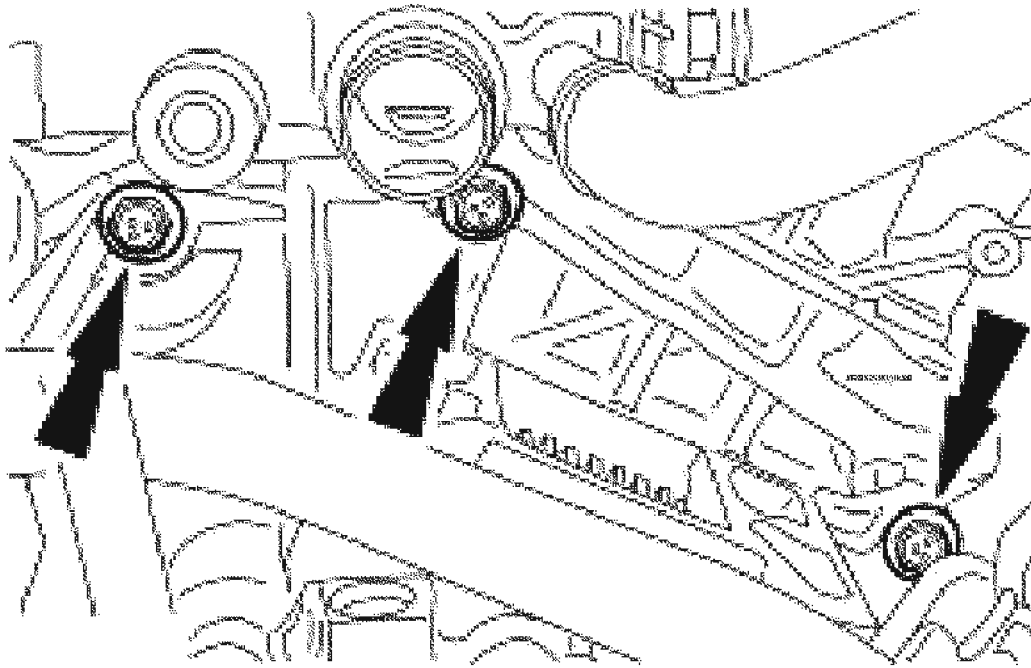


G02739436

**Fig. 263: Removing Powertrain From Universal Powertrain Lift Using Special Tool**

**Courtesy of FORD MOTOR CO.**

68. Using the special tools, remove the powertrain from the universal powertrain lift.
69. Remove the six transaxle bolts.



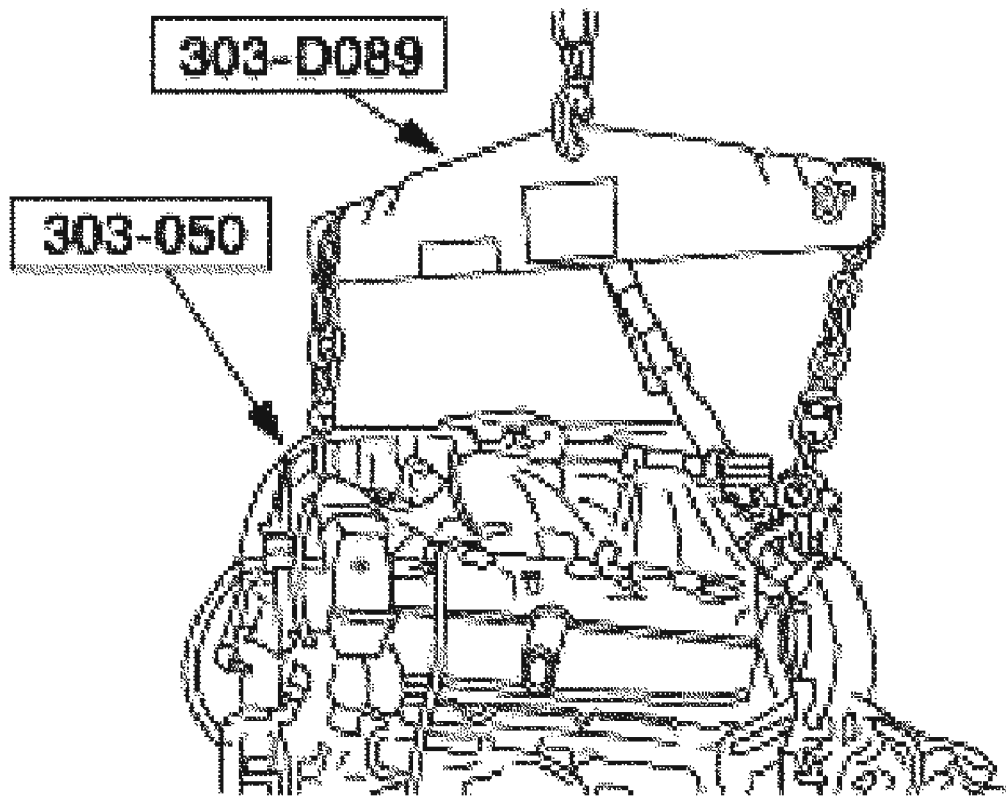
G02739437

**Fig. 264: Removing Transaxle Bolts**  
Courtesy of FORD MOTOR CO.

70. Using the special tools, remove the engine from the transaxle.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739438

**Fig. 265: Removing Engine From Transaxle**  
Courtesy of FORD MOTOR CO.

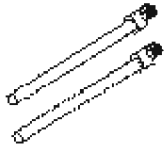

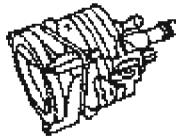



## DISASSEMBLY

### ENGINE



## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

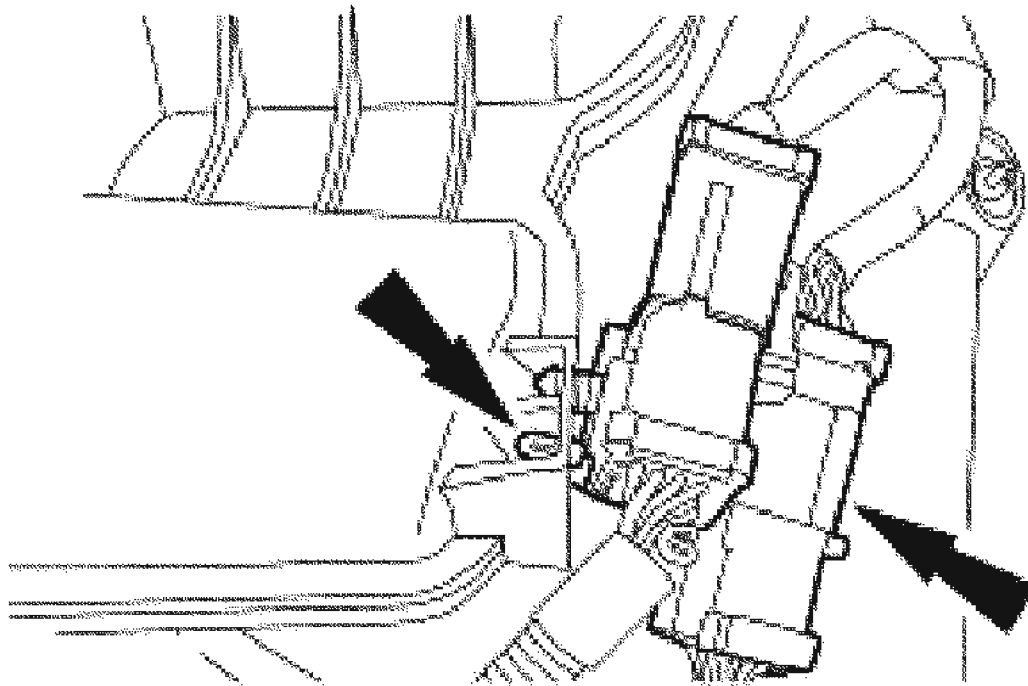
	Installer, Connecting Rod 303-462 (T94P-6136-AH)
	Remover, Crankshaft Vibration Damper 303-009 (T58P-6316-D)
	Cylinder Ridge Reamer 303-016 (T64L-6011-EA)
	Holding Tool, Flywheel 303-101 (T74P-6316-A)
	Remover, Oil Seal 303-409 (T92C-6700CH)
	Service Set, Water Pump Pulley 303-S455 (T94P-6312-AH)

G02739438

**Fig. 266: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

All vehicles

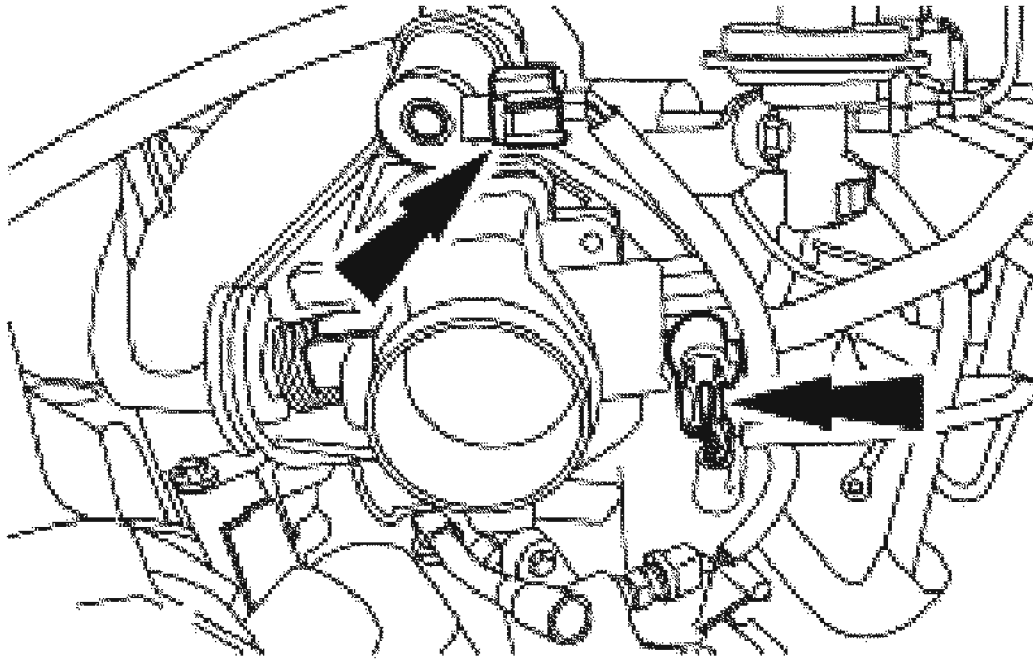
1. Separate the engine control sensor wiring connectors from the upper intake manifold.



**G02739440**

**Fig. 267: Separating Engine Control Sensor Wiring Connectors**  
**Courtesy of FORD MOTOR CO.**

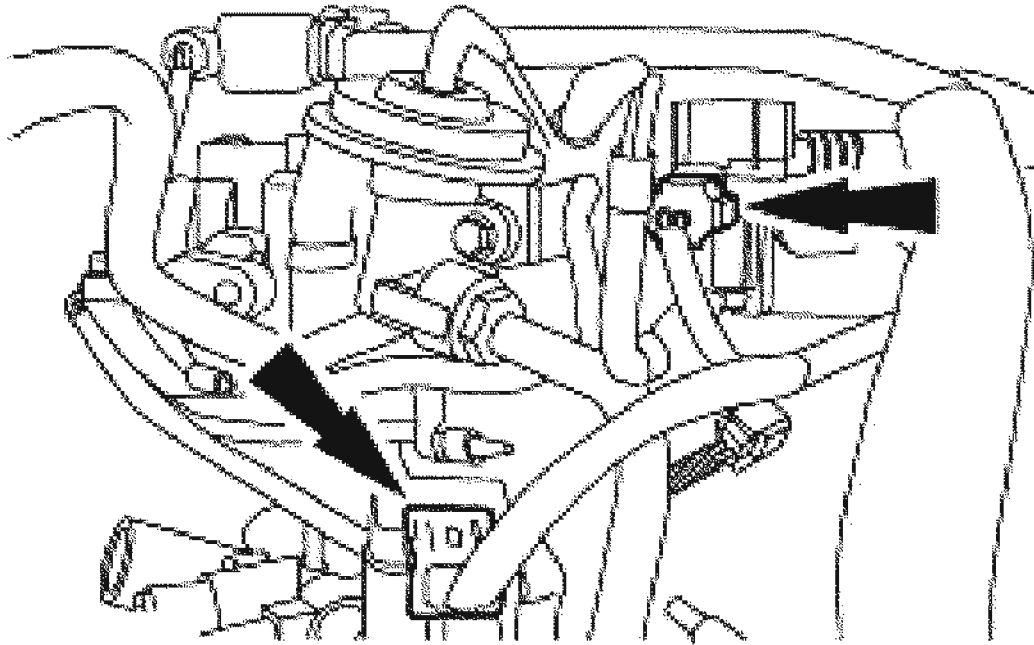
2. Disconnect the idle air control (IAC) valve and the throttle position (TP) sensor electrical connectors.



G02739441

**Fig. 268: Disconnecting Idle Air Control (IAC) Valve And Throttle Position (TP) Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

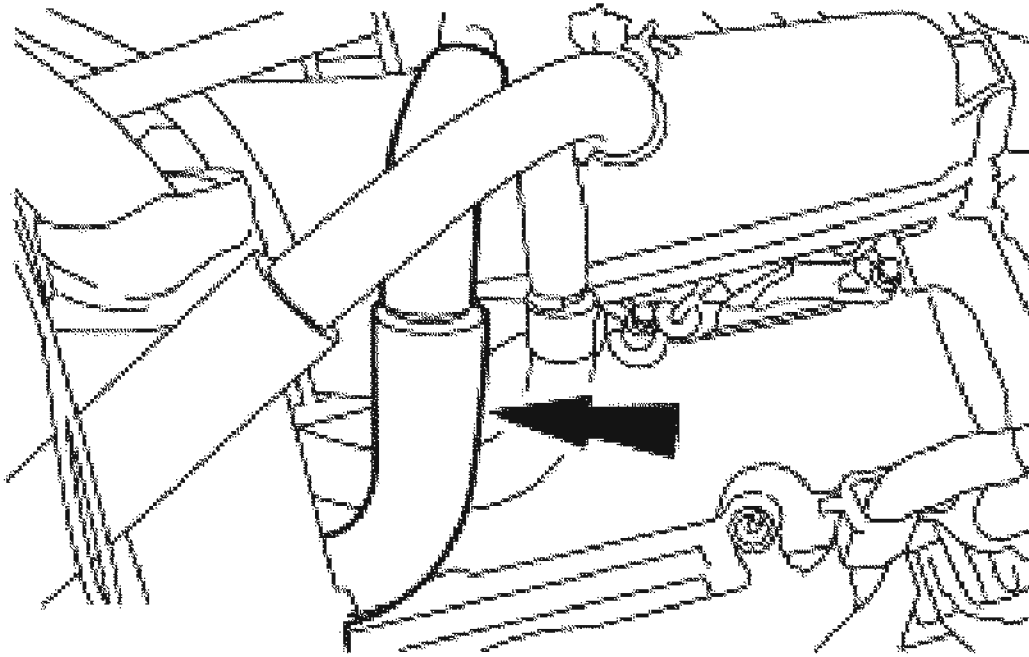
3. Disconnect the exhaust gas recirculation (EGR) vacuum regulator solenoid and the differential pressure feedback EGR system electrical connectors.



G02739442

**Fig. 269: Disconnecting Exhaust Gas Recirculation (EGR) Vacuum Regulator And Differential Pressure Feedback EGR System Electrical Connectors**  
Courtesy of FORD MOTOR CO.

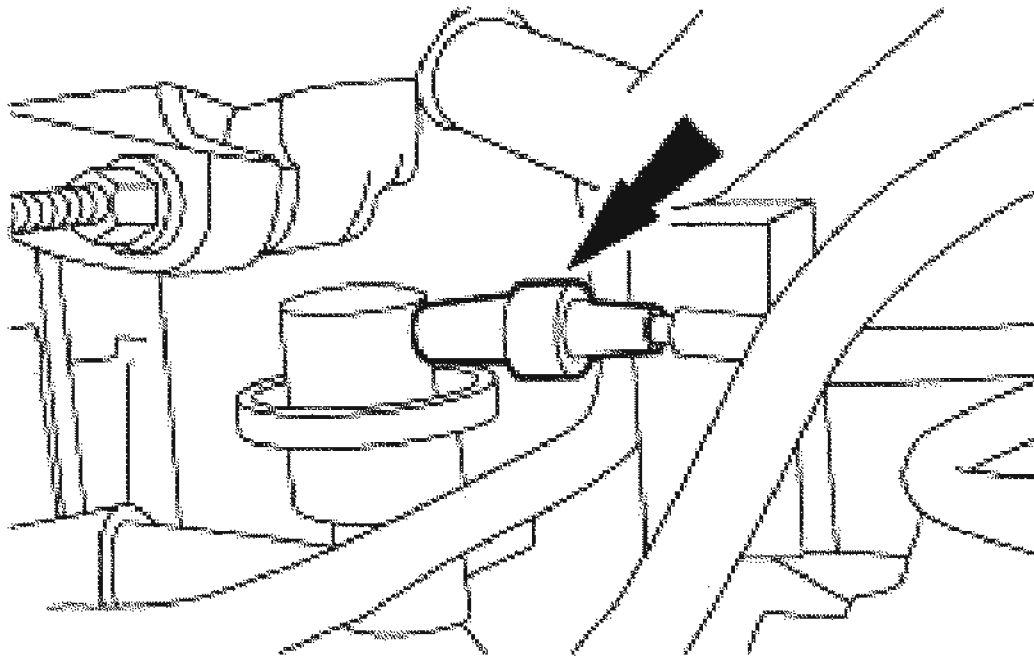
4. Remove the positive crankcase ventilation (PCV) tube.



G02739443

**Fig. 270: Removing Positive Crankcase Ventilation (PCV) Tube**  
Courtesy of FORD MOTOR CO.

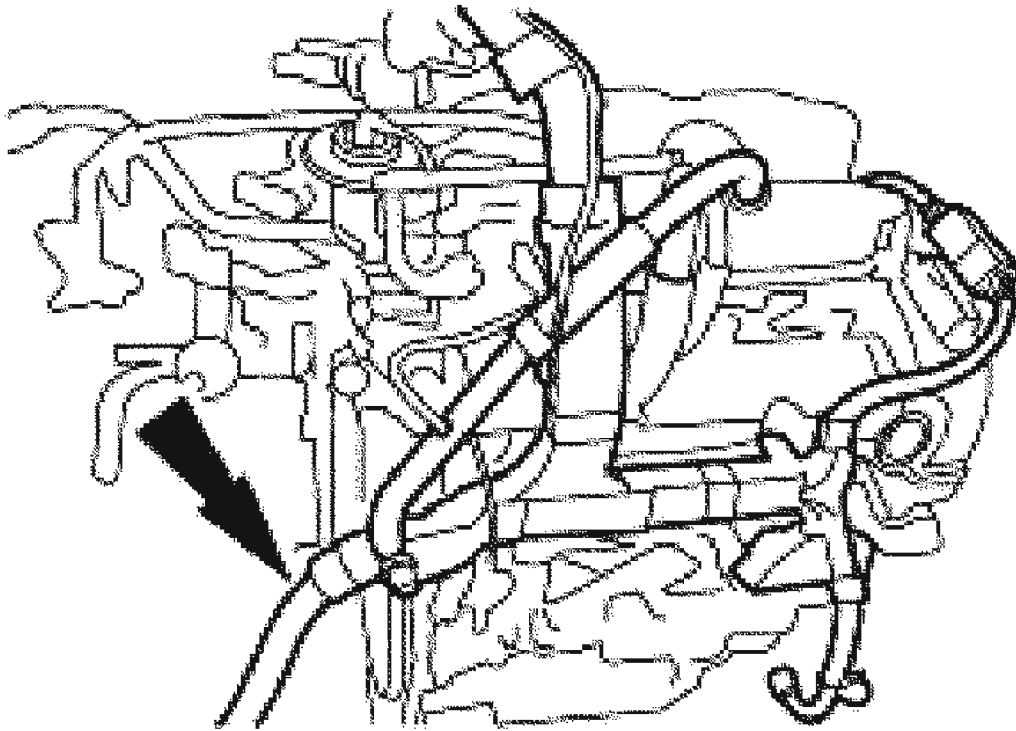
5. Disconnect the vacuum hose from the fuel pressure regulator.



G02739444

**Fig. 271: Disconnecting Vacuum Hose From Fuel Pressure Regulator**  
Courtesy of FORD MOTOR CO.

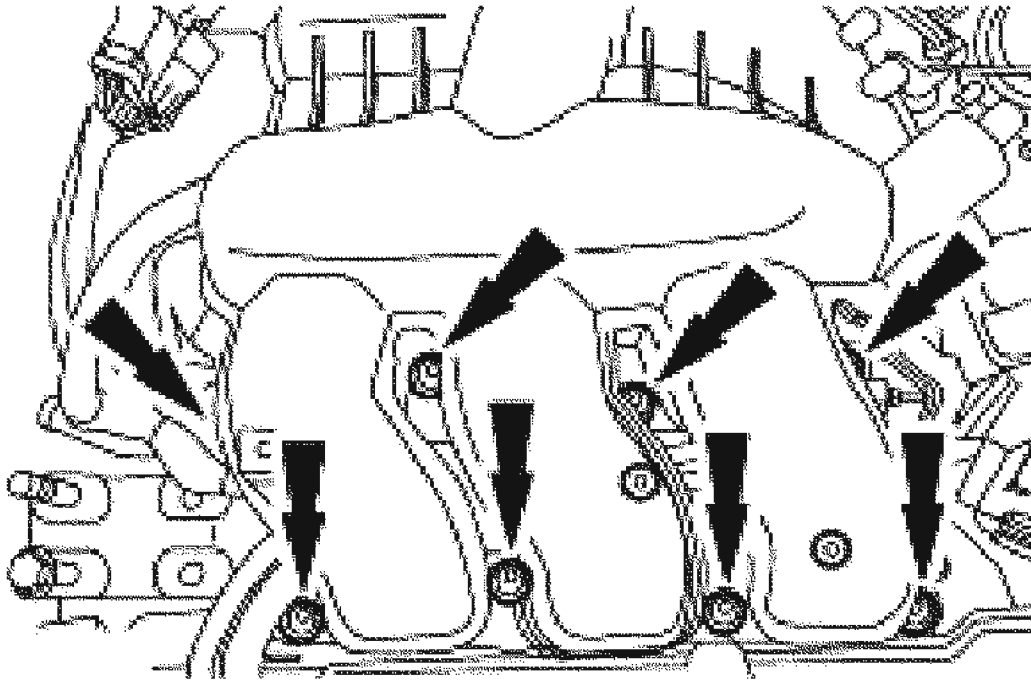
6. Disconnect and remove the engine control wire harness.



G02739445

**Fig. 272: Disconnecting And Removing Engine Control Wire Harness**  
Courtesy of FORD MOTOR CO.

7. Remove the bolts and upper intake manifold.

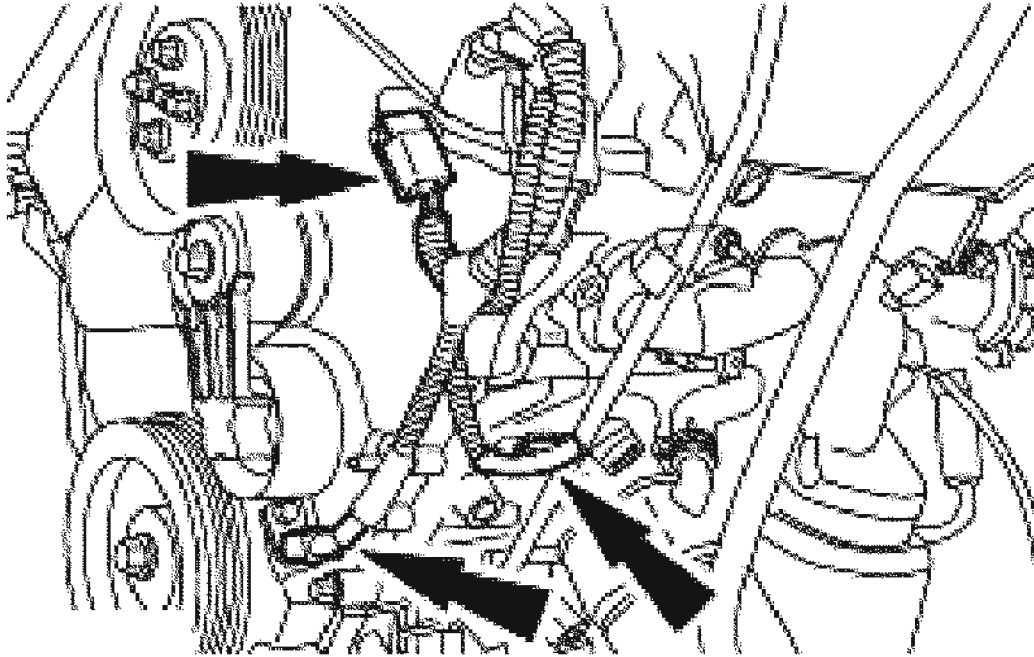


G02739446

**Fig. 273: Removing Bolts And Upper Intake Manifold**  
Courtesy of FORD MOTOR CO.

8. Disconnect the crankshaft and camshaft position sensor electrical connectors.



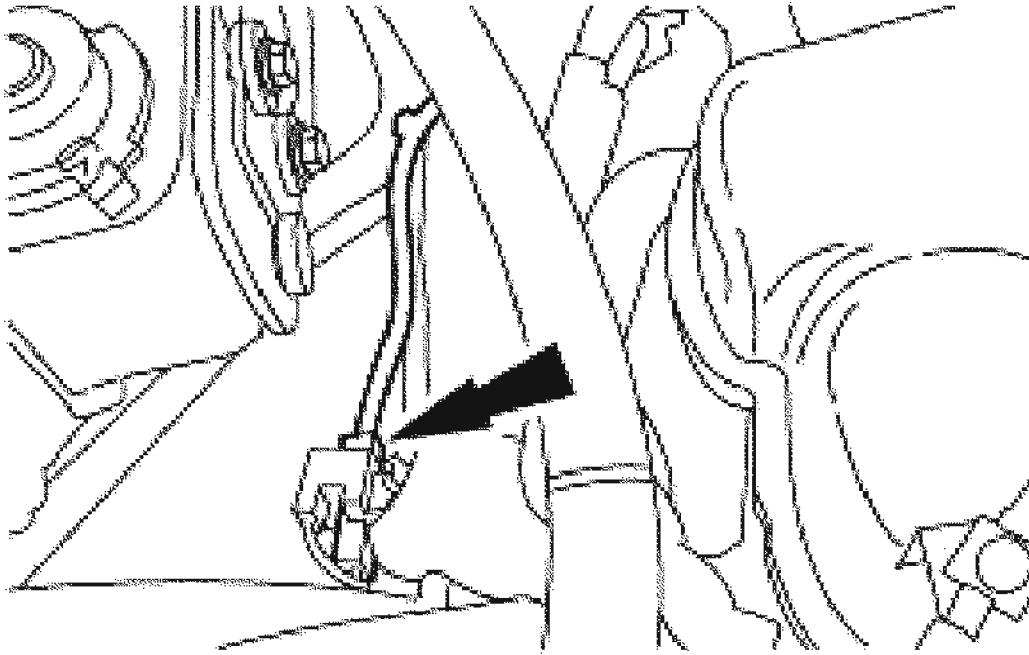


G02739447

**Fig. 274: Disconnecting Crankshaft And Camshaft Position Sensor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

9. Disconnect the radio ignition interference capacitor electrical connectors.

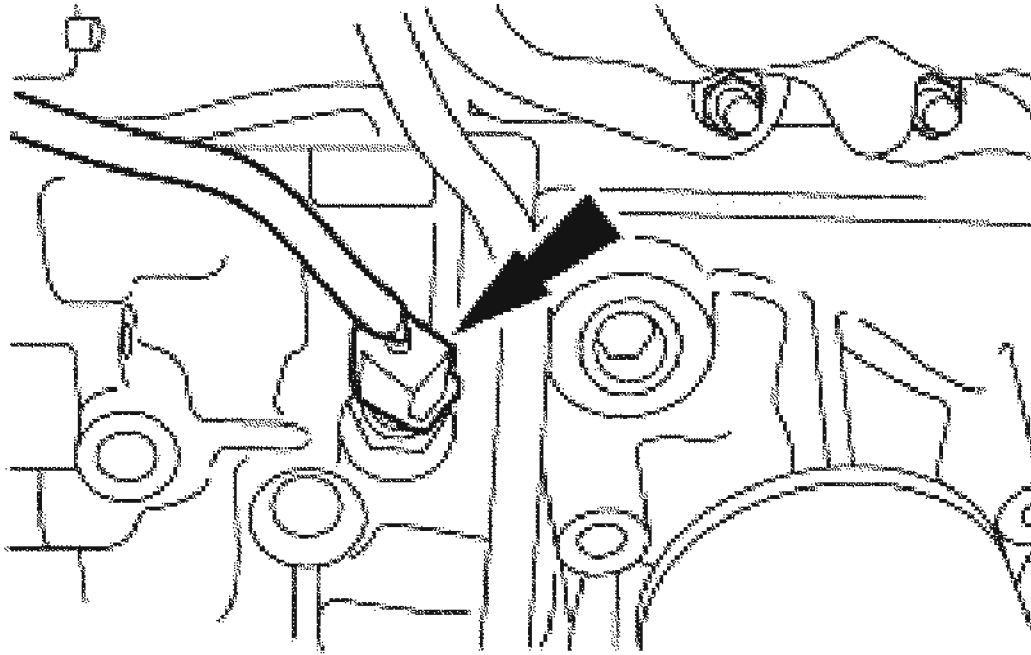


G02739448

**Fig. 275: Disconnecting Radio Ignition Interference Capacitor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

10. Disconnect the engine coolant temperature (ECT) sensor and the oil pressure switch.

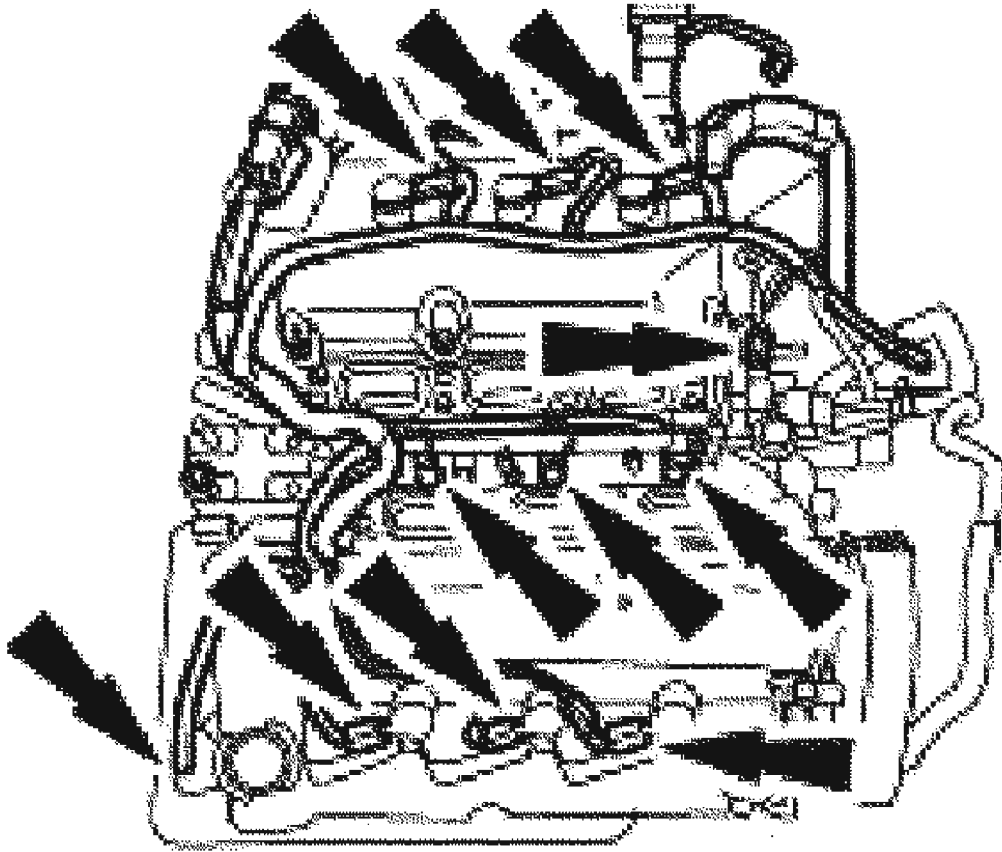


G02739449

**Fig. 276: Disconnecting Engine Coolant Temperature (ECT) Sensor And Oil Pressure Switch**

**Courtesy of FORD MOTOR CO.**

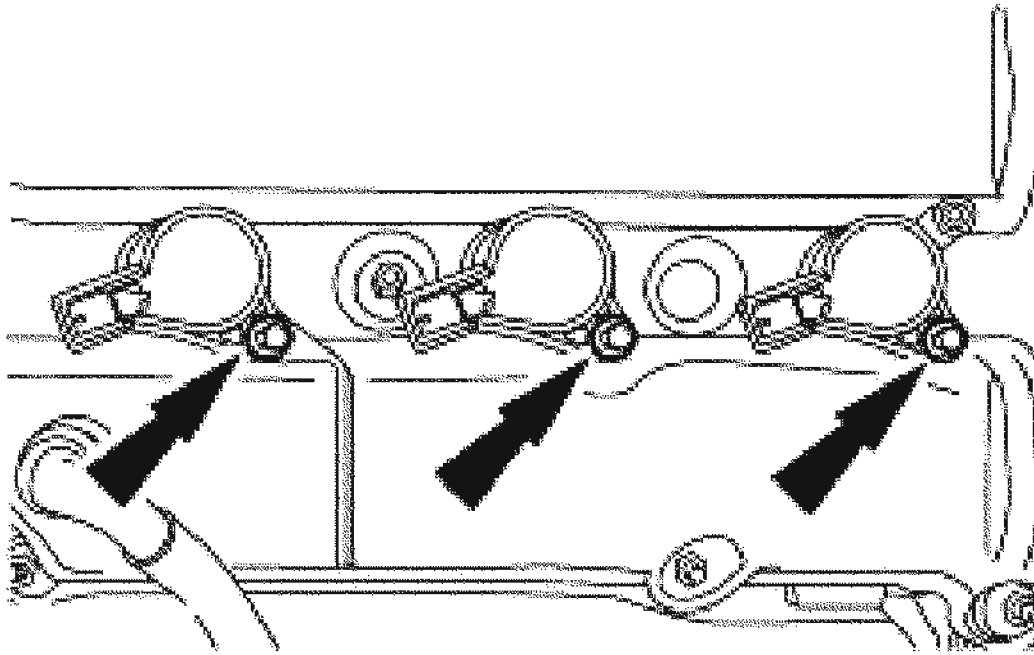
11. Disconnect the remaining electrical connectors and harness retainers and remove the harness.



G02739450

**Fig. 277: Disconnecting Remaining Electrical Connectors And Harness Retainers**  
Courtesy of FORD MOTOR CO.

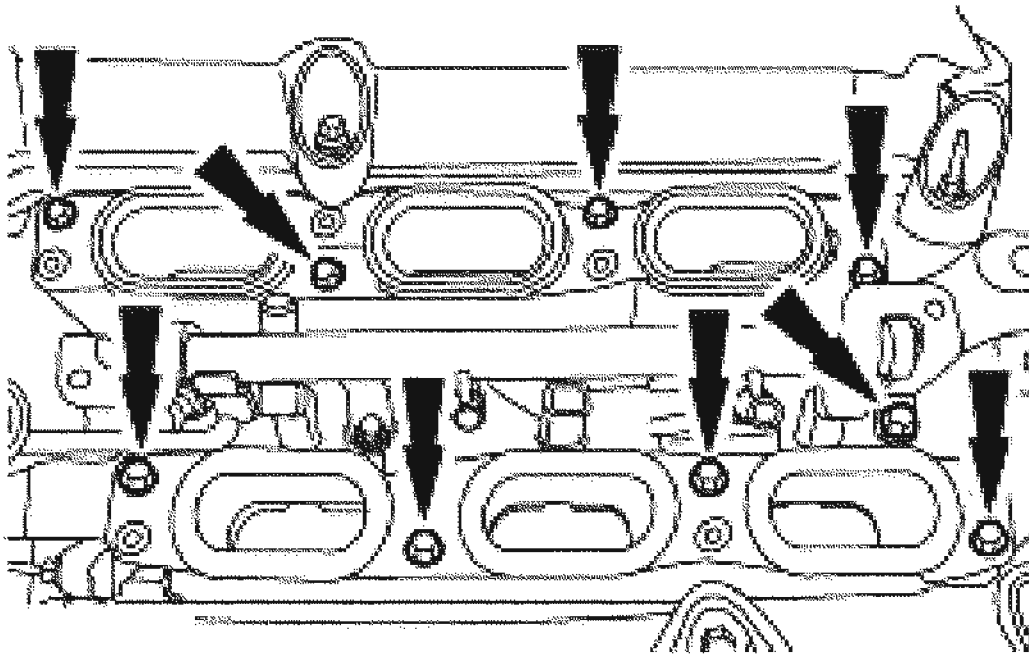
**CAUTION:** When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.



G02739451

**Fig. 278: Removing Bolts And Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

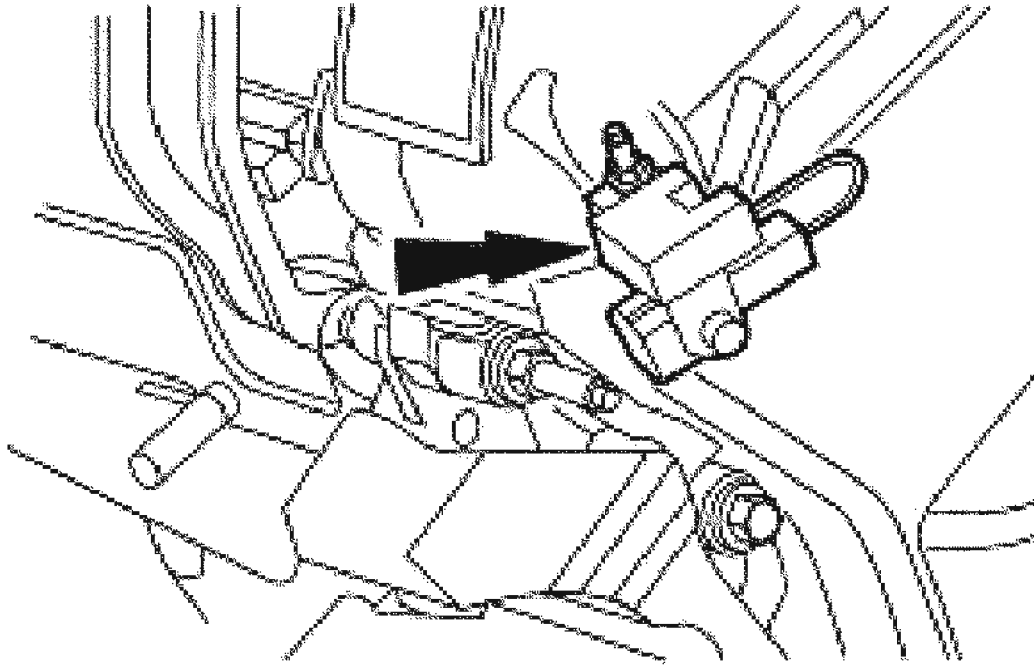
12. Remove the bolts and the six coil-on-plugs.
13. Remove the lower intake manifold and discard the gaskets.



G02739452

**Fig. 279: Removing Lower Intake Manifold**  
Courtesy of FORD MOTOR CO.

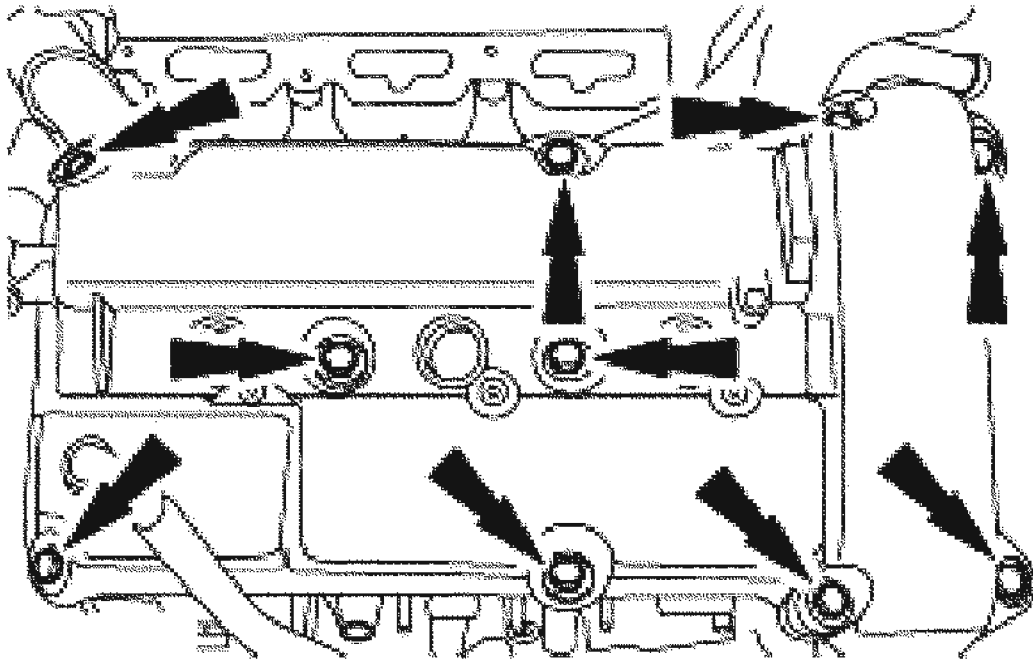
14. Remove the nut and the radio interference capacitors.



G02739453

**Fig. 280: Removing Nut And Radio Interference Capacitors**  
Courtesy of FORD MOTOR CO.

15. Remove the RH valve cover.
  - Remove and discard the gasket.

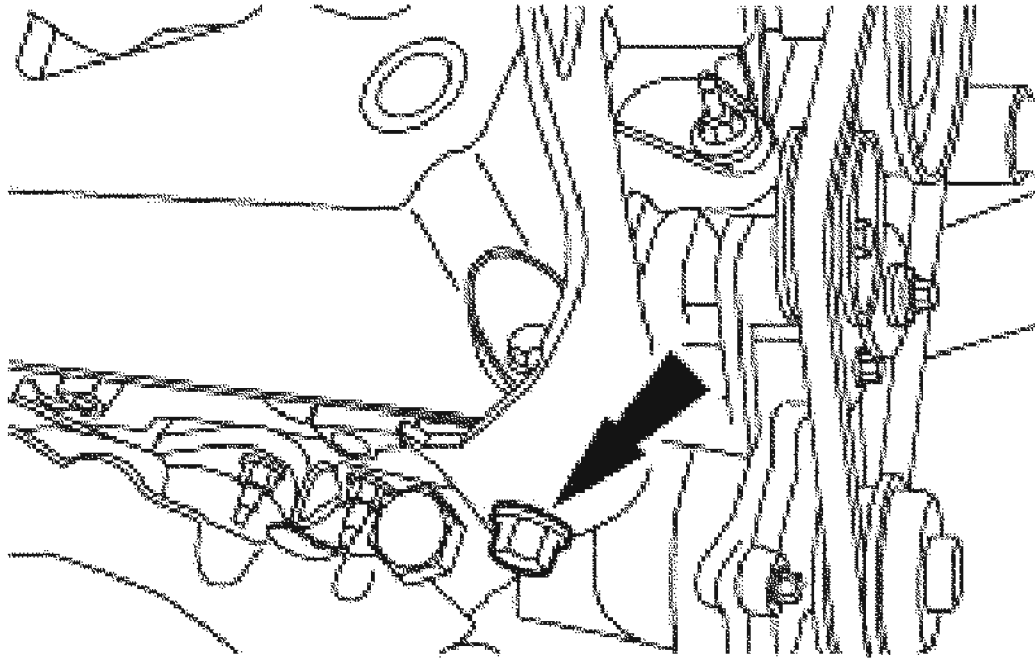


G02739454

**Fig. 281: Removing RH Valve Cover**  
Courtesy of FORD MOTOR CO.

16. Remove the engine lift bracket.

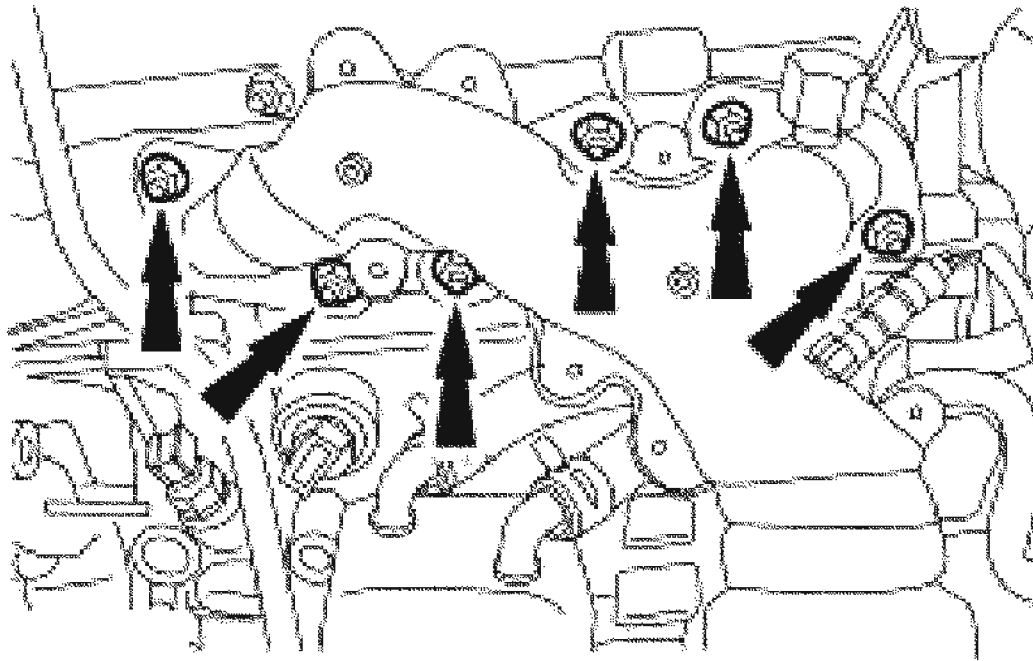




G02739455

**Fig. 282: Removing Engine Lift Bracket**  
Courtesy of FORD MOTOR CO.

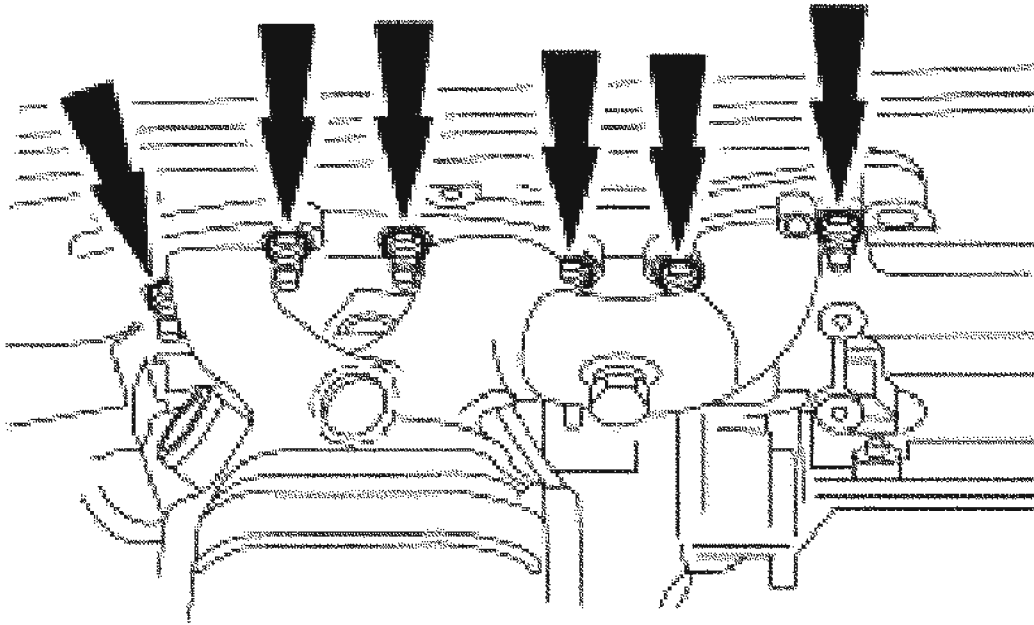
17. Remove the nuts, the LH exhaust manifold and the gasket. Discard the gasket.



G02739456

**Fig. 283: Removing Nuts, LH Exhaust Manifold And Gasket**  
Courtesy of FORD MOTOR CO.

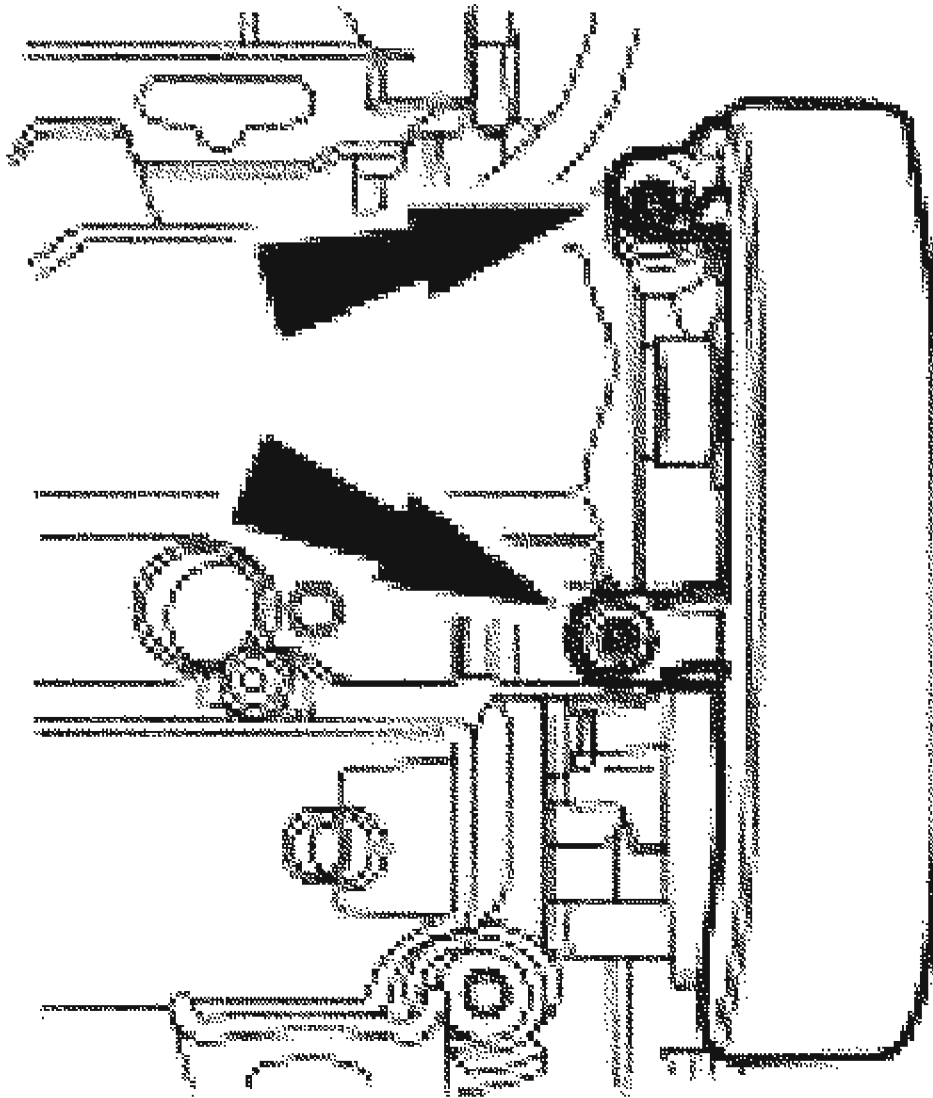
18. Remove the nuts, the RH exhaust manifold and the gasket. Discard the gasket.



G02739457

**Fig. 284: Removing Nuts, RH Exhaust Manifold And Gasket**  
Courtesy of FORD MOTOR CO.

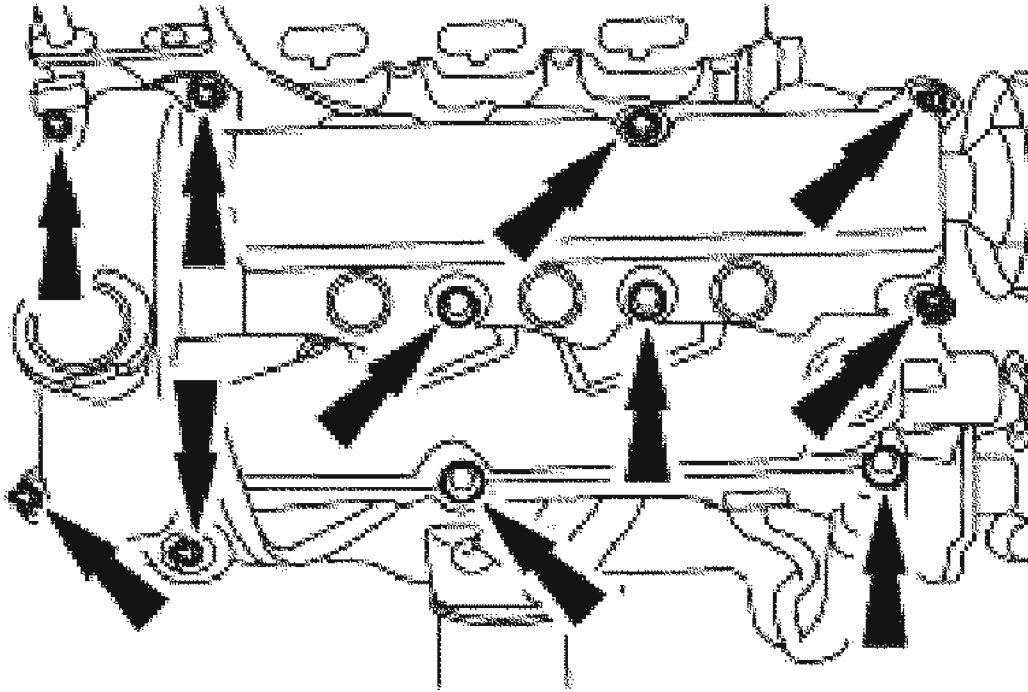
19. Remove the water pump belt cover.



G02739458

**Fig. 285: Removing Water Pump Belt Cover**  
Courtesy of FORD MOTOR CO.

20. Remove the LH valve cover.
  - Remove and discard the gasket.

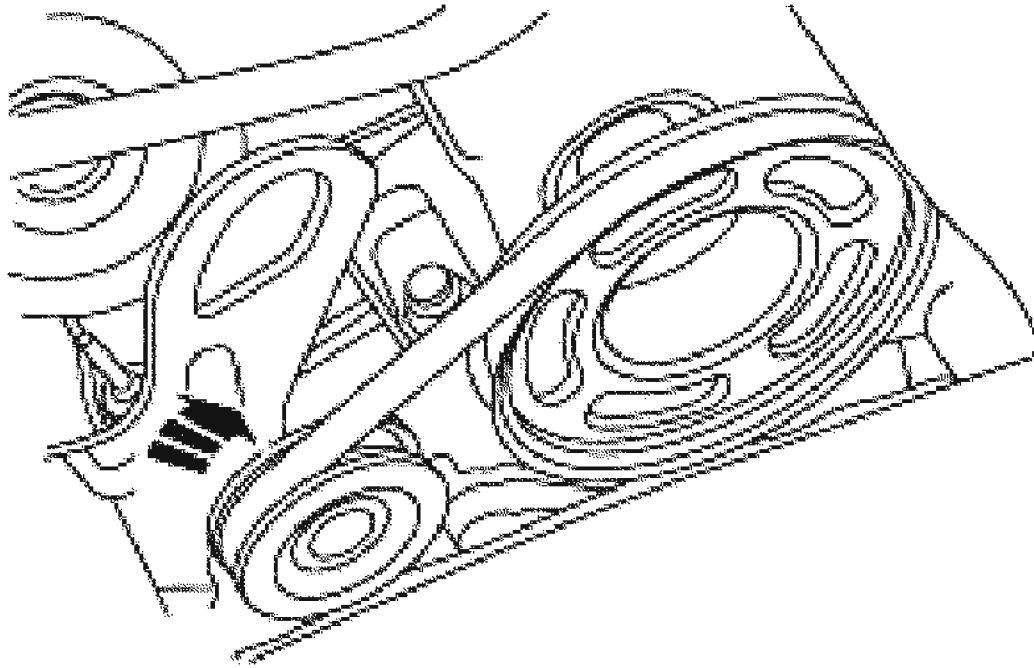


G02739459

**Fig. 286: Removing LH Valve Cover**  
Courtesy of FORD MOTOR CO.

**Vehicles equipped with water pump belt tensioner**

21. Rotate the belt tensioner clockwise and remove the water pump belt.

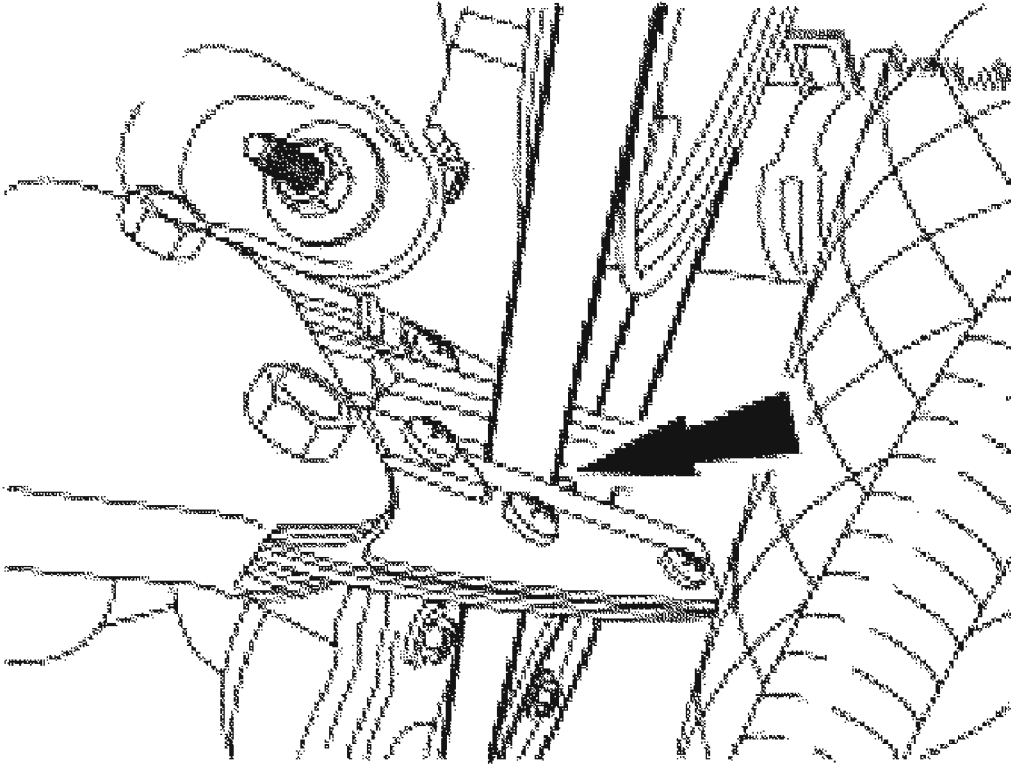


G02739460

**Fig. 287: Rotating Belt Tensioner Clockwise**  
Courtesy of FORD MOTOR CO.

**Vehicles not equipped with water pump belt tensioner**

22. Cut and remove the water pump belt. Discard the belt.

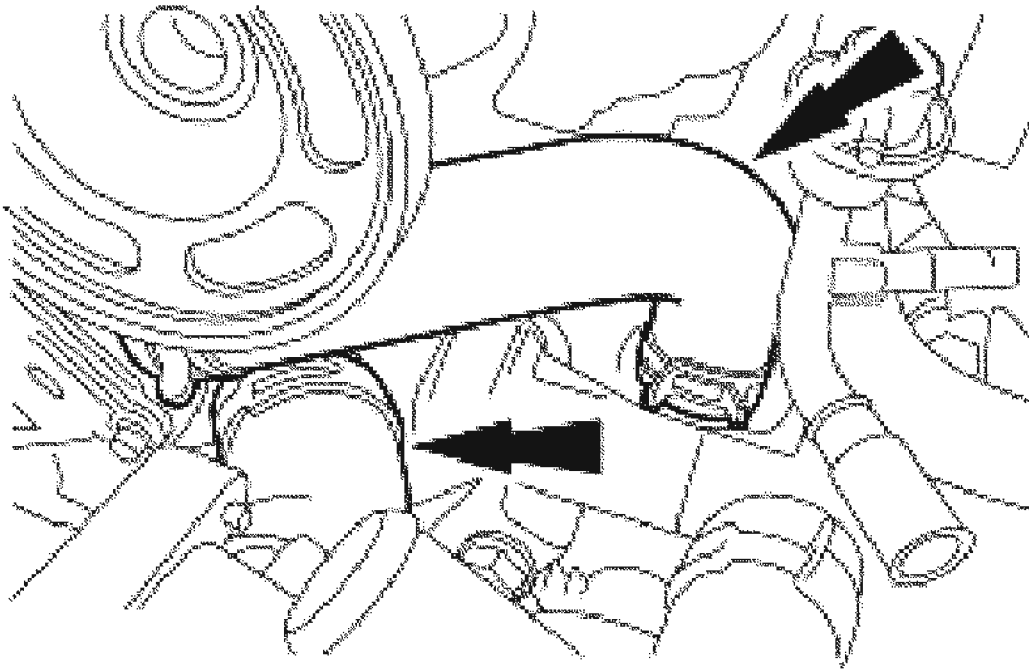


G02739461

**Fig. 288: Removing Water Pump Belt**  
Courtesy of FORD MOTOR CO.

**All vehicles**

23. Disconnect the hoses.

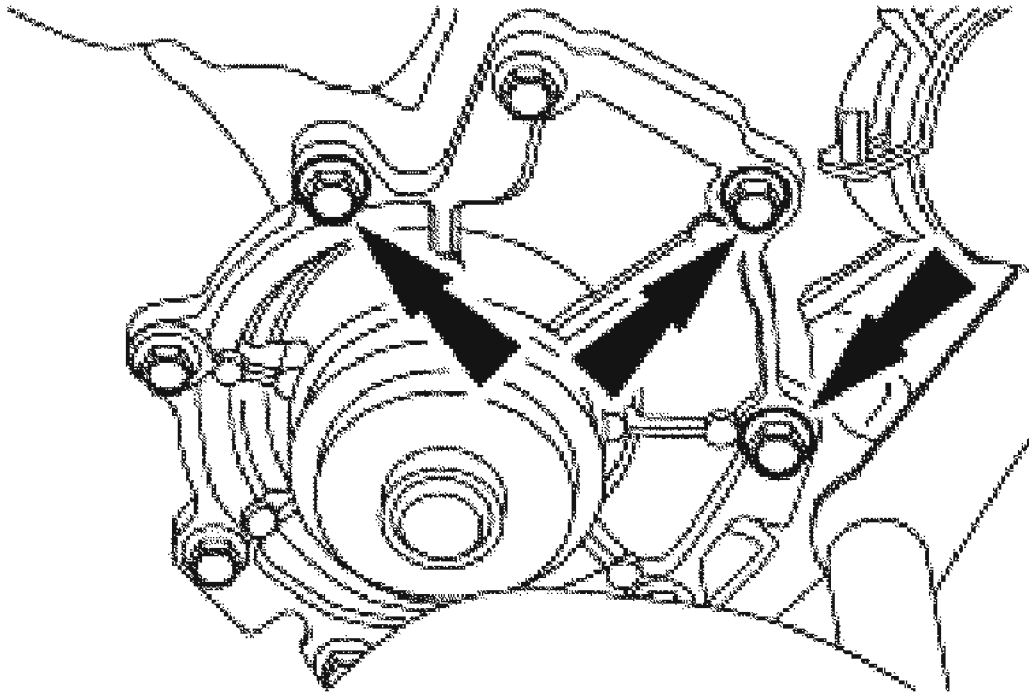


G02739462

**Fig. 289: Disconnecting Hoses**  
Courtesy of FORD MOTOR CO.

24. Remove the water pump assembly.

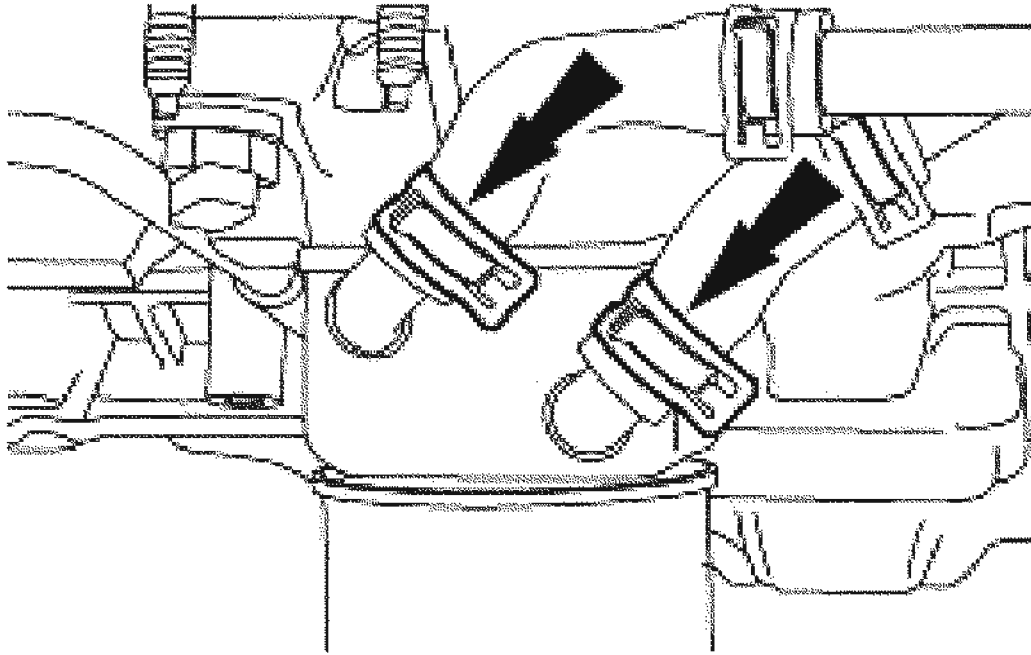




G02739463

**Fig. 290: Removing Water Pump Assembly**  
Courtesy of FORD MOTOR CO.

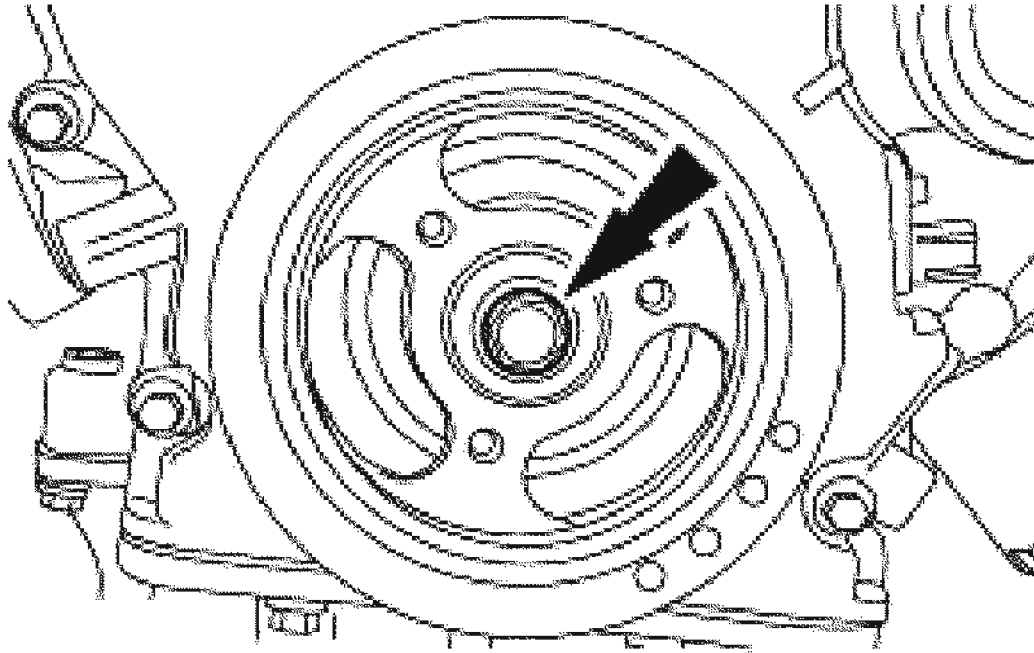
25. Disconnect the coolant hoses at the oil cooler.



G02739464

**Fig. 291: Disconnecting Coolant Hoses**  
Courtesy of FORD MOTOR CO.

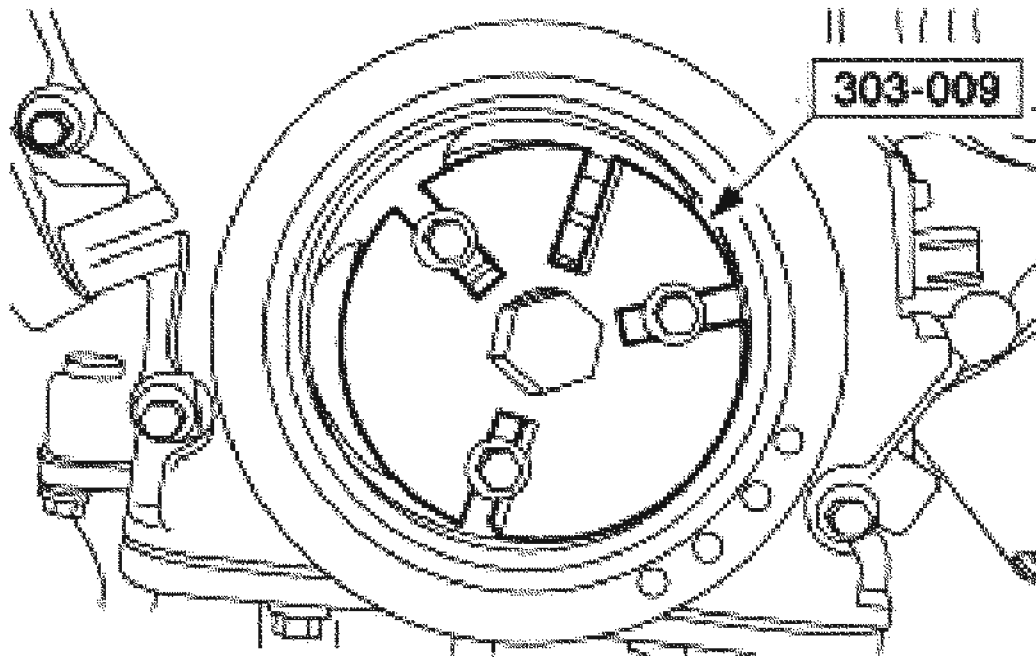
26. Remove the bolt.



G02739465

**Fig. 292: Removing Bolt**  
Courtesy of FORD MOTOR CO.

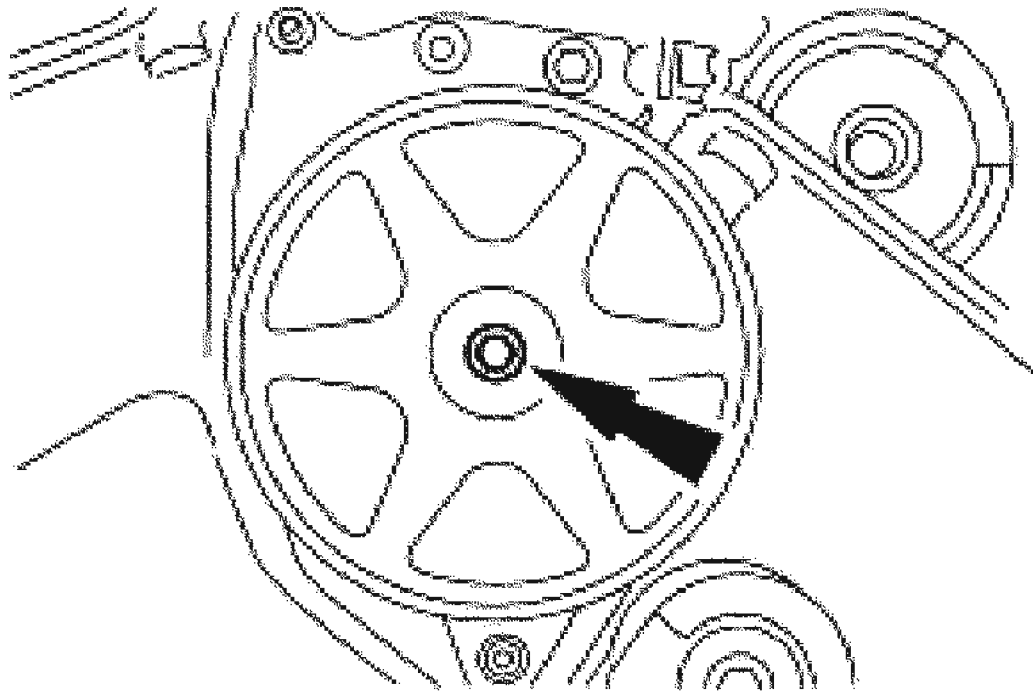
27. Using the special tool, remove the crankshaft damper.



G02739466

**Fig. 293: Removing Crankshaft Damper Using Special Tool**  
Courtesy of FORD MOTOR CO.

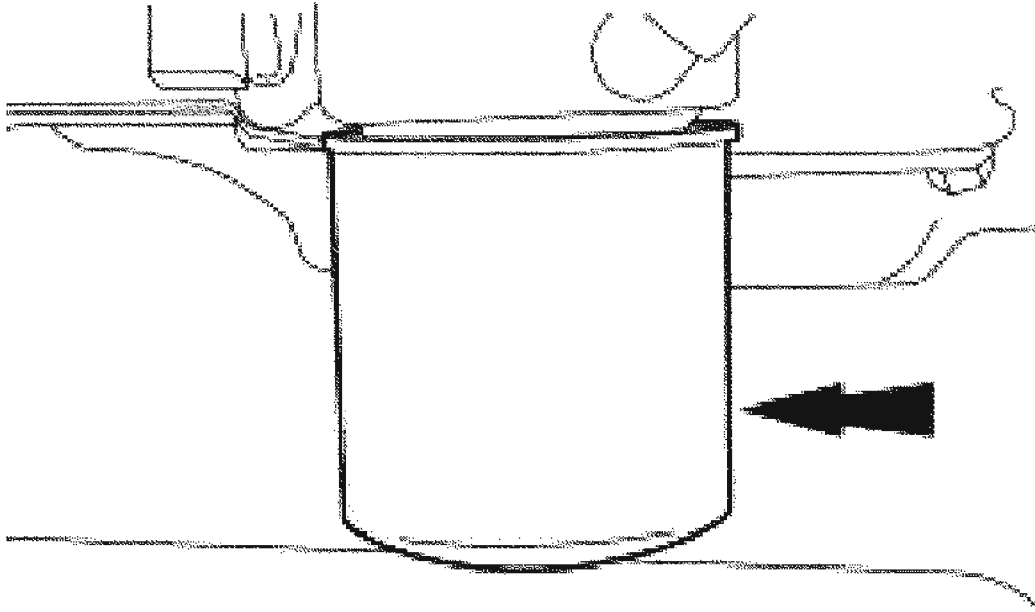
28. Remove the power steering pump pulley.



G02739467

**Fig. 294: Removing Power Steering Pump Pulley**  
Courtesy of FORD MOTOR CO.

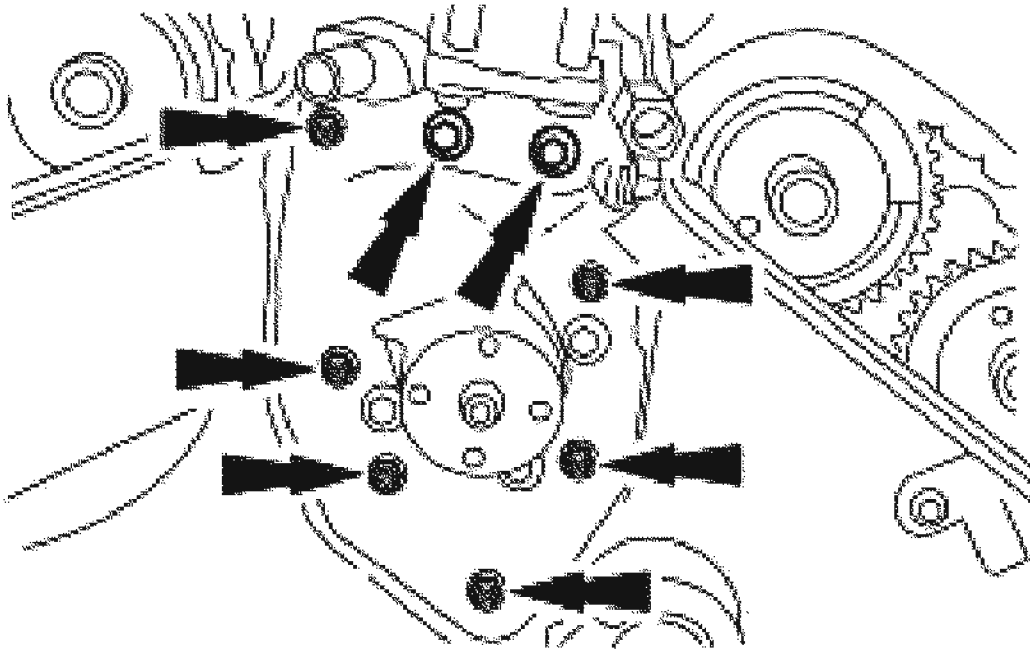
29. Remove and discard the oil filter.



G02739468

**Fig. 295: Removing Oil Filter**  
Courtesy of FORD MOTOR CO.

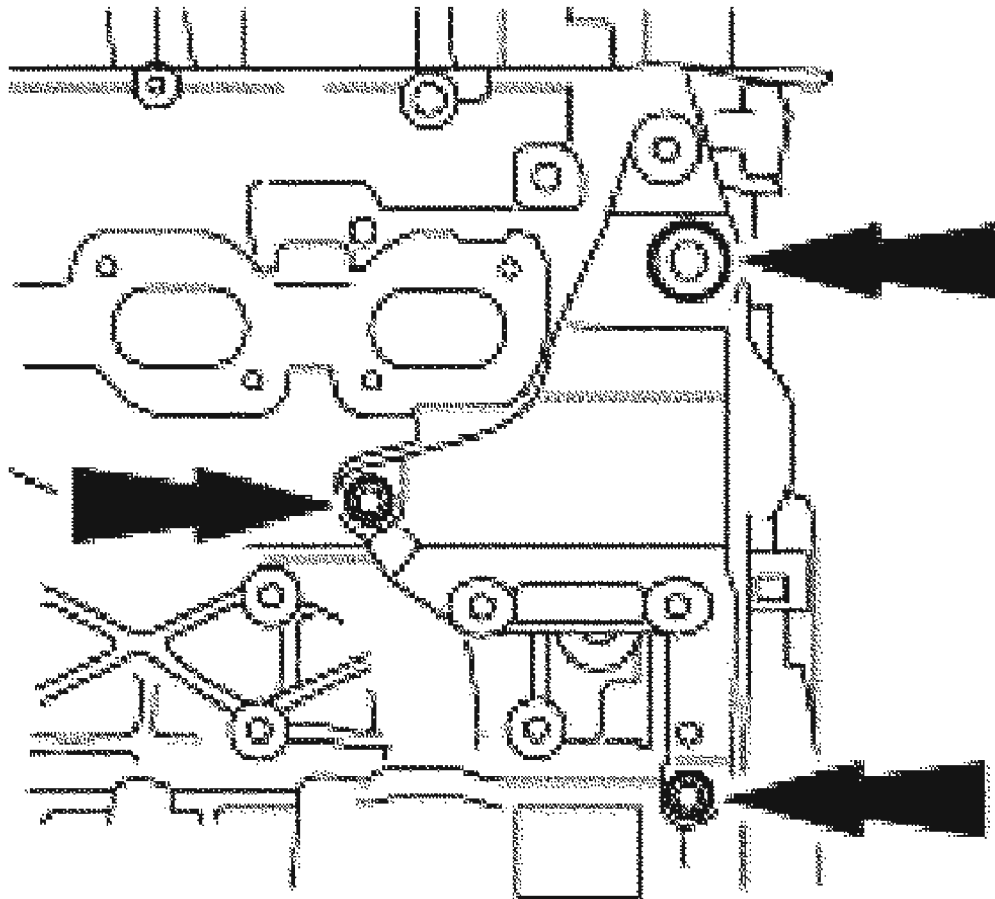
30. Remove the power steering pump.



G02739469

**Fig. 296: Removing Power Steering Pump**  
Courtesy of FORD MOTOR CO.

31. Remove the generator support bracket.

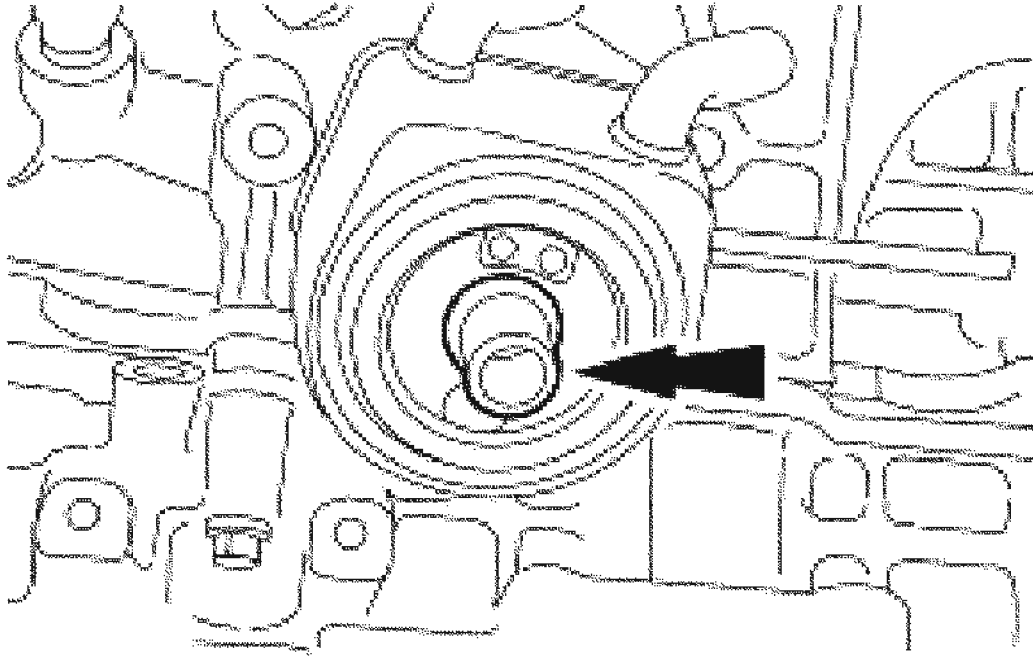


G02739470

**Fig. 297: Removing Generator Support Bracket**  
Courtesy of FORD MOTOR CO.

32. Remove the oil cooler.

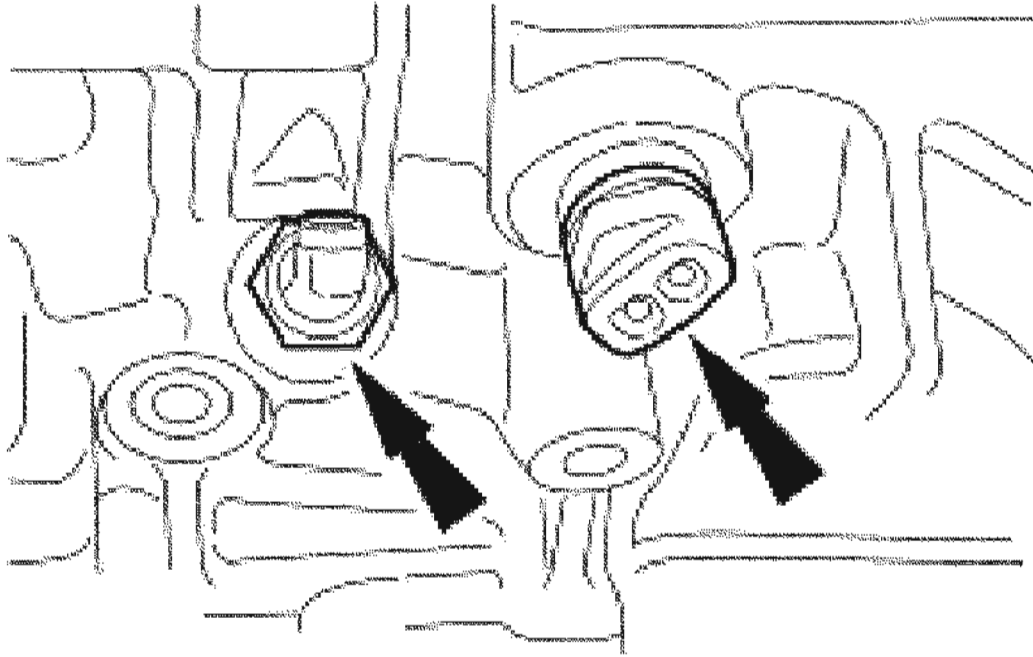




G02739471

**Fig. 298: Removing Oil Cooler**  
Courtesy of FORD MOTOR CO.

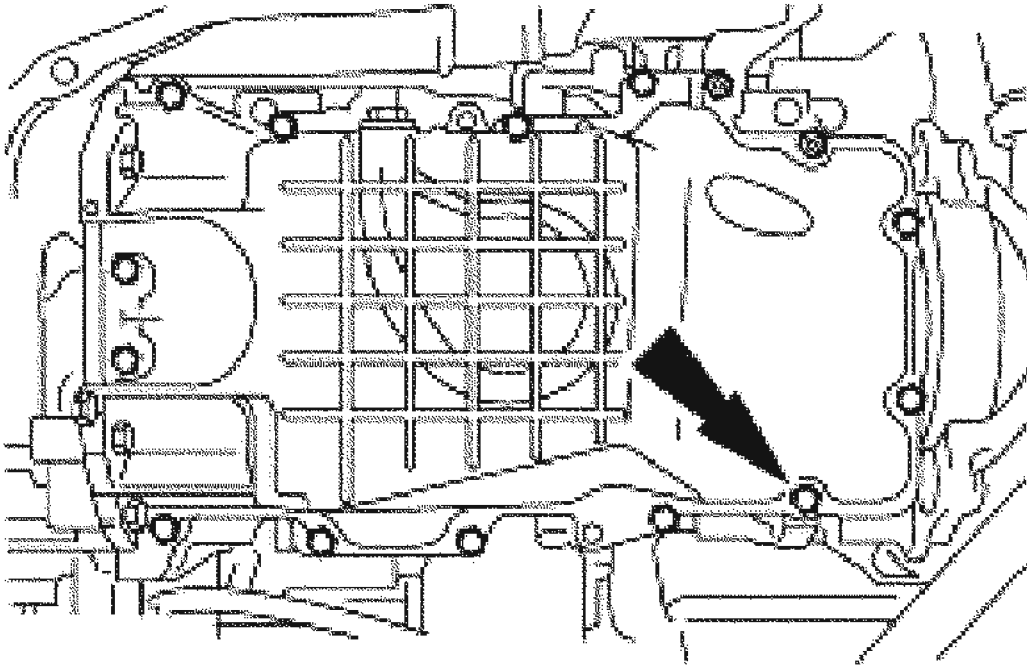
33. Remove the oil pressure sender and the block heater.



G02739472

**Fig. 299: Removing Oil Pressure Sender And Block Heater**  
Courtesy of FORD MOTOR CO.

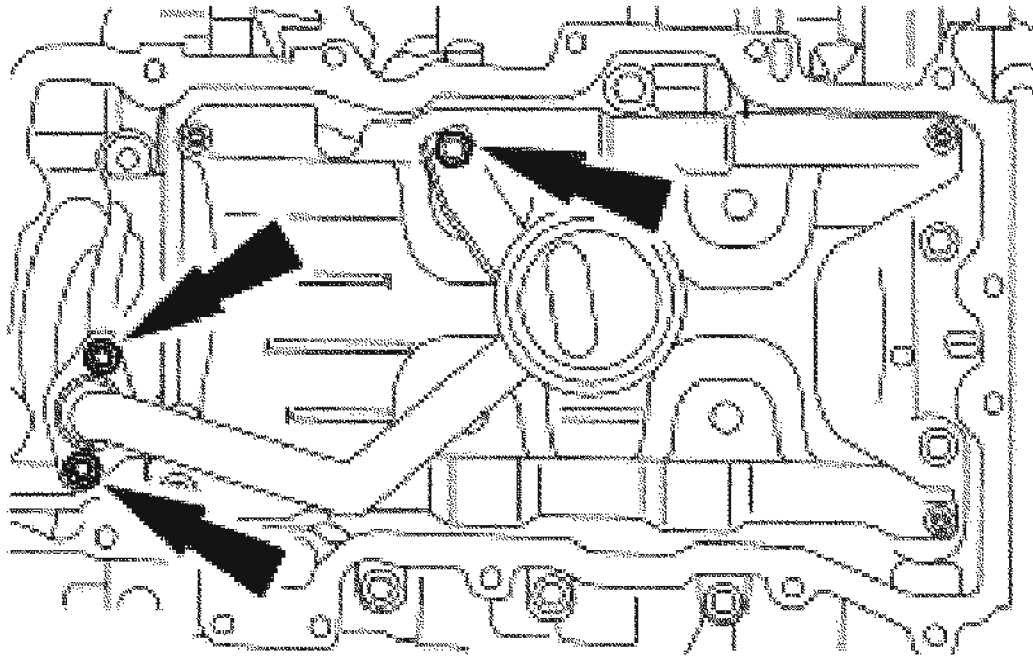
34. Remove the bolts and studs and the oil pan.
  - Discard the gasket.



G02739473

**Fig. 300: Removing Bolts, Studs And Oil Pan**  
Courtesy of FORD MOTOR CO.

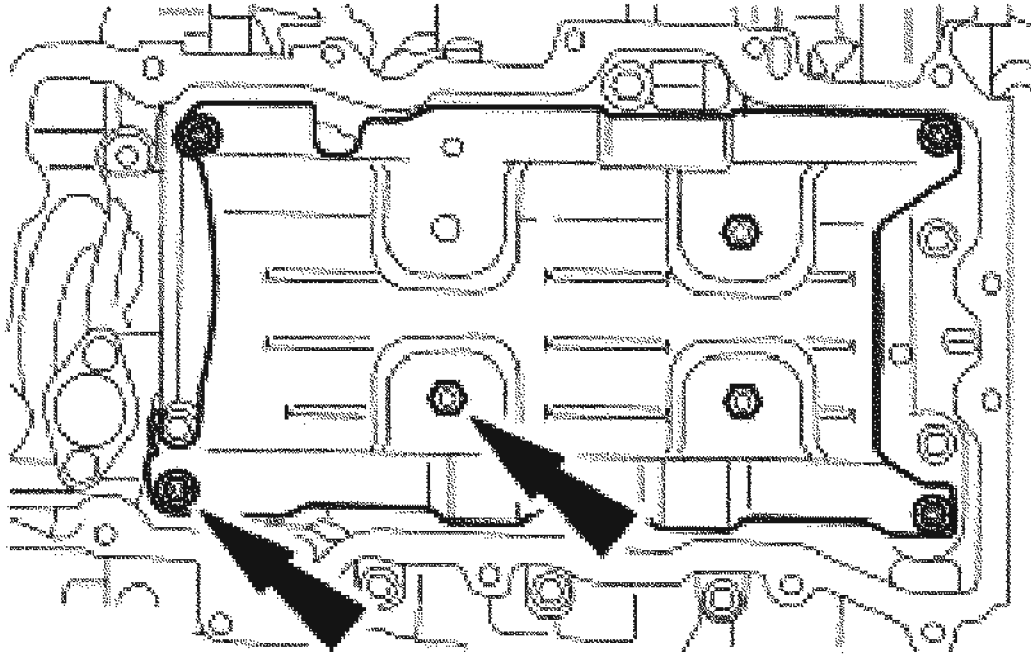
35. Remove the bolts, nut and the oil pump screen and pickup tube.



G02739474

**Fig. 301: Removing Bolts, Nut And Oil Pump Screen**  
Courtesy of FORD MOTOR CO.

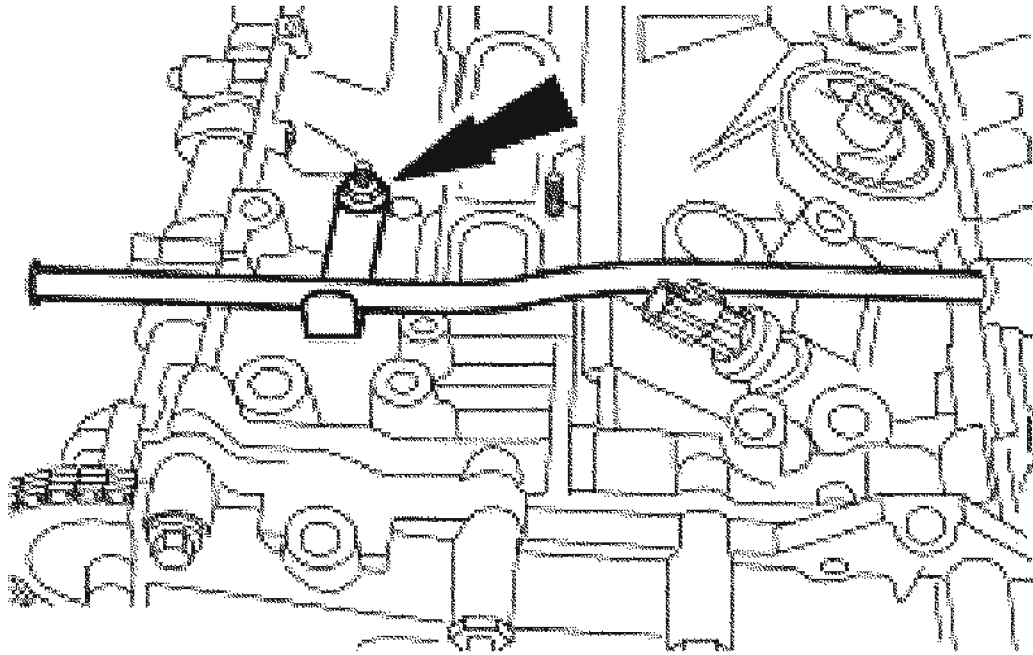
36. Remove the nuts and the oil pan baffle.



G02739475

**Fig. 302: Removing Nuts And Oil Pan Baffle**  
Courtesy of FORD MOTOR CO.

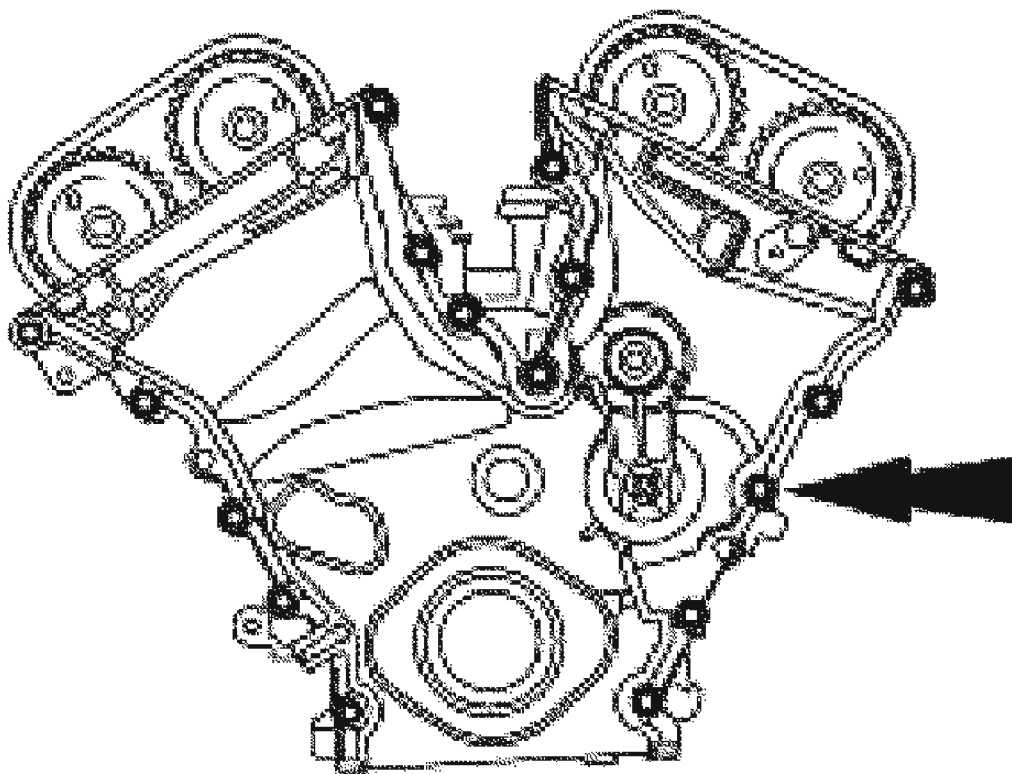
37. Remove the stud bolt and the oil level indicator and tube.



G02739476

**Fig. 303: Removing Stud Bolt And Oil Level Indicator And Tube**  
Courtesy of FORD MOTOR CO.

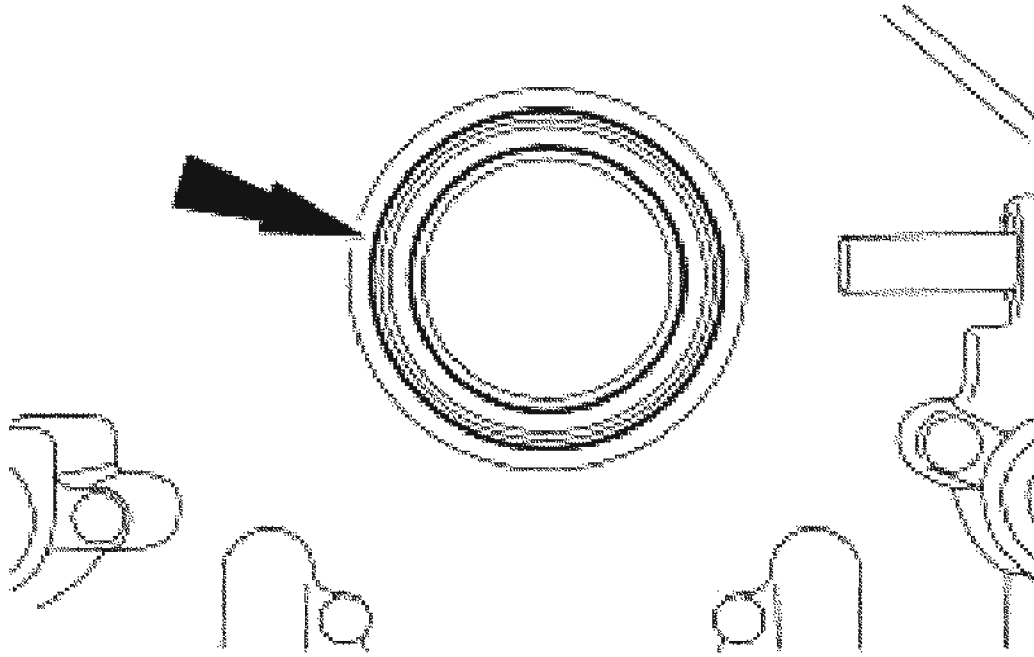
**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surface. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove all traces of sealant.



**G02739477**

**Fig. 304: Removing Bolts, Studs, And Front Cover**  
Courtesy of FORD MOTOR CO.

38. Remove the bolts, studs, and the front cover.
  - Discard the gasket.
39. Remove and discard the crankshaft front seal from the front cover.

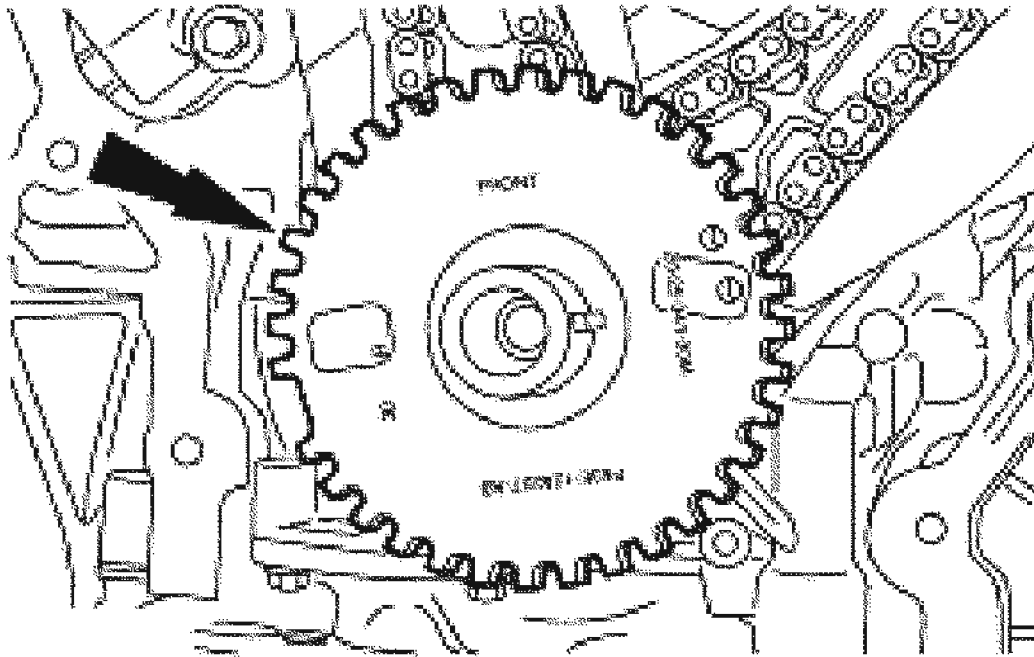


G02739478

**Fig. 305: Removing Crankshaft Front Seal From Front Cover**  
Courtesy of FORD MOTOR CO.

**CAUTION:** This pulse wheel is used in several different engines.  
Install the pulse wheel with the keyway in the slot  
stamped 20-25-34Y-30M (Color Blue).





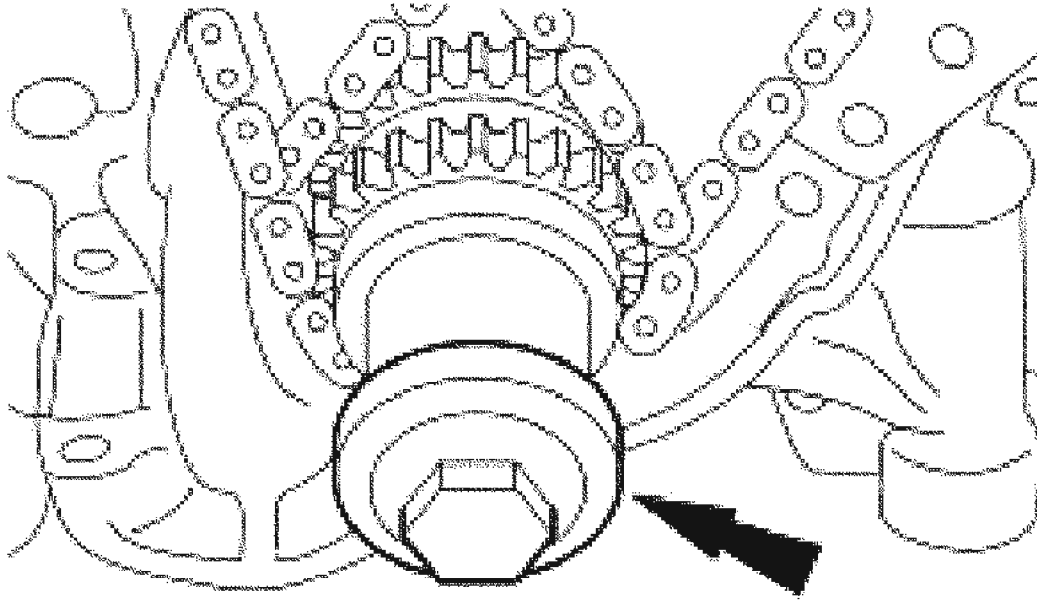
G02739479

**Fig. 306: Removing Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

40. Remove the ignition pulse wheel.
41. Install the damper bolt.

## 2004 Ford Escape

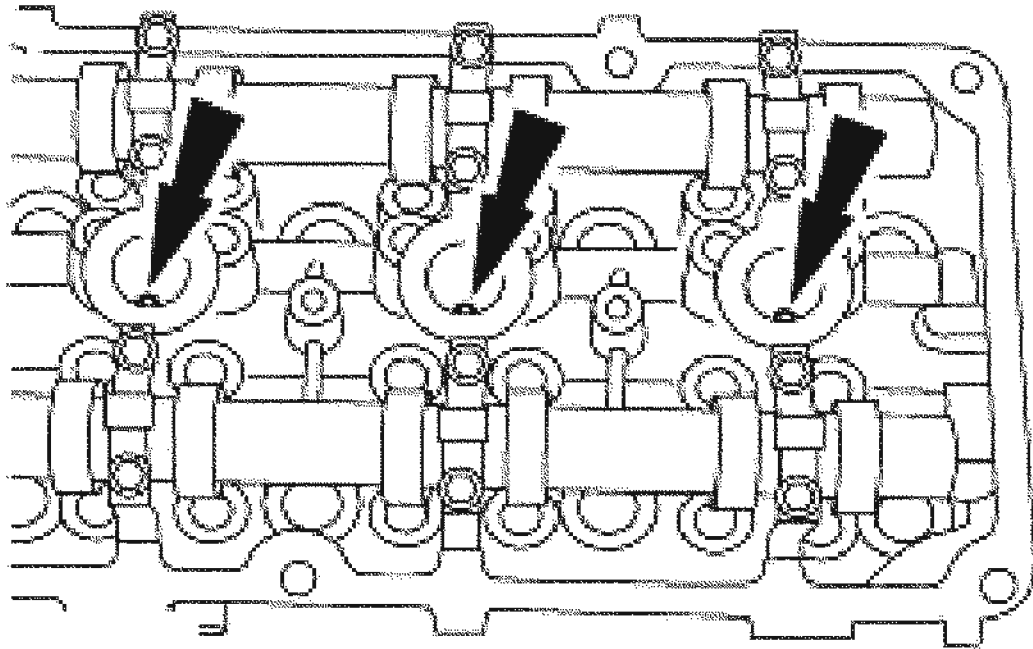
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739480

**Fig. 307: Installing Damper Bolt**  
Courtesy of FORD MOTOR CO.

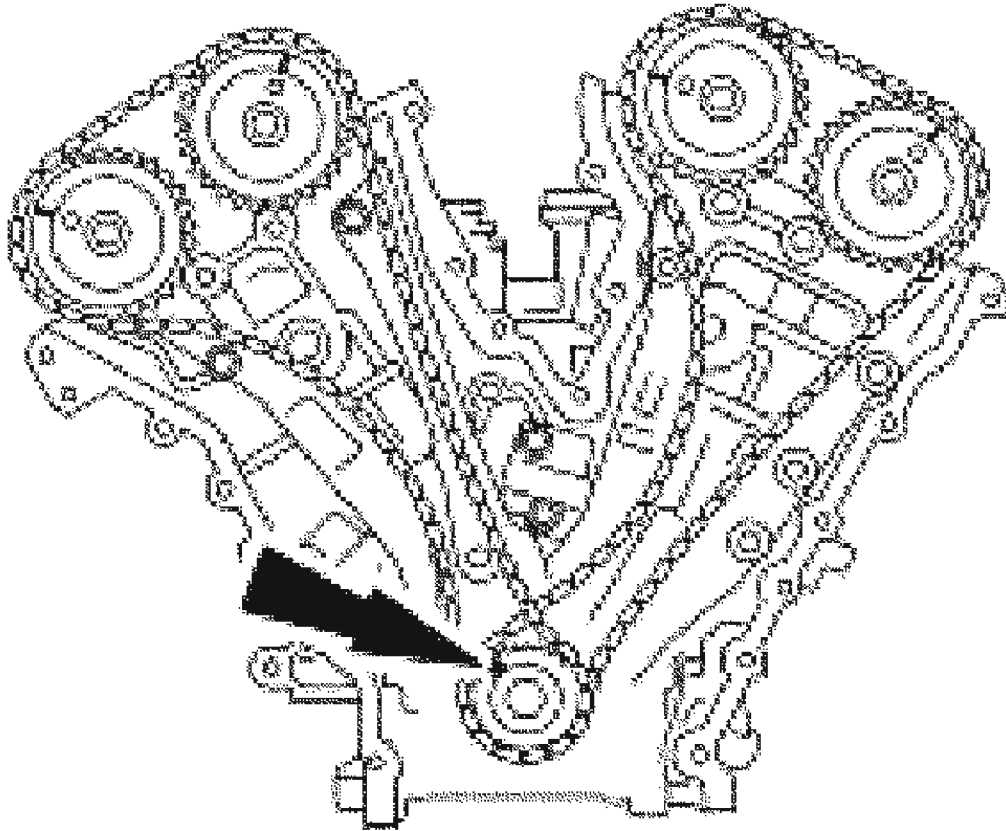
**NOTE:** RH shown; LH  
similar.



G02739481

**Fig. 308: Removing Spark Plugs**  
Courtesy of FORD MOTOR CO.

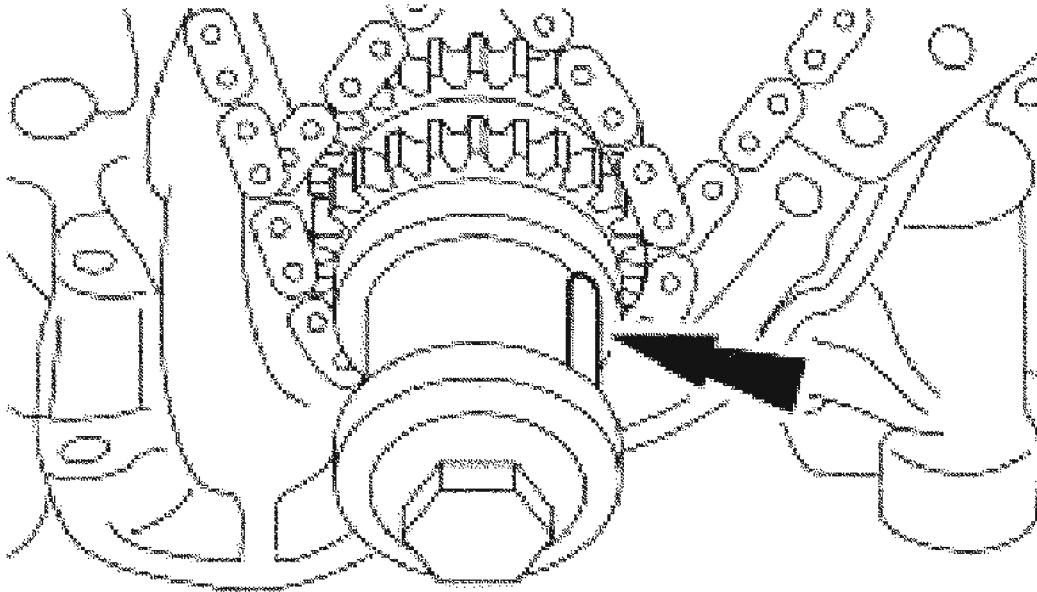
42. Remove the LH and RH spark plugs.
43. Rotate the crankshaft clockwise to position the crankshaft keyway in the 11 o'clock position and position the camshafts in the correct position. This will position the number one cylinder at top dead center (TDC).
  - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.



G02739482

**Fig. 309: Locating Pulley**  
Courtesy of FORD MOTOR CO.

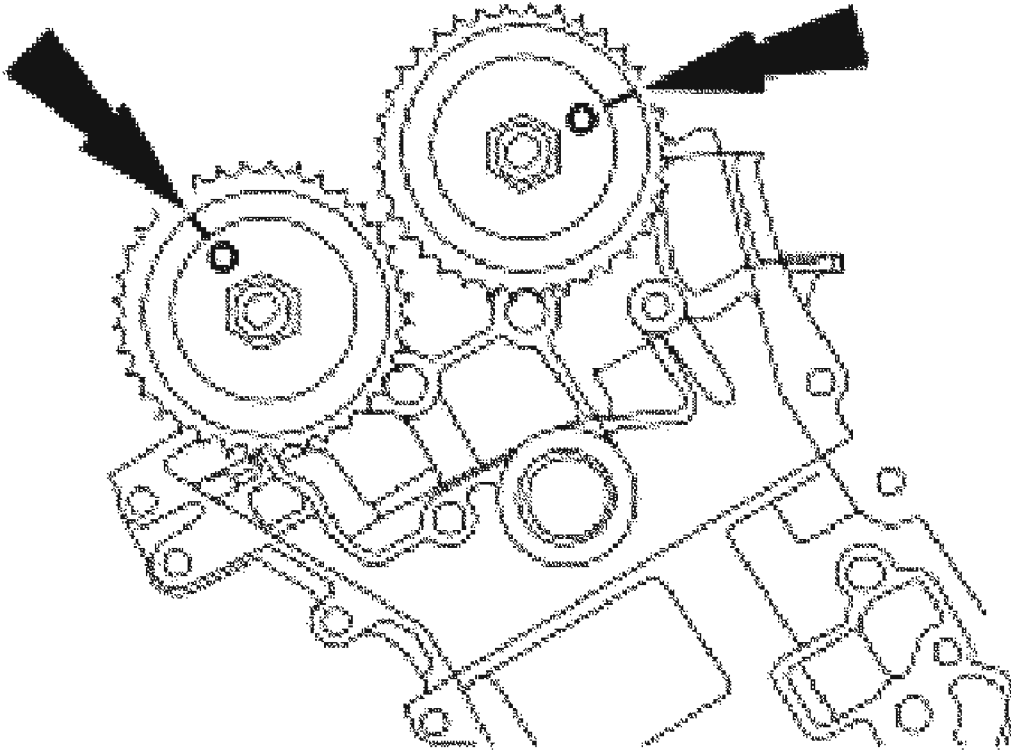
44. Rotate the crankshaft clockwise 120 degrees to the 3 o'clock position to locate the RH camshafts in the neutral position.



G02739483

**Fig. 310: Identifying Crankshaft Aligning Mark**  
Courtesy of FORD MOTOR CO.

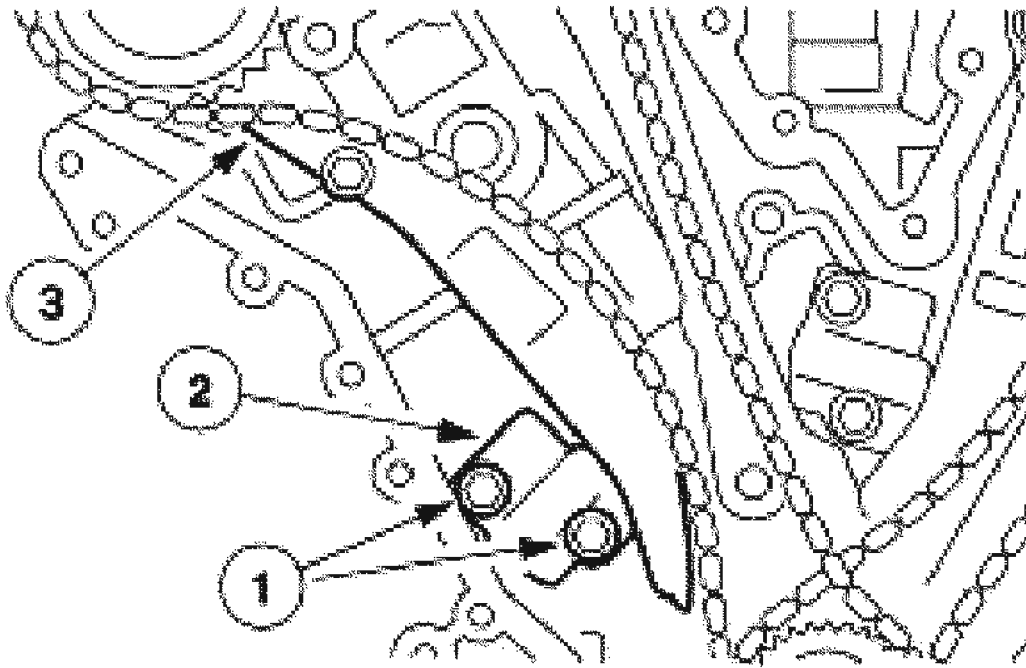
45. Verify that the RH camshafts are correctly positioned.



G02739484

**Fig. 311: Checking RH Camshafts Are Correctly Positioned**  
Courtesy of FORD MOTOR CO.

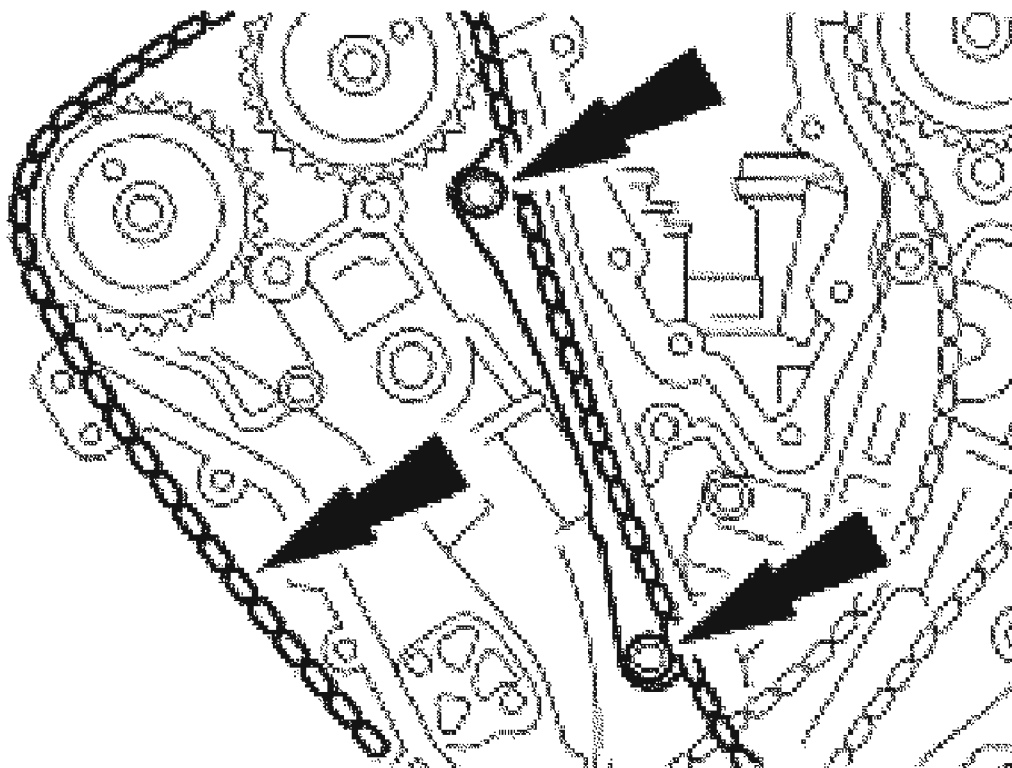
46. Remove the RH timing chain tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.



G02739485

**Fig. 312: Removing RH Timing Chain Tensioner Arm**  
Courtesy of FORD MOTOR CO.

47. Remove the bolts, RH timing chain guide and the timing chain.

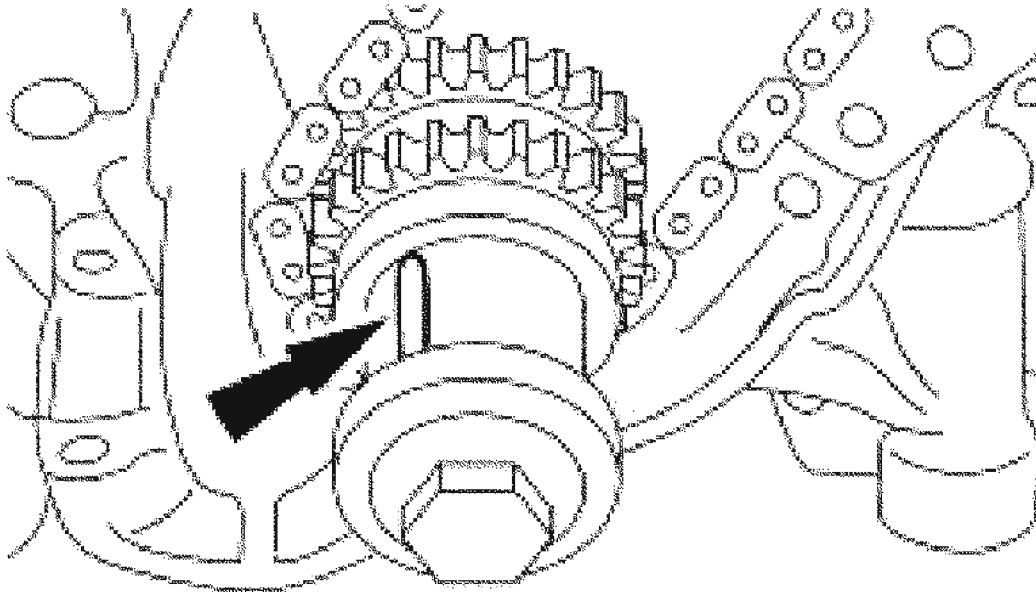


G02739486

**Fig. 313: Removing Timing Chain Guide & Timing Chain**  
Courtesy of FORD MOTOR CO.

48. Rotate the crankshaft clockwise 600 degrees (1 -2/3 times) to position the crankshaft keyway in the 11 o'clock position. This will position the LH camshafts in the neutral position.

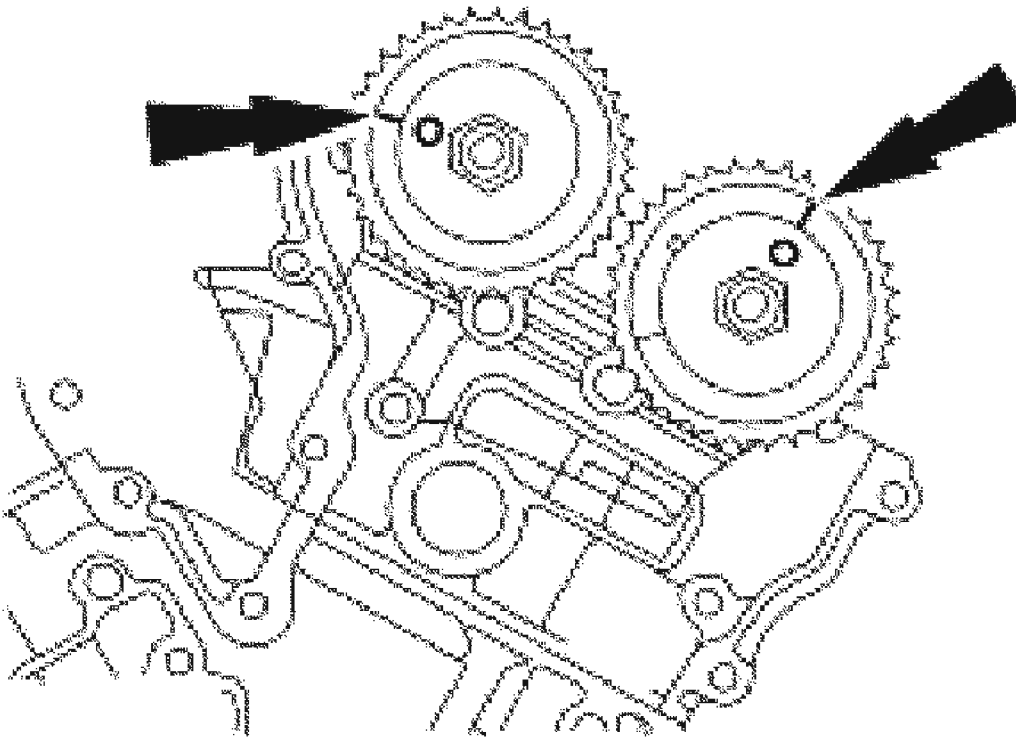




G02739487

**Fig. 314: Identifying Aligning Mark**  
Courtesy of FORD MOTOR CO.

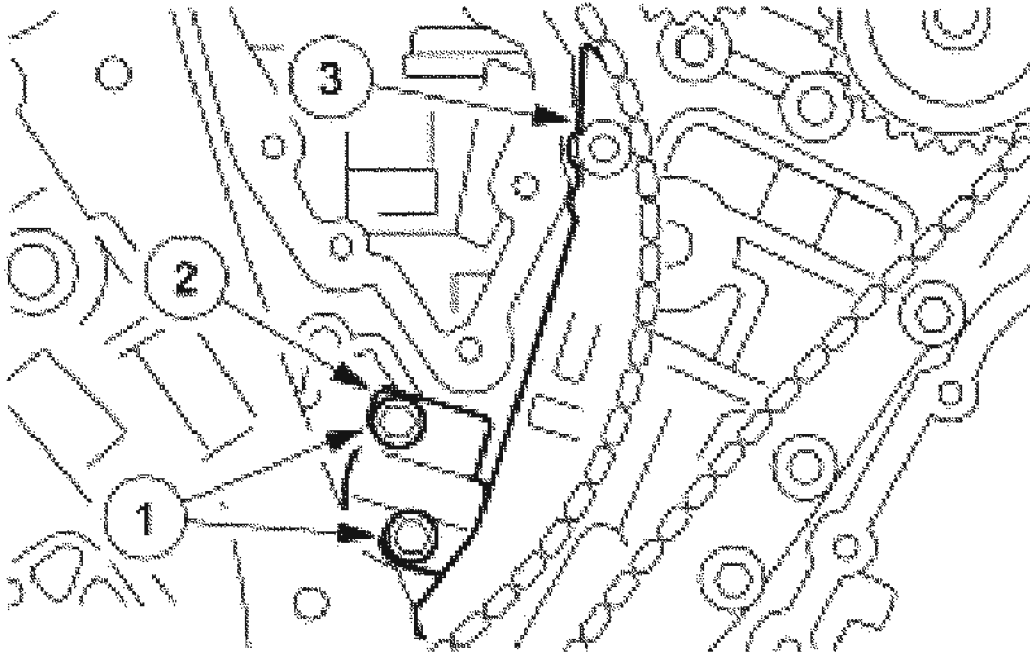
49. Verify that the LH camshafts are in the neutral position.



G02739488

**Fig. 315: Checking LH Camshafts Are In Neutral Position**  
Courtesy of FORD MOTOR CO.

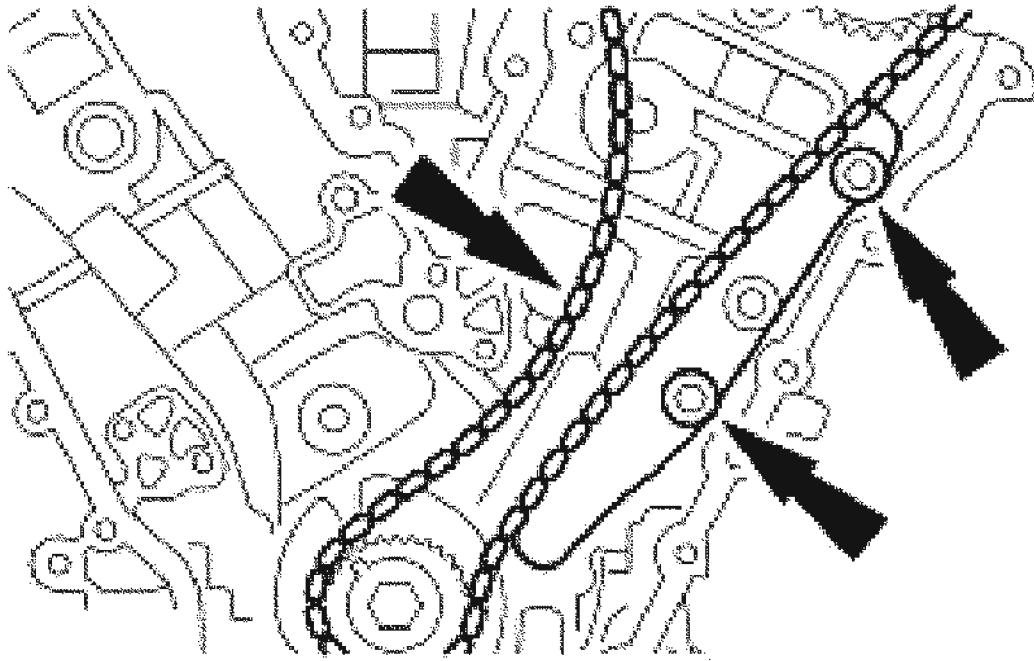
50. Remove the LH timing chain and tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.



G02739489

**Fig. 316: Removing LH Timing Chain And Tensioner Arm**  
Courtesy of FORD MOTOR CO.

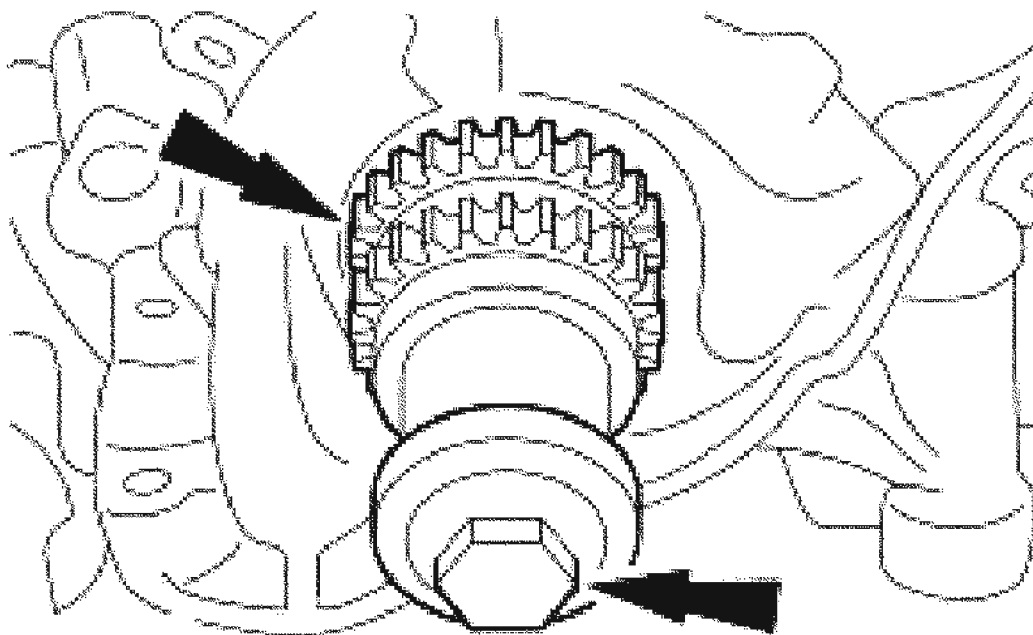
51. Remove the LH timing chain and timing chain guide.



G02739490

**Fig. 317: Removing LH Timing Chain And Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

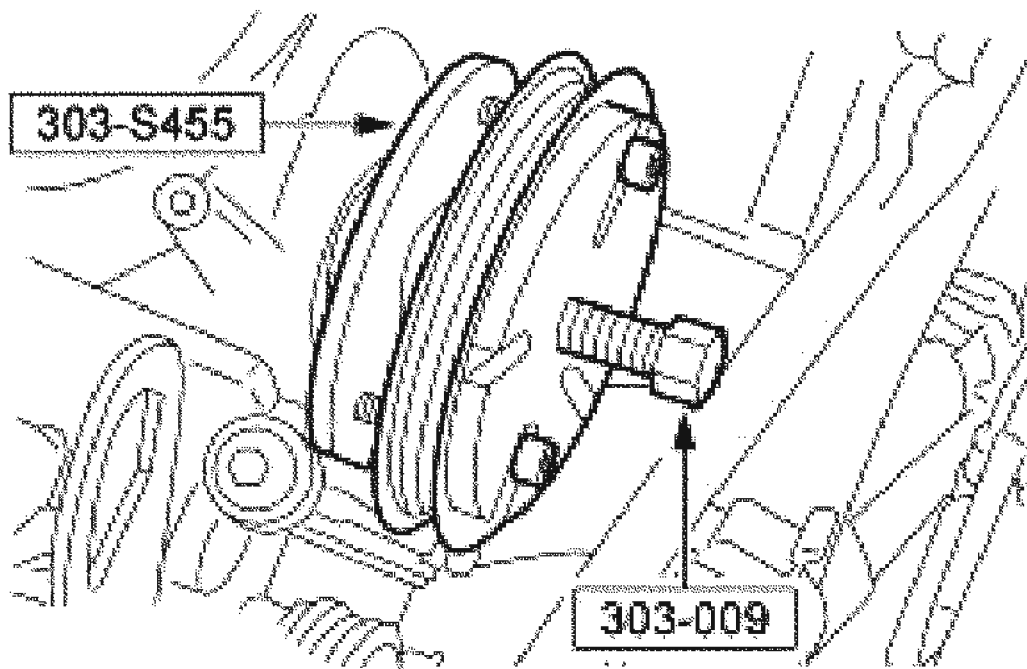
52. Remove the damper bolt and the crankshaft sprockets.



G02739491

**Fig. 318: Removing Damper Bolt And Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. The service pulley is pressed on flush to the end of the camshaft.

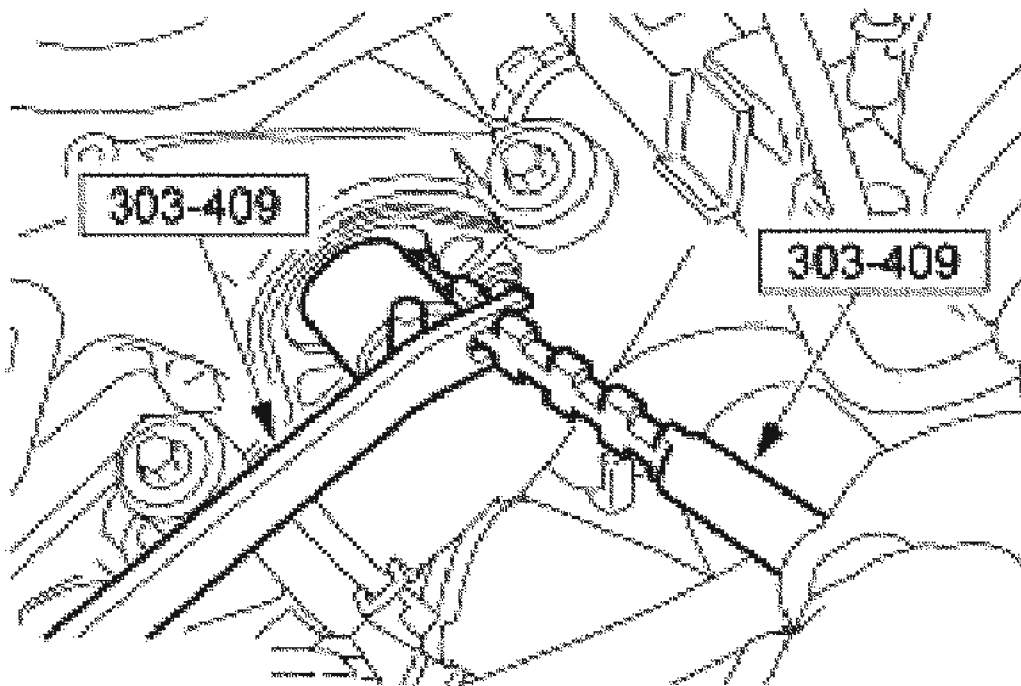


G02739492

**Fig. 319: Removing Water Pump Drive Pulley**  
Courtesy of FORD MOTOR CO.

53. Using the special tools, remove the water pump drive pulley and discard.

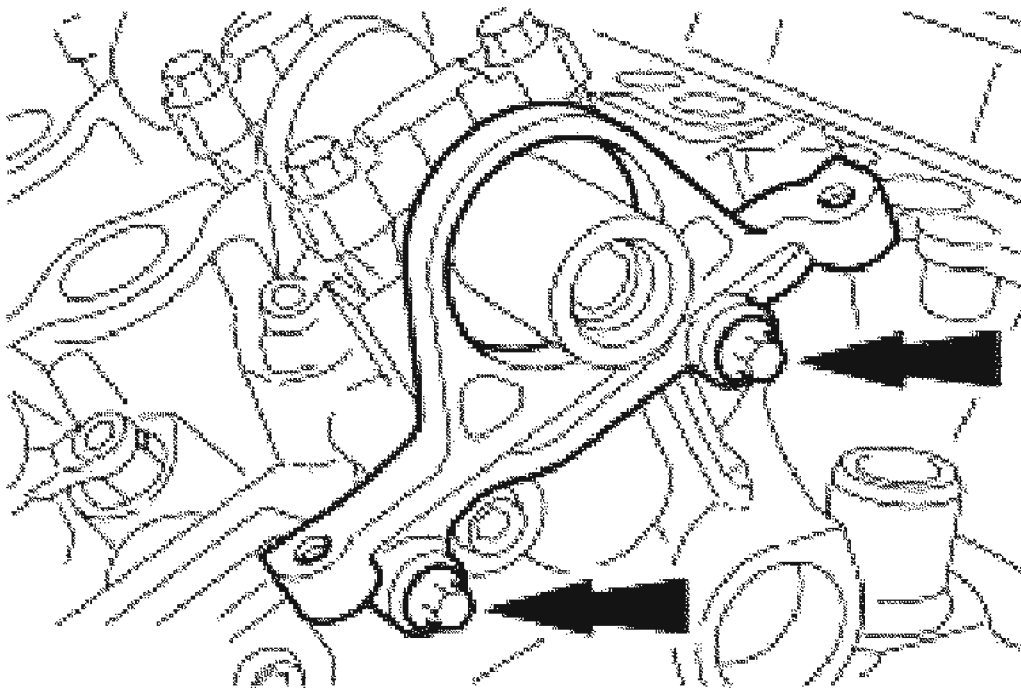
**CAUTION:** To make sure of the correct sealing, do not scratch the camshaft.



G02739493

**Fig. 320: Removing Camshaft Oil Seal Using Special Tool**  
**Courtesy of FORD MOTOR CO.**

54. Using the special tool, remove the camshaft oil seal and discard.
55. Remove the intake camshaft oil seal retainer and discard the press in place gasket.



G02739494

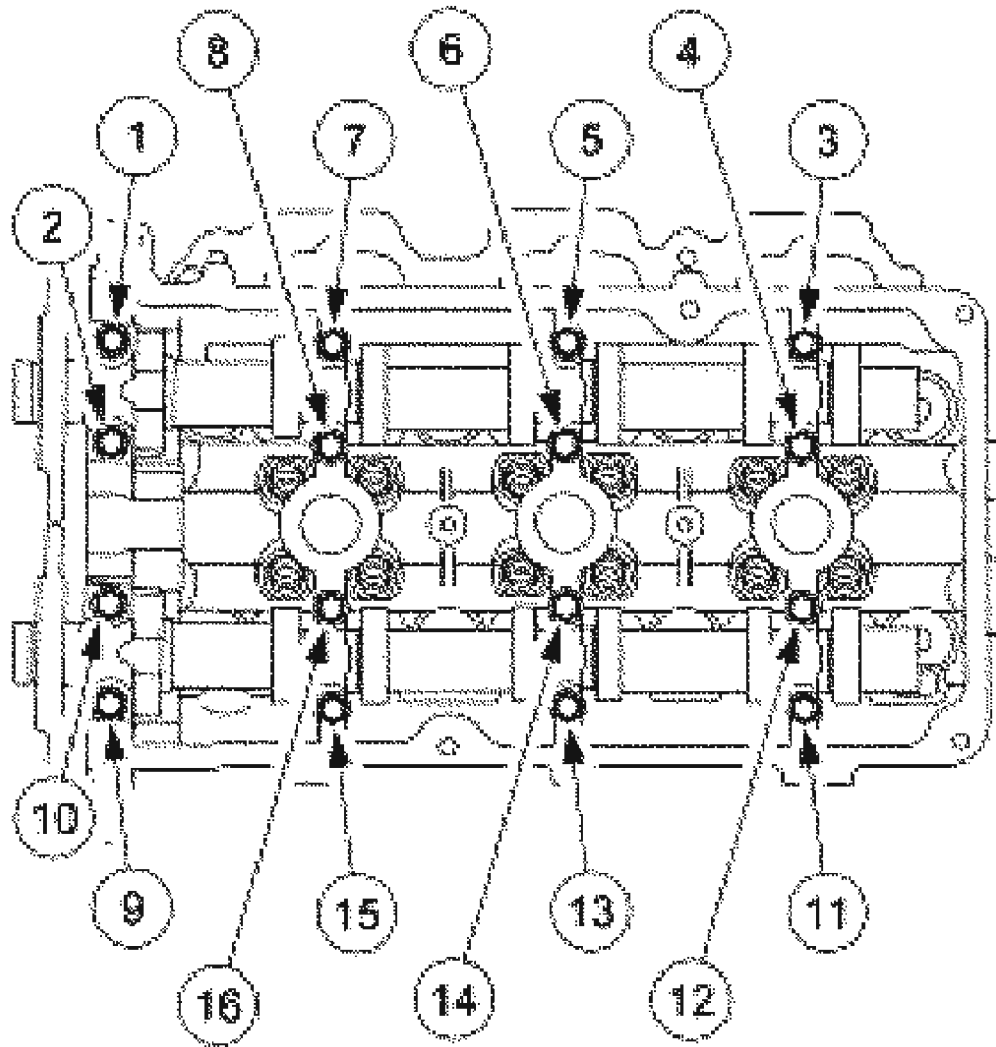
**Fig. 321: Removing Intake Camshaft Oil Seal Retainer**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled in their original positions.

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

**NOTE:** The camshaft caps have alignment dowels.





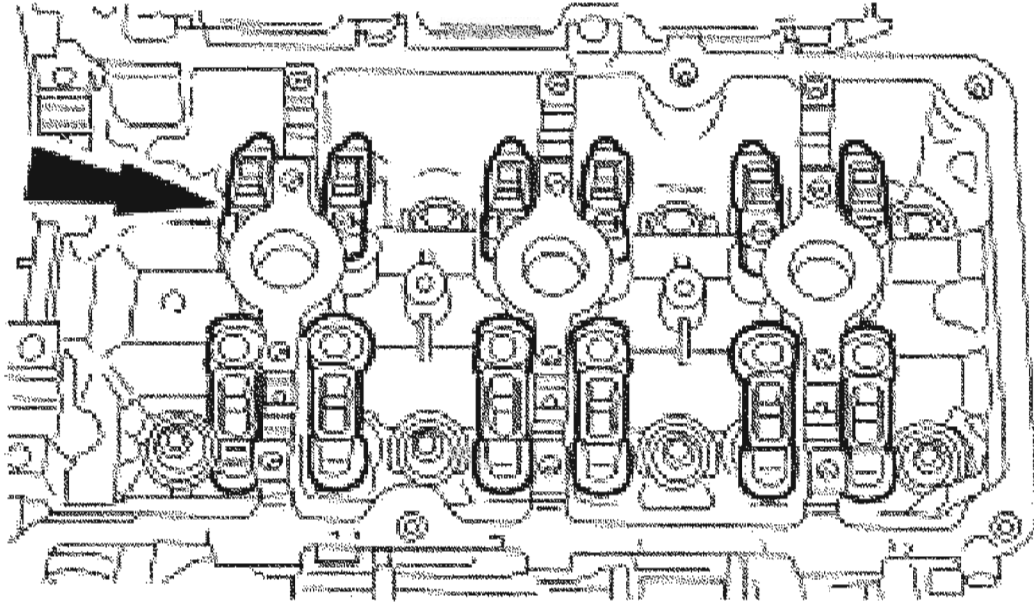
G02739495

**Fig. 322: Identifying Bolt Loosening Sequence**  
Courtesy of FORD MOTOR CO.

56. Loosen the LH and RH camshaft cap bolts in the indicated sequence and remove the camshaft caps.
  - Tap the caps lightly with a soft-faced mallet to loosen the camshaft caps.
57. Remove the LH and RH camshafts.

**CAUTION:** The camshaft followers must be installed in their original position.

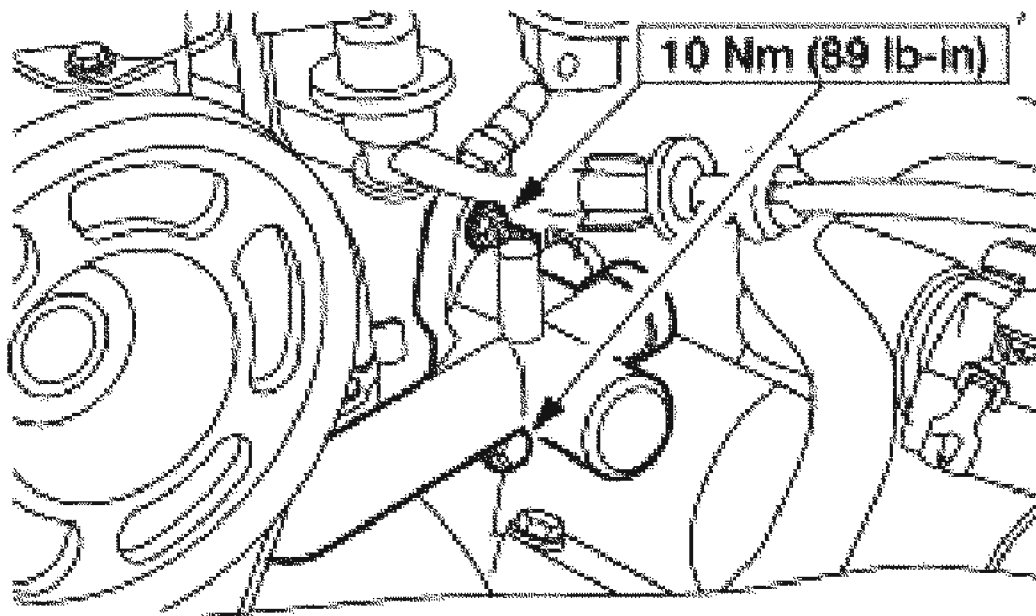
**NOTE:** RH shown; LH similar.



G02739496

**Fig. 323: Removing LH And RH Camshaft Followers**  
Courtesy of FORD MOTOR CO.

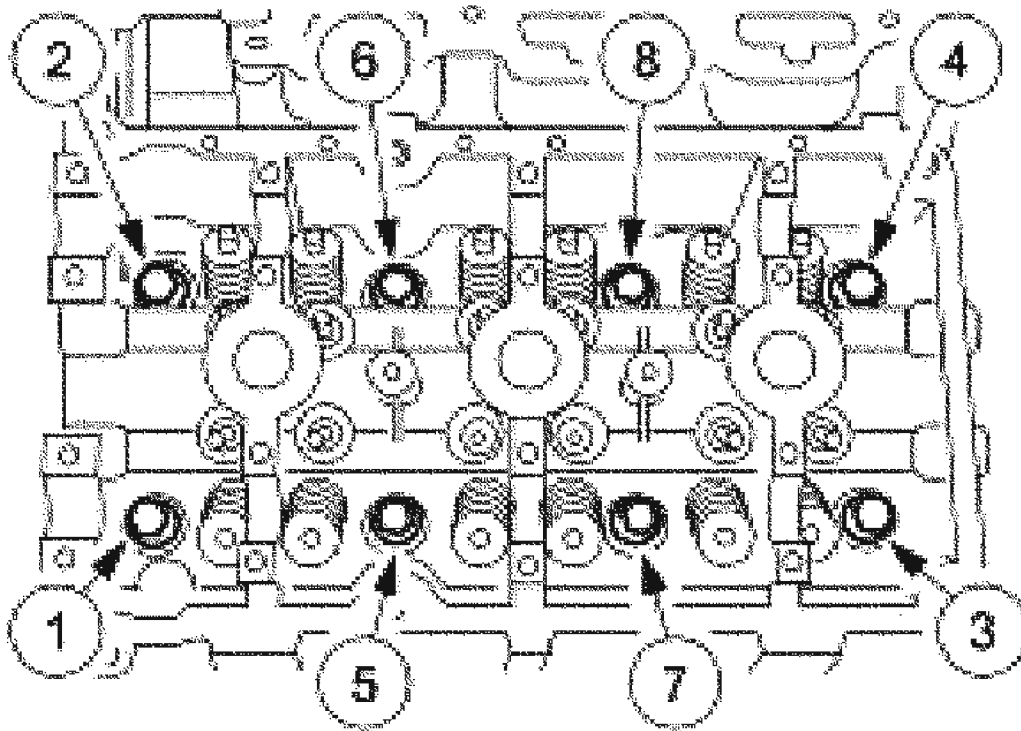
58. Remove the LH and RH camshaft followers.
  - Mark the location of the followers using a permanent-type marker.
59. Remove the coolant bypass tube.



G02739497

**Fig. 324: Removing Coolant Bypass Tube**  
Courtesy of FORD MOTOR CO.

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



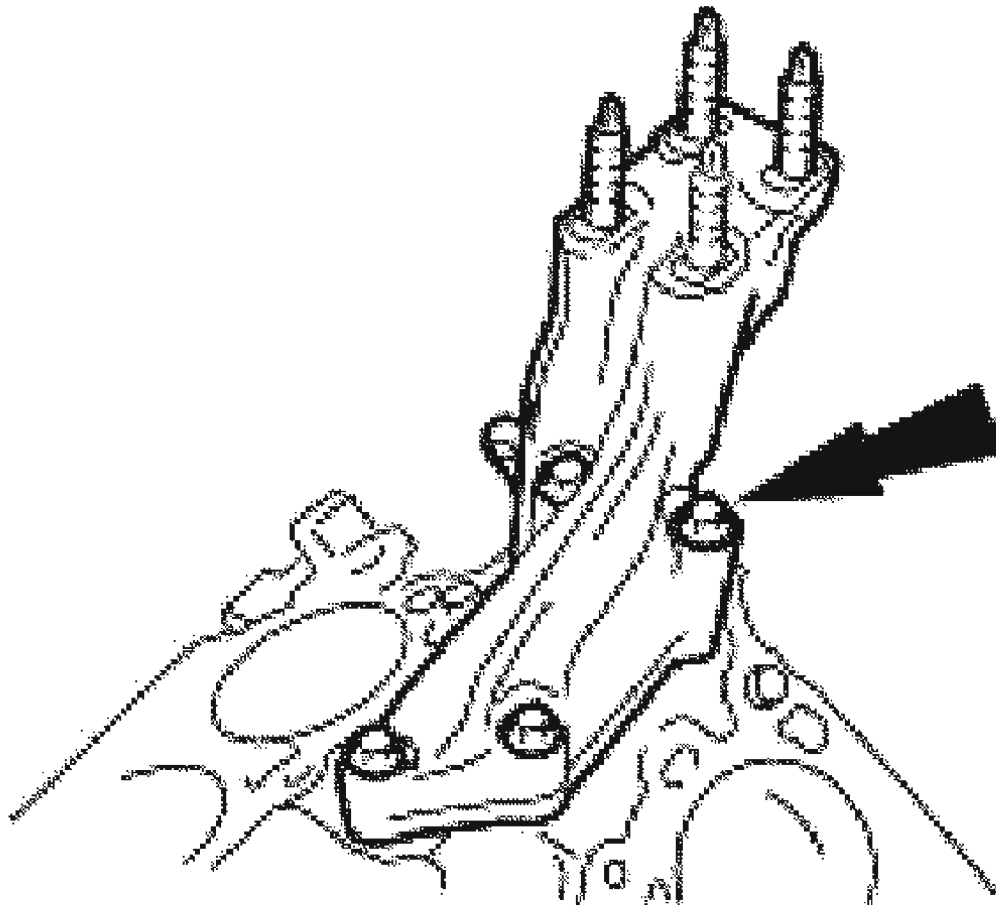
G02739498

**Fig. 325: Identifying Bolt Loosening Sequence**  
 Courtesy of FORD MOTOR CO.

60. Loosen the bolts in the indicated sequence and remove the LH and RH cylinder heads.
- Discard the gaskets.

**NOTE:** The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

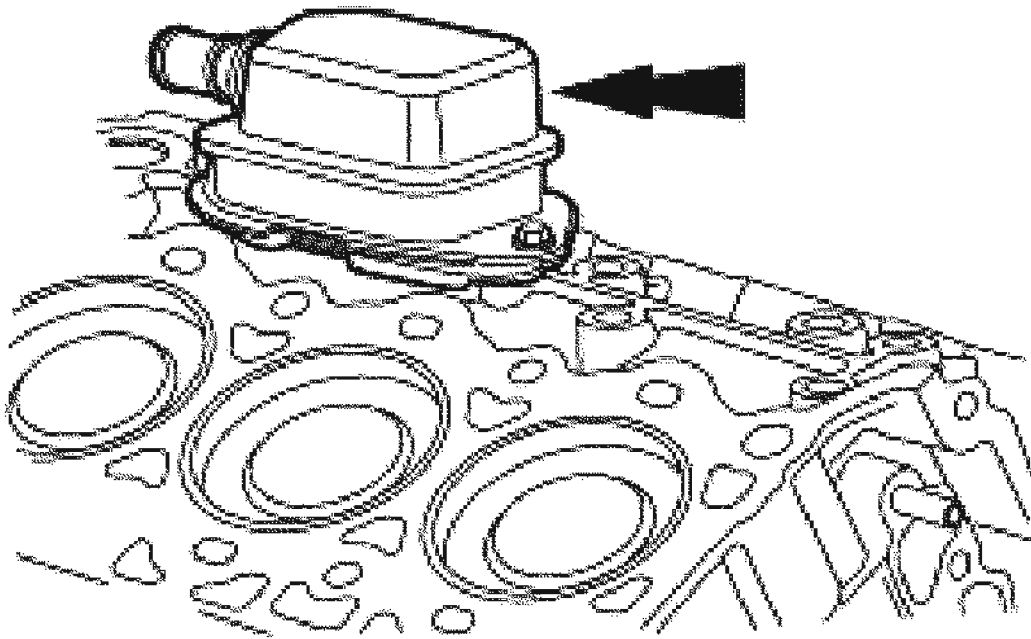
61. Support the cylinder head on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in) deep.
62. Remove the power steering/engine support bracket.



G02739499

**Fig. 326: Identifying Power Steering/Engine Support Bracket**  
Courtesy of FORD MOTOR CO.

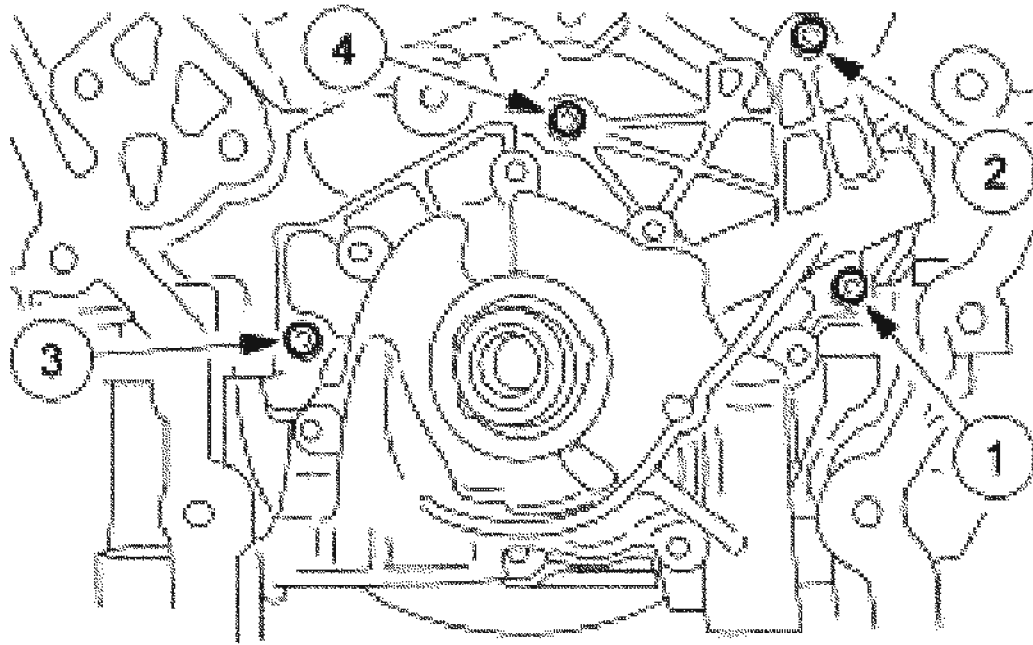
63. Remove the oil separator and discard the gasket.



G02739500

**Fig. 327: Removing Oil Separator**  
Courtesy of FORD MOTOR CO.

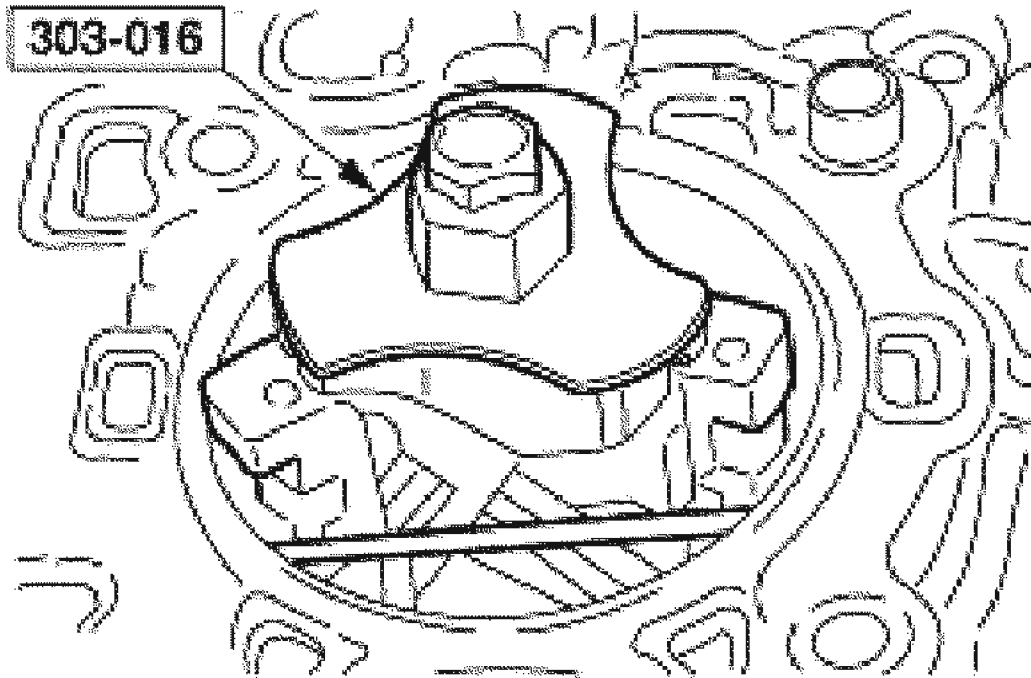
64. Remove the bolts in the indicated sequence and remove the oil pump.



G02739501

**Fig. 328: Identifying Bolt Loosening Sequence**  
Courtesy of FORD MOTOR CO.

65. Using the special tool, remove the cylinder ridge.

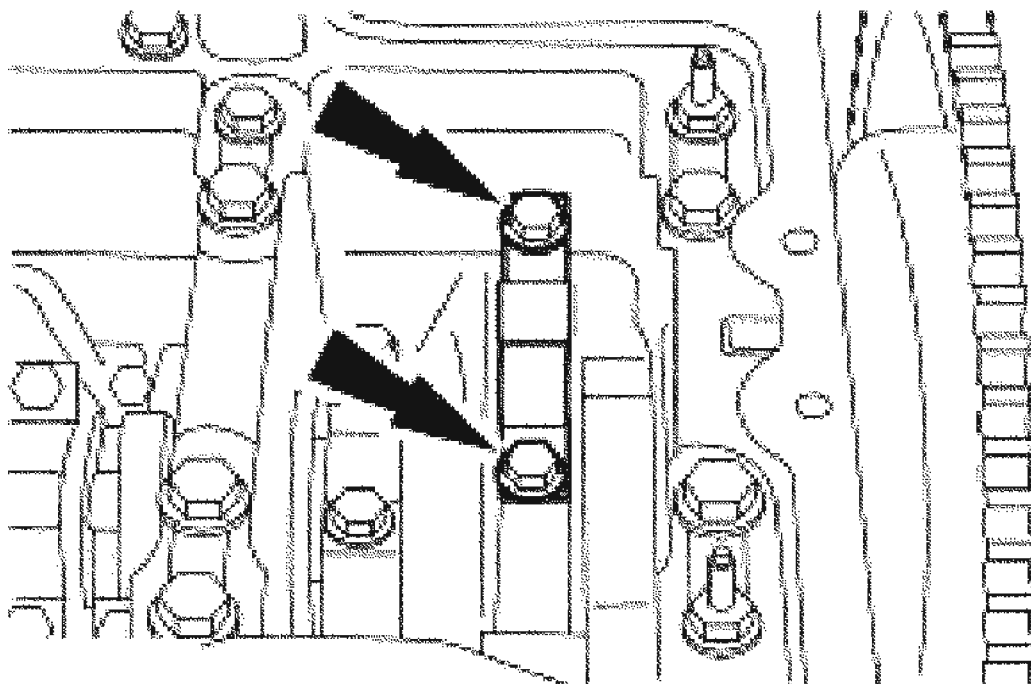


G02739502

**Fig. 329: Removing Cylinder Ridge**  
Courtesy of FORD MOTOR CO.

66. Remove the connecting rod cap bolts. Hold the piston/rod assembly to keep it from falling from the engine block.

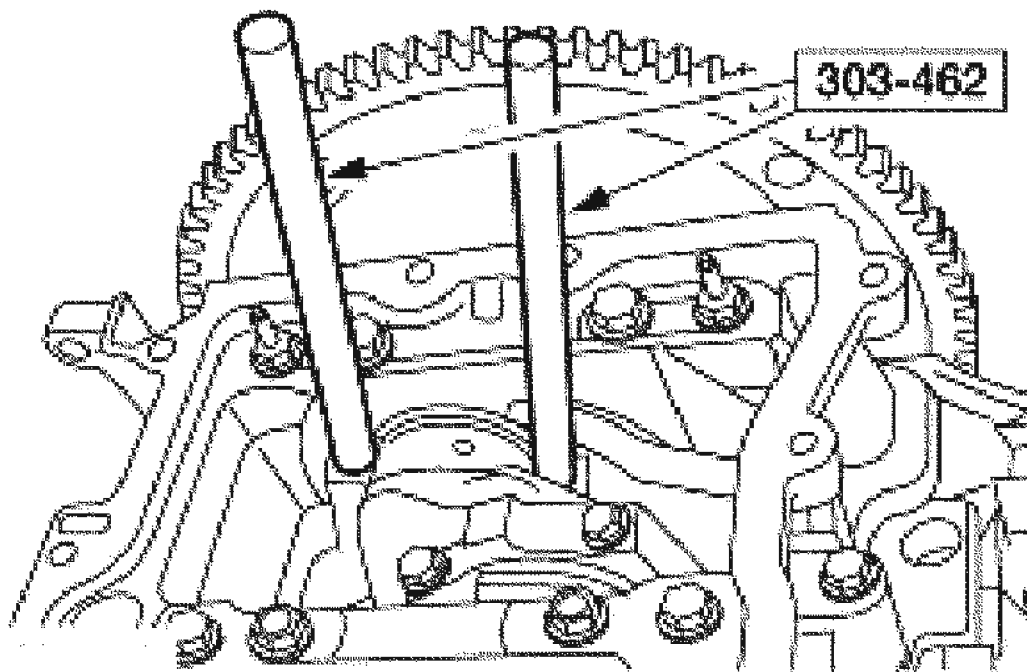




G02739503

**Fig. 330: Removing Connecting Rod Cap Bolts**  
Courtesy of FORD MOTOR CO.

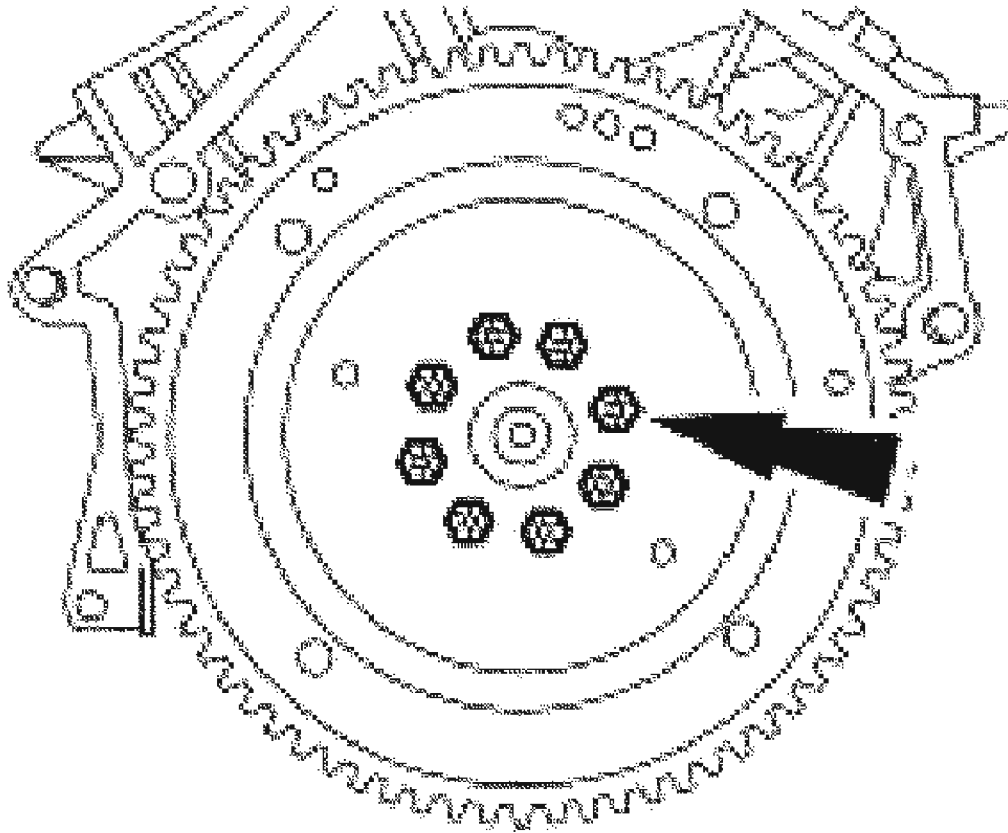
67. Using the special tool, remove the piston/rod assembly from the engine block. Remove the connecting rod bearings.
- Remove the connecting rod bearings.



G02739504

**Fig. 331: Removing Piston/Rod Assembly Using Special Tool**  
Courtesy of FORD MOTOR CO.

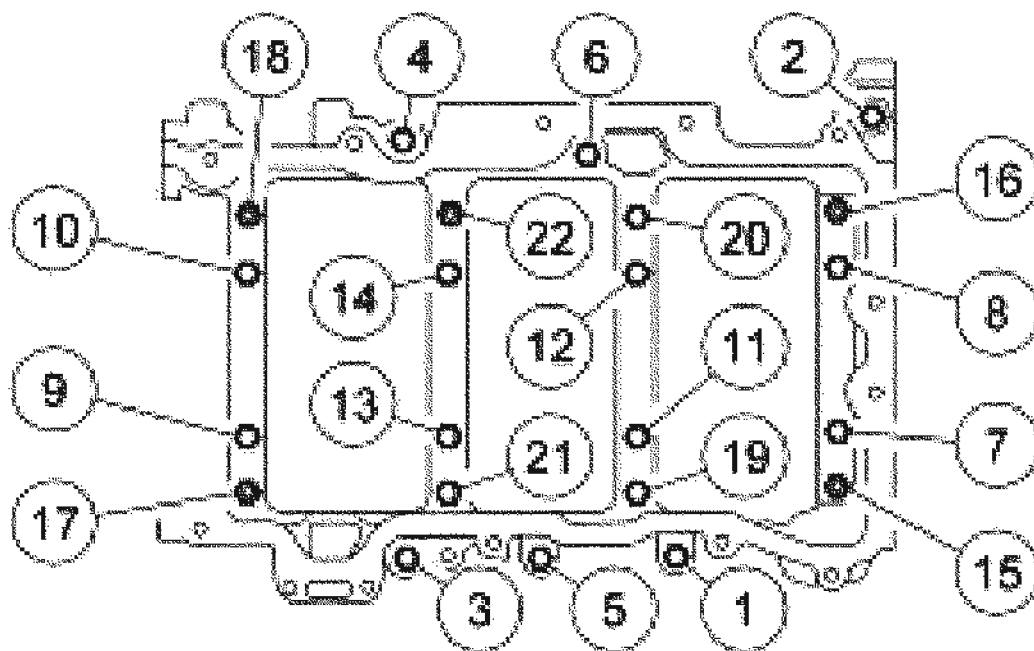
68. Remove the engine block from the stand and place it on a workbench.
69. Remove the bolts and the flexplate.



**G02739505**

**Fig. 332: Removing Bolts And Flexplate**  
Courtesy of FORD MOTOR CO.

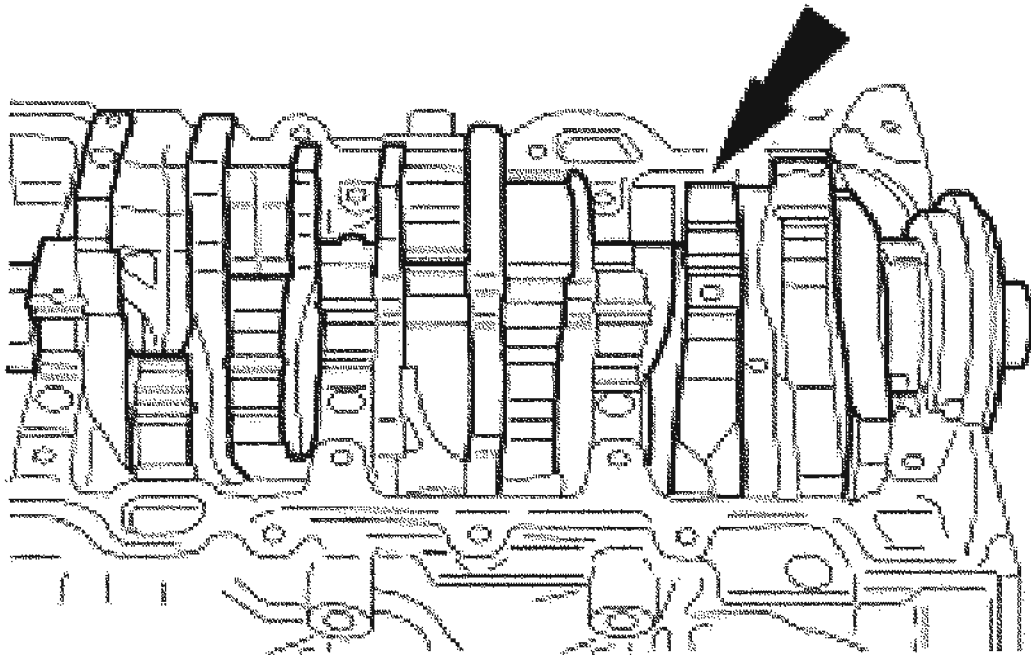
70. Remove the bolts and studs in the indicated sequence and remove the lower cylinder block.



G02739506

**Fig. 333: Identifying Bolt Removal Sequence**  
 Courtesy of FORD MOTOR CO.

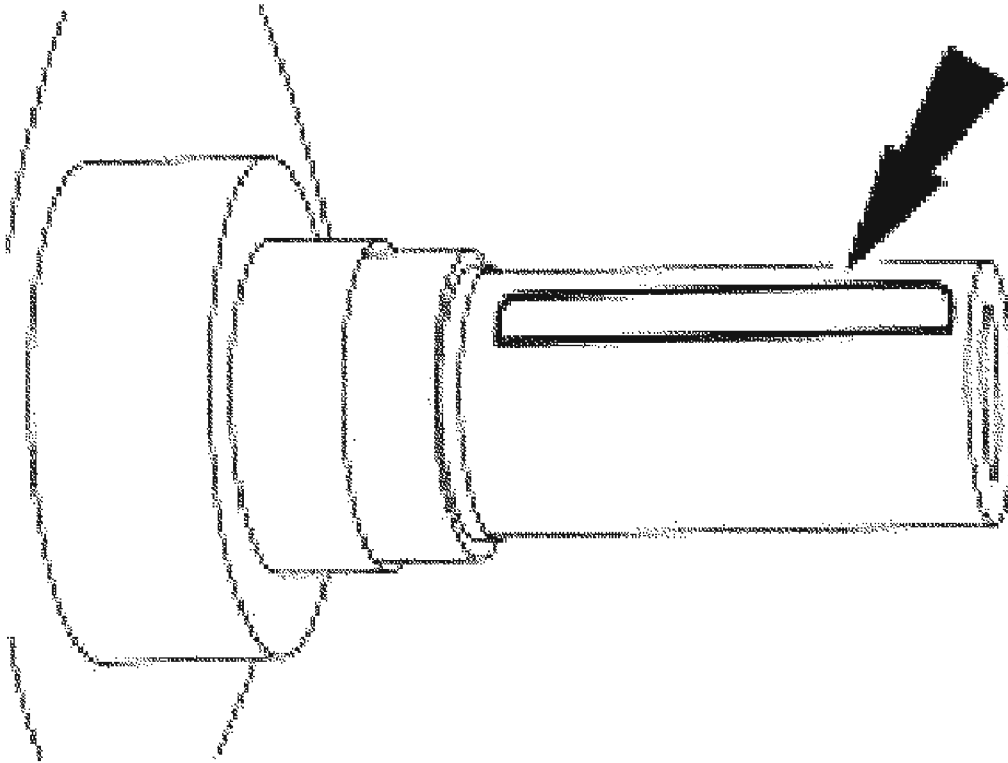
71. Remove the crankshaft rear main seal and remove the crankshaft.



G02739507

**Fig. 334: Removing Crankshaft Rear Main Seal**  
Courtesy of FORD MOTOR CO.

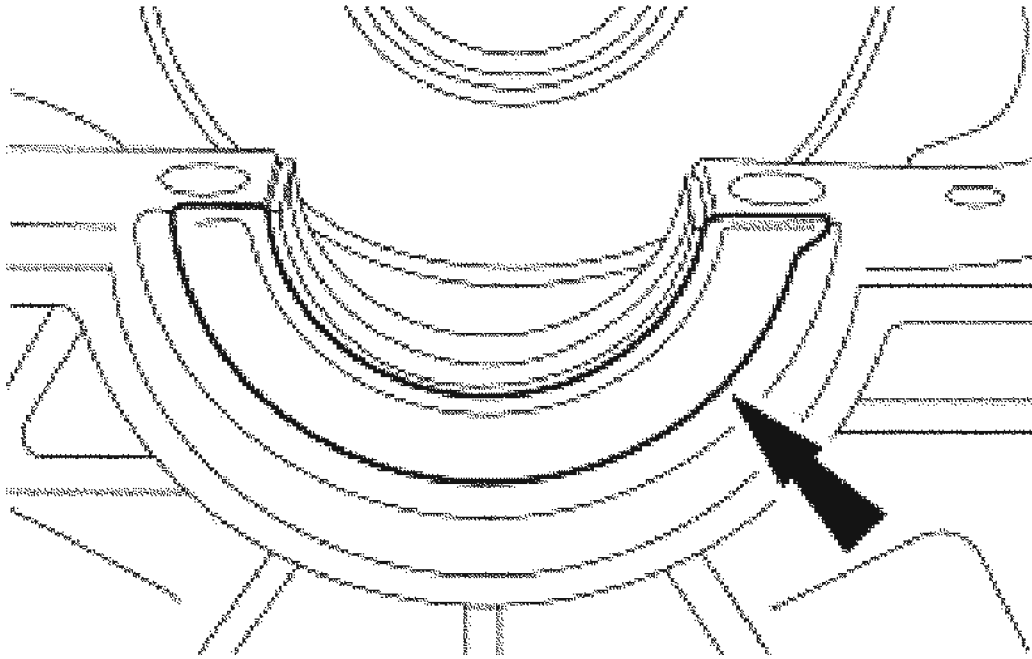
72. Remove the crankshaft key.



**G02739508**

**Fig. 335: Removing Crankshaft Key**  
Courtesy of FORD MOTOR CO.

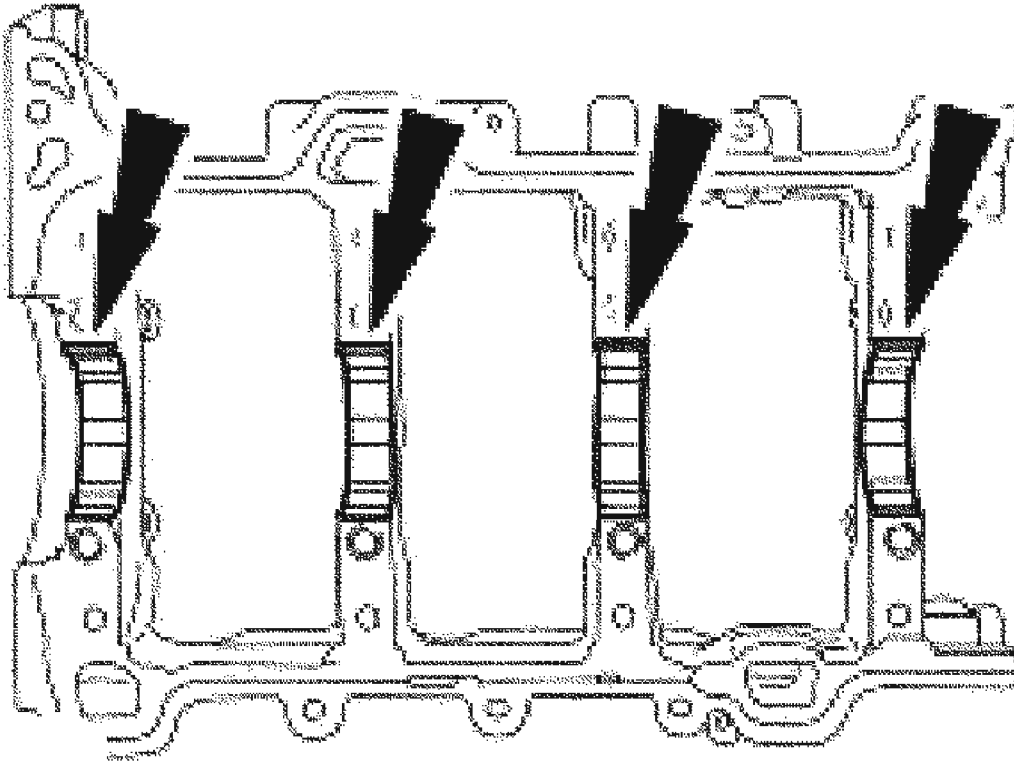
73. Remove the crankshaft thrust bearing from the cylinder block.



G02739509

**Fig. 336: Removing Crankshaft Thrust Bearing**  
Courtesy of FORD MOTOR CO.

74. Remove the bearings from the lower cylinder block.

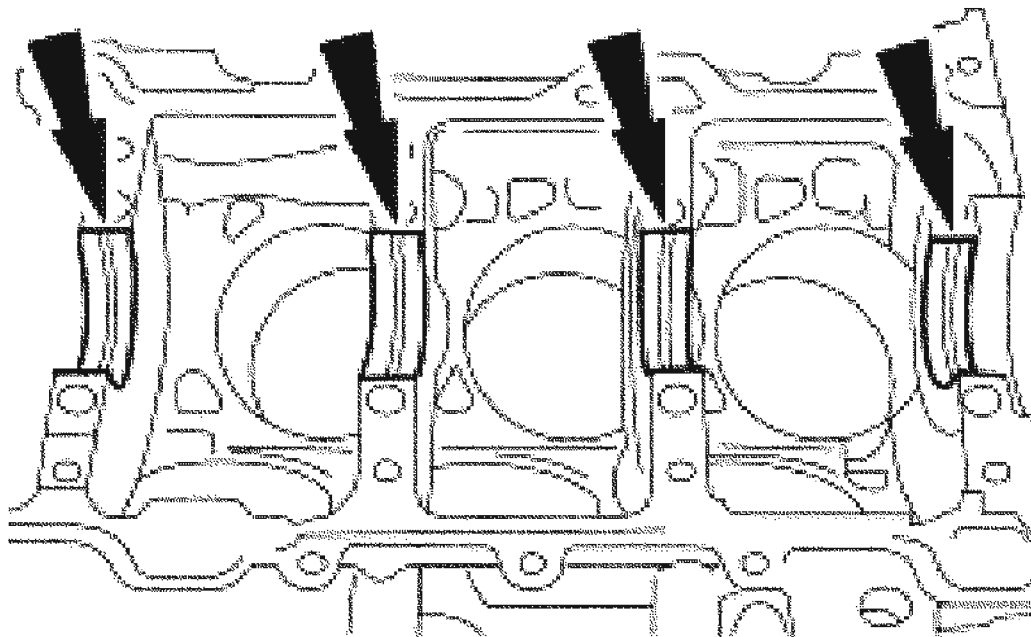


G02739510

**Fig. 337: Removing Bearings From Lower Cylinder Block**  
Courtesy of FORD MOTOR CO.

75. Remove the crankshaft main bearings from the cylinder block.





G02739511


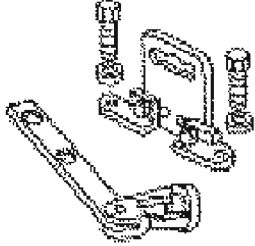

**Fig. 338: Removing Crankshaft Main Bearings From Cylinder Block**  
Courtesy of FORD MOTOR CO.

76. Inspect the cylinder block, lower cylinder block, pistons and connecting rods. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**

## **DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES**

### **CYLINDER HEAD**

**Special Tool(s)**

	Valve Spring Compressor Set 303-300 (T87C-6565-A)
	Valve Spring Compressor 303-350 (T89P-6565-A)
	Valve Stem Seal Replacer 303-470 (T94P-6510-CH)

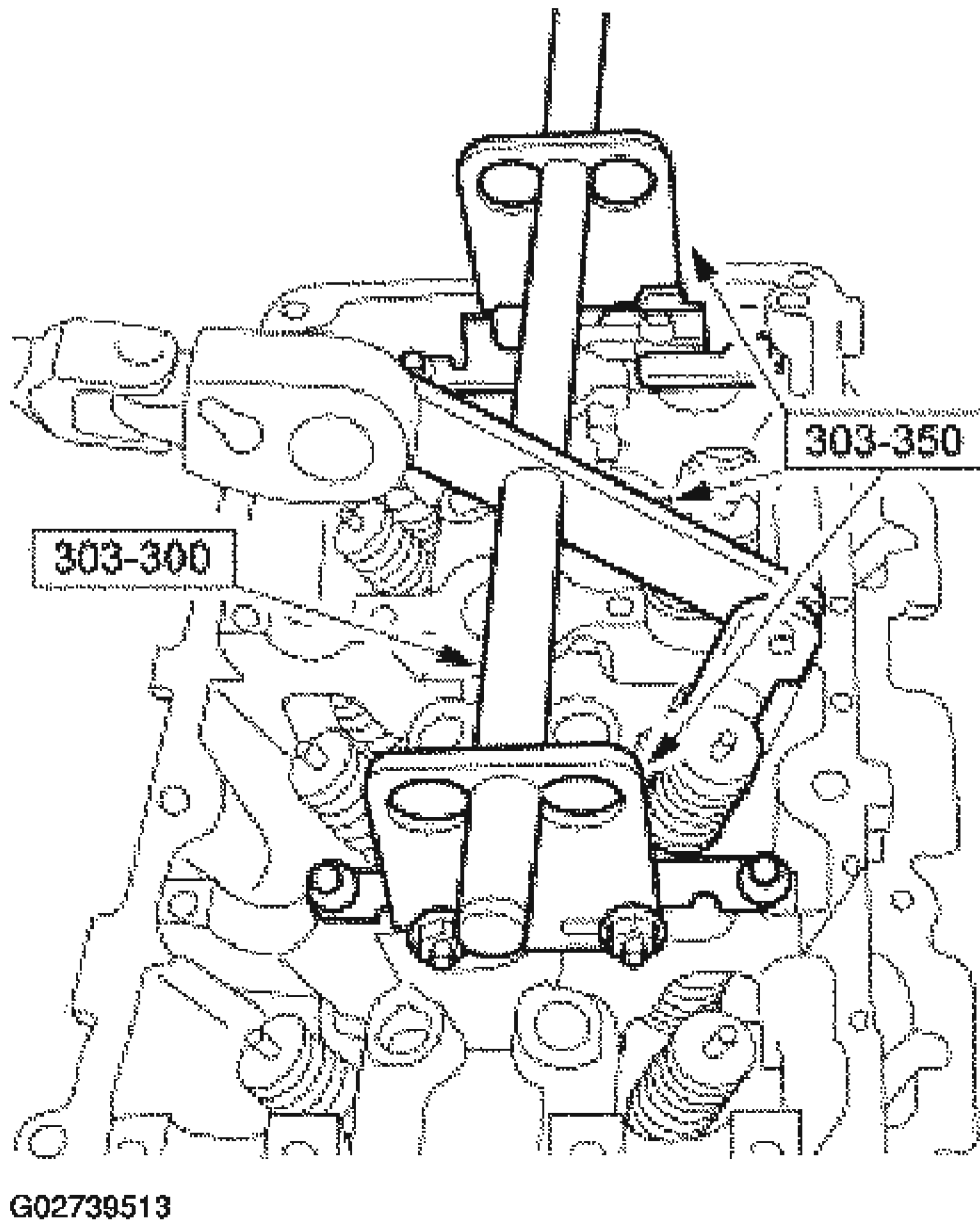
G02739512

**Fig. 339: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Disassembly

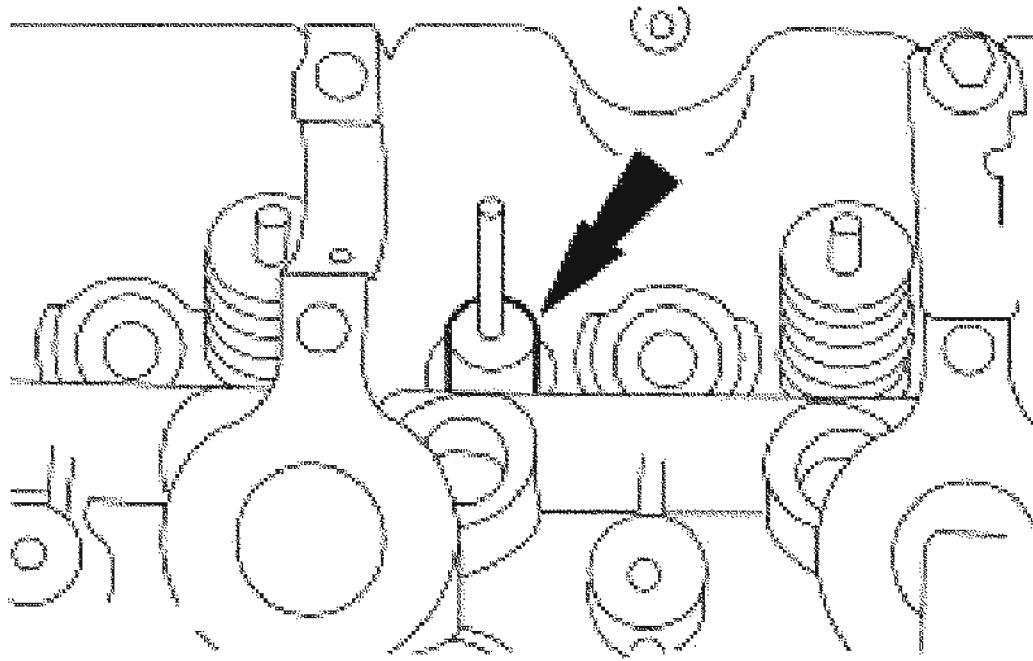
**CAUTION:** If the components are to be reinstalled, they must be installed in the same position. Mark the components removed for location.

1. Using the special tool, remove the keys, retainer, and spring.



**Fig. 340: Removing Keys, Retainer, And Spring**  
Courtesy of FORD MOTOR CO.

2. Remove the valve from the cylinder head.
3. Remove the valve stem seal.

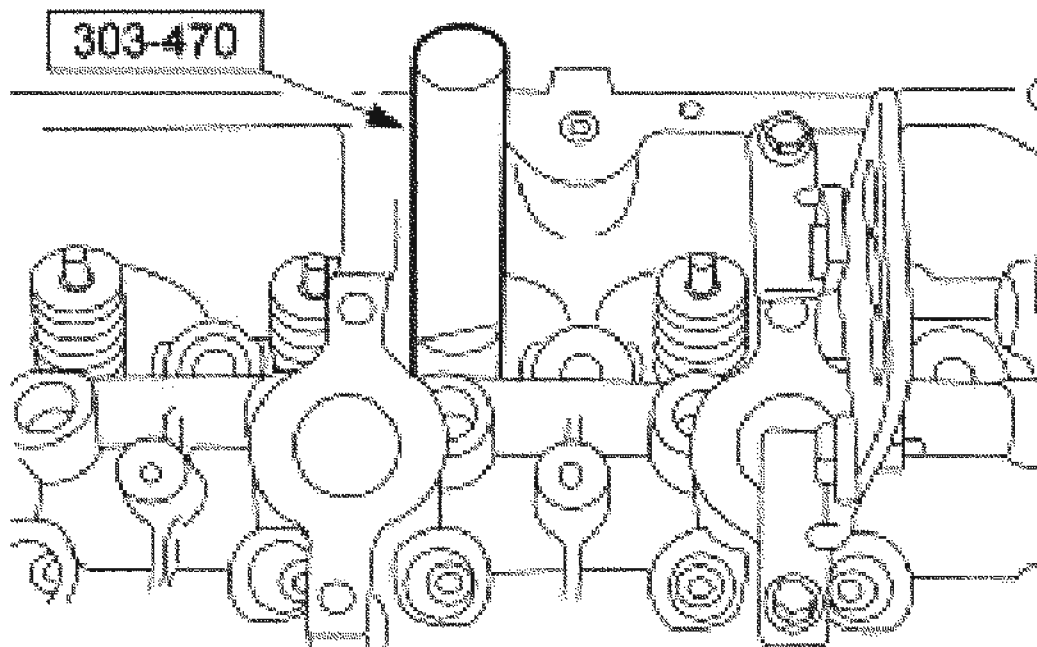


G02739514

**Fig. 341: Removing Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

**Assembly**

1. Using the special tool, install the valve stem seal.



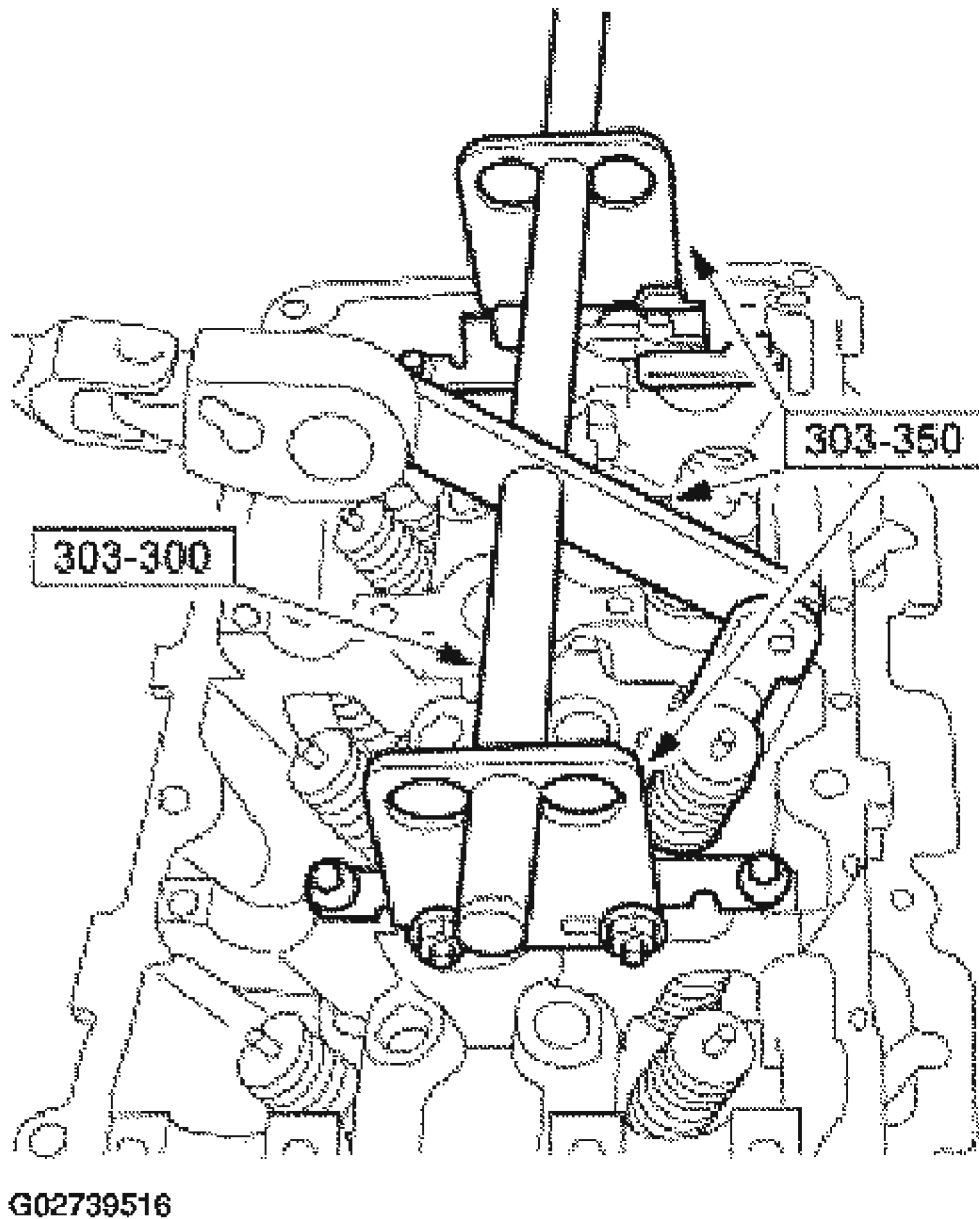
G02739515

**Fig. 342: Installing Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

2. Install the valve.
3. Using the special tool, install the valve spring, retainer and key.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



**Fig. 343: Installing Valve Spring, Retainer & Key**  
Courtesy of FORD MOTOR CO.

PISTON

Material

MATERIAL SPECIFICATION

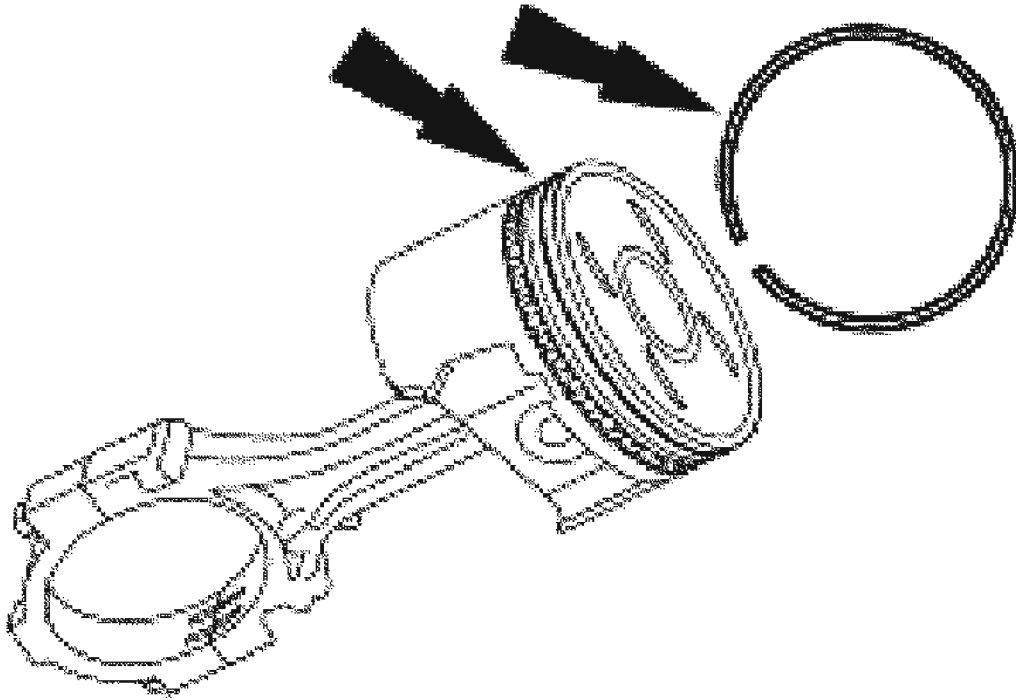
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153 H

### Disassembly

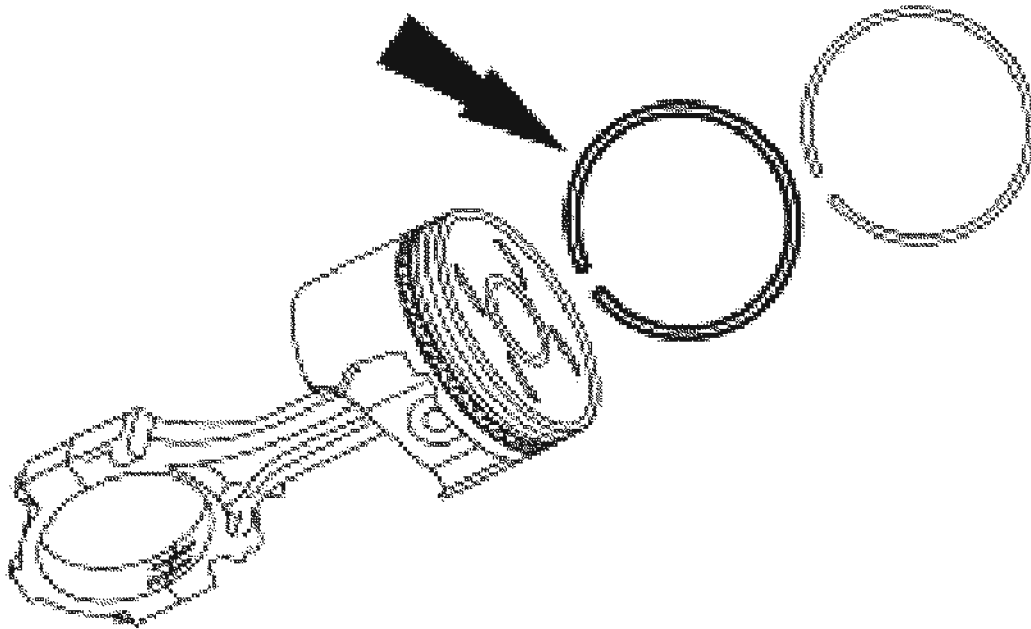
1. Remove the top compression ring.



**G02739517**

**Fig. 344: Removing Top Compression Ring**  
Courtesy of FORD MOTOR CO.

2. Remove the second compression ring.

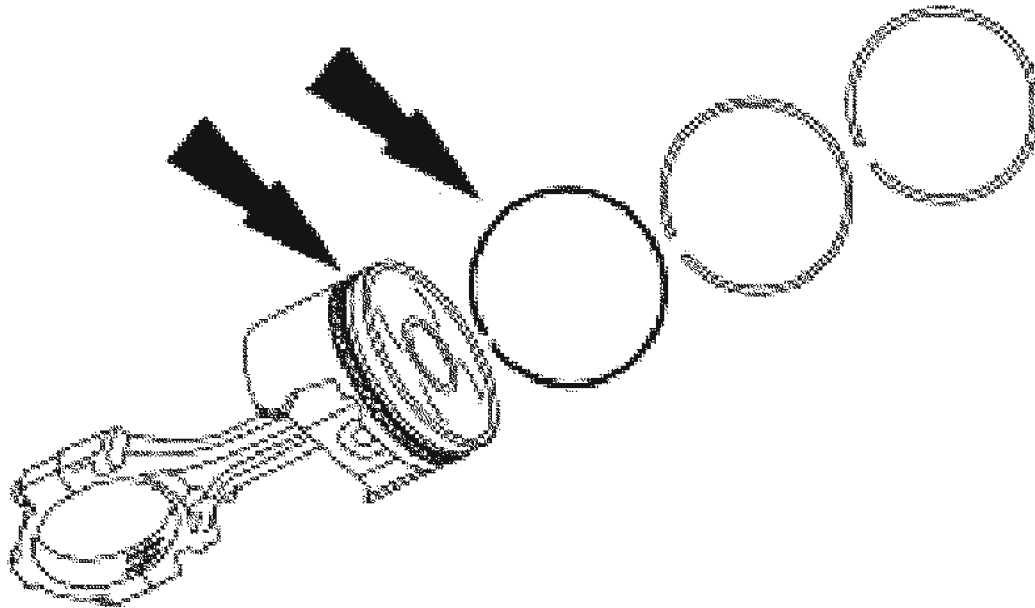


G02739518

**Fig. 345: Removing Second Compression Ring**  
Courtesy of FORD MOTOR CO.

3. Remove the first oil control ring.

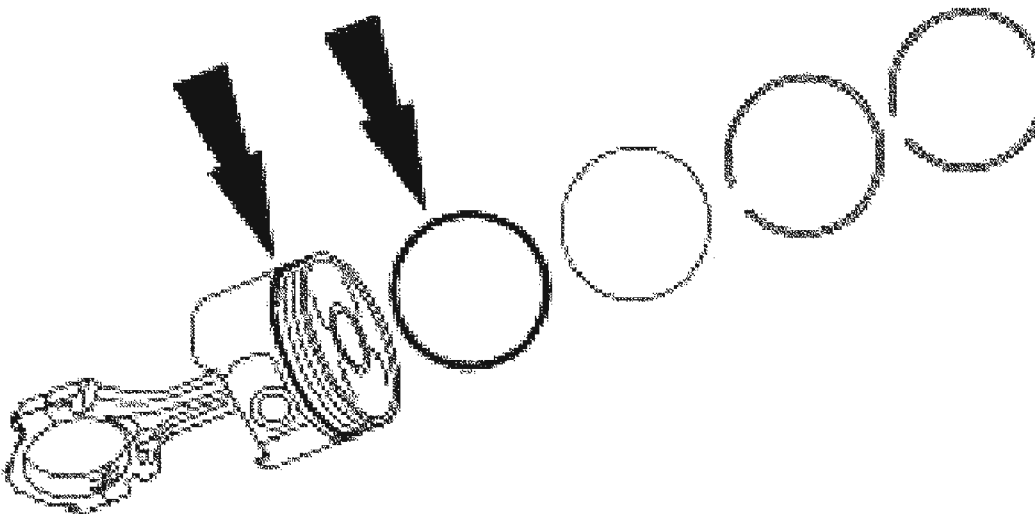




G02739519

**Fig. 346: Removing First Oil Control Ring**  
Courtesy of FORD MOTOR CO.

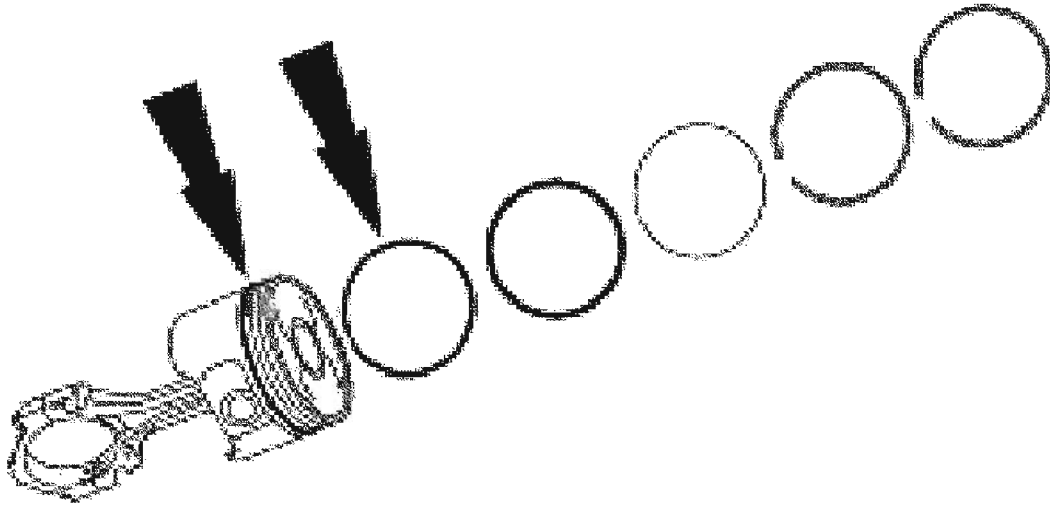
4. Remove the oil control spacer ring.



G02739520

**Fig. 347: Removing Oil Control Spacer Ring**  
Courtesy of FORD MOTOR CO.

5. Remove the second oil control ring.



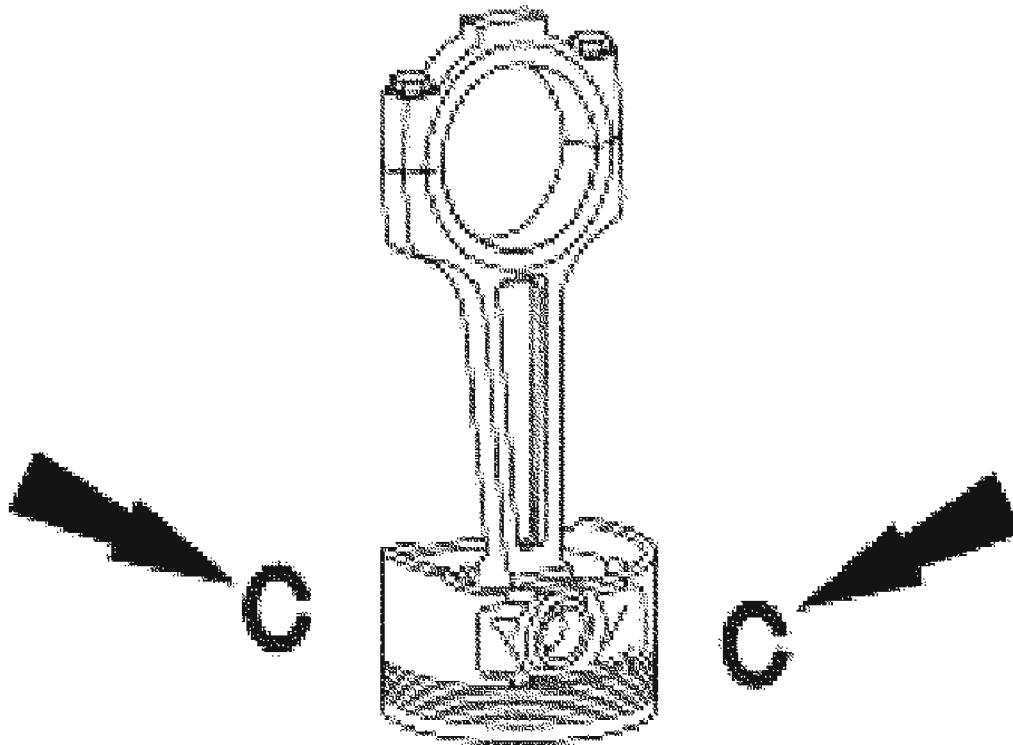
G02739521

**Fig. 348: Removing Second Oil Control Ring**  
Courtesy of FORD MOTOR CO.

6. Remove the clips.

## 2004 Ford Escape

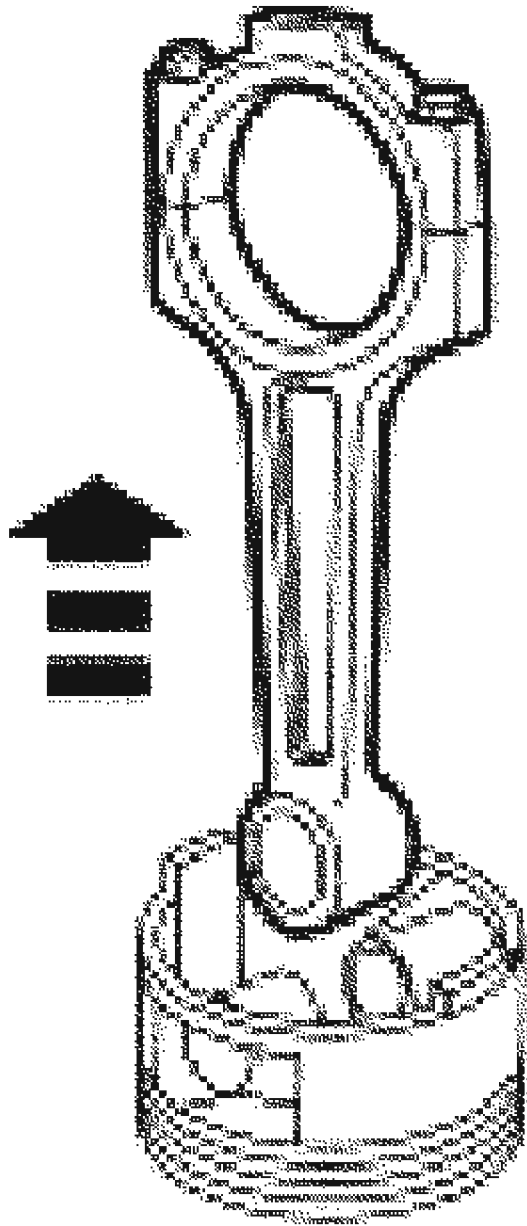
2004 ENGINE Engine - 3.0L (4V) - Escape



**G02739522**

**Fig. 349: Removing Clips**  
**Courtesy of FORD MOTOR CO.**

7. Remove the piston pin and the connecting rod from the piston.

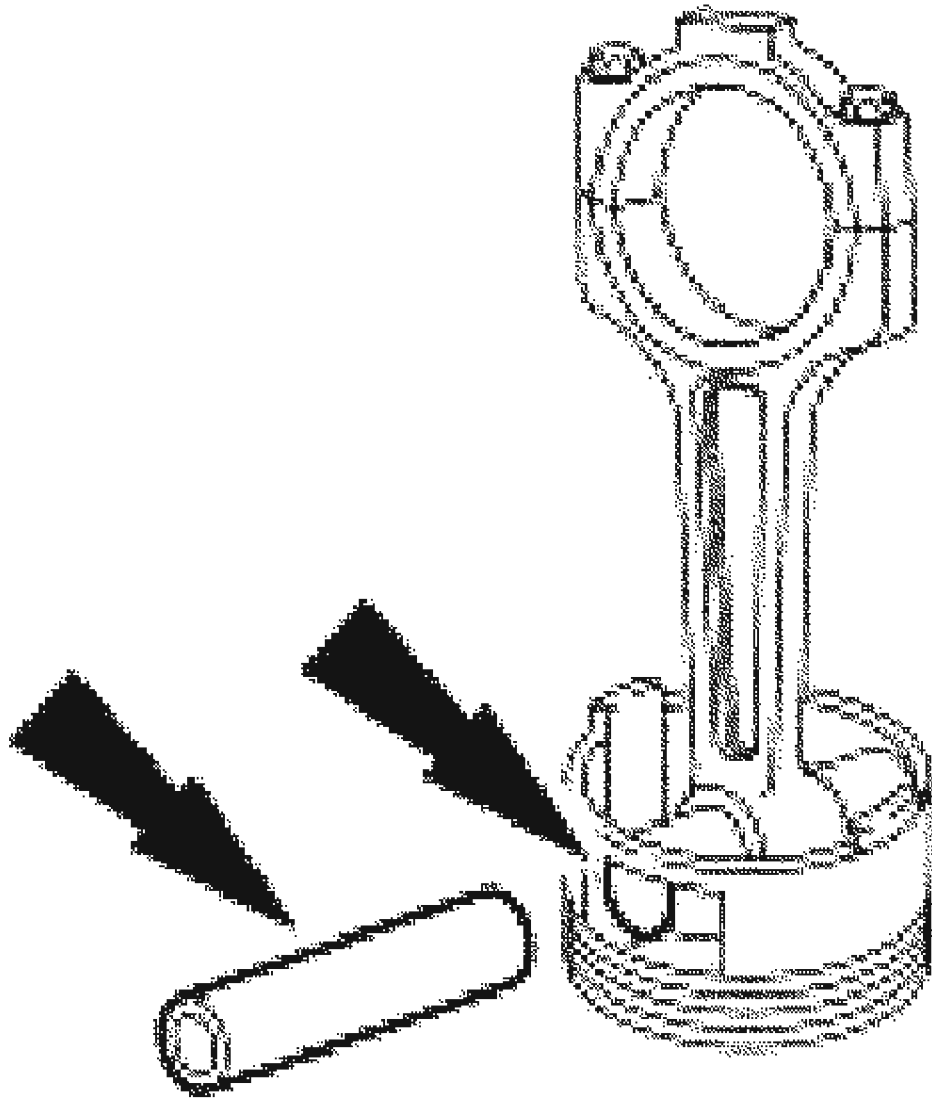


G02739523

**Fig. 350: Removing Piston Pin & Connecting Rod**  
Courtesy of FORD MOTOR CO.

8. Clean and inspect the connecting rod and the piston. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

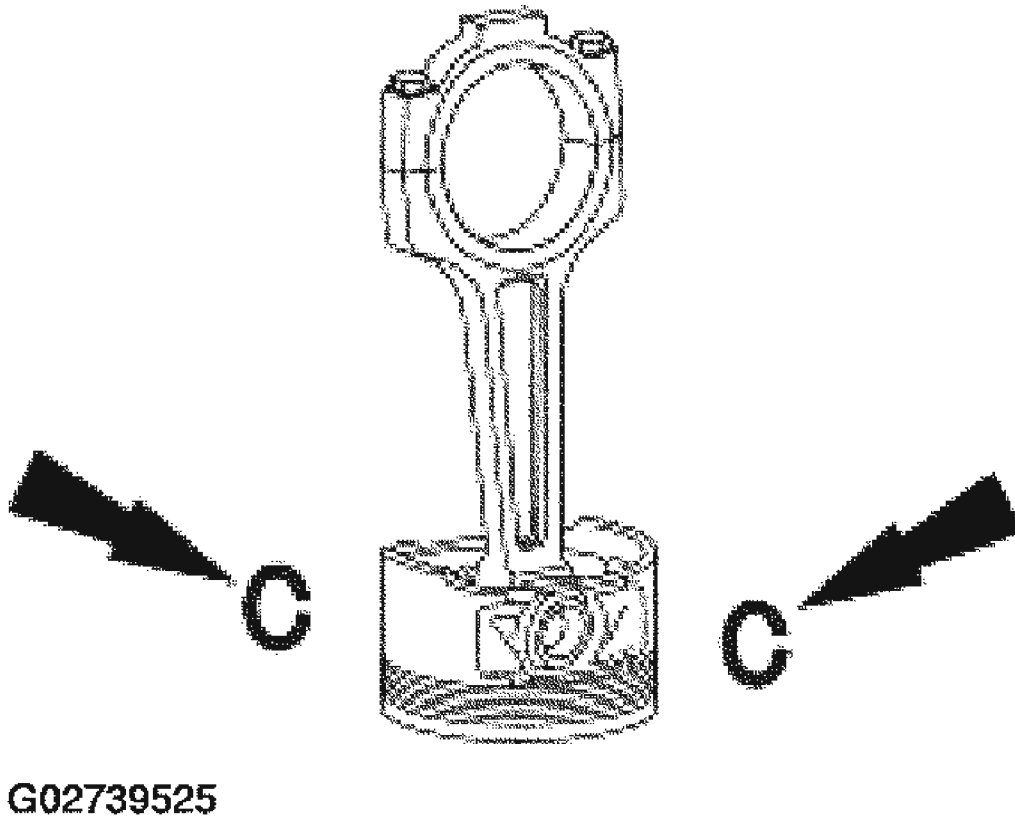
1. Lubricate the piston pin and piston bore with clean engine oil and install the piston pin.



**G02739524**

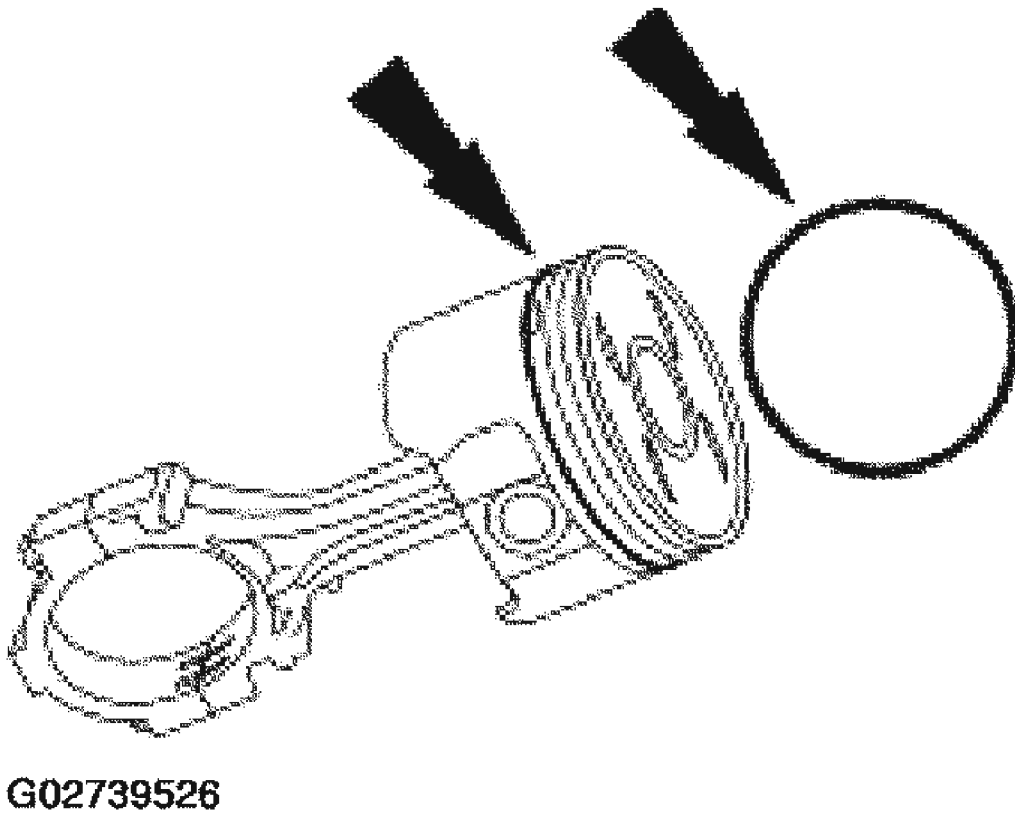
**Fig. 351: Identifying Piston Pin And Piston Bore**  
**Courtesy of FORD MOTOR CO.**

2. Install the clips.



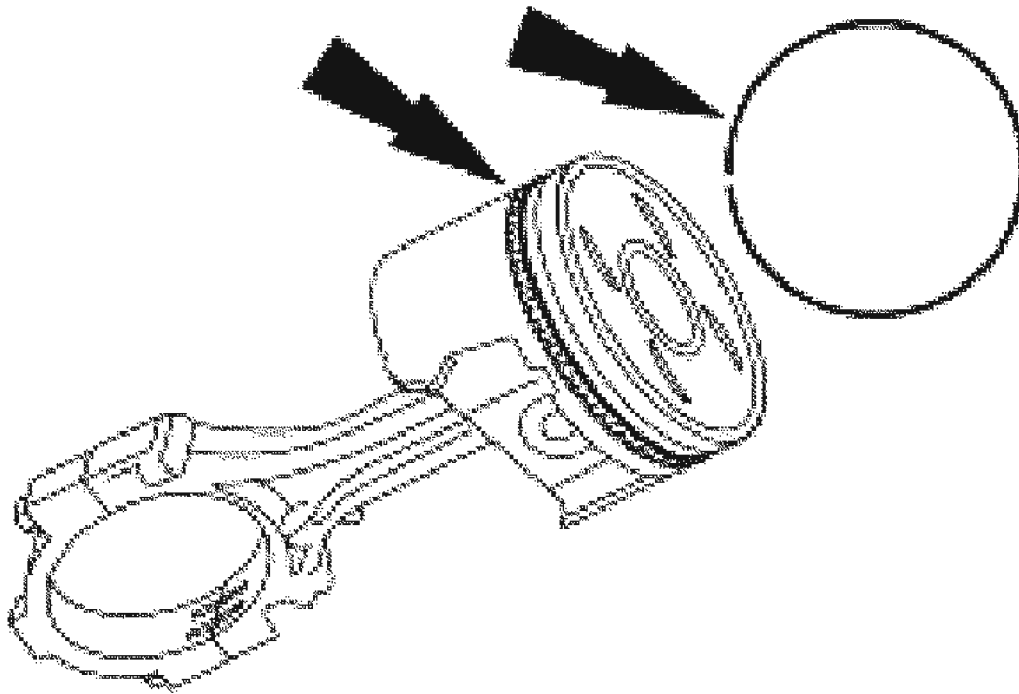
**Fig. 352: Installing Clips**  
Courtesy of FORD MOTOR CO.

3. Check the piston ring end gap. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**
4. Lubricate the piston rings with clean engine oil.
5. Install the first oil control ring.



**Fig. 353: Installing First Oil Control Ring**  
Courtesy of FORD MOTOR CO.

6. Install the oil control spacer ring.

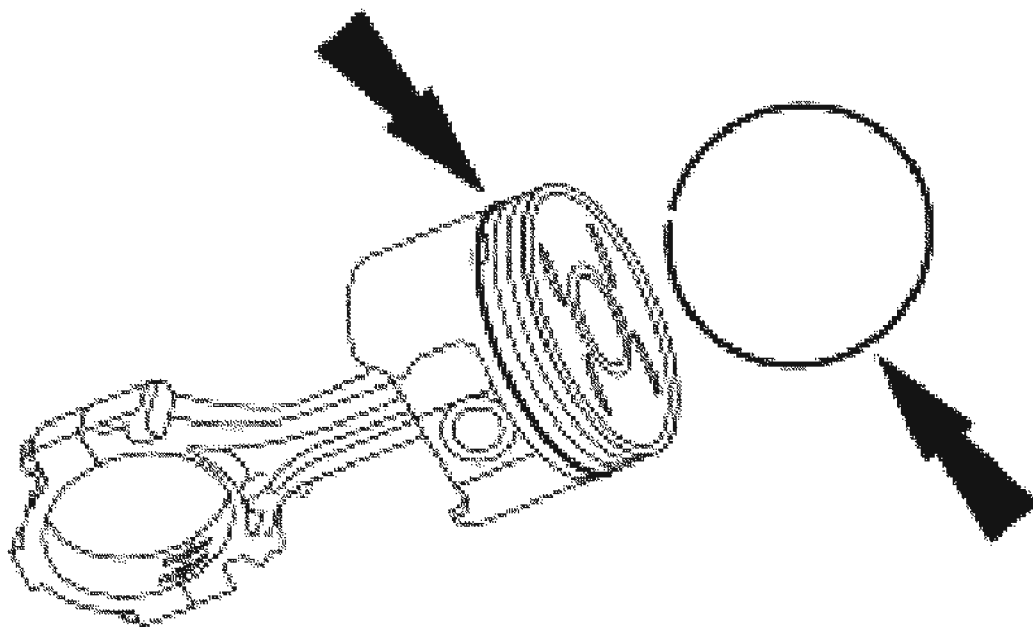


**G02739527**

**Fig. 354: Installing Oil Control Spacer Ring**  
Courtesy of FORD MOTOR CO.

7. Install the second oil control ring.

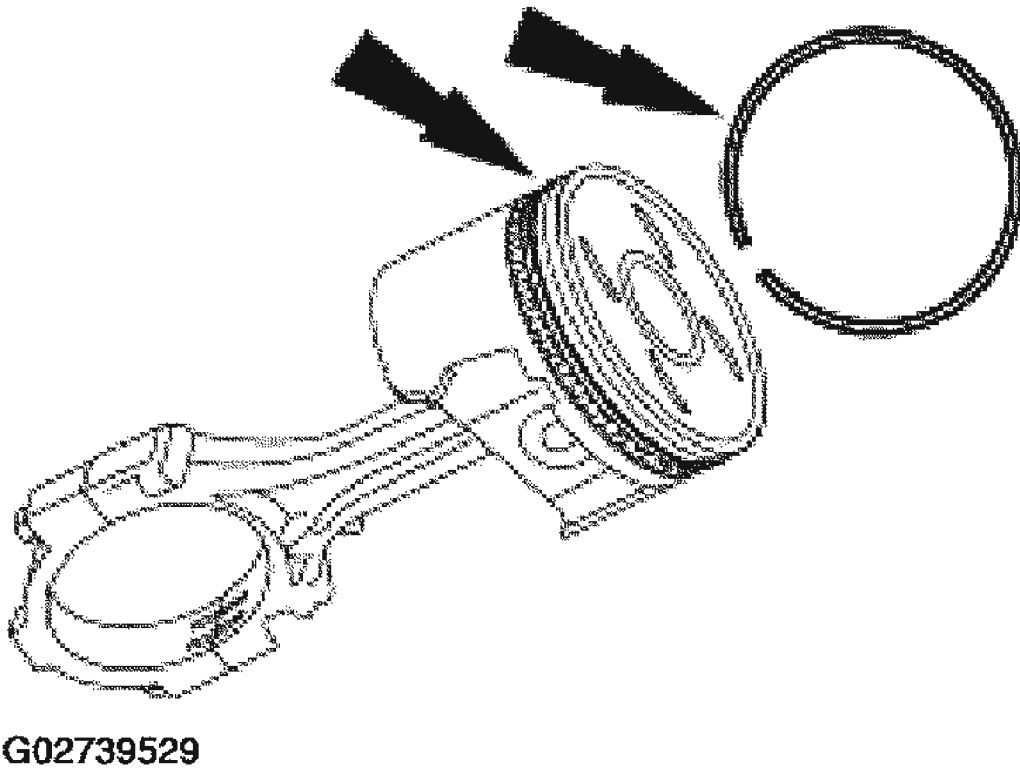




**G02739528**

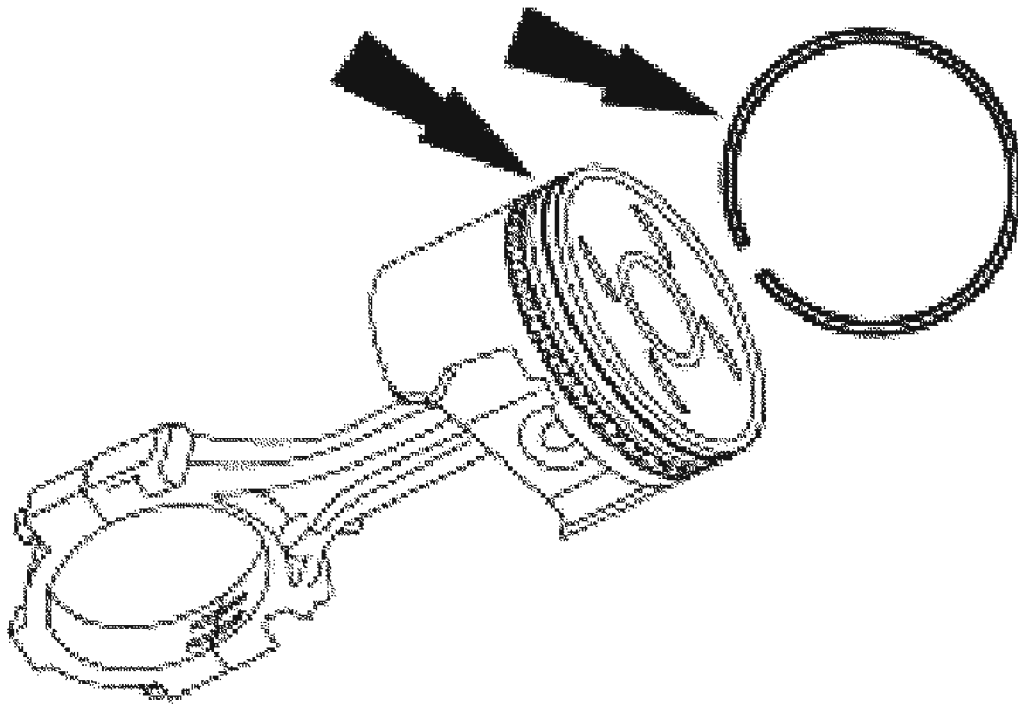
**Fig. 355: Installing Second Oil Control Ring**  
**Courtesy of FORD MOTOR CO.**

8. Install the second compression ring.
  - The top of the second compression ring has a "0" on it. Position this side of the ring towards the top of the piston.



**Fig. 356: Installing Second Compression Ring**  
Courtesy of FORD MOTOR CO.

9. Install the top compression ring.
  - The top compression ring can be installed with either side up.



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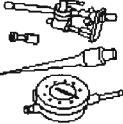


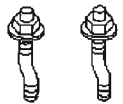

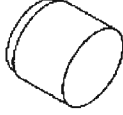

**Fig. 357: Installing Top Compression Ring**  
Courtesy of FORD MOTOR CO.

## ASSEMBLY

### ENGINE

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Installer, Connecting Rod 303-462 (T94P-6136-AH)
	Installer, Crankshaft Vibration Damper 303-102 (T74P-6316-B)
	Installer, Front Cover Oil Seal 303-335 (T88T-6701-A)
	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C)
	Holding Tool, Flywheel 303-101( T74P-6375-A)
	Installer, Crankshaft Rear Main Oil Seal 303-178 (T82L-6701-A)
	Installer Bolts, Crankshaft Rear Main Oil Seal 303-384 (T91P-6701-A)
	Installer, Power Steering Pump Pulley 211-185 (T91P-3A733-A)
	Protector, Camshaft Oil Seal 303-463 (T91P-6256-AH)
	Installer, Camshaft Oil Seal 303-464 (T94P-6256-BH)

G02739531

**Fig. 358: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### MATERIAL SPECIFICATION

Item	Specification
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-	ESE-M1C171-A

## 2004 Ford Escape

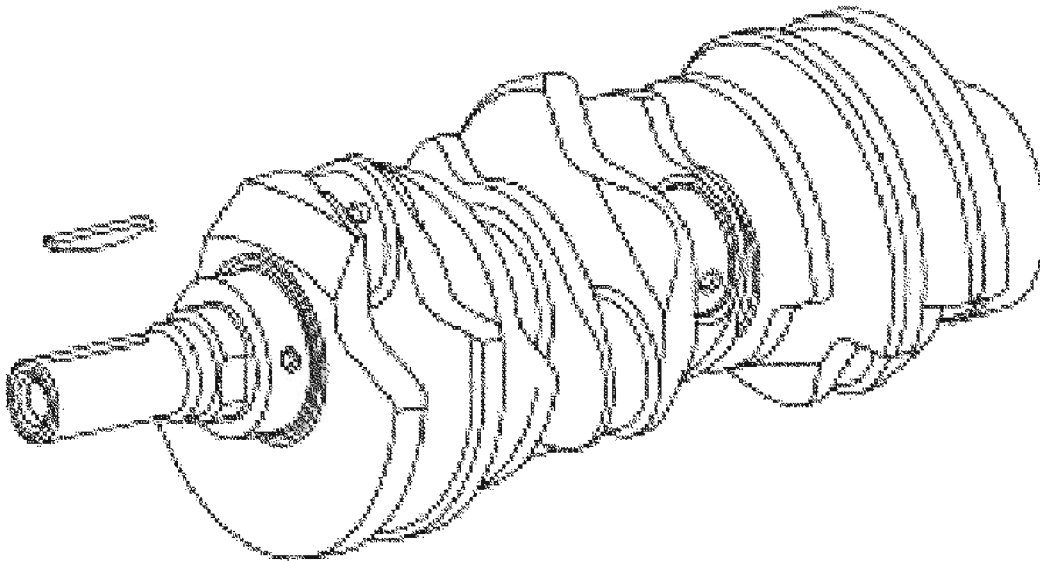
2004 ENGINE Engine - 3.0L (4V) - Escape

19A331-A	
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392- A
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA A4	WSE-M4G323- A4

### All vehicles

**WARNING:** Eye protection is required to be worn during the use of compressed air. Failure to wear eye protection could result in possible personal injury.

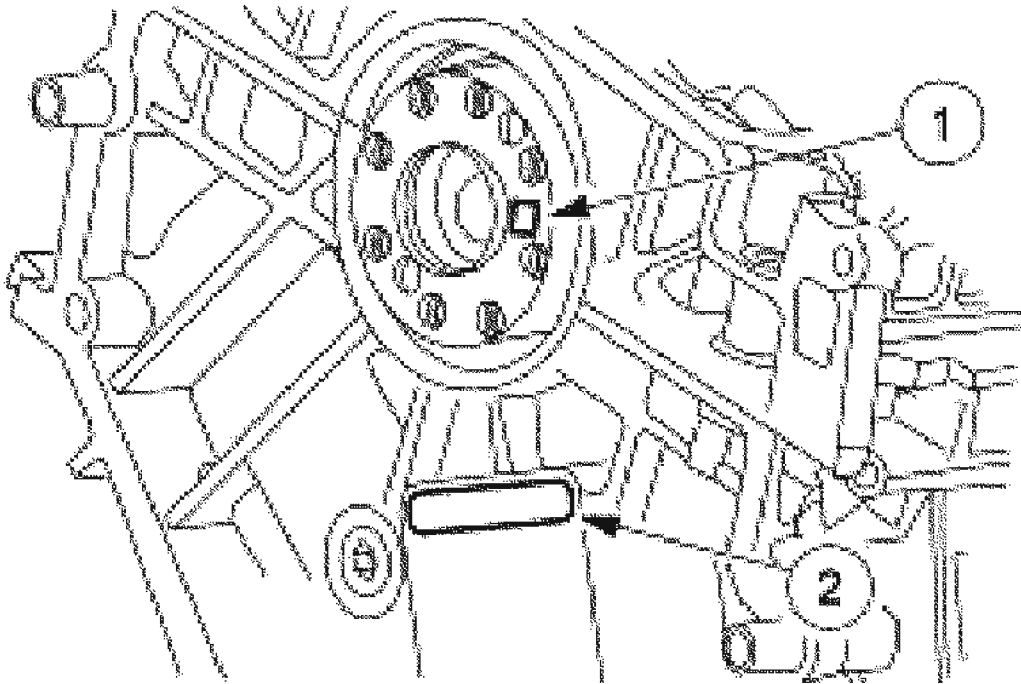
1. Clean gasket material, dirt and foreign material from the cylinder block. Wash the cylinder block with a suitable soap and water solution, and dry with compressed air.
2. If removed, install the crankshaft key into the keyway on the crankshaft.



G02739532

**Fig. 359: Installing Crankshaft Key Into Keyway On Crankshaft**  
Courtesy of FORD MOTOR CO.

**NOTE:** This procedure is for selecting bearings using a new crankshaft.



G02739533

**Fig. 360: Identifying Code On Crankshaft Flange**  
 Courtesy of FORD MOTOR CO.

3. Select the crankshaft main bearings for each crankshaft journal.
  1. Read the code on the crankshaft flange.
  2. Read the code on the cylinder block rear face.
    - The first two numbers after the asterisk make up the code for main No. 1 and the next two numbers for main No. 2.
    - The first two numbers after the second asterisk make up the code for main No. 3 and the last two numbers for main No. 4.
4. Using the Block Code chart, choose a bearing for each main. Match the block and crankshaft code with its corresponding column or row, by reading across the "crankshaft" row and down the "block" column.
  - For example: If the block code is \* 0609\* 0711\* and the crankshaft code is \*8580\* 8082\*, main No. 1 should use grade 1 bearings, as determined by the intersection of the 06 block column and the 85 crankshaft row. Mains 2, 3 and 4 should all be grade 2.

# 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

**BLOCK CODE**

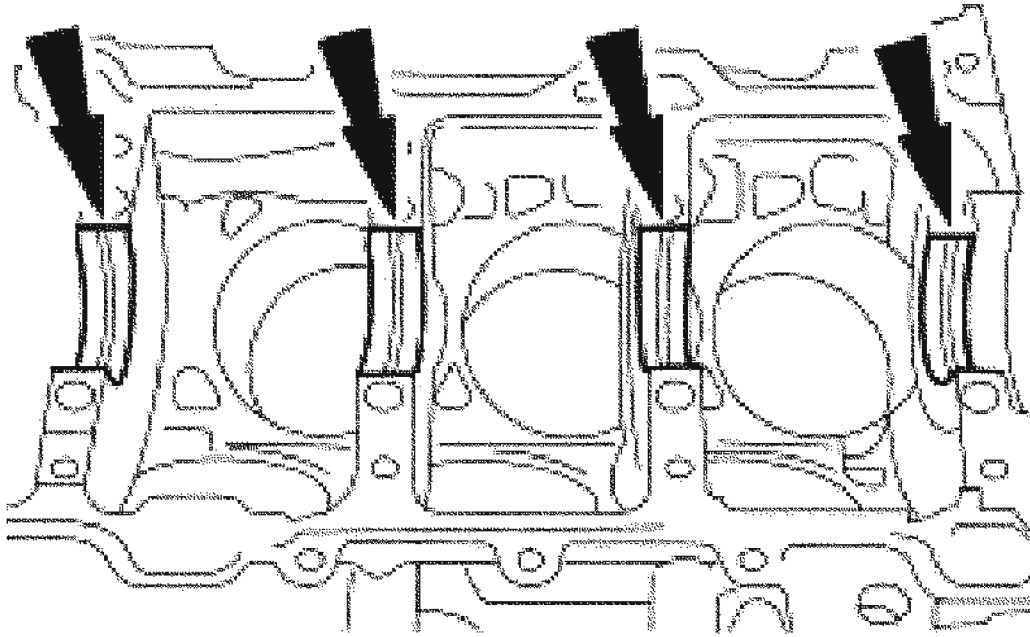
**C1**

	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
92	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
91	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
90	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
89	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
88	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
87	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
86	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
84	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
83	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
82	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
81	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
80	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
79	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
77	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
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74	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
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70	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
69	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
68	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

G02739534

**Fig. 361: Block Code Chart**  
Courtesy of FORD MOTOR CO.

5. Install the main bearings into the cylinder block.

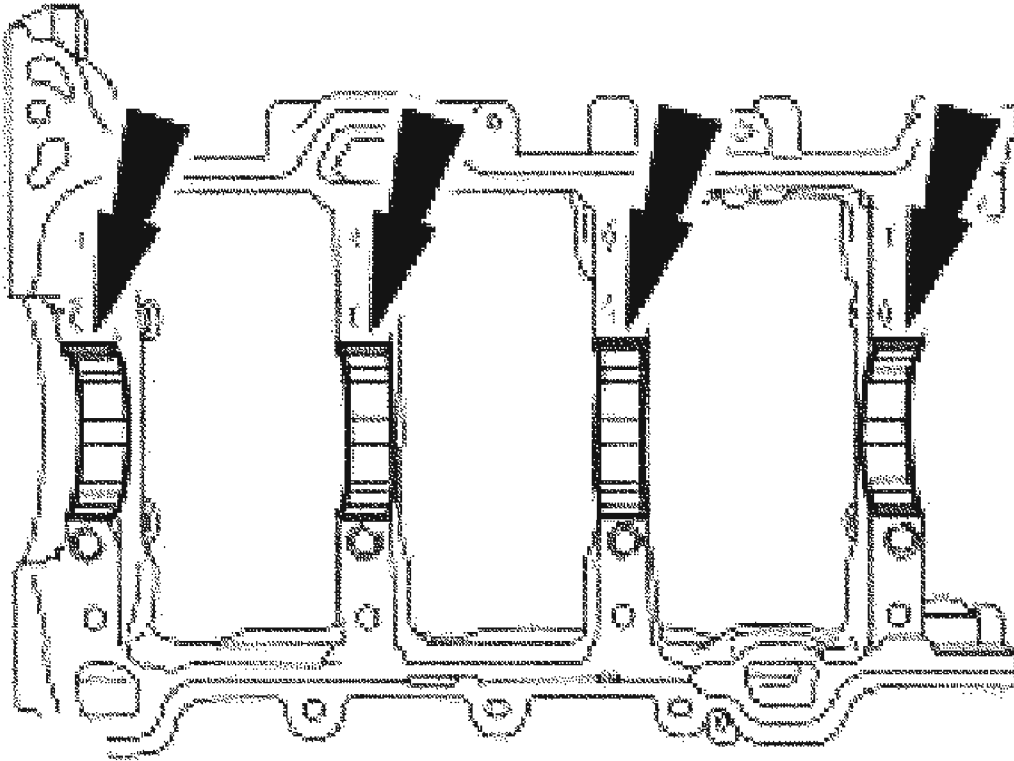


G02739535

**Fig. 362: Installing Main Bearings Into Cylinder Block**  
Courtesy of FORD MOTOR CO.

6. Install the main bearings into the lower cylinder block.

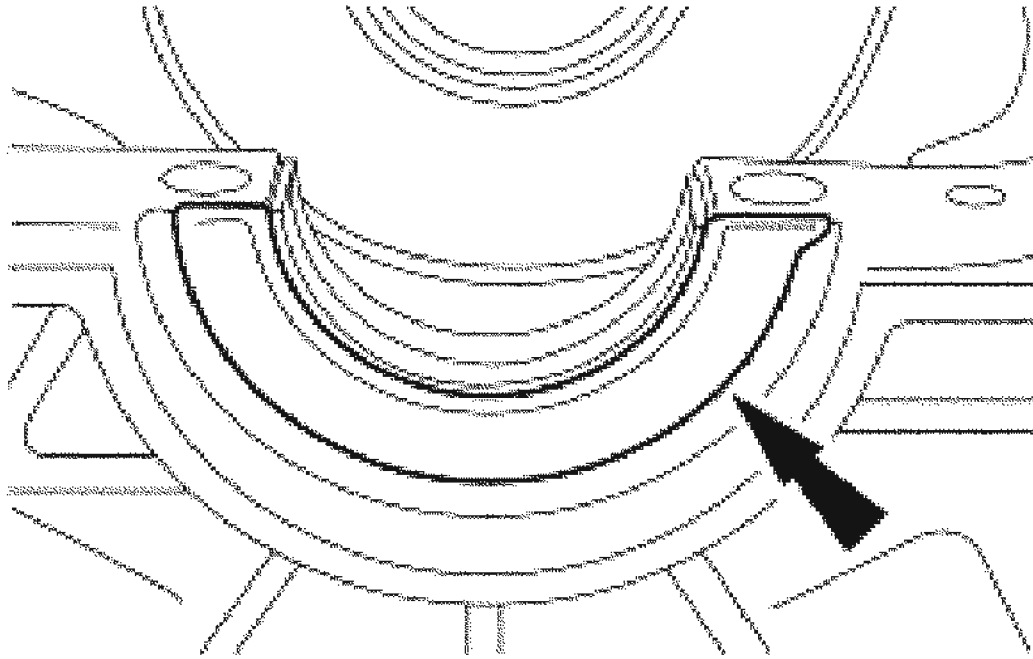




G02739536

**Fig. 363: Installing Main Bearings Into Lower Cylinder Block**  
Courtesy of FORD MOTOR CO.

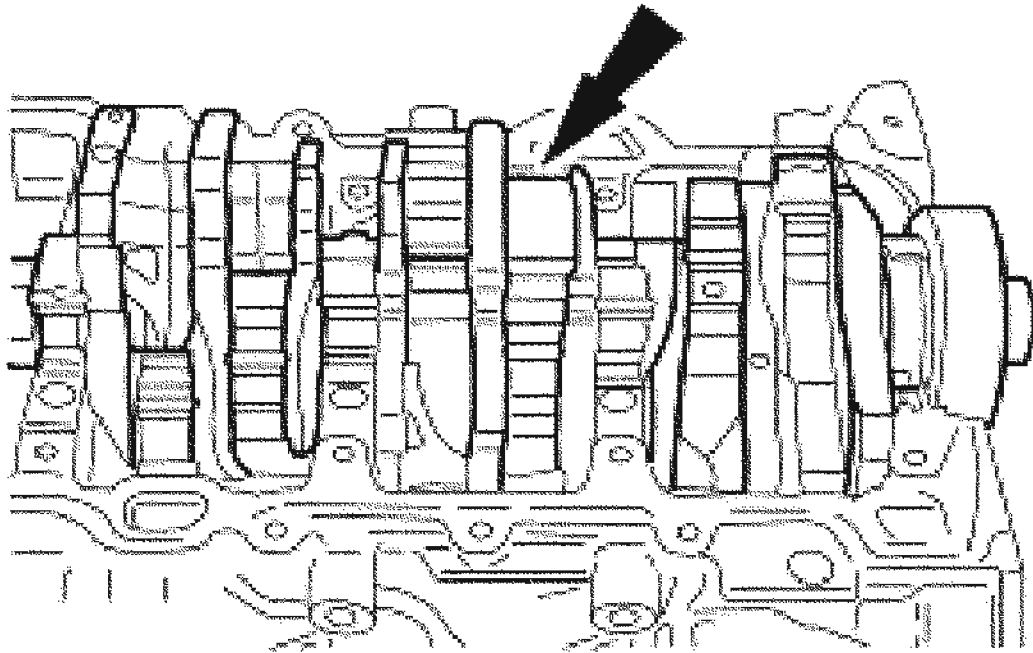
7. Install the crankshaft thrust bearing.



G02739537

**Fig. 364: Installing Crankshaft Thrust Bearing**  
Courtesy of FORD MOTOR CO.

8. Apply clean engine oil to the crankshaft main and rod bearing journals.
9. Position the crankshaft in the cylinder block.

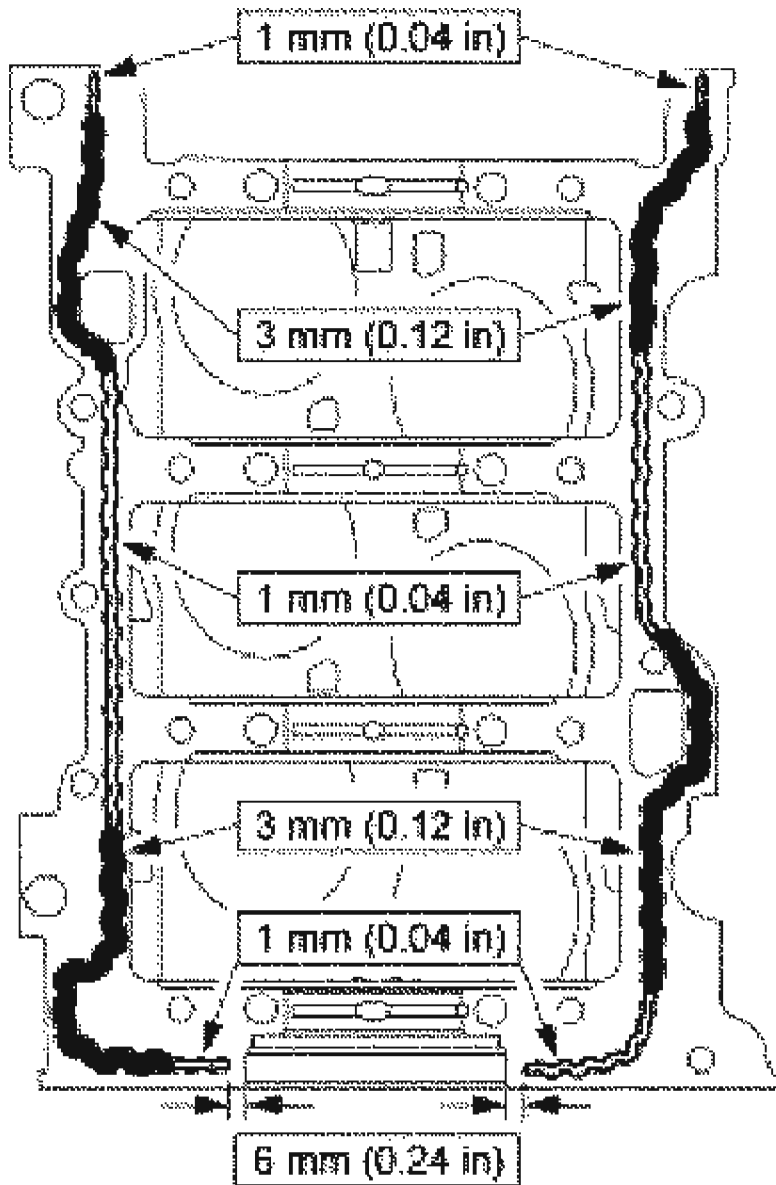


G02739538

**Fig. 365: Positioning Crankshaft In Cylinder Block**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The lower cylinder block must be installed and the bolts tightened within four minutes of applying the sealant.

**NOTE:** Clean and degrease both surfaces using metal surface cleaner before applying silicone gasket and sealer.



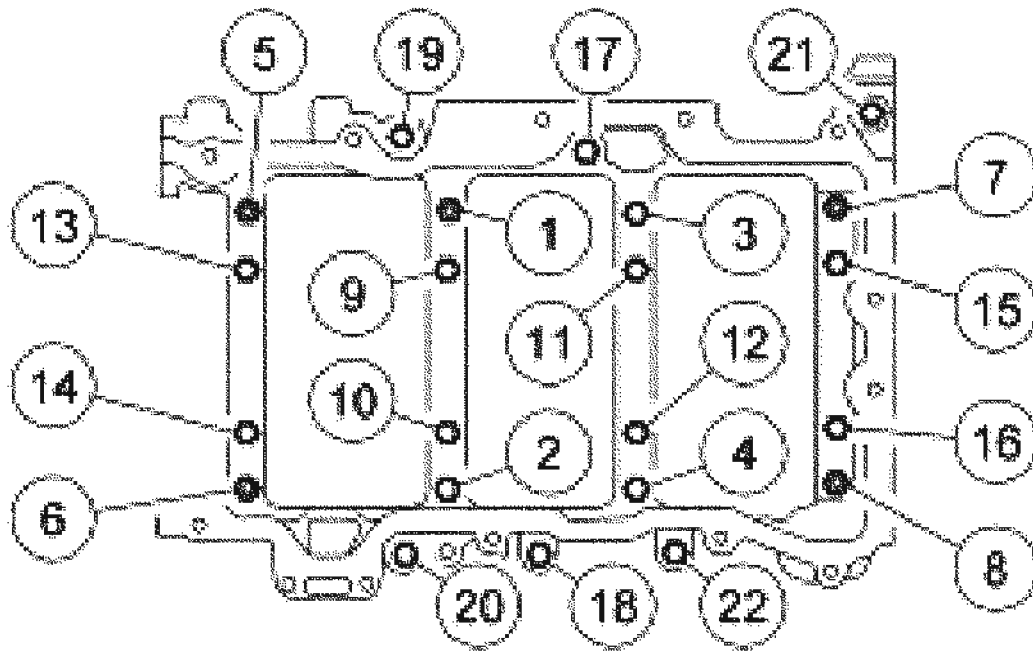
G02739539

**Fig. 366: Applying Silicon Gasket**  
Courtesy of FORD MOTOR CO.

10. Apply silicone gasket and sealant to the cylinder block as shown.

**CAUTION:** Fasteners No. 1,5, 6,7, 8 are studs. Fasteners No. 18-22 are M8 X 1.25 mm X 79.3 mm (0.05 in X 3.12 in) bolts.

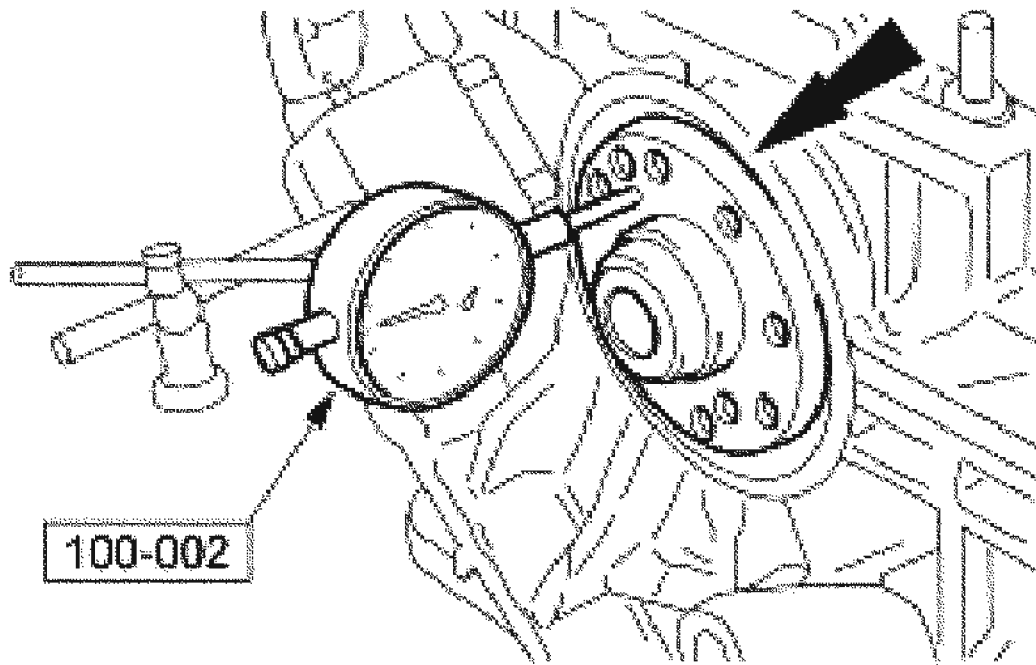
Fasteners No. 2-4,17 are M8 X 1.25 mm X 95.3 mm (0.05 in X 3.75 in) bolts. Fasteners 9-16 are M10 X 1.5 mm X 106 mm (0.06 in X 4.17 in) bolts. The bolts and studs must be installed in the correct position or engine damage can result.



G02739540

**Fig. 367: Identifying Tightening Sequence**  
Courtesy of FORD MOTOR CO.

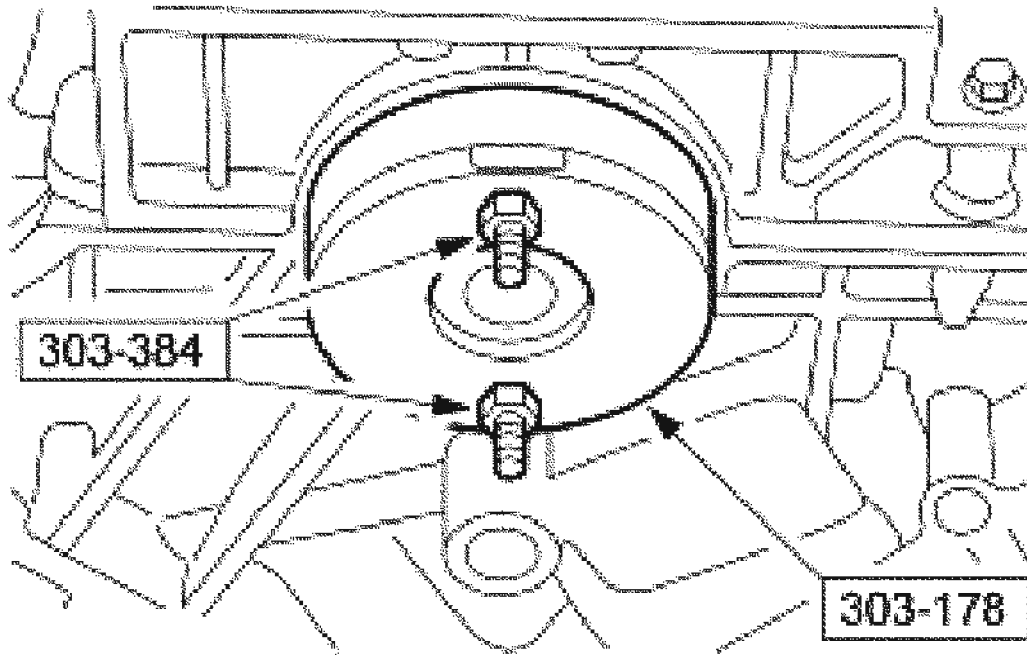
11. Position the lower cylinder block and install the bolts and studs in the sequence shown in four stages.
  - Stage 1: Tighten fasteners 1-8 to 25 Nm (18 lb-ft).
  - Stage 2: Tighten fasteners 9-16 to 40 Nm (30 lb-ft).
  - Stage 3: Tighten fasteners 1-16 90 degrees.
  - Stage 4: Tighten fasteners 17-22 to 25 Nm (18 lb-ft).
12. Using the special tool, measure the crankshaft end play.



G02739541

**Fig. 368: Measuring Crankshaft End Play**  
Courtesy of FORD MOTOR CO.

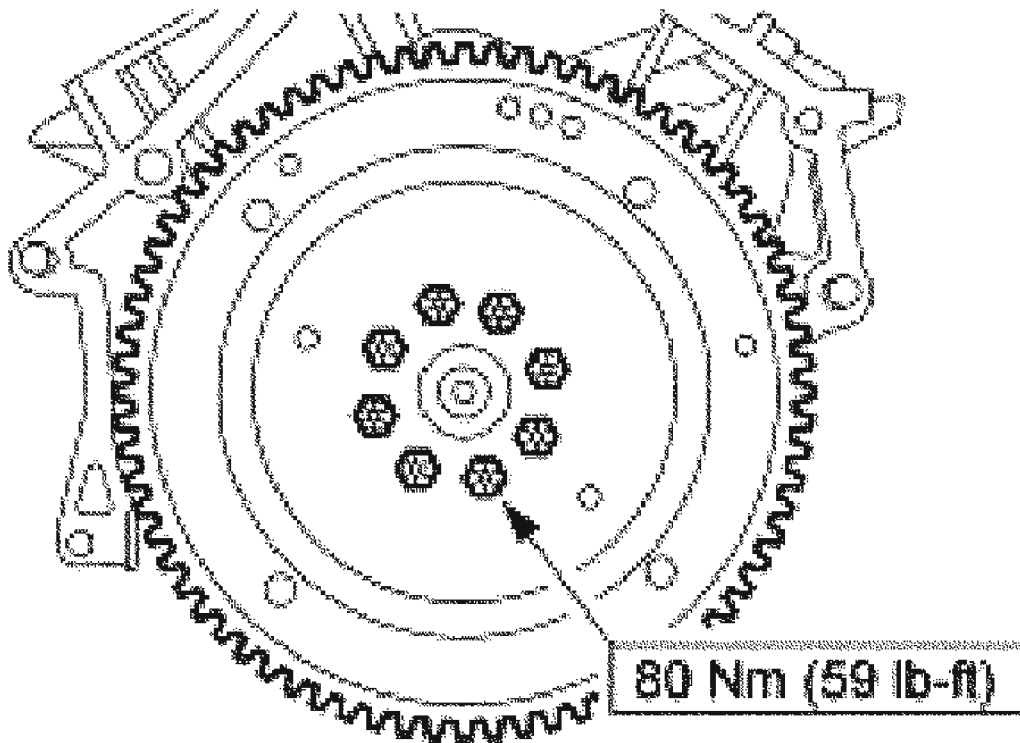
**NOTE:** Lubricate the seal lips with clean engine oil before installing.



G02739542

**Fig. 369: Installing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

13. Using the special tools, install the crankshaft rear oil seal.
14. Position the flexplate and install the bolts.

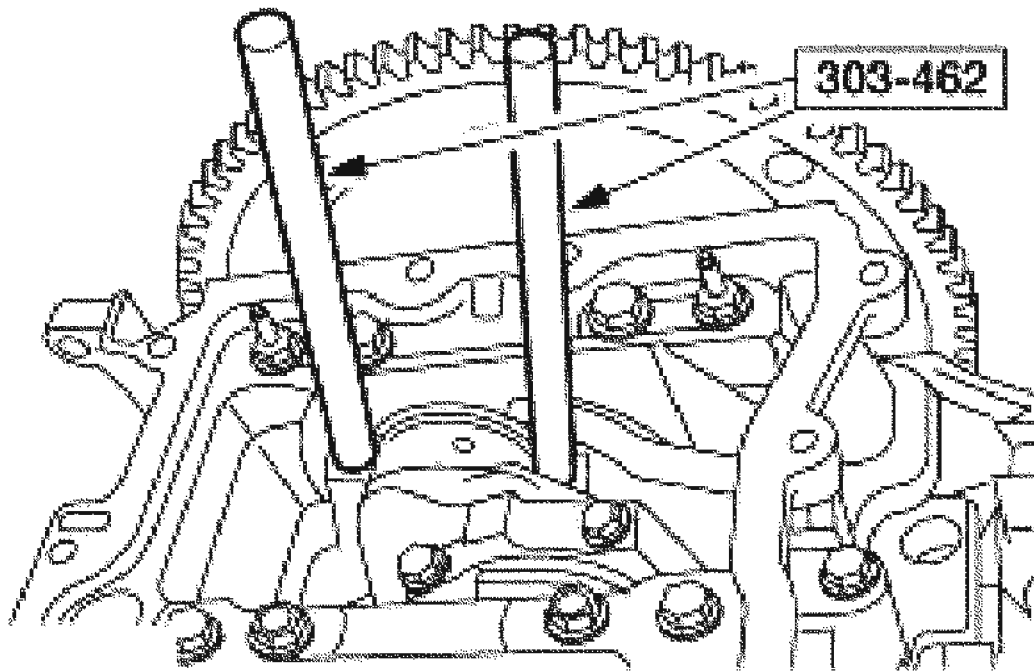


G02739543

**Fig. 370: Identifying Flexplate Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

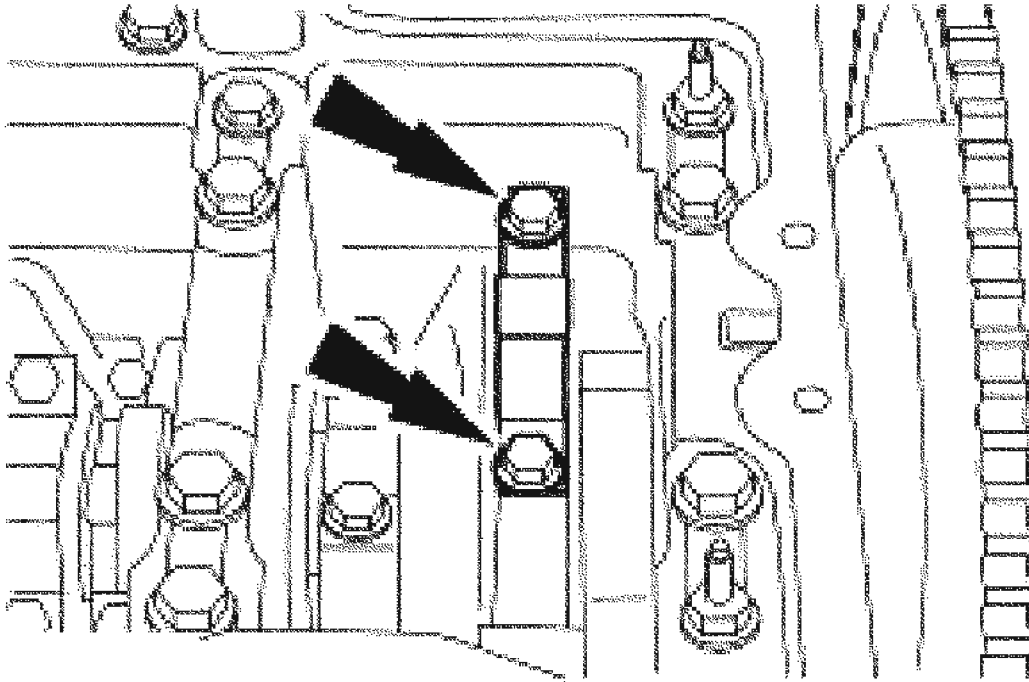
15. Mount the engine on an engine stand.
16. Apply clean engine oil to the cylinder bores.
17. Using the special tools, install the piston and connecting rod assemblies.





**Fig. 371: Installing Piston And Connecting Rod Assemblies**  
Courtesy of FORD MOTOR CO.

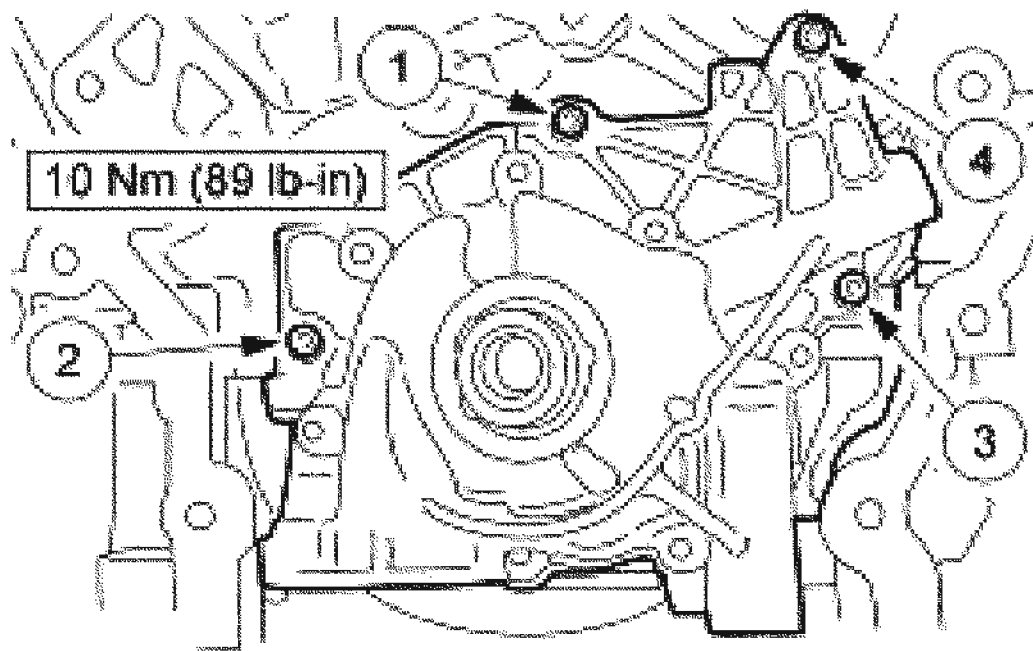
18. Check connecting rod bearing clearance. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**
19. Install the connecting rod caps and tighten the bolts in two stages.
  - Stage 1: Tighten to 23 Nm (17 lb-ft).
  - Stage 2: Tighten to 43 Nm (32 lb-ft).



G02739545

**Fig. 372: Installing Connecting Rod Caps**  
Courtesy of FORD MOTOR CO.

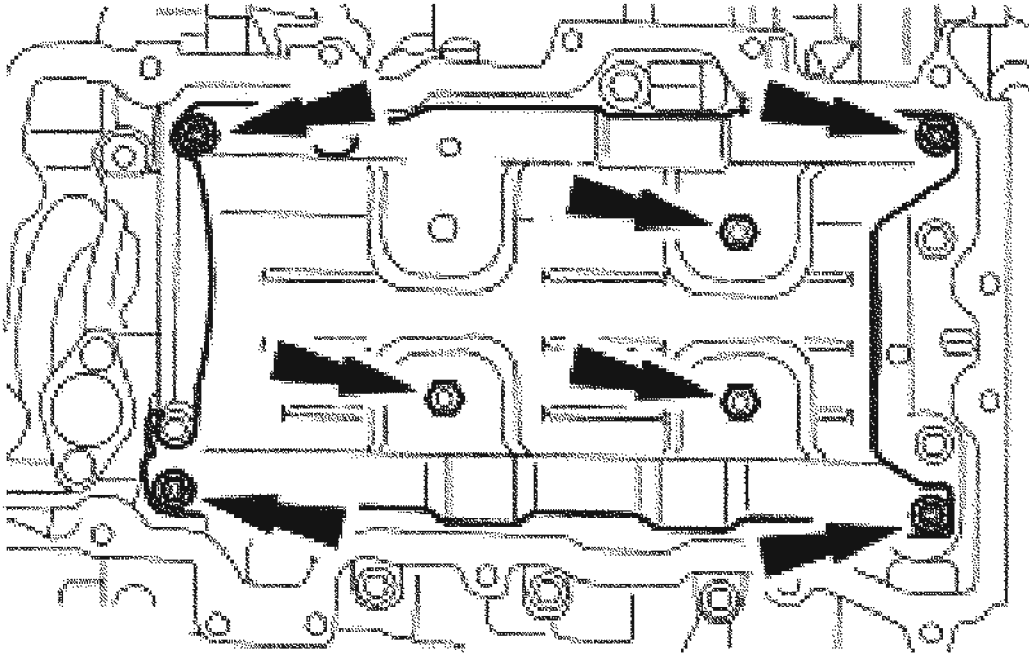
20. Position the oil pump and install the bolts in the indicated sequence.



G02739546

**Fig. 373: Identifying Oil Pump Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

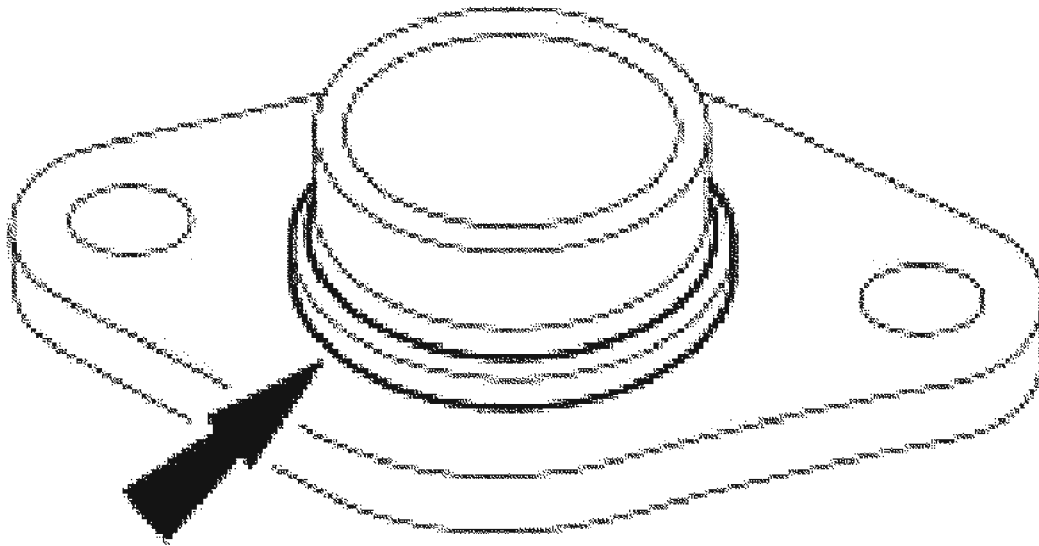
21. Position the oil pan baffle. Install the nuts and tighten in two stages.
  - Stage 1: Tighten to 5 Nm (44 lb-in).
  - Stage 2: Tighten 45 degrees.



G02739547

**Fig. 374: Positioning Oil Pan Baffle**  
Courtesy of FORD MOTOR CO.

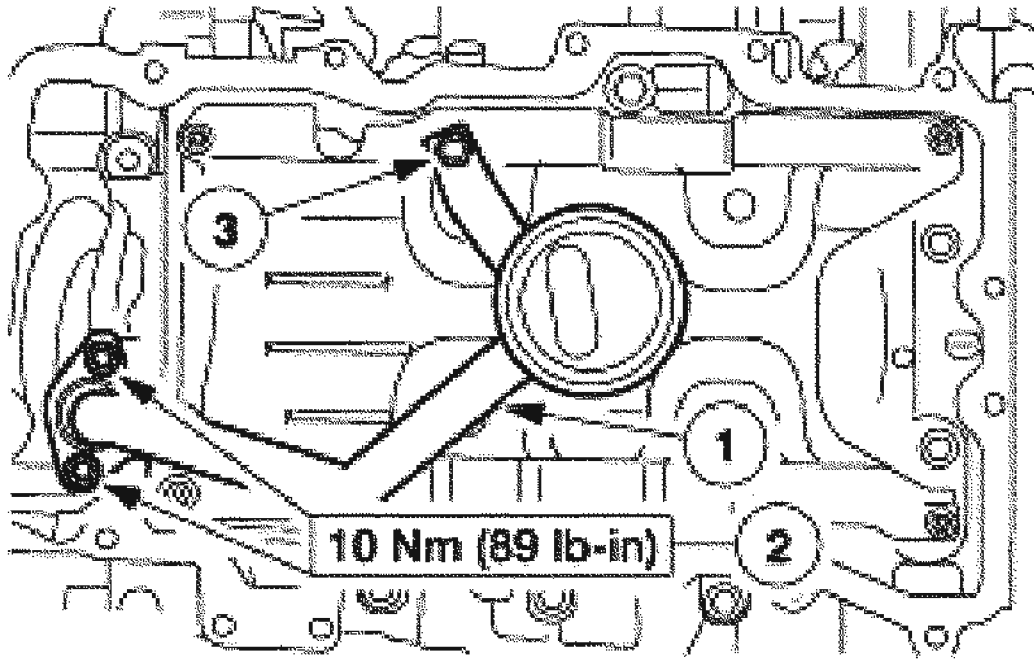
22. Install a new O-ring seal on the oil pump screen and pickup tube. Lubricate with clean engine oil.



**G02739548**

**Fig. 375: Installing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

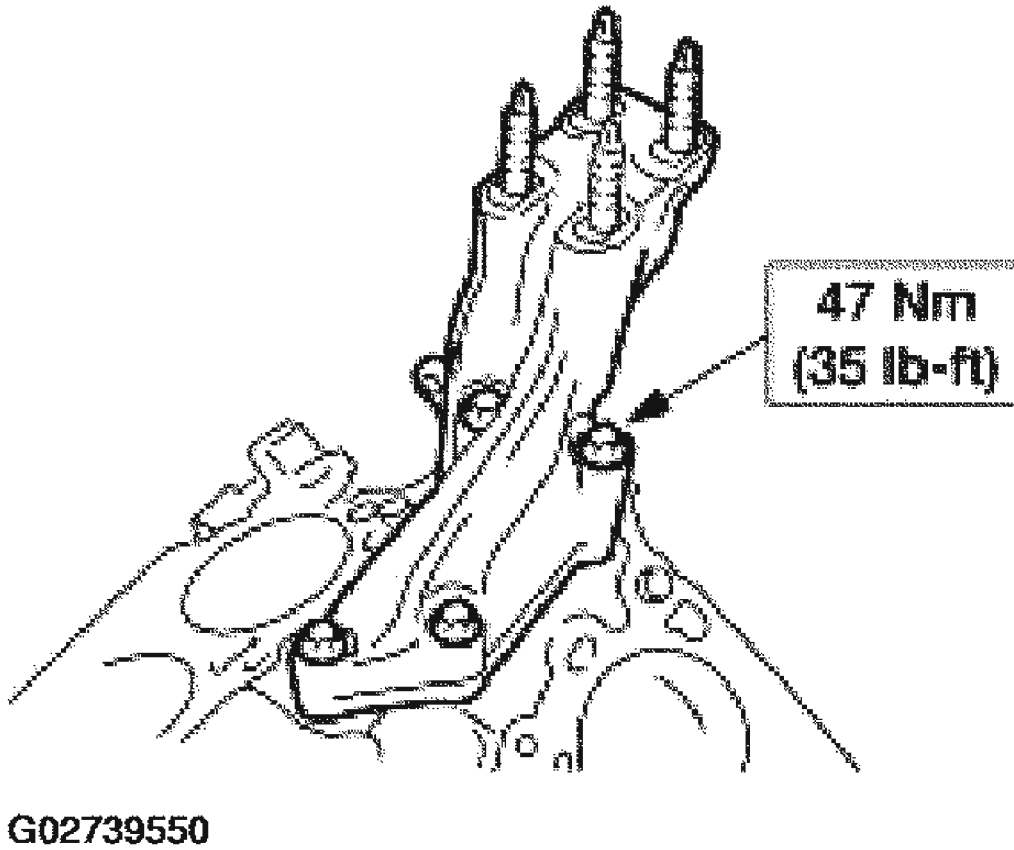
23. Install the oil pump screen and pickup tube.
  1. Position the oil pump screen and pickup tube.
  2. Install the bolts.
  3. Install the nut and tighten in two stages.
    - Stage 1: Tighten to 5 Nm (44 lb-in).
    - Stage 2: Tighten 45 degrees.



G02739549

**Fig. 376: Installing Oil Pump Screen & Pickup Tube**  
Courtesy of FORD MOTOR CO.

24. Install the power steering/engine support bracket.



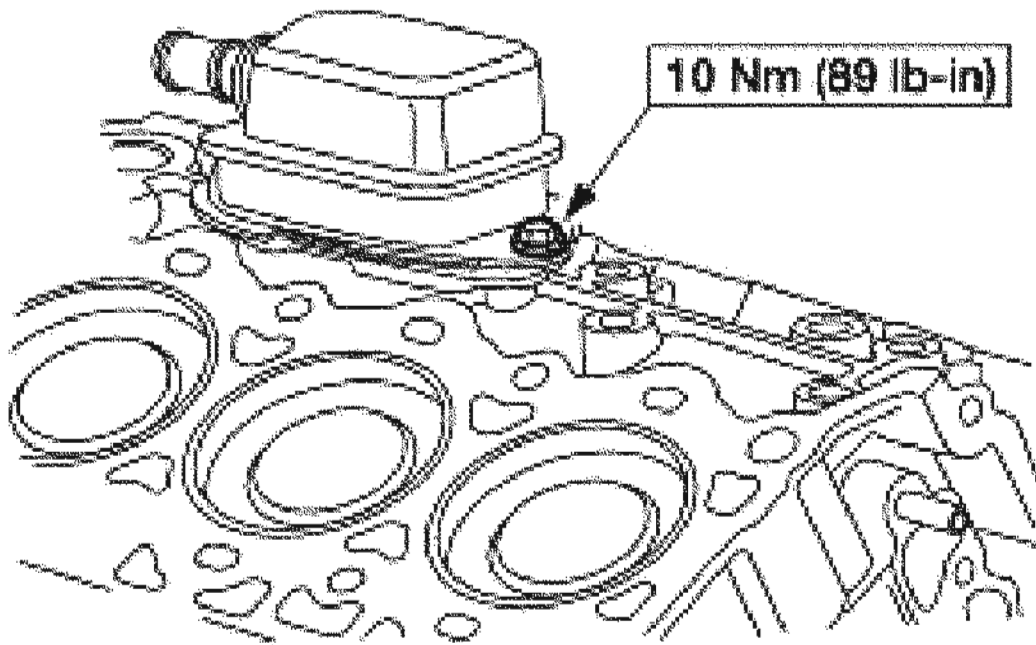
**Fig. 377: Identifying Power Steering/Engine Support Bracket Bolt Torque Specification**

**Courtesy of FORD MOTOR CO.**

25. Install the oil separator, a new gasket and the mounting bolts.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

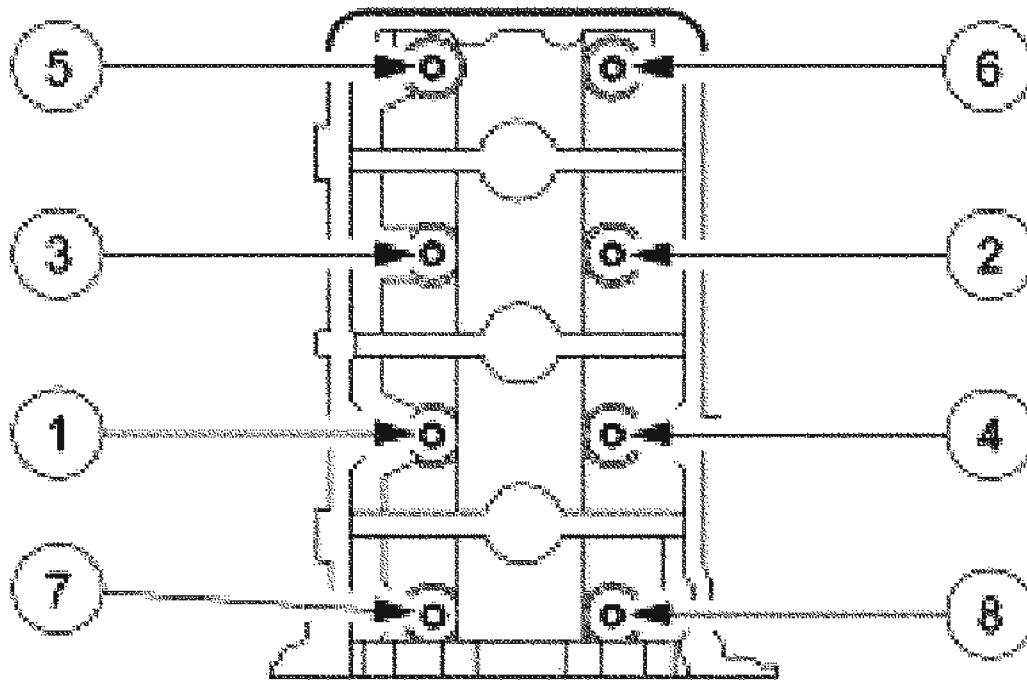


G02739551

**Fig. 378: Identifying Oil Separator Mounting Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

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

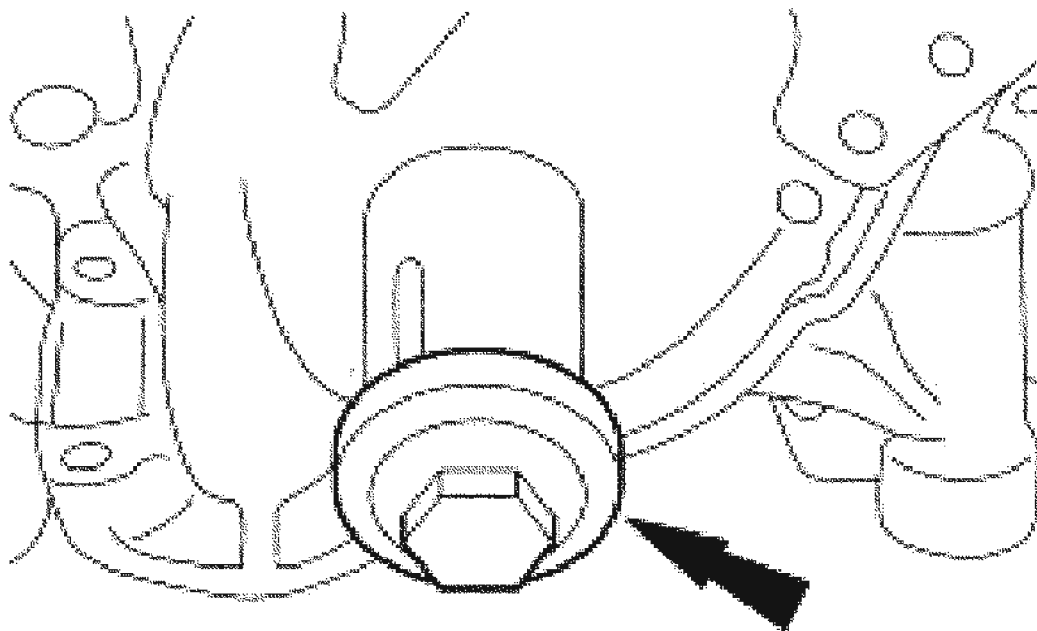




G02739552

**Fig. 379: Installing Bolts And Tightening Sequence**  
Courtesy of FORD MOTOR CO.

26. Position the LH and RH cylinder heads and gaskets. Install the bolts and tighten in the sequence shown in six stages.
- Stage 1: Tighten to 40 Nm (30 lb-ft).
  - Stage 2: Tighten to 90 Nm (66 lb-ft).
  - Stage 3: Loosen one full turn.
  - Stage 4: Tighten to 40 Nm (30 lb-ft).
  - Stage 5: Tighten 90 degrees.
  - Stage 6: Tighten 90 degrees.
27. Install the crankshaft damper bolt and rotate the crankshaft keyway to the 11 o'clock position to locate top dead center (TDC).



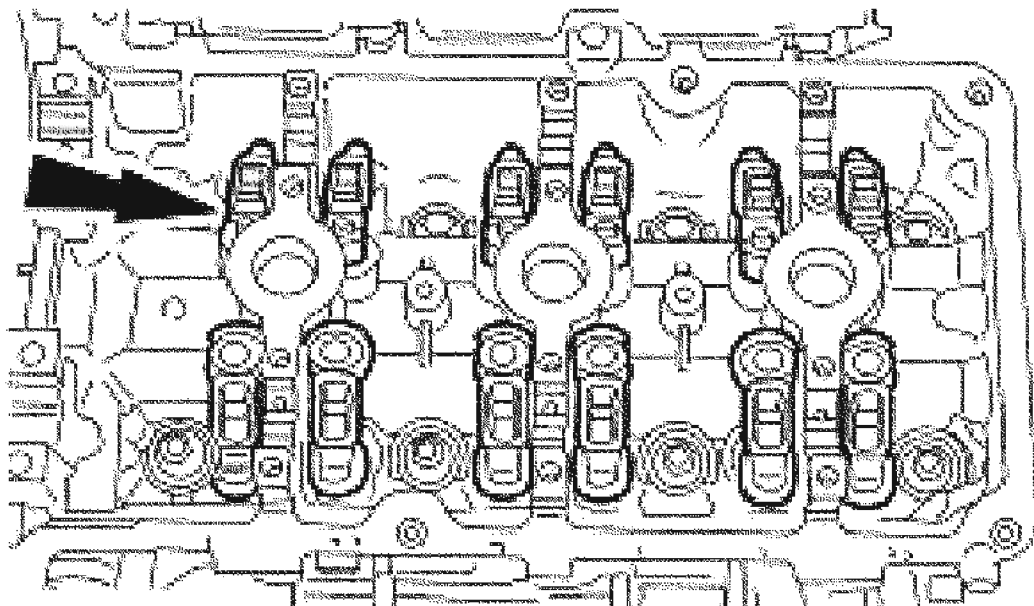
G02739553

**Fig. 380: Installing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

28. Apply clean engine oil to the LH and RH camshaft followers.

**CAUTION:** The camshaft followers must be installed in the original position.

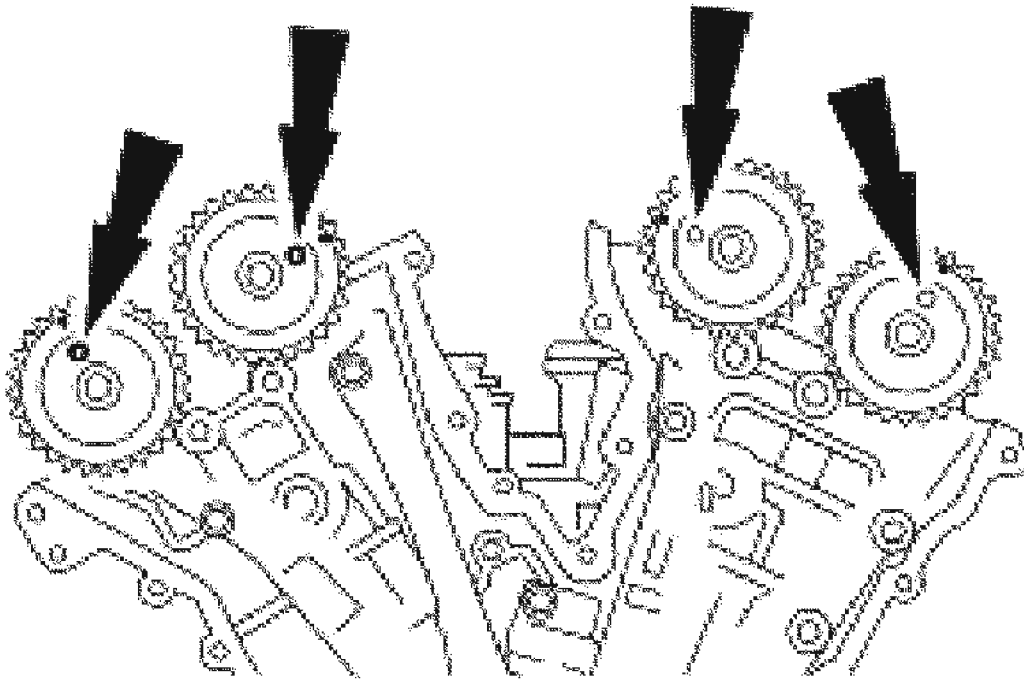
**NOTE:** RH shown; LH similar.



G02739554

**Fig. 381: Installing LH And RH Camshaft Followers**  
Courtesy of FORD MOTOR CO.

29. Install the LH and RH camshaft followers.
30. Apply clean engine oil to the LH and RH camshafts.
31. Install the LH and RH camshafts.
  - Locate the camshafts as shown.

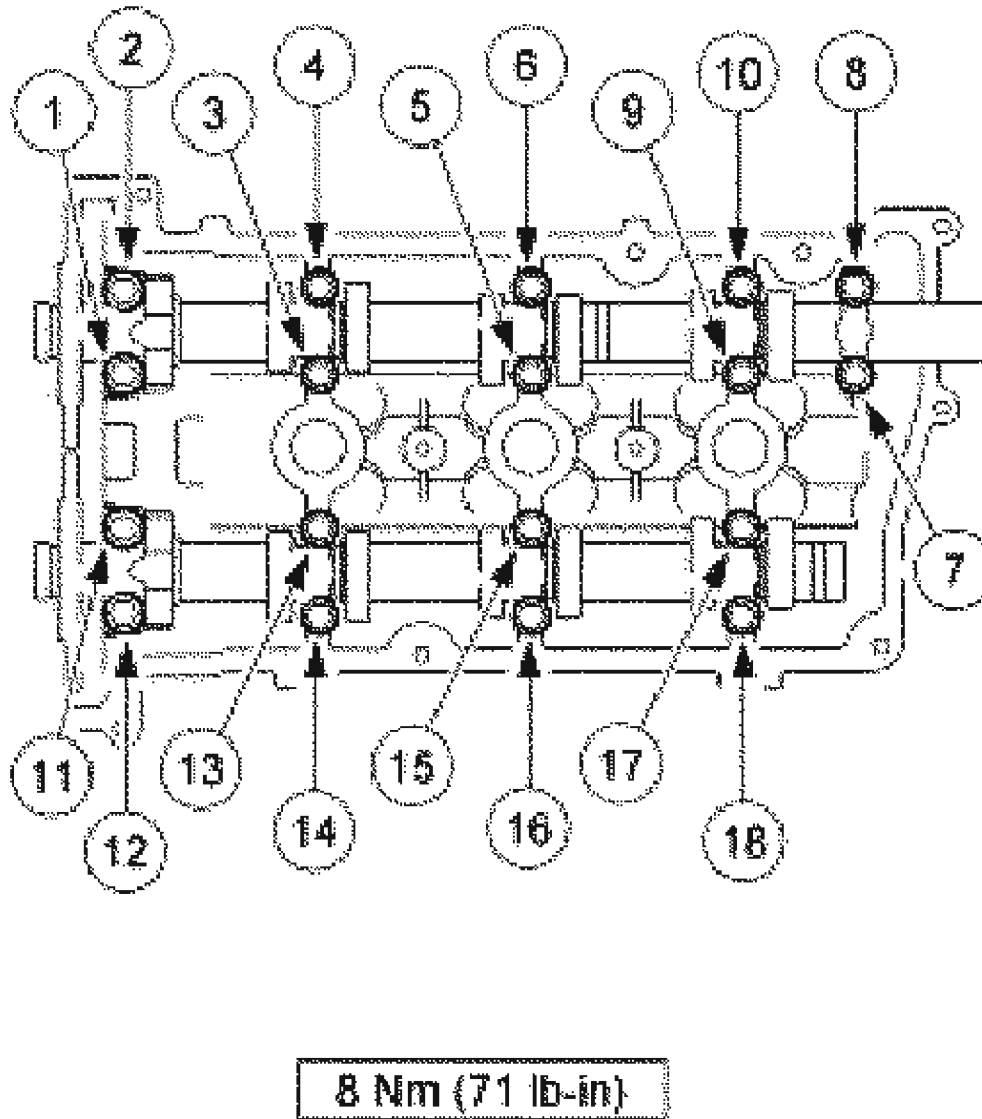


G02739555

**Fig. 382: Installing LH And RH Camshafts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled in their original positions.

**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps can occur.



G02739556

**Fig. 383: Identifying Tightening Sequence & Torque Specification Of Camshaft Journal Cap Bolts**

Courtesy of FORD MOTOR CO.

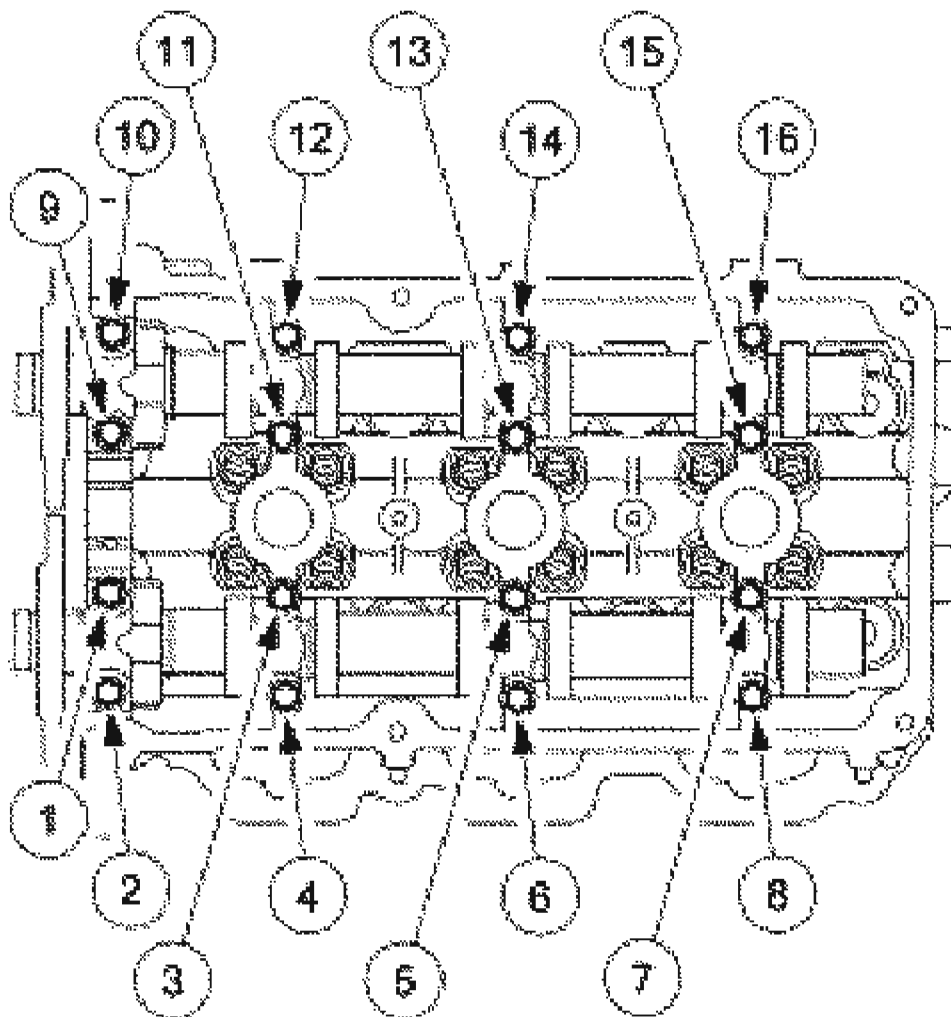
32. Lubricate the camshaft journal caps with clean engine oil. Position the LH camshaft caps and install the bolts in the sequence shown.

**CAUTION: Cylinder head camshaft journal caps and cylinder**

heads are numbered to verify that they are assembled in their original positions.

**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps can occur.

10 Nm (89 lb-in)



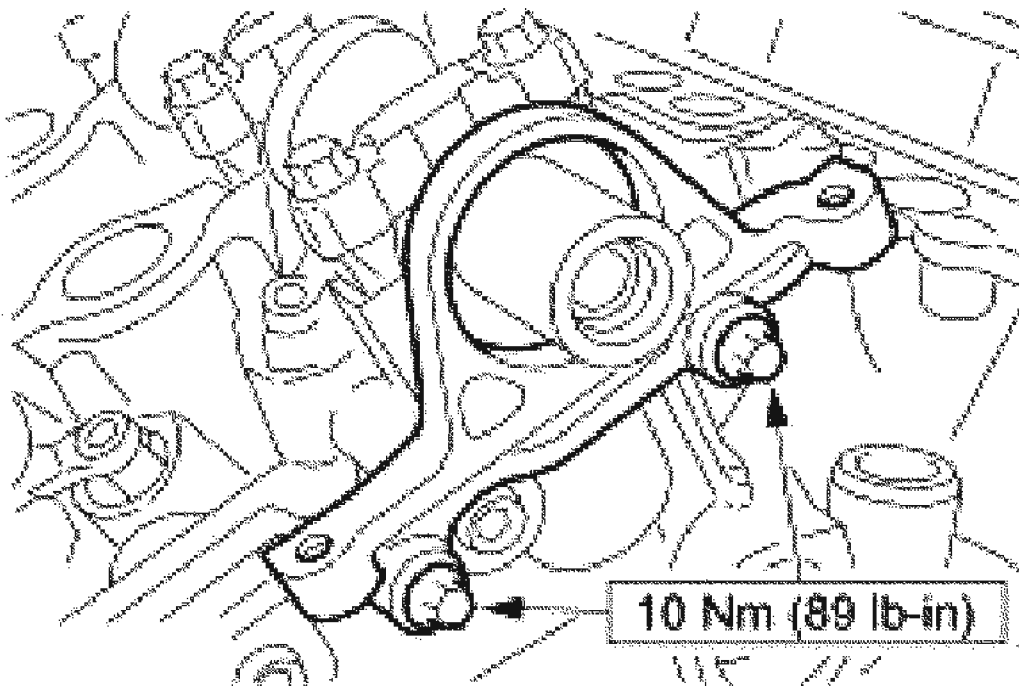
G02739557

**Fig. 384: Identifying Tightening Sequence & Torque Specification Of RH Camshaft Caps**

Courtesy of FORD MOTOR CO.

33. Position the RH camshaft caps and install the bolts in the sequence shown.

**NOTE:** Clean the sealing surface with metal surface cleaner before installing the press-in-place gasket.



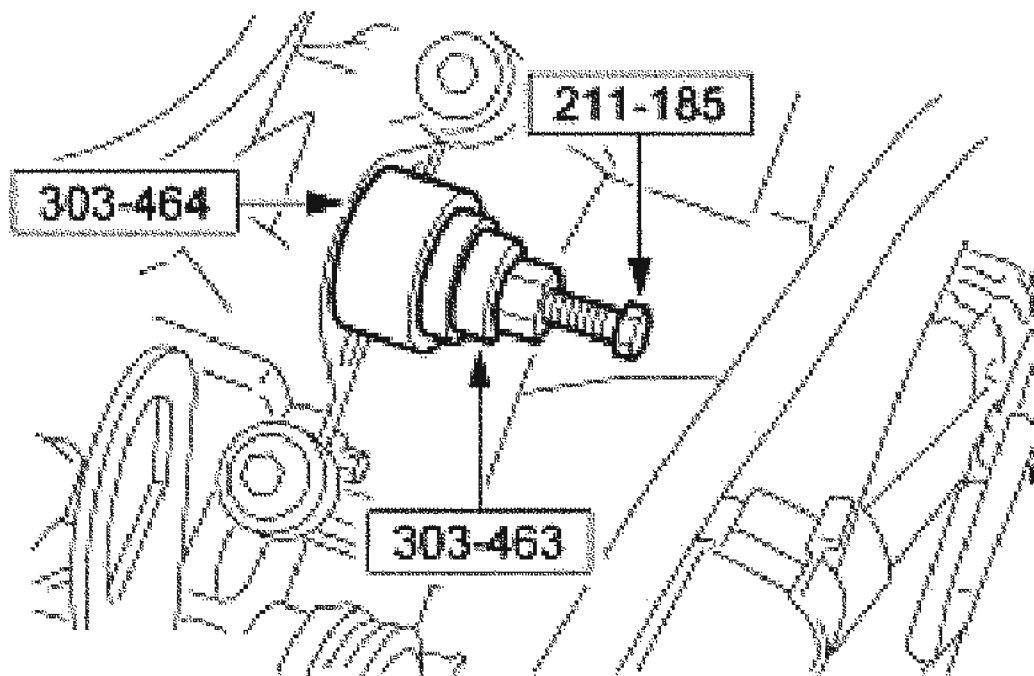
G02739558

**Fig. 385: Installing Camshaft Oil Seal Retainer**

Courtesy of FORD MOTOR CO.

34. Install a new press-in-place gasket and install the camshaft oil seal retainer.

**NOTE:** Lubricate the camshaft oil seal with clean engine oil.



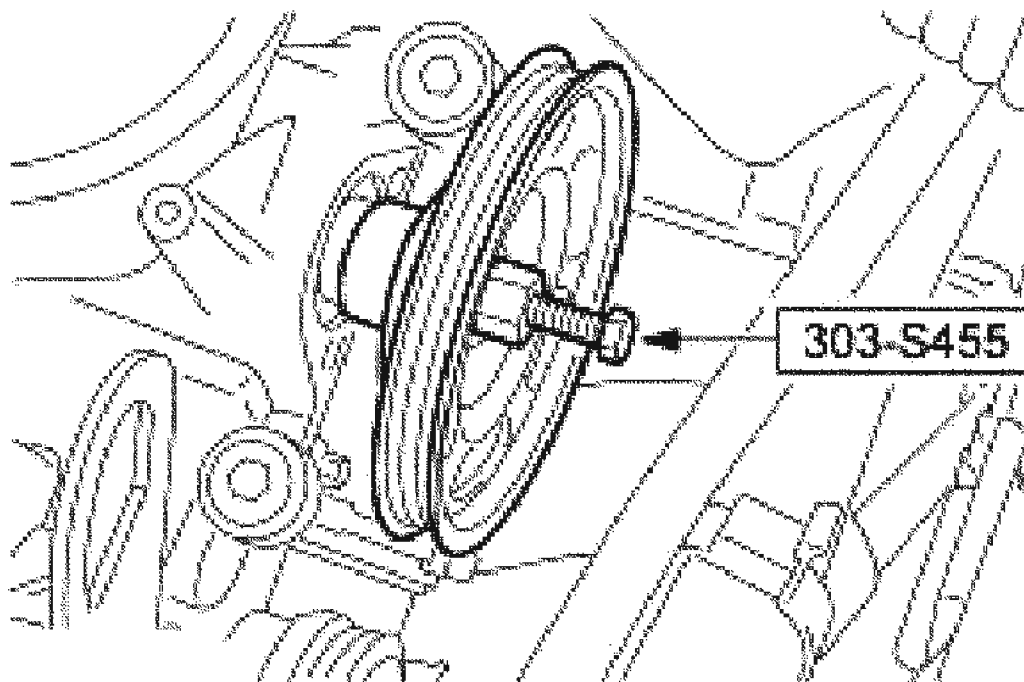
G02739559

**Fig. 386: Installing Camshaft Oil Seal Using Special Tool**  
Courtesy of FORD MOTOR CO.

35. Using the special tools, install a new camshaft oil seal.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. The service pulley is pressed on flush to the end of the camshaft.

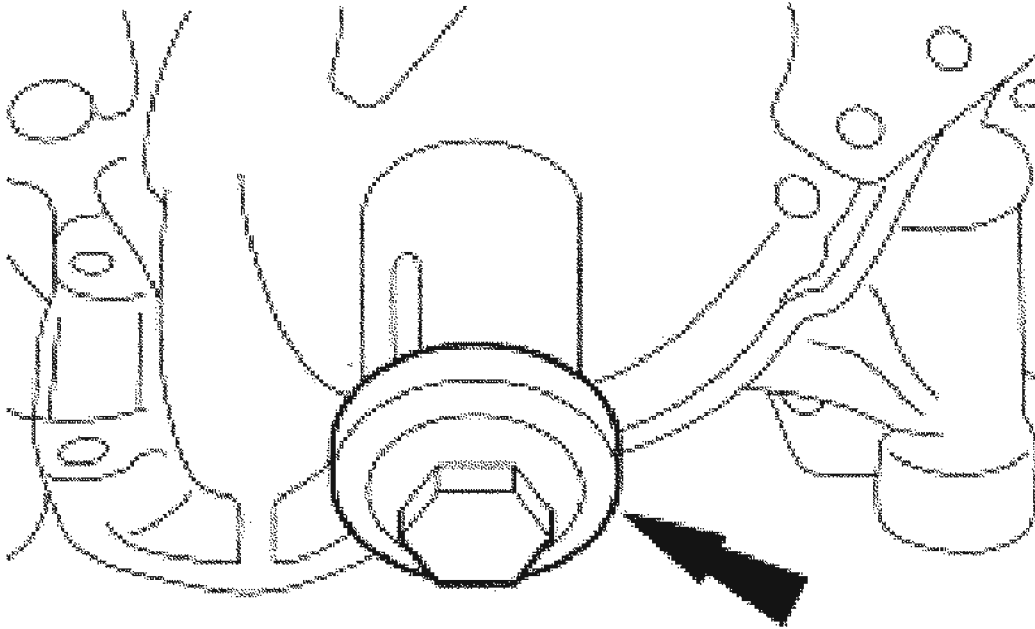




G02739560

**Fig. 387: Installing Service Water Pump Drive Pulley**  
Courtesy of FORD MOTOR CO.

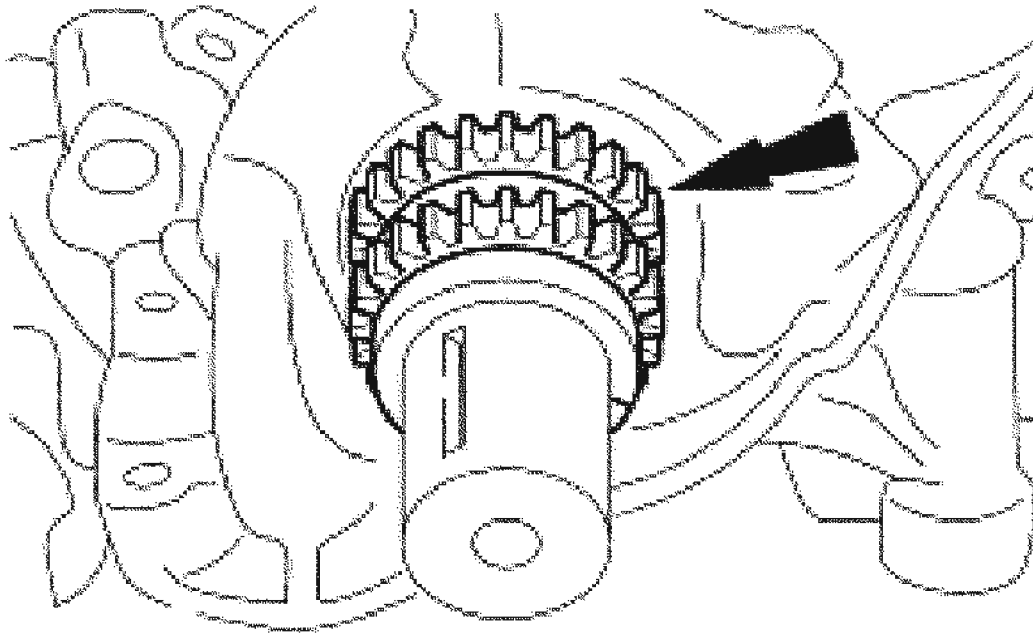
36. Using the special tool, install a new service water pump drive pulley.
37. Remove the crankshaft damper bolt.



G02739561

**Fig. 388: Removing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

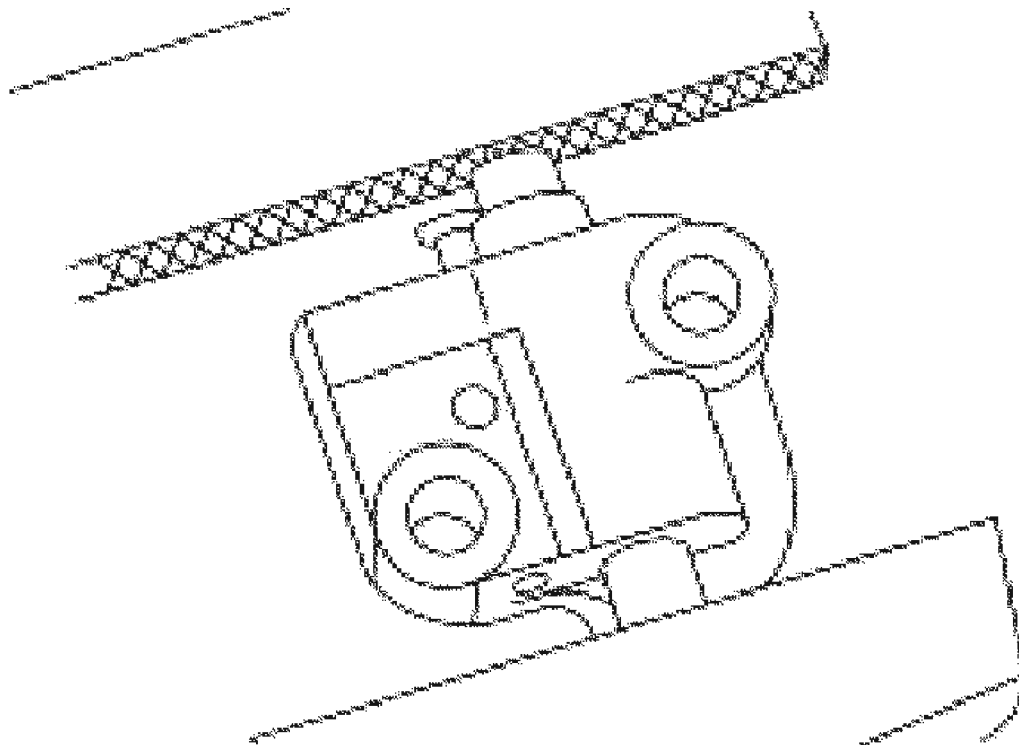
38. Install the crankshaft sprockets with the timing marks out.



G02739562

**Fig. 389: Installing Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

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

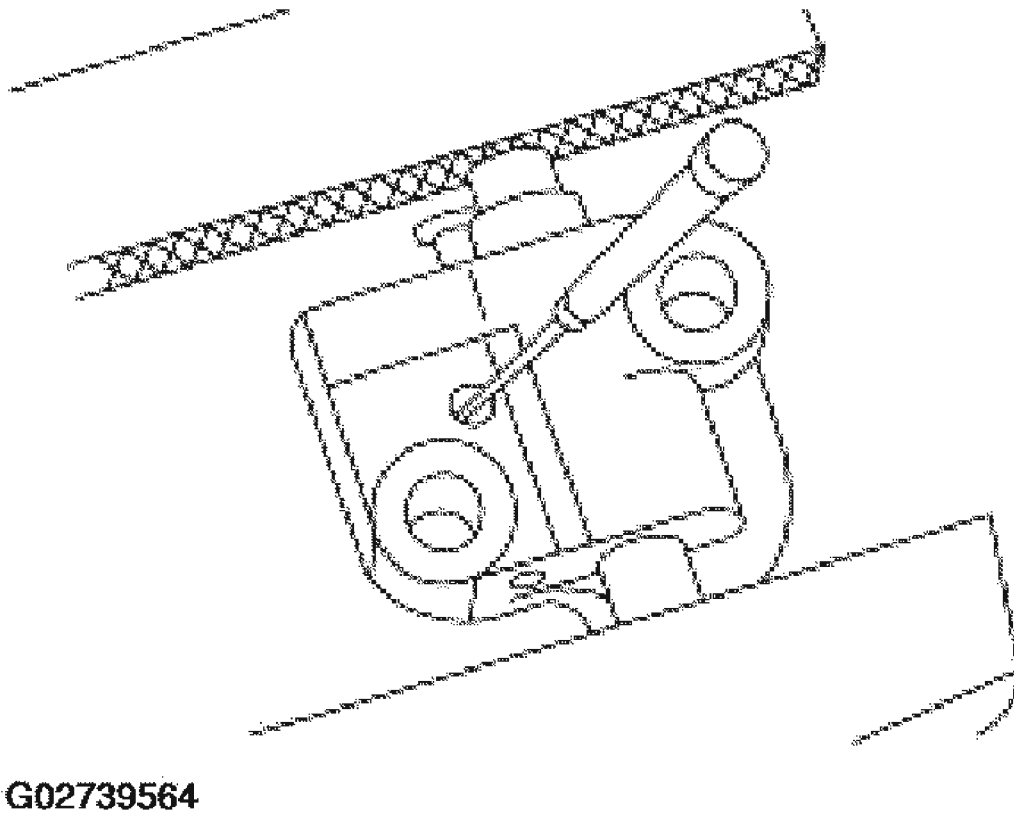


G02739563

**Fig. 390: Positioning Chain Tensioner In Soft-Jawed Vise**  
Courtesy of FORD MOTOR CO.

39. Position the chain tensioner in a soft-jawed vise.

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

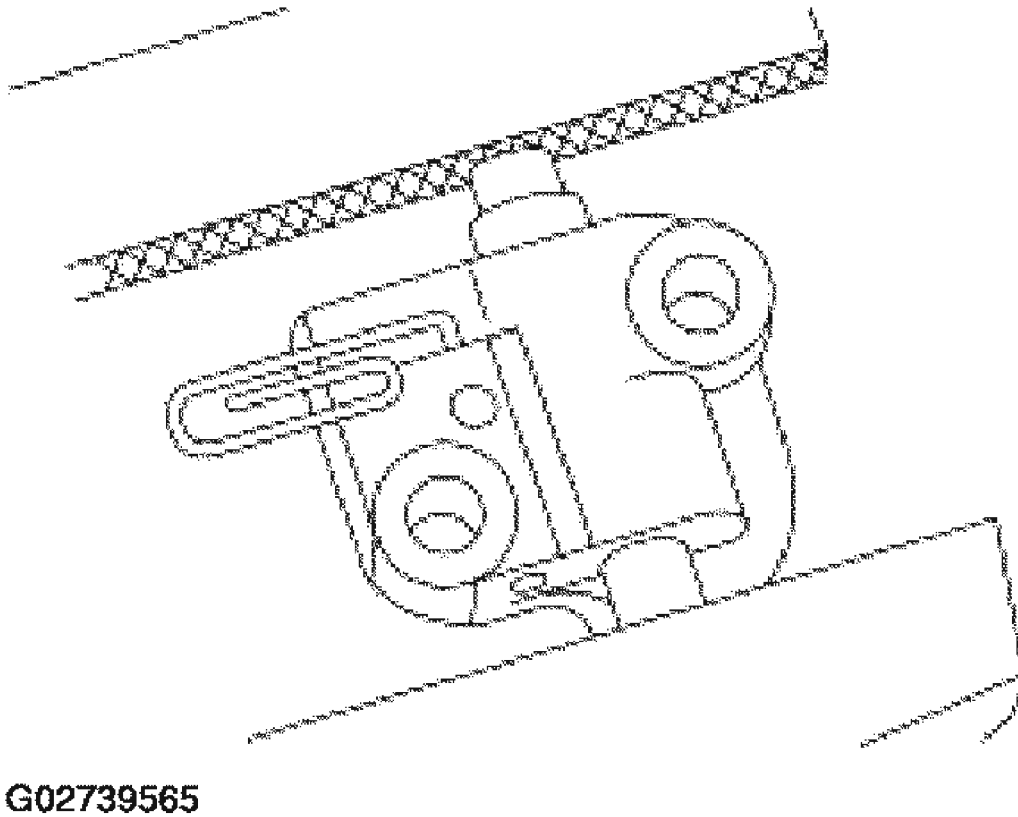


**Fig. 391: Holding Chain Tensioner Ratchet Lock Mechanism**  
Courtesy of FORD MOTOR CO.

40. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem with a small pick.

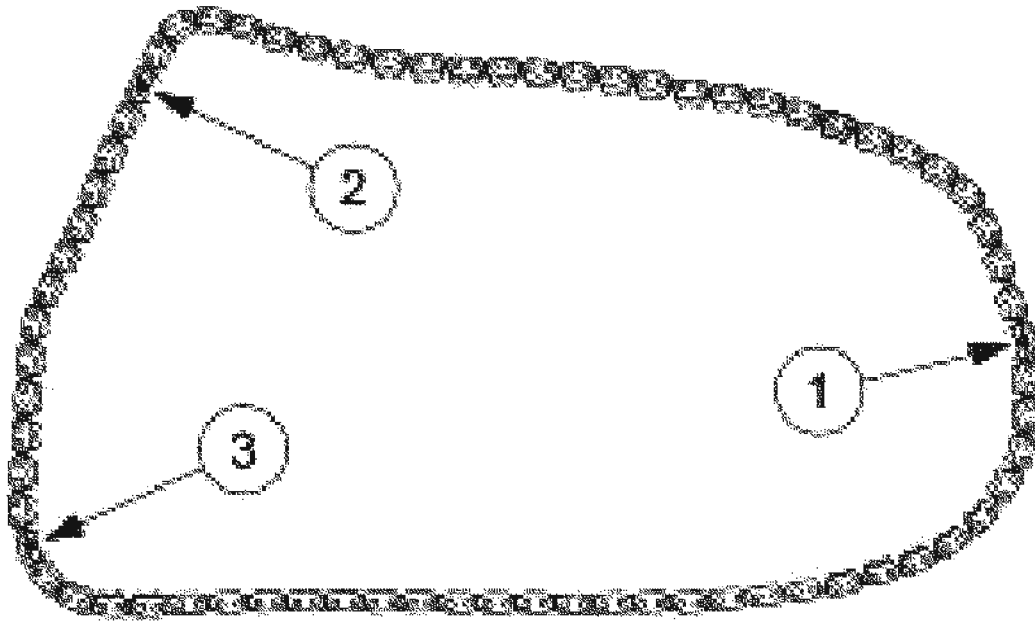
**CAUTION:** During tensioner compression, do not release the ratchet stem until the tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

41. Slowly compress the timing chain tensioner.
42. Retain the tensioner piston with a 1.5 mm (0.06 in) wire or paper clip.



**Fig. 392: Retaining Tensioner Piston**  
Courtesy of FORD MOTOR CO.

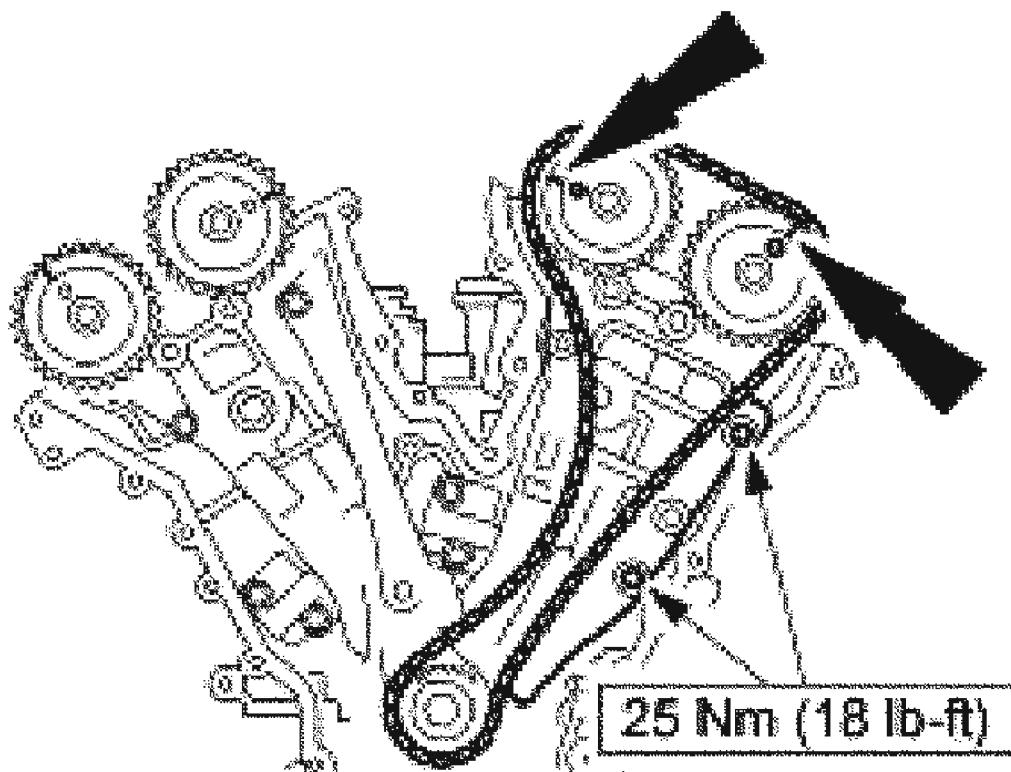
43. If timing marks in the timing chains are not evident, use a permanent-type marker to mark the crankshaft and camshaft timing marks on the LH and RH timing chains.
  1. Mark any link to use as the crankshaft timing mark.
  2. Starting with the crankshaft timing mark, count 29 links and mark the link.
  3. Continue counting to link 42 and mark the link.



G02739566

**Fig. 393: Marking Timing Chain**  
Courtesy of FORD MOTOR CO.

44. Position the LH timing chain and guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

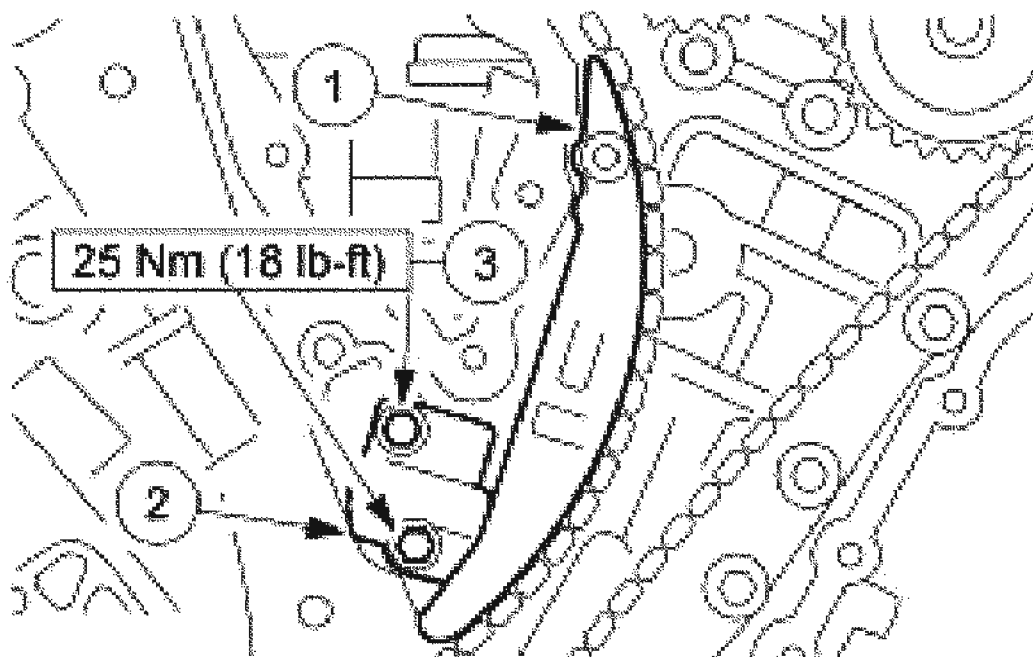


G02739567

**Fig. 394: Installing LH Timing Chain**  
Courtesy of FORD MOTOR CO.

45. Install the LH timing chain tensioner arm and the LH timing chain tensioner.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.

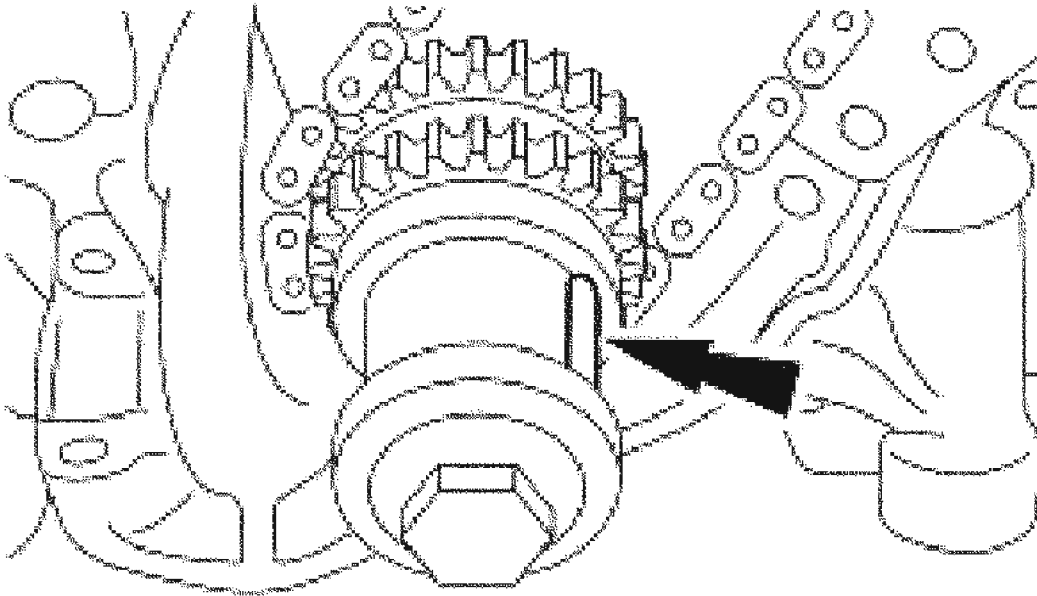




G02739568

**Fig. 395: Installing LH Timing Chain Tensioner Arm & Tensioner**  
Courtesy of FORD MOTOR CO.

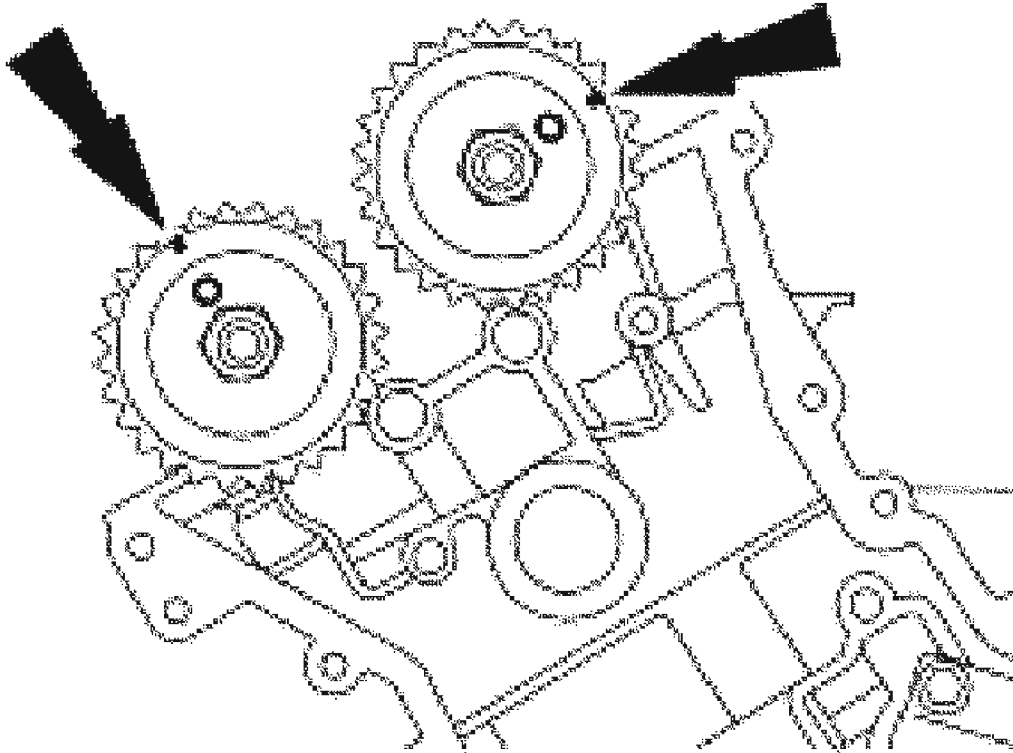
46. Install the crankshaft damper bolt and rotate the crankshaft clockwise 120 degrees until the crankshaft keyway to the 3 o'clock position.



G02739569

**Fig. 396: Identifying Crankshaft Keyway**  
Courtesy of FORD MOTOR CO.

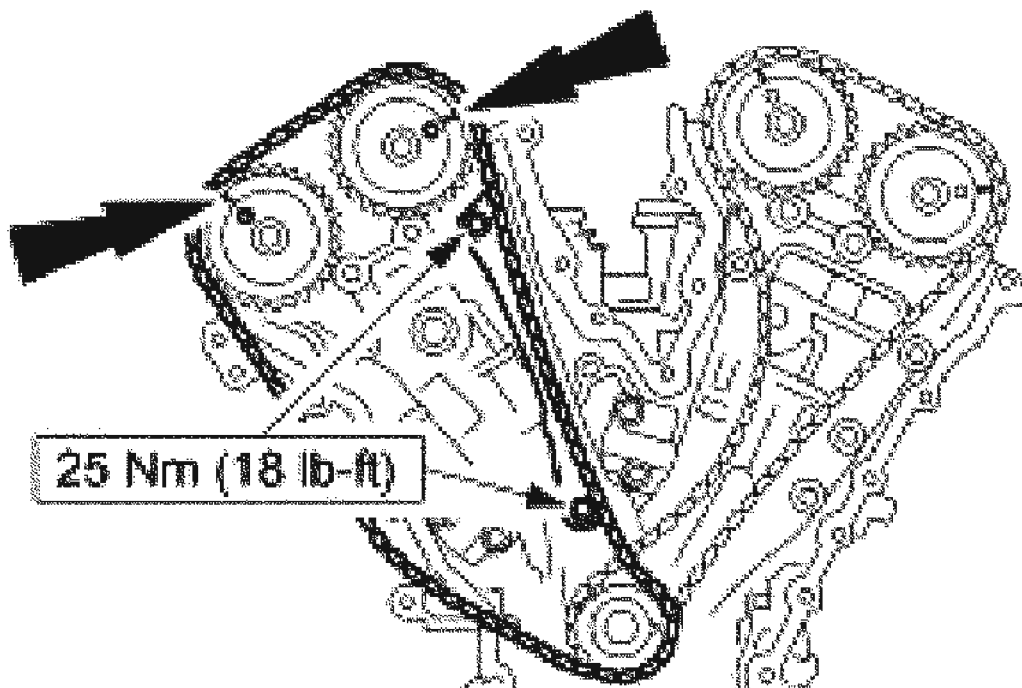
47. Verify that the RH camshafts are correctly positioned.



G02739570

**Fig. 397: Verifying That RH Camshafts Are Correctly Positioned**  
Courtesy of FORD MOTOR CO.

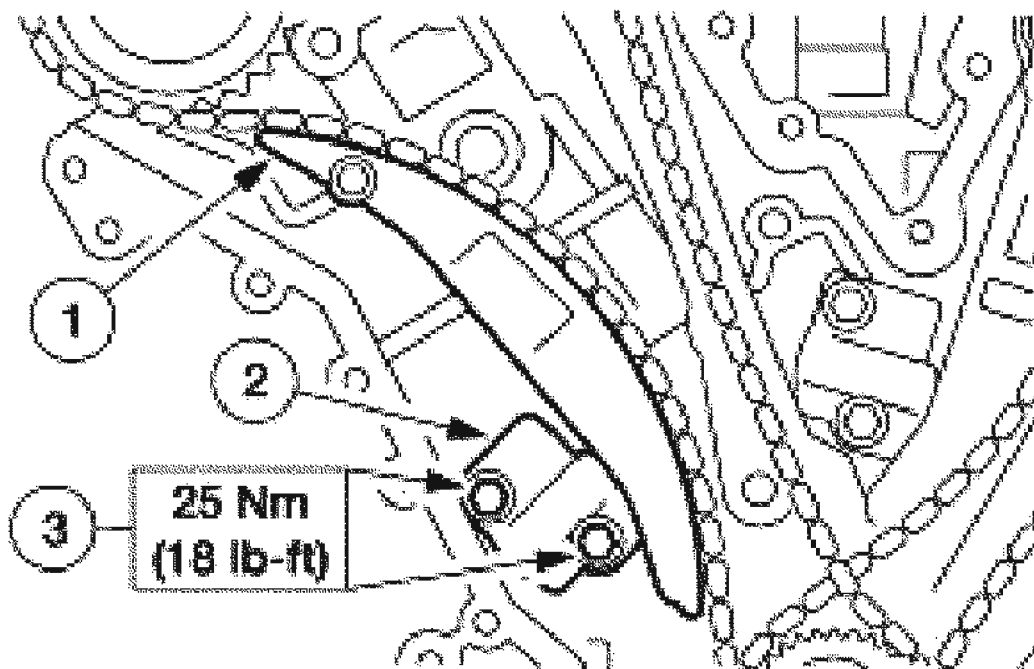
48. Position the RH timing chain and chain guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.



G02739571

**Fig. 398: Installing RH Timing Chain**  
Courtesy of FORD MOTOR CO.

49. Install the RH timing chain tensioner arm and the RH timing chain tensioner.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.

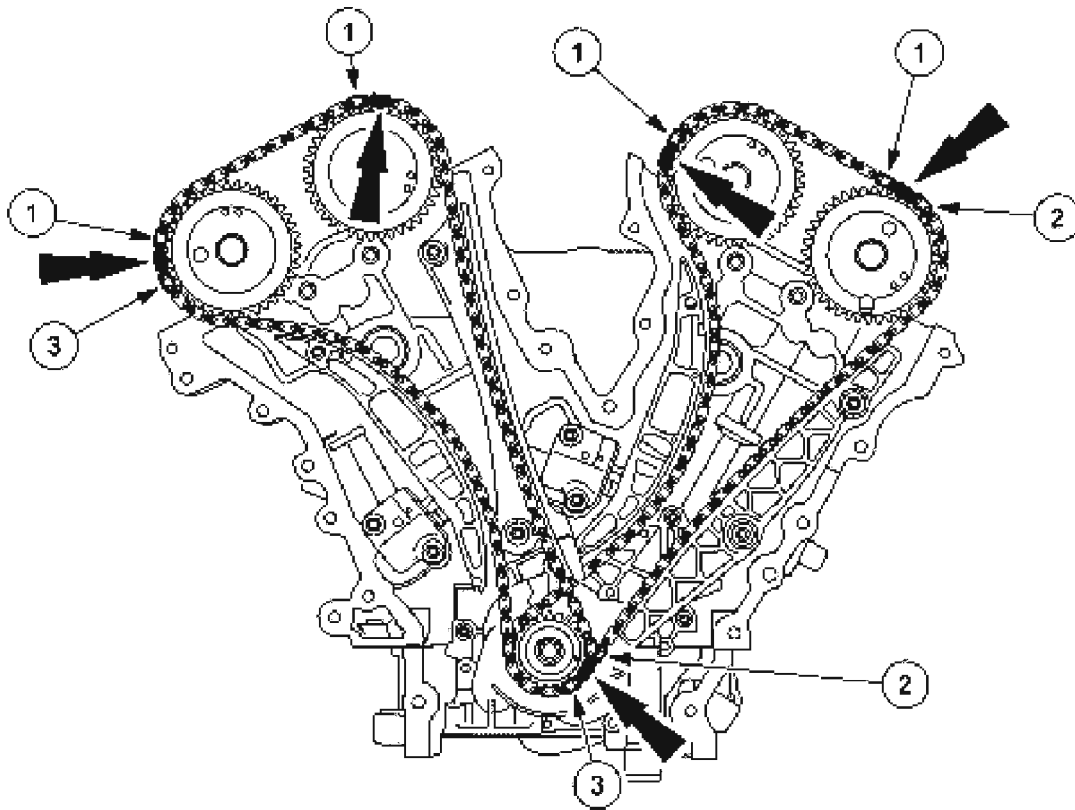


G02739572

**Fig. 399: Installing RH Timing Chain Tensioner Arm & Tensioner**  
Courtesy of FORD MOTOR CO.

50. Remove the LH and RH timing chain tensioner piston retaining wires.

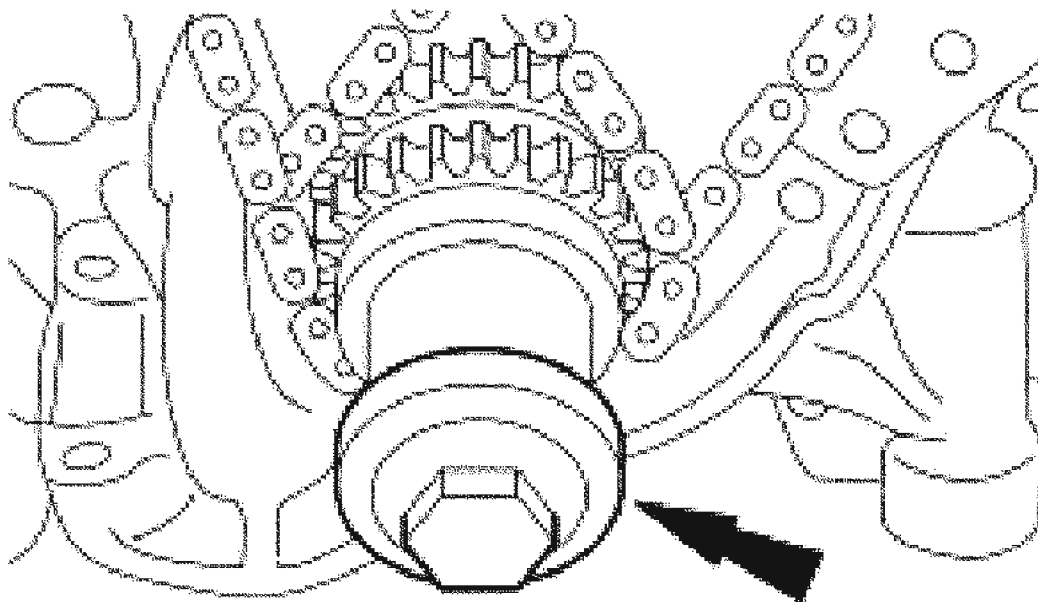
**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.



G02739573

**Fig. 400: Verifying Timing**  
Courtesy of FORD MOTOR CO.

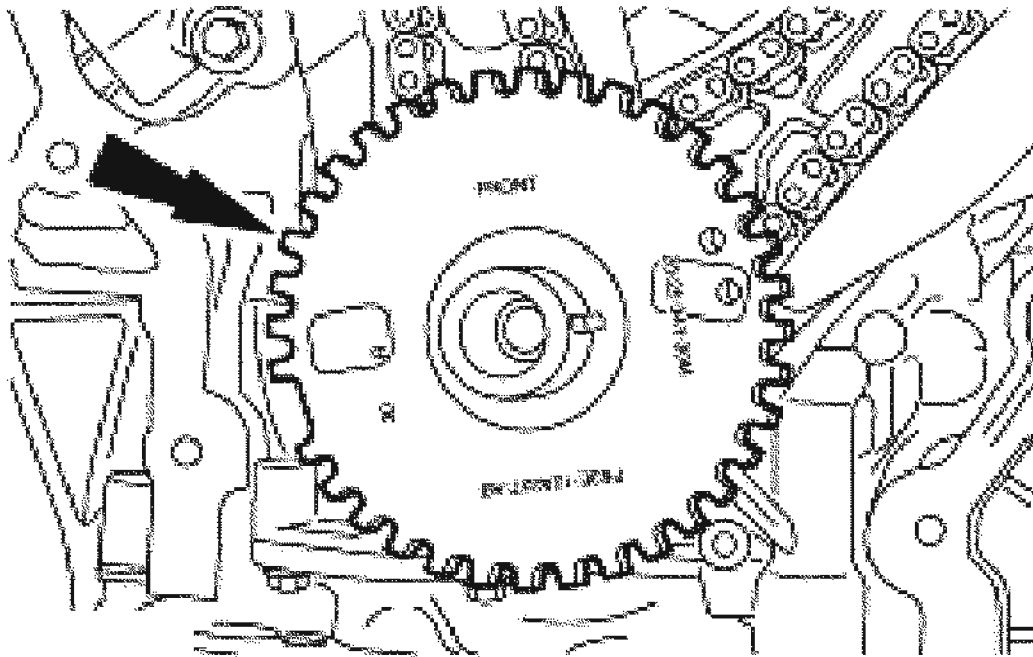
51. Rotate the crankshaft counterclockwise 120 degrees to top dead center (TDC). Verify the timing with the following step.
  1. There should be 12 chain links between the camshaft timing marks.
  2. There should be 27 chain links between the camshaft and the crankshaft timing marks.
  3. There should be 30 chain links between the camshaft and crankshaft timing marks.
52. Remove the crankshaft damper bolt.



G02739574

**Fig. 401: Removing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped 20-25-34Y-30M (Color Blue).

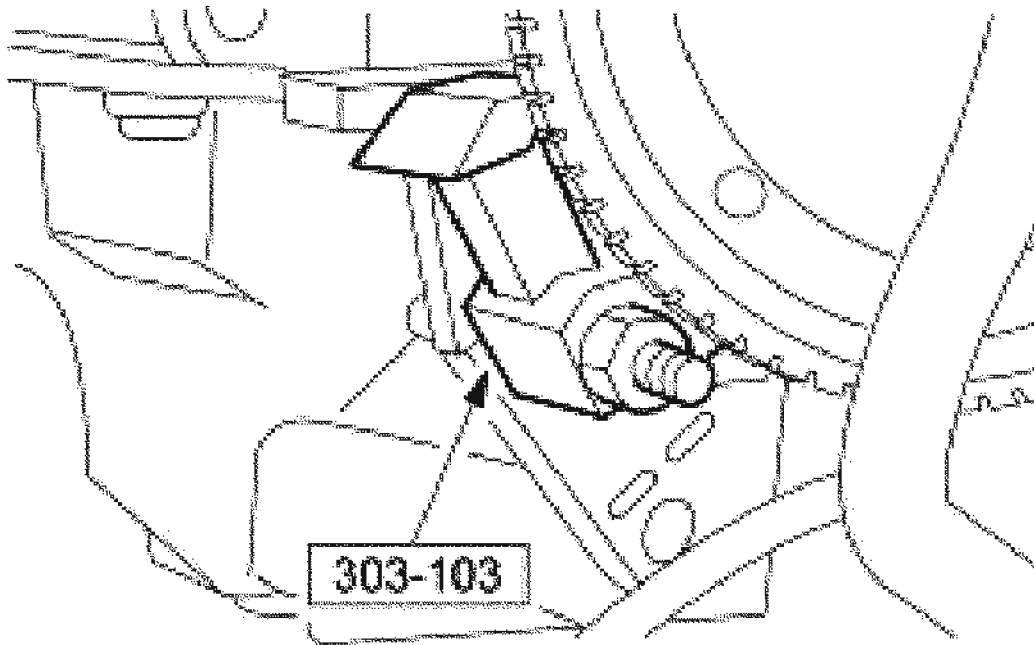


G02739575

**Fig. 402: Installing Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

53. Install the ignition pulse wheel.
54. Install the special tool to hold the flexplate.





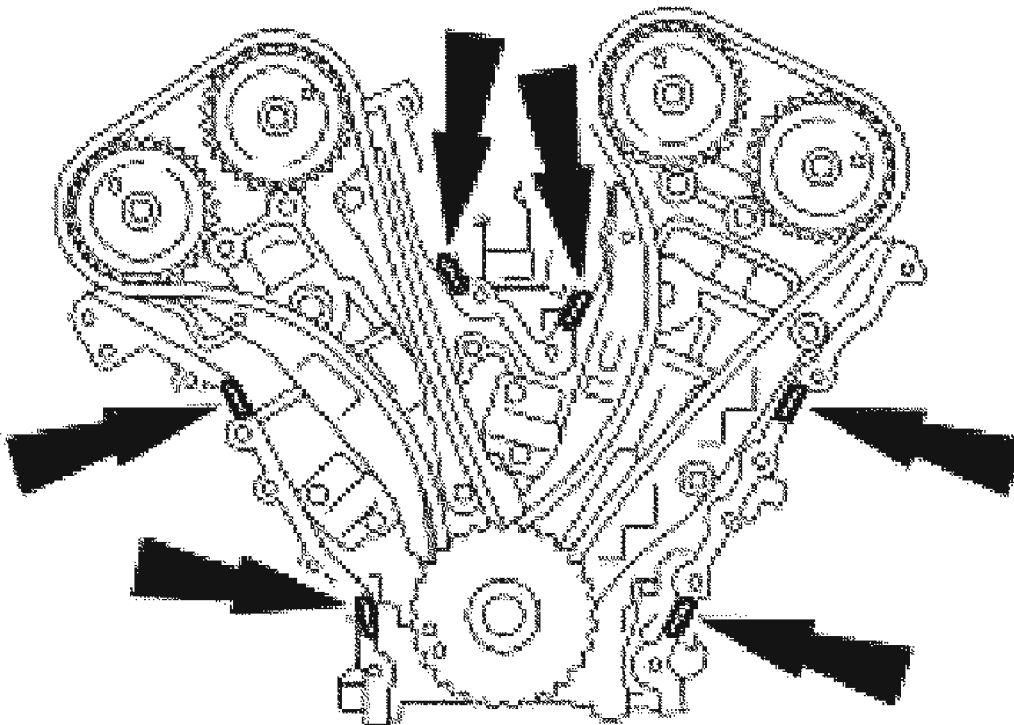
G02739576

**Fig. 403: Installing Special Tool To Hold Flexplate**  
Courtesy of FORD MOTOR CO.

55. Install three gaskets in the front cover.

**NOTE:** Clean and degrease the sealing surfaces with metal surface cleaner before applying gasket and sealant.

**NOTE:** The front cover must be installed and the bolts tightened within four minutes of sealant application.

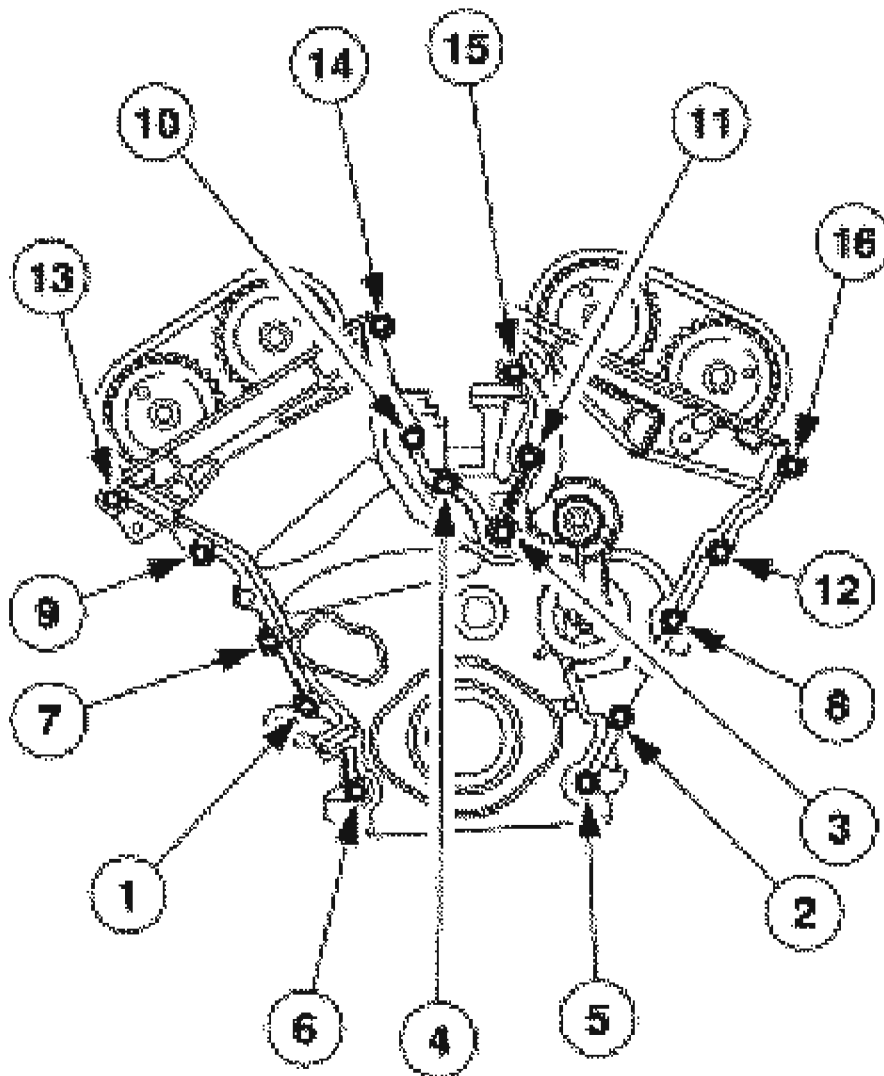


G02739577

**Fig. 404: Applying Silicone Gasket & Sealant**  
Courtesy of FORD MOTOR CO.

56. Apply a 6 mm (0.24 in) dot of silicone gasket and sealant to the cylinder block to lower cylinder block and cylinder head mating surfaces.

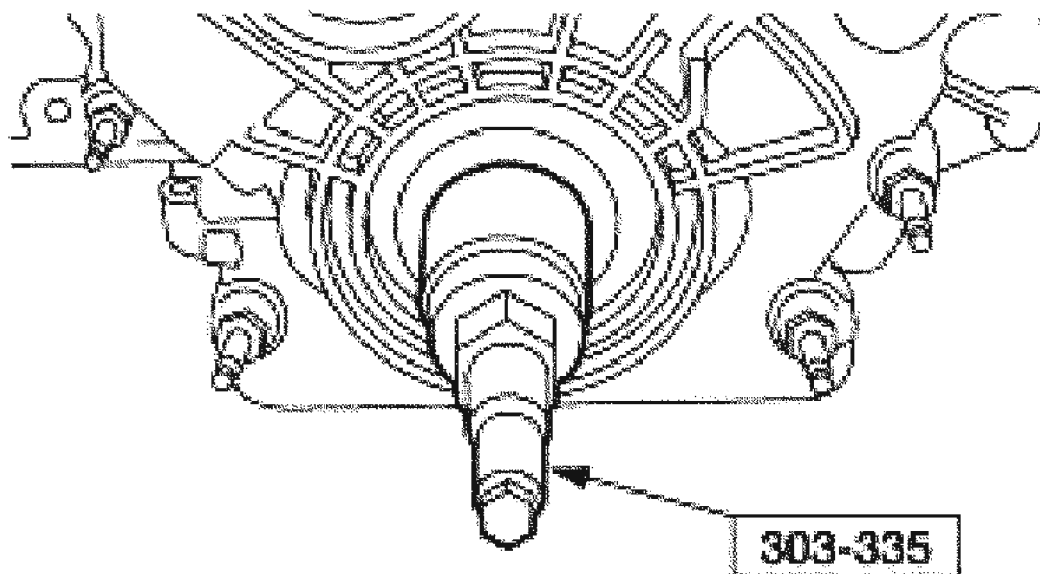
**NOTE:** Fasteners 1, 3, 4, 8, 10, 11, 14, 15 and 16 are studs.

**25 Nm (18 lb-ft)**

G02739578

**Fig. 405: Identifying Bolt Tightening Sequence & Torque Specification**  
Courtesy of FORD MOTOR CO.

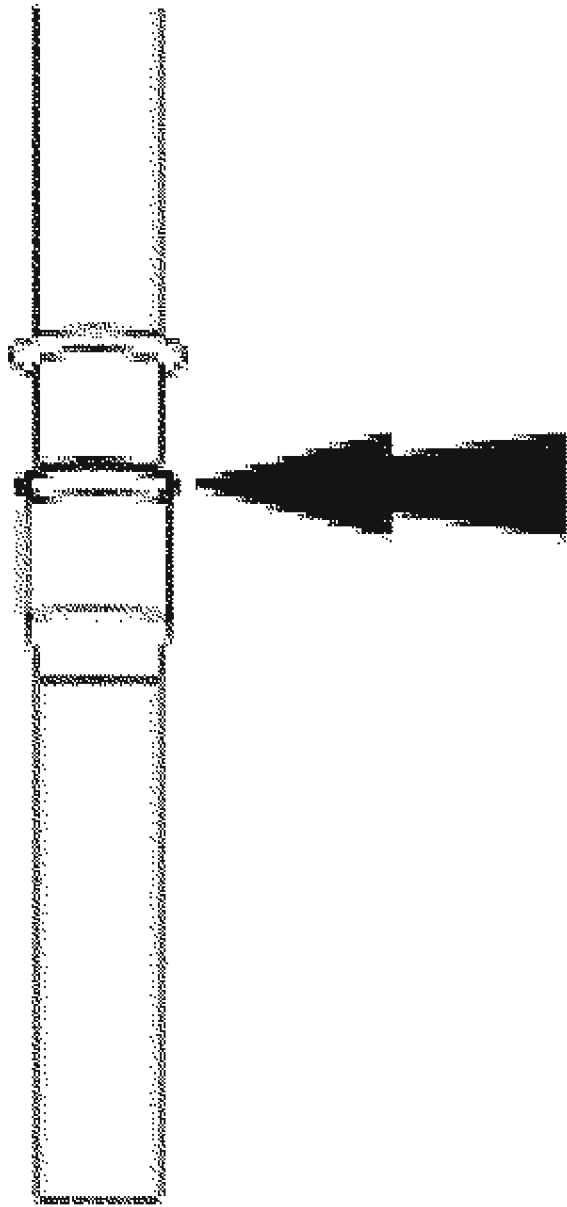
57. Position the front cover and install the bolts and studs in the sequence shown.
58. Using the special tool, install the crankshaft front oil seal.



G02739579

**Fig. 406: Installing Crankshaft Front Oil Seal**  
Courtesy of FORD MOTOR CO.

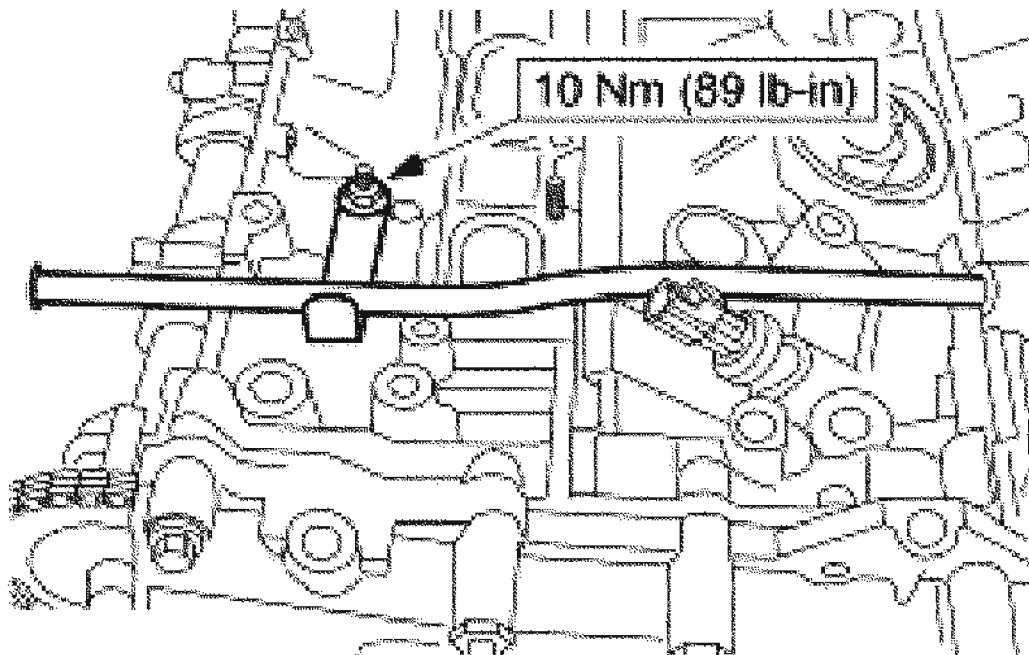
59. Install a new O-ring on the oil level indicator tube. Apply clean engine oil to the O-ring.



G02739580

**Fig. 407: Installing O-Ring On Oil Level Indicator Tube**  
**Courtesy of FORD MOTOR CO.**

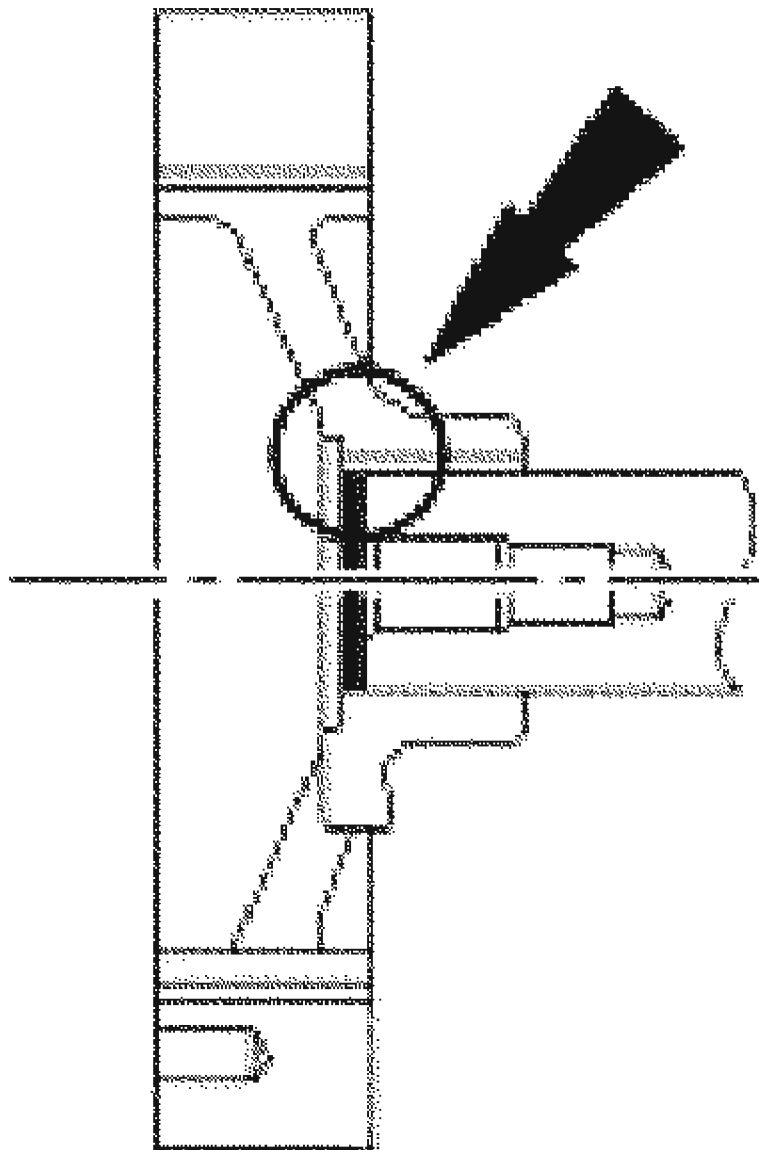
60. Install the oil level indicator tube and install the stud bolt.



G02739581

**Fig. 408: Installing Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

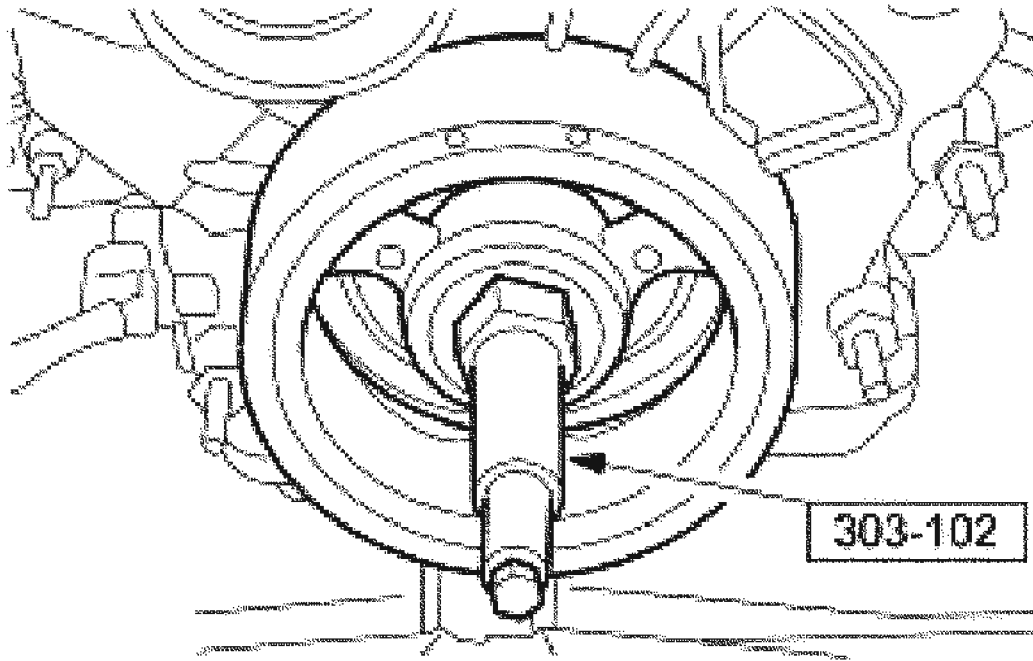
- NOTE:** Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealant.
- NOTE:** The crankshaft damper must be installed and the bolt tightened within four minutes of sealant application.



G02739582

**Fig. 409: Applying Silicone Gasket And Sealant To End Of Crankshaft Damper**  
Courtesy of FORD MOTOR CO.

61. Apply silicone gasket and sealant to the end of the crankshaft damper keyway slot.
62. Using the special tool, install the crankshaft vibration damper.

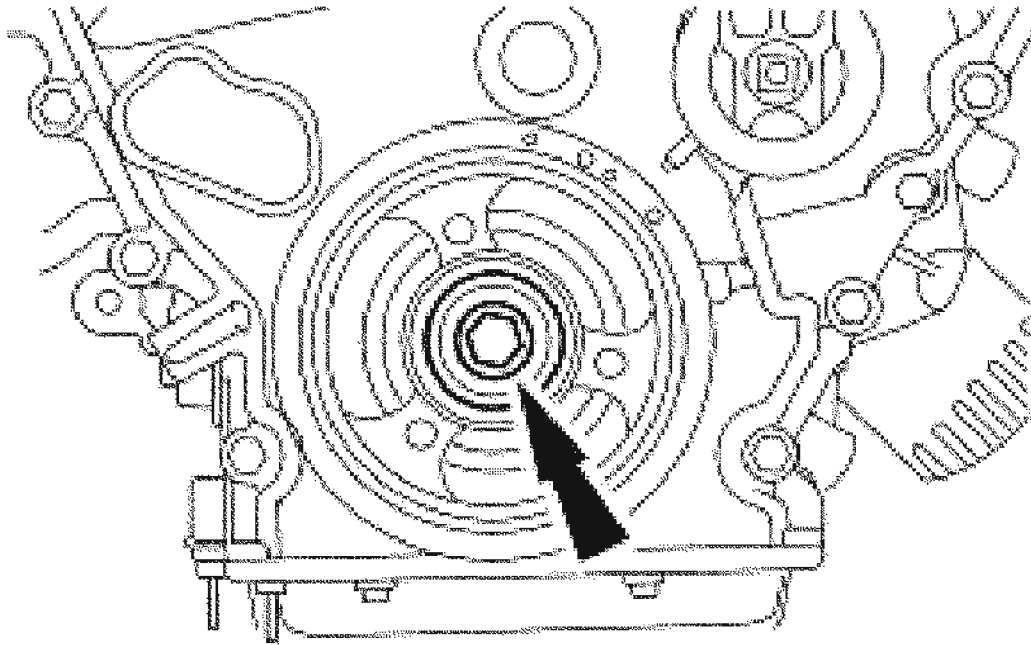


G02739583

**Fig. 410: Installing Crankshaft Vibration Damper**  
Courtesy of FORD MOTOR CO.

63. Install the crankshaft vibration damper washer and tighten the bolt in four stages.
- Stage 1: Tighten to 120 Nm (89 lb-ft).
  - Stage 2: Loosen one full turn (360 degrees).
  - Stage 3: Tighten to 50 Nm (37 lb-ft).
  - Stage 4: Tighten to 90 Nm (66 lb-ft).





G02739584

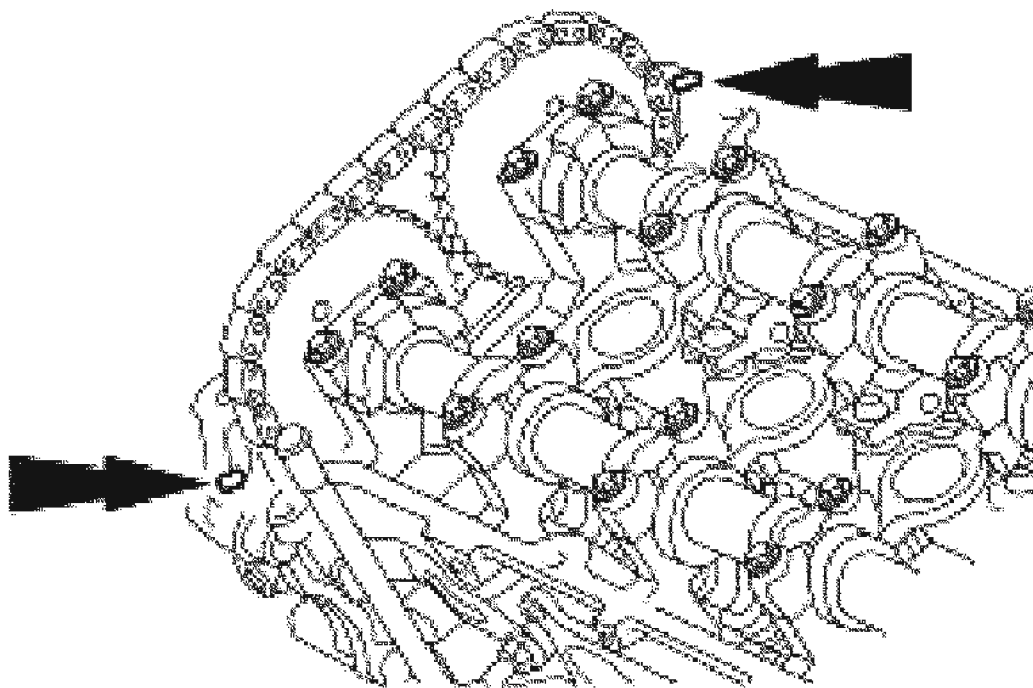
**Fig. 411: Installing Crankshaft Vibration Damper Washer**  
Courtesy of FORD MOTOR CO.

64. Install new gaskets in the valve covers.

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

**NOTE:** The valve cover must be installed and the bolts and studs tightened within four minutes of sealant application.

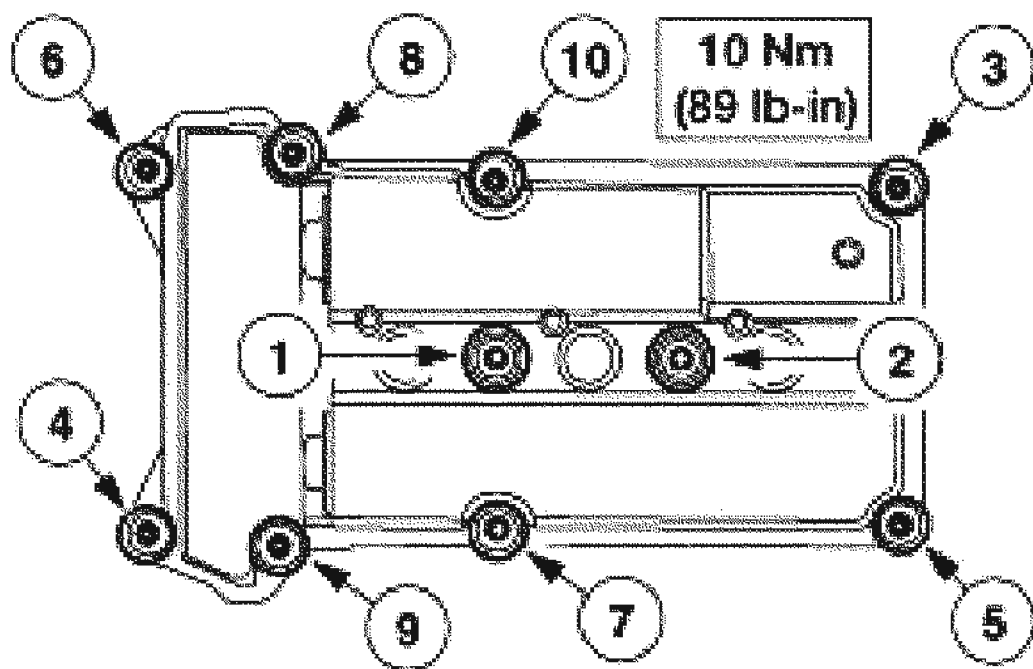
**NOTE:** Clean cylinder head and front cover surface using metal surface cleaner before applying silicone gasket and sealant.



G02739585

**Fig. 412: Applying Silicone Gasket & Sealant**  
**Courtesy of FORD MOTOR CO.**

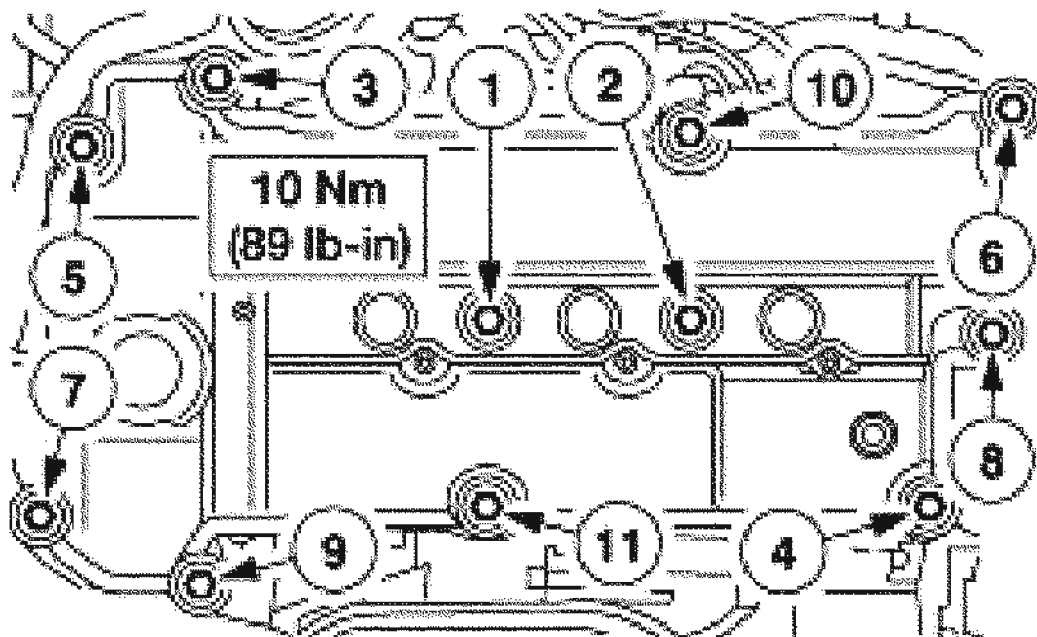
65. Apply a 8 mm (0.31 in) dot of silicone gasket and sealant at the cylinder block to front cover mating surface of the LH and RH valve covers.
66. Position the RH valve cover and install the bolts and studs in the sequence shown.



G02739586

**Fig. 413: Identifying Stud Bolts Installing Sequence & Torque Specification**  
 Courtesy of FORD MOTOR CO.

67. Position the LH valve cover and install the bolts and studs in the sequence shown.

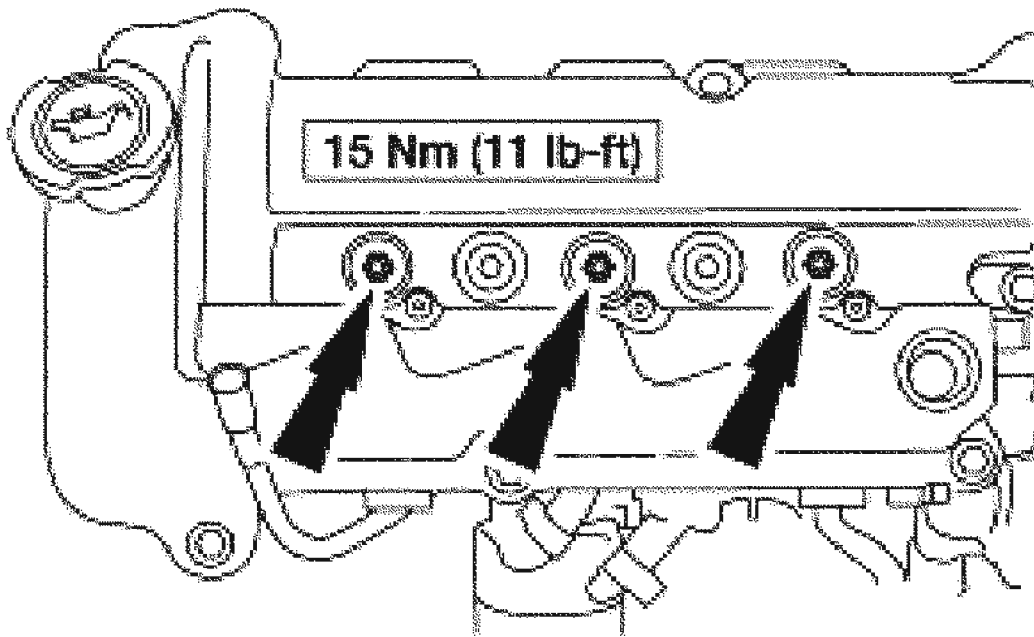


G02739587

**Fig. 414: Identifying LH Valve Cover Bolts Installing Sequence & Torque Specification**

Courtesy of FORD MOTOR CO.

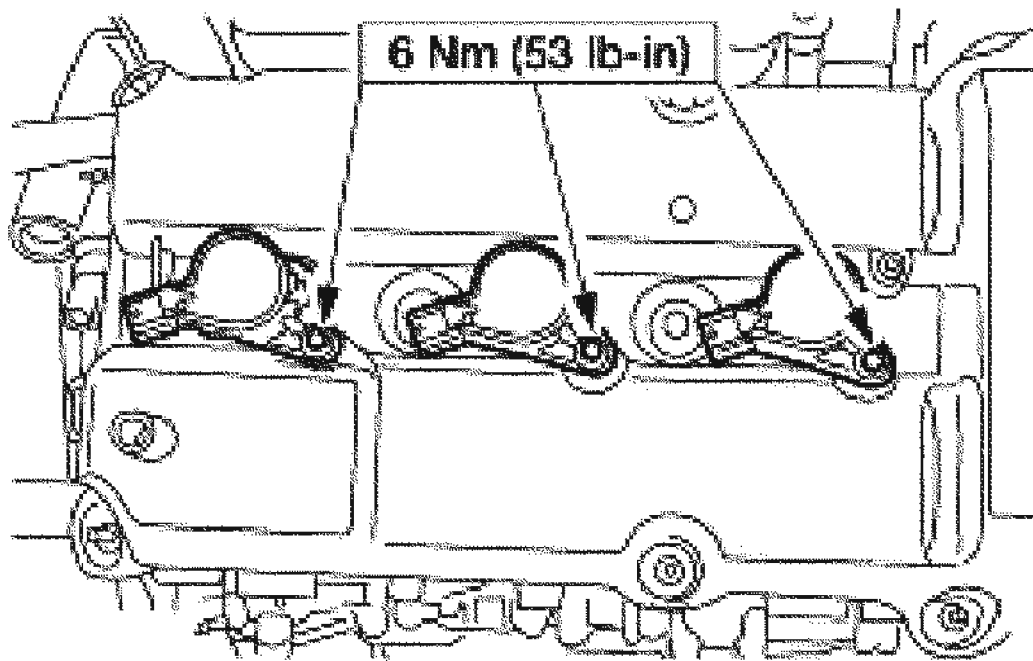
68. Install the spark plugs.



G02739588

**Fig. 415: Installing Spark Plugs**  
Courtesy of FORD MOTOR CO.

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



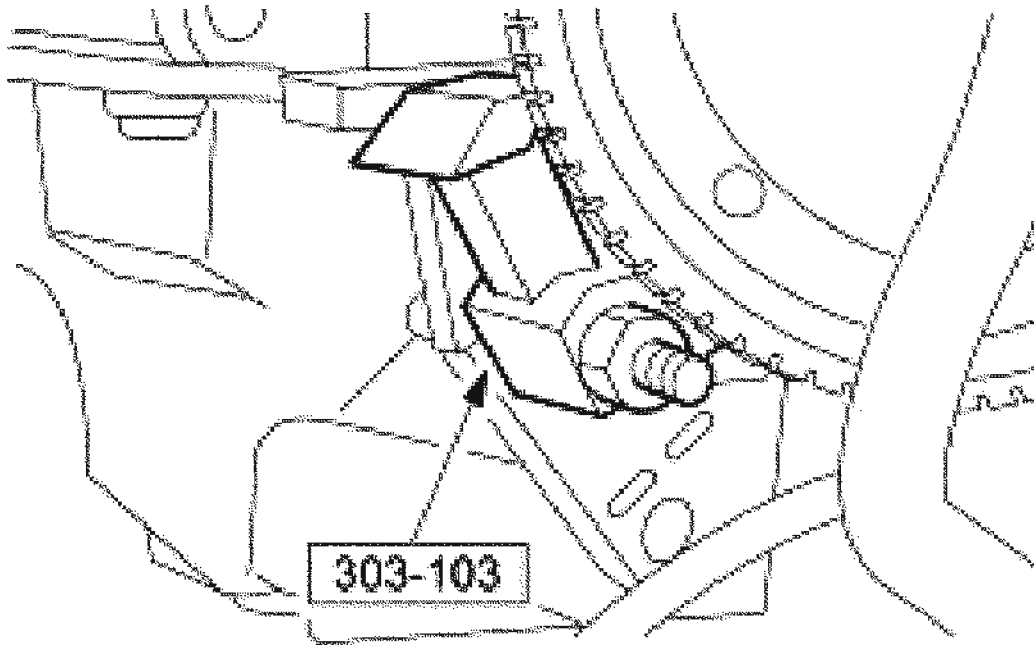
G02739589

**Fig. 416: Installing Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

69. Apply a light film of silicone brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.

Install the six coil-on-plugs and install the bolts.

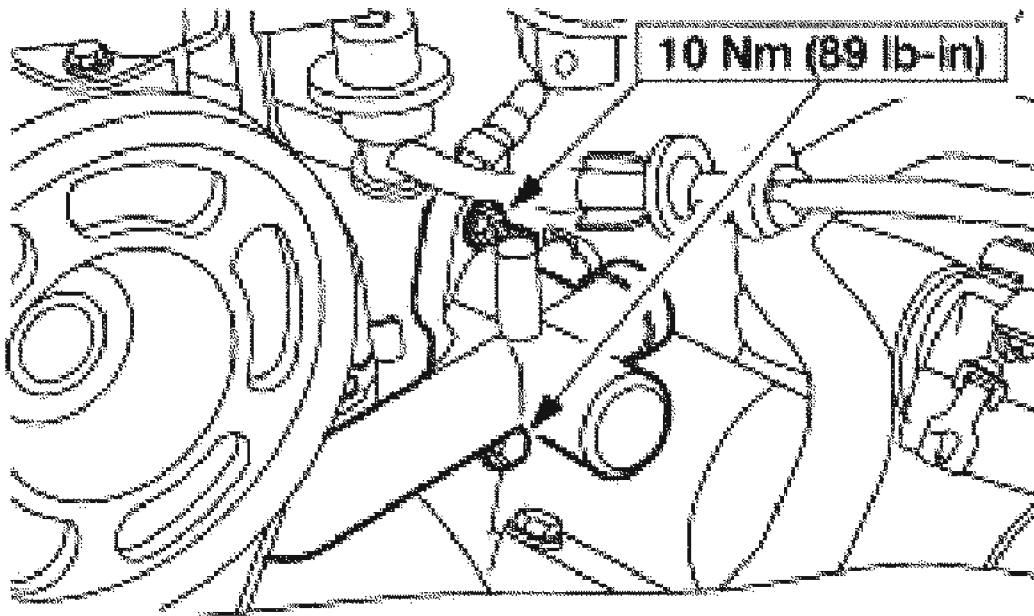
70. Install new gaskets in the lower intake manifold.
71. Remove the special tool.



G02739590

**Fig. 417: Removing Special Tool**  
Courtesy of FORD MOTOR CO.

72. Position the coolant bypass tube and connect the hoses.

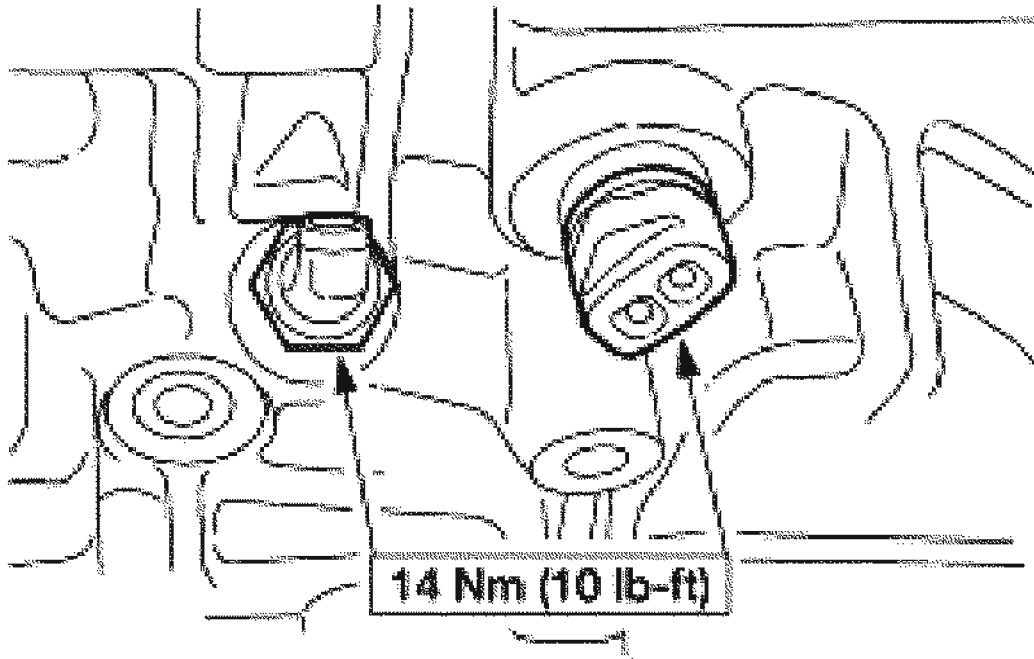


G02739591

**Fig. 418: Positioning Coolant Bypass Tube**  
Courtesy of FORD MOTOR CO.

73. Install the oil pressure sender and the block heater.

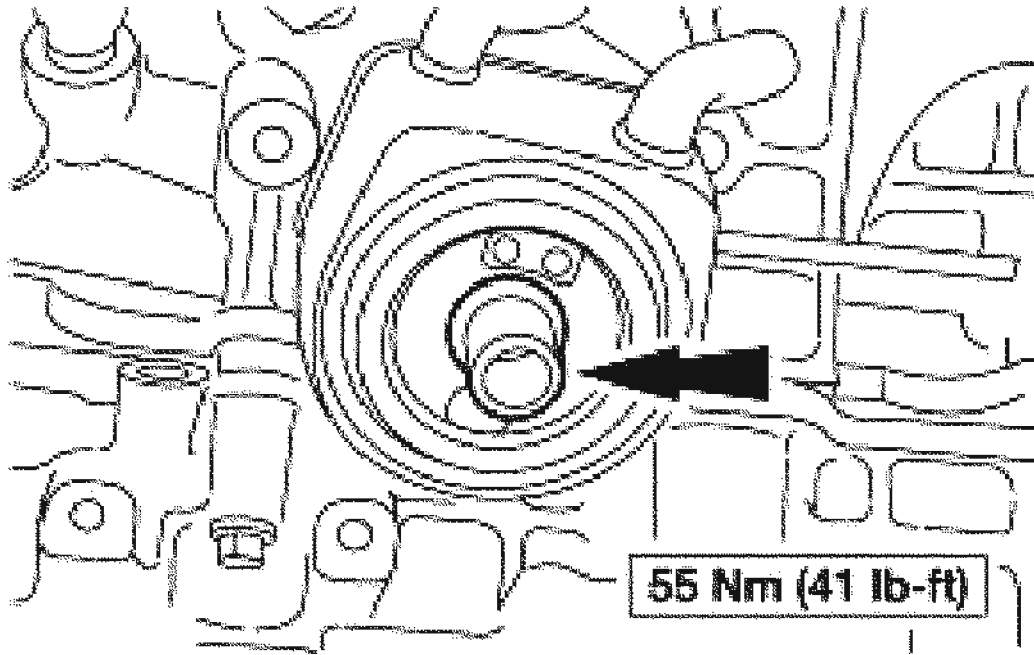




G02739592

**Fig. 419: Installing Oil Pressure Sender And Block Heater**  
Courtesy of FORD MOTOR CO.

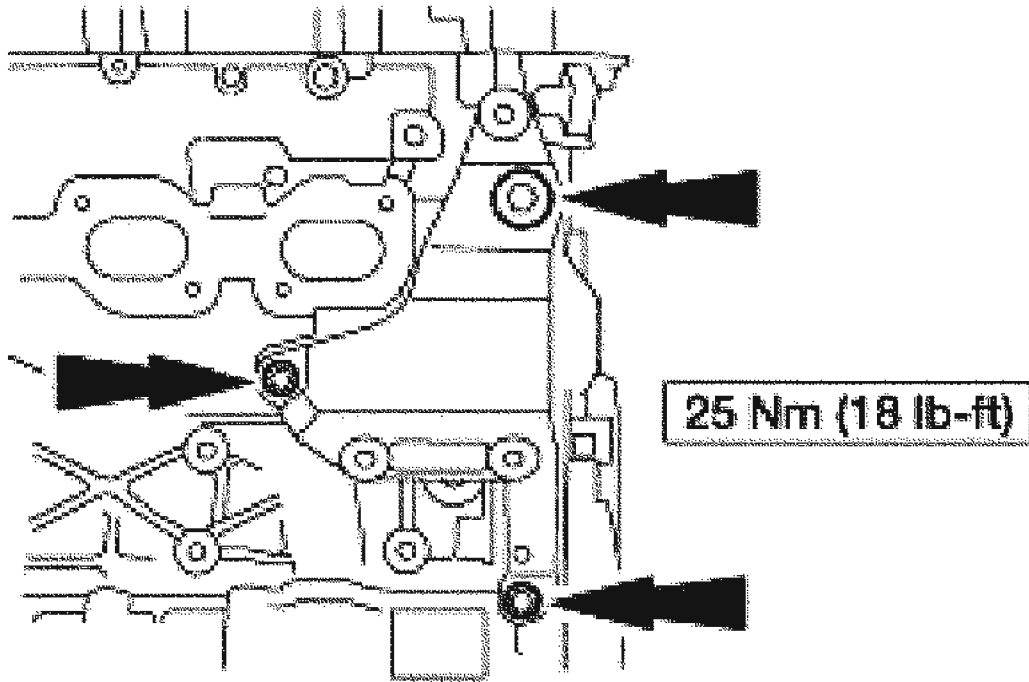
74. Install the oil cooler.



G02739593

**Fig. 420: Installing Oil Cooler**  
Courtesy of FORD MOTOR CO.

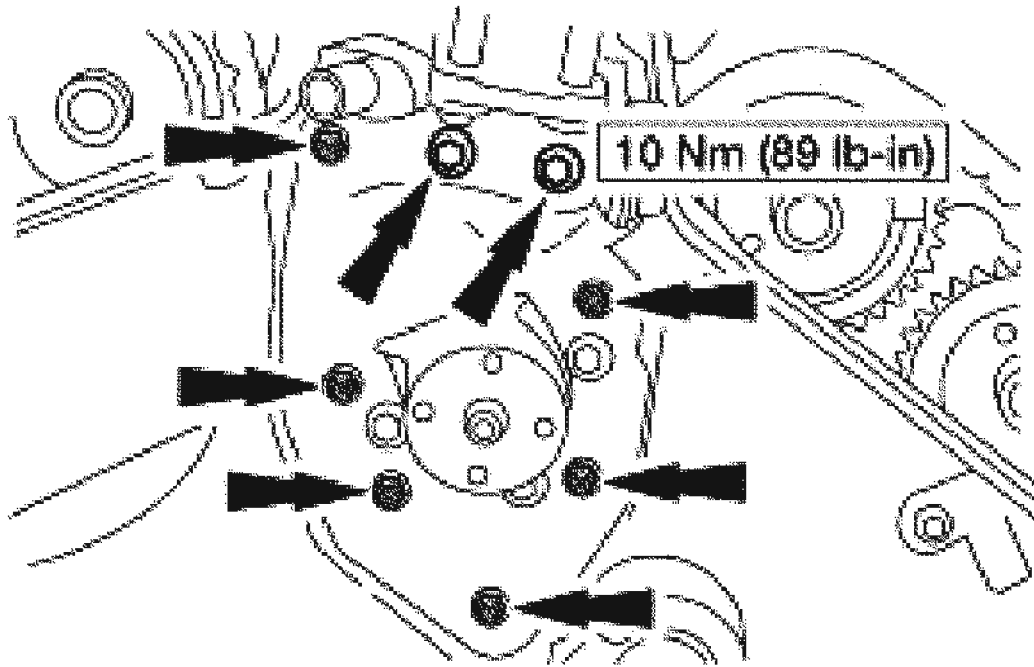
75. Install the generator support bracket.



G02739594

**Fig. 421: Identifying Generator Support Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

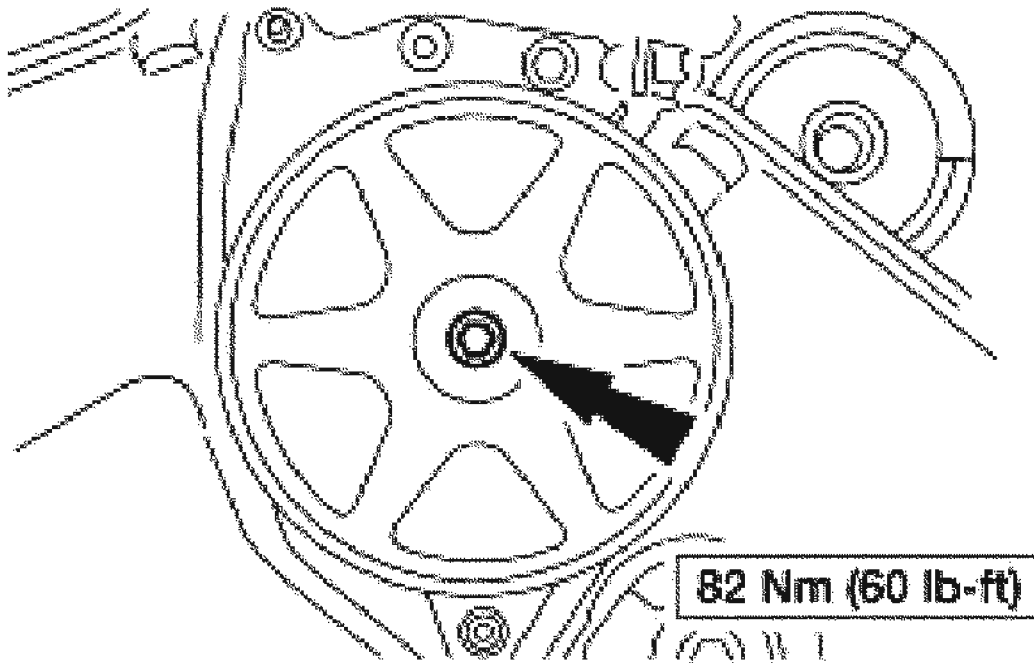
76. Install the power steering pump.



G02739595

**Fig. 422: Identifying Power Steering Pump Bolts Torque Specification**  
**Courtesy of FORD MOTOR CO.**

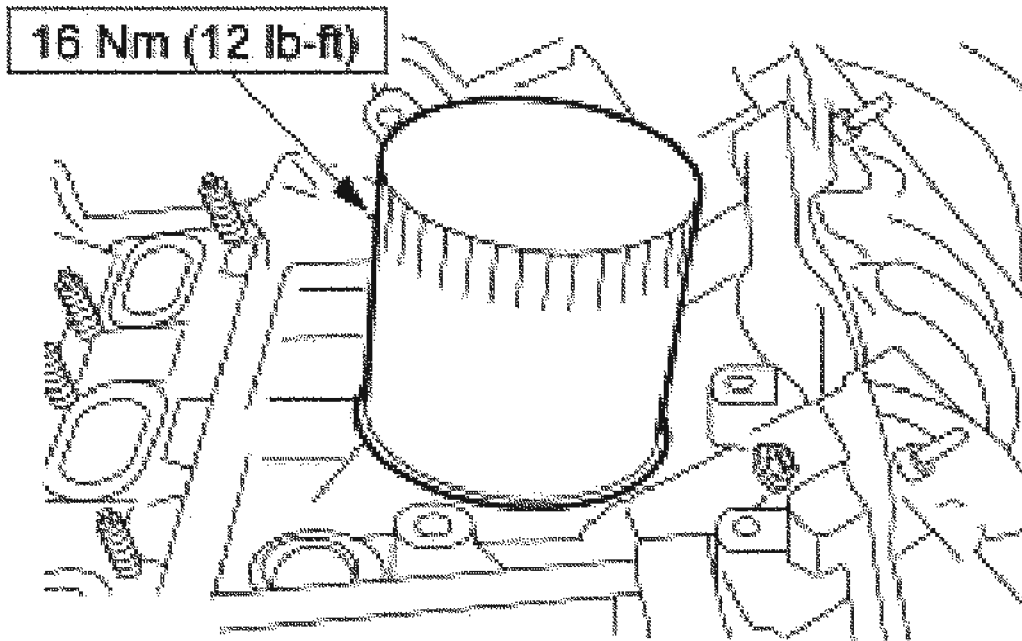
77. Install the power steering pump pulley.



G02739596

**Fig. 423: Identifying Power Steering Pump Pulley Bolt Torque Specification**  
**Courtesy of FORD MOTOR CO.**

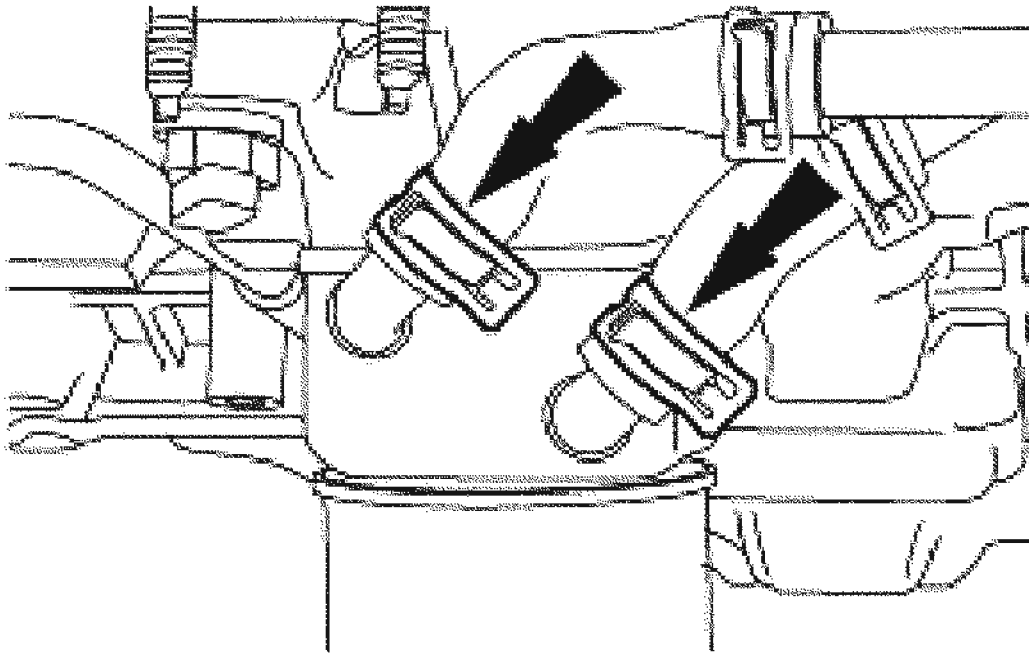
78. Lubricate the O-ring seal and install the oil filter.



G02739597

**Fig. 424: Installing Oil Filter**  
Courtesy of FORD MOTOR CO.

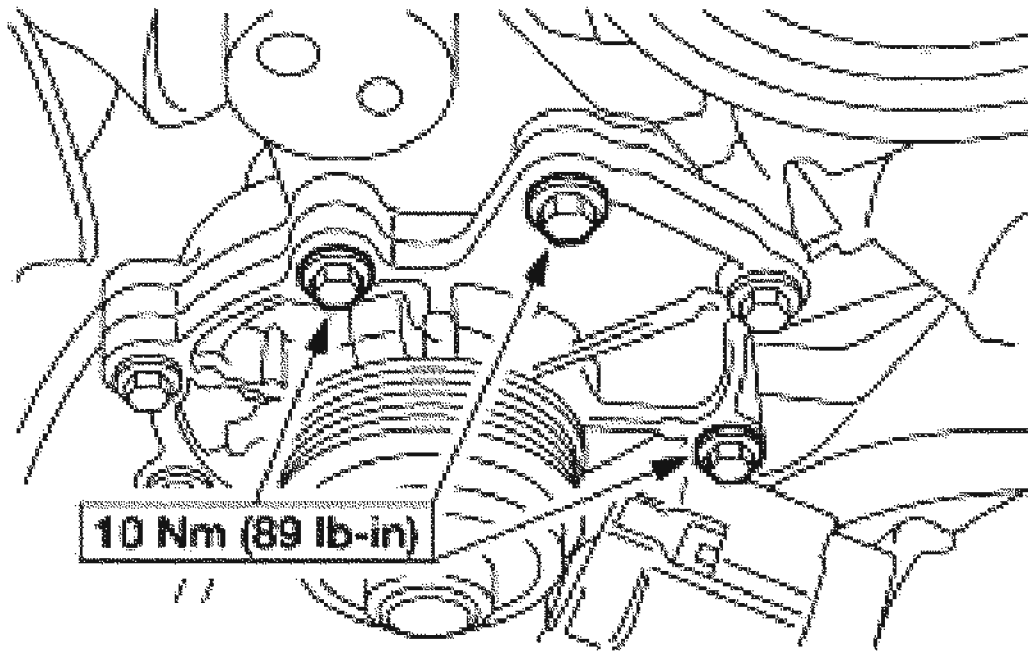
79. Connect the coolant hoses at the oil cooler.



G02739598

**Fig. 425: Connecting Coolant Hoses At Oil Cooler**  
Courtesy of FORD MOTOR CO.

80. Install the water pump assembly.

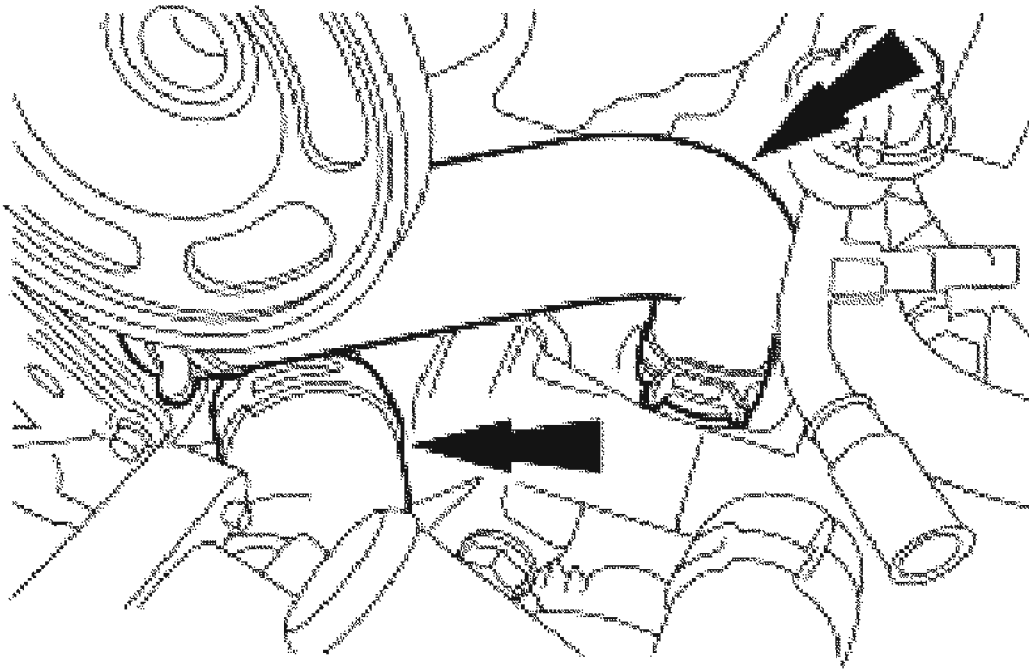


G02739599

**Fig. 426: Identifying Water Pump Assembly Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

81. Connect the hoses.



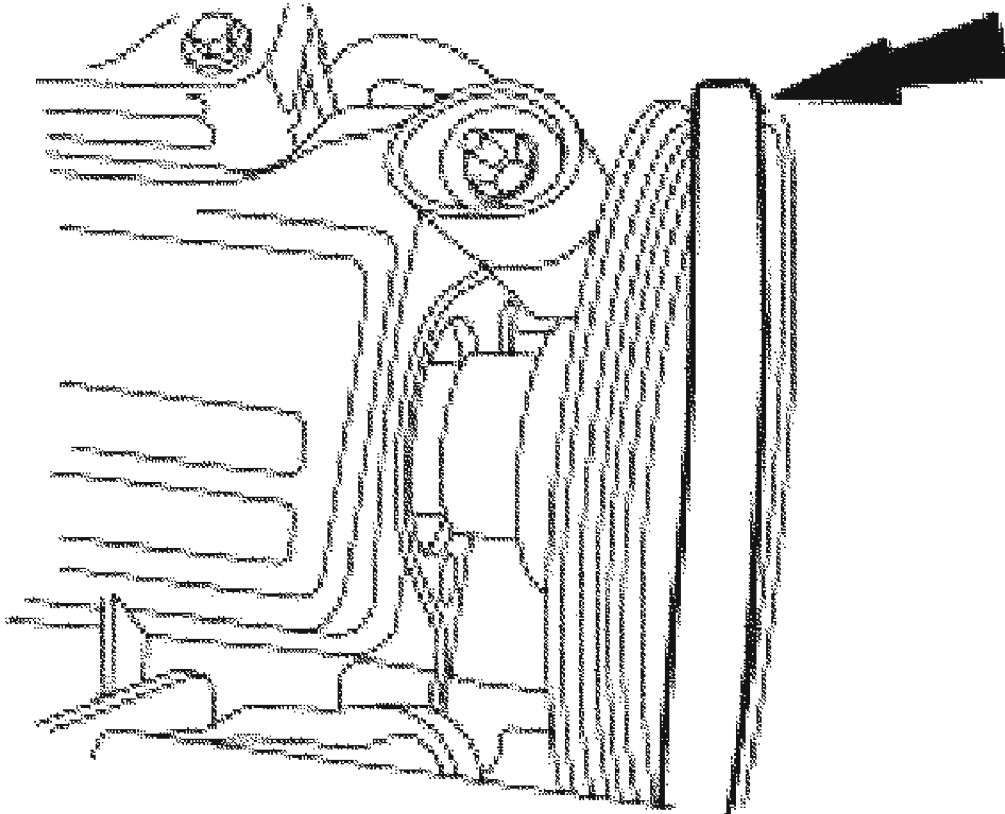


G02739600

**Fig. 427: Connecting Hoses**  
Courtesy of FORD MOTOR CO.

**Vehicles not equipped with water pump belt tensioner**

82. Install the water pump belt on the water pump pulley and position it on the camshaft pulley.



G02739601

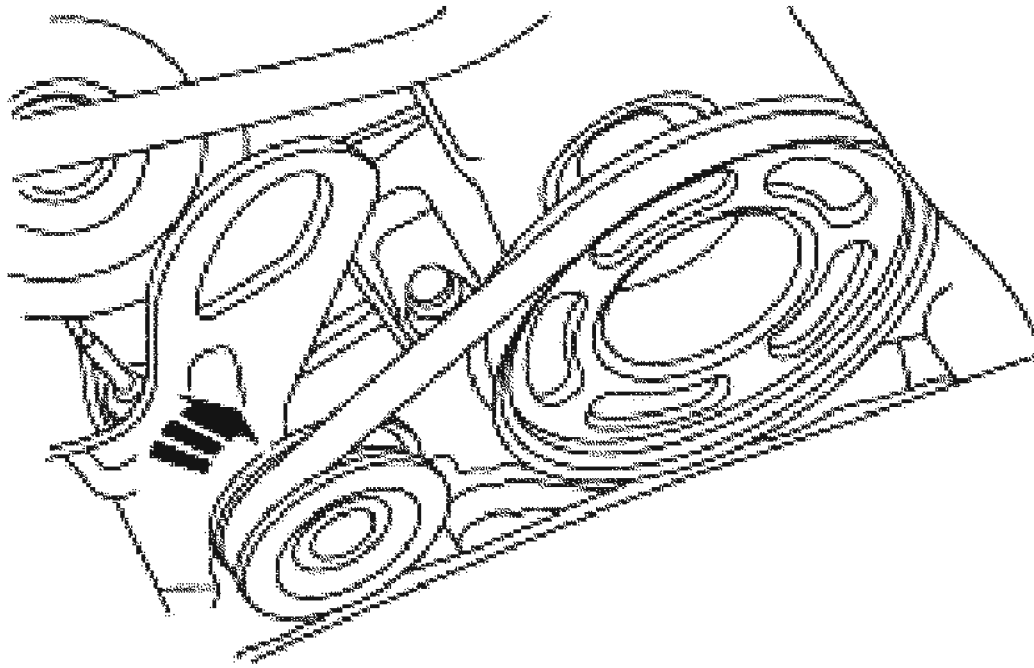
**Fig. 428: Installing Water Pump Belt On Water Pump Pulley**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use any screwdrivers, pliers or other metal objects that could cause damage to the belt or camshaft pulley while installing the belt.

83. Rotate the crankshaft clockwise to seat the water pump belt on the camshaft pulley.

**Vehicles equipped with water pump belt tensioner**

84. Rotate the drive belt tensioner clockwise and install the water pump belt.

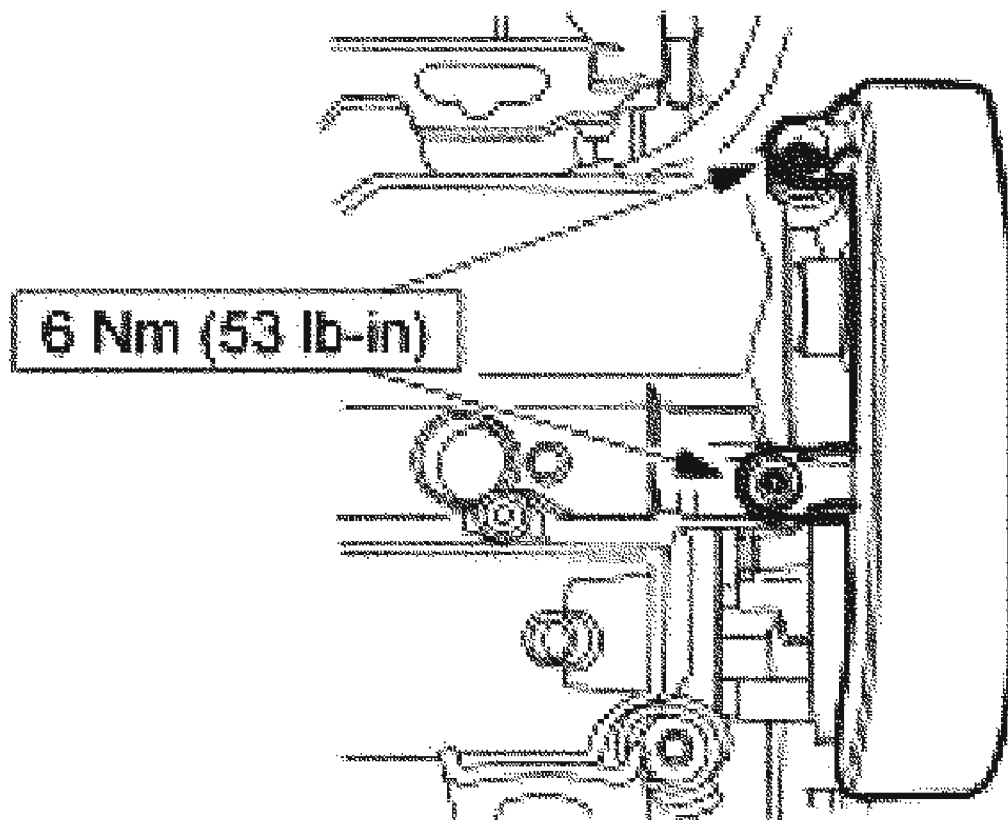


G02739602

**Fig. 429: Rotating Drive Belt Tensioner Clockwise**  
Courtesy of FORD MOTOR CO.

**All vehicles**

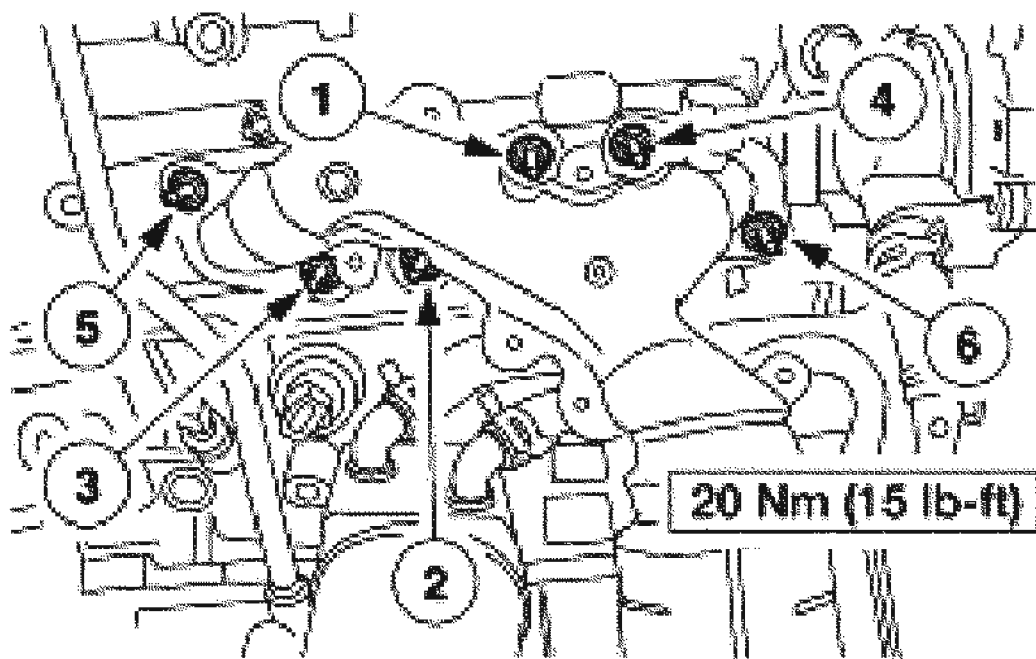
85. Install the water pump belt cover.



G02739603

**Fig. 430: Identifying Water Pump Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

86. Position a new gasket and tighten the exhaust manifold nuts in the sequence shown.

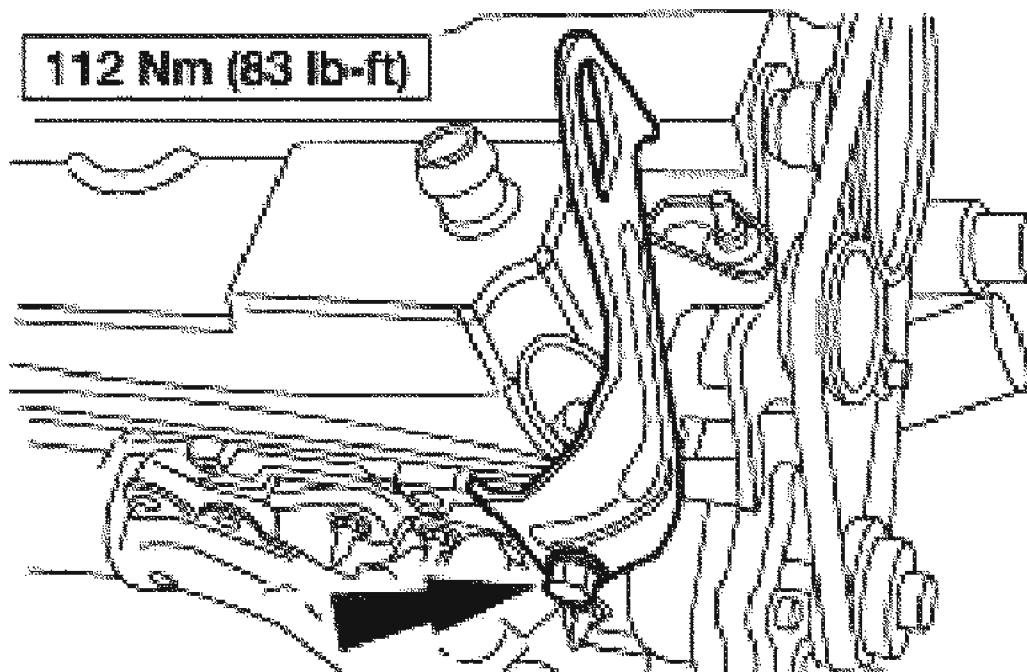


G02739604

**Fig. 431: Identifying Exhaust Manifold Nuts Tightening Sequence & Torque Specification**

Courtesy of FORD MOTOR CO.

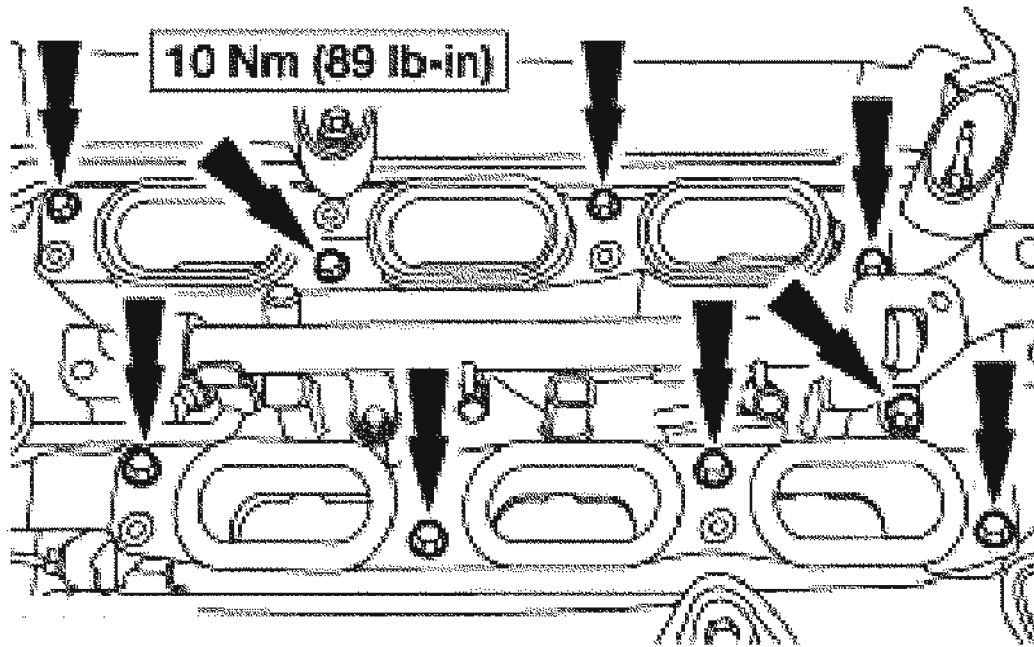
87. Install the engine lift bracket.



G02739605

**Fig. 432: Identifying Engine Lift Brackets Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

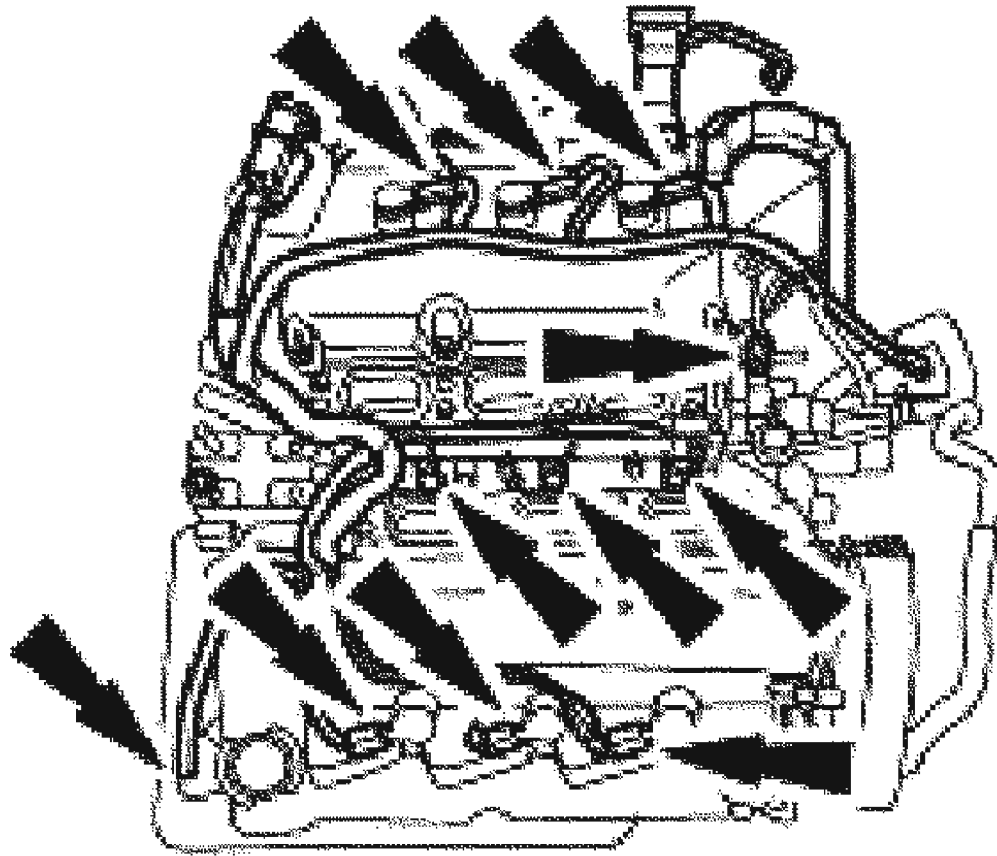
88. Clean the sealing area, position the gasket and install the lower intake manifold.



G02739606

**Fig. 433: Identifying Torque Specification Of Lower Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

89. Position and connect the engine control sensor wiring in the locations shown.

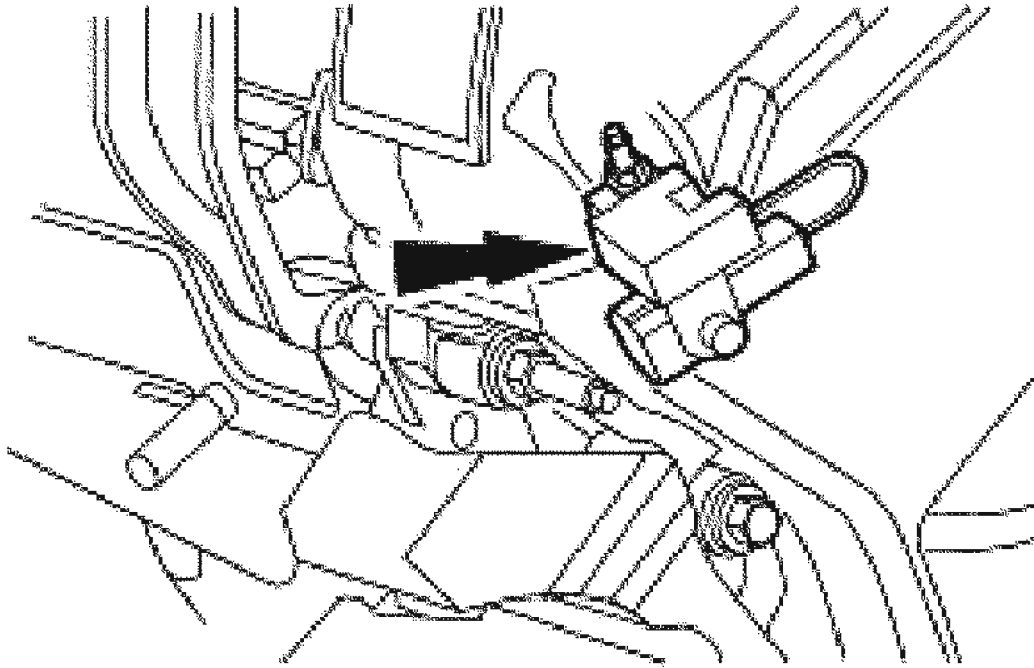


G02739607

**Fig. 434: Connecting Engine Control Sensor Wiring**  
Courtesy of FORD MOTOR CO.

90. Install the radio interference capacitor and the retaining nut.

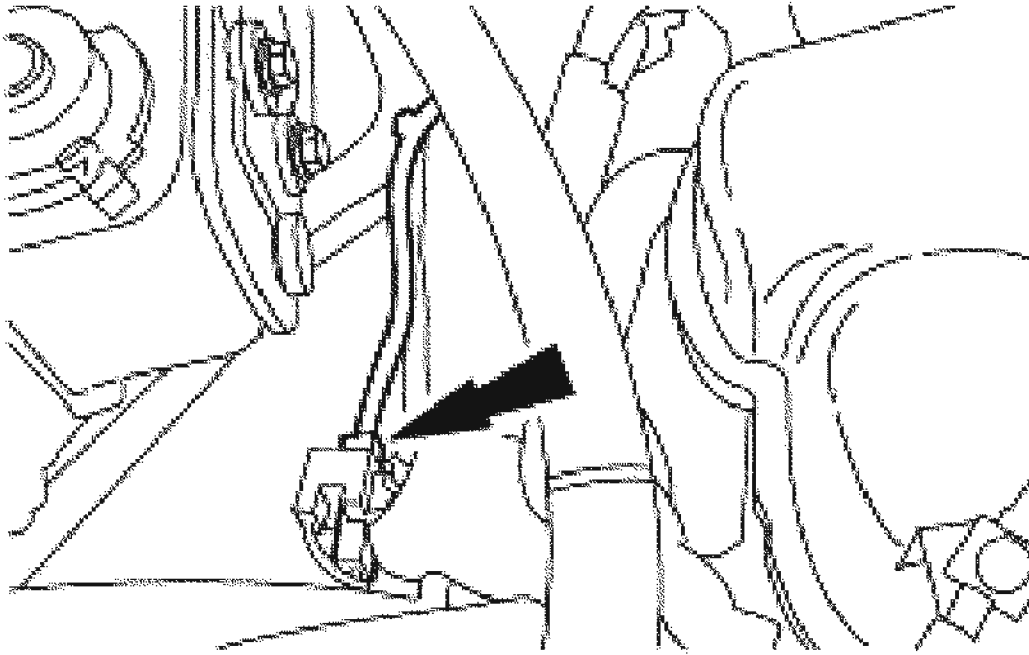




G02739608

**Fig. 435: Installing Radio Interference Capacitor**  
Courtesy of FORD MOTOR CO.

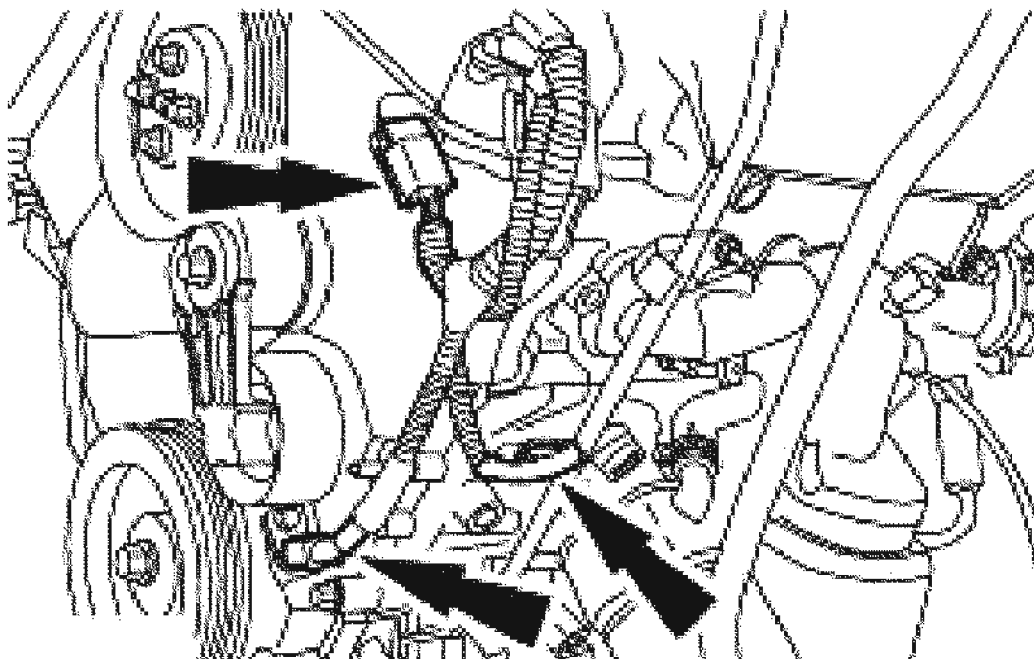
91. Install the radio ignition noise suppressor electrical connector.



G02739609

**Fig. 436: Installing Radio Ignition Noise Suppressor Electrical Connector**  
Courtesy of FORD MOTOR CO.

92. Connect the crankshaft and camshaft position sensor electrical connectors.

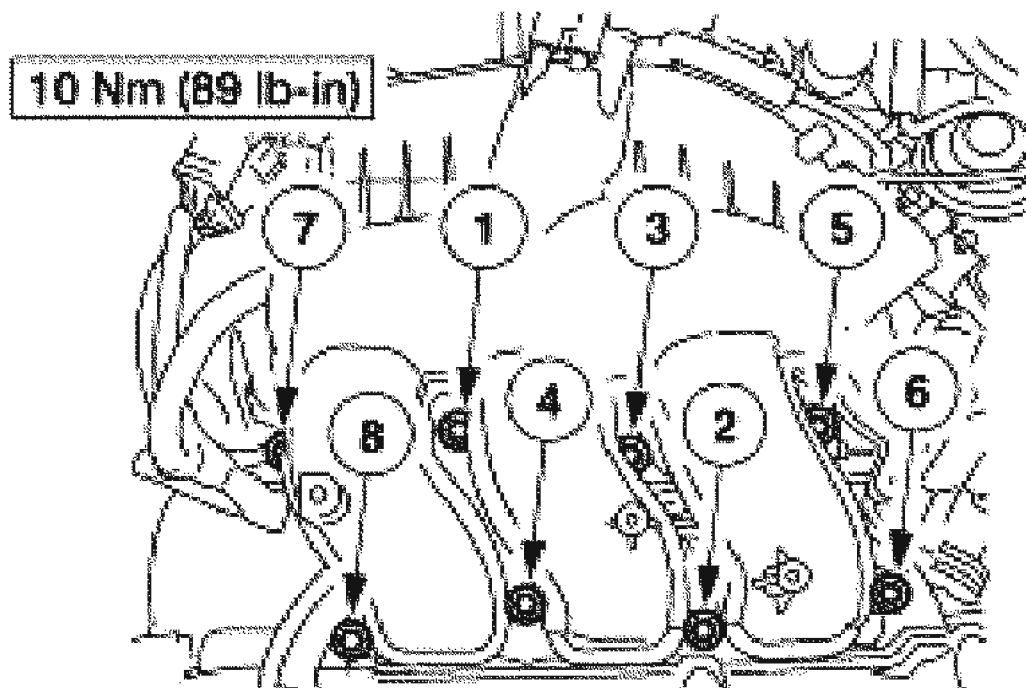


G02739610

**Fig. 437: Connecting Crankshaft And Camshaft Position Sensor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

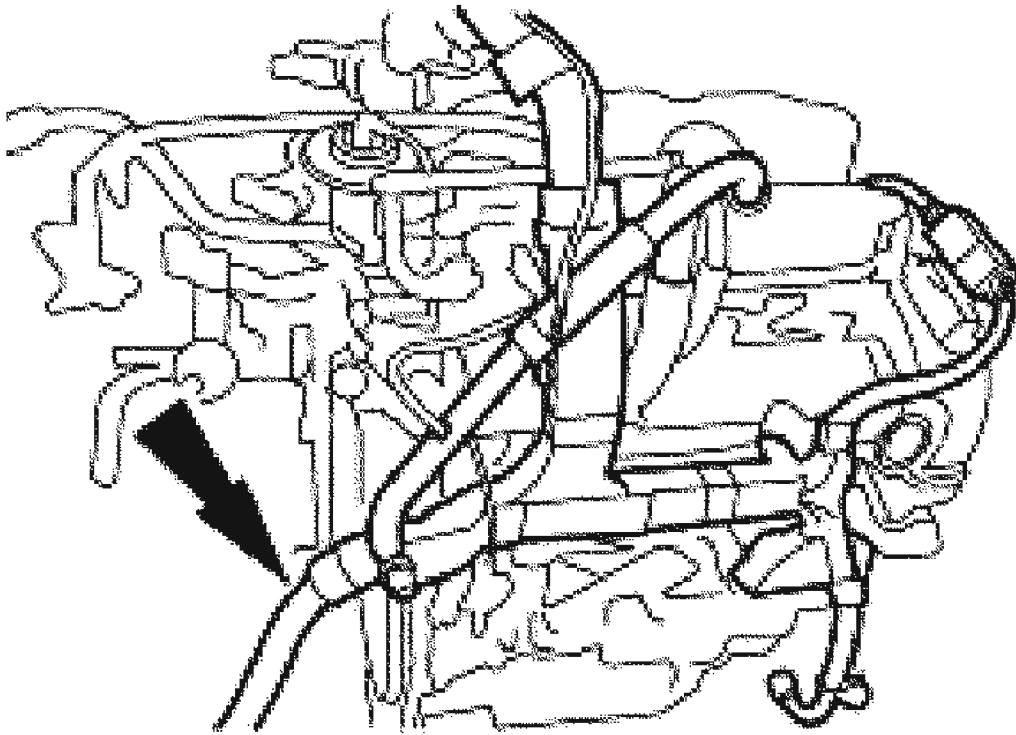
93. Install new gaskets in the upper intake manifold.
94. Clean the sealing area and install the upper intake manifold.



G02739611

**Fig. 438: Identifying Tightening Sequence & Torque Specification Of Upper Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

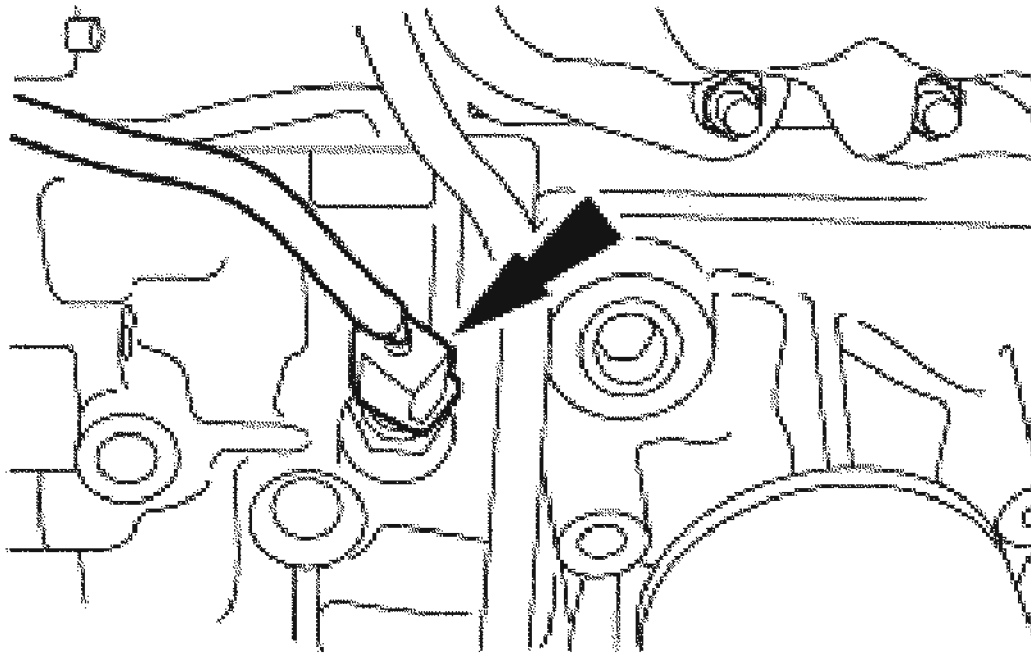
95. Install and connect the engine control wire harness.



G02739612

**Fig. 439: Connecting Engine Control Wire Harness**  
**Courtesy of FORD MOTOR CO.**

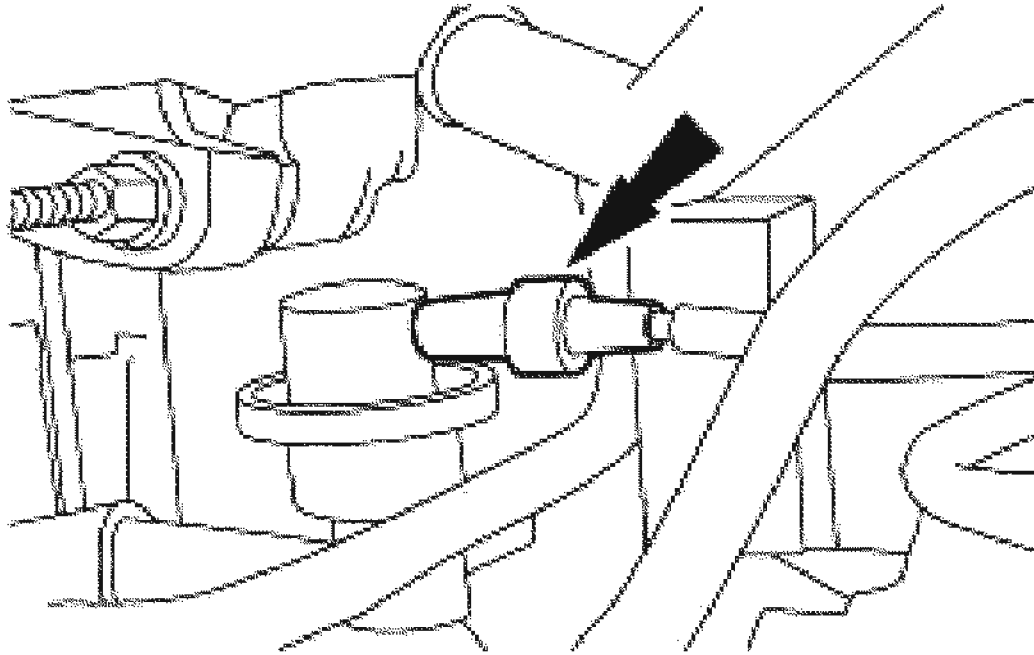
96. Connect the coolant temperature sender and the oil pressure switch.



G02739613

**Fig. 440: Connecting Coolant Temperature Sender And Oil Pressure Switch**  
Courtesy of FORD MOTOR CO.

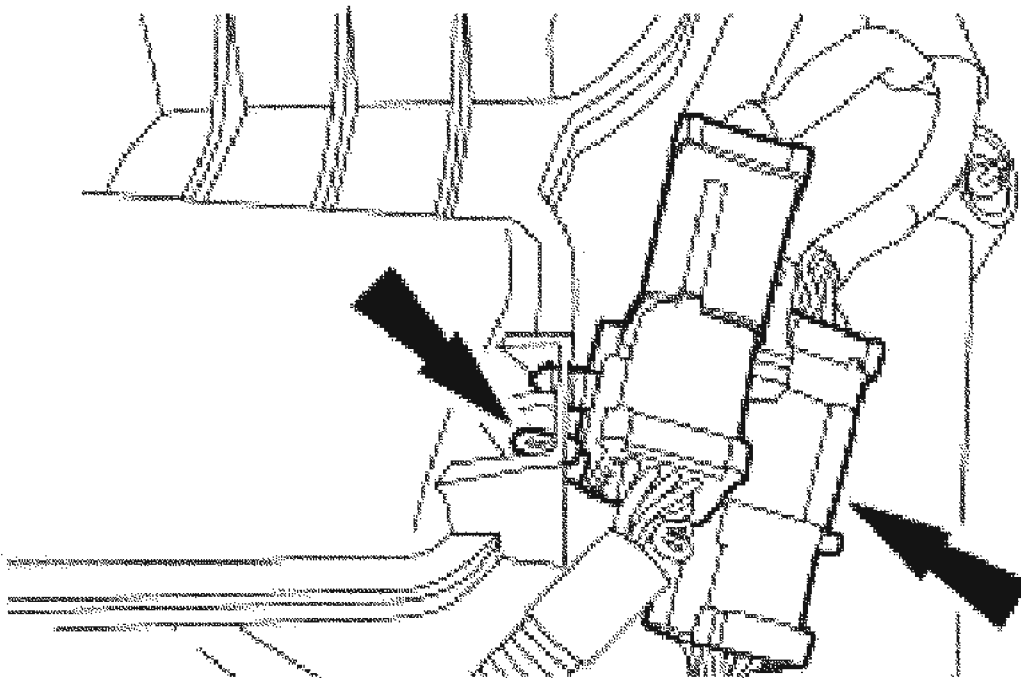
97. Connect the vacuum hose to the fuel pressure damper.



G02739614

**Fig. 441: Connecting Vacuum Hose To Fuel Pressure Damper**  
Courtesy of FORD MOTOR CO.

98. Connect the engine control sensor wiring to the upper intake manifold.

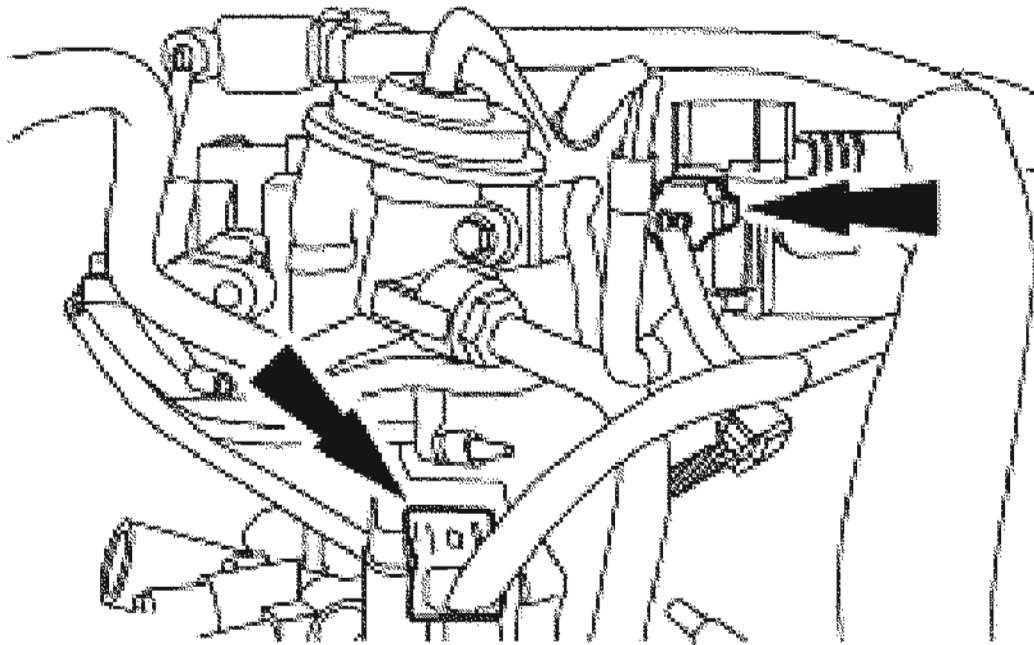


G02739615

**Fig. 442: Connecting Engine Control Sensor Wiring To Upper Intake Manifold**  
Courtesy of FORD MOTOR CO.

99. Connect the EGR vacuum regulator solenoid and the differential pressure feedback EGR system electrical connectors.

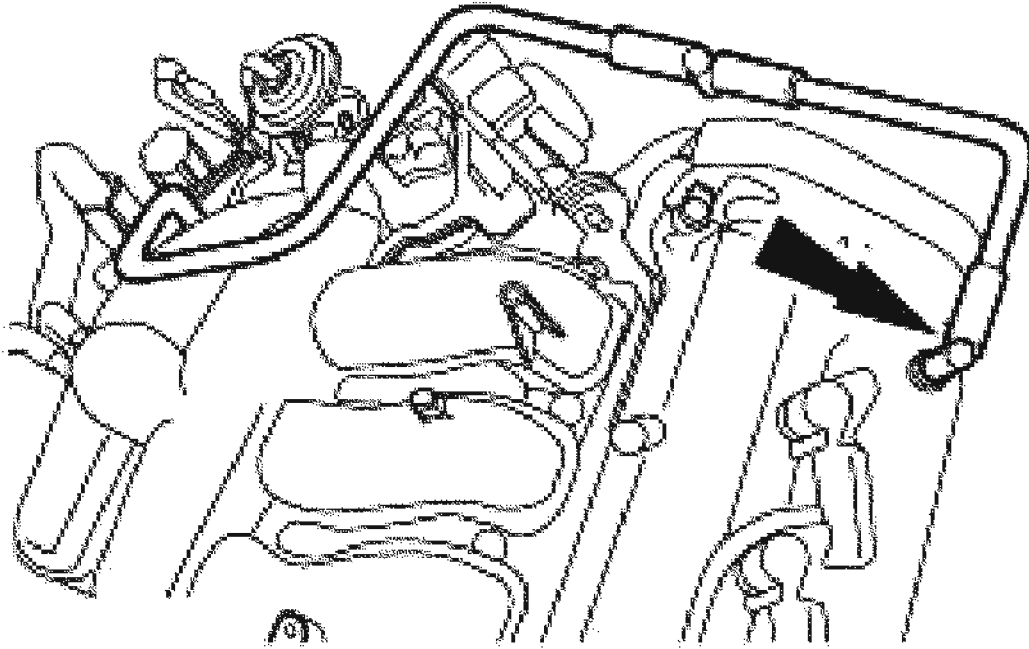




G02739616

**Fig. 443: Connecting EGR Vacuum Regulator Solenoid And Differential Pressure Feedback EGR System Electrical Connectors**  
Courtesy of FORD MOTOR CO.

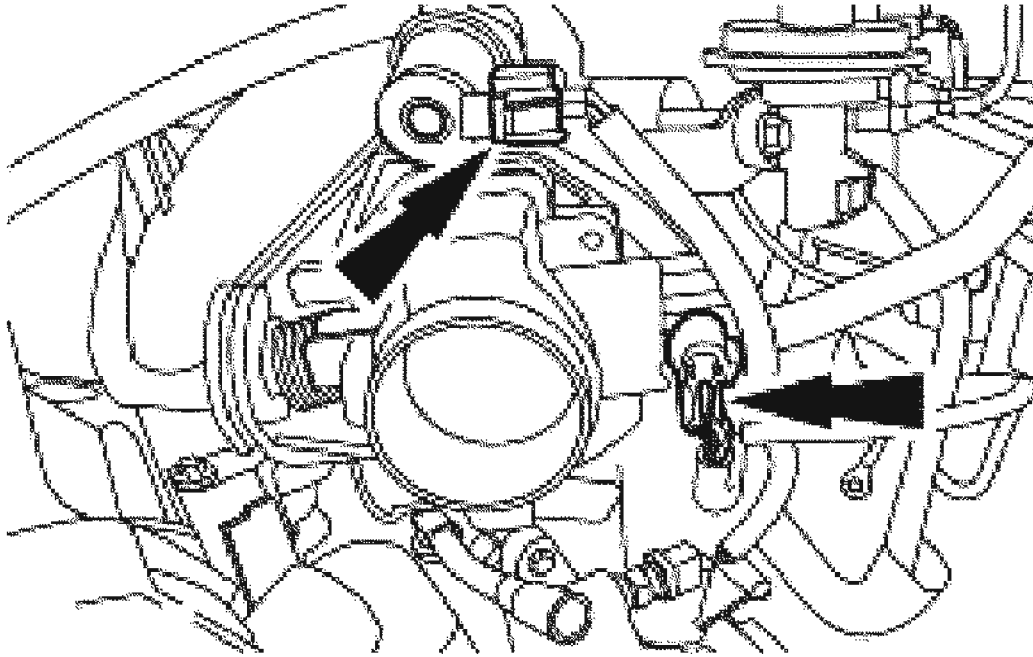
100. Install the PCV tube.



G02739617

**Fig. 444: Installing PCV Tube**  
Courtesy of FORD MOTOR CO.

101. Connect the idle air control (IAC) valve and the throttle position (TP) sensor electrical connectors.



G02739618

**Fig. 445: Connecting Idle Air Control (IAC) Valve And Throttle Position (TP) Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

## INSTALLATION

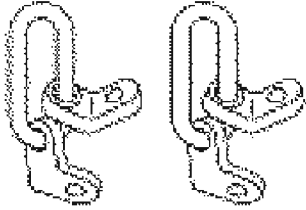
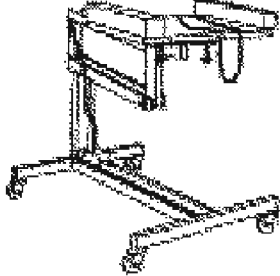

### ENGINE

#### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

<http://vnx.su>

	Lifting Bracket, Engine 303-050 (T70P-6000)
	Powertrain Lift with Tilting Plate 014-00765
	Spreader Bar 303-D089 (D93P-6001-A3) or Equivalent

G02739619

**Fig. 446: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Material

### MATERIAL SPECIFICATION

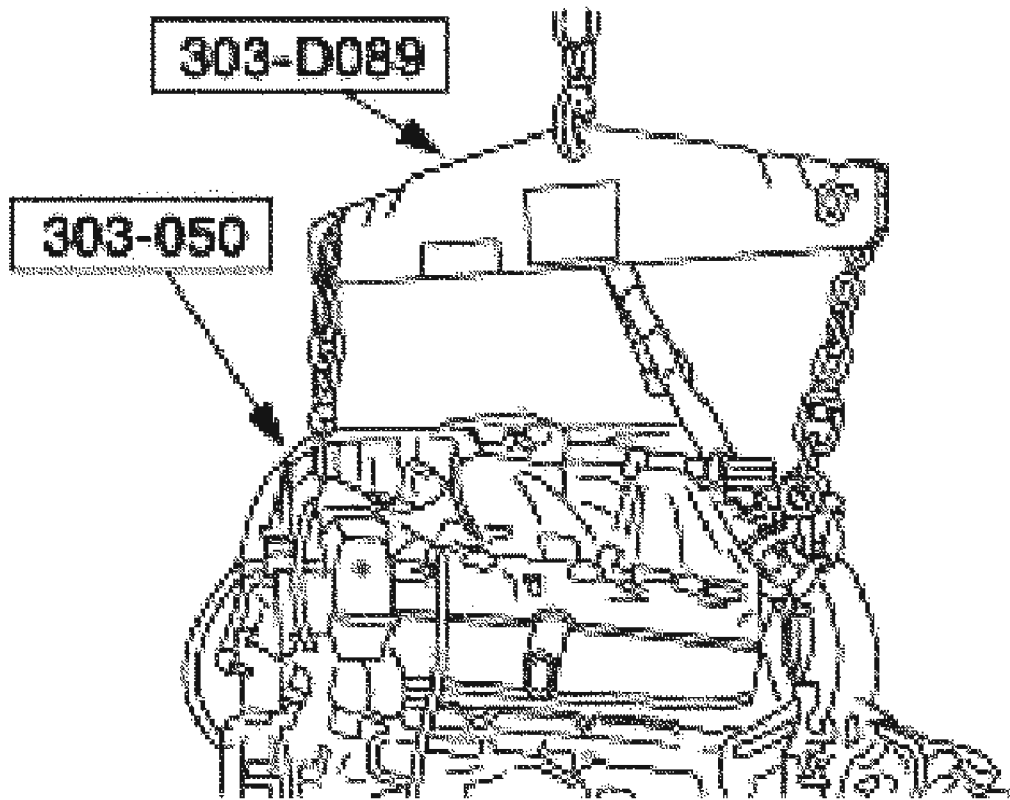
Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA A4	WSE-M4G323-A4

### Installation

1. Position the engine onto the subframe assembly.

## 2004 Ford Escape

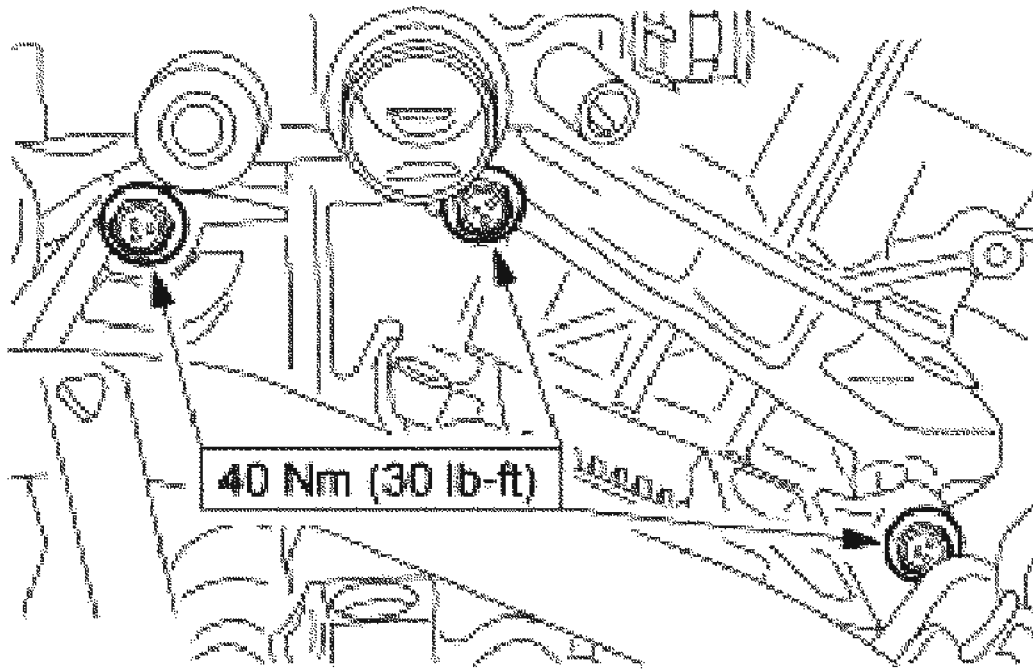
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739620

**Fig. 447: Installing Engine Onto Subframe Assembly**  
Courtesy of FORD MOTOR CO.

2. Install the five bolts in the transaxle.



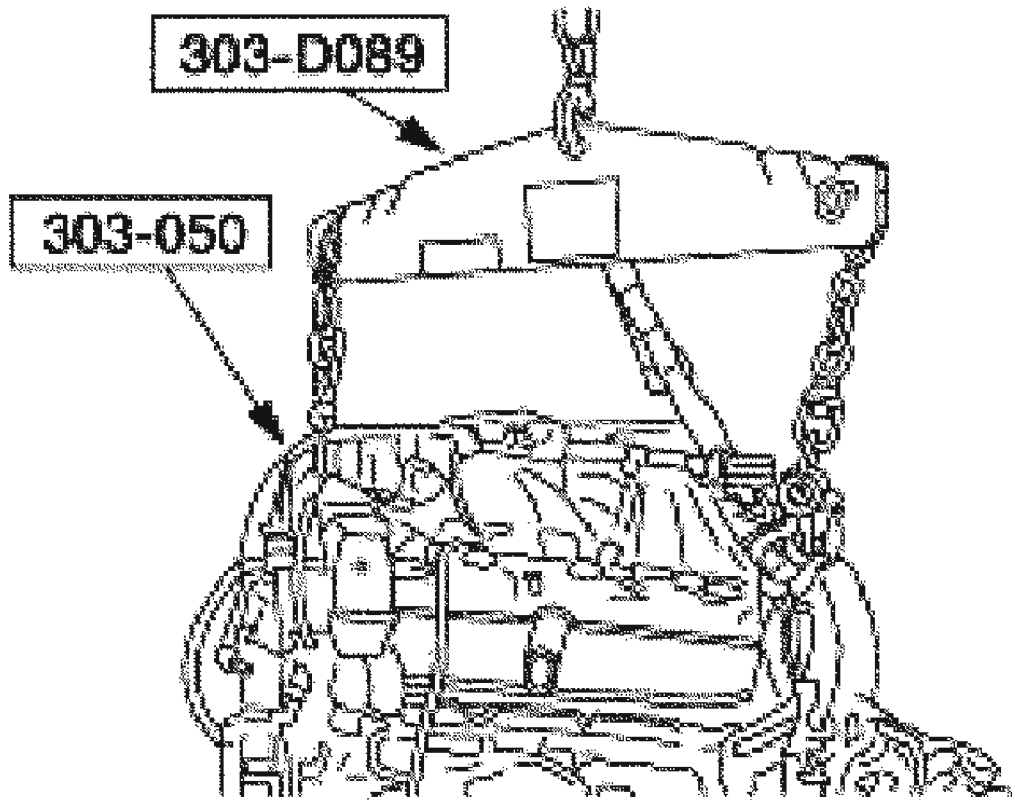
G02739621

**Fig. 448: Identifying Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

3. Using the special tools, position the powertrain on the universal powertrain lift and remove the special tools.

## 2004 Ford Escape

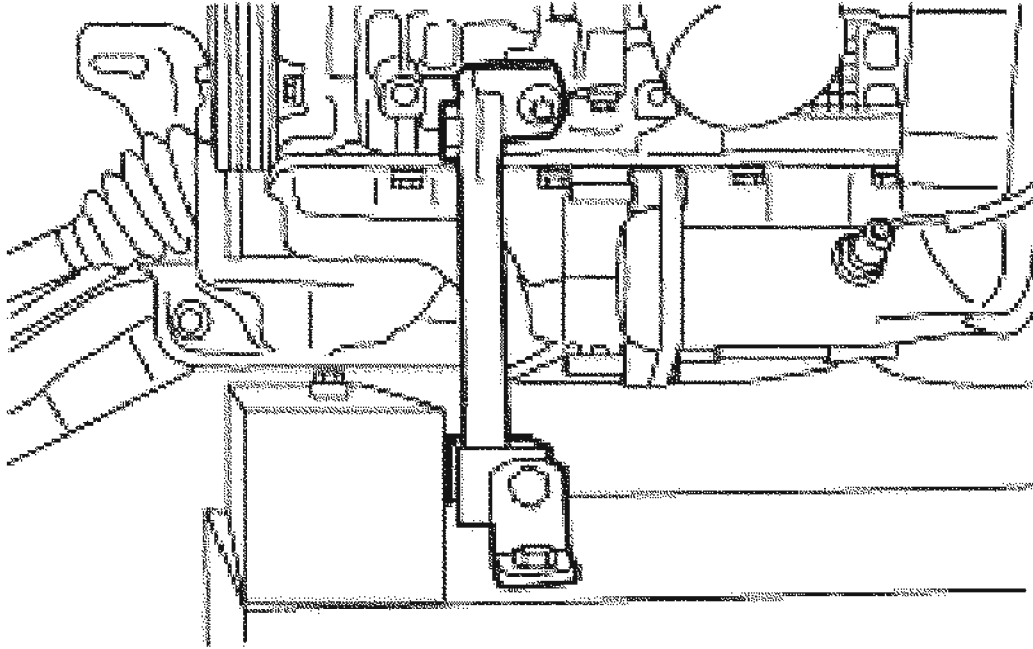
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739622

**Fig. 449: Installing Powertrain On Universal Powertrain Lift**  
Courtesy of FORD MOTOR CO.

4. Using a bracket from a heavy-duty engine stand, support the front of the engine.

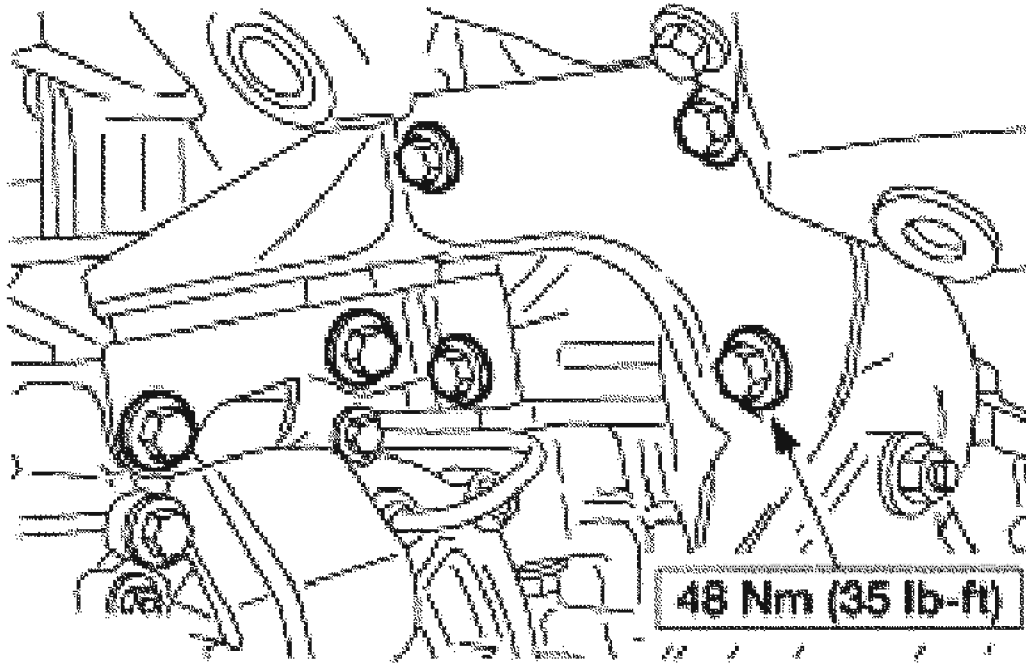


G02739623

**Fig. 450: Supporting Front Of Engine**  
Courtesy of FORD MOTOR CO.

5. Position the halfshaft bracket and install the bolts.

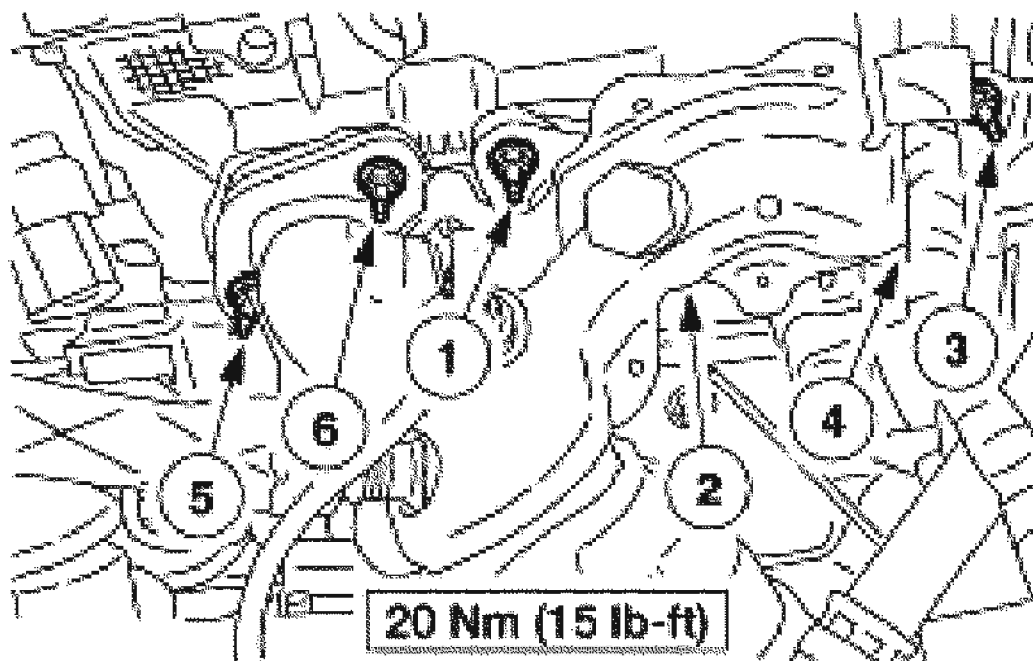




G02739624

**Fig. 451: Identifying Halfshaft Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Install a new gasket and the RH exhaust manifold.

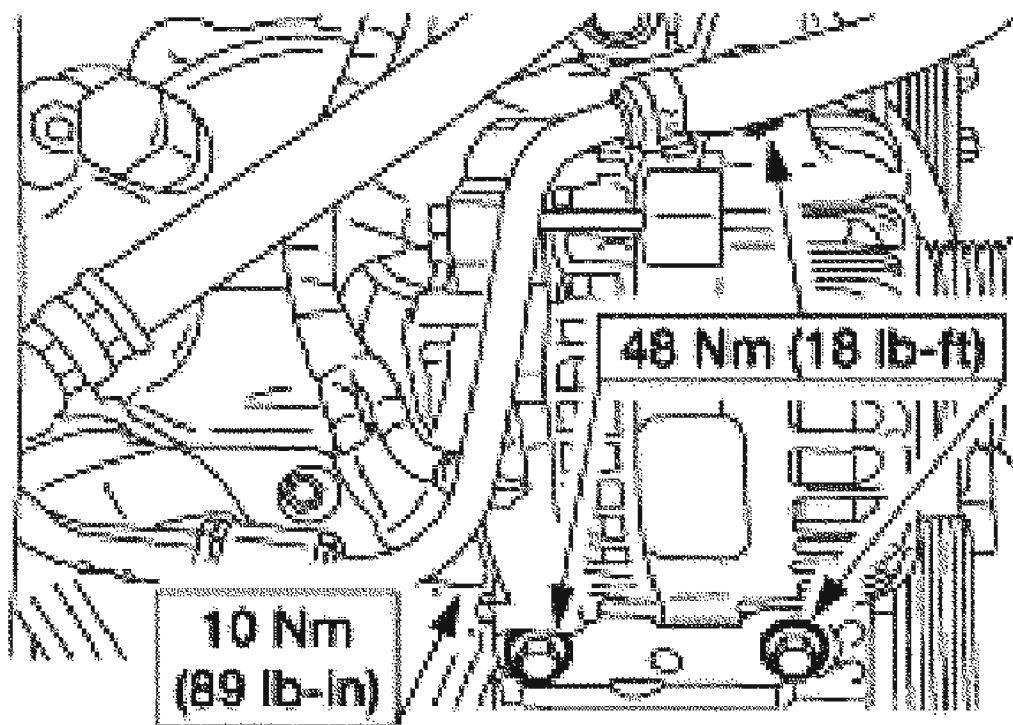


G02739625

**Fig. 452: Identifying Tightening Sequence & Torque Specification Of RH Exhaust Manifold Bolts**

Courtesy of FORD MOTOR CO.

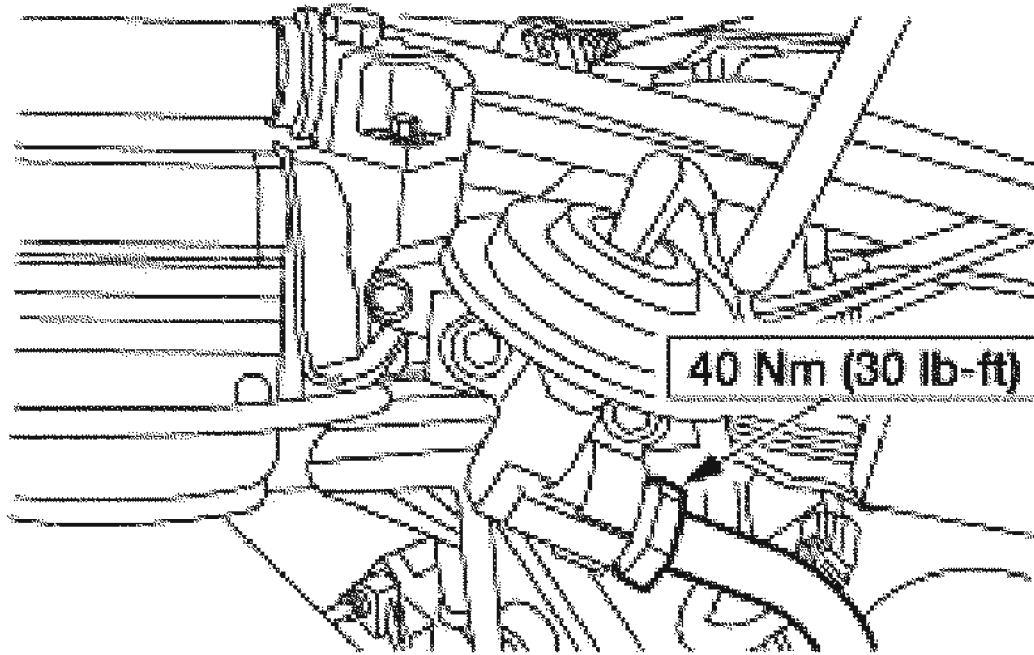
7. Install the generator.



G02739626

**Fig. 453: Identifying Generator Bolts Torque Specifications**  
Courtesy of FORD MOTOR CO.

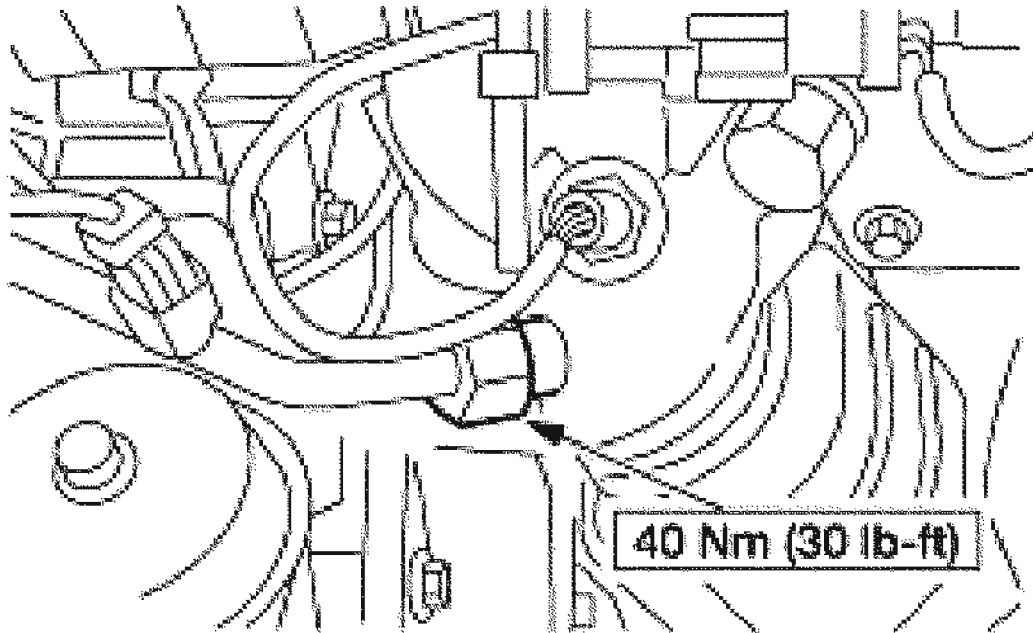
**NOTE:** Do not tighten the EGR tube until both ends of the tube have been connected.



G02739627

**Fig. 454: Connecting EGR Tube And Fitting**  
Courtesy of FORD MOTOR CO.

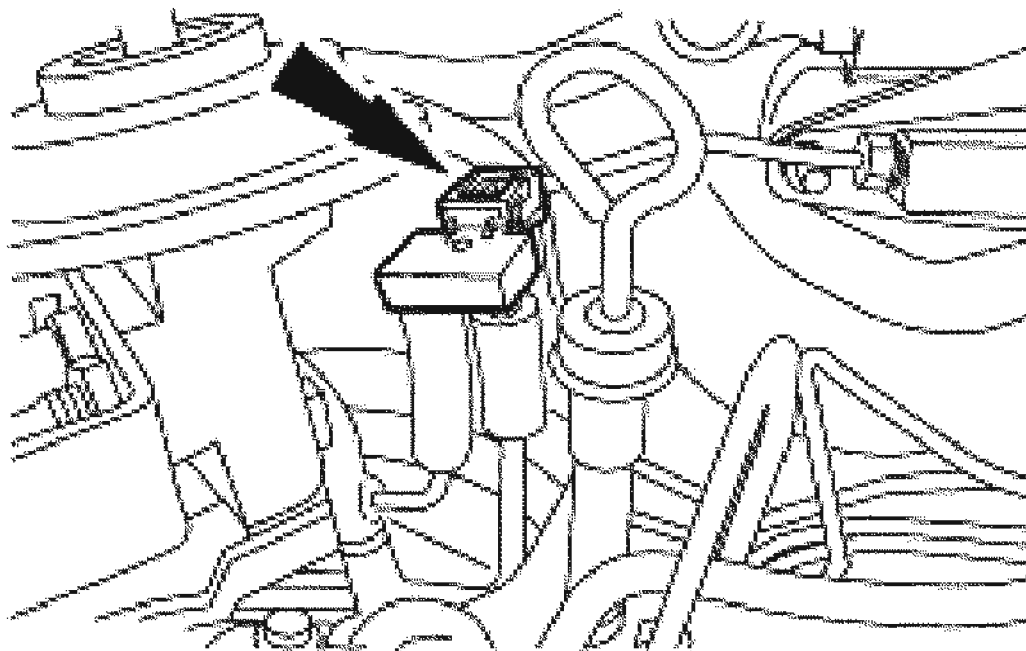
8. Position the EGR tube and connect the fitting.
9. Connect the EGR tube nut at the manifold connector.



G02739628

**Fig. 455: Connecting EGR Tube Nut At Manifold Connector**  
**Courtesy of FORD MOTOR CO.**

10. Connect the differential pressure feedback EGR system electrical connector.

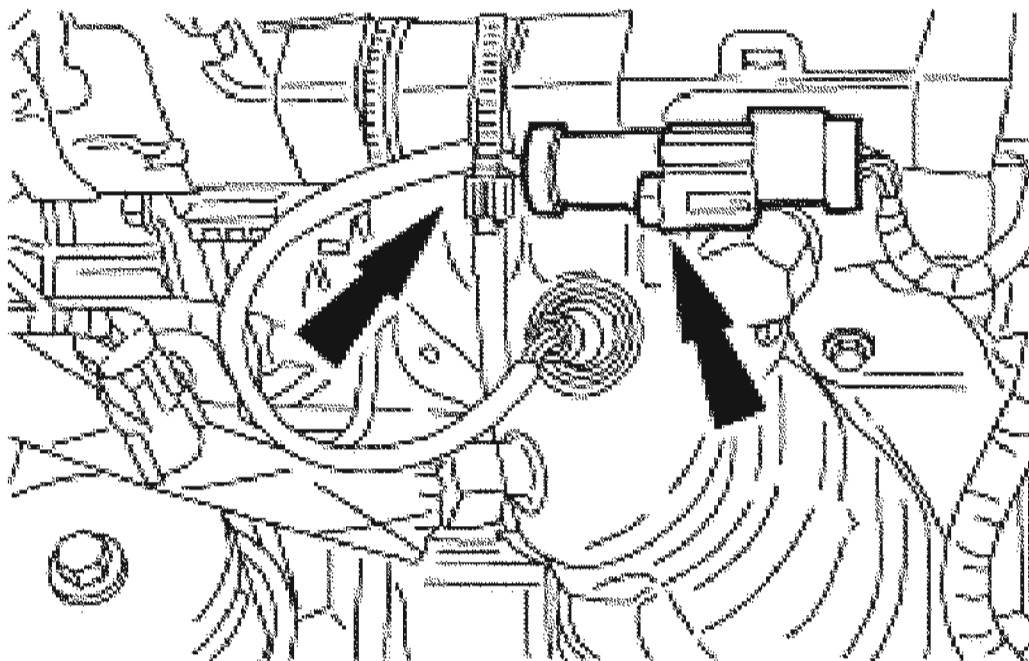


G02739629

**Fig. 456: Connecting Differential Pressure Feedback EGR System Electrical Connector**

**Courtesy of FORD MOTOR CO.**

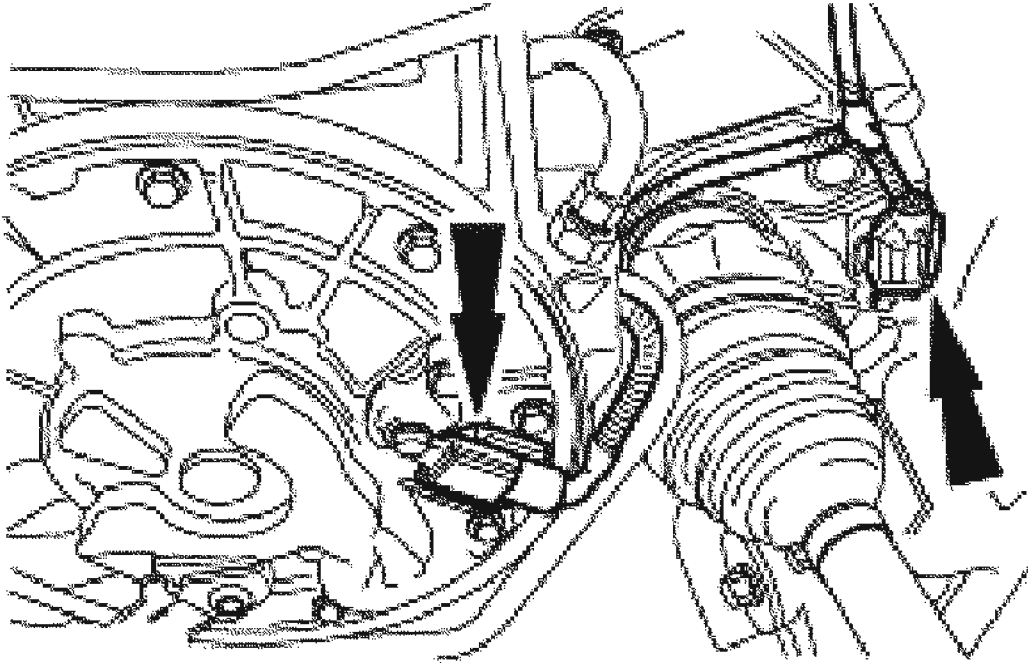
11. Connect the heated oxygen sensor (HO2S) electrical connector and install a new tie-strap.



G02739630

**Fig. 457: Connecting Heated Oxygen Sensor (HO2S) Electrical Connector**  
Courtesy of FORD MOTOR CO.

12. Connect the output shaft speed (OSS) sensor and turbine speed sensor (TSS) electrical connectors.

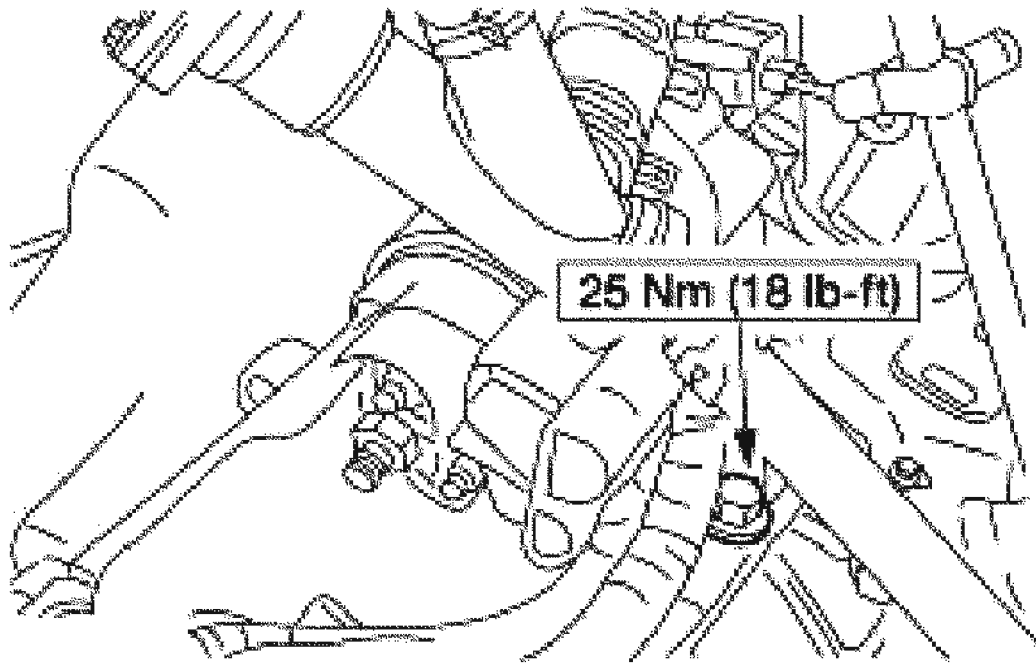


G02739631

**Fig. 458: Connecting Output Shaft Speed (OSS) Sensor And Turbine Speed Sensor (TSS) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

13. Install the starter.

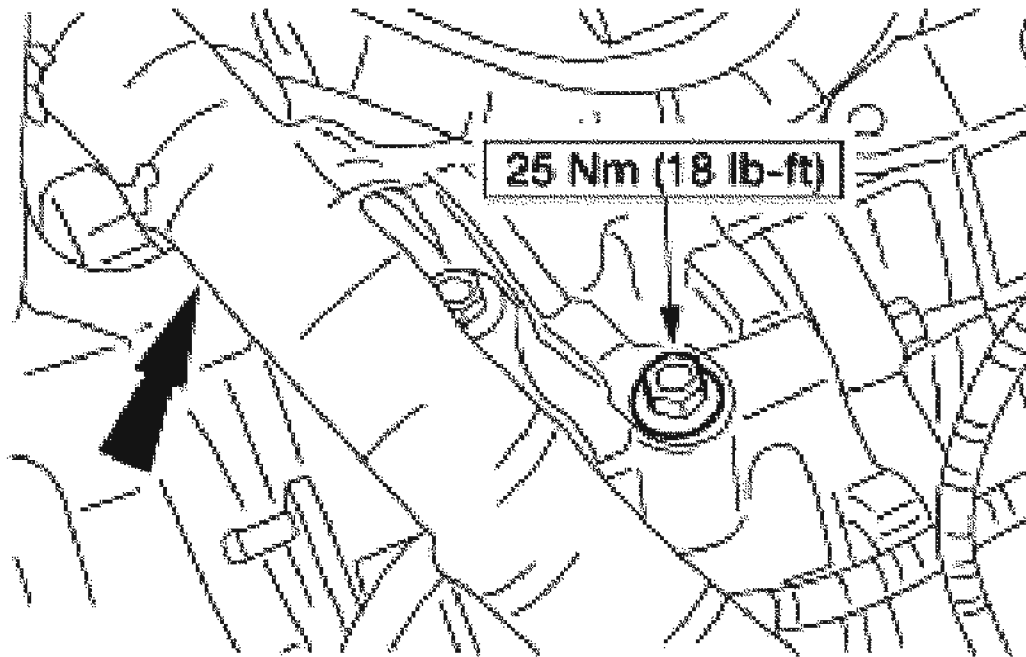




G02739632

**Fig. 459: Identifying Starter Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

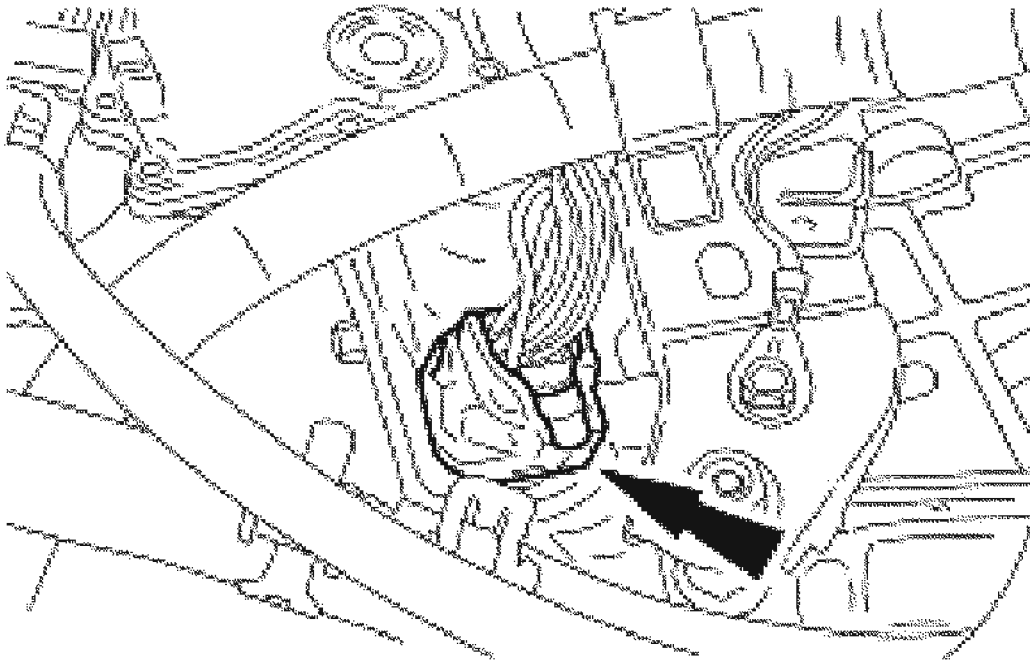
14. Install the bolt and connect the transaxle control harness to the bracket.



G02739633

**Fig. 460: Connecting Transaxle Control Harness To Bracket**  
Courtesy of FORD MOTOR CO.

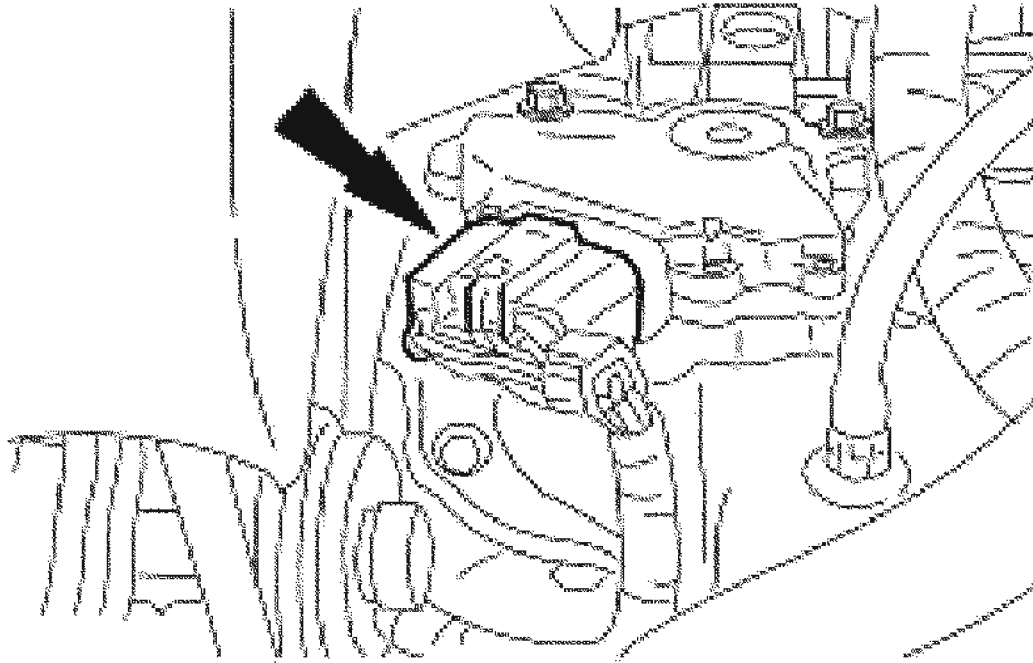
15. Connect the transaxle harness.



G02739634

**Fig. 461: Connecting Transaxle Harness**  
**Courtesy of FORD MOTOR CO.**

16. Connect the transmission range (TR) sensor.



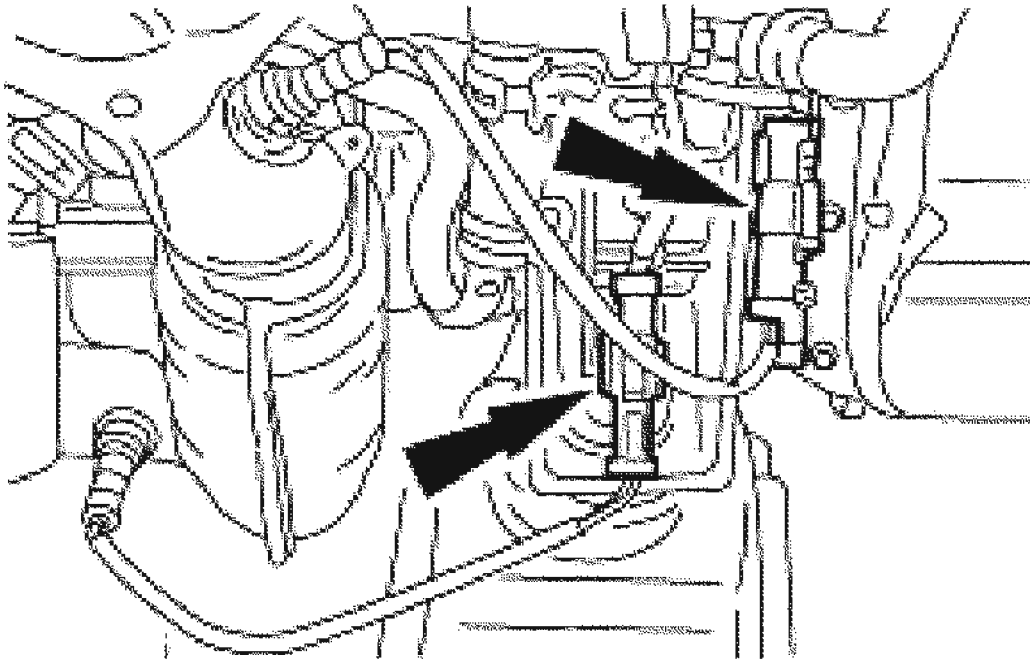
G02739635

**Fig. 462: Connecting Transmission Range (TR) Sensor**  
Courtesy of FORD MOTOR CO.

17. Connect the heated oxygen sensors.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



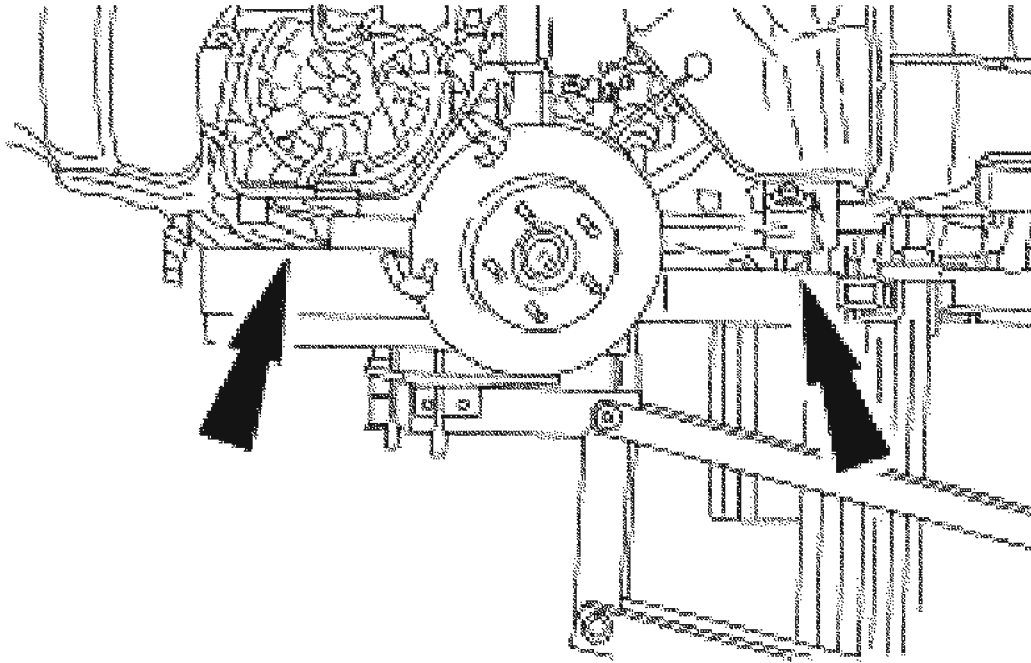
G02739636

**Fig. 463: Connecting Heated Oxygen Sensors**  
Courtesy of FORD MOTOR CO.

18. Position the powertrain in the vehicle.

## 2004 Ford Escape

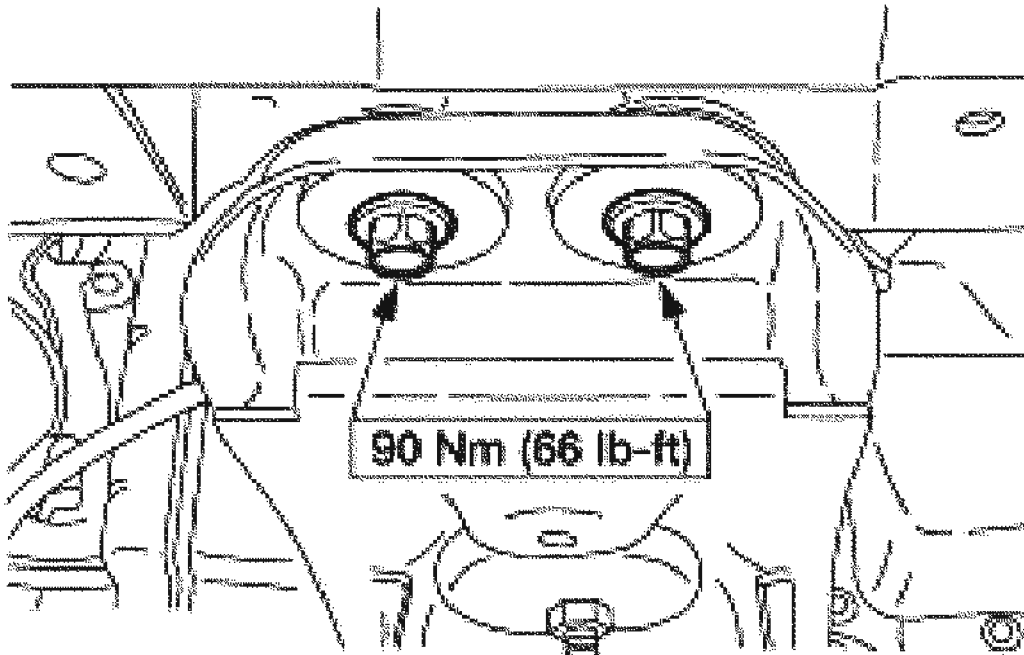
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739637

**Fig. 464: Positioning Powertrain In Vehicle**  
Courtesy of FORD MOTOR CO.

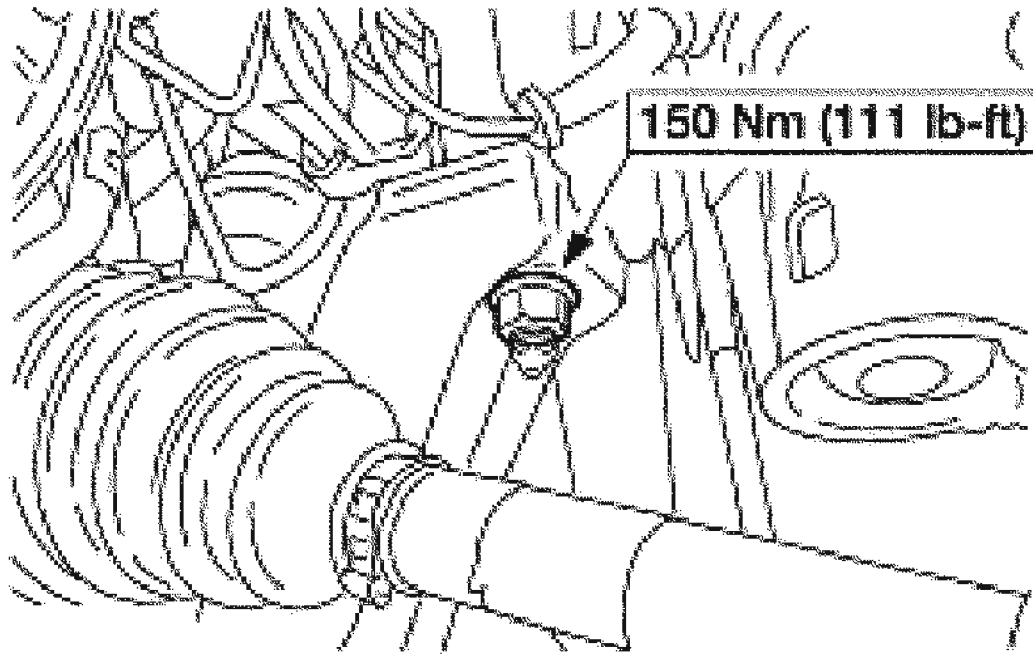
19. Install the two motor mount support bolts.



G02739638

**Fig. 465: Identifying Motor Mount Support Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

20. Install the two subframe side nuts.

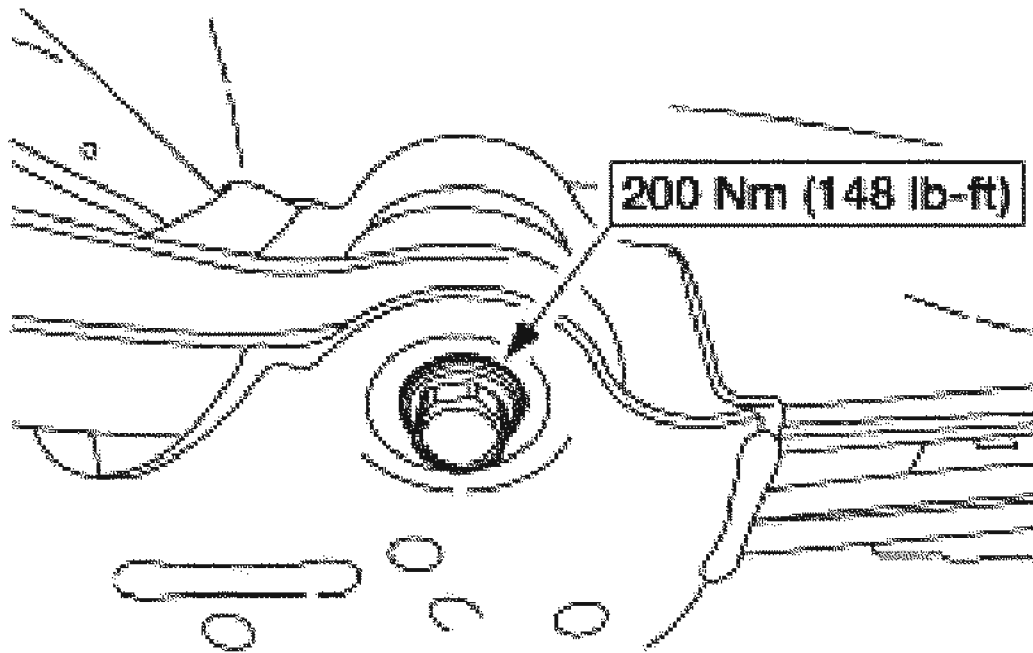


G02739639

**Fig. 466: Identifying Subframe Side Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

21. Install the two rear subframe bolts.

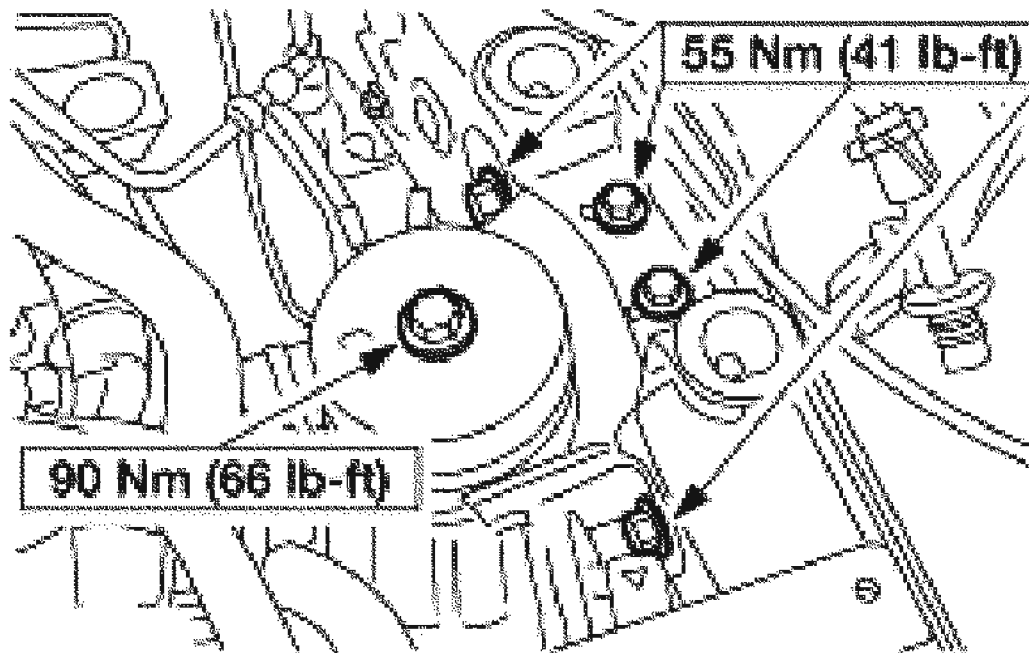




G02739640

**Fig. 467: Identifying Rear Subframe Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

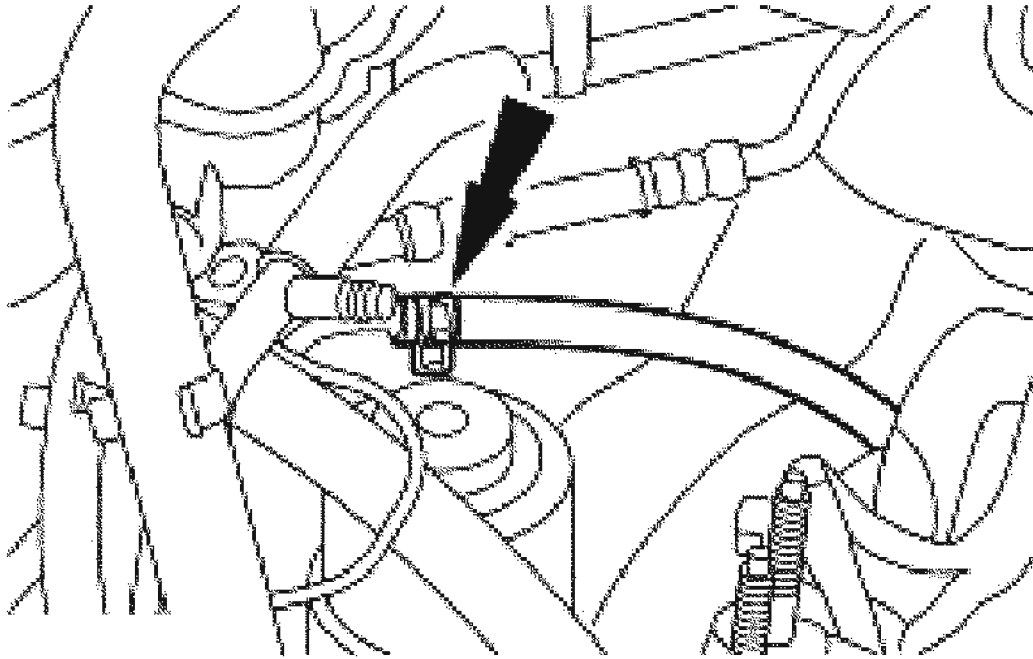
**NOTE:** The next two steps must be carried out with the vehicle raised and the powertrain assembly supported by the lift.



G02739641

**Fig. 468: Identifying Transaxle Mount Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

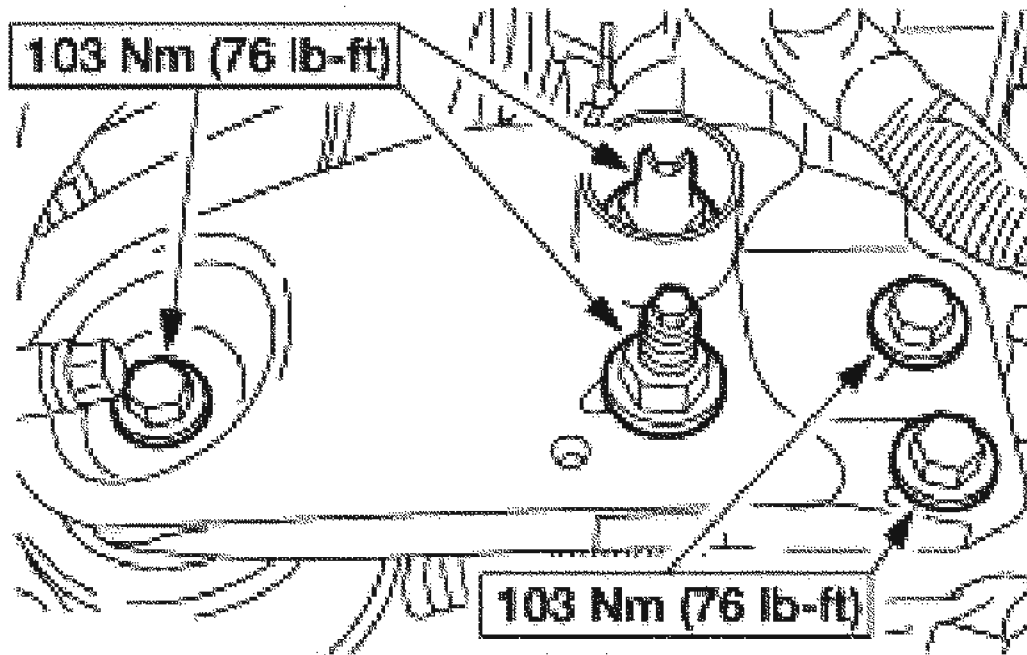
22. Position the transaxle mount and install the bolts.
23. Connect the power steering return hose.



G02739642

**Fig. 469: Connecting Power Steering Return Hose**  
Courtesy of FORD MOTOR CO.

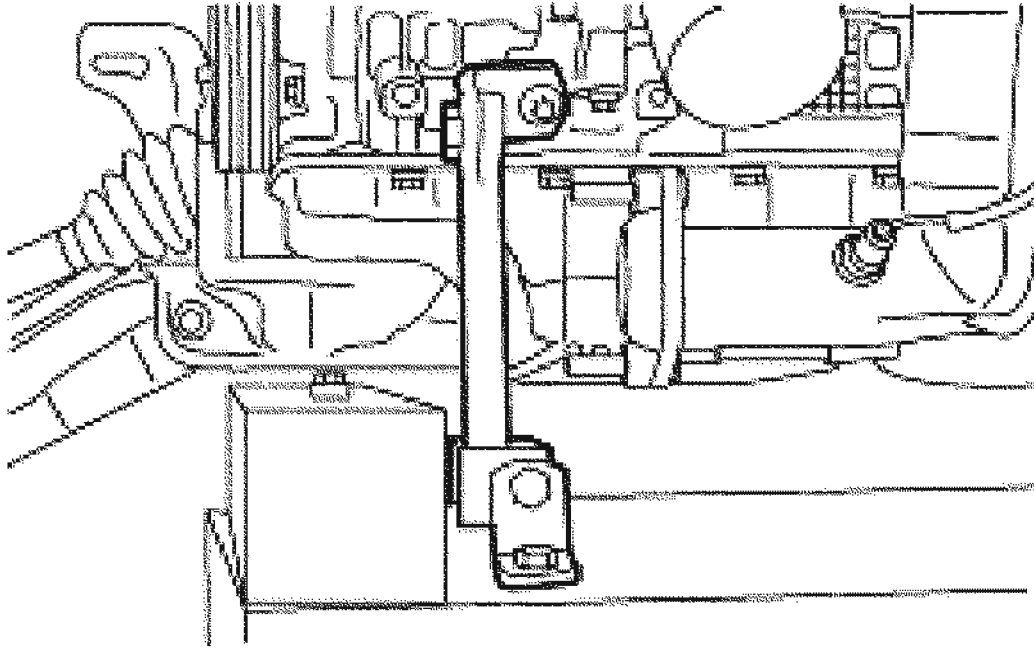
24. Install the motor mount bracket, the bolts and the nuts.



G02739643

**Fig. 470: Identifying Motor Mount Bracket Bolts & Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

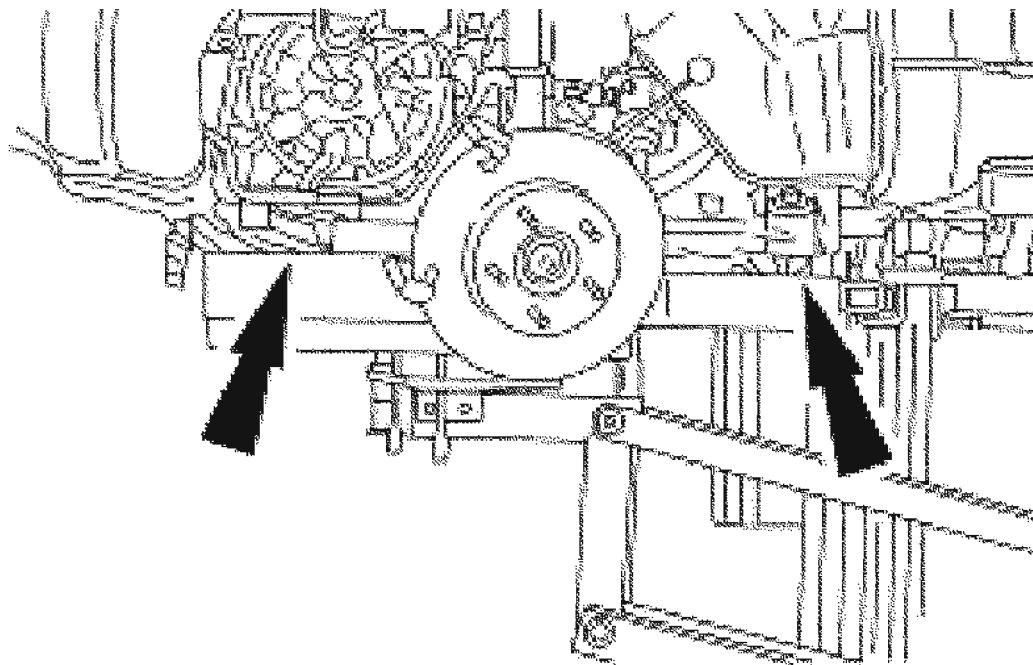
25. Remove the bracket.



G02739644

**Fig. 471: Removing Bracket**  
Courtesy of FORD MOTOR CO.

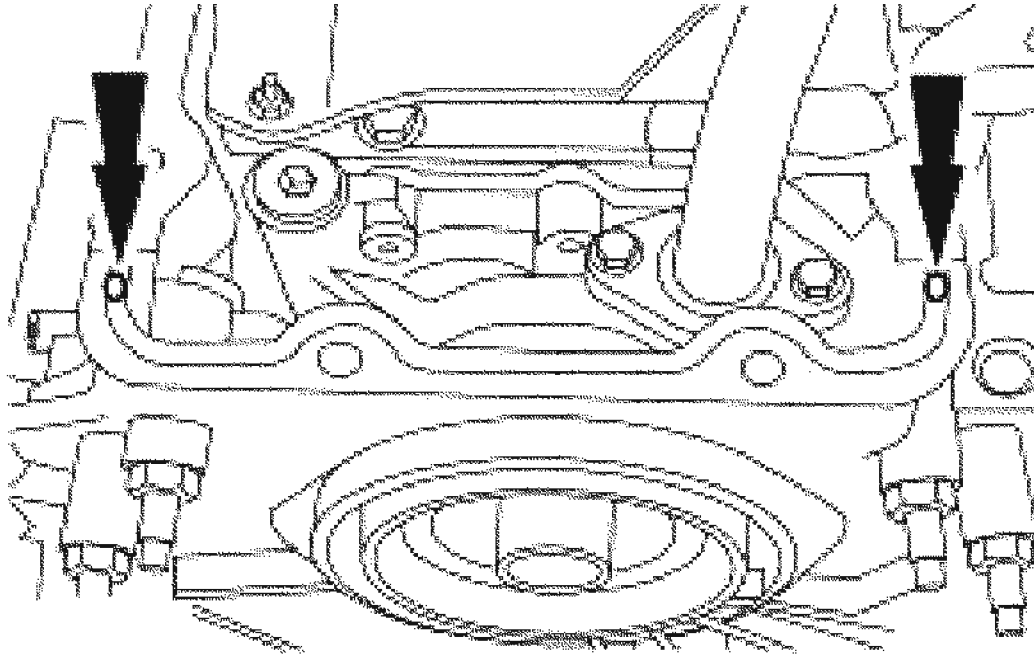
26. Remove the universal powertrain lift.



G02739645

**Fig. 472: Removing Universal Powertrain Lift**  
Courtesy of FORD MOTOR CO.

- NOTE:** Clean and degrease all sealing surfaces with metal surface cleaner.
- NOTE:** The oil pan must be installed and the bolts tightened within four minutes of the sealant application.

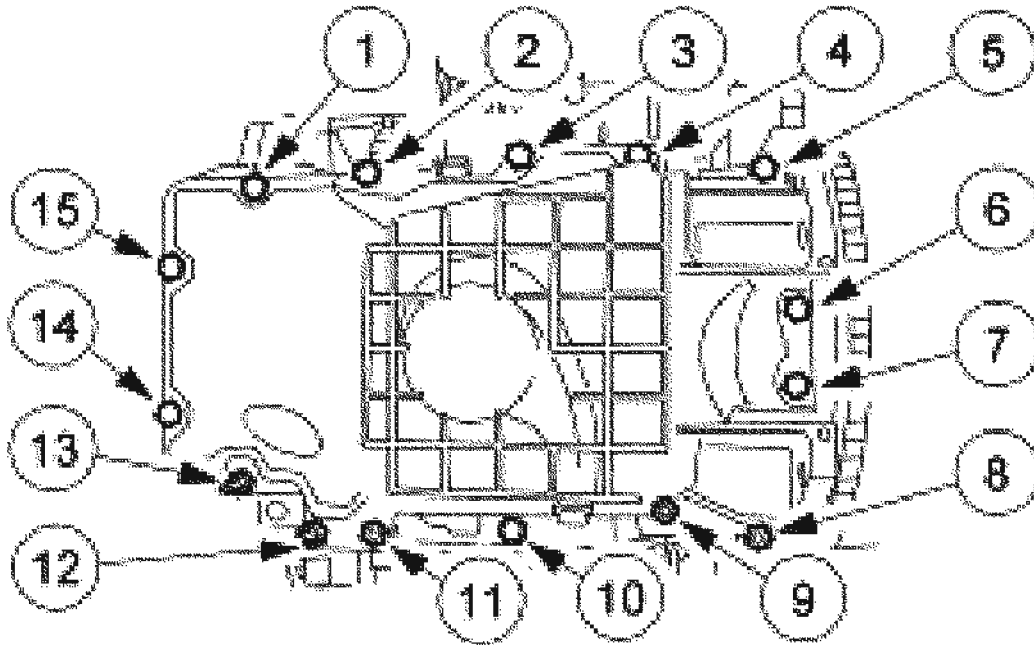


G02739646

**Fig. 473: Applying Silicone Gasket And Sealant To Front Cover-To-Cylinder Block Mating Surface**

**Courtesy of FORD MOTOR CO.**

27. Apply a 10 mm (0.4 in) dot of silicone gasket and sealant to the front cover-to-cylinder block mating surface.
28. Position the oil pan and gasket and loosely install the bolts in the indicated sequence.



G02739647

**Fig. 474: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

29. Install the oil pan-to-transaxle bolts.

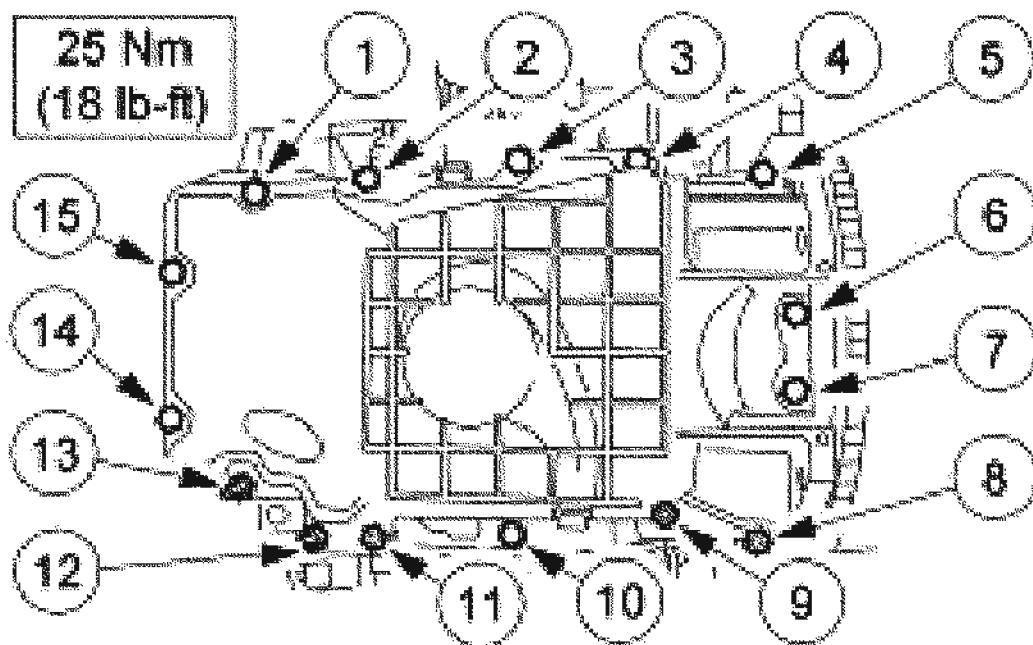




G02739648

**Fig. 475: Identifying Oil Pan-To-Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

30. Tighten the oil pan bolts in the sequence shown.

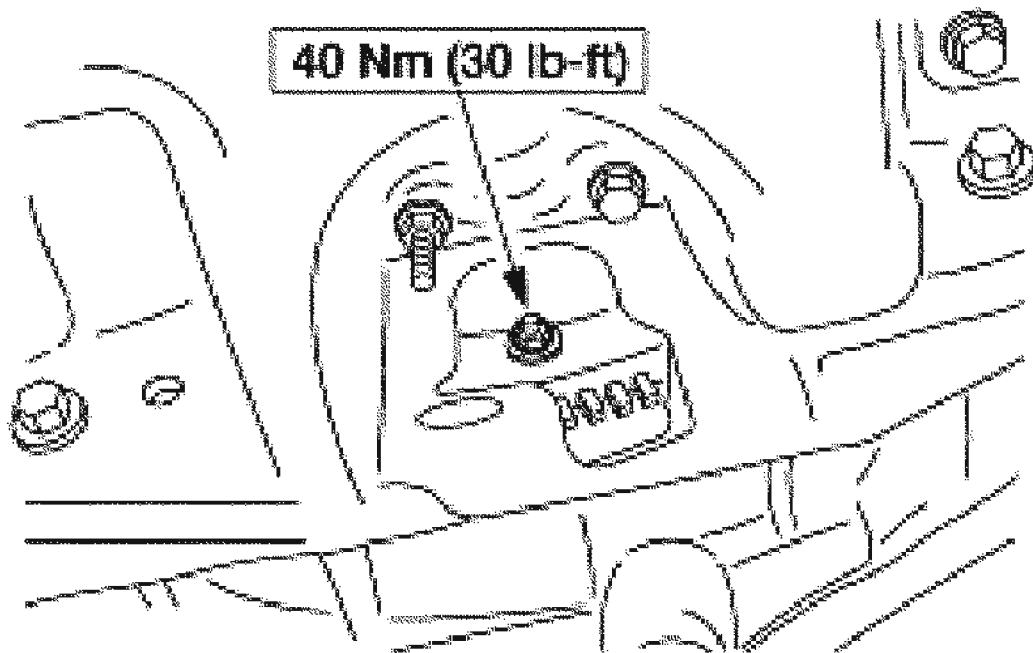


G02739649

**Fig. 476: Identifying Tightening Sequence & Torque Specification Of Oil Pan Bolts**

Courtesy of FORD MOTOR CO.

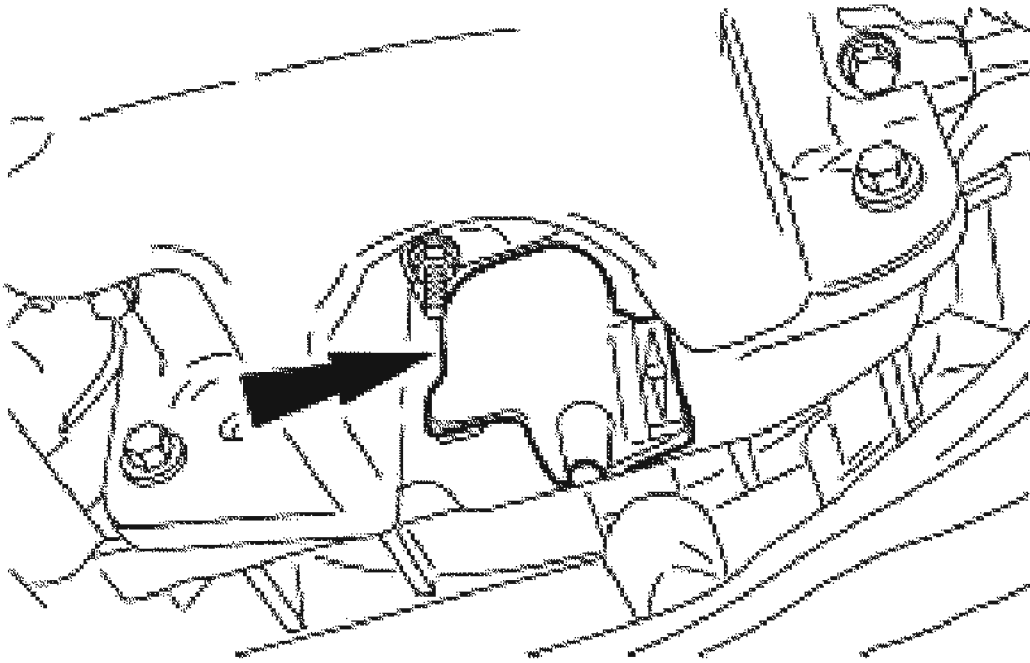
31. Install the four torque converter nuts.



G02739650

**Fig. 477: Identifying Torque Converter Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

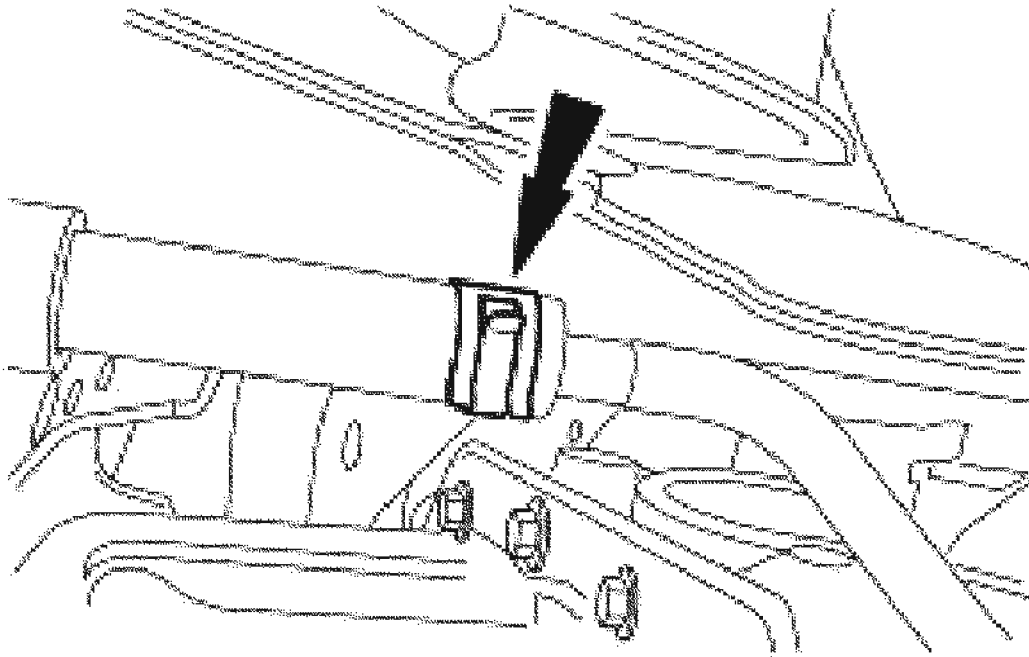
32. Install the inspection plug.



G02739651

**Fig. 478: Installing Inspection Plug**  
**Courtesy of FORD MOTOR CO.**

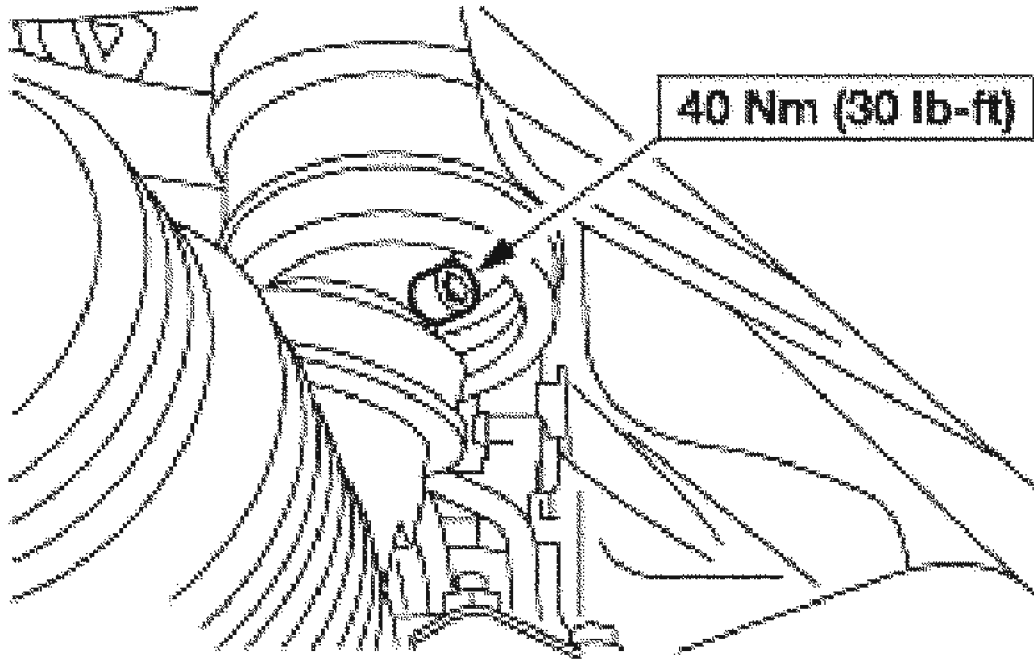
33. Connect the two transmission cooler tubes.



G02739652

**Fig. 479: Connecting Transmission Cooler Tubes**  
Courtesy of FORD MOTOR CO.

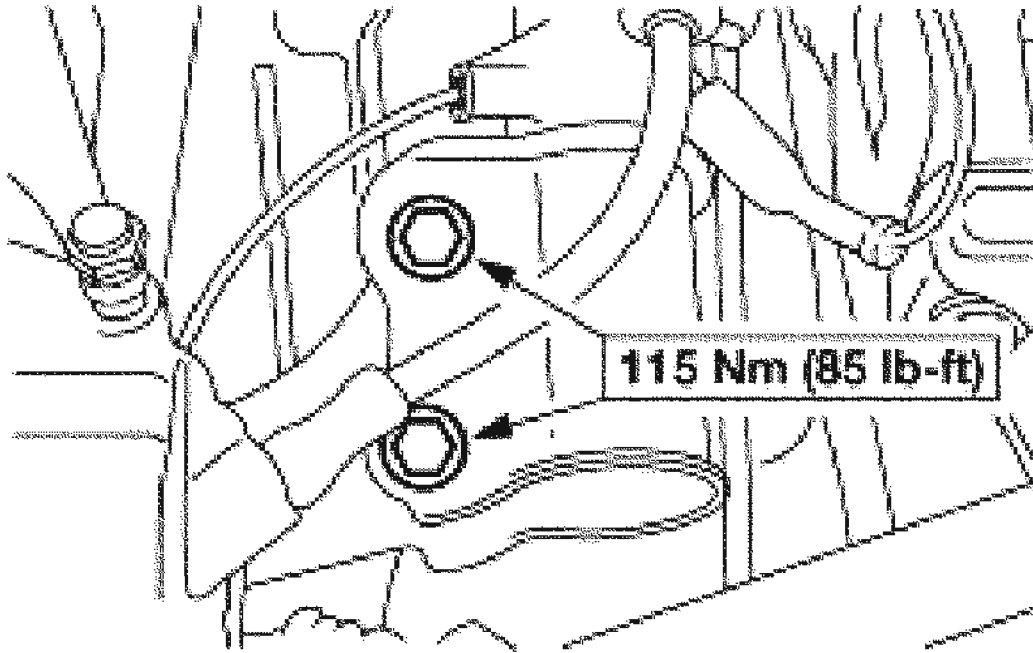
34. Connect the steering shaft to the rack and install the bolt.



G02739653

**Fig. 480: Identifying Steering Shaft To Rack Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

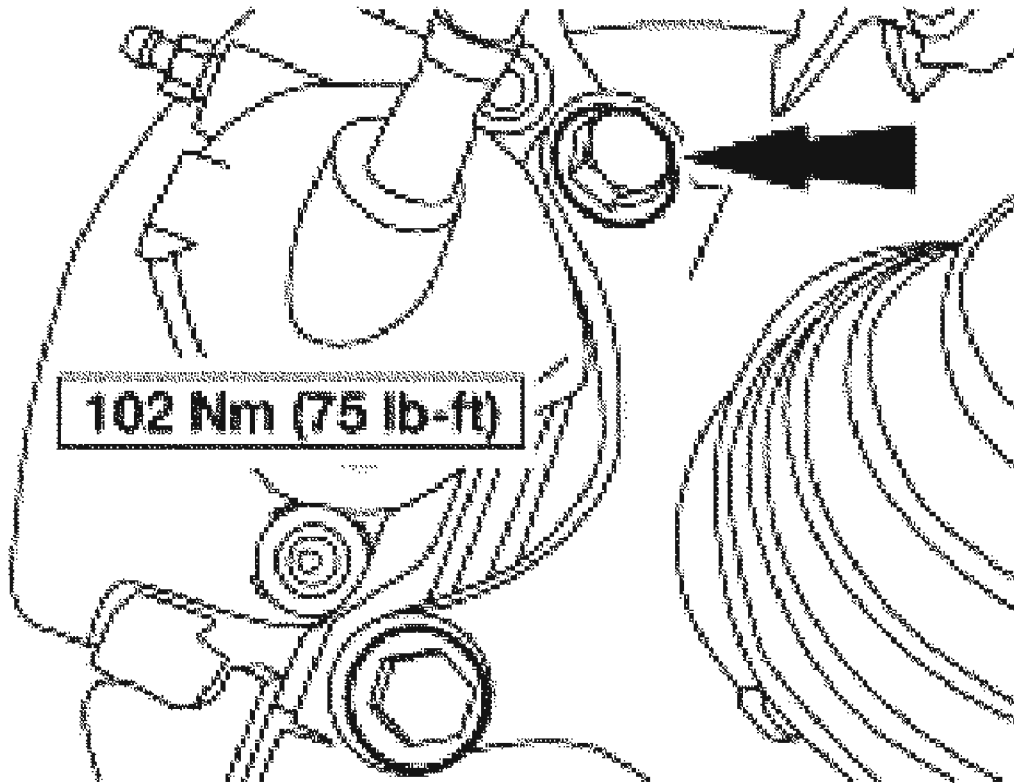
35. Connect the LH and RH struts to the steering knuckles and install the bolts and nuts.



G02739654

**Fig. 481: Identifying Strut To Steering Knuckle Bolts & Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

36. Install the brake calipers to the steering knuckle.



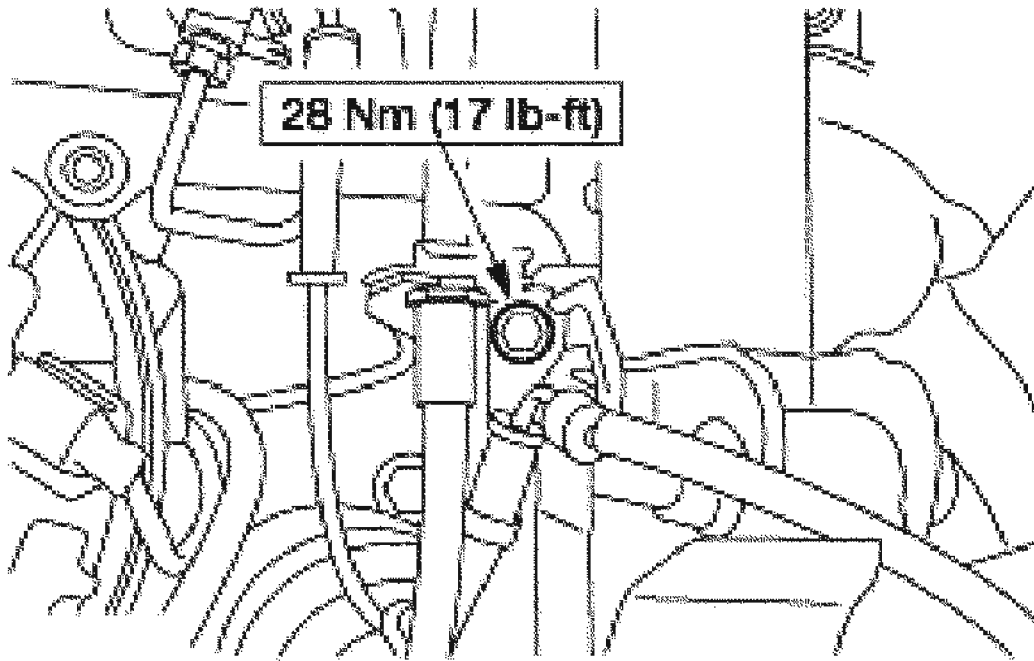
G02739655

**Fig. 482: Identifying Brake Calipers To Steering Knuckle Bolts Torque Specification**

Courtesy of FORD MOTOR CO.

37. If equipped, install the LH and RH wheel speed sensor harness brackets.



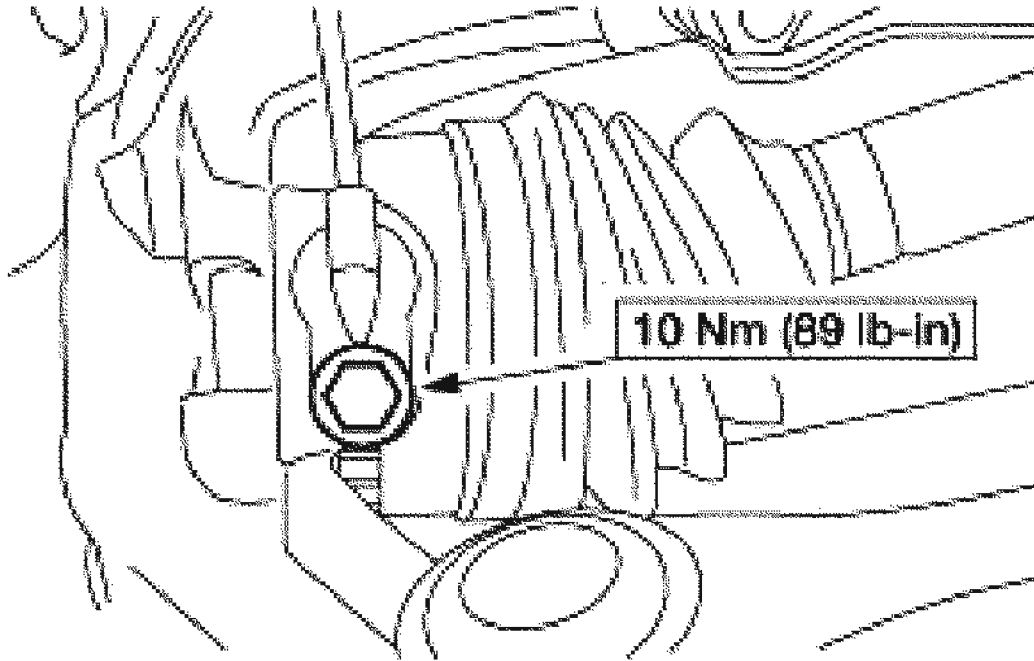


G02739656

**Fig. 483: Identifying Wheel Speed Sensor Harness Brackets Bolts Torque Specification**

**Courtesy of FORD MOTOR CO.**

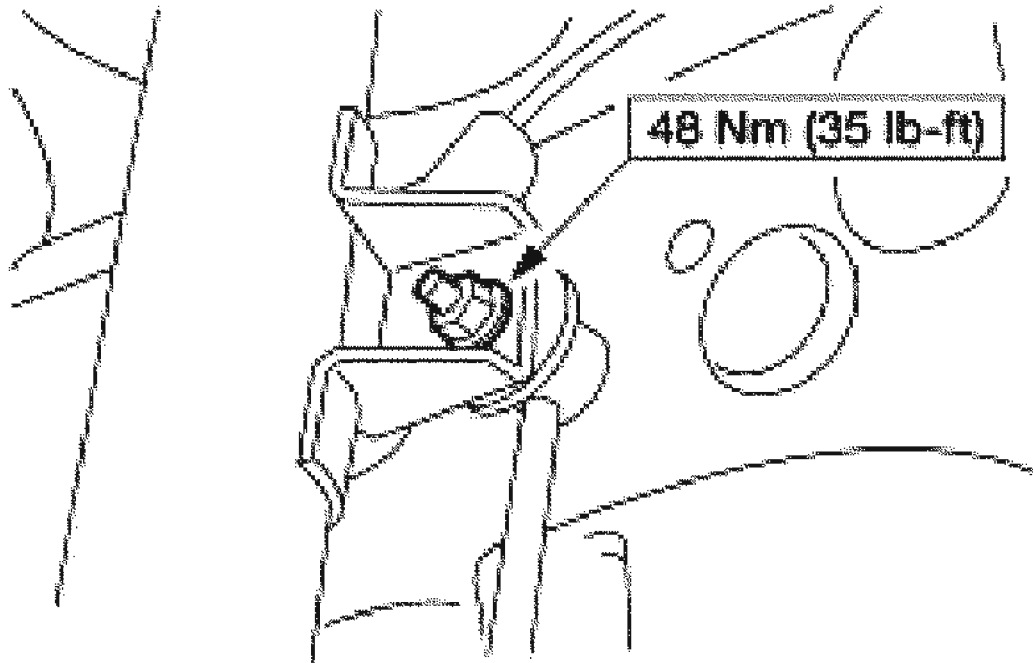
38. If equipped, position the LH and RH wheel speed sensors and install the bolts.



G02739657

**Fig. 484: Identifying Wheel Speed Sensors Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

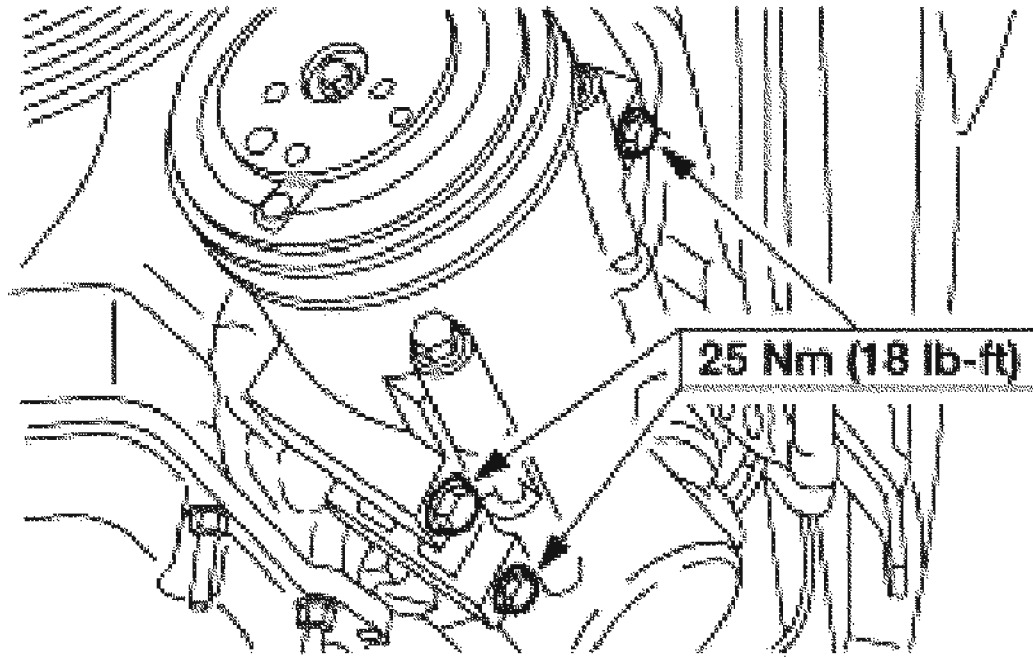
39. Connect the LH and RH sway bar links to the strut mount.



G02739658

**Fig. 485: Identifying Sway Bar Links To Strut Mount Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

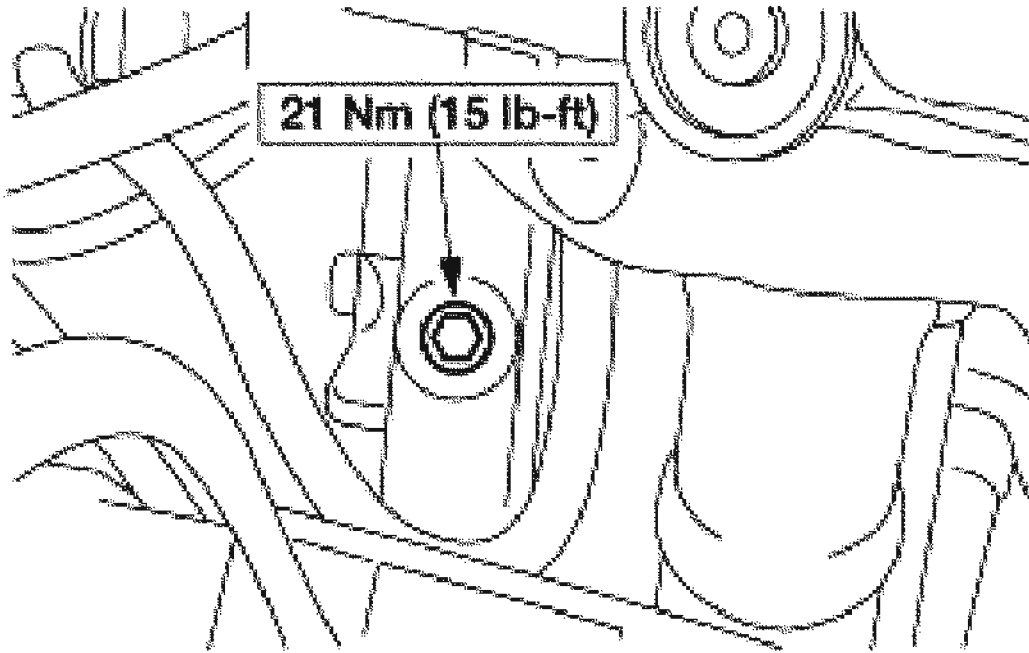
40. If equipped, install the intermediate driveshaft. For additional information, refer to **DRIVESHAFT**
41. Install both front wheel and tire assemblies.
42. Install the A/C compressor and the bolts.



G02739659

**Fig. 486: Identifying A/C Compressor Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

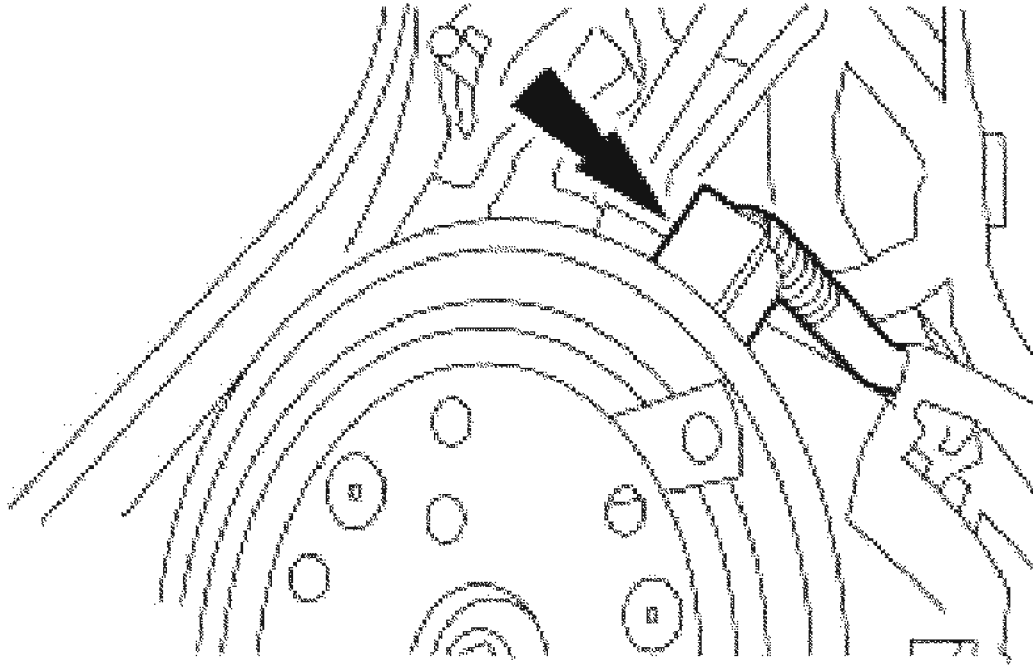
43. Remove the plugs and install the A/C manifold and tube assembly.



G02739660

**Fig. 487: Identifying A/C Manifold And Tube Assembly Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

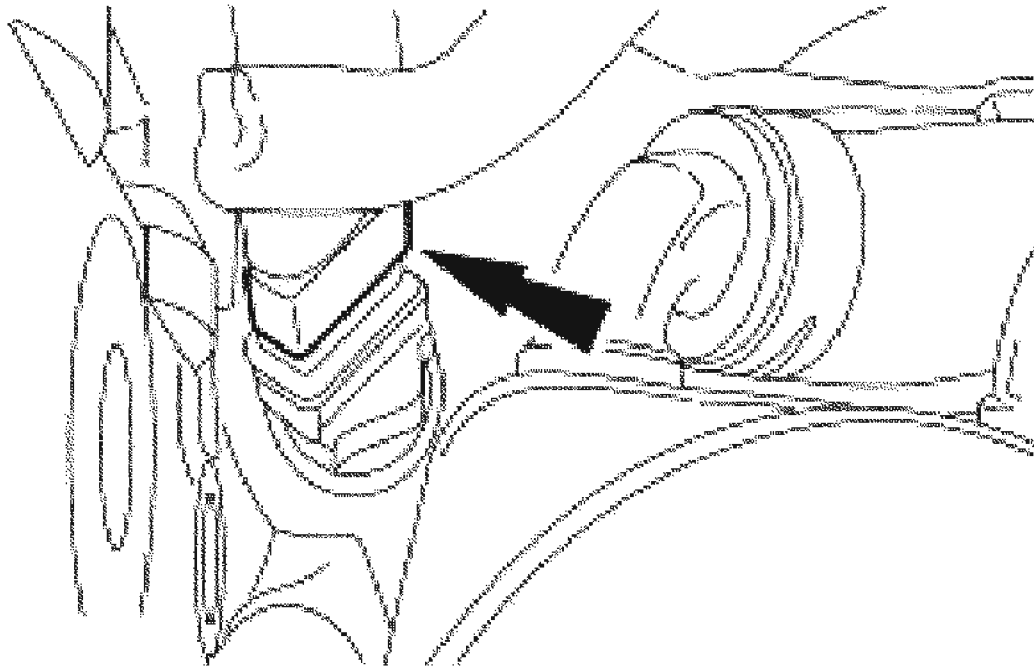
44. Connect the A/C clutch field coil electrical connector.



G02739661

**Fig. 488: Connecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

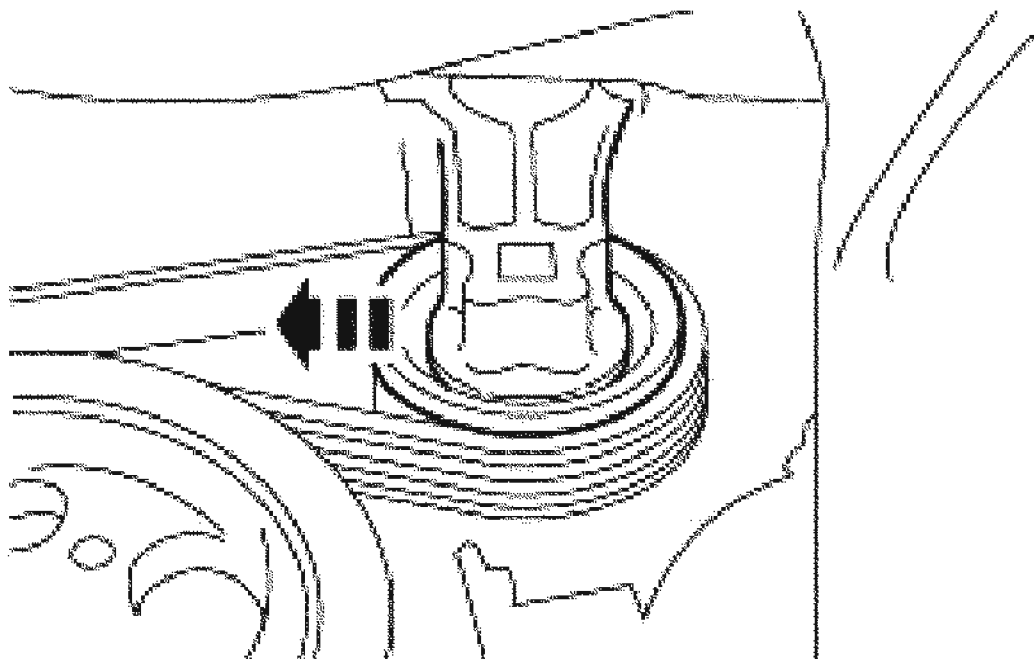
45. If equipped, connect the engine block heater electrical connector.



G02739662

**Fig. 489: Connecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

46. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.

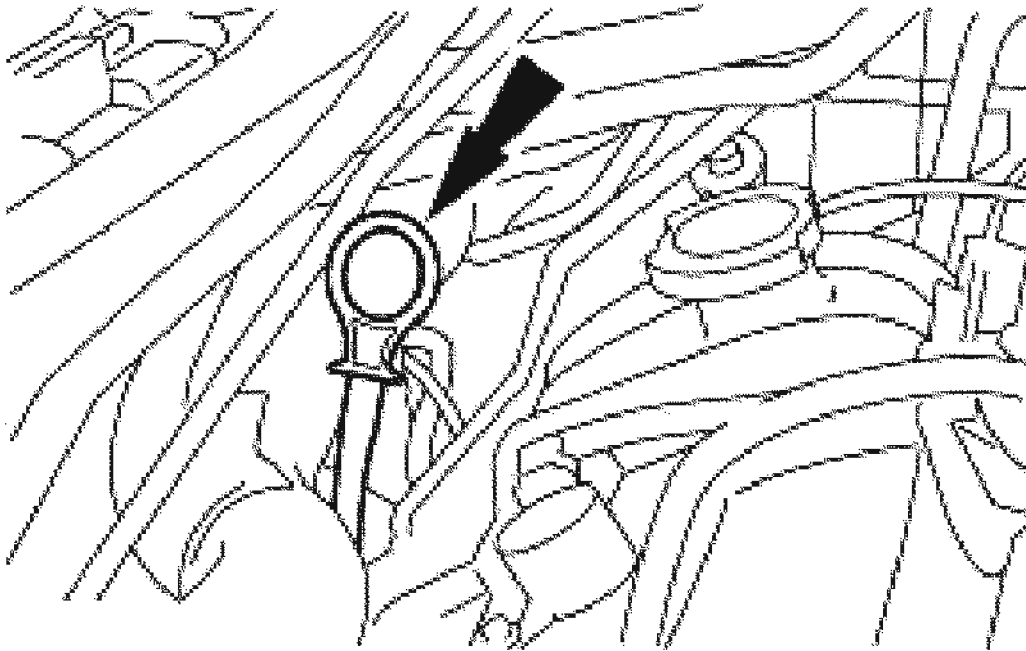


G02739663

**Fig. 490: Installing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

47. Install the flex pipe. For additional information, refer to **EXHAUST SYSTEM**
48. Install the lower radiator air deflectors.
49. Lower the vehicle.
50. Install the oil level indicator.

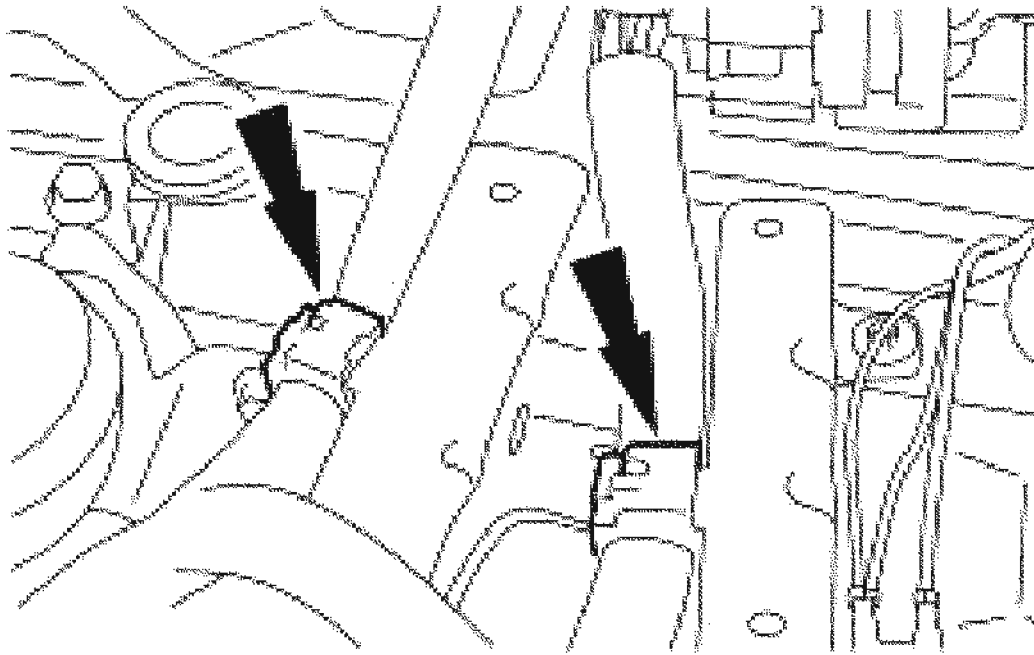




G02739664

**Fig. 491: Installing Oil Level Indicator**  
Courtesy of FORD MOTOR CO.

51. Position the wire harness and install the wire harness locating retainers.



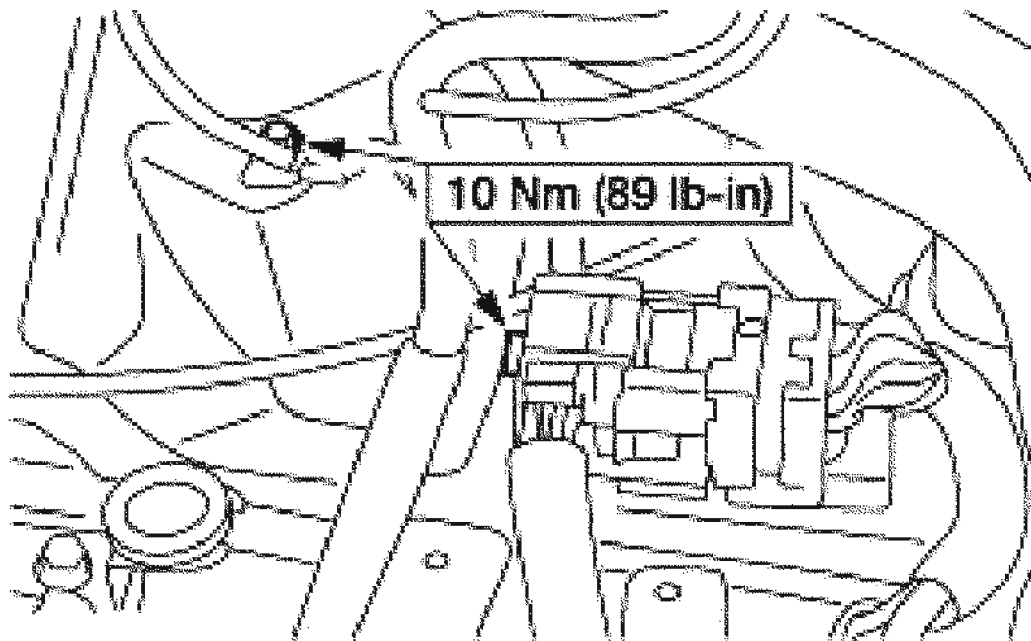
G02739665

**Fig. 492: Installing Wire Harness Locating Retainers**  
Courtesy of FORD MOTOR CO.

52. Connect the ground strap and the electrical connector.

## 2004 Ford Escape

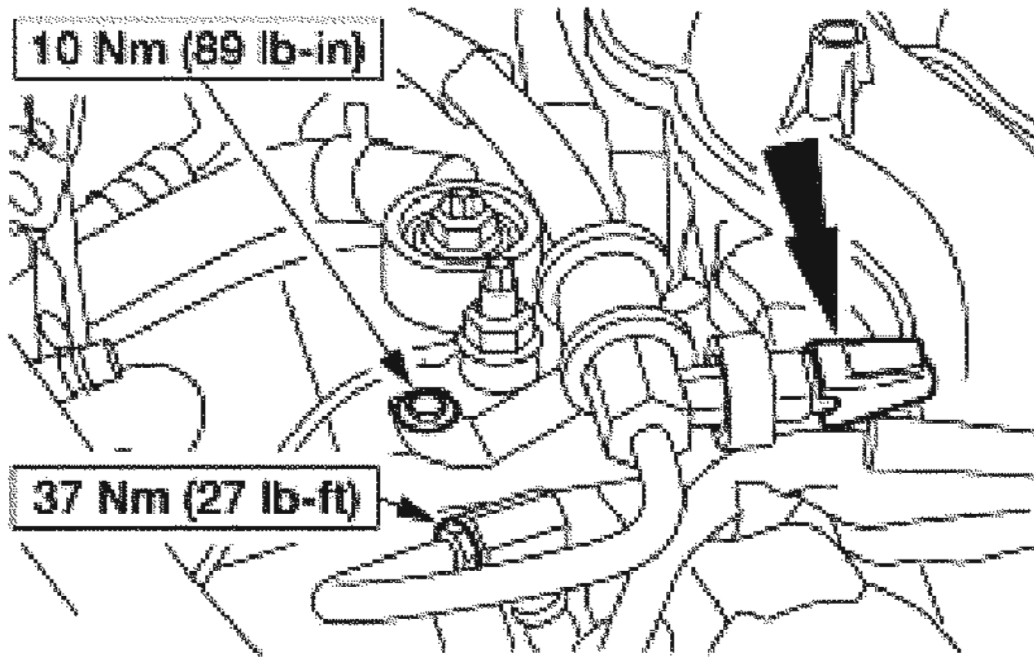
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739666

**Fig. 493: Connecting Ground Strap And Electrical Connector**  
Courtesy of FORD MOTOR CO.

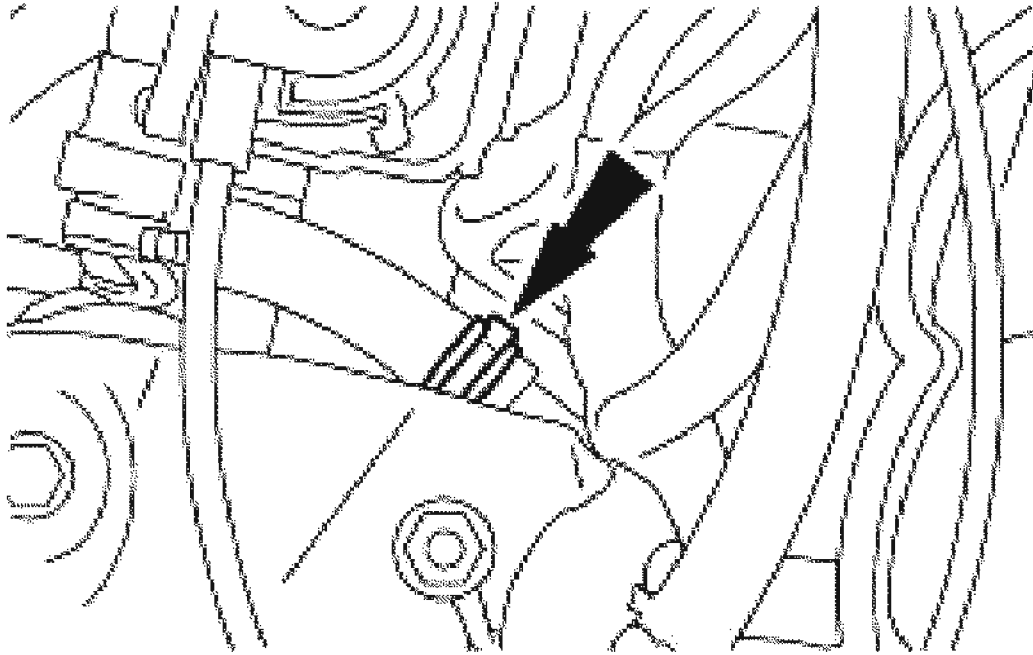
**NOTE:** Install new Teflon(R)  
seals.



G02739667

**Fig. 494: Connecting Power Steering Tube**  
Courtesy of FORD MOTOR CO.

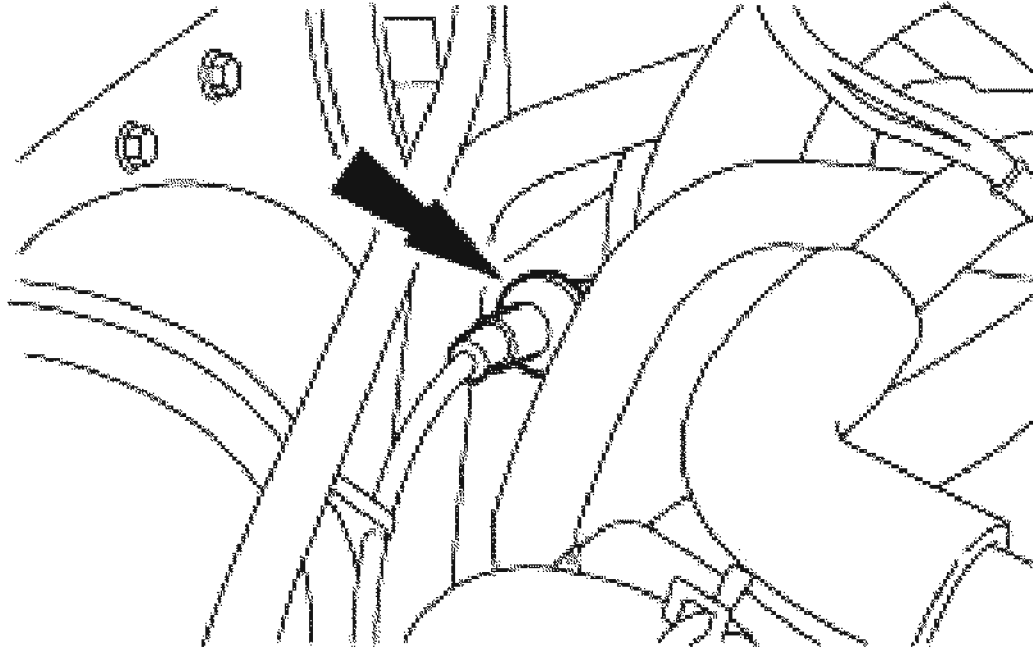
53. Connect the power steering tube.
  - Install the bracket bolt.
  - Connect the power steering pressure (PSP) switch electrical connector.
  - Connect the power steering tube.
54. Connect the power steering return tube.



G02739668

**Fig. 495: Connecting Power Steering Return Tube**  
Courtesy of FORD MOTOR CO.

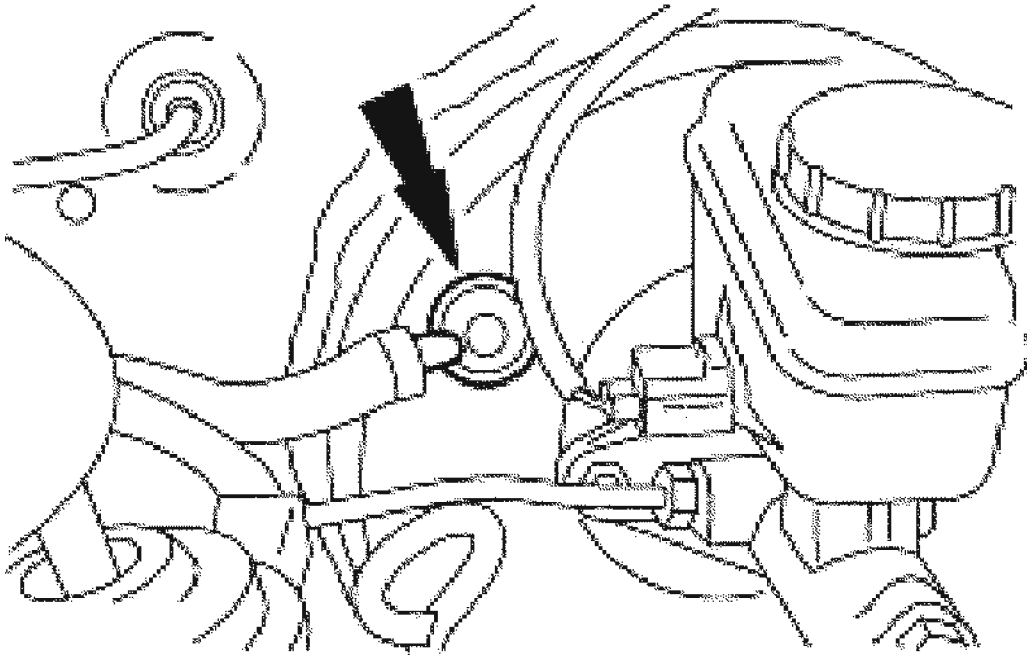
55. Connect the vacuum hose at the vacuum reservoir check valve.



G02739669

**Fig. 496: Connecting Vacuum Hose At Vacuum Reservoir Check Valve**  
Courtesy of FORD MOTOR CO.

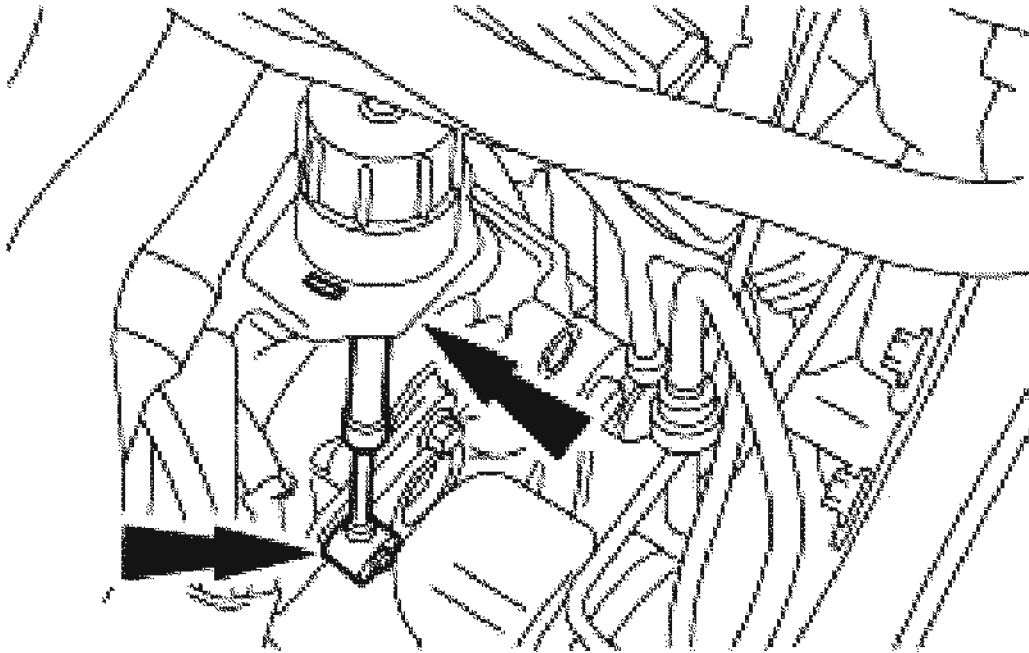
56. Connect the brake booster vacuum hose.



G02739670

**Fig. 497: Connecting Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

57. Connect the transaxle linkage.

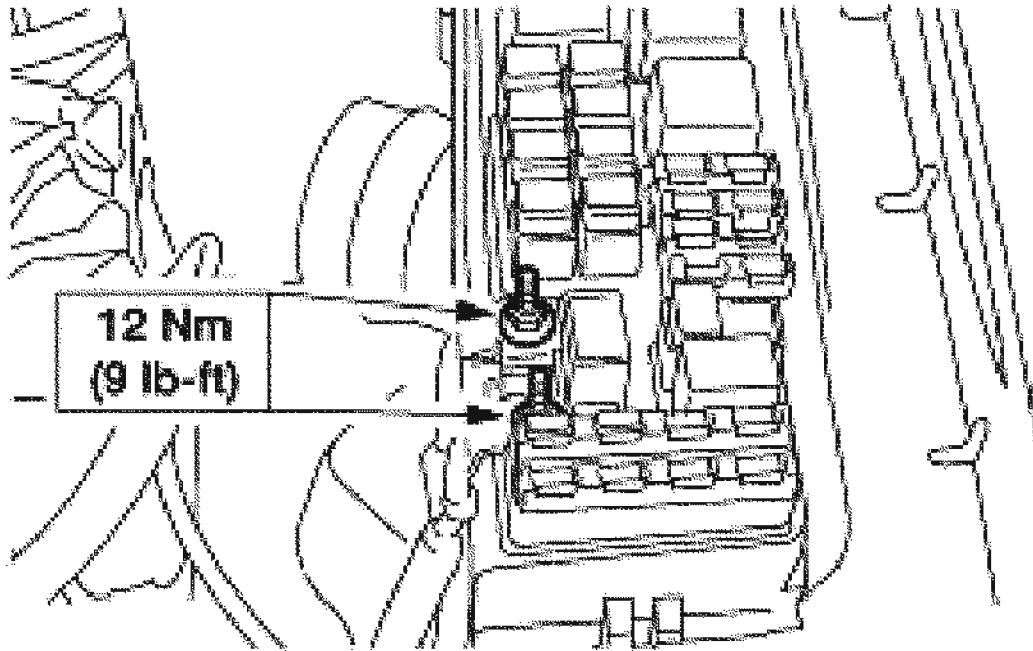


G02739671

**Fig. 498: Connecting Transaxle Linkage**  
**Courtesy of FORD MOTOR CO.**

58. Install the cables and the nuts.

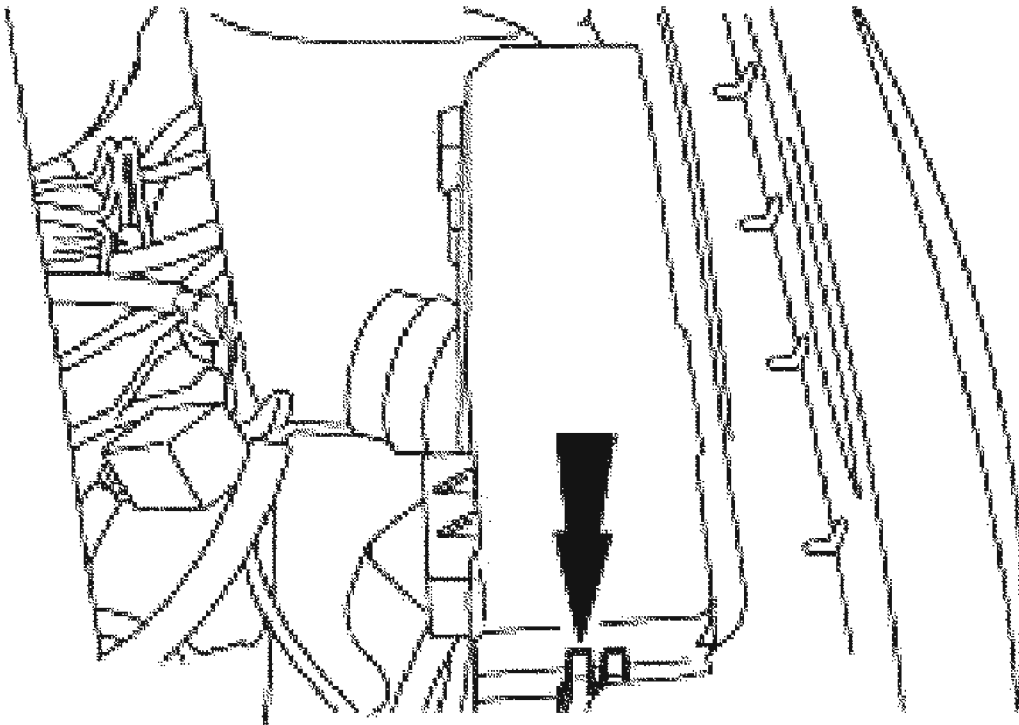




G02739672

**Fig. 499: Installing Cables & Nuts**  
Courtesy of FORD MOTOR CO.

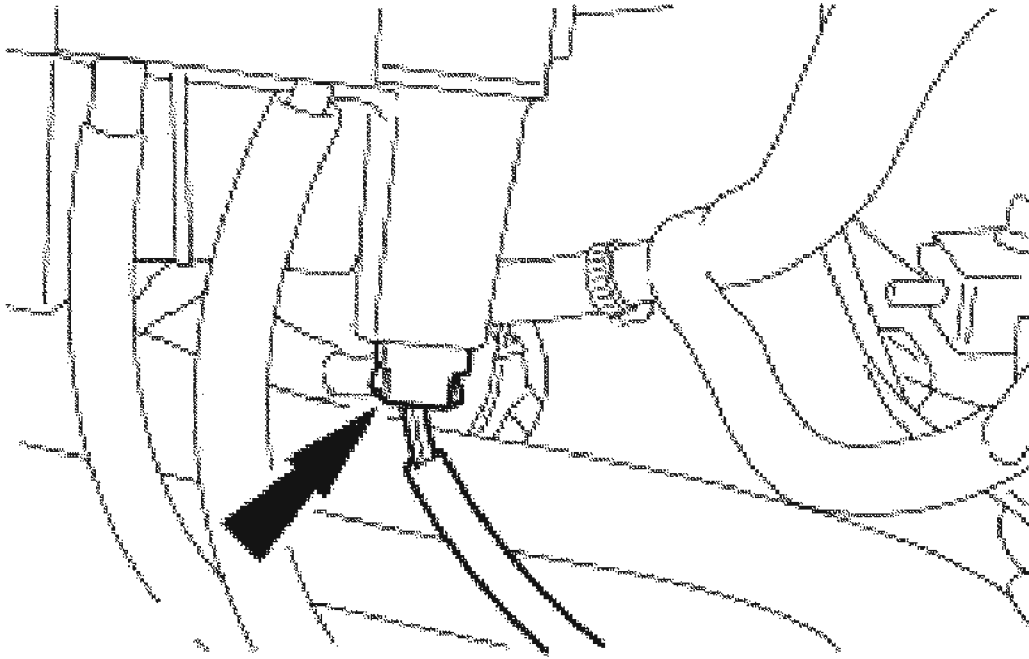
59. Install the power distribution box cover.



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**Fig. 500: Installing Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

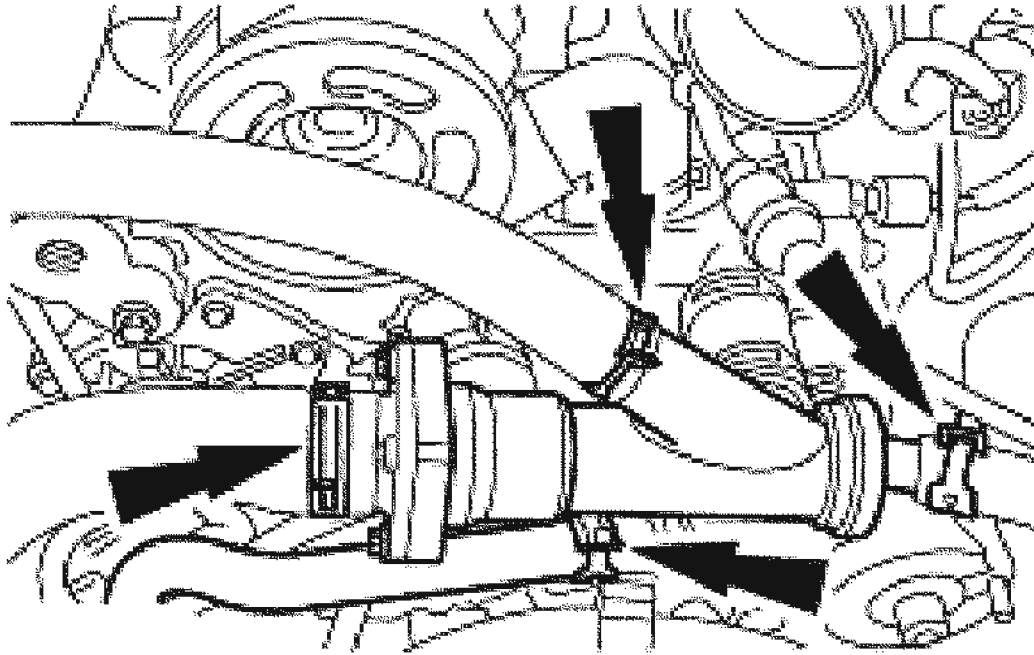
60. Connect the connector to the power distribution box.



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**Fig. 501: Connecting Connector To Power Distribution Box**  
Courtesy of FORD MOTOR CO.

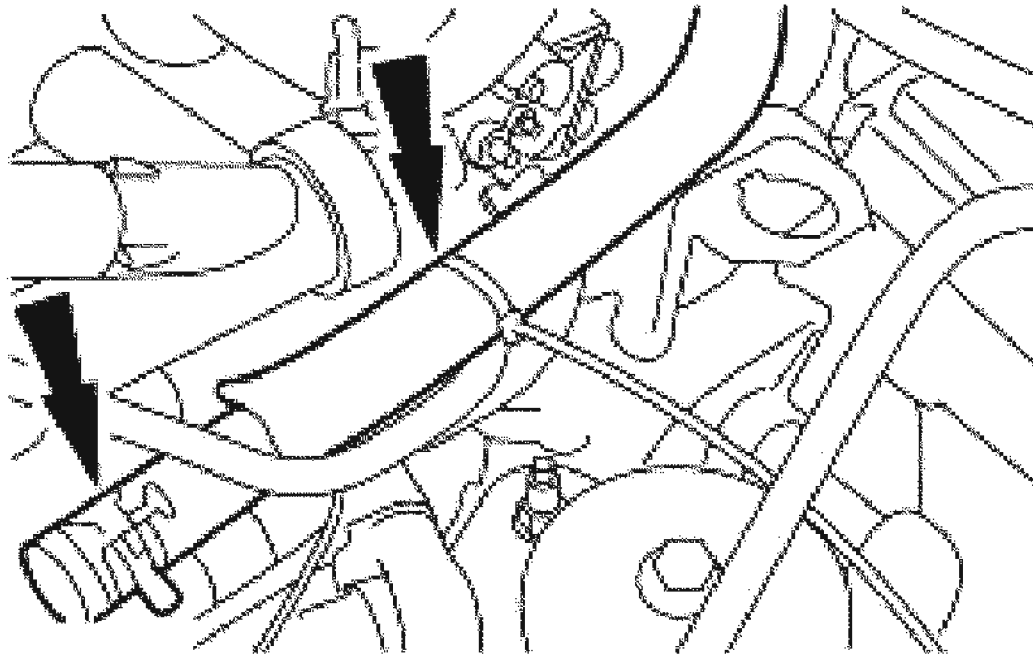
61. Position the thermostat housing and connect the hoses.



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**Fig. 502: Installing Thermostat Housing**  
Courtesy of FORD MOTOR CO.

62. Connect the heater hose and install a new tie-strap.



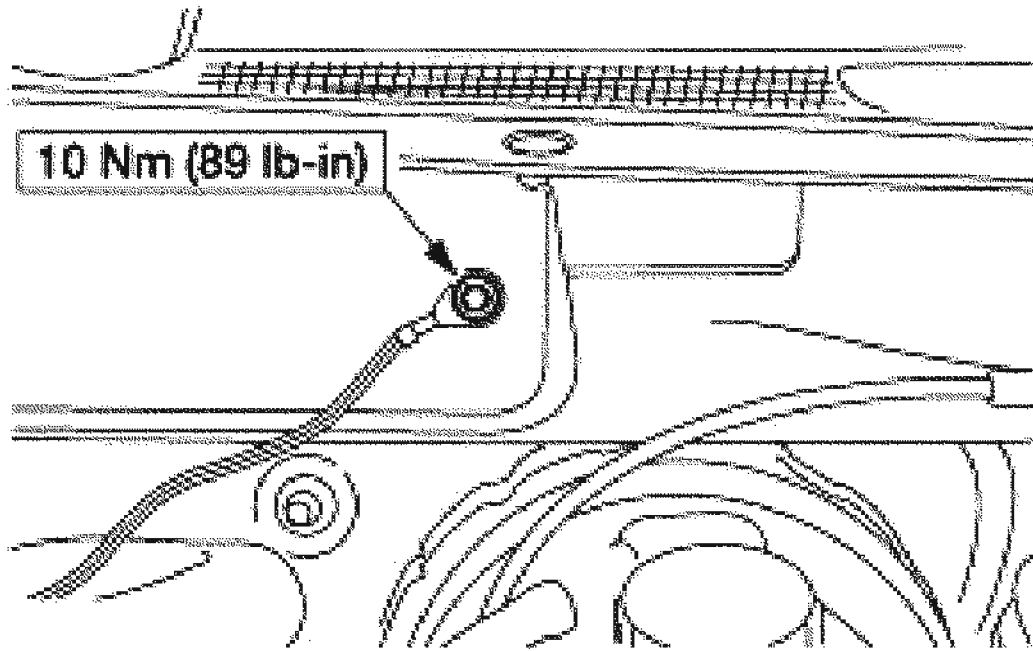
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**Fig. 503: Connecting Heater Hose**  
Courtesy of FORD MOTOR CO.

63. Connect the ground wire.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



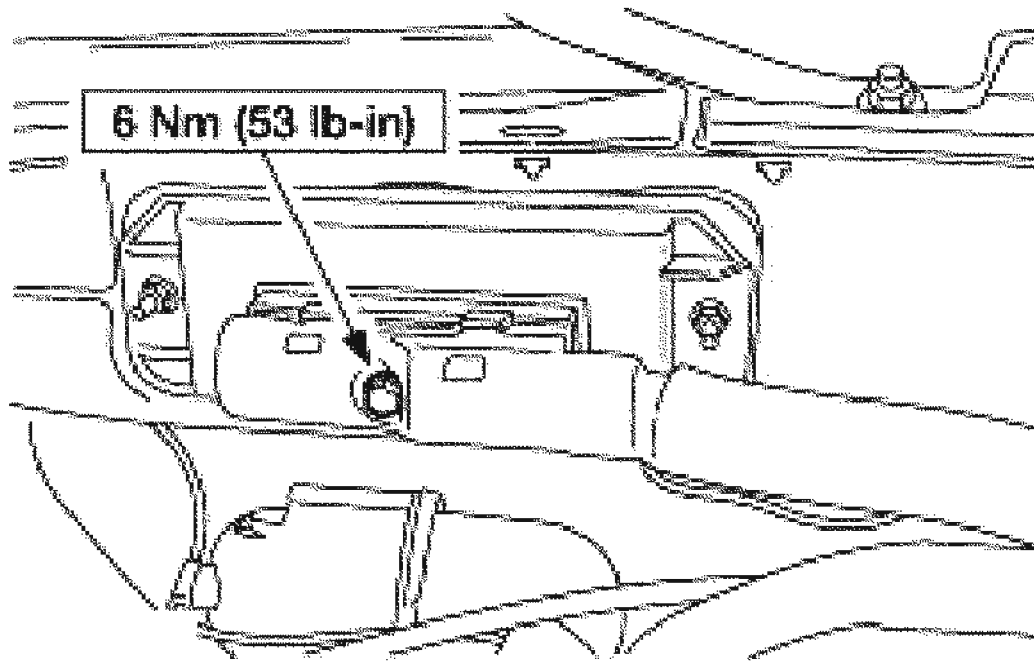
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**Fig. 504: Connecting Ground Wire**  
Courtesy of FORD MOTOR CO.

64. Connect the powertrain control module (PCM) electrical connector.

## 2004 Ford Escape

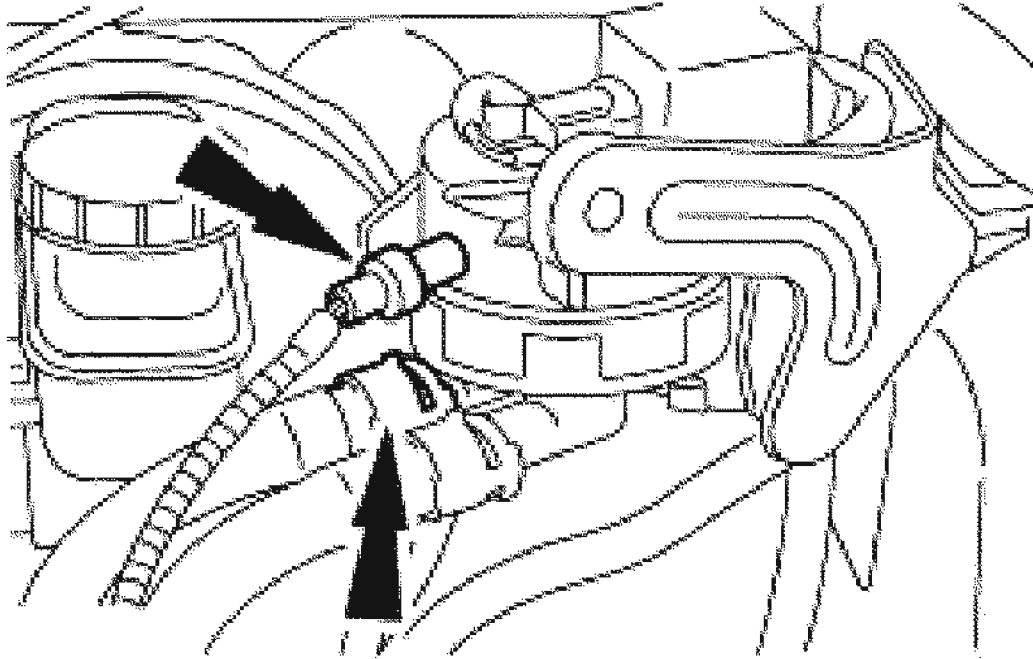
2004 ENGINE Engine - 3.0L (4V) - Escape



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**Fig. 505: Connecting Powertrain Control Module (PCM) Electrical Connector**  
Courtesy of FORD MOTOR CO.

65. Connect the vapor management valve (VMV) connectors.

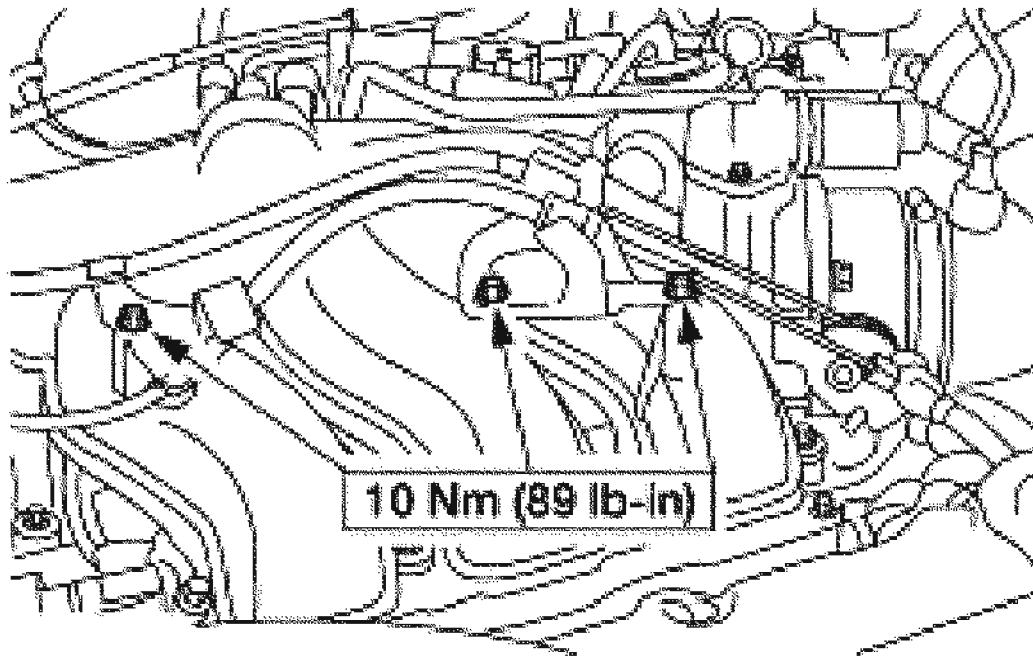


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**Fig. 506: Connecting Vapor Management Valve (VMV) Connectors**  
**Courtesy of FORD MOTOR CO.**

66. Connect the accelerator cable and speed control actuator cable.





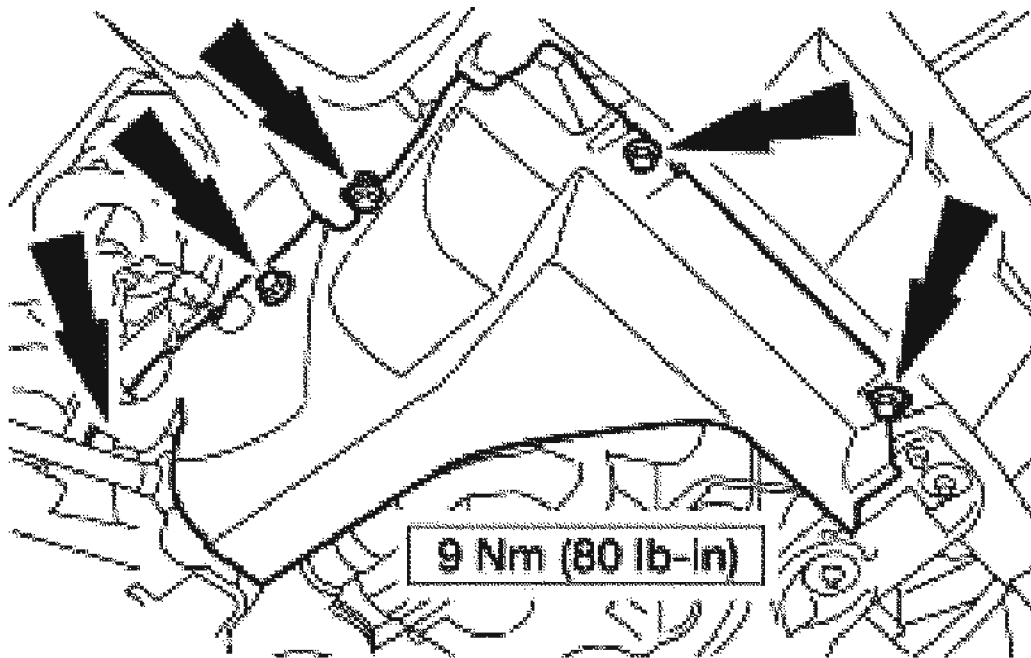
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**Fig. 507: Connecting Accelerator Cable And Speed Control Actuator Cable**  
Courtesy of FORD MOTOR CO.

67. Connect the fuel hose spring lock coupling. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**
68. Install the air cleaner outlet tube and air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**
69. Install the battery and the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**
70. Install the water pump drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**
71. Fill the crankcase with clean engine oil.
72. Fill the engine cooling system. For additional information, refer to **ENGINE COOLING** .
73. Fill and purge the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .
74. Recharge the A/C system. For additional information, refer to **AIR CONDITIONING** .

### Removal and Installation

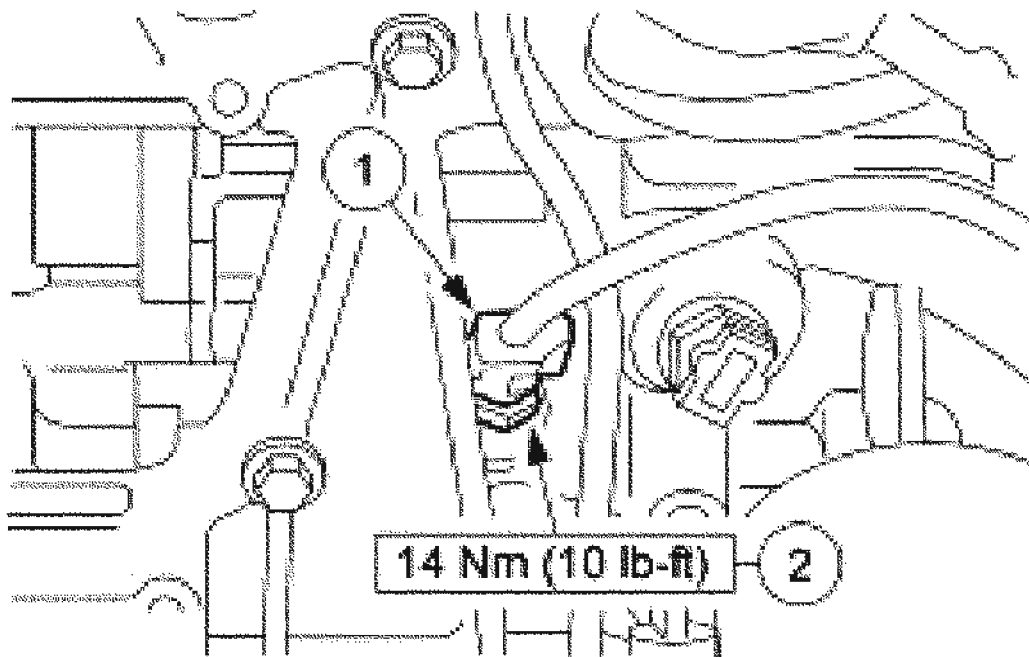
1. Raise and Support the vehicle. For additional information, refer to **JACKING & LIFTING** .
2. Remove the right side splash shield.



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**Fig. 508: Removing Right Side Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** The A/C compressor has been removed for clarity.



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**Fig. 509: Removing Oil Pressure Sender**  
Courtesy of FORD MOTOR CO.

3. Remove the oil pressure sender.
  1. disconnect the electrical connector.
  2. Remove the sender.
4. To install, reverse the removal procedure.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

### 2004 ENGINE

Engine - 3.0L (4V) - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Lubricants and Sealants</b>	
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A221 -A	ESE-M1C171 -A
<b>Engine</b>	
Displacement	3.0L (4V) (182 CID)
No. cylinder	6
Bore/stroke	89.0 x 79.5 (3.5 x 3.13 in)
Fire order	1-4-2-5-3-6
Oil pressure (Minimum at 1,500 RPM with engine warmed up after 10 minutes of idling.)	76 kPa (11 psi)
Spark plug	AWSF-32F (F35E-12405-EA) Gap = 1.30-1.40 (.052-0.56 inch)
<b>Cylinder Head/Valve Train</b>	
Cylinder head flatness	(1)
Combustion chamber volume	52 cc (3.17 CI)
Valve seat width - intake	1.1-1.4 mm (0.043-0.055 in)
Valve seat width - exhaust	1.4-1.7 mm (0.055-0.066 in)
Valve seat angle	44.75 degrees
Valve seat runout (T.I.R.)	0.04 mm (0.001 in)
<b>VALVE ARRANGEMENT (FRONT TO REAR)</b>	
LH intake	S-P-S-P-S-P
LH exhaust	E-E-E-E-E-E
RH intake	P-S-P-S-P-S
RH exhaust	E-E-E-E-E-E
Valve stem guide clearance Intake	0.020-0.069 mm (0.0007-0.0027 in)

**2004 Ford Escape**

2004 ENGINE Engine - 3.0L (4V) - Escape

Exhaust	0.045-0.094 mm (0.0017-0.037 in)
Valve head diameter Intake	35 mm (1.38 in)
Exhaust	30 mm (1.18 in)
Gauge diameter	31 and 24.5 mm (1.22 and 0.96 in)
Valve face runout (limit)	0.05 mm (0.001 in)
Valve face angle	45.5 degrees
Valve stem diameter (std) Intake	5.975-5.995 mm (0.2350-0.2358 in)
Exhaust	5.950-5.970 mm (0.2343-0.2350 in)
Valve spring compression pressure Intake (n @ spec. length)	680 N @ 30.19 mm (153 lbs @ 1.18 in)
Exhaust (n @ spec. length)	680 N @ 30.19 mm (153 lbs @ 1.18 in)
Valve spring free length (approximate) Intake	46.8 mm (1.84 in)
Exhaust	46.8 mm (1.84 in)
Valve spring installed pressure (n @ spec. length) Intake	228 N @ 39.99 mm (51 lbs @ 1.57 in)
Exhaust	228 N @ 39.99 mm (51 lbs @ 1.57 in)
Valve springs installed pressure (n @ spec. length - service limit)	10% Pressure loss @ 30.09
Valve springs - out of square limit	1%
Roller follower ratio	1.8:1
<b>Hydraulic Valve Tappet</b>	
Diameter (std)	16-15.988 mm (0.6290-0.6294 in)
Clearance to bore	0.018-0.069 mm (0.0007-0.0027 in)
Service limit	0.016 mm (0.0006 in)
Hydraulic leakdown rate <sup>(2)</sup>	5-25 seconds
Collapsed valve tappet gap-desired	0.50-1.11 mm (0.019-0.043 in)
<b>Camshaft</b>	
Lobe lift Intake (primary)	4.79 mm (0.188 in)
Intake (secondary)	4.79 mm (0.188 in)
Exhaust	4.79 mm (0.188 inch)
Lobe lift - allowable lift loss	0.76 mm (0.03 in)
Valve lift @ zero lash Intake (primary)	9.80 mm (0.388 in)
Intake (secondary)	9.80 mm (0.388 in)
Exhaust	9.80 mm (0.388 inch)
Camshaft end play	0.027-0.190 mm
Standard	0.025-0.165 mm (0.001-0.0064 in)
Service limit	0.190 mm (0.00748 in)
Journal-to-bearing clearance Standard	0.025-0.076 mm (0.001-0.0029 in)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Service limit	0.121 mm (0.0047 in)
Journal diameters (all)	26.962-26.936 mm (1.061 -1.060 in)
Journal inside diameter (cap assembled)	27.012-26.987 mm
Bearing inside diameter (all)	27.012-26.987 mm (1.063 -1.062 in)
<b>Cylinder Block</b>	
Head gasket surface flatness	0.50 mm (0.02 in) for 150 x 150 mm (5 x 5 in) area 0.25 mm (0.01 in) for 25 x 25 mm (1 x 1 in) area 0.120 mm (0.005 in) overall
Head gasket thickness	1.0 mm (0.40 in)
Main bearing bore diameter	67.998-68.022 mm (2.677-2.6780 in)
Cylinder bore	
Diameter	(3)
Out-of-round limit	0.015 mm (.0005 in)
Out-of-round service limit	0.020 mm (.0007 in)
Taper service limit	0.020 mm (0.0008 in)
<b>Crankshaft</b>	
Main bearing journal diameter	62.968-62.992 mm (2.479-2.480 in)
Connecting rod journal diameter	49.970-49.990 mm (1.967 -1.968 in)
Crankshaft free end play	0.110-0.232 mm (.004-.009 in)
Crankshaft runout to rear face of cylinder block	0.050 mm (in) max (0.001 in)
Connecting rod bearings Clearance to crankshaft	0.028-0.066 mm (0.001-0.0025 in)
Bearing wall thickness (std) <sup>(4)</sup>	1.503 mm (.059 in)
Main bearings Clearance to crankshaft - desired	0.025-0.045 mm (0.0009-0.0017 in)
Clearance to crankshaft-allowable 0.025-0.050 mm	(0.0009-0.0019 in)
Bearing wall thickness - grade 1	2.497 mm (0.0983 in)
Bearing wall thickness - grade 2	2.501 mm (0.0985 in)
Bearing wall thickness - grade 3	2.505 mm (0.0986 in)
<b>Connecting Rod</b>	
Piston pin bore diameter	21.017-21.031 mm (0.827 -0.828 in)
Crankshaft bearing bore diameter	53.015-53.035 mm (2.0872-2.0879 in)
Length (center to center)	138.06-138.14 mm (5.435-5.438 in)
Alignment (bore to bore max difference) <sup>(5)</sup> Twist	0.050 mm per 25 (0.0019 per 0.984 in)
Bend	0.038 mm per 25 (0.0014 per 0.984 in)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Side clearance (assembled to crank) Standard	0.100-0.30 mm (0.0039-0.0118 in)
Service limit	0.35 mm (0.0013in) max
<b>Piston</b>	
Piston diameter	(6)
Coated grade 1	88.990-89.010 mm (3.5035-3.5043 in)
Coated grade 2	88.998-89.022 mm (3.5039-3.5048 in)
Coated grade 3	89.010-89.030 mm (3.5043-3.5051 in)
Uncoated grade 1	88.970-88.980 mm (3.50275-3.50314 in)
Uncoated grade 2	88.978-88.992 mm (3.50306-3.50362 in)
Uncoated grade 3	89.010-89.030 mm (3.50432-3.50511 in)
Piston-to-bore clearance	0.012 to 0.022 mm (0.0005-0.0009 in)
Pin bore diameter (piston)	21.008-21.012 mm (0.8270-0.8272 in)
Ring groove width Compression (top)	1.230-1.245 mm (0.0484-0.0490 in)
Compression (bottom)	1.530-1.545 mm (0.0602-0.0608 in)
Oil ring	3.030-3.055 mm (0.1192-0.1203 in)
Piston pin Length	60.51 -60.08 mm (2.382-2.365 in)
Diameter	21.011-21.013 mm (0.0013 in)
Pin-to-piston clearance	-0.005 to +0.001 mm (0.0001 -0.00003 in)
Pin-to-rod clearance Standard	0.004-0.020 mm (0.0001 -0.0007 in)
Service limit	0.035 mm (0.0013 in)
<b>Piston Ring-To-Groove Clearance</b>	
Compression (top)	0.040-0.075 mm (0.0015-0.0029 in)
Compression (bottom)	0.040-0.085 mm (0.0015-0.0033 in)
Oil ring	Snug Fit
Piston ring gap <sup>(7)</sup> Compression (top) - gauge diameter	0.100-0.250 mm (0.0039-0.0098 in)
Compression (bottom) - gauge diameter	0.27-0.42 mm (0.0106-0.0165 in)
Oil ring (steel rail) - gauge diameter	0.15-0.65 mm (0.0059-0.0255 in)
Compression (top) - service limit	0.50 mm (0.0196 in) max
Compression (bottom) - service limit	0.65 mm (0.0255 in) max
Oil ring (steel rail) - service limit	0.90 mm (0.0354 in) max
<b>Lubrication System</b>	
Oil capacity <sup>(8)</sup>	5.5 Quarts 5.2 Liters
<b>Drive Belt Tension</b>	
Note: Drive belts have different tension specifications depending on whether they are newly installed	(9)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Drive belt type 6 rib front end accessory drive

Automatic Tensioners

- (1) Refer to the procedure for specifications.
- (2) Time required for plunger to leak down 1.6 mm of travel with 222 N force and leak down fluid in tappet.
- (3) Cylinder Bore Diameter Grade 1: 89.000-89.010 mm (3.50393-3.504323 inch)  
Grade 2: 89.010-89.020 mm (3.504323-3.504717 inch) Grade 3: 89.020-82.030 mm (3.504717-3.50511 inch)
- (4) 0.250 mm Undersize - Add 0.125 mm to standard or grade 2 thickness.
- (5) Pin bore and crank bearing bore must be parallel and in same vertical plane within the specified total difference when measured at the ends of a 203 mm bar, 101.5 mm on each side of rod centerline.
- (6) Measured at 50 mm (1.9685 inch) from outer perimeter top of piston to the pin axis.
- (7) Specification 82.4 mm (3.2441 inch) diameter gauge.
- (8) With filter change.
- (9) Newly installed refers to the condition of the "new" drive belt before the engine has made no more than one rotation and before the drive belt has had a chance to stretch or seat into the pulley grooves.

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
A/C compressor bolts	25	18	-
A/C compressor bracket bolts	(1)	-	-
A/C line nut	8	-	71
A/C to water pump bracket bolts	25	18	-
Accessory drive belt tensioner bolt	25	18	-
Camshaft cap bolts	10	-	89



**2004 Ford Escape**

2004 ENGINE Engine - 3.0L (4V) - Escape

Camshaft oil seal retainer bolts	10	-	89
Camshaft position sensor bolt	10	-	89
Cooler tube bracket bolt	28	18	-
Crankshaft damper bolt	(1)	-	-
Crankshaft position sensor bolt	10	-	89
Crankshaft pulley	(1)	-	-
Crankshaft pulley bracket nuts	25	18	-
Cylinder head bolts	(1)	-	-
Exhaust gas recirculation (EGR) tube nuts	40	30	-
EGR valve bolts	25	18	-
EGR valve nuts	(1)	-	-
Engine front cover bolts and studs	(1)	-	-
EGR vacuum regulator tube nuts	6	-	53
Exhaust bracket nut	40	30	-
Flexplate bolts	80	59	-
Ball joint nuts	80	59	-
Front splash shield bolts	7	-	62
Fuel charging harness nut	6	-	53
Fuel rail bolts	10	-	89
Generator bolts and studs	48	35	-
Ground strap bolt	15	11	-
Halfshaft nuts	258	191	-
Halfshaft bracket bolts	48	35	-
Heater hose bracket nuts	7	-	62
Ignition coil-on-plug bolts	6	-	53
LH engine support insulator bolts	70	52	-
LH engine support insulator nut	90	66	-
LH exhaust manifold nuts	20	15	-
Lower cylinder block bolts and studs	(1)	-	-
Water pump belt cover	6	-	53
Lower intake manifold bolts	10	-	89
Motor mount bracket bolts/nuts	103	76	-
Oil level indicator and tube stud	10	-	89
Oil pan baffle nuts	(1)	-	-
Oil pan bolts and studs	25	18	-
Oil pan to transaxle bolts	40	30	-

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Oil pressure sensor	14	10	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube bolts	A	-	-
Oil separator bolts	10	-	89
Outer tie rod end nuts	55	41	-
Power steering pump bolts	25	18	-
Power steering pressure tube bracket nut	10	-	89
Power steering pressure tube nut	37	27	-
Powertrain control module (PCM) electrical connector bolt	6	-	53
Power distribution box cable nuts	12	9	-
Radiator fan bolt	10	-	89
RH engine support insulator nut	90	66	-
RH engine support insulator through bolt and nut	120	89	-
RH exhaust manifold nuts	20	15	-
RH radio ignition interference capacitor nut	10	-	89
Shifter cable nut	17	13	-
Starter motor ground cable bolt	25	18	-
Starter cable positive nut	12	9	-
Steering shaft pinch bolt	40	30	-
Strut to knuckle bolts	115	85	-
Subframe bolts	200	148	-
Subframe nuts	150	111	-
Transaxle mount bolts	55	41	-
Transaxle mount through bolt	90	66	-
Sway bar end link nuts	48	35	-
Throttle body bolt and stud	10	-	89
Timing chain guide bolts	25	18	-
Timing chain tensioner bolts	25	18	-
Torque converter-to-flexplate nuts	40	30	-
Transaxle-to-oil pan bracket bolt	25	18	-
Transaxle to oil pan bracket nuts	10	-	89
Upper intake manifold bolts	10	-	89
Valve cover bolts and studs	10	-	89
Water pump bolts	25	18	-
Wire harness bolt	5	-	44
Y-pipe nuts	40	30	-
Y-pipe-to-exhaust manifold nuts	40	30	-

(1) Multiple step sequence. See procedure.

## DESCRIPTION AND OPERATION

### ENGINE

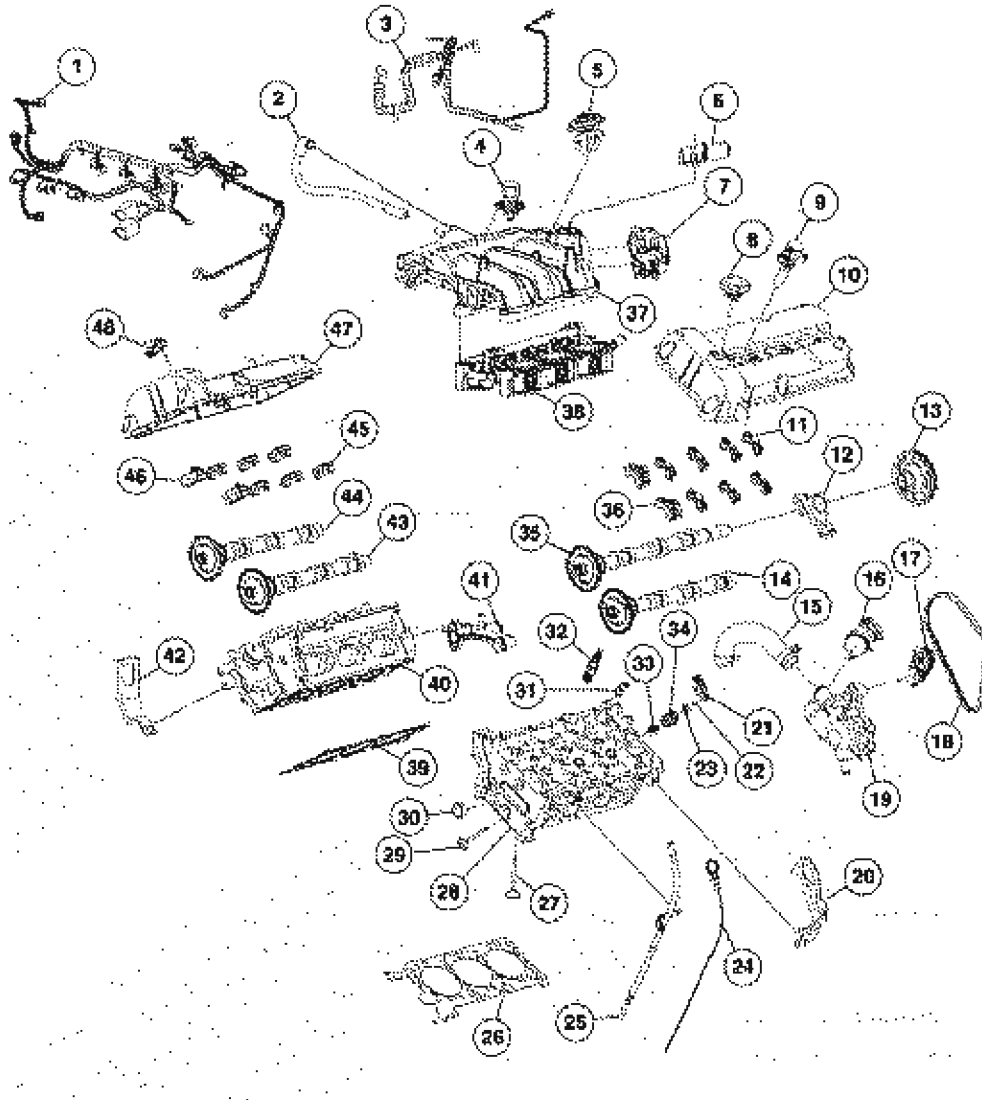
The 3.0L Duratec is a four-valve-per-cylinder, dual overhead camshaft engine. The engine uses a distributorless ignition system with a separate coil located above each spark plug. The cylinder block is a two-piece design with the upper portion housing the cylinders, and a separate lower cylinder block containing the main bearing caps. Both sections are made of aluminum, with inserts for the bearing areas and caps. An aluminum oil pan bolts to the bottom of the lower cylinder block and to the transaxle to provide greater strength.

The camshafts are mounted in the cylinder heads and act against a roller follower to open and close the valves. A hydraulic lash adjuster is located on one side of the roller follower and the valve tip on the opposite end. The camshafts are driven off the front of each cylinder head by two chains (one each side). Both of the chains are driven by a single sprocket that is located on the crankshaft, just in front of the oil pump.

### Upper Engine Components

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



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**Fig. 1: Identifying Upper Engine Components**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Part Number	Description
1	9H589	Engine control sensor and fuel charging wiring harness
2	6C658	Evaporative emissions tube
3	9E498	Vacuum harness
4	9J472	Exhaust gas recirculation (EGR) vacuum regulator
5	9D460	EGR valve
6	9F715	Idle air control (IAC) valve
7	9E926	Throttle body
8	6766	Oil fill cap
9	12A366	Coil-on-plug
10	6A505	Valve cover
11	6A258	Camshaft journal caps
12	6B293	Camshaft oil seal retainer
13	6A359	Pulley
14	6A269	Exhaust camshaft
15	8A577	Water pump outlet hose
16	8501	Water pump inlet hose
17	8W608	Belt tensioner (if equipped)
18	8K543	Belt
19	8501	Water pump
20	17A084	Lifting bracket
21	8529	Camshaft follower
22	6518	Valve spring retainer key
23	6514	Valve spring retainer
24	6750	Oil level indicator
25	6754	Oil level indicator tube
26	6083	Cylinder head gasket
27	6507	Exhaust valve
28	6050	LH cylinder head
29	6505	Intake valve
30	W701501	Cup plug
31	6C501	Hydraulic lash adjuster
32	12405	Spark plug
33	6A517	Valve stem seal
34	6513	Valve spring
35	6A267	Intake camshaft
36	6B280	Camshaft bearing thrust cap
37	9424	Upper intake manifold
38	9J447	Lower intake manifold
39	6051	Head gasket
40	6049	RH cylinder head
41	8548	Thermostat housing
42	17A084	Lifting bracket
43	6A266	Intake camshaft
44	6A266	Exhaust camshaft
45	6A258	Camshaft journal cap
46	6B280	Camshaft bearing thrust cap
47	6582	Valve cover
48	18801	Radio ignition interference capacitor

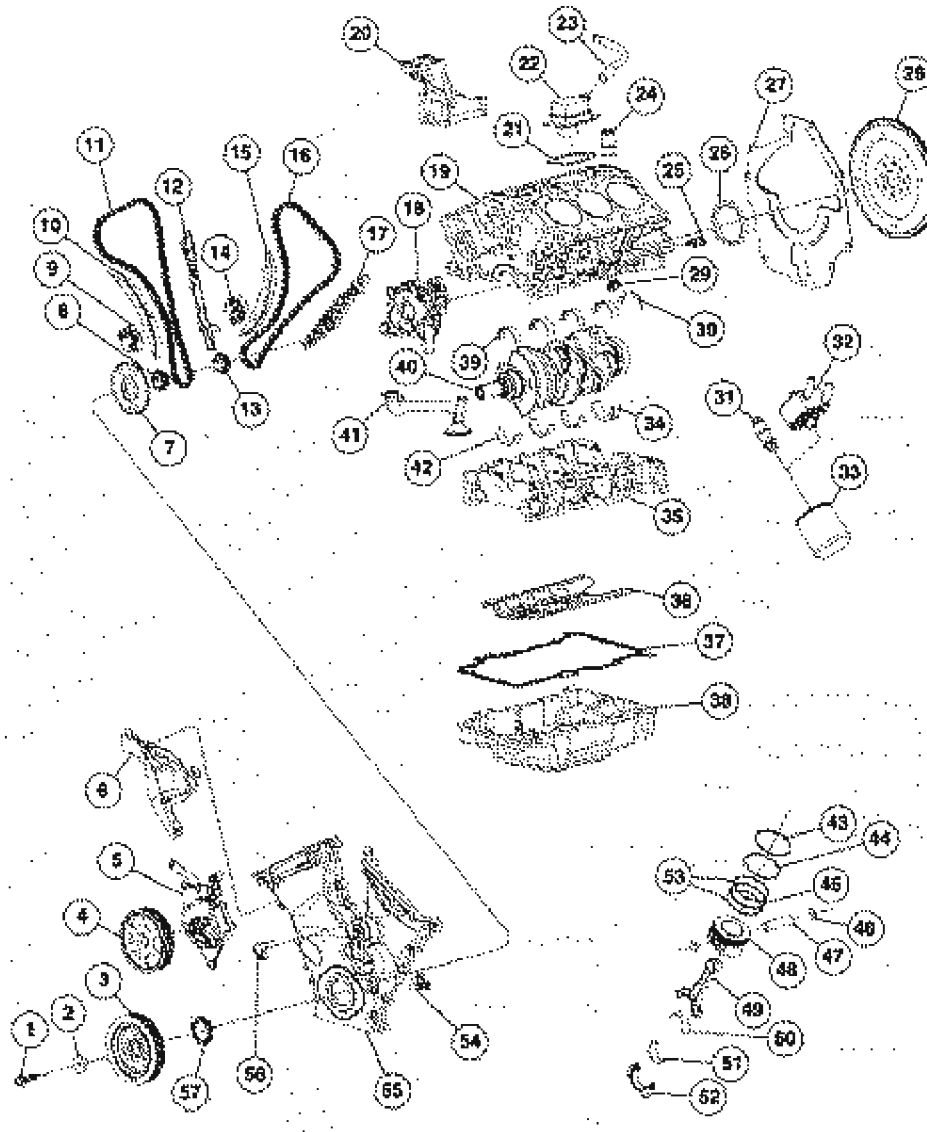
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**Fig. 2: Upper Engine Component Description Table**  
Courtesy of FORD MOTOR CO.

#### Lower Engine Components

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



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**Fig. 3: Identifying Lower Engine Components**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Part Number	Description
1	W701512	Crankshaft vibration damper bolt
2	W701511	Crankshaft vibration damper washer
3	6316	Crankshaft vibration damper
4	3A733	Power steering pump pulley
5	3D639	Power steering pump
6	10239	Generator bracket
7	12A227	Ignition pulse wheel
8	6306	Crankshaft sprocket
9	6L266	R/H timing chain tensioner
10	6K255	R/H timing chain guide
11	6268	R/H timing chain
12	6M256	R/H timing chain guide
13	6306	Crankshaft sprocket
14	6L266	L/H timing chain tensioner
15	6K255	L/H timing chain guide
16	6268	L/H timing chain
17	6B274	L/H timing chain guide
18	6621	Oil pump
19	6010	Engine block
20	3K738	Bracket
21	6B752	Oil separator gasket
22	6B673	Oil separator
23	6K817	Crankcase emission hose
24	8A505	Water inlet tube
25	9278	Oil pressure switch
26	6701	Crankshaft rear oil seal
27	6A373	Engine separator plate
28	6375	Flywheel
29	W701548	Plug
30	6A341	Crankshaft thrust washer
31	6890	Oil filter insert
32	6A642	Oil cooler
33	6714	Oil filter
34	6A339	Crankshaft thrust bearing
35	6F095	Lower cylinder block
36	6687	Oil pan baffle
37	6710	Oil pan gasket
38	6675	Oil pan
39	6333	Crankshaft main bearings
40	6303	Crankshaft
41	6622	Oil pickup tube and screen
42	6A338	Crankshaft main bearings
43	6150	Upper compression ring
44	6152	Lower compression ring
45	6161	Oil control ring spacer
46	6140	Piston pin clip
47	6135	Piston clip
48	6110	Piston
49	6200	Connecting rod
50	6211	Connecting rod bearings
51	6211	Connecting rod bearings
52	6205	Connecting rod bearing cap
53	6159	Oil control rings
54	6C315	Crankshaft position sensor
55	6019	Front cover
56	6B288	Camshaft position sensor
57	6700	Crankshaft front seal

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**Fig. 4: Lower Engine Component Description Table**  
Courtesy of FORD MOTOR CO.

## DIAGNOSIS AND TESTING

### ENGINE

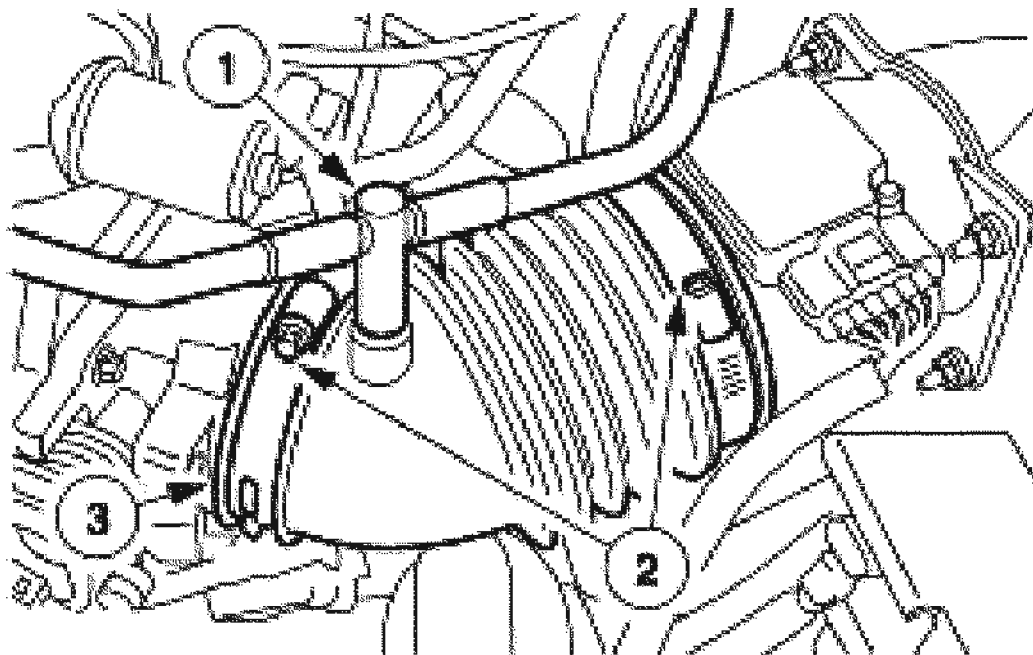
Refer to **ENGINE SYSTEM-GENERAL INFORMATION** for basic mechanical concerns. Refer to the appropriate **INTRODUCTION - CNG, FLEX-FUEL & GASOLINE** article for driveability concerns.

## IN-VEHICLE REPAIR

### UPPER INTAKE MANIFOLD

#### Removal

1. Remove the air cleaner outlet tube.
  1. Remove the crankcase ventilation tube.
  2. Loosen the clamps.
  3. Remove the air cleaner outlet tube.



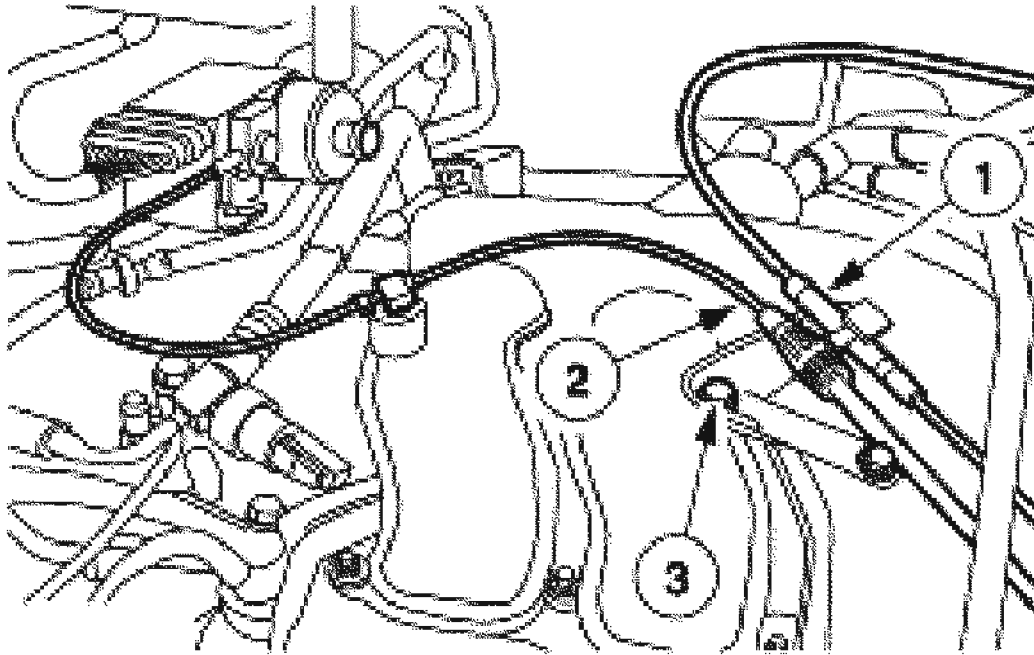
G02739178

**Fig. 5: Removing Air Cleaner Outlet Tube**  
Courtesy of FORD MOTOR CO.

2. Disconnect the cables.
  1. Disconnect the throttle cable.
  2. If equipped, disconnect the speed control cable.



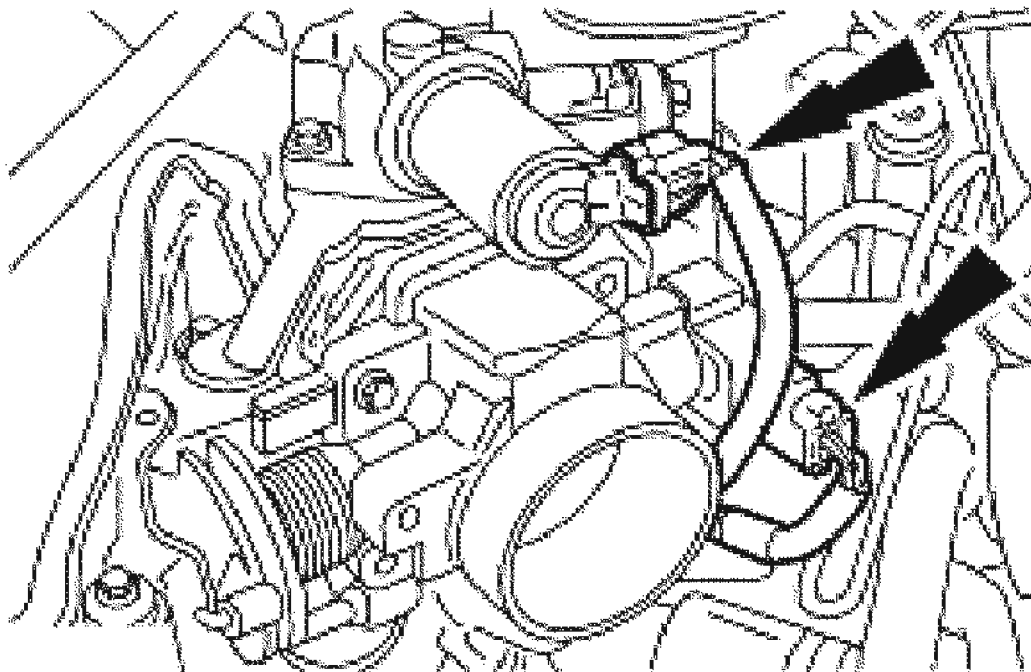
3. Remove the throttle cable bracket bolts.



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**Fig. 6: Disconnecting Cables**  
Courtesy of FORD MOTOR CO.

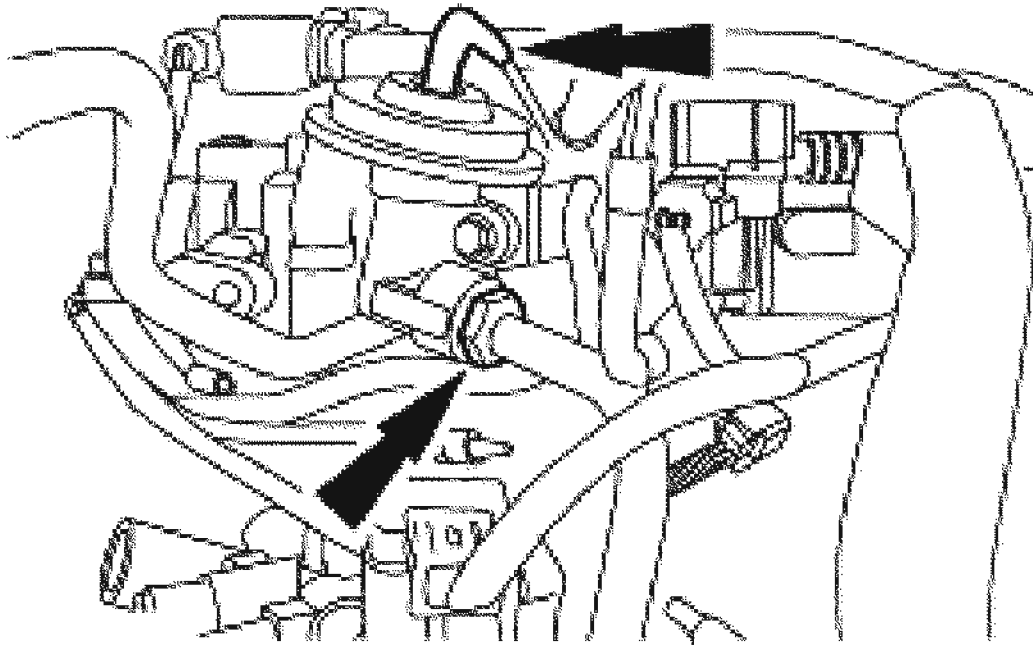
3. Disconnect the throttle position (TP) sensor and idle air control (IAC) electrical connectors.



G02739180

**Fig. 7: Disconnecting Throttle Position (TP) Sensor And Idle Air Control (IAC) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

4. Disconnect the exhaust gas recirculation (EGR) valve vacuum hose and EGR tube nut.

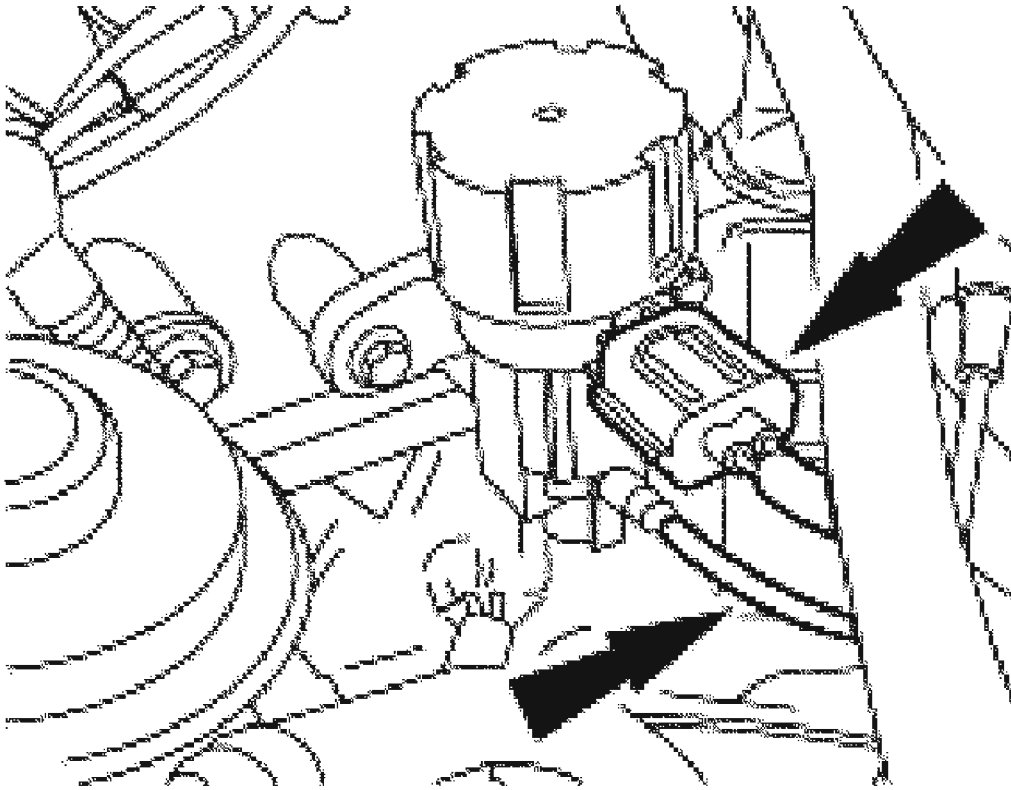


G02739181

**Fig. 8: Disconnecting Exhaust Gas Recirculation (EGR) Valve Vacuum Hose And EGR Tube Nut**

**Courtesy of FORD MOTOR CO.**

5. Disconnect the EGR vacuum regulator solenoid electrical connector and vacuum hose.

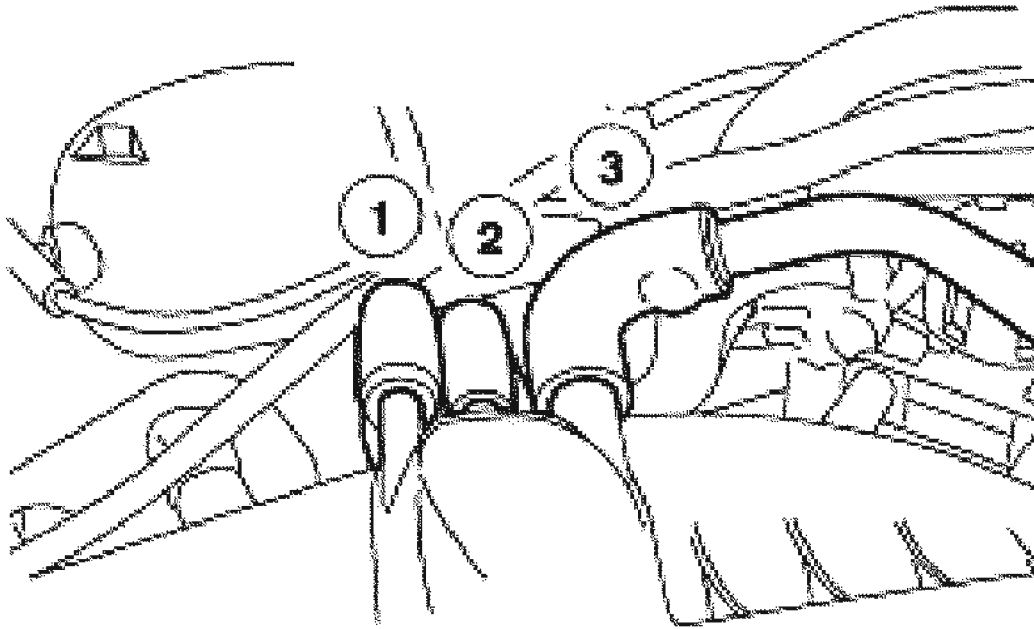


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**Fig. 9: Disconnecting EGR Vacuum Regulator Solenoid Electrical Connector And Vacuum Hose**

**Courtesy of FORD MOTOR CO.**

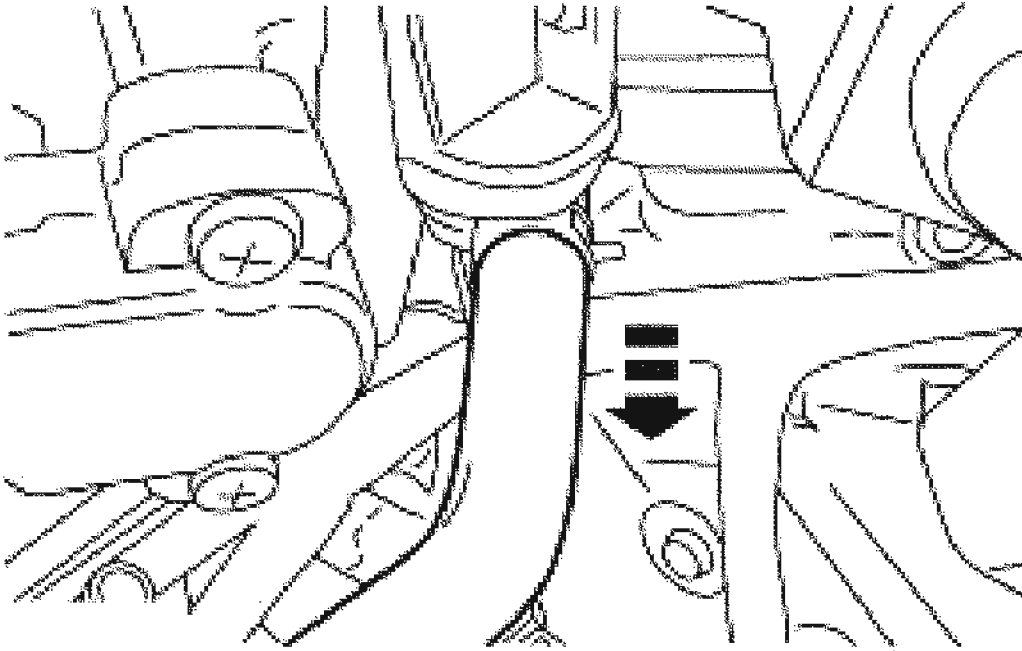
6. Disconnect the three vacuum hoses on the back of the intake manifold.
  1. Disconnect the chassis vacuum hose.
  2. Disconnect the engine vacuum hose.
  3. Disconnect the positive crankcase ventilation (PCV) hose.



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**Fig. 10: Disconnecting Vacuum Hoses**  
Courtesy of FORD MOTOR CO.

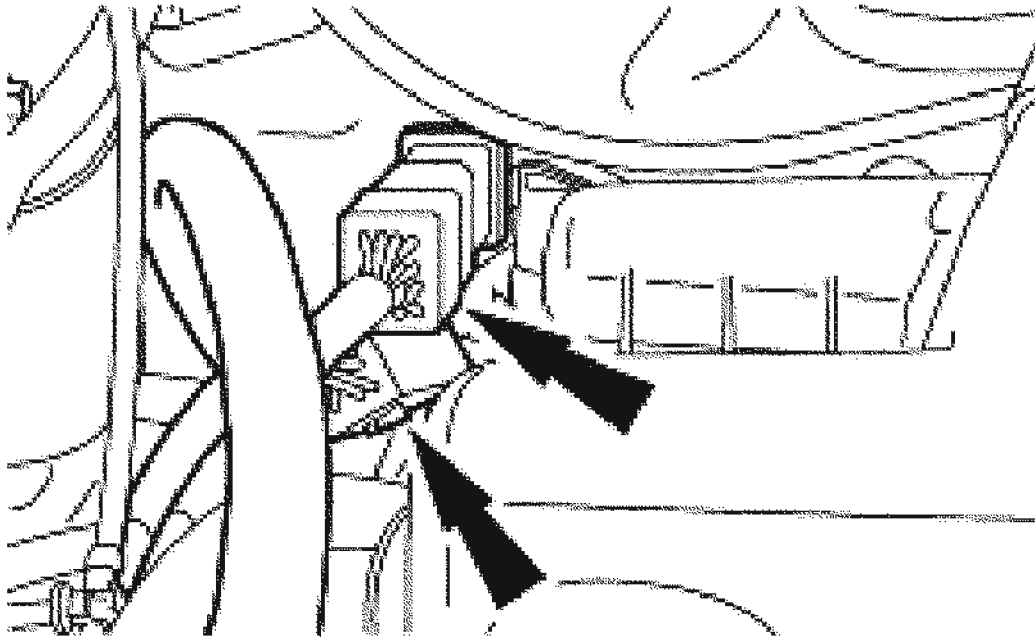
7. Disconnect the vapor management valve (VMV) vacuum hose.



G02739184

**Fig. 11: Disconnecting Vapor Management Valve (VMV) Vacuum Hose**  
Courtesy of FORD MOTOR CO.

8. Disconnect the two electrical connectors attached to the left side of the upper intake manifold.

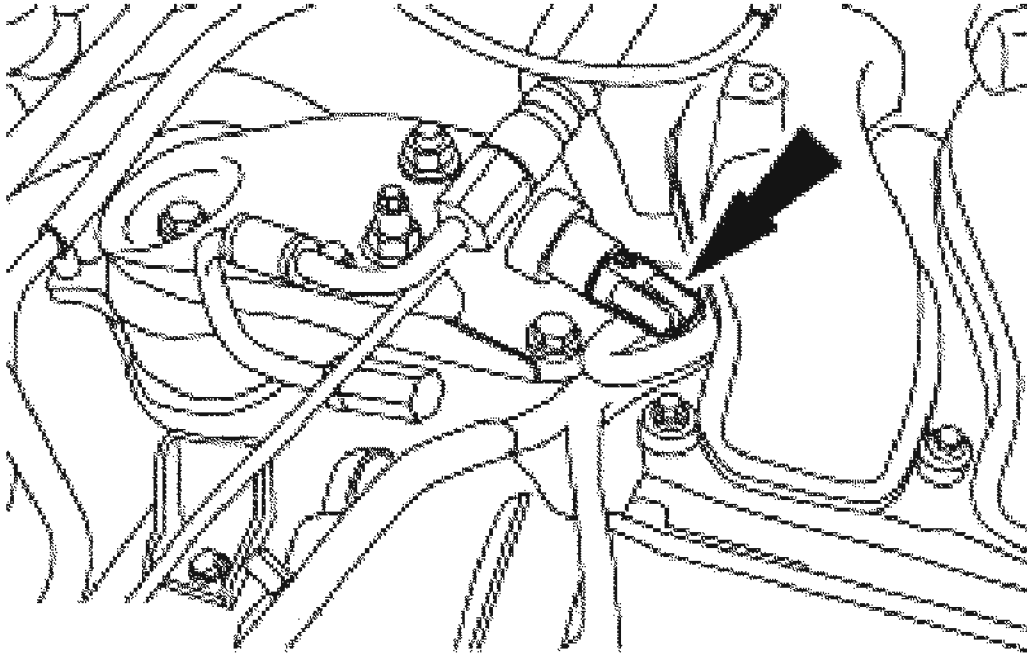


G02739185

**Fig. 12: Disconnecting Electrical Connectors Attached To Left Side Of Upper Intake Manifold**

**Courtesy of FORD MOTOR CO.**

9. Disconnect the power steering pressure (PSP) sensor electrical connector.

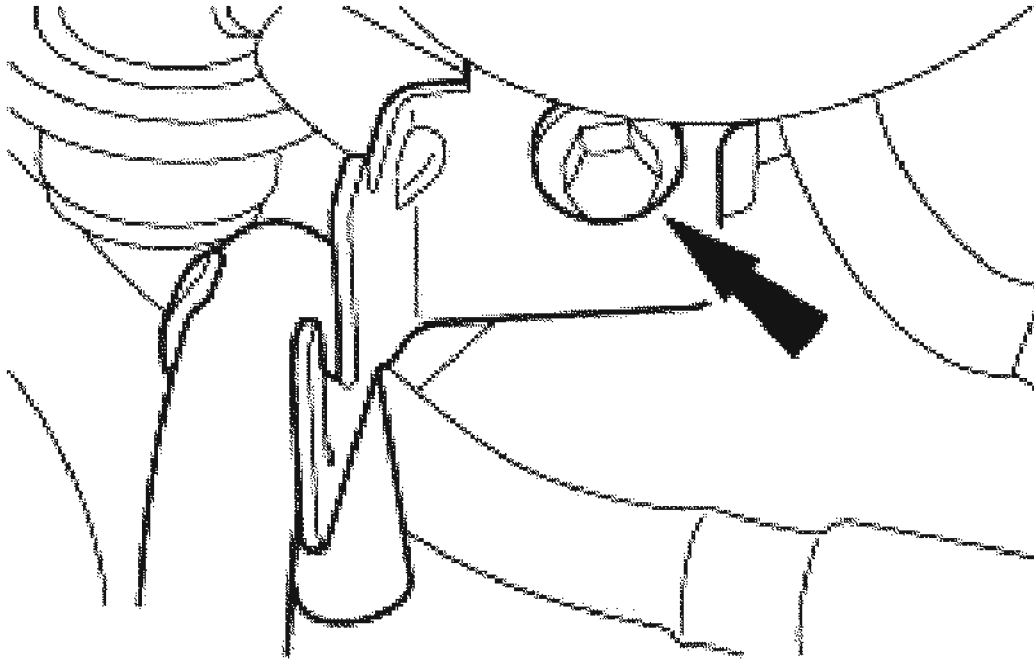


G02739186

**Fig. 13: Disconnecting Power Steering Pressure (PSP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

10. Remove the bolt and position the transmission vent hose and bracket aside.

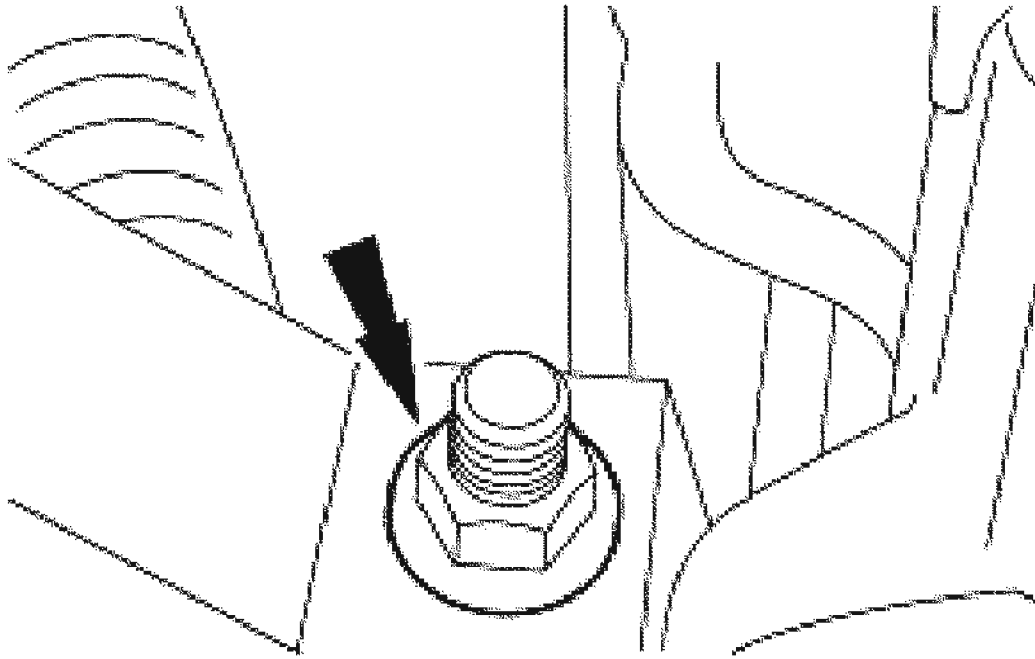




G02739187

**Fig. 14: Locating Bolt**  
Courtesy of FORD MOTOR CO.

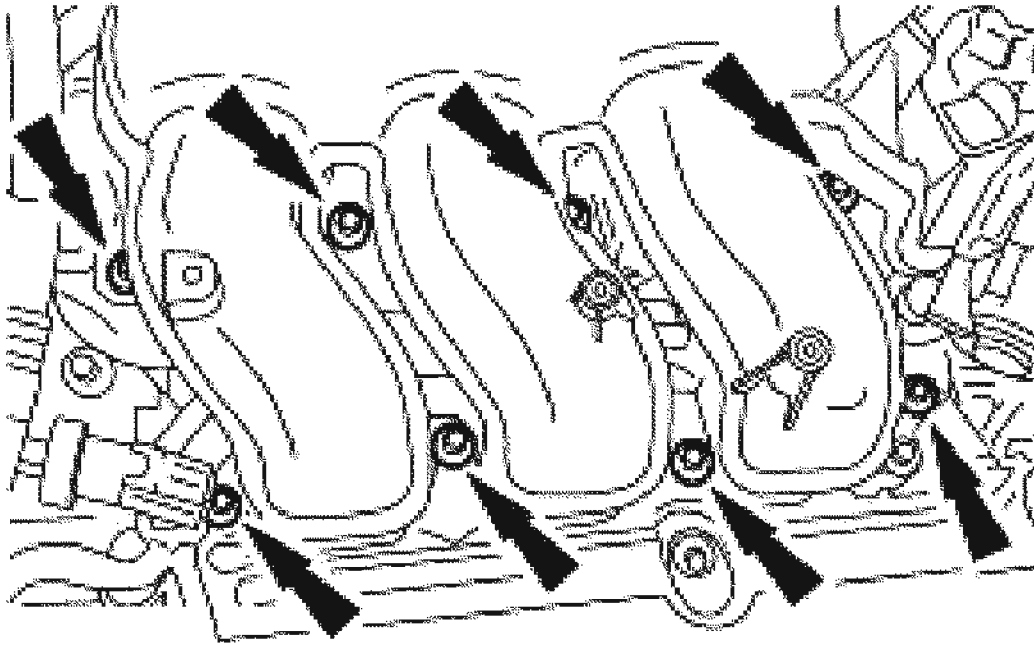
11. Remove the nut from the wire harness.



G02739188

**Fig. 15: Removing Nut From Wire Harness**  
Courtesy of FORD MOTOR CO.

12. Remove the eight bolts and the upper intake manifold.
  - Remove and discard the gaskets.
  - Clean all sealing surfaces.

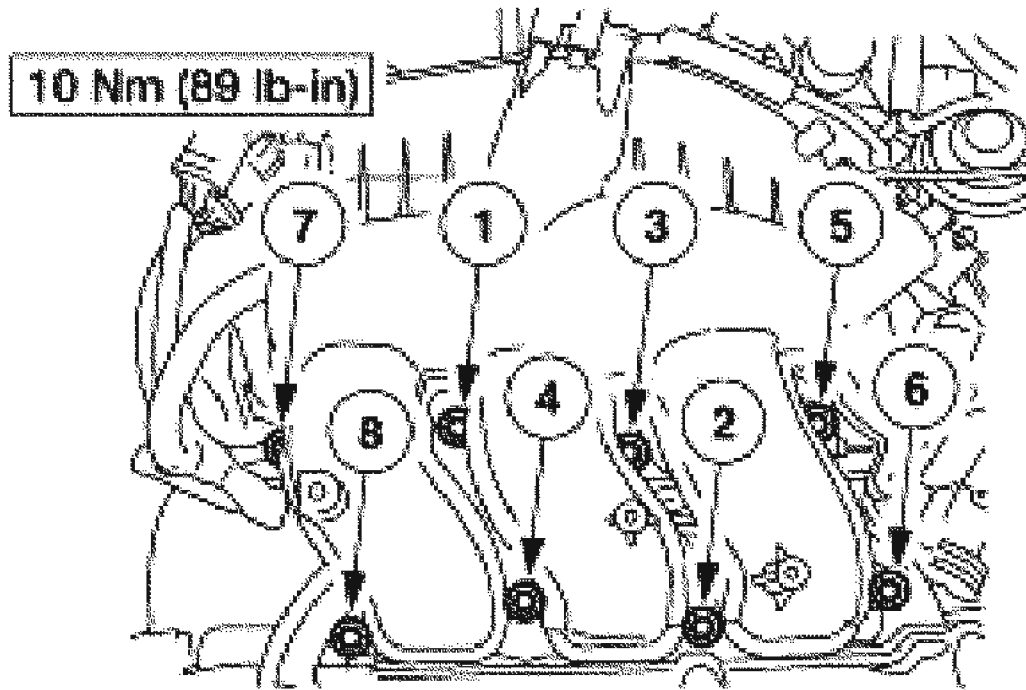


G02739189

**Fig. 16: Removing Bolts And Upper Intake Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

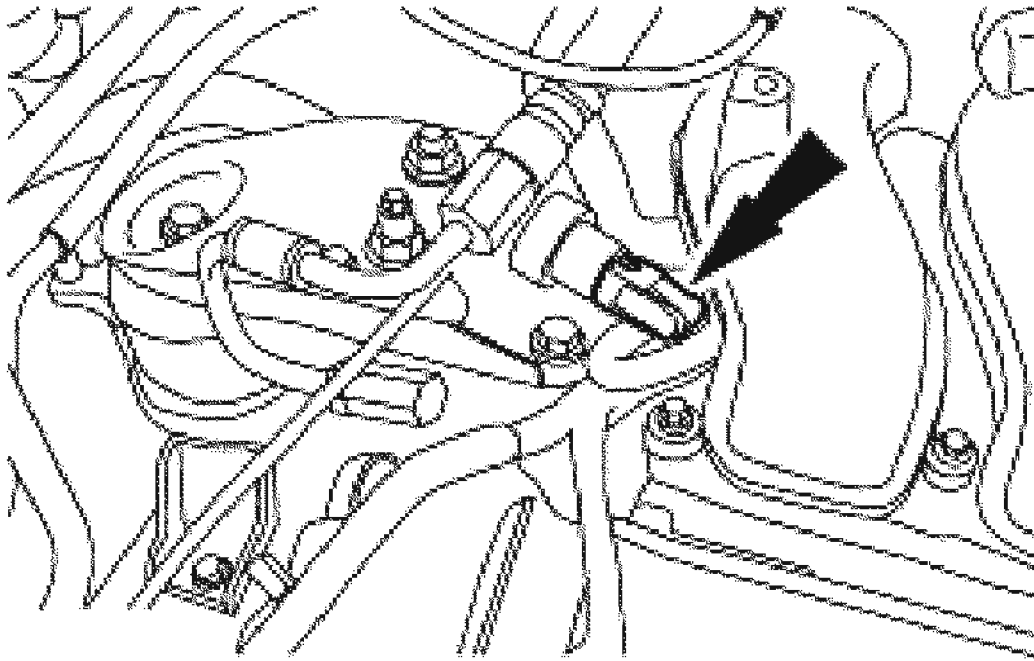
1. Install new gaskets in the upper intake manifold.
2. Position the upper intake manifold and tighten the bolts in the sequence shown.



G02739190

**Fig. 17: Identifying Tightening Sequence And Torque Specification Of Upper Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

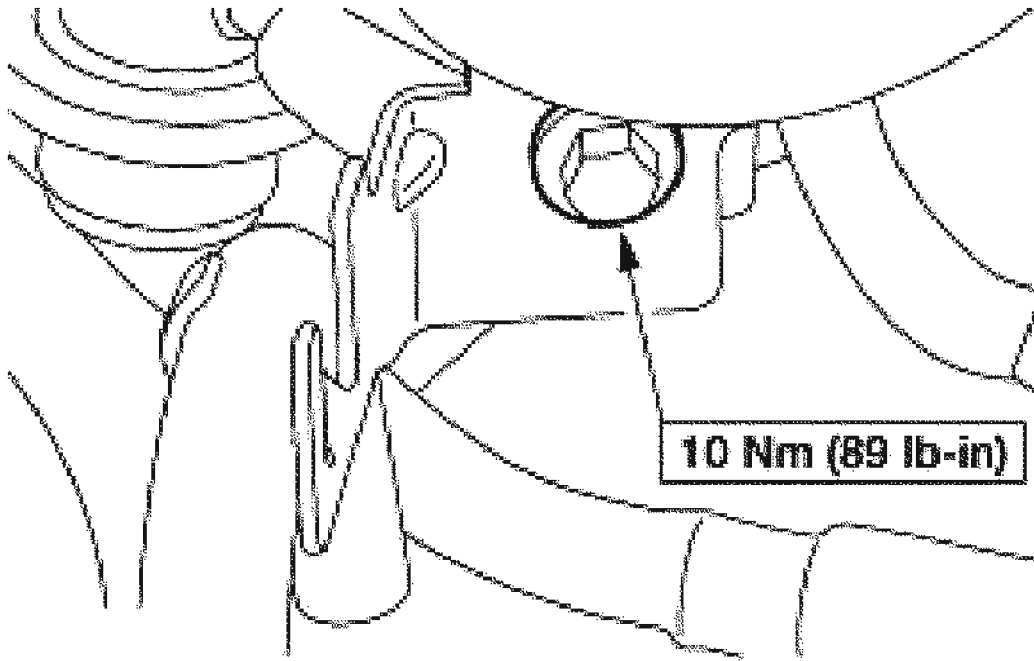
3. Connect the PSP electrical connector.



G02739191

**Fig. 18: Connecting PSP Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

4. Position the transmission vent tube and bracket and install the bolt.

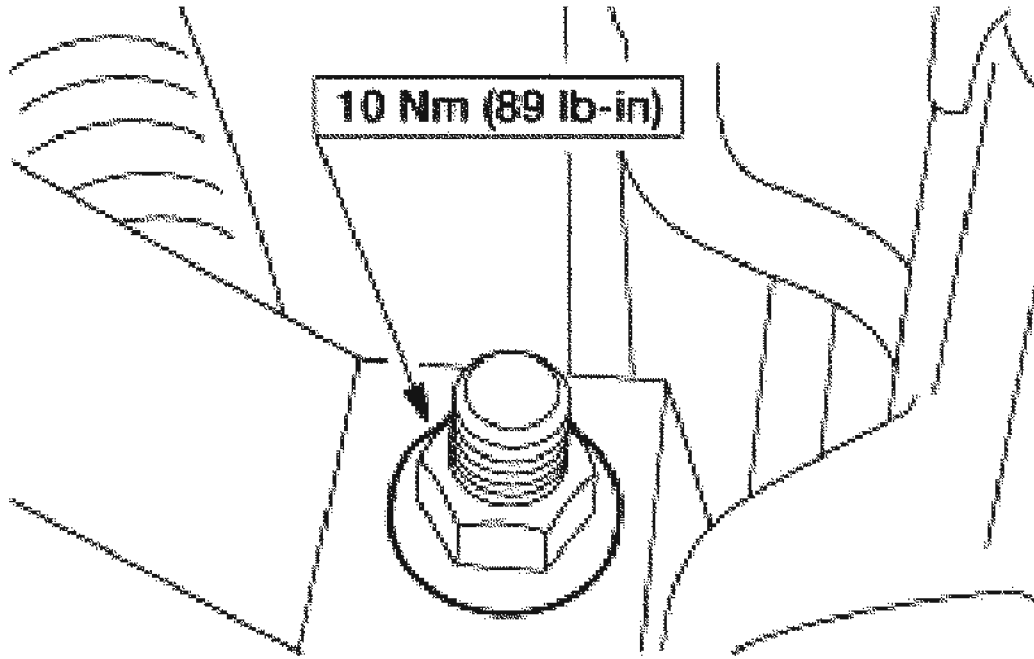


G02739192

**Fig. 19: Identifying Transmission Vent Tube And Bracket Bolt Torque Specification**

**Courtesy of FORD MOTOR CO.**

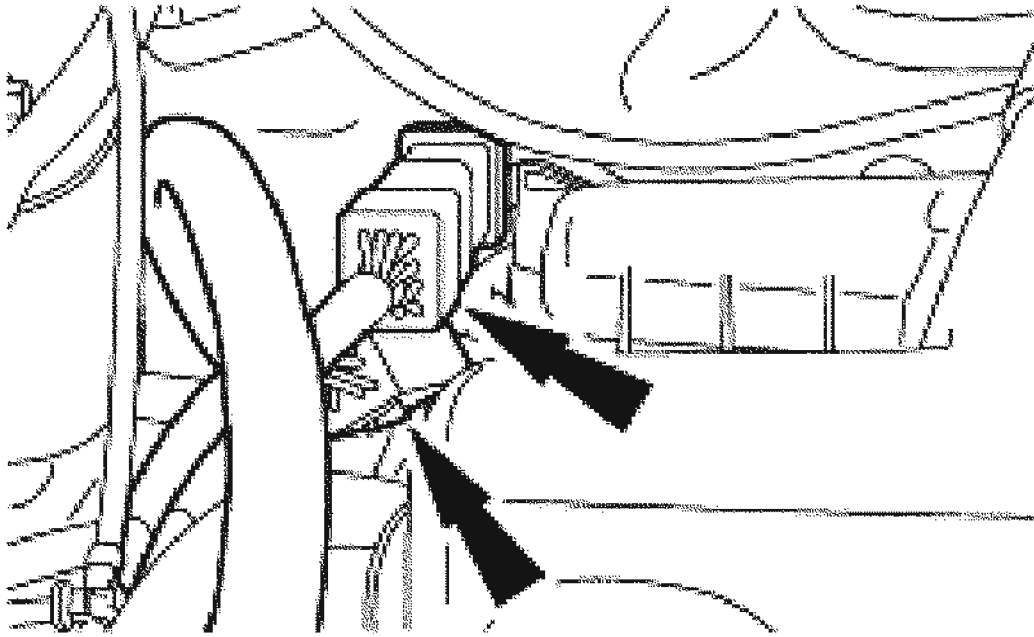
5. Position the wire harness and install the nut.



G02739193

**Fig. 20: Identifying Wire Harness Nut Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Install the two electrical connectors on the left side of the intake manifold.

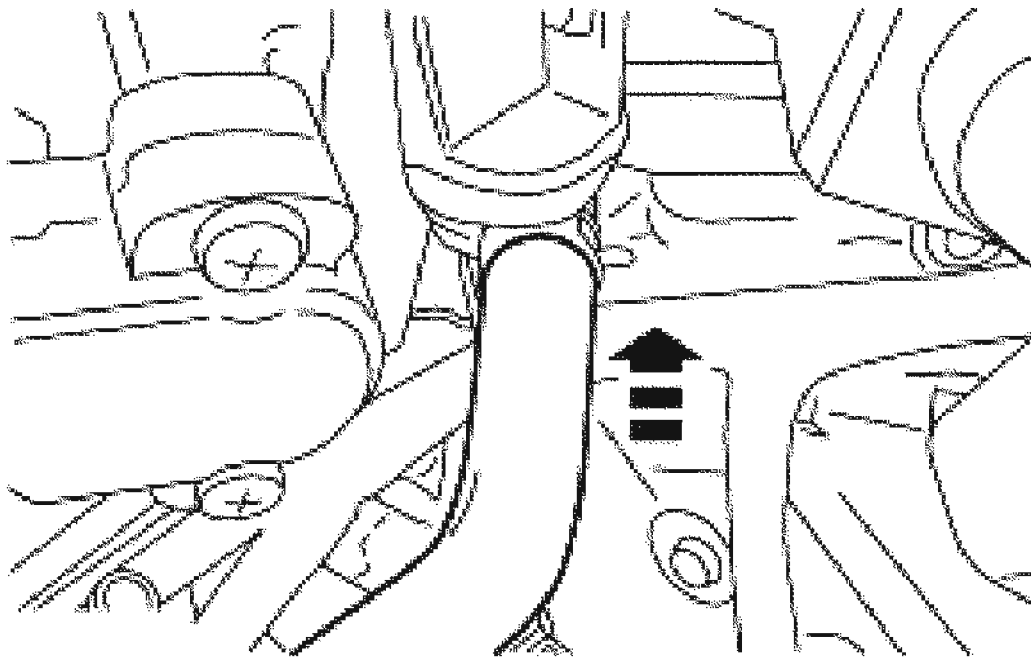


G02739194

**Fig. 21: Installing Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

7. Install the vapor management valve (VMV) vacuum hose.

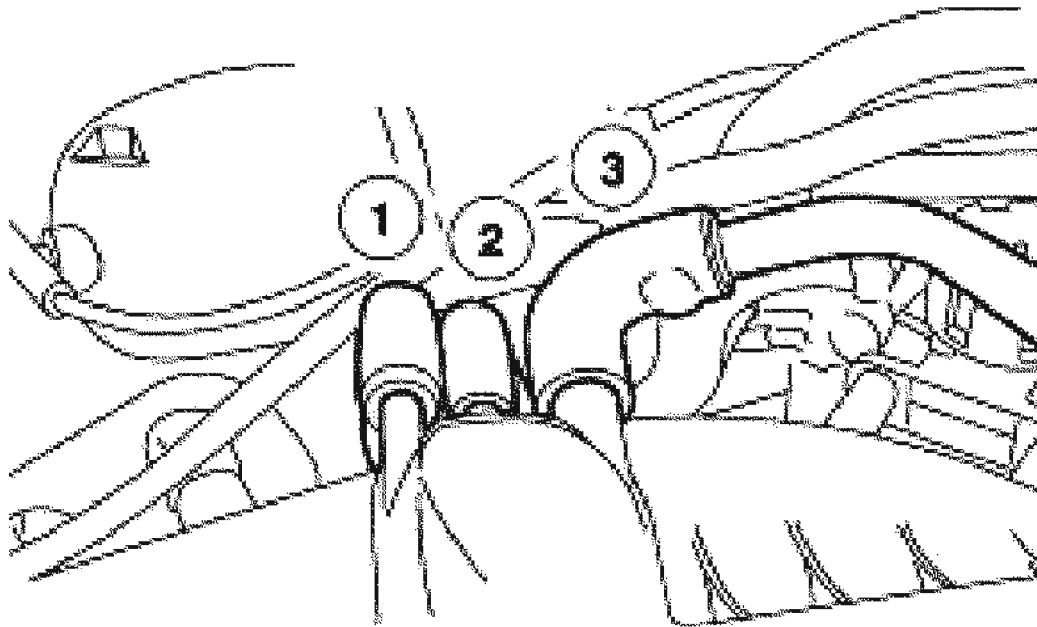




G02739195

**Fig. 22: Installing Vapor Management Valve (VMV) Vacuum Hose**  
Courtesy of FORD MOTOR CO.

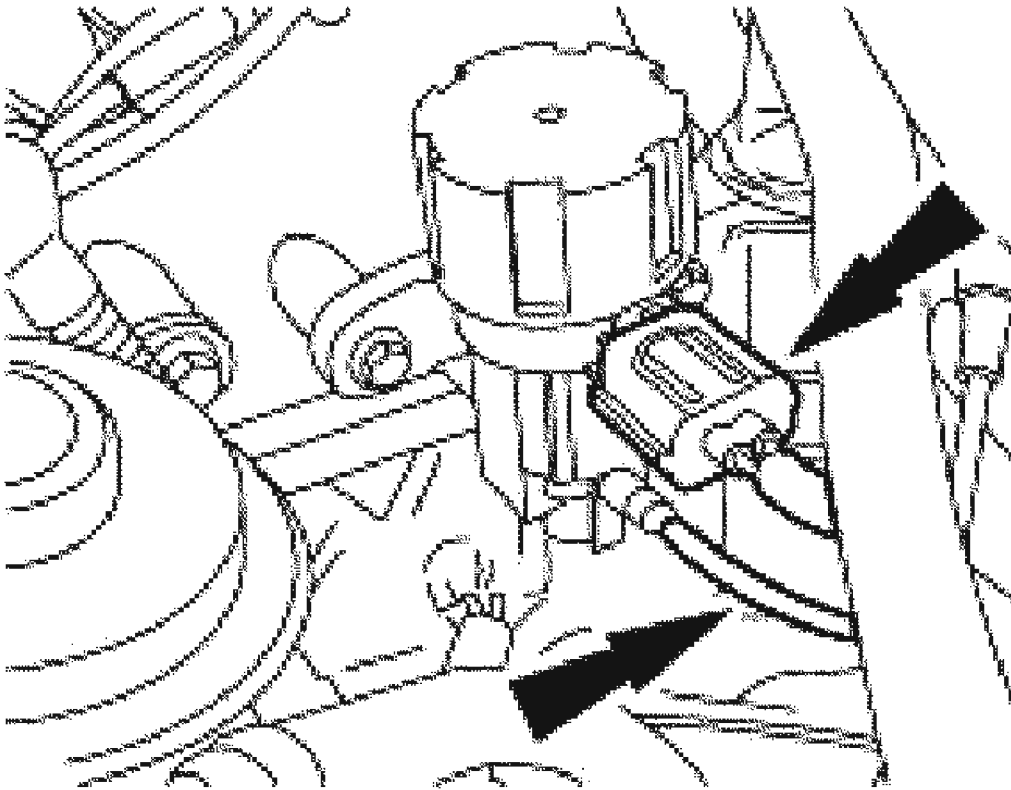
8. Connect the three vacuum hoses on the back of the upper intake manifold.
  1. Connect the chassis vacuum hose.
  2. Connect the engine vacuum hose.
  3. Connect the PCV hose.



G02739196

**Fig. 23: Connecting Vacuum Hoses**  
Courtesy of FORD MOTOR CO.

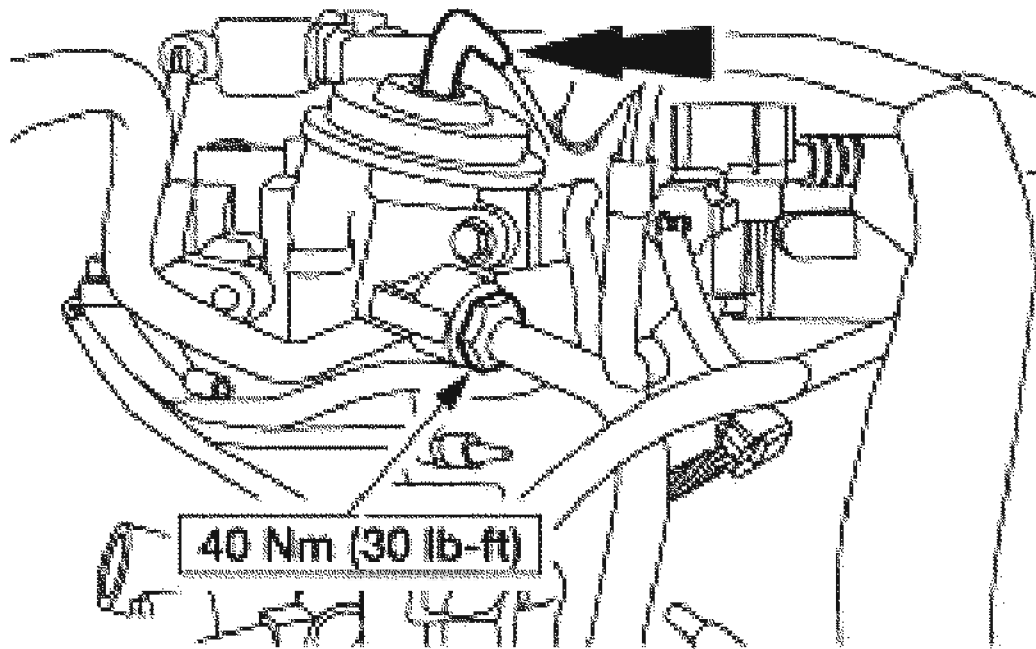
9. Connect the EGR vacuum regulator solenoid electrical connector and the vacuum hose.



G02739197

**Fig. 24: Connecting EGR Vacuum Regulator Solenoid Electrical Connector**  
Courtesy of FORD MOTOR CO.

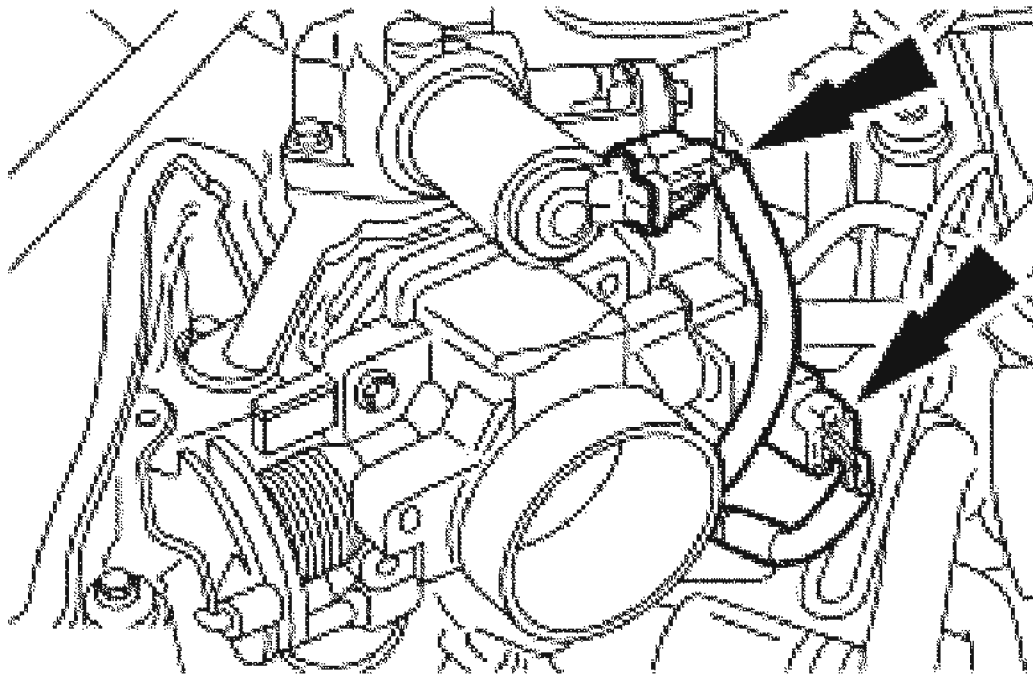
10. Install the EGR valve vacuum hose and EGR tube nut.



G02739198

**Fig. 25: Installing EGR Valve Vacuum Hose And EGR Tube Nut**  
Courtesy of FORD MOTOR CO.

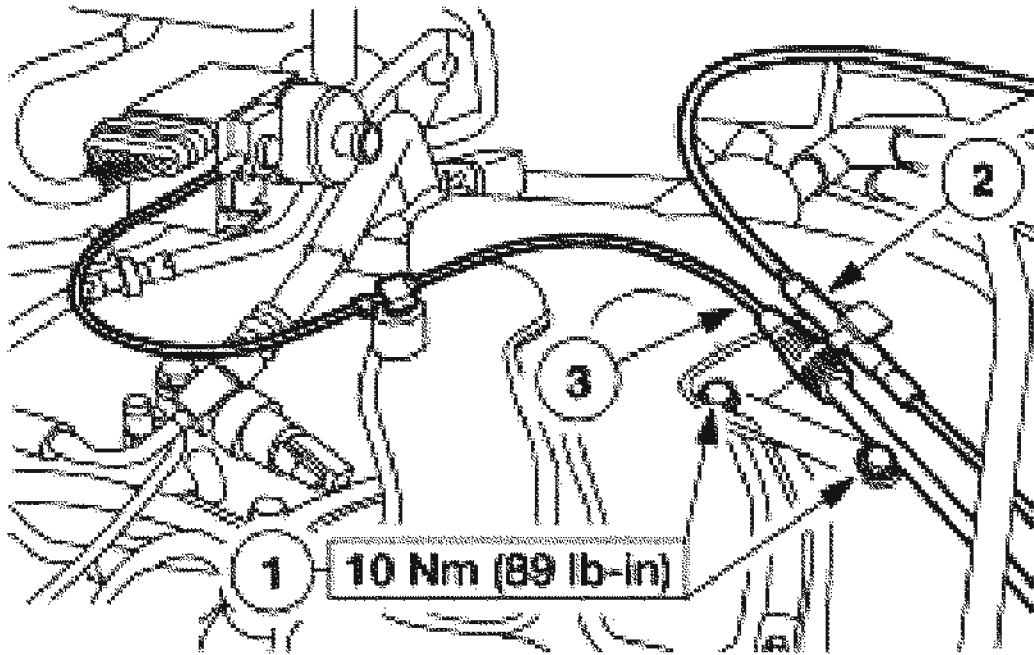
11. Connect the TP sensor and IAC electrical connectors.



G02739199

**Fig. 26: Connecting TP Sensor & IAC Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

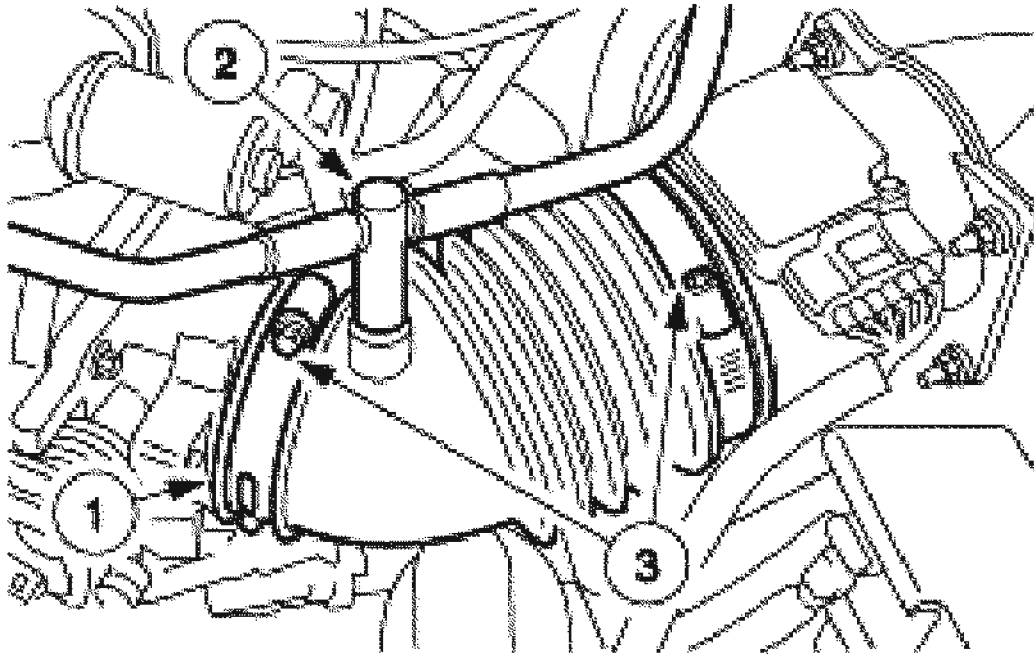
12. Connect the throttle cables.
  1. Install the throttle cable bracket bolts.
  2. Connect the throttle cable.
  3. If equipped, connect the speed control cable.



G02739200

**Fig. 27: Connecting Throttle Cables**  
Courtesy of FORD MOTOR CO.

13. Install the air cleaner outlet tube.
  1. Position the air cleaner outlet tube.
  2. Install the hoses.
  3. Install the clamps.



G02739201

**Fig. 28: Installing Air Cleaner Outlet Tube**  
Courtesy of FORD MOTOR CO.

## LOWER INTAKE MANIFOLD

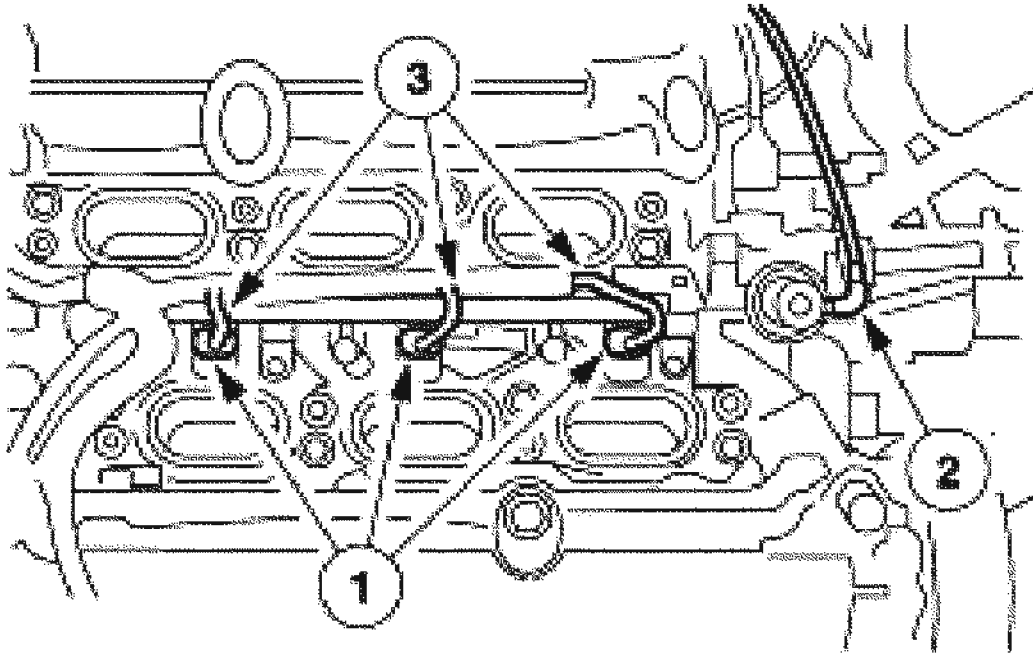
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Disconnect the fuel hose spring lock coupling. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION** .
2. Remove the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .
3. Disconnect the fuel rail.
  1. Disconnect the six fuel injector electrical connectors and wire harness locators.
  2. Disconnect the fuel pressure damper vacuum hose.
  3. Release the wire harness retainers from the fuel injection supply manifold.

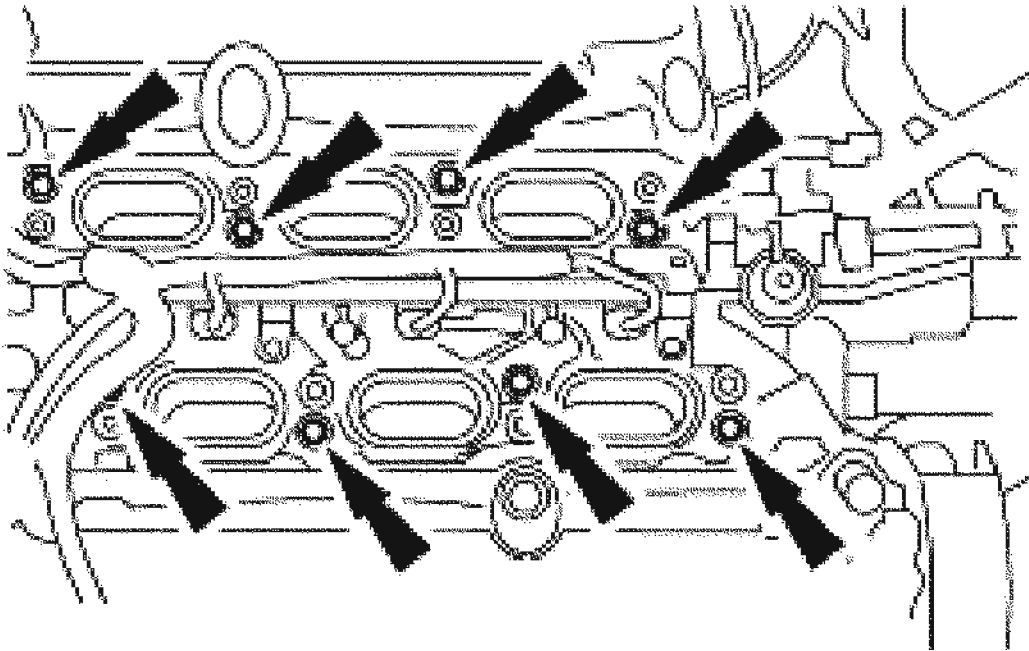


G02739202

**Fig. 29: Disconnecting Fuel Rail**  
Courtesy of FORD MOTOR CO.

4. Remove the bolts and the lower intake manifold. Remove and discard the gaskets.



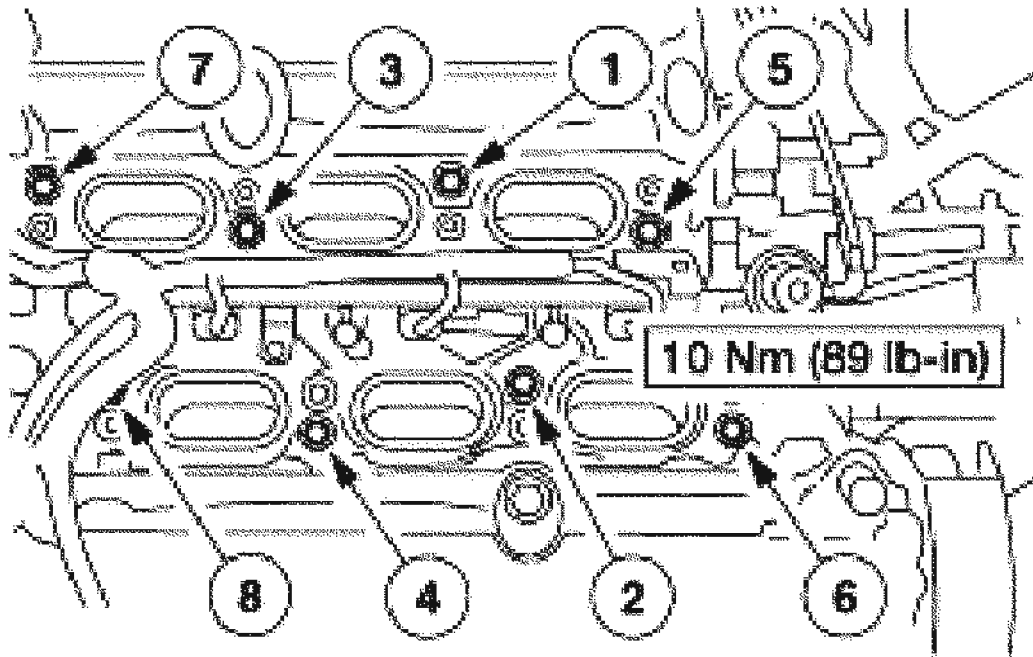


G02739203

**Fig. 30: Removing Bolts And Lower Intake Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Clean and inspect all mating surfaces.
2. Install new gaskets in the lower intake manifold.
3. Install the lower intake manifold assembly and tighten the bolts in the sequence shown.

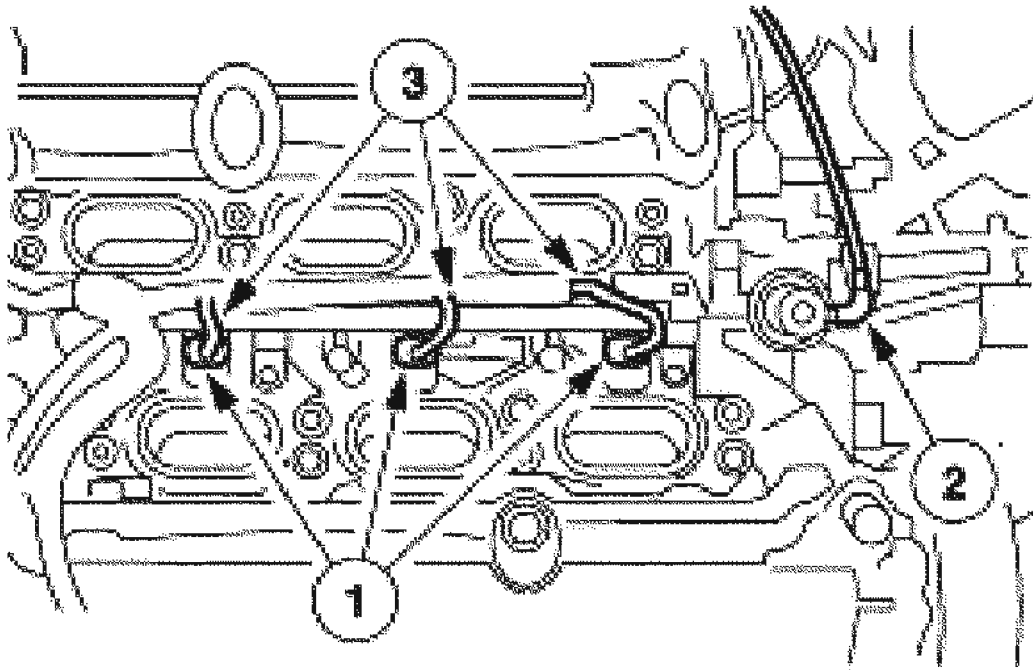


G02739204

**Fig. 31: Identifying Tightening Sequence & Torque Specification Of Lower Intake Manifold Assembly Bolts**

**Courtesy of FORD MOTOR CO.**

4. Connect the fuel rail.
  1. Position the wire harness locators and connect the six fuel injector electrical connectors.
  2. Connect the fuel pressure damper vacuum hose.
  3. Connect the fuel injection harness to the fuel supply manifold.



G02739205

**Fig. 32: Connecting Fuel Rail**  
Courtesy of FORD MOTOR CO.

5. Install the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .
6. Connect the fuel hose spring lock coupling. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION** .

## ENGINE FRONT COVER

### Material

### MATERIAL SPECIFICATION

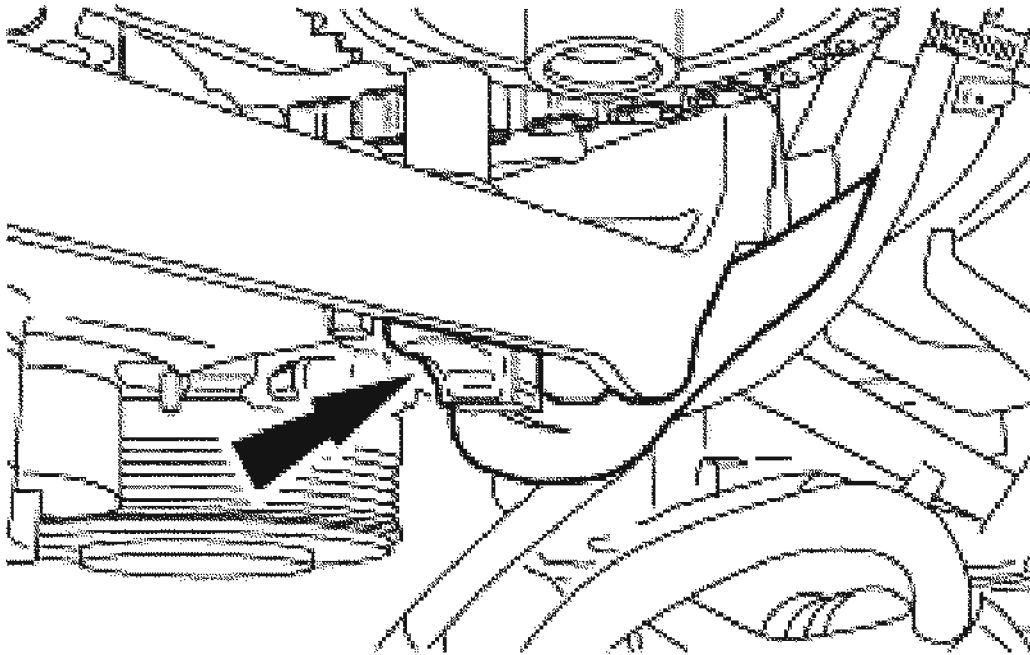
Item	Specification
Motocraft Metal Surface Cleaner ZC - 21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE -M4G323 -A4

### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY**,

### **MOUNTING AND CABLES .**

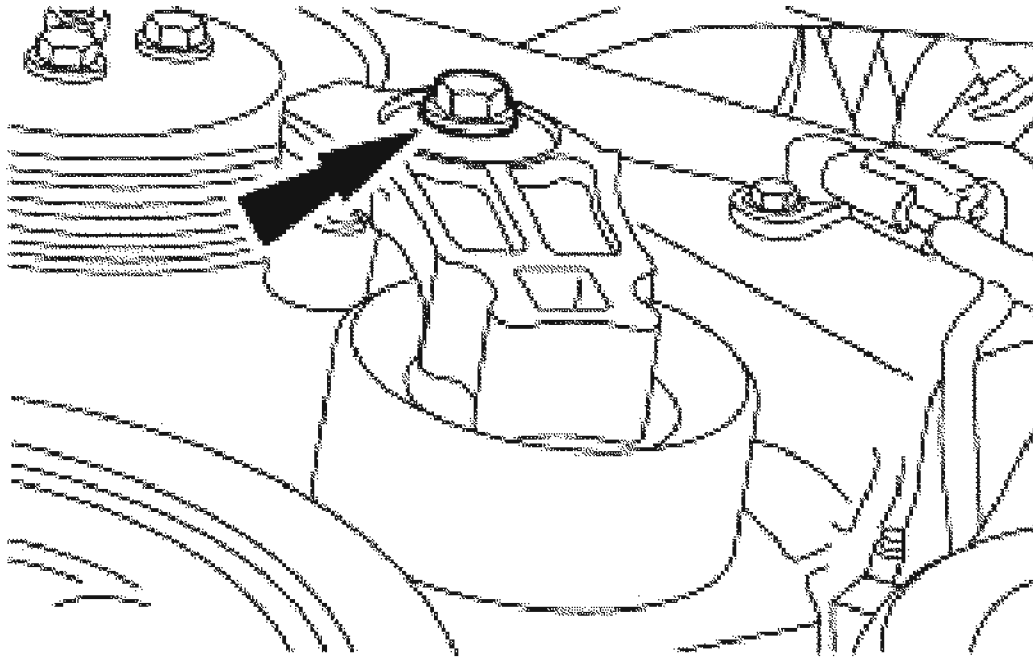
3. Remove the RH and LH valve covers. For additional information, refer to **VALVE COVER LH** and **VALVE COVER RH** .
4. Remove the generator. For additional information, refer to **GENERATORS & REGULATORS** .
5. Remove the front engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS - FRONT, RH** .
6. Remove the bolt and the camshaft position (CMP) sensor.



G02739206

**Fig. 33: Removing Bolt And Camshaft Position (CMP) Sensor**  
Courtesy of FORD MOTOR CO.

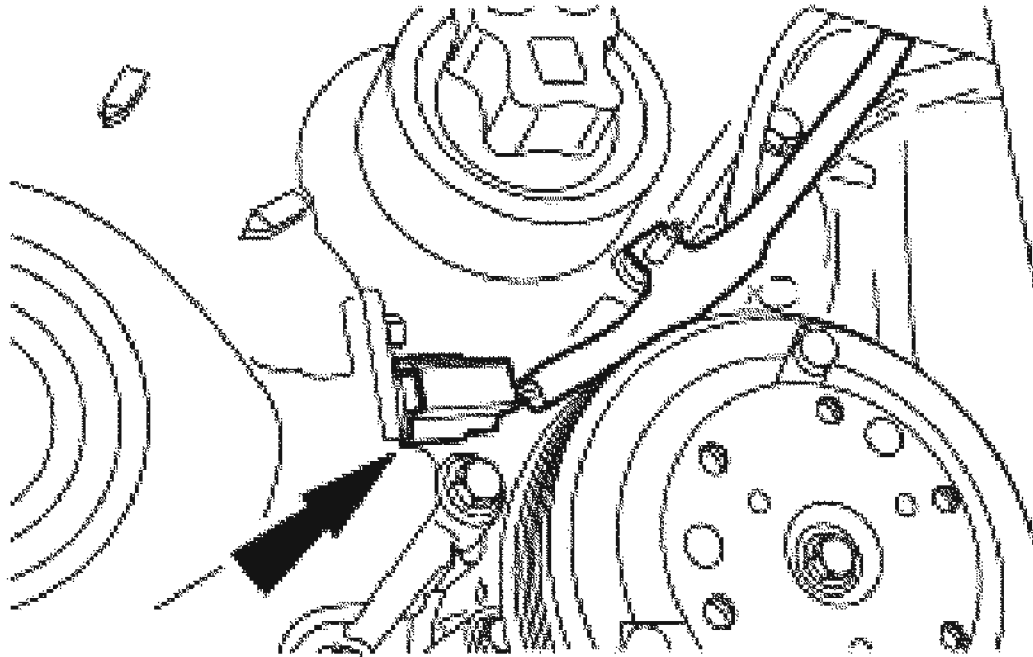
7. Remove the power steering pump. For additional information, refer to **POWER STEERING** .
8. Remove the bolt and remove the belt tensioner.



G02739207

**Fig. 34: Removing Power Steering Pump Bolt**  
Courtesy of FORD MOTOR CO.

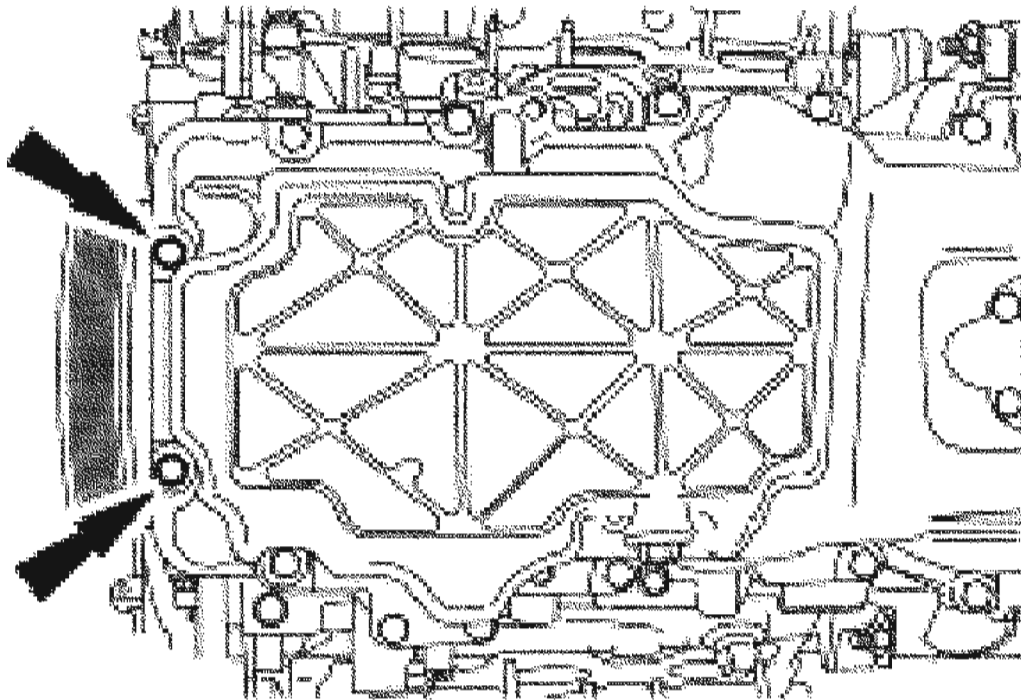
9. Remove the crankshaft front seal. For additional information, refer to **CRANKSHAFT FRONT OIL SEAL** .
10. Remove the crankshaft position (CKP) sensor.
  - Disconnect the electrical connector.
  - Remove the bolt and the sensor.



G02739208

**Fig. 35: Removing Crankshaft Position (CKP) Sensor**  
Courtesy of FORD MOTOR CO.

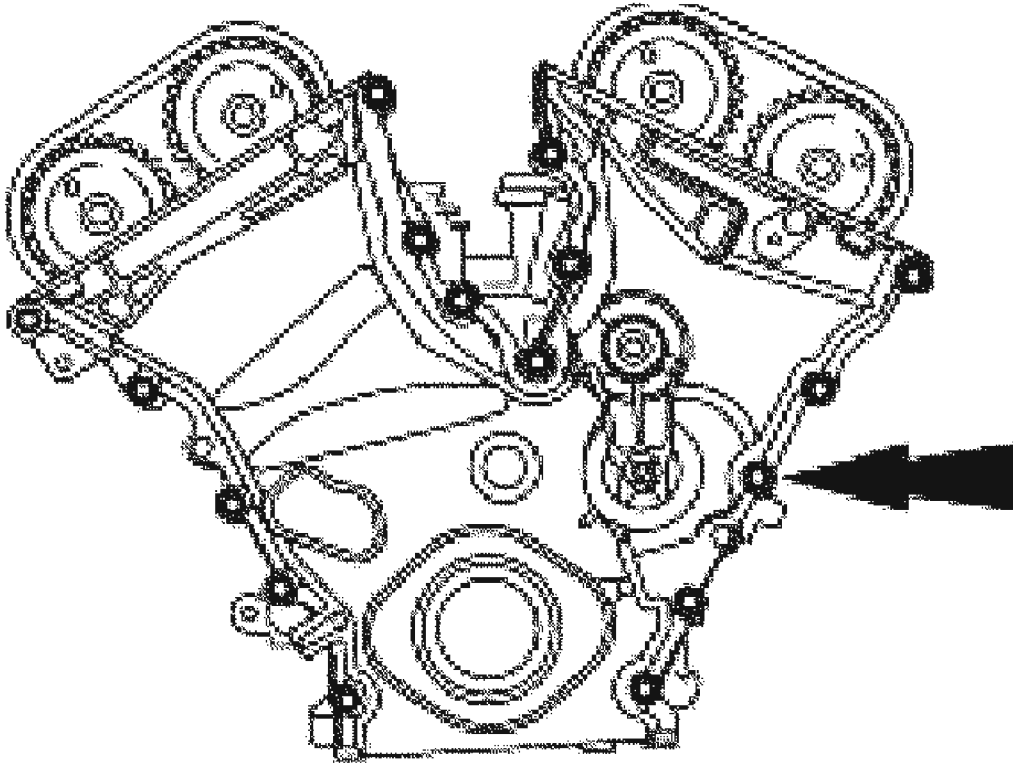
11. Remove the 2 oil pan-to-front cover bolts.



G02739209

**Fig. 36: Removing Oil Pan-To-Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

12. Remove the bolts, studs and the engine front cover.
  - Remove and discard the front cover gaskets.



G02739210

**Fig. 37: Removing Engine Front Cover**  
Courtesy of FORD MOTOR CO.

#### Installation

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

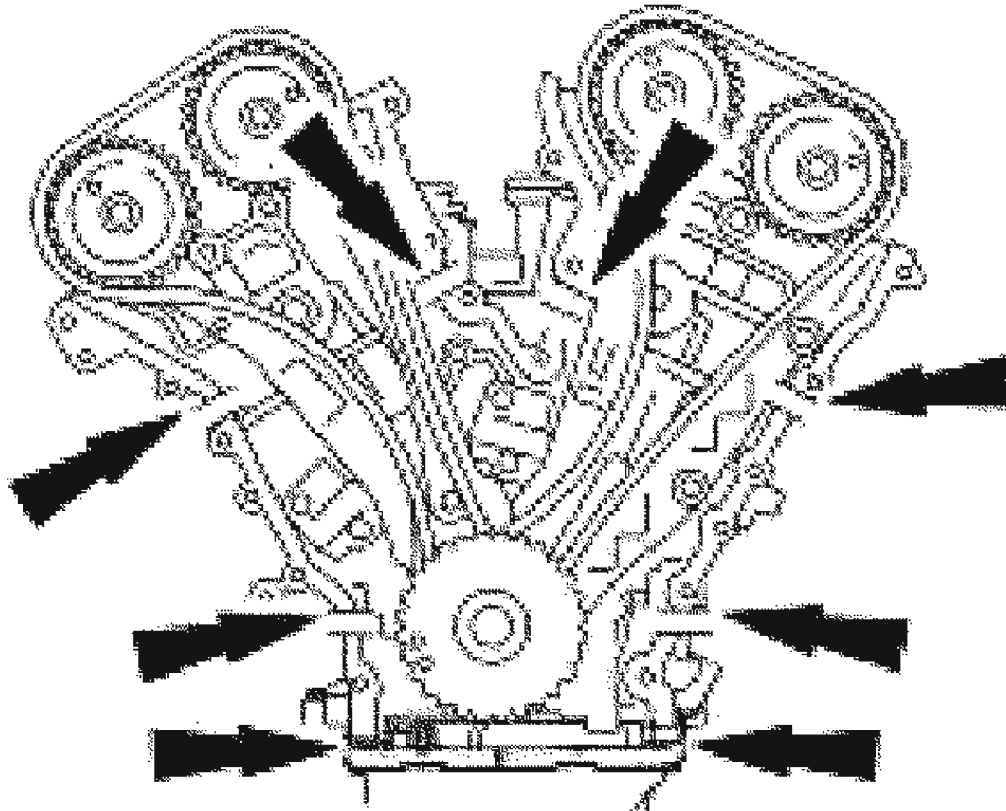
**CAUTION:** Do not damage the oil pan gasket while cleaning the sealant from the lower cylinder block-to-oil pan joint.

1. Clean all sealing surfaces with metal surface cleaner.
2. Install 3 new gaskets in the front cover.

**NOTE:** The engine front cover must be installed and the bolts



tightened within 4 minutes of applying the sealant.

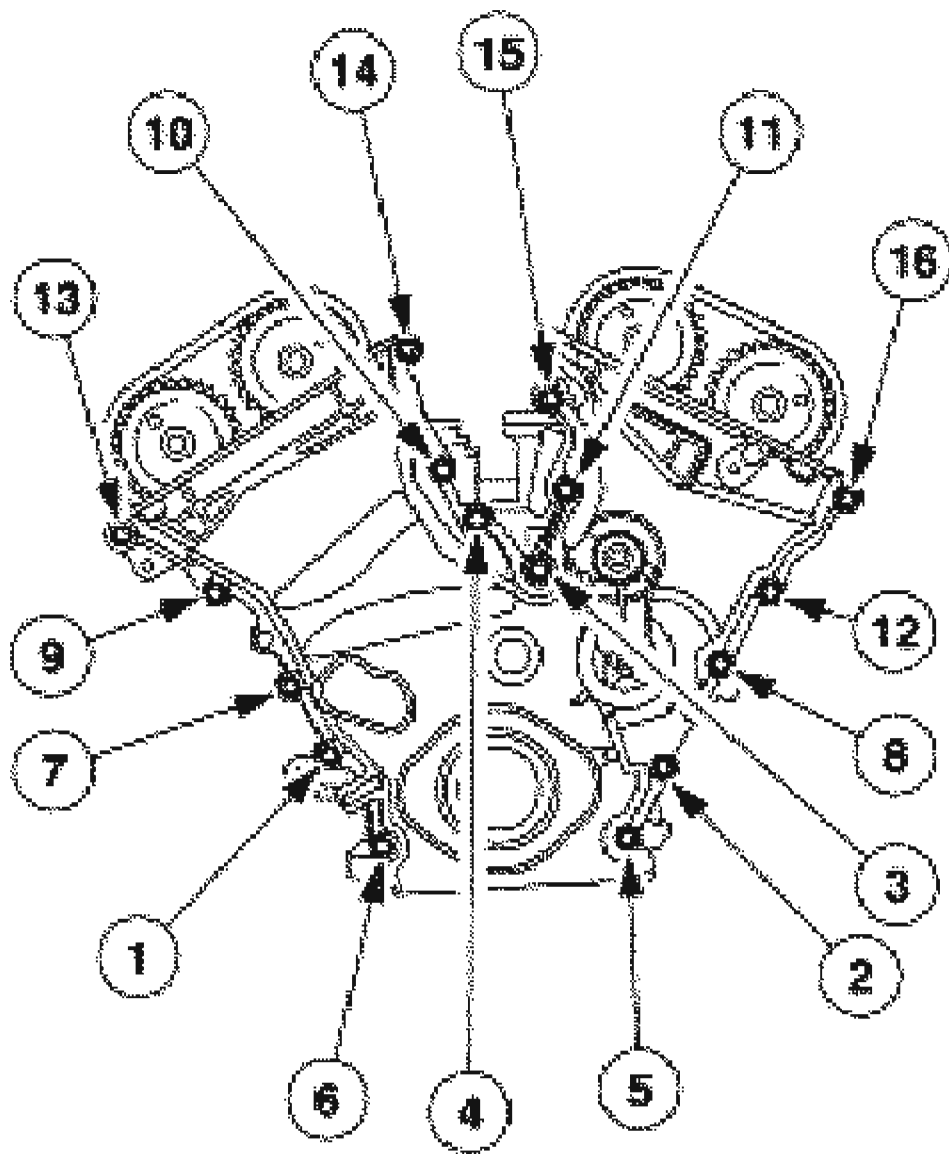


G02739211

**Fig. 38: Applying Silicone Gasket & Sealer**  
Courtesy of FORD MOTOR CO.

3. Apply a 6 mm (0.24 in) diameter dot of silicone gasket and sealer to the cylinder block, lower cylinder block, cylinder head and oil pan mating surfaces.

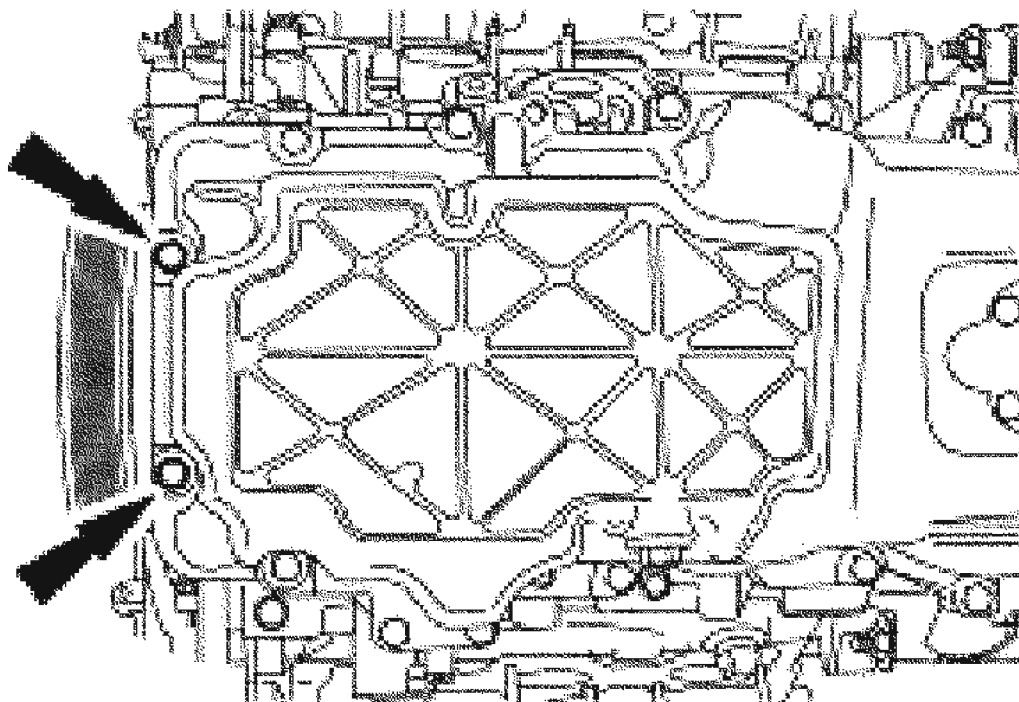
**NOTE:** Fasteners 1, 3, 4, 8, 10, 11, 14, 15 and 16 are studs.



G02739212

**Fig. 39: Identifying Front Cover Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

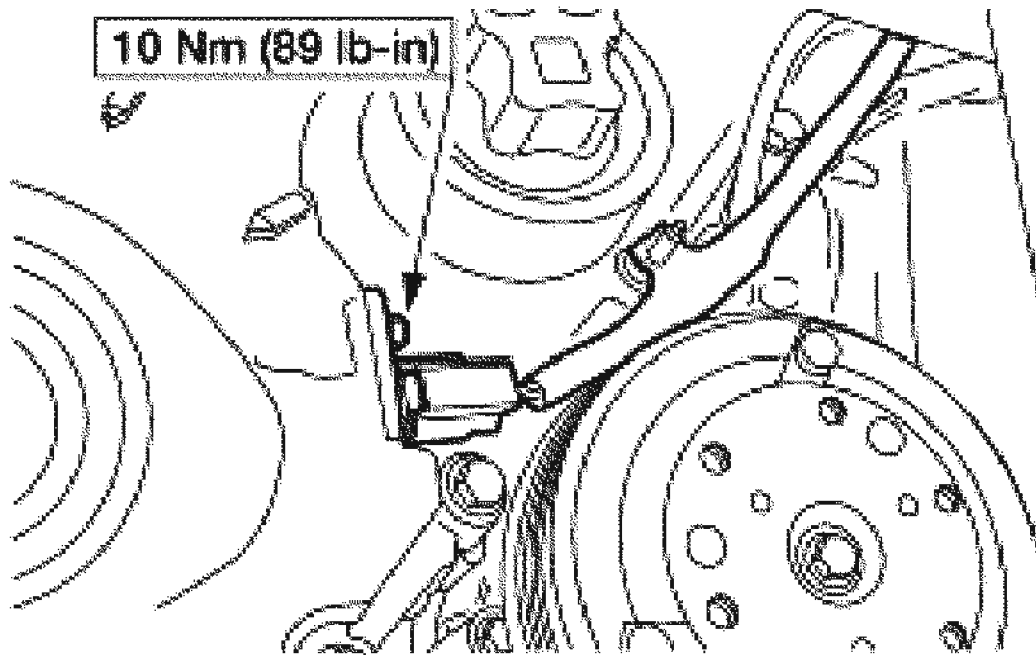
4. Position the cover and install the studs and bolts in the sequence shown.
5. Install the 2 oil pan-to-front cover bolts.
  - Tighten to 25 Nm (18 lb-ft).



G02739213

**Fig. 40: Installing Oil Pan-To-Front Cover Bolts**  
Courtesy of FORD MOTOR CO.

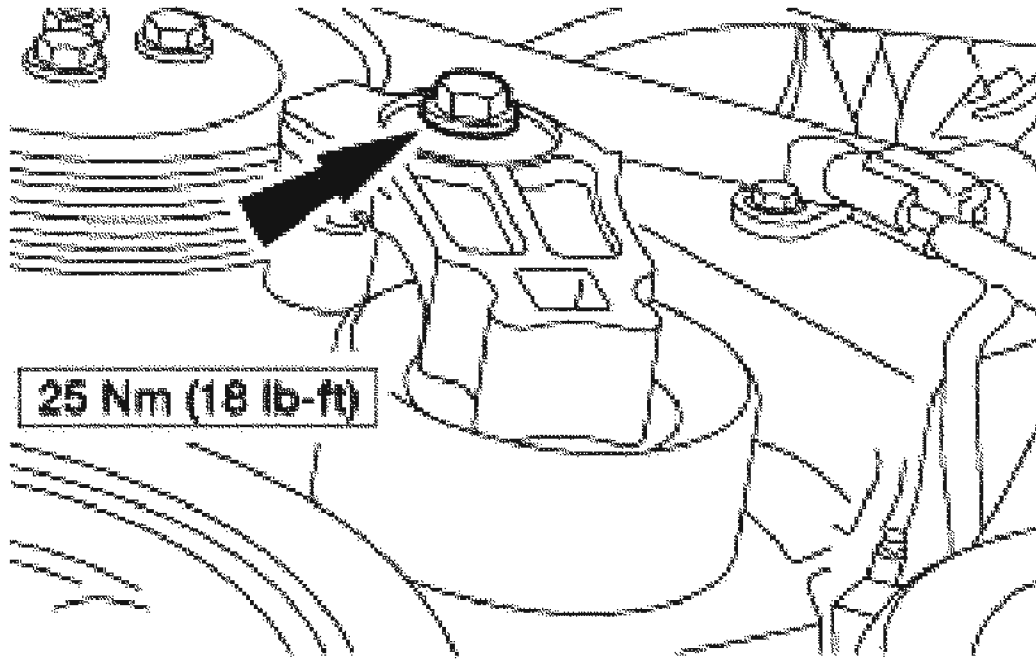
6. Remove the oil pan plug and drain the engine oil.
  - Install the plug and tighten to 26 Nm (19 lb-ft).
7. Install the (CKP) sensor and connect the electrical connector.



G02739214

**Fig. 41: Installing (CKP) Sensor**  
Courtesy of FORD MOTOR CO.

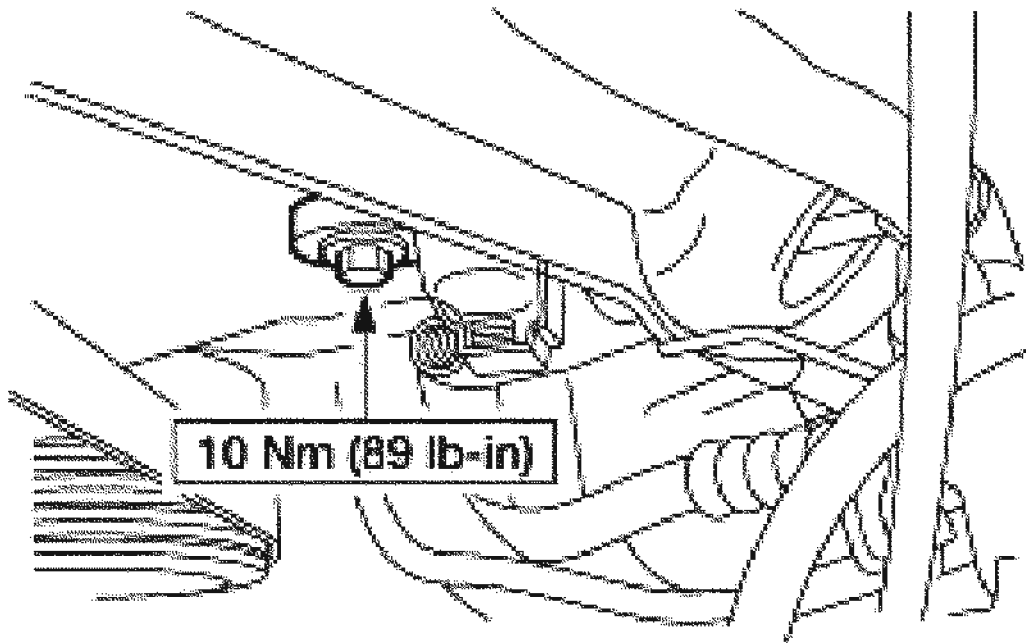
8. Install the crankshaft front seal. For additional information, refer to **CRANKSHAFT FRONT OIL SEAL** .
9. Install the tensioner and bolt.



G02739215

**Fig. 42: Identifying Tensioner Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

10. Install the CMP and the bolt.
  - Connect the electrical connector.



G02739216

**Fig. 43: Identifying CMP Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

11. Install the power steering pump. For additional information, refer to **POWER STEERING** .
12. Install the front engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS - FRONT, RH** .
13. Install the generator. For additional information, refer to **GENERATORS & REGULATORS** .
14. Install the RH and LH valve cover. For additional information, refer to **VALVE COVER RH** and **VALVE COVER LH** .
15. Fill the engine with clean engine oil.
16. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
17. Fill and bleed the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .

## VALVE COVER LH

### Material

## MATERIAL SPECIFICATION

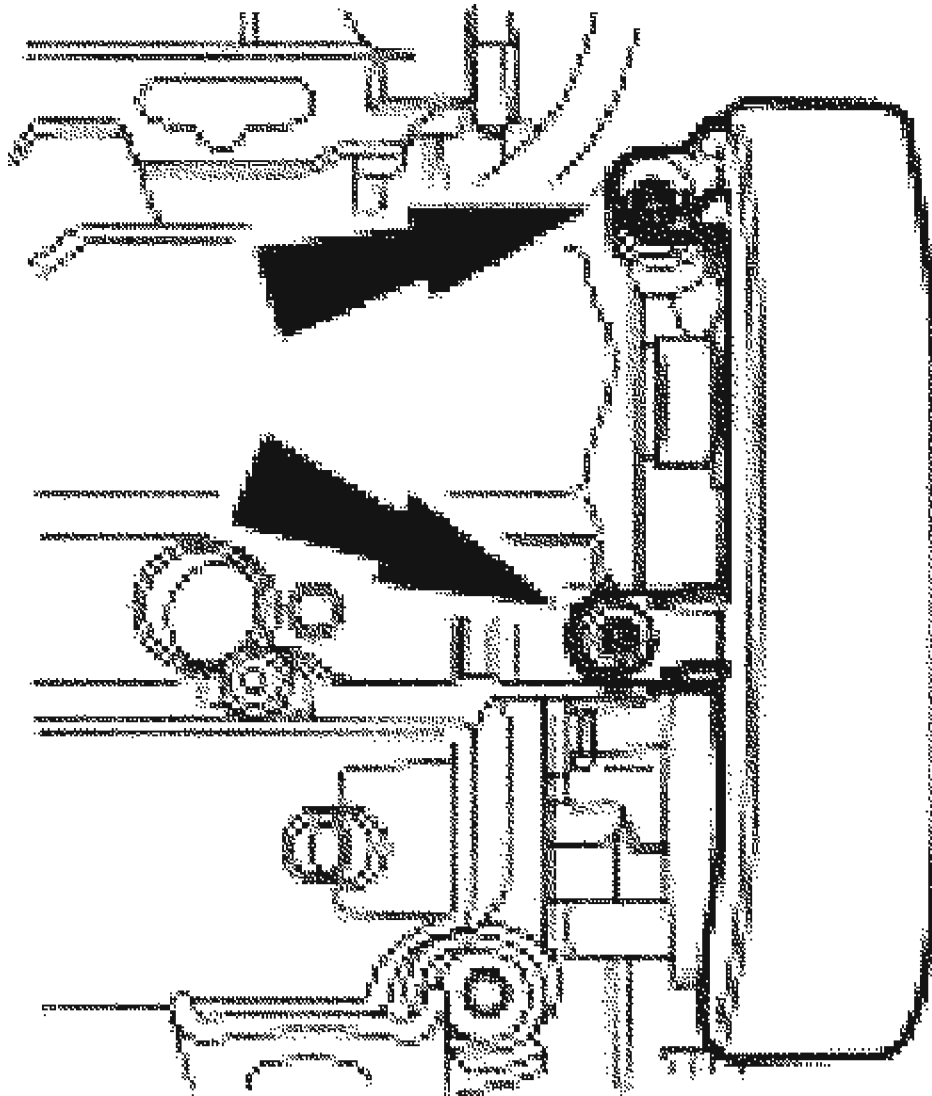
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A	ESE-M1C171-A
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the water pump belt cover.

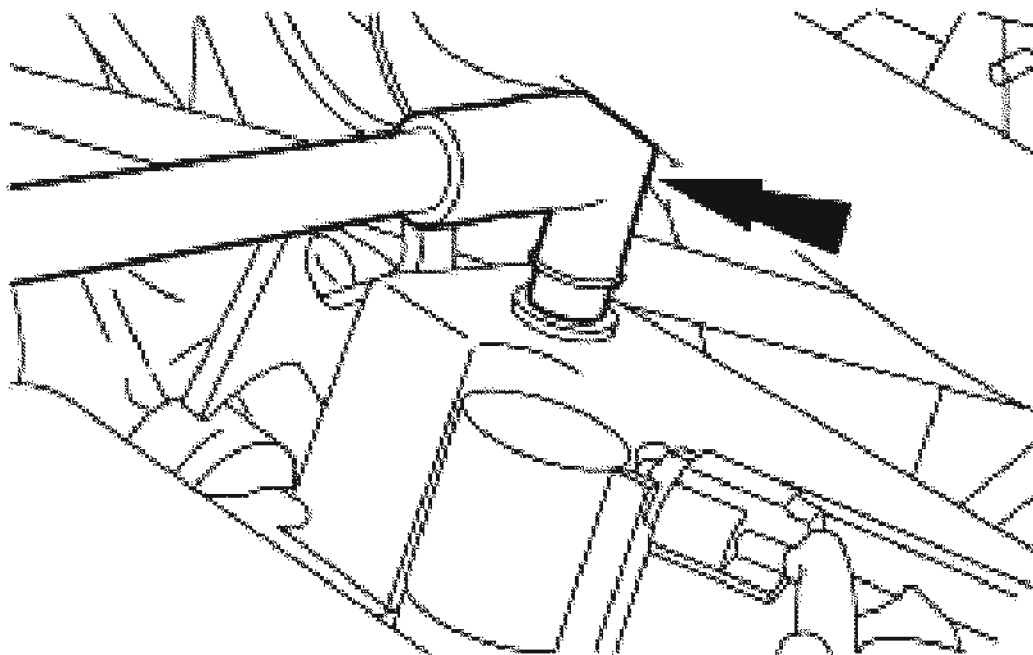


G02739217

**Fig. 44: Removing Water Pump Belt Cover**  
Courtesy of FORD MOTOR CO.

2. Disconnect the crankcase ventilation tube from the valve cover.

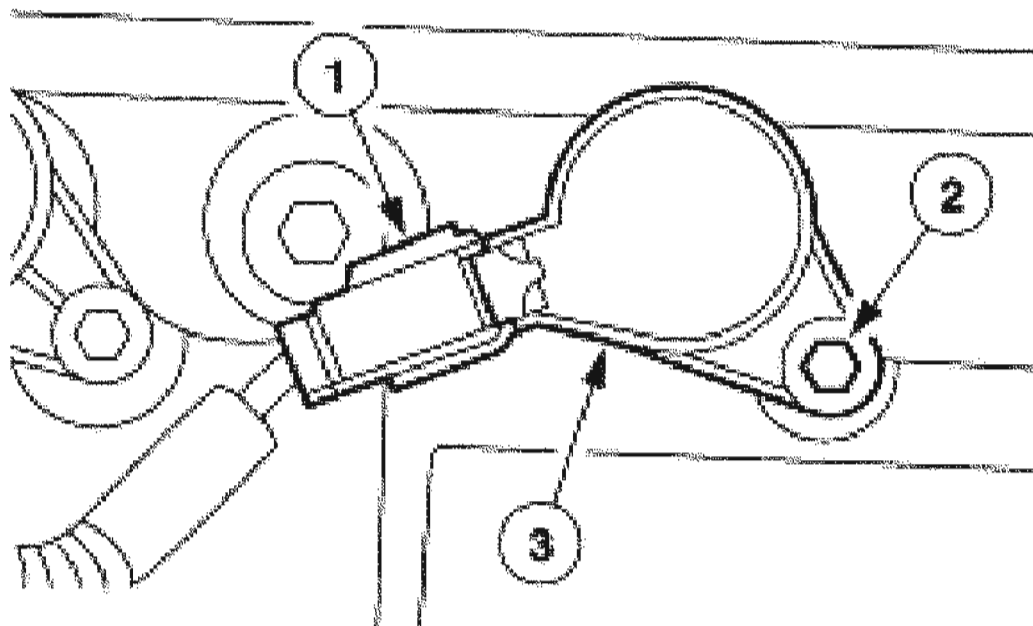




G02739218

**Fig. 45: Disconnecting Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

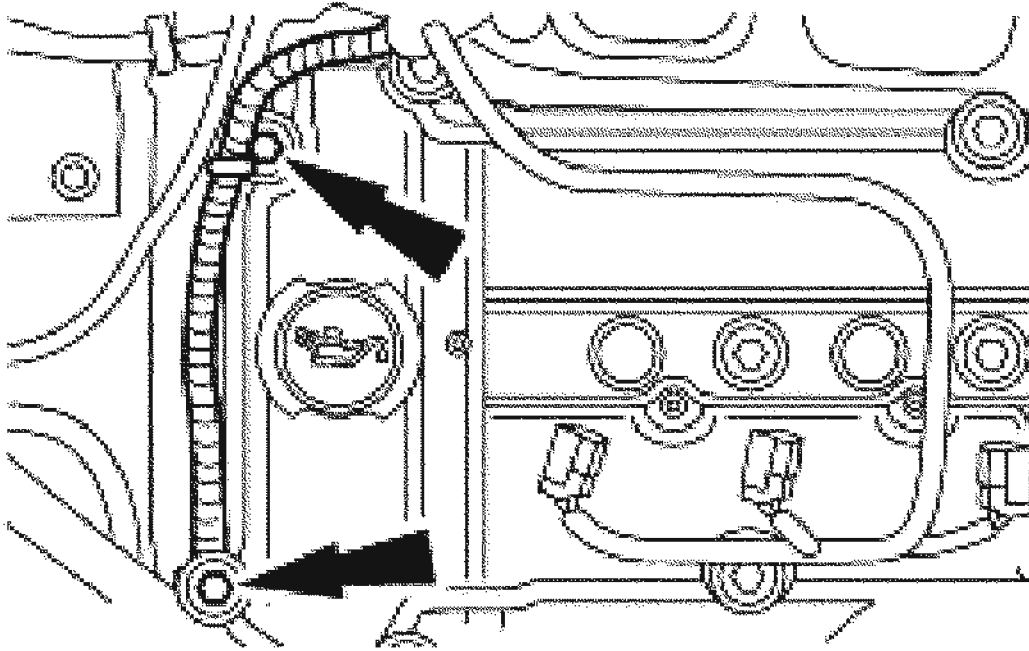
**CAUTION:** When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.



G02739219

**Fig. 46: Removing Three LH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

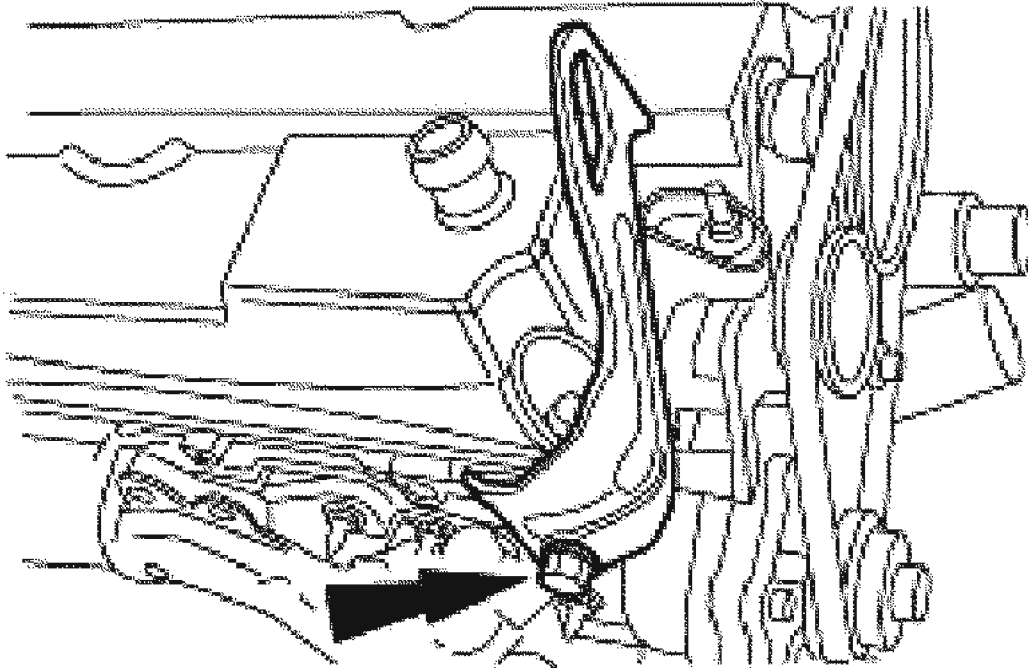
3. Remove the three LH coil-on-plugs.
  1. Disconnect the electrical connectors.
  2. Remove the bolts.
  3. Remove the coils.
4. Disconnect the wiring harness from the valve cover studs.



G02739220

**Fig. 47: Disconnecting Wiring Harness From Valve Cover Studs**  
Courtesy of FORD MOTOR CO.

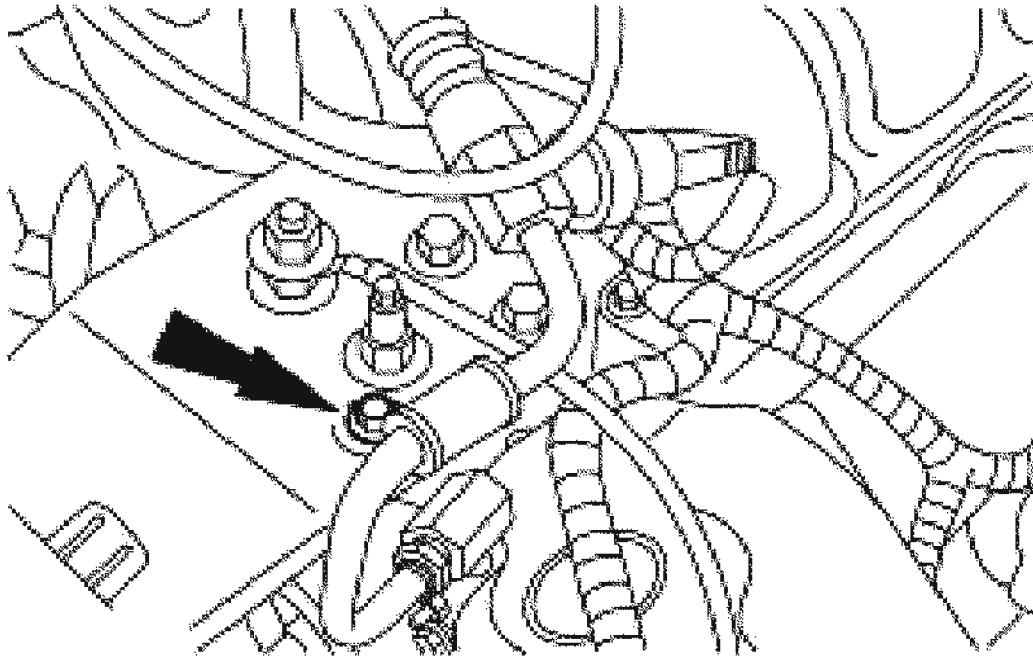
5. Remove the engine lift bracket.



G02739221

**Fig. 48: Removing Engine Lift Bracket**  
Courtesy of FORD MOTOR CO.

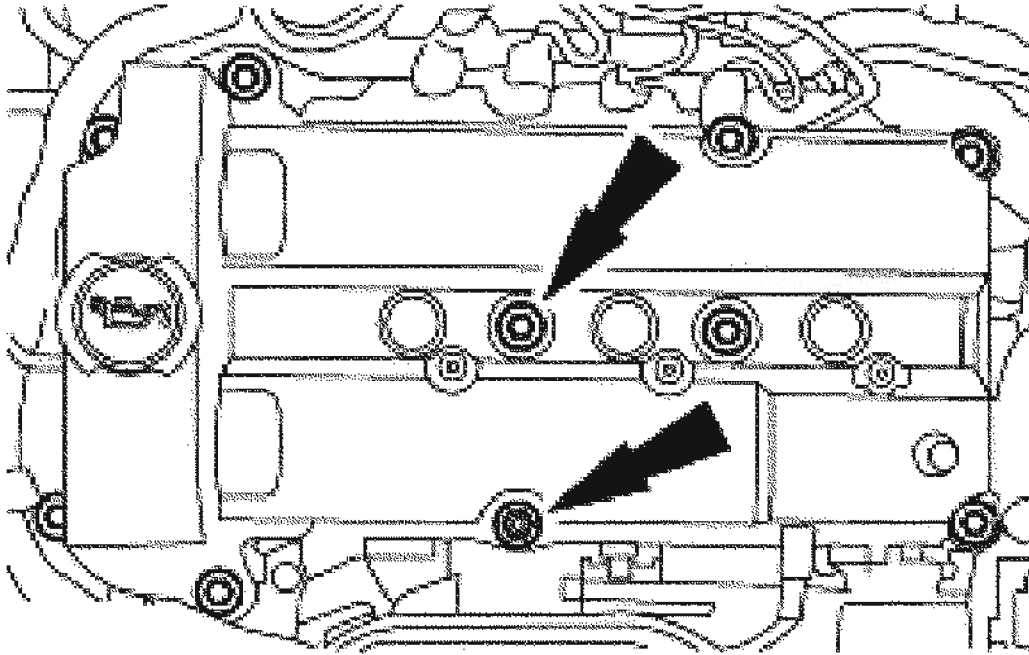
6. Position the power steering hose aside.
  - Remove the bolt.



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**Fig. 49: Locating Bolt**  
Courtesy of FORD MOTOR CO.

7. Remove the bolts, studs and the LH valve cover.
  - Remove and discard the gasket.



G02739223

**Fig. 50: Removing Bolts, Studs And LH Valve Cover**  
Courtesy of FORD MOTOR CO.

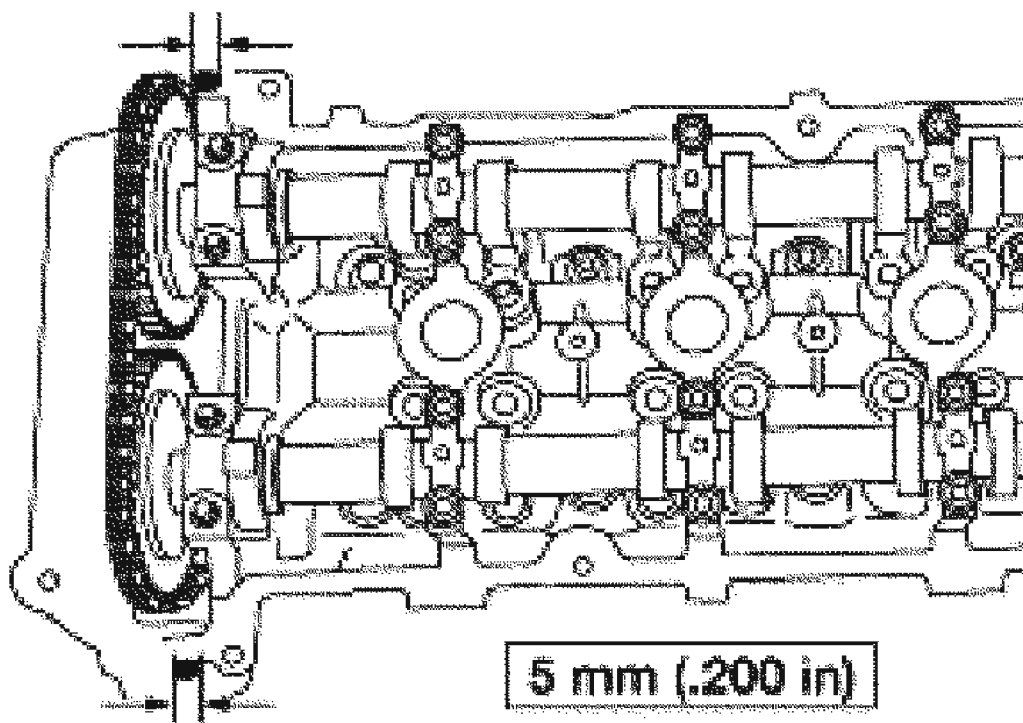
#### Installation

**NOTE:** Clean the valve cover sealing area before installing a new gasket.

1. Install a new gasket on the valve cover.

**NOTE:** Clean the head and the front cover sealing surfaces using metal surface cleaner before applying silicone gasket and sealant.

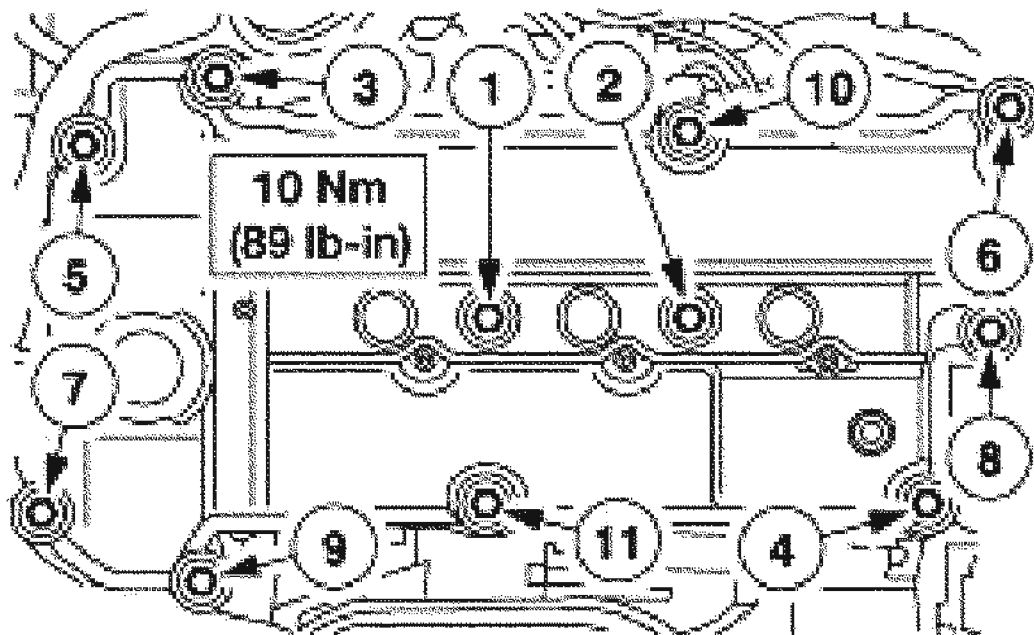
**NOTE:** The valve cover must be installed and the bolts tightened within four minutes of applying the sealant.



G02739224

**Fig. 51: Identifying Silicon Gasket Gap**  
Courtesy of FORD MOTOR CO.

2. Apply a 5 mm dot of silicone gasket sealant to the front cover to cylinder head joints.
3. Position the valve cover and install the studs and the bolts in the sequence shown.



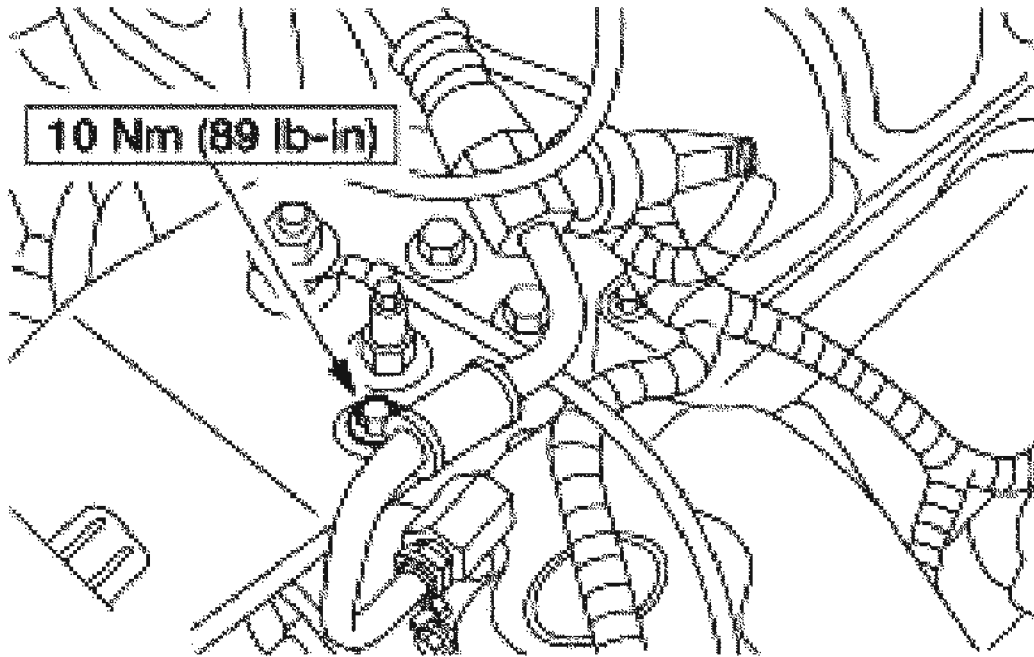
G02739225

**Fig. 52: Identifying Tightening Sequence & Torque Specification Of Valve Cover Studs & Bolts**

Courtesy of FORD MOTOR CO.

4. Position the power steering hose and install the bolt.

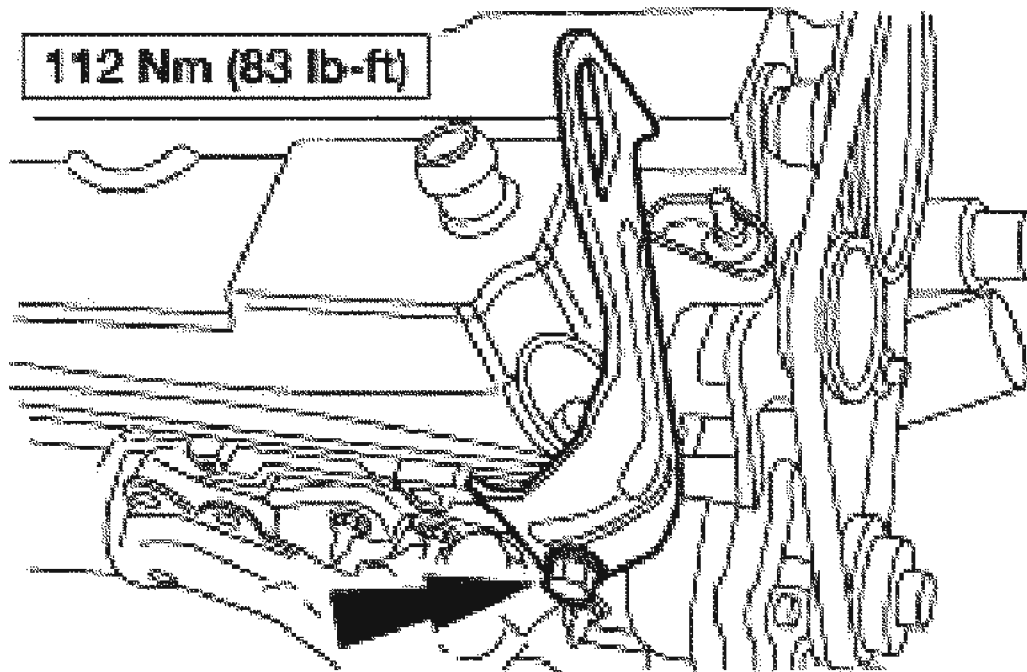




G02739226

**Fig. 53: Identifying Power Steering Hose Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

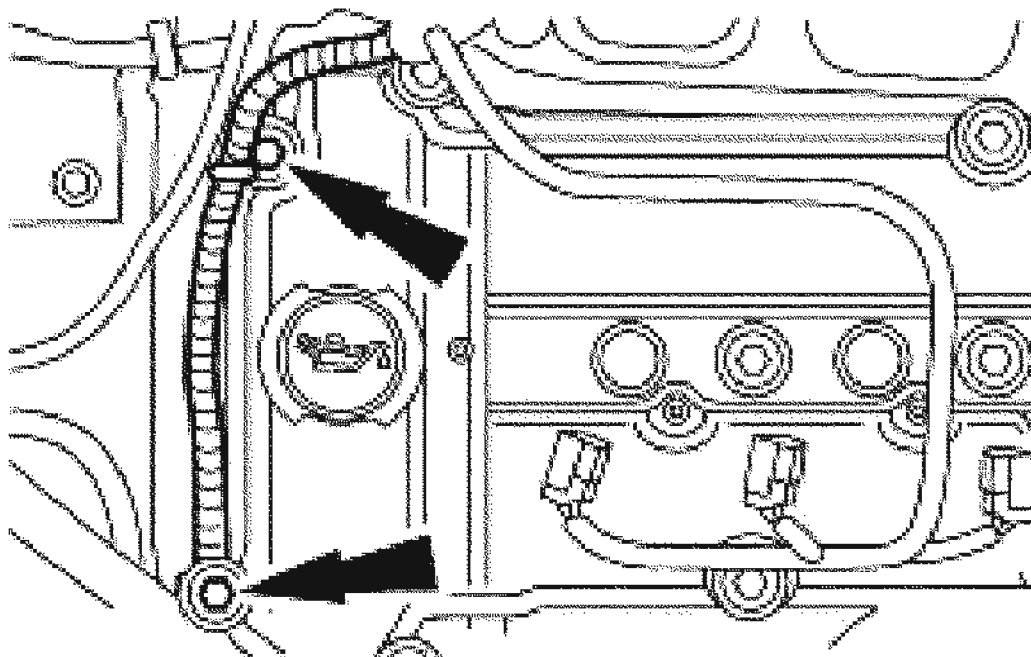
5. Position the engine lift bracket and install the bolt.



G02739227

**Fig. 54: Identifying Engine Lift Bracket Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

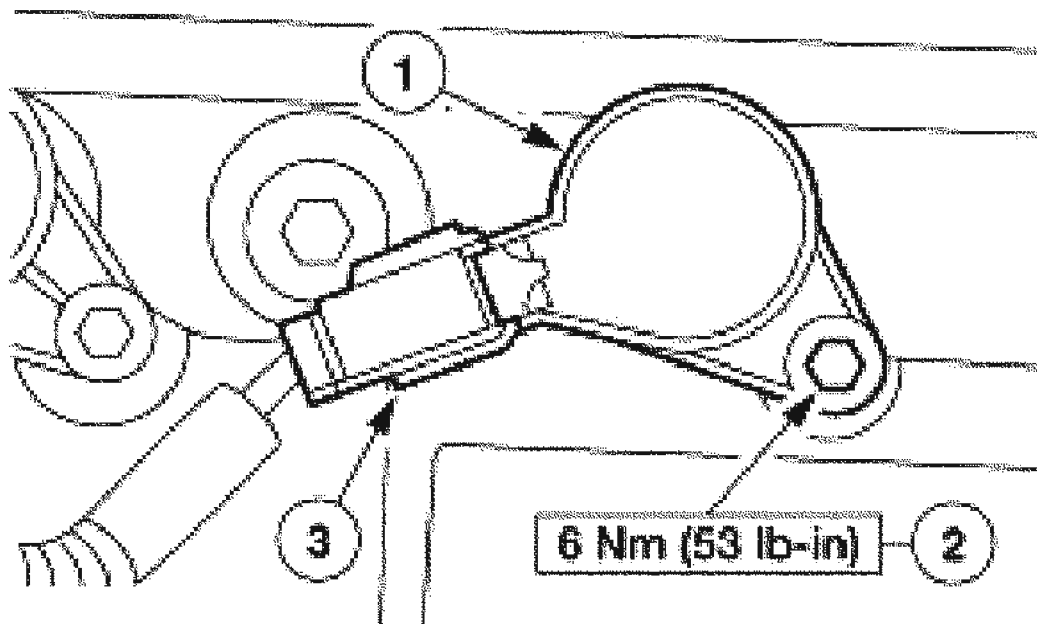
6. Connect the wiring harness to the valve cover studs.



G02739228

**Fig. 55: Connecting Wiring Harness**  
Courtesy of FORD MOTOR CO.

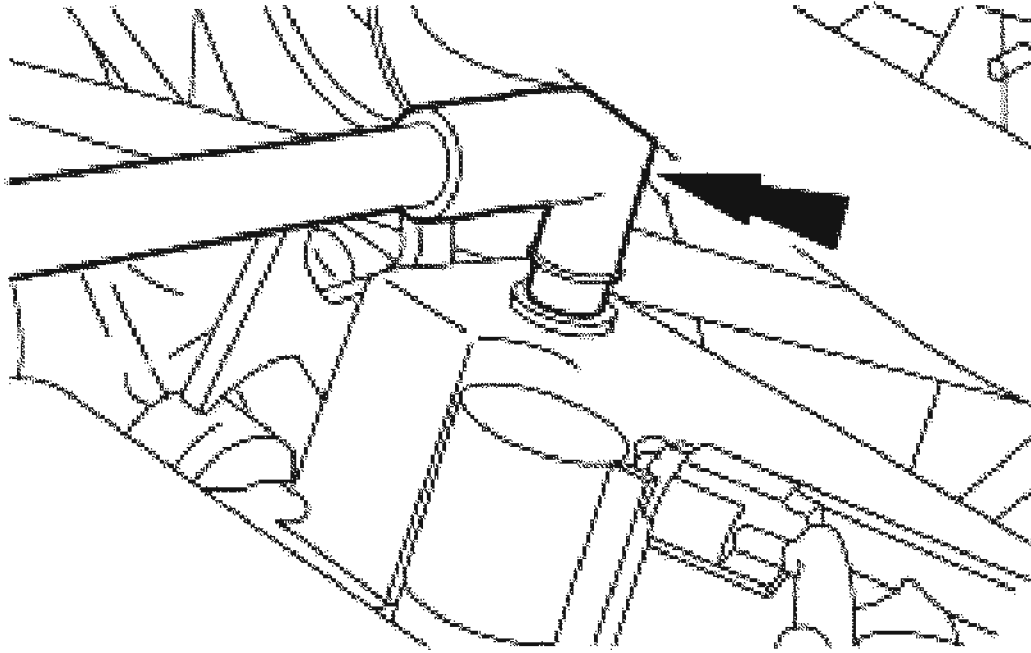
**NOTE:** Apply a light film of brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.



G02739229

**Fig. 56: Installing LH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

7. Install the three LH coil-on-plugs.
  1. Position the coils.
  2. Install the bolts.
  3. Connect the electrical connectors.
8. Connect the crankcase ventilation tube to the valve cover.



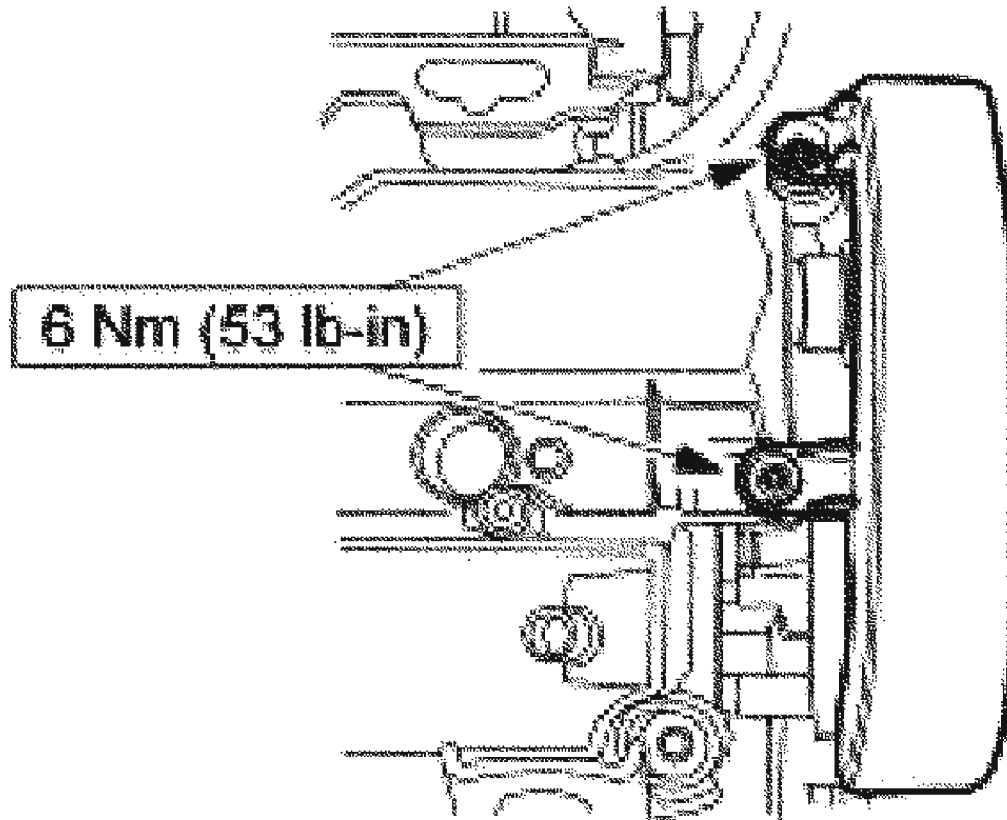
G02739230

**Fig. 57: Identifying Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

9. Install the water pump belt cover.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



**G02739231**

**Fig. 58: Identifying Water Pump Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

### VALVE COVER RH

#### Material

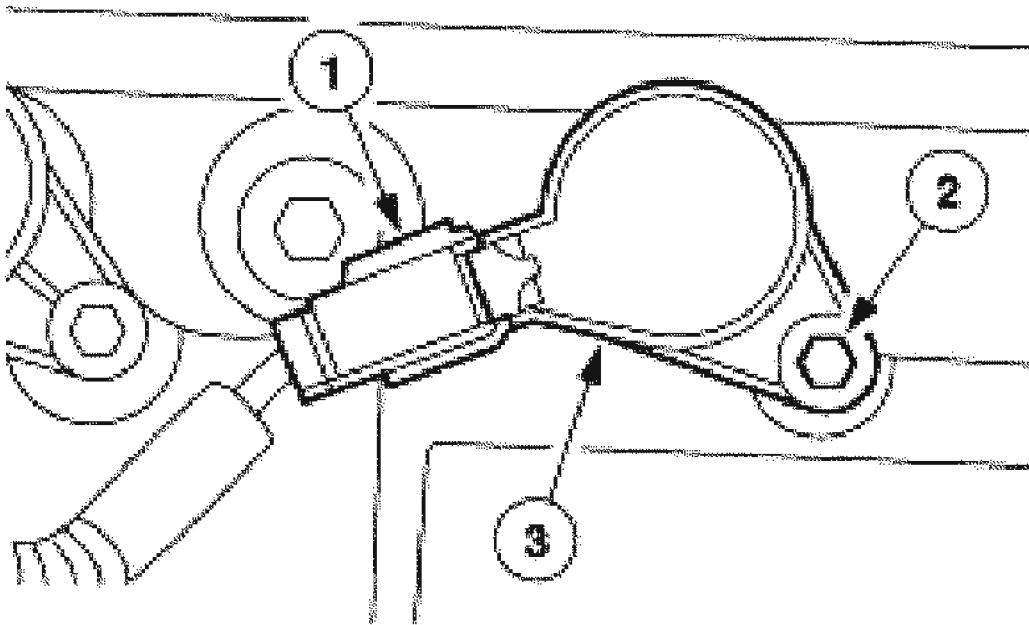
#### MATERIAL SPECIFICATION

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A ESE-M1C171-A	ESC-M1C171-A
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4

#### Removal

1. Remove the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .

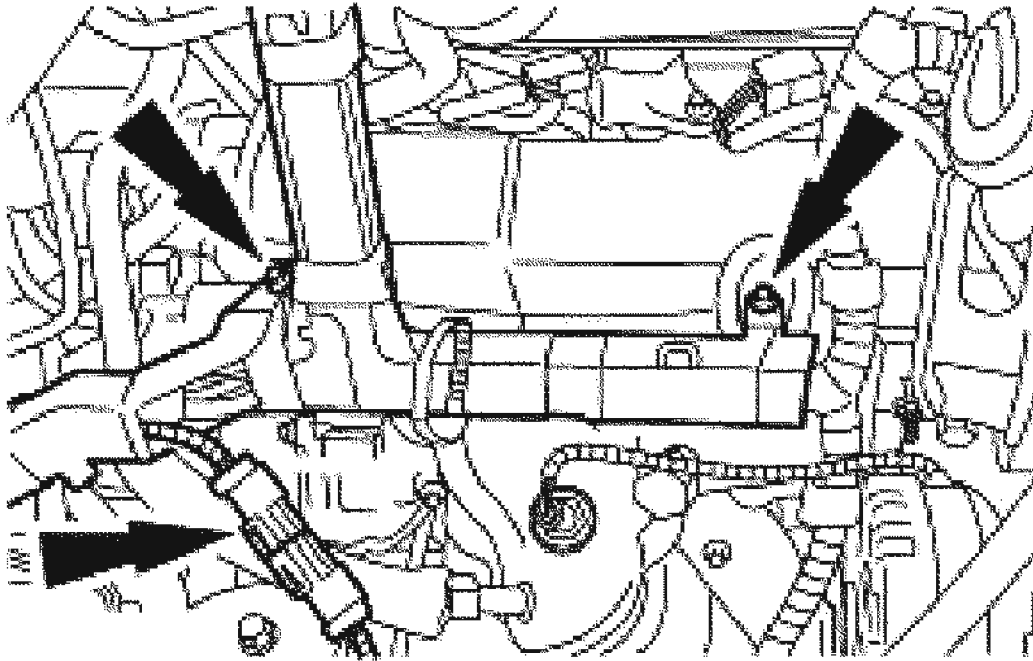
**CAUTION:** When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.



G02739232

**Fig. 59: Removing RH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

2. Remove the three RH coil-on-plugs.
  1. Disconnect the electrical connectors.
  2. Remove the bolts.
  3. Remove the coils.
3. Remove the wiring harness nuts and disconnect the oxygen sensor electrical connectors.

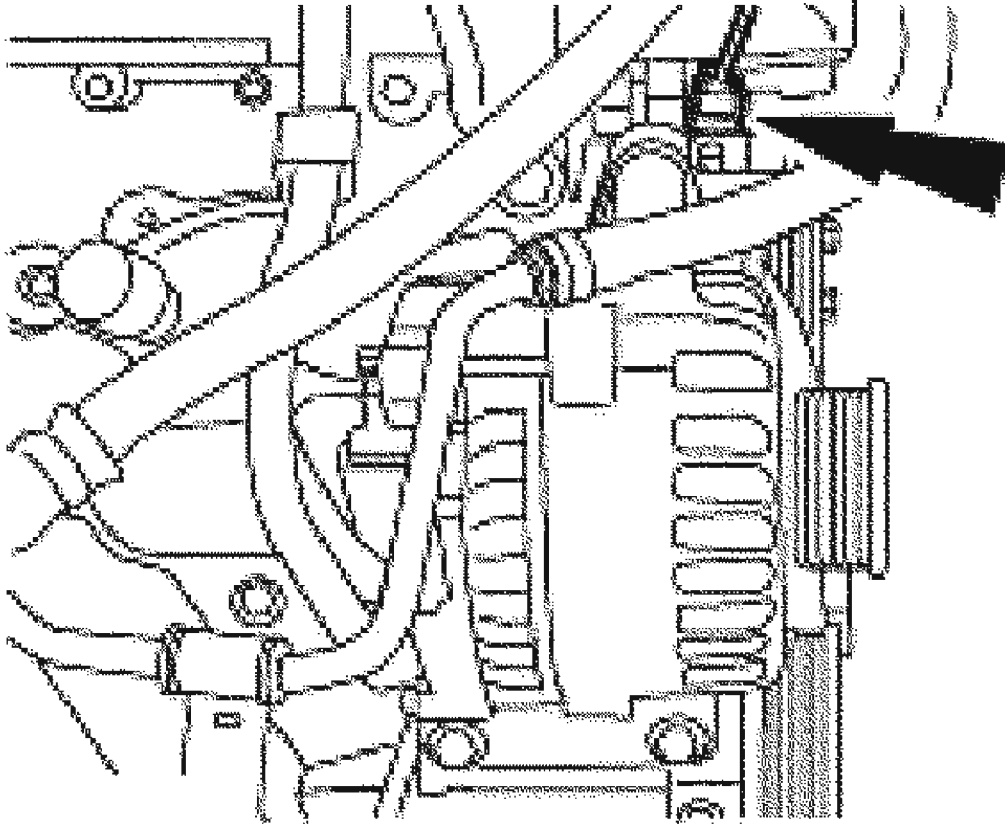


G02739233

**Fig. 60: Removing Wiring Harness Nuts**  
Courtesy of FORD MOTOR CO.

4. Remove the radio ignition interference capacitor.

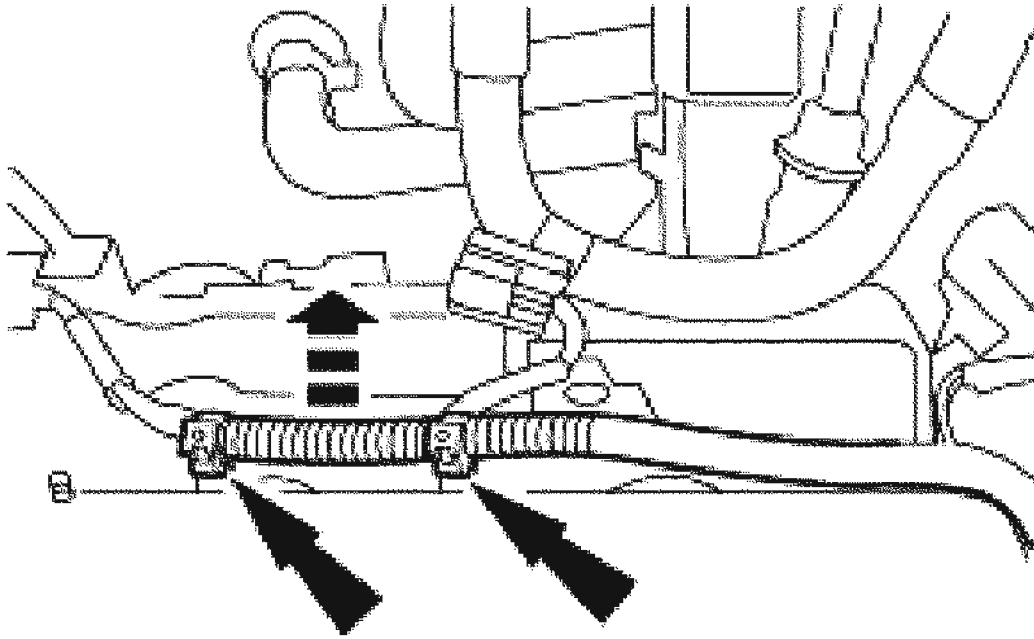




**G02739234**

**Fig. 61: Removing Radio Ignition Interference Capacitor**  
Courtesy of FORD MOTOR CO.

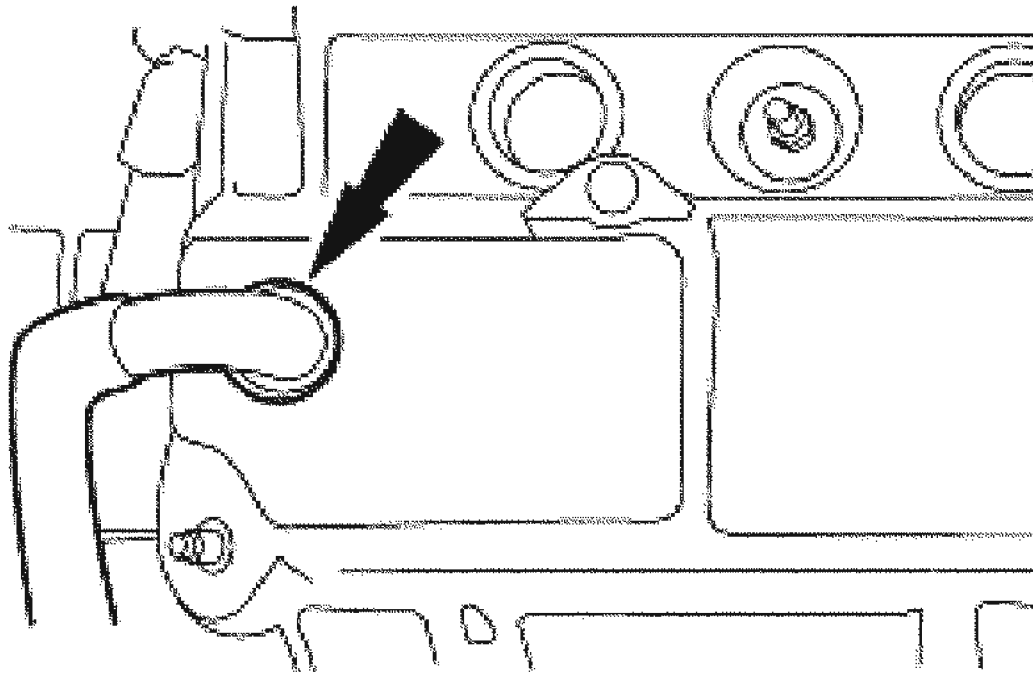
5. Separate the harness from the center locating pins and position aside.



G02739235

**Fig. 62: Separating Harness From Center Locating Pins**  
Courtesy of FORD MOTOR CO.

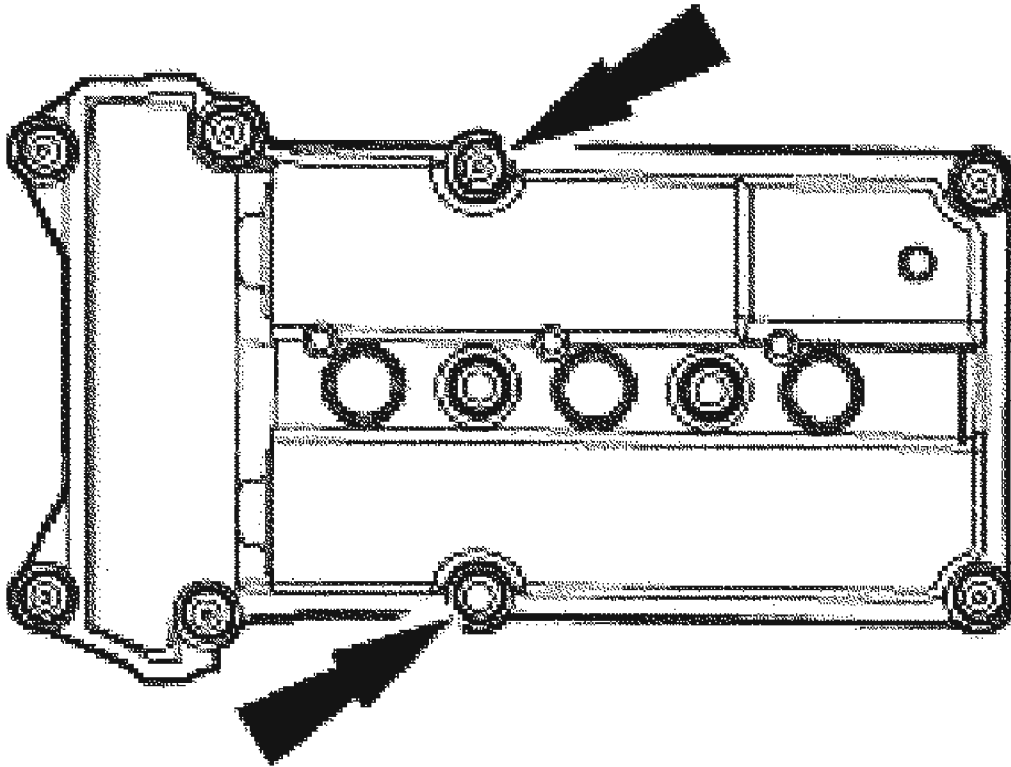
6. Disconnect the crankcase ventilation tube from the valve cover.



G02739236

**Fig. 63: Disconnecting Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

7. Remove the bolts, studs and the RH valve cover.
  - Remove and discard the gasket.



G02739237

**Fig. 64: Removing Bolts, Studs And RH Valve Cover**  
Courtesy of FORD MOTOR CO.

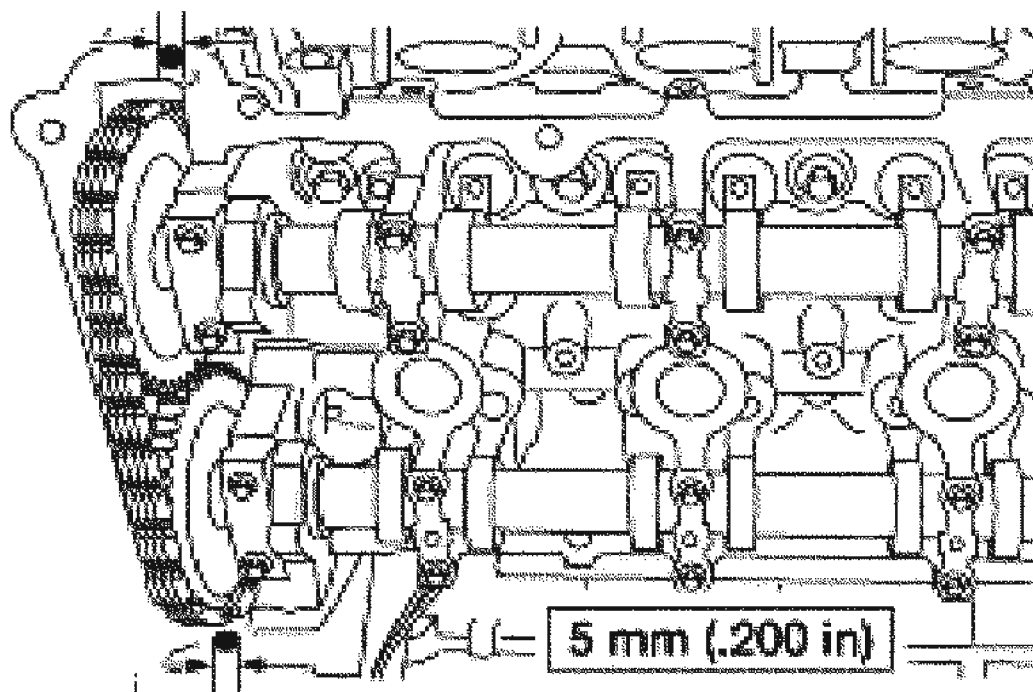
#### Installation

**NOTE:** Clean the valve cover sealing area before installing a new gasket.

1. Install a new valve cover gasket.

**NOTE:** Clean the head and front cover sealing surfaces using metal surface cleaner before applying silicone gasket and sealant.

**NOTE:** The valve cover must be installed and the bolts tightened within four minutes of applying the sealant.

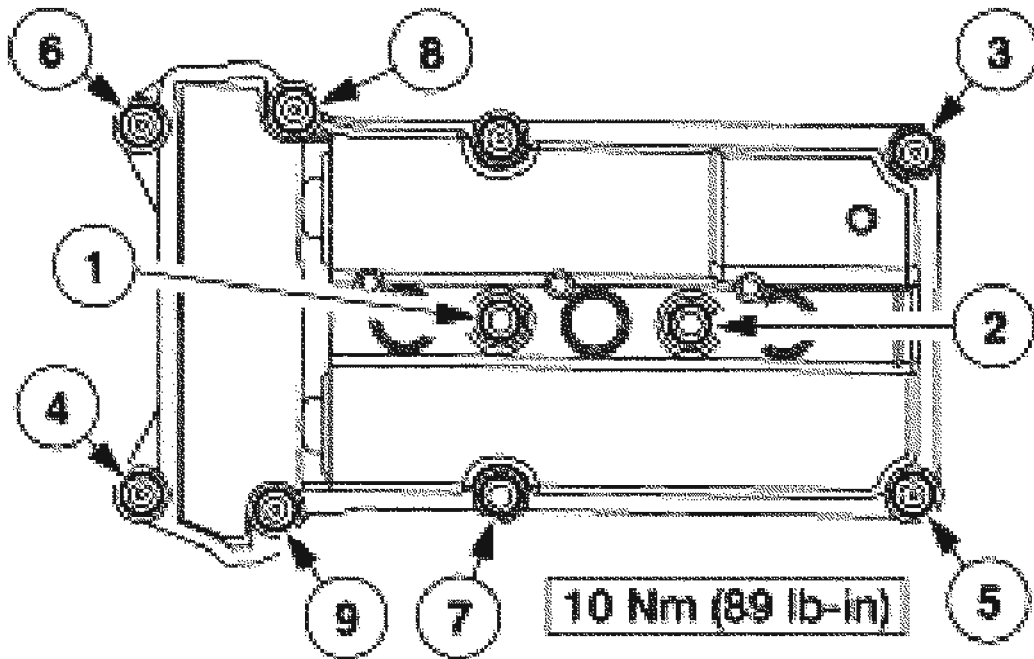


G02739238

**Fig. 65: Applying Silicone Gasket Sealant To Front Cover To Cylinder Head Joints**

Courtesy of FORD MOTOR CO.

2. Apply a 5 mm dot of silicone gasket sealant to the front cover to cylinder head joints.
3. Position the valve cover and install the bolt and the studs in the sequence shown.

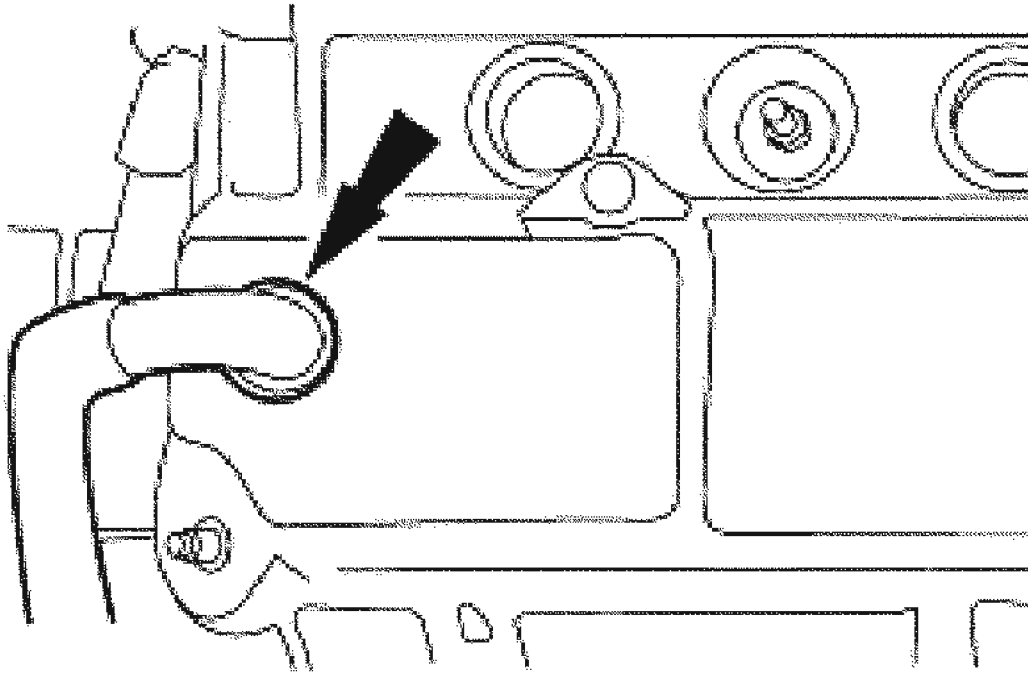


G02739239

**Fig. 66: Identifying Tightening Sequence & Torque Specification Of Valve Cover Bolt & Studs**

**Courtesy of FORD MOTOR CO.**

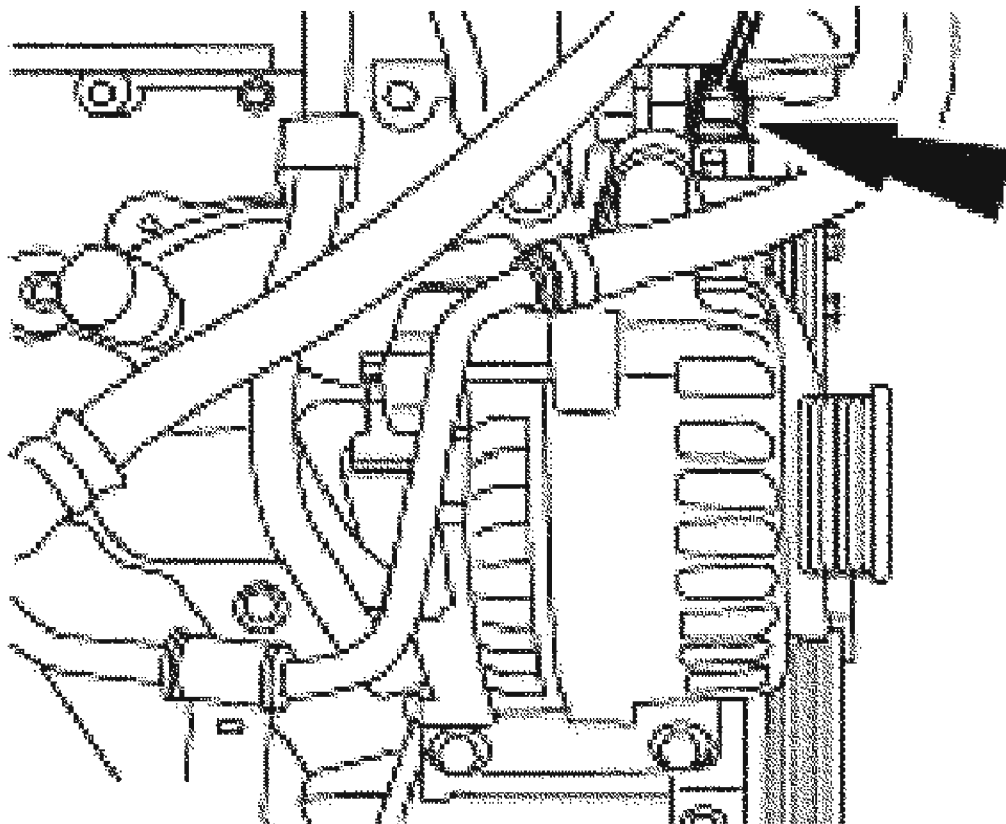
4. Connect the crankcase ventilation tube to the valve cover.



G02739240

**Fig. 67: Connecting Crankcase Ventilation Tube**  
Courtesy of FORD MOTOR CO.

5. Connect the radio ignition interference capacitor.

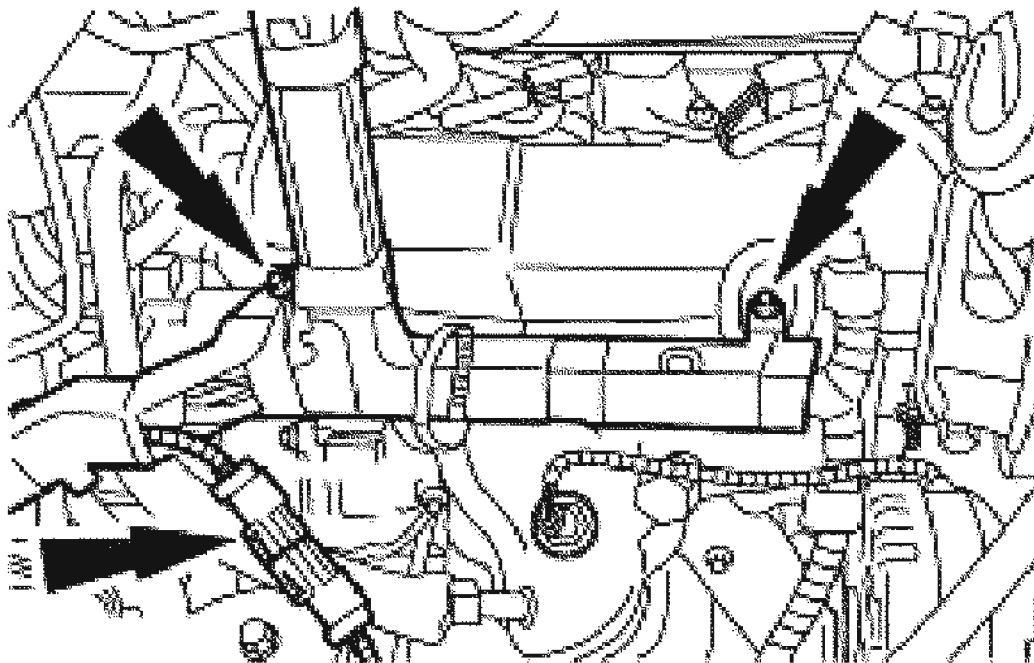


**G02739241**

**Fig. 68: Connecting Radio Ignition Interference Capacitor**  
Courtesy of FORD MOTOR CO.

6. Connect the O2 sensor electrical connectors and wiring harness to the RH valve cover stud.



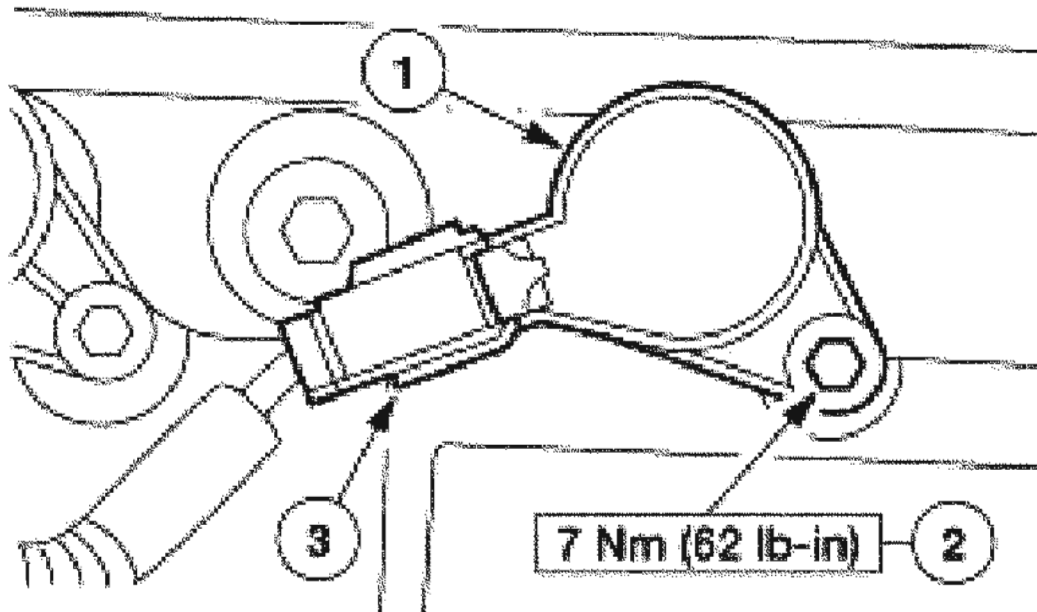


G02739242

**Fig. 69: Connecting O2 Sensor Electrical Connectors And Wiring Harness To RH Valve Cover Stud**

Courtesy of FORD MOTOR CO.

**NOTE:** Apply a light film of brake caliper and grease compound to the interior of the spark plug boot prior to installation.



G02739243







**Fig. 70: Identifying RH Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

7. Install the three RH coil-on-plugs.
  1. Position the coils.
  2. Install the bolts.
  3. Connect the electrical connectors.
8. Install the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD** .

**CAMSHAFTS LH**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Service Set, Water Pump Pulley 303-S455 (T94P-6312-AH)
	Remover, Crankshaft Vibration Damper 303-009 (T58P-6316-D)
	Remover, Oil Seal 303-409 (T92C-6700-CH)
	Installer, Camshaft Oil Seal 303-464 (T94P-6256-BH)
	Protector, Camshaft Oil Seal 303-463 (T94P-6256-AH)
	Installer, Power Steering Pump Pulley 211-185 (T91P-3A733-A)

G0273B244

**Fig. 71: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

Material

**MATERIAL SPECIFICATION**

## 2004 Ford Escape

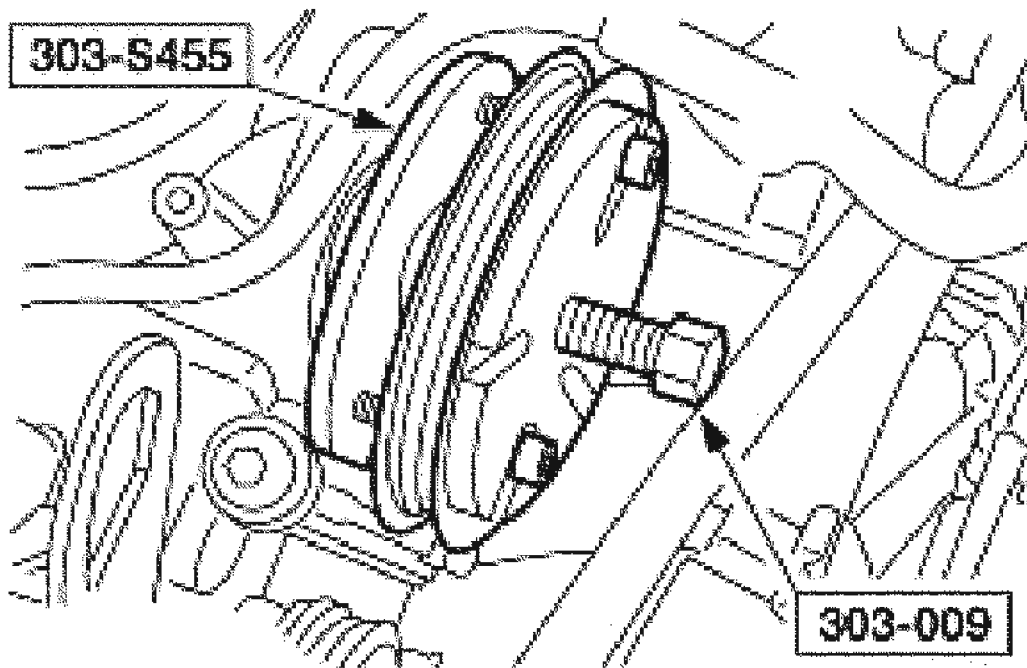
2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the water pump belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. The service pulley is pressed on flush to the end of the camshaft.

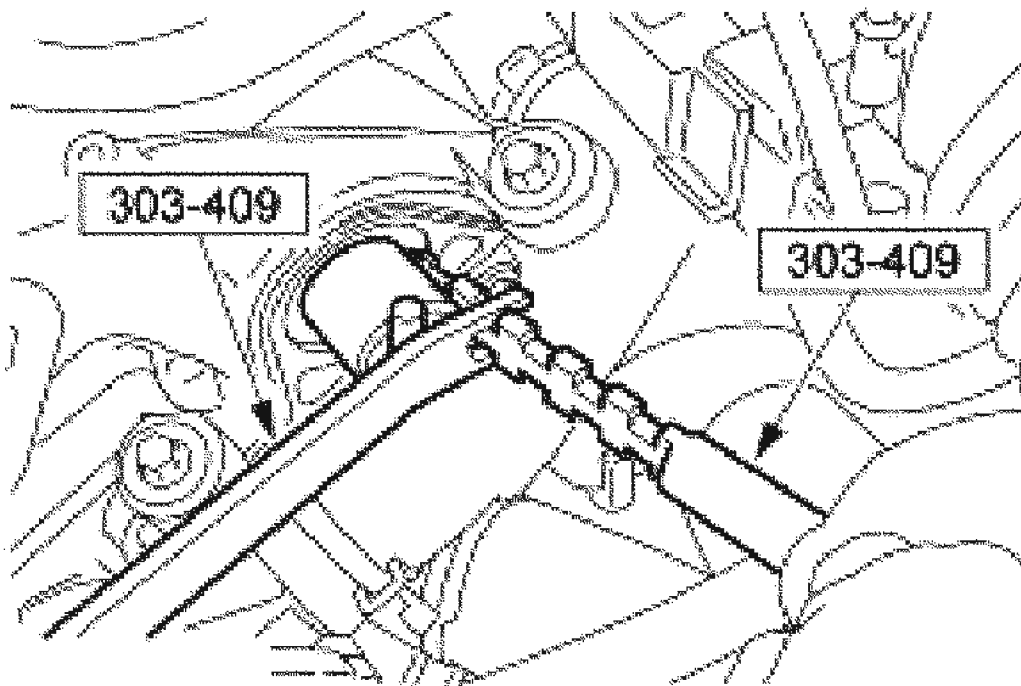


**Fig. 72: Removing Water Pump Drive Pulley Using Special Tool**  
Courtesy of FORD MOTOR CO.

2. Using the special tools, remove the water pump drive pulley and discard.
3. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

**NOTE:** To make sure of correct sealing, do not scratch the

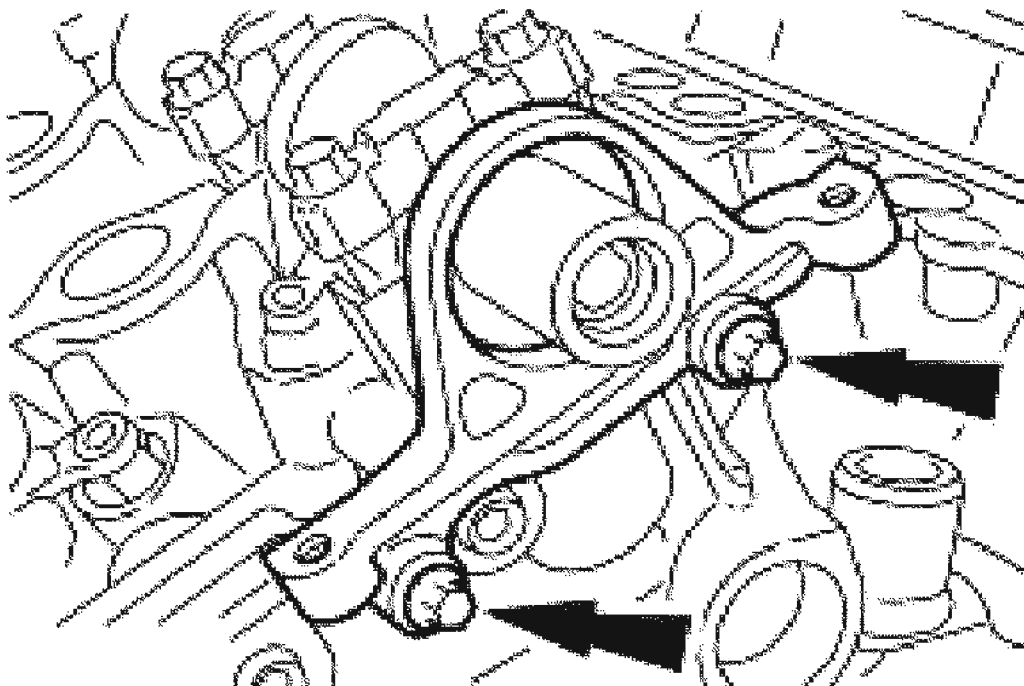
camshaft.



G02739246

**Fig. 73: Removing Camshaft Oil Seal Using Special Tool**  
Courtesy of FORD MOTOR CO.

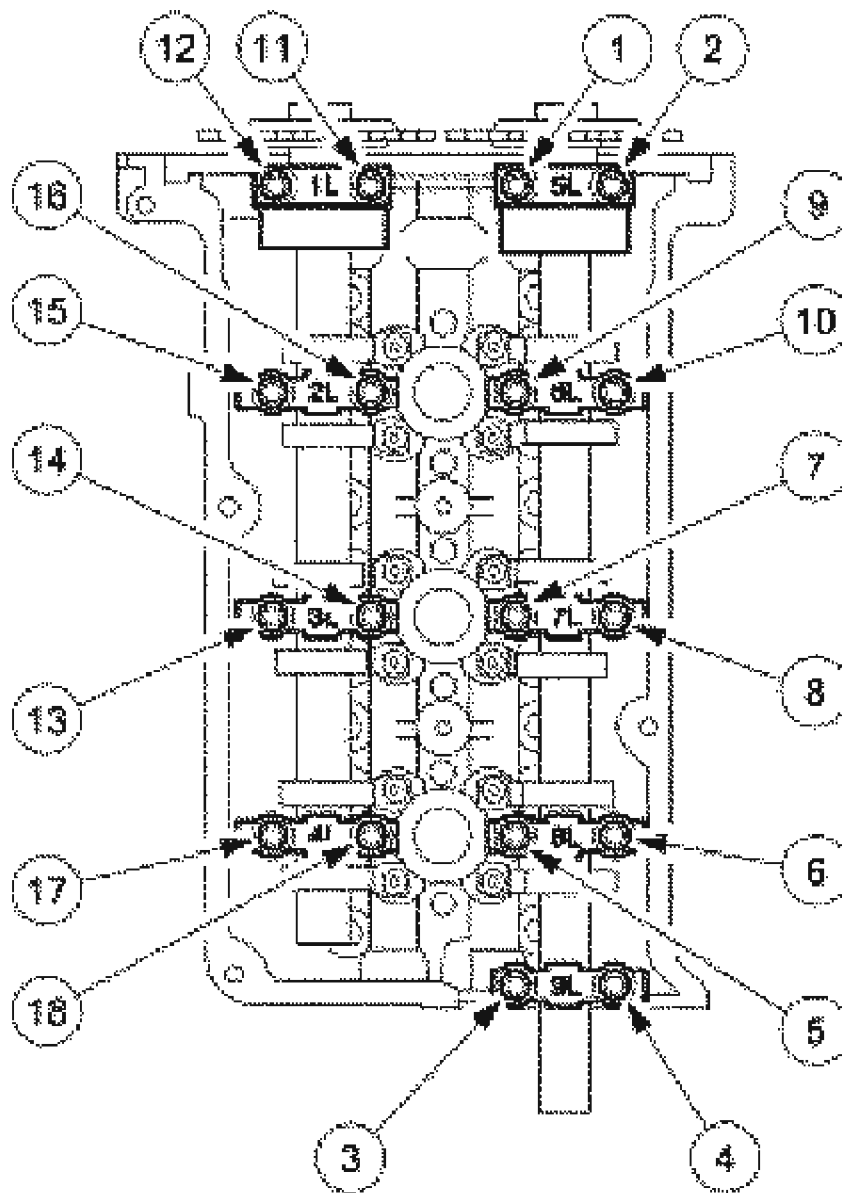
4. Using the special tools, remove the camshaft oil seal and discard.
5. Remove the bolts, the camshaft oil seal retainer and discard the press-in-place gasket.



G02739247

**Fig. 74: Removing Camshaft Oil Seal Retainer**  
Courtesy of FORD MOTOR CO.

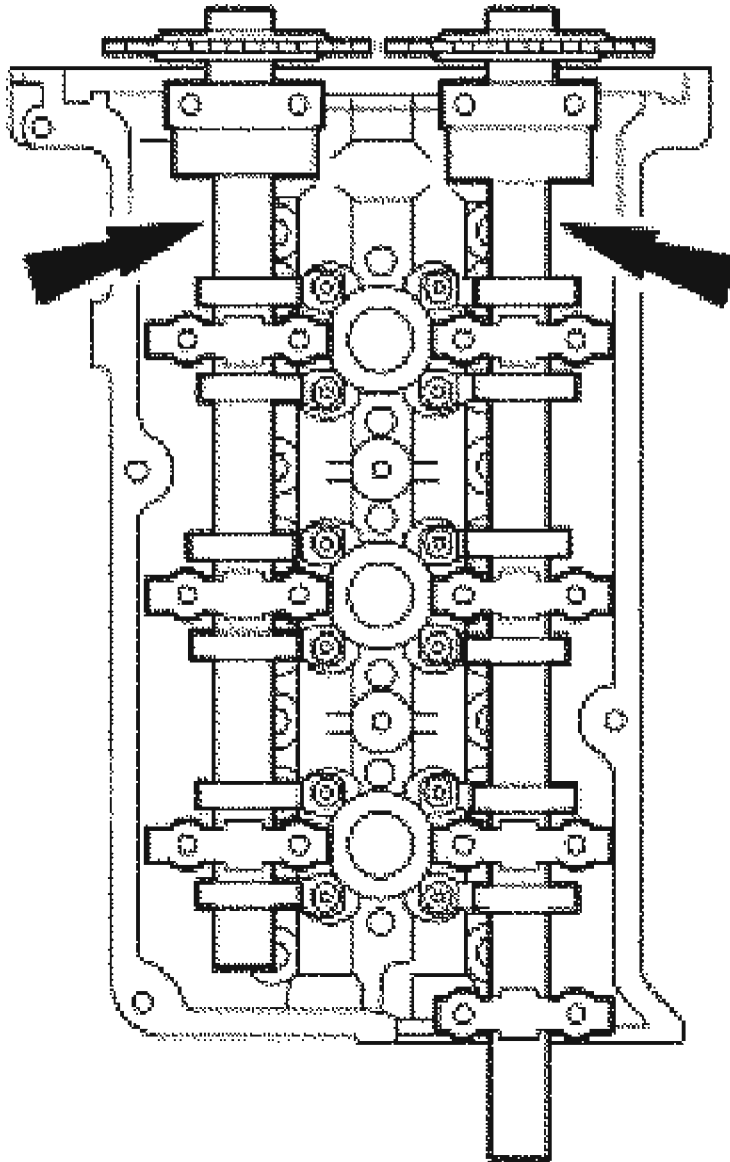
**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled in their original positions.



G02739248

**Fig. 75: Identifying Camshaft Journal Caps Loosening Sequence**  
Courtesy of FORD MOTOR CO.

6. Loosen the LH camshaft cap bolts evenly in the sequence shown to allow the camshafts to rise from the cylinder head and remove the caps.
7. Remove the camshafts.



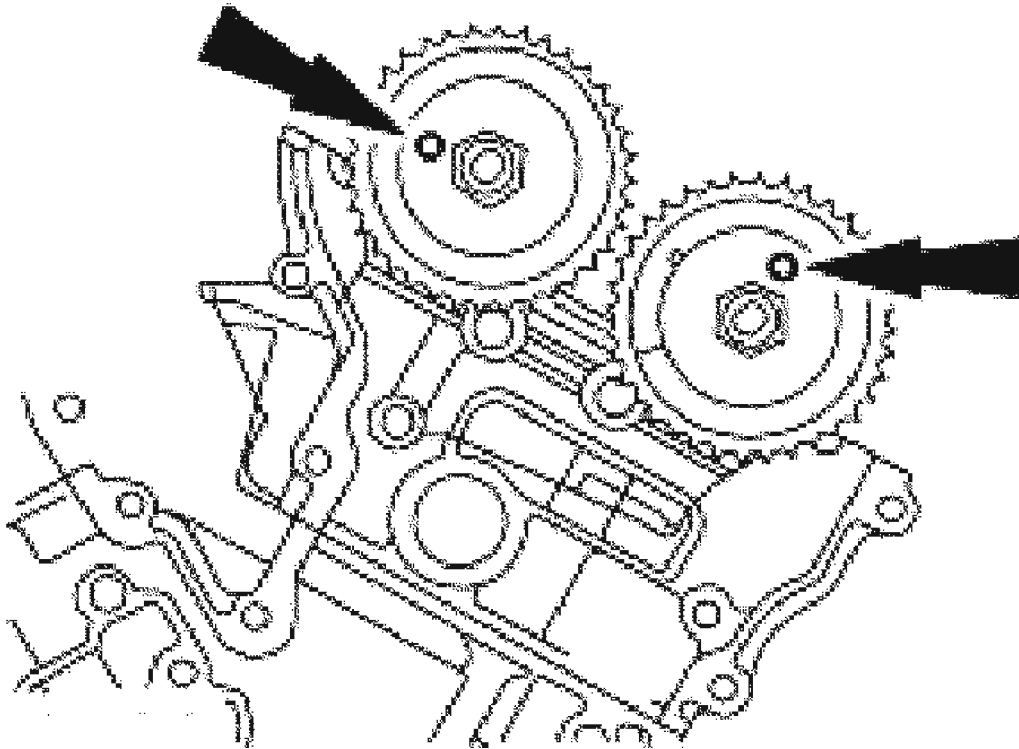
G02739249

**Fig. 76: Removing Camshafts**  
Courtesy of FORD MOTOR CO.

**Installation**

**NOTE:** Be sure camshaft bearing caps are installed in the original positions.



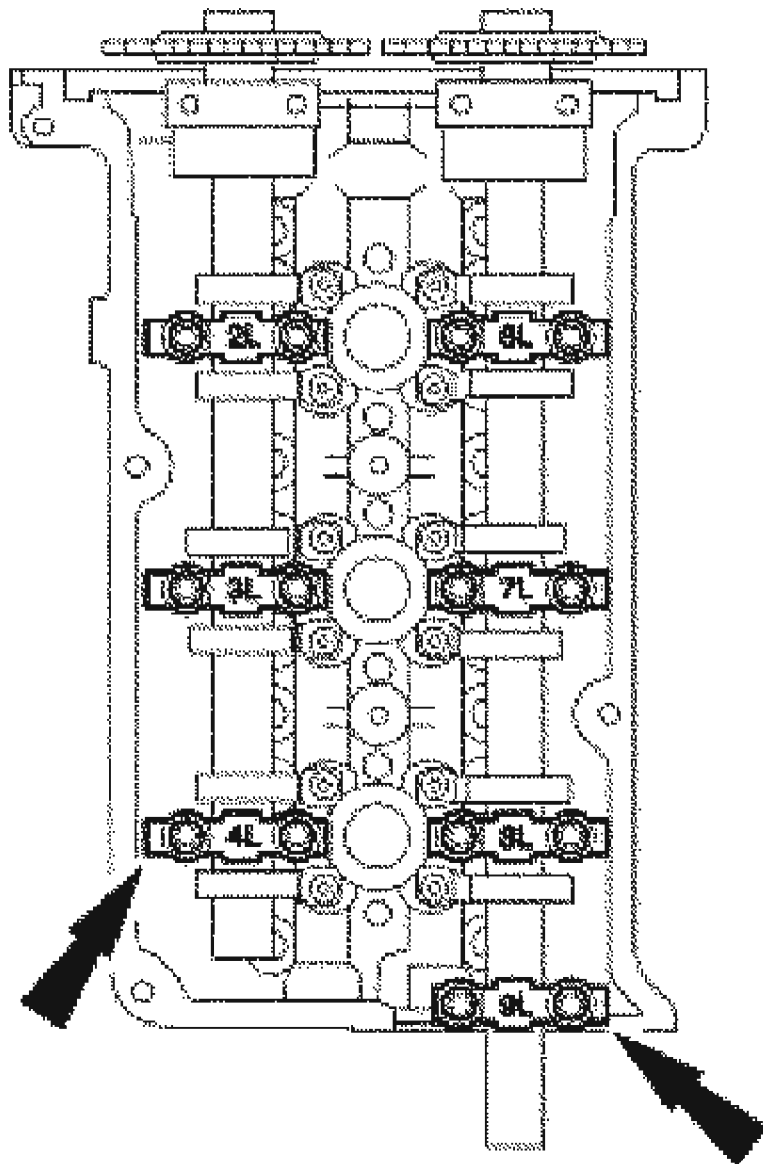


G02739250

**Fig. 77: Aligning Camshafts**  
Courtesy of FORD MOTOR CO.

1. Lubricate camshafts with clean engine oil and carefully position the camshafts into the cylinder head.
  - Align the camshafts as shown.

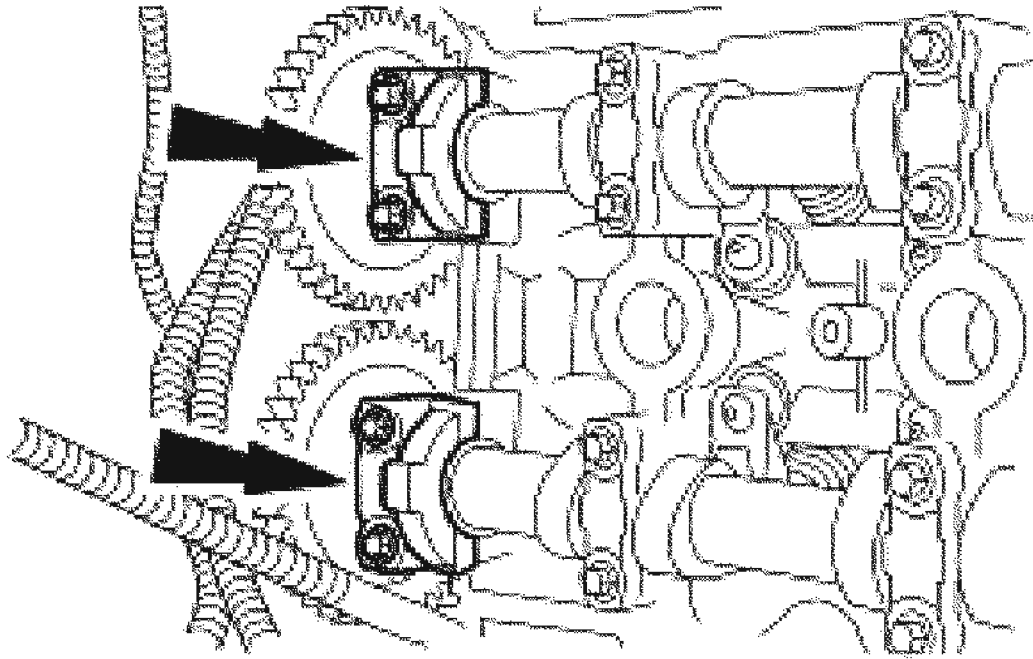
**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps can occur.



G02739251

**Fig. 78: Lubricating Bearing Surfaces**  
Courtesy of FORD MOTOR CO.

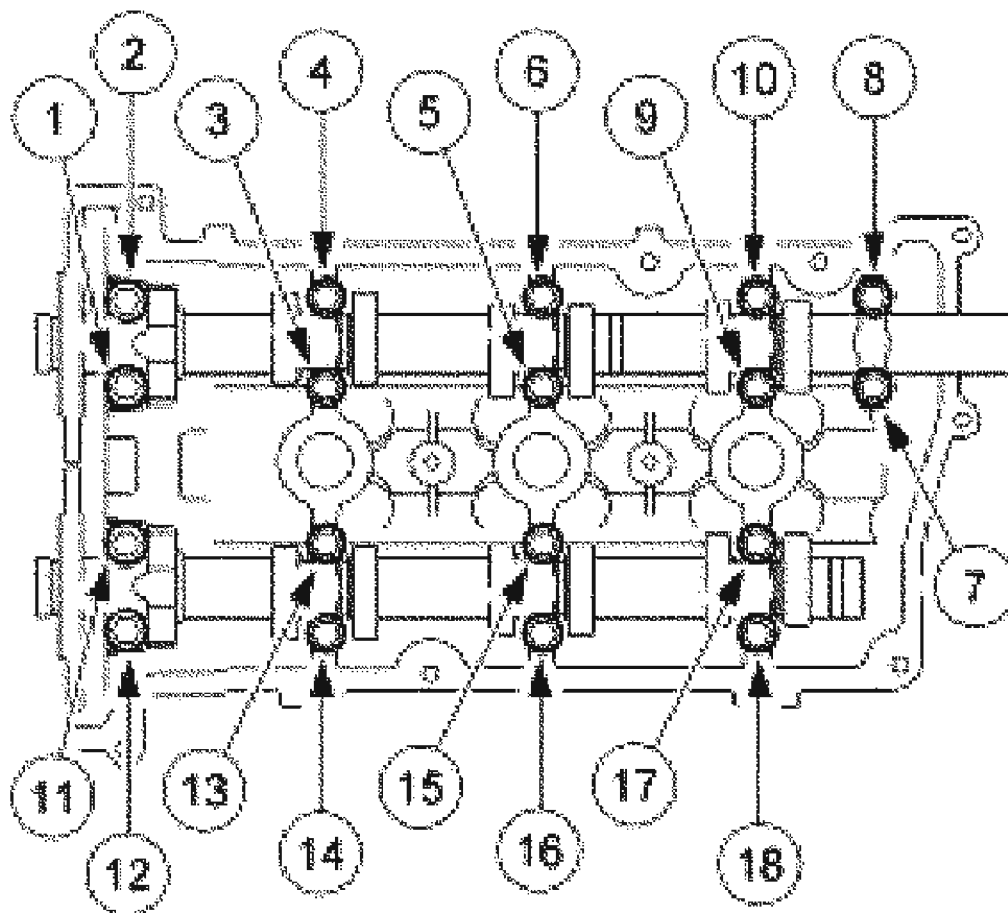
2. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil. Install the bearing caps and loosely install the bolts.
3. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil. Install the bearing thrust caps and loosely install the bolts.



G02739252

**Fig. 79: Installing Bearing Thrust Caps**  
Courtesy of FORD MOTOR CO.

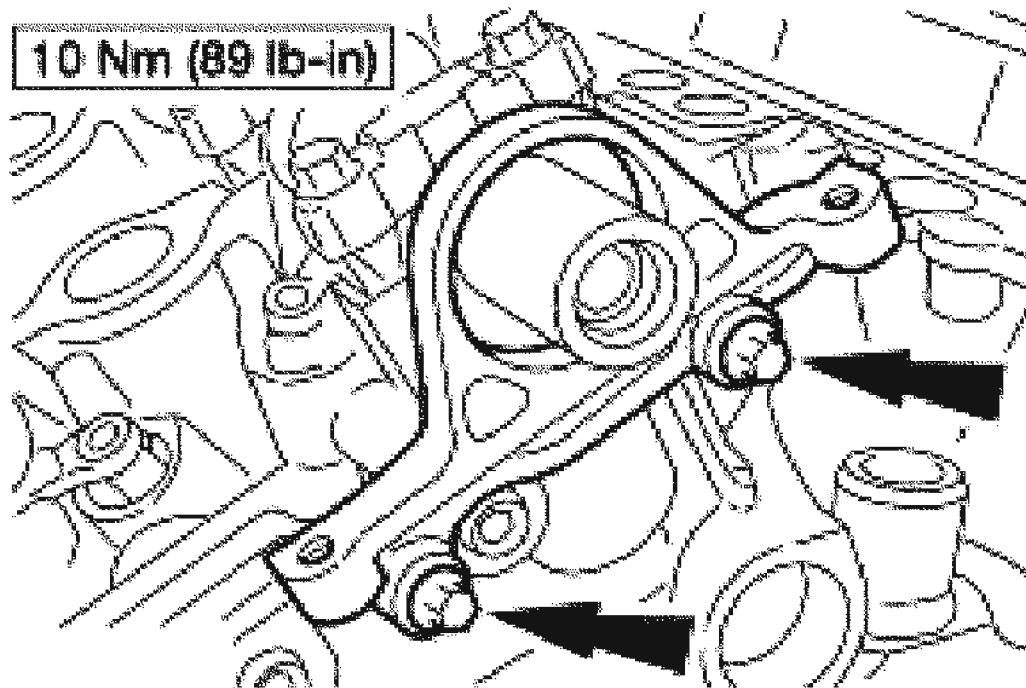
4. Tighten the bolts in the sequence shown.



G02739253

**Fig. 80: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean and degrease the sealing surfaces with metal surface cleaner.

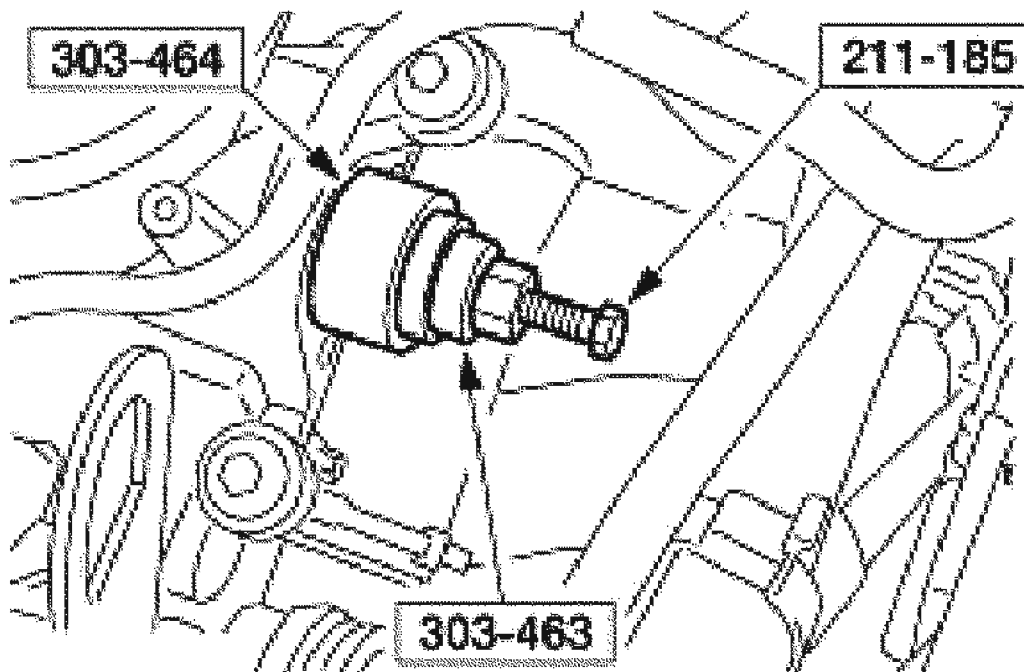


G02739254

**Fig. 81: Identifying Camshaft Oil Seal Retainer Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

5. Install a new press-in-place gasket and install the camshaft oil seal retainer.
6. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** .

**NOTE:**      Lubricate the camshaft oil seal with clean engine oil.

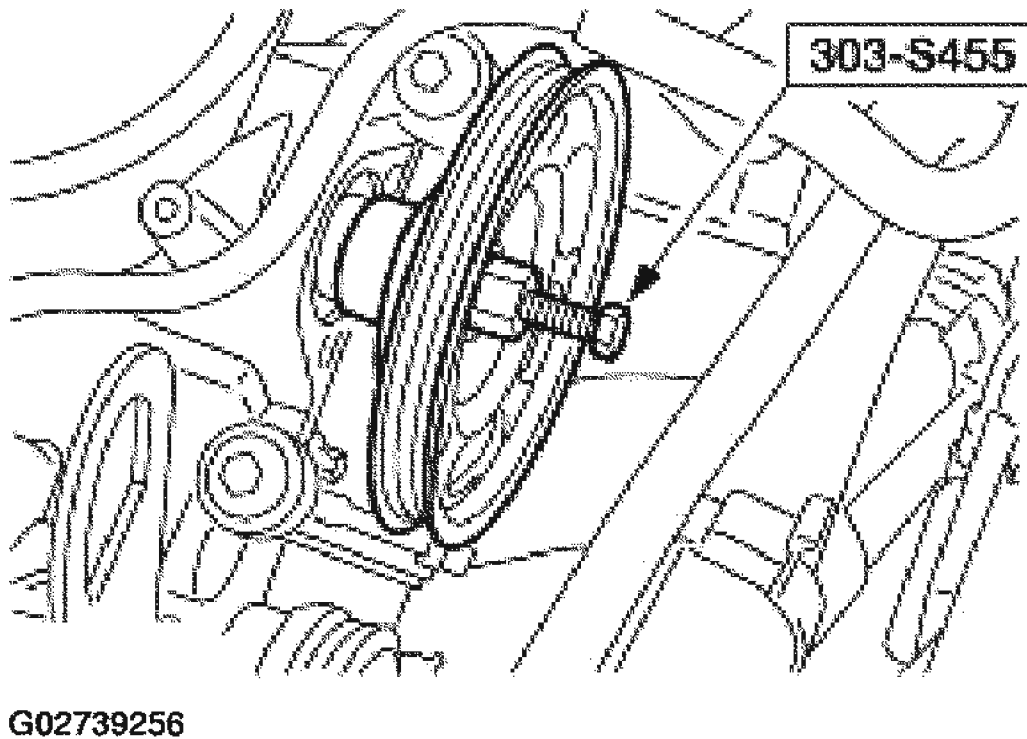


G02739255

**Fig. 82: Installing Camshaft Oil Seal**  
Courtesy of FORD MOTOR CO.

7. Using special tools, install a new camshaft oil seal.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the camshaft. The service pulley is pressed on flush to the end of the camshaft.



**Fig. 83: Installing Service Water Pump Drive Pulley**  
Courtesy of FORD MOTOR CO.

8. Using the special tool, install a new service water pump drive pulley.
9. Install the water pump belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING** .

## CAMSHAFTS RH

### Material

## MATERIAL SPECIFICATION

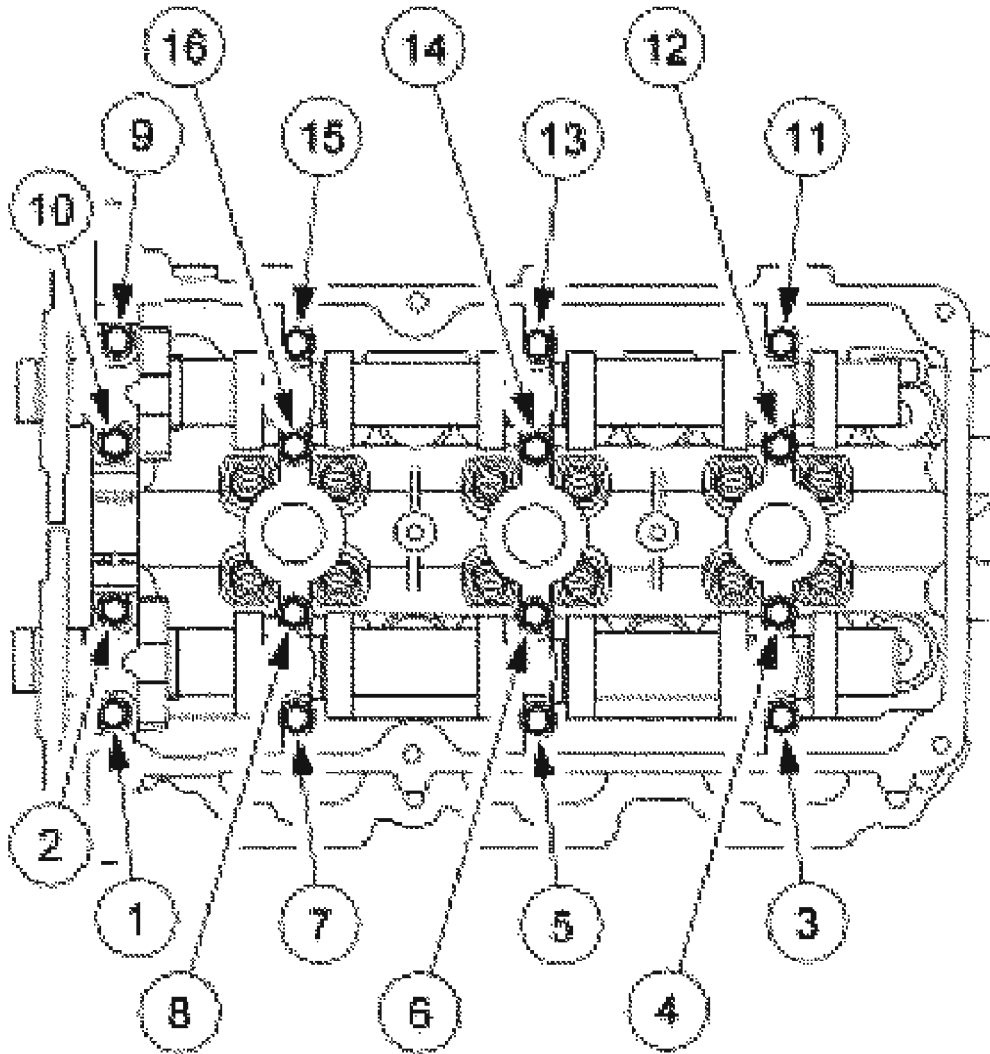
Item	Specification
SAE 5W - Premium Synthetic Blend Motor Oil W XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** .

**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled

in their original positions.

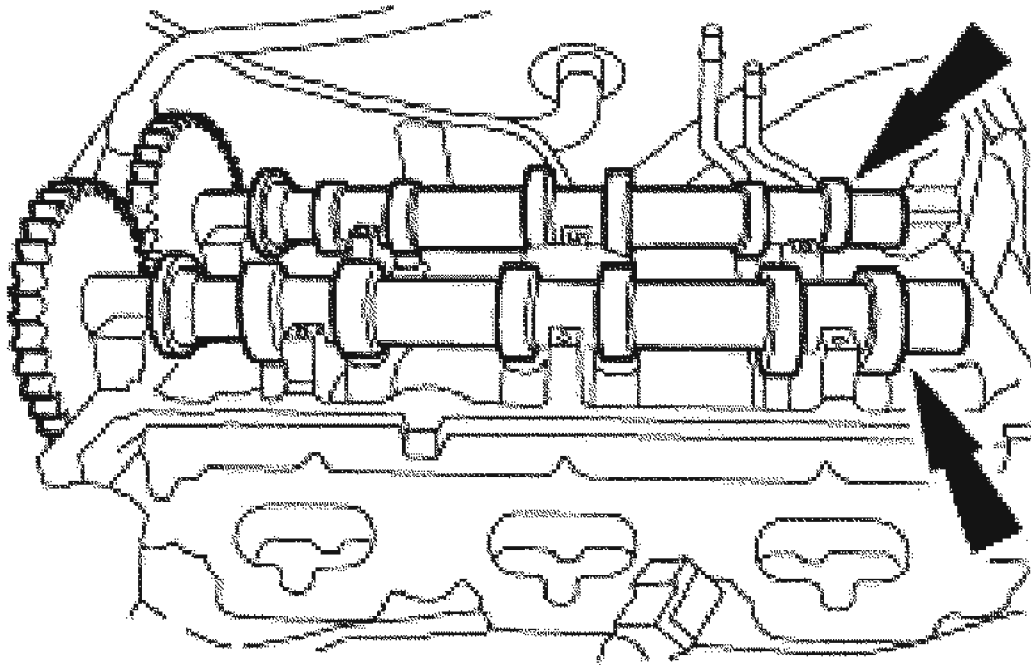


G02739257

**Fig. 84: Identifying RH Camshaft Cap Bolts Loosening Sequence**  
Courtesy of FORD MOTOR CO.

2. Loosen the RH camshaft cap bolts evenly in the sequence shown to allow the camshafts to rise from the cylinder head and remove the caps.
3. Remove the camshafts.



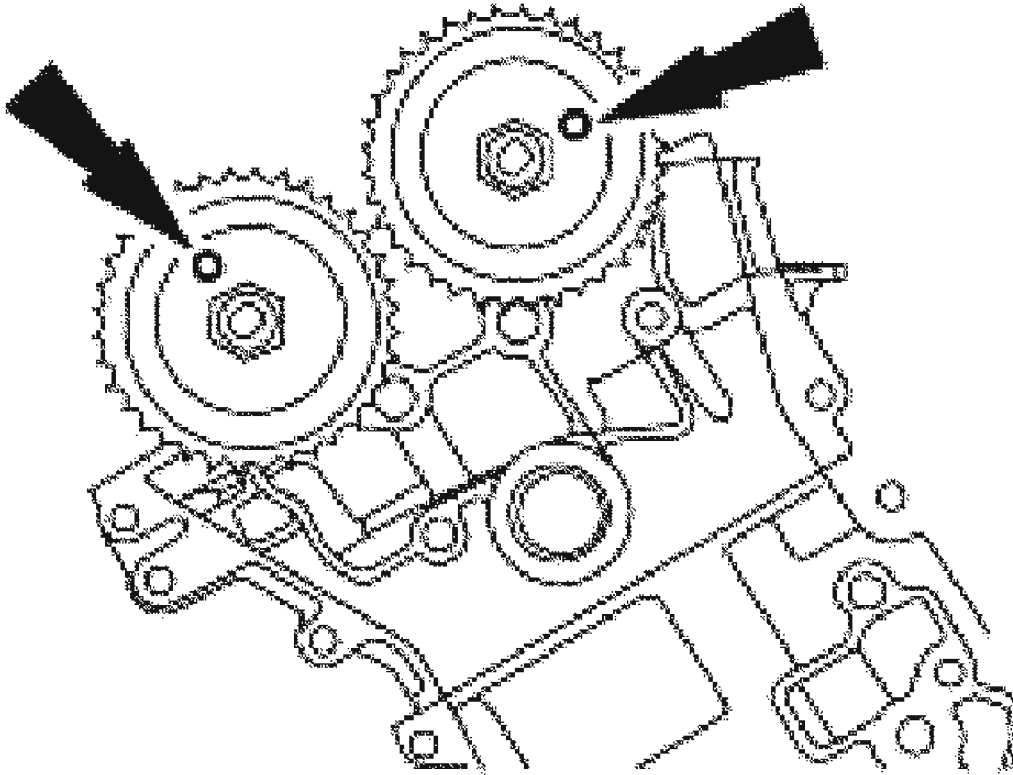


G02739258

**Fig. 85: Removing Camshafts**  
Courtesy of FORD MOTOR CO.

**Installation**

**NOTE:** Be sure camshaft bearing caps are installed in the original positions.

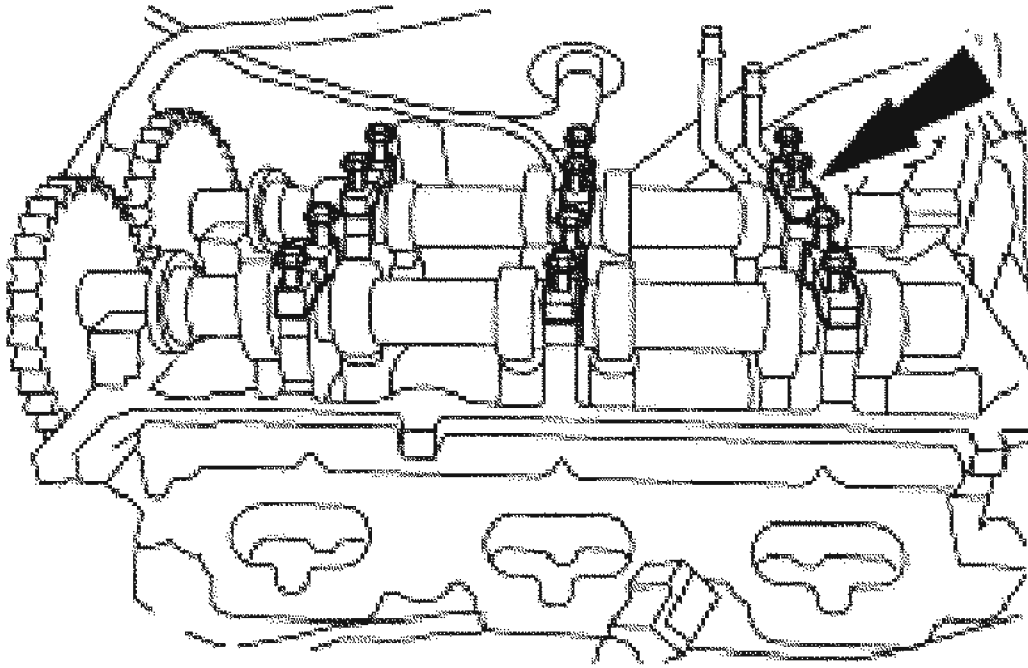


G02739259

**Fig. 86: Aligning Camshafts**  
Courtesy of FORD MOTOR CO.

1. Lubricate camshafts with clean engine oil and carefully position the camshafts into the cylinder head.
  - Align the camshafts as shown.

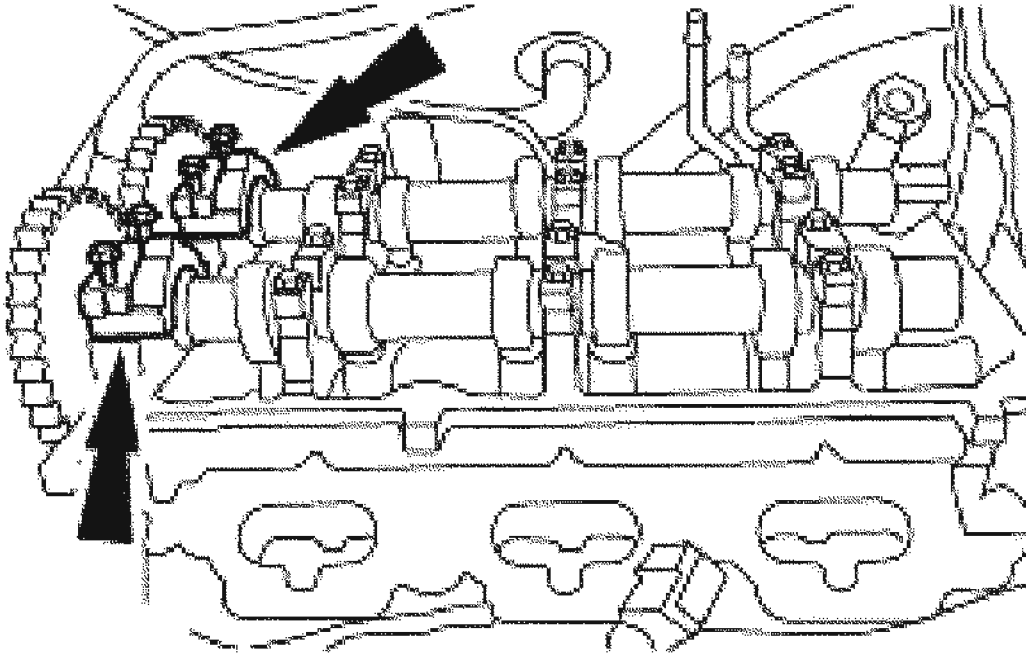
**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.



G02739260

**Fig. 87: Lubricating Bearing Surfaces Of Camshaft Bearing Caps**  
Courtesy of FORD MOTOR CO.

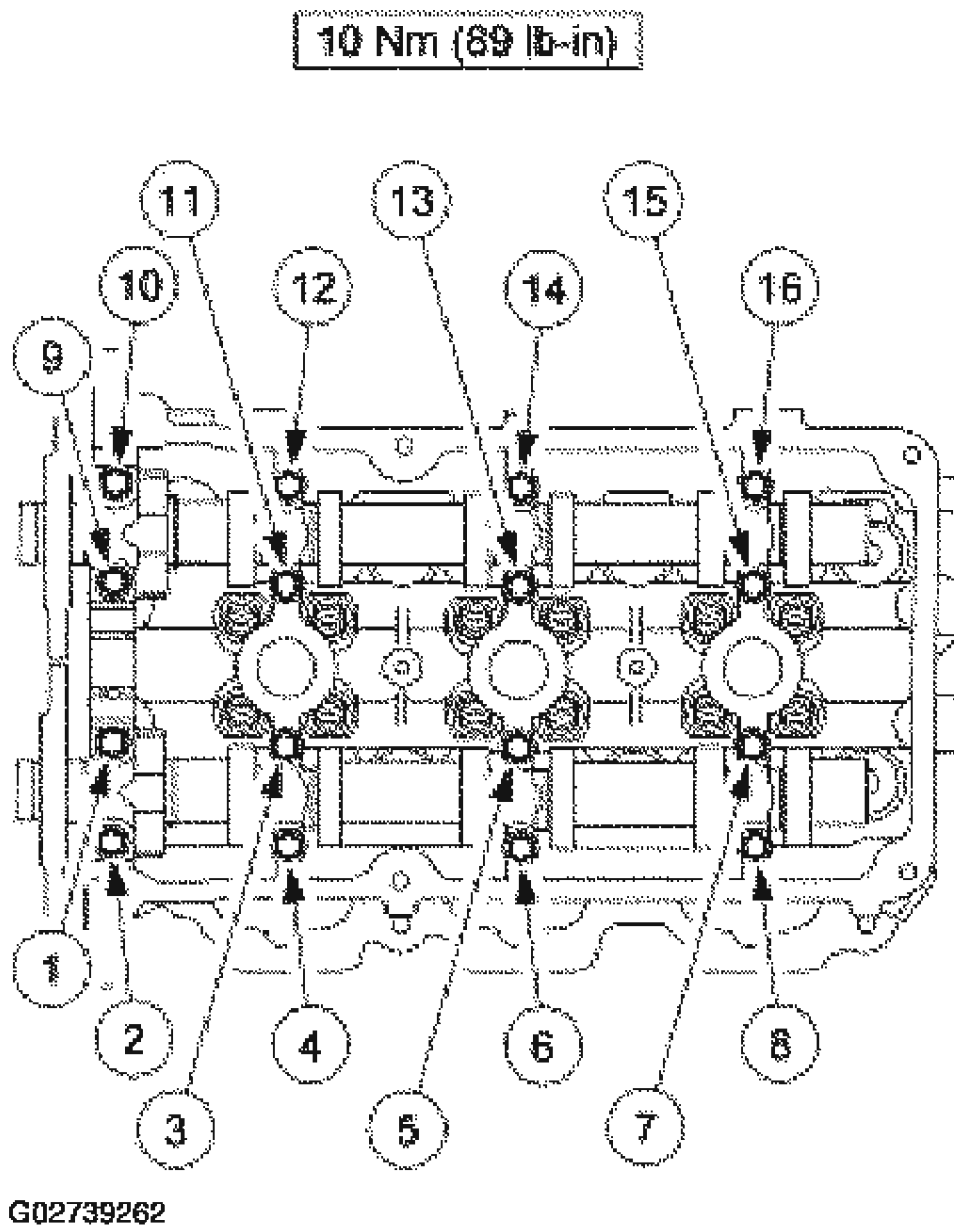
2. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil and install the bearing caps and loosely install the bolts.
3. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil. Install the bearing thrust caps and loosely install the bolts.



G02739261

**Fig. 88: Installing Bearing Thrust Caps**  
Courtesy of FORD MOTOR CO.

4. Tighten the bolts in the sequence shown.



**Fig. 89: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

5. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

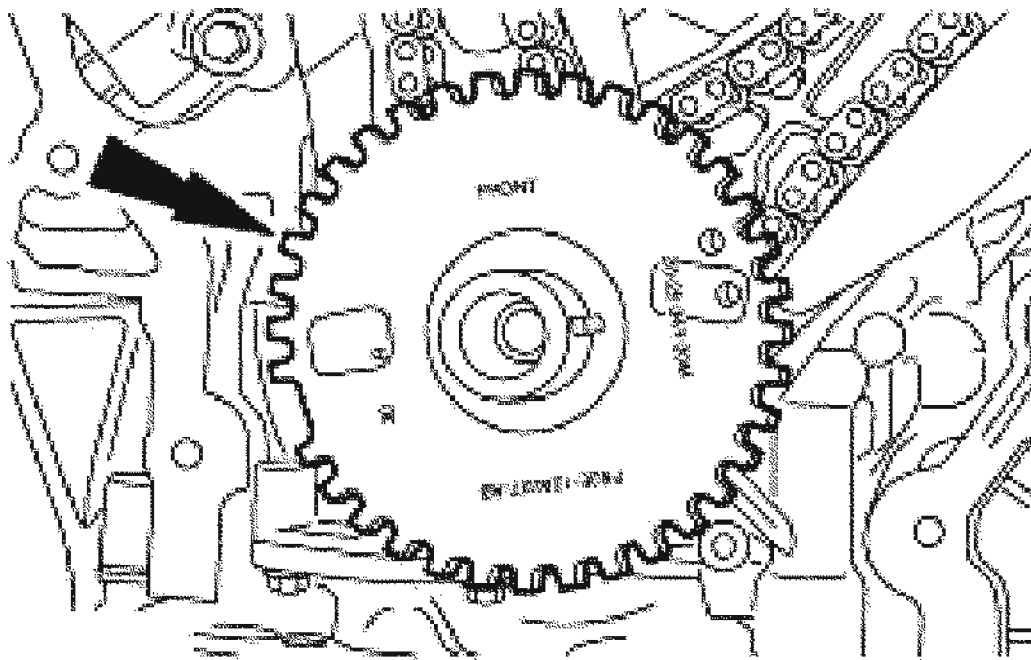
#### **TIMING DRIVE COMPONENTS**

## Removal

**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.

1. Remove the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.

**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "20-25-34Y-30M" (color blue).



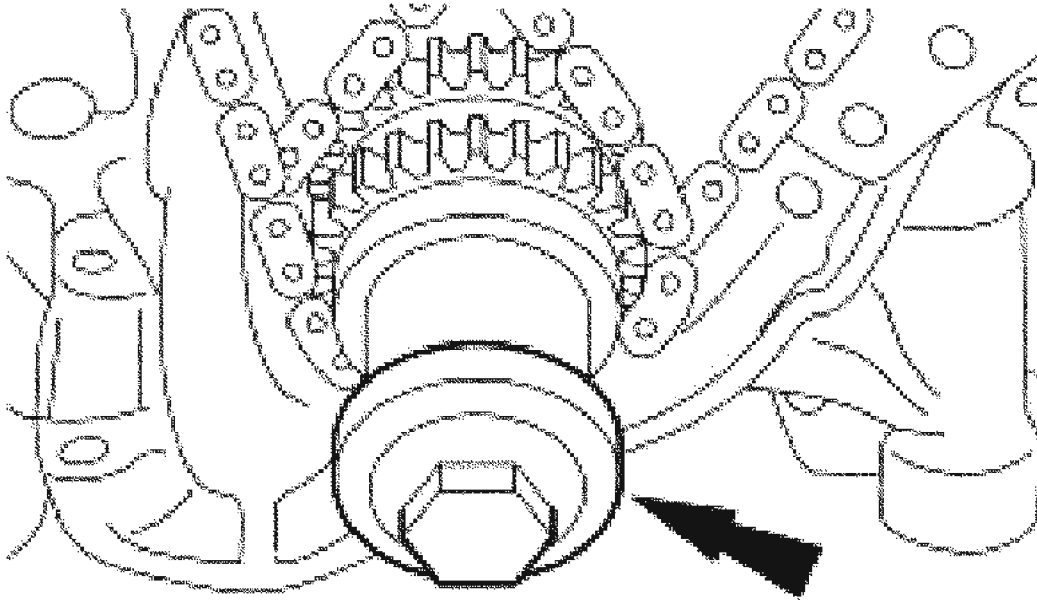
G02739263

**Fig. 90: Identifying Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

2. Remove the ignition pulse wheel.
3. Install the damper bolt.

## 2004 Ford Escape

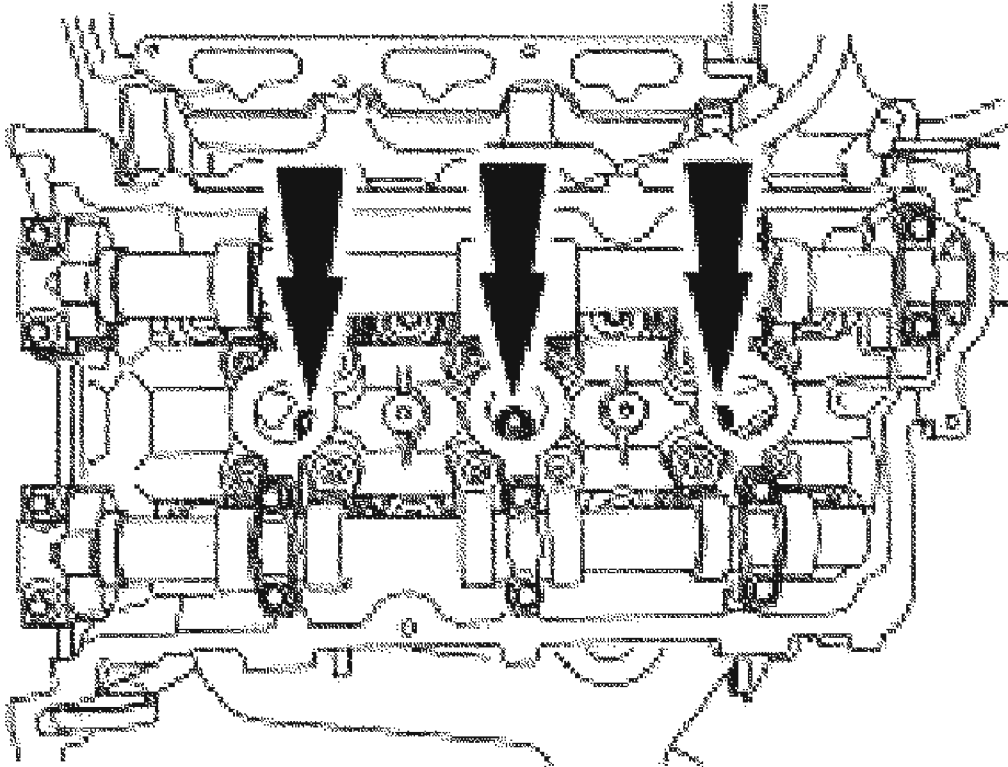
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739264

**Fig. 91: Installing Damper Bolt**  
Courtesy of FORD MOTOR CO.

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

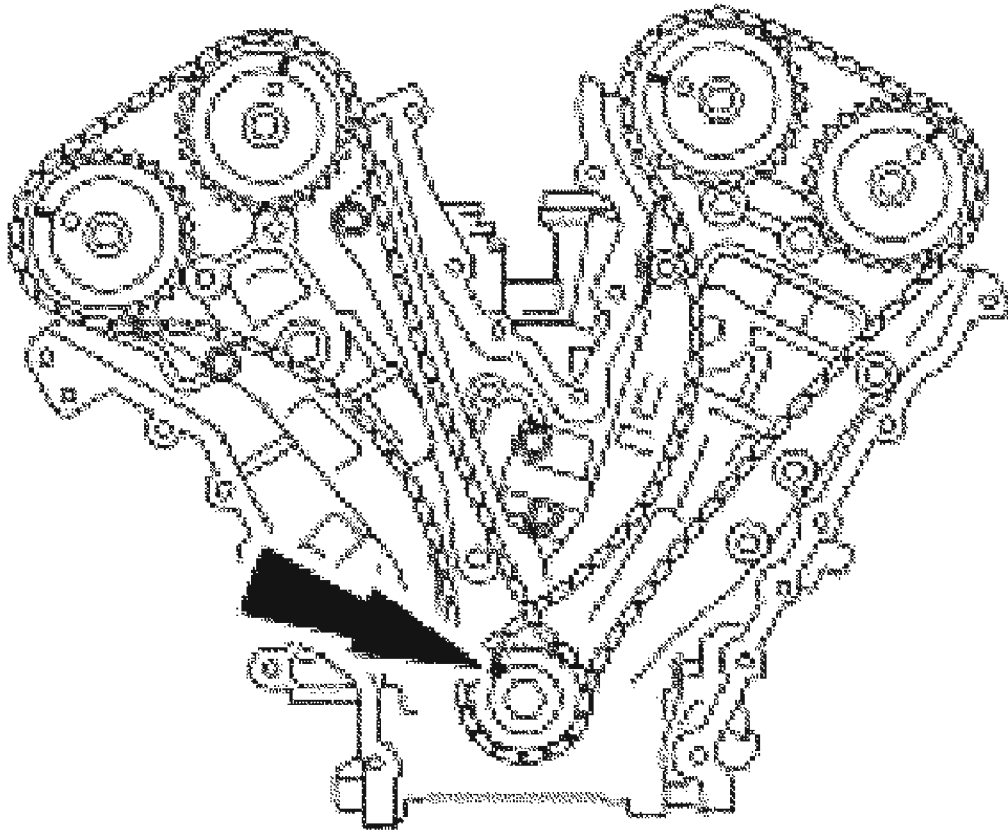


G02739265

**Fig. 92: Locating LH And RH Spark Plugs**  
Courtesy of FORD MOTOR CO.

4. Remove the LH and the RH spark plugs.
5. Rotate the crankshaft clockwise to position the crankshaft keyway in the 11 o'clock position and position the camshafts in the correct position. This will position the number 1 cylinder at top dead center (TDC).
  - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.

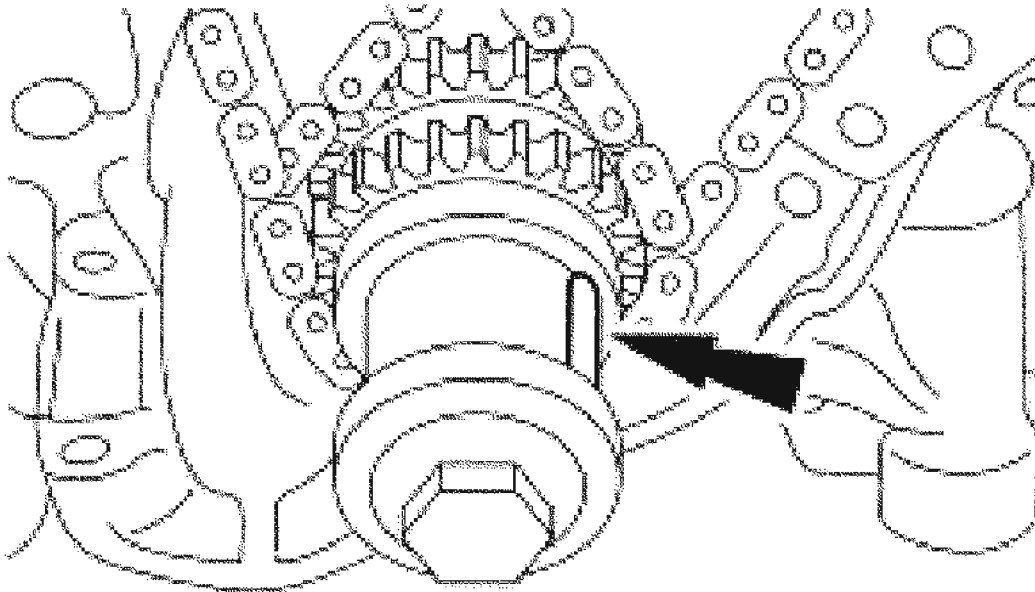




G02739266

**Fig. 93: Locating Camshaft Pulley**  
Courtesy of FORD MOTOR CO.

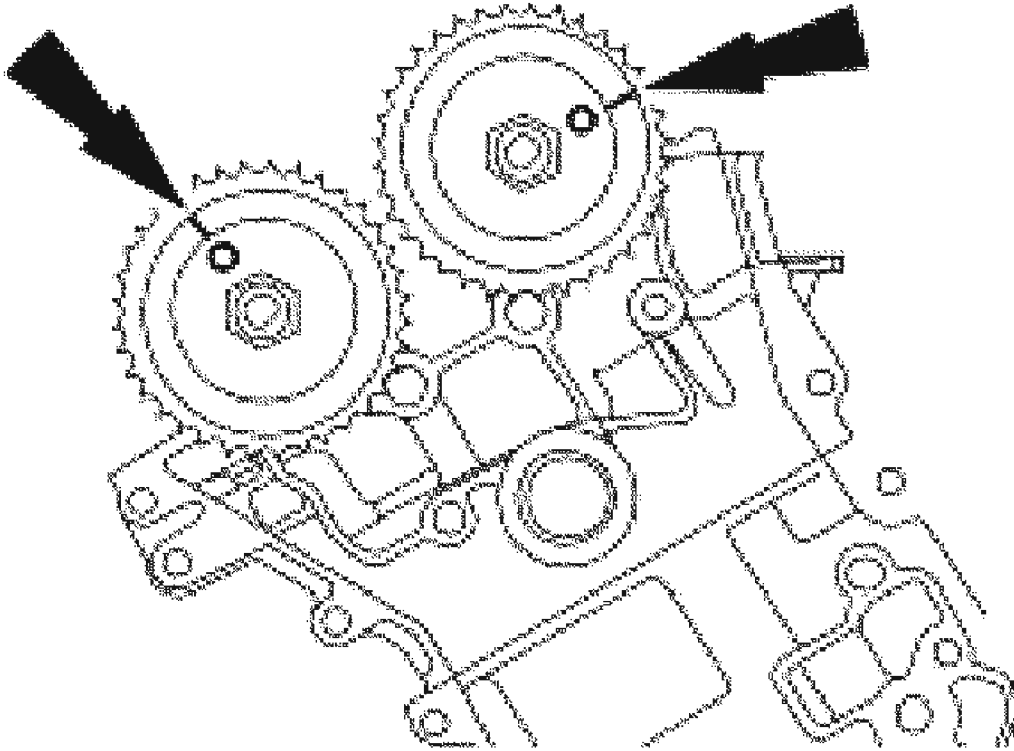
6. Rotate the crankshaft clockwise 120 degrees to the 3 o'clock position to locate the RH camshafts in the neutral position.



G02739267

**Fig. 94: Identifying Camshaft Aligning Mark**  
Courtesy of FORD MOTOR CO.

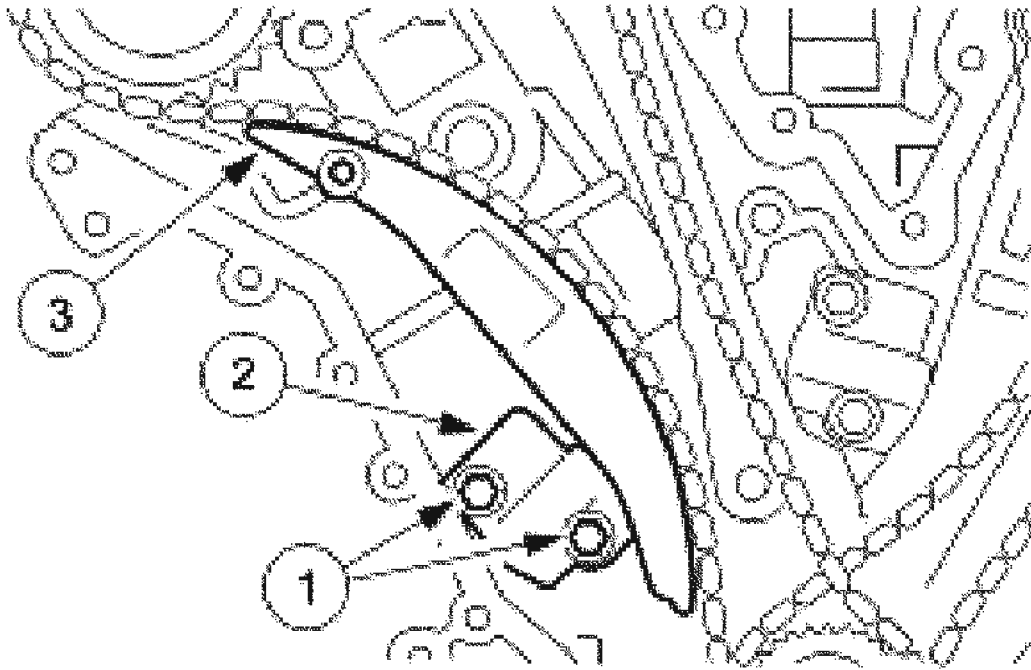
7. Verify that the RH camshafts are in the neutral position.



G02739268

**Fig. 95: Identifying RH Camshafts Are In Neutral Position**  
Courtesy of FORD MOTOR CO.

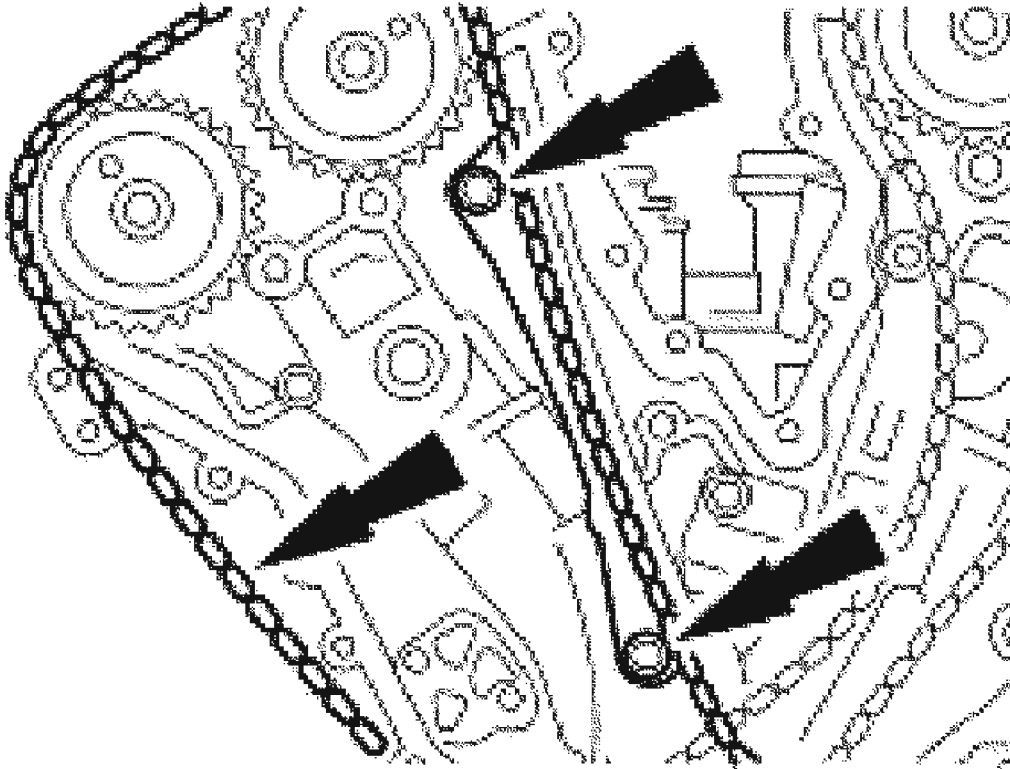
8. Remove the RH timing chain and tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.



G02739269

**Fig. 96: Removing RH Tensioner Arm**  
Courtesy of FORD MOTOR CO.

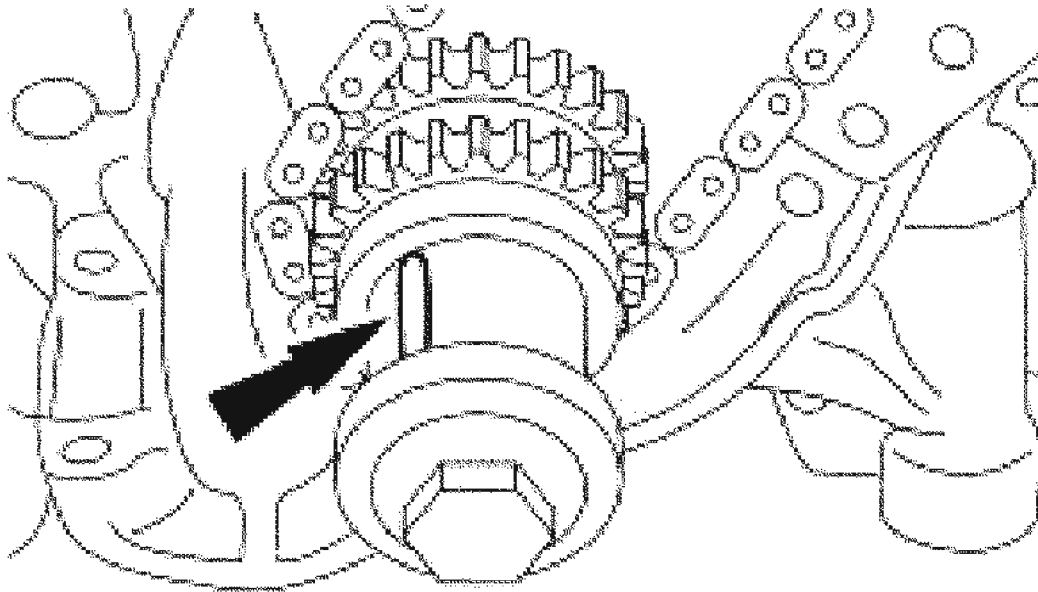
9. Remove the bolts, RH timing chain guide and the timing chain.



G02739270

**Fig. 97: Removing Bolts, RH Timing Chain Guide & Timing Chain**  
Courtesy of FORD MOTOR CO.

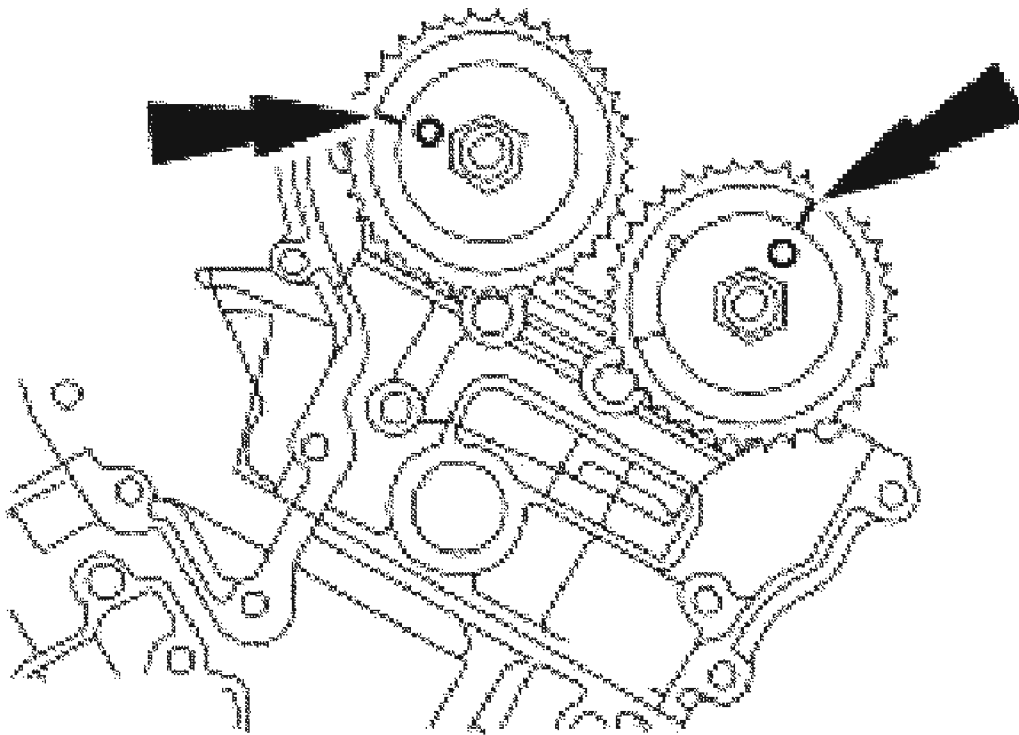
10. Rotate the crankshaft clockwise 600 degrees (1 -2/3 times) to position the crankshaft keyway in the 11 o'clock position. This will position the LH camshafts in the neutral position.



G02739271

**Fig. 98: Identifying Crankshaft Aligning Mark**  
Courtesy of FORD MOTOR CO.

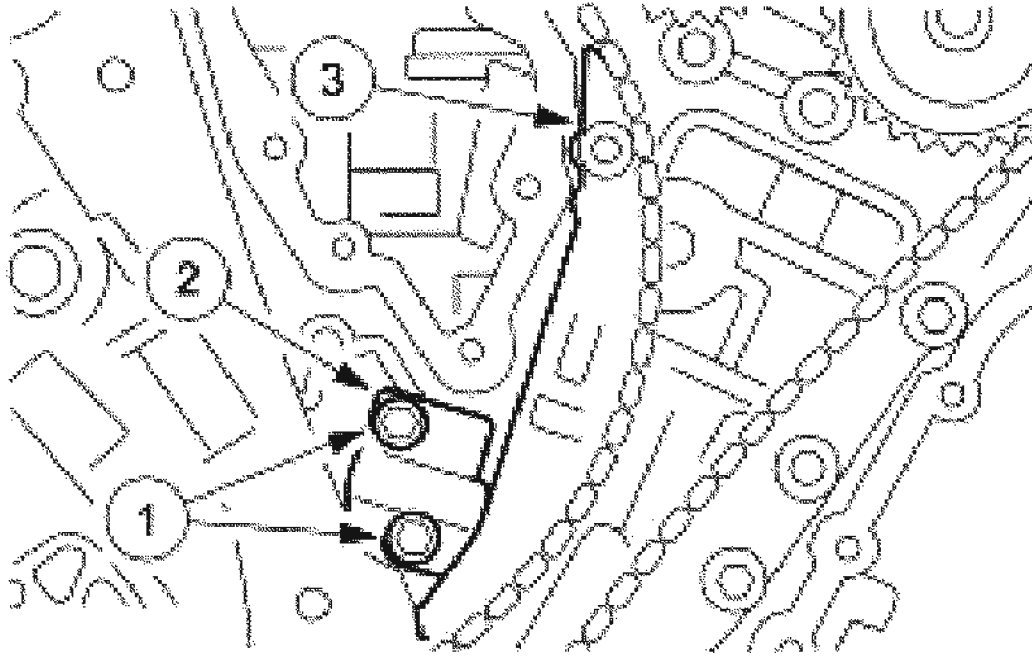
11. Verify that the LH camshafts are in the neutral position.



G02739272

**Fig. 99: Identifying LH Camshafts Are In Neutral Position**  
Courtesy of FORD MOTOR CO.

12. Remove the LH timing chain and tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.

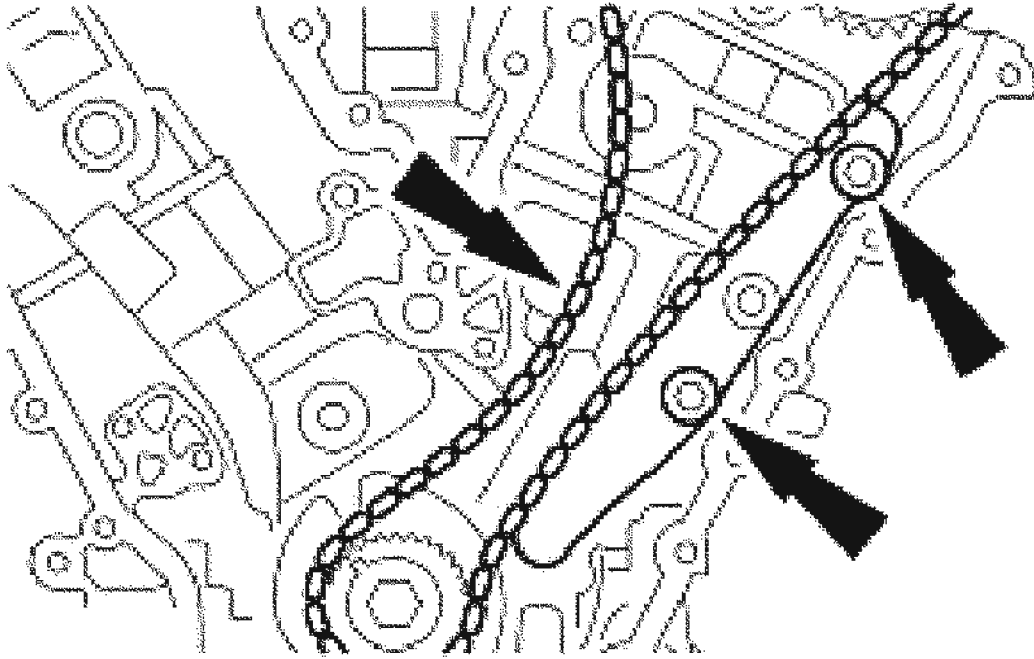


G02739273

**Fig. 100: Removing LH Timing Chain And Tensioner Arm**  
Courtesy of FORD MOTOR CO.

13. Remove the LH timing chain and the timing chain guide.

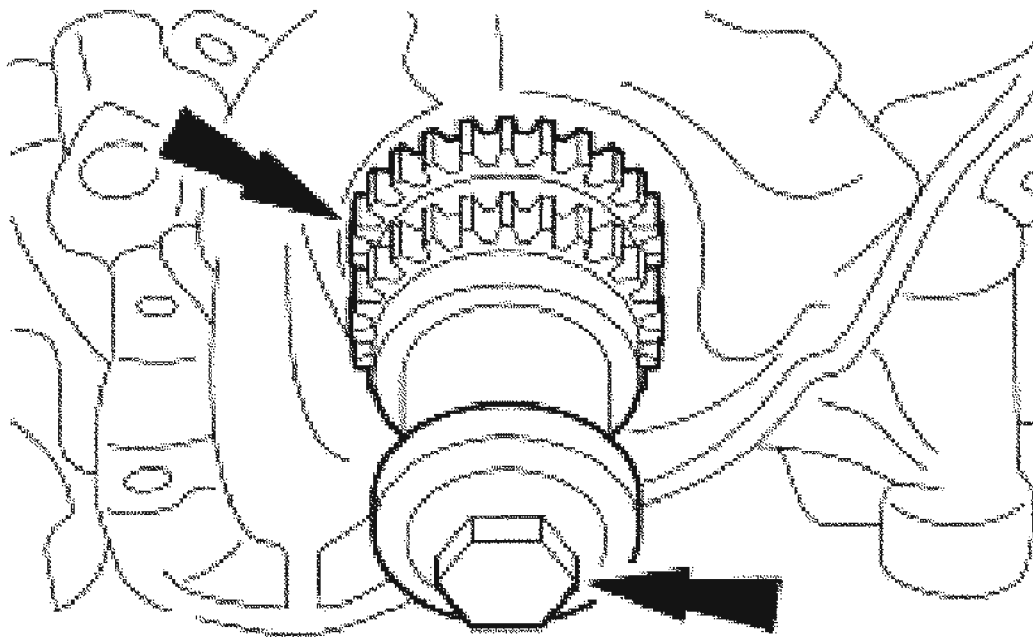




G02739274

**Fig. 101: Removing LH Timing Chain And Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

14. Remove the damper bolt and the crankshaft sprockets.



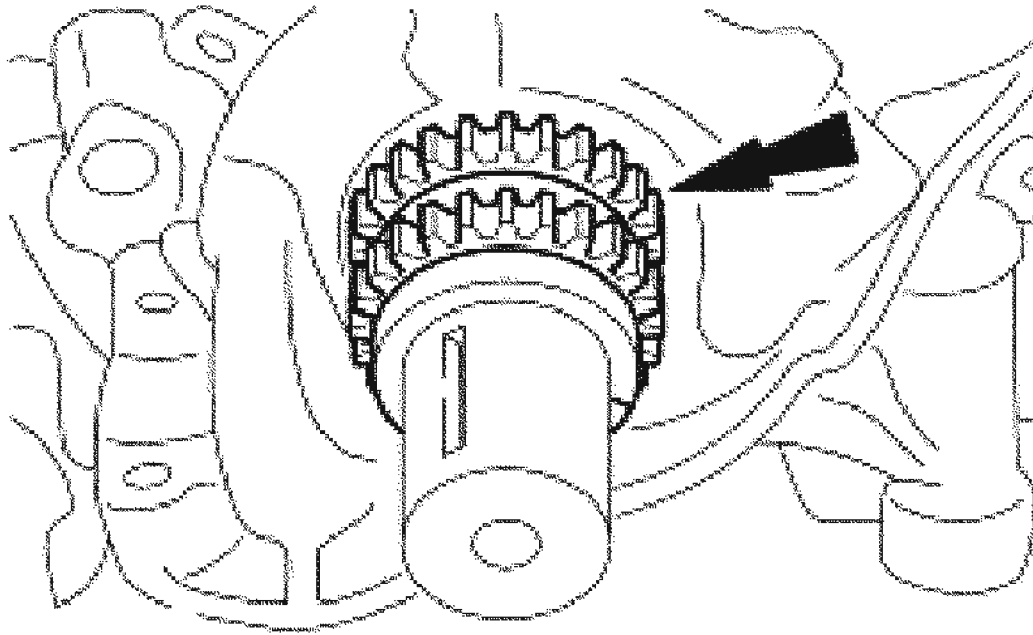
G02739275

**Fig. 102: Removing Damper Bolt And Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

#### Installation

**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.

**NOTE:** Install the sprockets with the timing marks out.

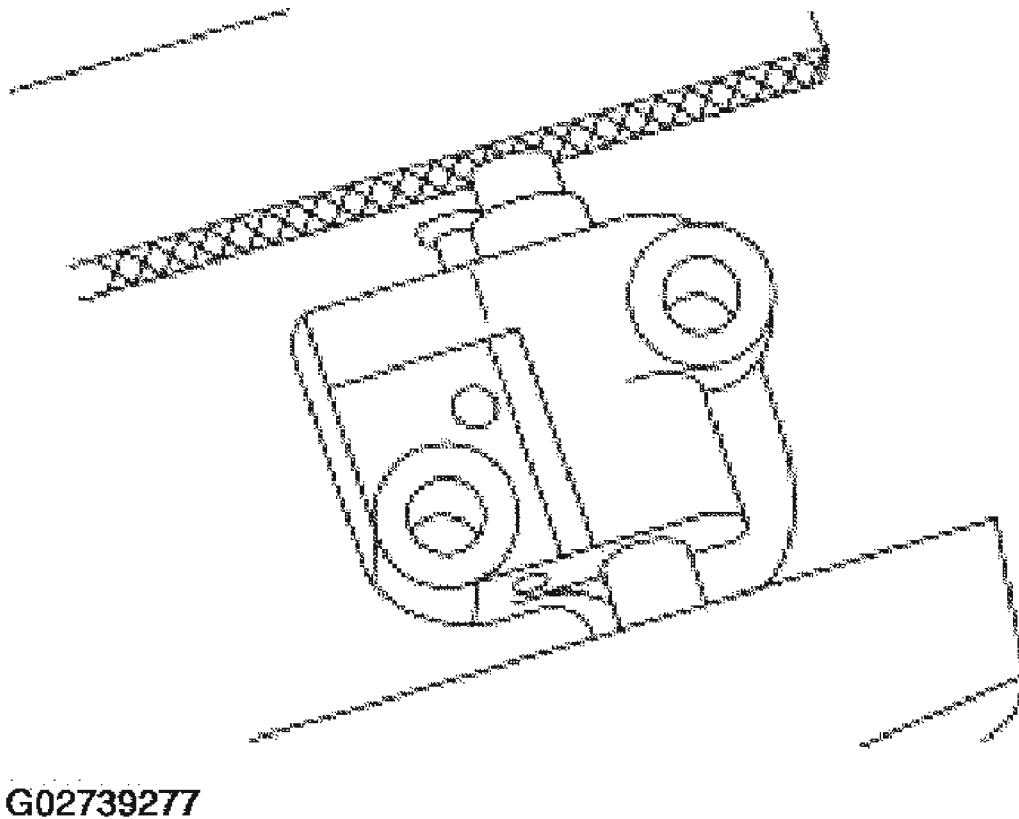


G02739276

**Fig. 103: Installing Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

1. Install the crankshaft sprockets.

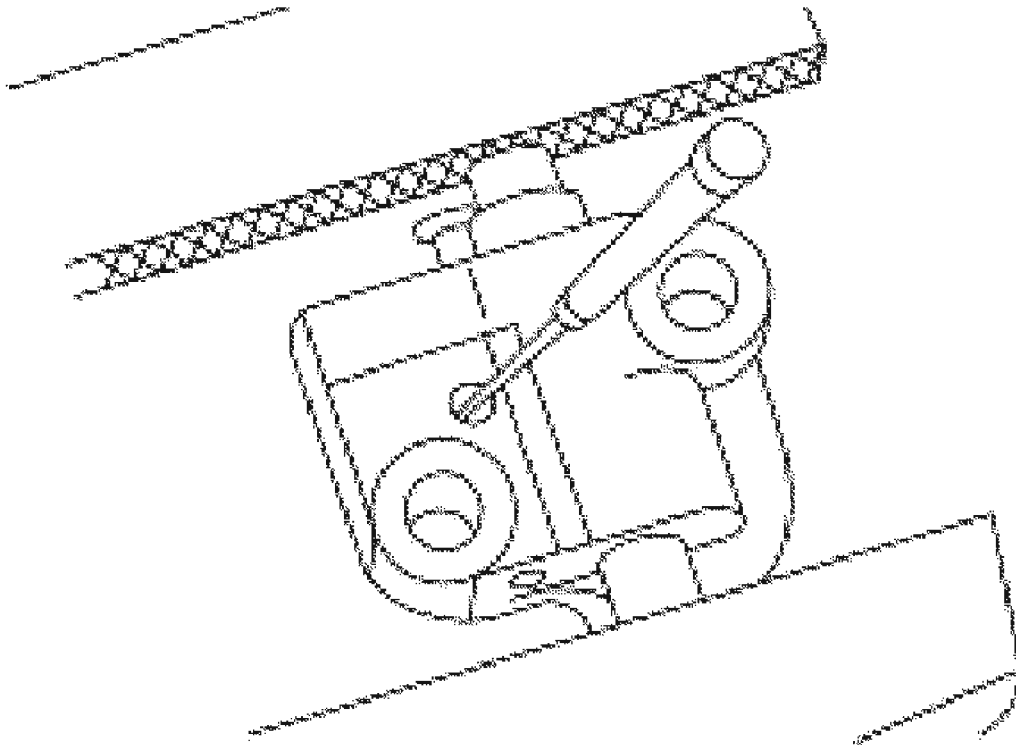
**NOTE:** LH shown, RH similar.



**Fig. 104: Positioning Chain Tensioner In A Soft-Jawed Vise**  
Courtesy of FORD MOTOR CO.

2. Position the chain tensioner in a soft-jawed vise.

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



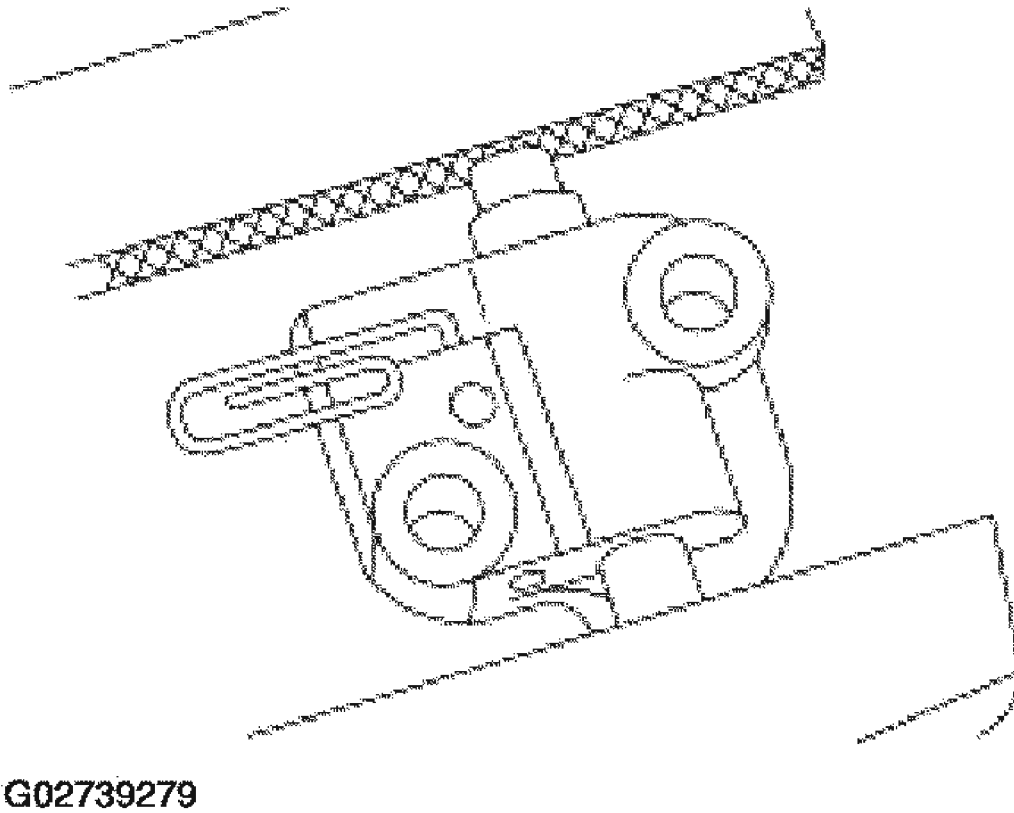
G02739278

**Fig. 105: Holding Chain Tensioner Ratchet Lock Mechanism**  
Courtesy of FORD MOTOR CO.

3. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem with a small pick.

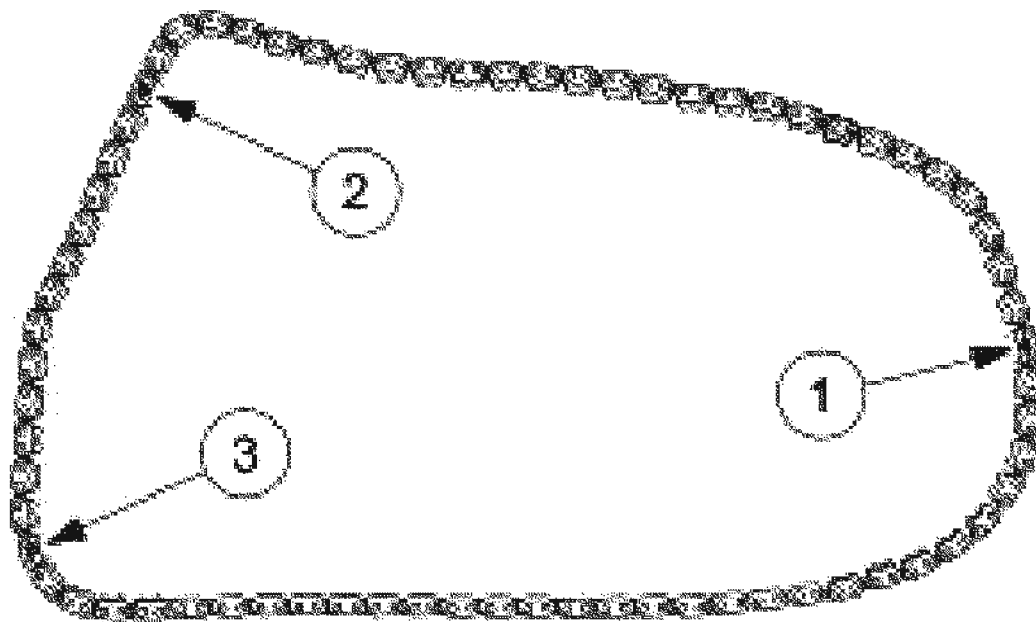
**CAUTION:** During tensioner compression, do not release the ratchet stem until the tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

4. Slowly compress the timing chain tensioner.
5. Retain the tensioner piston with a 1.5 mm (0.06 in) wire or paper clip.



**Fig. 106: Retaining Tensioner Piston**  
**Courtesy of FORD MOTOR CO.**

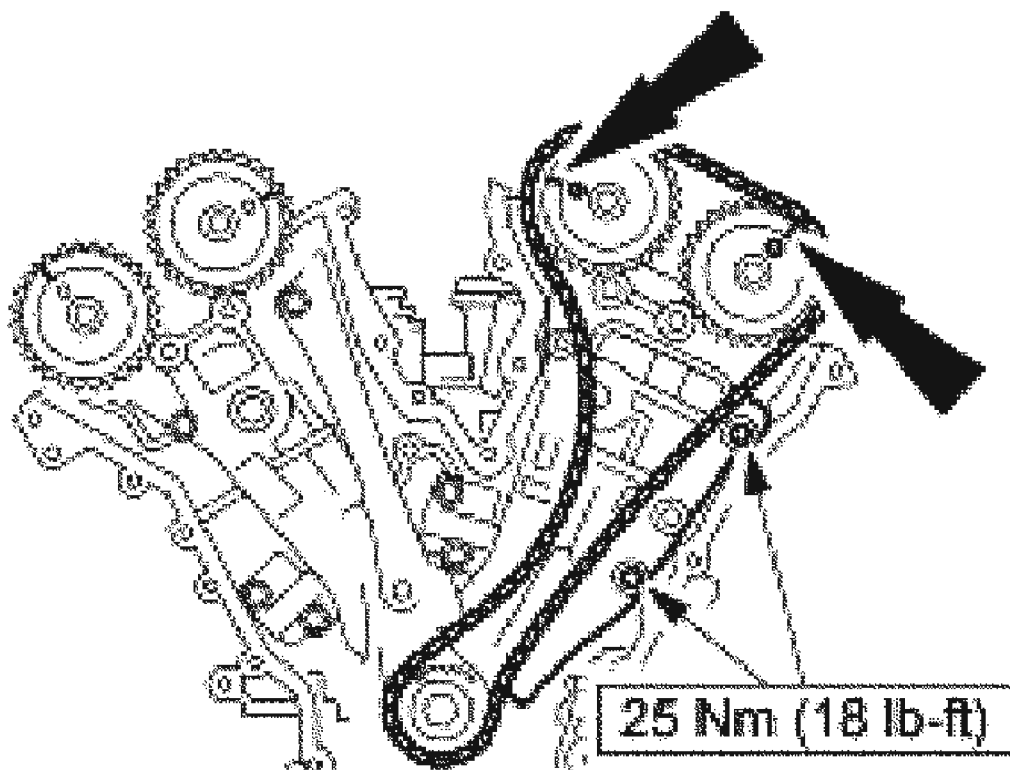
6. If the timing marks on the timing chains are not evident, use a permanent-type marker to mark on the LH and the RH timing chains.
  1. Mark any link to use as the crankshaft timing mark.
  2. Starting with the crankshaft timing mark, count 29 links and mark the link.
  3. Continue counting to 42 and mark the link.



G02739280

**Fig. 107: Identifying Timing Chain**  
**Courtesy of FORD MOTOR CO.**

7. Position the LH timing chain and guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

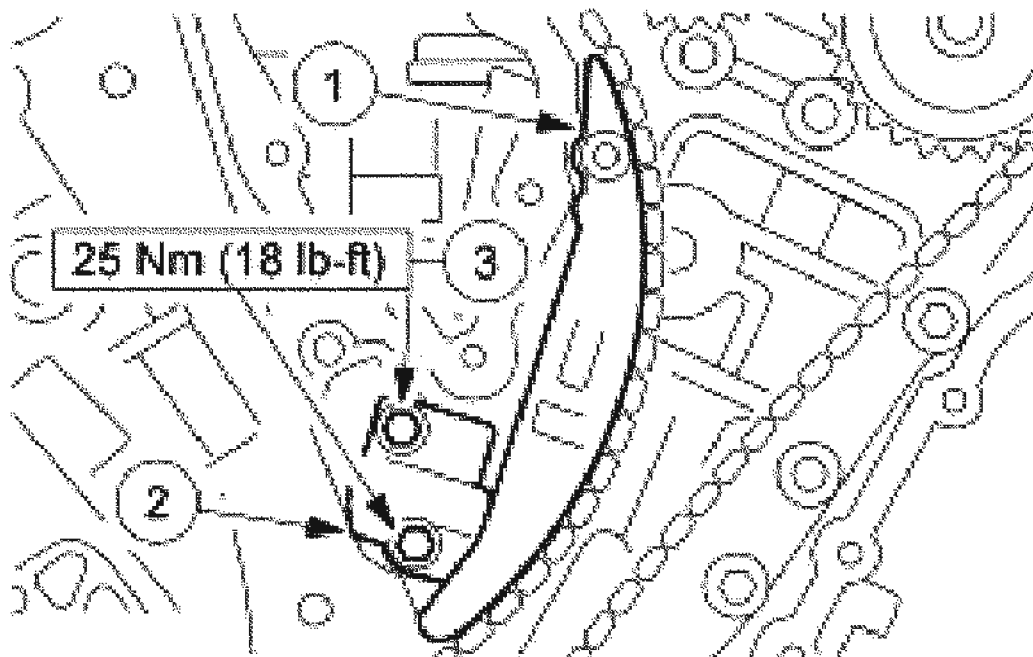


G02739281

**Fig. 108: Installing LH Timing Chain**  
Courtesy of FORD MOTOR CO.

8. Install the LH timing chain tensioner and tensioner arm.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.

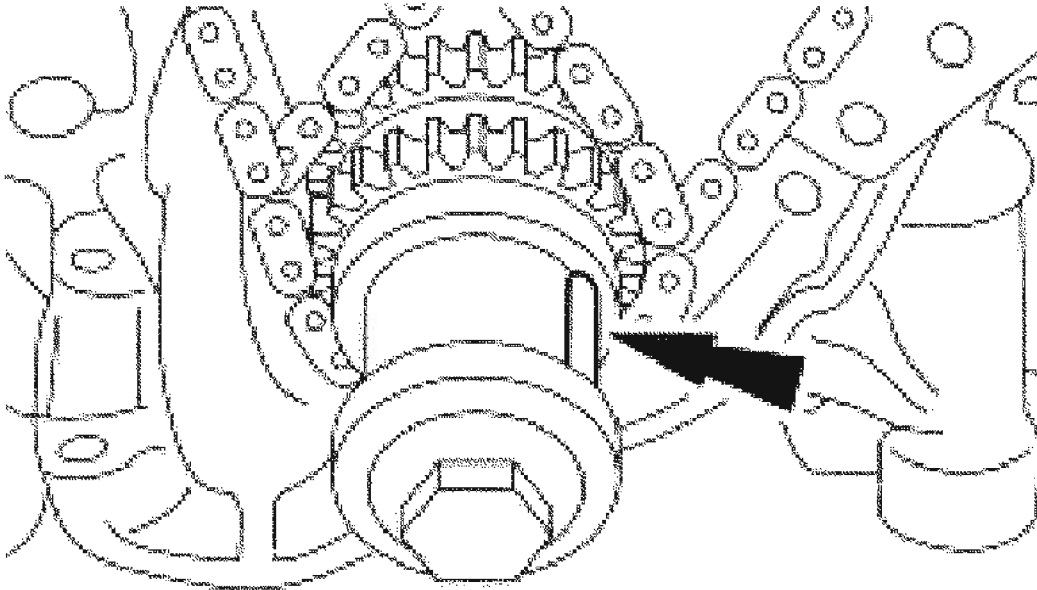




G02739282

**Fig. 109: Installing LH Timing Chain Tensioner & Tensioner Arm**  
Courtesy of FORD MOTOR CO.

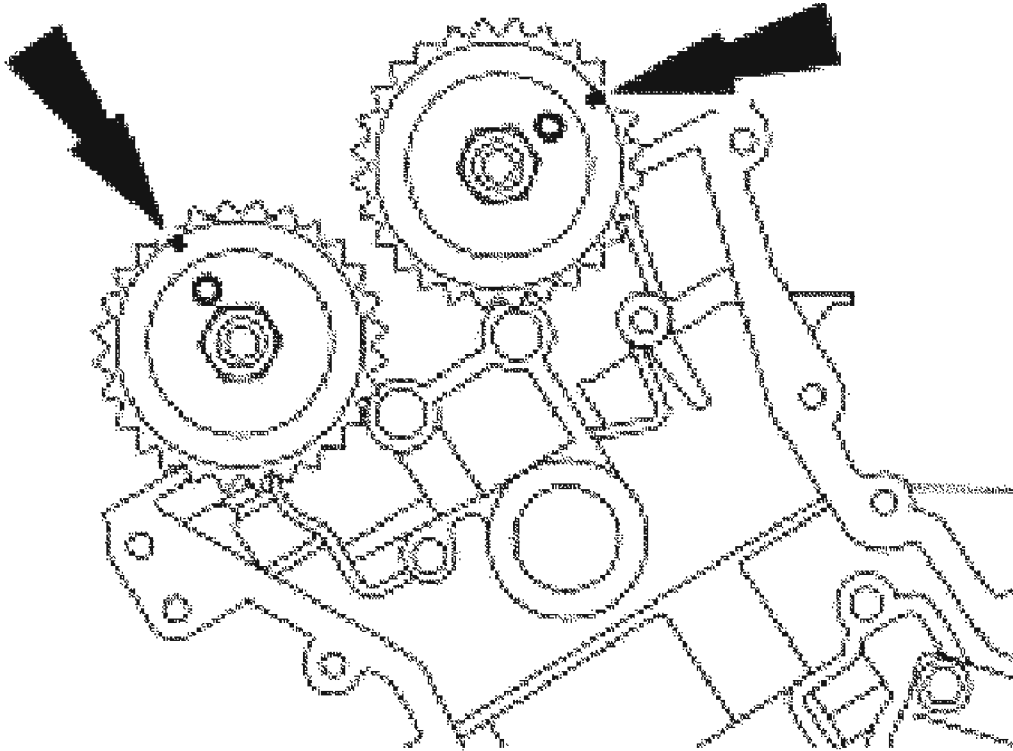
9. Install the crankshaft damper bolt and rotate the crankshaft clockwise 120 degrees until the crankshaft keyway is in the 3 o'clock position.



G02739283

**Fig. 110: Identifying Crankshaft Keyway**  
Courtesy of FORD MOTOR CO.

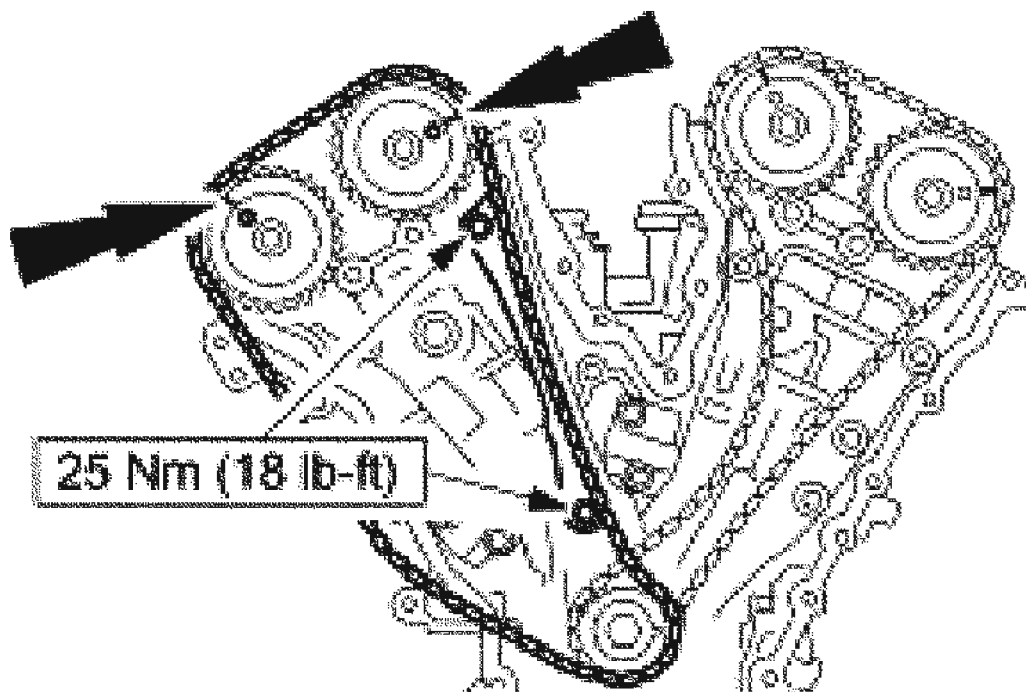
10. Verify that the RH camshafts are correctly positioned.



G02739284

**Fig. 111: Identifying RH Camshafts Position**  
Courtesy of FORD MOTOR CO.

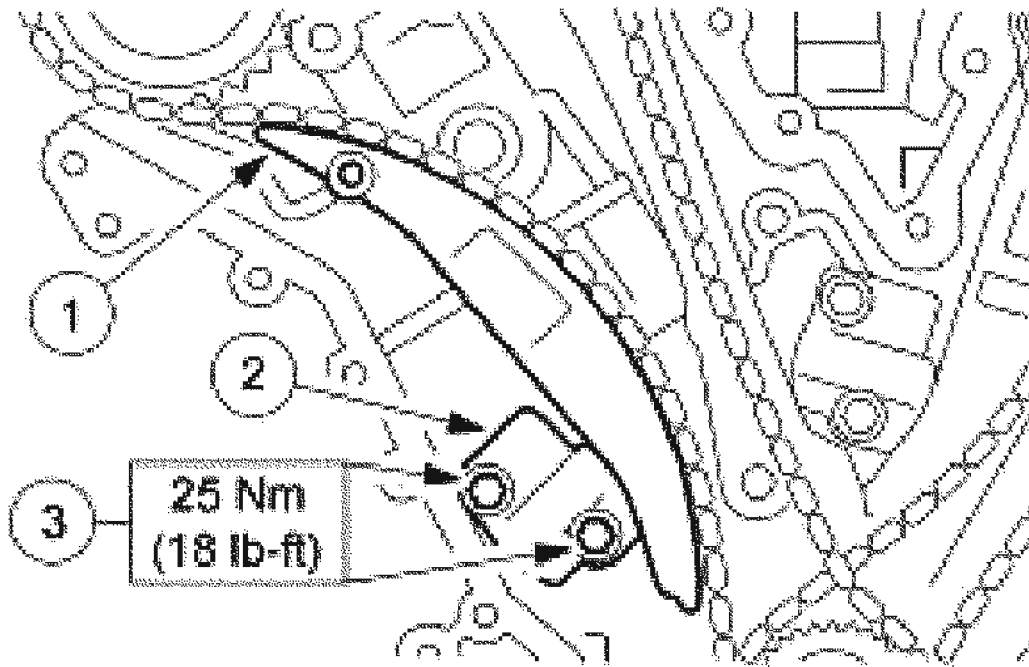
11. Position the RH timing chain and chain guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.



G02739285

**Fig. 112: Aligning Marks On Timing Chain**  
Courtesy of FORD MOTOR CO.

12. Install the RH timing chain tensioner and tensioner arm.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.

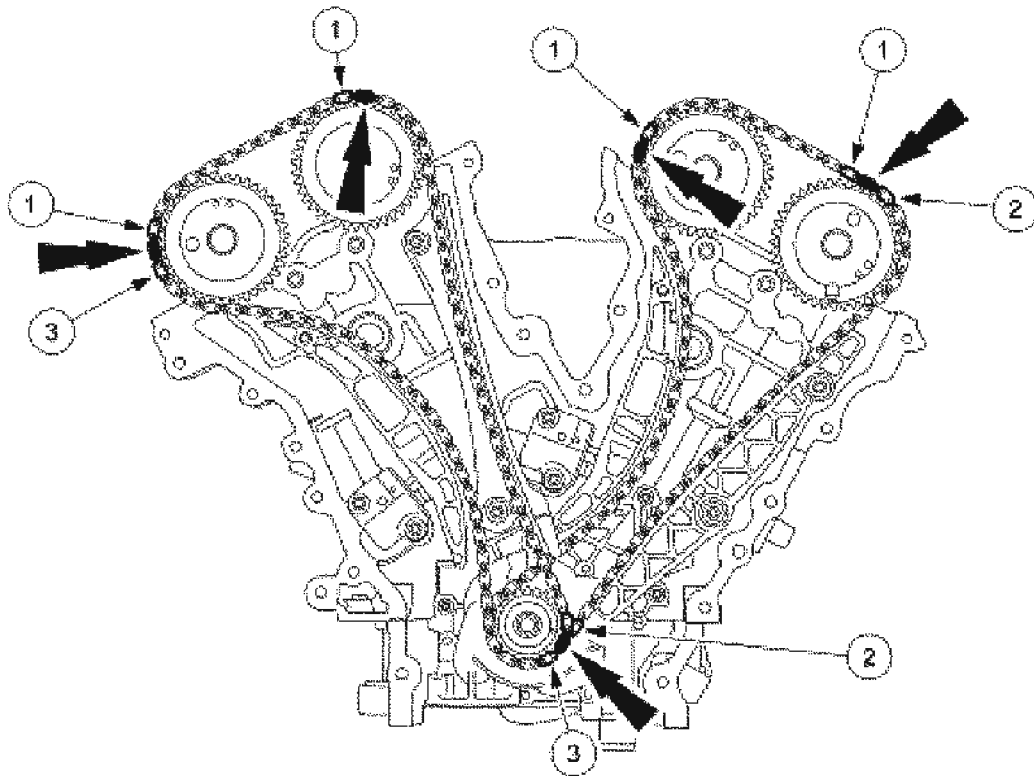


G02739286

**Fig. 113: Installing RH Timing Chain Tensioner & Tensioner Arm**  
Courtesy of FORD MOTOR CO.

13. Remove the LH and RH timing chain tensioner piston retaining wires.
14. Rotate the crankshaft counterclockwise 120 degrees to top dead center (TDC).

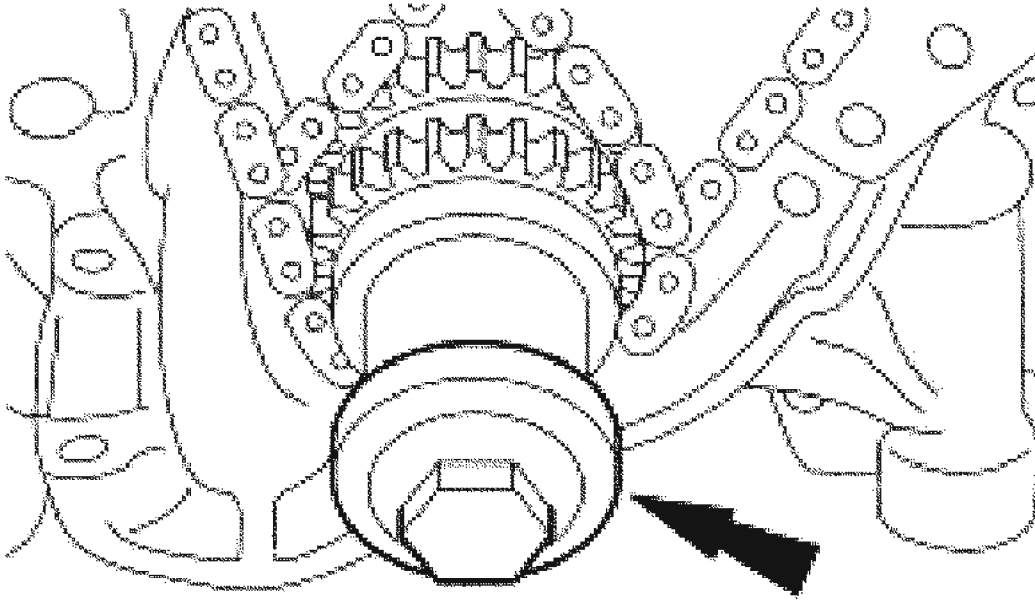
**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.



G02739287

**Fig. 114: Checking Timing Chain**  
Courtesy of FORD MOTOR CO.

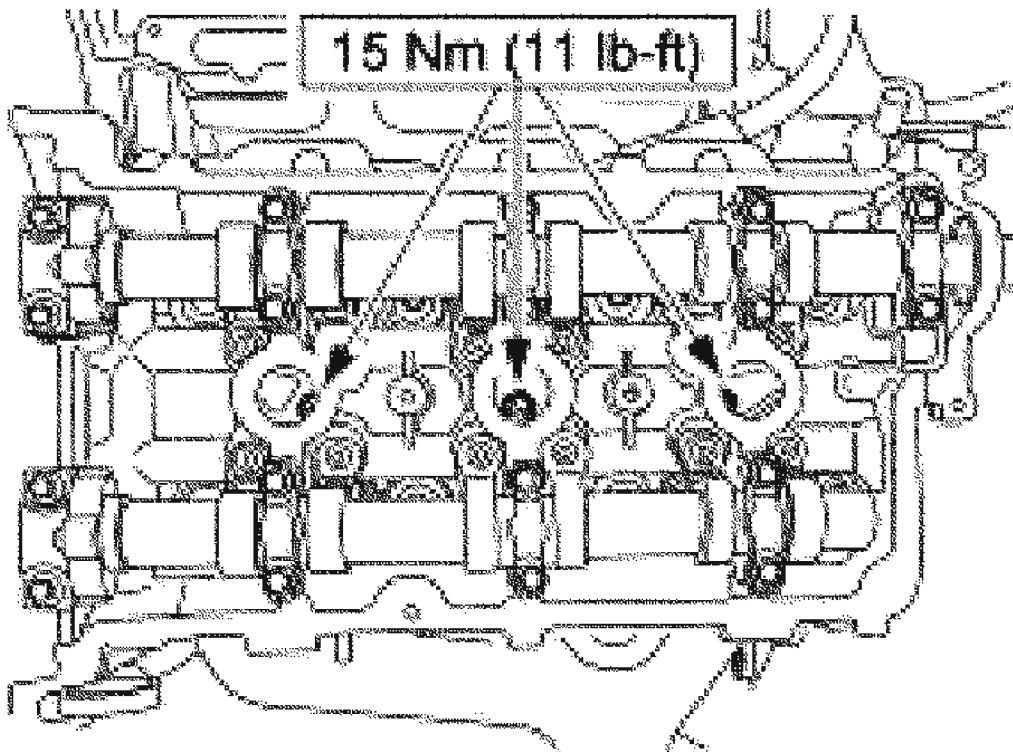
15. Verify the timing with the following steps.
  1. There should be 12 chain links between the front camshaft timing marks.
  2. There should be 27 chain links between the camshaft and crankshaft timing marks.
  3. There should be 30 chain links between the camshaft and crankshaft timing marks.
16. Remove the crankshaft damper bolt.



G02739288

**Fig. 115: Removing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

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



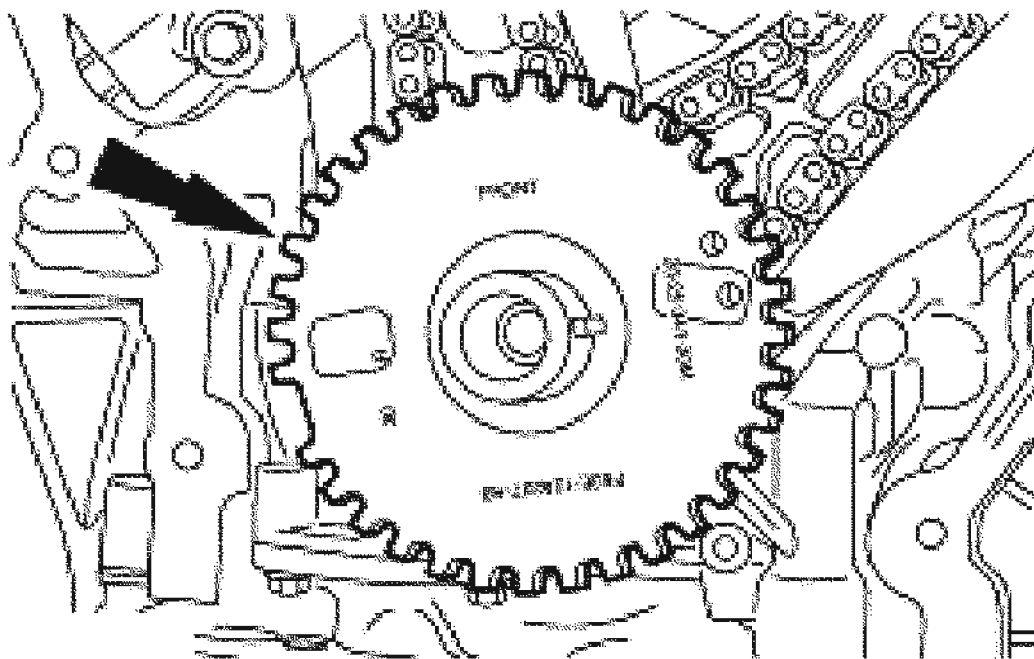
G02739289

**Fig. 116: Identifying Spark Plug Torque Specification**  
Courtesy of FORD MOTOR CO.

17. Install the LH and RH spark plugs.

**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "20-25-34Y-30M" (color blue).





G02739290

**Fig. 117: Installing Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

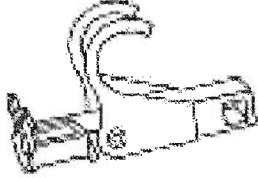
18. Install the ignition pulse wheel.
19. Install the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.

## ROLLER FOLLOWERS

### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



Compressor, Valve Spring  
303-473 (T94P-6565-BH)

G02739291

**Fig. 118: Identifying Roller Followers Special Tool**  
Courtesy of FORD MOTOR CO.

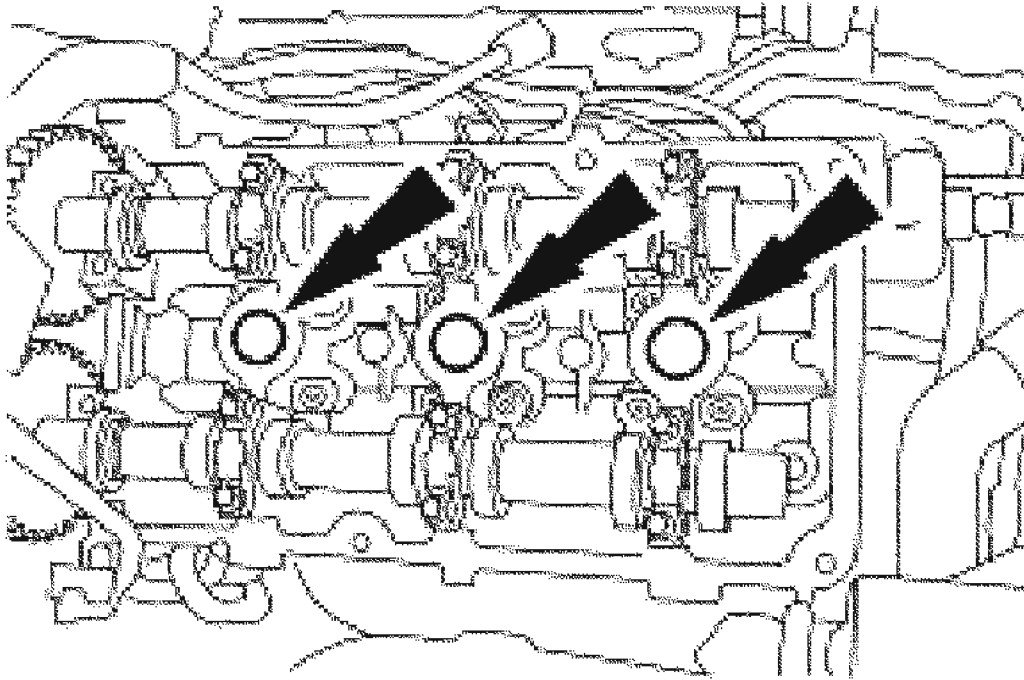
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

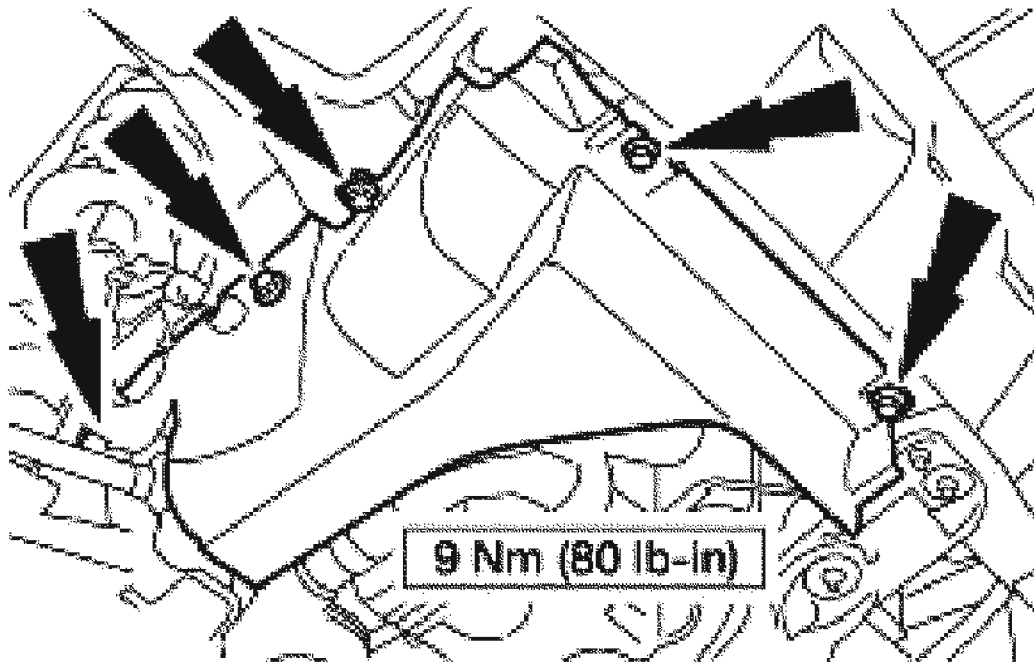
1. Remove the LH and RH valve covers. For additional information, refer to **VALVE COVER LH** and **VALVE COVER RH** .
2. Remove the LH and RH spark plugs.



**G02739292**

**Fig. 119: Removing LH And RH Spark Plugs**  
**Courtesy of FORD MOTOR CO.**

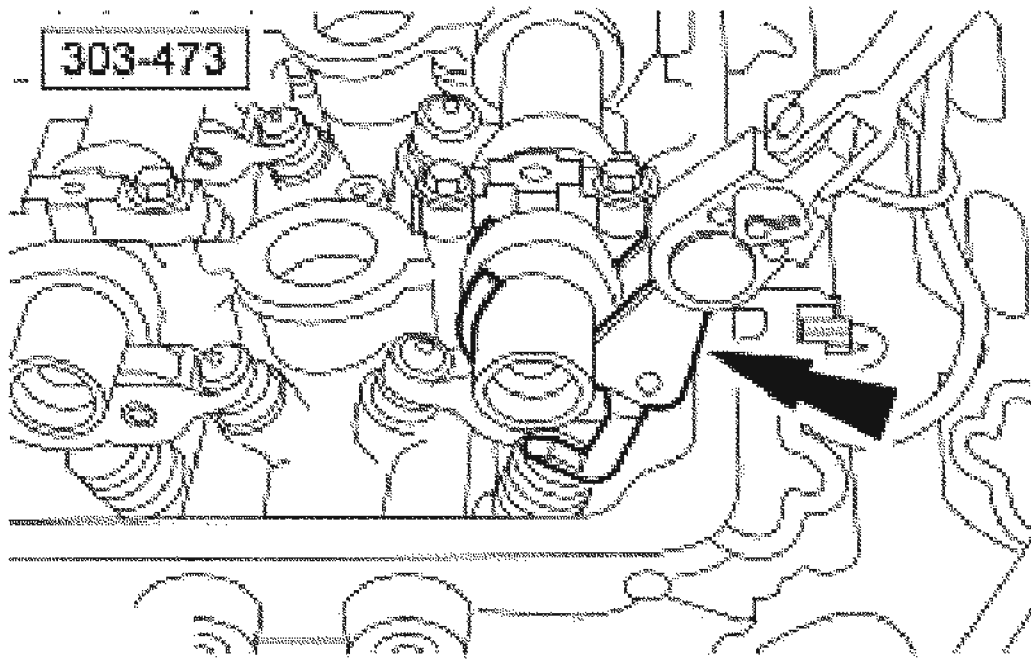
3. Remove the RH front wheel.
4. Remove the splash shield.



G02739293

**Fig. 120: Removing Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

5. Rotate the crankshaft until the camshaft lobe is pointing directly away from the follower.
6. Using the special tool, remove the followers.



G02739294

**Fig. 121: Removing Followers**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.
  - Lubricate the camshaft followers with clean engine oil.

## HYDRAULIC LASH ADJUSTERS

### Material

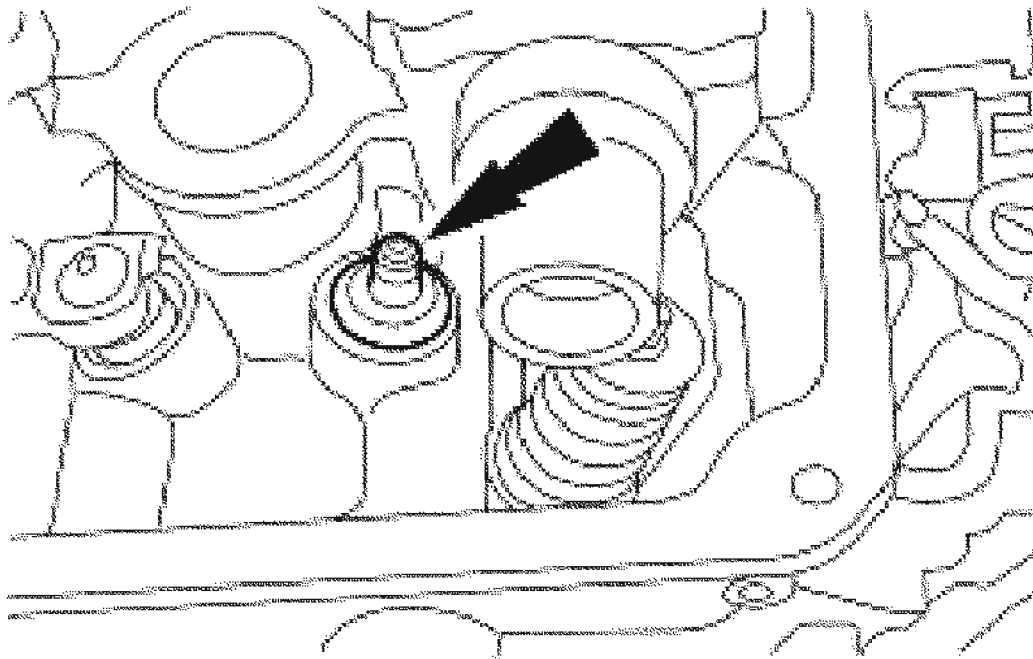
## MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

1. Remove the camshaft followers. For additional information, refer to **ROLLER FOLLOWERS**.

**NOTE:** Mark the positions of the hydraulic lash adjusters to make sure they are assembled in their original positions.



G02739295

**Fig. 122: Removing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

2. Remove the hydraulic lash adjusters.

**NOTE:**      **Inspect the hydraulic lash adjusters for scoring marks and uneven wear in the bore. Install new lash adjusters if necessary.**

3. To install, reverse the removal procedure.
  - Lubricate the hydraulic lash adjusters with clean engine oil.

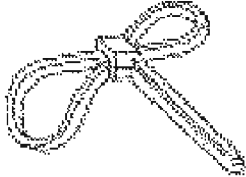

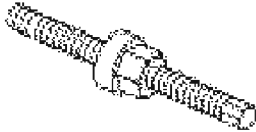
## CRANKSHAFT PULLEY

### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

<http://vnx.su>

	Strap Wrench 303-D055 (D85L-6000-A), or equivalent
	Remover, Crankshaft Vibration Damper 303-009 (T58P-6316-D)
	Installer, Crankshaft Vibration Damper 303-102 (T74P-6316-B)

G02739296

**Fig. 123: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

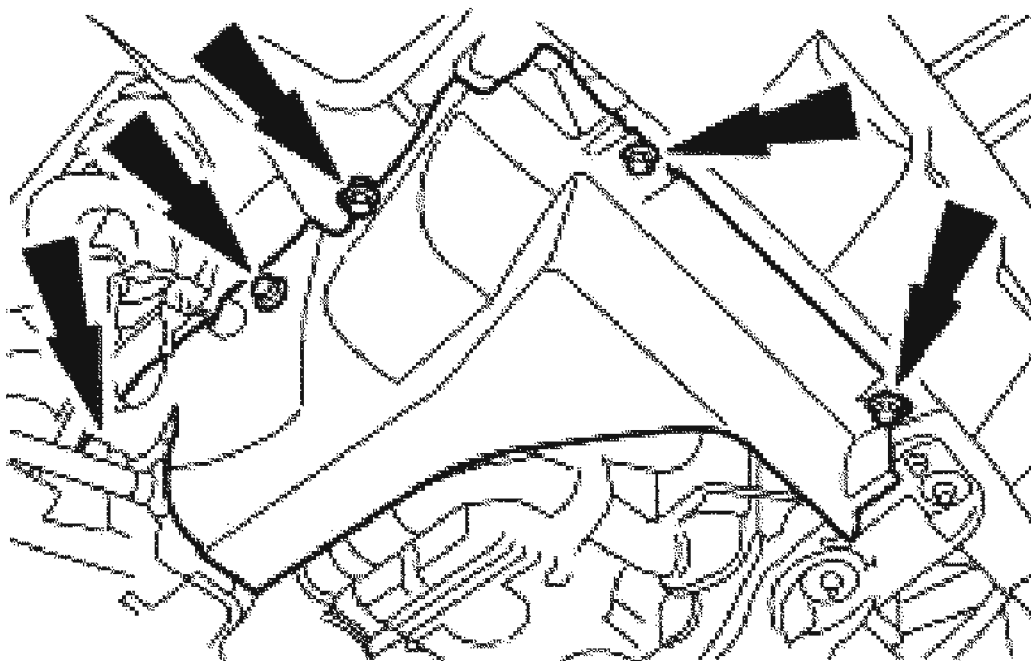
### Material

### MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal and Installation

1. Remove the accessory drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING** .
2. Remove the splash shield.

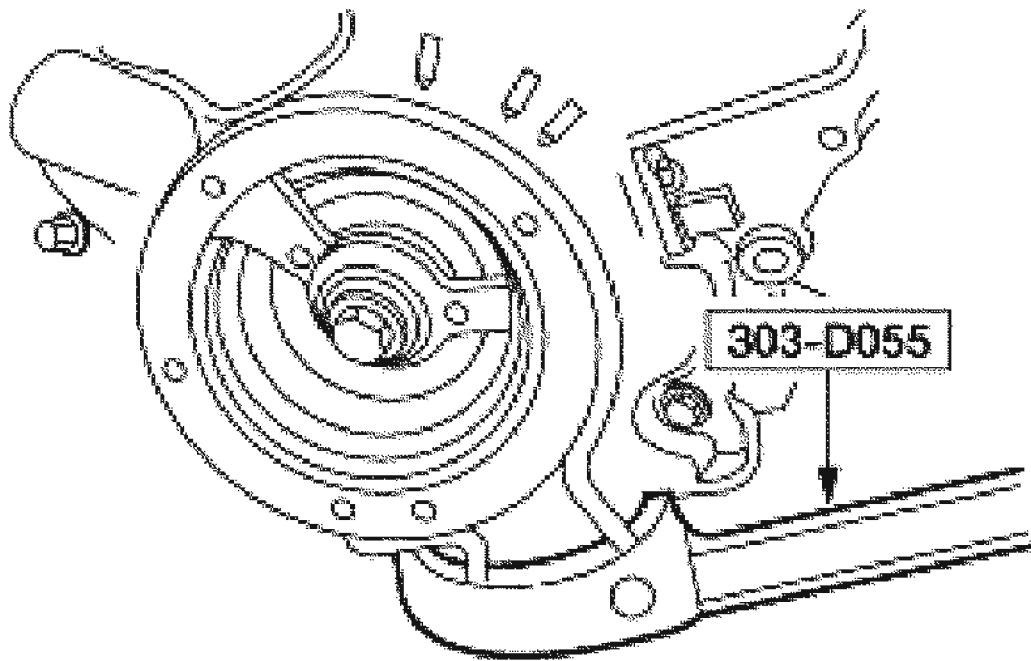


G02739297

**Fig. 124: Removing Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

3. Install the special tool.

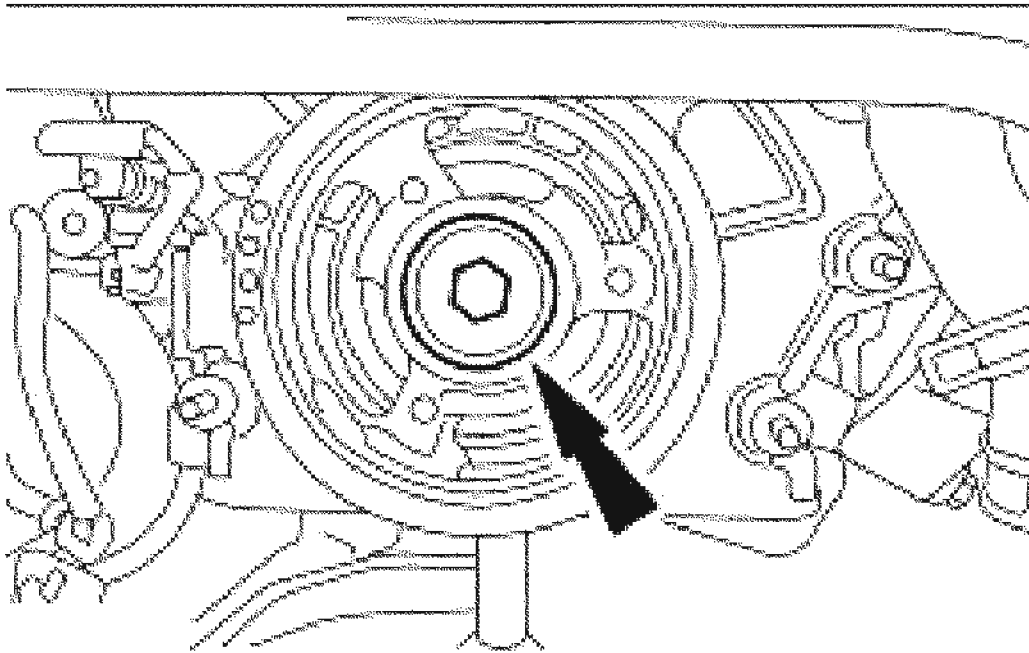




G02739298

**Fig. 125: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

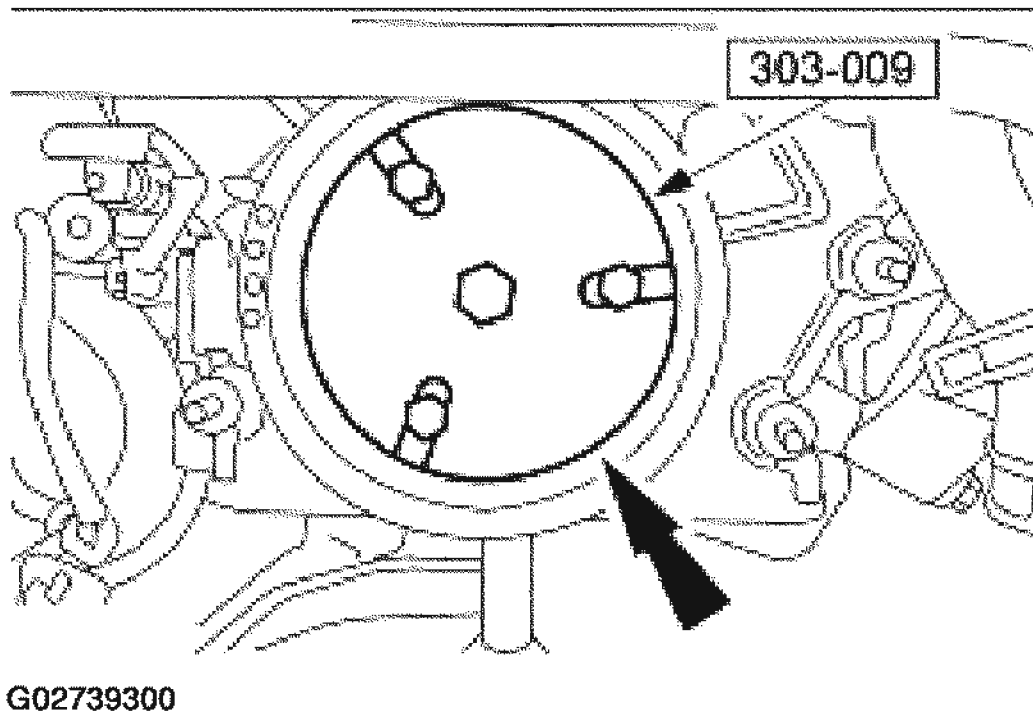
4. Remove the crankshaft pulley bolt and washer.



G02739299

**Fig. 126: Removing Crankshaft Pulley Bolt And Washer**  
Courtesy of FORD MOTOR CO.

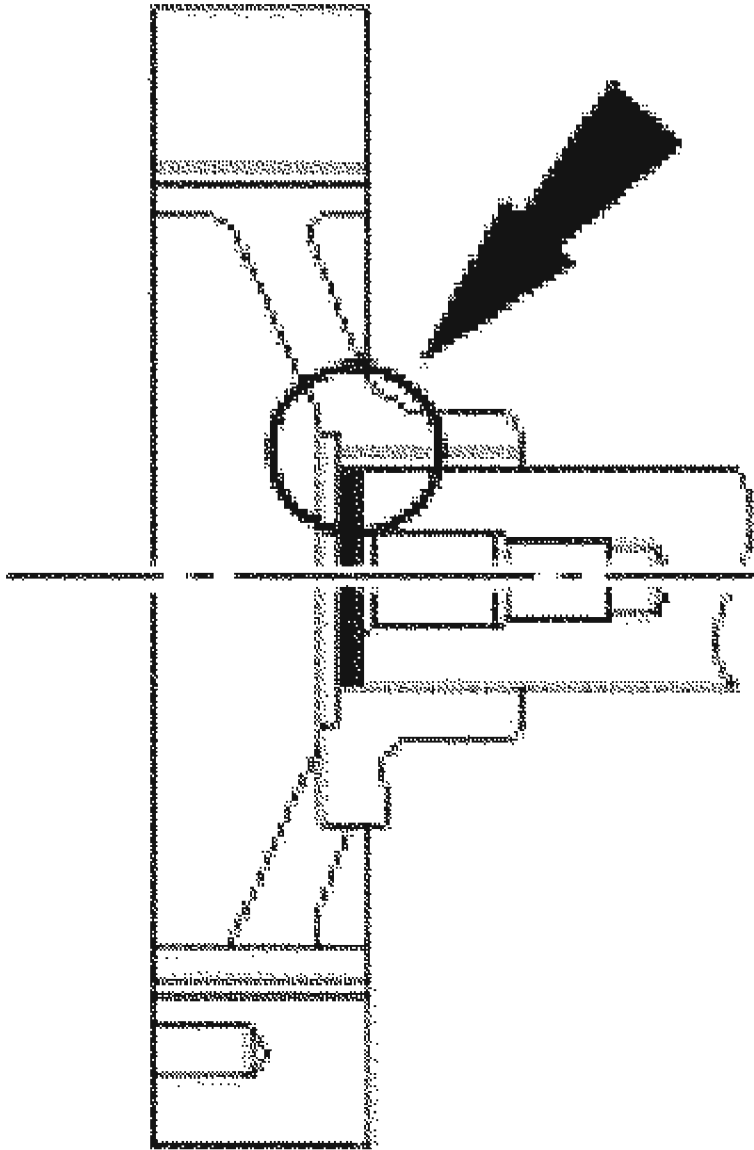
5. Using the special tool, remove the crankshaft pulley.



**Fig. 127: Removing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

**Installation**

- NOTE:** Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealer.
- NOTE:** Seal surfaces must be free of dirt and oil.
- NOTE:** The crankshaft pulley must be installed within four minutes of applying the silicone gasket and sealer.

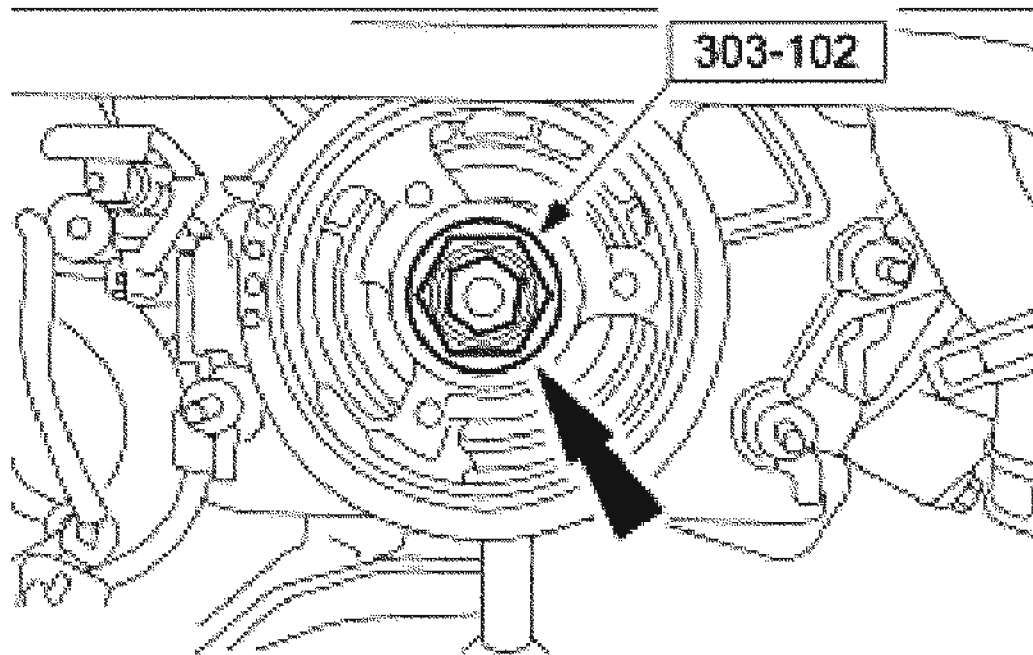


G02739301

**Fig. 128: Identifying End Of Keyway Slot**  
Courtesy of FORD MOTOR CO.

1. Apply silicone gasket and sealant to the end of the keyway slot.

**NOTE:** Lubricate the outside diameter sealing surface of the crankshaft pulley with clean engine oil.

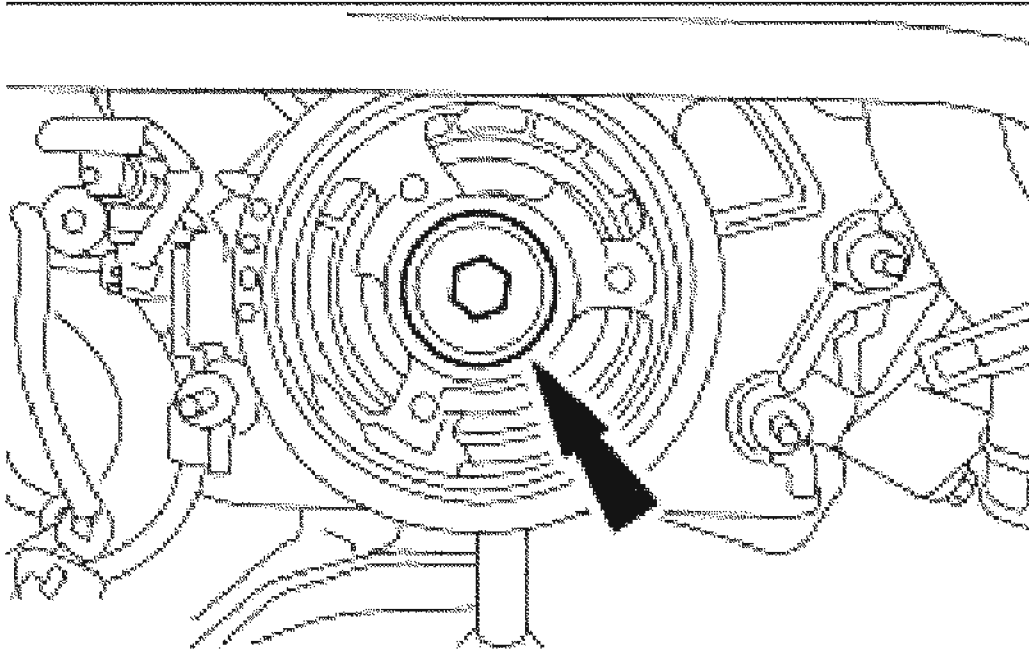


G02739302

**Fig. 129: Installing Crankshaft Pulley**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the crankshaft pulley.

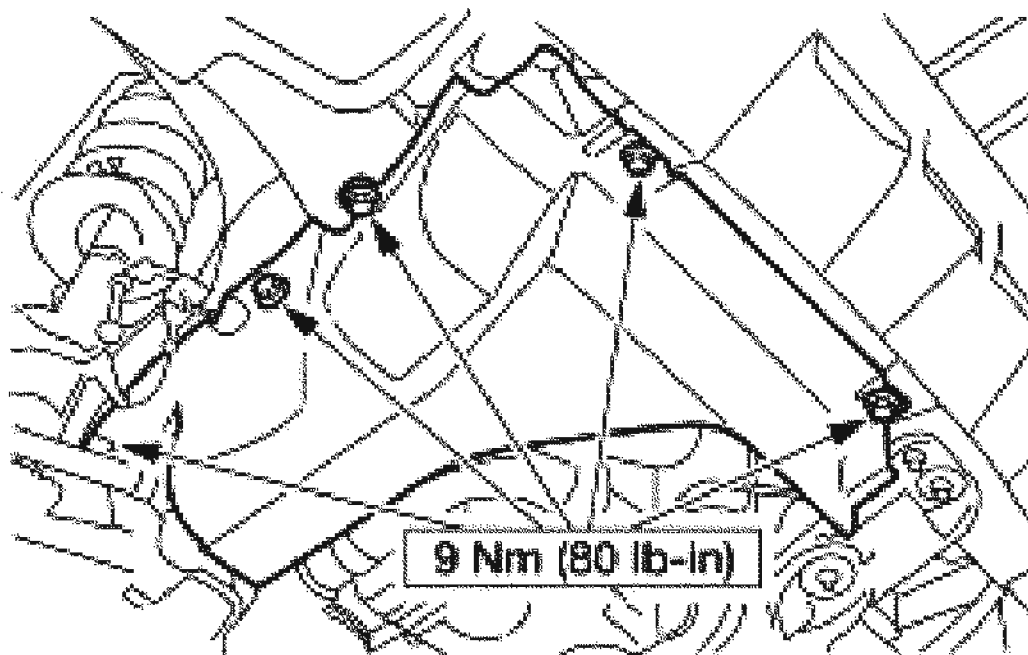
**NOTE:** Use an appropriate strap wrench to hold the crankshaft pulley.



G02739303

**Fig. 130: Installing Bolt And Washer**  
Courtesy of FORD MOTOR CO.

3. Install the bolt and the washer and tighten in four stages.
  - Stage 1: Tighten to 120 Nm (86 lb-ft).
  - Stage 2: Loosen 360 degrees.
  - Stage 3: Tighten to 50 Nm (37 lb-ft).
  - Stage 4: Tighten an additional 90 degrees.
4. Install RH front inner splash shield.



G02739304

**Fig. 131: Identifying RH Front Inner Splash Shield Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

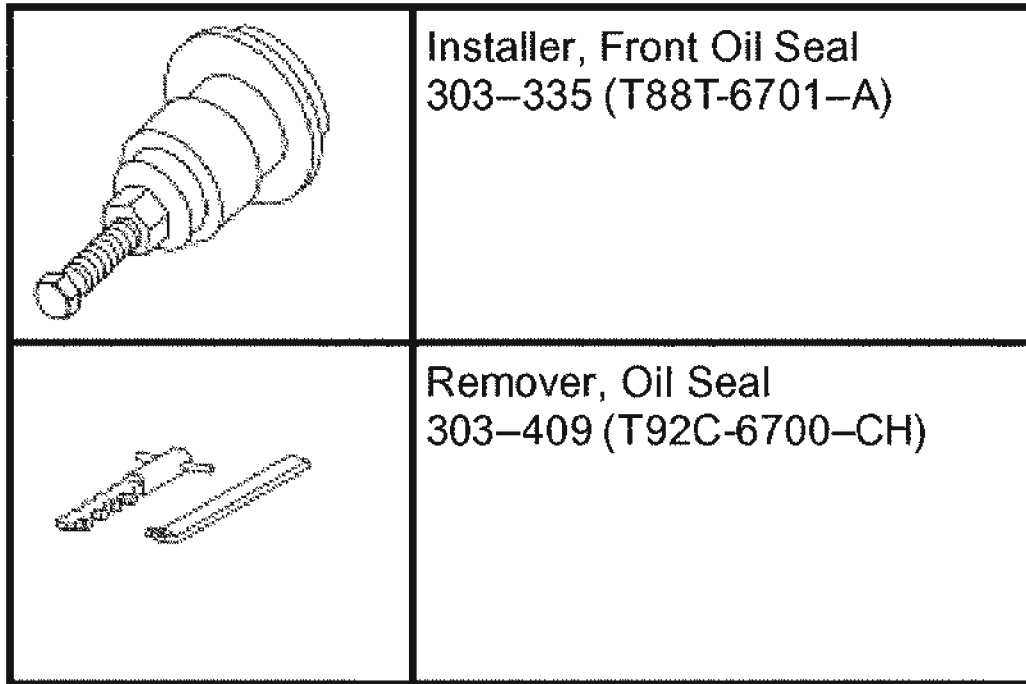
5. Install the accessory drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING** .

#### CRANKSHAFT FRONT OIL SEAL

Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739305

**Fig. 132: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Material

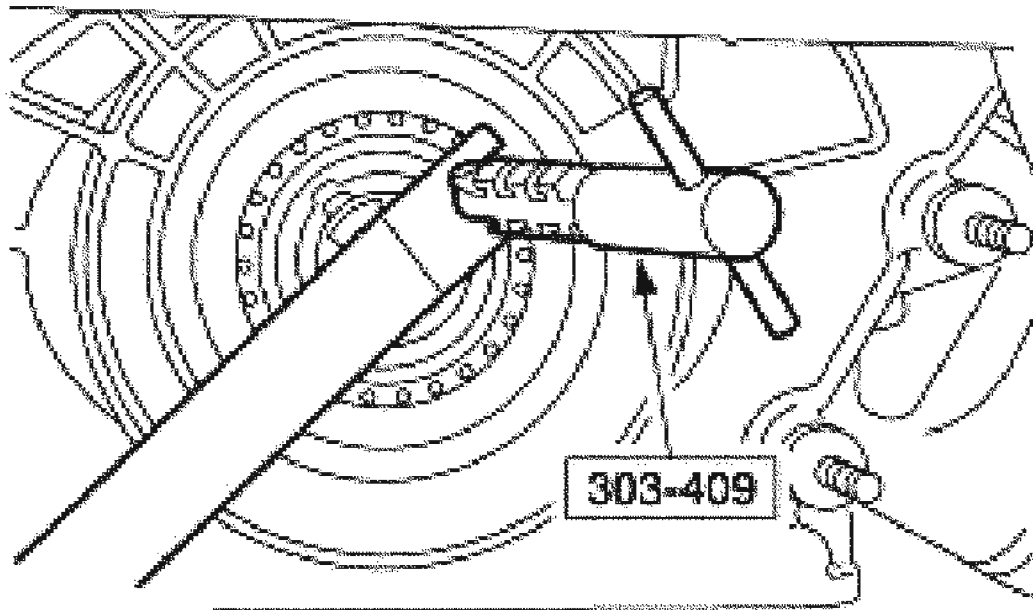
### MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY** .
2. Using the special tool, remove the crankshaft front oil seal and discard.





G02739306

**Fig. 133: Removing Crankshaft Front Oil Seal**  
Courtesy of FORD MOTOR CO.

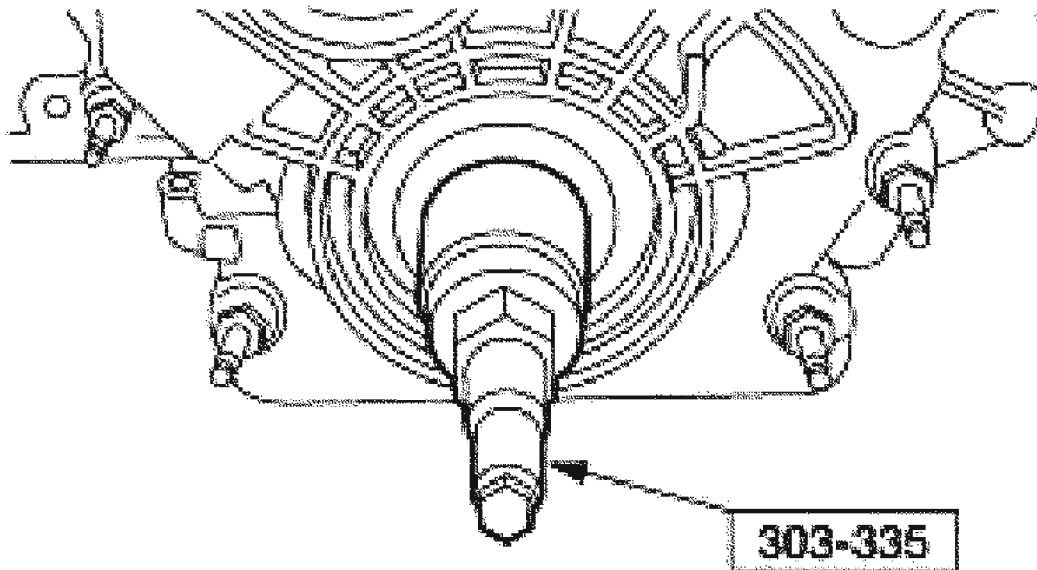
#### Installation

**NOTE:** Clean all sealing surfaces with metal surface cleaner.

1. Apply clean engine oil to the seal before installing the seal.
2. Using the special tool, install the crankshaft front oil seal.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



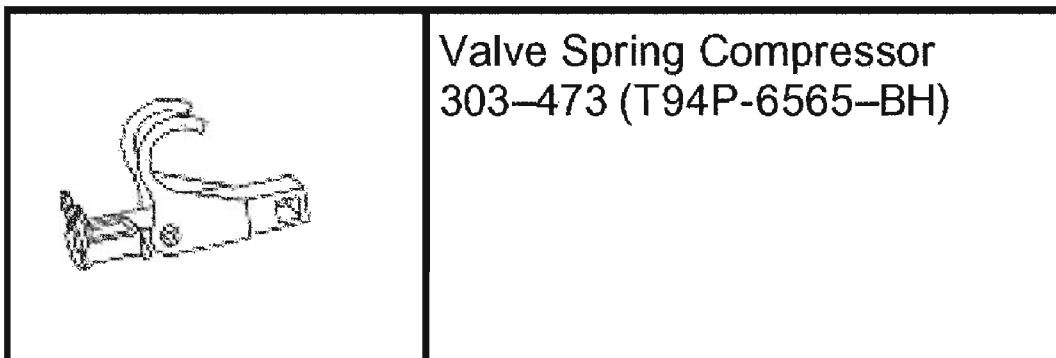
G02739307

**Fig. 134: Installing Crankshaft Front Oil Seal**  
Courtesy of FORD MOTOR CO.

3. Install the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY**.

### VALVE SPRING

#### Special Tool(s)



G02739308

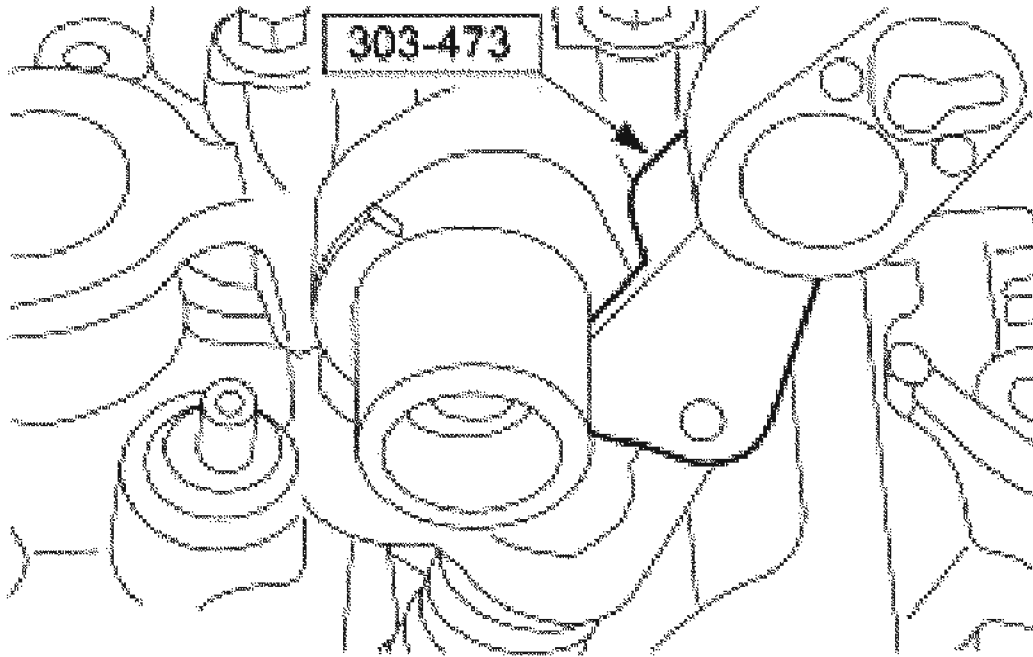
**Fig. 135: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal and Installation**

1. Remove the roller followers. For additional information, refer to **ROLLER FOLLOWERS**.

**NOTE:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve(s) to fall into the cylinder. A rubber band, tape or string wrapped around the end of the valve stem will prevent this from happening.

2. Pressurize the cylinder using compressed air.
3. Using the special tool, remove the key, retainer, and valve spring.

**G02739309**

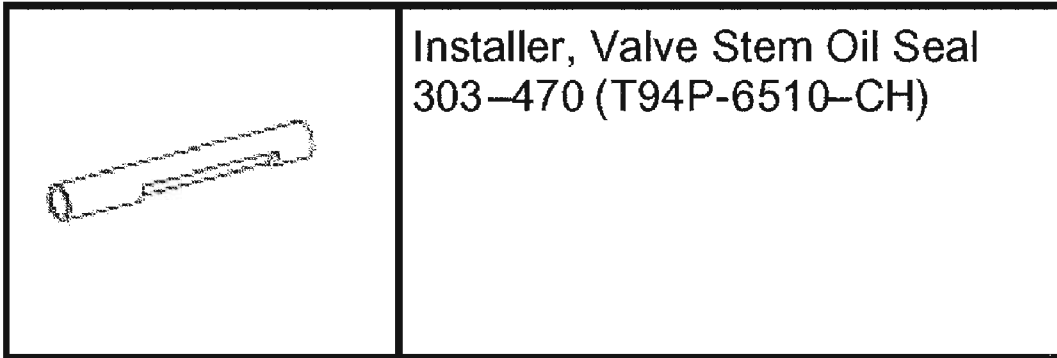
**Fig. 136: Removing Key, Retainer, And Valve Spring**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

**VALVE SEALS****Special Tool(s)**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739310

**Fig. 137: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

### Material

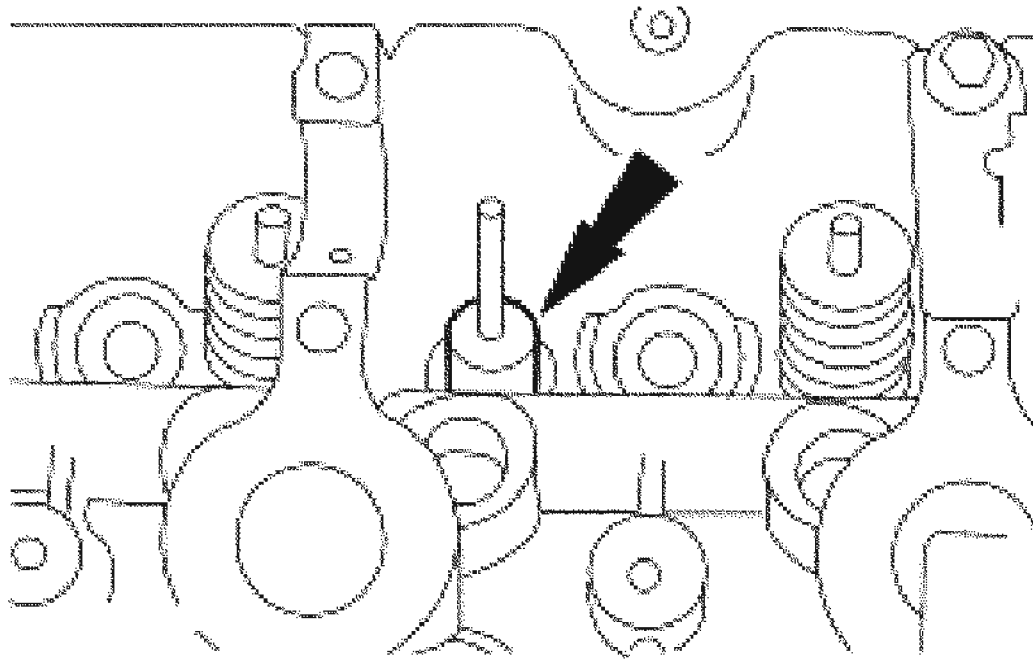
### MATERIAL SPECIFICATION

Item	Specification
SAE5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Remove the valve spring. Refer to VALVE SPRING .

**NOTE:** Camshaft removed for clarity.



G02739311

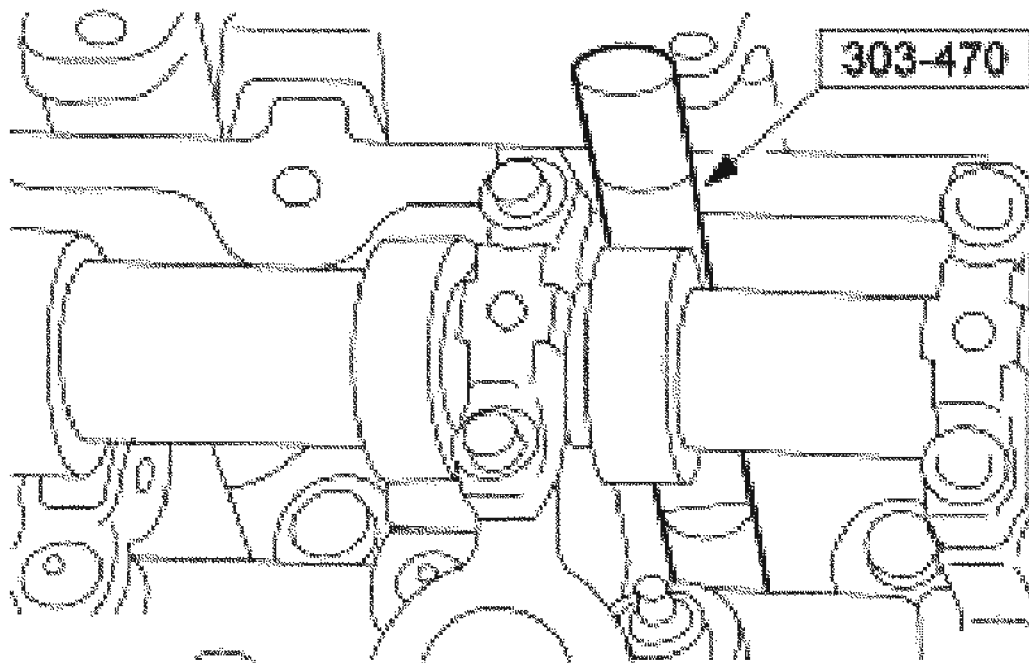
**Fig. 138: Removing Valve Seal**  
Courtesy of FORD MOTOR CO.

2. Remove the valve seal.

#### Installation

**NOTE:** Lubricate the valve guide with clean engine oil.

1. Using the special tool, install the valve seal.



G02739312

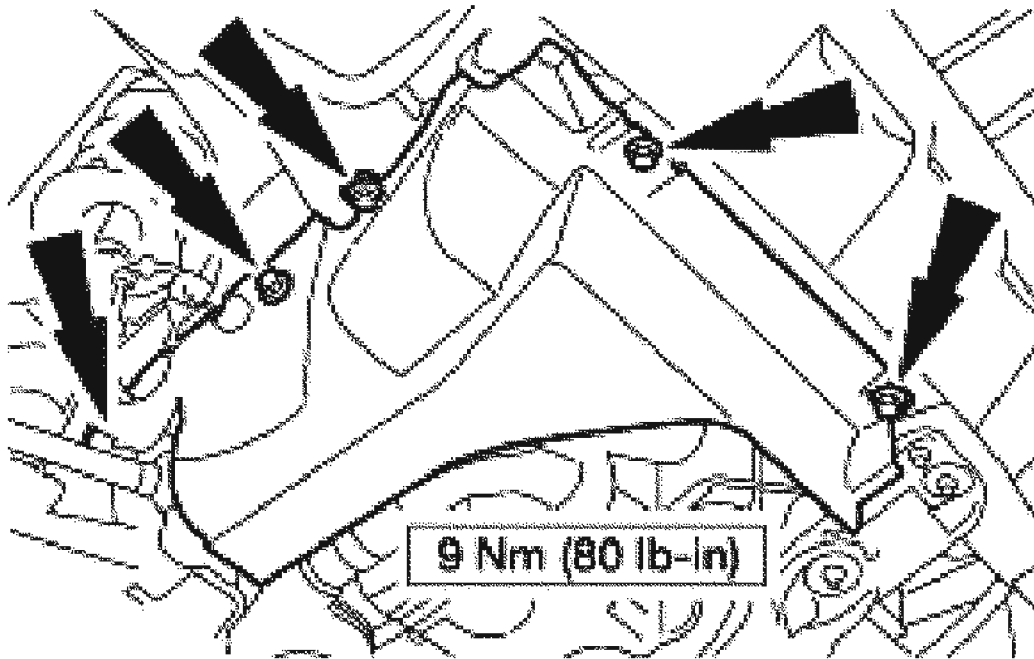
**Fig. 139: Installing Valve Seal**  
Courtesy of FORD MOTOR CO.

2. Install the valve spring. Refer to VALVE SPRING .

## EXHAUST MANIFOLD LH

### Removal

1. Remove the LH heated oxygen sensor (HO2S) and the LH catalyst monitor. For additional information, refer to ELECTRONIC ENGINE CONTROLS .
2. Remove the bolts and the splash shield.



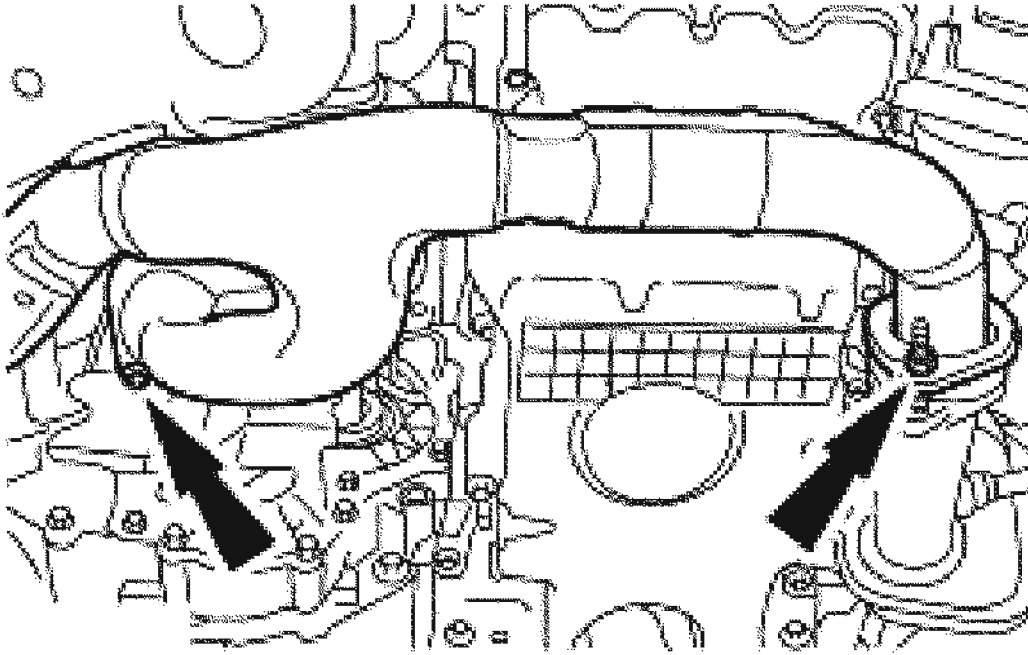
G02739313

**Fig. 140: Removing Bolts And Splash Shield**  
Courtesy of FORD MOTOR CO.

3. Remove the nuts and position the exhaust crossover aside.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

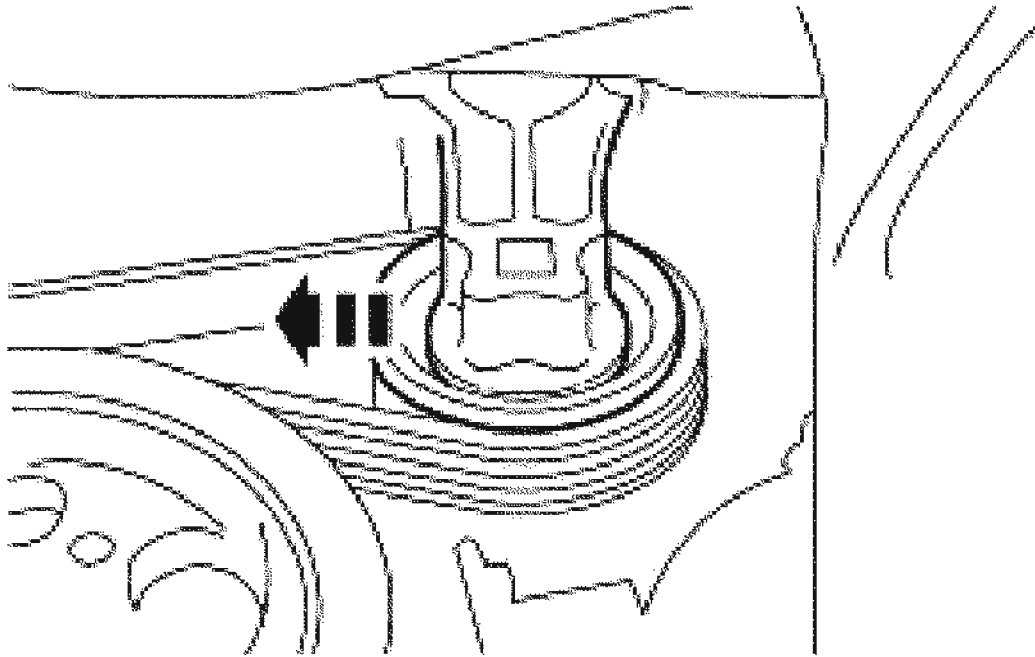


G02739314

**Fig. 141: Removing Nuts And Positioning Exhaust Crossover Aside**  
Courtesy of FORD MOTOR CO.

4. Rotate the accessory drive belt tensioner clockwise, and remove the belt.

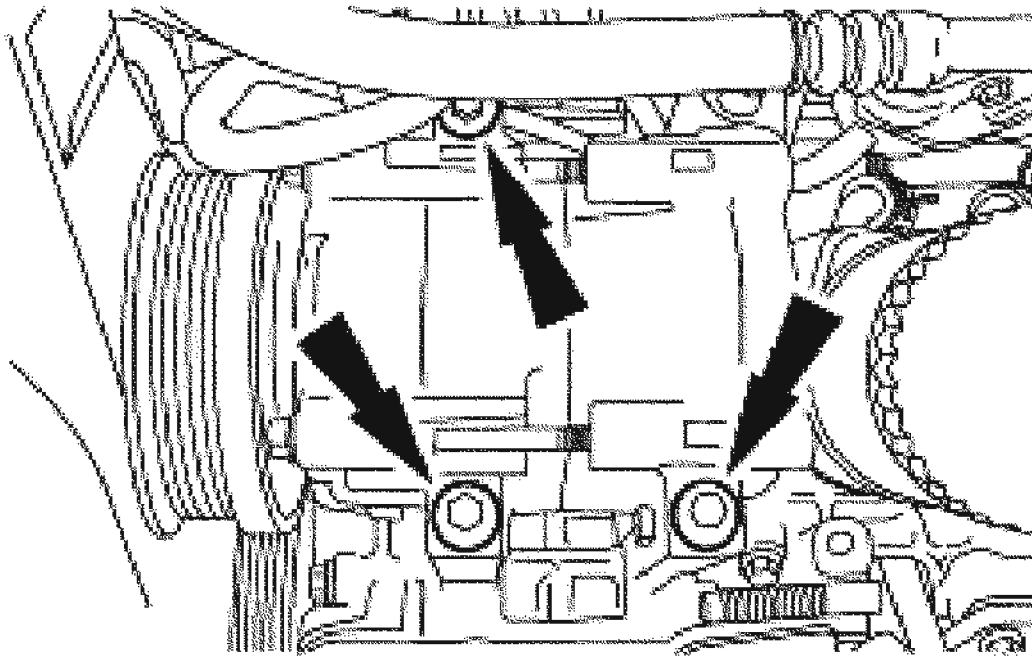




G02739315

**Fig. 142: Rotating Accessory Drive Belt Tensioner Clockwise**  
Courtesy of FORD MOTOR CO.

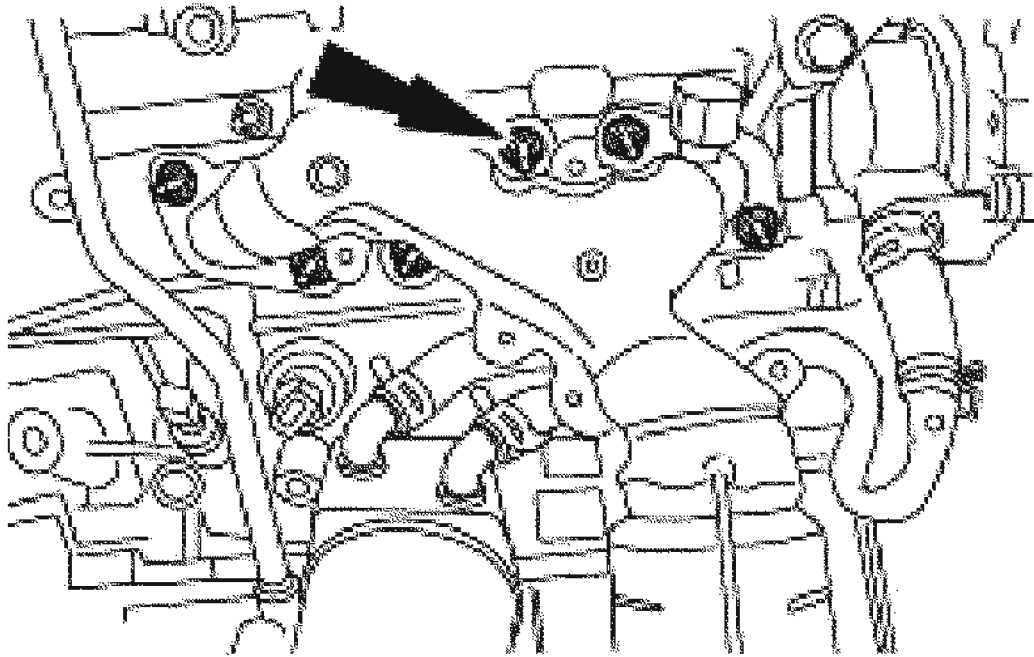
5. Remove the A/C compressor bolts and position aside.



G02739316

**Fig. 143: Removing A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

6. Remove the nuts and LH exhaust manifold and discard the gasket.

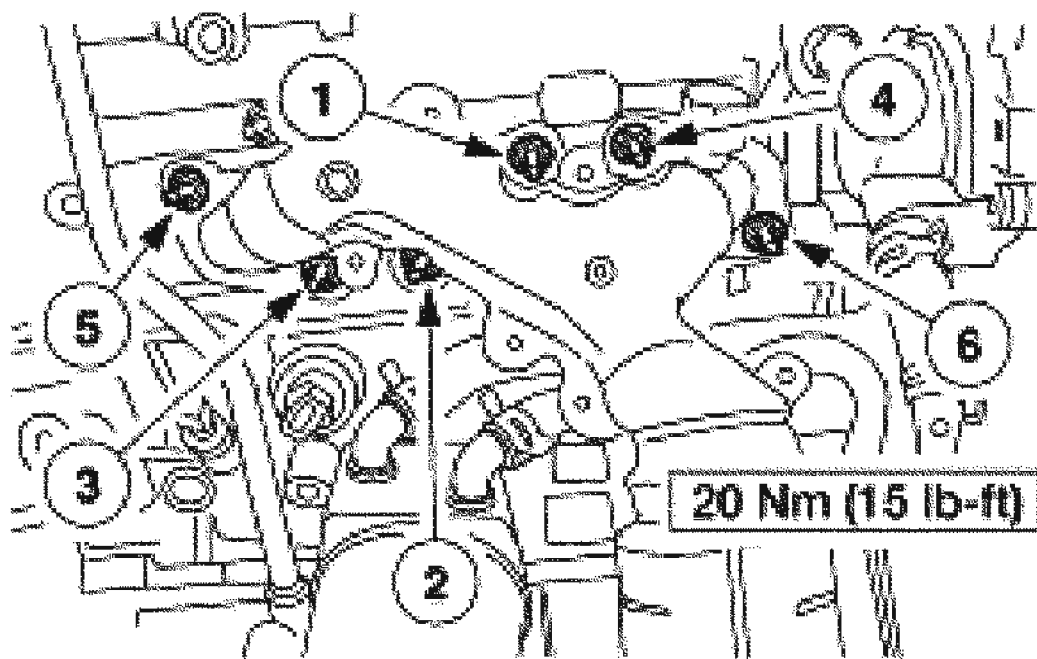


G02739317

**Fig. 144: Removing Nuts And LH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Position a new gasket and tighten the exhaust manifold in the sequence shown.

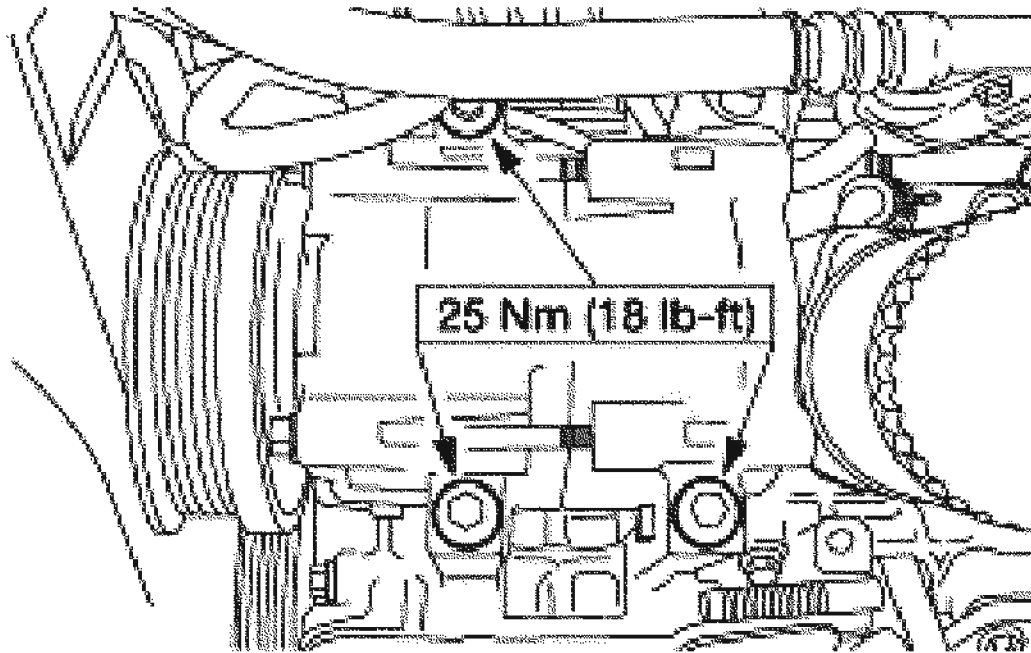


G02739318

**Fig. 145: Identifying Tightening Sequence & Torque Specification Of Exhaust Manifold Bolts**

**Courtesy of FORD MOTOR CO.**

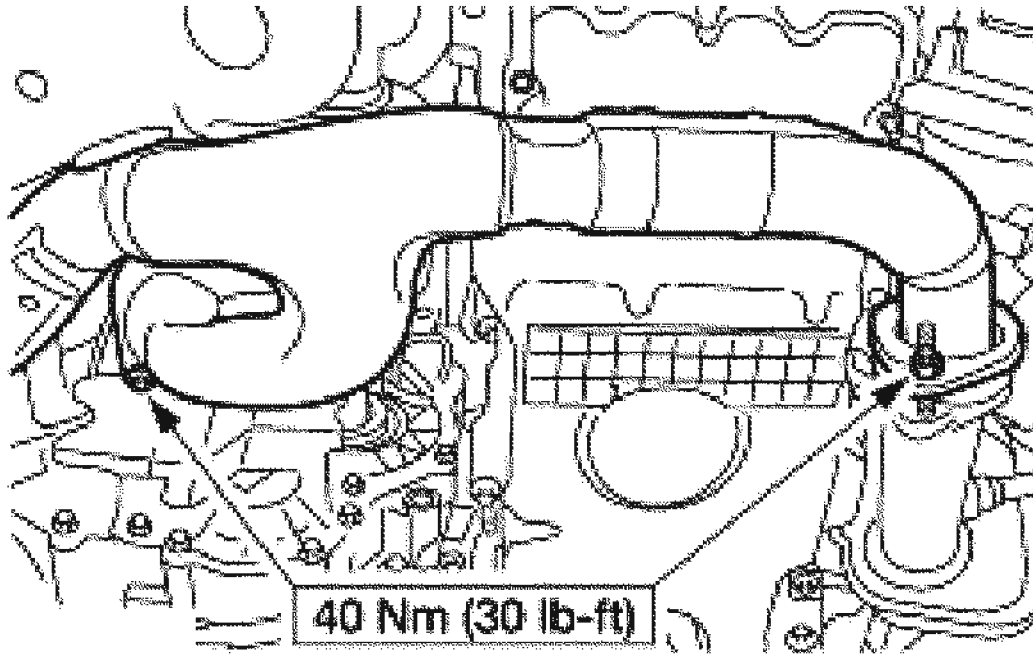
2. Position the A/C compressor and install the bolts.



G02739319

**Fig. 146: Identifying A/C Compressor Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

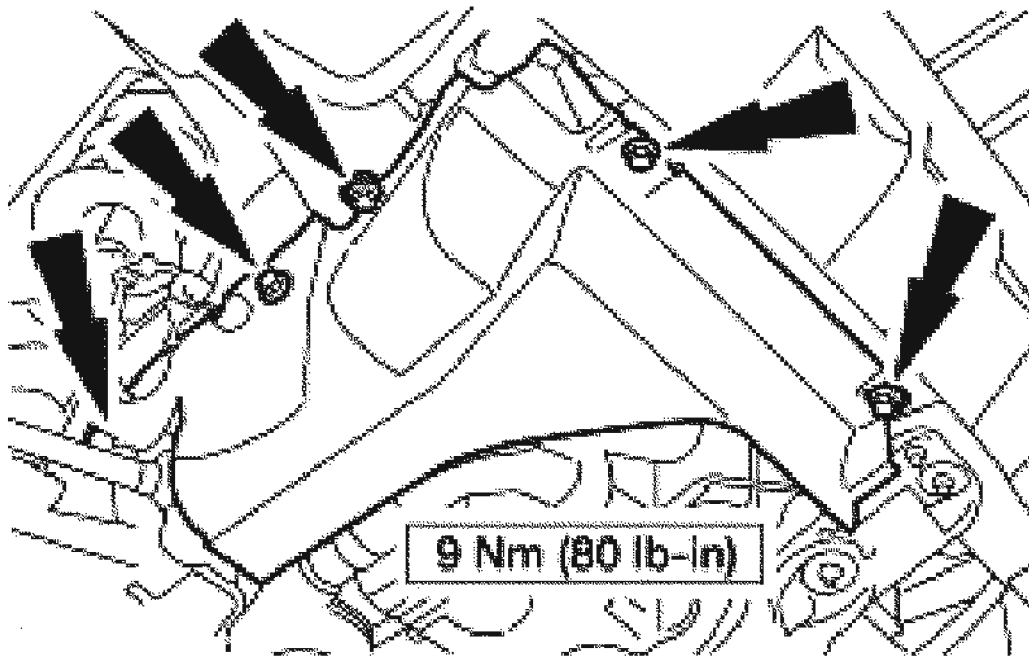
3. Rotate the accessory drive belt tensioner clockwise and install the belt. For correct drive belt installation, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**.
4. Position the exhaust crossover, and install the nuts.



G02739320

**Fig. 147: Identifying Exhaust Crossover Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

5. Install the splash shield.



G02739321

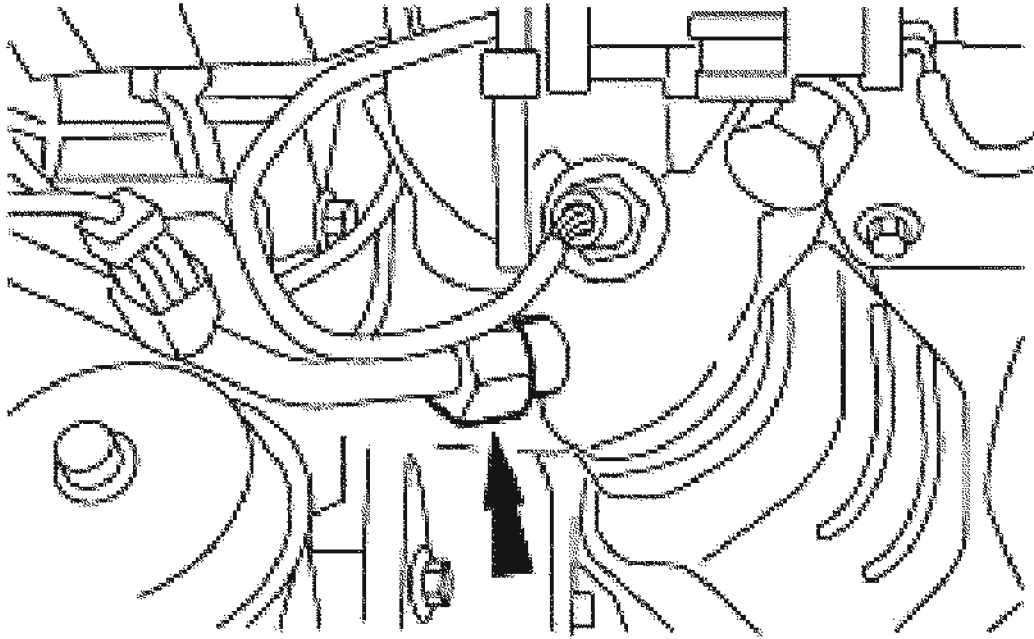
**Fig. 148: Identifying Splash Shield Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Install the LH HO2S and the LH catalyst monitor. For additional information, refer to **ELECTRONIC ENGINE CONTROLS**.

## EXHAUST MANIFOLD RH

### Removal

1. Remove the generator. For additional information, refer to **GENERATORS & REGULATORS**.
2. Remove the exhaust flexible pipe. For additional information, refer to **EXHAUST SYSTEM**.
3. Disconnect the RH heated oxygen sensor (HO2S) electrical connector.
4. Disconnect the exhaust gas recirculation (EGR) tube nut to the exhaust manifold.

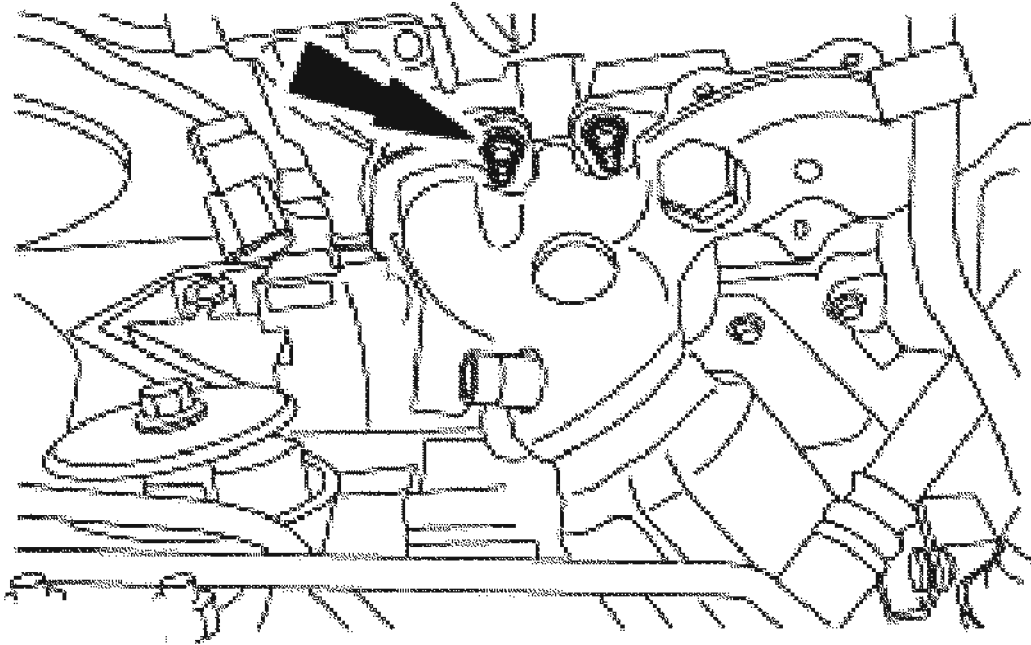


G02739322

**Fig. 149: Disconnecting Exhaust Gas Recirculation (EGR) Tube Nut**  
Courtesy of FORD MOTOR CO.

5. Remove the RH manifold.
  - Discard the gasket.



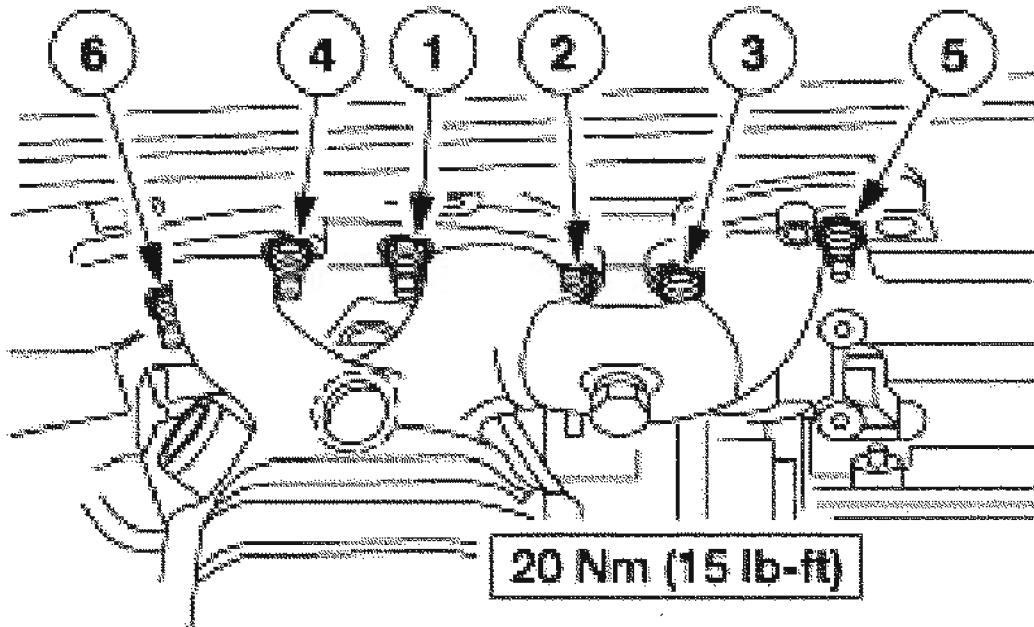


G02739323

**Fig. 150: Removing RH Manifold**  
Courtesy of FORD MOTOR CO.

**Installation**

1. Position a new gasket and install the exhaust manifold nuts in the sequence shown.

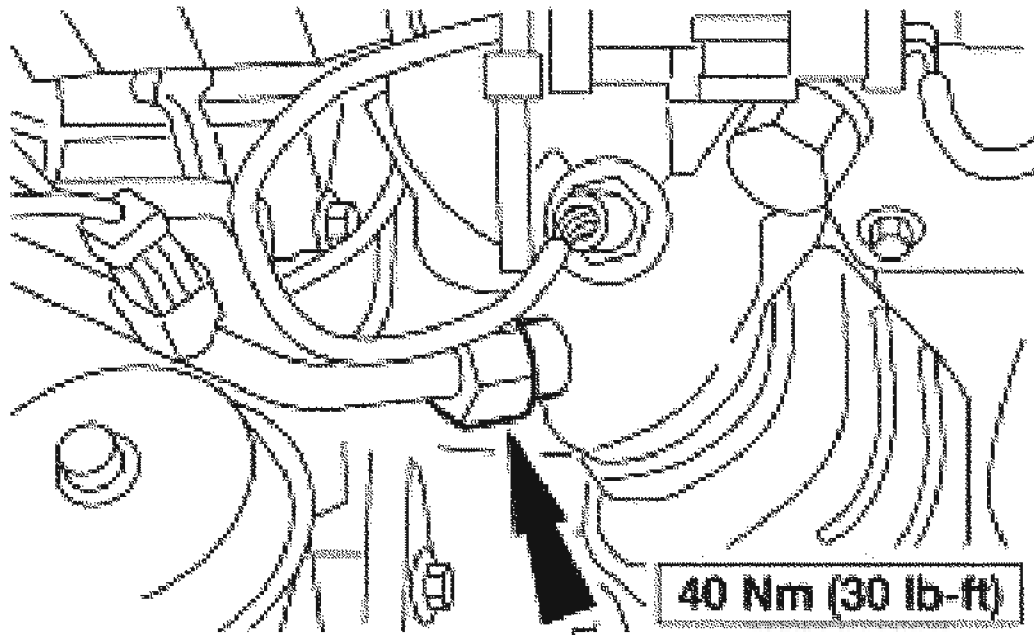


G02739324

**Fig. 151: Identifying Exhaust Manifold Nuts Installing Sequence & Torque Specification**

**Courtesy of FORD MOTOR CO.**

2. Connect the EGR tube nut to the exhaust manifold.



G02739325

**Fig. 152: Identifying EGR Tube Nut Torque Specification**  
Courtesy of FORD MOTOR CO.

3. Connect the RH HO2S electrical connector.
4. Install the exhaust flexible pipe. For additional information, refer to **EXHAUST SYSTEM**.
5. Install the generator. For additional information, refer to **GENERATORS & REGULATORS**.

## CYLINDER HEAD LH

### Material

### MATERIAL SPECIFICATION

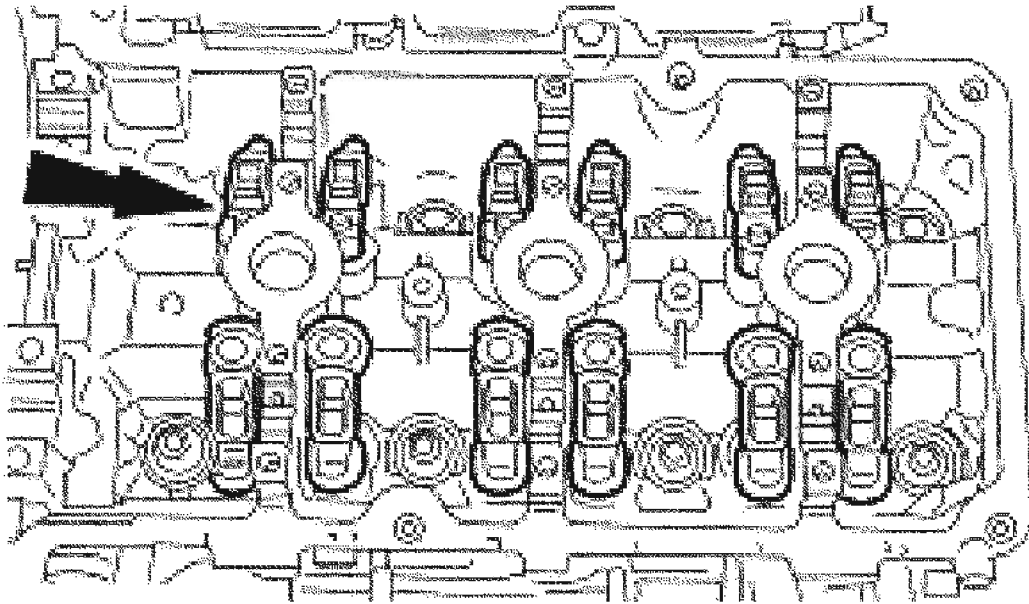
Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal

1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.

2. Remove the coolant bypass tube. For additional information, refer to **ENGINE COOLING**.
3. Remove the LH camshafts. For additional information, refer to **CAMSHAFTS LH** in this section.

**CAUTION:** The camshaft followers must be installed in their original position.

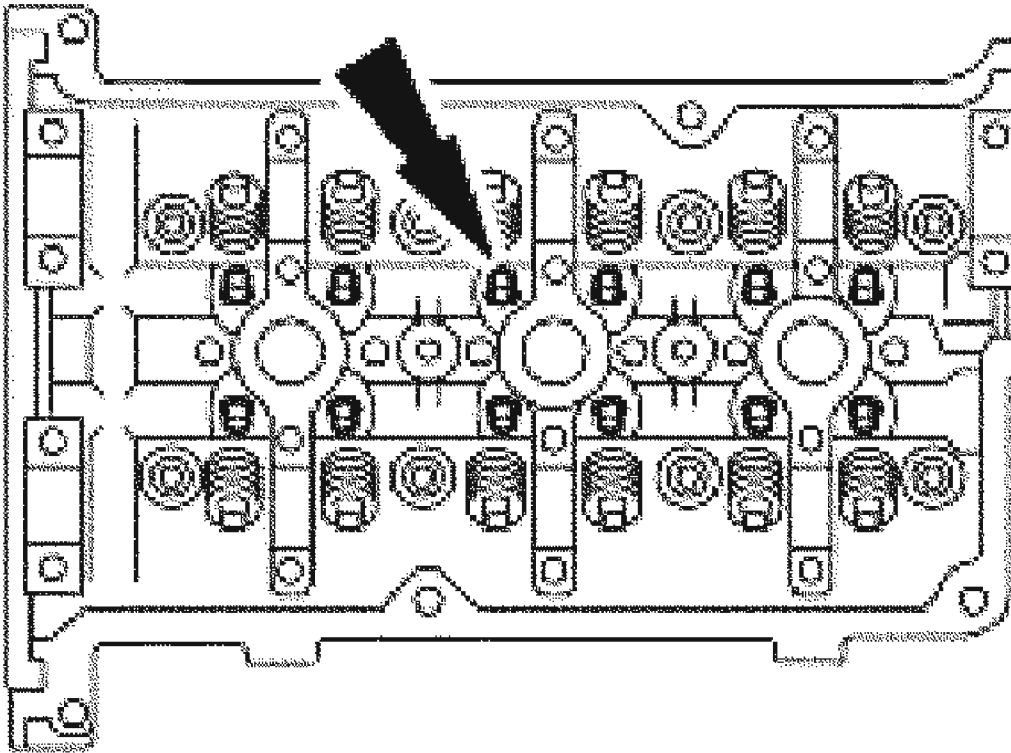


G02739326

**Fig. 153: Removing Camshaft Followers**  
Courtesy of FORD MOTOR CO.

4. Remove the camshaft followers.

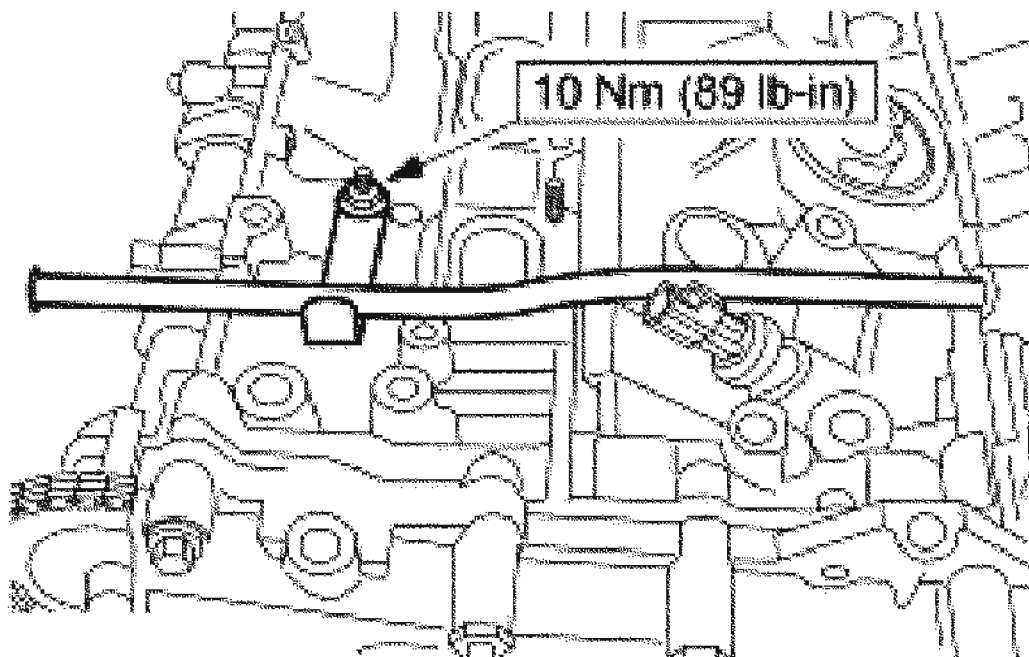
**CAUTION:** The hydraulic lash adjusters must be installed in their original position.



G02739327

**Fig. 154: Removing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

5. Remove the hydraulic lash adjusters.
6. Position the water pump and housing aside. For additional information, refer to **ENGINE COOLING** .
7. Raise and support the vehicle on a hoist. For additional information, refer to **JACKING & LIFTING** .
8. Remove the LH exhaust manifold. For additional information, refer to **EXHAUST MANIFOLD LH** .
9. Remove the oil level indicator tube stud bolt.



G02739328

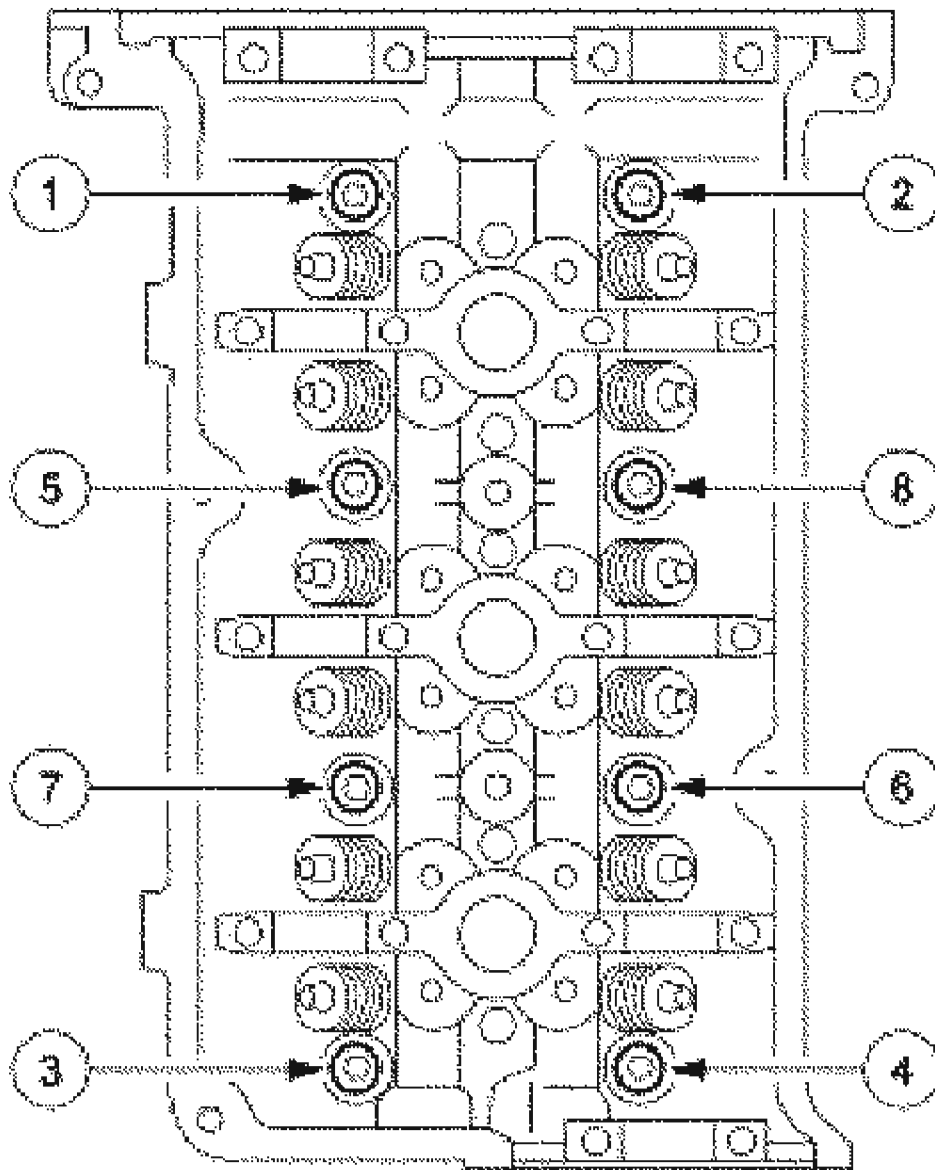
**Fig. 155: Removing Oil Level Indicator Tube Stud Bolt**  
Courtesy of FORD MOTOR CO.

10. Lower the vehicle.

**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739329

**Fig. 156: Identifying Bolt Removal Sequence**  
Courtesy of FORD MOTOR CO.

11. Remove the bolts in the sequence shown and remove the cylinder head.
  - Discard the gasket and the bolts.

**NOTE:** The straightedge used must be flat within 0.0051 mm (0.0002

**in) per foot of tool length.**

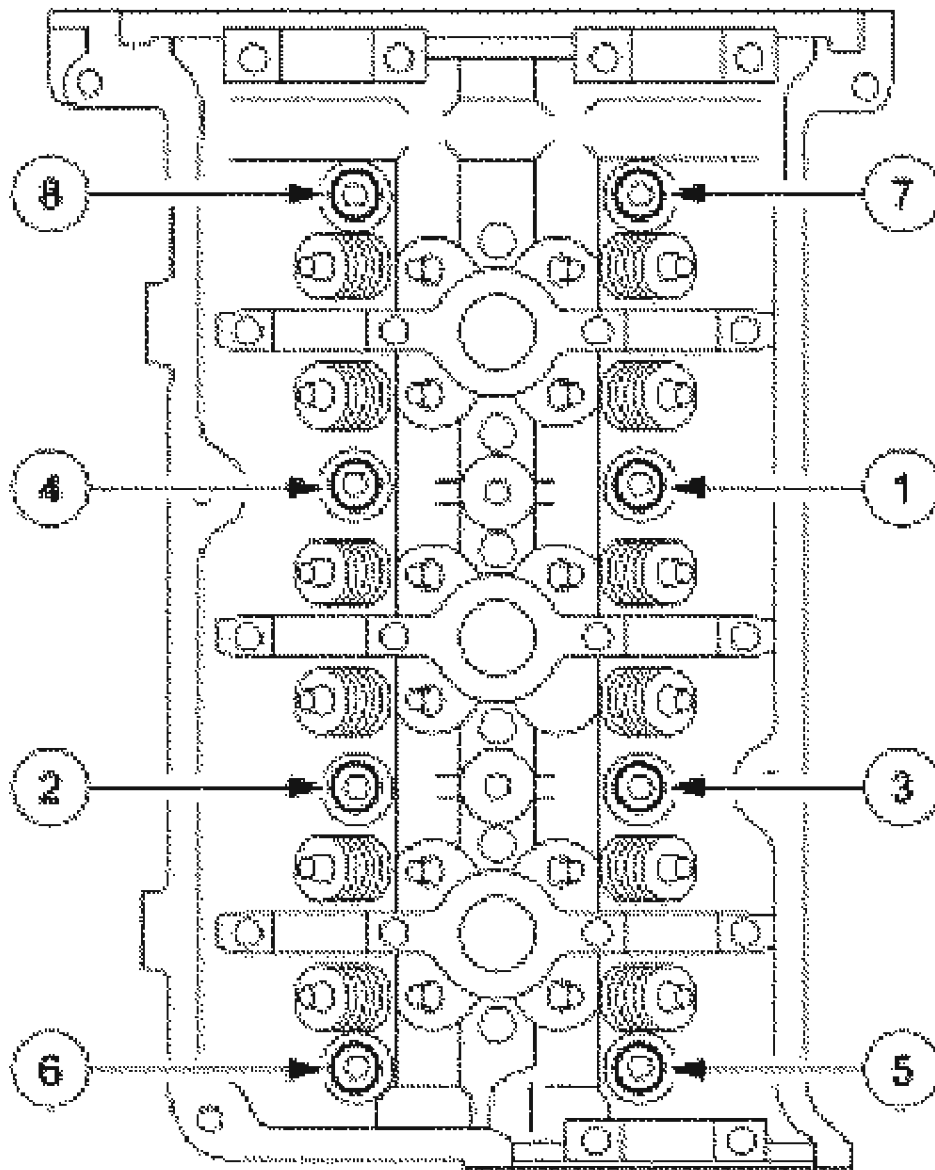
12. Support the cylinder head on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in) deep.

**Installation**

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of the head gasket. Clean all sealing surfaces with metal surface cleaner.

**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.



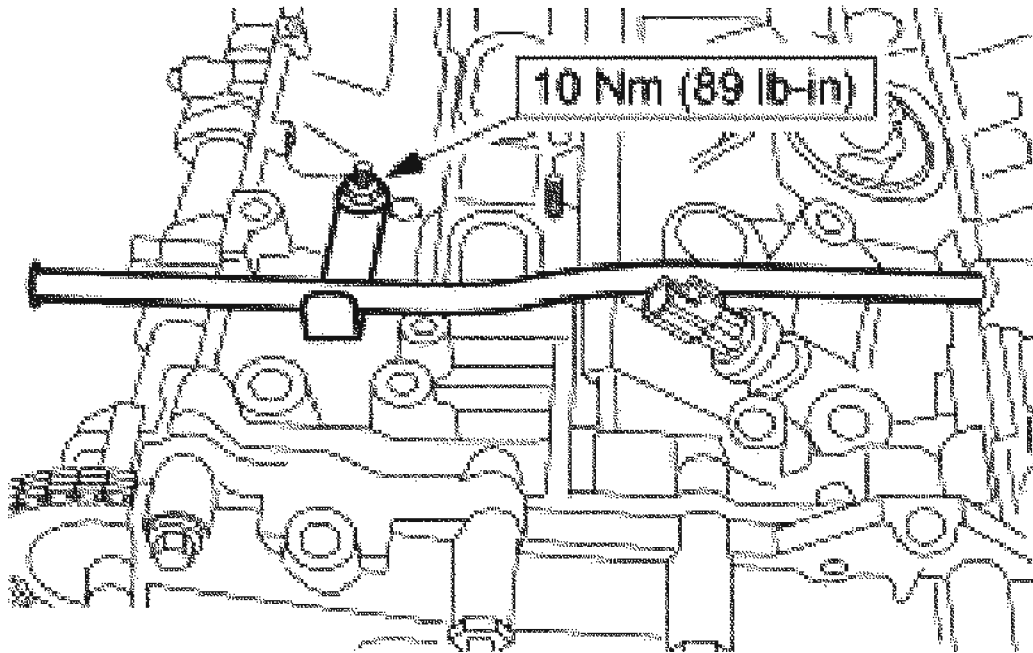


G02739330

**Fig. 157: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

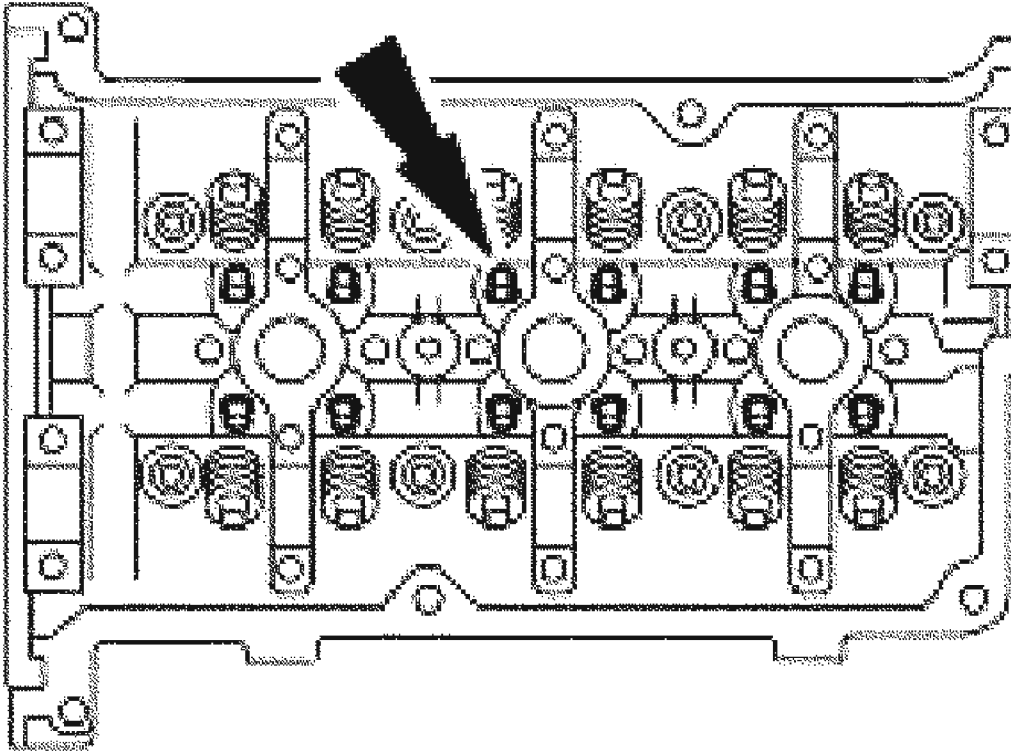
1. Position the LH cylinder head and gasket and install the bolts. Tighten the bolts in six stages, in the sequence shown:
  - Stage 1: Tighten to 40 Nm (30 lb-ft).
  - Stage 2: Tighten bolts 90 degrees.

- Stage 3: Loosen one full turn.
  - Stage 4: Tighten to 40 Nm (30 lb-ft).
  - Stage 5: Tighten 90 degrees.
  - Stage 6: Tighten 90 degrees.
2. Install the water pump. For additional information, refer to **ENGINE COOLING** .
  3. Raise the vehicle.
  4. Install the stud bolt.

**G02739331**

**Fig. 158: Identifying Stud Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

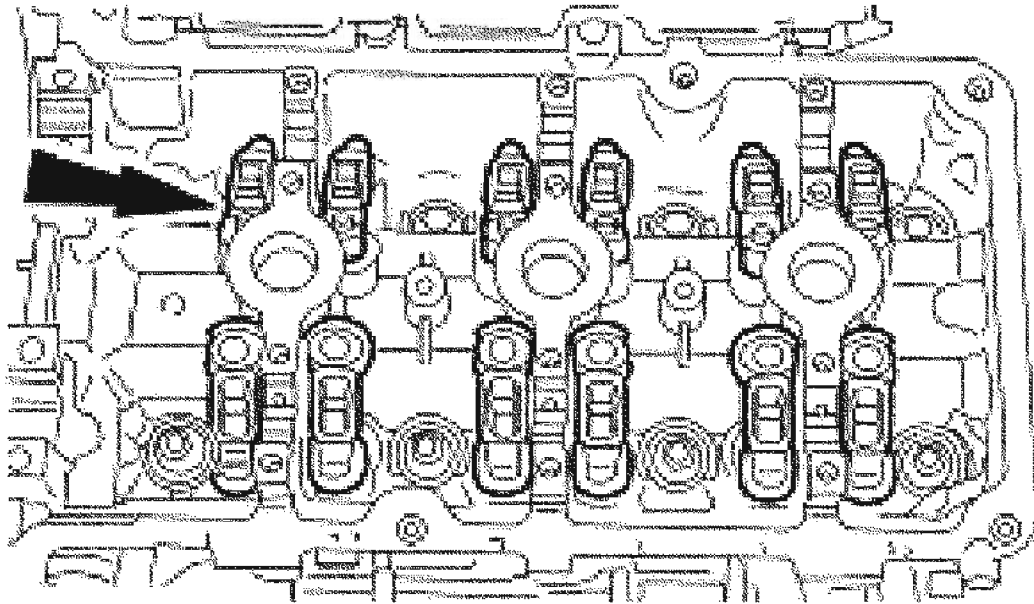
5. Install the LH exhaust manifold. For additional information, refer to **EXHAUST MANIFOLD LH** .
6. Lower the vehicle.
7. Install the hydraulic lash adjusters.
  - Lubricate the hydraulic lash adjusters with clean engine oil.



G02739332

**Fig. 159: Installing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

8. Install the camshaft followers.
  - Lubricate the camshaft followers with clean engine oil.



G02739333

**Fig. 160: Installing Camshaft Followers**  
 Courtesy of FORD MOTOR CO.

9. Install the LH camshafts. For additional information, refer to **CAMSHAFTS LH**.
10. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING**.
11. Install the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.

## CYLINDER HEAD RH

### Material

### MATERIAL SPECIFICATION

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

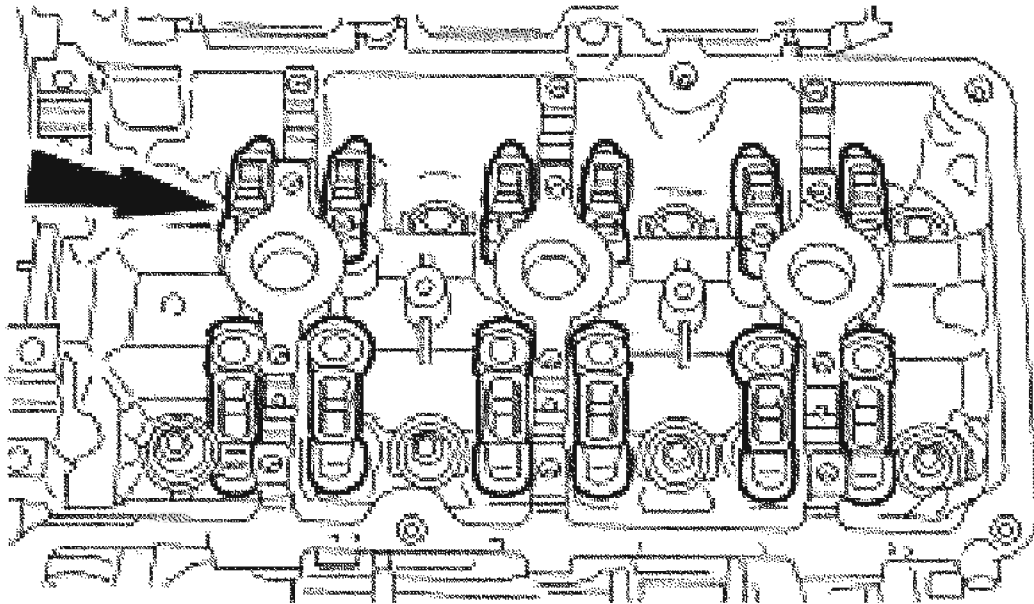
### Removal

1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD** in this section.
2. Remove the coolant bypass tube. For additional information, refer to **ENGINE**

**COOLING .**

3. Remove the exhaust gas recirculation (EGR) tube. For additional information, refer to **ENGINE EMISSION CONTROL .**
4. Remove the RH camshafts. For additional information, refer to **CAMSHAFTS RH .**

**CAUTION: The camshaft followers must be installed in their original positions.**

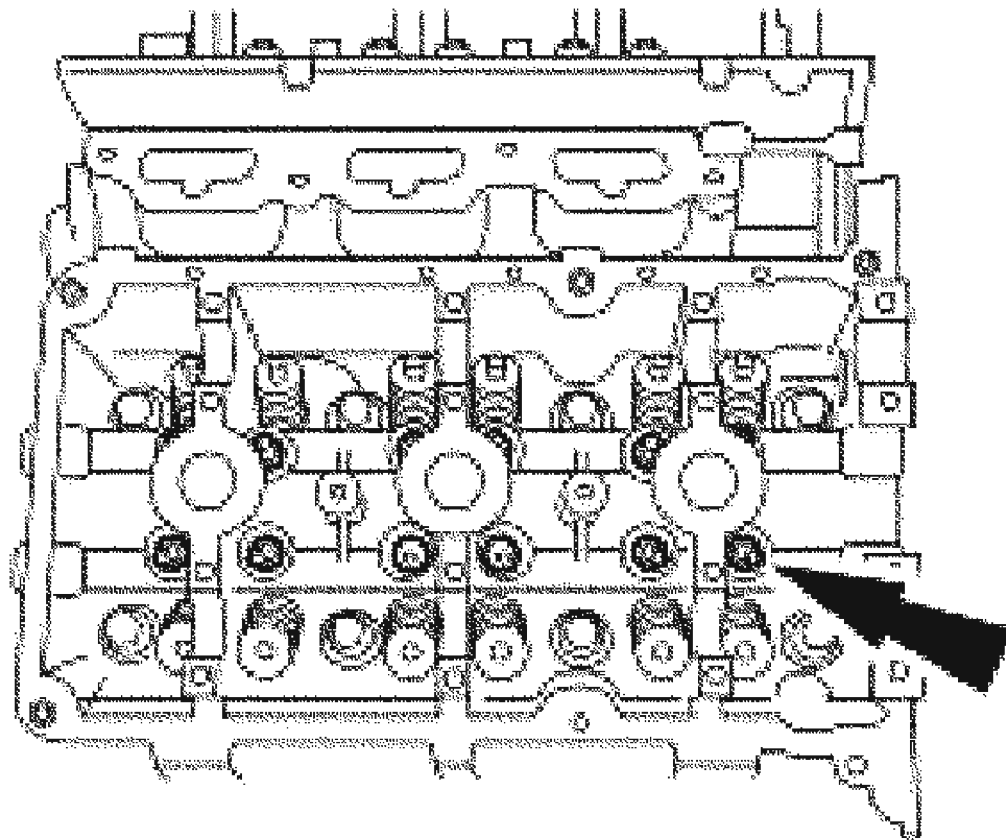


G02739334

**Fig. 161: Removing Camshaft Followers**  
Courtesy of FORD MOTOR CO.

5. Remove the camshaft followers.

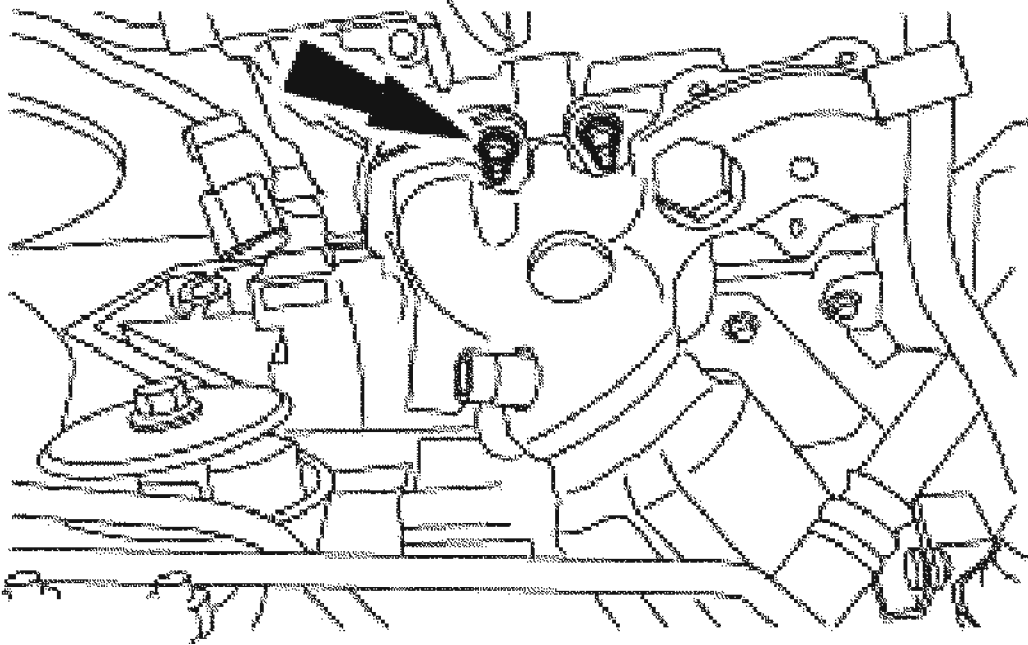
**CAUTION: The hydraulic lash adjusters must be installed in their original position.**



G02739335

**Fig. 162: Removing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

6. Remove the hydraulic lash adjusters.
7. Raise and support the vehicle on a hoist. For additional information, refer to **JACKING & LIFTING**.
8. Remove the six nuts from the RH exhaust manifold.

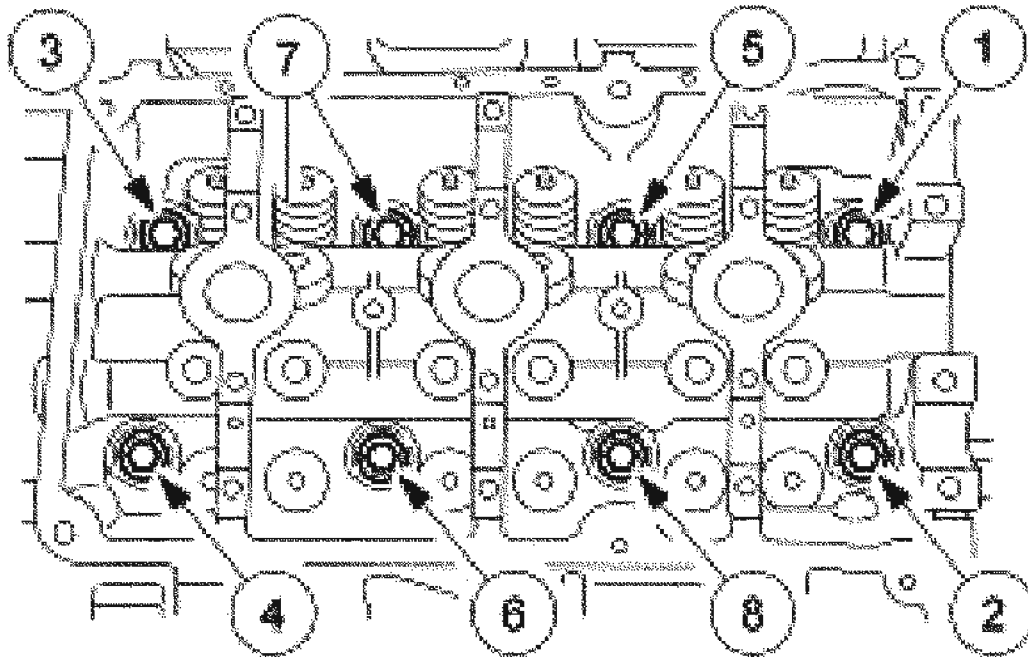


G02739336

**Fig. 163: Removing Nuts From RH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

9. Lower the vehicle.

**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.



G02739337

**Fig. 164: Identifying Bolt Removal Sequence**  
 Courtesy of FORD MOTOR CO.

10. Remove the bolts in the sequence shown and remove the cylinder head.
  - Discard the gasket and the bolts.

**NOTE:** The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

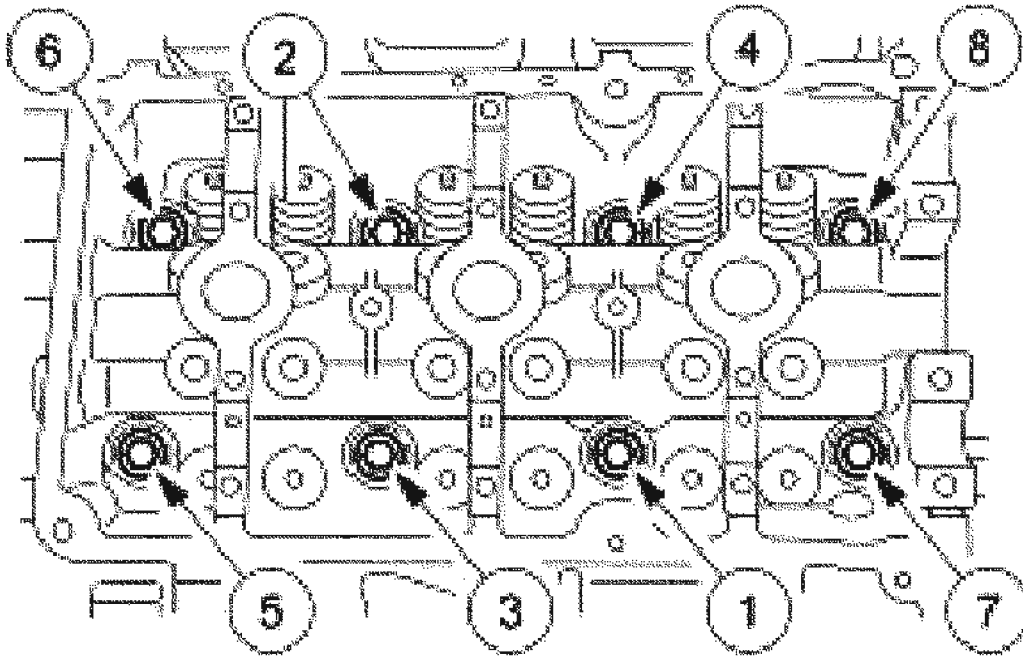
11. Support the cylinder head on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in) deep.

#### Installation

**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of the head gasket. Clean all sealing surfaces with metal surface cleaner.



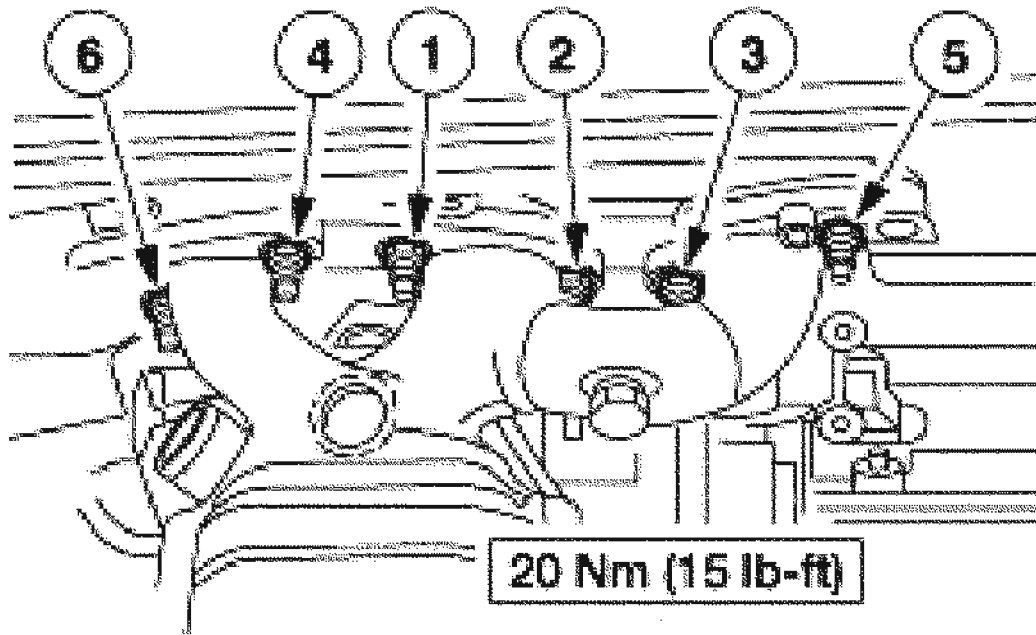
**NOTE:** New cylinder head bolts must be installed. They are torque-to-yield designed and cannot be reused.



G02739338

**Fig. 165: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

1. Position the RH cylinder head and gasket and install the bolts. Tighten the bolts in six stages, in the sequence shown:
  - Stage 1: Tighten to 40 Nm (30 lb-ft).
  - Stage 2: Tighten bolts 90 degrees.
  - Stage 3: Loosen one full turn.
  - Stage 4: Tighten to 40 Nm (30 lb-ft).
  - Stage 5: Tighten 90 degrees.
  - Stage 6: Tighten 90 degrees.
2. Raise the vehicle on a hoist. For additional information refer to **JACKING & LIFTING**.
3. Install RH exhaust manifold nuts in the sequence shown.

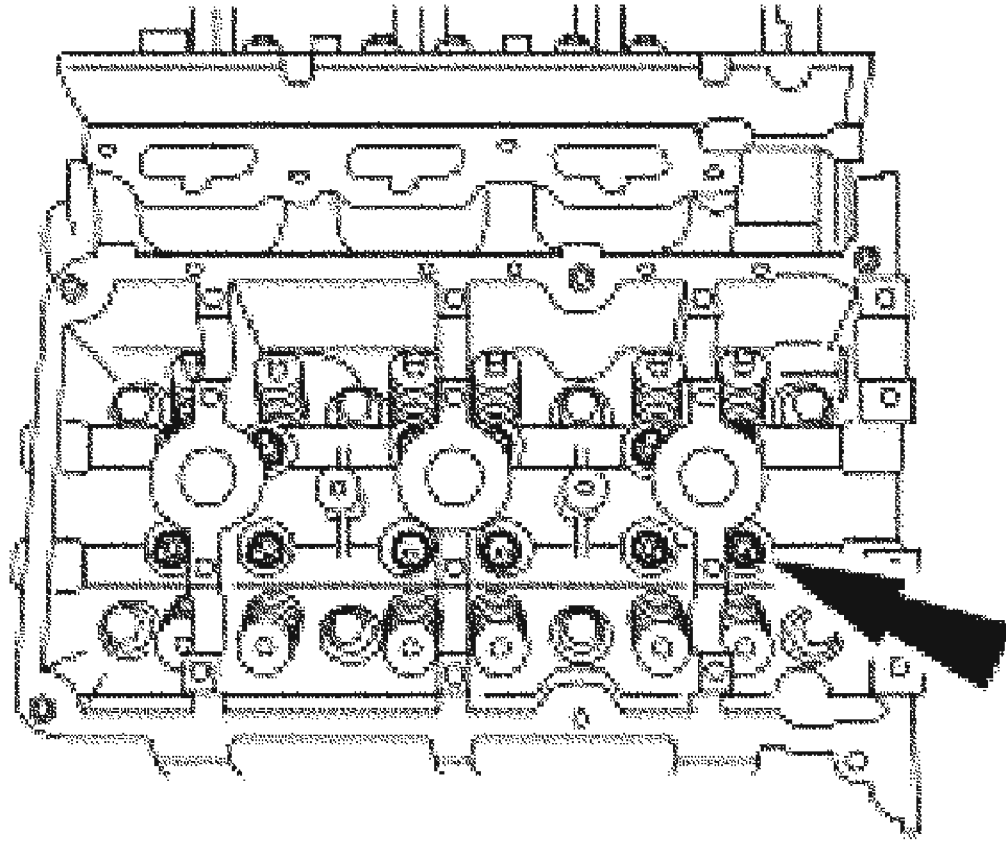


G02739339

**Fig. 166: Identifying Tightening Sequence & Torque Specification Of RH Exhaust Manifold Nuts**

**Courtesy of FORD MOTOR CO.**

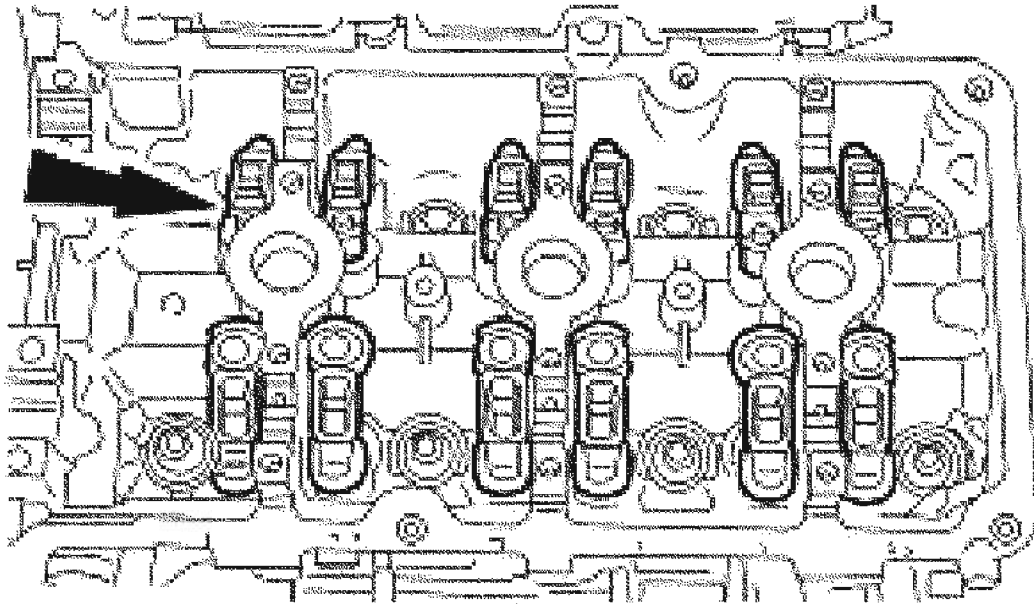
4. Lower the vehicle.
5. Install the hydraulic lash adjusters.
  - Lubricate the hydraulic lash adjusters with clean engine oil.



G02739340

**Fig. 167: Installing Hydraulic Lash Adjusters**  
Courtesy of FORD MOTOR CO.

6. Install the camshaft followers.
  - Lubricate the camshaft followers with clean engine oil.



G02739341

**Fig. 168: Installing Camshaft Followers**  
Courtesy of FORD MOTOR CO.

7. Install the RH camshafts. For additional information, refer to **CAMSHAFTS RH** .
8. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING** .
9. Install the exhaust gas recirculation (EGR) tube. For additional information, refer to **ENGINE EMISSION CONTROL** .
10. Install the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD** .

## OIL COOLER

### Material

### MATERIAL SPECIFICATION

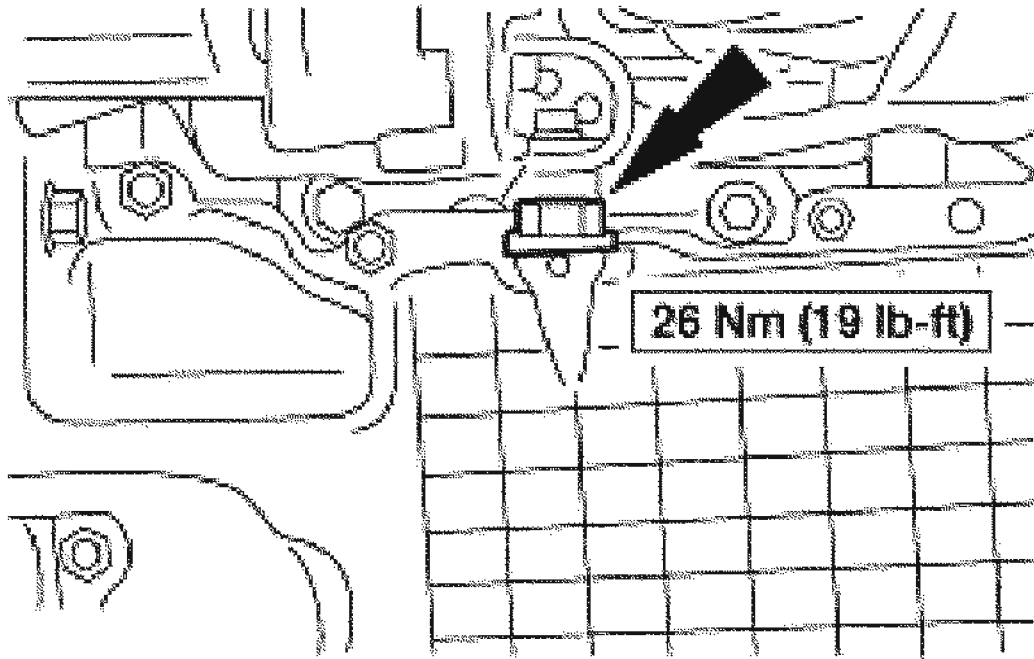
Item	Specification
SAE5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

1. Drain the engine coolant. For additional information refer to **ENGINE COOLING** .
2. Remove the oil pan drain bolt and drain the engine oil.

## 2004 Ford Escape

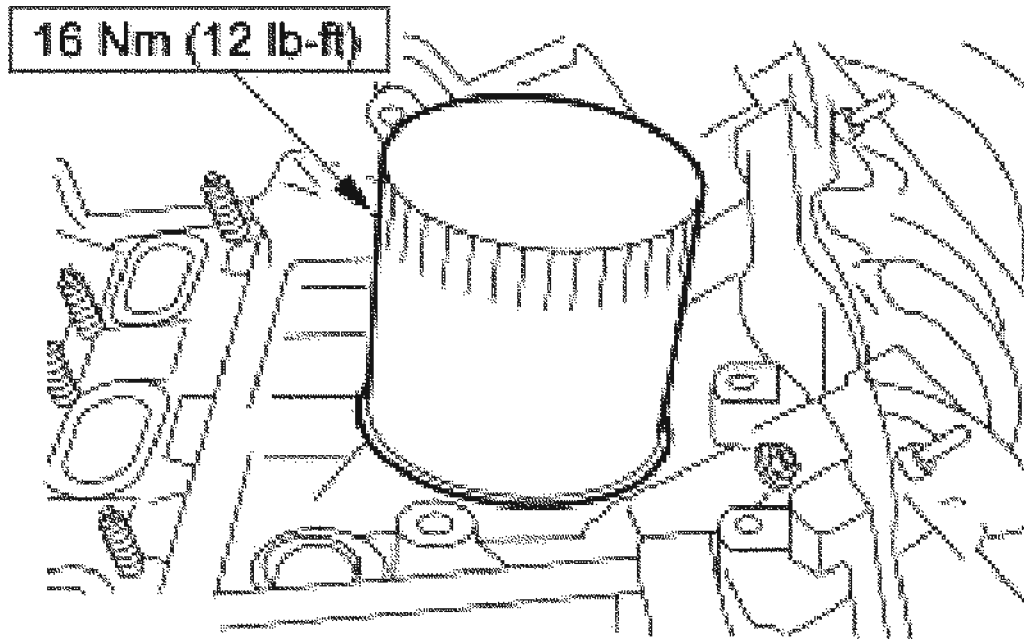
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739342

**Fig. 169: Removing Oil Pan Drain Bolt**  
Courtesy of FORD MOTOR CO.

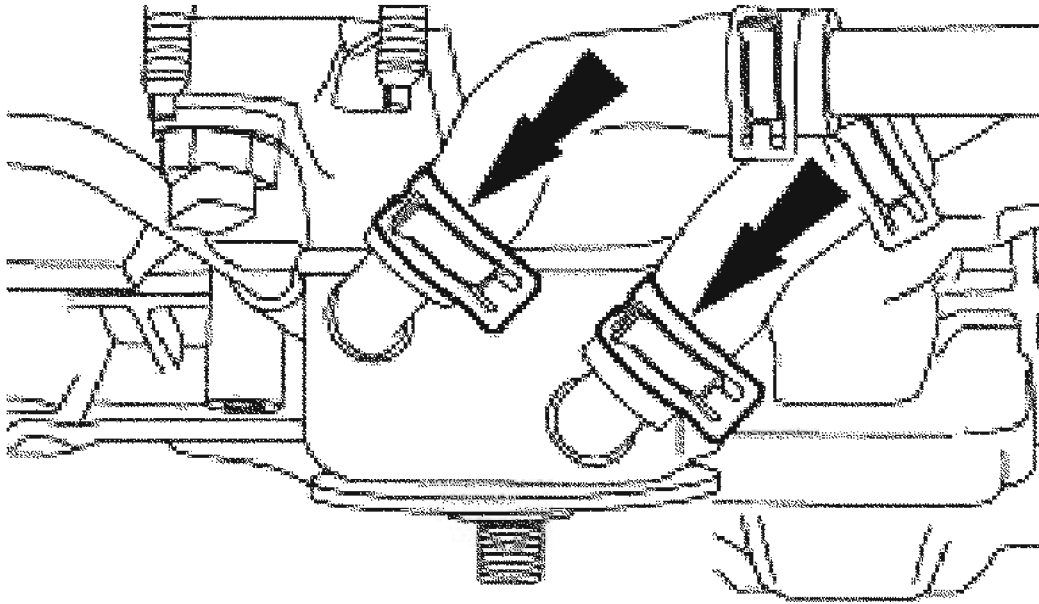
3. Remove and discard the oil filter.



G02739343

**Fig. 170: Removing Filter**  
Courtesy of FORD MOTOR CO.

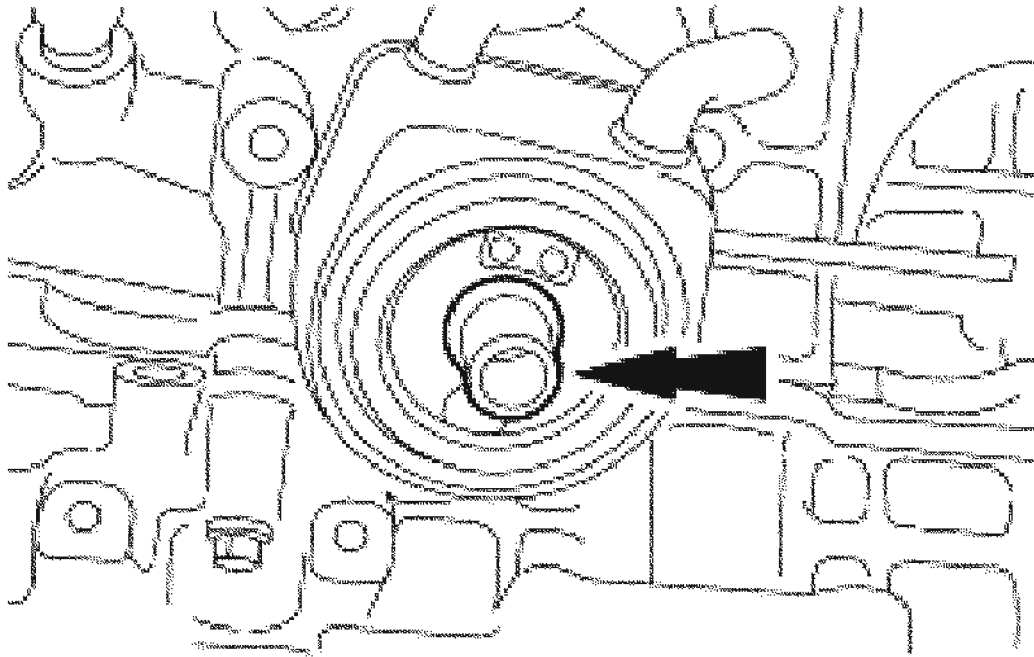
4. Disconnect the coolant hoses at the cooler.



G02739344

**Fig. 171: Disconnecting Coolant Hoses**  
Courtesy of FORD MOTOR CO.

5. Remove and discard the oil cooler.



G02739345

**Fig. 172: Removing Oil Cooler**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.
  - Install a new oil cooler.
  - Fill the crankcase with clean engine oil.

## OIL LEVEL INDICATOR AND TUBE

### Material

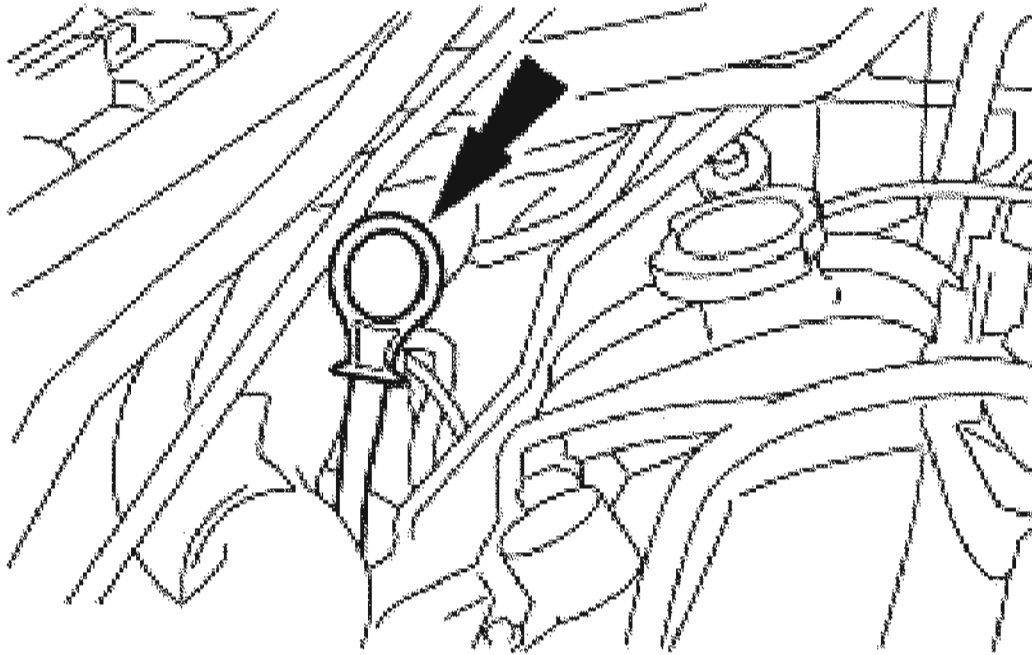
### MATERIAL SPECIFICATION

Item	Specification
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

### Removal and Installation

1. Release the push-pin securing the top radiator hose to the radiator core support and position the hose aside.
2. Remove the oil level indicator.

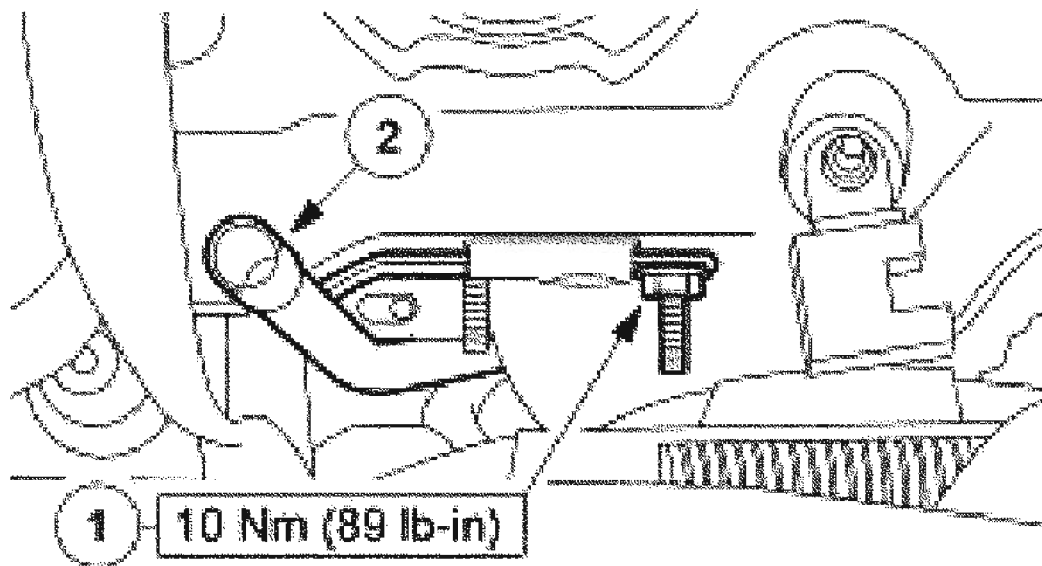




G02739346

**Fig. 173: Removing Oil Level Indicator**  
**Courtesy of FORD MOTOR CO.**

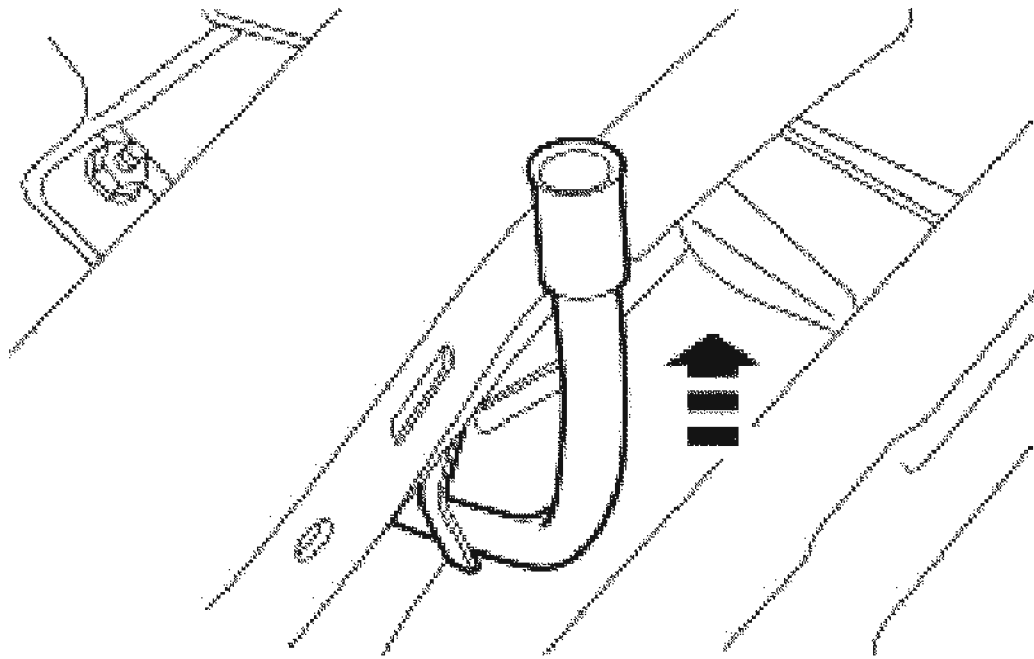
3. Remove the oil level indicator tube.
  1. Remove the stud bolt.
  2. Remove the oil level indicator tube from the engine.



G02739347

**Fig. 174: Removing Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

4. Remove the oil level indicator tube from the vehicle by guiding it between the radiator core support and the front grille.



G02739348

**Fig. 175: Identifying Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** Installation of the oil level indicator may require the assistance of a second technician to align the tube with the orifice.

5. To install, reverse the removal procedure.
  - Install a new O-ring seal and lubricate with clean engine oil.

## OIL PAN

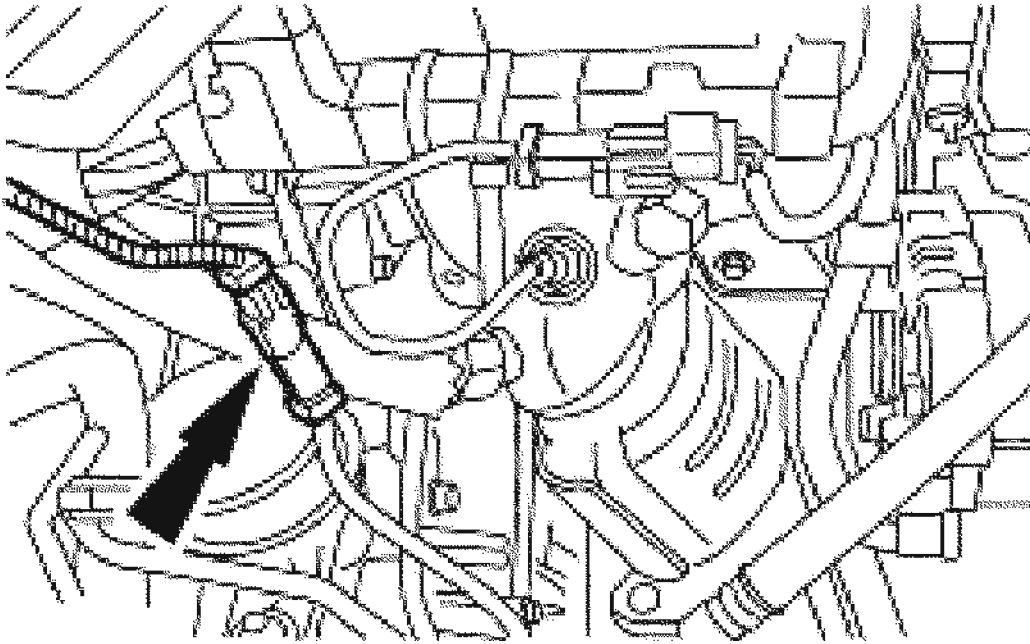
### Material

### MATERIAL SPECIFICATION

Item	Specification
Metal Surface Cleaner F4AZ - 19A536-RA	WSE-M5B392-A
SAE 5W - 20 Premium Synthetic Blend Motor Oil XO - 5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ - 19554 - EA	WSE -M4G323-A4

## Removal

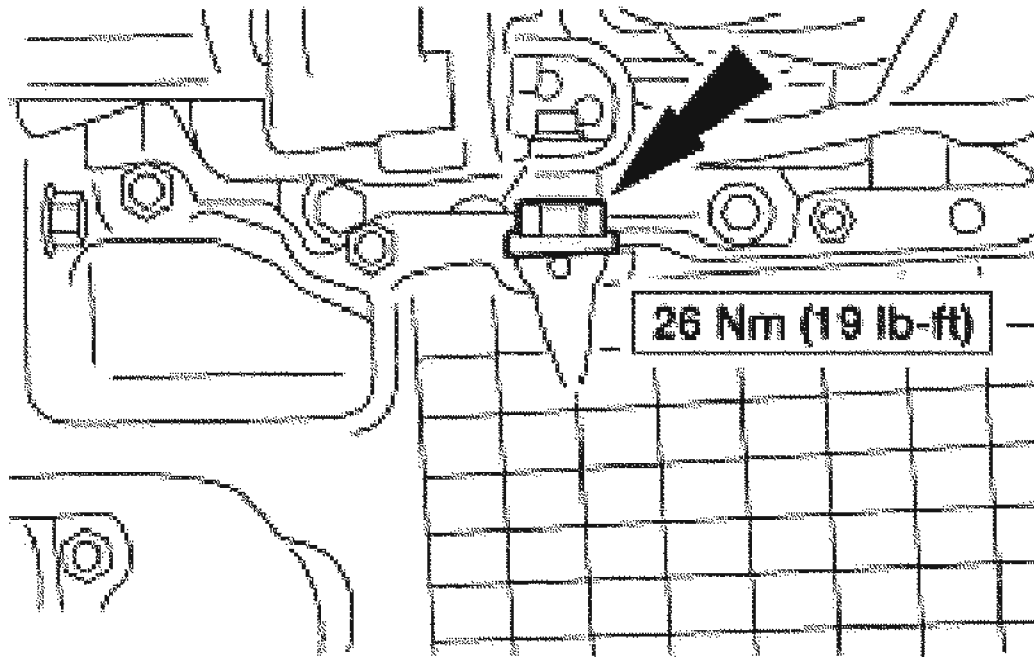
1. Remove the flexible exhaust pipe. For additional information, refer to **EXHAUST SYSTEM**.
2. Discount the downstream catalyst monitor sensor.



G02739349

**Fig. 176: Disconnecting Downstream Catalyst Monitor Sensor**  
Courtesy of FORD MOTOR CO.

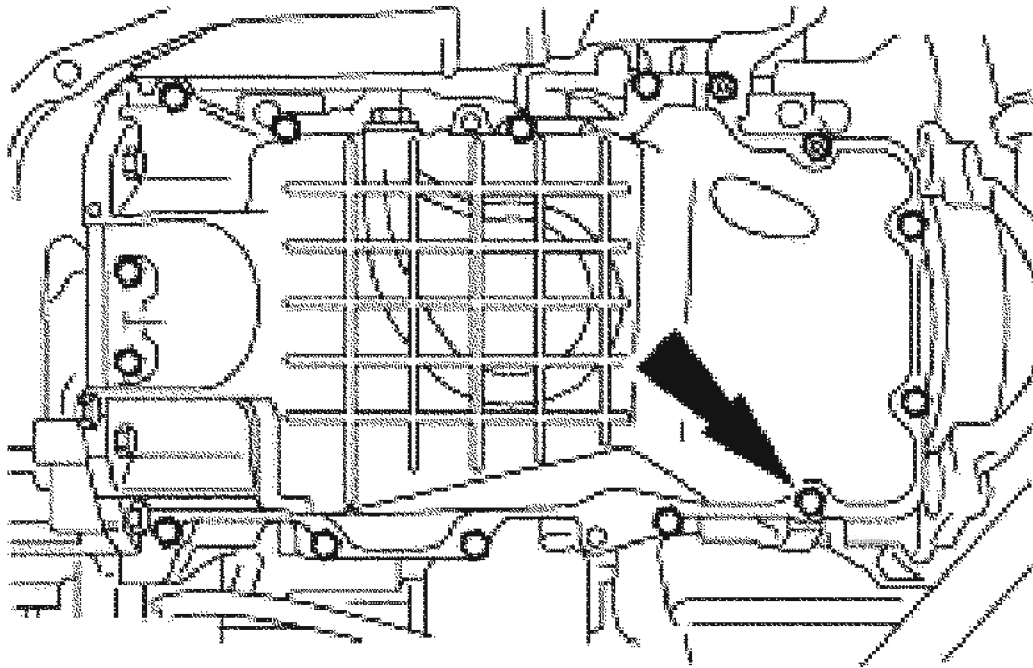
3. Drain the Oil.
4. Install the drain plug.



G02739350

**Fig. 177: Identifying Drain Plug Torque Specification**  
Courtesy of FORD MOTOR CO.

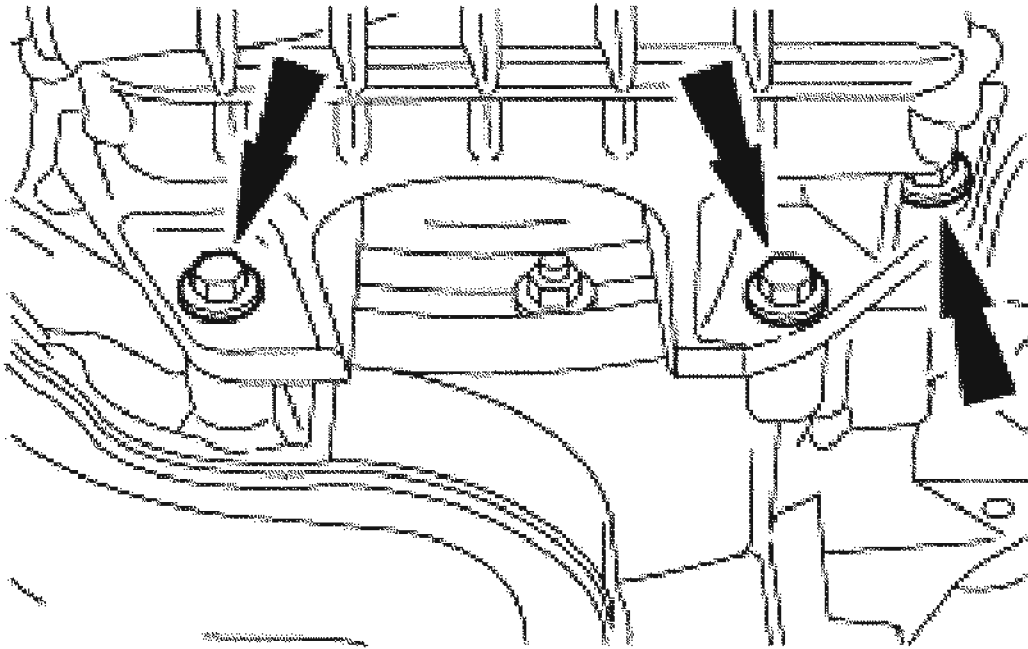
5. Remove and discard the oil filter.
6. Remove the 15 bolts.



G02739351

**Fig. 178: Removing Oil Filter**  
Courtesy of FORD MOTOR CO.

7. Remove the three bolts and the oil pan.



G02739352

**Fig. 179: Removing Oil Pan**  
Courtesy of FORD MOTOR CO.

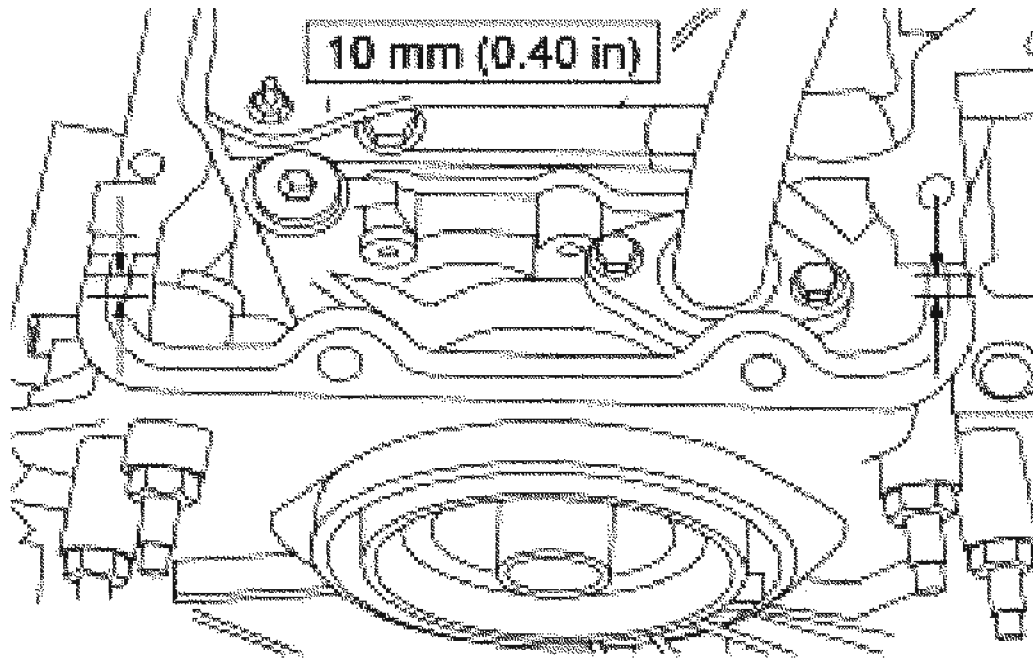
#### Installation

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

1. Clean all sealing surfaces on the engine and the oil pan with metal surface cleaner.
2. Position a new gasket on the oil pan.

**NOTE:** Clean and degrease all sealing surfaces with metal surface cleaner.

**NOTE:** The oil pan must be installed and the bolts tightened with in four minutes of sealant application.

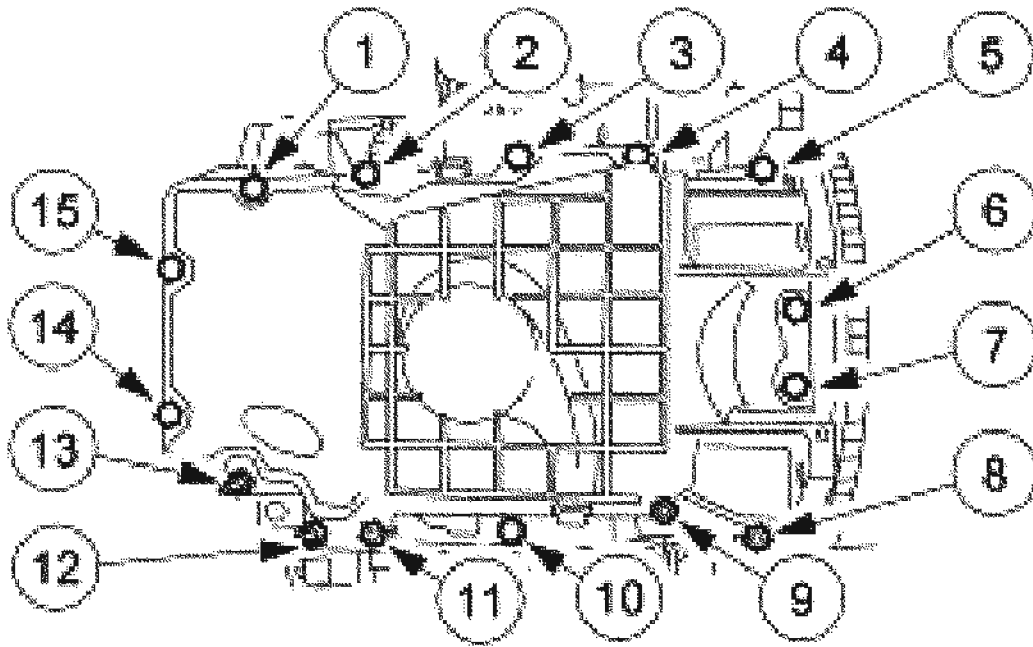


G02739353

**Fig. 180: Applying Silicone Gasket**  
Courtesy of FORD MOTOR CO.

3. Apply a 10 mm (0.40 in) diameter dot of silicone gasket and sealer to the areas indicated.
4. Position the oil pan and gasket and loosely install the bolts in the sequence shown.

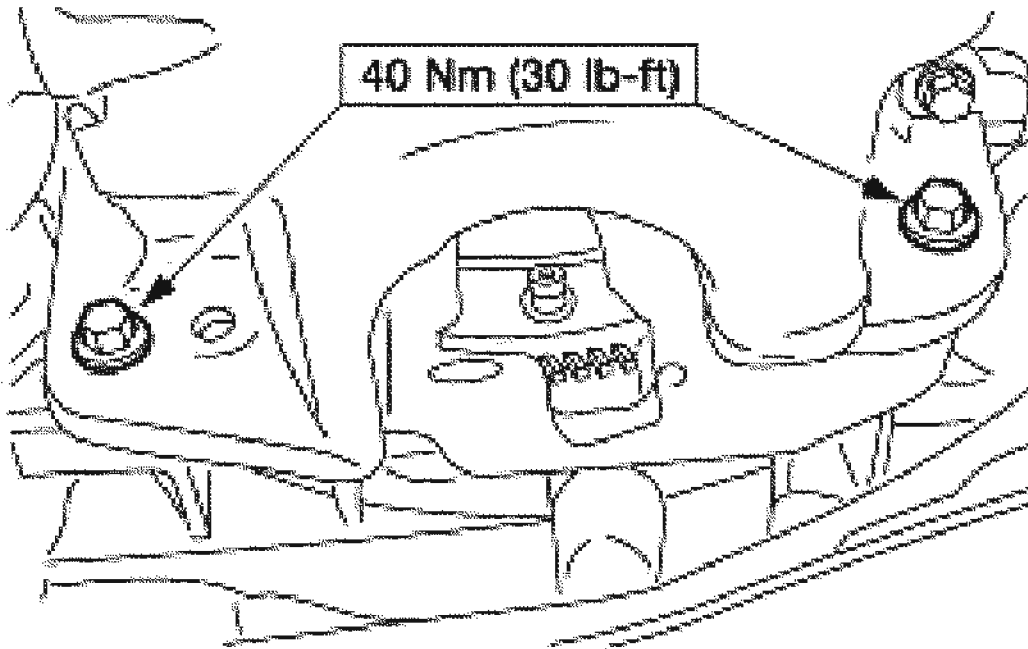




G02739354

**Fig. 181: Identifying Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

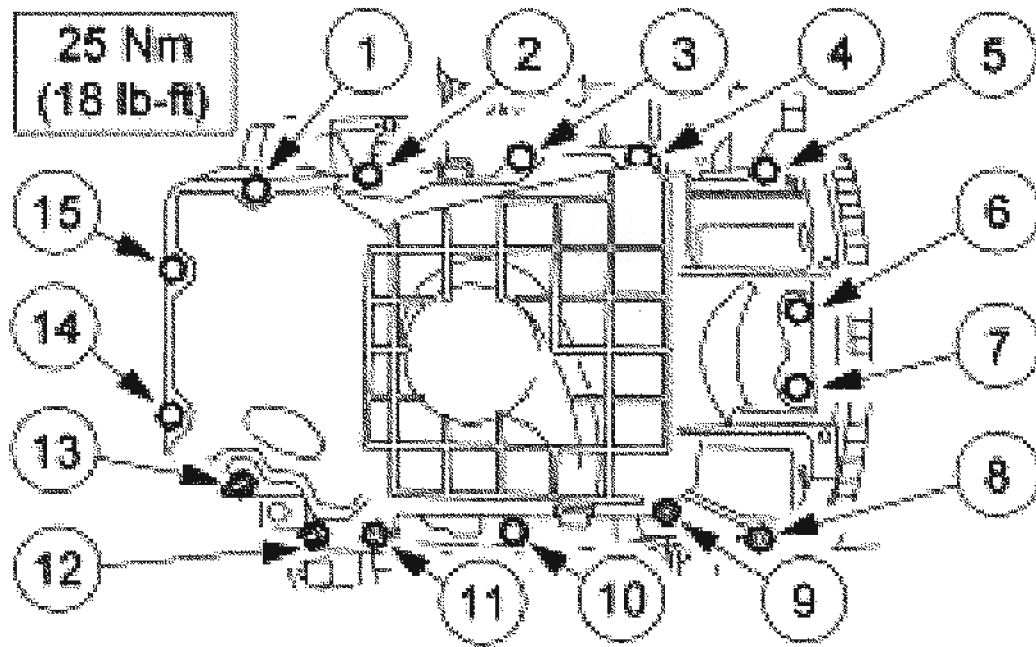
5. Install the oil pan-to-transaxle bolts.



G02739355

**Fig. 182: Identifying Oil Pan-To-Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Tighten the oil pan bolts in the sequence shown.

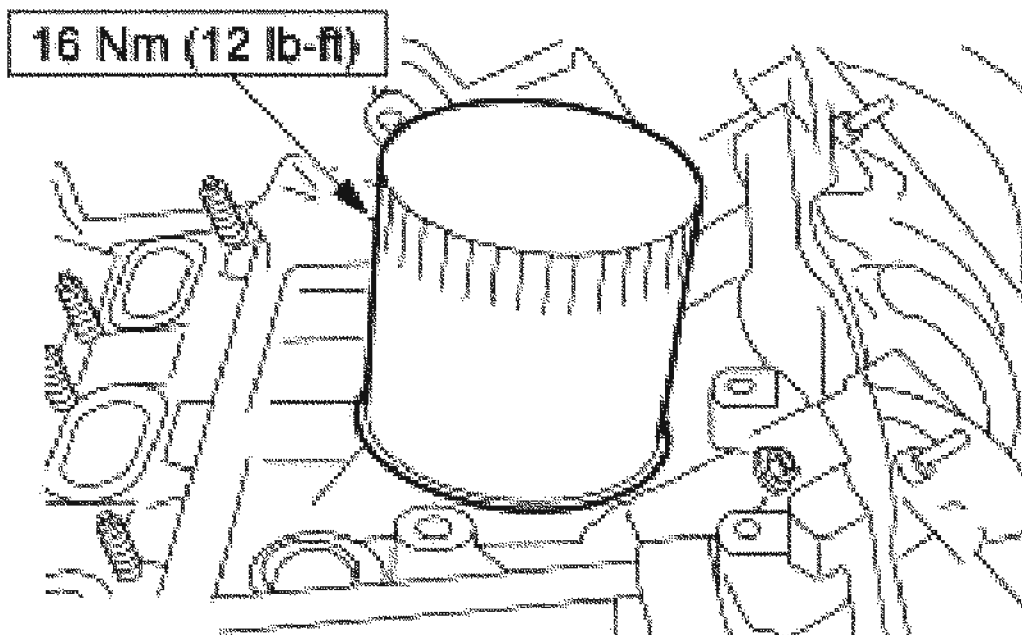


G02739356

**Fig. 183: Identifying Tightening Sequence & Torque Specification Of Oil Pan Bolts**

Courtesy of FORD MOTOR CO.

7. Lubricate the oil filter O-ring with clean engine oil and install the oil filter.



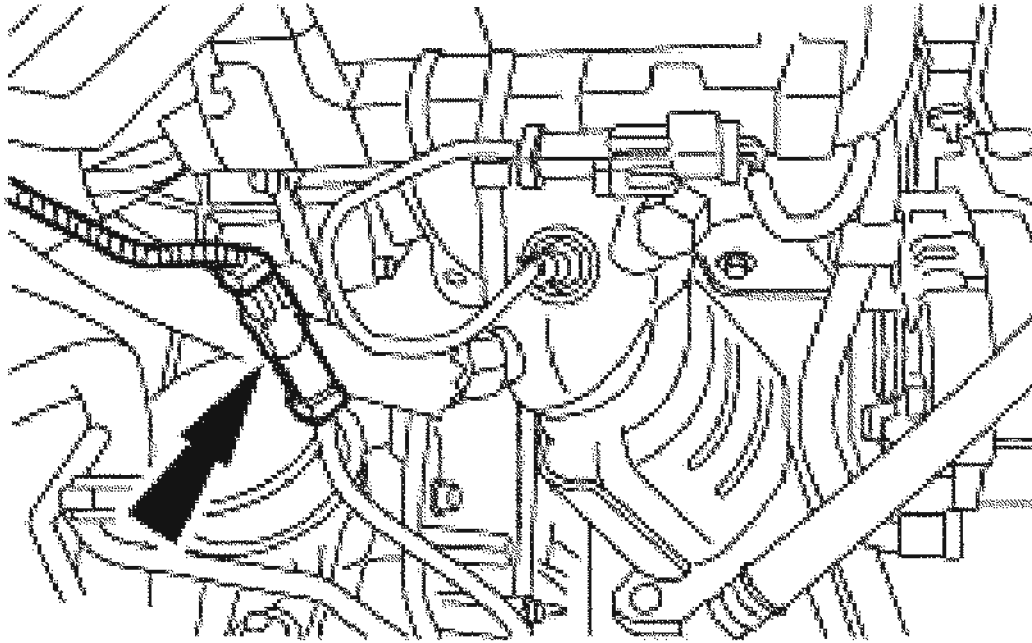
G02739357

**Fig. 184: Installing Oil Filter**  
Courtesy of FORD MOTOR CO.

8. Install the exhaust flexible exhaust pipe. For additional information, refer to **EXHAUST SYSTEM**.
9. Connect the downstream catalyst monitor.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



G02739358

**Fig. 185: Connecting Downstream Catalyst Monitor**  
Courtesy of FORD MOTOR CO.

10. Lower the vehicle.
11. Fill the crankcase with clean engine oil.

### OIL PUMP SCREEN AND PICKUP TUBE

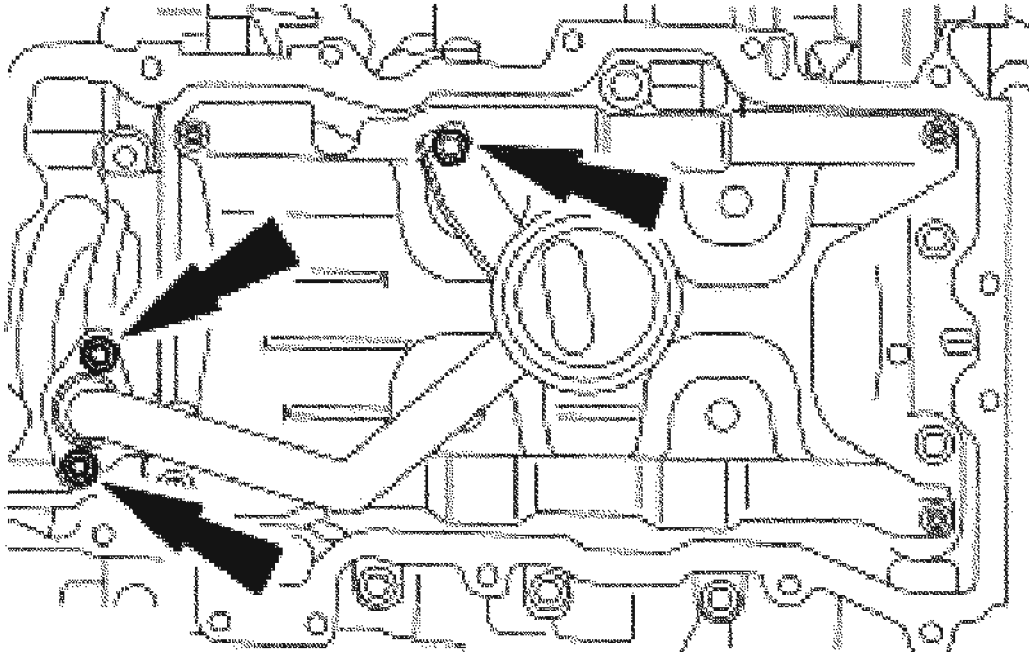
#### Material

#### MATERIAL SPECIFICATION

Item	Specification
SAE 5W-20 Premium Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H

#### Removal

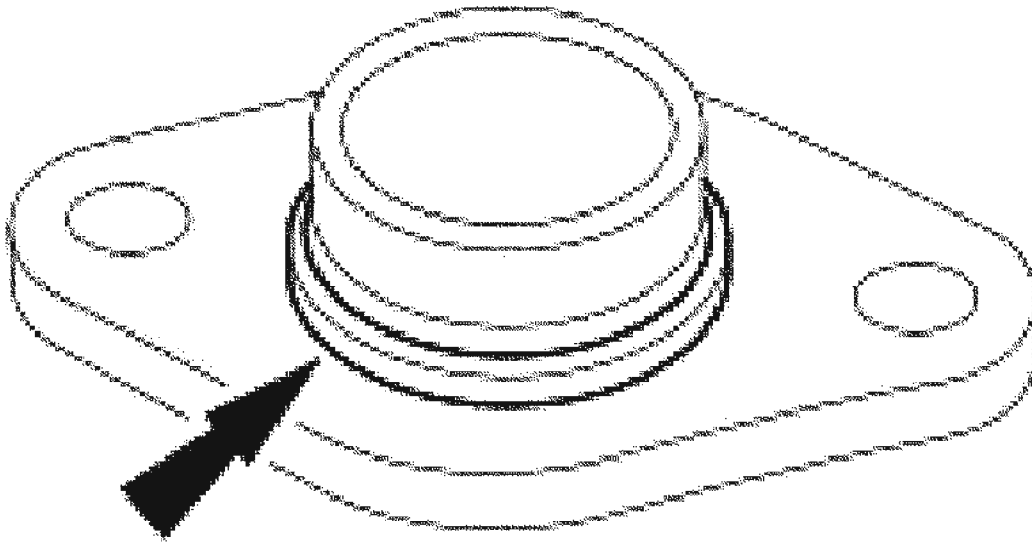
1. Remove the oil pan. For additional information, refer to **OIL PAN** .
2. Remove the nut, bolts and the oil pump screen and pickup tube.



G02739359

**Fig. 186: Removing Nut, Bolts, Oil Pump Screen And Pickup Tube**  
Courtesy of FORD MOTOR CO.

3. Remove and discard the O-ring seal.

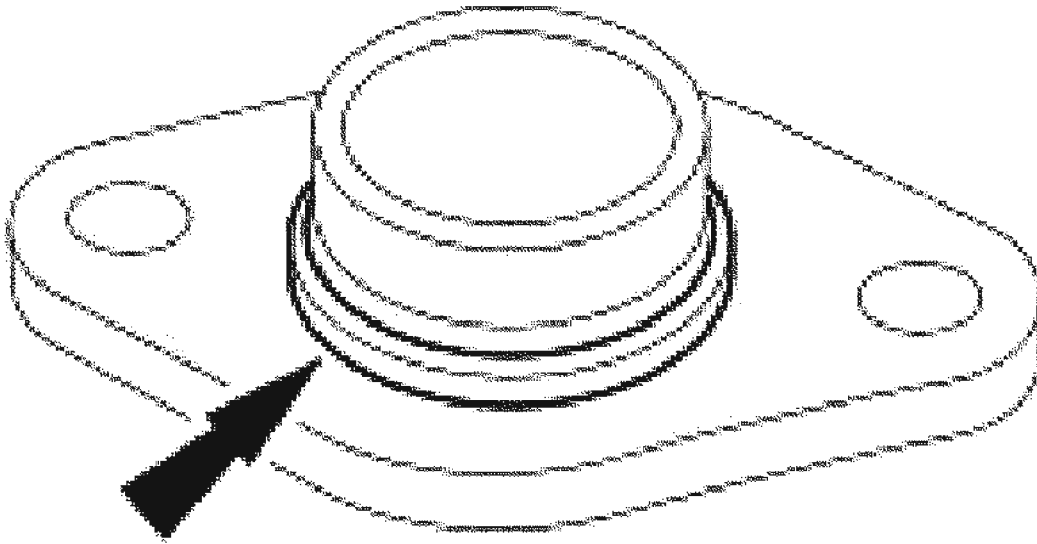


**G02739360**

**Fig. 187: Removing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

**Installation**

1. Install a new O-ring seal and lubricate with clean engine oil.

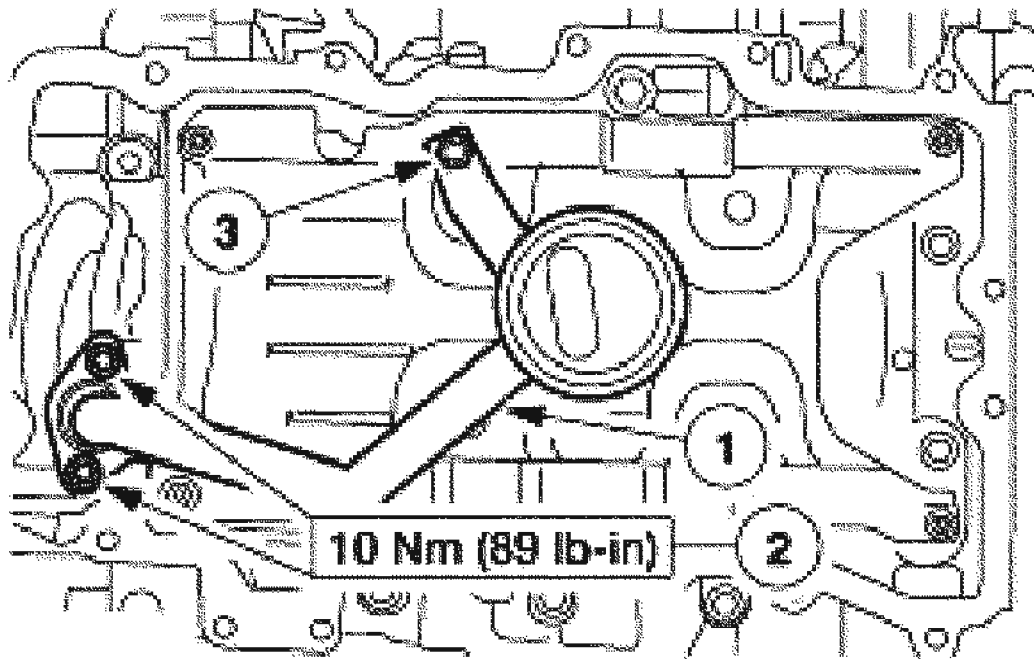


**G02739361**

**Fig. 188: Installing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

2. Install the oil pump screen and pickup tube.
  1. Position the oil pump screen and pickup tube.
  2. Install the bolts.
  3. Install the nut.
    - Tighten the nut in two stages.
    - Stage 1: Tighten to 5 Nm (44 lb-in).
    - Stage 2: Tighten 45 degrees.





G02739362

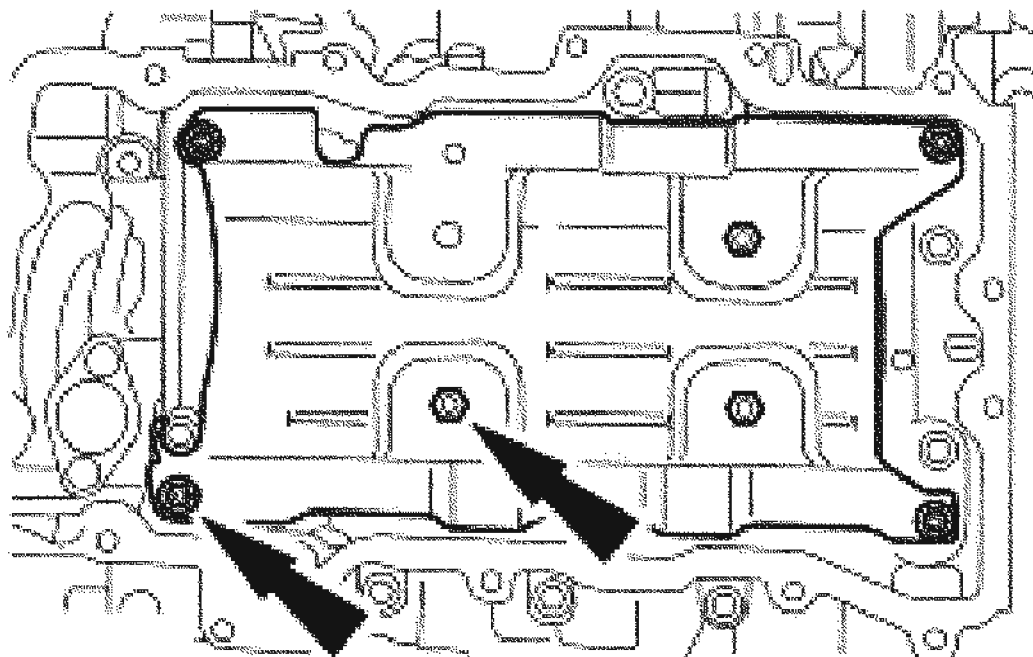
**Fig. 189: Installing Oil Pump Screen And Pickup Tube**  
Courtesy of FORD MOTOR CO.

3. Install the oil pan. For additional information, refer to **OIL PAN**.

#### **OIL PAN BAFFLE**

##### **Removal**

1. Remove the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE**.
2. Remove the nuts and the oil pan baffle.

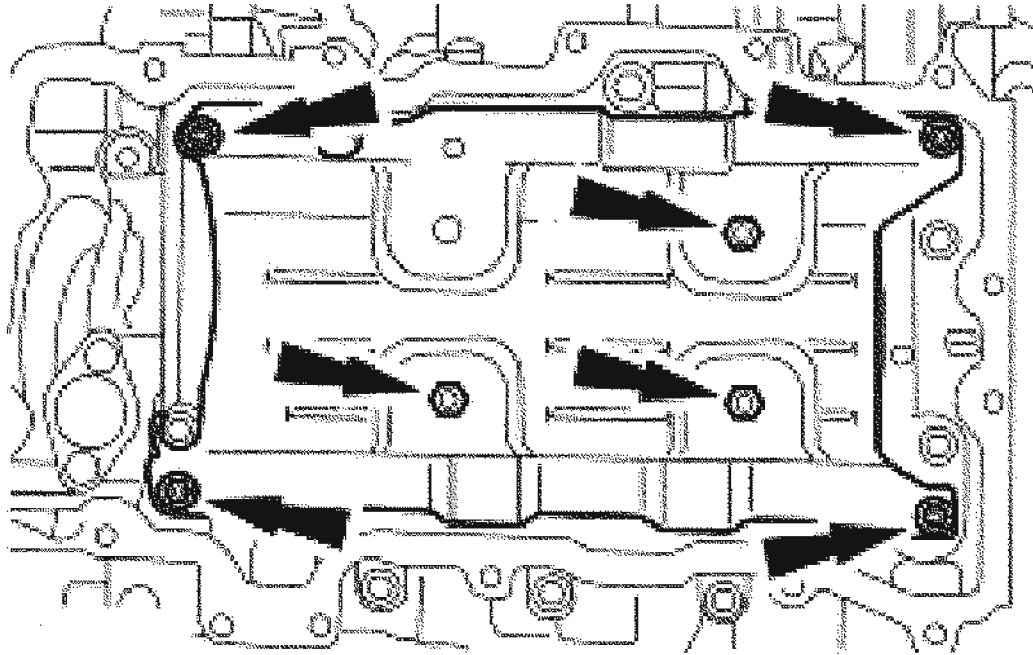


G02739363

**Fig. 190: Removing Nuts And Oil Pan Baffle**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Position the oil pan baffle and install the nuts.
  - Tighten the nuts in two stages.
  - Stage 1: Tighten to 5 Nm (44 lb-in).
  - Stage 2: Tighten 45 degrees.



G02739364

**Fig. 191: Installing Oil Pan Baffle And Nuts**  
Courtesy of FORD MOTOR CO.

2. Install the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE** .

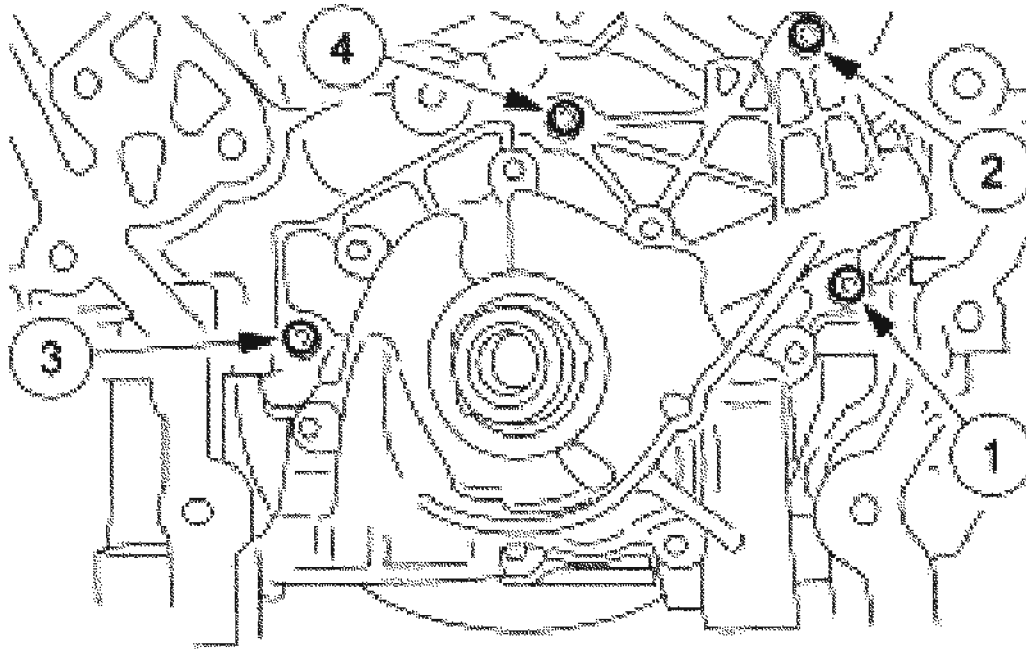
## **OIL PUMP**

### **Removal**

1. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** .
2. Remove the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE** .
3. Remove the bolts in the indicated sequence and remove the oil pump.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

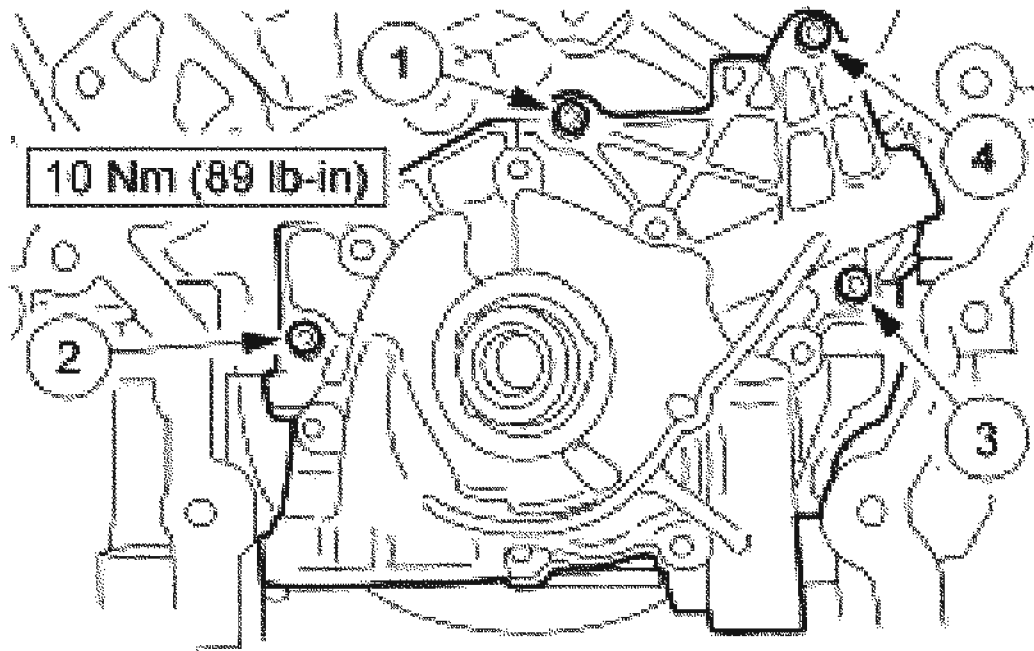


G02739365

**Fig. 192: Identifying Bolt Removal Sequence**  
Courtesy of FORD MOTOR CO.

### Installation

1. Position the oil pump and install the bolts in the sequence shown.



G02739366

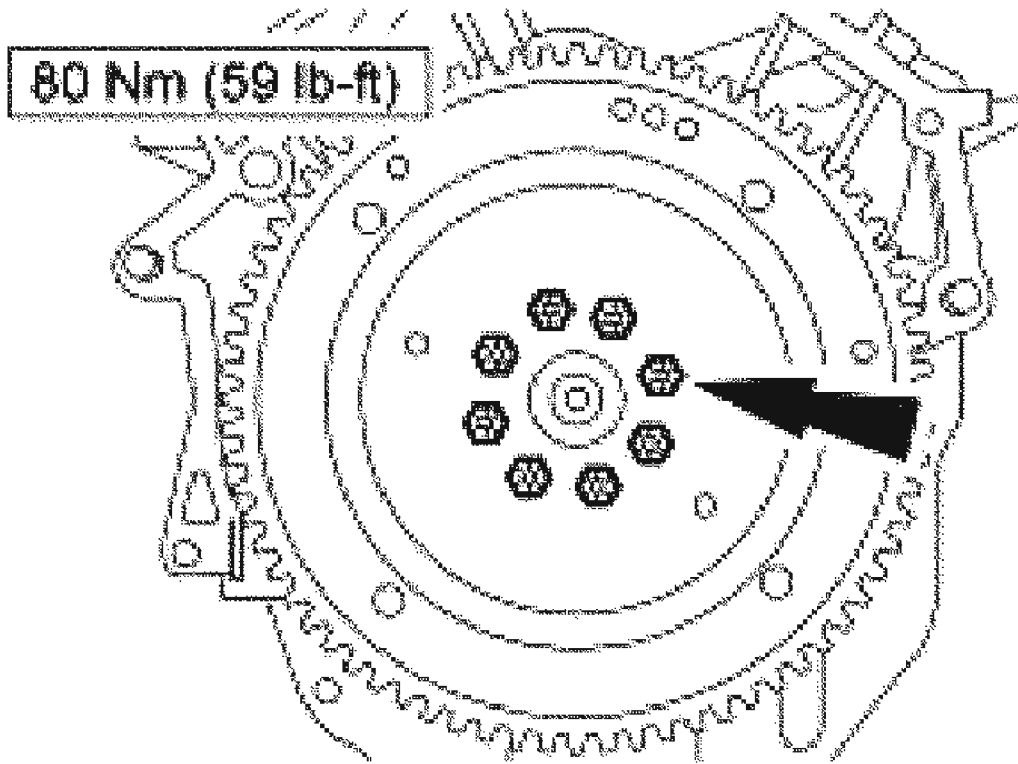
**Fig. 193: Identifying Bolt Tightening Sequence & Torque Specification**  
 Courtesy of FORD MOTOR CO.

2. Install the oil pump screen cover and tube. For additional information, refer to **OIL PUMP SCREEN AND PICKUP TUBE**.
3. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

## **FLEXPLATE**

### **Removal and Installation**

1. Remove the transaxle. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION**.
2. Remove the bolts and the flexplate.



**G02739367**

**Fig. 194: Removing Bolts And Flexplate**  
**Courtesy of FORD MOTOR CO.**


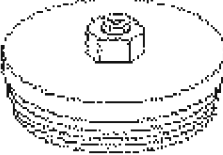

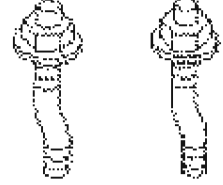
3. To install, reverse the removal procedure.

#### **CRANKSHAFT REAR OIL SEAL**

#### **Special Tool(s)**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Slide Hammer 307-005 (T59L-100-B)
	Remover Crankshaft Rear Oil Seal 303-519 (T95P-6701-EH)
	Installer, Crankshaft Rear Main Oil Seal 303-178 (T82L-6701-A)
	Installer Bolts, Crankshaft Rear Main Oil Seal 303-384 (T91P-6701-A)

G02739388

**Fig. 195: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

Material

### MATERIAL SPECIFICATION

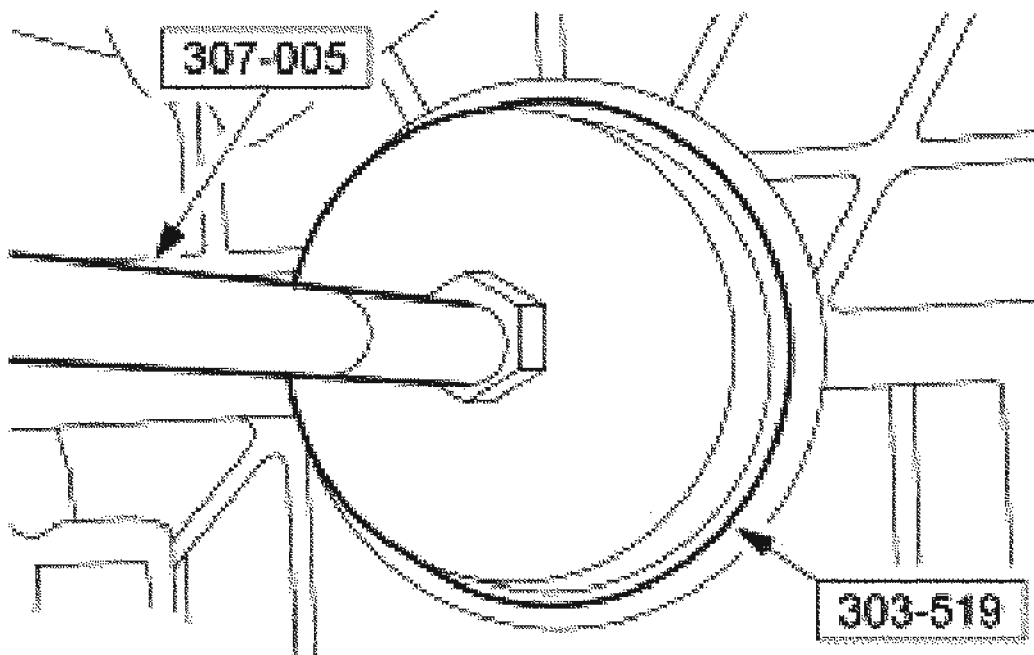
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal

1. Remove the flexplate. For additional information, refer to **FLEXPLATE** .
2. Using the special tools, remove the crankshaft rear oil seal and discard.



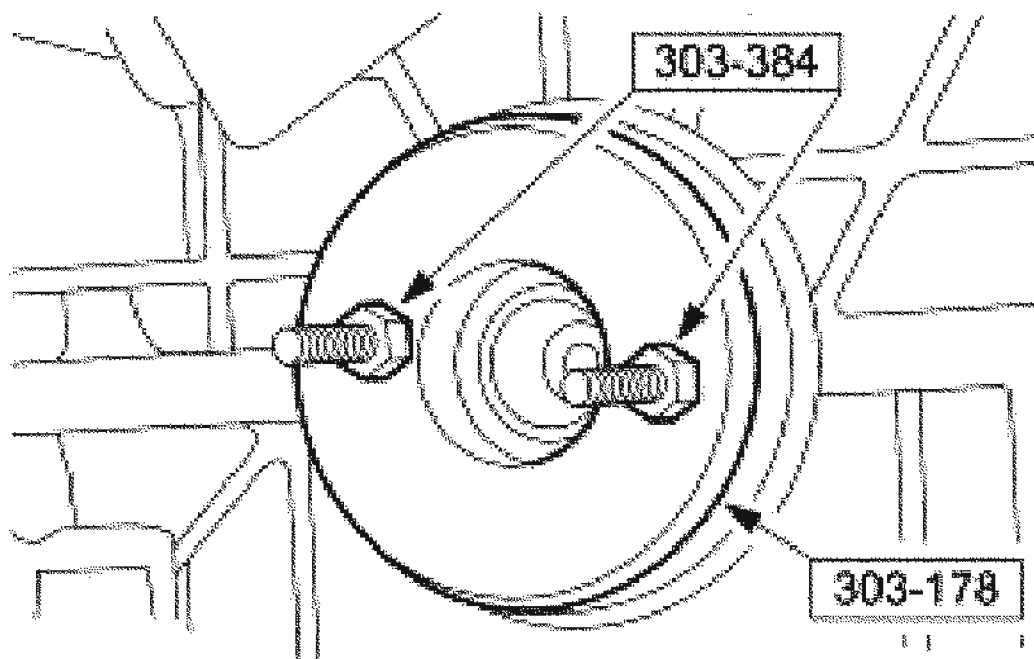
**Fig. 196: Removing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

### Installation

**NOTE:** Clean all sealing surfaces with metal surface cleaner.

**NOTE:** Lubricate the crankshaft rear oil lips with clean engine oil.





G02739370

**Fig. 197: Installing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

1. Using the special tools, install the crankshaft rear oil seal.
2. Install the flexplate. For additional information, refer to **FLEXPLATE**.

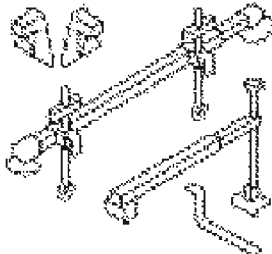
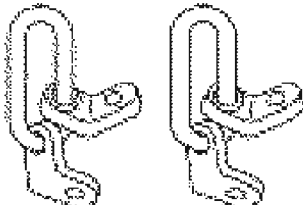

**ENGINE SUPPORT INSULATORS - FRONT, RH**

**Special Tool(s)**

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

<http://vnx.su>

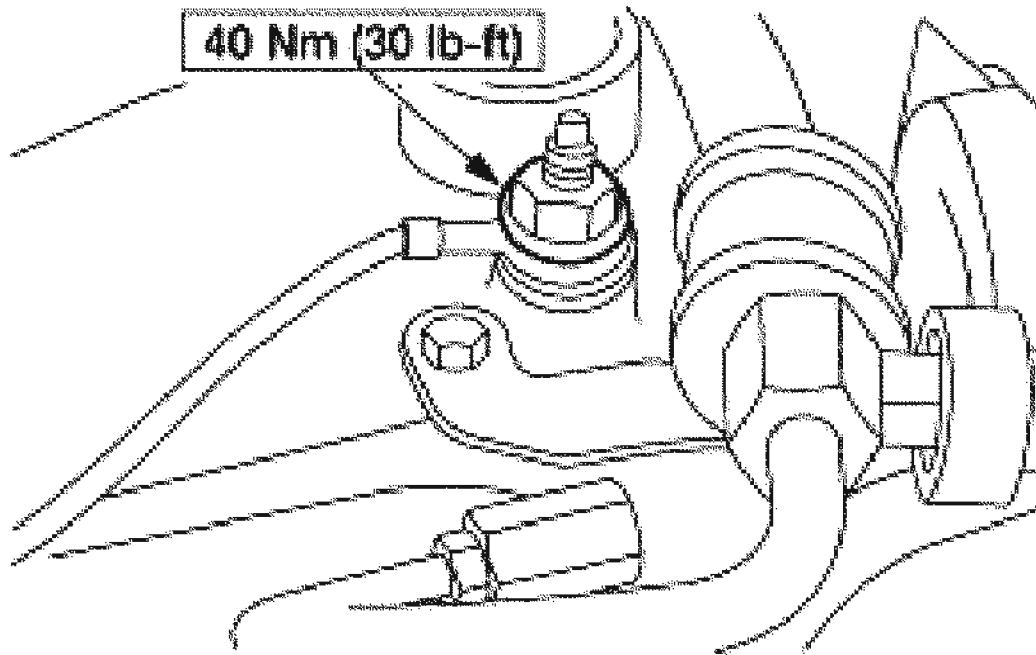
	3-Bar Engine Support Kit 303-F072
	Engine Lifting Bracket 303-050 (T70P-6000)
	Universal Adapter Brackets 014-0001

G02739371

**Fig. 198: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal and Installation

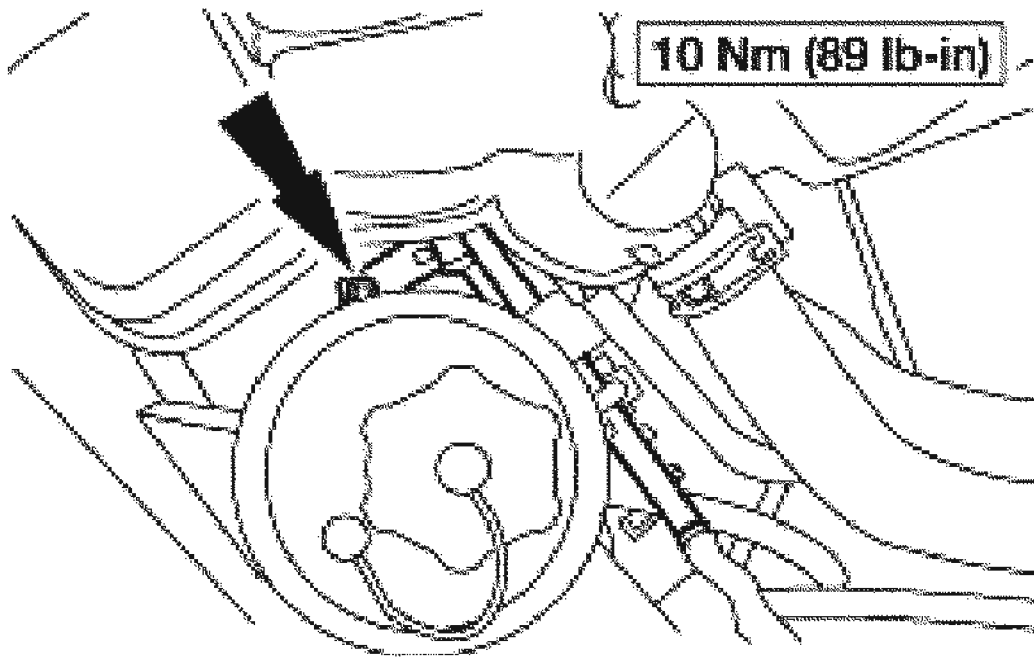
1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD** .
2. Remove the engine ground wire.



G02739372

**Fig. 199: Removing Engine Ground Wire**  
Courtesy of FORD MOTOR CO.

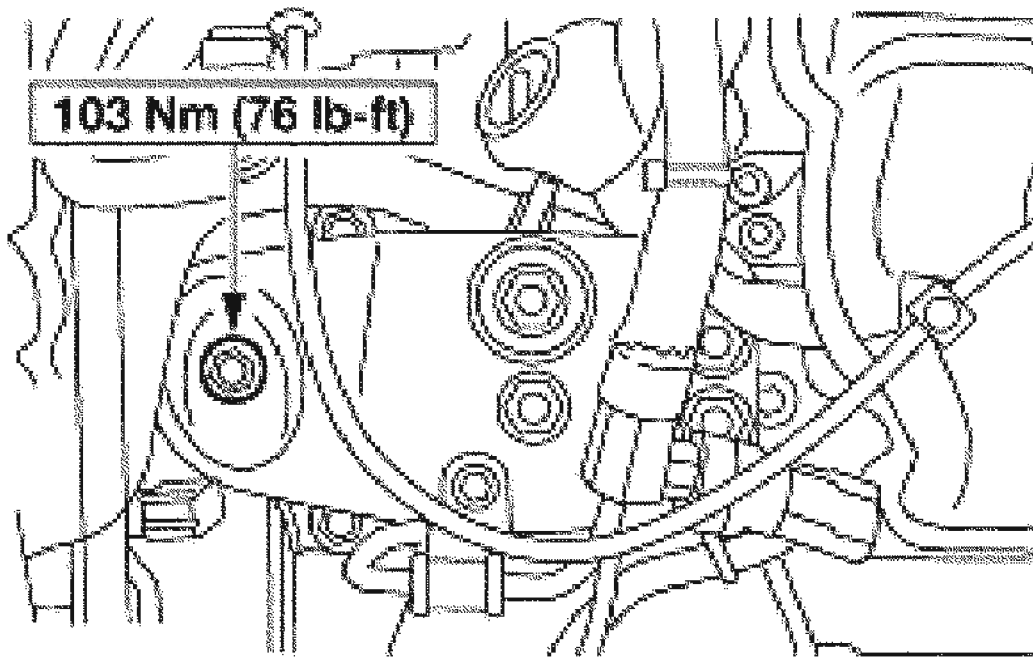
3. Remove the A/C line bracket bolt and position the A/C lines out of the way.



G02739373

**Fig. 200: Removing A/C Line Bracket Bolt**  
Courtesy of FORD MOTOR CO.

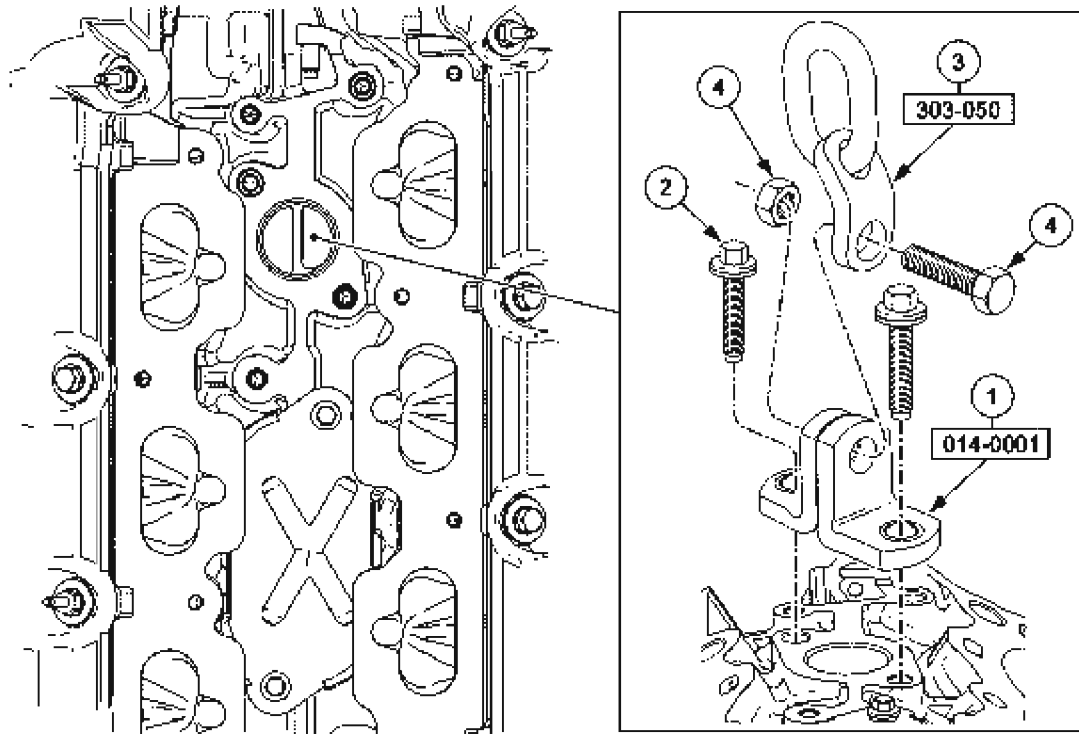
4. Remove the engine support insulator bolt.



G02739374

**Fig. 201: Removing Engine Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

5. Install the special tools.
  1. Position the 2 universal adapter brackets on top of the cylinder block.
  2. Install 2 M8 X 1.25 X 36 mm (1.41 in) bolts and tighten to 10 Nm (89 lb-in).
  3. Position the universal lifting bracket onto the 2 universal adapter brackets.
  4. Fasten the universal lifting bracket to the 2 universal adapter brackets with a suitable nut and bolt.

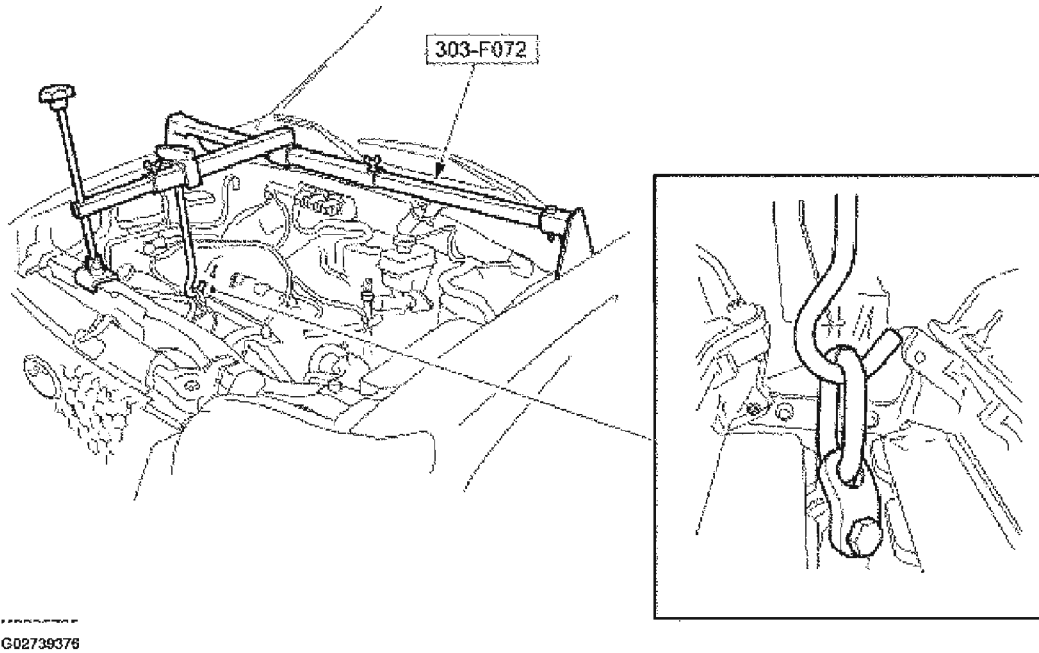


**Fig. 202: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

6. Using the special tools, lift the engine 12 mm (0.47 in).

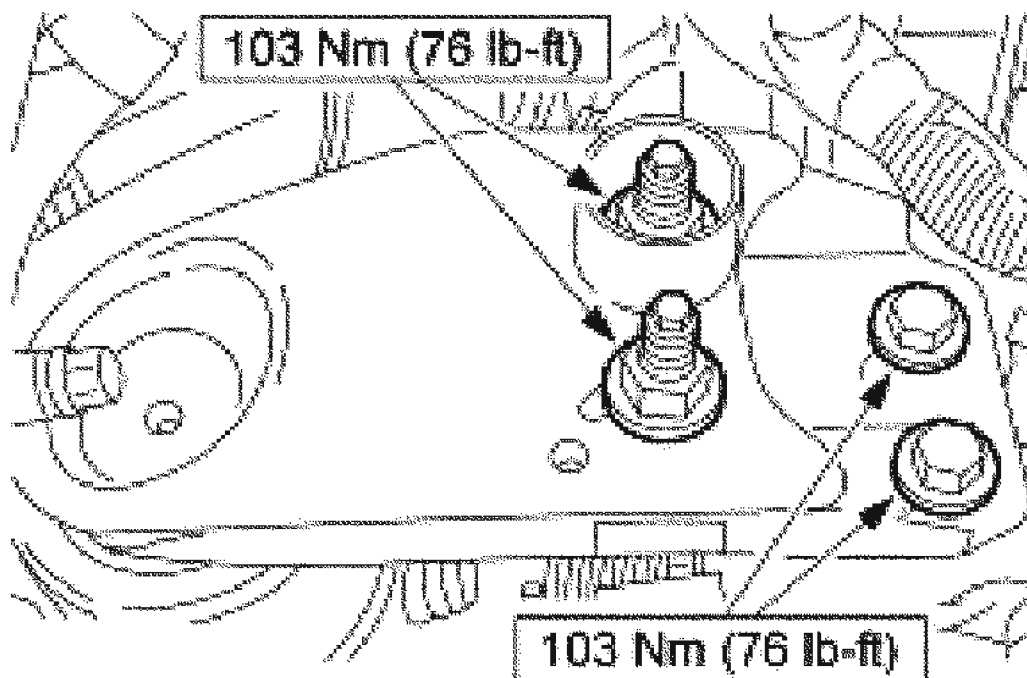
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



**Fig. 203: Lifting Engine Using Special Tool**  
Courtesy of FORD MOTOR CO.

7. Remove the bolts, nuts and the engine support insulator bracket.

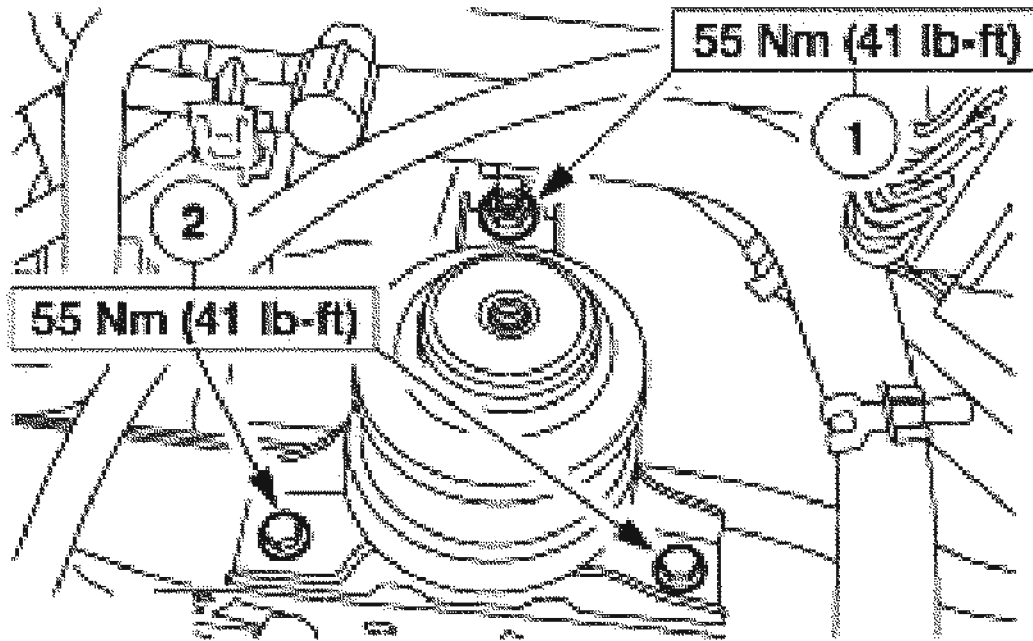


G02739377

**Fig. 204: Removing Bolts, Nuts And Engine Support Insulator Bracket**  
Courtesy of FORD MOTOR CO.

8. Remove the engine support insulator.
  1. Remove the nut.
  2. Remove the bolts and insulator.





G02739378

**Fig. 205: Removing Engine Support Insulator**  
Courtesy of FORD MOTOR CO.

9. To install, reverse the removal procedure.

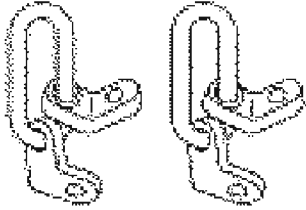
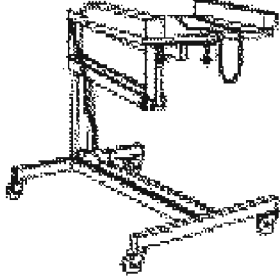

## REMOVAL

### ENGINE

### Special Tool(s)

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Lifting Brackets, Engine 303-050 (T70P-6000)
	Powertrain Lift with Tilting Plate 014-00765
	Spreader Bar 303-D089 (D93P-6001-A3) or Equivalent

G02739379

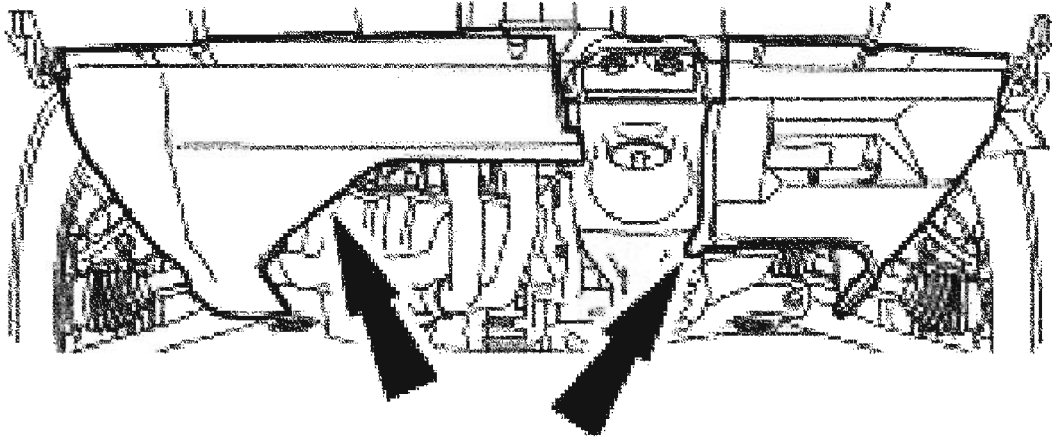
**Fig. 206: Identifying Engine Special Tool**  
Courtesy of FORD MOTOR CO.

### Removal

1. Remove the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**
2. Remove the air cleaner outlet pipe and air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**
3. Recover the A/C refrigerant. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**
4. Raise and support the vehicle. For additional information, refer to **CLIMATE**

## **CONTROL SYSTEM-GENERAL INFORMATION**

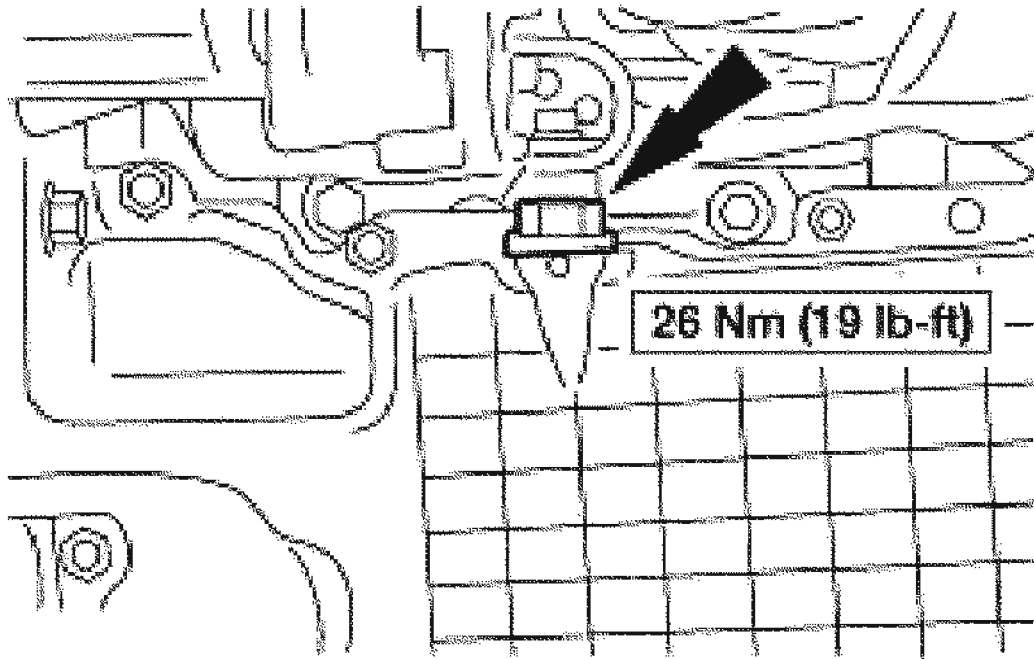
5. Remove the lower radiator air deflectors.



**G02739380**

**Fig. 207: Removing Lower Radiator Air Deflectors**  
Courtesy of FORD MOTOR CO.

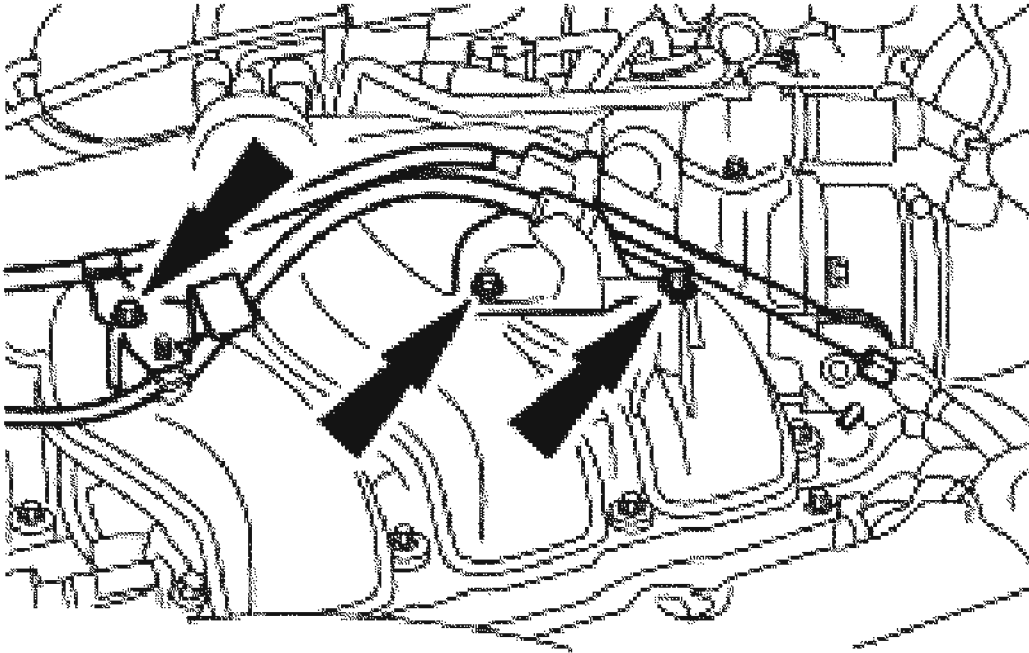
6. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING**
7. Drain the engine oil.
  - Install the drain plug.



G02739381

**Fig. 208: Identifying Drain Plug**  
Courtesy of FORD MOTOR CO.

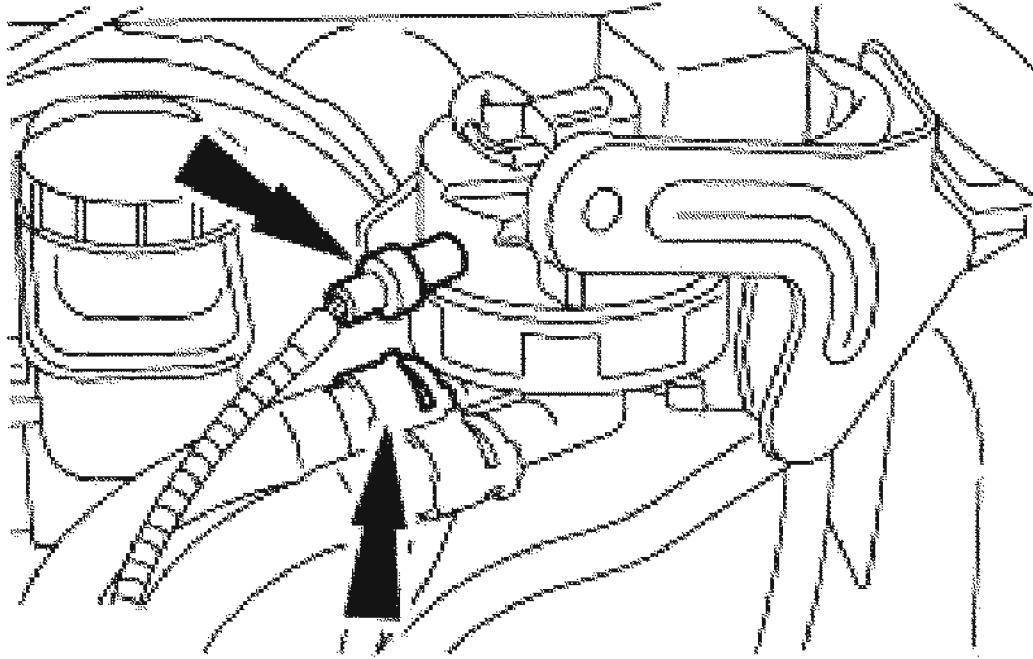
8. Lower the vehicle.
9. Disconnect the fuel hose spring lock coupling. For additional information, refer to **FUEL TANK & LINES**
10. Remove the water pump drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**
11. Disconnect the accelerator cable and, if equipped, the speed control actuator cable.



G02739382

**Fig. 209: Disconnecting Accelerator Cable & Speed Control Actuator Cable**  
Courtesy of FORD MOTOR CO.

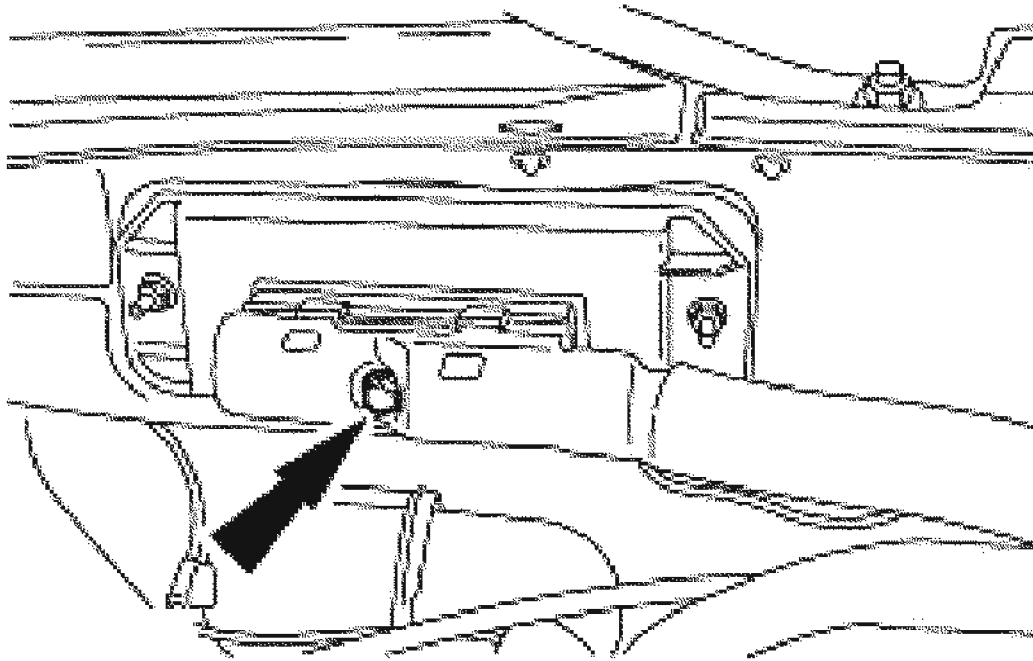
12. Disconnect the vapor management valve (VMV) connectors.



G02739383

**Fig. 210: Disconnecting Vapor Management Valve (VMV) Connectors**  
Courtesy of FORD MOTOR CO.

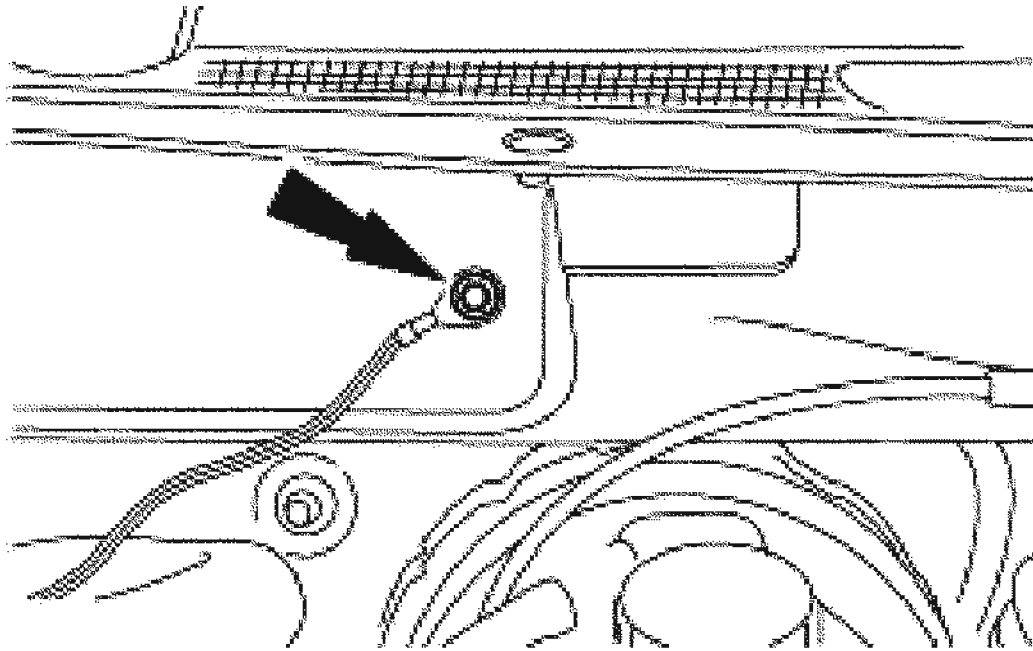
13. Disconnect the powertrain control module (PCM) electrical connector.



G02739384

**Fig. 211: Disconnecting Powertrain Control Module (PCM) Electrical Connector**  
Courtesy of FORD MOTOR CO.

14. Disconnect the ground wire.

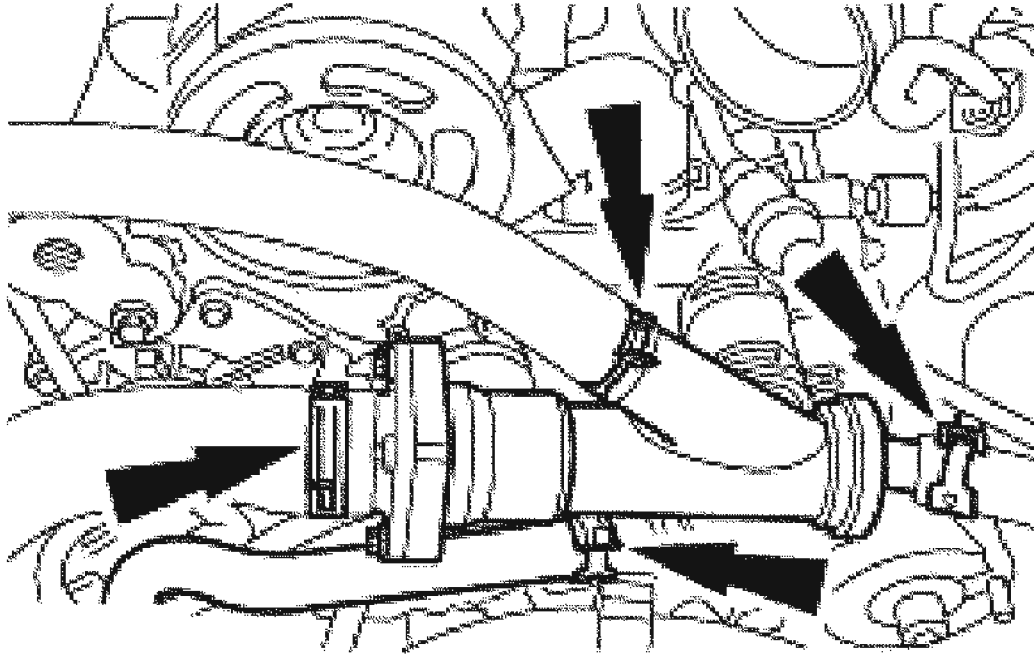


G02739385

**Fig. 212: Disconnecting Ground Wire**  
Courtesy of FORD MOTOR CO.

15. Disconnect the hoses.

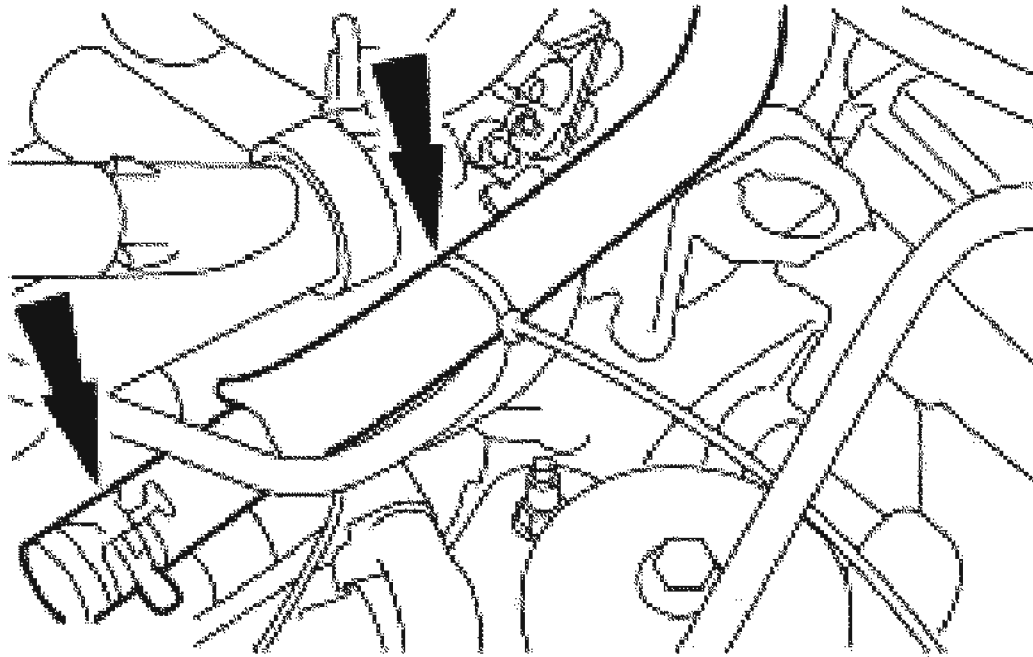




G02739386

**Fig. 213: Disconnecting Hoses**  
Courtesy of FORD MOTOR CO.

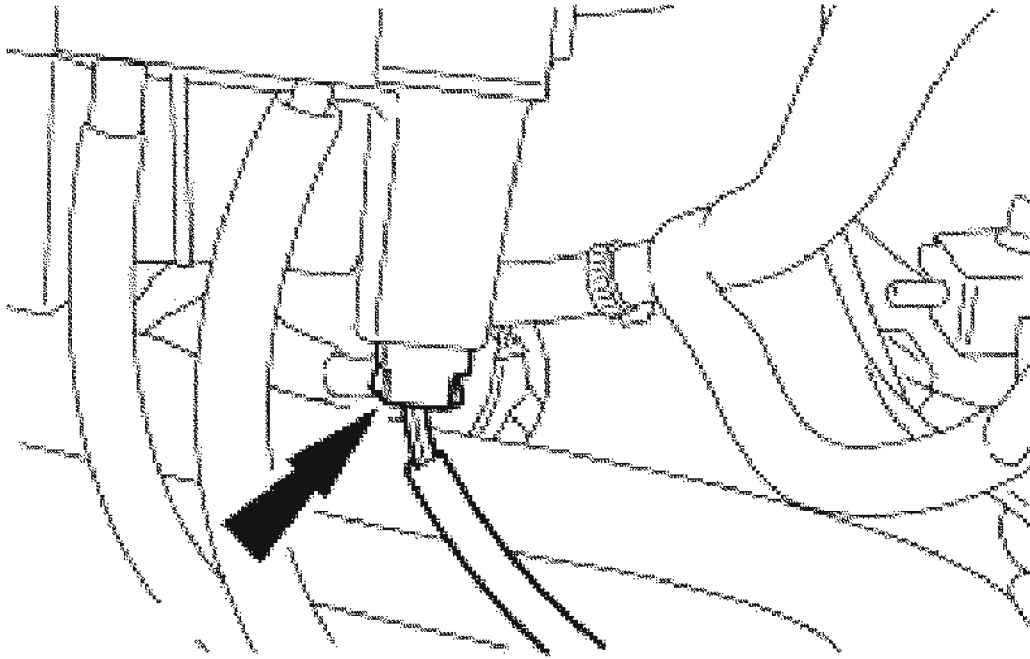
16. Remove the tie-strap and disconnect the heater hose.



G02739387

**Fig. 214: Removing Tie-Strap And Disconnecting Heater Hose**  
Courtesy of FORD MOTOR CO.

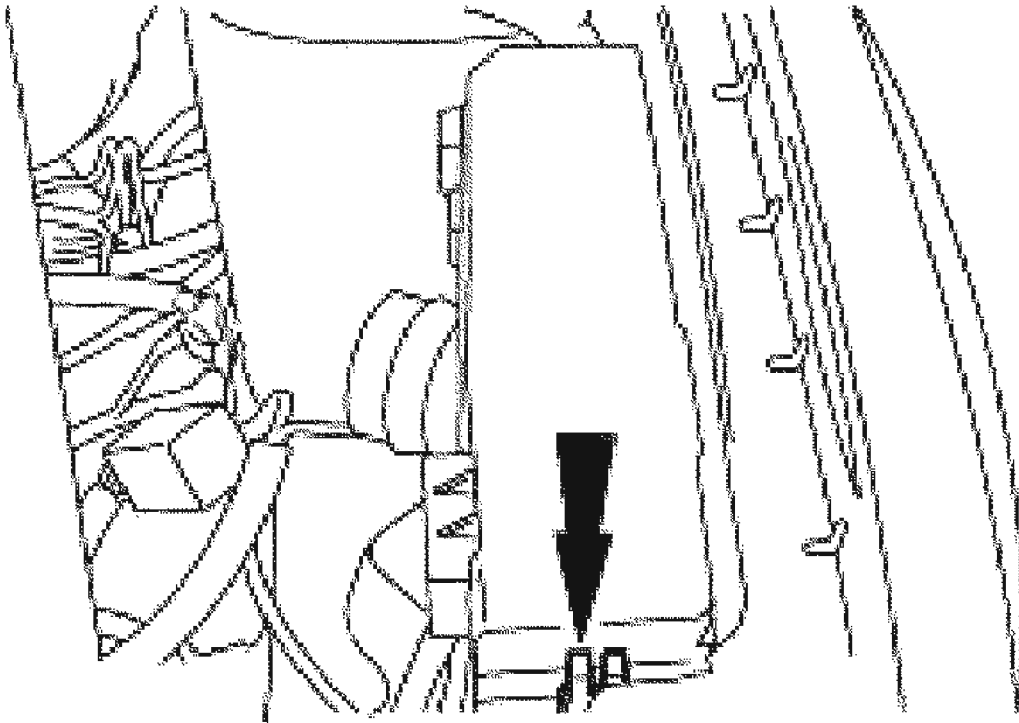
17. Disconnect the electrical connector from the power distribution box.



G02739388

**Fig. 215: Disconnecting Electrical Connector**  
Courtesy of FORD MOTOR CO.

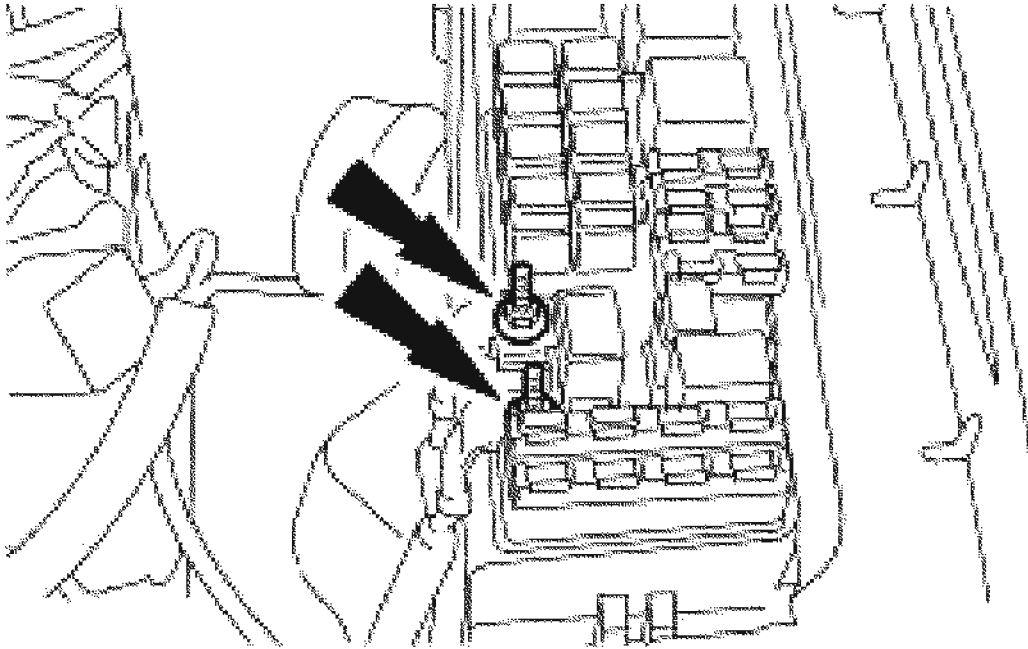
18. Remove the power distribution box cover.



G02739389

**Fig. 216: Removing Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

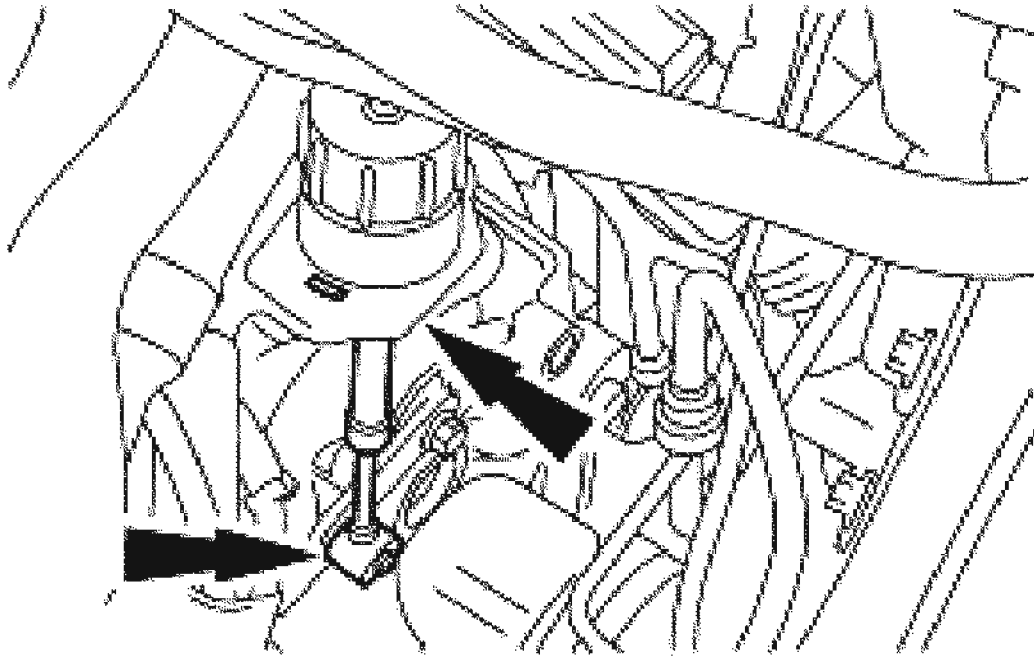
19. Remove the nuts and the cables.



G02739390

**Fig. 217: Removing Nuts And Cables**  
**Courtesy of FORD MOTOR CO.**

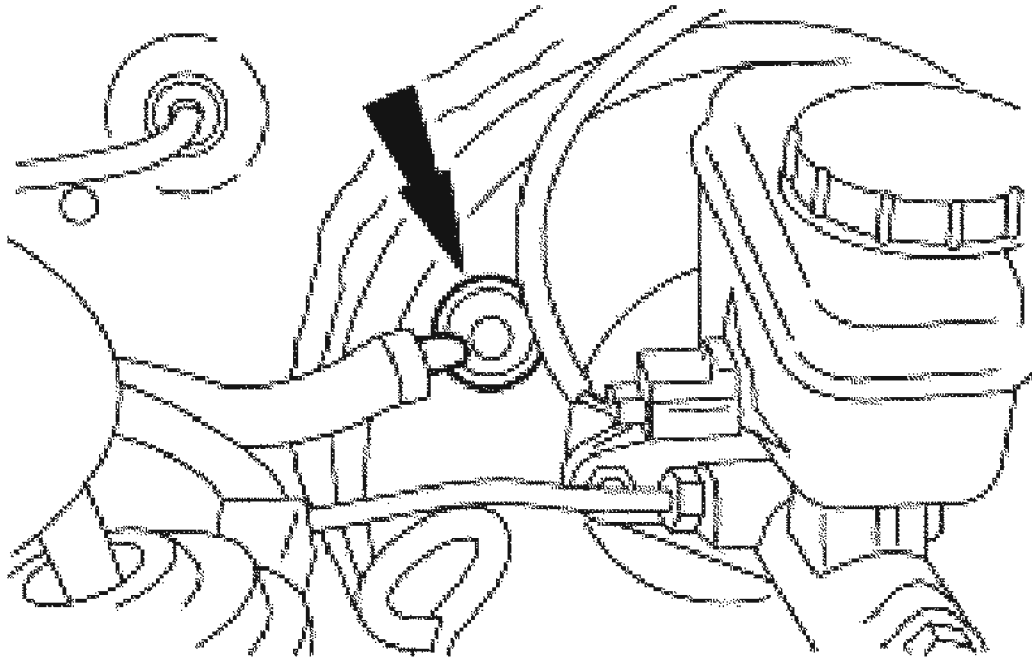
20. Disconnect the transaxle linkage.



G02739391

**Fig. 218: Disconnecting Transaxle Linkage**  
Courtesy of FORD MOTOR CO.

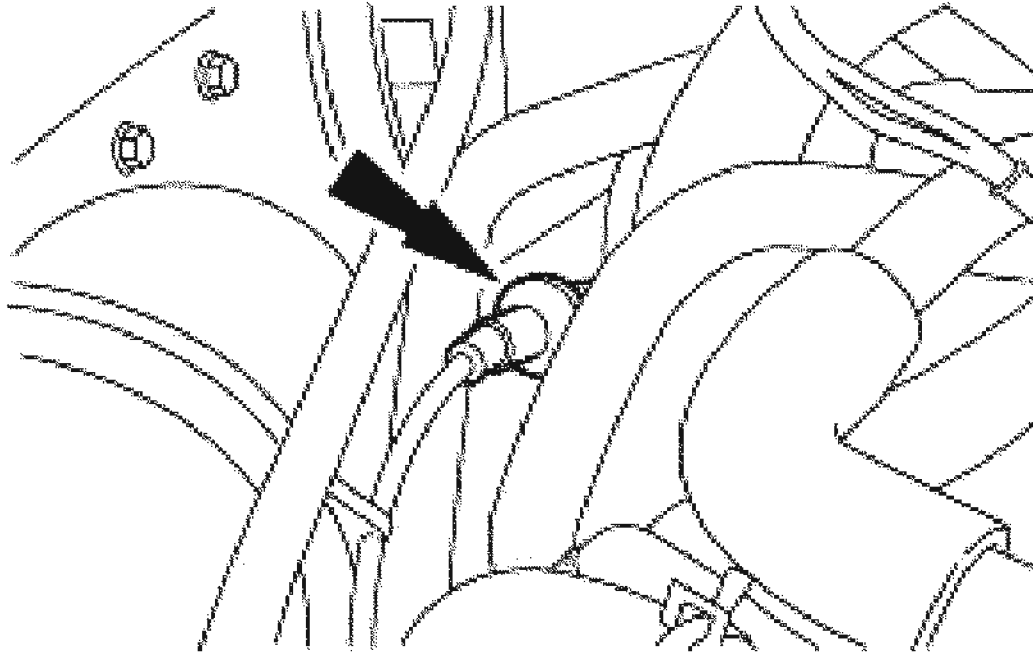
21. Disconnect the brake booster vacuum hose.



G02739392

**Fig. 219: Disconnecting Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

22. Disconnect the vacuum hose at the vacuum reservoir check valve.

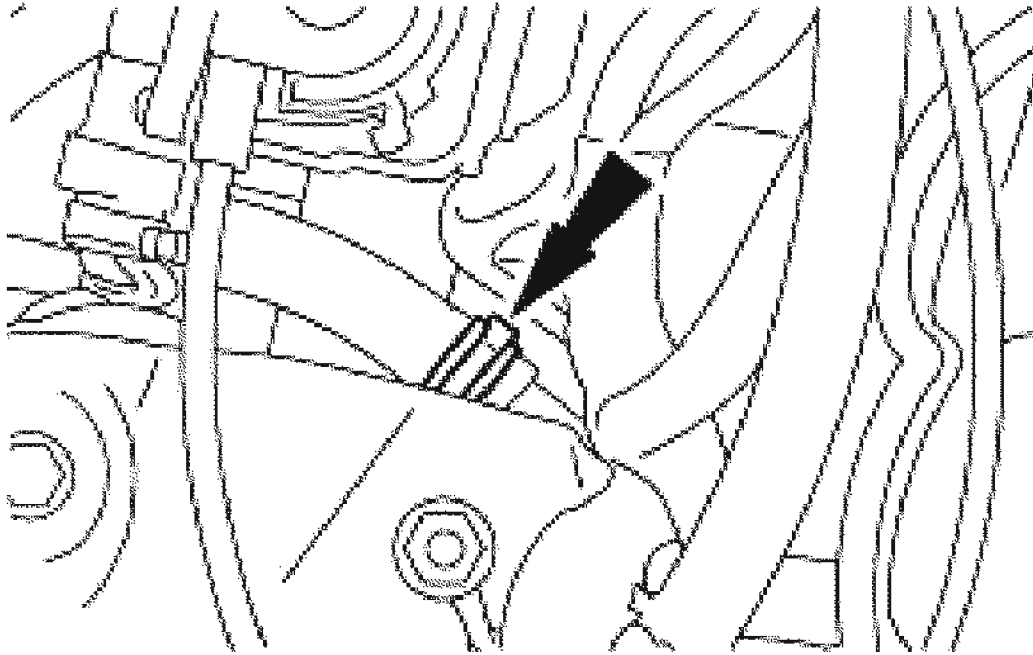


G02739393

**Fig. 220: Disconnecting Vacuum Hose**  
Courtesy of FORD MOTOR CO.

23. Disconnect the power steering return tube.

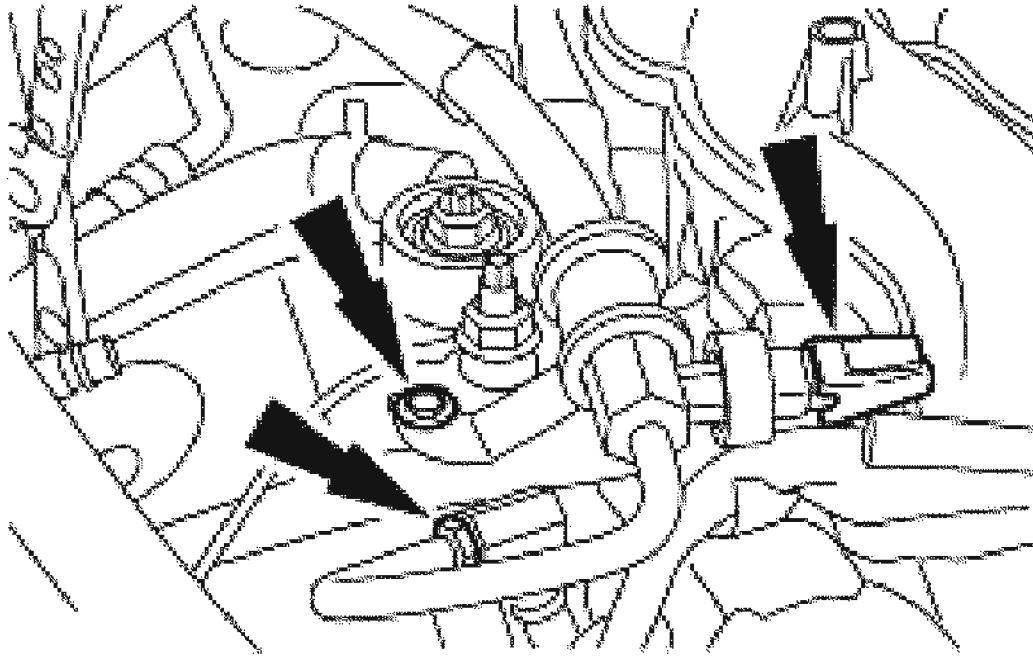




G02739394

**Fig. 221: Disconnecting Power Steering Return Tube**  
Courtesy of FORD MOTOR CO.

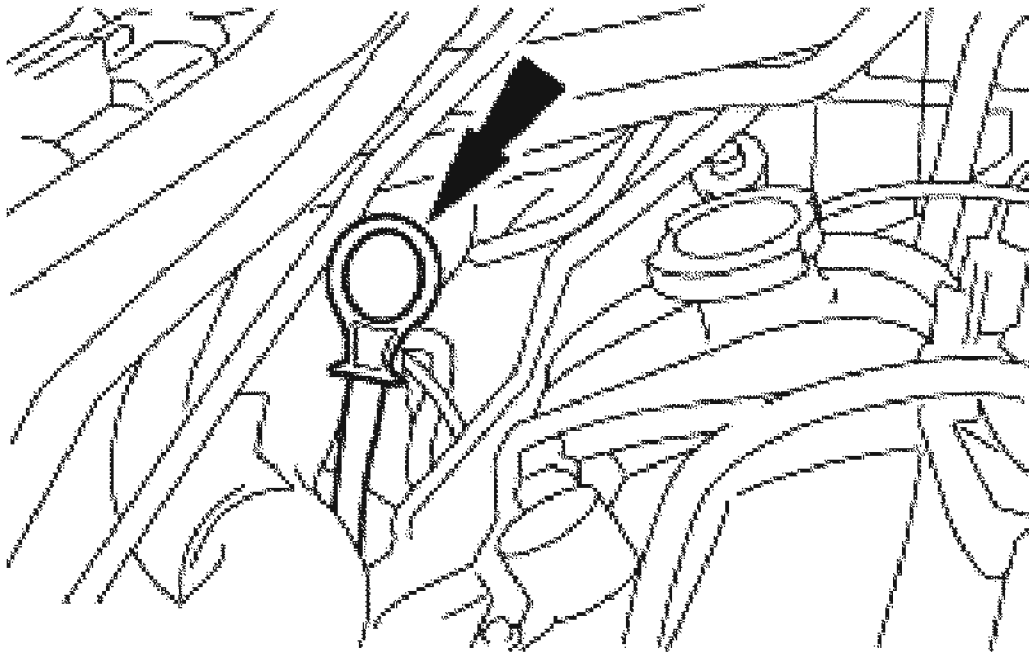
24. Disconnect the power steering hose.
  - Disconnect the power steering pressure (PSP) switch electrical connector.
  - Remove the bracket bolt.
  - Disconnect the power steering hose.



G02739395

**Fig. 222: Disconnecting Power Steering Hose**  
Courtesy of FORD MOTOR CO.

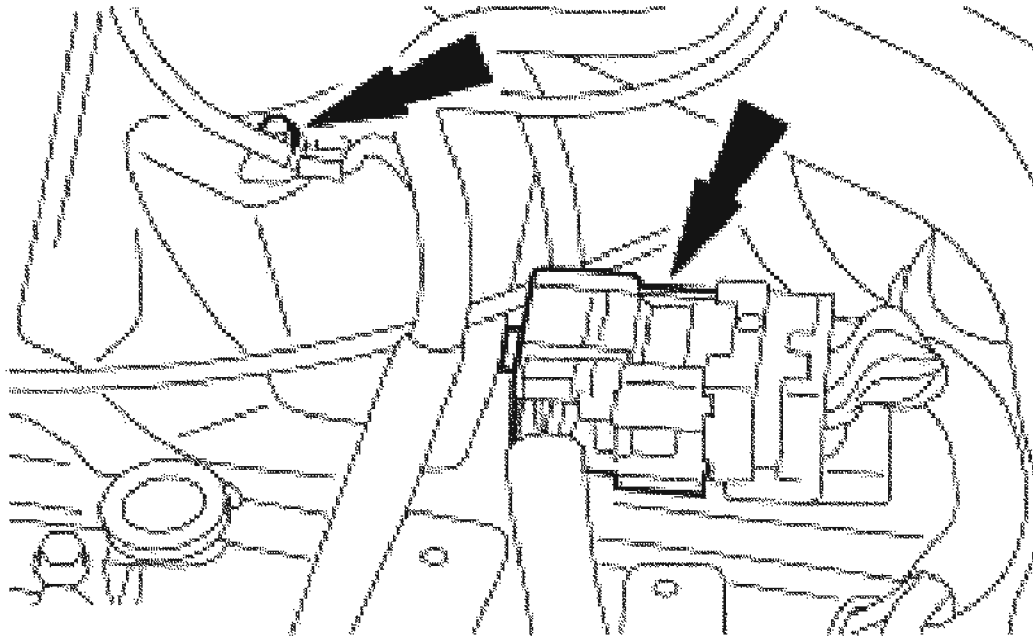
25. Remove the oil level indicator.



G02739396

**Fig. 223: Removing Oil Level Indicator**  
Courtesy of FORD MOTOR CO.

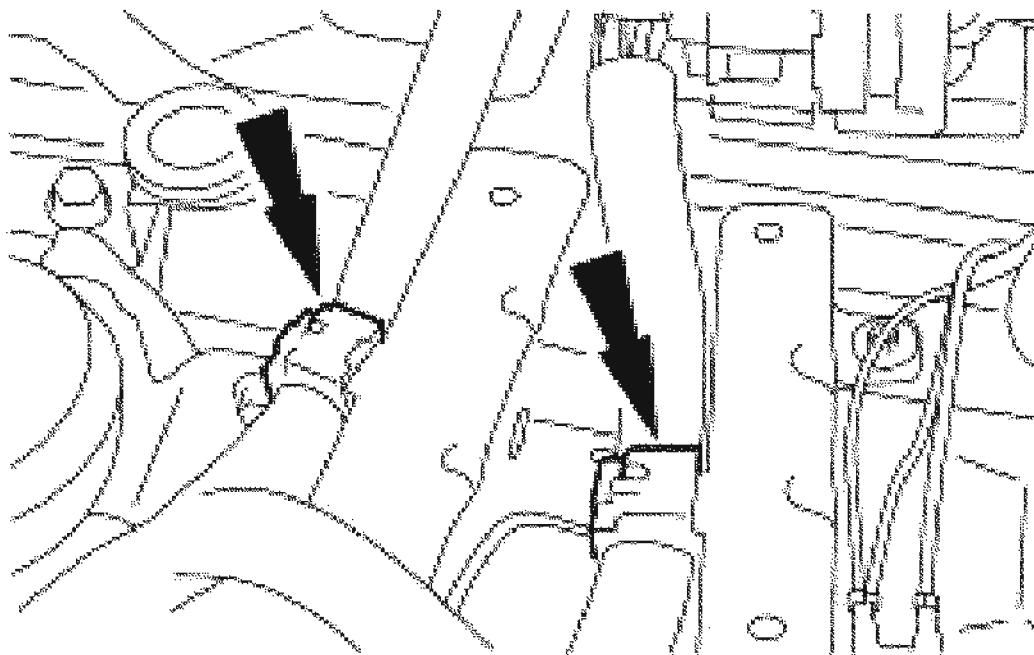
26. Disconnect the ground strap and the connector.



G02739397

**Fig. 224: Disconnecting Ground Strap And Connector**  
Courtesy of FORD MOTOR CO.

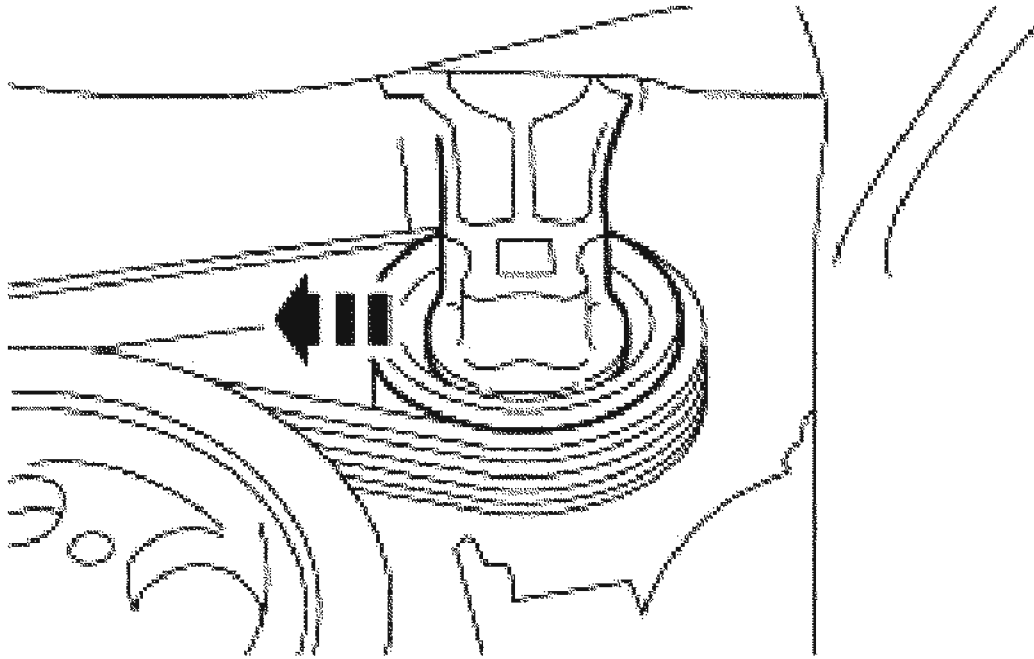
27. Remove the wiring harness retainers and position the wiring harness out of the way.



G02739398

**Fig. 225: Removing Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

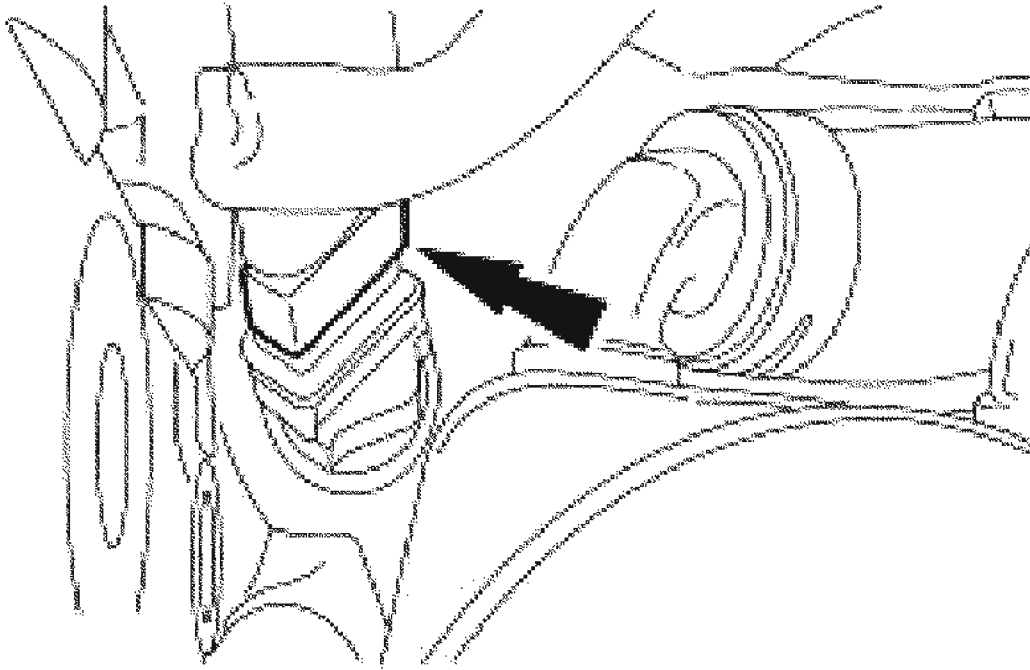
28. Remove the flex pipe. For additional information, refer to **EXHAUST SYSTEM**
29. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.



G02739399

**Fig. 226: Identifying Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

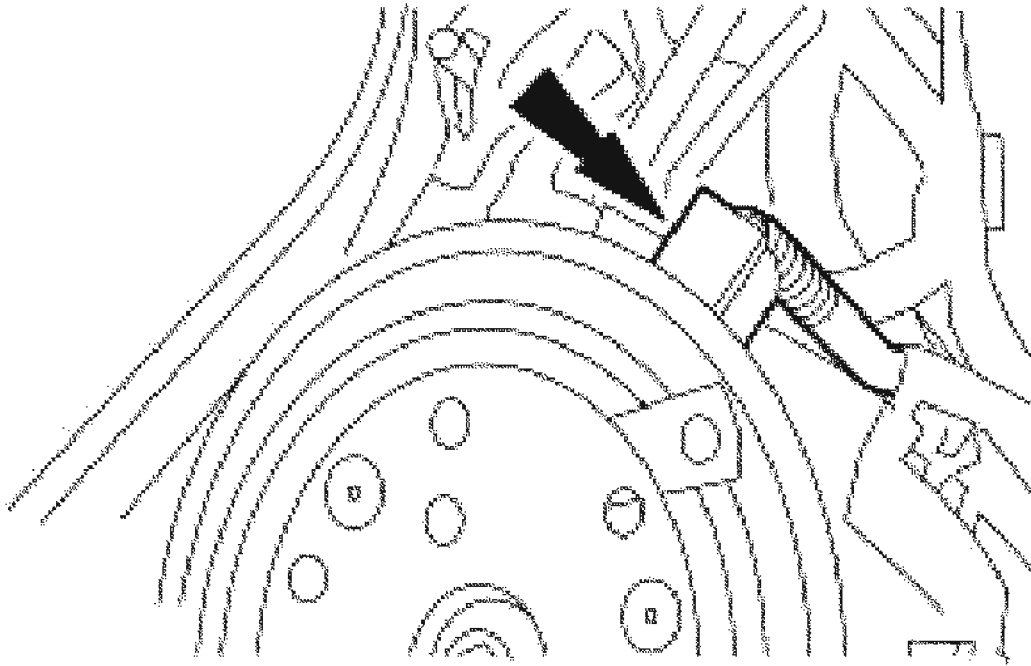
30. If equipped, disconnect the engine block heater electrical connector.



**G02739400**

**Fig. 227: Disconnecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

31. Disconnect the A/C clutch field coil electrical connector.

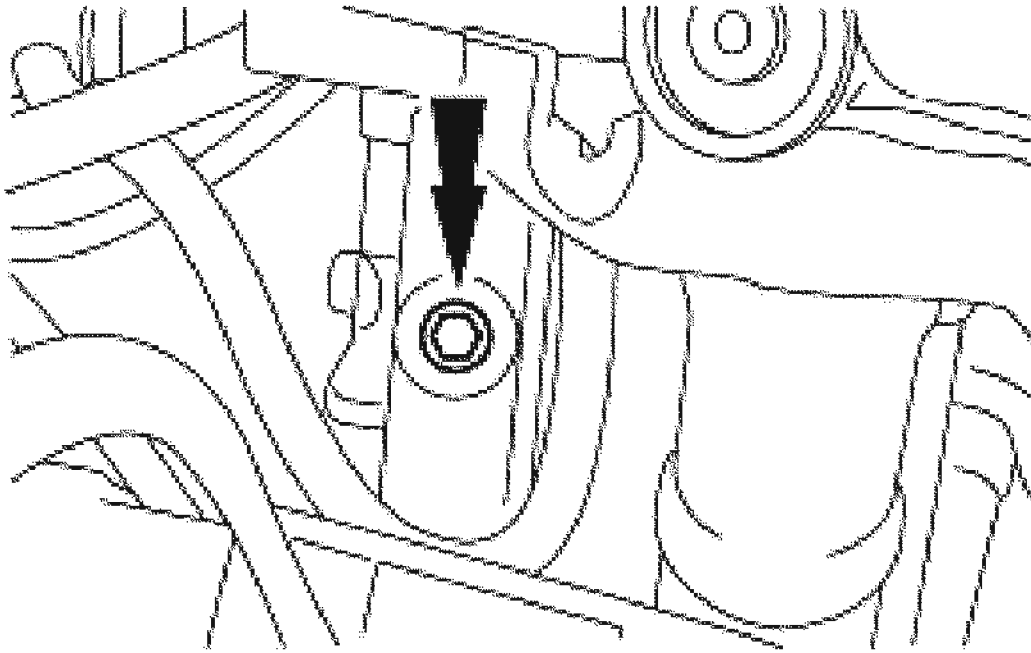


G02739401

**Fig. 228: Disconnecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.

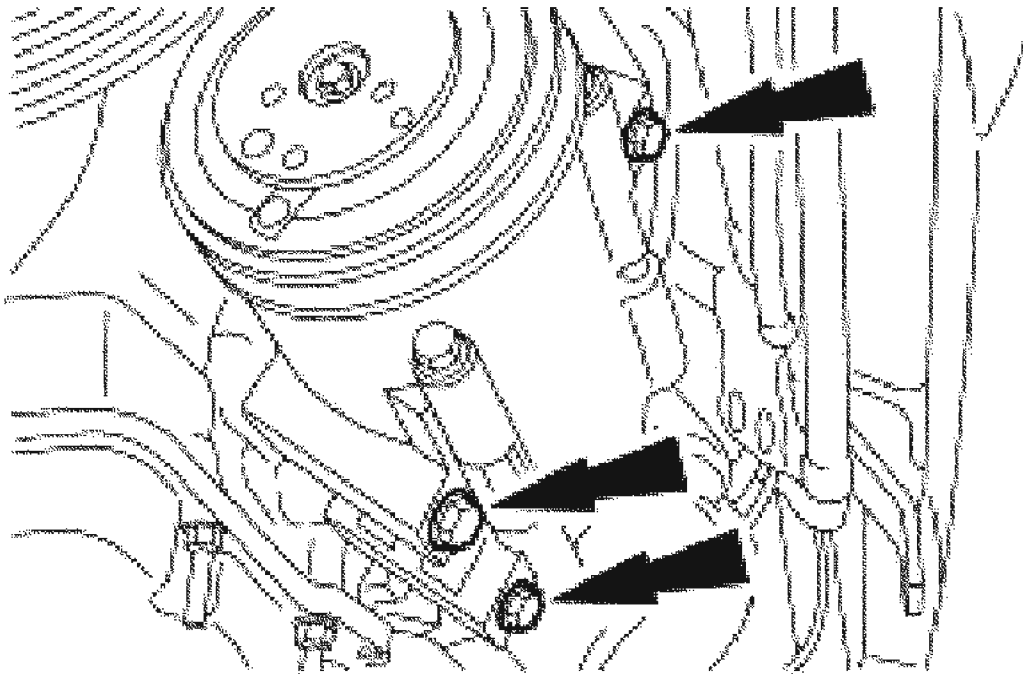




G02739402

**Fig. 229: Removing A/C Manifold & Tube Assembly Bolt**  
Courtesy of FORD MOTOR CO.

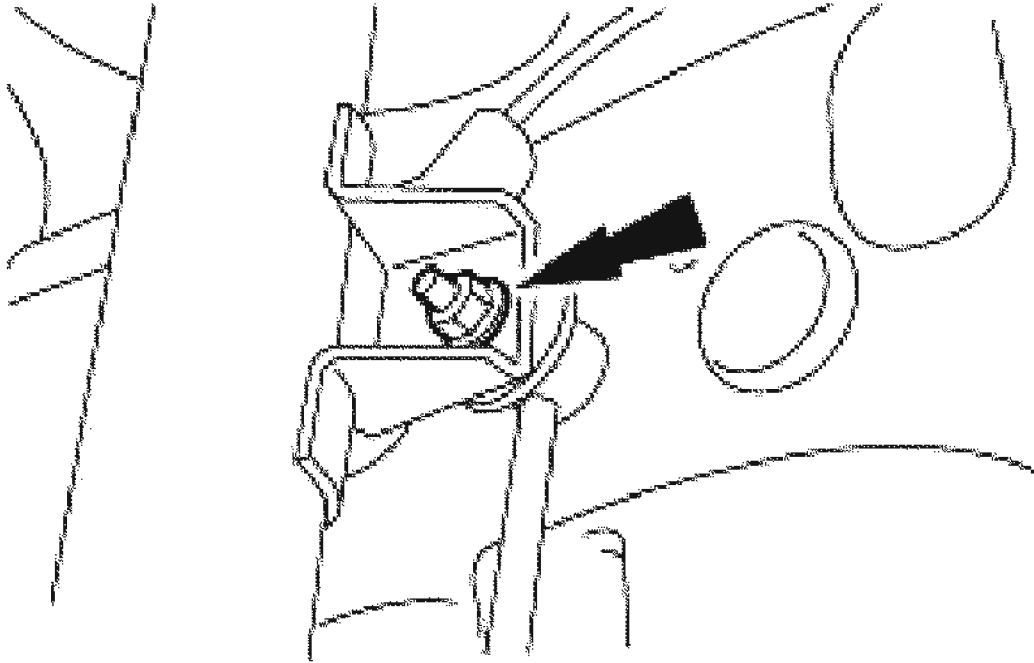
32. Remove the A/C manifold and tube assembly bolt from the top of the A/C compressor and disconnect the A/C manifold and tube assembly.
33. Remove the bolts and the A/C compressor.



G02739403

**Fig. 230: Removing Bolts And A/C Compressor**  
Courtesy of FORD MOTOR CO.

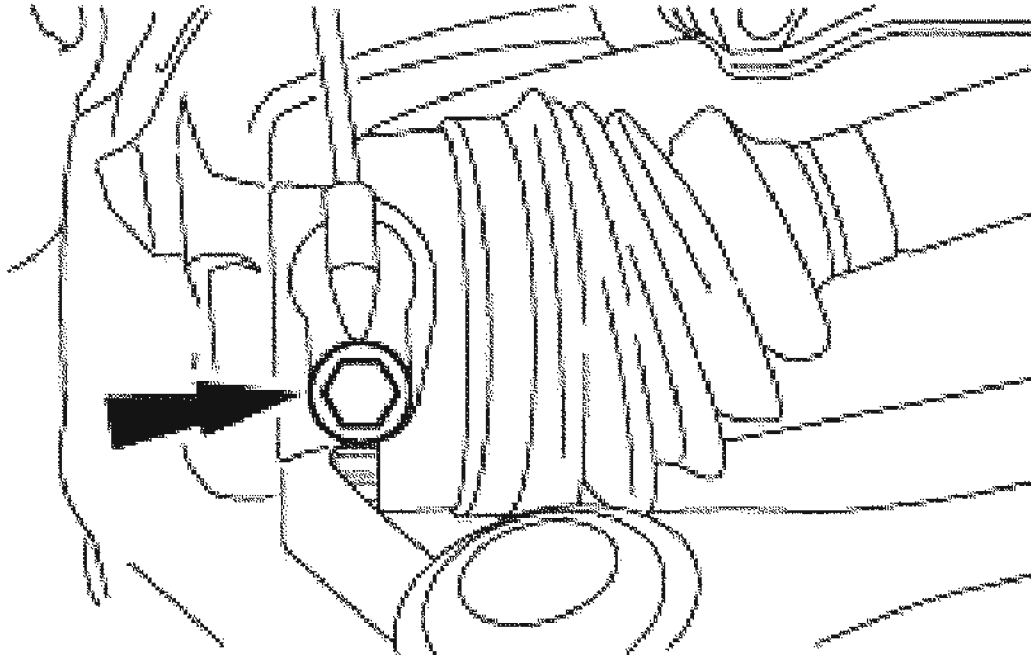
34. Remove both front wheel and tire assemblies.
35. If equipped, remove the intermediate driveshaft. For additional information, refer to **DRIVESHAFT**
36. Separate the LH and RH stabilizer bar links from the strut mount.



G02739404

**Fig. 231: Identifying LH And RH Stabilizer Bar**  
**Courtesy of FORD MOTOR CO.**

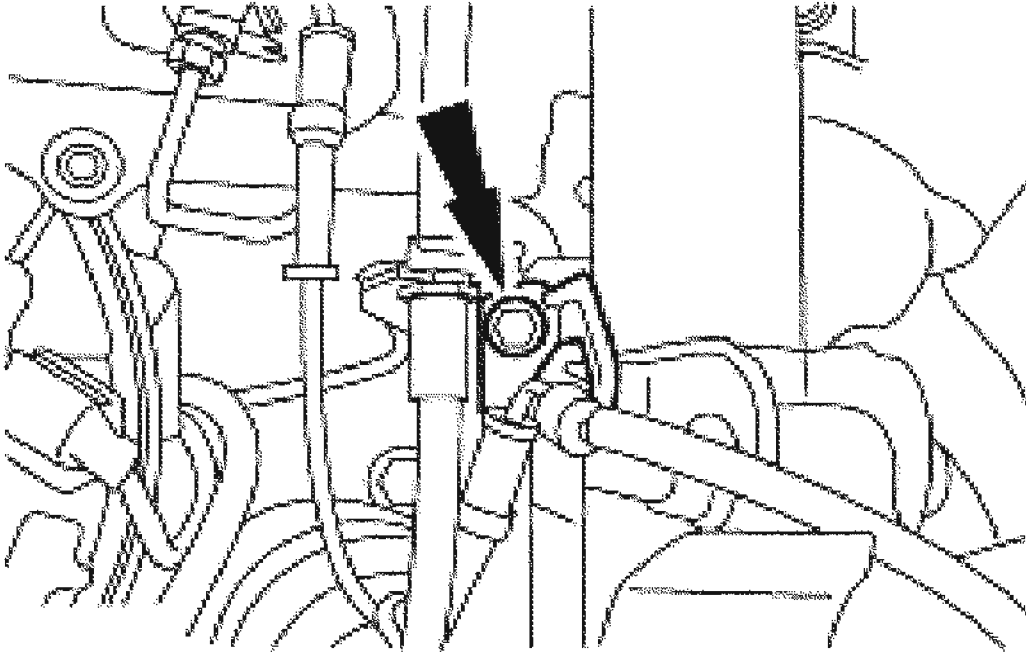
37. If equipped, remove the bolt and position aside the LH and RH wheel speed sensors.



G02739405

**Fig. 232: Identifying Bolt**  
Courtesy of FORD MOTOR CO.

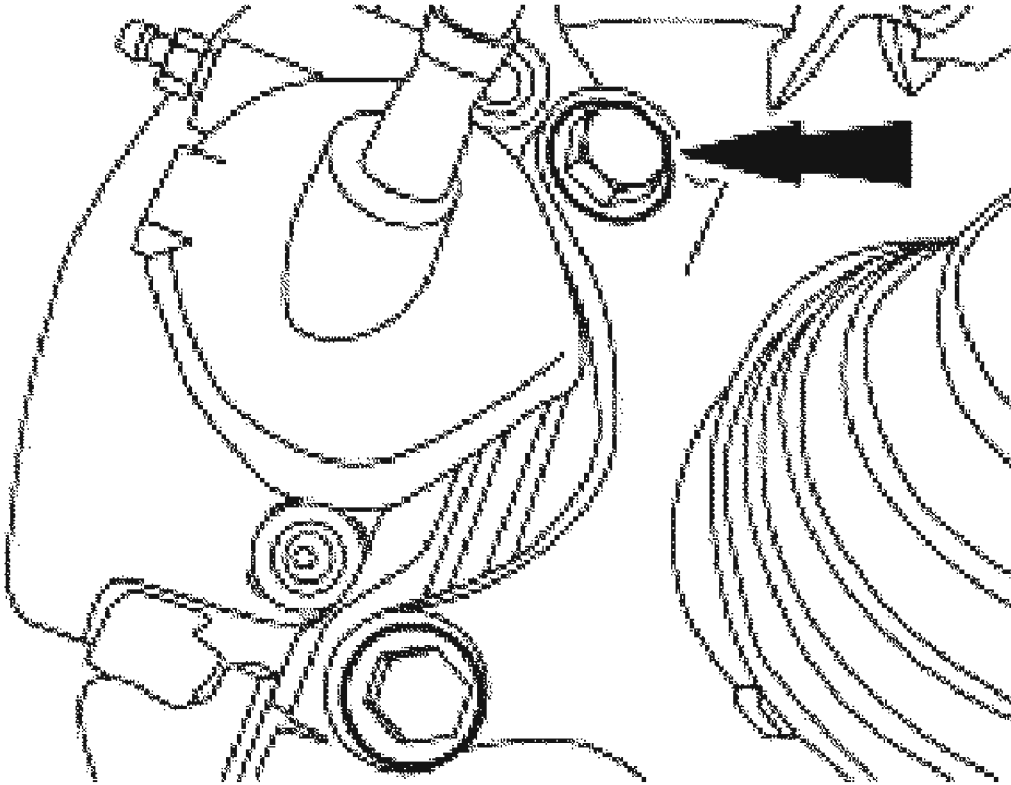
38. If equipped, remove the LH and RH wheel speed sensor brackets.



G02739406

**Fig. 233: Removing LH And RH Wheel Speed Sensor Brackets**  
Courtesy of FORD MOTOR CO.

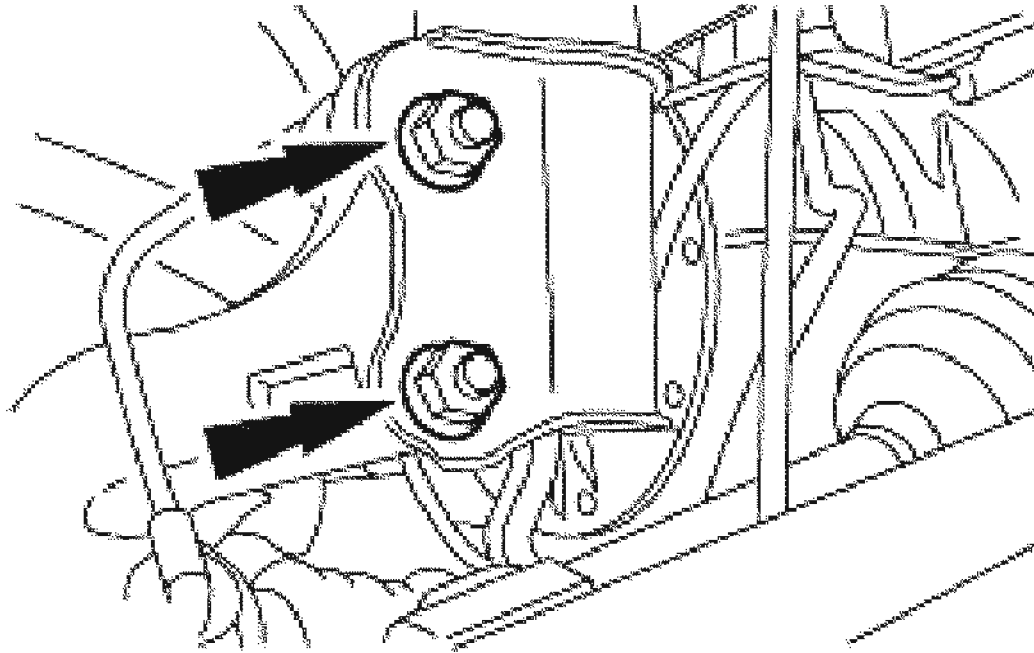
39. Remove the LH and RH brake calipers from the steering knuckles and support them on the struts.



G02739407

**Fig. 234: Removing LH And RH Brake Calipers**  
Courtesy of FORD MOTOR CO.

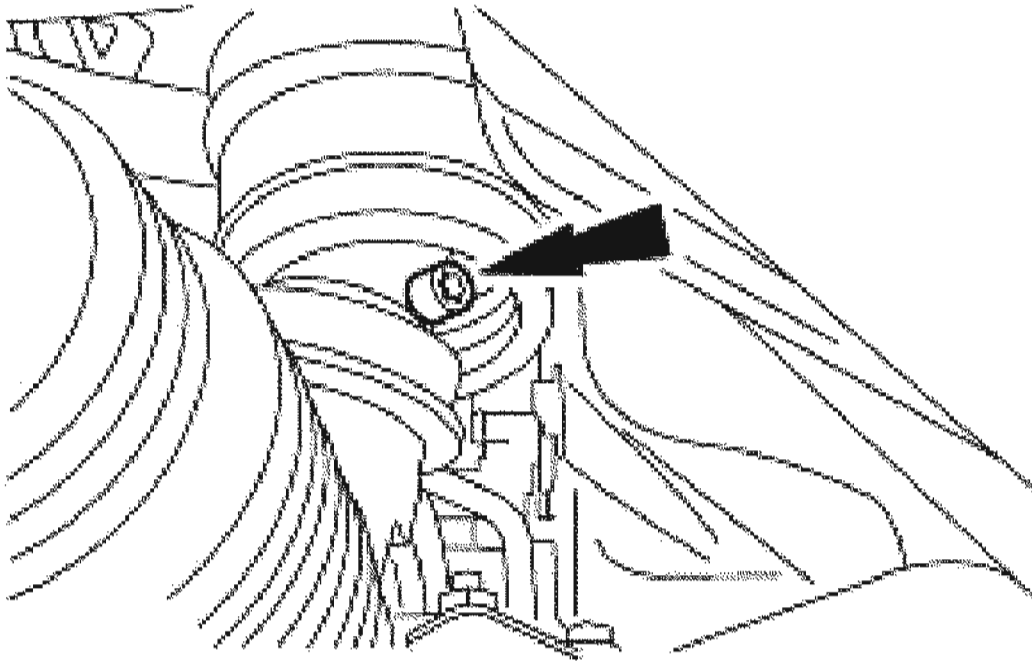
40. Remove the nuts and bolts and separate the struts from the LH and RH steering knuckles.



G02739408

**Fig. 235: Removing Nuts And Bolts**  
Courtesy of FORD MOTOR CO.

41. Remove the bolt and separate the steering shaft from the rack.

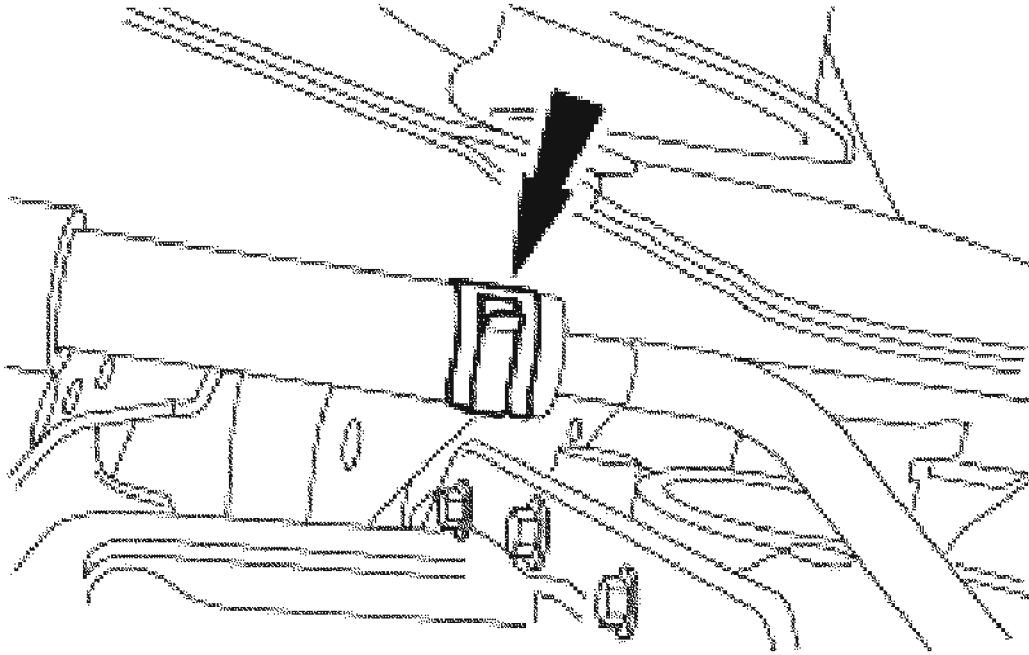


G02739409

**Fig. 236: Removing Bolt And Separate Steering Shaft From Rack**  
Courtesy of FORD MOTOR CO.

42. Disconnect the two transmission cooler tubes.

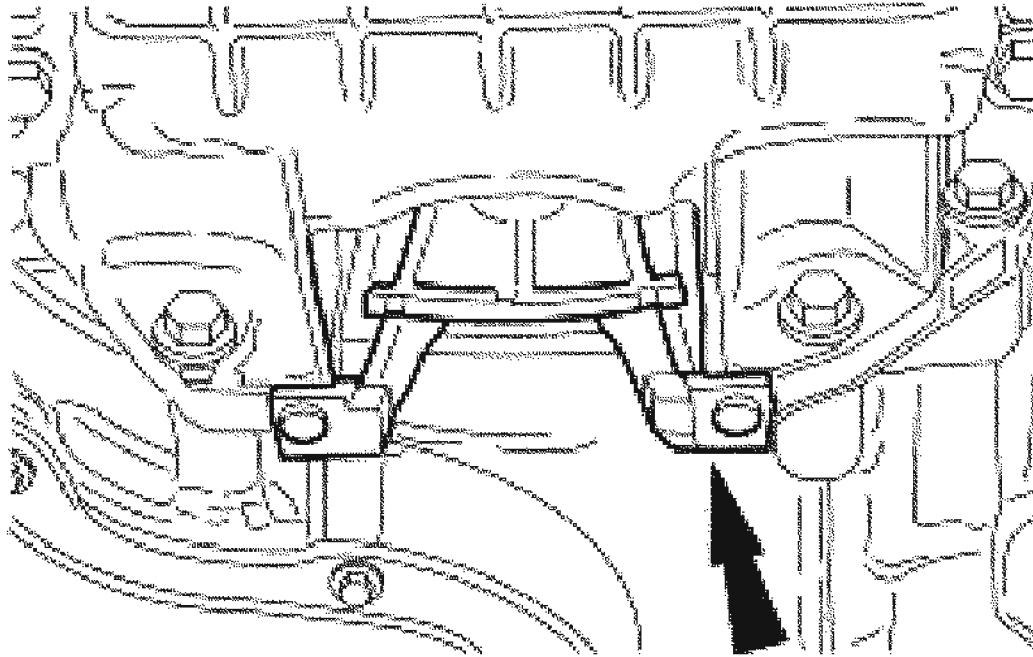




G02739410

**Fig. 237: Disconnecting Transmission Cooler Tubes**  
Courtesy of FORD MOTOR CO.

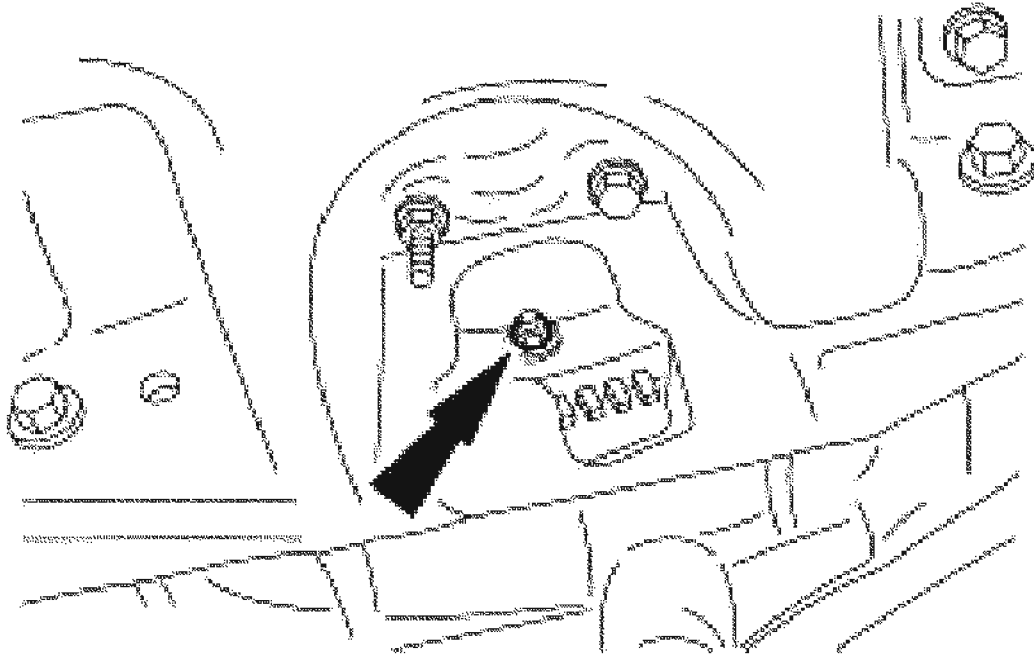
43. Remove the torque converter inspection cover.



G02739411

**Fig. 238: Removing Torque Converter Inspection Cover**  
Courtesy of FORD MOTOR CO.

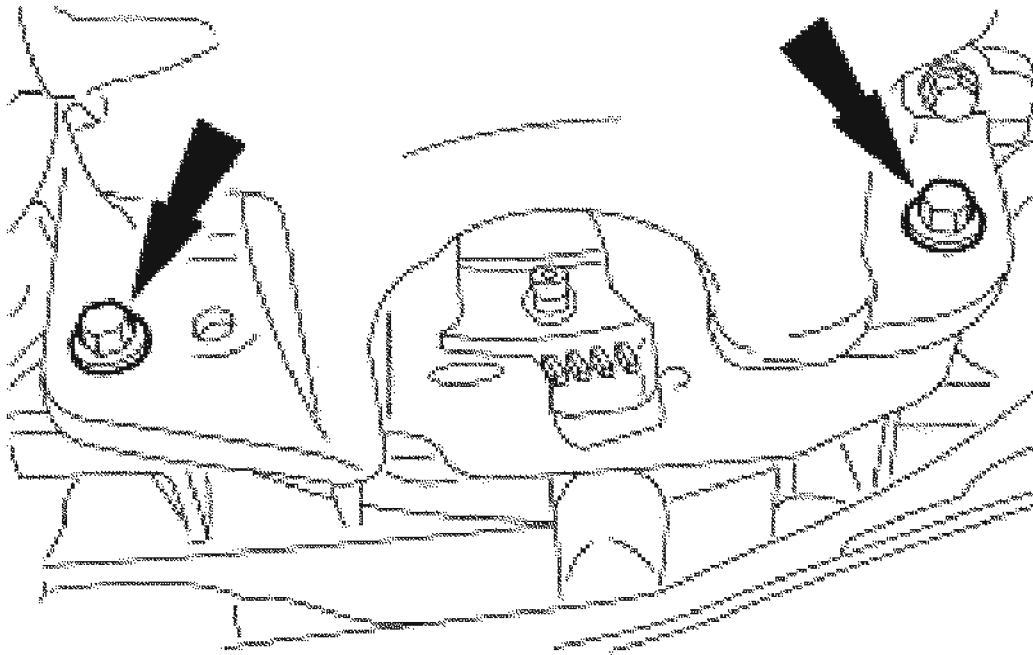
44. Remove the four torque converter nuts.



G02739412

**Fig. 239: Removing Torque Converter Nuts**  
**Courtesy of FORD MOTOR CO.**

45. Remove the four bolts.



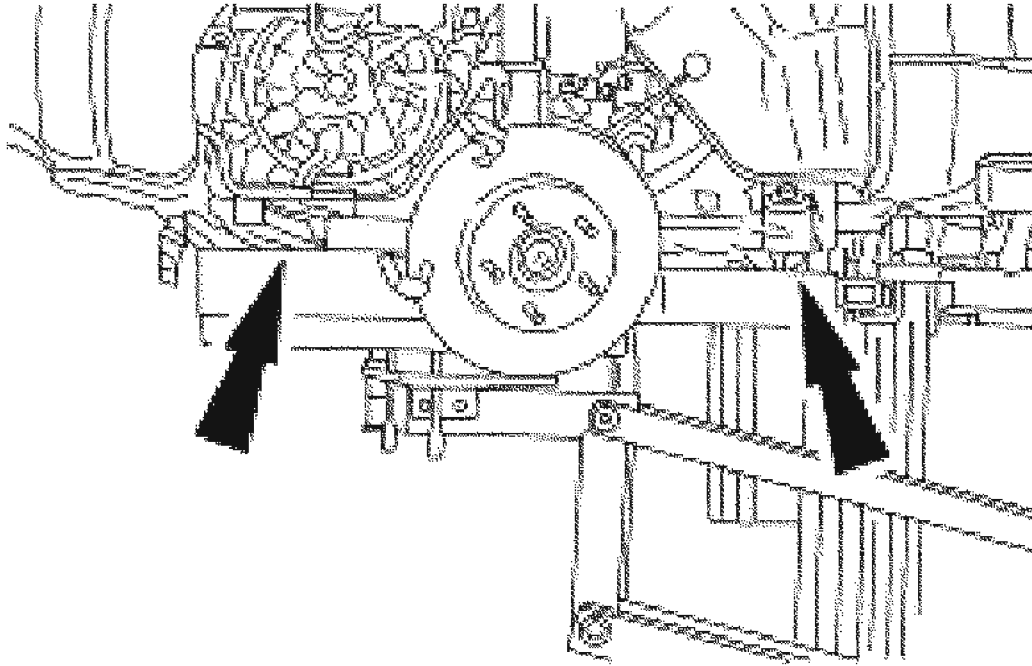
G02739413

**Fig. 240: Locating Bolt**  
Courtesy of FORD MOTOR CO.

46. Position the universal powertrain lift.

## 2004 Ford Escape

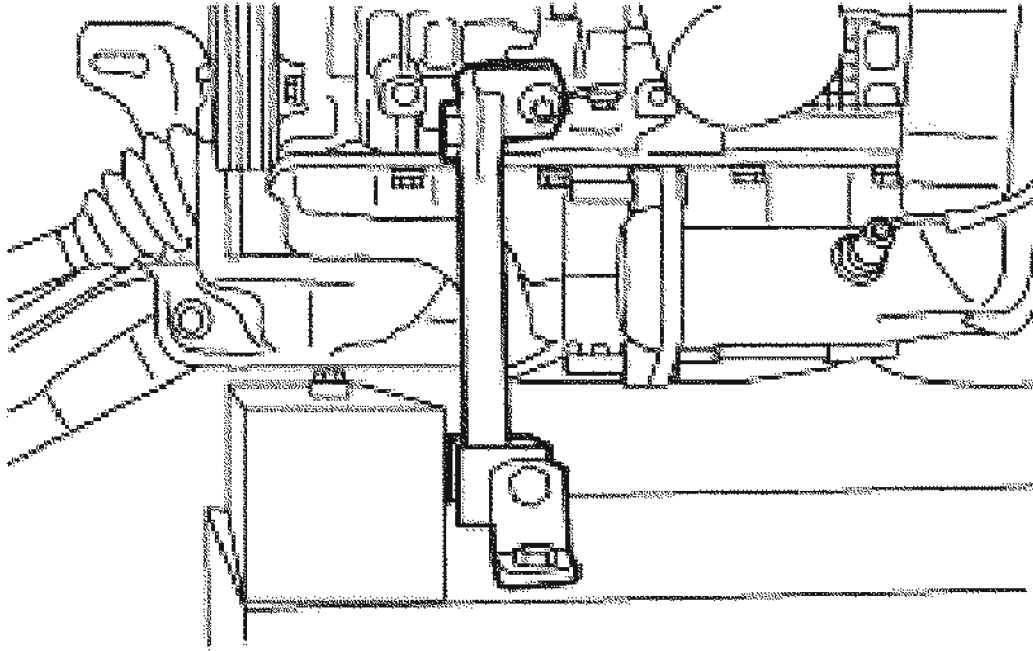
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739414

**Fig. 241: Positioning Universal Powertrain Lift**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not allow the engine oil pan to rest on the powertrain lift.

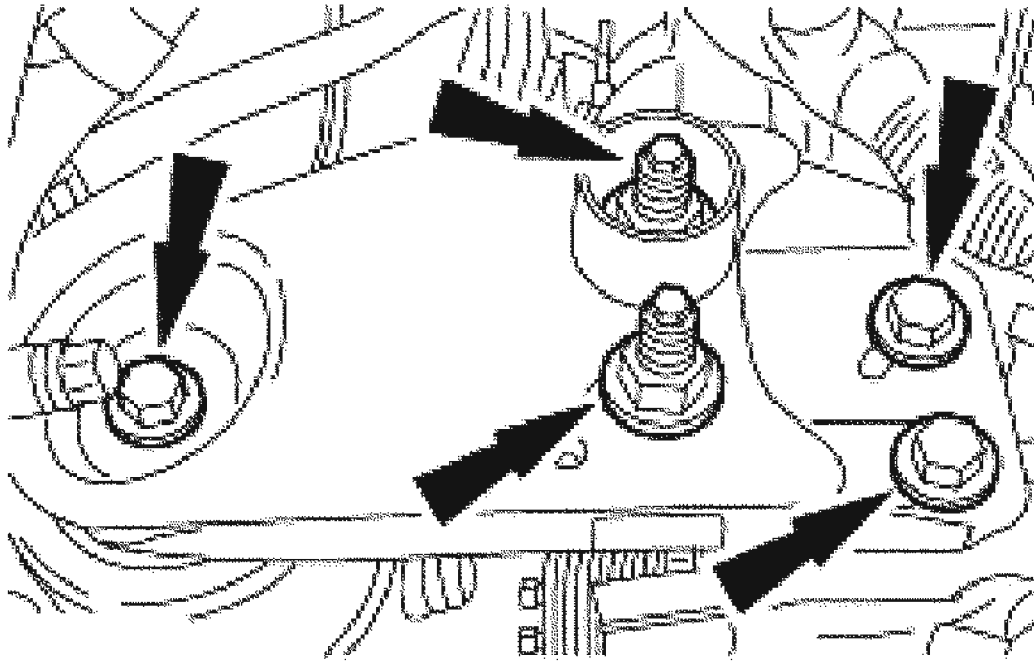


G02739415

**Fig. 242: Supporting Front Of Engine Using Engine Stand**  
Courtesy of FORD MOTOR CO.

**NOTE:** The next seven steps must be carried out with the vehicle raised and the universal powertrain lift in position.

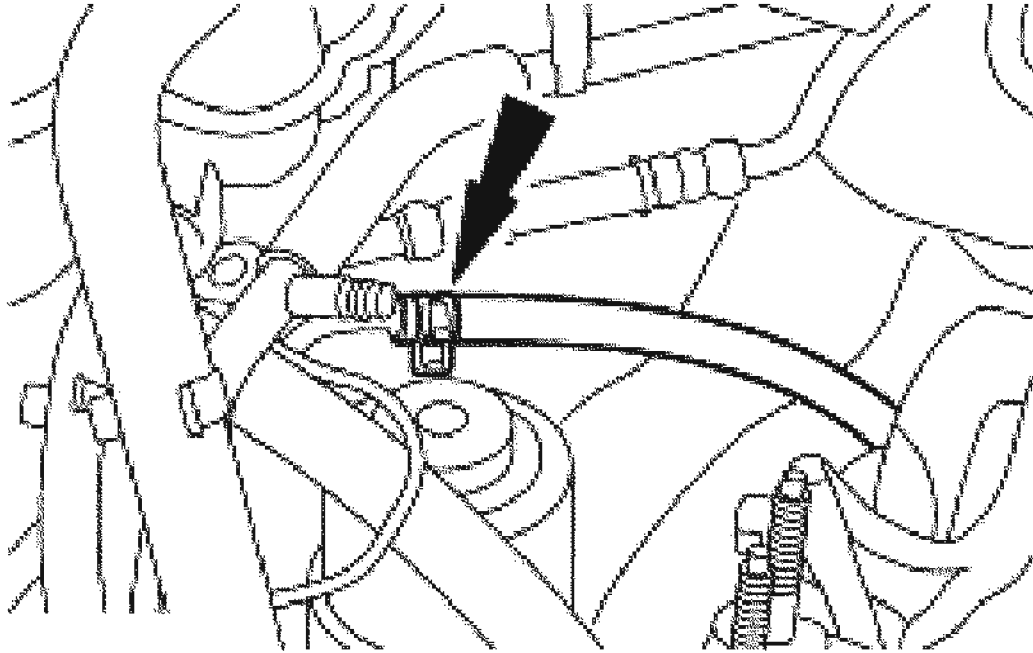
47. Using a bracket from a heavy-duty engine stand, support the front of the engine.
48. Remove the bolts and the nuts, remove the engine support bracket.



G02739416

**Fig. 243: Removing Engine Support Bracket**  
Courtesy of FORD MOTOR CO.

49. Disconnect the power steering return hose.

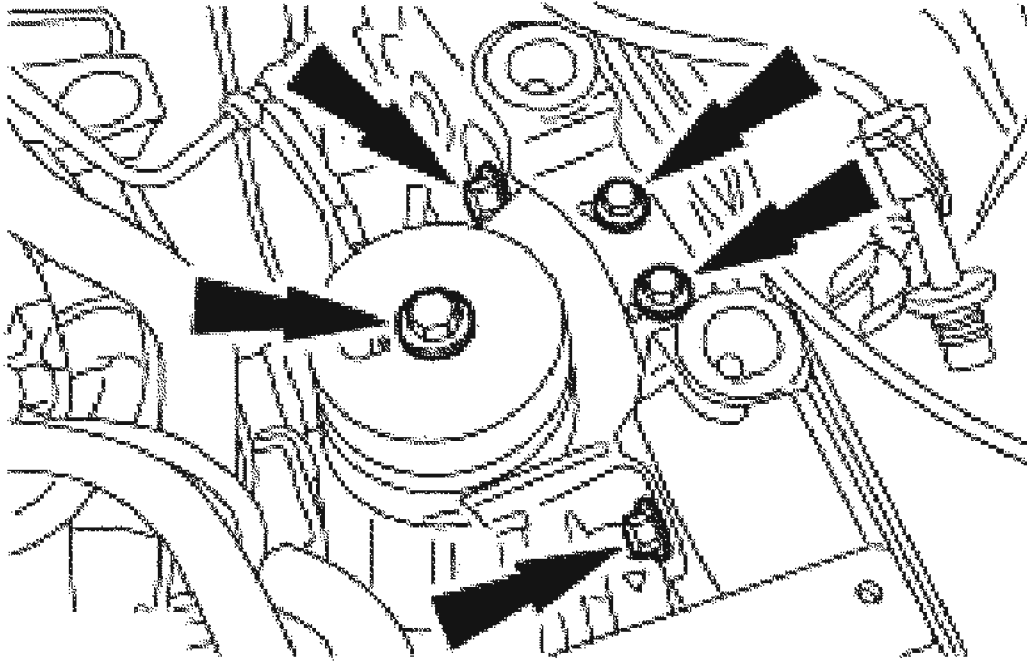


G02739417

**Fig. 244: Disconnecting Power Steering Return Hose**  
Courtesy of FORD MOTOR CO.

50. Remove the bolts and the transaxle support.

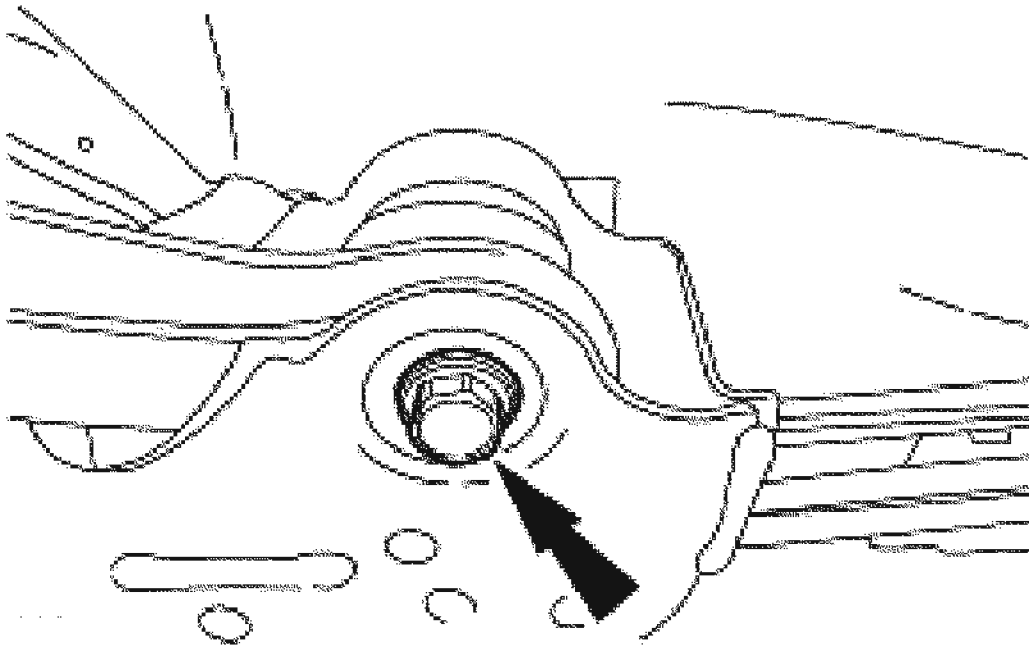




G02739418

**Fig. 245: Removing Bolts And Transaxle Support**  
Courtesy of FORD MOTOR CO.

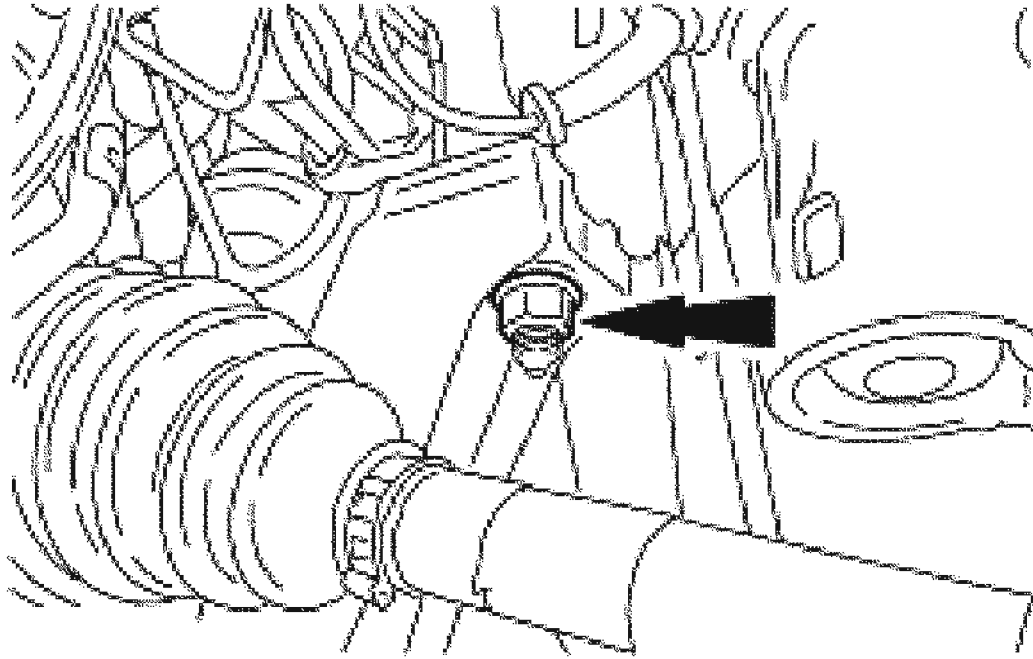
51. Remove two rear subframe bolts.



G02739419

**Fig. 246: Removing Rear Subframe Bolts**  
Courtesy of FORD MOTOR CO.

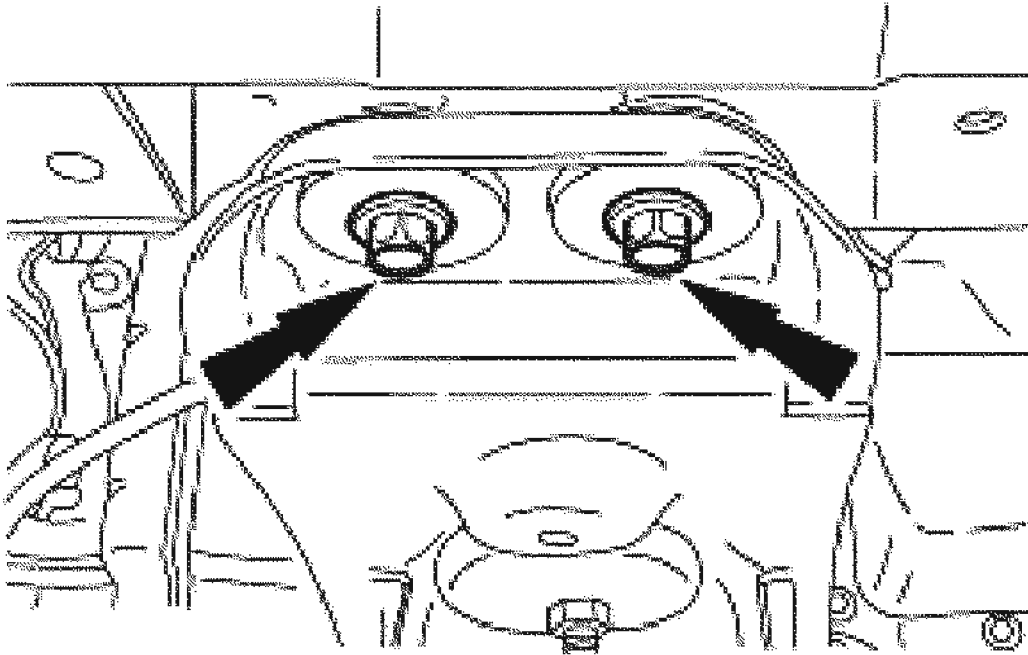
52. Remove the two subframe side nuts.



G02739420

**Fig. 247: Removing Subframe Side Nuts**  
Courtesy of FORD MOTOR CO.

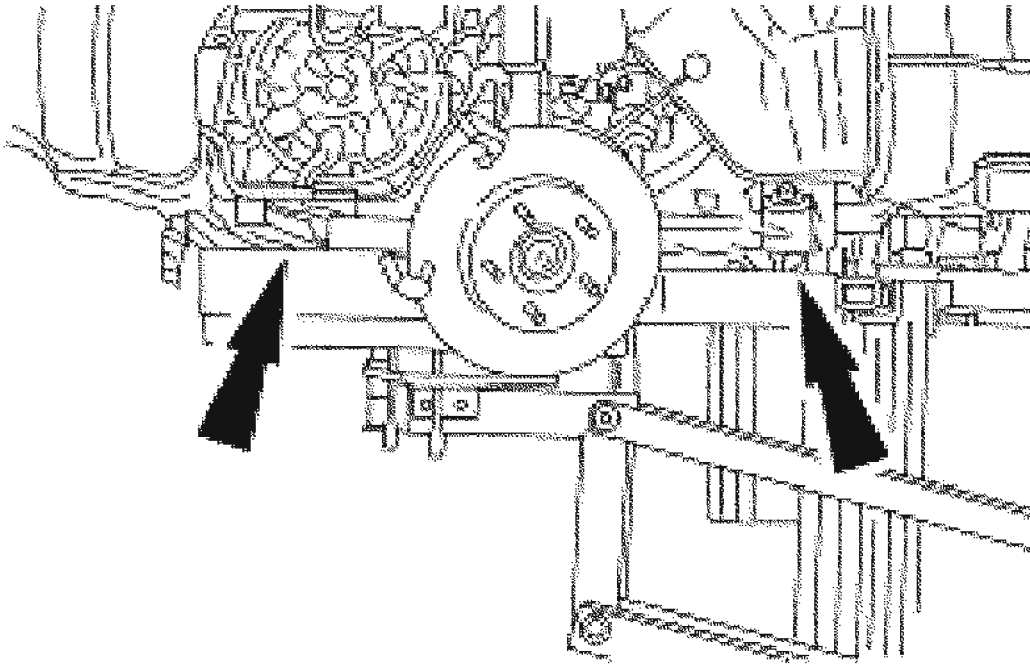
53. Remove the two bolts from the motor mount support.



G02739421

**Fig. 248: Removing Bolts From Motor Mount Support**  
Courtesy of FORD MOTOR CO.

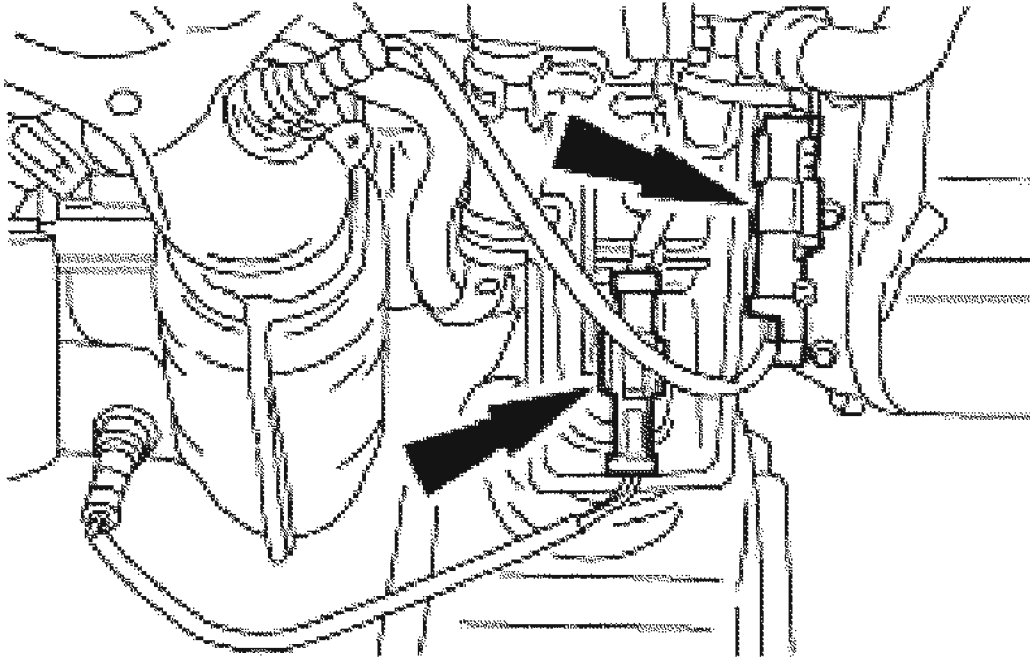
54. Remove the powertrain from the vehicle.



G02739422

**Fig. 249: Removing Powertrain From Vehicle**  
Courtesy of FORD MOTOR CO.

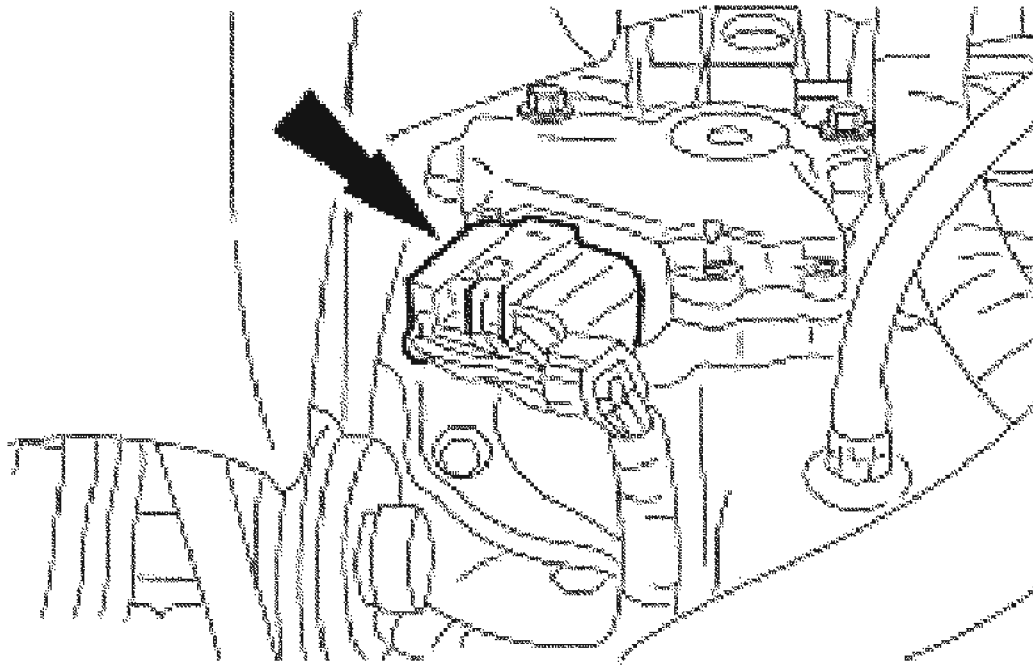
55. Disconnect the heated oxygen sensor electrical connectors.



G02739423

**Fig. 250: Disconnecting Heated Oxygen Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

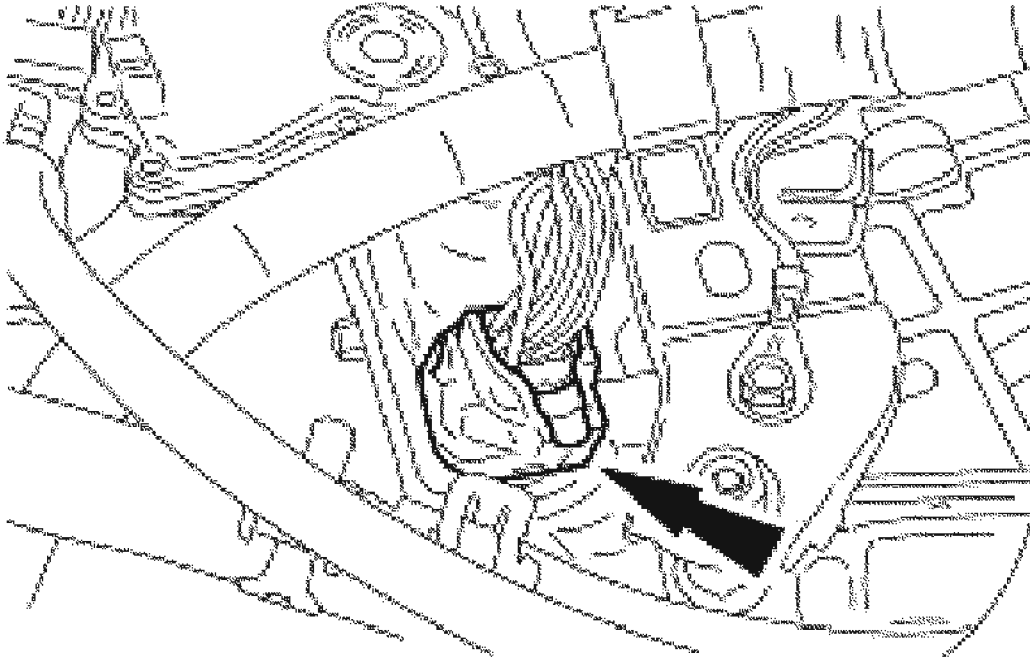
56. Disconnect the transmission range (TR) sensor electrical connector.



G02739424

**Fig. 251: Disconnecting Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

57. Disconnect the transaxle wiring harness electronic control switch electrical connector.



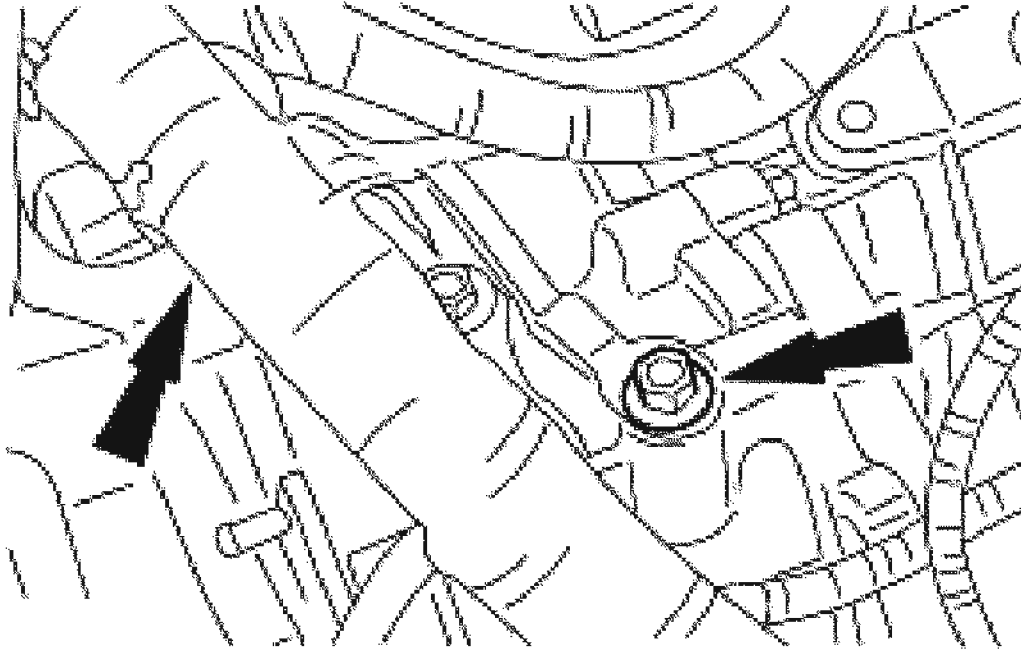
G02739425

**Fig. 252: Disconnecting Transaxle Wiring Harness Electronic Control Switch Electrical Connector**

**Courtesy of FORD MOTOR CO.**

58. Remove the bolt and separate the transaxle control harness from the bracket.

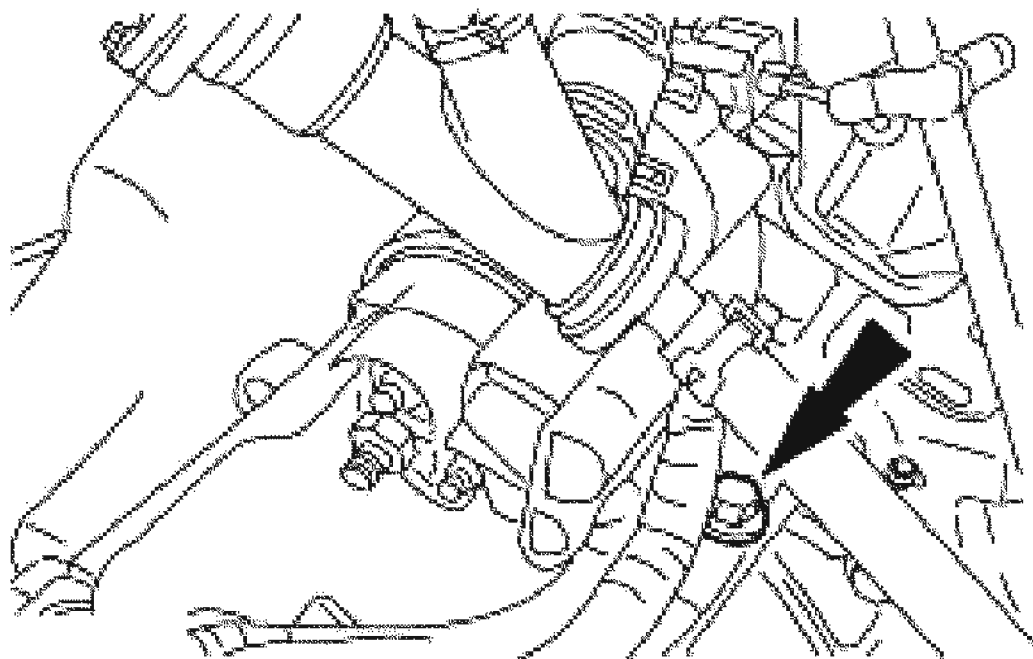




G02739426

**Fig. 253: Separating Transaxle Control Harness From Bracket**  
Courtesy of FORD MOTOR CO.

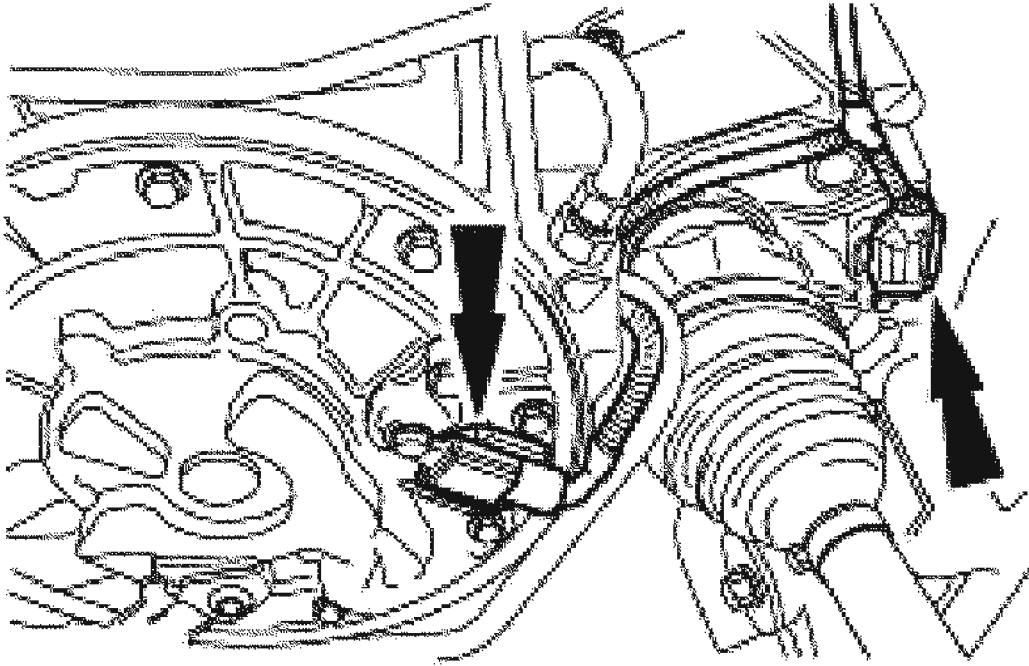
59. Remove the two bolts, the starter and the wiring harness as an assembly.



G02739427

**Fig. 254: Removing Bolts, Starter And Wiring Harness As An Assembly**  
Courtesy of FORD MOTOR CO.

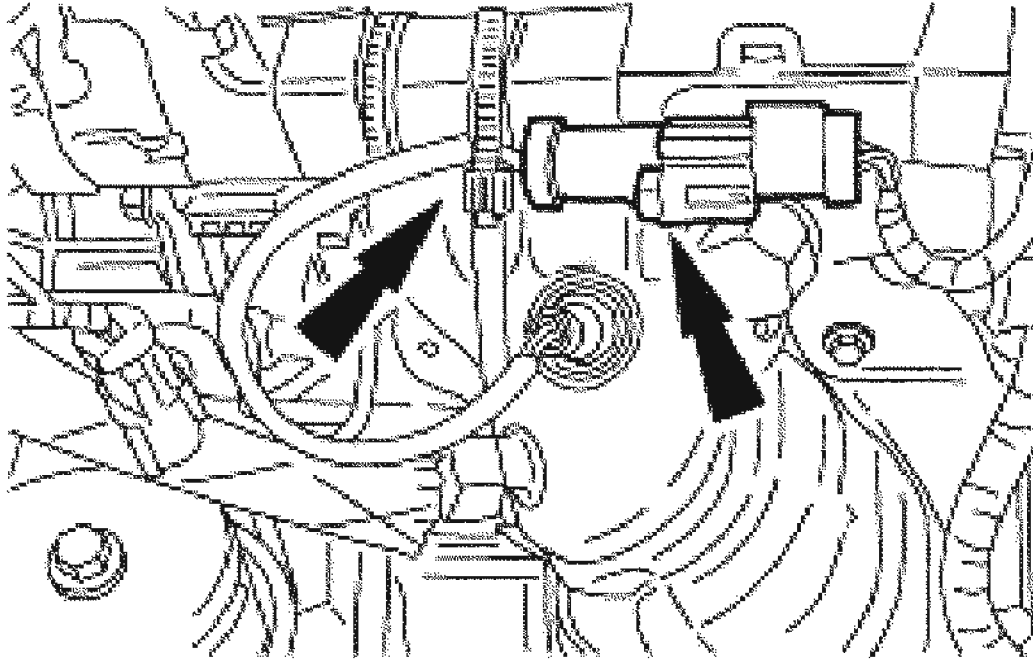
60. Disconnect the output shaft speed (OSS) sensor and the turbine speed sensor (TSS) electrical connectors.



G02739428

**Fig. 255: Disconnecting Output Shaft Speed (OSS) Sensor And Turbine Speed Sensor (TSS) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

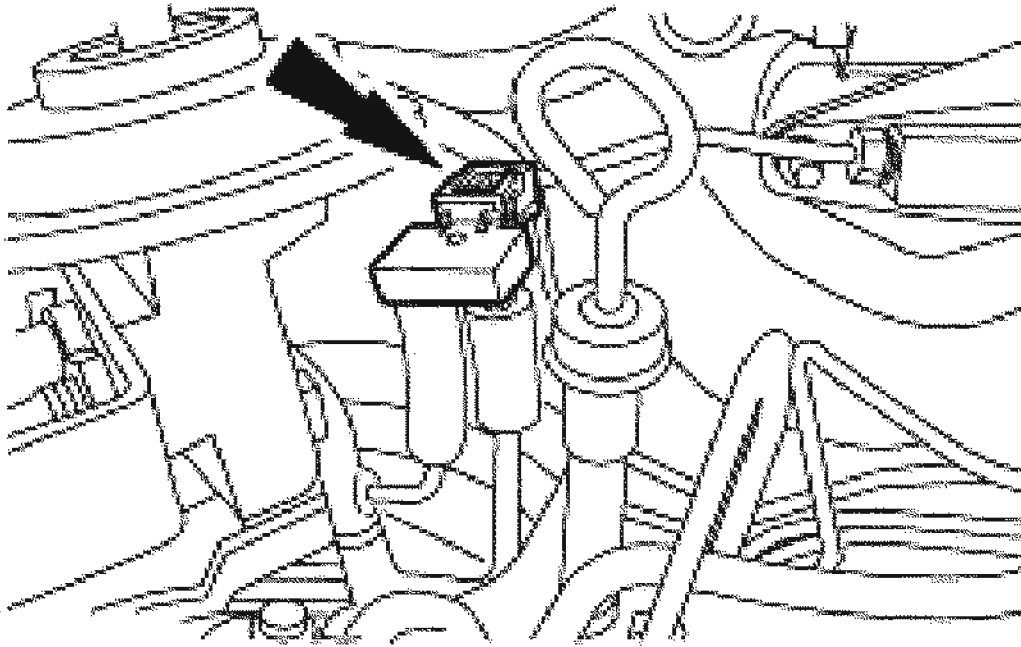
61. Remove the tie-strap and disconnect the HO2S sensor.



G02739429

**Fig. 256: Removing Tie-Strap And Disconnecting HO2S Sensor**  
Courtesy of FORD MOTOR CO.

62. Disconnect the differential pressure feedback EGR system electrical connector.

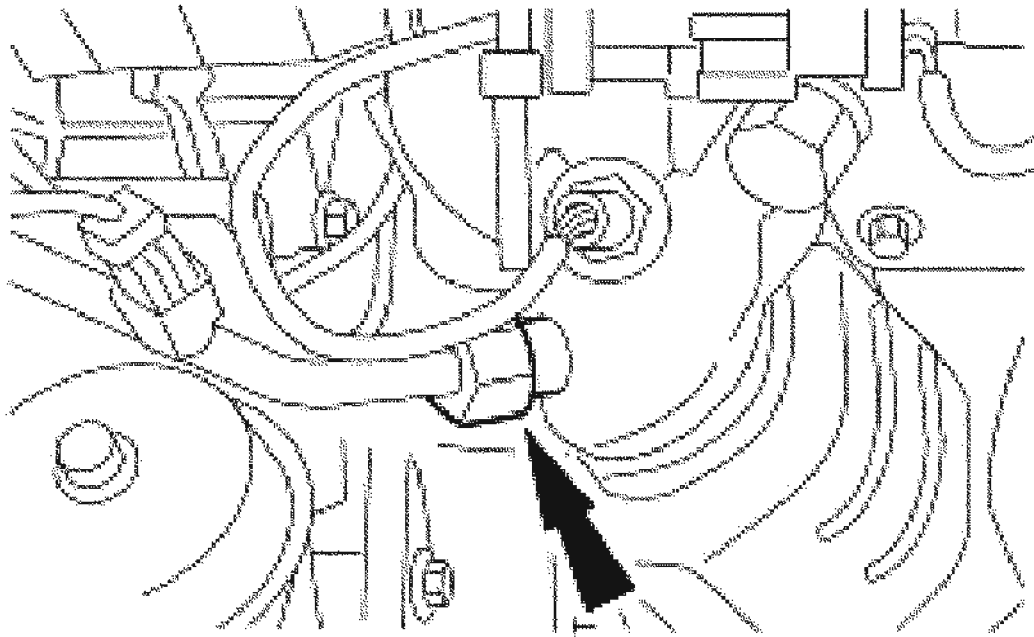


G02739430

**Fig. 257: Disconnecting Differential Pressure Feedback EGR System Electrical Connector**

**Courtesy of FORD MOTOR CO.**

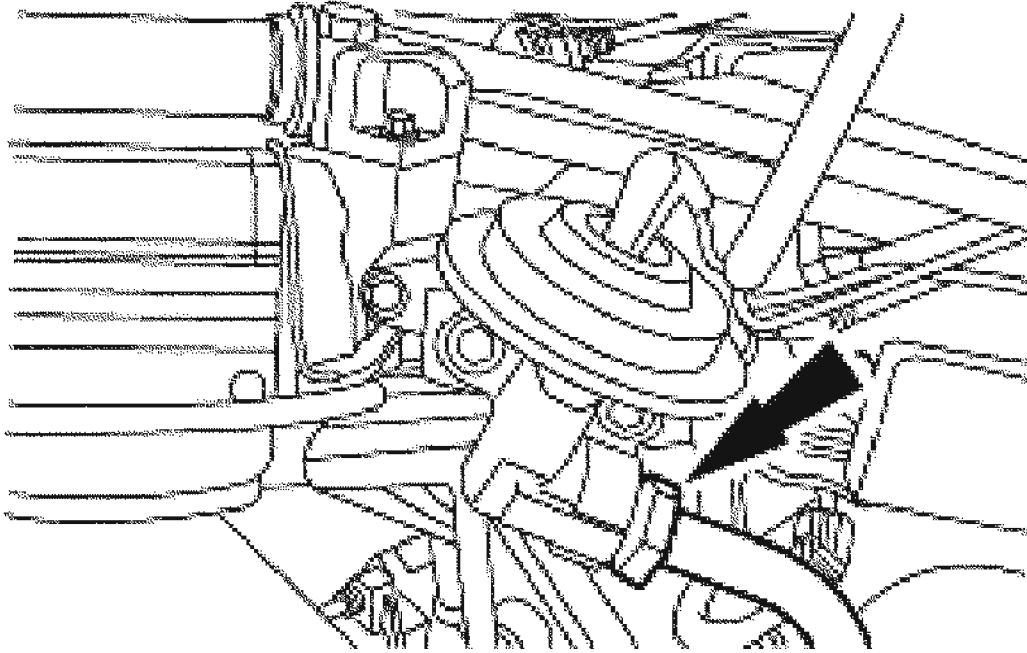
63. Disconnect the EGR tube nut at the manifold connector.



G02739431

**Fig. 258: Disconnecting EGR Tube Nut At Manifold Connector**  
Courtesy of FORD MOTOR CO.

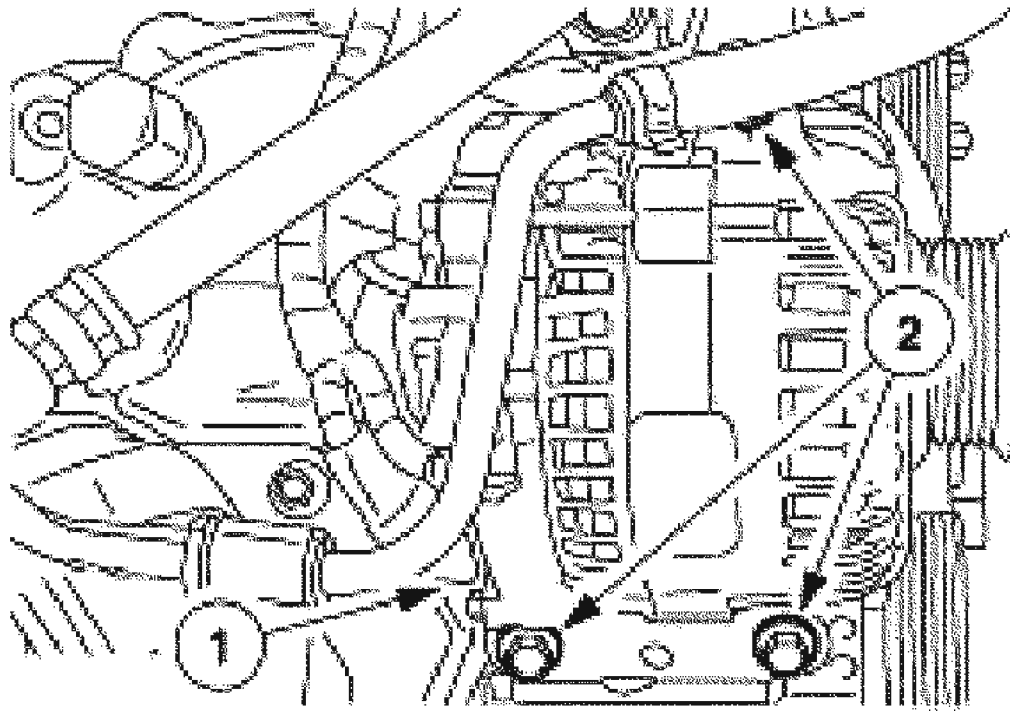
64. Disconnect the EGR tube fitting and remove the EGR tube.



G02739432

**Fig. 259: Disconnecting EGR Tube Fitting And Removing EGR Tube**  
Courtesy of FORD MOTOR CO.

65. Remove the generator.
  1. Disconnect the electrical connector.
  2. Remove the bolts.

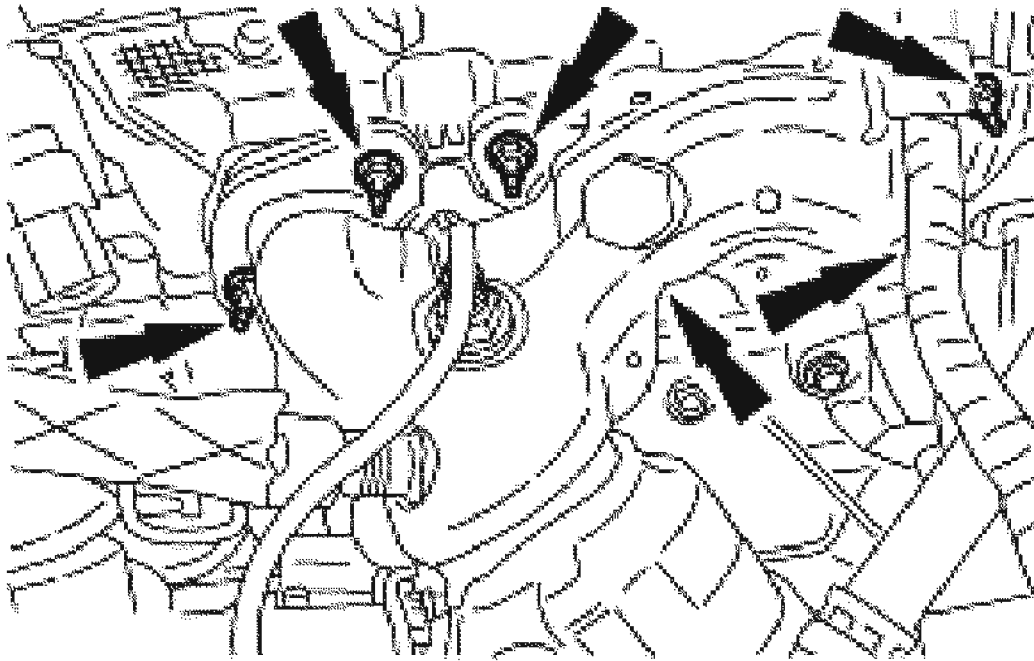


G02739433

**Fig. 260: Removing Generator**  
Courtesy of FORD MOTOR CO.

66. Remove the six RH exhaust manifold nuts and the gasket.





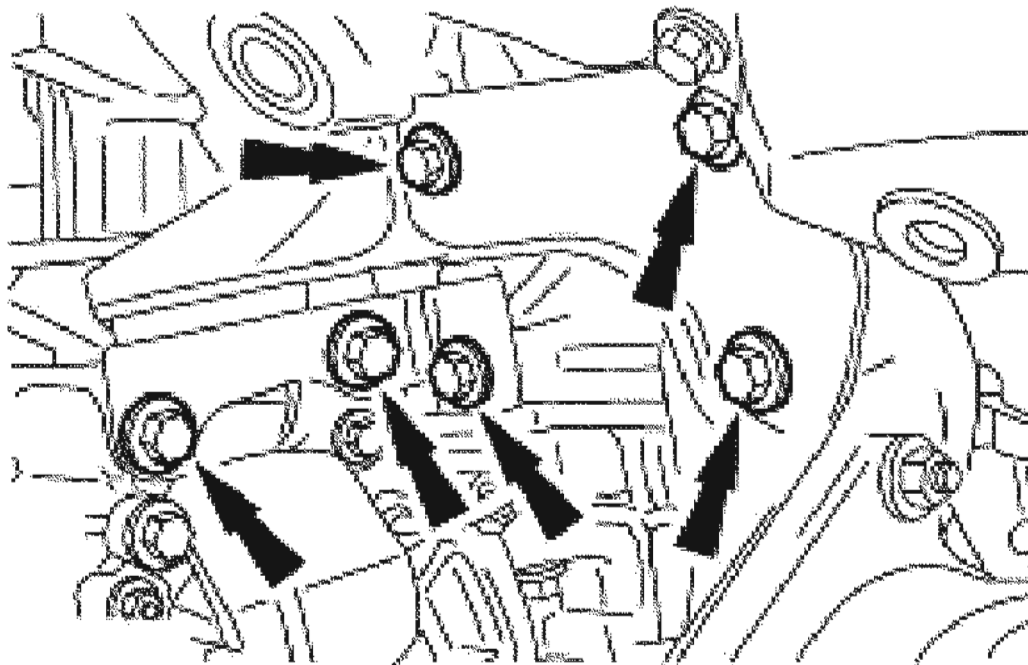
G02739434

**Fig. 261: Removing RH Exhaust Manifold Nuts And Gasket**  
**Courtesy of FORD MOTOR CO.**

67. Remove the bolts and position the halfshaft support bracket out of the way.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



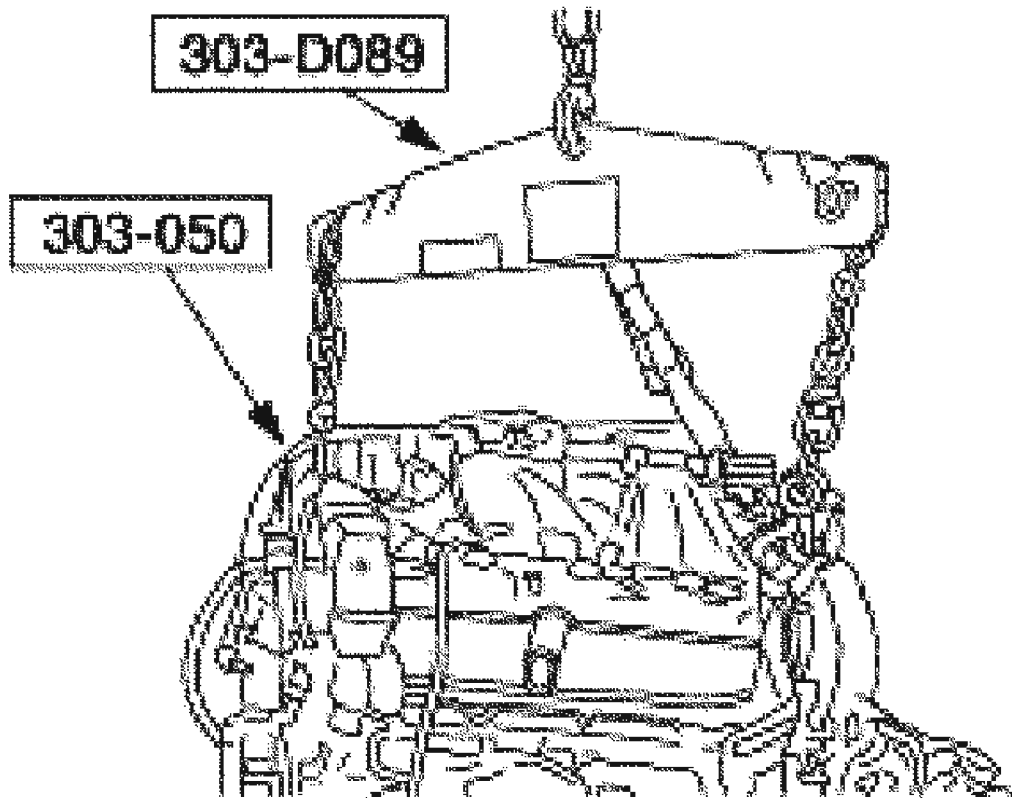
G02739435

**Fig. 262: Removing Bolts And Positioning Halfshaft Support Bracket Out Of Way**  
Courtesy of FORD MOTOR CO.

**NOTE:** Once the engine is supported by the engine crane, remove the bracket supporting the front of the engine.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

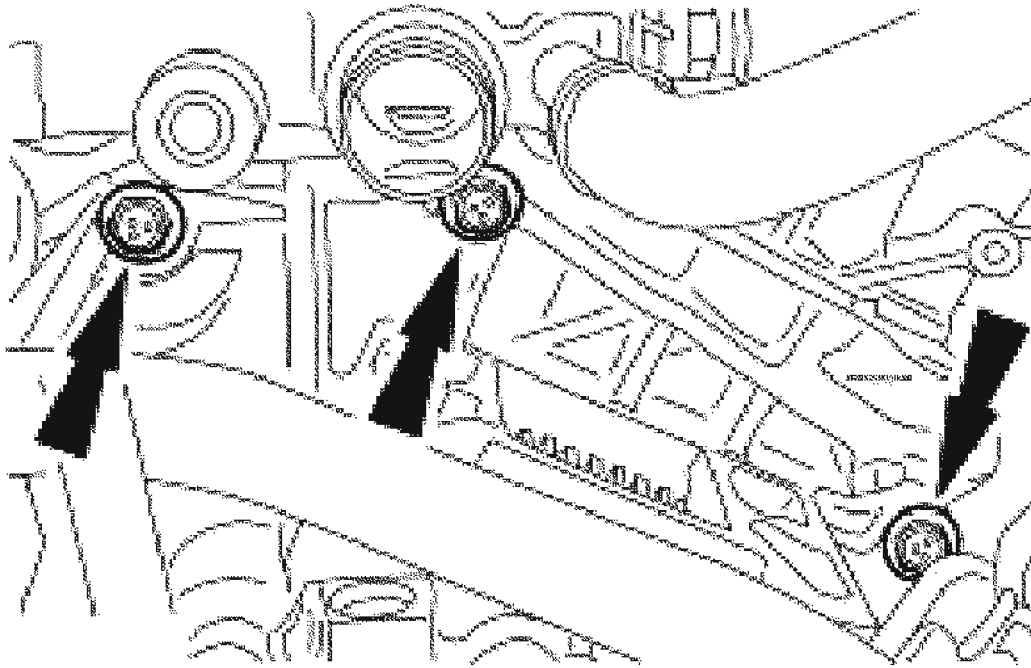


G02739436

**Fig. 263: Removing Powertrain From Universal Powertrain Lift Using Special Tool**

**Courtesy of FORD MOTOR CO.**

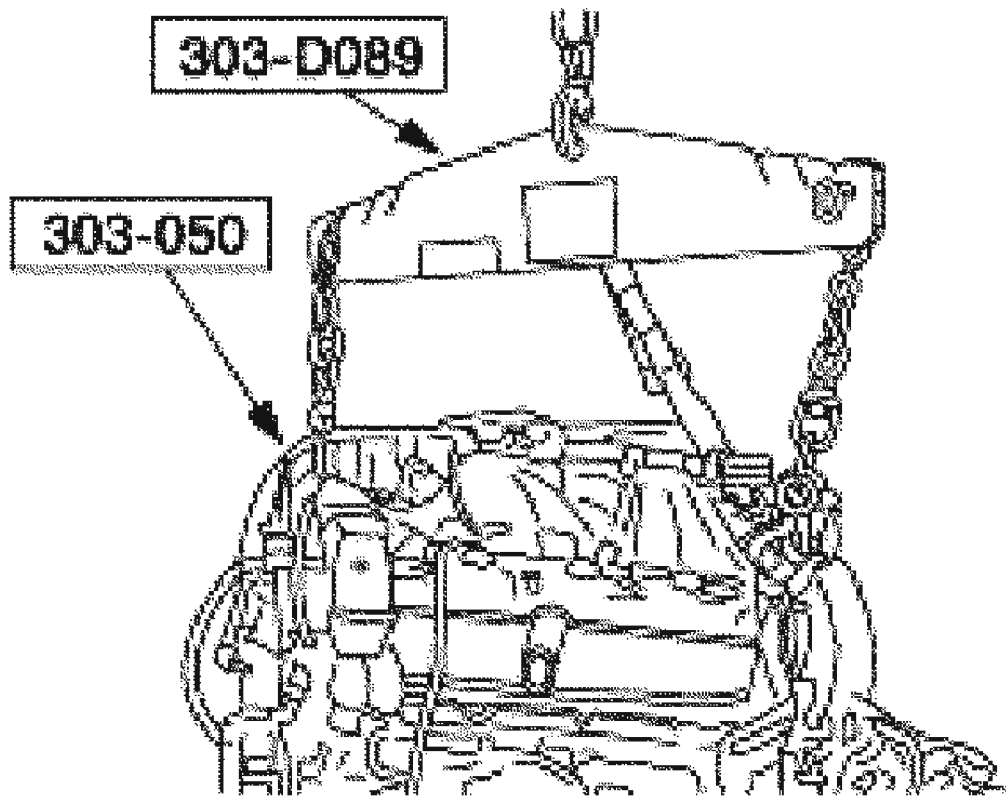
68. Using the special tools, remove the powertrain from the universal powertrain lift.
69. Remove the six transaxle bolts.



G02739437

**Fig. 264: Removing Transaxle Bolts**  
Courtesy of FORD MOTOR CO.

70. Using the special tools, remove the engine from the transaxle.



G02739438

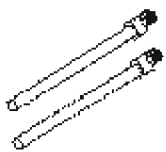

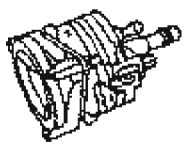



**Fig. 265: Removing Engine From Transaxle**  
Courtesy of FORD MOTOR CO.

## DISASSEMBLY

### ENGINE

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

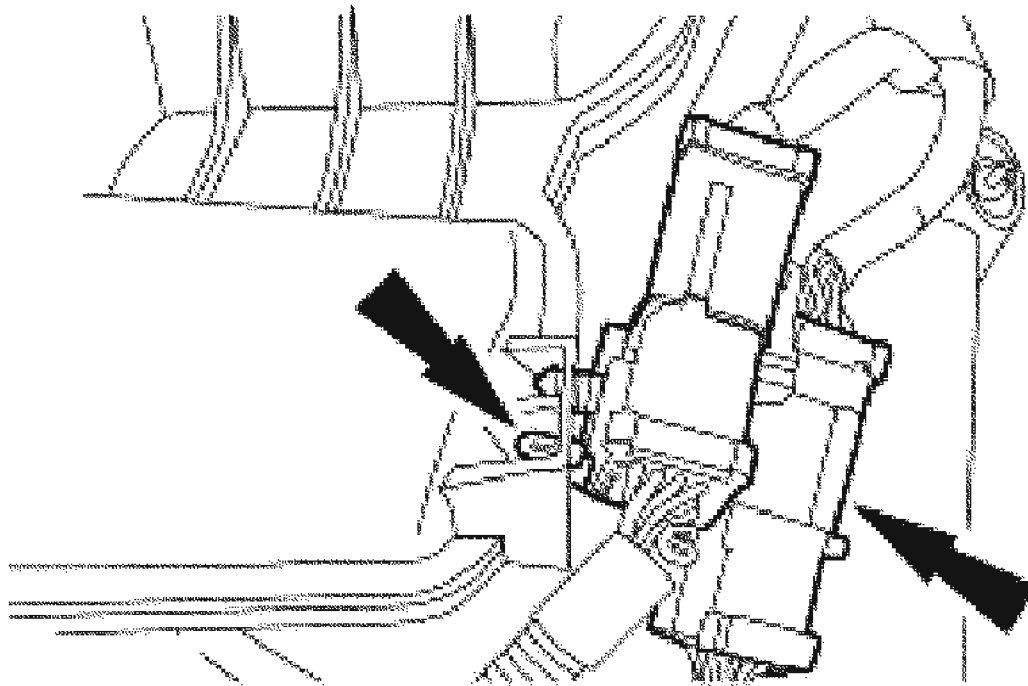
	Installer, Connecting Rod 303-462 (T94P-6136-AH)
	Remover, Crankshaft Vibration Damper 303-009 (T58P-6316-D)
	Cylinder Ridge Reamer 303-016 (T64L-6011-EA)
	Holding Tool, Flywheel 303-101 (T74P-6316-A)
	Remover, Oil Seal 303-409 (T92C-6700CH)
	Service Set, Water Pump Pulley 303-S455 (T94P-6312-AH)

G02739438

**Fig. 266: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

All vehicles

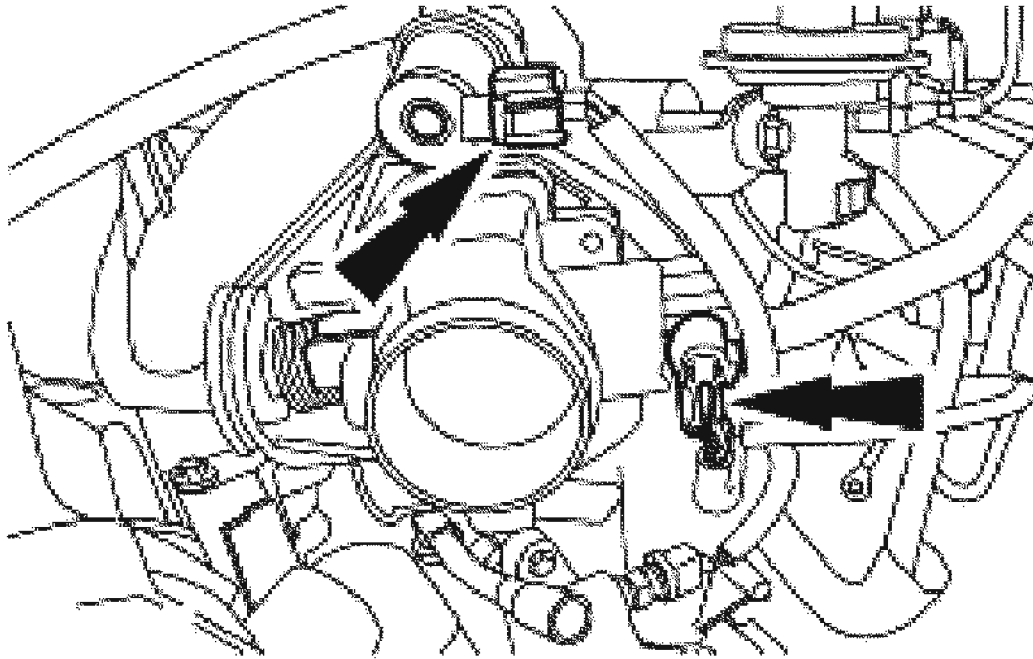
1. Separate the engine control sensor wiring connectors from the upper intake manifold.



**G02739440**

**Fig. 267: Separating Engine Control Sensor Wiring Connectors**  
**Courtesy of FORD MOTOR CO.**

2. Disconnect the idle air control (IAC) valve and the throttle position (TP) sensor electrical connectors.

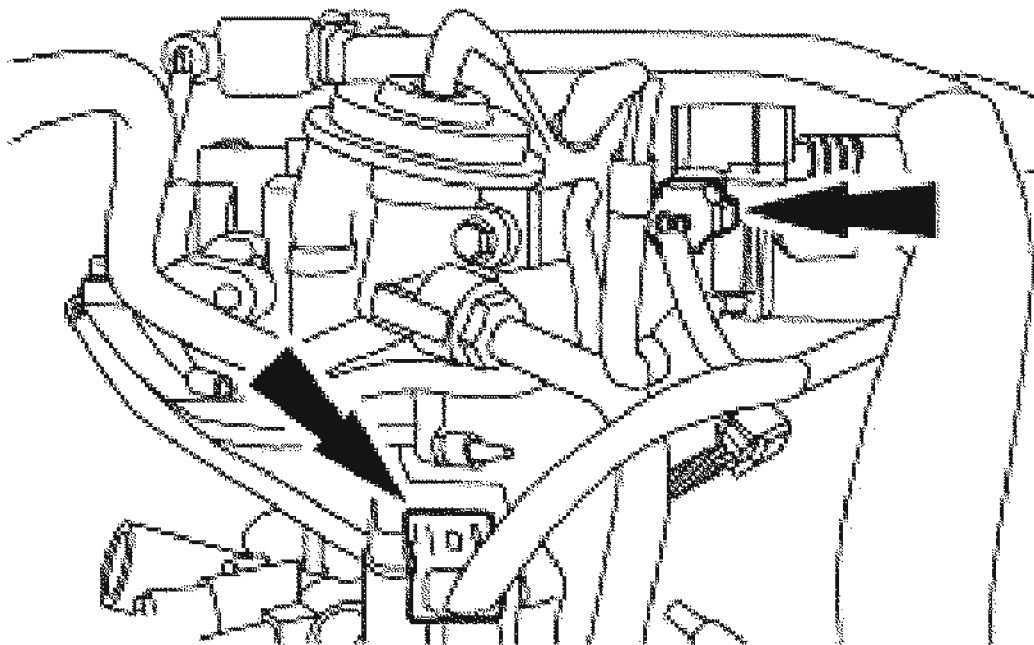


G02739441

**Fig. 268: Disconnecting Idle Air Control (IAC) Valve And Throttle Position (TP) Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

3. Disconnect the exhaust gas recirculation (EGR) vacuum regulator solenoid and the differential pressure feedback EGR system electrical connectors.

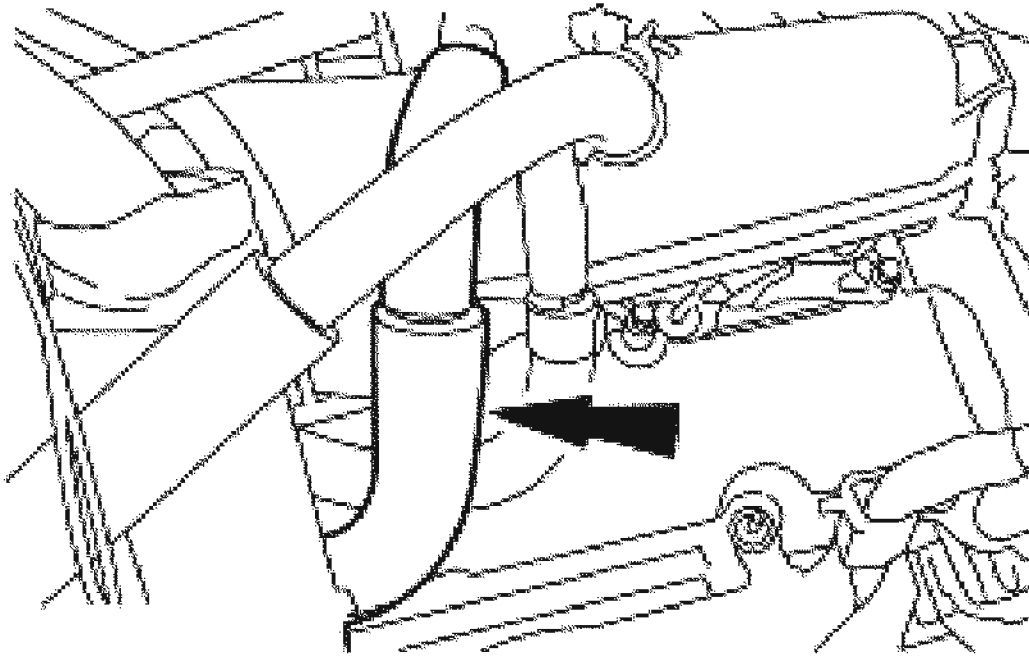




G02739442

**Fig. 269: Disconnecting Exhaust Gas Recirculation (EGR) Vacuum Regulator And Differential Pressure Feedback EGR System Electrical Connectors**  
Courtesy of FORD MOTOR CO.

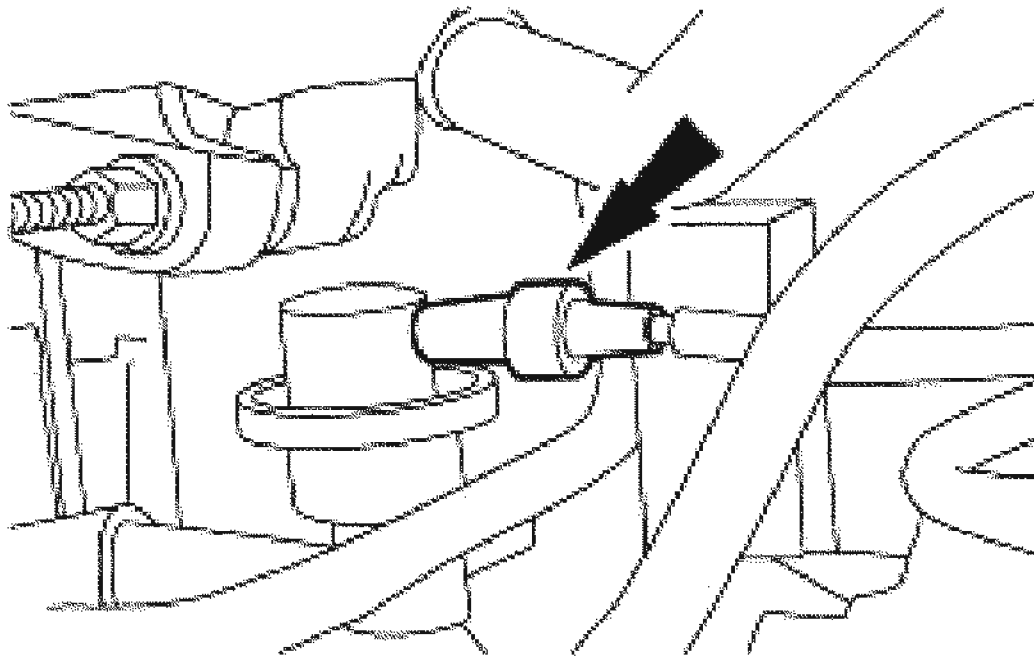
4. Remove the positive crankcase ventilation (PCV) tube.



G02739443

**Fig. 270: Removing Positive Crankcase Ventilation (PCV) Tube**  
Courtesy of FORD MOTOR CO.

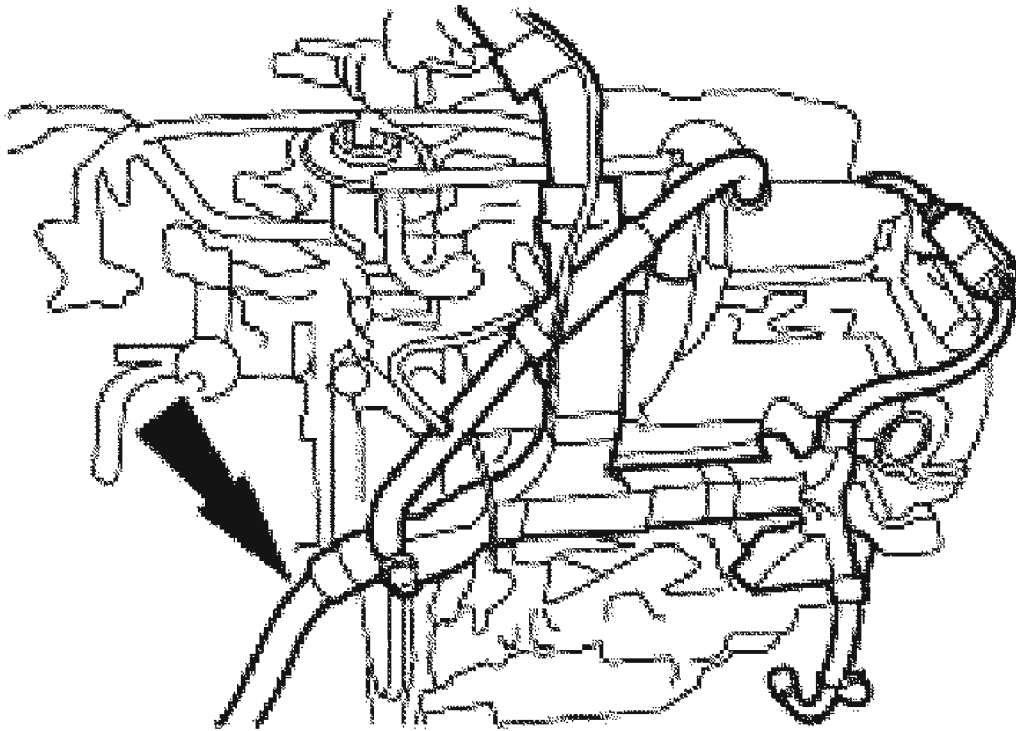
5. Disconnect the vacuum hose from the fuel pressure regulator.



G02739444

**Fig. 271: Disconnecting Vacuum Hose From Fuel Pressure Regulator**  
Courtesy of FORD MOTOR CO.

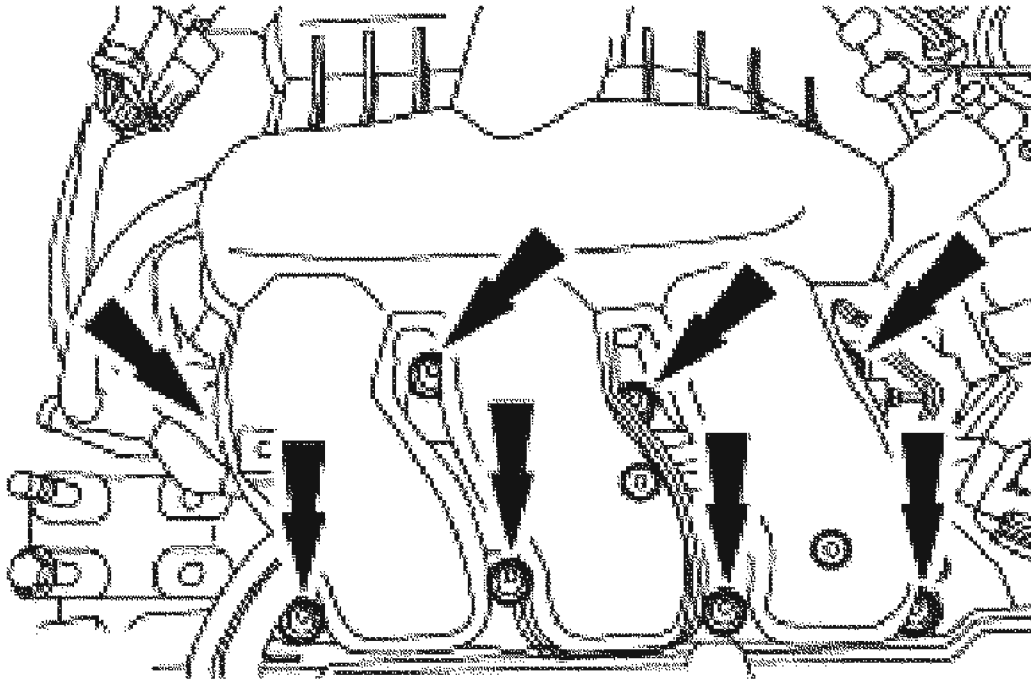
6. Disconnect and remove the engine control wire harness.



G02739445

**Fig. 272: Disconnecting And Removing Engine Control Wire Harness**  
Courtesy of FORD MOTOR CO.

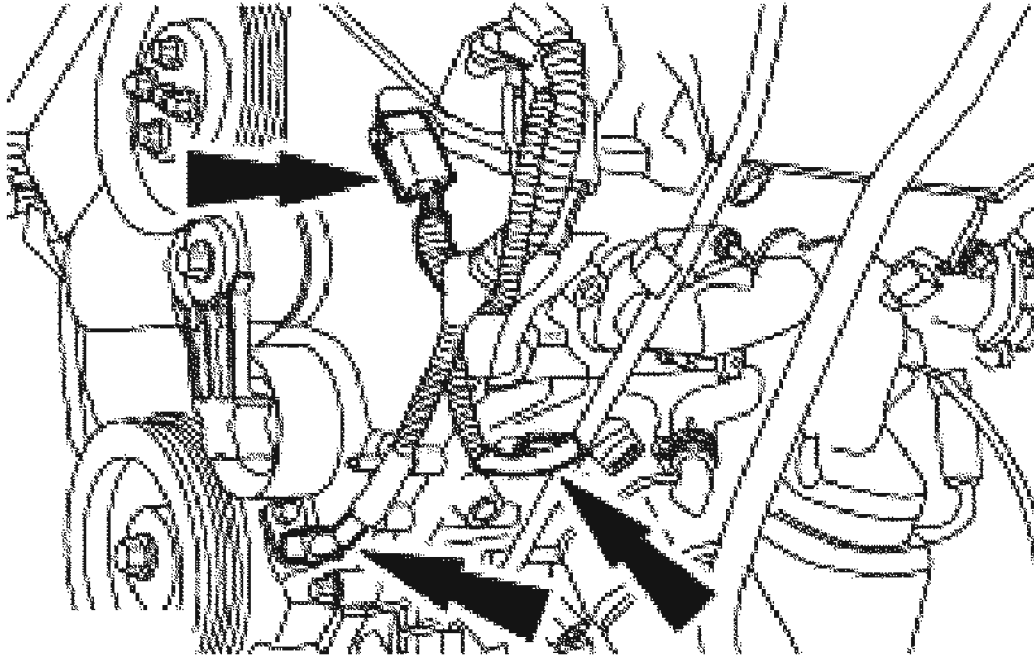
7. Remove the bolts and upper intake manifold.



G02739446

**Fig. 273: Removing Bolts And Upper Intake Manifold**  
Courtesy of FORD MOTOR CO.

8. Disconnect the crankshaft and camshaft position sensor electrical connectors.

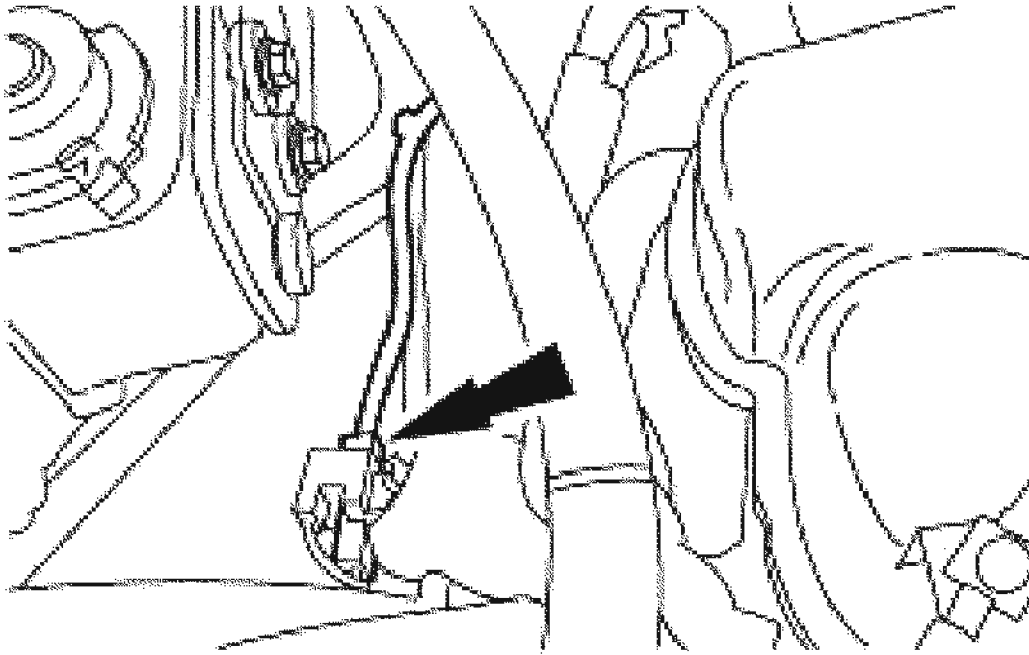


G02739447

**Fig. 274: Disconnecting Crankshaft And Camshaft Position Sensor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

9. Disconnect the radio ignition interference capacitor electrical connectors.

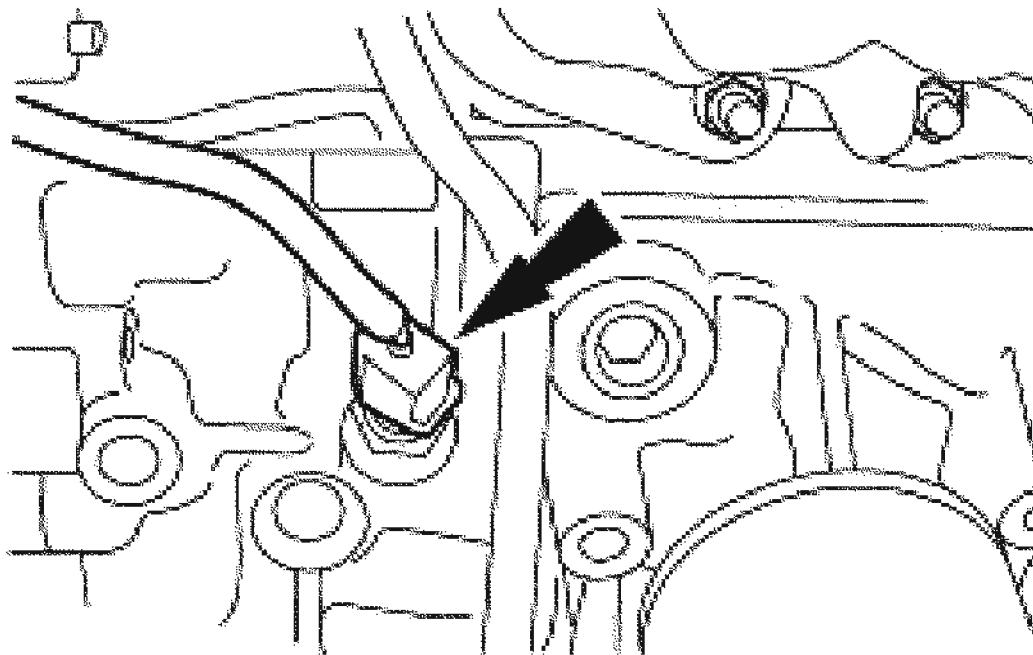


G02739448

**Fig. 275: Disconnecting Radio Ignition Interference Capacitor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

10. Disconnect the engine coolant temperature (ECT) sensor and the oil pressure switch.



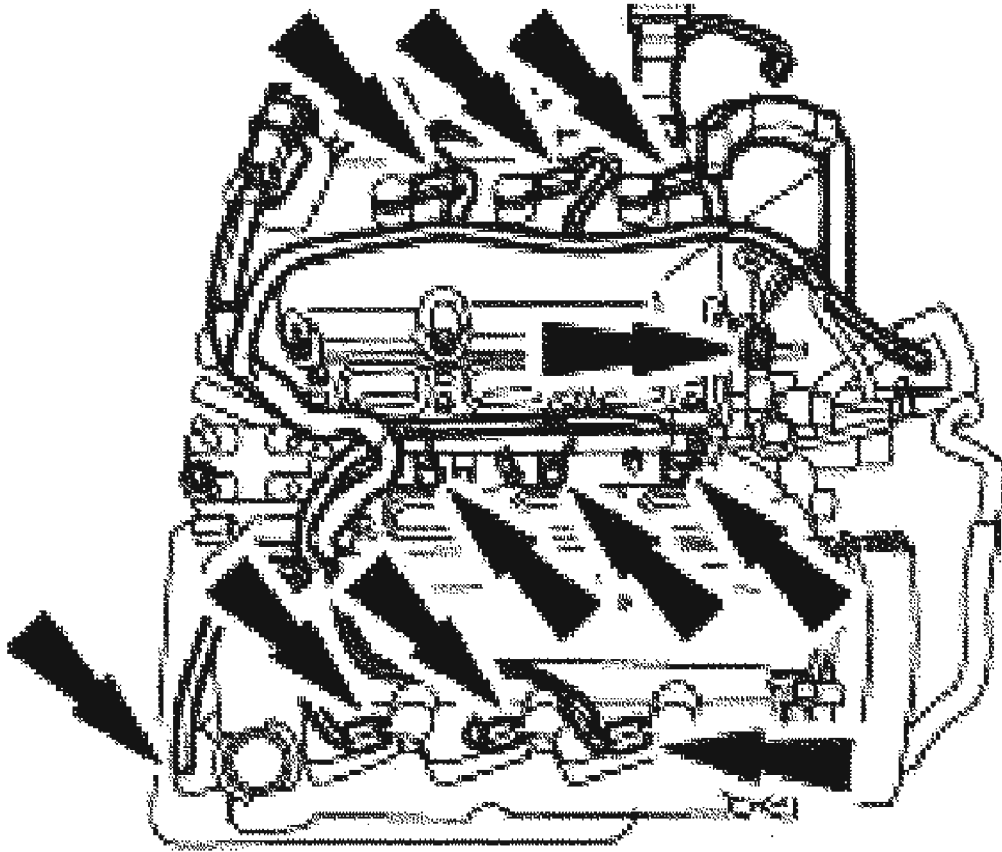
G02739449

**Fig. 276: Disconnecting Engine Coolant Temperature (ECT) Sensor And Oil Pressure Switch**

**Courtesy of FORD MOTOR CO.**

11. Disconnect the remaining electrical connectors and harness retainers and remove the harness.

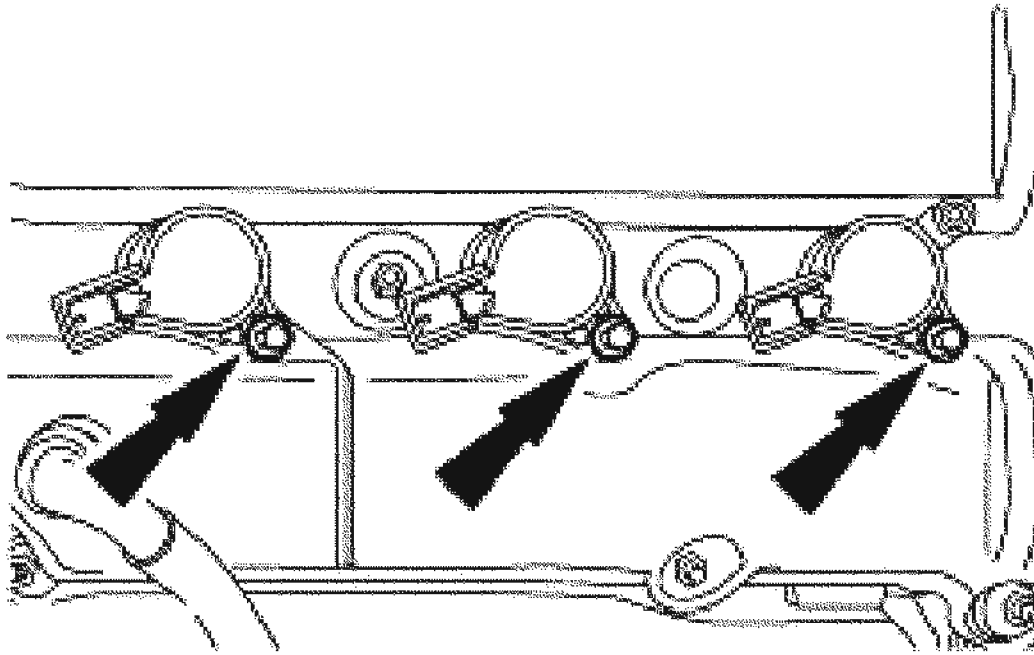




G02739450

**Fig. 277: Disconnecting Remaining Electrical Connectors And Harness Retainers**  
Courtesy of FORD MOTOR CO.

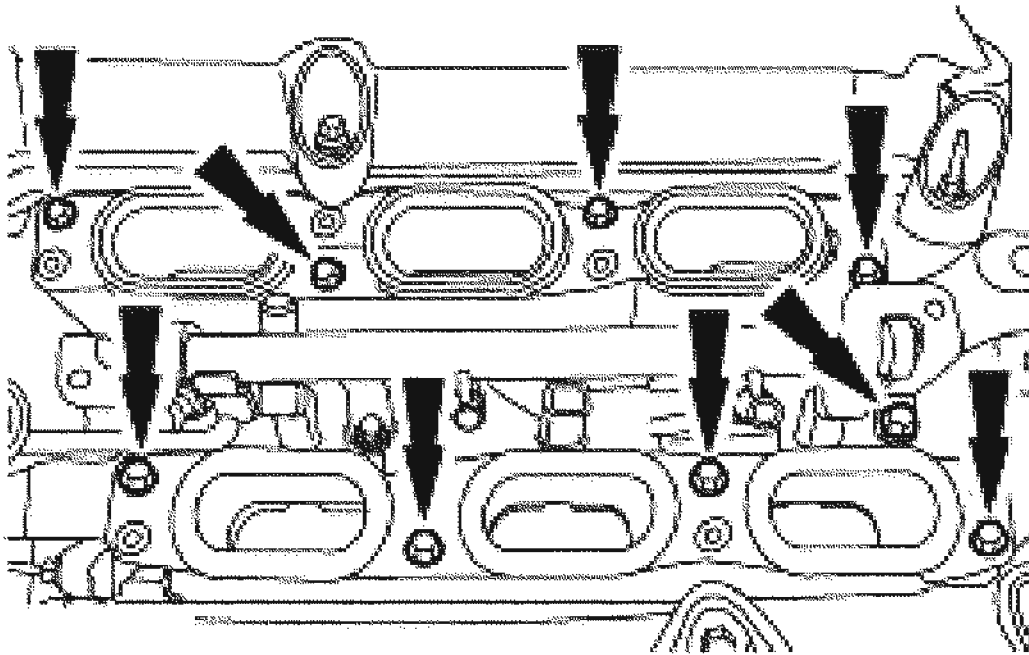
**CAUTION:** When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.



G02739451

**Fig. 278: Removing Bolts And Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

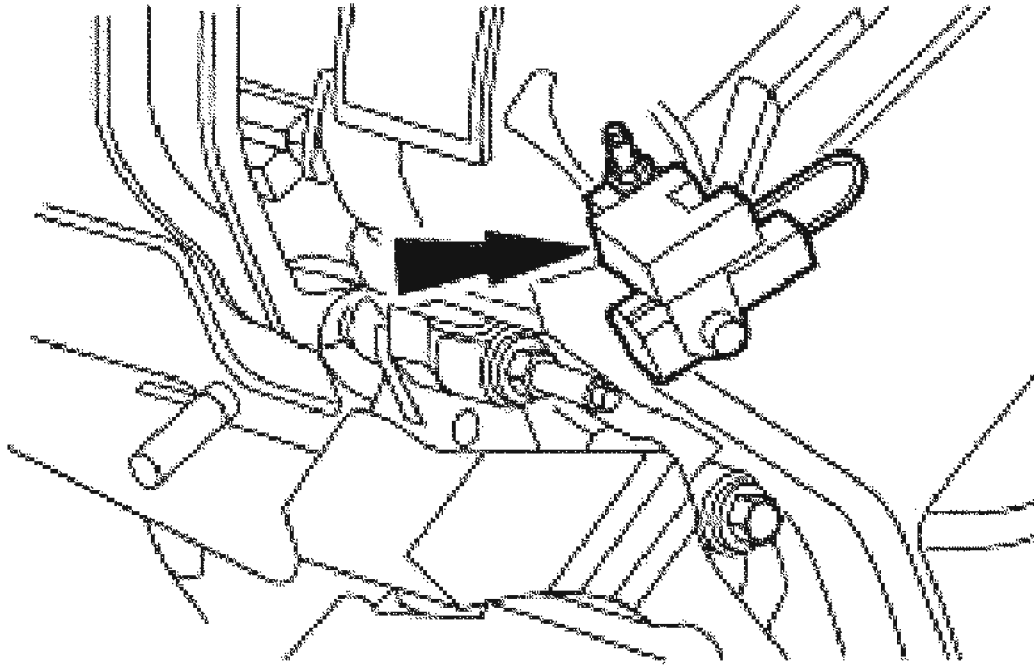
12. Remove the bolts and the six coil-on-plugs.
13. Remove the lower intake manifold and discard the gaskets.



G02739452

**Fig. 279: Removing Lower Intake Manifold**  
Courtesy of FORD MOTOR CO.

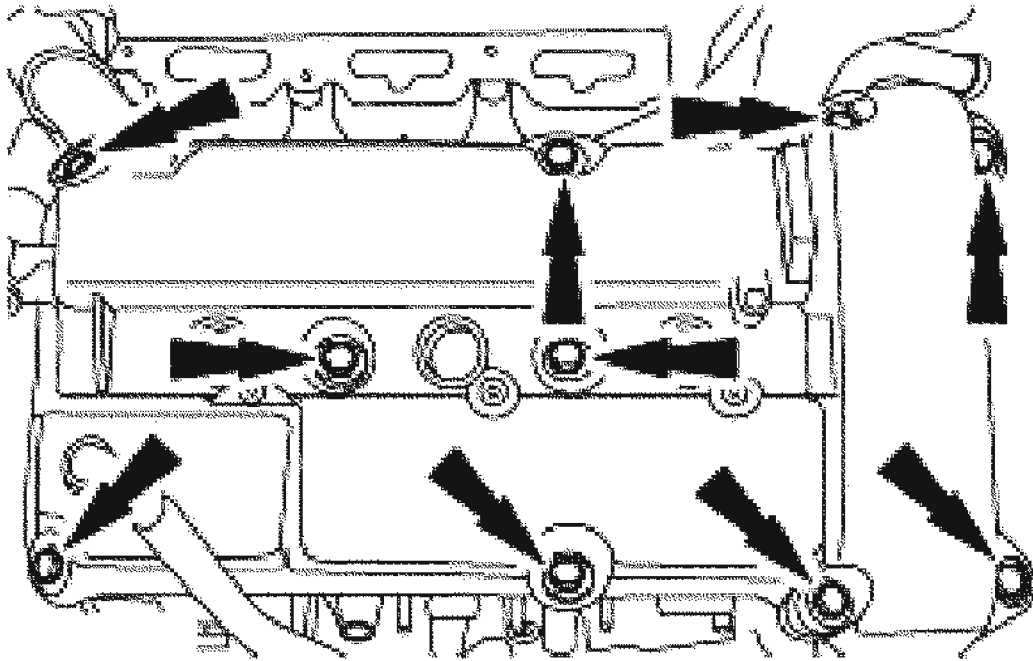
14. Remove the nut and the radio interference capacitors.



G02739453

**Fig. 280: Removing Nut And Radio Interference Capacitors**  
Courtesy of FORD MOTOR CO.

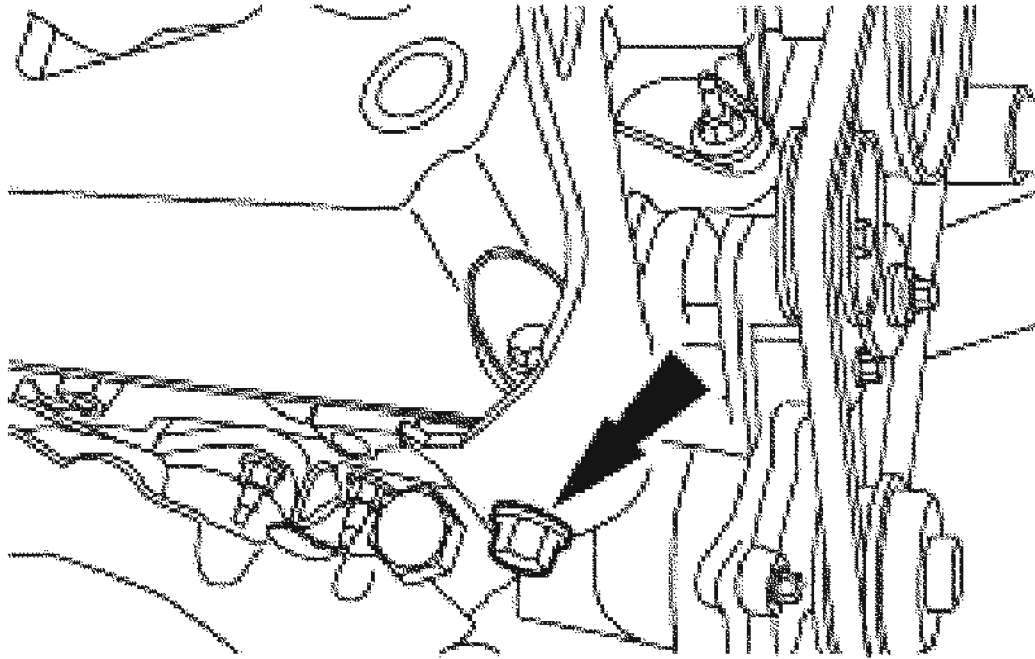
15. Remove the RH valve cover.
  - Remove and discard the gasket.



G02739454

**Fig. 281: Removing RH Valve Cover**  
Courtesy of FORD MOTOR CO.

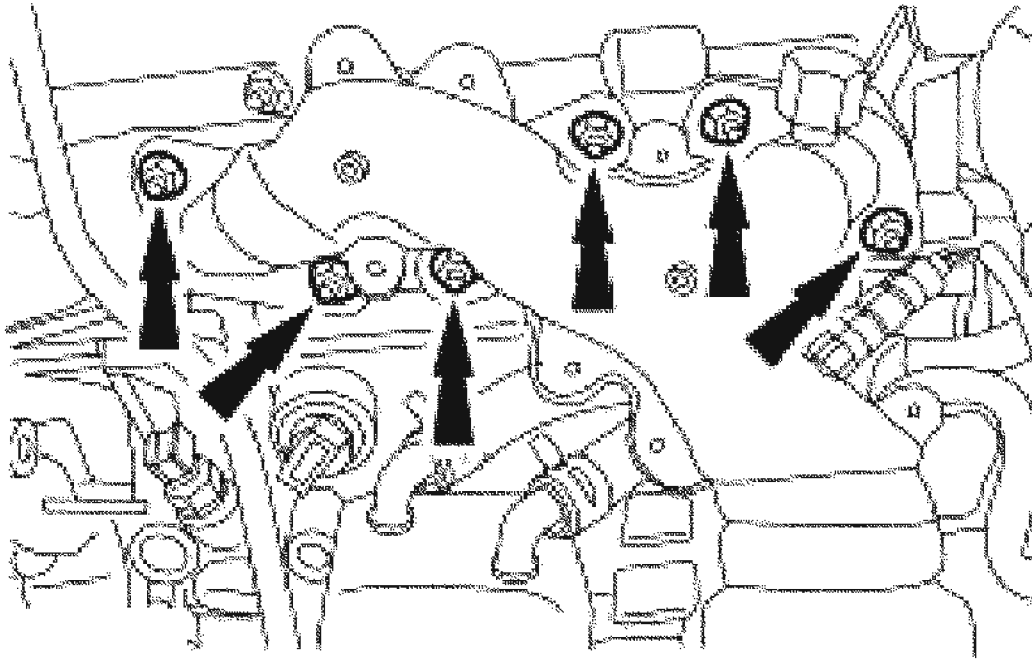
16. Remove the engine lift bracket.



G02739455

**Fig. 282: Removing Engine Lift Bracket**  
Courtesy of FORD MOTOR CO.

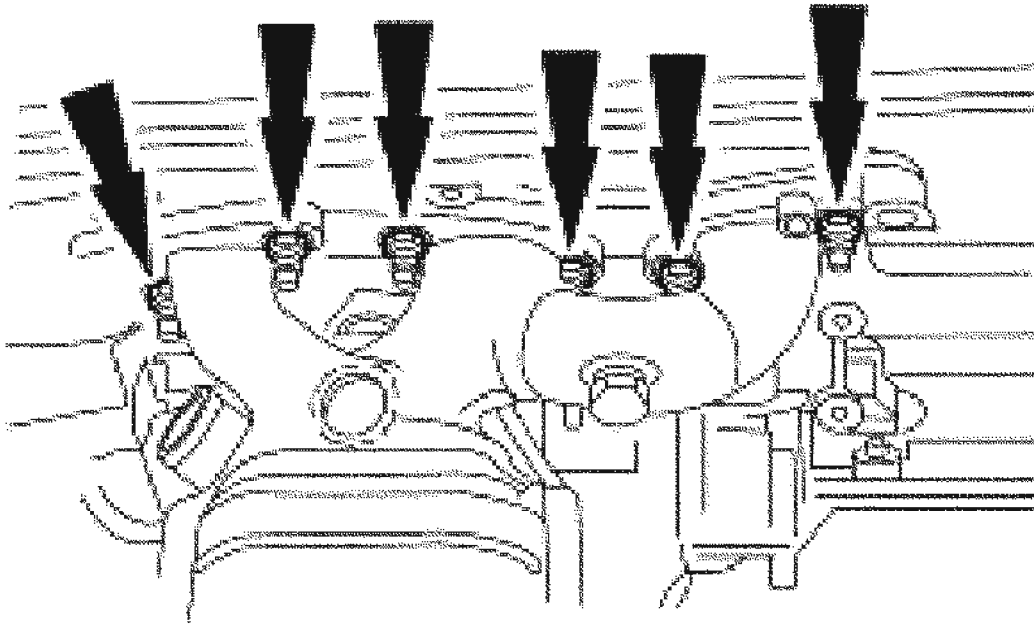
17. Remove the nuts, the LH exhaust manifold and the gasket. Discard the gasket.



G02739456

**Fig. 283: Removing Nuts, LH Exhaust Manifold And Gasket**  
Courtesy of FORD MOTOR CO.

18. Remove the nuts, the RH exhaust manifold and the gasket. Discard the gasket.

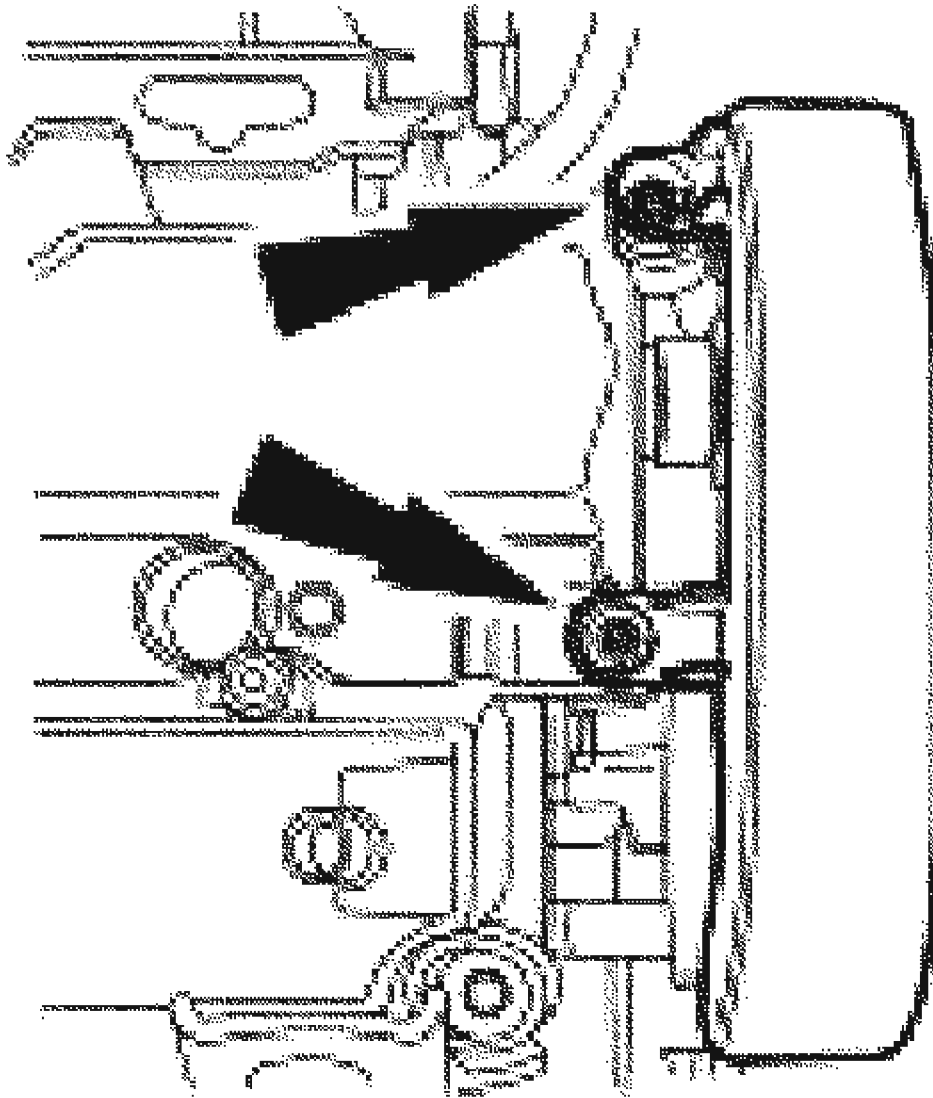


G02739457

**Fig. 284: Removing Nuts, RH Exhaust Manifold And Gasket**  
Courtesy of FORD MOTOR CO.

19. Remove the water pump belt cover.

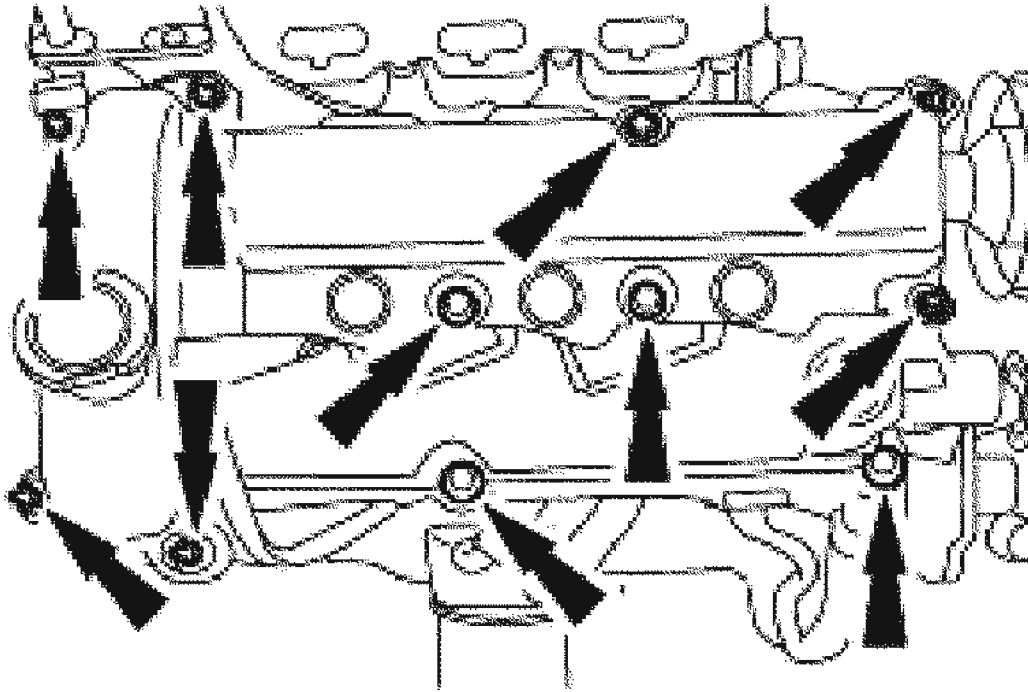




G02739458

**Fig. 285: Removing Water Pump Belt Cover**  
Courtesy of FORD MOTOR CO.

20. Remove the LH valve cover.
  - Remove and discard the gasket.

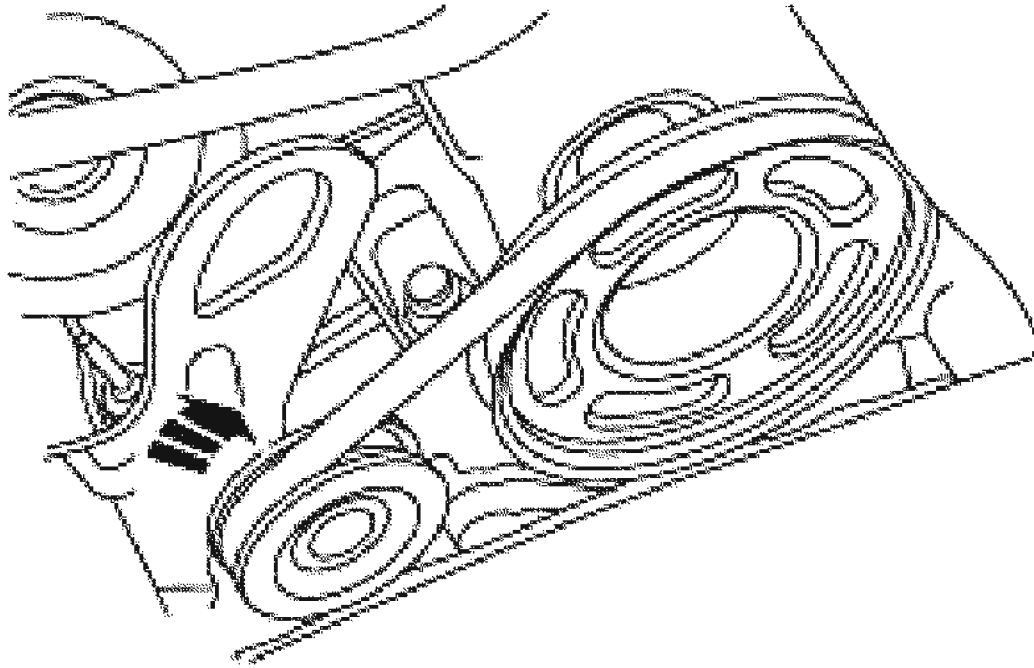


G02739459

**Fig. 286: Removing LH Valve Cover**  
Courtesy of FORD MOTOR CO.

**Vehicles equipped with water pump belt tensioner**

21. Rotate the belt tensioner clockwise and remove the water pump belt.

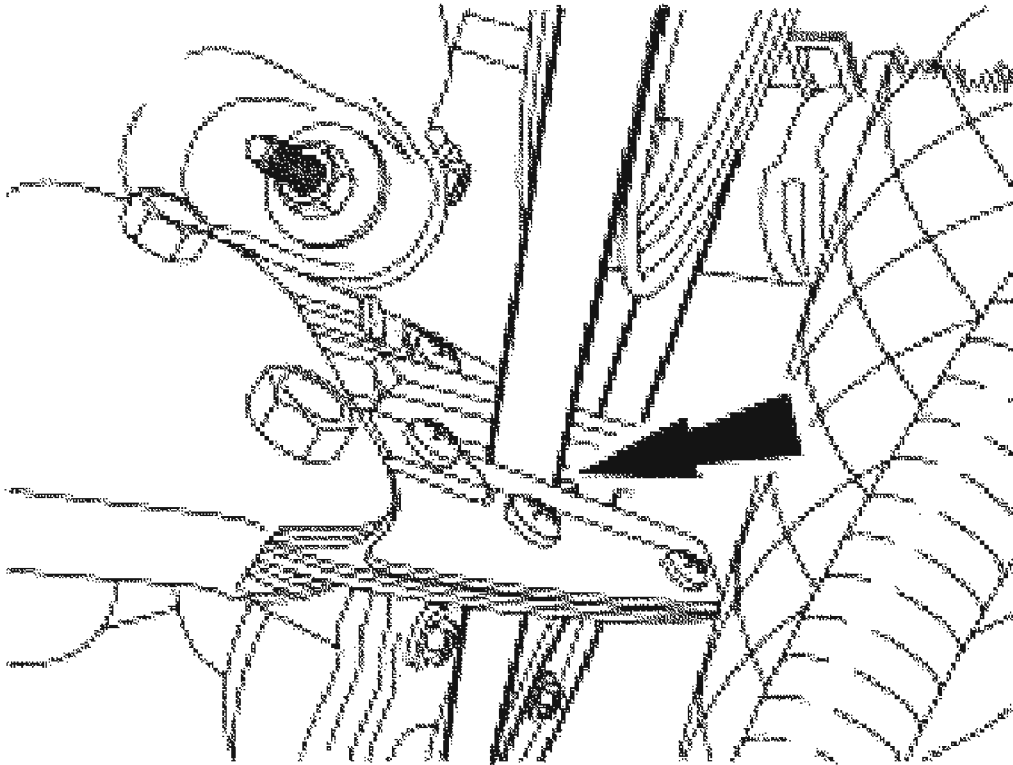


G02739460

**Fig. 287: Rotating Belt Tensioner Clockwise**  
Courtesy of FORD MOTOR CO.

**Vehicles not equipped with water pump belt tensioner**

22. Cut and remove the water pump belt. Discard the belt.

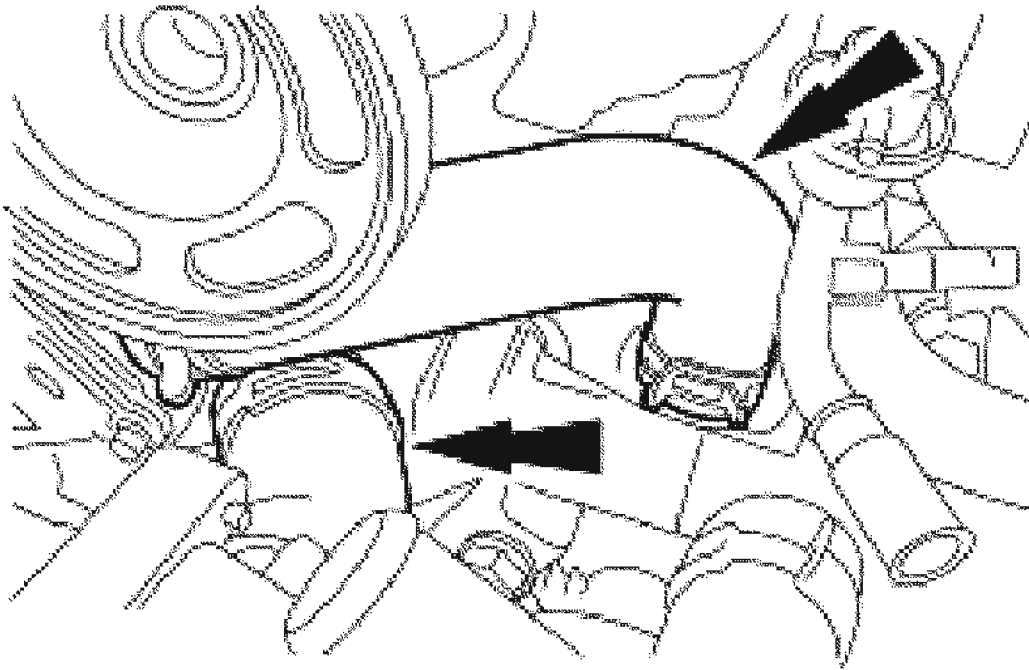


G02739461

**Fig. 288: Removing Water Pump Belt**  
Courtesy of FORD MOTOR CO.

**All vehicles**

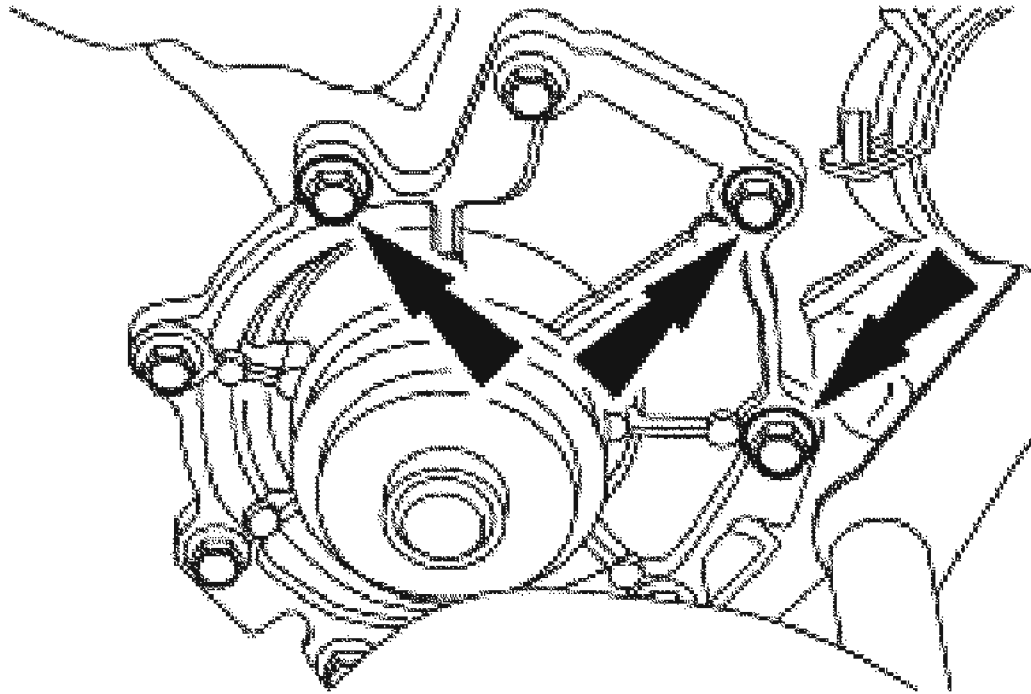
23. Disconnect the hoses.



G02739462

**Fig. 289: Disconnecting Hoses**  
Courtesy of FORD MOTOR CO.

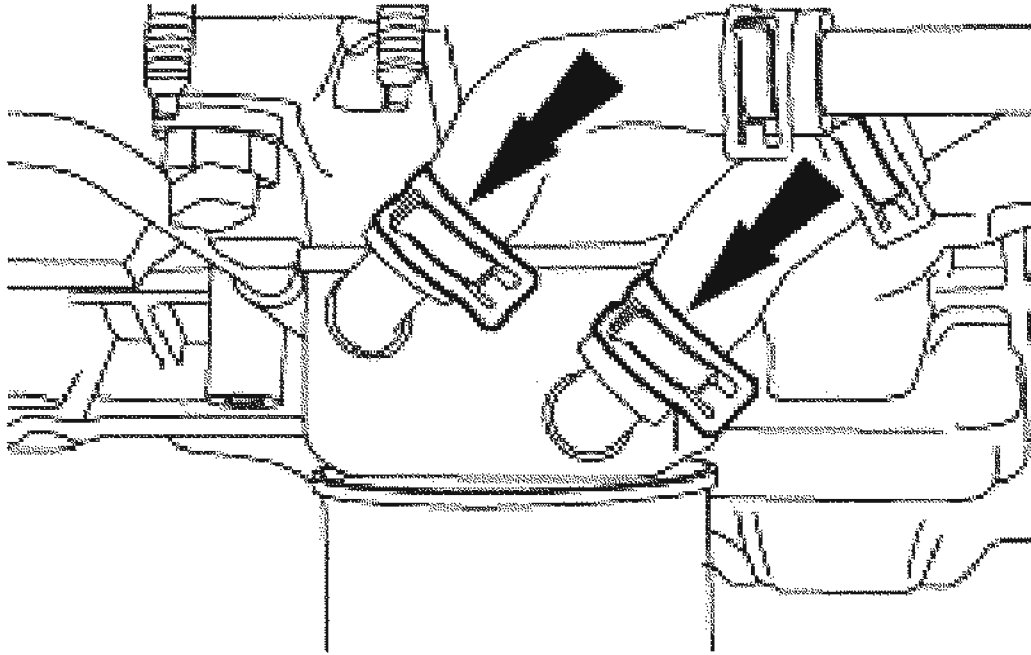
24. Remove the water pump assembly.



G02739463

**Fig. 290: Removing Water Pump Assembly**  
Courtesy of FORD MOTOR CO.

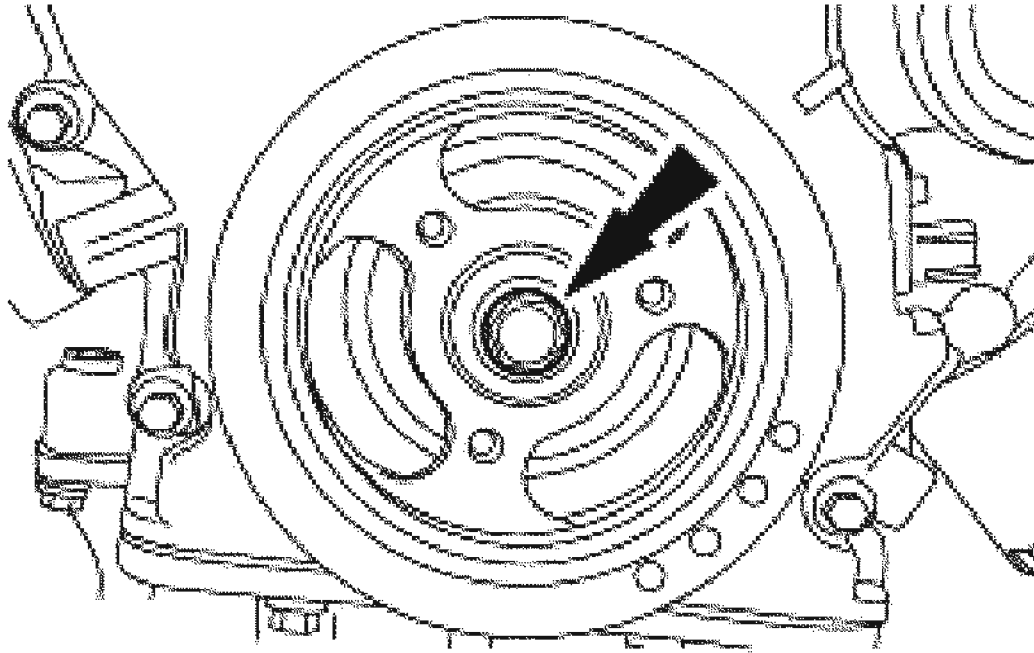
25. Disconnect the coolant hoses at the oil cooler.



G02739464

**Fig. 291: Disconnecting Coolant Hoses**  
Courtesy of FORD MOTOR CO.

26. Remove the bolt.

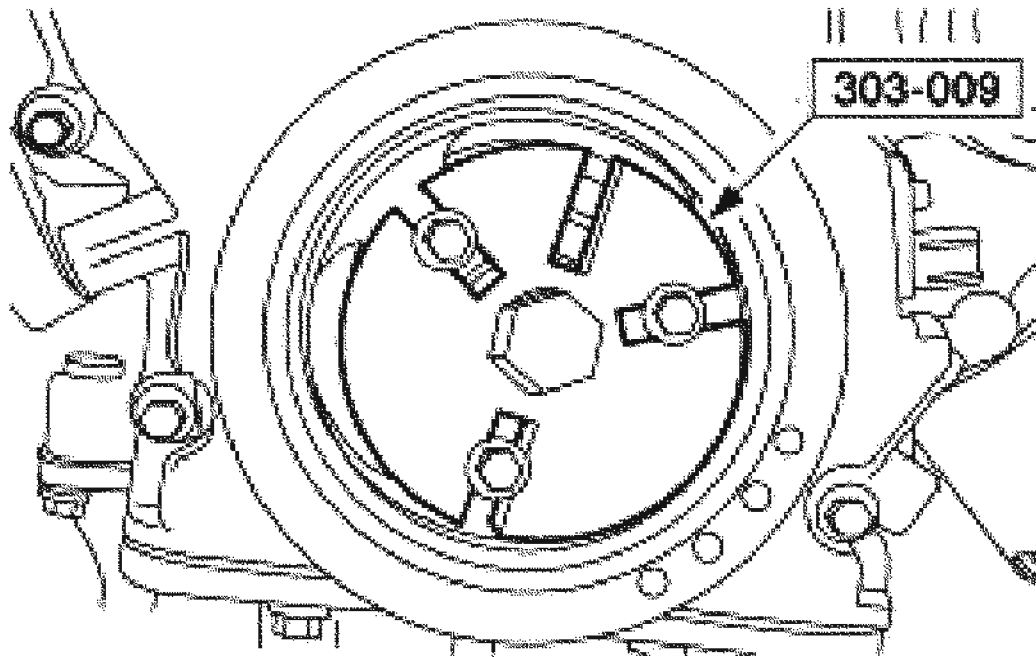


G02739465

**Fig. 292: Removing Bolt**  
Courtesy of FORD MOTOR CO.

27. Using the special tool, remove the crankshaft damper.

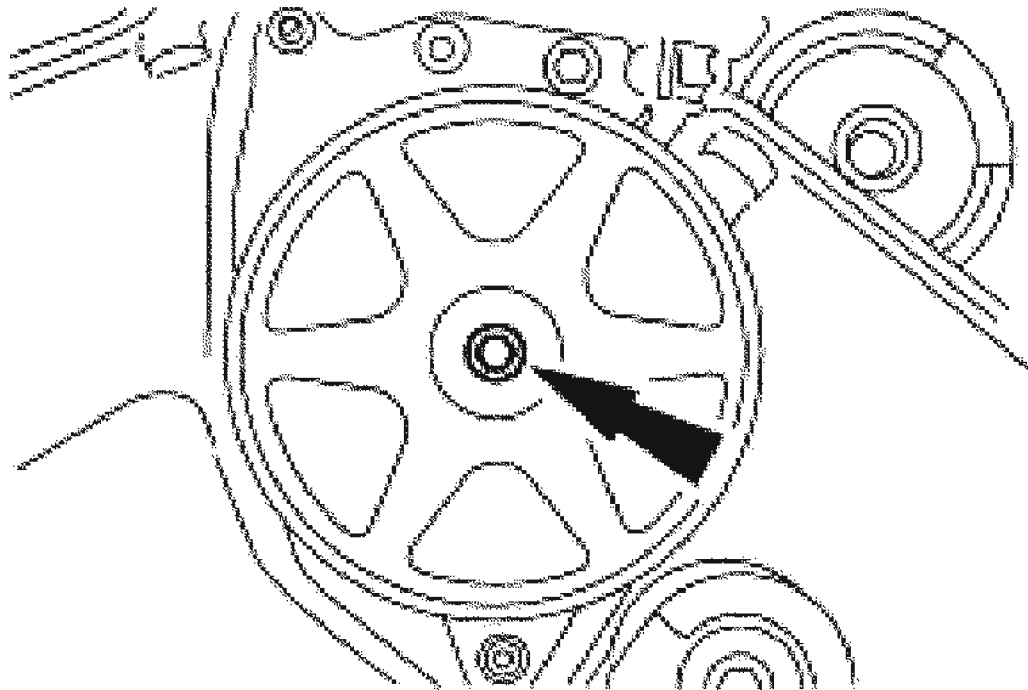




G02739466

**Fig. 293: Removing Crankshaft Damper Using Special Tool**  
Courtesy of FORD MOTOR CO.

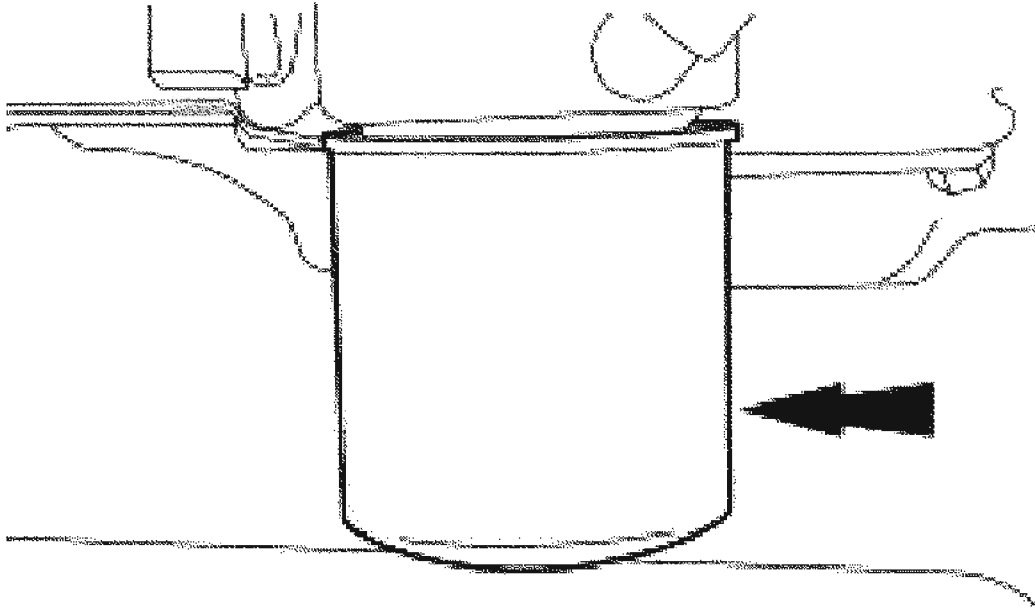
28. Remove the power steering pump pulley.



G02739467

**Fig. 294: Removing Power Steering Pump Pulley**  
Courtesy of FORD MOTOR CO.

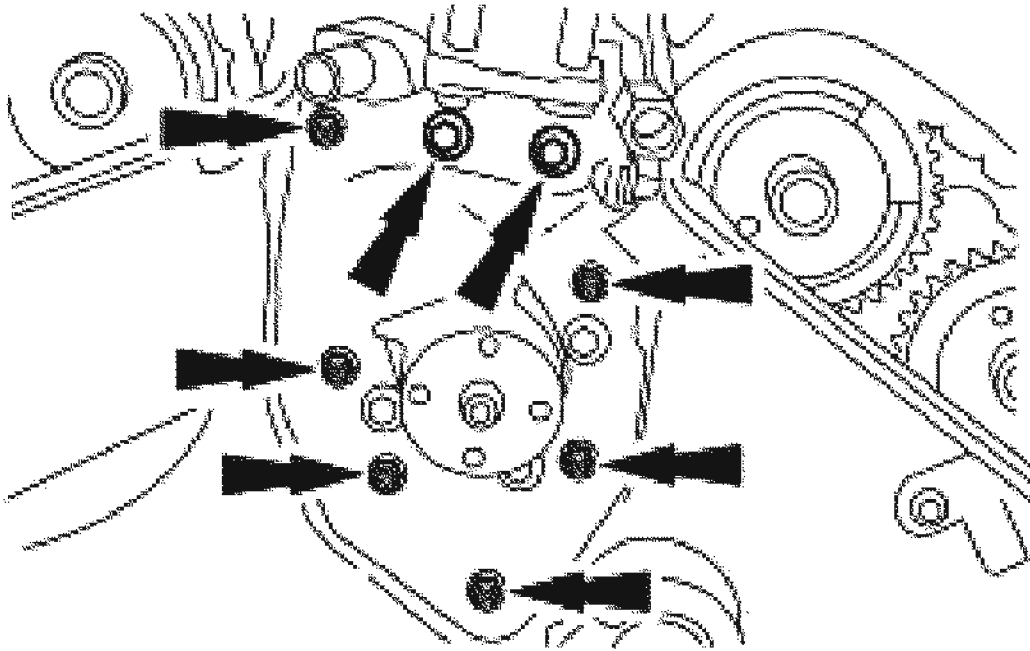
29. Remove and discard the oil filter.



G02739468

**Fig. 295: Removing Oil Filter**  
Courtesy of FORD MOTOR CO.

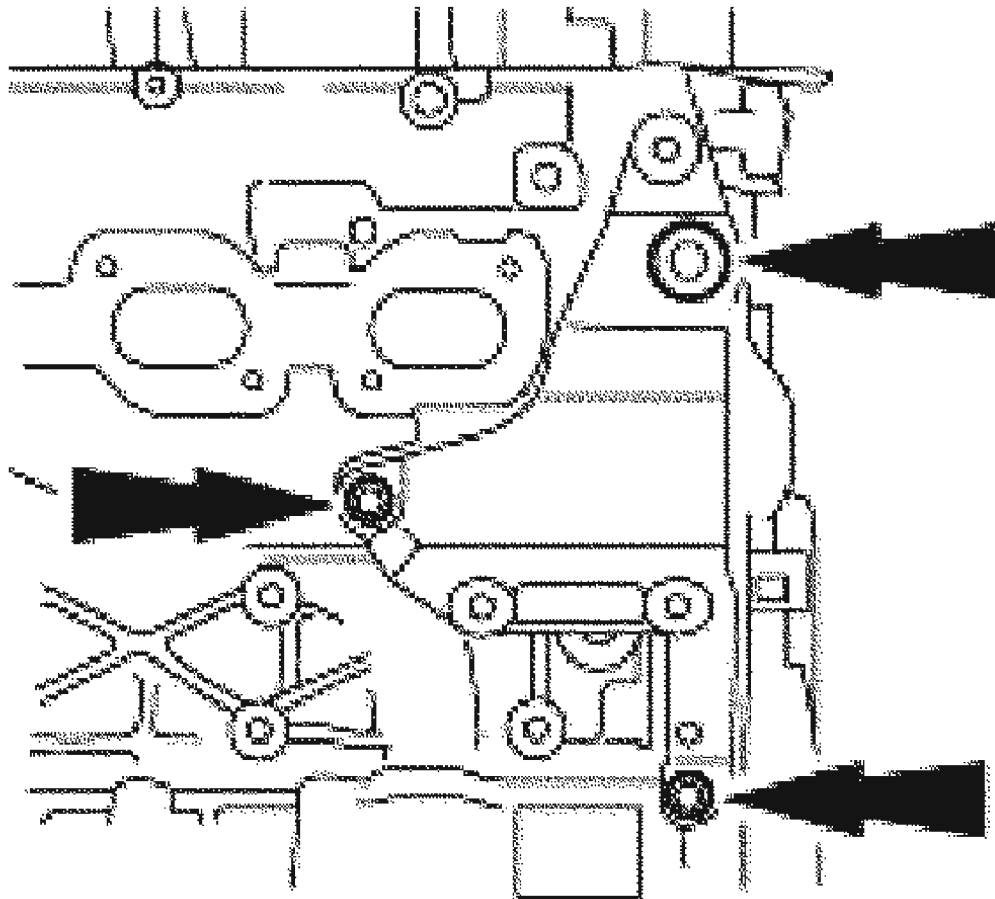
30. Remove the power steering pump.



G02739469

**Fig. 296: Removing Power Steering Pump**  
Courtesy of FORD MOTOR CO.

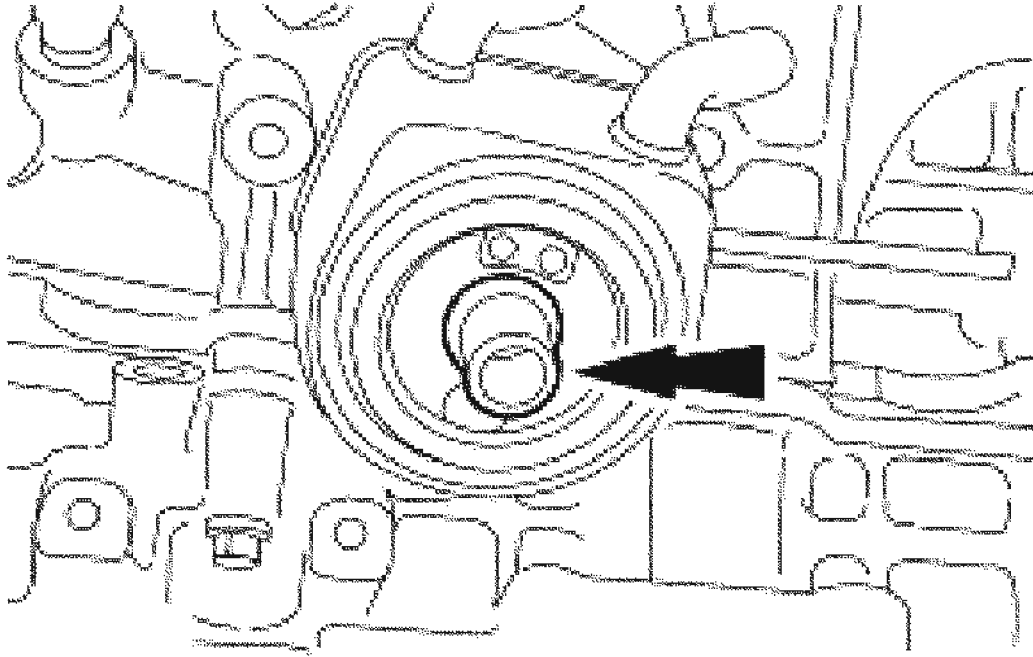
31. Remove the generator support bracket.



G02739470

**Fig. 297: Removing Generator Support Bracket**  
Courtesy of FORD MOTOR CO.

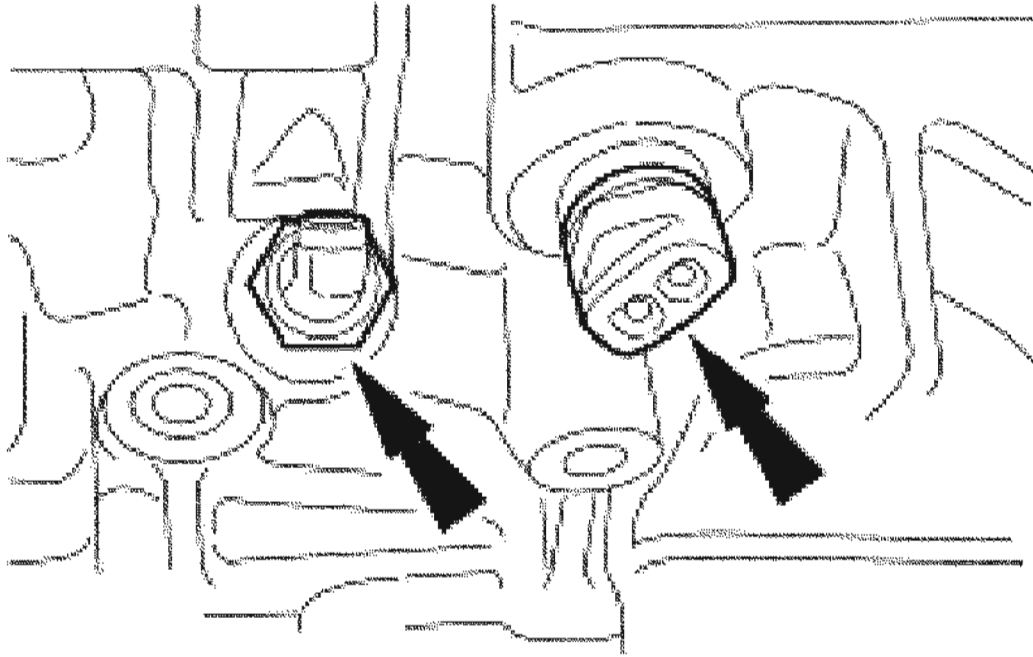
32. Remove the oil cooler.



G02739471

**Fig. 298: Removing Oil Cooler**  
Courtesy of FORD MOTOR CO.

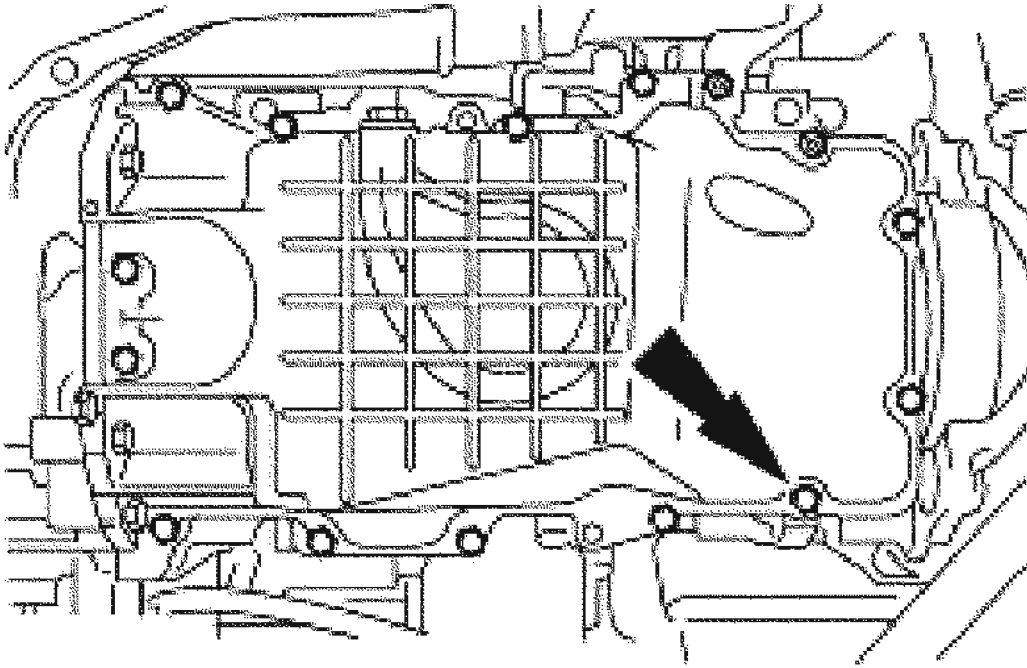
33. Remove the oil pressure sender and the block heater.



G02739472

**Fig. 299: Removing Oil Pressure Sender And Block Heater**  
**Courtesy of FORD MOTOR CO.**

34. Remove the bolts and studs and the oil pan.
  - Discard the gasket.

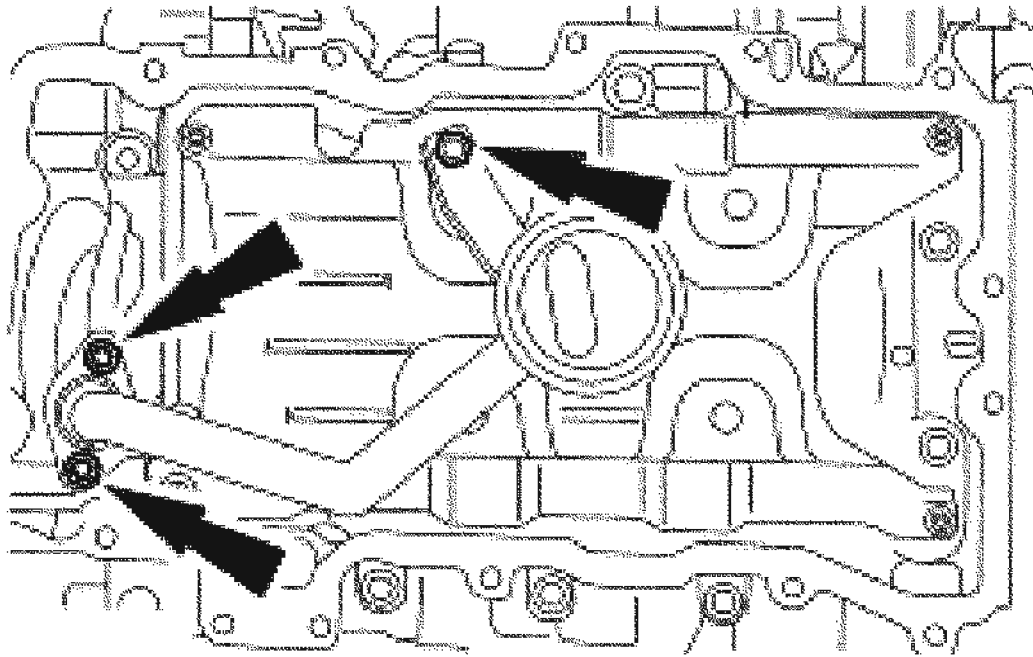


G02739473

**Fig. 300: Removing Bolts, Studs And Oil Pan**  
Courtesy of FORD MOTOR CO.

35. Remove the bolts, nut and the oil pump screen and pickup tube.

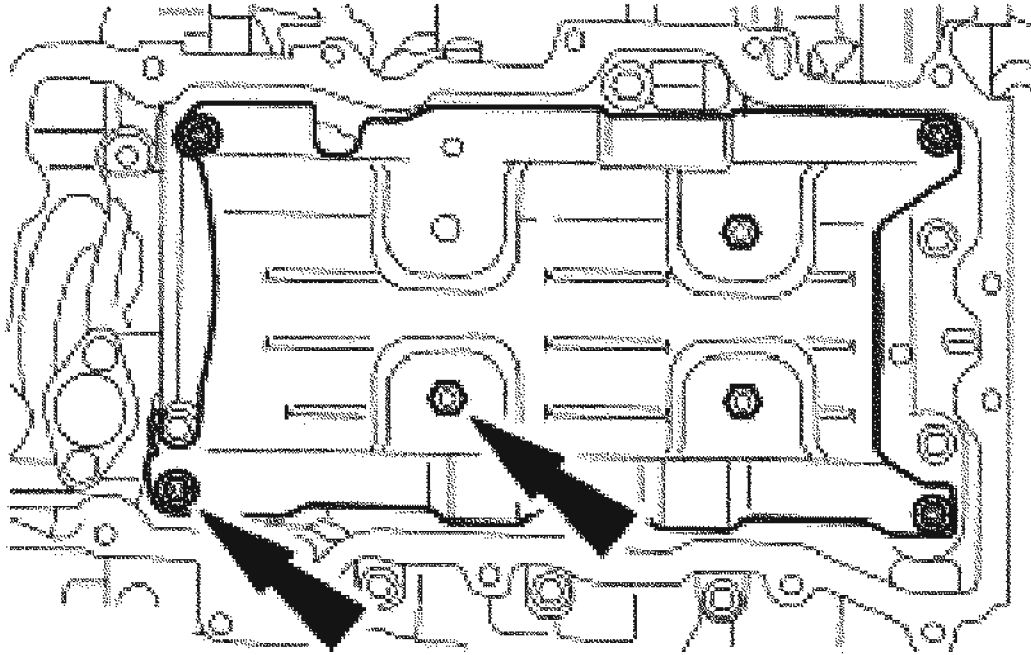




G02739474

**Fig. 301: Removing Bolts, Nut And Oil Pump Screen**  
Courtesy of FORD MOTOR CO.

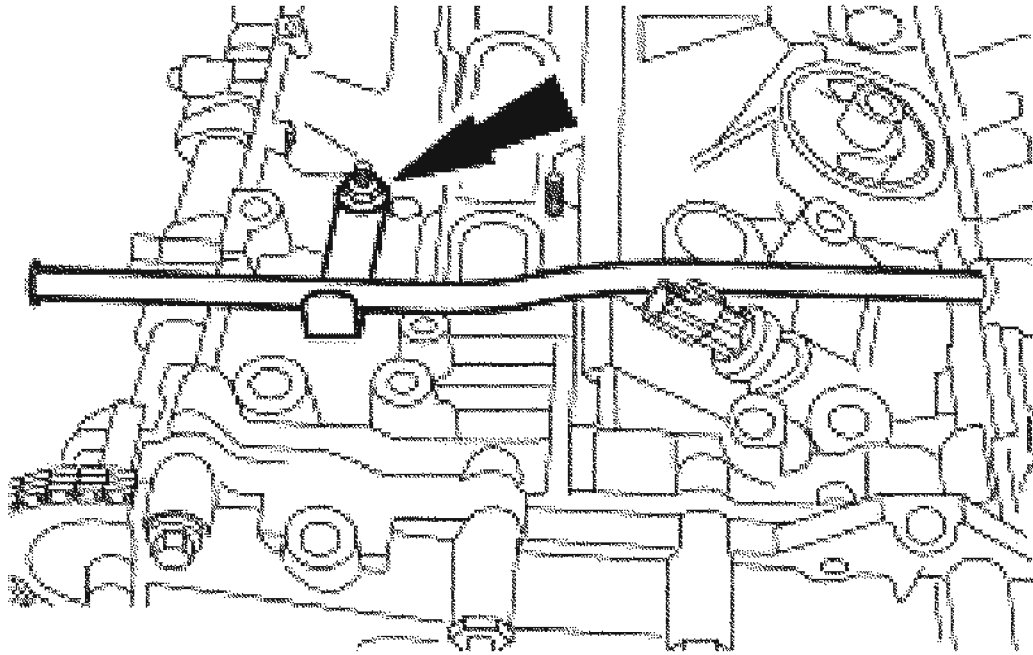
36. Remove the nuts and the oil pan baffle.



G02739475

**Fig. 302: Removing Nuts And Oil Pan Baffle**  
Courtesy of FORD MOTOR CO.

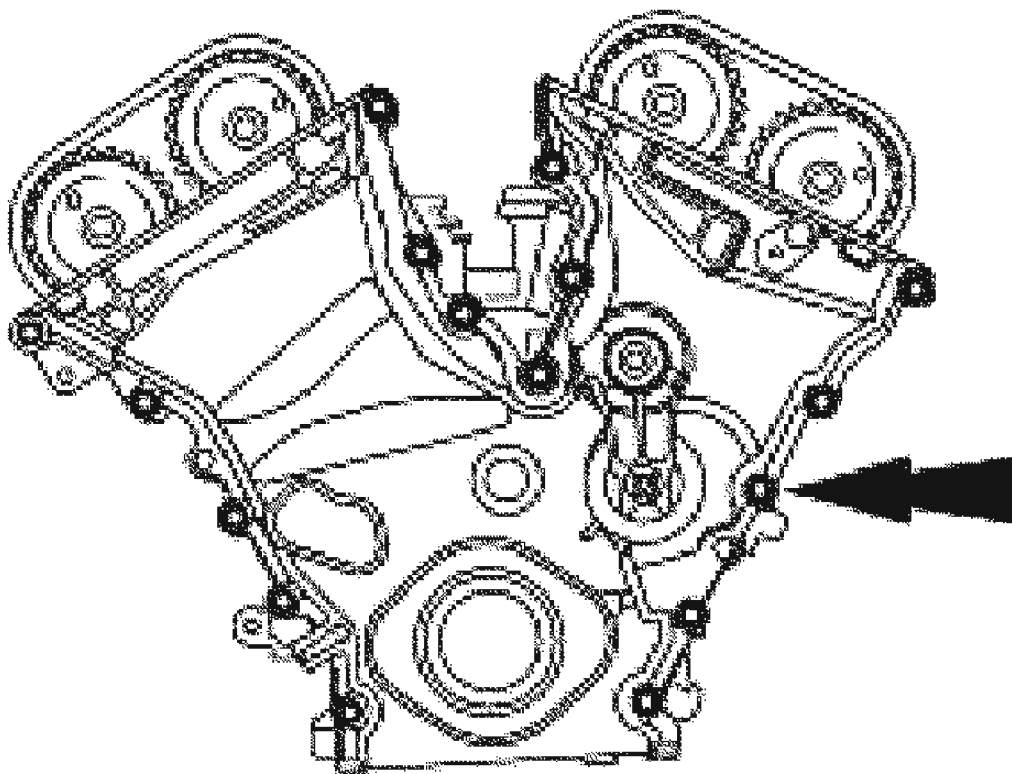
37. Remove the stud bolt and the oil level indicator and tube.



G02739476

**Fig. 303: Removing Stud Bolt And Oil Level Indicator And Tube**  
Courtesy of FORD MOTOR CO.

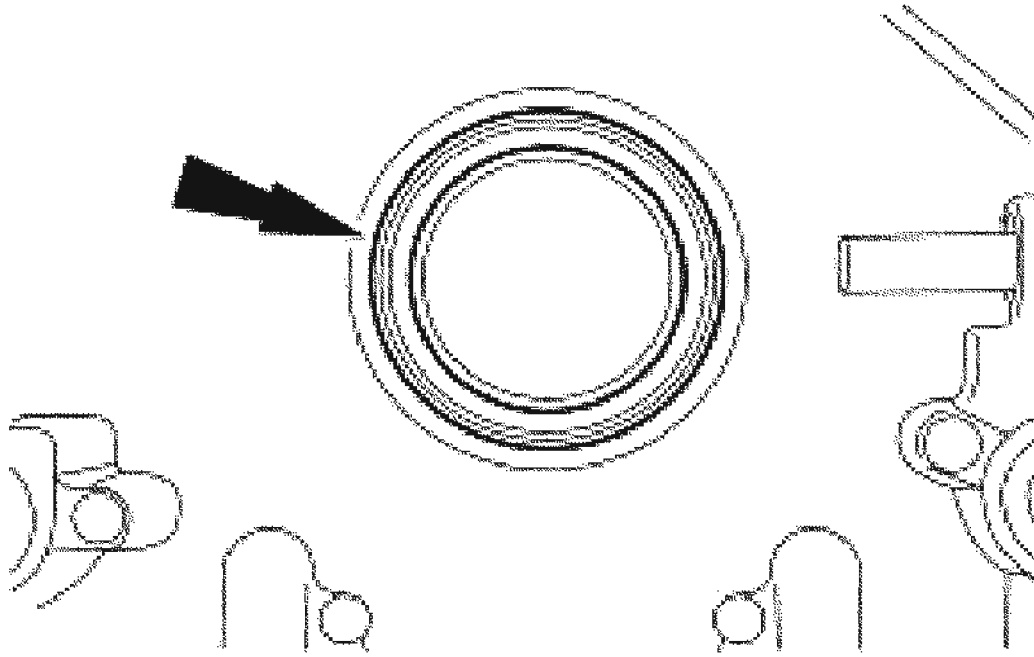
**CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surface. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove all traces of sealant.



**G02739477**

**Fig. 304: Removing Bolts, Studs, And Front Cover**  
Courtesy of FORD MOTOR CO.

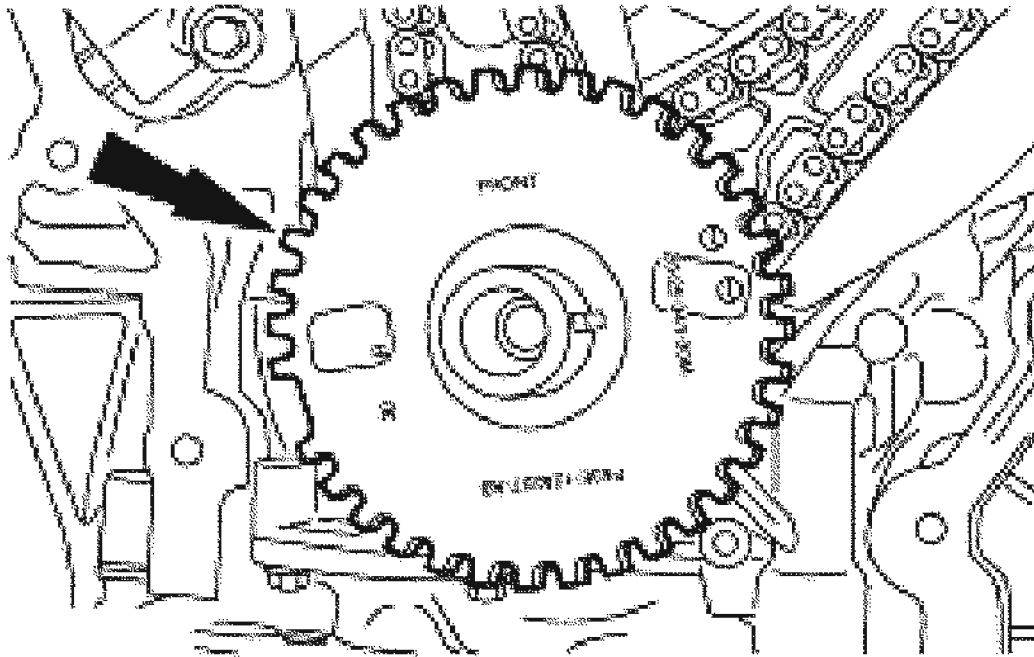
38. Remove the bolts, studs, and the front cover.
  - Discard the gasket.
39. Remove and discard the crankshaft front seal from the front cover.



G02739478

**Fig. 305: Removing Crankshaft Front Seal From Front Cover**  
Courtesy of FORD MOTOR CO.

**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped 20-25-34Y-30M (Color Blue).



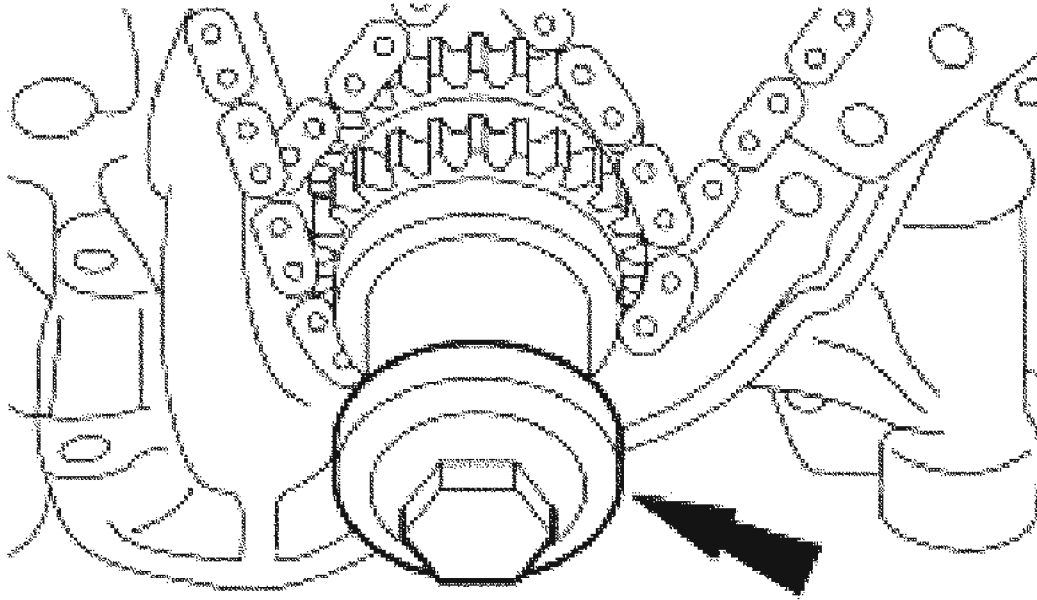
G02739479

**Fig. 306: Removing Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

40. Remove the ignition pulse wheel.
41. Install the damper bolt.

## 2004 Ford Escape

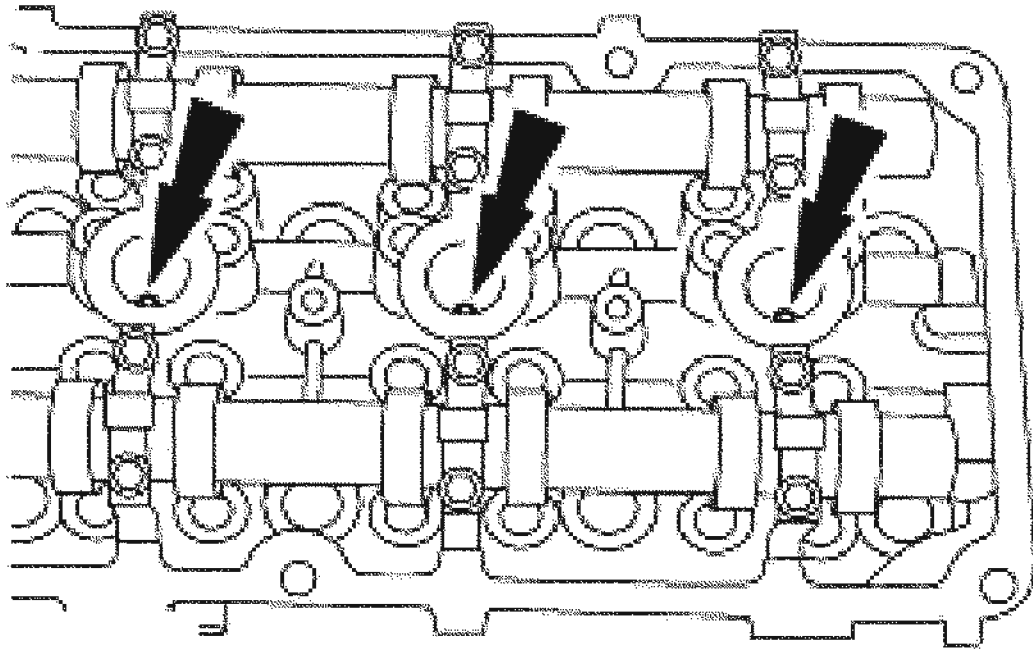
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739480

**Fig. 307: Installing Damper Bolt**  
Courtesy of FORD MOTOR CO.

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

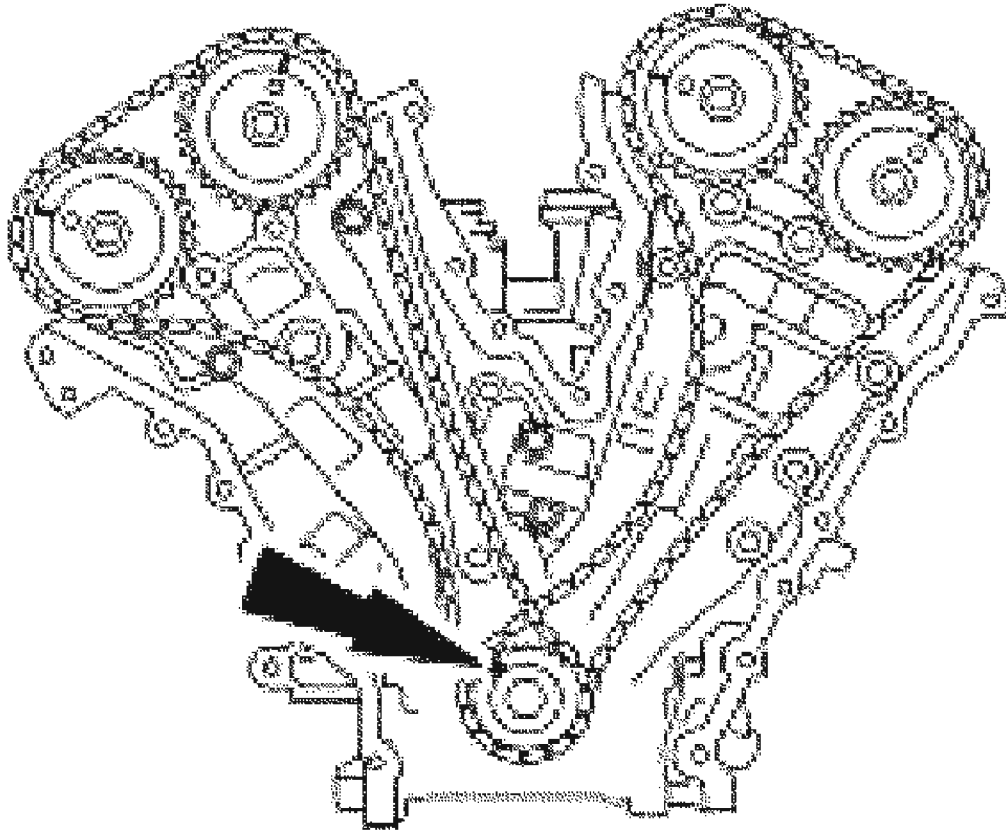


G02739481

**Fig. 308: Removing Spark Plugs**  
Courtesy of FORD MOTOR CO.

42. Remove the LH and RH spark plugs.
43. Rotate the crankshaft clockwise to position the crankshaft keyway in the 11 o'clock position and position the camshafts in the correct position. This will position the number one cylinder at top dead center (TDC).
  - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.

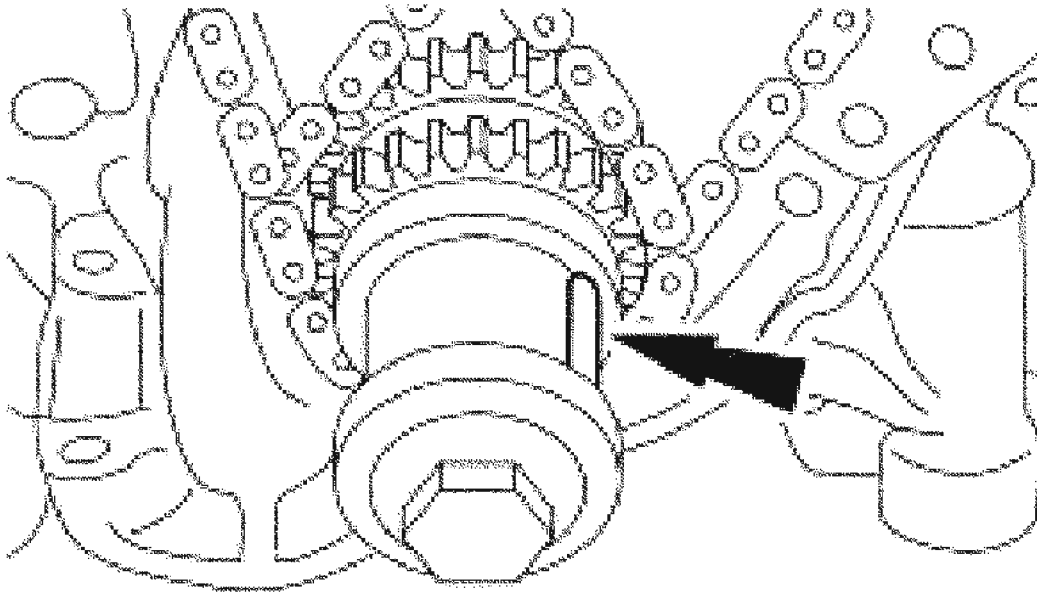




G02739482

**Fig. 309: Locating Pulley**  
Courtesy of FORD MOTOR CO.

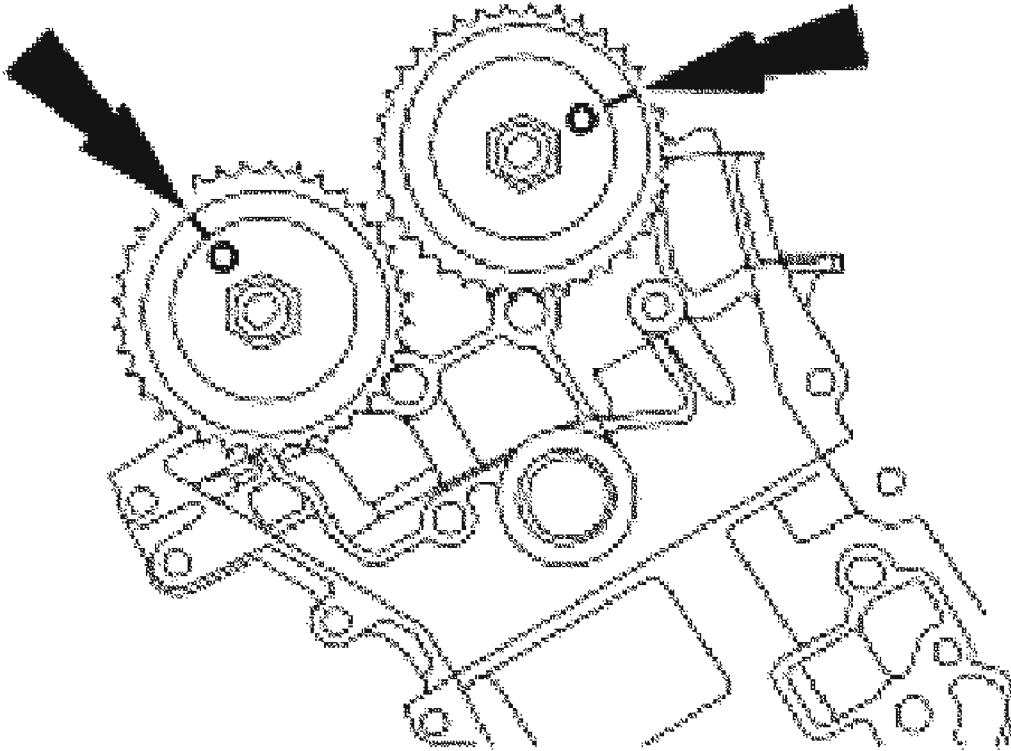
44. Rotate the crankshaft clockwise 120 degrees to the 3 o'clock position to locate the RH camshafts in the neutral position.



G02739483

**Fig. 310: Identifying Crankshaft Aligning Mark**  
Courtesy of FORD MOTOR CO.

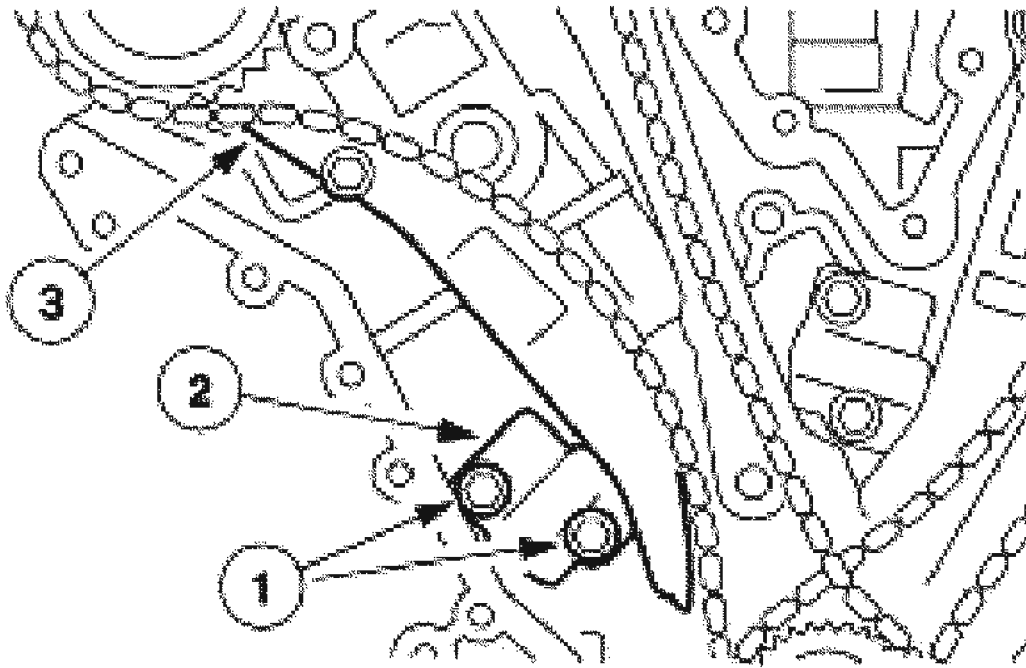
45. Verify that the RH camshafts are correctly positioned.



G02739484

**Fig. 311: Checking RH Camshafts Are Correctly Positioned**  
Courtesy of FORD MOTOR CO.

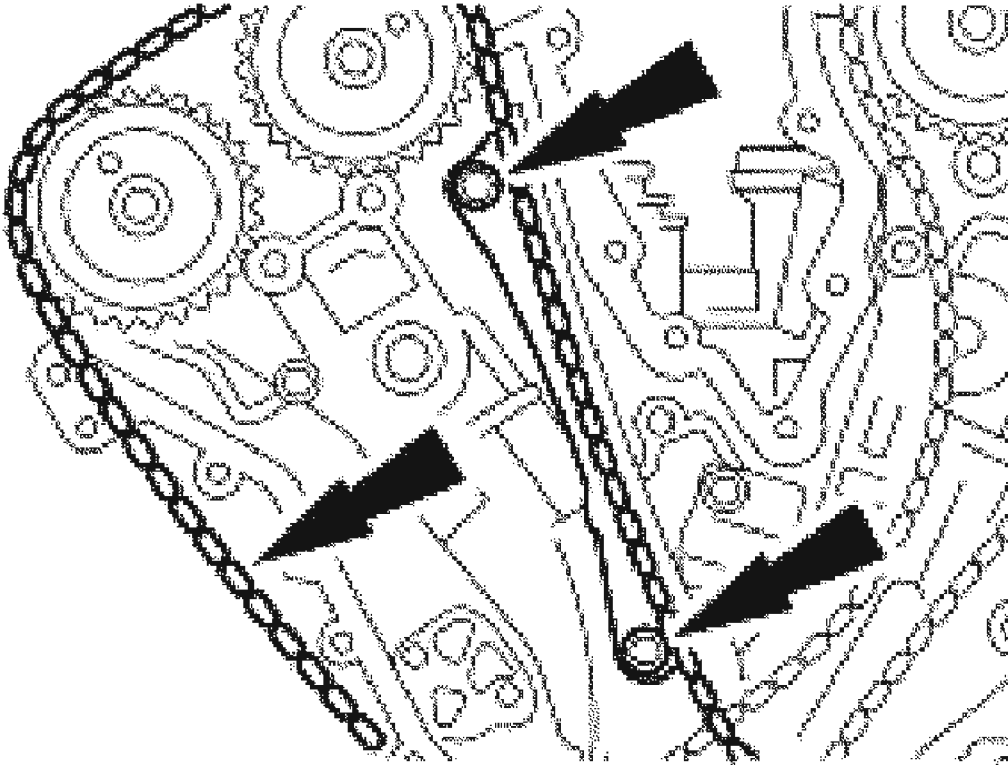
46. Remove the RH timing chain tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.



G02739485

**Fig. 312: Removing RH Timing Chain Tensioner Arm**  
Courtesy of FORD MOTOR CO.

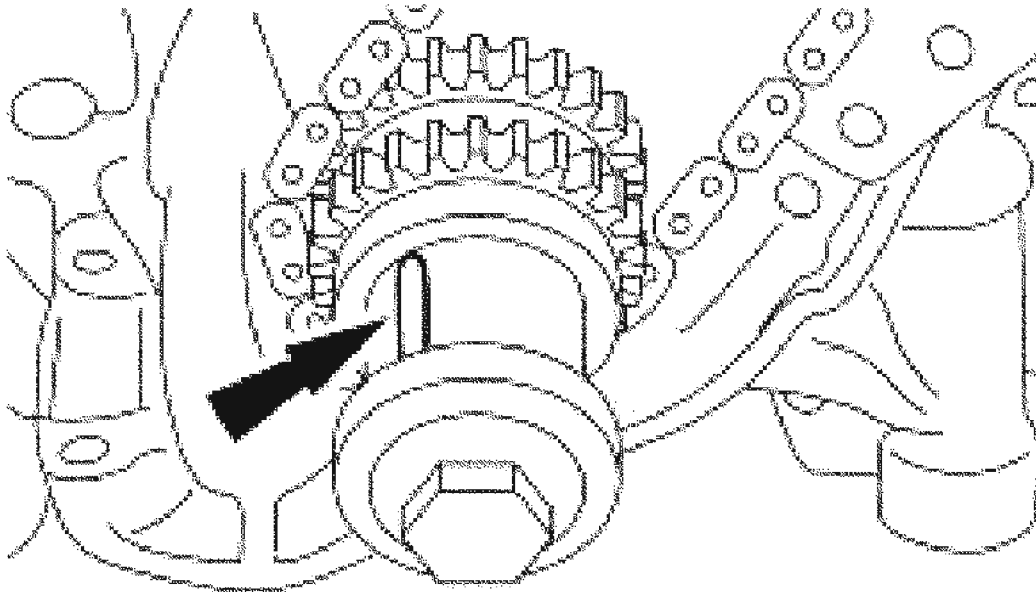
47. Remove the bolts, RH timing chain guide and the timing chain.



G02739486

**Fig. 313: Removing Timing Chain Guide & Timing Chain**  
Courtesy of FORD MOTOR CO.

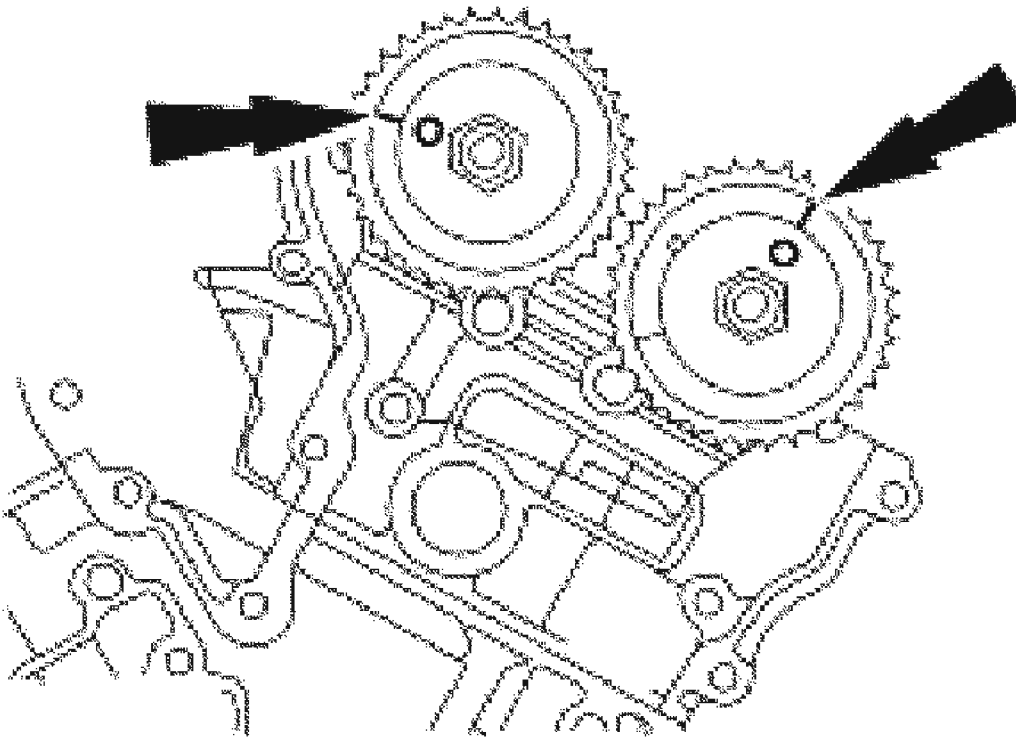
48. Rotate the crankshaft clockwise 600 degrees (1 -2/3 times) to position the crankshaft keyway in the 11 o'clock position. This will position the LH camshafts in the neutral position.



G02739487

**Fig. 314: Identifying Aligning Mark**  
Courtesy of FORD MOTOR CO.

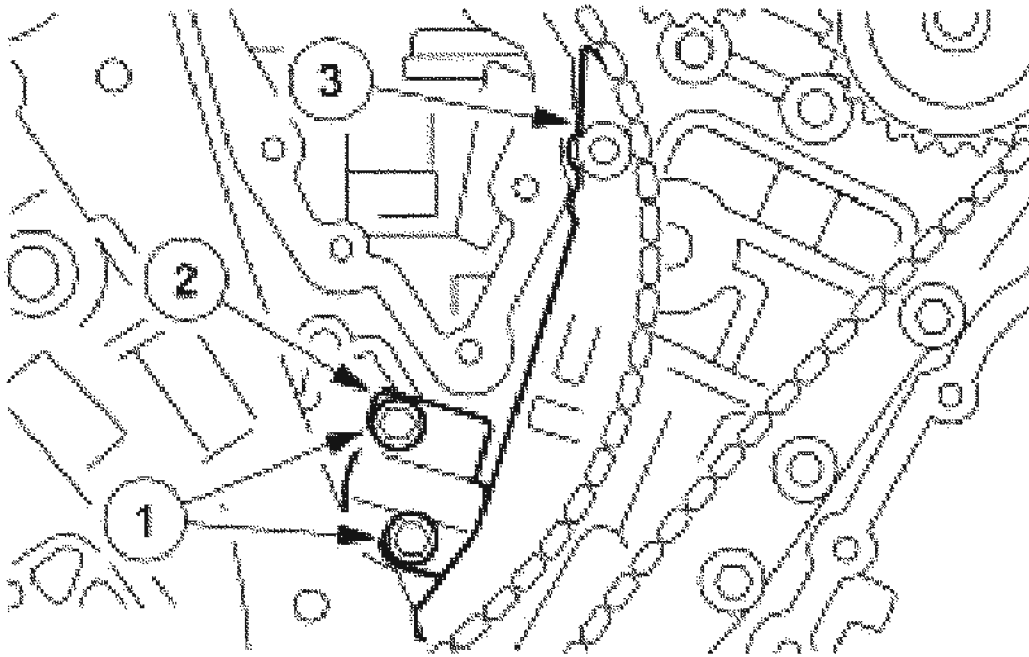
49. Verify that the LH camshafts are in the neutral position.



G02739488

**Fig. 315: Checking LH Camshafts Are In Neutral Position**  
Courtesy of FORD MOTOR CO.

50. Remove the LH timing chain and tensioner arm.
  1. Remove the bolts.
  2. Remove the tensioner.
  3. Remove the tensioner arm.

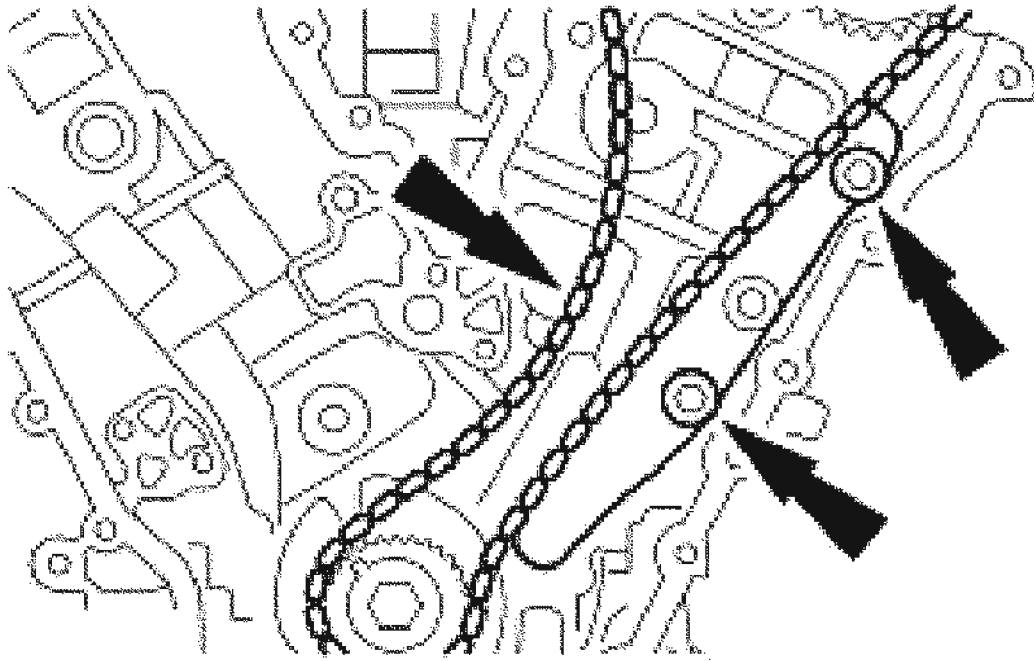


G02739489

**Fig. 316: Removing LH Timing Chain And Tensioner Arm**  
Courtesy of FORD MOTOR CO.

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

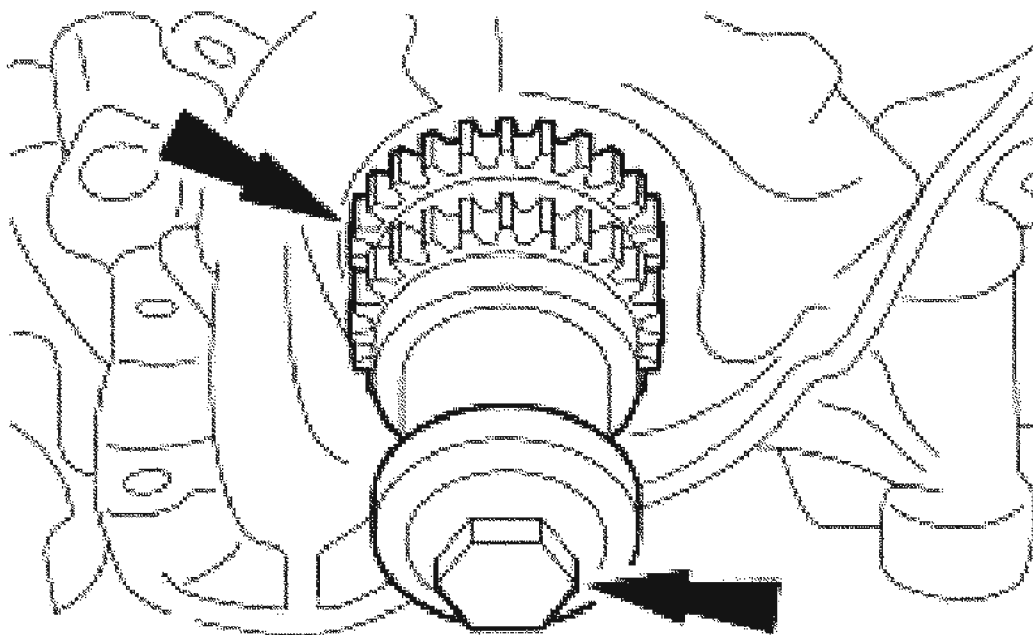




G02739490

**Fig. 317: Removing LH Timing Chain And Timing Chain Guide**  
Courtesy of FORD MOTOR CO.

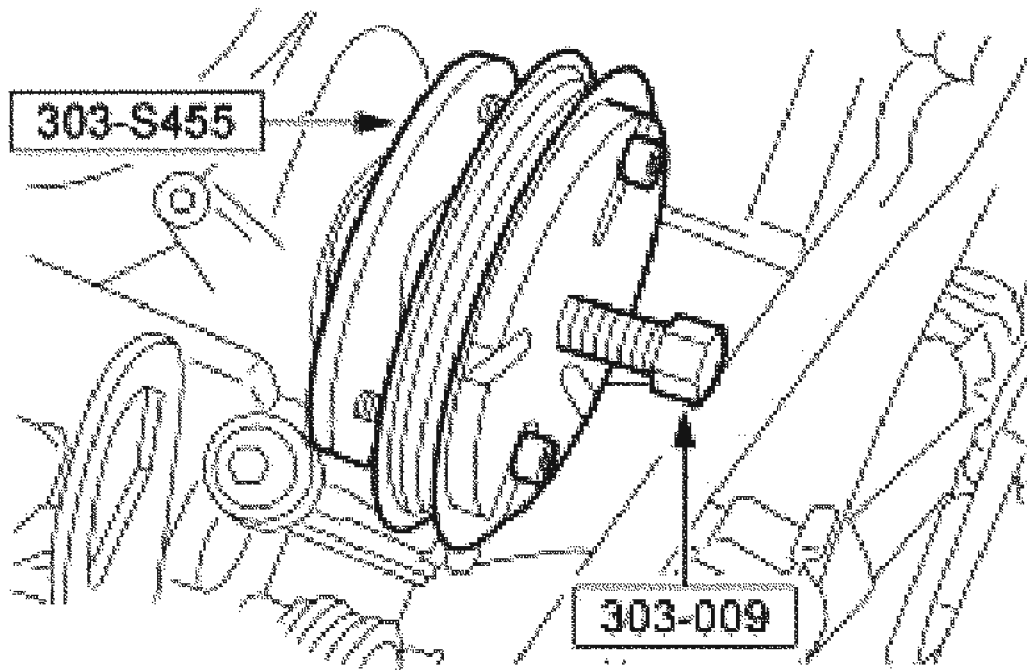
52. Remove the damper bolt and the crankshaft sprockets.



G02739491

**Fig. 318: Removing Damper Bolt And Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. The service pulley is pressed on flush to the end of the camshaft.

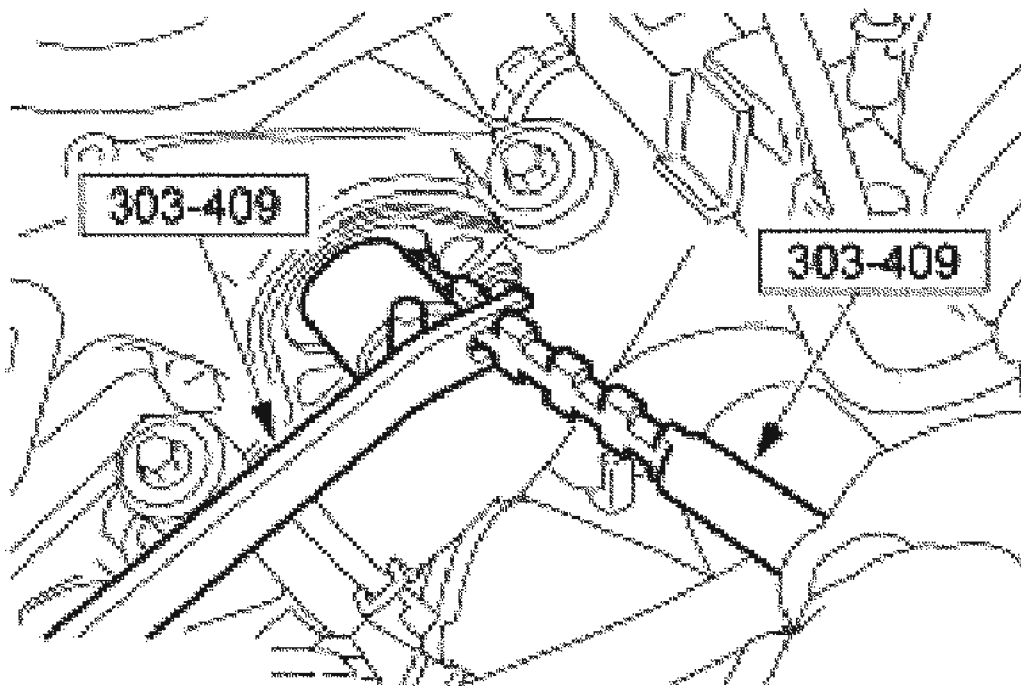


G02739492

**Fig. 319: Removing Water Pump Drive Pulley**  
Courtesy of FORD MOTOR CO.

53. Using the special tools, remove the water pump drive pulley and discard.

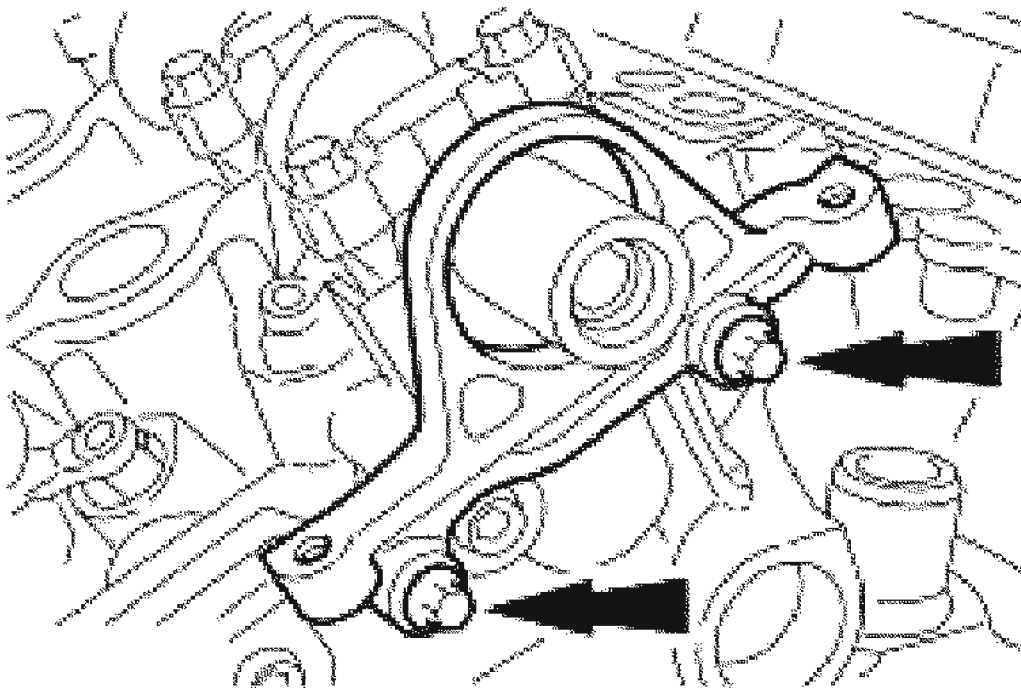
**CAUTION:** To make sure of the correct sealing, do not scratch the camshaft.



G02739493

**Fig. 320: Removing Camshaft Oil Seal Using Special Tool**  
**Courtesy of FORD MOTOR CO.**

54. Using the special tool, remove the camshaft oil seal and discard.
55. Remove the intake camshaft oil seal retainer and discard the press in place gasket.



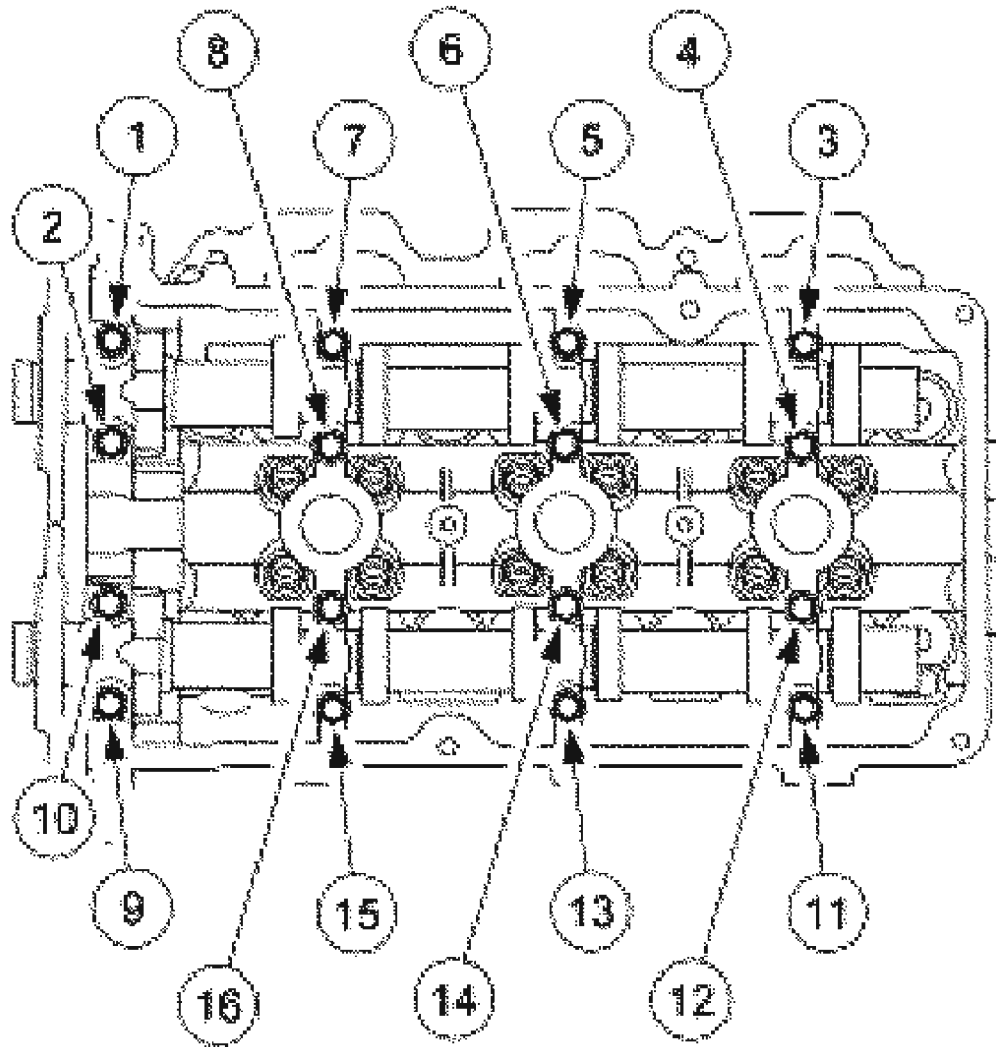
G02739494

**Fig. 321: Removing Intake Camshaft Oil Seal Retainer**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled in their original positions.

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

**NOTE:** The camshaft caps have alignment dowels.



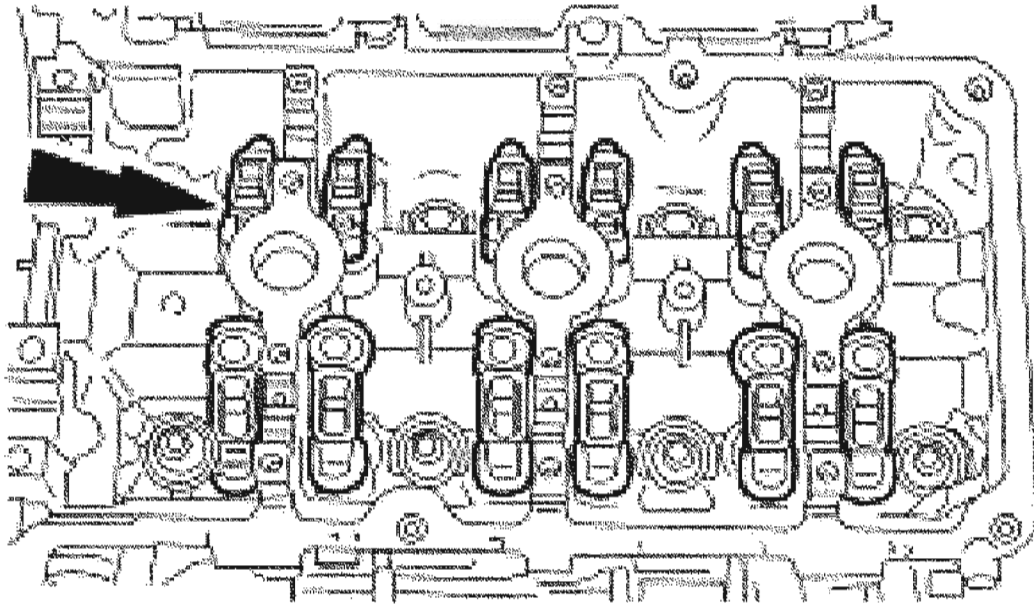
G02739495

**Fig. 322: Identifying Bolt Loosening Sequence**  
Courtesy of FORD MOTOR CO.

56. Loosen the LH and RH camshaft cap bolts in the indicated sequence and remove the camshaft caps.
  - Tap the caps lightly with a soft-faced mallet to loosen the camshaft caps.
57. Remove the LH and RH camshafts.

**CAUTION:** The camshaft followers must be installed in their original position.

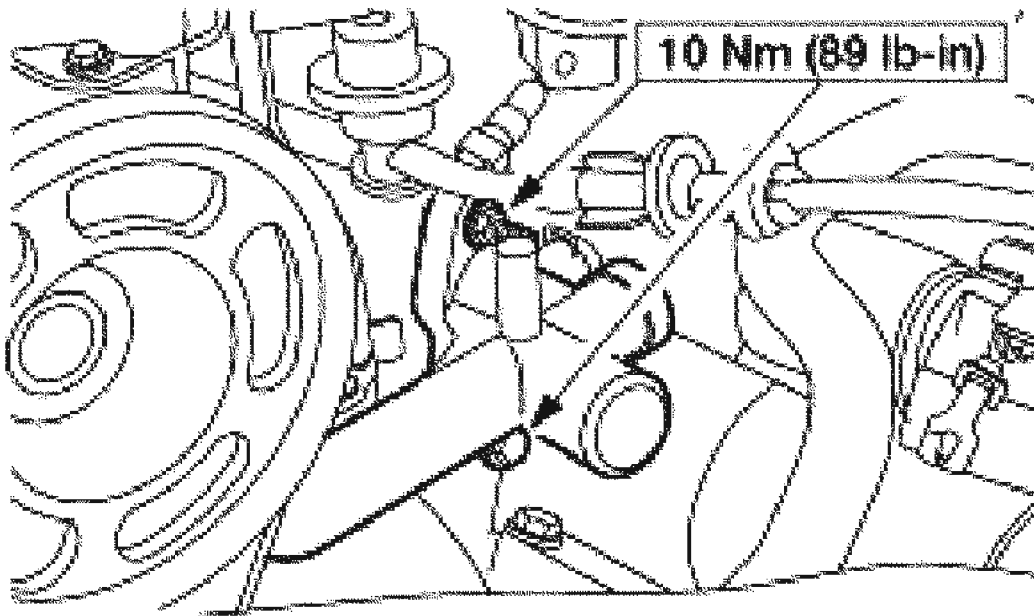
**NOTE:** RH shown; LH similar.



G02739496

**Fig. 323: Removing LH And RH Camshaft Followers**  
Courtesy of FORD MOTOR CO.

58. Remove the LH and RH camshaft followers.
  - Mark the location of the followers using a permanent-type marker.
59. Remove the coolant bypass tube.

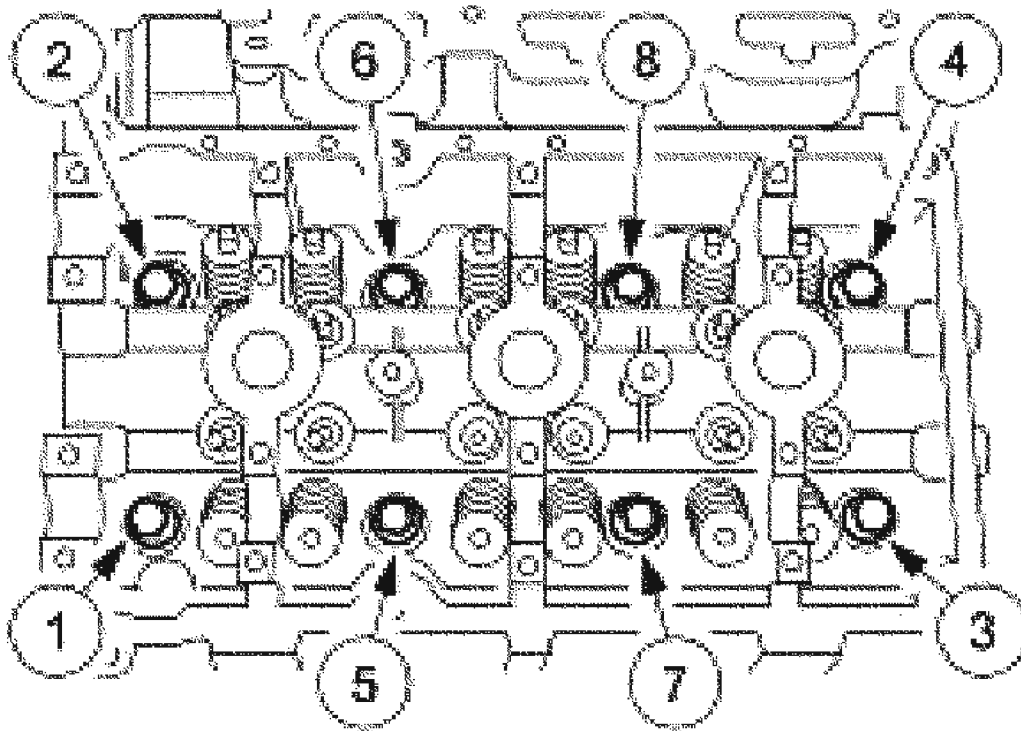


G02739497

**Fig. 324: Removing Coolant Bypass Tube**  
Courtesy of FORD MOTOR CO.

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





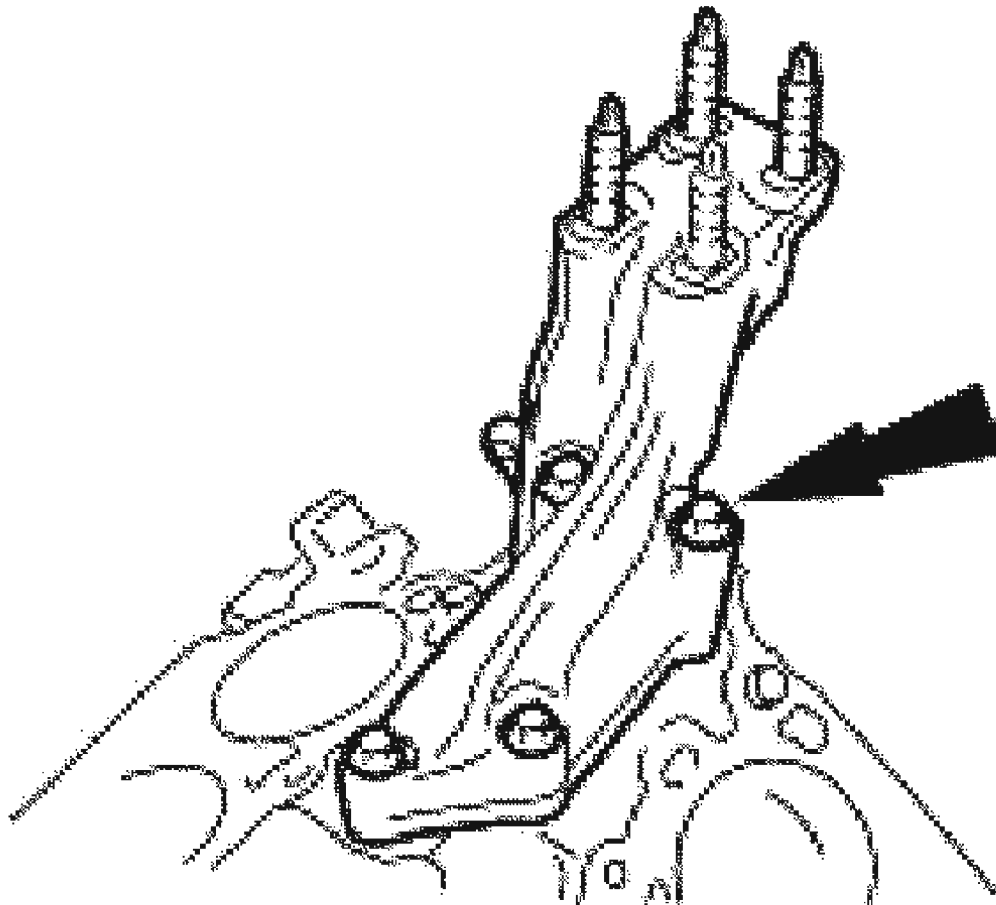
G02739498

**Fig. 325: Identifying Bolt Loosening Sequence**  
Courtesy of FORD MOTOR CO.

60. Loosen the bolts in the indicated sequence and remove the LH and RH cylinder heads.
- Discard the gaskets.

**NOTE:** The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

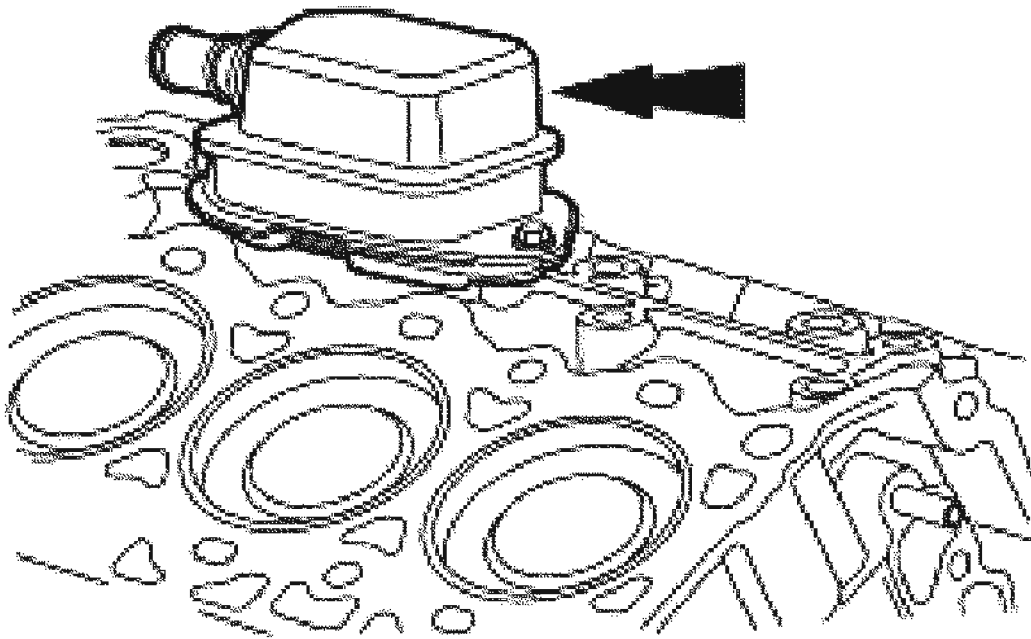
61. Support the cylinder head on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in) deep.
62. Remove the power steering/engine support bracket.



**G02739499**

**Fig. 326: Identifying Power Steering/Engine Support Bracket**  
Courtesy of FORD MOTOR CO.

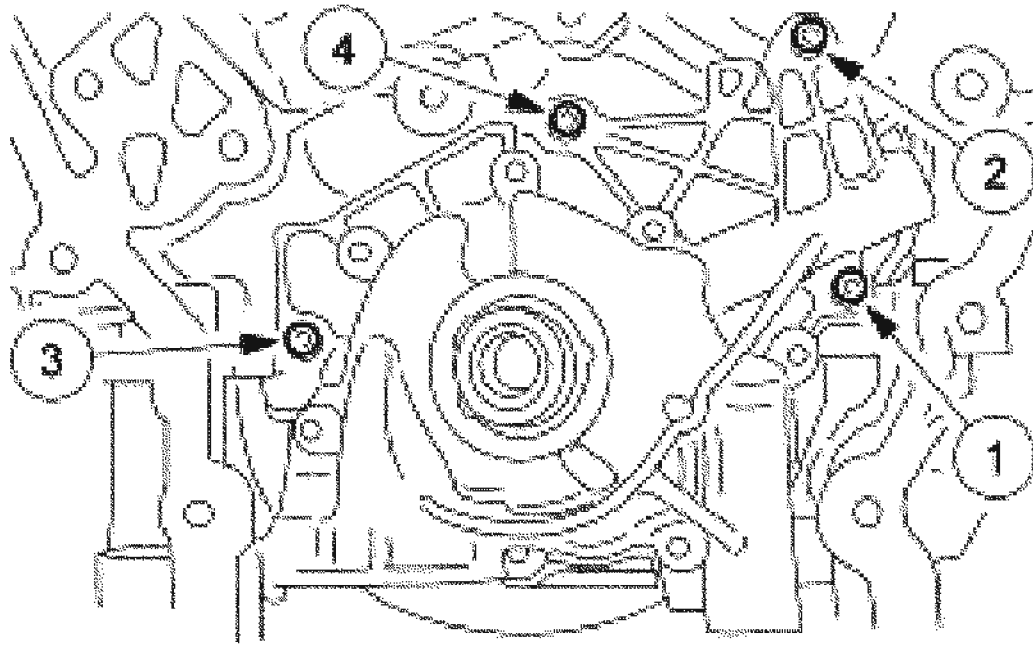
63. Remove the oil separator and discard the gasket.



G02739500

**Fig. 327: Removing Oil Separator**  
Courtesy of FORD MOTOR CO.

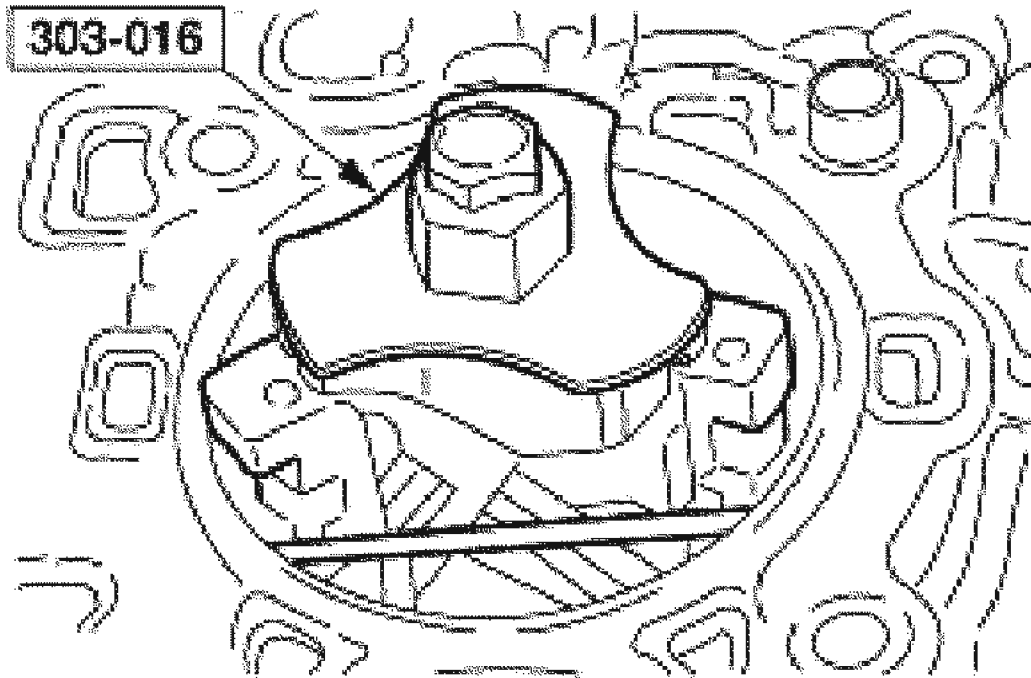
64. Remove the bolts in the indicated sequence and remove the oil pump.



G02739501

**Fig. 328: Identifying Bolt Loosening Sequence**  
Courtesy of FORD MOTOR CO.

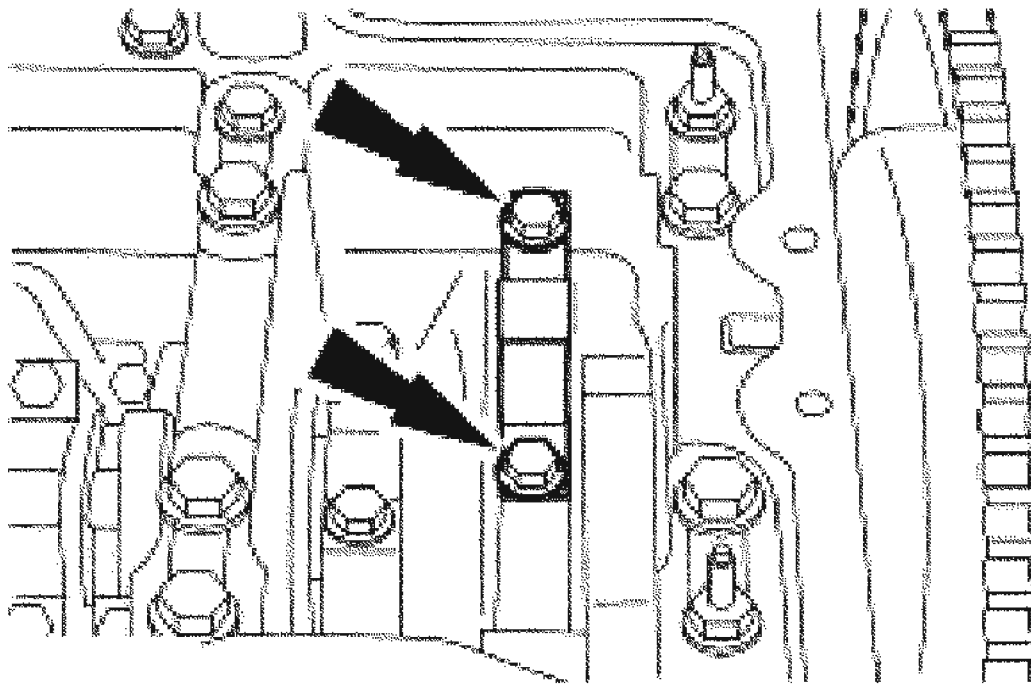
65. Using the special tool, remove the cylinder ridge.



G02739502

**Fig. 329: Removing Cylinder Ridge**  
Courtesy of FORD MOTOR CO.

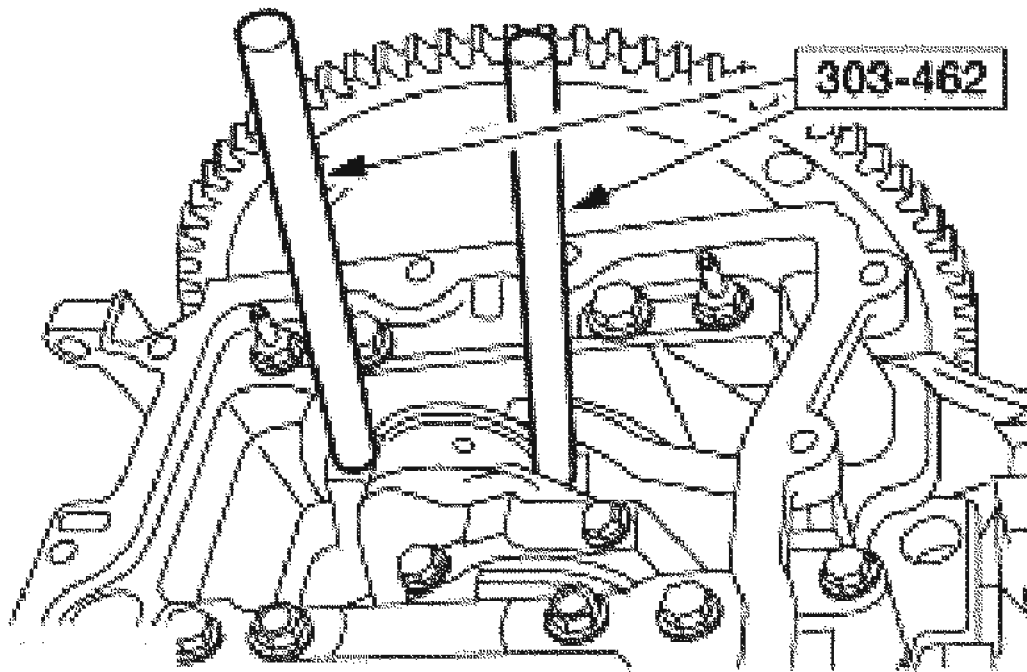
66. Remove the connecting rod cap bolts. Hold the piston/rod assembly to keep it from falling from the engine block.



G02739503

**Fig. 330: Removing Connecting Rod Cap Bolts**  
Courtesy of FORD MOTOR CO.

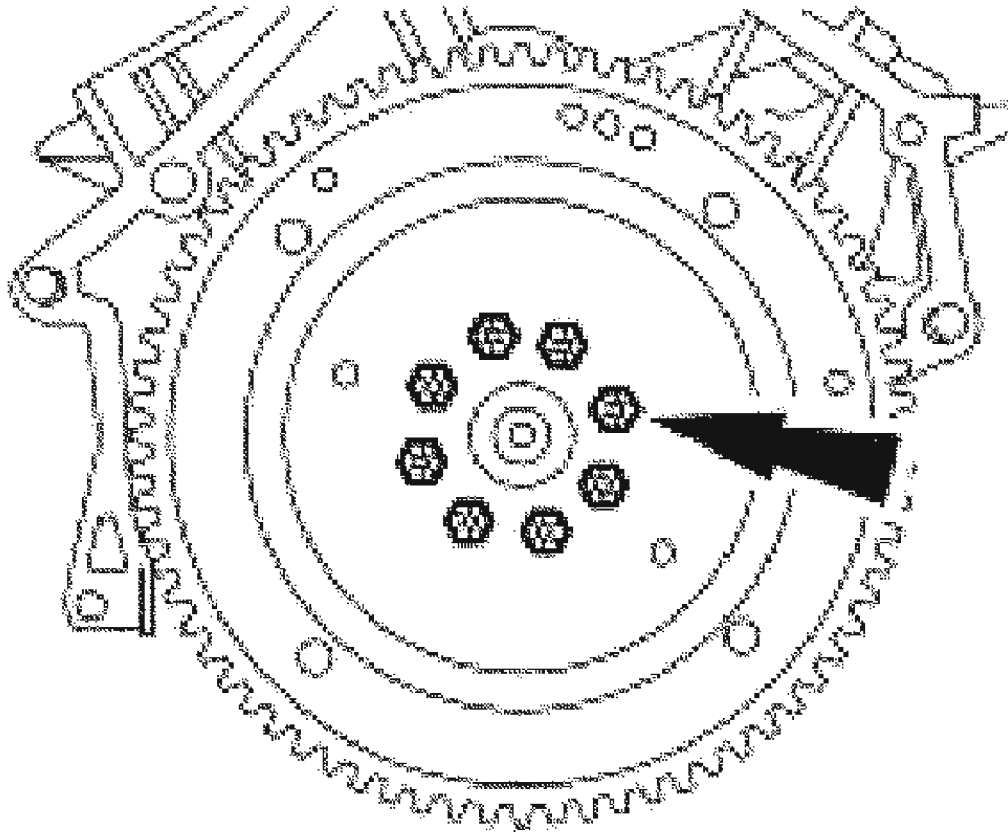
67. Using the special tool, remove the piston/rod assembly from the engine block. Remove the connecting rod bearings.
  - Remove the connecting rod bearings.



G02739504

**Fig. 331: Removing Piston/Rod Assembly Using Special Tool**  
Courtesy of FORD MOTOR CO.

68. Remove the engine block from the stand and place it on a workbench.
69. Remove the bolts and the flexplate.



**G02739505**

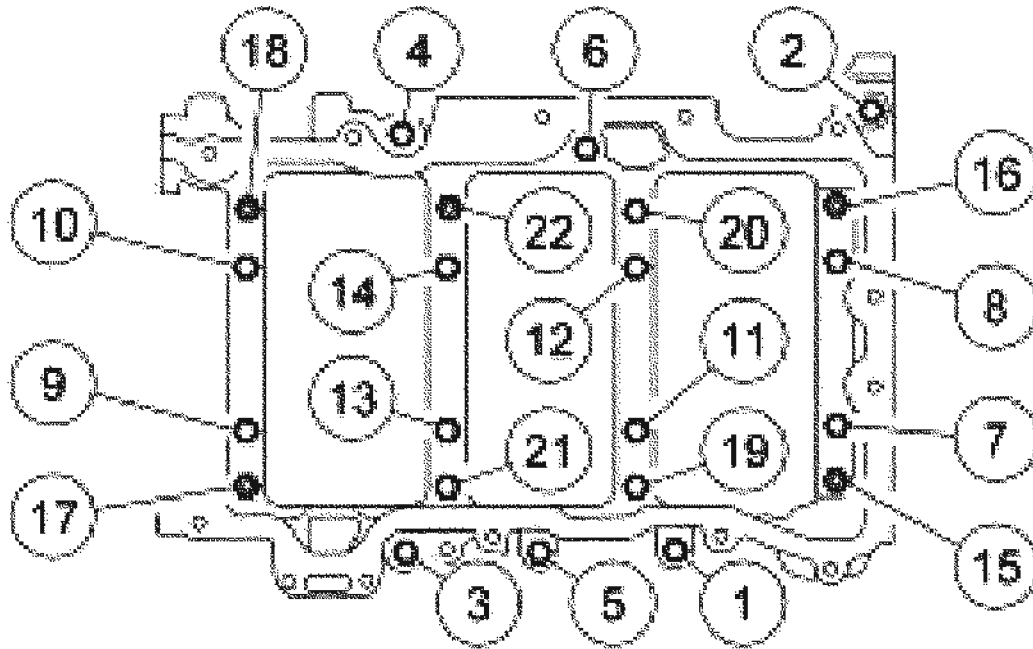
**Fig. 332: Removing Bolts And Flexplate**  
Courtesy of FORD MOTOR CO.

70. Remove the bolts and studs in the indicated sequence and remove the lower cylinder block.



## 2004 Ford Escape

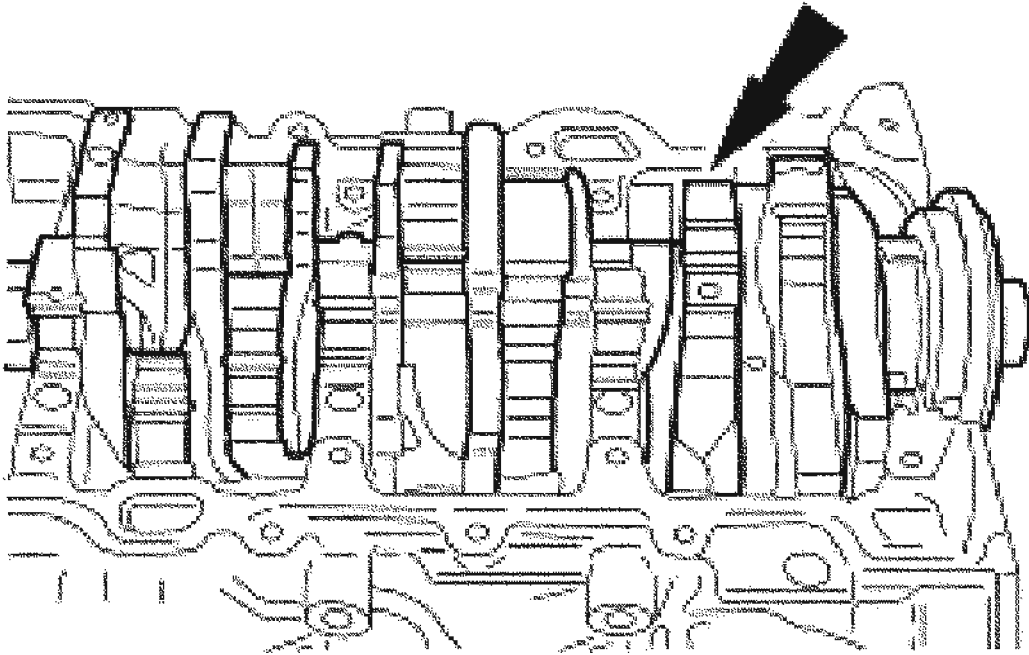
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739506

**Fig. 333: Identifying Bolt Removal Sequence**  
Courtesy of FORD MOTOR CO.

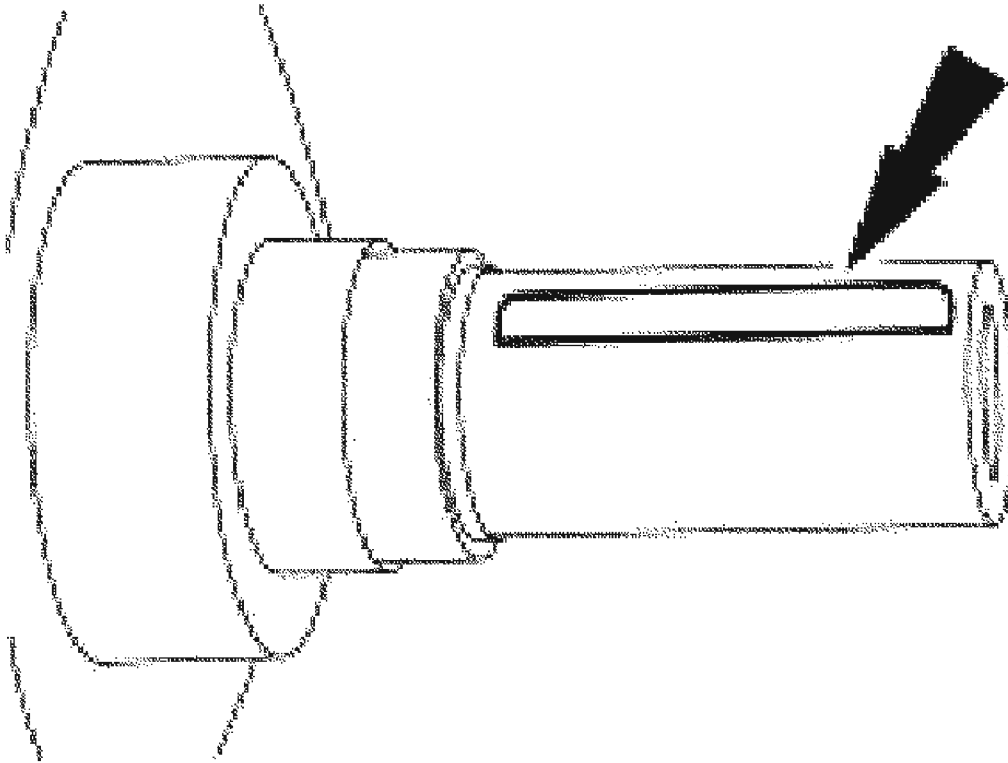
71. Remove the crankshaft rear main seal and remove the crankshaft.



G02739507

**Fig. 334: Removing Crankshaft Rear Main Seal**  
Courtesy of FORD MOTOR CO.

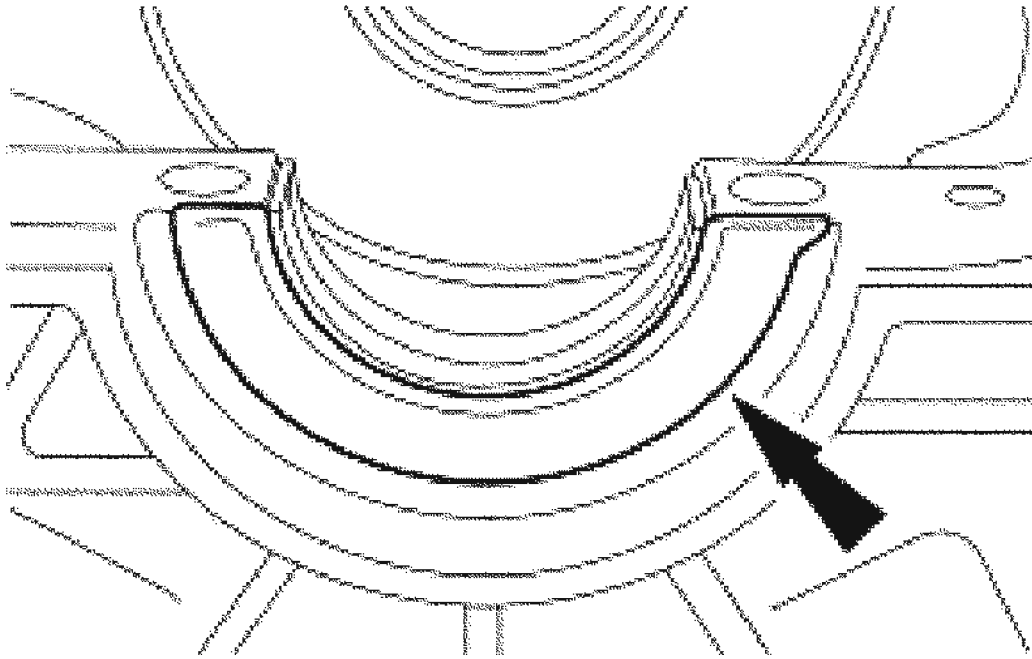
72. Remove the crankshaft key.



**G02739508**

**Fig. 335: Removing Crankshaft Key**  
Courtesy of FORD MOTOR CO.

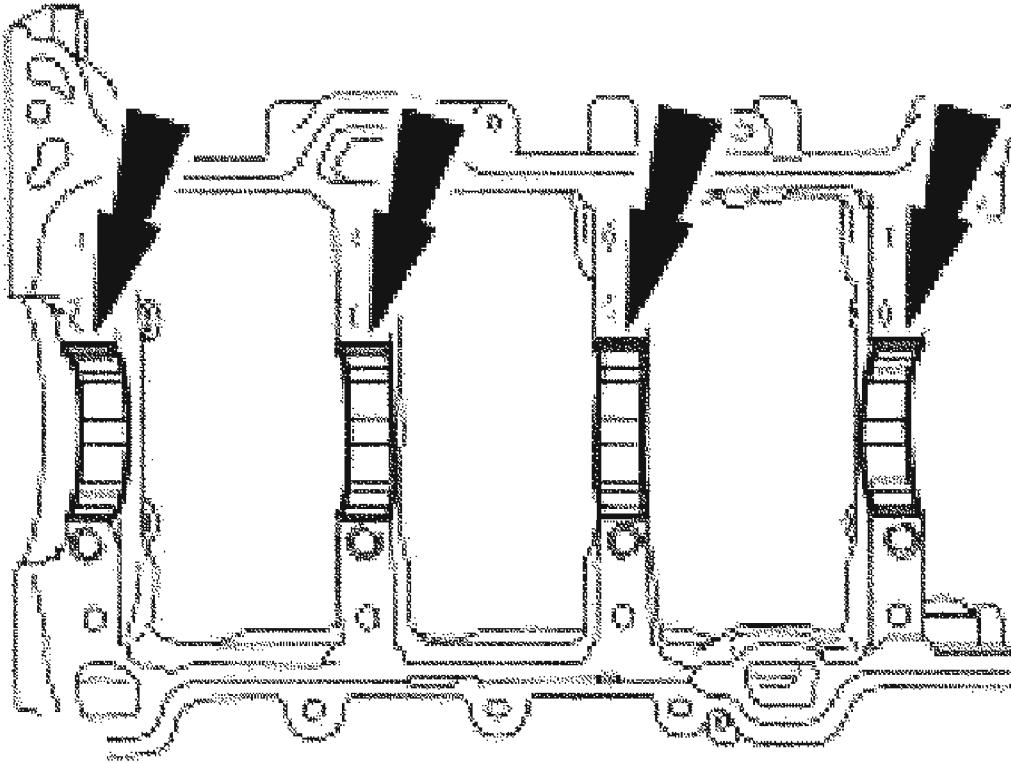
73. Remove the crankshaft thrust bearing from the cylinder block.



G02739509

**Fig. 336: Removing Crankshaft Thrust Bearing**  
Courtesy of FORD MOTOR CO.

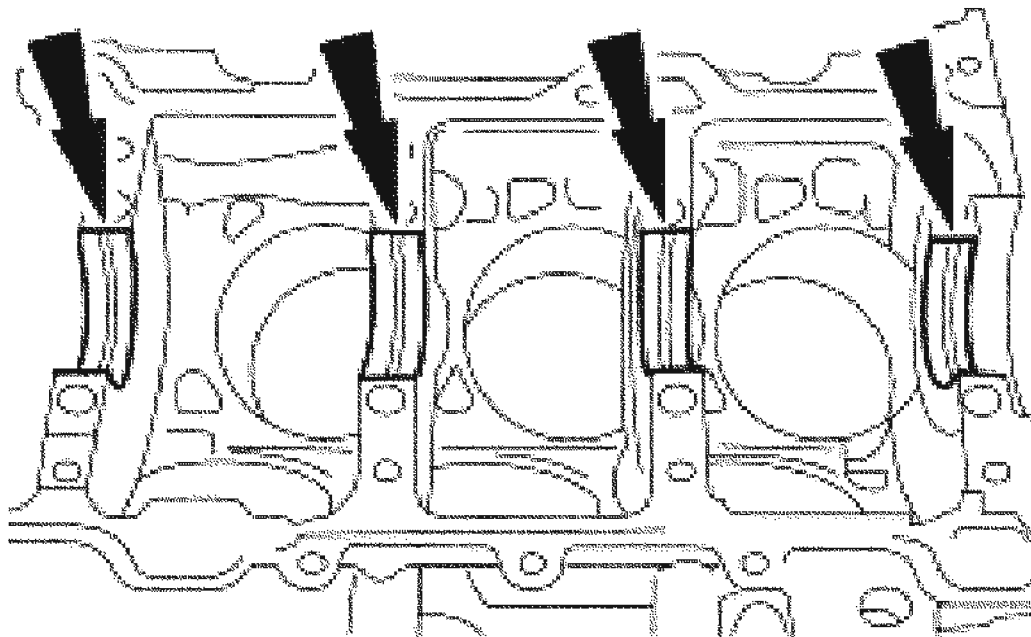
74. Remove the bearings from the lower cylinder block.



G02739510

**Fig. 337: Removing Bearings From Lower Cylinder Block**  
Courtesy of FORD MOTOR CO.

75. Remove the crankshaft main bearings from the cylinder block.



G02739511


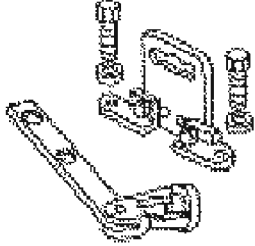

**Fig. 338: Removing Crankshaft Main Bearings From Cylinder Block**  
Courtesy of FORD MOTOR CO.

76. Inspect the cylinder block, lower cylinder block, pistons and connecting rods. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**

## **DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES**

### **CYLINDER HEAD**

**Special Tool(s)**

	Valve Spring Compressor Set 303-300 (T87C-6565-A)
	Valve Spring Compressor 303-350 (T89P-6565-A)
	Valve Stem Seal Replacer 303-470 (T94P-6510-CH)

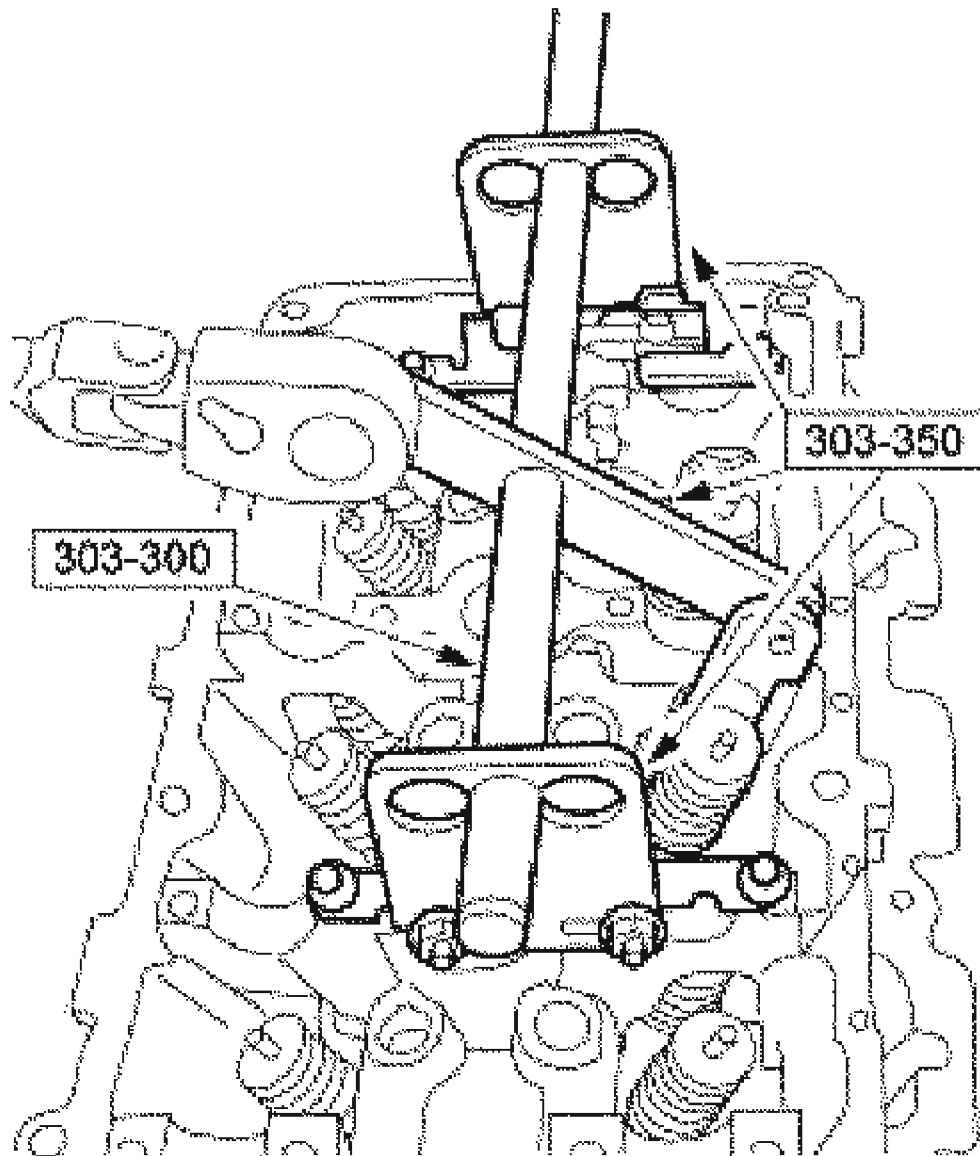
G02739512

**Fig. 339: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Disassembly

**CAUTION:** If the components are to be reinstalled, they must be installed in the same position. Mark the components removed for location.

1. Using the special tool, remove the keys, retainer, and spring.

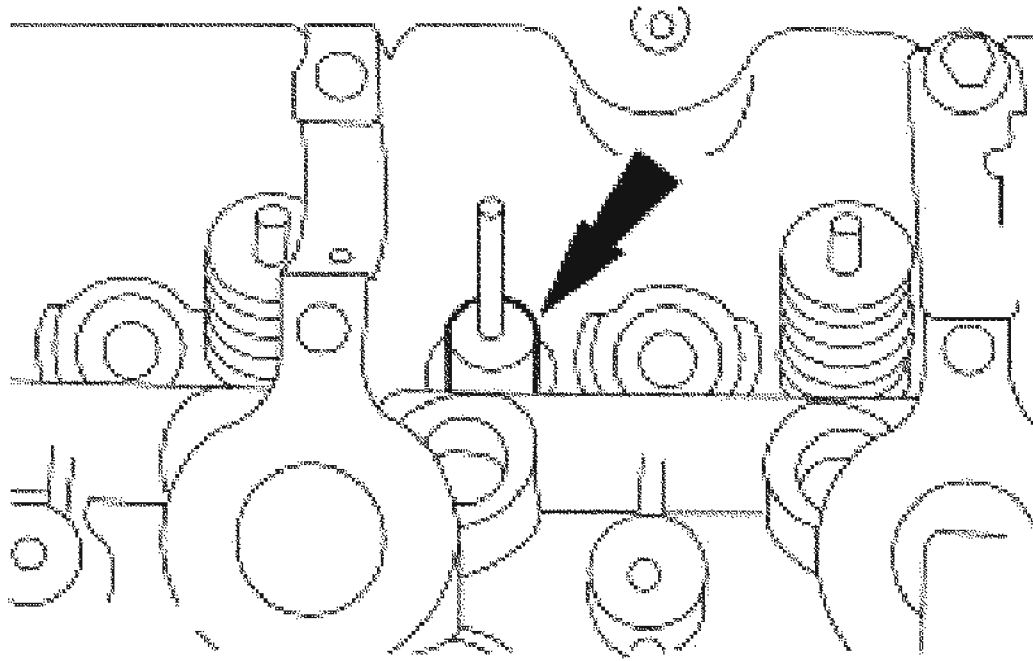


G02739513

**Fig. 340: Removing Keys, Retainer, And Spring**  
Courtesy of FORD MOTOR CO.

2. Remove the valve from the cylinder head.
3. Remove the valve stem seal.



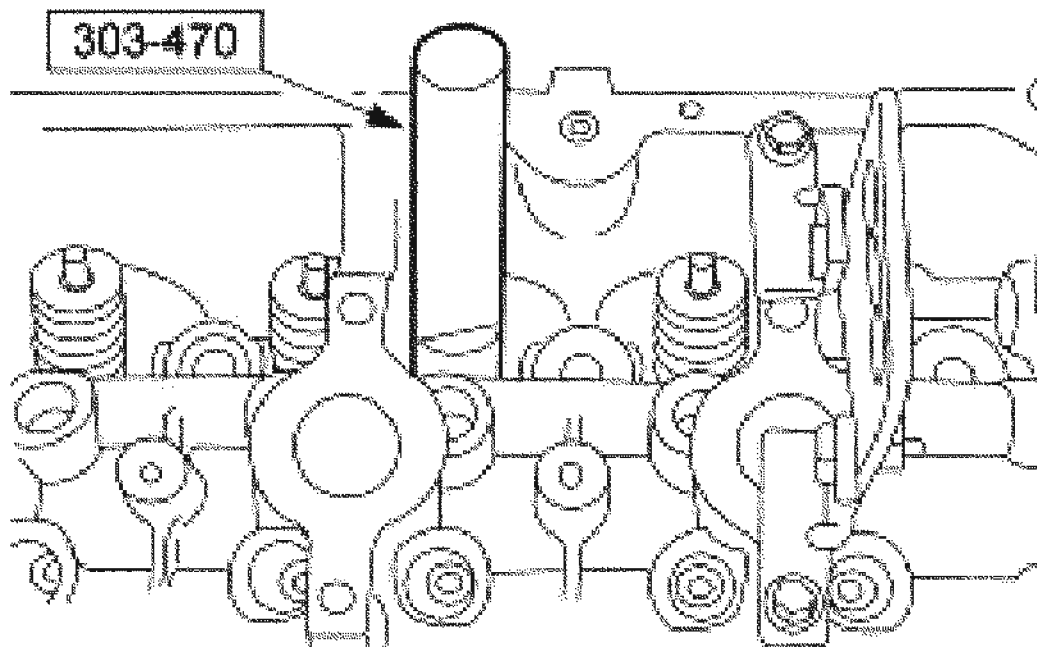


G02739514

**Fig. 341: Removing Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

**Assembly**

1. Using the special tool, install the valve stem seal.



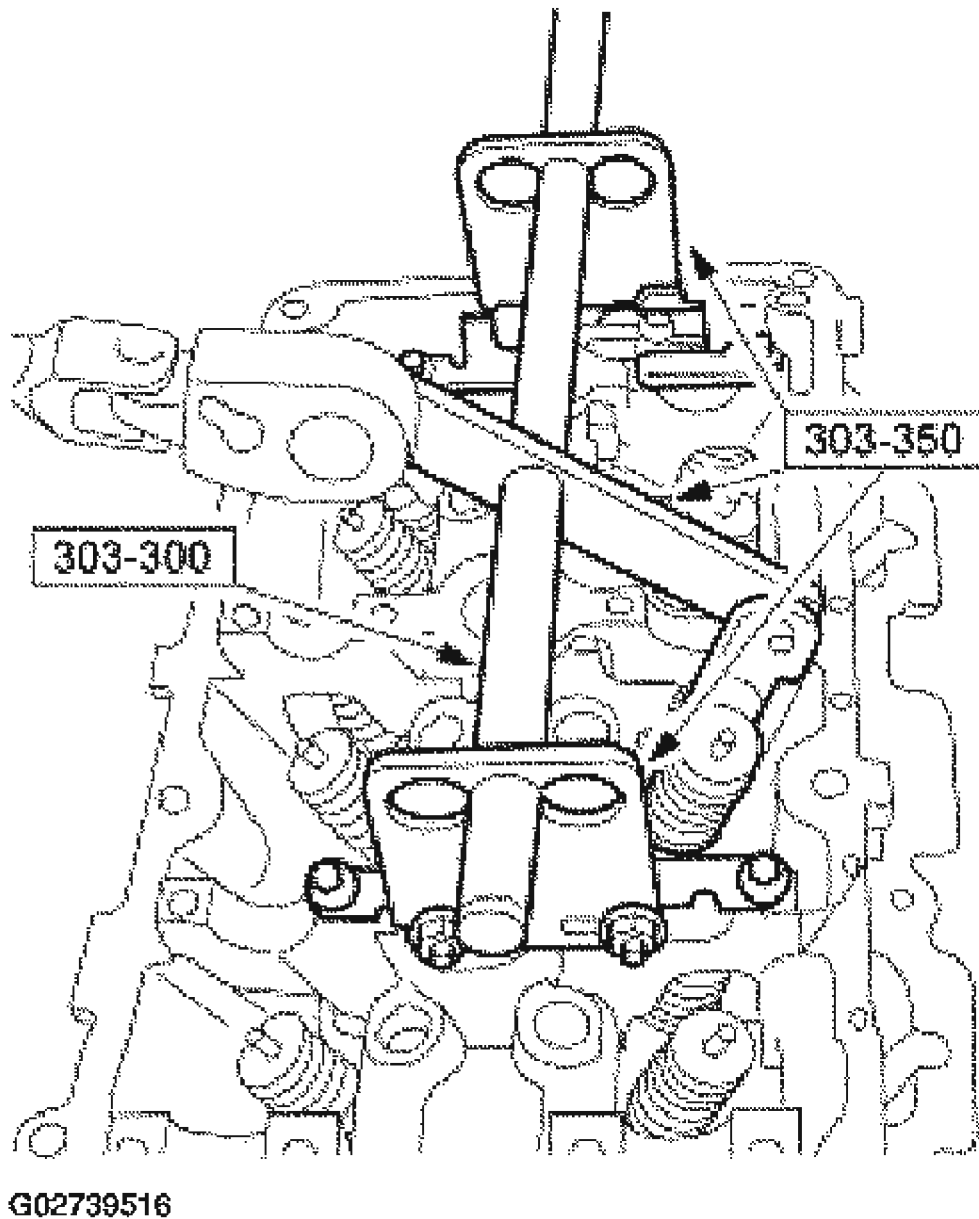
G02739515

**Fig. 342: Installing Valve Stem Seal**  
Courtesy of FORD MOTOR CO.

2. Install the valve.
3. Using the special tool, install the valve spring, retainer and key.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



**Fig. 343: Installing Valve Spring, Retainer & Key**  
Courtesy of FORD MOTOR CO.

PISTON

Material

MATERIAL SPECIFICATION

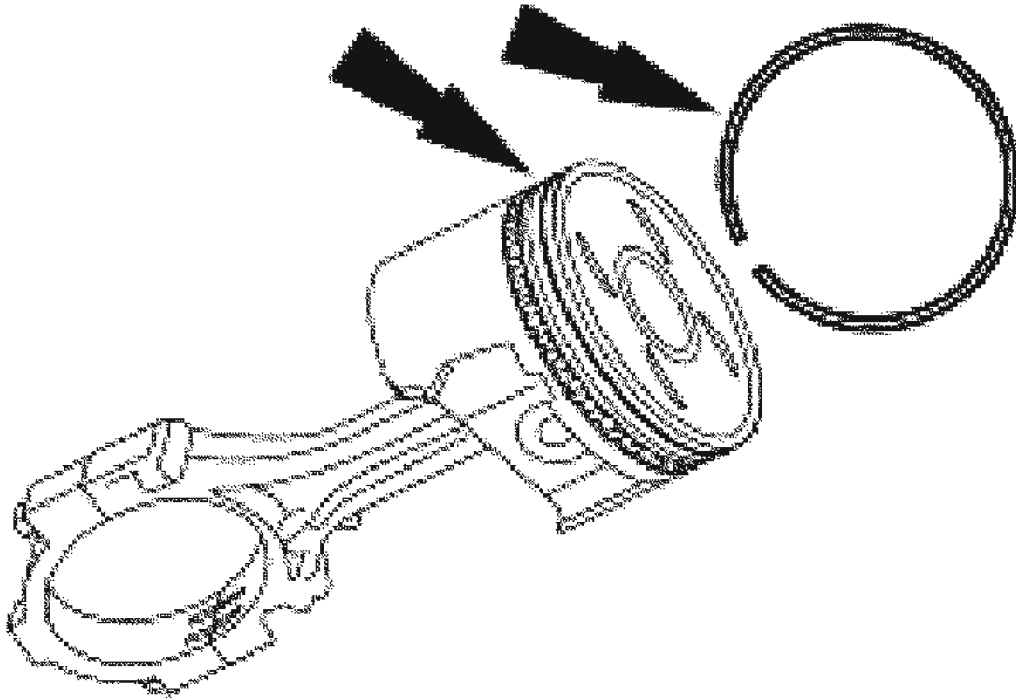
## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153 H

### Disassembly

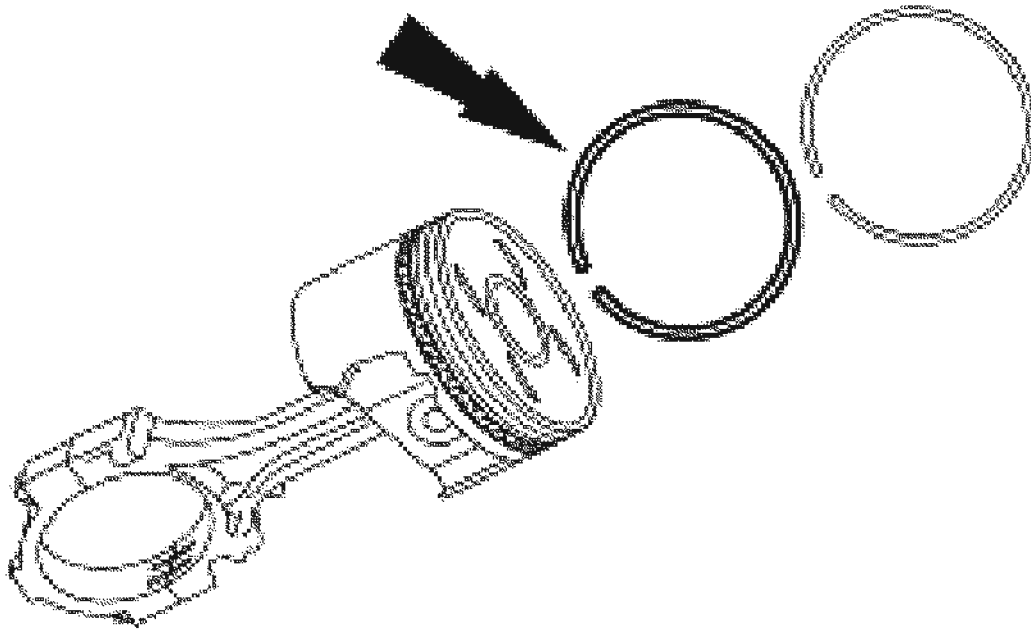
1. Remove the top compression ring.



G02739517

**Fig. 344: Removing Top Compression Ring**  
Courtesy of FORD MOTOR CO.

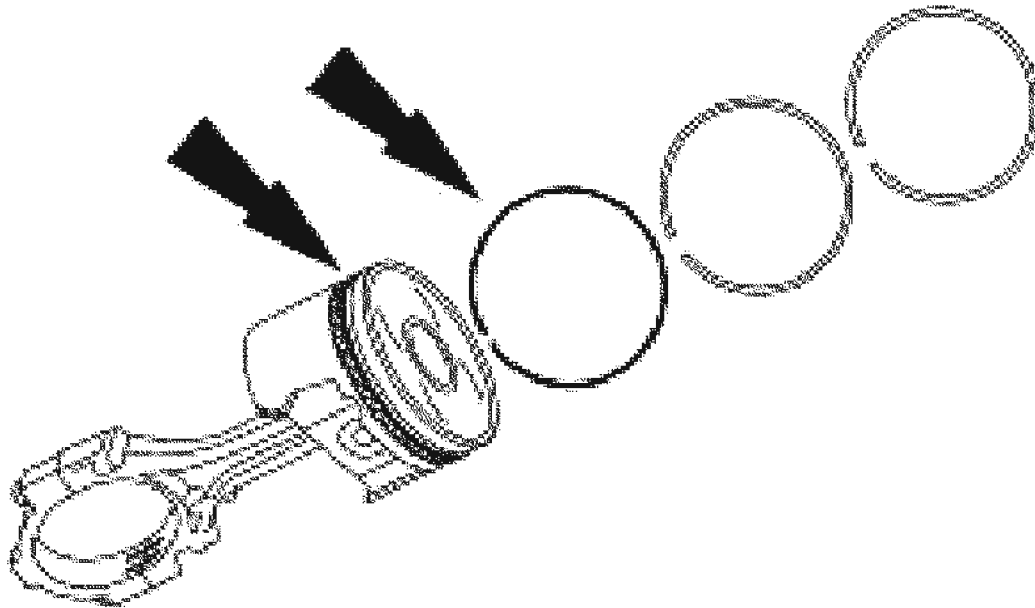
2. Remove the second compression ring.



G02739518

**Fig. 345: Removing Second Compression Ring**  
Courtesy of FORD MOTOR CO.

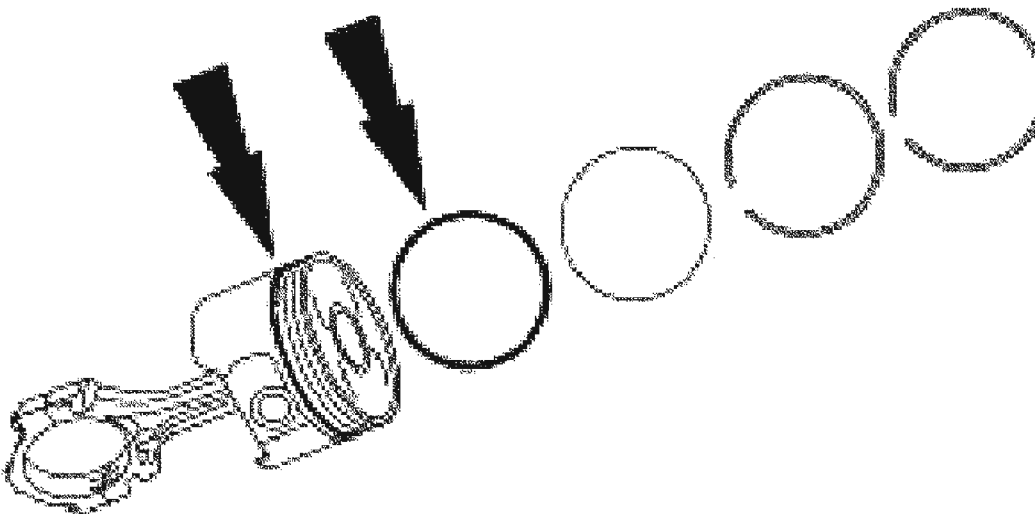
3. Remove the first oil control ring.



G02739519

**Fig. 346: Removing First Oil Control Ring**  
Courtesy of FORD MOTOR CO.

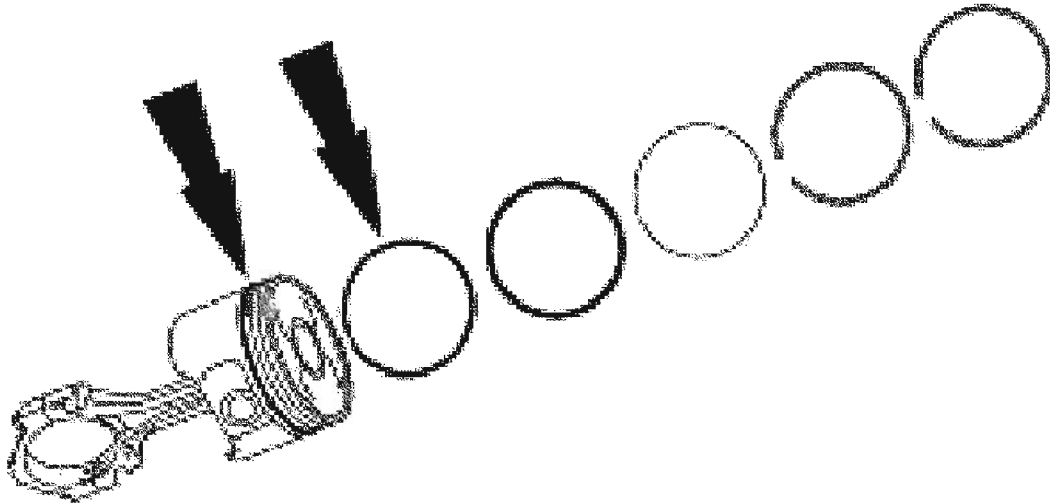
4. Remove the oil control spacer ring.



G02739520

**Fig. 347: Removing Oil Control Spacer Ring**  
Courtesy of FORD MOTOR CO.

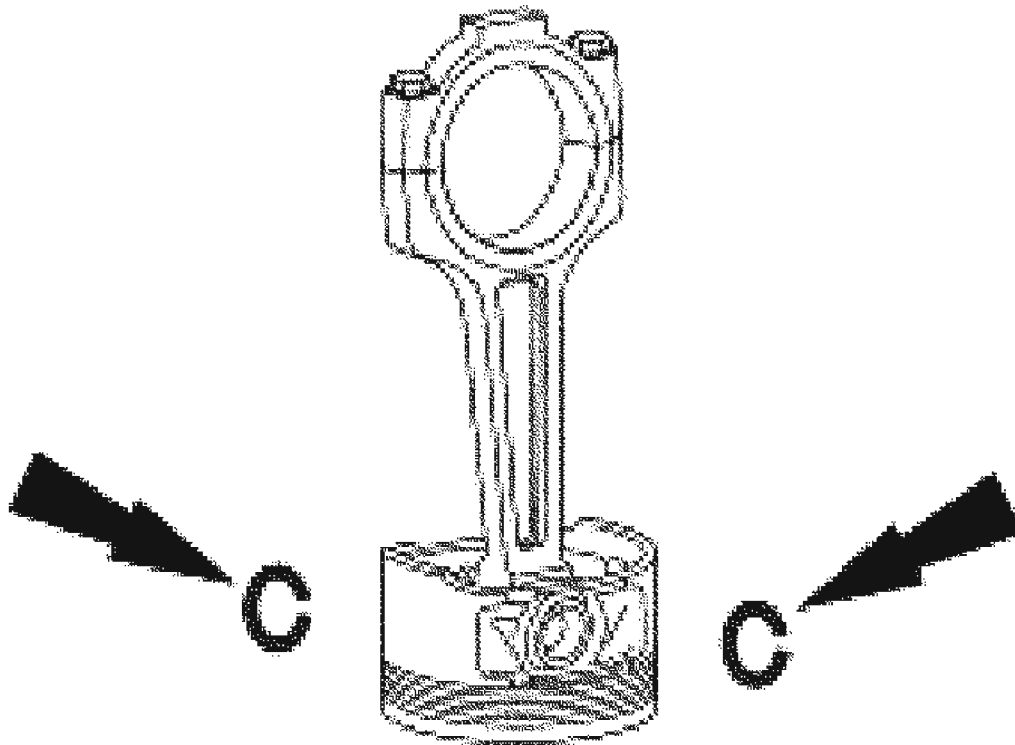
5. Remove the second oil control ring.



G02739521

**Fig. 348: Removing Second Oil Control Ring**  
Courtesy of FORD MOTOR CO.

6. Remove the clips.

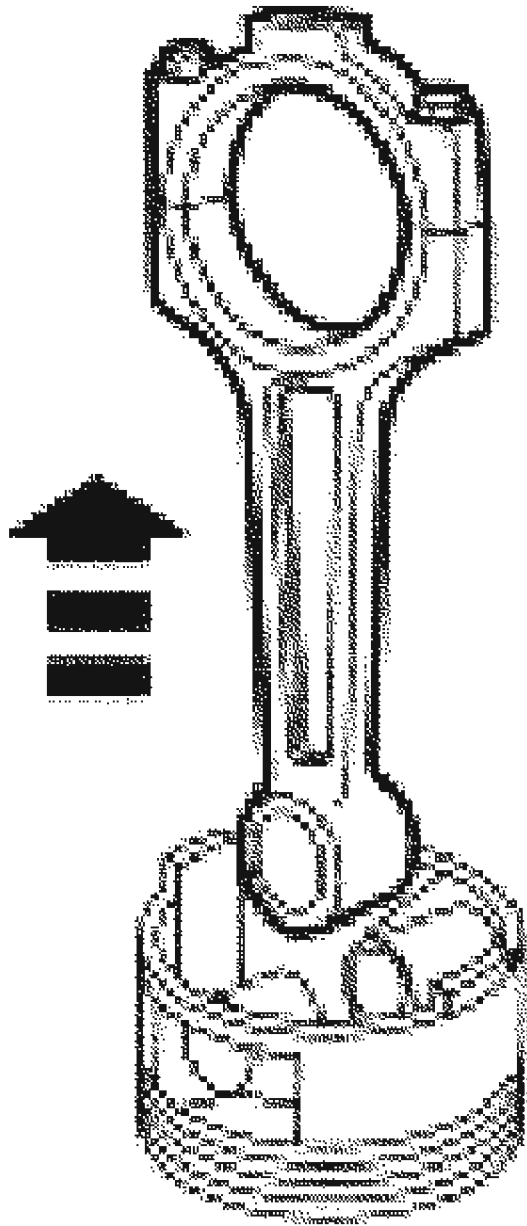


G02739522

**Fig. 349: Removing Clips**  
Courtesy of FORD MOTOR CO.

7. Remove the piston pin and the connecting rod from the piston.



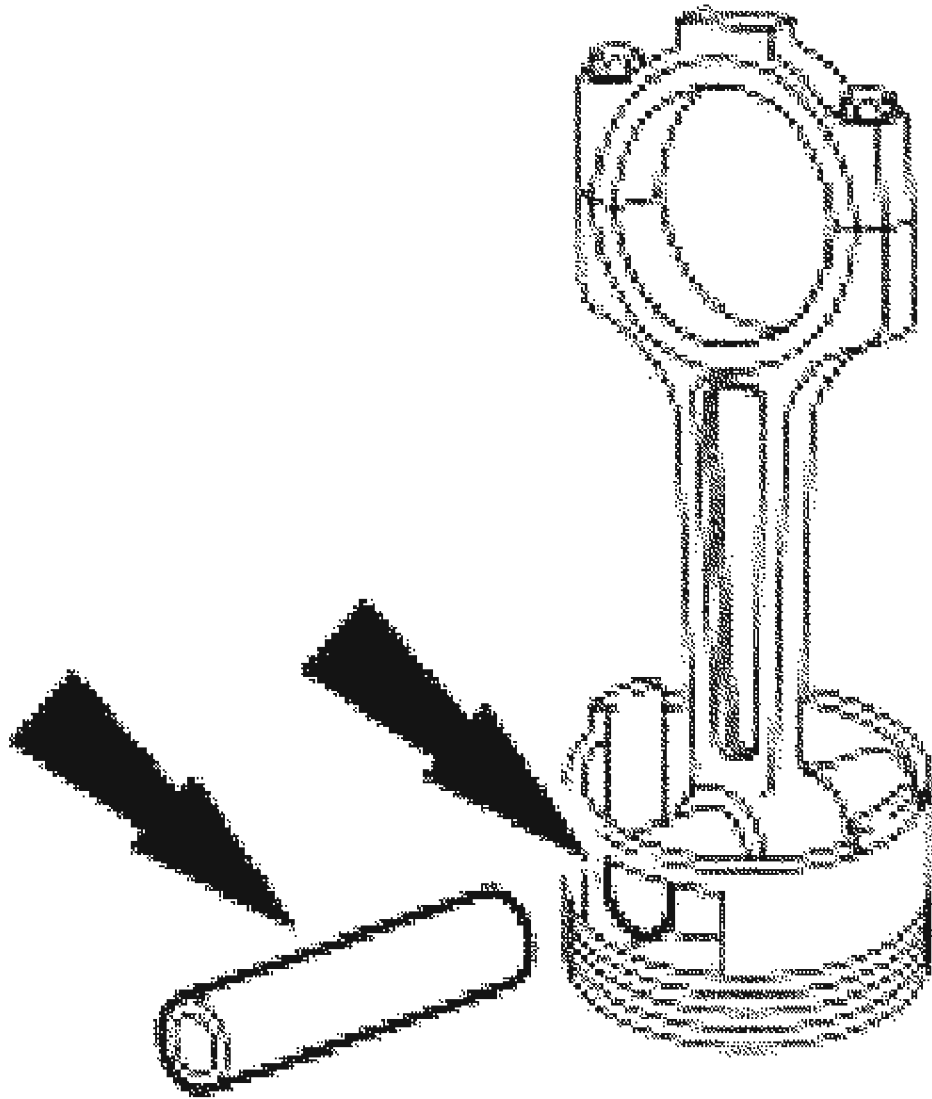


G02739523

**Fig. 350: Removing Piston Pin & Connecting Rod**  
Courtesy of FORD MOTOR CO.

8. Clean and inspect the connecting rod and the piston. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

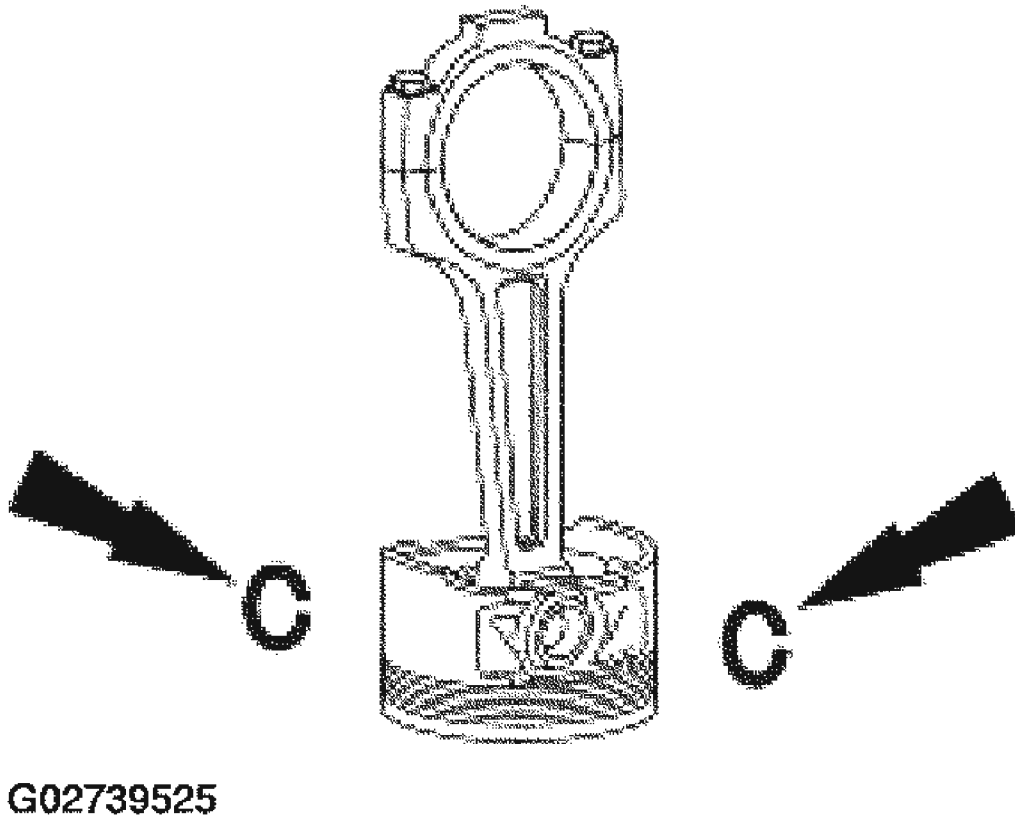
1. Lubricate the piston pin and piston bore with clean engine oil and install the piston pin.



**G02739524**

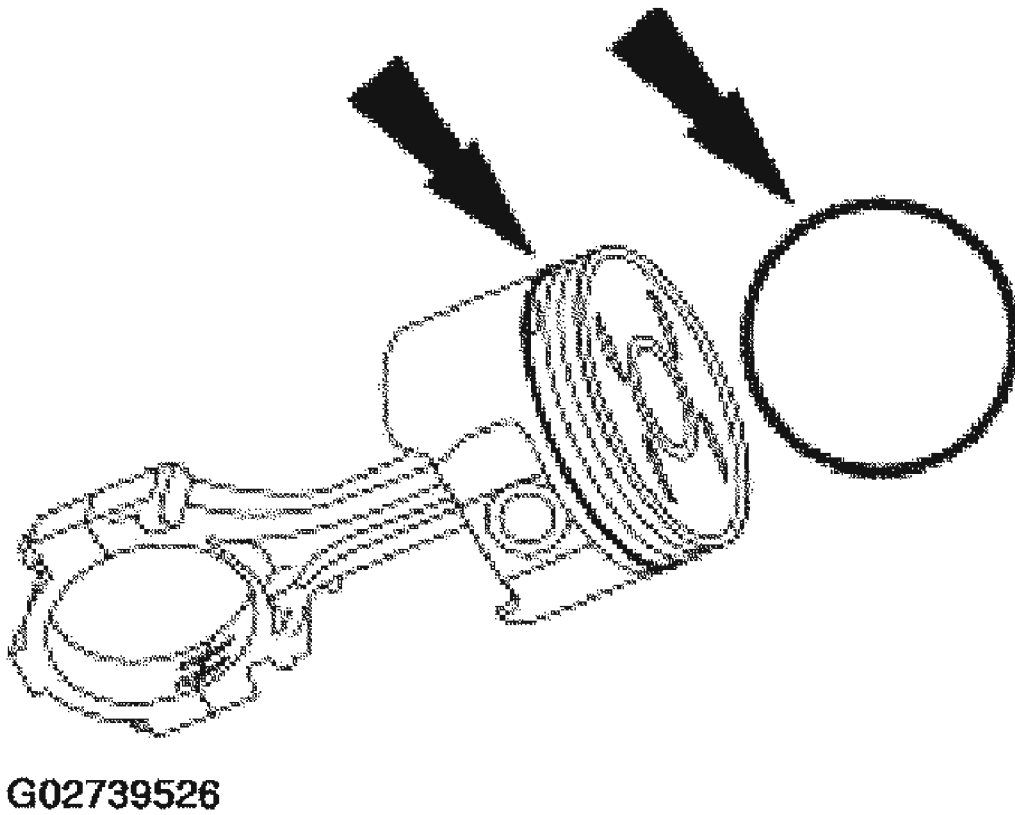
**Fig. 351: Identifying Piston Pin And Piston Bore**  
**Courtesy of FORD MOTOR CO.**

2. Install the clips.



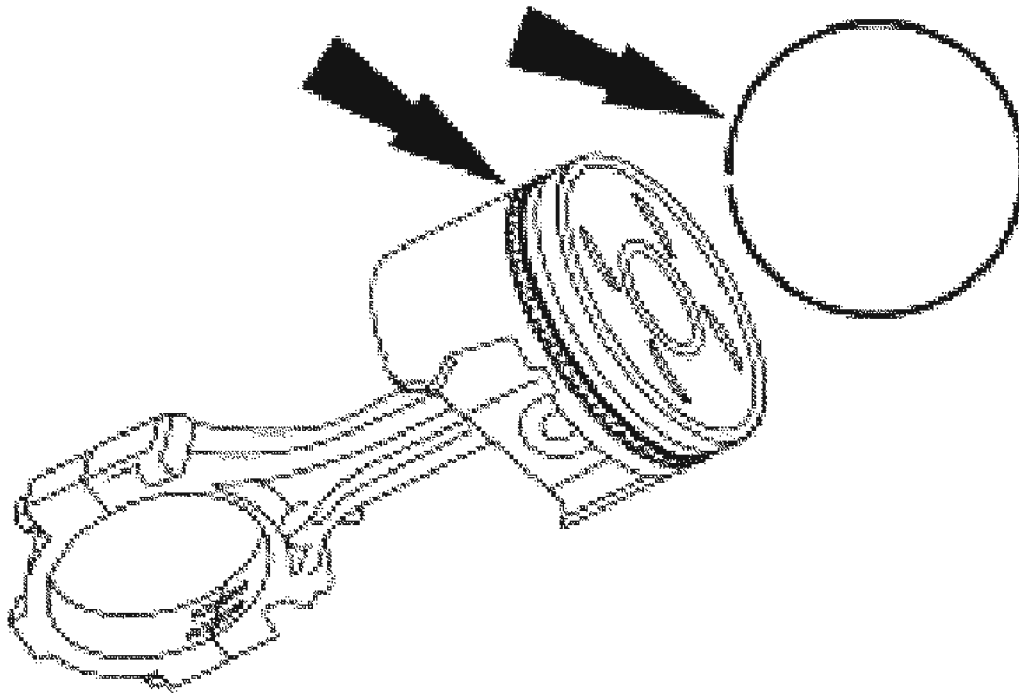
**Fig. 352: Installing Clips**  
Courtesy of FORD MOTOR CO.

3. Check the piston ring end gap. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**
4. Lubricate the piston rings with clean engine oil.
5. Install the first oil control ring.



**Fig. 353: Installing First Oil Control Ring**  
Courtesy of FORD MOTOR CO.

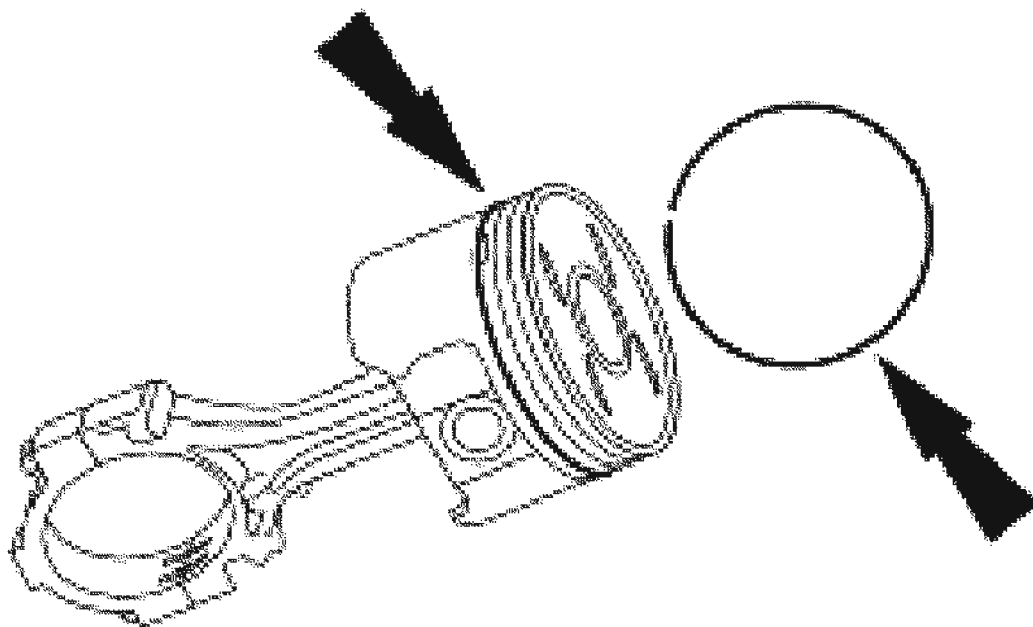
6. Install the oil control spacer ring.



**G02739527**

**Fig. 354: Installing Oil Control Spacer Ring**  
Courtesy of FORD MOTOR CO.

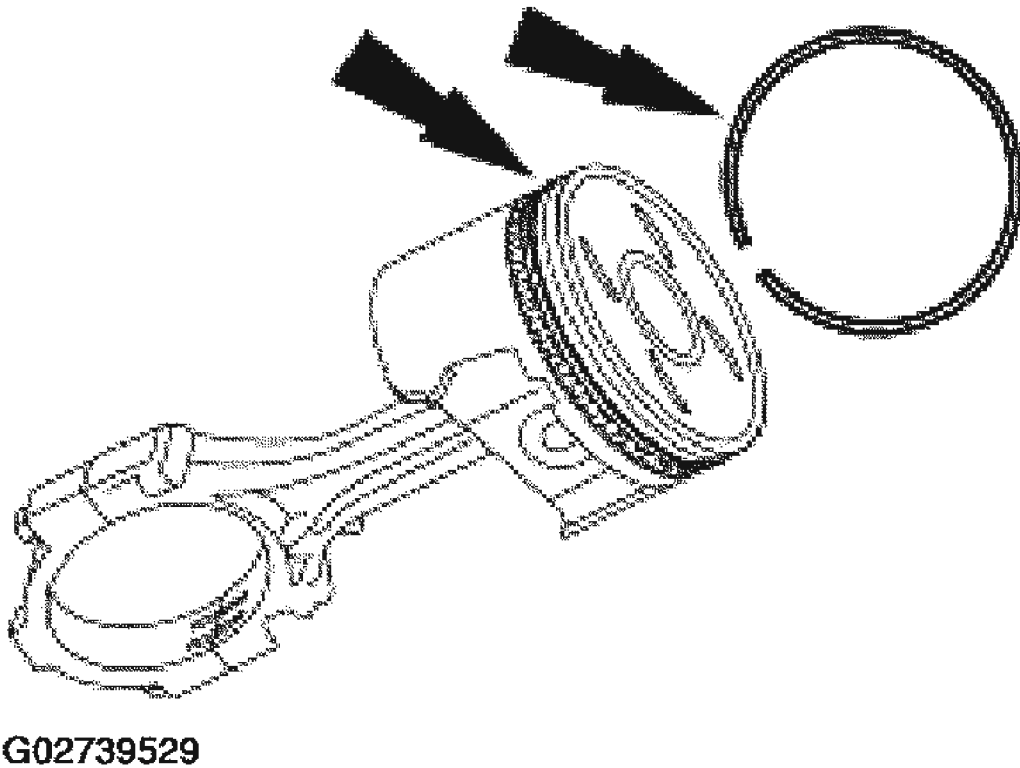
7. Install the second oil control ring.



**G02739528**

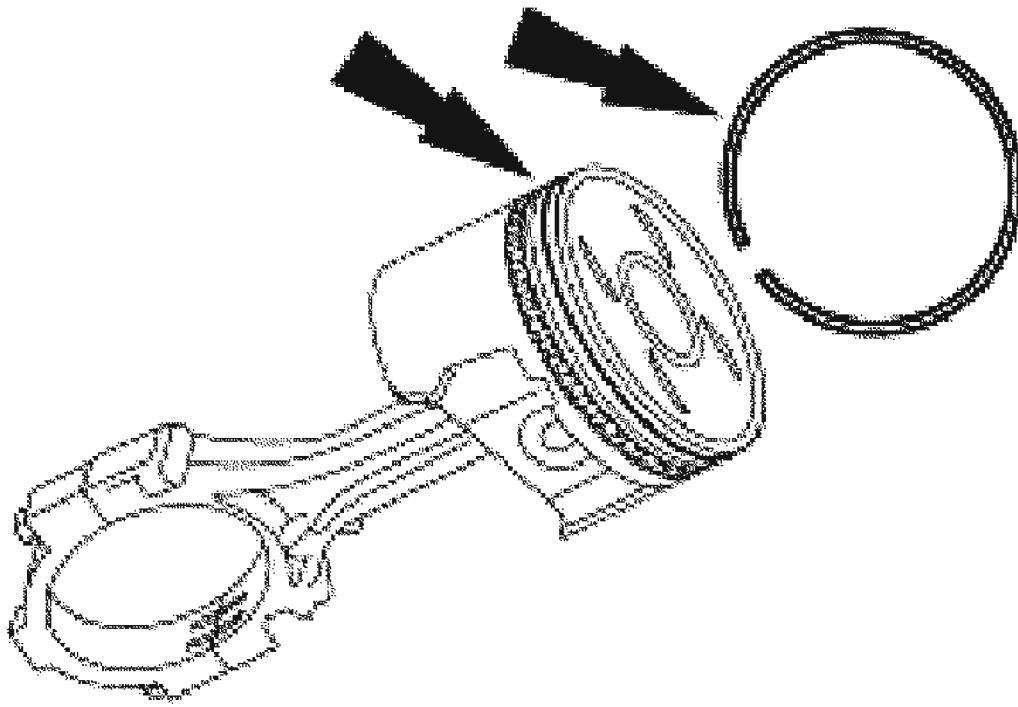
**Fig. 355: Installing Second Oil Control Ring**  
**Courtesy of FORD MOTOR CO.**

8. Install the second compression ring.
  - The top of the second compression ring has a "0" on it. Position this side of the ring towards the top of the piston.



**Fig. 356: Installing Second Compression Ring**  
Courtesy of FORD MOTOR CO.

9. Install the top compression ring.
  - The top compression ring can be installed with either side up.



G02739530

**Fig. 357: Installing Top Compression Ring**  
Courtesy of FORD MOTOR CO.




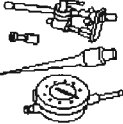


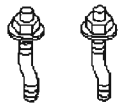

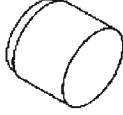

## ASSEMBLY

### ENGINE



## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Installer, Connecting Rod 303-462 (T94P-6136-AH)
	Installer, Crankshaft Vibration Damper 303-102 (T74P-6316-B)
	Installer, Front Cover Oil Seal 303-335 (T88T-6701-A)
	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C)
	Holding Tool, Flywheel 303-101( T74P-6375-A)
	Installer, Crankshaft Rear Main Oil Seal 303-178 (T82L-6701-A)
	Installer Bolts, Crankshaft Rear Main Oil Seal 303-384 (T91P-6701-A)
	Installer, Power Steering Pump Pulley 211-185 (T91P-3A733-A)
	Protector, Camshaft Oil Seal 303-463 (T91P-6256-AH)
	Installer, Camshaft Oil Seal 303-464 (T94P-6256-BH)

G02739531

**Fig. 358: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### MATERIAL SPECIFICATION

Item	Specification
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-	ESE-M1C171-A

## 2004 Ford Escape

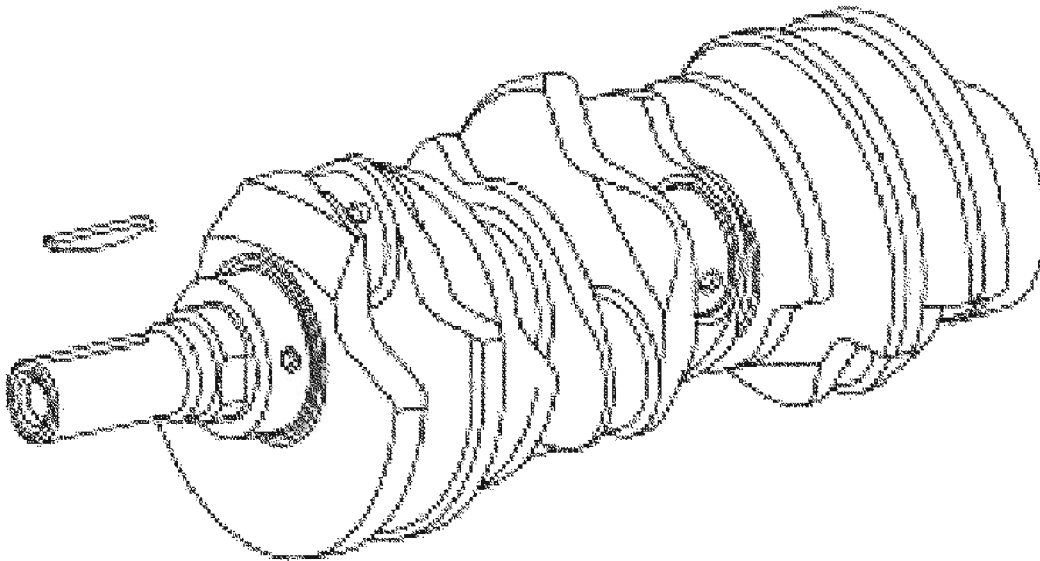
2004 ENGINE Engine - 3.0L (4V) - Escape

19A331-A	
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392- A
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA A4	WSE-M4G323- A4

### All vehicles

**WARNING:** Eye protection is required to be worn during the use of compressed air. Failure to wear eye protection could result in possible personal injury.

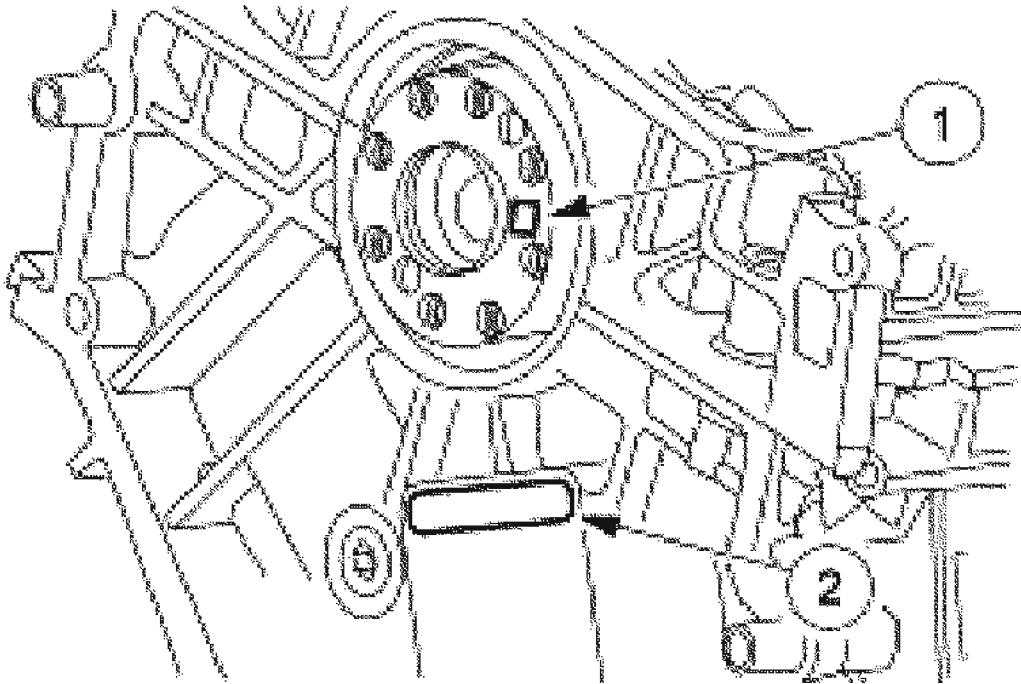
1. Clean gasket material, dirt and foreign material from the cylinder block. Wash the cylinder block with a suitable soap and water solution, and dry with compressed air.
2. If removed, install the crankshaft key into the keyway on the crankshaft.



G02739532

**Fig. 359: Installing Crankshaft Key Into Keyway On Crankshaft**  
Courtesy of FORD MOTOR CO.

**NOTE:** This procedure is for selecting bearings using a new crankshaft.



G02739533

**Fig. 360: Identifying Code On Crankshaft Flange**  
**Courtesy of FORD MOTOR CO.**

3. Select the crankshaft main bearings for each crankshaft journal.
  1. Read the code on the crankshaft flange.
  2. Read the code on the cylinder block rear face.
    - The first two numbers after the asterisk make up the code for main No. 1 and the next two numbers for main No. 2.
    - The first two numbers after the second asterisk make up the code for main No. 3 and the last two numbers for main No. 4.
4. Using the Block Code chart, choose a bearing for each main. Match the block and crankshaft code with its corresponding column or row, by reading across the "crankshaft" row and down the "block" column.
  - For example: If the block code is \* 0609\* 0711\* and the crankshaft code is \*8580\* 8082\*, main No. 1 should use grade 1 bearings, as determined by the intersection of the 06 block column and the 85 crankshaft row. Mains 2, 3 and 4 should all be grade 2.

# 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

**BLOCK CODE**

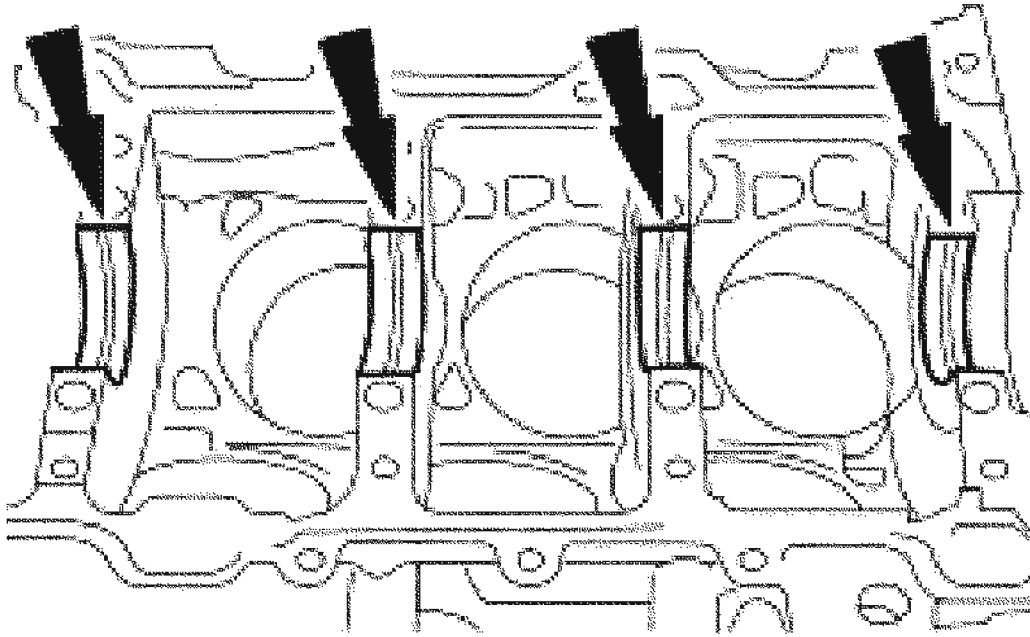
**(C1)**

	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
92	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
91	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
90	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
89	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
88	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
87	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
86	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
84	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
83	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
82	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
81	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
80	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
79	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
77	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
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71	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
70	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
69	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
68	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

G02739534

**Fig. 361: Block Code Chart**  
**Courtesy of FORD MOTOR CO.**

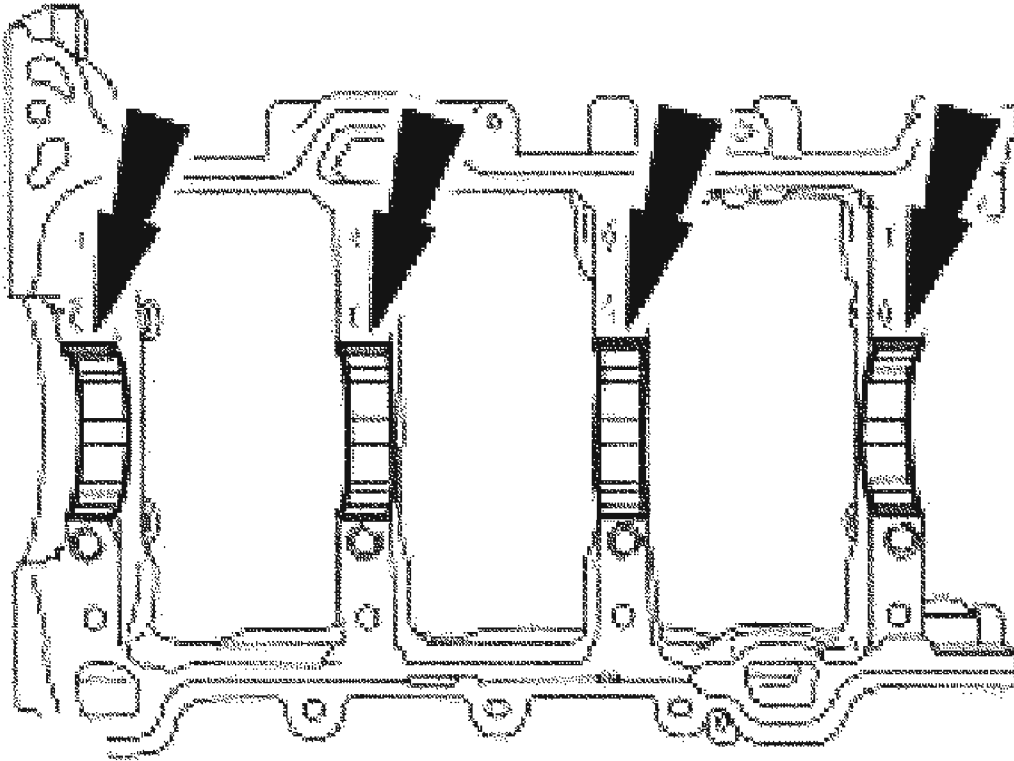
5. Install the main bearings into the cylinder block.



G02739535

**Fig. 362: Installing Main Bearings Into Cylinder Block**  
**Courtesy of FORD MOTOR CO.**

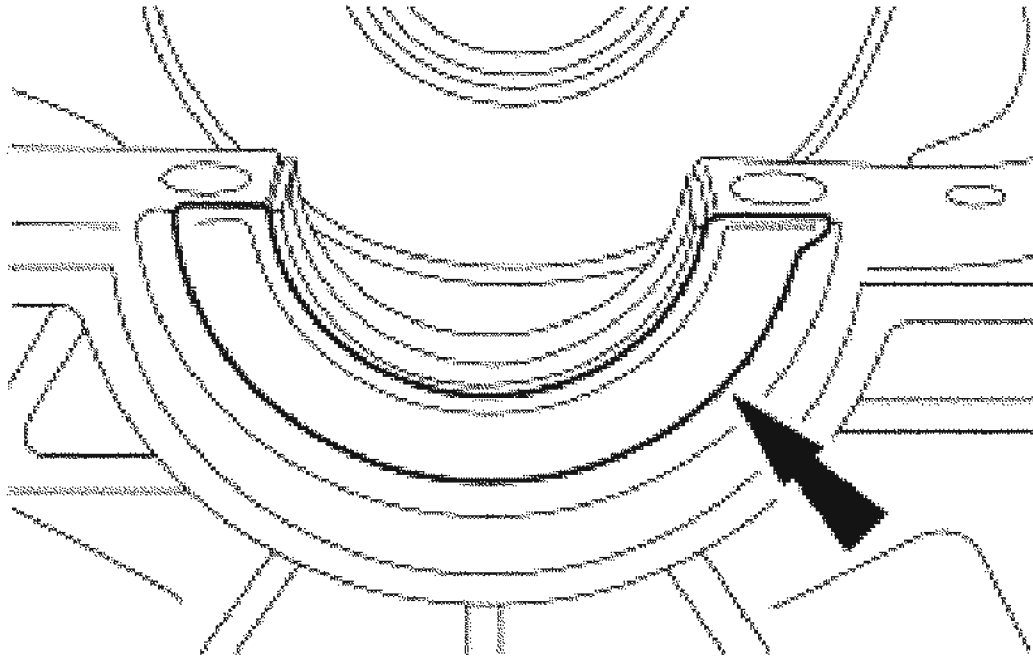
6. Install the main bearings into the lower cylinder block.



G02739536

**Fig. 363: Installing Main Bearings Into Lower Cylinder Block**  
Courtesy of FORD MOTOR CO.

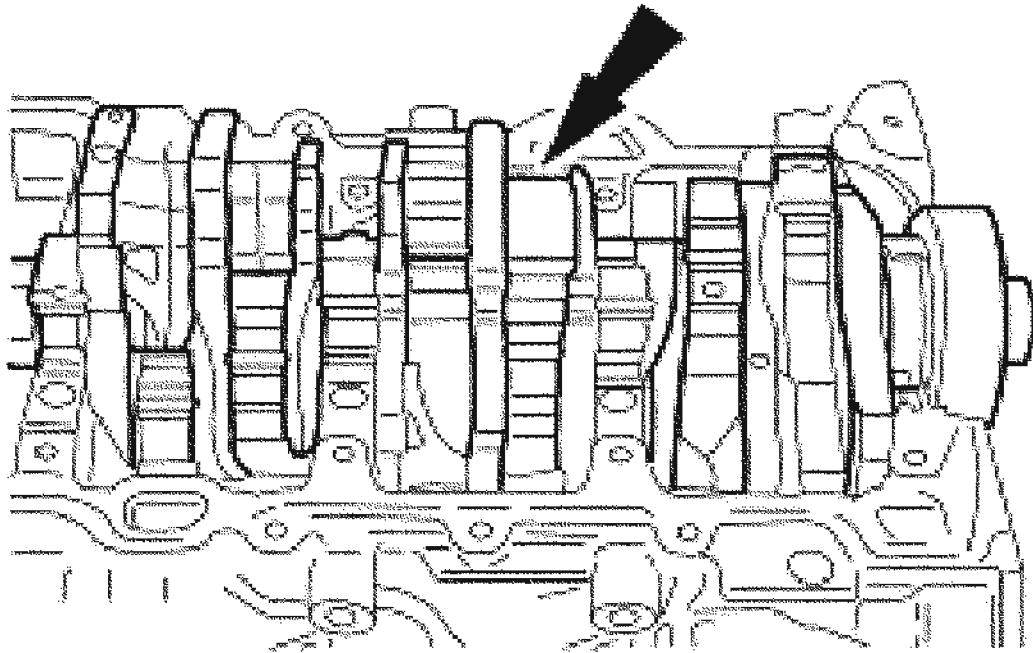
7. Install the crankshaft thrust bearing.



G02739537

**Fig. 364: Installing Crankshaft Thrust Bearing**  
Courtesy of FORD MOTOR CO.

8. Apply clean engine oil to the crankshaft main and rod bearing journals.
9. Position the crankshaft in the cylinder block.



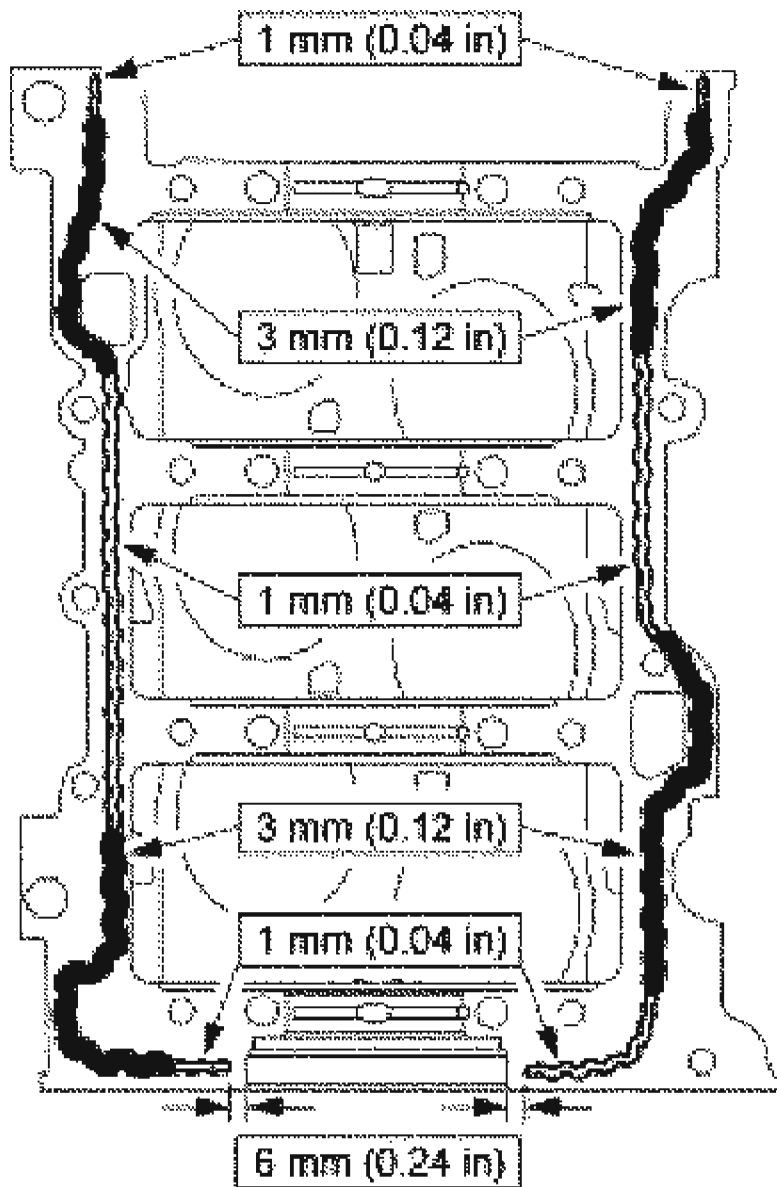
G02739538

**Fig. 365: Positioning Crankshaft In Cylinder Block**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The lower cylinder block must be installed and the bolts tightened within four minutes of applying the sealant.

**NOTE:** Clean and degrease both surfaces using metal surface cleaner before applying silicone gasket and sealer.





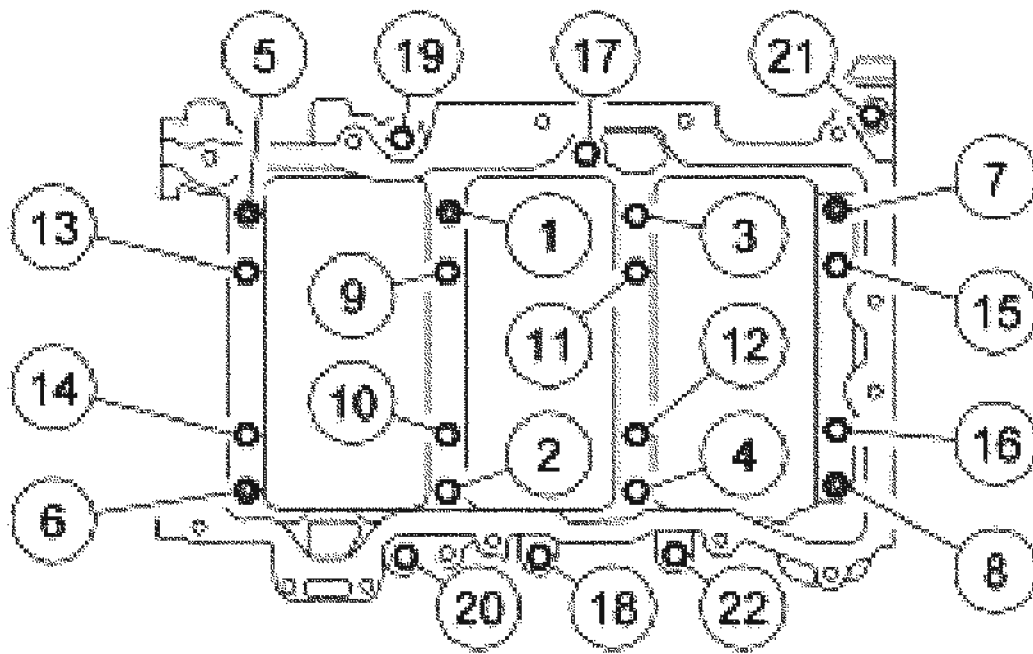
G02739539

**Fig. 366: Applying Silicon Gasket**  
 Courtesy of FORD MOTOR CO.

10. Apply silicone gasket and sealant to the cylinder block as shown.

**CAUTION:** Fasteners No. 1,5, 6,7, 8 are studs. Fasteners No. 18-22 are M8 X 1.25 mm X 79.3 mm (0.05 in X 3.12 in) bolts.

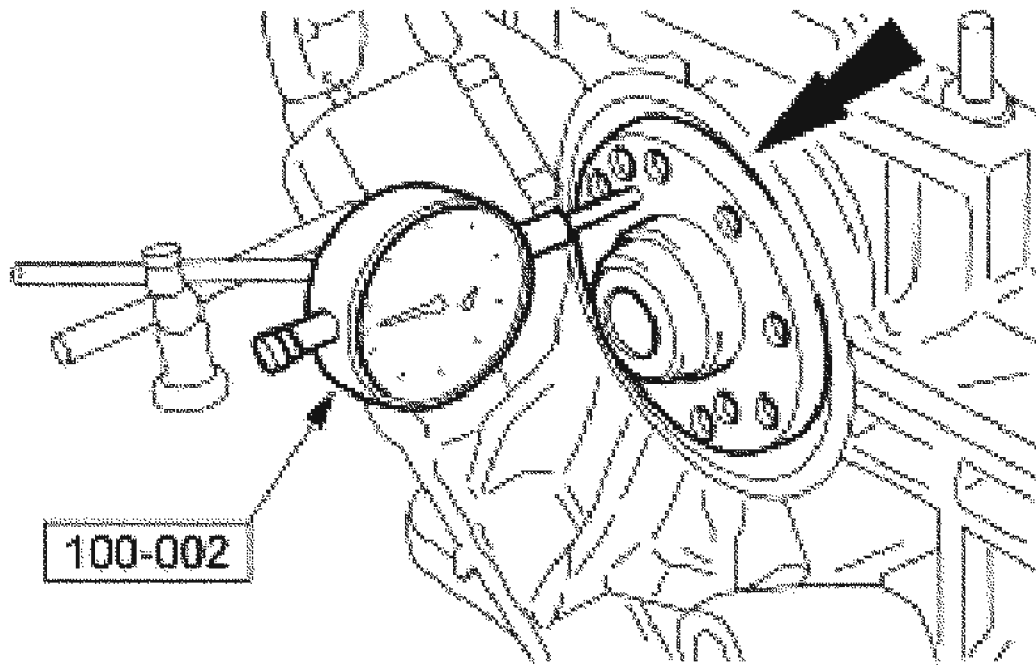
Fasteners No. 2-4,17 are M8 X 1.25 mm X 95.3 mm (0.05 in X 3.75 in) bolts. Fasteners 9-16 are M10 X 1.5 mm X 106 mm (0.06 in X 4.17 in) bolts. The bolts and studs must be installed in the correct position or engine damage can result.



G02739540

**Fig. 367: Identifying Tightening Sequence**  
Courtesy of FORD MOTOR CO.

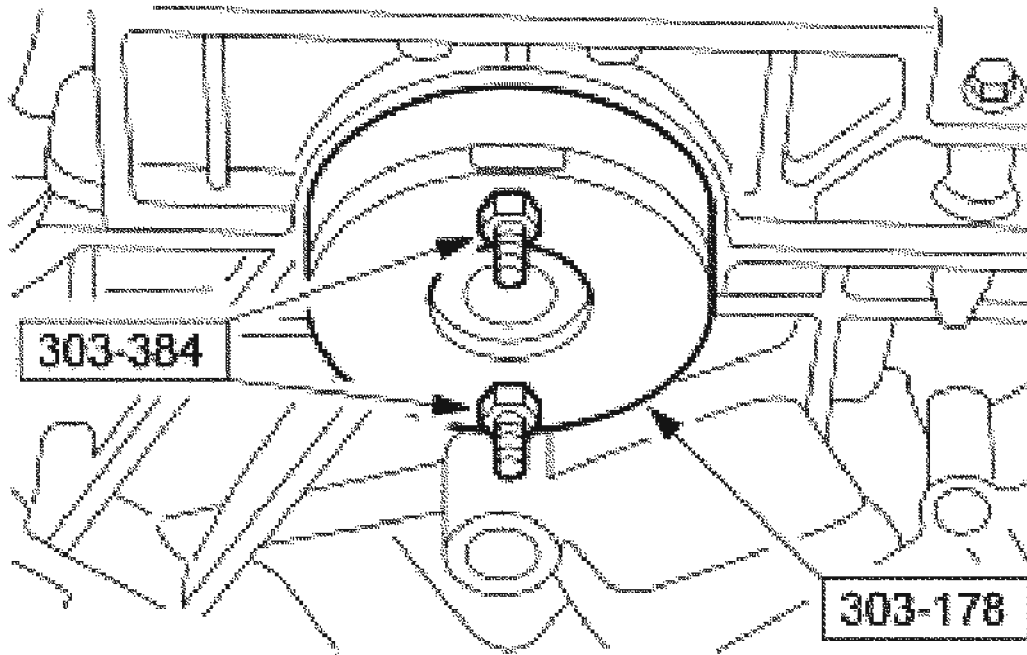
11. Position the lower cylinder block and install the bolts and studs in the sequence shown in four stages.
  - Stage 1: Tighten fasteners 1-8 to 25 Nm (18 lb-ft).
  - Stage 2: Tighten fasteners 9-16 to 40 Nm (30 lb-ft).
  - Stage 3: Tighten fasteners 1-16 90 degrees.
  - Stage 4: Tighten fasteners 17-22 to 25 Nm (18 lb-ft).
12. Using the special tool, measure the crankshaft end play.



G02739541

**Fig. 368: Measuring Crankshaft End Play**  
Courtesy of FORD MOTOR CO.

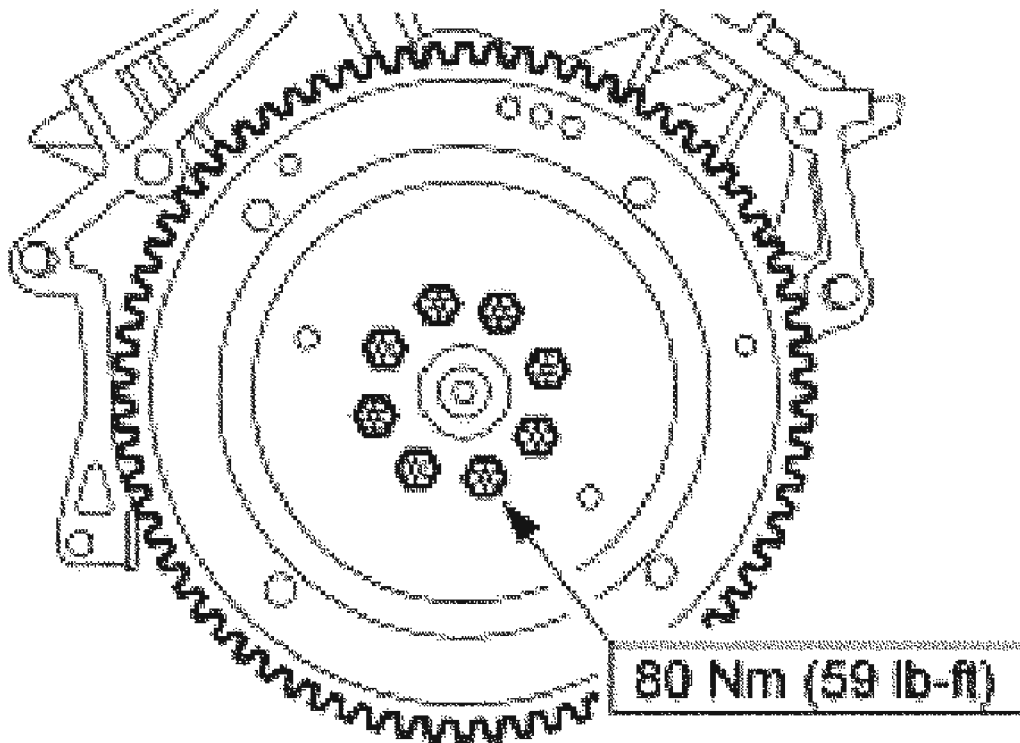
**NOTE:** Lubricate the seal lips with clean engine oil before installing.



G02739542

**Fig. 369: Installing Crankshaft Rear Oil Seal**  
Courtesy of FORD MOTOR CO.

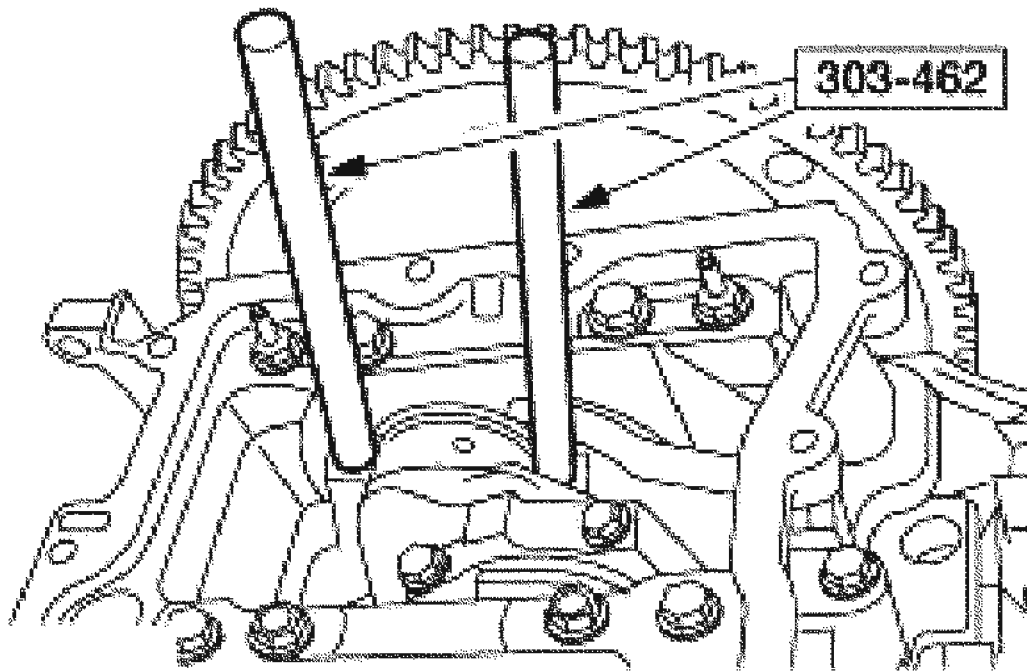
13. Using the special tools, install the crankshaft rear oil seal.
14. Position the flexplate and install the bolts.



G02739543

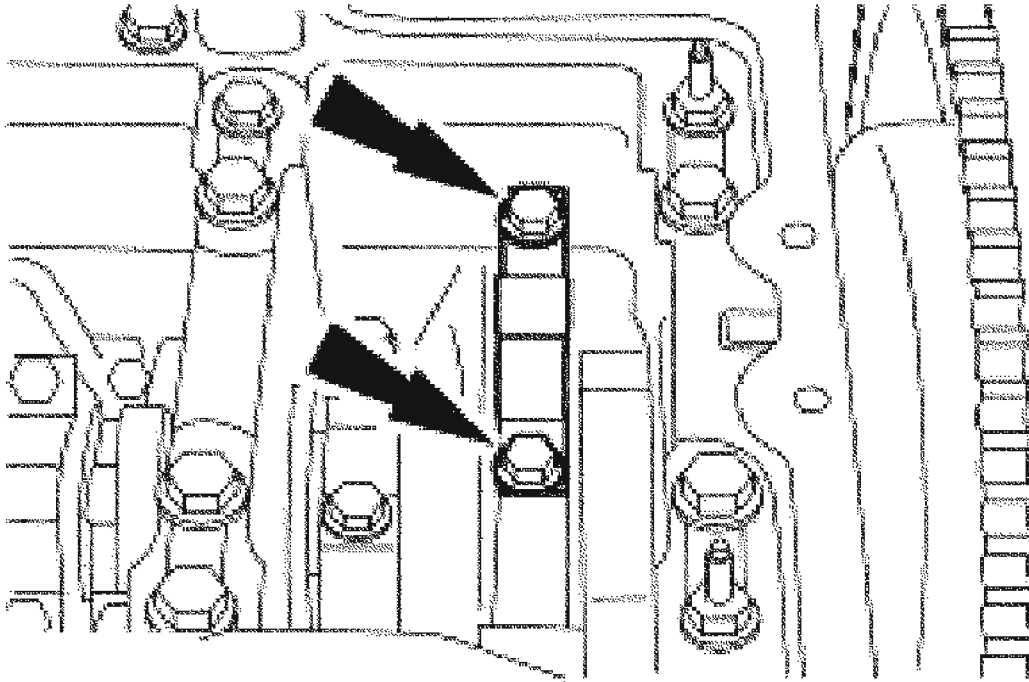
**Fig. 370: Identifying Flexplate Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

15. Mount the engine on an engine stand.
16. Apply clean engine oil to the cylinder bores.
17. Using the special tools, install the piston and connecting rod assemblies.



**Fig. 371: Installing Piston And Connecting Rod Assemblies**  
Courtesy of FORD MOTOR CO.

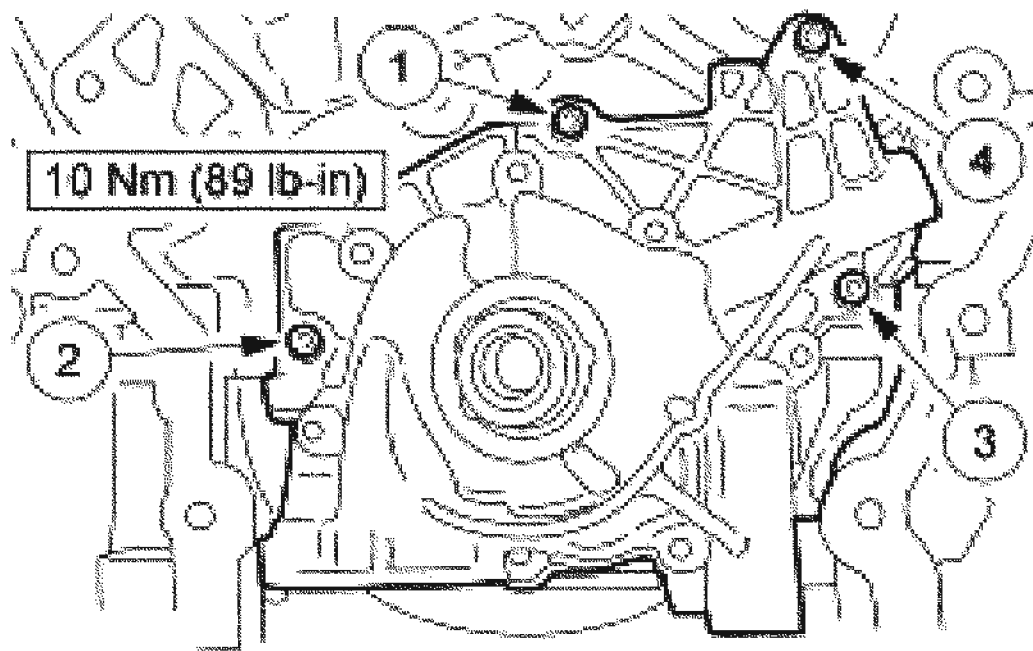
18. Check connecting rod bearing clearance. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**
19. Install the connecting rod caps and tighten the bolts in two stages.
  - Stage 1: Tighten to 23 Nm (17 lb-ft).
  - Stage 2: Tighten to 43 Nm (32 lb-ft).



G02739545

**Fig. 372: Installing Connecting Rod Caps**  
Courtesy of FORD MOTOR CO.

20. Position the oil pump and install the bolts in the indicated sequence.

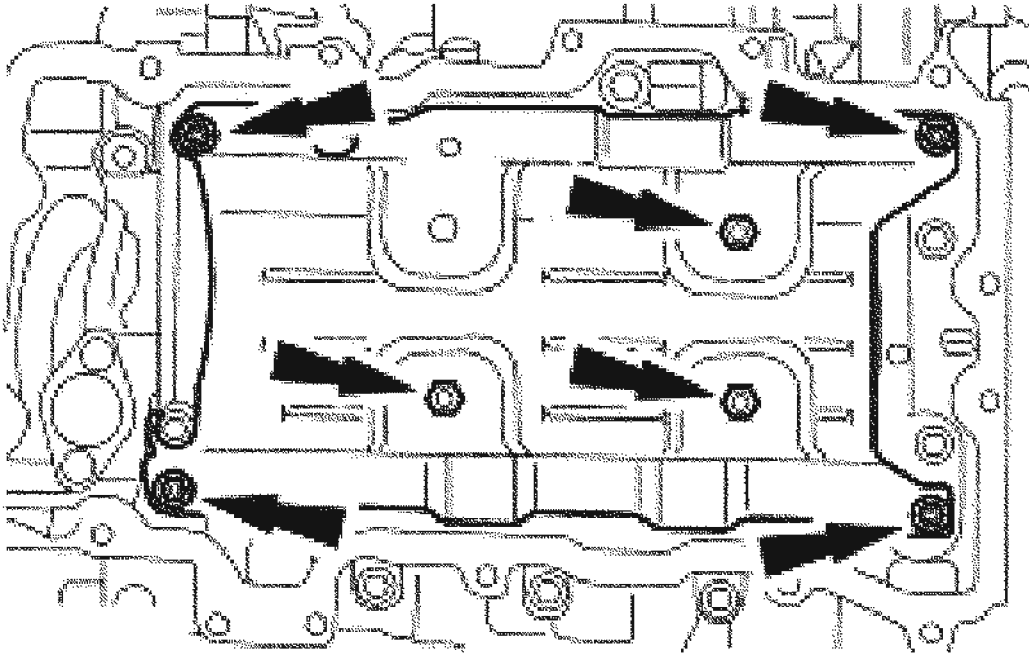


G02739546

**Fig. 373: Identifying Oil Pump Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

21. Position the oil pan baffle. Install the nuts and tighten in two stages.
  - Stage 1: Tighten to 5 Nm (44 lb-in).
  - Stage 2: Tighten 45 degrees.

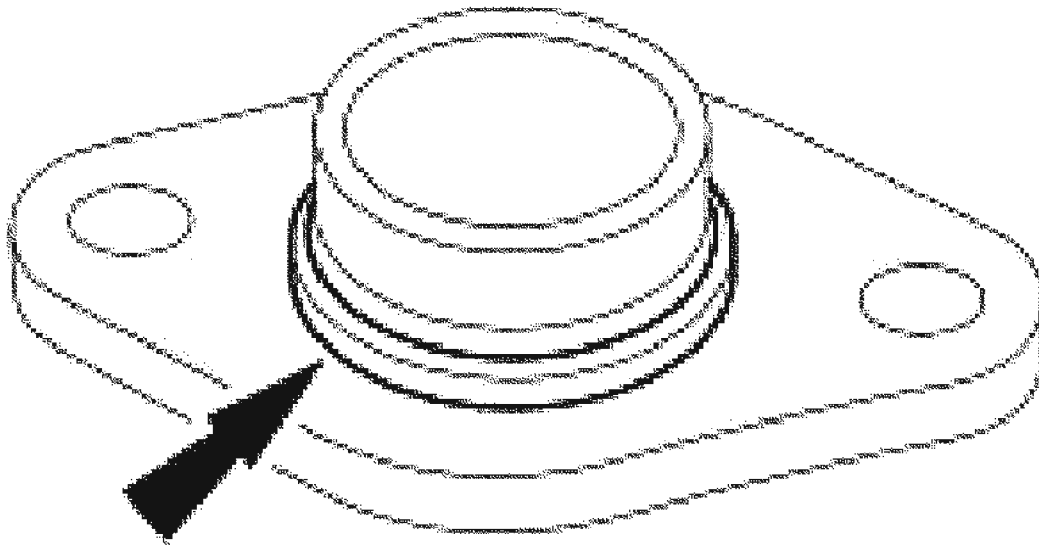




G02739547

**Fig. 374: Positioning Oil Pan Baffle**  
Courtesy of FORD MOTOR CO.

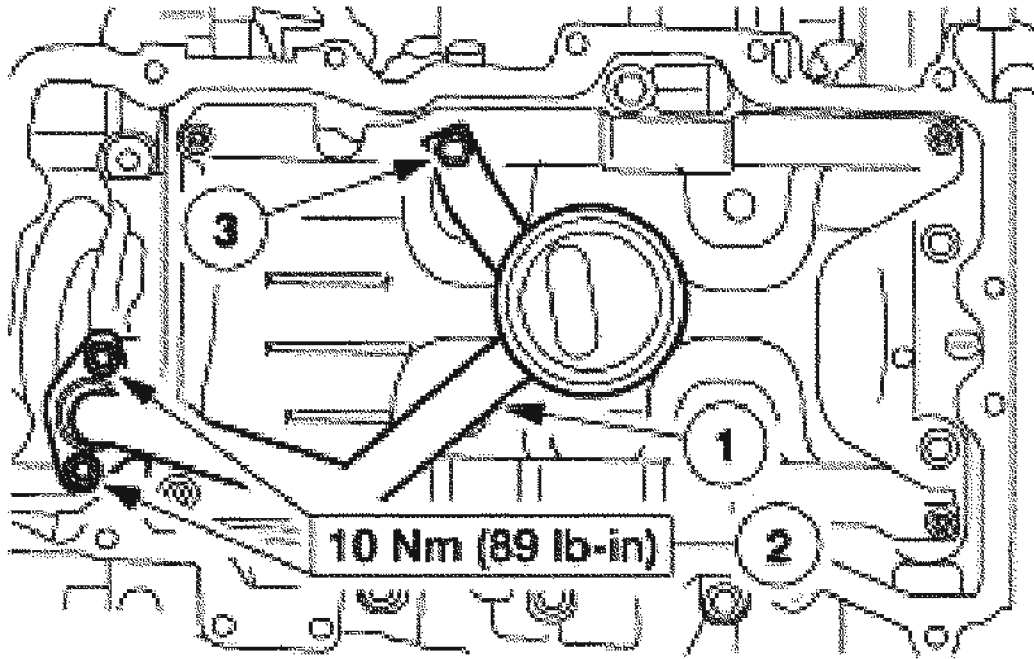
22. Install a new O-ring seal on the oil pump screen and pickup tube. Lubricate with clean engine oil.



**G02739548**

**Fig. 375: Installing O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

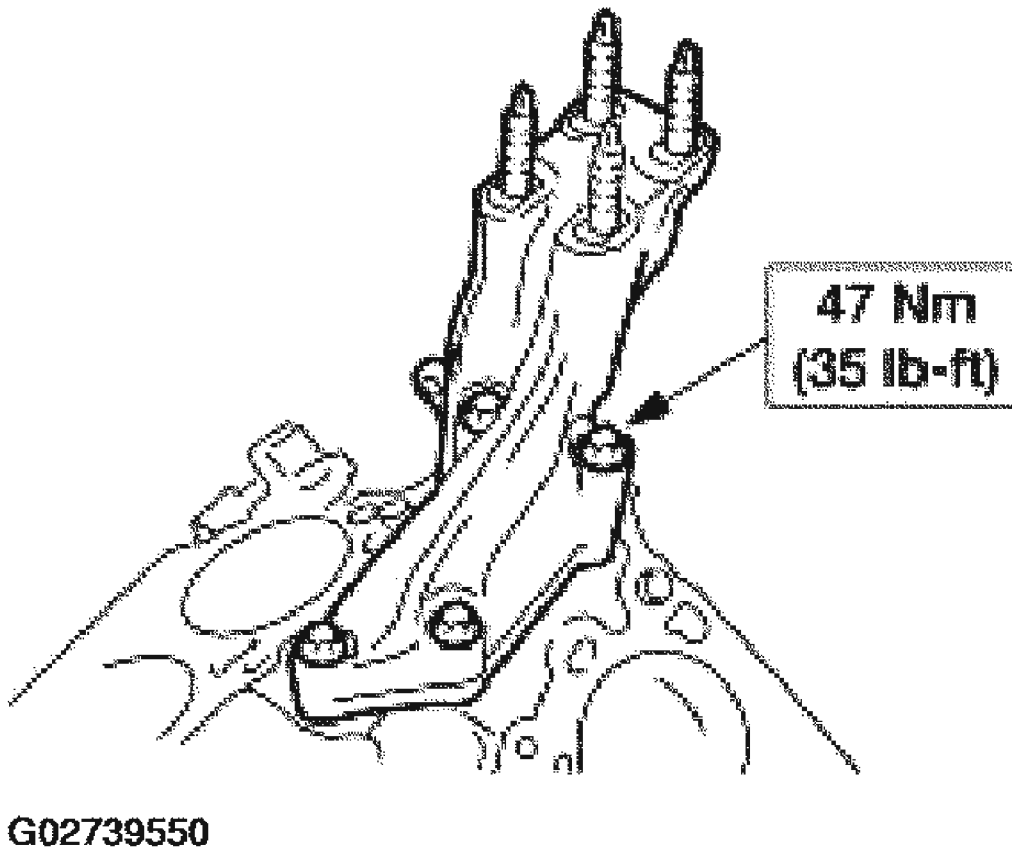
23. Install the oil pump screen and pickup tube.
  1. Position the oil pump screen and pickup tube.
  2. Install the bolts.
  3. Install the nut and tighten in two stages.
    - Stage 1: Tighten to 5 Nm (44 lb-in).
    - Stage 2: Tighten 45 degrees.



G02739549

**Fig. 376: Installing Oil Pump Screen & Pickup Tube**  
Courtesy of FORD MOTOR CO.

24. Install the power steering/engine support bracket.



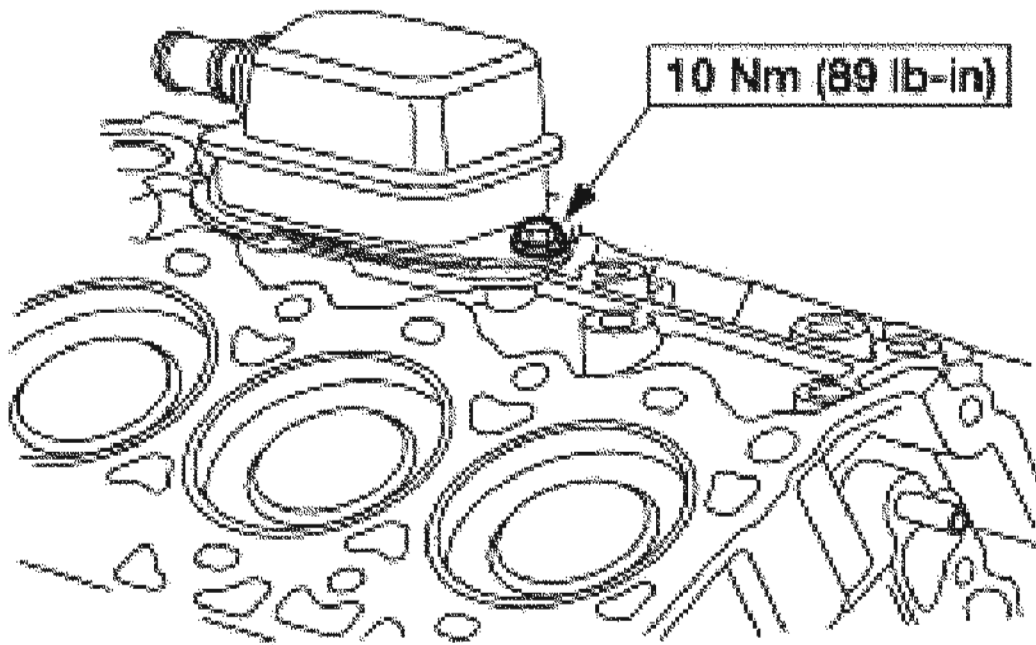
**Fig. 377: Identifying Power Steering/Engine Support Bracket Bolt Torque Specification**

**Courtesy of FORD MOTOR CO.**

25. Install the oil separator, a new gasket and the mounting bolts.

## 2004 Ford Escape

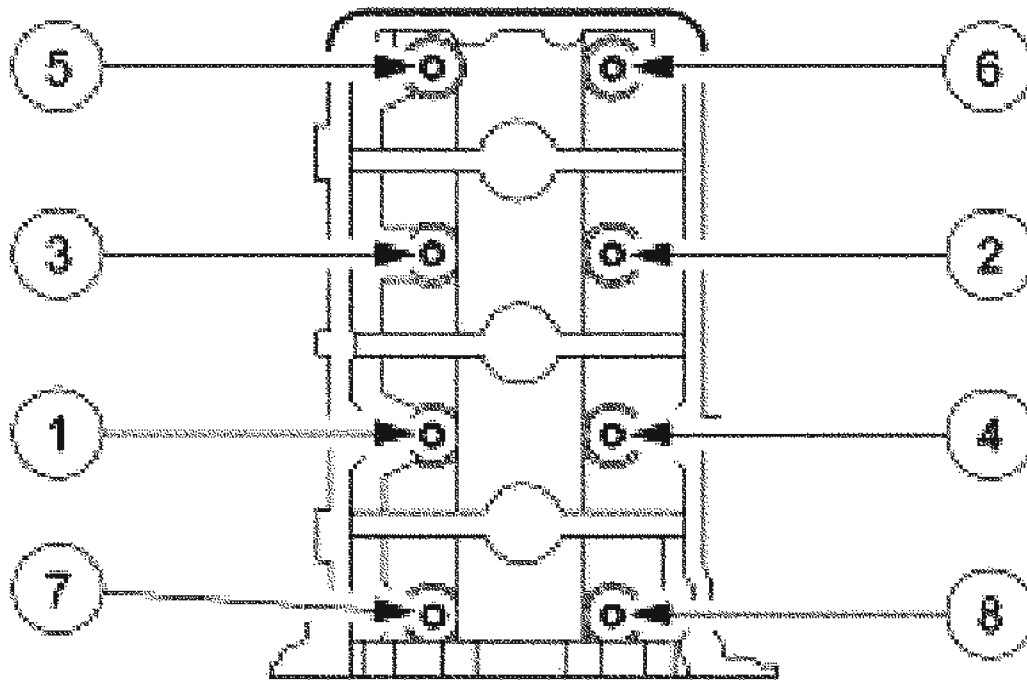
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739551

**Fig. 378: Identifying Oil Separator Mounting Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

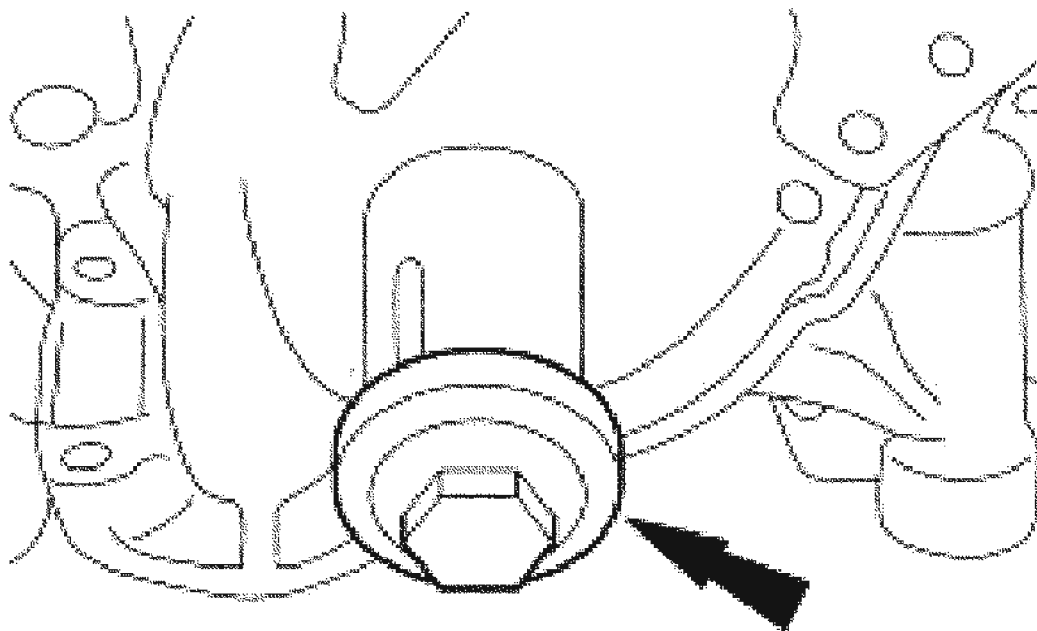
**NOTE:** LH shown; RH  
similar.



G02739552

**Fig. 379: Installing Bolts And Tightening Sequence**  
Courtesy of FORD MOTOR CO.

26. Position the LH and RH cylinder heads and gaskets. Install the bolts and tighten in the sequence shown in six stages.
  - Stage 1: Tighten to 40 Nm (30 lb-ft).
  - Stage 2: Tighten to 90 Nm (66 lb-ft).
  - Stage 3: Loosen one full turn.
  - Stage 4: Tighten to 40 Nm (30 lb-ft).
  - Stage 5: Tighten 90 degrees.
  - Stage 6: Tighten 90 degrees.
27. Install the crankshaft damper bolt and rotate the crankshaft keyway to the 11 o'clock position to locate top dead center (TDC).



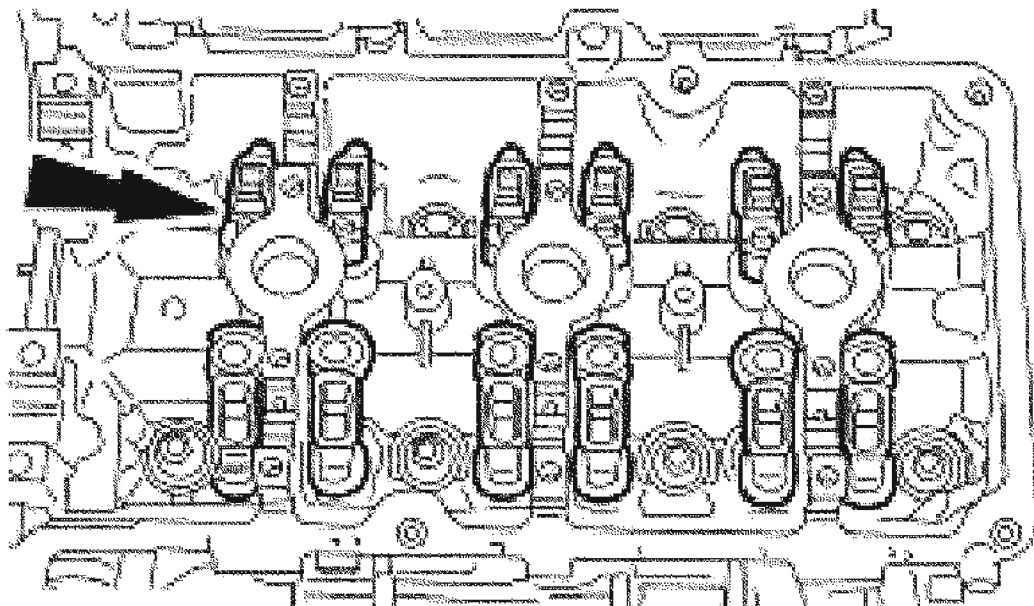
G02739553

**Fig. 380: Installing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

28. Apply clean engine oil to the LH and RH camshaft followers.

**CAUTION:** The camshaft followers must be installed in the original position.

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

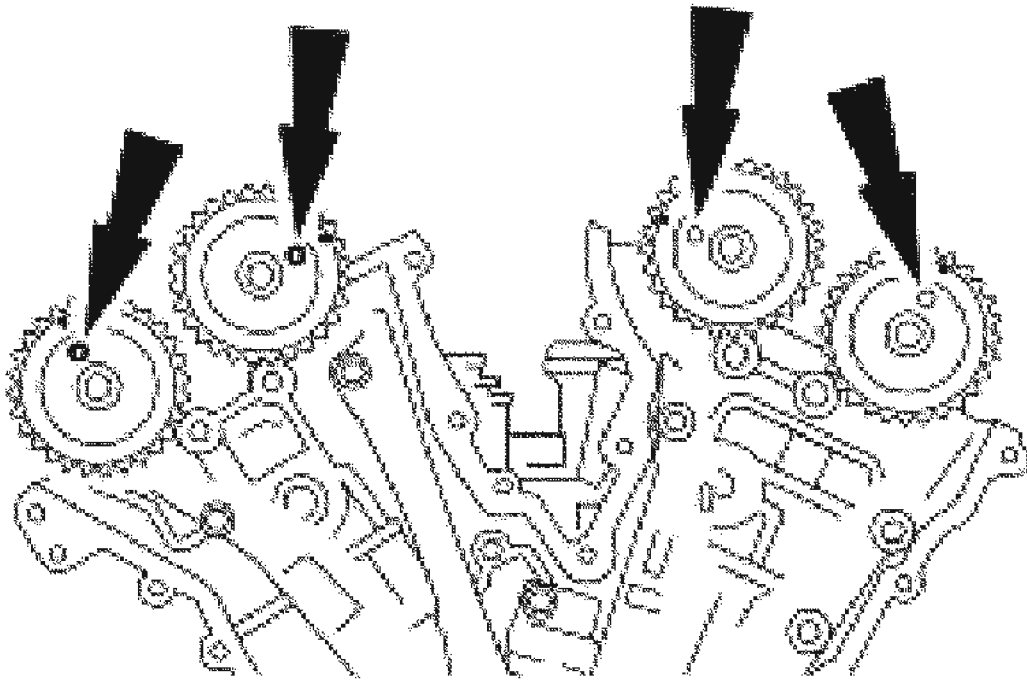


G02739554

**Fig. 381: Installing LH And RH Camshaft Followers**  
Courtesy of FORD MOTOR CO.

29. Install the LH and RH camshaft followers.
30. Apply clean engine oil to the LH and RH camshafts.
31. Install the LH and RH camshafts.
  - Locate the camshafts as shown.



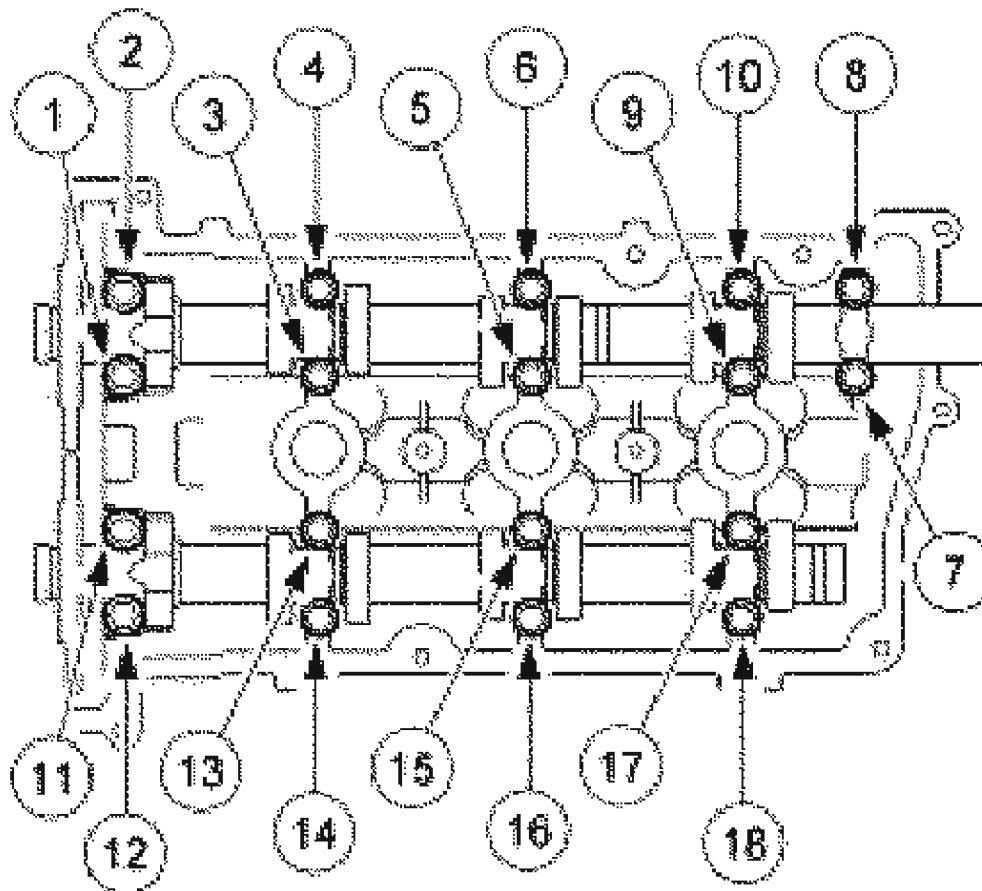


G02739555

**Fig. 382: Installing LH And RH Camshafts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Cylinder head camshaft journal caps and cylinder heads are numbered to verify that they are assembled in their original positions.

**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps can occur.



8 Nm (71 lb-in)

G02739556

**Fig. 383: Identifying Tightening Sequence & Torque Specification Of Camshaft Journal Cap Bolts**

Courtesy of FORD MOTOR CO.

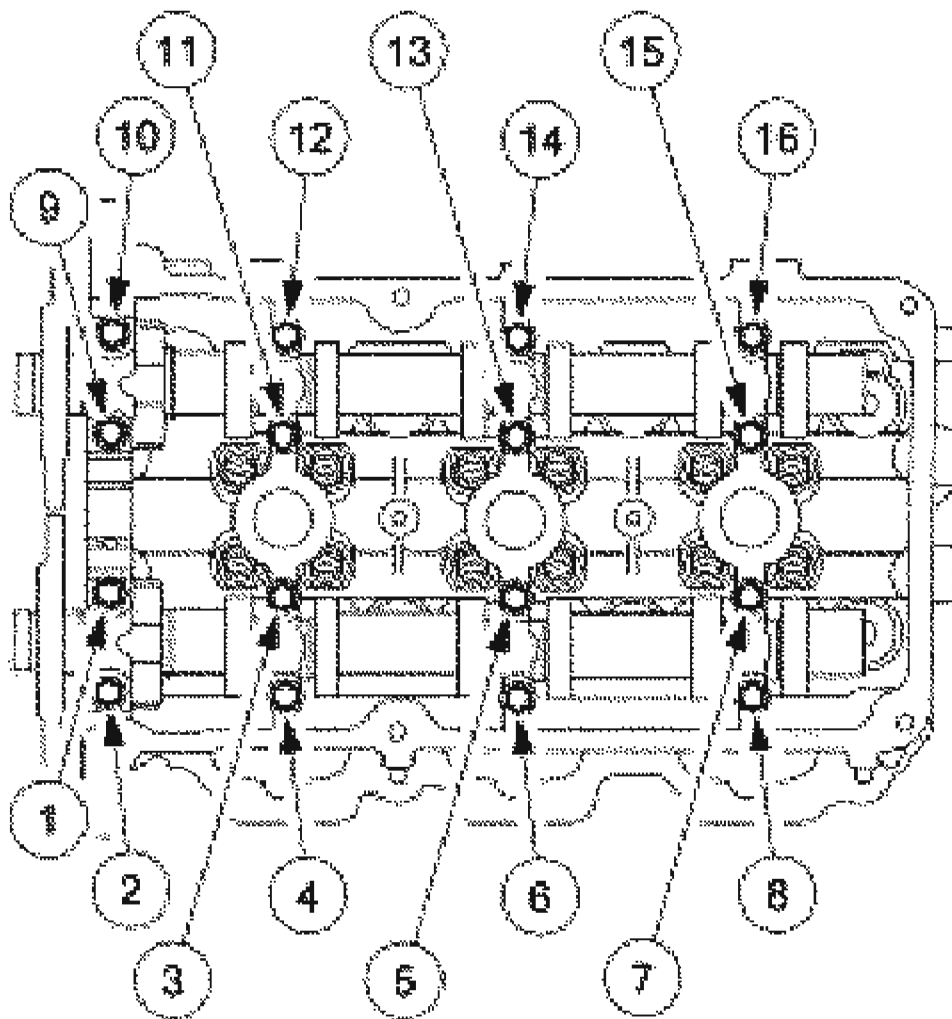
32. Lubricate the camshaft journal caps with clean engine oil. Position the LH camshaft caps and install the bolts in the sequence shown.

**CAUTION: Cylinder head camshaft journal caps and cylinder**

heads are numbered to verify that they are assembled in their original positions.

**CAUTION:** Do not install the camshaft journal thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps can occur.

10 Nm (89 lb-in)



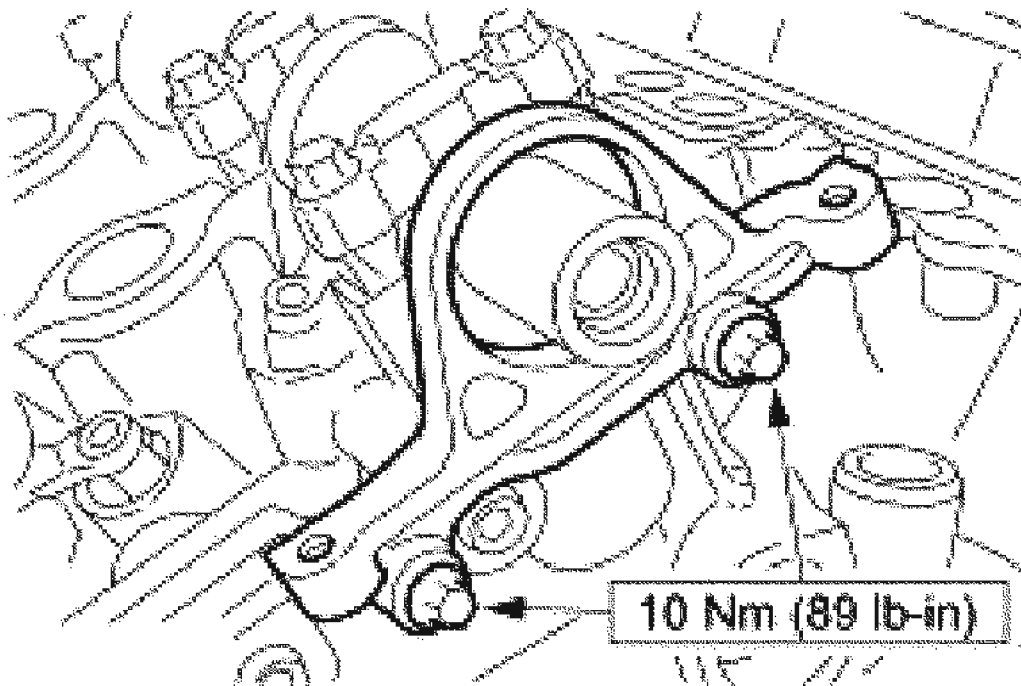
G02739557

**Fig. 384: Identifying Tightening Sequence & Torque Specification Of RH Camshaft Caps**

Courtesy of FORD MOTOR CO.

33. Position the RH camshaft caps and install the bolts in the sequence shown.

**NOTE:** Clean the sealing surface with metal surface cleaner before installing the press-in-place gasket.



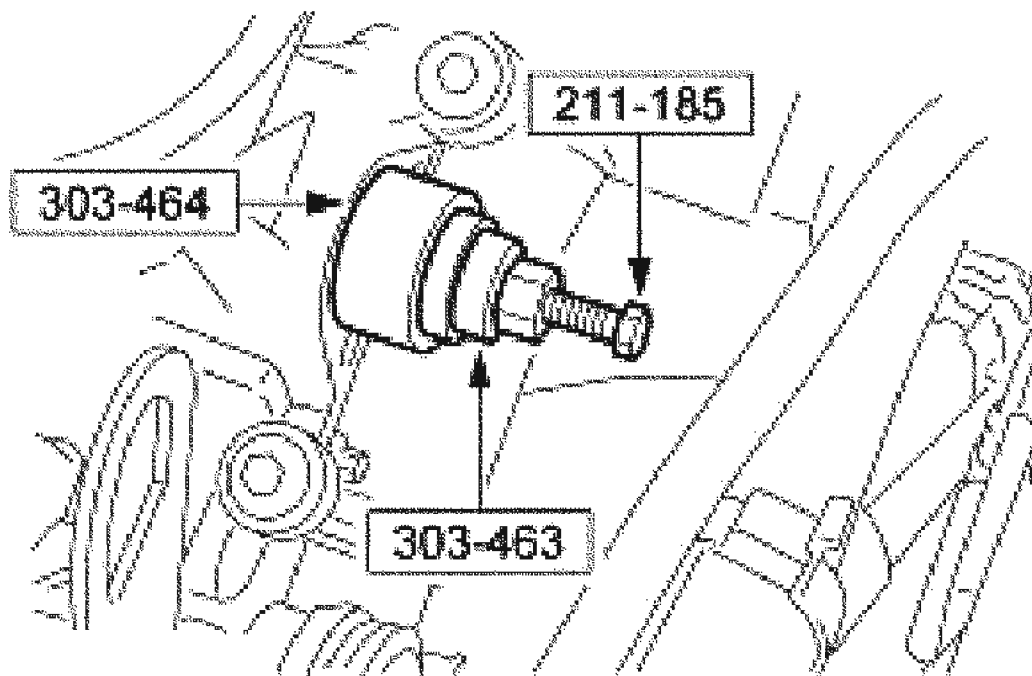
G02739558

**Fig. 385: Installing Camshaft Oil Seal Retainer**

Courtesy of FORD MOTOR CO.

34. Install a new press-in-place gasket and install the camshaft oil seal retainer.

**NOTE:** Lubricate the camshaft oil seal with clean engine oil.

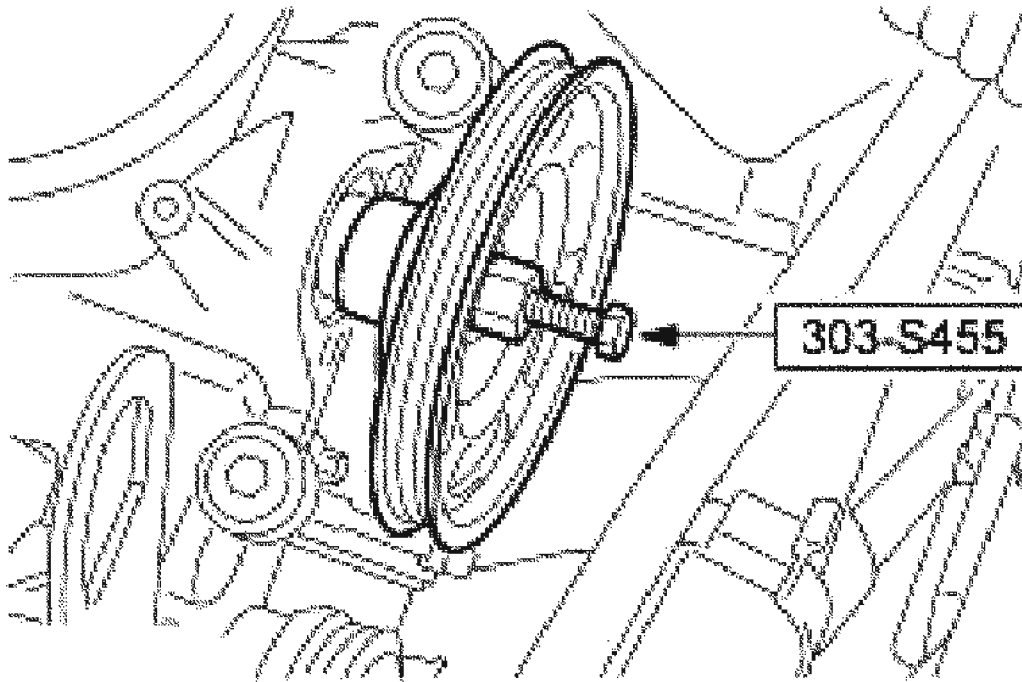


G02739559

**Fig. 386: Installing Camshaft Oil Seal Using Special Tool**  
Courtesy of FORD MOTOR CO.

35. Using the special tools, install a new camshaft oil seal.

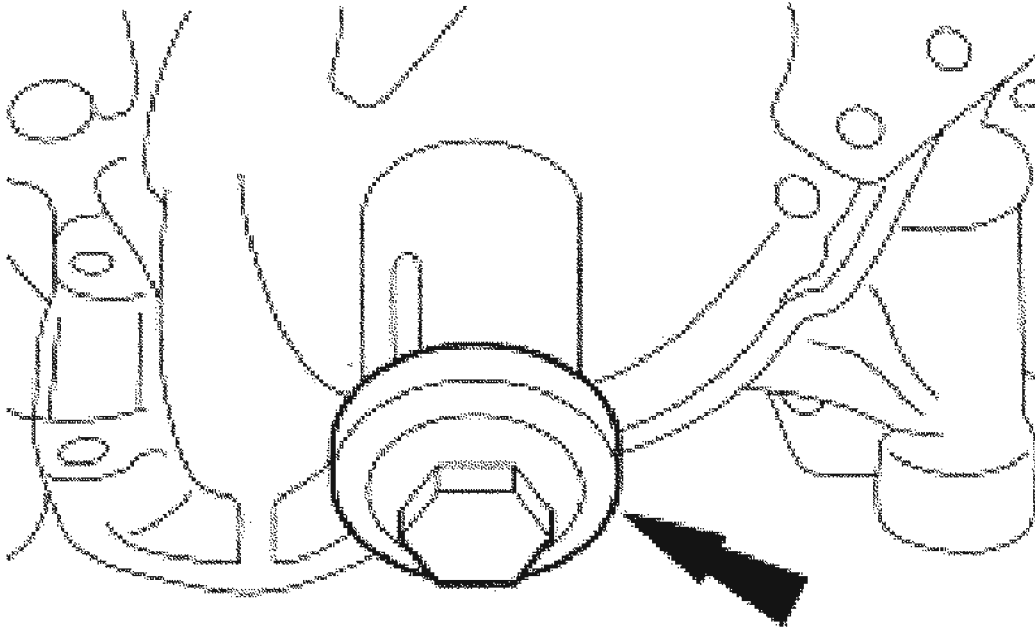
**CAUTION:** The OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. The service pulley is pressed on flush to the end of the camshaft.



G02739560

**Fig. 387: Installing Service Water Pump Drive Pulley**  
Courtesy of FORD MOTOR CO.

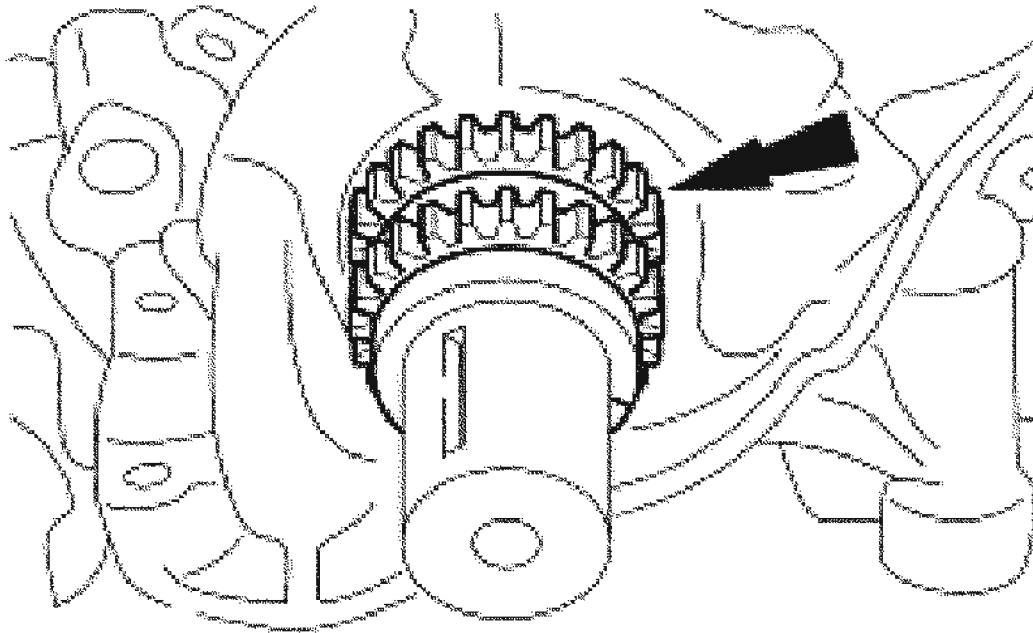
36. Using the special tool, install a new service water pump drive pulley.
37. Remove the crankshaft damper bolt.



G02739561

**Fig. 388: Removing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

38. Install the crankshaft sprockets with the timing marks out.

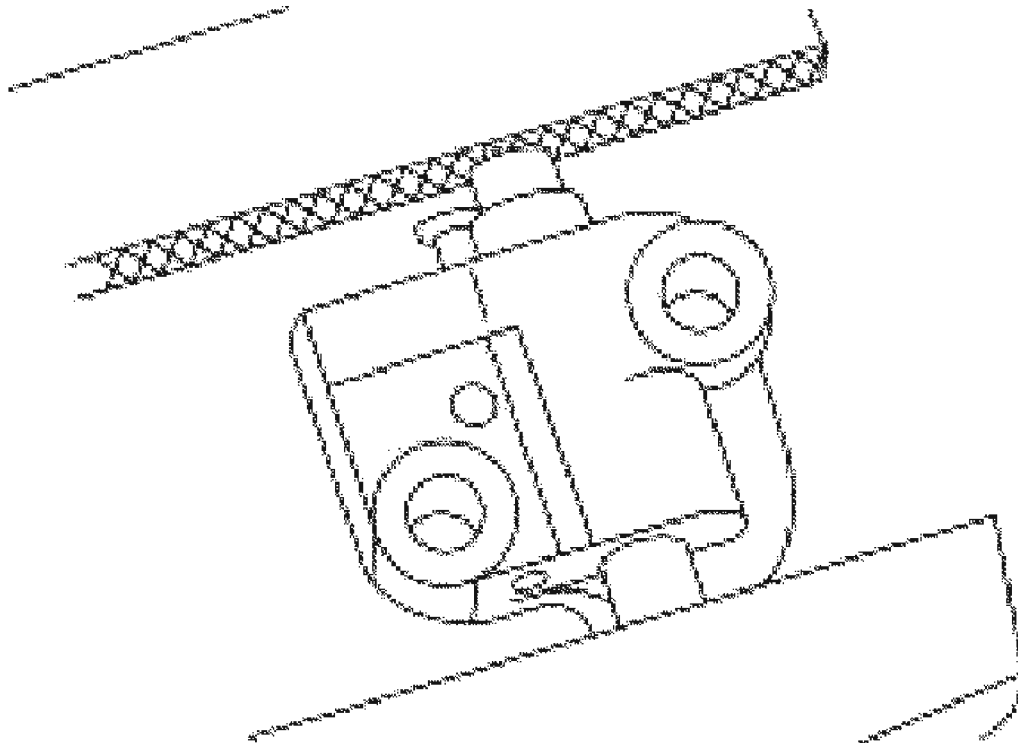


G02739562

**Fig. 389: Installing Crankshaft Sprockets**  
Courtesy of FORD MOTOR CO.

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



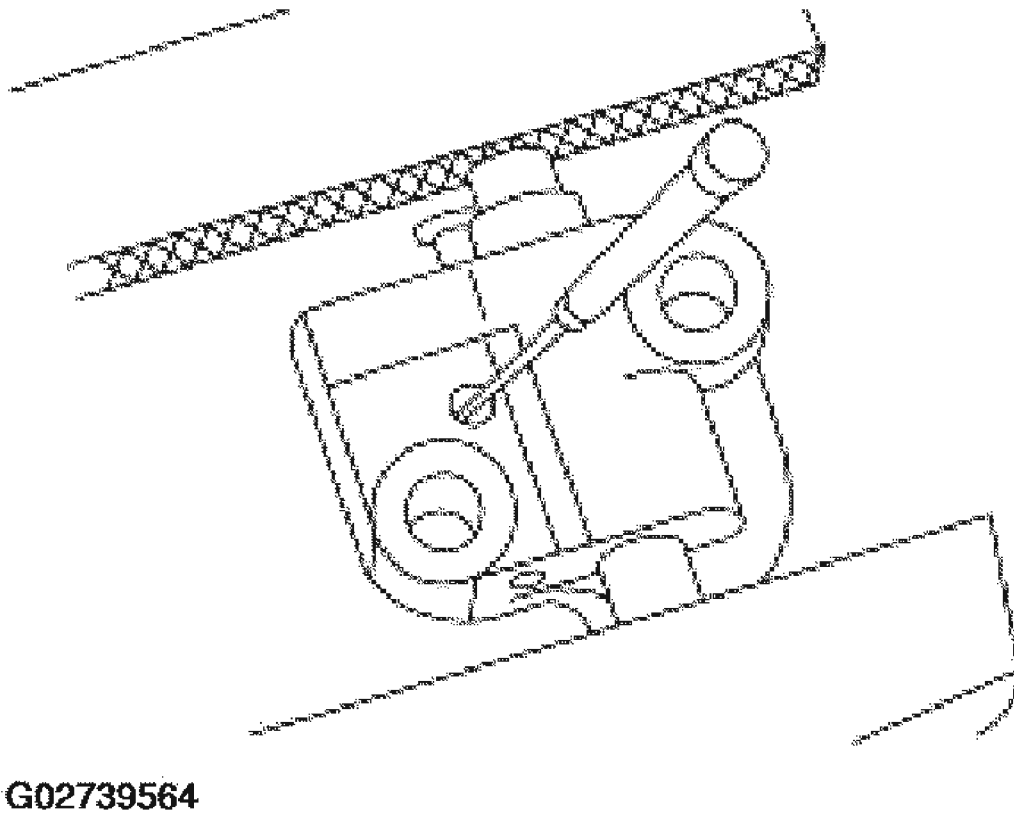


G02739563

**Fig. 390: Positioning Chain Tensioner In Soft-Jawed Vise**  
Courtesy of FORD MOTOR CO.

39. Position the chain tensioner in a soft-jawed vise.

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

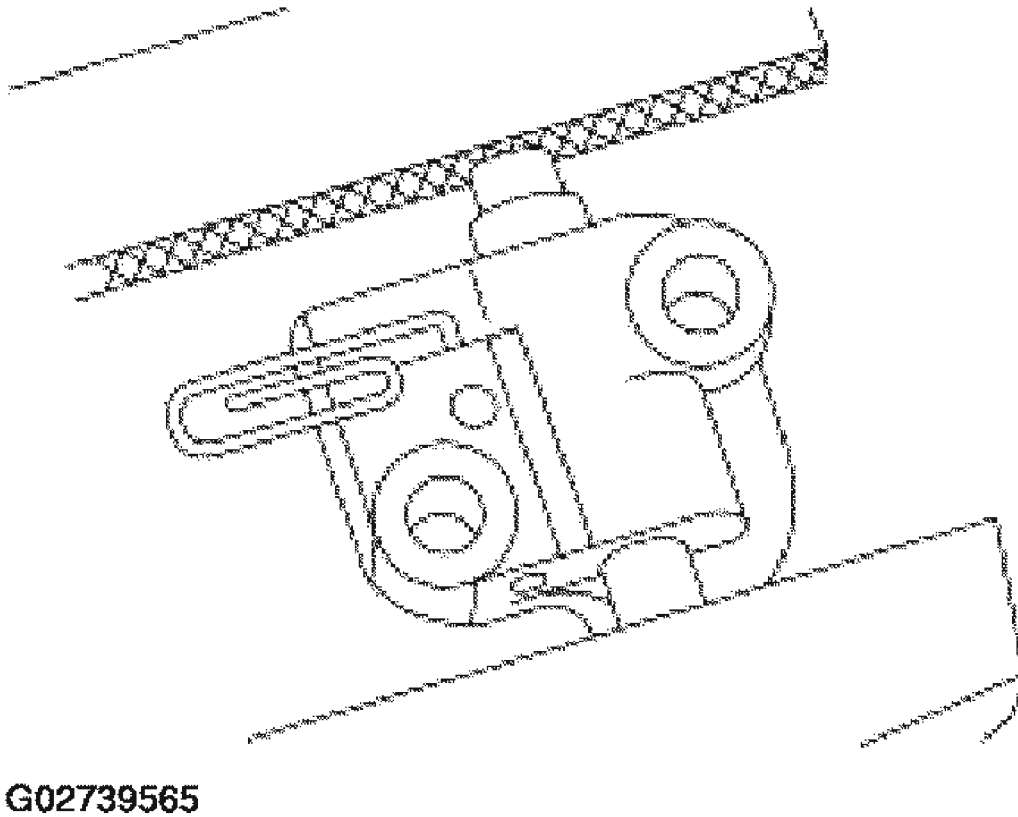


**Fig. 391: Holding Chain Tensioner Ratchet Lock Mechanism**  
Courtesy of FORD MOTOR CO.

40. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem with a small pick.

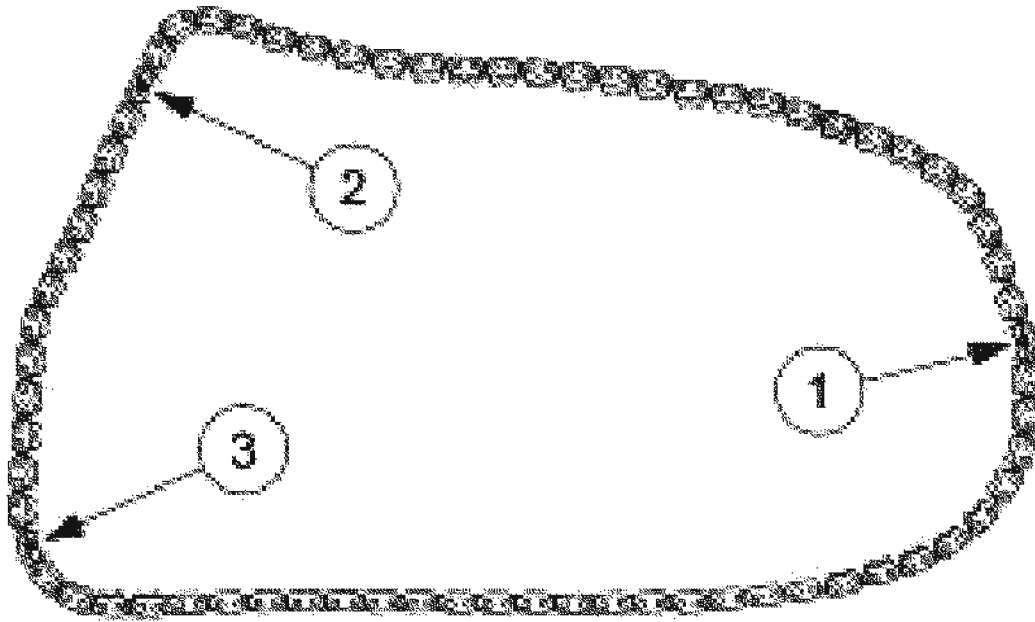
**CAUTION:** During tensioner compression, do not release the ratchet stem until the tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

41. Slowly compress the timing chain tensioner.
42. Retain the tensioner piston with a 1.5 mm (0.06 in) wire or paper clip.



**Fig. 392: Retaining Tensioner Piston**  
Courtesy of FORD MOTOR CO.

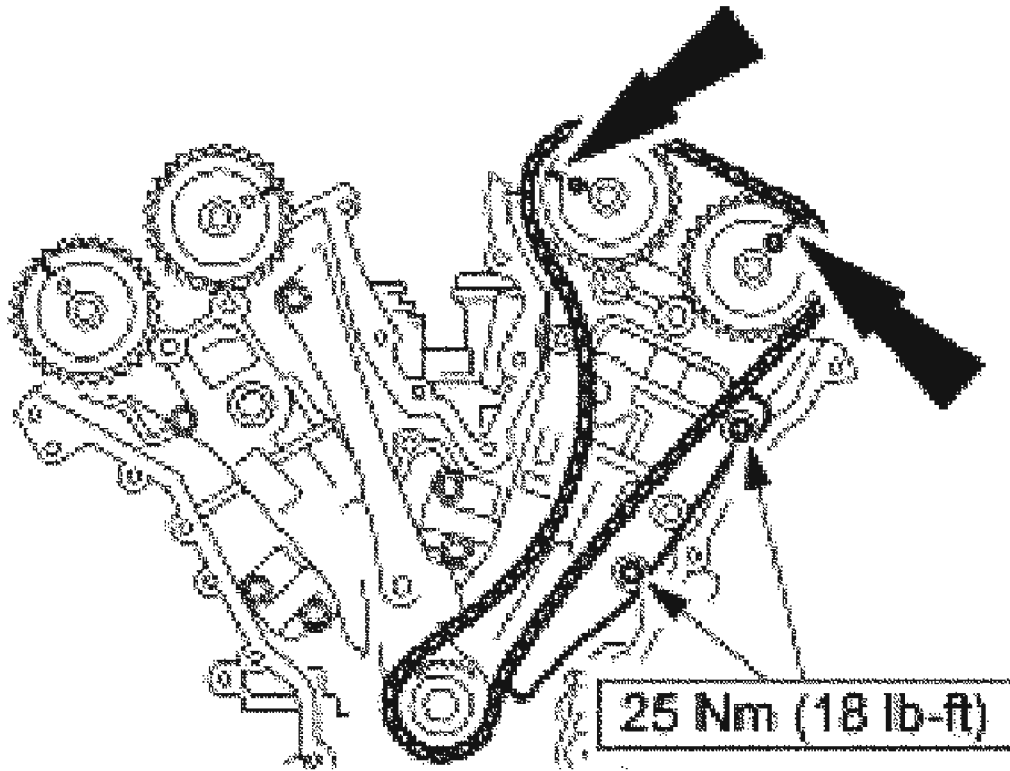
43. If timing marks in the timing chains are not evident, use a permanent-type marker to mark the crankshaft and camshaft timing marks on the LH and RH timing chains.
1. Mark any link to use as the crankshaft timing mark.
  2. Starting with the crankshaft timing mark, count 29 links and mark the link.
  3. Continue counting to link 42 and mark the link.



G02739566

**Fig. 393: Marking Timing Chain**  
Courtesy of FORD MOTOR CO.

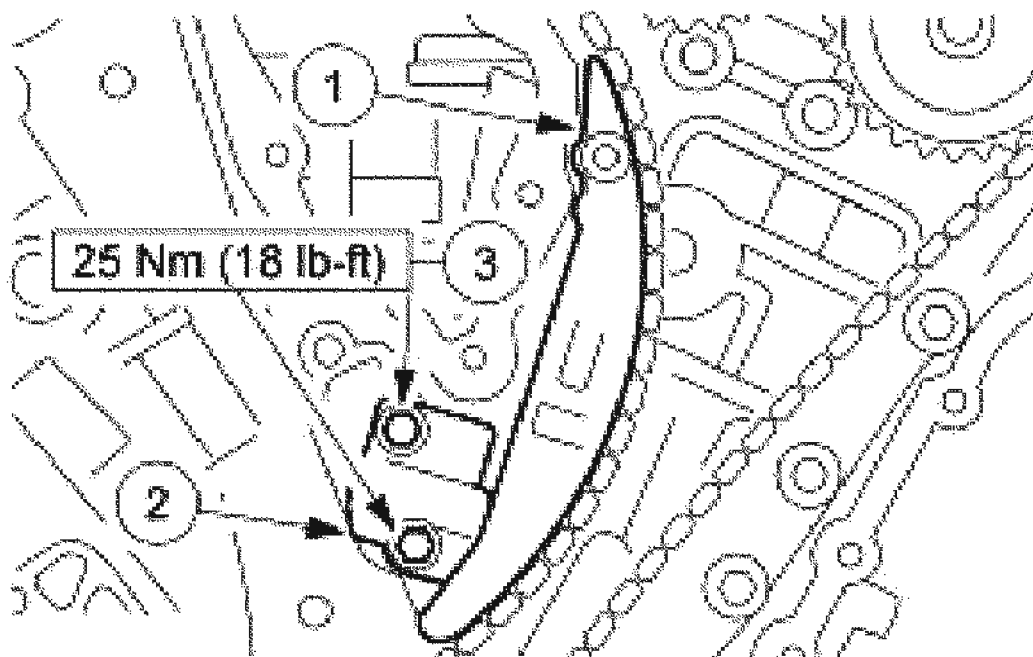
44. Position the LH timing chain and guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.



G02739567

**Fig. 394: Installing LH Timing Chain**  
Courtesy of FORD MOTOR CO.

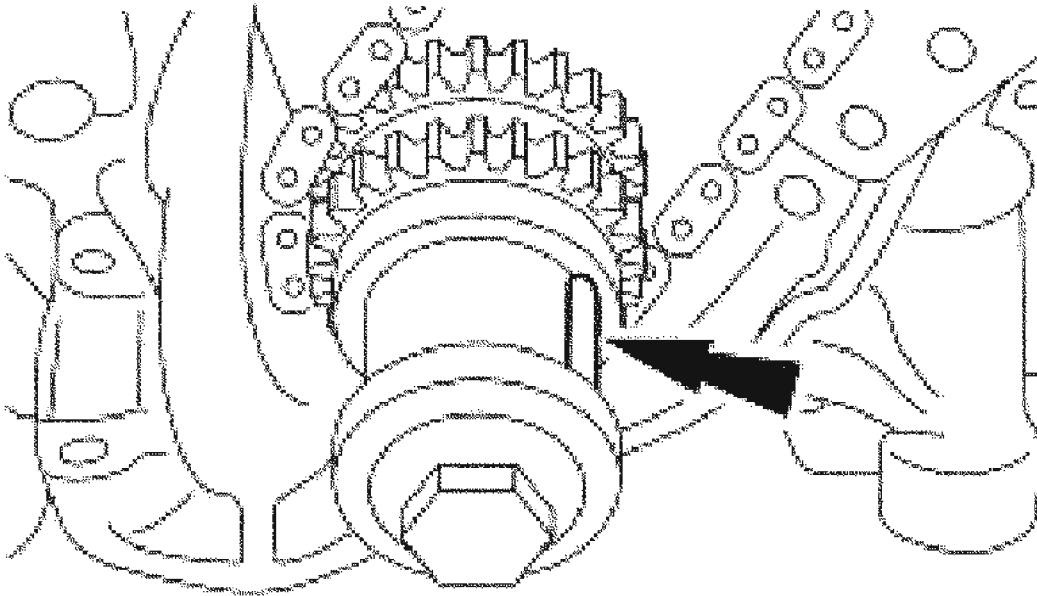
45. Install the LH timing chain tensioner arm and the LH timing chain tensioner.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.



G02739568

**Fig. 395: Installing LH Timing Chain Tensioner Arm & Tensioner**  
Courtesy of FORD MOTOR CO.

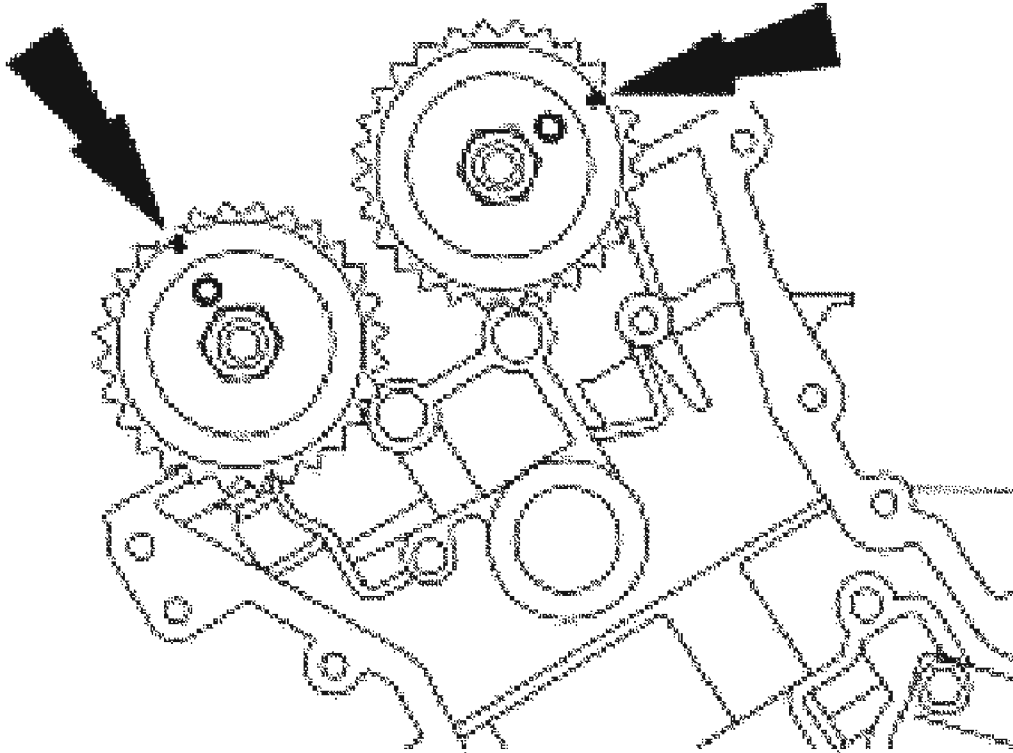
46. Install the crankshaft damper bolt and rotate the crankshaft clockwise 120 degrees until the crankshaft keyway to the 3 o'clock position.



G02739569

**Fig. 396: Identifying Crankshaft Keyway**  
Courtesy of FORD MOTOR CO.

47. Verify that the RH camshafts are correctly positioned.

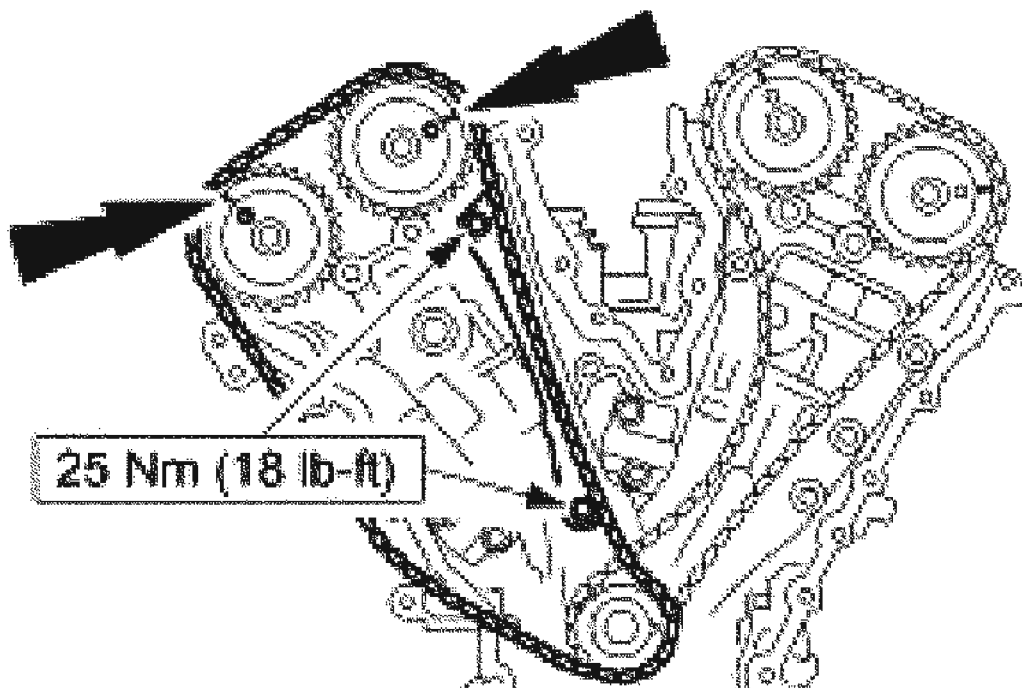


G02739570

**Fig. 397: Verifying That RH Camshafts Are Correctly Positioned**  
Courtesy of FORD MOTOR CO.

48. Position the RH timing chain and chain guide and install the bolts.
  - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

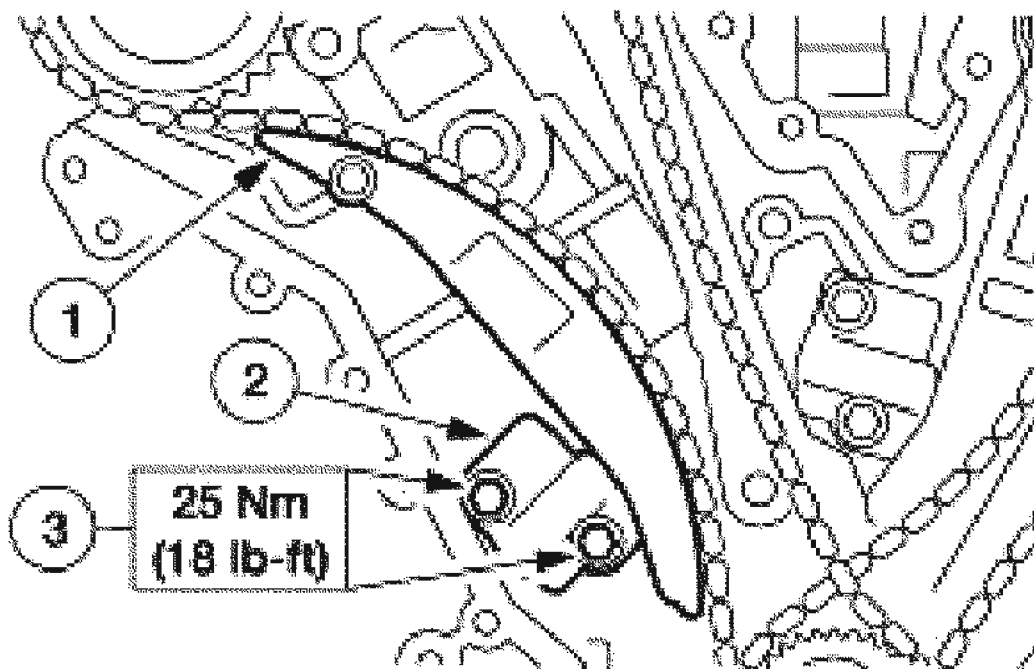




G02739571

**Fig. 398: Installing RH Timing Chain**  
Courtesy of FORD MOTOR CO.

49. Install the RH timing chain tensioner arm and the RH timing chain tensioner.
  1. Install the tensioner arm.
  2. Position the tensioner.
  3. Install the bolts.

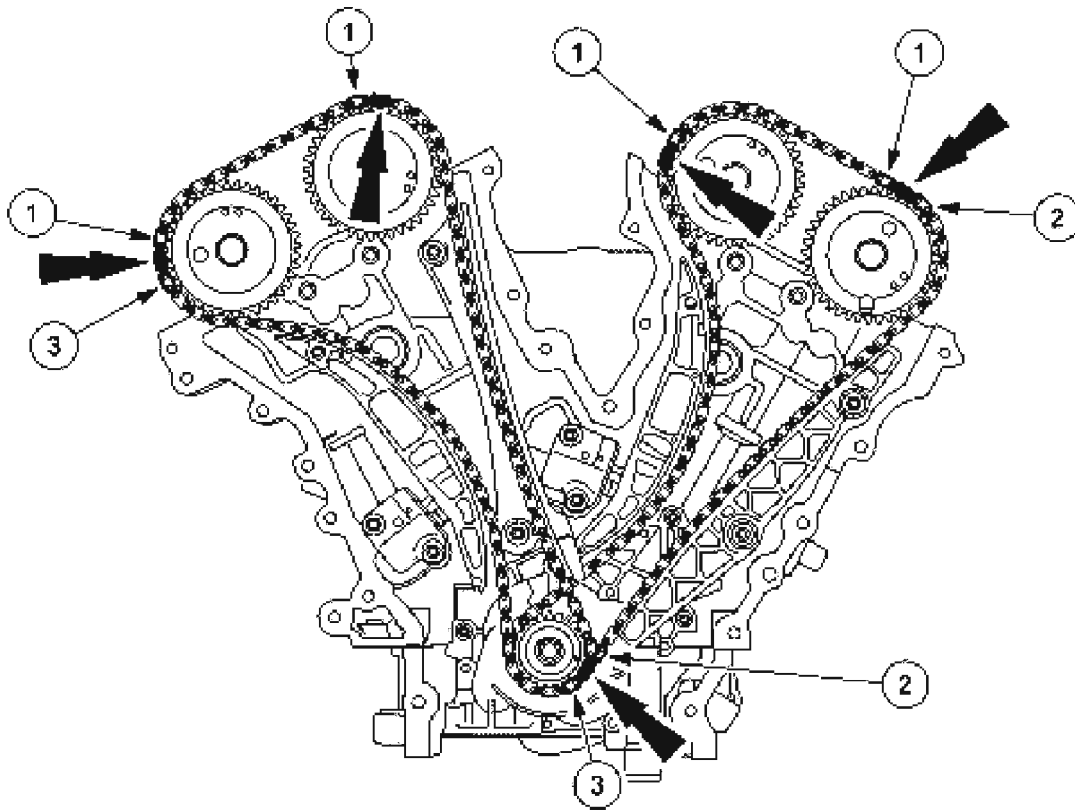


G02739572

**Fig. 399: Installing RH Timing Chain Tensioner Arm & Tensioner**  
Courtesy of FORD MOTOR CO.

50. Remove the LH and RH timing chain tensioner piston retaining wires.

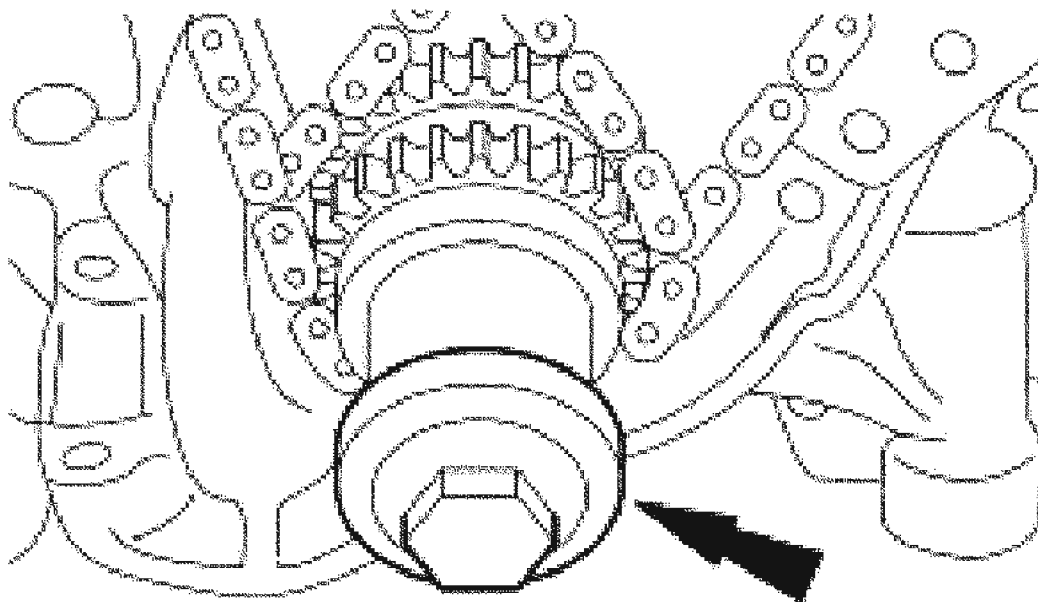
**CAUTION:** Failure to verify correct timing drive component alignment will result in severe engine damage.



G02739573

**Fig. 400: Verifying Timing**  
Courtesy of FORD MOTOR CO.

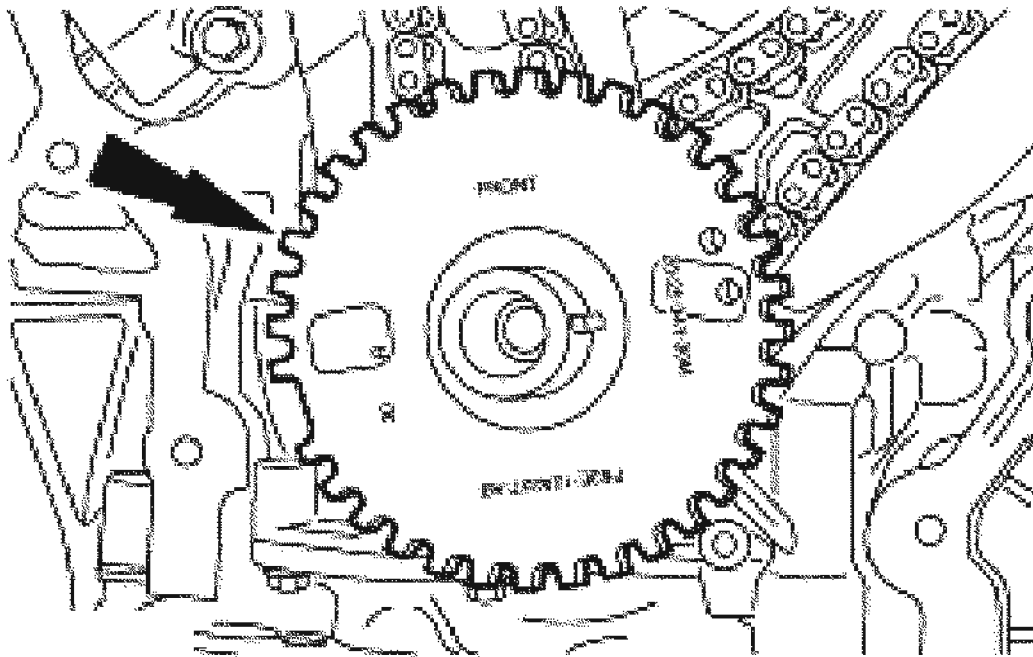
51. Rotate the crankshaft counterclockwise 120 degrees to top dead center (TDC). Verify the timing with the following step.
  1. There should be 12 chain links between the camshaft timing marks.
  2. There should be 27 chain links between the camshaft and the crankshaft timing marks.
  3. There should be 30 chain links between the camshaft and crankshaft timing marks.
52. Remove the crankshaft damper bolt.



G02739574

**Fig. 401: Removing Crankshaft Damper Bolt**  
Courtesy of FORD MOTOR CO.

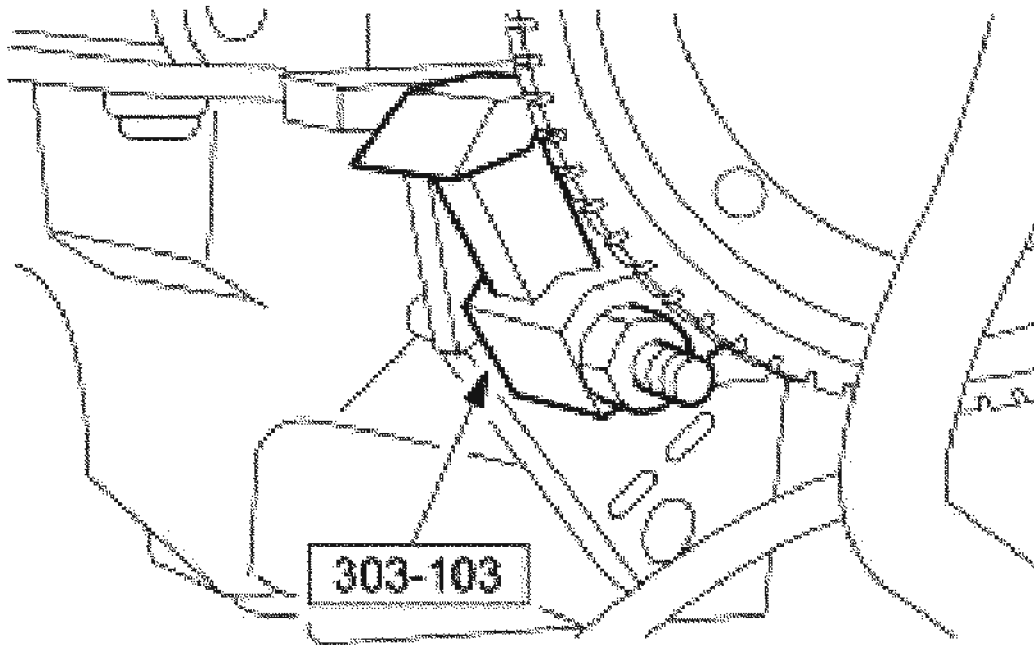
**CAUTION:** This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped 20-25-34Y-30M (Color Blue).



G02739575

**Fig. 402: Installing Ignition Pulse Wheel**  
Courtesy of FORD MOTOR CO.

53. Install the ignition pulse wheel.
54. Install the special tool to hold the flexplate.



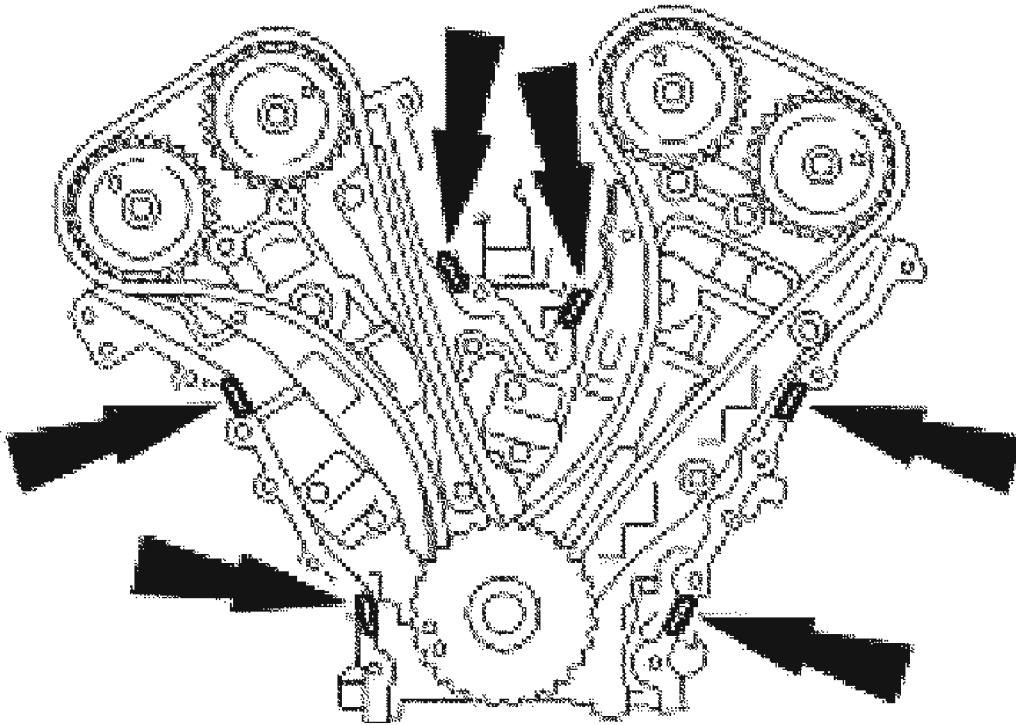
G02739576

**Fig. 403: Installing Special Tool To Hold Flexplate**  
Courtesy of FORD MOTOR CO.

55. Install three gaskets in the front cover.

**NOTE:** Clean and degrease the sealing surfaces with metal surface cleaner before applying gasket and sealant.

**NOTE:** The front cover must be installed and the bolts tightened within four minutes of sealant application.

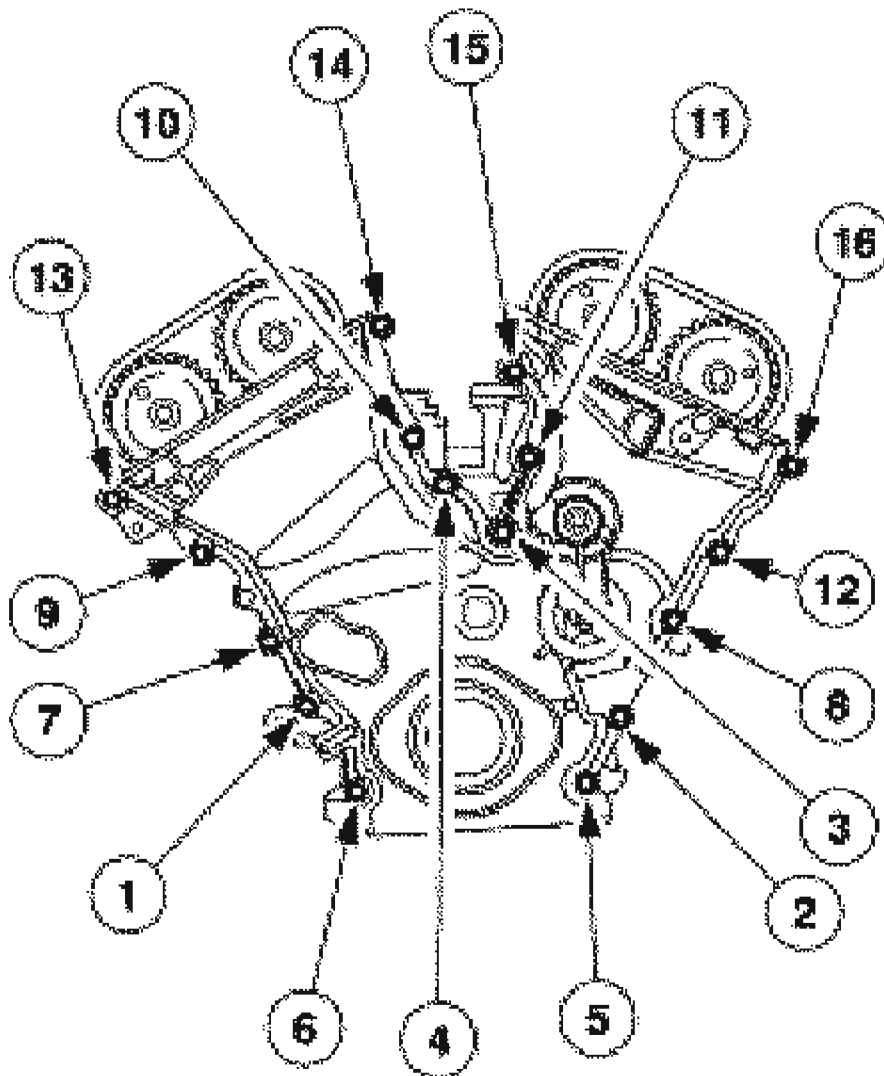


G02739577

**Fig. 404: Applying Silicone Gasket & Sealant**  
Courtesy of FORD MOTOR CO.

56. Apply a 6 mm (0.24 in) dot of silicone gasket and sealant to the cylinder block to lower cylinder block and cylinder head mating surfaces.

**NOTE:** Fasteners 1, 3, 4, 8, 10, 11, 14, 15 and 16 are studs.

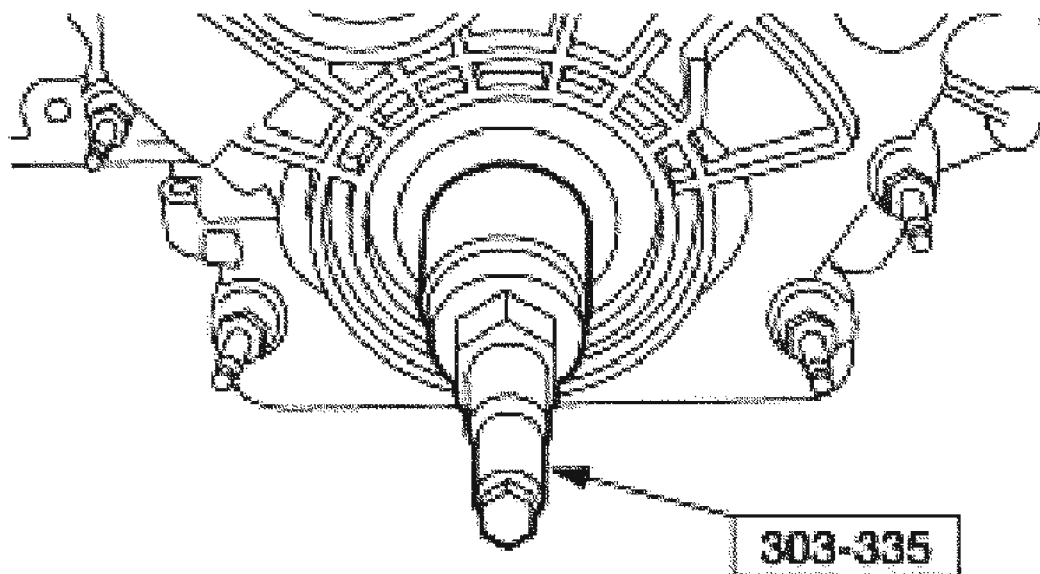
**25 Nm (18 lb-ft)**

G02739578

**Fig. 405: Identifying Bolt Tightening Sequence & Torque Specification**  
Courtesy of FORD MOTOR CO.

57. Position the front cover and install the bolts and studs in the sequence shown.
58. Using the special tool, install the crankshaft front oil seal.

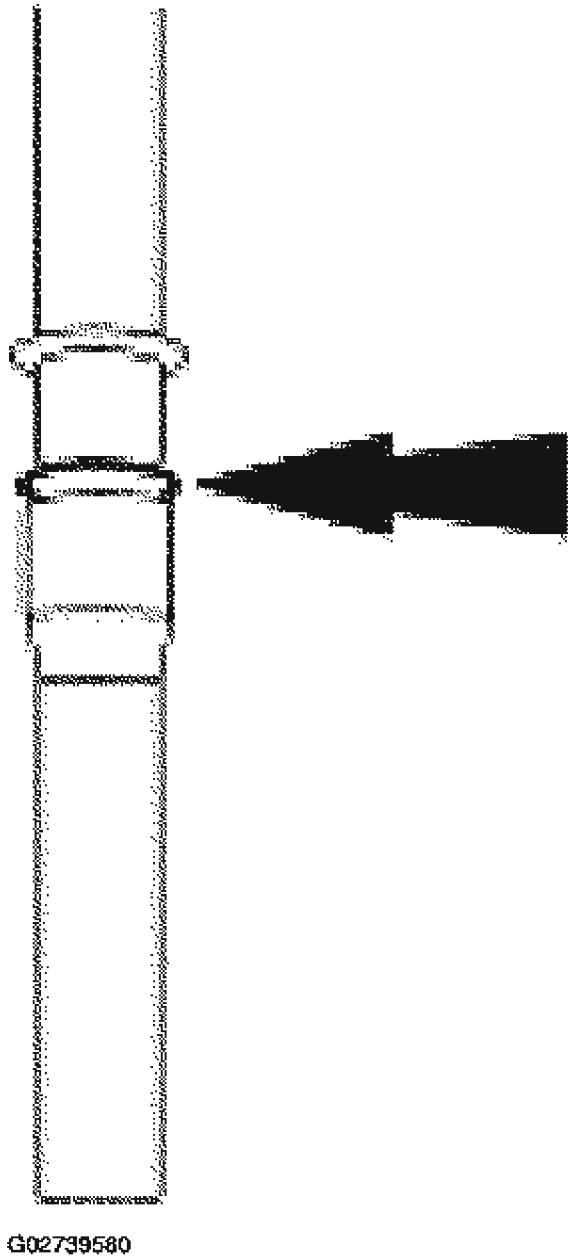




G02739579

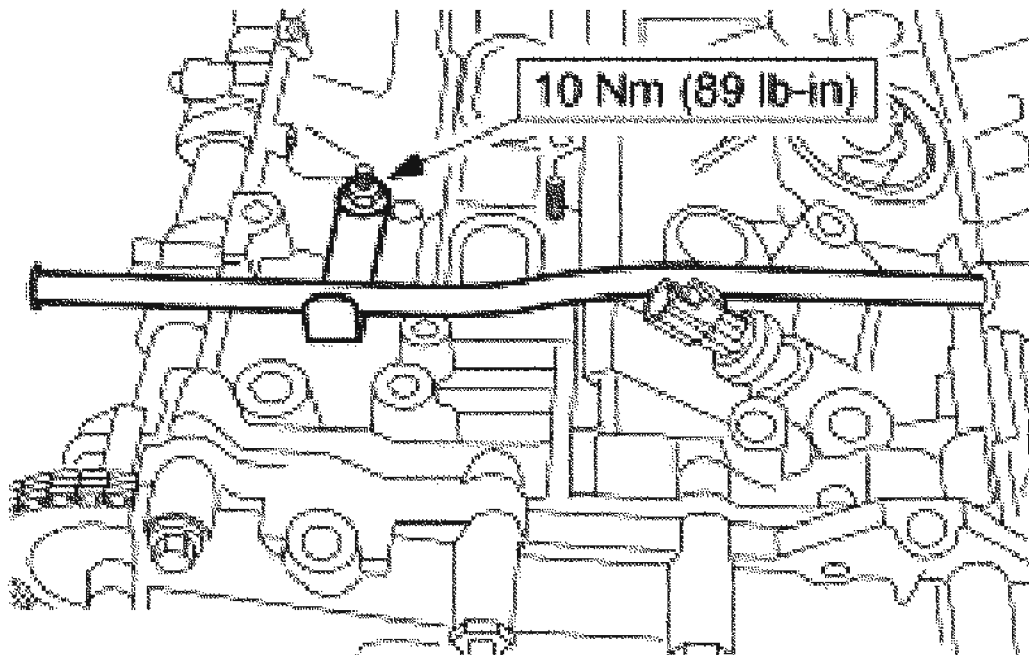
**Fig. 406: Installing Crankshaft Front Oil Seal**  
Courtesy of FORD MOTOR CO.

59. Install a new O-ring on the oil level indicator tube. Apply clean engine oil to the O-ring.



**Fig. 407: Installing O-Ring On Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

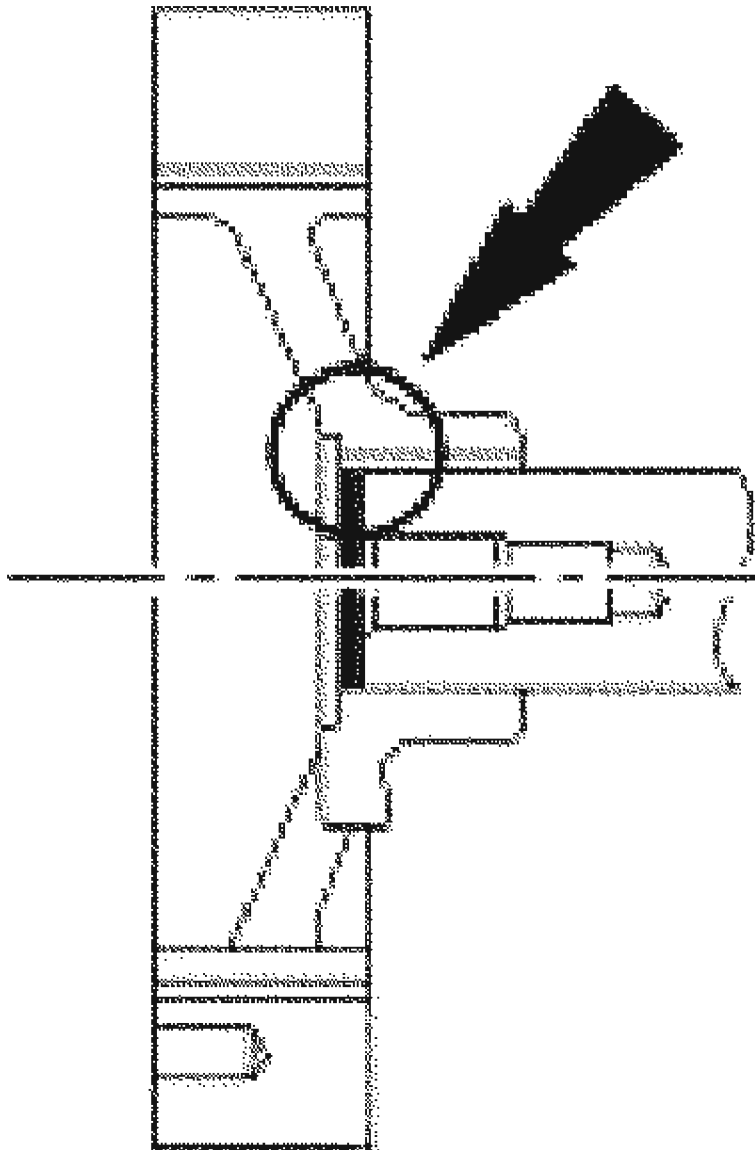
60. Install the oil level indicator tube and install the stud bolt.



G02739581

**Fig. 408: Installing Oil Level Indicator Tube**  
Courtesy of FORD MOTOR CO.

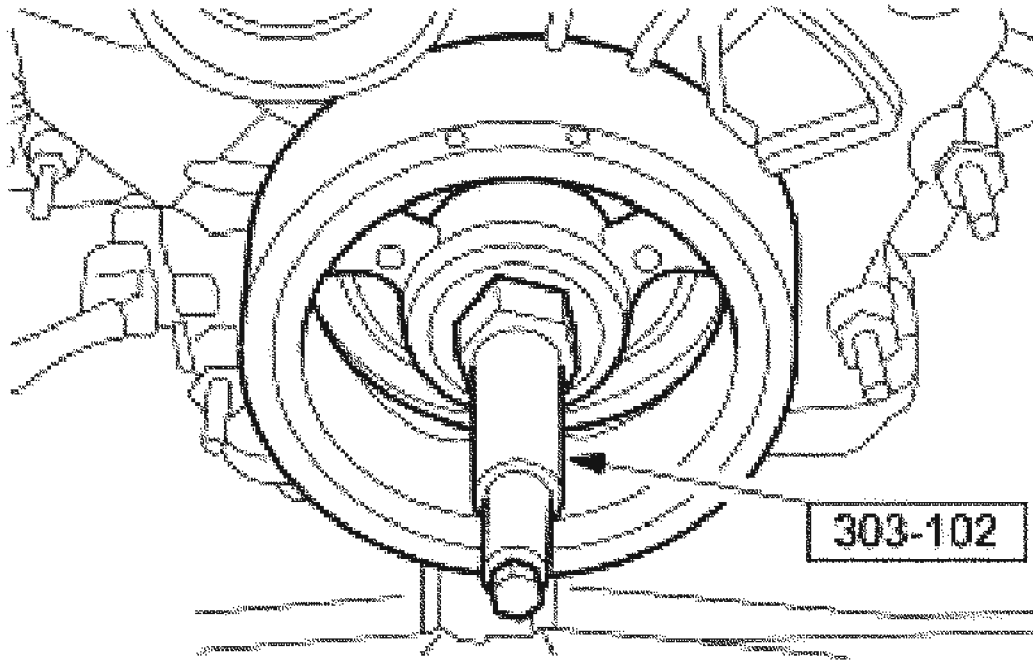
- NOTE:** Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealant.
- NOTE:** The crankshaft damper must be installed and the bolt tightened within four minutes of sealant application.



G02739582

**Fig. 409: Applying Silicone Gasket And Sealant To End Of Crankshaft Damper**  
Courtesy of FORD MOTOR CO.

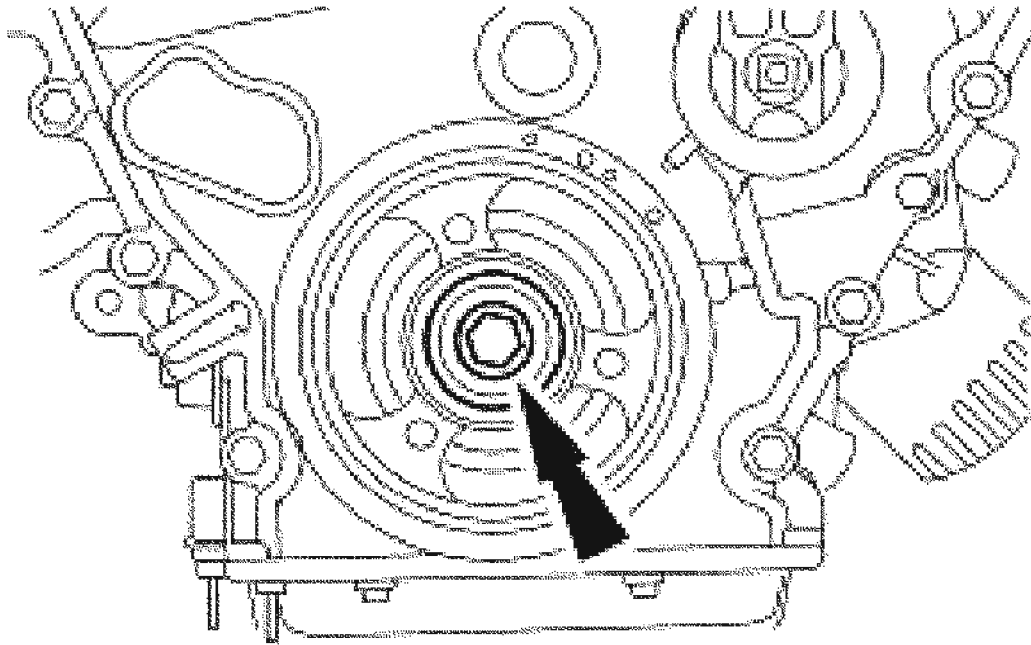
61. Apply silicone gasket and sealant to the end of the crankshaft damper keyway slot.
62. Using the special tool, install the crankshaft vibration damper.



G02739583

**Fig. 410: Installing Crankshaft Vibration Damper**  
Courtesy of FORD MOTOR CO.

63. Install the crankshaft vibration damper washer and tighten the bolt in four stages.
- Stage 1: Tighten to 120 Nm (89 lb-ft).
  - Stage 2: Loosen one full turn (360 degrees).
  - Stage 3: Tighten to 50 Nm (37 lb-ft).
  - Stage 4: Tighten to 90 Nm (66 lb-ft).



G02739584

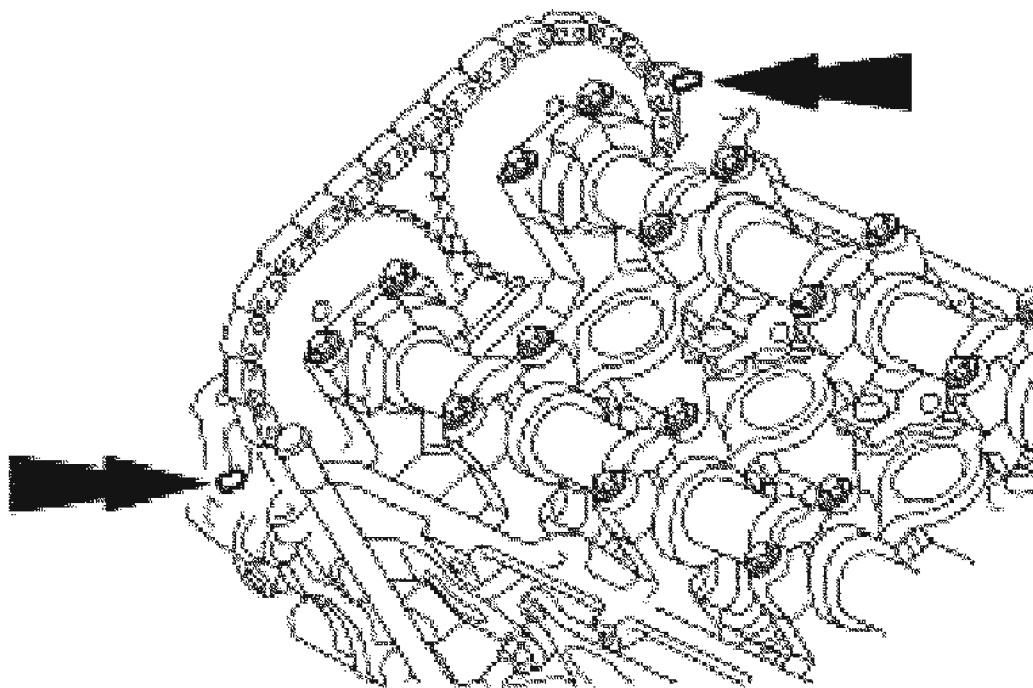
**Fig. 411: Installing Crankshaft Vibration Damper Washer**  
Courtesy of FORD MOTOR CO.

64. Install new gaskets in the valve covers.

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

**NOTE:** The valve cover must be installed and the bolts and studs tightened within four minutes of sealant application.

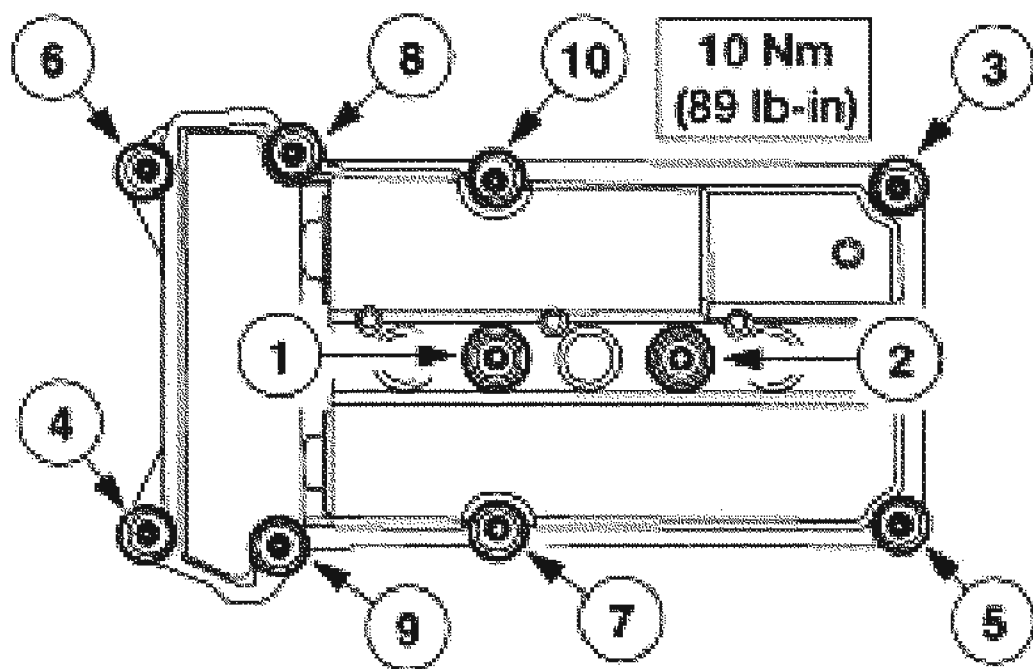
**NOTE:** Clean cylinder head and front cover surface using metal surface cleaner before applying silicone gasket and sealant.



G02739585

**Fig. 412: Applying Silicone Gasket & Sealant**  
**Courtesy of FORD MOTOR CO.**

65. Apply a 8 mm (0.31 in) dot of silicone gasket and sealant at the cylinder block to front cover mating surface of the LH and RH valve covers.
66. Position the RH valve cover and install the bolts and studs in the sequence shown.

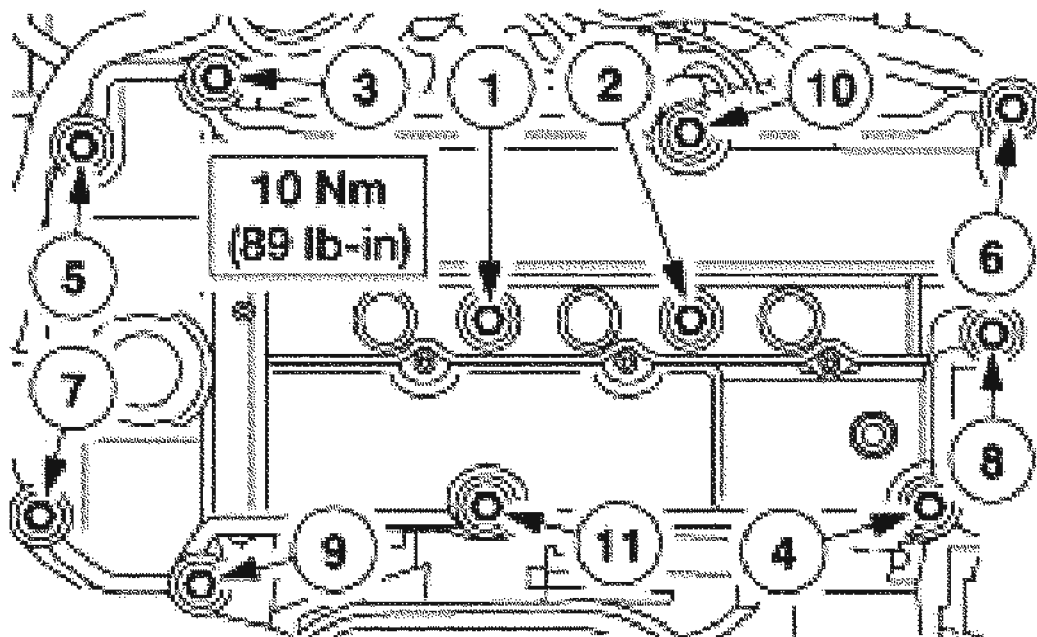


G02739586

**Fig. 413: Identifying Stud Bolts Installing Sequence & Torque Specification**  
Courtesy of FORD MOTOR CO.

67. Position the LH valve cover and install the bolts and studs in the sequence shown.



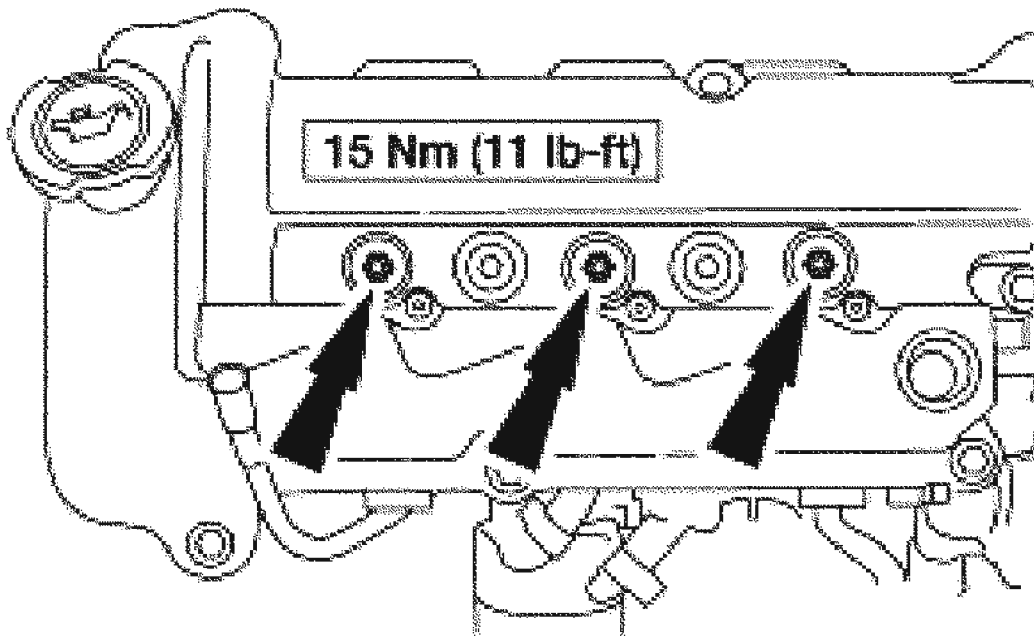


G02739587

**Fig. 414: Identifying LH Valve Cover Bolts Installing Sequence & Torque Specification**

Courtesy of FORD MOTOR CO.

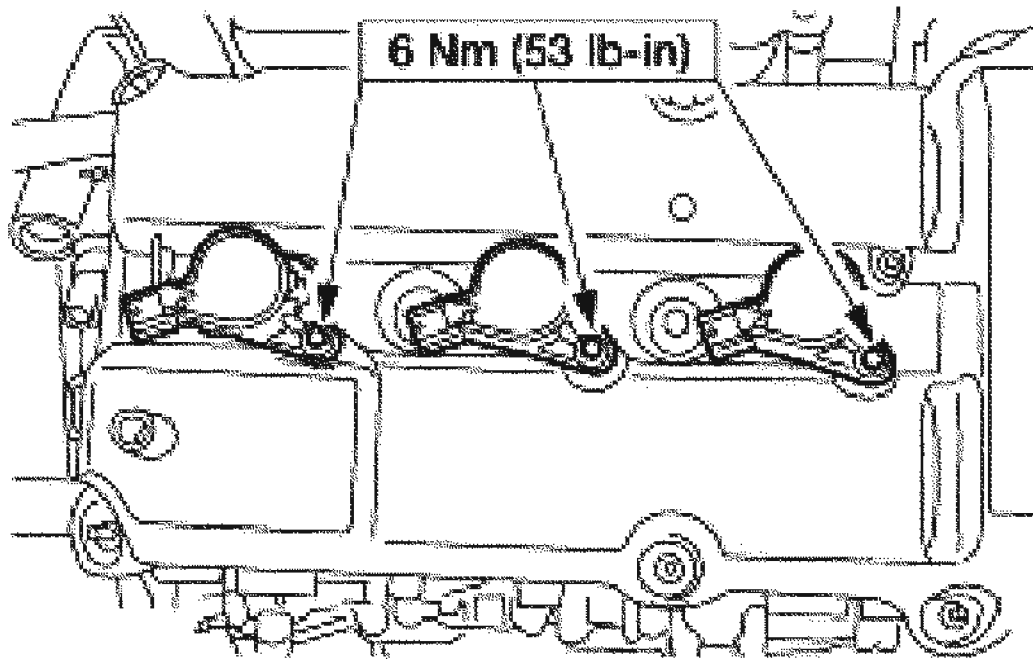
68. Install the spark plugs.



G02739588

**Fig. 415: Installing Spark Plugs**  
Courtesy of FORD MOTOR CO.

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



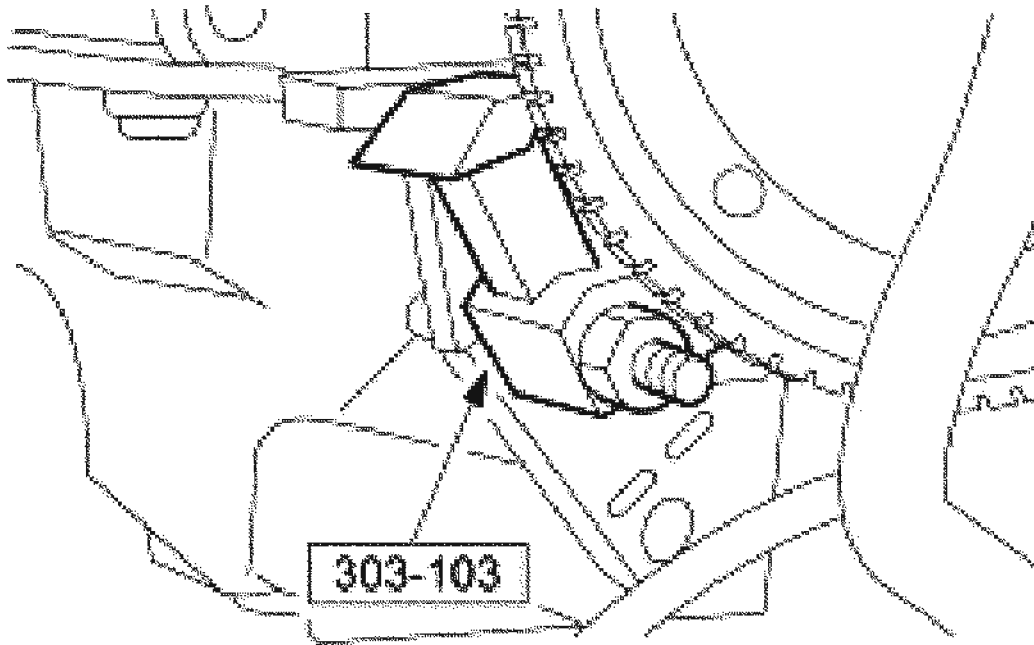
G02739589

**Fig. 416: Installing Coil-On-Plugs**  
Courtesy of FORD MOTOR CO.

69. Apply a light film of silicone brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.

Install the six coil-on-plugs and install the bolts.

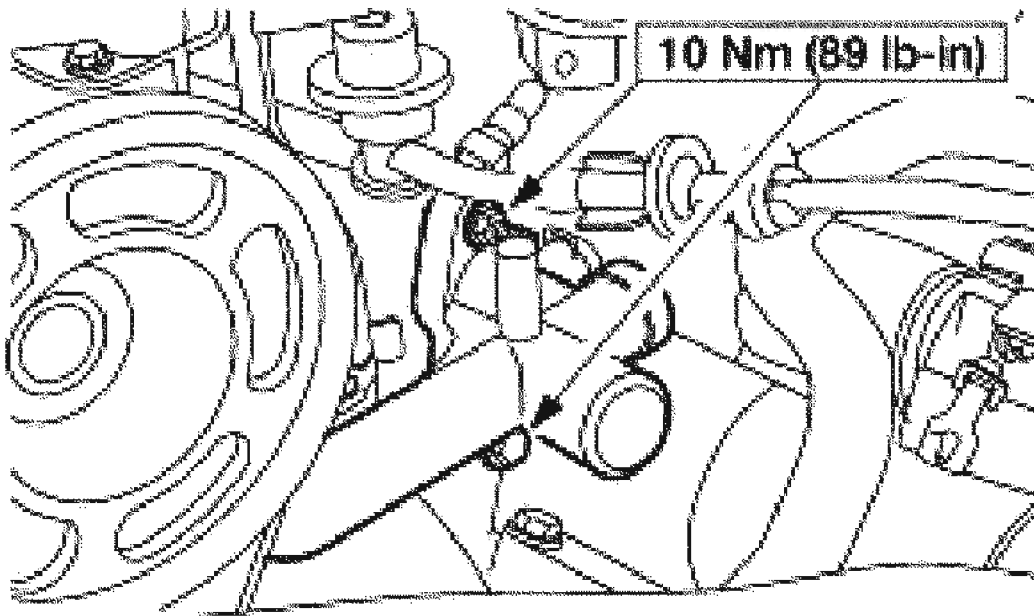
70. Install new gaskets in the lower intake manifold.
71. Remove the special tool.



G02739590

**Fig. 417: Removing Special Tool**  
Courtesy of FORD MOTOR CO.

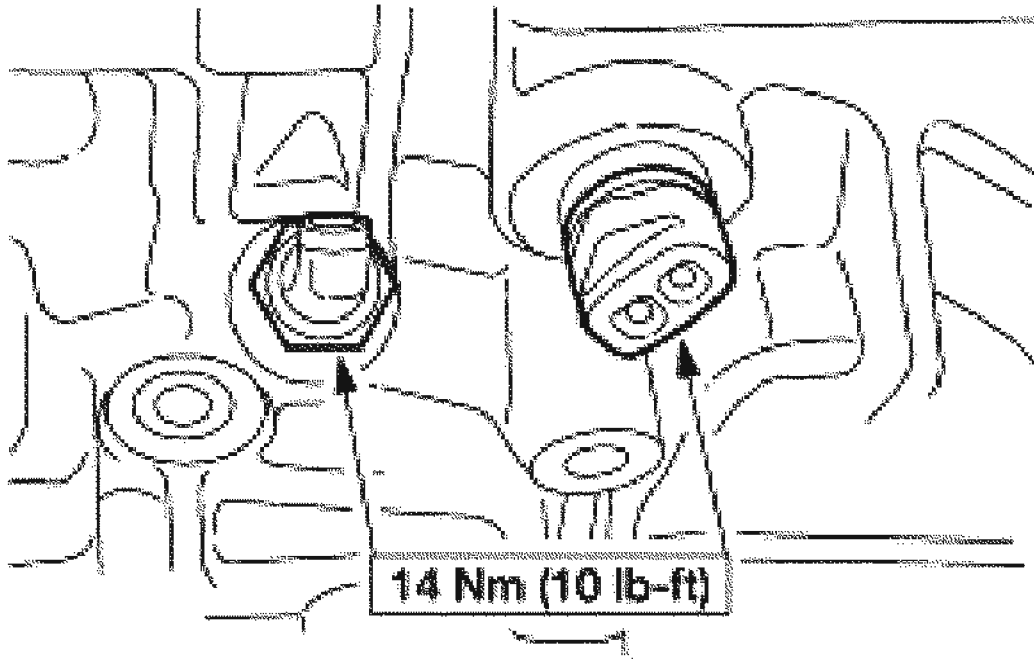
72. Position the coolant bypass tube and connect the hoses.



G02739591

**Fig. 418: Positioning Coolant Bypass Tube**  
Courtesy of FORD MOTOR CO.

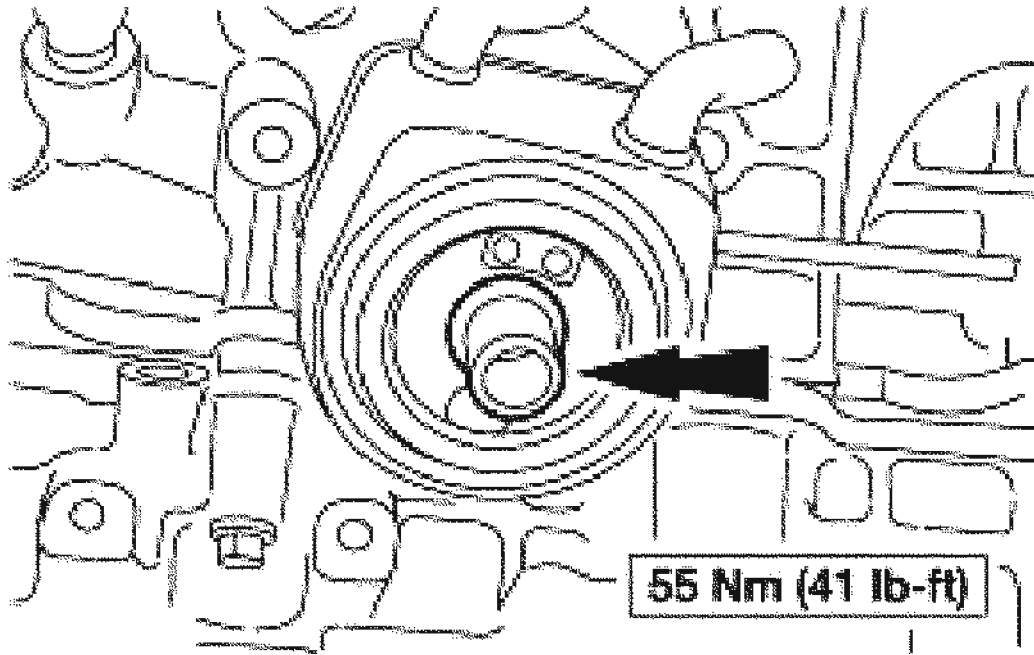
73. Install the oil pressure sender and the block heater.



G02739592

**Fig. 419: Installing Oil Pressure Sender And Block Heater**  
Courtesy of FORD MOTOR CO.

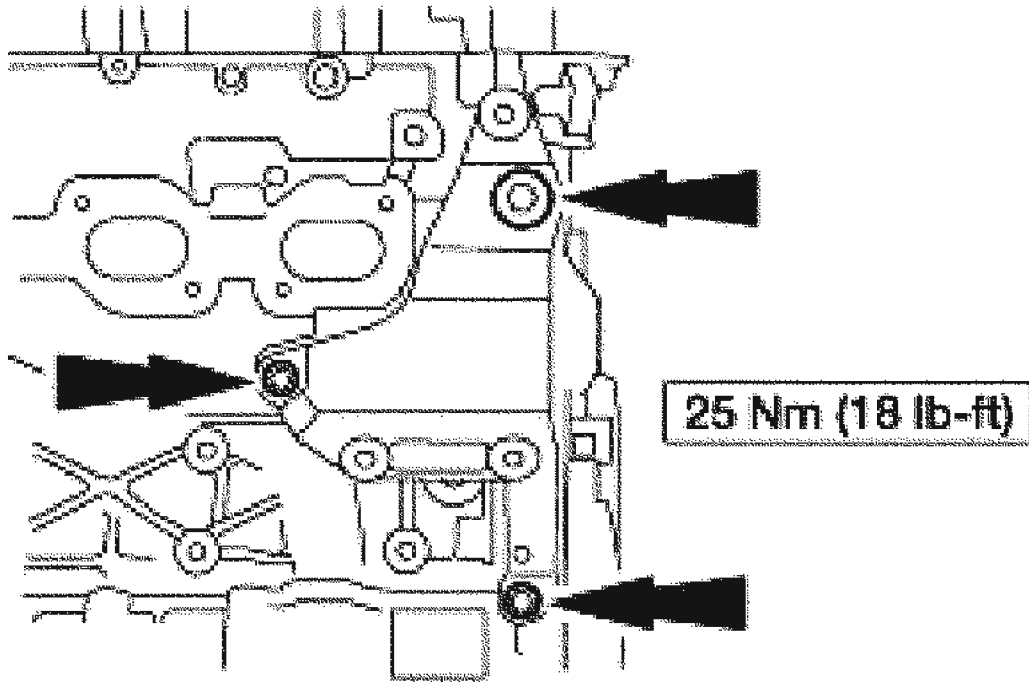
74. Install the oil cooler.



G02739593

**Fig. 420: Installing Oil Cooler**  
Courtesy of FORD MOTOR CO.

75. Install the generator support bracket.

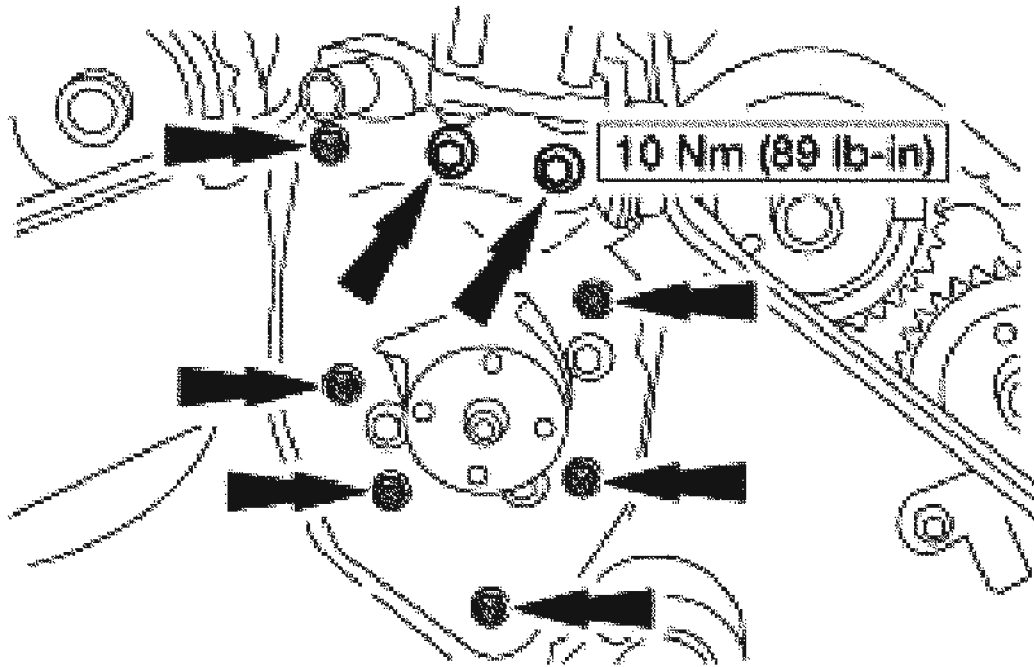


G02739594

**Fig. 421: Identifying Generator Support Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

76. Install the power steering pump.

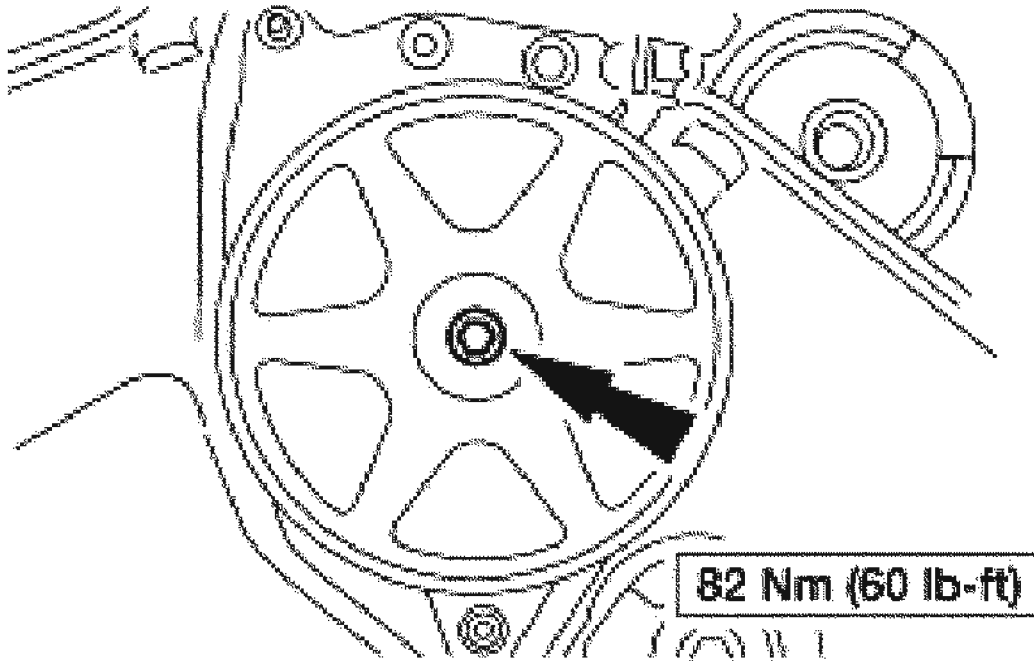




G02739595

**Fig. 422: Identifying Power Steering Pump Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

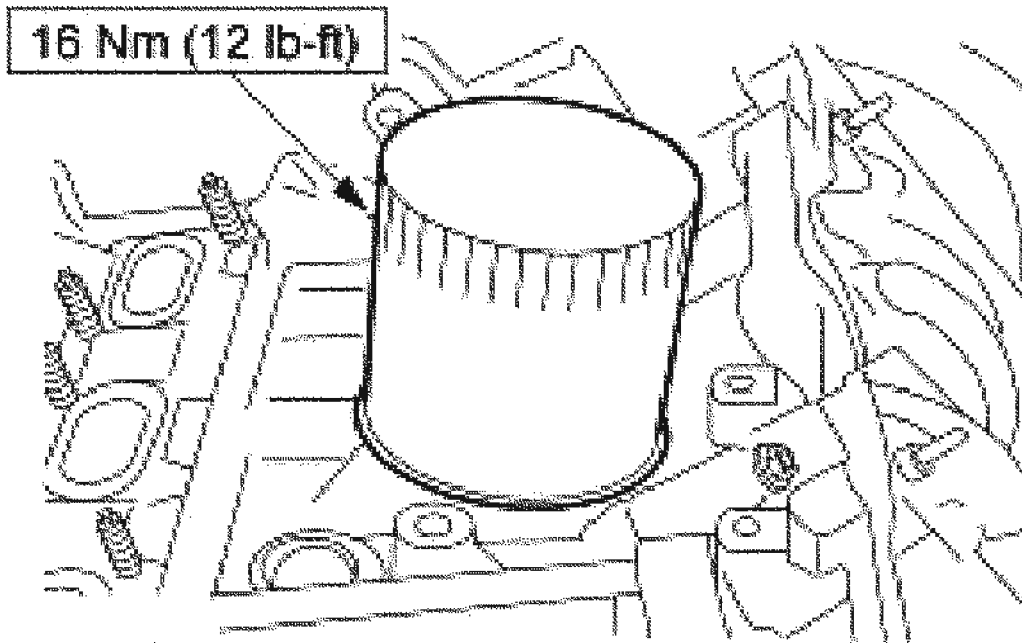
77. Install the power steering pump pulley.



G02739596

**Fig. 423: Identifying Power Steering Pump Pulley Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

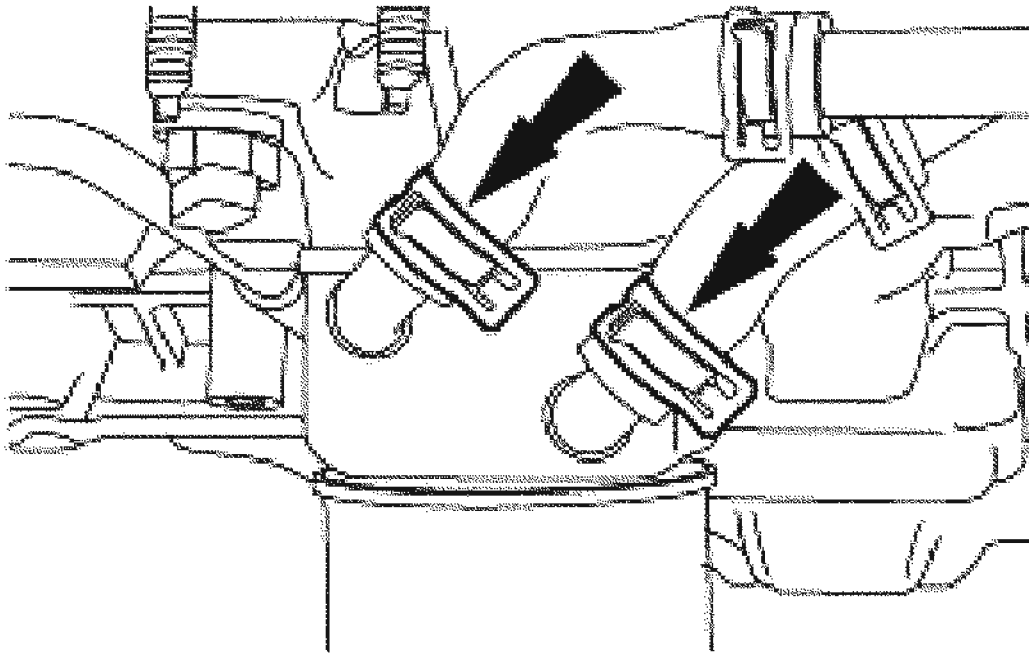
78. Lubricate the O-ring seal and install the oil filter.



G02739597

**Fig. 424: Installing Oil Filter**  
Courtesy of FORD MOTOR CO.

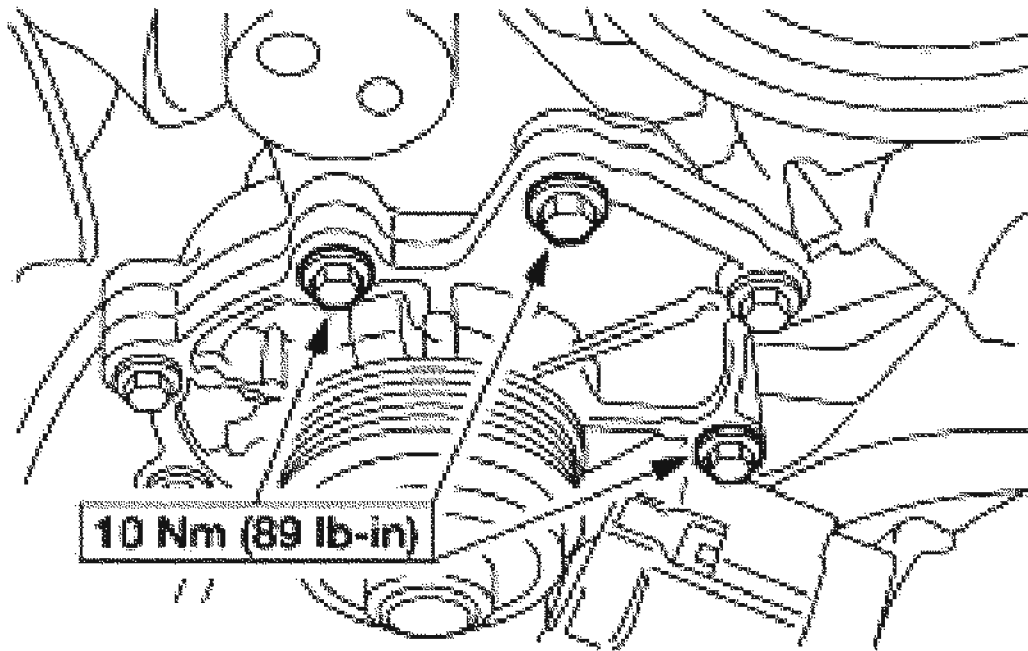
79. Connect the coolant hoses at the oil cooler.



G02739598

**Fig. 425: Connecting Coolant Hoses At Oil Cooler**  
Courtesy of FORD MOTOR CO.

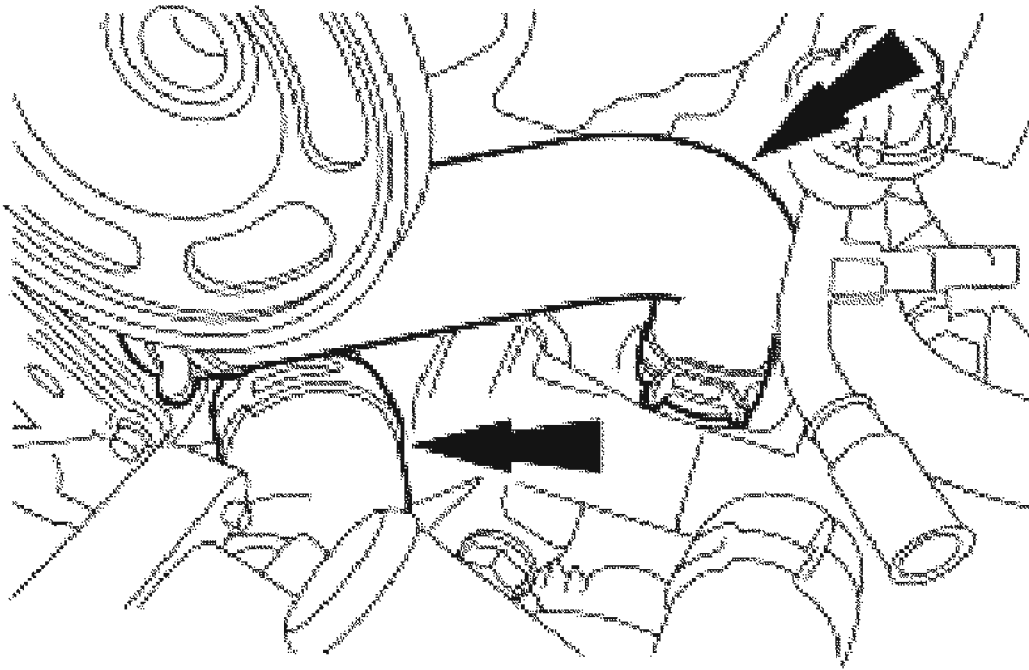
80. Install the water pump assembly.



G02739599

**Fig. 426: Identifying Water Pump Assembly Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

81. Connect the hoses.

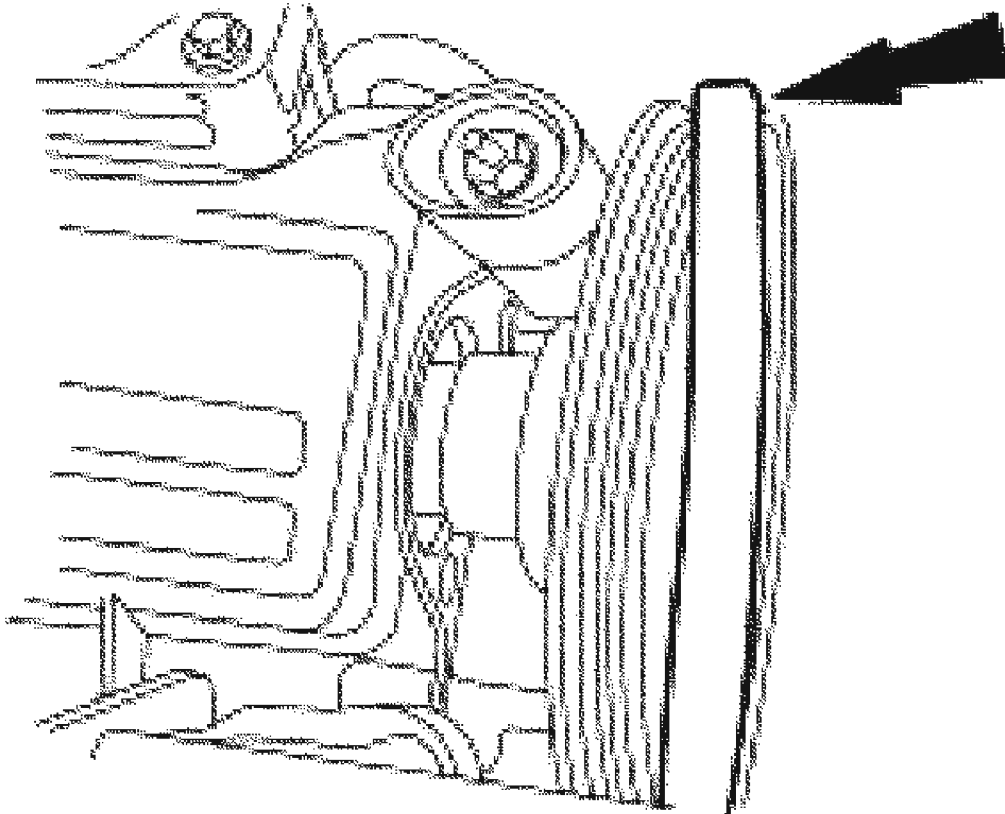


G02739600

**Fig. 427: Connecting Hoses**  
Courtesy of FORD MOTOR CO.

**Vehicles not equipped with water pump belt tensioner**

82. Install the water pump belt on the water pump pulley and position it on the camshaft pulley.



G02739601

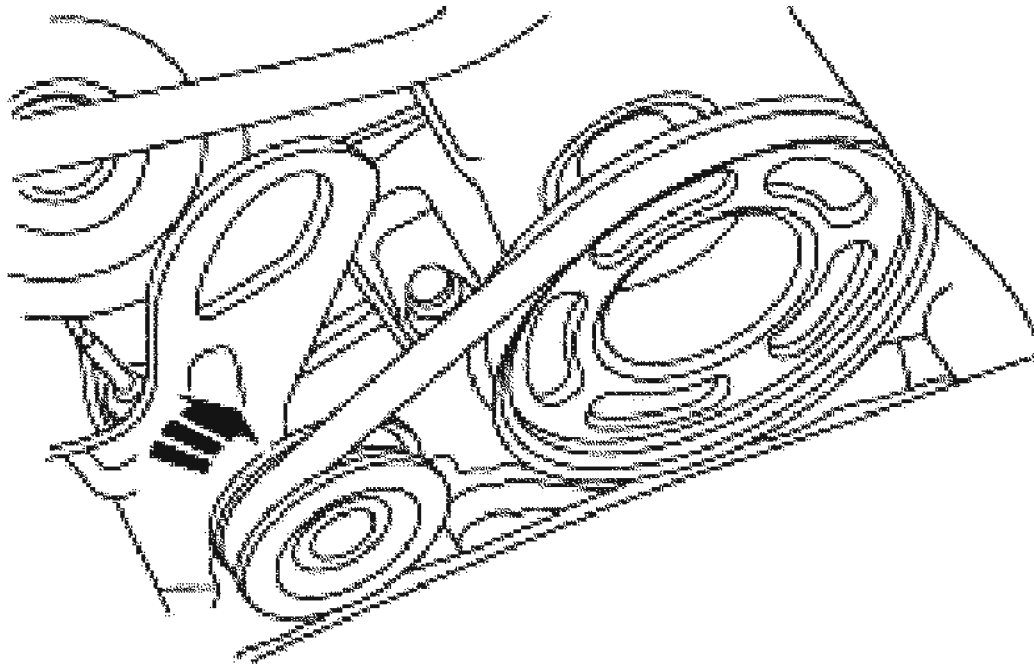
**Fig. 428: Installing Water Pump Belt On Water Pump Pulley**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use any screwdrivers, pliers or other metal objects that could cause damage to the belt or camshaft pulley while installing the belt.

83. Rotate the crankshaft clockwise to seat the water pump belt on the camshaft pulley.

**Vehicles equipped with water pump belt tensioner**

84. Rotate the drive belt tensioner clockwise and install the water pump belt.



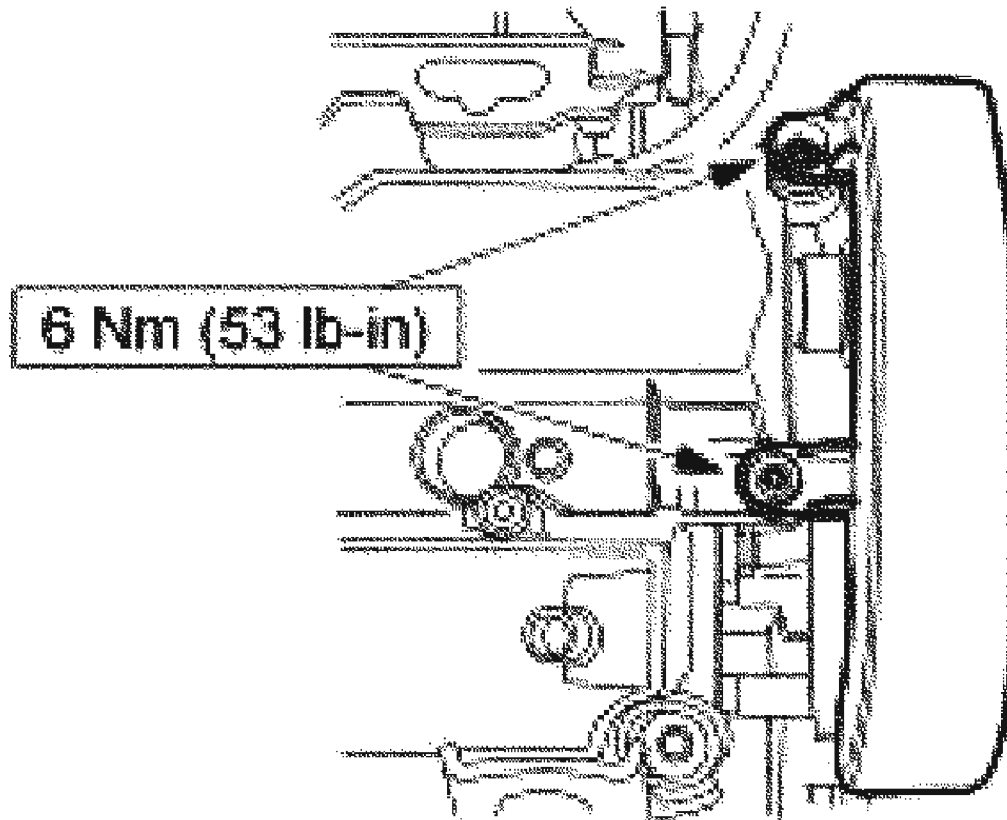
G02739602

**Fig. 429: Rotating Drive Belt Tensioner Clockwise**  
Courtesy of FORD MOTOR CO.

**All vehicles**

85. Install the water pump belt cover.

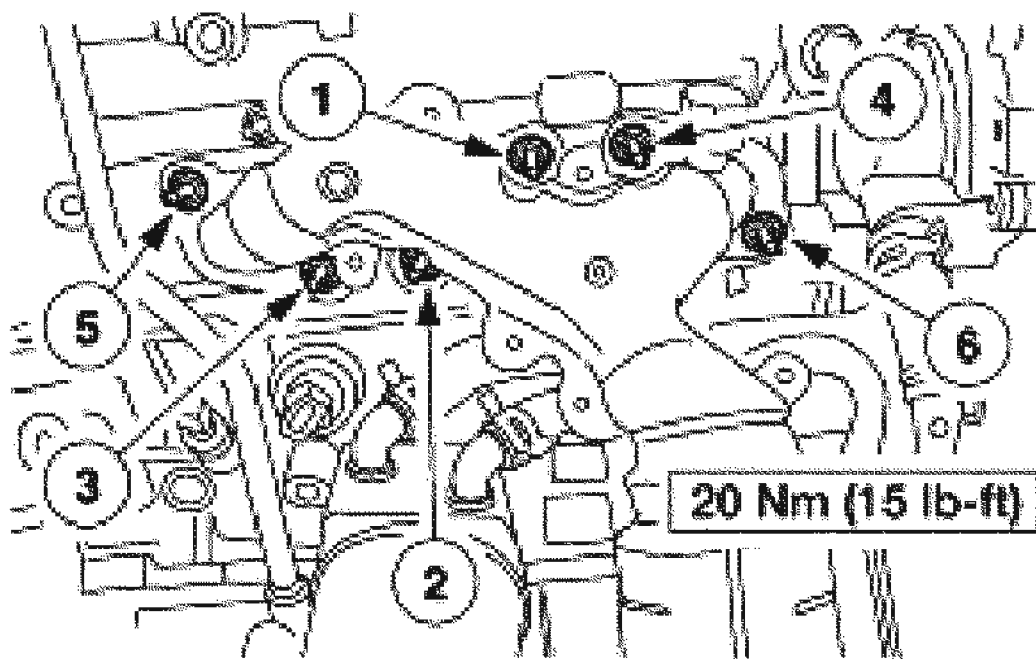




G02739603

**Fig. 430: Identifying Water Pump Belt Cover Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

86. Position a new gasket and tighten the exhaust manifold nuts in the sequence shown.

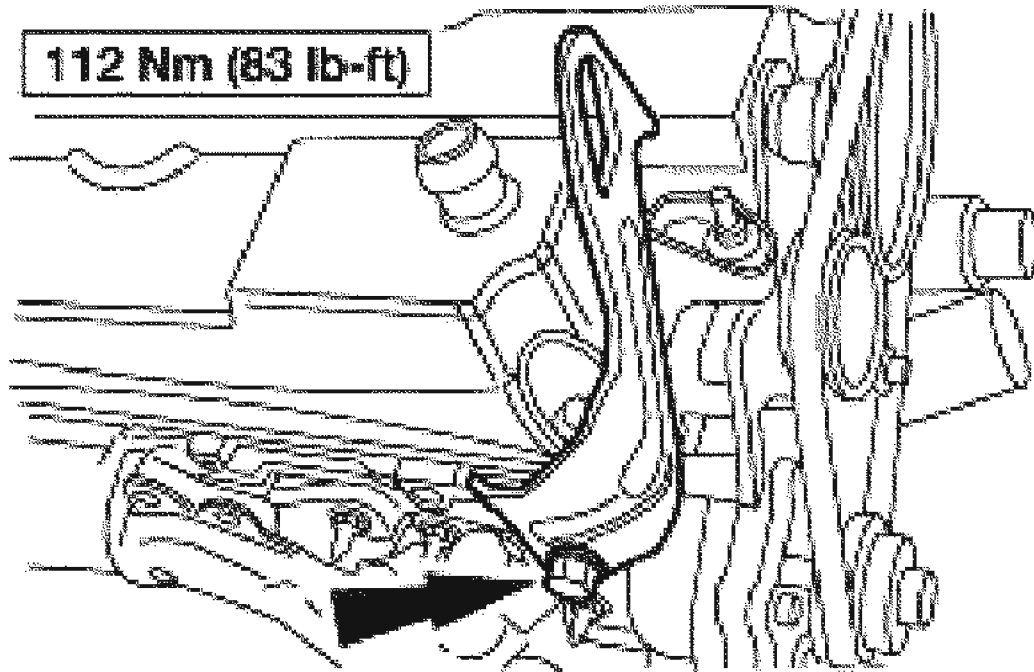


G02739604

**Fig. 431: Identifying Exhaust Manifold Nuts Tightening Sequence & Torque Specification**

Courtesy of FORD MOTOR CO.

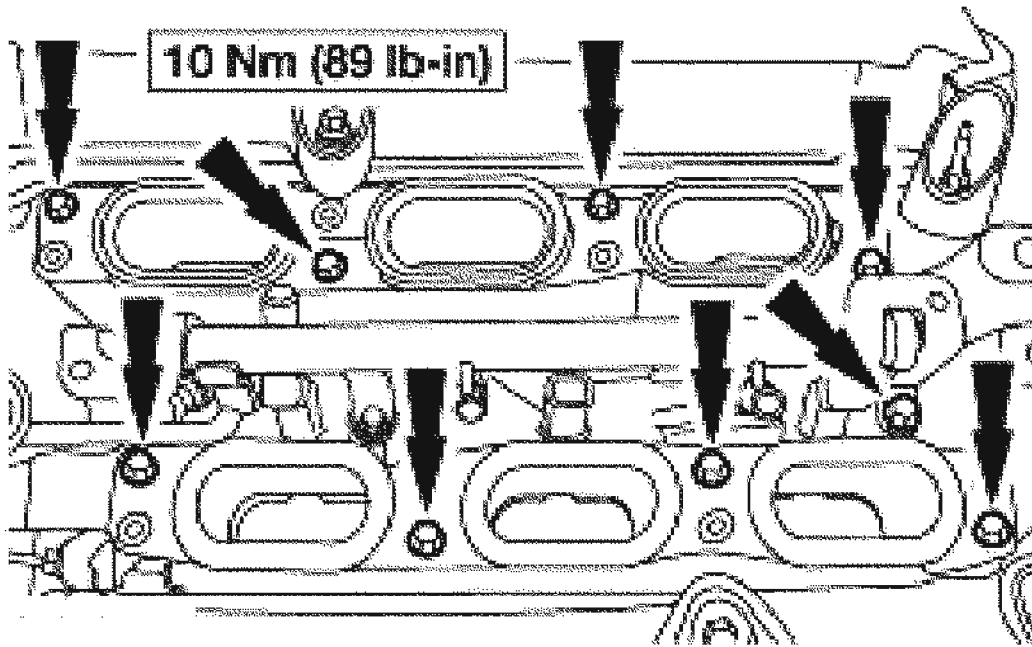
87. Install the engine lift bracket.



G02739605

**Fig. 432: Identifying Engine Lift Brackets Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

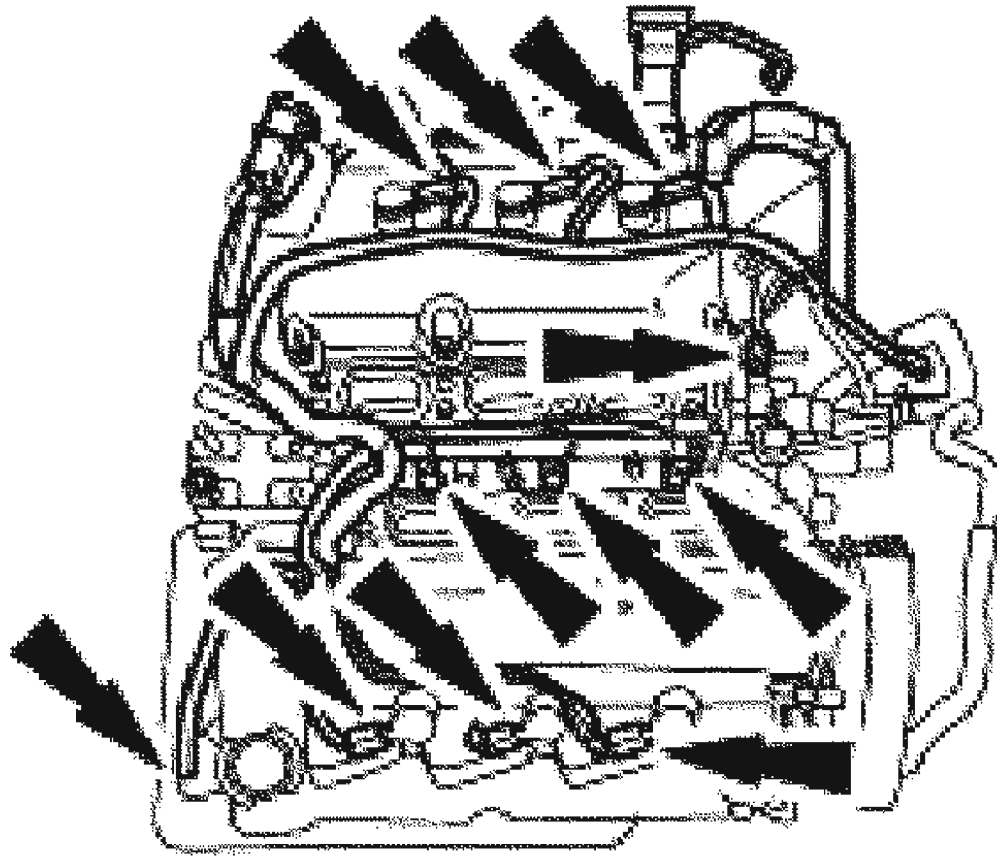
88. Clean the sealing area, position the gasket and install the lower intake manifold.



G02739606

**Fig. 433: Identifying Torque Specification Of Lower Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

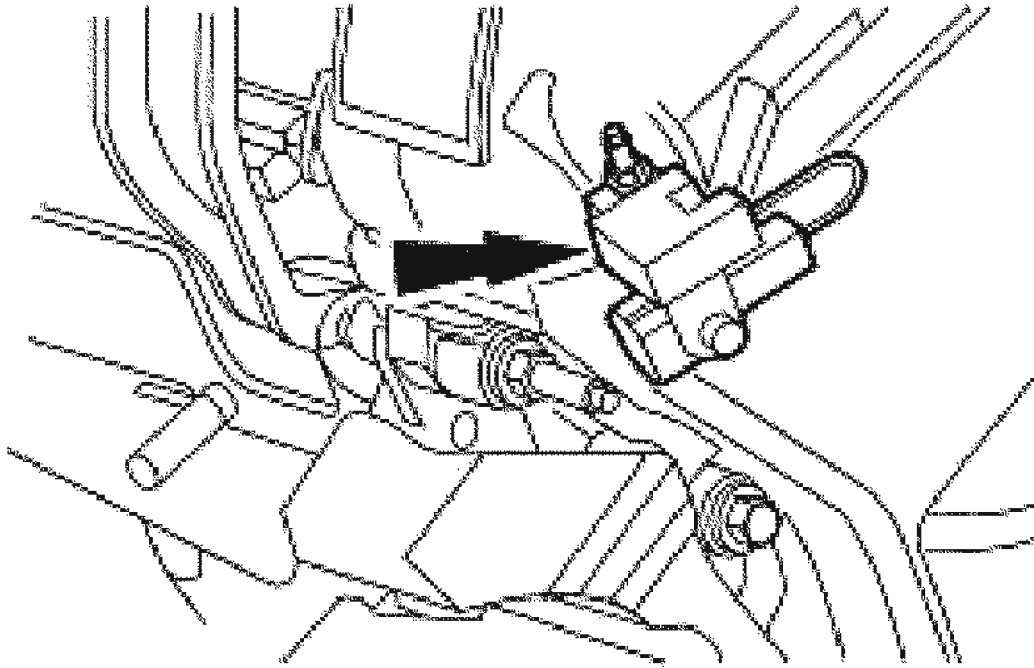
89. Position and connect the engine control sensor wiring in the locations shown.



G02739607

**Fig. 434: Connecting Engine Control Sensor Wiring**  
Courtesy of FORD MOTOR CO.

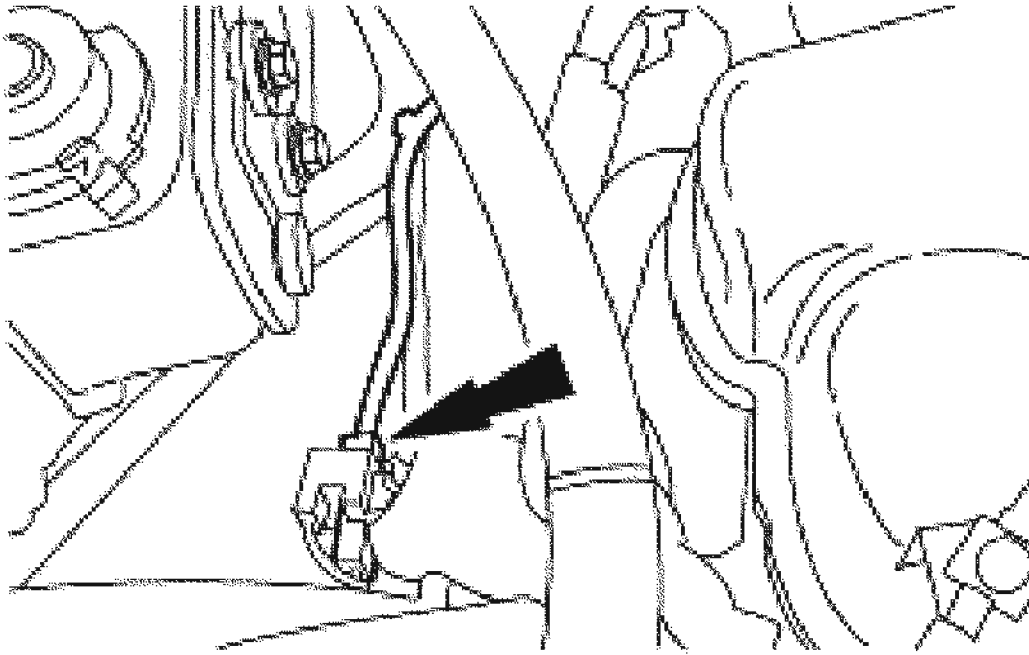
90. Install the radio interference capacitor and the retaining nut.



G02739608

**Fig. 435: Installing Radio Interference Capacitor**  
Courtesy of FORD MOTOR CO.

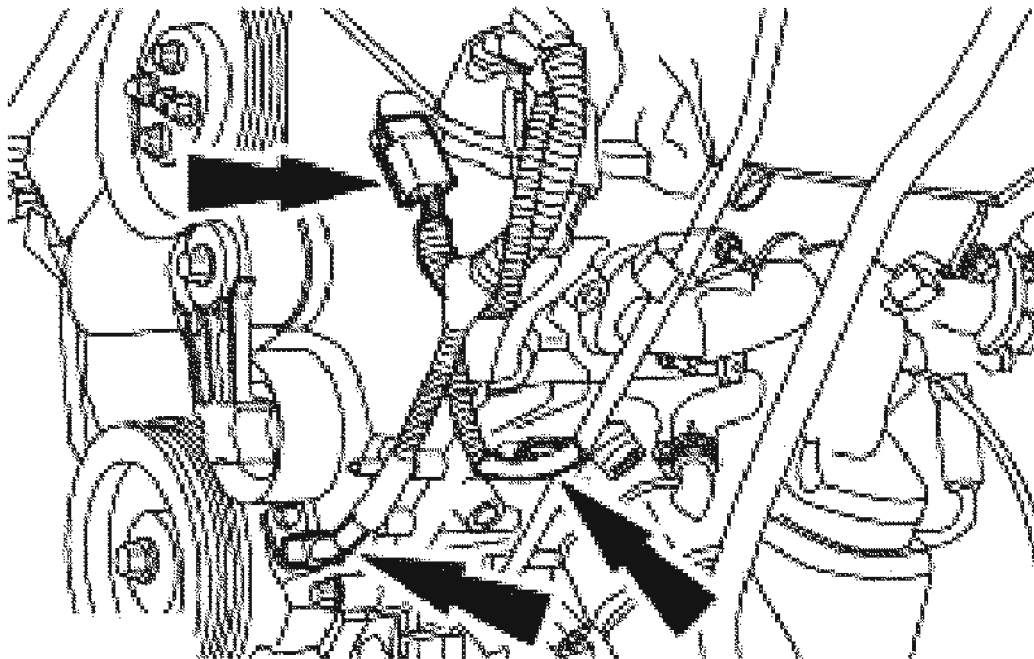
91. Install the radio ignition noise suppressor electrical connector.



G02739609

**Fig. 436: Installing Radio Ignition Noise Suppressor Electrical Connector**  
Courtesy of FORD MOTOR CO.

92. Connect the crankshaft and camshaft position sensor electrical connectors.



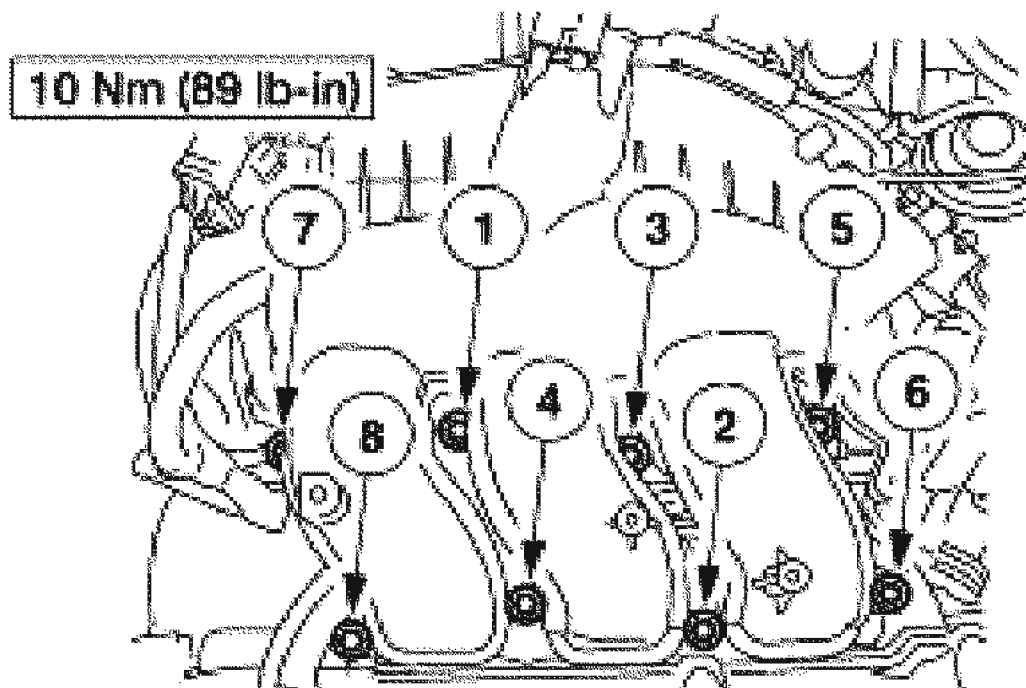
G02739610

**Fig. 437: Connecting Crankshaft And Camshaft Position Sensor Electrical Connectors**

**Courtesy of FORD MOTOR CO.**

93. Install new gaskets in the upper intake manifold.
94. Clean the sealing area and install the upper intake manifold.

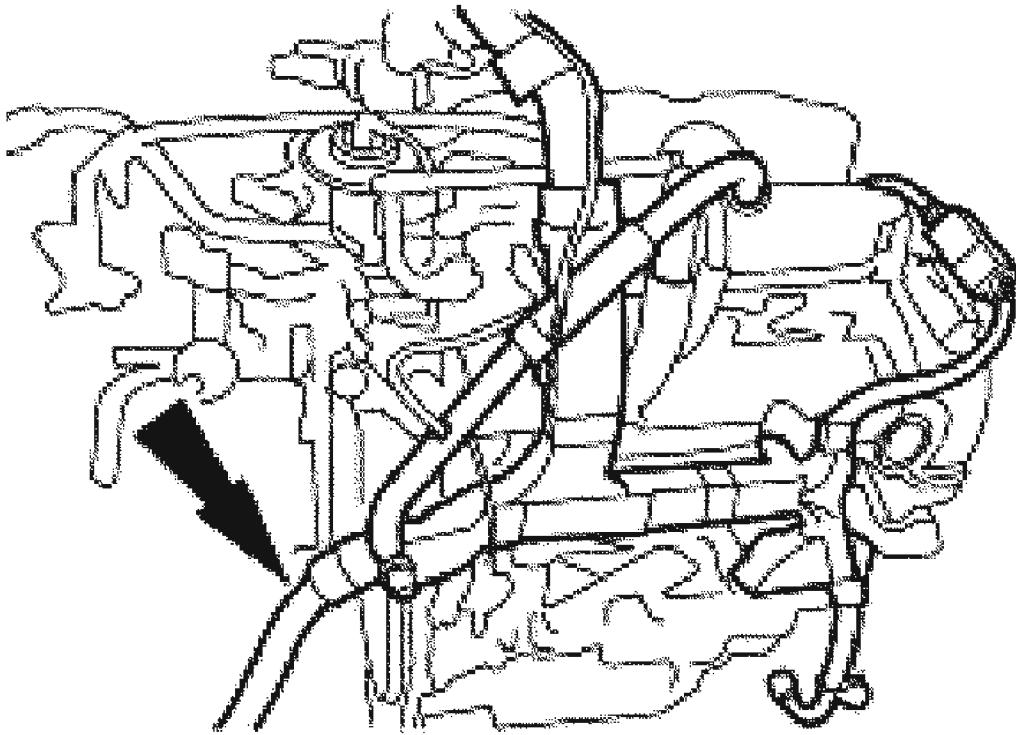




G02739611

**Fig. 438: Identifying Tightening Sequence & Torque Specification Of Upper Intake Manifold Bolts**  
Courtesy of FORD MOTOR CO.

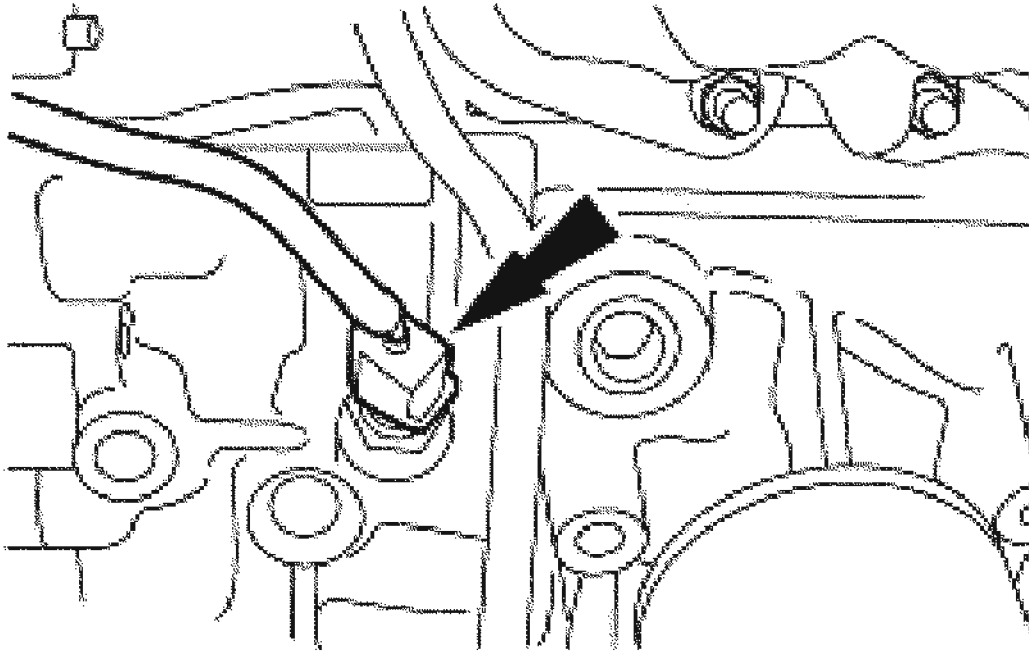
95. Install and connect the engine control wire harness.



G02739612

**Fig. 439: Connecting Engine Control Wire Harness**  
**Courtesy of FORD MOTOR CO.**

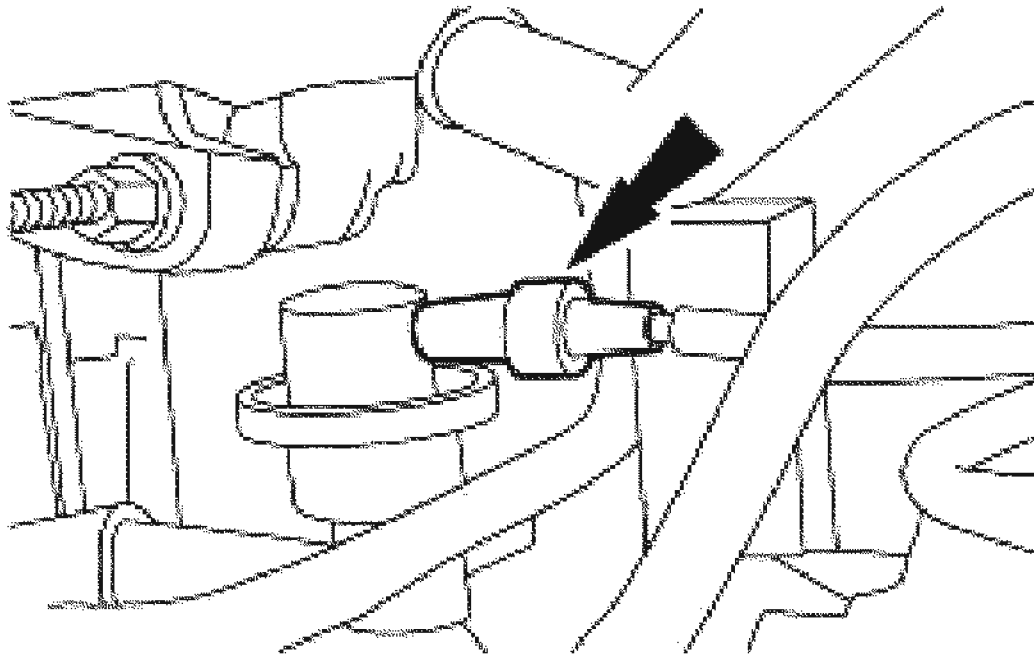
96. Connect the coolant temperature sender and the oil pressure switch.



G02739613

**Fig. 440: Connecting Coolant Temperature Sender And Oil Pressure Switch**  
Courtesy of FORD MOTOR CO.

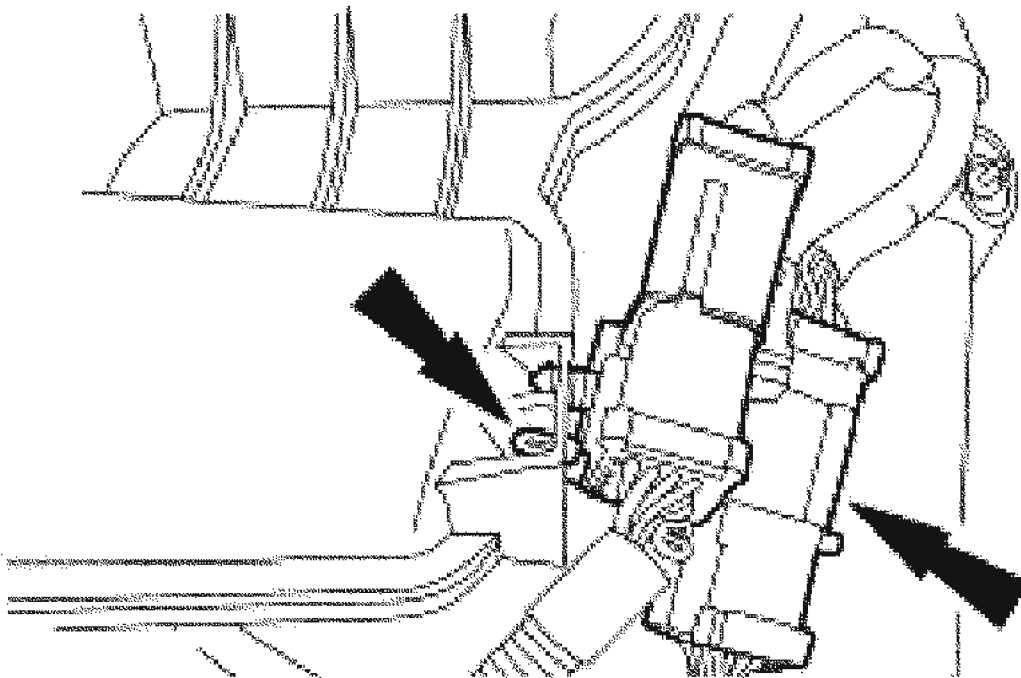
97. Connect the vacuum hose to the fuel pressure damper.



G02739614

**Fig. 441: Connecting Vacuum Hose To Fuel Pressure Damper**  
Courtesy of FORD MOTOR CO.

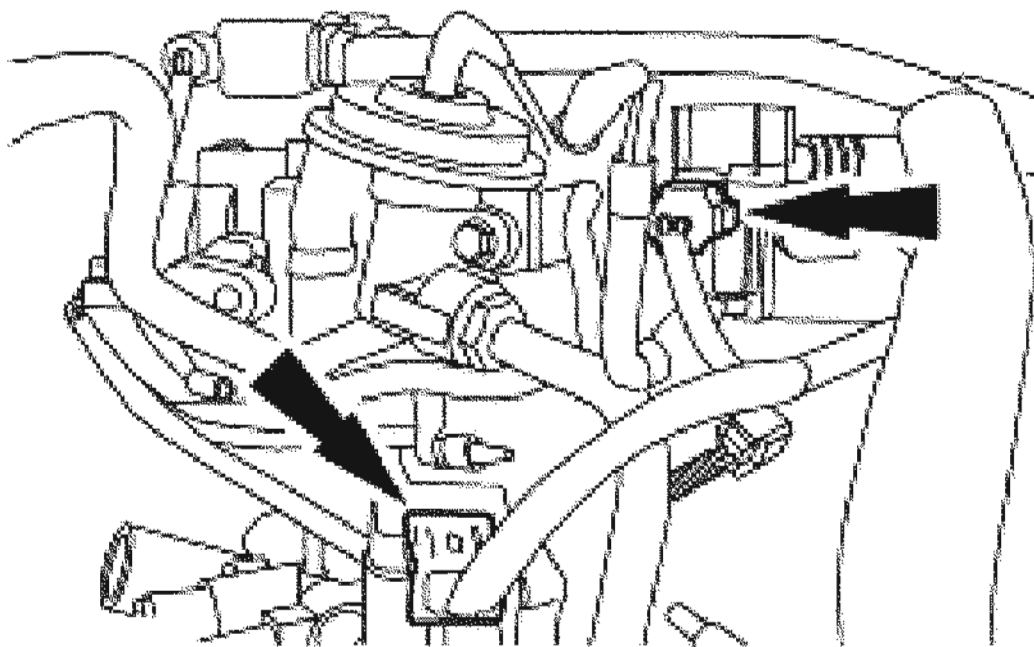
98. Connect the engine control sensor wiring to the upper intake manifold.



G02739615

**Fig. 442: Connecting Engine Control Sensor Wiring To Upper Intake Manifold**  
Courtesy of FORD MOTOR CO.

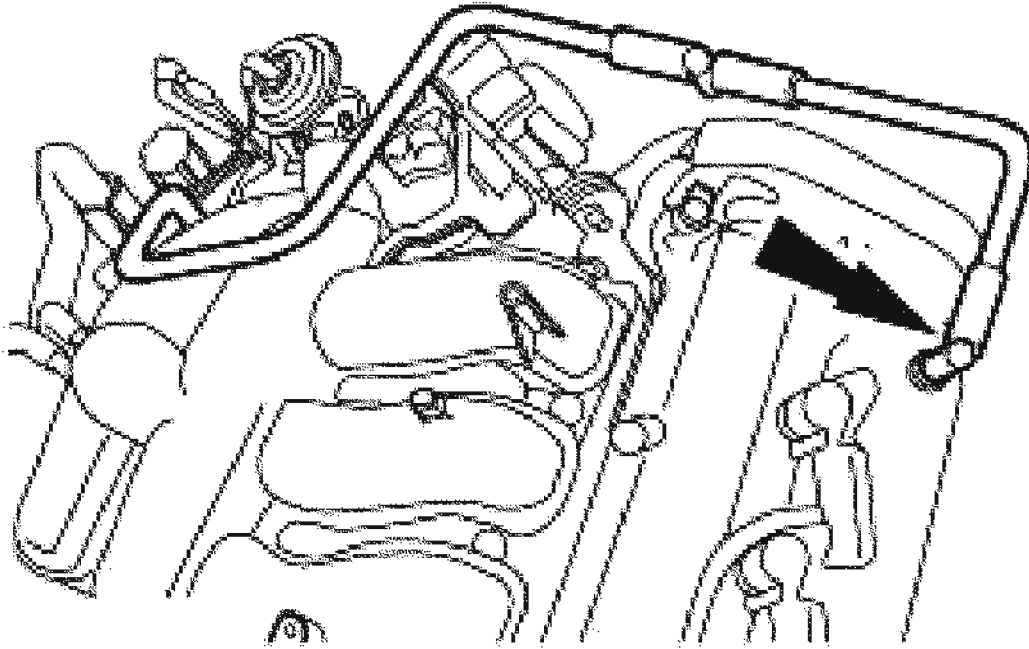
99. Connect the EGR vacuum regulator solenoid and the differential pressure feedback EGR system electrical connectors.



G02739616

**Fig. 443: Connecting EGR Vacuum Regulator Solenoid And Differential Pressure Feedback EGR System Electrical Connectors**  
Courtesy of FORD MOTOR CO.

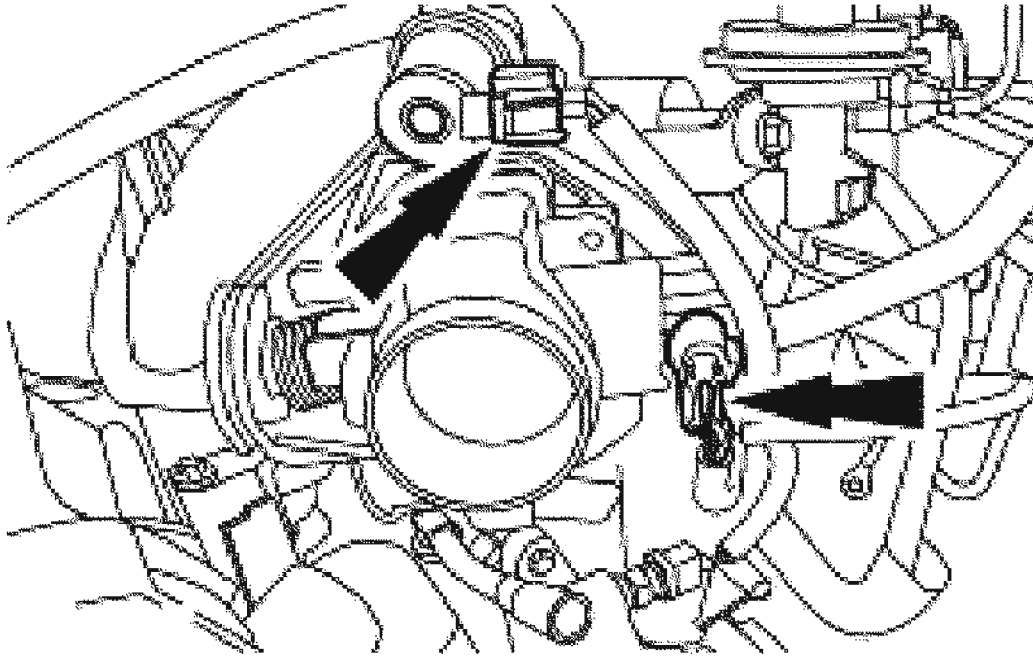
100. Install the PCV tube.



G02739617

**Fig. 444: Installing PCV Tube**  
Courtesy of FORD MOTOR CO.

101. Connect the idle air control (IAC) valve and the throttle position (TP) sensor electrical connectors.



G02739618

**Fig. 445: Connecting Idle Air Control (IAC) Valve And Throttle Position (TP) Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

## INSTALLATION

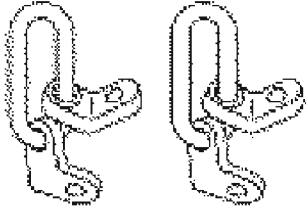
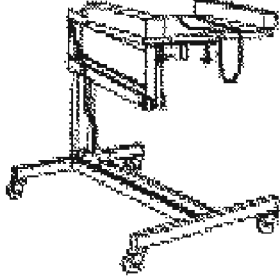

### ENGINE

#### Special Tool(s)



## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

	Lifting Bracket, Engine 303-050 (T70P-6000)
	Powertrain Lift with Tilting Plate 014-00765
	Spreader Bar 303-D089 (D93P-6001-A3) or Equivalent

G02739619

**Fig. 446: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Material

### MATERIAL SPECIFICATION

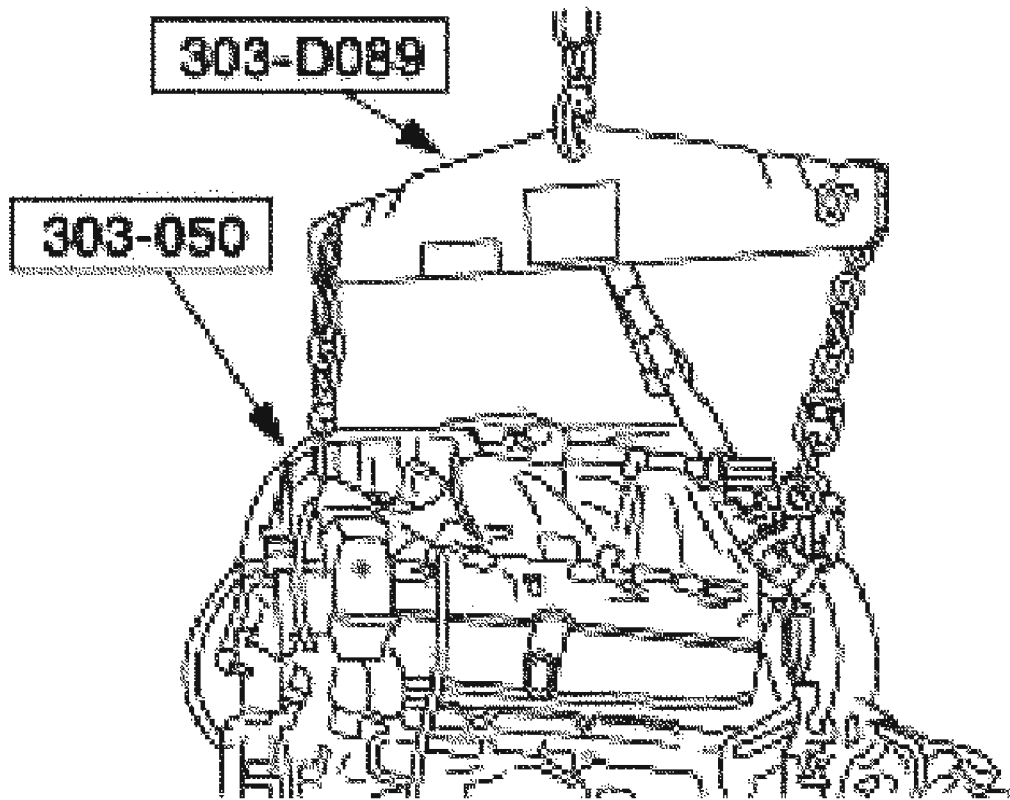
Item	Specification
SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C153-H
Silicone Gasket and Sealant F7AZ-19554-EA A4	WSE-M4G323-A4

### Installation

1. Position the engine onto the subframe assembly.

## 2004 Ford Escape

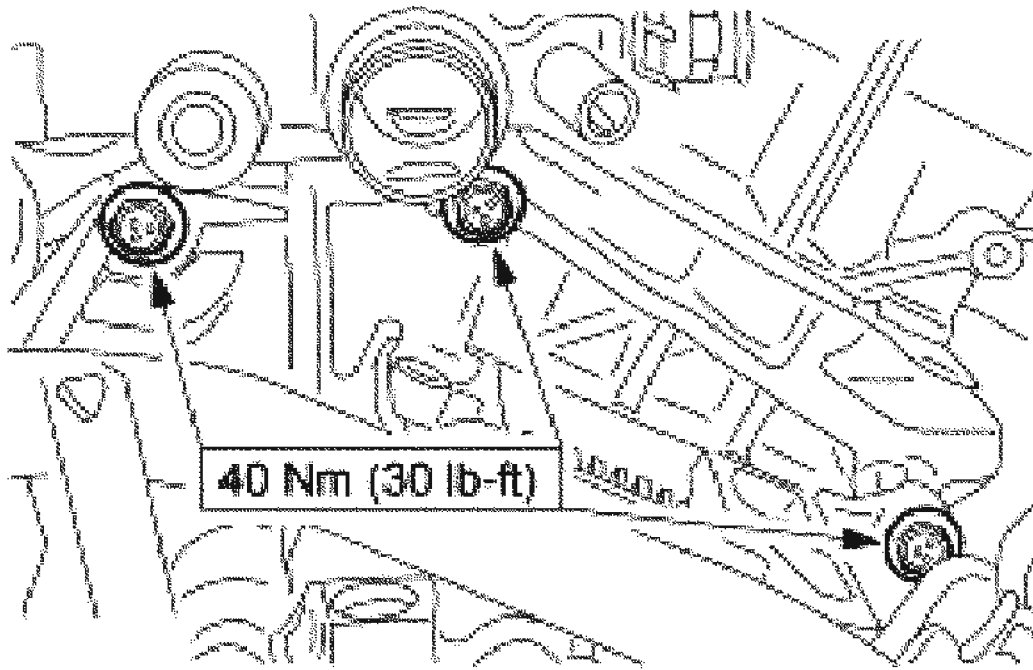
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739620

**Fig. 447: Installing Engine Onto Subframe Assembly**  
Courtesy of FORD MOTOR CO.

2. Install the five bolts in the transaxle.



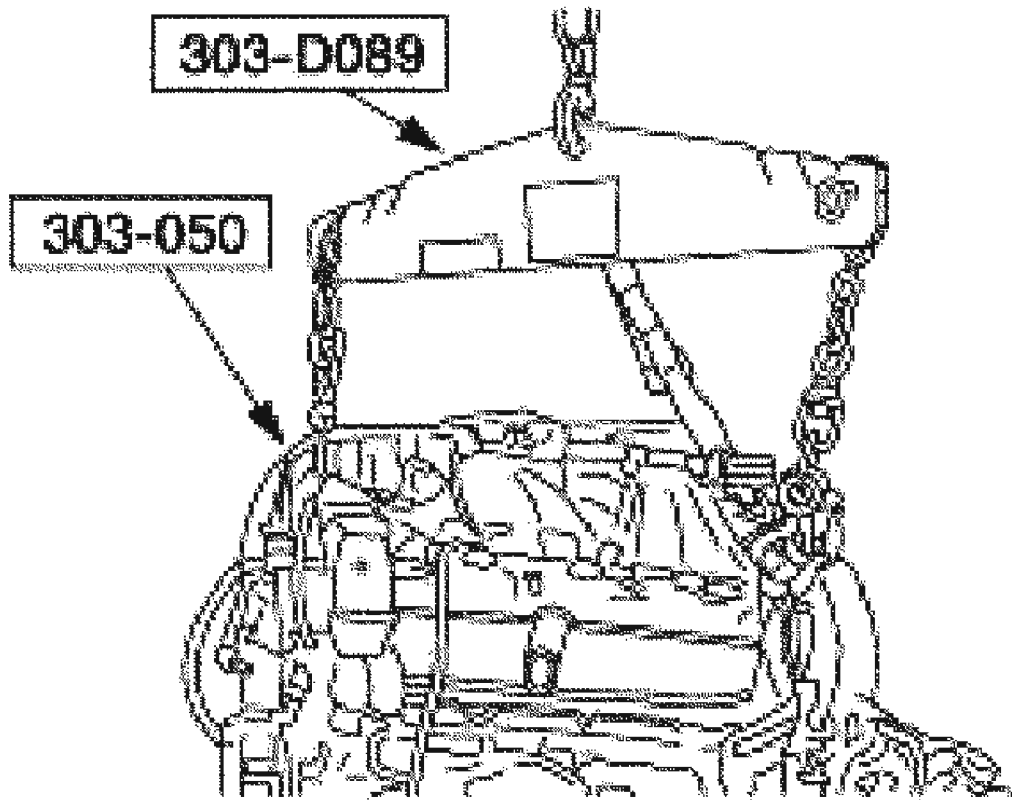
G02739621

**Fig. 448: Identifying Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

3. Using the special tools, position the powertrain on the universal powertrain lift and remove the special tools.

## 2004 Ford Escape

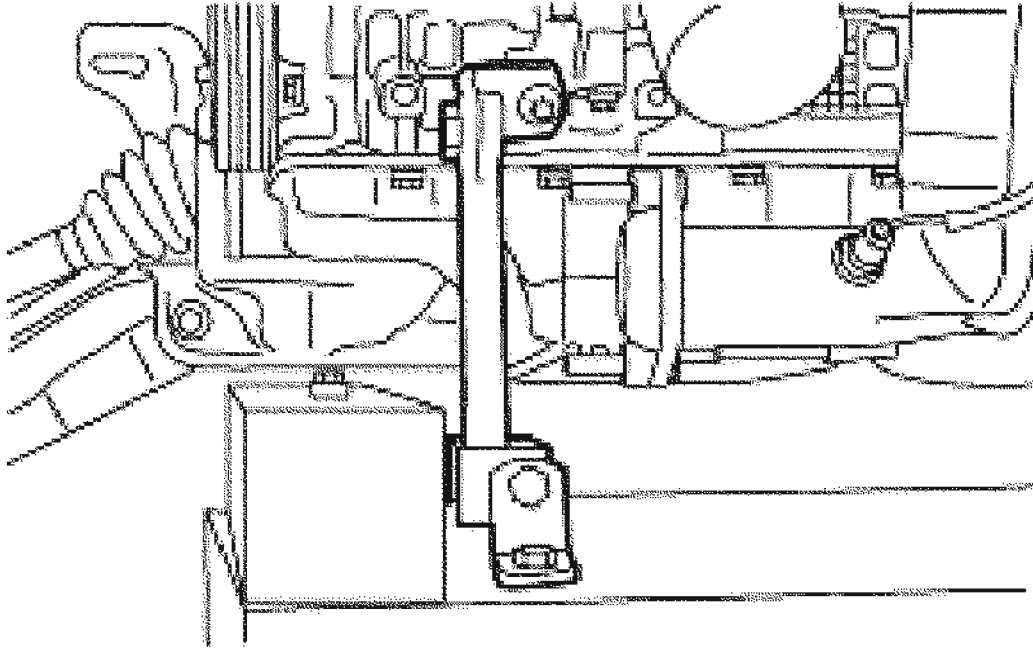
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739622

**Fig. 449: Installing Powertrain On Universal Powertrain Lift**  
Courtesy of FORD MOTOR CO.

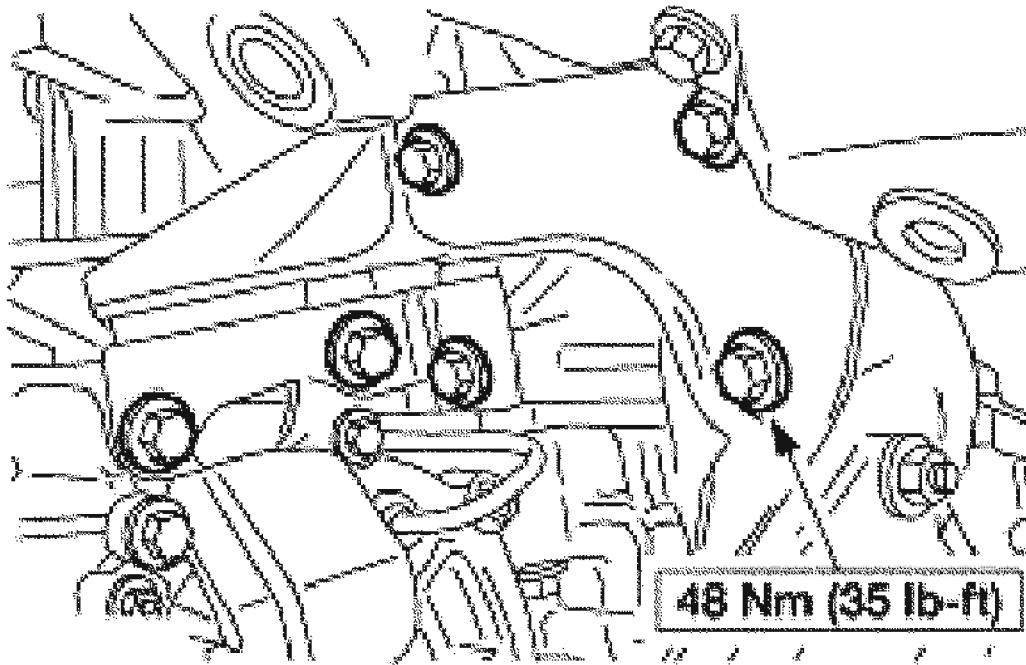
4. Using a bracket from a heavy-duty engine stand, support the front of the engine.



G02739623

**Fig. 450: Supporting Front Of Engine**  
Courtesy of FORD MOTOR CO.

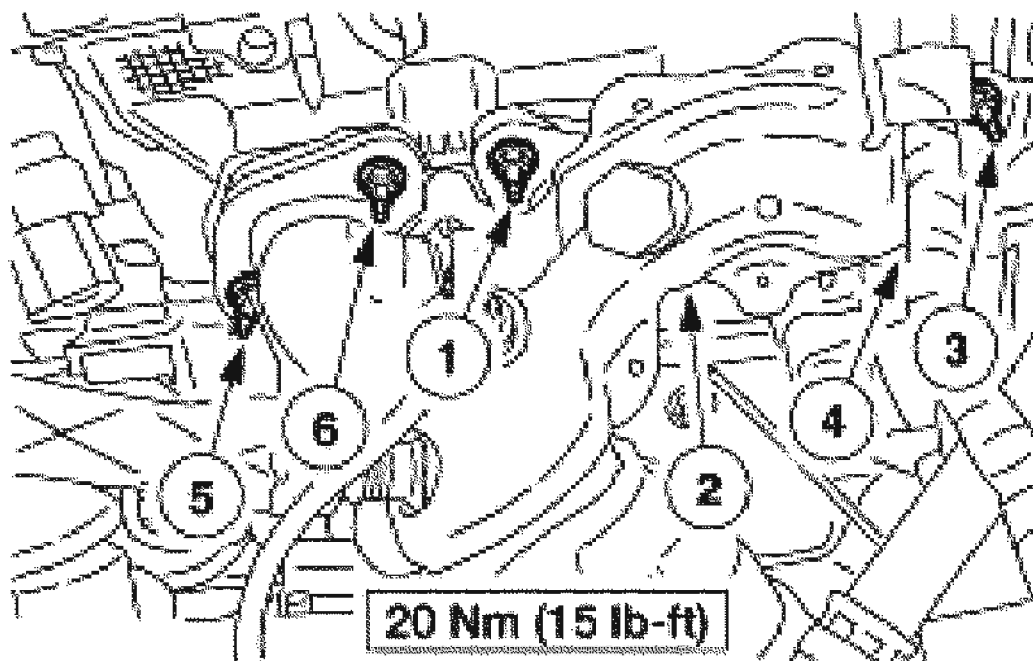
5. Position the halfshaft bracket and install the bolts.



G02739624

**Fig. 451: Identifying Halfshaft Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Install a new gasket and the RH exhaust manifold.

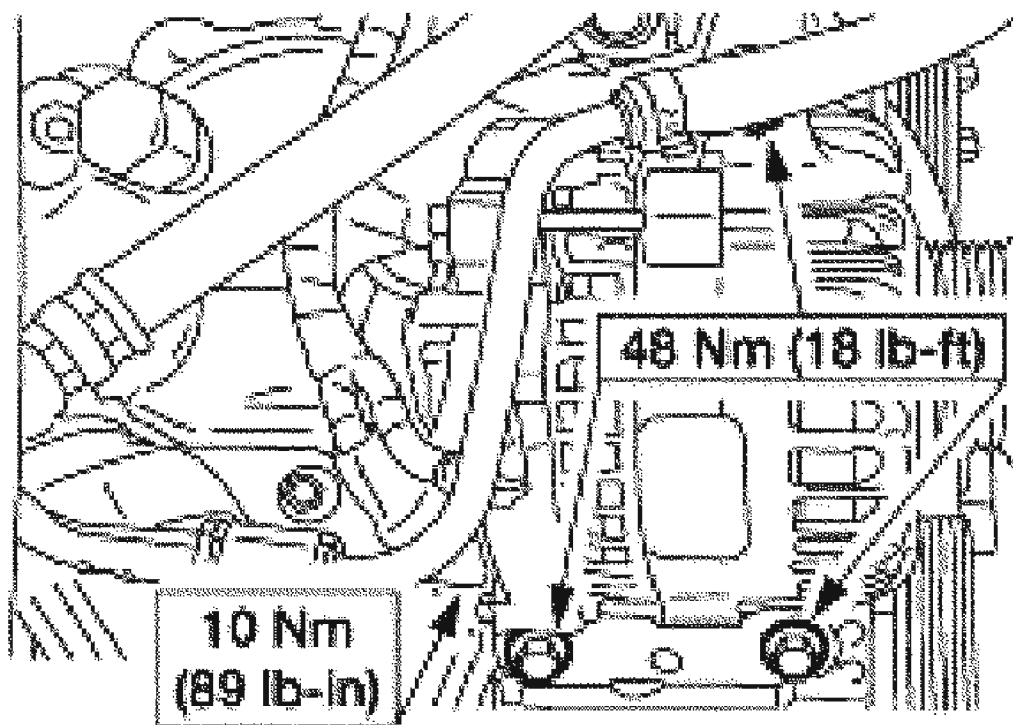


G02739625

**Fig. 452: Identifying Tightening Sequence & Torque Specification Of RH Exhaust Manifold Bolts**

Courtesy of FORD MOTOR CO.

7. Install the generator.

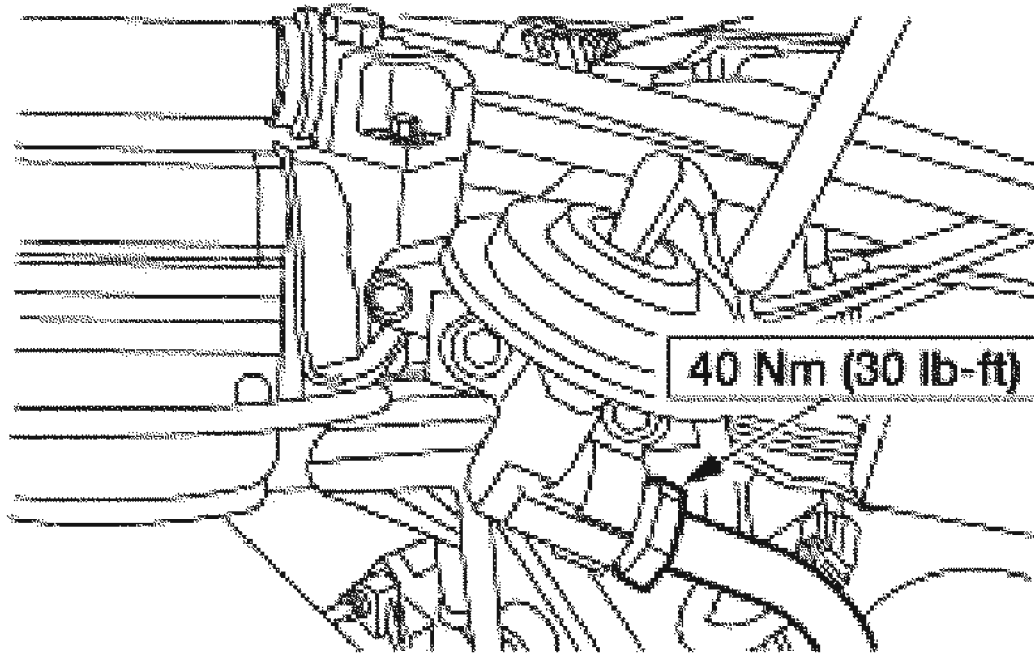


G02739626

**Fig. 453: Identifying Generator Bolts Torque Specifications**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not tighten the EGR tube until both ends of the tube have been connected.

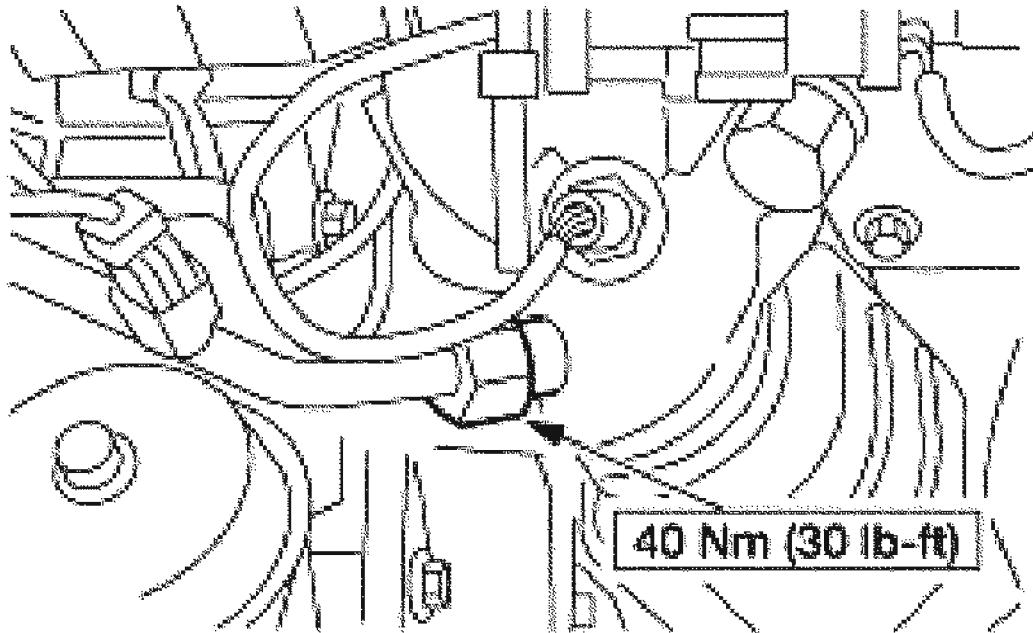




G02739627

**Fig. 454: Connecting EGR Tube And Fitting**  
Courtesy of FORD MOTOR CO.

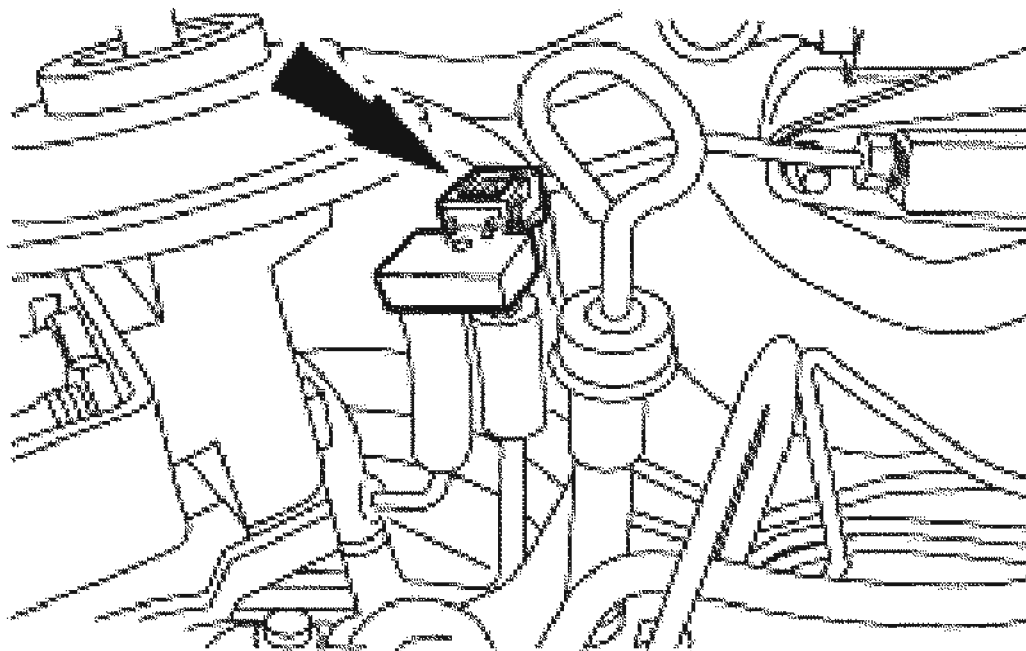
8. Position the EGR tube and connect the fitting.
9. Connect the EGR tube nut at the manifold connector.



G02739628

**Fig. 455: Connecting EGR Tube Nut At Manifold Connector**  
Courtesy of FORD MOTOR CO.

10. Connect the differential pressure feedback EGR system electrical connector.

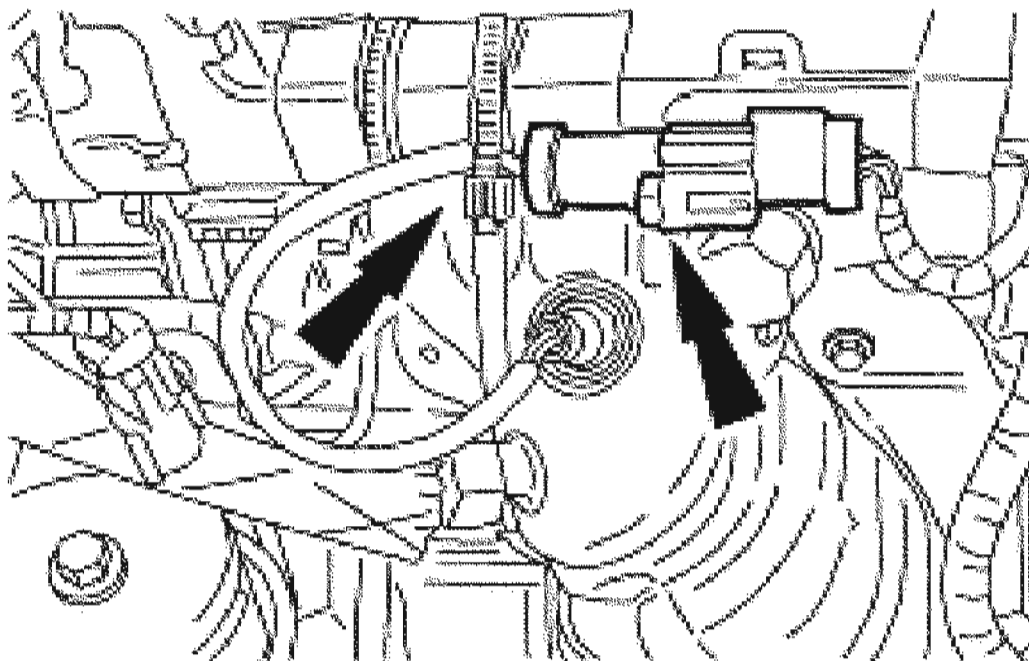


G02739629

**Fig. 456: Connecting Differential Pressure Feedback EGR System Electrical Connector**

**Courtesy of FORD MOTOR CO.**

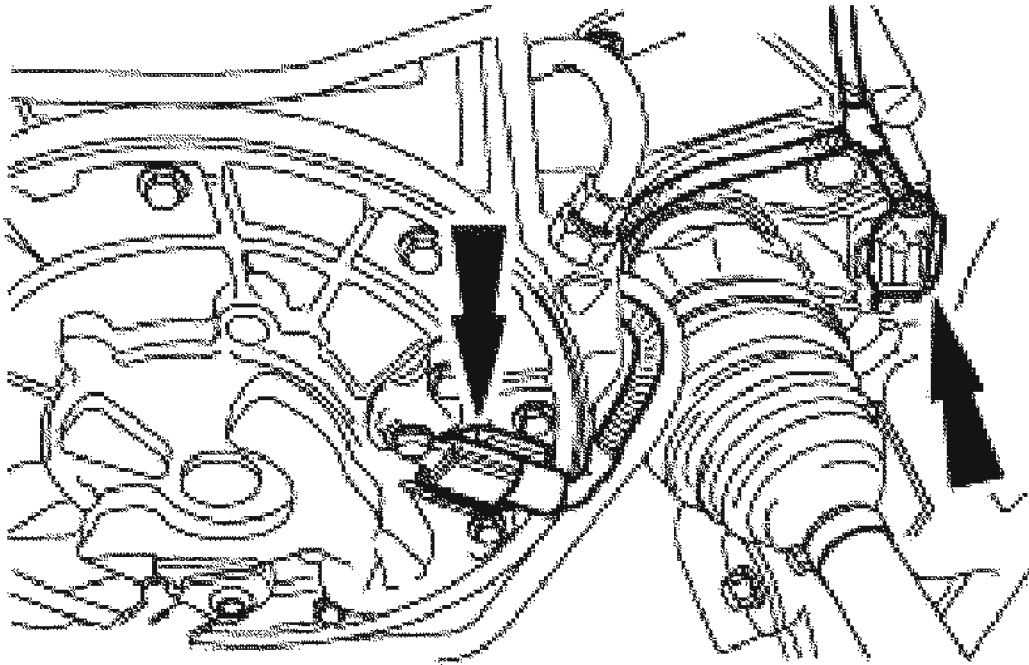
11. Connect the heated oxygen sensor (HO2S) electrical connector and install a new tie-strap.



G02739630

**Fig. 457: Connecting Heated Oxygen Sensor (HO2S) Electrical Connector**  
Courtesy of FORD MOTOR CO.

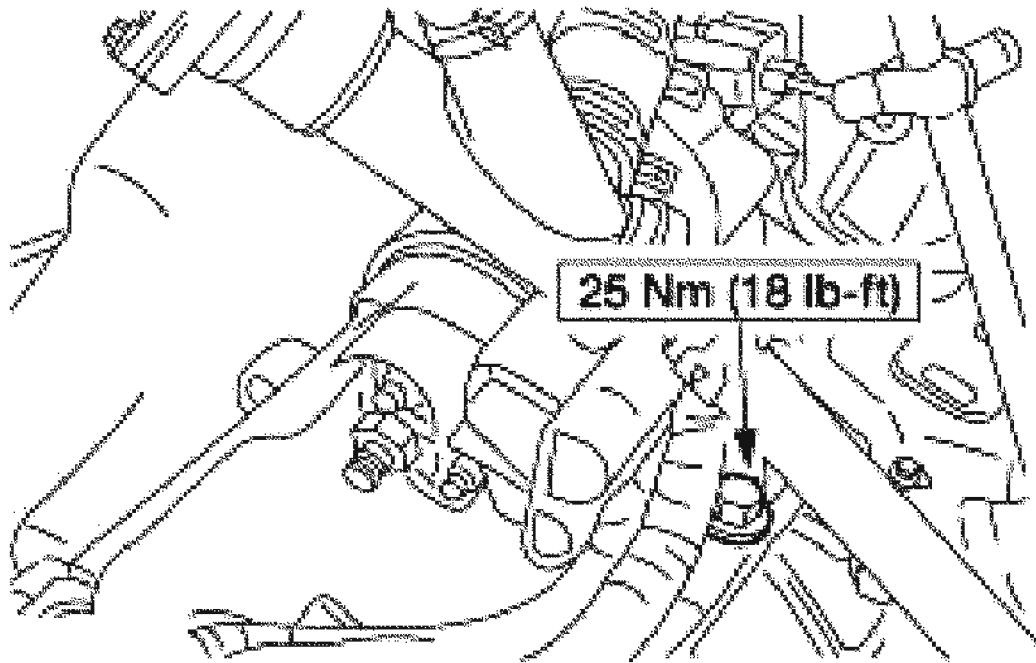
12. Connect the output shaft speed (OSS) sensor and turbine speed sensor (TSS) electrical connectors.



G02739631

**Fig. 458: Connecting Output Shaft Speed (OSS) Sensor And Turbine Speed Sensor (TSS) Electrical Connectors**  
Courtesy of FORD MOTOR CO.

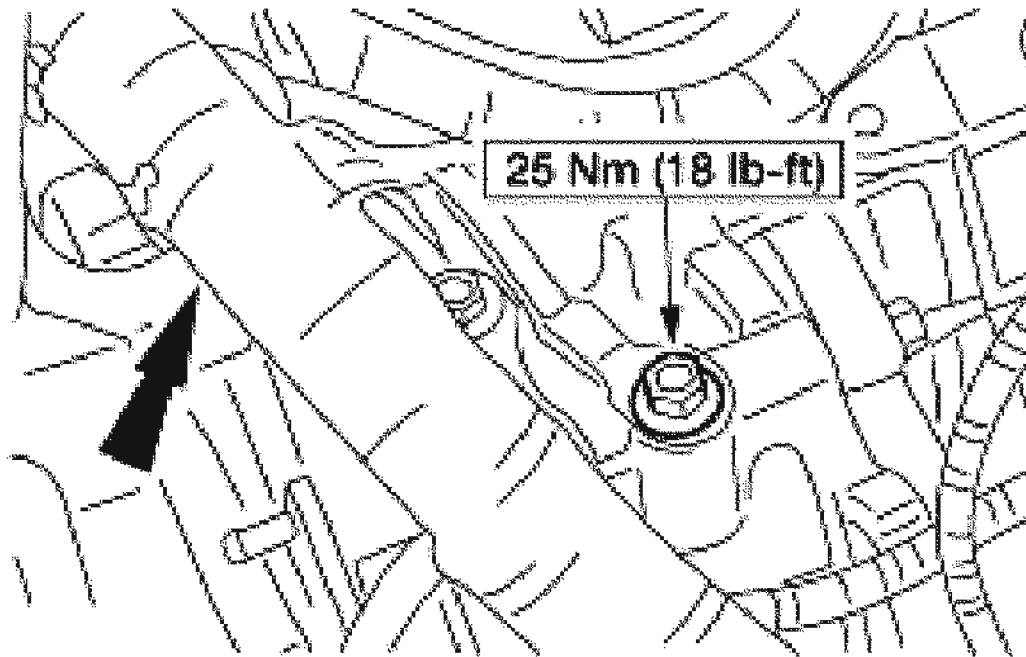
13. Install the starter.



G02739632

**Fig. 459: Identifying Starter Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

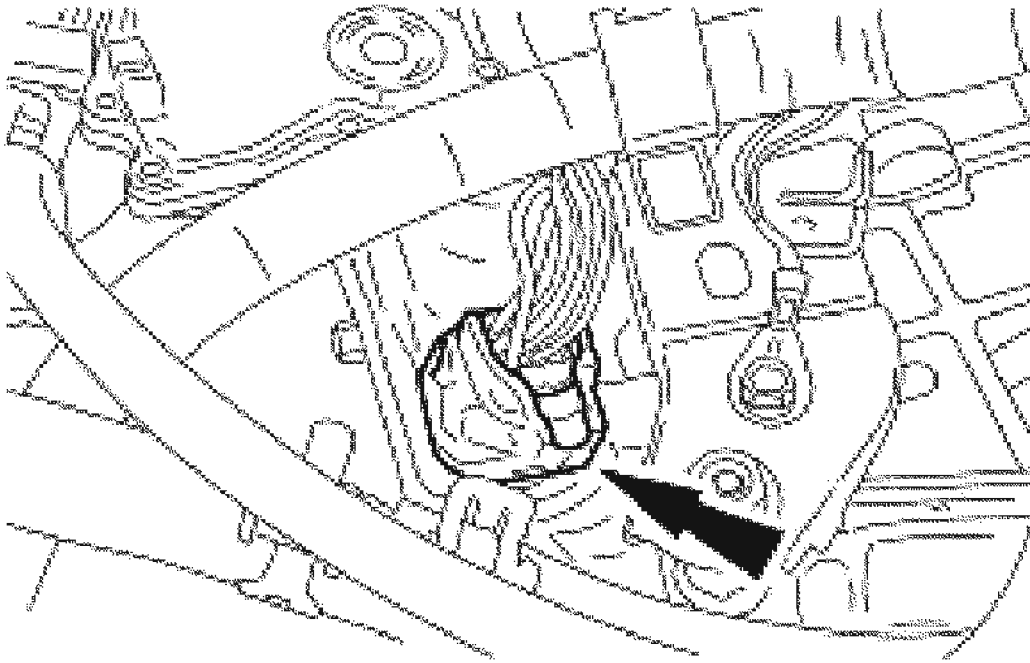
14. Install the bolt and connect the transaxle control harness to the bracket.



G02739633

**Fig. 460: Connecting Transaxle Control Harness To Bracket**  
Courtesy of FORD MOTOR CO.

15. Connect the transaxle harness.

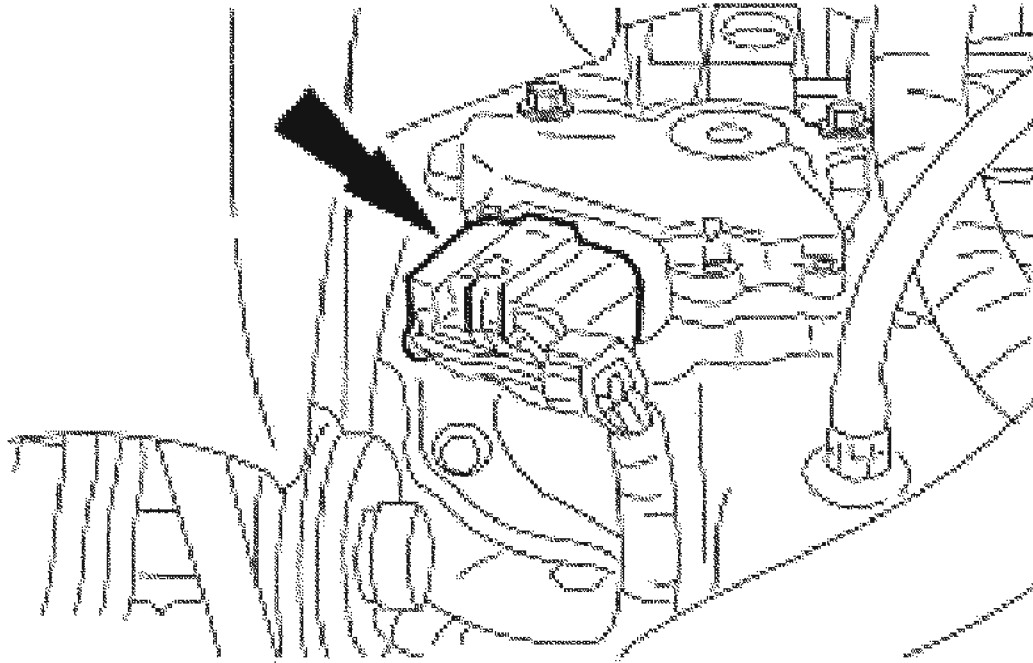


G02739634

**Fig. 461: Connecting Transaxle Harness**  
**Courtesy of FORD MOTOR CO.**

16. Connect the transmission range (TR) sensor.

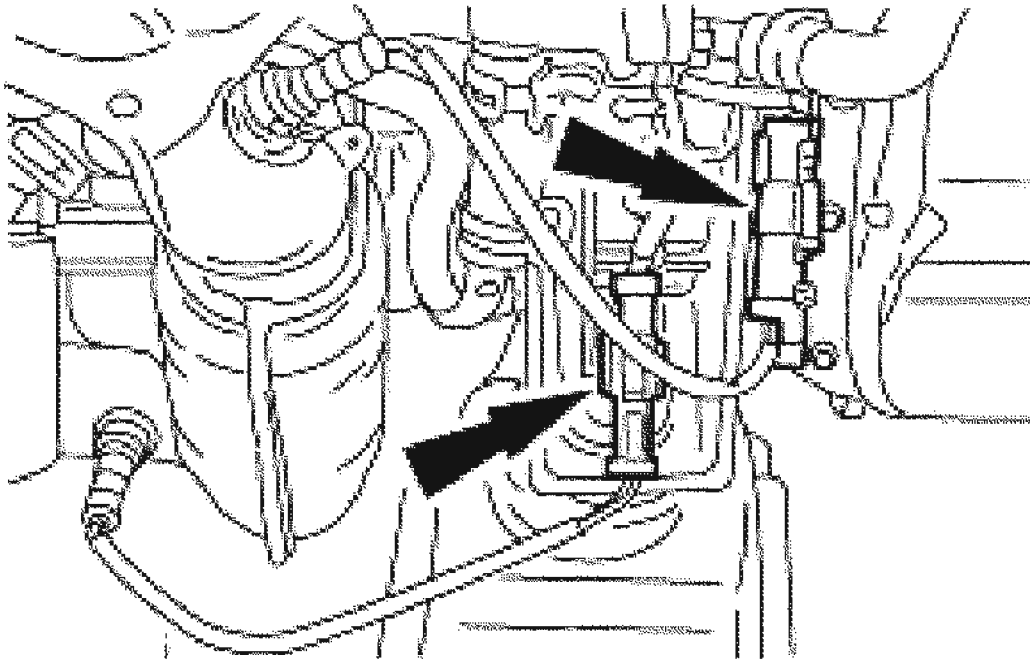




G02739635

**Fig. 462: Connecting Transmission Range (TR) Sensor**  
Courtesy of FORD MOTOR CO.

17. Connect the heated oxygen sensors.



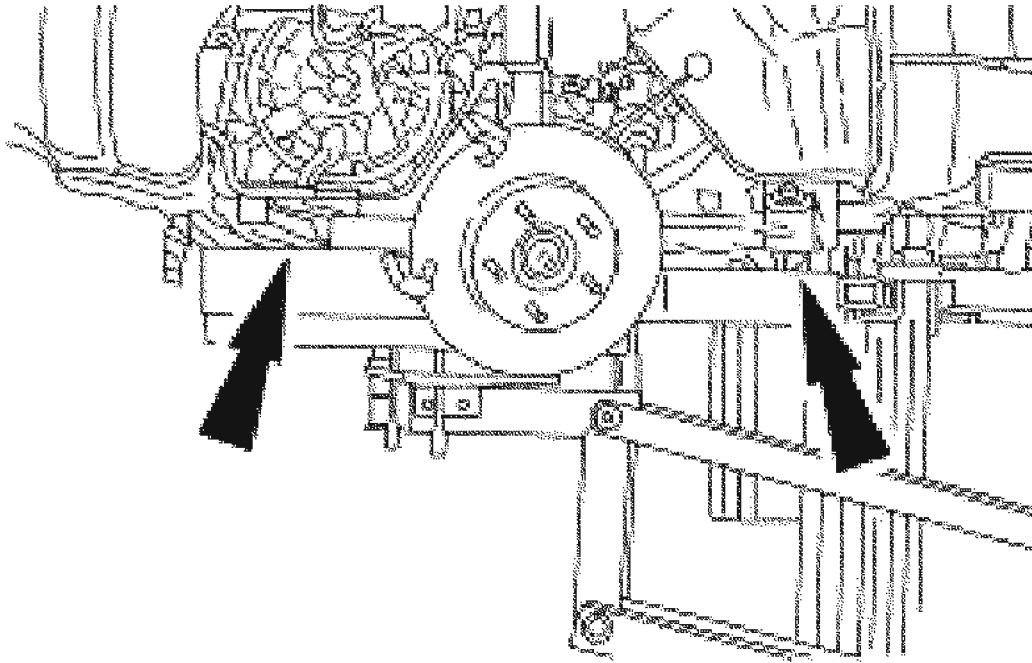
G02739636

**Fig. 463: Connecting Heated Oxygen Sensors**  
Courtesy of FORD MOTOR CO.

18. Position the powertrain in the vehicle.

## 2004 Ford Escape

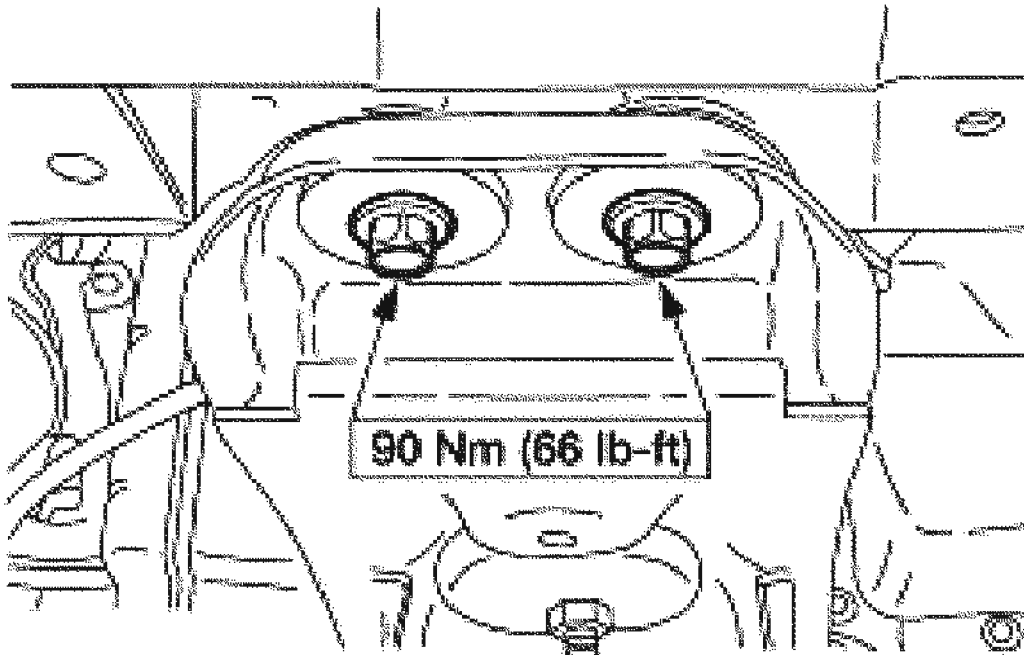
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739637

**Fig. 464: Positioning Powertrain In Vehicle**  
Courtesy of FORD MOTOR CO.

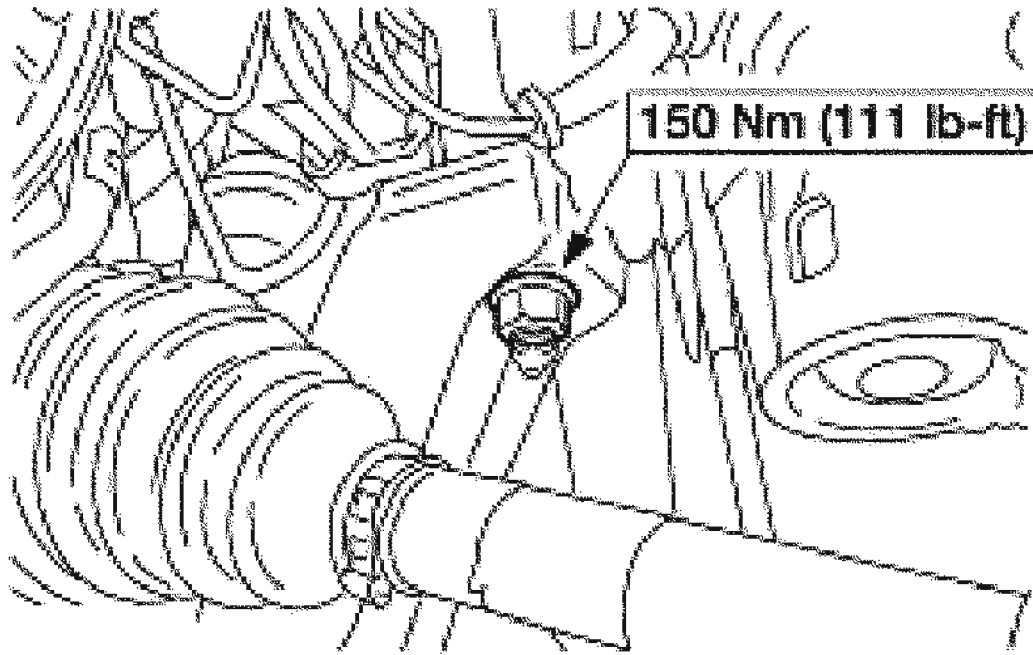
19. Install the two motor mount support bolts.



G02739638

**Fig. 465: Identifying Motor Mount Support Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

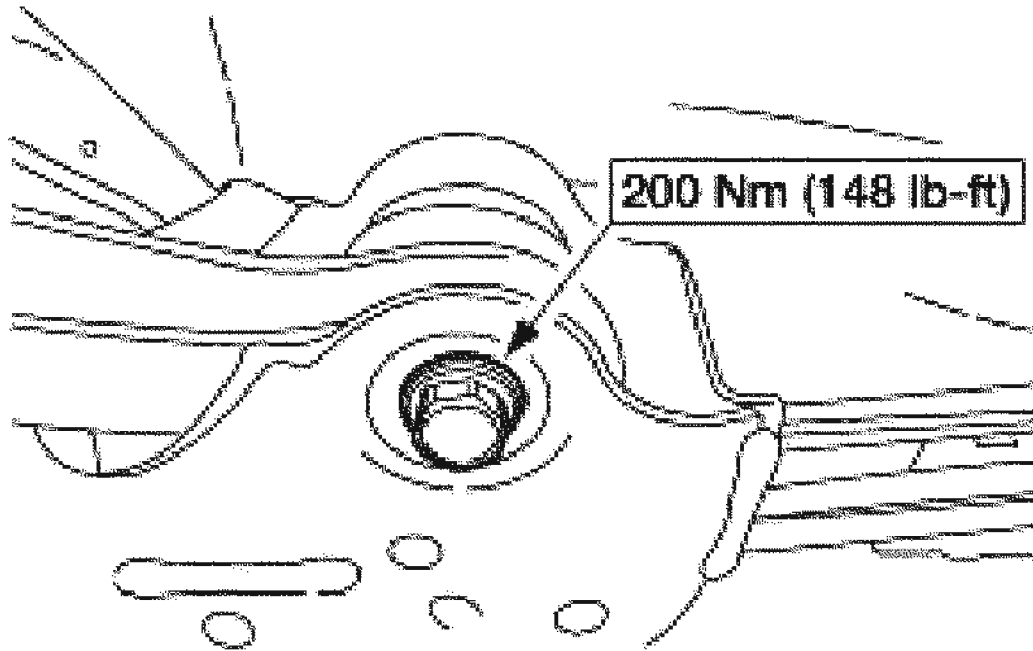
20. Install the two subframe side nuts.



G02739639

**Fig. 466: Identifying Subframe Side Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

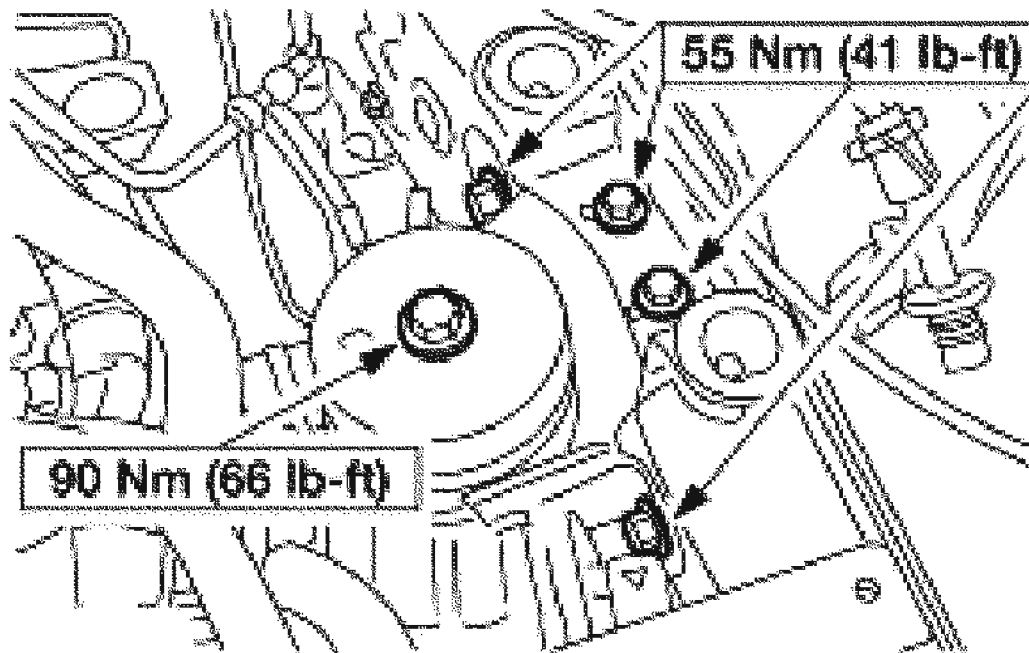
21. Install the two rear subframe bolts.



G02739640

**Fig. 467: Identifying Rear Subframe Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

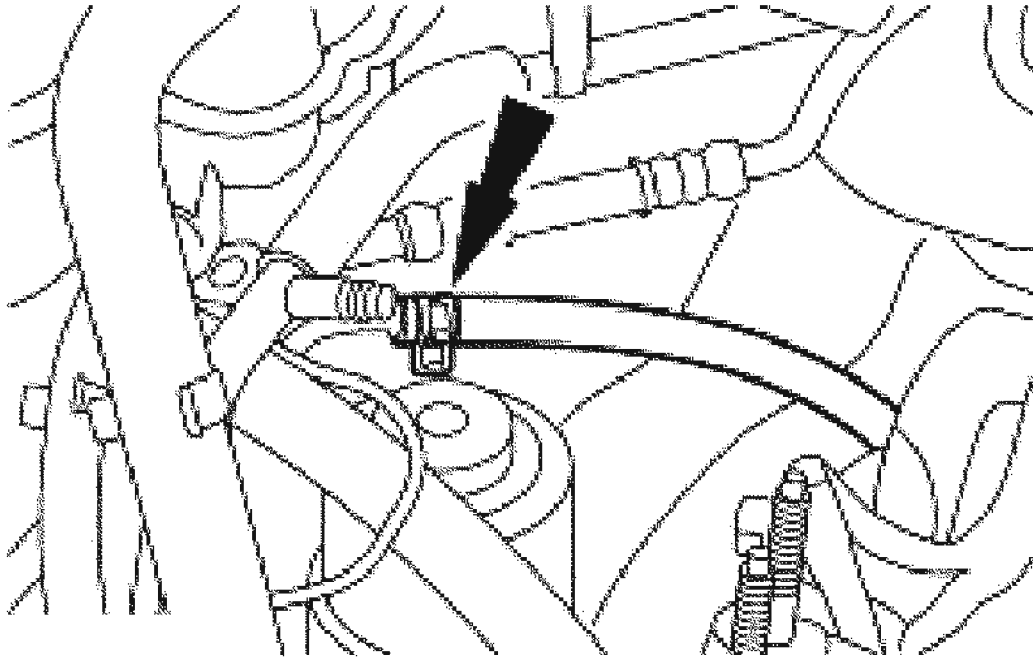
**NOTE:** The next two steps must be carried out with the vehicle raised and the powertrain assembly supported by the lift.



G02739641

**Fig. 468: Identifying Transaxle Mount Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

22. Position the transaxle mount and install the bolts.
23. Connect the power steering return hose.

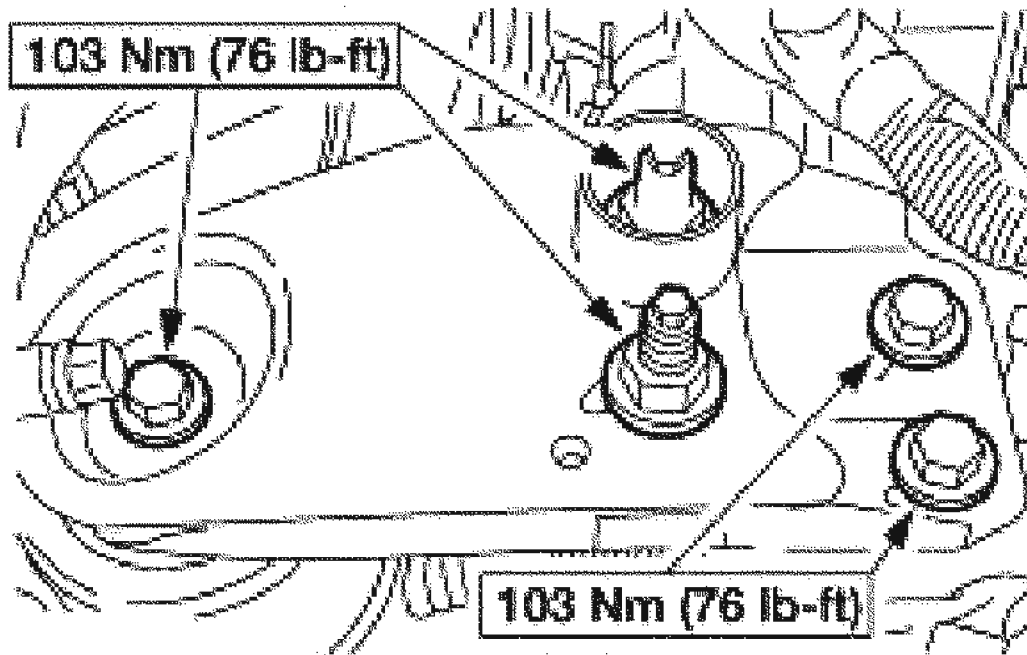


G02739642

**Fig. 469: Connecting Power Steering Return Hose**  
Courtesy of FORD MOTOR CO.

24. Install the motor mount bracket, the bolts and the nuts.

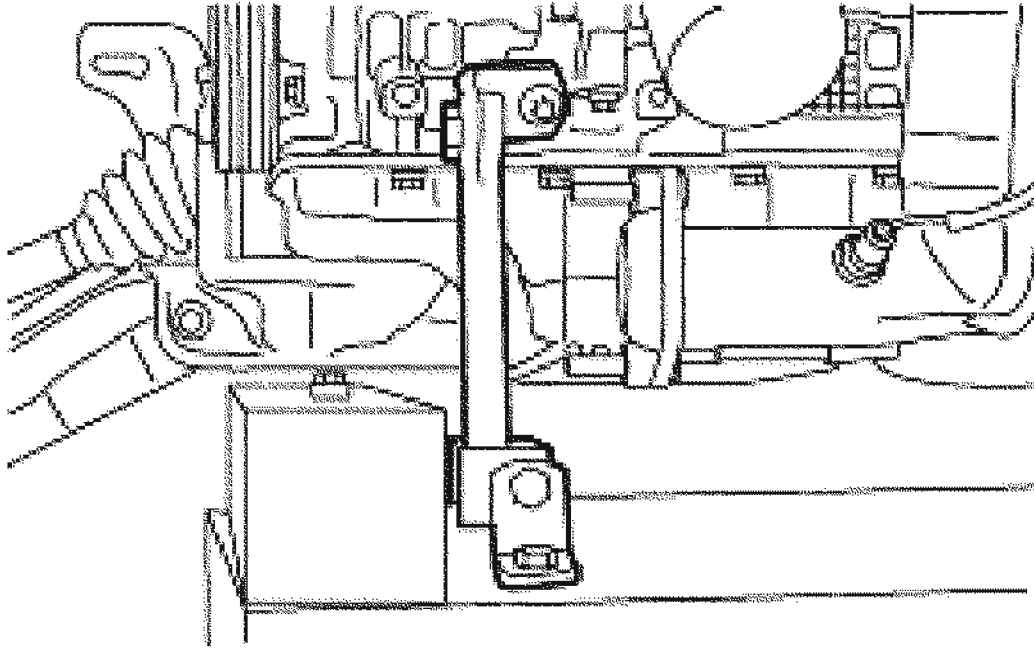




G02739643

**Fig. 470: Identifying Motor Mount Bracket Bolts & Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

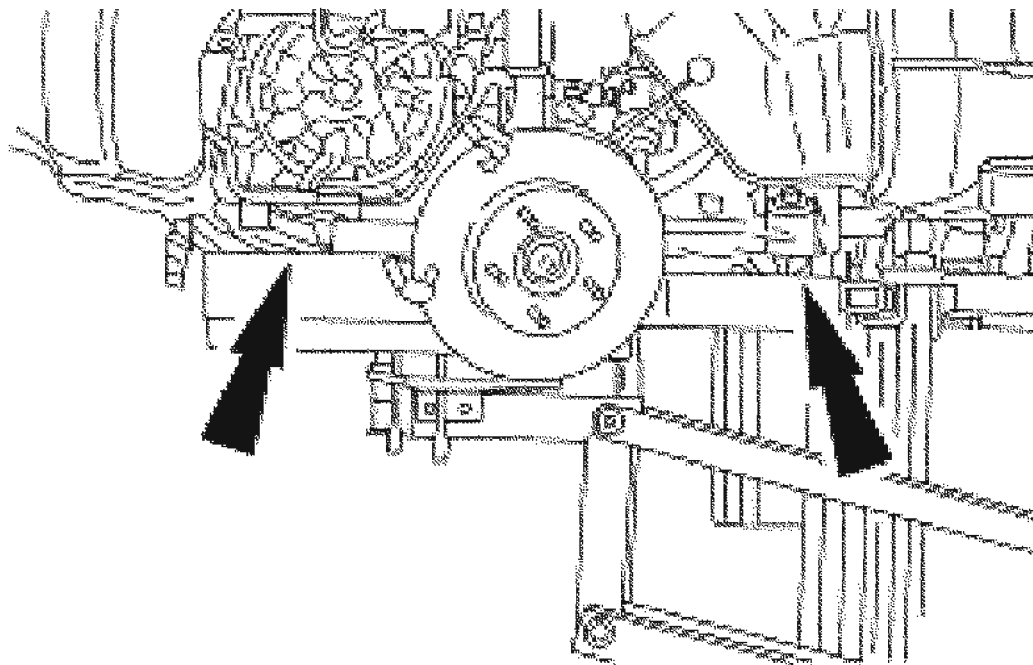
25. Remove the bracket.



G02739644

**Fig. 471: Removing Bracket**  
Courtesy of FORD MOTOR CO.

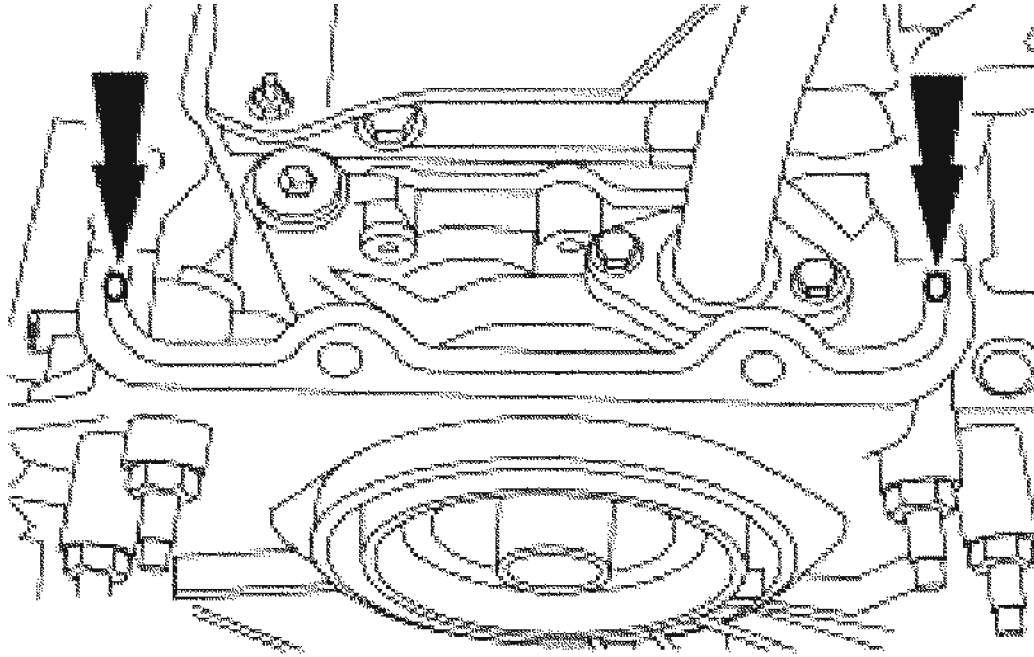
26. Remove the universal powertrain lift.



G02739645

**Fig. 472: Removing Universal Powertrain Lift**  
Courtesy of FORD MOTOR CO.

- NOTE:** Clean and degrease all sealing surfaces with metal surface cleaner.
- NOTE:** The oil pan must be installed and the bolts tightened within four minutes of the sealant application.

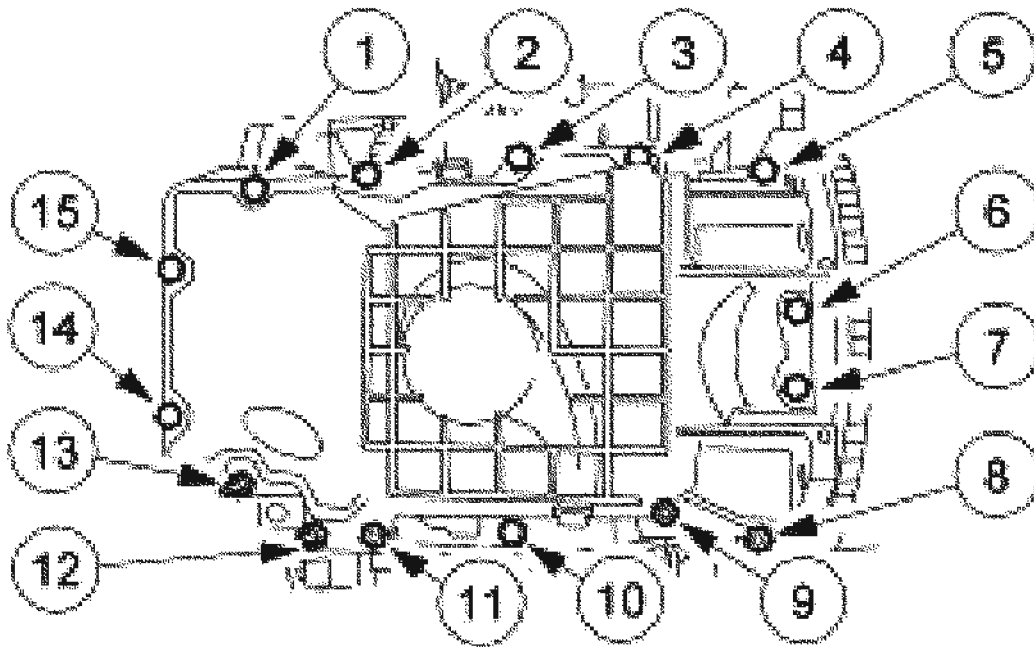


G02739646

**Fig. 473: Applying Silicone Gasket And Sealant To Front Cover-To-Cylinder Block Mating Surface**

**Courtesy of FORD MOTOR CO.**

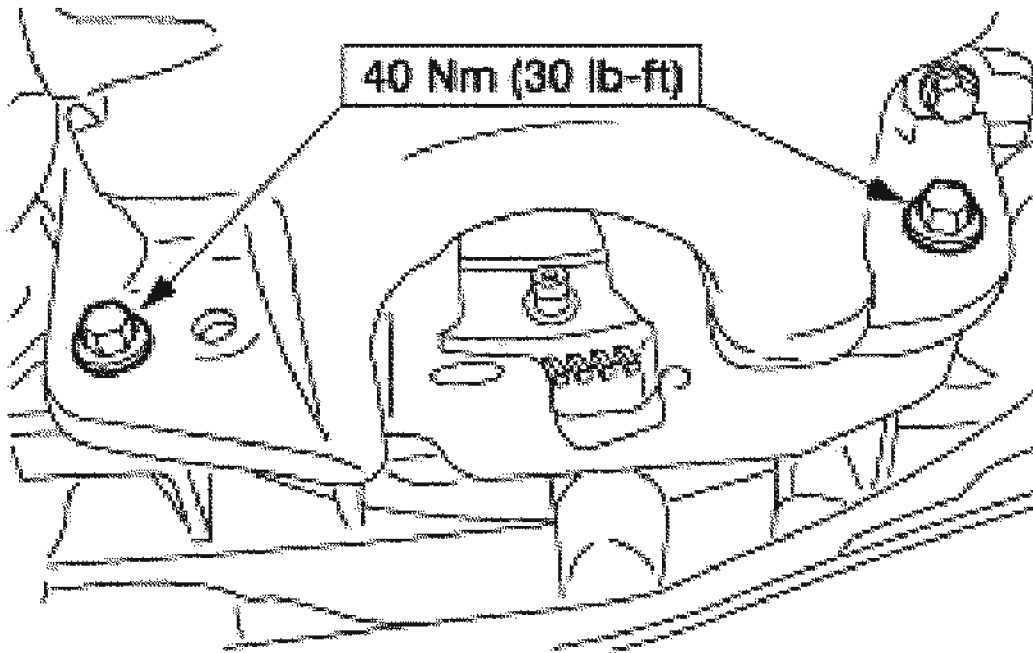
27. Apply a 10 mm (0.4 in) dot of silicone gasket and sealant to the front cover-to-cylinder block mating surface.
28. Position the oil pan and gasket and loosely install the bolts in the indicated sequence.



G02739647

**Fig. 474: Identifying Tightening Sequence Of Oil Pan Bolts**  
Courtesy of FORD MOTOR CO.

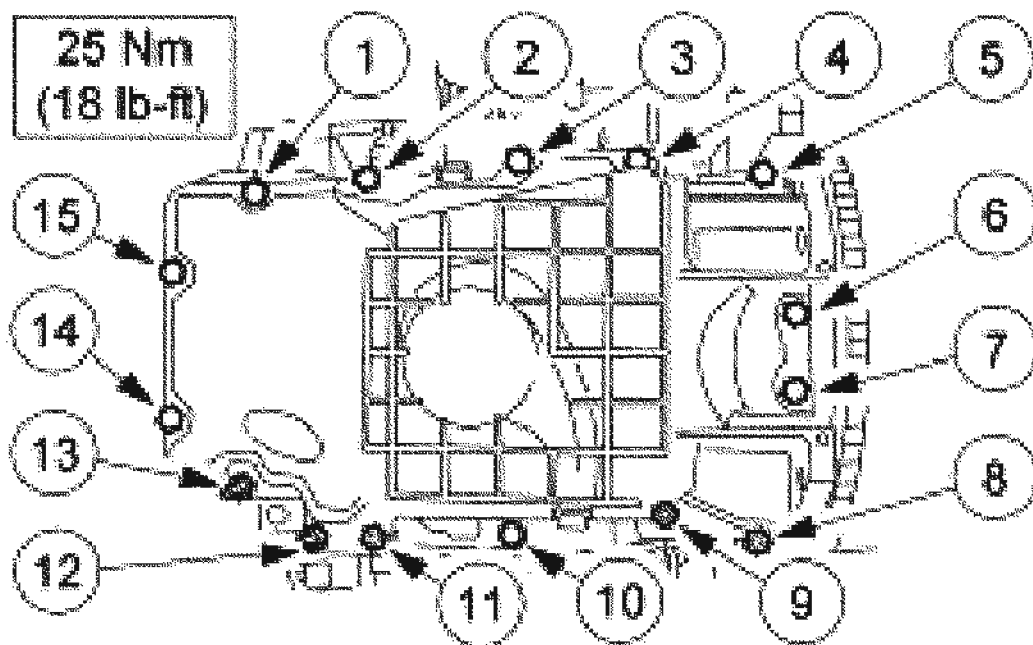
29. Install the oil pan-to-transaxle bolts.



G02739648

**Fig. 475: Identifying Oil Pan-To-Transaxle Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

30. Tighten the oil pan bolts in the sequence shown.

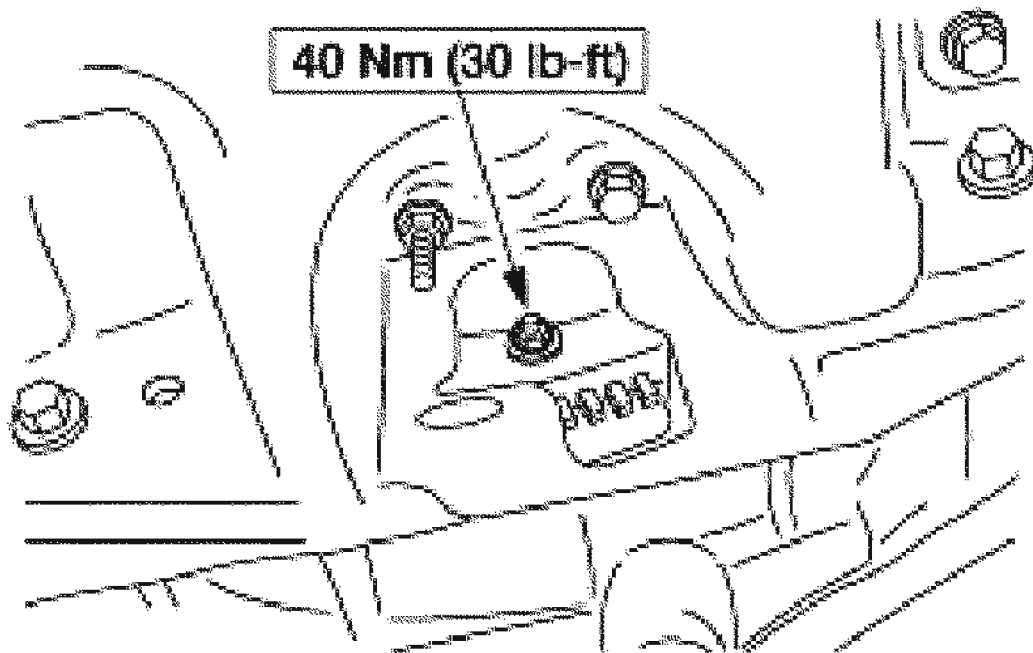


G02739649

**Fig. 476: Identifying Tightening Sequence & Torque Specification Of Oil Pan Bolts**

Courtesy of FORD MOTOR CO.

31. Install the four torque converter nuts.

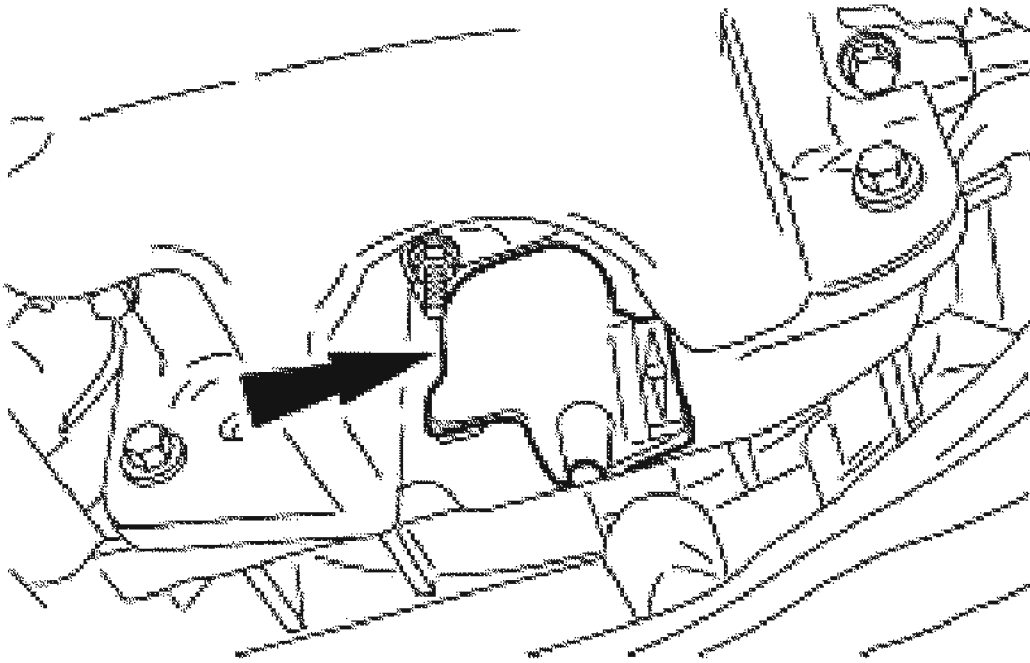


G02739650

**Fig. 477: Identifying Torque Converter Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

32. Install the inspection plug.

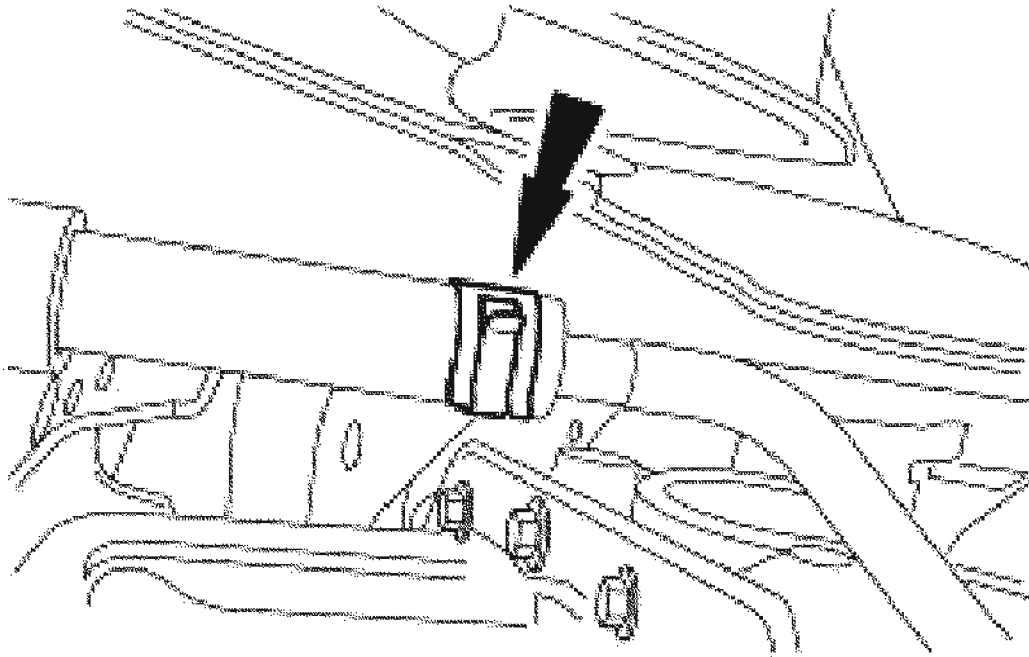




G02739651

**Fig. 478: Installing Inspection Plug**  
**Courtesy of FORD MOTOR CO.**

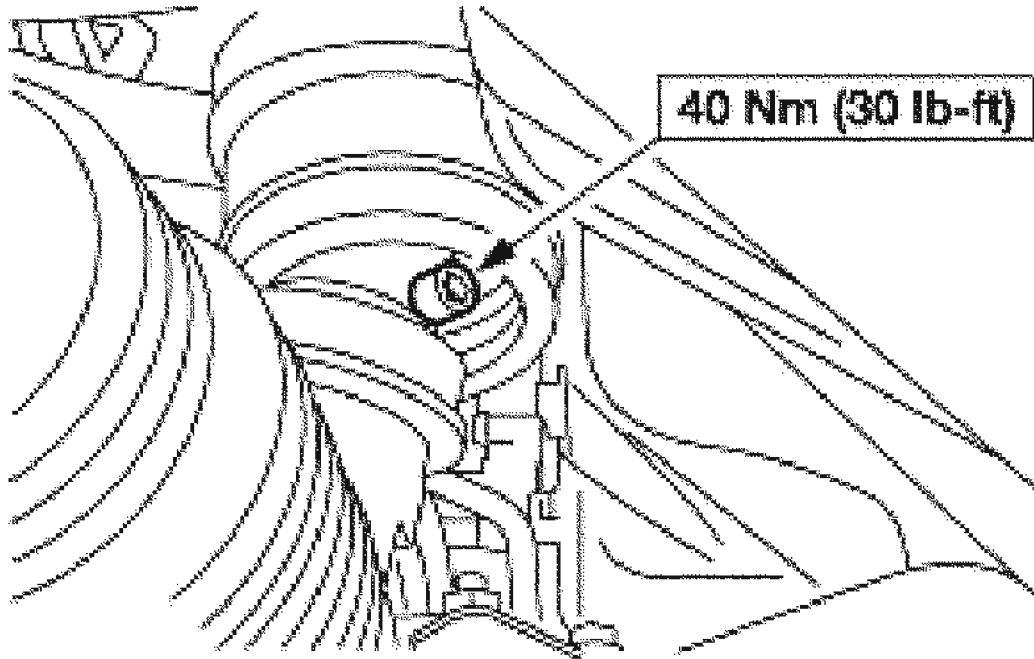
33. Connect the two transmission cooler tubes.



G02739652

**Fig. 479: Connecting Transmission Cooler Tubes**  
Courtesy of FORD MOTOR CO.

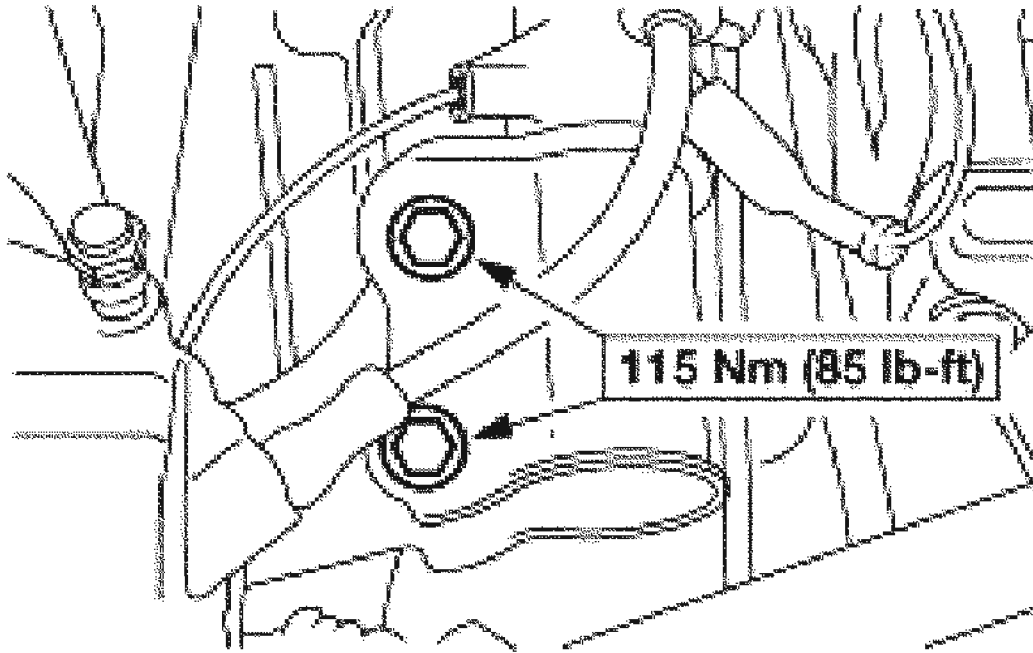
34. Connect the steering shaft to the rack and install the bolt.



G02739653

**Fig. 480: Identifying Steering Shaft To Rack Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

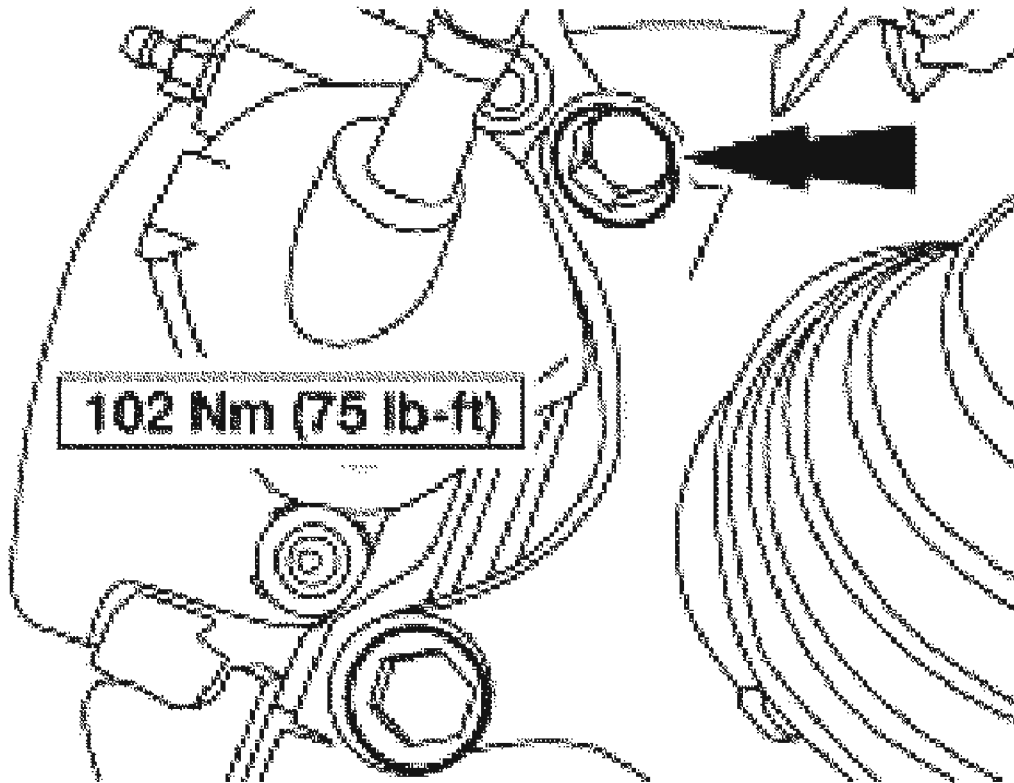
35. Connect the LH and RH struts to the steering knuckles and install the bolts and nuts.



G02739654

**Fig. 481: Identifying Strut To Steering Knuckle Bolts & Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

36. Install the brake calipers to the steering knuckle.

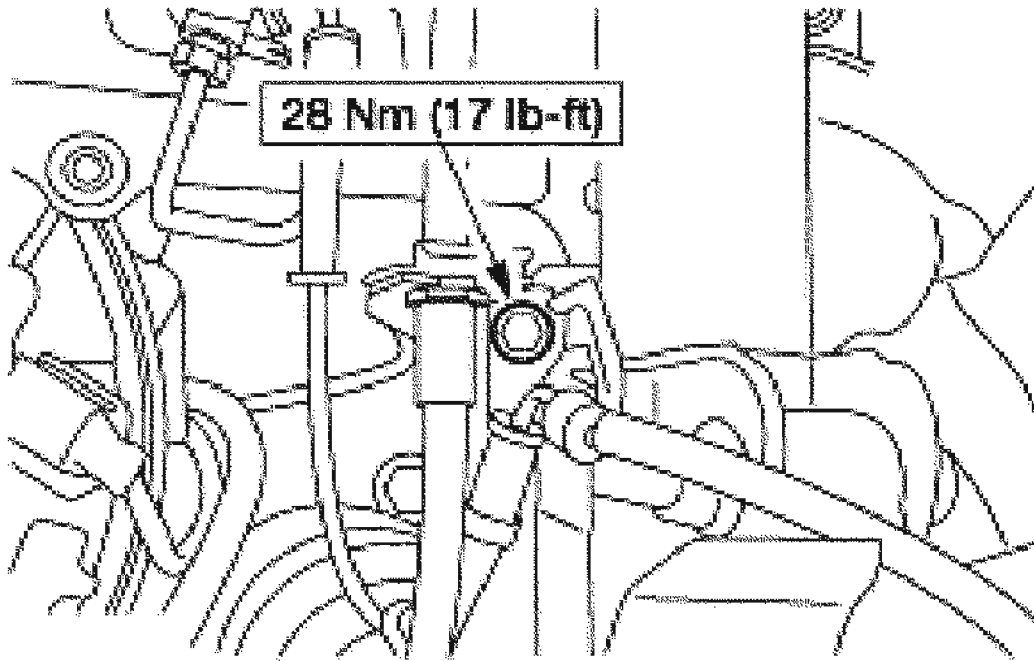


G02739655

**Fig. 482: Identifying Brake Calipers To Steering Knuckle Bolts Torque Specification**

Courtesy of FORD MOTOR CO.

37. If equipped, install the LH and RH wheel speed sensor harness brackets.

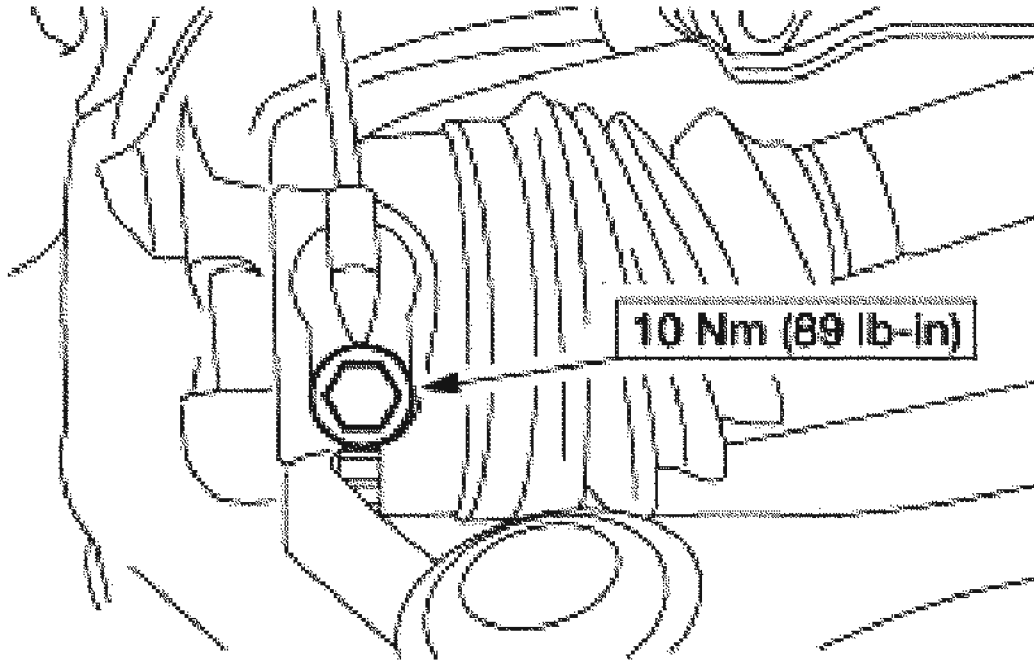


G02739656

**Fig. 483: Identifying Wheel Speed Sensor Harness Brackets Bolts Torque Specification**

**Courtesy of FORD MOTOR CO.**

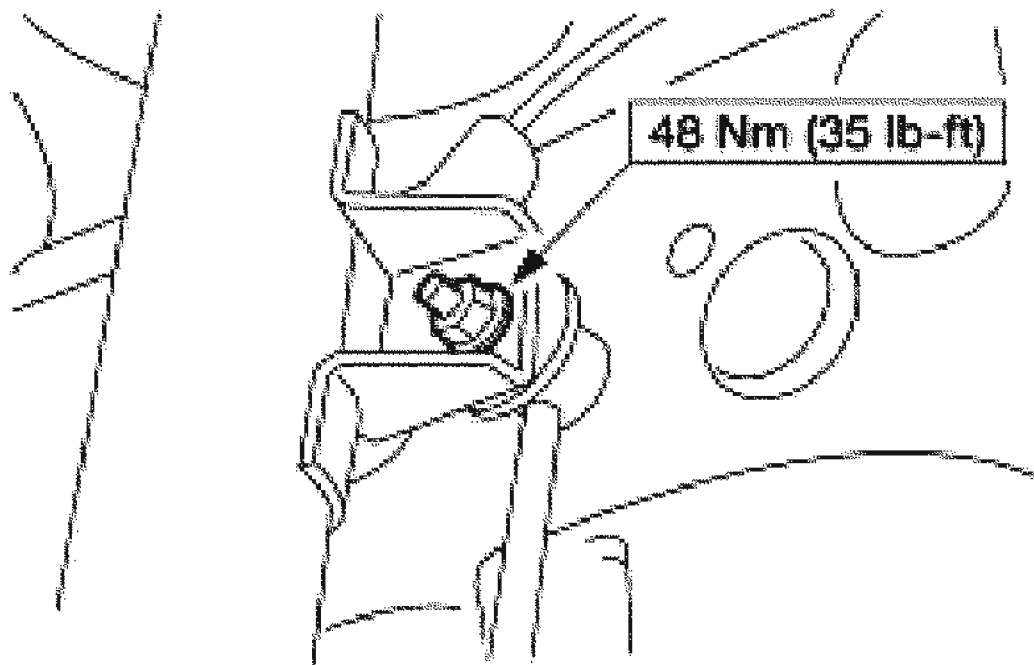
38. If equipped, position the LH and RH wheel speed sensors and install the bolts.



G02739657

**Fig. 484: Identifying Wheel Speed Sensors Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

39. Connect the LH and RH sway bar links to the strut mount.

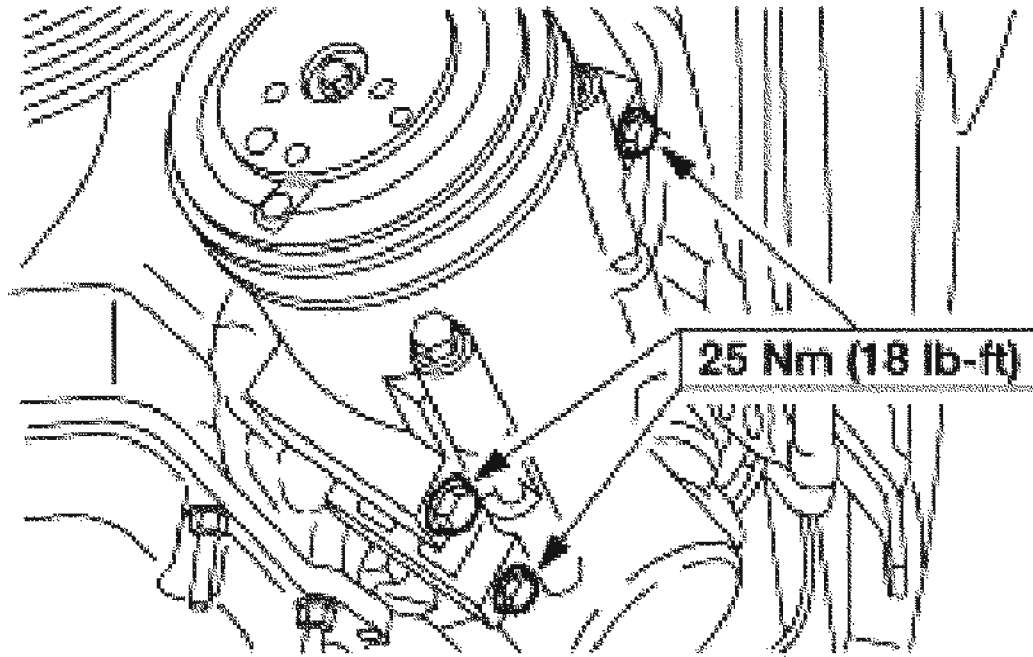


G02739658

**Fig. 485: Identifying Sway Bar Links To Strut Mount Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

40. If equipped, install the intermediate driveshaft. For additional information, refer to **DRIVESHAFT**
41. Install both front wheel and tire assemblies.
42. Install the A/C compressor and the bolts.

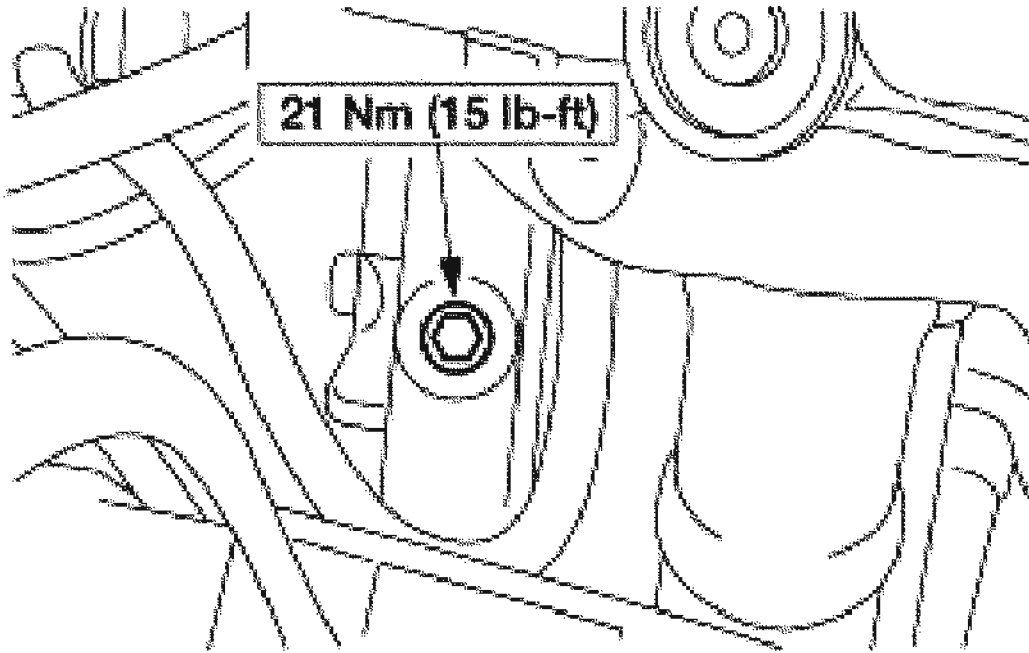




G02739659

**Fig. 486: Identifying A/C Compressor Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

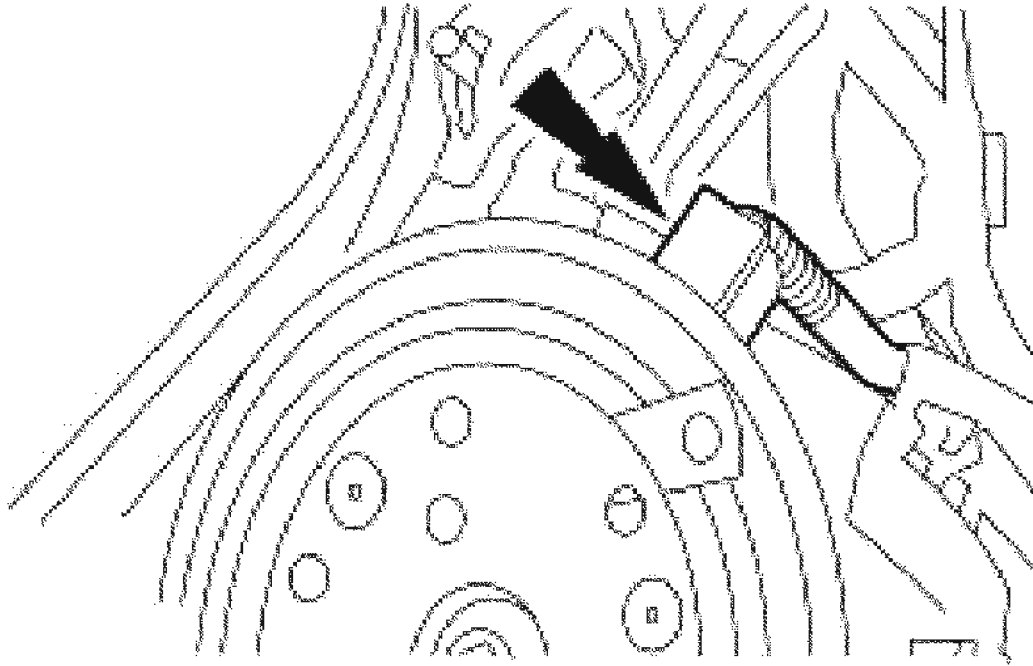
43. Remove the plugs and install the A/C manifold and tube assembly.



G02739660

**Fig. 487: Identifying A/C Manifold And Tube Assembly Bolt Torque Specification**  
Courtesy of FORD MOTOR CO.

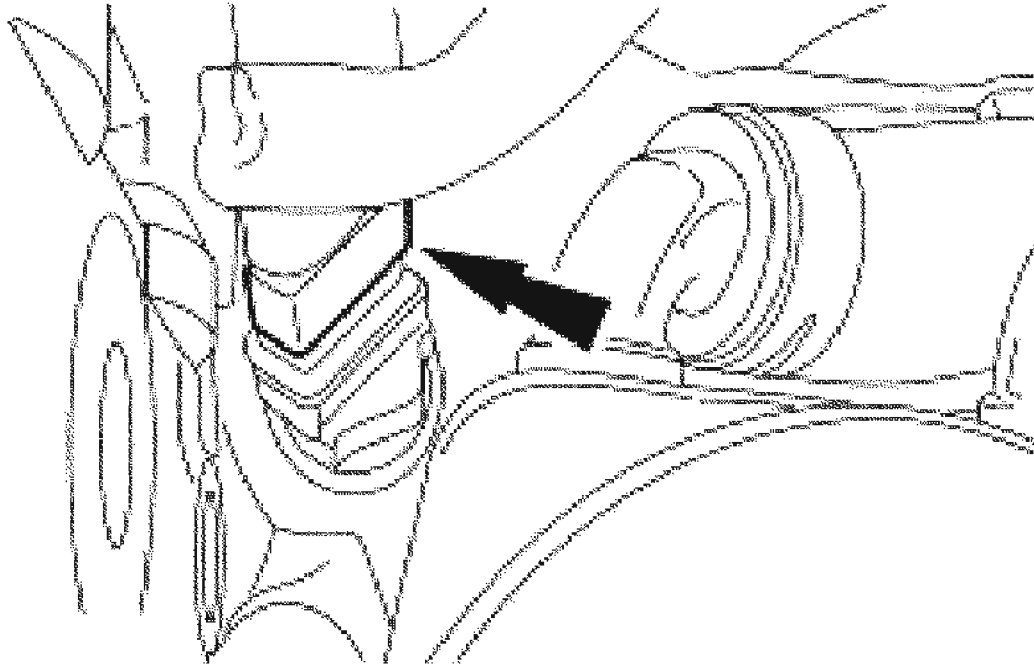
44. Connect the A/C clutch field coil electrical connector.



G02739661

**Fig. 488: Connecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

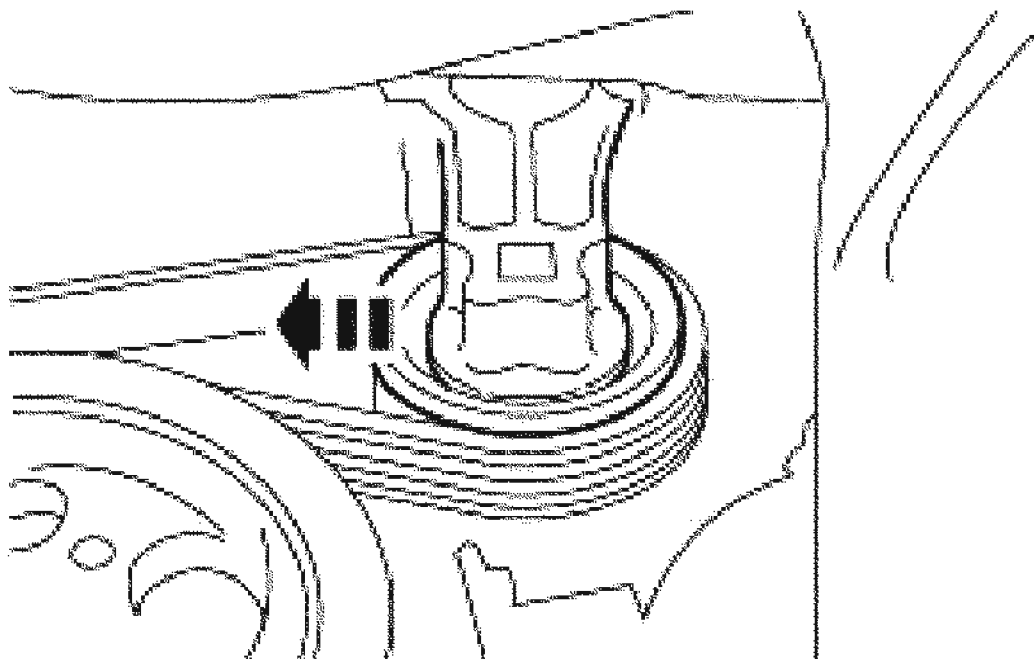
45. If equipped, connect the engine block heater electrical connector.



G02739662

**Fig. 489: Connecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

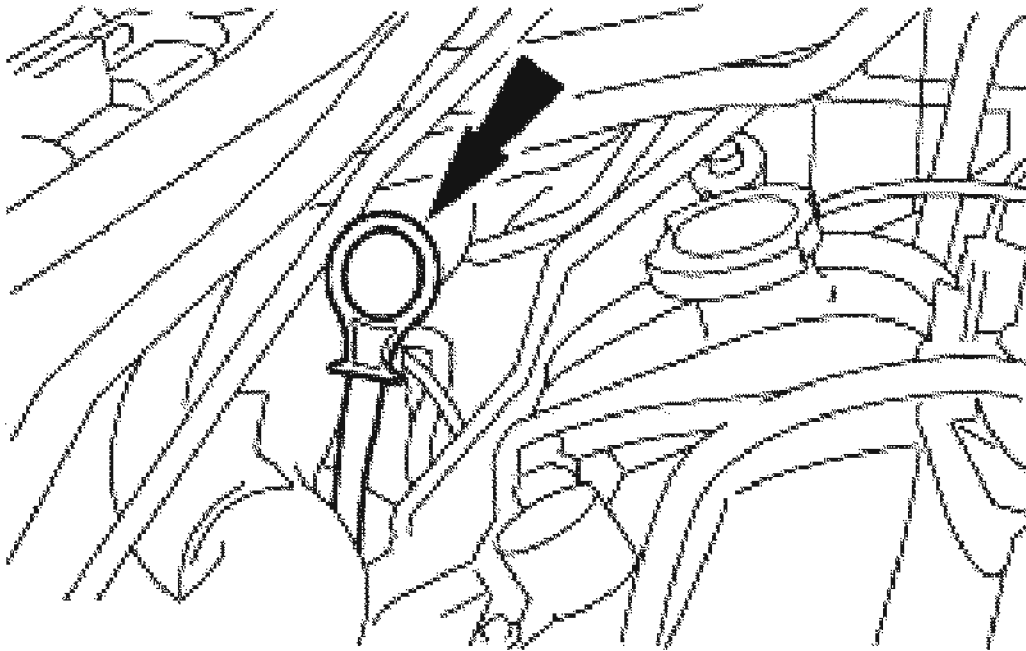
46. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.



G02739663

**Fig. 490: Installing Accessory Drive Belt**  
Courtesy of FORD MOTOR CO.

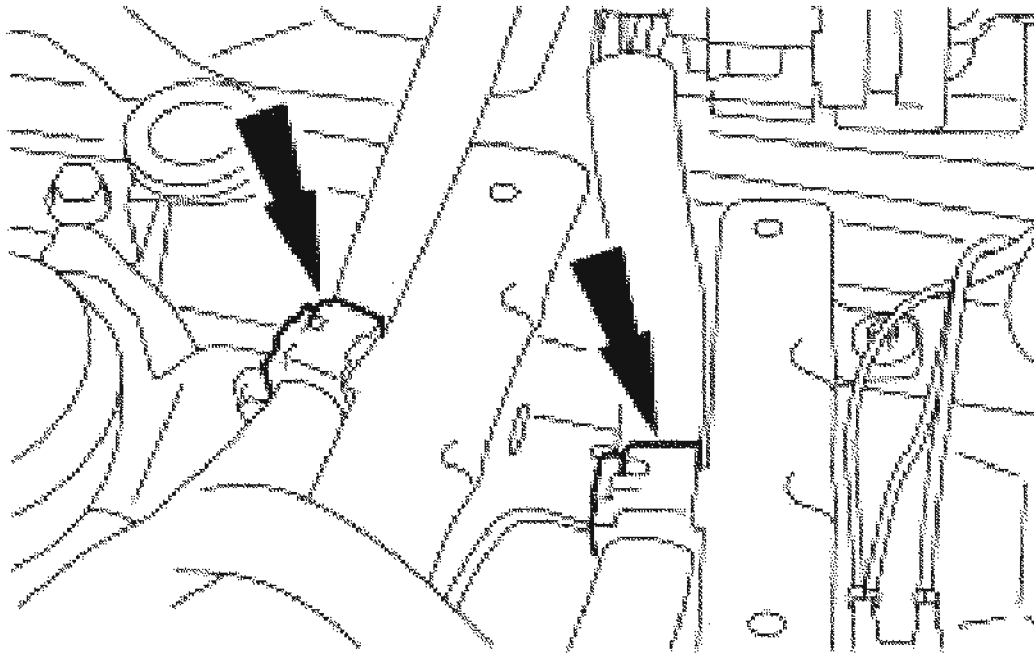
47. Install the flex pipe. For additional information, refer to **EXHAUST SYSTEM**
48. Install the lower radiator air deflectors.
49. Lower the vehicle.
50. Install the oil level indicator.



G02739664

**Fig. 491: Installing Oil Level Indicator**  
Courtesy of FORD MOTOR CO.

51. Position the wire harness and install the wire harness locating retainers.



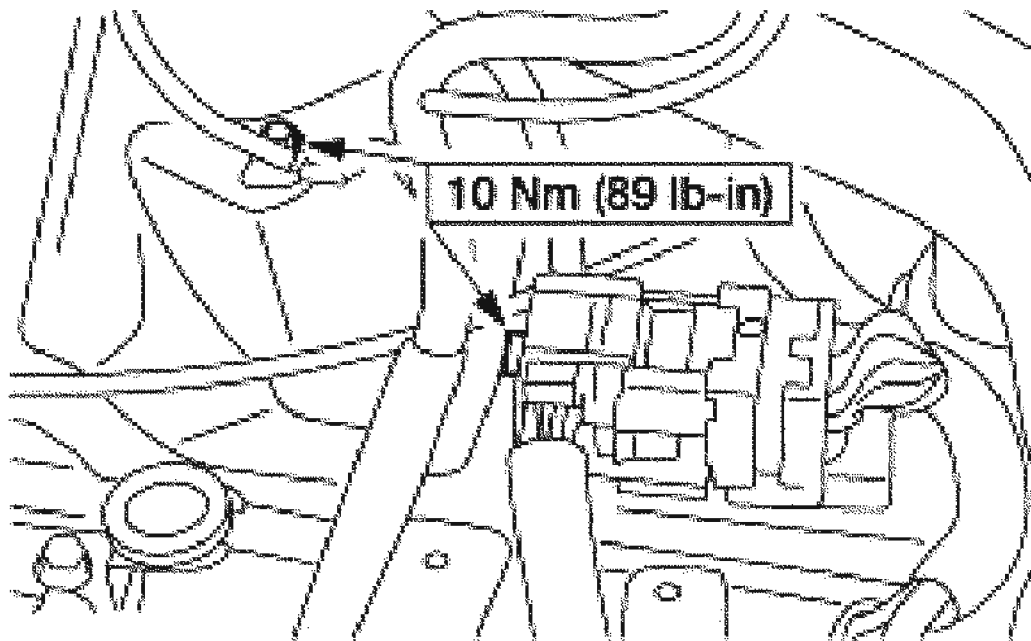
G02739665

**Fig. 492: Installing Wire Harness Locating Retainers**  
Courtesy of FORD MOTOR CO.

52. Connect the ground strap and the electrical connector.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape

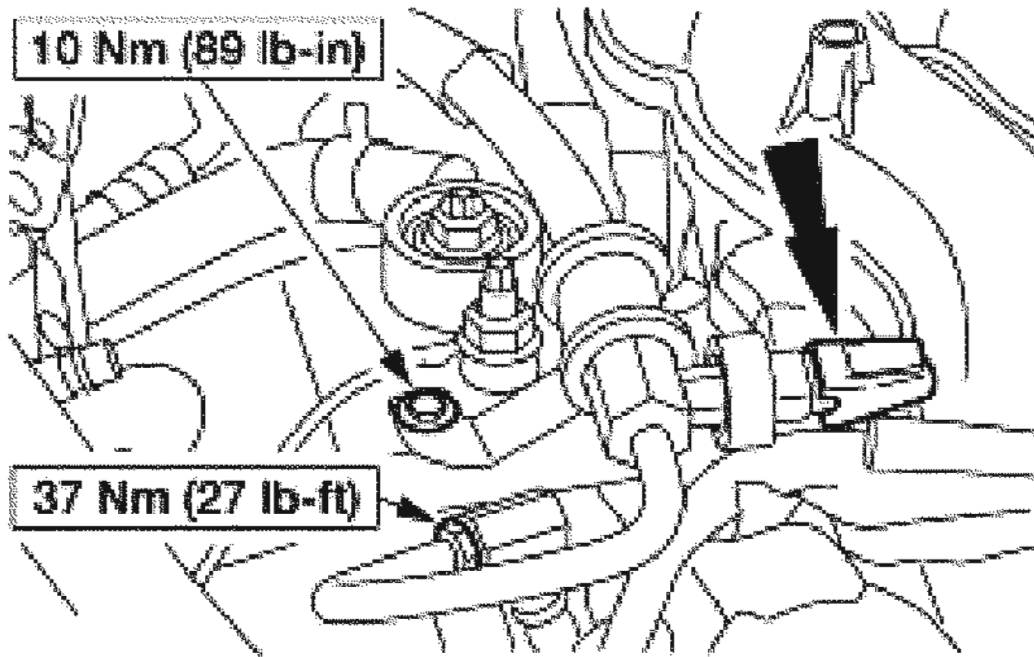


G02739666

**Fig. 493: Connecting Ground Strap And Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** Install new Teflon(R)  
seals.

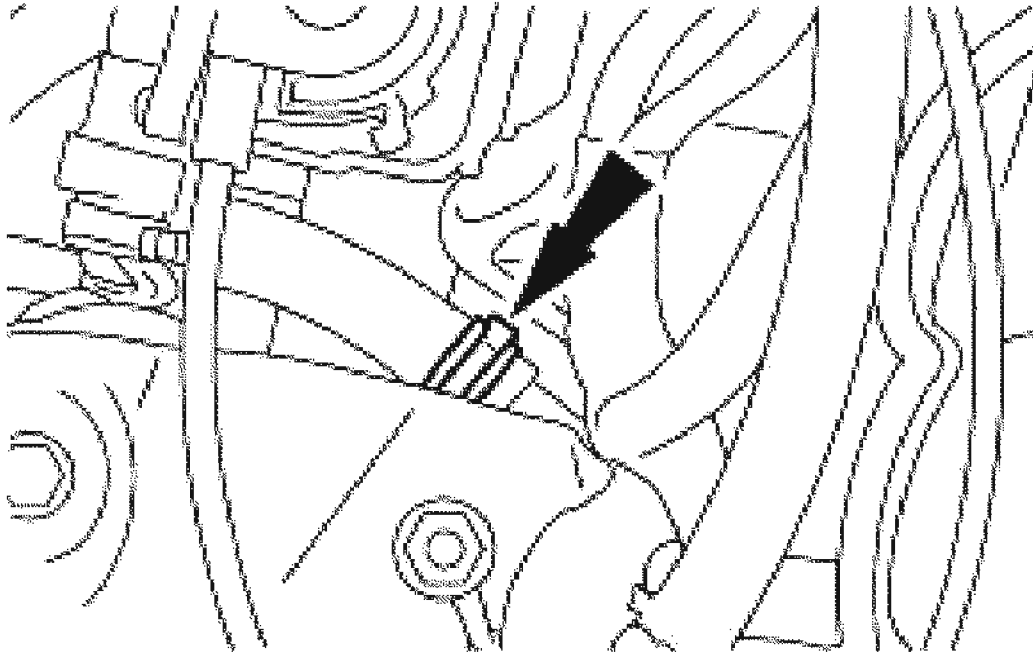




G02739667

**Fig. 494: Connecting Power Steering Tube**  
Courtesy of FORD MOTOR CO.

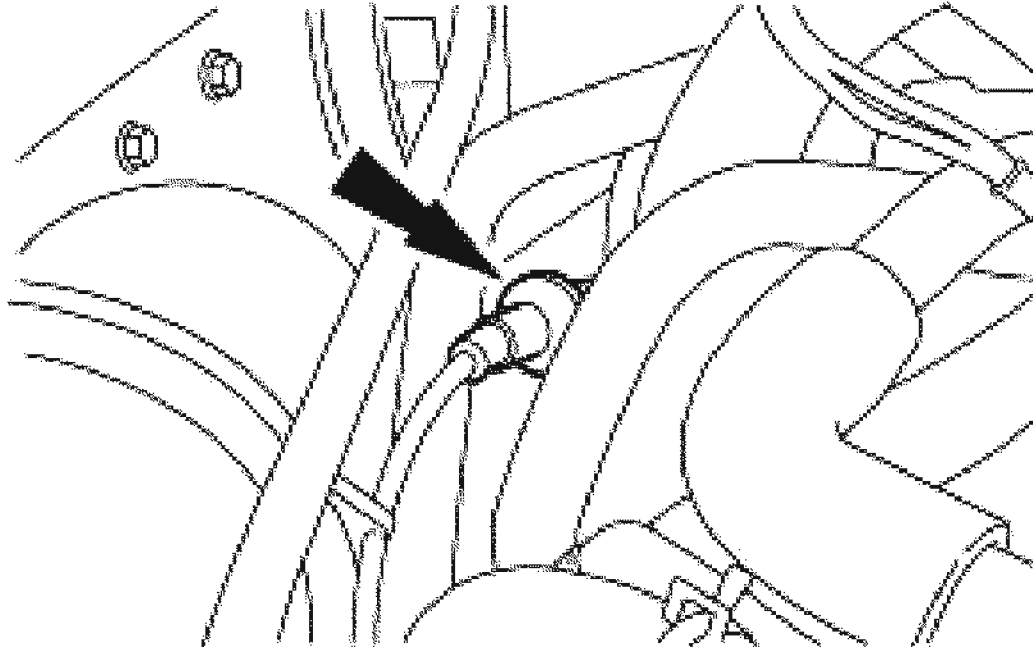
53. Connect the power steering tube.
  - Install the bracket bolt.
  - Connect the power steering pressure (PSP) switch electrical connector.
  - Connect the power steering tube.
54. Connect the power steering return tube.



G02739668

**Fig. 495: Connecting Power Steering Return Tube**  
Courtesy of FORD MOTOR CO.

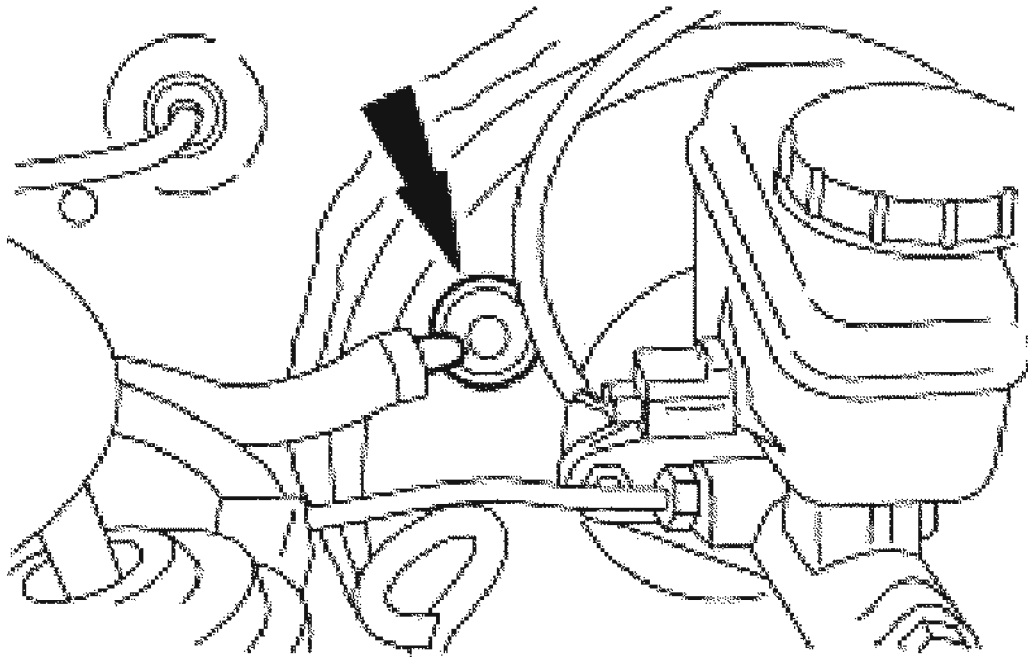
55. Connect the vacuum hose at the vacuum reservoir check valve.



G02739669

**Fig. 496: Connecting Vacuum Hose At Vacuum Reservoir Check Valve**  
Courtesy of FORD MOTOR CO.

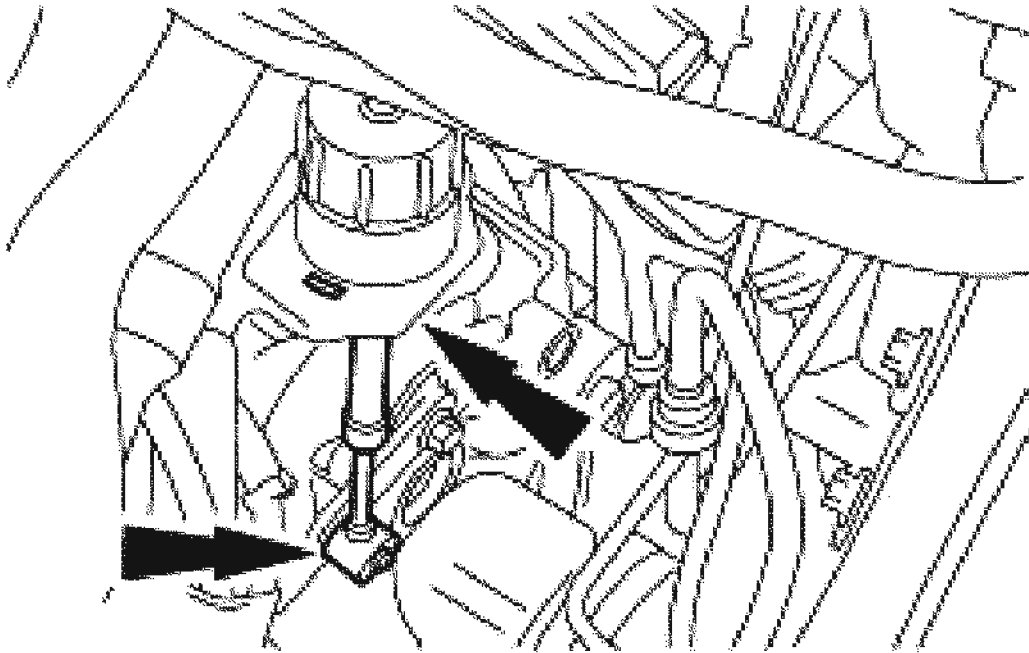
56. Connect the brake booster vacuum hose.



G02739670

**Fig. 497: Connecting Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

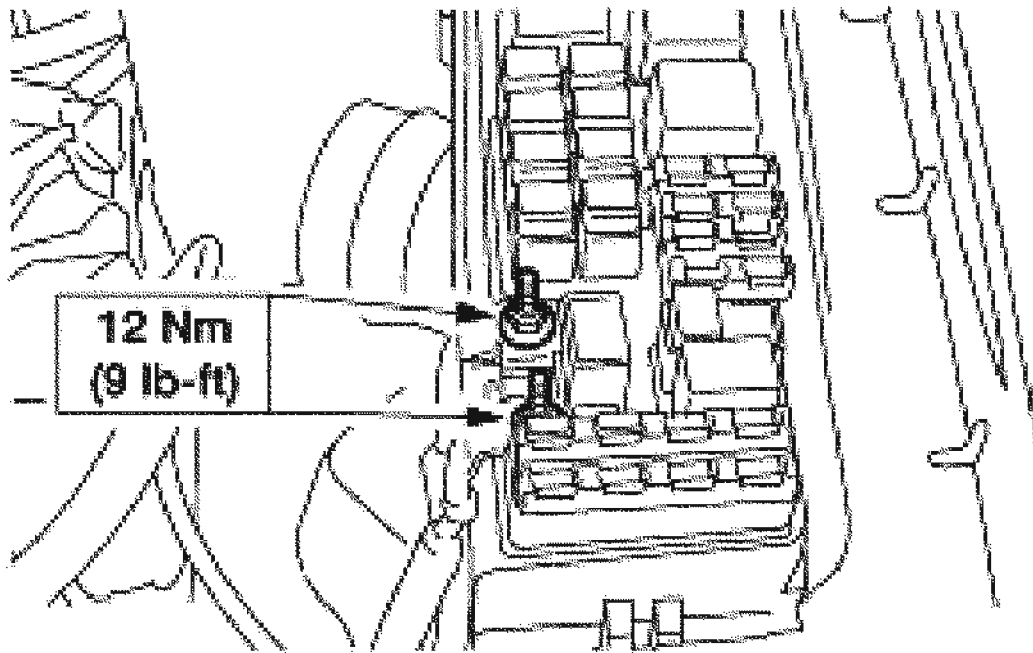
57. Connect the transaxle linkage.



G02739671

**Fig. 498: Connecting Transaxle Linkage**  
**Courtesy of FORD MOTOR CO.**

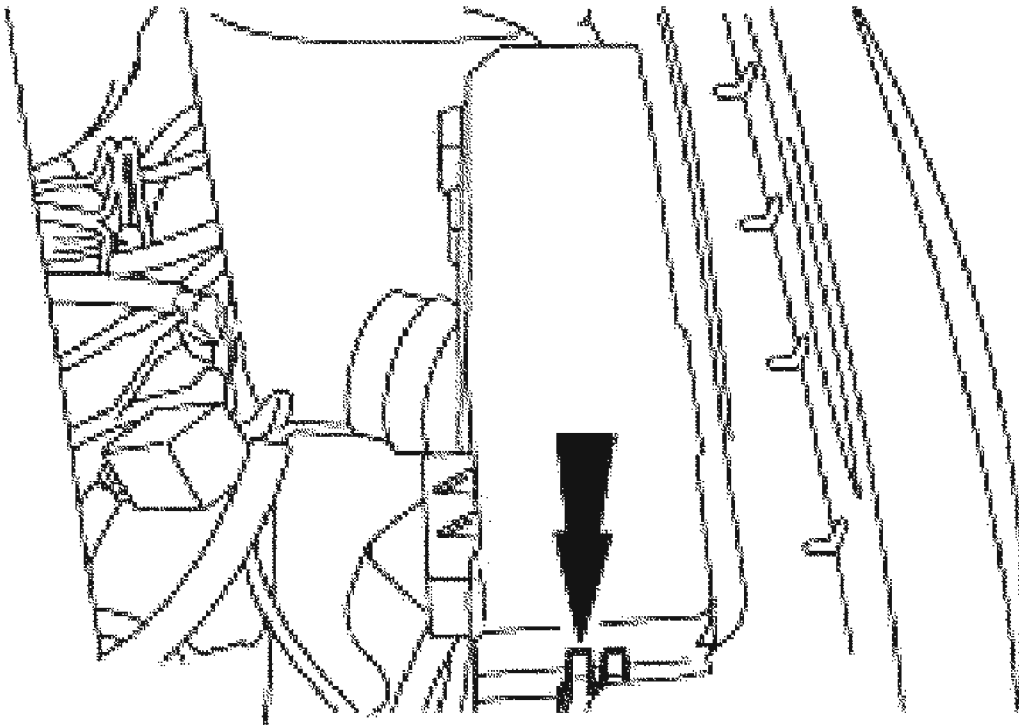
58. Install the cables and the nuts.



G02739672

**Fig. 499: Installing Cables & Nuts**  
Courtesy of FORD MOTOR CO.

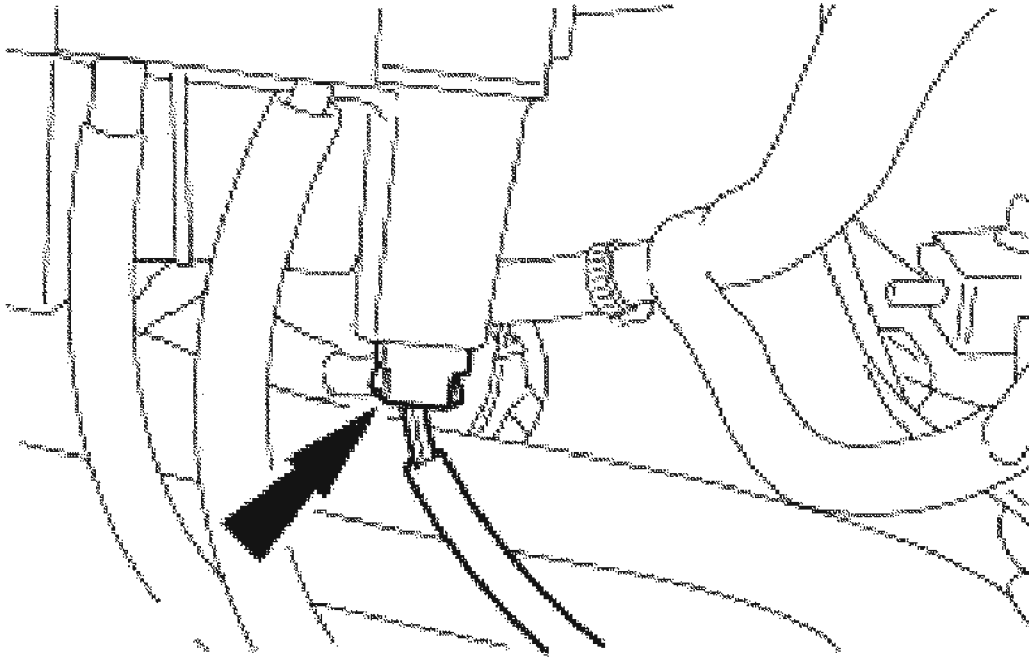
59. Install the power distribution box cover.



G02739673

**Fig. 500: Installing Power Distribution Box Cover**  
Courtesy of FORD MOTOR CO.

60. Connect the connector to the power distribution box.

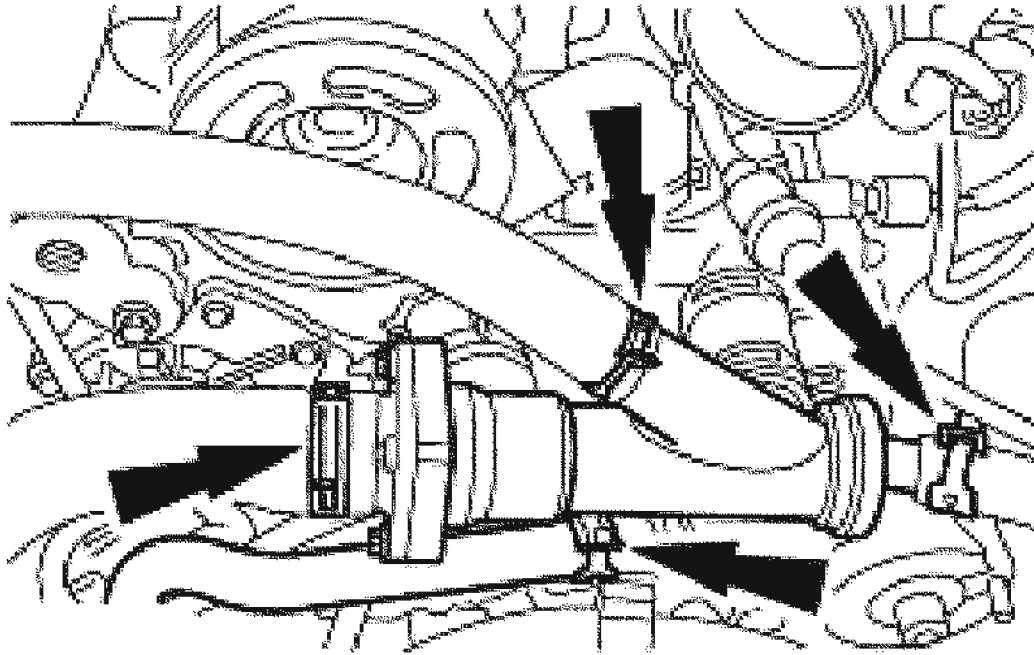


G02739674

**Fig. 501: Connecting Connector To Power Distribution Box**  
Courtesy of FORD MOTOR CO.

61. Position the thermostat housing and connect the hoses.

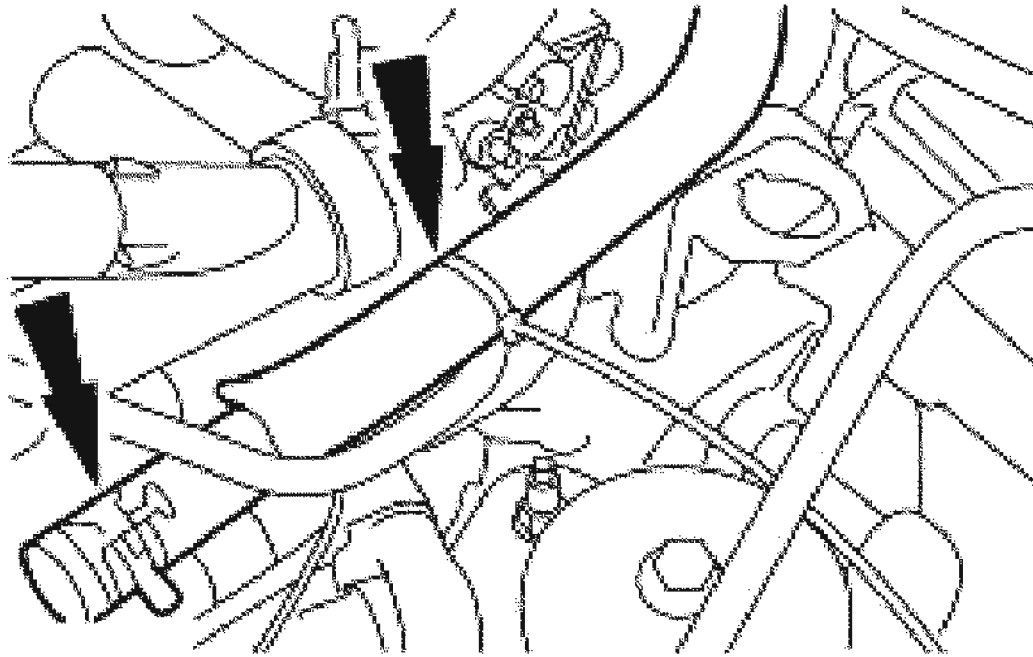




G02739675

**Fig. 502: Installing Thermostat Housing**  
Courtesy of FORD MOTOR CO.

62. Connect the heater hose and install a new tie-strap.



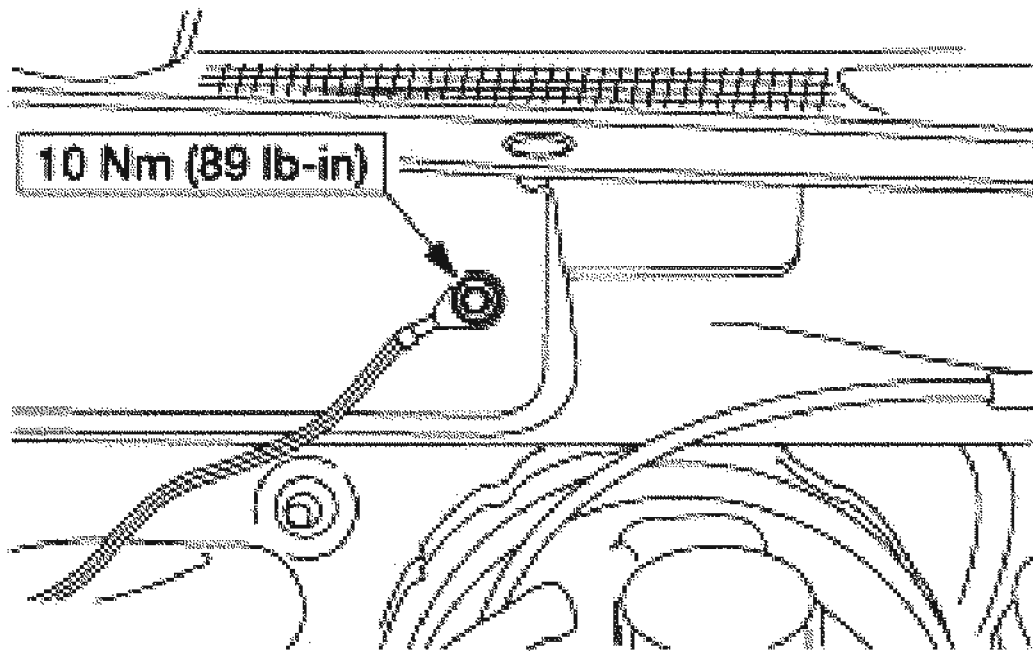
G02739676

**Fig. 503: Connecting Heater Hose**  
Courtesy of FORD MOTOR CO.

63. Connect the ground wire.

## 2004 Ford Escape

2004 ENGINE Engine - 3.0L (4V) - Escape



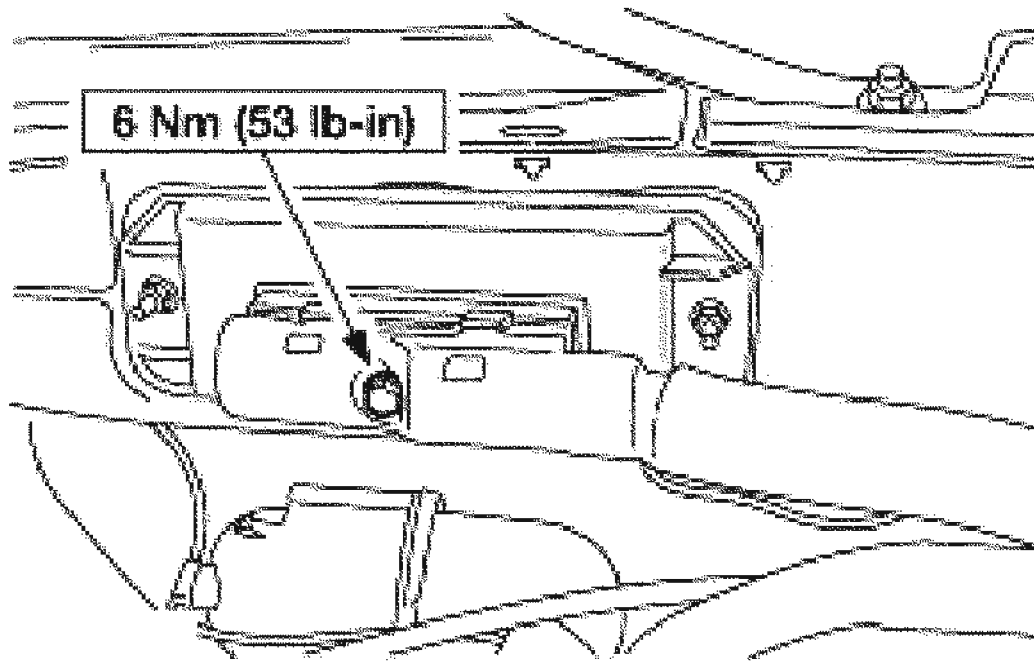
G02739677

**Fig. 504: Connecting Ground Wire**  
Courtesy of FORD MOTOR CO.

64. Connect the powertrain control module (PCM) electrical connector.

## 2004 Ford Escape

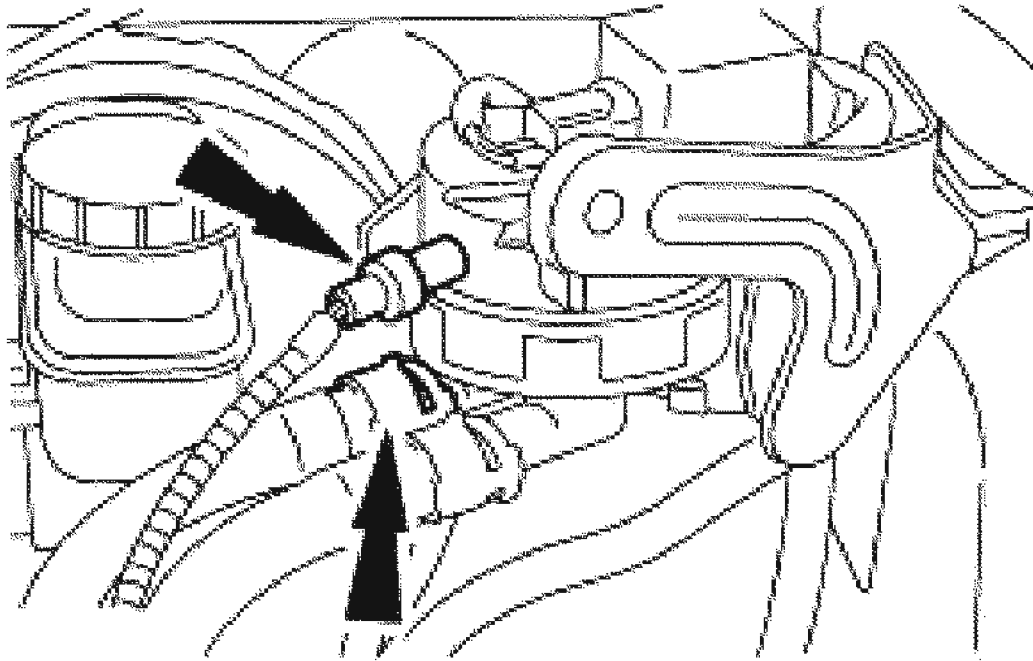
2004 ENGINE Engine - 3.0L (4V) - Escape



G02739678

**Fig. 505: Connecting Powertrain Control Module (PCM) Electrical Connector**  
Courtesy of FORD MOTOR CO.

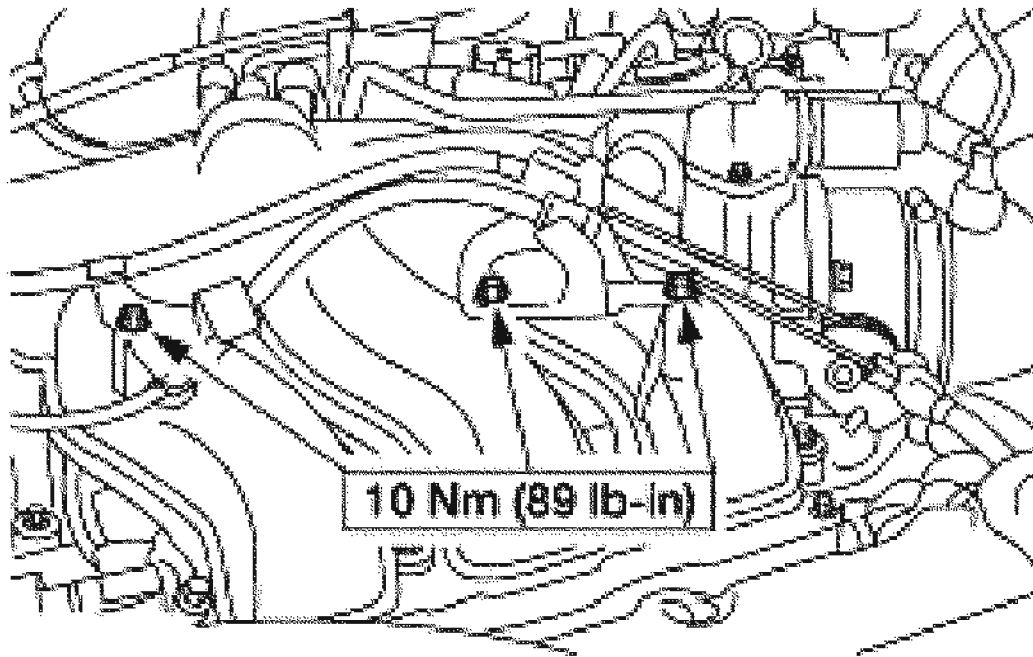
65. Connect the vapor management valve (VMV) connectors.



G02739679

**Fig. 506: Connecting Vapor Management Valve (VMV) Connectors**  
**Courtesy of FORD MOTOR CO.**

66. Connect the accelerator cable and speed control actuator cable.



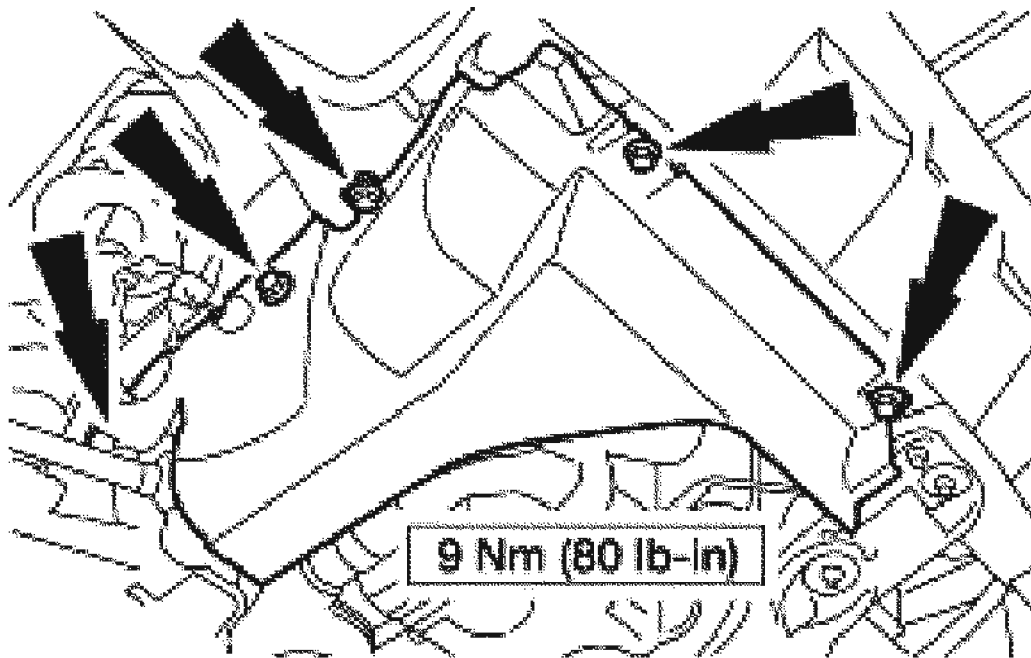
G02739680

**Fig. 507: Connecting Accelerator Cable And Speed Control Actuator Cable**  
Courtesy of FORD MOTOR CO.

67. Connect the fuel hose spring lock coupling. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**
68. Install the air cleaner outlet tube and air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**
69. Install the battery and the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**
70. Install the water pump drive belt. For additional information, refer to **SPECIFICATIONS & DRIVE BELT ROUTING**
71. Fill the crankcase with clean engine oil.
72. Fill the engine cooling system. For additional information, refer to **ENGINE COOLING** .
73. Fill and purge the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .
74. Recharge the A/C system. For additional information, refer to **AIR CONDITIONING** .

### Removal and Installation

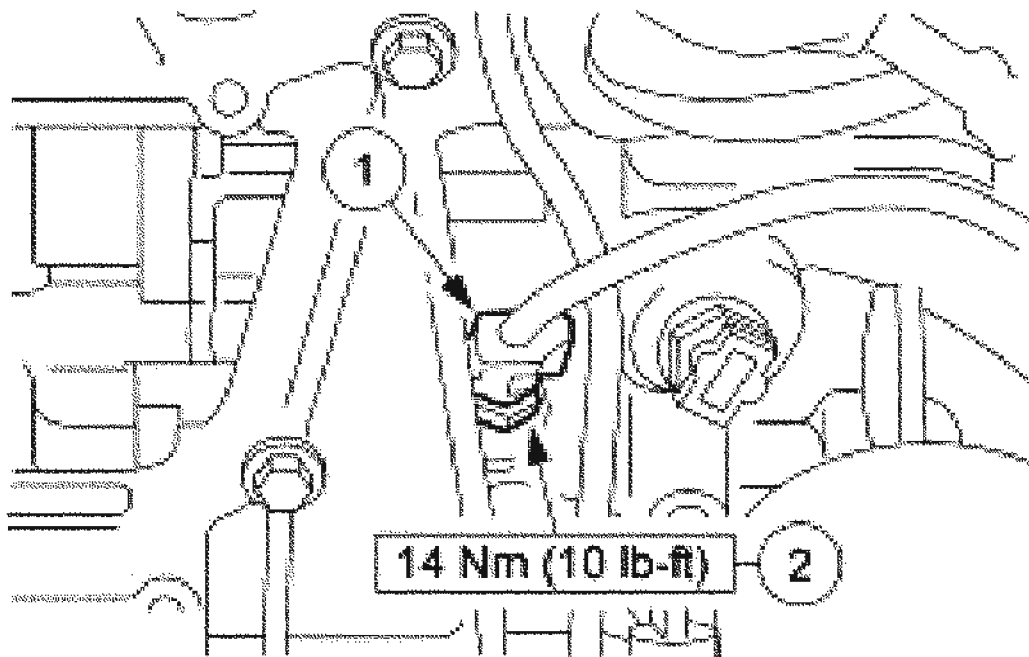
1. Raise and Support the vehicle. For additional information, refer to **JACKING & LIFTING** .
2. Remove the right side splash shield.



G02739681

**Fig. 508: Removing Right Side Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** The A/C compressor has been removed for clarity.



G02739682

**Fig. 509: Removing Oil Pressure Sender**  
Courtesy of FORD MOTOR CO.

3. Remove the oil pressure sender.
  1. disconnect the electrical connector.
  2. Remove the sender.
4. To install, reverse the removal procedure.



## 2004 Ford Escape

2004 ENGINE Engine Ignition - 2.0L Zetec - Escape

### 2004 ENGINE

#### Engine Ignition - 2.0L Zetec - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Base ignition timing	10 degrees $\pm$ 2 degrees BTDC (not adjustable)
Firing order	1-3-4-2
Spark plug gap	1.3 mm (0.05 in)
<b>Spark Plug Type</b>	
Spark plug cylinders 1 and 3	AZFS-32F
Spark plug cylinders 2 and 4	AZFS-32FE
<b>Lubricant</b>	
High Temperature Nickel Anti-Seize Lubricant F6AZ-9L494-AA	ESE-M12A4-A
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A	ESE-M1C171-A

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**Fig. 1: General Specifications Chart**  
Courtesy of FORD MOTOR CO.

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Exhaust gas recirculation (EGR) tube bracket bolt	10	-	89
Ignition coil bolts	6	-	53
Ignition coil bracket bolts	20	15	-
Spark plugs	15	11	-

## DESCRIPTION AND OPERATION

### ENGINE IGNITION

The ignition system consists of the following:

- ignition coil pack (12029)
- spark plug wires (12280)
- spark plugs (12405)

**Ignition Coil Pack**

The ignition coil pack (12029) contains two separate coils. The ignition coils are triggered by the powertrain control module (PCM) in pairs (cylinder 1 and 4 and cylinders 3 and 2) sending one ignition spark to the firing cylinder and one to the corresponding cylinder on the exhaust stroke.

- The majority of the ignition coil energy is used by the spark plug (12405) on the compression stroke.
- The firing voltage of one spark plug is negative with the respect to ground, while the firing voltage of the other spark plug in the cylinder pair is positive with respect to ground.

**Crankshaft Position Sensor**

The crankshaft position (CKP) sensor (6C315) provides crankshaft position and rpm information to the powertrain control module (PCM).

The crankshaft position sensor is:

- A variable-reluctance type sensor.
- Activated by a 36 minus one tooth wheel.

Refer to **ELECTRONIC ENGINE CONTROLS** for removal and installation procedures.

**Camshaft Position Sensor**

The camshaft position (CMP) sensor (6B288) provides a signal to the powertrain control module (PCM) when the number one piston is on the compression stroke.

Refer to **ELECTRONIC ENGINE CONTROLS** for removal and installation procedures.

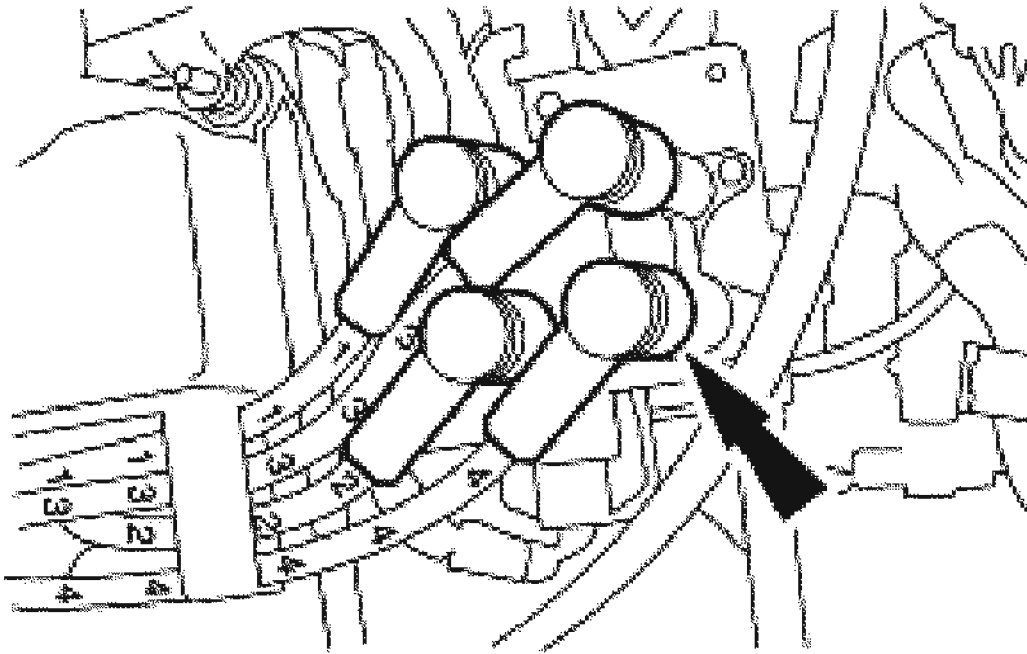
**DIAGNOSIS AND TESTING****ENGINE IGNITION**

REFER to the **INTRODUCTION - CNG, FLEX-FUEL & GASOLINE** article.

**REMOVAL AND INSTALLATION****IGNITION COIL**

### Removal and Installation

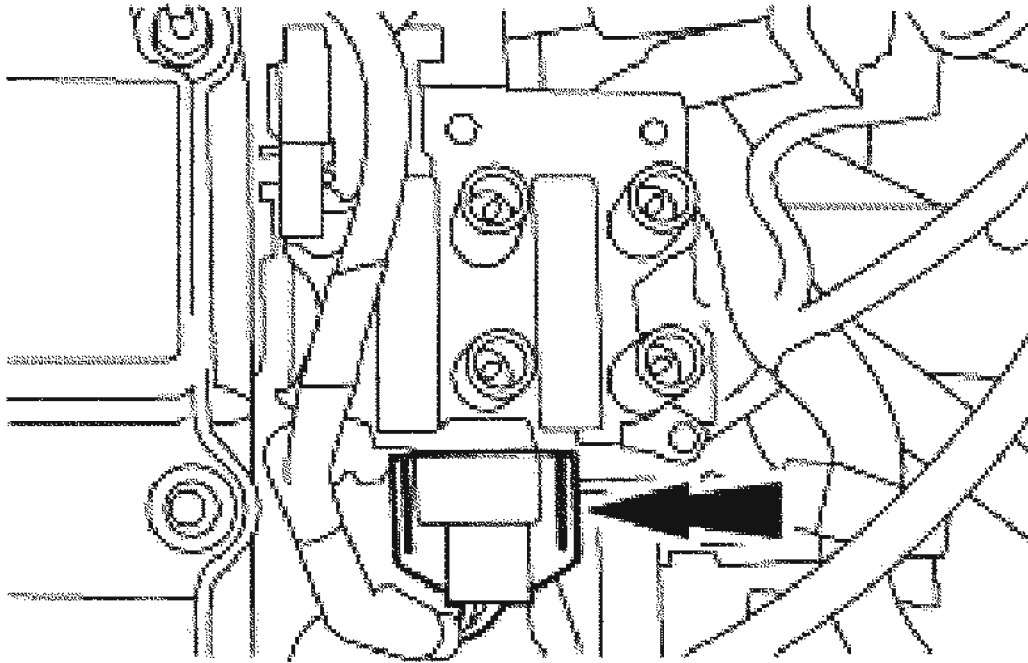
1. Disconnect the battery ground cable. For additional information, Refer to **BATTERY, MOUNTING AND CABLES**.
2. Disconnect the ignition wires.



G02740291

**Fig. 2: Disconnecting Ignition Wires**  
Courtesy of FORD MOTOR CO.

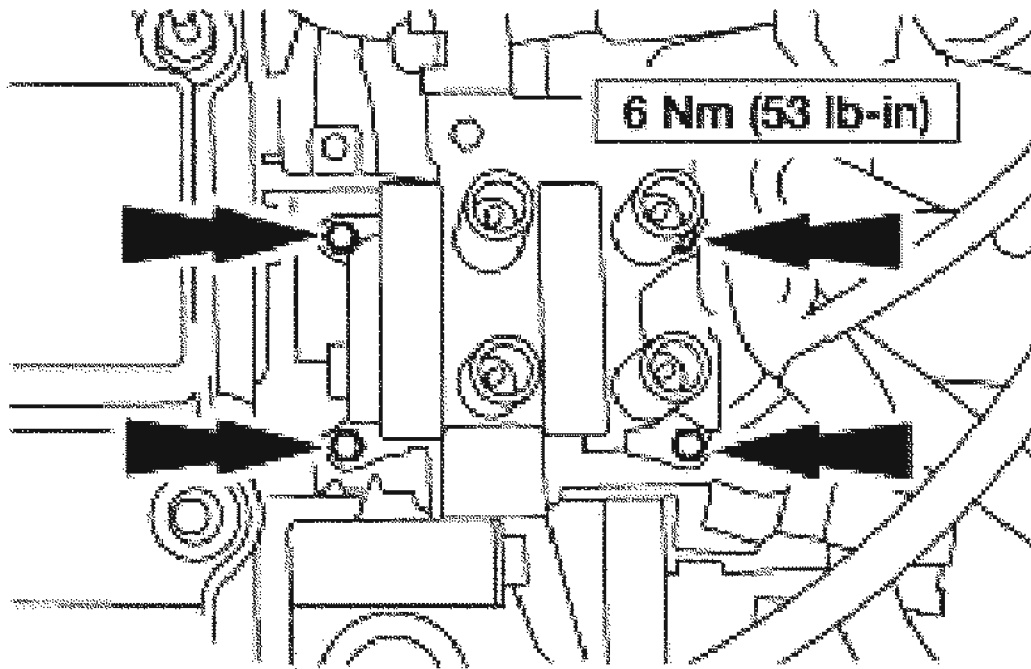
3. Disconnect the ignition coil electrical connectors.



G02740292

**Fig. 3: Disconnecting Ignition Coil Electrical Connectors**  
Courtesy of FORD MOTOR CO.

4. Remove the bolts and remove the ignition coil.



G02740293

**Fig. 4: Removing Ignition Coil Bolts**  
Courtesy of FORD MOTOR CO.

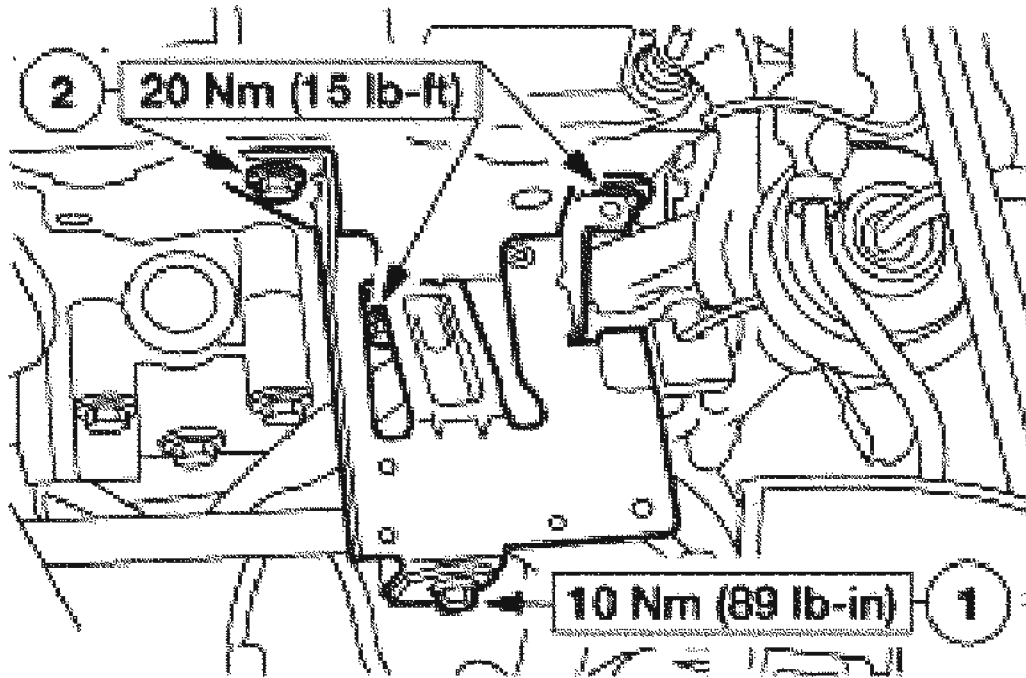
**CAUTION:** Correct installation of the ignition wires is critical to engine operation. If one spark plug wire is not correctly installed at either the spark plugs or the ignition coil, both spark plugs connected to the ignition coil may not fire under load.

5. To install, reverse the removal procedure.

## IGNITION COIL BRACKET

### Removal and Installation

1. Remove the ignition coil. For additional information, refer to **IGNITION COIL**.
2. Remove the bracket.
  1. Remove the exhaust gas recirculation (EGR) tube bracket bolt.
  2. Remove the three bolts and remove the ignition coil bracket.



G02740294

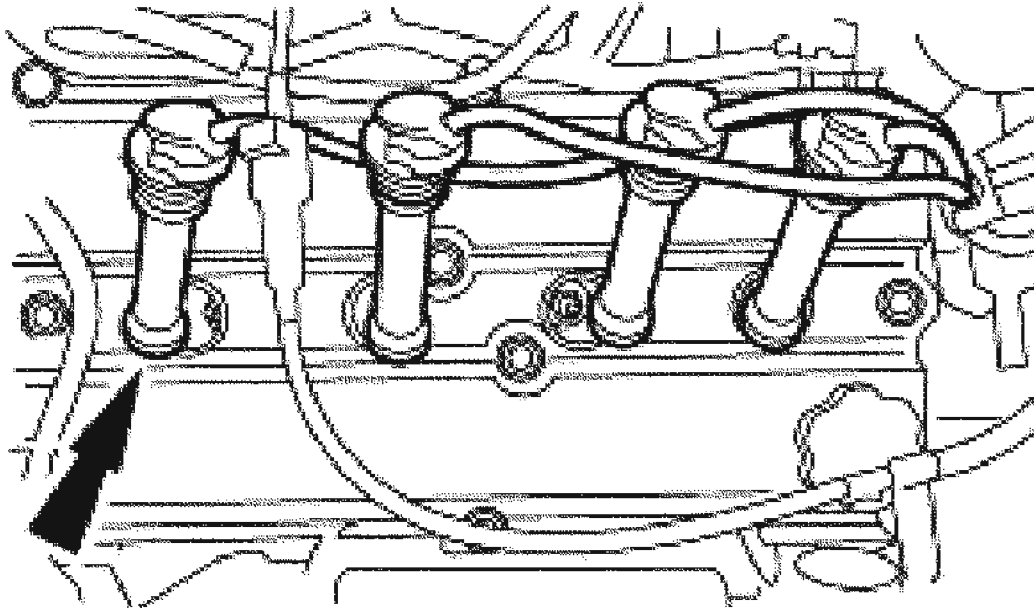
**Fig. 5: Removing Bracket**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### SPARK PLUG WIRES

##### Removal

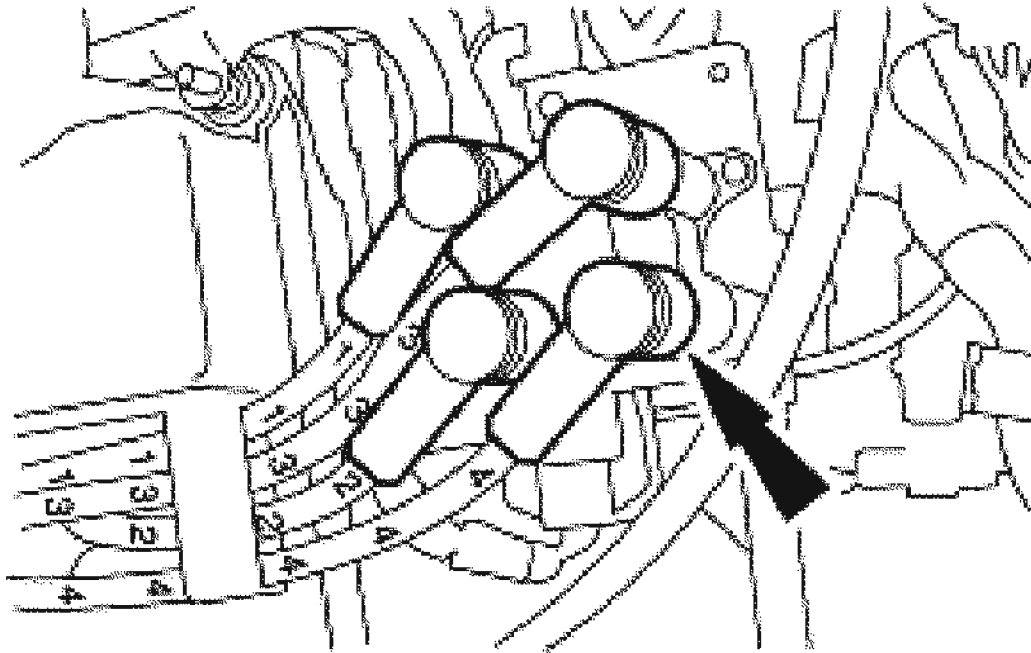
**CAUTION:** Do not pull on the ignition wire directly, as the wire may separate from the connector inside the spark plug boot.



G02740295

**Fig. 6: Disconnecting Ignition Wires From Spark Plugs**  
Courtesy of FORD MOTOR CO.

1. Grasp the spark plug boot firmly and with a twisting-pulling motion, disconnect the ignition wires from the spark plugs.
2. Disconnect the ignition wires from the ignition coil (12029) and remove the wires.



G02740296

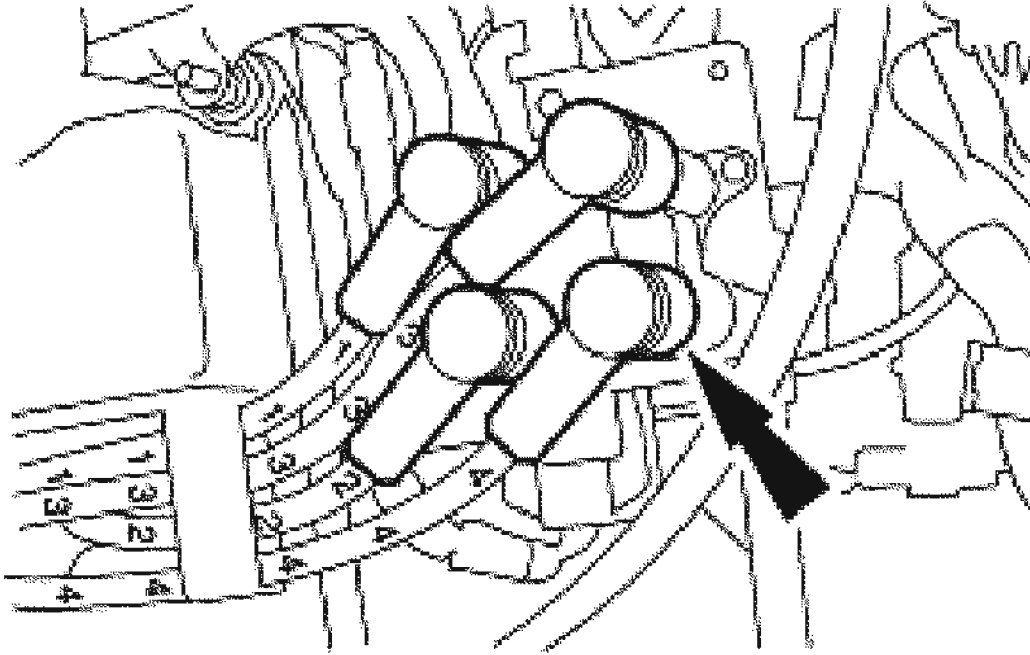
**Fig. 7: Disconnecting Ignition Wires From Ignition Coil**  
Courtesy of FORD MOTOR CO.

#### Installation

**CAUTION:** Correct installation of the ignition wires is critical to engine operation. If one spark plug wire is not correctly installed at either the spark plug or the ignition coil, both spark plugs connected to the ignition coil may not fire under load.

- NOTE:** Whenever an ignition wire is reinstalled or a new one is installed, apply Silicone Brake Caliper Grease and Dielectric compound to the interior surface of the ignition wire boot.
- NOTE:** Before installing the ignition wires, inspect the ignition wires for any visible damage; install new ignition wires if necessary.

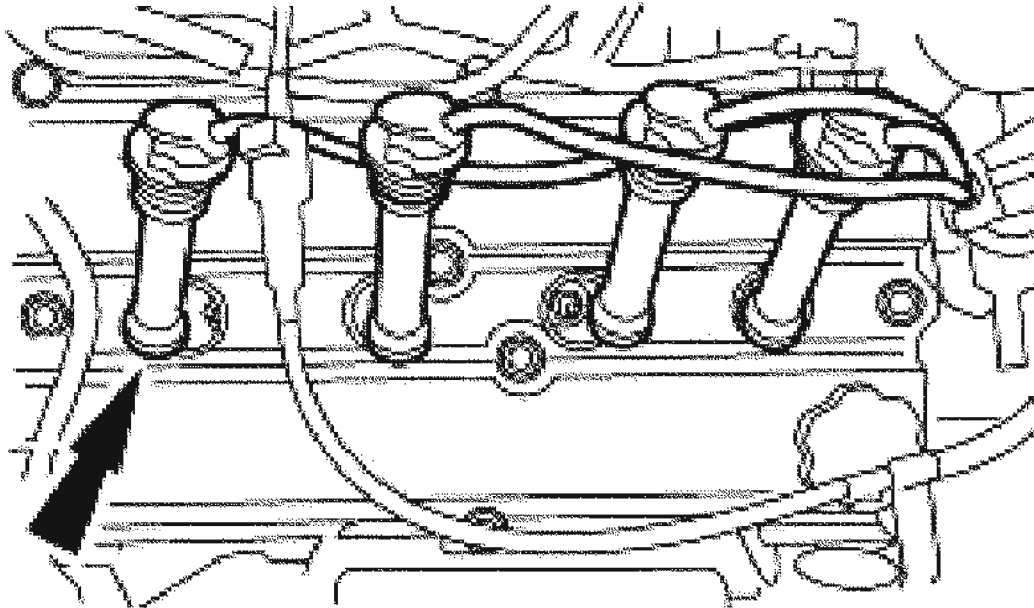




G02740297

**Fig. 8: Connecting Ignition Wires To Correct Ignition Coil Terminals**  
Courtesy of FORD MOTOR CO.

1. Connect the ignition wires to the correct ignition coil terminals.
2. Connect the ignition wires to the correct spark plugs (12405).



G02740298

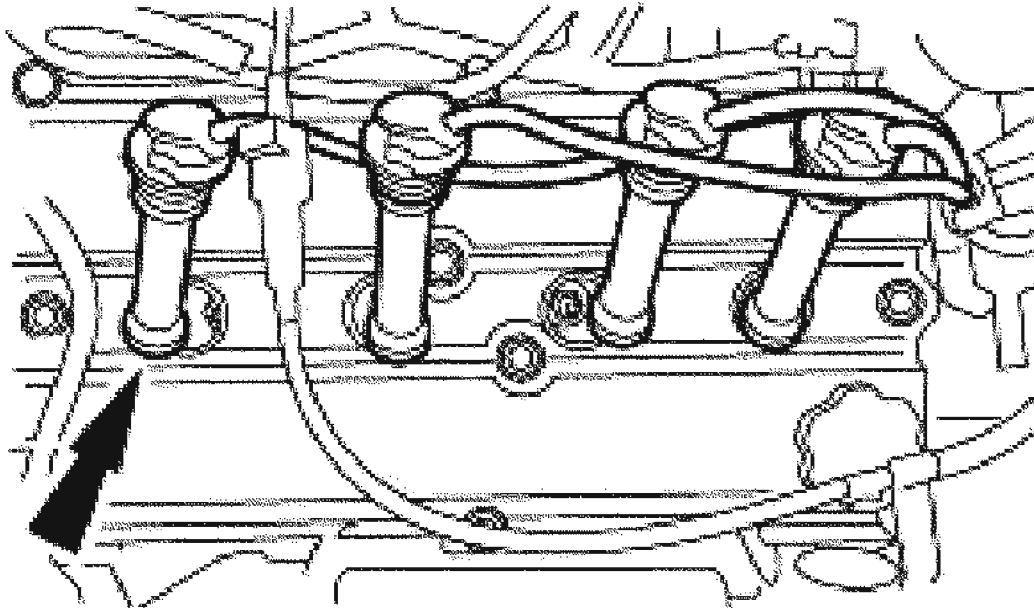
**Fig. 9: Connecting Ignition Wires To Correct Spark Plugs**  
Courtesy of FORD MOTOR CO.

## SPARK PLUGS

### Removal

**CAUTION:** Do not pull on the ignition wire directly, as it may separate from the connector inside the boot.

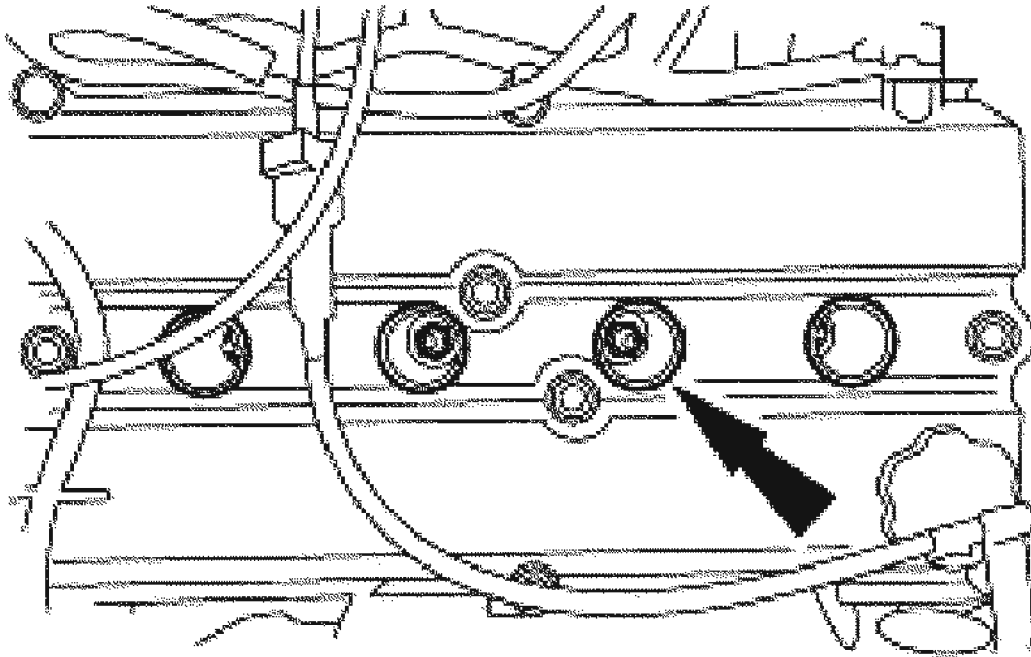
1. Grasp the spark plug boot firmly and with a twisting-pulling motion remove the spark plug wires from the spark plug.



G02740299

**Fig. 10: Removing Spark Plug Wires From Spark Plug**  
Courtesy of FORD MOTOR CO.

- NOTE:** If an original spark plug is reused, install it in the same cylinder from which it was removed. New spark plugs can be used in any cylinder.
- NOTE:** Use compressed air to remove any foreign material from the spark plug well before removing the spark plugs.



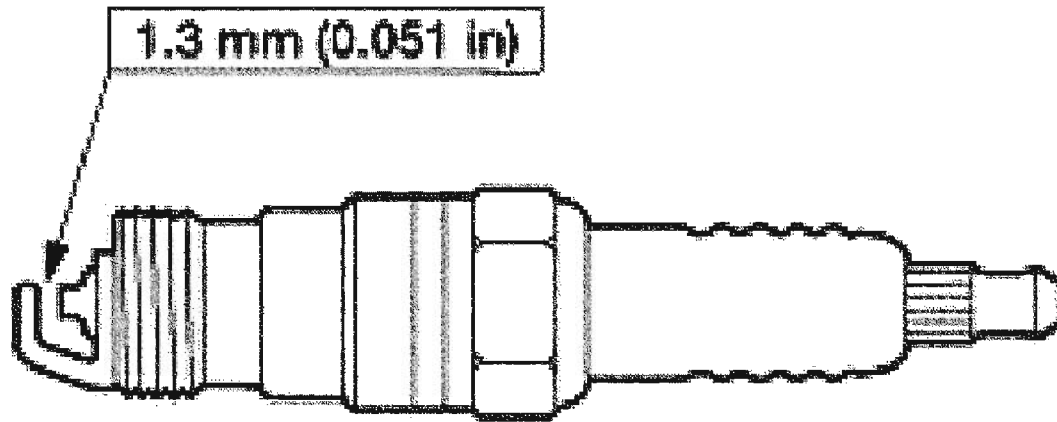
G02740300

**Fig. 11: Removing Spark Plugs**  
Courtesy of FORD MOTOR CO.

2. Remove the spark plugs.
3. Inspect the spark plugs. For additional information, Refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

#### Installation

**NOTE:** Clean the spark plugs with a wire brush or a professional spark plug cleaner (follow the manufacture's instructions).

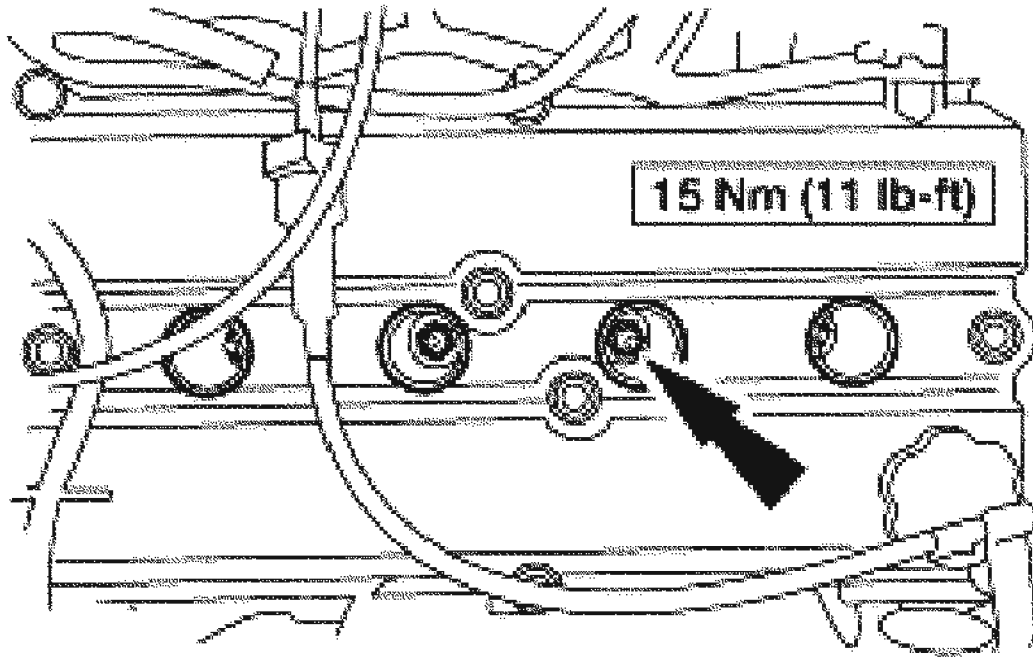


G02740301

**Fig. 12: Identifying Plug Gap**  
Courtesy of FORD MOTOR CO.

1. Adjust the plug gap as necessary.

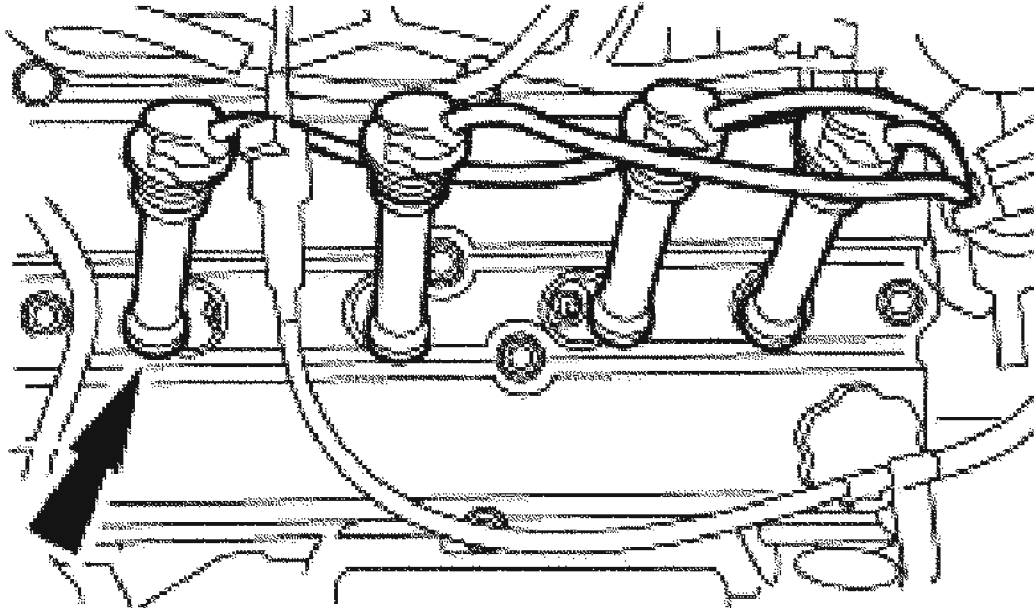
**NOTE:** Apply Anti-Seize Lubricant to the lower three threads of the spark plugs. Do not allow lubricant to contaminate the spark plug electrodes or insulator tips.



G02740302

**Fig. 13: Installing Spark Plugs**  
Courtesy of FORD MOTOR CO.

2. Install the spark plugs.
3. Connect the spark plug wires to the spark plugs.



G02740303

**Fig. 14: Connecting Spark Plug Wires To Spark Plugs**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

2004 ENGINE Engine Ignition - 3.0L (4V) - Escape

### 2004 ENGINE

#### Engine Ignition - 3.0L (4V) - Escape

## SPECIFICATION

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Firing order	1-4-2-5-3-6
Spark plug gap	1.3-1.4 mm (0.052-0.056 in)
Spark plug	AWSF-32F
Silicone Brake Caliper Grease and Dielectric Compound D7AZ - 19A331 -A	ESE - M1C171 -A

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Coil hold-down bolts	6	-	53
Spark plugs	15	11	-

## DESCRIPTION AND OPERATION

### ENGINE IGNITION

Six separate ignition coils:

- are mounted directly above each spark plug.
- are controlled by the powertrain control module (PCM) for correct firing sequence.

The spark plug:

- changes the high voltage pulse into a spark which ignites the fuel and air mixture.
- originally equipped on the vehicle has a platinum-enhanced active electrode for long life.

Crankshaft position (CKP) sensor:

**NOTE:** Initial engine ignition timing is set at 10 degrees +/- 2 degrees before top dead center (BTDC) and is not adjustable. For additional information, refer to the INTRODUCTION - CNG, FLEX-



## **FUEL & GASOLINE article.**

- is a variable reluctance sensor triggered by a 36-minus -1 tooth trigger pulse wheel located on the crankshaft located inside the engine front cover.

The sine wave type signal generated from the CKP sensor provides two types of information:

- position of the crankshaft in 10 degree increments.
- the crankshaft speed.

The PCM uses this information to determine ignition coil turn ON and turn OFF times and misfire detection. For additional information, refer to **ELECTRONIC ENGINE CONTROLS** article.

## **DIAGNOSIS AND TESTING**

### **ENGINE IGNITION**

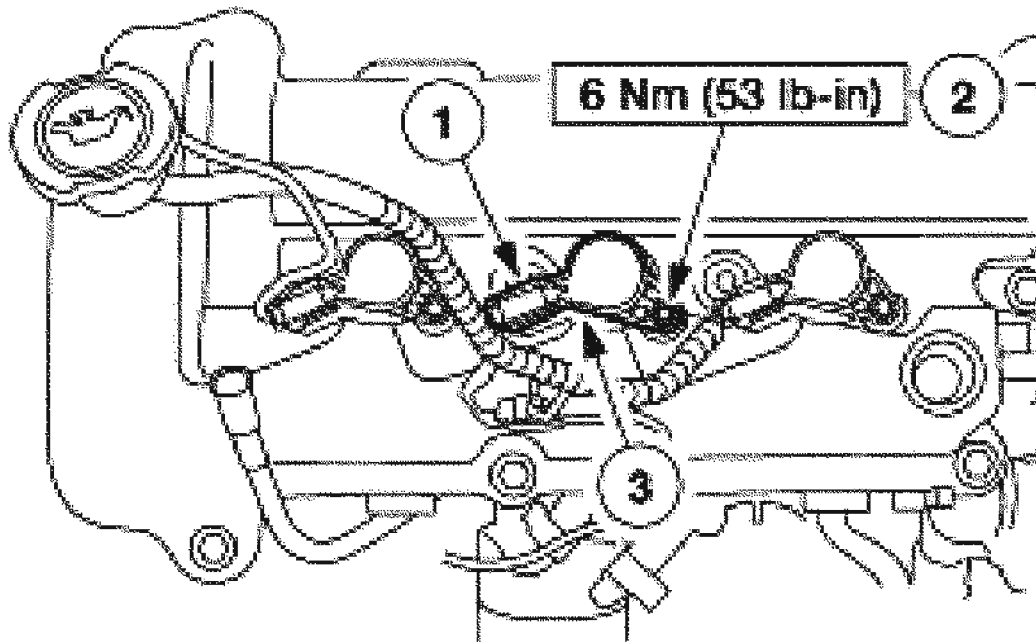
REFER to the **INTRODUCTION - CNG, FLEX-FUEL & GASOLINE** article for diagnosis and testing of the electronic ignition (EI) system.

## **REMOVAL AND INSTALLATION**

### **IGNITION COIL-ON-PLUG -LH**

#### **Removal and Installation**

1. Remove the ignition coil-on-plug.
  1. Disconnect the electrical connector.
  2. Remove the bolt.
  3. Remove the coil-on-plug.



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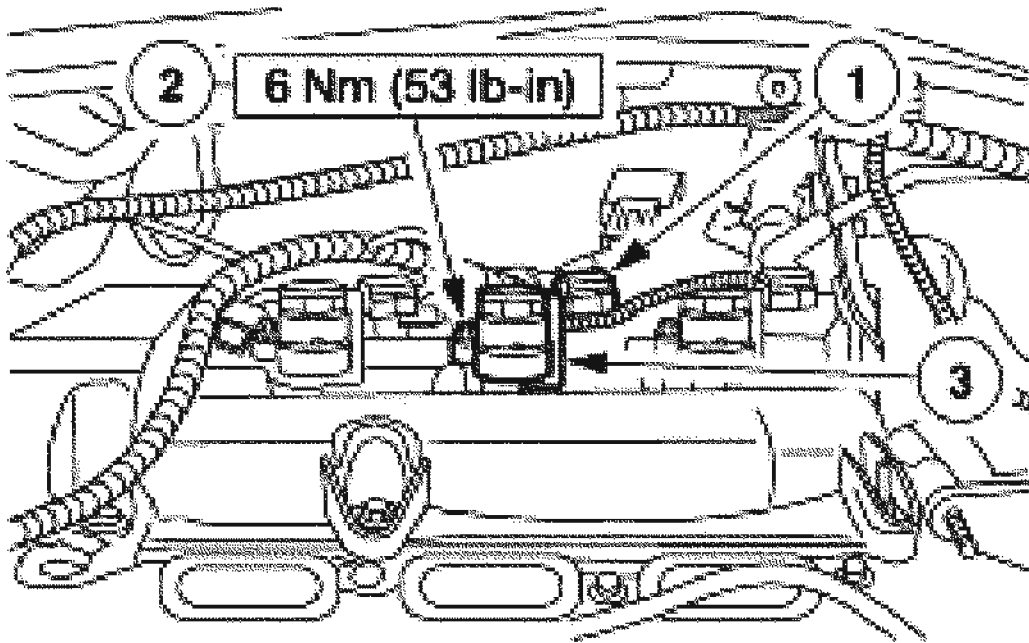
**Fig. 1: Removing LH Ignition Coil-On-Plug**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.
  - Apply a light film of silicone brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.

## IGNITION COIL-ON-PLUG -RH

### Removal and Installation

1. Remove the upper intake manifold. For additional information, refer to **ENGINE-3.0L (4V)**.
2. Remove the ignition coil-on-plug.
  1. Disconnect the electrical connector.
  2. Remove the bolt.
  3. Remove the coil-on-plug.



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**Fig. 2: Removing RH Ignition Coil-On-Plug**  
Courtesy of FORD MOTOR CO.

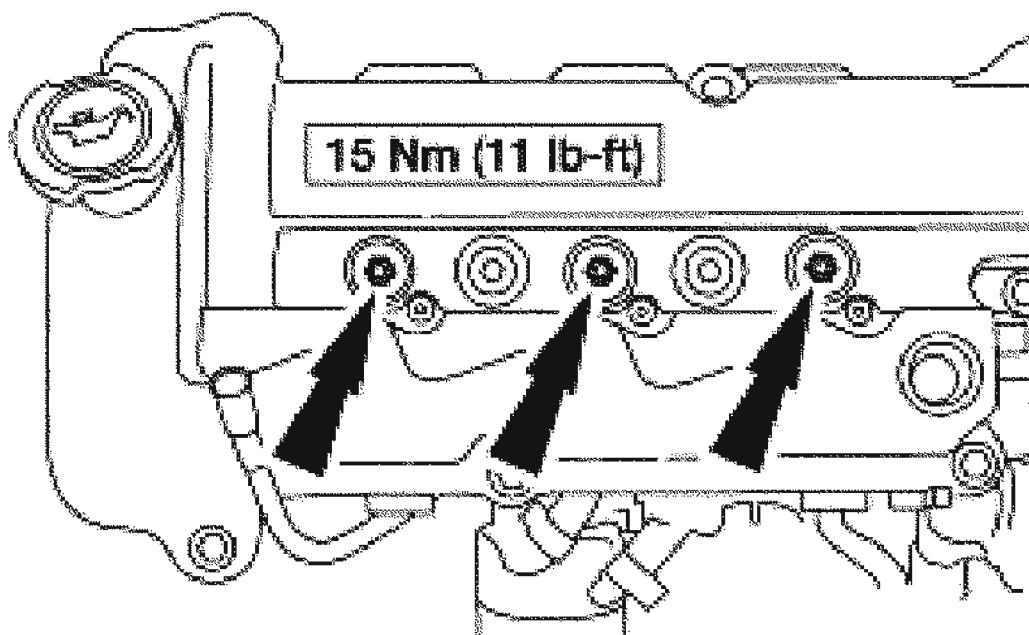
3. To install, reverse the removal procedure.
  - Apply a light film of silicone brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.

## SPARK PLUG

### Removal

1. Remove the ignition coil-on-plugs. For additional information, refer to **IGNITION COIL-ON-PLUG - LH** or **IGNITION COIL-ON-PLUG - RH**.

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



G02740306

**Fig. 3: Removing LH And RH Spark Plugs**  
Courtesy of FORD MOTOR CO.

2. Remove the LH and RH spark plugs.
3. Inspect the spark plugs. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
4. To install, reverse the removal procedure.

**2002-04 STARTING & CHARGING SYSTEMS****Generators & Regulators - Escape****IDENTIFICATION****VIN CODE IDENTIFICATION**

<b>VIN Code <sup>(1)</sup></b>	<b>Engine Displacement</b>
B	2.0L Zetec 4-Cylinder
1	3.0L Duratec V6
(1) Use 8th digit, for engine displacement identification.	

**DESCRIPTION**

System consists of generator, regulator, battery, fuses and associated wiring. On models with 2.0L Zetec engine, system also uses a PCM. Generators have an integral voltage regulator. Voltage regulator incorporates temperature compensation circuitry, so battery charging voltage is maintained at the optimum level. Charge rate is 13-15 volts.

Warning indicator should illuminate with key on, engine off. Warning indicator should not illuminate with ignition off, or with engine running.

**ADJUSTMENTS****BELT TENSION**

Vehicles are equipped with automatic drive belt tensioner. Drive belt does not require adjustment. Inspect condition and tension of generator drive belt prior to performing any on-vehicle charging system tests. Replace belt and/or repair tensioner mechanism if necessary.

**TROUBLE SHOOTING**

**NOTE:** For additional trouble shooting, see **CHARGING SYSTEM - GENERAL TROUBLE SHOOTING** article in **GENERAL INFORMATION**.

Verify customer's complaint. Ensure battery posts and cables are clean and tight. Inspect drive belt. Inspect battery junction box fuses No. 11 (15-amp) and mega fuse FB (120-amp) located near battery junction box. On vehicles with 3.0L Duratec engine, inspect central junction box fuse No. 16 (10-amp). On all models, ensure connections at generator, regulator and engine ground are clean and tight. If problem is found, repair as necessary. On vehicles with 3.0L Duratec engine, if problem is not found, repair by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS. On models with 2.0L Zetec engine, if problem is not

found, perform self-diagnostics. See **SELF-DIAGNOSTIC SYSTEM** .

## ON-VEHICLE TESTING

### BATTERY DRAIN TEST

**NOTE:**      **Amperage draw will vary from vehicle to vehicle depending on equipment package. Compare to a comparable vehicle for reference. No production vehicle should have more than a 50 mA (0.050 amp) draw.**

1. Ensure junction box/fuse panels are accessible without turning on interior and hood lights. Drive vehicle over 30 MPH for at least 5 minutes. Park vehicle and allow to sit with ignition off for at least 40 minutes to allow electronic modules to power down. Go to next step.
2. Connect a fused jumper wire between negative battery cable and negative battery post. Disconnect negative battery cable from negative battery post, without breaking the jumper wire connection to prevent modules from resetting. Go to next step.

**NOTE:**      **It is very important that continuity is not broken between negative battery post and negative battery cable when disconnecting battery cable or connecting ammeter. If continuity is broken, go to step 1 .**

3. Ensure ammeter is set to read milliamps with at least a 10 amp capability. Connect ammeter between negative battery cable and negative battery post. Remove fused jumper wire. Go to next step.
4. If excessive current draw is present (50 mA or more), pull fuses from battery/central junction box one at a time and note any current drop when each fuse is removed. DO NOT reinstall fuses until test is complete. Go to next step.
5. Check wiring diagrams for any circuits that run from battery without passing through battery/central junction box. Disconnect these circuits if current draw still exists. Repair appropriate circuits as necessary. See POWER DISTRIBUTION in appropriate SYSTEM WIRING DIAGRAMS article in ELECTRICAL.

### ELECTRONIC DRAINS WHICH SHUT OFF WHEN BATTERY CABLE IS DISCONNECTED

1. Perform battery drain test. See **BATTERY DRAIN TEST** . Ensure all doors are closed and accessories are off. Without starting engine, turn ignition switch on for a moment, and then turn ignition off. Wait a few minutes for illuminated entry lamps to turn off (if equipped).
2. Connect ammeter between negative battery cable and negative battery post. Disconnect negative battery cable from negative battery post, without breaking the ammeter

connection to prevent modules from resetting. Read amperage draw.

3. Amperage draw should be less than 50 milliamps. If current draw exceeds 50 milliamps, remove fuses from battery/central junction box one at a time to locate problem circuit. Repair appropriate circuits as necessary. See **POWER DISTRIBUTION** in appropriate **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL**.

### **GENERATOR LOAD TEST**

1. Ensure drive belt is in good condition. Replace belt as necessary. If belt is okay, connect charging system load tester in accordance with manufacturer's instructions. Start and run engine at 2000 RPM, and apply load until generator output levels off. Generator amperage should be at least 58 amps with engine at 2000 RPM. Go to next step.
2. Turn A/C system on. Turn blower speed to high. Turn headlights on to high beams. Voltage should increase a minimum of .5 volts. If voltage is as specified, system is operating properly at this time. If voltage is not as specified, perform **GENERATOR NO-LOAD TEST**.

### **GENERATOR NO-LOAD TEST**

1. Connect a voltmeter positive lead to B+ terminal on generator and negative lead to ground. Start and run engine at 2000 RPM, with all accessories off. Read voltmeter when voltage stabilizes. Voltage should be 13-15 volts. If voltage is not as specified, go to next step.
2. On vehicles equipped with 2.0L Zetec engine, perform self-diagnostics. See **SELF-DIAGNOSTIC SYSTEM**. On vehicles equipped with 3.0L Duratec engine, repair by symptom. See **SYMPTOM INDEX** table under **SYSTEM TESTS**.

### **SELF-DIAGNOSTIC SYSTEM**

**NOTE:** All diagnostic tests are written specifically for New Generation Star (NGS) tester. Most generic OBD-II compliant scan tools should be able to perform all test procedures.

### **DIAGNOSTIC FORMATS**

QUICK TEST and SYSTEM TESTS are diagnostic formats used to test and service EEC-V system. QUICK TEST allows technician to identify concerns and retrieve Diagnostic Trouble Codes (DTC). SYSTEM TESTS are used to check circuits, sensors and actuators.

Before starting any SYSTEM TEST, follow all steps under **QUICK TEST** to determine appropriate system test to perform. If vehicle passes QUICK TEST and no driveability symptoms or intermittent faults exist, EEC-V system is okay.

## DIAGNOSTIC TROUBLE CODES

During QUICK TEST, 3 types of Diagnostic Trouble Codes (DTCs) are retrieved and diagnosis must be performed in the following order: Key On Engine Off (KOEO), Key On Engine Running (KOER) and Continuous Memory DTCs. See **QUICK TEST** for self-test procedures. DTCs may be cleared from PCM memory after DTCs have been recorded or fault has been repaired. See **CLEARING CODES** . If fault is still present after clearing DTCs, fault will reset.

### KOEO & KOER Codes

These DTCs indicate faults are present at time of testing. A hard fault may cause Malfunction Indicator Light (MIL) to illuminate and remain illuminated until fault is repaired. The MIL is located on instrument cluster and may be labeled SERVICE ENGINE SOON or CHECK ENGINE. If KOEO or KOER DTCs are retrieved during KOEO ON-DEMAND SELF-TEST or KOER ON-DEMAND SELF-TEST, see **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under QUICK TEST to find appropriate system test to perform.

### Continuous Memory Codes

**NOTE:** Continuous Memory DTCs should be recorded when retrieved. These DTCs may be used to identify intermittent concerns that exist after all KOEO and KOER DTCs have been repaired. Some Continuous Memory DTC faults may not be valid after KOEO and KOER DTCs are serviced.

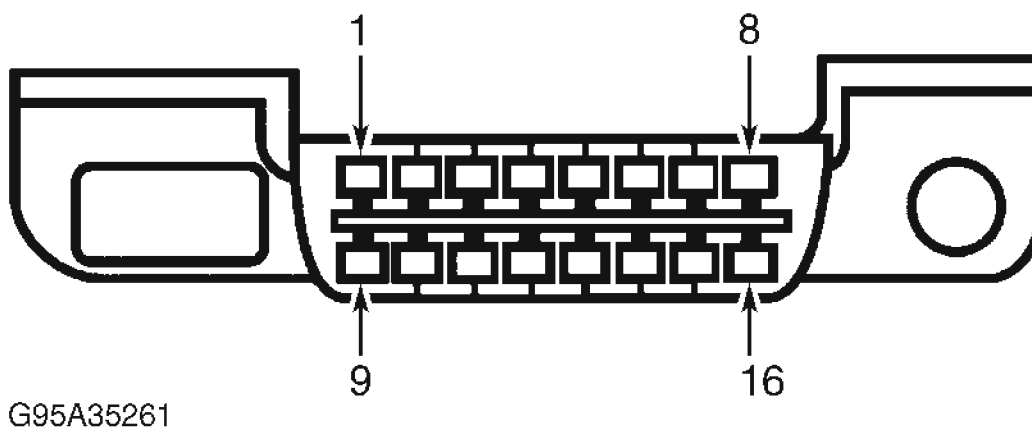
Continuous Memory DTCs are retrieved after performing KOER ON-DEMAND SELF-TEST. Unlike KOEO or KOER self-tests, which can only be activated on-demand, Continuous Memory self-test is always active. A fault may or may not be present at time of checking for Continuous Memory DTCs. This self-test is helpful in diagnosing intermittent concerns.

After noting and/or repairing fault, clear DTCs from memory. See **CLEARING CODES** . Intermittent faults may be caused by a sensor, connector or wiring-related concern.

## RETRIEVING CODES

Fault codes are retrieved from powertrain control system through Data Link Connector (DLC). See **Fig. 1** . DLC is located under left side of instrument panel, right side of steering column. Self-diagnostic test procedures are for use with Rotunda Worldwide Diagnostic System (WDS), New Generation Star (NGS) scan tool or equivalent. If a generic scan tool is used, ensure scan tool is certified to OBD-II standard. A generic scan tool may not be capable of performing all necessary test functions. Go to **READING CODES** .





**Fig. 1: Identifying Data Link Connector Terminals**  
Courtesy of FORD MOTOR CO.

## READING CODES

**NOTE:** If self-test will not activate or TOOL COMMUNICATION ERROR is received, go to TEST QA under SYSTEM TESTS in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

### KOEO & KOER On-Demand Self-Test Codes

Record DTCs in order received. These DTCs indicate current faults in system and should be serviced in order of appearance. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under QUICK TEST to identify appropriate system test to perform.

### Pass Codes

SYSTEM PASS indicates no DTCs were recorded in that portion of test. If SYSTEM PASS is not retrieved in KOEO ON-DEMAND SELF-TEST, DTCs retrieved during KOER ON-DEMAND SELF-TEST may not be valid.

### Continuous Memory Codes

These DTCs result from information stored by PCM during continuous self-test monitoring. Use these DTCs for diagnosis only when KOEO ON-DEMAND SELF-TEST and KOER ON-DEMAND SELF-TEST result in SYSTEM PASS and all steps under QUICK TEST are successfully completed. These DTCs indicate faults previously recorded. Fault may or may not be currently present. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under QUICK TEST.

## CLEARING CODES

**CAUTION: DO NOT disconnect vehicle battery to clear DTCs. This will erase operating information from keep alive RAM. To clear keep alive RAM, perform KEEP ALIVE RANDOM ACCESS MEMORY RESET PROCEDURE .**

#### PCM Reset Procedure

After a PCM reset procedure has been performed, the following conditions will be met:

- All DTCs will be cleared from PCM memory.
- All freeze frame data will be cleared from PCM memory.
- Diagnostic monitoring results will be cleared from PCM memory.
- OBD-II system monitor status will reset.
- DTC P1000 will be set in PCM memory until all OBD-II system monitors or components have been tested to satisfy OBD-II drive cycle without any faults occurring. To clear DTC P1000, perform DRIVE CYCLE PROCEDURE under DIAGNOSTIC MONITORS in appropriate SELF-DIAGNOSTICS in ENGINE PERFORMANCE. Ensure OBD-II DRIVE CYCLE PROCEDURE is performed to verify repair.

To perform PCM reset using scan tool, follow scan tool manufacturer's operating instructions. If after clearing DTCs a concern has not been corrected, or a fault is still present, a hard code will immediately be reset in PCM memory.

#### Keep Alive Random Access Memory Reset Procedure

**CAUTION: When battery is disconnected, vehicle computer may lose memory data. Driveability concerns may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting the battery.**

1. Resetting Keep Alive Random Access Memory (RAM) will return PCM memory to its default setting. Adaptive learning contents such as idle and fuel trim are included. PCM reset procedure is part of keep alive RAM reset. See PCM RESET PROCEDURE . If an error message is received or scan tool is unable to perform keep alive RAM reset procedure, disconnect negative battery terminal for a minimum for 5 minutes, then go to next step. If using Worldwide Diagnostic System (WDS) or New Generation Star (NGS) scan tool, turn ignition switch to ON position. Select ACTIVE COMMAND MODES, then select RESET KEEP ALIVE MEMORY. Go to next step.
2. After keep alive RAM has been reset, engine must idle for 15 minutes to learn new idle air trim values. Idle quality will improve as strategy adapts. Adaptation occurs in 4 separate modes. See IDLE AIR TRIM LEARNING MODES table.

**IDLE AIR TRIM LEARNING MODES**

<b>Transmission Gear Selector Position</b>	<b>A/C Mode</b>
Neutral	On
Neutral	Off
Drive	On
Drive	Off

**QUICK TEST**

Quick Test is divided into 3 specialized test procedures that are functional tests of EEC-V system. All self-tests are completely menu driven using the New Generation Star (NGS) scan tool. The following procedures must be followed in sequence to avoid misdiagnosis:

- **VISUAL CHECK**
- **VEHICLE PREPARATION & EQUIPMENT HOOKUP**
- **KOEO ON-DEMAND SELF-TEST**
- **KOER ON-DEMAND SELF-TEST**
- **CONTINUOUS MEMORY SELF-TEST**

Complete QUICK TEST before performing any system tests. Record any DTCs retrieved. Service DTCs in the following order: KOEO DTCs, KOER DTCs, then Continuous Memory DTCs and service first DTC output. If servicing Continuous Memory DTCs, retrieve any available freeze frame data. See FREEZE FRAME DATA MODE under ADDITIONAL SYSTEM FUNCTIONS in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Disregard any identical or related Continuous Memory DTCs if previously serviced. After each service or repair procedure has been completed, always repeat QUICK TEST procedures to ensure all EEC-V systems are working properly and DTCs are no longer present.

**VISUAL CHECK**

Perform the following, and make all necessary repairs before continuing with QUICK TEST:

- Inspect air cleaner and inlet ducts.
- Check all engine vacuum hoses for damage, bends, leaks, cracks, kinks or improper routing.
- Inspect system wiring harness for proper connections, bent or broken terminals, corrosion, loose wires and proper routing.
- Check Powertrain Control Module (PCM), sensors and actuators for physical damage.
- Check engine coolant for proper level and mixture.
- Check transmission fluid level and quality.

**VEHICLE PREPARATION & EQUIPMENT HOOKUP**

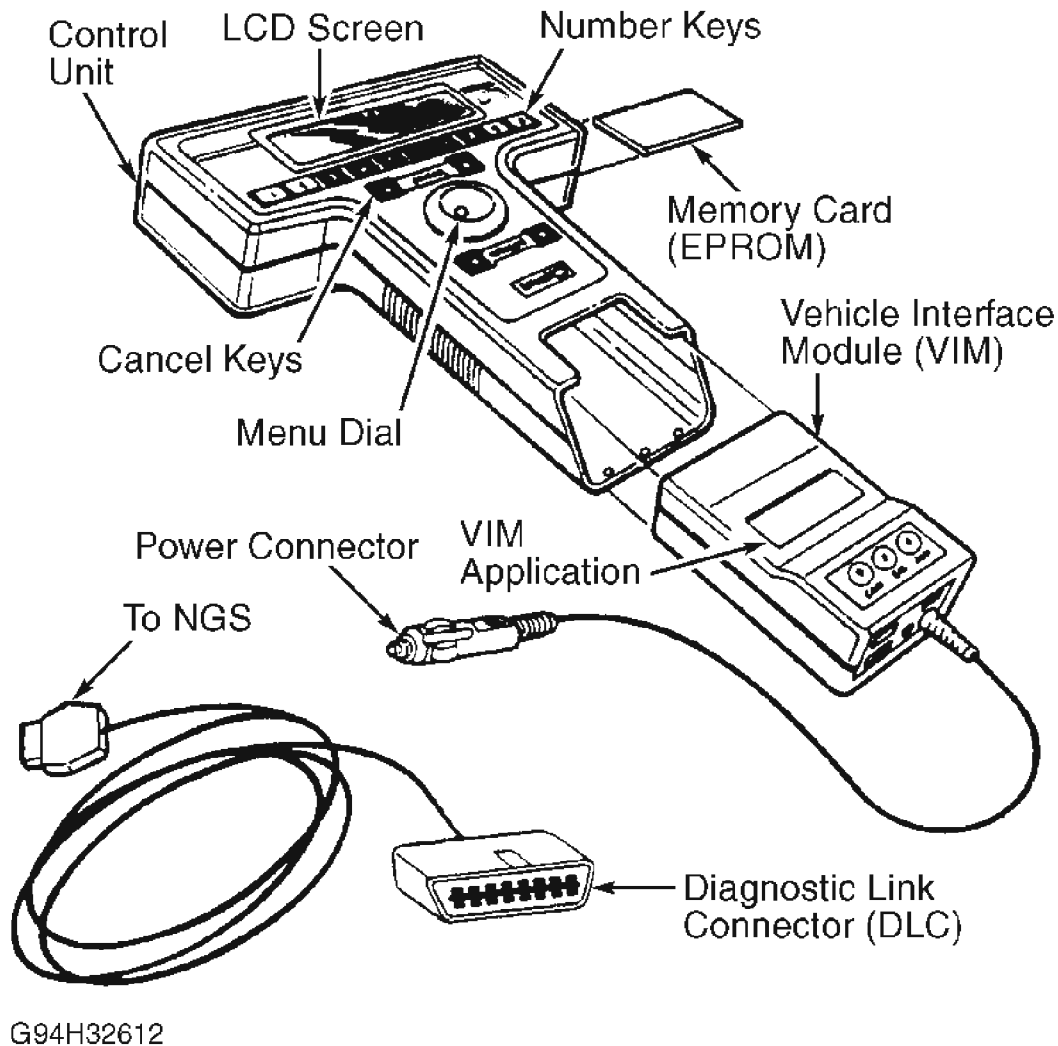
Apply parking brake, and place shift lever in Park (A/T) or Neutral (M/T) position. Block drive wheels. Turn off all electrical accessories. Ensure engine is at normal operating temperature. If vehicle is equipped with an auxiliary powertrain control system (RPM control), it must be turned off when performing any self-test procedure. Connect appropriate test equipment to vehicle as follows:

**Generic Scan Tool**

Ensure scan tool meets or exceeds OBD-II standard. Follow scan tool manufacturer's operating instructions to hook up equipment and record DTCs.

**New Generation STAR Scan Tool**

Turn ignition switch to OFF position. Ensure proper memory (EPROM) card is inserted into NGS scan tool. Connect service connectors of adapter cable to vehicle Data Link Connector (DLC) and the NGS scan tool. See **Fig. 2** . Connect NGS scan tool power supply cable to power and go to **KOEO ON-DEMAND SELF-TEST** .



**Fig. 2: Identifying New Generation Star (NGS) Scan Tool**  
 Courtesy of FORD MOTOR CO.

## KOEO ON-DEMAND SELF-TEST

### Description

KOEO on-demand self-test is a functional test of PCM performed with ignition switch turned to ON position, engine off. This test checks if PCM inputs and outputs are functioning electronically without any faults. A fault must be present at time of testing for KOEO on-demand self-test to detect a fault.

### Performing Self-Test

To perform self-test, turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select VEHICLE & ENGINE SELECTION menu.
- Select NEW VEHICLE, YEAR & MODEL.
- Select DIAGNOSTIC DATA LINK.
- Select POWERTRAIN CONTROL MODULE.
- Select DIAGNOSTIC TEST MODE.
- Select KOEO ON-DEMAND SELF-TEST.
- Turn ignition switch to ON position.
- Follow operating instructions from scan tool menu.
- Record DTCs and perform appropriate system test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** . After KOEO on-demand self-test is complete, cycle ignition switch before performing other self-tests or driving vehicle.

## KOER ON-DEMAND SELF-TEST

### Description

KOER on-demand self-test is a functional test of PCM performed with ignition key on, engine running. A check of certain inputs and outputs is made during operating conditions and normal operating temperature. The Brake Pedal Position (BPP) switch, Power Steering Pressure (PSP) switch and Transmission Control Switch (TCS) tests are part of KOER on-demand self-test and must be performed during this operation (if applicable). See **BPP, PSP & TCS TEST PROCEDURES** . A fault must be present at time of testing for KOER on-demand self-test to detect a fault.

### BPP, PSP & TCS Test Procedures

This test ensures EEC-V system is able to detect a change of state in brakelight switch, TCS and PSP switches. During KOER on-demand self-test, the brake pedal must be applied and then released, TCS must be cycled, and steering wheel must be turned at least 1/4 of a revolution.

### Performing Self-Test

Retrieve any available freeze frame data prior to self-test. See FREEZE FRAME DATA MODE under ADDITIONAL SYSTEM FUNCTIONS in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. To perform self-test, turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select VEHICLE & ENGINE SELECTION menu.
- Select NEW VEHICLE, YEAR & MODEL.
- Select DIAGNOSTIC DATA LINK.
- Select POWERTRAIN CONTROL MODULE.

- Select DIAGNOSTIC TEST MODE.
- Select RETRIEVE/CLEAR CONTINUOUS DTCs.
- Turn ignition switch to ON position.
- Follow operating instructions from scan tool menu.
- Record DTCs and perform appropriate system test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** . After continuous memory self-test is complete, cycle ignition switch before performing other self-tests or driving vehicle.

## CONTINUOUS MEMORY SELF-TEST

### Description

Continuous memory self-test is a functional test of PCM performed under any condition (engine running or engine off) with ignition switch turned to ON position. Unlike KOEO and KOER self-tests which can only be activated on demand, continuous monitor is always active in monitoring the system. When a fault is detected, DTC will be stored in memory. This makes it possible to diagnose intermittent faults.

There are 2 types of Continuous Memory DTCs. Emission related DTCs will illuminate the Malfunction Indicator Light (MIL) on instrument cluster. Non-emission DTCs will never illuminate MIL. On emission-related MIL codes, PCM will store DTC in continuous memory at first detection of concern. The MIL will not be illuminated, but DTC is considered by PCM to be a pending DTC. If same concern is detected in next drive cycle, MIL will illuminate. MIL will go out if fault is not present after 3 consecutive drive cycles, or PCM has been reset. An emission-related pending DTC or non-emission DTC will be erased after 40-80 warm-up cycles or PCM reset.

### Performing Self-Test

Retrieve any available freeze frame data prior to self-test. See FREEZE FRAME DATA MODE under ADDITIONAL SYSTEM FUNCTIONS in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. To perform self-test, turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select VEHICLE & ENGINE SELECTION menu.
- Select NEW VEHICLE, YEAR & MODEL.
- Select DIAGNOSTIC DATA LINK.
- Select POWERTRAIN CONTROL MODULE.
- Select DIAGNOSTIC TEST MODE.
- Select RETRIEVE/CLEAR CONTINUOUS DTCs.
- Turn ignition switch to ON position.

- Follow operating instructions from scan tool menu.
- Record DTCs and perform appropriate system test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** . After continuous memory self-test is complete, cycle ignition switch before performing other self-tests or driving vehicle.

## DIAGNOSTIC TROUBLE CODE DEFINITIONS

### POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX

DTC (1)	Description	Perform Test
P1246	System Voltage Failure	<u>A</u>
(1) Codes listed in this table are only for testing covered in this article. For complete DTC listing, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.		

## SYSTEM TESTS

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

**NOTE:** For proper diagnostics, see **VIN CODE IDENTIFICATION** table under **IDENTIFICATION**.

## SYMPTOM INDEX

Symptom	Perform Test
Battery Is Discharged Or Voltage Is Low	<u>A</u>
Warning Indicator Is On With Engine Running, System Is Not Charging (3.0L Duratec)	<u>B</u>
Warning Indicator Is On With Engine Running, System Is Not Charging (2.0L Zetec)	<u>C</u>
System Overcharges, Battery Voltage Is Greater Than 15.5 Volts (3.0L Duratec)	<u>D</u>
System Overcharges, Battery Voltage Is Greater Than 15.5 Volts (2.0L Zetec)	<u>E</u>
Warning Indicator Is On With Engine Running, System Is Charging (3.0L Duratec)	<u>F</u>
Warning Indicator Is On With Engine Running, System Is Charging (2.0L Zetec)	<u>G</u>



## 2004 Ford Escape

### 2002-04 STARTING & CHARGING SYSTEMS Generators & Regulators - Escape

Warning Indicator Is Off With Ignition Switch On & Engine Off (3.0L Duratec)	<u>H</u>
Warning Indicator Is Off With Ignition Switch On & Engine Off (2.0L Zetec)	<u>I</u>
Warning Indicator Flickers Or Is Intermittent (3.0L Duratec)	<u>J</u>
Warning Indicator Flickers Or Is Intermittent (2.0L Zetec)	<u>K</u>
Generator Noisy	<u>L</u>
Radio Interference	<u>M</u>

#### TEST A: BATTERY IS DISCHARGED OR VOLTAGE IS LOW

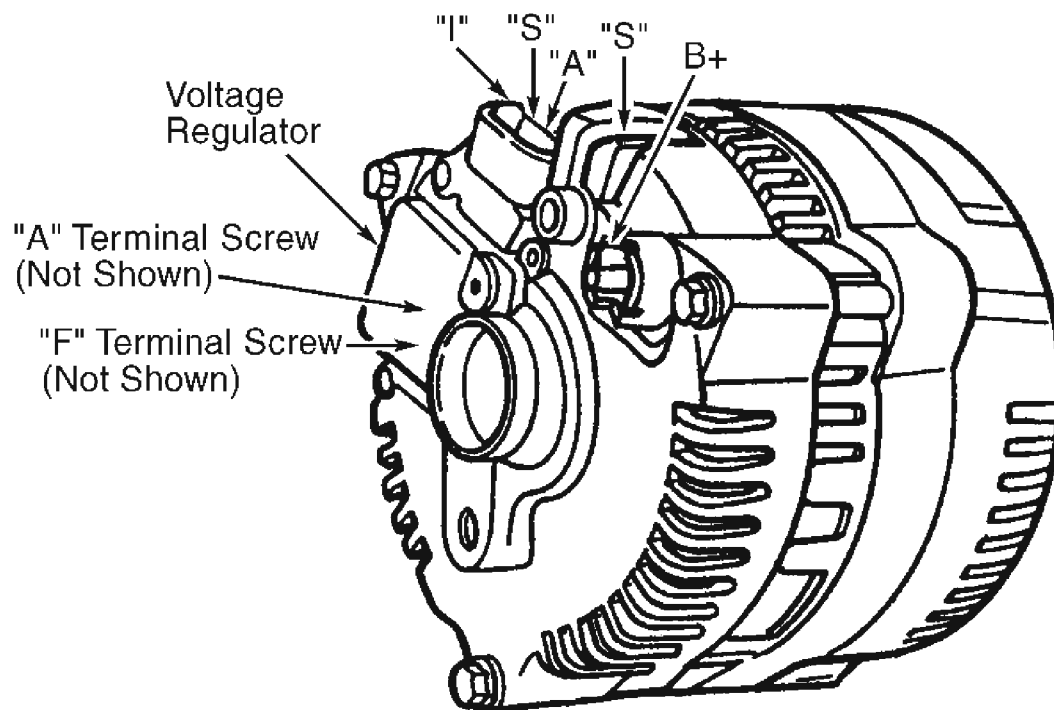
**NOTE:** Failure to fully charge battery before retesting may cause false readings.

1. Test battery condition. See **BATTERY DRAIN TEST** under ON-VEHICLE TESTING. If battery is okay, go to next step. If battery is not okay, replace battery.
2. Perform generator load and no-load tests. See **GENERATOR LOAD TEST** and **GENERATOR NO-LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is not okay, perform **TEST B: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (3.0L DURATEC)** or **TEST C: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (2.0L ZETEC)**.
3. Perform **BATTERY DRAIN TEST** under ON-VEHICLE TESTING. If no excessive current draw was not found, go to next step. If any excessive current draw was found, repair as necessary.
4. Perform **ELECTRONIC DRAINS WHICH SHUT OFF WHEN BATTERY CABLE IS DISCONNECTED** under ON-VEHICLE TESTING. If there are any current drains that shut off when the battery is disconnected, repair as necessary. If no drains were found, perform **TEST B: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (3.0L DURATEC)** or **TEST C: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (2.0L ZETEC)**.

#### TEST B: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (3.0L DURATEC)

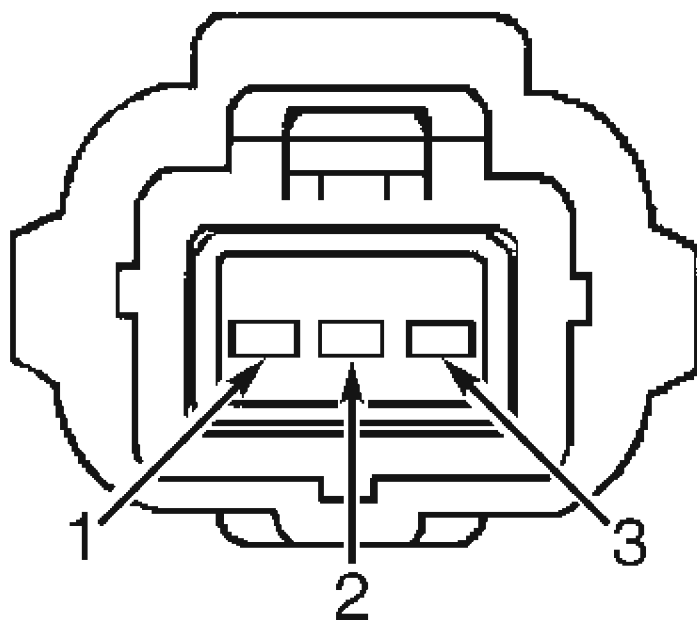
1. Measure voltage between ground and generator B+ terminal (Yellow/White wire). See **Fig. 3**. If battery voltage is present, go to next step. If battery voltage is not present, repair circuit between generator and battery.
2. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Measure voltage between ground and generator connector harness terminal No. 3 (Black/Yellow wire). See **Fig. 4**. If battery voltage is present, go to next step. If battery voltage is not present, repair circuit between generator and battery.

3. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal No. 1 (Light Green/Red wire). If battery voltage is present, go to next step. If battery voltage is not present, repair Light Green/Red wire between generator and instrument cluster. See **WIRING DIAGRAMS**.
4. Start engine and run at 2000 RPM. Measure voltage between positive battery terminal and generator terminal B+ (Yellow/White wire). See **Fig. 3**. If voltage is less than 0.5 volt, replace generator. If voltage is 0.5 volt or more, repair Yellow/White wire between generator and battery.



G94H32141

**Fig. 3: Identifying Generator Terminals**  
Courtesy of FORD MOTOR CO.



G00046837

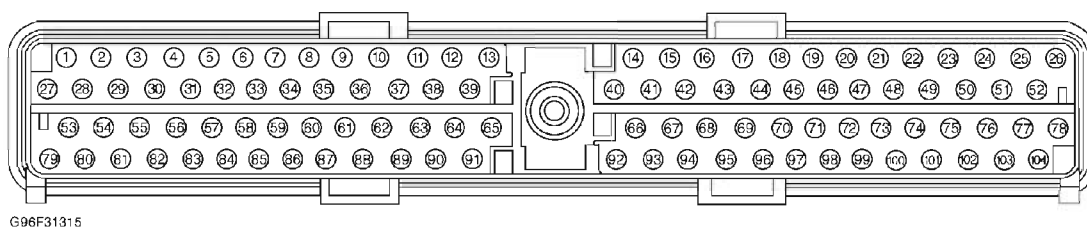
**Fig. 4: Identifying Generator Harness Connector Terminals**  
Courtesy of FORD MOTOR CO,

**TEST C: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal No. 1 (Gray/Orange wire). See **Fig. 4** . If voltage is zero volts, go to next step. If voltage is not zero volts, go to step 4 .
3. Turn ignition switch to LOCK position. Disconnect PCM 104-pin harness connector. Measure resistance in Gray/Orange wire between PCM harness connector terminal No. 59 and generator harness connector terminal No. 1. See **Fig. 4** and **Fig. 5** . If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open in

Gray/Orange wire between PCM and generator.

4. Connect generator harness connector. Perform **GENERATOR LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is defective, replace generator.
5. Turn ignition switch to LOCK position. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.



**Fig. 5: Identifying Powertrain Control Module Harness Connector Terminals**  
Courtesy of FORD MOTOR CO.

**TEST D: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (3.0L DURATEC)**

1. Turn ignition switch to RUN position. Measure voltage between positive battery terminal and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 4**. If voltage is less than .5 volt, go to next step. If voltage is .5 volt or more, repair high resistance in Black/Yellow wire between generator and battery junction box.
2. Turn ignition switch to LOCK position. Inspect ground connections between voltage regulator, generator and engine, and battery and engine. If problem exists, repair connections as necessary. If all connections are clean and tight, replace generator.

**TEST E: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Start engine and let idle. Turn all accessories off. Measure voltage between battery terminals while varying engine speed. If voltage is less than 15 volts, system is operating correctly. If voltage is 15 volts or more, go to next step.
3. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector.

Start engine and let idle. Perform load and no-load tests on generator. See **GENERATOR LOAD TEST** and **GENERATOR NO-LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is defective, replace generator.

4. Turn ignition switch to LOCK position. Measure voltage between ground and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 4** . If voltage is less than 0.5 volt from battery voltage, replace generator. If voltage is not less than 0.5 volt from battery voltage, repair high resistance in Black/Yellow wire between generator and battery junction box.

**TEST F: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS CHARGING (3.0L DURATEC)**

Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Check warning indicator. If warning indicator illuminates, repair short to ground in Light Green/Red wire between generator and instrument cluster. If warning indicator does not illuminate, replace generator.

**TEST G: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS CHARGING (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Start engine and let idle. Turn all accessories off. Measure voltage between battery terminals while varying engine speed. If voltage is less than 15 volts, go to next step. If voltage is 15 volts or more, perform **TEST E: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (2.0L ZETEC)** .
3. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 4** . If voltage is equal to battery voltage, go to next step. If voltage is not equal to battery voltage, repair Black/Yellow wire between generator and battery junction box.
4. Turn ignition switch to LOCK position. Disconnect PCM 104-pin harness connector. Measure resistance between ground and PCM harness connector terminal No. 59 (Gray/Orange wire). If resistance is 10 k/ohms or more, go to next step. If resistance is less than 10 k/ohms, repair short to ground in Gray/Orange wire between generator and PCM.
5. Connect PCM harness connector and generator harness connector. Perform load and no-load tests on generator. See **GENERATOR LOAD TEST** and **GENERATOR NO-LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next

step. If generator is defective, replace generator.

6. Disconnect PCM harness connectors. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.

#### **TEST H: WARNING INDICATOR IS OFF WITH IGNITION SWITCH ON & ENGINE OFF (3.0L DURATEC)**

Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Connect a fused jumper wire between ground and generator harness connector terminal No. 1 (Light Green/Red wire). See **Fig. 4**. Turn ignition switch to RUN position. If warning indicator illuminates, replace generator. If warning indicator does not illuminate, repair warning indicator problem as necessary. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

#### **TEST I: WARNING INDICATOR IS OFF WITH IGNITION SWITCH ON & ENGINE OFF (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Disconnect generator 3-pin harness connector. Connect a fused (15-amp) jumper wire between ground and generator harness connector terminal No. 1 (Gray/Orange wire). See **Fig. 4**. Turn ignition switch to RUN position. If warning indicator does not illuminate, go to next step. If warning indicator illuminates, replace generator.
3. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.

#### **TEST J: WARNING INDICATOR FLICKERS OR IS INTERMITTENT (3.0L DURATEC)**

1. Inspect all generator, battery, and power distribution connections for looseness, corrosion, loose or bent terminals, or loose eyelets. If connections are clean and tight, go to next step. If problem exists, repair as necessary.
2. Start engine and let idle. Inspect battery junction box fuse No. 11 (15-amp) for looseness. Wiggle fuse and note warning indicator operation. If warning indicator does not flicker, go to next step. If warning indicator flickers, repair loose fuse connections.

3. Turn ignition switch to LOCK position. Connect a fused jumper wire between positive battery terminal and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 4** . Start engine and let idle. Note warning indicator operation. If warning indicator flickers, repair warning indicator problem as necessary. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. If warning indicator does not flicker, repair loose connection(s) in circuits.

**TEST K: WARNING INDICATOR FLICKERS OR IS INTERMITTENT (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under SELF-DIAGNOSTIC SYSTEM.
2. Disconnect generator 3-pin harness connector. Inspect all generator, battery, and power distribution connections for looseness, corrosion, loose or bent terminals, or loose eyelets. Connect generator connector. If problem does not exist, go to next step. If problem exists, repair connections as necessary.
3. Start engine and let idle. Inspect battery junction box fuse No. 11 (15-amp) for looseness. Wiggling fuse and note warning indicator operation. If warning indicator does not flicker, go to next step. If warning indicator flickers, repair loose fuse connections as necessary.
4. Turn all accessories off. Measure voltage between battery terminals while varying engine speed. If voltage is less than 15 volts, go to next step. If voltage is 15 volts or more, perform **TEST E: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (2.0L ZETEC)** .
5. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Connect a fused jumper wire between ground and generator harness connector terminal No. 1 (Gray/Orange wire). See **Fig. 4** . If warning indicator illuminates, go to next step. If warning indicator does not illuminate, repair open in Gray/Orange wire between generator and PCM.
6. Turn ignition switch to LOCK position. Remove jumper wire. Connect generator harness connector. Turn ignition switch to RUN position. Observe warning indicator operation. If warning indicator does not illuminate, go to next step. If warning indicator illuminates, PCM is operating properly. Recheck generator circuits for intermittent shorts or opens.
7. Turn ignition switch to LOCK position. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.

**TEST L: GENERATOR NOISY**

1. Turn ignition switch to LOCK position. Check accessory drive belt for damage and correct installation. Check mounting brackets and pulleys for looseness and damage. If problem does not exist, go to next step. If problem exists, repair as necessary.
2. Check generator installation. Ensure all fasteners are tight. If problem does not exist, go to next step. If problem exists, repair as necessary.
3. Disconnect generator 3-pin harness connector. Start engine and let idle. Turn headlights on. Turn rear defogger on. Turn blower motor to high speed. If noise still exists, go to next step. If noise does not still exist, replace generator.
4. Turn ignition switch to LOCK position. Connect generator harness connector. Start engine and let idle. Turn all accessories off. Using a stethoscope, check generator for unusual mechanical noise. If generator is source of noise, replace generator. If generator is not source of noise, isolate noise and repair as necessary.

**TEST M: RADIO INTERFERENCE**

Start engine and let idle. Tune radio to station where interference is present. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Start engine and let idle. If interference is still present, repair radio concern. If interference is not still present, replace generator.

**REMOVAL & INSTALLATION**

**CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See appropriate COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.**

**GENERATOR****Removal & Installation (2.0L Zetec)**

1. Disconnect negative battery cable. Remove right front wheel and tire. Remove 5 bolts and right front lower splash shield. Rotate accessory drive belt tensioner clockwise. Remove accessory drive belt from generator pulley. Disconnect generator electrical connectors to voltage regulator. Remove B+ terminal cover, nut and disconnect electrical connector. Remove lower generator bolts.

**NOTE:** Prior to installing generator, ensure upper bolt is placed in generator.

2. Loosen upper generator bolt from engine. DO NOT remove upper bolt from generator. Insufficient clearance does not allow bolt to be completely removed. Move generator to



rear of vehicle. Remove generator. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

#### Removal & Installation (3.0L Duratec)

Disconnect negative battery cable. Remove right side front drive halfshaft and intermediate shaft. See appropriate AXLE SHAFTS article in DRIVE AXLES. Remove right side lower splash shield screws and pin-type retainer. Remove right front wheel and tire. Remove 5 bolts and right front lower splash shield. Rotate accessory drive belt tensioner clockwise. Remove accessory drive belt from generator pulley. Disconnect generator harness connector. Remove upper and lower mounting bolts and generator from vehicle. Remove generator mounting bracket. Remove generator electrical connectors. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

### POWERTRAIN CONTROL MODULE

#### Removal & Installation

Disconnect negative battery cable. Loosen Powertrain Control Module (PCM) cover bolt. Disconnect electrical connector. Remove cover nuts and cover. Remove PCM. To install, reverse removal procedure. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS** .

### GENERATOR SPECIFICATIONS

#### GENERATOR SPECIFICATIONS

Application	Specification
Generator Amperage Rating	110 Amps
Load Test <sup>(1)</sup>	
With Tester Load <sup>(2)</sup>	(3)
Without Tester Load <sup>(4)</sup>	(5)
No-Load Test <sup>(1) (2)</sup>	13-15 Volts
<p>(1) All tests are performed with engine running at 2000 RPM.</p> <p>(2) All accessories off.</p> <p>(3) Adjust tester load bank to determine generator output.</p> <p>(4) Perform this test with engine running, A/C on, blower motor on high speed, and headlamps on high beam.</p> <p>(5) With accessories on, voltage should increase a minimum of 0.5 volt above base voltage.</p>	

## 2004 Ford Escape

2002-04 STARTING & CHARGING SYSTEMS Generators & Regulators - Escape

### TORQUE SPECIFICATIONS

#### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Generator Bolts	
2.0L (Lower)	35 (47)
2.0L (Upper)	18 (24)
3.0L	35 (47)
Generator Mounting Bracket Bolts	15 (20)
	<b>INCH Lbs. (N.m)</b>
Generator Terminal B+ Nut	71 (8)
Powertrain Control Module Bolts & Nuts	53 (6)

### WIRING DIAGRAMS

#### 2002

For wiring diagrams, see STARTING/CHARGING in SYSTEM WIRING DIAGRAMS.

#### 2003

For wiring diagrams, see STARTING/CHARGING in SYSTEM WIRING DIAGRAMS.

#### 2004

For wiring diagrams, see STARTING/CHARGING in SYSTEM WIRING DIAGRAMS.

**2001 STARTING & CHARGING SYSTEMS****Generators & Regulators - Escape****IDENTIFICATION****VIN CODE IDENTIFICATION**

<b>VIN Code <sup>(1)</sup></b>	<b>Engine Displacement</b>
B	2.0L Zetec 4-Cylinder
1	3.0L Duratec V6
(1) Use 8th digit, for engine displacement identification.	

**DESCRIPTION**

System consists of generator, regulator, battery, fuses and associated wiring. On models with 2.0L Zetec engine, system also uses a PCM. Generators have an integral voltage regulator. Voltage regulator incorporates temperature compensation circuitry, so battery charging voltage is maintained at the optimum level. Charge rate is 13-15 volts.

Warning indicator should illuminate with key on, engine off. Warning indicator should not illuminate with ignition off, or with engine running.

**ADJUSTMENTS****BELT TENSION**

Vehicles are equipped with automatic drive belt tensioner. Drive belt does not require adjustment. Inspect condition and tension of generator drive belt prior to performing any on-vehicle charging system tests. Replace belt and/or repair tensioner mechanism if necessary.

**TROUBLE SHOOTING**

**NOTE:** See **TROUBLE SHOOTING** article in **GENERAL INFORMATION**.

Verify customer's complaint. Ensure battery posts and cables are clean and tight. Inspect drive belt. Inspect battery junction box fuses No. 11 (15-amp) and mega fuse FB (120-amp) located near battery junction box. On vehicle with 3.0L Duratec engine, inspect central junction box fuse No. 16 (10-amp). On all models, ensure connections at generator, regulator and engine ground are clean and tight. If problem is found, repair as necessary. On vehicle with 3.0L Duratec engine, if problem is not found, repair by symptom. See **SYMPTOM INDEX** table under **SYSTEM TESTS**. On models with 2.0L Zetec engine, if problem is not found, perform self-diagnostics. See **SELF-DIAGNOSTIC SYSTEM**.

## ON-VEHICLE TESTING

### BATTERY DRAIN TEST

**NOTE:** Amperage draw will vary from vehicle to vehicle depending on equipment package. Compare to a comparable vehicle for reference. No production vehicle should have more than a 50 mA (0.050 amp) draw.

1. Ensure junction box/fuse panels are accessible without turning on interior and hood lights. Drive vehicle over 30 MPH for at least 5 minutes. Park vehicle and allow to sit with ignition off for at least 40 minutes to allow electronic modules to power down. Go to next step.
2. Connect a fused jumper wire between negative battery cable and negative battery post. Disconnect negative battery cable from negative battery post, without breaking the jumper wire connection to prevent modules from resetting. Go to next step.

**NOTE:** It is very important that continuity is not broken between negative battery post and negative battery cable when disconnecting battery cable or connecting ammeter. If continuity is broken, go to step 1 .

3. Ensure ammeter is set to read milliamps with at least a 10 amp capability. Connect ammeter between negative battery cable and negative battery post. Remove fused jumper wire. Go to next step.
4. If excessive current draw is present (50 mA or more), pull fuses from battery/central junction box one at a time and note any current drop when each fuse is removed. DO NOT reinstall fuses until test is complete. Go to next step.
5. Check wiring diagrams for any circuits that run from battery without passing through battery/central junction box. Disconnect these circuits if current draw still exists. Repair appropriate circuits as necessary. See POWER DISTRIBUTION article in WIRING DIAGRAMS.

### ELECTRONIC DRAINS WHICH SHUT OFF WHEN BATTERY CABLE IS DISCONNECTED

1. Perform battery drain test. See **BATTERY DRAIN TEST** . Ensure all doors are closed and accessories are off. Without starting engine, turn ignition switch on for a moment, and then turn ignition off. Wait a few minutes for illuminated entry lamps to turn off (if equipped).
2. Connect ammeter between negative battery cable and negative battery post. Disconnect negative battery cable from negative battery post, without breaking the ammeter connection to prevent modules from resetting. Read amperage draw.
3. Amperage draw should be less than 50 milliamps. If current draw exceeds 50

milliamps, remove fuses from battery/central junction box one at a time to locate problem circuit. Repair appropriate circuits as necessary. See POWER DISTRIBUTION article in WIRING DIAGRAMS.

### LOAD TEST

1. Ensure drive belt is in good condition. Replace belt as necessary. If belt is okay, connect charging system load tester in accordance with manufacturer's instructions. Start and run engine at 2000 RPM, and apply load until generator output levels off. Generator amperage should be at least 58 amps with engine at 2000 RPM. Go to next step.
2. Turn A/C system on. Turn blower speed to high. Turn headlights on to high beams. Voltage should increase a minimum of .5 volts. If voltage is as specified, system is operating properly at this time. If voltage is not as specified, perform **NO-LOAD TEST**.

### NO-LOAD TEST

1. Connect a voltmeter positive lead to B+ terminal on generator and negative lead to ground. Start and run engine at 2000 RPM, with all accessories off. Read voltmeter when voltage stabilizes. Voltage should be 13-15 volts. If voltage is not as specified, go to next step.
2. On vehicles equipped with 2.0L Zetec engine, perform self-diagnostics. See **SELF-DIAGNOSTIC SYSTEM**. On vehicles equipped with 3.0L Duratec engine, repair by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS.

### SELF-DIAGNOSTIC SYSTEM

**NOTE:** All diagnostic tests are written specifically for New Generation Star (NGS) tester. Most generic OBD-II compliant scan tools should be able to perform all test procedures.

Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Using NGS tester, perform data link diagnostics test. See DATA LINK DIAGNOSTIC TEST under SELF-DIAGNOSTIC SYSTEM in MODULE COMMUNICATIONS NETWORK - ESCAPE article. If NGS tester displays CKT914, CKT915 or CKT70=ALL ECUS NO RESP/NOT EQUIP, repair module communications concern. See MODULE COMMUNICATIONS NETWORK - ESCAPE article. If NGS tester displays NO RESP/NOT EQUIP for Powertrain Control Module (PCM), repair powertrain control concern. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

If NGS tester responds with SYSTEM PASSED, retrieve and record continuous DTCs. Erase continuous DTCs. Using NGS tester, perform PCM self-test. Perform appropriate test under SYSTEM TEST in accordance with DTC retrieved. See **POWERTRAIN**

## 2001 Ford Escape

### 2001 STARTING & CHARGING SYSTEMS Generators & Regulators - Escape

**CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** table. Codes listed in this table are only for testing covered in this article. For complete DTC listing, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If no DTCs are retrieved, repair by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS.

### POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX

DTC (1)	Description	Perform Test
P1246	System Voltage Failure	<u>A</u>
(1) Codes listed in this table are only for testing covered in this article. For complete DTC listing, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.		

## SYSTEM TESTS

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

**NOTE:** For proper diagnostics, see **VIN CODE IDENTIFICATION** table under **IDENTIFICATION**.

## SYMPTOM INDEX

Symptom	Perform Test
Battery Is Discharged Or Voltage Is Low	<u>A</u>
Warning Indicator Is On With Engine Running, System Is Not Charging (3.0L Duratec)	<u>B</u>
Warning Indicator Is On With Engine Running, System Is Not Charging (2.0L Zetec)	<u>C</u>
System Overcharges, Battery Voltage Is Greater Than 15.5 Volts (3.0L Duratec)	<u>D</u>
System Overcharges, Battery Voltage Is Greater Than 15.5 Volts (2.0L Zetec)	<u>E</u>
Warning Indicator Is On With Engine Running, System Is Charging (3.0L Duratec)	<u>F</u>
Warning Indicator Is On With Engine Running, System Is Charging (2.0L Zetec)	<u>G</u>
Warning Indicator Is Off With Ignition Switch On & Engine Off (3.0L Duratec)	<u>H</u>

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### 2001 STARTING & CHARGING SYSTEMS Generators & Regulators - Escape

Warning Indicator Is Off With Ignition Switch On & Engine Off (2.0L Zetec)	<b>I</b>
Warning Indicator Flickers Or Is Intermittent (3.0L Duratec)	<b>J</b>
Warning Indicator Flickers Or Is Intermittent (2.0L Zetec)	<b>K</b>
Generator Noisy	<b>L</b>
Radio Interference	<b>M</b>

#### TEST A: BATTERY IS DISCHARGED OR VOLTAGE IS LOW

**NOTE:** Failure to fully charge battery before retesting may cause false readings.

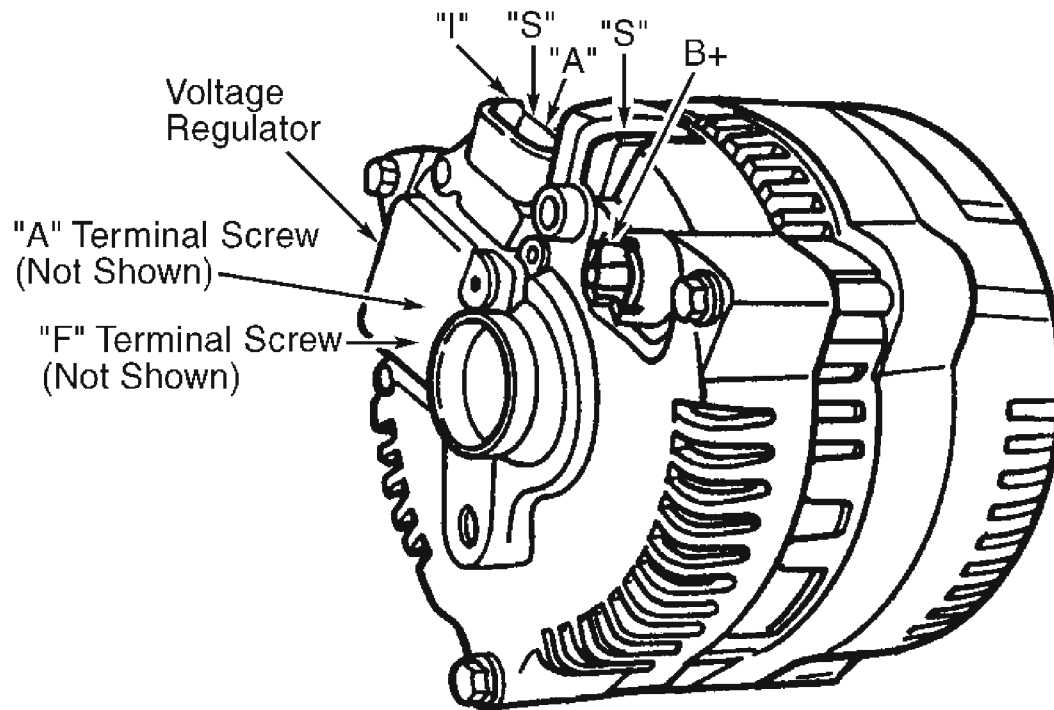
1. Test battery condition. If battery is okay, go to next step. If battery is not okay, replace battery.
2. Perform generator load and no-load tests. See **LOAD TEST** and **NO-LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is not okay, perform **TEST B: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (3.0L DURATEC)** or **TEST C: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (2.0L ZETEC)**.
3. Perform **BATTERY DRAIN TEST** under ON-VEHICLE TESTING. If no excessive current draw was not found, go to next step. If any excessive current draw was found, repair as necessary.
4. Perform **ELECTRONIC DRAINS WHICH SHUT OFF WHEN BATTERY CABLE IS DISCONNECTED** under ON-VEHICLE TESTING. If there are any current drains that shut off when the battery is disconnected, repair as necessary. If no drains were found, perform **TEST B: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (3.0L DURATEC)** or **TEST C: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (2.0L ZETEC)**.

#### TEST B: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (3.0L DURATEC)

1. Measure voltage between ground and generator B+ terminal (Yellow/White wire). See **Fig. 1**. If battery voltage is present, go to next step. If battery voltage is not present, repair circuit between generator and battery.
2. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Measure voltage between ground and generator connector harness terminal No. 3 (Black/Yellow wire). See **Fig. 2**. If battery voltage is present, go to next step. If battery voltage is not present, repair circuit between generator and battery.
3. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal No. 1 (Light Green/Red wire). If battery voltage is present.

go to next step. If battery voltage is not present, repair Light Green/Red wire between generator and instrument cluster. See **WIRING DIAGRAMS**.

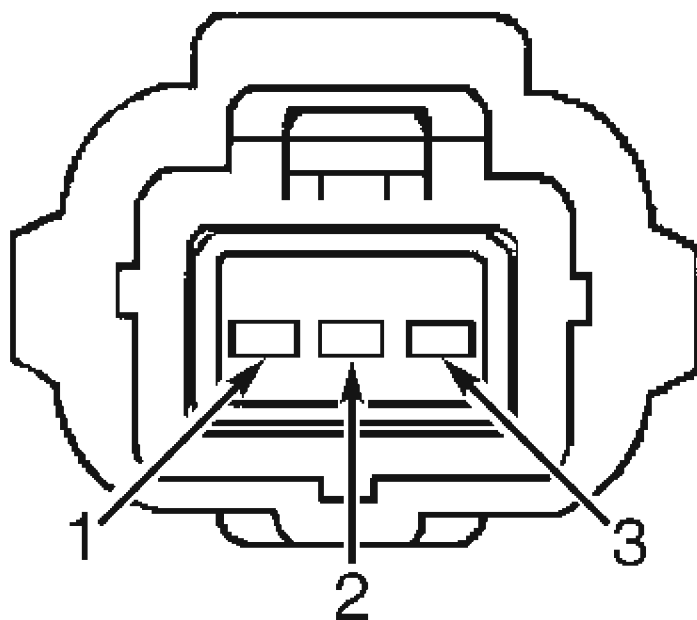
4. Start engine and let idle. Measure voltage between positive battery terminal B+ (Yellow/White wire). See **Fig. 1**. If voltage is less than 0.5 volt, replace generator. If voltage is 0.5 volt or more, repair Yellow/White wire between generator and battery.



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**Fig. 1: Identifying Generator Terminals**  
Courtesy of FORD MOTOR CO.





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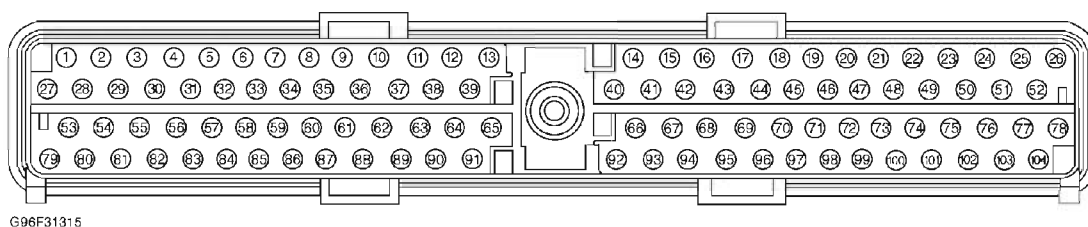
**Fig. 2: Identifying Generator Harness Connector Terminals**  
Courtesy of FORD MOTOR CO,

**TEST C: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS NOT CHARGING (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal No. 1 (Gray/Orange wire). See **Fig. 2** . If voltage is zero volts, go to next step. If voltage is not zero volts, go to step 4 .
3. Turn ignition switch to LOCK position. Disconnect PCM 104-pin harness connector. Measure resistance in Gray/Orange wire between PCM harness connector terminal No. 59 and generator harness connector terminal No. 1. See **Fig. 2** and **Fig. 3** . If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open in

Gray/Orange wire between PCM and generator.

4. Connect generator harness connector. Perform **LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is defective, replace generator.
5. Turn ignition switch to LOCK position. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.



**Fig. 3: Identifying Powertrain Control Module Harness Connector Terminals**  
Courtesy of FORD MOTOR CO.

### TEST D: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (3.0L DURATEC)

1. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Measure voltage between positive battery terminal and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 2** . If voltage is less than .5 volt, go to next step. If voltage is .5 volt or more, repair high resistance in Black/Yellow wire between generator and battery junction box.
2. Turn ignition switch to LOCK position. Inspect ground connections between voltage regulator, generator and engine, and battery and engine. If problem exists, repair connections as necessary. If all connections are clean and tight, replace generator.

### TEST E: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (2.0L ZETEC)

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Start engine and let idle. Turn all accessories off. Measure voltage between battery terminals while varying engine speed. If voltage is less than 15 volts, go to next step. If voltage is 15 volts or more, go to step 4 .

3. Vary engine speed and observe instrument cluster voltage gauge. If voltage gauge reads less than 15 volts, go to next step. If voltage gauge reads 15 volts or more, repair voltage gauge as necessary. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.
4. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Start engine and let idle. Perform load and no-load tests on generator. See **LOAD TEST** and **NO-LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is defective, replace generator.
5. Turn ignition switch to LOCK position. Measure voltage between ground and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 2** . If voltage is less than 0.5 volt from battery voltage, replace generator. If voltage is not less than 0.5 volt from battery voltage, repair high resistance in Black/Yellow wire between generator and battery junction box.

**TEST F: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS CHARGING (3.0L DURATEC)**

Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Check warning indicator. If warning indicator illuminates, repair short to ground in Light Green/Red wire between generator and instrument cluster. If warning indicator does not illuminate, replace generator.

**TEST G: WARNING INDICATOR IS ON WITH ENGINE RUNNING, SYSTEM IS CHARGING (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Start engine and let idle. Turn all accessories off. Measure voltage between battery terminals while varying engine speed. If voltage is less than 15 volts, go to next step. If voltage is 15 volts or more, perform **TEST E: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (2.0L ZETEC)** .
3. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 2** . If voltage is equal to battery voltage, go to next step. If voltage is not equal to battery voltage, repair Black/Yellow wire between generator and battery junction box.
4. Turn ignition switch to LOCK position. Disconnect PCM 104-pin harness connector. Measure resistance between ground and PCM harness connector terminal No. 59 (Gray/Orange wire). If resistance is 10 k/ohms or more, go to next step. If resistance is less than 10 k/ohms, repair short to ground in Gray/Orange wire between generator and

PCM.

5. Connect PCM harness connector. Perform load and no-load tests on generator. See **LOAD TEST** and **NO-LOAD TEST** under ON-VEHICLE TESTING. If generator is okay, go to next step. If generator is defective, replace generator.
6. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.

**TEST H: WARNING INDICATOR IS OFF WITH IGNITION SWITCH ON & ENGINE OFF (3.0L DURATEC)**

Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Connect a fused jumper wire between ground and generator harness connector terminal No. 1 (Light Green/Red wire). See **Fig. 2**. Turn ignition switch to RUN position. If warning indicator illuminates, replace generator. If warning indicator does not illuminate, repair warning indicator problem as necessary. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

**TEST I: WARNING INDICATOR IS OFF WITH IGNITION SWITCH ON & ENGINE OFF (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to LOCK position. Disconnect NGS tester. Disconnect generator 3-pin harness connector. Connect a fused (15-amp) jumper wire between ground and generator harness connector terminal No. 1 (Gray/Orange wire). See **Fig. 2**. Turn ignition switch to RUN position. If warning indicator does not illuminate, go to next step. If warning indicator illuminates, replace generator.
3. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.

**TEST J: WARNING INDICATOR FLICKERS OR IS INTERMITTENT (3.0L DURATEC)**

1. Inspect all generator, battery, and power distribution connections for looseness, corrosion, loose or bent terminals, or loose eyelets. If connections are clean and tight, go to next step. If problem exists, repair as necessary.

2. Start engine and let idle. Inspect battery junction box fuse No. 11 (15-amp) for looseness. Wiggle fuse and note warning indicator operation. If warning indicator does not flicker, go to next step. If warning indicator flickers, repair loose fuse connections.
3. Turn ignition switch to LOCK position. Connect a fused jumper wire between positive battery terminal and generator harness connector terminal No. 3 (Black/Yellow wire). See **Fig. 2** . Start engine and let idle. Note warning indicator operation. If warning indicator flickers, repair warning indicator problem as necessary. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. If warning indicator does not flicker, repair loose connection(s) in circuits.

**TEST K: WARNING INDICATOR FLICKERS OR IS INTERMITTENT (2.0L ZETEC)**

1. Connect New Generation Star (NGS) tester to Data Link Connector (DLC). Turn ignition switch to RUN position. Using NGS tester, perform Powertrain Control Module (PCM) self-test. If no DTCs exist, go to next step. If any DTCs exist, perform appropriate test. See **POWERTRAIN CONTROL MODULE DIAGNOSTIC TROUBLE CODE INDEX** under SELF-DIAGNOSTIC SYSTEM.
2. Disconnect generator 3-pin harness connector. Inspect all generator, battery, and power distribution connections for looseness, corrosion, loose or bent terminals, or loose eyelets. Connect generator connector. If problem does not exist, go to next step. If problem exists, repair connections as necessary.
3. Start engine and let idle. Inspect battery junction box fuse No. 11 (15-amp) for looseness. Wiggling fuse and note warning indicator operation. If warning indicator does not flicker, go to next step. If warning indicator flickers, repair loose fuse connections as necessary.
4. Turn all accessories off. Measure voltage between battery terminals while varying engine speed. If voltage is less than 15 volts, go to next step. If voltage is 15 volts or more, perform **TEST E: SYSTEM OVERCHARGES, BATTERY VOLTAGE IS GREATER THAN 15.5 VOLTS (2.0L ZETEC)** .
5. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Turn ignition switch to RUN position. Connect a fused jumper wire between ground and generator harness connector terminal No. 1 (Gray/Orange wire). See **Fig. 2** . If warning indicator illuminates, go to next step. If warning indicator does not illuminate, repair open in Gray/Orange wire between generator and PCM.
6. Turn ignition switch to LOCK position. Remove jumper wire. Connect generator harness connector. Turn ignition switch to RUN position. Observe warning indicator operation. If warning indicator does not illuminate, go to next step. If warning indicator illuminates, PCM is operating properly. Recheck generator circuits for intermittent shorts or opens.
7. Turn ignition switch to LOCK position. Disconnect PCM harness connector. Inspect connector for corrosion and pushed out pins. Connect PCM harness connector. Ensure connector is seated properly. Operate system. If problem still exists, replace PCM. If

system is operating properly, problem may have been caused by a loose or corroded connector. Clear DTCs. Repeat PCM self-test.

**TEST L: GENERATOR NOISY**

1. Turn ignition switch to LOCK position. Check accessory drive belt for damage and correct installation. Check mounting brackets and pulleys for looseness and damage. If problem does not exist, go to next step. If problem exists, repair as necessary.
2. Check generator installation. Ensure all fasteners are tight. If problem does not exist, go to next step. If problem exists, repair as necessary.
3. Disconnect generator 3-pin harness connector. Start engine and let idle. Turn headlights on. Turn rear defogger on. Turn blower motor to high speed. If noise still exists, go to next step. If noise does not still exist, replace generator.
4. Turn ignition switch to LOCK position. Connect generator harness connector. Start engine and let idle. Turn all accessories off. Using a stethoscope, check generator for unusual mechanical noise. If generator is source of noise, replace generator. If generator is not source of noise, isolate noise and repair as necessary.

**TEST M: RADIO INTERFERENCE**

Start engine and let idle. Tune radio to station where interference is present. Turn ignition switch to LOCK position. Disconnect generator 3-pin harness connector. Start engine and let idle. If interference is still present, repair radio concern. If interference is not still present, replace generator.

**REMOVAL & INSTALLATION**

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

**GENERATOR****Removal & Installation (2.0L Zetec)**

1. Disconnect negative battery cable. Remove right front wheel and tire. Remove 5 bolts and right front lower splash shield. Rotate accessory drive belt tensioner clockwise. Remove accessory drive belt from generator pulley. Disconnect generator electrical connectors to voltage regulator. Remove B+ terminal cover, nut and disconnect electrical connector. Remove lower generator bolts.

**NOTE:** Prior to installing generator, ensure upper bolt is placed in generator.

- Loosen upper generator bolt from engine. DO NOT remove upper bolt from engine. Insufficient clearance does not allow bolt to be completely removed. Move generator to rear of vehicle. Remove generator. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS**.

#### Removal & Installation (3.0L Duratec)

Disconnect negative battery cable. Remove right side front drive halfshaft and intermediate shaft. See appropriate AXLE SHAFTS article in DRIVE AXLES. Remove right side lower splash shield screws and pin-type retainer. Remove right front wheel and tire. Remove 5 bolts and right front lower splash shield. Rotate accessory drive belt tensioner clockwise. Remove accessory drive belt from generator pulley. Disconnect generator harness connector. Remove upper and lower mounting bolts and generator from vehicle. Remove generator mounting bracket. Remove generator electrical connectors. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS**.

#### POWERTRAIN CONTROL MODULE

##### Removal & Installation

Disconnect negative battery cable. Loosen Powertrain Control Module (PCM) cover bolt. Disconnect electrical connector. Remove cover nuts and cover. Remove PCM. To install, reverse removal procedure. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Generator Bolts	
2.0L (Lower)	35 (47)
2.0L (Upper)	18 (24)
3.0L	35 (47)
Generator Mounting Bracket Bolts	15 (20)
	<b>INCH Lbs. (N.m)</b>
Generator Terminal B+ Nut	71 (8)
Powertrain Control Module Bolts & Nuts	53 (6)

## WIRING DIAGRAMS

## 2001 Ford Escape

2001 STARTING & CHARGING SYSTEMS Generators & Regulators - Escape

**Fig. 4: Charging System Wiring Diagram (2.0L Zetec Engine)**



## 2001 Ford Escape

2001 STARTING & CHARGING SYSTEMS Generators & Regulators - Escape

**Fig. 5: Charging System Wiring Diagram (3.0L Duratec Engine)**

**2003-04 STARTING & CHARGING SYSTEMS****Starters - Escape****DESCRIPTION**

The starter motor is equipped with an externally mounted solenoid. Starting system consists of a starter motor, starter motor relay, battery, ignition switch, Digital Transmission Range (DTR) sensor (A/T) or Clutch Pedal Position (CPP) switch (M/T) and interconnecting cables and wires. Starter relay is controlled by the powertrain control module.

**COMPONENT LOCATIONS****COMPONENT LOCATIONS**

<b>Component</b>	<b>Location</b>
Battery Junction Box	Left Side Of Engine Compartment
Digital Transmission Range Sensor	Right Side, Top Of Transmission
Powertrain Control Module	In Engine Compartment On Center Of Firewall
Starter Relay	In Battery Junction Box
Starter Relay Diode	In Battery Junction Box

**ADJUSTMENTS****DIGITAL TRANSMISSION RANGE SENSOR**

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See appropriate **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery. Before testing starter, ensure transmission is in Park or Neutral.

1. With the vehicle in NEUTRAL, position it on a hoist. Remove the battery and tray. Disconnect the TR sensor electrical connector. Loosen the TR sensor bolts.
2. Make sure the transaxle is in the NEUTRAL position. Using the TR Sensor Alignment Gauge, (T97L-70010-A), align the TR sensor and tighten the bolts. Connect the electrical connector. Before installing the battery tray, check the vent tube hose for any obstructions, kinks, or incorrect routing position. Check the correct operation with parking brake control engaged. The engine should start only in PARK or NEUTRAL. Backup lamps should illuminate in the REVERSE position.

## TROUBLE SHOOTING

Check battery for state of charge. Check cable connections at battery and starter motor. Ensure transmission is fully engaged in Park or Neutral (A/T) or clutch pedal is fully depressed (M/T). On models equipped anti-theft system, ensure anti-theft system is operating properly. See appropriate ANTI-THEFT SYSTEMS article in ACCESSORIES & EQUIPMENT for additional information. If problem is found, repair as necessary. If problem is not found, repair by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS.

## SYSTEM TESTS

### SYMPTOM INDEX

Symptom	Perform Test
Engine Does Not Crank Or Relay Clicks	<b>A</b>
Unusual Starter Noise	<b>B</b>
Engine Cranks Slowly	(1)
Starter Spins, But Engine does not Crank	(2)
Engine Cranks With Clutch Pedal Not Depressed	(3)
(1) Perform <b>VOLTAGE DROP TEST</b> under ON-VEHICLE TESTING. (2) Inspect starter motor mounting. Inspect flywheel ring gear and starter motor gear for damaged and missing teeth. Repair or replace components as necessary. (3) Replace clutch pedal position switch.	

### TEST A: ENGINE DOES NOT CRANK OR RELAY CLICKS

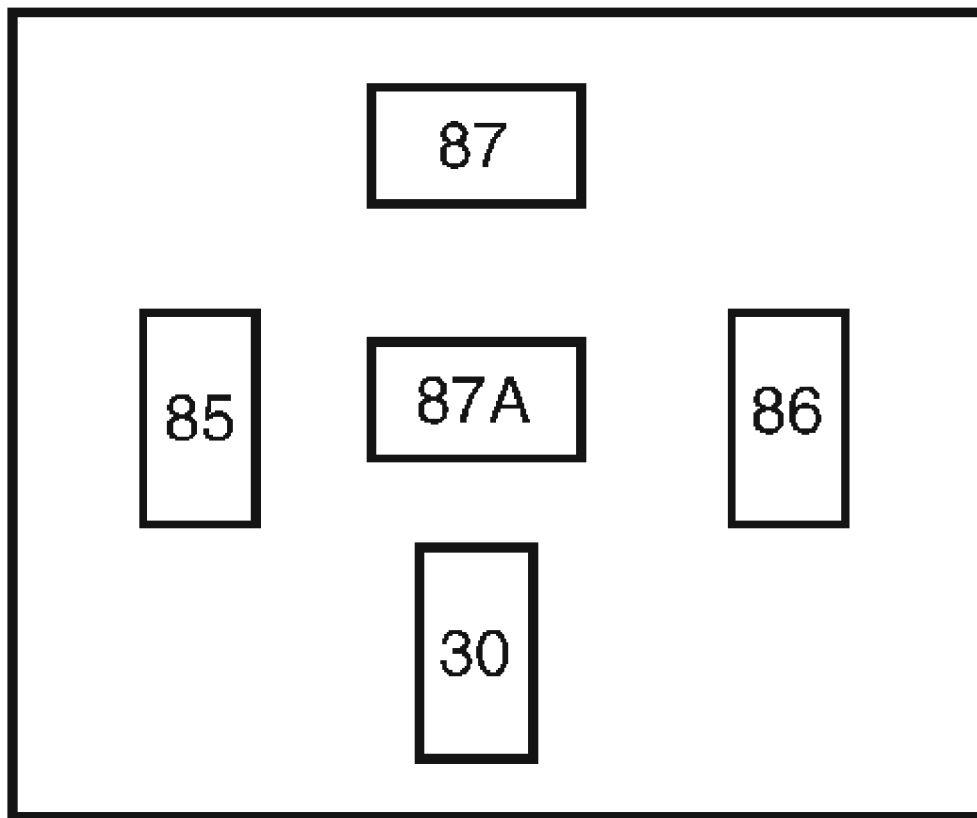
1. Ensure battery is fully charged and has sufficient capacity. Ensure battery terminals are clean and tight. If battery is okay, go to next step. If problem is found, replace battery as necessary.
2. Turn ignition switch to LOCK position. Remove starter relay from battery junction box. Test starter relay. See **STARTER RELAY** under COMPONENT TESTS. If starter relay is okay, go to next step. If starter relay is defective, replace starter relay.
3. Measure voltage between ground and starter relay connector terminal No. 87 (Yellow wire). See **Fig. 1**. If voltage is greater than 10 volts, go to next step. If voltage is not greater than 10 volts, replace battery junction box. Check system operation.
4. Install starter relay. Disconnect PCM connector 175. Connect a jumper wire between ground and PCM connector terminal No. 44 (Dark Blue/Orange wire). Turn ignition switch to START position. If engine cranks, see appropriate ANTI-THEFT SYSTEMS article in ACCESSORIES & EQUIPMENT. If engine does not crank, go to next step.
5. Turn ignition switch to LOCK position. Disconnect the starter relay. Measure the

resistance in Dark Blue/Orange wire between central junction box and PCM connector 175. Connect positive voltmeter lead to starter relay connector terminal No. 86 and negative voltmeter lead to PCM connector terminal No. 44. If resistance is less than 5 ohms, go to next step. If resistance is more than 5 ohms, ensure starter relay diode is not at fault, repair circuit between starter relay and PCM as necessary.

6. Install starter relay. Connect PCM connector 175. Turn ignition switch to RUN position. On M/T vehicles, ensure clutch pedal is depressed completely. On A/T vehicles, ensure transmission is in Park. On all models, turn ignition switch to START position. Measure voltage between ground and starter relay connector terminal No. 85 (Tan/Red wire). If voltage is greater than 10 volts, go to next step. If voltage is not greater than 10 volts, go to step 9 (A/T) or step 13 (M/T).
7. Turn ignition switch to LOCK position. Disconnect starter motor solenoid "S" connector. See **Fig. 2**. Measure the resistance of the White/Pink wire between starter motor solenoid terminal "S" connector and starter relay connector terminal No. 30. If resistance is less than 5 ohms, go to next step. If resistance is greater than 5 ohms, repair circuit in White/Pink wire between starter relay and starter motor. Check system operation.
8. Install starter relay. Connect starter motor solenoid "S" connector. Perform **STARTER GROUND CIRCUIT TEST** under ON-VEHICLE TESTING. If starter motor ground circuit is okay, perform **VOLTAGE DROP TEST** under ON-VEHICLE TESTING. If starter motor ground is not okay, repair or replace battery ground cable and/or engine ground cable as needed. Check system operation.
9. Ensure the transaxle linkage is adjusted properly. If linkage adjustment is okay, go to next step. If linkage adjustment is not okay, adjust linkage. Check system operation.
10. Check Digital Transmission Range (DTR) sensor adjustment. See **DIGITAL TRANSMISSION RANGE SENSOR** under ADJUSTMENTS. If adjustment is okay, go to next step. If out of adjustment, adjust DTR sensor as necessary. Check system operation.
11. Disconnect DTR sensor harness connector. Turn ignition switch to START position. Measure voltage between ground and DTR sensor harness connector terminal No. 9 (Tan/Light Blue wire). See **Fig. 3**. If voltage is greater than 10 volts, go to next step. If voltage is not greater than 10 volts, repair power distribution circuit as necessary (Tan/Light Blue wire). See appropriate POWER DISTRIBUTION in SYSTEM WIRING DIAGRAMS article ELECTRICAL. Check system operation.
12. Turn ignition switch to LOCK position. Remove starter relay from Battery Junction Box (BJB). Measure resistance between DTR sensor harness connector terminal No. 4 (Tan/Red wire) and starter relay connector terminal No. 85. See **Fig. 1** and **Fig. 3**. If resistance is less than 5 ohms, replace DTR sensor. If resistance is greater than 5 ohms, repair Tan/Red wire between DTR sensor and BJB. Check system operation.
13. Disconnect Clutch Pedal Position (CPP) switch harness connector. Turn ignition switch to START position. Measure voltage between ground and CPP switch harness connector terminal No. 1 (Tan/Light Blue wire). See **Fig. 4**. If voltage is greater than

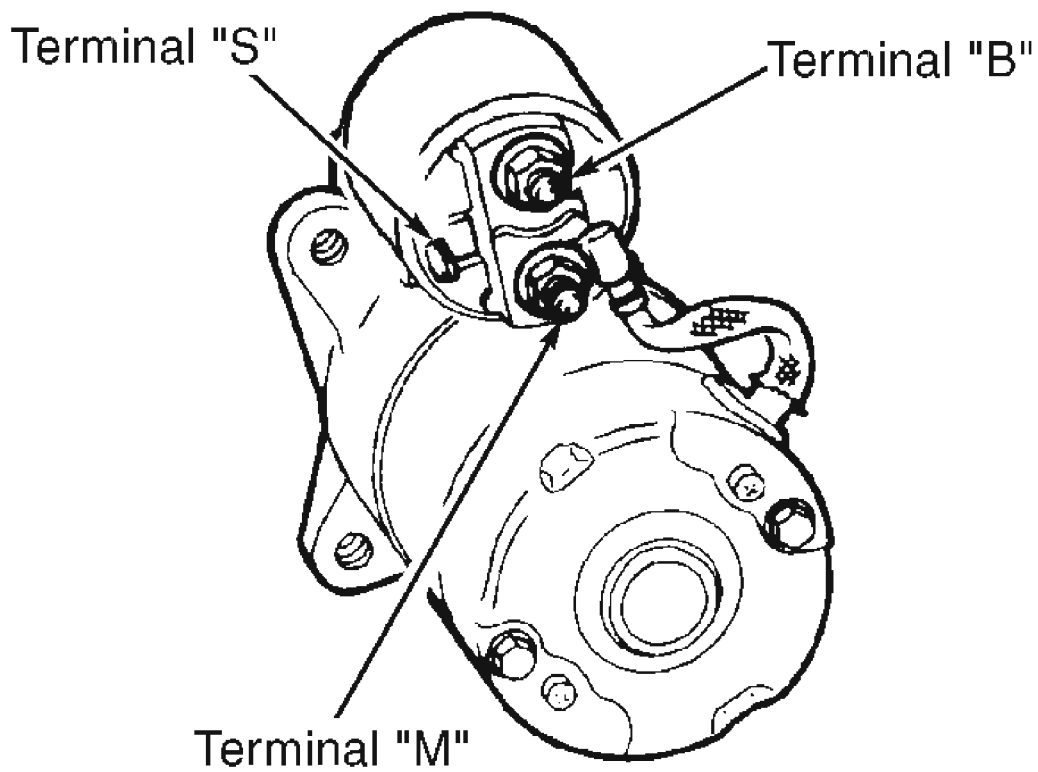
10 volts, go to next step. If battery voltage is not greater than 10 volts, repair power distribution circuit as necessary (Tan/Light Blue wire). See appropriate POWER DISTRIBUTION in SYSTEM WIRING DIAGRAMS article in ELECTRICAL. Check system operation.

14. Turn ignition switch to LOCK position. Measure resistance in Tan/Red wire between CPP switch harness connector terminal No. 2 and starter relay connector terminal No. 85. See **Fig. 1** and **Fig. 4** . If resistance is less than 5 ohms, replace CPP switch. Check system operation. If resistance is greater than 5 ohms, repair Tan/Red wire between CPP switch and starter relay. Check system operation.



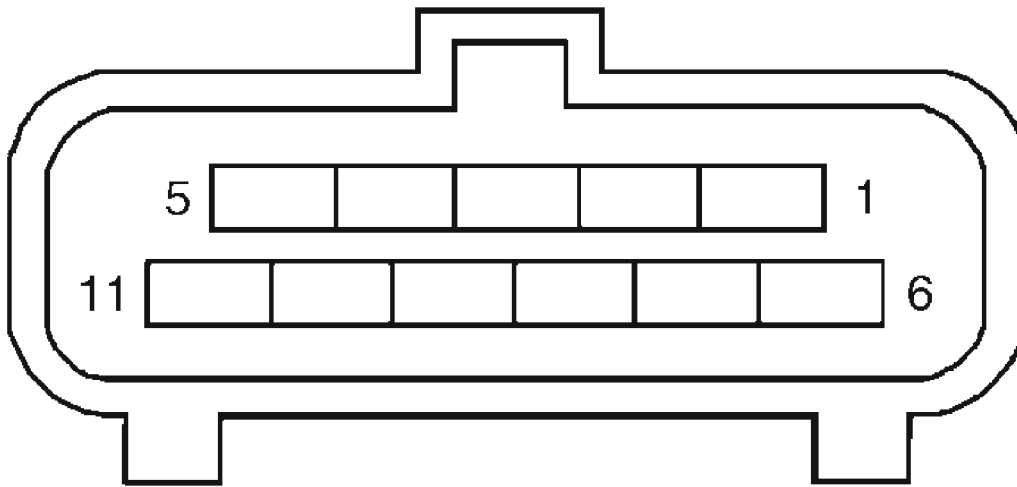
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**Fig. 1: Identifying Starter Relay Connector Terminals**  
Courtesy of FORD MOTOR CO.



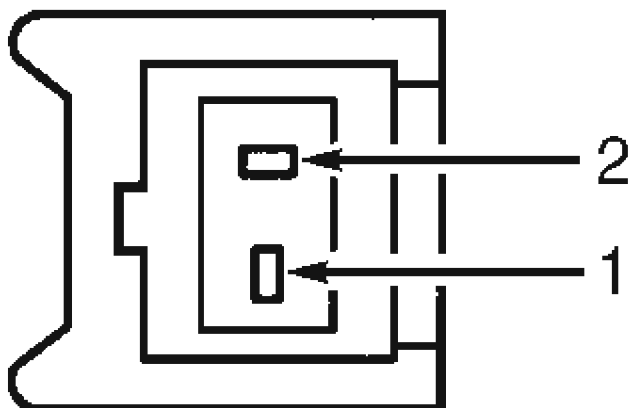
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**Fig. 2: Identifying Starter Motor Terminals**  
Courtesy of FORD MOTOR CO.



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**Fig. 3: Identifying Digital Transmission Range Sensor Harness Connector Terminals**  
Courtesy of FORD MOTOR CO.



G99E02176

**Fig. 4: Identifying Clutch Pedal Position Harness Connector Terminals**  
Courtesy of FORD MOTOR CO.

**TEST B: UNUSUAL STARTER NOISE**

1. Verify starter is installed properly. Ensure bolts are tight. See **TORQUE SPECIFICATIONS** . If starter is mounted properly, go to next step. If starter is not mounted properly, repair as necessary and check system for normal operation.
2. Remove starter motor. See **STARTER MOTOR** under REMOVAL & INSTALLATION. Inspect flywheel ring gear for wear or damage. If ring gear is okay, replace starter motor. If ring gear is worn or damaged, replace ring gear and inspect starter drive gear. If drive gear is also damaged, replace starter motor. If noise is not coming from starter motor, diagnose engine mechanical concern. See appropriate article in ENGINES.

**COMPONENT TESTS****STARTER RELAY**

1. Remove starter relay from battery junction box. Check relay continuity. Continuity should exist between relay terminals No. 85 and 86, and between relay terminals No. 30 and 87a. See **Fig. 5** . Continuity should not exist between relay terminals No. 30 and 87. If continuity is as specified, go to next step. If continuity is not as specified, replace relay.
2. Disconnect the ohmmeter. Connect terminals No. 30 and 85 to a 12 volt DC power and terminal No. 86 to ground. Measure voltage between terminal No. 86 and 87. If voltage is 12 volts, continue the test. If not , replace the relay. Disconnect power from terminal No. 85 and measure voltage between terminal No. 87a and 86. If the voltage is 12 volts, the relay is okay. If not, replace the relay.





## ON VEHICLE TESTING

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See appropriate COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery. Before testing starter, ensure transmission is in Park or Neutral.

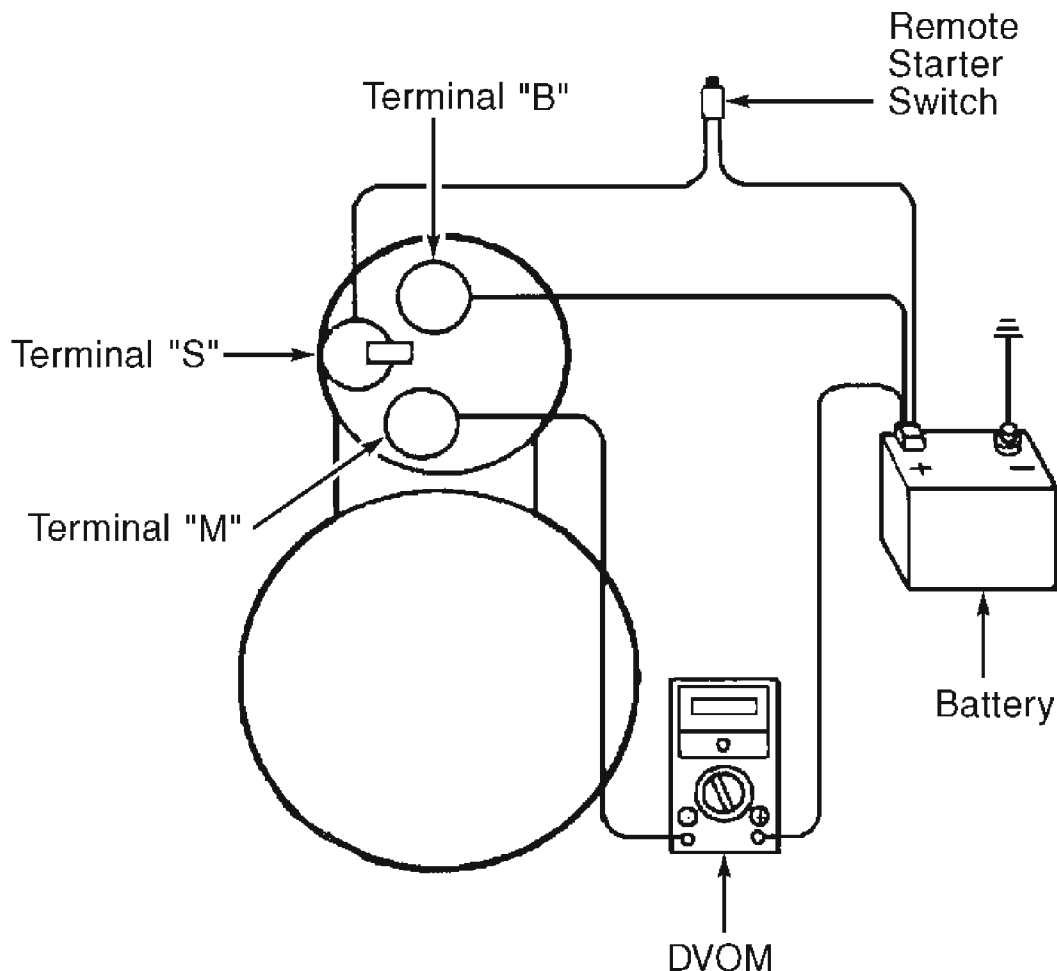
## VOLTAGE DROP TEST

**NOTE:** Make all voltmeter connections at component terminal rather than at cable or wire end.

1. Ensure battery is fully charged. Disconnect ignition coil connector. Connect remote starter switch between starter solenoid terminal "S" and positive battery post. See **Fig. 6** Connect positive voltmeter lead to positive battery post, and negative lead to solenoid

terminal "M".

2. Engage remote starter switch. If voltmeter indicates .5 volt or less, go to **STARTER GROUND CIRCUIT TEST** . If voltmeter indicates greater than .5 volt, go to next step.
3. Move negative voltmeter lead to solenoid terminal "B". Engage remote starter switch. If voltmeter indicates less than .5 volt, solenoid connections or contacts are bad. Clean solenoid terminals "B", "S" and "M". Repeat steps 1 -3 .
4. If voltmeter still indicates more than .5 volt at terminal "M" and less than .5 volt at terminal "B", solenoid contacts are bad. Replace starter motor. See **STARTER MOTOR** under REMOVAL & INSTALLATION. If voltmeter indicates greater than .5 volt at terminal "B", clean cables and connections at solenoid.
5. If voltmeter still indicates greater than .5 volt at terminal "B", check for poor positive battery cable connection or bad cable. Repair connection or replace battery cable as necessary.

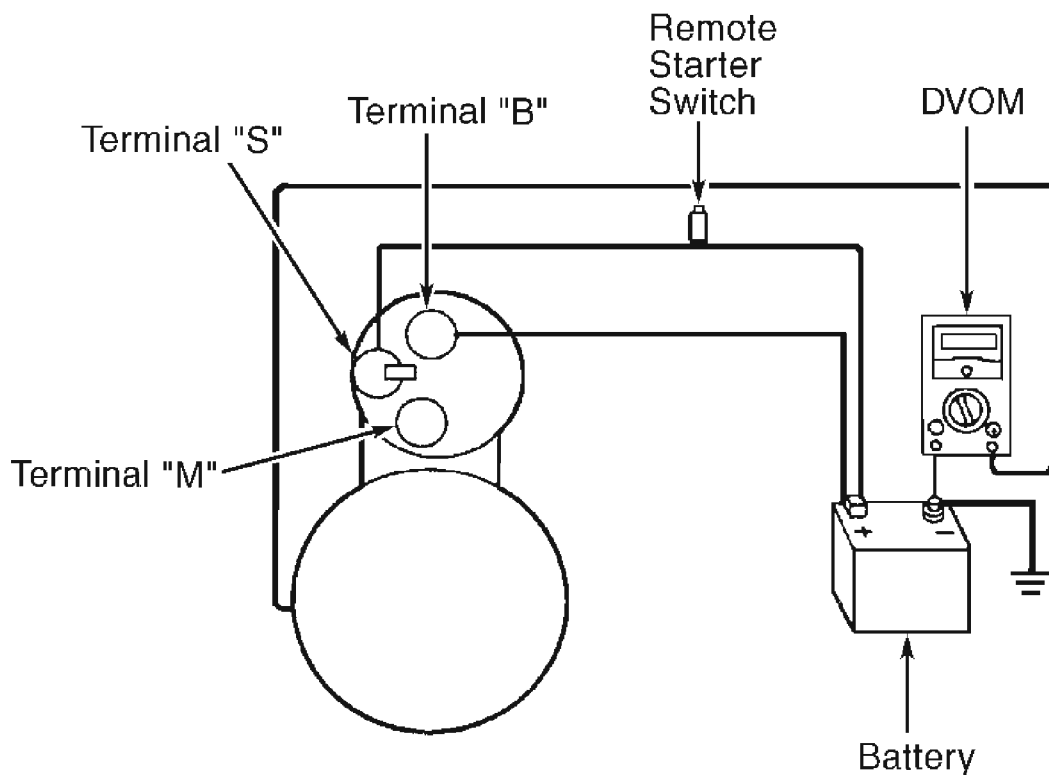


**Fig. 6: Testing Voltage Drop**  
Courtesy of FORD MOTOR CO.

### STARTER GROUND CIRCUIT TEST

**NOTE:** Make all voltmeter connections at component terminal rather than at cable or wire end.

1. Disconnect ignition coil connector. Connect remote starter switch between starter solenoid terminal "S" and positive battery post. See **Fig. 7** . Connect positive voltmeter lead to starter housing, and negative lead to negative battery post.
2. Engage remote starter switch while observing voltmeter. Voltmeter should indicate .2 volt or less. If voltmeter indicates greater than .2 volt, clean negative cable connections at battery, body ground connections and starter ground connections. Then retest.
3. If voltage drop is still excessive, repair or replace negative battery cable and/or engine ground cable as necessary. Repeat starter circuit test after repair to ensure problem has been corrected.
4. If the reading is less than .2 volt and the engine still cranks slowly, install a new starter motor. See **STARTER MOTOR** under REMOVAL & INSTALLATION.



**Fig. 7: Starter Ground Circuit Test**  
Courtesy of FORD MOTOR CO.

## REMOVAL & INSTALLATION

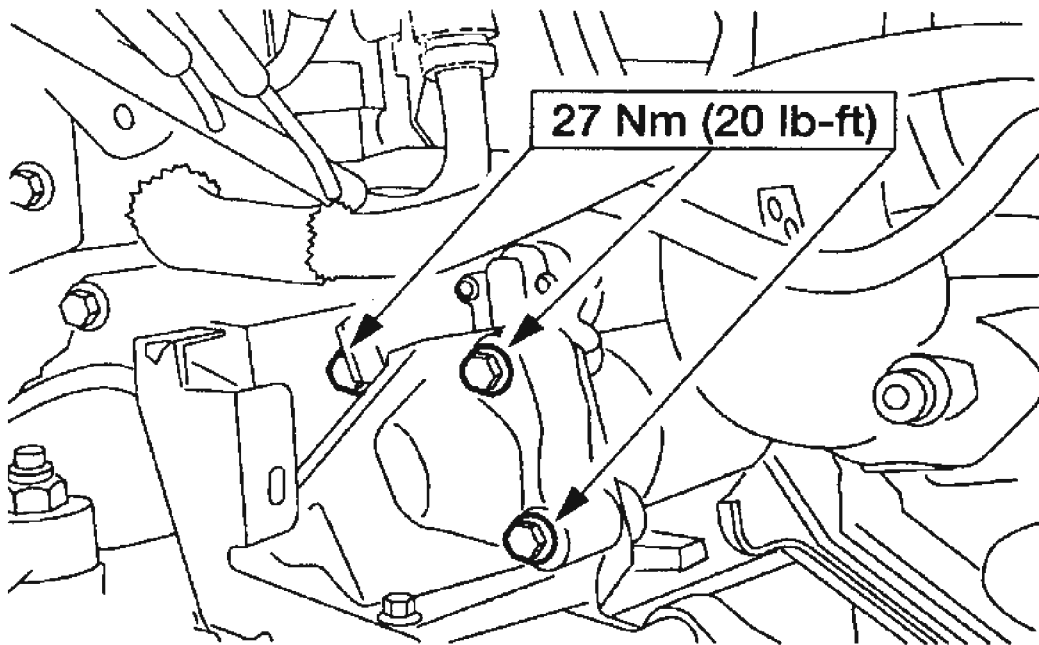
**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See appropriate **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery. Before testing starter, ensure transmission is in Park or Neutral.

### STARTER MOTOR

**WARNING:** When repairing the starter motor or working underhood in the vicinity of the starter motor, note the heavy gauge input lead connected to the starter solenoid is hot at all times. Make sure the protective cap is installed over the terminal and is reinstalled after repairing. Failure to follow these instructions may result in personal injury.

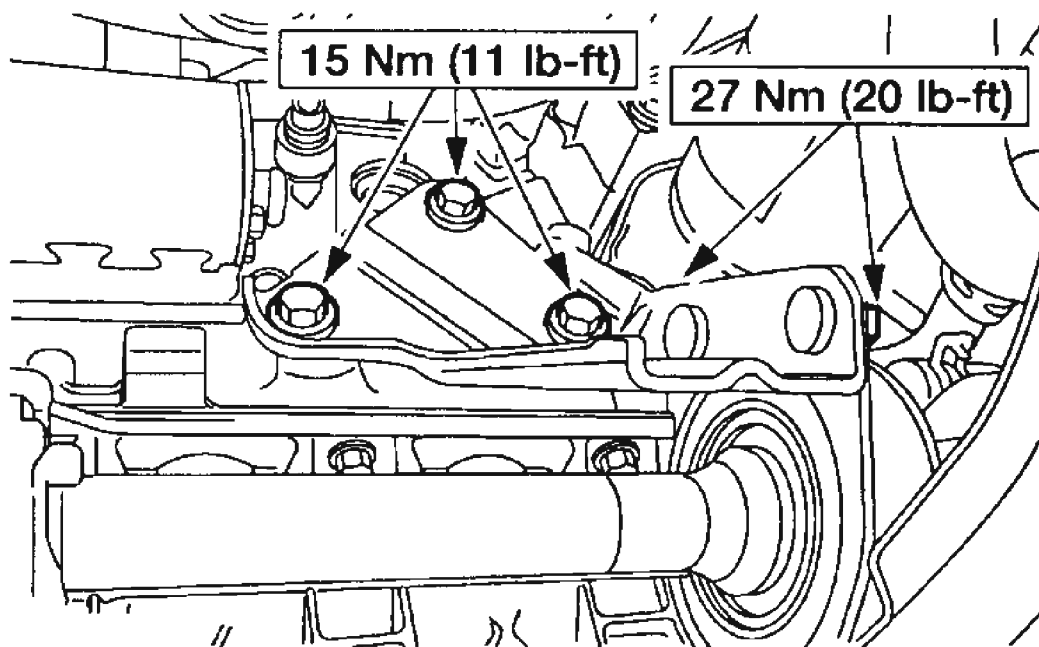
#### Removal & Installation (2.0L)

Disconnect negative battery cable. Remove starter bolts. See **Fig. 8** . Raise and support vehicle. Remove halfshaft support bracket bolts and nuts. See **Fig. 9** . Remove battery cable and starter control electrical connector nuts. See **Fig. 10** . Remove starter motor. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .



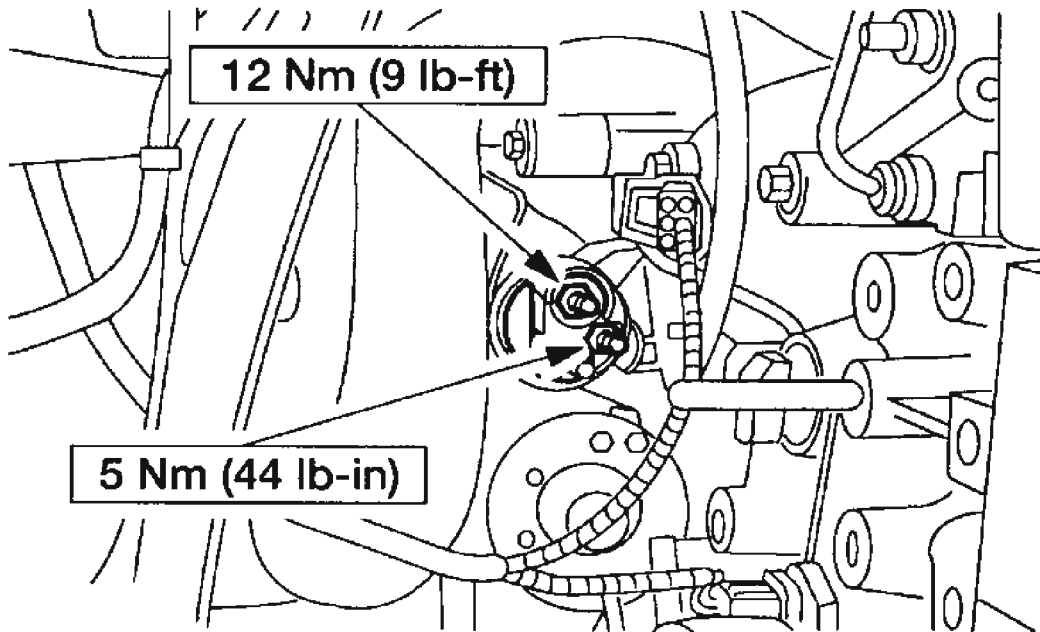
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**Fig. 8: Identifying Starter Bolts**  
Courtesy of FORD MOTOR CO.



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**Fig. 9: Identifying Halfshaft Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

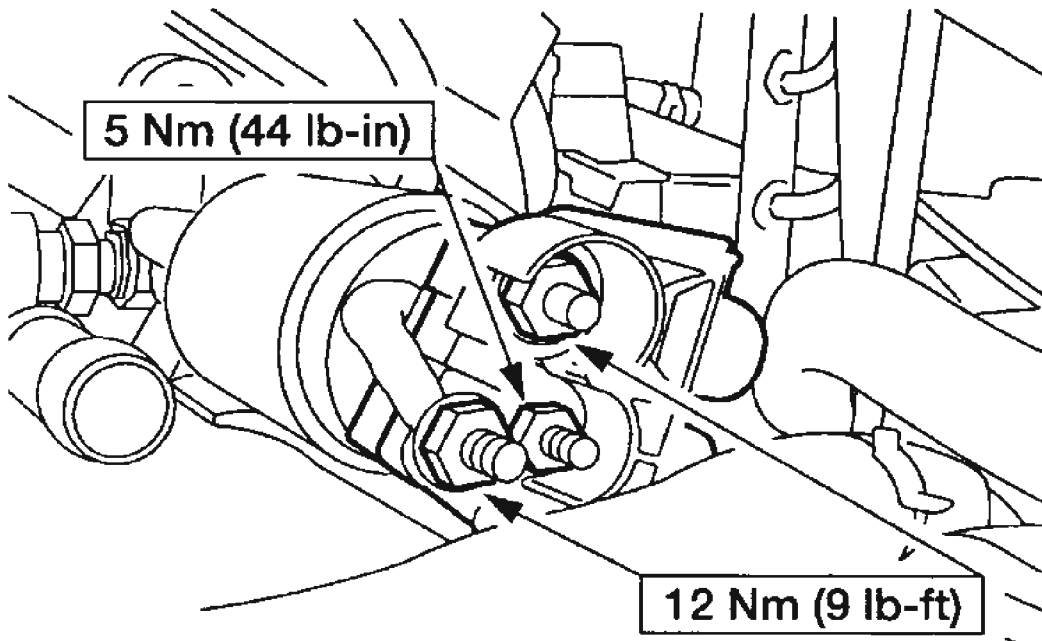


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**Fig. 10: Identifying Battery Cable & Starter Control Connector Nuts**  
Courtesy of FORD MOTOR CO.

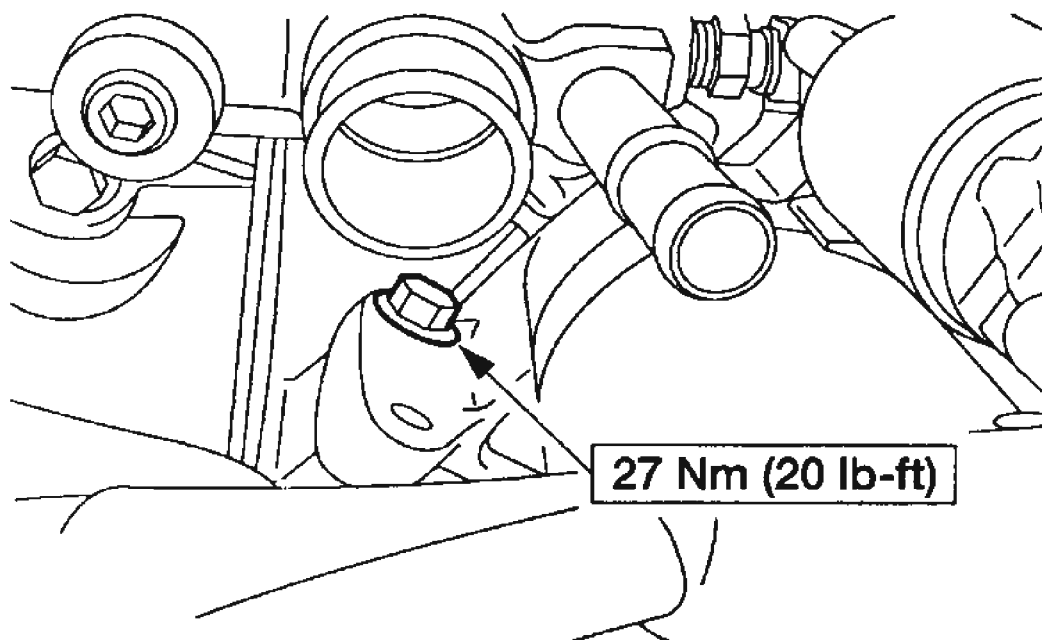
**Removal & Installation (3.0L)**

Disconnect negative battery cable. Remove air cleaner outlet tube and air cleaner assembly. Drain engine cooling system. Disconnect the 3 hoses and position thermostat aside. Remove starter solenoid cable nuts and position solenoid cables aside. See **Fig. 11**. Remove starter motor mounting bolts and starter motor. See **Fig. 12**. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.



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**Fig. 11: Identifying Starter Solenoid Cable Nuts**  
Courtesy of FORD MOTOR CO.



G00354480

**Fig. 12: Identifying Starter Bolt**  
 Courtesy of FORD MOTOR CO.

## STARTER MOTOR SPECIFICATIONS

### STARTER MOTOR SPECIFICATIONS

Application	Specification
Cranking Speed (Normal Load)	200-250 RPM
Current Draw	
Normal Load	130-190 Amps
No Load	60-80 Amps
Starter Circuit Voltage Drop	.5 Volt

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Battery Cable Nut (Starter) 2.0L	9 (12)
Exhaust Nuts	18 (25)
Halfshaft Bracket Mounting Bolts & Nuts	11 (15)
Starter Motor Mounting Bolts	20 (27)
	<b>INCH Lbs. (N.m)</b>
DTR Sensor Bolts	106 (12)
Starter Solenoid Cable Nuts	
2.0L	44 (5)
3.0L	106 (12)

## WIRING DIAGRAMS

### 2003

For starter system wiring diagram, see **STARTING/CHARGING** in **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL**.

### 2004

For starter system wiring diagram, see **STARTING/CHARGING** in **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL**.



## 2001 STARTING & CHARGING SYSTEMS

### Starters - Escape

## DESCRIPTION

The starter motor is equipped with an externally mounted solenoid. Starting system consists of a starter motor, solenoid, battery, ignition switch, Digital Transmission Range (DTR) sensor (A/T) or Clutch Pedal Position (CPP) switch (M/T), starter relay and interconnecting cables and wires. Starter relay is controlled by the powertrain control module.

## COMPONENT LOCATIONS

### COMPONENT LOCATIONS

Component	Location
Digital Transmission Range Sensor	Left Side Of Transmission
Passive Anti-Theft System Module	Behind Right Side Of Instrument Panel
Battery Junction Box	Left Side Of Engine Compartment
Powertrain Control Module	In Engine Compartment On Center Of Firewall
Starter Relay	In Battery Junction Box
Starter Relay Diode	In Battery Junction Box

## ADJUSTMENTS

### DIGITAL TRANSMISSION RANGE SENSOR

1. Raise and support vehicle. Disconnect manual shift control cable. Disconnect Digital Transmission Range (DTR) sensor harness connector. Remove manual control lever nut. Remove manual control lever. Loosen DTR sensor bolts.
2. Manual shift lever must be in neutral position. Using DTR Sensor Alignment Tool (T97L-70010-A), align DTR sensor slots. Tighten DTR sensor bolts. Install manual control lever. Install NEW manual shaft outer nut. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** . With manual lever in Overdrive, connect shift lever control cable. Connect DTR harness connector.

## TROUBLE SHOOTING

Check battery for state of charge. Check cable connections at battery and starter motor. Ensure transmission is fully engaged in Park or Neutral (A/T) or clutch pedal is fully depressed (M/T). On models equipped anti-theft system, ensure anti-theft system is operating properly. See appropriate ANTI-THEFT SYSTEMS article in ACCESSORIES & EQUIPMENT for additional information. If problem is found, repair as necessary. If problem is not found, repair by symptom. See **SYMPTOM INDEX** table under SYSTEM

TESTS.

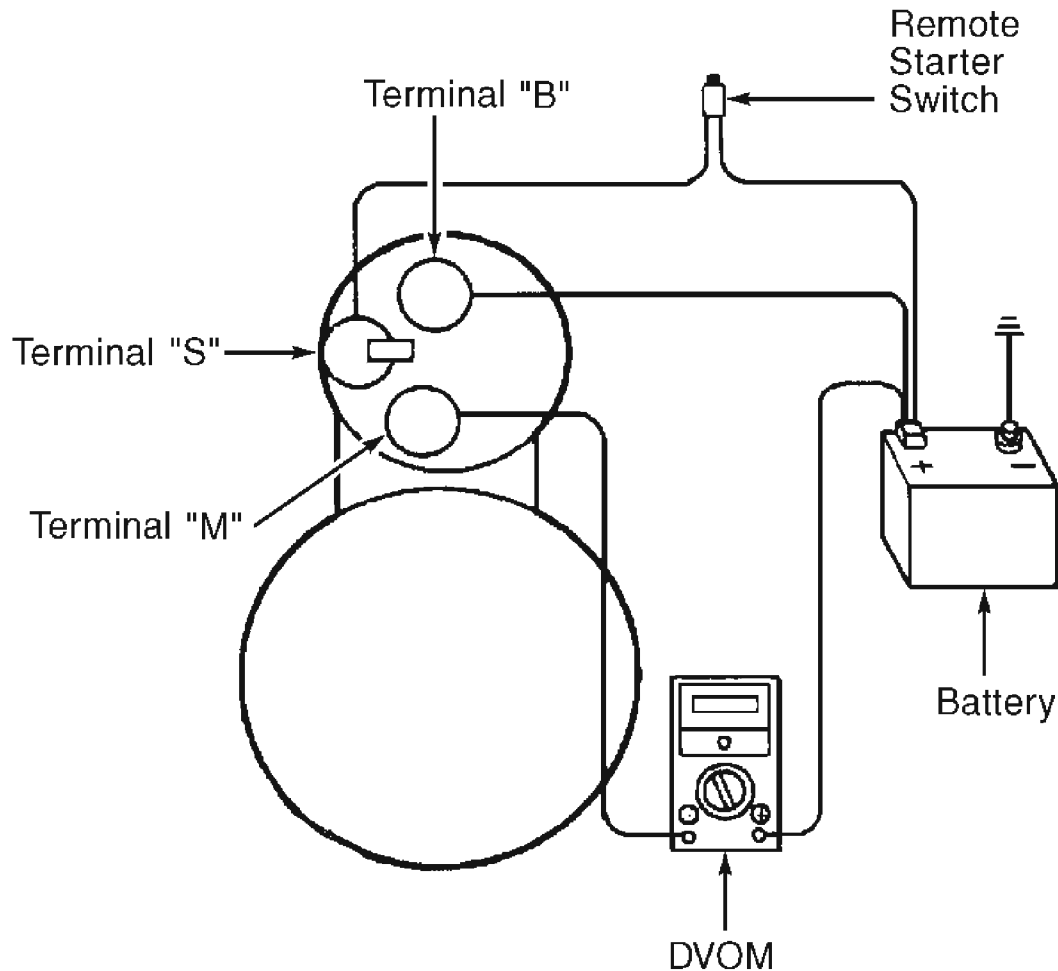
## ON-VEHICLE TESTING

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery. Before testing starter, ensure transmission is in Park or Neutral.

### VOLTAGE DROP TEST

**NOTE:** Make all voltmeter connections at component terminal rather than at cable or wire end.

1. Ensure battery is fully charged. Disconnect ignition coil connector. Connect remote starter switch between starter solenoid terminal "S" and positive battery post. Connect positive voltmeter lead to positive battery post, and negative lead to solenoid terminal "M". See **Fig. 1** .
2. Engage remote starter switch. If voltmeter indicates .5 volt or less, go to **STARTER GROUND CIRCUIT TEST** . If voltmeter indicates greater than .5 volt, go to next step.
3. Move negative voltmeter lead to solenoid terminal "B". Engage remote starter switch. If voltmeter indicates less than .5 volt, solenoid connections or contacts are bad. Clean solenoid terminals "B", "S" and "M". Repeat steps 1 -3 .
4. If voltmeter still indicates more than .5 volt at terminal "M" and less than .5 volt at terminal "B", solenoid contacts are bad. Replace starter motor. See **STARTER MOTOR** under REMOVAL & INSTALLATION. If voltmeter indicates greater than .5 volt at terminal "B", clean cables and connections at solenoid.
5. If voltmeter still indicates greater than .5 volt at terminal "B", check for poor positive battery cable connection or bad cable. Repair connection or replace battery cable as necessary.



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**Fig. 1: Testing Voltage Drop**  
 Courtesy of FORD MOTOR CO.

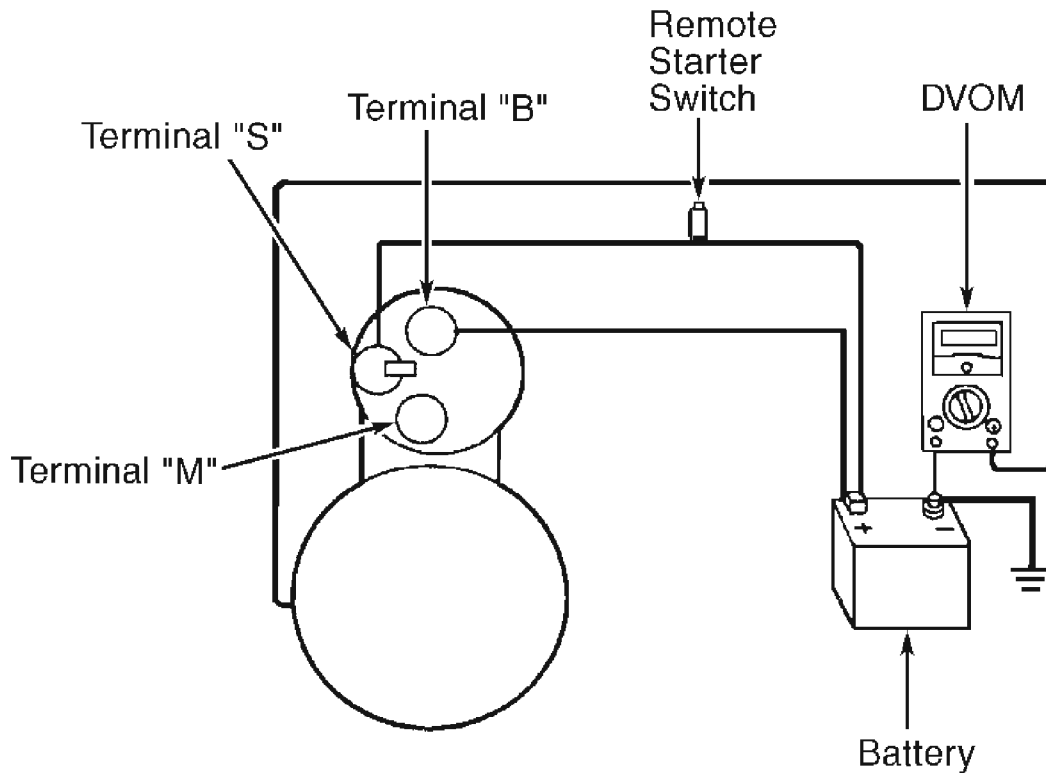
#### STARTER GROUND CIRCUIT TEST

**NOTE:** Make all voltmeter connections at component terminal rather than at cable or wire end.

1. Disconnect ignition coil connector. Connect remote starter switch between starter solenoid terminal "S" and positive battery post. See **Fig. 2** . Connect positive voltmeter lead to starter housing, and negative lead to negative battery post.
2. Engage remote starter switch while observing voltmeter. Voltmeter should indicate .2 volt or less. If voltmeter indicates greater than .2 volt, clean negative cable connections at battery and engine.
3. If voltage drop is still excessive, repair or replace negative battery cable and/or engine

ground cable as necessary. Repeat starter circuit test after repair to ensure problem has been corrected.

4. If battery and cables test okay and starter motor still cranks slowly or not at all, replace starter motor. See **STARTER MOTOR** under REMOVAL & INSTALLATION.



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**Fig. 2: Starter Ground Circuit Test**  
Courtesy of FORD MOTOR CO.

## SYSTEM TESTS

### SYMPTOM INDEX

Symptom	Perform Test
Engine Does Not Crank Or Relay Clicks	<b>A</b>
Unusual Starter Noise	<b>B</b>
Engine Cranks Slowly	(1)
Starter Spins, But Engine does not Crank	(2)
Engine Cranks With Clutch Pedal Not Depressed	(3)

(1) Perform **VOLTAGE DROP TEST** under ON-VEHICLE TESTING.

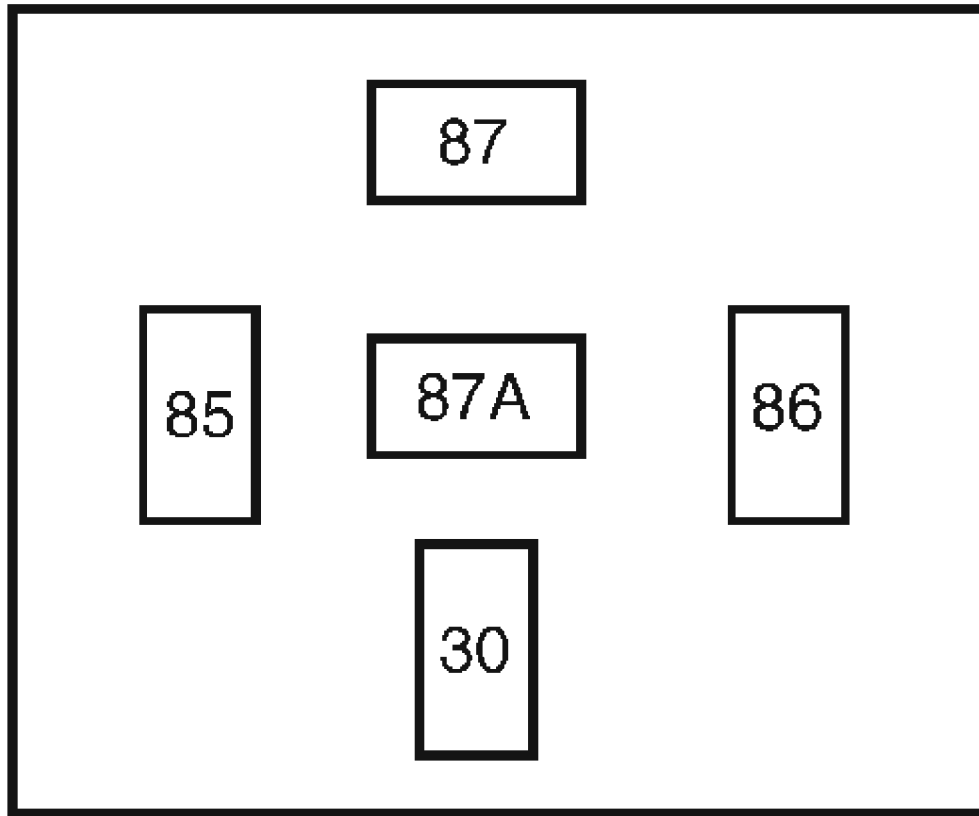
- (2) Inspect starter motor mounting. Inspect flywheel ring gear and starter motor gear for damaged and missing teeth. Repair or replace components as necessary.
- (3) Replace clutch pedal position switch.

#### TEST A: ENGINE DOES NOT CRANK OR RELAY CLICKS

1. Ensure battery is fully charged and has sufficient capacity. Ensure battery terminals are clean and tight. If battery is okay, go to next step. If problem is found, replace battery as necessary.
2. Measure voltage between positive battery post and battery ground cable connection at engine block. If battery voltage is present, go to next step. If battery voltage is not present, replace battery ground cable. Check system operation.
3. Turn ignition switch to LOCK position. Remove starter relay from battery junction box. Test starter relay. See **STARTER RELAY** under COMPONENT TESTS. If starter relay is okay, go to next step. If starter relay is defective, replace starter relay.
4. Turn ignition switch to RUN position. Measure voltage between ground and starter relay connector terminal No. 30 (Yellow wire). See **Fig. 3**. If battery voltage is present, go to next step. If battery voltage is not present, replace battery junction box. Check system operation.
5. Ensure vehicle is in Park (A/T) or Neutral (M/T). Measure resistance between ground and starter relay connector terminal No. 85 (Red/Light Blue wire). Turn ignition switch to START position. If resistance is less than 5 ohms, go to next step. If resistance is greater than 5 ohms, repair Red/Light Blue wire between starter relay and powertrain control module. Check system operation.
6. Turn ignition switch to RUN position. On M/T vehicles, ensure clutch pedal is depressed completely. On A/T vehicles, ensure transmission is in Park. On all models, turn ignition switch to START position. Measure voltage between ground and starter relay connector terminal No. 86 (Tan/Red wire). If battery voltage is present, go to next step. If battery voltage is not present, go to step 9 (A/T) or 13 (M/T).
7. Turn ignition switch to LOCK position. Disconnect starter motor solenoid "S" connector. See **Fig. 4**. Measure resistance between starter motor solenoid terminal "S" and starter relay connector terminal No. 87. If resistance is less than 5 ohms, go to next step. If resistance is greater than 5 ohms, repair open in White/Pink wire between starter relay and starter motor. Check system operation.
8. Install starter relay. Connect starter motor solenoid "S" connector. Perform **STARTER GROUND CIRCUIT TEST** under ON-VEHICLE TESTING. If starter motor ground circuit is okay, perform **VOLTAGE DROP TEST** under ON-VEHICLE TESTING. If starter motor ground is not okay, repair or replace battery ground cable and/or engine ground cable as needed. Check system operation.
9. Check transaxle linkage adjustment. See appropriate AUTOMATIC TRANSMISSIONS article in TRANSMISSION SERVICING. If linkage adjustment is

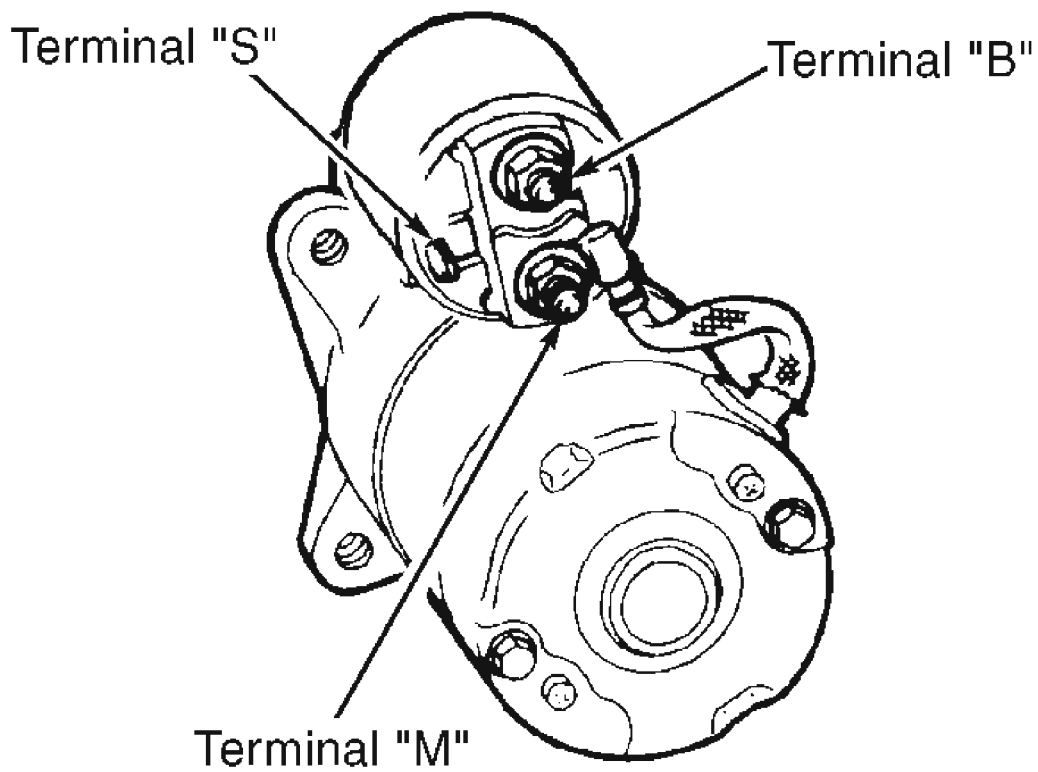
okay, go to next step. If linkage adjustment is not okay, adjust linkage. Check system operation.

10. Check Digital Transmission Range (DTR) sensor adjustment. See **DIGITAL TRANSMISSION RANGE SENSOR** under ADJUSTMENTS. If adjustment is okay, go to next step. If out of adjustment, adjust DTR sensor as necessary. Check system operation.
11. Disconnect DTR sensor harness connector. Turn ignition switch to START position. Measure voltage between ground and DTR sensor harness connector terminal No. 9 (Tan/Light Blue wire). See **Fig. 5** . If battery voltage is present, go to next step. If battery voltage is not present, repair power distribution circuit as necessary (Tan/Light Blue wire). See POWER DISTRIBUTION article in WIRING DIAGRAMS. Check system operation.
12. Turn ignition switch to LOCK position. Remove starter relay from Battery Junction Box (BJB). Measure resistance between DTR sensor harness connector terminal No. 4 (Tan/Red wire) and starter relay connector terminal No. 86. See **Fig. 3** and **Fig. 5** . If resistance is less than 5 ohms, replace DTR sensor. If resistance is greater than 5 ohms, repair Tan/Red wire between DTR sensor and BJB. Check system operation.
13. Disconnect Clutch Pedal Position (CPP) switch harness connector. Turn ignition switch to START position. Measure voltage between ground and CPP switch harness connector terminal No. 1 (Tan/Light Blue wire). See **Fig. 6** . If battery voltage is present, go to next step. If battery voltage is not present, repair power distribution circuit as necessary (Tan/Light Blue wire). See POWER DISTRIBUTION article in WIRING DIAGRAMS. Check system operation.
14. Turn ignition switch to LOCK position. Measure resistance in Tan/Red wire between CPP switch harness connector terminal No. 2 and starter relay connector terminal No. 86. See **Fig. 3** and **Fig. 6** . If resistance is less than 5 ohms, replace CPP switch. Check system operation. If resistance is greater than 5 ohms, repair Tan/Red wire between CPP switch and starter relay. Check system operation.



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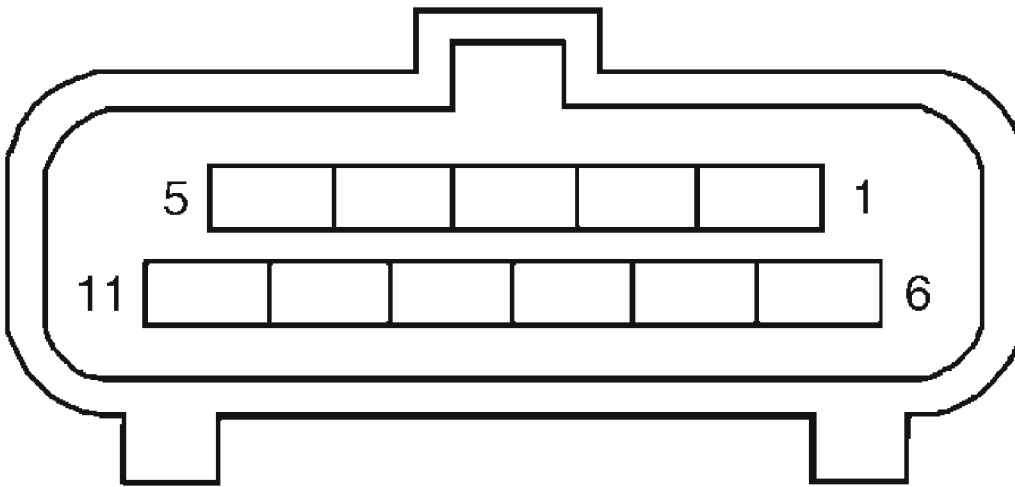
**Fig. 3: Identifying Starter Relay Connector Terminals**  
Courtesy of FORD MOTOR CO.



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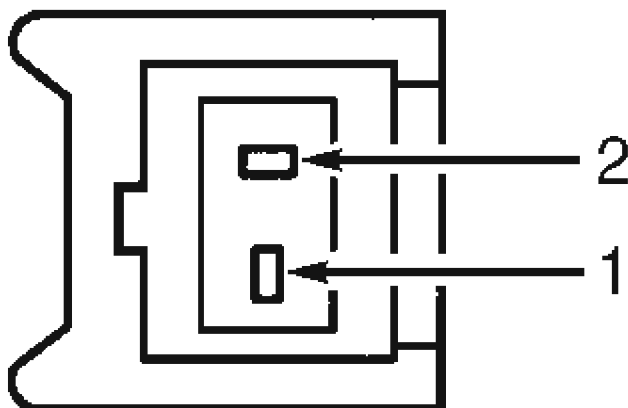
**Fig. 4: Identifying Starter Motor Terminals**  
Courtesy of FORD MOTOR CO.





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**Fig. 5: Identifying Digital Transmission Range Sensor Harness Connector Terminals**  
Courtesy of FORD MOTOR CO.



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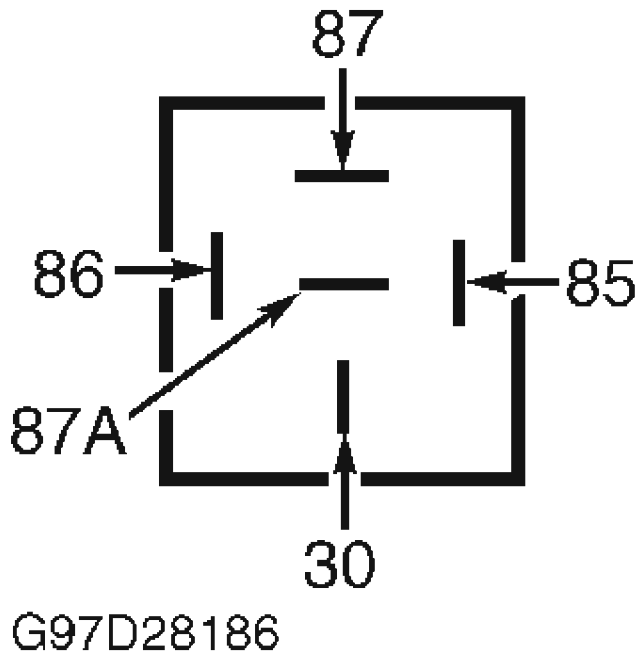
**Fig. 6: Identifying Clutch Pedal Position Harness Connector Terminals**  
Courtesy of FORD MOTOR CO.

**TEST B: UNUSUAL STARTER NOISE**

1. Verify starter is installed properly. Ensure bolts are tight. If starter is mounted properly, go to next step. If starter is not mounted properly, repair as necessary and check system for normal operation.
2. Remove starter motor. See **STARTER MOTOR** under REMOVAL & INSTALLATION. Inspect flywheel ring gear for wear or damage. If ring gear is okay, replace starter motor. If ring gear is worn or damaged, replace ring gear and inspect starter drive gear. If drive gear is also damaged, replace starter motor. If noise is not coming from starter motor, diagnose engine mechanical concern. See appropriate article in ENGINES.

**COMPONENT TESTS****STARTER RELAY**

1. Remove starter relay from battery junction box. Check relay continuity. Continuity should exist between relay terminals No. 85 and 86, and between relay terminals No. 30 and 87a. See **Fig. 7** . Continuity should not exist between relay terminals No. 30 and 87. If continuity is as specified, go to next step. If continuity is not as specified, replace relay.
2. Using a jumper wire, apply battery voltage to relay terminal No. 85. Using a second jumper wire, ground relay terminal No. 86. Continuity should now exist between relay terminals No. 30 and 87. If continuity is not as specified, replace relay. If continuity is as specified, relay is okay at this time.



**Fig. 7: Identifying Starter Relay Terminals**  
Courtesy of FORD MOTOR CO.

## REMOVAL & INSTALLATION

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery. Before testing starter, ensure transmission is in Park or Neutral.

### STARTER MOTOR

#### Removal & Installation (2.0L)

Disconnect negative battery cable. Remove starter bolts. Raise and support vehicle. On AWD vehicles, disconnect exhaust system. On all vehicles, remove halfshaft support bracket bolts and nuts. Remove battery cable and starter control electrical connector nuts. Remove starter motor. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

## 2001 Ford Escape

### 2001 STARTING & CHARGING SYSTEMS Starters - Escape

#### Removal & Installation (3.0L)

Disconnect negative battery cable. Remove air cleaner outlet tube and air cleaner assembly. Drain engine cooling system. Disconnect 4 hoses and position thermostat aside. Raise and support vehicle. Remove starter solenoid cable nuts and position solenoid cables aside. Remove starter motor mounting bolts and starter motor. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

## STARTER MOTOR SPECIFICATIONS

### STARTER MOTOR SPECIFICATIONS

Application	Specification
Cranking Speed (Normal Load)	200-250 RPM
Current Draw	
Normal Load	130-190 Amps
No Load	60-80 Amps
Starter Circuit Voltage Drop	.5 Volt

## TORQUE SPECIFICATIONS

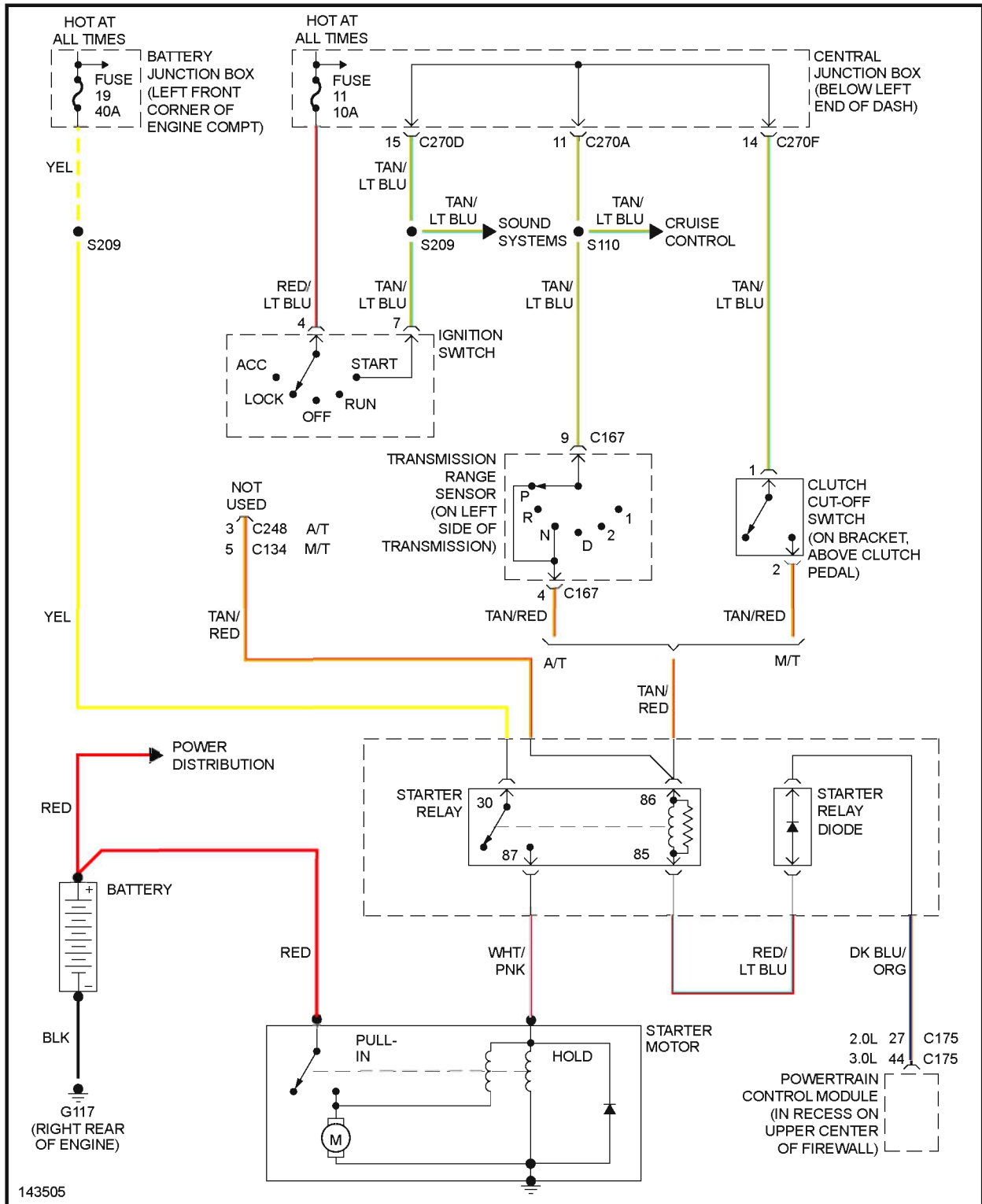
### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Exhaust Nuts	18 (24)
Halfshaft Bracket Mounting Bolts & Nuts	11 (15)
Starter Motor Mounting Bolts	16-20 (22-27)
INCH Lbs. (N.m)	
DTR Sensor Bolts	106 (12)
Starter Solenoid Cable Nuts	
2.0L	44 (5)
3.0L	106 (12)

## WIRING DIAGRAMS

## 2001 Ford Escape

### 2001 STARTING & CHARGING SYSTEMS Starters - Escape



**Fig. 8: Starter System Wiring Diagram (Escape)**

**2004 ENGINE****Fuel Tank and Lines - Escape****SPECIFICATIONS****TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
Differential mounting bracket to subframe mounting bolts	115	85	-
Differential to mounting bracket bolts	80	59	-
Fuel pump module (FPM) retaining ring	81	60	-
Fuel tank filler pipe bolt	10	-	89
Fuel tank support strap bolts	55	41	-

**DESCRIPTION AND OPERATION****FUEL TANK AND LINES**

The fuel system consists of the following components:

- the fuel tank
- the fuel tank filler pipe
- a 1/8 turn-type fuel tank filler cap
- a fuel filter
- fuel lines
- an inertia fuel shutoff (IFS) switch
- a fuel pump module (FPM) containing:
  - the electric fuel pump which provides pressurized fuel to the engine
  - the fuel level sensor
  - an inlet filter
  - a check valve which maintains system pressure after the pump is shut off
  - a mechanical fuel pressure regulator with pressure relief for over-pressure protection

The fuel pump is controlled by the powertrain control module (PCM) which energizes the fuel pump relay. Electrical power to the pump is provided through the inertia fuel shutoff (IFS) switch.

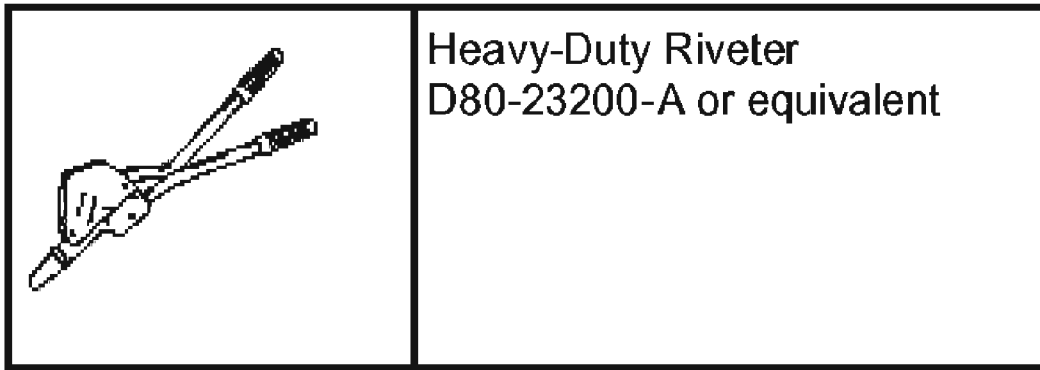
**DIAGNOSIS AND TESTING**

## FUEL TANK AND LINES

REFER to the INTRODUCTION - CNG, FLEX-FUEL & GASOLINE article.

## REMOVAL AND INSTALLATION

### FUEL TANK



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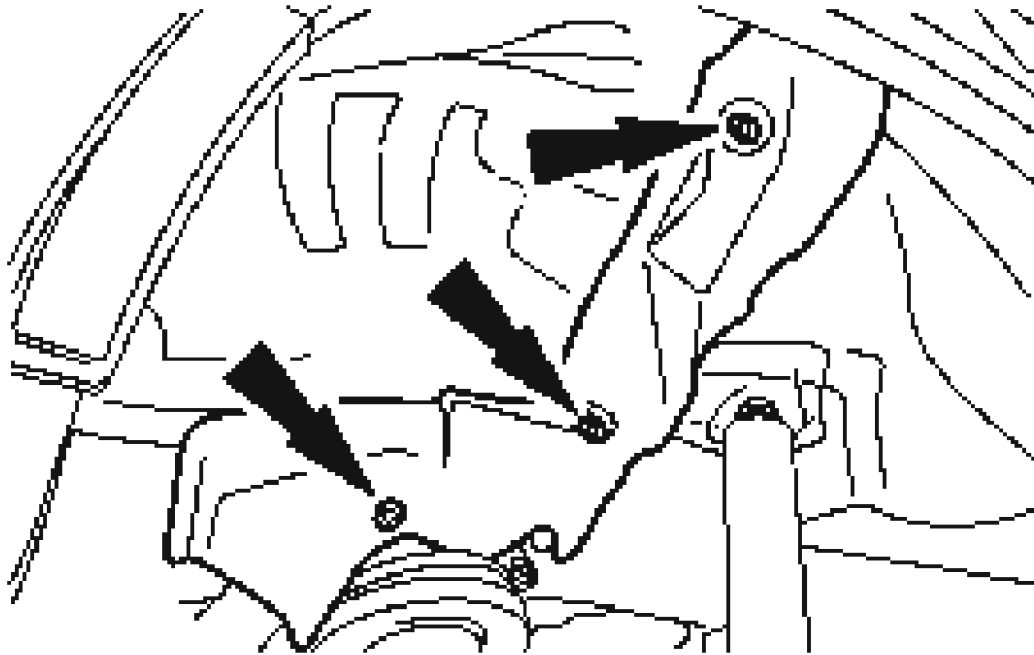
**Fig. 1: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

### Removal and Installation

**WARNING:** Do not smoke or carry an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited, resulting in possible personal injury.

### All vehicles

1. Drain the fuel tank. For additional information, refer to FUEL SYSTEM-GENERAL INFORMATION
2. Remove the left rear wheel.
3. Remove the rivets and the fuel tank filler tube shield.

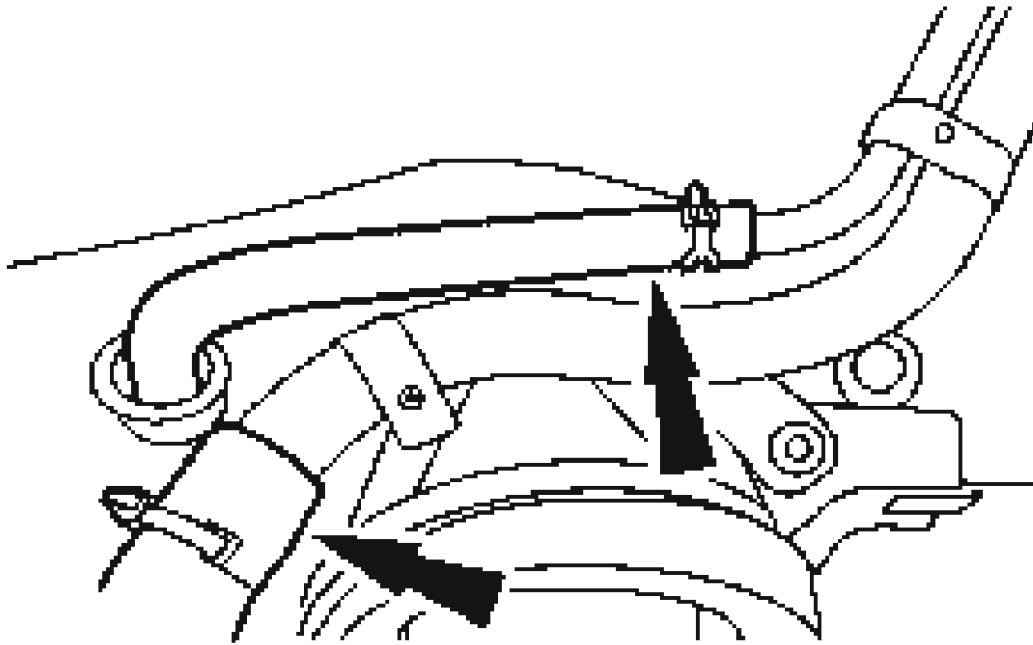


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**Fig. 2: Removing Fuel Tank Filler Tube Shield Rivets**  
Courtesy of FORD MOTOR CO.

4. Disconnect the fuel tank filler hose and the fuel tank filler vent hose from the fuel filler tube.





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**Fig. 3: Disconnecting Fuel Tank Filler Hose And Vent Hose**  
Courtesy of FORD MOTOR CO.

**2.0L vehicles**

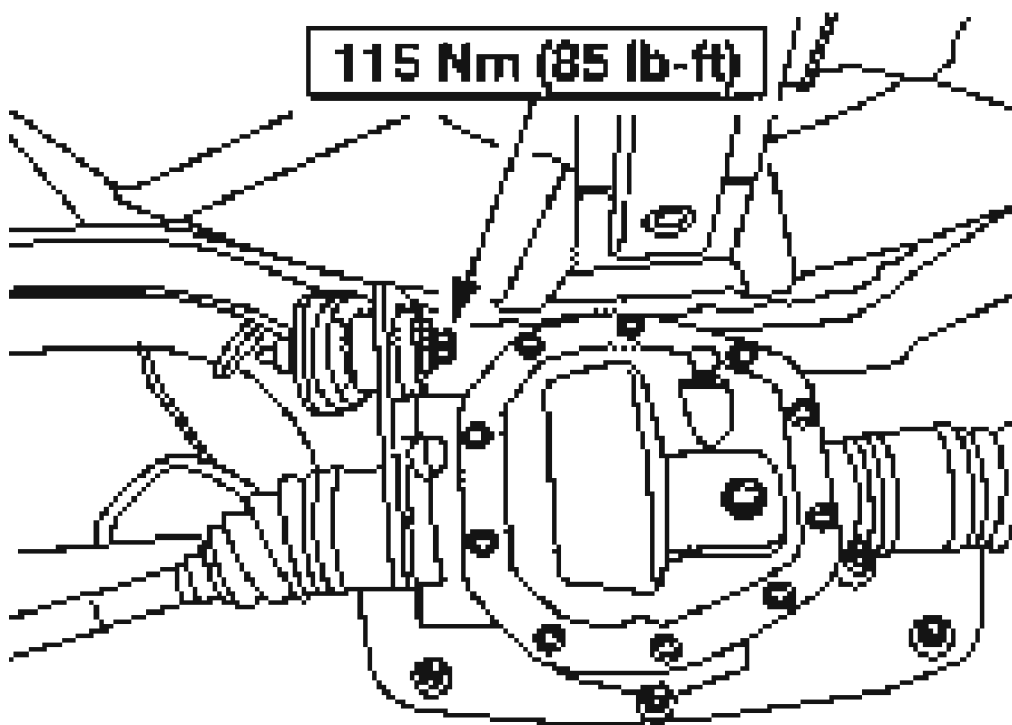
5. Remove the muffler. For additional information, refer to **EXHAUST SYSTEM**

**3.0L (4V) vehicles**

6. Remove the muffler and the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**

**4WD vehicles**

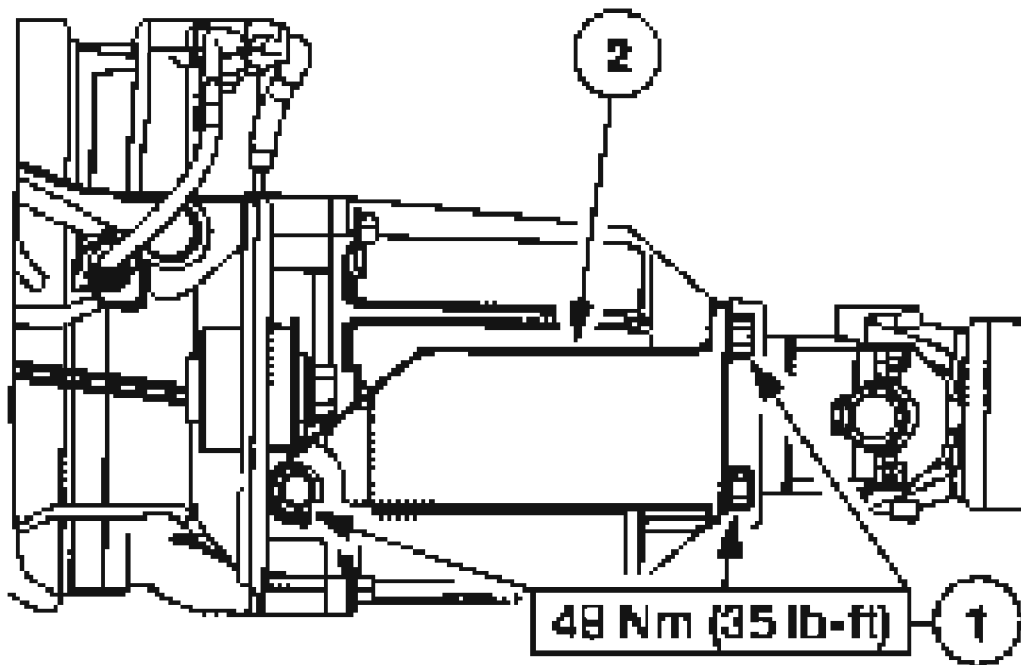
7. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** .
8. Remove the differential mounting bracket-to-subframe mounting bolt.



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**Fig. 4: Removing Differential Mounting Bracket-To-Subframe Mounting Bolt**  
Courtesy of FORD MOTOR CO.

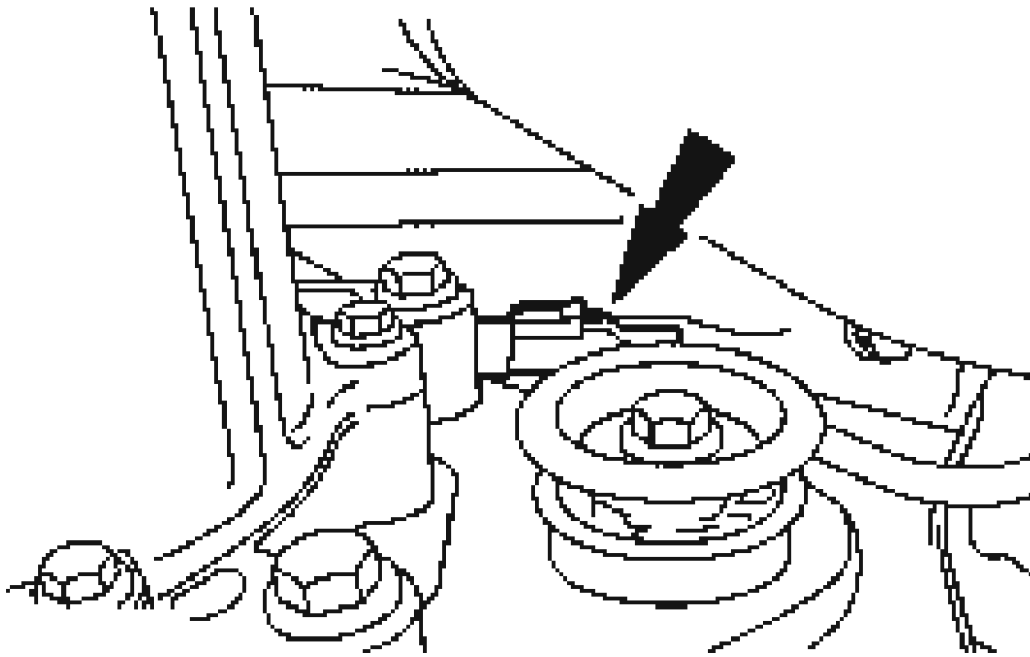
9. Remove the rear differential mass damper.
  1. Remove the bolts.
  2. Remove the rear differential mass damper.



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**Fig. 5: Removing Rear Differential Mass Damper**  
Courtesy of FORD MOTOR CO.

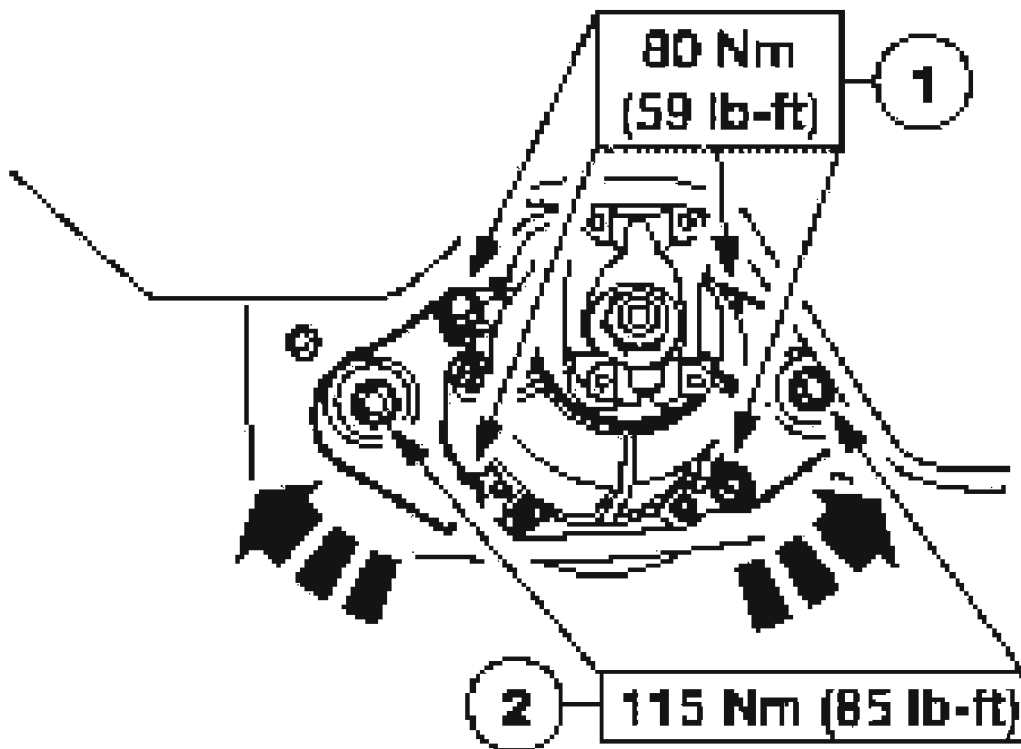
10. Disconnect the electrical connector.



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**Fig. 6: Disconnecting Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

11. Using a suitable jack, support the rear differential assembly.
12. Position the axle assembly rearward.
  1. Remove the differential-to-bracket bolts.
  2. Loosen the differential mounting bracket-to-subframe mounting bolts, rotate the brackets and position the axle assembly rearward.

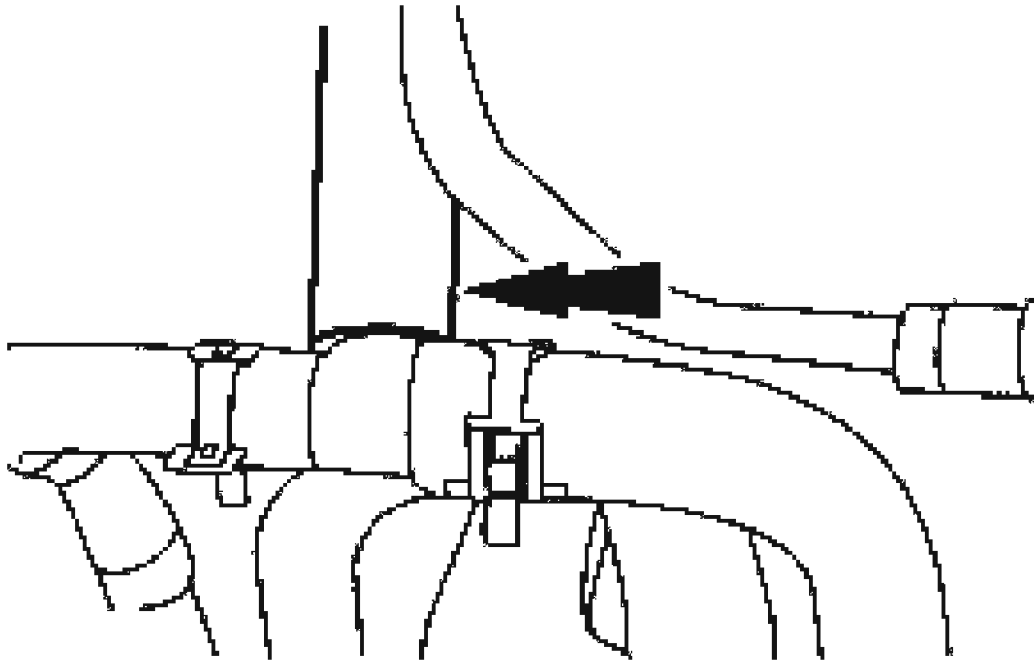


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**Fig. 7: Positioning Axle Assembly Rearward**  
**Courtesy of FORD MOTOR CO.**

**All vehicles**

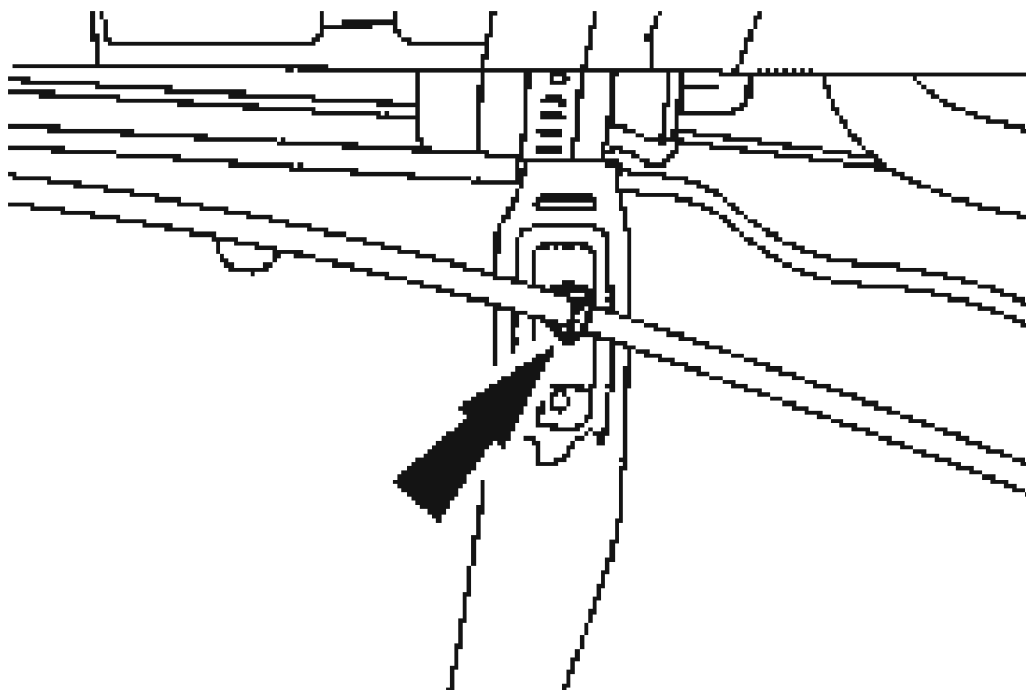
13. Use a suitable jack to support the fuel tank.
14. Disconnect the vapor hose.



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**Fig. 8: Disconnecting Vapor Hose**  
Courtesy of FORD MOTOR CO.

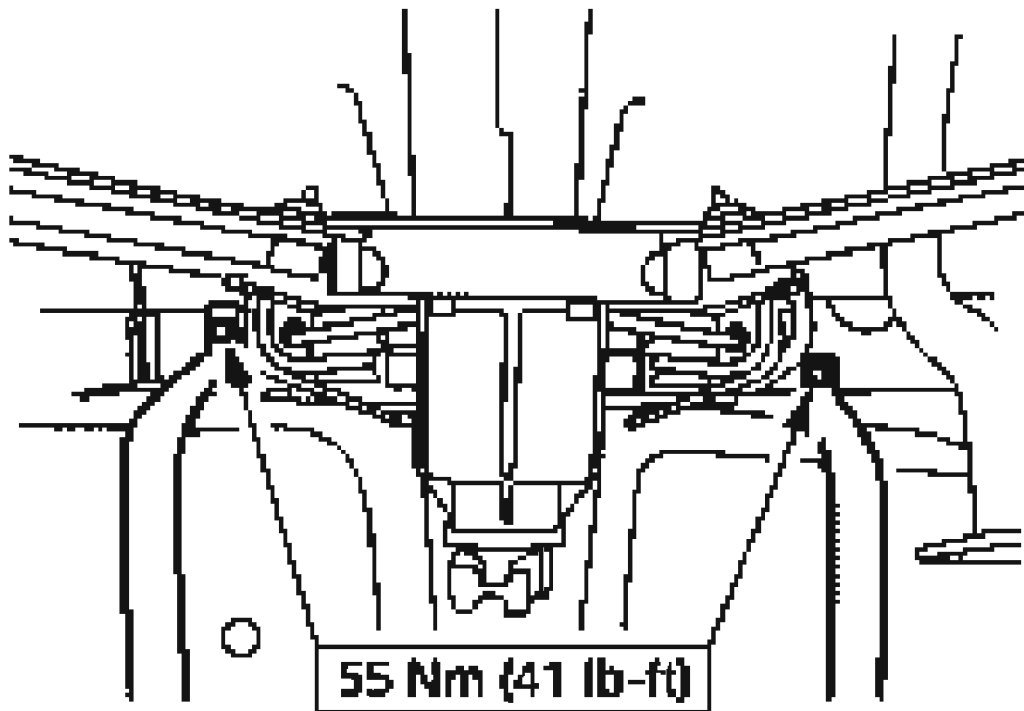
15. Disconnect the pin-type retainer from the fuel tank strap and position the parking brake cable aside.



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**Fig. 9: Disconnecting Pin-Type Retainer From Fuel Tank Strap**  
Courtesy of FORD MOTOR CO.

**NOTE:** For 4WD vehicles, it will be necessary to disconnect a wiring harness clip from the fuel tank strap.

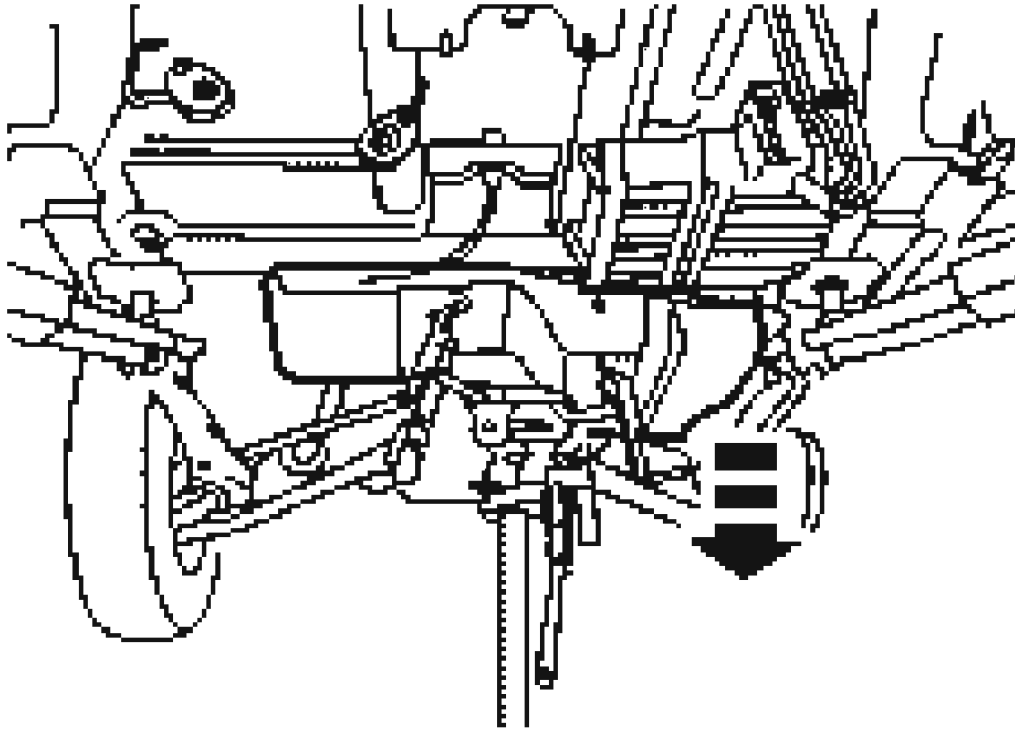


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**Fig. 10: Removing Fuel Tank Straps Bolts**  
**Courtesy of FORD MOTOR CO.**

16. Remove the bolts and the fuel tank straps.
17. Lower and remove the fuel tank.





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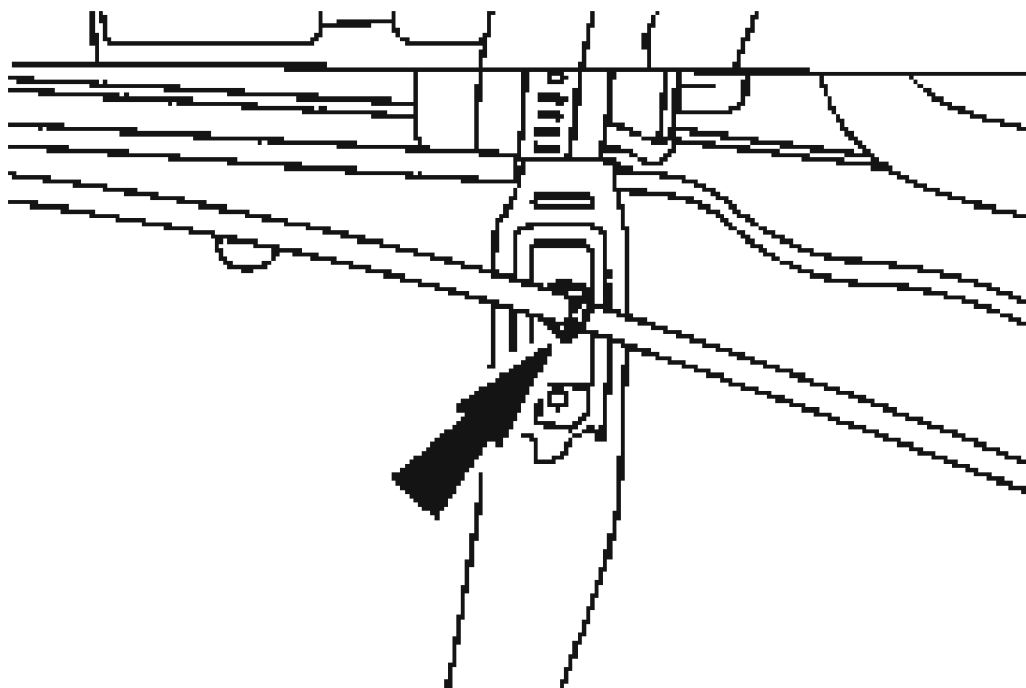
**Fig. 11: Removing Fuel Tank**  
Courtesy of FORD MOTOR CO.

18. To install, reverse the removal procedure.
  - Use the Heavy-Duty Riveter to install the rivets.

## **FUEL TANK SUPPORT STRAPS**

### **Removal and Installation**

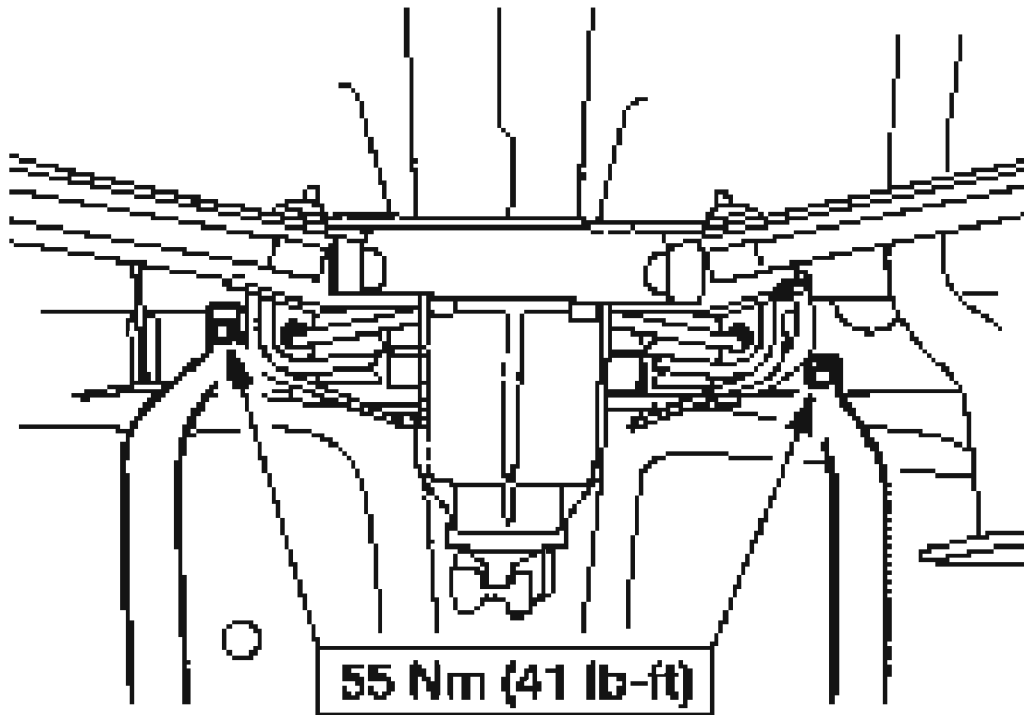
1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING** .
2. Use a suitable jack to support the fuel tank.
3. Disconnect the pin-type retainer from the fuel tank strap and position the parking brake cable aside.



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**Fig. 12: Disconnecting Pin-Type Retainer From Fuel Tank Strap**  
Courtesy of FORD MOTOR CO.

**NOTE:** For 4WD vehicles, it will be necessary to disconnect a wiring harness clip from the fuel tank strap.

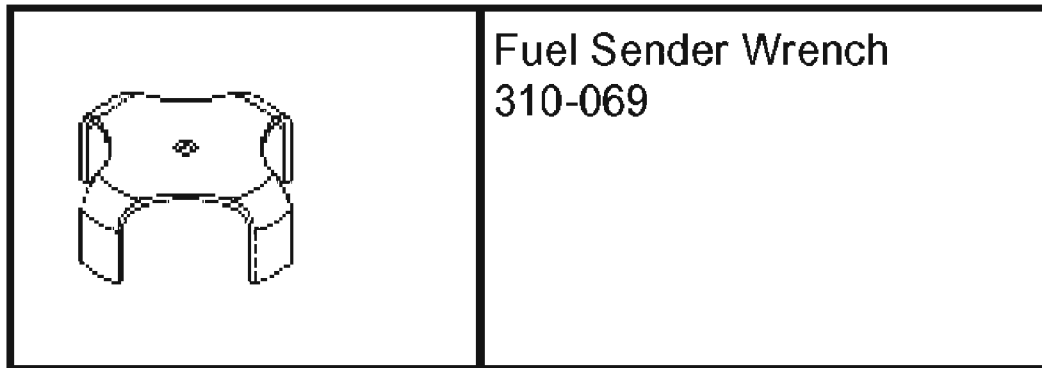


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**Fig. 13: Removing Fuel Tank Strap Bolts**  
Courtesy of FORD MOTOR CO.

4. Remove the bolts and the fuel tank straps.
5. To install, reverse the removal procedure.

#### **FUEL PUMP MODULE**



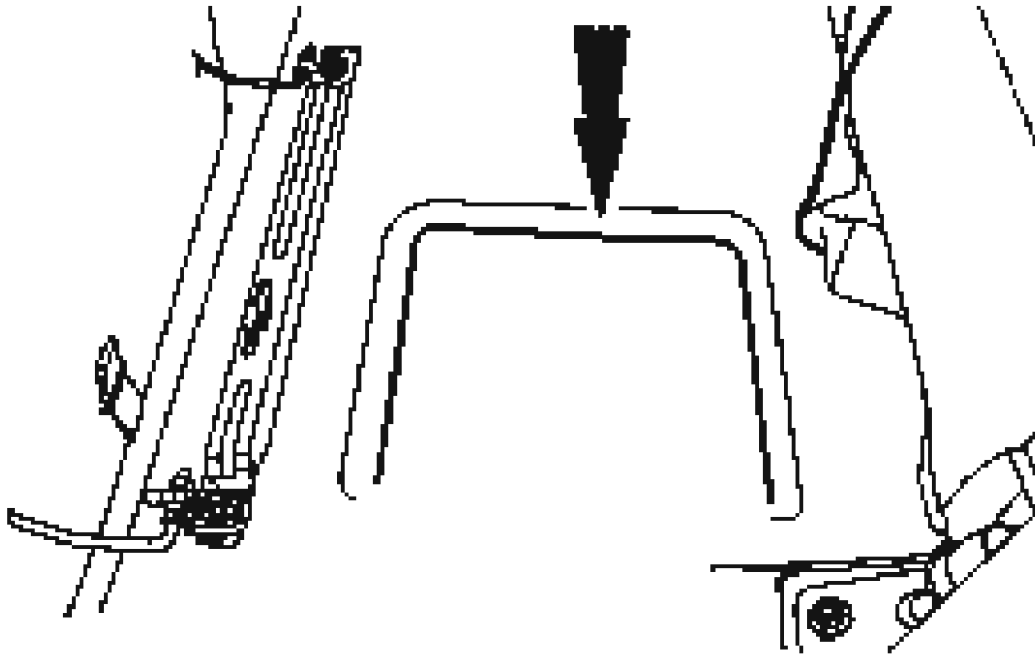
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**Fig. 14: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal and Installation**

**WARNING:** Do not smoke or carry an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited, resulting in possible personal injury.

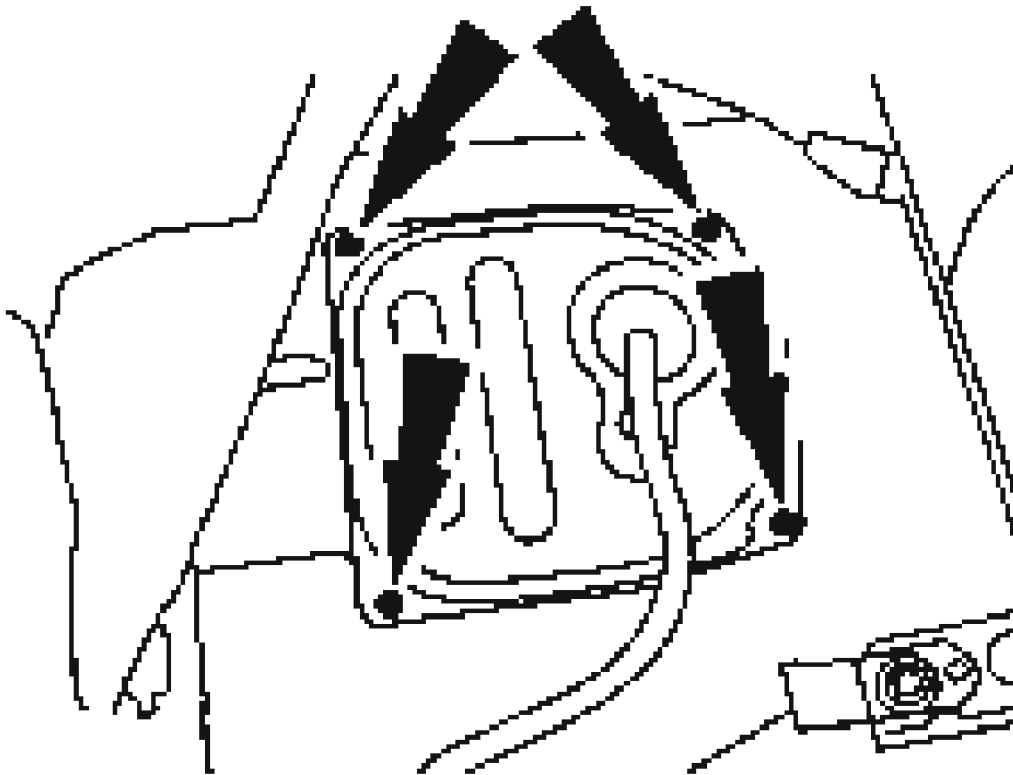
1. Relieve the fuel pressure. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**
3. Lift the LH rear seat cushion.
4. Position the carpet aside.



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**Fig. 15: Positioning Carpet Aside**  
**Courtesy of FORD MOTOR CO.**

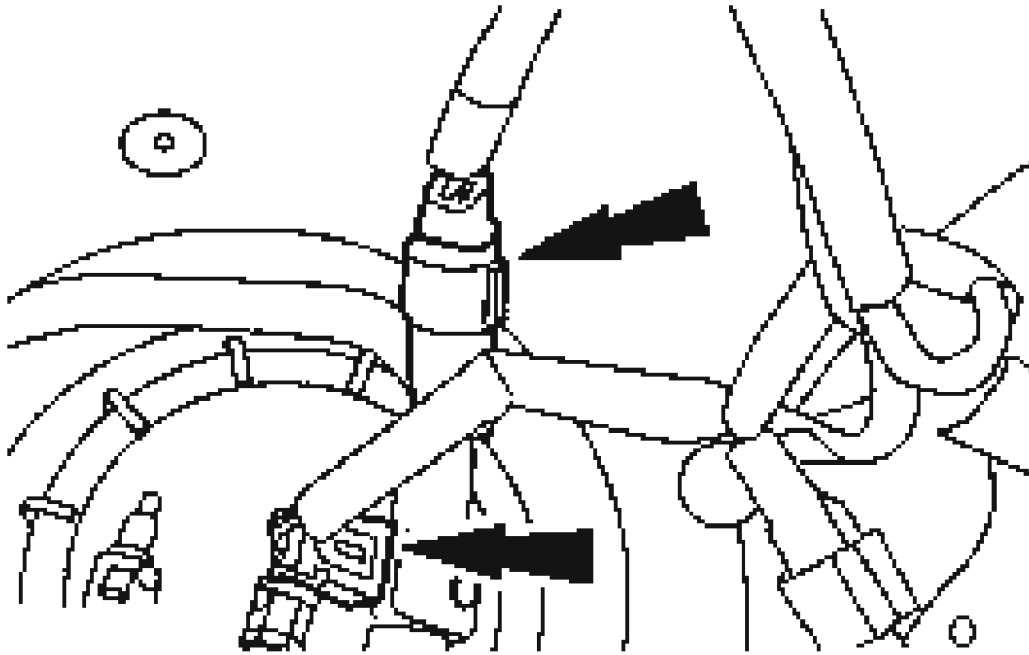
5. Remove the screws and the fuel pump module access cover.



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**Fig. 16: Removing Fuel Pump Module Screws**  
Courtesy of FORD MOTOR CO.

6. Disconnect the electrical connectors.

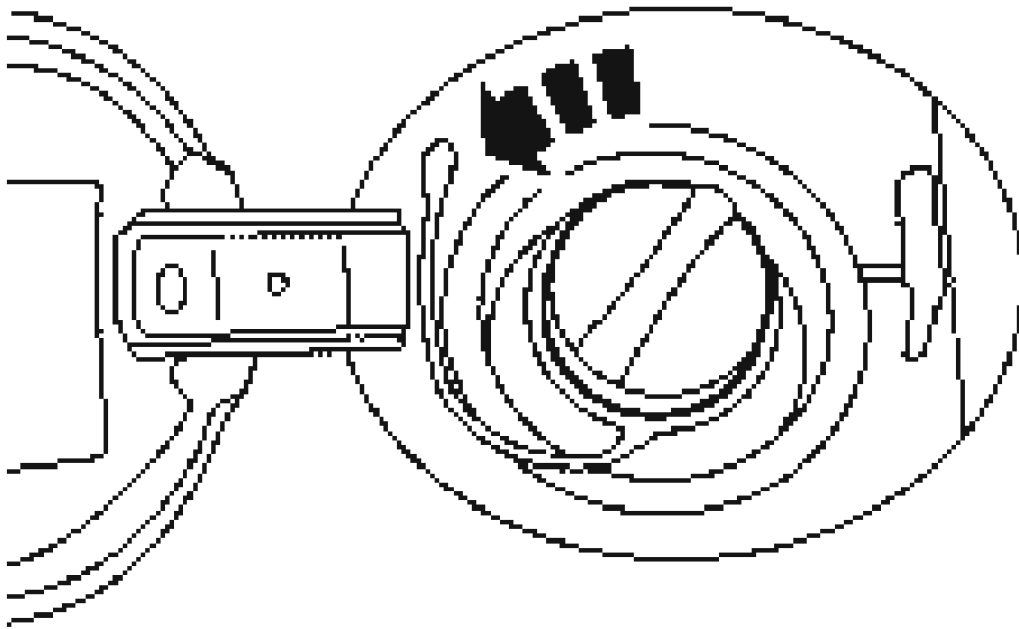


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**Fig. 17: Disconnecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

7. Disconnect the fuel and vapor lines from the fuel tank. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**.

**WARNING:** The fuel tank may be pressurized. Remove the fuel tank filler cap slowly. If a hissing sound is heard, wait until the condition stops before removing the fuel tank filler cap. If these precautions are not followed, fuel may spray and cause personal injury.

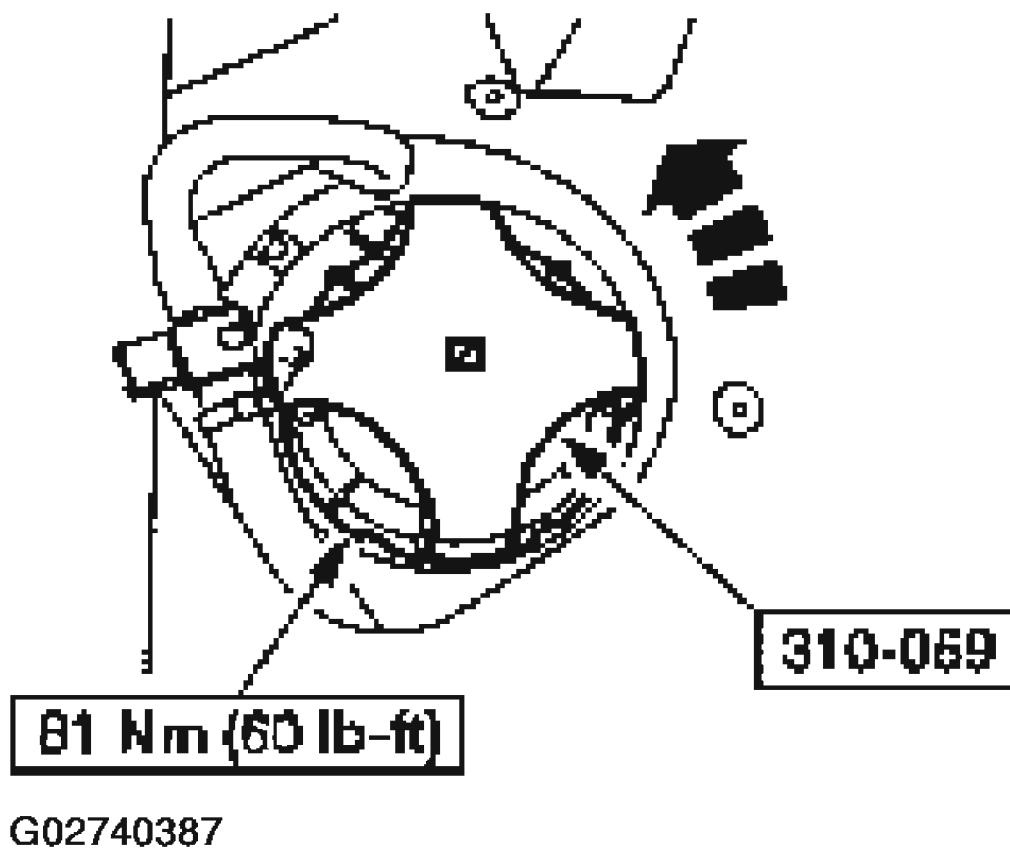


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**Fig. 18: Removing Gas Cap**  
**Courtesy of FORD MOTOR CO.**

8. Remove the gas cap.
9. Using the special tool, remove the fuel pump module.



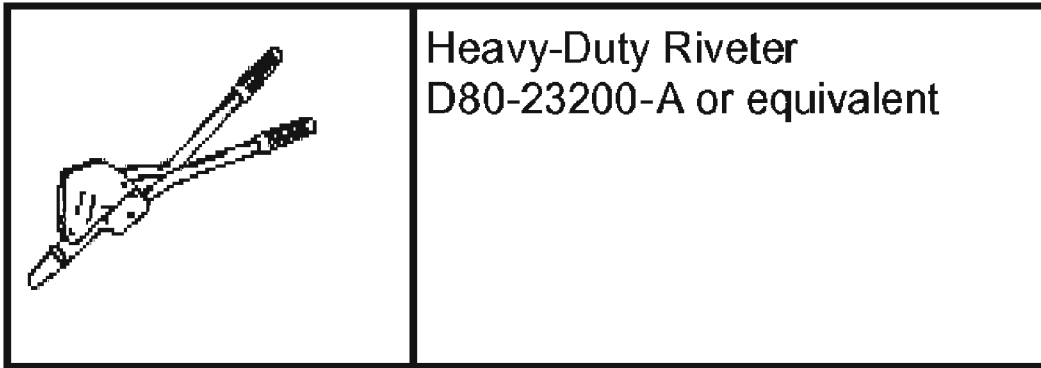


**Fig. 19: Removing Fuel Pump Module**  
Courtesy of FORD MOTOR CO.

**NOTE:** Install a new fuel pump mounting gasket.

10. To install, reverse the removal procedure.
  - Start the engine and visually inspect for leaks.

#### FUEL TANK FILLER PIPE



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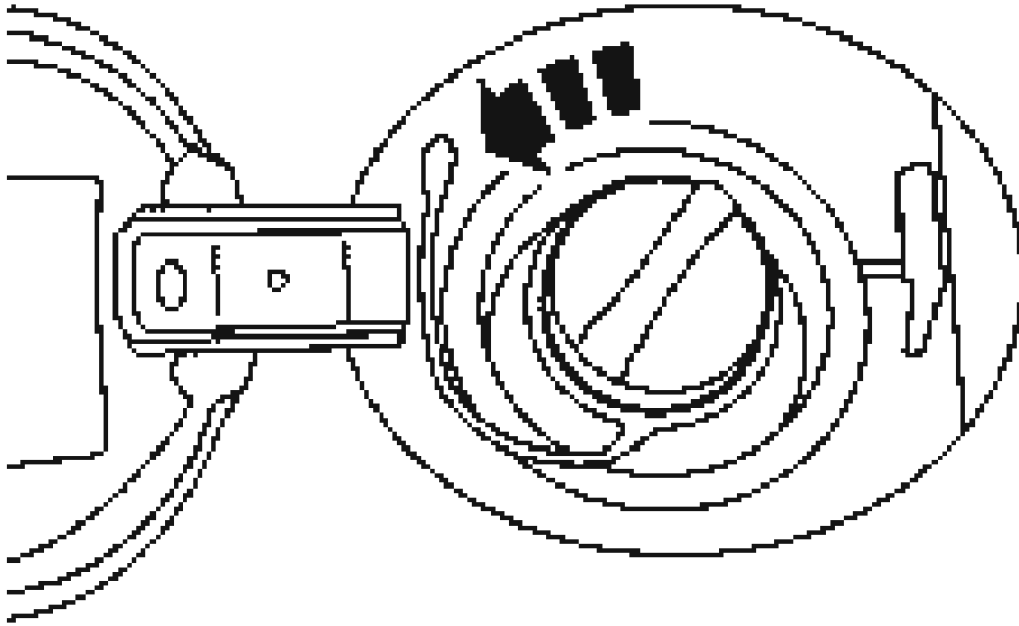
**Fig. 20: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal and Installation**

**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited, resulting in possible personal injury.

1. Remove the left rear wheel.

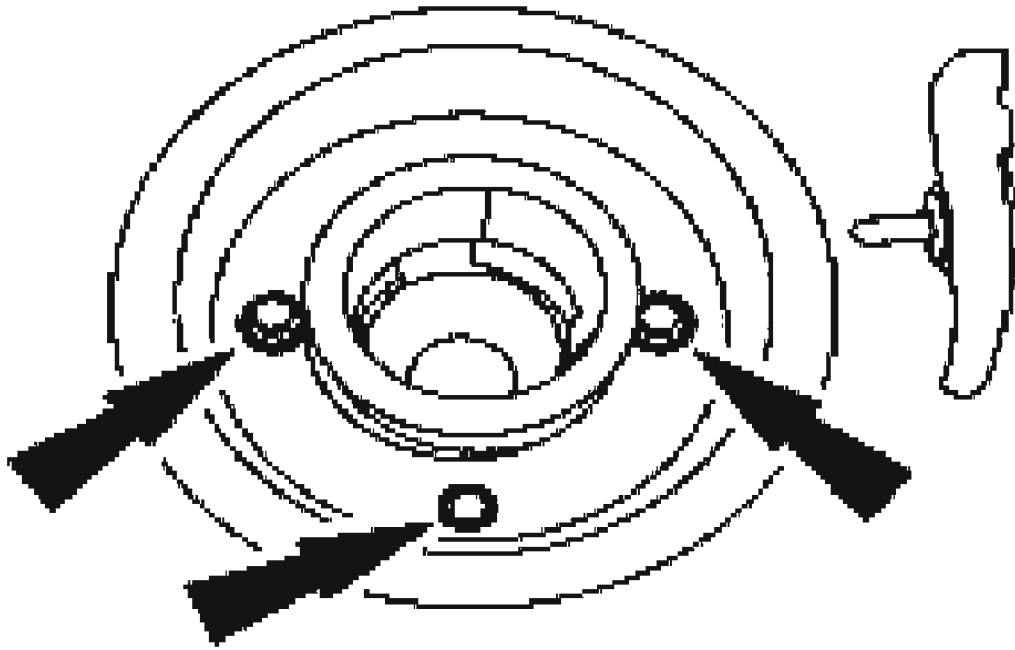
**WARNING:** The fuel tank may be pressurized. Remove the fuel tank filler cap slowly. If a hissing sound is heard, wait until the condition stops before removing the fuel tank filler cap. If these precautions are not followed, fuel may spray and cause personal injury.



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**Fig. 21: Removing Gas Cap**  
**Courtesy of FORD MOTOR CO.**

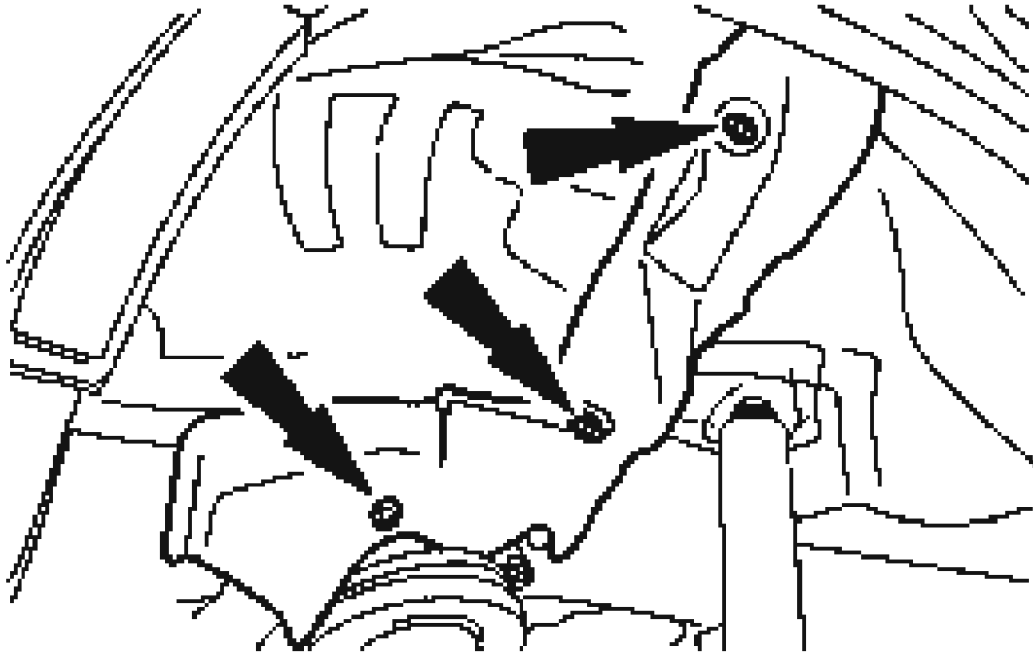
2. Remove the gas cap.
3. Remove the filler neck retaining screws.



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**Fig. 22: Removing Filler Neck Retaining Screws**  
Courtesy of FORD MOTOR CO.

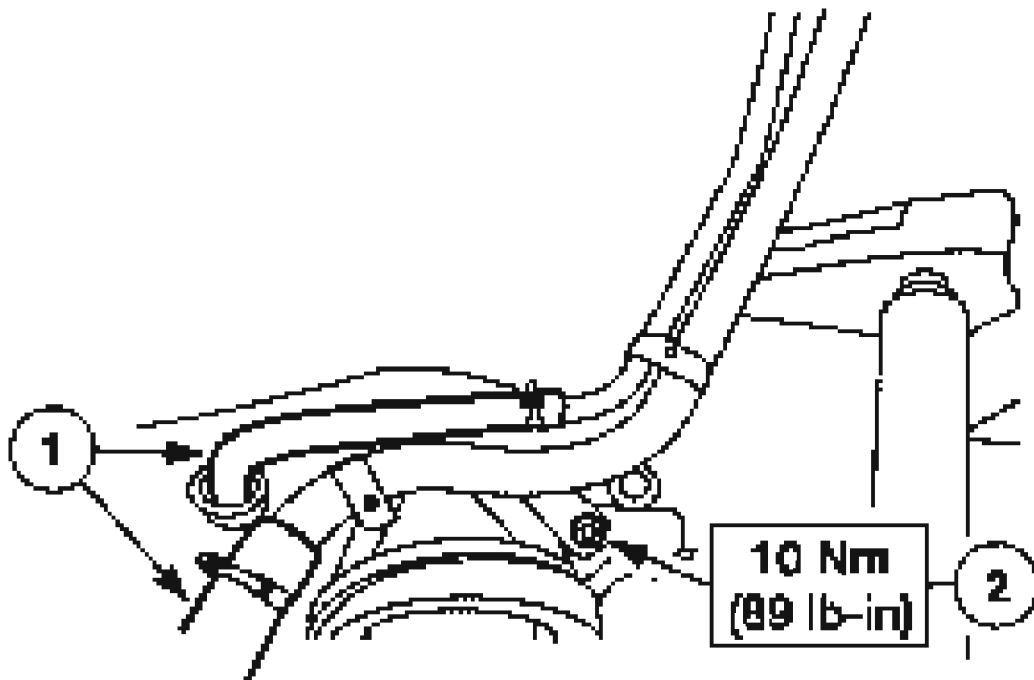
4. Remove the rivets and the fuel tank filler tube shield.



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**Fig. 23: Removing Fuel Tank Filler Tube Shield Rivets**  
Courtesy of FORD MOTOR CO.

5. Remove the fuel filler tube.
  1. Disconnect the hoses.
  2. Remove the bolt and the fuel filler tube.



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**Fig. 24: Removing Fuel Filler Tube**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.
  - Use the Heavy-Duty Riveter to install the rivets.

## FUEL FILTER

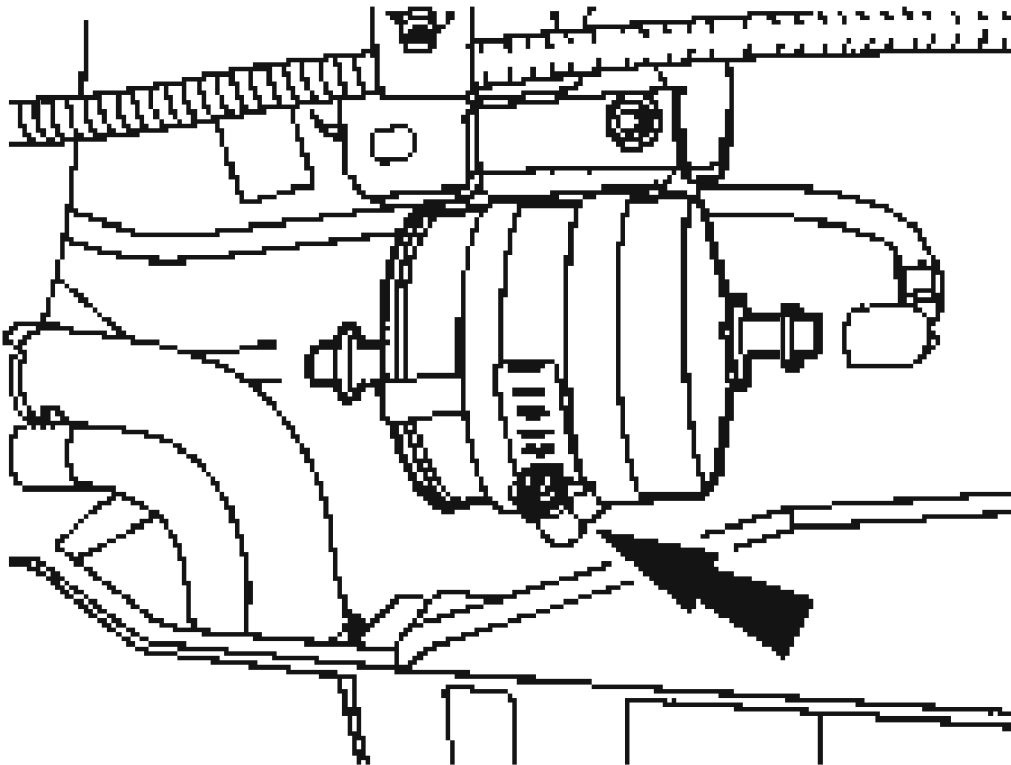
### Removal and Installation

**WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited, resulting in possible personal injury.

1. Relieve the fuel pressure. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**
3. Raise and support the vehicle. For additional information, refer to **ACCELERATION CONTROL** .

**NOTE:** Place a suitable container below the fuel filter.

4. Disconnect the fuel lines to the fuel filter. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**.
5. Loosen the clamp and remove the fuel filter.



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**Fig. 25: Loosening Fuel Filter Clamp**  
Courtesy of FORD MOTOR CO.

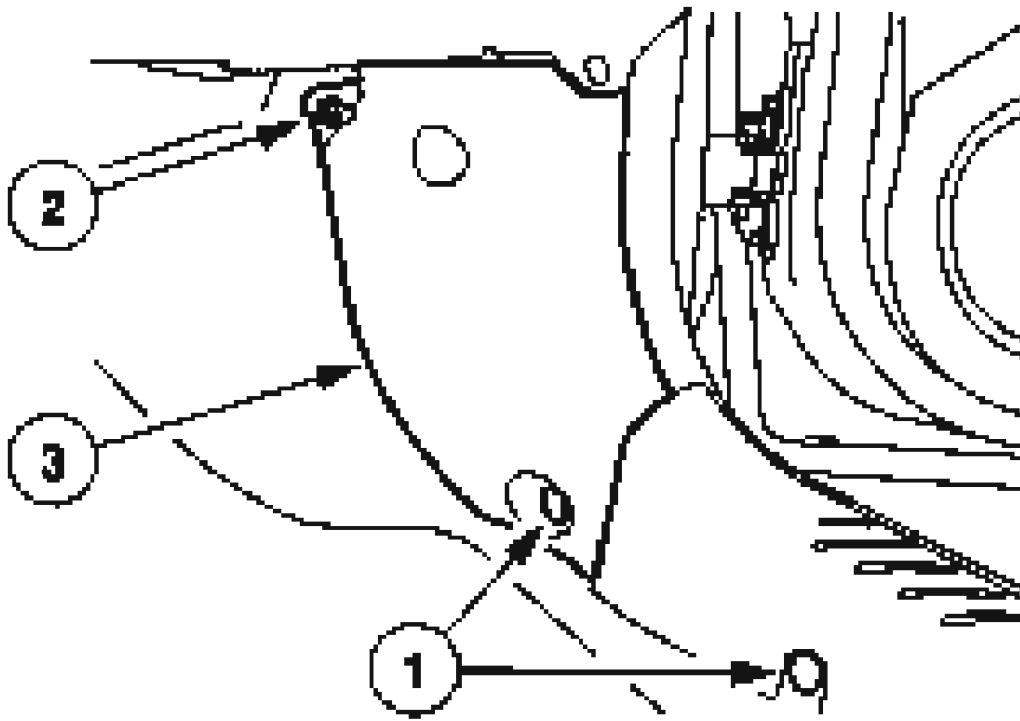
**NOTE:** When the fuel lines have been disconnected, install new retaining clips.

6. To install, reverse the removal procedure.

## INERTIA FUEL SHUTOFF (IFS) SWITCH

### Removal and Installation

1. Remove the cowl side trim panel.
  1. Remove the pin-type retainers.
  2. Remove the nut.
  3. Remove the cowl side trim panel.

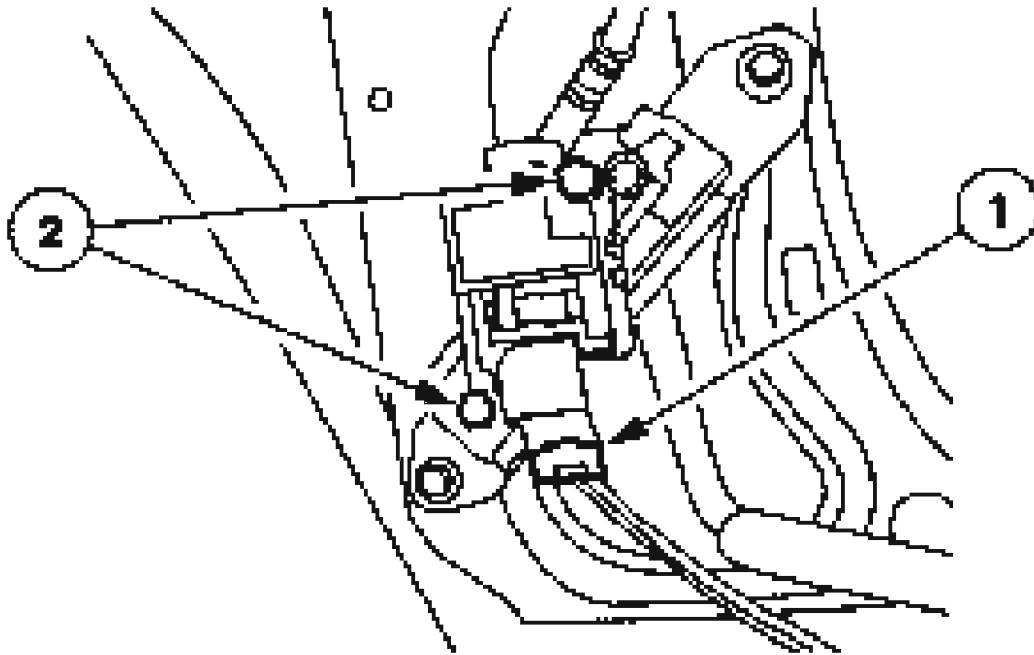


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**Fig. 26: Removing Cowl Side Trim Panel**  
Courtesy of FORD MOTOR CO.

2. Remove the inertia fuel shutoff (IFS) switch.
  1. Disconnect the connector.
  2. Remove the screws and the IFS switch.





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**Fig. 27: Removing Inertia Fuel Shutoff (IFS) Switch**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

## 2004 Ford Escape

### 2004 ENGINE Exhaust System - Escape

## 2004 ENGINE

### Exhaust System - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2 (Canada CXG-2-B)	ESE-M12A4-A

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Heat shield bolts	10	-	89
Catalytic converter nuts	47	35	-
Catalyst monitor sensor	40	30	-
Exhaust gas recirculation (EGR) tube fitting	63	46	-
EGR bracket bolts	9	-	80
Exhaust crossover nuts	47	35	-
Exhaust manifold nuts (2.3L)	47	35	-
Exhaust manifold nuts (3.0L)	25	18	-
Flex pipe nuts	25	18	-
Heated oxygen sensor	40	30	-
Manifold bracket bolts	25	18	-
Manifold bracket nuts	25	18	-
Resonator nuts	47	35	-
U-bolt clamp assembly nuts	50	37	-

## DESCRIPTION AND OPERATION

### EXHAUST SYSTEM

The exhaust system provides an exit for exhaust gases and reduces engine noise by passing exhaust gases through the catalytic converters, a muffler assembly and resonator. Rubber exhaust hanger insulators attach the exhaust system to the mounting hooks.

#### Catalytic Converter

The catalytic converter plays a major role in the emission control system. The catalytic

converter operates as a gas reactor. Its catalytic function is to speed the heat-producing chemical reaction of components in the exhaust gases in order to reduce air pollutants.

The catalyst material inside the catalytic converter consists of a ceramic substrate.

#### Precautions

**WARNING:** The normal operating temperature of the exhaust system is very high. Never work around or attempt to repair any part of the exhaust system until it has cooled. Use special care when working around the catalytic converter. The catalytic converter heats to a high temperature after only a short period of engine operation. Failure to follow these instructions may result in personal injury.

**WARNING:** Exhaust gases contain carbon monoxide which can be harmful to health and are potentially lethal. Exhaust system leaks should be repaired immediately. Never operate the engine in enclosed areas. Failure to follow these instructions may result in personal injury.

**CAUTION:** Do not use leaded fuel in a vehicle equipped with a catalytic converter.

**CAUTION:** In a vehicle that is continually misfueled, the lead in the fuel will be deposited in the catalytic converter and completely blanket the catalyst. Lead reacts with platinum to "poison" the catalyst. Continuous use of leaded fuel can destroy the catalyst and render the catalytic converter useless.

**CAUTION:** The addition of lead to the catalytic converter can also solidify the catalyst, causing excessive back pressure in the exhaust system and possibly causing engine damage.

**CAUTION:** Extremely high temperatures of 1,100°C (2,012°F) or above due to misfiring or an over-rich fuel/air mixture will cause the ceramic substrate to cinder or burn, destroying the catalytic converter.

The catalytic converter is designed to provide a long life. No maintenance is necessary for the catalytic converter. Avoid the following conditions:

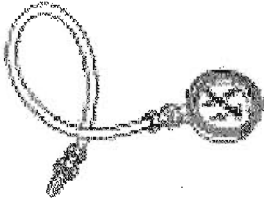
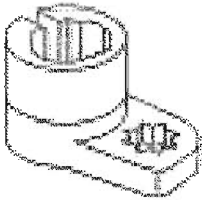
- Driving with a misfiring engine.

- Continuously running the engine with a misfiring spark plug.
- Parking or stopping the vehicle over combustible material such as dry grass. The material can be ignited by the high temperatures of the catalytic converter and the muffler.

**Sound Insulators and Shields**

Sound insulators and shields attached to the underbody protect the vehicle from exhaust system heat and should be inspected at regular intervals to ensure they are not dented or out of position. If a sound insulator and shield is damaged or shows evidence of deterioration, it should be replaced. The sound insulators and shields for the muffler, muffler pipe, resonator, and catalytic converter pipe are installed separately.

**DIAGNOSIS AND TESTING****EXHAUST SYSTEM**

	Exhaust Back Pressure Gauge 309-D002 (D95L-6000-A) or equivalent
	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

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**Fig. 1: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

1. Verify the concern by running the engine (with the vehicle on the ground) or road testing the vehicle to duplicate the condition.
2. Visually inspect the components of the exhaust system and related controls that may affect exhaust gas quality or loss of power.
3. Visually inspect for obvious signs of mechanical damage. Refer to the following chart.

Mechanical
<ul style="list-style-type: none"><li>• Exhaust pipe pinched or crushed</li><li>• Damaged muffler</li><li>• Broken or damaged exhaust hanger brackets</li><li>• Damaged catalytic converter</li><li>• Cracked exhaust manifold</li><li>• Dirty engine air cleaner</li><li>• Loose or damaged heat shields</li></ul>

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**Fig. 2: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

4. Verify that the exhaust system is installed correctly, with clamps correctly located and tightened to specification.
5. If the fault is not visually evident, determine the symptom. GO to **SYMPTOM CHART**.

Symptom Chart

## 2004 Ford Escape

### 2004 ENGINE Exhaust System - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>Rattle, squeaks or buzz type noise — from the bottom of vehicle</li> </ul>	<ul style="list-style-type: none"> <li>Loose or damaged heat shield.</li> <li>Loose or damaged exhaust isolators.</li> <li>Damaged exhaust isolator hanger bracket.</li> <li>Loose or damaged catalytic converter or muffler.</li> <li>Exhaust grounded to chassis.</li> </ul>	<ul style="list-style-type: none"> <li>GO to Exhaust Heat Shields Component Test in this section.</li> <li>CHECK exhaust isolators are correctly installed. INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.</li> <li>INSPECT the exhaust system components for damage or broken hangers. INSTALL new components as necessary. CHECK for loose or damaged exhaust hanger brackets or fasteners. TIGHTEN bolts to specification or INSTALL new components as necessary.</li> <li>MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly tap on the muffler, then the catalytic converter. Determine if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.</li> <li>INSPECT for signs of exhaust components-to-body contact. If necessary, CARRY OUT the <u>Exhaust System Alignment</u> in this section.</li> </ul>
<ul style="list-style-type: none"> <li>Drone or clunk type noise — from bottom of vehicle</li> </ul>	<ul style="list-style-type: none"> <li>Loose or damaged exhaust isolators.</li> <li>Exhaust grounded to chassis.</li> </ul>	<ul style="list-style-type: none"> <li>INSPECT exhaust isolators for wear or damage. INSTALL new isolators as necessary.</li> <li>INSPECT for signs of exhaust components-to-body contact. If necessary, CARRY OUT the <u>Exhaust System Alignment</u> in this section.</li> </ul>

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**Fig. 3: Exhaust System Troubleshooting Symptom Chart (1 Of 3)**  
 Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ENGINE Exhaust System - Escape

<ul style="list-style-type: none"> <li>Whistles, boom, hum or ticking type noise —</li> </ul> <p>noise tends to change as engine warms. Noises are often accompanied by exhaust fumes</p>	<ul style="list-style-type: none"> <li>Punctures in the muffler.</li> <li>Broken, loose or missing exhaust manifold fasteners or gaskets.</li> <li>Loose heated oxygen or catalyst monitor sensor.</li> <li>Exhaust system leak.</li> <li>Catalytic converter.</li> <li>Exhaust muffler/resonator drain hole enlarged due to corrosion.</li> </ul>	<ul style="list-style-type: none"> <li>REPAIR as necessary.</li> <li>INSPECT the entire exhaust system for leaks. CHECK for punctures, loose or damaged clamps/fasteners, or broken welds. EXAMINE the chassis for grayish-white or black exhaust soot, which would indicate exhaust leakage at that point. To magnify a small leak, have an assistant hold a rag over the tailpipe outlet, while listening for a leak. REPAIR or INSTALL new components as necessary.</li> <li>MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly tap on the muffler, then the catalytic converter. Determine if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.</li> <li><b>NOTE:</b> Check with vehicle on the ground, not on a hoist.</li> </ul> <p>CONFIRM drain holes are noise source. INSTALL new components as necessary.</p>
<ul style="list-style-type: none"> <li>Hissing or rushing noise — high frequency sound. Vehicle performance is unaffected</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust system. Exhaust flow through pipes.</li> </ul>	<ul style="list-style-type: none"> <li>CHECK the exhaust system for leaks. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly tap on the muffler, then the catalytic converter. Determine if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.</li> </ul>
<ul style="list-style-type: none"> <li>Pinging noise — occurs when exhaust system is hot, engine turned off</li> </ul>	<ul style="list-style-type: none"> <li>Catalytic converter/exhaust system.</li> </ul>	<ul style="list-style-type: none"> <li>Cool down pinging is the exhaust system expanding and contracting during heating and cooling. Condition is normal.</li> </ul>

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**Fig. 4: Exhaust System Troubleshooting Symptom Chart (2 Of 3)**  
**Courtesy of FORD MOTOR CO.**

## 2004 Ford Escape

### 2004 ENGINE Exhaust System - Escape

<ul style="list-style-type: none"> <li>Vibration — occurs at idle and at low speeds. Also accompanied by clunk or buzz type noise</li> </ul>	<ul style="list-style-type: none"> <li>Loose or damage exhaust isolator.</li> <li>Loose or damaged exhaust isolator hanger brackets.</li> <li>Damper broken or out of position if equipped.</li> <li>Exhaust system grounded to chassis.</li> </ul>	<ul style="list-style-type: none"> <li>INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.</li> <li>INSPECT the exhaust isolator hanger brackets for wear or damage. INSTALL or REPAIR as necessary.</li> <li>CHECK for the correct damper orientation in this section. RELOCATE to correct position and tighten nuts to specification. INSPECT for missing or damaged damper. INSTALL new components as necessary.</li> <li>CARRY OUT the <u>Exhaust System Alignment</u> in this article.</li> </ul>
<ul style="list-style-type: none"> <li>Vehicle has low or no power — vehicle performance complaint</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust pipe pinched or crushed.</li> <li>Damaged catalytic converter.</li> <li>Loose obstruction in exhaust.</li> <li>Restricted exhaust (possible frozen condensate in muffler).</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test A</u> to test for restricted exhaust.</li> <li>CHECK drain holes for debris. PARK the vehicle inside to thaw. TEST vehicle for normal operation. If concern is still present, <u>Go To Pinpoint Test A</u>.</li> </ul>
<ul style="list-style-type: none"> <li>Burning smell — usually occurs at idle, with possible traces of smoke</li> </ul>	<ul style="list-style-type: none"> <li>Foreign material caught in exhaust system.</li> <li>Missing heat shields.</li> </ul>	<ul style="list-style-type: none"> <li>INSPECT the exhaust system for debris or missing heat shields. REPAIR or INSTALL new components as necessary.</li> </ul>
<ul style="list-style-type: none"> <li>Odor — described as a sulfur or rotten egg smell.</li> </ul>	<ul style="list-style-type: none"> <li>Catalytic converter.</li> <li>Rich fuel conditions.</li> <li>Miss-fire conditions.</li> <li>Excessive sulfur content in fuel.</li> </ul>	<ul style="list-style-type: none"> <li>At times, a slight sulfur smell is normal for catalytic converters. The cause is the sulfur content in the gasoline being used. ADVISE customer, no repair required.</li> <li>REFER to the Introduction article in ENGINE PERFORMANCE.</li> </ul>
<ul style="list-style-type: none"> <li>Visible rust on surface of exhaust pipes</li> </ul>	<ul style="list-style-type: none"> <li>Catalytic converter/exhaust system.</li> </ul>	<ul style="list-style-type: none"> <li>Surface rust is a characteristic of materials used on exhaust system. Exposure to heat or road salt may result in surface rust. INSPECT for perforations. If there are no perforations, condition is normal.</li> </ul>



**Fig. 5: Exhaust System Troubleshooting Symptom Chart (3 Of 3)**  
 Courtesy of FORD MOTOR CO.

**Pinpoint Test**

**NOTE:** The vehicle can have a lack/loss of power, odor, a noise or a "no start" concern. These concerns may be related to the exhaust system. Carry out the following test, if no trouble codes were stored. This test is for diagnosing the source for these conditions.

**PINPOINT TEST A: RESTRICTED EXHAUST SYSTEM TEST**

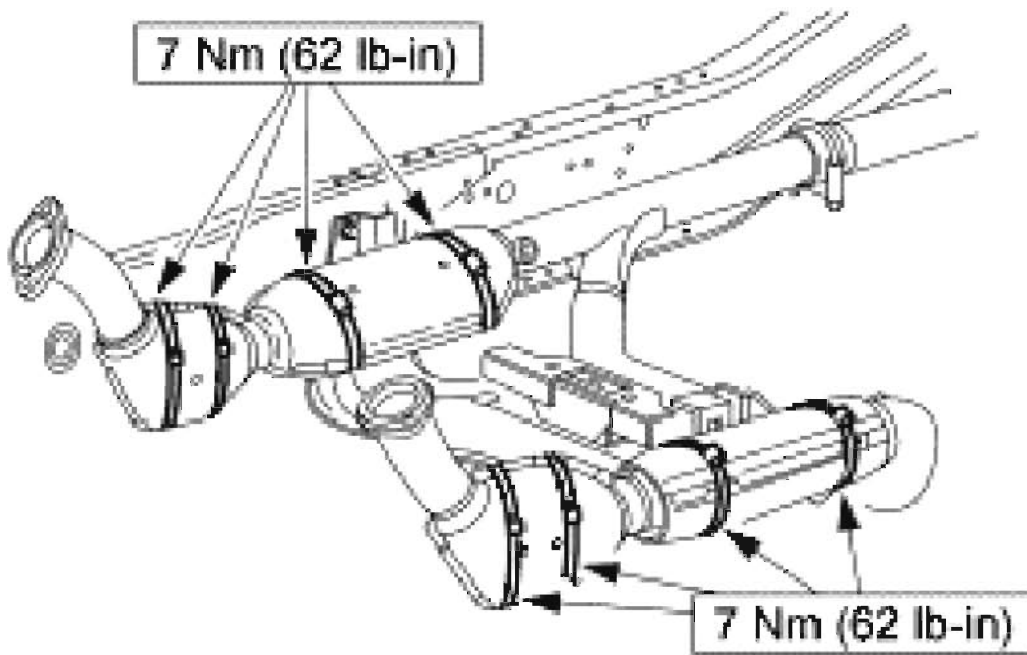
Test Step	Result / Action to Take
<b>A1 EXHAUST SYSTEM INSPECTION</b>	
<ul style="list-style-type: none"> <li>Inspect the exhaust system for damage or deterioration. Look for cracks, punctures, leaks, loose connections, dents or unusual bending.</li> <li><b>Is the exhaust system OK?</b></li> </ul>	<p><b>Yes</b> GO to A2.</p> <p><b>No</b> REPAIR or INSTALL any damaged or deteriorated exhaust components. Test the system for normal operation.</p>
<b>A2 BACK PRESSURE TEST</b>	
<ul style="list-style-type: none"> <li>Position vehicle on a hoist. Refer to <u>Jacking &amp; Lifting</u>.</li> <li>Connect a tachometer.</li> <li>Using the special tool, remove the upstream heated oxygen sensor (HO2S).</li> <li>Install the back pressure gauge.</li> <li>Start the engine and gradually increase the engine speed to 2,000 rpm with the transmission in NEUTRAL.</li> <li><b>Is the back pressure greater than 27.6 kPa (4 psi)?</b></li> </ul>	<p><b>Yes</b> GO to A3.</p> <p><b>No</b> No indications of a restriction have been detected. CONDUCT a diagnosis on other suspect systems. CLEAR the DTCs.</p>
<b>A3 BACK PRESSURE TEST — CATALYTIC CONVERTER(S) ON, MUFFLER(S) OFF</b>	
<ul style="list-style-type: none"> <li>Turn the engine OFF.</li> <li>Disconnect the muffler assembly from the catalytic converter.</li> <li>Repeat the back pressure test.</li> <li><b>Is the back pressure greater than 27 kPa (4 psi)?</b></li> </ul>	<p><b>Yes</b> The restriction is in the catalytic converter. INSTALL a new catalytic converter. INSPECT the muffler to be sure the catalytic converter debris has not entered the muffler. CLEAR the DTCs. TEST the system for normal operation.</p> <p><b>No</b> The restriction is in the muffler assembly. INSTALL a new muffler. CLEAR the DTCs. TEST the system for normal operation.</p>

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**Fig. 6: Pinpoint Test A: Restricted Exhaust System Test (Step A1-A3)**  
 Courtesy of FORD MOTOR CO.

**Component Tests****Exhaust Heat Shields**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Inspect the exhaust system for loose or missing heat shields or foreign material trapped between the heat shields and the exhaust system components.



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**Fig. 7: Identifying Exhaust Heat Shields**  
Courtesy of FORD MOTOR CO.

3. If any heat shields are loose, install worm gear clamps.
  - Use one of the following clamps: FOTZ-5A231-A or W705949-S300.
  - Trim off the excess ear of the worm clamp.
4. If the heat shields are missing, install new heat shields or exhaust system components as necessary.
5. If a rattle, noise or buzz condition persists, install a new heat shield.
6. Lower the vehicle.

**GENERAL PROCEDURES**

**EXHAUST SYSTEM ALIGNMENT**

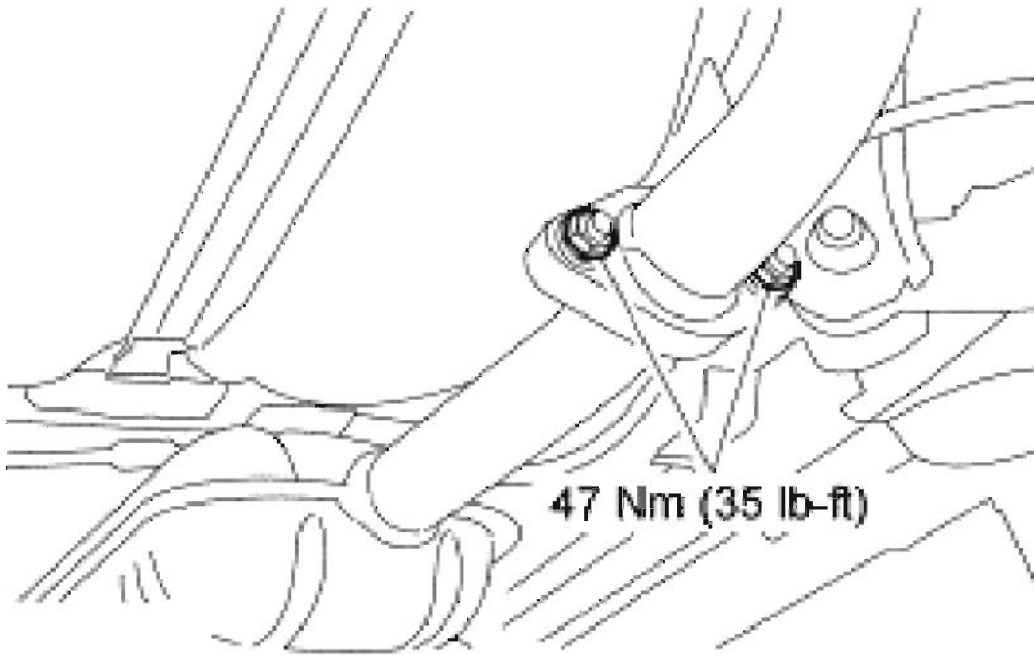
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Loosen all fasteners joining the exhaust system components.
3. Beginning at the front of the vehicle, align the exhaust system to establish the maximum clearance. Make sure all fit pipes are pushed all the way into the preceding pipe and the notches are correctly lined up with the tabs.
4. Beginning at the front of the vehicle, tighten all fasteners and clamps to specification. For additional information, refer to **SPECIFICATIONS** .
5. Start the engine and check the exhaust system for leaks.

**REMOVAL AND INSTALLATION****RESONATOR**

**CAUTION:** Do not use oil or grease-based lubricants on the insulators. They may cause deterioration of the rubber.

**CAUTION:** Oil or grease-based lubricants on the insulators may cause the exhaust hanger insulator to separate from the exhaust hanger bracket during vehicle operation.

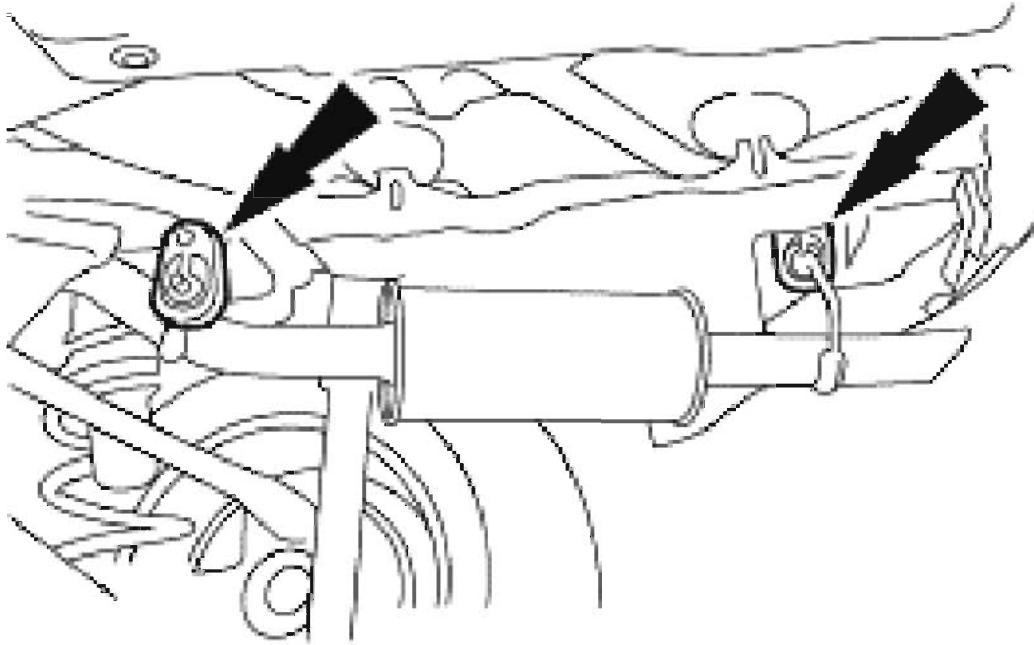
1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING** .
2. Remove and discard the nuts.
  - Discard the gasket.



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**Fig. 8: Identifying Exhaust Hanger Bracket Nuts Removing Torque**  
Courtesy of FORD MOTOR CO.

3. Disconnect the resonator from the hanger and remove the resonator.



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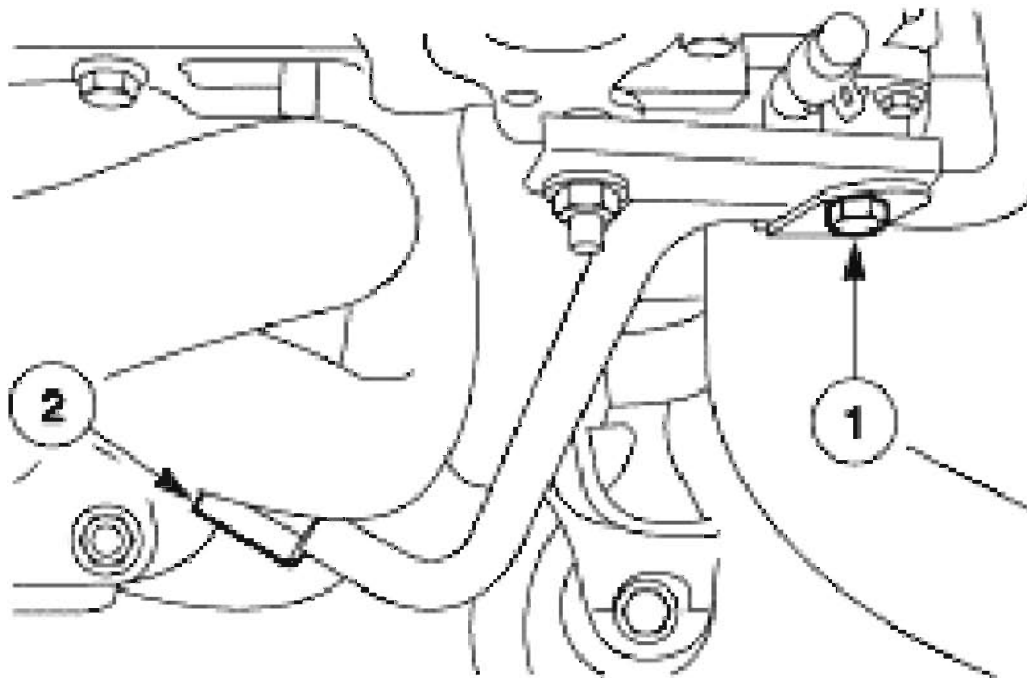
**Fig. 9: Disconnecting Resonator From Hanger**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.
  - Install a new gasket.
  - Install new nuts.

#### **CATALYTIC CONVERTER - 2.0L ZETEC**

##### **Removal**

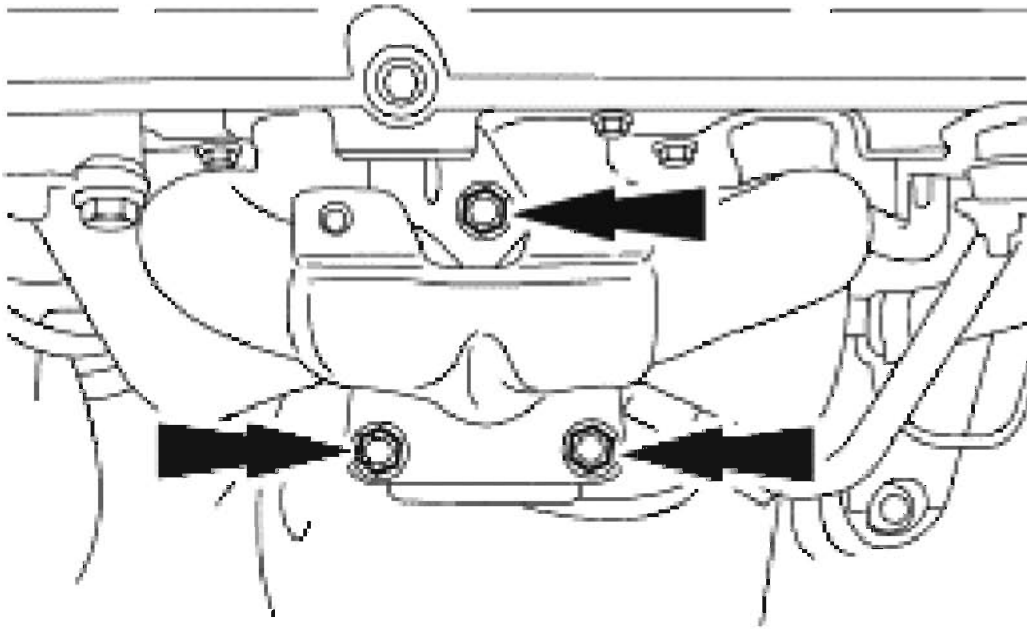
1. Remove the heated oxygen sensor (HO2S). For additional information, refer to **ELECTRONIC ENGINE CONTROLS**.
2. Disconnect the exhaust gas recirculation (EGR) tube.
  1. Remove the two bolts.
  2. Loosen the EGR tube nut.



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**Fig. 10: Disconnecting Exhaust Gas Recirculation (EGR) Tube**  
Courtesy of FORD MOTOR CO.

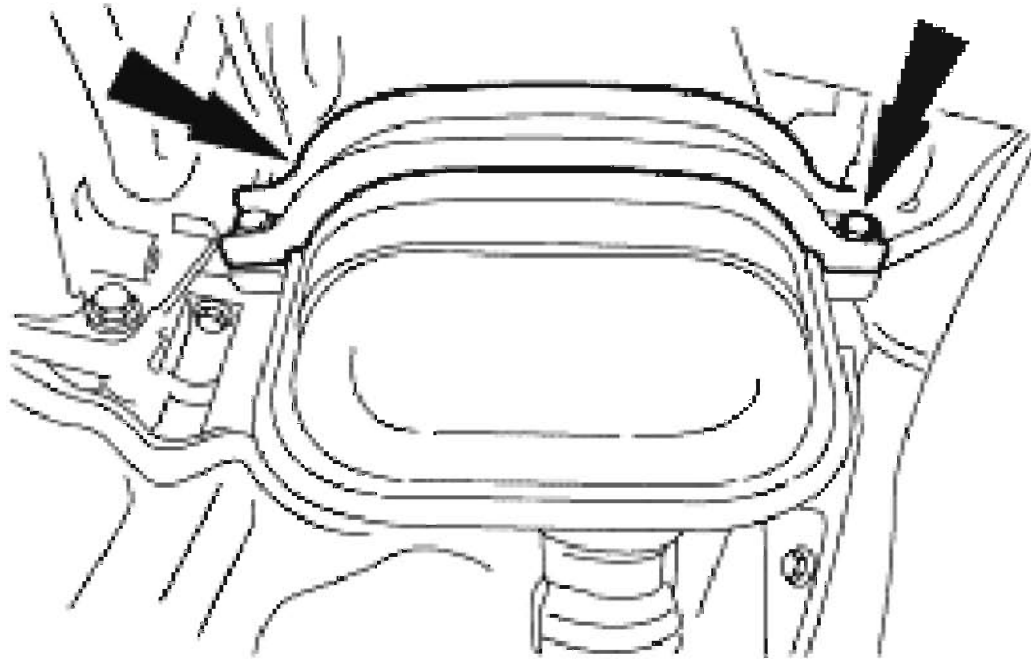
3. Remove the catalytic converter nuts.
  - Discard the nuts.



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**Fig. 11: Removing Catalytic Converter Nuts**  
Courtesy of FORD MOTOR CO.

4. Remove the catalyst monitor sensor. For additional information, refer to **ELECTRONIC ENGINE CONTROLS**
5. Remove the bolts and the catalytic converter bracket.

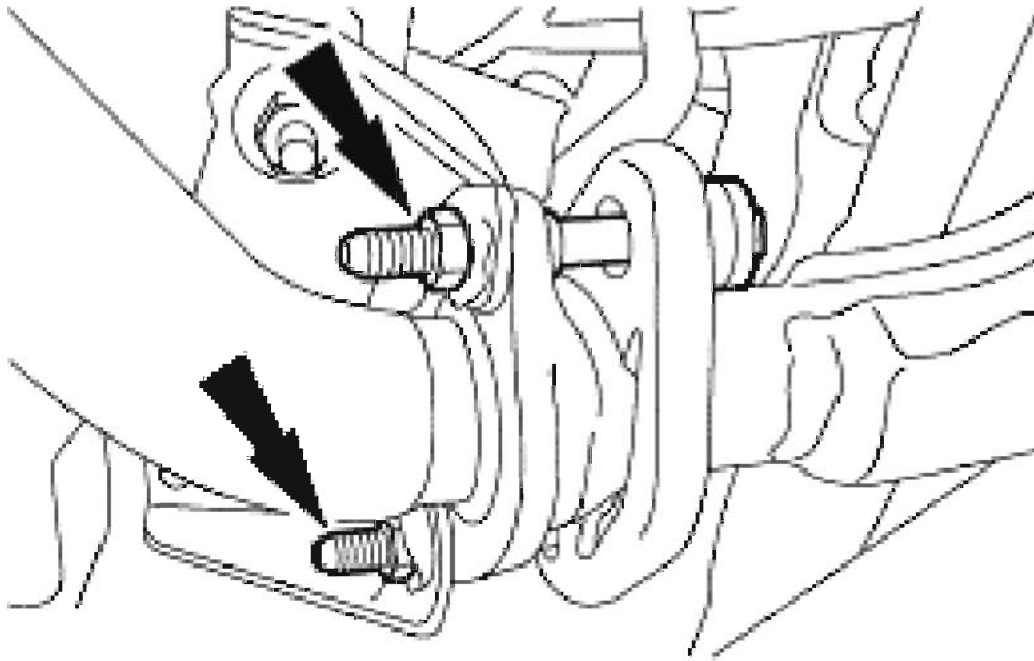


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**Fig. 12: Removing Catalytic Converter Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Remove the flagnuts and bolts.
  - Discard the flagnuts, springs and bolts.

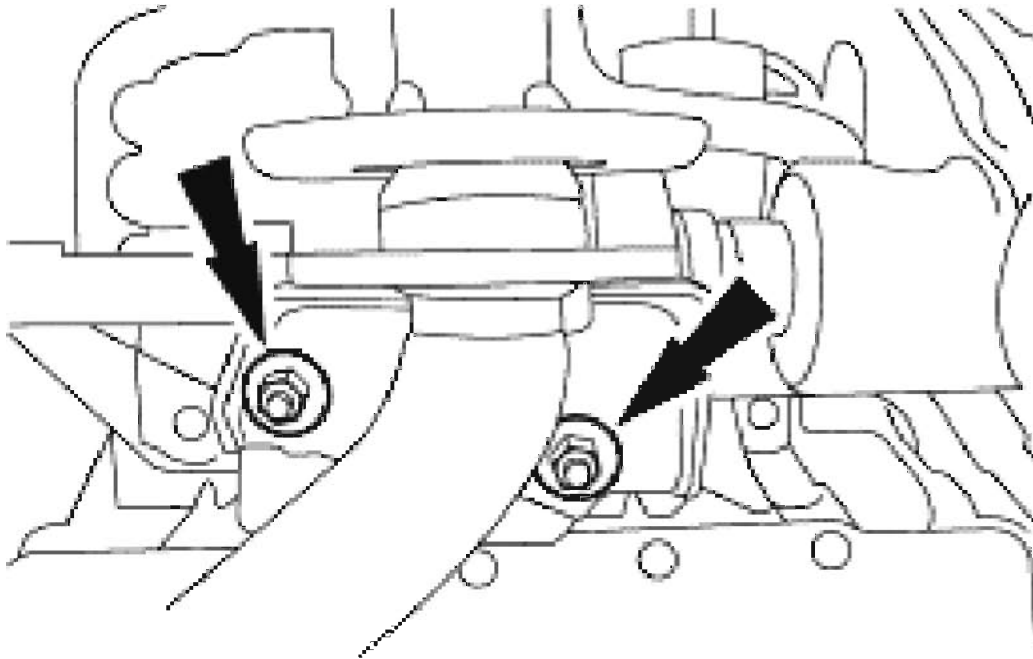




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**Fig. 13: Removing Flagnuts And Bolts**  
Courtesy of FORD MOTOR CO.

7. Remove the catalytic converter bracket nuts.



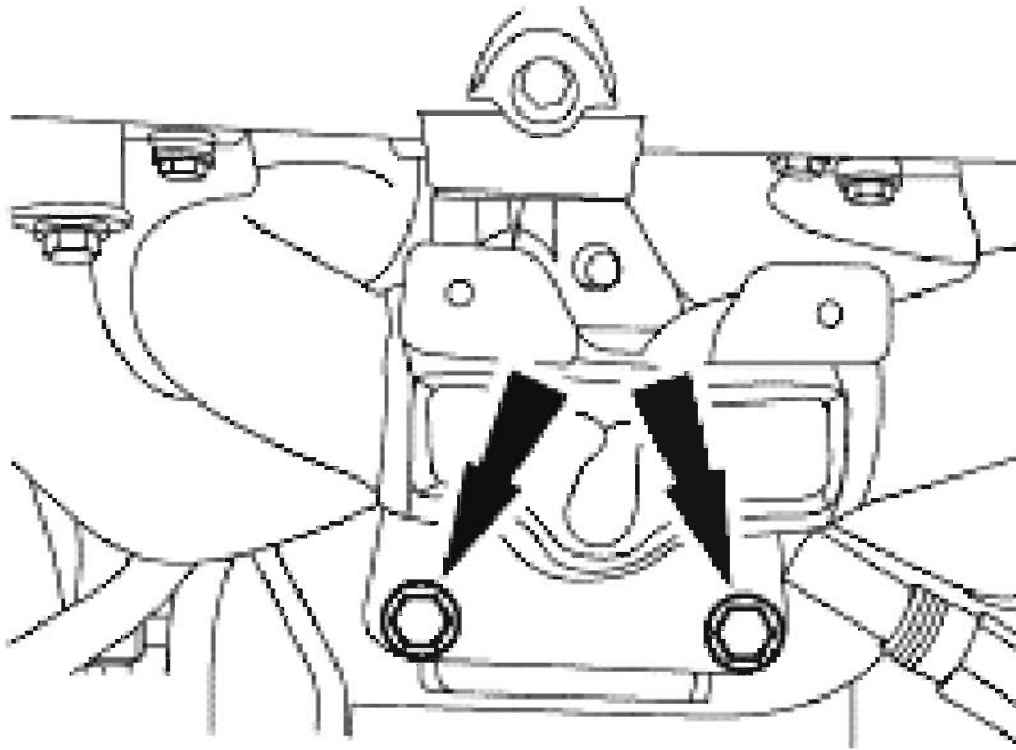
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**Fig. 14: Removing Catalytic Converter Bracket Nuts**  
Courtesy of FORD MOTOR CO.

8. Remove the catalytic converter and rear support bracket.
  - Discard the ring seal and gasket.

#### Installation

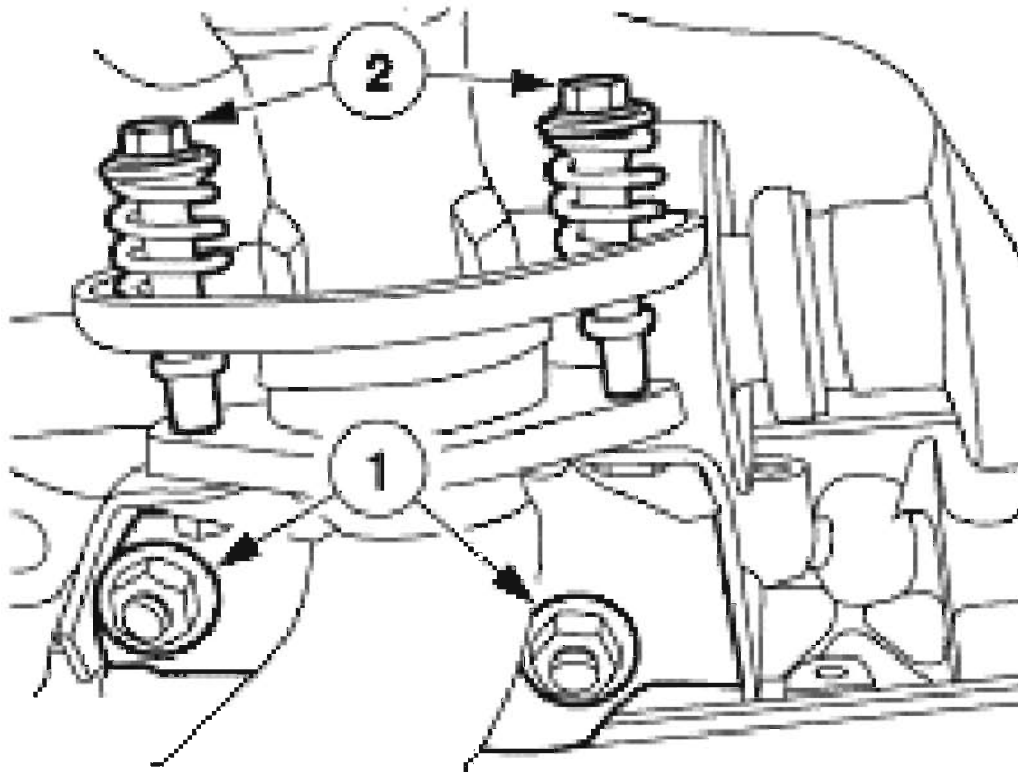
1. Position the catalytic converter into place and loosely install the two nuts.
  - Install a new gasket and ring seal.
  - Install new nuts.



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**Fig. 15: Installing Catalytic Converter Nuts**  
**Courtesy of FORD MOTOR CO.**

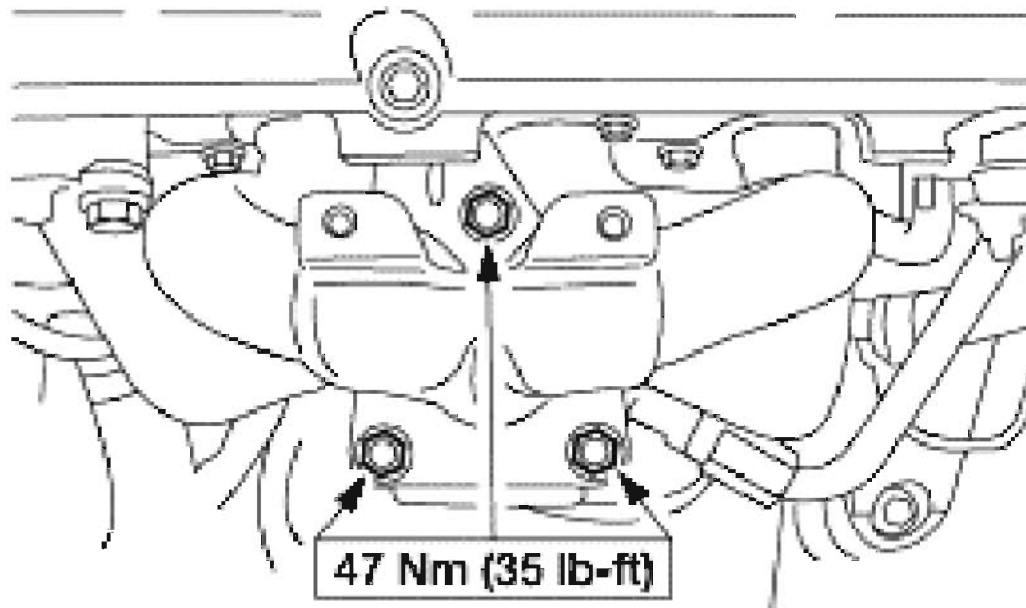
2. Connect the converter outlet to the muffler inlet pipe.
  1. Position the rear support bracket and install the washers and nuts.
  2. Loosely install the new bolts, springs and flagnuts.



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**Fig. 16: Connecting Converter Outlet To Muffler Inlet Pipe**  
Courtesy of FORD MOTOR CO.

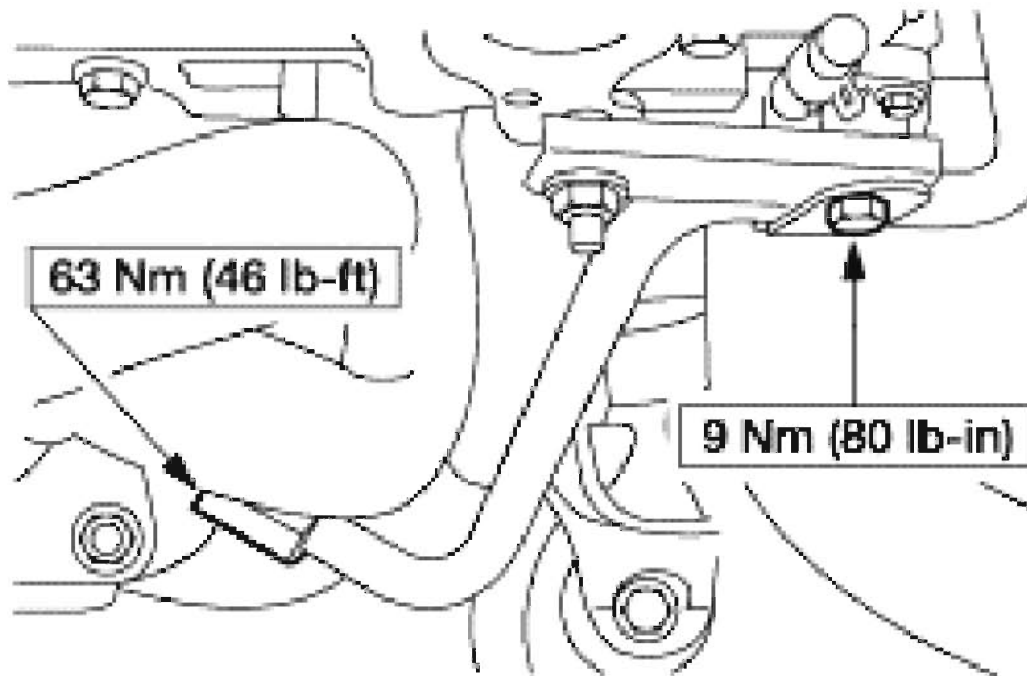
3. Lower the vehicle.
4. Install the third catalytic converter nut and tighten all the nuts.
  - Install a new nut.



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**Fig. 17: Identifying Catalytic Converter Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

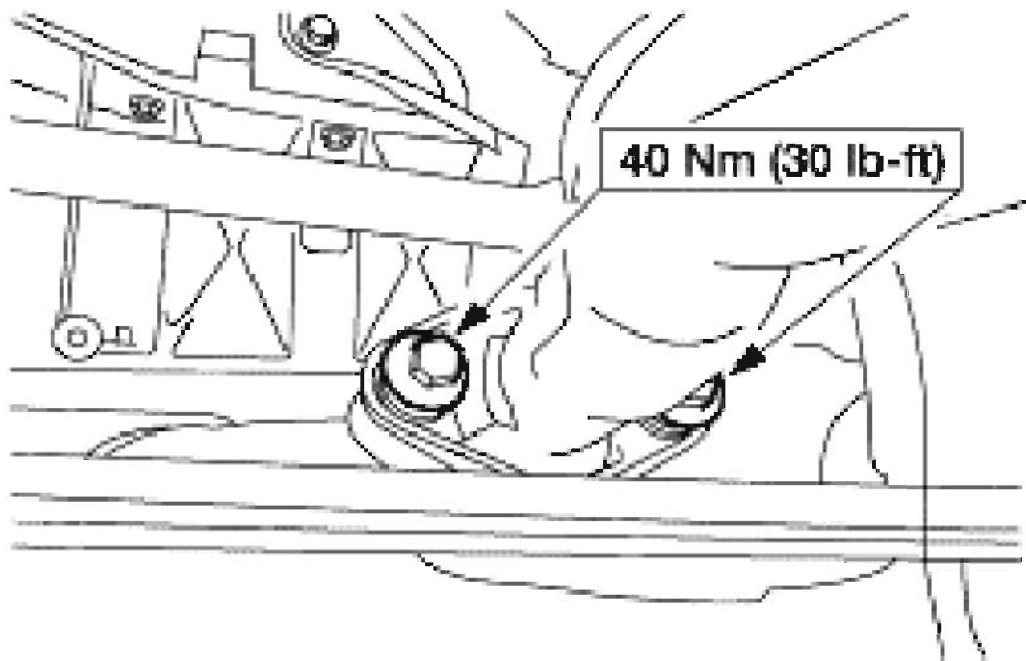
5. Connect the EGR tube and install the bracket bolts.



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**Fig. 18: Identifying Bracket Bolts Torque Specifications**  
Courtesy of FORD MOTOR CO.

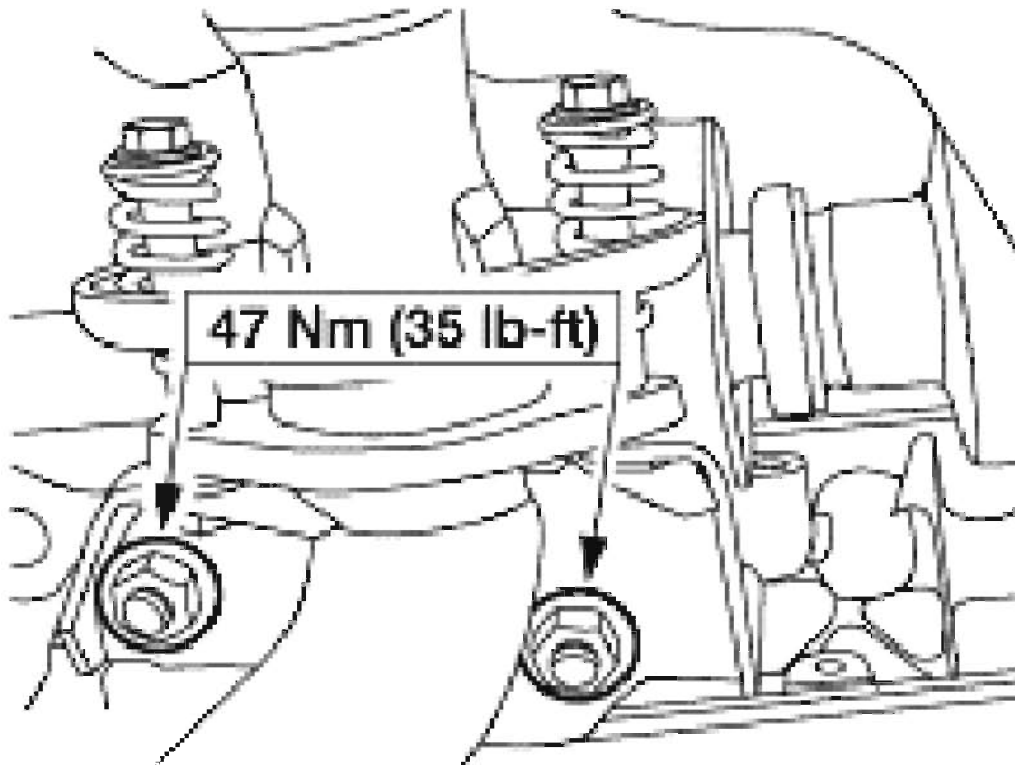
6. Raise the vehicle.
7. Tighten the converter outlet to the muffler inlet bolts.



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**Fig. 19: Tightening Converter Outlet To Muffler Inlet Bolts**  
Courtesy of FORD MOTOR CO.

8. Tighten the catalytic converter rear support bracket nuts.

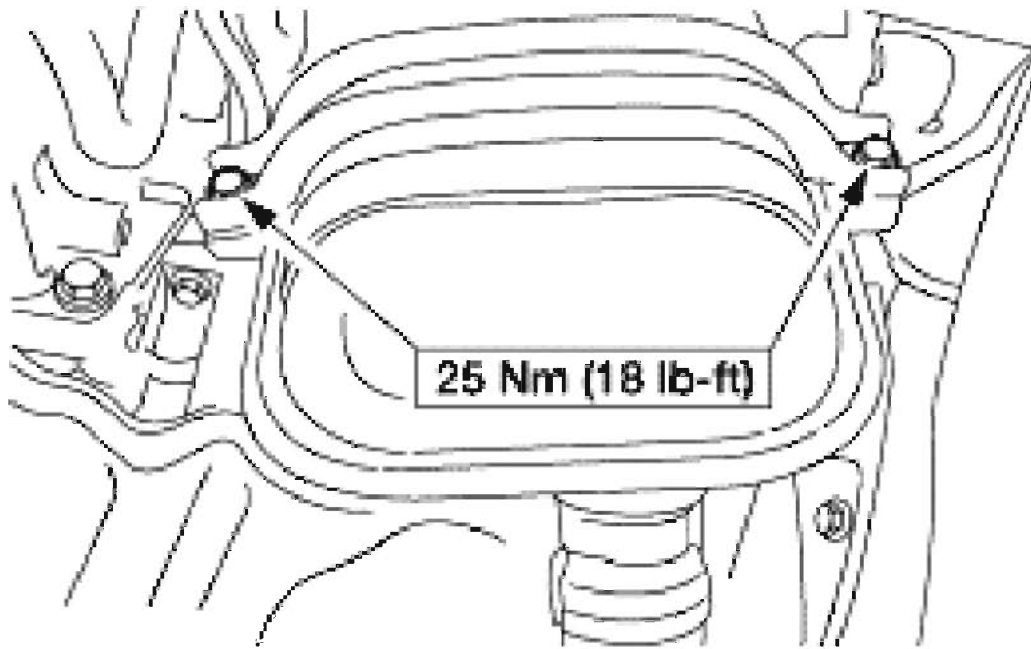


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**Fig. 20: Tightening Catalytic Converter Rear Support Bracket Nuts**  
Courtesy of FORD MOTOR CO.

9. Install the catalytic converter bracket and bolts.





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**Fig. 21: Identifying Catalytic Converter Bracket Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

10. Install the catalyst monitor sensor. For additional information, refer to **ELECTRONIC ENGINE CONTROLS**
11. Install the HO2S. For additional information, refer to **ELECTRONIC ENGINE CONTROLS**

#### **CATALYTIC CONVERTER - 3.0L (4V)**

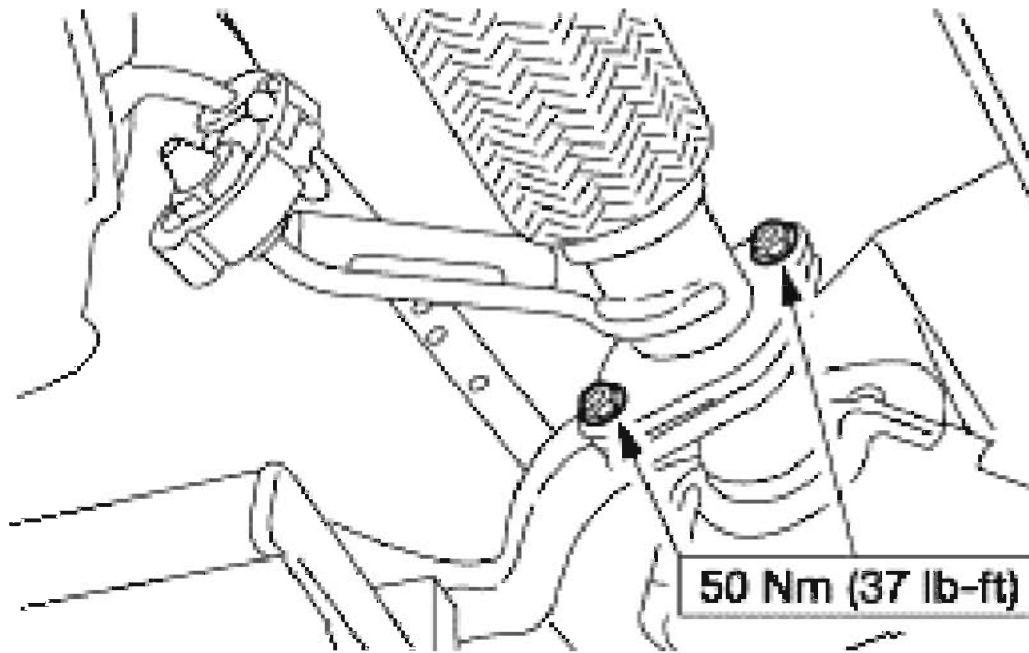
##### **Removal and Installation**

**CAUTION:** Do not use oil or grease-based lubricants on the insulators. They may cause deterioration of the rubber.

**CAUTION:** Oil or grease-based lubricants on the insulators may cause the exhaust hanger insulator to separate from the exhaust hanger bracket during vehicle operation.

1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.
2. Remove and discard the nuts.

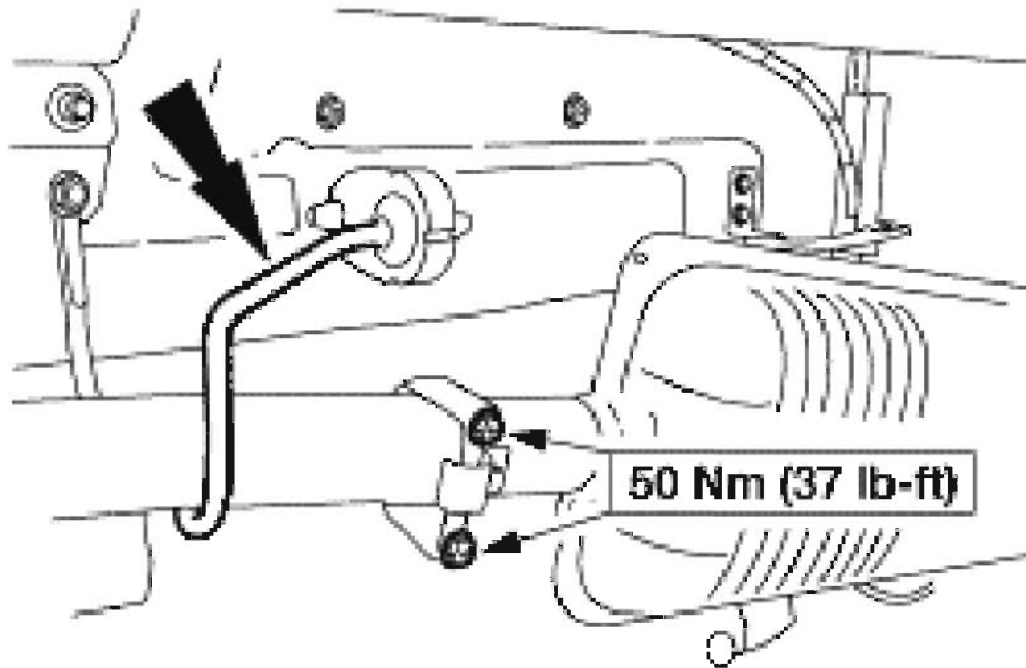
- Discard the gasket.



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**Fig. 22: Removing Converter Nuts**  
Courtesy of FORD MOTOR CO.

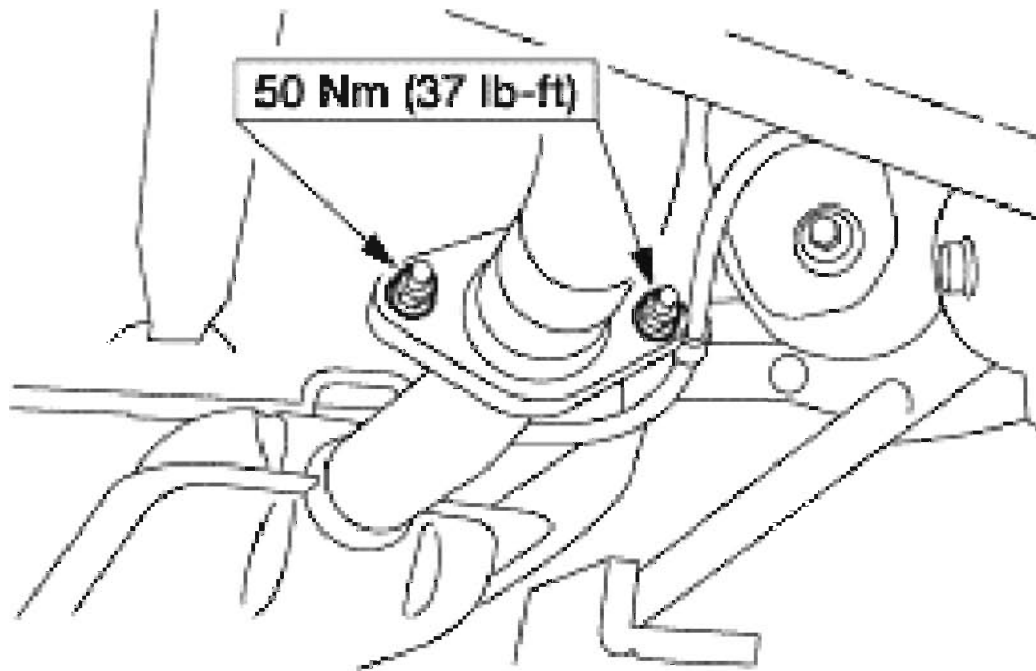
3. Remove the U-bolt and disconnect the catalytic converter from the hanger.



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**Fig. 23: Removing U-Bolt And Disconnecting Catalytic Converter From Hanger**  
Courtesy of FORD MOTOR CO.

4. Remove and discard the nuts between the main silencer and the after-silencer pipe.



G02740330

**Fig. 24: Removing Nuts Between Main Silencer And After-Silencer Pipe**  
Courtesy of FORD MOTOR CO.

5. Remove the converter and the main silencer together.
6. Remove the converter from the main silencer on the floor.
7. To install, reverse the removal procedure.
  - Install a new gasket.
  - Install new nuts.

#### MUFFLER - 2.0L

##### Removal and Installation

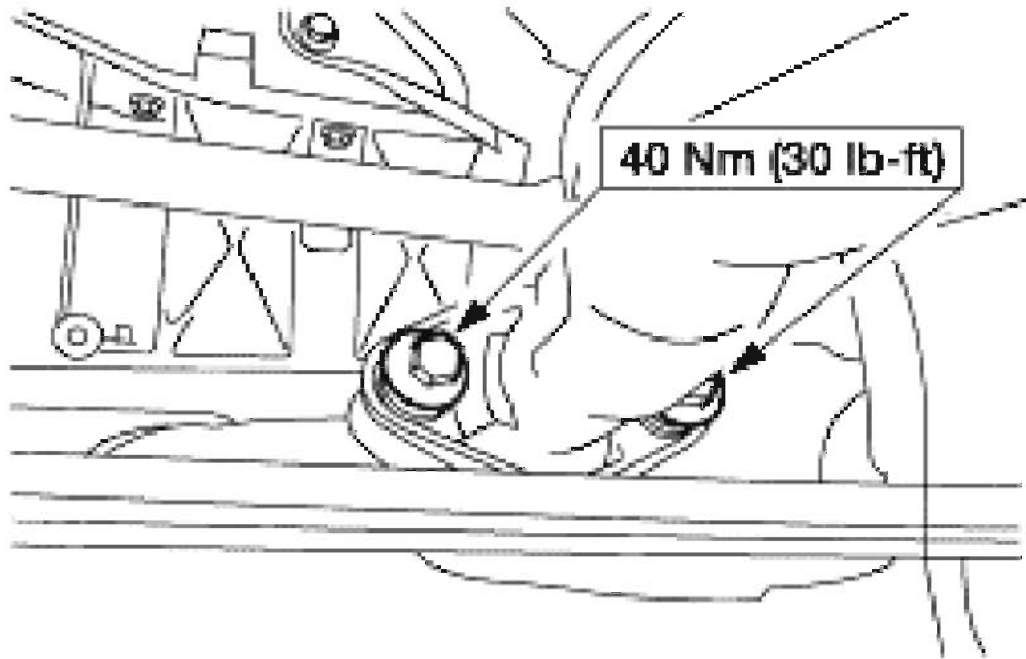
**CAUTION:** Do not use oil or grease-based lubricants on the insulators. They may cause deterioration of the rubber.

**CAUTION:** Oil or grease-based lubricants on the insulators may cause the exhaust hanger insulator to separate from the exhaust hanger bracket during vehicle operation.

1. Raise and support the vehicle. For additional information, refer to **JACKING &**

**LIFTING .**

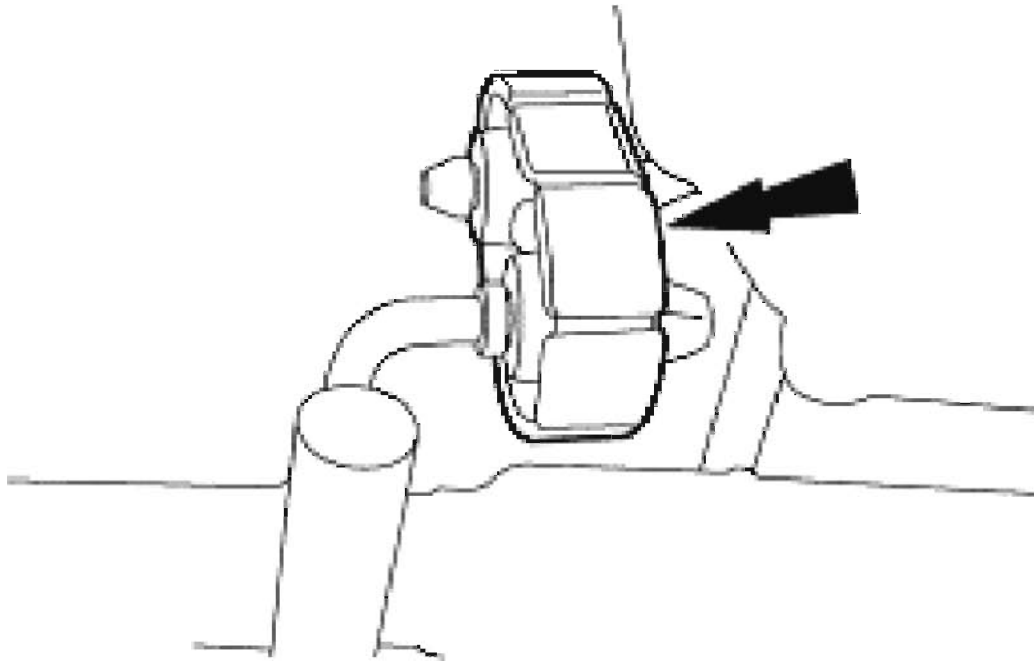
2. Remove and discard the nuts and bolts.
  - Discard the gasket.



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**Fig. 25: Removing Muffler Nuts And Bolts**  
**Courtesy of FORD MOTOR CO.**

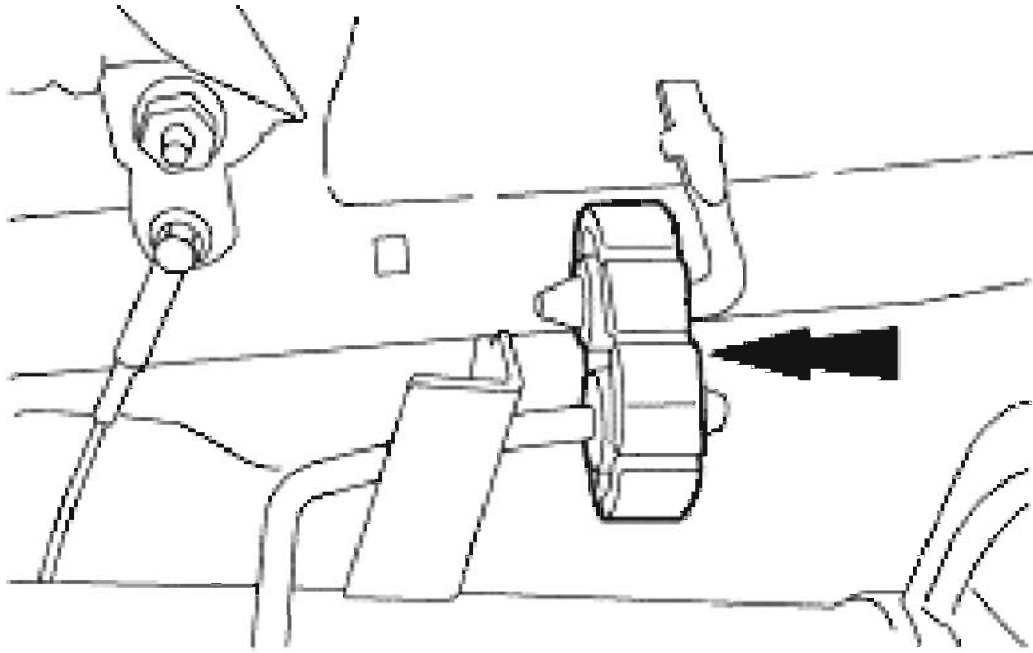
3. Disconnect the front muffler hanger insulator.



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**Fig. 26: Disconnecting Front Muffler Hanger Insulator**  
Courtesy of FORD MOTOR CO.

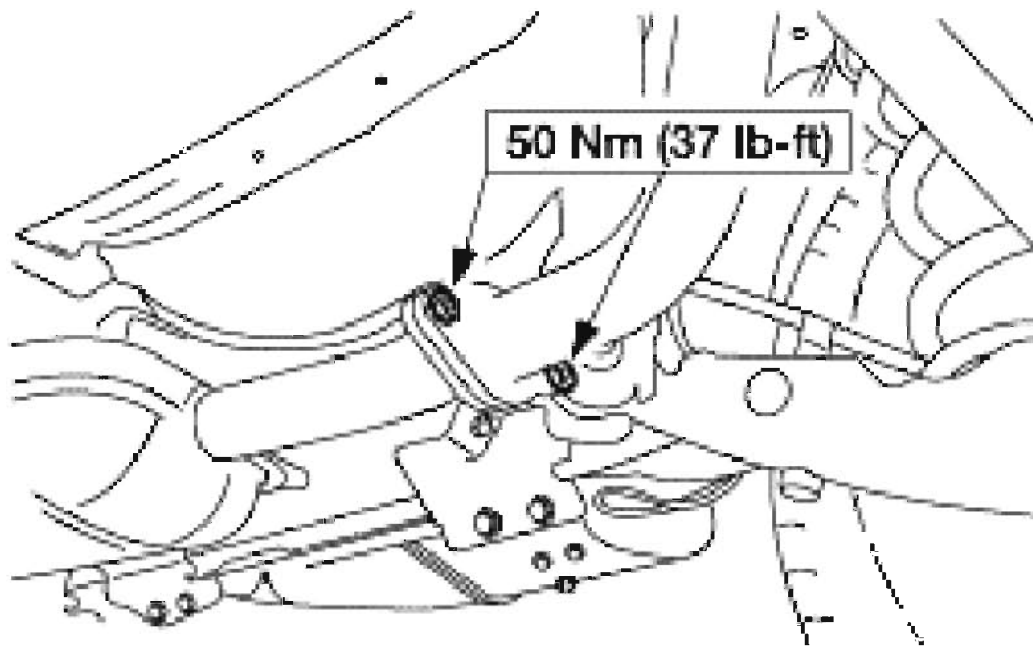
4. Disconnect the rear muffler hanger insulator.



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**Fig. 27: Disconnecting Rear Muffler Hanger Insulator**  
Courtesy of FORD MOTOR CO.

5. Remove the nuts, bolts, and the muffler.
  - Discard the gasket.
  - Discard the bolts and nuts.

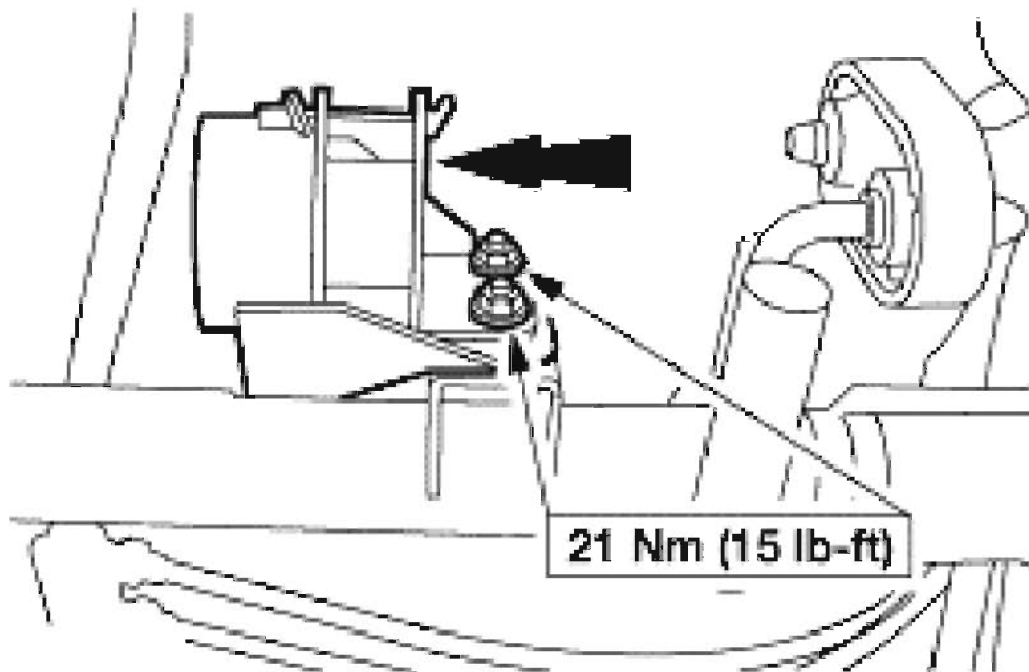


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**Fig. 28: Removing Muffler Nuts And Bolts**  
**Courtesy of FORD MOTOR CO.**

6. If necessary, remove the nuts and the exhaust damper.





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**Fig. 29: Removing Exhaust Damper**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.
  - Install a new gaskets.
  - Install new nuts and bolts.

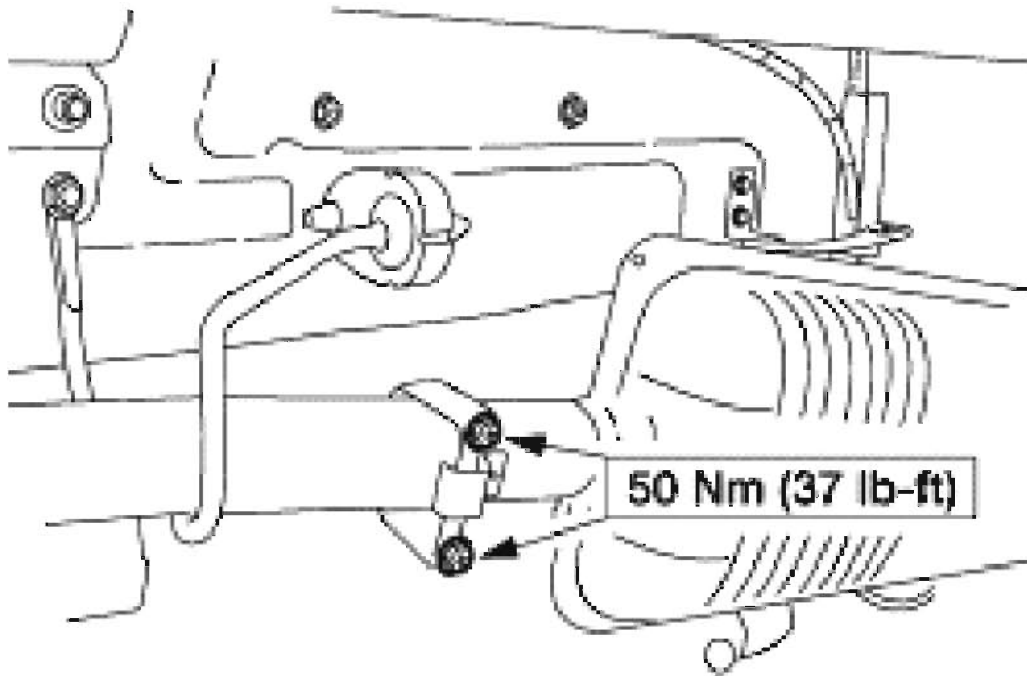
#### MUFFLER - 3.0L (4V)

##### Removal and Installation

**CAUTION:** Do not use oil or grease-based lubricants on the insulators. They may cause deterioration of the rubber.

**CAUTION:** Oil or grease-based lubricants on the insulators may cause the exhaust hanger insulator to separate from the exhaust hanger bracket during vehicle operation.

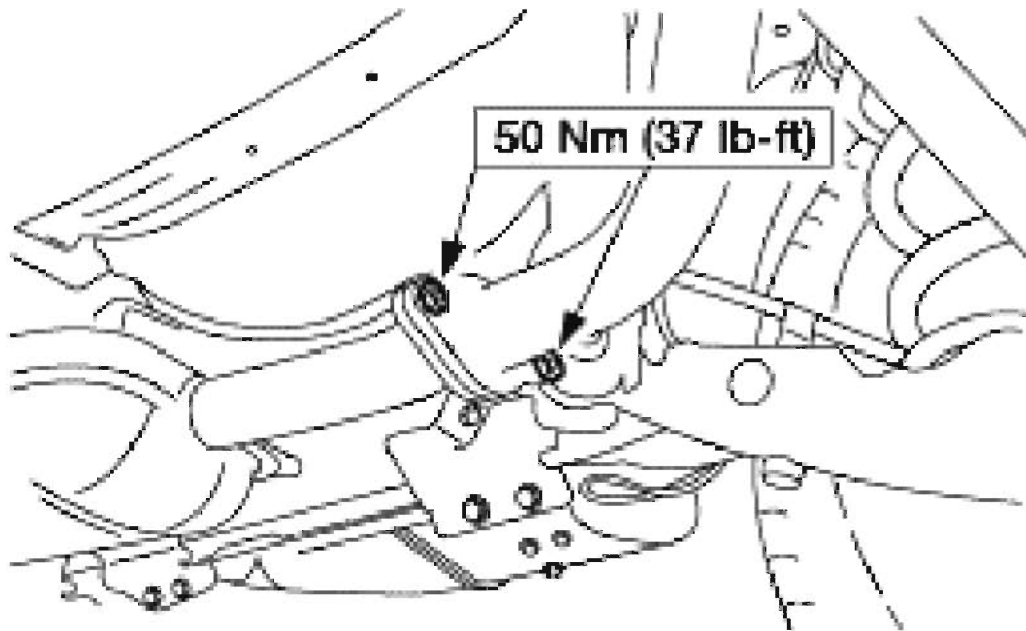
1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.
2. Remove the U-bolt.



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**Fig. 30: Removing U-Bolt**  
Courtesy of FORD MOTOR CO.

3. Remove the nuts and the muffler.
  - Discard the gasket.
  - Discard the nuts.



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**Fig. 31: Removing Muffler Nuts**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.
  - Install a new gasket.
  - Install new nuts.

#### EXHAUST FLEXIBLE PIPE - 3.0L (4V)

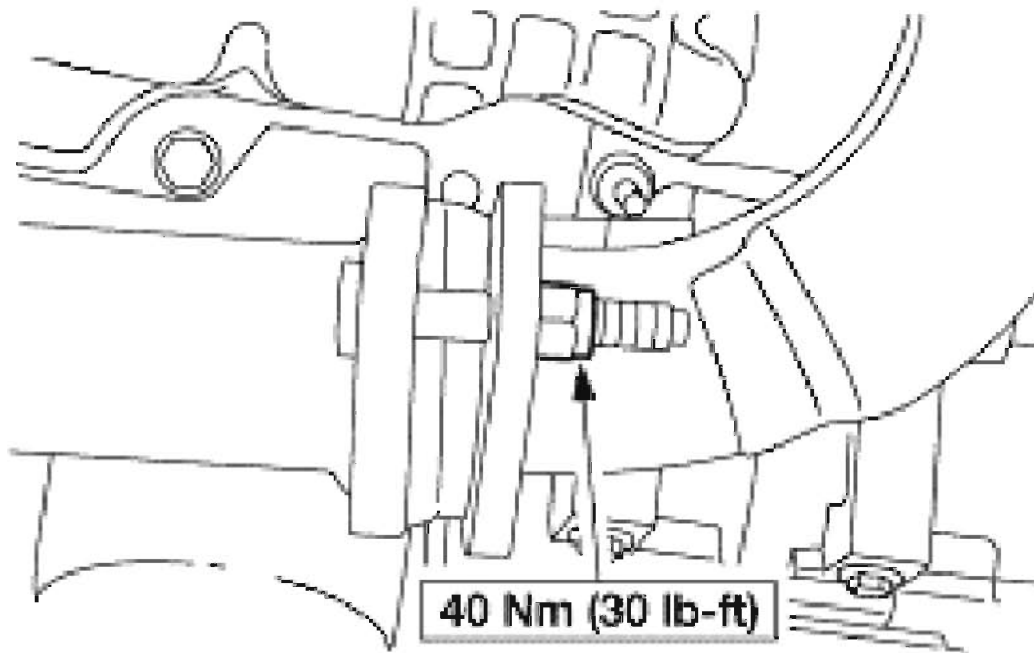
##### Removal and Installation

**CAUTION:** Do not use oil or grease-based lubricants on the insulators. They may cause deterioration of the rubber.

**CAUTION:** Oil or grease-based lubricants on the insulators may cause the exhaust hanger insulator to separate from the exhaust hanger bracket during vehicle operation.

1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.
2. Remove the RH catalyst monitor. For additional information, refer to **ELECTRONIC ENGINE CONTROLS**.

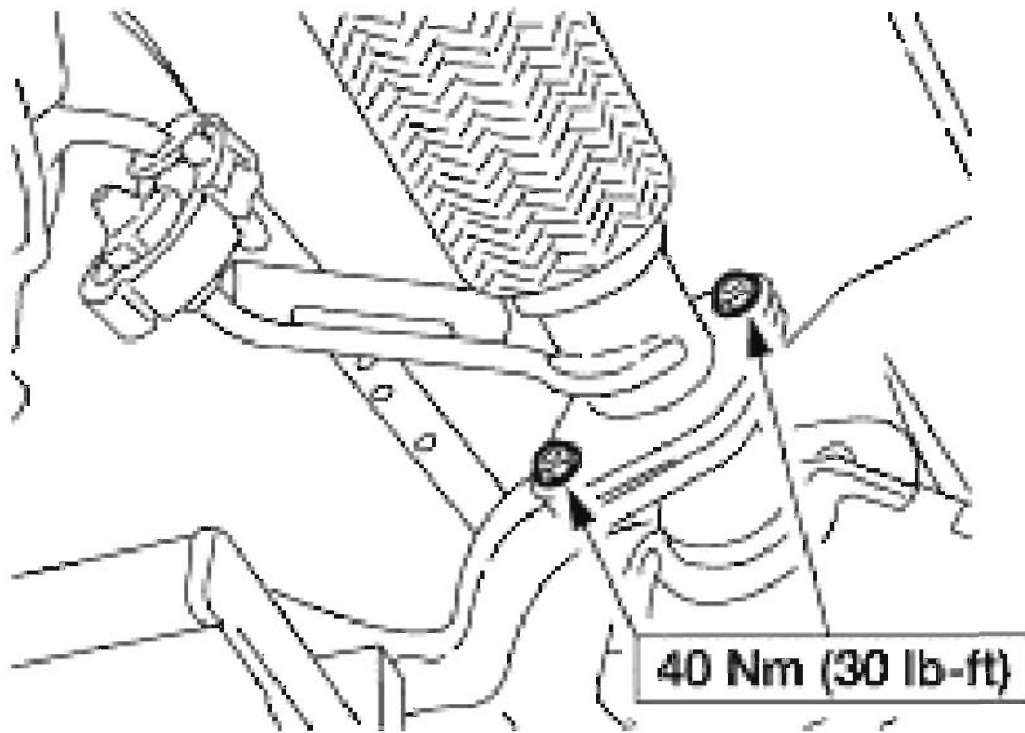
3. Remove and discard the two nuts and separate the flexible Y-pipe from the manifold.



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**Fig. 32: Removing Flexible Y-Pipe Nut**  
Courtesy of FORD MOTOR CO.

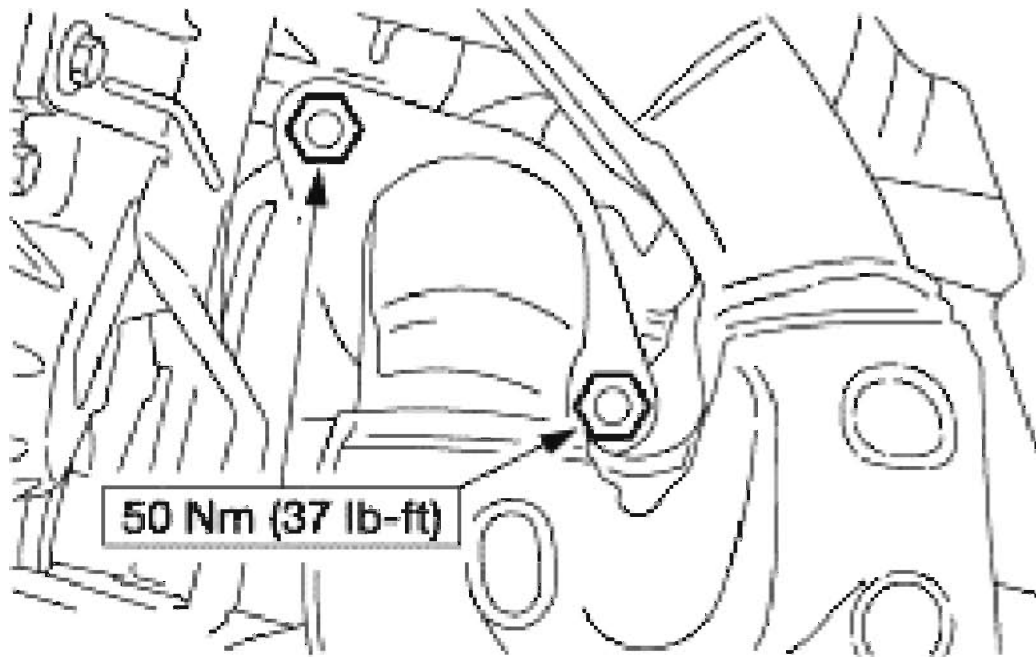
4. Remove and discard the nuts.
  - Discard the gasket.



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**Fig. 33: Removing Flexible Exhaust Pipe Nuts**  
Courtesy of FORD MOTOR CO.

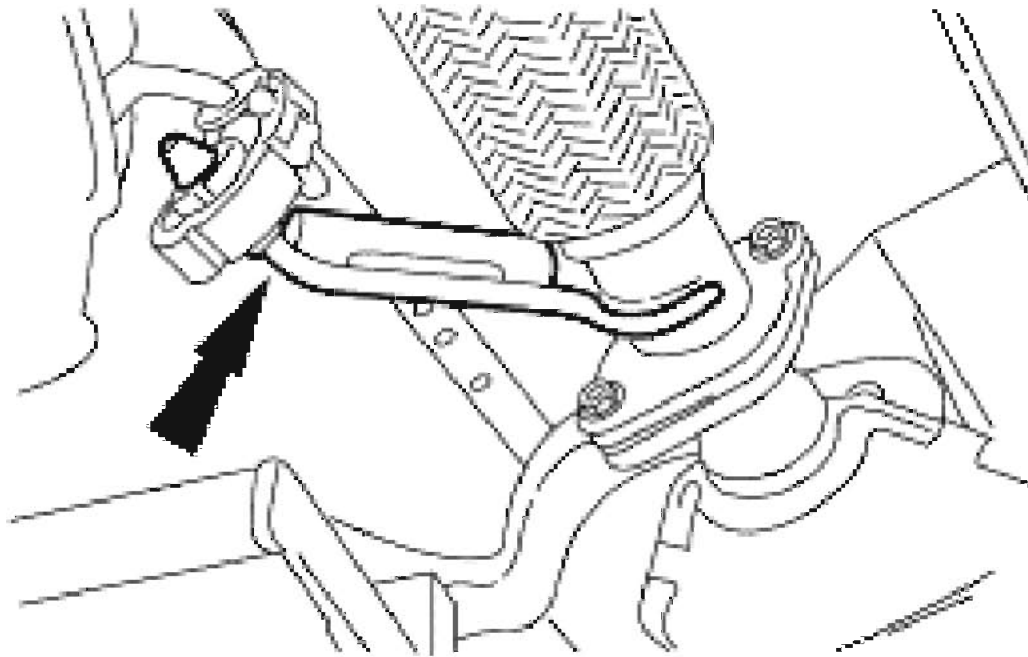
5. Remove the nuts.
  - Discard the gasket.



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**Fig. 34: Removing Exhaust Pipe Nuts**  
Courtesy of FORD MOTOR CO.

6. Remove the flexible pipe.
  - Disconnect from the hanger.



G02740341

**Fig. 35: Disconnecting Flexible Pipe From Hanger**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.
  - Install a new gasket.
  - Install new nuts.

## 2004 Ford Escape

### 2004 ENGINE Engine Cooling - Escape

## 2004 ENGINE

### Engine Cooling - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Cooling System Capacities</b>	
2.0L Zetec	Manual trans — 7.0L (7.4 quart)
3.0L 4V	10.0L (10.5 quart)
<b>Coolant Types</b> <b>Caution: Do not mix coolant types.</b>	
Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B)	WSS-M97B51-A1 (yellow color)
<b>Other Chemicals</b>	
Cooling System Stop Leak Pellets VC-6	WSS-M99B37-B6
Motorcraft Premium Cooling System Flush VC-1	ESR-M14P7-A
<b>Cooling System Pressure Test Specification</b>	
Radiator	138 kPa (20 psi)
<b>Radiator Cap Pressure Test Specification</b>	
Radiator cap	120 kPa (17.4 psi) to 150 kPa (21.7 psi)
<b>Thermostat Opening Temperatures</b>	
Starts to open (2.0L Zetec)	90°-94°C (194°-201°F)
Starts to open (3.0L 4V)	90-93°C (194-200°F)
Fully open (2.0L Zetec)	106°C (223°F)
Fully open (3.0L 4V)	106°C (223°F)

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**Fig. 1: General Specifications Chart**  
Courtesy of FORD MOTOR CO.

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Block heater	2	-	18
Center support	10	-	89
Cooling fan-to-radiator bolts	10	-	89
Degas bottle nuts	6	-	53
High pressure transmission line-to-radiator	25	18	-
Hood latch bolts and nut	10	-	89



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### 2004 ENGINE Engine Cooling - Escape

Thermostat housing bolts and studs	10	-	89
Coolant pump bolts	10	-	89
Coolant pump pulley	23	17	-
Upper radiator support bracket bolts	10	-	89
Draincock	2	-	18

## DESCRIPTION AND OPERATION

### ENGINE COOLING

**CAUTION:** Vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color). Always fill the cooling system with the same coolant that is present in the system. Do not mix coolant types.

**NOTE:** The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

The cooling system components are the:

- engine coolant temperature sensor (ECT sensor) (12A648)
- radiator (8005)
- degas bottle (8A080)
- radiator draincock (8115)
- coolant pump (8501)
- coolant thermostat (8575)
- dual speed fan motor assembly

The coolant pump circulates the coolant.

The coolant thermostat:

- controls the engine coolant temperature.
- allows quicker engine warm-up.

The degas bottle:

- provides a location for fill.
- contains coolant expansion and system pressurization.

- provides air separation during operation.
- replenishes the engine coolant to the system.

The fan motor (8C607):

- operates only when the ignition switch is in the RUN position.
- will not operate with the switch in the OFF position.
- operates when the A/C is turned on.

The engine coolant flows:

- from the lower radiator hose (8286) to the coolant pump.
- from the coolant pump to the engine block and the cylinder heads.

A closed thermostat returns the engine coolant to the coolant pump; an open thermostat allows the engine coolant to flow to the radiator.

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

When adding engine coolant, use a 50/50 mixture of clean, distilled water and engine coolant.

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

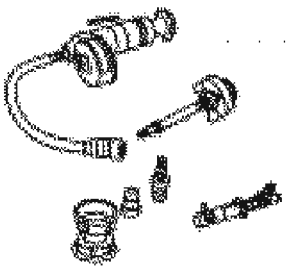
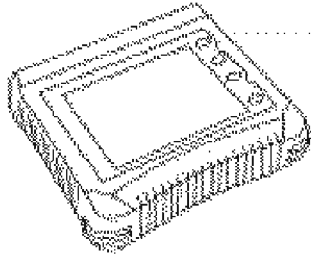

**NOTE: The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.**

- Vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color). Always fill the cooling system with the same coolant that is present in the system. Do not mix coolant types.
- Do not add/mix orange-colored Motorcraft Specialty Orange Engine Coolant VC-2 or equivalent meeting Ford specification WSS-M97B44-D. Mixing coolants can degrade the coolant's protection.
- Do not add alcohol, methanol, brine or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
- Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft Premium Gold Engine Coolant since a Ford-approved recycling process is not yet available.

- Used engine coolant should be disposed of in an appropriate manner. Follow your community's regulations and standards for recycling and disposing of automotive fluids.

## DIAGNOSIS AND TESTING

### ENGINE COOLING

	Radiator/Heater Core Pressure Tester 014-R1072 or equivalent
	Worldwide Diagnostic System (WDS) 418-F224  New Generation STAR (NGS) Tester 418-F082 or equivalent diagnostic tool
	73III Automatic Meter R05-R0057 or equivalent

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**Fig. 2: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

## Inspection and Verification

**WARNING:** To avoid personal injury, do not unscrew the coolant pressure relief cap while the engine is operating or hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly.

**CAUTION:** Check the coolant level, engine oil and transmission fluid. Top off the coolant if needed. If there is engine coolant in the engine oil or transmission fluid, the cause must be corrected and oil/fluid changed or major component damage can occur.

**CAUTION:** Vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color). Always fill the cooling system with the same coolant that is present in the system. Do not mix coolant types.

**NOTE:** The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

1. Verify the customer's concern by operating the engine to duplicate the condition.
2. Inspect to determine if any of the following mechanical or electrical concerns apply.

Mechanical	Electrical
<ul style="list-style-type: none"> <li>Leaks</li> <li>Restricted airflow through the condenser/radiator</li> <li>Damaged hoses</li> <li>Loose/damaged hose clamps</li> <li>Damaged gasket</li> <li>Damaged head gaskets</li> <li>Damaged intake manifold gasket</li> <li>Damaged coolant pump</li> <li>Damaged radiator</li> <li>Damaged degas bottle</li> <li>Damaged heater core</li> </ul>	<ul style="list-style-type: none"> <li>Damaged engine coolant temperature (ECT) sensor</li> <li>Damaged wiring</li> <li>Damaged electric cooling fans</li> </ul>

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**Fig. 3: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. If the inspection reveals an obvious concern that can be readily identified, repair it as

## 2004 Ford Escape

### 2004 ENGINE Engine Cooling - Escape

necessary.

4. Inspect the coolant condition. Refer to **COOLING SYSTEM INSPECTION** .
5. Verify the cooling system is correctly filled and bled. Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
6. If the concern remains after the inspection, determine the symptom(s). GO to **SYMPTOM CHART**

#### Symptom Chart

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>Loss of engine coolant</li></ul>	<ul style="list-style-type: none"><li>Radiator.</li><li>Thermostat housing assembly.</li><li>Heater control valve.</li><li>Transmission oil cooler.</li><li>Coolant pump seal.</li><li>Radiator hoses.</li><li>Heater hoses.</li><li>Heater core.</li><li>Engine gaskets.</li><li>Degas bottle.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test A.</u></li></ul>
<ul style="list-style-type: none"><li>The engine overheats</li></ul>	<ul style="list-style-type: none"><li>Thermostat.</li><li>Airlock in the system.</li><li>Coolant pump.</li><li>Internal engine coolant leak.</li><li>Radiator.</li><li>Radiator airflow obstruction.</li><li>Heater core.</li><li>Cooling fan(s)</li><li>Pressure relief cap.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test B.</u></li></ul>
<ul style="list-style-type: none"><li>The engine does not reach normal operating temperature</li></ul>	<ul style="list-style-type: none"><li>Thermostat.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test C.</u></li></ul>
<ul style="list-style-type: none"><li>The engine cooling fan(s) inoperative/incorrect operation</li></ul>	<ul style="list-style-type: none"><li>Circuitry open/shorted.</li><li>Engine cooling fan relay.</li><li>Engine cooling fan motor.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test D.</u></li></ul>
<ul style="list-style-type: none"><li>The block heater does not operate correctly</li></ul>	<ul style="list-style-type: none"><li>Block heater power cable.</li><li>Block heater.</li></ul>	<ul style="list-style-type: none"><li>CHECK the resistance in all three power cable circuits. If the resistance in any circuit is greater than 5 ohms, INSTALL a new power cable.</li><li>INSTALL a new block heater.</li></ul>

**Fig. 4: Symptom Chart**  
**Courtesy of FORD MOTOR CO.**

## PINPOINT TESTS

### PINPOINT TEST A: LOSS OF COOLANT

Test Step	Result / Action to Take
<b>A1 CHECK THE ENGINE COOLANT LEVEL</b>	
<p><b>NOTE:</b> Allow the engine to cool before checking the engine coolant level.</p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Visually check the engine coolant level at the degas bottle.</li> <li><b>Is the engine coolant level within specification?</b></li> </ul>	<p><b>Yes</b> GO to <u>A2</u>.</p> <p><b>No</b> REFILL the engine coolant as necessary. GO to <u>A4</u>.</p>
<b>A2 CHECK THE ENGINE COOLANT FOR INTERNAL LEAK</b>	
<ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Inspect the engine coolant in the degas bottle for signs of engine oil.</li> <li><b>Is oil evident in the coolant?</b></li> </ul>	<p><b>Yes</b> If engine oil is evident, GO to Engine System - General Information.</p> <p><b>No</b> GO to <u>A3</u>.</p>
<b>A3 CHECK THE ENGINE FOR COOLANT</b>	
<ul style="list-style-type: none"> <li>Remove the oil level dipsticks from the engine.</li> <li><b>Is coolant evident in the oil?</b></li> </ul>	<p><b>Yes</b> If coolant is in the engine, GO to Engine System - General Information.</p> <p><b>No</b> GO to <u>A4</u>.</p>
<b>A4 PRESSURE TEST THE ENGINE COOLING SYSTEM</b>	
<ul style="list-style-type: none"> <li>Carry out the cooling system pressure test. Refer to the Component Tests in this section.</li> <li><b>Does the engine cooling system leak?</b></li> </ul>	<p><b>Yes</b> REPAIR or INSTALL new components. TEST the system for normal operation.</p> <p><b>No</b> The cooling system is operational. GO to <u>Symptom Chart</u>.</p>


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**Fig. 5: Pinpoint Test A: Loss Of Coolant (A1-A4)**  
**Courtesy of FORD MOTOR CO.**

### PINPOINT TEST B: THE ENGINE OVERHEATS

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Test Step	Result / Action to Take
<b>B1 CHECK THE ENGINE COOLANT LEVEL</b>	
<p><b>NOTE:</b> If the engine is hot, allow the engine to cool before proceeding.</p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li> <b>WARNING:</b> To avoid personal injury, do not unscrew the coolant pressure relief cap while the engine is operating or hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly.</li> <li>Check the engine coolant level at the degas bottle.</li> <li>Is the engine coolant OK?</li> </ul>	<p><b>Yes</b> GO to <u>B2</u>.</p> <p><b>No</b> REFILL the engine coolant at the degas bottle. <u>Go To Pinpoint Test A</u>.</p>
<b>B2 CHECK THE COOLANT CONDITION</b>	
<ul style="list-style-type: none"> <li>Check the coolant for contaminants such as rust, corrosion, or discoloration.</li> <li>Is the coolant condition OK?</li> </ul>	<p><b>Yes</b> GO to <u>B3</u>.</p> <p><b>No</b> FLUSH the engine cooling system. REFER to <u>Cooling System Flushing</u> in this article. TEST the system for normal operation.</p>
<b>B3 CHECK FOR AN AIRFLOW OBSTRUCTION</b>	
<ul style="list-style-type: none"> <li>Inspect the A/C condenser core and radiator for obstructions such as leaves or dirt.</li> <li>Is there an obstruction?</li> </ul>	<p><b>Yes</b> REMOVE the obstruction. CLEAN the A/C condenser core and radiator. TEST the system for normal operation.</p> <p><b>No</b> GO to <u>B4</u>.</p>
<b>B4 CHECK THE THERMOSTAT OPERATION</b>	
<ul style="list-style-type: none"> <li>Start the engine and allow the engine to run for 10 minutes.</li> <li>Turn the engine off.</li> <li>Feel the upper and lower radiator hose.</li> <li>Are the upper and lower radiator hoses cold?</li> </ul>	<p><b>Yes</b> CARRY OUT thermostat component tests.</p> <p><b>No</b> GO to <u>B5</u>.</p>
<b>B5 CHECK THE COOLING FAN OPERATION</b>	
<ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Using the diagnostic tool, command the cooling fans ON in low and high speeds.</li> <li>Do the fans operate in all speeds?</li> </ul>	<p><b>Yes</b> GO to Engine System - General Information for diagnosis and testing of the engine.</p> <p><b>No</b> <u>Go To Pinpoint Test D</u>.</p>

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**Fig. 6: Pinpoint Test B: The Engine Overheats (B1-B4)**  
Courtesy of FORD MOTOR CO.

#### PINPOINT TEST C: THE ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE

## 2004 Ford Escape

### 2004 ENGINE Engine Cooling - Escape

Test Step	Result / Action to Take
<b>C1 CHECK THE ENGINE TEMPERATURE</b>	
<ul style="list-style-type: none"><li>Start the engine and allow the engine to idle for 10 minutes.</li><li>Key in OFF position.</li><li>Feel the upper and lower radiator hoses.</li><li><b>Are the upper and lower radiator hoses cold?</b></li></ul>	<p><b>Yes</b> CARRY OUT thermostat component tests.</p> <p><b>No</b> GO to Instrument Cluster for diagnosis and testing of the engine coolant temperature gauge.</p>

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### **Fig. 7: Pinpoint Test C: The Engine Does Not Reach Normal Operating Temperature (C1)**

Courtesy of FORD MOTOR CO.

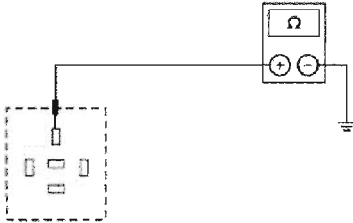
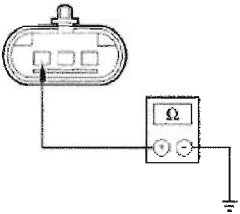
#### **PINPOINT TEST D: THE ENGINE COOLING FAN(S) INOPERATIVE/INCORRECT OPERATION**

**NOTE:** Before carrying out the following test, diagnose any PCM DTCs.



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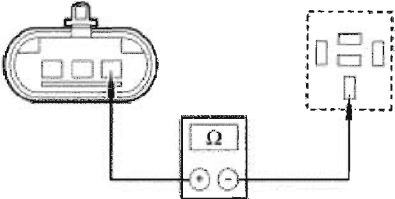
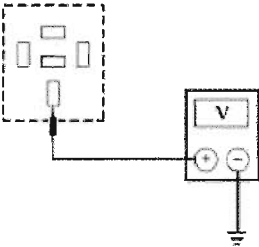
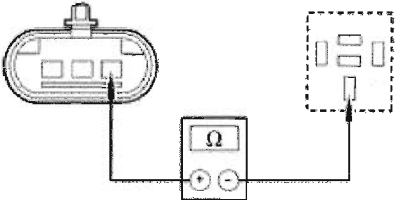
### 2004 ENGINE Engine Cooling - Escape

Test Step	Result / Action to Take
<b>D1 CHECK LOW AND HIGH SPEED OPERATION OF THE ELECTRIC COOLING FANS</b> <ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Connect the diagnostic tool.</li> <li>Using the diagnostic tool, command the cooling fans ON in low and high speeds.</li> <li><b>Do both cooling fans operate in low speed?</b></li> </ul>	<p><b>Yes</b> If the LH fan is inoperative in high speed only, carry out the relay component test on the cooling fan high speed relay 1. If the relay tests good, REPAIR circuit 60 (BK/LG) for an open. TEST the system for normal operation. If the RH fan is inoperative in high speed only, GO to D2.</p> <p><b>No</b> If both fans are inoperative in low speed and the LH fan is inoperative in high speed, GO to D3. If both fans are inoperative in low speed and the RH fan is inoperative in high speed, GO to D5. If both fans are inoperative in low speed and the both fans operate in high speed, REPAIR circuit 3829 (LB/BK) for an open. TEST the system for normal operation. If the LH fan is inoperative in low speed and the both fans operate in high speed, REPAIR circuit 3829 (LB/BK) for a short to ground. TEST the system for normal operation.</p>
<b>D2 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Cooling Fan High Speed Relay 2.</li> <li>Measure the resistance between the high speed cooling fan relay 2 pin 30, circuit 57 (BK) and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Is the resistance less than 5 ohms?</b></li> </ul>	<p><b>Yes</b> Carry out the relay component test on cooling fan high speed relay 2. If the relay tests good, REPAIR circuit 3829 (LB/BK) for an open. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 57 (BK) for an open. TEST the system for normal operation.</p>
<b>D3 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: LH Cooling Fan Motor C1074.</li> <li>Measure the resistance between the LH cooling fan motor C1074 pin 3, circuit 57 (BK) and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Is the resistance less than 5 ohms?</b></li> </ul>	<p><b>Yes</b> GO to D4.</p> <p><b>No</b> REPAIR circuit 57 (BK) for an open. TEST the system for normal operation.</p>

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**Fig. 8: Pinpoint Test D: The Engine Cooling Fan(S) Inoperative/Incorrect Operation (D1-D3)**

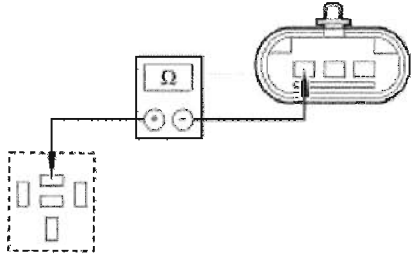
Courtesy of FORD MOTOR CO.

<p><b>D4 CHECK CIRCUIT 538 (GY/RD) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Cooling Fan High Speed Relay 1.</li> <li>• Measure the resistance between the LH cooling fan motor C1074 pin 1, circuit 538 (GY/RD) and high speed cooling fan relay 1, pin 30, circuit 538 (GY/RD).</li> </ul>  <p>A0077176</p> <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> Install a new LH cooling fan motor. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 538 (GY/RD) for an open. TEST the system for normal operation.</p>
<p><b>D5 CHECK CIRCUIT 30 (BK/LG) FOR VOLTAGE</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: Cooling Fan Low Speed Relay.</li> <li>• Measure the voltage between the low speed cooling fan relay pin 87, circuit 30 (BK/LG) and ground.</li> </ul>  <p>A0017443</p> <ul style="list-style-type: none"> <li>• Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to D6.</p> <p><b>No</b> REPAIR circuit 30 (BK/LG) for an open. TEST the system for normal operation.</p>
<p><b>D6 CHECK CIRCUIT 229 (RD/OG) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: RH Cooling Fan Motor C1077.</li> <li>• Measure the resistance between the RH cooling fan motor C1077 pin 1, circuit 229 (RD/OG) and low speed cooling fan relay pin 30, circuit 229 (RD/OG).</li> </ul>  <p>A0077176</p> <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> Carry out the relay component test on cooling fan low speed relay. If the relay tests good, GO to D7.</p> <p><b>No</b> REPAIR circuit 229 (RD/OG) for an open. TEST the system for normal operation.</p>

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**Fig. 9: Pinpoint Test D: The Engine Cooling Fan(S) Inoperative/Incorrect Operation (D4-D6)**

Courtesy of FORD MOTOR CO.

D7 CHECK CIRCUIT 3829 (LB/BK) FOR AN OPEN	
<ul style="list-style-type: none"> <li>Disconnect: Cooling Fan High Speed Relay 2.</li> <li>Measure the resistance between the RH cooling fan motor C1077 pin 3, circuit 3829 (LB/BK) and high speed cooling fan relay 2, pin 87, circuit 3829 (LB/BK).</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> Install a new RH cooling fan motor. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 3829 (LB/BK) for an open. TEST the system for normal operation.</p>

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**Fig. 10: Pinpoint Test D: The Engine Cooling Fan(S) Inoperative/Incorrect Operation (D7)**

Courtesy of FORD MOTOR CO.

## COMPONENT TESTS

### Pressure Test

1. Turn the engine off.

**WARNING:** Never remove the pressure relief cap under any conditions while the engine is operating. Failure to follow these instructions could cause damage to the cooling system or engine, or result in personal injury. To avoid having scalding coolant or steam blow out of the cooling system, never remove the pressure relief cap from a hot degas bottle. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly one turn (counterclockwise). Step back while the pressure is released from the cooling system. When certain all the pressure has been released, use the cloth to remove the pressure relief cap.

2. Check the engine coolant level. Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
3. Connect the Radiator/Heater Core Pressure Tester to the degas bottle nipple and overflow hose. Install a pressure test pump to the quick connect fitting of the test

adapter.

**NOTE:** If the plunger of the pump is depressed too fast, an erroneous pressure reading will result.

4. Slowly depress the plunger of the pressure test pump until the pressure gauge reading stops increasing and note the highest pressure reading obtained.
5. If the pressure relief cap does not hold pressure, remove and wash the pressure relief cap in clean water to dislodge all foreign particles from the gaskets. Check the sealing surface in the filler neck.
6. If the cooling system does not hold 120 kPa (17.4 psi) or if more than 150 kPa (21.7 psi) shows on gauge, determine the location of the leak. If it is the cap on the bottle, install a new pressure relief cap.

**CAUTION:** If the pressure drops, check for leaks at the engine to heater core hoses, engine-to-radiator hoses, water valve hose (if applicable), transmission oil cooler return tube gasket (6N789), radiator and heater core or other system components and connections. Any leaks which are found must be corrected and the system rechecked.

7. Pressurize the engine cooling system as described in Step 4 (using a pressure relief cap that operates within the specified upper and lower pressure limits). Observe the gauge reading for approximately two minutes; refer to **GENERAL SPECIFICATIONS**. Pressure should not drop during this time.
8. Release the system pressure by loosening the pressure relief cap. Check the engine coolant level and replenish, if necessary, with the correct engine coolant mixture; Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

### Thermostat

A new thermostat should be installed only after the following electrical and mechanical tests have been carried out.

#### Thermostat - Electrical Test

**NOTE:** The electrical thermostat test is most accurate if carried out indoors at less than 37.8°C (100°F) ambient air. This test may be carried out with or without the hood open and with the engine warm or cold.

1. Check the engine coolant level. Fill as needed.
2. With the ignition OFF, remove the engine coolant temperature (ECT) sensor harness

connector and attach ECT Sensor "T" Cable as a jumper between the powertrain control module and the ECT Sensor. Attach the 73III Automotive Meter to the ECT Sensor "T" Cable. Voltage values (0-5 V) may now be monitored while the sensor retains its connection to the wiring harness.

A scan tool may be used to monitor the ECT on vehicles equipped with data link connector (DLC).

**NOTE:**      **Running this test with the vehicle in gear or with the A/C compressor clutch engaged (running) will cause incorrect diagnosis.**

3. Place the transmission in PARK (P) or NEUTRAL (N).
4. Start the engine and allow the engine to idle throughout this test. Allow the engine to run for two minutes, then record the ECT voltage. Record the ECT voltage every 60 seconds. When the ECT voltage trend changes direction or only changes slightly (0.03 volt or less) from the previous reading, record this as the thermostat opening voltage. Use the voltage and corresponding coolant temperature chart listed below.

#### ECT TEMPERATURE SPECIFICATION

Coolant Temperature °C (°F)	ECT (Volts)
22 (71)	3.00
43 (109)	2.01
71 (159)	1.01
82 (180)	0.75
91 (195)	0.59
97 (206)	0.50
105 (221)	0.40

5. If the thermostat opening voltage is greater than 0.75 volt and less than 82°C (180°F), install a new thermostat.
6. If the thermostat opening voltage is less than 0.75 volt and greater than 82°C (180°F), the water thermostat is good and should not be replaced. GO to **SYMPTOM CHART** for further instructions.

#### Thermostat - Mechanical Test

1. Remove the thermostat.
2. Check the thermostat for seating. Hold the thermostat up to a lighted background. Leakage of light around the thermostat valve at room temperature indicates a new thermostat should be installed. Some thermostats have a small leakage notch at one location on the perimeter of the thermostat valve, which is considered normal.

3. Immerse the thermostat in a boiling antifreeze and water mixture.
4. See the General Specifications chart for thermostat opening temperatures.

**Radiator Leak Test, Removed From the Vehicle**

**CAUTION:** Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners can be present in the cleaning tank and they will damage aluminum radiators.

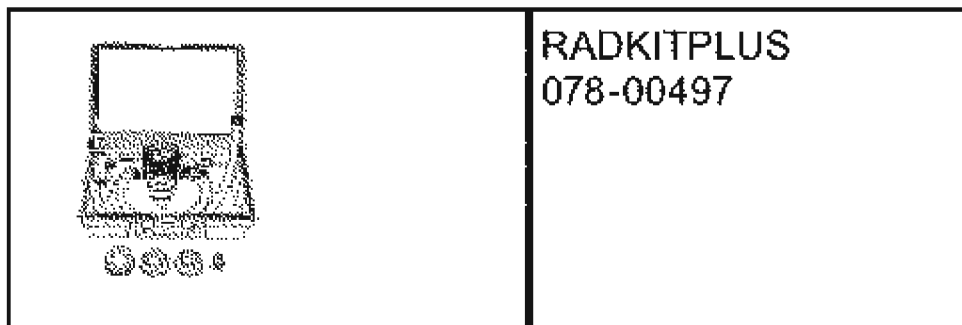
**NOTE:** Always install plugs in the oil cooler fittings before leak testing or cleaning any radiator.

**NOTE:** Clean the radiator before leak testing to avoid contamination of tank.

1. Leak-test the radiator in clean water with 138 kPa (20 psi) air pressure.

**GENERAL PROCEDURES**

**COOLING SYSTEM DRAINING, FILLING AND BLEEDING**



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**Fig. 11: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**WARNING:** Never remove the pressure relief cap under any conditions while the engine is operating. Failure to follow these instructions could cause damage to the cooling system or engine, or result in personal injury. To avoid having scalding coolant or steam blow out of the cooling system, never remove the pressure relief cap from a hot degas bottle. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly one turn (counterclockwise). Step back while the pressure is released from the cooling system. When certain all the pressure has been released, use the cloth to remove the pressure relief cap.

**CAUTION:** The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated it must be recycled or disposed of correctly.

**CAUTION:** Vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color). Always fill the cooling system with the same coolant that is present in the system. Do not mix coolant types.

**NOTE:** The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

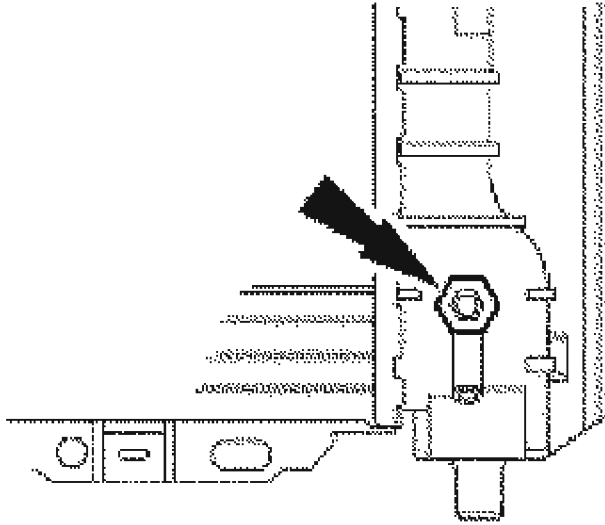
**NOTE:** Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

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

### **3.0L (4V)**

2. Remove the splash shields.
3. Place a suitable container below the radiator draincock (8115).
  - Open the draincock and allow to drain.
  - Close the radiator draincock when finished.

- Tighten to 2 Nm (18 lb-in).



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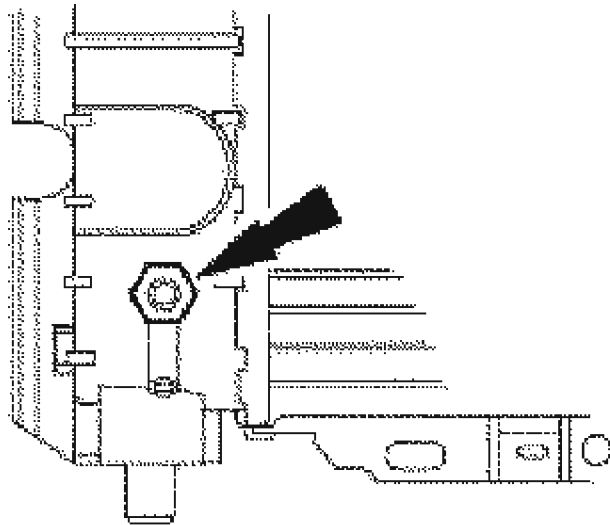
**Fig. 12: Identifying Radiator Draincock - 3.0L (4V)**  
Courtesy of FORD MOTOR CO.

4. Install the splash shields.

### **2.0L Zetec**

1. Place a suitable container below the radiator draincock (8115).
  - Open the draincock and allow to drain.
  - Close the radiator draincock when finished.
    - Tighten to 2 Nm (18 lb-in).





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**Fig. 13: Identifying Radiator Draincock - 2.0L Zetec**  
Courtesy of FORD MOTOR CO.

#### Filling and Bleeding with RADKITPLUS

1. Using the special tool, install the RADKITPLUS and follow the RADKITPLUS manufacturer's instructions to fill and bleed the cooling system.

#### Filling and Bleeding without RADKITPLUS

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

When adding engine coolant, use a 50/50 mixture of engine coolant and distilled water.

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

- Vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color). Always fill the cooling system with the same coolant that is present in the system. Do not mix coolant types.

- Do not add/mix orange-colored Motorcraft Specialty Orange Engine Coolant VC-2 or equivalent meeting Ford specification WSS-M97B44-D. Mixing coolants can degrade the coolant's protection.
- Do not add alcohol, methanol, brine or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
- Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft Premium Gold Engine Coolant since a Ford-approved recycling process is not yet available.
- Used engine coolant should be disposed of in an appropriate manner. Follow your community's regulations and standards for recycling and disposing of automotive fluids.

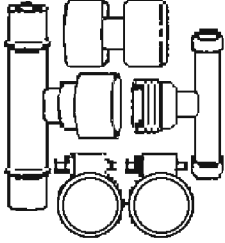
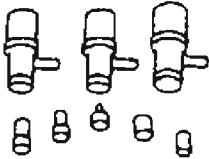
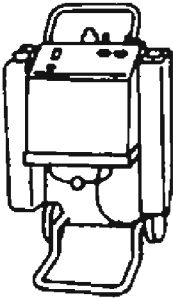
**NOTE: The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.**

1. Add the correct engine coolant mixture to the degas bottle until the coolant level is between the "COOLANT FILL LEVEL" marks.
2. Select the maximum heater temperature and blower motor speed settings. Position the control to discharge air at vents in instrument panel (04320).
3. Start the engine and allow to idle. While engine is idling, feel for hot air at vents.

**CAUTION: If air discharge remains cool and engine coolant temperature gauge does not move, engine coolant level is low in engine and must be filled. Stop engine, allow to cool and fill cooling system.**

4. Start engine and allow to idle until normal operating temperature is reached. Hot air should discharge from vents. The engine coolant temperature gauge should maintain a stabilized reading in the middle of the NORMAL range and the upper radiator hose (8260) should feel hot to the touch.
5. Shut the engine off and allow to cool.
6. Check the engine for coolant leaks.
7. Check the engine coolant level in degas bottle and fill as necessary.

## **COOLING SYSTEM FLUSHING**

 <p><b>ST1168-A</b></p>	<p><b>Flush Kit Hardware Package</b> 164-R3658 or equivalent</p>
 <p><b>ST1167-A</b></p>	<p><b>Drain Kit</b> 164-R3662 or equivalent</p>
 <p><b>ST2421-A</b></p>	<p><b>Pro Flush &amp; Fill ® Coolant</b> <b>Flush &amp; Fill</b> 023-00154</p>

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**Fig. 14: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

1. Drain the cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Remove the thermostat (8575). For additional information, refer to **THERMOSTAT - 2.0L ZETEC** or **THERMOSTAT - 3.0L (4V)** .
3. Install the water hose connection (8592) without the thermostat.

**NOTE:** Refer to the Pro Flush and Fill, Coolant Flush and Fill tool

**operating instructions for specific vehicle hook-up.**

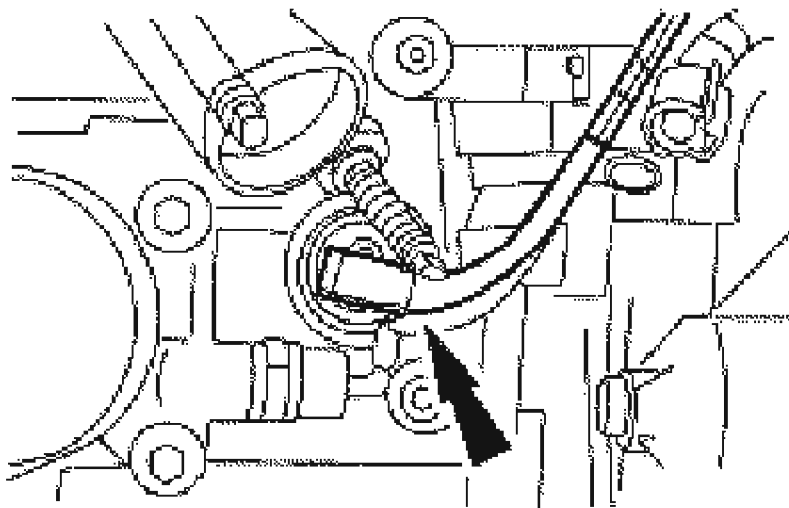
4. Using the special tools, flush the engine and radiator.

Use Motorcraft Premium Cooling System Flush VC-1 meeting Ford specification ESR-M14P7-A.

5. Install the thermostat.
6. Backflush the heater core.
7. Fill the cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

**REMOVAL AND INSTALLATION****BLOCK HEATER****Removal and Installation**

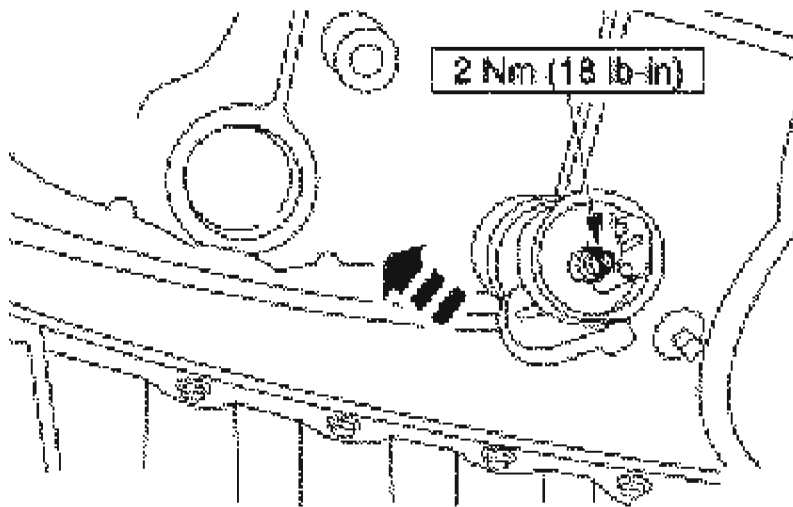
1. Drain the cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Raise the vehicle. For additional information, refer to **JACKING & LIFTING** .
3. Disconnect the block heater power cable from the block heater (6A051).



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**Fig. 15: Disconnecting Block Heater Power Cable From Block Heater**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not loosen the block heater retaining screw more than necessary for removal.



G02740190

**Fig. 16: Removing Block Heater**  
Courtesy of FORD MOTOR CO.

4. Remove the block heater.

**CAUTION:** Make sure the power cable is routed and secured away from rotating or hot components or damage to the cable can occur.

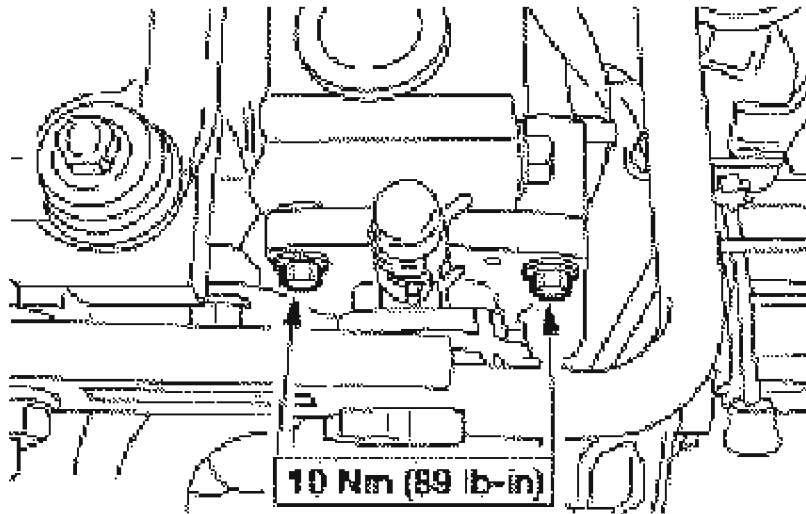
5. To install, reverse the removal procedure.

#### THERMOSTAT - 2.0L ZETEC

##### Removal and Installation

1. Partially drain the engine coolant. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Remove the three bolts and separate the coolant outlet adapter from the thermostat

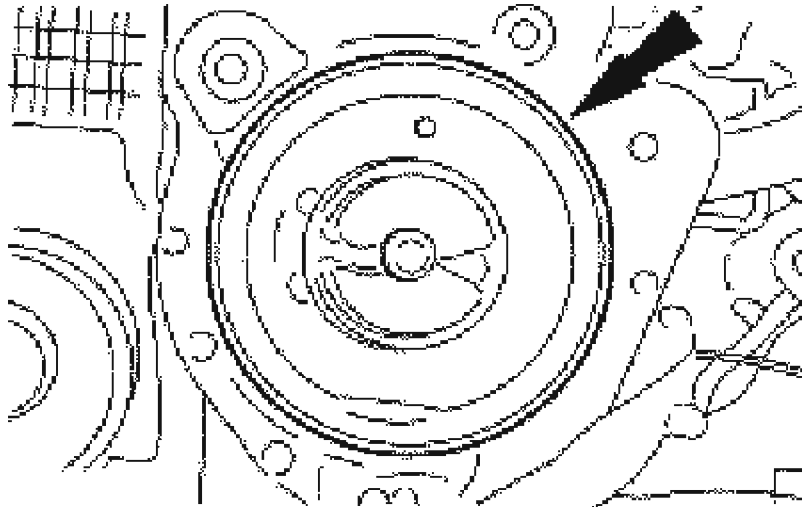
housing.



G02740191

**Fig. 17: Removing Coolant Outlet Adapter Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** The thermostat is indexed and must be installed correctly.



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**Fig. 18: Removing Thermostat And O-Ring Seal**  
Courtesy of FORD MOTOR CO.

3. Remove the thermostat and the O-ring seal.

**NOTE:**      **Clean and inspect the sealing surfaces.**

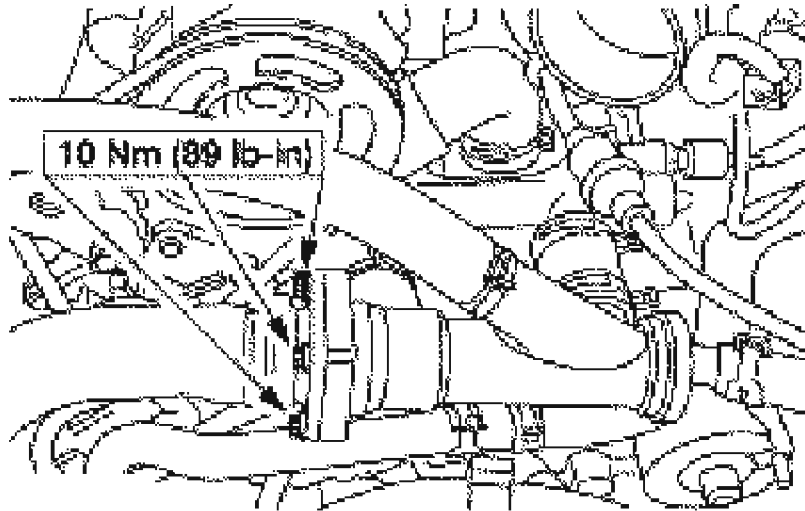
4. To install, reverse the removal procedure.

#### **THERMOSTAT - 3.0L (4V)**

##### **Removal and Installation**

1. Partially drain the engine cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

**NOTE:**      **The appearance cover is shown removed for clarity.**

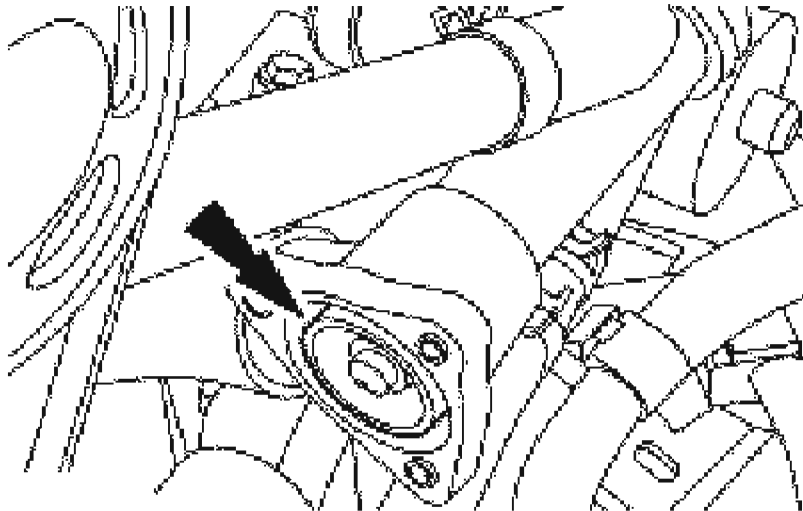


G02740193

**Fig. 19: Removing Thermostat Housing Bolts**  
**Courtesy of FORD MOTOR CO.**

2. Separate the thermostat housing.
3. Remove the thermostat and the O-ring seal from the thermostat housing.





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**Fig. 20: Removing Thermostat And O-Ring Seal From Thermostat Housing**  
Courtesy of FORD MOTOR CO.

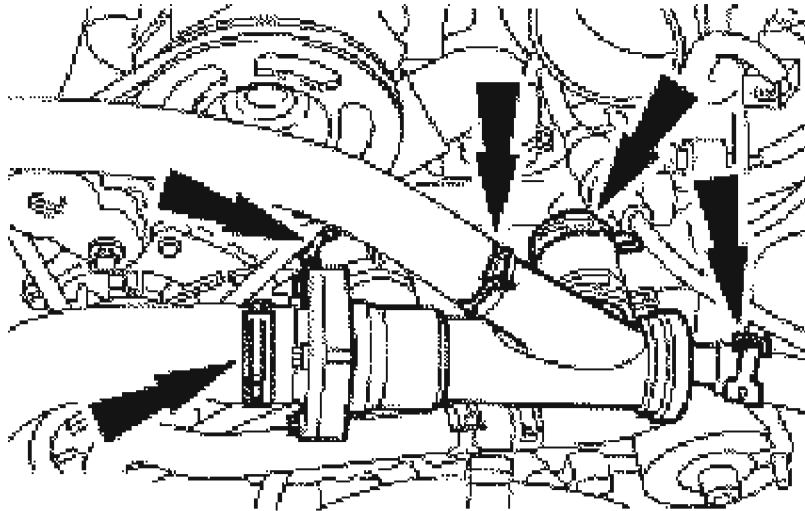
**NOTE:**      **Clean and inspect the sealing surfaces.**

4. To install reverse the removal procedure.

#### **BYPASS TUBE - 3.0L (4V)**

##### **Removal and Installation**

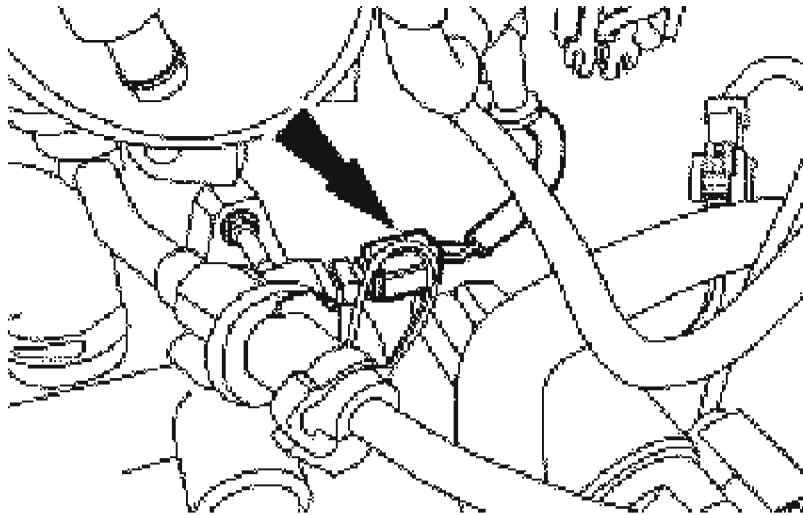
1. Drain the engine Cooling System. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Remove the air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
3. Disconnect the five hoses from the thermostat housing and remove the thermostat housing.



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**Fig. 21: Disconnecting Hoses From Thermostat Housing**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine coolant temperature (ECT) sensor from the bypass tube.

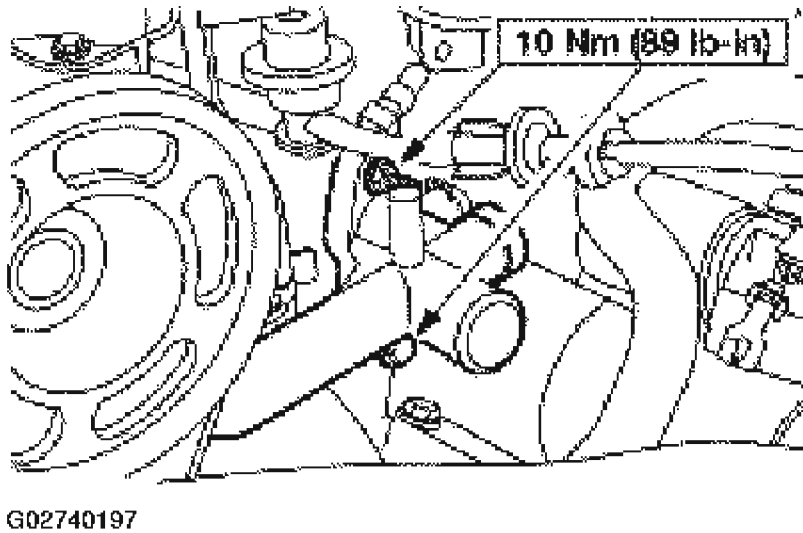


G02740196

**Fig. 22: Disconnecting Engine Coolant Temperature (ECT) Sensor From Bypass Tube**

**Courtesy of FORD MOTOR CO.**

5. Remove the bolt, stud, and the bypass tube.



**Fig. 23: Removing Bolt, Stud, And Bypass Tube**  
Courtesy of FORD MOTOR CO.

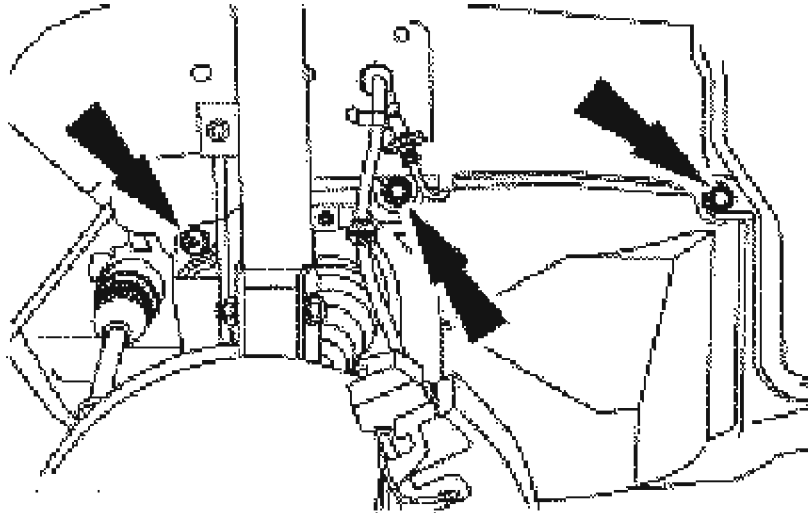
**NOTE:** Clean and inspect the sealing surfaces.

6. To install, reverse the removal procedure.

#### **WATER PUMP - 2.0L ZETEC**

##### **Removal and Installation**

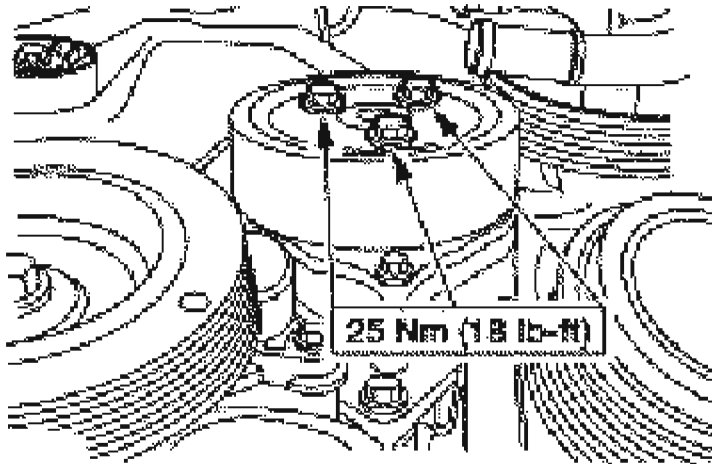
1. Drain the engine cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
2. Remove the right front tire assembly.
3. Remove the splash shield.



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**Fig. 24: Removing Splash Shield**  
Courtesy of FORD MOTOR CO.

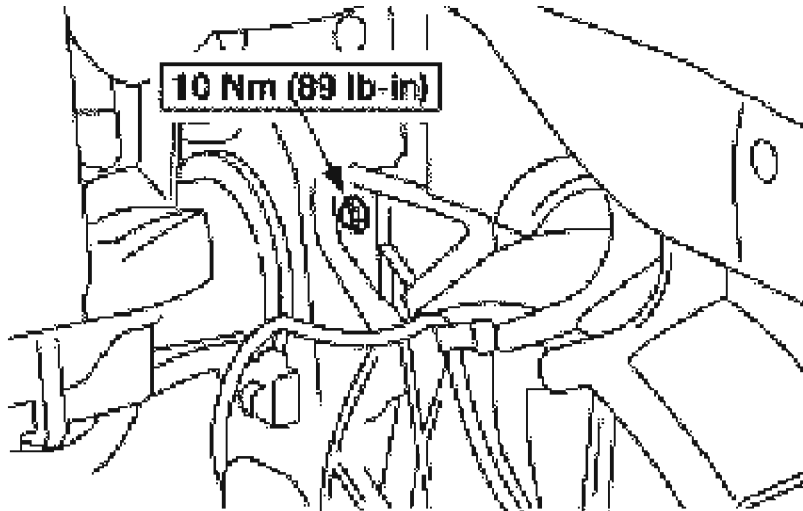
4. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE**.
5. Remove the coolant pump pulley.



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**Fig. 25: Removing Coolant Pump Pulley Bolts**  
Courtesy of FORD MOTOR CO.

6. Remove the four bolts and the coolant pump.



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**Fig. 26: Removing Coolant Pump Bolts**  
Courtesy of FORD MOTOR CO.

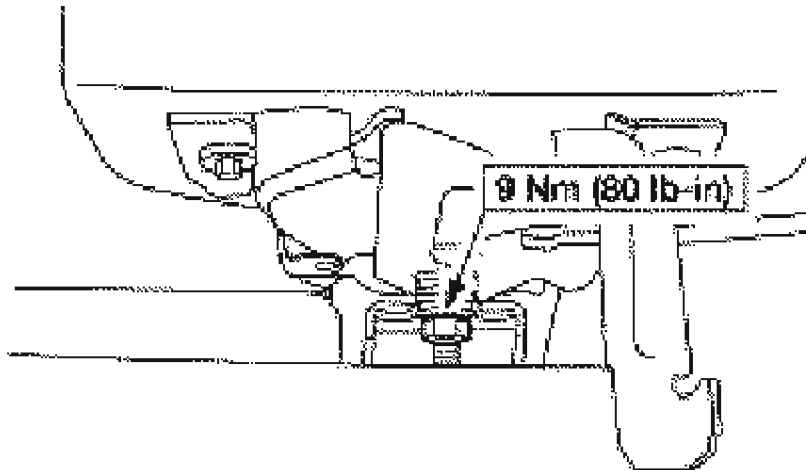
**NOTE:** Clean and inspect the sealing surfaces.

7. To install, reverse the removal procedure.

## COOLING FAN

### Removal and Installation

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Remove the hood latch nut.

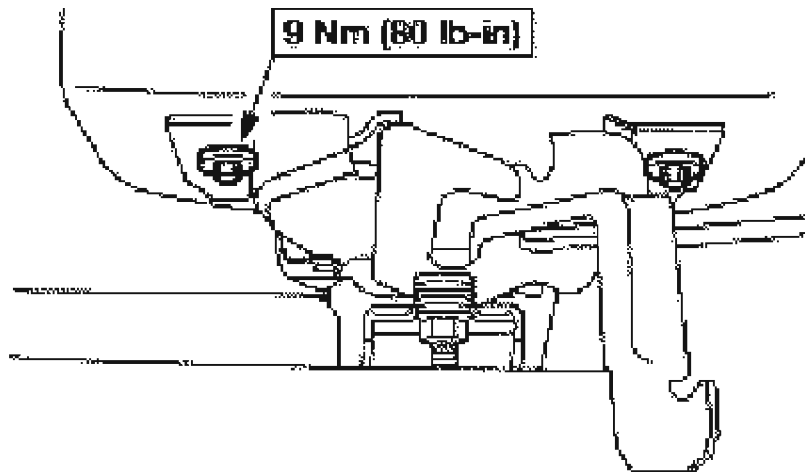


G02740201

**Fig. 27: Locating Hood Latch Nut**  
Courtesy of FORD MOTOR CO.

**NOTE:** Mark the hood latch position prior to removal of the bolts.

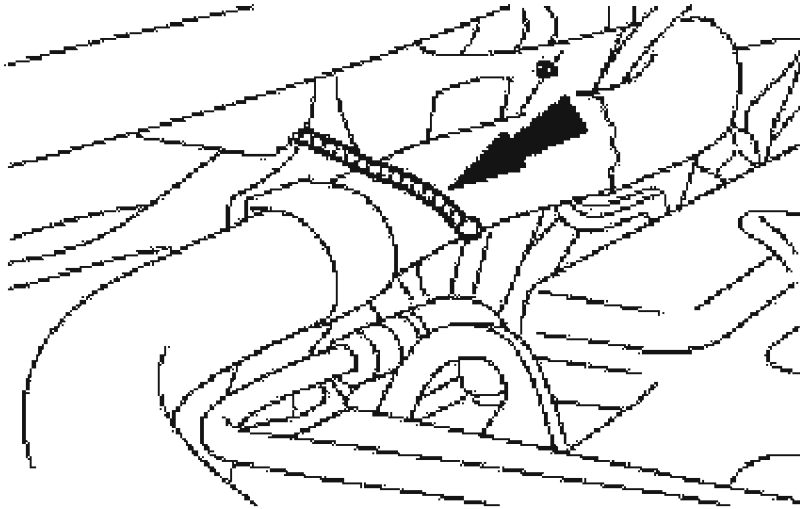




G02740202

**Fig. 28: Removing Hood Latch Bolts**  
**Courtesy of FORD MOTOR CO.**

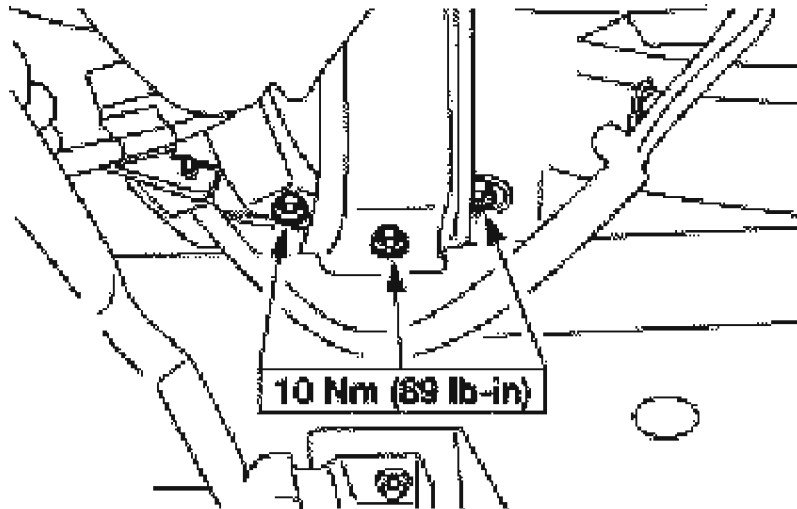
3. Remove the hood latch bolts and position the hood latch out of the way.
4. If equipped, remove the upper radiator tie strap.



G02740203

**Fig. 29: Removing Upper Radiator Tie Strap**  
**Courtesy of FORD MOTOR CO.**

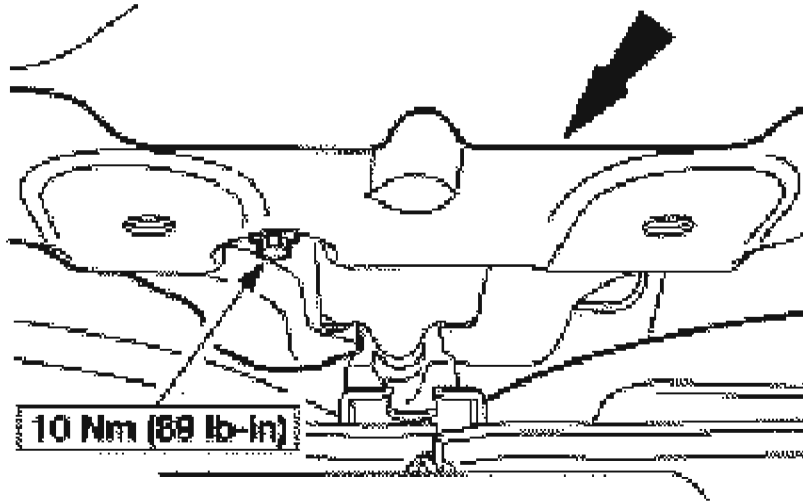
5. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING** .
6. Remove the lower center support bolt and the lower fan bolts.



G02740204

**Fig. 30: Removing Lower Center Support Bolt**  
Courtesy of FORD MOTOR CO.

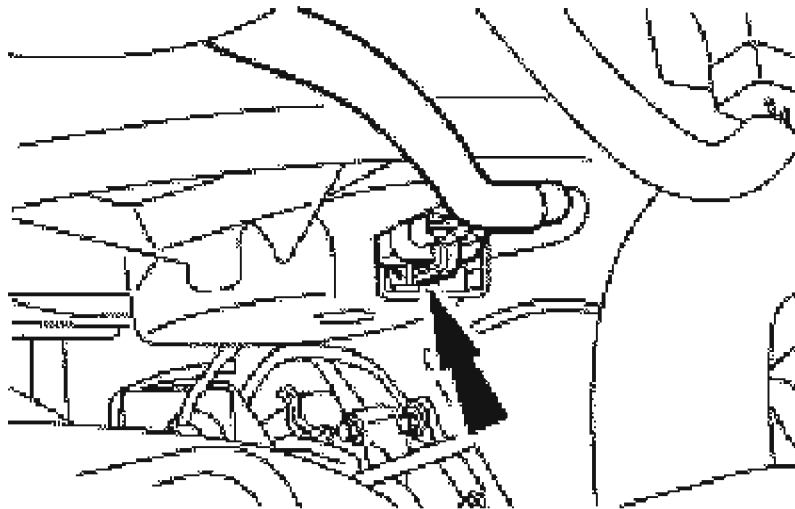
7. Lower the vehicle.
8. Remove the upper center support bolt and the center support.



G02740205

**Fig. 31: Removing Upper Center Support Bolt**  
Courtesy of FORD MOTOR CO.

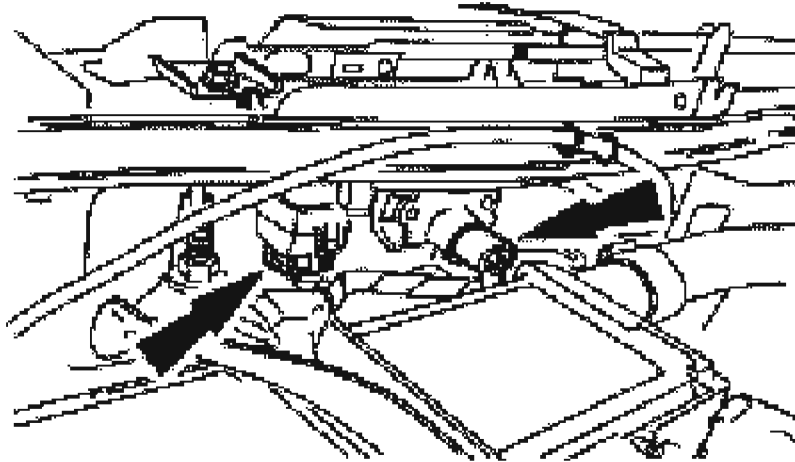
9. Disconnect the LH fan electrical connector.



G02740206

**Fig. 32: Disconnecting LH Fan Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

10. If equipped, disconnect the cooling fan resistor and the cooling fan relay electrical connectors.

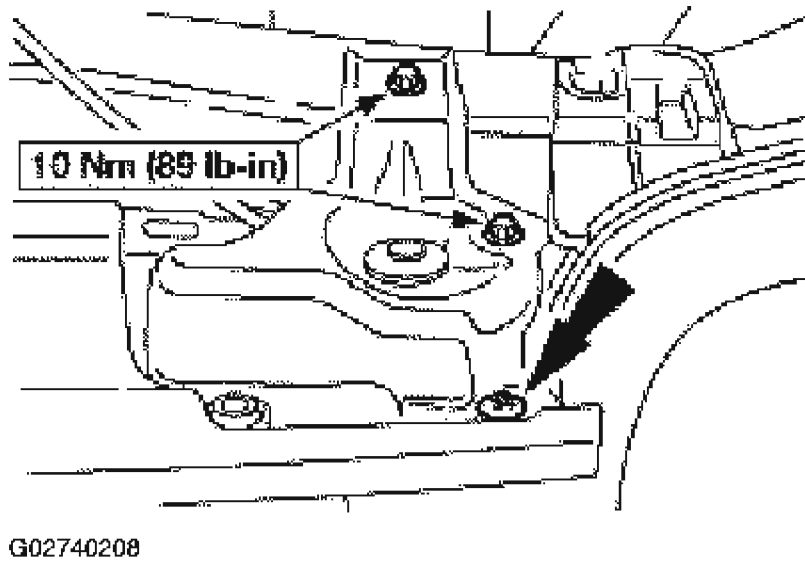


G02740207

**Fig. 33: Disconnecting Cooling Fan Resistor & Cooling Fan Relay Electrical Connectors**

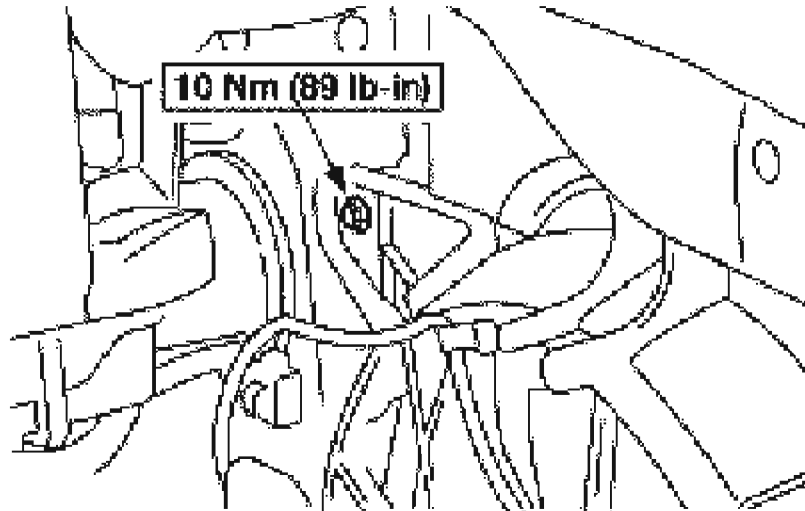
**Courtesy of FORD MOTOR CO.**

11. Remove the LH and RH upper radiator supports.



**Fig. 34: Removing LH And RH Upper Radiator Supports**  
**Courtesy of FORD MOTOR CO.**

12. Tilt the radiator forward for clearance.
13. Remove the three bolts and the LH cooling fan.

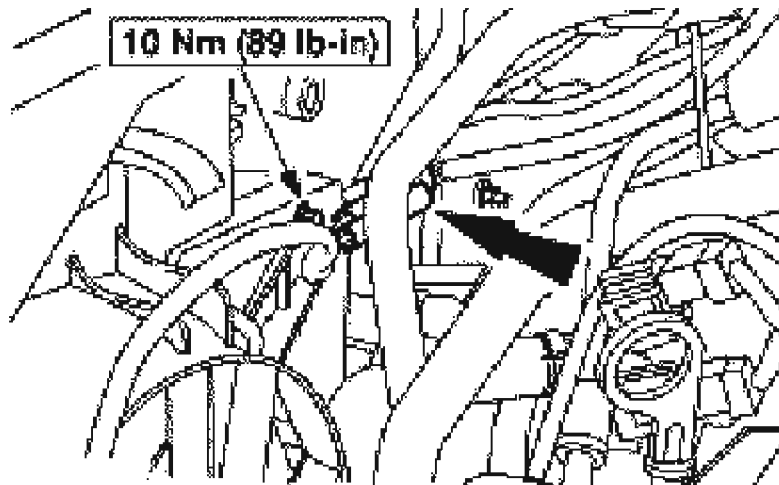


G02740209

**Fig. 35: Removing LH Cooling Fan Bolts**  
**Courtesy of FORD MOTOR CO.**

14. If necessary remove the bolt and disconnect the electrical connector, remove the RH fan.





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**Fig. 36: Disconnecting Electrical Connector & Removing Bolt**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure the hood latch is fully engaged.

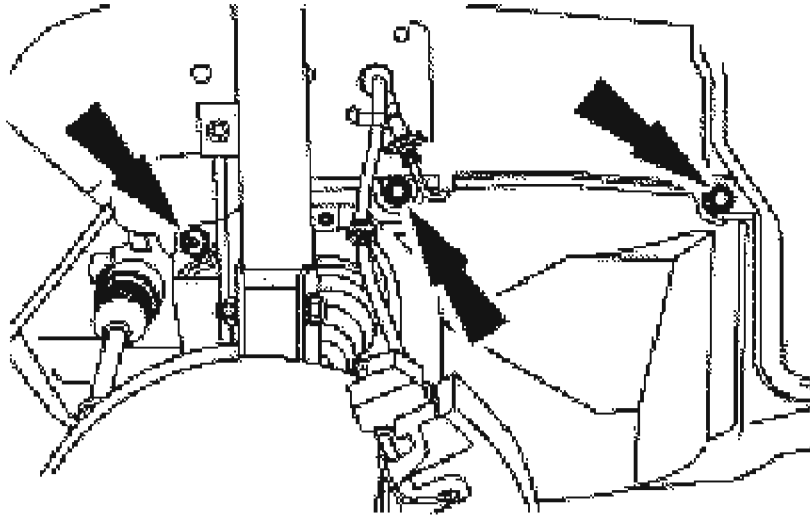
15. To install, reverse the removal procedure.
  - Verify the hood latch striker is fully engaging the hood latch.

## **RADIATOR**

### **Removal and Installation**

#### **All vehicles**

1. Drain the engine cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Raise and support the vehicle. For additional information refer to **JACKING & LIFTING** .
3. Remove the lower splash shields.

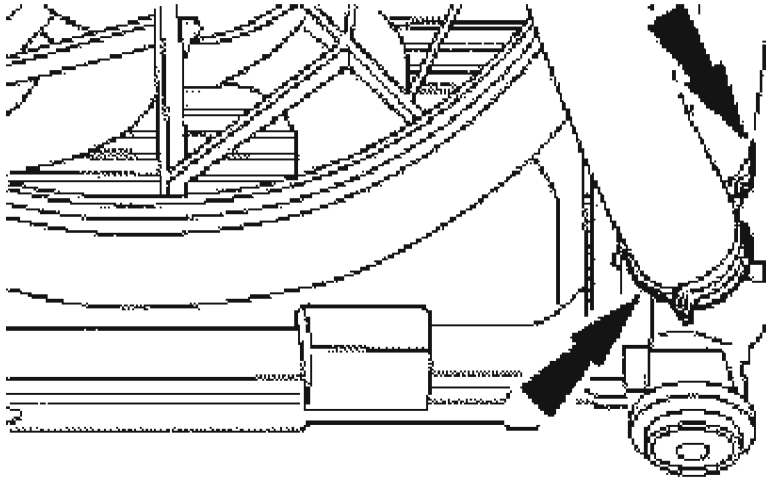


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**Fig. 37: Removing Lower Splash Shields**  
Courtesy of FORD MOTOR CO.

**Vehicles with 2.0L Zetec engines**

4. Disconnect the lower radiator hose and the degas return hose.

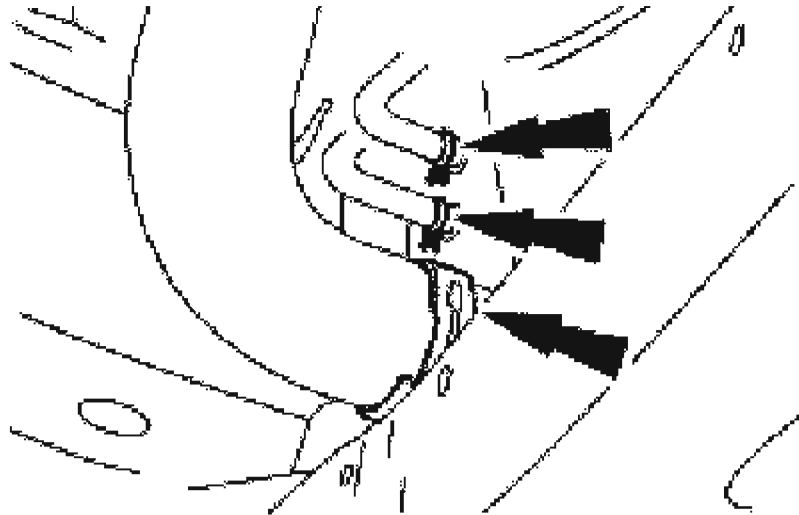


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**Fig. 38: Disconnecting Lower Radiator Hose**  
Courtesy of FORD MOTOR CO.

**Vehicles with 3.0L (4V) engines**

5. Disconnect the lower radiator hose, the high pressure transmission line and the degas return hose.

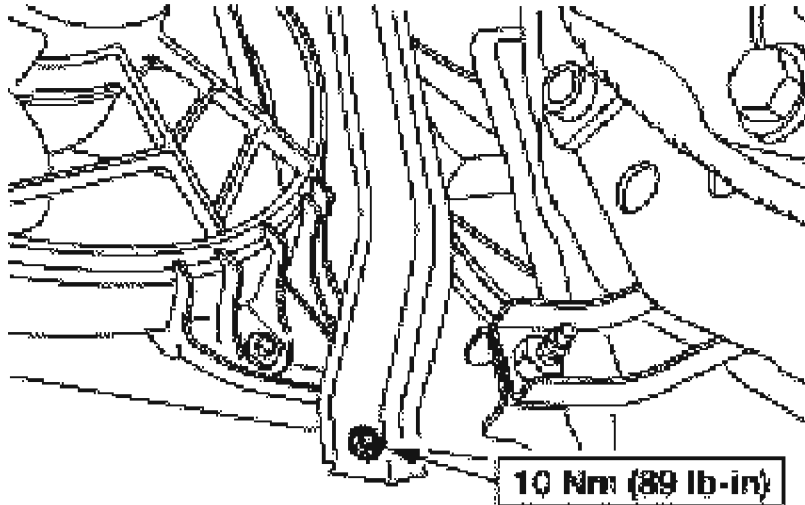


G02740213

**Fig. 39: Disconnecting Lower Radiator Hose, High Pressure Transmission Line And Degas Return Hose**  
Courtesy of FORD MOTOR CO.

**All vehicles**

6. Remove the lower center support bolt.



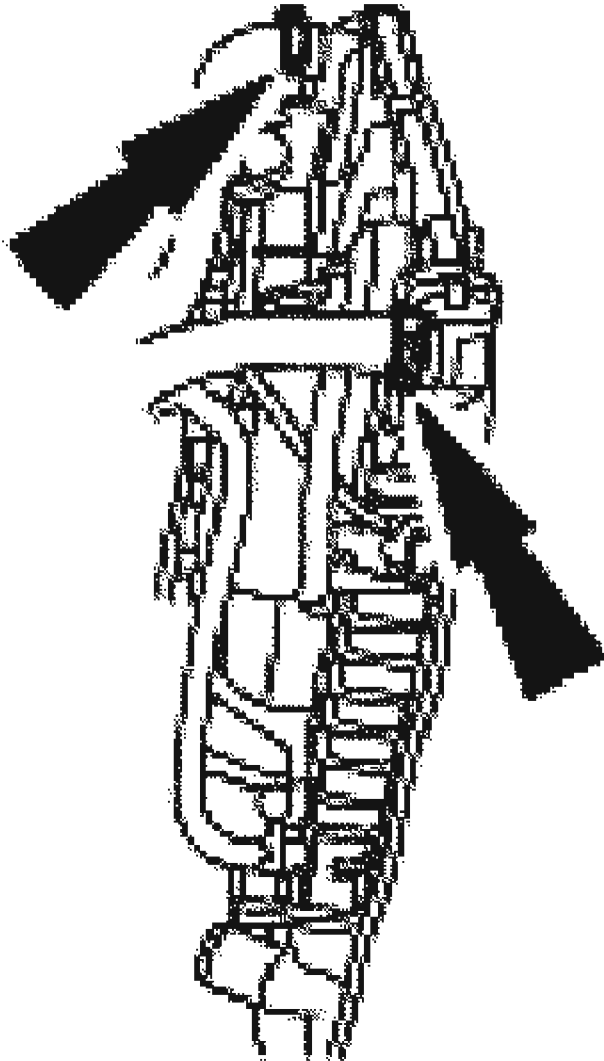
G02740214

**Fig. 40: Removing Lower Center Support Bolt**  
**Courtesy of FORD MOTOR CO.**

7. Lower the vehicle.

**Vehicles with 2.0L Zetec engines**

8. Disconnect the remaining coolant hose connections.

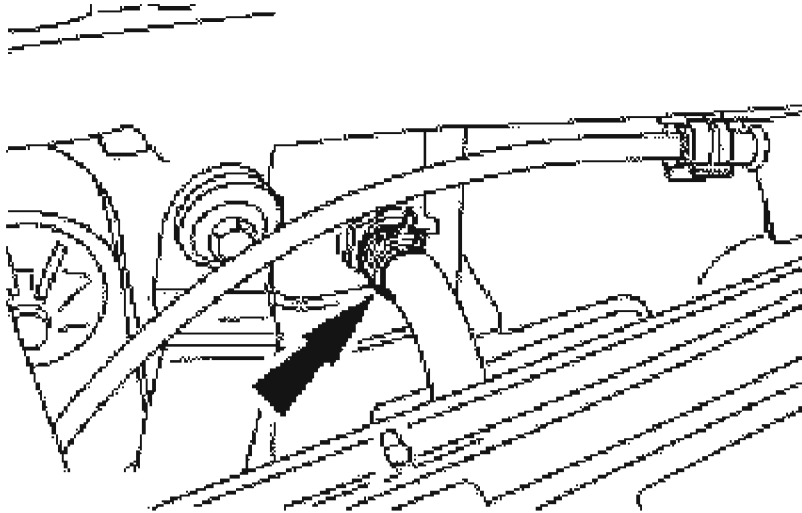


G02740215

**Fig. 41: Disconnecting Coolant Hose Connections**  
Courtesy of FORD MOTOR CO.

**Vehicles with 3.0L (4V) engines**

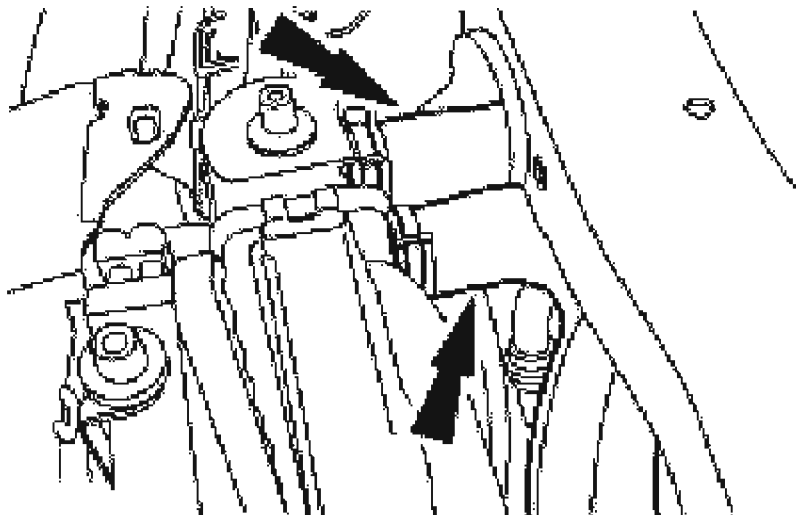
9. Disconnect the transmission return line.



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**Fig. 42: Disconnecting Transmission Return Line**  
Courtesy of FORD MOTOR CO.

10. Disconnect the upper radiator hose and degas supply hose.



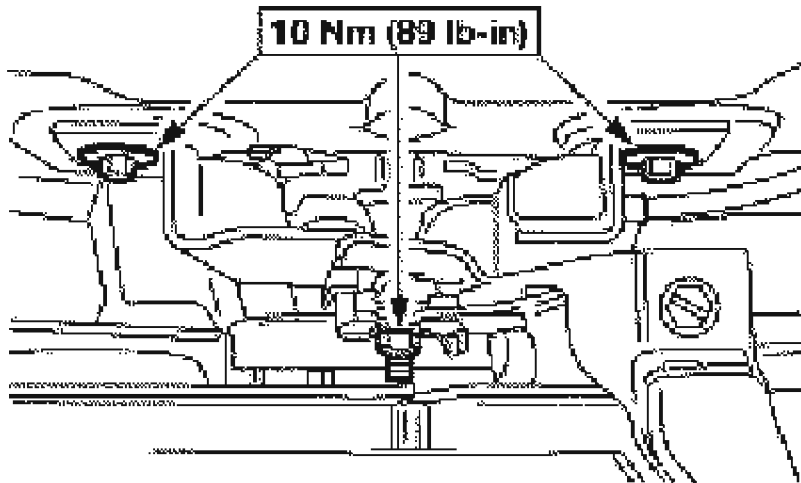
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**Fig. 43: Disconnecting Upper Radiator Hose And Degas Supply Hose**  
Courtesy of FORD MOTOR CO.

**All vehicles**

11. Position the hood latch assemble out of the way. For additional information, refer to **HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS** .

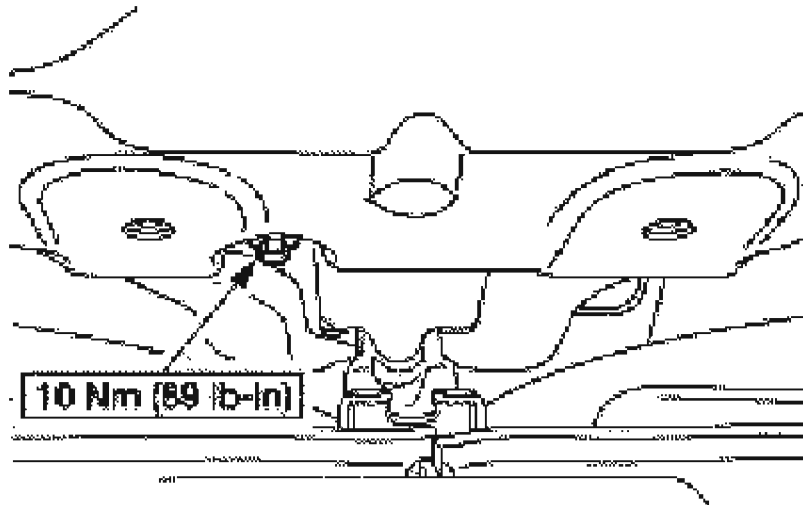




G02740218

**Fig. 44: Locating Bolts**  
Courtesy of FORD MOTOR CO.

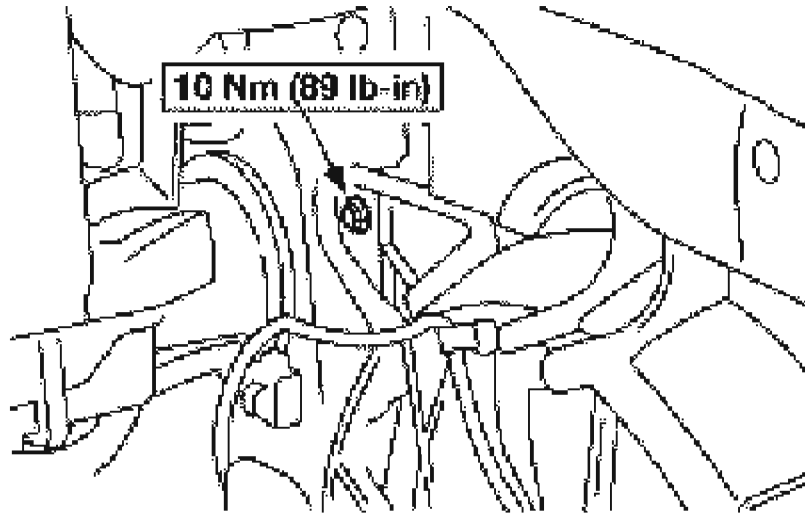
12. Remove the two bolts and the center support.



G02740219

**Fig. 45: Removing Center Support Bolts**  
**Courtesy of FORD MOTOR CO.**

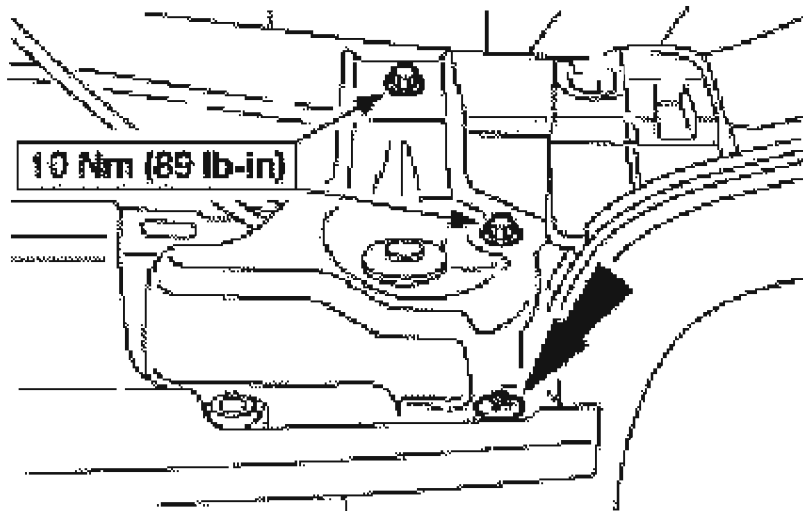
13. Remove the two top bolts retaining the cooling fan to the radiator.



G02740220

**Fig. 46: Removing Top Bolts Retaining Cooling Fan To Radiator**  
Courtesy of FORD MOTOR CO.

14. Remove the upper radiator support brackets, and remove the radiator from the vehicle.



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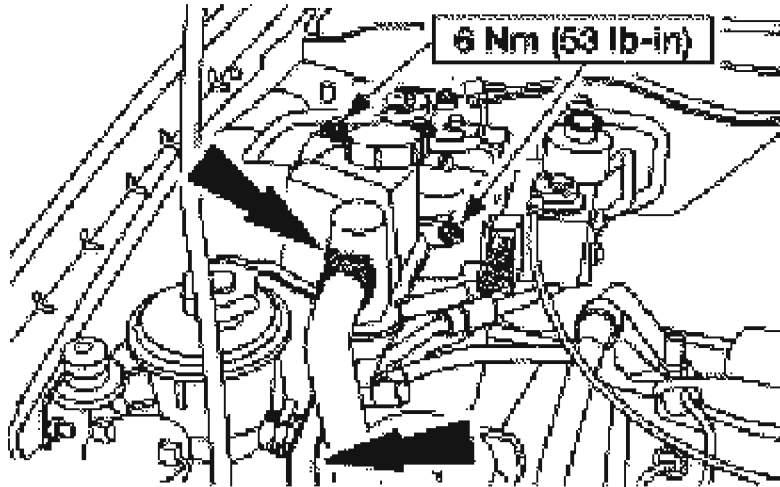
**Fig. 47: Removing Upper Radiator Support Brackets**  
Courtesy of FORD MOTOR CO.

15. To install, reverse the removal procedure.

## **DEGAS BOTTLE**

### **Removal and Installation**

1. Drain the engine cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Remove the degas bottle.




G02740222

**Fig. 48: Removing Degas Bottle**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### COOLING SYSTEM INSPECTION

	Battery/Anti-Freeze Tester 014-R1060 or equivalent
---	---

G02740223

**Fig. 49: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**WARNING:** To avoid personal injury, do not unscrew the coolant pressure relief cap while the engine is operating or hot. The coolant system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to these instructions can result in personal injury.

**CAUTION:** Check the coolant level, engine oil and transmission fluid, top off the coolant if needed, if there is engine coolant in the engine oil or transmission fluid the cause must be corrected and oil/fluid changed or major component damage can occur.

1. Inspect the coolant color:

**NOTE:** The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

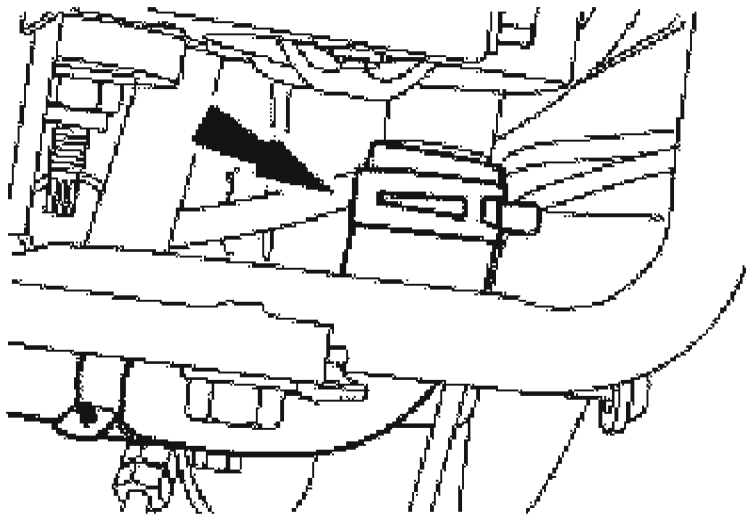
- If Motorcraft Premium Gold Engine Coolant VC-7-A or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color) has a clear or pale yellow color, this indicates higher water content than required.
- Dark brown could indicate unauthorized stop leak may have been used. Use Motorcraft Cooling System Stop Leak Pellets VC-6 or equivalent meeting Ford specification WSS-M99B37-B6.
- On Zetec engines only, a light or reddish brown color indicates that rust may be present in the cooling system. Flush the system and refill with the correct mixture of water and Motorcraft Premium Gold Engine Coolant.
- An iridescent sheen on top of the coolant could indicate a trace of oil is entering the system. For additional information on engine diagnosis, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
- A milky brown color may indicate that either engine oil or transmission fluid is entering the cooling system. If transmission fluid is suspected the cause may be a leaky radiator, pressure test the cooling system. Refer to **COMPONENT TESTS**. If engine oil is suspected the cause of the leak may be internal to the engine. For additional information on engine diagnosis, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
- If transmission fluid is contaminated with engine coolant the cause may be a leaky radiator, pressure test the system. For additional information, refer to the **COMPONENT TESTS**.

2. If engine coolant appearance is good, test the engine coolant range with the battery and antifreeze tester:

- Maximum coolant concentration is 60/40.
  - Minimum coolant concentration is 40/60.
3. Adjust coolant range and level if necessary:
- If coolant is low, add specified coolant mixture only.
  - If the engine coolant tests too weak, add straight engine coolant until the readings are within acceptable levels.
  - If the engine coolant tests strong, remove some of the engine coolant and add distilled water until the readings are within acceptable levels.

**THERMOSTAT HOUSING - 2.0L ZETEC****Removal and Installation**

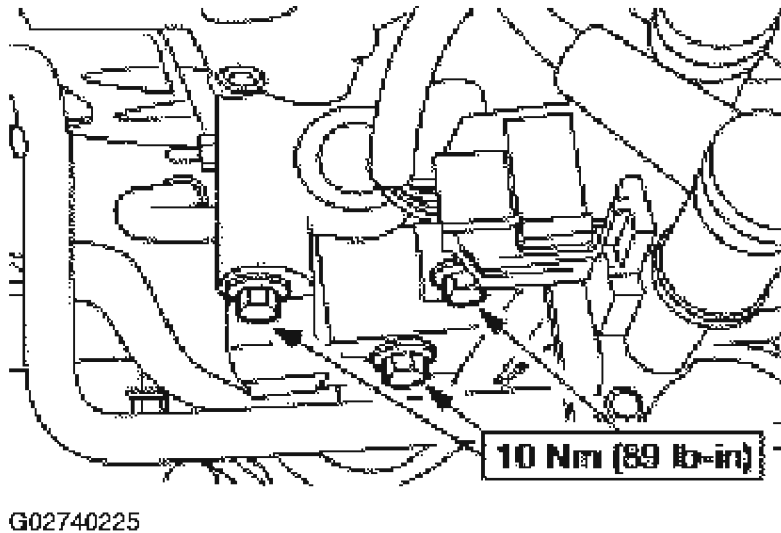
1. Remove the thermostat. For additional information, refer to **THERMOSTAT - 2.0L ZETEC**.
2. Disconnect the heater hose and position out of the way.



G02740224

**Fig. 50: Disconnecting Heater Hoses**  
Courtesy of FORD MOTOR CO.

3. Remove the thermostat housing.



**Fig. 51: Removing Thermostat Housing Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean and inspect the sealing surfaces.

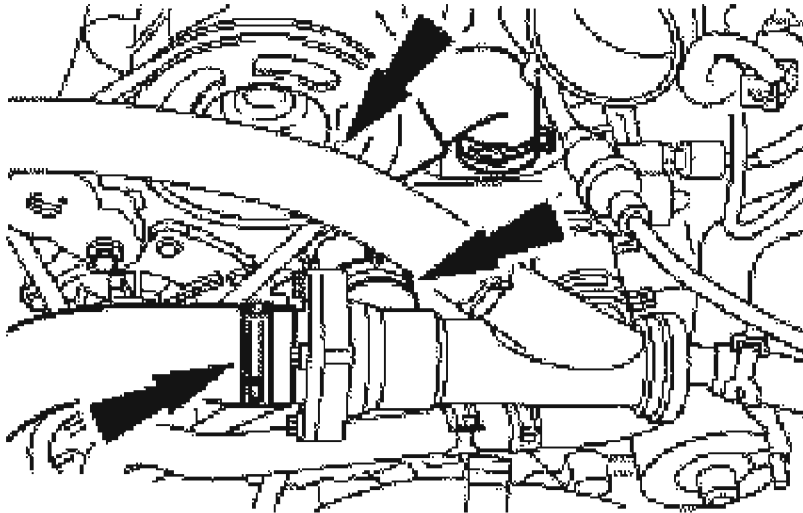
4. To install, reverse the removal procedure.

#### **WATER PUMP - 3.0L (4V)**

##### **Removal and Installation**

1. Drain the engine cooling system. For additional information, Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
2. Remove the air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
3. Remove the coolant pump belt tensioner, if equipped. For additional information, refer to **ACCESSORY DRIVE** .
4. Disconnect the three hoses.

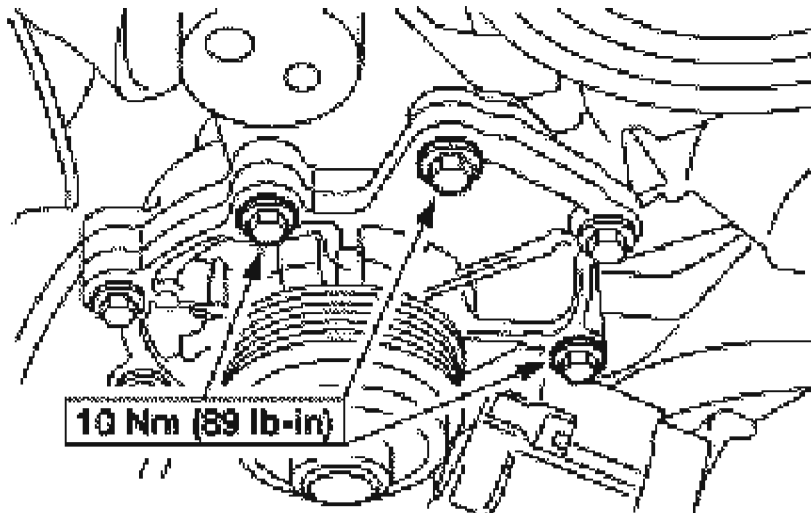




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**Fig. 52: Disconnecting Hoses**  
Courtesy of FORD MOTOR CO.

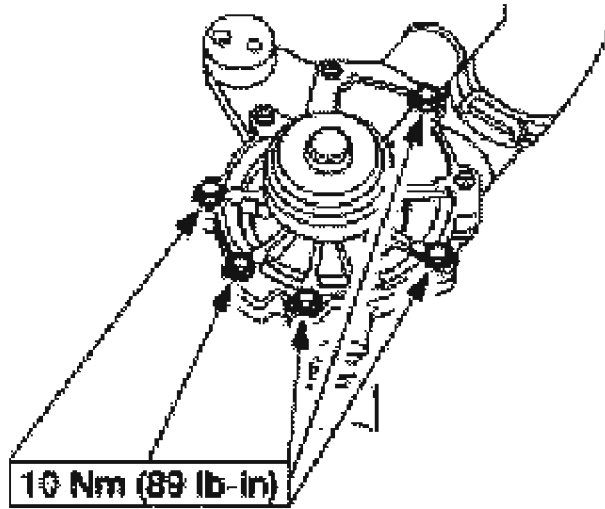
5. Remove the bolts and the coolant pump assembly.



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**Fig. 53: Removing Coolant Pump Assembly Bolts**  
Courtesy of FORD MOTOR CO.

6. Separate the coolant pump from the coolant pump housing.



G02740228

**Fig. 54: Removing Coolant Pump-To-Coolant Pump Housing Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean and inspect the sealing surfaces.

7. To install, reverse the removal procedure.

**2004 ENGINE COOLING****Electric Cooling Fans - Escape****DESCRIPTION & OPERATION****2.0L**

The electric cooling fan system consists of 3-speed cooling fans controlled by Powertrain Control Module (PCM). Three or 4 relays control fan speed. The electric cooling fans are activated when ignition switch is in ON position and engine coolant exceeds a specified temperature. Cooling fans are also active when A/C is on.

The PCM monitors certain parameters (such as engine coolant temperature, vehicle speed, A/C on/off status, A/C pressure, etc.) to determine engine cooling fan needs. The PCM controls the fan operation through the Low Fan Control (LFC), Medium Fan Control (MFC) and/or High Fan Control (HFC) outputs. Although the PCM output circuits for three speed fans are called low, medium and high Fan Control (FC), cooling fan speed is controlled by a combination of these outputs. See **PCM FC OUTPUT STATE FOR COOLING FAN SPEEDS** table.

**PCM FC OUTPUT STATE FOR COOLING FAN SPEEDS**

PCM Output	Low Speed	Medium Speed	High Speed	Fan Off
LFC	On	On	On	Off
MFC	Off	On	Off Or ON	Off
HFC	Off	Off	On	Off

**3.0L**

The electric cooling fan system consists of 2-speed cooling fans controlled by Powertrain Control Module (PCM). Three relays control fan speed. The electric cooling fans are activated when ignition switch is in ON position and engine coolant exceeds a specified temperature. Cooling fans are also active when A/C is on.

The PCM monitors certain parameters (such as engine coolant temperature, vehicle speed, A/C on/off status, A/C pressure, etc.) to determine engine cooling fan needs. The PCM controls the fan operation through the Low Fan Control (LFC) and the High Fan Control (HFC) outputs.

**COMPONENT LOCATIONS**

All fan control relays are located in the battery junction box. The battery junction box is located in the left front corner of engine compartment.

**TROUBLE SHOOTING**

**NOTE:** To trouble shoot mechanical cooling system components, see GENERAL COOLING SYSTEM SERVICE article in ENGINE in GENERAL INFORMATION.

## PRELIMINARY INSPECTION

Verify customer complaint by operating suspected system. Visually inspect for obvious signs of mechanical and electrical damage. Inspect for blown fuses and damaged relays. See WIRING DIAGRAMS . Inspect for loose or corroded connections, damaged wiring harness and/or switches. Check for a broken or partially broken wire inside insulation, which could cause system malfunction but prove good in a continuity/voltage check with system disconnected. Ensure any aftermarket electronic equipment is properly installed. If fault is found, repair as necessary. If no fault is found, see DIAGNOSTIC SYSTEM .

## DIAGNOSTIC SYSTEM

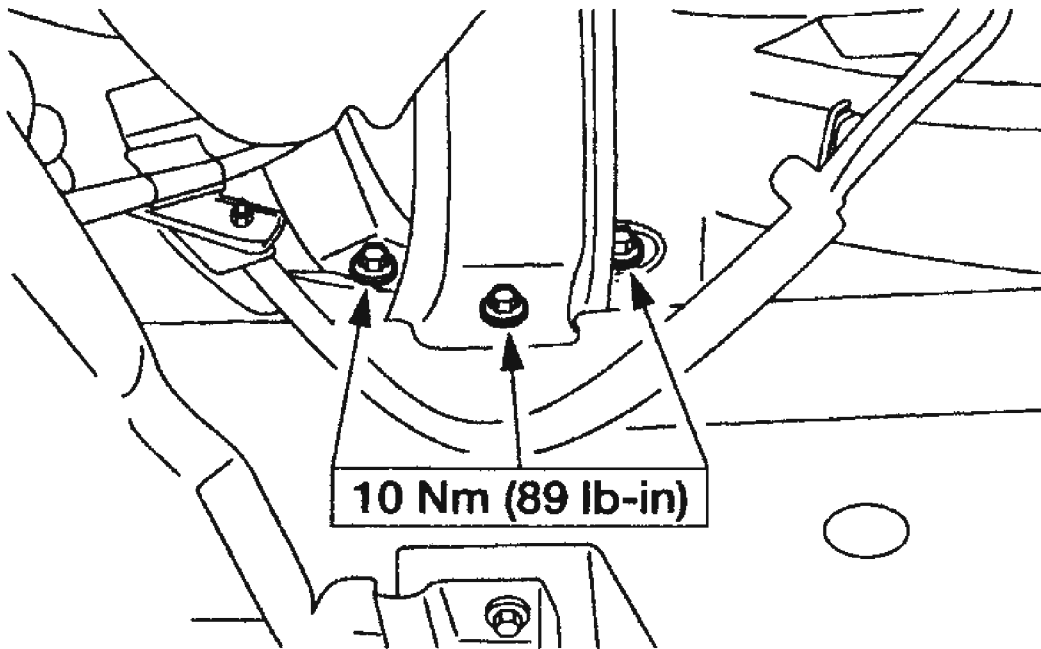
For cooling fan electrical diagnostics, see SYMPTOMS in appropriate TROUBLE SHOOTING - NO CODES article in ENGINE PERFORMANCE.

## REMOVAL & INSTALLATION

### FAN ASSEMBLY

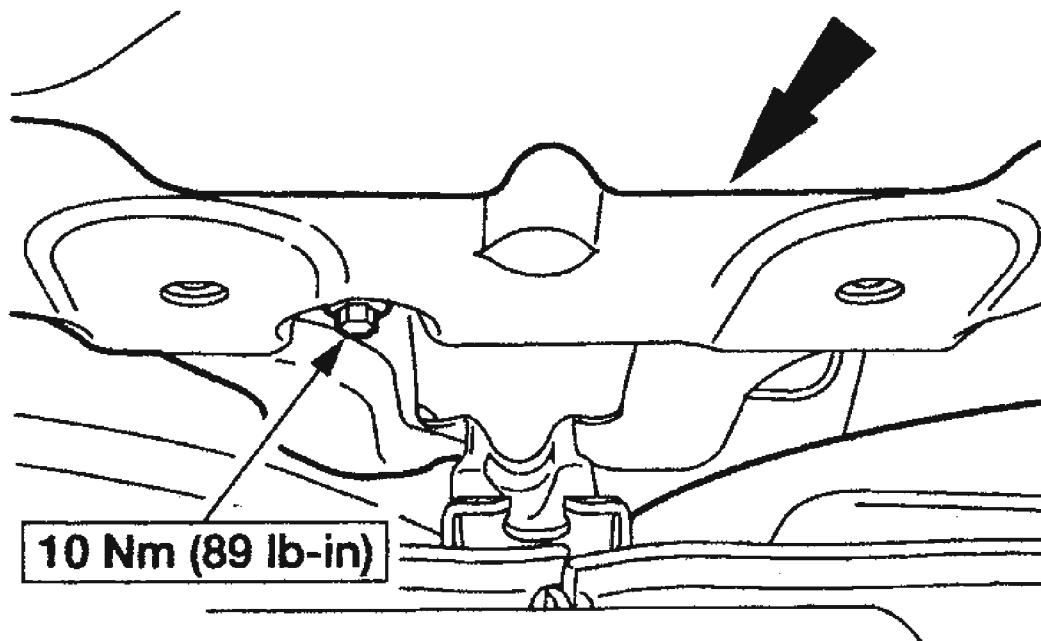
#### Removal & Installation

1. Disconnect the battery ground cable. Remove the hood latch nut. Mark the hood latch position prior to removal of the bolts. Remove the hood latch bolts and position the hood latch out of the way.
2. If equipped, remove the upper radiator tie strap. Raise and support the vehicle. Remove the lower center support bolt and the lower fan bolts. See **Fig. 1** . Lower the vehicle. Remove the upper center support bolt and the center support. See **Fig. 2** .
3. Disconnect the left fan electrical connector. If equipped, disconnect the cooling fan resistor and the cooling fan relay electrical connectors. Remove the left and right upper radiator supports. See **Fig. 3** . Tilt the radiator forward for clearance.
4. Remove the 3 bolts and the left cooling fan. If necessary remove the bolt and disconnect the electrical connector, remove the right fan. See **Fig. 4** . To install, reverse the removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS . Verify the hood latch striker is fully engaging the hood latch. Make sure the hood latch is fully engaged.



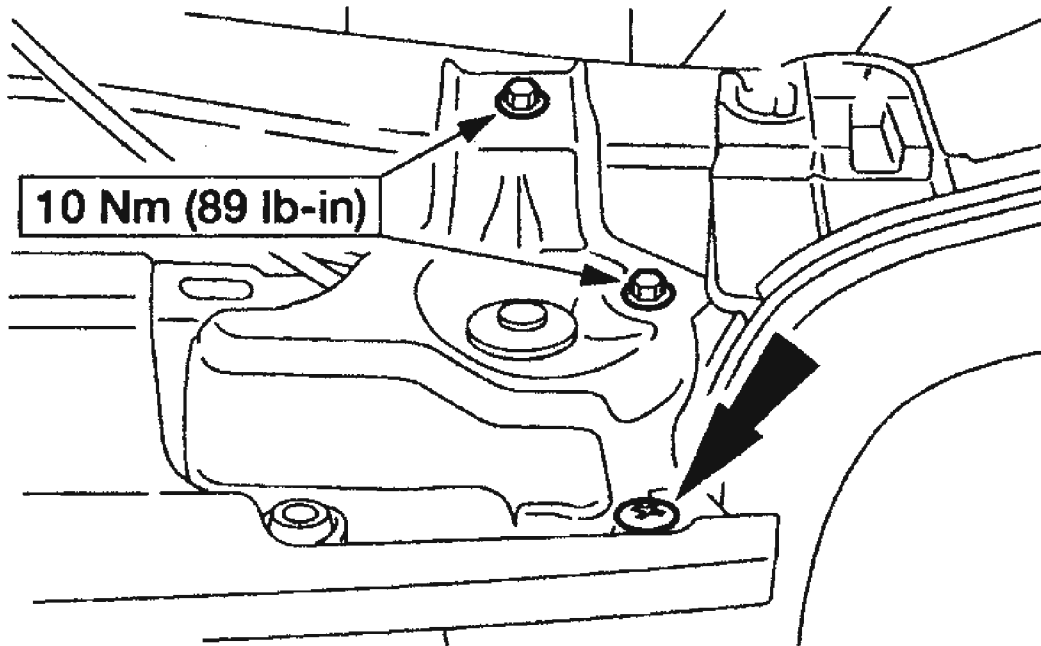
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**Fig. 1: Locating Center Support Bolt & Lower Fan Bolts**  
Courtesy of FORD MOTOR CO.



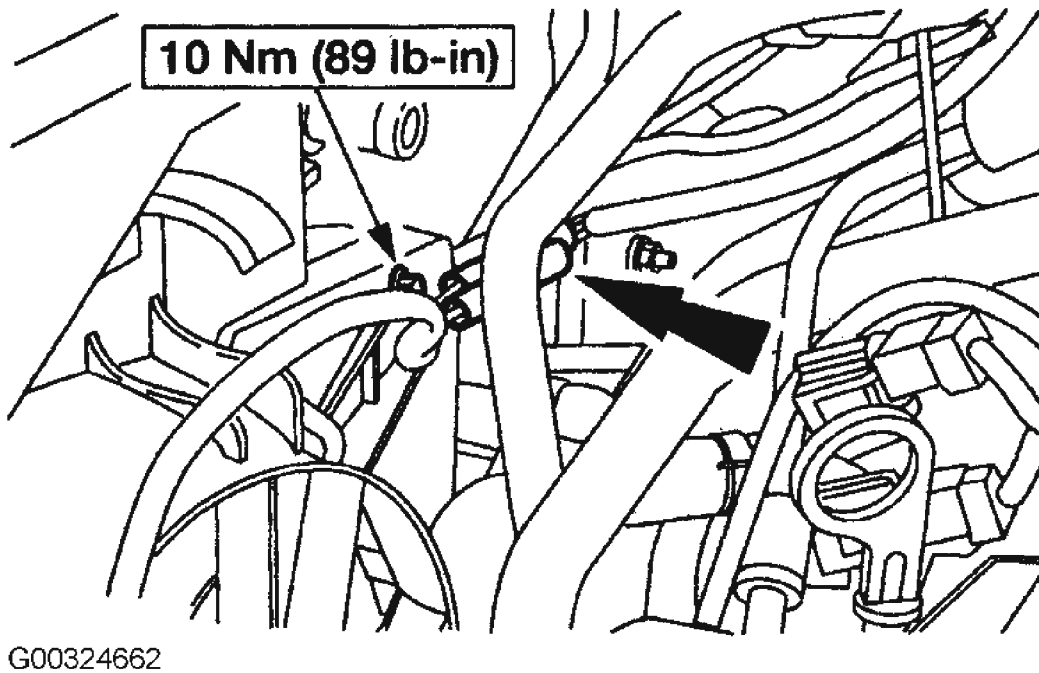
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**Fig. 2: Locating Upper Center Bolt**  
Courtesy of FORD MOTOR CO.



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**Fig. 3: Locating Upper Radiator Support Bolts**  
Courtesy of FORD MOTOR CO.



**Fig. 4: Locating Right Fan Bolt & Electrical Connector**  
Courtesy of FORD MOTOR CO.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	INCH Lbs. (N.m)
Center Support Bolts	89 (10)
Cooling Fan-To-Radiator	89 (10)
Lower Radiator Support Bolts	89 (10)
Hood Latch Bolts & Nuts	89 (10)
Upper Radiator Support Bolts	89 (10)

## WIRING DIAGRAMS

For wiring diagrams, see **COOLING FAN** in SYSTEM WIRING DIAGRAMS article in ELECTRICAL.



**2002-04 BRAKES****Disc & Drum - Escape****DESCRIPTION & OPERATION****SYSTEM OPERATION****Hydraulic Brake Actuation**

The hydraulic brake actuation system consists of the following components:

- If equipped, Anti-Lock Brake System (ABS).
- Brake master cylinder.
- Brake pressure control valve (without ABS).
- Disc brake calipers.
- Rear wheel cylinders.
- Brake tubes and hoses.

The hydraulic brake system is diagonally split with the left front and right rear brakes on one circuit and the right front and left rear brakes on the other circuit.

**Disc/Drum Actuation**

The brake pedal is connected to the brake master cylinder. When the brake pedal is depressed, brake fluid is pushed through the double-walled steel lines and flexible hoses to the rear wheel cylinders and the front disc brake caliper. The brake fluid enters the rear wheel cylinder, forcing the rear wheel cylinder pistons outward against the brake shoe and lining. The brake shoe and lining press against the braking surface of the brake drum. The front disc brake caliper pistons are forced outward against the brake pad and lining, and contact the braking surface of the front disc brake rotor. When the brake pedal is released, the pressure is relieved, returning the front disc brake caliper pistons and rear wheel cylinder pistons and the brake shoe, brake pad and lining to the unapplied position.

**SYSTEM COMPONENTS****Brake Booster**

The brake booster consists of a power brake booster, vacuum booster hose and power brake booster check valve. The power brake booster reduces the effort required to push the brake pedal to actuate the brakes. The vacuum booster hose supplies vacuum to the brake booster. The vacuum booster check valve closes when the engine is turned off and traps engine vacuum in the power brake booster.

**Brake Lines and Hoses**

Steel tubing is used throughout the brake hydraulic system. All brake tube fittings must be correctly double flared to provide strong leakproof connections. If a section of brake tube is damaged, the entire section must be removed and a new tube of the same type, size, shape and length installed. When installing new hydraulic brake lines, hoses, or connectors, tighten all connections securely. After installation, bleed the brake system.

### **Brake Pressure Control Valve**

The brake pressure control valve proportions the pressure to the rear brakes. When the brake pedal is applied, brake fluid pressure passes through the brake pressure control valve to the rear brake system until the valve split point is reached. Above its split point, the brake pressure control valve begins to reduce the hydraulic pressure to the rear brakes, creating a balanced braking condition between the front and rear brakes.

### **Front Disc Brakes**

The front disc brake system consists of a single-piston front disc brake caliper and a ventilated front disc brake rotor. The brake pads are held in the front disc brake caliper by two front disc brake caliper bolts. The front disc brake system consists of piston seals, piston dust seals, caliper, caliper bleeder screw, caliper bleeder screw cap, rotor, anchor plate, dust shield and brake pads.

### **Master Cylinder**

The brake master cylinder is a dual-piston type. The brake master cylinder operates as follows:

- When the brake pedal is depressed, pressure is applied by mechanical linkage to the primary and secondary piston.
- Brake master cylinder pistons apply hydraulic pressure to the two hydraulic circuits.

The brake master cylinder consists of the following components:

- Brake master cylinder reservoir.
- Brake master cylinder body.
- Primary piston.
- Secondary piston.
- Snap ring.

Whenever the brake master cylinder is removed from the brake booster, new nuts must be installed.

### **Master Cylinder Reservoir**

The brake master cylinder reservoir is mounted to the brake master cylinder. The reservoir

holds fluid supply for each brake master cylinder hydraulic piston and provides visual fluid level markings. The reservoir contains the brake master cylinder fluid level warning switch.

On vehicles equipped with a manual transmission, the reservoir is shared with the clutch master cylinder.

#### **Master Cylinder Reservoir Brake Fluid Level Warning Switch**

The brake fluid level warning switch is an integral part of the brake master cylinder reservoir. It consists of a float containing a magnet and a reed switch mounted in the bottom of the brake master cylinder reservoir.

When the brake fluid in the brake master cylinder reservoir gets to a predetermined level, the float and magnet actuates the reed switch that causes the Red brake warning indicator to illuminate. Loss of brake fluid from either the primary (front) or secondary (rear) system will cause this system to activate. If the brake fluid level warning switch is inoperative, a new brake master cylinder reservoir must be installed.

#### **Parking Brake**

The parking brake system consists of the following components:

- Front parking brake cable.
- Parking brake control.
- Parking brake cable equalizer.
- Parking brake warning indicator switch.
- Rear parking brake cable.
- Rear drum brake.

#### **Rear Drum Brakes**

The rear drum brake uses a pedal actuated rear wheel cylinder to move the rear brake shoes against the brake drum. After initial setting, rear drum brake adjustment is maintained through periodic parking brake operation.

The drum brake system consists of the following components:

1. Brake backing plate.
2. Brake drum.
3. Brake shoes.
4. Brake shoe hold-down pins and clips.
5. Brake shoe retracting springs.
6. Parking brake cable.

7. Parking brake lever.
8. Parking brake lever pin.
9. Parking brake return spring.
10. Self adjuster.
11. Self adjuster lever.
12. Self adjuster spring.
13. Wheel cylinder assembly.

## BLEEDING BRAKE SYSTEM

**CAUTION: Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash it with water.**

When any part of the hydraulic system has been disconnected for repair or a new component is installed, air may enter the system, causing spongy brake pedal action. This requires the bleeding of the hydraulic system after it has been correctly connected. Always bleed brakelines in sequence. See **BLEEDING SEQUENCE** .

Before bleeding system, remove all vacuum from power unit by depressing brake pedal several times. Bleed master cylinder first, followed in sequence by rear wheel cylinders, anti-lock system components (if equipped) and calipers. See **BLEEDING SEQUENCE** .

### ANTI-LOCK BRAKES BLEED

**NOTE: Bleeding the Hydraulic Control Unit (HCU) is required only when removing or installing the HCU or master cylinder, or opening the lines to the HCU.**

**NOTE: Carrying out the System Bleed function drives trapped air from the HCU. Subsequent bleeding removes the air from the brake hydraulic system through the bleeder screws.**

**NOTE: Adequate voltage to the HCU module is required during the anti-lock control portion of the system bleed.**

1. Connect the diagnostic scan tool Data Communication Link (DCL) to the data link connector located in the passenger compartment. It is attached to the instrument panel and accessible from the driver's seat.
2. Access the SYSTEM BLEED FUNCTION on the scan tool. Go to TOOL TAB-CHASSIS-BRAKING-ABS SERVICE BLEED and follow the directions on the scan tool.

3. Manually bleed the brake hydraulic system. See **MANUAL BLEEDING** .
4. Repeat the procedure carrying out a total of two diagnostic tool cycles and two manual bleed cycles.

**MANUAL BLEEDING**

**NOTE: DO NOT allow reservoir to run dry during bleeding operation.**

**Master Cylinder Bleeding (Bench)**

1. Support brake master cylinder body in a vise.
2. Remove the master cylinder cap and install short brake hoses to the master cylinder outlet ports with the ends submerged in the brake master cylinder reservoir.
3. Fill the brake master cylinder reservoir with High Performance DOT 3 brake fluid C6AZ-19542-AB or equivalent meeting Ford specification ESA-M6C25-A, DOT 3. Fill fluid brake master cylinder reservoir with brake fluid. If equipped with a manual transmission, plug the master cylinder feed port.
4. Slowly depress the primary piston until bubble-free brake fluid flows from both brake hoses.
5. Remove the brake hoses from the master cylinder.
6. Install plugs in the front and rear brake outlet port.
7. Install the reservoir cap and install the brake master cylinder in the vehicle. Remove the master cylinder outlet port plugs before installing the lines.

**Master Cylinder Bleeding (On-Vehicle)**

1. Disconnect the brake outlet lines from the brake master cylinder and cap the lines.
2. Install short brake hoses to the master cylinder outlet ports with the ends submerged in the brake master cylinder reservoir.
3. Fill the brake master cylinder reservoir with High Performance DOT 3 Brake Fluid C6AZ-19542-AB or equivalent meeting Ford specification ESA-M6C25-A, DOT 3.
4. Have an assistant pump the brake pedal until clear, bubble-free brake fluid flows from both brake hoses.
5. Remove the short brake hoses and install the brake outlet lines.
6. Bleed the hydraulic brake system.

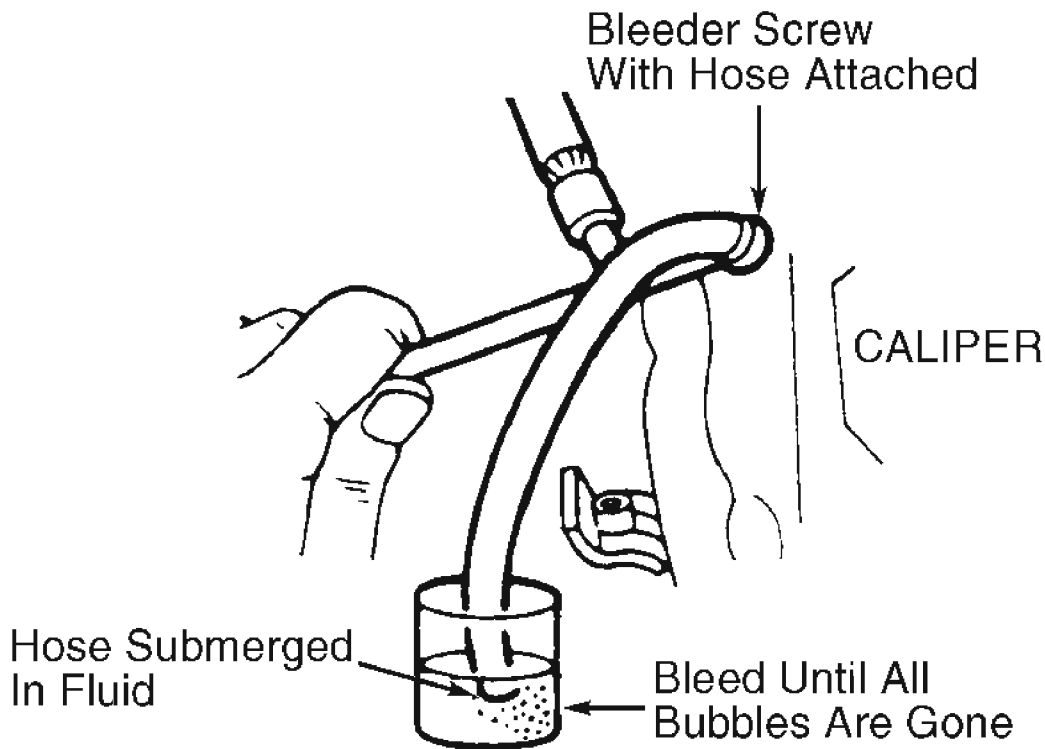
**Gravity Bleeding**

**CAUTION: Be sure to check the brake fluid level in the brake master cylinder reservoir often. Do not let it run dry.**

1. Fill the brake master cylinder reservoir with High Performance DOT 3 Brake Fluid C6AZ-19542-AB or equivalent meeting Ford specification ESA-M6C25-A, DOT 3.
2. Begin bleeding the system, going in order from the right rear wheel, to the left rear wheel, then to the right front wheel and ending with the left front wheel.
3. Loosen the rear wheel cylinder bleeder screw and leave open until clear, bubble-free brake fluid flows.
4. Tighten the wheel cylinder bleeder screw.
5. Open the front disc brake caliper bleeder screw. Leave open until clear bubble-free brake fluid flows.
6. Tighten the front disc brake caliper bleeder screw.
7. Fill the brake master cylinder reservoir with fluid and install the reservoir cap.

**Manual Bleeding**

1. Clean master cylinder cap and surrounding area. Remove cap. All models are equipped with dual-type master cylinder. Bleed primary and secondary systems separately. Loosen primary or secondary master cylinder hydraulic line fitting.
2. Wrap a cloth around brakelines to absorb escaping brake fluid. Slowly push brake pedal down to force out air. With pedal fully depressed, tighten fittings to prevent air from being sucked into master cylinder when pedal is released. Release pedal.
3. Repeat procedure until air is completely purged from master cylinder. When all air has escaped, tighten fittings with pedal down. Release pedal, and depress again. If pedal is not firm, repeat bleeding procedure.
4. Repeat procedure at bleeder fitting on rear anti-lock brake electrohydraulic RABS valve, each wheel cylinder and caliper. See **Fig. 1** . See **BLEEDING SEQUENCE** . When bleeding is complete, fill master cylinder to proper level.



G95A27623

**Fig. 1: Bleeding Wheel Cylinders (Typical)**  
Courtesy of FORD MOTOR CO.

#### PRESSURE BLEEDING

**CAUTION:** DO NOT exceed 50 psi (3.5 kg/cm<sup>2</sup>) during bleeding.

1. Clean the outside of the brake master cylinder reservoir. Remove the reservoir cap and fill the brake master cylinder reservoir with brake fluid.

**NOTE:** Master cylinder pressure bleeder adapter tools are available from various manufacturers of pressure bleeding equipment. Follow the instructions of the manufacturer when installing the adapter.

2. Install brake bleeder to the brake master cylinder reservoir, and attach the brake bleeder tank hose to the fitting on the adapter.
3. Attach a rubber drain hose to the right rear bleeder screw and submerge the free end of

the hose in a container partially filled with clean brake fluid. See **Fig. 1** .

4. Open the valve on the brake bleeder tank. Loosen the bleeder screw. Leave open until clear, bubble-free brake fluid flows, then close the bleeder screw and remove the rubber hose. Repeat procedure on remaining wheel cylinder and calipers in sequence. See **BLEEDING SEQUENCE** .
5. Close the Brake Bleeder tank valve and remove the tank hose from the adapter, and remove the adapter.
6. Fill the brake master cylinder reservoir and install the reservoir cap.

#### BLEEDING SEQUENCE

#### BLEEDING SEQUENCE

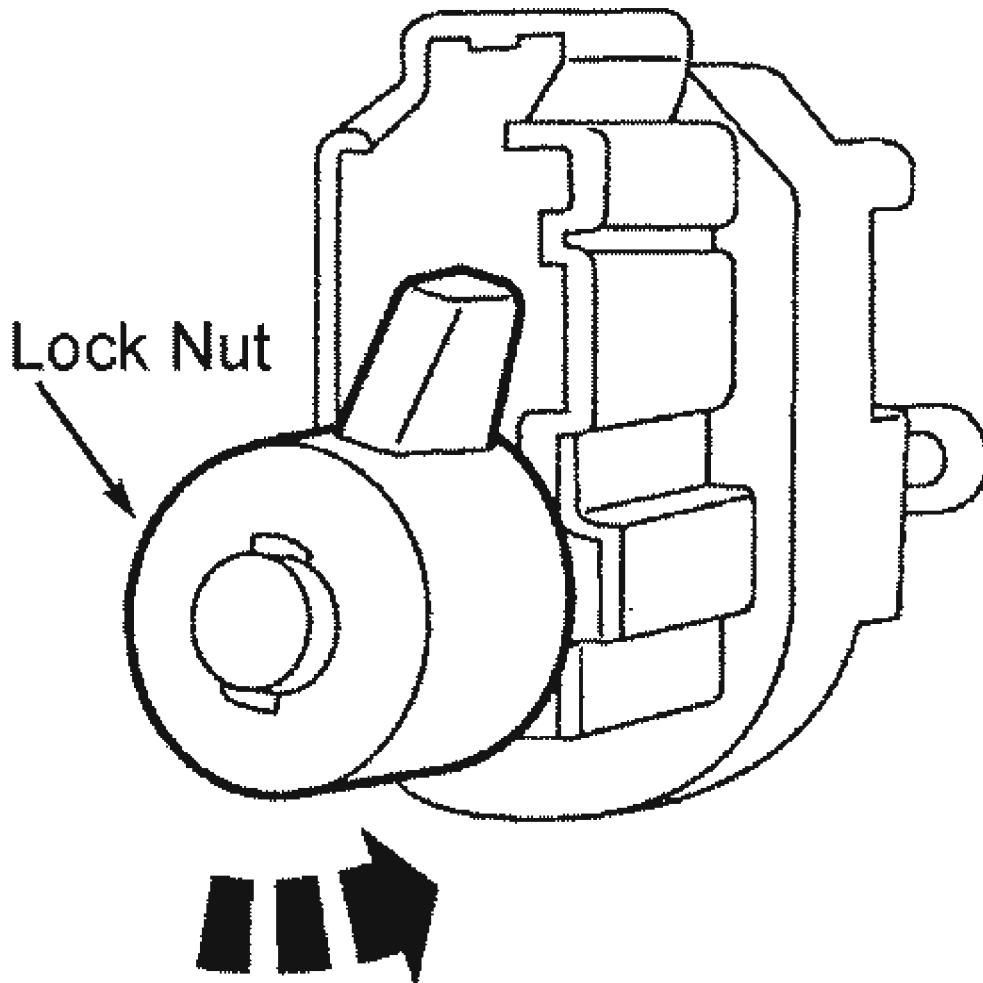
Application	Sequence
All	(1) RR, LR, RF & LF
(1) Or in the order displayed by scan tool.	

#### ADJUSTMENTS

##### BRAKE PEDAL POSITION SWITCH & SPEED CONTROL DEACTIVATOR SWITCH

Initial installation of Brake Pedal Position (BPP) and speed control deactivator switch allows for one adjustment. If additional adjustments are necessary, install a new switch. To unlock, rotate the lock knob counterclockwise to the stop. See **Fig. 2** . With the engine running, fully depress and hold the brake pedal. Install the BPP or deactivator switch. Position the switch in the bracket and rotate counterclockwise. Connect the electrical connector. Slowly release the brake pedal.





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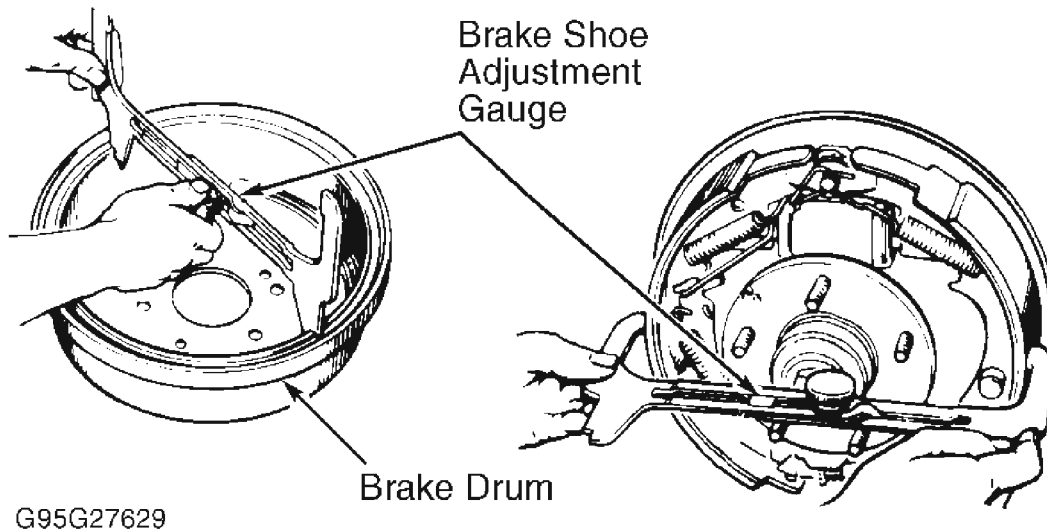
**Fig. 2: Adjusting Lock Knob**  
Courtesy of FORD MOTOR CO.

#### **BRAKE SHOES**

Drums Removed

**NOTE:** Rear brake shoes are automatically adjusted when vehicle is driven forward and backward and brakes are applied sharply. Manual adjustment is required if brakes do not self-adjust or after brake shoes have been removed or replaced.

1. Adjust with brake drums cold and parking brake correctly adjusted. Measure brake drum inside diameter using Brake Adjustment Gauge (D81L-1103-A) or equivalent . See **Fig. 3** .



**Fig. 3: Measuring Brake Drum & Shoe Diameter**  
**Courtesy of FORD MOTOR CO.**

2. Reverse adjustment gauge. Position the special tool on the brake shoes and linings and adjust accordingly. Hold adjusting lever away from adjusting screw. Turn screw until outside diameter of shoes contacts gauge. See **Fig. 3** .
3. Install brake drum and wheel assembly. Complete adjustment by applying brakes quickly several times while driving vehicle alternately forward and backward. Check brake operation by stopping often while driving forward.

## DISC PADS

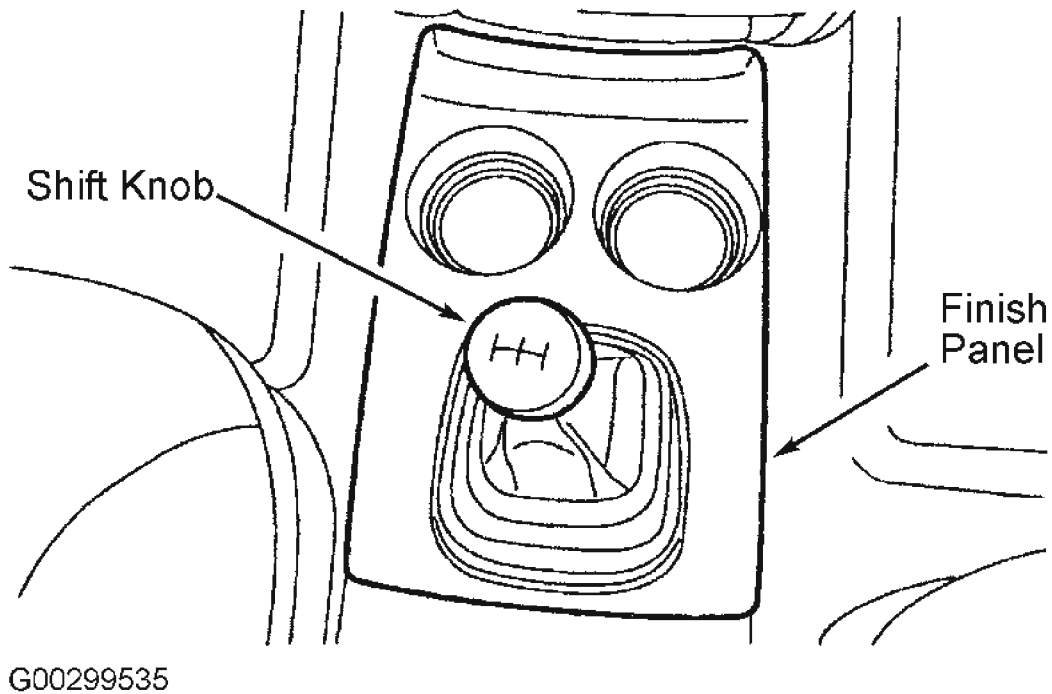
As brake pads wear, caliper piston remains in constant contact with brake pad, eliminating need for adjustment.

## PARKING BRAKE CABLE

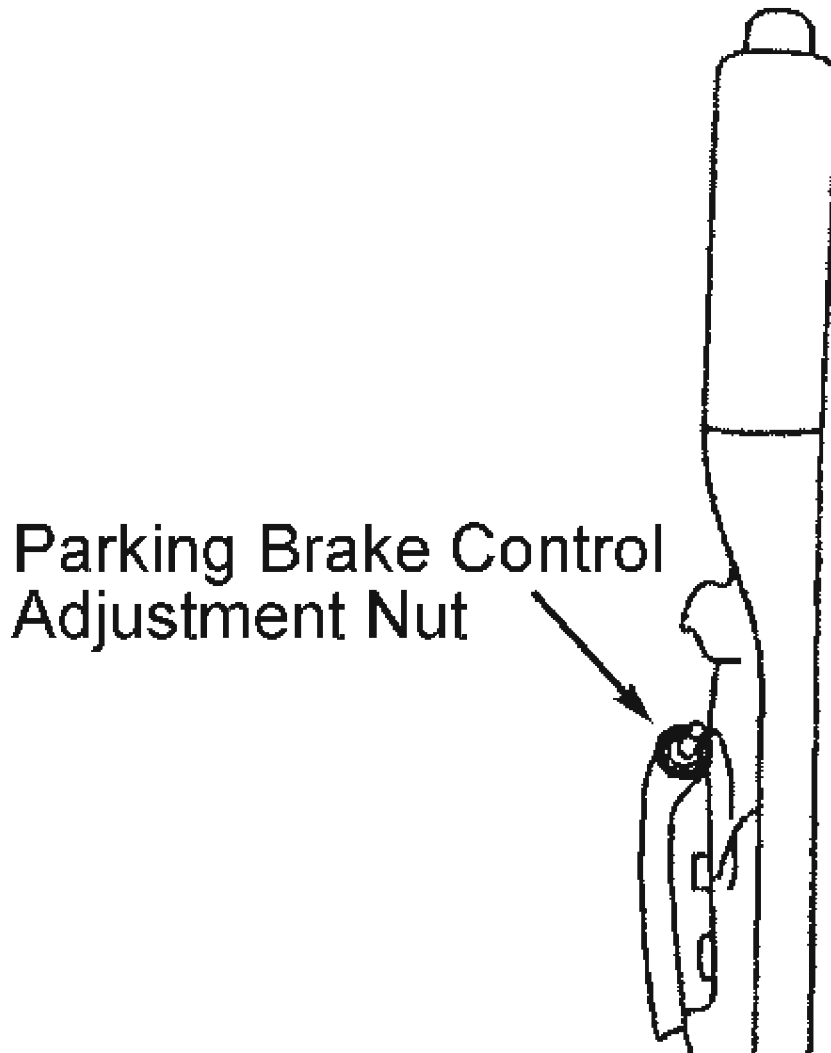
### Vehicle With Low Series Floor Console

1. If equipped, remove the manual transmission shift knob by turning counterclockwise. Remove the floor console front finish panel. See **Fig. 4** .
2. Apply the parking brake. Remove the floor console rear finish panel.
3. Remove the adjustment nut clip. See **Fig. 5** .

4. Turn the parking brake control adjustment nut so that the parking brake control stroke is three to five notches when pulled.
5. Confirm the parking brake is applied.
6. Install the adjustment nut clip.
7. To install, reverse removal procedure.



**Fig. 4: Identifying Shift Knob & Finish Panel**  
Courtesy of FORD MOTOR CO.



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**Fig. 5: Identifying Parking Brake Control Adjustment Nut**  
Courtesy of FORD MOTOR CO.

**Vehicle With High Series Floor Console**

1. Apply the parking brake. Remove the floor console finish panel.
2. Remove the adjustment nut clip. See **Fig. 5**.
3. Turn the parking brake control adjustment nut so that the parking brake control stroke is three to five notches when pulled.
4. Confirm the parking brake is applied.

5. Install the adjustment nut clip.
6. To install, reverse removal procedure.

## TESTING

### BRAKE WARNING LIGHT

1. Brake warning light should only illuminate when ignition switch is in START position or when ignition is on with parking brake applied or fluid level low.
2. If brake warning light does not illuminate when brake fluid is low, manually push reservoir float to bottom of reservoir. If light still does not illuminate, check fuse, wiring and bulb. Repair as necessary. If bulb and related circuitry are okay, replace reservoir assembly.
3. If brake warning light does not illuminate when parking brake is applied, check parking brake switch, wiring and bulb. Repair as necessary. With parking brake released and master cylinder reservoir full, turn ignition on. If warning light is illuminated, check for shorted, grounded or defective warning switches or wiring. Repair as necessary. Turn ignition switch to START position. If brake warning light does not illuminate as a bulb check function, check fuse, bulb and wiring. Repair as necessary.

### MASTER CYLINDER

#### Bypass Condition Test

1. Check the brake hydraulic system for leaks or insufficient brake fluid. Repair as necessary.
2. Observe the brake fluid level in the brake master cylinder reservoir as the brake pedal is slowly pressed and quickly released. If the brake fluid level rises when the brake pedal is pressed and drops when the brake pedal is released, but the net brake fluid level remains unchanged, the brake master cylinder is bypassing. Repair or install a new brake master cylinder.

#### Non-Pressure External Leaks

A low brake fluid level in the brake master cylinder reservoir may be caused by the following non-pressure external leaks:

##### Type 1

An external leak may exist at the brake master cylinder filler cap due to incorrect position of the cap, cap gasket, or cap gasket deterioration.

##### Type 2

An external leak may exist at the brake master cylinder mounting flange due to internal

seal failure. Repair or install a new brake master cylinder.

### **Type 3**

An external leak may exist at the base of the brake master cylinder reservoir due to deteriorated reservoir mounting seals. Repair or install a new brake master cylinder

#### **Compensator Port Check**

The purpose of the compensator ports in the brake master cylinder is to:

- Supply additional brake fluid from the brake master cylinder reservoir needed by the brake system due to brake shoe and lining wear.
- Allow brake fluid to return to the brake master cylinder reservoir when the brakes are released. The returning brake fluid will create a slight turbulence in the brake master cylinder reservoir. This is a normal condition and indicates that the compensator ports are not clogged.

Clogged compensator ports may cause the brakes to hang up or not fully release. If clogged compensator ports are suspected, proceed as follows:

1. Raise and support vehicle.
2. With the brakes released, attempt to rotate each wheel. If an excessive amount of brake drag exists, continue with the test. If an excessive amount of brake drag exists at only one wheel, it indicates a possible seized rear disc brake caliper, front disc brake caliper, rear wheel cylinder, or parking brake component. Repair or install new components as necessary.
3. Check the Brake Pedal Position (BPP) switch adjustment, and brake pedal free play to verify that the brake pedal is not partially applied.
4. Loosen the nuts attaching the brake master cylinder to the power brake booster and pull the brake master cylinder away from the power brake booster.
5. Repeat Steps 2 and 3 . If the brake drag disappears, the power brake booster is binding and new one must be installed. If the brake drag continues, the brake master cylinder is binding and new one must be installed.

#### **VACUUM BOOSTER FUNCTION TEST**

1. Inspect all vacuum hoses and connections. All unused vacuum connectors must be capped. Hoses and their connections must be correctly secured and in good condition with no holes, cracks, or collapsed areas.
2. Check the brake hydraulic system for leaks or insufficient brake fluid. Repair as necessary.
3. With the engine off, place the transaxle in Park (A/T) or Neutral (M/T) and apply the parking brake.

**NOTE:** If the power brake booster is noisy when the brakes are applied, a new component must be installed.

4. Press the brake pedal several times to exhaust all of the vacuum from the system.
5. Press and hold the brake pedal.
6. Start the engine. If the vacuum system is operating, the brake pedal will move downward under constant foot pressure. If no movement occurs, the power brake booster system is not functioning.
7. Remove the vacuum booster hose from the power brake booster.
8. Place the transaxle in PARK (A/T) or NEUTRAL (M/T) and apply the parking brake. Start the engine. Manifold vacuum should be available from the vacuum booster hose. If manifold vacuum is not available, inspect all of the hoses and hose connections. Repair as necessary.
9. Reconnect the vacuum booster hose and run the engine at fast idle for 10 seconds.
10. Stop the engine and let the vehicle stand for 10 minutes.
11. Apply the brake pedal with approximately 20 lbs. of force. The brake pedal feel should be the same as normal power assisted brake operation for at least one application. If the brake pedal feel is normal, then the power brake booster is okay. If the brake pedal feels hard, continue with the test.
12. Remove the vacuum booster hose from the power brake booster. Apply 17 in. Hg (57.3 kPa) of vacuum to the vacuum booster hose. If the vacuum does not leak off after 10 minutes, install a new power brake booster. If the vacuum does leak off, install a new check valve and/or new vacuum booster hoses.

#### **VACUUM BOOSTER CHECK VALVE**

1. Remove the vacuum booster hose from the power brake booster.
2. Apply 17 in. Hg (57.3 kPa) of vacuum to the vacuum booster hose. If the vacuum does not leak off after ten minutes, the check valve is okay. Otherwise, install a new check valve.

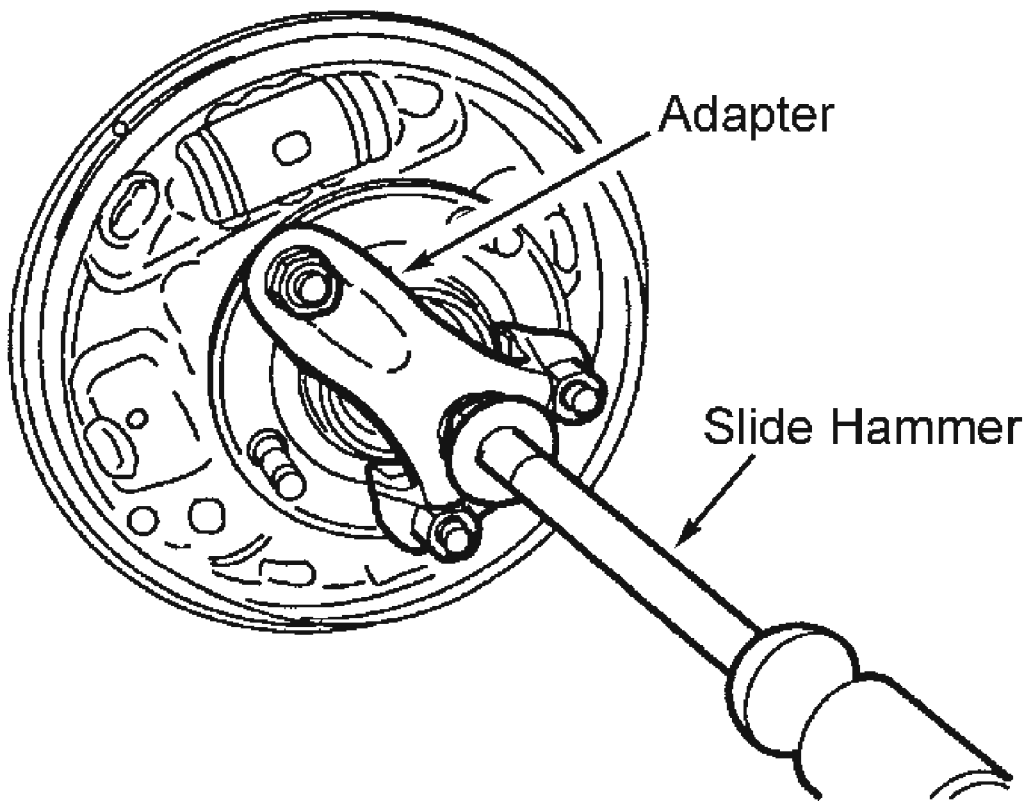
#### **REMOVAL & INSTALLATION**

**WARNING:** Deactivate suspension prior to hoisting vehicle. This can be accomplished by turning off air suspension switch located on right kick panel.

**CAUTION:** Anti-lock brake systems operate under high pressure. Before servicing, system pressure must be discharged. See appropriate ANTI-LOCK article.

### Removal & Installation

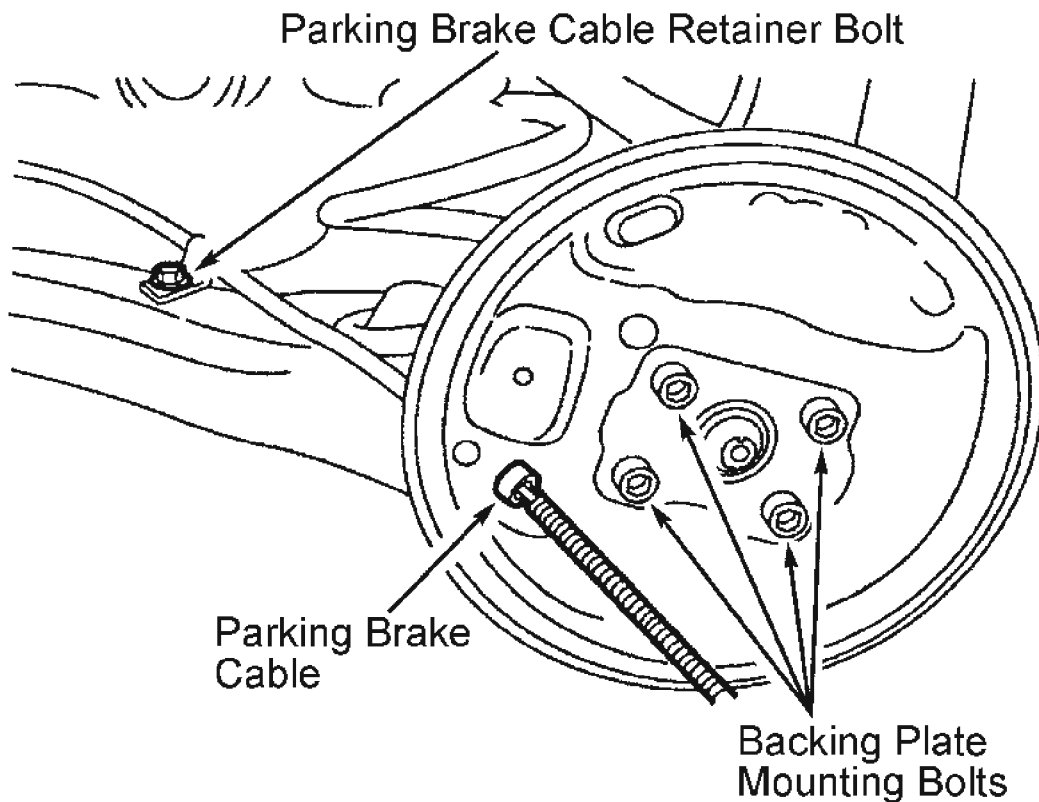
1. Remove wheel cylinder. See **WHEEL CYLINDERS** .
2. Remove the wheel hub nut.
3. Remove ABS sensor ring, if equipped.
4. Using an appropriate slide hammer and adaptor, remove the wheel hub. See **Fig. 6** .
5. Remove the cable retainer bolt. Remove the parking brake cable from the brake backing plate. See **Fig. 7** .
6. Remove the backing plate bolts. Remove the brake backing plate.



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**Fig. 6: Removing Wheel Hub**  
Courtesy of FORD MOTOR CO.





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**Fig. 7: Removing Backing Plate**  
 Courtesy of FORD MOTOR CO.

## BRAKE DRUM

### Removal & Installation

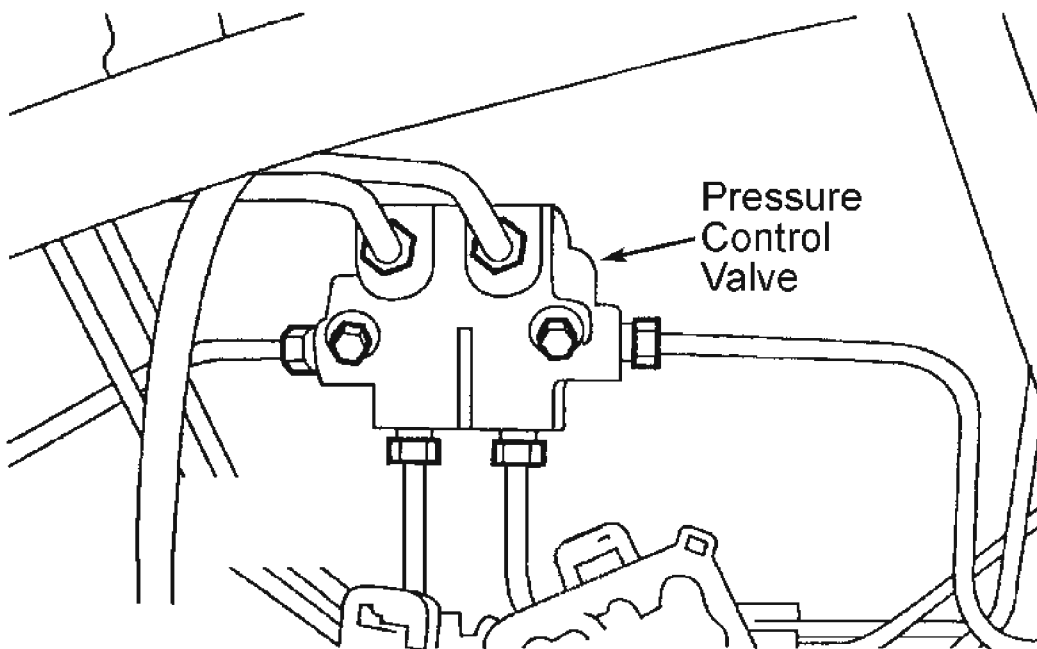
1. Raise and support vehicle. Remove rear wheels.
2. Remove the brake drum retaining clips, if equipped. Remove the brake drum. If the brake drum is rusted to the axle shaft pilot diameter, tap the center of the brake drum between the wheel studs.
3. If the brake drums will not come off, move the brake shoe adjusting lever off the brake adjuster screw and loosen the brake shoe adjuster screw nut by adjusting the nut upward.
4. Using the Brake Drum Gauge (134-R0191), or equivalent, measure the brake drum inside diameter. Install a new brake drum if the maximum inside diameter exceeds the specification stamped or molded on the outside of the brake drum.
5. To install, reverse removal procedure. Adjust BPP switch and deactivator switch as necessary. See **BRAKE PEDAL POSITION SWITCH & SPEED CONTROL**

**DEACTIVATOR SWITCH** under ADJUSTMENTS.

**BRAKE PRESSURE CONTROL VALVE**

**Removal & Installation**

1. Disconnect the six brake line fittings and plug the brake lines. See **Fig. 8** Remove the brake pressure control valve bolts.
2. To install, reverse the removal procedure. Bleed the brake system. See **BLEEDING BRAKE SYSTEM** .



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**Fig. 8: Identifying Brake Pressure Control Valve**  
Courtesy of FORD MOTOR CO.

**BRAKE SHOES**

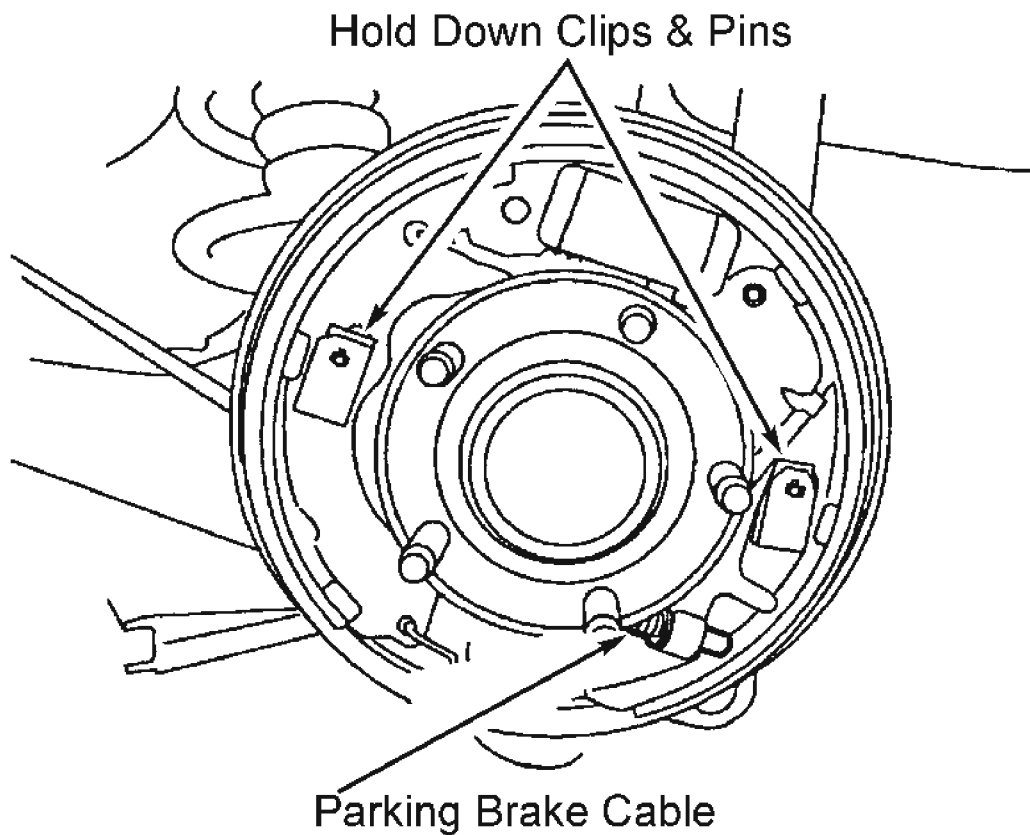
**Removal & Installation**

1. Remove tire and wheel assembly. Remove brake drum. See **BRAKE DRUM** .
2. Use the Brake/Clutch/Service Vacuum or equivalent to remove brake dust and dirt from the brake assemblies.

**NOTE:** If new rear brake shoes and linings are being installed, resurface the brake drums to remove glazing and to ensure

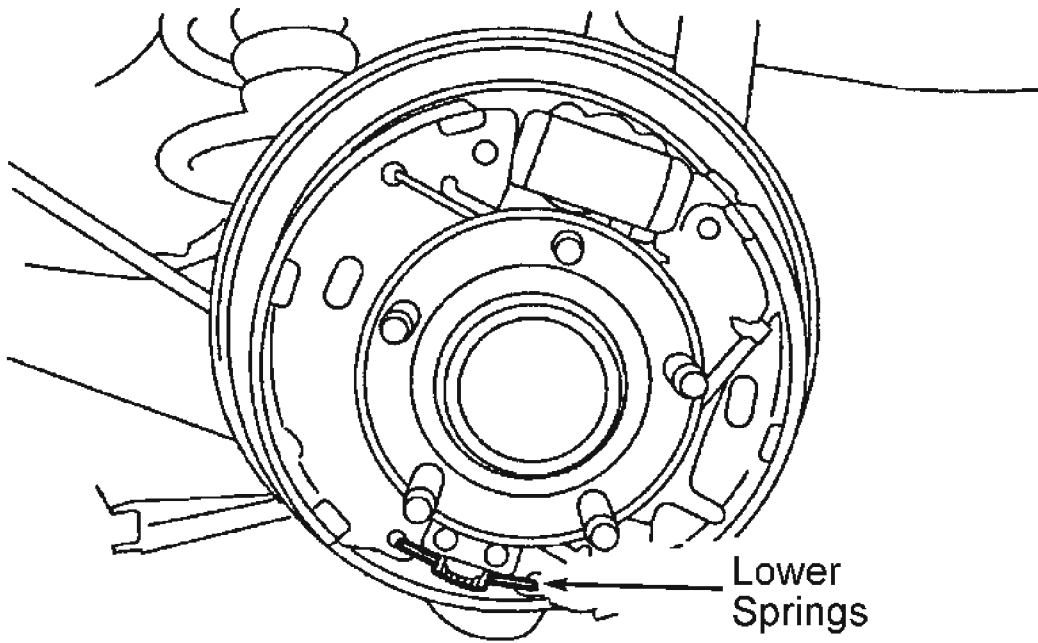
**an equal friction surface from side-to-side. Resurfacing will also correct out-of-round and bell conditions.**

3. Using the Brake Drum Gauge (134-R0191), or equivalent, measure the braking surface diameter. If the inside diameter measures more than the maximum specification shown on the outside of the brake drum, install a new brake drum.
4. Remove the parking brake cable from the parking brake cable lever. Remove the hold-down clips and pins. See **Fig. 9** .
5. Remove the lower spring. See **Fig. 10** .
6. Pull the bottom of the brake shoe forward. Release the upper return spring. Remove both brake shoes together.
7. Remove the self adjuster lever. See **Fig. 11** .
8. Remove the self adjuster and spring assembly. Return the self adjuster to the fully seated position. See **Fig. 11** .
9. Remove the horseshoe clip. Remove the parking brake lever. See **Fig. 12** .
10. Inspect the rear brake shoes for minimum thickness above the backing plate, and install new as necessary. See **Fig. 13** .
11. To install, reverse the removal procedure.



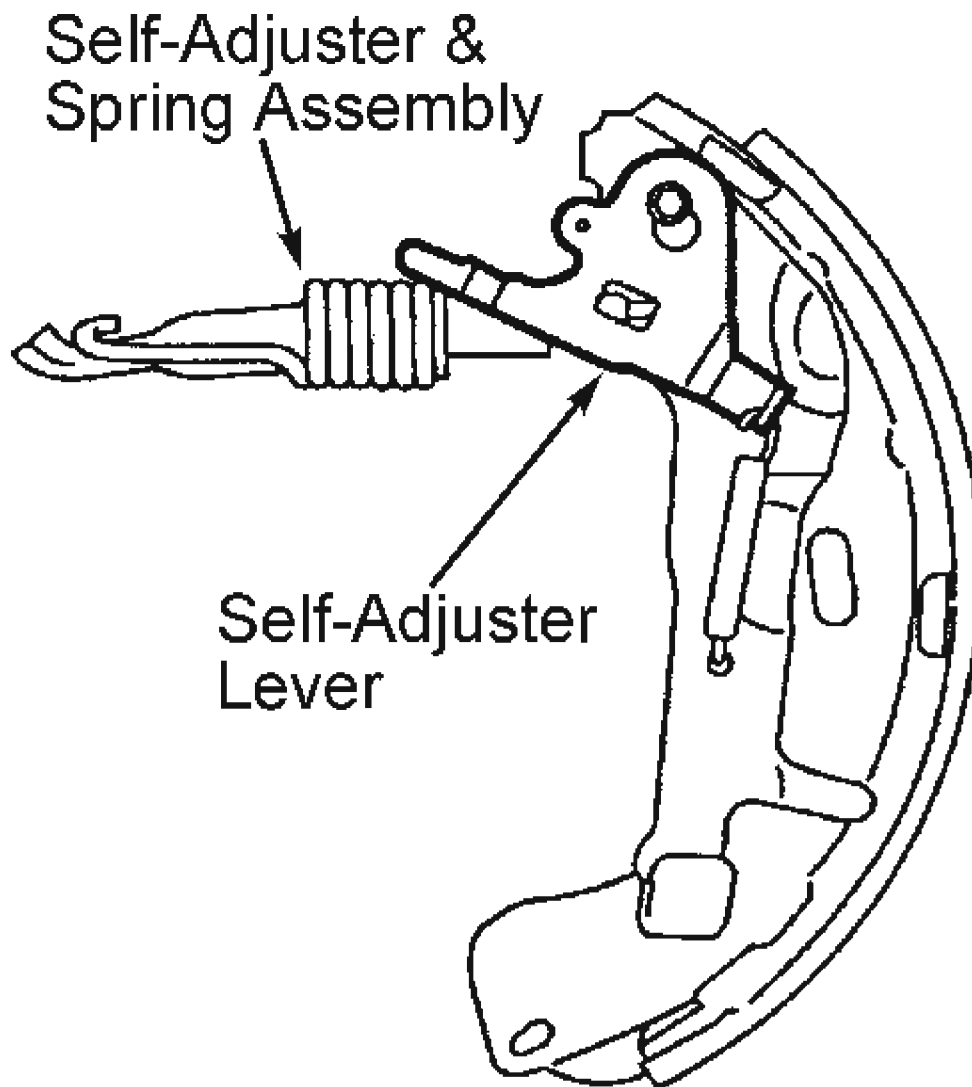
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**Fig. 9: Identifying Parking Brake Cable, Hold Down Clips & Pins**  
Courtesy of FORD MOTOR CO.



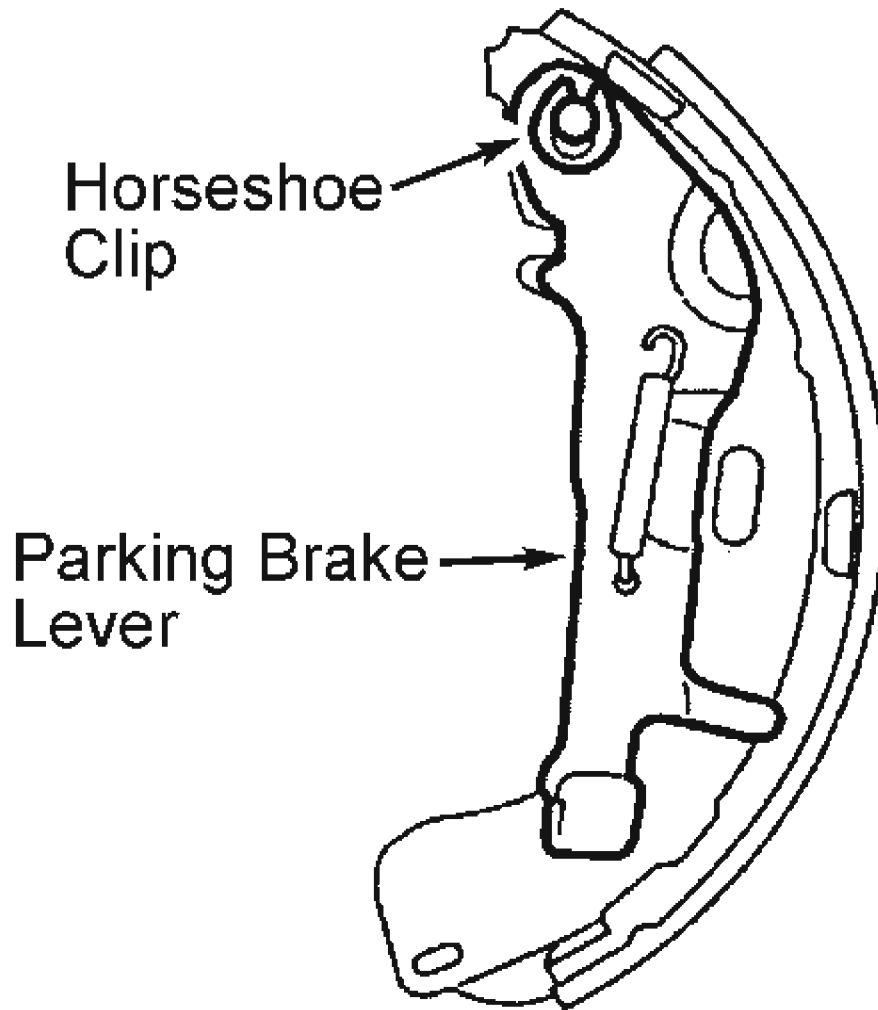
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**Fig. 10: Identifying Lower Spring**  
Courtesy of FORD MOTOR CO.



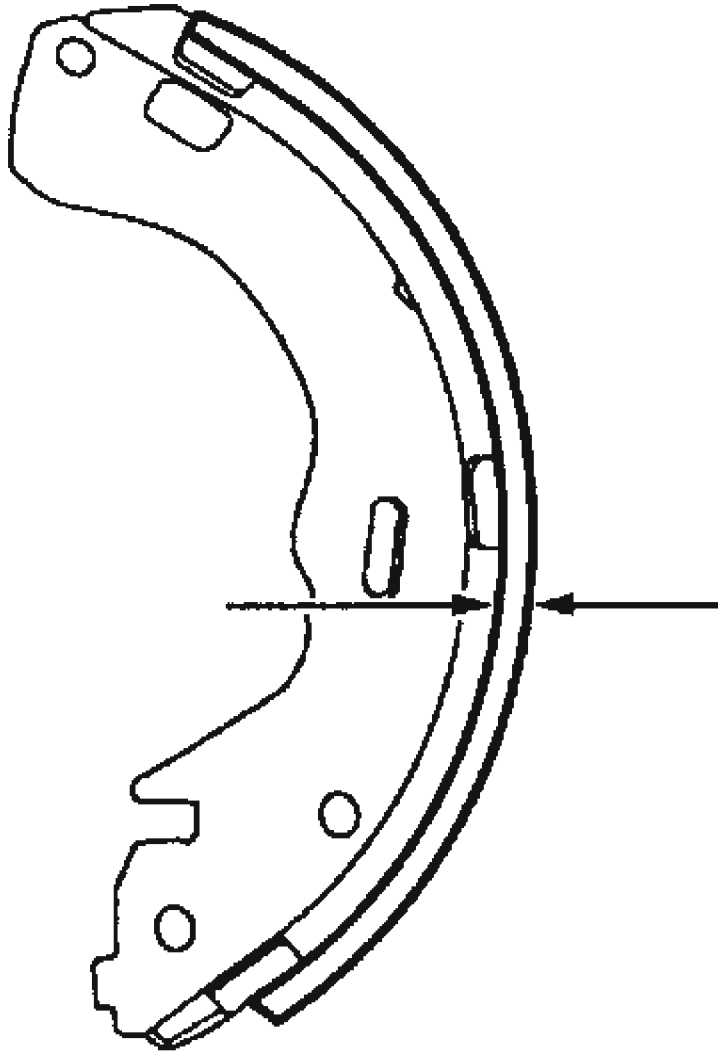
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**Fig. 11: Identifying Self Adjuster Lever & Assembly**  
Courtesy of FORD MOTOR CO.



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**Fig. 12: Identifying Parking Brake Lever & Horseshoe Clip**  
Courtesy of FORD MOTOR CO.



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**Fig. 13: Measuring Brake Shoe Lining Thickness**  
Courtesy of FORD MOTOR CO.

#### DISC BRAKE CALIPERS & PADS

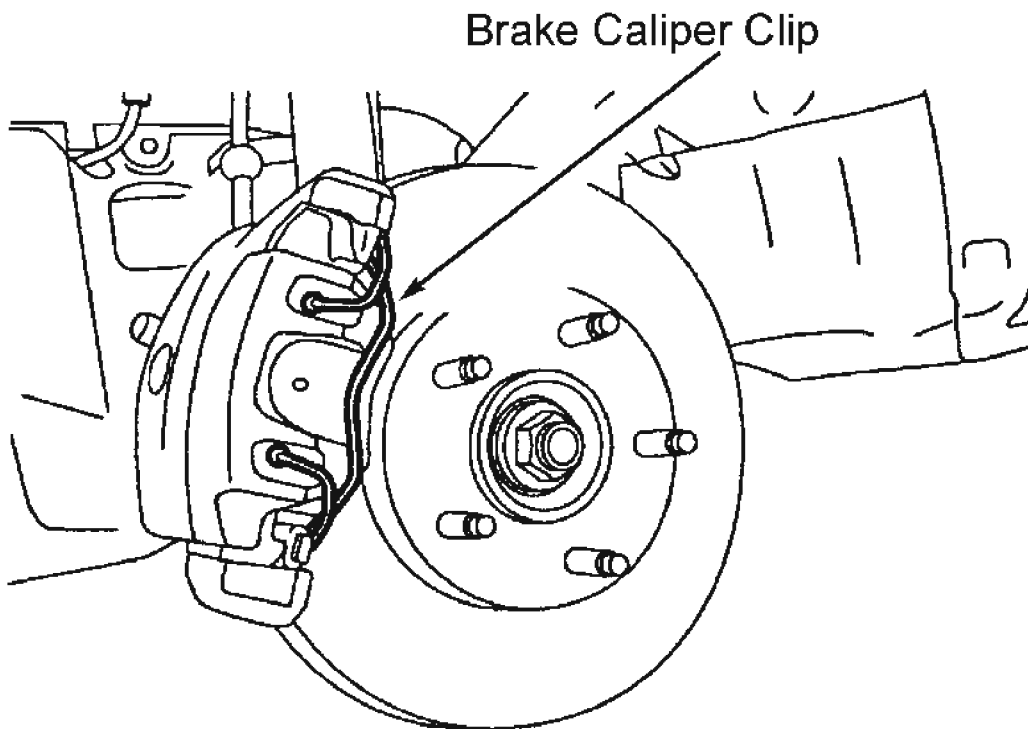
##### Removal & Installation

**NOTE:** If caliper does not require service, it is not necessary to remove brake hose from caliper unless indicated.



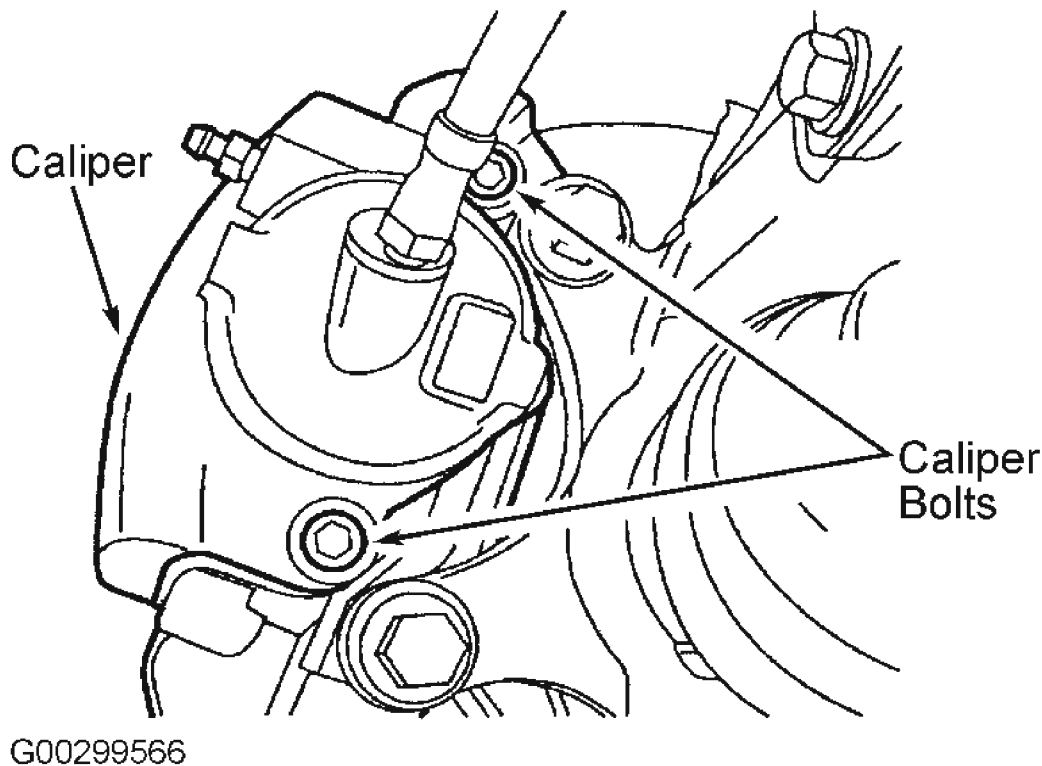
**NOTE:** To prevent master cylinder overflow when caliper piston is depressed, remove and discard some brake fluid from master cylinder.

1. Raise and support vehicle. Remove wheel.
2. Remove the brake caliper clip. See **Fig. 14** .
3. Remove brake caliper bolt caps and the bolts. See **Fig. 15** . Position and support the caliper aside.
4. Remove the outer brake pad from the anchor. Remove the inner brake pad from the caliper piston.
5. To install, reverse removal procedure. Inspect caliper for leakage. If caliper is leaking, overhaul as necessary. See **DISC BRAKE CALIPER** under OVERHAUL. If caliper is okay, use a "C" clamp to push caliper piston into piston bore until it bottoms out. Connect brake hose to rotor using NEW copper washers on connector bolt. Bleed brakes. See **BLEEDING BRAKE SYSTEM** .



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**Fig. 14: Identifying Brake Caliper Clip**  
Courtesy of FORD MOTOR CO.



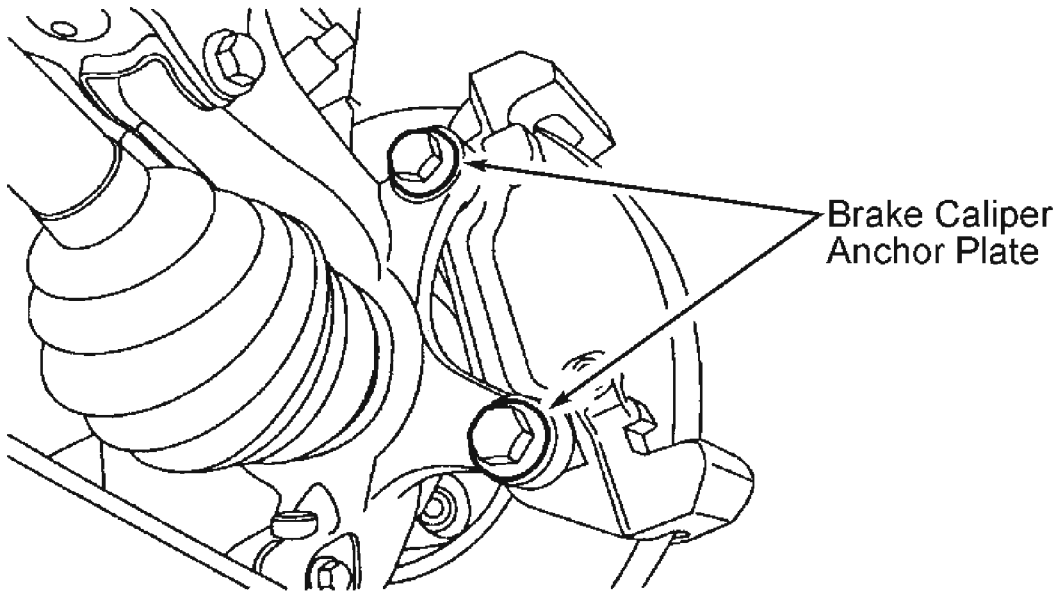
**Fig. 15: Identifying Caliper Bolts**  
Courtesy of FORD MOTOR CO.

#### FRONT BRAKE DISC

**NOTE:** If caliper does not require service, it is not necessary to remove brake hose from caliper unless indicated.

#### Removal & Installation

1. Raise and support vehicle. Remove wheel.
2. Remove caliper and pads. See **DISC BRAKE CALIPERS & PADS** .
3. Remove bolts and caliper anchor plate. See **Fig. 16** .
4. Remove the brake disc retaining clips (if equipped) and the brake disc.
5. To install, reverse removal procedure. Tighten bolts and nuts. See **TORQUE SPECIFICATIONS** .



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**Fig. 16: Identifying Brake Caliper Anchor Plate**  
Courtesy of FORD MOTOR CO.

## MASTER CYLINDER & RESERVOIR

### Removal & Installation

1. Disconnect brake warning light indicator wire from indicator switch. See **Fig. 17** .
2. Using a suitable suction device, drain the brake master cylinder reservoir.
3. If equipped with manual transmission, disconnect and plug the clutch master cylinder feed.
4. Disconnect the brake lines and plug the lines and the brake master cylinder ports.

**NOTE:** Whenever the brake master cylinder is removed from the brake booster, new nuts must be installed.

5. Remove the nuts and the brake master cylinder.

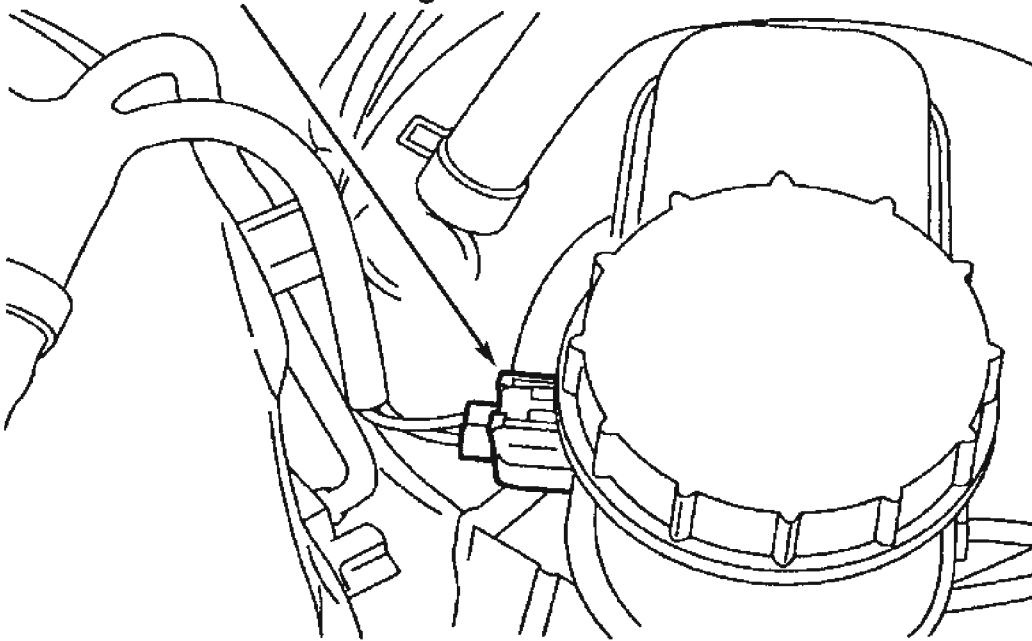
**NOTE:** Whenever installing a new brake master cylinder reservoir, install **NEW** seals. Lubricate the new seals with clean brake fluid.

6. Transfer the brake master cylinder reservoir if a new master cylinder is to be installed. Lubricate the two "O" ring seals with clean brake fluid and insert into the brake master

cylinder. See **Fig. 18** . Press the brake master cylinder reservoir into the "O" ring seals until it snaps into the brake master cylinder securely.

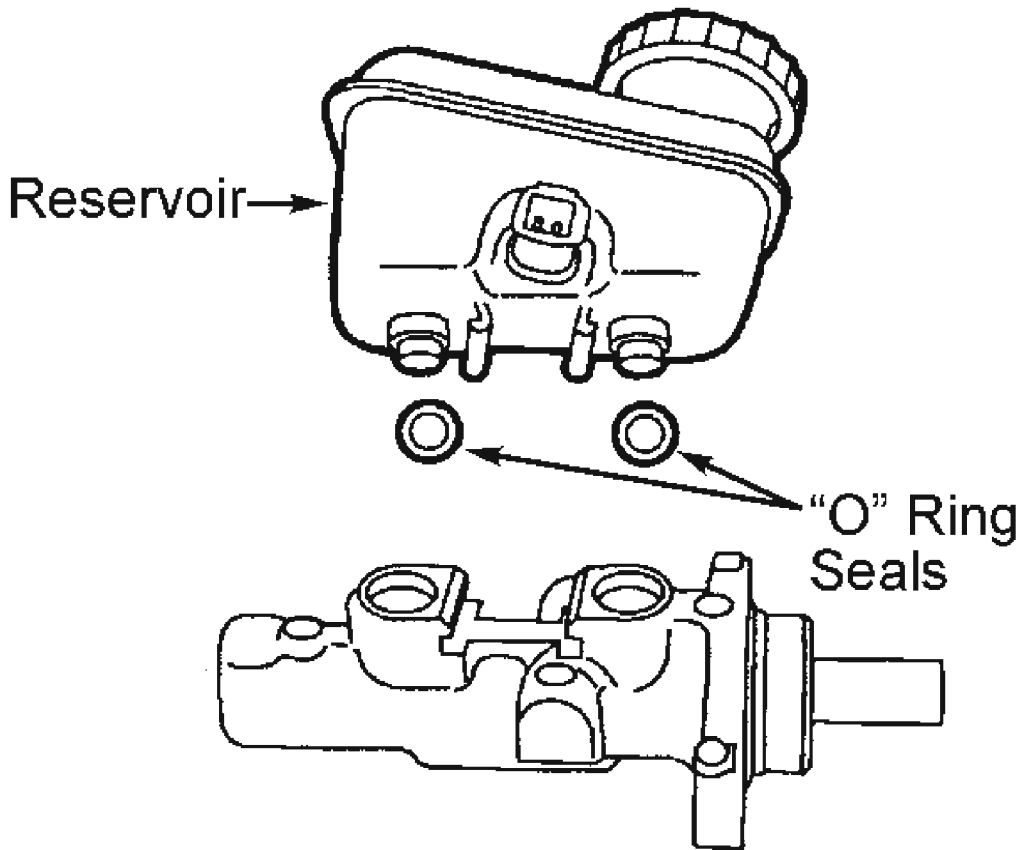
7. To install, reverse the removal procedure. Bleed the master cylinder. If equipped with manual transmission, bleed the clutch master cylinder. See BLEEDING HYDRAULIC SYSTEM in appropriate CLUTCHES article in TRANSAXLE/TRANSMISSION. Bleed brakes. See **BLEEDING BRAKE SYSTEM** .

Fluid Level Warning Switch Harness Connector



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**Fig. 17: Identifying Brake Fluid Level Warning Switch Harness Connector**  
Courtesy of FORD MOTOR CO.



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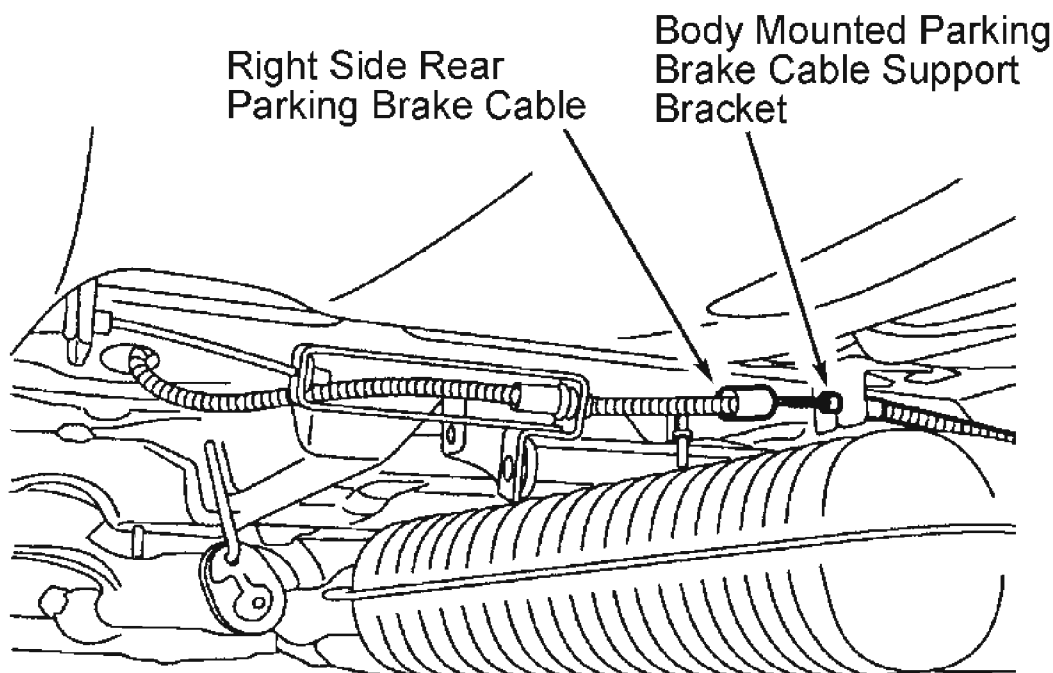
**Fig. 18: Identifying Master Cylinder "O" Ring Seals**  
Courtesy of FORD MOTOR CO.

#### **PARKING BRAKE CABLE (FRONT)**

##### **Removal & Installation**

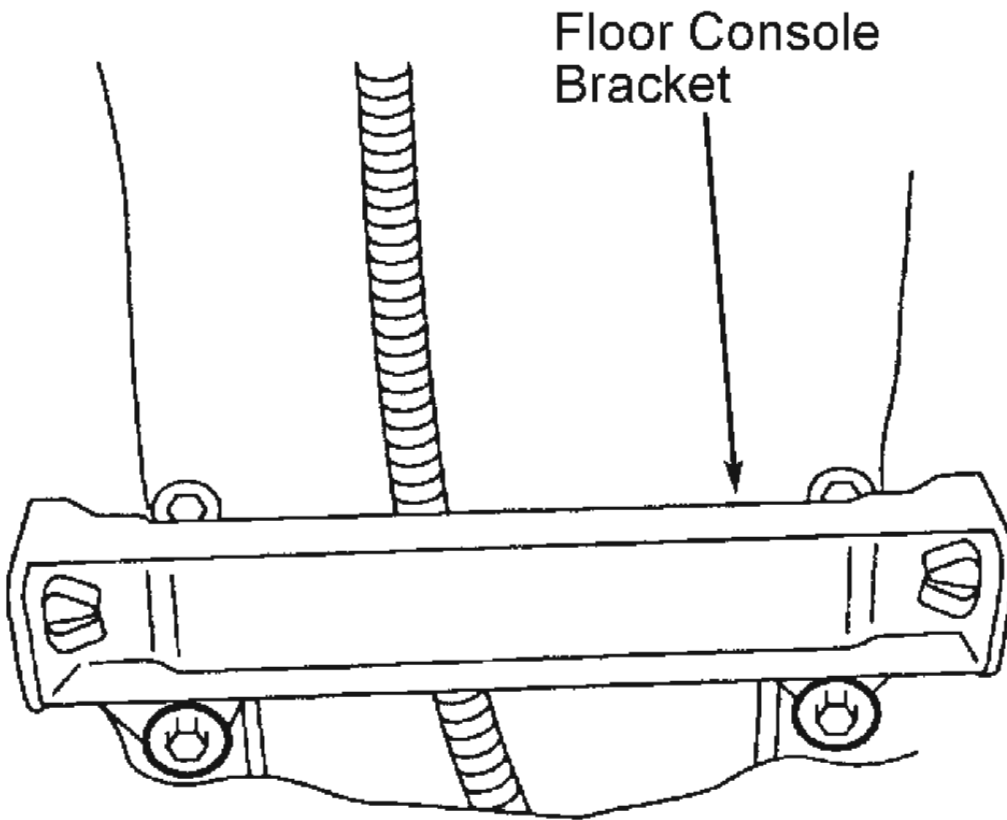
1. Remove the parking brake control. See **PARKING BRAKE CONTROL** .
2. On vehicles with floor console, remove the 2 bolts and the floor console bracket. See **Fig. 20** .
3. On vehicles without floor console, remove the left front seat. See REMOVAL & INSTALLATION in appropriate POWER SEATS article.
4. Remove the left front door scuff plate. See **Fig. 21** .
5. Remove the left lower "A" pillar trim panel.
6. Remove the left front safety belt.

7. Pull back carpet to gain access to the console bracket.
8. Remove the 2 bolts and the floor console bracket.
9. On all vehicles, raise and support vehicle.
10. Disconnect the parking brake cable from the right side rear parking brake cable. See **Fig. 19** . Disconnect the front parking brake cable from the parking brake cable equalizer.
11. To install, reverse removal procedure.



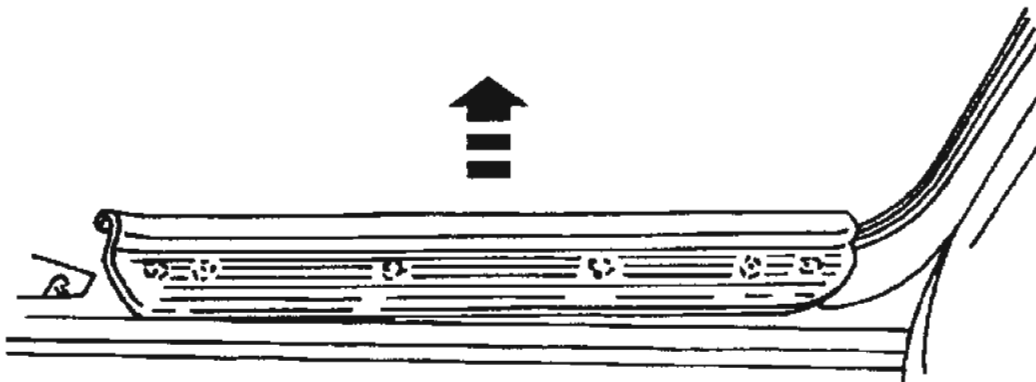
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**Fig. 19: Disconnecting Right Side Rear Parking Brake Cable**  
Courtesy of FORD MOTOR CO.



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**Fig. 20: Identifying Floor Console Bracket**  
Courtesy of FORD MOTOR CO.



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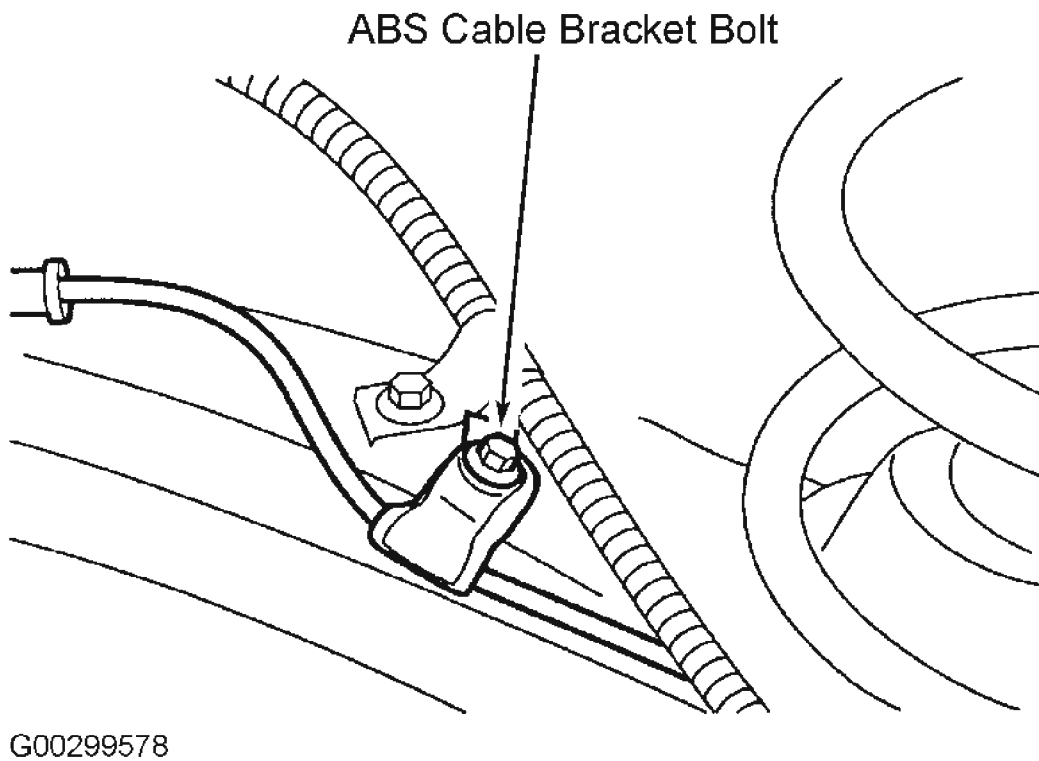
**Fig. 21: Removing Left Front Door Scuff Plate**  
**Courtesy of FORD MOTOR CO.**

**PARKING BRAKE CABLE (REAR)**

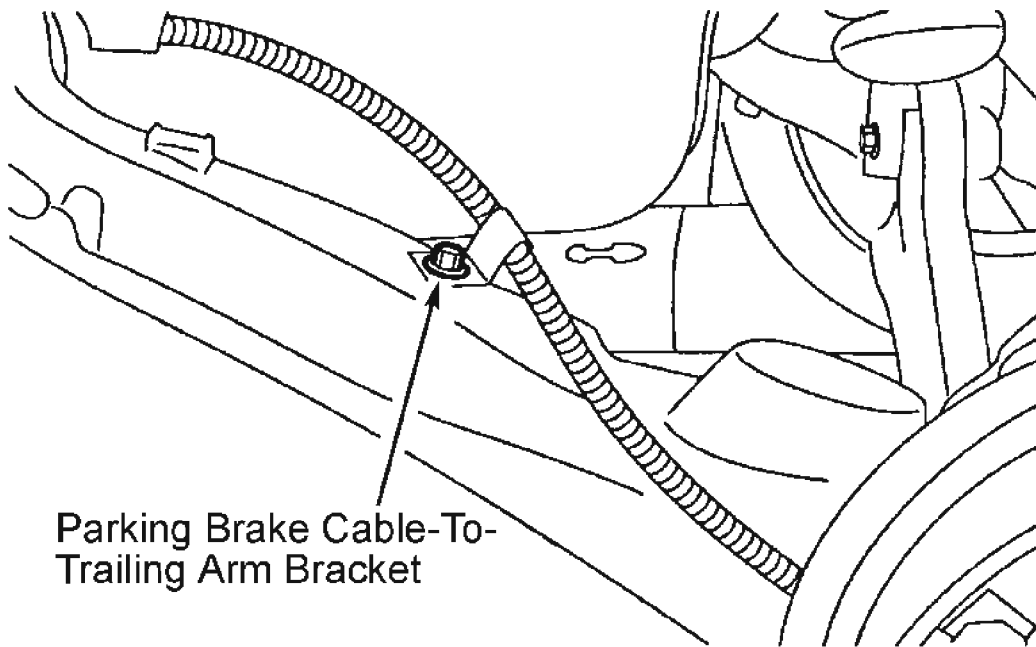
**Removal & Installation**

1. Remove the rear drum brake shoes. See **BRAKE SHOES** .
2. Remove the ABS cable bracket bolt (if equipped). See **Fig. 22** .
3. Remove the rear parking brake cable to trailing arm bracket bolts. See **Fig. 23** .
4. Disconnect the rear parking brake cable from the backing plates. See **Fig. 7** .
5. Remove the rear parking brake cable bracket bolts. See **Fig. 24** .
6. Disconnect the right side rear parking brake cable from the front parking brake cable. Disconnect the right side rear parking brake cable from the body-mounted parking brake cable support bracket. See **Fig. 19** .
7. Disconnect the left rear parking brake cable to fuel tank support strap. See **Fig. 25** .
8. Disconnect the front parking brake cable.
9. Remove the two bolts. Disconnect the left rear parking brake cable from the body-mounted parking brake cable support bracket. See **Fig. 26** .
10. To install, reverse the removal procedure.





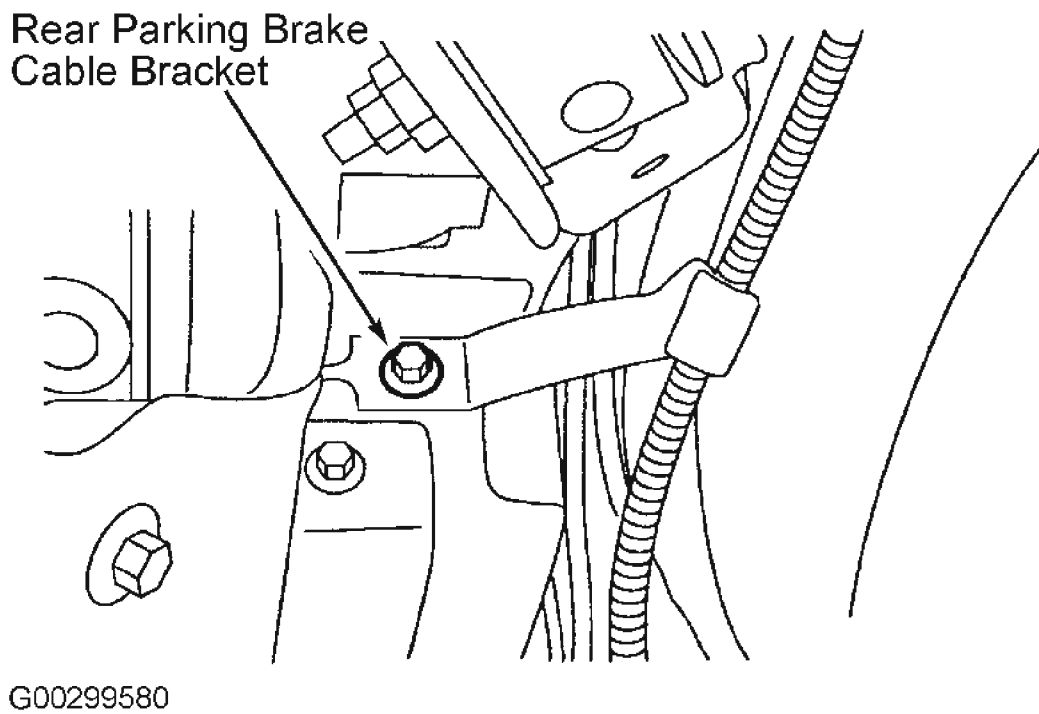
**Fig. 22: Identifying ABS Cable Bracket Bolt**  
Courtesy of FORD MOTOR CO.



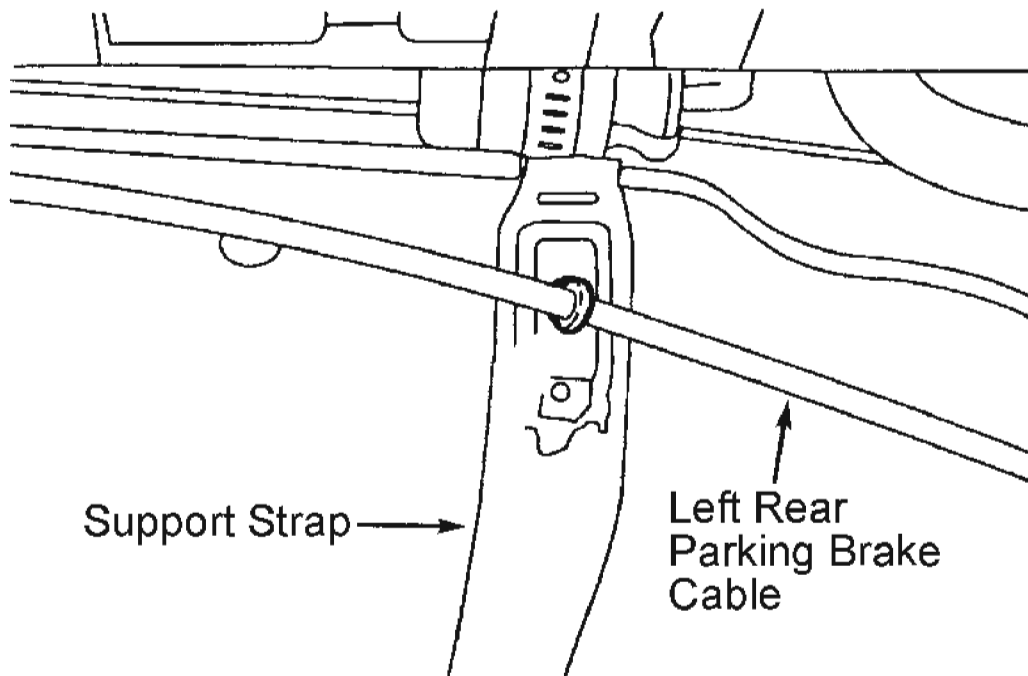
Parking Brake Cable-To-Trailing Arm Bracket

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**Fig. 23: Identifying Parking Brake Cable-To-Trailing Arm**  
Courtesy of FORD MOTOR CO.

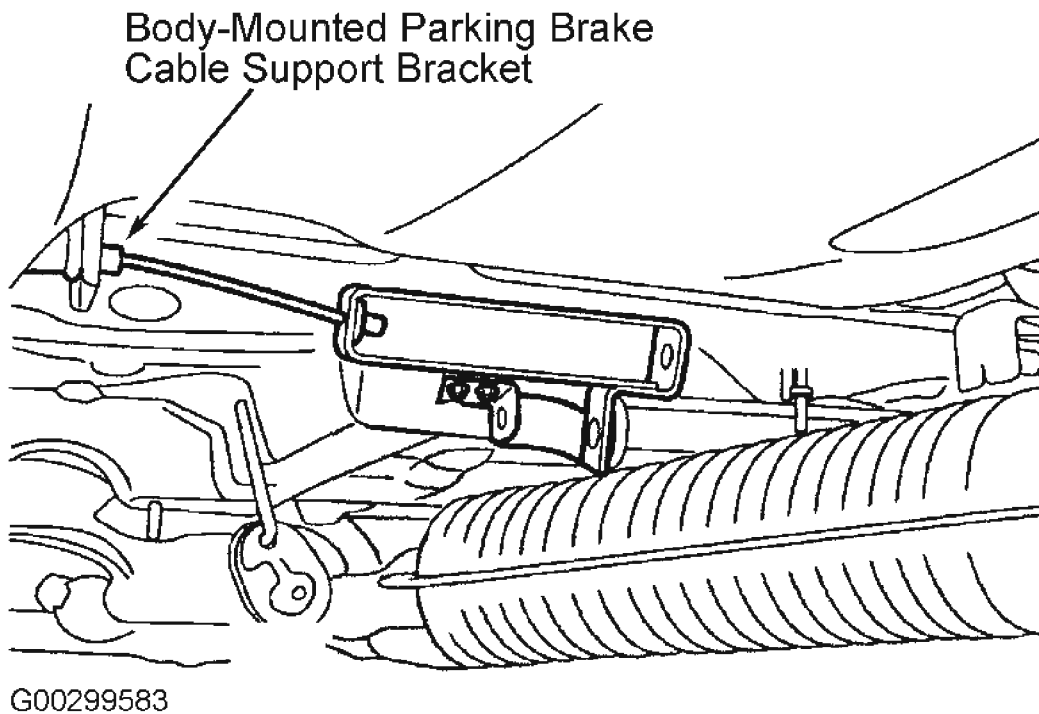


**Fig. 24: Identifying Rear Parking Brake Cable Bracket**  
Courtesy of FORD MOTOR CO.



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**Fig. 25: Identifying Left Rear Parking Brake Cable-To-Fuel Tank Support Strap**  
Courtesy of FORD MOTOR CO.



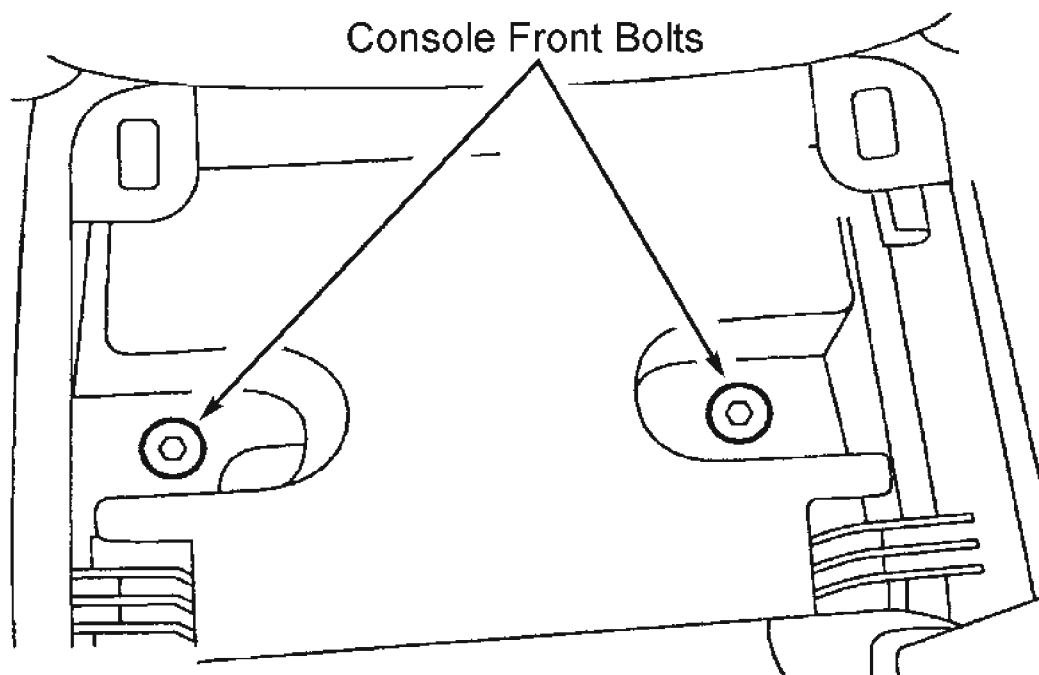
**Fig. 26: Identifying Body-Mounted Parking Brake Cable Support Bracket**  
Courtesy of FORD MOTOR CO.

## PARKING BRAKE CONTROL

### Removal & Installation

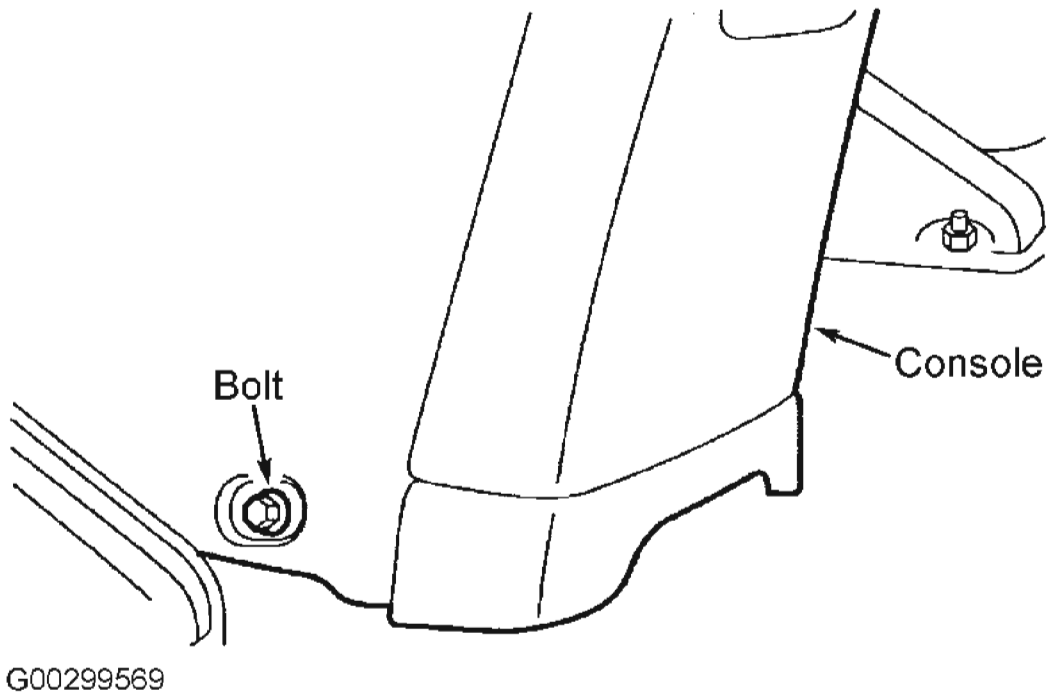
1. If equipped with the high series floor console, apply the parking brake. Remove the floor console finish panel.
2. Remove the floor console front bolts. See **Fig. 27** .
3. Remove the two rear bolts. See **Fig. 28** . Remove the floor console.
4. If equipped with the low series floor console, remove the manual transmission shifter knob by turning counterclockwise (if equipped). Remove the floor console front finish panel.
5. Apply the parking brake. Remove the floor console rear finish panel.
6. Remove the floor console front bolts. See **Fig. 29** .
7. Remove the rear two bolts and the floor console. See **Fig. 30** .
8. Release the parking brake control.
9. Disconnect the parking brake warning indicator switch harness connector. See **Fig. 31** .
10. Remove the parking brake adjusting nut. See **Fig. 5** .
11. Remove the bolts. Remove the parking brake cable.

12. To install, reverse the removal procedure. Adjust the parking brake cable. See **PARKING BRAKE CABLE** under ADJUSTMENTS.

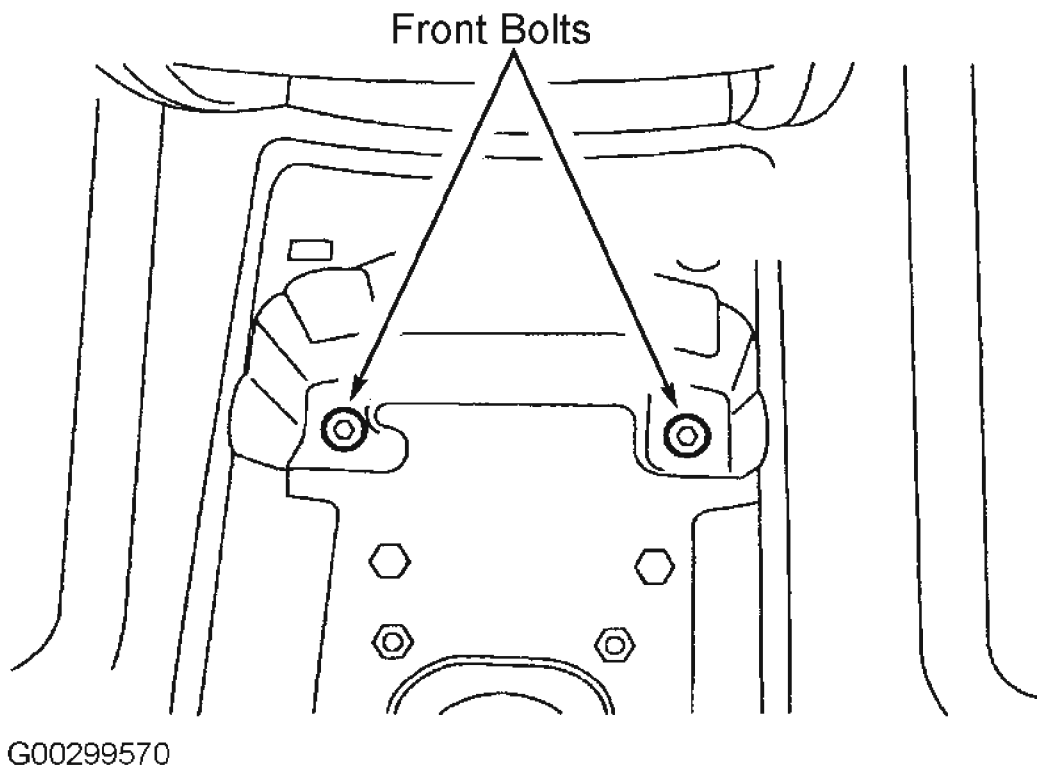


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**Fig. 27: Identifying Console Front Bolts (High Series)**  
Courtesy of FORD MOTOR CO.

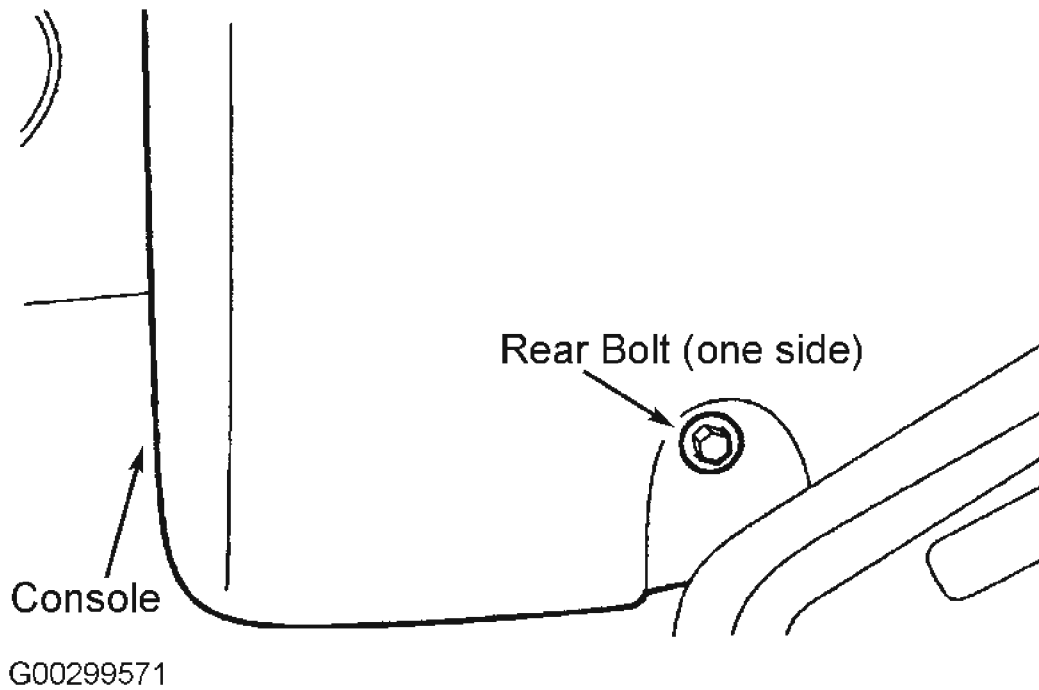


**Fig. 28: Identifying Console Rear Bolts (High Series)**  
Courtesy of FORD MOTOR CO.



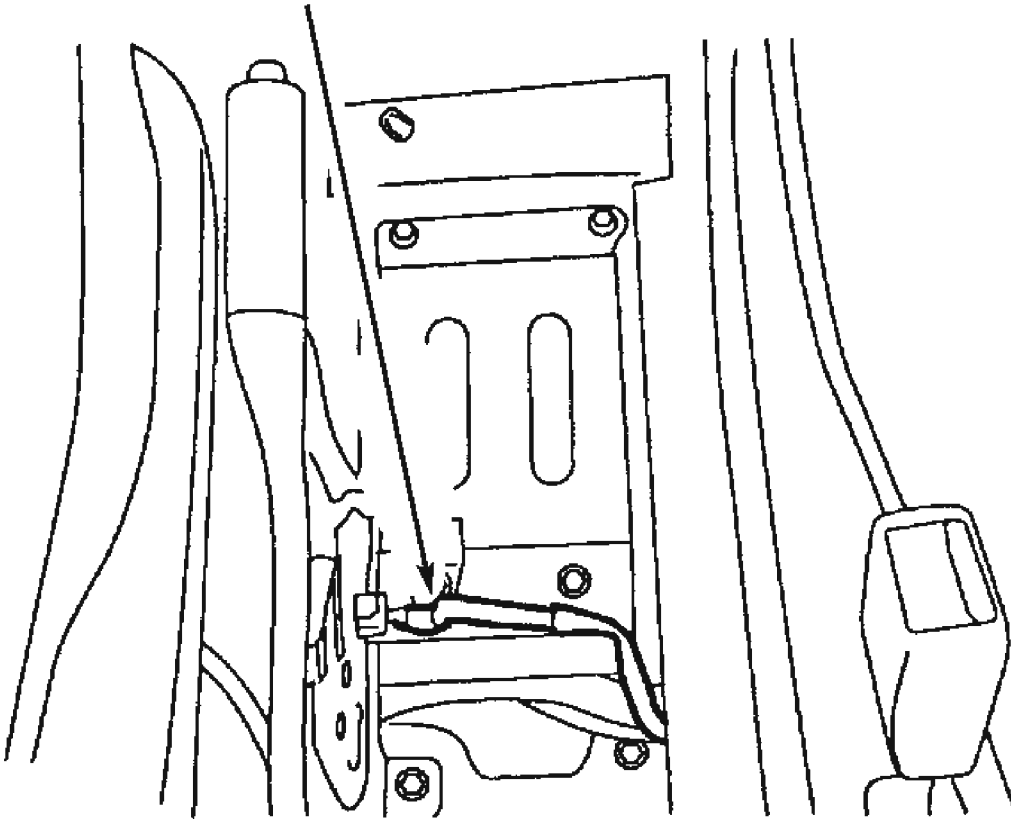
**Fig. 29: Identifying Floor Console Front Bolts (Low Series)**  
Courtesy of FORD MOTOR CO.





**Fig. 30: Identifying Floor Console Rear Bolts (Low Series)**  
Courtesy of FORD MOTOR CO.

### Parking Brake Warning Indicator Harness Connector



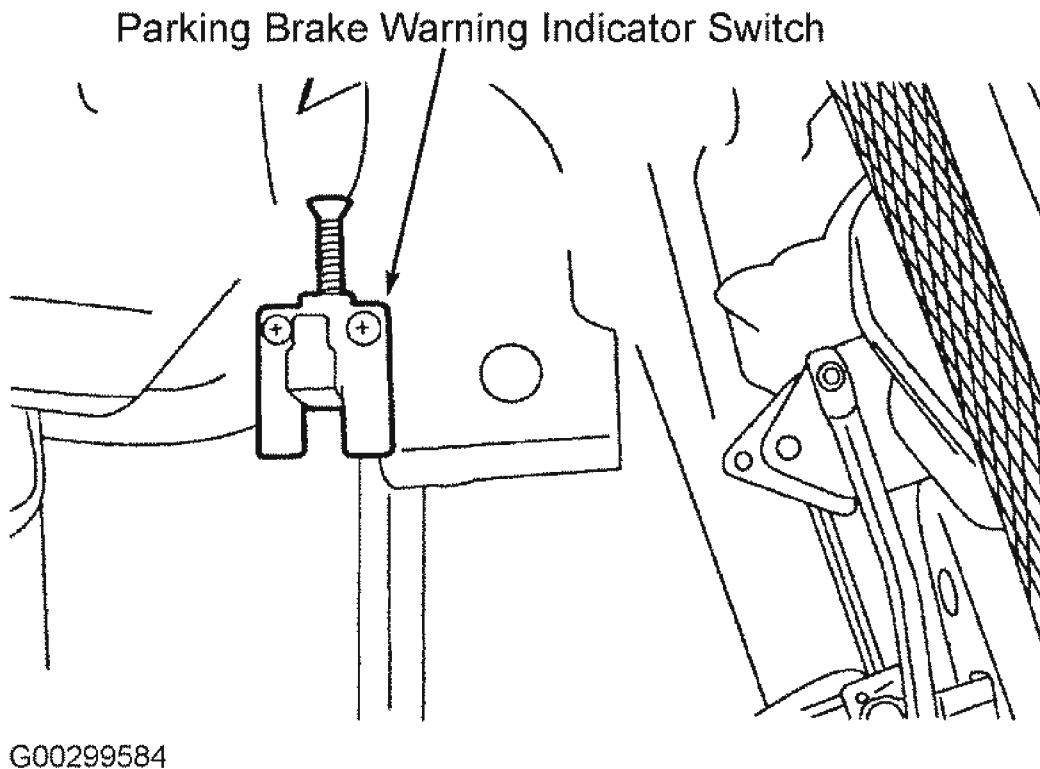
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**Fig. 31: Identifying Parking Brake Warning Indicator**  
Courtesy of FORD MOTOR CO.

### **PARKING BRAKE WARNING INDICATOR SWITCH**

#### **Removal & Installation**

1. Remove the parking brake control. See **PARKING BRAKE CONTROL** .
2. Remove the screws. Remove the parking brake warning indicator switch. See **Fig. 32** .
3. To install, reverse the removal procedure.



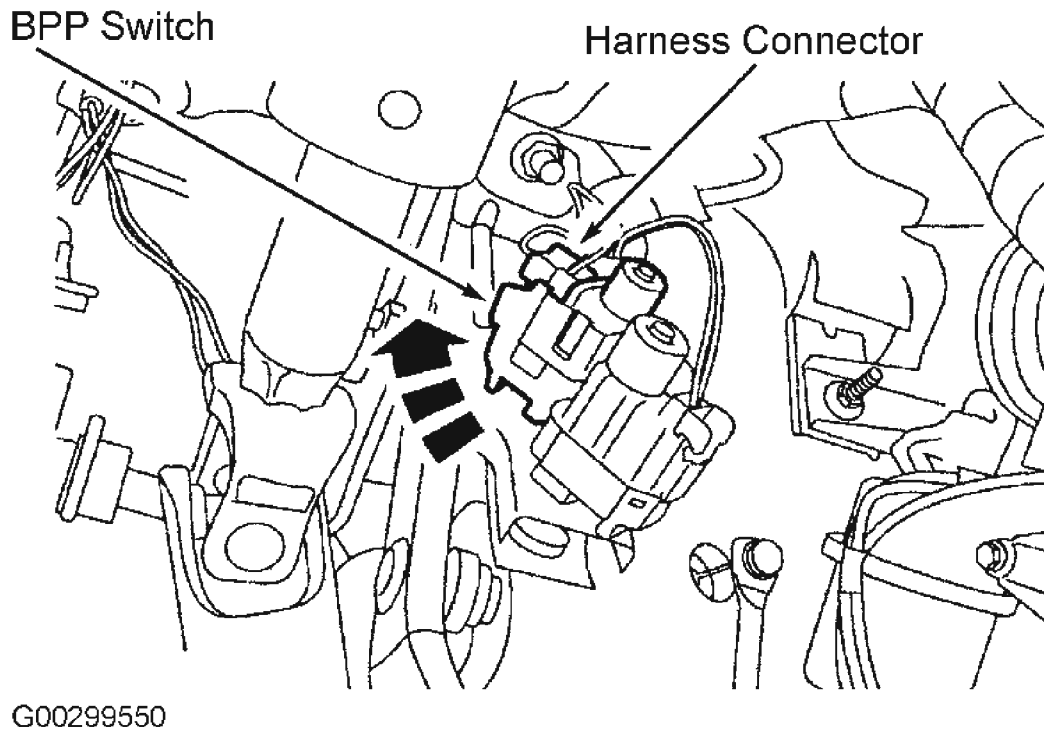
**Fig. 32: Identifying Parking Brake Warning Indicator Switch**  
Courtesy of FORD MOTOR CO.

## POWER BRAKE BOOSTER

### Removal & Installation

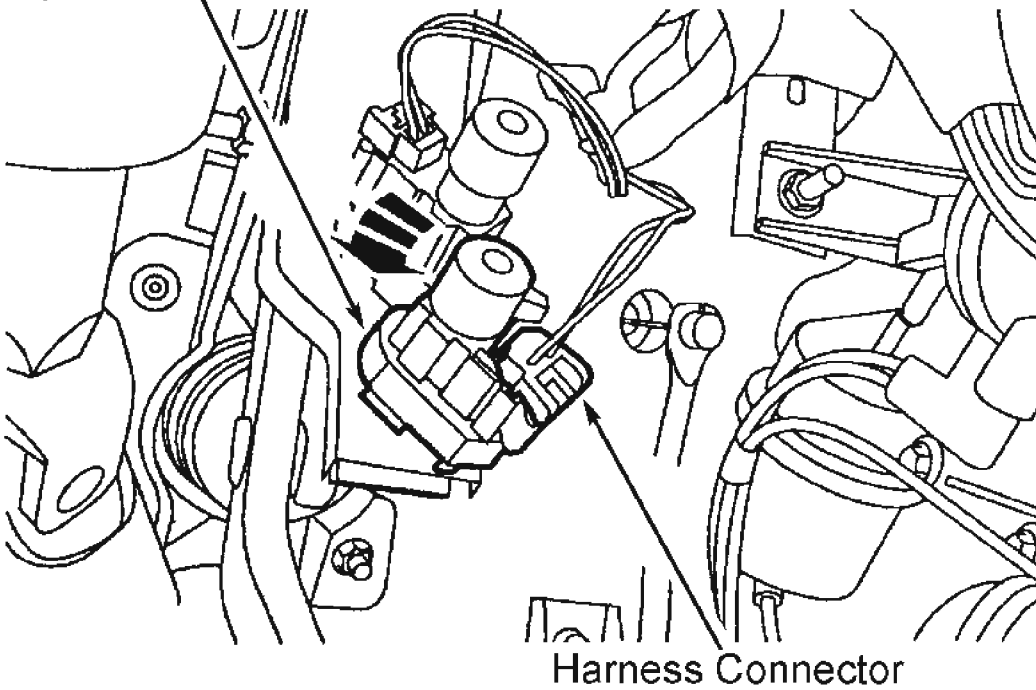
1. Disconnect the Brake Pedal Position (BPP) switch harness connector. Rotate clockwise and remove the BPP switch. See **Fig. 33** .
2. Disconnect the speed control deactivator switch harness connector (if equipped). Rotate counterclockwise 45 degrees and remove the deactivator switch. See **Fig. 34** .
3. Remove the brake pedal push rod cotter pin and washer. See **Fig. 35** .
4. Remove the power brake booster pushrod bracket nuts. See **Fig. 36** .
5. Disconnect the brake pedal pushrod. See **Fig. 35** .
6. On vehicles with 3.0L (4V) engines, disconnect the evaporative emission canister purge valve and position it aside. Disconnect the cable locator. Remove the nuts. Position the evaporative emission canister purge valve aside. See **Fig. 37** .
7. On all vehicles, disconnect the master cylinder mounting nuts. Remove and position the master cylinder aside.
8. Disconnect the vacuum hose. See **Fig. 38** . Remove the brake booster.

9. To install, reverse the removal procedure.



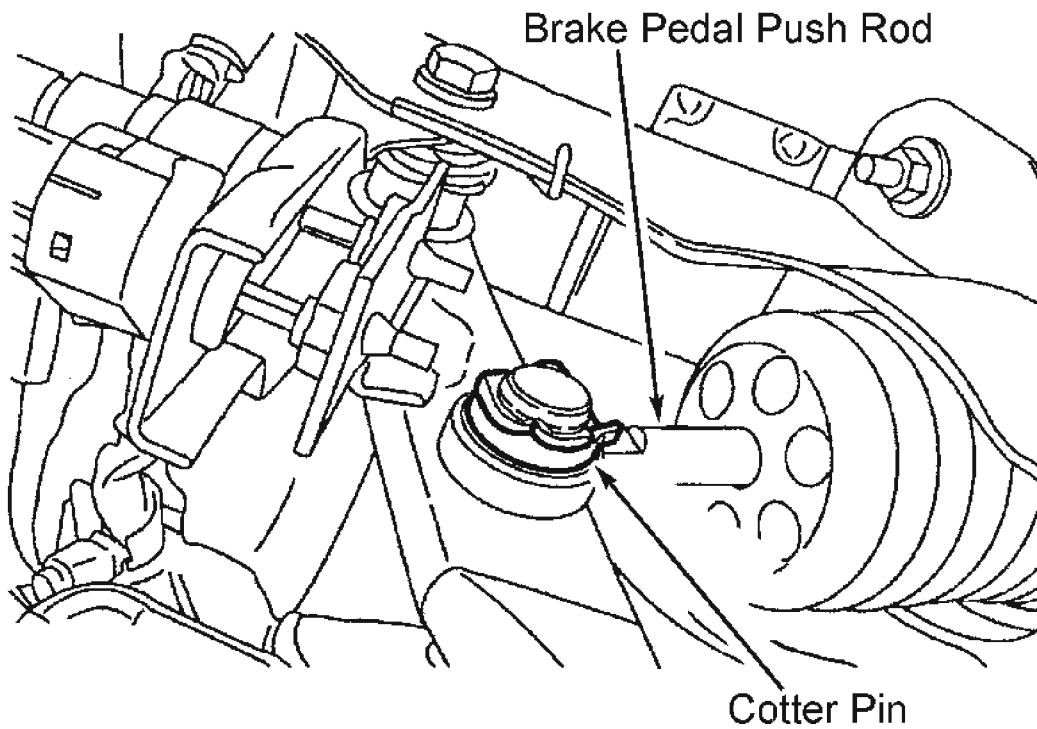
**Fig. 33: Removing Brake Pedal Position Switch**  
Courtesy of FORD MOTOR CO.

Speed Control Deactivator Switch



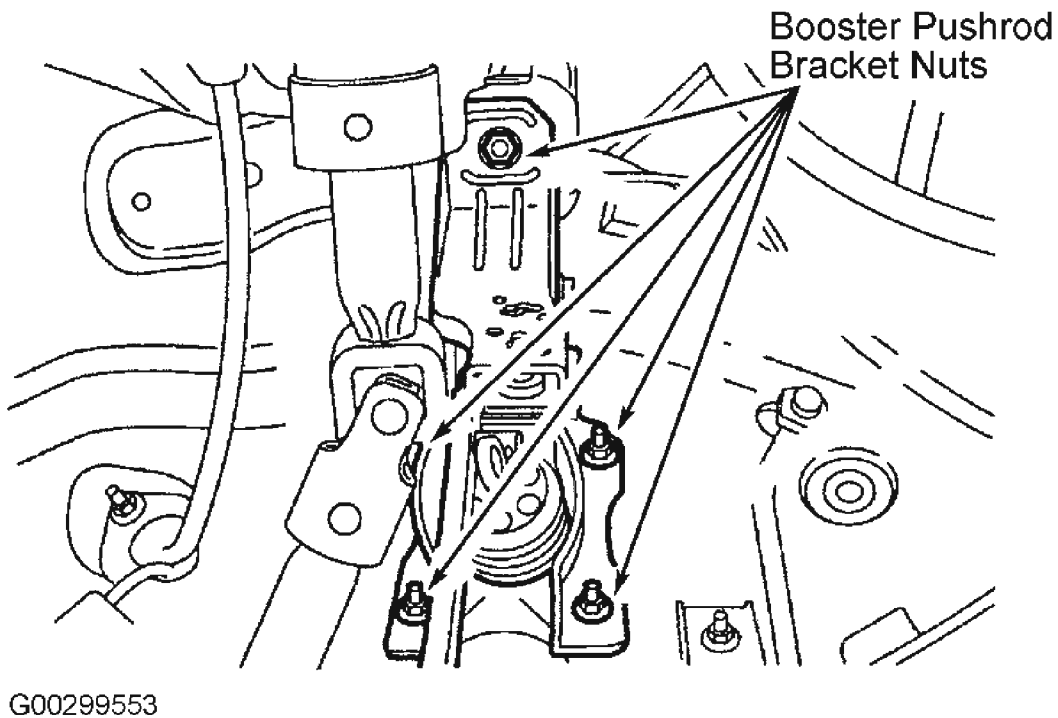
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**Fig. 34: Removing Speed Control Deactivator Switch**  
Courtesy of FORD MOTOR CO.

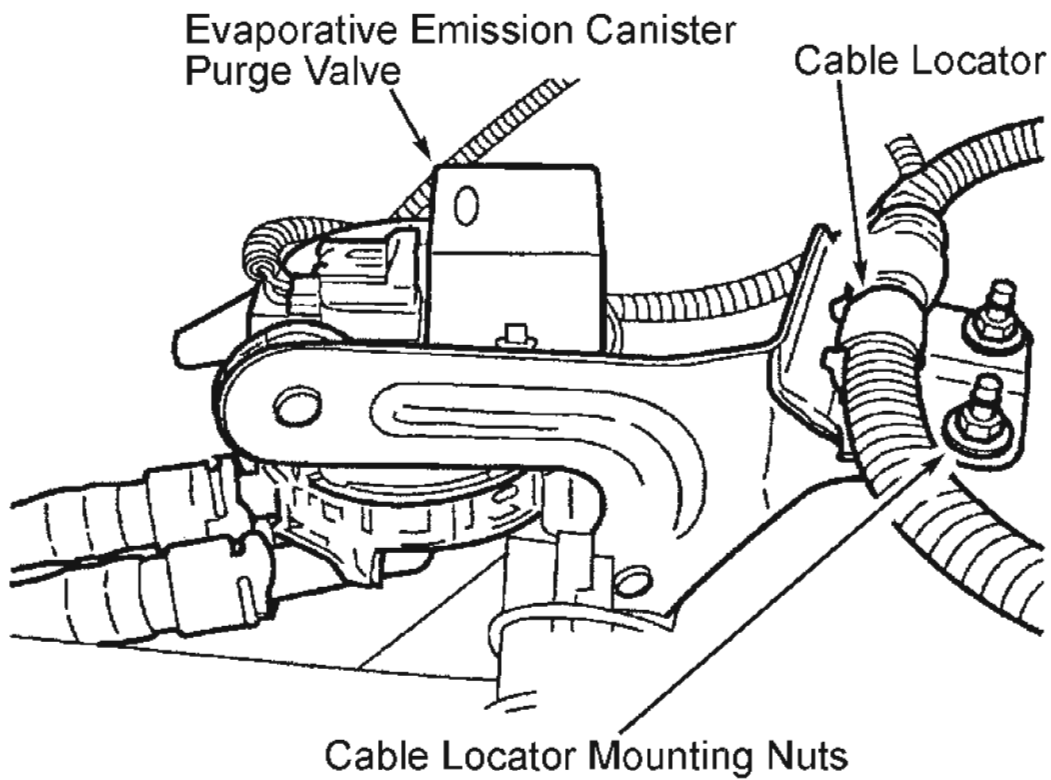


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**Fig. 35: Identifying Brake Pedal Pushrod Cotter Pin & Washer**  
Courtesy of FORD MOTOR CO.



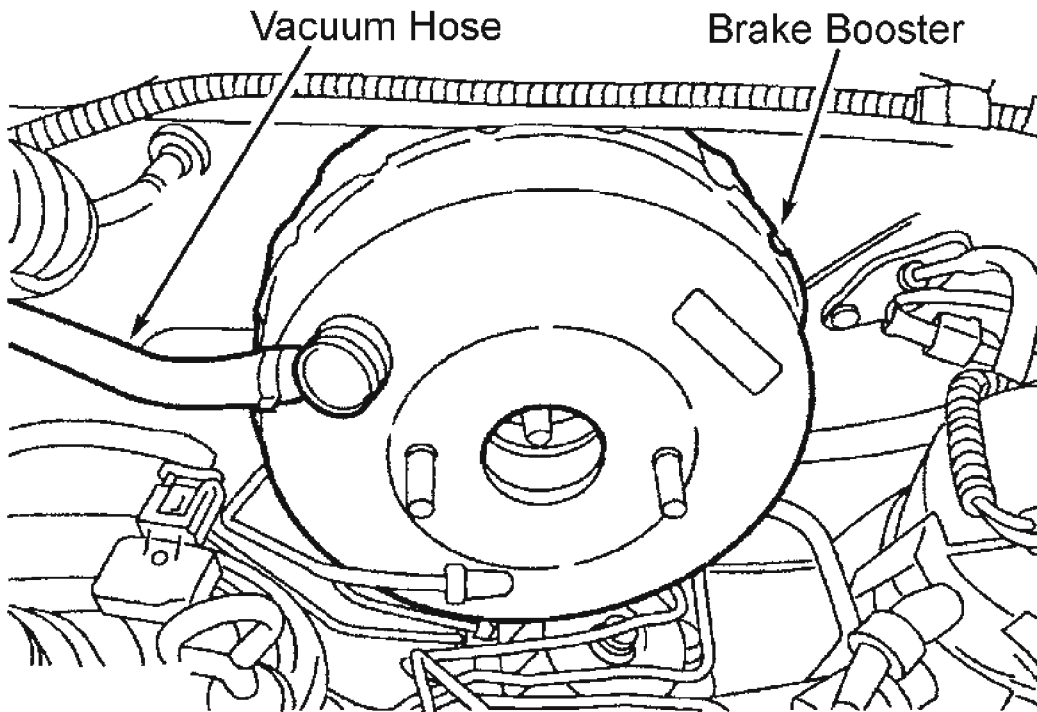
**Fig. 36: Identifying Power Brake Booster Pushrod Bracket Nuts**  
Courtesy of FORD MOTOR CO.



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**Fig. 37: Identifying Evaporative Emission Canister Purge Valve**  
Courtesy of FORD MOTOR CO.





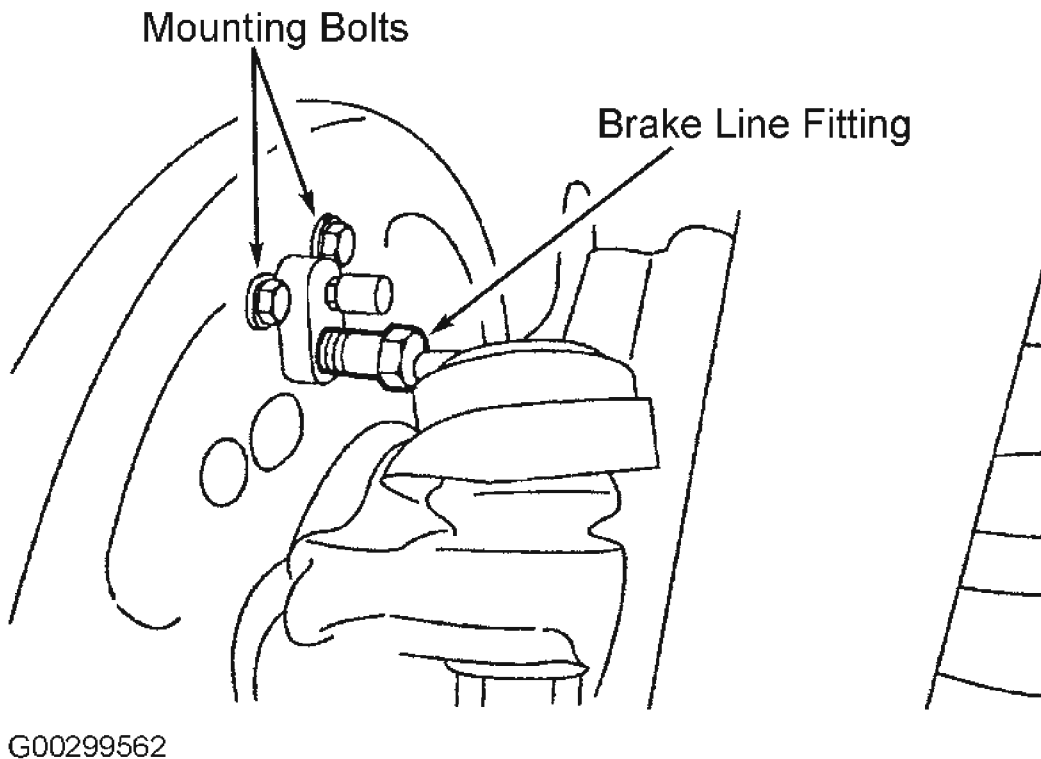
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**Fig. 38: Identifying Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

## WHEEL CYLINDERS

### Removal & Installation

1. Remove the rear brake drum. See **BRAKE DRUM** .
2. Remove brake shoes. See **BRAKE SHOES** .
3. Disconnect the brake line fitting from the wheel cylinder. See **Fig. 39** .
4. Remove the mounting bolts. Remove the wheel cylinder. See **Fig. 39** .
5. To install, reverse removal procedure. Adjust brakes, and bleed hydraulic system. See **BLEEDING BRAKE SYSTEM** .



**Fig. 39: Identifying Wheel Cylinder Mounting Bolts & Brake Line Fitting**  
Courtesy of FORD MOTOR CO.

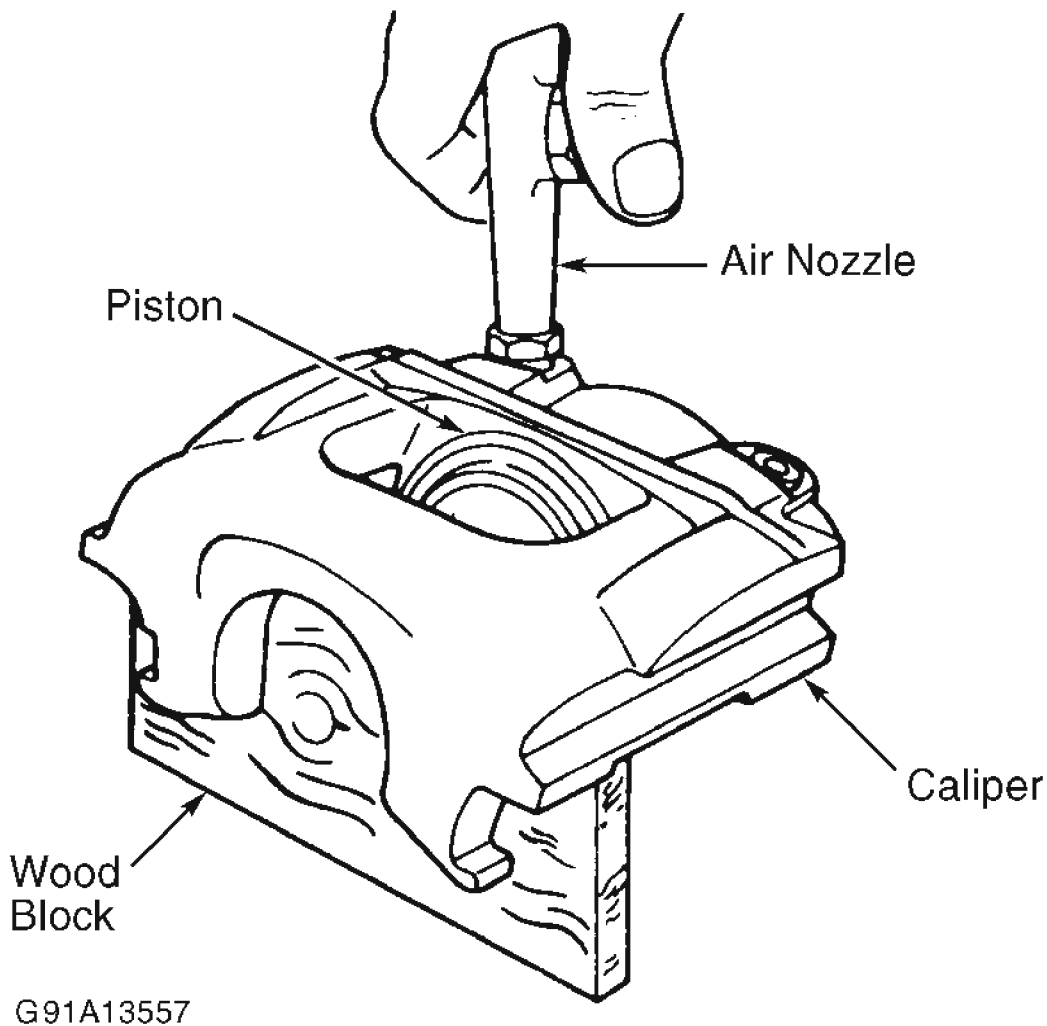
## OVERHAUL

### DISC BRAKE CALIPER

#### Disassembly

**WARNING:** DO NOT place fingers between wood and piston as piston leaves caliper.

1. Remove caliper. See **DISC BRAKE CALIPERS & PADS** under REMOVAL & INSTALLATION.
2. Drain fluid from caliper. Secure caliper in a vise. Place a block of wood between caliper and piston. See **Fig. 40**.
3. Apply low air pressure to brake hose inlet. Air pressure forces piston outward.
4. If piston is jammed or seized and does not come out easily, use a brass hammer to lightly tap caliper while applying air pressure. Do not pry piston from bore. After piston comes out, remove dust boot and seal using a plastic or wooden pick. Discard seals and boots.



**Fig. 40: Removing Caliper Piston**  
Courtesy of FORD MOTOR CO.

**Cleaning & Inspection**

**CAUTION:** DO NOT use denatured alcohol to clean rubber components or assemblies that have rubber components. Cleaning rubber components with denatured alcohol weakens the rubber and may result in failure of the component.

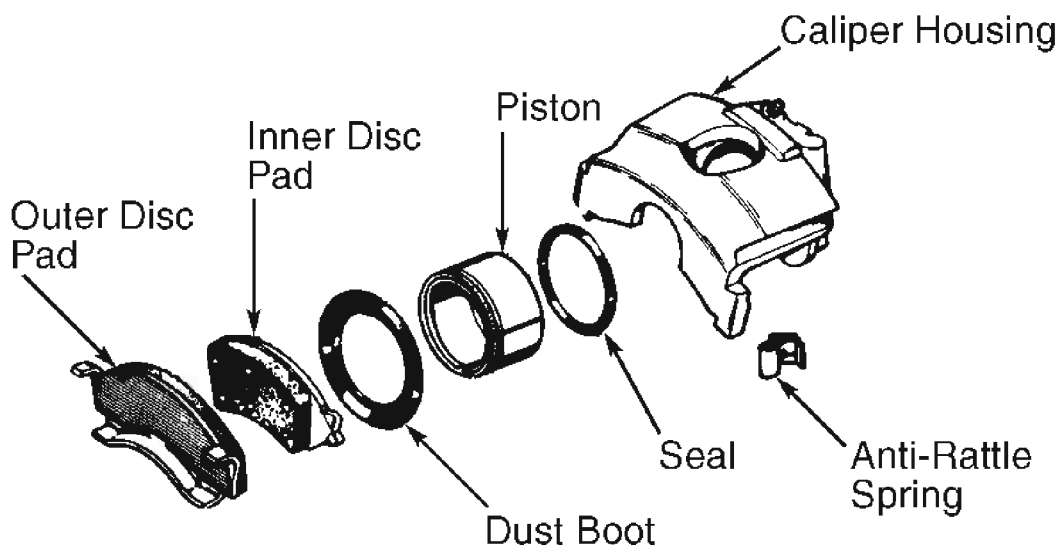
**CAUTION:** Never allow any petroleum product or mineral oil to contact the inside of a brake hydraulic system. Mineral oil and petroleum products deteriorate the natural rubber seals used in brake hydraulic system. If a brake system becomes contaminated, it must be flushed with clean brake fluid and

**all rubber seals and flex hoses replaced. Use High Performance DOT 3 Motor Vehicle Brake Fluid (C6AZ-19542-AB) or equivalent meeting Ford specification ESA-M6C25-A, DOT 3.**

1. Clean all brake caliper components. All parts must be air-dried completely. Coat all internal parts and piston seal with high performance DOT 3 motor vehicle brake fluid.
2. Inspect caliper bore, seal grooves and boot grooves for wear or damage. If bores are scored, corroded or worn, replace caliper. Replace anti-rattle clip, caliper support spring and key.

#### Reassembly

1. Apply clean brake fluid to NEW piston seal, and install in caliper bore groove. Ensure the seal is not twisted and is firmly seated in the caliper bore. Apply clean brake fluid to caliper bore. Coat piston and outside beads of dust boot with clean brake fluid.
2. Push piston through boot until boot is around bottom (closed end) of piston. See **Fig. 41**. Position piston and boot directly over caliper bore. Spread dust boot over piston as it is installed.
3. With bead seated in groove, carefully press straight down on piston until it bottoms in caliper bore. Do not cock or jam piston in caliper bore. If necessary, use a "C" clamp and a block of wood to bottom piston in caliper bore.

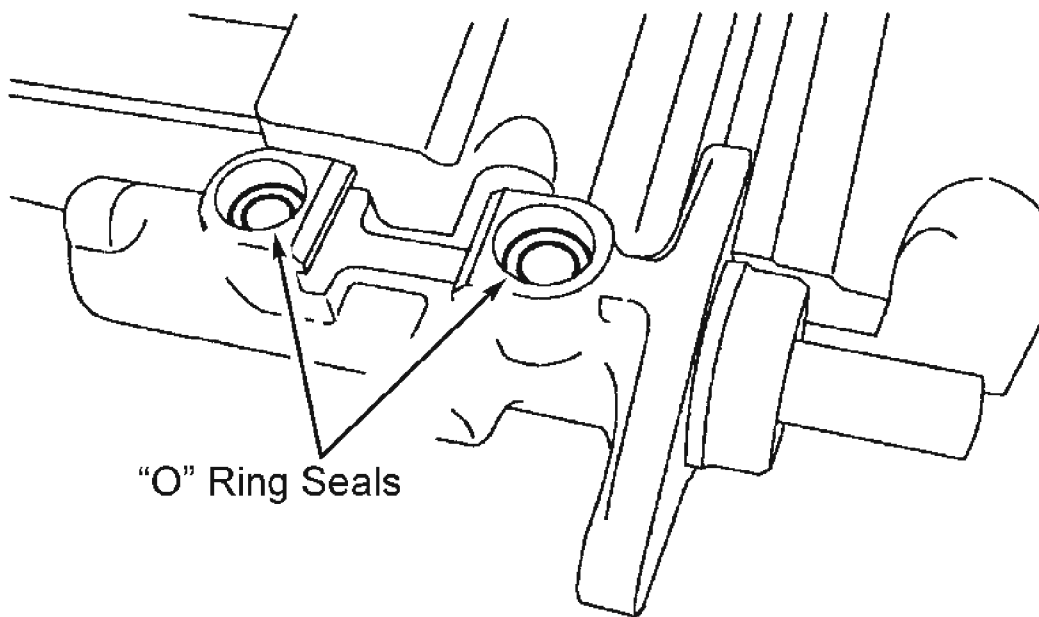


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**Fig. 41: Exploded View Of Single Piston Caliper**  
Courtesy of FORD MOTOR CO.

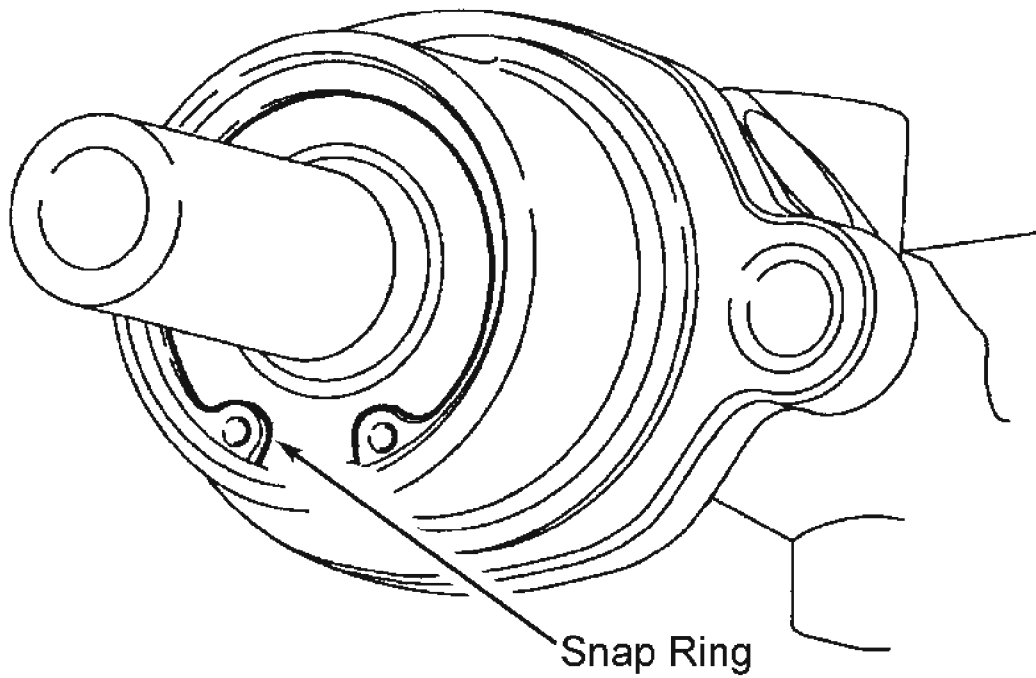
**MASTER CYLINDER****Disassembly**

1. Remove master cylinder. See **MASTER CYLINDER & RESERVOIR** under REMOVAL & INSTALLATION.
2. Clean outside of master cylinder.
3. Remove the brake master cylinder reservoir.
4. Remove the seals. See **Fig. 42** .
5. Remove the snap ring. See **Fig. 43** .
6. Remove the primary and secondary piston. See **Fig. 44** and **Fig. 45** .
7. Use isopropyl alcohol to clean and inspect the brake master cylinder bore for damage.



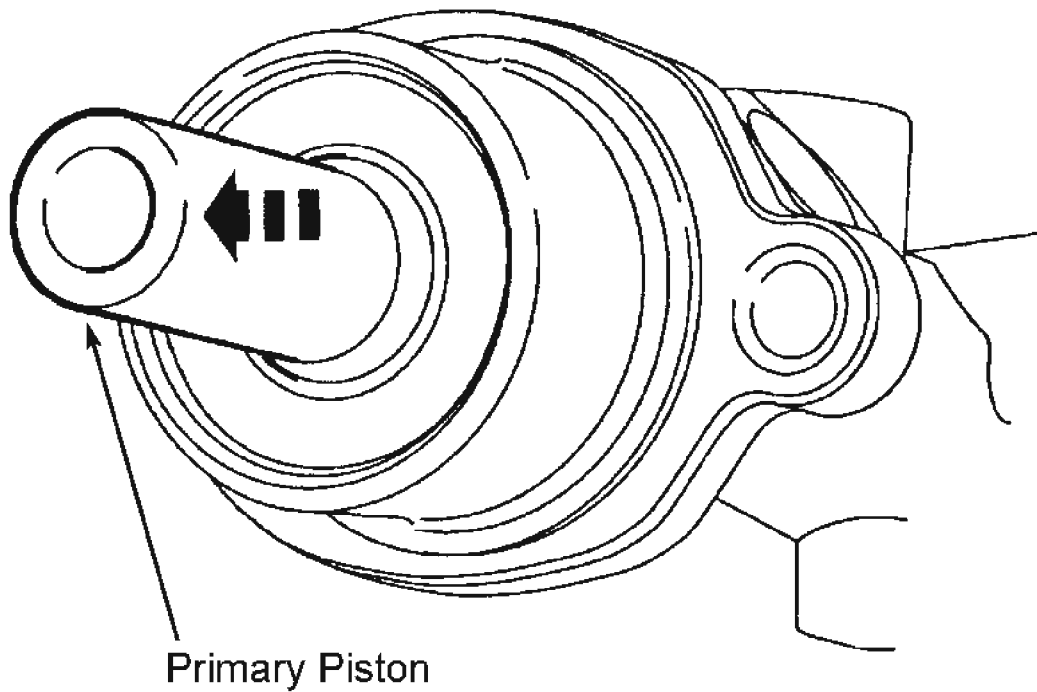
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**Fig. 42: Identifying Master Cylinder Reservoir "O" Rings**  
Courtesy of FORD MOTOR CO.



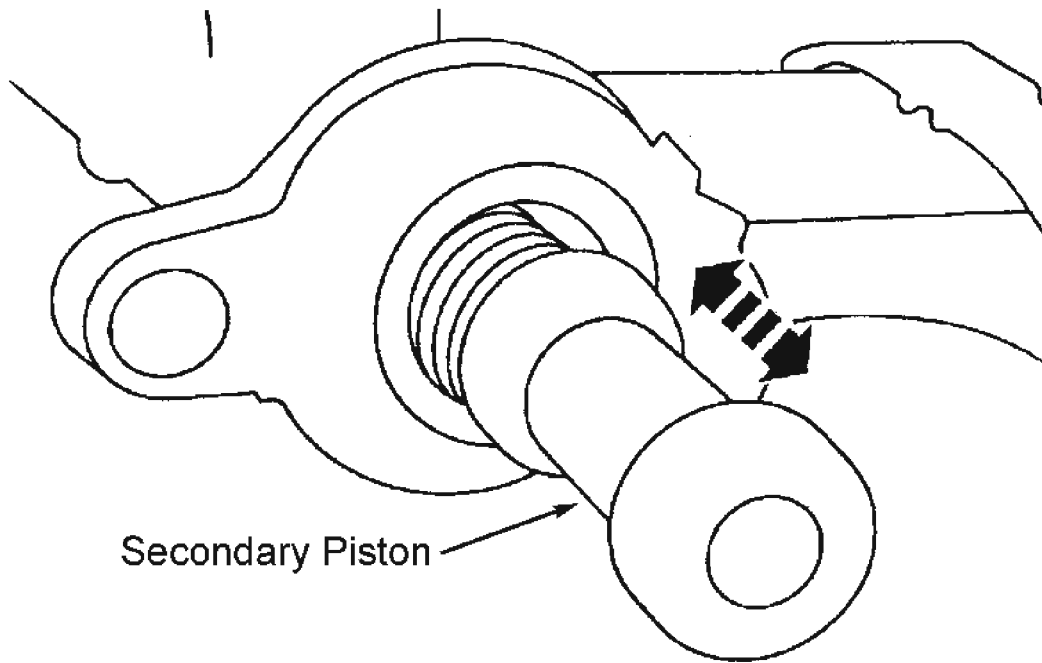
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**Fig. 43: Identifying Master Cylinder Snap Ring**  
Courtesy of FORD MOTOR CO.



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**Fig. 44: Removing Primary Piston**  
Courtesy of FORD MOTOR CO.



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**Fig. 45: Removing/Installing Secondary Piston**  
Courtesy of FORD MOTOR CO.

#### Inspection

**NOTE:** Manufacturer does not recommend honing cylinder bore.

Clean all parts with isopropyl alcohol and blow dry with compressed air. Ensure all ports and vents are open and free of foreign matter. Inspect master cylinder bore and all parts for excessive wear or damage. If bore is damaged, replace master cylinder.

#### Reassembly

1. Use clean brake fluid to lubricate the new piston assembly seals and the brake master cylinder bore.
2. Install the secondary piston assembly.
3. Install the primary piston assembly.
4. Install the snap ring.
5. Lubricate the seals with clean brake fluid and insert the seals into the brake master cylinder. Install the seals.
6. Press the brake master cylinder reservoir into the "O" ring seals until it snaps in



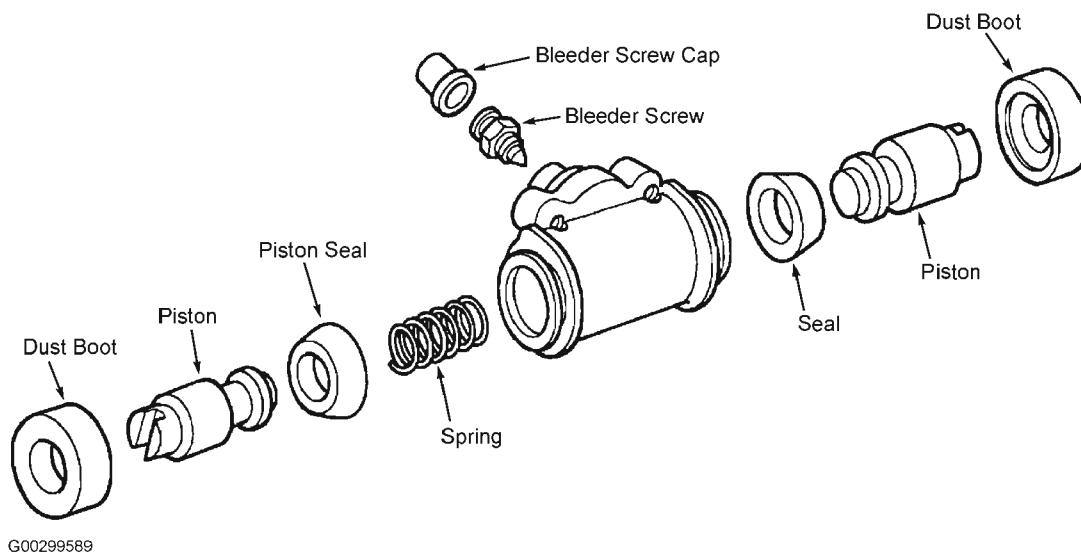
securely.

7. Install master cylinder. Bleed brake system as necessary. See **BLEEDING BRAKE SYSTEM**.

## WHEEL CYLINDERS

### Disassembly

With wheel cylinder removed from vehicle, remove rubber boots from ends of cylinders. Remove pistons, piston cups and return spring from cylinder. Remove bleeder screw. Inspect cylinder bore for damage. See **Fig. 46**.



**Fig. 46: Exploded View Of Wheel Cylinder**  
Courtesy of FORD MOTOR CO.

### Reassembly

Inspect the rear wheel cylinder bore for wear, rust or pits. If any of these conditions exist, install a new wheel cylinder. Coat all parts with clean brake fluid. To assemble, reverse disassembly procedure. Clamp brake cylinder pistons against ends of cylinder.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Brake Pedal Bracket Nuts	17 (23)
Brake Line Fitting-To-Pressure Control Valve Fittings	10 (14)
Brake Line Master Cylinder Fittings	11 (15)
Brake Line-To-Caliper Fitting	15 (20)

**2004 Ford Escape****2002-04 BRAKES Disc & Drum - Escape**

Brake Line-To-Rear Wheel Cylinder Fitting	10 (14)
Caliper Anchor Plate Bolts	111 (150)
Caliper Bleeder Screws	12 (16)
Caliper Bolts	26 (35)
Master Cylinder Nuts	18 (24)
Parking Brake Cable Bracket Bolt	17 (23)
Parking Brake Control Bolts	18 (24)
Power Brake Booster Pushrod Bracket Nuts	17 (23)
Rear Brake Backing Plate Bolts	49 (66)
Rear Parking Brake Cable Bracket Bolts	17 (23)
Rear Parking Brake Cable-To-Knuckle Bracket Bolts	17 (23)
Wheel Lug Nut	98 (133)
<b>INCH Lbs. (N.m)</b>	
Brake Pressure Control Valve Bolts	80 (9)
Floor Console Bracket Bolts	53 (6)
Parking Brake Cable Equalizer Bracket Bolts	80 (9)
Pressure Control Valve Bolts	80 (9)
Purge Valve Bracket Nuts	89 (10)
Wheel Cylinder Bleeder Screws	71 (8)
Wheel Cylinder Bolts	108 (12)

**DISC & DRUM BRAKE SPECIFICATIONS****BRAKE SPECIFICATIONS**

<b>Application</b>	<b>In. (mm)</b>
Brake Pedal Free-Play	0.31-0.47 (7.9-12.0)
Disc Brake Pad Minimum Thickness	0.118 (3.0)
Disc Brake Pad Minimum Thickness Variation (Pad-To-Pad)	0.079 (2.0)
Disc Brake Pad Maximum Taper Wear (In Any Direction)	0.118 (3.0)
Disc Diameter	10.94 (278)
Disc Lateral Runout	0.004 (0.10)
Disc Parallelism (Maximum Thickness Variation)	(1)
Disc Discard Thickness	0.86 (22)
Front Disc Minimum Machine To Thickness	0.88 (22.4)
Rear Brake Wheel Cylinder Inner Diameter	0.937 (23.8)
Rear Lining Minimum Thickness	0.03 (0.762)
Rear Lining Standard Thickness (New)	0.18 (4.5)
Rear Drum Maximum Refinish Diameter	9.06 (230.1)

## 2004 Ford Escape

2002-04 BRAKES Disc & Drum - Escape

Rear Drum Standard Diameter (New)	9.00 (228.7)
Wheel Cylinder Inner Diameter	0.937 (23.8)
(1) Information not available from manufacturer.	

**2000-01 BRAKES****Disc & Drum - Trucks - Except Villager****DESCRIPTION & OPERATION**

**NOTE:** This article also applies to Cab & Chassis.

**NOTE:** References to F250/350 also apply to super duty models, except where noted.

**SYSTEM COMPONENTS****Brake Booster**

All models are equipped with a dual-diaphragm vacuum booster. Boosters are self-contained, vacuum power brake units. Booster assists in actuating master cylinder push rod.

Booster contains a dual vacuum-suspended diaphragm which uses engine manifold vacuum or atmospheric pressure for power. Diesel models use a belt-driven vacuum pump to provide vacuum for booster actuation.

A mechanically operated booster check valve controls power brake application and release in relation to pressure applied to check valve operating rod. Booster check valve is the only serviceable component of brake booster assembly.

An equalizer valve links 2 chambers of brake booster. When valve opens, vacuum in chambers can equalize. When it closes, chambers are separated. A vacuum bleed valve functions to reduce amount of vacuum in secondary chambers when boost is required.

Excursion and Super Duty Pickup uses a Hydro-Boost system. Hydro-Boost is hydraulically operated by power steering pump and provides a variable power assist regulated by brake pedal pressure. Hydro-Boost has a reserve system (compressed gas accumulator) which stores enough fluid under pressure to provide at least 2 power-assisted brake applications if power steering pump fluid flow stops. Brakes can also be operated manually if reserve system is lost.

Hydro-Boost power units in normal condition produce certain noises. These noises occur when brakes are used more than usual. In general, these noises are hissing, clunks, clicks and chattering. Hydro-Boost hisses when greater than normal braking effort is used. Hissing increases when pedal effort and operating temperatures increase. Loud hissing at normal pedal effort of 25-35 lbs. (11-16 kg) or less should be investigated. Clunk, chatter and clicking noises are heard when brake pedal is quickly released from hard braking.

**WARNING:** Hydro-Boost unit should not be carried by accumulator. **DO NOT** drop Hydro-Boost on accumulator. Snap ring should be checked for proper seating before booster is used. Accumulator contains high-pressure nitrogen gas and can be dangerous if mishandled. Before disposing of boosters, drill a 1/16" (1.6 mm) hole in end of accumulator to relieve gas pressure.

#### Deactivator Switch

On Van with speed control, a deactivator switch is located underneath brake master cylinder as an additional safety feature. Normally, when brake pedal is depressed, an electrical signal from brakelight circuit to speed control amplifier will turn off system. Under increased brake pedal efforts, deactivator switch mounted on master cylinder will open and remove power to speed control actuator clutch, releasing throttle independent of speed control amplifier.

#### Front Disc Brakes

Front disc brakes are standard on all models. A dual piston front caliper assembly is used on all models except E150.

#### Rear Disc Brakes

Rear disc brakes are standard or optional on all models except E150/E250 and Ranger. Super Duty Pickup and E350 and E450 use dual piston rear caliper. All models are equipped with full-cast rear disc brake rotors and a cable-actuated, single-anchor, shoe type parking brake.

#### Rear Drum Brakes

Rear drum brakes are used on E150/E250, some F150/F250 models, Escape, Explorer, Explorer Sport, Explorer Sport-Trac, Ranger, and Windstar models. On rear drum brake models, parking brake is actuated by a cable, which pulls the parking brake lever located inside rear brake assembly. The lever pivots parking brake strut between brake shoes. This movement pushes outward on brake shoes. Brake shoe linings are made of asbestos-free, fiberglass material. Rear drum brake assembly consists of a support plate, 2 brake shoes, return springs, automatic adjuster components and one dual-piston wheel cylinder.

#### Master Cylinder

Models are equipped with dual master cylinder with primary and secondary pistons.

#### Vacuum Pump (Diesel)

Vacuum is supplied from a belt-driven vacuum pump. Diesel equipped vehicles use a low vacuum indicator switch. Indicator switch is located on left side of engine compartment, near vacuum pump. Indicator switch will turn on brake warning lamp when a low vacuum

situation occurs.

## BLEEDING BRAKE SYSTEM

**CAUTION: Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash it with water.**

Bleed hydraulic system whenever air has been introduced into system. Bleed master cylinder and brakes at all 4 wheels if master cylinder lines have been disconnected or master cylinder has run dry. Bleed brakes with pressure bleeding equipment or by manually pumping brake pedal while using bleeder tubes. Always bleed brakelines in sequence. See **BLEEDING SEQUENCE** .

### MANUAL BLEEDING

**NOTE: DO NOT allow reservoir to run dry during bleeding operation.**

#### Master Cylinder Bleeding (Bench)

1. Support brake master cylinder body in a vise, and fill both fluid brake master cylinder reservoirs with brake fluid. Install plugs in front and rear brake outlet ports. Bleed front brake system first. Loosen plug in front brake outlet port and depress primary piston slowly to force air out of master cylinder.
2. Tighten plug while piston is depressed or air will enter brake master cylinder. Repeat procedure until no air bubbles are present. Repeat bleeding procedure for rear brake outlet port with front brake outlet plugged. Tighten plugs and try to depress piston. Piston will not depress if all air is out of master cylinder.

#### Master Cylinder Bleeding (On-Vehicle)

1. Using a line wrench, remove front brake tube and master cylinder outlet rear tube from master cylinder. Install short brake tubes in master cylinder and position them so they curve into master cylinder reservoir, and ends of tubes are submerged in brake fluid.
2. Fill master cylinder reservoir with clean brake fluid. Have an assistant pump brakes until clear, bubble-free fluid flows from both brake tubes. Remove short brake tubes and reinstall front brake tube and master cylinder inlet rear tube on master cylinder. Bleed each brake tube at master cylinder by having an assistant pump brake pedal 10 times and then hold firm pressure on brake pedal.
3. Loosen rearmost brake tube fittings until a stream of brake fluid comes out. Have an assistant maintain pressure on brake pedal until brake tube fitting is tightened again. Repeat procedure until clear, bubble-free fluid comes out from around tube fitting. Refill master cylinder reservoir as necessary. Repeat this bleeding operation at front

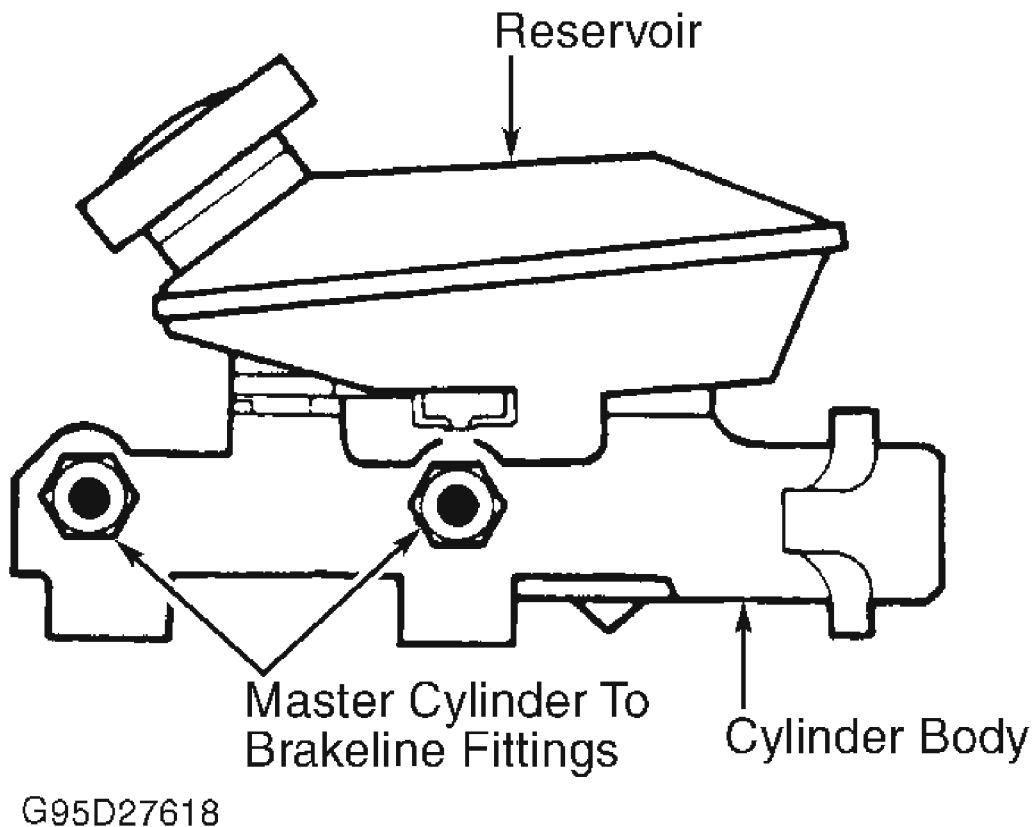
brake tube fittings.

### Gravity Bleeding

Fill brake master cylinder with new brake fluid. Loosen both wheel cylinder bleeder screws and leave them open until clear brake fluid flows. Check master cylinder reservoir fluid level often and do not let it run dry. Tighten wheel cylinder bleeder screws. One at a time, loosen caliper bleeder screws. Leave bleeder screws open until clear fluid flows. Check fluid level often. Tighten caliper bleeder screws.

### Manual Bleeding

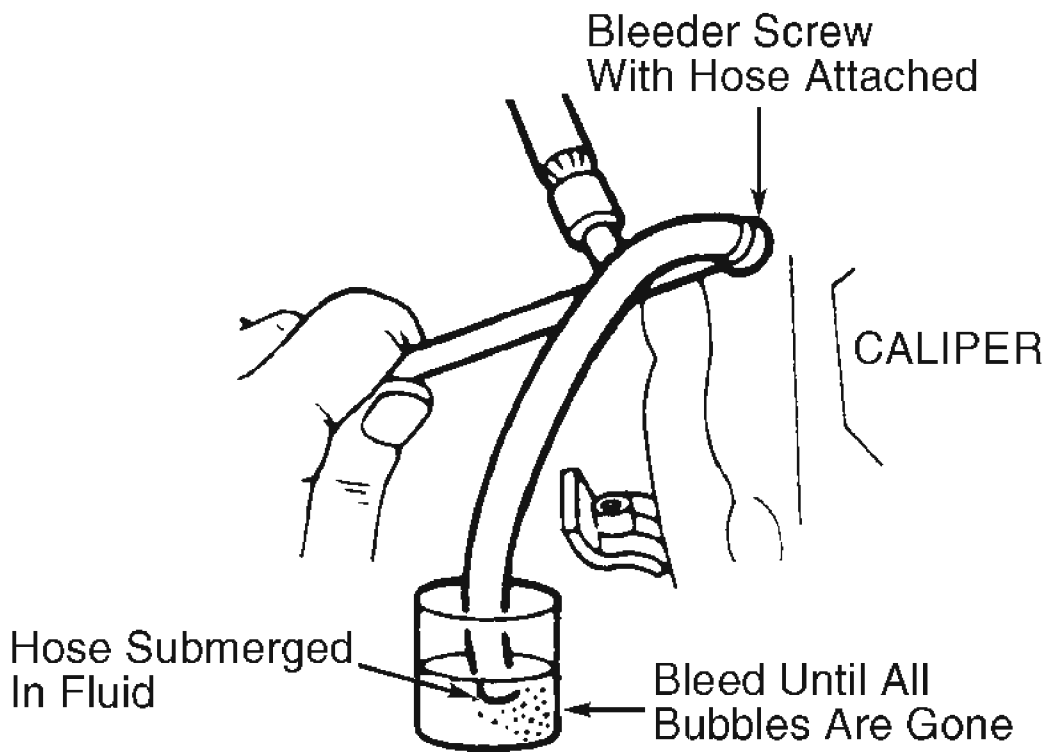
1. Clean master cylinder cap and surrounding area. Remove cap. All models are equipped with dual-type master cylinder. Bleed primary and secondary systems separately. Loosen primary or secondary master cylinder hydraulic line fitting. See **Fig. 1**.



**Fig. 1: Identifying Master Cylinder (Typical)**  
Courtesy of FORD MOTOR CO.

2. Wrap a cloth around brakelines to absorb escaping brake fluid. Slowly push brake

- pedal down to force out air. With pedal fully depressed, tighten fittings to prevent air from being sucked into master cylinder when pedal is released. Release pedal.
3. Repeat procedure until air is completely purged from master cylinder. When all air has escaped, tighten fittings with pedal down. Release pedal, and depress again. If pedal is not firm, repeat bleeding procedure.
  4. Repeat procedure at bleeder fitting on rear anti-lock brake electrohydraulic RABS valve, each wheel cylinder and caliper. See **Fig. 2** . See **BLEEDING SEQUENCE** table under BLEEDING SEQUENCE. When bleeding is complete, fill master cylinder to proper level.



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**Fig. 2: Bleeding Wheel Cylinders (Typical)**  
 Courtesy of FORD MOTOR CO.

#### PRESSURE BLEEDING

**CAUTION:** DO NOT exceed 50 psi (3.5 kg/cm<sup>2</sup>) during bleeding.

1. Clean master cylinder cap and surrounding area. Remove cap. With pressure tank at



least 1/2 full of specified fluid and charged at 10-30 psi (.7-2.0 kg/cm<sup>2</sup>), use adapters to connect tank to master cylinder. Follow equipment manufacturer's pressure instructions.

2. Open pressure bleeder valve. Bleed master cylinder primary and secondary hydraulic lines individually. Put shop towels in place to catch brake fluid.
3. Open lines. Allow brake fluid to flow out until all air is purged. Close bleed fitting and hydraulic line. Close pressure bleeder valve. Attach rubber drain hose to first wheel cylinder bleeder valve to be serviced. See [Fig. 2](#). See **BLEEDING SEQUENCE** table under BLEEDING SEQUENCE.
4. Place other end of hose in clean glass jar partially filled with clean brake fluid so end of hose is submerged in fluid. Open pressure bleeder valve. Open bleeder fitting. Close bleeder fitting when fluid flow is free of bubbles. Repeat procedure on remaining wheel cylinder and calipers in sequence. See **BLEEDING SEQUENCE** table under BLEEDING SEQUENCE.
5. When bleeding operation is complete, close pressure bleeder valve, and remove tank hose from adapter fitting. Check brake pedal operation. Ensure master cylinder is full of fluid.

## BLEEDING SEQUENCE

Before bleeding system, remove all vacuum from power unit by depressing brake pedal several times. Bleed master cylinder first, followed in sequence by rear wheel cylinders, anti-lock system components (if equipped) and calipers. See **BLEEDING SEQUENCE** table.

## BLEEDING SEQUENCE

Application	Sequence
All (Except Models With ABS)	RR, LR, RF, LF
ABS Models	RR, LR, <sup>(1)</sup> , RF, LF
(1) Bleed hydraulic control unit. See appropriate Anti-Lock article.	

## BLEEDING HYDRO-BOOST UNIT

**NOTE:** Hydro-Boost is generally self-bleeding. Listed procedure will normally bleed air from system. Normal vehicle operation will remove any additional air.

### Super Duty Pickup

1. Fill power steering pump reservoir with MERCON multipurpose automatic transmission fluid. Remove powertrain control module (PCM) fuse and crank engine for several seconds. Check and add fluid if necessary. Install PCM fuse. Start engine. Turn wheels from lock-to-lock twice.

2. Turn engine off. Depress brake pedal several times to discharge accumulator. Start engine, and turn wheels from lock-to-lock twice. If foaming occurs, stop engine, and allow foam to dissipate. Repeat lock-to-lock procedure until all air is removed from system.

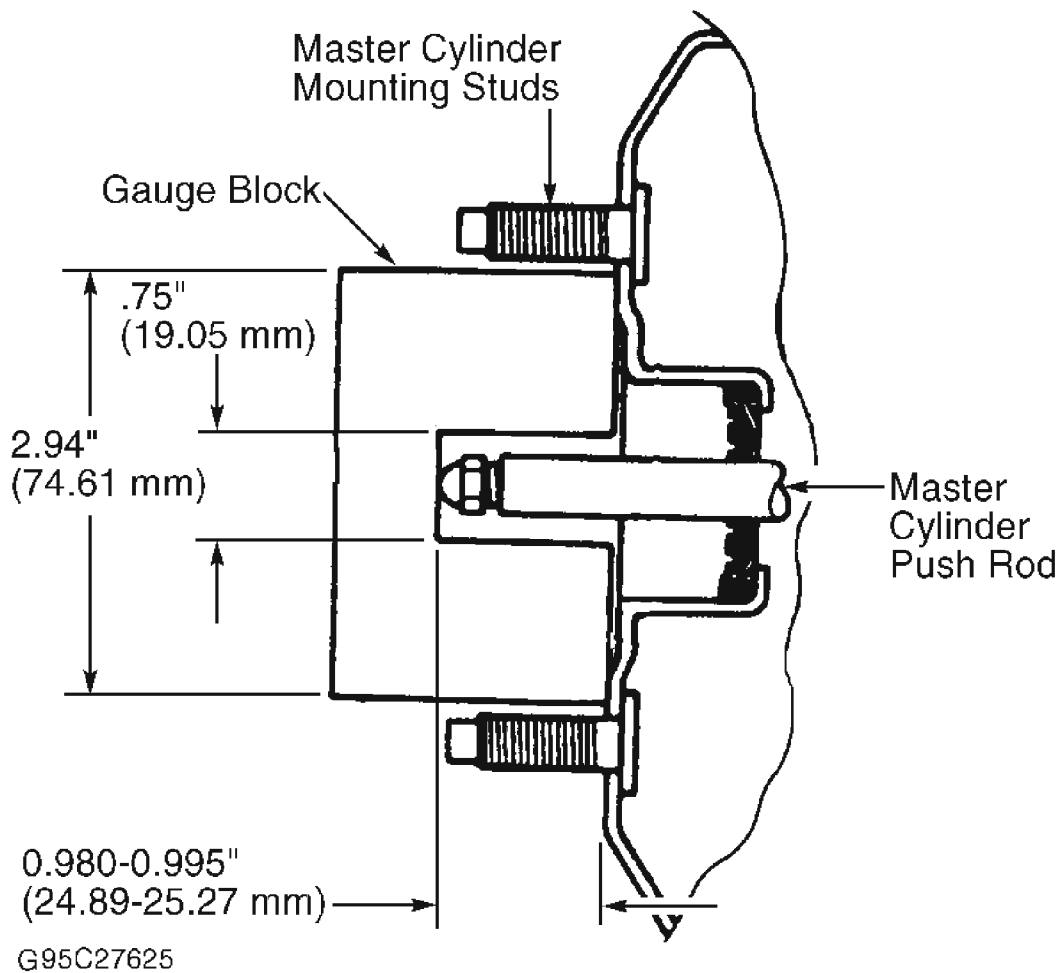
## **ADJUSTMENTS**

**WARNING:** Shut air suspension off, prior to hoisting vehicle. This can be accomplished by turning off air suspension switch located on right kick panel.

### **VACUUM POWER BOOSTER PUSH ROD**

**NOTE:** Push rod is not adjustable on Escape.

1. Push rod has an adjustment screw to maintain correct distance between booster push rod and master cylinder piston. If push rod is adjusted too long, it prevents master cylinder piston from completely releasing hydraulic pressure, causing brakes to drag. If push rod is adjusted too short, it causes excessive pedal travel and an undesirable groaning noise in booster area.
2. Remove master cylinder to access push rod. To check screw adjustment, fabricate a gauge. See **Fig. 3** . With engine running, place gauge against master cylinder mounting surface of booster. Adjust push rod screw by turning it until end of screw just touches inner edge of gauge slot.



**Fig. 3: Adjusting Brake Booster Push Rod (All Models Except Escape, Econoline, Super Duty Pickup & Windstar)**  
 Courtesy of FORD MOTOR CO.

## BRAKE PEDAL FREE PLAY

### Escape

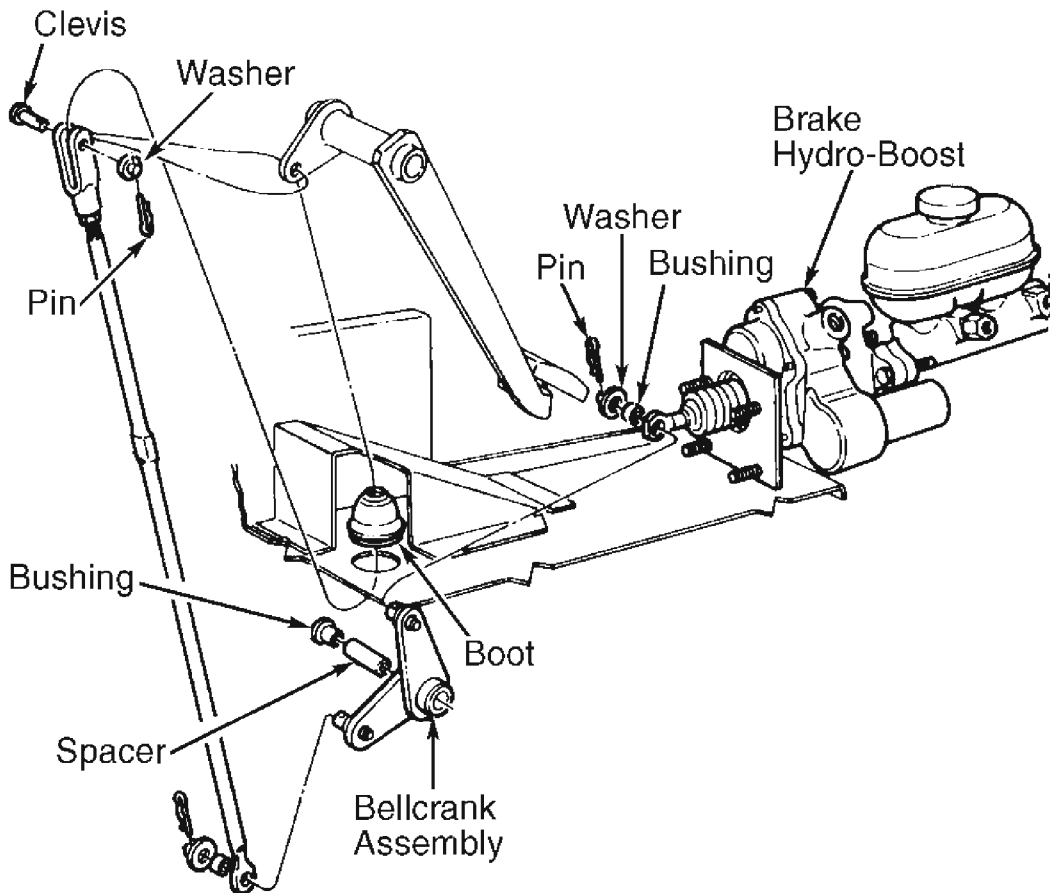
Release vacuum from brake booster by depressing brake pedal several times. gently depress brake pedal by hand, and check pedal free play. Free play specification is .3-.47" (7.8-12 mm). To adjust free play, loosen clevis nut on brake pedal push rod. Turn clevis until free play is within specification. Tighten clevis nut.

## BRAKE PEDAL LINKAGE

### Excursion & Super Duty Pickup

Remove spring clip and washer from lower end of brake pedal rod. Remove lower end of rod

from bellcrank pin. Loosen jam nut. Hold brake pedal against rubber stop. Turn brake rod into clevis until lower hole lines up with pin on bellcrank. Slide brake rod onto pin of bellcrank, and attach washer and spring clip. See **Fig. 4**.



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**Fig. 4: Adjusting Brake Pedal Linkage (Excursion & Super Duty Pickup)**  
Courtesy of FORD MOTOR CO.

## PARKING BRAKE

Parking Brake Shoe Adjustment (Expedition, Excursion, Explorer, Explorer Sport, Explorer Sport-Trac, Mountaineer & Super Duty Pickup)

**NOTE:** On all models except Excursion, Escape, Explorer, Explorer Sport, Explorer Sport-Trac, Mountaineer and Super Duty Pickup, parking brake system is self-adjusting and does not require adjustment.

Using Brake Adjustment Gauge (D81L-1103-A), measure inside diameter of drum portion of

rear disc brake rotor. On Excursion and Super Duty Pickup, using parking brake adjuster screw, adjust parking brake shoe and lining until they drag against parking brake drum. On all other models, adjust parking brake shoe and lining to .020" (.508 mm) less than drum measurement.

### PARKING BRAKE CABLE (ESCAPE)

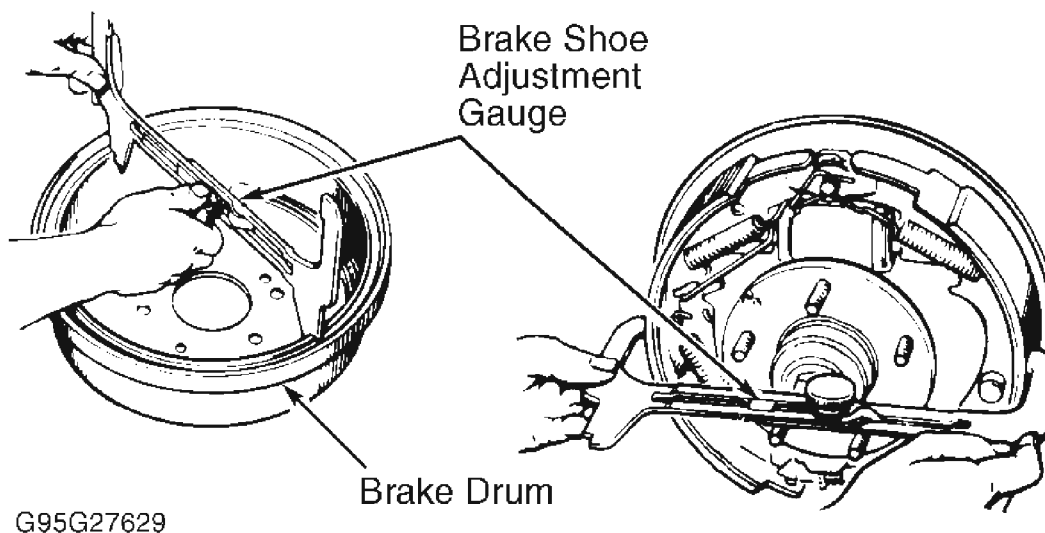
1. Count number of notches it takes to fully apply parking brake lever. If parking brake is fully applied, 3-5 notches, parking brake adjustment is okay. If parking brake requires adjustment, go to next step.
2. Parking brake cable is adjusted at parking brake lever. Remove center console. Ensure parking brake is fully released. Tighten adjusting nut at parking brake lever until adjustment is within specification. Install center console. Check parking brake operation.

### BRAKE SHOES

#### Drums Removed

**NOTE:** Rear brake shoes are automatically adjusted when vehicle is driven forward and backward and brakes are applied sharply. Manual adjustment is required if brakes do not self-adjust or after brake shoes have been removed or replaced.

1. Adjust with brake drums cold and parking brake correctly adjusted. Measure brake drum inside diameter using brake shoe adjustment gauge. See **Fig. 5**.



**Fig. 5: Measuring Brake Drum & Shoe Diameter**

**Courtesy of FORD MOTOR CO.**

2. Reverse adjustment gauge. Apply gauge to brake shoes on a line parallel to ground and through center of axle. Hold adjusting lever away from adjusting screw. Turn screw until outside diameter of shoes contacts gauge. See [Fig. 5](#).
3. Install brake drum and wheel assembly. Complete adjustment by applying brakes quickly several times while driving vehicle alternately forward and backward. Check brake operation by stopping often while driving forward.

**Drums Installed**

1. Raise vehicle, and support with safety stands. Remove adjusting hole cover rubber plug. Turn adjusting screw and expand brake shoes until drag is felt against brake drum.
2. Loosen adjusting screw 10-12 notches. Drum should rotate freely without drag. If drum does not rotate freely, remove wheel and drum. Apply grease to brake shoe contact areas on backing plate.
3. Reinstall wheel and drum. Install adjusting hole cover. Apply brakes. If brake pedal travels more than halfway to floor, clearance between brake shoes and drums is too great. Additional adjustment is required.

**DISC PADS**

As brake pads wear, caliper piston remains in constant contact with brake pad, eliminating need for adjustment.

**TROUBLE SHOOTING**

**NOTE:** Occasional brake squeal can be caused by environmental conditions such as cold ambient temperatures, heat, rain, snow salt, mud, hot ambient temperatures or high humidity. This occasional squeal is not a functional problem and does not indicate any loss in brake effectiveness.

**INSPECTION**

1. Visually examine front and rear tire and wheel assemblies for damage such as uneven wear, tread washouts, or side-wall damage. Make sure tires are of same size, type and same manufacturer (where possible). Any tire or wheel that is damaged should be replaced. Wheels and tires must be cleared of any foreign matter and tire pressures adjusted to correct specifications.
2. If tires exhibit uneven wear or feathering, cause must be corrected. Check steering and suspension components for damage or wear and check and adjust steering alignment (if necessary). Check hydraulic hoses and tubes for leaks, cracks, chaffing and distortions.

Fasteners that hold these components in place should also be checked.

**NOTE: DO NOT pry under or otherwise disturb dust boot.**

3. Check drum brakes for loose or worn parts. Check rear wheel cylinder for leakage around dust boot. Check for proper component installation, leakage, caliper slide lubrication and excessive wear along caliper supports. Check instrument cluster brake warning light.
4. Ensure link from brake load sensor proportioning valve to frame is properly connected. Brake load sensor proportioning valve is calibrated for particular vehicle it is installed on. If modifications are made to rear suspension system, brake load sensor proportioning valve will not work properly and must be deactivated.

### MASTER CYLINDER

Changes in brake pedal feel or travel indicate possible problem in brake system. When diagnosing brake system problems, use brake warning light, pedal feel/travel and fluid level as indicators. Following symptoms indicate brake trouble:

Pedal goes down fast:

- Check for leaks or air in system.

Pedal goes down slowly:

- Check for external or internal leaks.

Pedal is low and/or feels spongy:

- Check for empty master cylinder reservoir, reservoir cap vent holes clogged, rear brakes out of adjustment or air in system.

Pedal effort too high:

- Check for binding or obstruction in pedal linkage. Check for poor booster assist.

Brake warning light is on:

- Check for low fluid level, ignition wires too close to fluid level indicator assembly, damaged indicator float, low vacuum (diesel) or applied parking brake.

### HYDRO-BOOST UNIT

Use following list of symptoms to aid in diagnosing Hydro-Boost problems:

Brake pedal returns slowly:

- Check for restriction in return line between Hydro-Boost and power steering reservoir.
- Check for incorrectly connected return line.
- Reposition brake pedal or add return spring.
- Replace Hydro-Boost.

Brakes grab:

- Tighten power steering belt.
- Flush steering system while pumping brake pedal.
- Replace Hydro-Boost.

Hydro-Boost chatter/Pedal vibration:

- Tighten power steering belt.
- Check for low fluid level.

Accumulator leaks down/No reserve brake application:

- Replace Hydro-Boost.

High brake pedal effort:

- Tighten or replace power steering belt.
- Low fluid level.
- Replace Hydro-Boost.

Brakes apply by themselves:

- Restriction in return line.
- Return line not connected correctly.
- Replace Hydro-Boost.

## **COMPONENT TESTS**

### **POWER BRAKE BOOSTER FUNCTION TEST**

1. With engine stopped, remove vacuum in system by pumping brake pedal several times. Push pedal down as far as it will go. If pedal moves downward slowly, hydraulic system is leaking. Check hydraulic system for leaks.
2. With pedal pushed down as far as it will go, start engine. If pedal moves downward, vacuum system is okay. If pedal does not change position, a problem exists in vacuum



system. Check vacuum system for leaks.

## **MASTER CYLINDER**

To check master cylinder for internal leak, disconnect brake lines at master cylinder. Plug outlet ports of master cylinder. Apply brakes. If pedal height cannot be maintained, master cylinder has internal leak and must be rebuilt or replaced.

## **BRAKE WARNING LIGHT**

1. Brake warning light should only come on when ignition switch is in START position or when ignition is on with parking brake applied or fluid level low. On diesel vehicles, brake warning light should also come on when vacuum is low.
2. If brake warning light does not come on when brake fluid is low, manually push reservoir float to bottom of reservoir. If light still does not come on, check fuse, wiring and bulb. Repair as necessary. If bulb and related circuitry are okay, replace reservoir assembly.
3. If brake warning light does not come on when parking brake is applied, check parking brake switch, wiring and bulb. Repair as necessary. With parking brake released and master cylinder reservoir full, turn ignition on. If warning light is on, check for shorted, grounded or defective warning switches or wiring. Repair as necessary. Turn ignition switch to START position. If brake warning light does not come on as a bulb check function, check fuse, bulb and wiring. Repair as necessary.

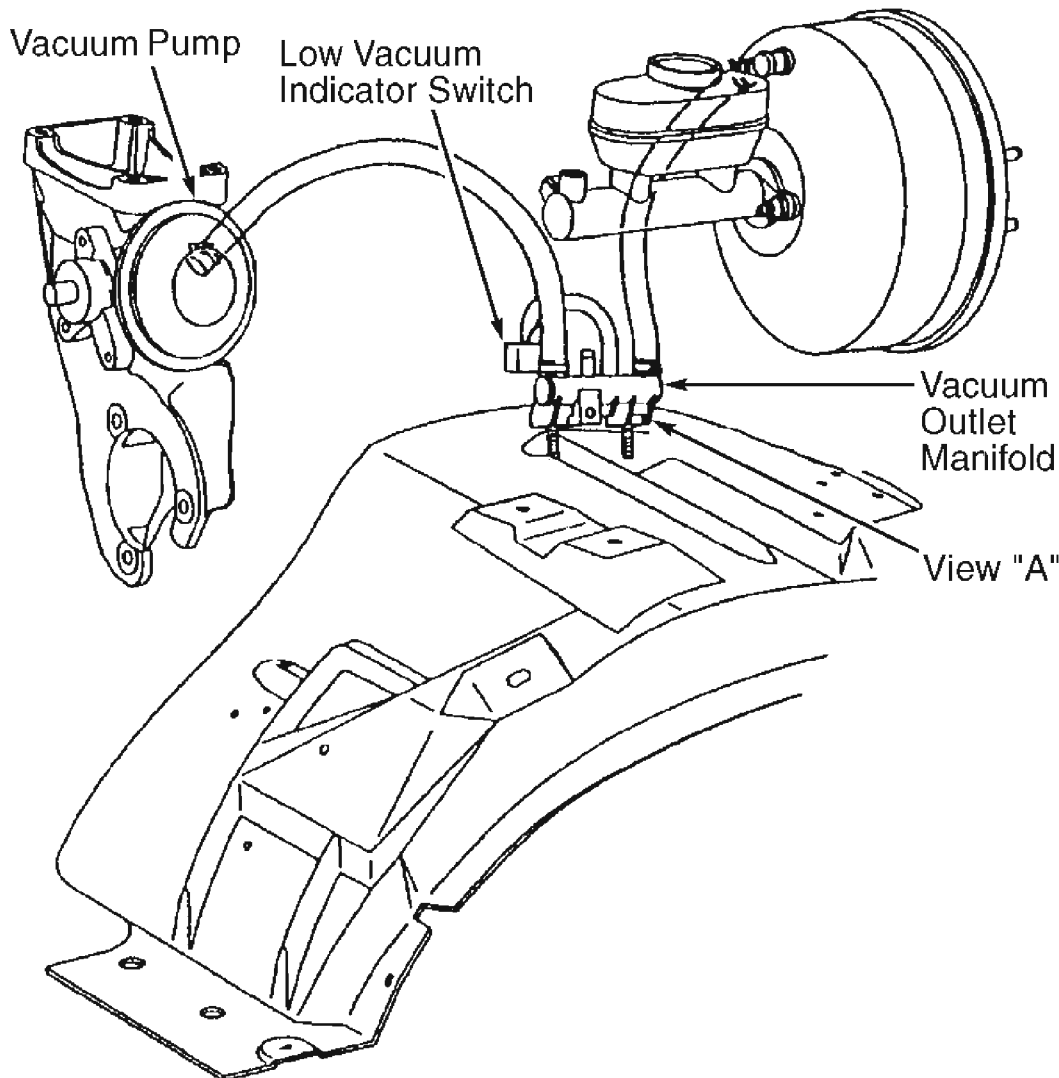
## **BRAKE PEDAL RESERVE**

1. If brake pedal is low or bottoming out, run engine at idle with transmission in Park or Neutral. Lightly depress brake pedal 3 or 4 times. Wait 15 seconds for vacuum to build in booster. Depress brake pedal until it stops moving downward.
2. While holding pedal down, increase engine speed to about 2000 RPM. Release accelerator pedal. Brake pedal should move downward as engine speed returns to idle. If results are correct, system has proper pedal reserve. If results are not correct, check for adequate vacuum. If vacuum is okay, replace vacuum booster.

## **VACUUM PUMP (DIESEL)**

1. Turn key off, disconnect vacuum line and connect a vacuum gauge with a "T" fitting to lower part of dash mounted plastic check valve. See **Fig. 6** . Start engine and allow to run at idle until vacuum reaches 17-21 in. Hg.
2. Turn ignition off and observe vacuum gauge for one minute. If vacuum drops more than 1 in. Hg, replace power brake booster check valve. If vacuum does not drop more than 1 in. Hg, go to next step.
3. Reconnect vacuum gauge in same point as in step 1 , but leave rest of system connected. Start engine and allow engine to run at idle until vacuum reaches 17-21 in.

- Hg. Turn ignition off and observe vacuum gauge for one minute.
4. If vacuum drops more than one in. Hg, disconnect each component one at a time and repeat test procedures in step 3 until leaking component is found. Plug disconnected vacuum line while performing test procedures. Repair or replace defective component as required. On diesel engine with dash mounted power brake booster, replace power brake booster check valve also. If vacuum does not drop more than one in. Hg, go to next step.
  5. Start engine and run engine until vacuum reaches 17-21 in. Hg. Turn ignition off and push down on brake pedal for a few seconds and release. If vacuum pressure drops to zero in. Hg, replace power brake booster. If vacuum pressure does not drop to zero in. Hg, system is okay. Remove vacuum gauge and reconnect all vacuum lines.



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**Fig. 6: Identifying Vacuum Pump Components (7.3L Diesel)**

Courtesy of FORD MOTOR CO.

## HYDRO-BOOST

Reserve

**CAUTION: DO NOT hold brake pedal with 100 lbs. (45 kg) of force for longer than 5 seconds at a time. DO NOT hold valve closed for more than 5 seconds. Damage to pump will result.**

Charge system with pressure by holding steering wheel on steering stop or by holding brake pedal down with 100 lbs. (45 kg) of force for 5 seconds with engine idling. Turn engine off. After 8-12 hours, depress brake pedal with engine off. If power reserve is not present, replace Hydro-Boost unit.

### Hydraulic Pressure Tests

1. Check for hydraulic leaks in system. Check power steering pump does not exhibit sustained failure or internal damage that may contaminate fluid in system. If there is a possibility of burned fluid or metal particles in fluid, brake system should be purged before connecting power steering analyzer.
2. Connect Power Steering System Analyzer (014-00230). Follow installation procedure supplied with analyzer. Fully open shutoff valve, start engine and purge air from brake system by applying brakes several times. Shut off engine and check connections for leaks.
3. Check for proper fluid level at reservoir and add or remove fluid as required. Recheck for air in system by restarting engine, partially closing shutoff valve and viewing pressure gauge. If gauge needle vibration is excessive, too much air remains in system. Install thermometer in reservoir and connect tachometer to engine.
4. Fully open analyzer shutoff valve. Start engine and run at 2000 RPM. When fluid temperature reaches 130°F (55°C), record flow and pressure. If flow is less than 3.1 gal/min (11.7 L/min), check to see if correct pump is installed. If correct pump is installed, continue testing. If pressure exceeds 25 psi (1.8 kg/cm<sup>2</sup>), check lines for kinks or obstructions.
5. Check pump for minimum efficiency flow. Decrease engine speed to 750-850 RPM. Slowly close shutoff valve to build pressure to 1200 psi (84 kg/cm<sup>2</sup>). Record flow with temperature at least 130°F (55°C). If flow is less than 1.3 gal/min (5 L/min), check if correct pump is installed. Pump may require repair or replacement, especially if flow in step 4 was also less than value indicated.
6. Check pump for pressure relief valve operation. Run engine at 750-850 RPM. Completely close and partially open shutoff valve 3 times. Read pressure when valve is fully closed. If pressure is less than 1230 psi (84.8 kg/cm<sup>2</sup>), or greater than 1350 psi

(93 kg/cm<sup>2</sup>), clean or replace pressure relief valve. If pressure is within specification, pump is operating normally and other areas should be investigated.

### **VACUUM POWER BOOSTER**

1. With a "T" fitting, connect vacuum gauge into vacuum line between engine and power brake booster. With engine at operating temperature, gauge should read 15-19 in. Hg vacuum at idle with transmission in Neutral. If reading is less than specification, stop engine, disconnect vacuum hose at power brake booster and cap open end of hose and open port of vacuum "T".
2. Start engine, and allow it to idle. If reading is still less than 15-19 in. Hg vacuum, engine is producing low vacuum and mechanical problem must be corrected. If vacuum is to specification, check plastic check valve, rubber grommet and vacuum hose connection at power brake booster.
3. With low engine vacuum corrected and/or leaking components replaced, start engine, and allow it to idle. Stop engine, and depress brake pedal for a few seconds. If vacuum drops to zero, booster is leaking and requires replacement.

### **VACUUM BOOSTER CHECK VALVE**

1. Remove vacuum booster hose from power brake booster and check valve connection. Manifold vacuum should be available at check valve end of vacuum booster hose with engine idling and transmission in Neutral.
2. Operate engine a minimum of 10 seconds at fast idle. Stop engine, and let vehicle stand for 10 minutes. Apply brake pedal with about 20 lbs. (9 kg) of force. Brake pedal feel should be same as that noted with engine operating. If brake pedal feels hard, replace check valve and retest.

### **REMOVAL & INSTALLATION**

**WARNING:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

**WARNING:** Deactivate suspension prior to hoisting vehicle. This can be accomplished by turning off air suspension switch located on right kick panel.

**CAUTION:** Anti-lock brake systems operate under high pressure. Before servicing, system pressure must be discharged. See

**appropriate ANTI-LOCK article.**

## **BRAKE BOOSTER VACUUM PUMP**

### **Removal & Installation (Diesel)**

**NOTE:** Vacuum pump is serviced only as a unit. Vacuum pump pulley can be replaced separately.

Remove hose from vacuum pump outlet. Remove vacuum pump belt. Remove pivot and adjustment bolts. Remove vacuum pump. To install, reverse removal procedure. Brake warning light comes on until vacuum builds up to normal level. See **Fig. 6** .

## **FRONT BRAKE ROTOR**

**NOTE:** If caliper does not require service, it is not necessary to remove brake hose from caliper unless indicated.

### **Removal (2WD Models Except Escape)**

1. Raise and support vehicle. Remove wheel. Remove anchor plate and caliper assembly, and position aside. See **DISC BRAKE CALIPERS & PADS** . On all models except Windstar, remove grease cap, cotter pin, nut, washer and outer bearing. See **Fig. 7** . Remove rotor. Remove inner bearing, and grease seal.
2. On Windstar, remove rotor bolts and remove rotor.

### **Inspection**

On all models except Windstar, inspect and thoroughly clean front wheel bearings, hub and rotor. Apply grease and pack front wheel bearings. If excessive force was necessary during removal, check brake rotor total indicated runout, prior to installation. See **ROTOR** under OVERHAUL.

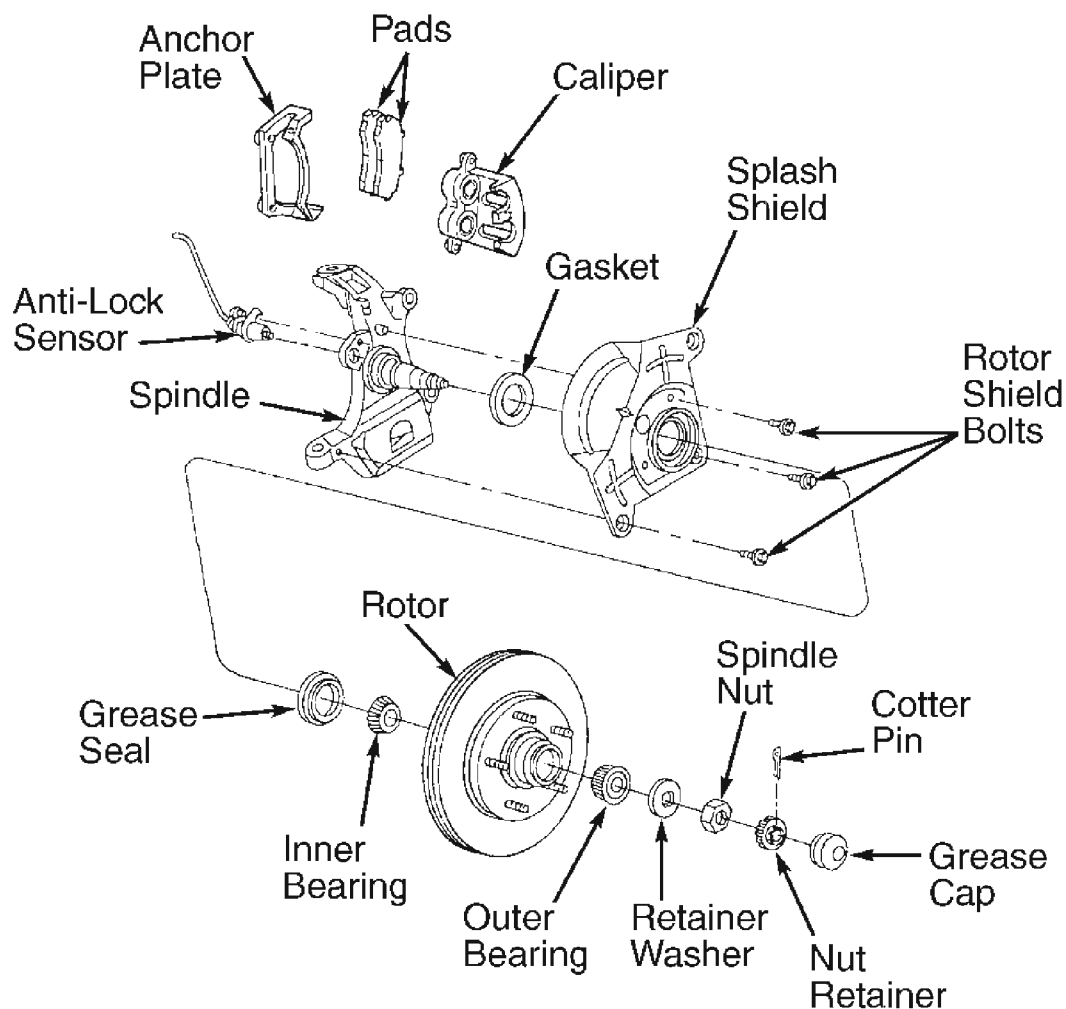
### **Installation (Expedition, Pickup & Navigator 2WD)**

1. Apply grease and pack wheel bearings. Install inner bearing and NEW grease seal. Position rotor. Install outer wheel bearing, and bearing retainer washer. Position spindle nut. See **Fig. 7** .
2. To seat bearings, while rotating rotor clockwise, tighten spindle nut to 30 ft. lbs. (40 N.m). Loosen spindle nut 2 full turns. While rotating rotor counterclockwise, tighten spindle nut to 17-24 ft. lbs. (23-34 N.m). Back off spindle nut 175 degrees. To complete tightening procedure, rotate rotor clockwise while tightening spindle nut to 17 INCH lbs. (2 N.m).
3. To complete installation, install spindle nut retainer, NEW cotter pin, and grease cap. Install anchor plate and caliper assembly. Tighten bolts. See **TORQUE**

## SPECIFICATIONS .

Installation (Explorer, Explorer Sport, Explorer Sport-Trac, Mountaineer & Ranger 2WD)

1. Apply grease and pack wheel bearings. Install inner bearing and NEW grease seal. Position rotor assembly. Install outer wheel bearing, and bearing retainer washer. Position spindle nut. See **Fig. 7** .
2. To seat bearings, while rotating rotor counterclockwise, tighten spindle nut to 17-24 ft. lbs. (23-34 N.m). Back off spindle nut 175 degrees. To complete tightening procedure, rotate rotor clockwise while tightening spindle nut to 17 INCH lbs. (2 N.m).
3. Install spindle nut retainer, NEW cotter pin, and grease cap. Install anchor plate and caliper assembly. Tighten bolts. See **Fig. 7** . See **TORQUE SPECIFICATIONS** .



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**Fig. 7: Identifying 2WD Front Brake Components (Except Windstar)**  
Courtesy of FORD MOTOR CO.

**Installation (Van)**

1. Apply grease and pack wheel bearings. Install inner bearing and NEW grease seal. Position rotor. Install outer wheel bearing, and bearing retainer washer. Position spindle nut.
2. To seat bearings, while rotating rotor clockwise, tighten spindle nut to 29.5 ft. lbs. (40 N.m). Loosen spindle nut 2 full turns. While rotating rotor clockwise, tighten spindle nut to 17-24 ft. lbs. (23-34 N.m). Back off spindle nut 175 degrees. To complete tightening procedure, rotate hub and rotor clockwise while tightening spindle nut to 17 INCH lbs. (2 N.m).
3. To complete installation, install spindle nut retainer, NEW cotter pin, and grease cap. Install caliper anchor plate and caliper. Tighten bolts. See **TORQUE SPECIFICATIONS** .

**Installation (Windstar)**

Install rotor. Install and tighten rotor bolts to 106 INCH lbs. (12 N.m). Install anchor plate and caliper assembly. Tighten bolts. See **TORQUE SPECIFICATIONS** .

**Removal & Installation (Escape)**

1. Raise and support vehicle. Remove wheel. Remove caliper clip. Remove caliper bolt caps. Remove caliper bolts and position caliper aside. Remove outboard brake pad. Remove bolts and caliper anchor plate.
2. To install, reverse removal procedure. Tighten bolts and nuts. See **TORQUE SPECIFICATIONS** .

**Removal & Installation (4WD Models - Except Excursion & Super Duty Pickup)**

1. Raise and support vehicle. Remove wheel. Remove anchor plate and caliper assembly. See **DISC BRAKE CALIPERS & PADS** . Remove rotor.
2. To install, reverse removal procedure. Tighten bolts and nuts. See **TORQUE SPECIFICATIONS** .

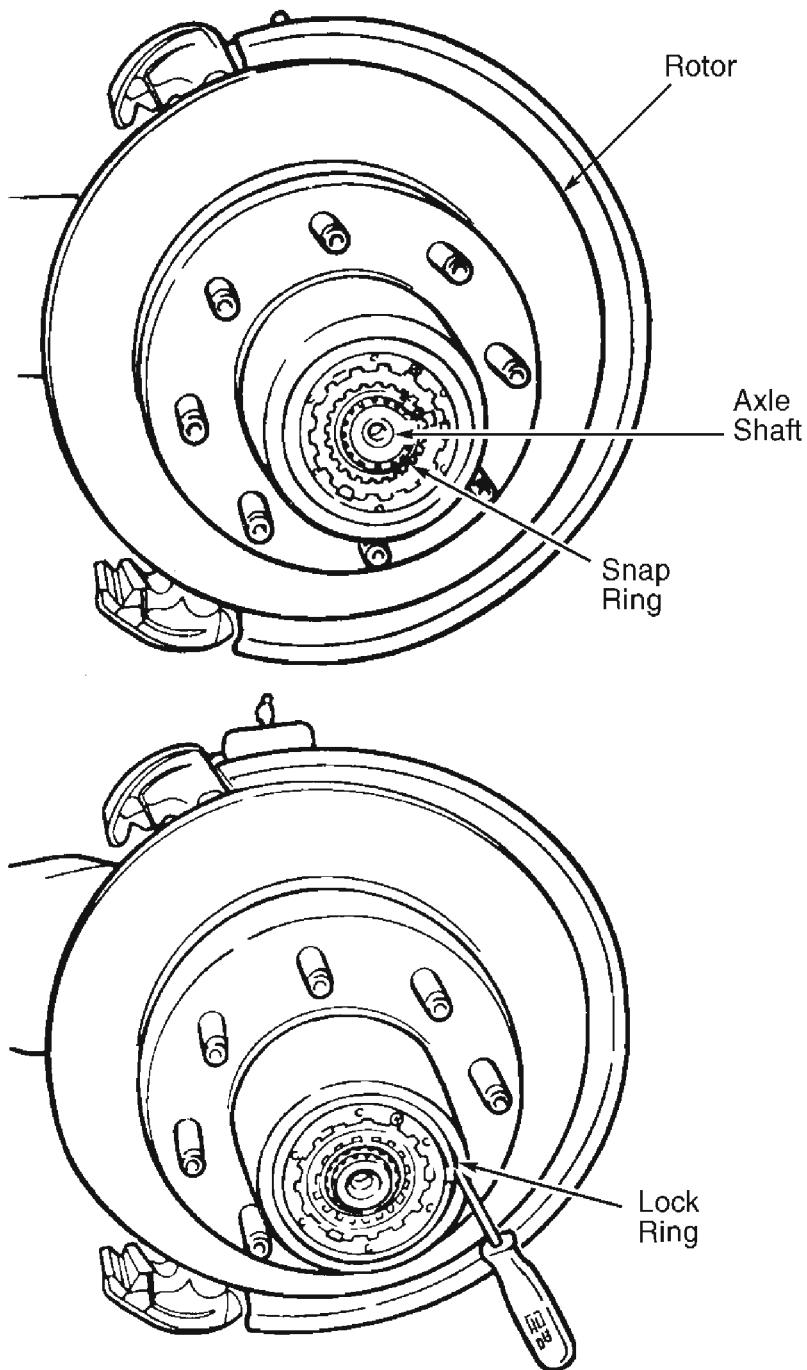
**Removal (Excursion & Super Duty Pickup - 4WD)**

Raise and support vehicle. Remove wheel. Remove anchor plate and caliper assembly. See **DISK BRAKE CALIPERS & PADS** . On models with single rear wheels, remove rotor. On models with dual rear wheels, remove hub plate extender nuts, and remove hub extender plate. See **Fig. 8** . Remove rotor.

**NOTE:** If excessive force is used when removing rotor, it should be checked for lateral runout prior to installation. See **ROTOR** under **OVERHAUL**.

## 2001 Ford Escape

2000-01 BRAKES Disc & Drum - Trucks - Except Villager



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**Fig. 8: View Of Front Hub & Rotor Assembly (Super Duty Pickup - 4WD With Dual Rear Wheels)**

Courtesy of FORD MOTOR CO.

### Installation

To install, position rotor to hub. Ensure hub and rotor braking surfaces are clean. Install

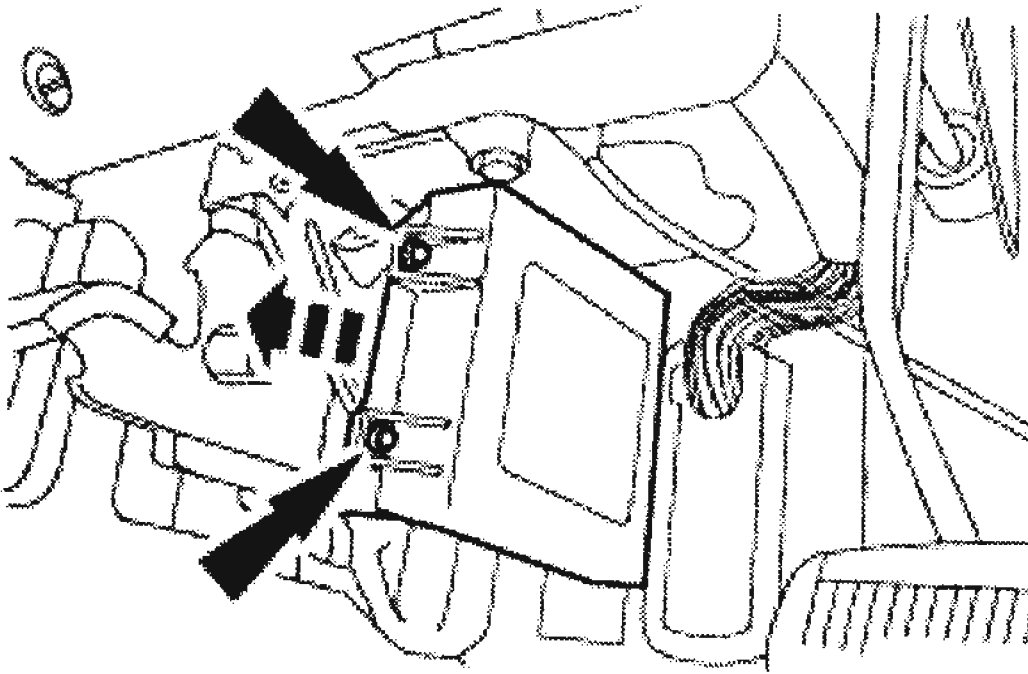


rotor. On single rear wheel models, install anchor plate and caliper assembly. On dual rear wheel models, install hub extender plate and nuts. Install anchor plate and caliper assembly. See **Fig. 8** . On all models, tighten bolts and nuts. See **TORQUE SPECIFICATIONS** .

### **PARK BRAKE PEDAL ASSEMBLY (F550)**

#### **Removal & Installation**

1. Disconnect the battery ground cable. Loosen Powertrain Control Module (PCM) connector bolt and remove connector. The PCM is located next to park brake pedal assembly. Remove PCM bracket assembly screws and remove PCM. See **Fig. 9** .
2. Disconnect the electrical connector from the parking brake switch. Relieve the tension on the parking brake system. Pull the front parking brake cable and conduit. Insert a suitable retainer in the parking brake assembly. See **Fig. 10** .
3. Disconnect the parking brake release handle cable from the parking brake control. Unclip and remove the scuff panel. See **Fig. 11** . Remove the cowl trim panel pushpin and remove panel. See **Fig. 12** .
4. Remove the parking brake control retaining nuts. See **Fig. 13** . Lower the parking brake control. Disconnect the hood release cable from the parking brake control. See **Fig. 14** .
5. Disconnect the front parking brake cable and conduit from the parking brake control. Remove the parking brake control. To install, reverse removal procedure. Tighten bolts and nuts. See **TORQUE SPECIFICATIONS** .

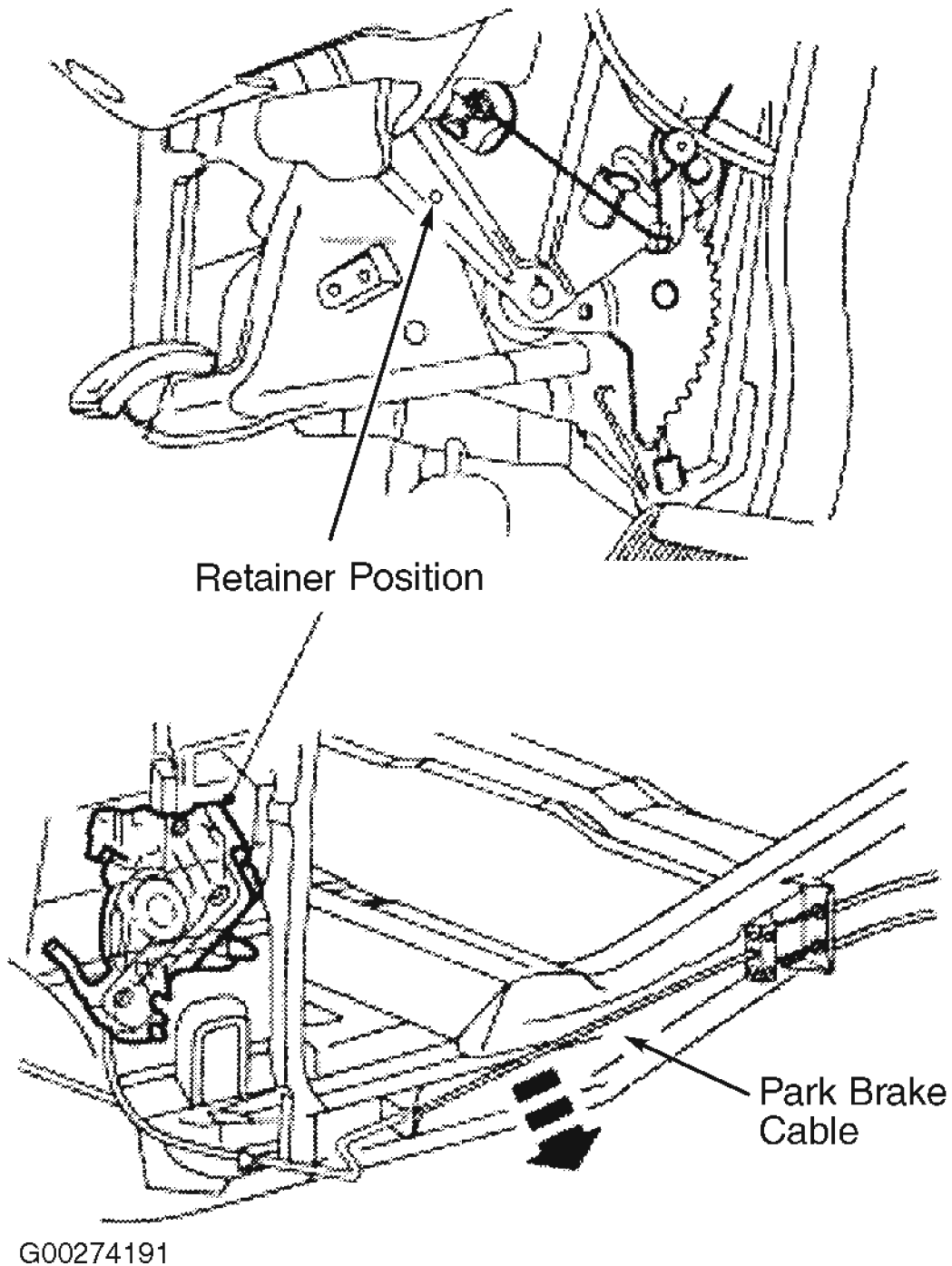


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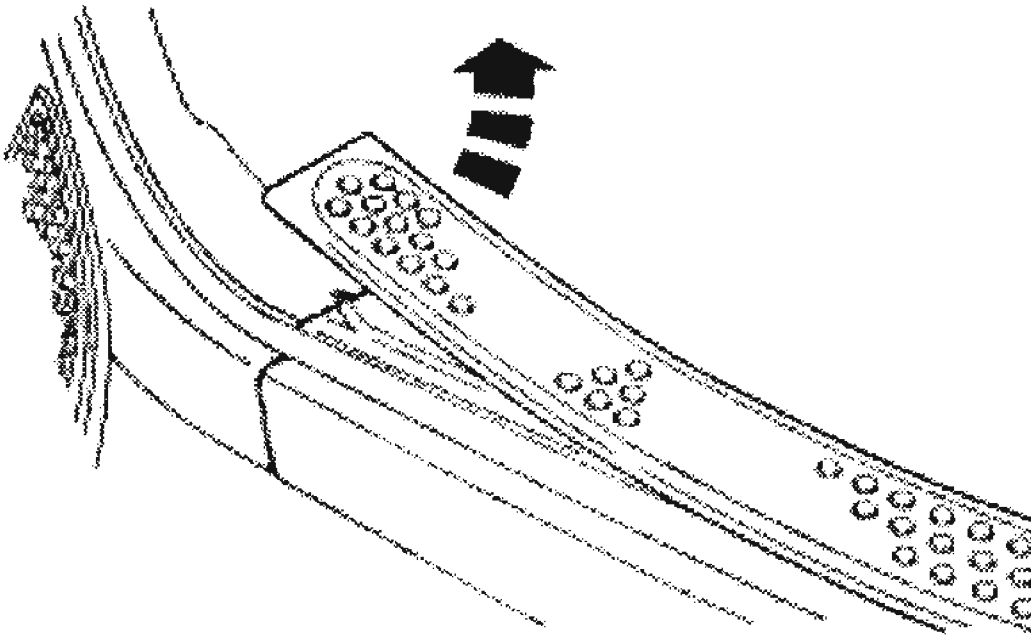
**Fig. 9: Removing Powertrain Control Module (Gasoline Is Shown; Diesel Is Similar)**  
Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

2000-01 BRAKES Disc & Drum - Trucks - Except Villager

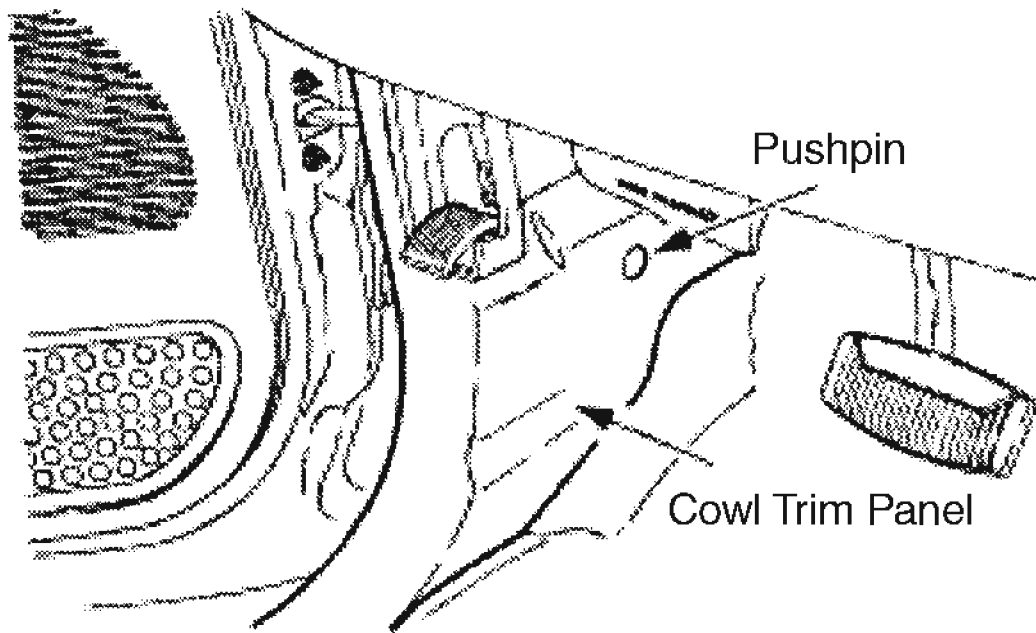


**Fig. 10: Relieving Tension On Park Brake System**  
Courtesy of FORD MOTOR CO.



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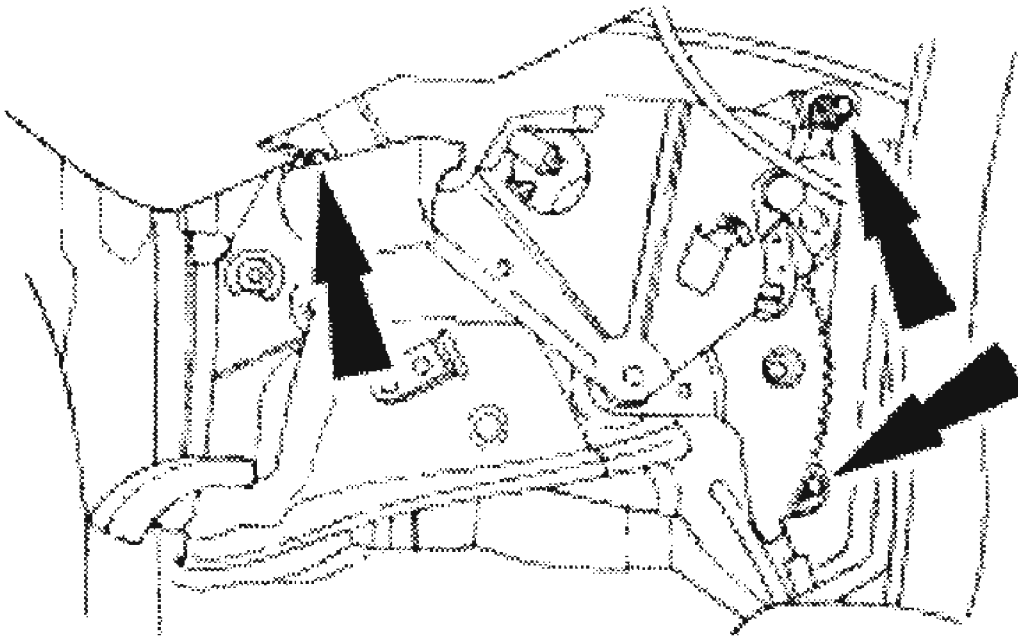
**Fig. 11: Removing Scuff Panel**  
**Courtesy of FORD MOTOR CO.**



**Fig. 12: Removing Cowl Trim Panel**  
Courtesy of FORD MOTOR CO.

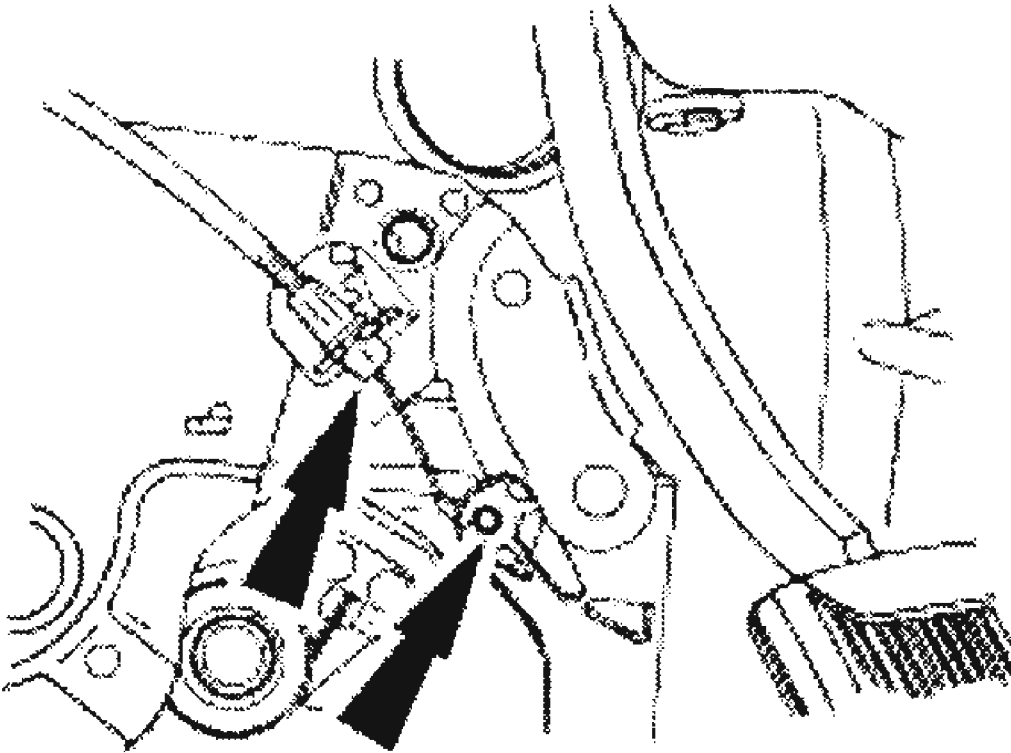
## 2001 Ford Escape

2000-01 BRAKES Disc & Drum - Trucks - Except Villager



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**Fig. 13: Locating Park Brake Pedal Assembly Retaining Nuts**  
Courtesy of FORD MOTOR CO.



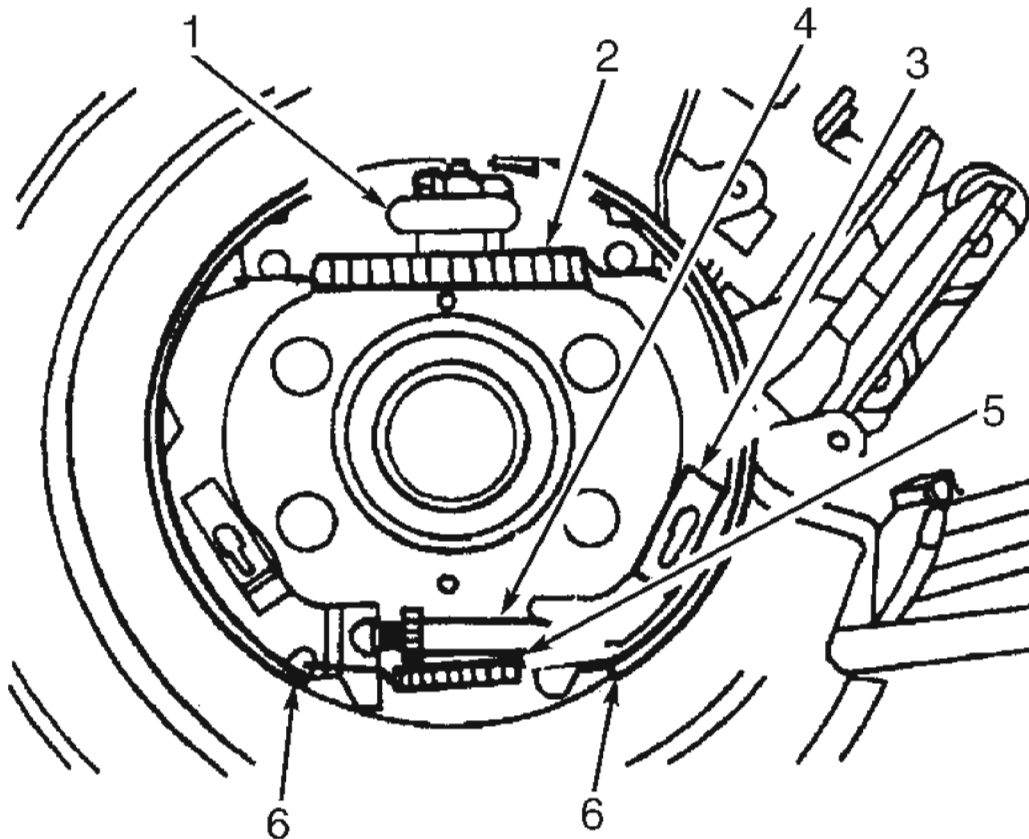
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**Fig. 14: Removing Hood Release Cable From Park Brake Pedal Assembly**  
Courtesy of FORD MOTOR CO.

## **PARK BRAKE SHOES**

### **Removal & Installation**

Remove the rotor. See **REAR BRAKE ROTOR** . Remove brake shoe retracting spring and brake shoe adjusting screw spring. See **Fig. 15** . Remove brake shoe adjusting screw. Remove brake shoe hold-down springs. Remove parking brake shoes. To install, reverse removal procedure. Adjust parking brake shoes. See **PARKING BRAKE** under ADJUSTMENTS.



1. Parking Brake Lever
2. Brake Shoe Retracting Spring
3. Brake Shoe Hold-Down Spring
4. Brake Adjuster Screw
5. Brake Shoe Adjusting Screw Spring
6. Parking Brake Shoe & Lining

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**Fig. 15: Identifying Parking Brake Components**  
Courtesy of FORD MOTOR CO.

#### REAR BRAKE ROTOR

##### Removal & Installation (Expedition & Navigator)

1. Raise and support vehicle. Remove wheel. Remove anchor and caliper assembly, and position aside. See **DISC BRAKE CALIPERS & PADS** . Remove press-on keeper nuts from hub studs (if equipped). Remove rotor.



## 2001 Ford Escape

2000-01 BRAKES Disc & Drum - Trucks - Except Villager

2. To install, reverse removal procedure. Tighten bolts. See **TORQUE SPECIFICATIONS** .

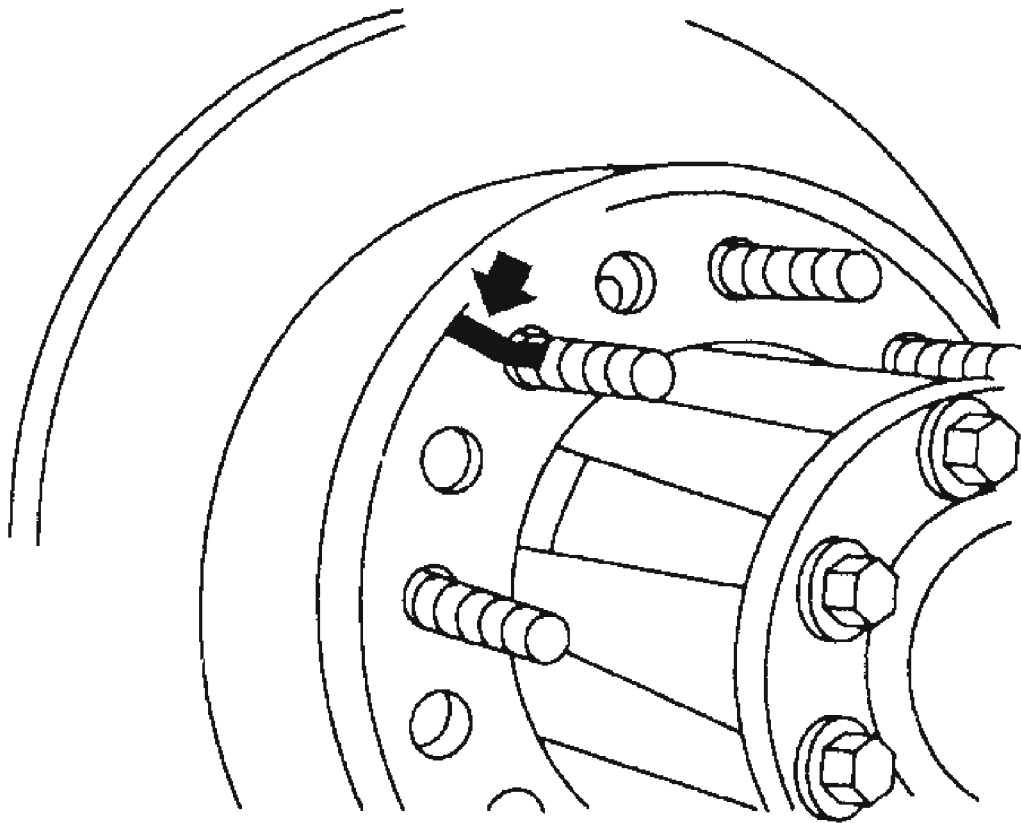
Removal & Installation (Explorer, Explorer Sport, Explorer Sport-Trac, E150/250, F150/250 & Mountaineer)

**NOTE:**      **On all models except E250 and F250, when removing rear brake rotor, it is not necessary to disconnect hydraulic lines.**

1. Raise and support vehicle. Remove wheel. Remove brake hose-to-caliper bolt. Remove and plug brake hose. Remove caliper. See **DISC BRAKE CALIPERS & PADS** . Remove rotor.
2. To install, reverse removal procedure. Install NEW copper washers when installing brake hose-to-caliper bolt. Tighten bolts and nuts. See **TORQUE SPECIFICATIONS** . Bleed brakes. See **BLEEDING BRAKE SYSTEM** .

Removal & Installation (E350)

1. Raise and support vehicle. Remove wheel. Remove caliper. See **DISC BRAKE CALIPERS & PADS** . Remove caliper anchor plate. Mark wheel stud and corresponding rotor hole to minimize runout when installing. See **Fig. 16** . Remove rotor bolts. Remove rotor.
2. To install, reverse removal procedure. Align rotor and hub stud marks. Install new brake pads as necessary. Tighten bolts. See **TORQUE SPECIFICATIONS** .



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**Fig. 16: Marking E350 Rear Hub & Rotor For Reassembly**  
Courtesy of FORD MOTOR CO.

Removal (Super Duty Pickup - Dual Rear Wheels)

**NOTE:** Dana and Ford dual rear wheel axles are used. See Fig. 17 . On Ford axles, hub nut is right-hand thread on passenger side (nut stamped "RH"), and left-hand thread on driver side (nut stamped "LH").

**CAUTION: DO NOT use power impact tools to remove or install hub nuts on Ford axle.**

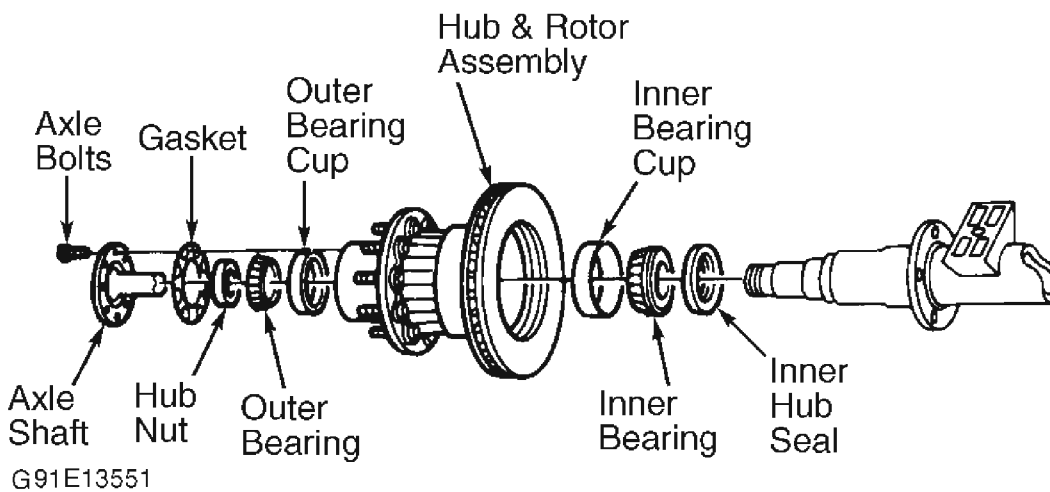
1. Set parking brake. Loosen axle shaft retaining bolts. Raise and support vehicle. Release parking brake. Remove wheel. Remove anchor plate and caliper assembly. See **DISC BRAKE CALIPERS & PADS** . Remove axle shaft retaining bolts and axle shaft.
2. On Dana axle, using socket wrench, remove hub nut. Remove outer bearing. Remove

hub and rotor assembly. Remove rotor-to-hub bolts and separate rotor from hub.

3. On Ford axle, using hub nut wrench, and in correct rotation, remove hub nut. Using 2-Jaw Puller (D80L-1002-L), pull hub to point of removal, and secure outer bearing. Remove hub and rotor assembly. Remove rotor-to-hub bolts, and separate rotor from hub.

### Installation

To install, reverse removal procedure. Install NEW hub seal. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS** .



**Fig. 17: Removing Rear Hub & Rotor Assembly (Super Duty Pickup - Dual Rear Wheels)**

Courtesy of FORD MOTOR CO.

### Removal (Excursion & Super Duty Pickup - Single Rear Wheels)

Raise and support vehicle. Remove wheel. Remove caliper assembly. See **DISC BRAKE CALIPERS & PADS** . Remove rotor.

### Installation

To install, reverse removal procedure. Tighten bolts. See **TORQUE SPECIFICATIONS** .

### Removal & Installation (Windstar)

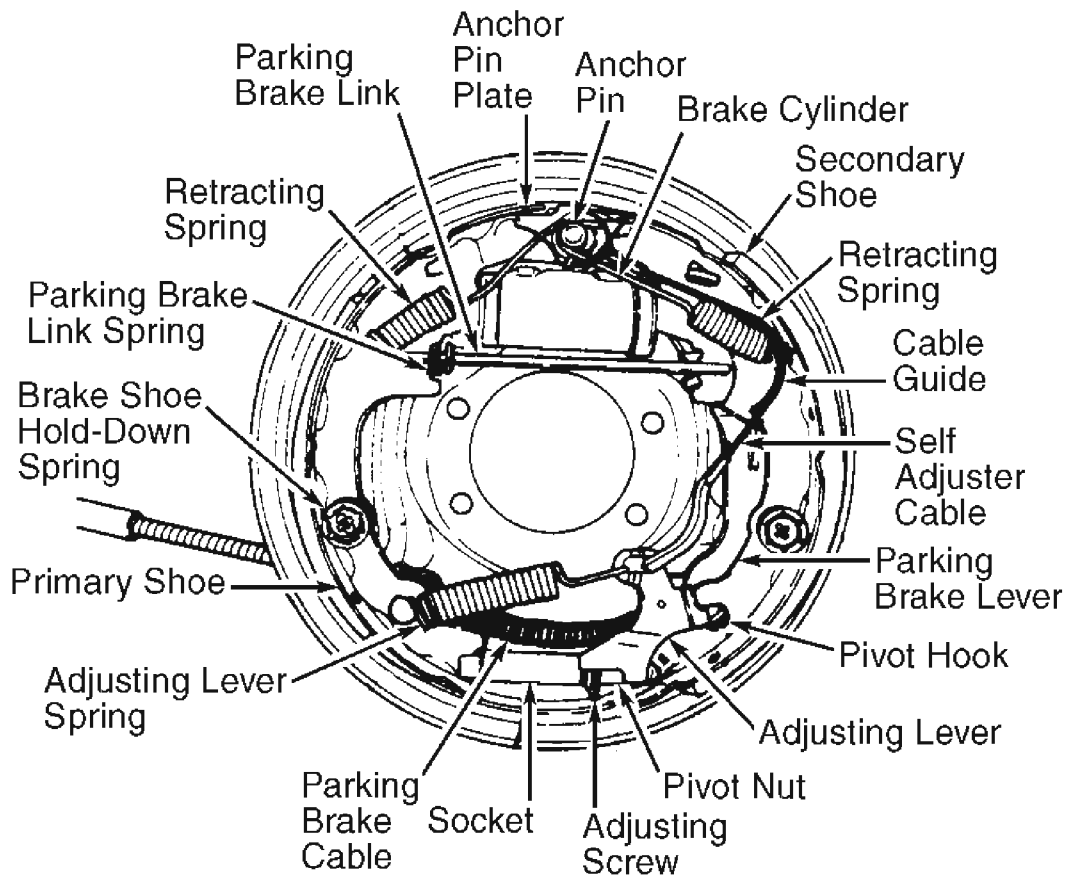
1. Raise and support vehicle. Remove wheel. Remove anchor plate and caliper assembly and position aside. See **DISC BRAKE CALIPERS & PADS** .
2. Remove keeper nuts from rotor (if equipped). Remove plug from adjustment hole on back of brake shield. Contract parking brake shoes by turning adjuster clockwise for

driver side, and counterclockwise for passenger side. Remove rotor from hub. To install, reverse removal procedure.

## **BRAKE SHOES**

### **Removal (Explorer, Explorer Sport, Explorer Sport-Trac & Ranger)**

1. Raise and support vehicle. Remove brake drum. Inspect rear wheel cylinder for leaks or presence of rust. If no leaks are found, install brake cylinder clamp over ends of rear wheel cylinder. Remove brake shoe retracting springs. Remove brake shoe adjusting lever cable from anchor pin, cable guide and adjusting lever. See **Fig. 18** .
2. Remove cable guide from secondary brake shoe and lining web. Remove adjusting lever and adjusting lever return spring. Remove brake shoe adjusting screw spring. Using Hold-Down Spring Remover/Installer (T73T-2300-A), remove brake shoe hold-down spring and pin from each rear brake shoe and lining. Remove brake shoe adjuster assembly.
3. Remove primary brake shoe parking brake lever link and parking brake link spring. Remove parking brake rear cable and conduit from parking brake lever. Remove rear brake shoe and lining. Remove parking brake lever from secondary rear brake shoe.



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**Fig. 18: Examining Rear Brake Assemblies (Explorer, Explorer Sport, Explorer Sport-Trac & Ranger)**

Courtesy of FORD MOTOR CO.

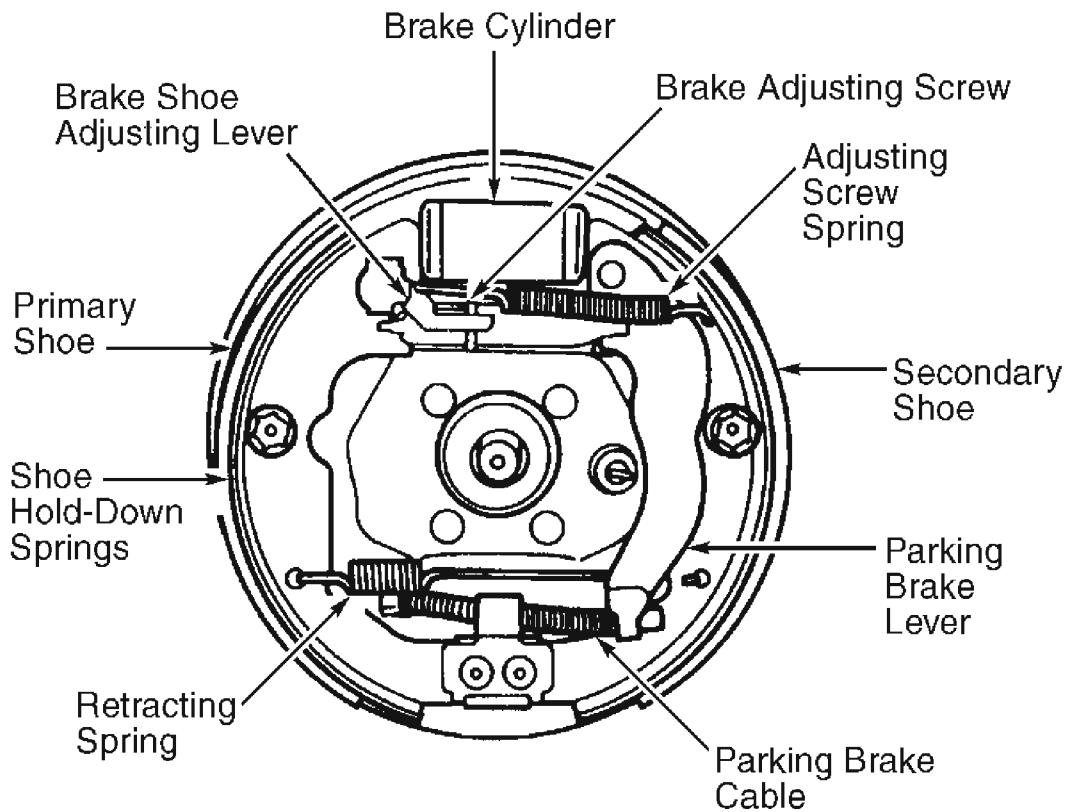
**Removal (Escape)**

1. Remove tire and wheel assembly. Remove brake drum retaining clips (if equipped). Remove brake drum.
2. Remove parking brake cable from parking brake cable lever. Remove shoe hold down clips and pins. Remove lower spring. Pull bottom of brake shoes forward. Release upper return spring. Remove both brake shoes together.
3. Remove self adjuster and spring assembly. Return self adjuster to fully seated position. Remove horseshoe clip. Remove parking brake lever.

**Removal (Windstar)**

1. Remove brake drum. Disconnect right parking brake rear cable and conduit or left parking brake rear cable and conduit from parking brake lever. Remove 2 brake shoe hold-down springs and brake shoe hold-down pins.

2. Remove brake shoe adjusting screw spring. Remove brake shoe adjusting lever and brake adjuster screw. Remove brake shoe retracting spring. Remove rear brake shoes and linings from brake backing plate. Remove and discard parking brake lever clip and washer. Remove parking brake lever from secondary rear brake shoe and lining. See **Fig. 19** .



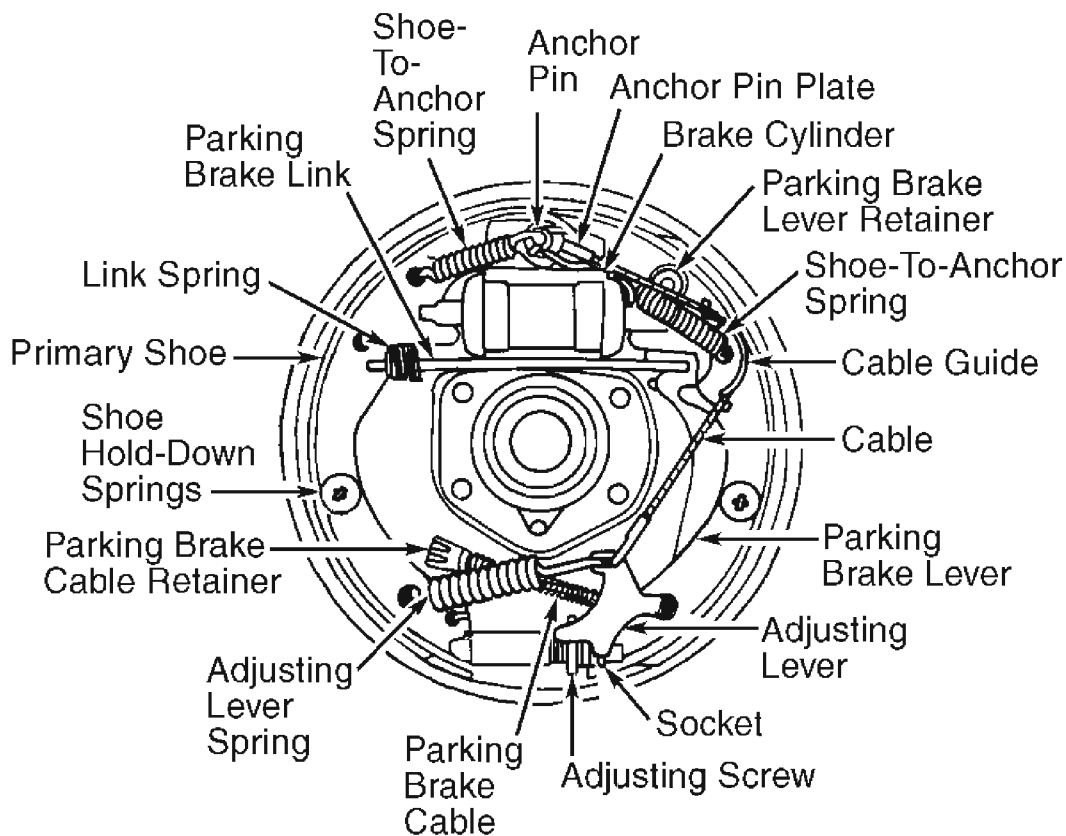
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**Fig. 19: Examining Brake Assemblies (Windstar)**  
 Courtesy of FORD MOTOR CO.

**Removal (E150 & F150)**

1. Remove wheel assembly and drum. If brake drum is difficult to remove, use a narrow screwdriver and brake adjustment tool to retract brake shoes. Place a wheel cylinder clamp over ends of wheel cylinder. Disengage adjusting lever from adjusting screw by pulling backward on lever cable. See **Fig. 20** .
2. Move outboard side of adjusting screw upward, and back off pivot nut as far as possible. Pull adjusting lever, cable and adjusting spring down and toward rear to unhook pivot hook from large hole in secondary shoe. DO NOT pry pivot hook from hole.
3. Remove adjusting spring and adjusting lever. Remove secondary shoe-to-anchor

- spring. Remove primary shoe-to-anchor spring. Unhook cable anchor, and remove anchor pin plate.
4. Remove cable guide, shoe hold-down springs, brake shoes, adjusting screw, pivot nut and socket. Remove parking brake link spring and link. Note color and position of springs for reassembly.
  5. Disconnect parking brake cable from lever. Remove secondary shoe. Disassemble parking brake lever from shoe by removing lever retainer and spring washer.

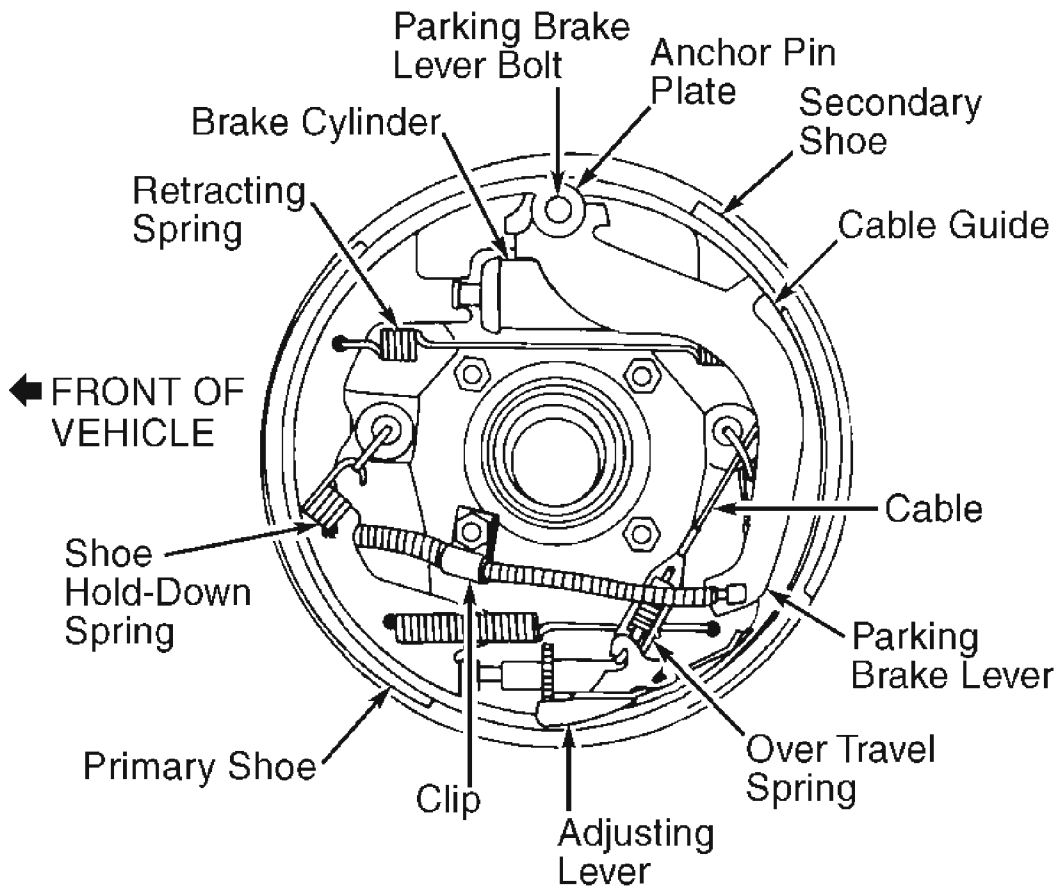


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**Fig. 20: Examining Rear Brake Assemblies (E150 & F150)**  
 Courtesy of FORD MOTOR CO.

**Removal (E250 & F250 Standard Duty)**

Remove wheel assembly and brake drum. If brake drum is difficult to remove, use a narrow screwdriver and brake adjustment tool to retract brake shoes. Remove parking brake lever assembly retaining bolt from backing plate. Remove parking brake lever assembly. See **Fig. 21**. Remove adjusting cable assembly from anchor pin, cable guide and adjusting lever. Remove brake shoe return springs, hold-down springs and brake shoes. Remove and disassemble adjusting screw assembly.



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**Fig. 21: Examining Brake Assemblies (E250 & F250 Standard Duty)**  
**Courtesy of FORD MOTOR CO.**

**Installation (All Models Except Escape)**

1. Clean and sand brake shoe contact points on backing plate. Apply a light coating of lithium base grease to contact points. Apply grease to adjusting cable eye and anchor pin area. Apply grease to adjusting screw, pivot and socket. Ensure brake shoe adjusting lever cable is positioned in groove and not between cable guide and shoe web.
2. Ensure cable end is not cocked or binding on anchor pin when installed. All parts should be flat on anchor pin. Ensure brake adjuster screw is installed in same location from which it was removed.
3. Brake adjusting screw nuts can also be distinguished by number lines machined around body or nut. One line indicates left-hand nut, and 2 lines indicates right-hand nut. Another way to identify adjusters is to check thread pitch. Right side adjuster has right-hand threads while left side adjuster has left-hand threads. To install, reverse removal procedure.



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### 2000-01 BRAKES Disc & Drum - Trucks - Except Villager

4. On Ranger, check action of adjuster by pulling brake shoe adjusting lever cable toward secondary shoe, activating brake shoe adjusting lever. Brake shoe adjusting lever should snap in above next tooth of adjuster. Release brake shoe adjusting lever cable to return brake shoe adjusting lever to original position and adjuster should turn one notch.
5. If adjusting lever action is sluggish instead of positive and sharp, check position of brake shoe adjusting lever on adjusting screw toothed wheel. Brake shoe adjusting lever should contact adjusting wheel one tooth above centerline of brake adjuster screw.

#### Installation (Escape)

1. Install parking brake lever into rear brake shoe and install horseshoe clip. Ensure self adjuster is returned to fully seated position. Install self adjuster and spring assembly. Install self adjuster lever.
2. Install upper spring. Install both brake shoes together. Install lower spring. Install pins and hold down clips.
3. Install parking brake cable to parking brake cable lever. Install brake drum and adjust shoes. See **BRAKE SHOES** under ADJUSTMENTS.

#### DISC BRAKE CALIPERS & PADS

**NOTE:** Procedure for removing/installing front and rear calipers is same.

#### Removal

**NOTE:** To prevent master cylinder overflow when caliper piston is depressed, remove and discard some brake fluid from master cylinder.

1. Raise and support vehicle. Remove wheel. Remove brake hose-to-caliper bolt. Remove and plug hose. Place a large "C" clamp on caliper. Tighten clamp to bottom piston in cylinder bore. Remove clamp.
2. Remove caliper pin bolts. Remove caliper from rotor. Remove brake pads. Remove anchor plate rail clips. Check brake pad wear.
3. On all models except Excursion and Super Duty Pickup, replace brake pads if lining is less than .04" (1.0 mm) above backing plate at any point. On Excursion and Super Duty Pickup, replace pads if lining is less than .06" (1.5 mm) above backing plate or rivets at any point.

#### Installation

Install anchor plate rail clips. Install brake pads. Use "C" clamp to push caliper piston into

piston bore until it bottoms out. Position caliper on rotor. Install caliper pin bolts. Connect brake hose to rotor using NEW copper washers on connector bolt. Bleed brakes. See **BLEEDING BRAKE SYSTEM** .

## **MASTER CYLINDER**

### **Removal & Installation**

1. On Excursion and Super Duty Pickup, with engine off, pump brake pedal several times to discharge Hydro-Boost accumulator. On all others, disconnect brake warning light indicator wire from indicator switch. With engine off, depress brake pedal to bleed vacuum from brake booster.
2. Disconnect brakelines at master cylinder. Remove nuts retaining master cylinder to brake booster. Remove master cylinder. To install, reverse removal procedure. Bleed brakes. See **BLEEDING BRAKE SYSTEM** .

## **STOPLIGHT SWITCH**

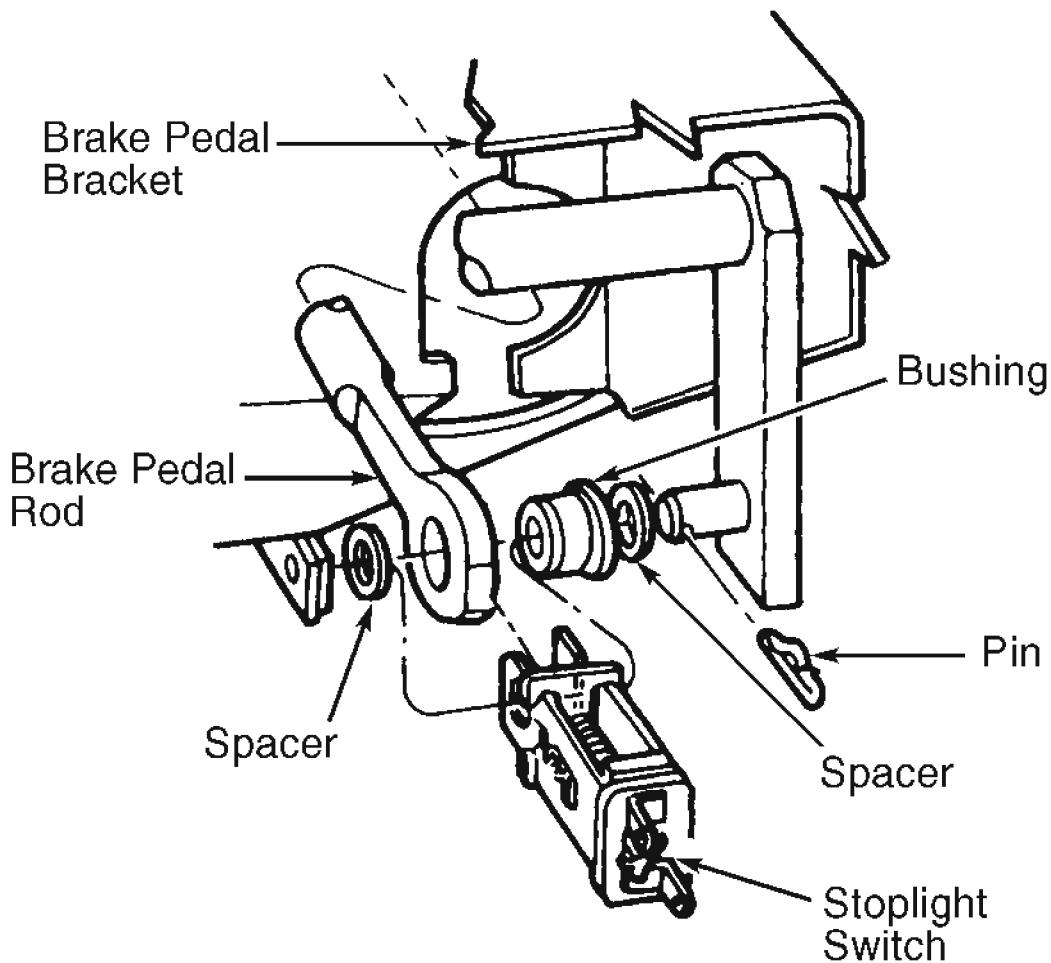
### **Removal**

**NOTE:** Since stoplight switch side plate nearest brake pedal arm is slotted, brake pedal rod and one spacer from pedal arm do not need removal.

Disconnect wire harness from connector. Remove pin. Slide stoplight switch, brake pedal rod, spacer and bushing away from brake pedal arm. See **Fig. 22** .

### **Installation**

Position switch so slotted side is facing pedal arm. Swing switch up and down, trapping brake pedal rod between switch side plates. Push switch and rod firmly against pedal arm. Install remaining parts, and check stoplight operation.



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**Fig. 22: Removing Stoplight Switch**  
 Courtesy of FORD MOTOR CO.

## HYDRO-BOOST UNIT

### Removal

1. With engine off, depress brake pedal several times to discharge accumulator. Disconnect negative battery cable(s). Remove battery on driver side. Remove air cleaner housing. Disconnect brake pressure switch electrical connector.
2. Disconnect power steering hoses. Remove master cylinder nuts, and remove master cylinder. Remove fuse panel cover. Remove stoplight switch, and brake booster push rod from brake pedal pin. Remove brake booster nuts, and remove booster.

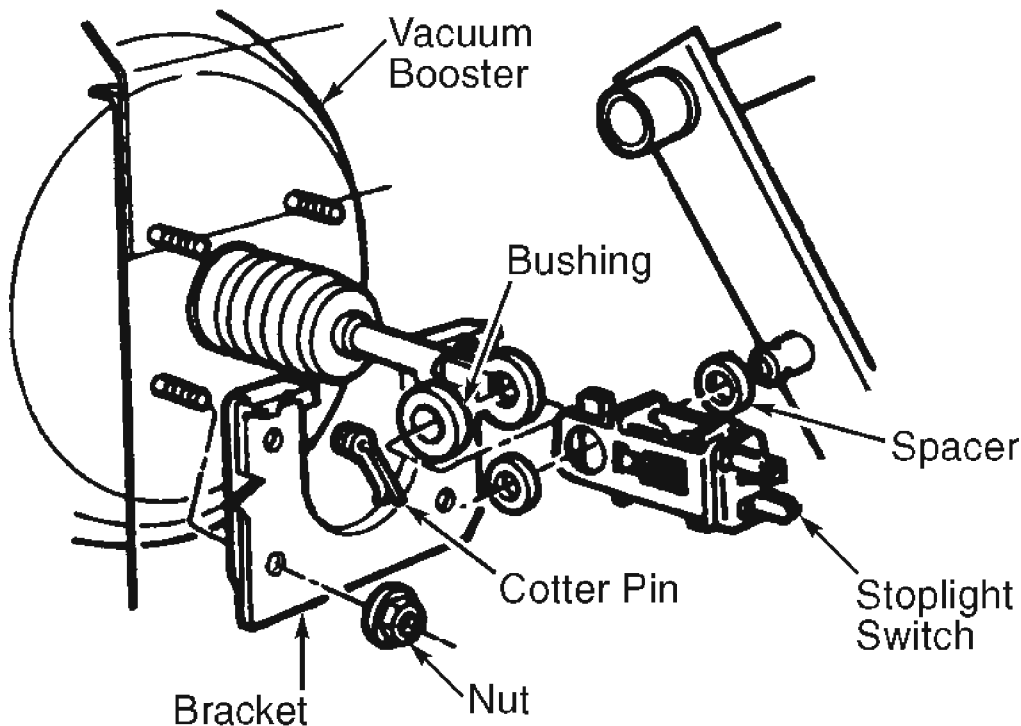
### Installation

To install, reverse removal procedure. Install NEW Teflon seals on power steering pressure hose fittings. Tighten nuts to specification. See **TORQUE SPECIFICATIONS** . Bleed booster. See **BLEEDING HYDRO-BOOST UNIT** under BLEEDING BRAKE SYSTEM.

## VACUUM POWER BOOSTER

### Removal & Installation

1. Disconnect negative battery cable. Remove air cleaner assembly. On Escape 3.0L, disconnect EVAP emission canister purge valve, and position aside. On all models, disconnect the master cylinder by removing the nuts and position aside. Disconnect speed control and accelerator cables if necessary. Remove speed control module bolts and position speed control aside. Remove vacuum hose from booster check valve.
2. Remove instrument panel lower cover. Remove cotter pin holding stoplight switch to brake pedal arm. See **Fig. 23** . Remove bushing and spacers. Remove booster mount nuts, and then remove booster. To install, reverse removal procedure.



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**Fig. 23: Removing Vacuum Power Booster (Typical)**  
Courtesy of FORD MOTOR CO.

## WHEEL CYLINDERS

**Removal & Installation**

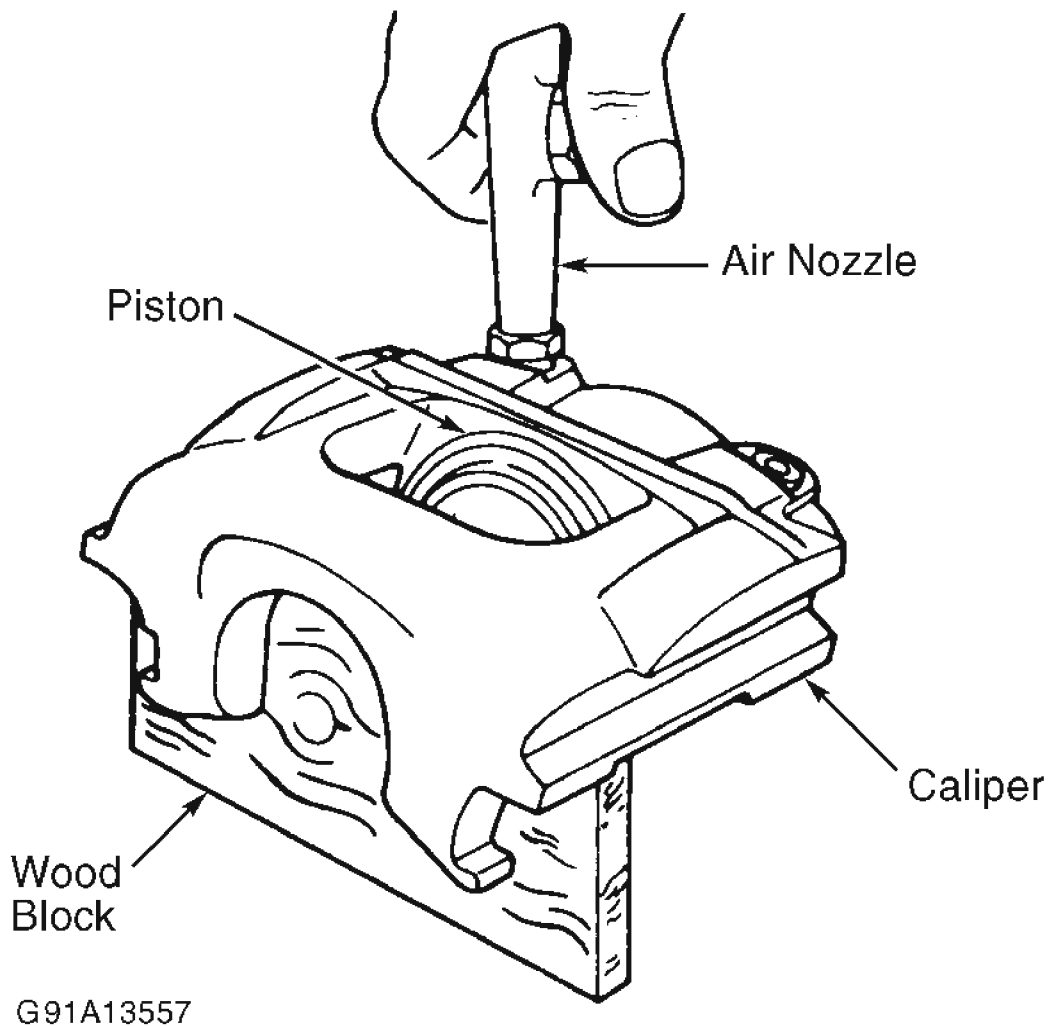
Remove wheel assembly, drum and brake shoes. Remove wheel cylinder connecting links. Disconnect hydraulic brakeline from cylinder. Remove wheel cylinder retaining bolts and lock washers. Remove wheel cylinder from backing plate. To install, reverse removal procedure. Adjust brakes, and bleed hydraulic system. See **BLEEDING BRAKE SYSTEM** .

**OVERHAUL****DISC BRAKE CALIPER****Disassembly**

**WARNING:** DO NOT place fingers between wood and piston as piston leaves caliper.

**NOTE:** Use same disassembly procedures for single and dual piston calipers.

1. Remove caliper. See **DISC BRAKE CALIPERS & PADS** under REMOVAL & INSTALLATION. Drain fluid from caliper. Secure caliper in a vise. Place a block of wood between caliper and piston(s). See **Fig. 24** . Apply low air pressure to brake hose inlet. Air pressure forces piston(s) outward.



**Fig. 24: Removing Caliper Piston**  
Courtesy of FORD MOTOR CO.

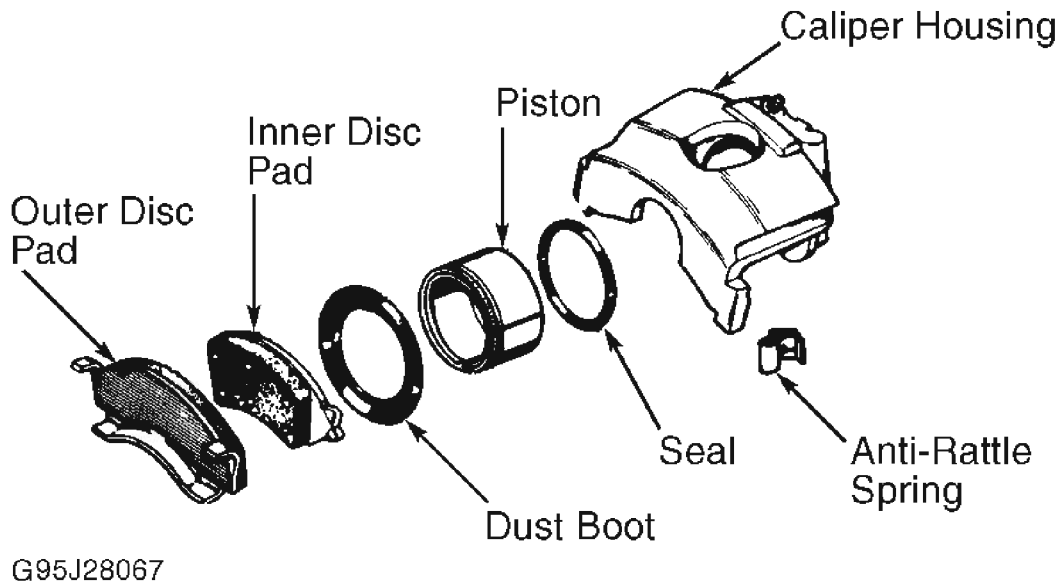
2. If piston is jammed or seized and does not come out easily, use a brass hammer to lightly tap caliper while applying air pressure. DO NOT pry piston from bore. After piston comes out, remove seal and dust boot. Discard seals and boots.

#### **Cleaning & Inspection**

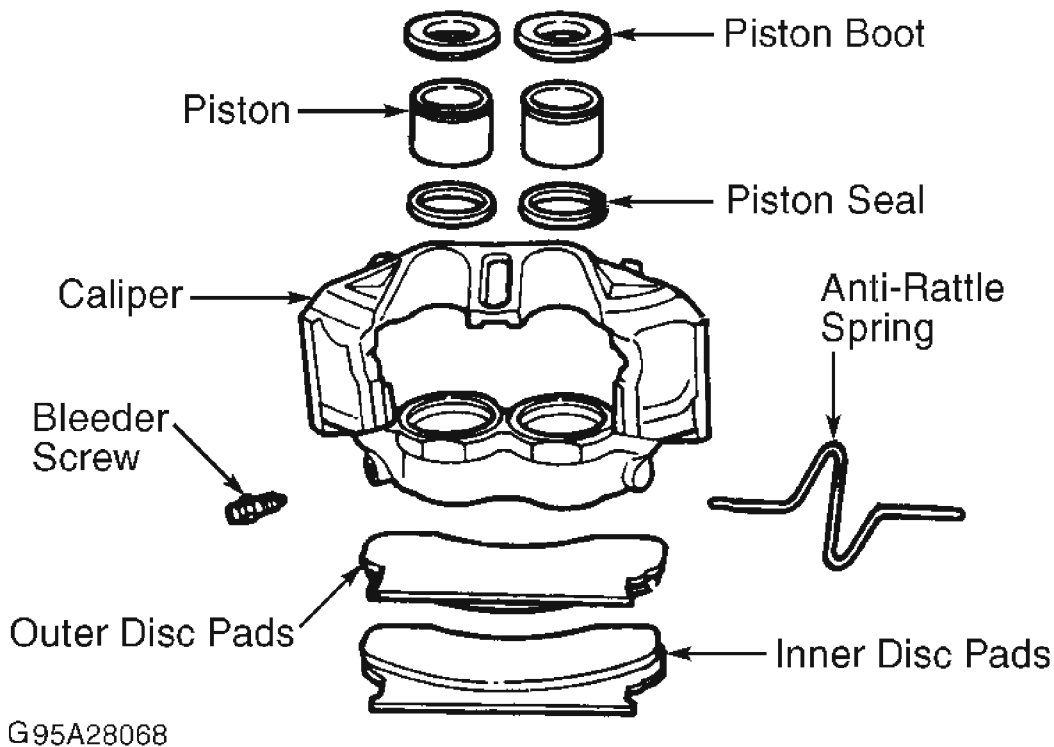
1. Carefully clean rust and corrosion from caliper machined surfaces using a wire brush. DO NOT use wire brush in caliper bores. Clean all components with isopropyl alcohol and dry with compressed air.
2. Inspect caliper bore, seal grooves and boot grooves for wear or damage. If bores are scored, corroded or worn, replace caliper. Replace anti-rattle clip, caliper support spring and key.

### Reassembly

1. Apply clean brake fluid to NEW piston seal, and install in caliper bore groove. Apply clean brake fluid to caliper bore. Coat piston and outside beads of dust boot with clean brake fluid.
2. Push piston through boot until boot is around bottom (closed end) of piston. See **Fig. 25** or **Fig. 26** . Position piston and boot directly over caliper bore. Spread dust boot over piston as it is installed.
3. With bead seated in groove, carefully press straight down on piston until it bottoms in caliper bore. DO NOT cock or jam piston in caliper bore. If necessary, use a "C" clamp and a block of wood to bottom piston in caliper bore.



**Fig. 25: Exploded View Of Single Piston Caliper**  
 Courtesy of FORD MOTOR CO.



**Fig. 26: Exploded View Of Dual Piston Caliper**  
 Courtesy of FORD MOTOR CO.

## MASTER CYLINDER

### Disassembly

1. Remove master cylinder. Clean outside of master cylinder. Remove filler cap and diaphragm. Drain any remaining fluid from cylinder. On dual master cylinder, remove stop bolt from bottom of master cylinder.
2. On all models, remove proportioning valve (if equipped). Depress pinion, and remove snap ring from end of master cylinder bore. See **Fig. 27** . Remove piston assembly from cylinder bore. Carefully apply air pressure in outlet port of cylinder to remove remaining piston assembly from bore.

### Inspection

**NOTE:**      **Manufacturer does not recommend honing cylinder bore.**

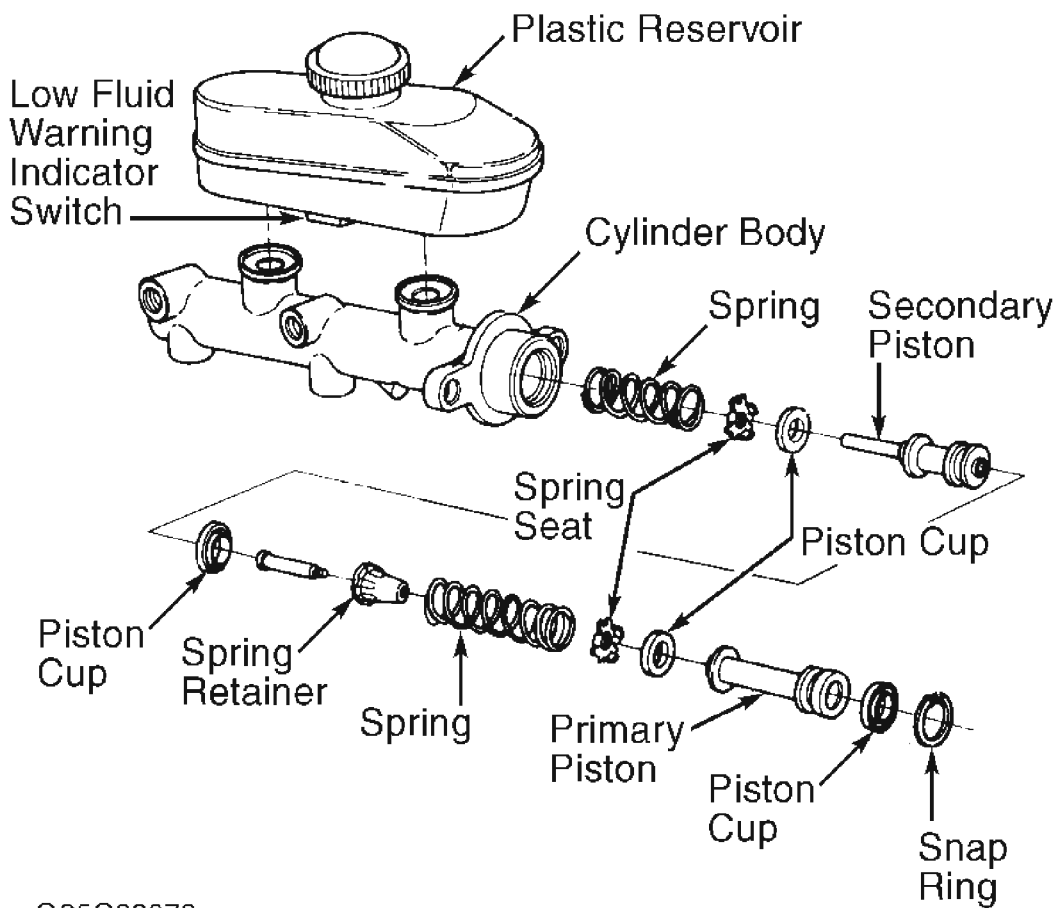
Clean all parts with isopropyl alcohol and blow dry with compressed air. Ensure all ports and vents are open and free of foreign matter. Inspect master cylinder bore and all parts for



excessive wear or damage. If bore is damaged, replace master cylinder.

### Reassembly

Lubricate all components, including cylinder bore, with clean brake fluid. Install NEW grommets and plastic reservoir. Carefully insert piston assembly into master cylinder bore. If cylinder is equipped with piston stop pin, depress piston and install pin. Install other piston assembly into cylinder. Depress piston and install snap ring in groove.



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**Fig. 27: Exploded View Of Master Cylinder Assembly**  
Courtesy of FORD MOTOR CO.

### ROTOR

#### Lateral Runout (Front & Rear Disc)

1. On front disc brakes, tighten wheel bearing adjusting nut to eliminate bearing end play. Ensure rotor can be rotated by hand. When checking runout on Excursion and Super Duty Pickup rear disc brakes, make sure rear axle bearings are adjusted properly.

2. Once adjusted, DO NOT change rear bearing setting. Attach dial indicator to suspension, with indicator tip set 1" from outer edge of rotor face. Set dial indicator to zero, and slowly turn rotor. Take reading within a 6.00" (152.4 mm) radius on rotor. Runout must not exceed specification. See **DISC BRAKE SPECIFICATIONS** table. Resurface or replace rotor as required.

**Parallelism (Rotor Thickness Variation)**

**NOTE:**      **Parallelism can be tested by either testing procedures in step 1) or 2) .**

1. Using a micrometer, measure rotor thickness at 12 points, approximately 30 degrees apart and 1.00" (25.4 mm) from outer edge of rotor. Difference must not exceed specification. See **DISC BRAKE SPECIFICATIONS** table. Resurface or replace rotor as required.
2. Mount rotor on a brake lathe. Attach 2 dial indicators, one on each side of rotor, with tip of indicators contacting rubbing surface of rotor directly opposite each other and 1.00" (25.4 mm) from outer edge of rotor. Zero both indicators, and rotate rotor. Note indicator reading. If reading exceeds specification, resurface or replace as required. See **DISC BRAKE SPECIFICATIONS** table.

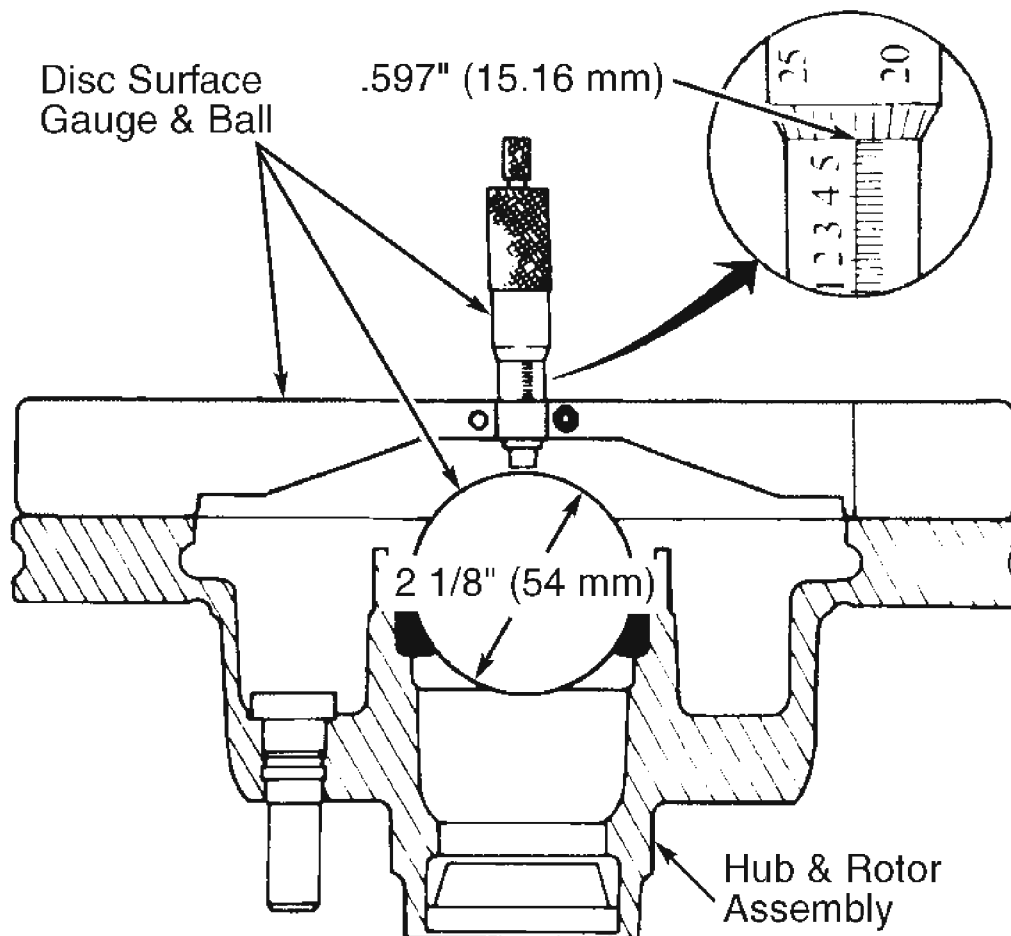
**Discard Thickness**

**CAUTION: Never refinish a rotor down to minimum wear or discard thickness.**

Using micrometer, measure thickness of rotor. Disc brake rotors have a minimum wear thickness. Minimum wear thickness is not refinishing dimension. See **DISC BRAKE SPECIFICATIONS** table.

**Maximum Allowable Stock Removal**

1. To measure maximum allowable stock remaining for refinishing on inner rotor face, use Disc Rotor Surface Gauge & Ball (T71P-1102-A). See **Fig. 28** . Remove inner grease seal and bearing from rotor. Wipe inner and outer bearing cups clean.



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**Fig. 28: Measuring Maximum Allowable Refinishing Stock**  
Courtesy of FORD MOTOR CO.

2. Carefully place gauge ball in inner bearing cup. DO NOT drop. Set micrometer at base line setting number. Using a 2 1/8" (54 mm) gauge ball, base line setting is .256" (6.50 mm). Position micrometer gauge bar on inner rotor face with micrometer centered over gauge ball.
3. To measure distance between micrometer base line setting and gauge ball, turn micrometer down to touch top of ball. Calculate difference between reading and base line setting; difference is maximum allowable stock which can be removed from inner rotor face.
4. When micrometer is set at base line setting and micrometer end touches top of ball, no additional material may be removed from rotor. If micrometer must be retracted from base line setting to allow gauge bar legs to rest on rotor face, rotor has been refinished beyond allowable limit. Replace rotor.

## 2001 Ford Escape

2000-01 BRAKES Disc & Drum - Trucks - Except Villager

### WHEEL CYLINDERS

#### Disassembly

With wheel cylinder removed from vehicle, remove rubber boots from ends of cylinders. Remove pistons, piston cups and return spring from cylinder. Remove bleeder screw. Inspect cylinder bore for damage.

#### Reassembly

If cylinder bore is lightly pitted or scratched, hone or replace as necessary. DO NOT hone cylinders more than .003" (.08 mm). Coat all parts with clean brake fluid. To assemble, reverse disassembly procedure. Clamp brake cylinder pistons against ends of cylinder.

### DISC BRAKE SPECIFICATIONS

#### FRONT DISC BRAKE SPECIFICATIONS

Application	In. (mm)
Lateral Runout	
Escape	.004 (.10)
Excursion & F250/350	(1)
Expedition & Navigator	(1)
Explorer & Mountaineer	.0005 (.013)
Explorer Sport & Explorer Sport-Trac	.04 (1.0)
E150 & F150 (2WD)	.003 (.08)
E250/350	.003 (.08)
2WD	.05 (.002)
2-Piece (Dual Rear Wheels)	.07 (.0028)
4WD	.04 (1.0)
F150 (4WD)	.003 (.08)
Ranger	.003 (.08)
Windstar	.003 (.08)
Parallelism (Maximum Thickness Variation)	
Escape	(1)
Excursion (2WD) & F250/350 (2WD)	
Integral (Single Rear Wheels)	(1)
Excursion (4WD) & F250/350 (4WD)	(1)
Expedition & Navigator	(1)
Explorer, Mountaineer & Ranger	(1)
Explorer Sport & Explorer Sport-Trac	.0004 (.010)

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E150, E250 & E350	.0004 (.010)
F150 Integral (4WD)	.0004 (.010)
F150 2-Piece (4WD)	.0004 (.010)
F150 (2WD)	.0004 (.010)
F350 (2WD)	
2-Piece (Dual Rear Wheels)	(1)
Windstar	.0004 (.010)
Discard Thickness	
Escape	0.86 (22.0)
Explorer (2WD) & Mountaineer (2WD)	.964 (24.5)
Explorer Sport & Explorer Sport-Trac	(1)
F150	
2WD	.972 (24.7)
4WD	1.09 (27.7)
Explorer (4WD) & Mountaineer (4WD)	0.96 (24.5)
Expedition & Navigator	1.09 (27.7)
E150	0.96 (24.5)
E250/350	(1)
Excursion & F250/350	1.417 (36.0)
Ranger 2WD & 4WD	(1)
Windstar	1.01 (25.75)
(1) Information is not available from manufacturer.	

## REAR DISC BRAKE SPECIFICATIONS

Application	In. (mm)
Lateral Runout	
Expedition, Navigator	.003 (.08)
Explorer	.04 (1.0)
Explorer Sport & Explorer Sport-Trac	.04 (1.0)
E250, E350, Excursion, F250 & F350	.04 (1.0)
F150	.003 (.08)
Parallelism (Maximum Thickness Variation)	
Expedition, Navigator	.0005 (.013)
Explorer	.0004 (.010)
Explorer Sport & Explorer Sport-Trac	.0004 (.010)
E250, E350, Excursion, F250 & F350	.0010 (.025)
F150	.0004 (.010)

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### Discard Thickness

Expedition & Navigator	.40 (10.5)
Explorer	(1)
Explorer Sport & Explorer Sport-Trac	(1)
E250, E350, Excursion, F250 & F350	1.102 (28)
F150	.48 (12.0)

(1) Information is not available from manufacturer.

## DRUM BRAKE SPECIFICATIONS

**NOTE:** Maximum drum diameter is stamped on outside of brake drum.

### DRUM BRAKE SPECIFICATIONS

Application	In. (mm)
Maximum Drum Refinish Diameter	
Escape	9.06 (230.1)
Explorer	(1)
Explorer Sport & Explorer Sport Trac	(1)
E150 & F150	11.06 (280.9)
E250/350 <sup>(2)</sup>	12.06 (306.3)
Ranger (9")	9.06 (230.1)
Ranger (10")	10.06 (255.5)
Windstar	9.90 (251.5)

(1) Information is not available from manufacturer.

(2) Includes Super Duty

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Escape	
Brake Booster Pushrod Bracket Nuts	17 (23)
Brake Line Fitting-To-Pressure Control Valve Fittings	10 (14)
Brake Line Master Cylinder Fittings	11 (15)
Brake Line-To-Wheel Cylinder Fitting	10 (14)
Caliper Anchor Plate Bolts	111 (150)

## 2001 Ford Escape

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Caliper Bolts	26 (35)
Master Cylinder Nuts	18 (24)
Rear Brake Backing Plate Bolts	49 (66)
Parking Brake Cable Bracket Bolt	16 (22)
Parking Brake Control Bolts	18 (24)
Wheel Lug Nuts	98 (133)
Explorer, Explorer Sport, Explorer Sport-Trac, Mountaineer & Ranger	
Brakeline-To-Wheel Caliper Bolt	29 (40)
Caliper Anchor Plate Bolts	
Front (Only)	72-97 (98-132)
Caliper Bleed Screws	13-17 (17-23)
Caliper Hose Bolt	23-29 (31-40)
Caliper Pin Bolts	
Front	21-26 (28-35)
Rear	20 (27)
Master Cylinder Brake Line Nuts	11-14 (15-19)
Master Cylinder-To-Booster Nut	14-19 (19-26)
Parking Brake	
Control-To-Cowl Side Bolt	13-17 (17-23)
Front Cable Clamp Bolt	11-14 (15-19)
Wheel Lug Nuts	(1) 100 (135)
Excursion, Pickup & Van	
Axle Shaft-To-Hub Bolts (F250 & F350 Super Duty Pickups)	80 (109)
Caliper Bleeder Screws	13-18 (17-24)
Front Brake Hose Attachment	22-30 (30-40)
Front Caliper Anchor Plate Bolts	
Excursion & F250 & F350 Super Duty Pickups	166 (225)
E250/350	141-191 (191-259)
F150/250	136 (185)
F450 & F550 Super Duty Pickups	295 (400)
Front Caliper Hose Bolt	23 (31)
Front Caliper Pin Bolts	
Excursion & F250, F350, F450 & F550 Super Duty Pickups	42 (56)
E150/F150	21-26 (28-35)
E250/350	16-30 (22-40)
Front Wheel Hub Extender Nuts	130 (176)

## 2001 Ford Escape

2000-01 BRAKES Disc & Drum - Trucks - Except Villager

Master Cylinder Brake Line Nuts	19 (26)
Master Cylinder-To-Hydro Boost Nuts	28 (37)
Park Brake Pedal Assembly Retaining Nuts (F550)	19 (25)
Rear Caliper Anchor Plate Bolts	
Excursion & F250 & F350 Super Duty Pickups	128 (173)
E350	128 (173)
F450 & F550 Super Duty Pickups	295 (400)
Rear Caliper Hose Bolt	26 (35)
Rotor-To-Rear Hub Bolts	
Excursion, F250, F350, F450 & F550 Super Duty Pickups	94 (127)
Rear Caliper Pin Bolts	
Excursion & F250 & F350 Super Duty Pickups	27 (36)
E350	27 (36)
F150/250	20 (27)
F450 & F550 Super Duty Pickups	41 (55)
Wheel Lug Nuts	
E150	<sup>(1)</sup> 74-133 (100-180)
E250 & E350	<sup>(1)</sup> 126-170 (171-230)
Excursion & F250 & F350 Super Duty Pickups	140 (190)
F150 & F250 Light Duty (12 mm)	100 (135)
F150 & F250 Light Duty (14 mm)	150 (204)
F450 & F550 (14 mm)	148 (200)
Expedition & Navigator	
Front Caliper	
Caliper Bolts	21-26 (28-36)
Front Axle Hub Nuts	221 (300)
Front Brake Hose Bolt	23-29 (31-40)
Front Caliper Anchor Bolts	125-169 (170-230)
Rear Caliper	
Caliper Pin Bolts	20 (27)
Rear Brake Hose Bolt	23-29 (31-40)
Rear Wheel Rotor Adapter Nut	40 (54)
Wheel Lug Nuts	
12-mm	100 (135)
14-mm	150 (204)



**2001 Ford Escape**

2000-01 BRAKES Disc &amp; Drum - Trucks - Except Villager

**Windstar**

Brake Hose Connection To Caliper	41 (55)
Caliper Anchor Plate Bolt	85 (115)
Caliper Bleeder Screw	13 (17)
Caliper Pin Bolts	26 (35)
Master Cylinder-To-Booster Nuts	18 (24)
Parking Brake Retaining Bolts	16 (22)
Rotor Retainer Bolts	9 (12)
Vacuum Booster-To-Dash Nuts	16 (22)
Wheel Cylinder Bleeder Screw	12 (15)
Wheel Cylinder Mounting Bolts	12 (15)
Wheel Lug Nuts	100 (135)

**INCH Lbs. (N.m)****Explorer, Explorer Sport, Explorer Sport-Trac & Mountaineer**

Speed Sensor Clamp Bolt	53-62 (6-7)
Speed Sensor-To-Spindle Bolt	61-90 (7-10)

**Ranger**

Speed Sensor Clamp Bolt	53-62 (6-7)
Speed Sensor-To-Spindle Bolt	61-90 (7-10)
Wheel Cylinder Bleeder Screw	61-79 (7-9)
Wheel Cylinder-To-Backing Plate Bolts	106-159 (12-18)

**Excursion, Pickup & Van**

PCM Connector Bolt (F550)	44 (5)
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(1) Failure to retighten wheel lug nuts at 500 miles after installation, may result in wheel coming loose and loss of vehicle control.

**2002-04 BRAKES****Disc & Drum - Escape****DESCRIPTION & OPERATION****SYSTEM OPERATION****Hydraulic Brake Actuation**

The hydraulic brake actuation system consists of the following components:

- If equipped, Anti-Lock Brake System (ABS).
- Brake master cylinder.
- Brake pressure control valve (without ABS).
- Disc brake calipers.
- Rear wheel cylinders.
- Brake tubes and hoses.

The hydraulic brake system is diagonally split with the left front and right rear brakes on one circuit and the right front and left rear brakes on the other circuit.

**Disc/Drum Actuation**

The brake pedal is connected to the brake master cylinder. When the brake pedal is depressed, brake fluid is pushed through the double-walled steel lines and flexible hoses to the rear wheel cylinders and the front disc brake caliper. The brake fluid enters the rear wheel cylinder, forcing the rear wheel cylinder pistons outward against the brake shoe and lining. The brake shoe and lining press against the braking surface of the brake drum. The front disc brake caliper pistons are forced outward against the brake pad and lining, and contact the braking surface of the front disc brake rotor. When the brake pedal is released, the pressure is relieved, returning the front disc brake caliper pistons and rear wheel cylinder pistons and the brake shoe, brake pad and lining to the unapplied position.

**SYSTEM COMPONENTS****Brake Booster**

The brake booster consists of a power brake booster, vacuum booster hose and power brake booster check valve. The power brake booster reduces the effort required to push the brake pedal to actuate the brakes. The vacuum booster hose supplies vacuum to the brake booster. The vacuum booster check valve closes when the engine is turned off and traps engine vacuum in the power brake booster.

**Brake Lines and Hoses**

Steel tubing is used throughout the brake hydraulic system. All brake tube fittings must be correctly double flared to provide strong leakproof connections. If a section of brake tube is damaged, the entire section must be removed and a new tube of the same type, size, shape and length installed. When installing new hydraulic brake lines, hoses, or connectors, tighten all connections securely. After installation, bleed the brake system.

### **Brake Pressure Control Valve**

The brake pressure control valve proportions the pressure to the rear brakes. When the brake pedal is applied, brake fluid pressure passes through the brake pressure control valve to the rear brake system until the valve split point is reached. Above its split point, the brake pressure control valve begins to reduce the hydraulic pressure to the rear brakes, creating a balanced braking condition between the front and rear brakes.

### **Front Disc Brakes**

The front disc brake system consists of a single-piston front disc brake caliper and a ventilated front disc brake rotor. The brake pads are held in the front disc brake caliper by two front disc brake caliper bolts. The front disc brake system consists of piston seals, piston dust seals, caliper, caliper bleeder screw, caliper bleeder screw cap, rotor, anchor plate, dust shield and brake pads.

### **Master Cylinder**

The brake master cylinder is a dual-piston type. The brake master cylinder operates as follows:

- When the brake pedal is depressed, pressure is applied by mechanical linkage to the primary and secondary piston.
- Brake master cylinder pistons apply hydraulic pressure to the two hydraulic circuits.

The brake master cylinder consists of the following components:

- Brake master cylinder reservoir.
- Brake master cylinder body.
- Primary piston.
- Secondary piston.
- Snap ring.

Whenever the brake master cylinder is removed from the brake booster, new nuts must be installed.

### **Master Cylinder Reservoir**

The brake master cylinder reservoir is mounted to the brake master cylinder. The reservoir

holds fluid supply for each brake master cylinder hydraulic piston and provides visual fluid level markings. The reservoir contains the brake master cylinder fluid level warning switch.

On vehicles equipped with a manual transmission, the reservoir is shared with the clutch master cylinder.

#### **Master Cylinder Reservoir Brake Fluid Level Warning Switch**

The brake fluid level warning switch is an integral part of the brake master cylinder reservoir. It consists of a float containing a magnet and a reed switch mounted in the bottom of the brake master cylinder reservoir.

When the brake fluid in the brake master cylinder reservoir gets to a predetermined level, the float and magnet actuates the reed switch that causes the Red brake warning indicator to illuminate. Loss of brake fluid from either the primary (front) or secondary (rear) system will cause this system to activate. If the brake fluid level warning switch is inoperative, a new brake master cylinder reservoir must be installed.

#### **Parking Brake**

The parking brake system consists of the following components:

- Front parking brake cable.
- Parking brake control.
- Parking brake cable equalizer.
- Parking brake warning indicator switch.
- Rear parking brake cable.
- Rear drum brake.

#### **Rear Drum Brakes**

The rear drum brake uses a pedal actuated rear wheel cylinder to move the rear brake shoes against the brake drum. After initial setting, rear drum brake adjustment is maintained through periodic parking brake operation.

The drum brake system consists of the following components:

1. Brake backing plate.
2. Brake drum.
3. Brake shoes.
4. Brake shoe hold-down pins and clips.
5. Brake shoe retracting springs.
6. Parking brake cable.

7. Parking brake lever.
8. Parking brake lever pin.
9. Parking brake return spring.
10. Self adjuster.
11. Self adjuster lever.
12. Self adjuster spring.
13. Wheel cylinder assembly.

## BLEEDING BRAKE SYSTEM

**CAUTION:** Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash it with water.

When any part of the hydraulic system has been disconnected for repair or a new component is installed, air may enter the system, causing spongy brake pedal action. This requires the bleeding of the hydraulic system after it has been correctly connected. Always bleed brakelines in sequence. See **BLEEDING SEQUENCE** .

Before bleeding system, remove all vacuum from power unit by depressing brake pedal several times. Bleed master cylinder first, followed in sequence by rear wheel cylinders, anti-lock system components (if equipped) and calipers. See **BLEEDING SEQUENCE** .

### ANTI-LOCK BRAKES BLEED

**NOTE:** Bleeding the Hydraulic Control Unit (HCU) is required only when removing or installing the HCU or master cylinder, or opening the lines to the HCU.

**NOTE:** Carrying out the System Bleed function drives trapped air from the HCU. Subsequent bleeding removes the air from the brake hydraulic system through the bleeder screws.

**NOTE:** Adequate voltage to the HCU module is required during the anti-lock control portion of the system bleed.

1. Connect the diagnostic scan tool Data Communication Link (DCL) to the data link connector located in the passenger compartment. It is attached to the instrument panel and accessible from the driver's seat.
2. Access the SYSTEM BLEED FUNCTION on the scan tool. Go to TOOL TAB-CHASSIS-BRAKING-ABS SERVICE BLEED and follow the directions on the scan tool.

3. Manually bleed the brake hydraulic system. See **MANUAL BLEEDING** .
4. Repeat the procedure carrying out a total of two diagnostic tool cycles and two manual bleed cycles.

**MANUAL BLEEDING**

**NOTE: DO NOT allow reservoir to run dry during bleeding operation.**

**Master Cylinder Bleeding (Bench)**

1. Support brake master cylinder body in a vise.
2. Remove the master cylinder cap and install short brake hoses to the master cylinder outlet ports with the ends submerged in the brake master cylinder reservoir.
3. Fill the brake master cylinder reservoir with High Performance DOT 3 brake fluid C6AZ-19542-AB or equivalent meeting Ford specification ESA-M6C25-A, DOT 3. Fill fluid brake master cylinder reservoir with brake fluid. If equipped with a manual transmission, plug the master cylinder feed port.
4. Slowly depress the primary piston until bubble-free brake fluid flows from both brake hoses.
5. Remove the brake hoses from the master cylinder.
6. Install plugs in the front and rear brake outlet port.
7. Install the reservoir cap and install the brake master cylinder in the vehicle. Remove the master cylinder outlet port plugs before installing the lines.

**Master Cylinder Bleeding (On-Vehicle)**

1. Disconnect the brake outlet lines from the brake master cylinder and cap the lines.
2. Install short brake hoses to the master cylinder outlet ports with the ends submerged in the brake master cylinder reservoir.
3. Fill the brake master cylinder reservoir with High Performance DOT 3 Brake Fluid C6AZ-19542-AB or equivalent meeting Ford specification ESA-M6C25-A, DOT 3.
4. Have an assistant pump the brake pedal until clear, bubble-free brake fluid flows from both brake hoses.
5. Remove the short brake hoses and install the brake outlet lines.
6. Bleed the hydraulic brake system.

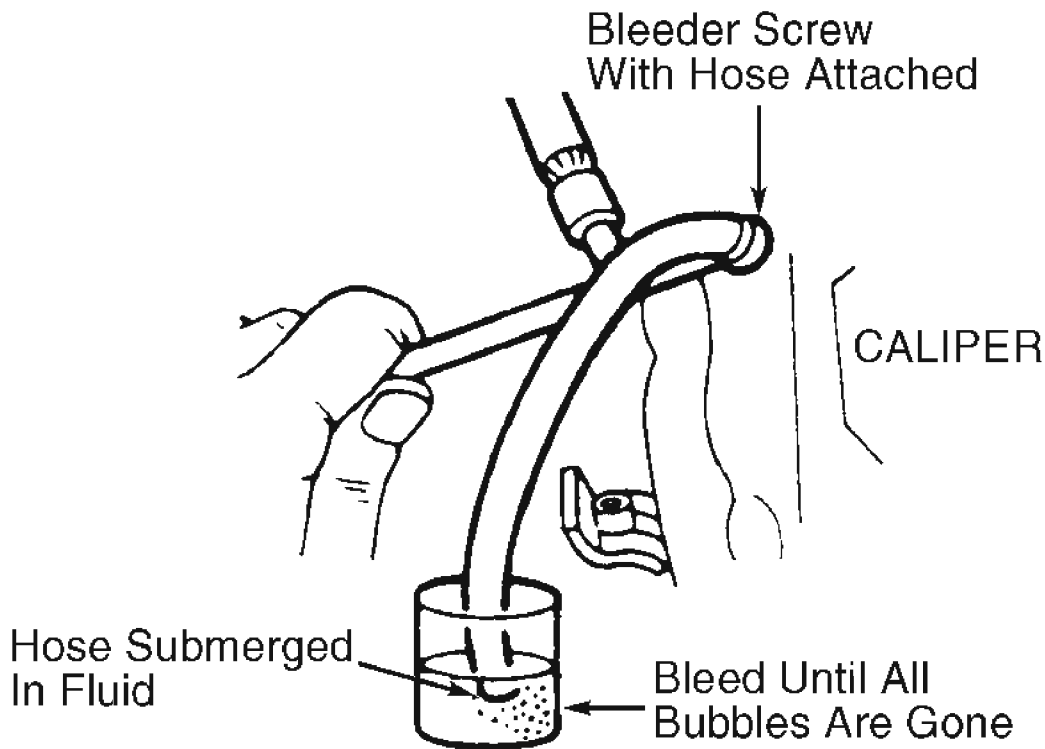
**Gravity Bleeding**

**CAUTION: Be sure to check the brake fluid level in the brake master cylinder reservoir often. Do not let it run dry.**

1. Fill the brake master cylinder reservoir with High Performance DOT 3 Brake Fluid C6AZ-19542-AB or equivalent meeting Ford specification ESA-M6C25-A, DOT 3.
2. Begin bleeding the system, going in order from the right rear wheel, to the left rear wheel, then to the right front wheel and ending with the left front wheel.
3. Loosen the rear wheel cylinder bleeder screw and leave open until clear, bubble-free brake fluid flows.
4. Tighten the wheel cylinder bleeder screw.
5. Open the front disc brake caliper bleeder screw. Leave open until clear bubble-free brake fluid flows.
6. Tighten the front disc brake caliper bleeder screw.
7. Fill the brake master cylinder reservoir with fluid and install the reservoir cap.

**Manual Bleeding**

1. Clean master cylinder cap and surrounding area. Remove cap. All models are equipped with dual-type master cylinder. Bleed primary and secondary systems separately. Loosen primary or secondary master cylinder hydraulic line fitting.
2. Wrap a cloth around brakelines to absorb escaping brake fluid. Slowly push brake pedal down to force out air. With pedal fully depressed, tighten fittings to prevent air from being sucked into master cylinder when pedal is released. Release pedal.
3. Repeat procedure until air is completely purged from master cylinder. When all air has escaped, tighten fittings with pedal down. Release pedal, and depress again. If pedal is not firm, repeat bleeding procedure.
4. Repeat procedure at bleeder fitting on rear anti-lock brake electrohydraulic RABS valve, each wheel cylinder and caliper. See **Fig. 1** . See **BLEEDING SEQUENCE** . When bleeding is complete, fill master cylinder to proper level.



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**Fig. 1: Bleeding Wheel Cylinders (Typical)**  
Courtesy of FORD MOTOR CO.

#### PRESSURE BLEEDING

**CAUTION:** DO NOT exceed 50 psi (3.5 kg/cm<sup>2</sup>) during bleeding.

1. Clean the outside of the brake master cylinder reservoir. Remove the reservoir cap and fill the brake master cylinder reservoir with brake fluid.

**NOTE:** Master cylinder pressure bleeder adapter tools are available from various manufacturers of pressure bleeding equipment. Follow the instructions of the manufacturer when installing the adapter.

2. Install brake bleeder to the brake master cylinder reservoir, and attach the brake bleeder tank hose to the fitting on the adapter.
3. Attach a rubber drain hose to the right rear bleeder screw and submerge the free end of



the hose in a container partially filled with clean brake fluid. See **Fig. 1** .

4. Open the valve on the brake bleeder tank. Loosen the bleeder screw. Leave open until clear, bubble-free brake fluid flows, then close the bleeder screw and remove the rubber hose. Repeat procedure on remaining wheel cylinder and calipers in sequence. See **BLEEDING SEQUENCE** .
5. Close the Brake Bleeder tank valve and remove the tank hose from the adapter, and remove the adapter.
6. Fill the brake master cylinder reservoir and install the reservoir cap.

#### BLEEDING SEQUENCE

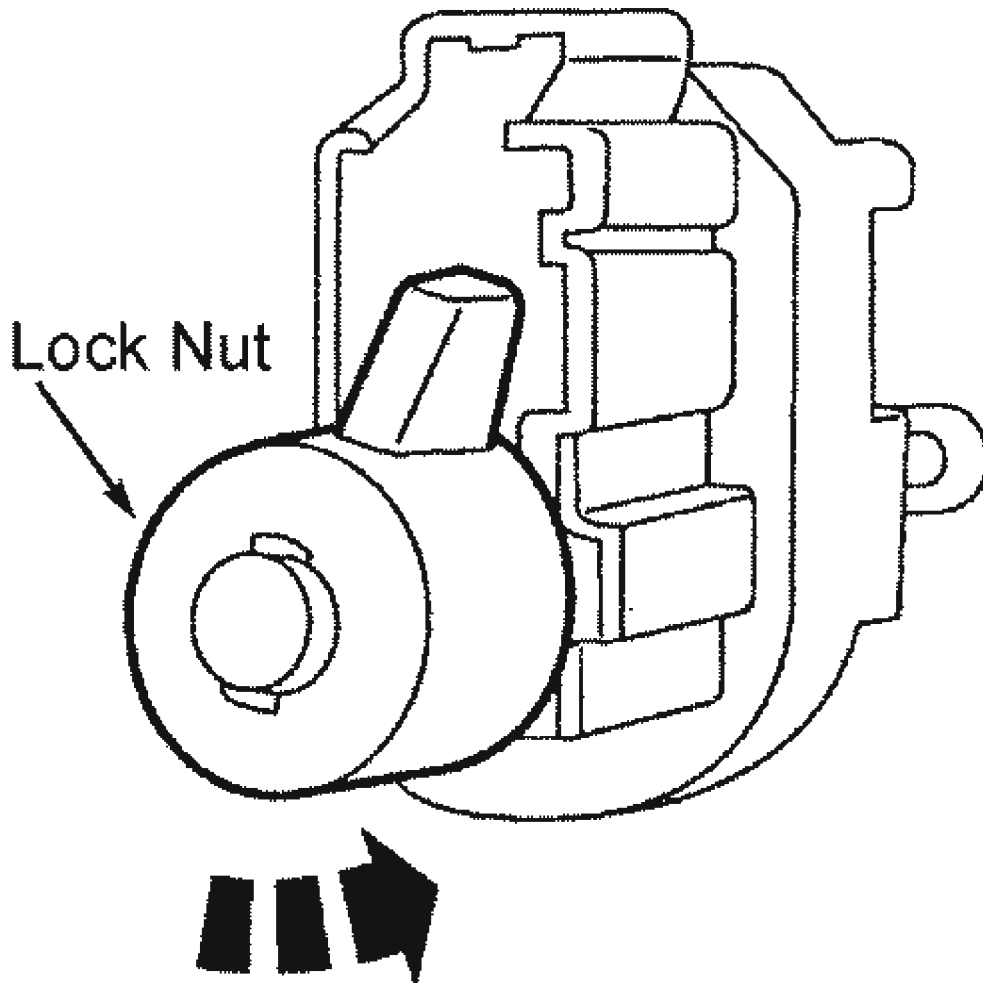
#### BLEEDING SEQUENCE

Application	Sequence
All	(1) RR, LR, RF & LF
(1) Or in the order displayed by scan tool.	

#### ADJUSTMENTS

##### BRAKE PEDAL POSITION SWITCH & SPEED CONTROL DEACTIVATOR SWITCH

Initial installation of Brake Pedal Position (BPP) and speed control deactivator switch allows for one adjustment. If additional adjustments are necessary, install a new switch. To unlock, rotate the lock knob counterclockwise to the stop. See **Fig. 2** . With the engine running, fully depress and hold the brake pedal. Install the BPP or deactivator switch. Position the switch in the bracket and rotate counterclockwise. Connect the electrical connector. Slowly release the brake pedal.



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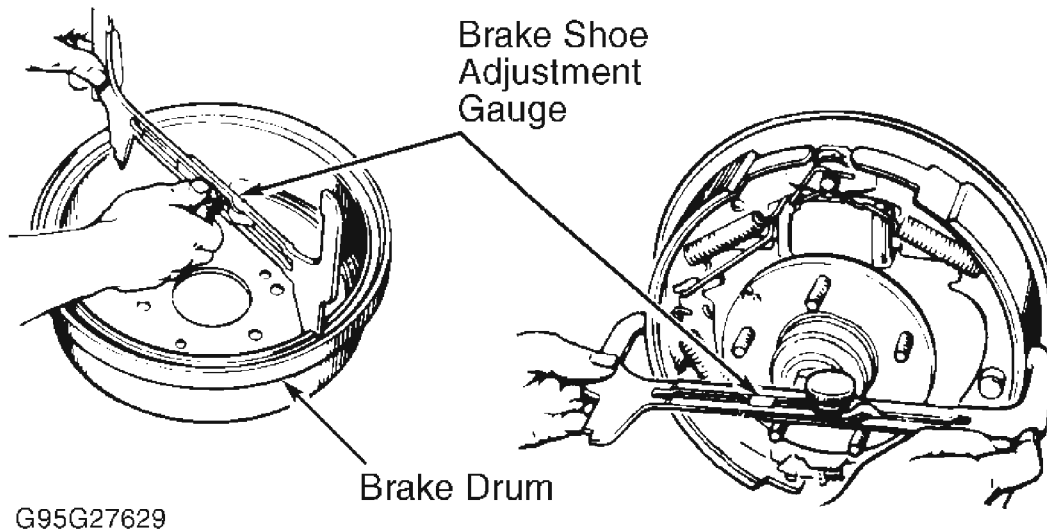
**Fig. 2: Adjusting Lock Knob**  
Courtesy of FORD MOTOR CO.

#### **BRAKE SHOES**

Drums Removed

**NOTE:** Rear brake shoes are automatically adjusted when vehicle is driven forward and backward and brakes are applied sharply. Manual adjustment is required if brakes do not self-adjust or after brake shoes have been removed or replaced.

1. Adjust with brake drums cold and parking brake correctly adjusted. Measure brake drum inside diameter using Brake Adjustment Gauge (D81L-1103-A) or equivalent . See **Fig. 3** .



**Fig. 3: Measuring Brake Drum & Shoe Diameter**  
 Courtesy of FORD MOTOR CO.

2. Reverse adjustment gauge. Position the special tool on the brake shoes and linings and adjust accordingly. Hold adjusting lever away from adjusting screw. Turn screw until outside diameter of shoes contacts gauge. See **Fig. 3** .
3. Install brake drum and wheel assembly. Complete adjustment by applying brakes quickly several times while driving vehicle alternately forward and backward. Check brake operation by stopping often while driving forward.

## DISC PADS

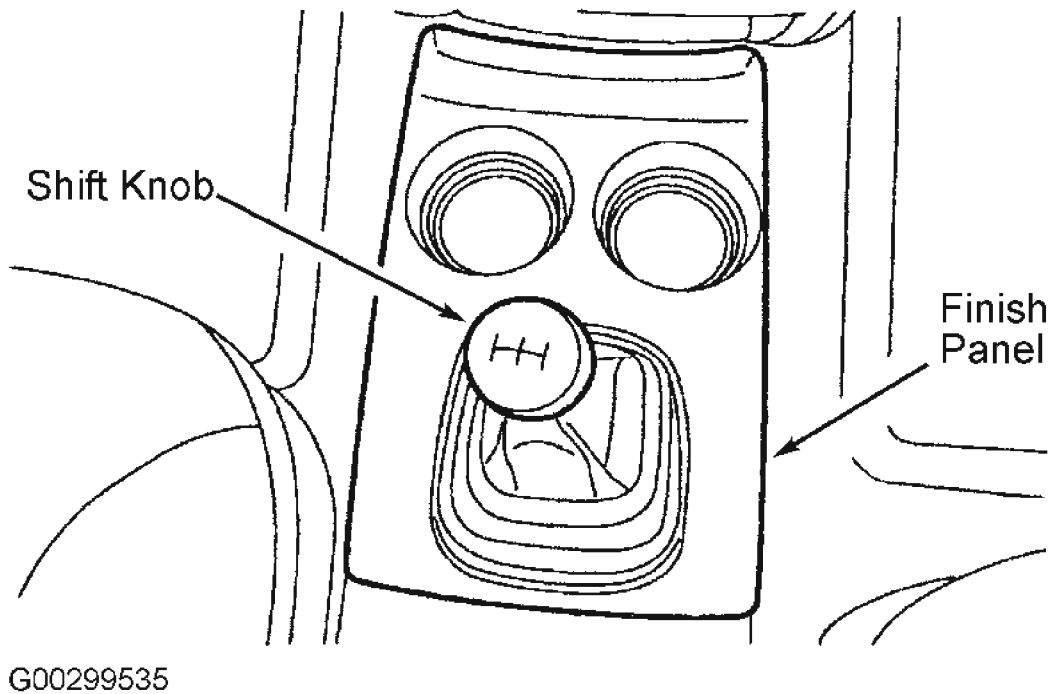
As brake pads wear, caliper piston remains in constant contact with brake pad, eliminating need for adjustment.

## PARKING BRAKE CABLE

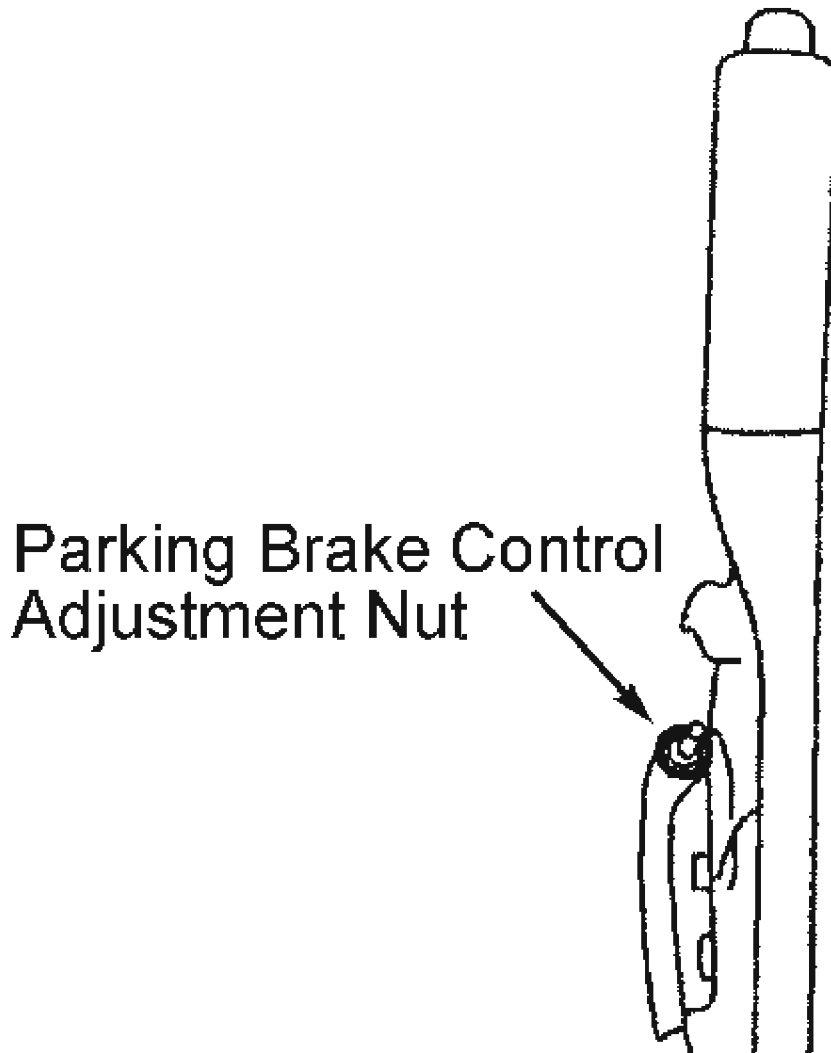
### Vehicle With Low Series Floor Console

1. If equipped, remove the manual transmission shift knob by turning counterclockwise. Remove the floor console front finish panel. See **Fig. 4** .
2. Apply the parking brake. Remove the floor console rear finish panel.
3. Remove the adjustment nut clip. See **Fig. 5** .

4. Turn the parking brake control adjustment nut so that the parking brake control stroke is three to five notches when pulled.
5. Confirm the parking brake is applied.
6. Install the adjustment nut clip.
7. To install, reverse removal procedure.



**Fig. 4: Identifying Shift Knob & Finish Panel**  
Courtesy of FORD MOTOR CO.



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**Fig. 5: Identifying Parking Brake Control Adjustment Nut**  
Courtesy of FORD MOTOR CO.

**Vehicle With High Series Floor Console**

1. Apply the parking brake. Remove the floor console finish panel.
2. Remove the adjustment nut clip. See **Fig. 5**.
3. Turn the parking brake control adjustment nut so that the parking brake control stroke is three to five notches when pulled.
4. Confirm the parking brake is applied.

5. Install the adjustment nut clip.
6. To install, reverse removal procedure.

## TESTING

### BRAKE WARNING LIGHT

1. Brake warning light should only illuminate when ignition switch is in START position or when ignition is on with parking brake applied or fluid level low.
2. If brake warning light does not illuminate when brake fluid is low, manually push reservoir float to bottom of reservoir. If light still does not illuminate, check fuse, wiring and bulb. Repair as necessary. If bulb and related circuitry are okay, replace reservoir assembly.
3. If brake warning light does not illuminate when parking brake is applied, check parking brake switch, wiring and bulb. Repair as necessary. With parking brake released and master cylinder reservoir full, turn ignition on. If warning light is illuminated, check for shorted, grounded or defective warning switches or wiring. Repair as necessary. Turn ignition switch to START position. If brake warning light does not illuminate as a bulb check function, check fuse, bulb and wiring. Repair as necessary.

### MASTER CYLINDER

#### Bypass Condition Test

1. Check the brake hydraulic system for leaks or insufficient brake fluid. Repair as necessary.
2. Observe the brake fluid level in the brake master cylinder reservoir as the brake pedal is slowly pressed and quickly released. If the brake fluid level rises when the brake pedal is pressed and drops when the brake pedal is released, but the net brake fluid level remains unchanged, the brake master cylinder is bypassing. Repair or install a new brake master cylinder.

#### Non-Pressure External Leaks

A low brake fluid level in the brake master cylinder reservoir may be caused by the following non-pressure external leaks:

##### Type 1

An external leak may exist at the brake master cylinder filler cap due to incorrect position of the cap, cap gasket, or cap gasket deterioration.

##### Type 2

An external leak may exist at the brake master cylinder mounting flange due to internal

seal failure. Repair or install a new brake master cylinder.

### **Type 3**

An external leak may exist at the base of the brake master cylinder reservoir due to deteriorated reservoir mounting seals. Repair or install a new brake master cylinder

#### **Compensator Port Check**

The purpose of the compensator ports in the brake master cylinder is to:

- Supply additional brake fluid from the brake master cylinder reservoir needed by the brake system due to brake shoe and lining wear.
- Allow brake fluid to return to the brake master cylinder reservoir when the brakes are released. The returning brake fluid will create a slight turbulence in the brake master cylinder reservoir. This is a normal condition and indicates that the compensator ports are not clogged.

Clogged compensator ports may cause the brakes to hang up or not fully release. If clogged compensator ports are suspected, proceed as follows:

1. Raise and support vehicle.
2. With the brakes released, attempt to rotate each wheel. If an excessive amount of brake drag exists, continue with the test. If an excessive amount of brake drag exists at only one wheel, it indicates a possible seized rear disc brake caliper, front disc brake caliper, rear wheel cylinder, or parking brake component. Repair or install new components as necessary.
3. Check the Brake Pedal Position (BPP) switch adjustment, and brake pedal free play to verify that the brake pedal is not partially applied.
4. Loosen the nuts attaching the brake master cylinder to the power brake booster and pull the brake master cylinder away from the power brake booster.
5. Repeat Steps 2 and 3 . If the brake drag disappears, the power brake booster is binding and new one must be installed. If the brake drag continues, the brake master cylinder is binding and new one must be installed.

#### **VACUUM BOOSTER FUNCTION TEST**

1. Inspect all vacuum hoses and connections. All unused vacuum connectors must be capped. Hoses and their connections must be correctly secured and in good condition with no holes, cracks, or collapsed areas.
2. Check the brake hydraulic system for leaks or insufficient brake fluid. Repair as necessary.
3. With the engine off, place the transaxle in Park (A/T) or Neutral (M/T) and apply the parking brake.

**NOTE:** If the power brake booster is noisy when the brakes are applied, a new component must be installed.

4. Press the brake pedal several times to exhaust all of the vacuum from the system.
5. Press and hold the brake pedal.
6. Start the engine. If the vacuum system is operating, the brake pedal will move downward under constant foot pressure. If no movement occurs, the power brake booster system is not functioning.
7. Remove the vacuum booster hose from the power brake booster.
8. Place the transaxle in PARK (A/T) or NEUTRAL (M/T) and apply the parking brake. Start the engine. Manifold vacuum should be available from the vacuum booster hose. If manifold vacuum is not available, inspect all of the hoses and hose connections. Repair as necessary.
9. Reconnect the vacuum booster hose and run the engine at fast idle for 10 seconds.
10. Stop the engine and let the vehicle stand for 10 minutes.
11. Apply the brake pedal with approximately 20 lbs. of force. The brake pedal feel should be the same as normal power assisted brake operation for at least one application. If the brake pedal feel is normal, then the power brake booster is okay. If the brake pedal feels hard, continue with the test.
12. Remove the vacuum booster hose from the power brake booster. Apply 17 in. Hg (57.3 kPa) of vacuum to the vacuum booster hose. If the vacuum does not leak off after 10 minutes, install a new power brake booster. If the vacuum does leak off, install a new check valve and/or new vacuum booster hoses.

#### **VACUUM BOOSTER CHECK VALVE**

1. Remove the vacuum booster hose from the power brake booster.
2. Apply 17 in. Hg (57.3 kPa) of vacuum to the vacuum booster hose. If the vacuum does not leak off after ten minutes, the check valve is okay. Otherwise, install a new check valve.

#### **REMOVAL & INSTALLATION**

**WARNING:** Deactivate suspension prior to hoisting vehicle. This can be accomplished by turning off air suspension switch located on right kick panel.

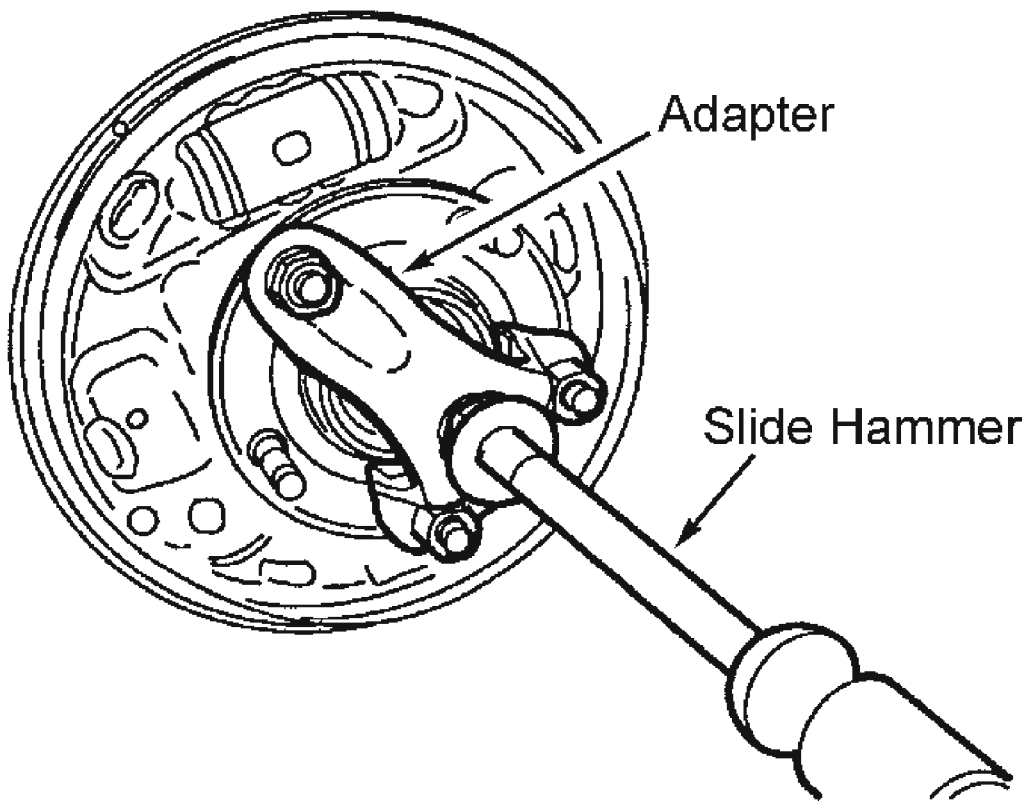
**CAUTION:** Anti-lock brake systems operate under high pressure. Before servicing, system pressure must be discharged. See appropriate ANTI-LOCK article.

#### **BRAKE BACKING PLATE**



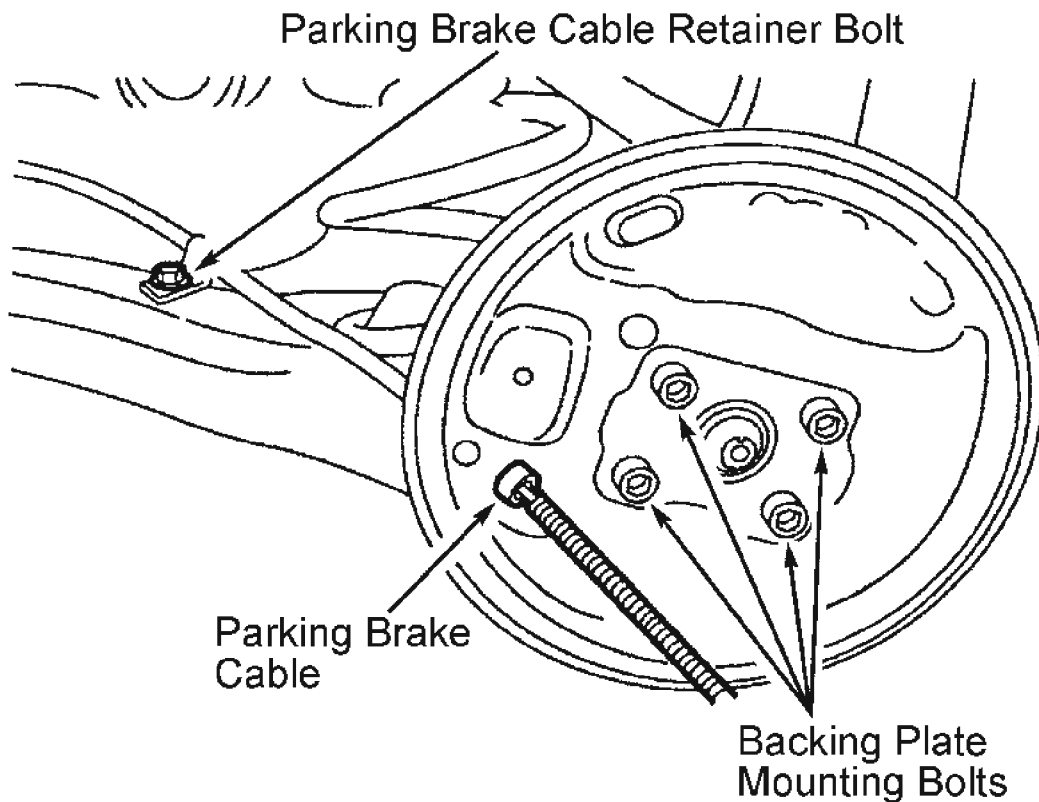
### Removal & Installation

1. Remove wheel cylinder. See **WHEEL CYLINDERS** .
2. Remove the wheel hub nut.
3. Remove ABS sensor ring, if equipped.
4. Using an appropriate slide hammer and adaptor, remove the wheel hub. See **Fig. 6** .
5. Remove the cable retainer bolt. Remove the parking brake cable from the brake backing plate. See **Fig. 7** .
6. Remove the backing plate bolts. Remove the brake backing plate.



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**Fig. 6: Removing Wheel Hub**  
Courtesy of FORD MOTOR CO.



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**Fig. 7: Removing Backing Plate**  
Courtesy of FORD MOTOR CO.

## BRAKE DRUM

### Removal & Installation

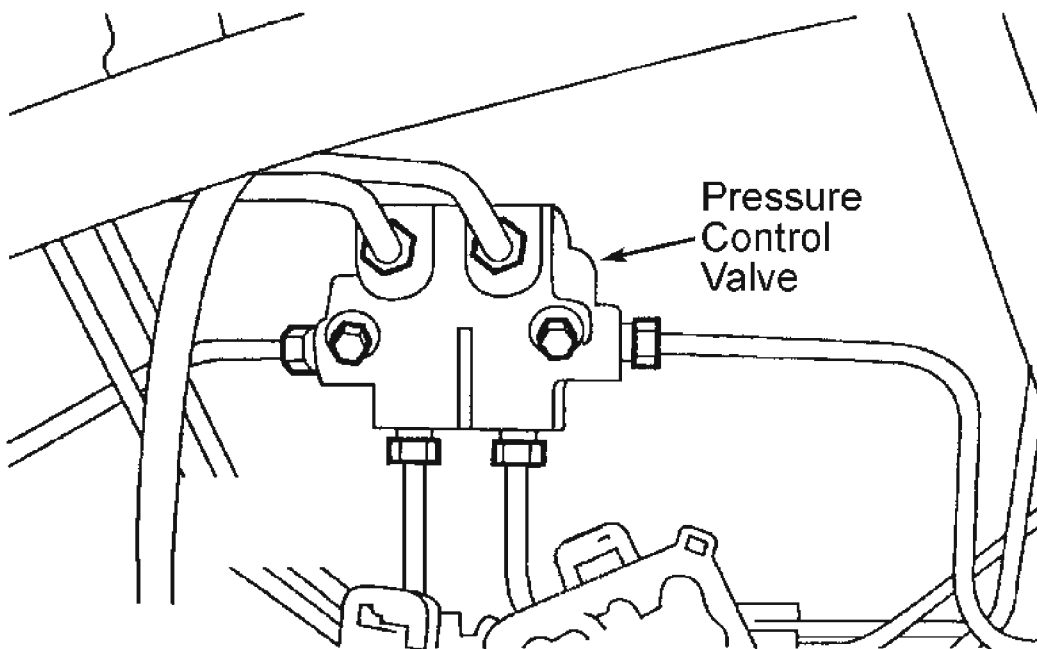
1. Raise and support vehicle. Remove rear wheels.
2. Remove the brake drum retaining clips, if equipped. Remove the brake drum. If the brake drum is rusted to the axle shaft pilot diameter, tap the center of the brake drum between the wheel studs.
3. If the brake drums will not come off, move the brake shoe adjusting lever off the brake adjuster screw and loosen the brake shoe adjuster screw nut by adjusting the nut upward.
4. Using the Brake Drum Gauge (134-R0191), or equivalent, measure the brake drum inside diameter. Install a new brake drum if the maximum inside diameter exceeds the specification stamped or molded on the outside of the brake drum.
5. To install, reverse removal procedure. Adjust BPP switch and deactivator switch as necessary. See **BRAKE PEDAL POSITION SWITCH & SPEED CONTROL**

**DEACTIVATOR SWITCH** under ADJUSTMENTS.

**BRAKE PRESSURE CONTROL VALVE**

**Removal & Installation**

1. Disconnect the six brake line fittings and plug the brake lines. See **Fig. 8** Remove the brake pressure control valve bolts.
2. To install, reverse the removal procedure. Bleed the brake system. See **BLEEDING BRAKE SYSTEM** .



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**Fig. 8: Identifying Brake Pressure Control Valve**  
Courtesy of FORD MOTOR CO.

**BRAKE SHOES**

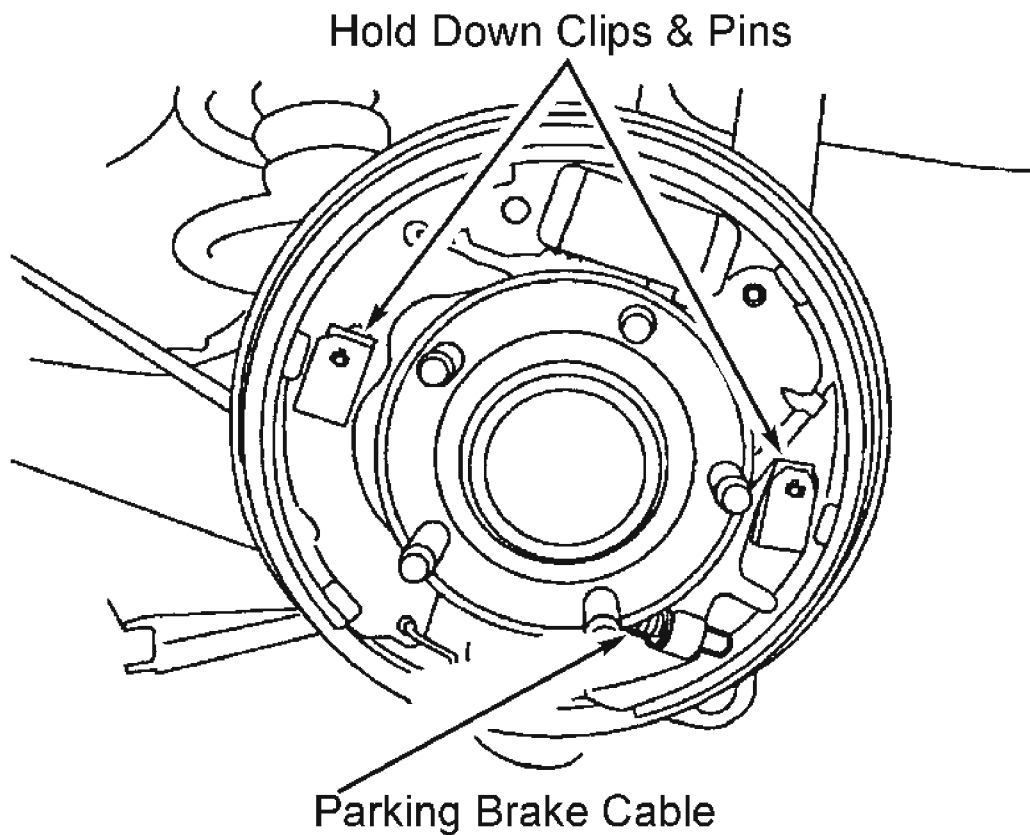
**Removal & Installation**

1. Remove tire and wheel assembly. Remove brake drum. See **BRAKE DRUM** .
2. Use the Brake/Clutch/Service Vacuum or equivalent to remove brake dust and dirt from the brake assemblies.

**NOTE:** If new rear brake shoes and linings are being installed, resurface the brake drums to remove glazing and to ensure

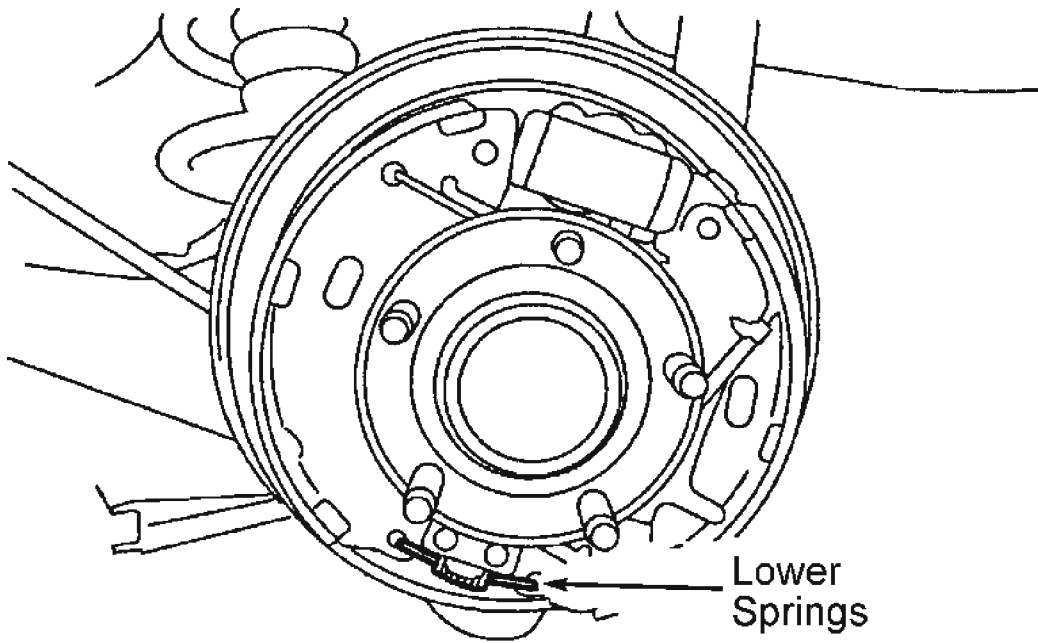
**an equal friction surface from side-to-side. Resurfacing will also correct out-of-round and bell conditions.**

3. Using the Brake Drum Gauge (134-R0191), or equivalent, measure the braking surface diameter. If the inside diameter measures more than the maximum specification shown on the outside of the brake drum, install a new brake drum.
4. Remove the parking brake cable from the parking brake cable lever. Remove the hold-down clips and pins. See **Fig. 9** .
5. Remove the lower spring. See **Fig. 10** .
6. Pull the bottom of the brake shoe forward. Release the upper return spring. Remove both brake shoes together.
7. Remove the self adjuster lever. See **Fig. 11** .
8. Remove the self adjuster and spring assembly. Return the self adjuster to the fully seated position. See **Fig. 11** .
9. Remove the horseshoe clip. Remove the parking brake lever. See **Fig. 12** .
10. Inspect the rear brake shoes for minimum thickness above the backing plate, and install new as necessary. See **Fig. 13** .
11. To install, reverse the removal procedure.



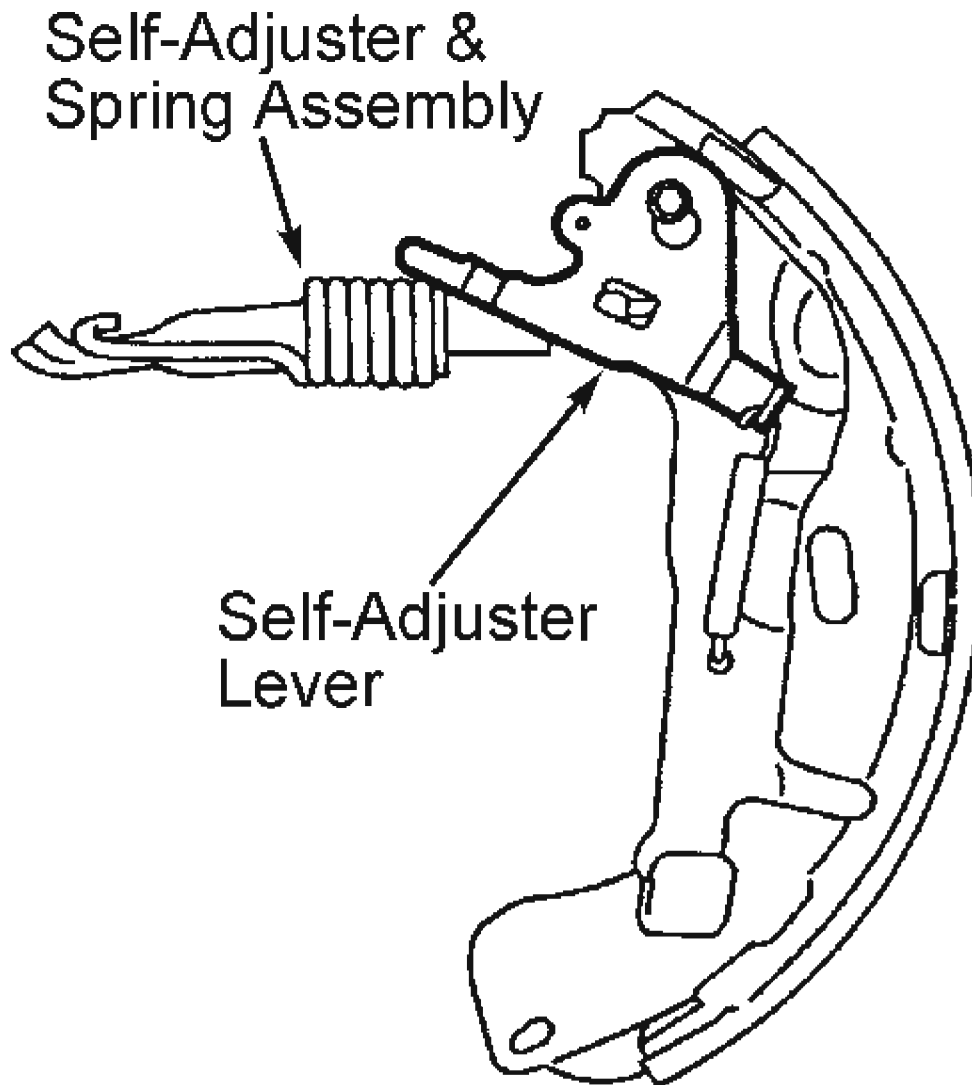
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**Fig. 9: Identifying Parking Brake Cable, Hold Down Clips & Pins**  
Courtesy of FORD MOTOR CO.



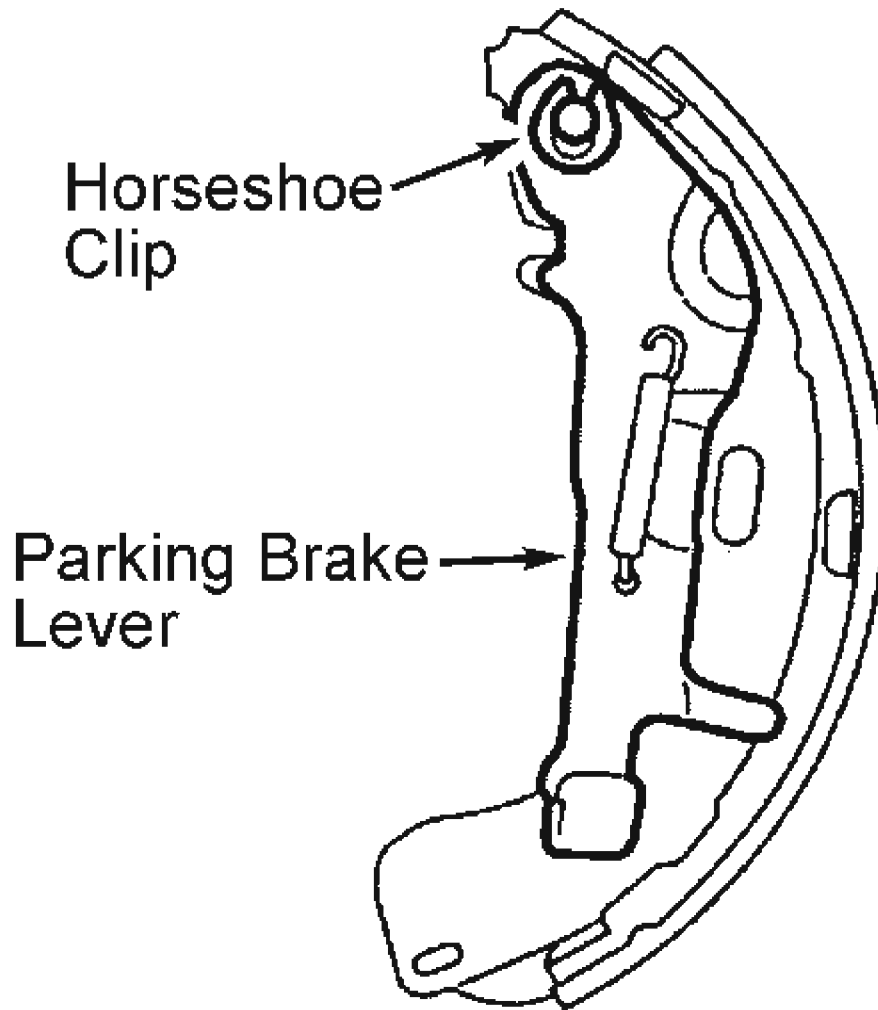
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**Fig. 10: Identifying Lower Spring**  
Courtesy of FORD MOTOR CO.



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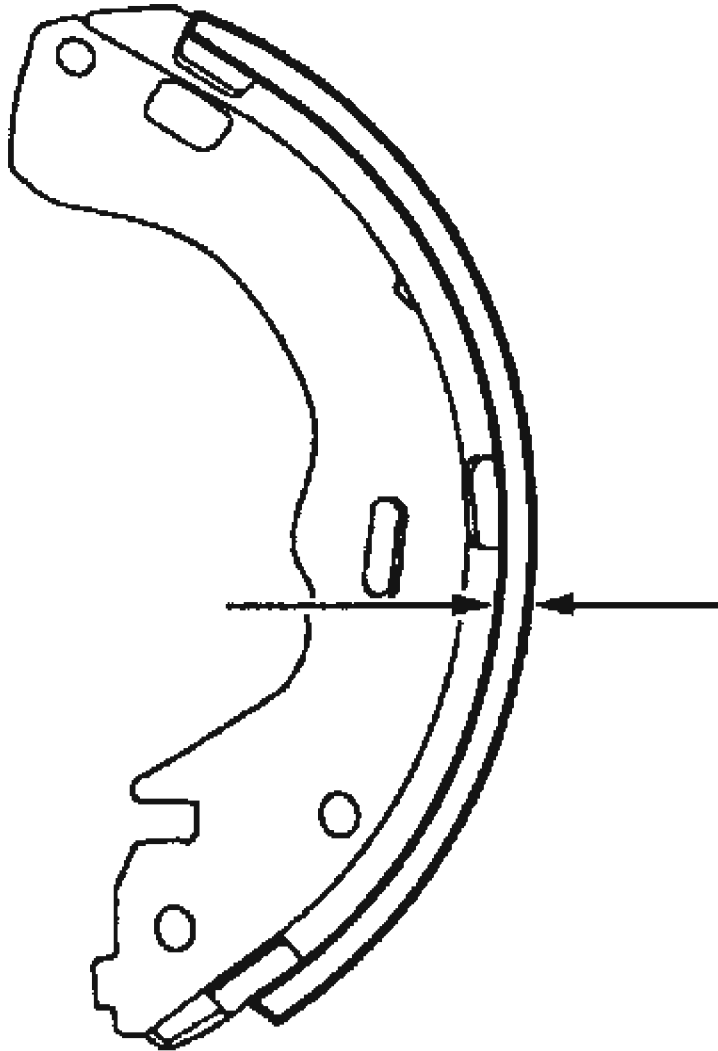
**Fig. 11: Identifying Self Adjuster Lever & Assembly**  
Courtesy of FORD MOTOR CO.



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**Fig. 12: Identifying Parking Brake Lever & Horseshoe Clip**  
Courtesy of FORD MOTOR CO.





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**Fig. 13: Measuring Brake Shoe Lining Thickness**  
Courtesy of FORD MOTOR CO.

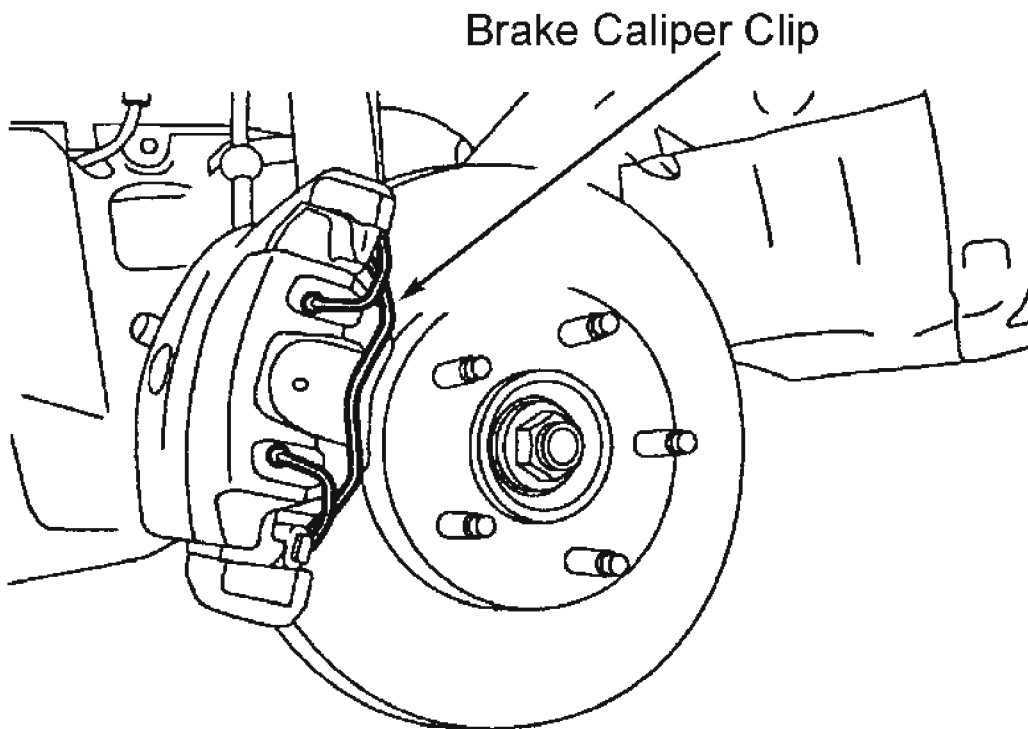
#### DISC BRAKE CALIPERS & PADS

##### Removal & Installation

**NOTE:** If caliper does not require service, it is not necessary to remove brake hose from caliper unless indicated.

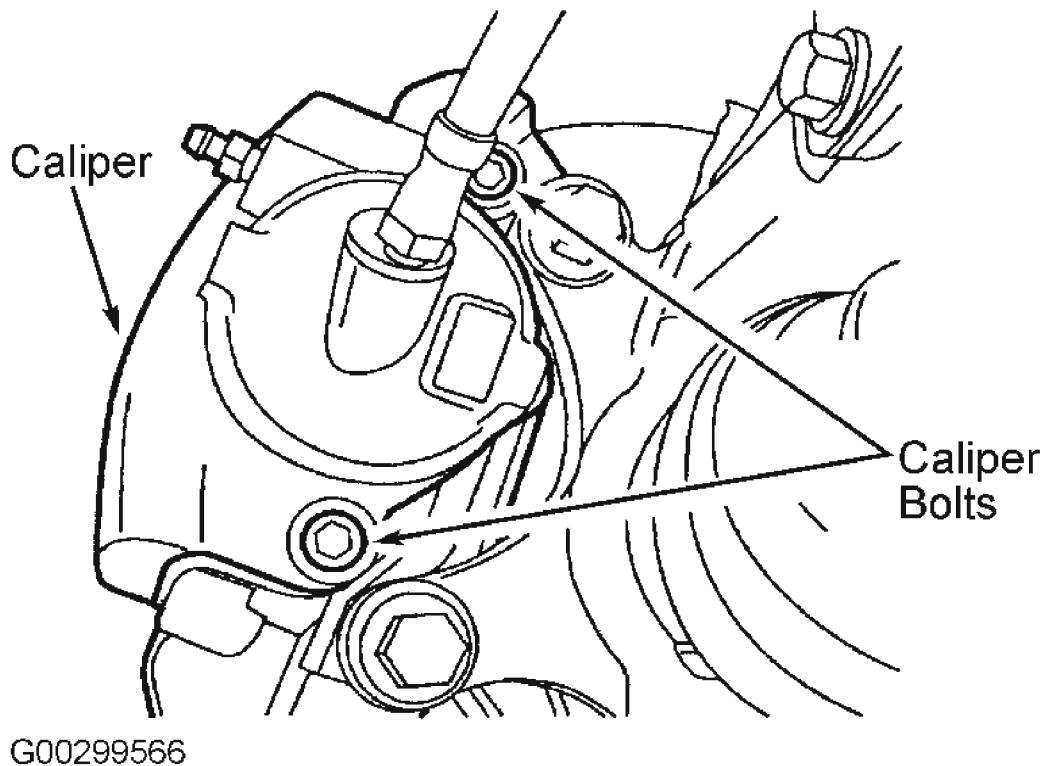
**NOTE:** To prevent master cylinder overflow when caliper piston is depressed, remove and discard some brake fluid from master cylinder.

1. Raise and support vehicle. Remove wheel.
2. Remove the brake caliper clip. See **Fig. 14** .
3. Remove brake caliper bolt caps and the bolts. See **Fig. 15** . Position and support the caliper aside.
4. Remove the outer brake pad from the anchor. Remove the inner brake pad from the caliper piston.
5. To install, reverse removal procedure. Inspect caliper for leakage. If caliper is leaking, overhaul as necessary. See **DISC BRAKE CALIPER** under OVERHAUL. If caliper is okay, use a "C" clamp to push caliper piston into piston bore until it bottoms out. Connect brake hose to rotor using NEW copper washers on connector bolt. Bleed brakes. See **BLEEDING BRAKE SYSTEM** .



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**Fig. 14: Identifying Brake Caliper Clip**  
Courtesy of FORD MOTOR CO.



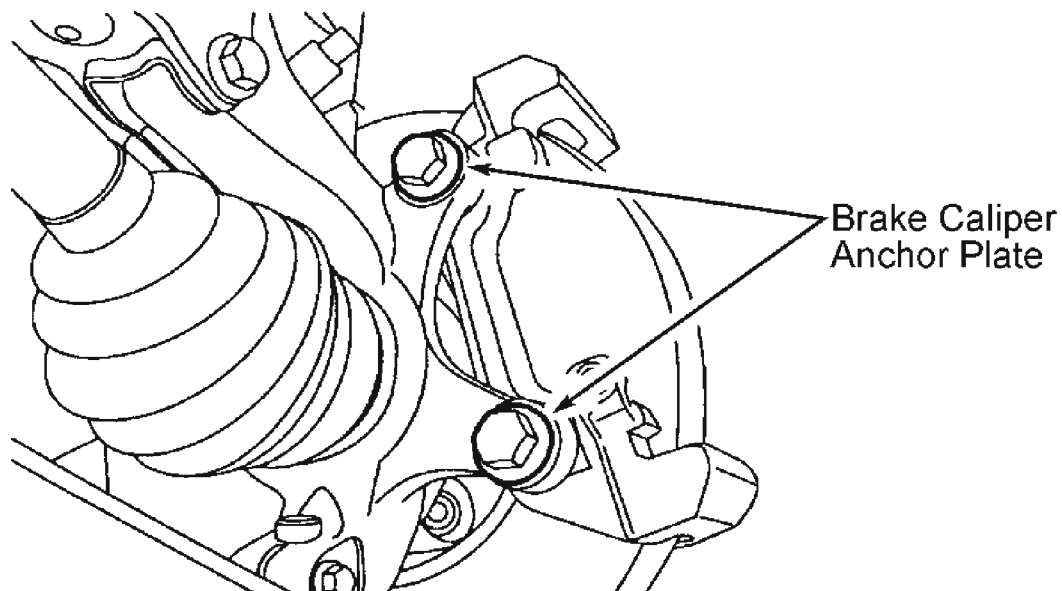
**Fig. 15: Identifying Caliper Bolts**  
Courtesy of FORD MOTOR CO.

#### FRONT BRAKE DISC

**NOTE:** If caliper does not require service, it is not necessary to remove brake hose from caliper unless indicated.

#### Removal & Installation

1. Raise and support vehicle. Remove wheel.
2. Remove caliper and pads. See **DISC BRAKE CALIPERS & PADS** .
3. Remove bolts and caliper anchor plate. See **Fig. 16** .
4. Remove the brake disc retaining clips (if equipped) and the brake disc.
5. To install, reverse removal procedure. Tighten bolts and nuts. See **TORQUE SPECIFICATIONS** .



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**Fig. 16: Identifying Brake Caliper Anchor Plate**  
Courtesy of FORD MOTOR CO.

## MASTER CYLINDER & RESERVOIR

### Removal & Installation

1. Disconnect brake warning light indicator wire from indicator switch. See **Fig. 17** .
2. Using a suitable suction device, drain the brake master cylinder reservoir.
3. If equipped with manual transmission, disconnect and plug the clutch master cylinder feed.
4. Disconnect the brake lines and plug the lines and the brake master cylinder ports.

**NOTE:** Whenever the brake master cylinder is removed from the brake booster, new nuts must be installed.

5. Remove the nuts and the brake master cylinder.

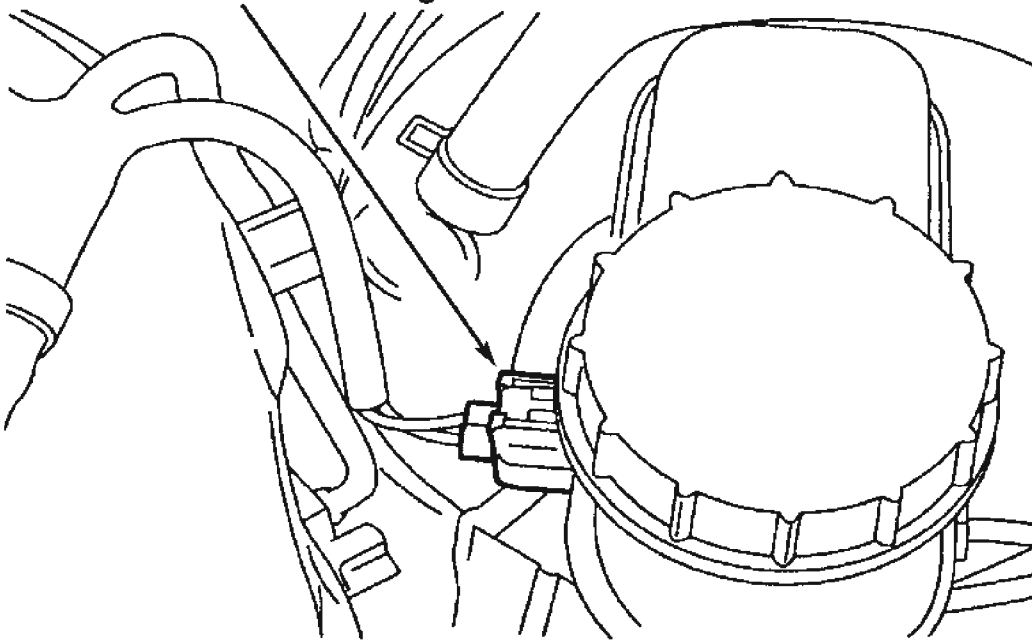
**NOTE:** Whenever installing a new brake master cylinder reservoir, install **NEW** seals. Lubricate the new seals with clean brake fluid.

6. Transfer the brake master cylinder reservoir if a new master cylinder is to be installed. Lubricate the two "O" ring seals with clean brake fluid and insert into the brake master

cylinder. See **Fig. 18** . Press the brake master cylinder reservoir into the "O" ring seals until it snaps into the brake master cylinder securely.

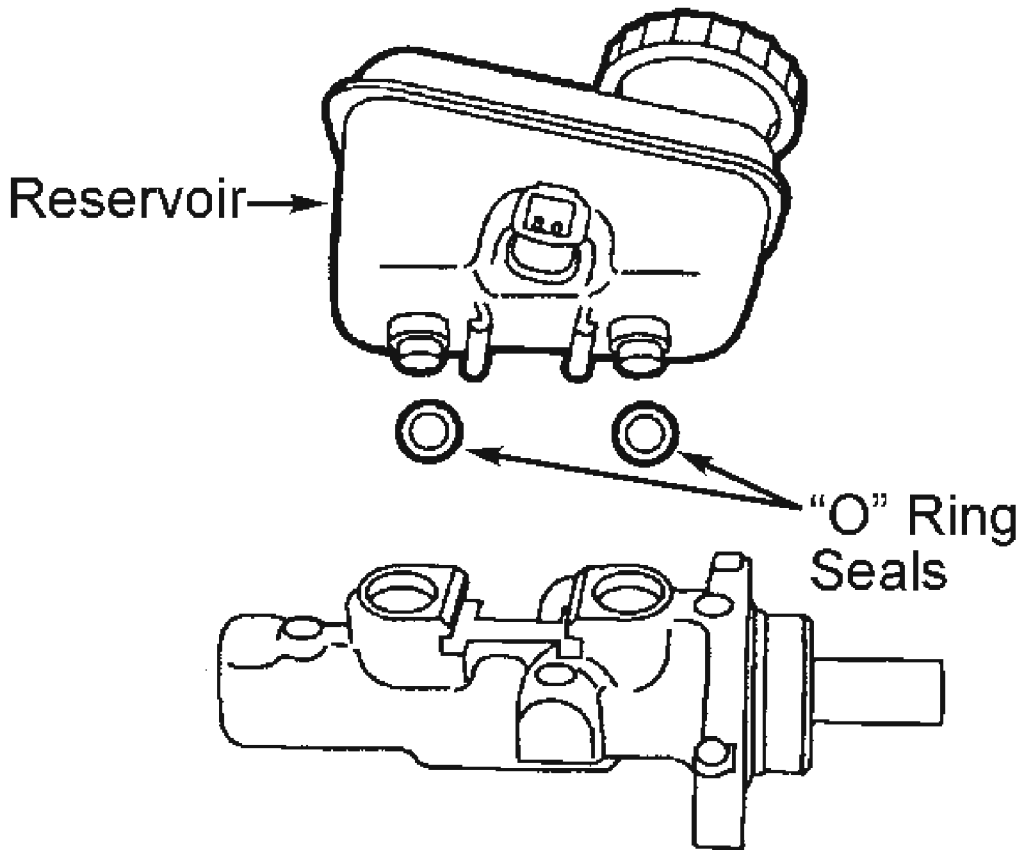
7. To install, reverse the removal procedure. Bleed the master cylinder. If equipped with manual transmission, bleed the clutch master cylinder. See BLEEDING HYDRAULIC SYSTEM in appropriate CLUTCHES article in TRANSAXLE/TRANSMISSION. Bleed brakes. See **BLEEDING BRAKE SYSTEM** .

Fluid Level Warning Switch Harness Connector



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**Fig. 17: Identifying Brake Fluid Level Warning Switch Harness Connector**  
Courtesy of FORD MOTOR CO.



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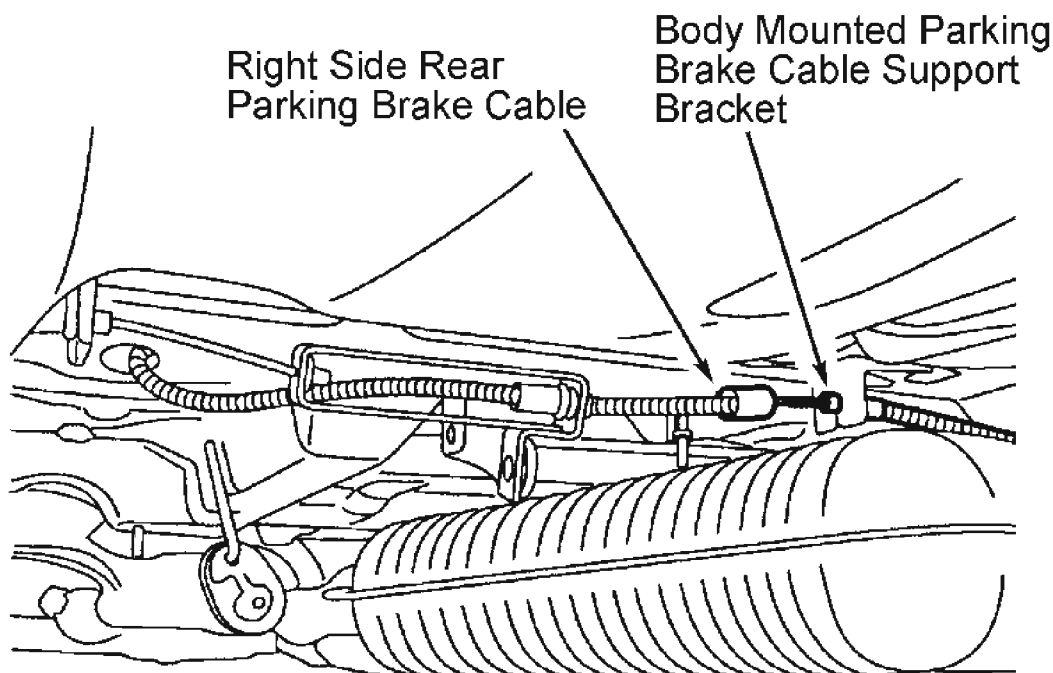
**Fig. 18: Identifying Master Cylinder "O" Ring Seals**  
Courtesy of FORD MOTOR CO.

#### **PARKING BRAKE CABLE (FRONT)**

##### **Removal & Installation**

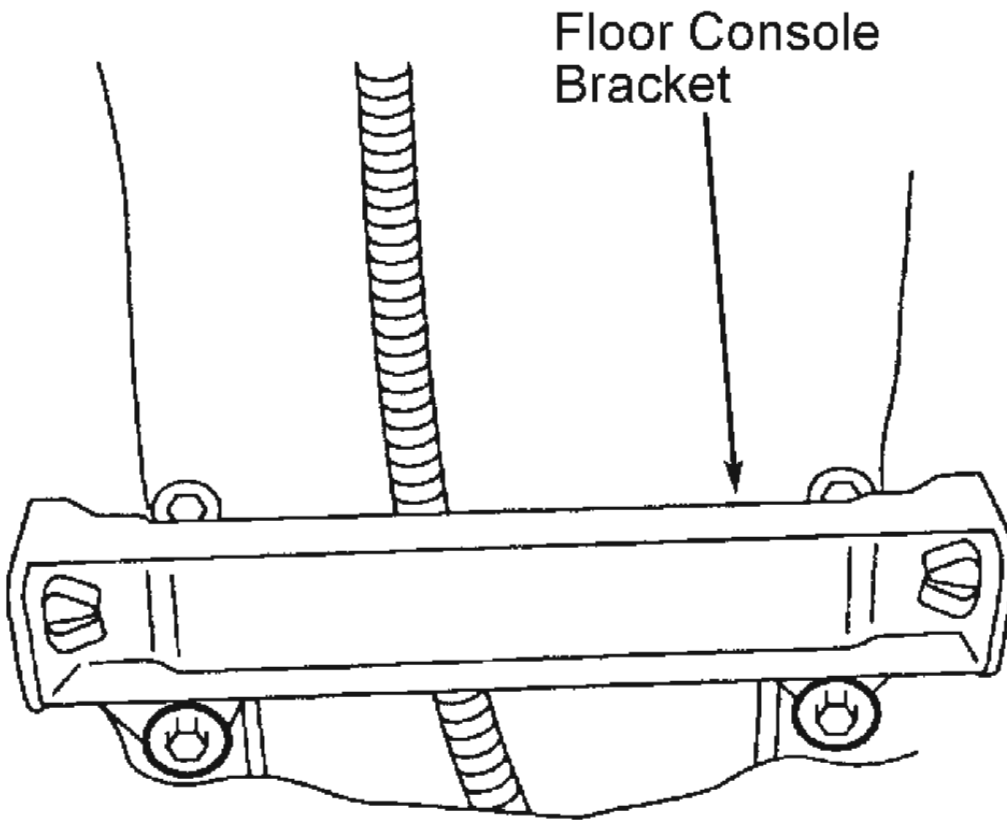
1. Remove the parking brake control. See **PARKING BRAKE CONTROL** .
2. On vehicles with floor console, remove the 2 bolts and the floor console bracket. See **Fig. 20** .
3. On vehicles without floor console, remove the left front seat. See REMOVAL & INSTALLATION in appropriate POWER SEATS article.
4. Remove the left front door scuff plate. See **Fig. 21** .
5. Remove the left lower "A" pillar trim panel.
6. Remove the left front safety belt.

7. Pull back carpet to gain access to the console bracket.
8. Remove the 2 bolts and the floor console bracket.
9. On all vehicles, raise and support vehicle.
10. Disconnect the parking brake cable from the right side rear parking brake cable. See **Fig. 19** . Disconnect the front parking brake cable from the parking brake cable equalizer.
11. To install, reverse removal procedure.



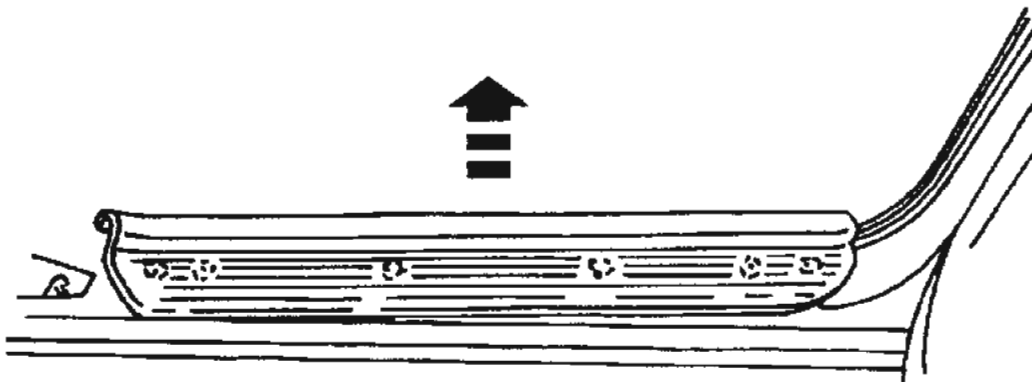
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**Fig. 19: Disconnecting Right Side Rear Parking Brake Cable**  
Courtesy of FORD MOTOR CO.



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**Fig. 20: Identifying Floor Console Bracket**  
Courtesy of FORD MOTOR CO.



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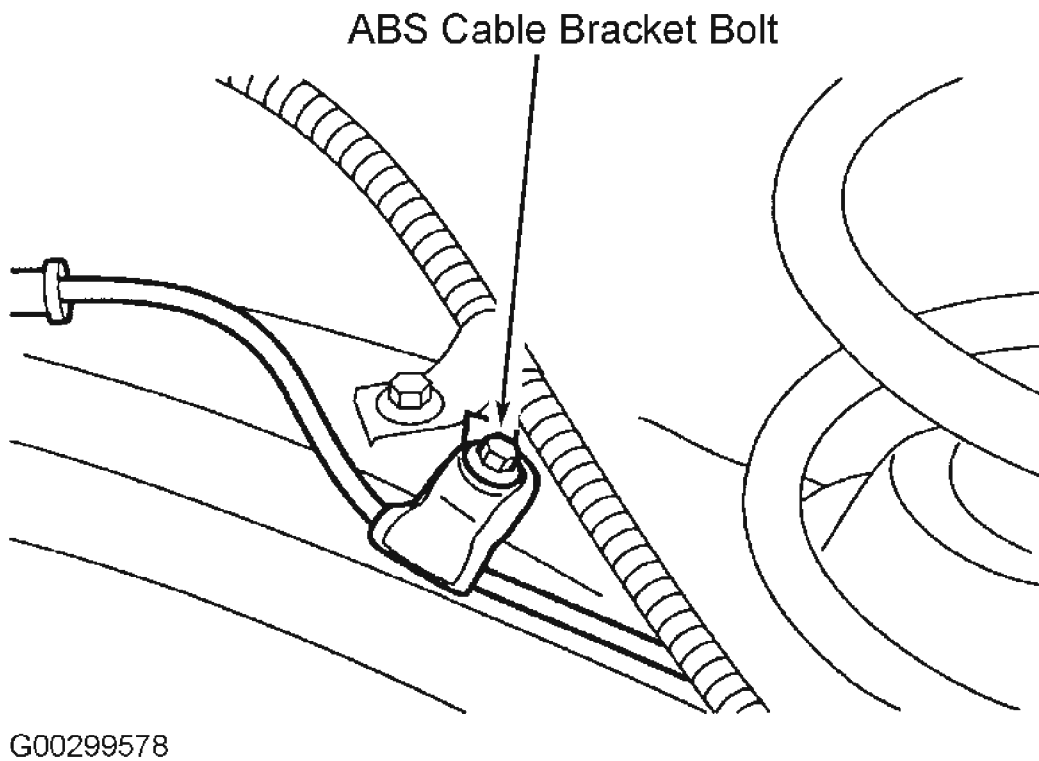


**Fig. 21: Removing Left Front Door Scuff Plate**  
**Courtesy of FORD MOTOR CO.**

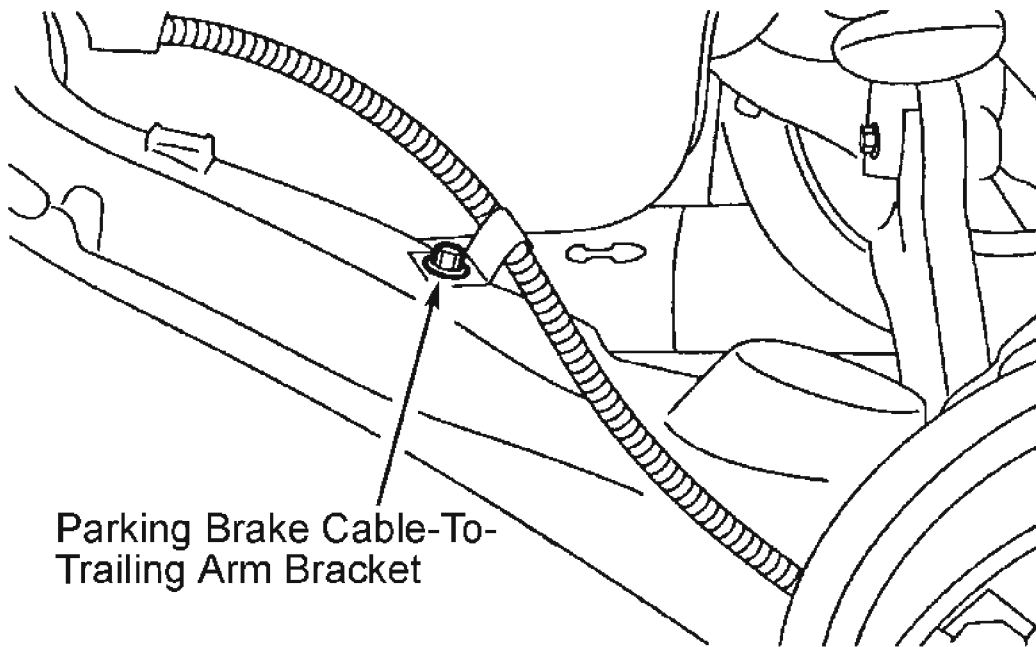
**PARKING BRAKE CABLE (REAR)**

**Removal & Installation**

1. Remove the rear drum brake shoes. See **BRAKE SHOES** .
2. Remove the ABS cable bracket bolt (if equipped). See **Fig. 22** .
3. Remove the rear parking brake cable to trailing arm bracket bolts. See **Fig. 23** .
4. Disconnect the rear parking brake cable from the backing plates. See **Fig. 7** .
5. Remove the rear parking brake cable bracket bolts. See **Fig. 24** .
6. Disconnect the right side rear parking brake cable from the front parking brake cable. Disconnect the right side rear parking brake cable from the body-mounted parking brake cable support bracket. See **Fig. 19** .
7. Disconnect the left rear parking brake cable to fuel tank support strap. See **Fig. 25** .
8. Disconnect the front parking brake cable.
9. Remove the two bolts. Disconnect the left rear parking brake cable from the body-mounted parking brake cable support bracket. See **Fig. 26** .
10. To install, reverse the removal procedure.



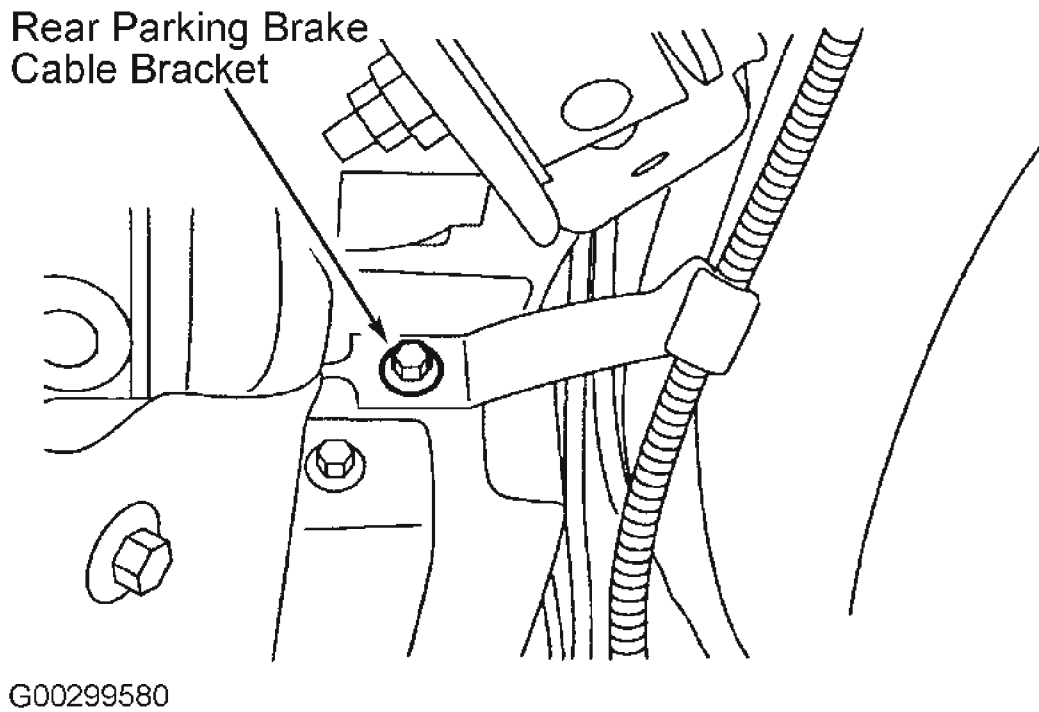
**Fig. 22: Identifying ABS Cable Bracket Bolt**  
Courtesy of FORD MOTOR CO.



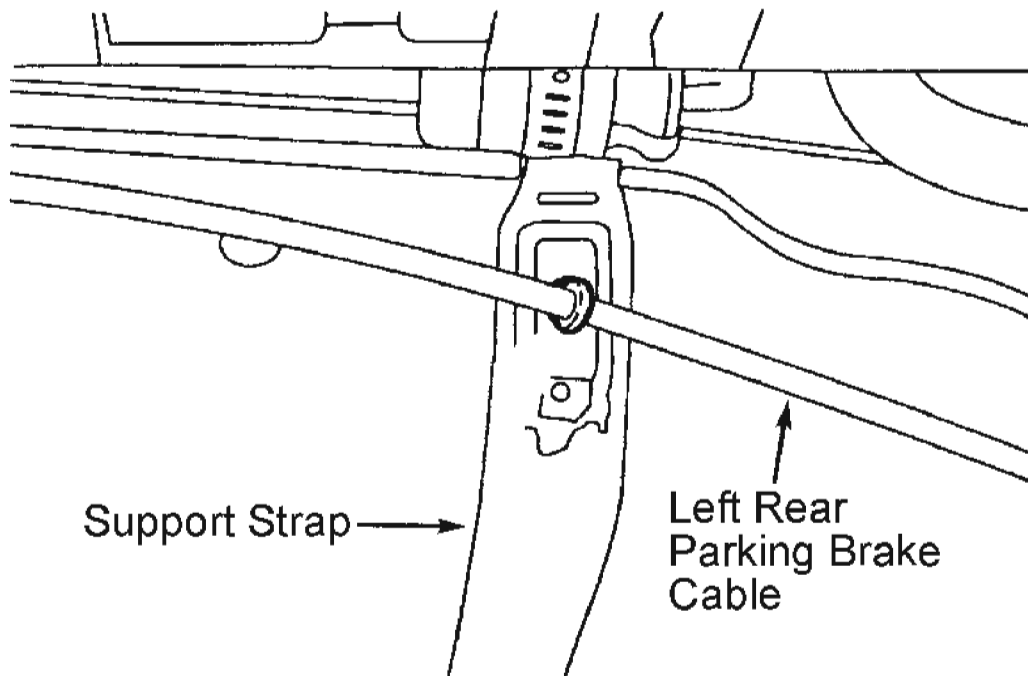
Parking Brake Cable-To-Trailing Arm Bracket

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**Fig. 23: Identifying Parking Brake Cable-To-Trailing Arm**  
Courtesy of FORD MOTOR CO.

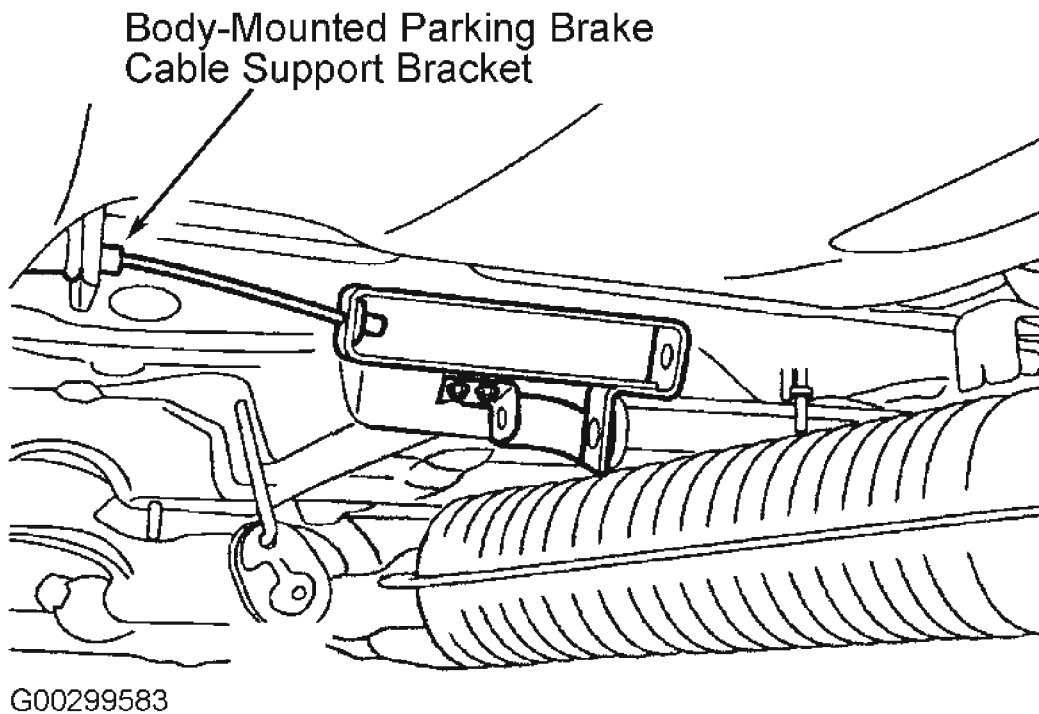


**Fig. 24: Identifying Rear Parking Brake Cable Bracket**  
Courtesy of FORD MOTOR CO.



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**Fig. 25: Identifying Left Rear Parking Brake Cable-To-Fuel Tank Support Strap**  
Courtesy of FORD MOTOR CO.



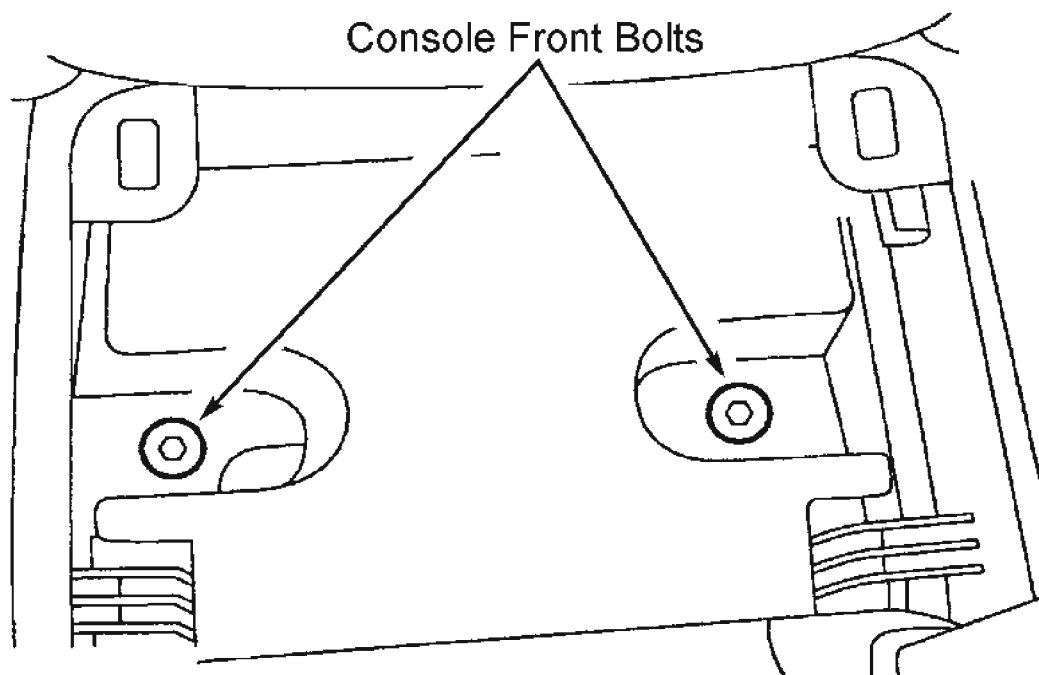
**Fig. 26: Identifying Body-Mounted Parking Brake Cable Support Bracket**  
Courtesy of FORD MOTOR CO.

## PARKING BRAKE CONTROL

### Removal & Installation

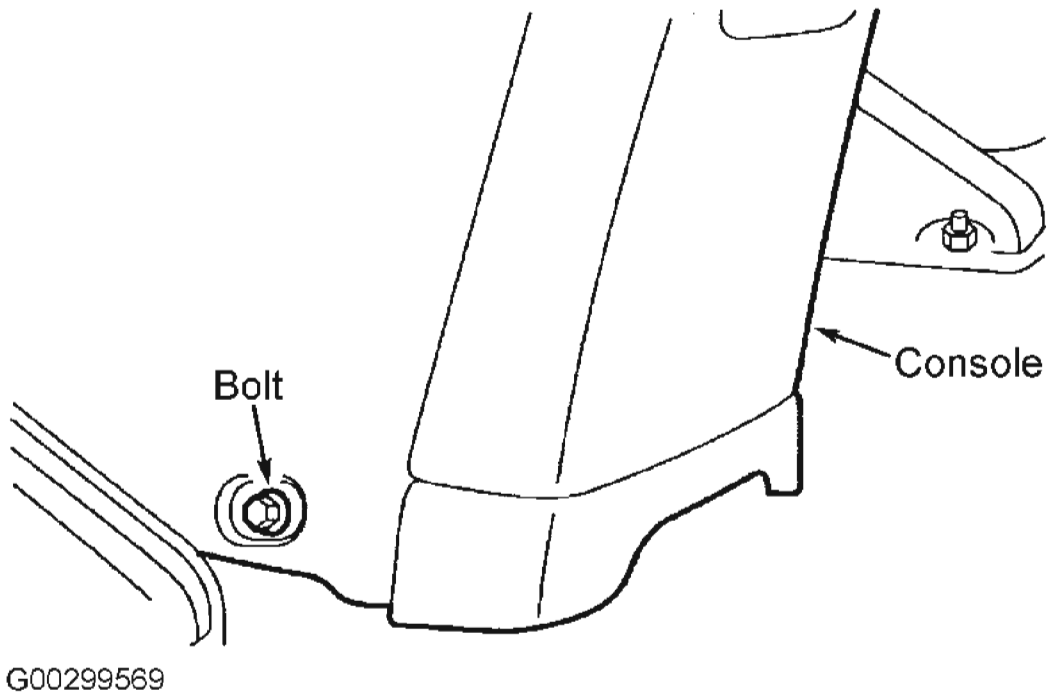
1. If equipped with the high series floor console, apply the parking brake. Remove the floor console finish panel.
2. Remove the floor console front bolts. See **Fig. 27** .
3. Remove the two rear bolts. See **Fig. 28** . Remove the floor console.
4. If equipped with the low series floor console, remove the manual transmission shifter knob by turning counterclockwise (if equipped). Remove the floor console front finish panel.
5. Apply the parking brake. Remove the floor console rear finish panel.
6. Remove the floor console front bolts. See **Fig. 29** .
7. Remove the rear two bolts and the floor console. See **Fig. 30** .
8. Release the parking brake control.
9. Disconnect the parking brake warning indicator switch harness connector. See **Fig. 31** .
10. Remove the parking brake adjusting nut. See **Fig. 5** .
11. Remove the bolts. Remove the parking brake cable.

12. To install, reverse the removal procedure. Adjust the parking brake cable. See **PARKING BRAKE CABLE** under ADJUSTMENTS.



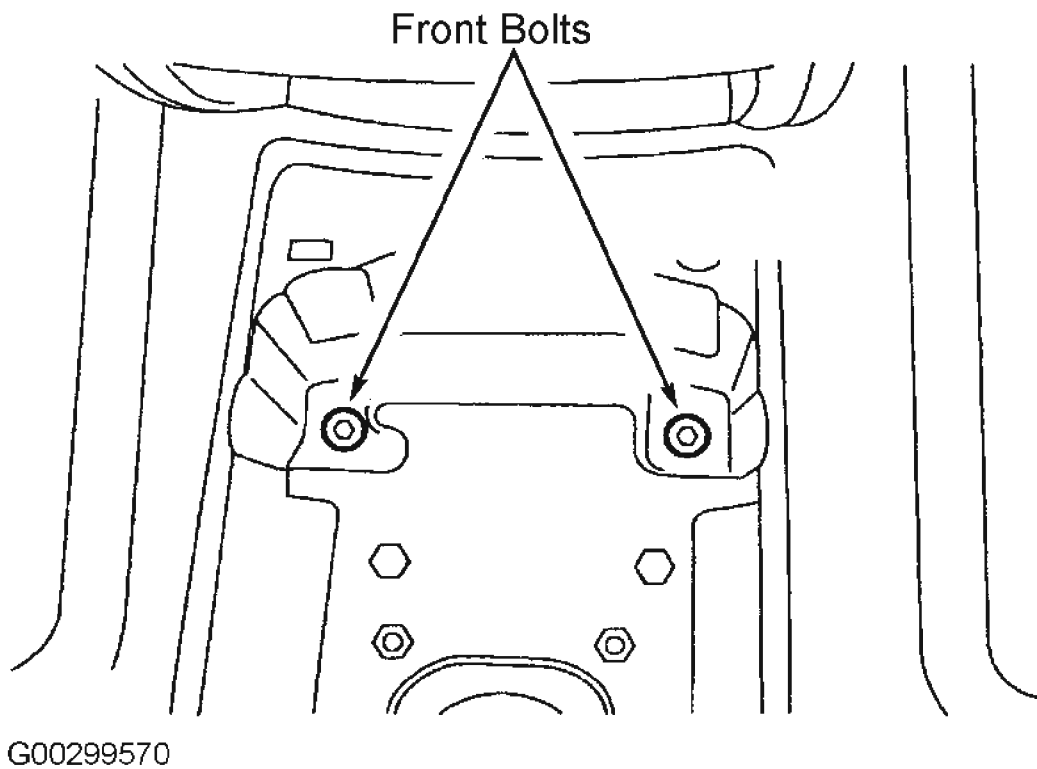
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**Fig. 27: Identifying Console Front Bolts (High Series)**  
Courtesy of FORD MOTOR CO.

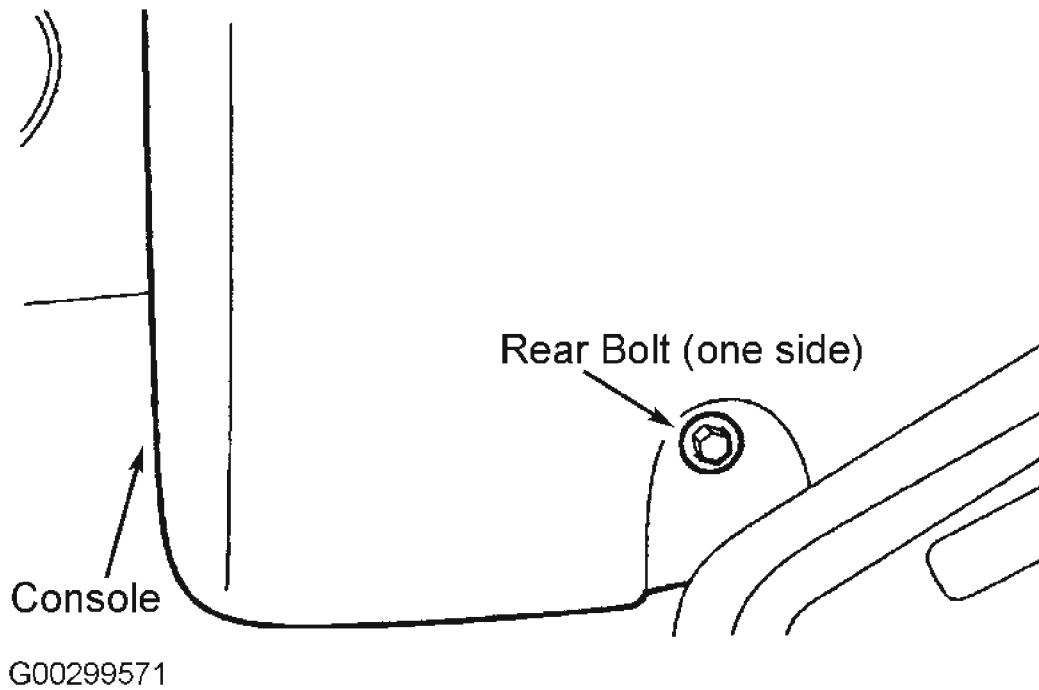


**Fig. 28: Identifying Console Rear Bolts (High Series)**  
Courtesy of FORD MOTOR CO.



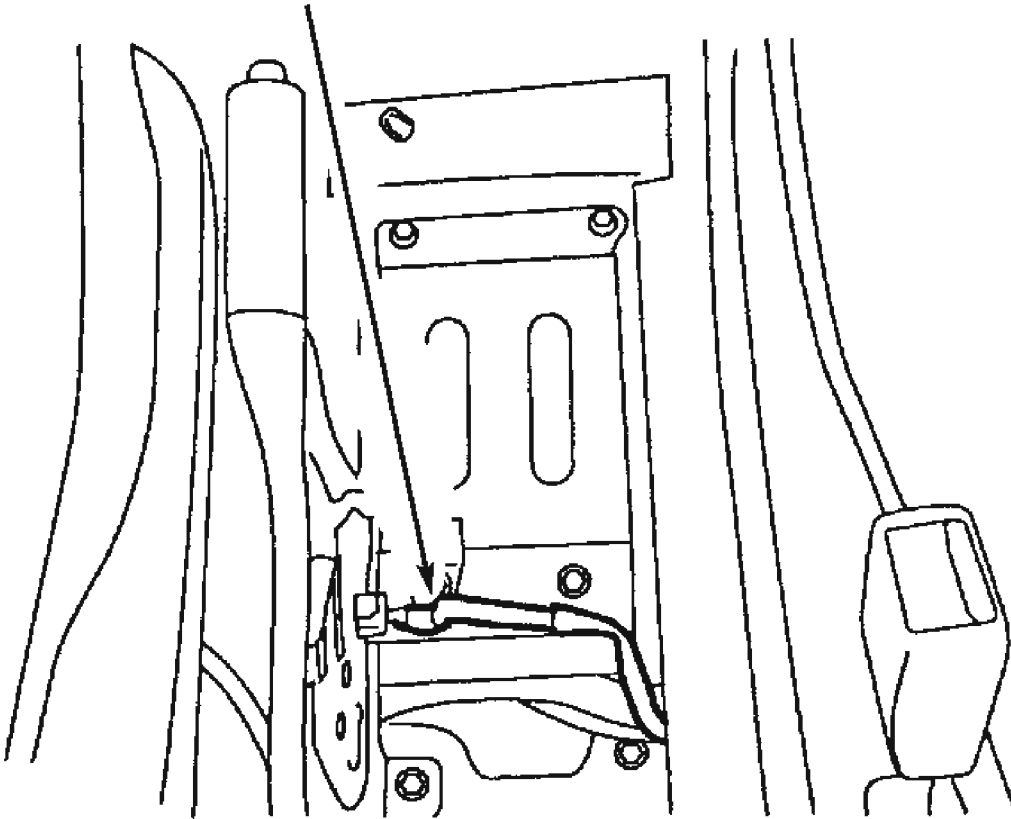


**Fig. 29: Identifying Floor Console Front Bolts (Low Series)**  
Courtesy of FORD MOTOR CO.



**Fig. 30: Identifying Floor Console Rear Bolts (Low Series)**  
Courtesy of FORD MOTOR CO.

### Parking Brake Warning Indicator Harness Connector



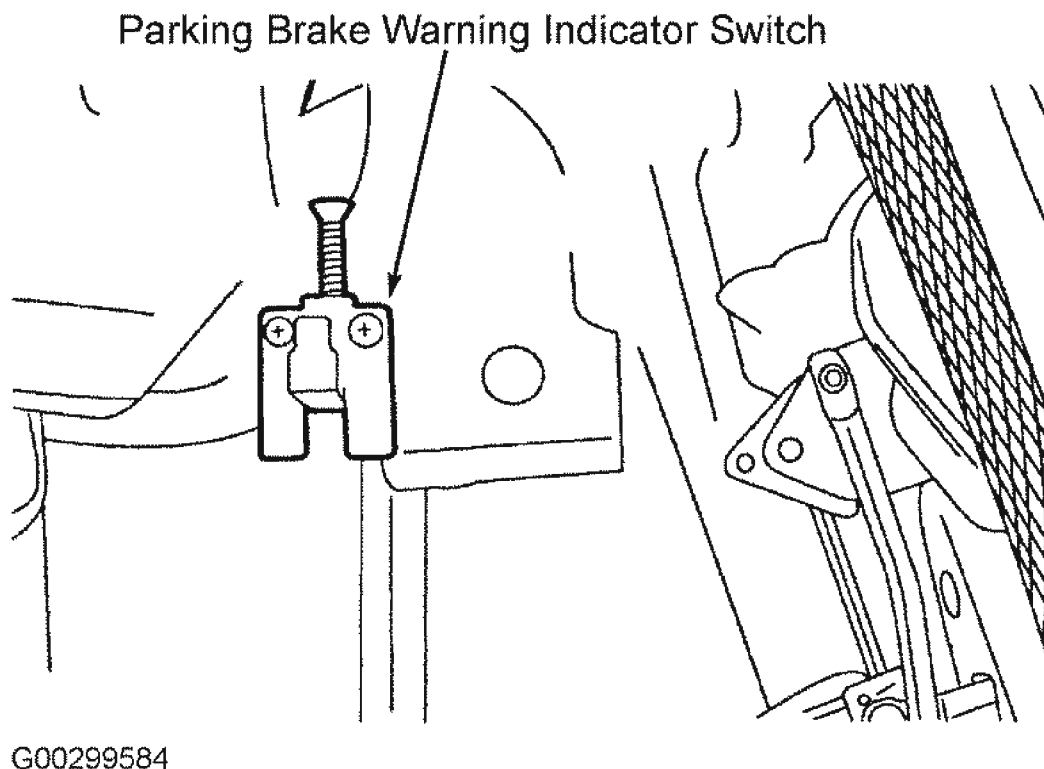
G00299572

**Fig. 31: Identifying Parking Brake Warning Indicator**  
Courtesy of FORD MOTOR CO.

### PARKING BRAKE WARNING INDICATOR SWITCH

#### Removal & Installation

1. Remove the parking brake control. See **PARKING BRAKE CONTROL** .
2. Remove the screws. Remove the parking brake warning indicator switch. See **Fig. 32** .
3. To install, reverse the removal procedure.



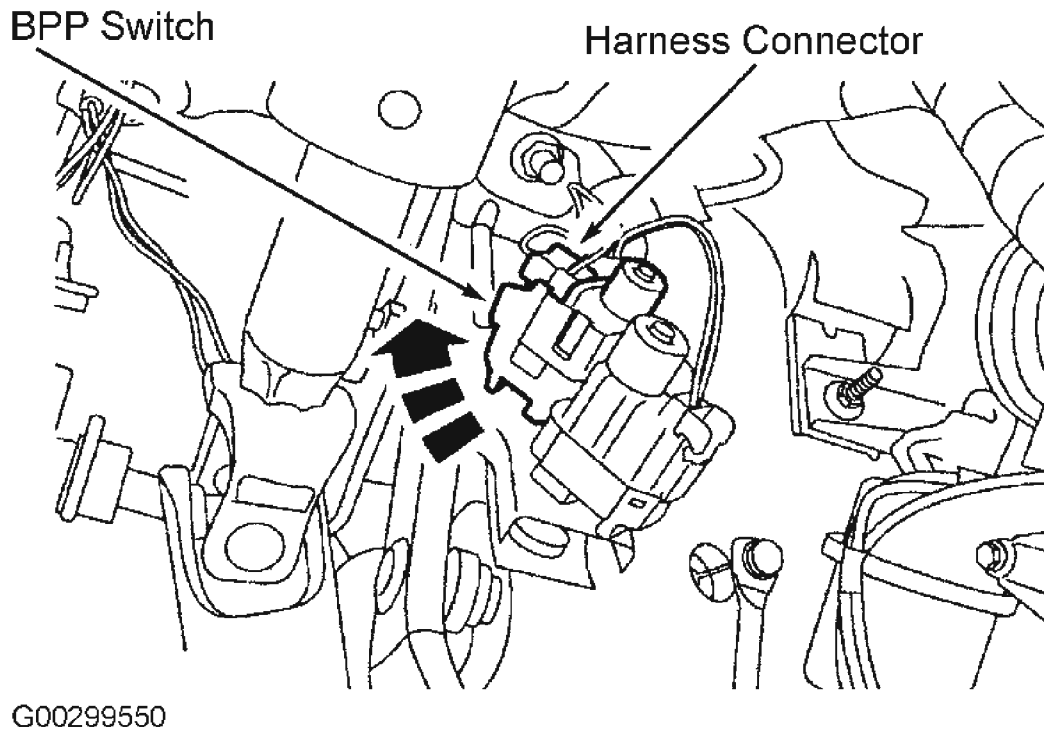
**Fig. 32: Identifying Parking Brake Warning Indicator Switch**  
Courtesy of FORD MOTOR CO.

## POWER BRAKE BOOSTER

### Removal & Installation

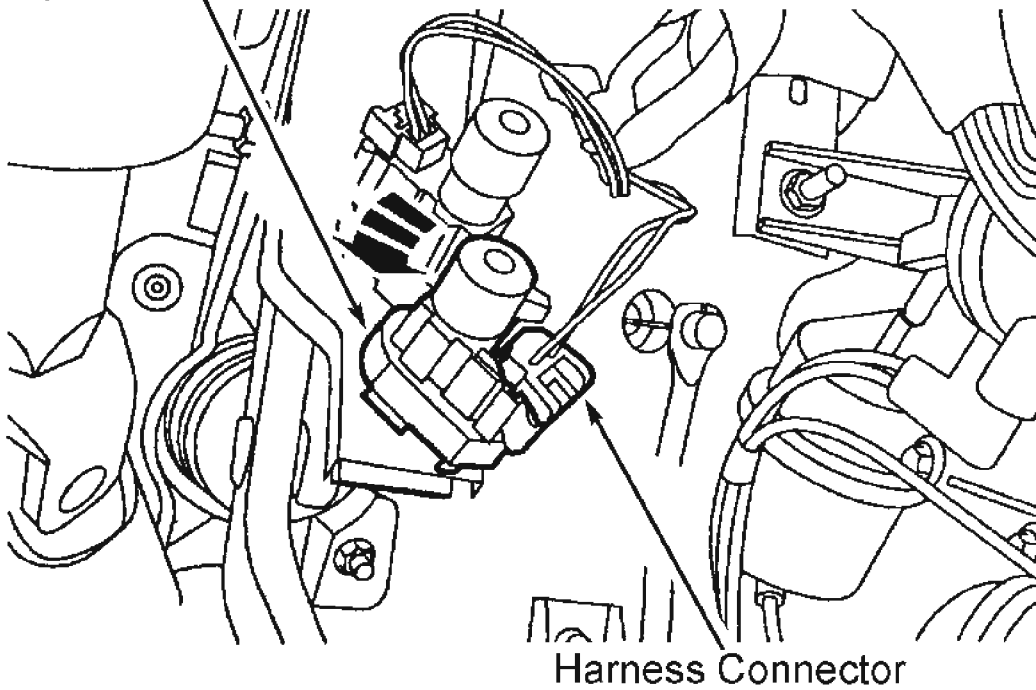
1. Disconnect the Brake Pedal Position (BPP) switch harness connector. Rotate clockwise and remove the BPP switch. See **Fig. 33** .
2. Disconnect the speed control deactivator switch harness connector (if equipped). Rotate counterclockwise 45 degrees and remove the deactivator switch. See **Fig. 34** .
3. Remove the brake pedal push rod cotter pin and washer. See **Fig. 35** .
4. Remove the power brake booster pushrod bracket nuts. See **Fig. 36** .
5. Disconnect the brake pedal pushrod. See **Fig. 35** .
6. On vehicles with 3.0L (4V) engines, disconnect the evaporative emission canister purge valve and position it aside. Disconnect the cable locator. Remove the nuts. Position the evaporative emission canister purge valve aside. See **Fig. 37** .
7. On all vehicles, disconnect the master cylinder mounting nuts. Remove and position the master cylinder aside.
8. Disconnect the vacuum hose. See **Fig. 38** . Remove the brake booster.

9. To install, reverse the removal procedure.



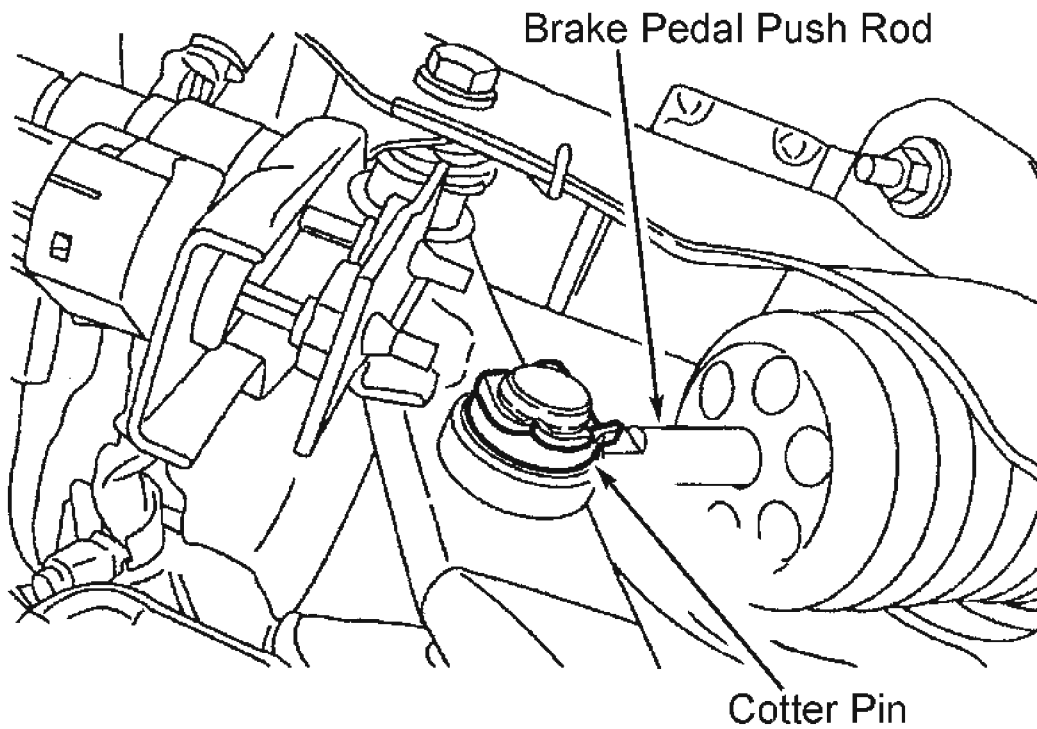
**Fig. 33: Removing Brake Pedal Position Switch**  
Courtesy of FORD MOTOR CO.

### Speed Control Deactivator Switch



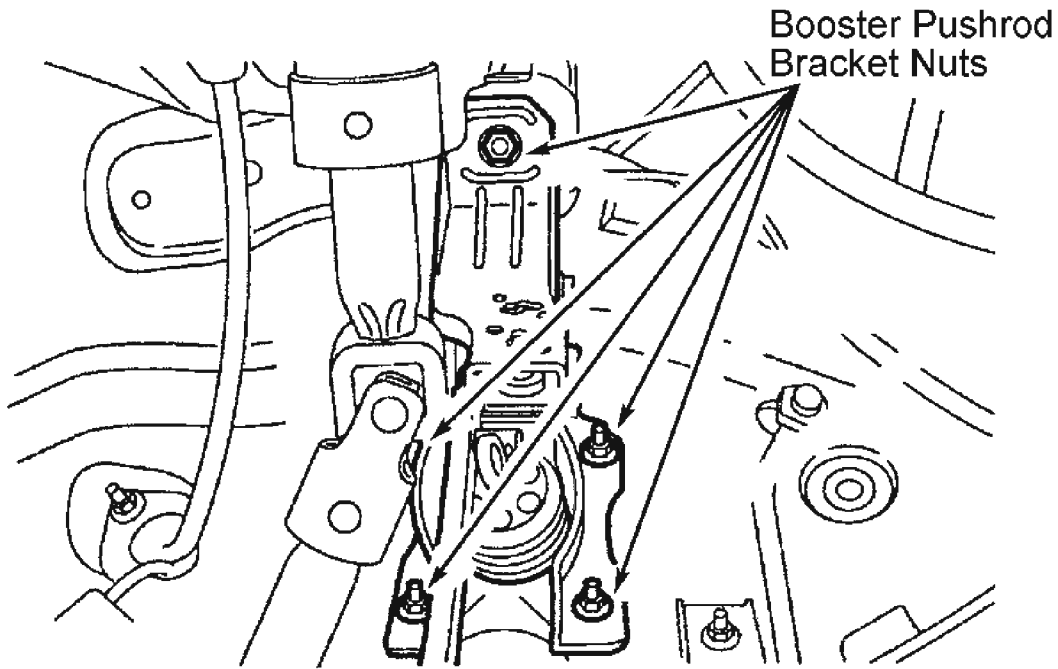
G00299551

**Fig. 34: Removing Speed Control Deactivator Switch**  
Courtesy of FORD MOTOR CO.



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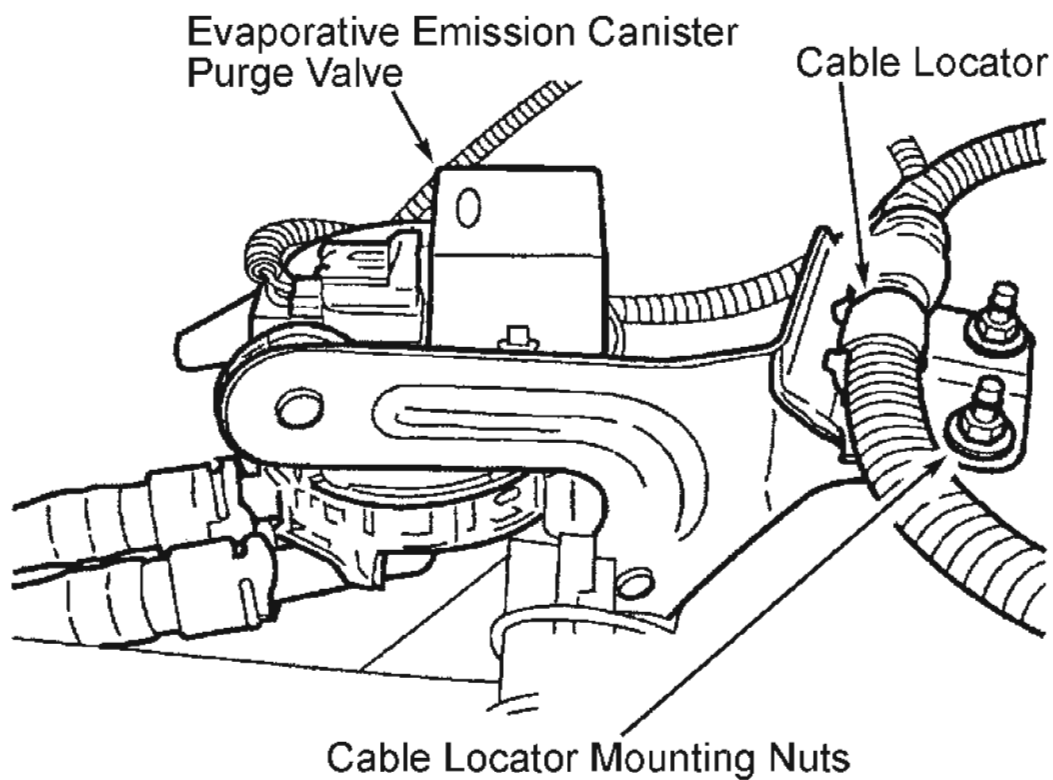
**Fig. 35: Identifying Brake Pedal Pushrod Cotter Pin & Washer**  
Courtesy of FORD MOTOR CO.



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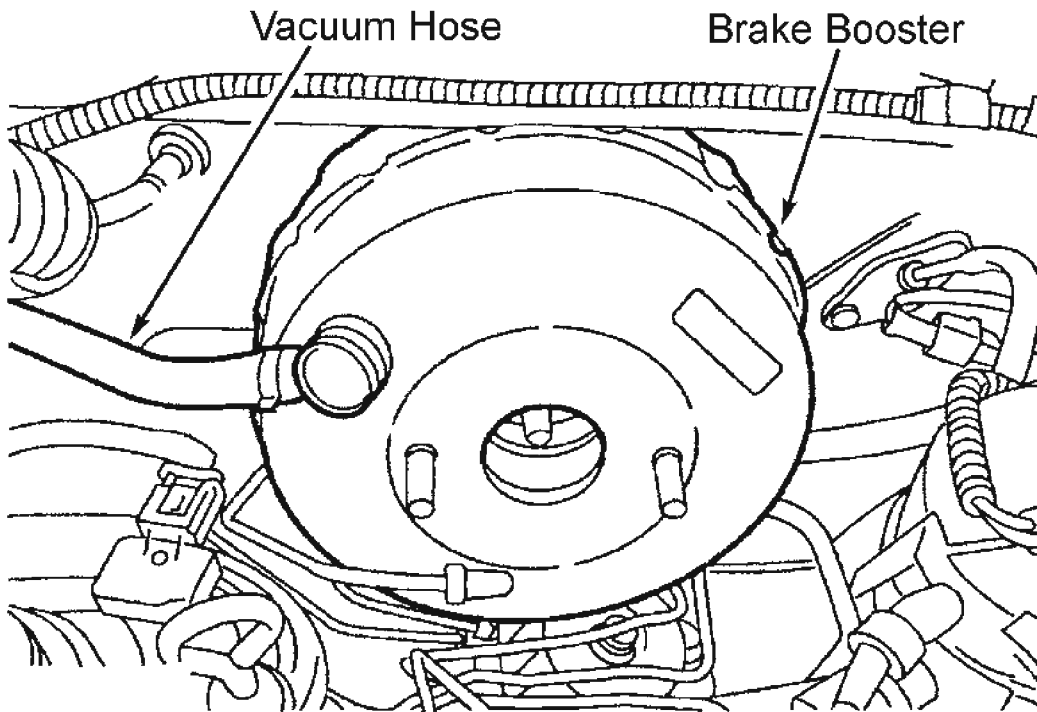
**Fig. 36: Identifying Power Brake Booster Pushrod Bracket Nuts**  
Courtesy of FORD MOTOR CO.





G00299554

**Fig. 37: Identifying Evaporative Emission Canister Purge Valve**  
Courtesy of FORD MOTOR CO.



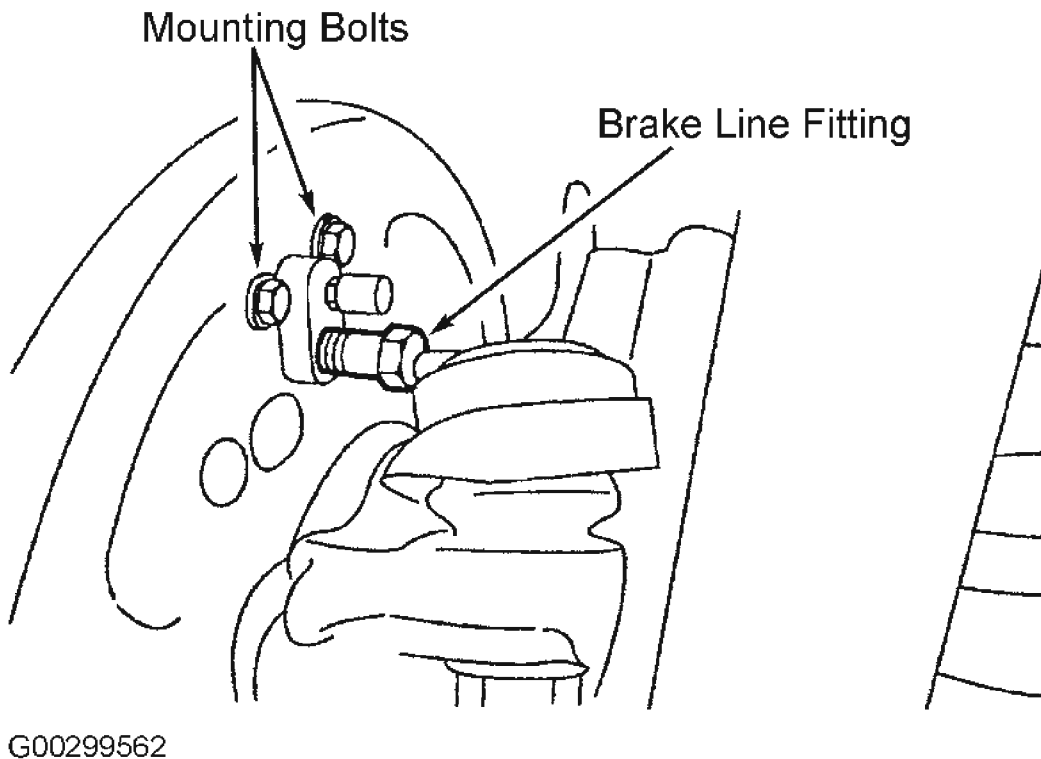
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**Fig. 38: Identifying Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

## WHEEL CYLINDERS

### Removal & Installation

1. Remove the rear brake drum. See **BRAKE DRUM** .
2. Remove brake shoes. See **BRAKE SHOES** .
3. Disconnect the brake line fitting from the wheel cylinder. See **Fig. 39** .
4. Remove the mounting bolts. Remove the wheel cylinder. See **Fig. 39** .
5. To install, reverse removal procedure. Adjust brakes, and bleed hydraulic system. See **BLEEDING BRAKE SYSTEM** .



**Fig. 39: Identifying Wheel Cylinder Mounting Bolts & Brake Line Fitting**  
Courtesy of FORD MOTOR CO.

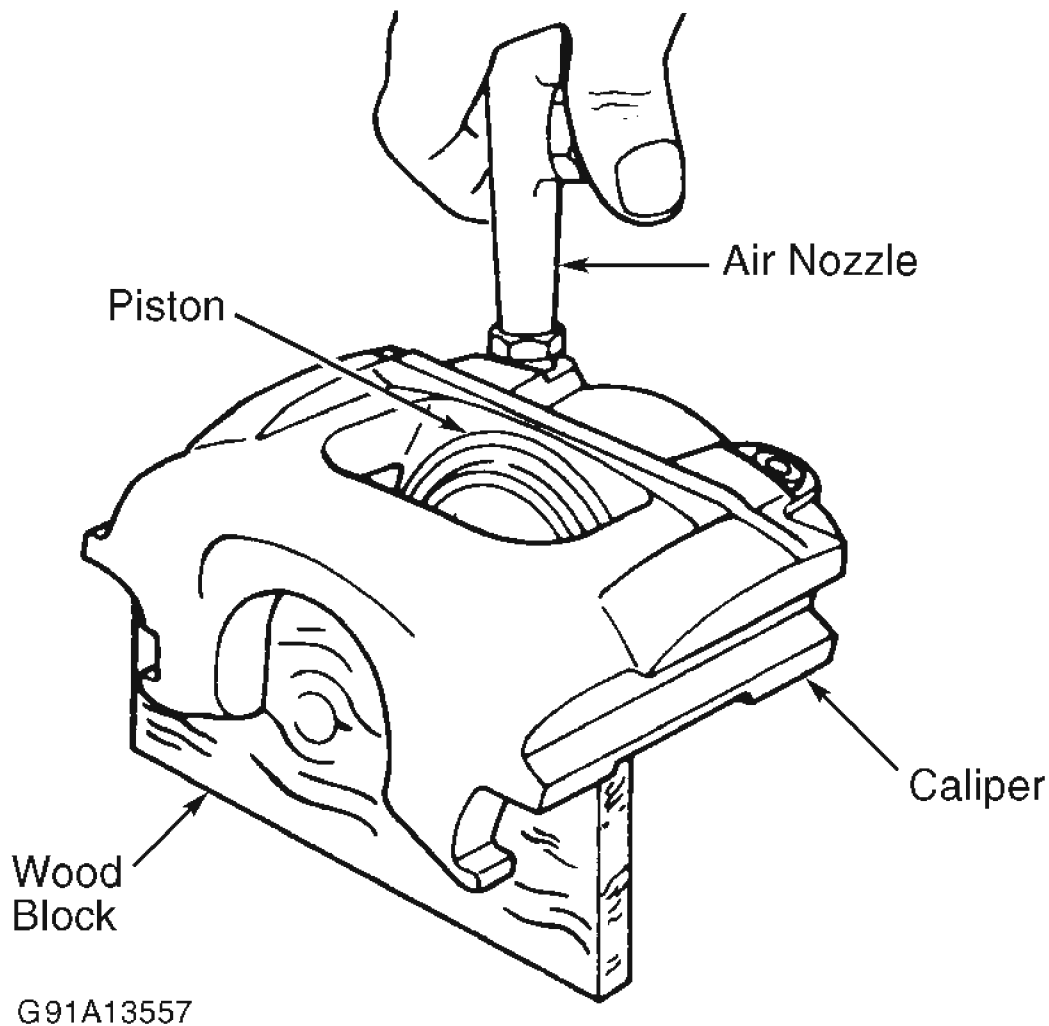
## OVERHAUL

### DISC BRAKE CALIPER

#### Disassembly

**WARNING:** DO NOT place fingers between wood and piston as piston leaves caliper.

1. Remove caliper. See **DISC BRAKE CALIPERS & PADS** under REMOVAL & INSTALLATION.
2. Drain fluid from caliper. Secure caliper in a vise. Place a block of wood between caliper and piston. See **Fig. 40**.
3. Apply low air pressure to brake hose inlet. Air pressure forces piston outward.
4. If piston is jammed or seized and does not come out easily, use a brass hammer to lightly tap caliper while applying air pressure. Do not pry piston from bore. After piston comes out, remove dust boot and seal using a plastic or wooden pick. Discard seals and boots.



**Fig. 40: Removing Caliper Piston**  
Courtesy of FORD MOTOR CO.

**Cleaning & Inspection**

**CAUTION:** DO NOT use denatured alcohol to clean rubber components or assemblies that have rubber components. Cleaning rubber components with denatured alcohol weakens the rubber and may result in failure of the component.

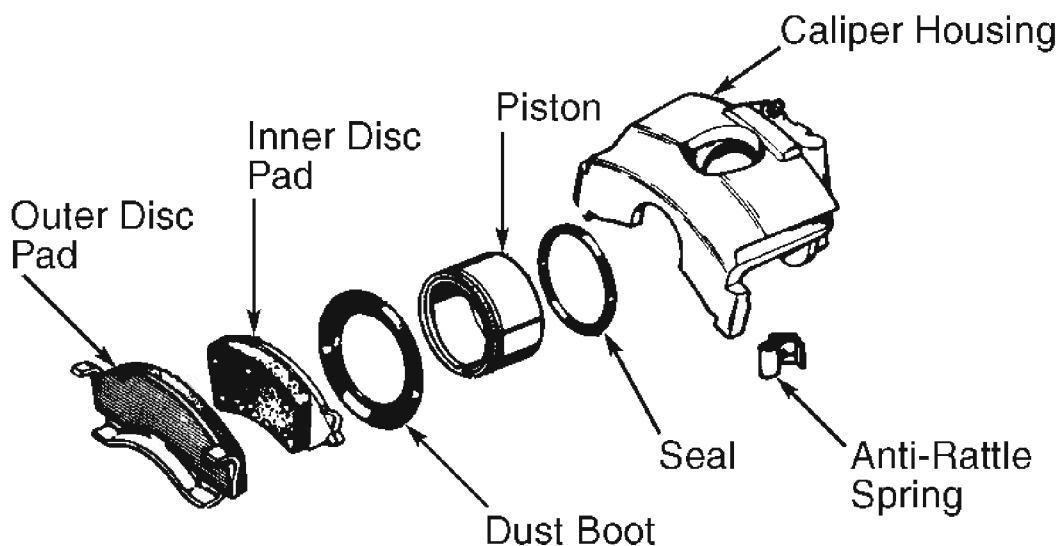
**CAUTION:** Never allow any petroleum product or mineral oil to contact the inside of a brake hydraulic system. Mineral oil and petroleum products deteriorate the natural rubber seals used in brake hydraulic system. If a brake system becomes contaminated, it must be flushed with clean brake fluid and

**all rubber seals and flex hoses replaced. Use High Performance DOT 3 Motor Vehicle Brake Fluid (C6AZ-19542-AB) or equivalent meeting Ford specification ESA-M6C25-A, DOT 3.**

1. Clean all brake caliper components. All parts must be air-dried completely. Coat all internal parts and piston seal with high performance DOT 3 motor vehicle brake fluid.
2. Inspect caliper bore, seal grooves and boot grooves for wear or damage. If bores are scored, corroded or worn, replace caliper. Replace anti-rattle clip, caliper support spring and key.

#### Reassembly

1. Apply clean brake fluid to NEW piston seal, and install in caliper bore groove. Ensure the seal is not twisted and is firmly seated in the caliper bore. Apply clean brake fluid to caliper bore. Coat piston and outside beads of dust boot with clean brake fluid.
2. Push piston through boot until boot is around bottom (closed end) of piston. See **Fig. 41**. Position piston and boot directly over caliper bore. Spread dust boot over piston as it is installed.
3. With bead seated in groove, carefully press straight down on piston until it bottoms in caliper bore. Do not cock or jam piston in caliper bore. If necessary, use a "C" clamp and a block of wood to bottom piston in caliper bore.

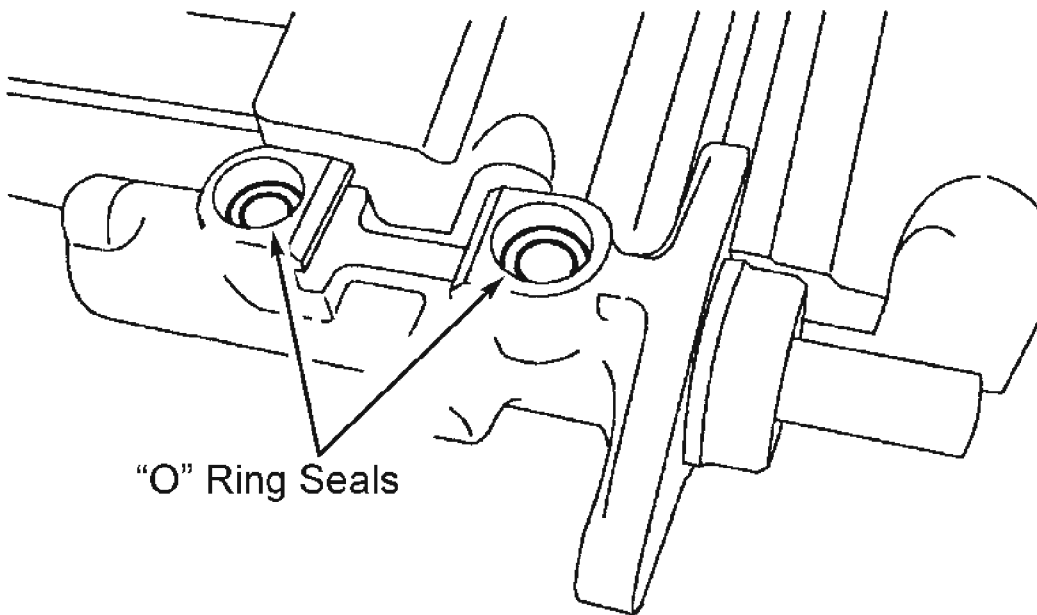


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**Fig. 41: Exploded View Of Single Piston Caliper**  
 Courtesy of FORD MOTOR CO.

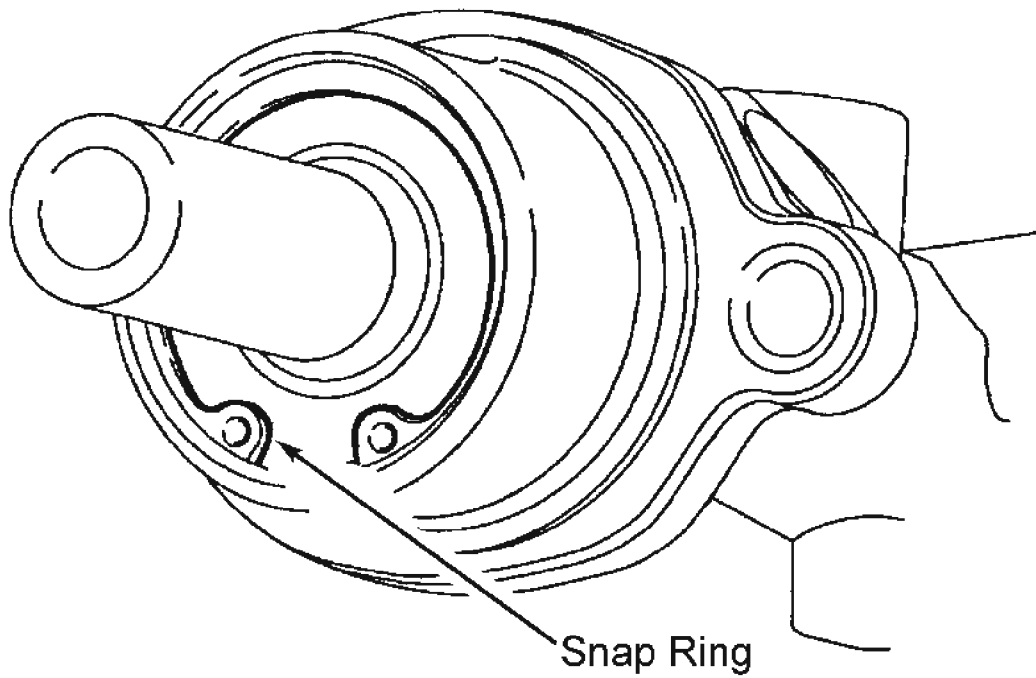
**MASTER CYLINDER****Disassembly**

1. Remove master cylinder. See **MASTER CYLINDER & RESERVOIR** under REMOVAL & INSTALLATION.
2. Clean outside of master cylinder.
3. Remove the brake master cylinder reservoir.
4. Remove the seals. See **Fig. 42** .
5. Remove the snap ring. See **Fig. 43** .
6. Remove the primary and secondary piston. See **Fig. 44** and **Fig. 45** .
7. Use isopropyl alcohol to clean and inspect the brake master cylinder bore for damage.



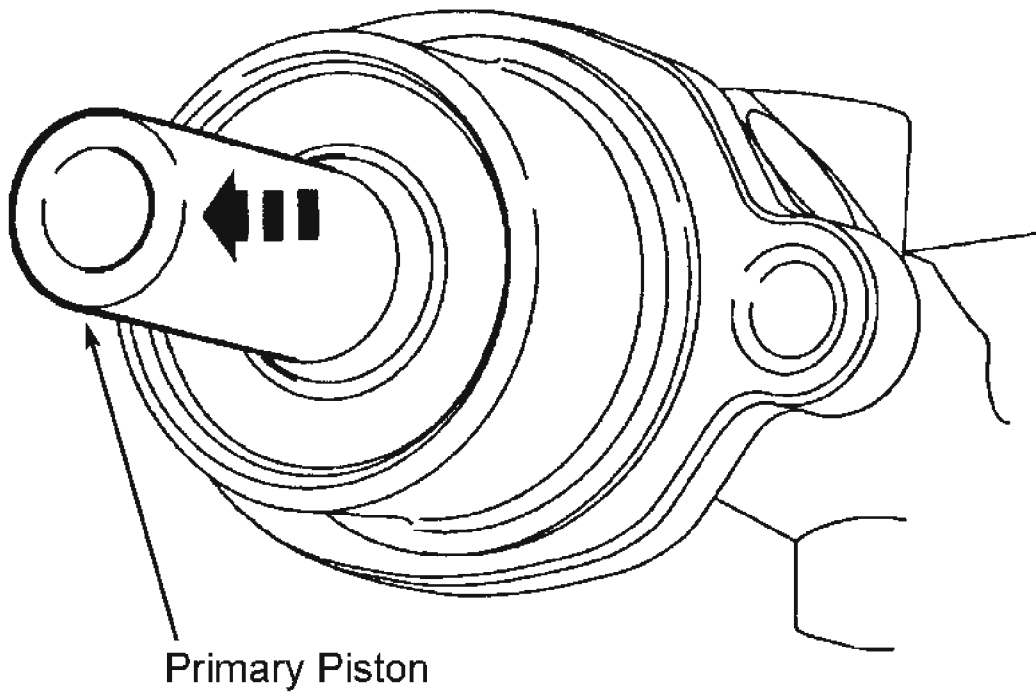
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**Fig. 42: Identifying Master Cylinder Reservoir "O" Rings**  
Courtesy of FORD MOTOR CO.



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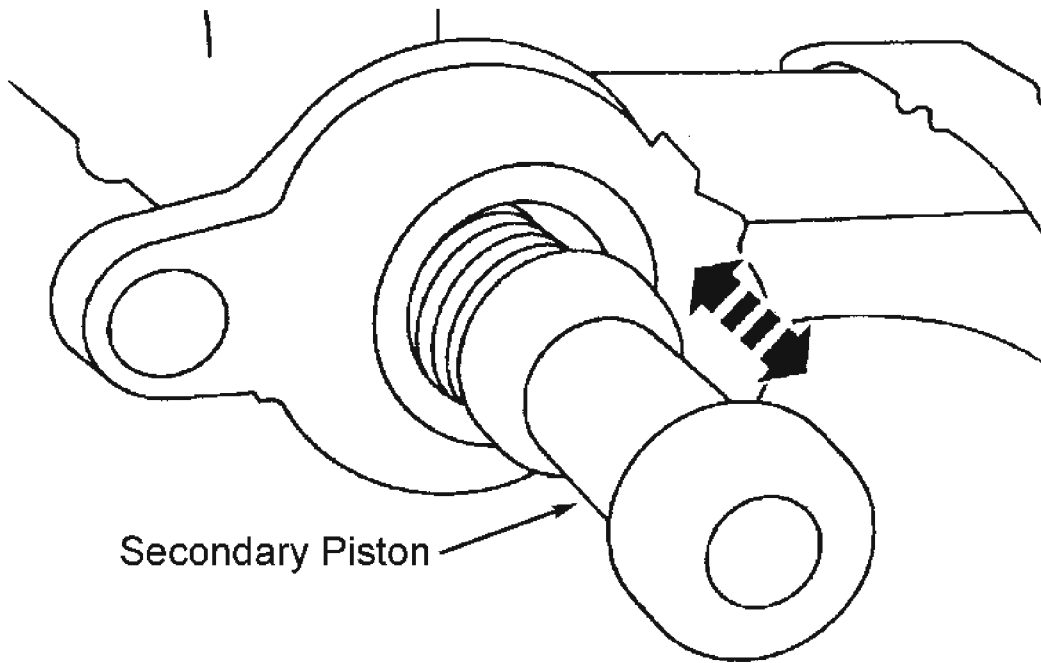
**Fig. 43: Identifying Master Cylinder Snap Ring**  
Courtesy of FORD MOTOR CO.



G00299587

**Fig. 44: Removing Primary Piston**  
Courtesy of FORD MOTOR CO.





G00299588

**Fig. 45: Removing/Installing Secondary Piston**  
Courtesy of FORD MOTOR CO.

#### Inspection

**NOTE:** Manufacturer does not recommend honing cylinder bore.

Clean all parts with isopropyl alcohol and blow dry with compressed air. Ensure all ports and vents are open and free of foreign matter. Inspect master cylinder bore and all parts for excessive wear or damage. If bore is damaged, replace master cylinder.

#### Reassembly

1. Use clean brake fluid to lubricate the new piston assembly seals and the brake master cylinder bore.
2. Install the secondary piston assembly.
3. Install the primary piston assembly.
4. Install the snap ring.
5. Lubricate the seals with clean brake fluid and insert the seals into the brake master cylinder. Install the seals.
6. Press the brake master cylinder reservoir into the "O" ring seals until it snaps in

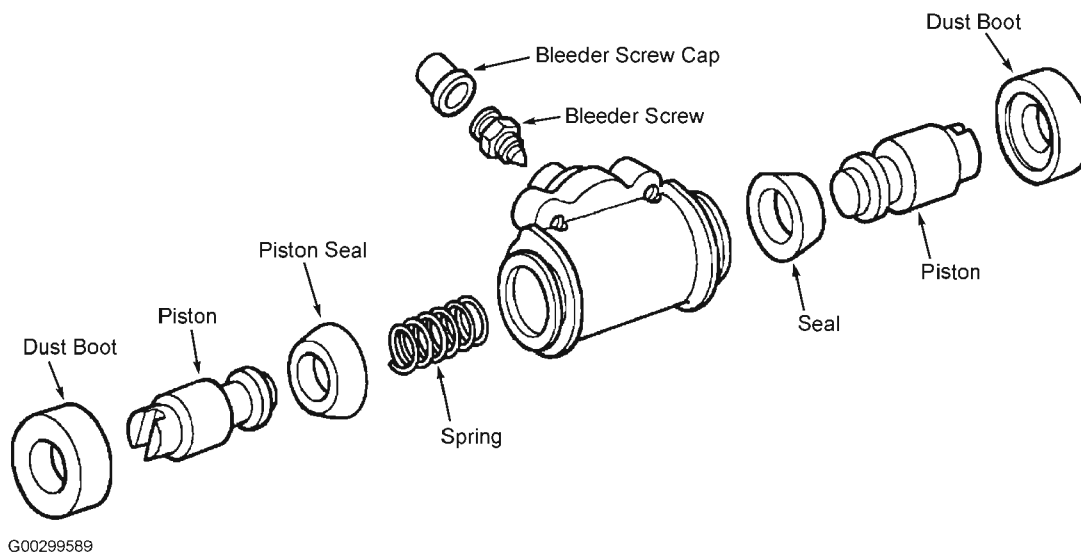
securely.

7. Install master cylinder. Bleed brake system as necessary. See **BLEEDING BRAKE SYSTEM**.

## WHEEL CYLINDERS

### Disassembly

With wheel cylinder removed from vehicle, remove rubber boots from ends of cylinders. Remove pistons, piston cups and return spring from cylinder. Remove bleeder screw. Inspect cylinder bore for damage. See **Fig. 46**.



**Fig. 46: Exploded View Of Wheel Cylinder**  
Courtesy of FORD MOTOR CO.

### Reassembly

Inspect the rear wheel cylinder bore for wear, rust or pits. If any of these conditions exist, install a new wheel cylinder. Coat all parts with clean brake fluid. To assemble, reverse disassembly procedure. Clamp brake cylinder pistons against ends of cylinder.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Brake Pedal Bracket Nuts	17 (23)
Brake Line Fitting-To-Pressure Control Valve Fittings	10 (14)
Brake Line Master Cylinder Fittings	11 (15)
Brake Line-To-Caliper Fitting	15 (20)

**2002 Ford Escape****2002-04 BRAKES Disc & Drum - Escape**

Brake Line-To-Rear Wheel Cylinder Fitting	10 (14)
Caliper Anchor Plate Bolts	111 (150)
Caliper Bleeder Screws	12 (16)
Caliper Bolts	26 (35)
Master Cylinder Nuts	18 (24)
Parking Brake Cable Bracket Bolt	17 (23)
Parking Brake Control Bolts	18 (24)
Power Brake Booster Pushrod Bracket Nuts	17 (23)
Rear Brake Backing Plate Bolts	49 (66)
Rear Parking Brake Cable Bracket Bolts	17 (23)
Rear Parking Brake Cable-To-Knuckle Bracket Bolts	17 (23)
Wheel Lug Nut	98 (133)
<b>INCH Lbs. (N.m)</b>	
Brake Pressure Control Valve Bolts	80 (9)
Floor Console Bracket Bolts	53 (6)
Parking Brake Cable Equalizer Bracket Bolts	80 (9)
Pressure Control Valve Bolts	80 (9)
Purge Valve Bracket Nuts	89 (10)
Wheel Cylinder Bleeder Screws	71 (8)
Wheel Cylinder Bolts	108 (12)

**DISC & DRUM BRAKE SPECIFICATIONS****BRAKE SPECIFICATIONS**

<b>Application</b>	<b>In. (mm)</b>
Brake Pedal Free-Play	0.31-0.47 (7.9-12.0)
Disc Brake Pad Minimum Thickness	0.118 (3.0)
Disc Brake Pad Minimum Thickness Variation (Pad-To-Pad)	0.079 (2.0)
Disc Brake Pad Maximum Taper Wear (In Any Direction)	0.118 (3.0)
Disc Diameter	10.94 (278)
Disc Lateral Runout	0.004 (0.10)
Disc Parallelism (Maximum Thickness Variation)	(1)
Disc Discard Thickness	0.86 (22)
Front Disc Minimum Machine To Thickness	0.88 (22.4)
Rear Brake Wheel Cylinder Inner Diameter	0.937 (23.8)
Rear Lining Minimum Thickness	0.03 (0.762)
Rear Lining Standard Thickness (New)	0.18 (4.5)
Rear Drum Maximum Refinish Diameter	9.06 (230.1)

## 2002 Ford Escape

2002-04 BRAKES Disc & Drum - Escape

Rear Drum Standard Diameter (New)	9.00 (228.7)
Wheel Cylinder Inner Diameter	0.937 (23.8)
(1) Information not available from manufacturer.	

## 2006 Ford Escape

2006 BRAKES Rear Disc Brake - Escape & Mariner

### 2006 BRAKES

#### Rear Disc Brake - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Brake Pad</b>	
Brake pad minimum thickness	3.0 mm (0.118 inch)
Brake pad maximum thickness variation (pad-to-pad)	2.0 mm (0.079 inch)
Brake pad maximum taper wear (in any direction)	3.0 mm (0.118 inch)
<b>Brake Disc</b>	
Brake disc minimum thickness	11.0 mm (0.43 inch)
Brake disc minimum thickness to machine	11.6 mm (0.45 inch)
<b>Lubricant</b>	
High Performance DOT 3 Motor Vehicle Brake Fluid PM-1 (Canada CPM-1)	ESA-M6C25-A
Brake Parts Cleaner PM-4	-

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft
Bleeder screw	16	12
Brake caliper guide bolts	35	26
Brake caliper jounce hose flow bolt	35	26
Brake caliper jounce hose bracket bolt	17	13
Brake line fitting nut	15	11

## DESCRIPTION AND OPERATION

### REAR DISC BRAKE

The rear disc brake system includes the brake caliper, the brake pads and the brake disc. The brake caliper is a single piston floating design. The brake caliper is mounted to the anchor

plate by the caliper guide bolts. The brake caliper slides, or floats, on the caliper guide bolts. The brake disc is a cast, non-ventilated type disc. When mechanical force is applied by the driver to the brake pedal, the force is converted into hydraulic pressure by the master cylinder. The hydraulic force is directed to the brake calipers and transferred to the brake pads. The brake pads are then forced against the brake disc friction surfaces by the brake caliper pistons. The friction of the brake pads on the brake disc causes the slowing of wheel rotation and the vehicle.

## **DIAGNOSIS AND TESTING**

### **REAR DISC BRAKE**

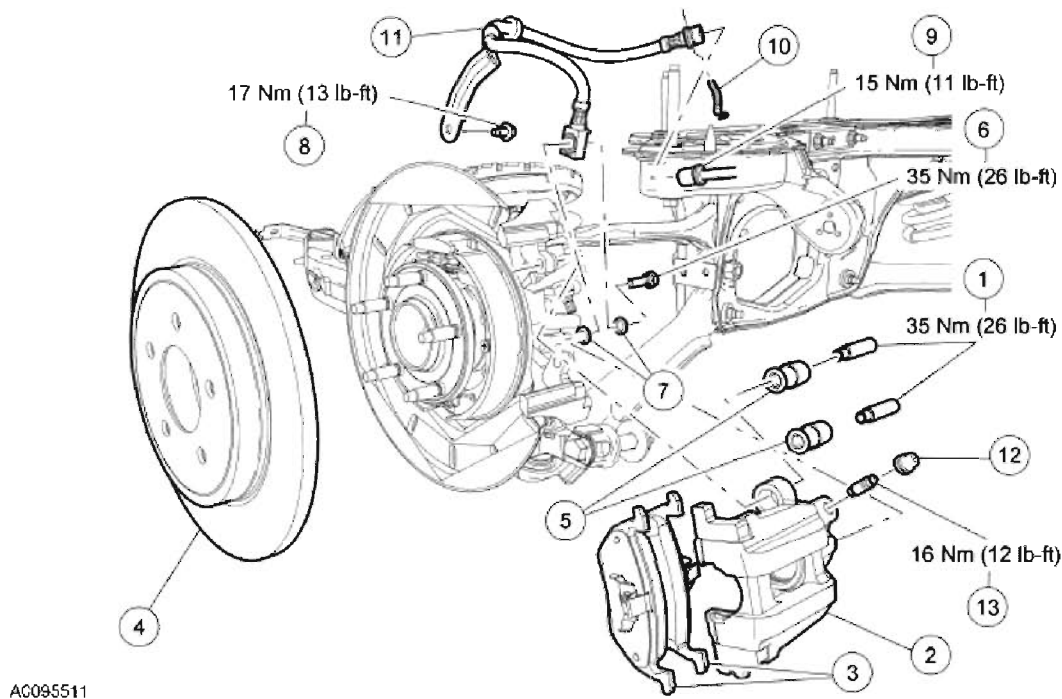
Refer to **BRAKE SYSTEM-GENERAL INFORMATION** .

## **REMOVAL AND INSTALLATION**

### **DISC BRAKE SYSTEM - EXPLODED VIEW**

## 2006 Ford Escape

### 2006 BRAKES Rear Disc Brake - Escape & Mariner



Item	Part Number	Description
1	8171	Brake caliper guide bolts (2 required)
2	2K327 RH/ 2K328 LH	Brake caliper
3	5105	Brake pads
4	2C026	Brake disc
5	9171	Brake caliper guide bolt bushings (2 required)
6	385116-S2	Brake caliper jounce hose flow bolt
7	2179	Copper washers (2 required)
8	W500220	Brake caliper jounce hose bracket bolt

Item	Part Number	Description
9	—	Brake line fitting nut
10	2B223	Brake caliper jounce hose retaining clip
11	2C338 RH/ 2C339 LH	Brake caliper jounce hose
12	2L126	Bleeder screw cap
13	0110	Bleeder screw

**Fig. 1: Rear Disc Brake System - Exploded View With Torque Specifications**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the appropriate procedures.

#### BRAKE PADS

##### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the 2 brake caliper guide bolts.
  - To install, tighten to 35 Nm (26 lb-ft).

**CAUTION:** Do not allow the brake caliper to hang by the brake caliper jounce hose.

3. Remove the brake caliper and secure the brake caliper to the vehicle.
4. Remove the inboard and outboard brake pads from the brake caliper.
5. To install, reverse the removal procedure.

**BRAKE PADS - HYBRID****Removal and Installation**

**CAUTION:** Do not allow brake fluid to overflow from the master cylinder reservoir. Brake fluid may damage the high-voltage components.

**NOTE:** The rear brake pads will wear at approximately twice the rate of the front brake pads.

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

**NOTE:** The following steps must be followed to prevent the accumulator from charging and pressurizing the brake system.

2. Disconnect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
  - Remove the battery junction box (BJB) fuses 24 (50A) and 31 (50A).
3. Remove the 2 brake caliper guide bolts.
  - To install, tighten to 35 Nm (26 lb-ft).

**CAUTION:** Do not allow the brake caliper to hang by the brake caliper jounce hose.

4. Remove the brake caliper and secure the brake caliper to the vehicle.
5. Remove the inboard and outboard brake pads from the brake caliper.
6. To install, reverse the removal procedure.

**BRAKE CALIPER****MATERIAL SPECIFICATION**

Item	Specification
High Performance DOT 3 Motor Vehicle Brake Fluid PM-1 (Canada CPM-1)	ESA-M6C25-A



## Removal and Installation

**WARNING:** Use of any other than approved DOT 3 motor vehicle brake fluid will cause permanent damage to brake components and will render the brakes inoperative. Failure to follow these instructions may result in personal injury.

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

**CAUTION:** Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash it with water.

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

**NOTE:** Install new copper washers.

2. Remove the brake caliper jounce hose flow bolt and discard the 2 copper washers.
  - To install, tighten to 35 Nm (26 lb-ft).
3. Remove the 2 brake caliper guide bolts.
  - To install, tighten to 35 Nm (26 lb-ft).
4. Remove the brake caliper.
5. To install, reverse the removal procedure.
  - Bleed the brake system. For additional information, refer to **BRAKE SYSTEM-GENERAL INFORMATION**.

## BRAKE CALIPER - HYBRID

## MATERIAL SPECIFICATION

Item	Specification
High Performance DOT 3 Motor Vehicle Brake Fluid PM-1 (Canada CPM-1)	ESA-M6C25-A

## Removal and Installation

**WARNING:** Use of any other than approved DOT 3 motor vehicle brake fluid will cause permanent damage to brake components and will render the brakes inoperative. Failure to follow these instructions may result in personal injury.

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

**CAUTION:** Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash it with water.

**CAUTION:** Do not allow brake fluid to overflow from the master cylinder reservoir. Brake fluid may damage the high-voltage components.

**NOTE:** The rear brake pads will wear at approximately twice the rate of the front brake pads.

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

**NOTE:** The following steps must be followed to prevent the accumulator from charging and pressurizing the brake system.

2. Disconnect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
  - Remove the battery junction box (BJB) fuses 24 (50A) and 31 (50A).

**NOTE:** Install new copper washers.

3. Remove the brake caliper jounce hose flow bolt and discard the 2 copper washers.
  - To install, tighten to 35 Nm (26 lb-ft).
4. Remove the 2 brake caliper guide bolts.
  - To install, tighten to 35 Nm (26 lb-ft).

5. Remove the brake caliper.
6. To install, reverse the removal procedure.
  - Bleed the brake system. For additional information, refer to **BRAKE SYSTEM-GENERAL INFORMATION** .

## **BRAKE DISC**

### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the brake pads. For additional information, refer to **BRAKE PADS**.
3. Remove the brake disc.
4. If the brake disc binds on the parking brake shoe and lining, remove the adjustment hole access plug and retract the parking brake shoe and lining by rotating the adjuster.
5. To install, reverse the removal procedure.
  - Adjust the parking brake shoe and lining, if necessary. For additional information, refer to **PARKING BRAKE & ACTUATION** .

## **BRAKE DISC - HYBRID**

### **Removal and Installation**

**CAUTION:** Do not allow brake fluid to overflow from the master cylinder reservoir. Brake fluid may damage the high-voltage components.

**NOTE:** The rear brake pads will wear at approximately twice the rate of the front brake pads.

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

**NOTE:** The following steps must be followed to prevent the accumulator from charging and pressurizing the brake system.

2. Disconnect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
  - Remove the battery junction box (BJB) fuses 24 (50A) and 31 (50A).
3. Remove the brake pads. For additional information, refer to **BRAKE PADS - HYBRID**.

## 2006 Ford Escape

### 2006 BRAKES Rear Disc Brake - Escape & Mariner

4. Remove the brake disc.
5. If the brake disc binds on the parking brake shoe and lining, remove the adjustment hole access plug and retract the parking brake shoe and lining by rotating the adjuster.
6. To install, reverse the removal procedure.
  - Adjust the parking brake shoe and lining, if necessary. For additional information, refer to **PARKING BRAKE & ACTUATION** .

## DISASSEMBLY AND ASSEMBLY

### BRAKE CALIPER

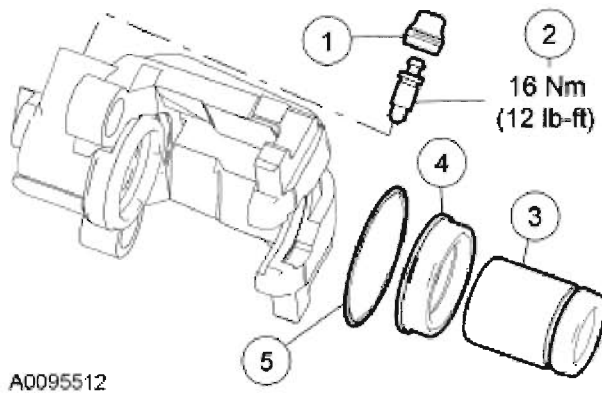
### MATERIAL SPECIFICATION

Item	Specification
High Performance DOT 3 Motor Vehicle Brake Fluid PM-1 (Canada CPM-1)	ESA-M6C25-A

**WARNING:** Use of any other than approved DOT 3 motor vehicle brake fluid will cause permanent damage to brake components and will render the brakes inoperative. Failure to follow these instructions may result in personal injury.

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

**CAUTION:** Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.



Item	Part Number	Description
1	2L126	Bleeder screw cap
2	2208	Bleeder screw
3	2196	Piston
4	2207	Dust boot (part of 2B120 and kit 2221)
5	2A418	Piston seal (part of 2B120 and kit 2221)

**Fig. 2: Identifying Brake Caliper Components With Torque Specifications**  
**Courtesy of FORD MOTOR CO.**

#### Disassembly and Assembly

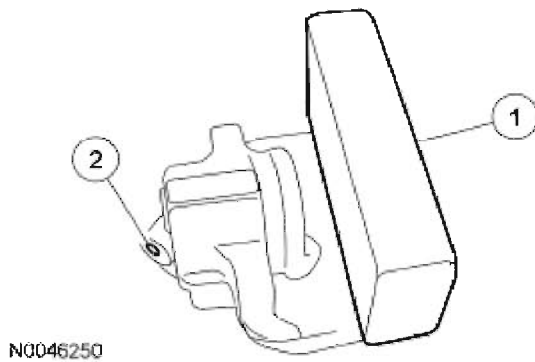
1. Remove the brake caliper. For additional information, refer to **BRAKE CALIPER** or **BRAKE CALIPER - HYBRID**.
2. Secure the brake caliper in a vise.
3. Remove the brake caliper dust boot.
4. Remove the bleeder screw cap.
5. Remove the bleeder screw.
  - To install, tighten to 16 Nm (12 lb-ft).

**CAUTION:** Apply moderate air pressure in short bursts to prevent an uncontrolled release of the piston.

**NOTE:** Inspect the brake caliper piston and bore for excessive wear, corrosion or pitting. If any of these conditions exist, a new caliper must be installed.

6. Remove the brake caliper piston.
  1. Place a block of wood between the brake caliper piston and the brake caliper housing.
  2. Apply compressed air through the brake caliper jounce hose port to remove the

piston.



**Fig. 3: Identifying Block Of Wood And Brake Caliper Jounce Hose Port**  
Courtesy of FORD MOTOR CO.

7. Remove the dust boot.

**CAUTION:** Use a plastic or wooden pick to remove the piston seal from the caliper bore. A metal tool may scratch or nick the seal groove, which could result in a seal leak.

8. Remove the piston seal using a plastic or wooden tool.
9. To assemble, reverse the disassembly procedure.
  - Lubricate the piston seal with clean brake fluid.

## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

## 2004 BRAKES

### Anti-Lock Control - Escape

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Battery ground cable bolt	7-10	-	62-89
Control module bolts	1-2	-	9-17
Hydraulic control unit (HCU) to bracket bolts	8	-	71
Front anti-lock brake sensor bolt (4x2)	8-10	-	71-89
Front anti-lock brake sensor bolt (4x4)	8-10	-	71-89
Front wheel speed sensor wire bolt	15	11	-
Front anti-lock brake sensor wire retaining bolt (4x4)	7-9	-	62-80
Inlet brake line to HCU nuts (M12-1)	17	13	-
Outlet brake line to HCU nuts (M12-1)	18	13	-
Rear anti-lock brake sensor bolt	9	-	80

## DESCRIPTION AND OPERATION

### ANTI-LOCK CONTROL - (4WABS)

The anti-lock control system consists of the following components:

- hydraulic control unit (HCU)
- anti-lock brake control module
- rear anti-lock brake sensor
- rear anti-lock brake sensor indicator
- front anti-lock brake sensor
- front anti-lock brake sensor indicator
- yellow ABS warning indicator
- red brake warning indicator

## DIAGNOSIS AND TESTING




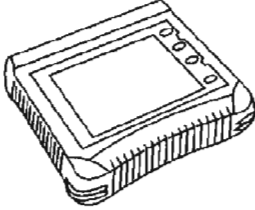

### ANTI-LOCK CONTROL

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

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### 2004 BRAKES Anti-Lock Control - Escape

#### Special Tool(s)

	73III Digital Multimeter 105-R0057 or equivalent
	FLUKE 88 Digital Multimeter 105-R0053 or equivalent
	EEC-IV 60-Pin Breakout Box 418-005 (014-00322) (T83L-50-EEC-IV) or equivalent
	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent diagnostic tool
	Anti-Lock Brake Adapter 418-063 (T97P-50-ALA)

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**Fig. 1: Identifying Special Tool Specification Chart**  
Courtesy of FORD MOTOR CO.

#### Principles of Operation

The ABS operates as follows:



- When the brakes are applied, fluid is forced from the brake master cylinder outlet ports to the HCU inlet ports. This pressure is transmitted through four normally open solenoid valves contained inside the HCU and then through the outlet ports of the HCU to each wheel.

The electronic brake distribution (EBD) operates as follows:

- The EBD control system detects the front/rear wheel slip according to the signal of ABS wheel speed sensors. If the rear wheel slip increases beyond a preset limit in proportion to the front wheel, the ABS HU/CU optimally reduces the brake fluid to the rear wheels. Brake force can, therefore, be proportioned optimally according to vehicle load and road surface conditions. The EBD control changes the distribution rate of the brake fluid pressure to the rear wheel slip. If the ABS control conditions are satisfied, EBD control is stopped and ABS control takes priority.
- If the ABS/EBD brake control module senses a wheel is about to lock, based on anti-lock brake sensor data, it closes the normally open solenoid valve for that circuit. This prevents any more fluid from entering that circuit.
- The anti-lock brake control module then looks at the anti-lock brake sensor signal from the affected wheel(s) again.
- If that wheel(s) is still decelerating, it opens the closed solenoid valve for that circuit.
- Once the affected wheel comes back up to speed, the anti-lock brake control module returns the valves to their normal condition, allowing fluid to flow to the affected brake.
- The ABS/EBD control module monitors the electromechanical components of the system.
- A malfunction in the ABS/EBD system will cause the ABS/EBD module to shut off or inhibit the system. However, normal power-assisted braking remains.
- Malfunctions are indicated by a yellow ABS warning indicator in the instrument cluster.
- A malfunction in the EBD function will cause the ABS control module to inhibit the function of the rear brake force distribution. In the event that EBD control stops, the rear wheels may lock before the front wheels, causing the vehicle to skid.
- Malfunctions are indicated by a red brake system warning light in the instrument cluster.
- The anti-lock brake and EBD system is self-monitoring. When the ignition switch is turned to the RUN position, the anti-lock brake and EBD control module will carry out a preliminary self-check on the anti-lock electrical system indicated by a three-second illumination of the yellow ABS warning indicator and the red brake warning indicator (if the parking brake is unapplied) in the instrument cluster.
- During vehicle operation, including normal and anti-lock braking, the anti-lock brake control module monitors all electrical anti-lock functions and some hydraulic

operations.

- Each time the vehicle is driven, as soon as vehicle speed reaches approximately 20 km/h (12 mph), the anti-lock brake control module turns on the pump motor for approximately one-half second. At this time, a mechanical noise may be heard. This is a normal function of the self-check by the anti-lock brake control module.
- Pedal pulsation coupled with noise while braking on loose gravel, bumps, wet or snowy roads is normal and indicates correct functioning of the vehicle's anti-lock brake control system.

#### Hydraulic Control Unit

The HCU consists of the following components:

- brake pressure control valve block
- pump motor

New brake pressure control valve block and pump motor are installed as an assembly.

#### Anti-Lock Brake Control Module

**NOTE:**     **The 4x2 service replacement module cannot be interchanged with the 4x4 module. The service replacement 4x4 module is interchangeable with the 4x2 module.**

The anti-lock brake control module is mounted to the HCU.

It is an on-board diagnostic, non-repairable unit consisting of two microprocessors and the necessary circuitry for their operation. The anti-lock brake control module monitors system operation during normal driving as well as during anti-lock braking.

Anti-lock brake module operation is as follows:

- Under normal driving conditions, the microprocessor produces short test pulses to the solenoid valves that check the electrical system without any mechanical reaction.
- Impending wheel lock conditions trigger signals from the anti-lock brake control module that open and close the appropriate solenoid valves. This results in moderate pulsations in the brake pedal.
- The anti-lock brake module used in 4x4 application includes a G-sensor. It detects vehicle movement during a brake lockup event that is transferred to other wheels through the powertrain.

During normal braking, the brake pedal feel is identical to a standard brake system.

Most faults that occur in the anti-lock brake system will be stored as a diagnostic trouble

code (DTC) in the keep-alive memory of the anti-lock brake control module. The DTCs can be retrieved by following the onboard diagnostic procedures.

#### Anti-Lock Brake Sensor

**NOTE:** Any time an anti-lock brake sensor is removed, thoroughly clean the mounting surfaces. On front anti-lock brake sensors, apply High-Temperature 4x4 Front Axle and Wheel Bearing Grease.

The anti-lock brake system uses four "active" sensors and four sensor indicators to detect the speed of each wheel. The teeth on the sensor indicator rotate past the stationary sensor at wheel speed. As the teeth pass the sensor, a digital input signal is generated. The control module uses the input to compute the speed of each wheel.

#### Inspection and Verification

1. Verify the customer concern by applying the brakes under different conditions.
2. Visually inspect for obvious signs of mechanical and electrical damage.

#### Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Parking brake cable</li> <li>• Tire pressure</li> <li>• Tire size or mismatched tires</li> </ul>	<ul style="list-style-type: none"> <li>• Central junction box (CJB) fuse(s):               <ul style="list-style-type: none"> <li>▪ 15 (5A)</li> <li>▪ 24 (15A)</li> </ul> </li> <li>• Battery junction box (BJB) maxi-fuse 24 (60A)</li> <li>• BJB mini-fuse 14 (25A)</li> <li>• Connectors or connections</li> <li>• Harness routing</li> <li>• Wire chafing</li> <li>• Circuitry open/shorted</li> <li>• Indicator bulb</li> </ul>

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**Fig. 2: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. If the fault is not visually evident, connect the diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
  - check that the program card is correctly installed.
  - check the connections to the vehicle.
  - check the ignition switch position.
4. If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool manual.

5. Carry out the diagnostic tool data link test. If the diagnostic tool responds with:
  - SCP or ISO; all electronic control units, no response/not equipped, refer to **MODULE COMMUNICATIONS NETWORK** .
  - No response/not equipped for anti-lock brake control module, Go to **PINPOINT TEST A** .
  - System passed, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the anti-lock brake control module.
6. If the DTCs retrieved are related to the concern, go to **ANTI-LOCK BRAKE CONTROL MODULE DIAGNOSTIC TROUBLE CODE (DTC) INDEX** to continue diagnostics.
7. If no DTCs related to the concern are retrieved, GO to **SYMPTOM CHART** .

#### Warning Lamp Indicators

The anti-lock brake system uses the yellow ABS warning indicator to alert the driver of malfunctions in the ABS.

The yellow ABS warning indicator will come on for numerous reasons. It warns the driver that the ABS has been deactivated due to a symptom that exists in the ABS. Normal power assist braking remains, but wheels can lock during a panic stop while the yellow ABS warning indicator is illuminated. The anti-lock brake system alerts the driver of an EBD fault by illuminating the red brake warning indicator.

The diagnostic procedures must be followed step-by-step in order to correct the condition.

#### Anti-Lock Brake Control Module Diagnostic Trouble Code (DTC) Index

#### DTC DESCRIPTION

DTC	Description	Action
B1342	Anti-Lock Brake Control Module Failure	INSTALL a new anti-lock brake control module. REFER to <b><u>MODULE - ANTI-LOCK BRAKE CONTROL</u></b> . REPEAT the self-test.
B1485	Brake Pedal Input Circuit Battery Short	Go to <b><u>PINPOINT TEST H</u></b> .
B1676	Battery Voltage Out Of Range	Go to <b><u>PINPOINT TEST B</u></b> .
C1095	Hydraulic Pump Motor Circuit Failure	Go to <b><u>PINPOINT TEST E</u></b> .
C1145	RF Anti-Lock Brake Sensor Circuit Failure (Static)	Go to <b><u>PINPOINT TEST C</u></b> .
C1155	LF Anti-Lock Brake Sensor	Go to <b><u>PINPOINT TEST C</u></b> .

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	Circuit Failure (Static)	
C1165	RR Anti-Lock Brake Sensor Circuit Failure	Go to <b><u>PINPOINT TEST C</u></b>
C1175	LR Anti-Lock Brake Sensor Circuit Failure	Go to <b><u>PINPOINT TEST C</u></b>
C1233	LF Anti-Lock Brake Sensor Output Failure	Go to <b><u>PINPOINT TEST D</u></b>
C1234	RF Anti-Lock Brake Sensor Output Failure	Go to <b><u>PINPOINT TEST D</u></b>
C1235	RR Anti-Lock Brake Sensor Output Failure	Go to <b><u>PINPOINT TEST D</u></b>
C1236	LR Anti-Lock Brake Sensor Output Failure	Go to <b><u>PINPOINT TEST D</u></b>

**Anti-Lock Brake Control Module Parameter Identification (PID) Index****PID DESCRIPTION**

<b>PID</b>	<b>Description</b>	<b>Expected Values</b>
CCNTABS	Number of Continuous DTCs on ABS	One count per bit
BOO_ABS	Brake Pedal Position (BPP) Switch Input	ON, OFF
ABSR_L_O	LR ABS Outlet Valve	ON, OFF
ABSR_R_O	RR ABS Outlet Valve	ON, OFF
ABSL_F_O	LF ABS Outlet Valve	ON, OFF
ABSR_F_O	RF ABS Outlet Valve	ON, OFF
ABSR_L_I	RL ABS Inlet Valve	ON, OFF
ABSR_R_I	RR ABS Inlet Valve	ON, OFF
ABSL_F_I	LF ABS Inlet Valve	ON, OFF
ABSR_F_I	RF ABS Inlet Valve	ON, OFF
LF_WSPD	LF Wheel Speed	0-255 KPH
RF_WSPD	RF Wheel Speed	0-255 KPH
LR_WSPD	LR Wheel Speed	0-255 KPH
RR_WSPD	RR Wheel Speed	0-255 KPH

**Anti-Lock Brake Control Module Active Command Index****ANTI-LOCK BRAKE CONTROL MODULE ACTIVE COMMAND INDEX**

<b>Active Command</b>	<b>Display</b>	<b>Action</b>
ABS OUTPUT CONTROL	PMP_MOTOR	ON, OFF

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### 2004 BRAKES Anti-Lock Control - Escape

	LF_INLET	ON, OFF
	RF_INLET	ON, OFF
	RR_INLET	ON, OFF
	RR_INLET	ON, OFF
	LR_OUTLET	ON, OFF
	RR_OUTLET	ON, OFF
	LF_OUTLET	ON, OFF
	RF_OUTLET	ON, OFF

#### Symptom Chart

**NOTE:** Refer to SYSTEM WIRING DIAGRAMS for connector numbers stated in the Pinpoint Tests.

## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>No communication with the module — anti-lock brake control module</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse 15 (5A).</li> <li>Circuitry.</li> <li>Anti-lock brake control module</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>A</b>.</li> </ul>
<ul style="list-style-type: none"> <li>Loss of sensor signal during vehicle deceleration or sensor signal drops out at low speed</li> </ul>	<ul style="list-style-type: none"> <li>Anti-lock brake sensor indicator.</li> <li>Sensor output is weak.</li> <li>Air gap.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>D</b>.</li> </ul>
<ul style="list-style-type: none"> <li>Unwarranted anti-lock brake system (ABS) activity</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Anti-lock brake sensor.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>D</b>.</li> </ul>
<ul style="list-style-type: none"> <li>Maladjusted rear brakes or "grabby" brake shoe or pad linings</li> </ul>	<ul style="list-style-type: none"> <li>Rear brake adjustment.</li> <li>Linings.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake mechanical concern for wheels lockup</li> </ul>	<ul style="list-style-type: none"> <li>Rear brake shoe linings.</li> <li>Wheel cylinder.</li> <li>Rear brakes.</li> <li>Parking brake.</li> <li>Rear axle seal.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> <li>REFER to DISC &amp; DRUM article.</li> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake hydraulic concern (soft pedal)</li> </ul>	<ul style="list-style-type: none"> <li>Brake line or hose, fitting, master cylinder, wheel cylinder or caliper.</li> <li>Air in brake system.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake mechanical concern (hard pedal)</li> </ul>	<ul style="list-style-type: none"> <li>Vacuum boost.</li> <li>Wheel cylinder or caliper.</li> <li>Brake line or hose.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake hydraulic concern during medium/hard brake application</li> </ul>	<ul style="list-style-type: none"> <li>Brake line or hose, fitting, master cylinder, wheel cylinder or caliper.</li> <li>Air in brake system.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake mechanical concern during medium/hard brake application</li> </ul>	<ul style="list-style-type: none"> <li>Vacuum boost.</li> <li>Wheel cylinder or caliper.</li> <li>Brake line or hose.</li> <li>Brake shoe or pad linings.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake mechanical concern for vehicle pulls</li> </ul>	<ul style="list-style-type: none"> <li>Rear brake.</li> <li>Caliper.</li> <li>Brake pad or shoe wear.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Base brake hydraulic concern for vehicle pulls</li> </ul>	<ul style="list-style-type: none"> <li>Brake line or hose.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>One wheel locks up; no DTCs recorded</li> </ul>	<ul style="list-style-type: none"> <li>Base brake.</li> <li>Dump valve.</li> <li>ISO valve.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> <li>INSTALL a new electronic hydraulic control unit. REFER to Hydraulic Control Unit.</li> </ul>
<ul style="list-style-type: none"> <li>The anti-lock brake system (ABS) warning indicator does not self check</li> </ul>	<ul style="list-style-type: none"> <li>Bulb.</li> <li>Circuitry.</li> <li>Instrument cluster.</li> <li>Anti-lock brake control module.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>E</b>.</li> </ul>
<ul style="list-style-type: none"> <li>Soft or excessive brake pedal</li> </ul>	<ul style="list-style-type: none"> <li>Brake line or hose, fitting, master cylinder, wheel cylinder, wheel cylinder or caliper.</li> <li>Air in brake system.</li> <li>Hydraulic control unit (HCU).</li> </ul>	<ul style="list-style-type: none"> <li>REFER to BRAKE SYSTEM - GENERAL INFORMATION article.</li> </ul>
<ul style="list-style-type: none"> <li>Anti-lock brake system (ABS) warning indicator always on, no DTC</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Module.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>G</b>.</li> </ul>
<ul style="list-style-type: none"> <li>Red brake warning indicator always on</li> </ul>	<ul style="list-style-type: none"> <li>Instrument cluster.</li> <li>Circuit 603 (DG).</li> <li>Parking brake.</li> <li>Brake fluid level.</li> </ul>	<ul style="list-style-type: none"> <li>Go to INSTRUMENT CLUSTER article.</li> </ul>

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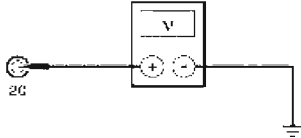
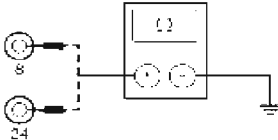
**Fig. 3: Identifying Symptom Specification Chart**  
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#### Pinpoint Tests

#### PINPOINT TEST A: NO COMMUNICATION WITH THE MODULE - ANTI-LOCK BRAKE CONTROL MODULE

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### 2004 BRAKES Anti-Lock Control - Escape

Test Step	Result / Action to Take				
<b>A1 CHECK CIRCUIT 677 (LB)</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Anti-Lock Brake Control Module C155.</li><li>Connect EEC-IV 60-Pin Breakout Box.</li><li>Key in ON position.</li><li>Measure the voltage between EEC-IV 60-Pin Breakout Box pin and ground as follows:</li></ul> <table><tr><th>EEC-IV 60-Pin Breakout Box Pin</th><th>Circuit</th></tr><tr><td>20</td><td>677 (LB)</td></tr></table>  <ul style="list-style-type: none"><li>Is the voltage greater than 10 volts?</li></ul>	EEC-IV 60-Pin Breakout Box Pin	Circuit	20	677 (LB)	<b>Yes</b> GO to A2. <b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.
EEC-IV 60-Pin Breakout Box Pin	Circuit				
20	677 (LB)				
<b>A2 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Measure the resistance between EEC-IV 60-Pin Breakout Box pin 8, circuit 57 (BK) and ground; and between EEC-IV 60-Pin Breakout Box pin 24, circuit 57 (BK) and ground.</li></ul>  <ul style="list-style-type: none"><li>Are the resistances less than 5 ohms?</li></ul>	<b>Yes</b> REFER to MODULE COMMUNICATIONS NETWORK article. <b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.				

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### Fig. 4: Pinpoint Test A: No Communication With Module - Anti-Lock Brake Control Module

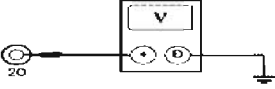
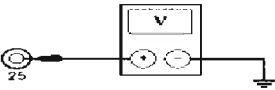
Courtesy of FORD MOTOR CO.

#### PINPOINT TEST B: DTC B1676 - BATTERY VOLTAGE OUT OF RANGE

**NOTE:** DTC B1676 is generated when the anti-lock brake control module



detects system voltage is less than 9 volts or greater than 19 volts for more than 8 seconds.

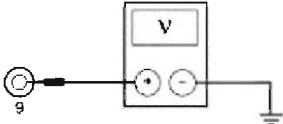
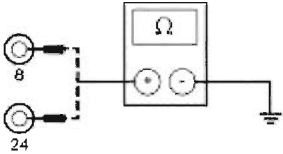
Test Step	Result / Action to Take
<b>B1 CHECK BLOWN FUSE</b> <ul style="list-style-type: none"> <li>Check the blown fuse.</li> <li>Is the fuse OK?</li> </ul>	<b>Yes</b> GO to B2.  <b>No</b> INSTALL the fuse.
<b>B2 CHECK RECENT VEHICLE HISTORY</b> <ul style="list-style-type: none"> <li>Check recent vehicle history.</li> <li>Has the vehicle been jump-started by a tow truck within the past two weeks?</li> </ul>	<b>Yes</b> The system is OK. CLEAR the DTCs. REPEAT the self-test.  <b>No</b> GO to B3.
<b>B3 CHECK THE BATTERY VOLTAGE</b> <ul style="list-style-type: none"> <li>Measure the voltage between the positive and negative battery posts.</li> <li>Is the voltage between 9 and 19 volts?</li> </ul>	<b>Yes</b> GO to B4.  <b>No</b> REFER to GENERATORS & REGULATORS article.
<b>B4 CHECK THE CHARGING SYSTEM</b> <ul style="list-style-type: none"> <li>Key in START position.</li> <li>With the engine running at 2,000 rpm, measure the voltage between the positive and negative battery posts.</li> <li>Is the voltage between 9 and 19 volts?</li> </ul>	<b>Yes</b> GO to B5.  <b>No</b> REPAIR the charging system. REFER to GENERATORS & REGULATORS article.
<b>B5 CHECK CIRCUIT 677 (LB) FOR CORRECT VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Anti-Lock Brake Control Module C155.</li> <li>Connect EEC-IV 60-Pin Breakout Box.</li> <li>Key in ON position.</li> <li>Measure the voltage between EEC-IV 60-Pin Breakout Box pin 20, circuit 677 (LB) and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<b>Yes</b> GO to B6.  <b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
<b>B6 CHECK CIRCUIT 483 (RD) FOR CORRECT VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the voltage between EEC-IV 60-Pin Breakout Box pin 25, circuit 483 (RD) and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<b>Yes</b> GO to B7.  <b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

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**Fig. 5: Pinpoint Test B: DTC B1676 - Battery Voltage Out Of Range (Step B1 To B6)**  
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## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

<b>B7 CHECK CIRCUIT 534 (YE/LG) FOR CORRECT VOLTAGE</b> <ul style="list-style-type: none"><li>Measure the voltage between EEC-IV 60-Pin Breakout Box pin 9, circuit 534 (YE/LG) and ground.</li></ul>  <ul style="list-style-type: none"><li>Is the voltage greater than 10 volts?</li></ul>	<b>Yes</b> GO to <u>B8</u> .  <b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
<b>B8 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"><li>Measure the resistance between EEC-IV 60-Pin Breakout Box pin 8, circuit 57 (BK) and ground; and between EEC-IV 60-Pin Breakout Box pin 24, circuit 57 (BK) and ground.</li></ul>  <ul style="list-style-type: none"><li>Are the resistances less than 5 ohms?</li></ul>	<b>Yes</b> INSTALL a new anti-lock brake control module. REFER to <u>Module — Anti-Lock Brake Control</u> . REPEAT the self-test.  <b>No</b> REPAIR the circuit. CLEAR the DTCs.

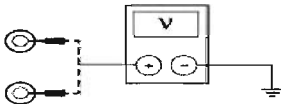
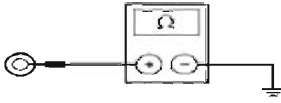
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**Fig. 6: Pinpoint Test B: DTC B1676 - Battery Voltage Out Of Range (Step B7 To B8)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST C: DTC C1145 (RF), DTC C1155 (LF), DTC C1165 (RR) AND DTC C1175 (LR) - ANTI-LOCK BRAKE SENSOR INPUT CIRCUIT FAILURE**

# 2004 Ford Escape

## 2004 BRAKES Anti-Lock Control - Escape

Test Step	Result / Action to Take															
<p><b>C1 CHECK FOR SHORT TO POWER</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Anti-Lock Brake Control Module C155.</li> <li>Connect the EEC-IV 60-Pin Breakout Box.</li> <li>Key in ON position.</li> <li>Measure the voltage between EEC-IV 60-Pin Breakout Box pins and ground as follows:</li> </ul> <table border="1"> <thead> <tr> <th>DTC</th><th>Breakout Box Pin</th><th>Breakout Box Pin</th></tr> </thead> <tbody> <tr> <td>C1145 (RF)</td><td>4 (circuit 514 [YE/RD])</td><td>3 (circuit 516 [YE/BK])</td></tr> <tr> <td>C1155 (LF)</td><td>18 (circuit 521 [TN/OG])</td><td>17 (circuit 522 [TN/BK])</td></tr> <tr> <td>C1165 (RR)</td><td>6 (circuit 523 [RD/PK])</td><td>7 (circuit 524 [PK/BK])</td></tr> <tr> <td>C1175 (LR)</td><td>22 (circuit 518 [LG/RD])</td><td>21 (circuit 519 [LG/BK])</td></tr> </tbody> </table>  <ul style="list-style-type: none"> <li>Is voltage present?</li> </ul>	DTC	Breakout Box Pin	Breakout Box Pin	C1145 (RF)	4 (circuit 514 [YE/RD])	3 (circuit 516 [YE/BK])	C1155 (LF)	18 (circuit 521 [TN/OG])	17 (circuit 522 [TN/BK])	C1165 (RR)	6 (circuit 523 [RD/PK])	7 (circuit 524 [PK/BK])	C1175 (LR)	22 (circuit 518 [LG/RD])	21 (circuit 519 [LG/BK])	<p><b>Yes</b> REPAIR the suspect anti-lock brake sensor circuit(s). CLEAR the DTCs. TEST the system for normal operation.</p> <p><b>No</b> GO to C2.</p>
DTC	Breakout Box Pin	Breakout Box Pin														
C1145 (RF)	4 (circuit 514 [YE/RD])	3 (circuit 516 [YE/BK])														
C1155 (LF)	18 (circuit 521 [TN/OG])	17 (circuit 522 [TN/BK])														
C1165 (RR)	6 (circuit 523 [RD/PK])	7 (circuit 524 [PK/BK])														
C1175 (LR)	22 (circuit 518 [LG/RD])	21 (circuit 519 [LG/BK])														
<p><b>C2 CHECK FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between EEC-IV 60-Pin Breakout Box pins and ground as follows:</li> </ul> <table border="1"> <thead> <tr> <th>DTC</th><th>EEC-IV 60-Pin Breakout Box Pin</th><th>EEC-IV 60-Pin Breakout Box Pin</th></tr> </thead> <tbody> <tr> <td>C1145 (RF)</td><td>4 (circuit 514 [YE/RD])</td><td>3 (circuit 516 [YE/BK])</td></tr> <tr> <td>C1155 (LF)</td><td>18 (circuit 521 [TN/OG])</td><td>17 (circuit 522 [TN/BK])</td></tr> <tr> <td>C1165 (RR)</td><td>6 (circuit 523 [RD/PK])</td><td>7 (circuit 524 [PK/BK])</td></tr> <tr> <td>C1175 (LR)</td><td>22 (circuit 518 [LG/RD])</td><td>21 (circuit 519 [LG/BK])</td></tr> </tbody> </table>  <ul style="list-style-type: none"> <li>Are the resistances greater than 10,000 ohms?</li> </ul>	DTC	EEC-IV 60-Pin Breakout Box Pin	EEC-IV 60-Pin Breakout Box Pin	C1145 (RF)	4 (circuit 514 [YE/RD])	3 (circuit 516 [YE/BK])	C1155 (LF)	18 (circuit 521 [TN/OG])	17 (circuit 522 [TN/BK])	C1165 (RR)	6 (circuit 523 [RD/PK])	7 (circuit 524 [PK/BK])	C1175 (LR)	22 (circuit 518 [LG/RD])	21 (circuit 519 [LG/BK])	<p><b>Yes</b> GO to C3.</p> <p><b>No</b> REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.</p>
DTC	EEC-IV 60-Pin Breakout Box Pin	EEC-IV 60-Pin Breakout Box Pin														
C1145 (RF)	4 (circuit 514 [YE/RD])	3 (circuit 516 [YE/BK])														
C1155 (LF)	18 (circuit 521 [TN/OG])	17 (circuit 522 [TN/BK])														
C1165 (RR)	6 (circuit 523 [RD/PK])	7 (circuit 524 [PK/BK])														
C1175 (LR)	22 (circuit 518 [LG/RD])	21 (circuit 519 [LG/BK])														

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**Fig. 7: Pinpoint Test C: Anti-Lock Brake Sensor Input Circuit Failure (Step C1 To C2)**  
Courtesy of FORD MOTOR CO.

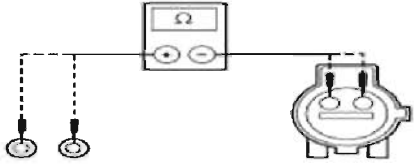
## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

**C3 CHECK FOR AN OPEN**

- Key in OFF position.
- Disconnect: Suspect Anti-Lock Brake Sensor Connector.
- Measure the resistance between EEC-IV 60-Pin Breakout Box pins and anti-lock brake sensor connector as follows:

DTC	EEC-IV 60-Pin Breakout Box Pin	Anti-Lock Brake Sensor Connector
C1145 (RF)	4 (circuit 514 [YE/RD])	C160 (circuit 514 [YE/RD])
C1145 (RF)	3 (circuit 516 [YE/BK])	C160 (circuit 516 [YE/BK])
C1155 (LF)	18 (circuit 521 [TN/OG])	C150 (circuit 521 [TN/OG])
C1155 (LF)	17 (circuit 522 [TN/BK])	C150 (circuit 522 [TN/BK])
C1165 (RR)	6 (circuit 523 [RD/PK])	C426 (circuit 523 [RD/PK])
C1165 (LR)	7 (circuit 524 [PK/BK])	C426 (circuit 524 [PK/BK])
C1175 (LR)	22 (circuit 518 [LG/RD])	C440 (circuit 518 [LG/RD])
C1175 (LR)	21 (circuit 519 [LG/BK])	C440 (circuit 519 [LG/BK])

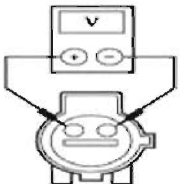


- Are the resistances less than 5 ohms?

**C4 CHECK THE ANTI-LOCK BRAKE CONTROL MODULE OUTPUT**

- Connect: Anti-Lock Brake Control Module C155.
- Measure the voltage between suspect anti-lock brake sensor as follows:

DTC	Suspect Anti-Lock Brake Sensor Circuit	Suspect Anti-Lock Brake Sensor Circuit
C1145 (RF)	514 (YE/RD)	516 (YE/BK)
C1155 (LF)	521 (TN/OG)	522 (TN/BK)
C1165 (RR)	523 (RD/PK)	524 (PK/BK)
C1175 (LR)	518 (LG/RD)	519 (LG/BK)



- Is the voltage greater than 9 volts?

**Yes**  
RECONNECT the anti-lock brake control module. GO to **C4**.

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

**Yes**  
INSTALL a new anti-lock brake sensor. REFER to Sensor — Front or Sensor — Rear. CLEAR the DTCs. TEST the system for normal operation.

**No**  
INSTALL a new anti-lock brake control module. REFER to Module — Anti-Lock Brake Control. TEST the system for normal operation.

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**Fig. 8: Pinpoint Test C: Anti-Lock Brake Sensor Input Circuit Failure (Step C3 To C4)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST D: DTCS C1233, C1234, C1235 AND C1236 - ANTI-LOCK BRAKE SENSOR OUTPUT FAILURE**

**NOTE:** Any time an anti-lock brake sensor is removed, thoroughly clean the mounting surfaces. On front anti-lock brake sensors, apply High-Temperature 4x4 Front Axle and Wheel Bearing Grease.

## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

Test Step	Result / Action to Take
<b>D1 CHECK FOR DTCS</b>	
<ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Connect the diagnostic tool.</li> <li>Retrieve DTCs.</li> <li><b>Is DTC C1145, C1155, C1165 or C1175 present?</b></li> </ul>	<p><b>Yes</b> GO to <u>C1</u>.</p> <p><b>No</b> GO to <u>D2</u>.</p>
<b>D2 CHECK THE ANTI-LOCK BRAKE SENSOR PIDS</b>	
<ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Enter the following diagnostic mode on the diagnostic tool: Monitor the anti-lock brake control module PIDS LF_WSPD, RF_WSPD, LR_WSPD and RR_WSP while driving the vehicle at a constant speed.</li> <li><b>Are the anti-lock brake sensor PIDS consistent?</b></li> </ul>	<p><b>Yes</b> CLEAR the DTCs. DRIVE the vehicle. RETRIEVE DTCs. If DTC C1233, C1234, C1235 or C1236 is present, INSTALL a new anti-lock brake control module. REFER to <u>Module — Anti-Lock Brake Control</u>. REPEAT the self-test.</p> <p><b>No</b> GO to <u>D3</u>.</p>
<b>D3 CHECK FOR ANTI-LOCK BRAKE SENSOR DAMAGE AND LOOSENESS</b>	
<p><b>NOTE:</b> Any time an anti-lock brake sensor is removed, thoroughly clean the mounting surfaces. On front anti-lock brake sensors, apply High-Temperature 4x4 Front Axle and Wheel Bearing Grease.</p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Raise and support the vehicle. Refer to JACKING &amp; LIFTING article.</li> <li> <b>CAUTION: Examine the anti-lock brake sensor wire carefully with good light. Failure to verify damage in the anti-lock brake sensor wire can lead to unnecessary installation of a new component.</b></li> <li>Inspect the anti-lock brake sensor mounting for looseness. If the anti-lock brake sensor is suspected, inspect the sensor for corrosion on the rear axle housing boss, or on the front anti-lock brake mounting flange. Clean as necessary.</li> <li><b>Is the anti-lock brake sensor OK?</b></li> </ul>	<p><b>Yes</b> GO to <u>D4</u>.</p> <p><b>No</b> If the anti-lock brake sensor mounting is loose or corroded, REMOVE the anti-lock brake sensor, plug the opening, and thoroughly clean the mounting surfaces. On the front anti-lock brake sensors, APPLY High Temperature 4x4 Front Axle and Wheel Bearing Grease E8TZ-19590-A or equivalent meeting Ford Specification ESA-M1C198-A. REPEAT the self-test.</p> <p>If the anti-lock brake sensor is damaged, INSTALL a new anti-lock brake sensor.</p> <p>For the front anti-lock brake sensor, REFER to <u>Sensor Indicator — Front</u>. CLEAR the DTCs. REPEAT the self-test.</p> <p>For the rear anti-lock brake sensor, REFER to <u>Sensor — Rear</u>. CLEAR the DTCs. REPEAT the self-test.</p>
<b>D4 CHECK FOR ANTI-LOCK BRAKE SENSOR INDICATOR DAMAGE</b>	
<p><b>NOTE:</b> Any time an anti-lock brake sensor is removed, thoroughly clean the mounting surfaces. On front anti-lock brake sensors, apply High Temperature 4x4 Front Axle and Wheel Bearing Grease.</p> <ul style="list-style-type: none"> <li>Remove the anti-lock brake sensor.</li> <li> <b>CAUTION: Examine the anti-lock brake sensor indicator carefully with good light. Failure to verify damage in the anti-lock brake sensor indicator can lead to unnecessary installation of a new component.</b></li> <li>Inspect the anti-lock brake sensor indicator for damaged or missing teeth. Rotate the wheel to verify that no teeth are missing.</li> <li><b>Is the anti-lock brake sensor indicator OK?</b></li> </ul>	<p><b>Yes</b> GO to <u>D5</u>.</p> <p><b>No</b> INSTALL a new anti-lock brake sensor indicator.</p> <p>For the front anti-lock brake sensor indicator, REFER to <u>Sensor Indicator — Front</u>. CLEAR the DTCs. REPEAT the self-test.</p> <p>For the rear anti-lock brake sensor indicator, REFER to <u>Sensor Indicator — Rear</u>. CLEAR the DTCs. REPEAT the self-test.</p>

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**Fig. 9: Pinpoint Test D: DTCS C1233, C1234, C1235 And C1236 - Anti-Lock Brake Sensor Output Failure (Step D1 To D4)**  
Courtesy of FORD MOTOR CO.

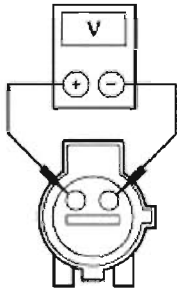
## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

#### D5 CHECK THE ANTI-LOCK BRAKE CONTROL MODULE OUTPUT

- Key in ON position.
- Measure the voltage between the suspect anti-lock brake sensor as follows:

DTC	Suspect Anti-Lock Brake Sensor Circuit	Suspect Anti-Lock Brake Sensor Circuit
C1234 (RF)	514 (YE/RD)	516 (YE/BK)
C1233 (LF)	521 (TN/OG)	522 (TN/BK)
C1235 (RR)	523 (RD/PK)	524 (PK/BK)
C1236 (LR)	518 (LG/RD)	519 (LG/BK)



- Is the voltage greater than 9 volts?

#### Yes

INSTALL a new anti-lock brake sensor. REFER to Sensor — Front or Sensor — Rear. CLEAR the DTCs. TEST the system for normal operation.

#### No

INSTALL a new anti-lock brake control module. REFER to Module — Anti-Lock Brake Control. TEST the system for normal operation.

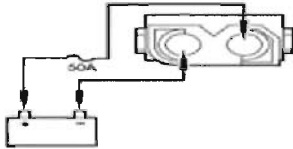
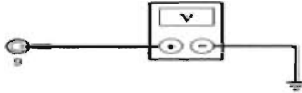
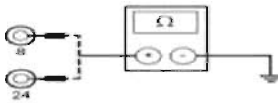
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**Fig. 10: Pinpoint Test D: DTCS C1233, C1234, C1235 And C1236 - Anti-Lock Brake Sensor Output Failure (Step D5)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST E: DTC C1095 - HYDRAULIC PUMP MOTOR CIRCUIT FAILURE**

## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

Test Step	Result / Action to Take
<b>E1 CHECK THE ABS PUMP MOTOR</b> <ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Is the pump motor on constantly?</li> </ul>	<b>Yes</b> INSTALL a new anti-lock brake control module. REFER to <u>Module — Anti-Lock Brake Control</u> . CLEAR the DTCs. REPEAT the self-test.  <b>No</b> GO to E2.
<b>E2 CHECK THE PUMP MOTOR OPERATION</b> <ul style="list-style-type: none"> <li>Connect the diagnostic tool.</li> <li>Key in ON position.</li> <li>Enter the following diagnostic mode on the diagnostic tool: Trigger the anti-lock brake control module active command PMP MOTOR ON.</li> <li>Does the pump motor operate?</li> </ul>	<b>Yes</b> CLEAR the DTC. CHECK the yellow ABS warning indicator while driving the vehicle above 32 km/h (20 mph) and no brakes applied until the vehicle exceeds 32 km/h (20 mph). If the yellow ABS warning indicator illuminates, INSTALL a new anti-lock brake control module. REFER to <u>Module — Anti-Lock Brake Control</u> . CLEAR the DTCs. REPEAT the self-test. If the yellow ABS warning indicator does not illuminate, CLEAR the DTCs. REPEAT the self-test.  <b>No</b> GO to E3.
<b>E3 CHECK THE PUMP MOTOR</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Pump Motor Connector.</li> <li>Connect a fused 50A jumper wire between the positive battery terminal and red ABS pump motor terminal.</li> <li>Connect a jumper wire between the negative battery terminal and brown ABS pump motor terminal.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>Is the ABS pump motor running?</li> </ul>	<b>Yes</b> GO to E4.  <b>No</b> INSTALL a new HCU. REFER to <u>Hydraulic Control Unit</u> . REPEAT the self-test.
<b>E4 CHECK CIRCUIT 534 (YE/LG)</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Anti-Lock Brake Control Module C155.</li> <li>Connect EEC-IV 60-Pin Breakout Box.</li> <li>Key in ON position.</li> <li>Measure the voltage between EEC-IV 60-Pin Breakout Box pin 9, circuit 534 (YE/LG) and ground.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<b>Yes</b> GO to E5.  <b>No</b> REPAIR the circuit(s) in question. CLEAR the DTCs. REPEAT the self-test.
<b>E5 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between EEC-IV 60-Pin Breakout Box pin 8, circuit 57 (BK) and ground; and between EEC-IV 60-Pin Breakout Box pin 24, circuit 57 (BK), and ground.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>Are the resistances less than 5 ohms?</li> </ul>	<b>Yes</b> INSTALL a new anti-lock brake control module. REFER to <u>Module — Anti-Lock Brake Control</u> . REPEAT the self-test.  <b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

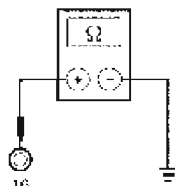
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**Fig. 11: Pinpoint Test E: DTC C1095 - Hydraulic Pump Motor Circuit Failure**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST F: THE YELLOW ABS WARNING INDICATOR DOES NOT SELF-CHECK**

## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

Test Step	Result / Action to Take
<b>F1 CHECK THE ANTI-LOCK BRAKE CONTROL MODULE</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Anti-Lock Brake Control Module C155.</li><li>Connect EEC-IV 60-Pin Breakout Box.</li><li>Key in ON position.</li><li><b>Does the yellow ABS warning indicator illuminate?</b></li></ul>	<b>Yes</b> VERIFY that all repair procedures have been carried out and DTCs have been repaired. REPEAT the self-test.  <b>No</b> GO to <u>F2</u> .
<b>F2 CHECK CIRCUIT 398 (BK/YE) FOR SHORT TO GROUND</b> <ul style="list-style-type: none"><li>Measure the resistance between EEC-IV 60-Pin Breakout Box pin 16, circuit 398 (BK/YE) and ground.</li></ul>  <ul style="list-style-type: none"><li><b>Is the resistance less than 5 ohms?</b></li></ul>	<b>Yes</b> REPAIR circuit 398 (BK/YE). TEST the system for normal operation.  <b>No</b> CHECK the instrument cluster. REFER to INSTRUMENT CLUSTER article.

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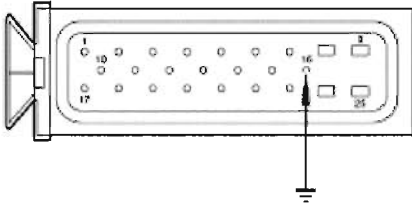
**Fig. 12: Pinpoint Test F: Yellow ABS Warning Indicator Does Not Self-Check**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST G: ABS WARNING INDICATOR ALWAYS ON, NO DTCS**



## 2004 Ford Escape

### 2004 BRAKES Anti-Lock Control - Escape

Test Step	Result / Action to Take
<b>G1 CHECK THE MODULE</b> <ul style="list-style-type: none"> <li>Disconnect: Anti-Lock Brake Control Module C155.</li> <li>Key in ON position.</li> <li>Connect a jumper between the anti-lock brake control module C155 pin 16, circuit 398 (BK/YE) and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the ABS warning indicator on?</li> </ul>	<p><b>Yes</b> GO to <u>G2</u>.</p> <p><b>No</b> INSTALL a new anti-lock brake control module. REFER to <u>Module — Anti-Lock Brake Control</u>. TEST the system for normal operation.</p>
<b>G2 CHECK CIRCUIT 398 (BK/YE) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Instrument Cluster C220b.</li> <li>Measure the resistance between instrument cluster C220b pin 7, harness side and anti-lock brake control module C155 pin 16, circuit 398 (BK/YE) harness side.</li> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> RESEAT the connector. If warning indicator remains on, INSTALL a new ABS control module.</p> <p><b>No</b> REPAIR circuit 398 (BK/YE). REPEAT the self-test.</p>

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**Fig. 13: Pinpoint Test G: ABS Warning Indicator Always On, No DTCS**  
Courtesy of FORD MOTOR CO.

#### PINPOINT TEST H: DTC B1485 - BRAKE PEDAL INPUT CIRCUIT BATTERY SHORT

**NOTE:** This DTC is retrieved from the ABS module if the brake pedal is pressed during the ABS module self-test, or if there is a short to battery on circuit 511 (L/G). Clear the DTCs. Carry out the ABS module self-test.

Test Step	Result / Action to Take
<b>H1 CHECK THE BRAKE PEDAL INPUT</b> <ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Enter the following diagnostic mode on the diagnostic tool: Carry out the ABS SELF-TEST.</li> <li>Is DTC B1485 retrieved?</li> </ul>	<p><b>Yes</b> If the stoplamps are illuminated, REFER to EXTERIOR LIGHTING article.</p> <p>If the stoplamps are not illuminated, INSTALL a new ABS control module. REFER to <u>Module — Anti-Lock Brake Control</u>.</p> <p><b>No</b> REFER to EXTERIOR LIGHTING article.</p>

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**Fig. 14: Pinpoint Test H: DTC B1485 - Brake Pedal Input Circuit Battery Short**  
Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

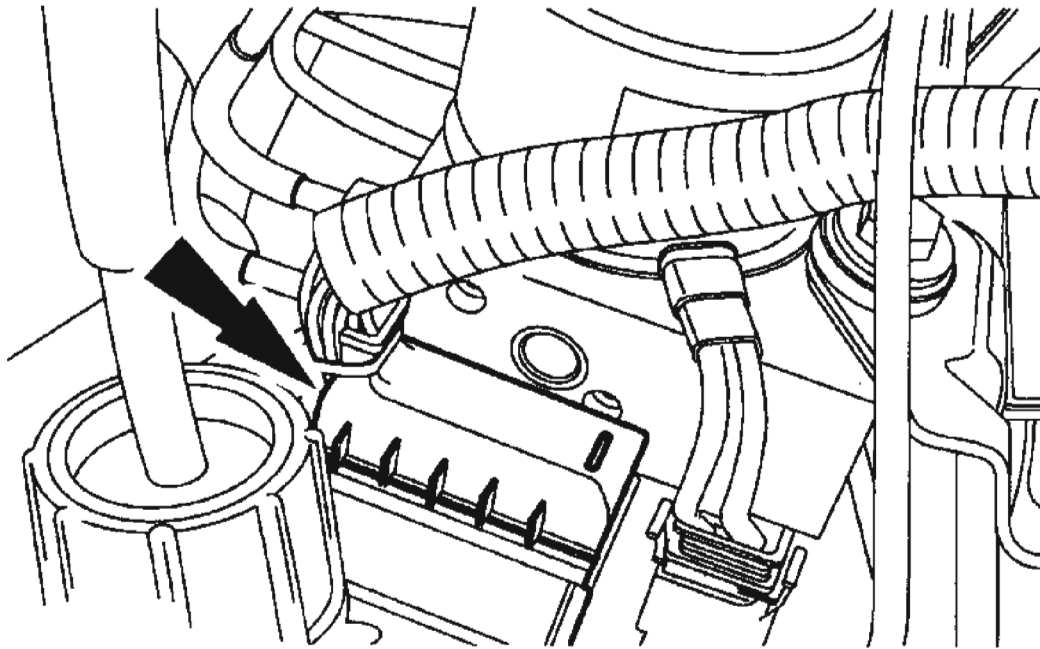
### HYDRAULIC CONTROL UNIT

#### Removal and Installation

**WARNING:** Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with eyes. Wash hands thoroughly after handling. If brake fluid contacts eyes, flush eyes with running water for 15 minutes. Get medical attention if irritation persists. If taken internally, drink water and induce vomiting. Get medical attention immediately.

**CAUTION:** Brake fluid is harmful to painted and plastic surfaces. If brake fluid is spilled onto a painted or plastic surface, immediately wash it with water.

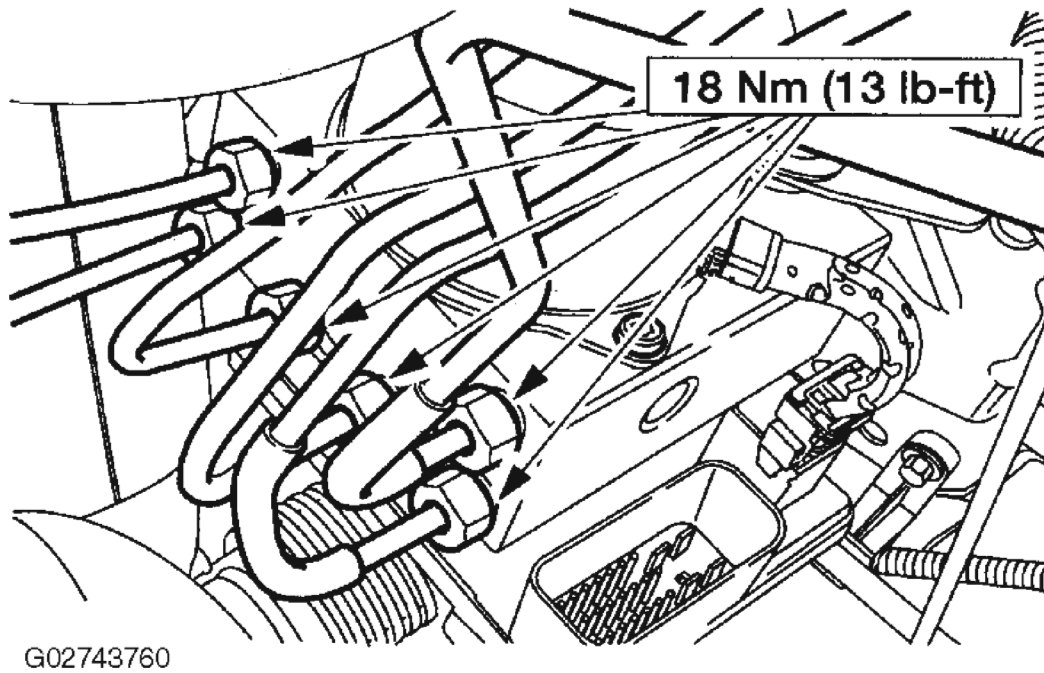
1. Disconnect the battery negative cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
2. Remove the air cleaner and the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING** .
3. Disconnect the electrical connector.



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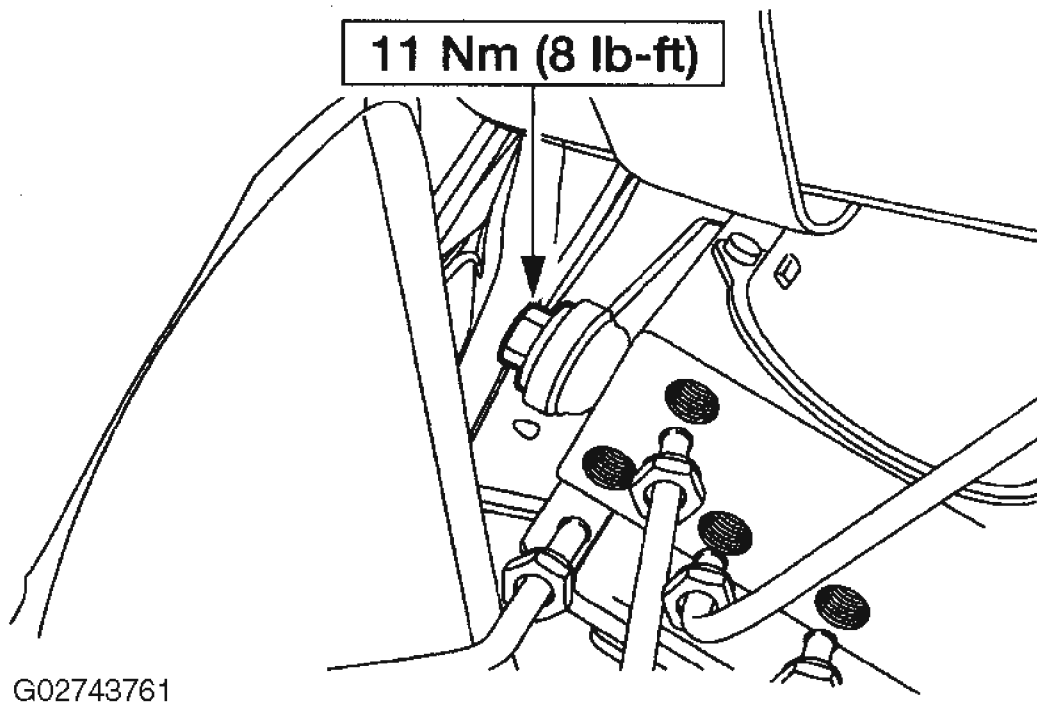
**Fig. 15: Disconnecting Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

4. Disconnect the brake lines.



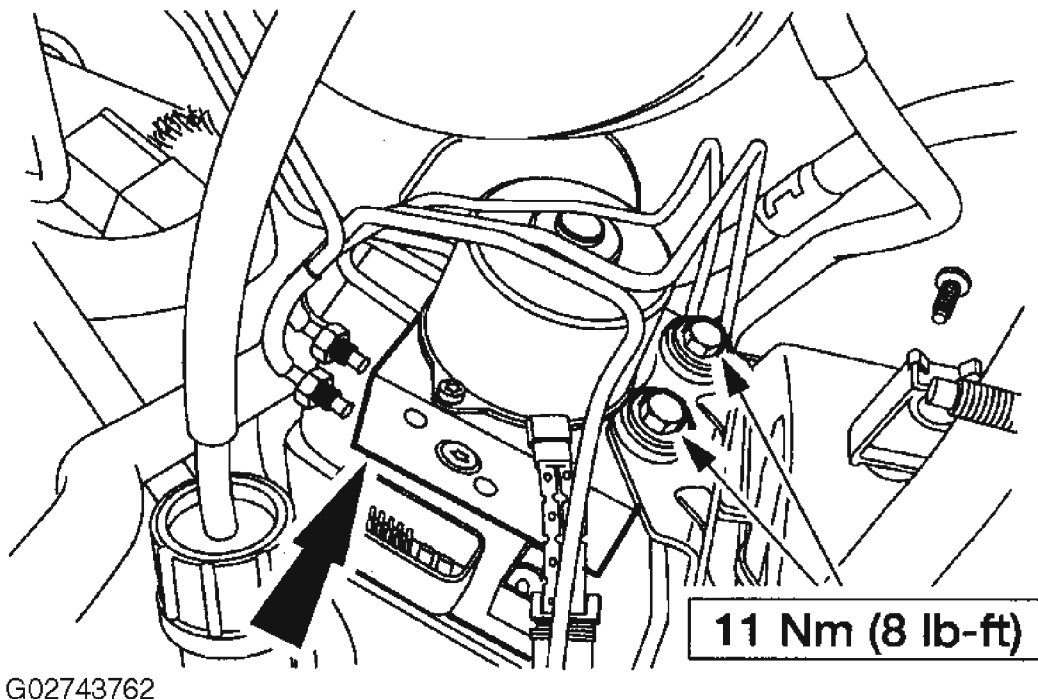
**Fig. 16: Disconnecting Brake Lines**  
Courtesy of FORD MOTOR CO.

5. Remove the bolt.



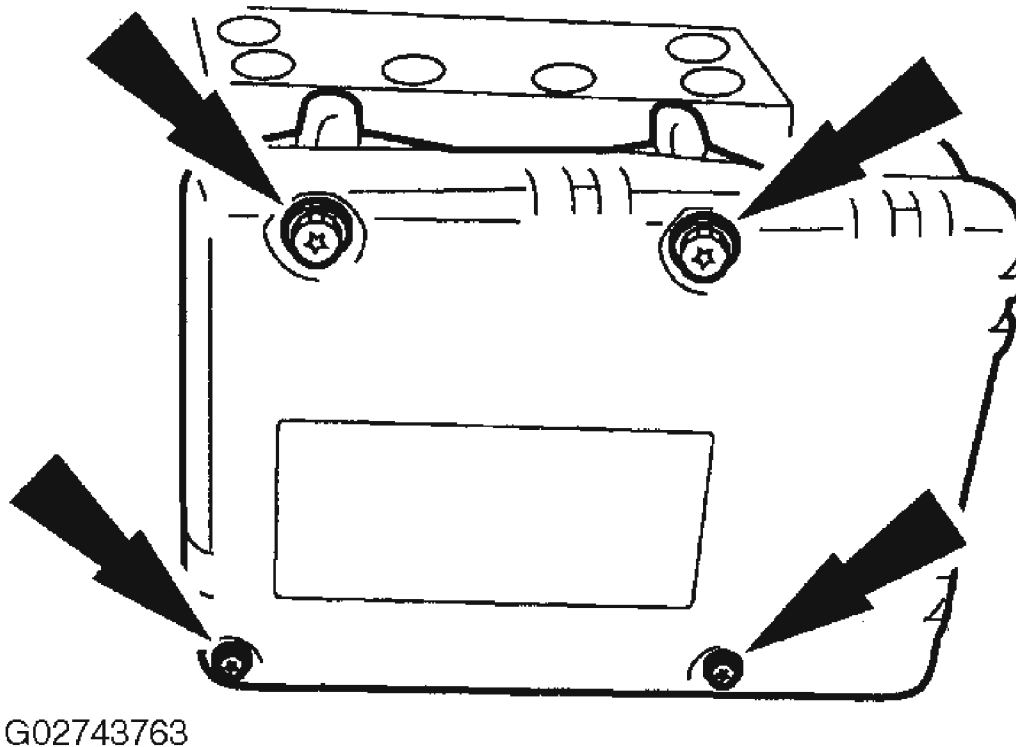
**Fig. 17: Removing Bolt**  
Courtesy of FORD MOTOR CO.

6. Remove the bolts and the HCU.



**Fig. 18: Removing Bolts And HCU**  
Courtesy of FORD MOTOR CO.

**NOTE:** The 4x2 module cannot be interchanged with the 4x4 module.  
The 4x4 module is interchangeable with the 4x2 module.



**Fig. 19: Removing Screws And Control Module**  
Courtesy of FORD MOTOR CO.

7. Remove the screws and the control module, if necessary.

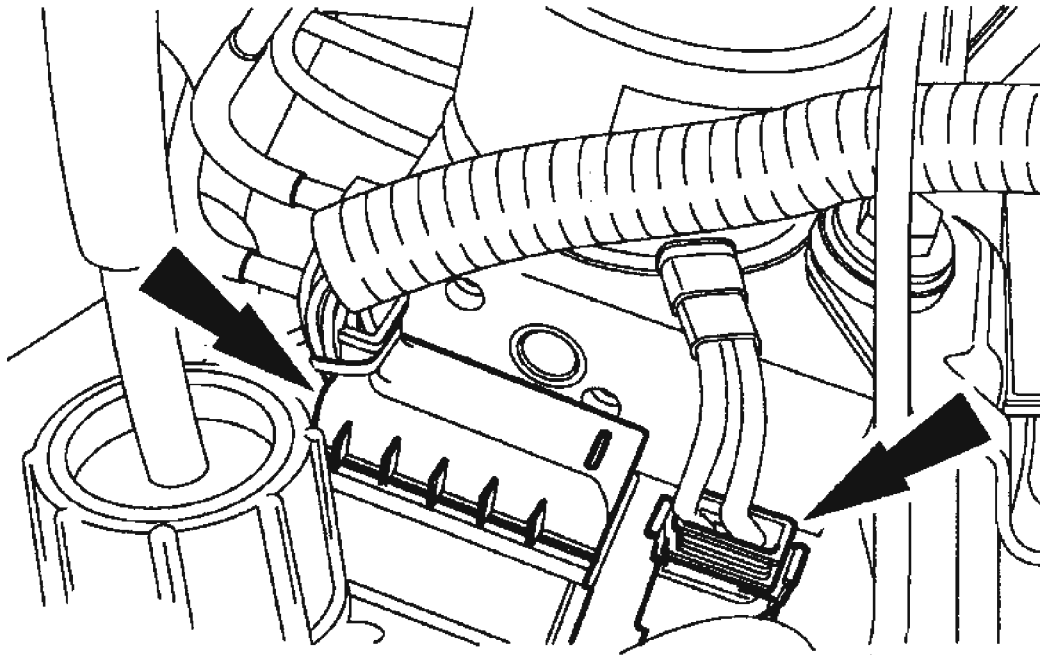
**NOTE:**      **Bleed the HCU after performing this procedure. For additional information, refer to BRAKE SYSTEM-GENERAL INFORMATION .**

8. To install, reverse the removal procedure.

#### **MODULE - ANTI-LOCK BRAKE CONTROL**

##### **Removal and Installation**

1. Disconnect the battery negative cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
2. Disconnect the electrical connectors.

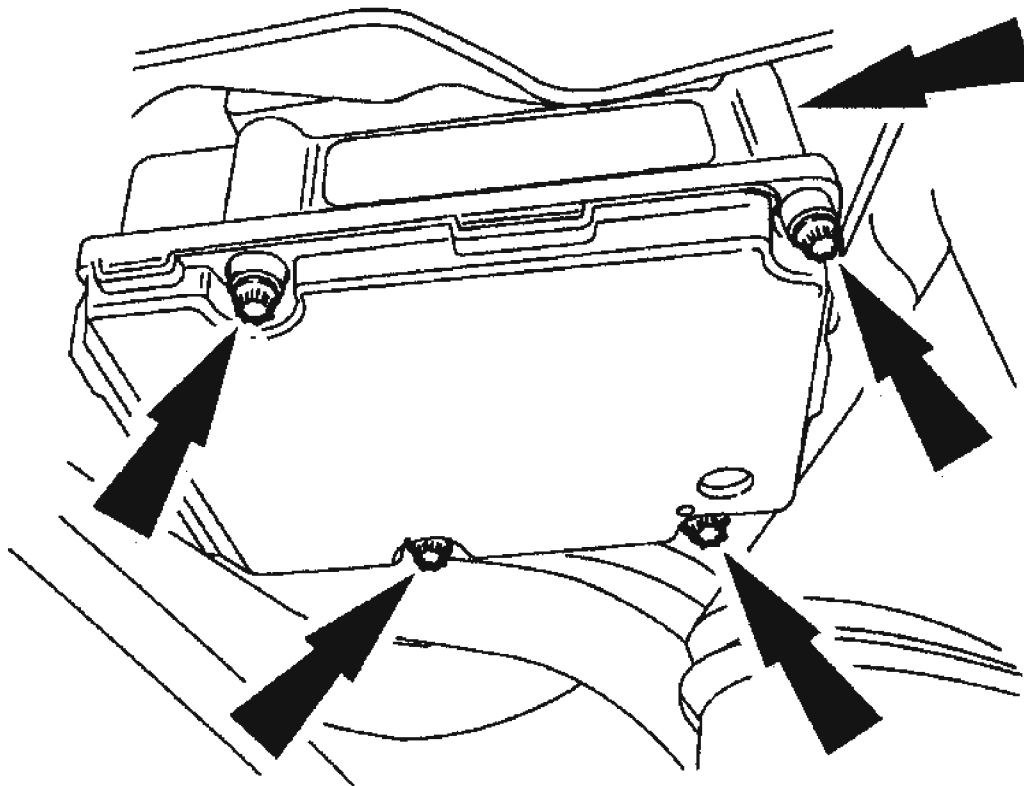


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**Fig. 20: Disconnecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

3. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING** .
4. Remove the screws and the control module.





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**Fig. 21: Removing Screws And Control Module**  
Courtesy of FORD MOTOR CO.

**NOTE:** The 4x2 module cannot be interchanged with the 4x4 module.  
The 4x4 module is interchangeable with the 4x2 module.

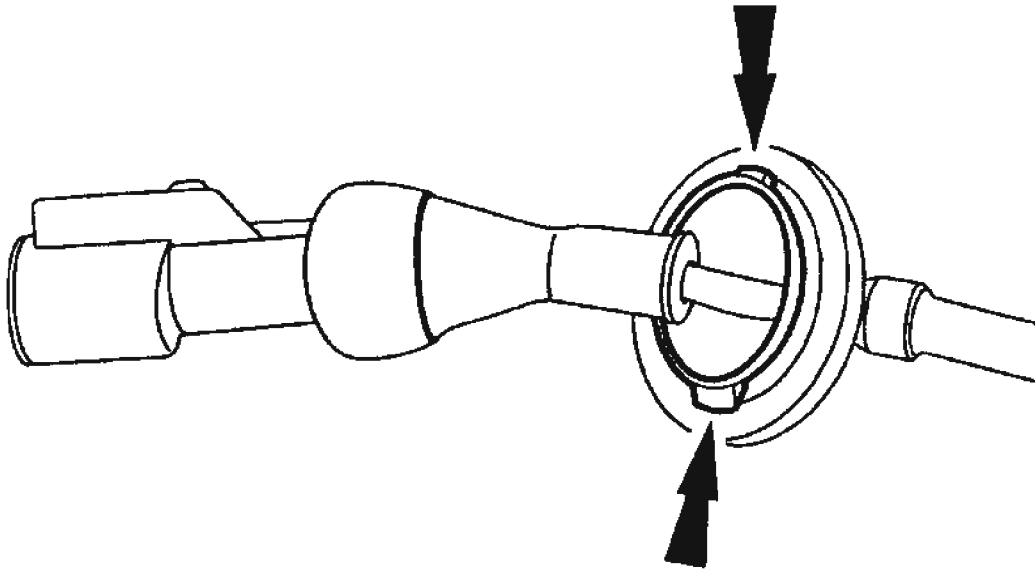
5. To install, reverse the removal procedure.

#### SENSOR - FRONT

##### Removal and Installation

1. Remove the wheel and tire.

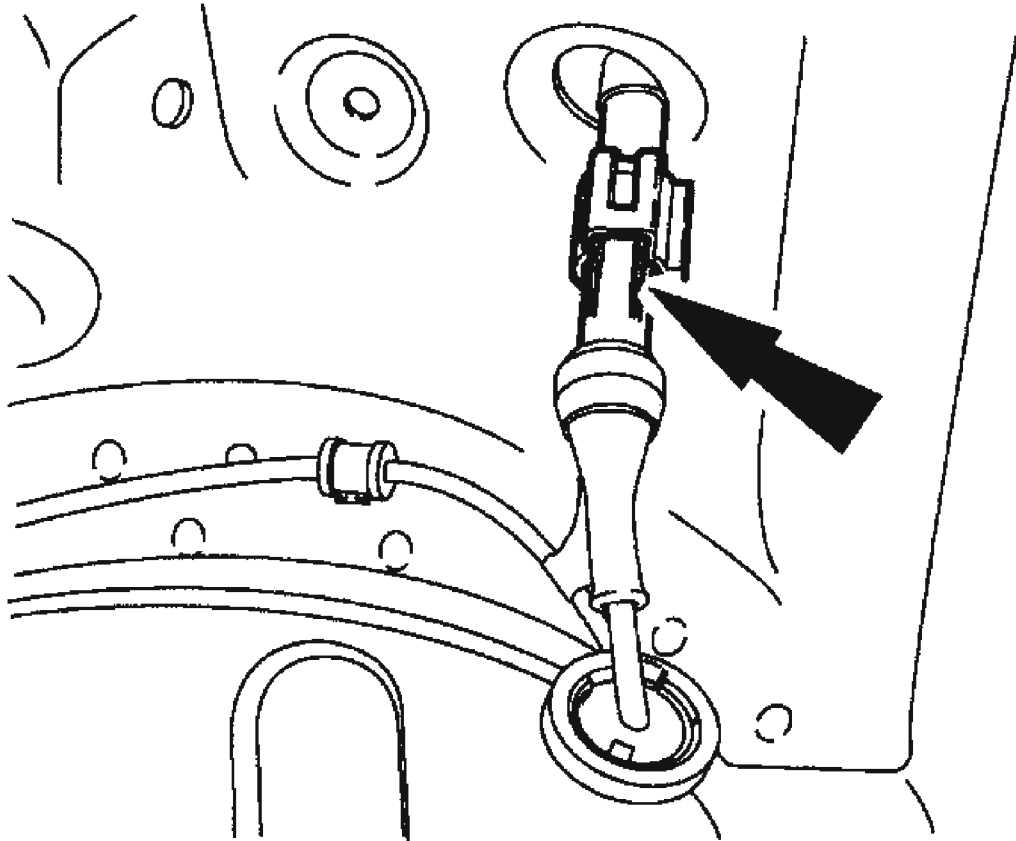
**CAUTION:** Care must be taken during the removal of the plug to prevent damage. If the plug is damaged, a new sensor may need to be installed even though the sensor is functional in all other aspects.



G042743766

**Fig. 22: Removing Grommet From Body**  
**Courtesy of FORD MOTOR CO.**

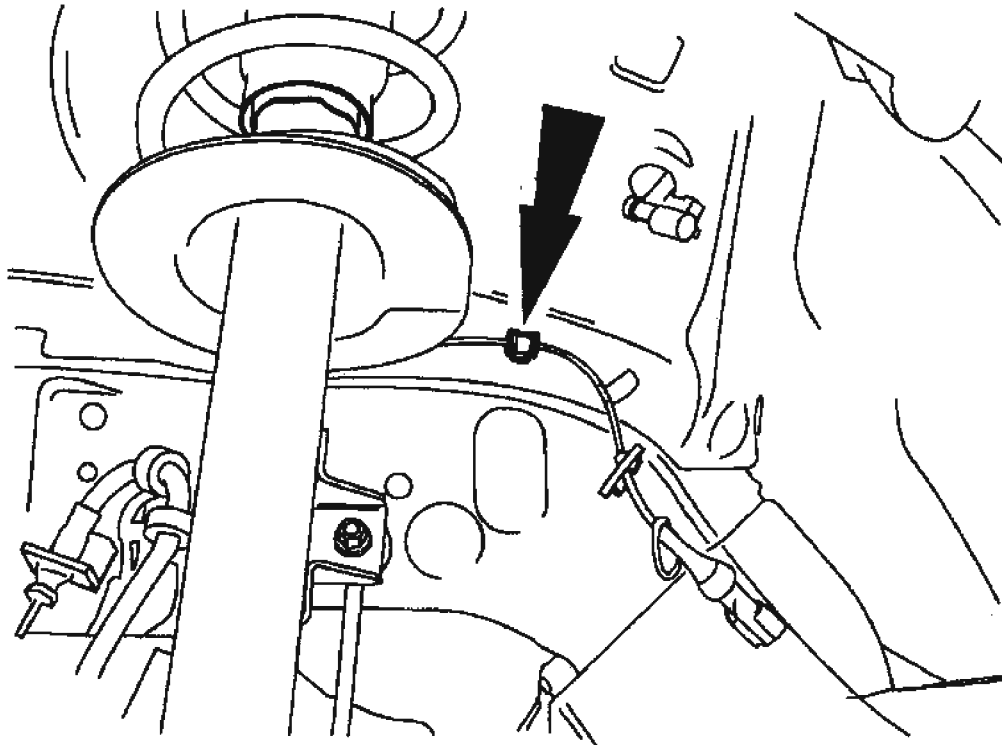
2. Remove the grommet from the body.
  - When removing the body plug, rotate the plug into a position which allows the use of a small screwdriver to release the tabs on the underside of the body plug. These 2 tabs are located at right angles to the sensor wire.
3. Disconnect the sensor wiring.



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**Fig. 23: Disconnecting Sensor Wiring**  
Courtesy of FORD MOTOR CO.

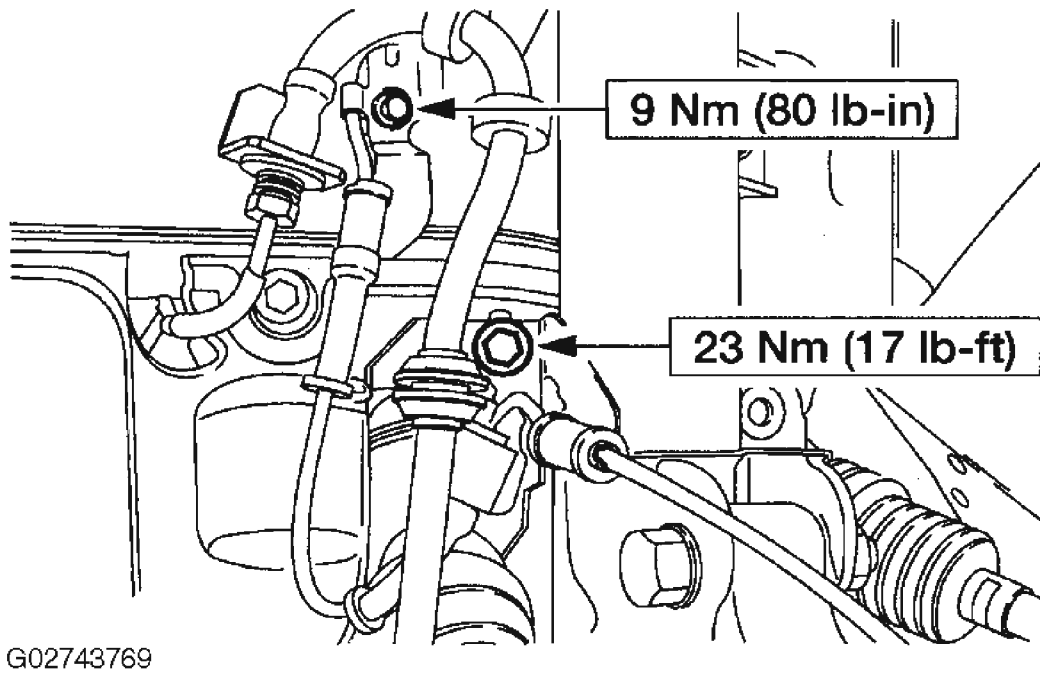
4. Detach the retainer.



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**Fig. 24: Detaching Retainer**  
Courtesy of FORD MOTOR CO.

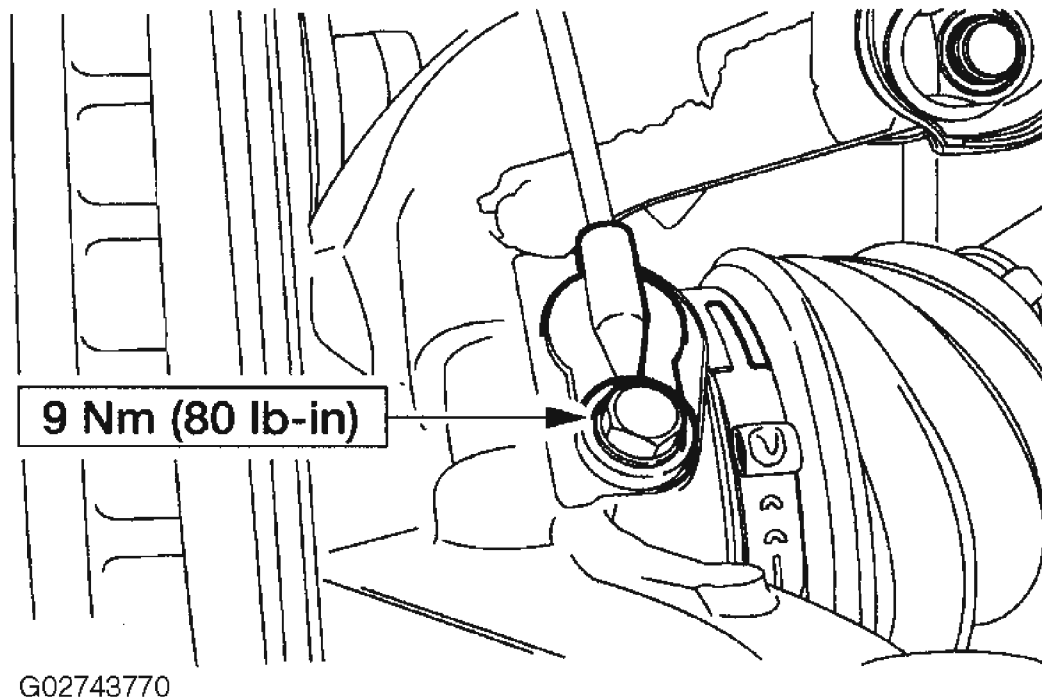
5. Remove the bolts.



**Fig. 25: Removing Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Clean off any dirt that may have collected around the sensor before removal.



**Fig. 26: Removing Bolt And Sensor**  
Courtesy of FORD MOTOR CO.

6. Remove the bolt and the sensor.

**NOTE:** Thoroughly clean the mounting surface.

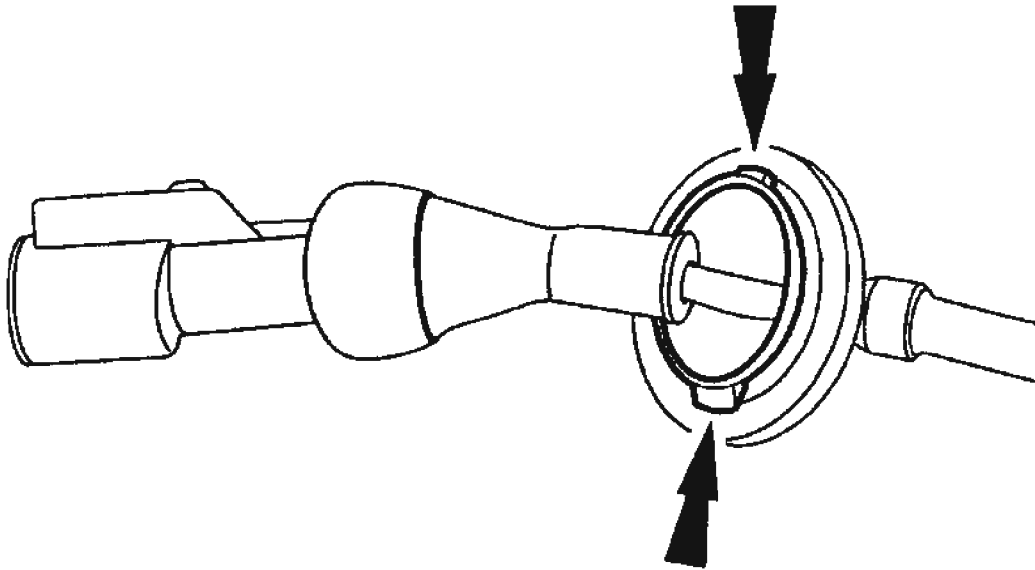
7. To install, reverse the removal procedure.

## SENSOR - REAR

### Removal and Installation

1. Remove the wheel and tire.

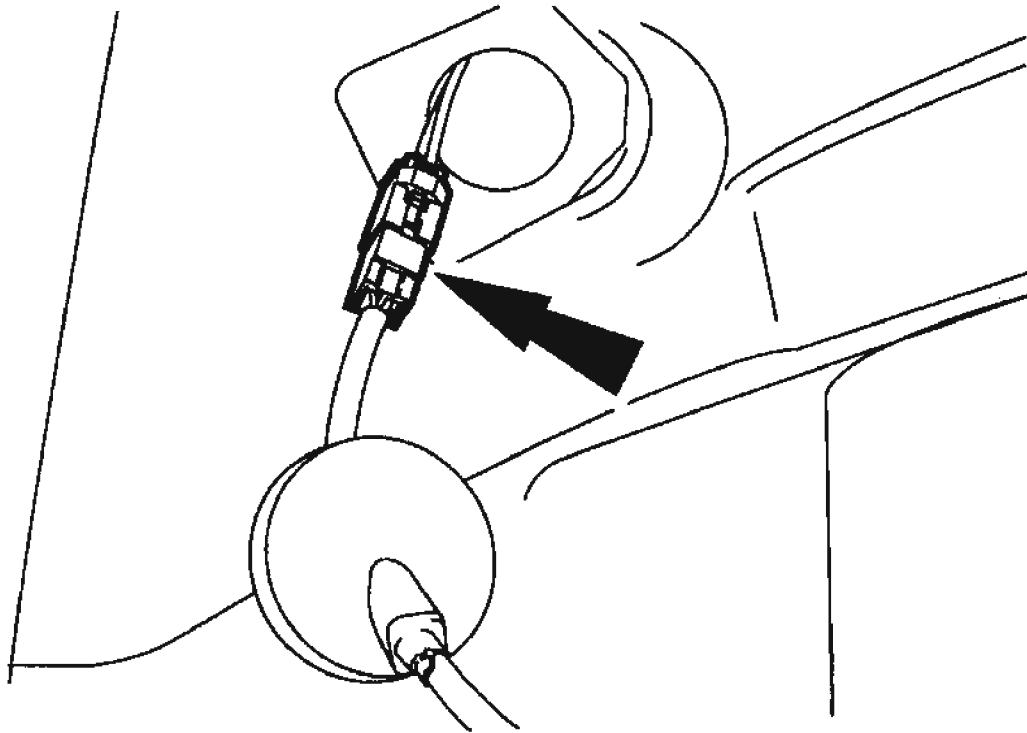
**CAUTION:** Care must be taken during the removal of the plug to prevent damage. If the plug is damaged, a new sensor may need to be installed even though the sensor is functional in all other aspects.



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**Fig. 27: Removing Grommet From Body**  
**Courtesy of FORD MOTOR CO.**

2. Remove the grommet from the body.
  - When removing the body plug, rotate the plug into a position which allows the use of a small screwdriver to release the tabs on the underside of the body plug. These 2 tabs are located at right angles to the sensor wire.
3. Disconnect the sensor wiring.

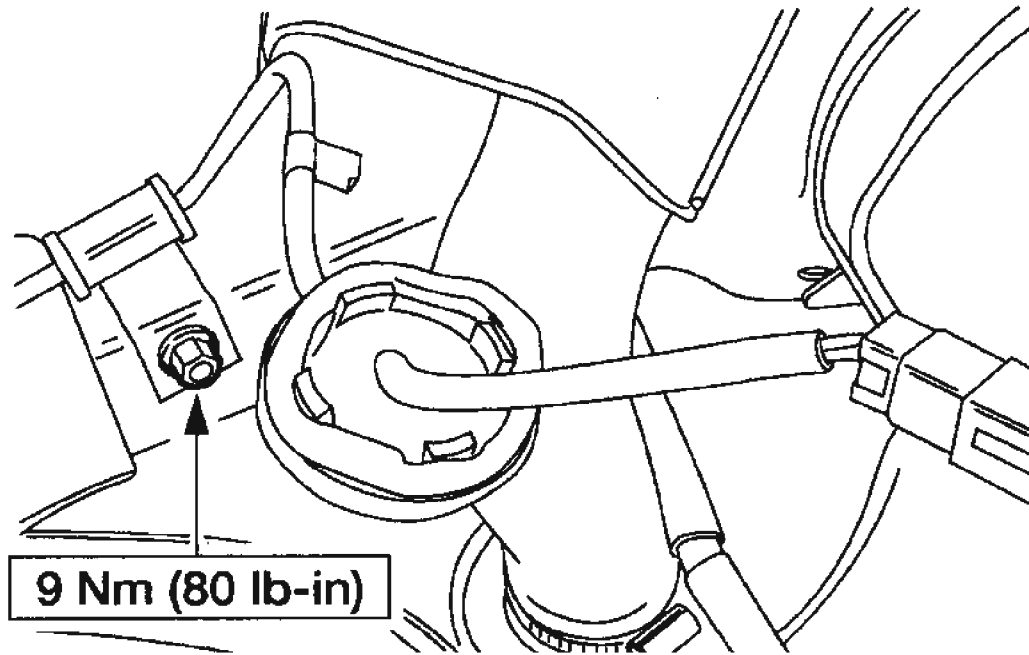


G02743772

**Fig. 28: Disconnecting Sensor Wiring**  
Courtesy of FORD MOTOR CO.

4. Detach the bolt.

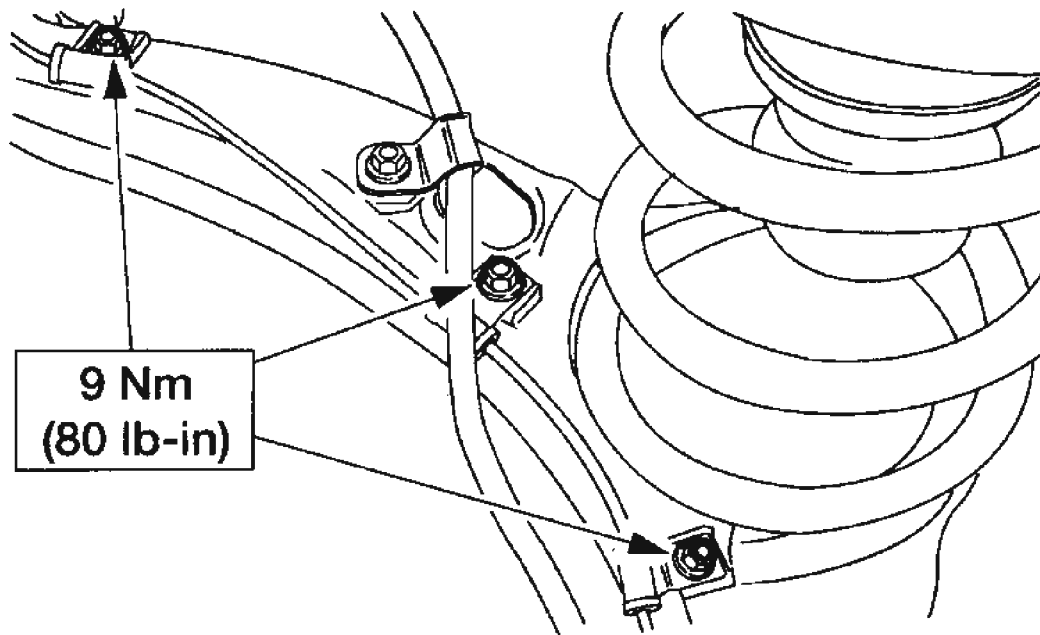




G02743773

**Fig. 29: Detaching Bolt**  
Courtesy of FORD MOTOR CO.

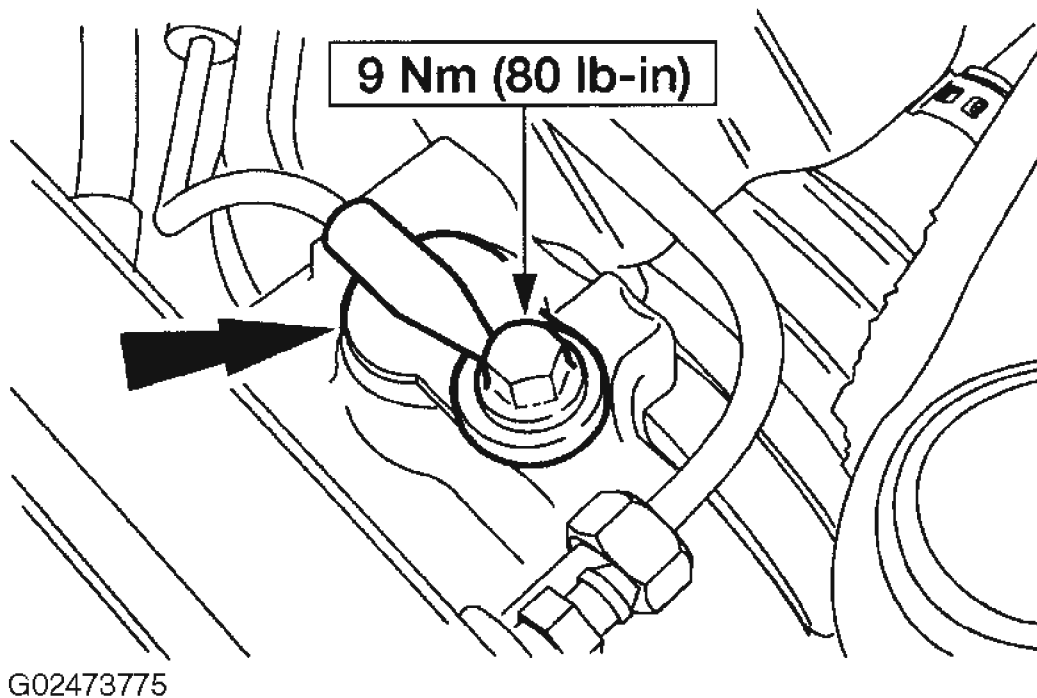
5. Remove the bolts.



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**Fig. 30: Removing Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Clean off any dirt that may have collected around the sensor before removal.



**Fig. 31: Removing Bolt And Sensor**  
Courtesy of FORD MOTOR CO.

6. Remove the bolt and the sensor.

**NOTE:** Thoroughly clean the mounting surface.

7. To install, reverse the removal procedure.

#### SENSOR INDICATOR - FRONT

##### Removal and Installation

1. The front anti-lock brake sensor indicator is attached to the halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS**.

#### SENSOR INDICATOR - REAR

##### Removal and Installation

1. The rear anti-lock brake sensor indicator is attached to the halfshaft. For additional information, refer to **REAR DRIVE HALFSHAFTS**.

**2001 BRAKES****Anti-Lock - Escape****DESCRIPTION & OPERATION****ANTI-LOCK BRAKE SYSTEM (ABS)**

During normal driving and braking operation, ABS performs by automatically modulating braking pressure during an emergency stop to prevent wheel lock-up. Each wheel speed sensor constantly sends a digital signal to the Anti-Lock Brake Control Module (ABCM). This information is translated to wheel rotation speed. When the ABCM determines that wheel lock-up is about to occur, it activates electromagnetic solenoid valve (dump valve), located inside Hydraulic Control Unit (HCU), to increase or decrease hydraulic pressure to each wheel. HCU is serviceable, but is not repairable.

**NOTE:**      **A slight pulsation is usually felt through brake pedal during ABS operation.**

Electronic Brake Force Distribution (EBD) function is an additional program to the conventional ABS program that allows greater utilization of rear brakes up to the point of ABS intervention. EBD replaces Pressure Conscious Regulator Valves (PCRV) used in conventional braking systems. EBD can come into operation during regular braking, depending on the load of the vehicle and surface friction. In contrast to the PCRV, during EBD control, the brake force is determined not by brake pressure or vehicle speed but by wheel slip.

**BLEEDING BRAKE SYSTEM**

**WARNING:** It is necessary to use New Generation Star (NGS) tester to properly bleed ABS hydraulic system. Other scan tools may be used, but may have limited functions.

**CONVENTIONAL BLEEDING**

1. Remove dust cap from right rear wheel bleeder screw. Connect hose to bleeder screw. Submerge other end of hose in container of clean brake fluid.
2. Loosen bleeder screw while an assistant presses brake pedal through its full travel. Close bleeder screw. Release brake pedal. Wait 5 seconds. Repeat procedure until air bubbles are no longer present at submerged end of hose.
3. Repeat procedure at left rear, right front and left front wheels. Refill reservoir after each wheel is bled. When complete, adjust fluid level to .16" (4.1 mm) below MAX line.

**PRESSURE BLEEDING**

1. Clean reservoir cap area. Connect pressure bleeder. Remove dust cap from right rear wheel bleeder screw. Attach hose to bleeder screw. Submerge other end of hose in container of clean brake fluid.
2. Open valve on bleeder tank to pressurize system. Maintain system pressure at less than 50 psi (3.5 kg/cm<sup>2</sup>). With brake pedal released, open bleeder screw until air bubbles no longer emerge from submerged end of hose.
3. Repeat procedure at left rear, right front and left front wheels. When complete, close pressure bleeder tank valve. Remove adapter and adjust fluid level to .16" (4.1 mm) below MAX line.

### **ABS BLEEDING USING SCAN TOOL**

**NOTE:** Engine must be running to provide adequate voltage to ABS control module during anti-lock control portion of following service bleed procedure. Ensure brake fluid reservoir level remains constant during bleeding procedure.

1. This procedure is used to bleed Hydraulic Control Unit (HCU). Connect New Generation Star (NGS) Tester (077-00500) to Data Link Connector (DLC). Enter vehicle identification information. Ensure master cylinder reservoir is full and remains full during this procedure. Use DOT 3 brake fluid. Turn ignition to START position (engine running).
2. Choose DIAGNOSTIC DATA LINK from menu selection. Next, choose ABS MODULE, then FUNCTION TEST. Prepare to bleed right rear bleeder. Depress and hold brake pedal to half of its travel. Select SYSTEM BLEED FUNCTION and depress trigger of NGS. Bleed until clear, bubble-free fluid flows. Repeat procedure for left rear, right front and left front bleeders. Follow scan tool instructions until SYSTEM BLEED PROCEDURE COMPLETE message is displayed.

### **DIAGNOSIS & TESTING**

**WARNING:** Ensure ignition is off before disconnecting or reconnecting any ABS electrical component.

### **VISUAL INSPECTION**

1. Verify customer concern by operating system.
2. Ensure master cylinder reservoir is full and parking brake is fully released. Inspect HCU, ABS relay, brake position switch, wheel speed sensors and brake lines for damage. Inspect wheel bearings for looseness or damage. Repair items as necessary. Ensure all ABS system fuses are okay. See **WIRING DIAGRAMS**. Check ABS warning indicator bulb. Check for damage to wiring harness. Check for loose or corroded connectors. Make necessary repairs.

3. Inspect parking brake cable or wear or damage. Inspect tire pressure, and tire size or mismatched tires.
4. Inspect maxi-fuse No. 24 (60-amp) and mini-fuse No. 14 (25-amp) in battery junction box. Inspect fuses No. 5 (5-amp) and 24 (15-amp) in central junction box.
5. If problem remains after inspection, retrieve trouble codes. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** . If DTCs are retrieved, go to **DIAGNOSTIC TROUBLE CODE INDEX** table. Perform appropriate test. If no DTCs related to concern are retrieved, see **SYMPTOM DIAGNOSIS** . If ABS control module cannot be accessed using scan tool, see appropriate MODULE COMMUNICATIONS NETWORK article in ACCESSORIES & EQUIPMENT.

### RETRIEVING DIAGNOSTIC TROUBLE CODES

**NOTE:** Procedure is used for retrieving continuous Diagnostic Trouble Codes (DTCs).

1. Connect New Generation Star (NGS) scan tester to Data Link Connector (DLC). Turn ignition switch to RUN position unless otherwise instructed by scan tool. Rotate dial on scan tester to DIAGNOSTIC DATA LINK menu, and press trigger.

**NOTE:** If instructed to retrieve Diagnostic Trouble Codes (DTC) from a specified test procedure, ensure ignition is in proper position as listed in test procedure or test will fail.

2. Rotate dial on scan tester to highlight desired module. Ensure DIAGNOSTIC TEST MODES is highlighted, and press trigger. Rotate dial on scan tester to highlight RETRIEVE/CLEAR CONTINUOUS DTC, and press trigger. Press button No. 3 to start.
3. Record all DTCs that are displayed for specified module. See **DIAGNOSTIC TROUBLE CODE INDEX** table.

### CLEARING DIAGNOSTIC TROUBLE CODES

**NOTE:** If instructed to clear Diagnostic Trouble Codes (DTC) from a specified test procedure, ensure ignition is in proper position as listed in test procedure or test will fail.

1. Connect New Generation Star (NGS) tester on Data Link Connector (DLC). Turn ignition switch to RUN position unless otherwise instructed by scan tool. Rotate dial on scan tester to DIAGNOSTIC DATA LINK menu, and press trigger.
2. Rotate dial on scan tester to highlight desired module. Ensure DIAGNOSTIC TEST MODES is highlighted, and press trigger. Rotate dial on scan tester to highlight RETRIEVE/CLEAR CONTINUOUS DTC and press trigger. Press button No. 3 to

## 2001 Ford Escape

### 2001 BRAKES Anti-Lock - Escape

start.

- To clear an individual DTC from a selected module, rotate dial on scan tool to highlight DTC to be cleared. Press button No. 8. This will clear only that DTC from that module. To clear all DTCs from a selected module, press button No. 7.

## DIAGNOSTIC TROUBLE CODE INDEX

DTC	Circuit Description	Go To Test
B1342	ABCM Internal Failure	(1)
B1676	Battery Voltage Out Of Range	<u>A</u>
C1095	ABS Hydraulic Pump Motor Circuit Failure	<u>B</u>
C1145	RF WSS Circuit Failure	<u>C</u>
C1155	LF WSS Circuit Failure	<u>C</u>
C1165	RR WSS Circuit Failure	<u>C</u>
C1175	LR WSS Circuit Failure	<u>C</u>
C1233	LF WSS Signal Failure	<u>D</u>
C1234	RF WSS Signal Failure	<u>D</u>
C1235	RR WSS Signal Failure	<u>D</u>
C1236	LF WSS Signal Failure	<u>D</u>
(1) Replace ABCM.		

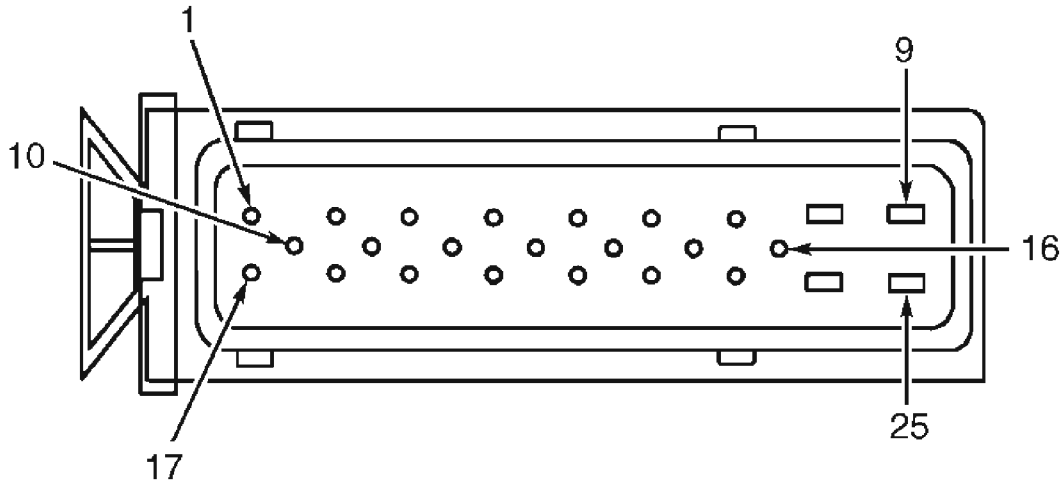
## SYMPTOM DIAGNOSIS

### ABS SYMPTOM CHART

Condition	Go To Test
Loss Of Sensor Signal During Vehicle Deceleration	<u>D</u>
No Communication With ABCM	<u>1</u>
Sensor Signal Drops Out At Low Speed	<u>D</u>
Yellow ABS Warning Indicator Does Not Self-Check	<u>2</u>
Yellow ABS Warning Indicator Is Always On, No DTCs Present	<u>3</u>

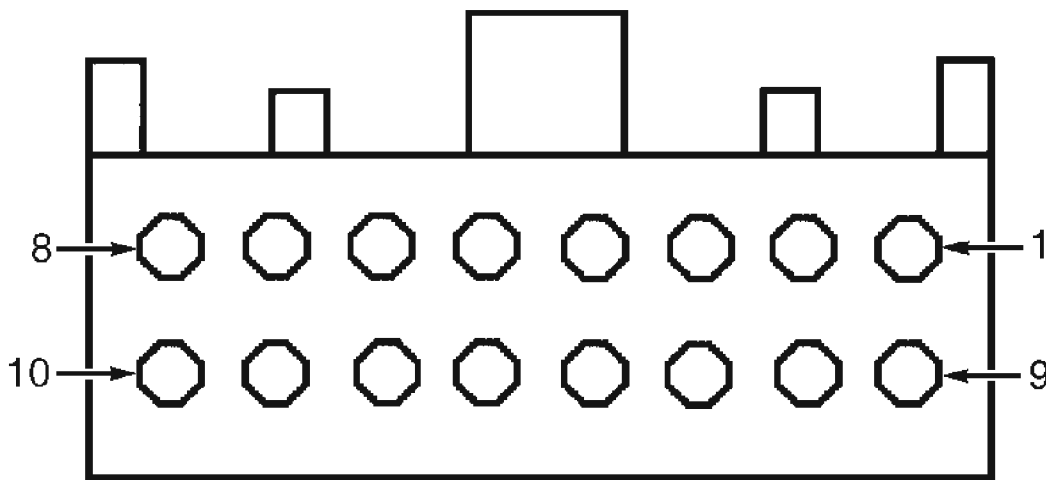
## CONNECTOR TERMINAL LOCATIONS

Use illustrations to identify connector terminal locations. See **Fig. 1 -Fig. 2** .



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**Fig. 1: Identifying ABCM Connector (C155) Terminals**  
Courtesy of FORD MOTOR CO.



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**Fig. 2: Identifying Instrument Cluster Connector (C220b) Terminals**  
Courtesy of FORD MOTOR CO.

## SYMPTOM TESTS

**NOTE:** To identify circuits and wire colors referenced in testing, see WIRING DIAGRAMS . To identify terminals referenced in testing,



**see CONNECTOR TERMINAL LOCATIONS . After each repair, clear DTCs and repeat self-test.**

**TEST 1: NO COMMUNICATION WITH ANTI-LOCK CONTROL MODULE**

1. Turn ignition off. Disconnect ABCM connector (C155). Connect EEC-IV 60-pin breakout box. Turn ignition on. Using a DVOM, measure voltage between breakout box terminal No. 20 (Light Blue wire) and ground. If voltage is more than 10 volts, go to next step. If voltage is less than 10 volts, repair open in Light Blue wire. See **WIRING DIAGRAMS** .
2. Turn ignition off. Measure resistance between breakout box terminal No. 8 (Black wire) and ground. Measure resistance between breakout box terminal No. 24 (Black wire) and ground. If resistances are less than 5 ohms, see appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. If resistance is more than 5 ohms, repair open in circuit(s).

**TEST 2: YELLOW ABS WARNING INDICATOR DOES NOT SELF-CHECK**

1. Turn ignition off. Disconnect ABCM connector (C155). Connect EEC-IV 60-pin breakout box. Turn ignition on. Connect a fused (10 amp) jumper wire between breakout box terminal No. 15 (Dark Green wire) and ground. If Yellow ABS warning indicator illuminates, verify that all repair procedures have been performed and DTCs have been repaired. Replace ABCM. If Yellow ABS warning indicator does not illuminate, go to next step.
2. Disconnect instrument cluster connector (C220b). Using DVOM, measure resistance between breakout box terminal No. 16 (Black/Yellow wire) and instrument cluster connector (C220b) terminal No. 7 (Black/Yellow wire). If resistance is less than 5 ohms, replace instrument cluster printed circuit. If resistance is more than 5 ohms, repair Black/Yellow wire.

**TEST 3: YELLOW ABS WARNING INDICATOR IS ALWAYS ON & NO DTCS RETRIEVED**

1. Turn ignition off. Disconnect ABCM connector (C155). Turn ignition on. If Yellow ABS light illuminates, go to next step. If Yellow ABS light does not illuminate, go to **TEST 2: YELLOW ABS WARNING INDICATOR DOES NOT SELF-CHECK** .
2. Turn ignition off. Press shorting bar at ABCM. If Yellow ABS light is illuminated, repair Black/Yellow wire. If Yellow ABS light is off, reseal connector. If light remains on, replace ABCM.

**DIAGNOSTIC TESTS**

**NOTE:** To identify circuits and wire colors referenced in testing, see **WIRING DIAGRAMS** . To identify terminals referenced in testing, see **CONNECTOR TERMINAL LOCATIONS** . After each repair,

**clear DTCs and repeat self-test.**

**NOTE:** Any time a WSS is removed, thoroughly clean mounting surfaces. On front WSS, apply high-temperature 4WD front axle and wheel bearing grease.

**TEST A: DTC B1676 - BATTERY VOLTAGE OUT OF RANGE**

1. Check recent vehicle history. If vehicle has been jump-started by a tow truck within 2 weeks, system is okay. If vehicle has not been jump-started by a tow truck within 2 weeks, go to next step.
2. Using DVOM, measure voltage between positive and negative battery terminals. If voltage is 9-19 volts, go to next step. If voltage is not 9-19 volts, repair charging system. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS.
3. Turn ignition switch to START position (engine running). With engine running at 2000 RPM, measure voltage between positive and negative battery terminals. If voltage is 9-19 volts, go to next step. If voltage is not 9-19 volts, repair charging system. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS.
4. Turn ignition off. Disconnect ABCM connector (C155). Connect EEC-IV 60-pin breakout box. Turn ignition on. Measure voltage between breakout box terminal No. 20 (Light Blue wire) and ground. See **WIRING DIAGRAMS** . If voltage is more than 10 volts, go to next step. If voltage is less than 10 volts, repair Light Blue wire.
5. Measure voltage between breakout box terminal No. 25 (Red wire) and ground. If voltage is more than 10 volts, go to next step. If voltage is less than 10 volts, repair Red wire.
6. Measure voltage between breakout box terminal No. 9 (Yellow/Light Green wire) and ground. If voltage is more than 10 volts, go to next step. If voltage is less than 10 volts, repair Yellow/Light Green wire.
7. Turn ignition off. Measure resistance between breakout box terminal No. 8 (Black wire) and ground. Measure resistance between breakout box terminal No. 24 (Black wire) and ground. If resistances are less than 5 ohms, replace ABCM. If resistances are more than 5 ohms, repair faulty circuit.

**TEST B: DTC C1095 - ABS HYDRAULIC PUMP MOTOR CIRCUIT FAILURE**

1. Turn ignition on. Check ABS pump for continuous operation. If pump motor runs continuously, replace ABCM. If pump motor does not run continuously, go to next step.
2. Connect scan tool. Turn ignition on. Using scan tool, actuate pump motor. If ABS pump motor does not operate, go to next step. If ABS pump motor operates, clear DTC.

Check Yellow ABS warning indicator while driving vehicle at speed greater than 20 MPH. DO NOT apply brakes. If Yellow ABS warning indicator illuminates, replace ABCM. Using scan tool, clear DTCs and repeat self-test. If Yellow ABS warning indicator does not illuminate, system is okay.

3. Turn ignition off. Disconnect pump motor connector. See **WIRING DIAGRAMS** . Connect a fused (50 amp) jumper wire between positive battery terminal and Red ABS pump motor terminal. Connect a jumper wire between negative battery terminal and Brown ABS pump motor terminal. If ABS pump motor operates, go to next step. If ABS pump motor does not operate, replace HCU.
4. Turn ignition off. Disconnect ABCM connector (C155). Connect EEC-IV 60-pin breakout box. Turn ignition on. Using DVOM, measure voltage between breakout box terminal No. 9 (Yellow/Light Green wire) and ground. If voltage is more than 10 volts, go to next step. If voltage is less than 10 volts, repair Yellow/Light Green wire.
5. Turn ignition off. Measure resistance between breakout box terminal No. 8 (Black wire) and ground. Measure resistance between breakout box terminal No. 24 (Black wire) and ground. If resistances are less than 5 ohms, replace ABCM. If resistances are more than 5 ohms, repair faulty circuit.

#### TEST C: DTC C1145, C1155, C1165 & C1175 - WHEEL SPEED SENSOR INPUT CIRCUIT FAILURE

1. Turn ignition off. Disconnect ABCM connector (C155). Connect EEC-IV 60-pin breakout box. Turn ignition on. Using DVOM, measure voltage of suspect WSS circuits between breakout box terminals. See **BREAKOUT BOX WHEEL SPEED SENSOR VOLTAGE CHECK** table. If voltage is present, repair faulty circuit. If voltage is not present, go to next step.
2. Turn ignition off. Measure resistance of suspect WSS circuits between breakout box terminals. See **BREAKOUT BOX WHEEL SPEED SENSOR VOLTAGE CHECK** table. If resistance is more than 10,000 ohms, go to next step. If resistance is less than 10,000 ohms, repair faulty circuit.
3. Disconnect suspect WSS. Measure resistance between breakout box and WSS terminals. See **BREAKOUT BOX WHEEL SPEED SENSOR RESISTANCE CHECK** table. If resistance is less than 5 ohms, go to next step. If resistance is more than 5 ohms, repair faulty circuit.
4. Reconnect ABCM connector (C155). Turn ignition on. Measure voltage between suspect WSS terminals on harness side. If voltage is more than 9 volts, replace WSS. If voltage is less than 9 volts, replace ABCM.

#### BREAKOUT BOX WHEEL SPEED SENSOR VOLTAGE CHECK

DTC/Sensor	Breakout Box Terminal No. (Wire Color)	Breakout Box Terminal No. (Wire Color)
C1145/RF	4 (Yellow/Red)	3 (Yellow/Black)
C1155/LF	8 (Tan/Orange)	17 (Tan/Black)

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C1165/RR	6 (Red/Pink)	7 (Pink/Black)
C1175/LR	22 (Light Green/Red)	21 (Light Green/Black)

**BREAKOUT BOX WHEEL SPEED SENSOR RESISTANCE CHECK**

DTC/Sensor	Breakout Box Terminal No. (Wire Color)	WSS Terminal No. (Wire Color)
C1145/RF	4 (Yellow/Red)	2 (Yellow/Red)
C1145/RF	3 (Yellow/Black)	1 (Yellow/Black)
C1155/LF	18 (Tan/Orange)	2 (Tan/Orange)
C1155/LF	17 (Tan/Black)	1 (Tan/Black)
C1165/RR	6 (Red/Pink)	1 (Red/Pink)
C1165/RR	7 (Pink/Black)	2 (Pink/Black)
C1175/LR	22 (Light Green/Red)	1 (Light Green/Red)
C1175/LR	21 (Light Green/Black)	2 (Light Green/Black)

**TEST D: DTC C1233, C1234, C1235 & C1236 - WHEEL SPEED SENSOR OUTPUT CIRCUIT FAILURE**

1. Turn ignition on. Connect scan tool. Using scan tool, retrieve DTCs. If DTC C1145, C1155, C1165 or C1175 is present, go to **TEST C: DTC C1145, C1155, C1165 & C1175 - WHEEL SPEED SENSOR INPUT CIRCUIT FAILURE**. If these DTCs are not retrieved, go to next step.
2. Using scan tool, monitor ABCM PIDs "LF\_WSPD", "RF\_WSPD", "LR\_WSPD" and "RR\_WSPD" while driving vehicle at a constant speed. If PIDs are consistent, clear DTCs. Drive vehicle. Using scan tool, retrieve DTCs. If DTC C1233, C1234, C1235 or C1236 is present, replace ABCM. If PIDs are not consistent, go to next step.

**NOTE:** Inspect WSS wire carefully with good light. Failure to verify damage in sensor wire can lead to unnecessary installation of a new component.

3. Turn ignition off. Raise and support vehicle. Inspect suspect WSS mounting for looseness. Inspect WSS for excessive dirt, metal obstructions or damage. Clean as necessary. If WSS is okay, go to next step. If WSS is damaged, repair or replace WSS as needed.

**NOTE:** Inspect WSS wire carefully with good light. Failure to verify damage in sensor wire can lead to unnecessary installation of a new component.

4. Remove suspect WSS. Inspect ABS sensor indicator for damaged or missing teeth. Rotate wheel to verify that no teeth are missing. If ABS sensor indicator is damaged,

replace ABS sensor indicator. If ABS sensor indicator is okay, go to next step.

5. Turn ignition on. Using DVOM, measure voltage between suspect WSS terminals, harness side. See **WHEEL SPEED SENSOR VOLTAGE CHECK** table. If voltage is more than 9 volts, replace faulty sensor. If voltage is less than 9 volts, replace ABCM.

### WHEEL SPEED SENSOR VOLTAGE CHECK

DTC/Sensor	WSS Terminal No. (Wire Color)	WSS Terminal No. (Wire Color)
C1234/RF	2 (Yellow/Red)	1 (Yellow/Black)
C1233/LF	2 (Tan/Orange)	1 (Tan/Black)
C1235/RR	1 (Red/Pink)	2 (Pink/Black)
C1236/LR	1 (Light Green/Red)	2 (Light Green/Black)

### REMOVAL & INSTALLATION

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

### ANTI-LOCK BRAKE CONTROL MODULE

**CAUTION:** Electronic modules are sensitive to static electrical charges. If exposed to charges, damage my result.

**NOTE:** The 2WD module cannot be interchanged with 4WD module. The 4WD module is interchangeable with 2WD module.

#### Removal & Installation

1. Ensure ignition is off. Disconnect negative battery cable. Remove air cleaner and air cleaner outlet pipe. Disconnect electrical connectors.
2. Loosen ABCM connector mounting bolt. Remove 2 front and one rear control module mounting bolts. Raise and support vehicle. Remove control module screws and control module.
3. To install, reverse removal procedure. Tighten bolts and screws to specification. See **TORQUE SPECIFICATIONS**.

### HYDRAULIC CONTROL UNIT

**NOTE:** Hydraulic Control Unit (HCU) is not serviceable and cannot be pressure checked. If any HCU component is defective, HCU must be replaced as a complete unit.

#### Removal & Installation

**CAUTION:** If brake fluid spills on paintwork, area must be immediately washed down with cold water.

1. Disconnect negative battery terminal. Remove air cleaner and air cleaner outlet pipe. Disconnect electrical connector. Disconnect brake lines. Remove HCU retaining bolts and HCU.

**NOTE:** The 2WD module cannot be interchanged with 4WD module. The 4WD module is interchangeable with 2WD module.

2. Remove screws and control module, if necessary. Bleed HCU.
3. To install, reverse removal procedure. Tighten all bolts and screws to specification. See **TORQUE SPECIFICATIONS**.

#### SENSOR INDICATORS

##### Removal & Installation

Front and rear anti-lock brake sensor indicators are attached to half-shaft. See appropriate article in DRIVE AXLES.

#### WHEEL SPEED SENSORS

##### Removal & Installation

1. Disconnect negative battery cable. Loosen wheel nuts. Raise and support vehicle. Remove wheel and tire. Detach grommet from body. Pull connector through hole. Disconnect wheel speed sensor wiring harness electrical connector. On front sensor, detach retainer. On all sensors, remove sensor retaining bolts. Clean off any dirt collected around sensor prior to removal. Remove wheel speed sensor. Thoroughly clean mounting surface.
2. To install, reverse removal procedure. Tighten sensor retaining bolts to specification. See **TORQUE SPECIFICATIONS**.

#### TORQUE SPECIFICATIONS

##### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)

## 2001 Ford Escape

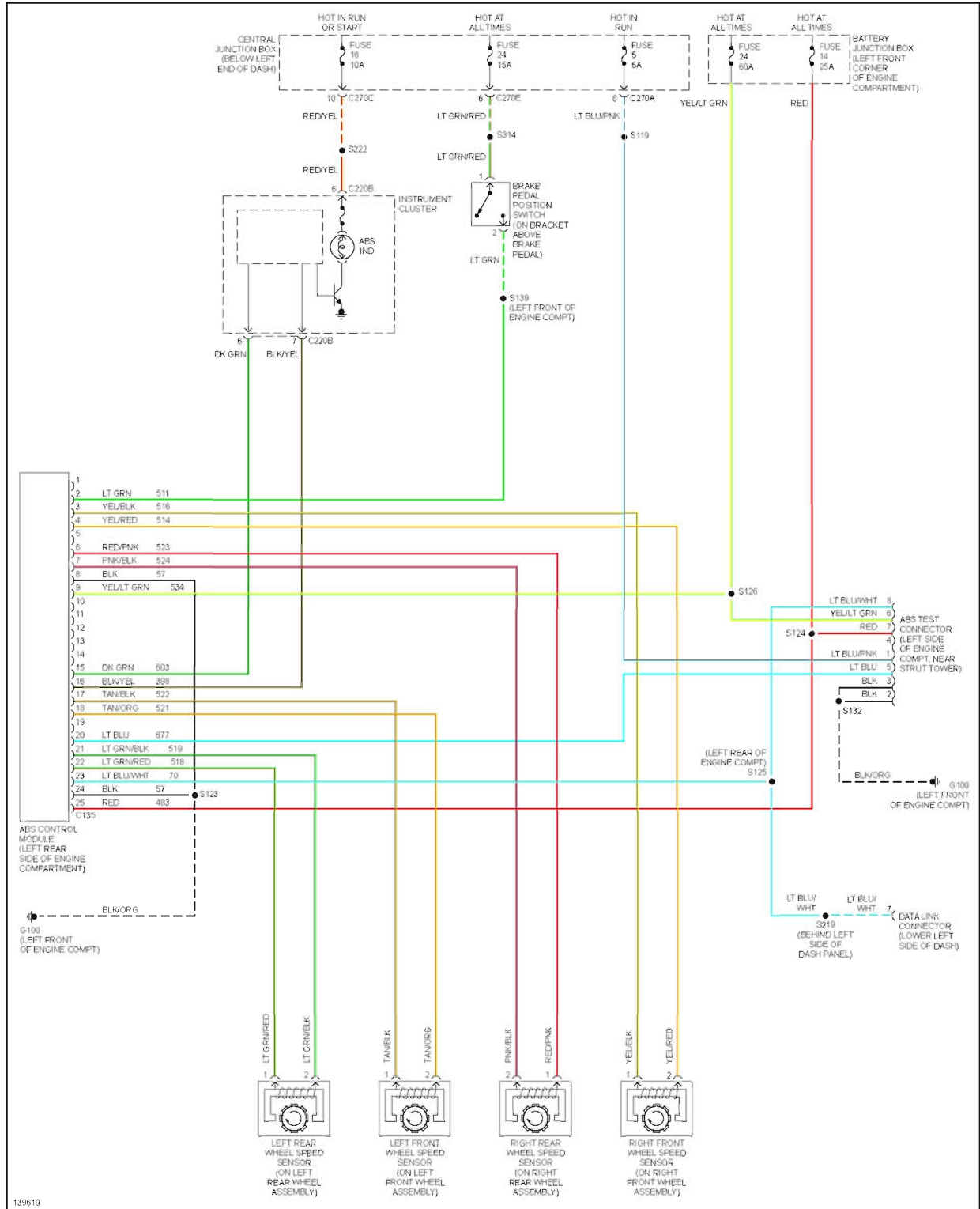
### 2001 BRAKES Anti-Lock - Escape

Inlet Brake Line-To-HCU Nuts	17 (23)
Outlet Brake Line-To-HCU	13 (18)
Rear Sensor Bolt	20 (27)
<b>INCH Lbs. (N.m)</b>	
Battery Ground Cable Bolt	62-89 (7-10)
Control Module Bolts	9-17 (1-2)
Front Sensor Bolt (2WD)	97-115 (11-13)
Front Sensor Bolt (4WD)	62-80 (7-9)
Front Sensor Wire Retaining Bolt (4WD)	62-80 (7-9)
HCU-To-Bracket Bolt	71 (8)

## WIRING DIAGRAMS

# 2001 Ford Escape

## 2001 BRAKES Anti-Lock - Escape



**Fig. 3: ABS Wiring Diagram (Escape - 2001)**



## 2005 Ford Escape

### 2005 SUSPENSION Front Suspension - Escape & Mariner

## 2005 SUSPENSION

### Front Suspension - Escape & Mariner

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TIGHTENING TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Anti-lock brake system (ABS) wheel speed sensor harness bolt	23	17	-
ABS wheel speed sensor bolt	9	-	80
Front lower arm bolt	115	85	-
Rear lower arm bolt	200	148	-
Lower ball joint pinch bolt nut	70	52	-
Stabilizer bar bushing bracket bolts	70	52	-
Upper stabilizer bar link nuts	63	46	-
Lower stabilizer bar link nuts	55	41	-
Strut piston rod-to-bushing nut	103	76	-
Strut-to-knuckle nuts	115	85	-
Strut upper bushing nuts	40	30	-
Tie-rod end-to-knuckle nut	55	41	-
Wheel hub nut	290	214	-

## DESCRIPTION AND OPERATION

### FRONT SUSPENSION

The front suspension consists of the following components:

- wheel bearings
- wheel hubs
- wheel studs
- lower arms
- stabilizer bar
- stabilizer bar bushings
- stabilizer bar links
- strut and spring assemblies
- wheel knuckles

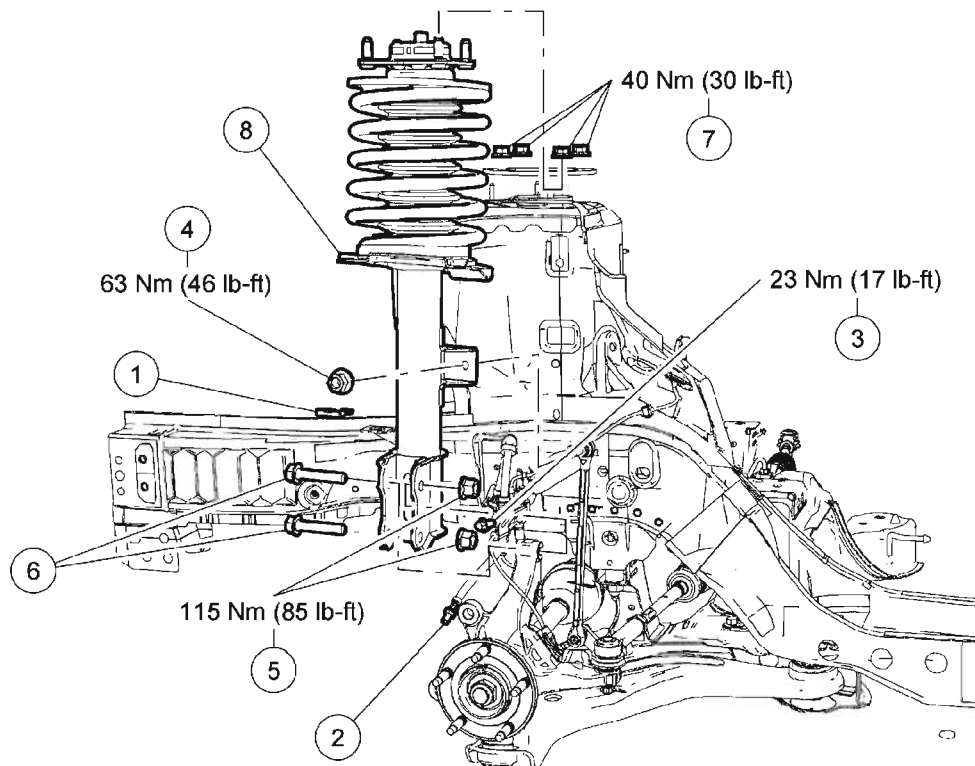
## DIAGNOSIS AND TESTING

### FRONT SUSPENSION

Refer to SUSPENSION SYSTEM-GENERAL INFORMATION .

## REMOVAL AND INSTALLATION

### STRUT AND SPRING ASSEMBLY



A0095433

Item	Part Number	Description
1	2B223	Brake jounce hose clip
2	2078	Brake jounce hose (LH/RH)
3	3C293	Anti-lock brake system (ABS) wheel speed sensor harness bolt
4	W708990	Upper stabilizer bar link nut
5	W707629	Strut-to-knuckle nuts (2 required)
6	W707788	Strut-to-knuckle bolts (2 required)
7	W701267	Strut upper bushing nuts (4 required)
8	18K001/18045	Strut and spring assembly (LH/RH)

**Fig. 1: Removing/Installing Strut And Spring Assembly With Torque Specifications**  
**Courtesy of FORD MOTOR CO.**

**Removal**

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

**NOTE:** Verify the steering wheel is in the unlocked position before removal.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the brake jounce hose clip.
3. Pull the brake jounce hose downward slightly to remove the hose from the bracket and position the brake jounce hose aside.
4. Remove the ABS wheel speed sensor harness bolt.

**NOTE:** Use the hex holding feature to prevent the ball stud from turning while removing or installing the stabilizer bar link nut.

5. Remove the upper stabilizer bar link nut.
6. Remove the 2 strut-to-knuckle nuts and bolts.

**NOTE:** Reference mark the 4 strut upper bushing plate nuts.

7. Remove the 4 strut upper bushing nuts.

**CAUTION:** Do not allow the axle shaft to move outboard. Over-extension of the tripod CV joint can result in the separation of internal parts, causing failure of the axle shaft.

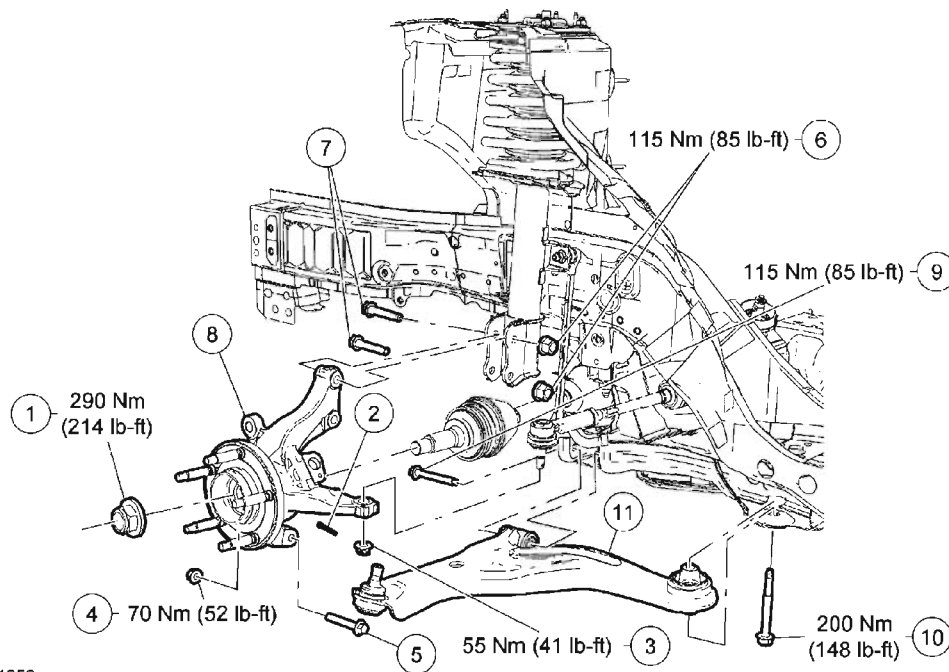
8. Remove the strut and spring assembly.
9. For additional information on the disassembly and assembly of the strut and spring assembly, refer to **STRUT AND SPRING ASSEMBLY**.

**Installation**

1. Position the strut and spring assembly upper mounting plate into the inner fender.
2. Align the 4 strut upper bushing nuts to the reference marks.

- Tighten to 40 Nm (30 lb-ft).
3. Install the 2 strut-to-knuckle bolts and nuts.
    - Tighten to 115 Nm (85 lb-ft).
  4. Install the upper stabilizer bar link nut.
    - Tighten to 63 Nm (46 lb-ft).
  5. Install the ABS wheel speed sensor harness bolt.
    - Tighten to 23 Nm (17 lb-ft).
  6. Position the brake jounce hose to the bracket and install the brake jounce hose clip.
  7. Check the front end alignment and adjust as necessary. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION**.

### FRONT SUSPENSION - EXPLODED VIEW



N0001958

Item	Part Number	Description
1	W705967	Wheel hub nut
2	—	Cotter pin
3	W705833	Tie-rod end-to-knuckle nut
4	W520213	Lower ball joint pinch bolt nut
5	W709618	Lower ball joint pinch bolt
6	W707629	Strut-to-knuckle nuts (2 required)
7	W707788	Strut-to-knuckle bolts (2 required)

Item	Part Number	Description
8	3K171/3K170	Wheel knuckle (LH/RH)
9	W500749	Front lower arm bolt
10	W708549	Rear lower arm bolt
11	3A424/3A423	Lower arm (LH/RH)

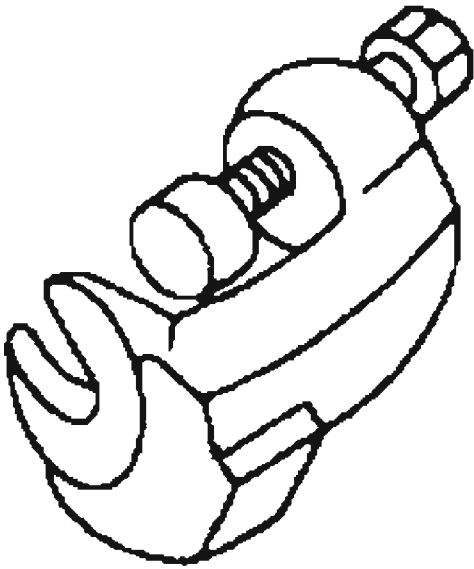
**Fig. 2: Exploded View Of Front Suspension With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

## WHEEL KNUCKLE

### Special Tool(s)

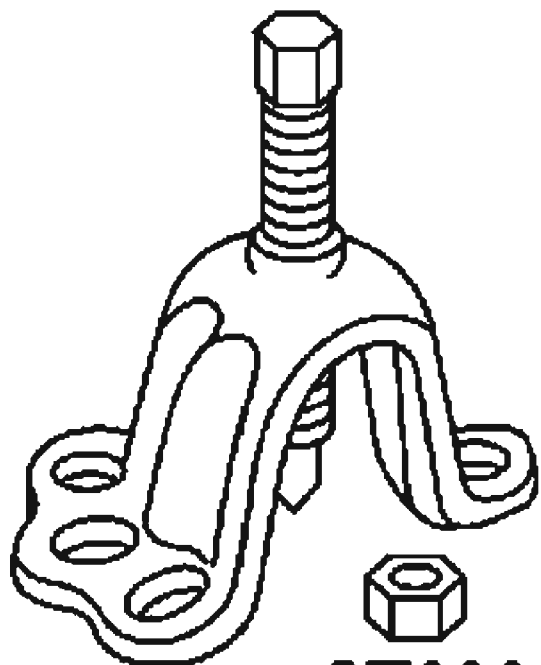
### SPECIAL TOOLS DESCRIPTION



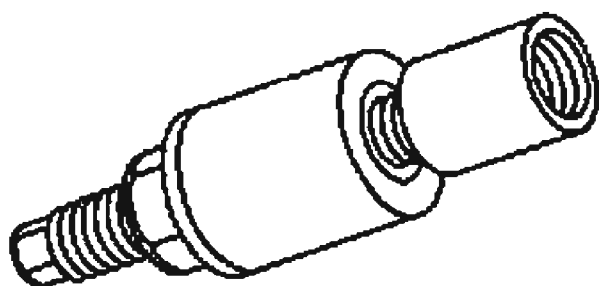
**ST1408-A**

Tie Rod End Remover 211-105  
(T85M-3395-A)

Front Hub Remover 205-D070  
(D93P-1175-B) or equivalent



**ST2330-A**

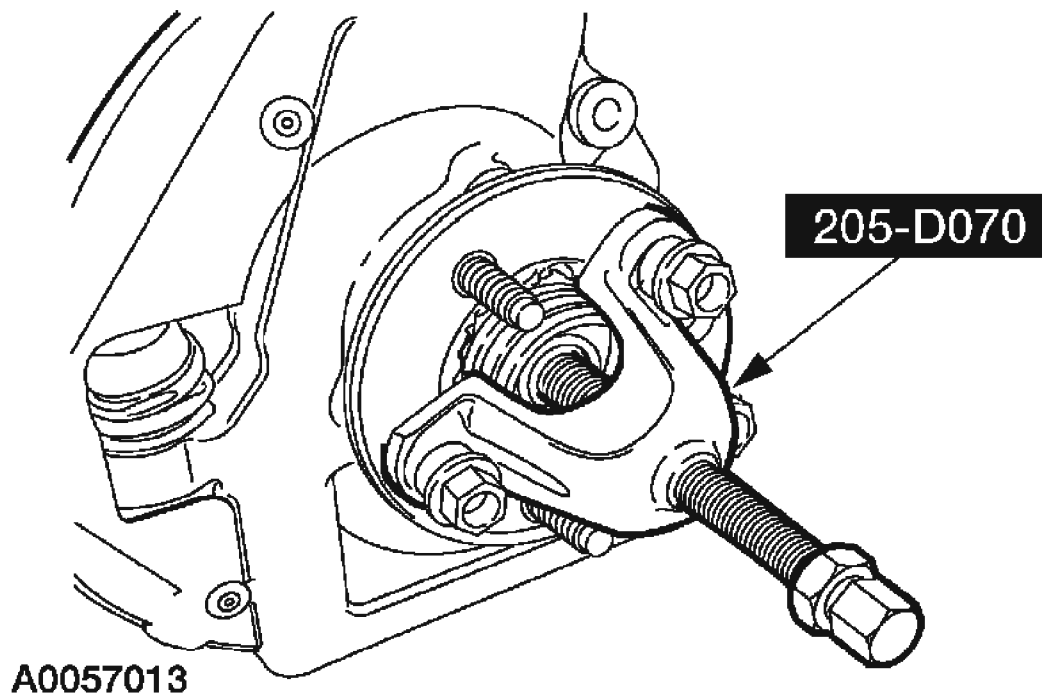


**ST2445-A**

Front Hub Replacer 205-D069 (D93-1175A) or equivalent

#### Removal

1. Remove the brake disc. For additional information, refer to **FRONT DISC BRAKE** .
2. Remove and discard the wheel hub nut.
3. Using the special tool, separate the outer CV joint spindle from the wheel hub.

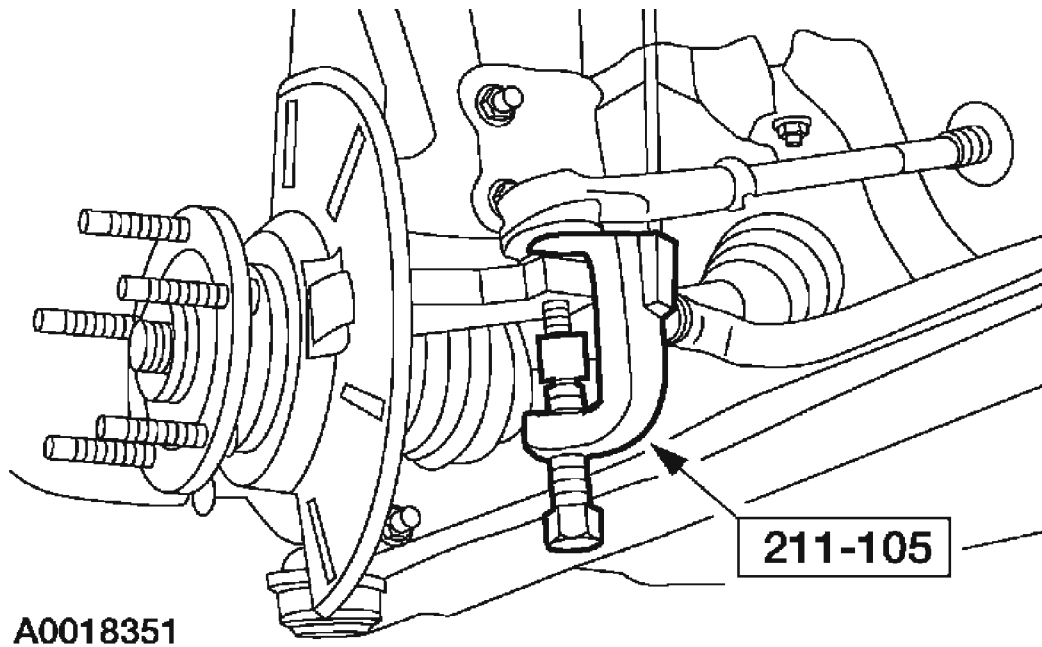


**Fig. 3: Removing Outer CV Joint Spindle From Wheel Hub**  
Courtesy of FORD MOTOR CO.

4. Remove the cotter pin and the tie-rod end-to-knuckle nut.

**CAUTION:** Do not use a hammer to separate the tie-rod end from the wheel knuckle or damage to the wheel knuckle can result.

**CAUTION:** Do not damage the tie-rod end boot while installing the special tool.



**Fig. 4: Removing Tie-Rod From Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

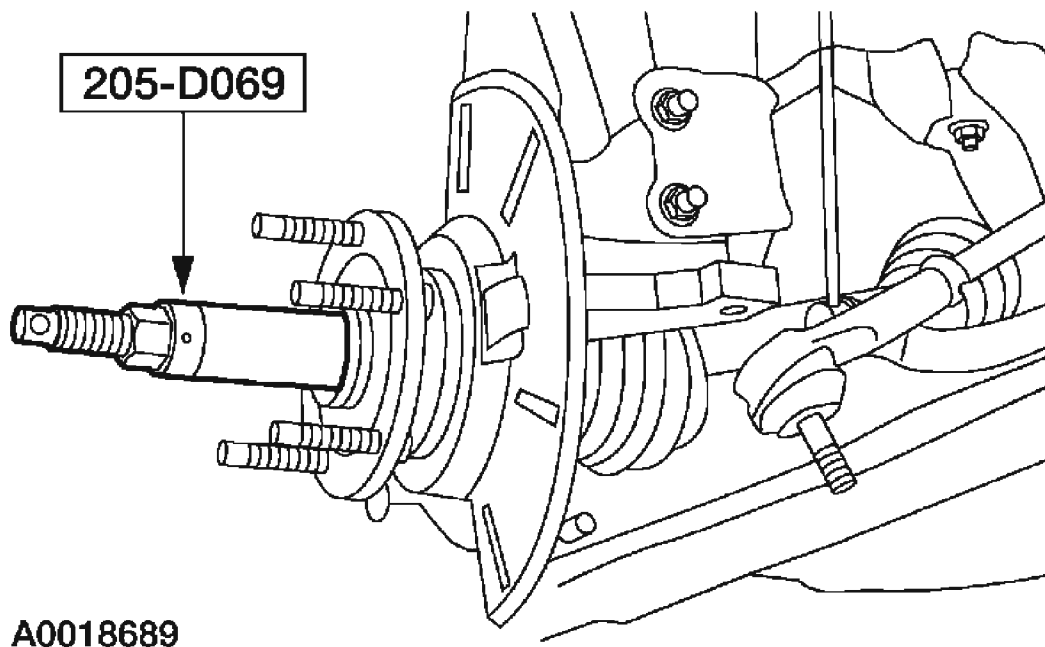
5. Using the special tool, separate the tie-rod from the wheel knuckle.
6. Remove the lower ball joint pinch bolt nut and the pinch bolt.
7. Remove the anti-lock brake system (ABS) wheel speed sensor bolt and position the sensor aside.
8. Separate the lower ball joint from the wheel knuckle.
9. Remove the 2 strut-to-knuckle nuts, bolts and the wheel knuckle.

#### Installation

1. Position the wheel knuckle and install the 2 strut-to-knuckle bolts and nuts.
  - Tighten to 115 Nm (85 lb-ft).
2. Position and align the ball joint stud into the wheel knuckle.
3. Install the lower ball joint pinch bolt and nut.
  - Tighten to 70 Nm (52 lb-ft).
4. Install the ABS wheel speed sensor and the bolt.
  - Tighten to 9 Nm (80 lb-in).
5. Position the tie rod-end into the wheel knuckle and install the tie-rod end-to-knuckle nut and a new cotter pin.
  - Tighten to 55 Nm (41 lb-ft).



6. Using the special tool, insert the half shaft into the wheel hub.



**Fig. 5: Installing Half Shaft Into Wheel Hub**  
 Courtesy of FORD MOTOR CO.

7. Install the wheel hub nut.
  - Tighten to 290 Nm (214 lb-ft).
8. Install the brake disc. For additional information, refer to **FRONT DISC BRAKE**.
9. Check and, if necessary, align the front end. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION**.

## LOWER ARM

### Removal

**NOTE:** The ride height is measured from the center of the halfshaft spindle to the edge of the fender.

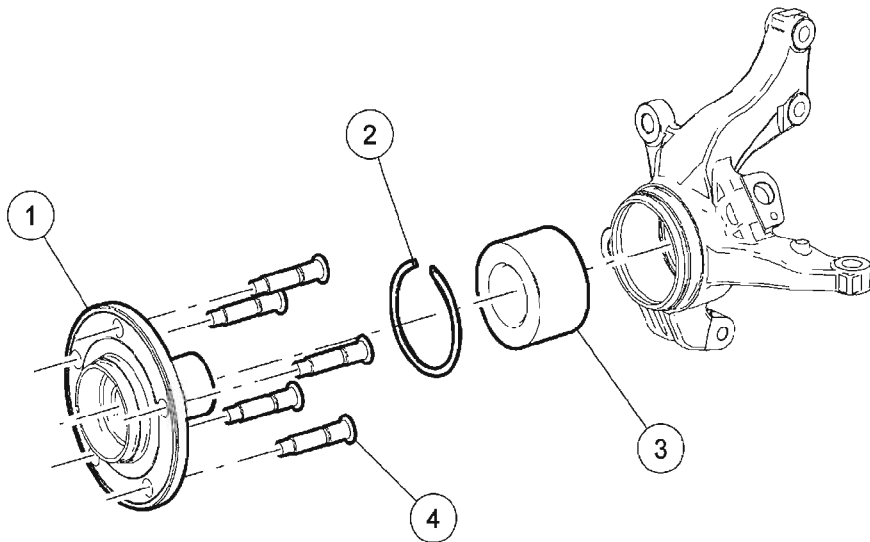
1. For reference during the installation of the lower arm, measure the distance between the center of the wheel hub and the lip of the fender with the weight of the vehicle resting on the wheel and tire assemblies.
2. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
3. Remove the lower ball joint pinch bolt nut and the pinch bolt.

4. Separate the lower ball joint from the wheel knuckle.
5. Remove the front lower arm bolt.
6. Support the subframe.
7. Remove the rear lower arm bolt and the lower arm.

### Installation

1. Position the lower arm to the frame and loosely install the 2 lower arm bolts.
2. Remove the support from the subframe.
3. Position the wheel knuckle on the lower ball joint and install the lower ball joint pinch bolt and the nut.
  - Tighten to 70 Nm (52 lb-ft).
4. Position a floor jack under the lower ball joint and raise it until the previously recorded ride height is achieved.
  - Tighten the front lower arm bolt to 115 Nm (85 lb-ft).
  - Tighten the rear lower arm bolt to 200 Nm (148 lb-ft).
5. Check and, if necessary, align the front end. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION**.

### WHEEL BEARING AND WHEEL HUB - EXPLODED VIEW



N0001959

Item	Part Number	Description
1	1106	Wheel hub
2	3B625	Snap ring
3	1215	Wheel bearing
4	1107	Wheel studs (5 required)

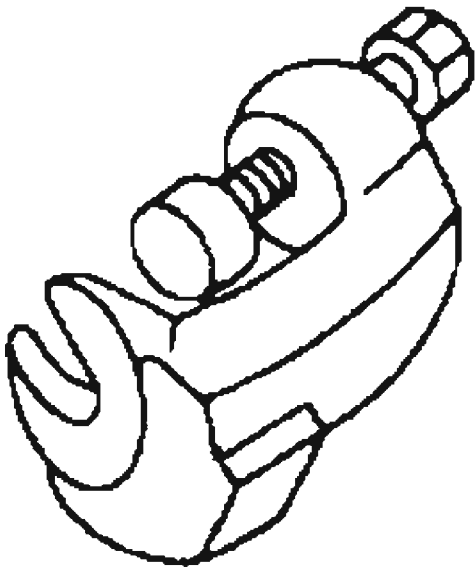
**Fig. 6: Exploded View Of Wheel Bearing And Wheel Hub**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

## WHEEL BEARING AND WHEEL HUB

### Special Tool(s)

### SPECIAL TOOLS DESCRIPTION



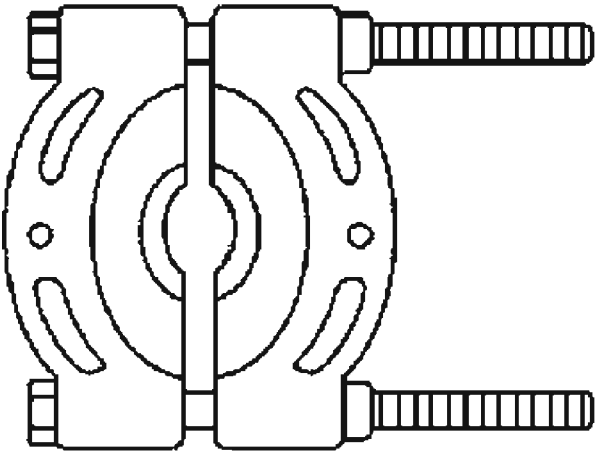
**ST1408-A**

Tie Rod End Remover 211-105  
(T85M-3395-A)

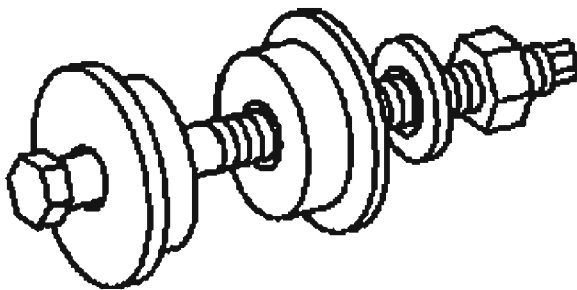
Pinion Bearing Cone Remover 205-  
D002 (D79L-4621-A) or equivalent

## 2005 Ford Escape

2005 SUSPENSION Front Suspension - Escape & Mariner



**ST1895-A**



Pinion Bearing Cup Replacer 205-014 (T60K-4616-A)

**ST2449-A**

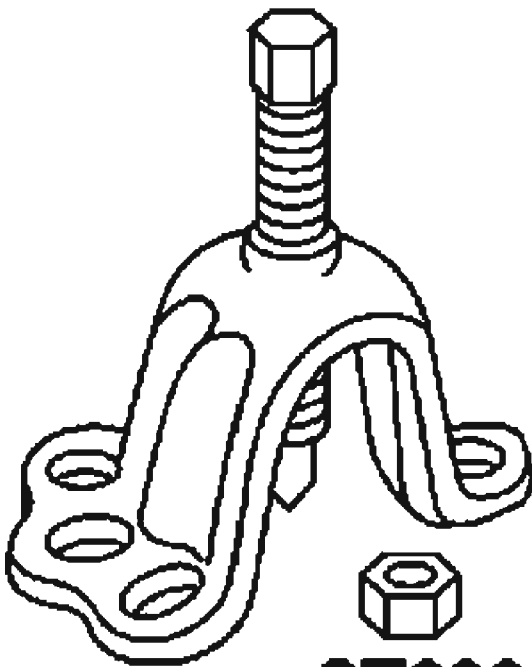
Handle 205-153 (T80T-4000W)

## 2005 Ford Escape

2005 SUSPENSION Front Suspension - Escape & Mariner



**ST1255-A**

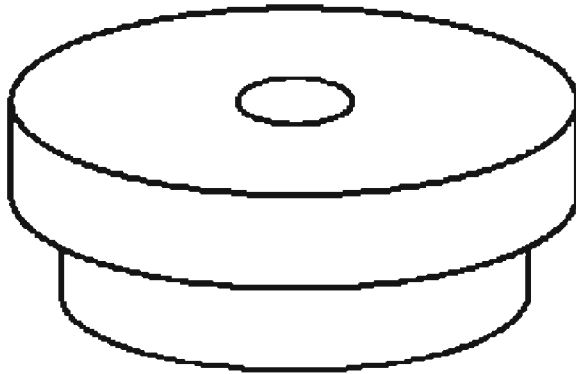


**ST2330-A**

Front Hub Remover 205-D070  
(D93P-1175-B) or equivalent

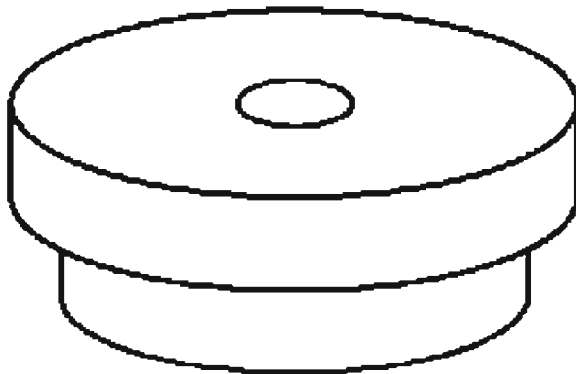
## 2005 Ford Escape

### 2005 SUSPENSION Front Suspension - Escape & Mariner



**ST2446-A**

Step Plate 205-239 (T86P-1104-A3)  
or equivalent



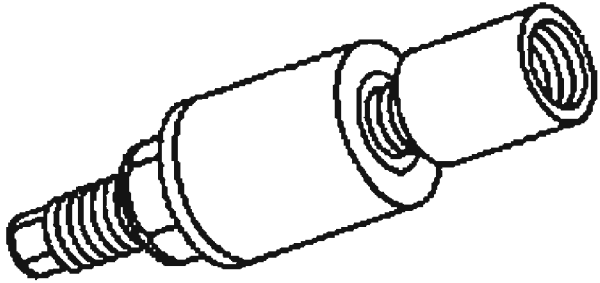
**ST2446-A**

Step Plate 205-278 (T88T-1175-C) or  
equivalent

Front Hub Replacer 205-D069 (D93-

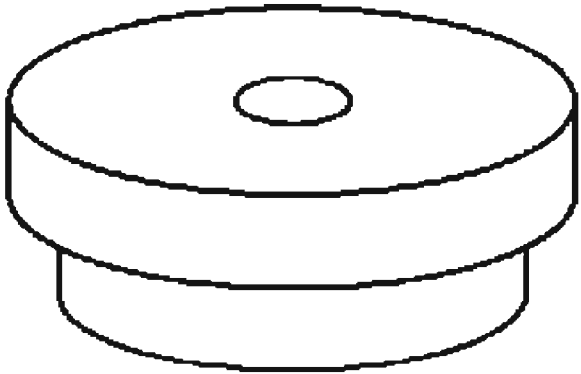
## 2005 Ford Escape

2005 SUSPENSION Front Suspension - Escape & Mariner



**ST2445-A**

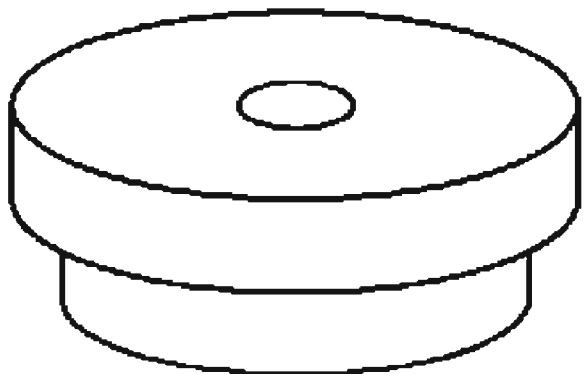
1175A) or equivalent



**ST2446-A**

Step Plate 205-D014 (D80L-630-3)  
or equivalent

Wheel Bearing Adapter 205-D015  
(D80L-630-4) or equivalent



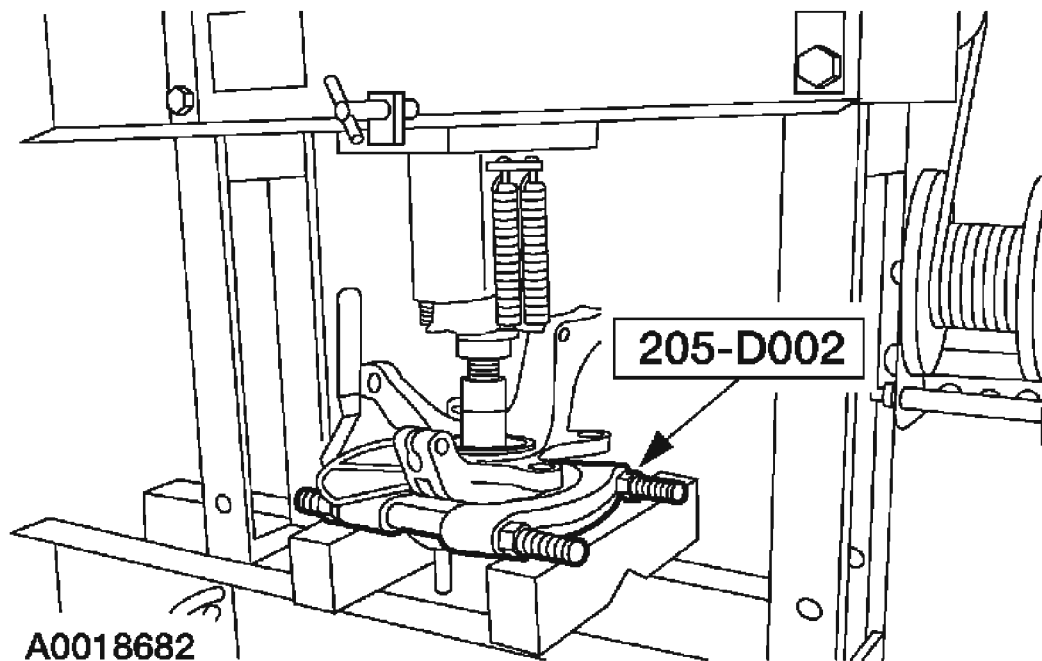
**ST2446-A**

**Removal**

**NOTE:** If removing the wheel hub, the wheel bearing must be replaced.

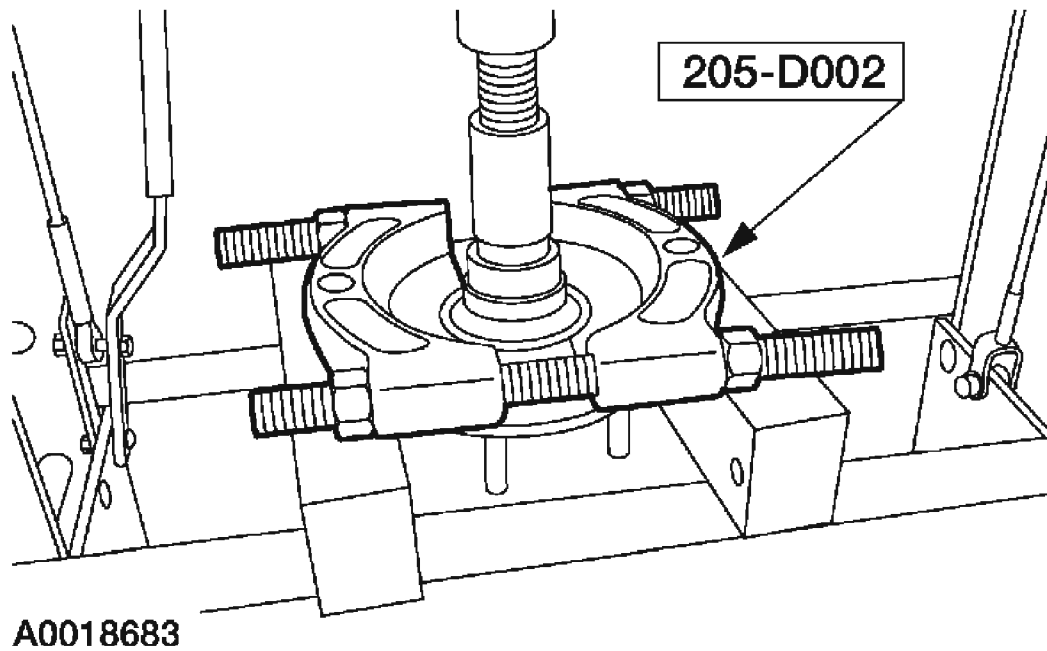
1. Remove the wheel knuckle. For additional information, refer to **WHEEL KNUCKLE**.
2. Using the special tool, press the wheel hub from the wheel bearing.





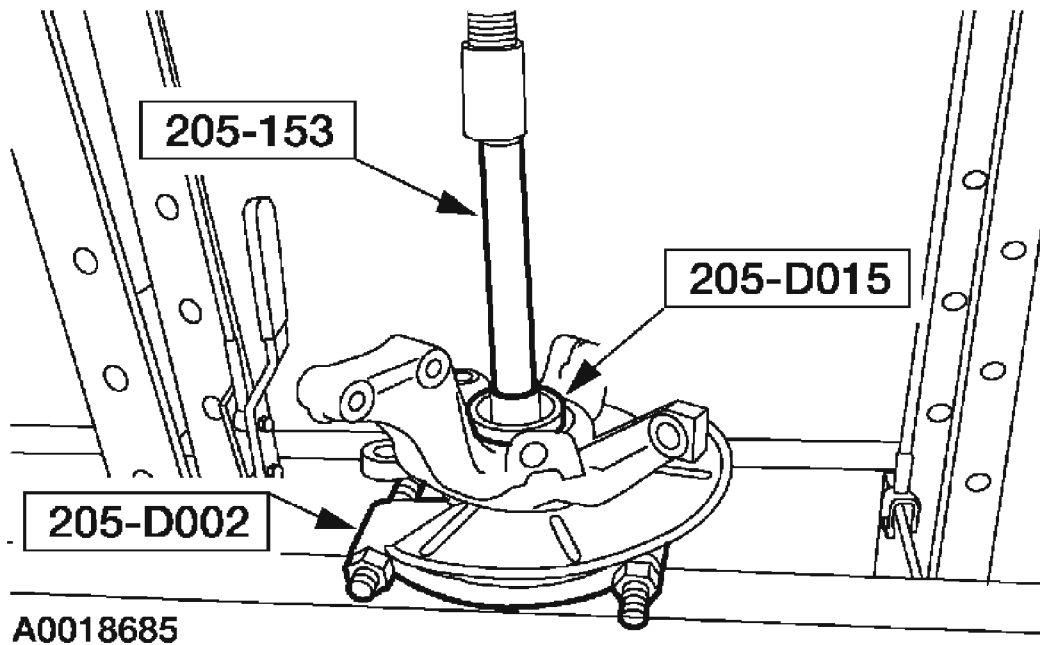
**Fig. 7: Pressing Wheel Hub From Wheel Bearing**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step may not be necessary if the inner wheel bearing race remains in the wheel knuckle after removing the wheel hub.



**Fig. 8: Pressing Inner Wheel Bearing Race From Wheel Hub**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, press the inner wheel bearing race from the wheel hub.
4. Remove the snap ring.
5. Using the special tools, press the outer wheel bearing race from the wheel knuckle.

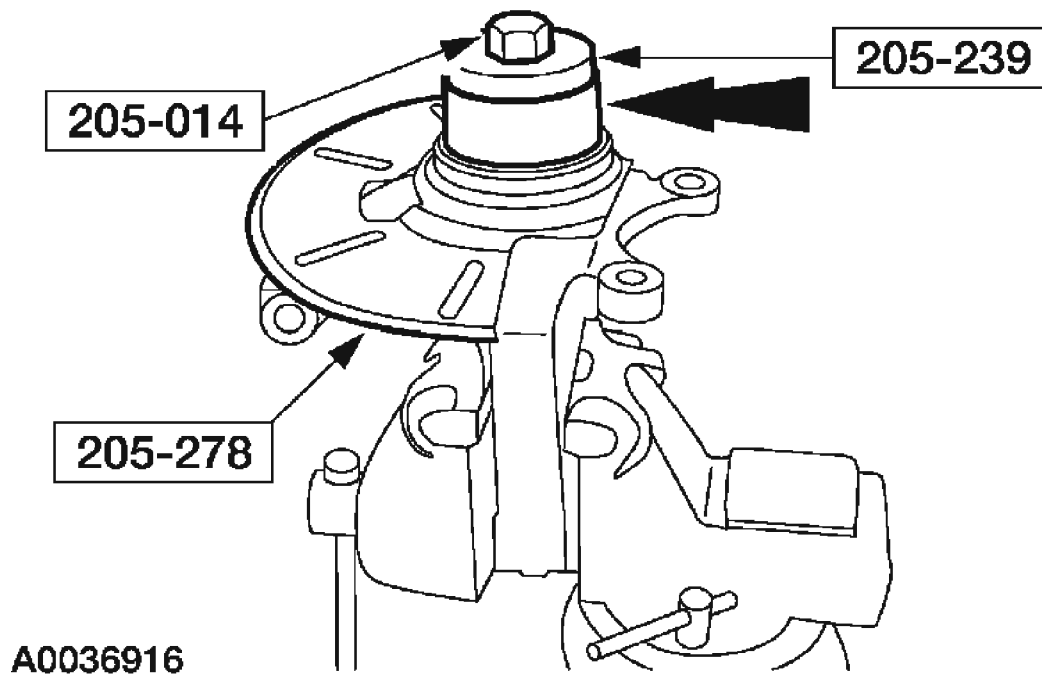


**Fig. 9: Pressing Outer Wheel Bearing Race From Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

#### Installation

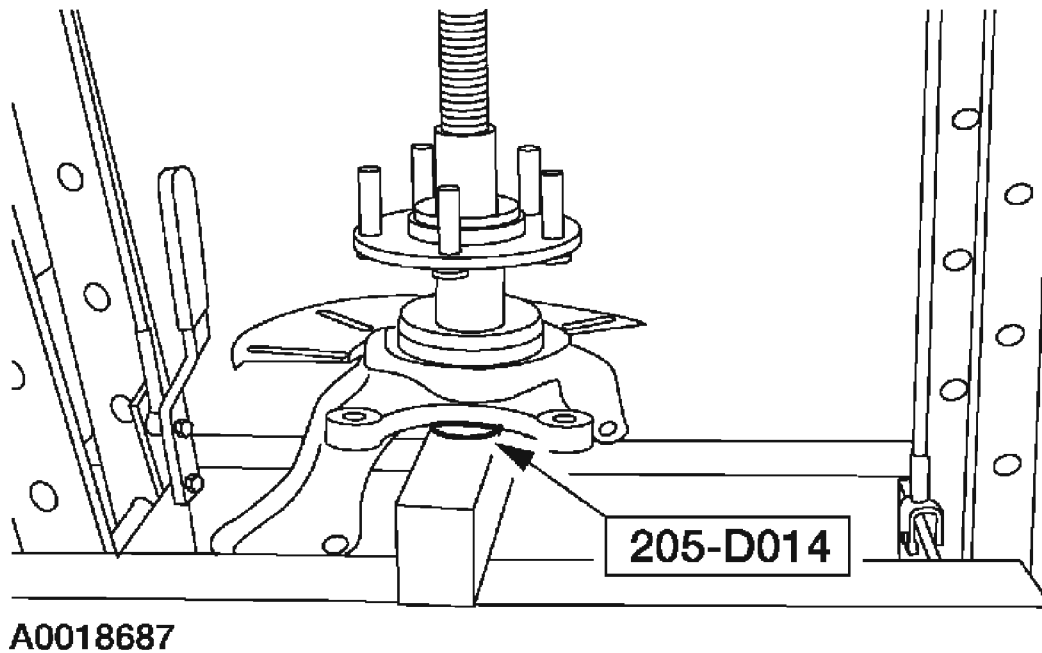
1. Position the wheel knuckle in a vise.

**NOTE:** Special Tool 205-278 is not seen in place. It is located behind the wheel knuckle.



**Fig. 10: Installing Wheel Bearing Into Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

2. Using the special tools, install the wheel bearing into the wheel knuckle.
3. Install the snap ring.
4. Using the special tool, press the wheel hub into the wheel bearing.



**Fig. 11: Pressing Wheel Hub Into Wheel Bearing**  
Courtesy of FORD MOTOR CO.

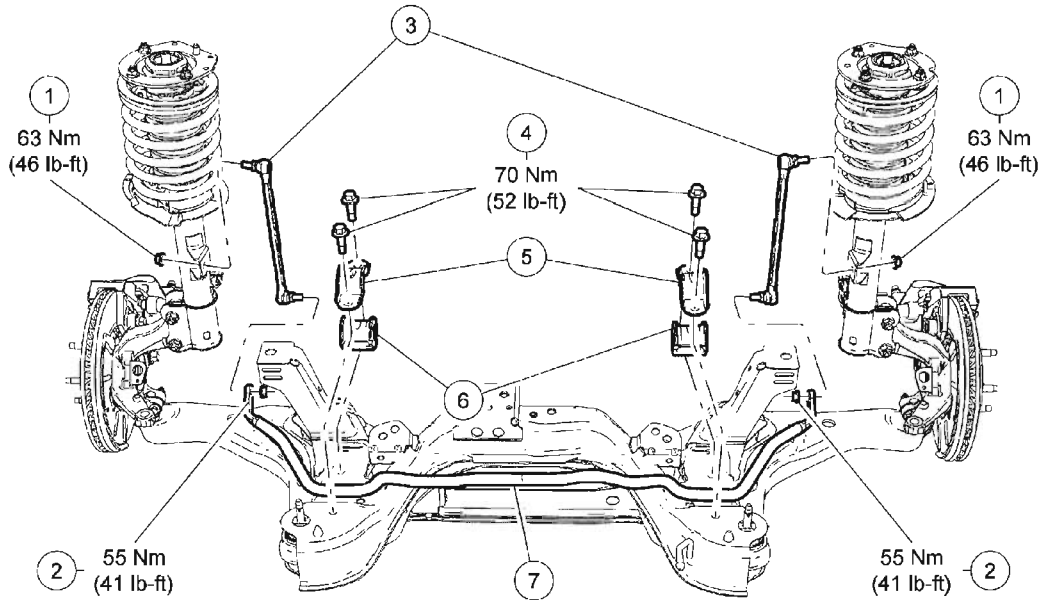
5. Install the wheel knuckle. For additional information, refer to WHEEL KNUCKLE.

## WHEEL STUDS

### Removal and Installation

1. Remove the wheel bearing and hub. Refer to WHEEL BEARING AND WHEEL HUB.
2. Using a suitable press, remove the wheel stud from the wheel hub.
3. To install, reverse the removal procedure.

## STABILIZER BAR, LINK AND BUSHING - EXPLODED VIEW



A0095434

Item	Part Number	Description
1	W708990	Stabilizer bar link nuts (upper) (2 required)
2	W708990	Stabilizer bar link nuts (lower) (2 required)
3	5K483	Stabilizer bar links (2 required)
4	W506441	Stabilizer bar bushing bracket bolts (4 required)

Item	Part Number	Description
5	5486	Stabilizer bar bushing brackets (2 required)
6	5484	Stabilizer bar bushing (2 required)
7	5494	Stabilizer bar

**Fig. 12: Exploded View Of Stabilizer Bar, Link And Bushing**  
 Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

## STABILIZER BAR

### Removal and Installation

1. Remove the stabilizer bar bushings. Refer to **STABILIZER BAR BUSHING**.

**NOTE:** Use the hex holding feature to prevent the ball stud from turning while removing or installing the stabilizer link nut.

2. Remove the 2 lower stabilizer bar link nuts.
  - To install, tighten to 55 Nm (41 lb-ft).

**NOTE:** Access the stabilizer bar through the LH wheel opening.

3. Remove the stabilizer bar.
4. To install, reverse the removal procedure.

## **STABILIZER BAR BUSHING**

### **Removal and Installation**

**CAUTION:** When installing the stabilizer bar bushings, make sure the bushings are correctly oriented with the bushing flanges in the up position and the bushing split pointing to the rear of the vehicle.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 2 bolts and the stabilizer bar bushing bracket.
  - To install, tighten to 70 Nm (52 lb-ft).

**NOTE:** Inspect the stabilizer bar bushing for wear. If necessary, install a new part.

3. Remove the stabilizer bar bushing.
4. To install, reverse the removal procedure.

## **STABILIZER BAR LINK**

### **Removal and Installation**

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

**NOTE:** Use the hex holding feature to prevent the ball stud from turning while removing or installing the stabilizer bar link nut.

2. Remove the upper stabilizer bar link nut.
  - To install, tighten to 63 Nm (46 lb-ft).

**NOTE:** Use the hex holding feature to prevent the ball stud from turning while removing or installing the stabilizer link nut.

3. Remove the lower stabilizer bar link nut.
  - To install, tighten to 55 Nm (41 lb-ft).

**NOTE:** Inspect the stabilizer bar link ball joints and boots for wear. If

**necessary, install new parts.**

4. Remove the stabilizer bar link.
5. To install, reverse the removal procedure.

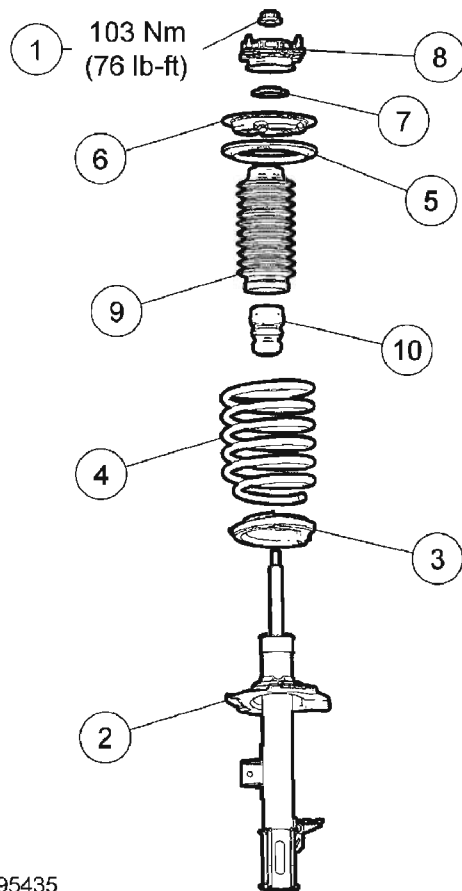
## **DISASSEMBLY AND ASSEMBLY**

### **STRUT AND SPRING ASSEMBLY**



## 2005 Ford Escape

### 2005 SUSPENSION Front Suspension - Escape & Mariner



A0095435

Item	Part Number	Description
1	W706004-S	Strut piston rod-to-bushing nut
2	18K001/18045	Strut (LH/RH)
3	5A307	Lower coil spring insulator
4	5310	Coil spring
5	5A318	Upper coil spring insulator
6	5A306	Bearing plate
7	3K099	Bearing
8	18A007	Strut upper bushing
9	18A179	Dust boot
10	18061	Bumper

**Fig. 13: Disassembling Strut And Spring Assembly**  
Courtesy of FORD MOTOR CO.

#### Disassembly and Assembly

**WARNING:** Always wear safety goggles when using a spring compressor. Failure to follow these instructions may

**result in personal injury.**

**NOTE: Do not use an impact wrench on the nut.**

1. Mount the strut and spring assembly in a suitable spring compressor.
2. Compress the coil spring enough to relieve the tension on the strut assembly.
3. Remove the strut piston rod-to-bushing nut.
  - To assemble, tighten to 103 Nm (76 lb-ft).
4. Remove the strut.
5. Remove the lower coil spring insulator.
6. Remove the coil spring.
7. Remove the upper coil spring insulator.

**NOTE: During assembly, assemble the bearing plate to the strut so the arrow on the bearing plate points to the outboard side of the vehicle when the strut is installed.**

8. Remove the bearing plate.
9. Remove the bearing.
10. Remove the strut upper bushing.
11. Remove the dust boot and the bumper.
12. To assemble, reverse the disassembly procedure.

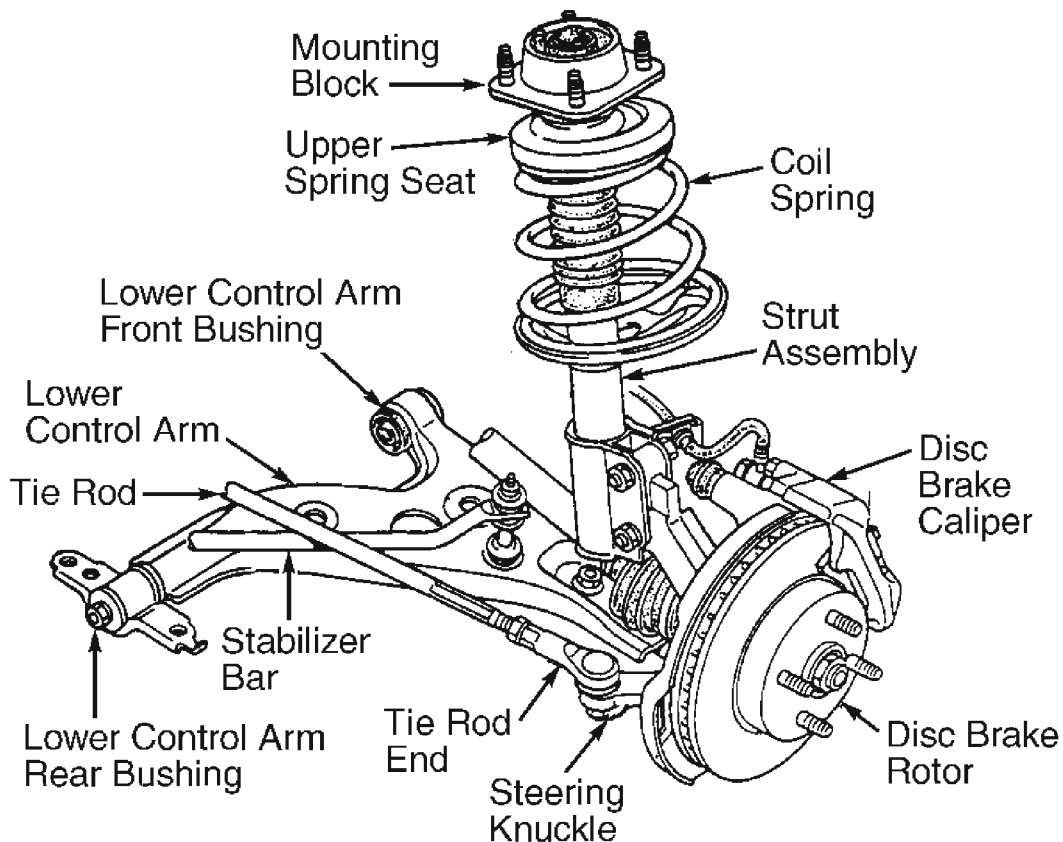
## 2000-01 SUSPENSION

## Front - Escape, Escort &amp; Focus

## DESCRIPTION

Front suspension is MacPherson strut type using gas-pressurized struts and cast steering knuckles. See **Fig. 1**. Strut assembly includes a rubber isolated top mount and a thrust bearing. Strut assembly is bolted to strut tower and steering knuckle. A pinch joint is built into steering knuckle to retain ball joint stud. A forged control arm is attached to underbody and steering knuckle. A stabilizer bar is connected to both control arms and secured to crossmember at bracket assemblies. Tie rod ends connect to steering knuckle.

Installation of new front strut assemblies and/or springs in pairs is not required by manufacturer. Install front suspension assemblies and/or springs one at a time as required. Ball joints and control arm pivot bushings may be replaced individually.



G91D11737

**Fig. 1: Identifying Front Suspension (Escort Shown; Escape & Focus Are Similar)**  
 Courtesy of FORD MOTOR CO.

## ADJUSTMENTS & INSPECTION

### LOWER BALL JOINT CHECKING

**CAUTION:** When hoisting FWD vehicles, ensure hoist adapters are positioned properly. See **JACKING & HOISTING** in **SPECIFICATIONS & PROCEDURES** article in **WHEEL ALIGNMENT**.

Raise and support vehicle. Prior to performing this test, check front wheel hub for excessive end play. See **FRONT WHEEL BEARINGS** in **ADJUSTMENTS & INSPECTION**. Grasp tire by top and bottom edges. Move wheel assembly in and out from pivot center line. Any movement between wheel spindle and control arm indicates lower ball joint wear. If movement exceeds 1/32" (.79 mm), replace lower ball joint.

### FRONT WHEEL BEARINGS

Raise and support vehicle. Remove front wheel, brake caliper and rotor. Position Dial Indicator Bracketry (D78P-4201-F) and Dial Indicator (D78P-4201-G), or equivalents, to wheel hub. Push and pull wheel hub by hand in axial direction, and measure wheel bearing play. On Focus, there should be no end play. If end play exists, replace bearing. On Escort and Escape, if wheel bearing play exceeds .002" (.05 mm), check and adjust bearing lock nut torque. If necessary, replace bearing.

### WHEEL ALIGNMENT

**NOTE:** See **SPECIFICATIONS & PROCEDURES - TRUCKS** article in **WHEEL ALIGNMENT**.

## REMOVAL & INSTALLATION

### COIL SPRING & STRUT ASSEMBLY

#### Removal

Raise and support vehicle. Remove front wheel. Remove brake hose-to-strut clip. On Escape and Focus, disconnect brake hose grommet from bracket. On all models, remove ABS brake sensor clip from strut bracket (if equipped). On Escape and Focus, remove upper stabilizer bar link nut, and position aside. On all models, remove strut-to-knuckle bolts. Remove upper mounting bracket nuts. Remove spring and strut assembly.

#### Disassembly & Reassembly

1. Secure strut assembly mounting block in vise. Using Strut Spring Compressor (014-00781), compress coil spring. Remove piston rod nut and upper mounting block. On Escape and Focus, remove metal sheet plate, upper strut mount, thrust bearing plate.

## 2001 Ford Escape

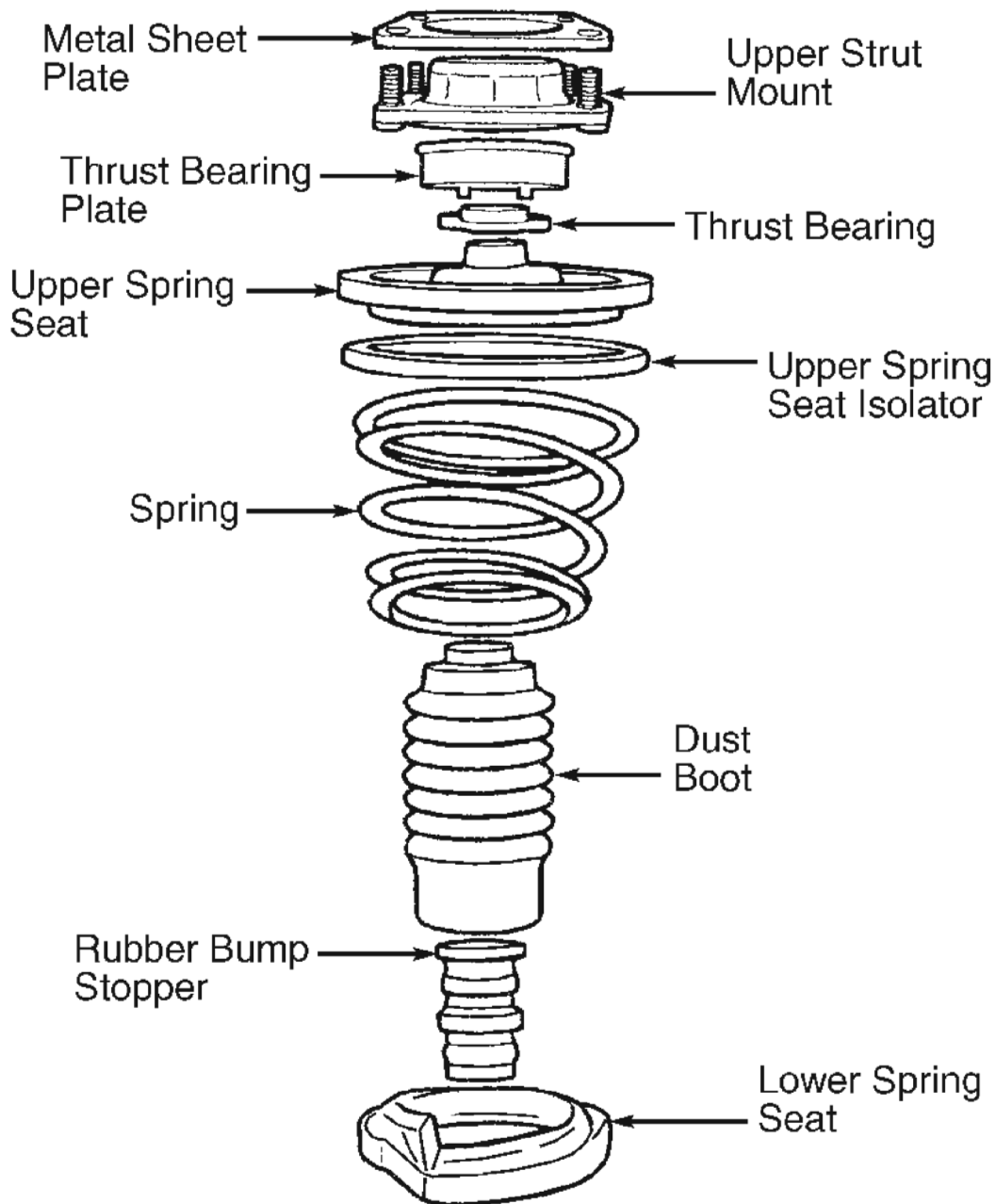
2000-01 SUSPENSION Front - Escape, Escort & Focus

thrust bearing, upper spring seat, upper spring seat isolator, spring, dust boot, rubber bump stopper and lower spring seat. See **Fig. 2** . On Escort, remove rebound stopper, dust boot, rubber spring seat, coil spring, upper spring seat and thrust bearing. See **Fig. 3** .

2. To reassemble, reverse disassembly procedure. Ensure spring is properly seated into insulator.

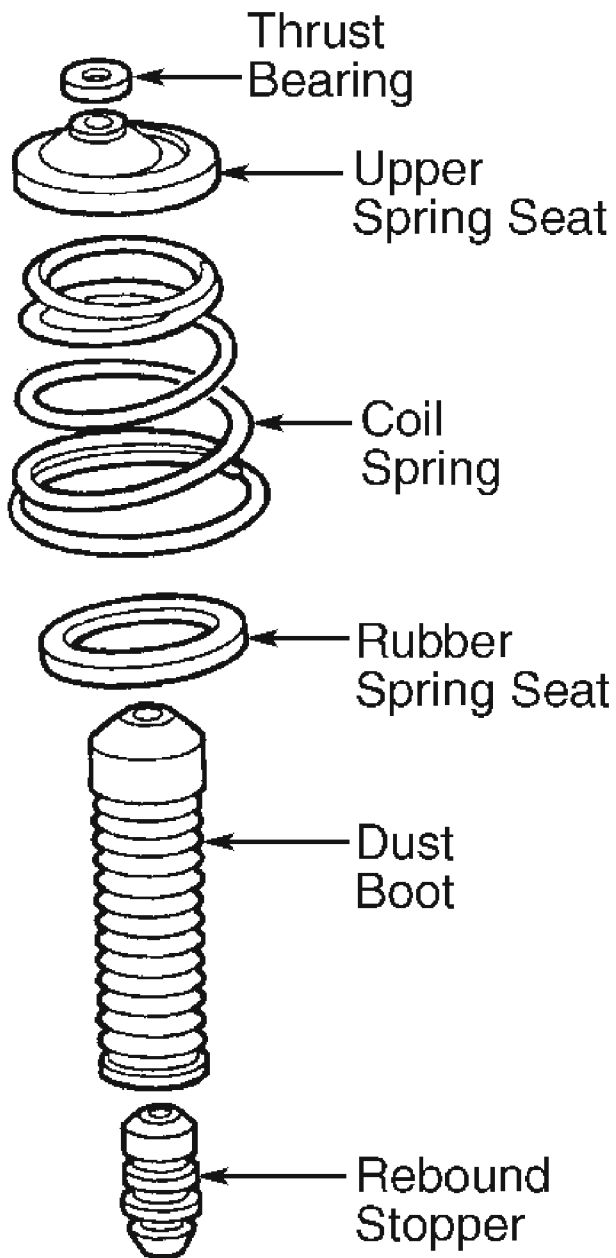
### Installation

To install, reverse removal procedure. Install NEW nuts and bolts. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** . Check front end alignment, and adjust as necessary. See **SPECIFICATIONS & PROCEDURES - TRUCKS** article in WHEEL ALIGNMENT.



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**Fig. 2: Exploded View Of Strut Spring Assembly (Escape)**  
Courtesy of FORD MOTOR CO.



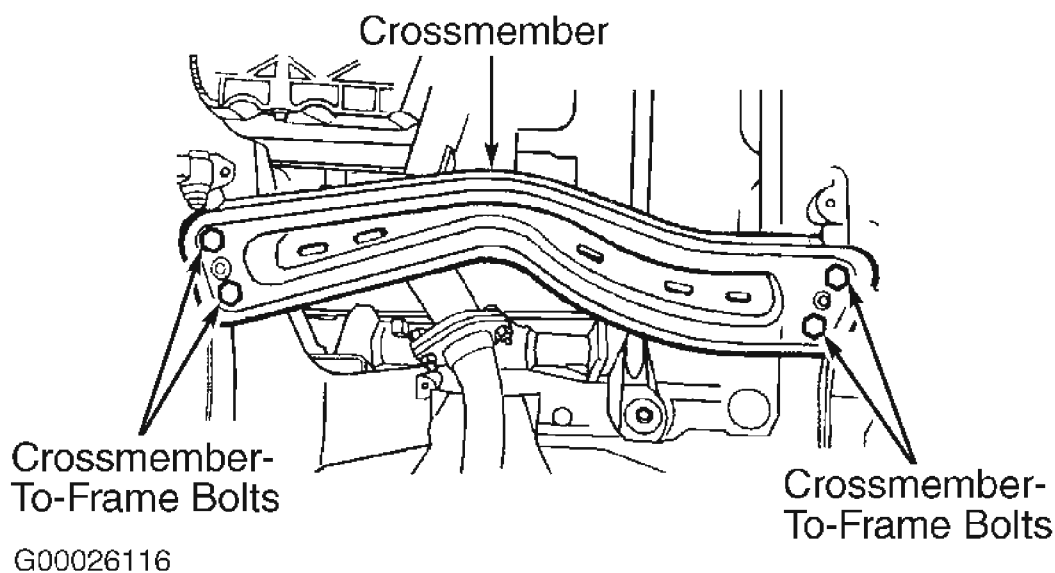
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**Fig. 3: Exploded View Of Strut Spring Assembly (Escort Shown; Focus Is Similar)**  
Courtesy of FORD MOTOR CO.

#### STABILIZER BAR

#### Removal & Installation (Escort)

1. Using 3-Bar Engine Support (D88L-6000-A), support engine. Raise and support vehicle. Remove wheel assemblies. Remove crossmember-to-frame bolts. See **Fig. 4** . Remove steering gear mounting brackets. Position steering gear slightly forward. Remove stabilizer bar link nuts, retainers, bushing, bolts and spacer from lower control arms. See **Fig. 7** .
2. Remove transaxle insulator nuts and rear engine support-to-vehicle frame nuts. See **Fig. 8** . Lower end of crossmember. Support subframe with transmission jack. Remove front, then rear crossmember-to-subframe nuts. Lower front of subframe. Remove stabilizer bar "U" bracket bolts from subframe, and remove stabilizer bar from vehicle.
3. To install, reverse removal procedure. When installing crossmember, reposition as shown in **Fig. 4** . Install NEW nuts and bolts. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** . Tighten stabilizer bar link bushing nuts so that .67-.75" (17-19 mm) of thread is exposed. See **Fig. 9** .

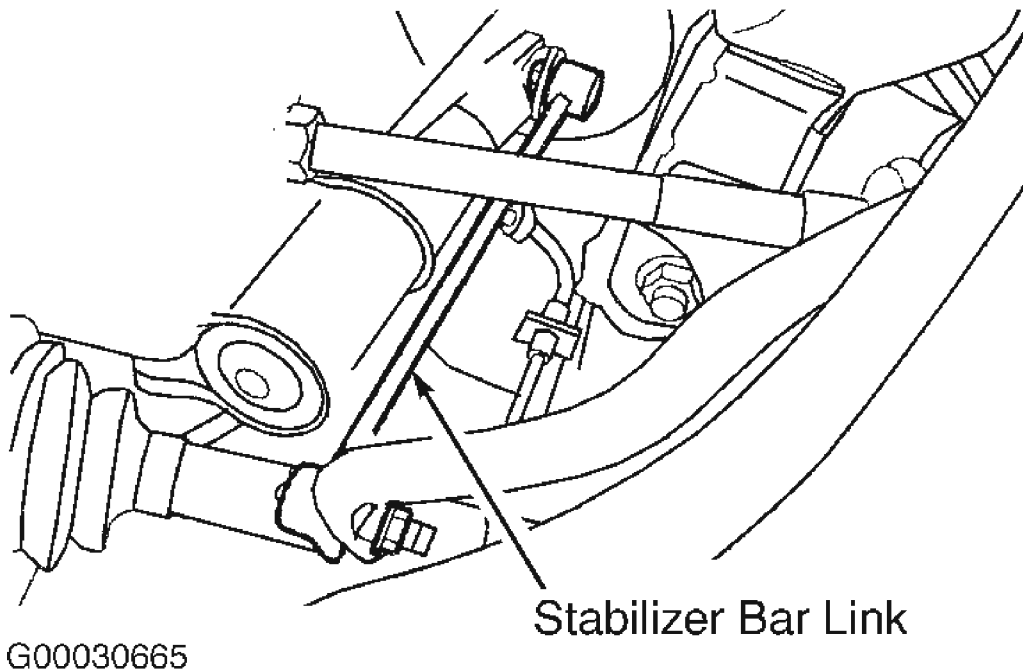


**Fig. 4: Installing Crossmember On Vehicle Frame (Escort)**  
 Courtesy of FORD MOTOR CO.

**Removal & Installation (Escape)**

Raise and support vehicle. Remove left front wheel. Remove four bolts and two bushings. Remove two stabilizer bar links upper and lower nuts. See **Fig. 5** . Remove stabilizer bar and links. To install, reverse removal procedure. See **TORQUE SPECIFICATIONS** .



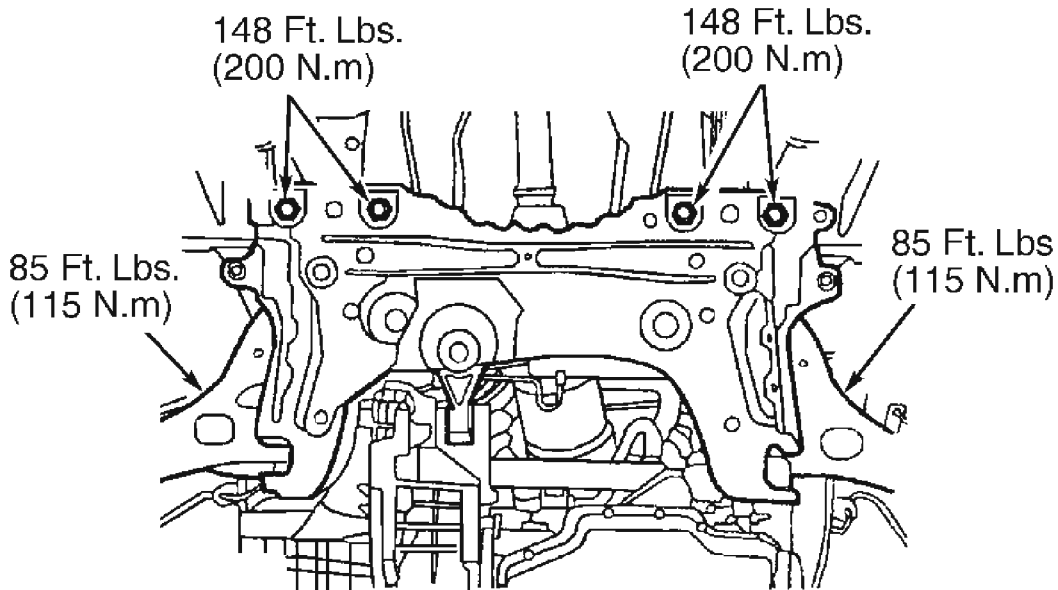


**Fig. 5: Stabilizer Bar Link Removal (Escape)**  
Courtesy of FORD MOTOR CO.

**Removal & Installation (Focus)**

1. Disconnect battery ground cable. Center steering wheel, remove key and lock in position. Disconnect steering column shaft from pinion extension. Loosen front wheel nuts. Raise and support vehicle. Remove wheels.
2. Remove tie-rod end retaining nuts. Remove tie rod end nuts. Pull tie rod using Tie Rod End Remover (3290-D). Detach connecting links. Remove lower control arm ball joints.
3. Remove support insulator-to-transaxle center bolt. Using transmission jack, support crossmember. Remove crossmember bolts, and lower crossmember. Remove stabilizer bar clamps and fasteners, and remove stabilizer bar.
4. Install insulators onto stabilizer bar. Set stabilizer bar to design height setting, but do not install links. Support stabilizer bar with twine. Install clamps, and tighten bolts to specification. See **TORQUE SPECIFICATIONS**.
5. Use Subframe Alignment Pins (T94P-2100-AH)) to alignment crossmember. Install crossmember bolts, and tighten to specification. Remove transaxle jack and alignment pins. Install support insulator bolt, and tighten to specification.
6. Install lower control arm ball joint and connecting links, and tighten to specification. See **TORQUE SPECIFICATIONS**. Install tie rod ends, and tighten to specification.

Install wheel. Reconnect steering column shaft. Connect battery ground cable. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** .



G00034149

**Fig. 6: Installing Crossmember To Vehicle Frame (Focus)**  
 Courtesy of FORD MOTOR CO.

## HUB/STEERING KNUCKLE ASSEMBLY

### Removal

1. Raise and support vehicle. Remove front wheel, brake caliper and rotor. Carefully raise staked portion of front axle wheel hub retainer, and remove. Remove tie rod end cotter pin and nut. Using Tie Rod End Separator (T85M-3395-A), remove tie rod end.
2. If equipped, remove ABS wire bracket bolt and bracket. Remove bolts and ABS sensor, and position aside. Remove lower control arm nut and pinch bolt. Separate lower control arm from steering knuckle. On Escape, use Front Hub Remover (D93P-1175-B) to separate axle shaft from wheel knuckle. On Focus, use Front Wheel Hub Remover/Installer (T81P-1104-C). Remove strut assembly-to-steering knuckle nuts and bolts. Remove steering knuckle.

### Disassembly & Reassembly

1. Remove oil seal from rear of hub/steering knuckle assembly. Using Bearing Pulling Attachment (D84L-1123-A) for Escape, or (D79L-4621-A) for Escort and Focus, press wheel hub from wheel knuckle. Remove retainer ring from wheel knuckle. Using Bearing Pulling Attachment, press front wheel bearing from wheel knuckle.

**CAUTION: On Focus, make sure the wheel bearing is installed into the wheel knuckle with the wheel speed sensor ring, colored black, at the wheel speed sensor end of the wheel knuckle.**

2. To reassemble, reverse disassembly procedure. Install NEW inner oil seal. Apply Threadlock 262 onto front wheel bearing outer race.

### Installation

To install, reverse removal procedure. Install NEW fasteners. On Escort, apply Threadlock 262 or equivalent onto lower ball joint nut and pinch bolt threads. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** .

## LOWER BALL JOINT

### Removal & Installation

1. Raise and support vehicle. Remove wheel assembly. Remove nut and pinch bolt securing lower ball joint to knuckle. Separate steering knuckle from lower ball joint. Remove nuts and lower ball joint.
2. To install, reverse removal procedure. Install NEW nuts and bolts. On Escort, apply Threadlock 262 onto lower ball joint nut and pinch bolt threads. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** .

## LOWER CONTROL ARM

### Removal

1. Raise and support vehicle. Remove wheel assembly. On Escort, remove stabilizer bar nuts, washers, bushings, bolts and spacer. See **Fig. 7** . On all models, remove nut and pinch bolt securing lower ball joint to knuckle. Separate steering knuckle from lower ball joint.
2. On Escape, support subframe. On all models, remove lower control arm pivot bolt. Remove bolts securing lower control arm rear bushing onto chassis. Remove lower control arm.

### Installation

To install, reverse removal procedure. On Escort, DO NOT tighten pivot bolts until vehicle is lowered and at operating level. Tighten stabilizer bar link bushing nuts so that .67-.75" (17-19 mm) of thread is exposed. See **Fig. 9** . Install NEW nuts and bolts. On Escort, apply Threadlock 262 onto lower ball joint nut and pinch bolt threads. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** .

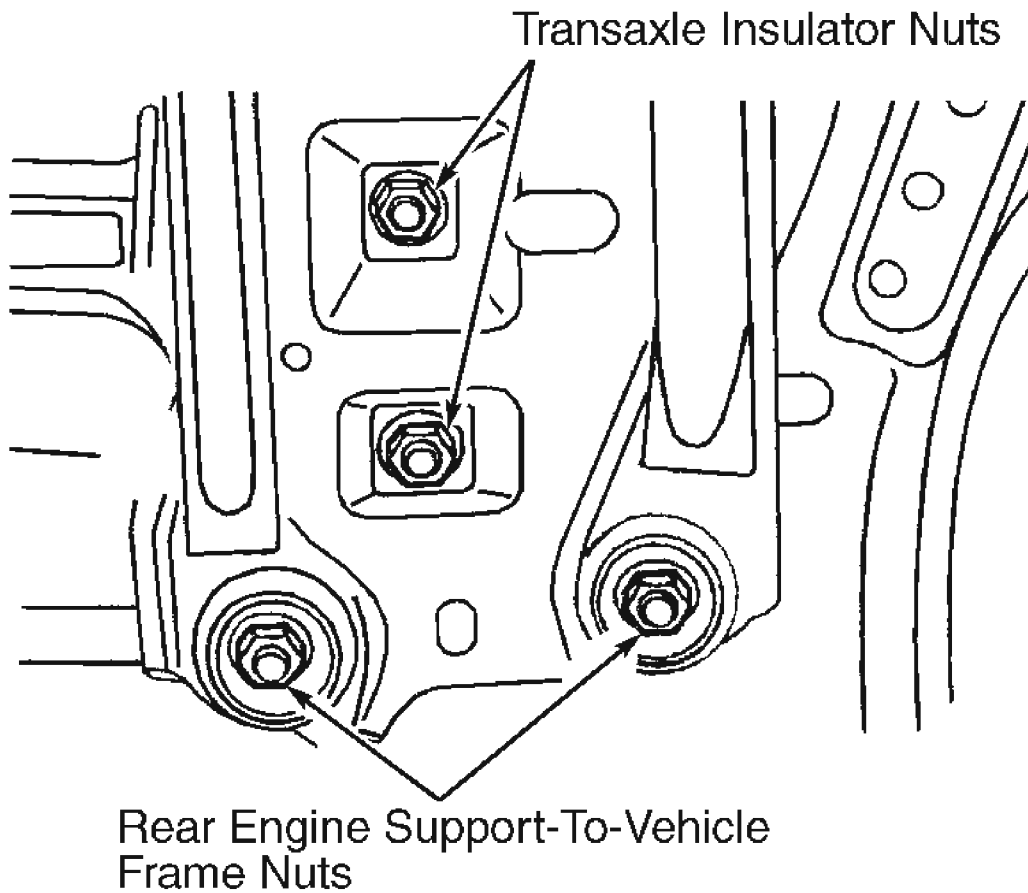
2001 Ford Escape
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2000-01 SUSPENSION Front - Escape, Escort & Focus
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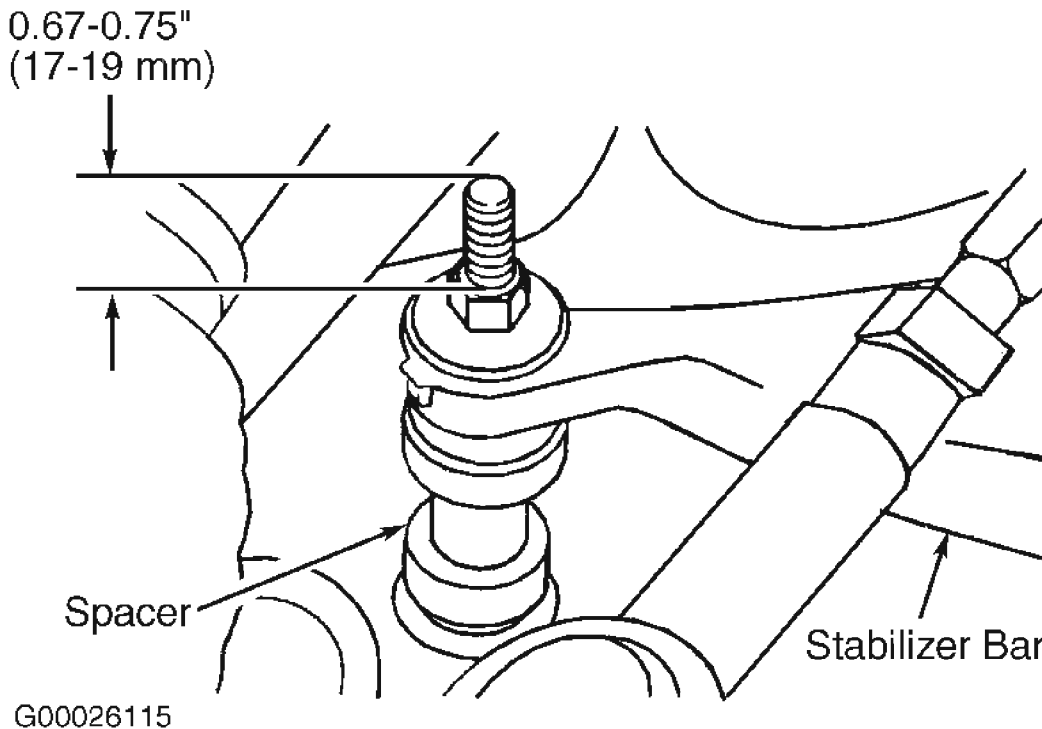
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**Fig. 7: Exploded View Of Stabilizer Bar Link Bushing Assembly (Escort)**  
**Courtesy of FORD MOTOR CO.**



G00026118

**Fig. 8: Identifying Transaxle Insulator Nuts & Rear Engine Support Nuts (Escort)**  
Courtesy of FORD MOTOR CO.



**Fig. 9: Installing Stabilizer Bar Link Bushing Assembly (Escort)**  
Courtesy of FORD MOTOR CO.

#### LOWER CONTROL ARM BUSHINGS (ESCORT)

**NOTE:** Lower control arm bushings can only be replaced on Escort. On other models, bushings are not serviceable and are replaced with control arm.

#### Removal & Installation

Remove lower control arm. See **LOWER CONTROL ARM** under REMOVAL & INSTALLATION. Using Lower Control Arm Bushing Tool (T81P-5493-B) and "C" Frame & Clamp Assembly (T74P-3044-A1), remove front lower control arm pivot bolt bushing. To install, reverse removal procedure.

#### WHEEL BEARINGS

#### Removal & Installation

See **HUB/STEERING KNUCKLE ASSEMBLY** under REMOVAL & INSTALLATION.

#### TORQUE SPECIFICATIONS

**2001 Ford Escape**

2000-01 SUSPENSION Front - Escape, Escort &amp; Focus

**TORQUE SPECIFICATIONS**

<b>Application</b>	<b>Ft. Lbs. (N.m)</b>
<b>Escape</b>	
Anti-Lock Brake Sensor Wire Bracket Bolts	14 (18)
Ball Joint Pinch Bolt	52 (70)
Brake Caliper Bolts	26 (35)
Front Axle Wheel Hub Nut	214 (290)
Lower Arm Pivot Bolt	85 (115)
Lower Arm Mounting Bolt Bushing (Rear)	148 (200)
Stabilizer Bar Bushing Mount	52 (70)
Stabilizer Bar Links	35 (48)
Strut Piston Rod To Bearing Plate Nut	76 (103)
Strut-To-Wheel Knuckle Bolts	85 (115)
Tie Rod End Nuts	41 (55)
Upper Strut Mount Bolts	59 (80)
Wheel Lug Nuts	98 (133)
<b>Escort</b>	
Anti-Lock Brake Sensor Bolt	12-16 (16-22)
Ball Joint Retaining Bolt	32-43 (43-58)
Ball Joint-To-Lower Control Arm Nuts	69-86 (93-117)
Brake Caliper Bolts	36-44 (49-59)
Control Arm Pivot Bolt	69-94 (93-127)
Crossmember-To-Frame "B" Bolts	47-66 (64-89)
Hub Retaining Nut	173-235 (235-319)
Lower Control Arm Bolt	69-86 (93-117)
Rear Engine Support Nuts	47-66 (64-89)
Stabilizer Bar-To-Subframe Bolts	32-44 (43-59)
Steering Gear-To-Frame Nut	27-38 (37-52)
Strut Piston Rod Nut	58-81 (79-110)
Strut Top Mount-To-Strut Tower Nuts	21-30 (29-40)
Strut-To-Steering Knuckle Bolts	69-94 (93-127)
Subframe-To-Vehicle Frame Bolts & Nuts	69-94 (93-127)
Tie Rod-To-Steering Knuckle Lock Nut	25-34 (34-46)
Transaxle Insulator Nuts	27-38 (37-52)
Wheel Lug Nuts	74-100 (100-135)
<b>Focus</b>	
Brake Caliper Guide Pin Bolt	21 (28)

## 2001 Ford Escape

2000-01 SUSPENSION Front - Escape, Escort & Focus

Crossmember Bolt	(1)
Hub Retaining Nut	233 (316)
Knuckle-To-Strut Bolt	66 (89)
Lower Control Arm Ball Joint Bolt	35 (47)
Lower Control Arm Inboard Nut	74 (100) + 60 degrees
Lower Control Arm Outboard Nut	89 (120)
Lower Control Arm-To-Crossmember Bolt	89 (120)
Lower Control Arm-To-Knuckle Pinch Bolt Nut	37 (50)
Stabilizer Bar Clamp Bolts	52 (71)
Stabilizer Bar Link-To-Strut Assembly Nut	37 (50)
Stabilizer Bar-To-Link Nut	37 (50)
Steering Column Shaft Coupling	21 (28)
Strut/String Assembly Thrust Bearing Nut	35 (47)
Strut Upper Mount Nuts	18 (24)
Tie Rod-To-Knuckle Nut	35 (47)
Wheel Lug Nuts	94 (127)
<b>INCH Lbs. (N.m)</b>	
ABS Wheel Speed Sensor Bolt	
Escape	
2WD	(2)
4WD	62-80 (7-9)
(1) See <b>Fig. 6</b> .	
(2) Tighten to 9-10 ft. lbs. (11-13 N.m).	



**2002-04 SUSPENSION****Front - Escape****DESCRIPTION**

Front suspension is MacPherson strut type using gas-pressurized struts and cast steering knuckles. Strut assembly includes a rubber isolated top mount and a thrust bearing. Strut assembly is bolted to strut tower and steering knuckle. A pinch joint is built into steering knuckle to retain ball joint stud. A control arm is attached to underbody and steering knuckle. A stabilizer bar is connected to both struts and secured to crossmember at bracket assemblies. Tie rod ends connect to steering knuckle.

Installation of new front strut assemblies and/or springs in pairs is not required by manufacturer. Install front suspension assemblies and/or springs one at a time as required. Ball joints and control arm pivot bushings may be replaced individually.

**ADJUSTMENTS & INSPECTION****LOWER BALL JOINT CHECKING**

**CAUTION:** When hoisting FWD vehicles, ensure hoist adapters are positioned properly. See **JACKING & HOISTING** in appropriate **SPECIFICATIONS & PROCEDURES** article in **WHEEL ALIGNMENT**.

Raise and support vehicle. Prior to performing this test, check front wheel hub for excessive end play. See **FRONT WHEEL BEARINGS**. Grasp tire by top and bottom edges. Move wheel assembly in and out from pivot center line. Any movement between wheel spindle and control arm indicates lower ball joint wear. If movement exceeds 1/32" (.79 mm), replace lower ball joint.

**FRONT WHEEL BEARINGS**

The wheel bearings are not adjustable. Check if the front wheel bearing is seized or damaged. If wheel bearing needs service, see **HUB/STEERING KNUCKLE ASSEMBLY** under **REMOVAL & INSTALLATION**.

**WHEEL ALIGNMENT**

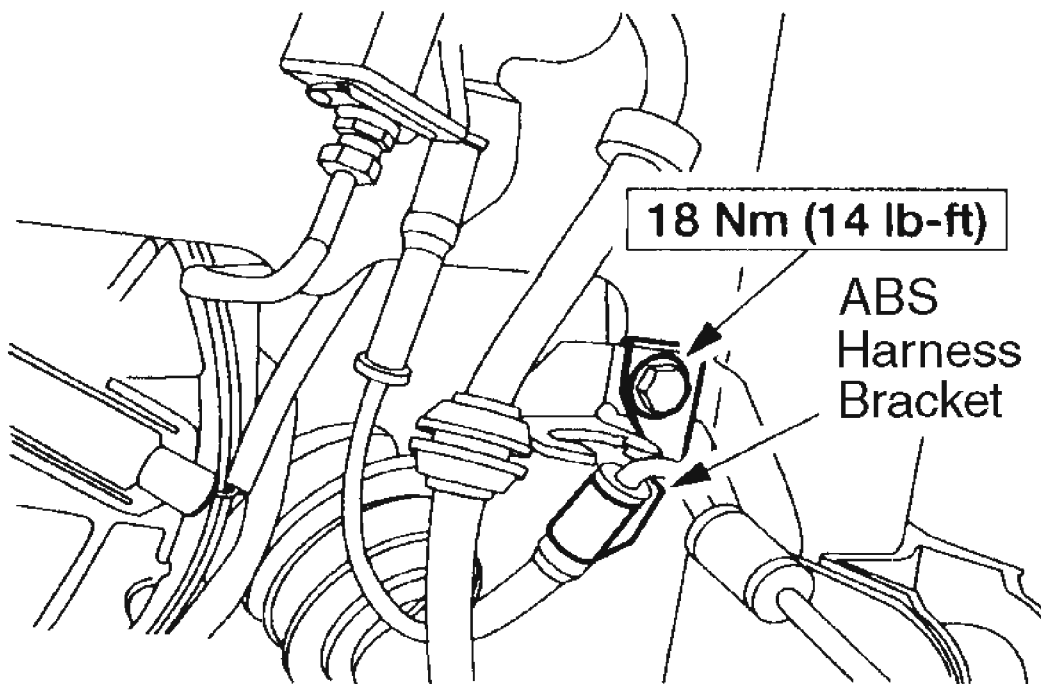
**NOTE:** See appropriate **SPECIFICATIONS & PROCEDURES** article in **WHEEL ALIGNMENT**.

**REMOVAL & INSTALLATION**

## COIL SPRING & STRUT ASSEMBLY

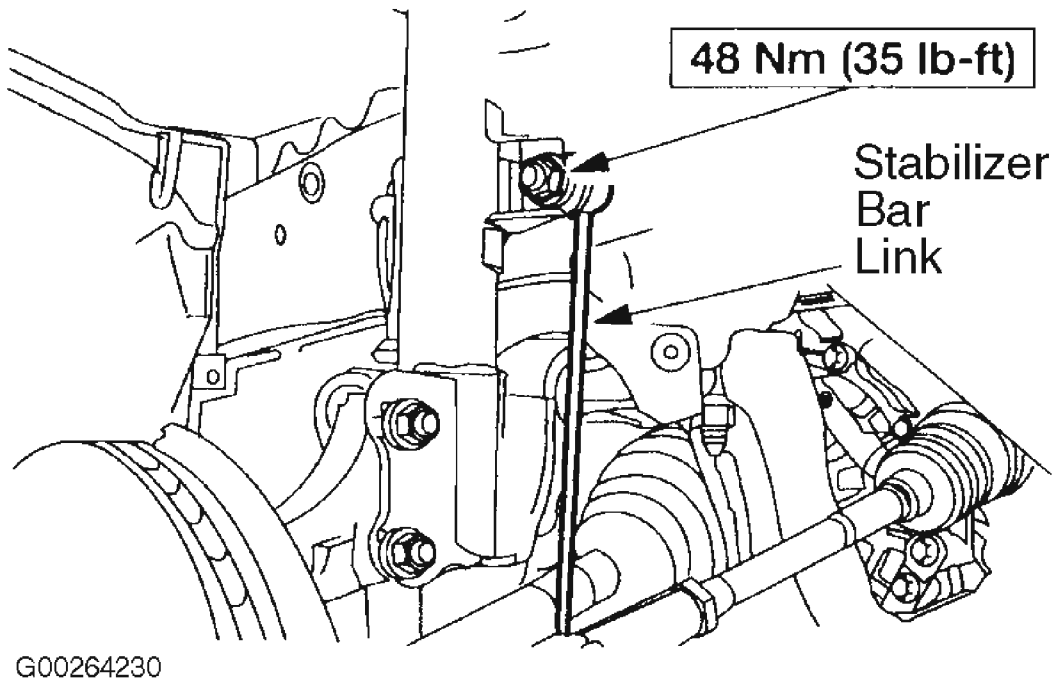
### Removal

Raise and support vehicle. Remove front wheel. Remove brake hose-to-strut clip. Remove brake hose from bracket. Remove ABS brake sensor clip from strut bracket (if equipped). See **Fig. 1** . Remove upper stabilizer bar link nut, and position aside. See **Fig. 2** . Remove strut-to-knuckle bolts. See **Fig. 3** . Remove upper mounting bracket nuts. See **Fig. 4** . Remove spring and strut assembly.

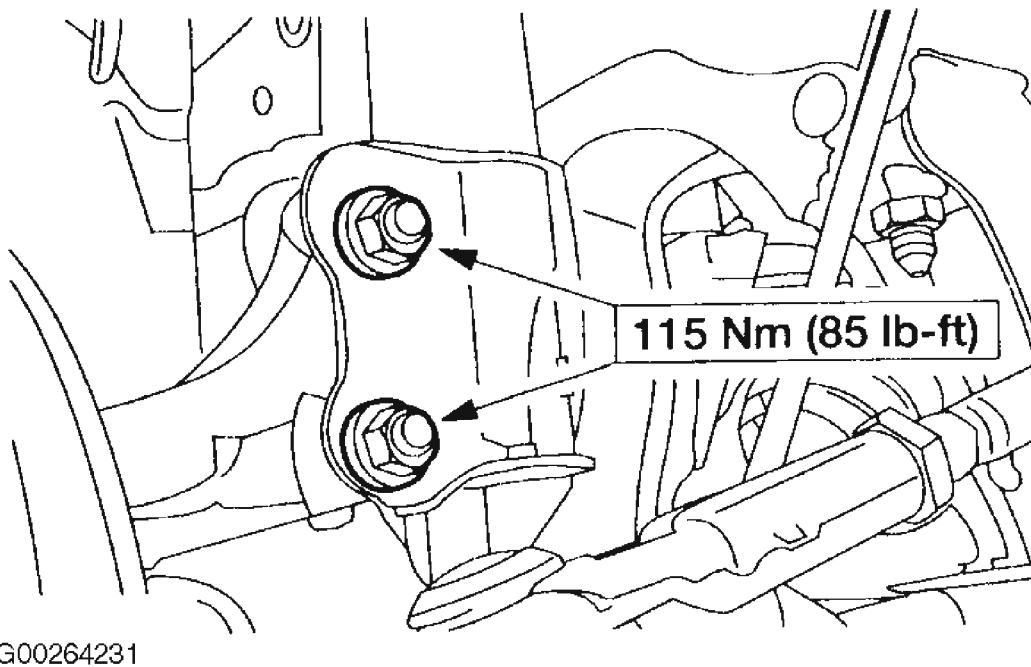


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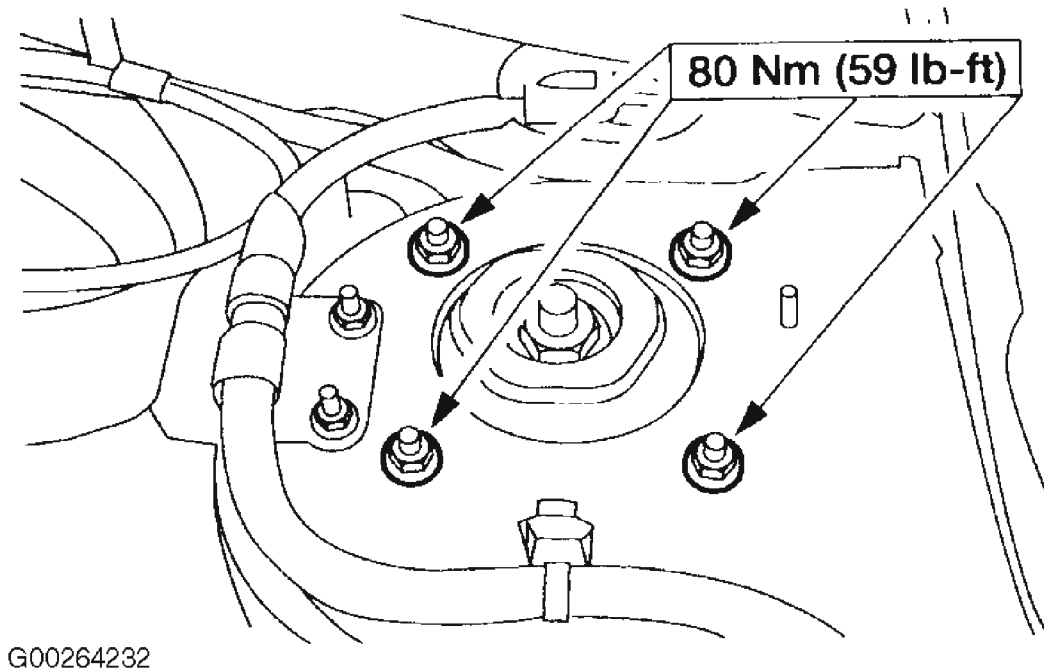
**Fig. 1: Locating ABS Harness Bracket**  
Courtesy of FORD MOTOR CO.



**Fig. 2: Locating Stabilizer Bar Link**  
Courtesy of FORD MOTOR CO.



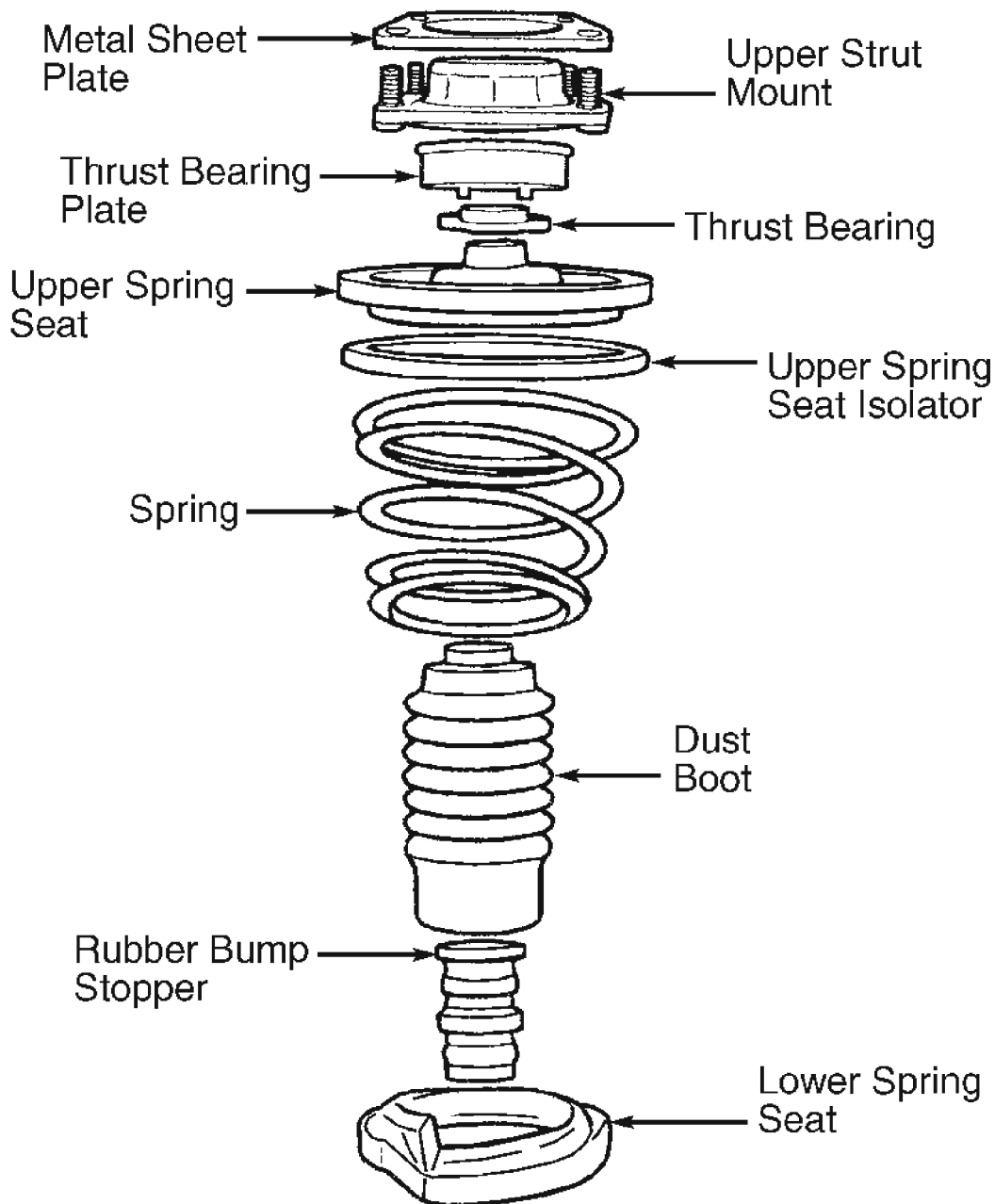
**Fig. 3: Locating Strut-To-Knuckle Bolts**  
Courtesy of FORD MOTOR CO.



**Fig. 4: Locating Upper Mounting Bracket Nuts**  
Courtesy of FORD MOTOR CO.

#### Disassembly & Reassembly

1. Secure strut assembly mounting block in vise. Using a suitable spring compressor, compress coil spring. Remove piston rod nut. Remove metal sheet plate, upper strut mount, thrust bearing plate, thrust bearing, upper spring seat, upper spring seat isolator, spring, dust boot, rubber bump stopper and lower spring seat. See **Fig. 5**.
2. To reassemble, reverse disassembly procedure. Ensure spring is properly seated into insulator.



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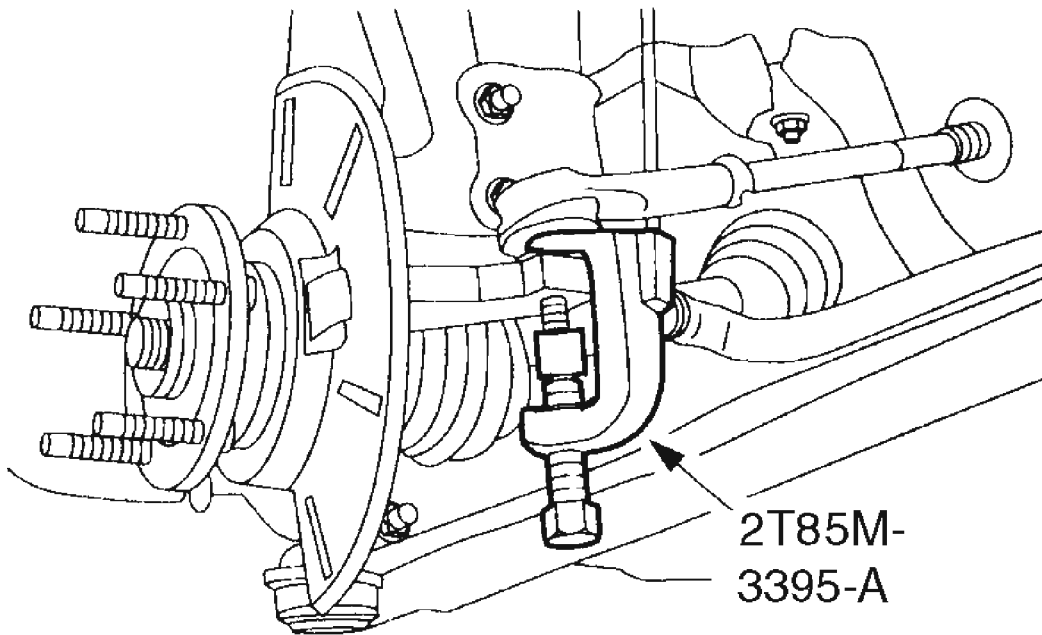
**Fig. 5: Exploded View Of Strut Spring Assembly**  
Courtesy of FORD MOTOR CO.

#### Installation

To install, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** . Check front end alignment, and adjust as necessary. See appropriate SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT.

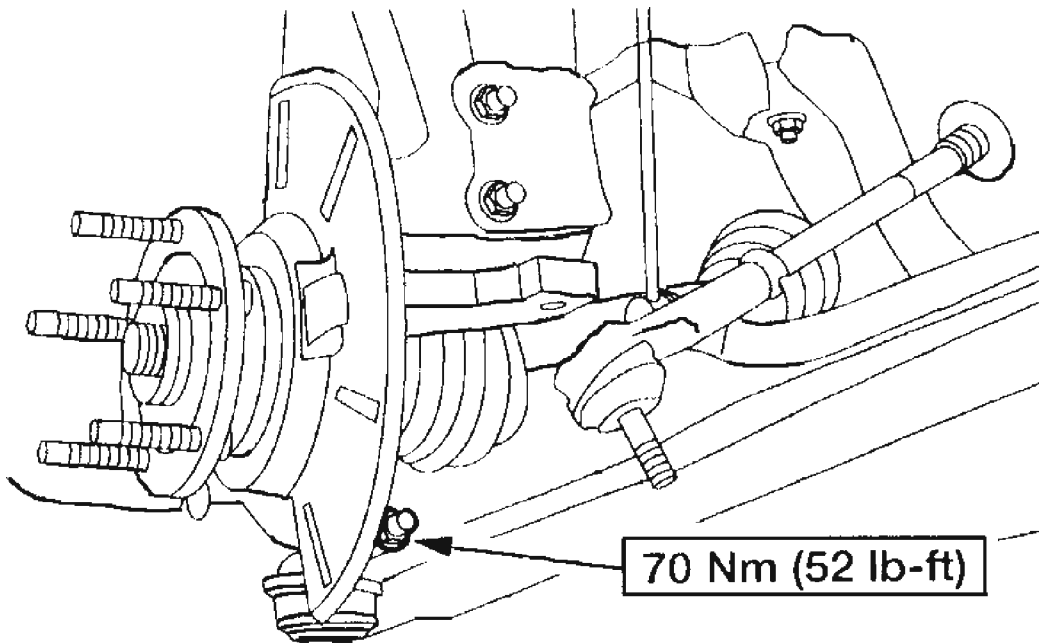
**HUB/STEERING KNUCKLE ASSEMBLY****Removal**

1. Raise and support vehicle. Remove front wheel, brake caliper and rotor. Remove wheel hub nut. Remove tie rod end cotter pin and nut. Using Tie Rod End Separator (T85M-3395-A), remove tie rod end. See **Fig. 6**.
2. If equipped, remove ABS wire bracket bolt and bracket. Remove bolts and ABS sensor, and position aside. Remove lower control arm nut and pinch bolt. See **Fig. 7**. Separate lower control arm from steering knuckle. Use Front Hub Remover (D93P-1175-B) to separate axle shaft from wheel knuckle. Remove strut assembly-to-steering knuckle nuts and bolts. Remove steering knuckle.



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**Fig. 6: Removing Tie Rod End From Knuckle**  
Courtesy of FORD MOTOR CO.

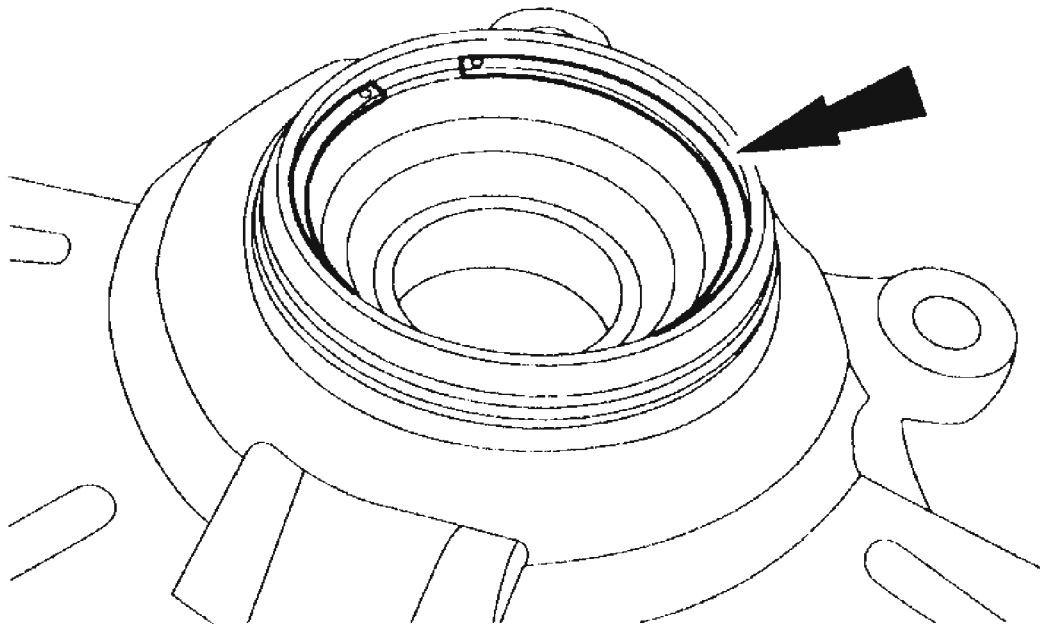


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**Fig. 7: Locating Lower Ball Joint Stud Pinch Bolt**  
Courtesy of FORD MOTOR CO.

#### Disassembly & Reassembly

1. Using Bearing Pulling Attachment (D79L-4621-A) to support steering knuckle, press wheel hub from wheel knuckle. See **Fig. 8** . If inner wheel remains on wheel hub, use Bearing Pulling Attachment to remove inner bearing race from wheel hub. Remove retainer ring from wheel knuckle. See **Fig. 9** . Using Bearing Pulling Attachment, press front wheel bearing from wheel knuckle.
2. To reassemble, reverse disassembly procedure.





**Fig. 9: Removing Wheel Bearing Snap Ring**  
Courtesy of FORD MOTOR CO.

**Installation**

To install, reverse removal procedure. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS**.

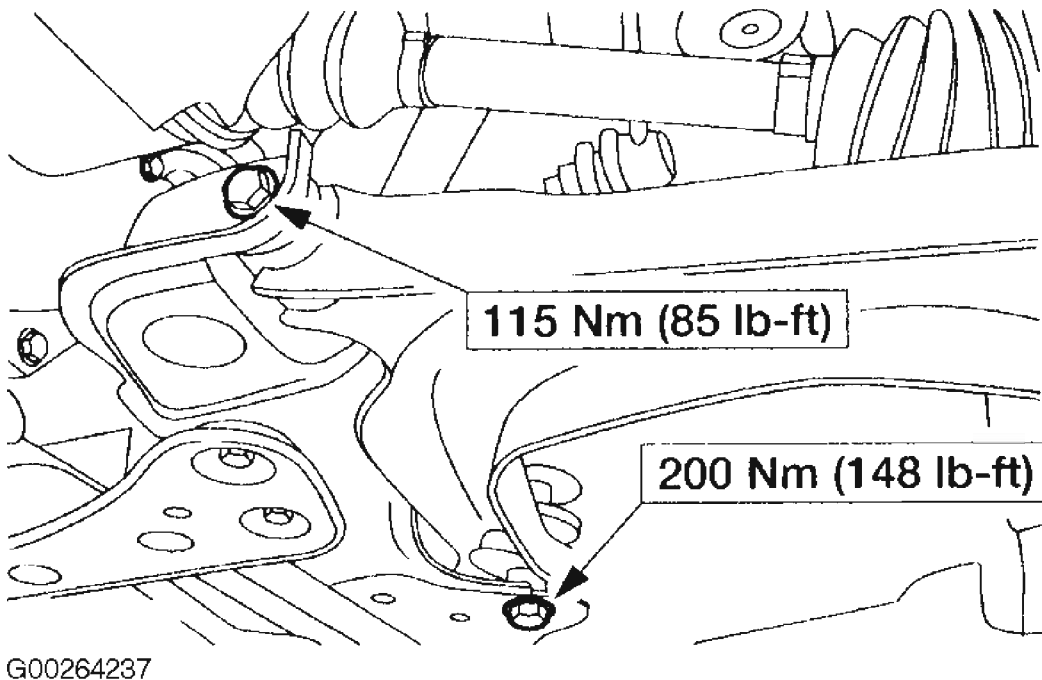
**LOWER BALL JOINT**

The lower ball joint is part of the lower control arm. For removal and installation, see **LOWER CONTROL ARM**.

**LOWER CONTROL ARM**

**Removal**

1. Raise and support vehicle. Remove wheel assembly. Remove nut and pinch bolt securing lower ball joint to knuckle. See **Fig. 7**. Separate steering knuckle from lower ball joint.
2. Support subframe. Remove lower control arm bolts. See **Fig. 10**. Remove lower control arm.



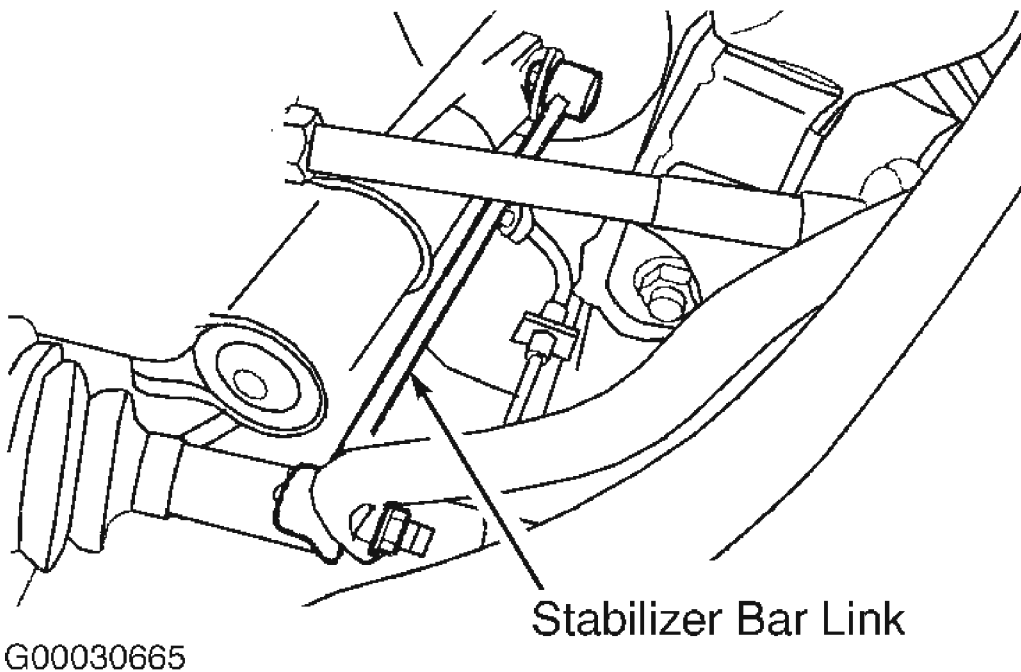
**Fig. 10: Locating Lower Control Arm Bolts**  
Courtesy of FORD MOTOR CO.

**Installation**

To install, reverse removal procedure. DO NOT tighten pivot bolts until vehicle is lowered and at operating level. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** .

**STABILIZER BAR & LINKS****Removal & Installation**

Raise and support vehicle. Remove left front wheel. Remove four bolts and two bushings. Remove two stabilizer bar links upper and lower nuts. See **Fig. 11** . Remove stabilizer bar and links. To install, reverse removal procedure. See **TORQUE SPECIFICATIONS** .



**Fig. 11: Stabilizer Bar Link Removal**  
Courtesy of FORD MOTOR CO.

**WHEEL BEARINGS****Removal & Installation**

See **HUB/STEERING KNUCKLE ASSEMBLY** under REMOVAL & INSTALLATION.

**TORQUE SPECIFICATIONS**

**2004 Ford Escape**

2002-04 SUSPENSION Front - Escape

**TORQUE SPECIFICATIONS**

<b>Application</b>	<b>Ft. Lbs. (N.m)</b>
Anti-Lock Brake Sensor Wire Bracket Bolts	14 (18)
Ball Joint Pinch Bolt	52 (70)
Brake Caliper Bolts	26 (35)
Front Axle Wheel Hub Nut	214 (290)
Lower Arm Mounting Bolt Bushing (Rear)	148 (200)
Lower Arm Pivot Bolt	85 (115)
Stabilizer Bar Bushing Mount	52 (70)
Stabilizer Bar Links	35 (48)
Strut Piston Rod To Bearing Plate Nut	76 (103)
Strut-To-Wheel Knuckle Bolts	85 (115)
Tie Rod End Nuts	41 (55)
Upper Strut Mount Bolts	41 (55)
Wheel Lug Nuts	98 (133)
	<b>INCH Lbs. (N.m)</b>
ABS Wheel Speed Sensor Bolt	80 (9)

## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner

## 2005 SUSPENSION

### Rear Suspension - Escape & Mariner

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TIGHTENING TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Anti-lock brake system (ABS) wheel speed sensor bolt	9	-	80
ABS wheel speed sensor wire bolt	9	-	80
Brake line bracket bolt	22	16	-
Brake line fitting	17	13	-
Lower arm inner bolt	115	85	-
Lower ball joint nut	63	46	-
Lower shock absorber nut	175	129	-
Parking brake cable bracket bolt	23	17	-
Upper arm inner bolt	115	85	-
Upper ball joint nut	63	46	-
Upper shock absorber nut	18	13	-
Wheel hub nut	290	214	-
Wheel knuckle bolt	150	111	-

## DESCRIPTION AND OPERATION

### REAR SUSPENSION

The rear suspension consists of the following components:

- Wheel hub
- Wheel bearing
- Wheel studs
- Upper arm
- Lower arm
- Wheel knuckle
- Shock absorber
- Spring

When a new wheel knuckle is installed on the 4WD vehicle, a new wheel bearing must also

be installed. Refer to **WHEEL BEARING**.

## **DIAGNOSIS AND TESTING**

### **REAR SUSPENSION**

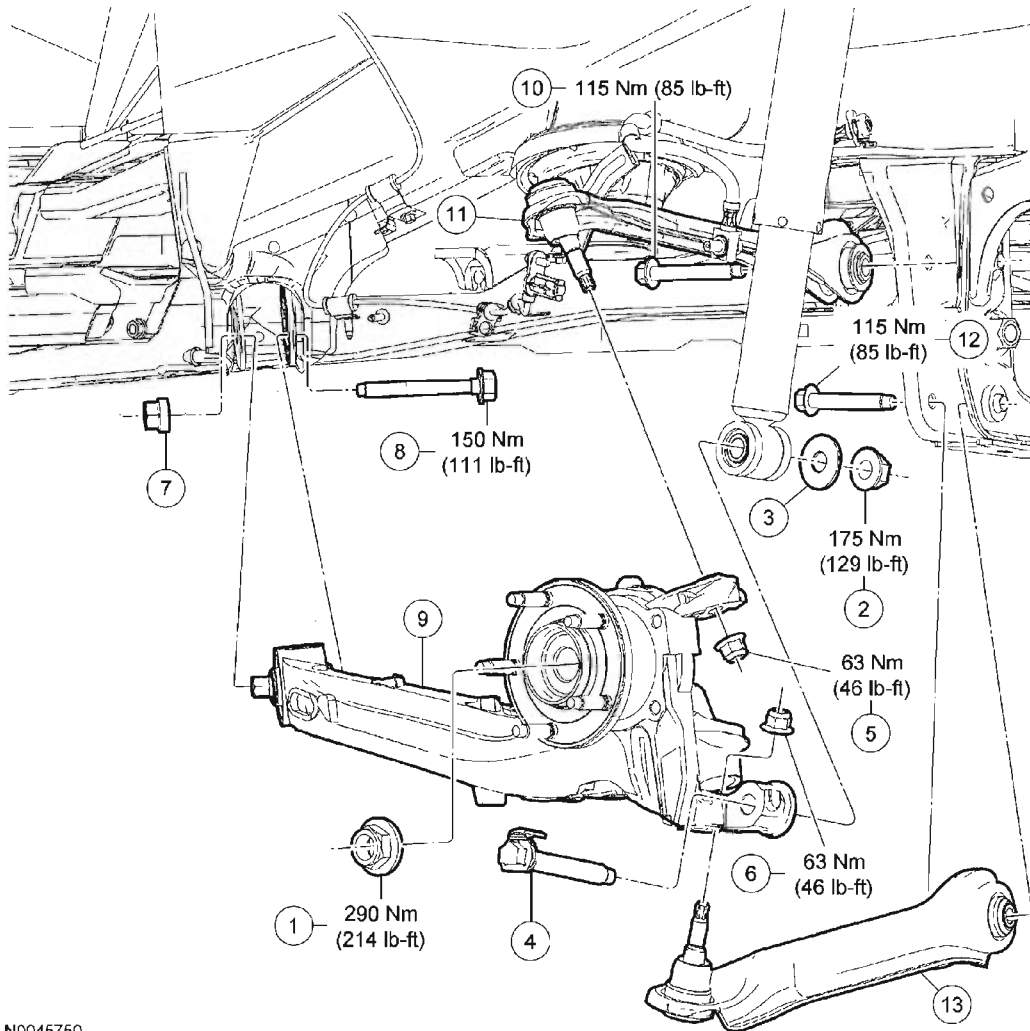
For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION** .

## **REMOVAL AND INSTALLATION**

### **REAR SUSPENSION - EXPLODED VIEW**

## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



N0045750

Item	Part Number	Description
1	W705967	Wheel hub nut (4WD only)
2	W520517	Lower shock absorber nut
3	W710426	Washer
4	W706874	Lower shock absorber bolt
5	W705606	Upper ball joint nut
6	W705606	Lower ball joint nut

Item	Part Number	Description
7	5B677	Cam nut
8	W710205	Wheel knuckle bolt
9	5B731/ 5B730	Wheel knuckle (LH/RH)
10	W707646	Upper arm inner bolt
11	5B673	Upper arm
12	W707646	Lower arm inner bolt
13	5B675	Lower arm

**Fig. 1: Exploded View Of Rear Suspension With Torque Specifications**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

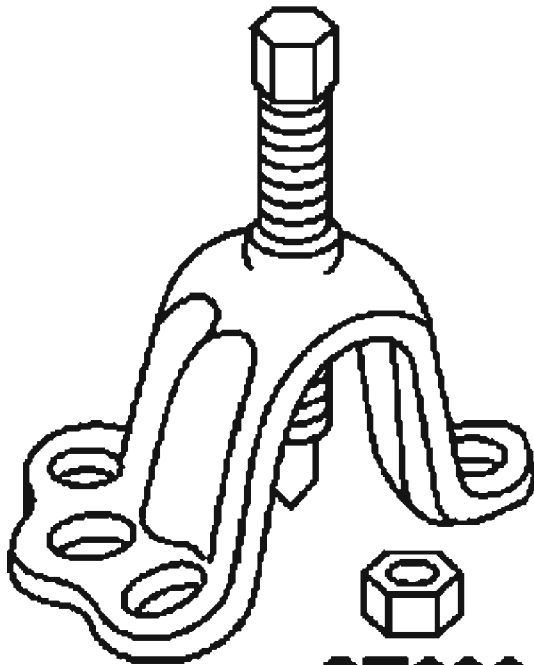
## WHEEL KNUCKLE

### Special Tool(s)

### SPECIAL TOOLS DESCRIPTION

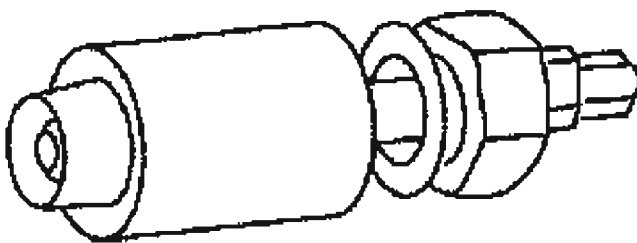
## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



**ST2330-A**

Front Hub Remover 205-D070  
(D93P-1175-B) or equivalent



**ST2138-A**

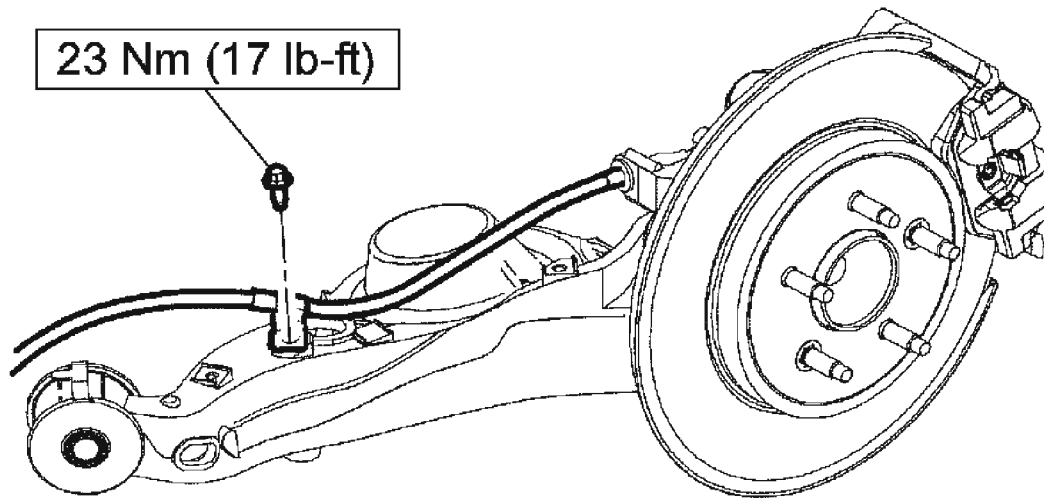
Halfshaft Installer 204-161 (T97P-  
1175-4)

#### Removal

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

**Drum brake vehicles**

1. Remove the brake shoes. For additional information, refer to **DRUM BRAKE** .
2. Remove the parking brake cable bracket-to-control arm bolt.



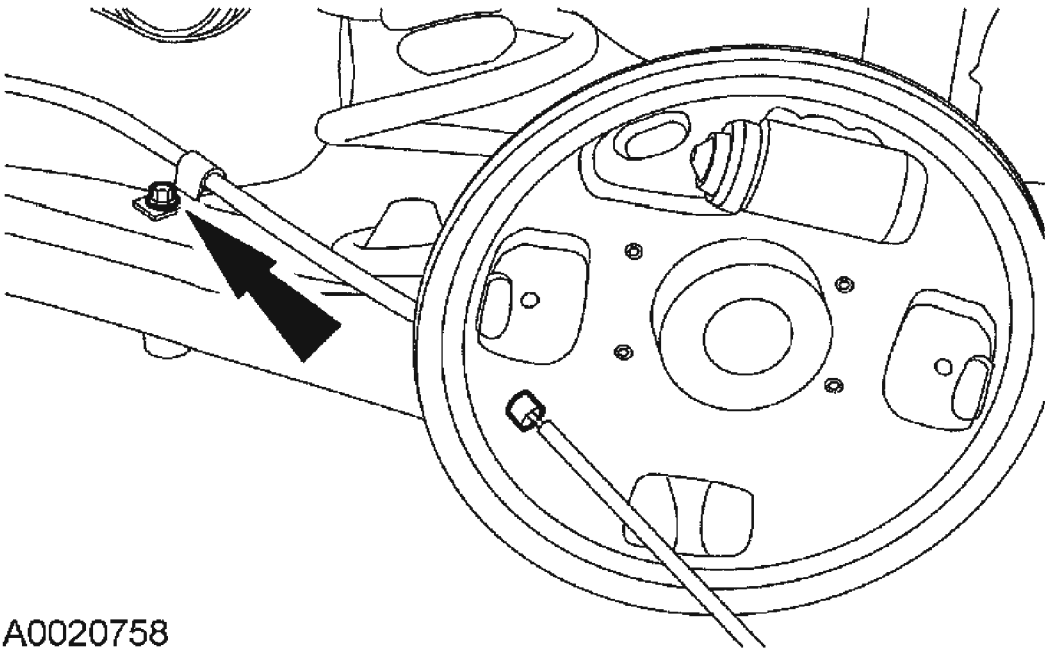
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**Fig. 2: Removing Parking Brake Cable Bracket-To-Control Arm Bolt With Torque Specifications**

Courtesy of FORD MOTOR CO.

3. Disconnect the parking brake cable from the brake backing plate.
  - Remove the parking brake cable from the brake backing plate.

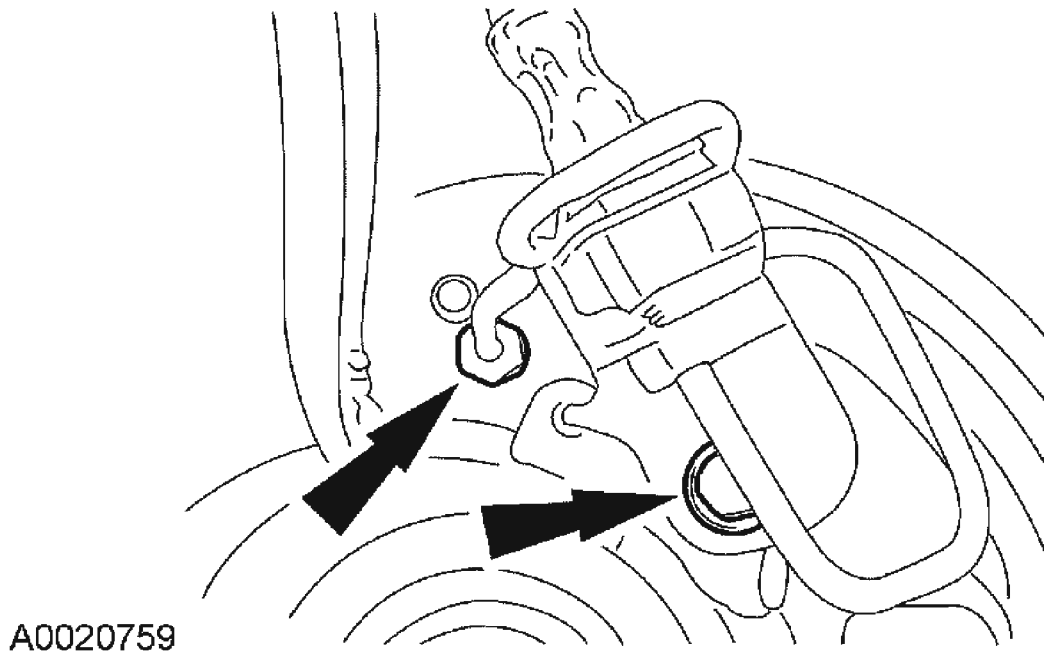




A0020758

**Fig. 3: Disconnecting Parking Brake Cable From Brake Backing Plate**  
Courtesy of FORD MOTOR CO.

4. Disconnect the brake line from the wheel cylinder and remove the brake line bracket bolt.

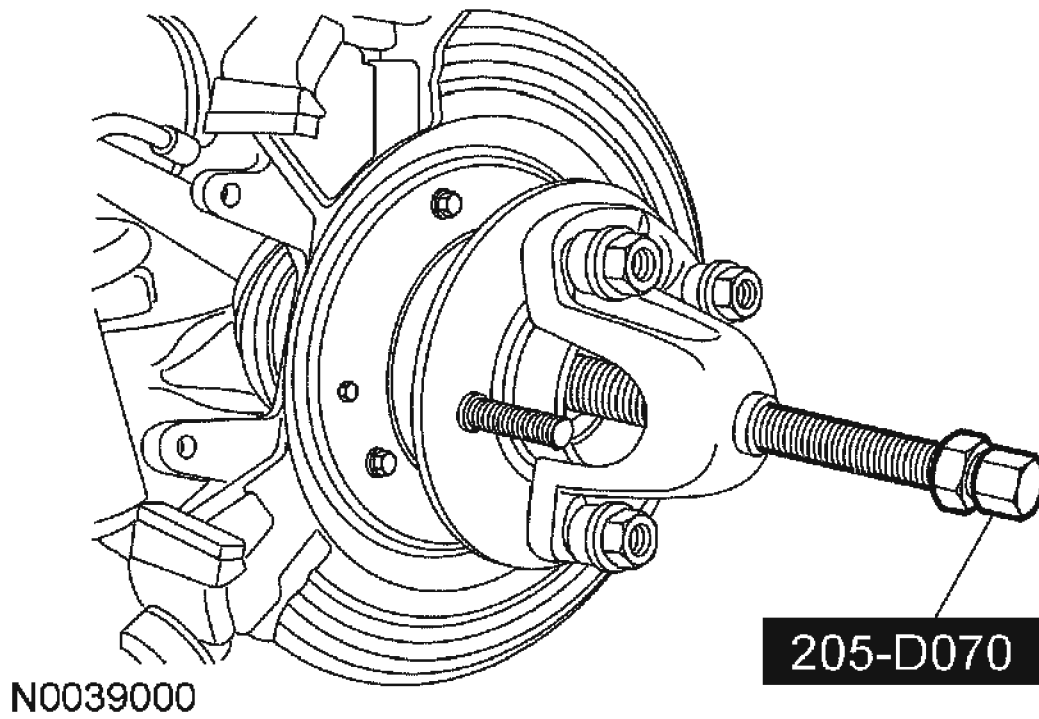


**Fig. 4: Removing Brake Line Bracket Bolt**  
Courtesy of FORD MOTOR CO.

**Disc brake vehicles**

5. Remove the parking brake shoes. For additional information, refer to **PARKING BRAKE AND ACTUATION**.
6. Remove and discard the wheel hub nut.

**CAUTION:** Do not use a hammer to separate the outer constant velocity (CV) joint from the hub. Damage to the threads and internal CV joint components can result.



**Fig. 5: Removing Outer CV Joint From Wheel Hub**  
Courtesy of FORD MOTOR CO.

7. Using the special tools, separate the outer CV joint from the wheel hub.

**All vehicles**

8. Remove the anti-lock brake system (ABS) wheel speed sensor bolt and the 2 ABS wheel speed sensor wire bolts.
9. Remove and position the wheel speed sensor and harness aside.
10. Remove the coil spring. For additional information, refer to **SPRING**.
11. Remove the lower ball joint nut.

**CAUTION: The joint surfaces must be clean.**

**NOTE: Clean the general area of the joint to prevent debris from entering the joint. Clean using only mild liquids.**

12. Reference mark the notch on the cam nut adjustment cam.
13. Remove and discard the wheel knuckle bolt.

14. Remove and discard the cam nut.
15. Remove the wheel knuckle.

**Installation****All vehicles**

**CAUTION:** The joint area must be free of debris to make sure of correct clamping.

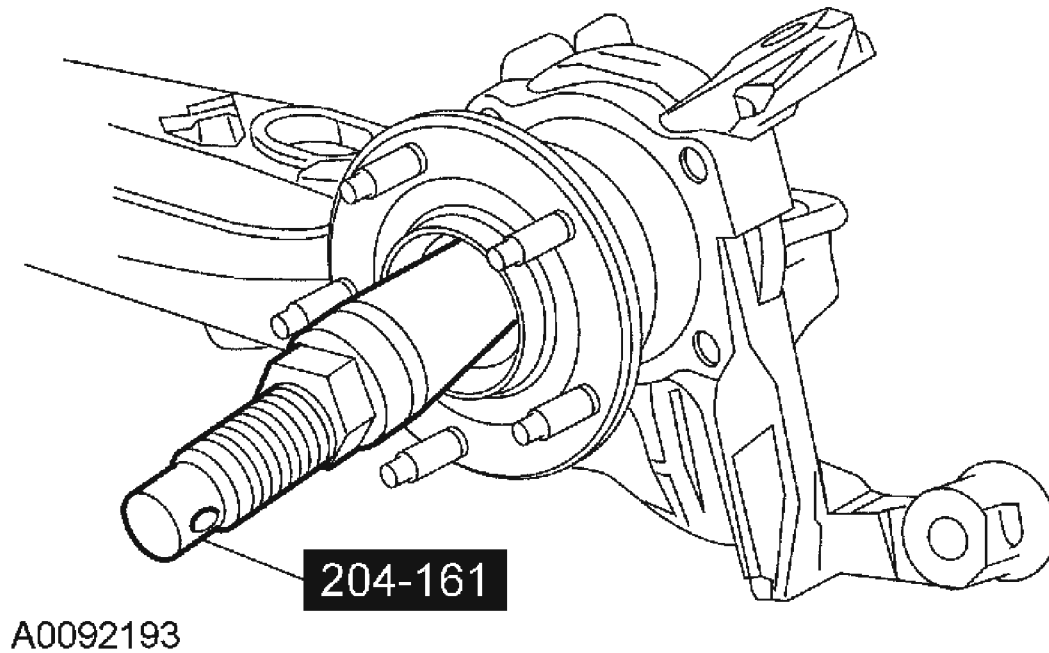
**NOTE:** The joint surfaces and the bushing sleeve serrations must be clean before assembly. Clean the joint surfaces and the bushing sleeve serrations with a wire brush.

**NOTE:** Align the notch on the cam nut with the reference marks.

1. Position the wheel knuckle and install a new wheel knuckle bolt and cam nut.
2. Using a suitable tool, hold the cam nut stationary while tightening the wheel knuckle bolt.
  - Tighten to 150 Nm (111 lb-ft).
3. Position the ABS wheel speed sensor harness and the sensor.
4. Position the lower ball joint into the wheel knuckle and install the lower ball joint nut.
  - Tighten to 63 Nm (46 lb-ft).
5. Install the coil spring. For additional information, refer to **SPRING**.
6. Install the ABS wheel speed sensor bolt and the 2 ABS wheel speed sensor wire bolts.
  - Tighten to 9 Nm (80 lb-in).

**Disc brake vehicles**

7. Using the special tool, install the outer CV joint into the wheel hub.

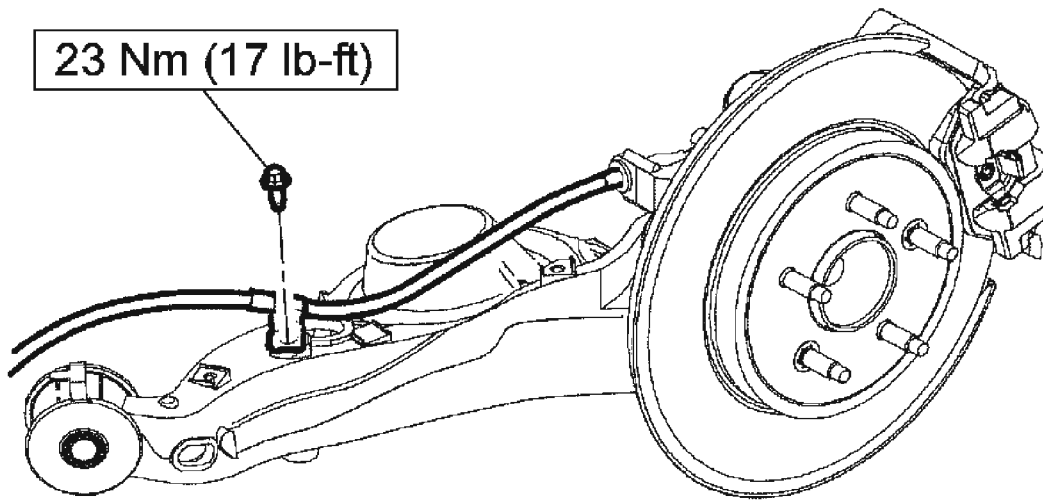


**Fig. 6: Installing Outer CV Joint Into Wheel Hub**  
Courtesy of FORD MOTOR CO.

8. Install a new wheel hub nut.
  - Tighten to 290 Nm (214 lb-ft).
9. Install the brake shoes. For additional information, refer to **DRUM BRAKE** .

#### **Drum brake vehicles**

10. Connect the brake line to the wheel cylinder.
  - Tighten to 17 Nm (13 lb-ft).
11. Install the brake line bracket bolt.
  - Tighten to 22 Nm (16 lb-ft).
12. Connect the parking brake cable to the brake backing plate and install the parking brake cable bracket bolt.
  - Tighten to 23 Nm (17 lb-ft).



N0047291

**Fig. 7: Connecting Parking Brake Cable To Brake Backing Plate With Torque Specifications**  
Courtesy of FORD MOTOR CO.

13. Install the parking brake shoes. For additional information, refer to **PARKING BRAKE AND ACTUATION**.

#### **All vehicles**

14. Check and adjust the wheel alignment as necessary. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION**.

#### **UPPER ARM**

##### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the upper ball joint nut.
  - To install, tighten to 63 Nm (46 lb-ft).

**NOTE:** Tighten the upper arm inner bolt with the weight of the vehicle on the ground.

3. Remove the upper arm inner bolt and the upper arm.
  - To install, tighten to 115 Nm (85 lb-ft).

4. To install, reverse the removal procedure.

## **LOWER ARM**

### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the lower ball joint nut and separate the lower ball joint from the wheel knuckle.
  - To install, tighten to 63 Nm (46 lb-ft).

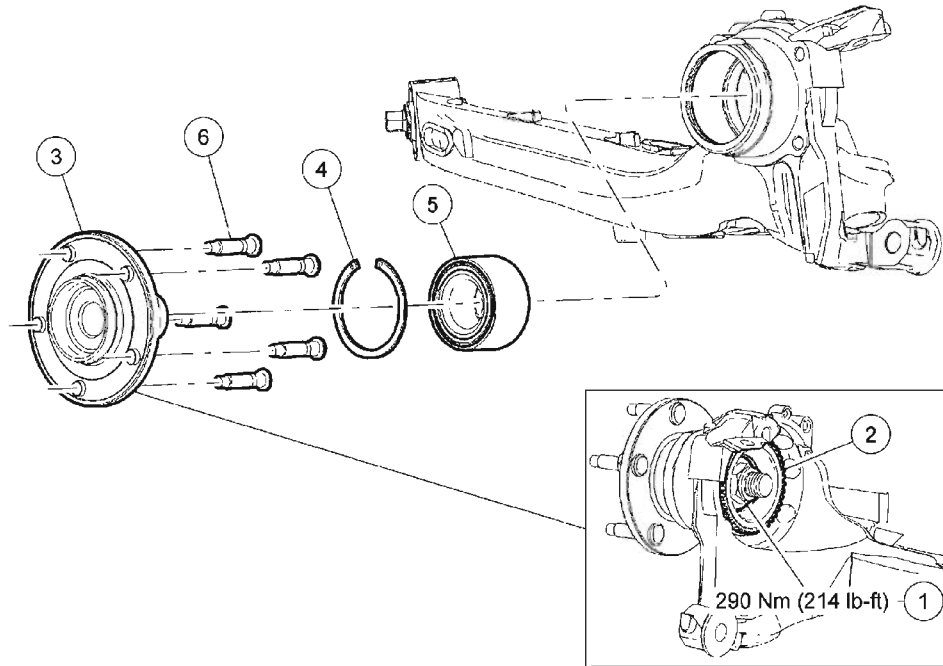
**NOTE:**      **Tighten the lower arm inner bolt with the weight of the vehicle on the ground.**

3. Remove the lower arm inner bolt and the lower arm.
  - To install, tighten to 115 Nm (85 lb-ft).
4. To install, reverse the removal procedure.

## **WHEEL BEARING AND WHEEL HUB - EXPLODED VIEW**

## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



N0001999

Item	Part Number	Description
1	W705967	Wheel hub nut (FWD)
2	2C186	Anti-lock brake system (ABS) wheel speed sensor ring (FWD)
3	1109	Wheel hub
4	1069	Wheel bearing snap ring

Item	Part Number	Description
5	1225	Wheel bearing
6	1107	Wheel studs

**Fig. 8: Exploded View Of Wheel Bearing And Wheel Hub With Torque Specifications**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

## WHEEL BEARING

### Special Tool(s)

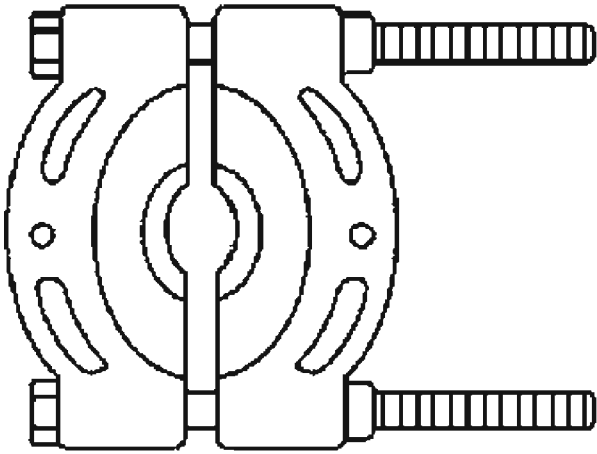
### SPECIAL TOOLS DESCRIPTION

Pinion Bearing Cone Remover 205-D002 (D79L-4621-A) or equivalent

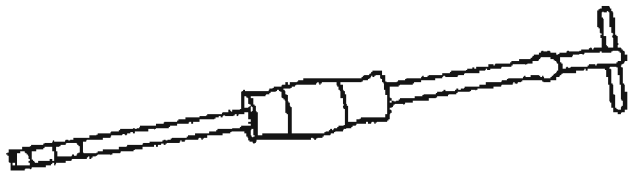


## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



**ST1895-A**

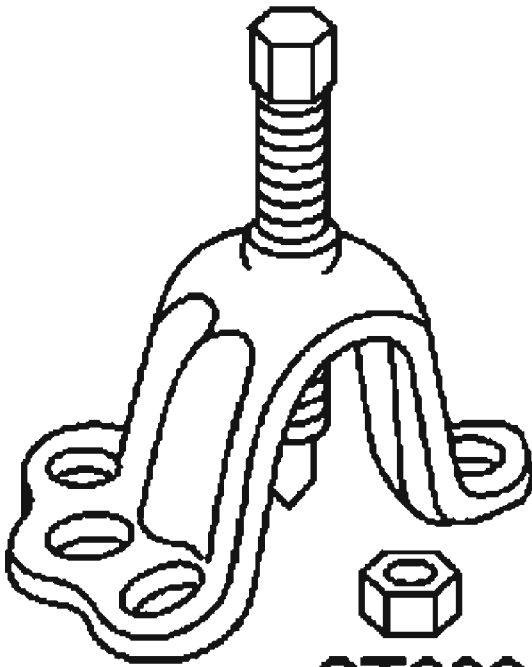


Impact Slide Hammer 100-D006  
(D79P-100-A) or equivalent

**ST1185-A**

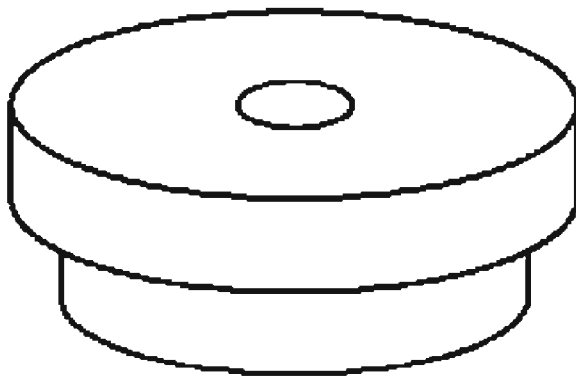
## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



**ST2330-A**

Front Hub Remover 205-D070  
(D93P-1175-B) or equivalent



**ST2446-A**

Pinion Bearing Cup Replacer 205-014 (T60K-4614-A)

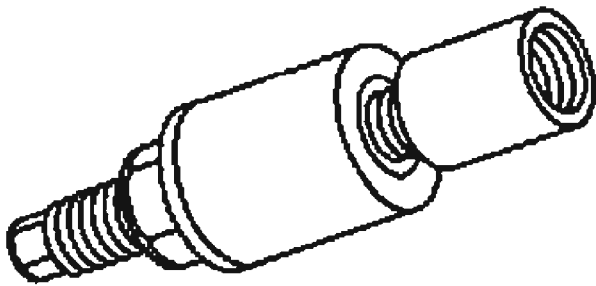
## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



Handle 205-153 (T80T-4000W)

**ST1255-A**



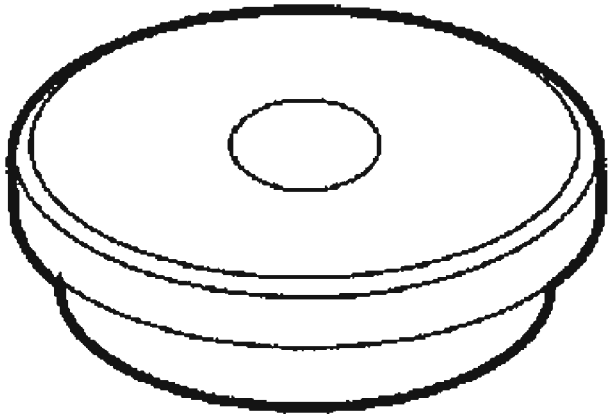
Wheel Bearing Adapter 205-D015  
(D80L-630-4) or equivalent

**ST2445-A**

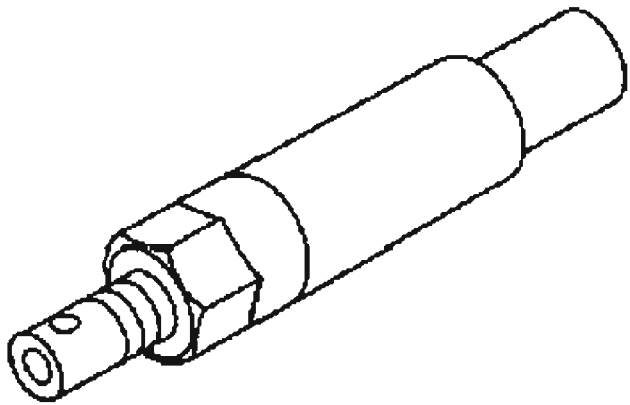
Differential Bearing Cup Replacer  
308-153 (T88C-7025-BH)

## 2005 Ford Escape

### 2005 SUSPENSION Rear Suspension - Escape & Mariner



ST2450-A

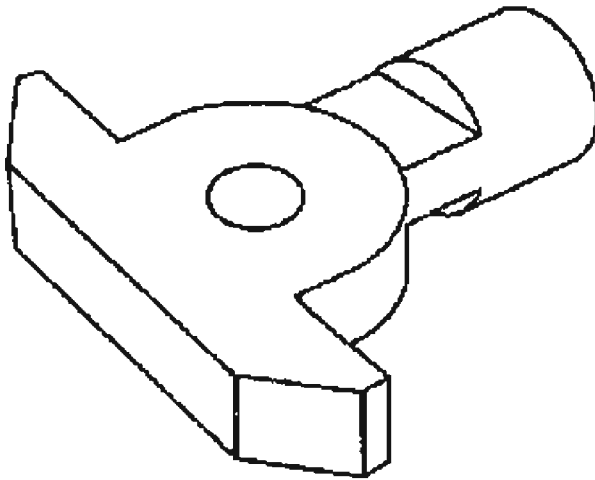


ST2566-A

Installer, Half Shaft 204-161 (T97P-1175-A)

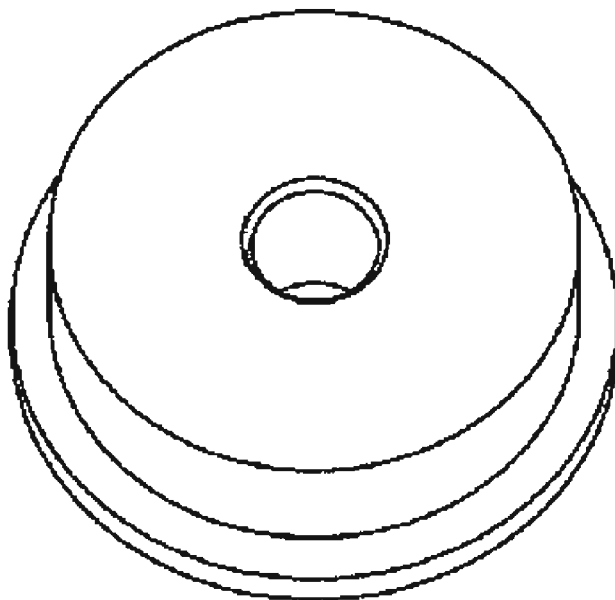
## 2005 Ford Escape

2005 SUSPENSION Rear Suspension - Escape & Mariner



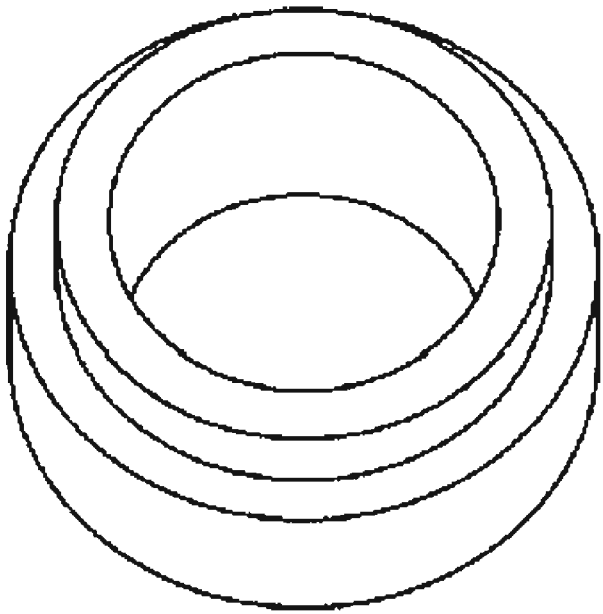
Axle Bearing Remover 205-193  
(T83T-1225-A)

**ST2554-A**



Bearing Cup Replacer 205-278  
(T88T-1175-C)

**ST2608-A**



**ST2607-A**

Receiver Adapter 204-142 (T88C-5493-E)

#### Removal

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

#### **4WD vehicles**

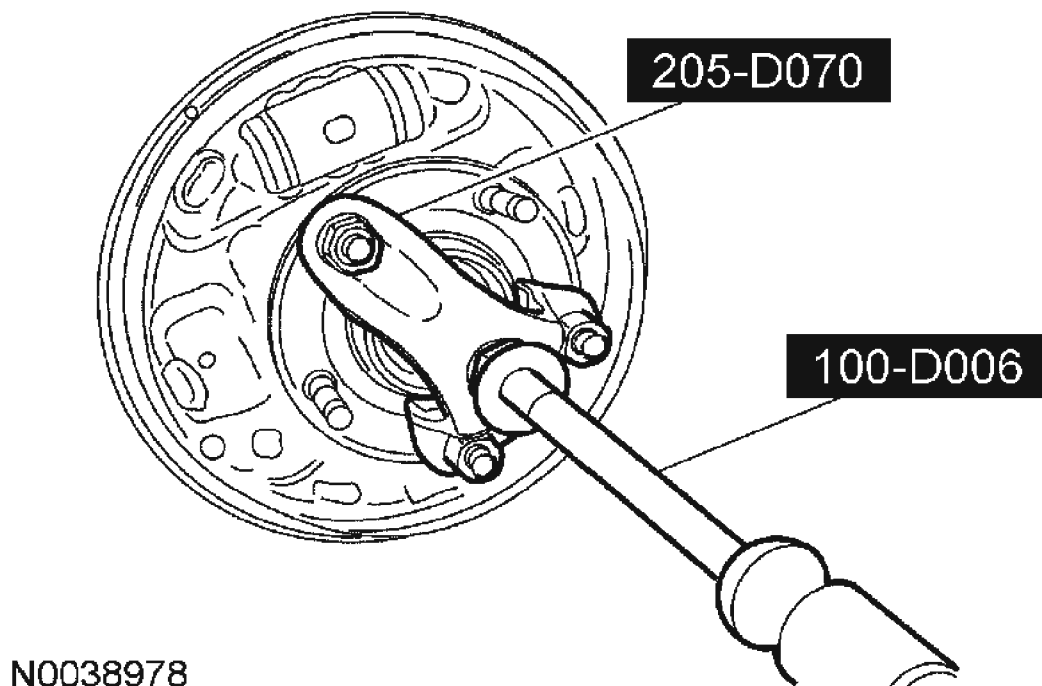
1. Remove the wheel knuckle. For additional information, refer to **WHEEL KNUCKLE**.

#### **FWD vehicles**

2. Remove and discard the wheel hub nut.
3. Remove the anti-lock brake system (ABS) wheel speed sensor ring.

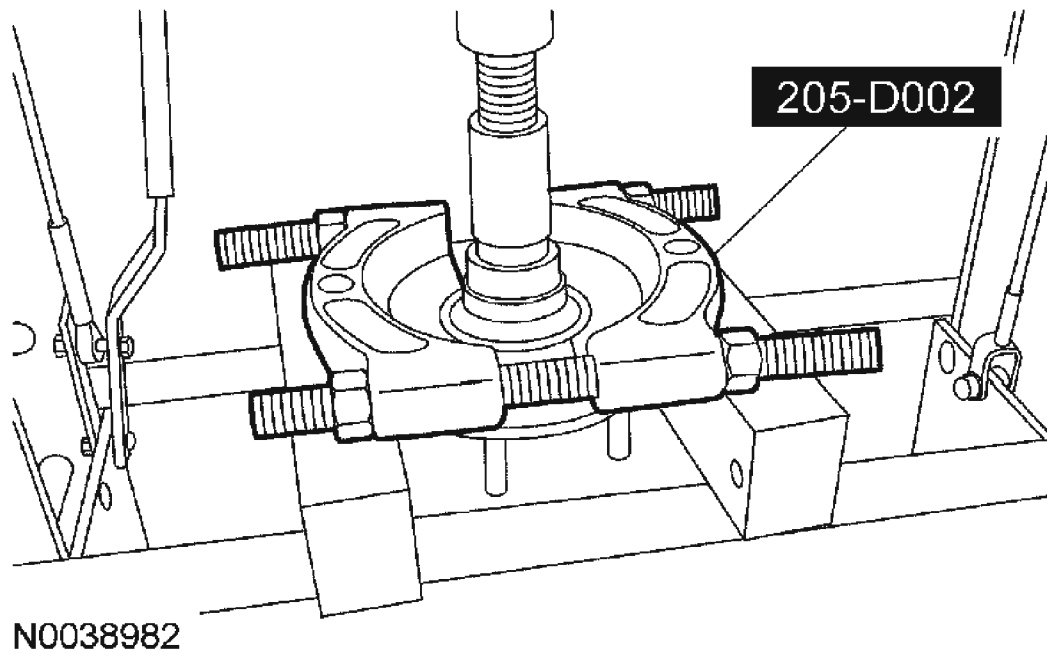
#### **All vehicles**

4. Using the special tools, remove the wheel hub.



**Fig. 9: Removing Wheel Hub**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step may not be necessary if the inner wheel bearing race remains in the wheel knuckle after removing the wheel hub.



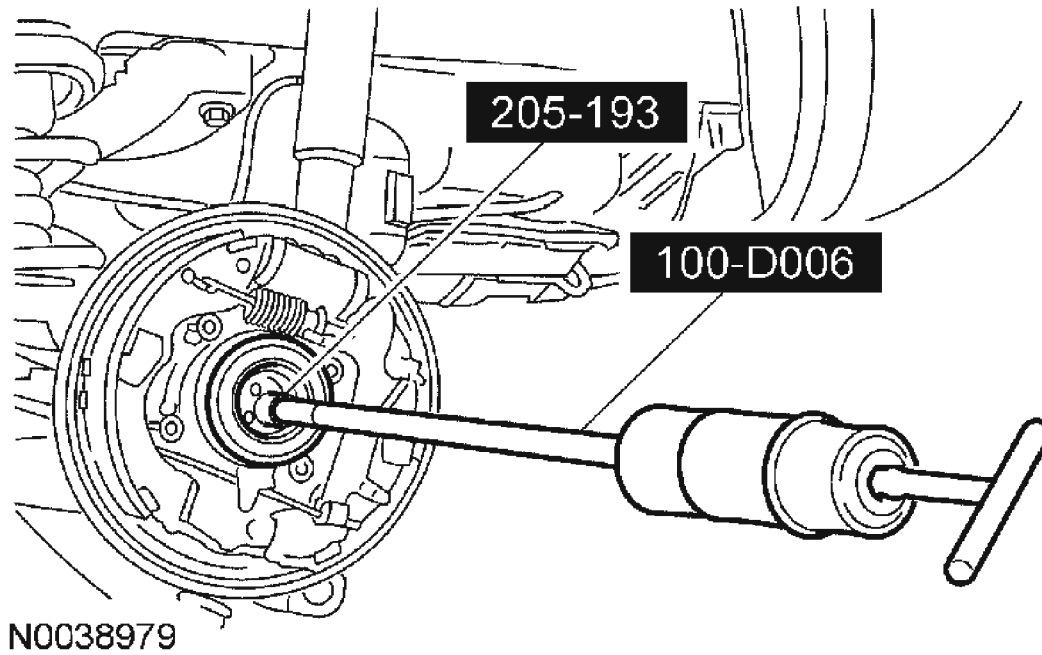
**Fig. 10: Pressing Inner Wheel Bearing Race From Wheel Hub**  
**Courtesy of FORD MOTOR CO.**

5. Using the special tool, press the inner wheel bearing race from the wheel hub.
6. Remove the wheel bearing snap ring from the wheel knuckle.

**FWD vehicles**

7. Using the special tools, remove the wheel bearing from the wheel knuckle.

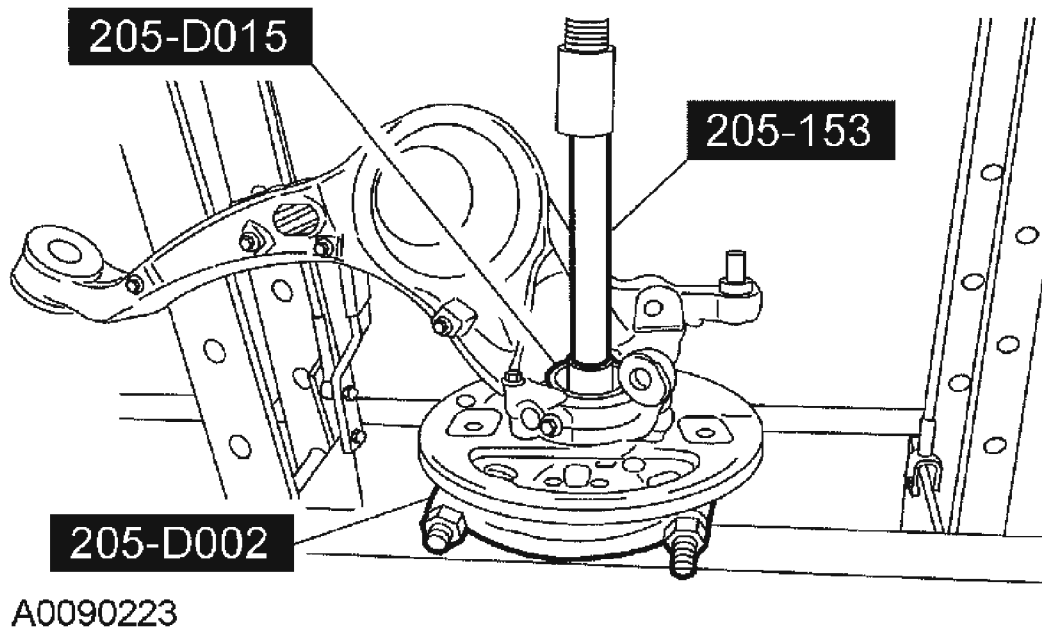




**Fig. 11: Removing Wheel Bearing From Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

**4WD vehicles**

8. Using the special tools, press the wheel bearing race from the wheel knuckle.

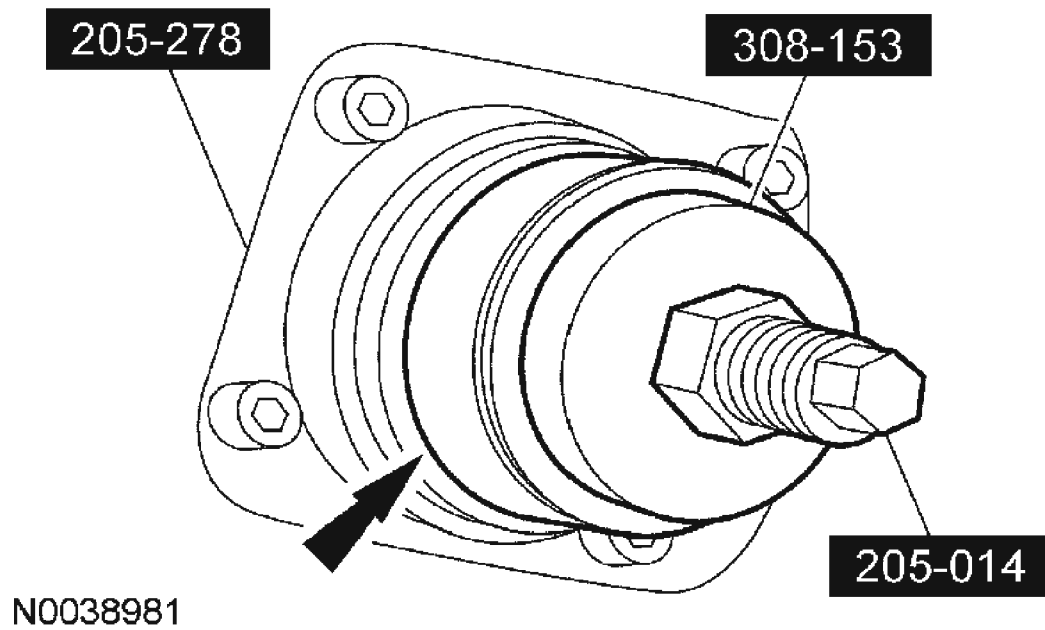


**Fig. 12: Pressing Wheel Bearing Race From Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

#### Installation

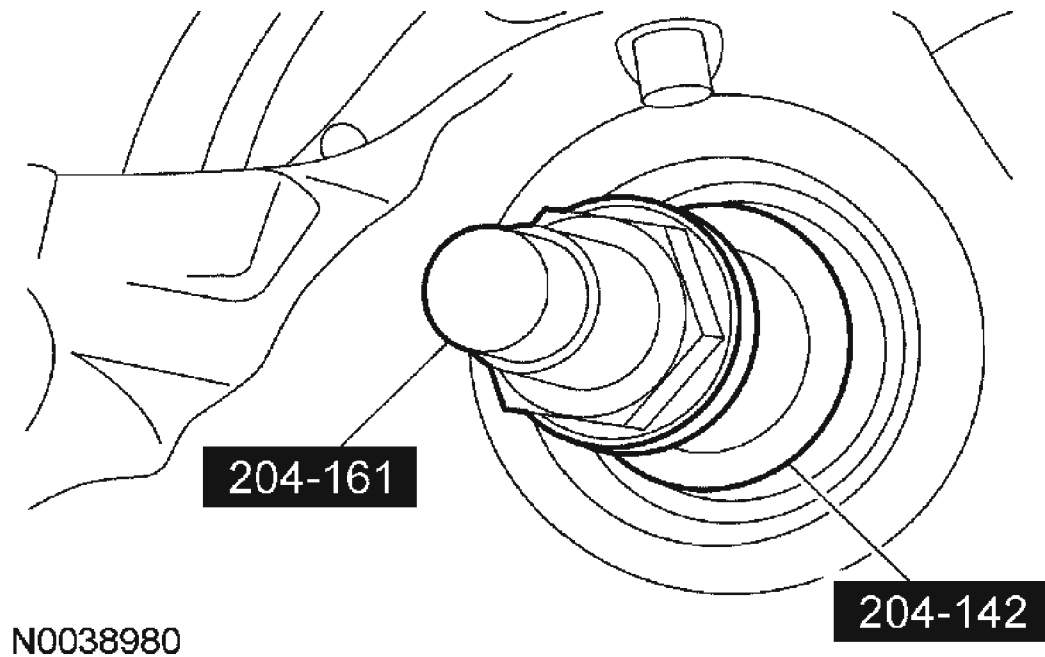
##### All vehicles

1. Using the special tools, install a new wheel bearing into the wheel knuckle.



**Fig. 13: Installing New Wheel Bearing Into Wheel Knuckle**  
**Courtesy of FORD MOTOR CO.**

2. Install the wheel bearing snap ring.
3. Using the special tools, install the wheel hub into the wheel bearing.



**Fig. 14: Installing Wheel Hub Into Wheel Bearing**  
Courtesy of FORD MOTOR CO.

#### **FWD vehicles**

4. Install the ABS wheel speed sensor ring.
5. Install the wheel hub nut.
  - Tighten to 290 Nm (214 lb-ft).

#### **4WD vehicles**

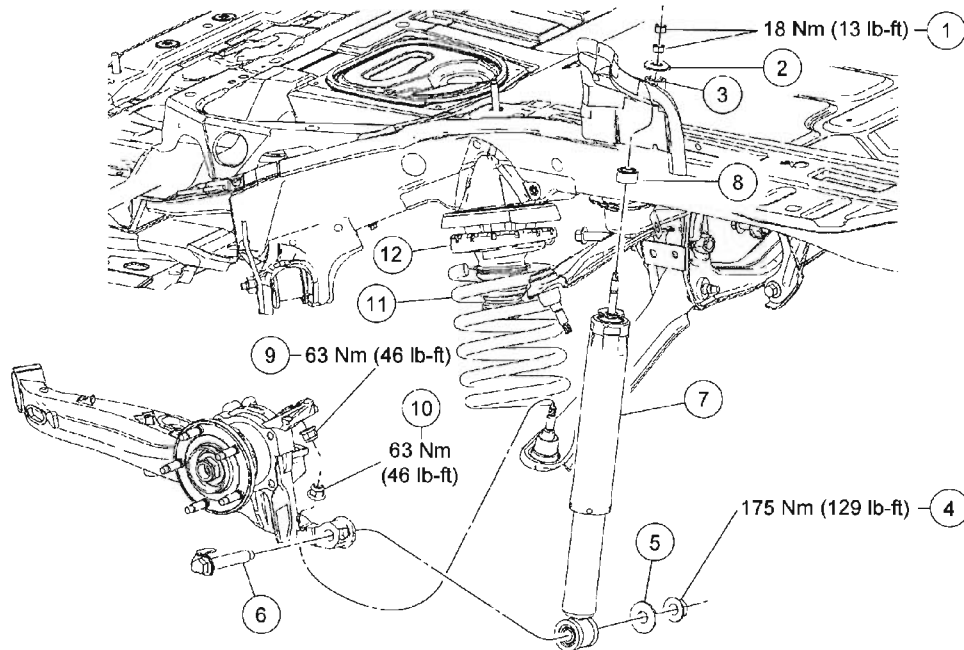
6. Install the wheel knuckle. For additional information, refer to **WHEEL KNUCKLE**.

### **WHEEL STUDS**

#### **Removal and Installation**

1. Remove the wheel bearing and hub. For additional information, refer to **WHEEL BEARING**.
2. Using a suitable press, remove the wheel studs from the wheel hub.
3. To install, reverse the removal procedure.

### **SHOCK ABSORBER AND SPRING ASSEMBLY - EXPLODED VIEW**



N0049101

Item	Part Number	Description
1	W520504	Upper shock absorber nuts (also part of 18008)
2	18B010	Washer (also part of 18008)
3	18017	Bushing (also part of 18008)
4	W520517	Lower shock absorber nut (also part of 18008)
5	W710426	Washer (also part of 18008)
6	W706874	Lower shock absorber bolt (also part of 18008)

Item	Part Number	Description
7	18008	Shock absorber kit
8	18197	Bushing (also part of 18008)
9	W705606	Upper ball joint nut
10	W705606	Lower ball joint nut
11	5560	Coil spring
12	5A565	Coil spring insulator

**Fig. 15: Exploded View Of Shock Absorber And Spring Assembly With Torque Specifications**

Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

## SHOCK ABSORBER

### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the rear quarter trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
3. Remove the upper shock absorber nuts, washer and bushing.
  - To install, tighten to 18 Nm (13 lb-ft).
4. Remove the lower shock absorber nut, washer and bolt.

- To install, tighten to 175 Nm (129 lb-ft).
5. Remove the shock absorber and the bushing.
  6. To install, reverse the removal procedure.

## **SPRING**

### **Removal**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Support the wheel knuckle and remove the upper ball joint nut.
3. Remove the lower shock absorber nut, washer and bolt.
4. Remove the upper arm inner bolt.
  - Loosen the lower arm inner bolt.

**NOTE:**      **Note the position of the coil spring insulator and coil spring for installation.**

5. Carefully lower the wheel knuckle support.
6. Remove the coil spring.

### **Installation**

1. Align the coil spring and coil spring insulator to the previously noted position.
2. Carefully raise the wheel knuckle support.
3. Install the upper arm inner bolt.
  - Tighten the upper and lower arm inner bolts to 115 Nm (85 lb-ft).
4. Install the lower shock absorber bolt, washer and nut.
  - Tighten the nut to 175 Nm (129 lb-ft).
5. Install the upper ball joint nut and remove the wheel knuckle support.
  - Tighten the nut to 63 Nm (46 lb-ft).

**2001 SUSPENSION****Rear - Escape****DESCRIPTION**

Tribute uses an independent rear suspension. The main components consist of a vertically-mounted shock absorber and coil spring, upper and lower control arms, knuckle, and hub assembly.

**ADJUSTMENTS & INSPECTION****WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES**

**NOTE:** See **SPECIFICATIONS & PROCEDURES** article in **WHEEL ALIGNMENT**.

**WHEEL BEARING****Inspection**

Wheel bearings are not adjustable. Raise and support vehicle. Move tire assembly in and out, and spin tire. If excessive movement or any roughness is detected, replace bearing. See **HUB & BEARING** under REMOVAL & INSTALLATION.

**REMOVAL & INSTALLATION****UPPER CONTROL ARM****Removal & Installation**

**NOTE:** It may be necessary to hold ball joint stud in place while removing nut.

Raise and support vehicle. Remove wheel and tire. Remove upper ball joint nut. Separate upper arm from knuckle. Remove upper arm-to-crossmember bolt. Remove upper arm. To install, reverse removal procedures. Tighten fasteners to specifications. See **TORQUE SPECIFICATIONS**.

**LOWER CONTROL ARM****Removal & Installation**

**NOTE:** It may be necessary to hold ball joint stud in place while removing nut.

Raise and support vehicle. Remove wheel and tire. Remove lower ball joint nut. Separate lower ball joint from knuckle. Remove lower arm-to-crossmember bolts. Remove lower control arm. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

## **HUB, BEARING & WHEEL KNUCKLE ASSEMBLY**

### **Removal (2WD)**

1. Raise and support vehicle. Remove wheel and tire. Remove brake drum. Remove ABS sensor ring, if equipped. Remove wheel hub nut. Using Hub Remover (205-D070) and slide hammer, remove wheel hub.
2. Using Pinion Bearing Remover (205-D002), press inner wheel bearing race from hub. Remove snap ring. Using Axle Bearing Remover (205-224) and slide hammer, remove outer race from knuckle.

### **Installation**

Using Differential Bearing Cup Replacer (308-153) and Pinion Bearing cup Replacer (205-014) install NEW wheel bearing into knuckle. Install snap ring into knuckle. Position brake backing plate on to wheel knuckle, and tighten bolts to 49 ft. lbs. (69 N.m). Using wheel hub washer and Half Shaft Installer (204-161), install wheel hub into wheel bearing. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

### **Removal (4WD)**

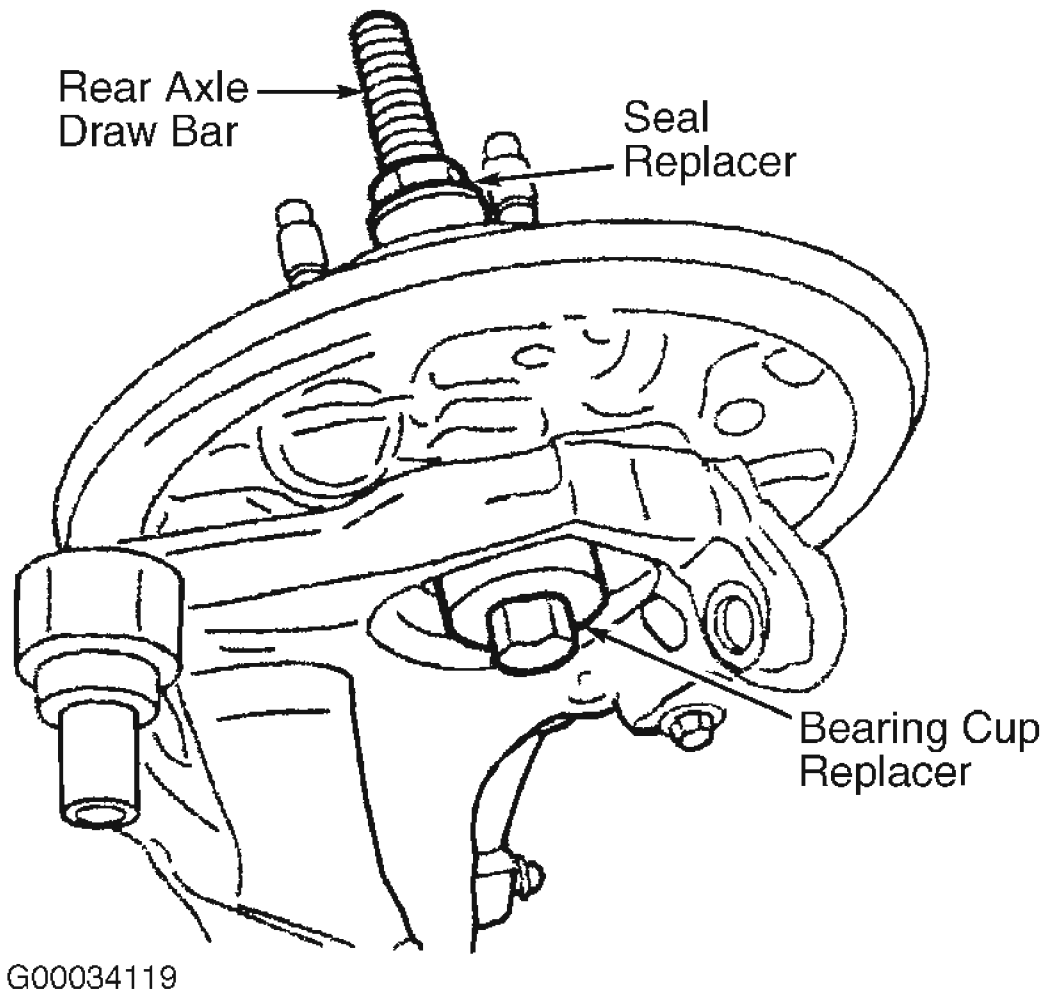
1. Raise and support vehicle. Remove wheel and tire. Remove brake shoes. Remove axle shaft nut. Using Hub Remover (205-D070), loosen half-shaft from hub. Using hub remover and slide hammer, remove wheel hub.
2. Using Pinion Bearing Remover (205-D002), press inner wheel bearing race from hub. Position ABS sensor aside, if equipped. Disconnect parking brake cable from knuckle. Disconnect brake line. Support knuckle.
3. Remove lower ball joint nut. Remove upper ball joint nut. Remove coil spring. Mark relationship between knuckle cam bolt and adjustment cam notch. Remove knuckle cam bolt and knuckle cam. Remove knuckle. Remove snap ring. Using Wheel Bearing Adapter (205-D015), pinion bearing remover, and Handle (205-153), press outer bearing race from knuckle.

### **Installation**

Using Differential Bearing Cup Replacer (308-153) and Pinion Bearing cup Replacer (205-014) install NEW wheel bearing into wheel knuckle. Install snap ring into knuckle. Position brake backing plate onto wheel knuckle, and tighten bolts to 49 ft. lbs. (69 N.m). Using Rear Axle Draw Bar (205-098), Seal Replacer (204-019) and Bearing Cup Replacer (204-020),



install wheel hub into wheel bearing. See **Fig. 1** . To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .



**Fig. 1: Installing Wheel Hub (4WD)**  
Courtesy of FORD MOTOR CO.

## SHOCK ABSORBER

### Removal & Installation

Remove rear quarter panel. Remove upper shock absorber nut. Raise and support vehicle. Remove lower shock absorber nut. Remove shock absorber. To install, reverse removal procedure. Tighten all fasteners to specification. See **TORQUE SPECIFICATIONS** .

## SPRING

### Removal

## 2001 Ford Escape

### 2001 SUSPENSION Rear - Escape

**NOTE:** If brake drum retainers have been removed, finger tighten one lug nut to support drum.

Raise and support vehicle. Remove tire and wheel. Disconnect brake line. Position ABS sensor aside, if equipped. Support knuckle. Remove upper arm bolt. Remove lower shock absorber nut. Remove spring.

#### Installation

To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

### TORQUE SPECIFICATIONS

#### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Ball Joint Nut	85 (115)
Brakeline Bracket Bolt	15 (20)
Brakeline Nut	11 (15)
Hub Nut	214 (290)
Knuckle Cam Bolt	85 (115)
Lower Arm Bolt	85 (115)
Lower Shock Absorber Nut	85 (115)
Parking Brake Cable Bracket Bolt	16 (22)
Upper Arm Bolt	85 (115)
Upper Shock Absorber Nut	13 (18)
Wheel Lug Nut	98 (133)

## 2004 Ford Escape

2002-04 SUSPENSION Rear - Escape

### 2002-04 SUSPENSION

Rear - Escape

## TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Anti-lock brake system (ABS) sensor bolt	9	—	80
Anti-lock brake system (ABS) sensor wire bracket bolts	9	—	80
Brake backing plate bolts	66	49	—
Brake line nut	17	13	—
Brake line bracket bolt	22	16	—
Parking brake cable bracket bolt	22	16	—
Lower arm bolt (Inner)	115	85	—
Upper arm bolt (Inner)	115	85	—
Lower shock absorber nut	115	85	—
Upper shock absorber nut	18	13	—
Lower ball joint nut	103	76	—
Upper ball joint nut	103	76	—
Wheel knuckle cam bolt	115	85	—
Wheel hub nut	290	214	—

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**Fig. 1: Torque Specifications**  
Courtesy of FORD MOTOR CO.

## DESCRIPTION

The rear suspension consist of the following components:

- wheel hub
- wheel bearing
- wheel studs
- upper arm
- lower arm
- wheel knuckle

- shock absorber
- spring

New LH and RH rear wheel knuckles can be installed individually. The rear suspension arm and bushings can be installed individually. Only toe can be adjusted on the rear suspension.

## **ADJUSTMENTS & INSPECTIONS**

**NOTE:** At regular intervals, check the condition of the rear suspension arms and bushings. Install new components as necessary.

### **WHEEL BEARING INSPECTION**

**NOTE:** The wheel bearings are not adjustable.

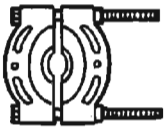
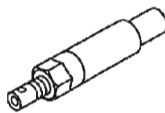

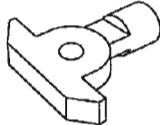
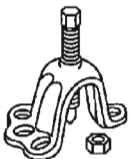
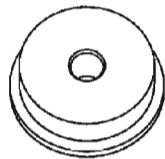
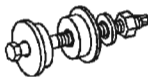
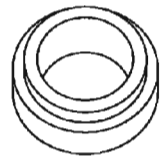
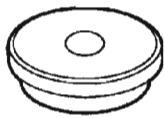
For removal and installation, see **WHEEL BEARING - 2WD** or **WHEEL BEARING - 4WD** .

## **REMOVAL & INSTALLATION**

### **WHEEL BEARING - 2WD**

## 2004 Ford Escape

### 2002-04 SUSPENSION Rear - Escape

	Pinion Bearing Cone Remover 205-D002 (D79L-4621-A) or equivalent		Installer, Half Shaft 204-161 (T97P-1175-A)
	Impact Slide Hammer 100-D006 (D79P-100-A)		Axle Bearing Remover 205-193 (T83T-1225-A)
	Front Hub Remover 205-D070 (D93P-1175-B) or equivalent		Bearing Cup Replacer 205-278 (T88T-1175-C)
	Pinion Bearing Cup Replacer 205-014 (T60K-4614-A)		Receiver Adapter 204-142 (T88C-5493-B)
	Differential Bearing Cup Replacer 308-153 (T88C-7025-BH)		

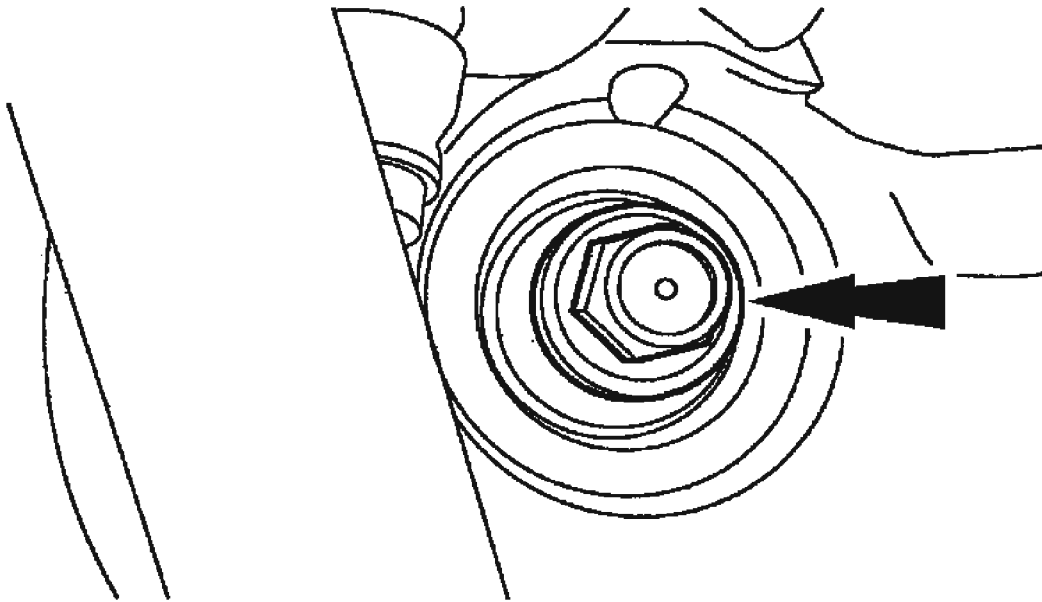
G00370549

**Fig. 2: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

1. Remove the brake drum, see **DISC & DRUM**.

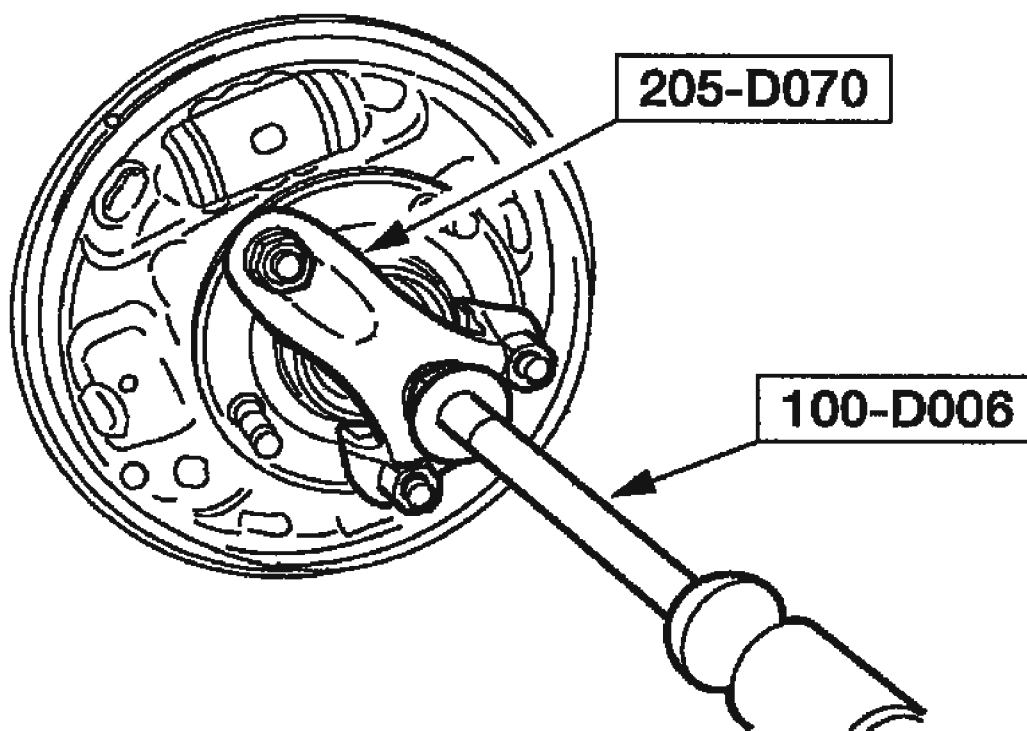
**NOTE:** If equipped, remove the ABS sensor ring.



G00370550

**Fig. 3: Identifying Wheel Hub Nut (2WD)**  
**Courtesy of FORD MOTOR CO.**

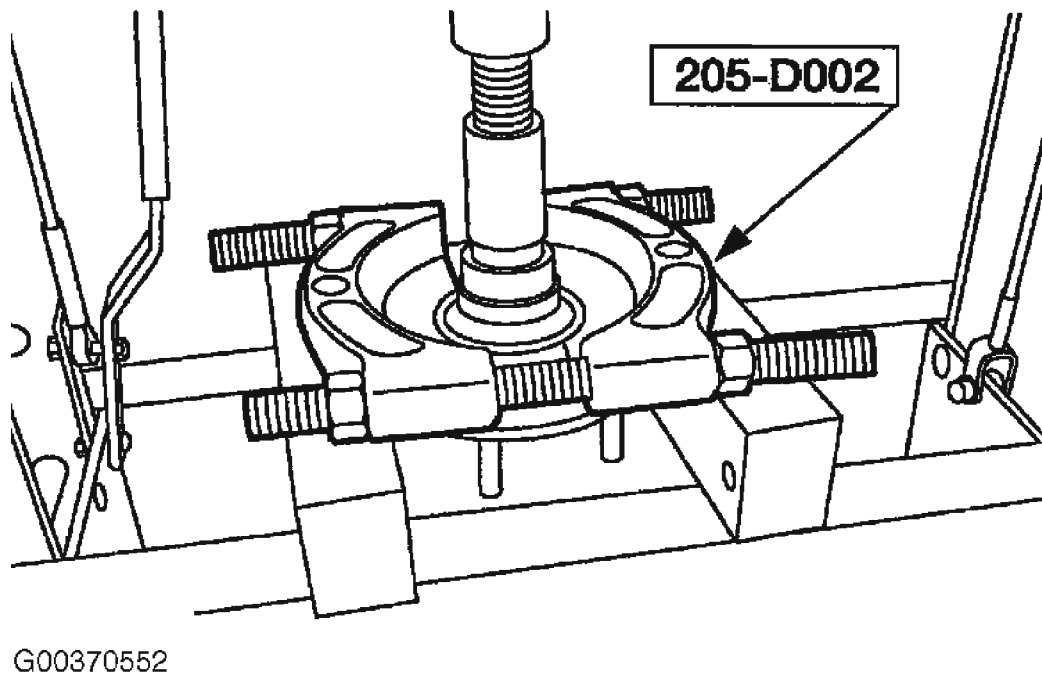
2. Remove the wheel hub nut.
3. Using the special tools, remove the wheel hub.



G00370551

**Fig. 4: Removing Rear Wheel Hub (2WD)**  
Courtesy of FORD MOTOR CO.

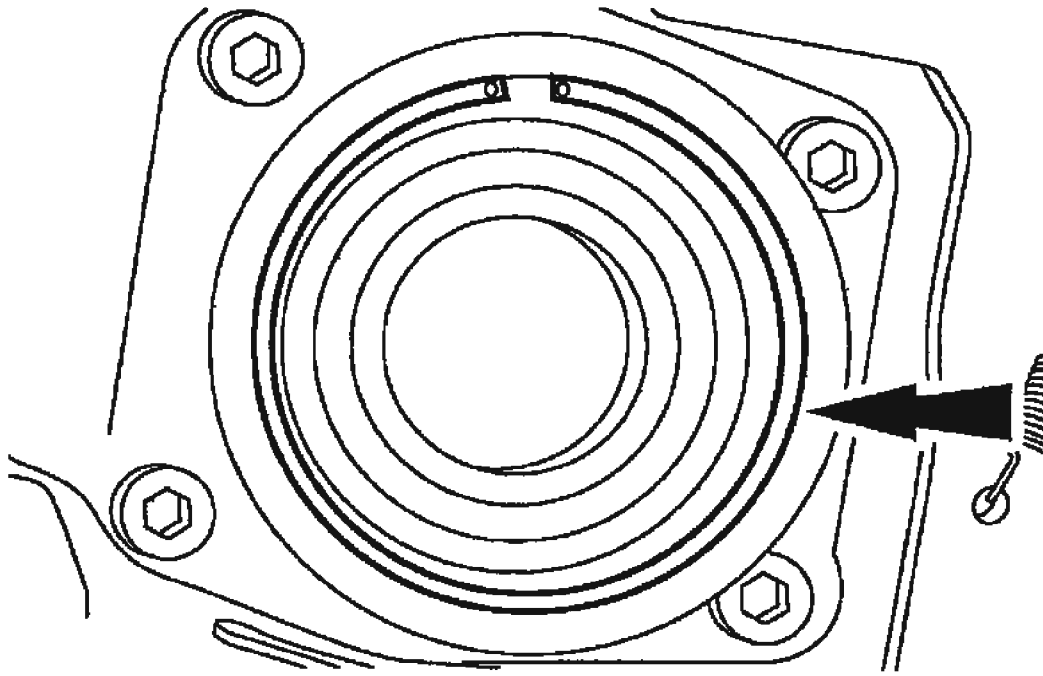
**NOTE:** This step may not be necessary if the inner wheel bearing race remains in the wheel knuckle, after removing the wheel hub.



**Fig. 5: Pressing Inner Wheel Bearing Race From Wheel Hub (2WD)**  
Courtesy of FORD MOTOR CO.

4. Using the special tool, press the inner wheel bearing race from the wheel hub.
5. Remove the snap ring.

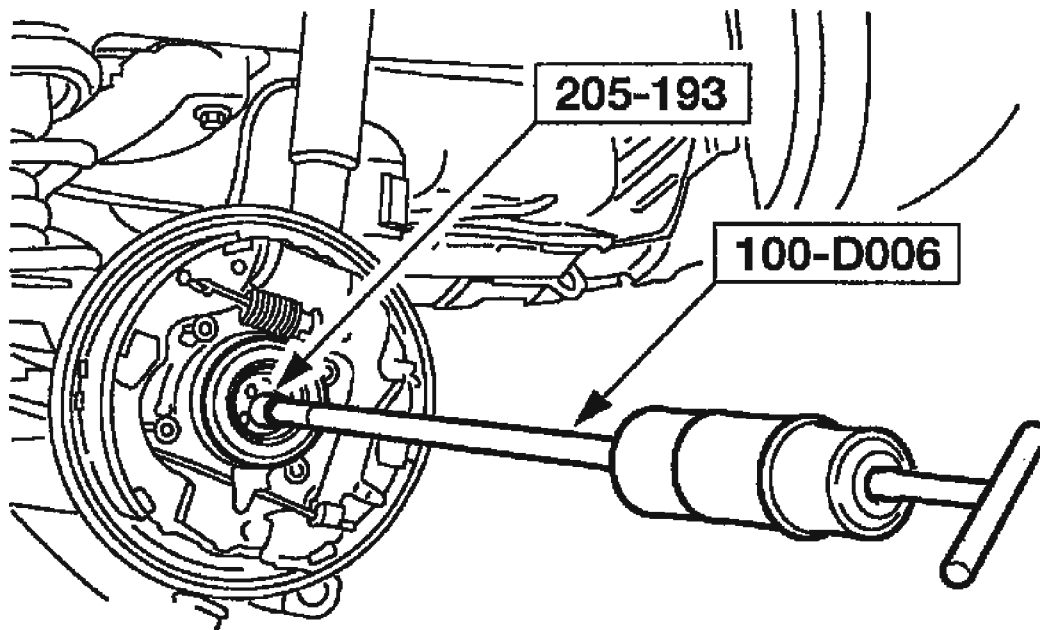




G00370553

**Fig. 6: Identifying Snap Ring**  
Courtesy of FORD MOTOR CO.

6. Using the special tools, remove the wheel bearing outer race from the wheel knuckle.

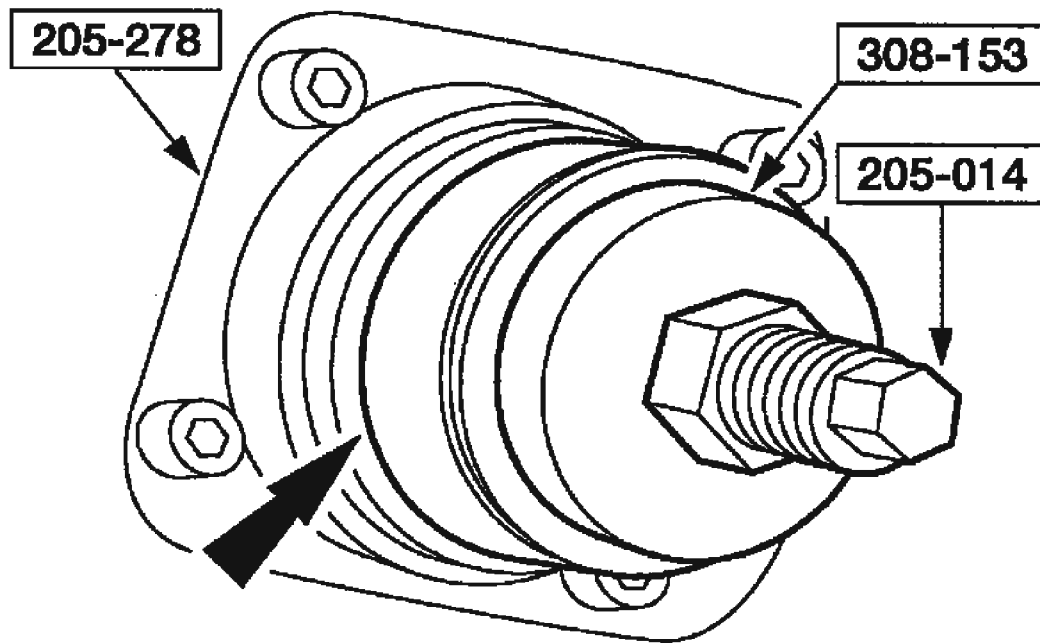


G00370554

**Fig. 7: Removing Wheel Bearing Outer Race From Wheel Knuckle (2WD)**  
Courtesy of FORD MOTOR CO.

#### Installation

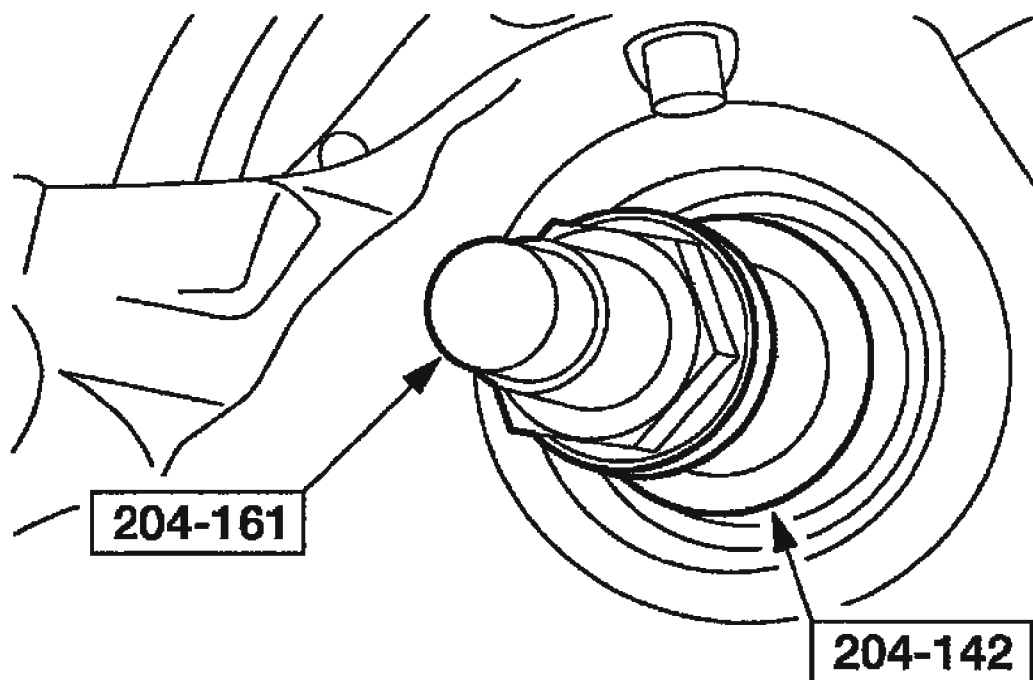
1. Using the special tools, install the wheel bearing into the wheel knuckle.



G00370555

**Fig. 8: Installing Wheel Bearing (2WD)**  
Courtesy of FORD MOTOR CO.

2. Install the snap ring.
3. Using the special tools, install the wheel hub into the wheel bearing.



G00370556

**Fig. 9: Installing Wheel Hub (2WD)**  
Courtesy of FORD MOTOR CO.

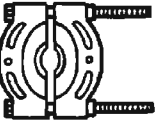

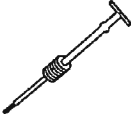

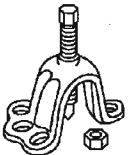
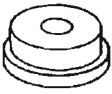
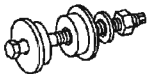



**NOTE:** If equipped, install the ABS sensor ring.

4. Install the wheel hub nut.
5. Install the brake drum, see DISC & DRUM .

**WHEEL BEARING - 4WD**

## 2004 Ford Escape

### 2002-04 SUSPENSION Rear - Escape

	Pinion Bearing Cone Remover 205-D002 (D79L-4621-A)		Handle 205-153 (T80T-4000W)
	Impact Slide Hammer 100-001(T50T-100-A)		Wheel Bearing Adapter 205-D015 (D80L-630-4)
	Front Hub Remover 205-D070 (D93P-1175-B) or equivalent		Bearing Cup Replacer 205-278 (T88T-1175-C)
	Pinion Bearing Cup Replacer 205-014 (T60K-4614-A)		Pinion Bearing Cup Replacer 205-014 (T60K-4616-A)
	Differential Bearing Cup Replacer 308-153 (T88C-7025-BH)		Halfshaft Installer 205-379 (T97P-1175-A)

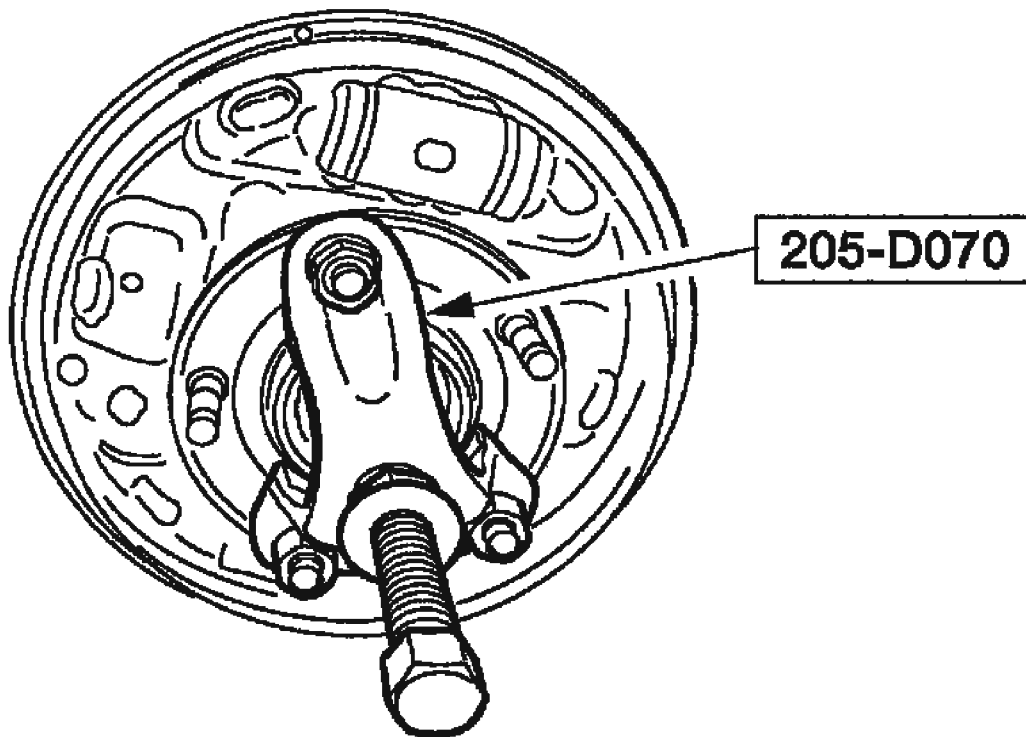
G00370558

**Fig. 10: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

##### All vehicles

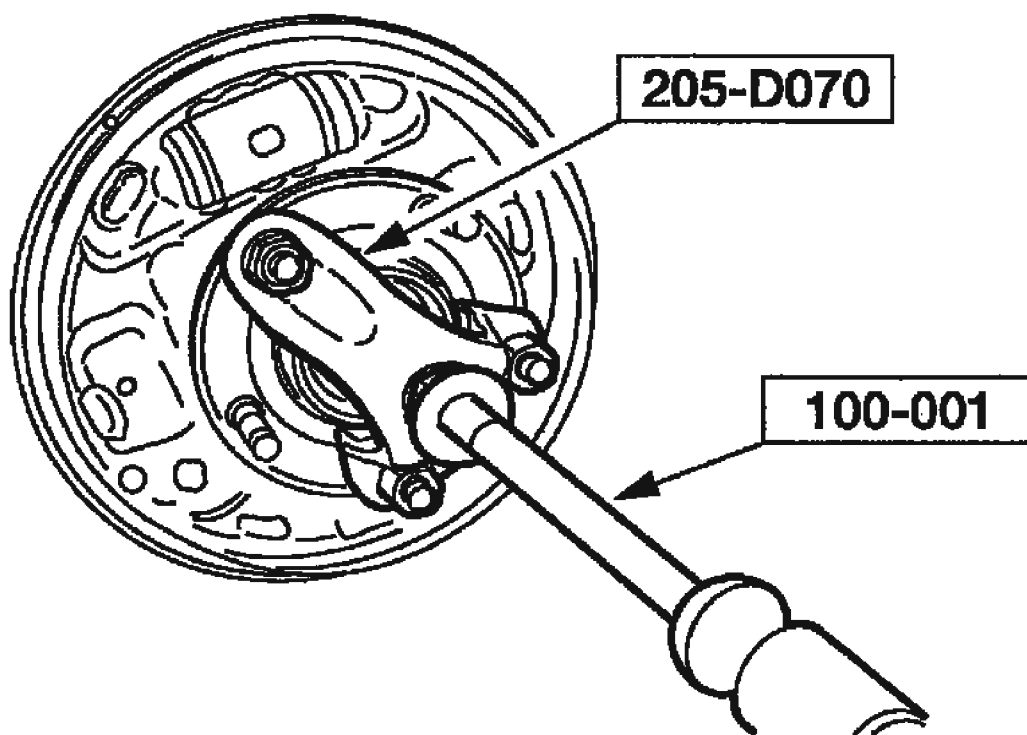
1. Remove the brake shoes, see **DISC & DRUM** .
2. Remove the rear halfshaft nut.
3. Using the special tool, loosen the halfshaft from the wheel hub.



G00370559

**Fig. 11: Loosening Halfshaft From Hub**  
Courtesy of FORD MOTOR CO.

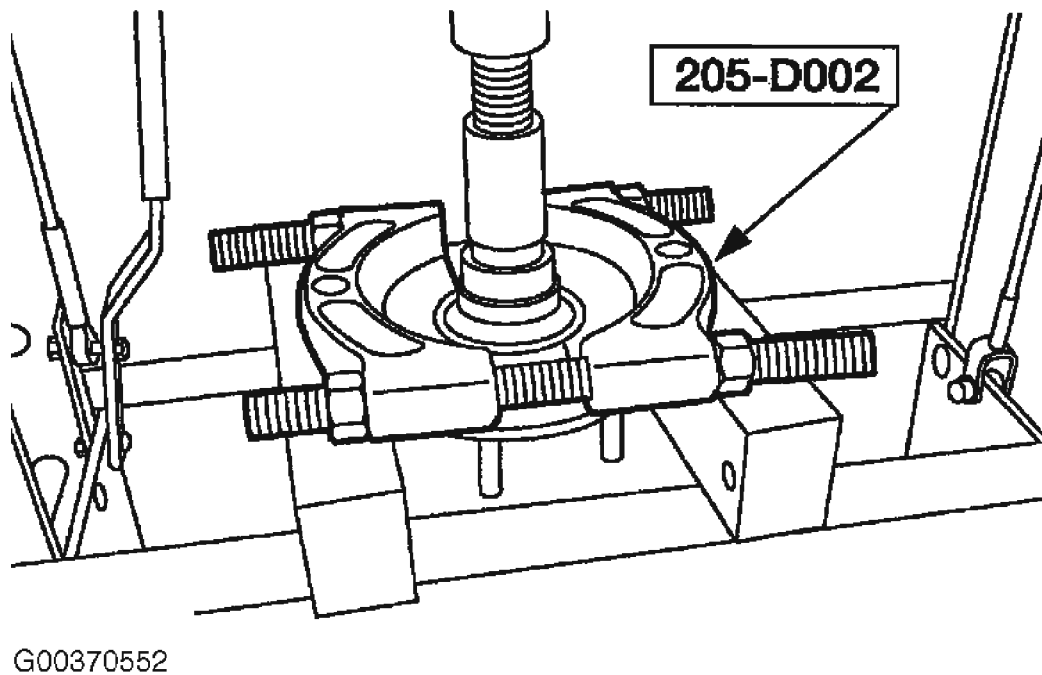
4. Using the special tools, remove the wheel hub.



G00370560

**Fig. 12: Removing Wheel Hub (4WD)**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step may not be necessary if the inner wheel bearing race remains in the wheel knuckle, after removing the wheel hub.



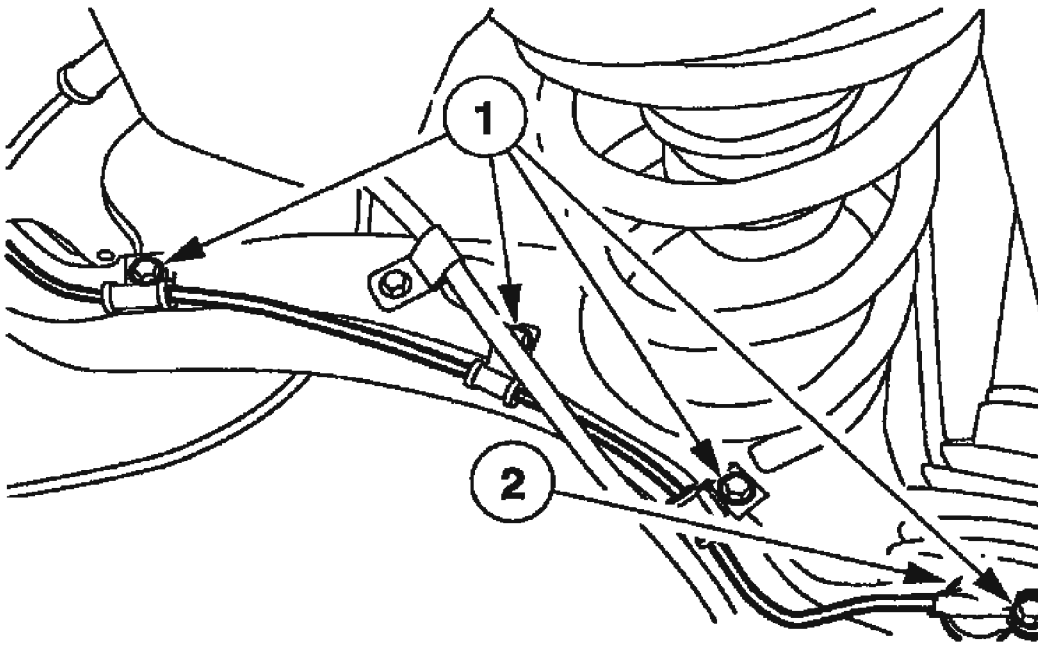
**Fig. 13: Pressing Inner Wheel Bearing Race From Wheel (4WD)**  
Courtesy of FORD MOTOR CO.

5. Using the special tool, press the inner wheel bearing race from the wheel hub.

**Vehicles with ABS**

1. Remove the ABS sensor bolt and bracket bolts.
2. Position the ABS sensor aside.





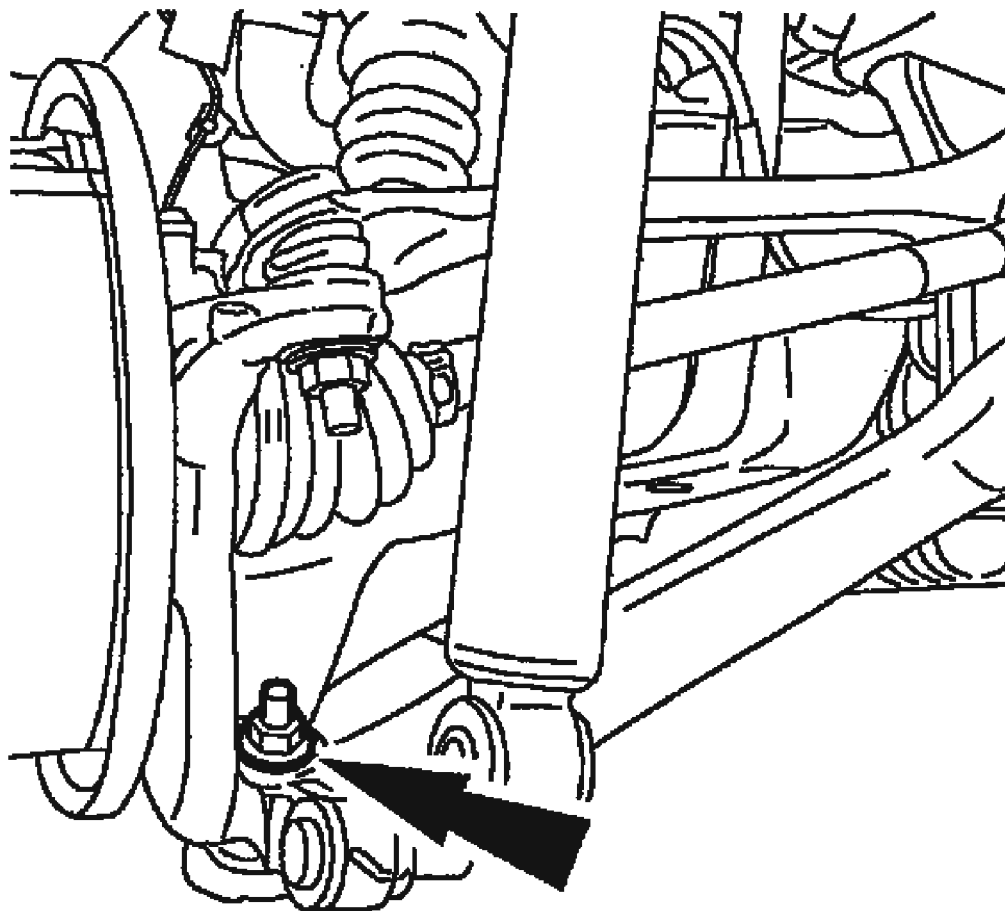
G00370561

**Fig. 14: Identifying ABS Wiring Retainers**  
Courtesy of FORD MOTOR CO.

All vehicles

1. Disconnect the parking brake cable. Remove the parking brake cable bolt from the wheel knuckle.
2. Disconnect the brake line from the wheel cylinder. Remove the brake line bracket bolt.
3. Support the wheel knuckle.
4. Remove the lower shock absorber nut.

**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.

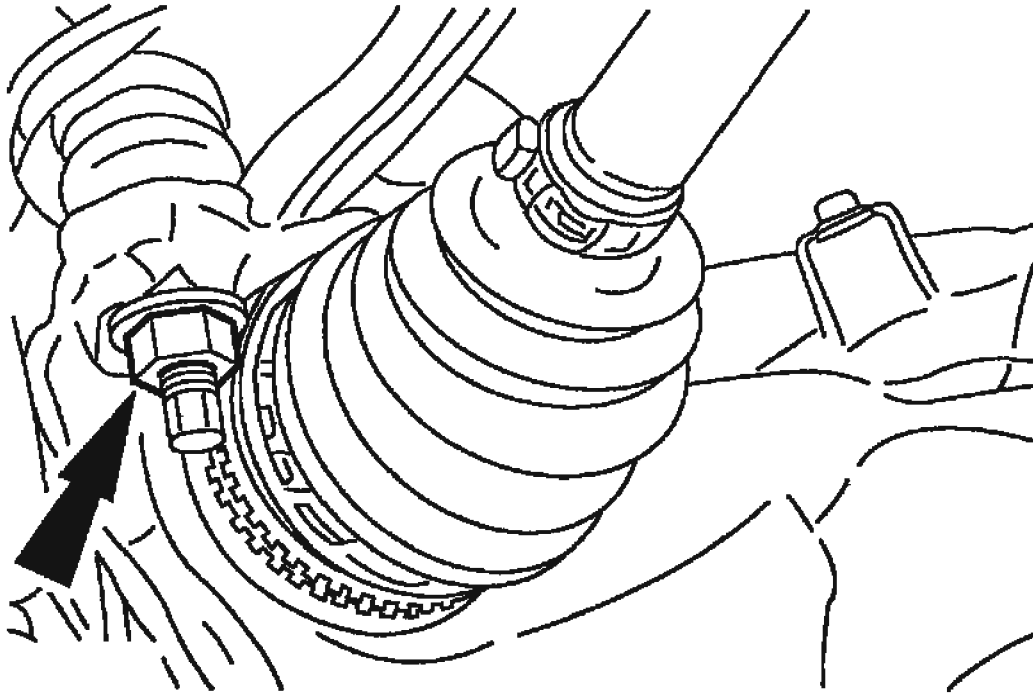


G00370562

**Fig. 15: Identifying Lower Ball Joint Nut (4WD)**  
Courtesy of FORD MOTOR CO.

5. Disconnect the lower ball joint. Remove the nut.

**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.



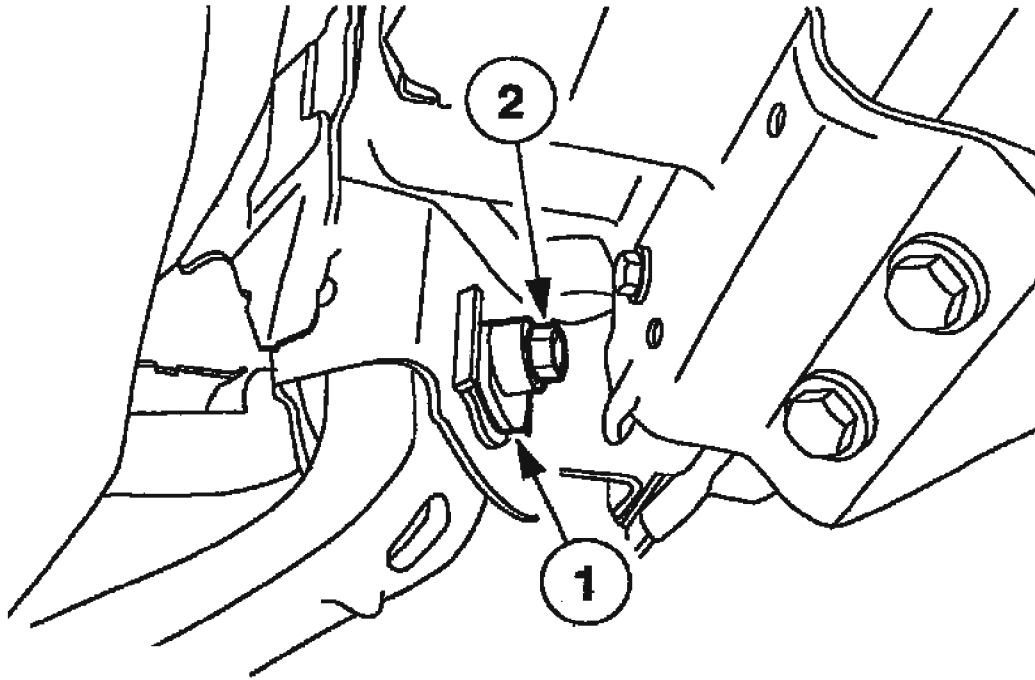
G00370563

**Fig. 16: Identifying Upper Ball Joint Nut (4WD)**  
**Courtesy of FORD MOTOR CO.**

6. Disconnect the upper ball joint. Remove the nut.

**NOTE:**      **Note the position of the spring insulator and spring for installation.**

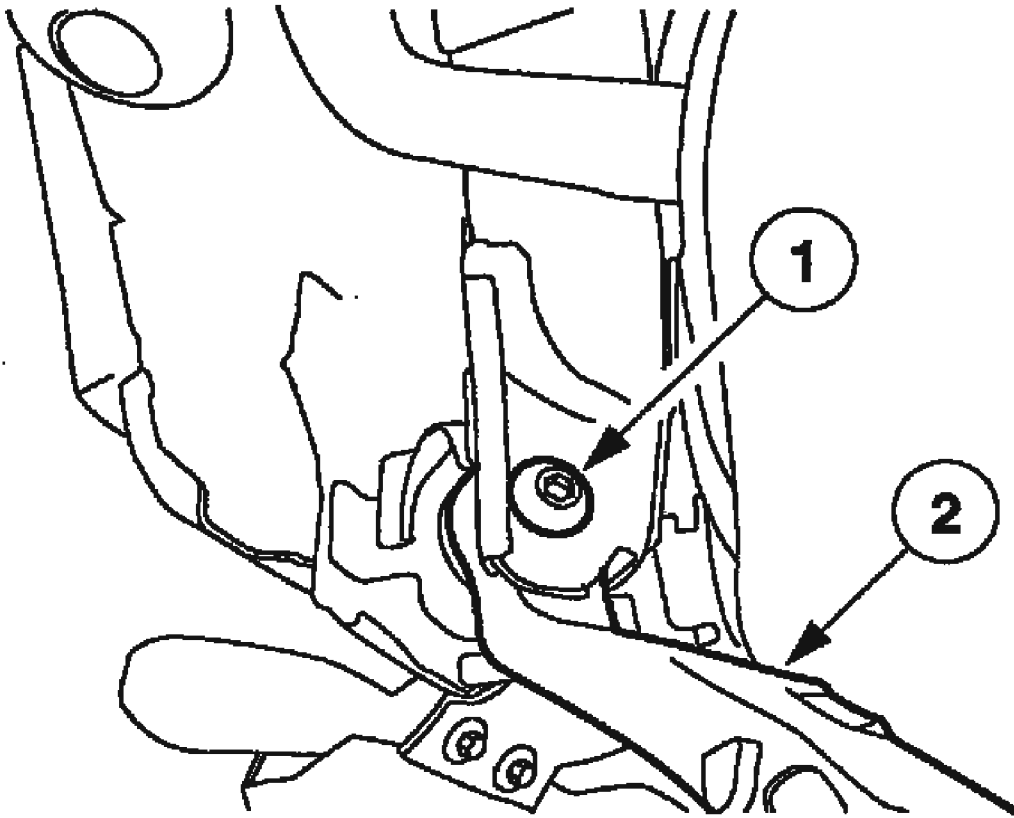
7. Remove the spring. Lower the support to the wheel knuckle.
8. Mark the position of the adjustment cam notch. Remove the wheel knuckle cam bolt and nut.



G00370564

**Fig. 17: Removing Wheel Knuckle Cam Bolt & Nut (4WD)**  
**Courtesy of FORD MOTOR CO.**

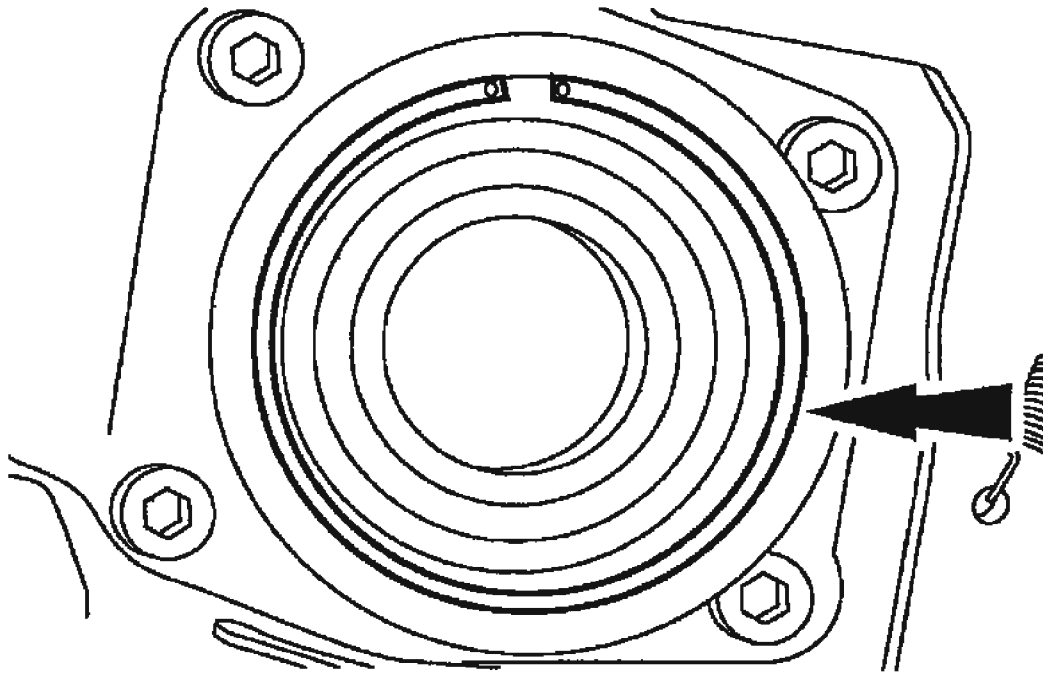
9. Remove the wheel knuckle cam. Remove the wheel knuckle.



G00370565

**Fig. 18: Removing Wheel Knuckle (4WD)**  
Courtesy of FORD MOTOR CO.

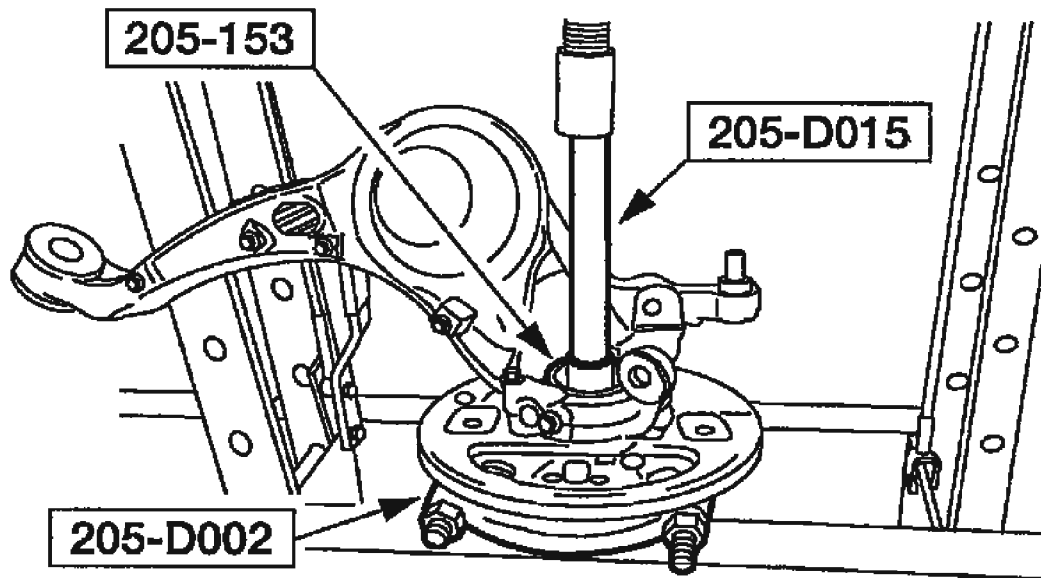
10. Remove the snap ring.



G00370553

**Fig. 19: Identifying Snap Ring**  
**Courtesy of FORD MOTOR CO.**

11. Using the special tools, press the outer wheel bearing race from the wheel knuckle.



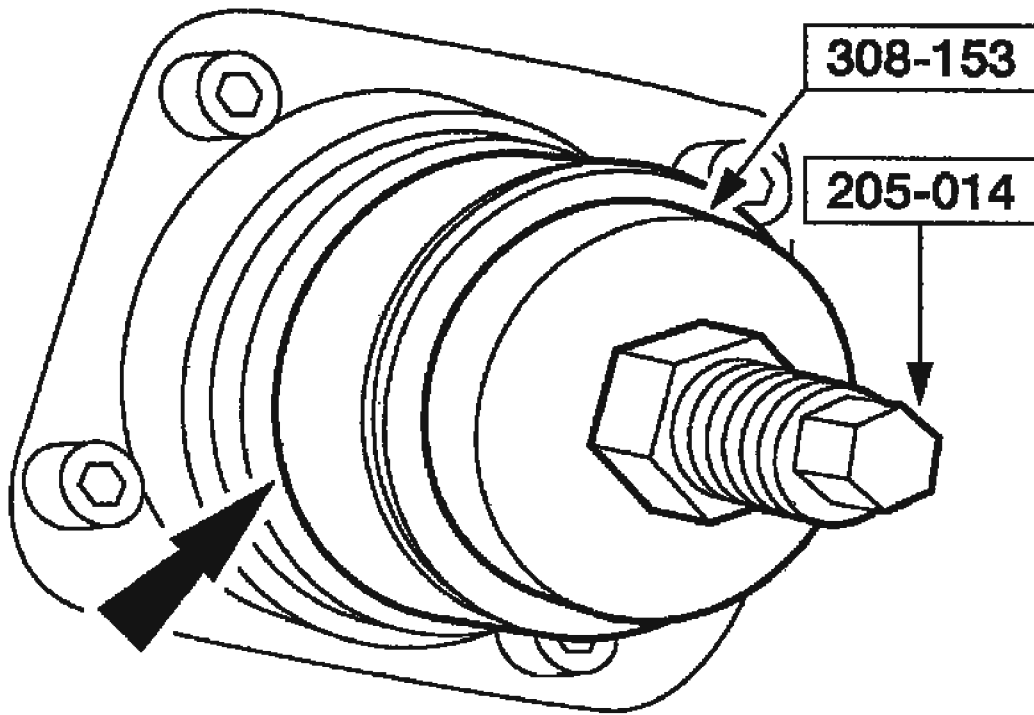
G00370566

**Fig. 20: Pressing Outer Wheel bearing Race From Wheel Knuckle (4WD)**  
Courtesy of FORD MOTOR CO.

#### Installation

#### All vehicles

1. Using the special tools, install a new wheel bearing into the wheel knuckle.

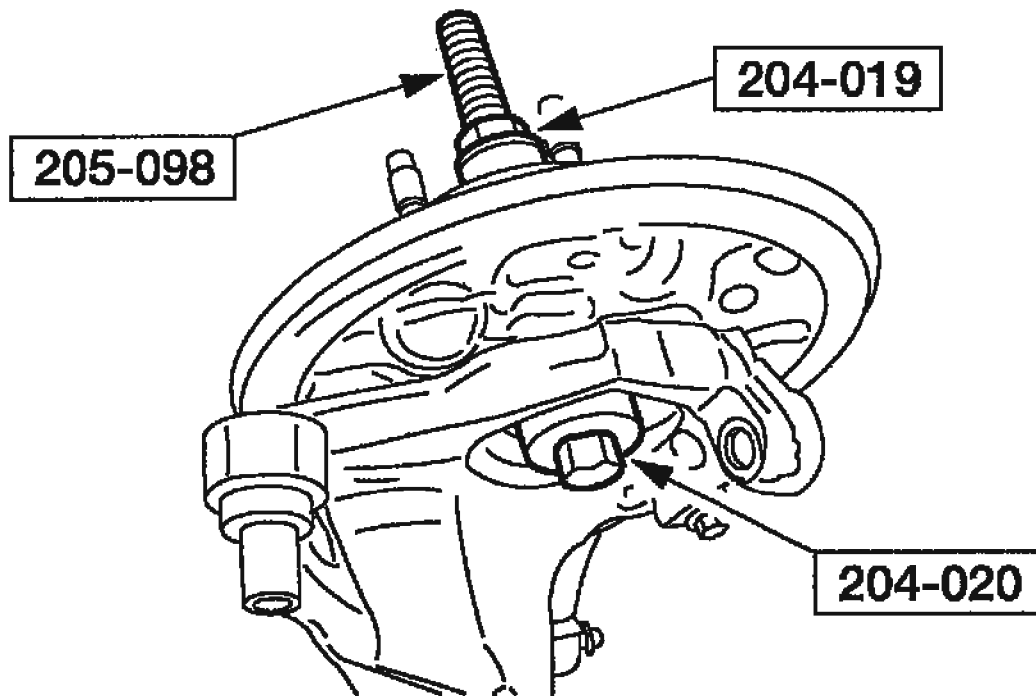


G00370567

**Fig. 21: Installing Wheel Bearing (4WD)**  
**Courtesy of FORD MOTOR CO.**

2. Install the snap ring into the wheel knuckle.
3. Using the special tools, install the wheel hub.





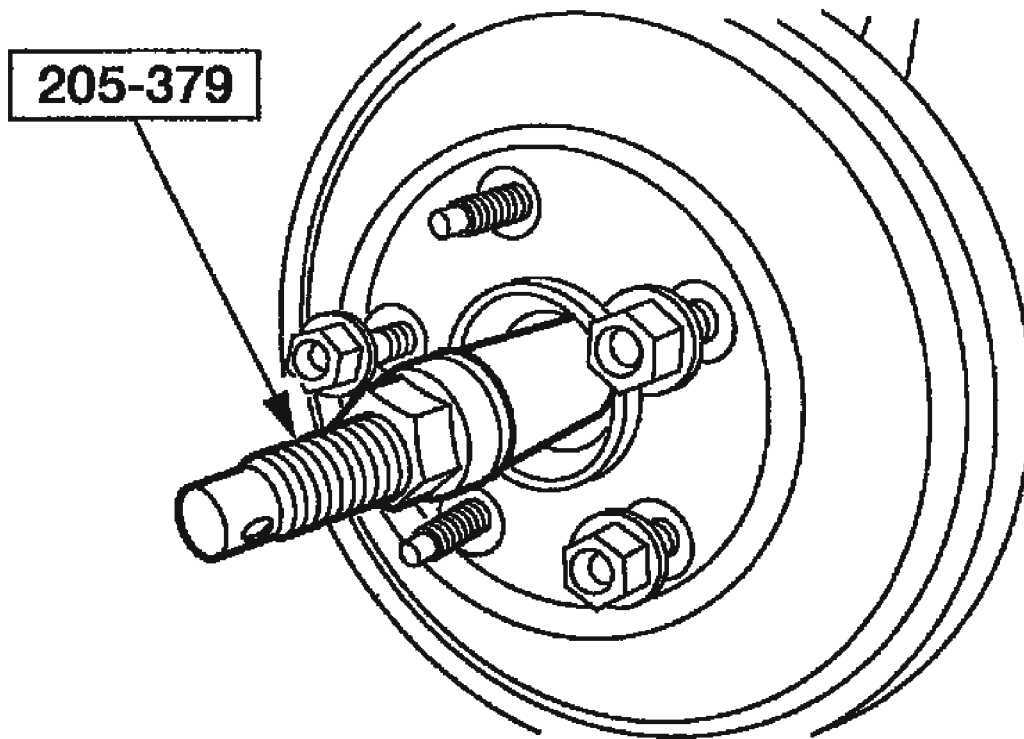
G00370568

**Fig. 22: Installing Wheel Hub (4WD)**  
**Courtesy of FORD MOTOR CO.**

4. Position the wheel knuckle and install the wheel knuckle cam. Position the halfshaft into the wheel hub.
5. Install the wheel knuckle cam bolt loosely.
6. Support the wheel knuckle and install the spring.
7. Install the lower shock absorber nut.
8. Install the upper ball joint. Install the nut.
9. Install the lower ball joint. Install the nut.
10. Align the wheel knuckle cam. Tighten the wheel knuckle cam bolt.
11. Install the brake line to the wheel cylinder. Install the brake line bracket bolt.
12. Install the parking brake cable retainer bolt. Install the parking brake cable onto the backing plate.

**Vehicles with ABS**

1. Position the anti-lock (ABS) brake sensor and bracket bolts. Install the bolts.
2. Using the special tool, install the halfshaft end into the hub assembly.



G00370569

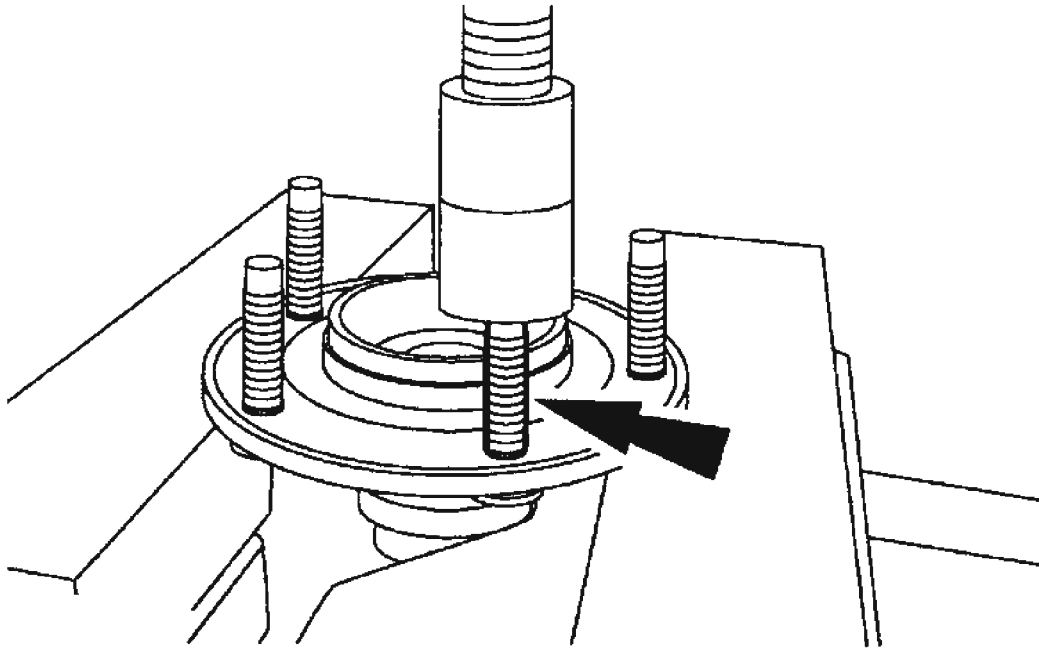
**Fig. 23: Installing Halfshaft End Into Hub Assembly**  
Courtesy of FORD MOTOR CO.

**All vehicles**

1. Install the halfshaft nut.
2. Install the brake shoes. See **DISC & DRUM** .
3. Bleed the brake system. See **DISC & DRUM** .
4. Check and adjust the wheel alignment as necessary. See **SPECIFICATION & PROCEDURES** .

**WHEEL STUDS**

1. Remove the wheel bearing. For additional information, refer to **WHEEL BEARING - 2WD** or **WHEEL BEARING - 4WD** .
2. Press out the wheel studs.



G00370529

**Fig. 24: Pressing Wheel Stud From Hub**  
Courtesy of FORD MOTOR CO.

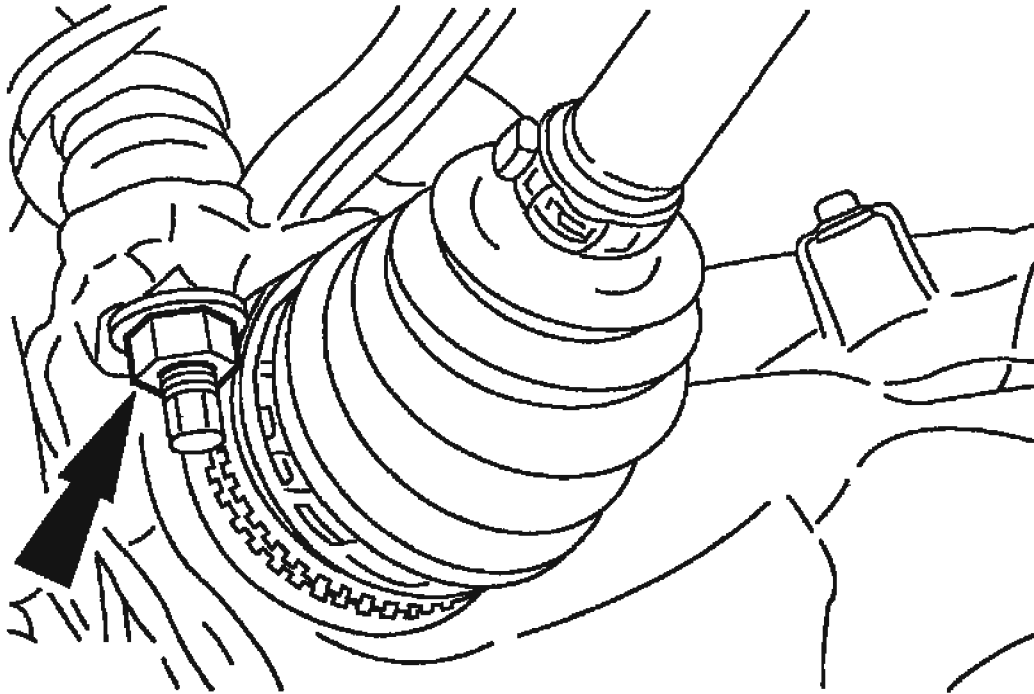
3. To install, reverse the removal procedure.

## UPPER ARM

### Removal and Installation

1. Remove the wheel and tire.

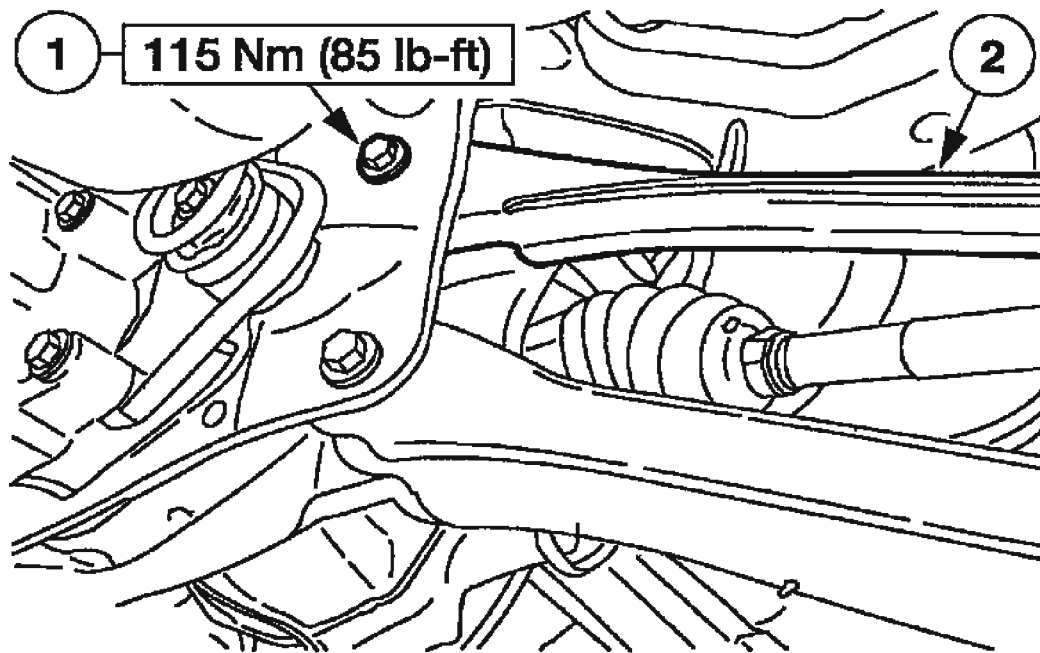
**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.



G00370563

**Fig. 25: Identifying Upper Ball Joint Nut**  
**Courtesy of FORD MOTOR CO.**

2. Separate the upper arm from the wheel knuckle. Remove the upper ball joint nut.
3. Remove the upper arm inner bolt. Remove the upper arm.



G00370570

**Fig. 26: Removing Upper Arm**  
Courtesy of FORD MOTOR CO.

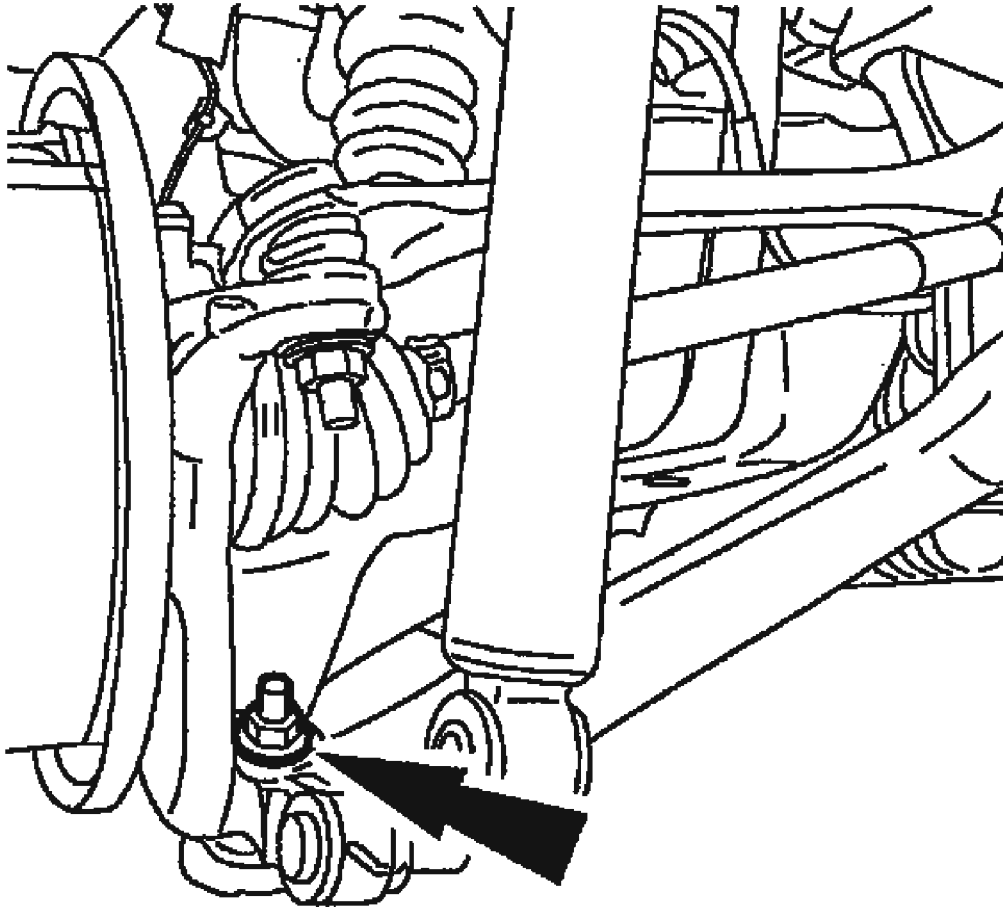
4. To install, reverse the removal procedure.

## LOWER ARM

### Removal and Installation

1. Remove the wheel and tire.

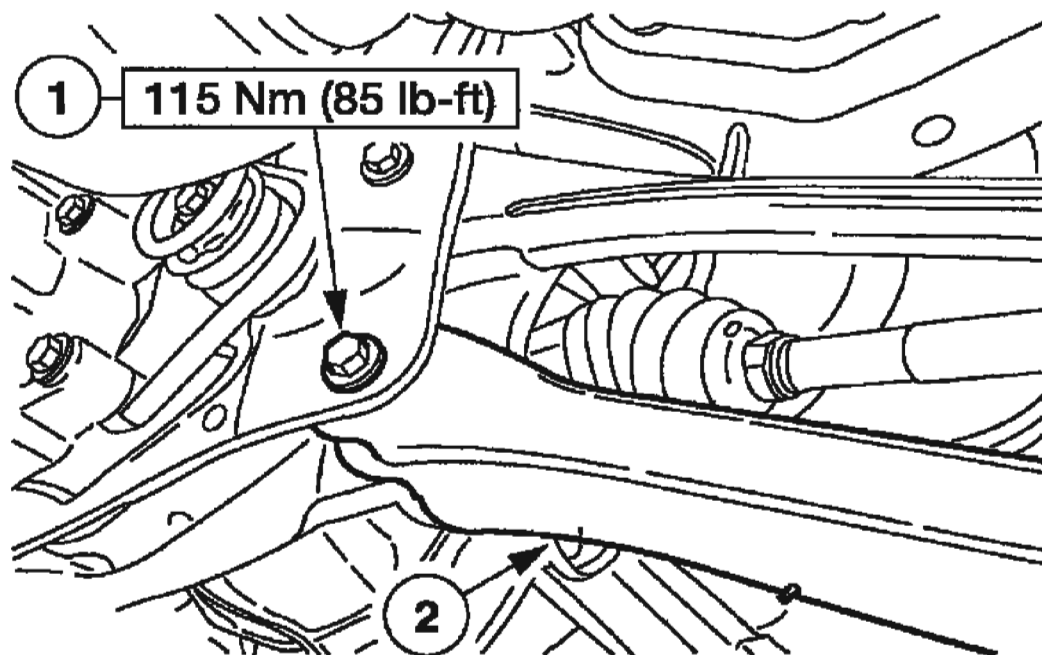
**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.



G00370562

**Fig. 27: Identifying Lower Ball Joint Nut**  
Courtesy of FORD MOTOR CO.

2. Separate the lower ball joint from the wheel knuckle. Remove the lower ball joint nut.
3. Remove the lower arm inner bolt. Remove the lower arm.



G00370571

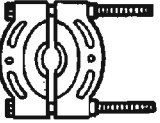
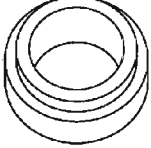

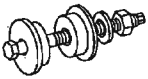
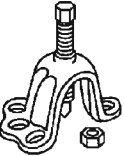
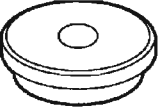
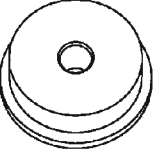
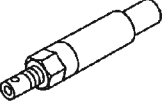
**Fig. 28: Removing Lower Arm**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

**WHEEL KNUCKLE - 2WD**

## 2004 Ford Escape

### 2002-04 SUSPENSION Rear - Escape

	Pinion Bearing Cone Remover 205-D002 (D79L-4621-A) or equivalent		Receiver Adapter 204-142 (T88C-5493-E)
	Impact Slide Hammer 100-D006 (D79P-100-A)		Pinion Bearing Cup Replacer 205-014 (T60K-4614-A)
	Front Hub Remover 205-D070 (D93P-1175-B) or equivalent		Differential Bearing Cup Replacer 308-153 (T88C-7025-BH)
	Bearing Cup Replacer 205-278 (T88T-1175-C)		Installer, Half Shaft 204-161 (T97P-1175-A)

G00370572

**Fig. 29: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

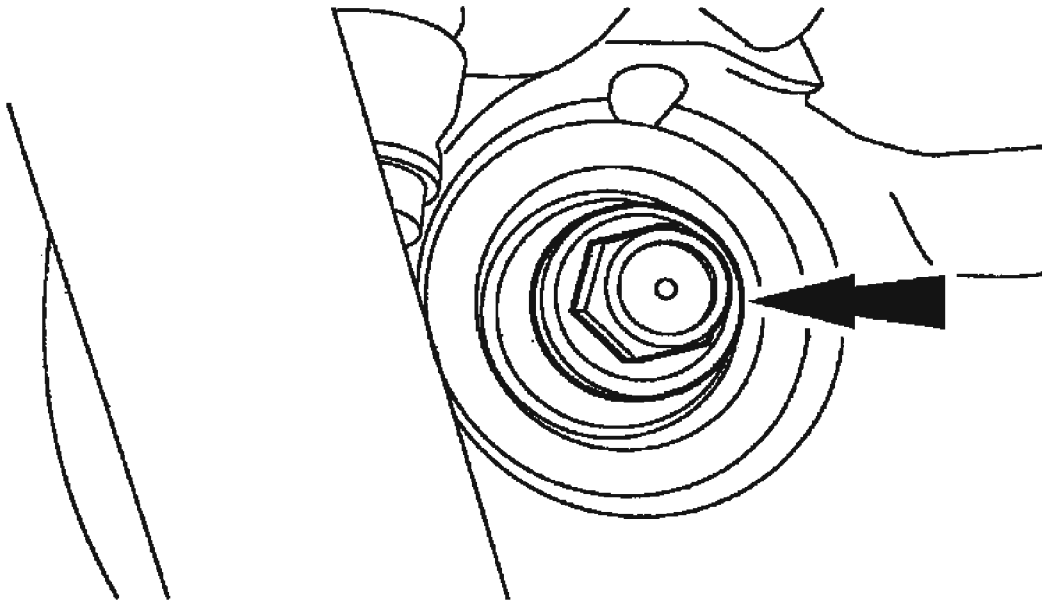
#### All vehicles

**NOTE:** When a new wheel knuckle is installed a new wheel bearing must also be installed.

1. Remove the brake shoes. See **DISC & DRUM** .

**NOTE:** If equipped, remove ABS sensor ring.

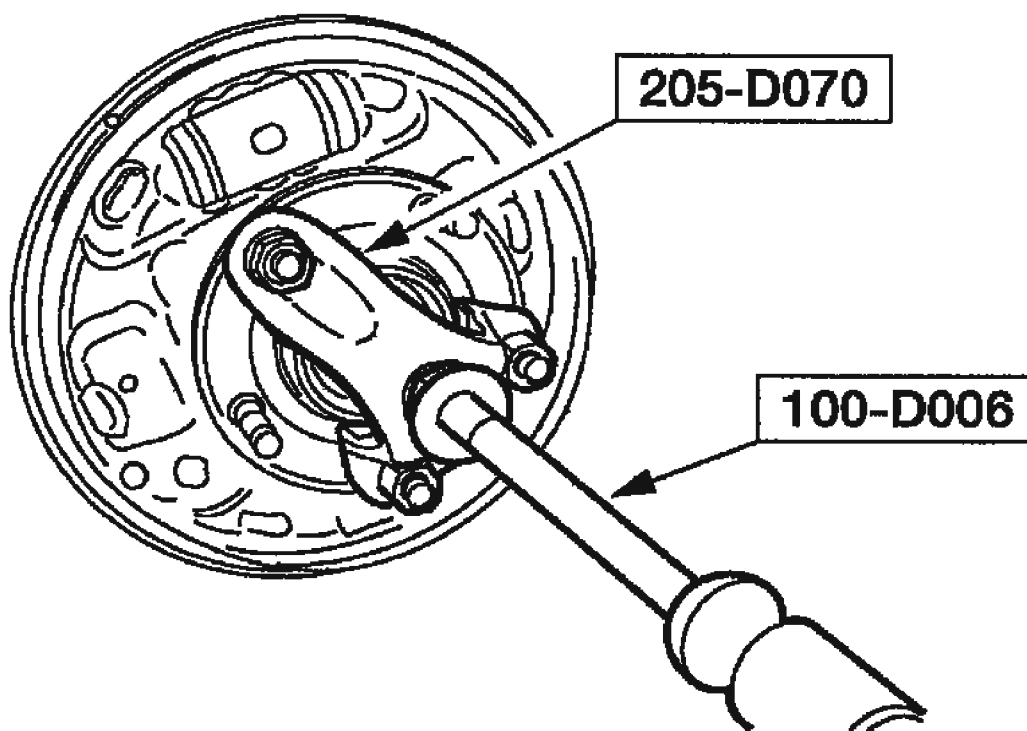




G00370550

**Fig. 30: Identifying Wheel Hub Nut (2WD)**  
**Courtesy of FORD MOTOR CO.**

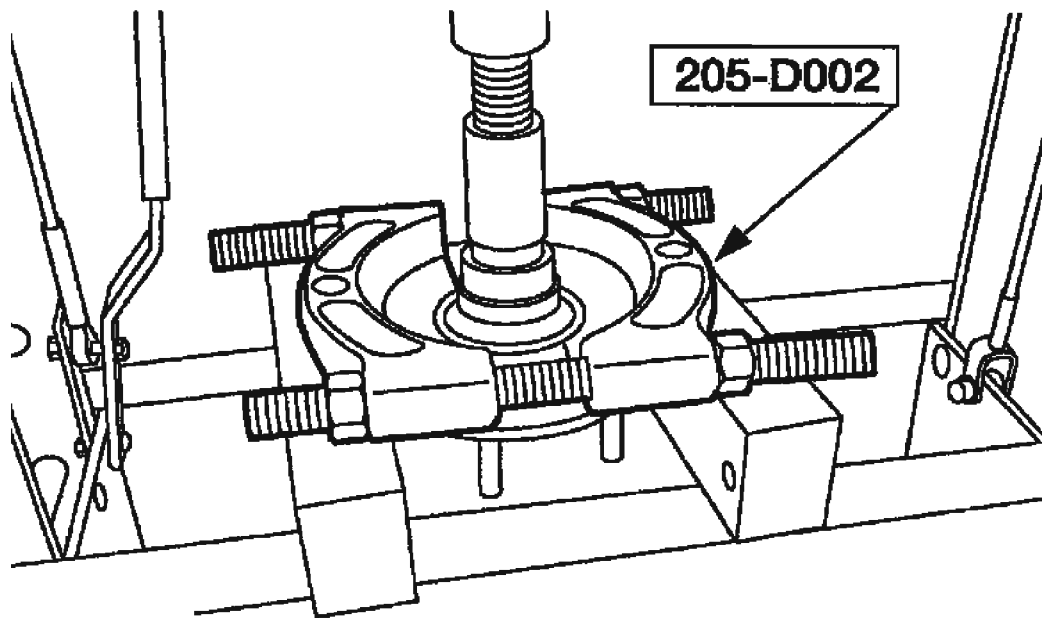
2. Remove the wheel hub nut.
3. Using the special tools, remove the wheel hub.



G00370551

**Fig. 31: Removing Rear Wheel Hub (2WD)**  
Courtesy of FORD MOTOR CO.

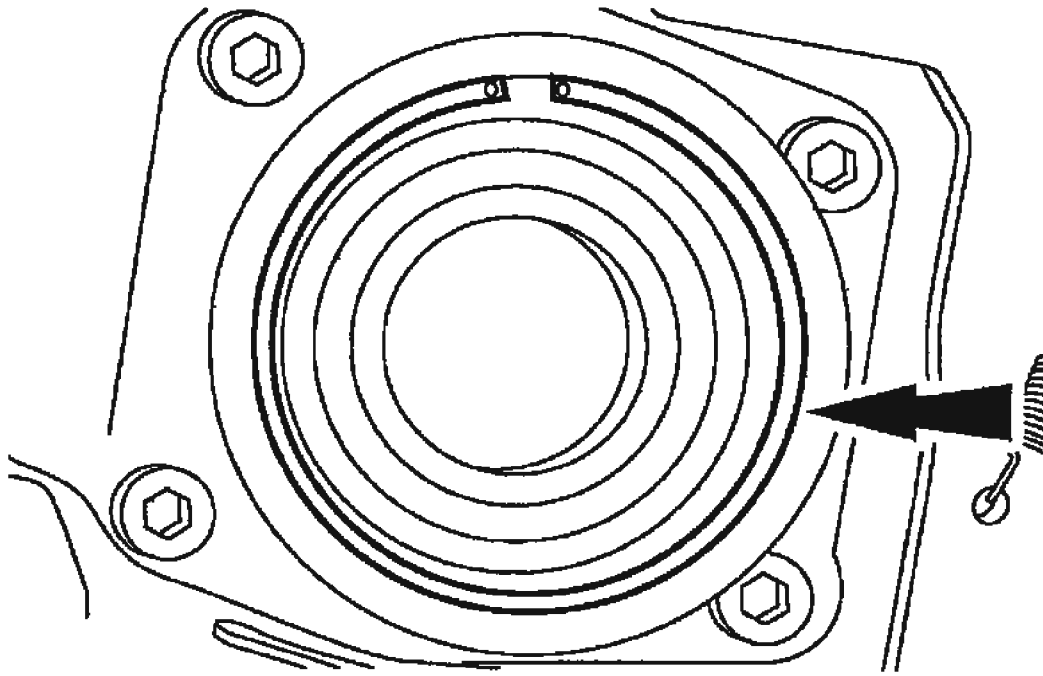
**NOTE:** This step may not be necessary if the inner wheel bearing race remains in the wheel knuckle, after removing the wheel hub.



G00370552

**Fig. 32: Pressing Inner Wheel Bearing Race From Wheel Knuckle (2WD)**  
Courtesy of FORD MOTOR CO.

4. Using the special tool, press the inner wheel bearing race from the wheel hub.
5. Remove the snap ring.

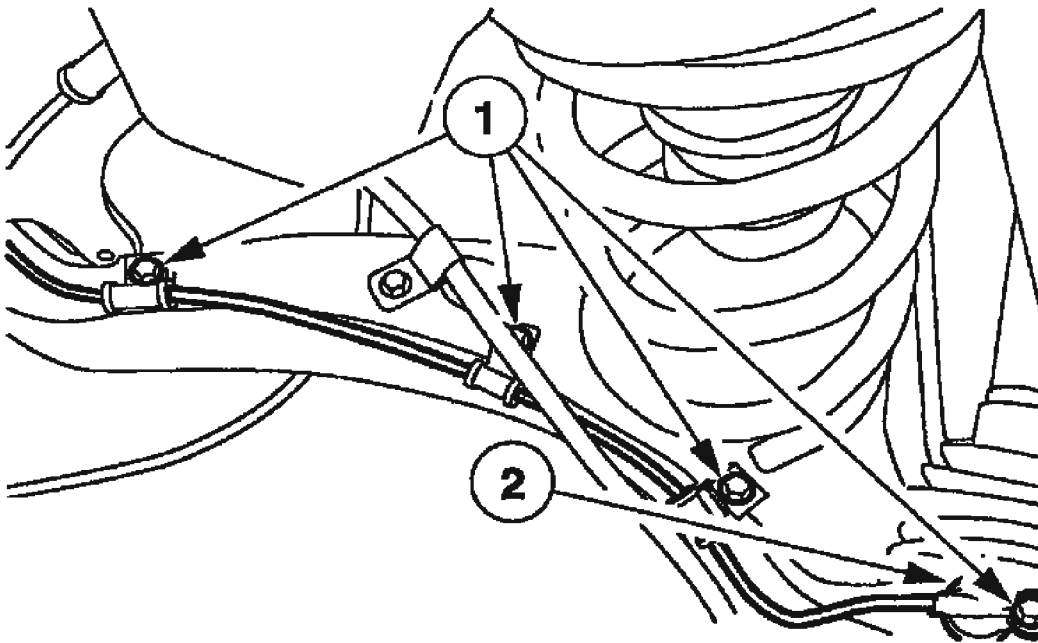


G00370553

**Fig. 33: Identifying Snap Ring**  
Courtesy of FORD MOTOR CO.

**Vehicles with ABS**

Remove the ABS sensor bolt and bracket bolts. Position the ABS sensor aside.



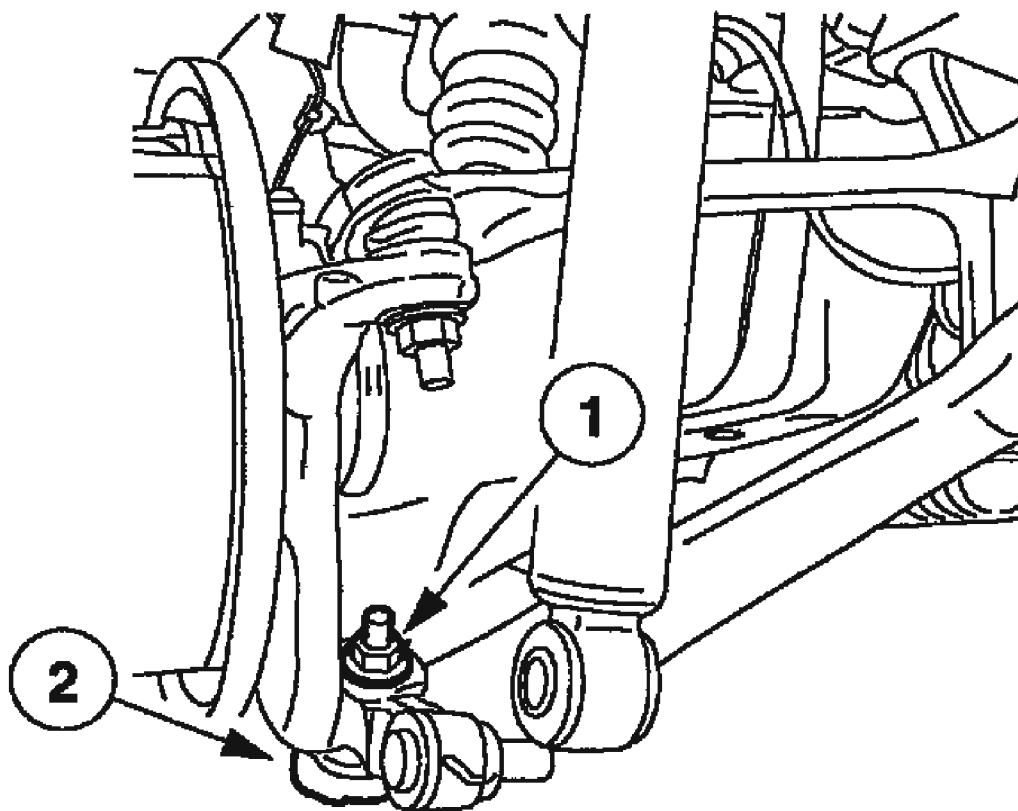
G00370561

**Fig. 34: Identifying ABS Wiring Retainers**  
Courtesy of FORD MOTOR CO.

All vehicles

1. Disconnect the parking brake cable from the brake backing plate. Remove the parking brake cable bolt from the wheel knuckle.
2. Disconnect the brake line from the wheel cylinder. Remove the brake line bracket bolt.
3. Support the wheel knuckle.
4. Remove the lower shock absorber nut.

**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.



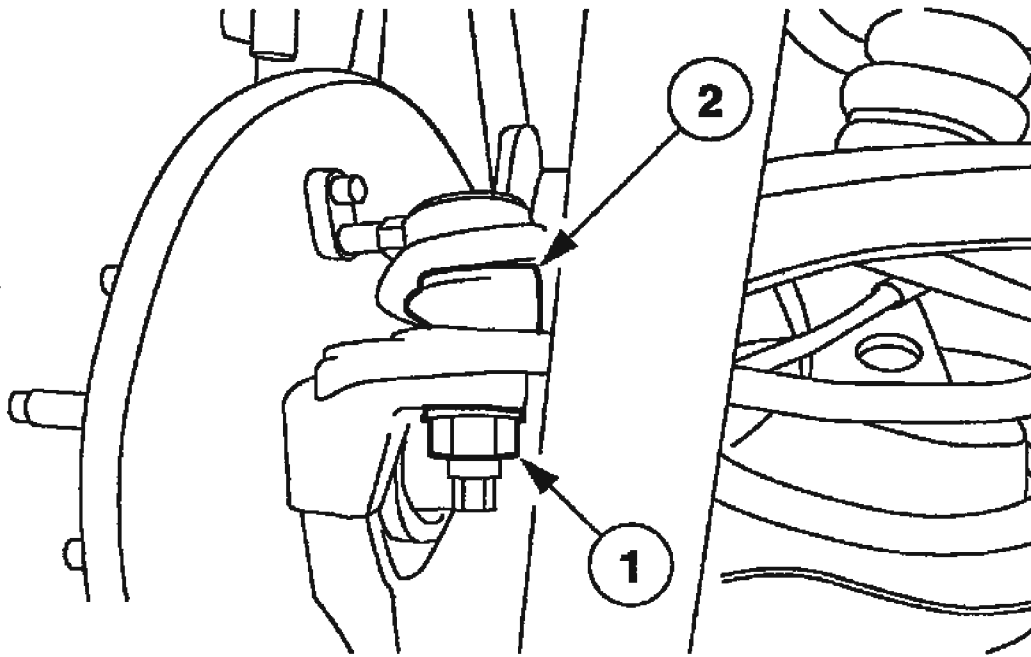
G00370573

**Fig. 35: Separating Lower Ball Joint (2WD)**

**Courtesy of FORD MOTOR CO.**

5. Remove the nut. Separate the lower ball joint from the wheel knuckle.

**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.



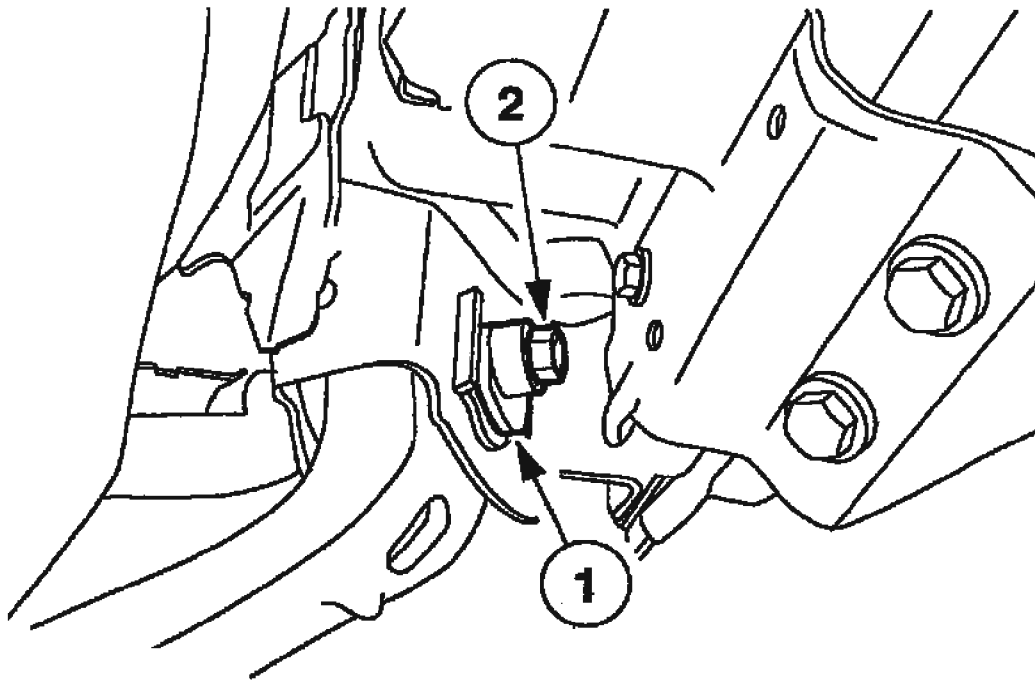
G00370574

**Fig. 36: Separating Upper Ball Joint (2WD)**  
Courtesy of FORD MOTOR CO.

6. Remove the nut. Separate the upper ball joint from the wheel knuckle.

**NOTE:**      **Note the position of the spring insulator and spring for installation.**

7. Remove the spring. Lower the support to the wheel knuckle.
8. Mark the position of the adjustment cam notch. Remove the wheel knuckle cam bolt and nut.

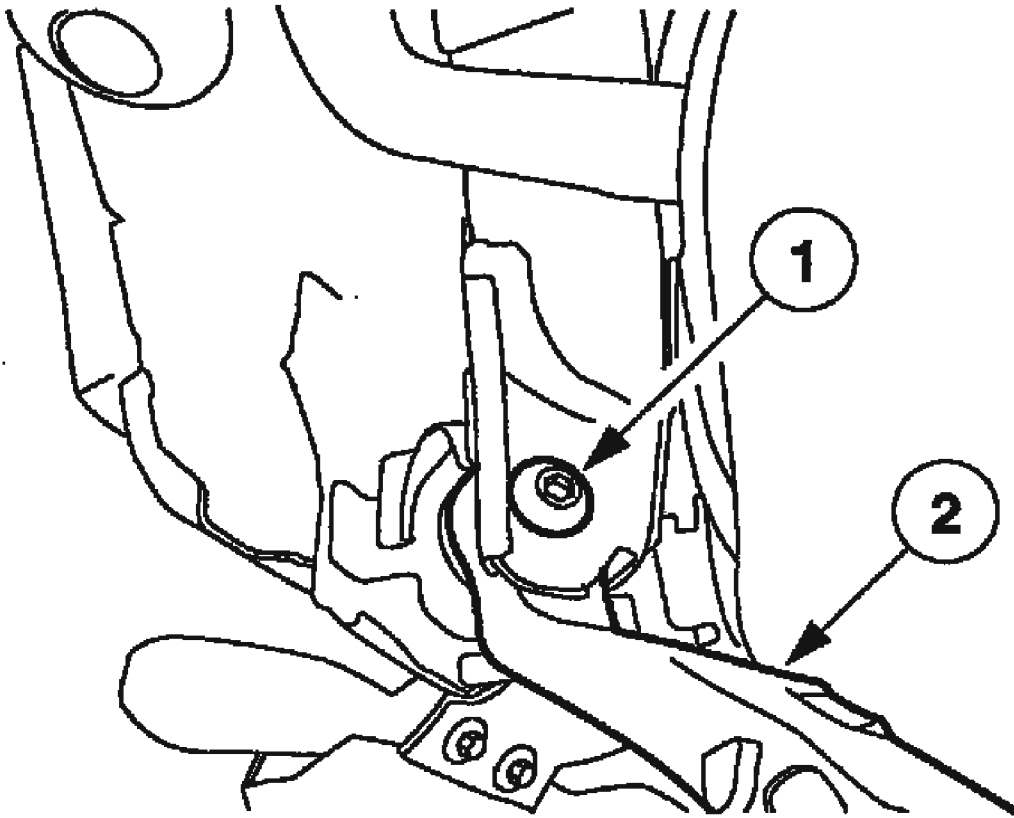


G00370564

**Fig. 37: Removing Wheel Knuckle Cam Bolt & Nut**  
**Courtesy of FORD MOTOR CO.**

9. Remove the wheel knuckle cam. Remove the wheel knuckle.

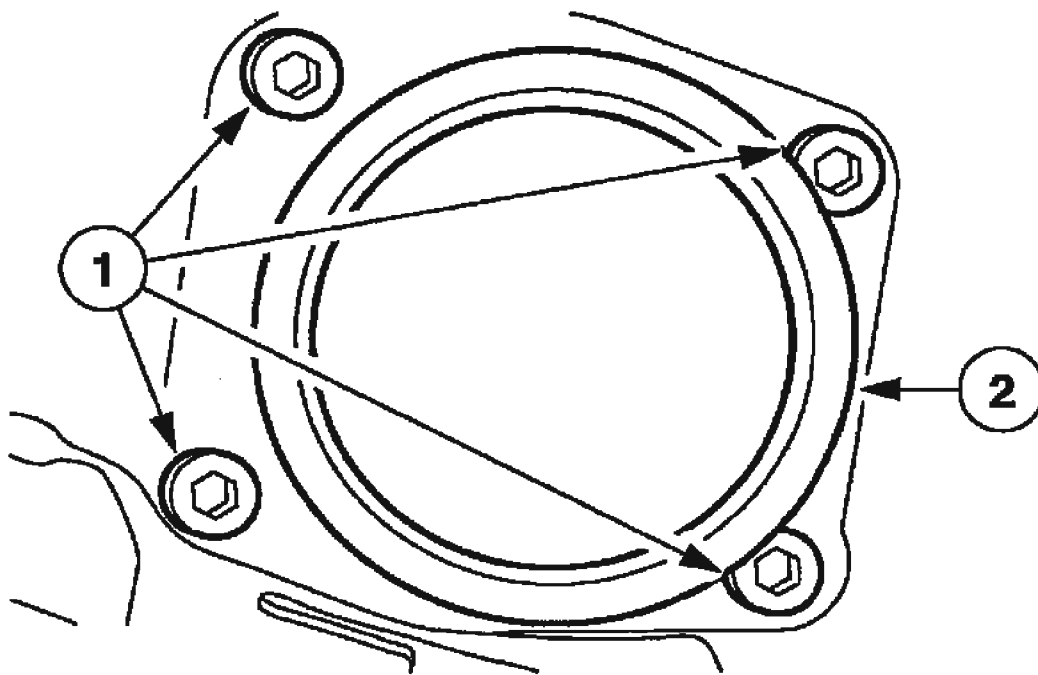




G00370565

**Fig. 38: Removing Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

10. Remove the bolts. Remove the brake backing plate from the wheel knuckle.



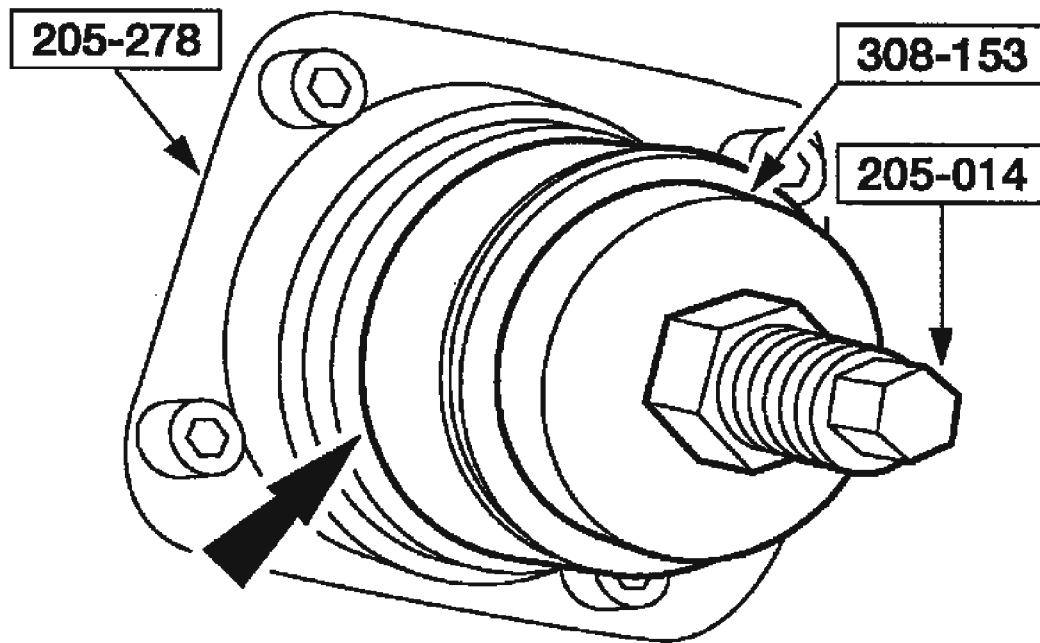
G00370575

**Fig. 39: Removing Brake Backing Plate From Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

#### Installation

#### All vehicles

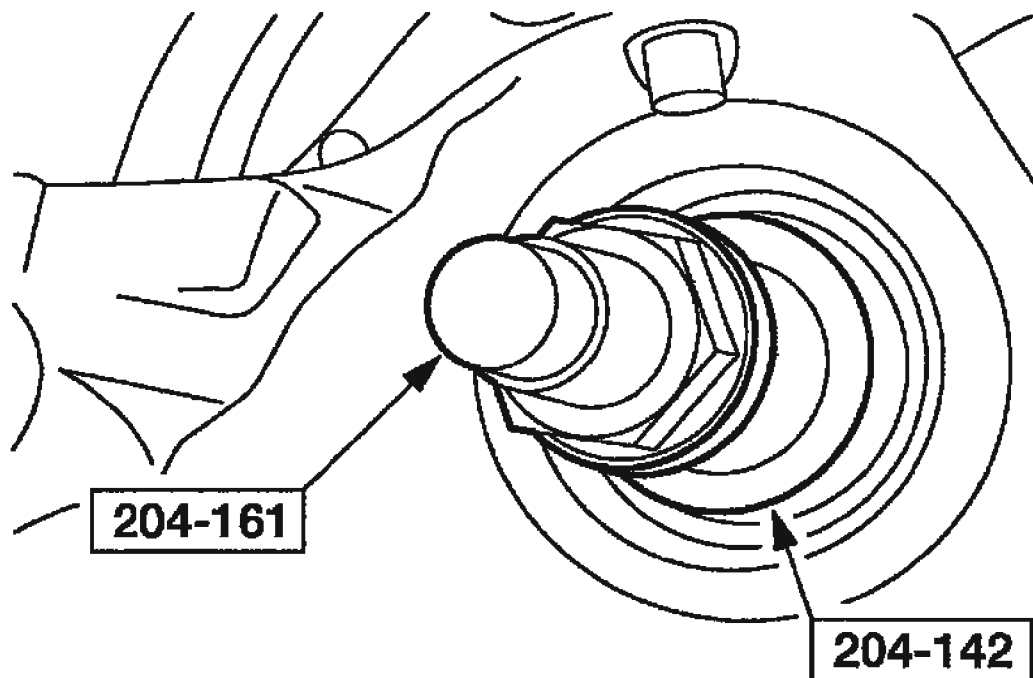
1. Using the special tools, install a new wheel bearing into the wheel knuckle.



G00370555

**Fig. 40: Installing Wheel Bearing (2WD)**  
Courtesy of FORD MOTOR CO.

2. Install the snap ring into the wheel knuckle.
3. Position the brake backing plate to the wheel knuckle and install the bolts.
4. Using the wheel hub washer and the special tool, install the wheel hub into the wheel bearing.



G00370556

**Fig. 41: Installing Wheel Hub (2WD)**  
Courtesy of FORD MOTOR CO.

**NOTE:** If equipped, install the ABS sensor ring.

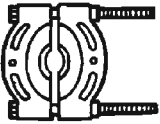
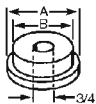

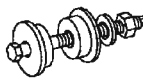
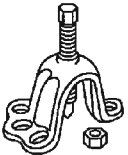



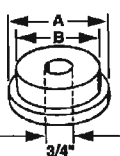
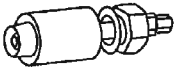
5. Install the wheel hub nut.
6. Position the wheel knuckle and install the wheel knuckle cam.
7. Install the wheel knuckle cam bolt and nut loosely.
8. Support the wheel knuckle and install the spring.
9. Install the lower shock absorber nut.
10. Position the upper ball joint and install the nut.
11. Position the lower ball joint and install the nut.
12. Align the wheel knuckle cam. Tighten the wheel knuckle cam bolt and nut.
13. Connect the brake line to the wheel cylinder. Install the brake line bracket bolt.
14. Install the parking brake cable through the brake backing plate. Install the bolt. Install the parking brake cable.

Position the ABS sensor and bracket bolts. Install the bolts.

All vehicles

1. Install the brake shoes. See **DISC & DRUM** .
2. Bleed the brake system. See **DISC & DRUM** .
3. Check and adjust the wheel alignment as necessary. See **SPECIFICATION & PROCEDURES** .

## WHEEL KNUCKLE - 4WD

	Pinion Bearing Cone Remover 205-D002 (D79L-4621-A)		Bearing Cup Replacer 204-020 (T73T-1202-A)
	Impact Slide Hammer 100-D006 (D79P-100-A)		Pinion Bearing Cup Replacer 205-014 (T60K-4614-A)
	Front Hub Remover 205-D070 (D93P-1175-B) or equivalent		Differential Bearing Cup Replacer 308-153 (T88C-7025-BH)
	Rear Axle Draw Bar 205-098 (T75T-1176-A) or equivalent		Bearing Cup Replacement 205-278 (T88T-1175-C)
	Seal Replacer 204-019 (T73T-1190-B)		Halfshaft Installer 205-379 (T79P-1175-A)

G00370576

**Fig. 42: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

## Removal and Installation

All vehicles

**NOTE:** When a new wheel knuckle is installed a new wheel bearing must

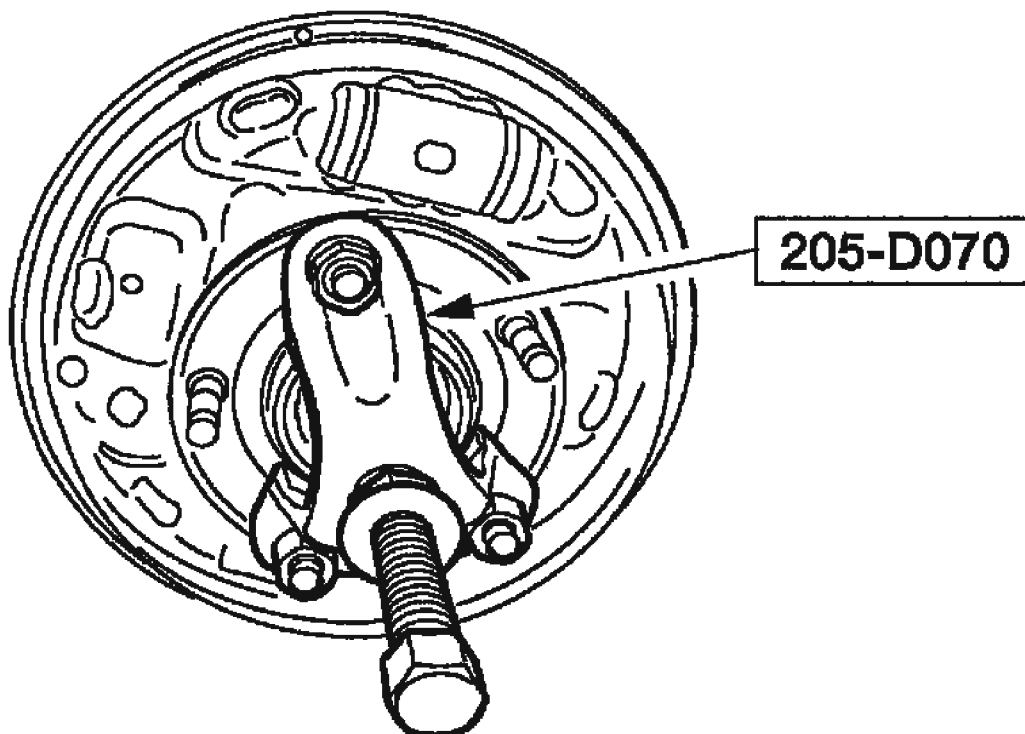
**also be installed.**

1. Raise the vehicle on the hoist.
2. Remove the wheel and tire assembly. If necessary, remove the center cap. Remove the nuts.

**CAUTION:** Use of a brake drum puller or a torch is not recommended. Brake drum distortion can occur.

**NOTE:** If the brake drum is rusted to the axle shaft pilot diameter, tap the center of the brake drum between the wheel studs.

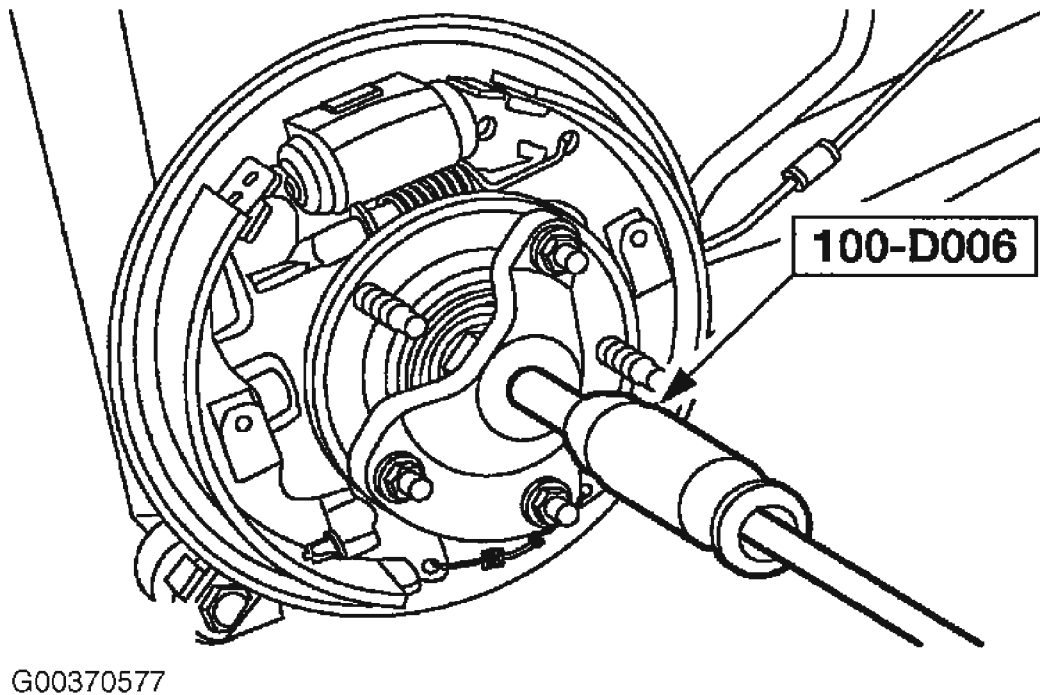
3. Remove the brake drum. If equipped, remove the brake drum retaining clips.
4. If the brake drum will not come off, follow these steps. Move the brake shoe adjusting lever off the brake adjuster screw. Loosen the brake shoe adjuster screw nut by adjusting the nut upward.
5. Remove the rear halfshaft nut.
6. Using the special tool, loosen the halfshaft from the wheel hub.



G00370559

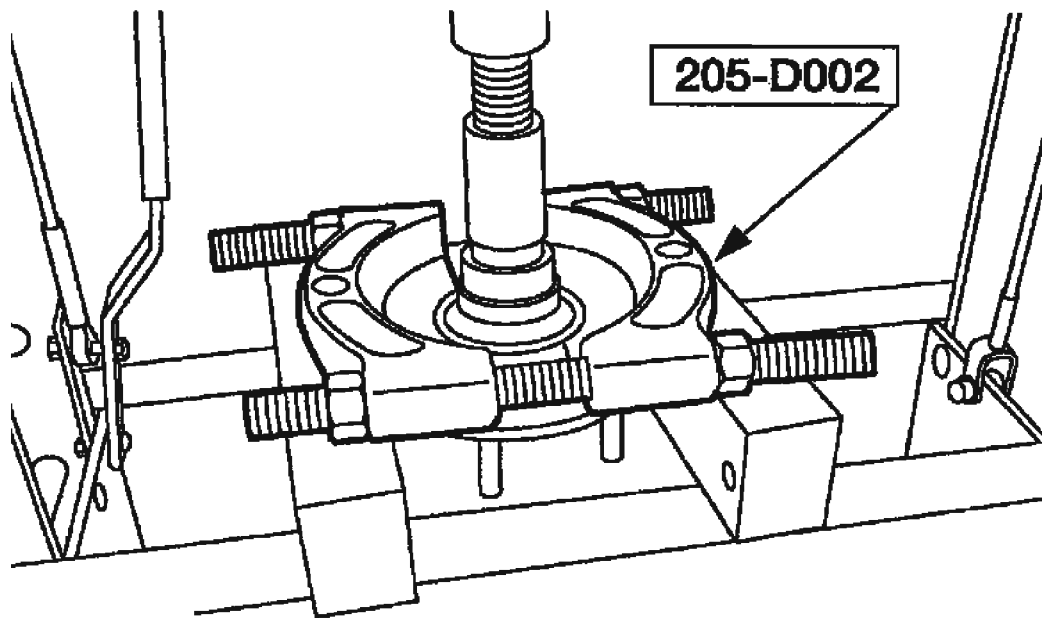
**Fig. 43: Loosening Halfshaft From Hub**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, remove the wheel hub.



**Fig. 44: Removing Wheel Hub (4WD)**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step may not be necessary if the inner wheel bearing race remains in the wheel knuckle, after removing the wheel hub.

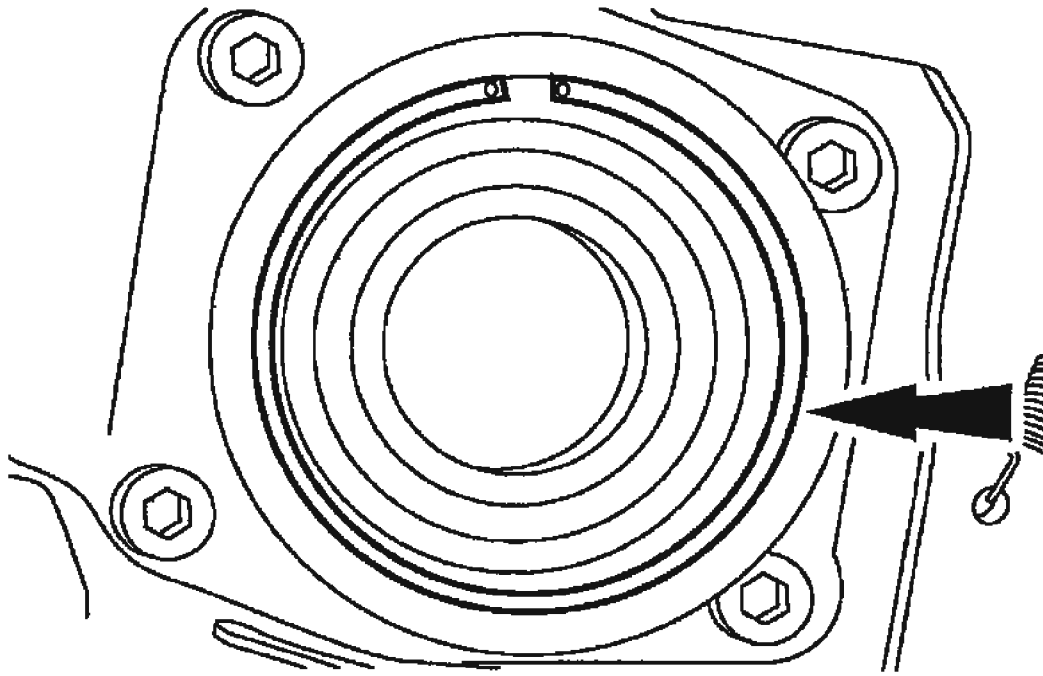


G00370552

**Fig. 45: Pressing Inner Wheel Bearing Race From Wheel Hub**  
Courtesy of FORD MOTOR CO.

8. Using the special tool, press the inner wheel bearing race from the wheel hub.
9. Remove the snap ring.



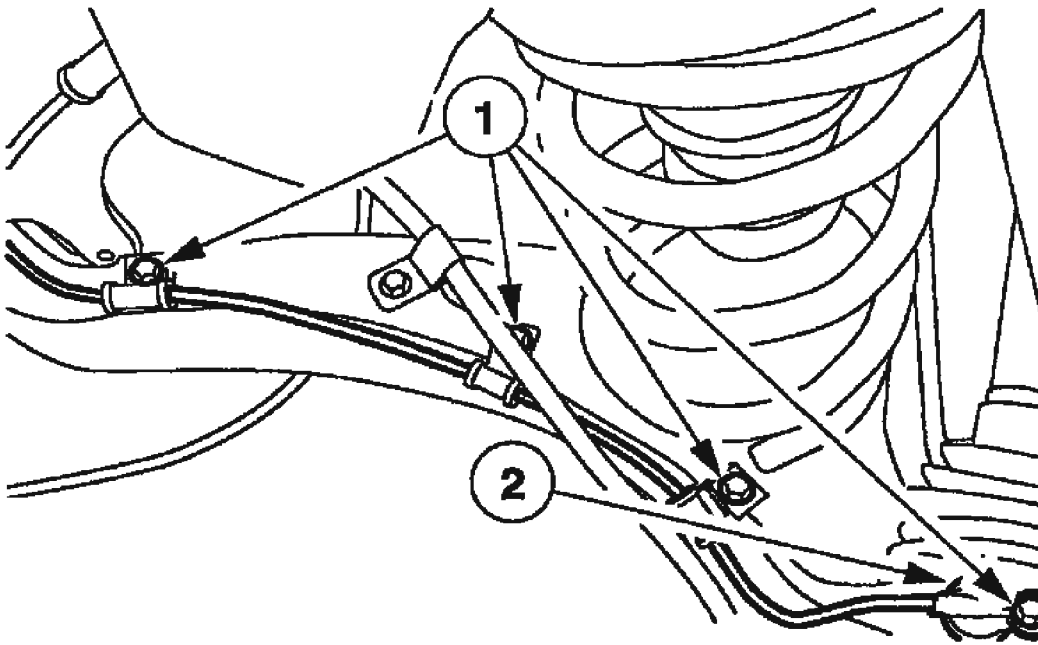


G00370553

**Fig. 46: Identifying Snap Ring**  
**Courtesy of FORD MOTOR CO.**

**Vehicles with ABS**

Remove the ABS sensor bolt and bracket bolts. Position the ABS sensor aside.

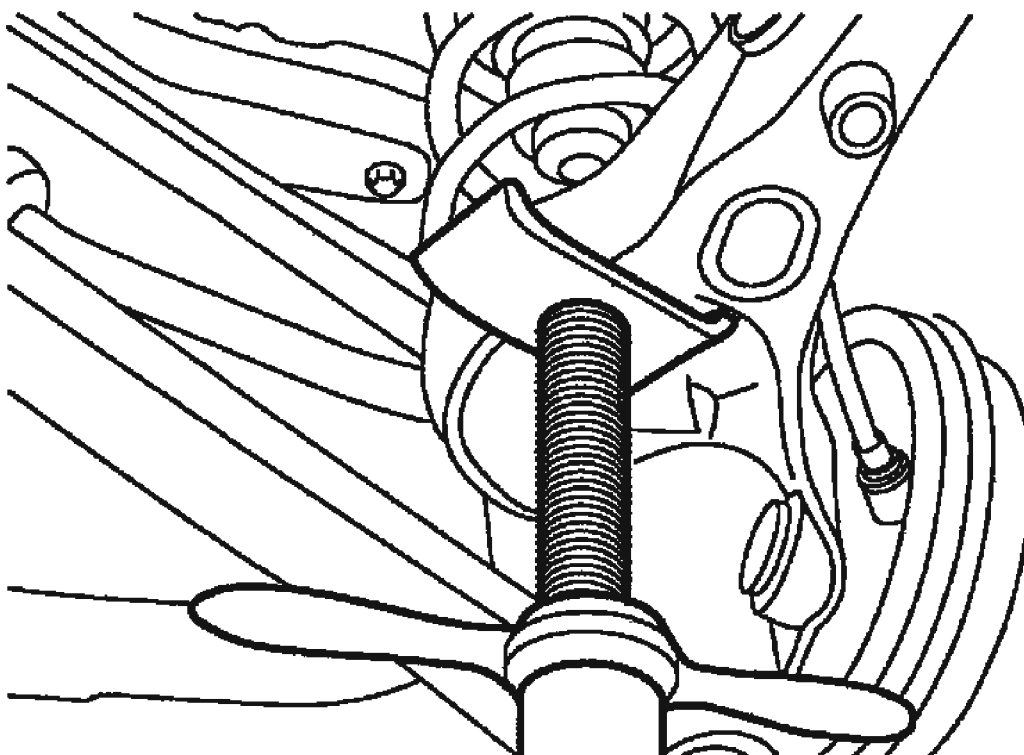


G00370561

**Fig. 47: Identifying ABS Wiring Retainers**  
Courtesy of FORD MOTOR CO.

All vehicles

1. Disconnect the parking brake cable. Remove the parking brake cable bolt from the wheel knuckle.
2. Remove brake line bracket bolt.
3. Support the wheel knuckle.

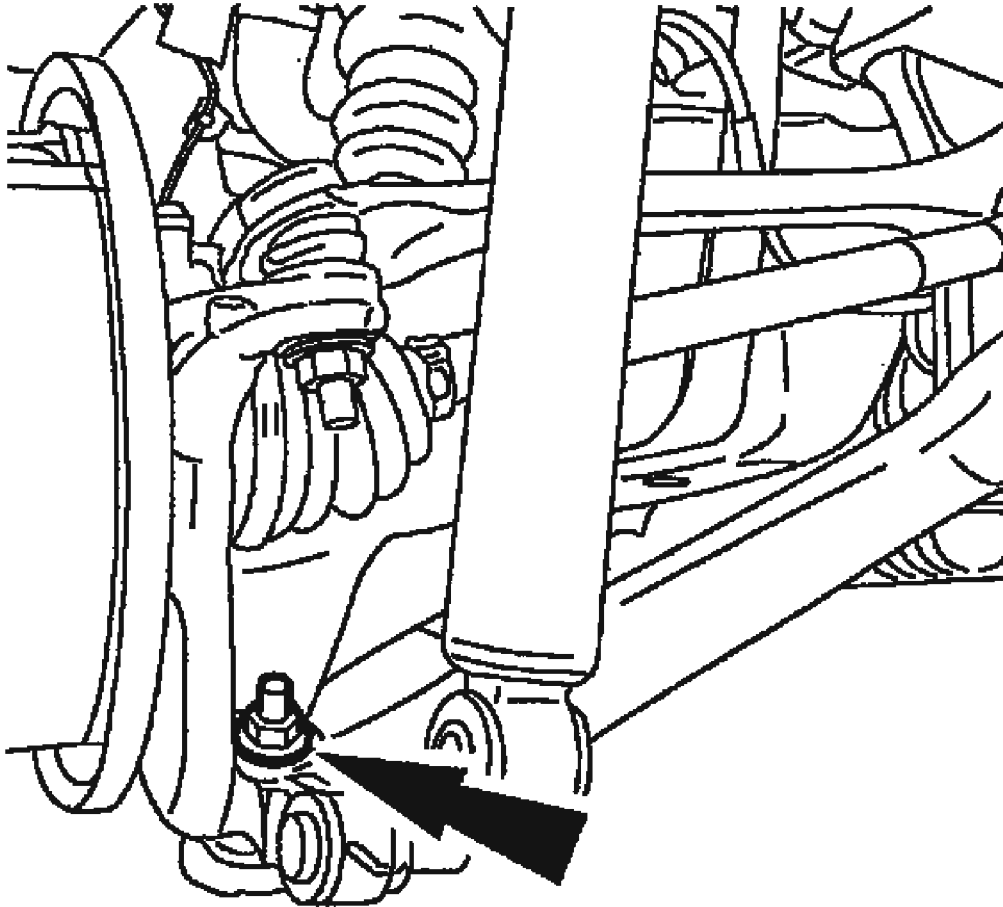


G00370578

**Fig. 48: Supporting Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

4. Remove the lower shock absorber nut.

**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.

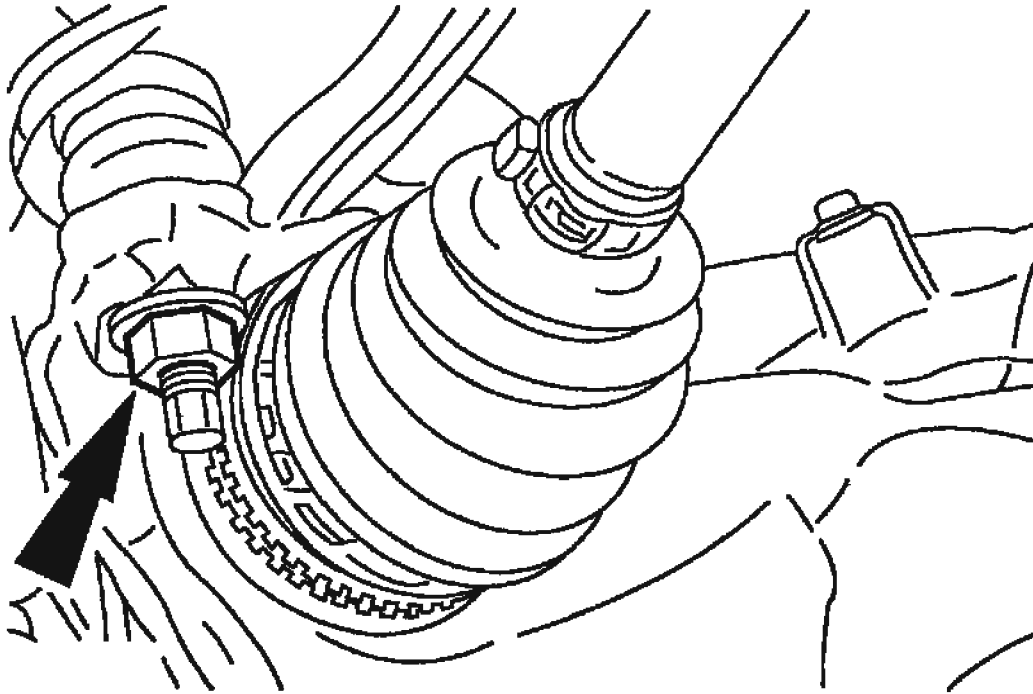


G00370562

**Fig. 49: Identifying Lower Ball Joint Nut**  
Courtesy of FORD MOTOR CO.

5. Disconnect the lower ball joint. Remove the nut.

**NOTE:** It may be necessary to hold the ball joint stud to keep it from turning while removing the nut.



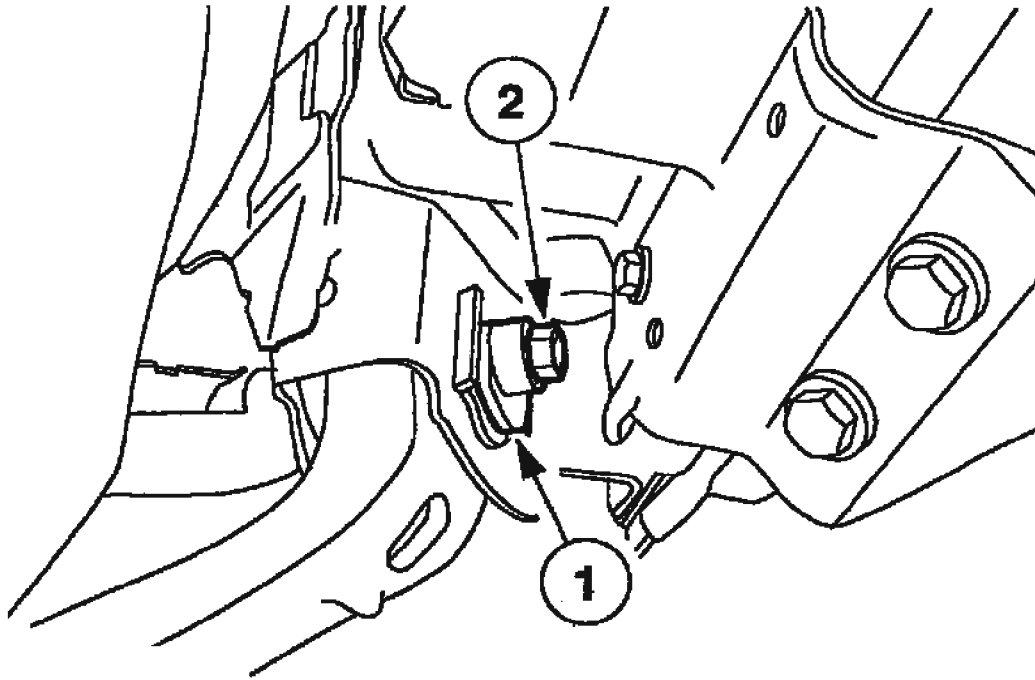
G00370563

**Fig. 50: Identifying Upper Ball Joint Nut**  
**Courtesy of FORD MOTOR CO.**

6. Disconnect the upper ball joint. Remove the nut.

**NOTE:**      **Note the position of the spring insulator and spring for installation.**

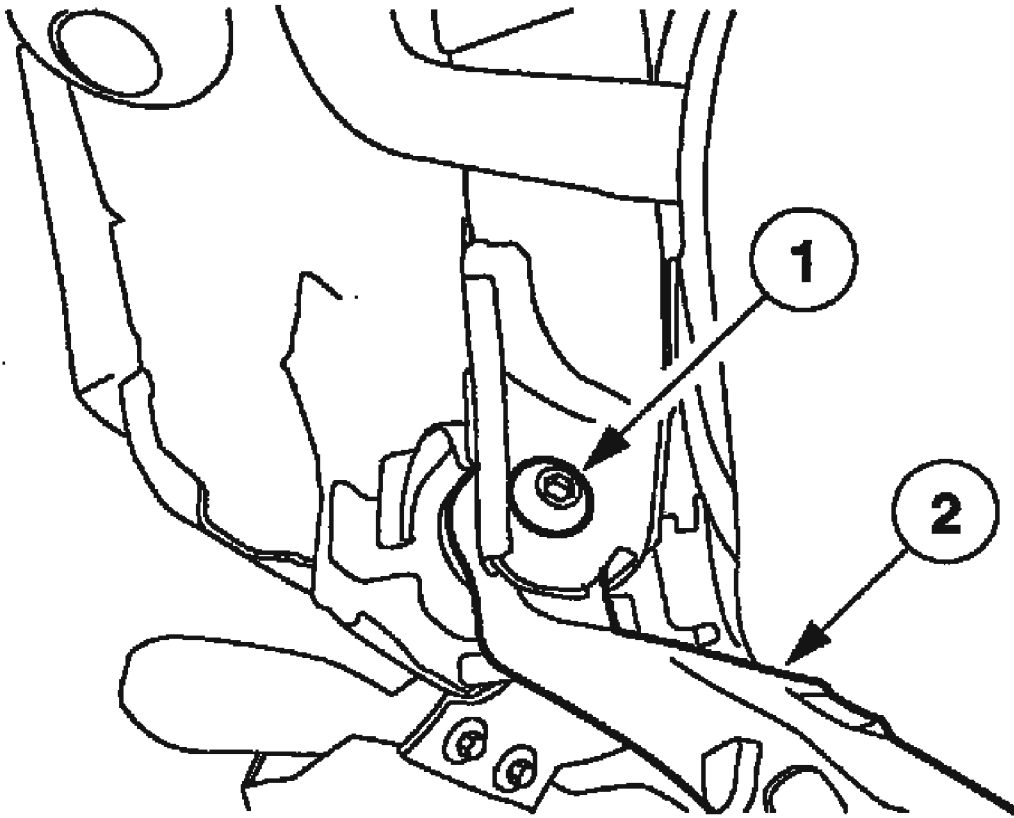
7. Remove the spring. Lower the support to the wheel knuckle.
8. Mark the position of the adjustment cam notch. Remove the wheel knuckle cam bolt and nut.



G00370564

**Fig. 51: Removing Wheel Knuckle Cam Bolt & Nut**  
**Courtesy of FORD MOTOR CO.**

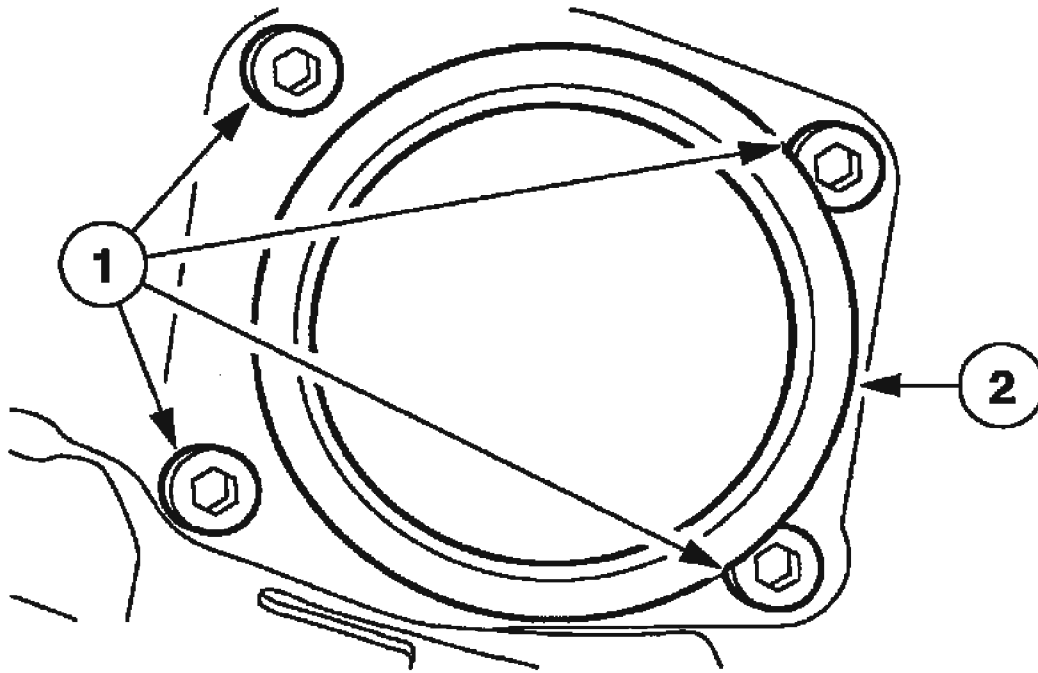
9. Remove the wheel knuckle cam. Remove the wheel knuckle.



G00370565

**Fig. 52: Removing Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

10. Remove the bolts. Remove the brake backing plate from the wheel knuckle and position aside.



G00370575

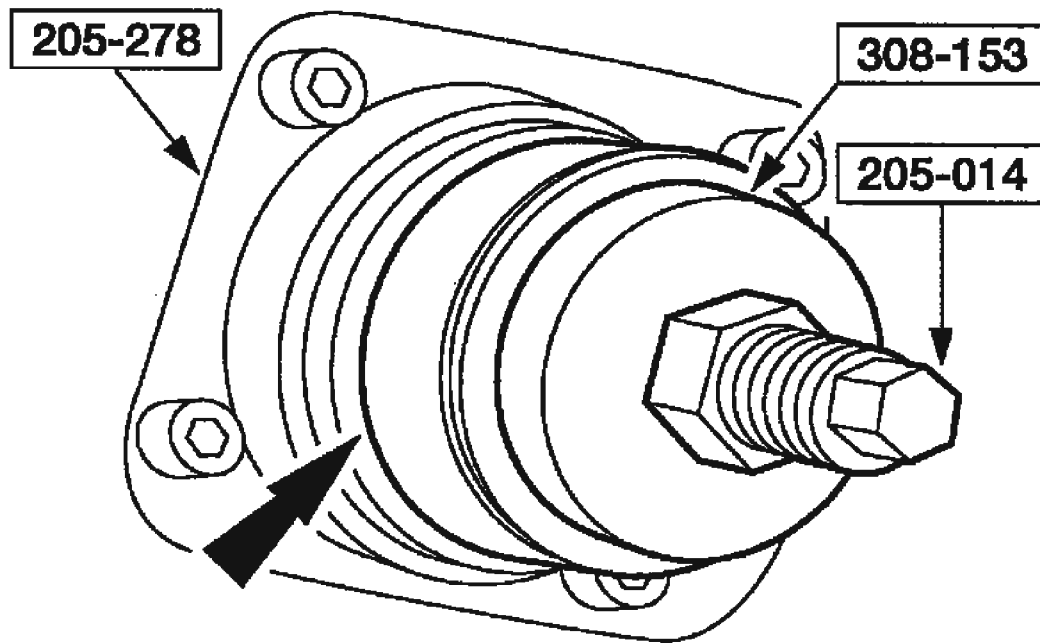
**Fig. 53: Removing Brake Backing Plate From Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

#### Installation

#### All vehicles

1. Using the special tools, install a new wheel bearing into the wheel knuckle.





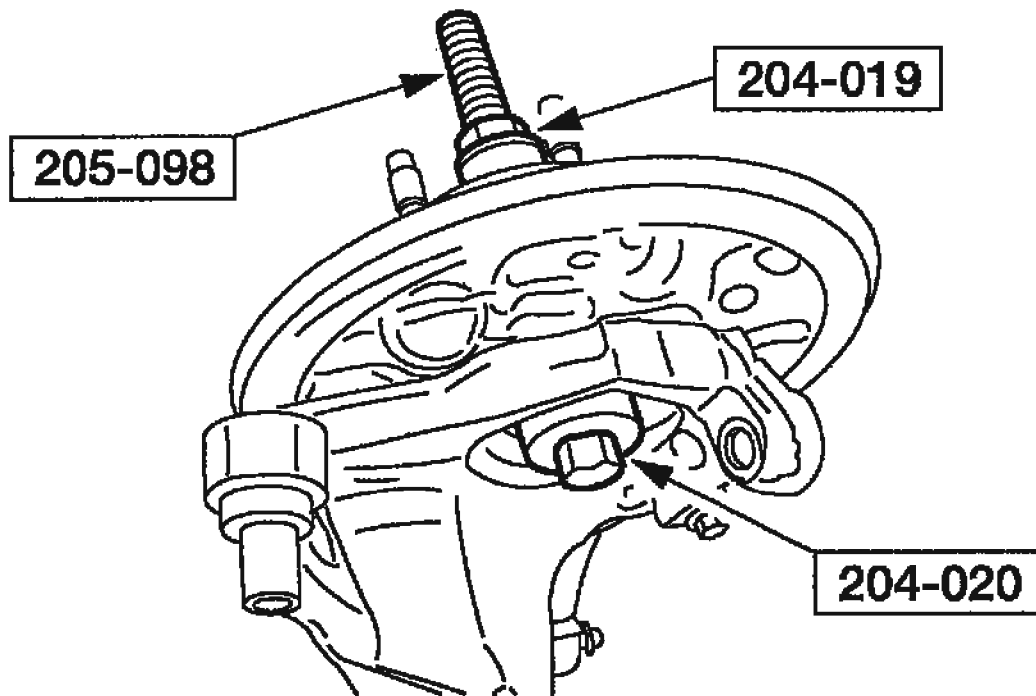
G00370555

**Fig. 54: Installing Wheel Bearing (2WD)**  
Courtesy of FORD MOTOR CO.

2. Install the snap ring into the wheel knuckle.
3. Position the wheel knuckle and install the wheel knuckle cam.
4. Install the wheel knuckle cam bolt loosely.

**NOTE:** Brake shoes shown removed for clarity.

5. Install the brake backing plate into the wheel knuckle. Install the bolts.
6. Using the special tools, install the wheel hub.



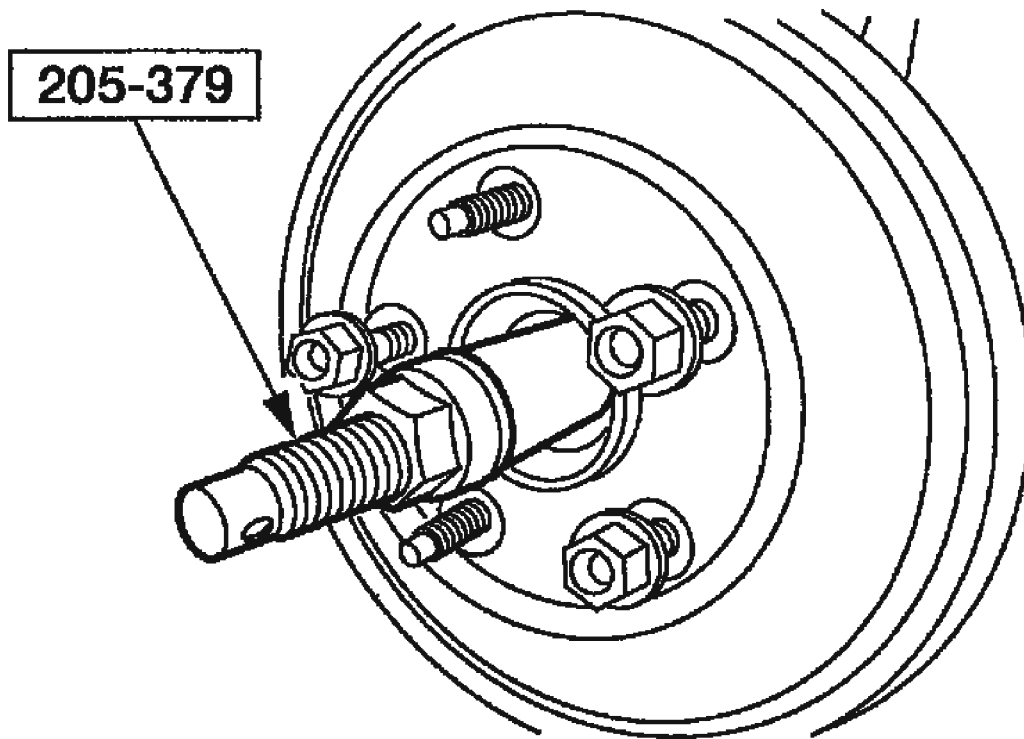
G00370568

**Fig. 55: Installing Wheel Hub (4WD)****Courtesy of FORD MOTOR CO.**

7. Position the halfshaft into the wheel hub.
8. Support the wheel knuckle and install the spring.
9. Install the lower shock absorber nut.
10. Remove the support from the wheel knuckle.
11. Install the upper ball joint. Install the nut.
12. Install the lower ball joint. Install the nut.
13. Tighten the wheel knuckle cam bolt and nut. Align the wheel knuckle cam. Tighten the wheel knuckle cam bolt and nut.
14. Install brake line bracket bolt.
15. Install the parking brake cable bolt.

**Vehicles with ABS**

1. Position the ABS brake sensor and bracket bolts. Install the bolts.
2. Using the special tool, install the halfshaft end into the hub assembly.



G00370569

**Fig. 56: Installing Halfshaft End Into Hub Assembly**  
Courtesy of FORD MOTOR CO.

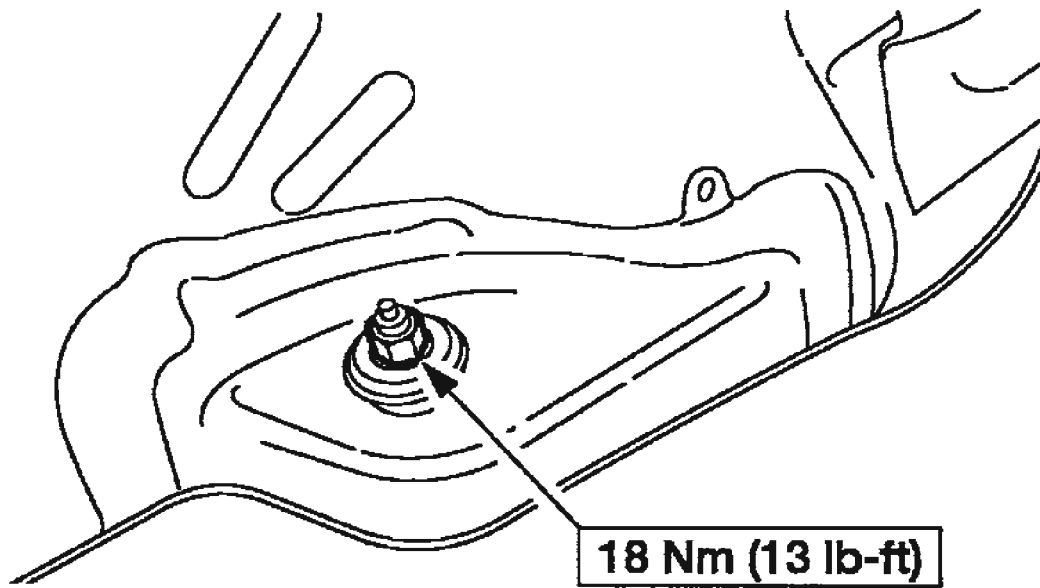
**All vehicles**

1. Install the halfshaft nut.
2. Install the brake drum. See **DISC & DRUM** .
3. Install the wheel and tire assembly.
4. Check and adjust the wheel alignment as necessary. See **SPECIFICATION & PROCEDURES** .

**SHOCK ABSORBER**

**Removal and Installation**

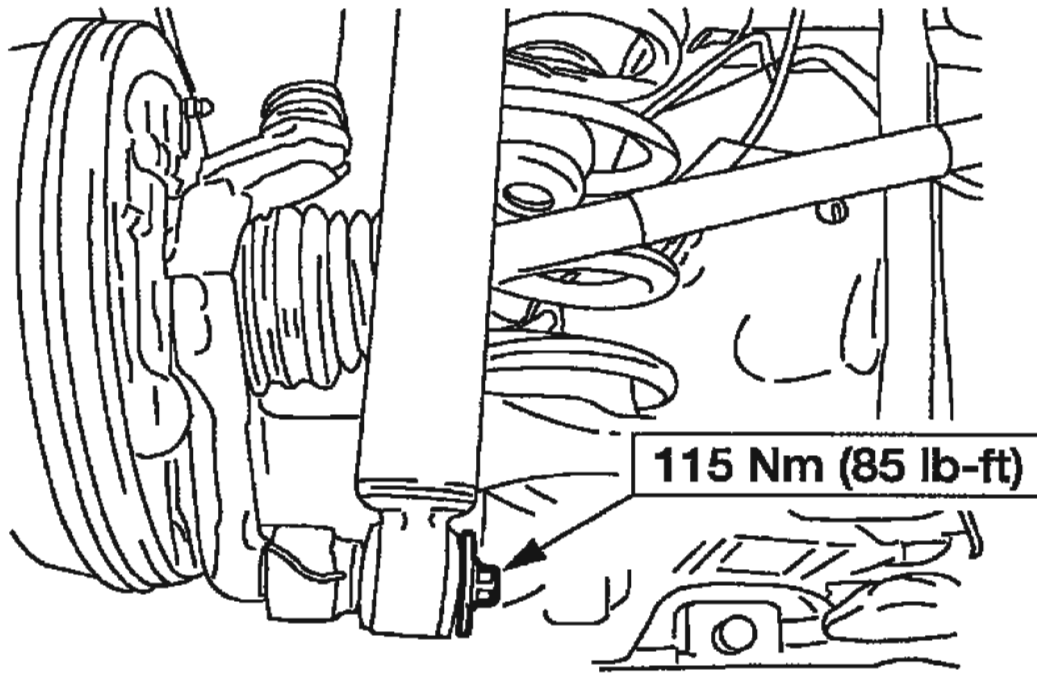
1. Remove the rear quarter trim panel.
2. Remove the upper shock absorber nut.



G00370579

**Fig. 57: Identifying Shock Absorber Upper Nut**  
Courtesy of FORD MOTOR CO.

3. Raise and support the vehicle enough to relax the suspension system.
4. Remove the lower shock absorber nut. Remove the shock absorber.



G00370580

**Fig. 58: Identifying Shock Absorber Lower Nut**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

## SPRING

### Removal and Installation

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

**NOTE:** After removing the wheel, finger-tighten one lug nut to retain the drum if the drum retainers have been removed.

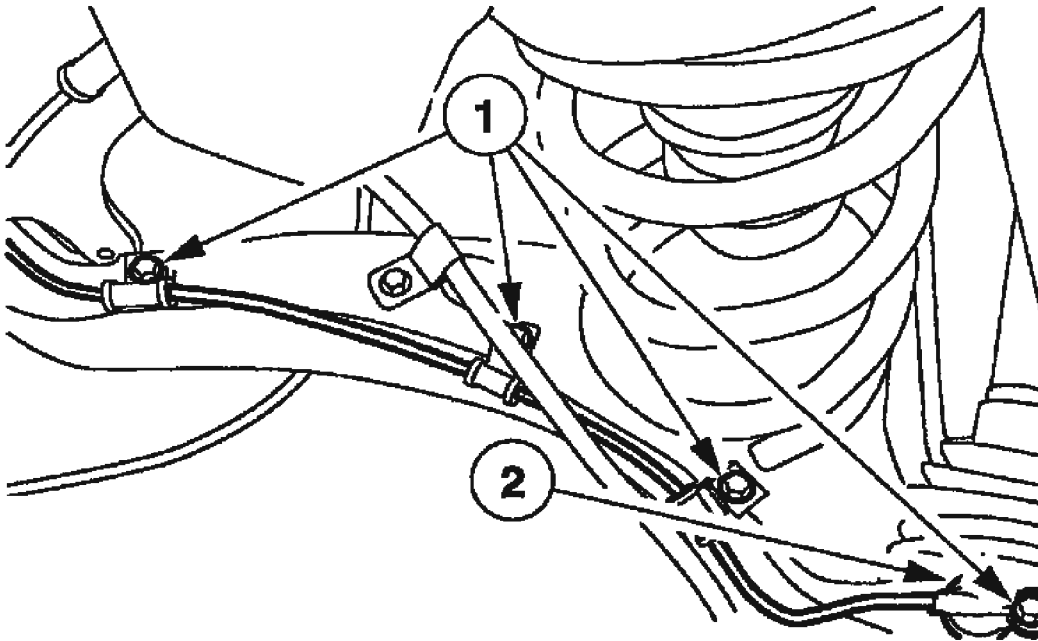
### All vehicles

1. Remove the wheel and tire.
2. Disconnect the brake line from the wheel cylinder. Remove the brake line bracket bolt.

### Vehicles with ABS

1. Remove the ABS sensor bolt and bracket bolts.

2. Position the ABS sensor aside.

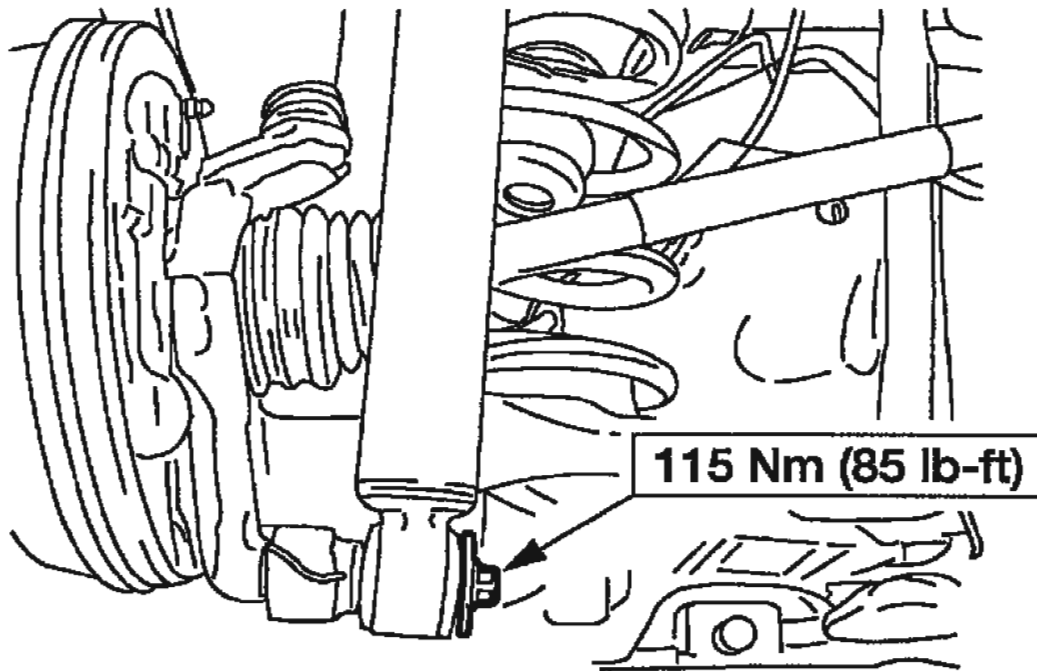


G00370561

**Fig. 59: Identifying ABS Wiring Retainers**  
Courtesy of FORD MOTOR CO.

All vehicles

1. Support the rear wheel knuckle.
2. Remove the upper arm bolt. Loosen the lower arm bolt.
3. Remove the lower shock nut and position aside.



G00370580

**Fig. 60: Identifying Shock Absorber Lower Nut**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the position of the spring insulator and spring for installation.

4. Remove the spring. Lower the support to the wheel knuckle.
5. To install, reverse the removal procedure. Bleed the brake system. See **DISC & DRUM** .

## 2005 Ford Escape

2005 STEERING Power Steering - Escape & Mariner

### 2005 STEERING

#### Power Steering - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Power Steering Fluid</b>	
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
<b>Power Steering System - Escape, Mariner</b>			
Power steering fluid cooler bolts	10	-	89
Power steering fluid cooler nuts	10	-	89
Power steering fluid reservoir bolts	8	-	71
Power steering line clamp plate bolt	25	18	-
Power steering pressure line bracket nut (2.3L)	10	-	89
Power steering pressure line bracket nut (3.0L)	12	9	-
Power steering pressure line fitting nut (3.0L (4V))	73	54	-
Power steering pressure line fitting nut (2.3L)	65	48	-
Power steering pressure line bracket-to-steering gear bolt	10	-	89
Steering gear-to-fluid cooler return hose bracket-to-subframe bolt	10	-	89
Power steering pump bolts	25	18	-
Power steering pump pulley nut (3.0L (4V))	61	45	-
Steering gear-to-fluid cooler return hose bracket-to-steering gear stud	10	-	89
Rear transaxle insulator-to-bracket through-bolt	90	66	-



**2005 Ford Escape****2005 STEERING Power Steering - Escape & Mariner**

Rear transaxle insulator bracket bolt	90	66	-
Rear transaxle insulator bracket nuts	90	66	-
Steering column coupling-to-steering gear pinch bolt	40	30	-
Steering gear mounting bolts	115	85	-
Inner tie-rod	110	81	-
Outer tie-rod end nuts	55	41	-
Tie-rod end jam nuts	41	30	-

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

Description	Nm	lb-ft	lb-in
<b>Power Steering System - Escape Hybrid</b>			
Ball joint pinch bolt nuts	70	52	-
Engine support crossmember bolts	90	66	-
Engine support crossmember nut	175	129	-
Front insulator bolt	115	85	-
Inner tie-rod	110	81	-
Lower stabilizer bar link nuts	55	41	-
Rear engine mount bracket bolts	90	66	-
Rear engine mount heat shield nuts	15	11	-
Rear engine mount nuts	55	41	-
Rear engine mount stud nut	90	66	-
Engine roll restrictor bracket bolts	90	66	-
Steering gear bolts	115	85	-
Steering gear coupling pinch bolt	40	30	-
Power steering control module nuts	23	17	-
Subframe bolts	200	148	-
Subframe nuts	150	111	-
Tie-rod end nut	55	41	-
Tie-rod end jam nut	47	35	-
Upper steering column pinch bolt	24	18	-

**DESCRIPTION AND OPERATION****POWER STEERING**

The power steering system consists of:

- power steering pump
- fluid reservoir
- rack-and-pinion steering gear
- fluid cooler
- power steering pressure and return lines/hoses
- inner tie-rod

The power steering system uses a vane-type pump to pump the fluid from the reservoir to the rack-and-pinion steering gear. The power steering pump is mounted to the engine and is driven by the accessory belt from the engine crankshaft. Power steering fluid is pulled into one side of the pump from the reservoir by vacuum. The power steering fluid is then trapped and squeezed into a smaller area inside the pump. This action pressurizes the fluid as it flows to the rest of the system. A pressure relief/flow valve is built into the pump to control the maximum pressure. The relief pressure is between 9,200-10,205 kPa (1,334-1,480 psi). This action prevents damage to the system during different engine speeds. The power steering fluid, while under pressure, flows through the high pressure power steering line to the rack-and-pinion steering gear.

### **POWER STEERING - HYBRID**

The electric power assist steering system consists of:

- power steering control module
- electric motor
- torque sensor
- rack-and-pinion steering gear

The electric power steering system provides power steering assist to the driver by replacing the conventional hydraulic valve system with an electric motor coupled to the steering gear. The motor is controlled by an electronic control unit that senses the steering effort through the use of a torque sensor mounted between the steering column shaft and the steering gear. Steering assist is provided in proportion to the steering input effort and vehicle speed.

## **DIAGNOSIS AND TESTING**

### **POWER STEERING**

Refer to **STEERING SYSTEM-GENERAL INFORMATION** .

## **REMOVAL AND INSTALLATION**

## 2005 Ford Escape

2005 STEERING Power Steering - Escape & Mariner

### POWER STEERING FLUID RESERVOIR

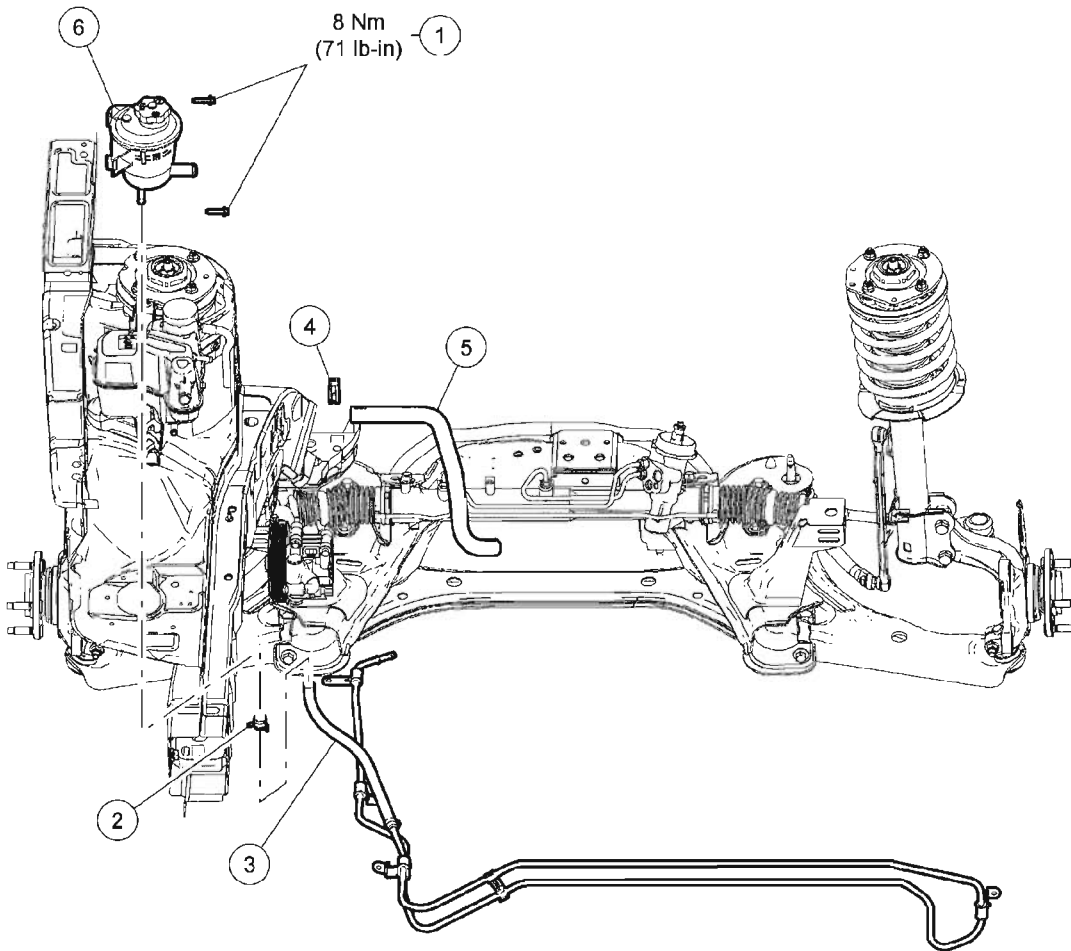
#### Material

### POWER STEERING FLUID RESERVOIR MATERIAL SPECIFICATION

Item	Specification
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



N0001948

Item	Part Number	Description
1	W703845	Power steering fluid reservoir bolts (2 required)
2	—	Power steering fluid cooler-to-fluid reservoir hose clamp
3	—	Power steering fluid cooler-to-fluid reservoir hose (part of 3D746)
4	—	Suction hose-to-power steering reservoir hose clamp (part of 3691-A)
5	3691-A	Suction hose
6	3531-A	Power steering fluid reservoir

**Fig. 1: Identifying Power Steering Fluid Reservoir With Torque Specifications**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

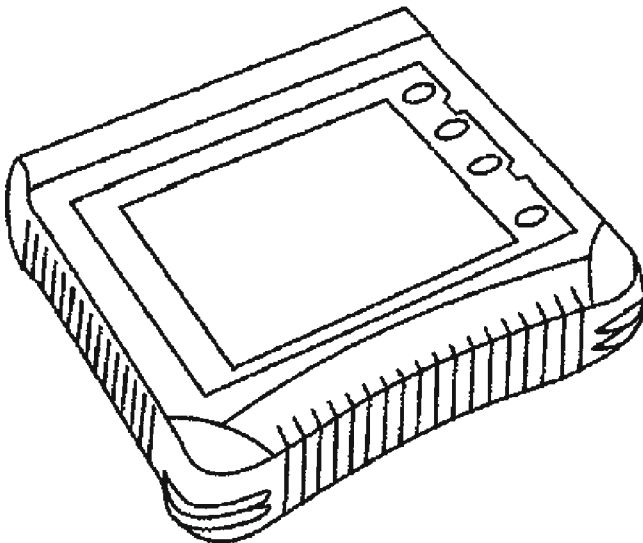
**CAUTION:** While repairing the power steering system, care should be taken to prevent the entry of contaminants or premature failure of the power steering components can result.

1. Drain the power steering fluid into a suitable drain pan.
2. Remove the 2 power steering pump reservoir bolts.
  - To install, tighten to 8 Nm (71 lb-in)
3. Release the clamp and disconnect the power steering fluid cooler-to-fluid reservoir hose.
4. Release the clamp and disconnect the power steering suction hose.
5. Remove the power steering pump reservoir.
6. To install, reverse the removal procedure.
  - Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .

#### POWER STEERING PUMP - 2.3L

Special Tool(s)

#### POWER STEERING PUMP - 2.3L SPECIAL TOOL



**ST2332-A**

Teflon® Seal Replacer Set 211-D027 (D90P-3517-A) or equivalent

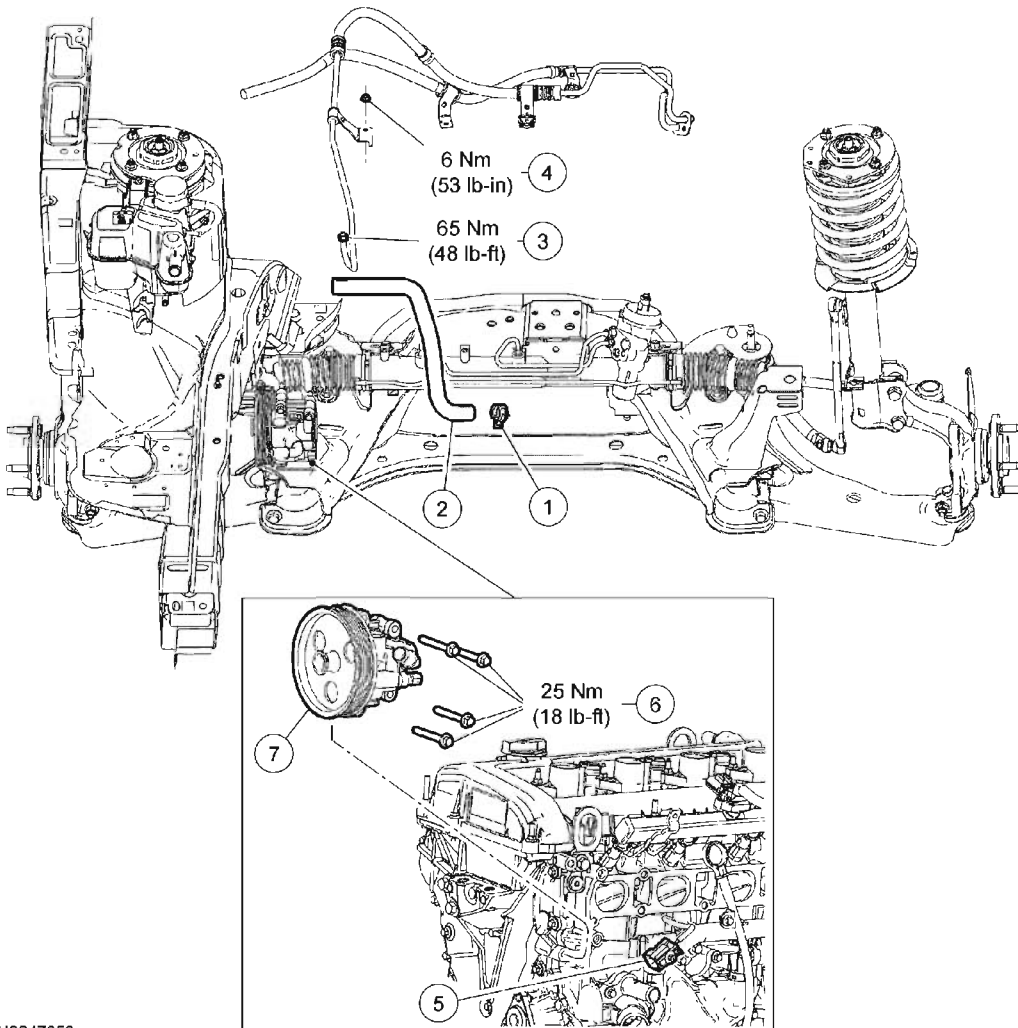
Material

#### MATERIAL SPECIFICATION

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner

Item	Specification
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®



N0047353

Item	Part Number	Description
1	—	Suction hose-to-power steering pump hose clamp (part of 3691-A)
2	3691-A	Suction hose
3	—	Power steering pressure line fitting nut (part of 3A719)
4	W520412	Power steering pressure line bracket nut

Item	Part Number	Description
5	—	Power steering pressure switch electrical connector
6	W500315	Power steering pump bolts (4 required)
7	3A696-A	Power steering pump

**Fig. 2: Identifying Power Steering Fluid Reservoir With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation

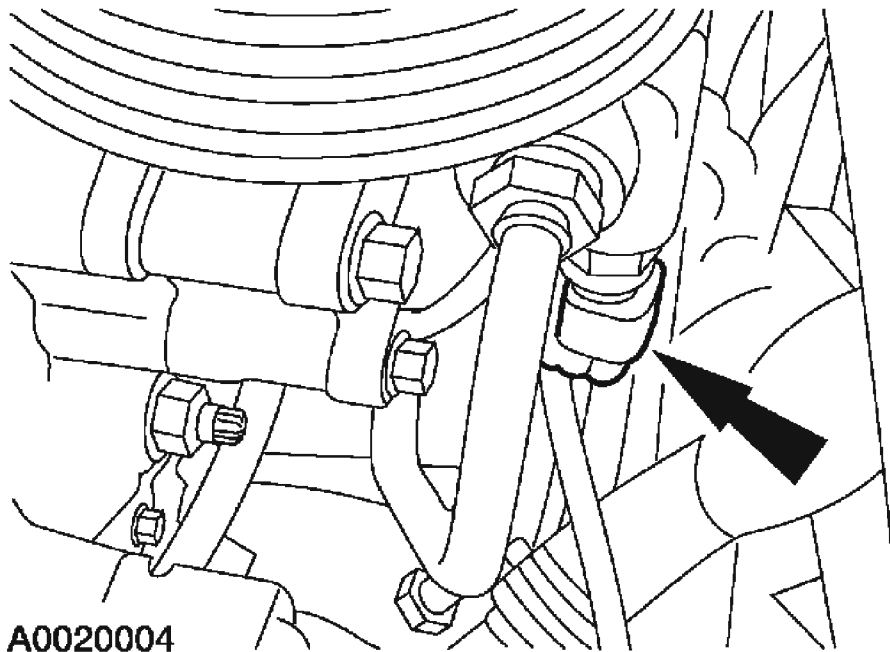
**CAUTION:** While repairing the power steering system, care should be

**taken to prevent the entry of contaminants or premature failure of the power steering components can result.**

1. Remove the power steering pump pulley. For additional information, refer to **POWER STEERING PUMP PULLEY - 2.3L**.

**NOTE:** Do not allow power steering fluid to contact the accessory drive belt.

2. Compress the clamp and disconnect the supply hose.
3. Disconnect the power steering pressure line.
  - Remove and discard the O-ring seal.
  - To install, tighten to 65 Nm (48 lb-ft).
4. Remove the power steering pressure line bracket nut and position the pressure line aside.
  - To install, tighten to 10 Nm (89 lb-in).
5. Disconnect the power steering pressure switch electrical connector.



**Fig. 3: Disconnecting Power Steering Pressure Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

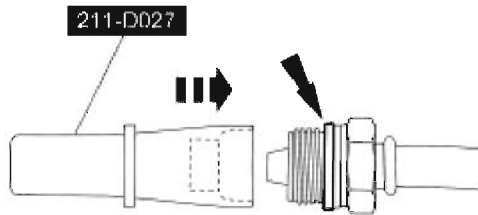
6. Remove the power steering pump bolts and the power steering pump.

- To install, tighten to 25 Nm (18 lb-ft).

**CAUTION:** A new Teflon® O-ring seal must be installed any time the power steering pressure line is disconnected from the power steering pump.

7. To install, reverse the removal procedure.

- Using the special tool, install a new Teflon® O-ring seal on the power steering pressure line.
- Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION**.



N0032102

**Fig. 4: -->Installing Teflon® Seal**  
Courtesy of FORD MOTOR CO.

#### POWER STEERING PUMP - 3.0L (4V)

##### Material

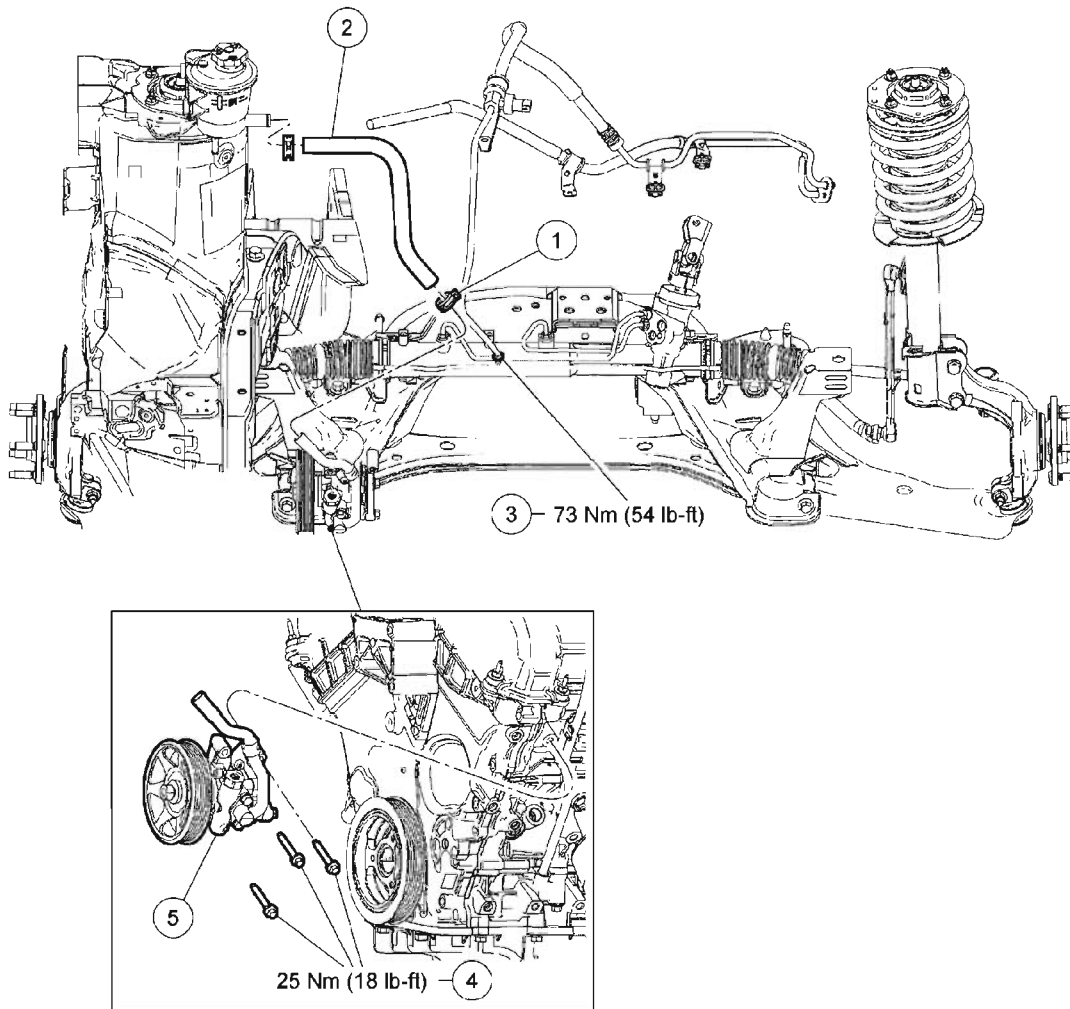
#### POWER STEERING PUMP - 3.0L (4V) MATERIAL SPECIFICATION

Item	Specification
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®



## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



N0035677

Item	Part Number	Description
1	—	Suction hose-to-power steering pump hose clamp
2	3691-B	Suction hose
3	—	Power steering pressure line fitting nut (part of 3A719)
4	W701656	Power steering pump bolts (3 required)
5	3A696-B	Power steering pump

**Fig. 5: Identifying Power Steering Pump - 3.0L (4V) With Torque Specifications**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

**CAUTION:** While repairing the power steering system, care should be taken to prevent the entry of contaminants or premature failure of the power steering components can result.

1. Remove the power steering pump pulley. For additional information, refer to **POWER STEERING PUMP PULLEY - 3.0L (4V)**.
2. Rotate the accessory drive belt tensioner counterclockwise and position the accessory drive belt aside.

**NOTE:**      **Drain the power steering fluid into a suitable drain pan.**

3. Release the clamp and remove the power steering fluid suction hose from the power steering pump.
4. Disconnect the power steering pressure line fitting nut from the power steering pump.
  - To install, tighten to 73 Nm (54 lb-ft)
5. Remove the 3 power steering pump bolts.
  - To install, tighten to 25 Nm (18 lb-ft).

**CAUTION:** Do not let the flow control valve fall out of the power steering pump.

6. Remove the power steering pump.
7. To install, reverse the removal procedure.
8. Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION**.

#### POWER STEERING PUMP PULLEY - 2.3L

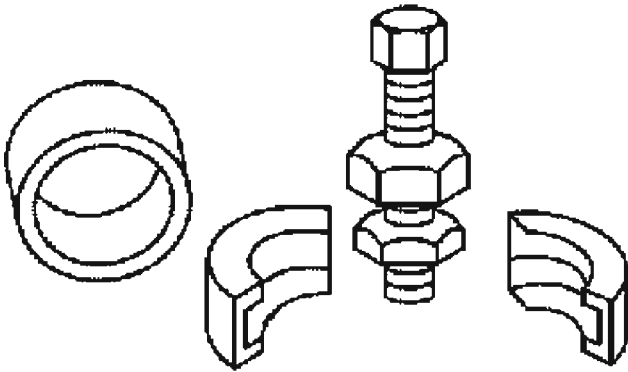
Special Tool(s)

#### POWER STEERING PUMP PULLEY - 2.3L MATERIAL SPECIFICATION

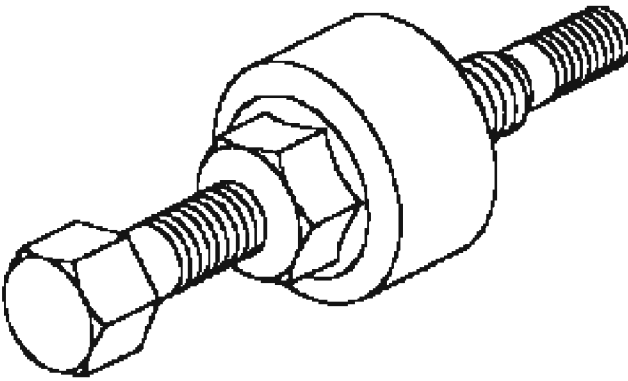
	Remover, Power Steering Pump Pulley 211-016 (T69L-10300-B)
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## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



**ST1290-A**

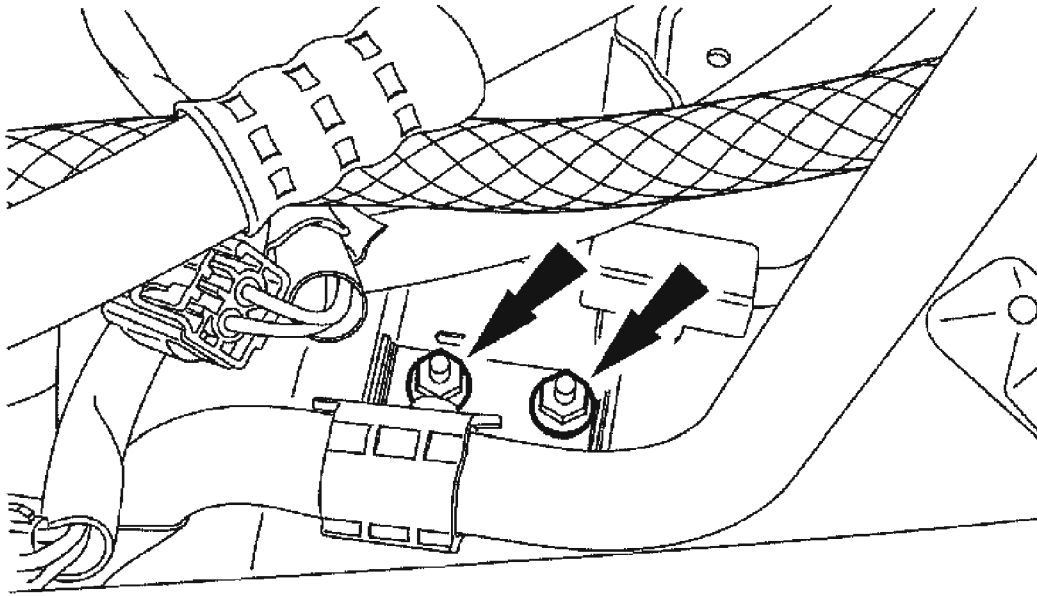


**ST1586-A**

Installer, Power Steering Pump  
Pulley 211-185 (T91P-3A733-A)

#### Removal

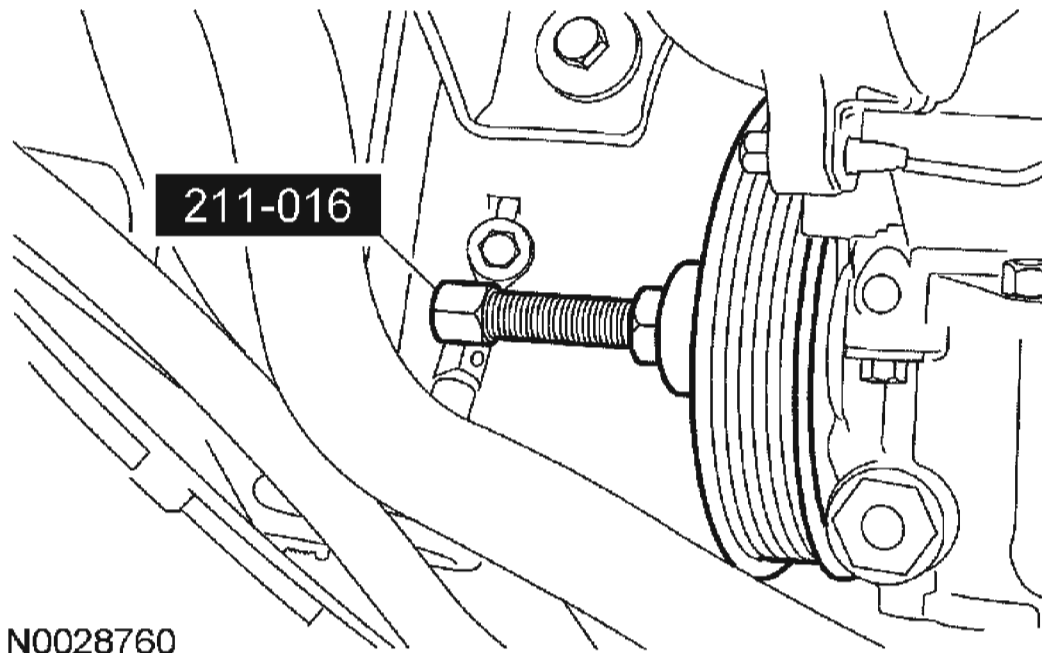
1. Rotate the accessory drive belt tensioner clockwise and position the accessory drive belt aside.
2. Remove the 2 A/C manifold and tube assembly bracket nuts and position the bracket aside.



N0047092

**Fig. 6: Locating A/C Manifold And Tube Assembly Bracket Nuts**  
**Courtesy of FORD MOTOR CO.**

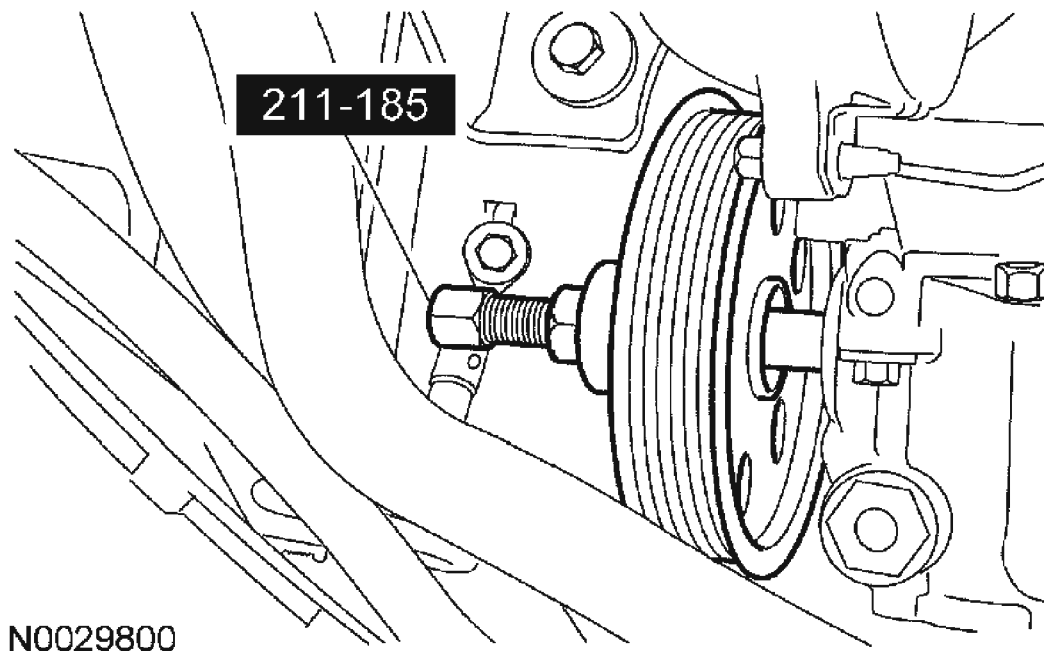
3. Using the special tool, remove the power steering pump pulley.



**Fig. 7: Removing Power Steering Pump Pulley**  
Courtesy of FORD MOTOR CO.

**Installation**

**NOTE:** Make sure the pulley is flush with the end of the power steering pump shaft.



**Fig. 8: Installing Power Steering Pump Pulley**  
Courtesy of FORD MOTOR CO.

1. Using the special tool, install the power steering pump pulley.
2. Position the A/C manifold tube assembly bracket and install the 2 nuts.
  - Tighten to 8 Nm (71 lb-in).
3. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.

#### **POWER STEERING PUMP PULLEY - 3.0L (4V)**

##### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 2 bolts and the RH splash shield.
  - To install, tighten to 7 Nm (62 lb-in).
3. Loosen the power steering pump pulley bolt.
4. Rotate the accessory drive belt tensioner counterclockwise and position the accessory drive belt aside.
5. Remove the nut and the power steering pump pulley.
  - To install, tighten to 61 Nm (45 lb-ft).
6. To install, reverse the removal procedure.

## 2005 Ford Escape

2005 STEERING Power Steering - Escape & Mariner

### POWER STEERING PUMP TO STEERING GEAR PRESSURE LINE

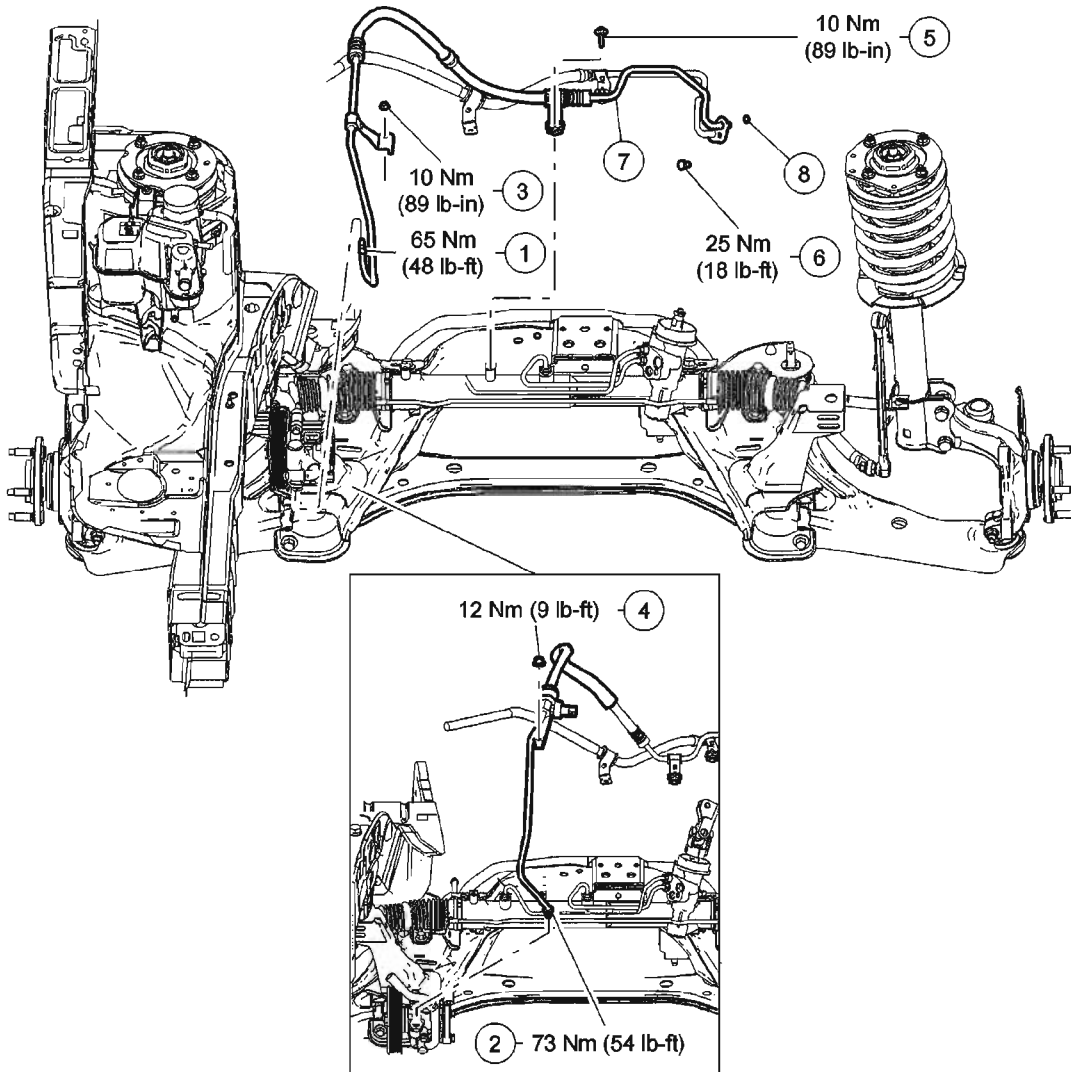
#### Material

### POWER STEERING PUMP MATERIAL SPECIFICATION

Item	Specification
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



A0002386

Item	Part Number	Description
1	—	Power steering pressure line fitting nut (part of 3A719) (2.3L engine)
2	—	Power steering pressure line fitting nut (part of 3A719) (3.0L engine)
3	W707142	Power steering pressure line bracket nut (2.3L engine)
4	W520414	Power steering pressure line bracket nut (3.0L engine)
5	W707554-S	Power steering pressure line bracket-to-steering gear bolt
6	W708234-S	Power steering line clamp plate bolt
7	3A719-A/ 3A719-B	Power steering pressure line (2.3L engine/3.0L engine)
8	3L551-AA	O-ring

**Fig. 9: Identifying Pump To Steering Gear Pressure Line With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation



**CAUTION:** While repairing the power steering system, care should be taken to prevent the entry of contaminants or premature failure of the power steering components can result.

**NOTE:** New O-rings must be installed any time the lines are disconnected from the steering gear.

#### All vehicles

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

#### 3.0L (4V) only

2. Remove the power steering pump pulley. For additional information, refer to **POWER STEERING PUMP PULLEY - 3.0L (4V)**.
3. Disconnect the power steering pressure switch (PSP) electrical connector.

#### All vehicles

4. Drain the power steering fluid into a suitable drain pan.
5. Remove the power steering pressure line fitting nut.
  - To install, tighten to 65 Nm (48 lb-ft) (2.3L engine).
  - To install, tighten to 73 Nm (54 lb-ft) [3.0L (4V) engine].
6. Remove the power steering pressure line bracket nut.
  - To install, tighten to 10 Nm (89 lb-in) (2.3L engine).
  - To install, tighten to 12 Nm (9 lb-ft) [3.0L (4V) engine].
7. Remove the power steering pressure line bracket-to-steering gear bolt.
  - To install, tighten to 10 Nm (89 lb-in).
8. Remove the power steering line clamp plate bolt.
  - To install, tighten to 25 Nm (18 lb-ft).

**NOTE:** The power steering pressure and return lines are of different diameters and the O-rings are not interchangeable.

9. Rotate the clamp plate and remove the power steering pump-to-steering gear pressure line.
  - Install a new high pressure line O-ring.
10. To install, reverse the removal procedure.
11. Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION**.

## 2005 Ford Escape

2005 STEERING Power Steering - Escape & Mariner

### STEERING GEAR TO FLUID COOLER RETURN HOSE

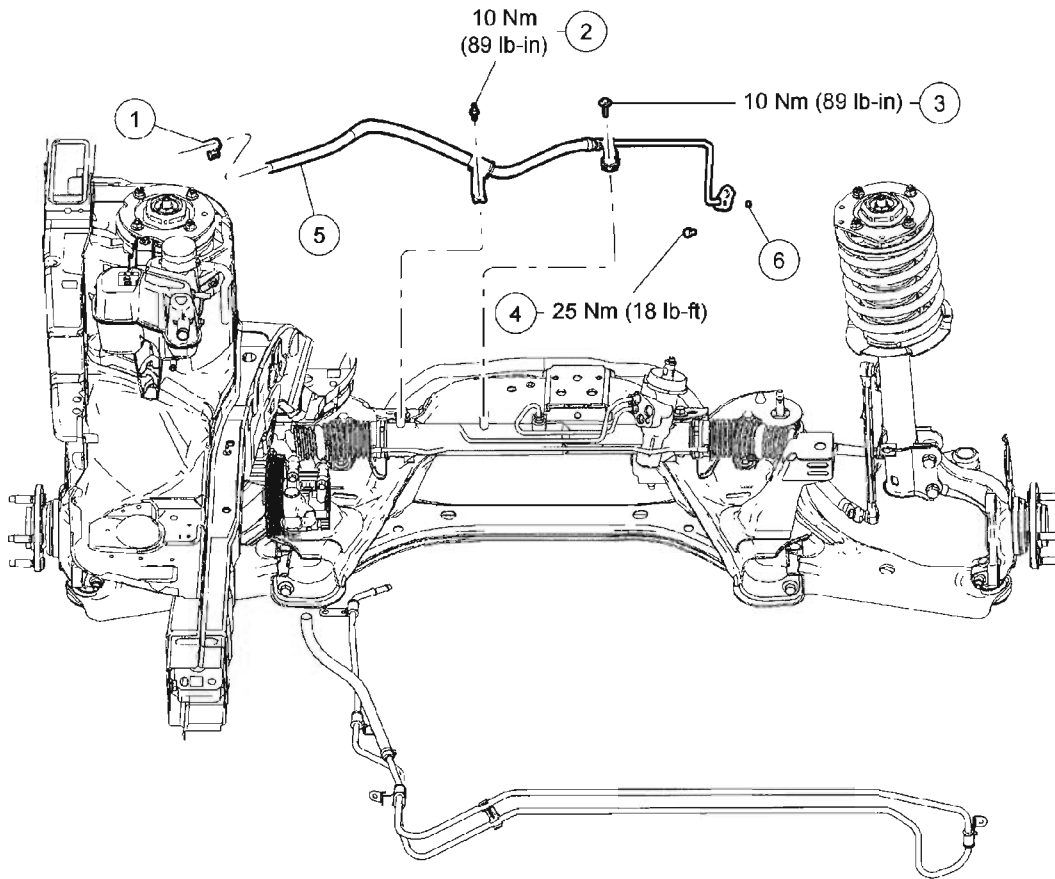
#### Material

### STEERING GEAR TO FLUID COOLER RETURN HOSE MATERIAL SPECIFICATION

Item	Specification
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



N0002387

Item	Part Number	Description
1	—	Steering gear-to-fluid cooler return hose clamp (part of 3A713)
2	W707428-S	Steering gear-to-fluid cooler return hose bracket-to-steering gear stud
3	W707554-S	Steering gear-to-fluid cooler return hose bracket-to-subframe bolt
4	W708234-S	Power steering line clamp plate bolt
5	3A713	Steering gear-to-fluid cooler return hose
6	3L551-BA	O-ring

**Fig. 10: Identifying Steering Gear To Fluid Cooler Return Hose With Torque Specifications**

Courtesy of FORD MOTOR CO.

#### Removal and Installation

**CAUTION:** While repairing the power steering system, care should be taken to prevent the entry of contaminants or premature failure of the power steering components can result.

**NOTE:** New O-rings must be installed any time the lines are disconnected from the steering gear.

1. Drain the power steering fluid into a suitable drain pan.
2. Release the clamp and disconnect the steering gear-to-fluid cooler return hose from the power steering cooler.
3. Remove the steering gear-to-fluid cooler return hose bracket-to-steering gear stud.
  - To install, tighten to 10 Nm (89 lb-in).
4. Remove the steering gear-to-fluid cooler return hose bracket-to-subframe bolt.
  - To install, tighten to 10 Nm (89 lb-in).
5. Remove the power steering line clamp plate bolt.
  - To install, tighten to 25 Nm (18 lb-ft).

**NOTE:** The power steering pressure and return lines are of different diameters and the O-rings are not interchangeable.

6. Rotate the clamp plate and remove the steering gear-to-fluid cooler return hose.
  - Install a new return hose O-ring seal.
7. To install, reverse the removal procedure.
  - Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION**.

## POWER STEERING FLUID COOLER

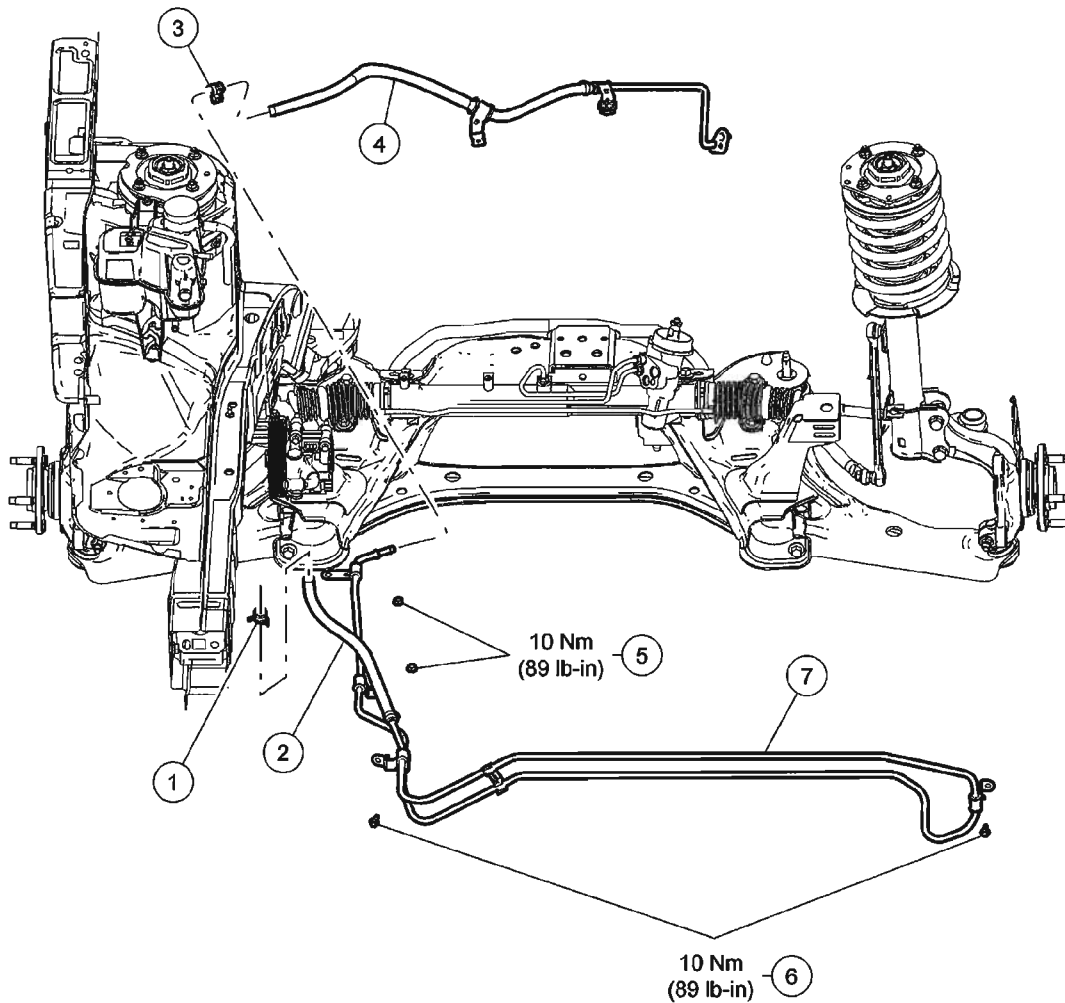
### Material

## POWER STEERING FLUID COOLER MATERIAL SPECIFICATION

Item	Specification
MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



N0002388

Item	Part Number	Description
1	—	Power steering fluid cooler hose clamp (part of 3D746)
2	—	Power steering fluid cooler-to-fluid reservoir hose (part of 3D746)
3	—	Steering gear-to-fluid cooler return hose clamp (part of 3A713)
4	—	Steering gear-to-fluid cooler return hose (part of 3A713)
5	W707142-S	Power steering fluid cooler nuts (2 required)
6	W707399	Power steering fluid cooler bolts (2 required)
7	3D746	Power steering fluid cooler

**Fig. 11: Identifying Power Steering Fluid Cooler With Torque Specifications**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

**CAUTION:** While repairing the power steering system, care should be taken to prevent the entry of contaminants or premature failure of the power steering components can result.

1. Drain the power steering fluid into a suitable drain pan.
2. Remove the front bumper cover. For additional information, refer to **BUMPERS** .
3. Release the power steering fluid cooler hose clamp and disconnect the power steering fluid cooler-to-fluid reservoir hose.
4. Release the clamp and disconnect the power steering gear-to-fluid cooler return hose.
5. Remove the 2 power steering fluid cooler nuts.
  - To install, tighten to 10 Nm (89 lb-in).
6. Remove the 2 power steering fluid cooler bolts.
  - To install, tighten to 10 Nm (89 lb-in).
7. Remove the power steering fluid cooler.
8. To install, reverse the removal procedure.
  - Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .

## STEERING GEAR

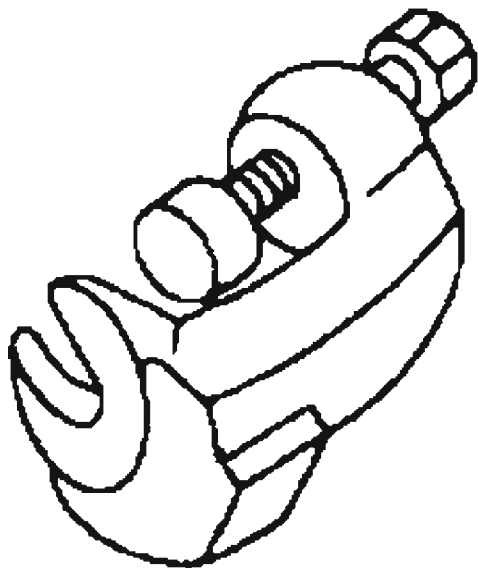
### Special Tool(s)

### STEERING GEAR SPECIAL TOOL

Tie-Rod End Remover 211-105  
(T85M-3395-A)

## 2005 Ford Escape

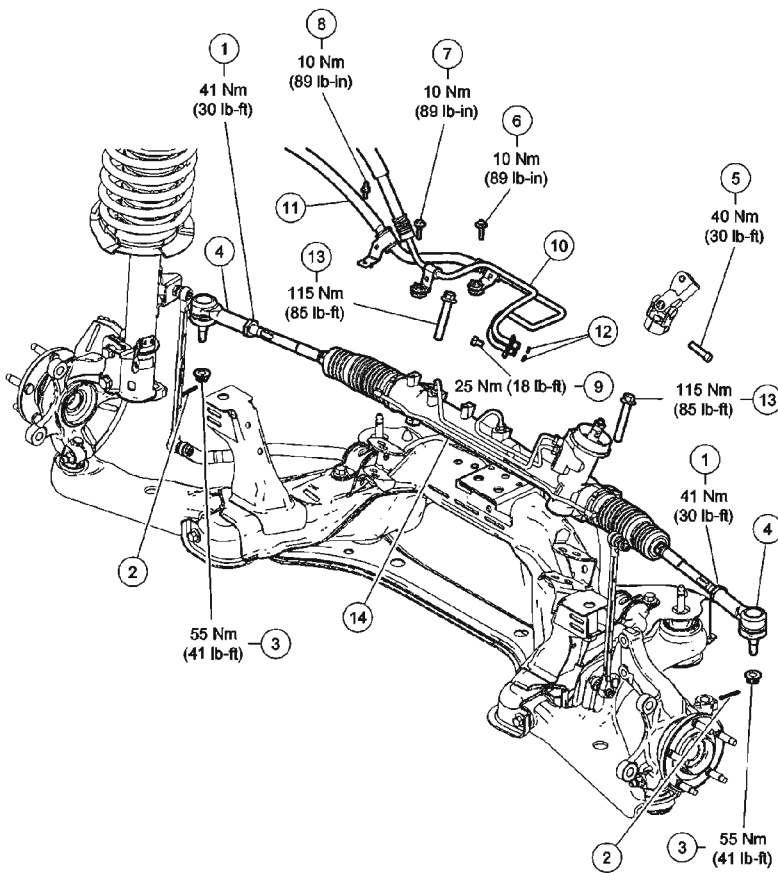
2005 STEERING Power Steering - Escape & Mariner



**ST1408-A**

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner



N0035676

Item	Part Number	Description
1	—	Tie-rod end jam nut (part of 3280) (2 required)
2	—	Cotter pin (2 required)
3	W705833	Outer tie-rod end nut (2 required)
4	3289-AA	Outer tie-rod end
5	3R827	Steering column coupling-to-steering gear pinch bolt
6	W707554-S	Steering gear-to-fluid cooler return hose bracket-to-subframe bolt
7	W707554-S	Power steering pressure line bracket-to-steering gear bolt
8	W707428-S	Steering gear-to-fluid cooler return hose bracket-to-steering gear stud
9	W708234-S	Power steering line clamp plate bolt
10	3A719	Power steering pressure line
11	3A715	Steering gear-to-fluid cooler return hose
12	3L551-AA/ 3L551-BA	O-rings (1 each required)
13	W500545-S	Steering gear mounting bolt (2 required)
14	3200	Steering gear

**Fig. 12: Exploded View Of Tie-Rod With Torque Specifications**  
**Courtesy of FORD MOTOR CO.**

#### Removal and Installation

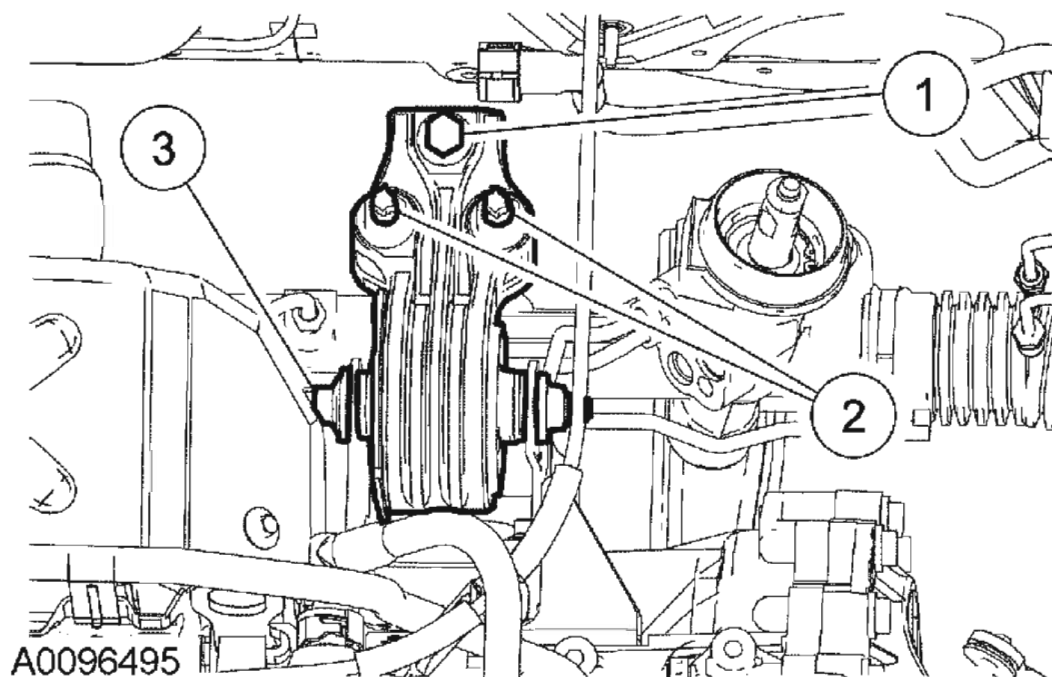
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.



2. Vehicle equipped with 3.0L engine, remove the EGR valve. For additional information, refer to **ENGINE EMISSION CONTROL - 3.0L (4V)**.

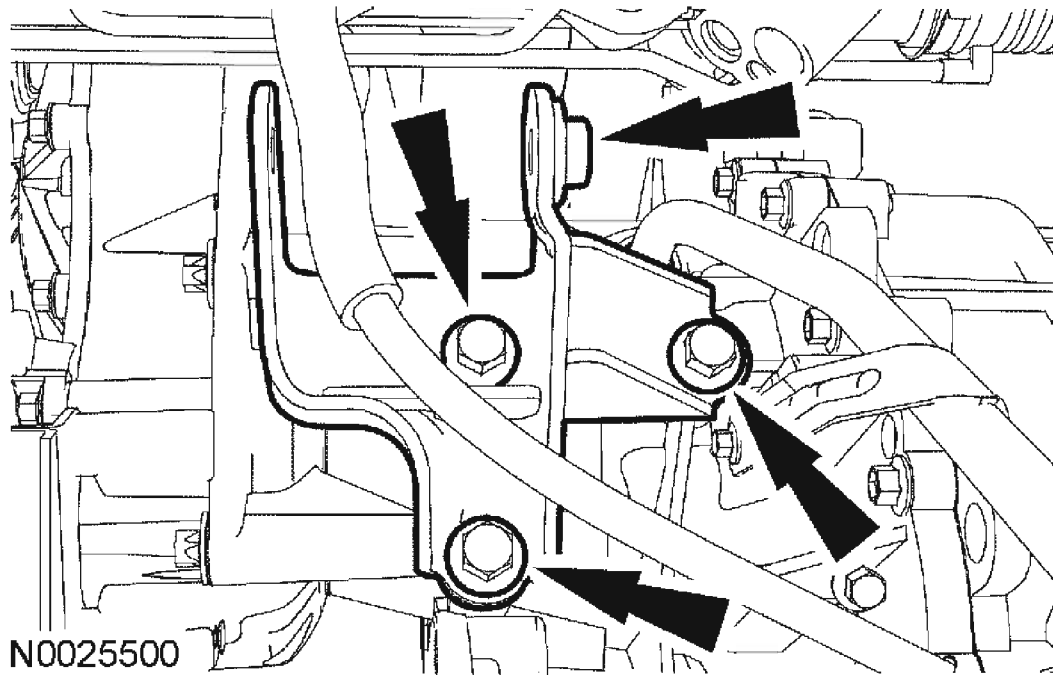
**NOTE:** 2.3L engine shown, 3.0L engine similar.

3. Remove the rear transaxle insulator bracket.
  1. Remove the rear transaxle insulator bracket bolt.
    - To install, tighten to 90 Nm (66 lb-ft).
  2. Remove the 2 rear transaxle insulator bracket nuts.
    - To install, tighten to 90 Nm (66 lb-ft).
  3. Remove the rear transaxle insulator-to-bracket through-bolt.
    - To install, tighten to 90 Nm (66 lb-ft).



**Fig. 13: Removing Rear Transaxle Insulator**  
Courtesy of FORD MOTOR CO.

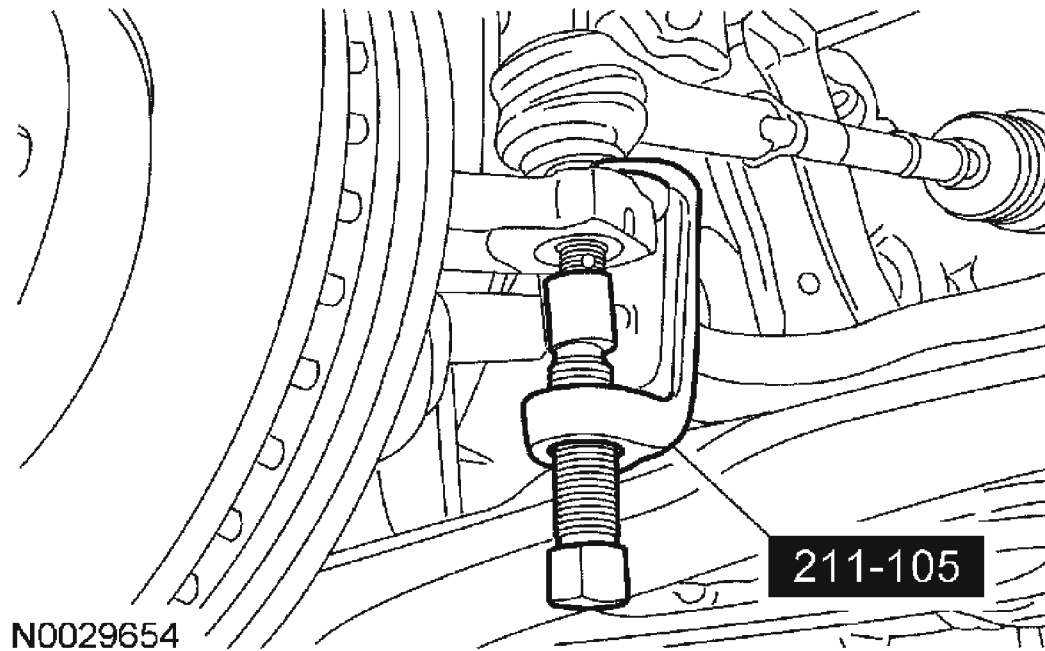
4. Remove the 3 bolts and the rear transaxle mounting plate.
  - To install, tighten to 90 Nm (66 lb-ft).



**Fig. 14: Locating Rear Transaxle Mounting Plate Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not loosen the tie-rod end nut to align the slot in the nut with the tie-rod end stud through-hole.

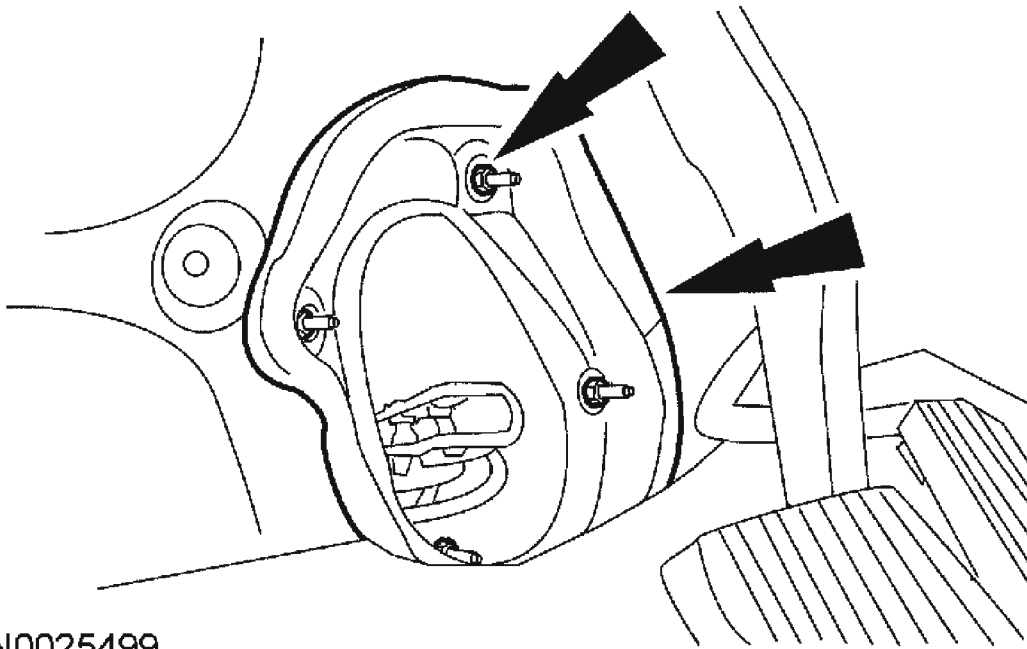
5. Remove the 2 outer tie-rod end cotter pins and the 2 tie-rod end nuts.
  - To install, tighten to 55 Nm (41 lb-ft).
  - If necessary, continue to tighten the tie-rod end nut until the slot in the nut aligns with the tie-rod end stud through-hole.
6. Using the special tool, separate the tie-rod end from the knuckle.



**Fig. 15: Separating Tie-Rod End From Knuckle Using Special Tool**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not allow the steering wheel to rotate while the intermediate shaft is disconnected or damage to the clockspring can result. If there is evidence that the shaft has rotated, the clockspring must be removed and recentered. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM** .

7. Hold the steering wheel in a straight-ahead position using a suitable tool.
8. Remove the nuts and the steering column boot.



**Fig. 16: Removing Steering Column Boot Nut**  
Courtesy of FORD MOTOR CO.

9. Remove the steering column coupling-to-steering gear pinch bolt.
  - To install, tighten to 40 Nm (30 lb-ft).
10. Remove the steering gear-to-fluid cooler return hose bracket-to-subframe bolt.
  - To install, tighten to 10 Nm (89 lb-in).
11. Remove the power steering pressure line bracket-to-steering gear bolt.
  - To install, tighten to 10 Nm (89 lb-in).
12. Remove the steering gear-to-fluid return hose bracket-to-steering gear stud.
  - To install, tighten to 10 Nm (89 lb-in).
13. Remove the power steering line clamp plate bolt.
  - To install, tighten to 25 Nm (18 lb-ft).

**NOTE:**      **Install a new high pressure hose O-ring seal and a new return hose O-ring seal.**

14. Remove the power steering pressure and return lines.
15. Remove the 2 steering gear mounting bolts.
  - To install, tighten to 115 Nm (85 lb-ft).

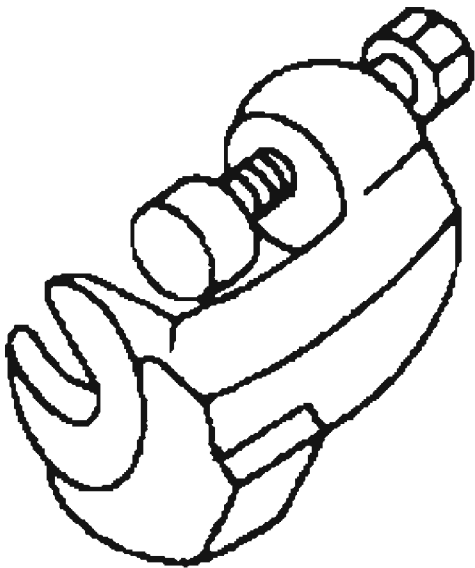
**NOTE:** Remove the steering gear from the RH side of the vehicle.

16. Remove the steering gear.
17. To install, reverse the removal procedure.
18. Fill the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .
19. Check and, if necessary, align the front end. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION** .

### STEERING GEAR - HYBRID

Special Tool(s)

### STEERING GEAR HYBRID SPECIAL TOOL

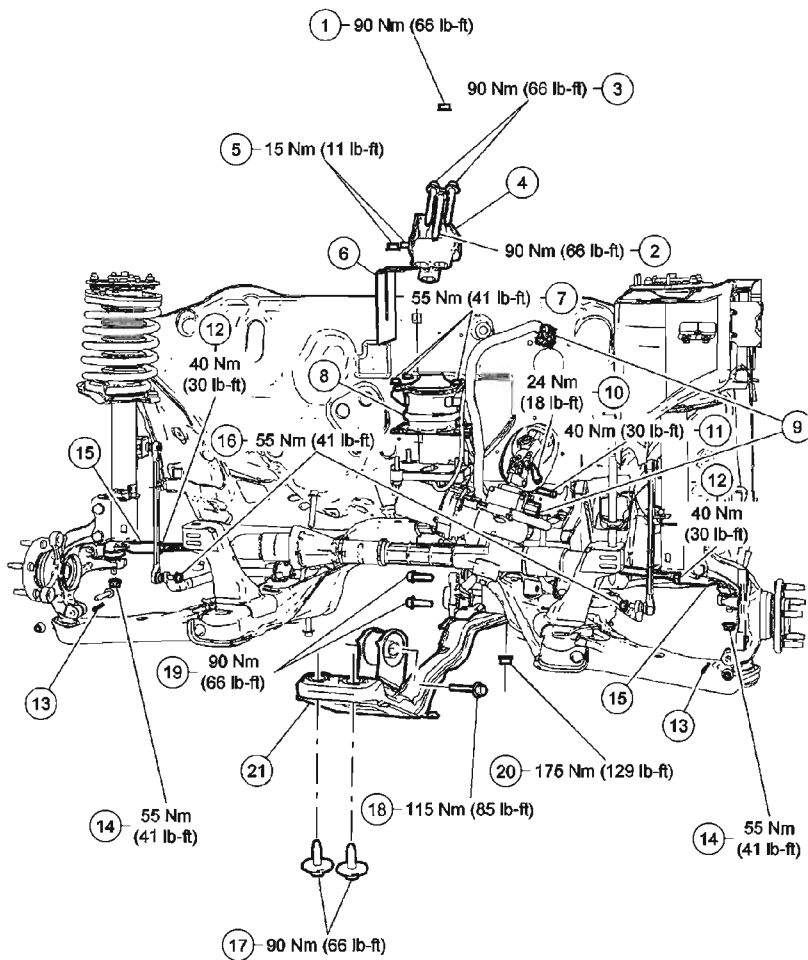


**ST1408-A**

Tie-Rod End Remover 211-105  
(T85M-3395-A)

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner

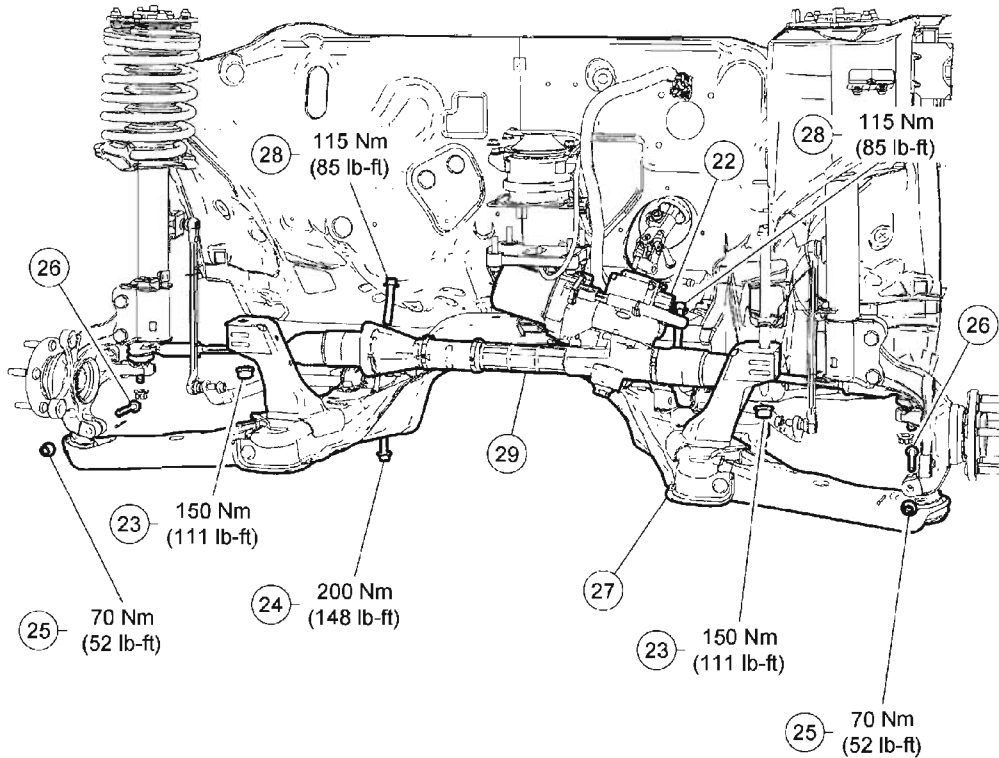


N0047594

Item	Part Number	Description
1	W520415	Rear engine mount stud nut
2	W710187	Rear engine mount bracket aft bolt
3	W710186	Rear engine mount bracket forward bolts (2 required)
4	7C034	Rear engine mount bracket
5	W707654	Rear engine mount heat shield nuts (2 required)
6	316.7	Rear engine mount heat shield
7	W520414	Rear engine mount nuts (4 required)
8	6P037	Rear engine mount
9	—	Electrical connectors (part of 3F570)
10	3R827	Upper steering column pinch bolt
11	W705857	Steering gear coupling pinch bolt

Item	Part Number	Description
12	—	Tie rod end jam nuts (2 required)
13	—	Cotter pin
14	W705833	Tie-rod end nuts (2 required)
15	3289	Outer tie-rod end
16	W708990	Lower stabilizer bar link nuts (2 required)
17	W706899	Engine support crossmember bolts (2 required)
18	W709323	Front insulator bolt
19	W500044	Engine roll restrictor bracket bolts (2 required)
20	W710553	Engine support crossmember nut
21	6P094	Engine support crossmember

**Fig. 17: Removing/Installing Steering Gear - Hybrid (1 Of 2)**  
Courtesy of FORD MOTOR CO.



N0012826

Item	Part Number	Description
22	—	Electrical connector (part of 12B637)
23	W520516	Subframe nuts (2 required)
24	W500644	Subframe bolts (2 required)
25	W520213	Ball joint pinch bolt nuts (2 required)

Item	Part Number	Description
26	W709618	Ball joint pinch bolts (2 required)
27	5025	Subframe
28	W500545	Steering gear bolts (2 required)
29	3F570	Steering gear

**Fig. 18: Removing/Installing Steering Gear - Hybrid (2 Of 2)**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation

**WARNING:** The traction battery and charging system contains high voltage components and wiring. High voltage insulated safety gloves and a face shield must be worn when carrying out any diagnostics on this vehicle. Failure to follow these instructions may result in severe personal injury or death.

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

2. Disconnect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
3. Depower the high voltage battery. For additional information, refer to **HIGH VOLTAGE TRACTION BATTERY**.
4. Remove the engine appearance cover.
5. Remove the exhaust flexible pipe. For additional information, refer to **EXHAUST SYSTEM**.
6. If equipped, remove the driveshaft. For additional information, refer to **DRIVESHAFT**.
7. Remove the rear engine mount stud nut.
  - To install, tighten to 90 Nm (66 lb-ft).
8. Remove the 3 rear engine mount bracket bolts.
  - To install, tighten to 90 Nm (66 lb-ft).
9. Remove the rear engine mount bracket.
10. Remove the 2 rear engine mount heat shield nuts and the heat shield.
  - To install, tighten to 15 Nm (11 lb-ft).

**NOTE:**        **Disconnect the vacuum hose from the rear engine mount.**

**NOTE:**        **When the rear engine mount nuts are removed, the rear engine mount bolts will drop through the rear engine mount bracket. Secure the rear engine mount bolts to the rear engine mount bracket.**

11. Remove the 4 rear engine mount nuts and the rear engine mount.
  - To install, tighten to 55 Nm (41 lb-ft).
12. Disconnect the electrical connectors at the steering gear and the power steering control module.

**CAUTION:** **Do not allow the steering wheel to rotate while the intermediate shaft is disconnected or damage to the clockspring can result. If there is evidence that the shaft has rotated, the clockspring must be removed and recentered. For additional information, refer to SUPPLEMENTAL RESTRAINT SYSTEM.**

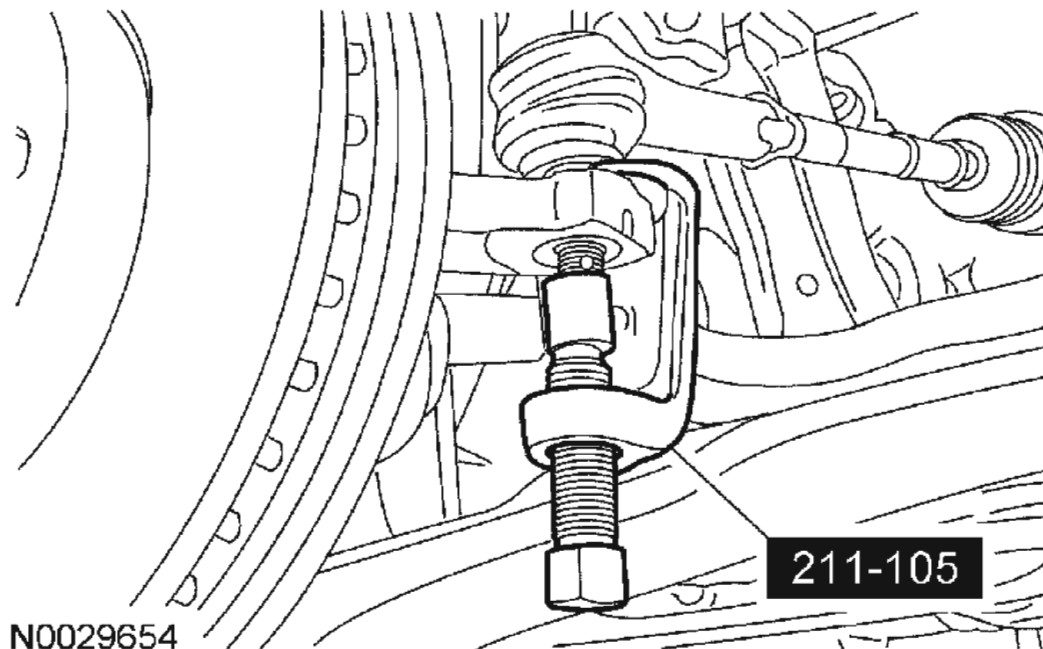
13. Hold the steering wheel in the straight-ahead position using a suitable tool.

**NOTE:**        **Position the steering column shaft boot**



**upward.**

14. Loosen the upper steering column pinch bolt.
  - To install, tighten to 24 Nm (18 lb-ft).
15. Remove the steering gear coupling pinch bolt.
  - To install, tighten to 40 Nm (30 lb-ft).
16. Remove the 2 outer tie-rod end cotter pins and the 2 outer tie-rod nuts.
  - To install, tighten to 55 Nm (41 lb-ft).
17. Using the special tool, separate the tie-rod end from the knuckle.



**Fig. 19: Separating Tie-Rod End From Knuckle**  
**Courtesy of FORD MOTOR CO.**

18. Remove the 2 lower stabilizer bar link nuts.
  - To install, tighten to 55 Nm (41 lb-ft).
19. Remove the 2 engine support crossmember bolts.
  - To install, tighten to 90 Nm (66 lb-ft).
20. Remove the front insulator bolt.
  - To install, tighten to 115 Nm (85 lb-ft).
21. Remove the 2 engine roll restrictor bracket bolts.
  - To install, tighten to 90 Nm (66 lb-ft).

22. Remove the engine crossmember-to-engine splash shield bolt and position aside.
23. Remove the nut and the engine support crossmember.
  - To install, tighten to 175 Nm (129 lb-ft).
24. Remove the 2 subframe nuts.
  - To install, tighten to 150 Nm (111 lb-ft).

**NOTE:**      **Using a suitable support, support the subframe.**

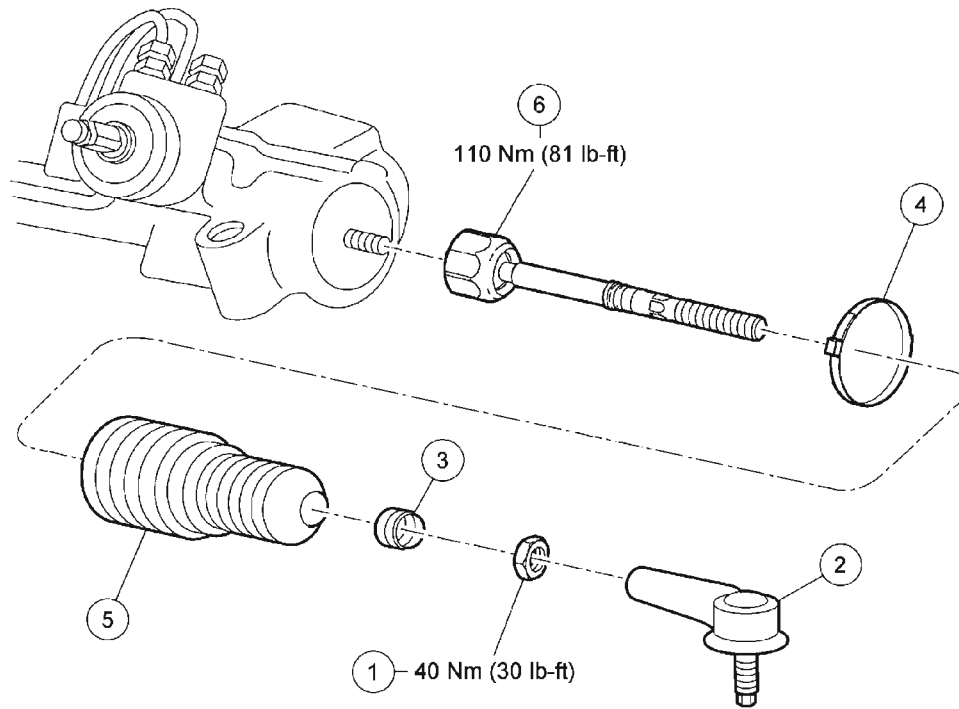
**NOTE:**      **Completely loosen but do not remove the 2 subframe bolts from the subframe.**

25. Loosen the 2 subframe bolts.
  - To install, tighten to 200 Nm (148 lb-ft).
26. Remove the 2 ball joint pinch bolts and nuts.
  - To install, tighten to 70 Nm (52 lb-ft).
27. Lower the front subframe while simultaneously disconnecting the front ball joints.
28. Remove the 2 steering gear bolts.
  - To install, tighten to 115 Nm (85 lb-ft).

**NOTE:**      **Remove the steering gear from the left side of the vehicle.**

29. Remove the steering gear.
30. To install, reverse the removal procedure.
31. Check and, if necessary, align the front end. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION** .

## **INNER TIE ROD**



N0047595

Item	Part Number	Description
1	W705833	Tie-rod end jam nut
2	3289-GA	Outer tie-rod end
3	3C650B	Tie-rod boot clamp, outer
4	3C650A	Tie-rod boot clamp, inner
5	3K661	Tie-rod boot
6	3280	Inner tie-rod

**Fig. 20: Identifying Inner Tie Rod Components (Escape & Mariner)**  
 Courtesy of FORD MOTOR CO.

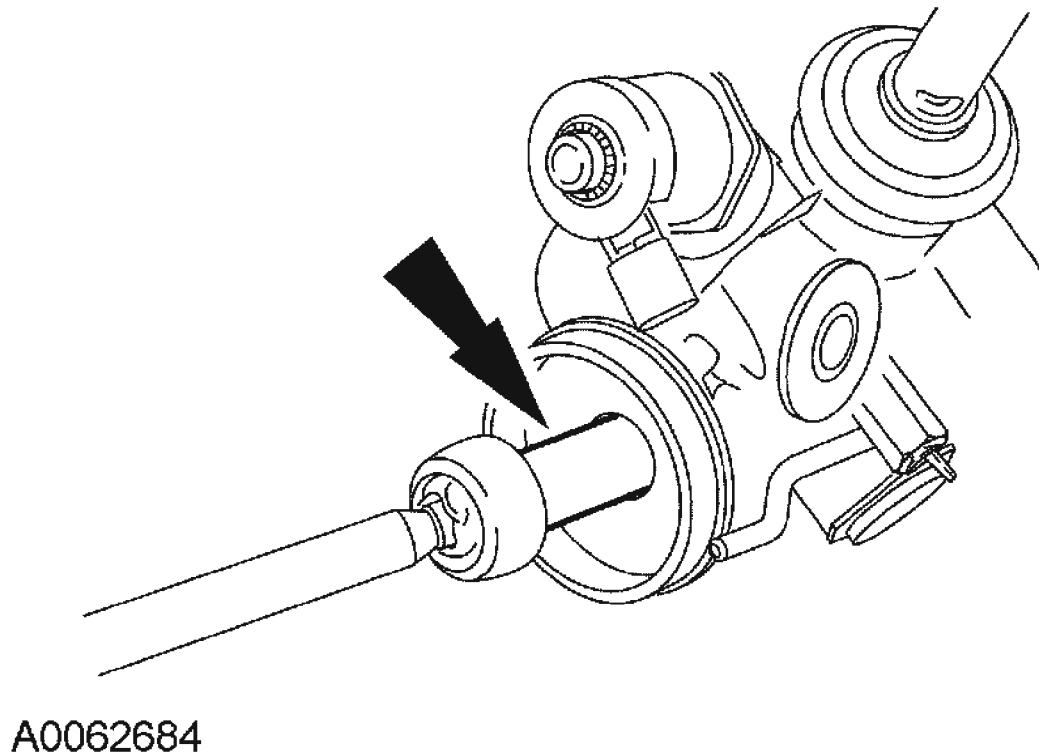
#### Removal and Installation

1. Remove the steering gear. For additional information, refer to **STEERING GEAR**.
2. Loosen the tie-rod end jam nut.
  - To install, tighten to 40 Nm (30 lb-ft).
3. Remove the outer tie-rod end.

**NOTE:** It is necessary to remove both steering gear boots when removing the RH inner tie-rod end.

4. Remove the boot clamps and the steering gear boot.

**NOTE:** LH side is shown; RH side is similar.



**Fig. 21: Removing Boot Clamp**  
Courtesy of FORD MOTOR CO.

5. Using a suitable tool, hold the piston shaft.
6. Using a suitable tool, remove the inner tie-rod end.
  - To install, tighten to 110 Nm (81 lb-ft).

**NOTE:** Using a suitable tool, hold the piston shaft while tightening the inner tie-rod.

7. To install, reverse the removal procedure.

## POWER STEERING CONTROL (PSC) MODULE

### Removal and Installation

1. Remove the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - HYBRID**.
2. Remove the battery junction box (BJB) bracket nuts on the strut tower.
  - Position the BJB aside.
3. Disconnect the power steering control module electrical connectors.

## 2005 Ford Escape

### 2005 STEERING Power Steering - Escape & Mariner

4. Remove the 2 power steering control module nuts.
  - To install, tighten to 23 Nm (17 lb-ft).
5. Remove the power steering control module ground cable bolt.
6. Remove the power steering control module nuts from inside the vehicle.
  - To install, tighten to 23 Nm (17 lb-ft).
7. Remove the power steering control module.
8. To install, reverse the removal procedure.

## 2005 Ford Escape

### 2005 STEERING Steering Linkage - Escape & Mariner

## 2005 STEERING

### Steering Linkage - Escape & Mariner

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft
Tie-rod end nut	55	41
Tie-rod end jam nut	40	30

## DESCRIPTION AND OPERATION

### STEERING LINKAGE

The steering linkage consists of the following components:

- Steering gear
- Outer tie-rod end
- Steering gear boot
- Tie-rod end jam nut
- Front wheel knuckle
- Tie-rod end nut

The steering linkage connects the steering gear to the front wheel knuckle. The steering linkage is adjustable at the 2 tie-rod ends.

## DIAGNOSIS AND TESTING

### STEERING LINKAGE

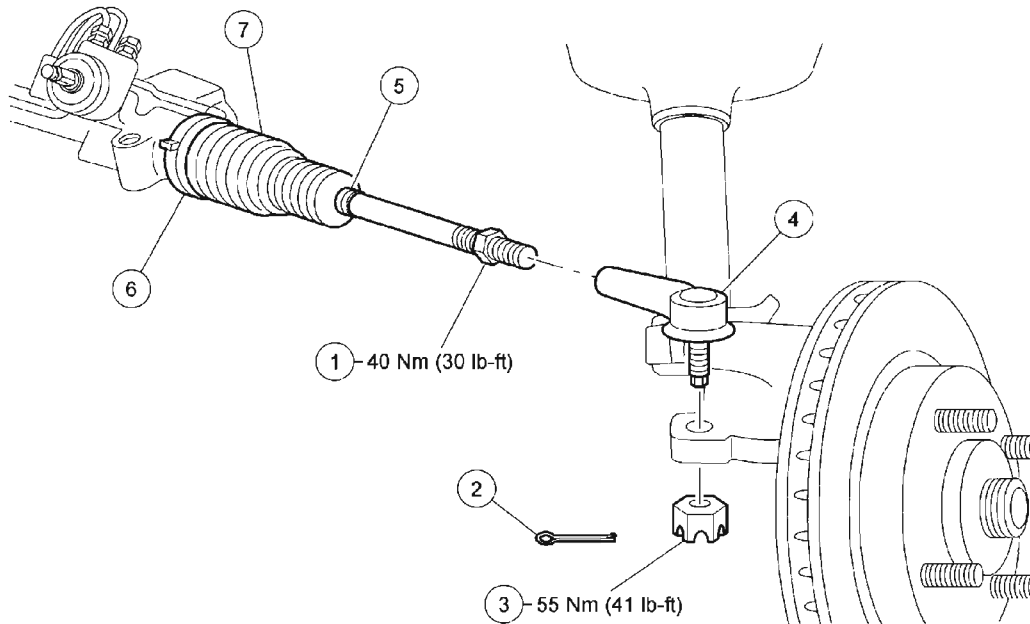
For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION** .

## REMOVAL AND INSTALLATION

### STEERING LINKAGE - EXPLODED VIEW

## 2005 Ford Escape

### 2005 STEERING Steering Linkage - Escape & Mariner



N0047596

Item	Part Number	Description
1	—	Tie-rod end jam nut (part of 3280)
2	—	Cotter pin
3	W705833	Tie-rod end nut
4	3289-GA	Outer tie-rod end
5	3C650B	Steering gear boot clamp, outer

Item	Part Number	Description
6	3C650A	Steering gear boot clamp, inner
7	3K661	Steering gear boot

**Fig. 1: Exploded View Of Steering Linkage With Torque Specifications**  
Courtesy of FORD MOTOR CO.

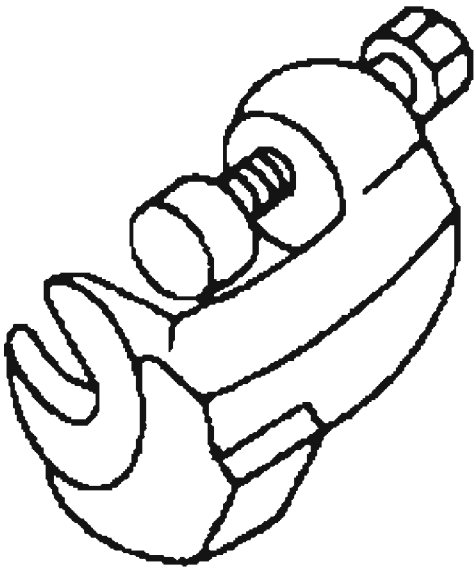
1. For additional information, refer to the procedures in this article.

#### TIE ROD END - OUTER

##### Special Tool(s)

#### TIE ROD END OUTER SPECIAL TOOL

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**ST1408-A**

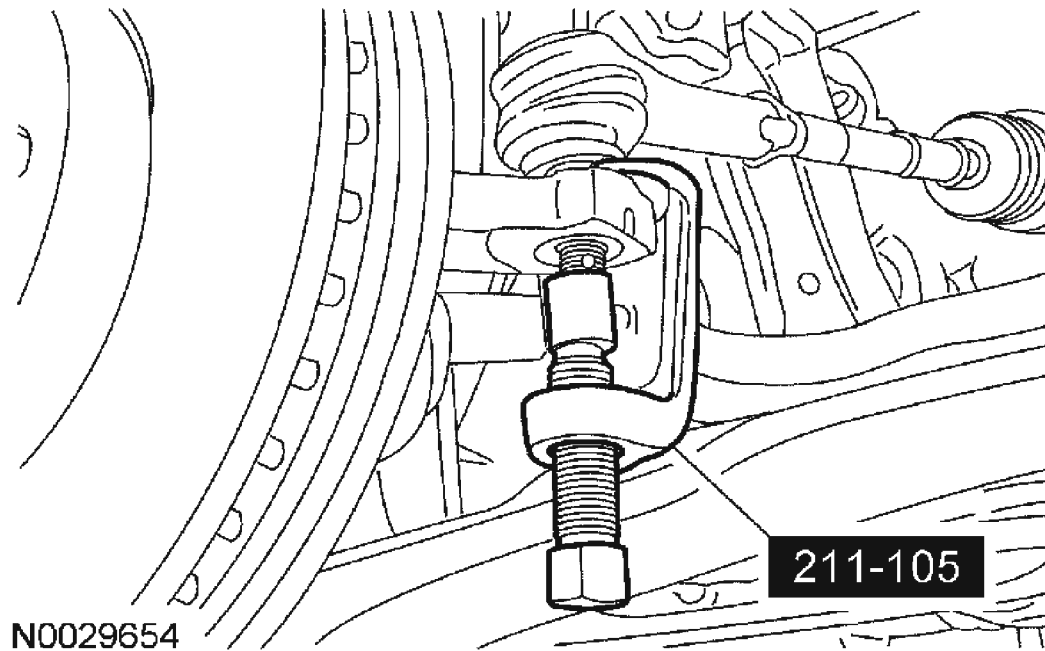
Tie Rod End Remover 211-105  
(T85M-3395-A)

#### Removal and Installation

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

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the cotter pin and the tie-rod end nut.
  - To install, tighten to 55 Nm (41 lb-ft).
3. Loosen the tie-rod end jam nut.
  - To install, tighten to 40 Nm (30 lb-ft).
4. Using the special tool, separate the outer tie-rod end from the front wheel knuckle.





**Fig. 2: Separating Outer Tie-Rod End From Front Wheel Knuckle Using Special Tool**

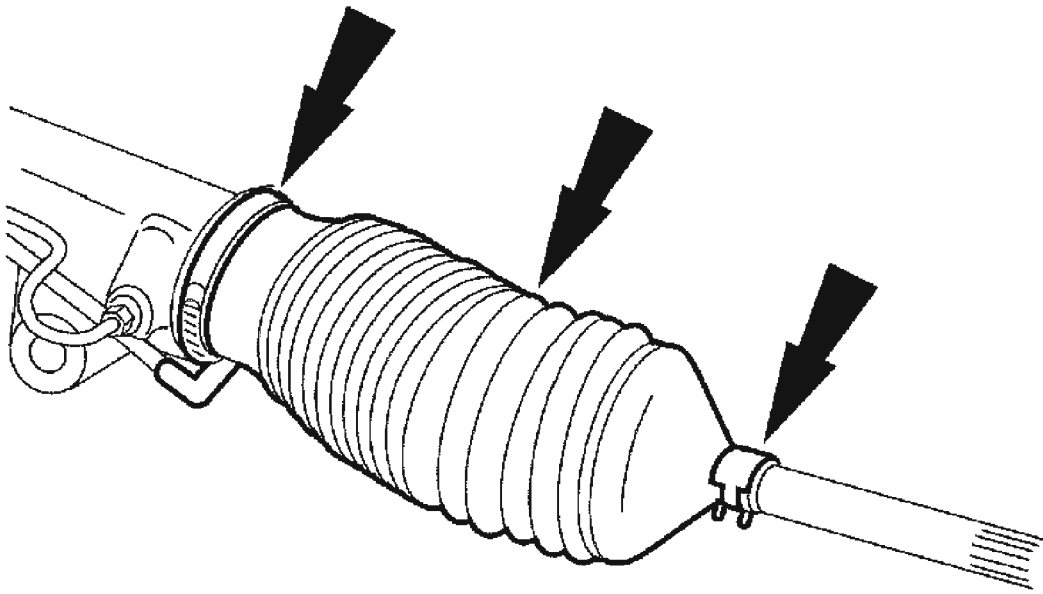
Courtesy of FORD MOTOR CO.

5. Remove the tie-rod end.
6. To install, reverse the removal procedure.
  - Adjust the front toe. For additional information, refer to **SUSPENSION SYSTEM-GENERAL INFORMATION** .

## **STEERING GEAR BOOT**

### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** .
2. Remove the outer tie-rod end. For additional information, refer to **TIE ROD END - OUTER**.
3. Remove the tie-rod end jam nut.
  - To install, tighten to 40 Nm (30 lb-ft).
4. Remove the 2 steering gear boot clamps and the steering gear boot.



A0001145

**Fig. 3: Locating Steering Gear Boot Clamps**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

## 2005 Ford Escape

### 2005 STEERING Steering Column - Escape & Mariner

## 2005 STEERING

### Steering Column - Escape & Mariner

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft
Steering column coupling lower pinch bolt	40	30
Steering column coupling upper pinch bolt	23	17
Steering column mounting bolts	25	19
Steering wheel pinion bolt	12	9

## DESCRIPTION AND OPERATION

### STEERING COLUMN

The steering column is the mechanical linkage between the steering wheel and the steering gear. It contains various switches and is able to tilt to suit driver preference. The steering wheel is mounted to a shaft which passes through the center of the steering column to the upper steering shaft. The upper steering shaft then connects to the lower steering shaft, which is connected to the steering gear. The upper and lower connections utilize U-joint type knuckles. The steering shaft is centered by roller ball bearings within the steering column. The tilt function of the steering column is controlled by a mechanical lever on the underside of the steering column which uses a cam to lock and unlock the steering column. When the tilt column lever is unlocked, the steering column can then be adjusted to various positions through a pin-type pivot. The steering column switches (multifunction and ignition) are mounted to the steering column. These switches are covered by the upper and lower steering column covers.

## DIAGNOSIS AND TESTING

### STEERING COLUMN

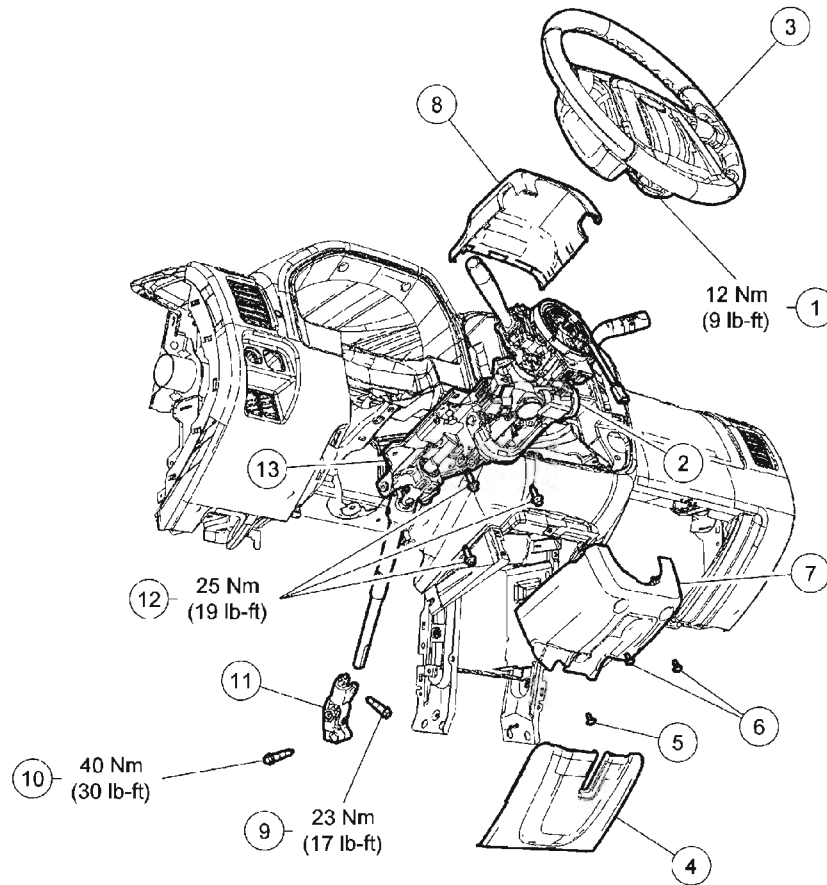
Refer to STEERING SYSTEM-GENERAL INFORMATION .

## REMOVAL AND INSTALLATION

### STEERING COLUMN - EXPLODED VIEW

## 2005 Ford Escape

### 2005 STEERING Steering Column - Escape & Mariner



A0095507

Item	Part Number	Description
1	3E735	Steering wheel pinion bolt
2	—	Electrical connectors
3	3600	Steering wheel
4	—	Instrument panel steering column cover
5	W705827-S	Lower steering column cover mounting screw

Item	Part Number	Description
6	W705828-S	Lower steering column cover mounting screws (2 required)
7	3K512	Lower steering column cover
8	3C695	Upper steering column cover
9	3R827	Steering column coupling upper pinch bolt
10	3R827	Steering column coupling lower pinch bolt
11	—	Steering column coupling
12	W500223-S	Steering column mounting bolts (3 required)
13	3C529	Steering column assembly

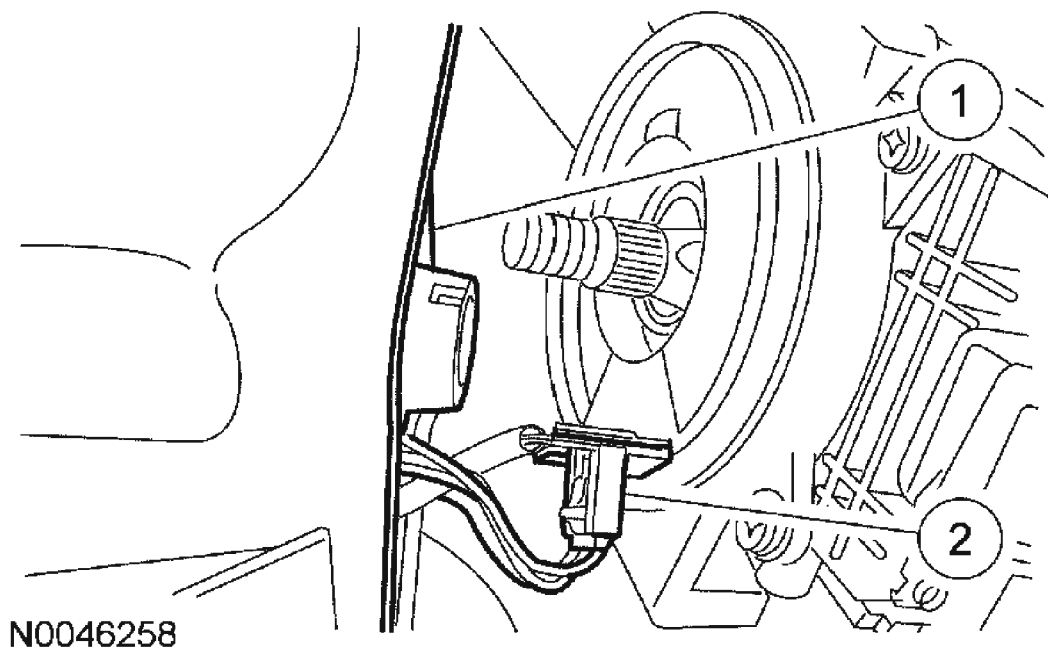
**Fig. 1: Exploded View Of Steering Column With Torque Specifications**  
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the procedures in this article.

## STEERING WHEEL

### Removal and Installation

1. Position the steering wheel in the straight-ahead position and remove the ignition key.
  - Rotate the steering wheel until the steering column locks into position.
2. Depower the supplemental restraint system (SRS). For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM**.
3. Open the cover on the underside of the steering wheel.
4. Remove the steering wheel pinion bolt.
  - To install, tighten to 12 Nm (9 lb-ft).
5. Remove the steering wheel.
  1. Position the steering wheel rearward.
  2. Disconnect the 2 electrical connectors.



**Fig. 2: Removing Steering Wheel**  
Courtesy of FORD MOTOR CO.

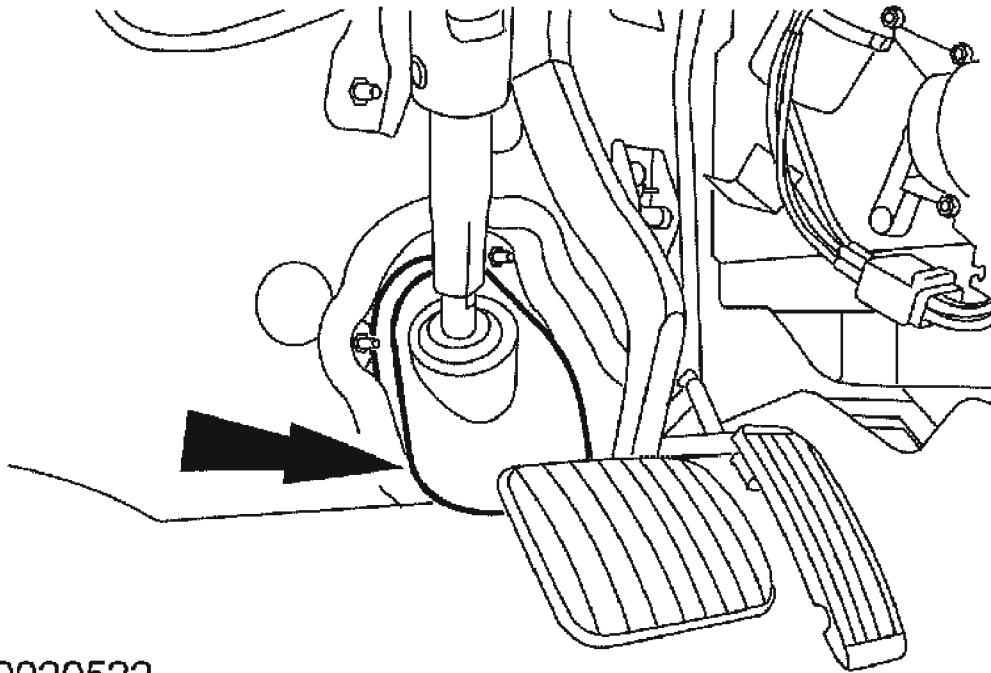
6. To install, reverse the removal procedure.
  - Repower the supplemental restraint system (SRS). For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM**.

## STEERING COLUMN

### Removal and Installation

1. Position the steering wheel in the straight-ahead position and remove the ignition key.

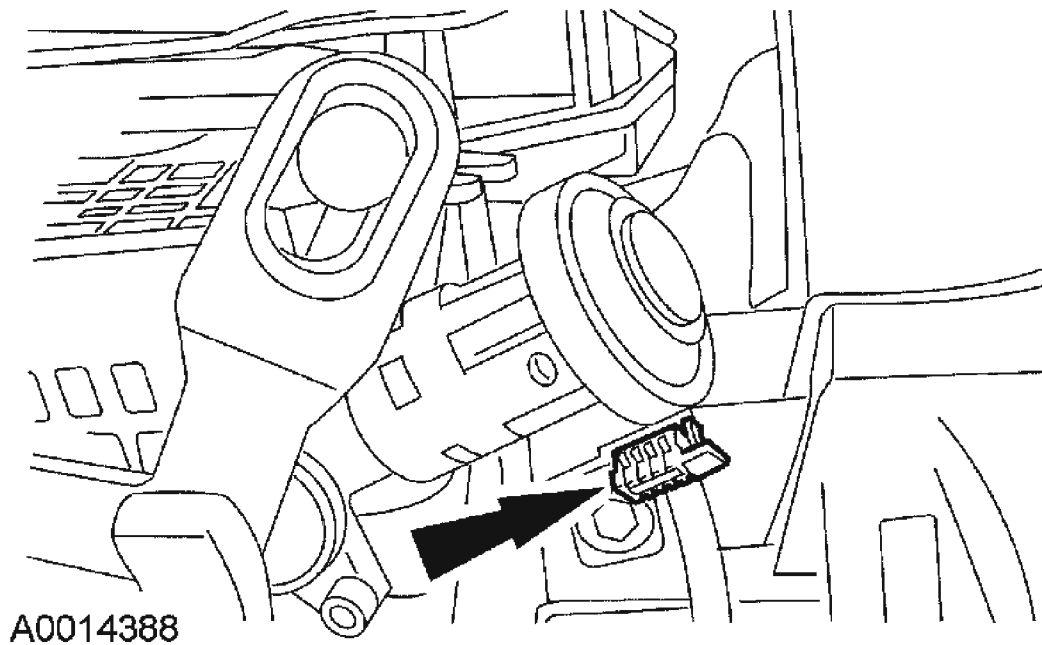
- Rotate the steering wheel until the steering column locks into position.
2. Remove the clockspring. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM**.
  3. Position the steering column boot aside.



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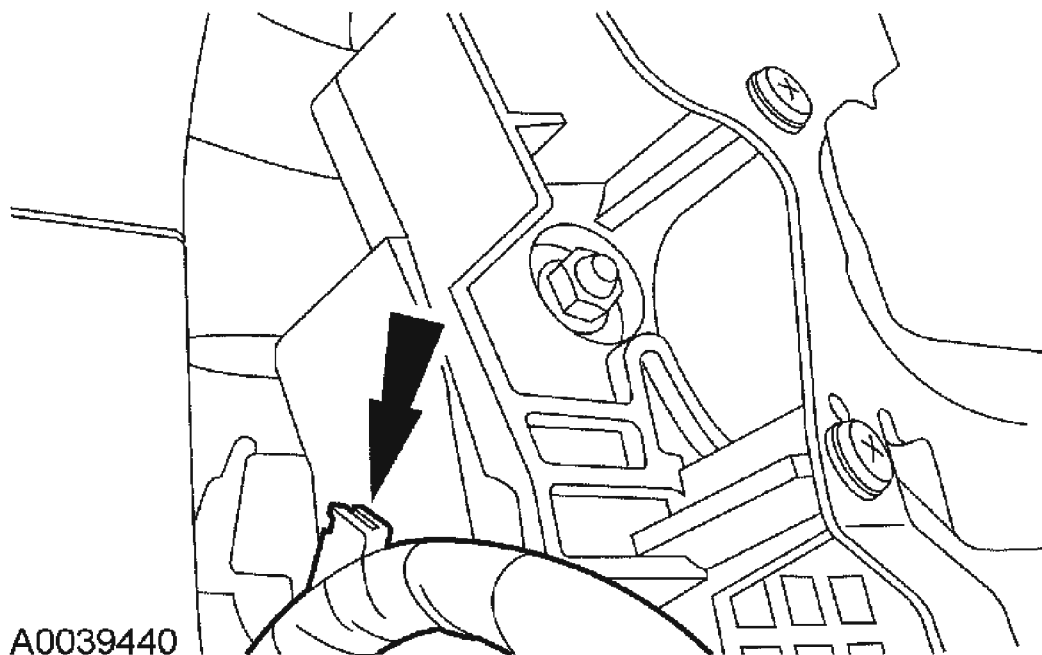
**Fig. 3: Positioning Steering Column Boot Aside**  
Courtesy of FORD MOTOR CO.

4. Remove the steering column coupling upper pinch bolt.
  - To install, tighten to 23 Nm (17 lb-ft).
5. If equipped, disconnect the passive anti-theft system (PATS) transceiver module electrical connector.



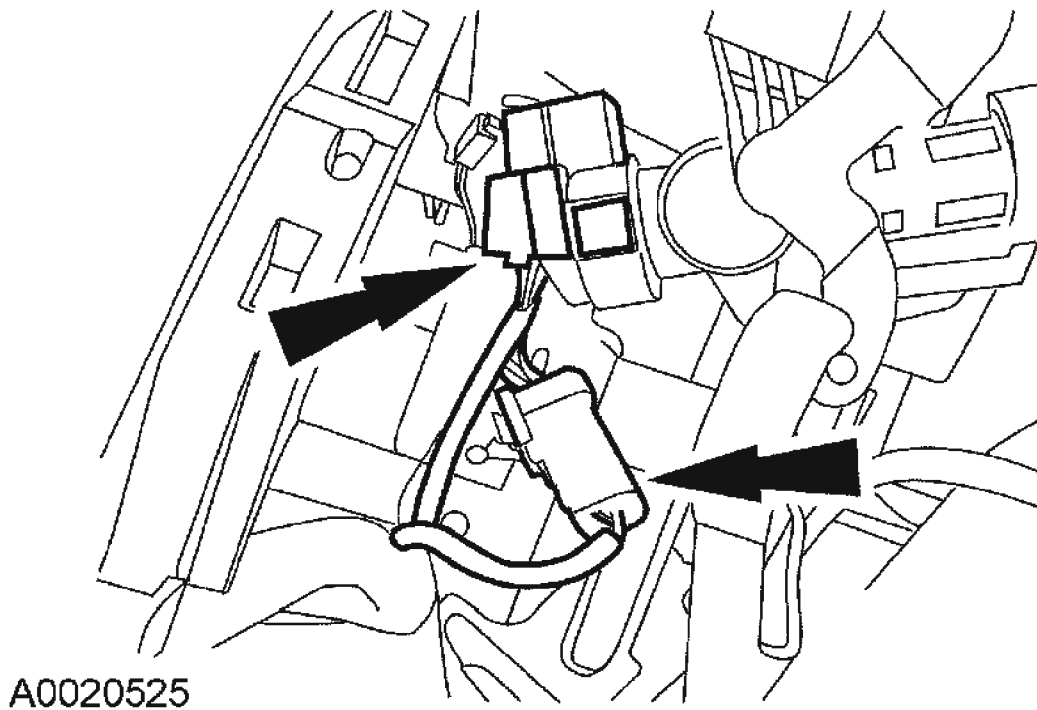
**Fig. 4: Disconnecting Passive Anti-Theft System**  
Courtesy of FORD MOTOR CO.

6. Disconnect the wiring harness from the steering column.



**Fig. 5: Disconnecting Wiring Harness From Steering Column**  
Courtesy of FORD MOTOR CO.

7. Disconnect the 2 electrical connectors.



**Fig. 6: Disconnecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

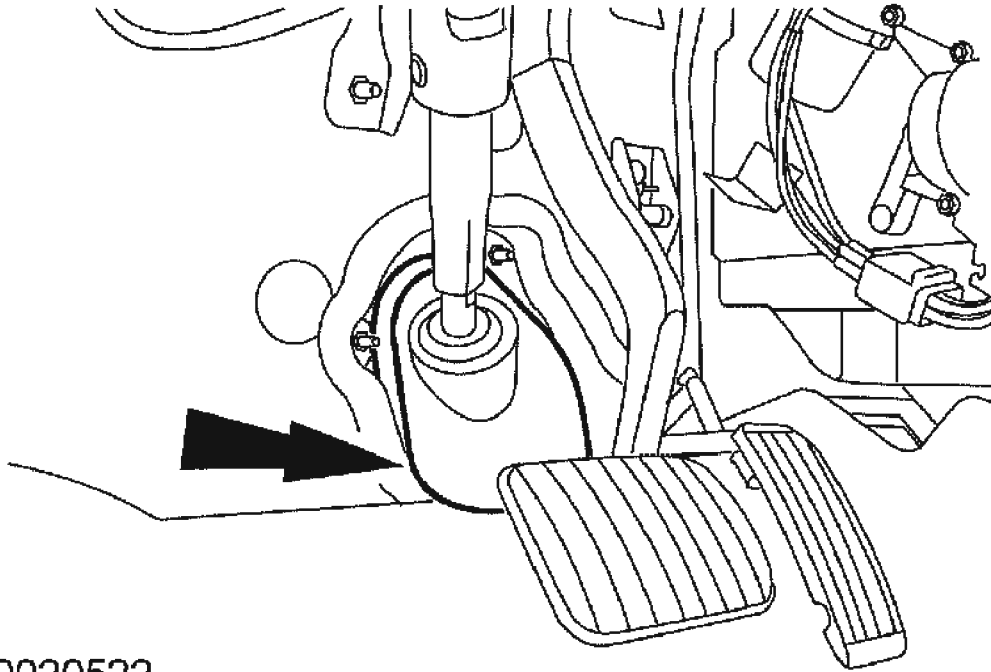
8. Remove the 3 steering column mounting bolts.
  - To install, tighten to 25 Nm (19 lb-ft).
9. Remove the steering column assembly.
10. To install, reverse the removal procedure.

## STEERING COLUMN COUPLING

### Removal and Installation

1. Position the steering wheel in the straight-ahead position and remove the ignition key.
  - Rotate the steering wheel until the steering column locks into position.
2. Position the steering column boot aside.





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**Fig. 7: Positioning Steering Column Boot Aside**  
Courtesy of FORD MOTOR CO.

3. Remove the steering column coupling upper pinch bolt.
  - To install, tighten to 23 Nm (17 lb-ft).
4. Position aside the steering column coupling boot at the steering gear.
5. Remove the steering column coupling lower pinch bolt.
  - To install, tighten to 40 Nm (30 lb-ft).
6. Remove the steering column coupling.
7. To install, reverse the removal procedure.

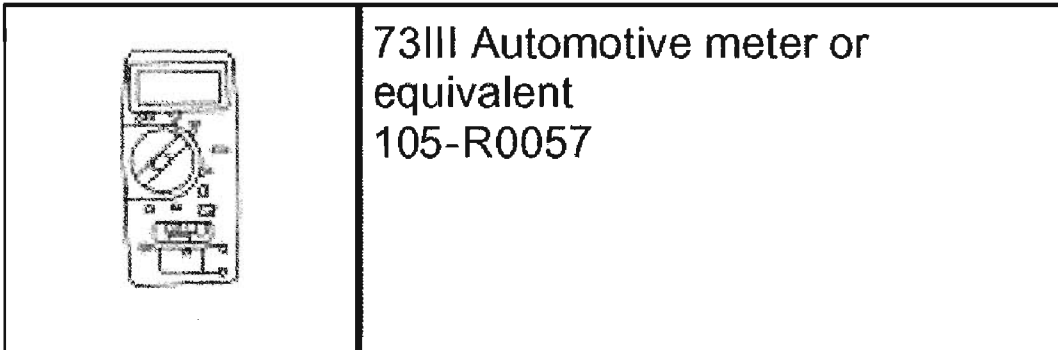
**2004 ACCESSORIES & BODY, CAB****Steering Column Switches - Escape****DESCRIPTION AND OPERATION****STEERING COLUMN SWITCHES**

The steering column switches of the following:

- Multifunction switch
- Ignition switch

**DIAGNOSIS AND TESTING****STEERING COLUMN SWITCHES**

Refer to **POWER DISTRIBUTION** for schematic and connector information.



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**Fig. 1: Identifying Special Tool**  
**Courtesy of FORD MOTOR CO.**

**Inspection And Verification**

1. Verify the customer concern by operating the ignition switch and the multifunction switch.
2. Visually inspect the ignition switch and the steering column multifunction switch for damage; refer to the following chart:

## 2004 Ford Escape

### 2004 ACCESSORIES & BODY, CAB Steering Column Switches - Escape

Mechanical	Electrical
<ul style="list-style-type: none"><li>• Ignition switch</li><li>• Turn signal switch (part of the steering column multifunction switch)</li><li>• Hazard flasher switch</li><li>• Wiper/washer switch</li></ul>	<ul style="list-style-type: none"><li>• Connections</li><li>• Battery junction box (BJB) fuse<ul style="list-style-type: none"><li>▪ MAIN (120A)</li><li>▪ 19 (40A)</li><li>▪ 20 (40A)</li></ul></li><li>• Central junction box (CJB) fuse IG KEY<ul style="list-style-type: none"><li>▪ 11 (10A)</li></ul></li><li>• Circuitry</li></ul>

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**Fig. 2: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. If binding occurs, turn the steering wheel left or right to release any pressure on the ignition switch and make sure the ignition key is cut correctly.
4. If the cause of the switch concern is not visually evident, proceed to the **SYMPTOM CHART** .

#### Symptom Chart

## 2004 Ford Escape

### 2004 ACCESSORIES & BODY, CAB Steering Column Switches - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>The ignition switch is inoperative</li></ul>	<ul style="list-style-type: none"><li>Battery junction box (BJB) fuse MAIN (120A).</li><li>BJB fuse 19 (40A).</li><li>Central junction box (CJB) fuse 11 (10A).</li><li>Ignition switch.</li><li>Circuitry.</li><li>Battery.</li></ul>	<ul style="list-style-type: none"><li>GO to <a href="#">Pinpoint Test A.</a></li></ul>
<ul style="list-style-type: none"><li>No power in ACC</li></ul>	<ul style="list-style-type: none"><li>Battery junction box (BJB) fuse 2 (40A).</li><li>Ignition switch.</li><li>ACC relay.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li>GO to <a href="#">Pinpoint Test B.</a></li></ul>
<ul style="list-style-type: none"><li>No power in ON</li></ul>	<ul style="list-style-type: none"><li>Ignition switch.</li><li>IGN relay.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li>GO to <a href="#">Pinpoint Test C.</a></li></ul>
<ul style="list-style-type: none"><li>No power in START</li></ul>	<ul style="list-style-type: none"><li>Ignition switch.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li>GO to <a href="#">Pinpoint Test D.</a></li></ul>
<ul style="list-style-type: none"><li>The ignition switch is inoperative—key cannot be removed from ignition switch (automatic transmission only)</li></ul>	<ul style="list-style-type: none"><li>Ignition switch.</li><li>Shift lock module.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li>GO to <a href="#">Pinpoint Test E.</a></li></ul>
<ul style="list-style-type: none"><li>The ignition switch is inoperative—key can be removed from ignition switch with transmission in gear (automatic transmission only)</li></ul>	<ul style="list-style-type: none"><li>Ignition switch.</li><li>Shift lock module.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li>GO to <a href="#">Pinpoint Test F.</a></li></ul>

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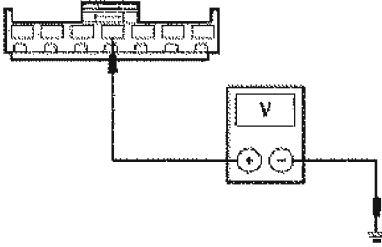
**Fig. 3: Identifying Symptom Specification Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

#### PINPOINT TEST A: THE IGNITION SWITCH IS INOPERATIVE

## 2004 Ford Escape

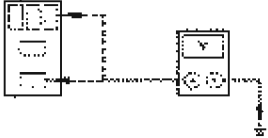
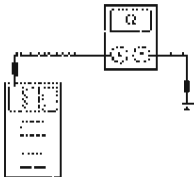
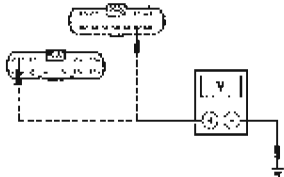
### 2004 ACCESSORIES & BODY, CAB Steering Column Switches - Escape

Test Step	Result / Action to Take
<b>A1 CHECK CIRCUIT 32 (RD/LB) FOR VOLTAGE</b> <ul style="list-style-type: none"><li>• Key in OFF position.</li><li>• Disconnect: Ignition Switch.</li><li>• Measure the voltage between the ignition switch C250 pin 4, circuit 32 (RD/LB), harness side and ground.</li></ul>  <ul style="list-style-type: none"><li>• Is the voltage greater than 10 volts?</li></ul>	<p><b>Yes</b> INSTALL a new ignition switch; REFER to <u>Ignition Switch</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 4: Pinpoint Test A: Ignition Switch Is Inoperative**  
Courtesy of FORD MOTOR CO.

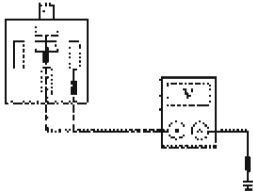
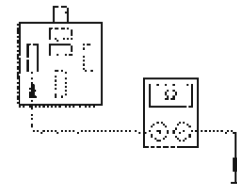
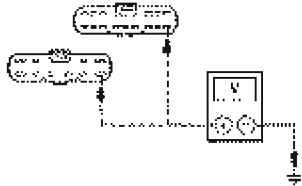
**PINPOINT TEST B: NO POWER IN ACC**

Test Step	Result / Action to Take
<b>B1 CHECK IGNITION SWITCH</b> <ul style="list-style-type: none"> <li>• Carry out the Ignition Switch Component Test, refer to Wiring Diagrams Cell 149.</li> <li>• Is the Ignition switch OK?</li> </ul>	<p>Yes GO to B2.</p> <p>No INSTALL a new Ignition switch. REFER to Ignition Switch in this section. TEST the system for normal operation.</p>
<b>B2 CHECK POWER TO ACC RELAY</b> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect ACC Relay.</li> <li>• Key in ACCESSORY position.</li> <li>• Measure the voltage between ACC relay C2060 pin 1, circuit 287 (BK/Lt), harness side and ground; and between ACC relay C2060 pin 3, circuit 1052 (TN/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Are the voltages greater than 10 volts?</li> </ul>	<p>Yes GO to B3.</p> <p>No GO to B4.</p>
<b>B3 CHECK GROUND AT ACC RELAY</b> <ul style="list-style-type: none"> <li>• Measure the resistance between ACC relay C2060 pin 2, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p>Yes INSTALL a new ACC relay. TEST the system for normal operation.</p> <p>No INSTALL a new central junction box (CJB). TEST the system for normal operation.</p>
<b>B4 CHECK CENTRAL JUNCTION BOX FOR OPEN</b> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect CJB.</li> <li>• Key in ACCESSORY position.</li> <li>• Measure the voltage between the CJB C270b pin 1, circuit 1052 (TN/BK), harness side and ground; and between the CJB C270c pin 6, circuit 287 (BK/Lt), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Are the voltages greater than 10 volts?</li> </ul>	<p>Yes INSTALL a new central junction box (CJB). TEST the system for normal operation.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 5: Pinpoint Test B: No Power In ACC**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST C: NO POWER IN ON**

Test Step	Result / Action to Take
<b>C1 CHECK IGNITION SWITCH</b> <ul style="list-style-type: none"> <li>• Carry out the Ignition Switch Component Test; refer to Wiring Diagrams Cell 143</li> <li>• Is the Ignition switch OK?</li> </ul>	<p>Yes GO to C2.</p> <p>No INSTALL a new Ignition switch; REFER to Ignition Switch in this section. TEST the system for normal operation.</p>
<b>C2 CHECK POWER TO IGN RELAY</b> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect IGN Relay.</li> <li>• Key in ACCESSORY position.</li> <li>• Measure the voltage between the IGN relay C2076 pin 86, circuit 1050 (LG/YT), harness side and ground; and between the IGN relay C2076 pin 30, circuit 37 (YE), harness side and ground.</li> </ul>  <p>• Are the voltages greater than 10 volts?</p>	<p>Yes GO to C3.</p> <p>No GO to C4.</p>
<b>C3 CHECK GROUND AT IGN RELAY</b> <ul style="list-style-type: none"> <li>• Measure the resistance between the IGN relay C2076 pin 85, circuit 57 (BK), harness side and ground.</li> </ul>  <p>• Is the resistance less than 5 ohms?</p>	<p>Yes INSTALL a new IGN relay. TEST the system for normal operation.</p> <p>No INSTALL a new central junction box (CJB). TEST the system for normal operation.</p>
<b>C4 CHECK CENTRAL JUNCTION BOX FOR OPEN</b> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect CJB.</li> <li>• Key in ACCESSORY position.</li> <li>• Measure the voltage between the CJB C270b pin 10, circuit 37 (YE), harness side and ground; and between the CJB C270d pin 45, circuit 1050 (LG/YT), harness side and ground.</li> </ul>  <p>• Are the voltages greater than 10 volts?</p>	<p>Yes INSTALL a new central junction box (CJB). TEST the system for normal operation.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 6: Pinpoint Test C: No Power In On**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST D: NO POWER IN START**

## 2004 Ford Escape

### 2004 ACCESSORIES & BODY, CAB Steering Column Switches - Escape

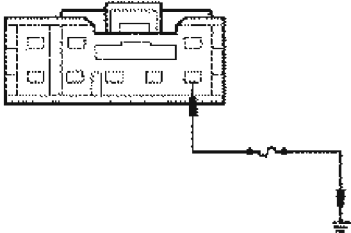
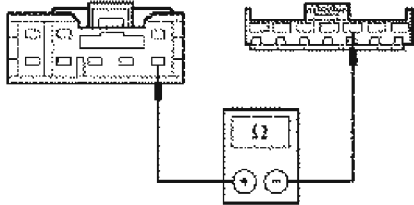
Test Step	Result / Action to Take
<b>D1 CHECK THE IGNITION SWITCH</b>	
<ul style="list-style-type: none"><li>Carry out the Ignition Switch Component Test; refer to COMPONENT TESTING article in Accessories &amp; Equipment.</li><li><b>Is the ignition switch OK?</b></li></ul>	<p><b>Yes</b> REPAIR circuit 306 (TN/LB). TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new ignition switch; REFER to <u>Ignition Switch</u>. TEST the system for normal operation.</p>

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**Fig. 7: Pinpoint Test D: No Power In Start**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST E: THE IGNITION SWITCH IS INOPERATIVE - KEY CANNOT BE REMOVED FROM IGNITION SWITCH (AUTOMATIC TRANSMISSION ONLY)**



Test Step	Result / Action to Take
<b>E1 CHECK THE SHIFT LOCK MODULE</b> <ul style="list-style-type: none"> <li>Disconnect: Shift Lock Module.</li> <li>Key in ON position.</li> <li>Connect a fused jumper wire between shift lock module C2067 pin 8, circuit 1420 (YE/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Can the key be removed from the ignition switch?</li> </ul>	<p><b>Yes</b> INSTALL a new shift lock module. REFER to <a href="#">Section 307-05</a>. TEST the system for normal operation.</p> <p><b>No</b> REMOVE the jumper wire. GO to E2.</p>
<b>E2 CHECK CIRCUIT 1420 (YE/LB) FOR OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Ignition Switch.</li> <li>Measure the resistance between the shift lock module C2067 pin 8, circuit 1420 (YE/LB), harness side and ignition switch C250 pin 3, circuit 1420 (YE/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new ignition switch; REFER to <a href="#">Ignition Switch</a> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 8: Pinpoint Test E: Ignition Switch Is Inoperative - Key Cannot Be Removed From Ignition Switch (A/T Only)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST F: THE IGNITION SWITCH IS INOPERATIVE - KEY CAN BE REMOVED FROM IGNITION SWITCH WITH TRANSMISSION IN GEAR (AUTOMATIC TRANSMISSION ONLY)**

## 2004 Ford Escape

### 2004 ACCESSORIES & BODY, CAB Steering Column Switches - Escape

Test Step	Result / Action to Take
<b>F1 CHECK THE SHIFT LOCK MODULE</b>	
<ul style="list-style-type: none"><li>Disconnect: Shift Lock Module.</li><li>Key in ON position.</li><li><b>Can the key be removed from the ignition switch?</b></li></ul>	<b>Yes</b> GO to <u>E2</u> .  <b>No</b> INSTALL a new shift lock module. REFER to TRANSAXLE/ TRANSMISSION EXTERNAL CONTROLS article in Transmission. TEST the system for normal operation.
<b>F2 CHECK CIRCUIT 1420 (YE/LB) FOR SHORT TO GROUND</b>	
<ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Ignition Switch.</li><li>Key in ON position.</li><li><b>Can the key be removed from the ignition switch?</b></li></ul>	<b>Yes</b> REPAIR the circuit. TEST the system for normal operation.  <b>No</b> INSTALL a new ignition switch; REFER to <u>Ignition Switch</u> . TEST the system for normal operation.

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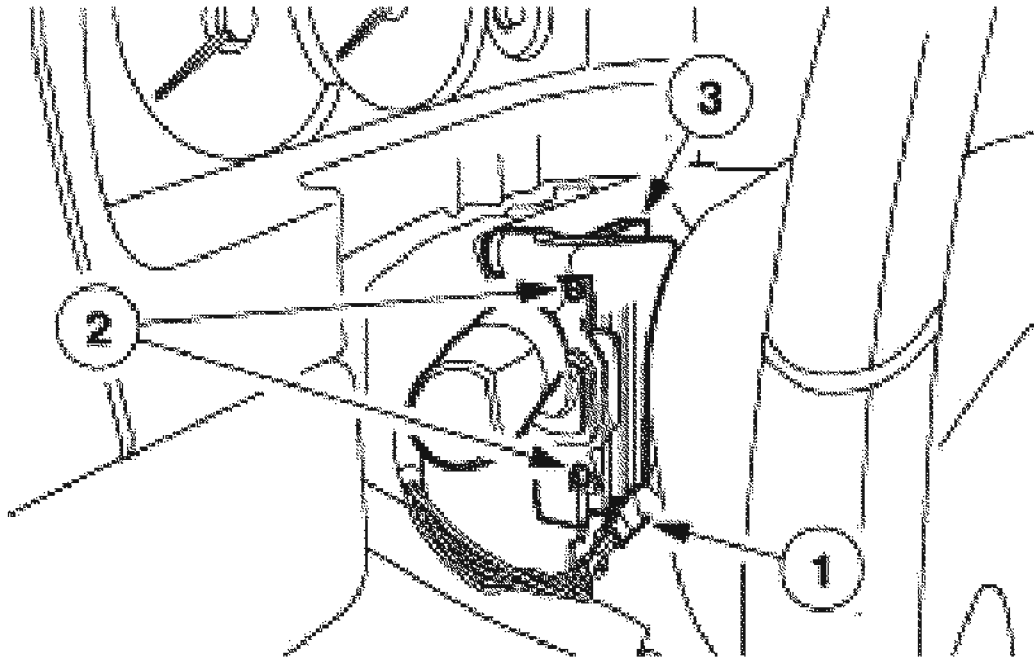
**Fig. 9: Pinpoint Test F: Ignition Switch Is Inoperative - Key Can Be Removed From Ignition Switch With Transmission In Gear (A/T Only)**  
Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

### STEERING COLUMN MULTIFUNCTION SWITCH

#### Removal And Installation

1. Remove the clockspring. For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**.
2. Remove the multifunction switch.
  1. Disconnect the electrical connector.
  2. Remove the screws.
  3. Remove the multifunction switch.



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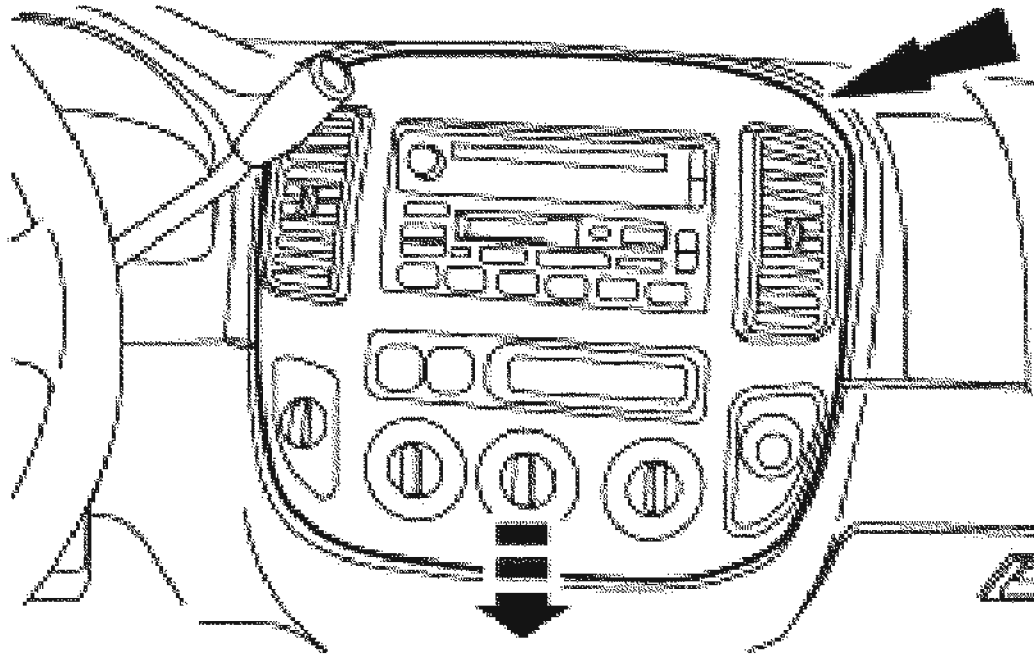
**Fig. 10: Removing Multifunction Switch**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

## HAZARD FLASHER SWITCH

### Removal And Installation

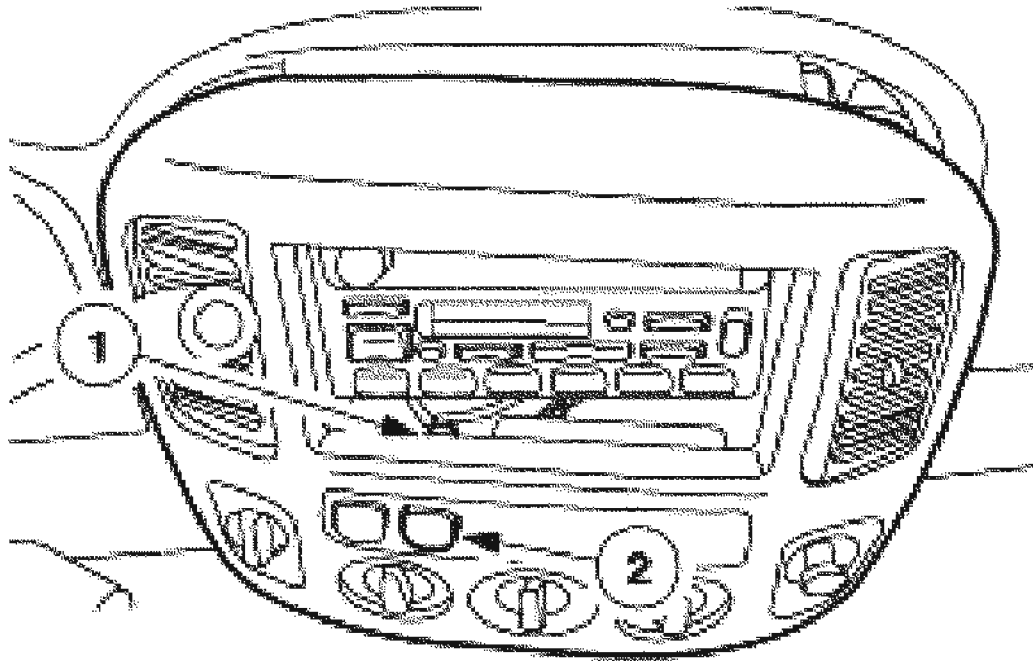
1. Disconnect the battery ground cable. For additional information refer to **BATTERY, MOUNTING AND CABLES**.
2. Position the instrument panel center finish panel rearward from the instrument panel.



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**Fig. 11: Identifying Instrument Panel Center Finish Panel**  
Courtesy of FORD MOTOR CO.

3. Remove the hazard flasher switch.
  1. Disconnect electrical connector.
  2. Remove the hazard flasher switch.



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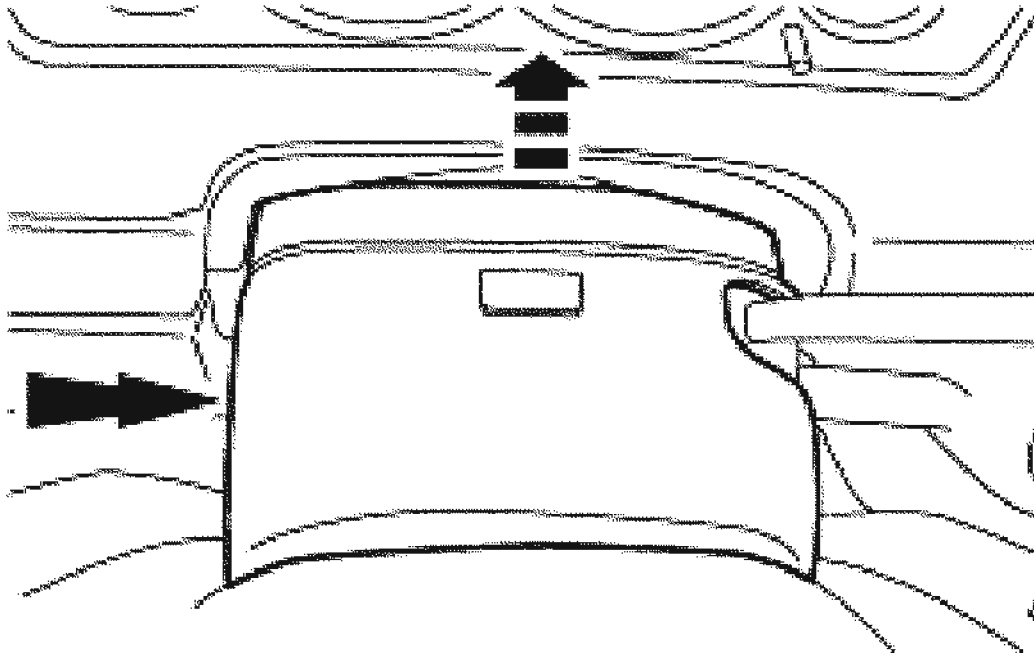
**Fig. 12: Removing Hazard Flasher Switch**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## IGNITION SWITCH

### Removal And Installation

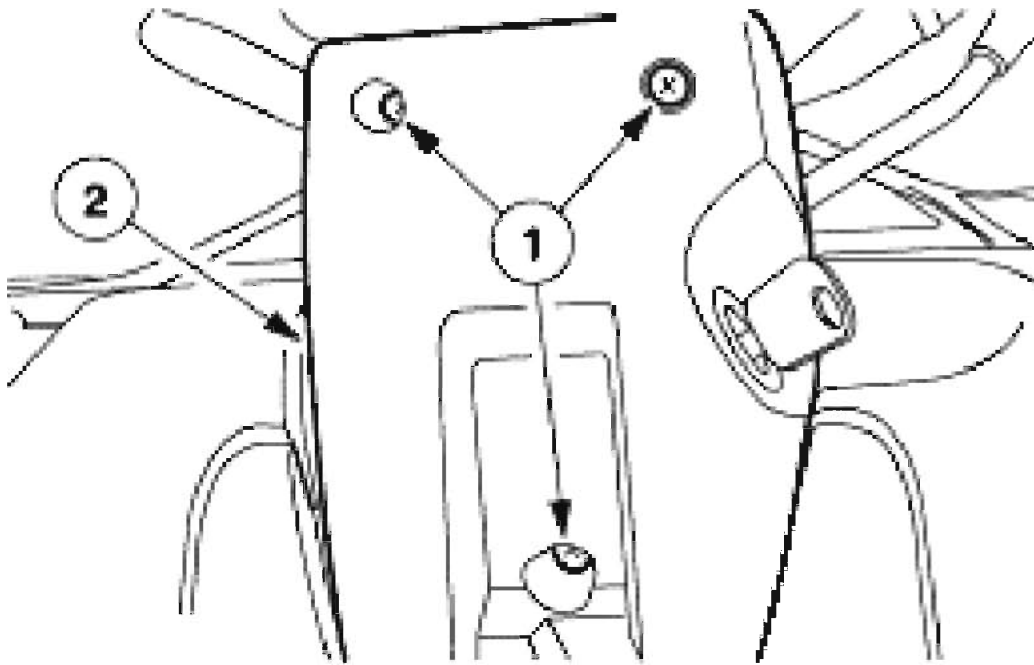
1. Depower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS** .
2. Remove the upper steering column shroud.



G02743950

**Fig. 13: Removing Upper Steering Column Shroud**  
Courtesy of FORD MOTOR CO.

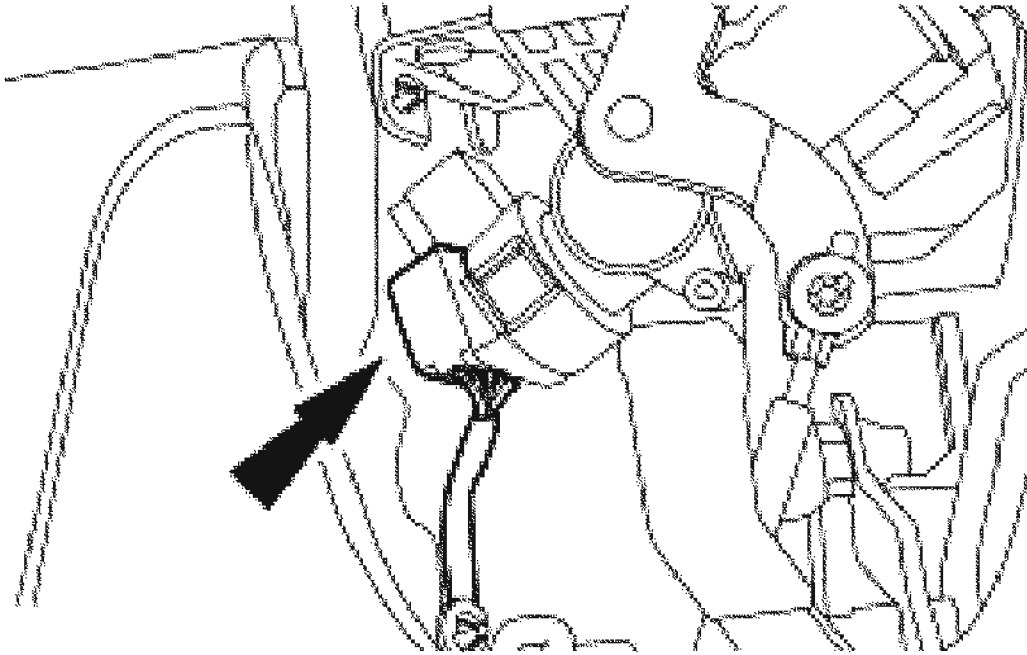
3. Remove the lower steering column shroud.
  1. Remove the screws.
  2. Remove the lower steering column shroud.



G02743951

**Fig. 14: Removing Lower Steering Column Shroud**  
Courtesy of FORD MOTOR CO.

4. Disconnect the ignition switch electrical connector.

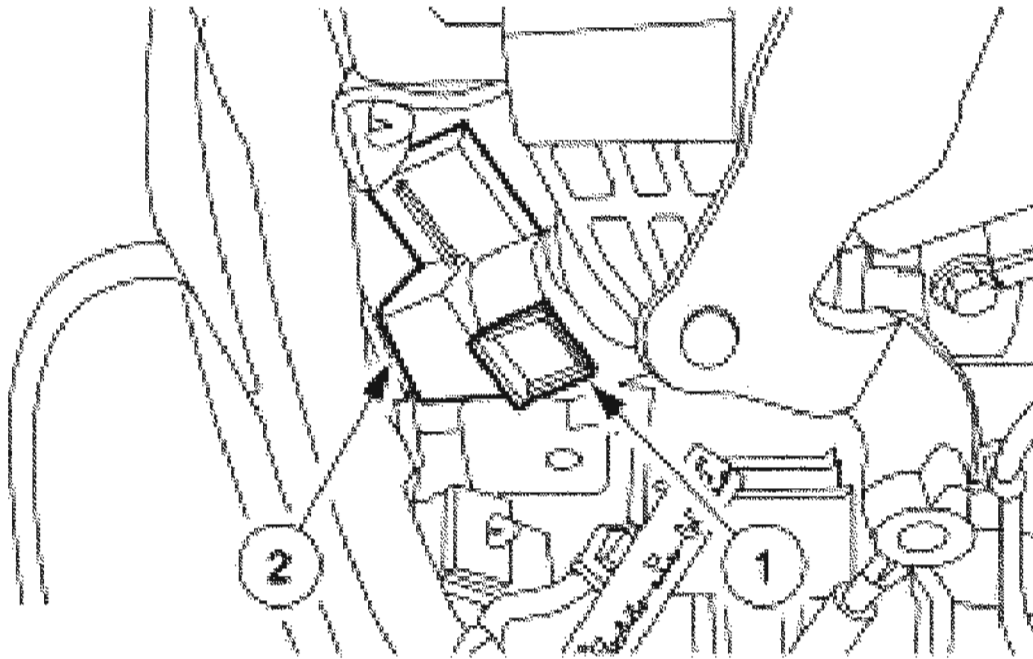


G02743952

**Fig. 15: Disconnecting Ignition Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** Lower steering column to lowest tilt position.





G02743953

**Fig. 16: Removing Ignition Switch**  
Courtesy of FORD MOTOR CO.

5. Remove the ignition switch.
  1. Press the two tabs.
  2. Remove the ignition switch.
6. To install, reverse the removal procedure.
  - Activate the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**.

**2005 TRANSMISSIONS****Clutch - Escape & Mariner****SPECIFICATIONS****TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

Description	Nm	lb-ft
Clutch pressure plate bolts	29	21

**DESCRIPTION AND OPERATION****CLUTCH**

The clutch system includes:

- flywheel
- clutch disc
- clutch pressure plate
- clutch master cylinder
- clutch slave cylinder
- hydraulic line
- clutch pedal

The clutch system transmits fluid pressure to the slave cylinder, which in turn moves the clutch diaphragm spring.

The clutch master cylinder uses brake fluid and shares a common reservoir with the brake master cylinder.

The clutch is a single plate, dry-friction disc with a diaphragm-style spring clutch pressure plate. The clutch disc has a hub which is splined to the input shaft. The clutch disc has friction material where it contacts the flywheel and the clutch pressure plate. Torsion springs on the flywheel help absorb the engine torque pulses. The clutch pressure plate applies pressure to the clutch disc, holding it tightly against the surface of the flywheel. In the engaged position, the diaphragm spring holds the clutch pressure plate against the clutch disc, so that engine torque is transmitted to the input shaft.

When the clutch pedal is pressed, the slave cylinder with an integral release bearing pushes the diaphragm spring center of the clutch pressure plate toward the flywheel. The diaphragm spring pivots at the fulcrum, relieving the load on the clutch pressure plate. Steel spring straps riveted to the clutch pressure plate cover pull the clutch pressure plate from the clutch

disc, disengaging the engine torque from the transaxle and enabling the gears to be changed.

## DIAGNOSIS AND TESTING

### CLUTCH

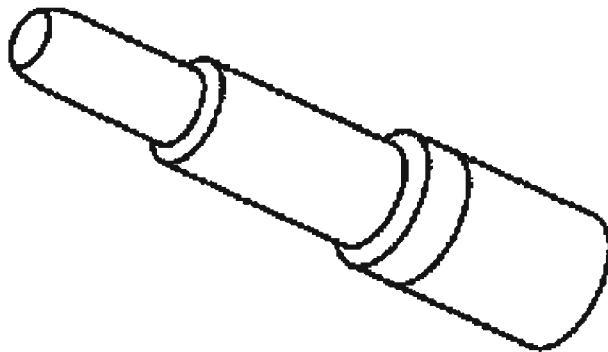
Refer to MANUAL TRANSAXLE-TRANSMISSION AND CLUTCH - GENERAL INFORMATION .

## REMOVAL AND INSTALLATION

### CLUTCH DISC AND PRESSURE PLATE

Special Tool(s)

### SPECIAL TOOLS



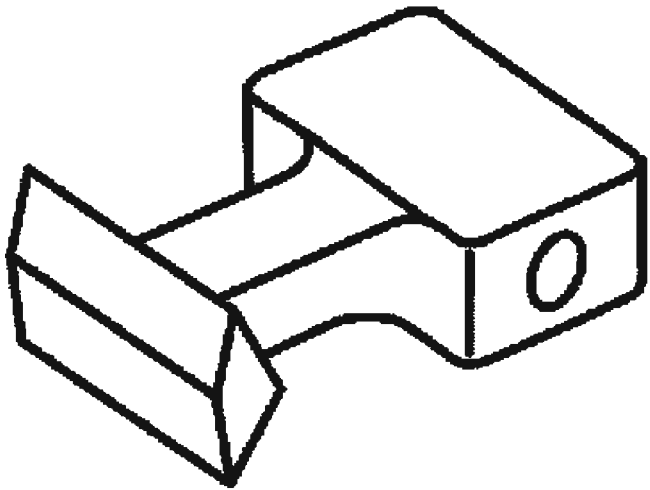
**ST1469-A**

Clutch Aligner 308-020 (T74P-7137-K)

Flywheel Holding Tool 303-103  
(T74P-6375-A)

## 2005 Ford Escape

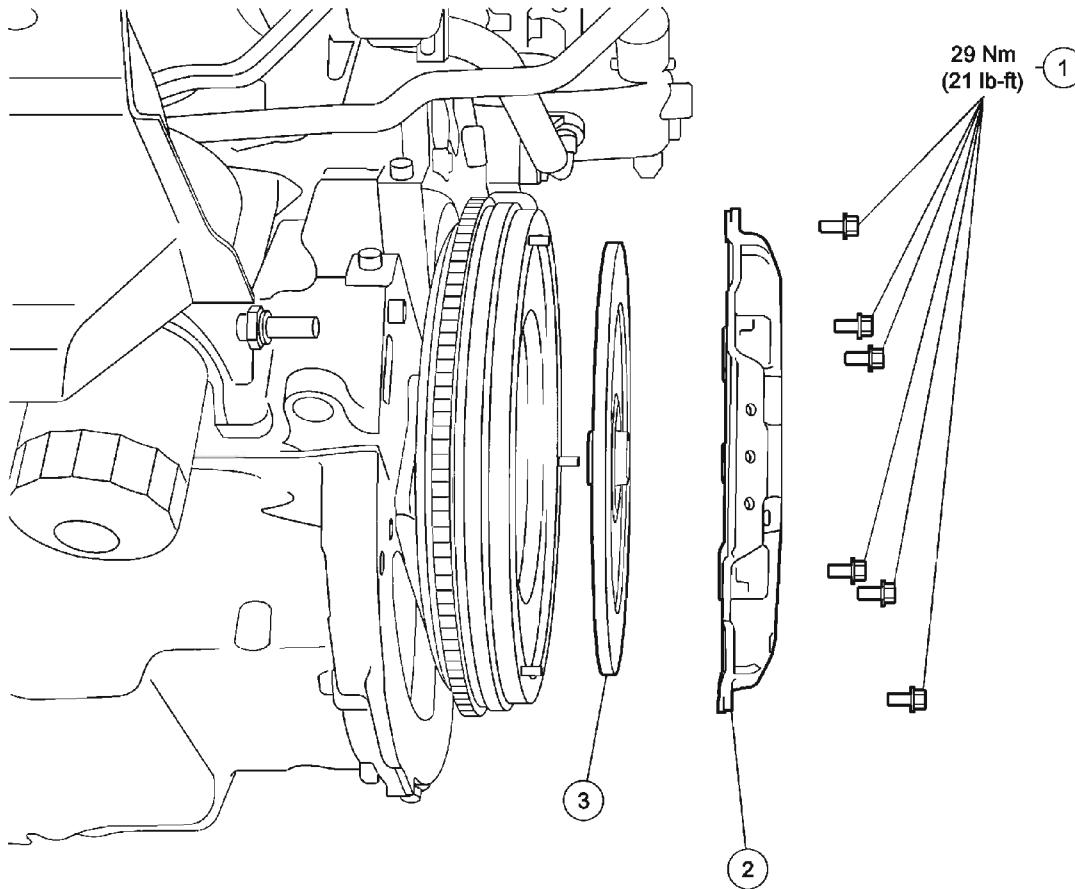
2005 TRANSMISSIONS Clutch - Escape & Mariner



ST1840-A

## 2005 Ford Escape

### 2005 TRANSMISSIONS Clutch - Escape & Mariner



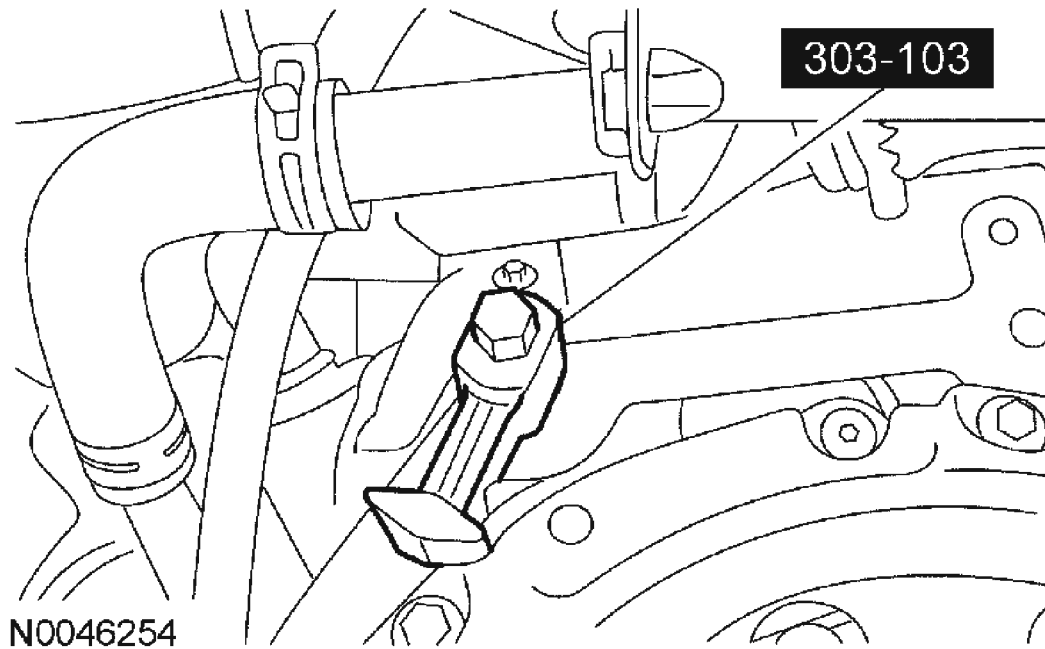
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Item	Part Number	Description
1	—	Clutch pressure plate bolts (6 required)
2	7563	Clutch pressure plate
3	7550	Clutch disc

**Fig. 1: Removing/Installing Clutch Disc And Pressure Plate**  
Courtesy of FORD MOTOR CO.

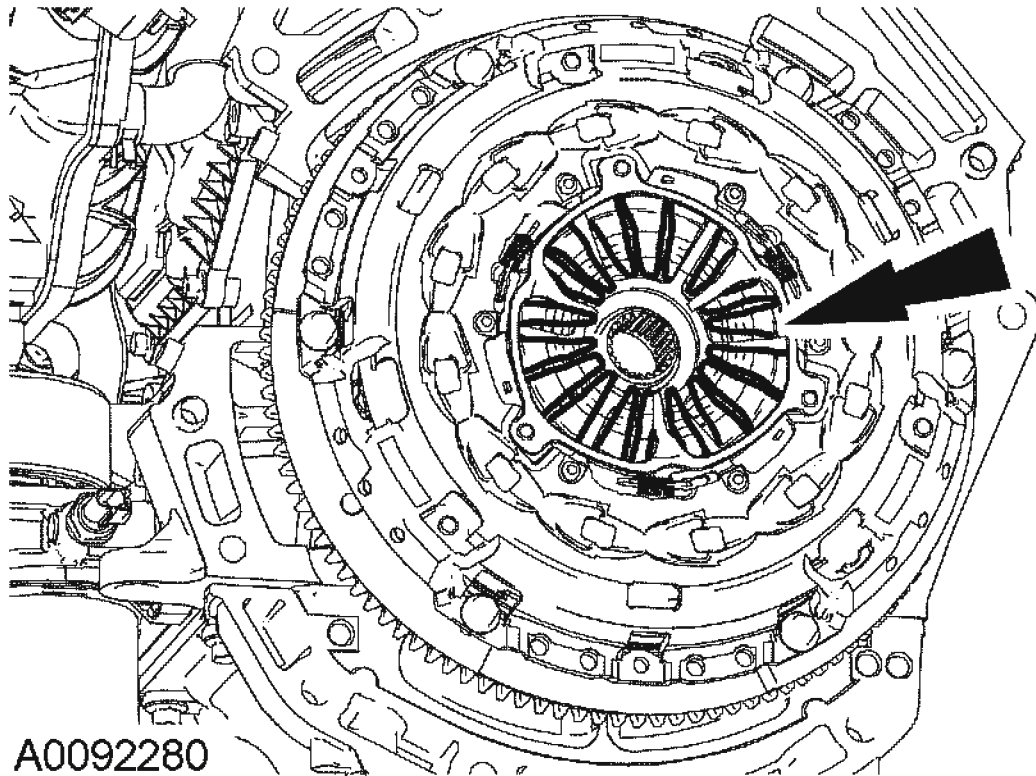
#### Removal

1. Remove the transaxle. For additional information, refer to MANUAL TRANSAXLE-TRANSMISSION.
2. Using the special tool, lock the flywheel to the engine.



**Fig. 2: Locking Flywheel To Engine**  
**Courtesy of FORD MOTOR CO.**

3. Check the diaphragm spring fingers for discoloration, scoring, bent or broken segments and spring ends that are higher or lower than the rest.



**Fig. 3: Checking Diaphragm Spring Fingers For Discoloration**  
Courtesy of FORD MOTOR CO.

**WARNING:** The clutch disc and clutch pressure plate are heavy and may fall if not held when the bolts are removed. Failure to follow these instructions may result in personal injury.

**CAUTION:** Loosen the bolts evenly to prevent pressure plate damage.

4. Remove the bolts, clutch pressure plate and clutch disc.

**CAUTION:** Do not use cleaners with a petroleum base and do not immerse the clutch pressure plate in solvent.

5. Using a suitable commercial alcohol based solvent, clean the clutch pressure plate.
6. Inspect the clutch pressure plate surface for burn marks, scores, flatness or ridges. For additional information, refer to **MANUAL TRANSAXLE-TRANSMISSION AND CLUTCH - GENERAL INFORMATION**.

**CAUTION:** If the clutch disc is saturated with oil, inspect the rear engine crankshaft seal for leakage. If leakage is found, install a new seal prior to clutch disc installation. For additional information, refer to ENGINE - 2.3L .

**NOTE:** Use an emery cloth to remove minor imperfections in the clutch disc lining surface.

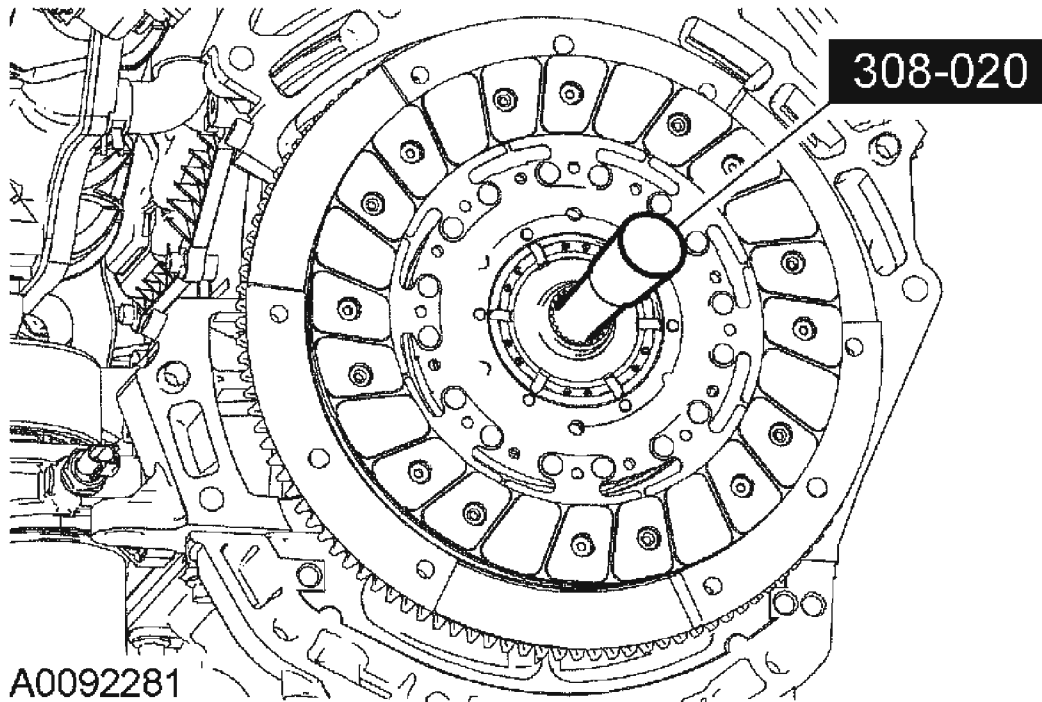
**NOTE:** Install a new clutch disc if any of the following conditions are present.

7. Inspect the clutch disc for:
  - oil or grease saturation
  - worn or loose facings
  - warpage or loose rivets at the hub
  - wear or rust on the splines
8. Check the clutch disc runout and wear. For additional information, refer to MANUAL TRANSAXLE-TRANSMISSION AND CLUTCH - GENERAL INFORMATION .

#### **Installation**

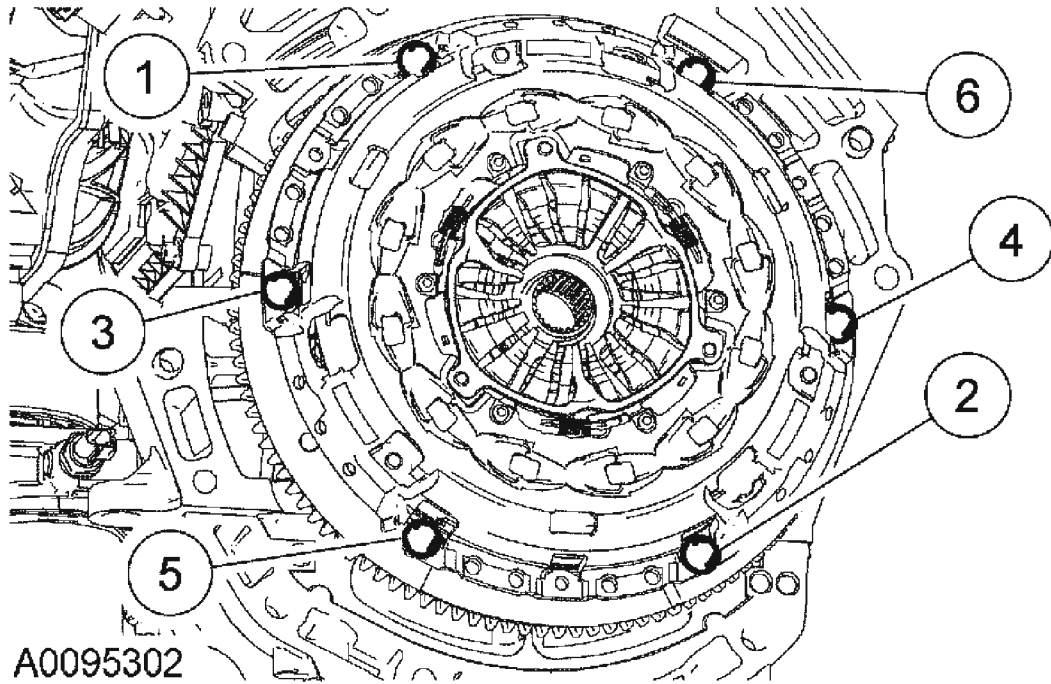
1. Using the special tool, position the clutch disc on the flywheel.





**Fig. 4: Positioning Clutch Disc On Flywheel**  
Courtesy of FORD MOTOR CO.

2. Position the clutch pressure plate on the flywheel and install the clutch pressure plate bolts.
  - Tighten to 29 Nm (21 lb-ft) in sequence.



**Fig. 5: Installing Clutch Pressure Plate Bolts**  
Courtesy of FORD MOTOR CO.

3. Install the transaxle. For additional information, refer to MANUAL TRANSAXLE-TRANSMISSION .

## 2005 TRANSMISSIONS

## Manual Transaxle/Transmission - Escape &amp; Mariner

## SPECIFICATIONS

## GENERAL SPECIFICATIONS

## GENERAL SPECIFICATIONS

Item	Specification
<b>Gear Clearance</b>	
1st gear end play	0.20 - 0.30 mm (0.007 -0.011 in)
2nd gear end play	0.06 - 0.16 mm (0.002 - 0.006 in)
3rd gear thrust clearance	0.18 - 0.31 mm (0.0071 - 0.0122 in)
4th gear end play	0.20 - 0.30 mm (0.0078 -0.0118 in)
5th gear thrust clearance	0.06 - 0.16 mm (0.002 - 0.006 in)
<b>Synchronizer Ring Clearance</b>	
1st gear clearance (outer ring-to-synchronizer cone)	0.60 - 1.10 mm (0.023 - 0.043 in)
1st gear clearance (inner ring-to-synchronizer cone)	0.60 - 0.80 mm (0.023 - 0.031 in)
2nd gear clearance (middle synchronizer ring-to-gear)	0.60 - 1.20 mm (0.023 - 0.047 in)
2nd gear clearance (outer ring-to-synchronizer cone)	0.60 - 1.10 mm (0.023 - 0.043 in)
2nd gear clearance (inner ring-to-gear)	0.70 - 1.10 mm (0.027 - 0.043 in)
3rd gear	0.90 - 1.45 mm (0.035 - 0.057 in)
4th gear	0.90 - 1.45 mm (0.035 - 0.057 in)
5th gear	0.95 - 1.40 mm (0.037 - 0.055 in)
Reverse idler gear	0.95 - 1.40 mm (0.037 - 0.055 in)
<b>Input Shaft</b>	
End play	0.00 - 0.06 mm (0.00 - 0.0024 in)
Adjustment shim thickness	Refer to <b>TRANSAXLE</b> for shim selection procedure.
<b>Mainshaft</b>	
End play	0.00 - 0.06 mm (0.00 - 0.0024 in)
Adjustment shim thickness	Refer to <b>TRANSAXLE</b> for shim selection procedure.
<b>Reverse Idler Gear</b>	
End play	0.04 - 0.14 mm (0.0016 -0.0060 in)

**2005 Ford Escape****2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner**

Adjustment shim thickness	Refer to <b>TRANSAXLE</b> for shim selection procedure.
Input shaft thrust washer thickness	Refer to <b>INPUT SHAFT</b> for thrust washer thickness chart.
Input shaft snap ring thickness	Refer to <b>INPUT SHAFT</b> for snap ring thickness chart.
4th gear adjustment shim thickness	Refer to <b>MAINSHAFT</b> for 4th gear adjustment shim thickness chart.
5th gear snap ring thickness	Refer to <b>MAINSHAFT</b> for 5th gear snap ring thickness chart.
Mainshaft C-ring thickness	Refer to <b>MAINSHAFT</b> for C-ring thickness chart.
<b>Differential</b>	
Preload	0.15 - 0.21 mm (0.0059 - 0.0083 in)
Adjustment shim thickness	Refer to <b>TRANSAXLE</b> for adjustment shim selection procedure.
Side gear and pinion gear backlash	0.02 - 0.08 mm (0.0008 - 0.0031 in)
<b>Lubricants and sealants</b>	
SAE 75W-90 Gear Oil F32Z-19C547-MA	MAZDA (MES) 115-A WSS-M2C203-A1
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Premium Long-Life Grease XG-1-C	ESA-M1C75-B

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

<b>Description</b>	<b>Nm</b>	<b>lb-ft</b>	<b>lb-in</b>
Drain plug	35	26	-
Check plug (external)	15	11	-
Check plug (internal)	15	11	-
Crossmember bolts	115	85	-
Fill level inspection plug	35	26	-
Transaxle fill plug	35	26	-
Transaxle front support insulator bolts	90	66	-
Transaxle front support insulator bracket bolts	55	41	-
Transaxle front support insulator through-bolt	90	66	-
Transaxle front-to-aft crossmember	90	66	-

## 2005 Ford Escape

### 2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner

bolts			
Transaxle front-to-aft crossmember nut	90	66	-
LH transaxle support insulator bolts	55	41	-
LH transaxle support insulator bracket nuts	90	66	-
LH transaxle support insulator through-bolt	90	66	-
Clutch hydraulic line bracket bolt	2.5	-	22
Mainshaft bearing retainer bolt	7	-	62
Transaxle rear support insulator bolt	90	66	-
Transaxle rear support insulator bracket bolts	90	66	-
Transaxle rear support insulator nuts	90	66	-
Transaxle rear support insulator through-bolt	90	66	-
Reverse lever bracket bolts	14	10	-
Shift assembly bolts	7	-	62
Shift check bolt	24	18	-
Stopper bolt	28	21	-
Standard (gold) transaxle case bolts	52	38	-
Black transaxle case bolt	65	48	-
Transaxle-to-engine bolts	47	35	-
Wiring harness bracket nuts	12	9	-
Final drive gear bolts	120	89	-
Shift cable bracket bolts	22	16	-
Upper transaxle-to-engine bolts	45	33	-
Reduction gear bolts	96	71	-

## DESCRIPTION AND OPERATION

### MANUAL TRANSAXLE

#### Manual Transaxle

The manual transaxle is a fully synchronized 5-speed transaxle. The forward gears are selected by a synchronizer mechanism. The 3rd gear (3GR), 4th gear (4GR) and 5th speed

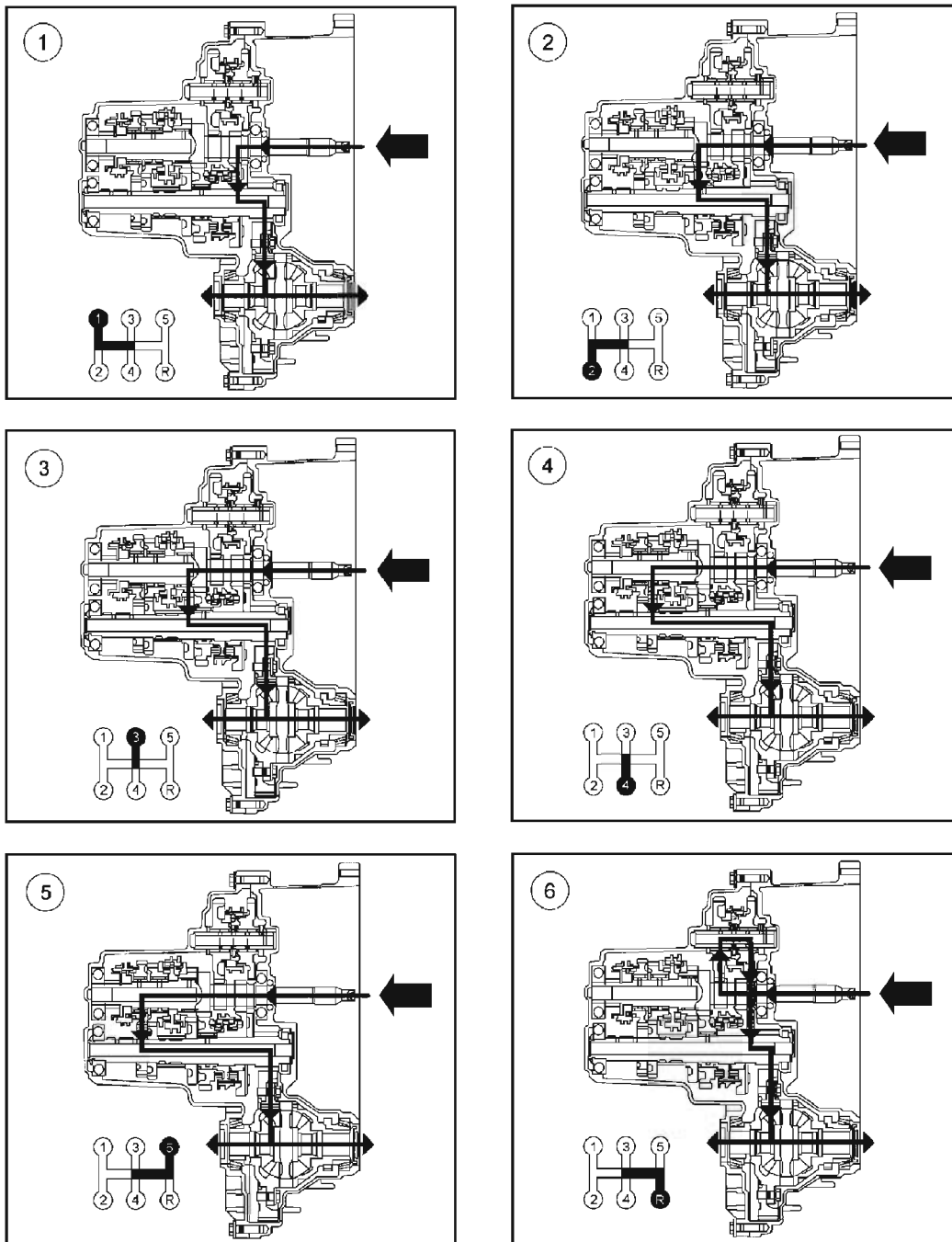
## 2005 Ford Escape

### 2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner

cluster gear are mounted on the input shaft. First gear (1GR) and 2nd gear (2GR) are mounted on the mainshaft. The helical-cut forward gears are in constant mesh with the corresponding gears on the opposing shaft. The manual transaxle features a synchronized reverse gear. The reverse gears have helical-cut teeth and are engaged through a synchronizer.

## 2005 Ford Escape

### 2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner



A0092137

Item	Part Number	Description
1	—	1st gear
2	—	2nd gear
3	—	3rd gear
4	—	4th gear
5	—	5th gear
6	—	Reverse gear

**Fig. 1: Power Flow Diagram**

## Courtesy of FORD MOTOR CO.

### External Shift Linkage

The manual transaxle is controlled by a floor-mounted gearshift lever located in the floor console. Connection between the floor-mounted gear shift lever and the manual transaxle gear shift control mechanism is made through 2 shift cables. For shift cable adjustment, refer to **MANUAL TRANSAXLE-TRANSMISSION AND CLUTCH - GENERAL INFORMATION**.

### Internal Shift Linkage

The manual transaxle is shifted internally by 4 shift forks. The 1st/2nd gears shift fork, 3rd/4th gears shift fork and the 5th gear shift fork control all forward gear shifts. The reverse gear shift fork controls reverse.

### Reverse Gear

The reverse idler gears are mounted on a reverse idler gear shaft supported at one end in the flywheel housing and at the other in the transaxle case. Because the reverse idler gears rotate on the reverse idler gear shaft, they are supported by 2 sets of reverse idler gear needle bearings to prevent metal-to-metal contact and wear.

When the reverse idler coupling sleeve and hub engage the reverse idler gear, it reverses the power flow to the mainshaft.

### Differential

The ends of the differential are supported on tapered roller differential bearings. The cups for these differential bearings are seated in the transaxle case and the flywheel housing. Differential bearing preload is set using a selective differential bearing shim that is installed under the differential bearing cup in the transaxle case.

The differential includes the differential side gears and the shaft mounted differential pinion gears. Direct contact between the gears and the differential case is prevented by the differential side gear thrust washers installed under the gears. The differential pinion shaft is held in position by a differential pinion shaft lock pin that extends through the end of the differential pinion shaft and the differential case.

The speedometer drive gear is also mounted on the differential case. It is located between the tapered roller differential bearing and the differential case. A tab on the speedometer drive gear and a matching slot in the differential case prevent the speedometer drive gear from spinning on the differential case.

For 4-wheel drive (4WD) vehicles, there is an additional helical-cut ring gear installed on the differential case which is in constant mesh with the transfer case. For additional information



concerning the transfer case, refer to **FOUR-WHEEL DRIVE SYSTEMS** .

## **DIAGNOSIS AND TESTING**

### **MANUAL TRANSAXLE**

Refer to **MANUAL TRANSAXLE-TRANSMISSION AND CLUTCH - GENERAL INFORMATION** .

## **GENERAL PROCEDURES**

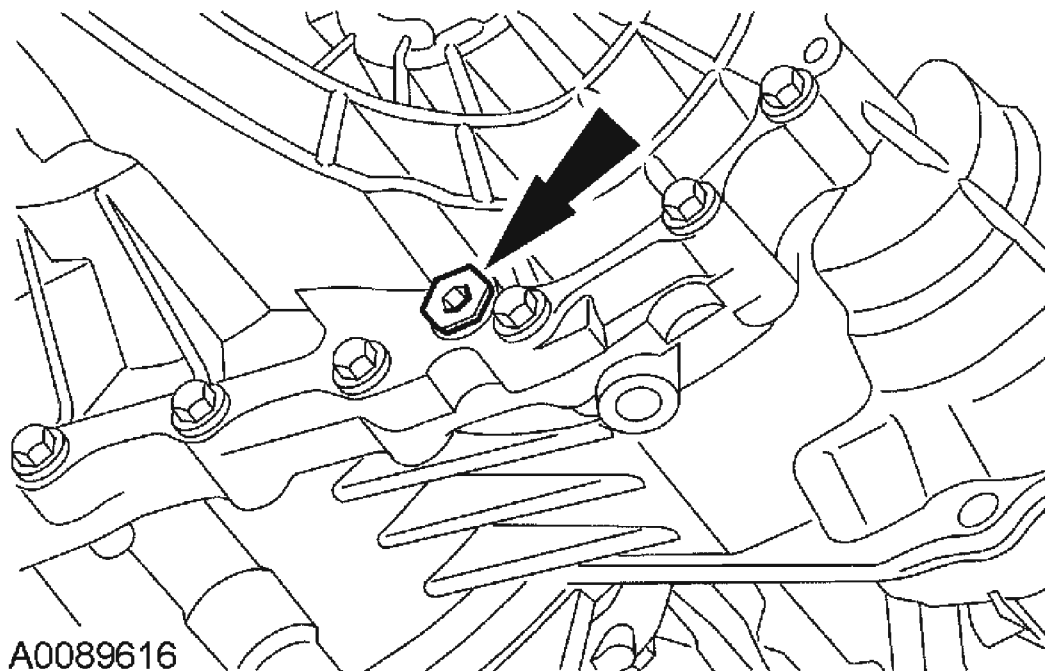
### **TRANSAXLE DRAINING AND FILLING**

#### **Material**

#### **MATERIAL**

<b>Item</b>	<b>Specification</b>
SAE 75W-90 Premium Synthetic Transaxle Lubricant XT-75W90-QGT	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

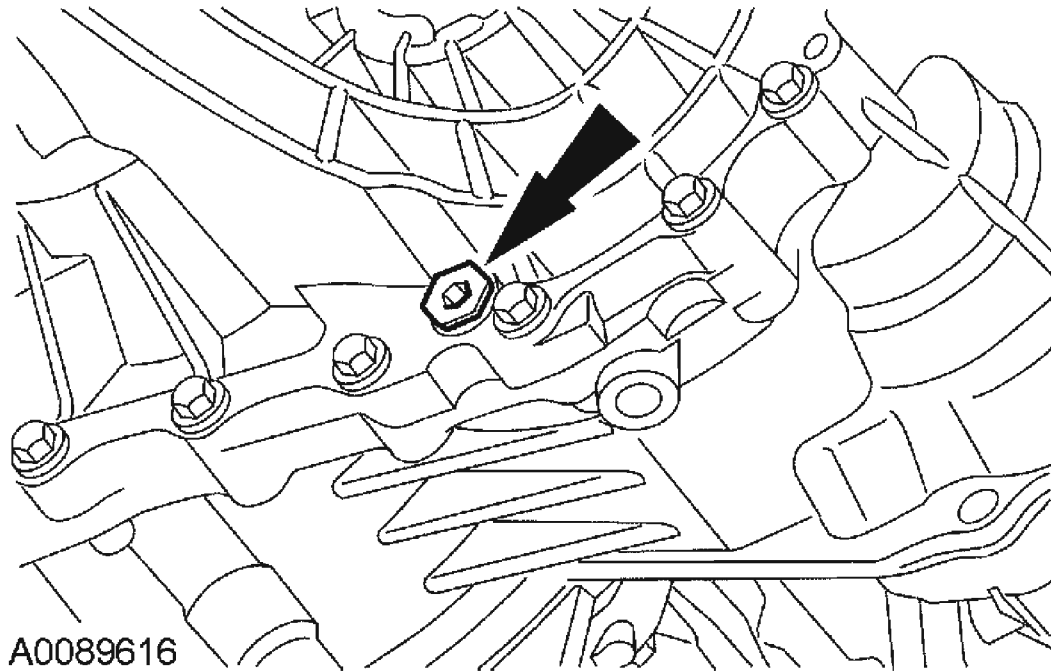
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** .
2. Remove the drain plug and drain the fluid.



**Fig. 2: Removing Drain Plug And Drain Fluid**  
Courtesy of FORD MOTOR CO.

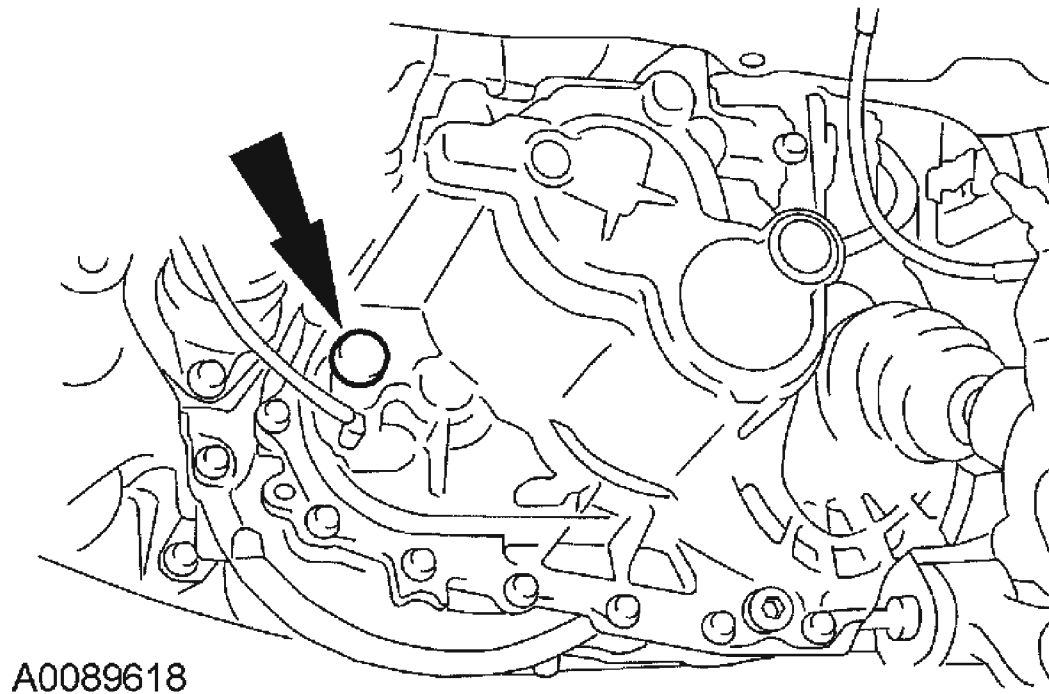
**NOTE:** Use a new gasket and apply sealant on the drain plug.

3. Install the drain plug.
  - Tighten to 35 Nm (26 lb-ft).



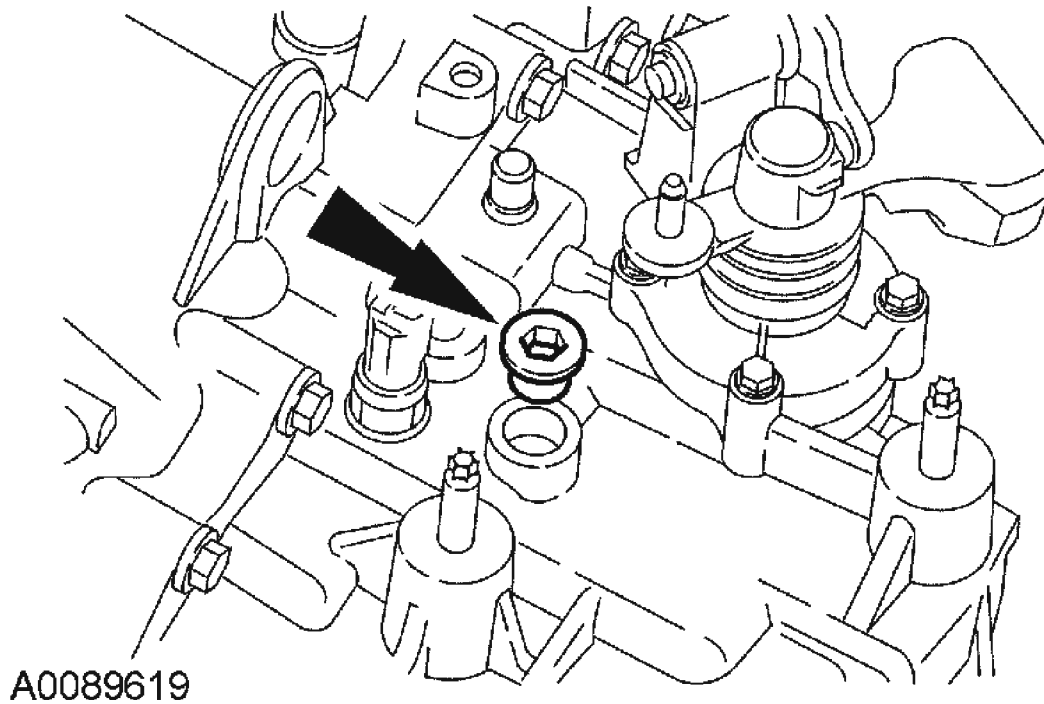
**Fig. 3: Installing Drain Plug**  
Courtesy of FORD MOTOR CO.

4. Remove the fill level inspection plug.



**Fig. 4: Removing Fill Level Inspection Plug**  
Courtesy of FORD MOTOR CO.

5. Remove the transaxle fill plug.

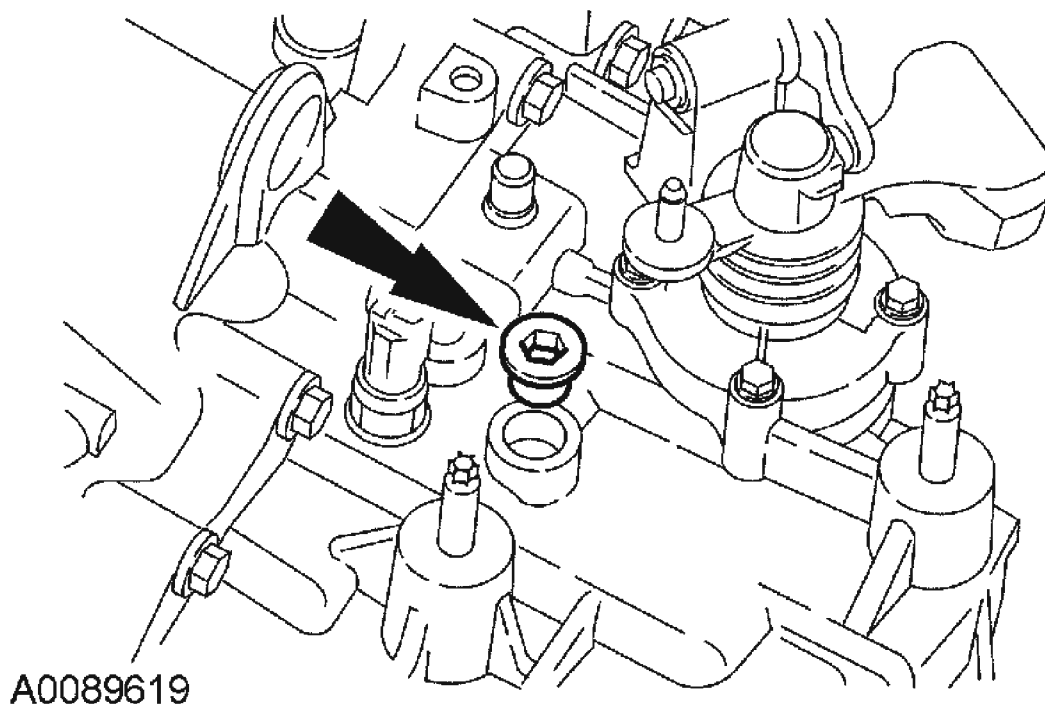


**Fig. 5: Removing Transaxle Fill Plug**  
Courtesy of FORD MOTOR CO.

6. Fill the transmission with gear oil until level with the fill level inspection plug hole.

**NOTE:** Use a new gasket and apply sealant on the fill plug.

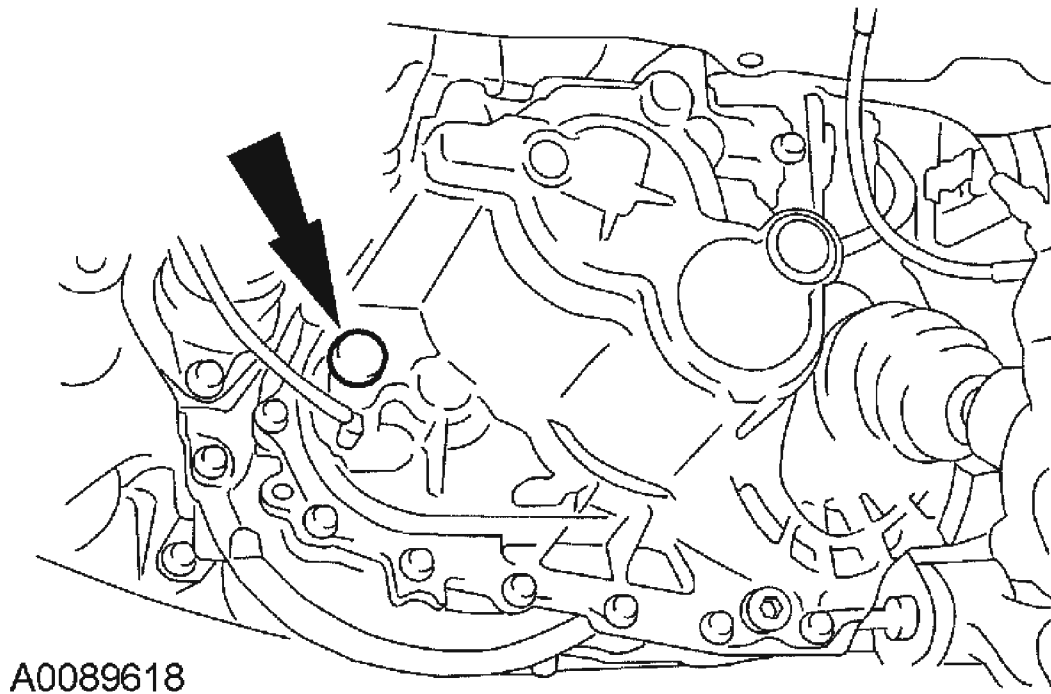
7. Install the transaxle fill plug.
  - Tighten to 35 Nm (26 lb-ft).



**Fig. 6: Installing Transaxle Fill Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** Use a new gasket and apply sealant on the fill level inspection plug.

8. Install the fill level inspection plug.
  - Tighten to 35 Nm (26 lb-ft).

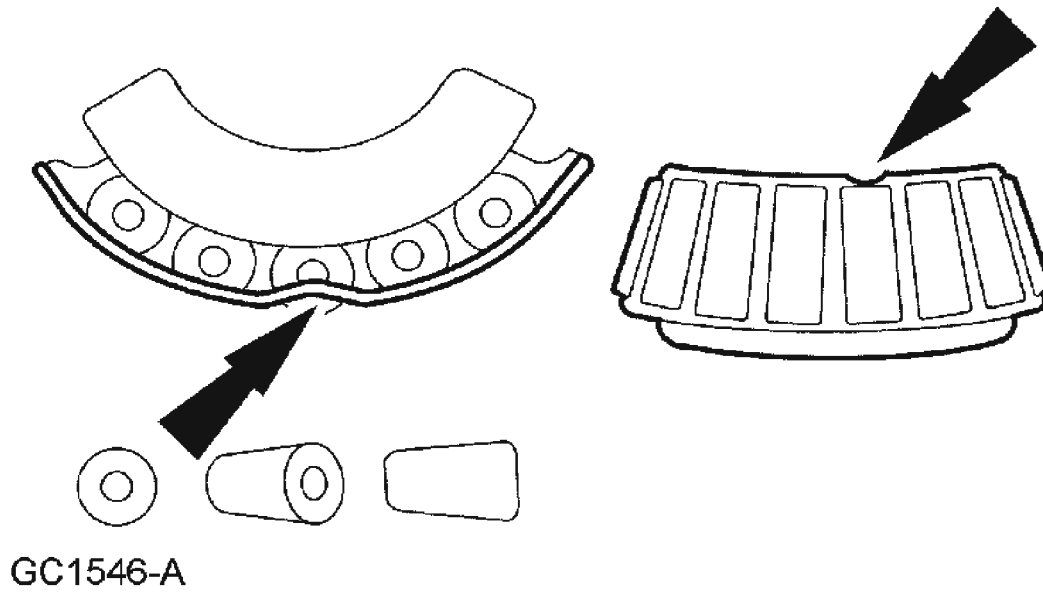


**Fig. 7: Installing Fill Level Inspection Plug**  
Courtesy of FORD MOTOR CO.

#### BEARING CHECK

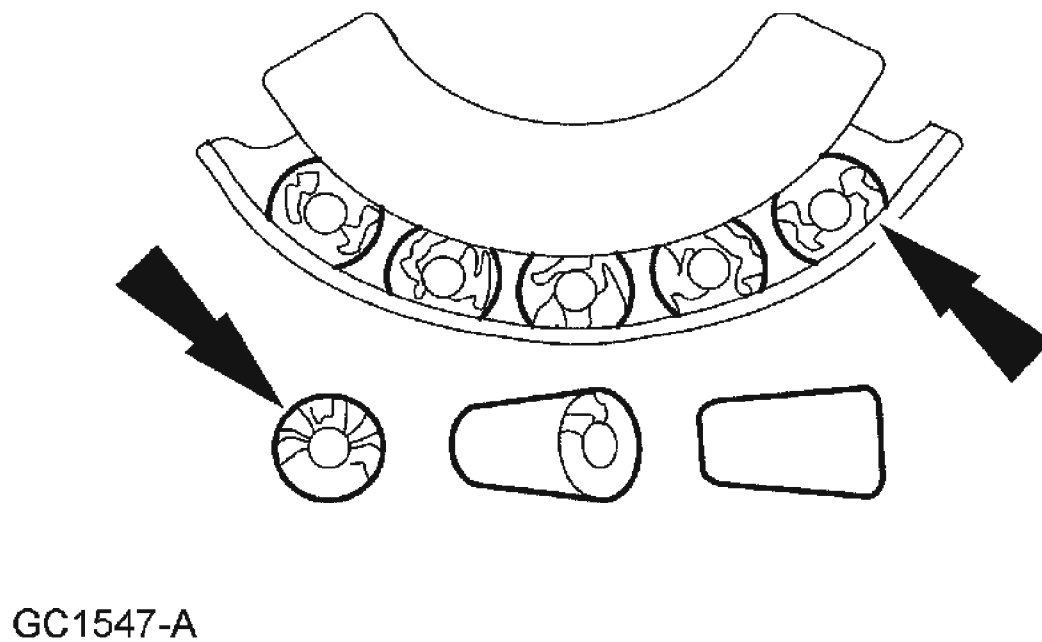
**CAUTION:** If any of the following conditions exist, install a new bearing.

1. Inspect the bearing for a bent cage.



**Fig. 8: Inspecting Bearing For Bent Cage**  
Courtesy of FORD MOTOR CO.

2. Inspect the bearings for galling (metal smears on the roller ends).

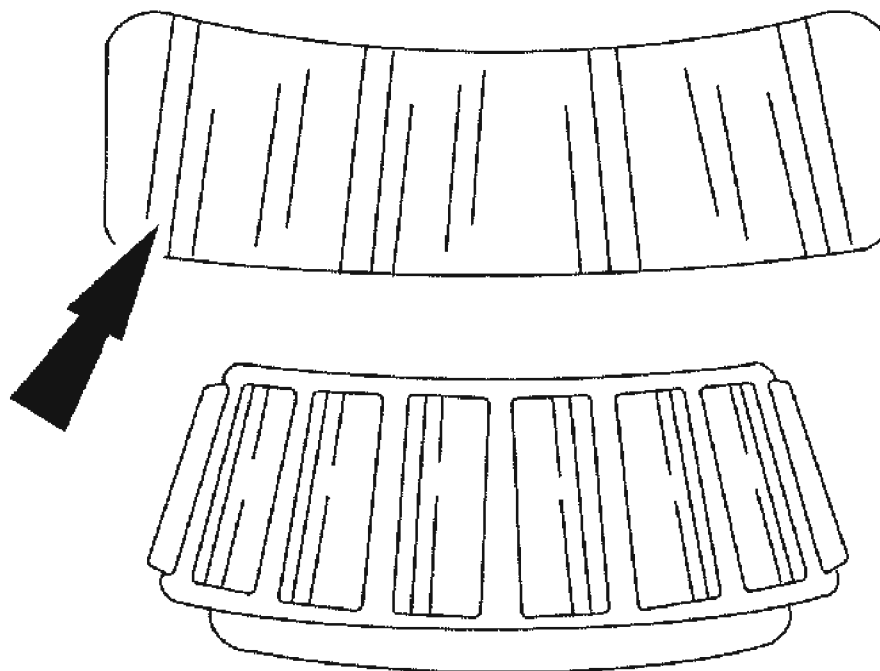


**Fig. 9: Inspecting Bearings For Galling**



Courtesy of FORD MOTOR CO.

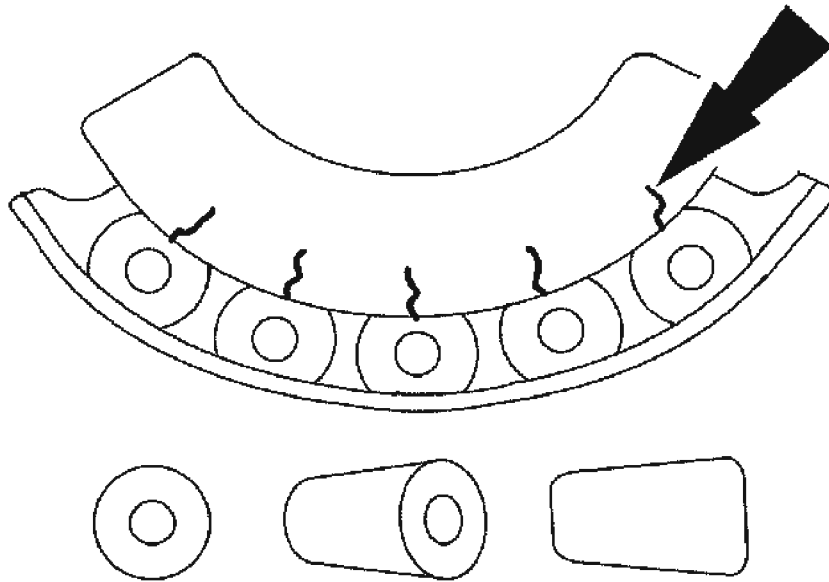
3. Inspect the bearings for brinelling (surface indentation in the race).



GC1548-A

**Fig. 10: Inspecting Bearings For Brinelling (Surface Indentation In Race)**  
Courtesy of FORD MOTOR CO.

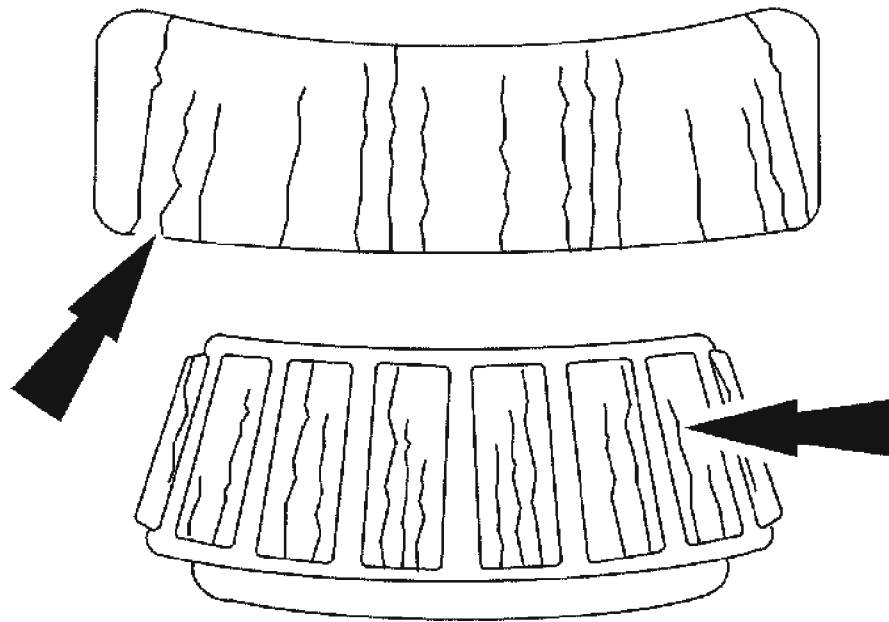
4. Inspect the bearing for a cracked inner race.



GC1549-A

**Fig. 11: Inspecting Bearing For Cracked Inner Race**  
Courtesy of FORD MOTOR CO.

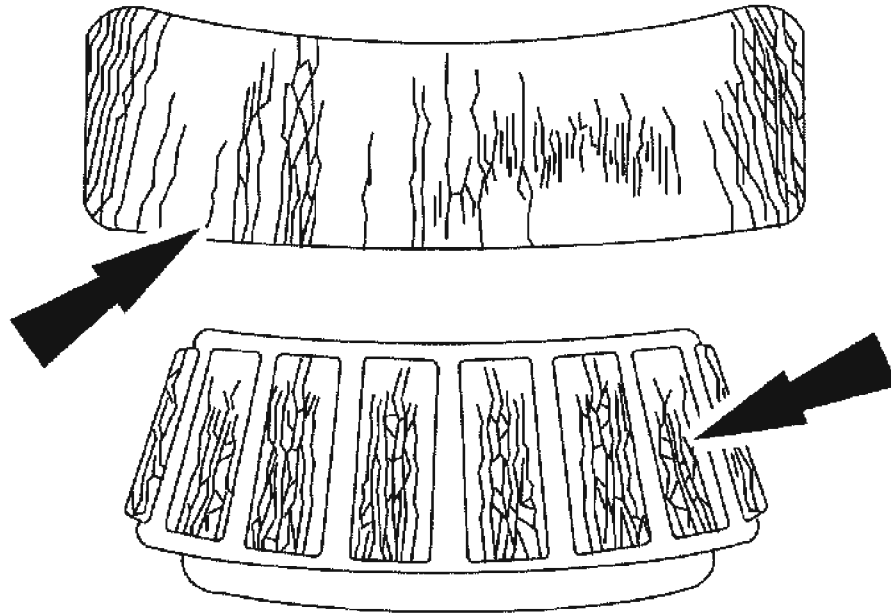
**CAUTION:** If etching is present, inspect the seals.



GC1550-A

**Fig. 12: Inspecting Bearing And Race For Etching**  
**Courtesy of FORD MOTOR CO.**

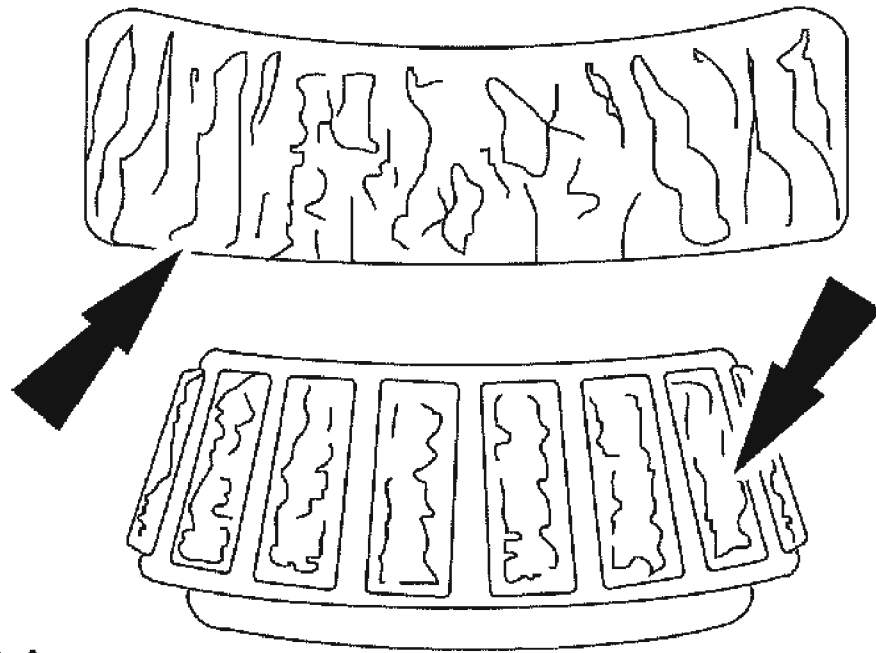
5. Inspect the bearing and race for etching.
6. Inspect the bearing for heat discoloration (dark blue).



GC1551-A

**Fig. 13: Inspecting Bearing For Heat Discoloration (Dark Blue)**  
Courtesy of FORD MOTOR CO.

7. Inspect the bearing for fatigue spalling (metal flaking).



GC1552-A

**Fig. 14: Inspecting Bearing For Fatigue Spalling (Metal Flaking)**  
Courtesy of FORD MOTOR CO.

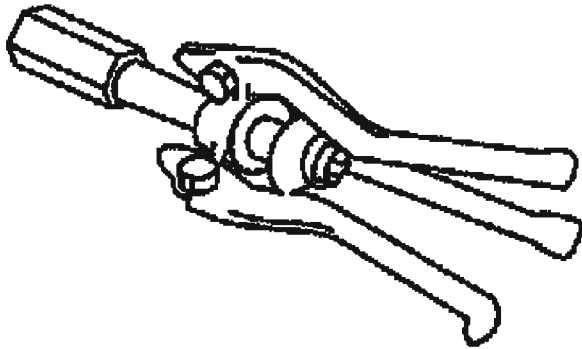
## IN-VEHICLE REPAIR

### HALFSHAFT OIL SEAL

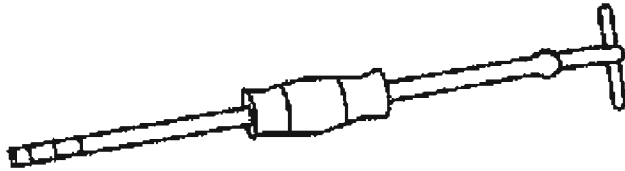
Special Tool(s)

### SPECIAL TOOL DESCRIPTION

Bearing Cup Remover 308-047  
(T77F-1102-A)



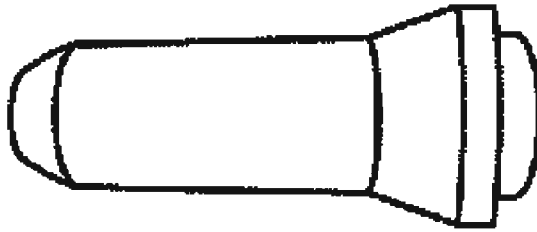
**ST1200-A**



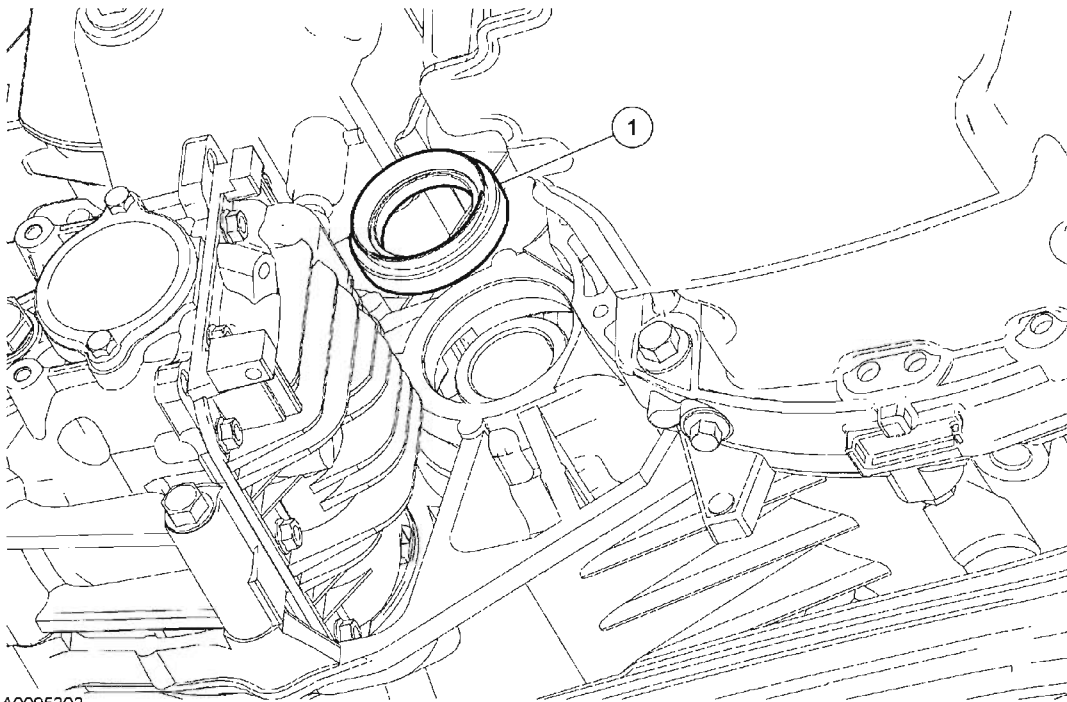
**ST1185-A**

Slide Hammer 100-001 (T50T-100-A)

Installer, Output Shaft Seal 308-579 or equivalent



**ST1833-A**



A0095303

Item	Part Number	Description
1	7052	Halfshaft oil seal

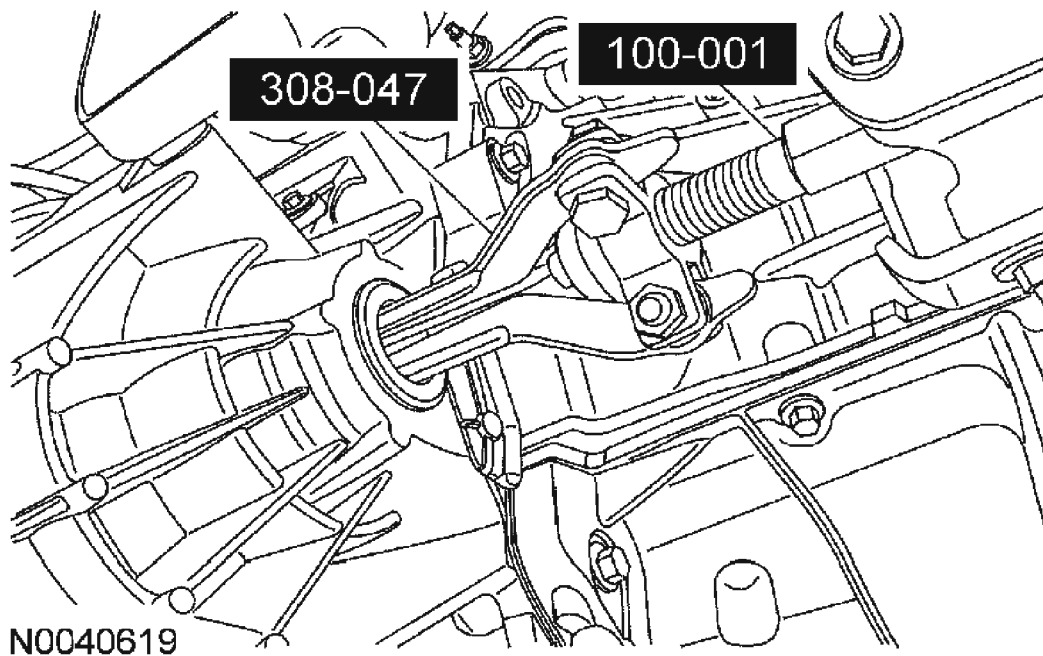
**Fig. 15: Identifying Halfshaft Oil Seal**  
Courtesy of FORD MOTOR CO.

Removal and Installation

**CAUTION:** New halfshaft oil seals should be installed anytime the halfshafts are removed. Failure to install new halfshafts seals may result in transmission oil leak(s).

**NOTE:** RH intermediate shaft oil seal shown in Fig. 16, LH halfshaft oil seal similar.

1. Remove the RH intermediate shaft or LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS**.
2. Using the special tools, remove the RH intermediate shaft oil seal or the LH halfshaft oil seal.

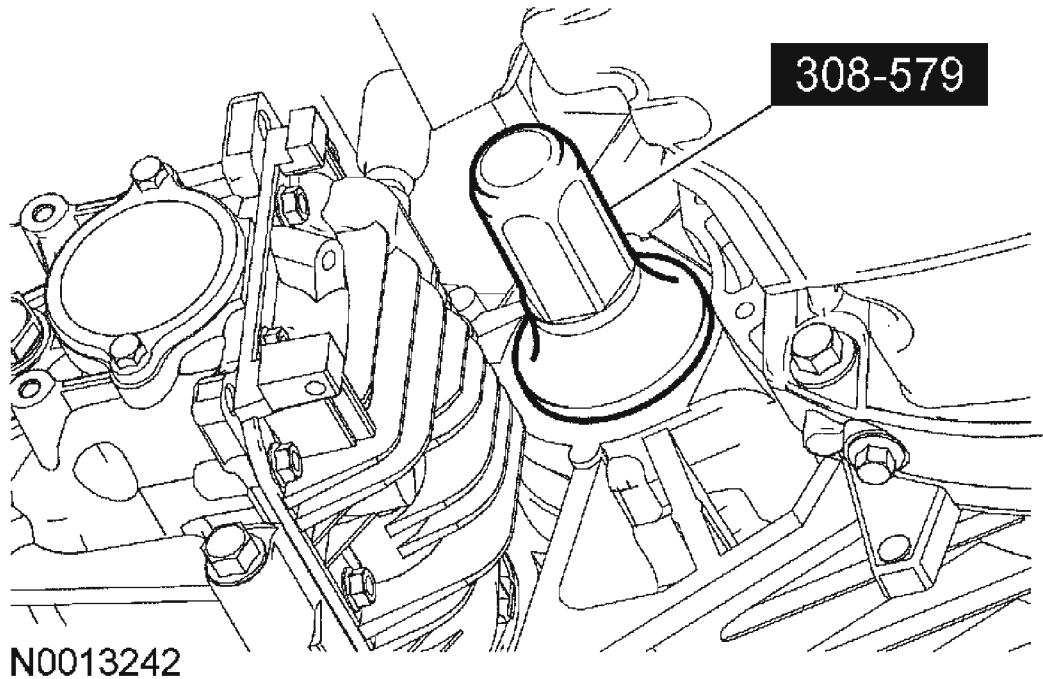


**Fig. 16: Removing RH Intermediate Shaft Oil Seal**  
Courtesy of FORD MOTOR CO.

#### Installation

1. Using the special tool, install the halfshaft oil seal.



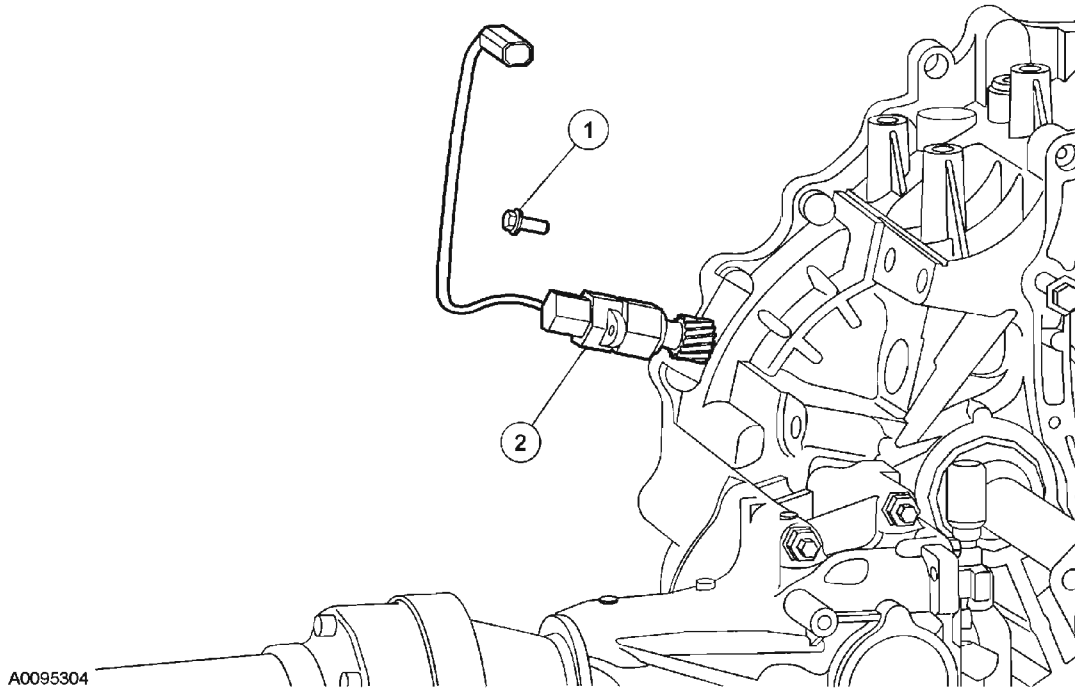


**Fig. 17: Installing Halfshaft Oil Seal**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure to use the seal protector when installing the RH intermediate shaft and the LH halfshaft. Failure to use the seal protector may result in transmission oil leaks.

2. Install the RH intermediate shaft or LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS**.

**VEHICLE SPEED SENSOR (VSS)**



Item	Part Number	Description
1	W500013-S301	Vehicle speed sensor (VSS) bolt
2	17271	VSS

**Fig. 18: Identifying Vehicle Speed Sensor (VSS)**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation

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

**NOTE:** The electrical connector and the VSS are accessed from the top of the transaxle.

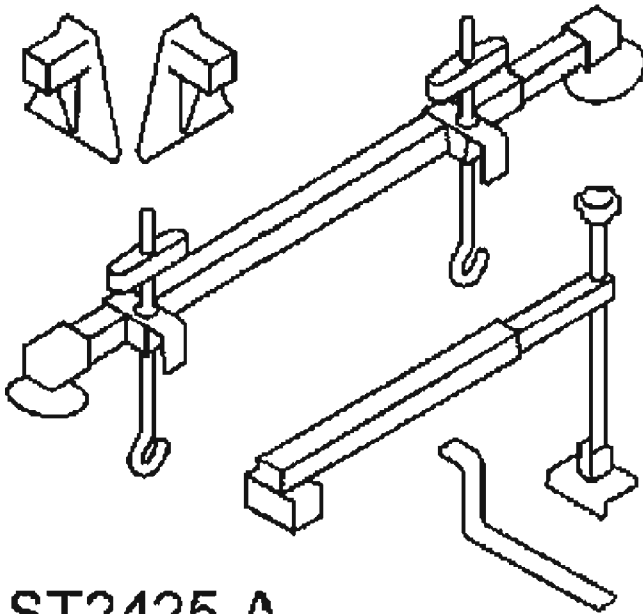
2. Remove the VSS bolt.
3. Disconnect the electrical connector and remove the VSS.
4. To install, reverse the removal procedure.

#### TRANSAXLE SUPPORT INSULATOR - LH

#### Special Tool(s)

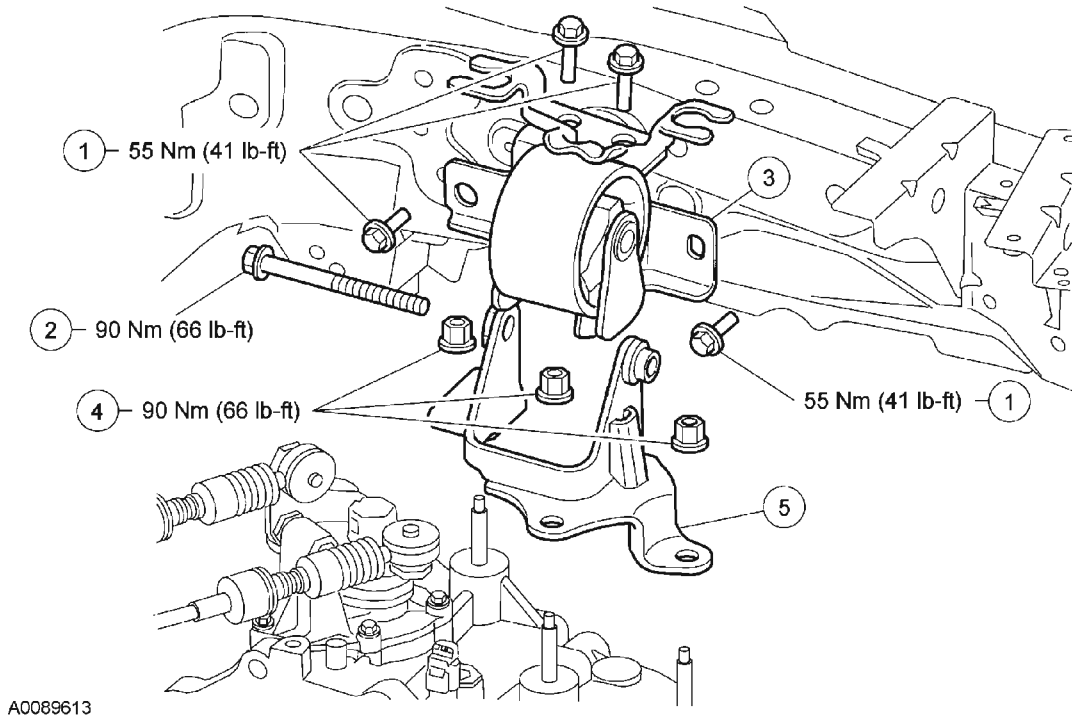
#### SPECIAL TOOL DESCRIPTION

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**ST2425-A**

3-Bar Engine Support Kit 303-F072  
or equivalent

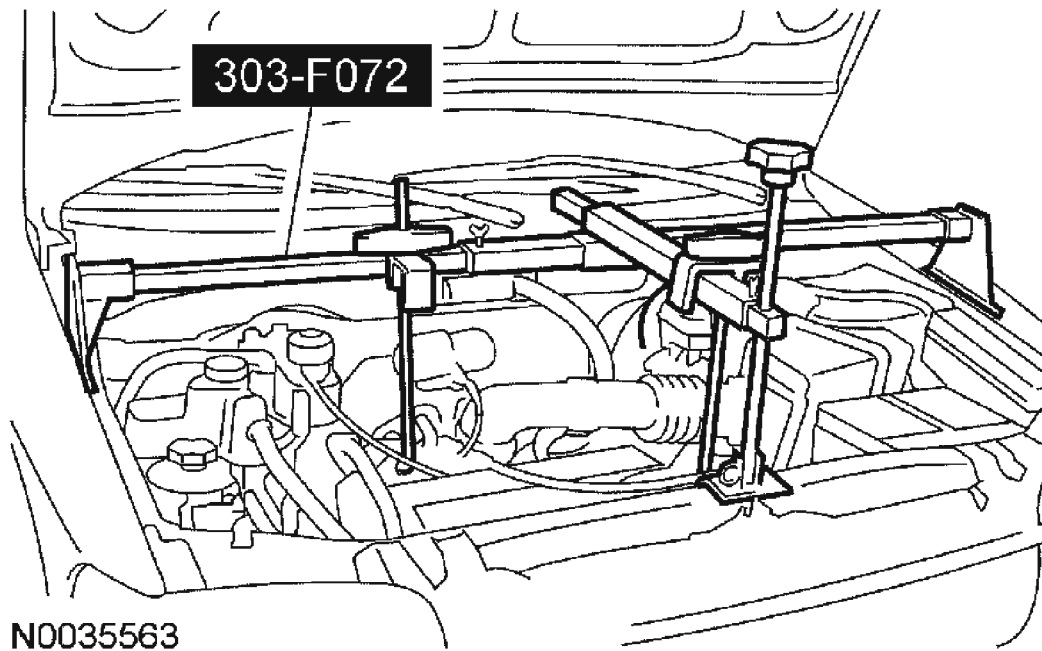


Item	Part Number	Description
1	W500032-S309	LH transaxle support insulator bolts (4 required)
2	W500553-S309	LH transaxle support insulator through-bolt
3	6B049	LH transaxle support insulator
4	W520415-S309	LH transaxle support insulator bracket nuts (3 required)
5	6M007	LH transaxle support insulator bracket

**Fig. 19: Identifying Transaxle Support Insulator - LH With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation

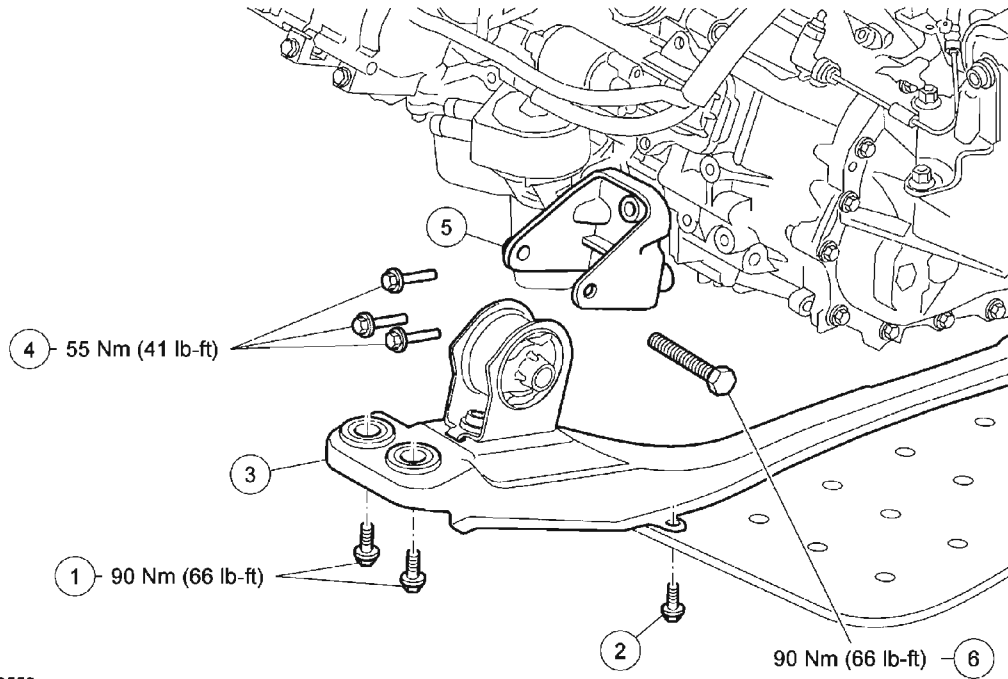
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L**.
3. Using the special tool, support the engine.



**Fig. 20: Supporting Engine**  
**Courtesy of FORD MOTOR CO.**

4. Remove the 4 LH transaxle support insulator bolts.
  - To install, tighten to 55 Nm (41 lb-ft).
5. Remove the through-bolt and the LH transaxle support insulator.
  - To install, tighten to 90 Nm (66 lb-ft).
6. Remove the 3 nuts and the LH transaxle support insulator bracket.
  - To install, tighten to 90 Nm (66 lb-ft).
7. To install, reverse the removal procedure.

**TRANSAXLE FRONT SUPPORT INSULATOR**



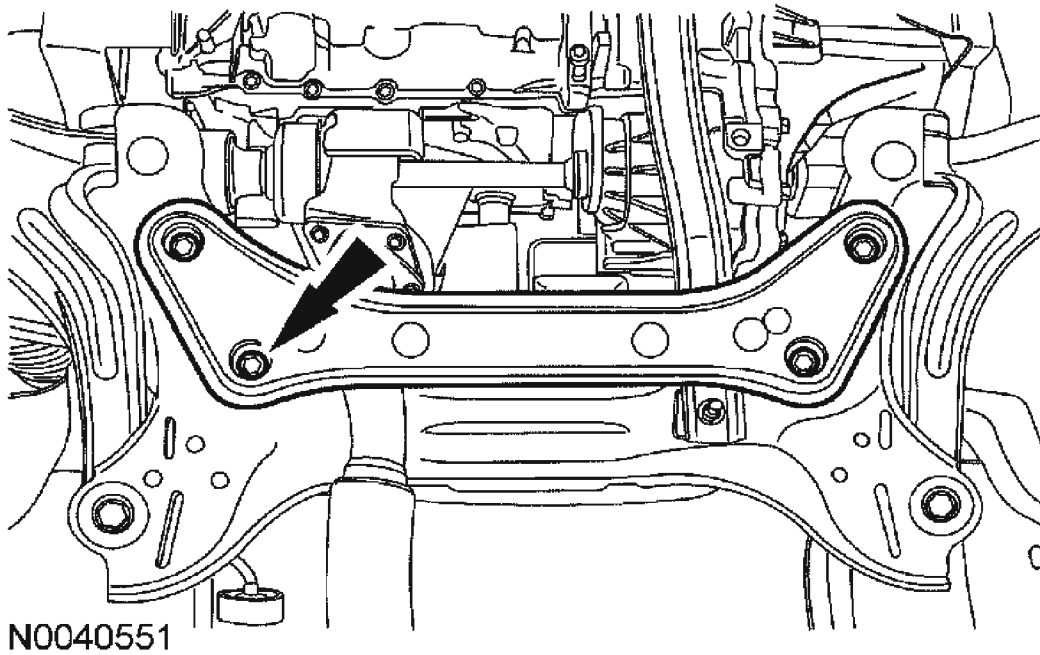
N0040558

Item	Part Number	Description
1	—	Transaxle front-to-aft crossmember bolts (2 required) and nut (1 required)
2	—	Splash shield screw
3	10852	Transaxle front-to-aft crossmember and transaxle front support insulator
4	W705878-S309	Transaxle front support insulator bracket bolts (3 required)
5	6A060	Transaxle front support insulator bracket
6	W500554-S309	Transaxle front support insulator through-bolt

**Fig. 21: Identifying Transaxle Front Support Insulator With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

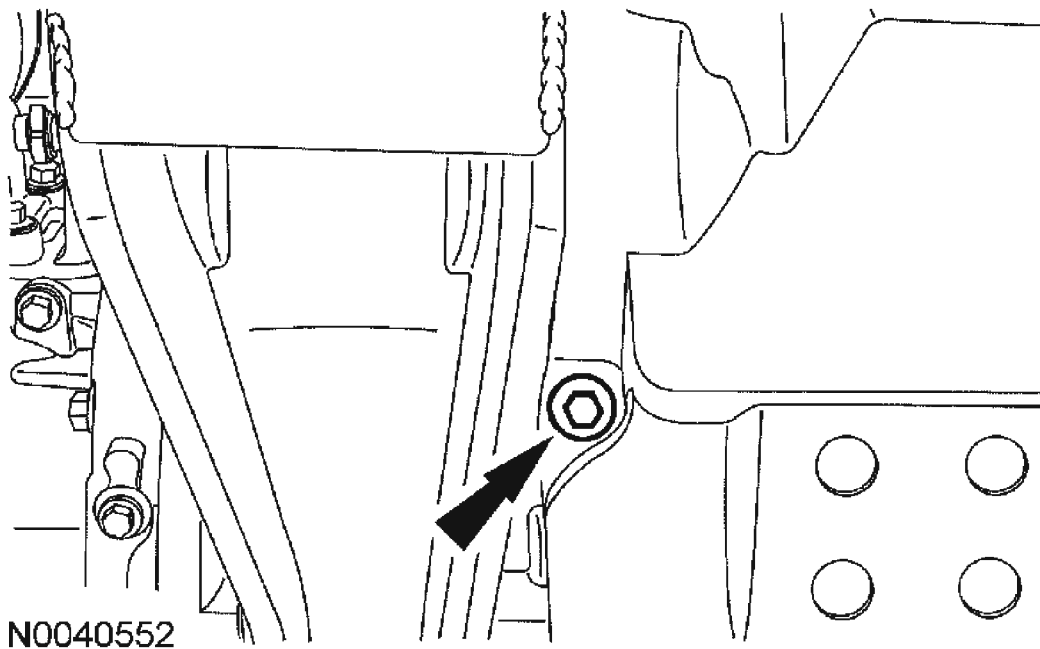
#### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the crossmember bolts and the crossmember.



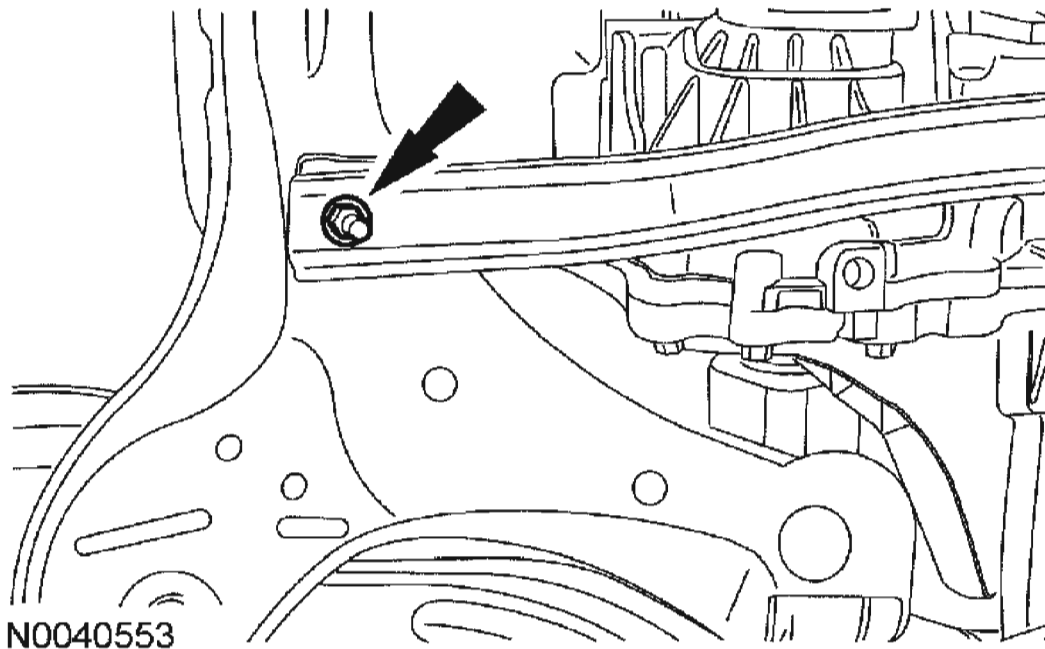
**Fig. 22: Removing Crossmember Bolts And Crossmember**  
Courtesy of FORD MOTOR CO.

3. Remove the splash shield bolt.



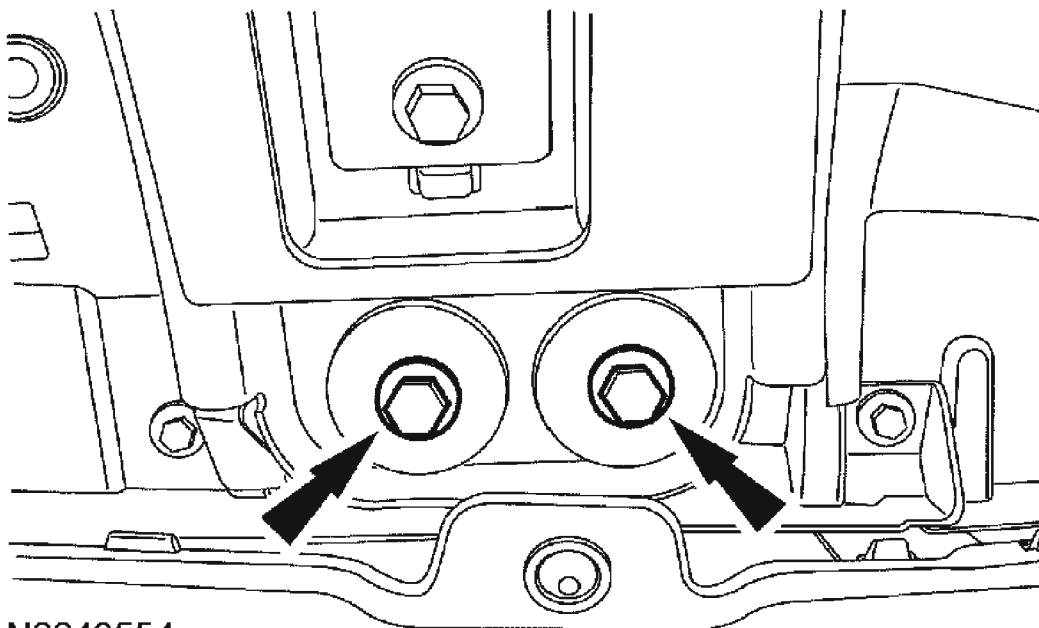
**Fig. 23: Removing Splash Shield Bolt**  
Courtesy of FORD MOTOR CO.

4. Remove the 2 rear front-to-aft crossmember bolts and nut and the rear front-to-aft crossmember.
  - To install, tighten to 90 Nm (66 lb-ft).



**Fig. 24: Removing Rear Front-To-AFT Crossmember Bolts And Nut**  
Courtesy of FORD MOTOR CO.

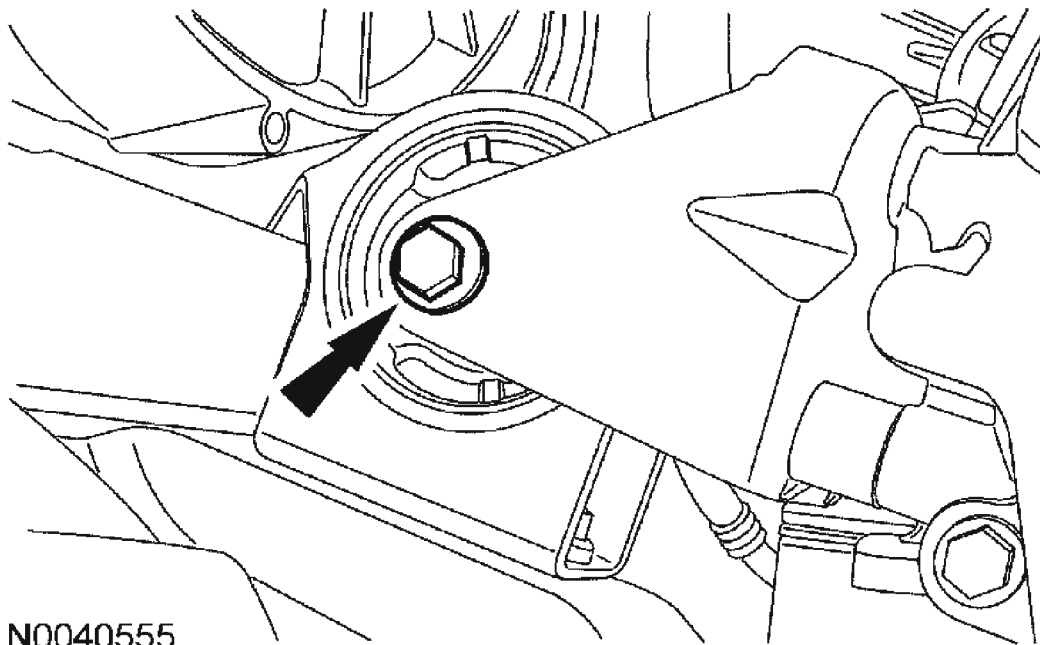




N0040554

**Fig. 25: Installing Rear Front-To-Aft Crossmember Bolts And Nut**  
Courtesy of FORD MOTOR CO.

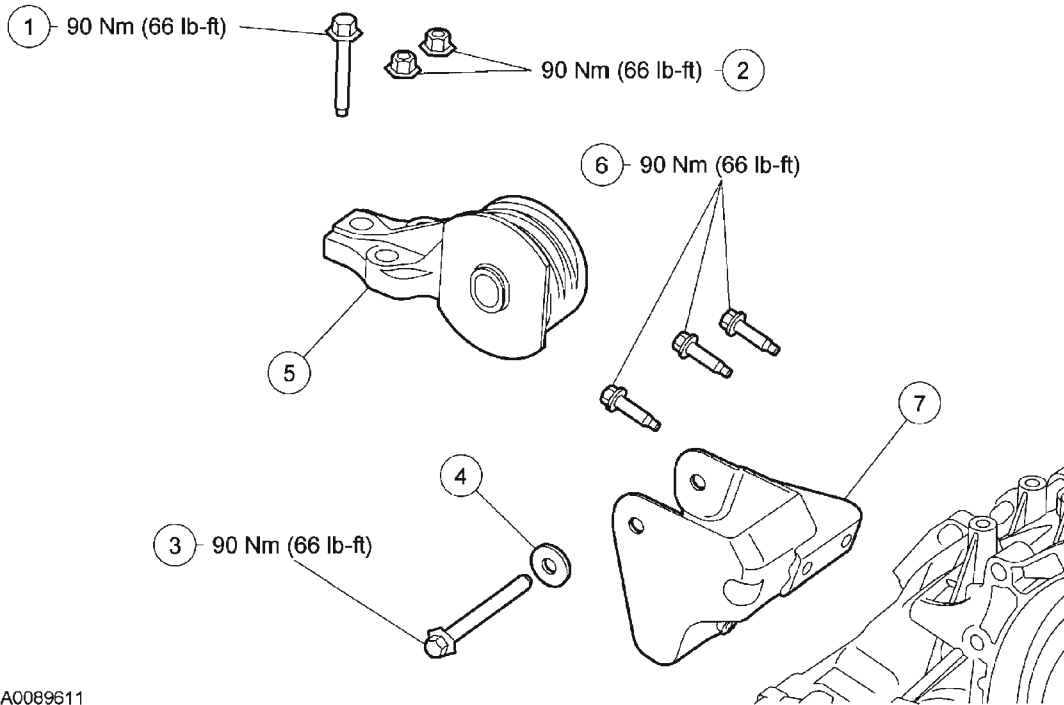
5. Remove the through-bolt and the transaxle front support insulator and rear front-to-aft crossmember assembly.
  - To install, tighten to 90 Nm (66 lb-ft).



**Fig. 26: Removing Through-Bolt And Transaxle Front Support Insulator**  
Courtesy of FORD MOTOR CO.

6. If necessary, remove the 3 bolts and the transaxle front support insulator bracket.
  - To install, tighten to 55 Nm (41 lb-ft).
7. To install, reverse the removal procedure.

#### **TRANSAXLE REAR SUPPORT INSULATOR**



A0089611

Item	Part Number	Description
1	W500032-S309	Transaxle rear support insulator bolt
2	W520415-S309	Transaxle rear support insulator nuts (2 required)
3	W500544-S309	Transaxle rear support insulator through-bolt
4	—	Washer (part of 6E037)
5	6E037	Transaxle rear support insulator
6	W705878-S309	Transaxle rear support insulator bracket bolts (3 required)
7	7G034	Transaxle rear support insulator bracket

**Fig. 27: Identifying Transaxle Rear Support Insulator With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

#### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the transaxle rear support insulator bolt.
  - To install, tighten to 90 Nm (66 lb-ft).
3. Remove the 2 transaxle rear support insulator nuts.
  - To install, tighten to 90 Nm (66 lb-ft).
4. Remove the transaxle rear support insulator through-bolt and washer.

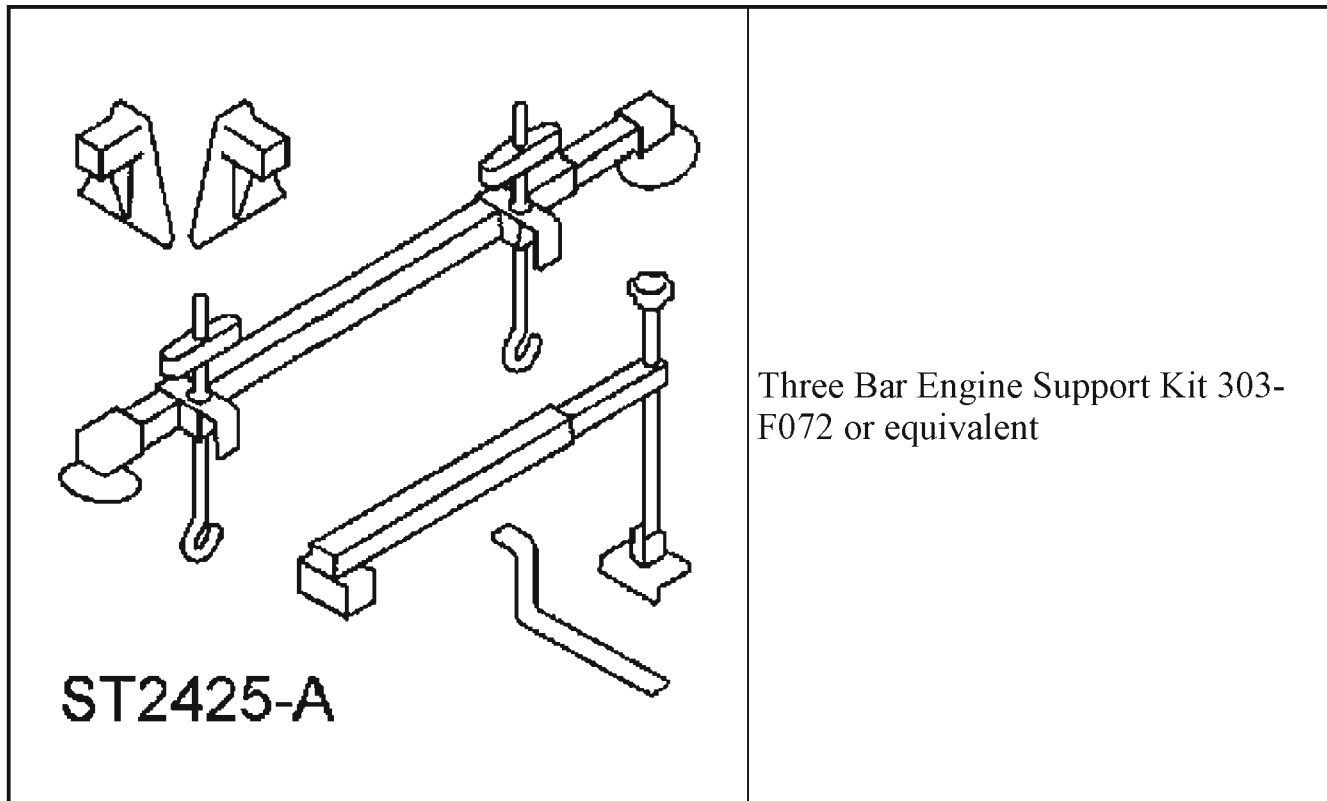
- To install, tighten to 90 Nm (66 lb-ft).
- 5. Remove the transaxle rear support insulator.
- 6. If necessary, remove the 3 bolts and the transaxle rear support insulator bracket.
  - To install, tighten to 90 Nm (66 lb-ft).
- 7. To install, reverse the removal procedure.

## REMOVAL

### TRANSAXLE

#### Special Tool(s)

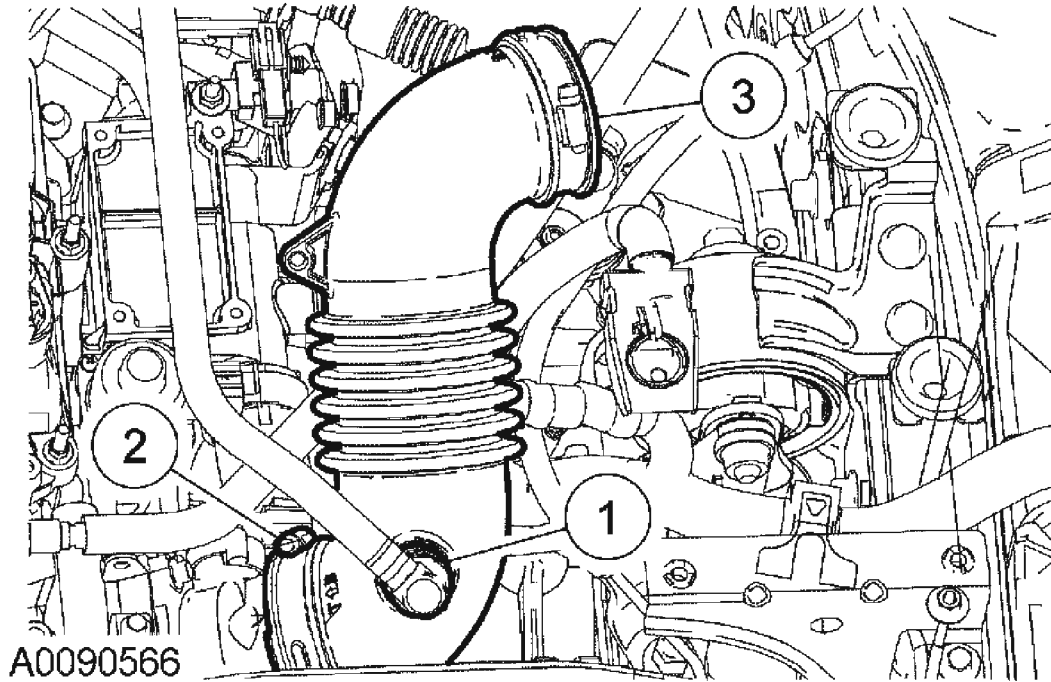
#### SPECIAL TOOL DESCRIPTION



#### Removal

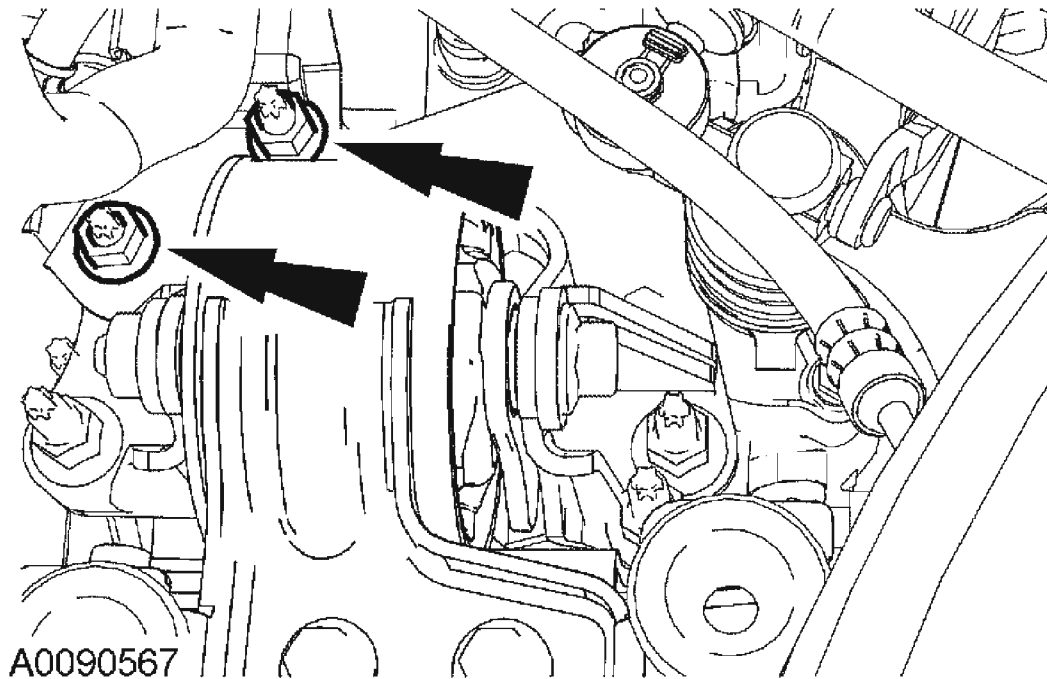
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L**.
3. Remove the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
4. Remove the air cleaner outlet tube.
  1. Disconnect the emission management hose.

2. Loosen the clamp.
3. Remove the air cleaner outlet tube.



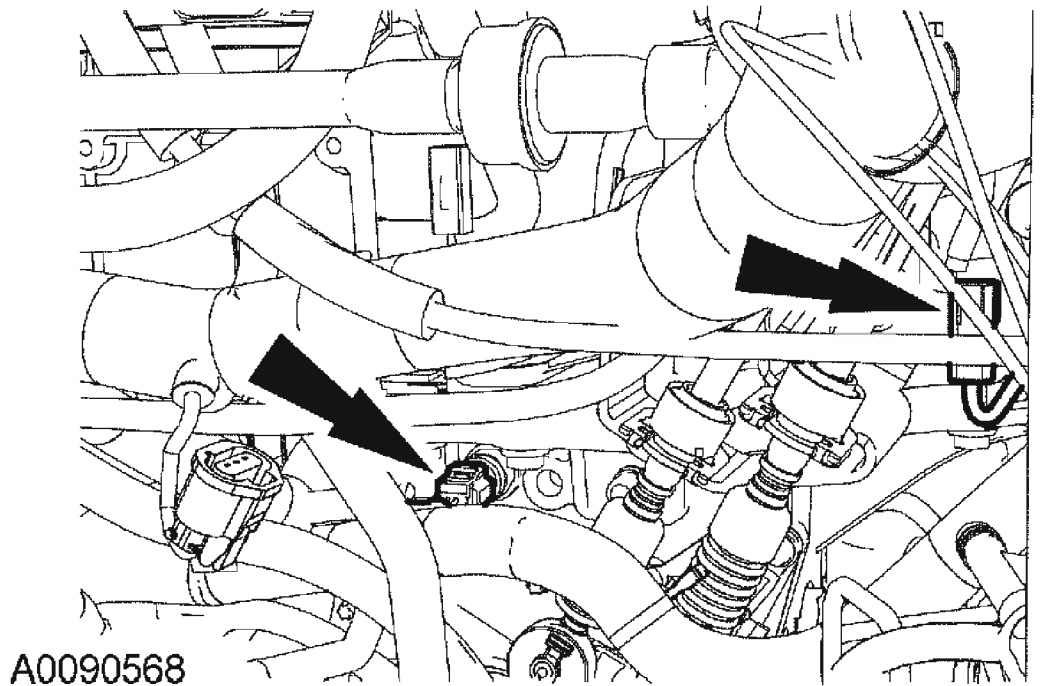
**Fig. 28: Removing Air Cleaner Outlet Tube**  
Courtesy of FORD MOTOR CO.

5. Remove the wiring harness bracket nuts.



**Fig. 29: Removing Wiring Harness Bracket Nuts**  
Courtesy of FORD MOTOR CO.

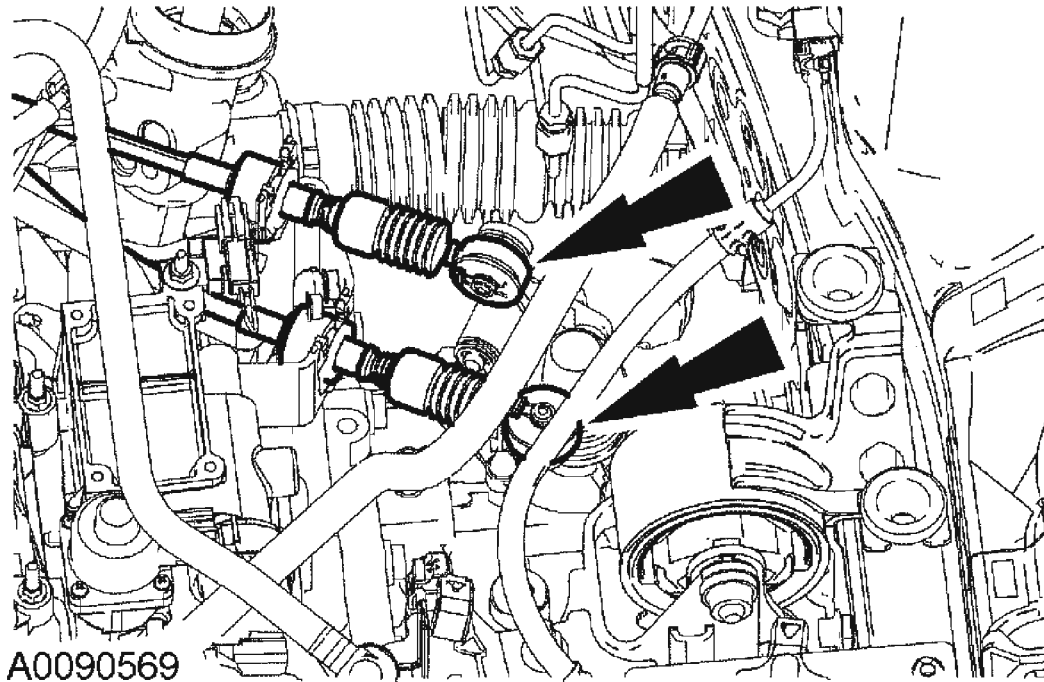
6. Disconnect the reverse switch and vehicle speed sensor (VSS) connectors.



**Fig. 30: Disconnecting Reverse Switch And Vehicle Speed Sensor (VSS) Connectors**

**Courtesy of FORD MOTOR CO.**

7. Disconnect the shift cables.

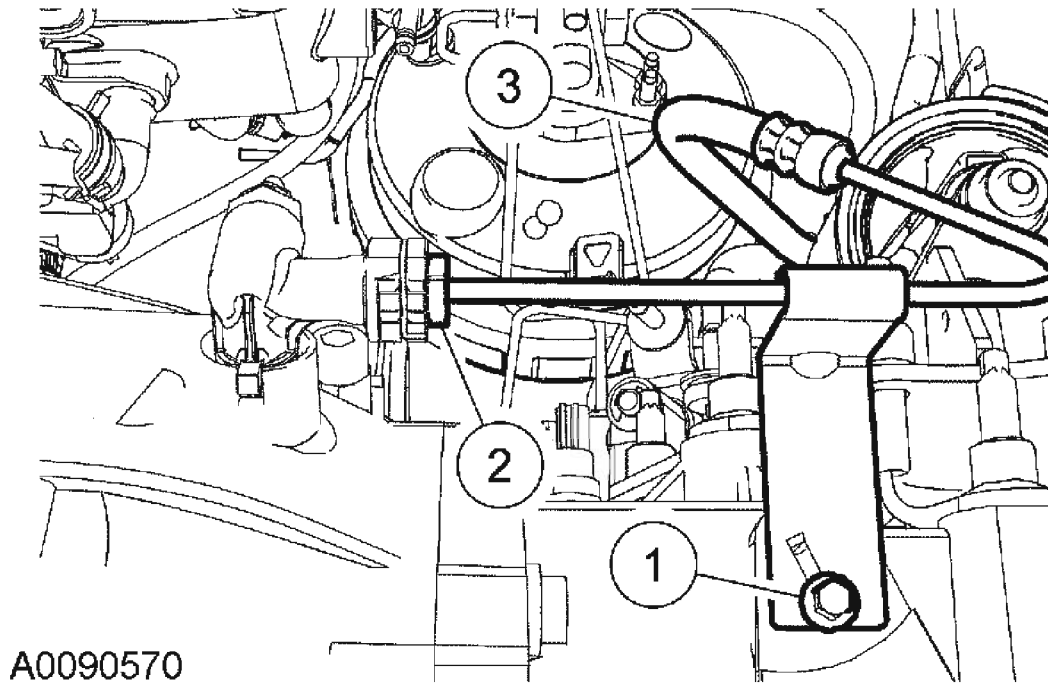


**Fig. 31: Disconnecting Shift Cables**  
Courtesy of FORD MOTOR CO.

**CAUTION:** To prevent damage, do not spill brake fluid onto plastic or painted surfaces.

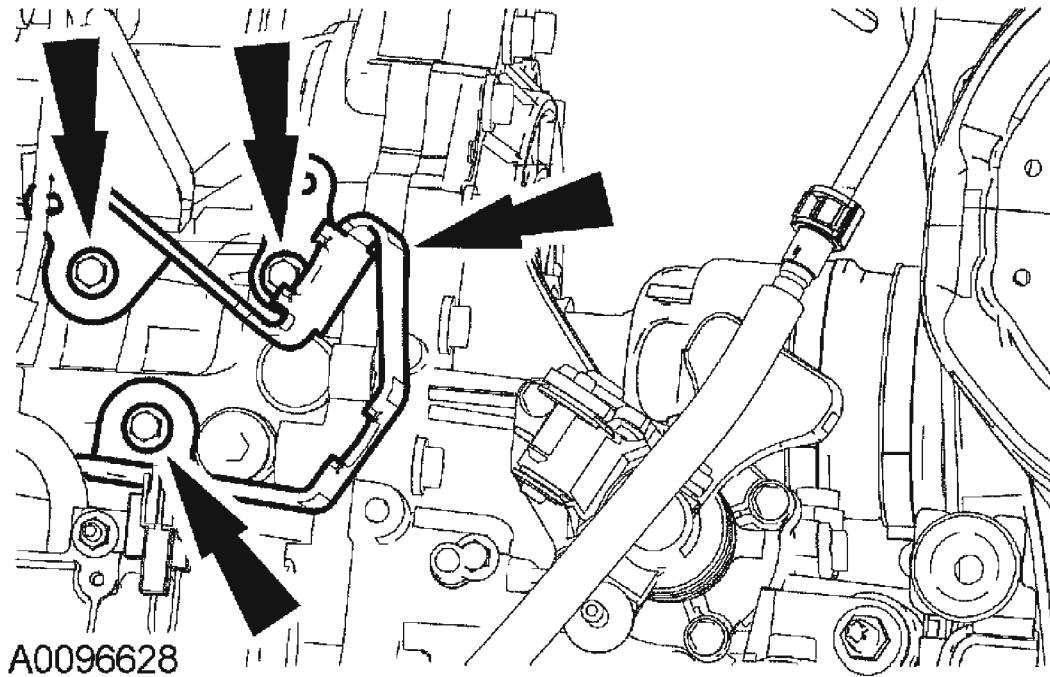
8. Position the clutch hydraulic line aside.
  1. Remove the clutch hydraulic line bracket-to-transaxle bolt.
  2. Disconnect the clutch hydraulic line from the clutch slave cylinder.
    - Plug the hydraulic line.
  3. Position the clutch hydraulic line aside.





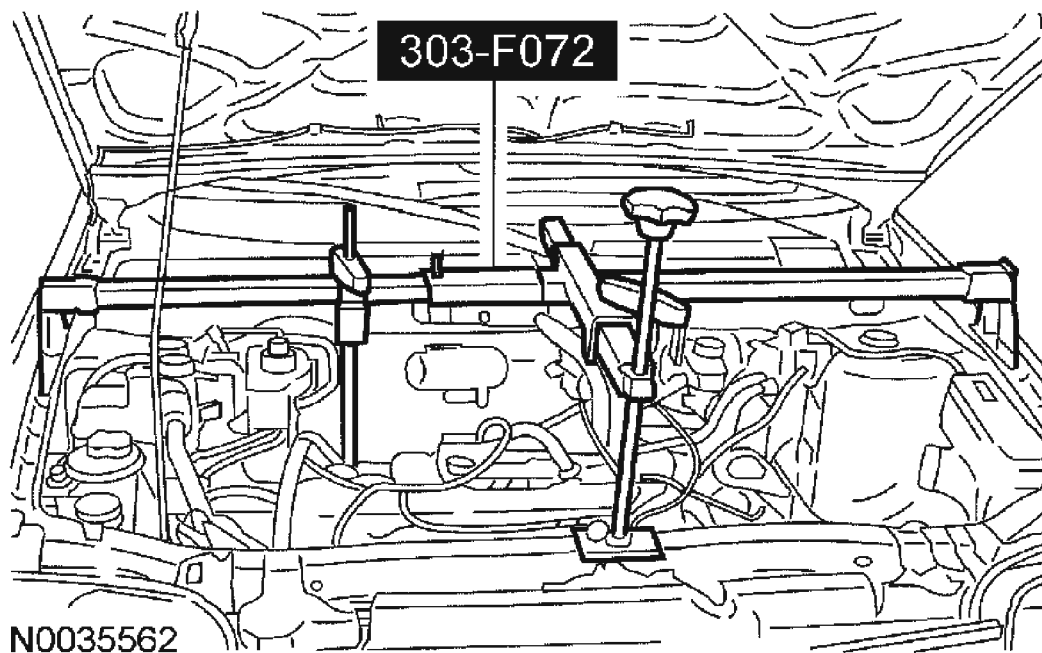
**Fig. 32: Positioning Clutch Hydraulic Line Aside**  
**Courtesy of FORD MOTOR CO.**

9. Remove the shift cable bracket.
  - Remove the 3 bolts.
  - Remove the shift cable bracket.



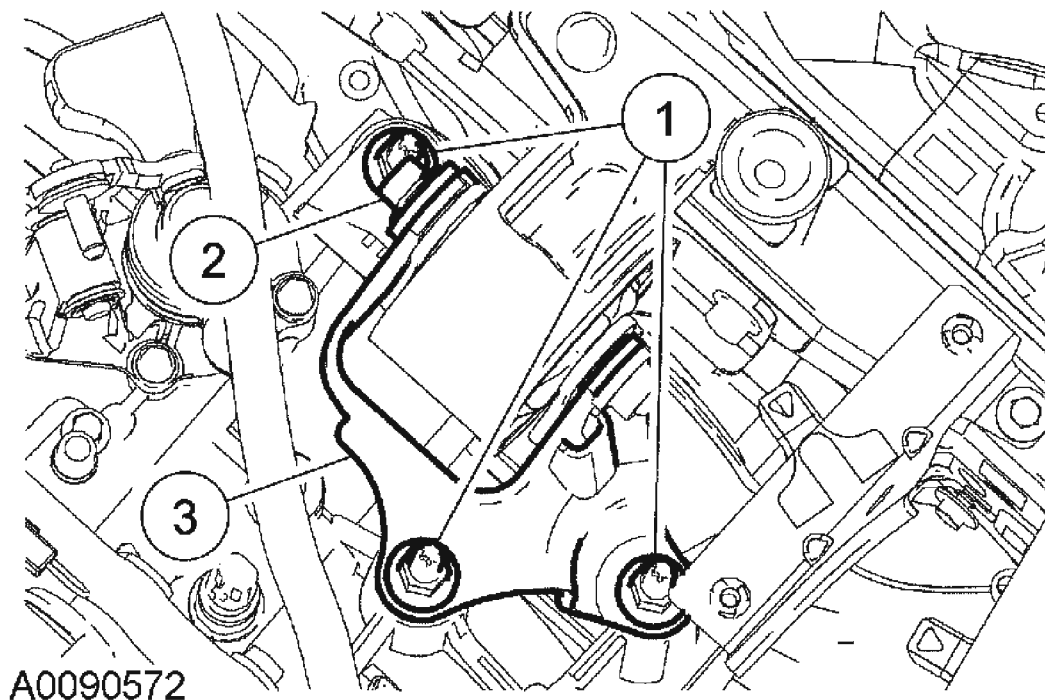
**Fig. 33: Removing Shift Cable Bracket**  
Courtesy of FORD MOTOR CO.

10. Using the special tool, support the engine.



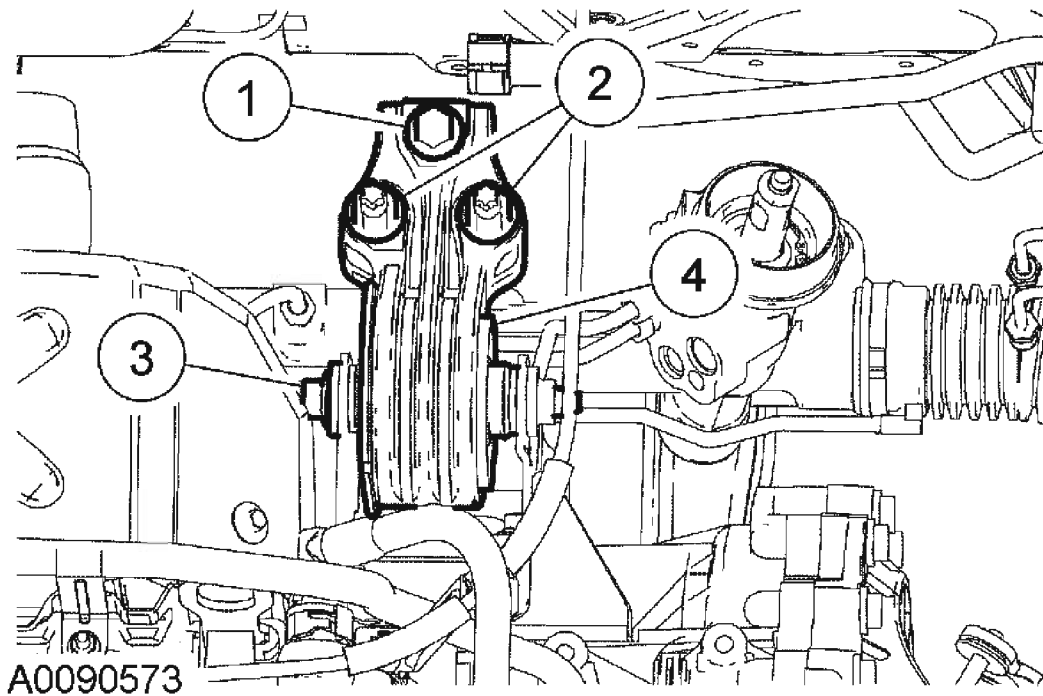
**Fig. 34: Supporting Engine**  
Courtesy of FORD MOTOR CO.

11. Remove the LH transaxle support insulator bracket.
  1. Remove the 3 nuts.
  2. Remove the through-bolt.
  3. Remove the LH transaxle support insulator bracket.



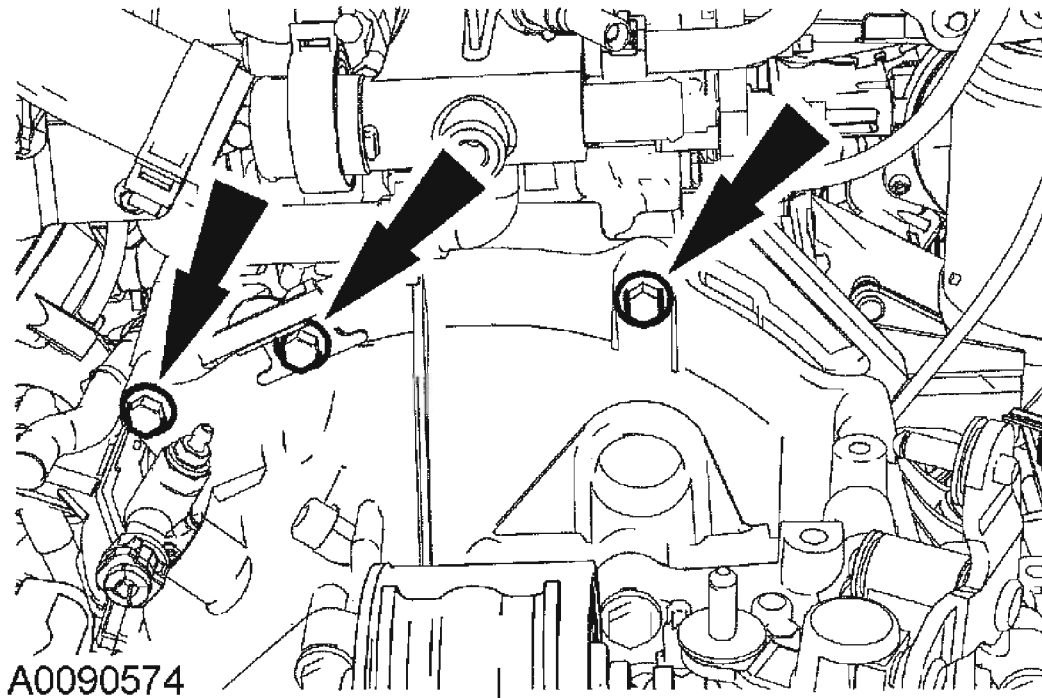
**Fig. 35: Removing LH Transaxle Support Insulator Bracket**  
Courtesy of FORD MOTOR CO.

12. Remove the transaxle rear support insulator.
  1. Remove the bolt.
  2. Remove the nuts.
  3. Remove the through-bolt.
  4. Remove the transaxle rear support insulator.



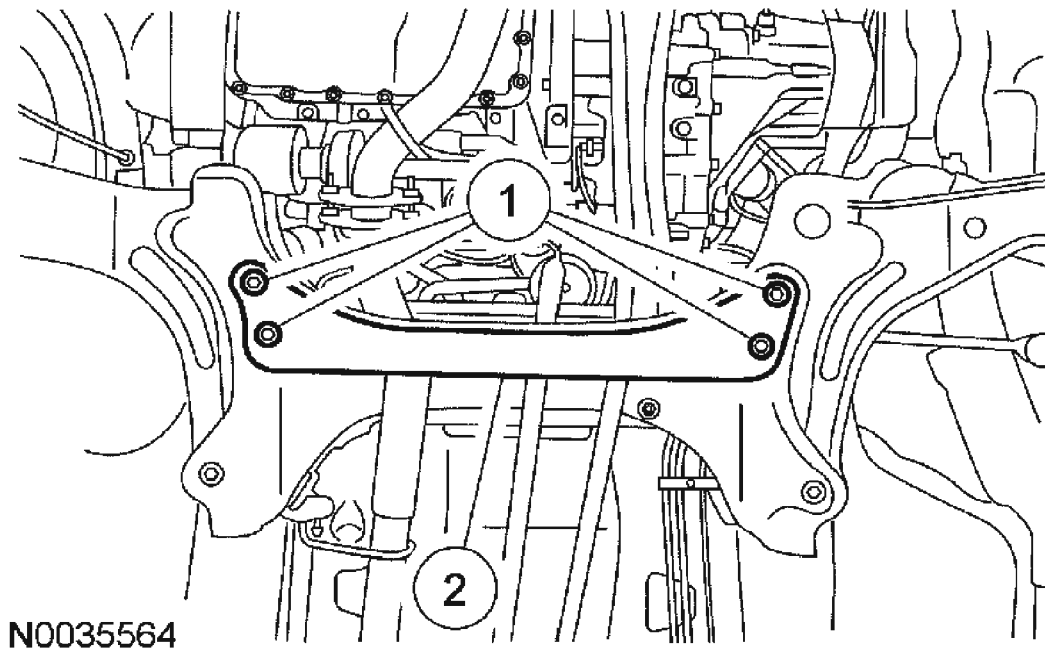
**Fig. 36: Remove Transaxle Rear Support Insulator**  
Courtesy of FORD MOTOR CO.

13. Remove the 3 upper transaxle-to-engine bolts.



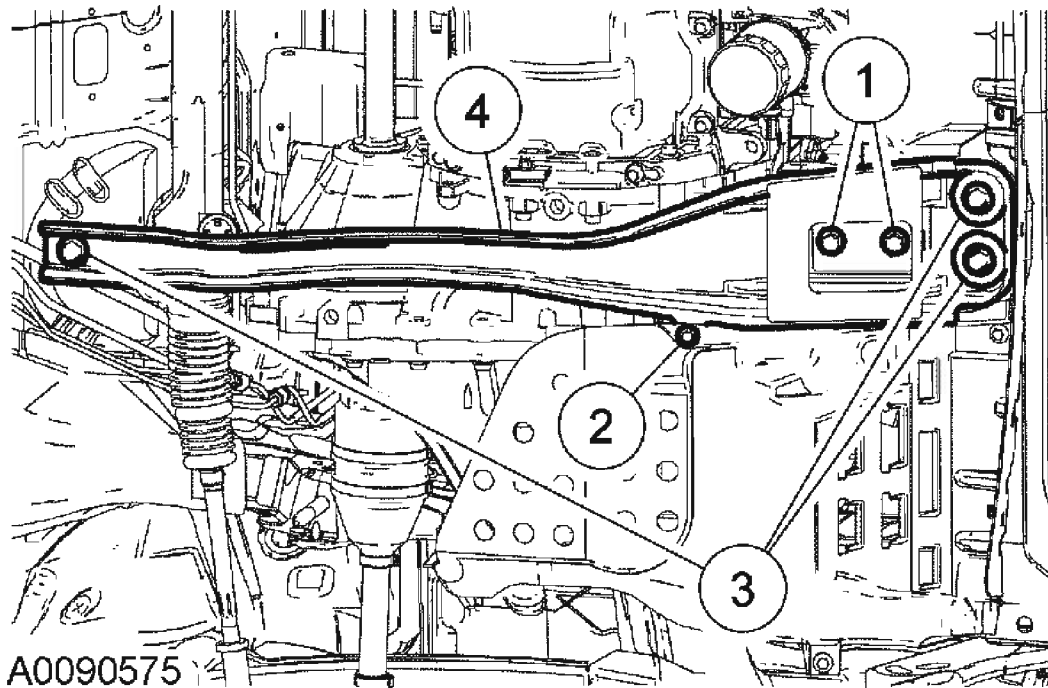
**Fig. 37: Removing Transaxle Rear Support Insulator**  
Courtesy of FORD MOTOR CO.

14. Drain the transaxle fluid. For additional information, refer to **TRANSAXLE DRAINING AND FILLING**.
15. Remove the crossmember.
  1. Remove the bolts.
  2. Remove the crossmember.



**Fig. 38: Removing Crossmember**  
Courtesy of FORD MOTOR CO.

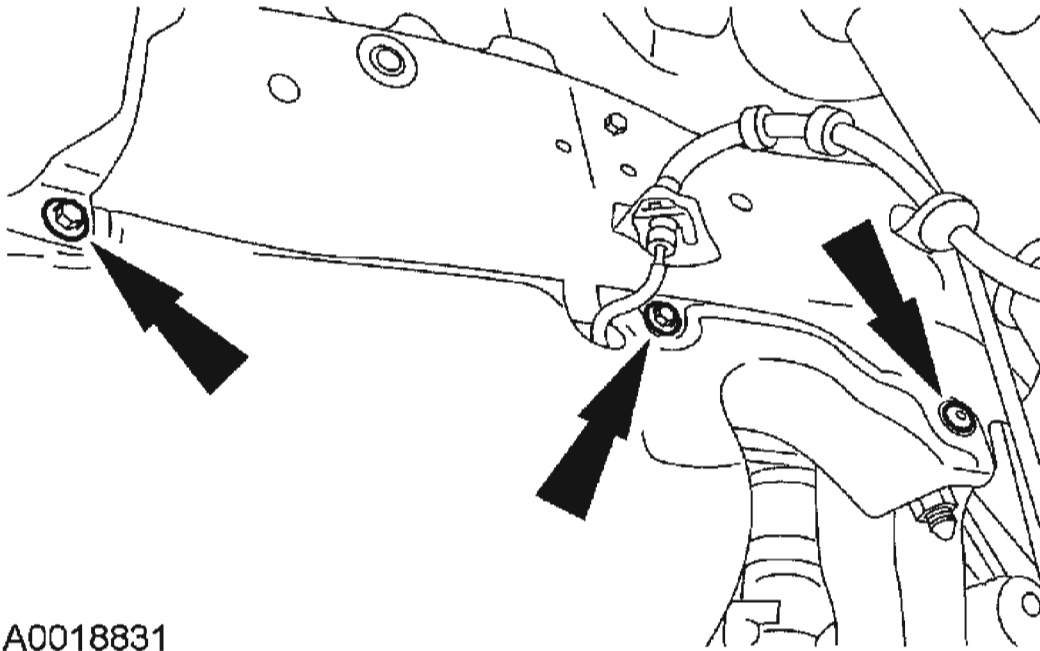
16. Remove the front-to-aft crossmember.
  1. Remove the 2 transaxle front support insulator bolts.
  2. Remove the splash shield screw.
  3. Remove the 2 front-to-aft crossmember bolts and nut.
  4. Remove the crossmember.



**Fig. 39: Removing Splash Shield Screw**  
Courtesy of FORD MOTOR CO.

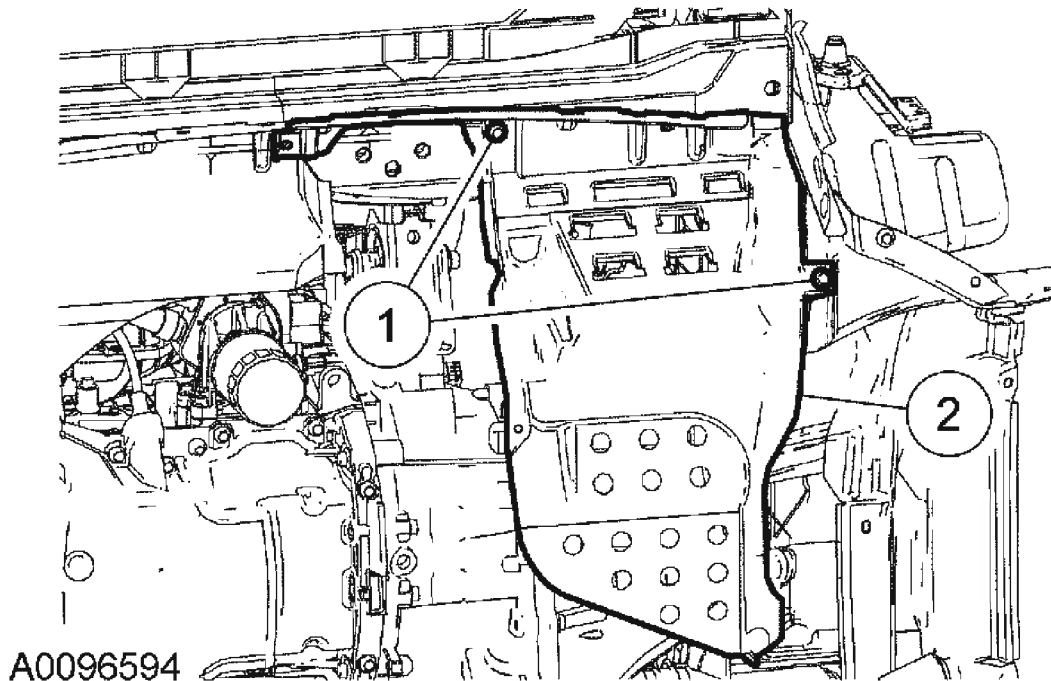
17. Remove the 3 LH splash shield screws.





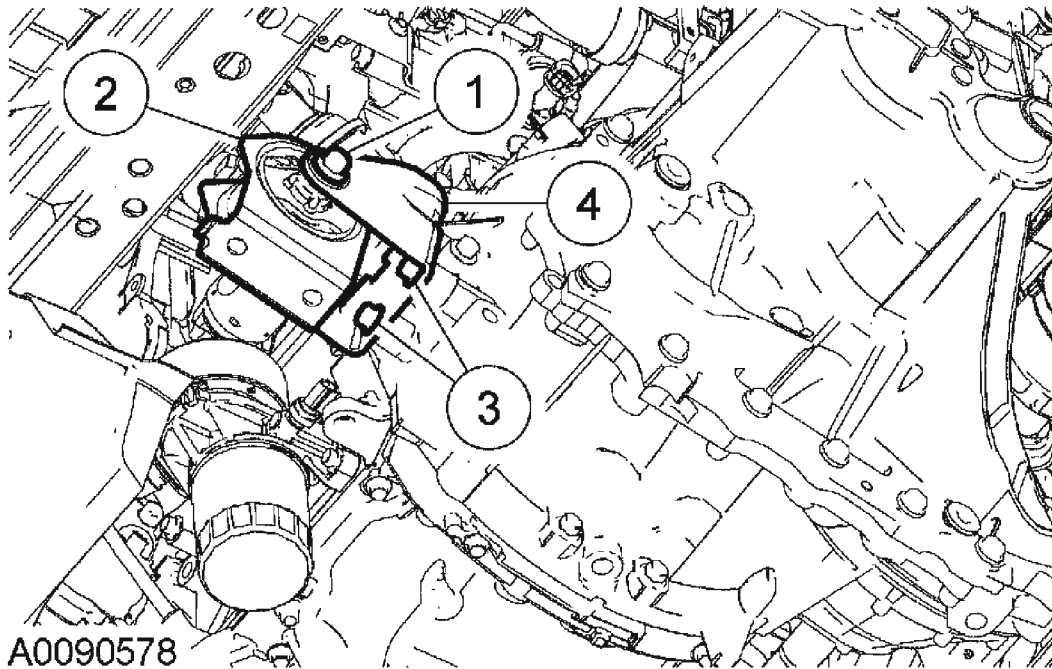
**Fig. 40: Removing LH Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

18. Remove the LH side splash shield.
  1. Remove the 2 screws.
  2. Remove the LH splash shield.



**Fig. 41: Removing LH Splash Shield**  
Courtesy of FORD MOTOR CO.

19. Remove the starter motor assembly. For additional information, refer to **STARTING SYSTEM** .
20. If equipped, remove the transfer case. For additional information, refer to **TRANSFER CASE-POWER TRANSFER UNIT (PTU)** .
21. Remove the RH intermediate shaft and the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** .
22. Remove the transaxle front support insulator bracket.
  1. Remove the through-bolt.
  2. Remove the transaxle front support insulator.
  3. Remove the 3 bolts.
  4. Remove the transaxle front support insulator bracket.



**Fig. 42: Removing Transaxle Front Support Insulator Bracket**  
Courtesy of FORD MOTOR CO.

23. Remove the exhaust outlet pipe. For additional information, refer to **EXHAUST SYSTEM**.

**WARNING:** Secure the transaxle to the transmission jack with a safety chain. Failure to follow these instructions may result in personal injury.

24. Position the transmission jack under the transaxle. Raise and support the transaxle.
25. Remove the remaining 4 transaxle-to-engine bolts.
26. Remove the transaxle.

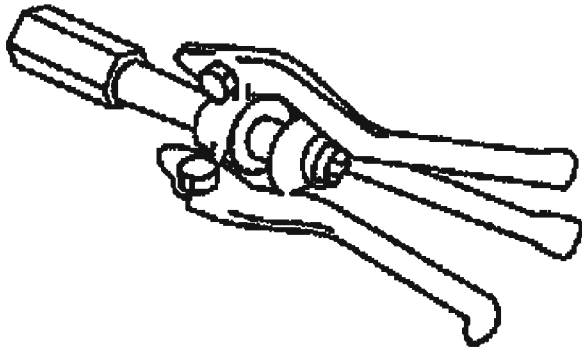
## DISASSEMBLY

### TRANSAXLE

Special Tool(s)

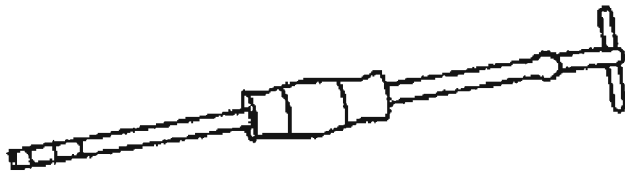
### SPECIAL TOOL DESCRIPTION

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Bearing Cup Remover 308-047  
(T77F-1102-A)

**ST1200-A**



Slide Hammer 100-001 (T50T-100-A)

**ST1185-A**

**CAUTION:** Clean all disassembled parts in a suitable solvent only and blow dry with compressed air or damage to the transaxle may occur.

**CAUTION:** Disassembly should only be carried out in a clean environment or damage to the transaxle may occur.

**CAUTION:** Be careful not to scratch the sliding face or mating faces or damage to the transaxle may occur.

**CAUTION:** Visually inspect all disassembled parts for any damage, deformation, or abnormal wear. Replace any unsuitable parts with new parts only or damage to the transaxle may occur.

**CAUTION:** Do not work on the transaxle with cotton gloves. Cotton threads could become dislodged and damage to the transaxle may occur.

**NOTE:** Verify the normal assembled condition before disassembly.

1. Clean the transaxle exterior with solvent before disassembly.

**WARNING:** Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air. Failure to follow these instructions may result in personal injury.

2. Clean out all holes and passages with compressed air and verify that there are no obstructions.
3. Remove the fill plug, the drain plug, the fill level inspection plug and the washers.
4. Remove the neutral switch.
5. Remove the reverse switch.
6. Remove and discard the breather.
7. Remove the shift check bolt.
8. Remove the stopper bolt.
9. Remove the 4 shift assembly bolts.
10. Remove the shift assembly and the shift assembly O-ring seal.
11. Remove the 1st/2nd gear shift rod check plug, the 3rd/4th gear shift rod check plug and the 5th/reverse gear shift rod check plug.
12. Remove the 1st/2nd gear shift rod spring (white), the 3rd/4th gear shift rod spring (blue) and the 5th/reverse gear shift rod spring (yellow).
13. Remove the 5th/reverse gear shift check sleeve.
14. Remove the 3 check balls.
15. Remove the 20 transaxle case-to-clutch housing bolts.
16. Remove the bore plug.

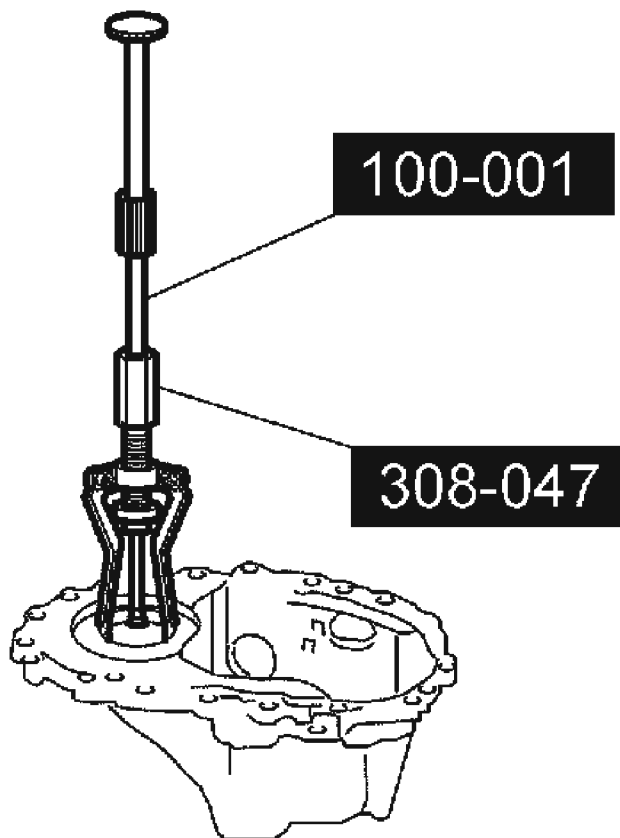
**NOTE:** The mainshaft will make noise as it drops when the snap ring

**releases from the mainshaft.**

17. Separate the transaxle case from the clutch housing.
  - Pry open the snap ring.
  - Separate the transaxle case from the clutch housing.
18. Remove the baffle plate.
19. Remove the oil gutter.
20. Remove the mainshaft adjustment shim and the mainshaft snap ring.
21. Remove the input shaft adjustment shim and the reverse idler shaft adjustment shim.

**CAUTION:** Do not exceed 120°C (248°F) or damage to the transaxle case may occur.

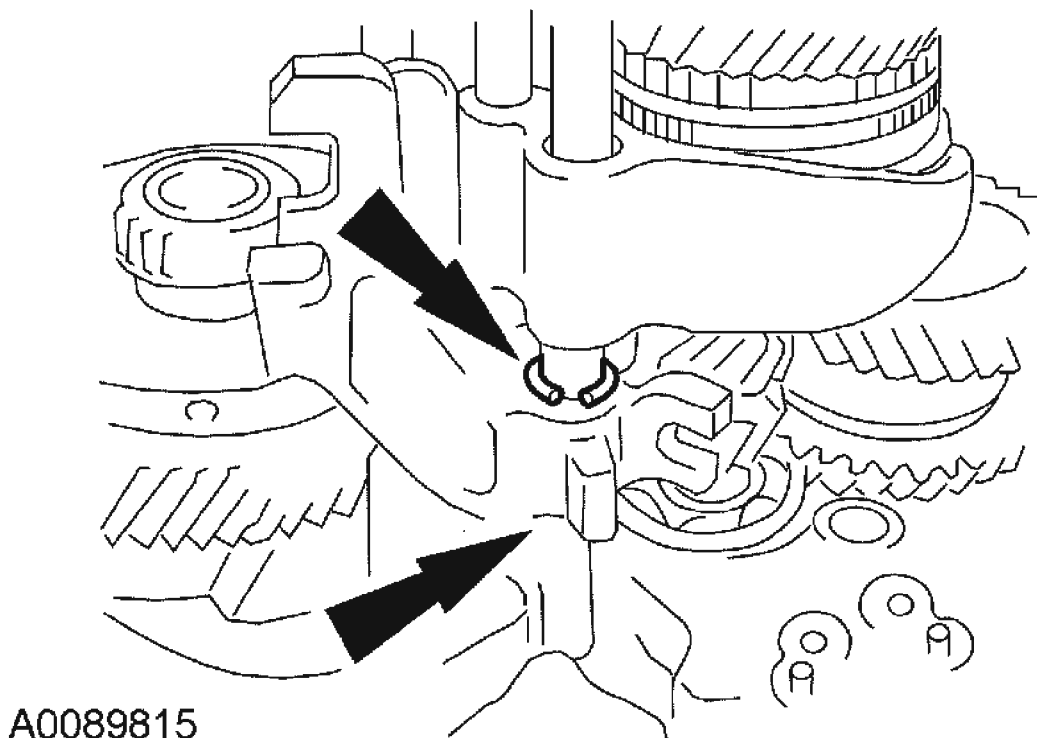
**NOTE:** If there is difficulty in removing the differential side bearing outer race, use the special tool.



A0089814

**Fig. 43: Removing Differential Side Bearing Outer Race**  
Courtesy of FORD MOTOR CO.

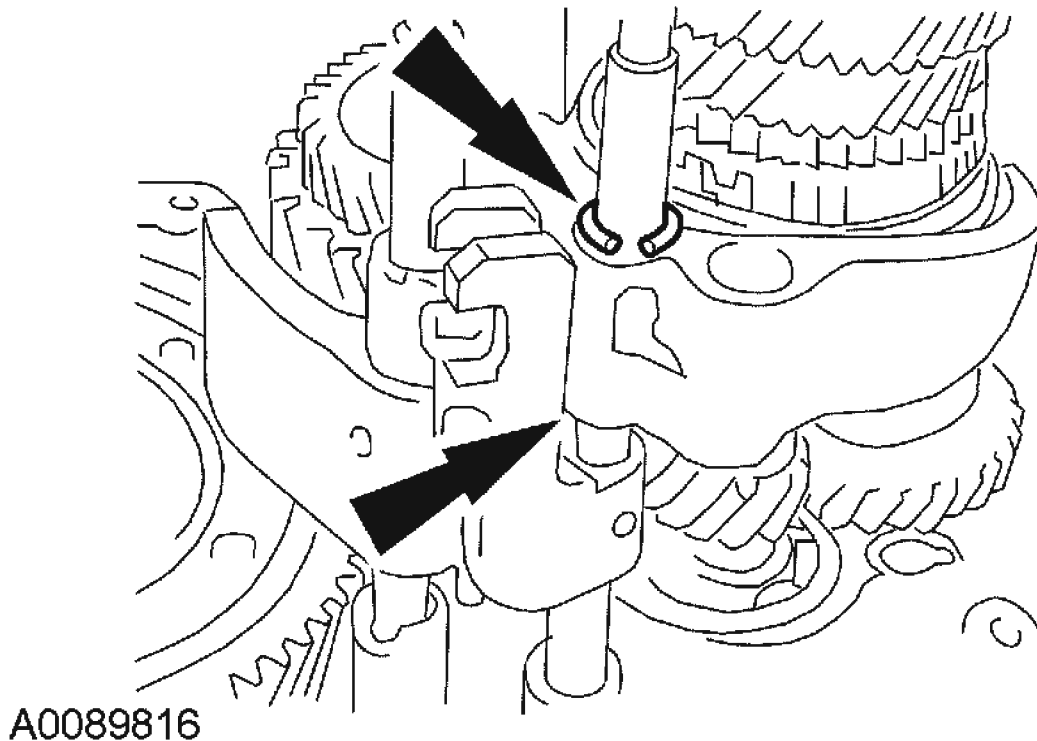
22. Heat the transaxle case to 100°C (212°F) and remove the differential side bearing outer race.
23. Remove the differential side bearing adjustment shim.
24. Remove the plug.
25. Remove the LH half shaft oil seal.
26. Remove the magnet.
27. Shift the transaxle to 5th gear and remove the 2 reverse lever bracket bolts.
28. Remove the reverse lever bracket.
29. Remove the shifter cap.
30. Remove the reverse gear shift fork rod.
31. Remove the reverse gear shift fork.
32. Shift the transaxle into 3rd gear and remove the 5th gear shift fork roll pin
33. Remove the 5th gear shift fork.
34. Remove the 2 circlips.



**Fig. 44: Removing Circlips**

**Courtesy of FORD MOTOR CO.**

35. Remove the 5th/reverse gear shift rod.
36. Remove the 5th/reverse gear bracket.
37. Remove the 2 interlock pins.
38. Remove the 3rd/4th gear shift rod roll pin.
39. Remove the 3rd/4th gear shift finger roll pin.
40. Remove the 2 circlips.



**Fig. 45: Removing Circlips**  
**Courtesy of FORD MOTOR CO.**

41. Remove the 3rd/4th gear shift rod.
42. Remove the 3rd/4th gear shift fork and the 3rd/4th gear shift finger.
43. Remove the 1st/2nd gear check sleeve.
44. Remove the 1st/2nd gear shift finger roll pin.
45. Remove the 1st/2nd gear shift finger.
46. Remove the 1st/2nd gear shift fork roll pin.
47. Remove the 1st/2nd gear shift rod.



48. Remove the 1st/2nd gear shift fork.

**CAUTION: Make sure to remove the mainshaft straight out. Failure to remove the mainshaft correctly may result in damage to the funnel on the clutch housing.**

49. Remove the reverse gear idler shaft assembly, mainshaft assembly and input shaft assembly as a set.

50. Remove the differential assembly.

51. Remove the mainshaft bearing retainer bolt and the mainshaft bearing retainer.

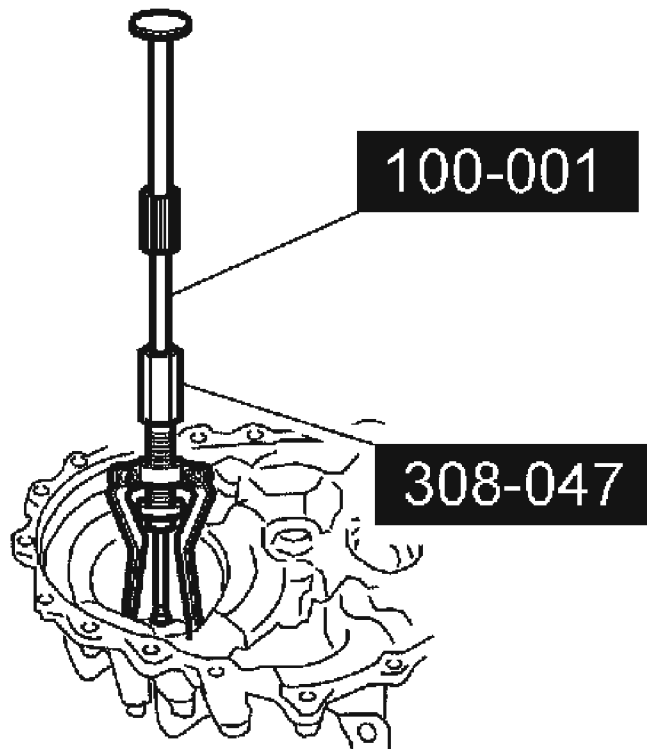
52. Remove the mainshaft bearing.

53. Remove the funnel.

54. Remove the RH intermediate shaft oil seal.

**CAUTION: Do not exceed 120°C (248°F) or damage to the clutch housing may occur.**

**NOTE: If there is difficulty in removing the differential side bearing outer race, use the special tool.**



A0089817

**Fig. 46: Removing Differential Side Bearing Outer Race**  
Courtesy of FORD MOTOR CO.

55. Heat the clutch housing to 100°C (212°F) and remove the differential side bearing outer race.
56. Remove the input shaft oil seal.

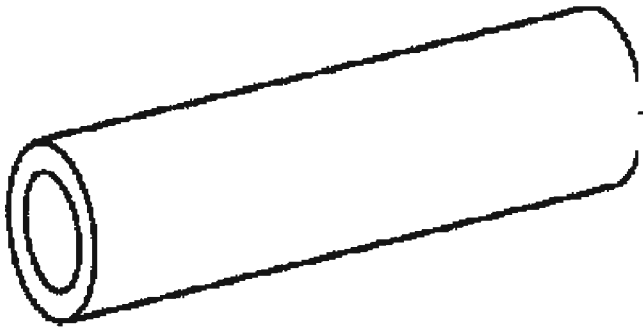
## DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

### INPUT SHAFT

Special Tool(s)

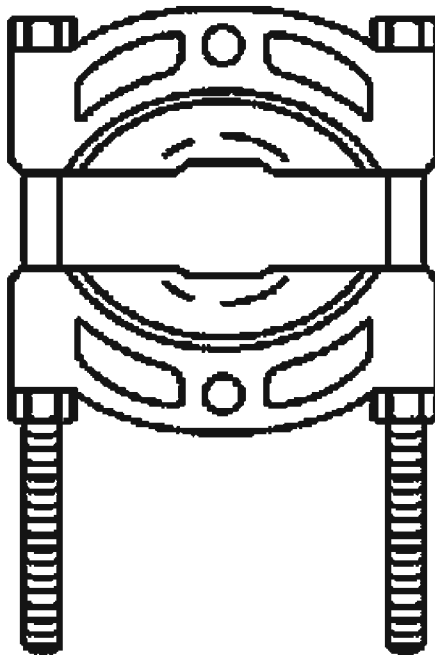
### SPECIAL TOOL DESCRIPTION

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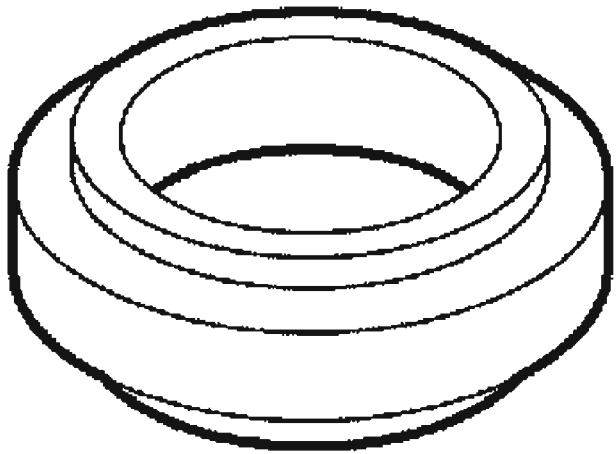
Installer, Spindle/Axleshaft 205-199 or equivalent

**ST2131-A**



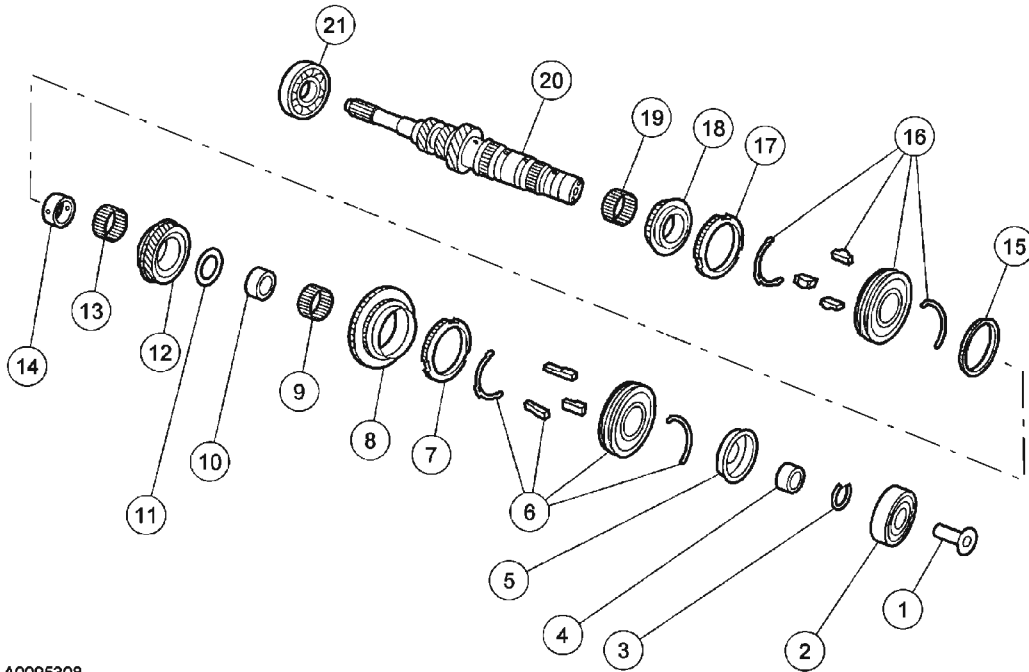
Puller, Bearing 205-D064 or equivalent

**ST1368-A**



Input Bearing Installer 308-582 or equivalent

ST1883-A



A0095308

Item	Part Number	Description
1	7L276	Oil channel
2	7A453	Input shaft rear bearing
3	4097	Snap ring
4	7N112	Input shaft spacer
5	7L049	Fifth gear stopper
6	7L052	Fifth gear synchronizer assembly
7	7107	Fifth gear synchronizer ring
8	7144	Fifth input gear
9	7K275	Fifth gear needle bearing
10	7N090	Fifth gear bushing
11	7G103	Thrust washer
12	7112	Fourth input gear
13	7065	Fourth gear needle bearing
14	7N090	4th gear bushing
15	7107	Fourth gear synchronizer ring
16	7K160	Third and 4th gears synchronizer assembly

Item	Part Number	Description
17	7107	Third gear synchronizer ring
18	7N315	Third input gear
19	7065	Third gear needle bearing
20	7017	Input shaft
21	7G429	Input shaft front bearing

**Fig. 47: Disassembling/Assembling Input Shaft**  
 Courtesy of FORD MOTOR CO.

#### Disassembly

1. Prior to disassembly of the input shaft, measure and record the end play for the 3rd, 4th, and 5th gears. Refer to the following **STANDARD VALUES FOR 3RD, 4TH, & 5TH GEAR END PLAY** for standard values:

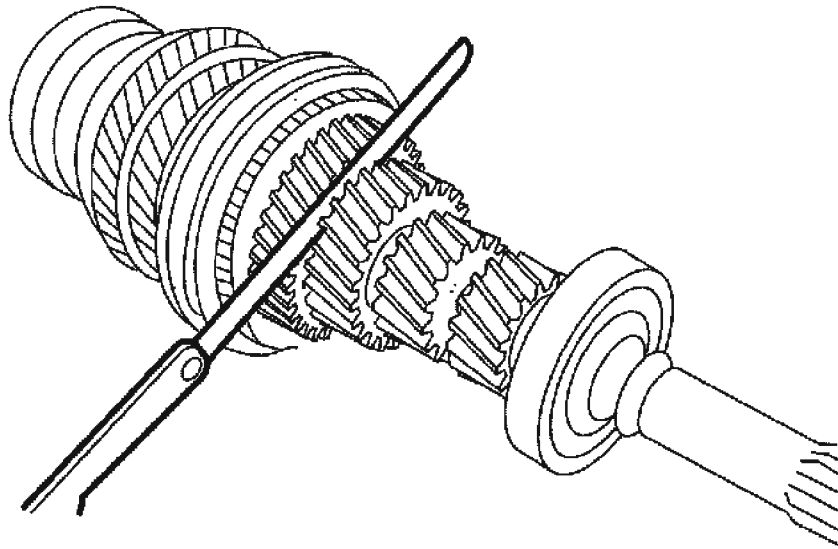
#### STANDARD VALUES FOR 3RD, 4TH, & 5TH GEAR END PLAY

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## 2005 Ford Escape

### 2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner

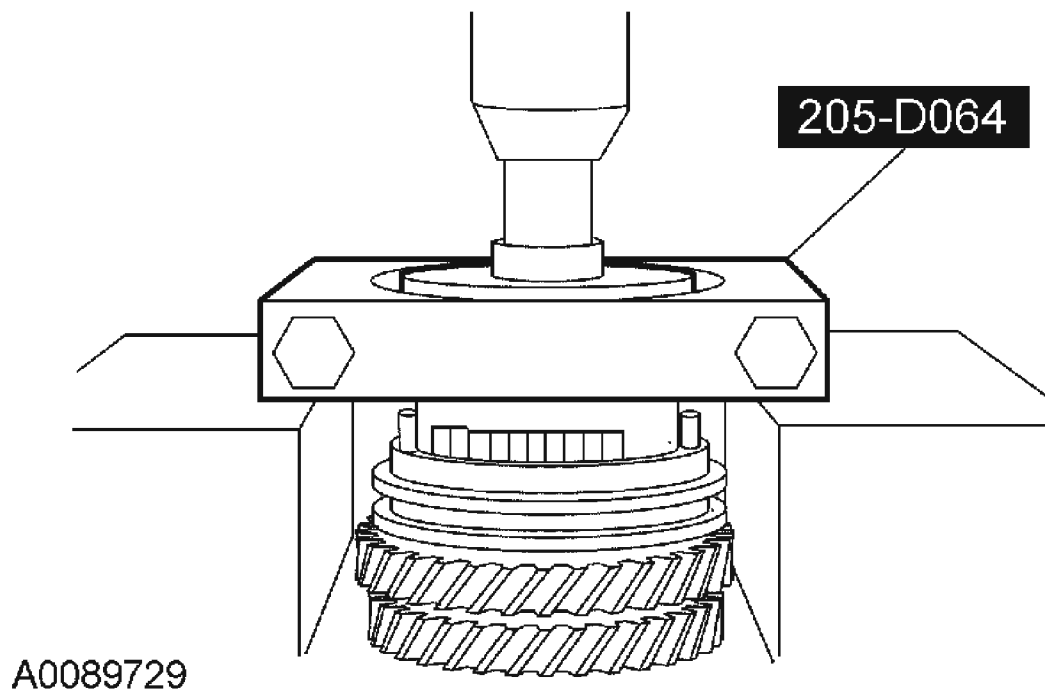
Gear	mm	in
3RD	0.18 - 0.31	0.007 - 0.012
4TH	0.20 - 0.30	0.0078 - 0.0118
5TH	0.06 - 0.16	0.0023 - 0.0062



A0089728

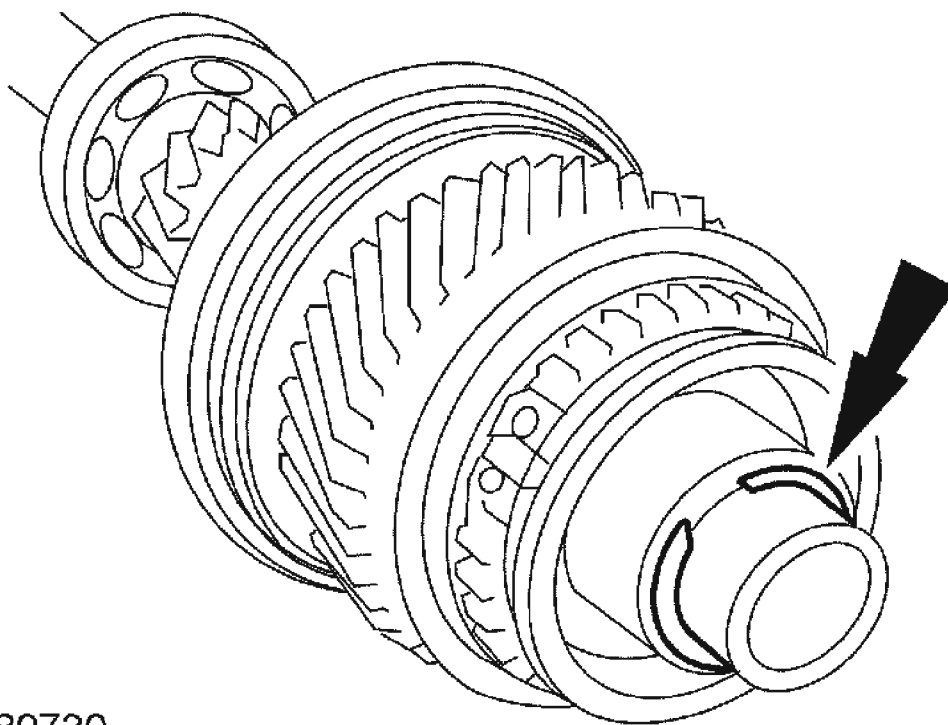
**Fig. 48: Measuring And Record End Play For 3rd, 4th, and 5th Gears**  
Courtesy of FORD MOTOR CO.

2. Remove the oil channel.
3. Using the special tool, remove the input shaft rear bearing.



**Fig. 49: Removing Input Shaft Rear Bearing**  
Courtesy of FORD MOTOR CO.

**NOTE:** The snap ring is not reusable.

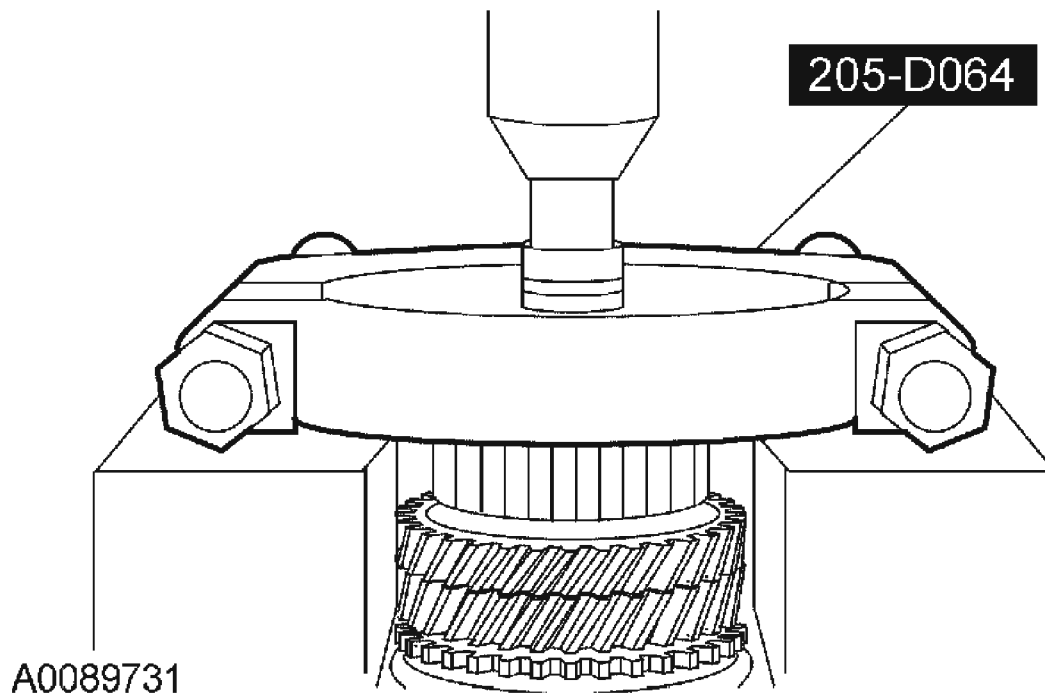


A0089730

**Fig. 50: Removing And Discard Snap Ring**  
**Courtesy of FORD MOTOR CO.**

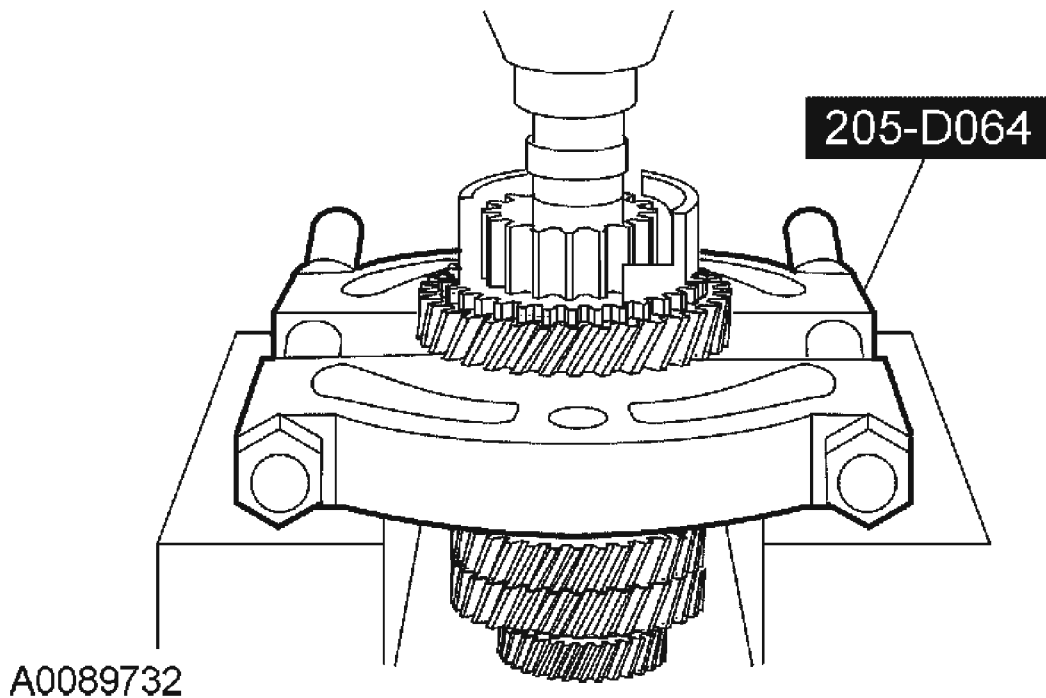
4. Remove and discard the snap ring.
5. Using the special tool, remove the input shaft spacer and the 5th gear stopper together.





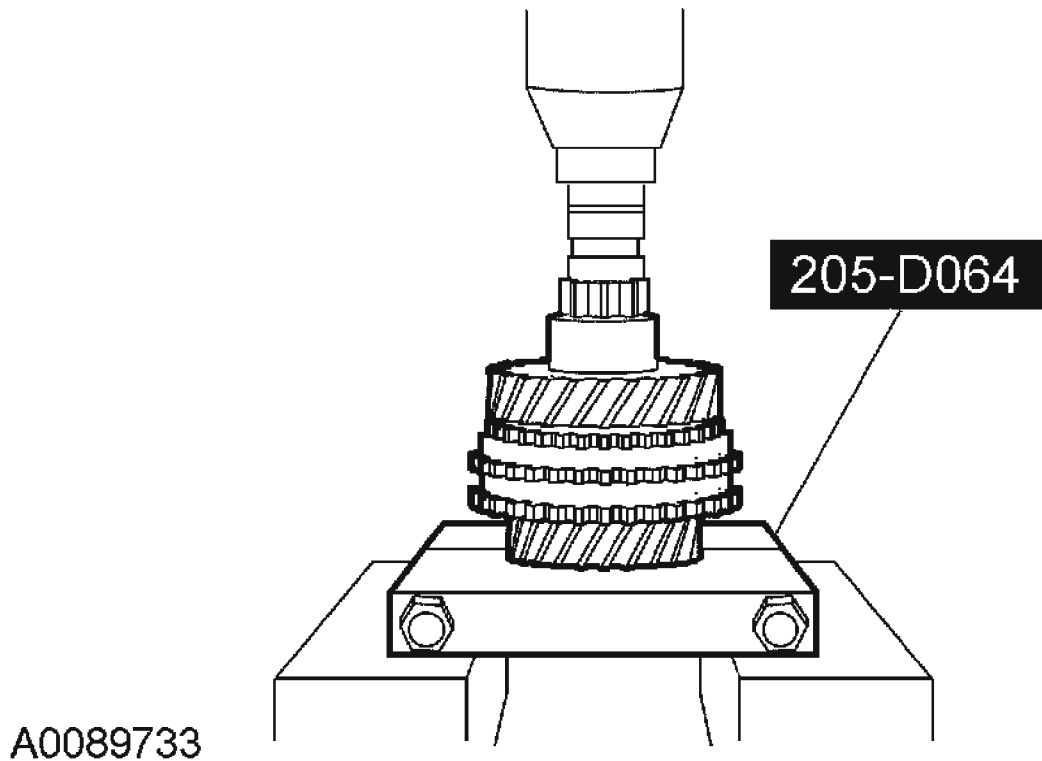
**Fig. 51: Removing Input Shaft Spacer And 5th Gear Stopper Together**  
Courtesy of FORD MOTOR CO.

6. Using the special tools, remove the 5th gear synchronizer assembly, the 5th gear synchronizer ring, and the 5th input gear together.
  - Discard the 5th gear synchronizer ring and assembly.



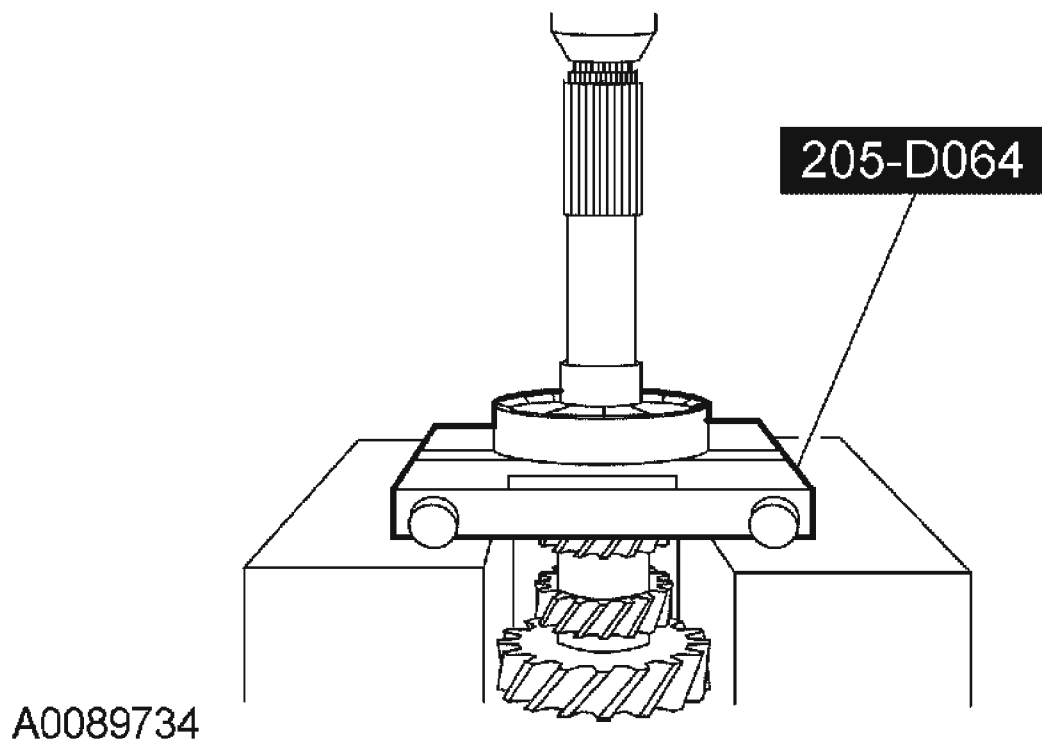
**Fig. 52: Discarding 5th Gear Synchronizer Ring And Assembly**  
Courtesy of FORD MOTOR CO.

7. Remove the 5th gear needle bearing.
8. Using the special tools, remove the 5th gear bushing, thrust washer, 4th input gear, 4th gear needle bearing, 4th gear bushing, 4th gear synchronizer ring, 3rd and 4th gear synchronizer assembly, 3rd gear synchronizer ring, and 3rd input gear together.
  - Discard the 5th gear bushing.
  - Discard the 3rd and 4th gear synchronizer assembly.



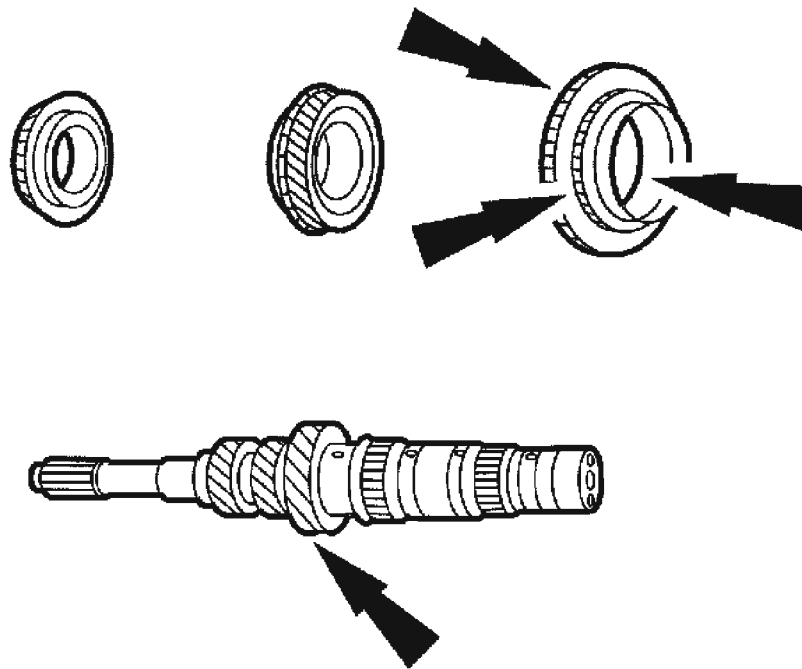
**Fig. 53: Discarding 3rd And 4th Gear Synchronizer Assembly**  
Courtesy of FORD MOTOR CO.

9. Remove the 3rd gear needle bearing.
10. Using the special tool, remove the input shaft front bearing.



**Fig. 54: Removing Input Shaft Front Bearing**  
Courtesy of FORD MOTOR CO.

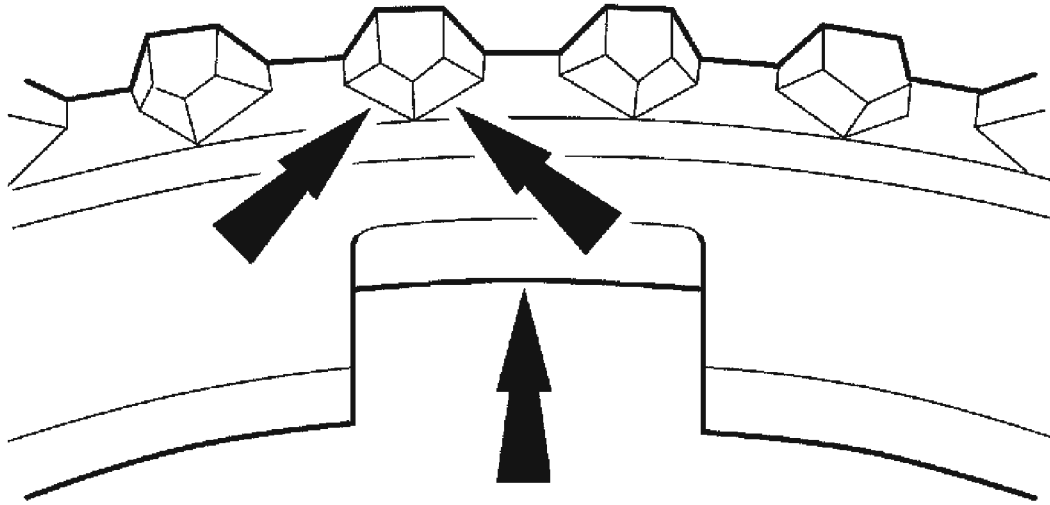
11. Inspect all input shaft parts for damage, peeling, dents, uneven wear or bending. Install new parts as necessary.



A0089751

**Fig. 55: Inspecting All Input Shaft Parts For Damage**  
Courtesy of FORD MOTOR CO.

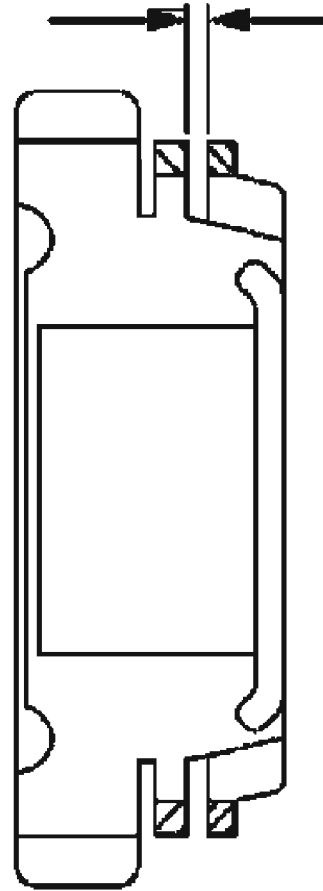
12. Inspect the synchronizer rings for damage. Install new parts as necessary.



A0090164

**Fig. 56: Inspecting Synchronizer Rings For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Limit value: 0.7 mm (0.02 in).

**A0089752**

**Fig. 57: Measuring Clearance Between Synchronizer Ring And Gear Cone**  
Courtesy of FORD MOTOR CO.

13. Press the synchronizer ring against the cone and measure the clearance between the synchronizer ring and gear cone. Install a new synchronizer ring if the measurement is not within specification. Refer to **SYNCHRONIZER RING-TO-GEAR CONE CLEARANCE SPECIFICATIONS** chart for correct synchronizer ring clearance:

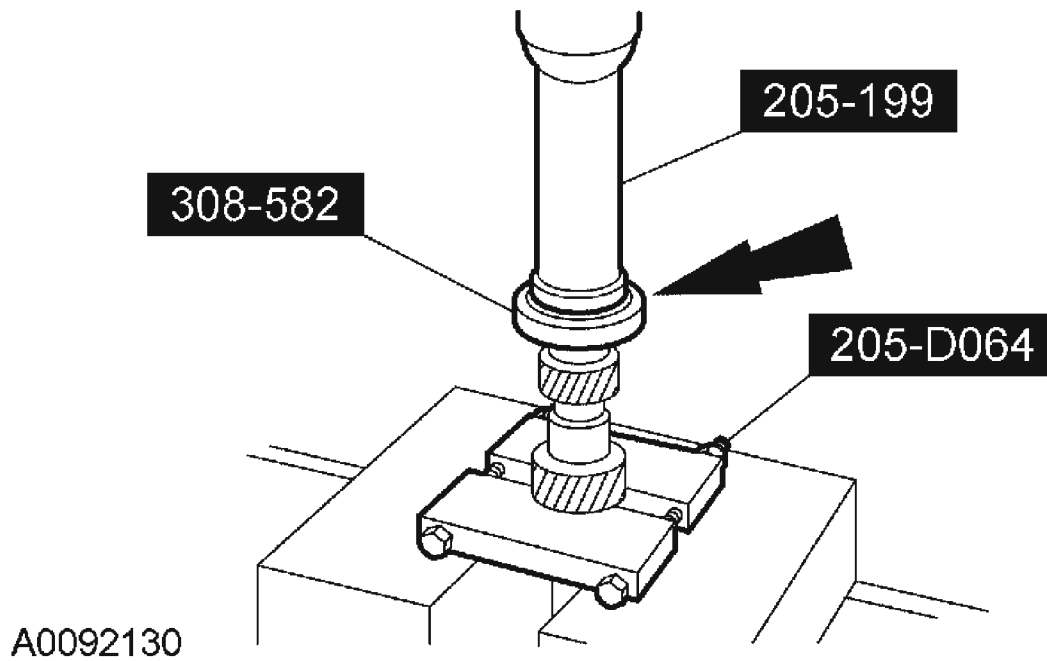
**SYNCHRONIZER RING-TO-GEAR CONE CLEARANCE SPECIFICATIONS**

Gear	mm	in
3RD	0.9 -	0.035 -
	1.45	0.057
4TH	0.9 -	0.035 -

	1.45	0.057
5TH	0.95 - 1.4	0.037 - 0.055

### Assembly

1. Using the special tools, install the input shaft front bearing.

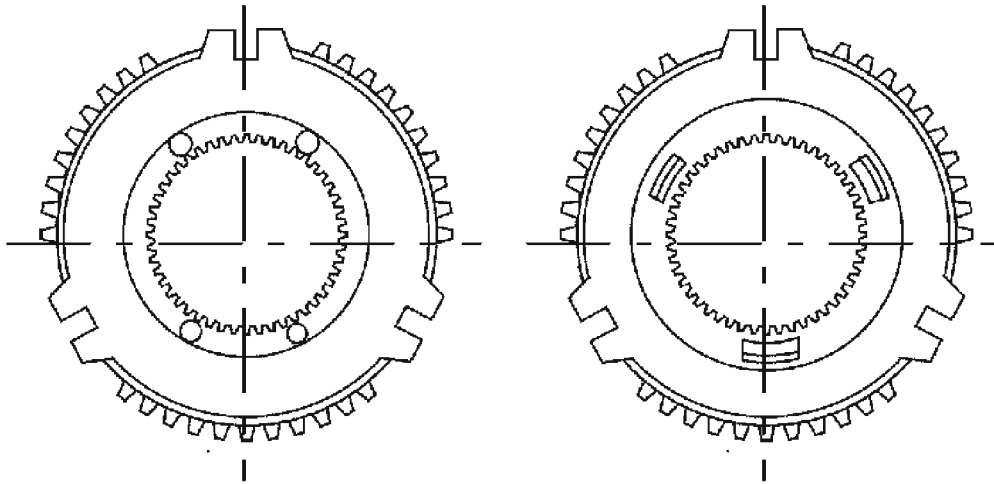


**Fig. 58: Installing Input Shaft Front Bearing**  
Courtesy of FORD MOTOR CO.

2. Install the 3rd gear needle bearing.
3. Install the 3rd input gear.
4. Install the 3rd gear synchronizer ring.

**CAUTION:** Make sure the synchronizer side with 3 notches is facing the 3rd input gear and the synchronizer side with 4 notches is facing the 4th gear.

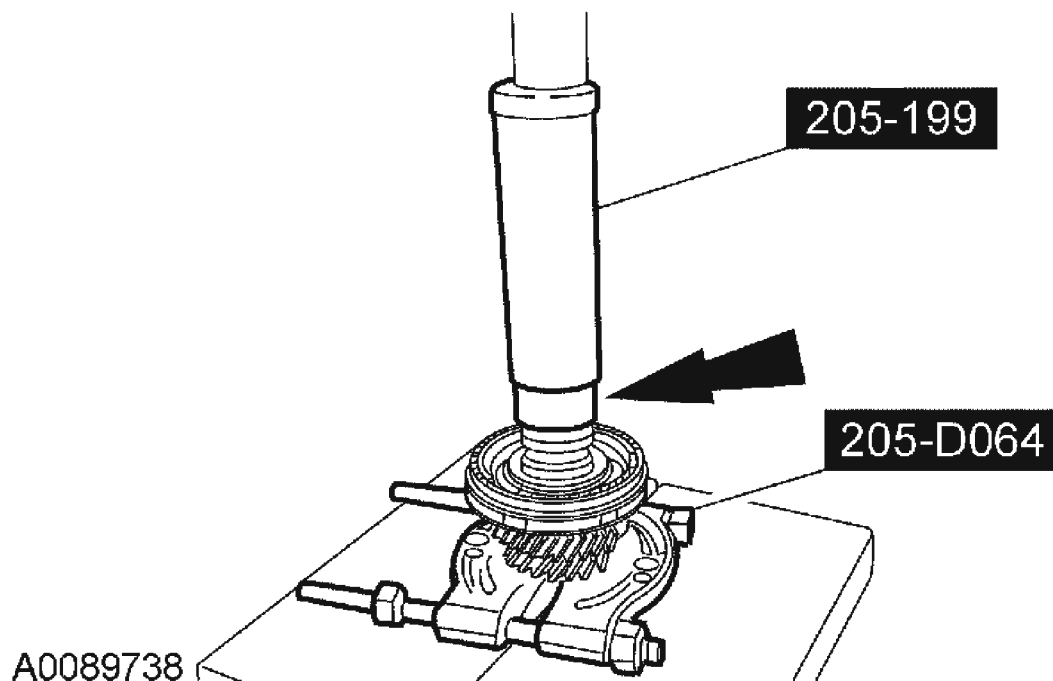




A0089735

**Fig. 59: Installing New 3rd And 4th Gear Synchronizer Assembly**  
**Courtesy of FORD MOTOR CO.**

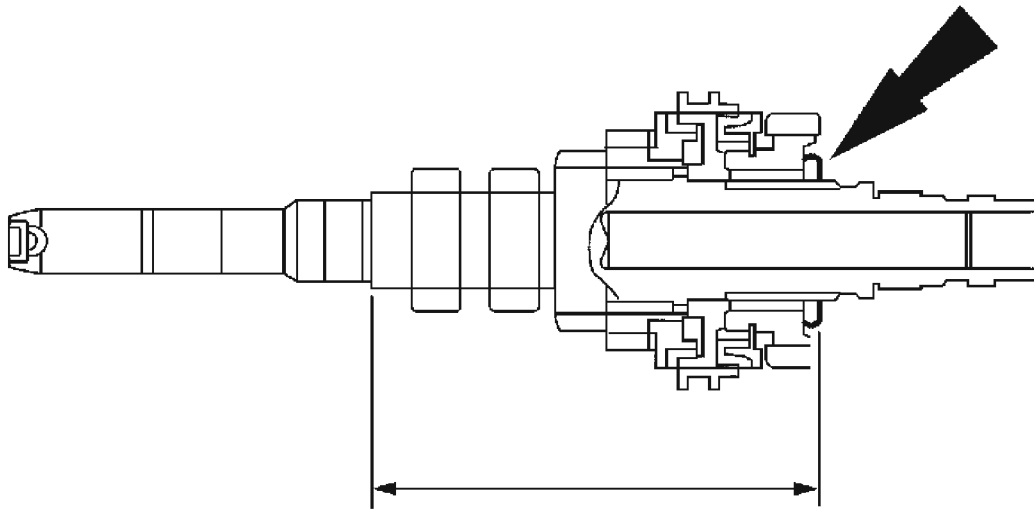
5. Install a new 3rd and 4th gear synchronizer assembly.
6. Install the 4th gear synchronizer ring.
7. Using the special tools, install the 4th gear bushing.



**Fig. 60: Installing 4th Gear Bushing**  
Courtesy of FORD MOTOR CO.

8. Install the 4th gear needle bearing.
9. Install the 4th input gear.

**CAUTION:** Only one thrust washer can be selected.



N0002378

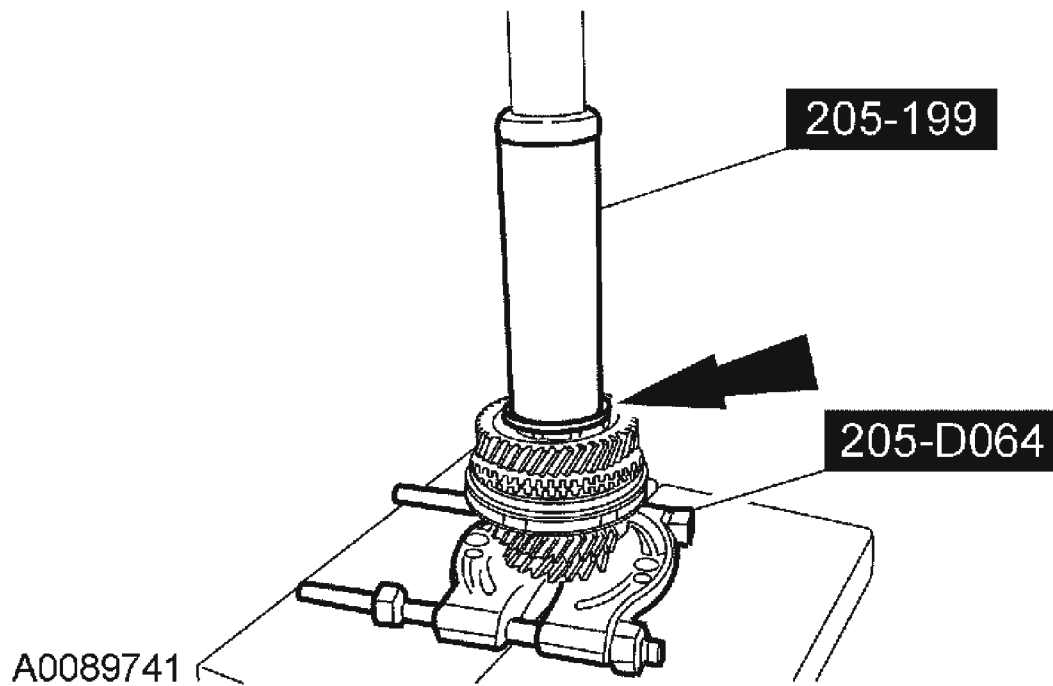
**Fig. 61: Measuring Distance**  
 Courtesy of FORD MOTOR CO.

10. Select the correct thickness thrust washer.
  - Measure the distance as shown in **Fig. 61**.
  - If the measurement is not within 154.7 - 154.8 mm (6.090 - 6.094 in), select the correct thickness of shim from the following chart:

#### SHIM THICKNESS SPECIFICATIONS

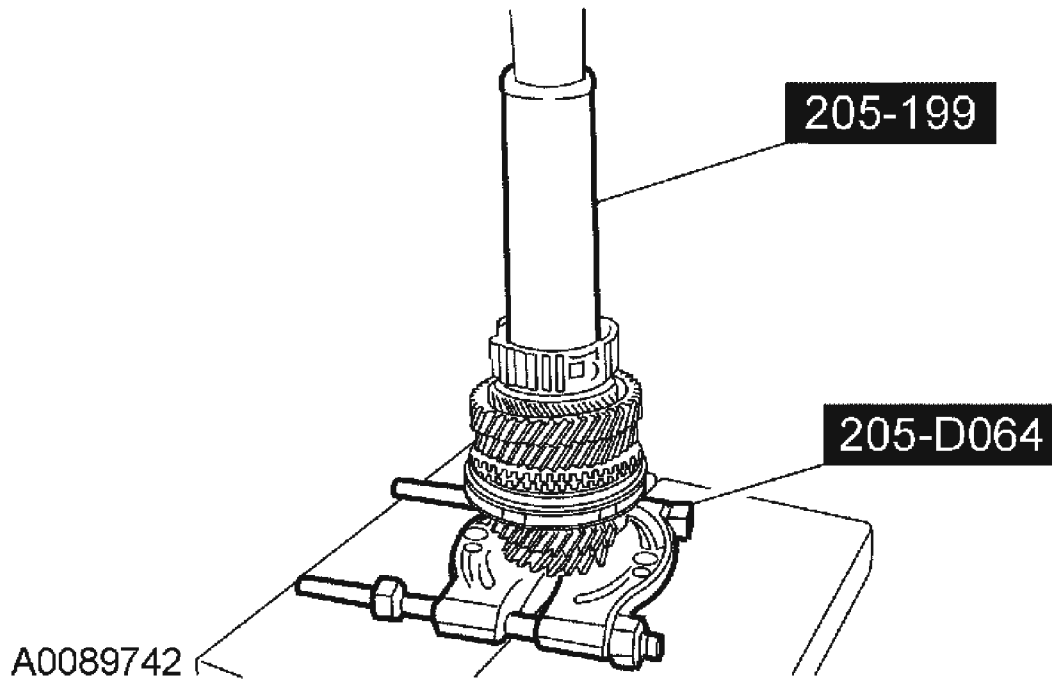
mm	in
3.84	0.151
3.90	0.153
3.96	0.155
4.02	0.158
4.08	0.16
4.14	0.162

11. Using the special tools, install the thrust washer.



**Fig. 62: Installing Thrust Washer**  
Courtesy of FORD MOTOR CO.

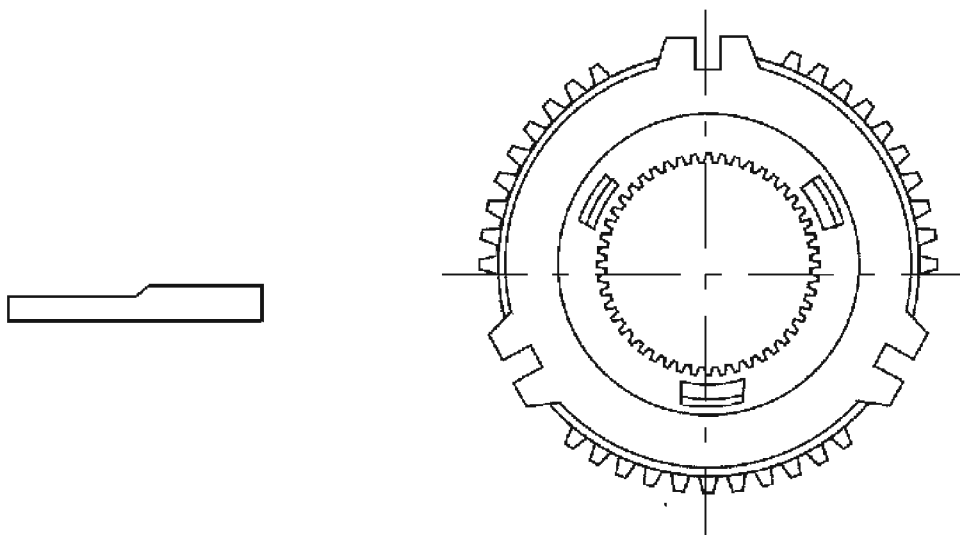
12. Using the special tools, install a new 5th gear bushing.



**Fig. 63: Installing New 5th Gear Bushing**  
Courtesy of FORD MOTOR CO.

13. Install the 5th gear needle bearing.
14. Install the 5th input gear.
15. Install a new 5th gear synchronizer ring.

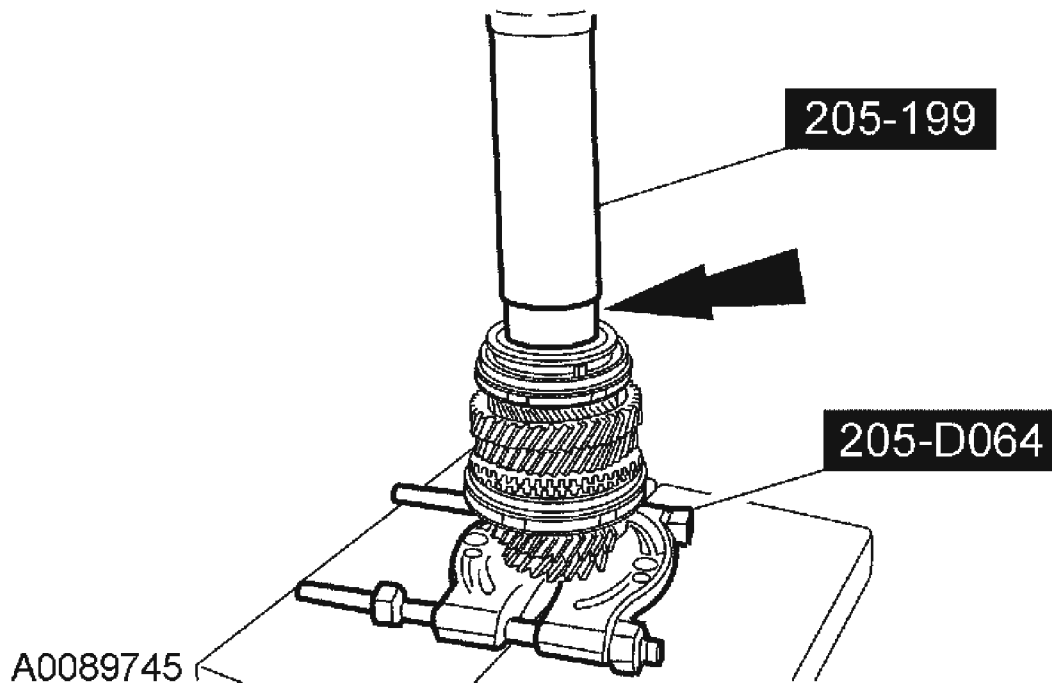
**CAUTION:** Make sure the synchronizer side with the 3 notches is facing the 4th input gear.



A0089743

**Fig. 64: Installing New 5th Gear Synchronizer Assembly**  
**Courtesy of FORD MOTOR CO.**

16. Install a new 5th gear synchronizer assembly.
17. Using the special tools, install the 5th gear stopper and input shaft bearing spacer together.



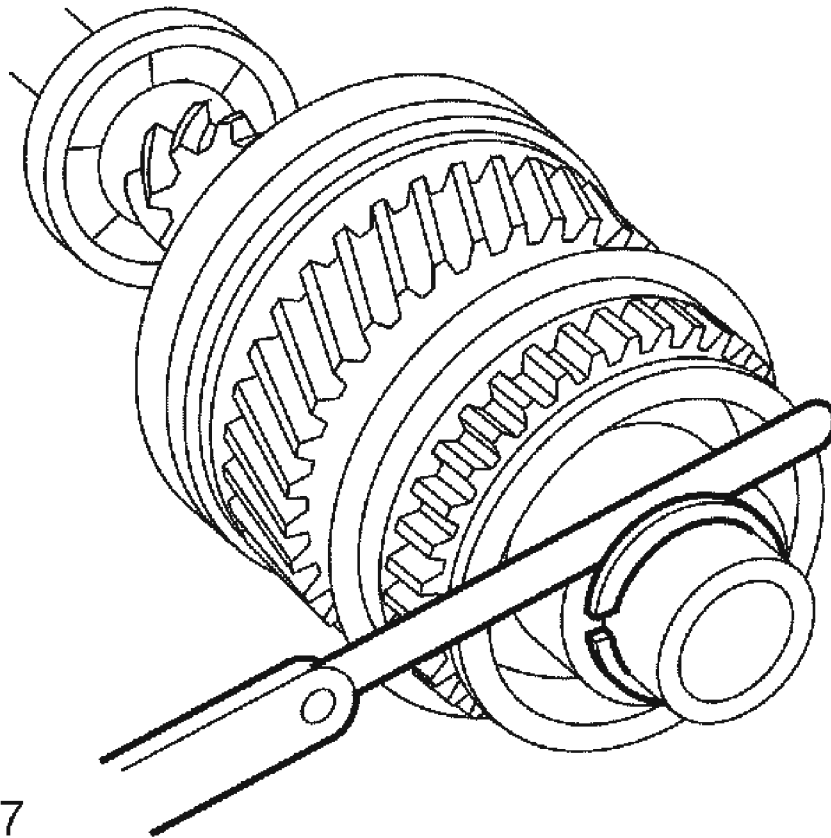
**Fig. 65: Installing 5th Gear Stopper And Input Shaft Bearing Spacer Together**  
**Courtesy of FORD MOTOR CO.**

18. Install the input shaft spacer.
19. Measure the gap between the snap ring groove and the snap ring. The end play should be between 0 - 0.1 mm (0 - 0.0039 in). Refer to **SNAP RING THICKNESS SPECIFICATIONS** for the correct snap ring thickness:

#### **SNAP RING THICKNESS SPECIFICATIONS**

mm	in
1.71	0.067
1.76	0.069
1.81	0.071
1.86	0.073
1.91	0.075
1.96	0.077
2.01	0.079
2.06	0.081
2.11	0.083
2.16	0.085
2 21	0.087

2.26 | 0.088

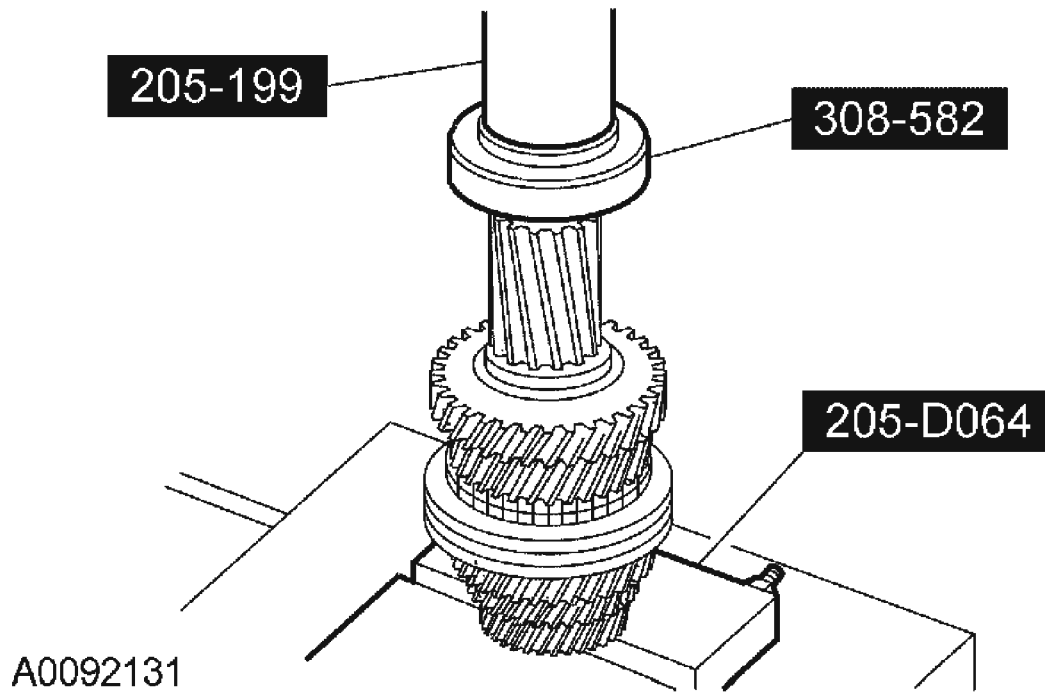


A0089747

**Fig. 66: Measuring Gap Between Snap Ring Groove And Snap Ring**  
Courtesy of FORD MOTOR CO.

20. Using the special tools, install the input shaft rear bearing.





**Fig. 67: Installing Input Shaft Rear Bearing**  
Courtesy of FORD MOTOR CO.

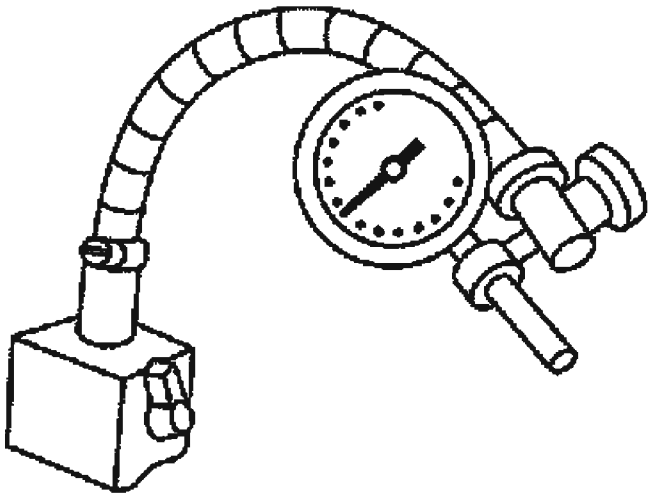
21. Install the oil channel.

## MAINSHAFT

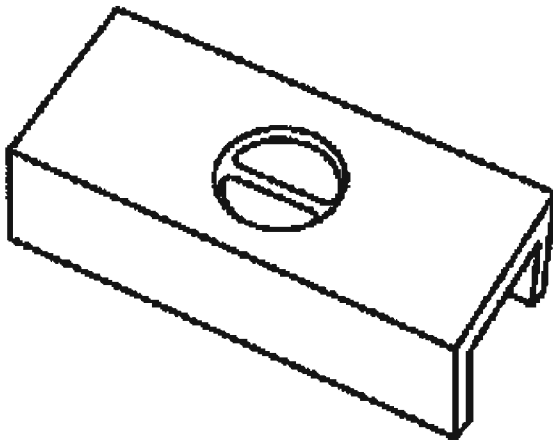
Special Tool(s)

## SPECIAL TOOL DESCRIPTION

Dial Indicator with Holding Fixture  
100-D002 or equivalent

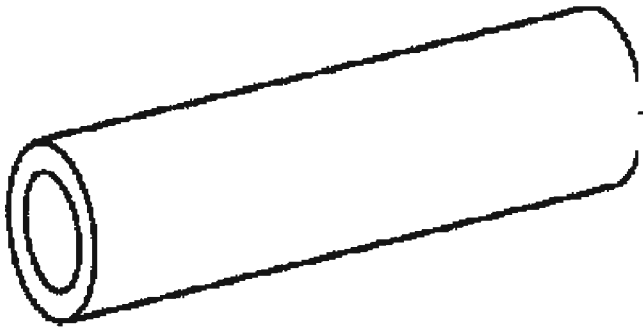


**ST1266-A**



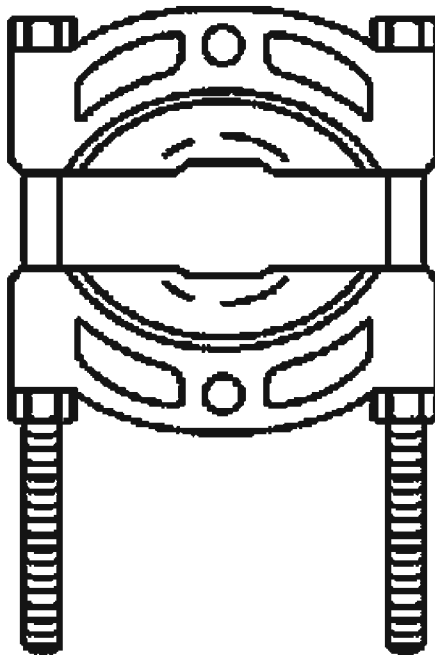
**ST1254-A**

Bearing/Oil Seal Plate 205-090 or equivalent



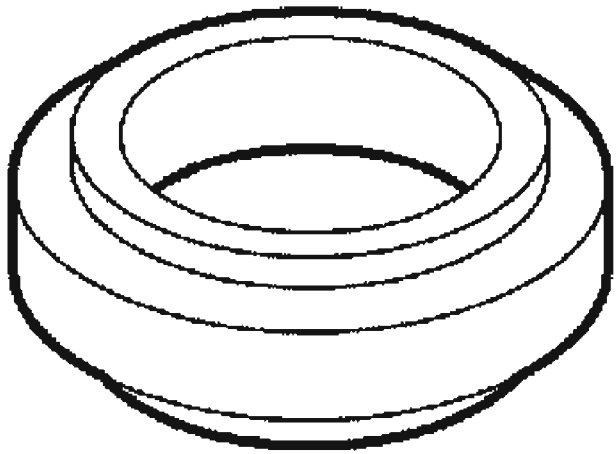
Spindle/Axle Shaft Installer 205-199  
or equivalent

**ST2131-A**



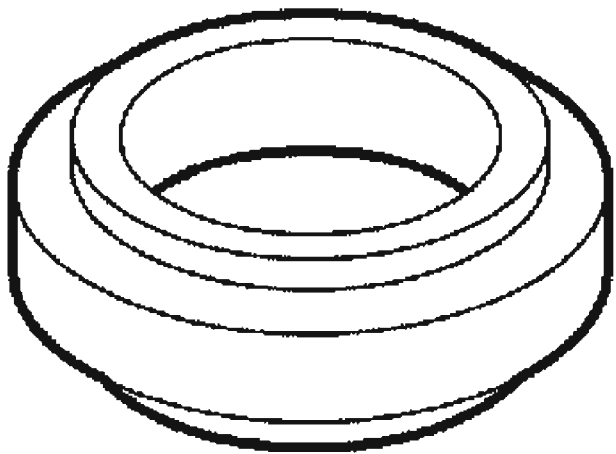
Bearing Puller 205-D064 or  
equivalent

**ST1368-A**



2nd Gear Bushing Installer 308-580  
or equivalent

ST1883-A

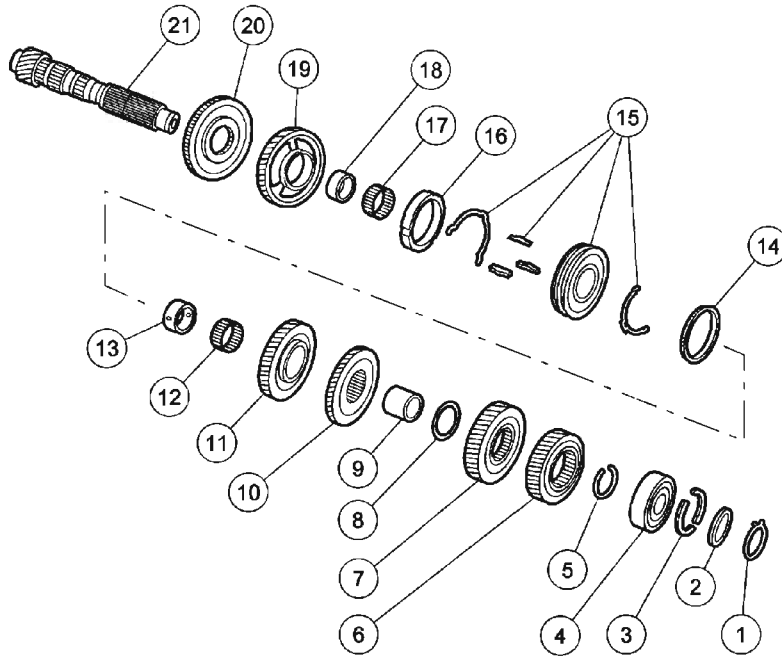


1st Gear Bushing Installer 308-581 or  
equivalent

ST1883-A

## 2005 Ford Escape

### 2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner



A0095309

Item	Part Number	Description
1	4097	Snap ring
2	7L049	C-ring holder
3	4079	Mainshaft C-ring
4	7065	Mainshaft rear bearing
5	4097	Snap ring
6	7K316	Fifth main gear
7	7110	Fourth main gear
8	7013	Fourth main gear adjusting shim
9	7A073	Third/4th main gear shaft spacer
10	7B340	Third main gear
11	7102	Second main gear
12	7K169	Second gear needle bearing
13	7N090	Second gear bushing
14	7107	Second gear synchronizer ring
15	7C115	First and 2nd gear synchronizer assembly

Item	Part Number	Description
16	7107	First gear synchronizer ring
17	7K274	First gear needle bearing
18	7N090	First main gear bushing
19	7100	First main gear
20	7142	Reverse main gear
21	7C094	Mainshaft

**Fig. 68: Disassembling/Assembling Mainshaft**  
Courtesy of FORD MOTOR CO.

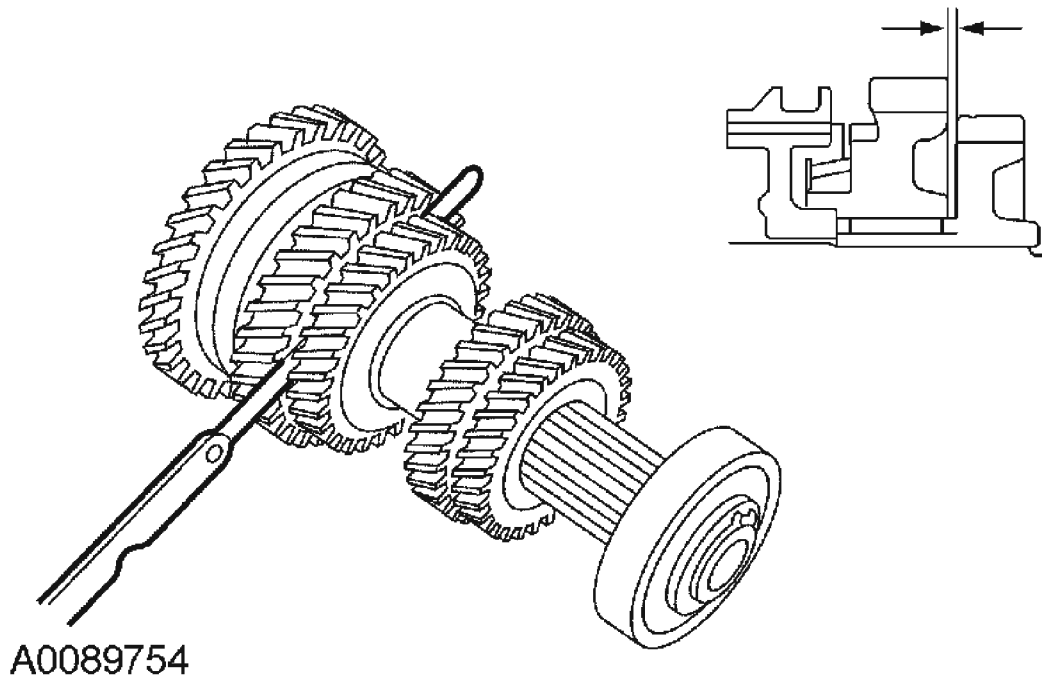
#### Disassembly

1. Prior to disassembly of the mainshaft, measure and record the end play for 1st and 2nd gears. Refer to **1ST & 2ND GEAR END PLAY SPECIFICATIONS** chart for standard values:

#### 1ST & 2ND GEAR END PLAY SPECIFICATIONS

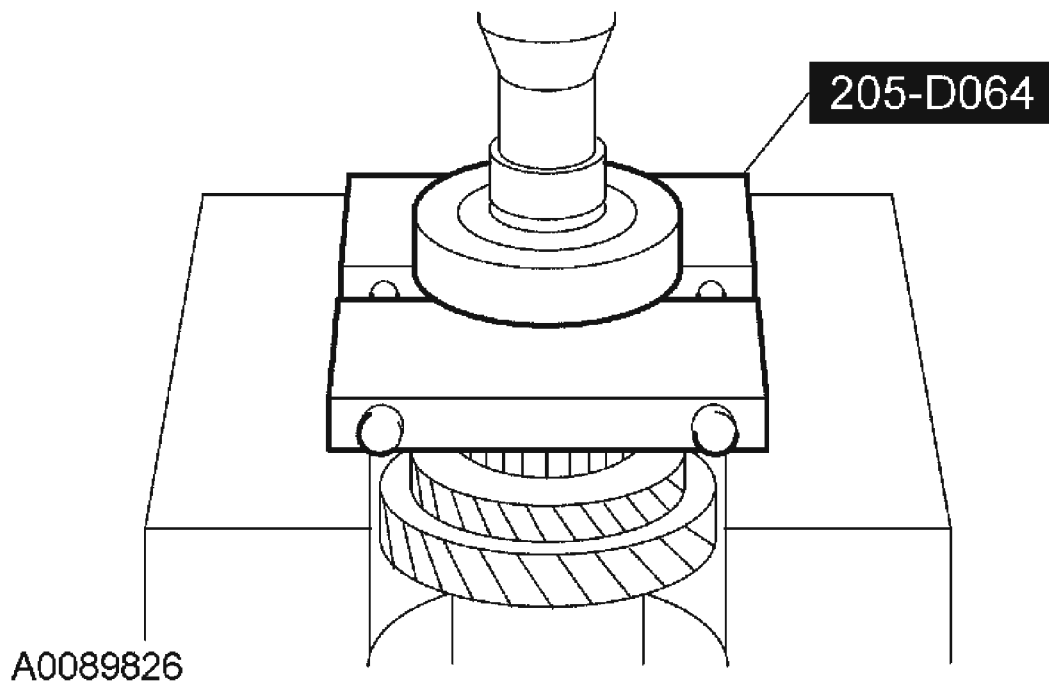
Gear	mm	in
------	----	----

1st	0.20 - 0.30	0.007 - 0.011
2nd	0.06 - 0.16	0.002 - 0.006



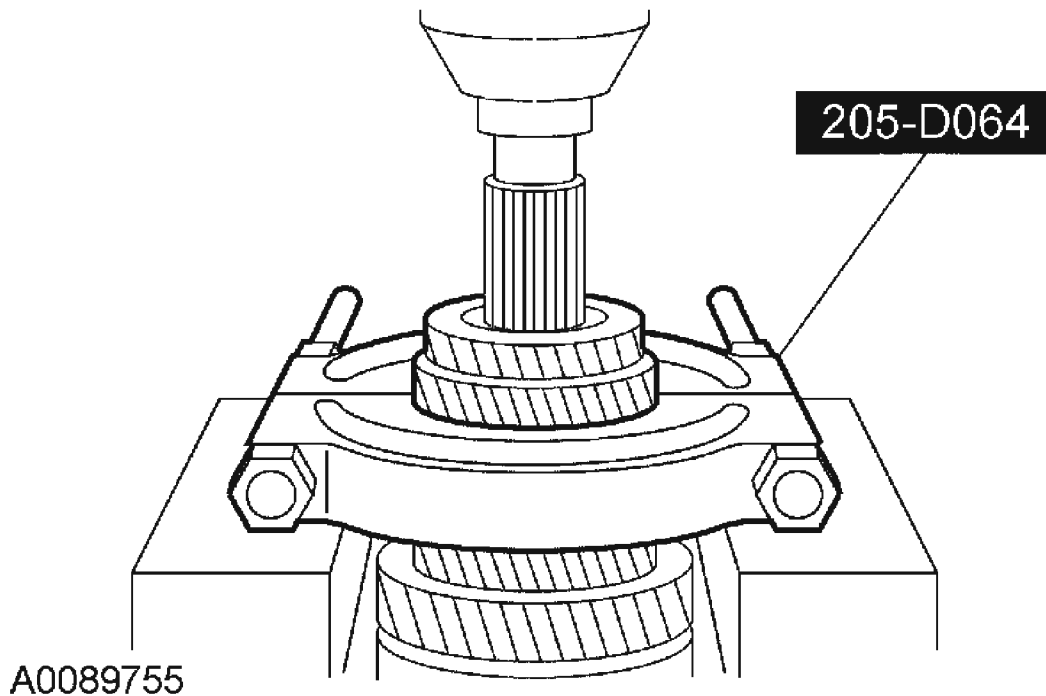
**Fig. 69: Measuring Record End Play For 1st And 2nd Gears**  
Courtesy of FORD MOTOR CO.

2. Remove and discard the snap ring.
3. Remove the C-ring holder.
4. Remove the mainshaft C-ring.
5. Using the special tool, remove the mainshaft rear bearing.



**Fig. 70: Removing Mainshaft Rear Bearing**  
Courtesy of FORD MOTOR CO.

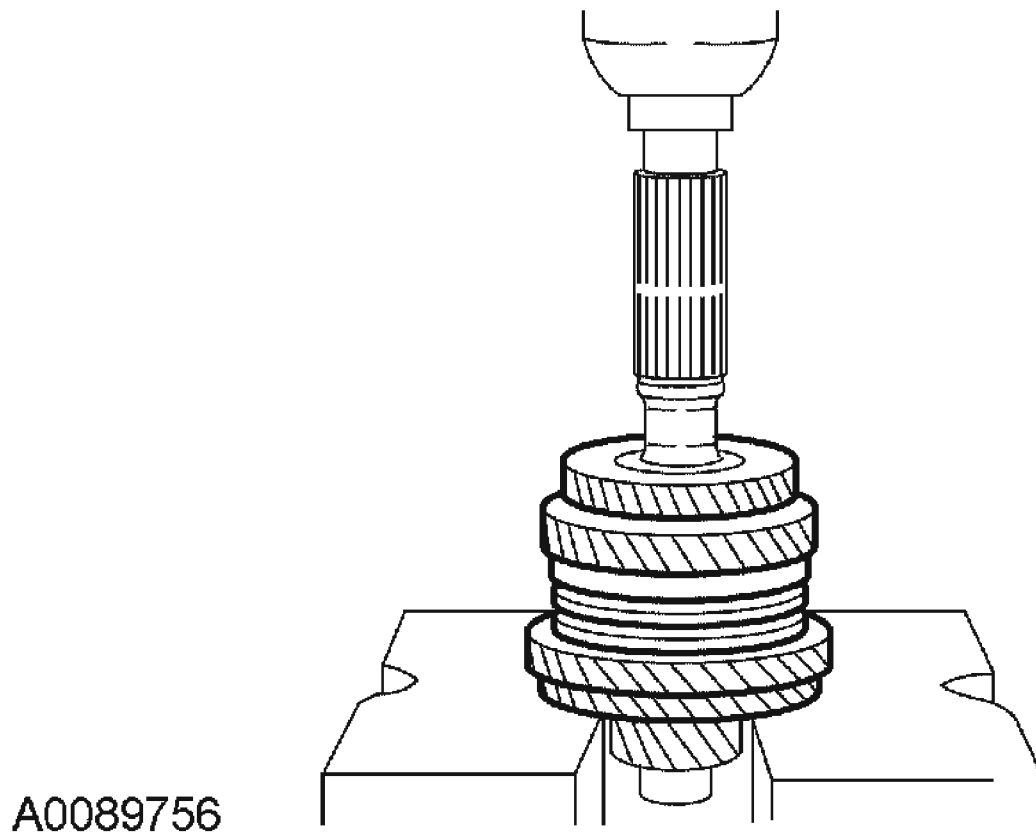
6. Remove and discard the snap ring.
7. Using the special tool, remove the 5th main gear and the 4th main gear together.
  - Discard both gears.



**Fig. 71: Removing 5th Main Gear And 4th Main Gear Together**  
Courtesy of FORD MOTOR CO.

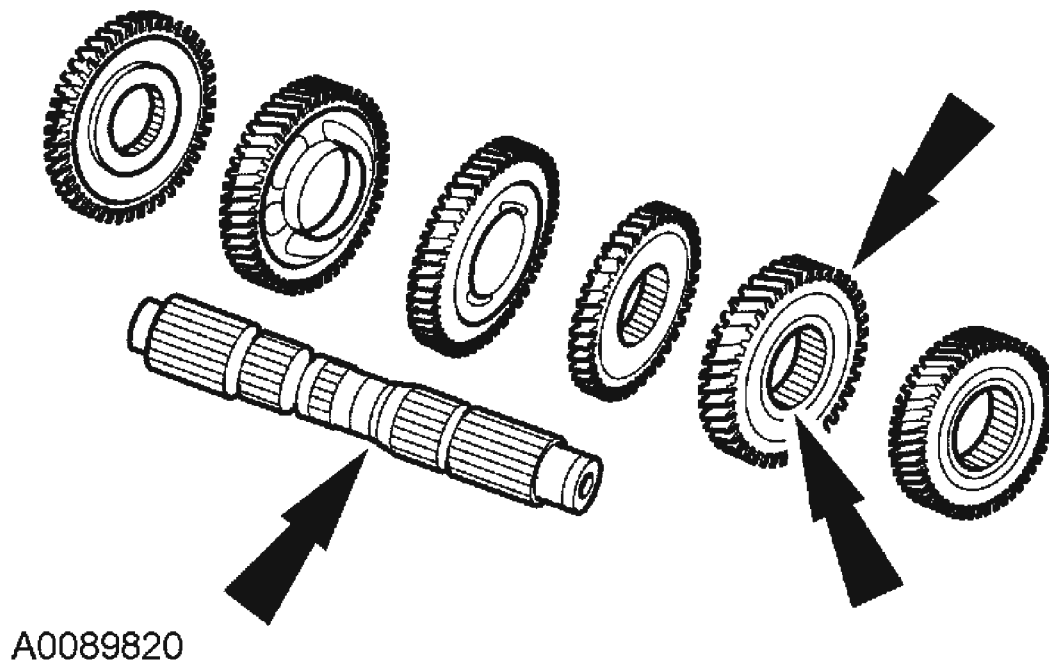
8. Remove the 4th gear main adjusting shim.
9. Remove the 3rd/4th gear shaft spacer.
10. Remove the 3rd main gear, 2nd main gear, 2nd gear needle bearing, 2nd gear bushing, 1st and 2nd gear synchronizer assembly, 1st and 2nd gear synchronizer rings, 1st main gear, reverse main gear, 1st gear needle bearing, and 1st gear bushing together.
  - Discard the 3rd main gear, the reverse main gear, and the 1st and 2nd gear synchronizer assembly.





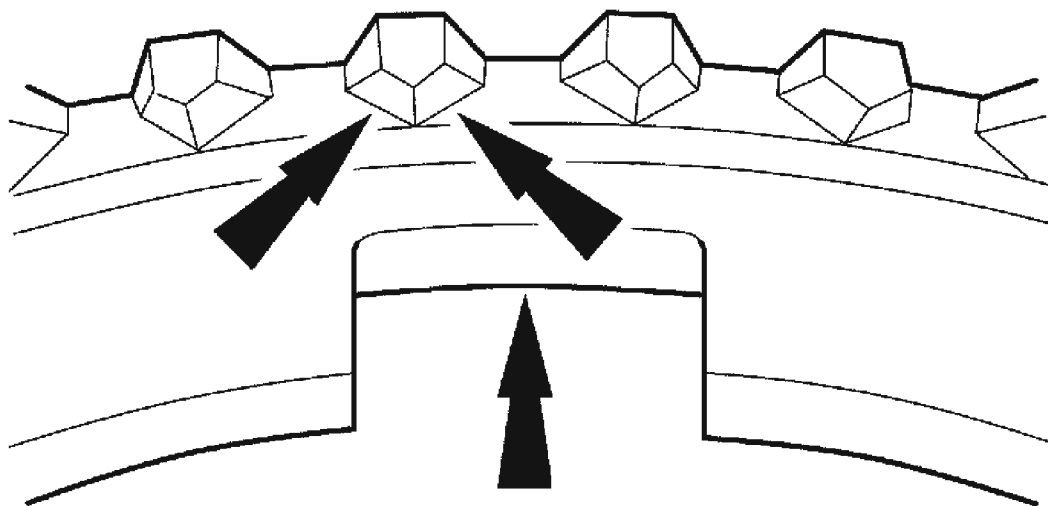
**Fig. 72: Discarding 3rd Main Gear**  
Courtesy of FORD MOTOR CO.

11. Inspect all mainshaft parts for damage, peeling, dents, uneven wear, bending, etc.  
Install new parts as necessary.



**Fig. 73: Inspecting All Mainshaft Parts For Damage, Peeling And Dents**  
 Courtesy of FORD MOTOR CO.

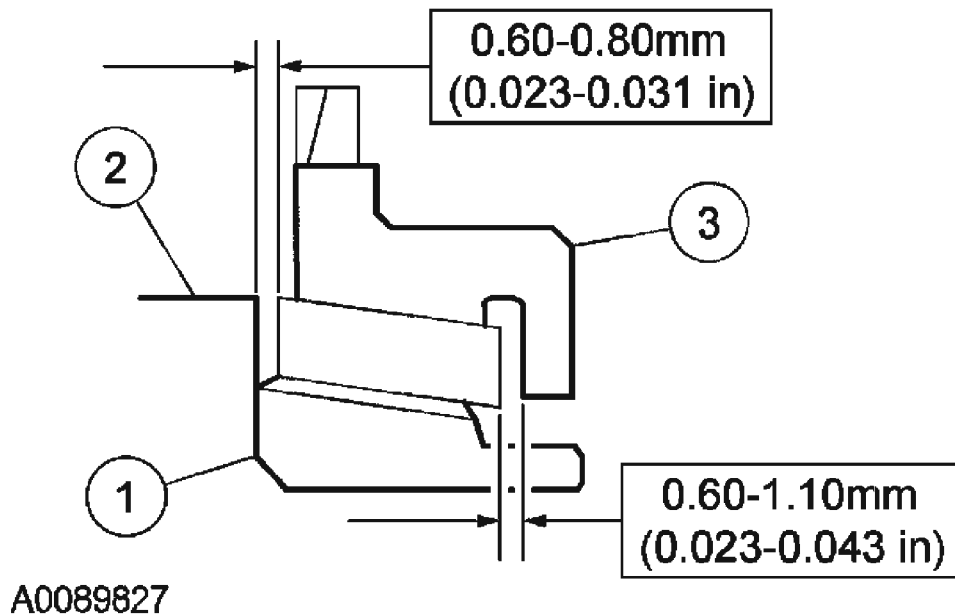
12. Inspect the synchronizer rings for damage. Install new parts as necessary.



A0090164

**Fig. 74: Inspecting Synchronizer Rings For Damage**  
 Courtesy of FORD MOTOR CO.

**NOTE:** The outer synchronizer ring, synchronizer cone and inner synchronizer ring have a set control clearance. If the measurement exceeds specification, install all 3 parts as a set.

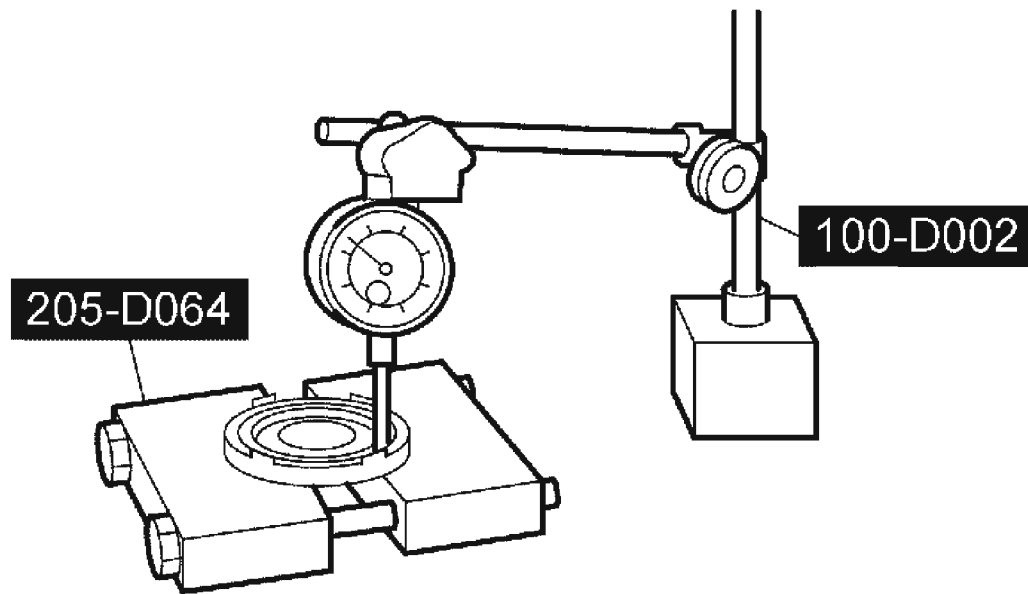


Item	Part Number	Description
1	7107	Inner ring
2	7C115	Synchronizer cone
3	7107	Outer ring

**Fig. 75: Checking Clearances Of Double Cone Synchronizer For 1st Gear**  
 Courtesy of FORD MOTOR CO.

- Check the clearances of the double cone synchronizer for 1st gear. If any of the clearances are beyond specification, install new parts as a set.

**NOTE:** If the difference in measurements is greater than 0.2 mm (0.079 in), install new parts.

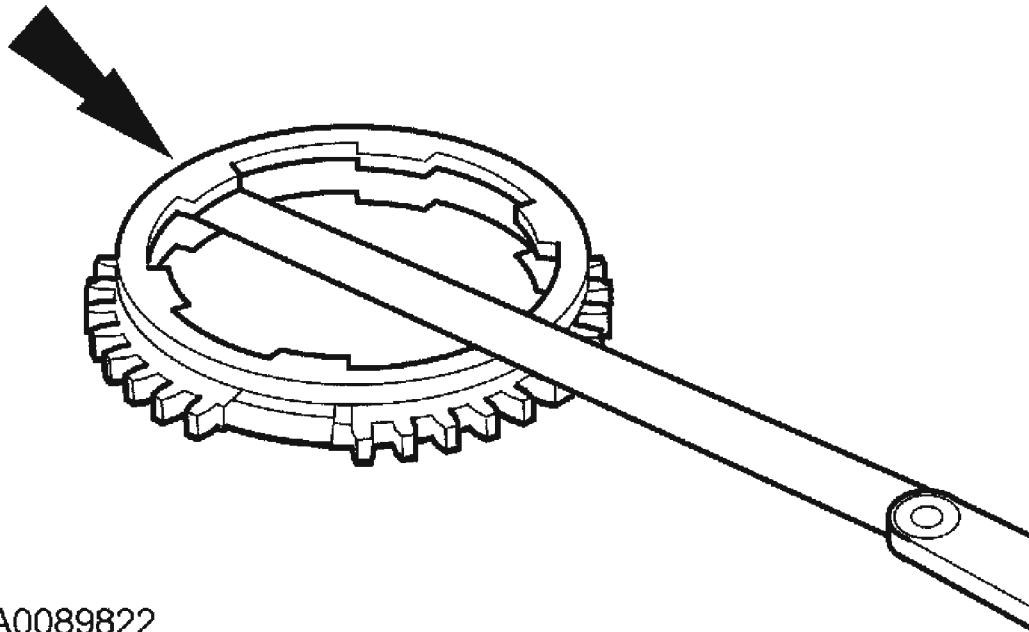


A0089821

**Fig. 76: Measuring Clearance More Points Diagonally Between Synchronizer Cone And Inner Synchronizer Ring**  
Courtesy of FORD MOTOR CO.

14. Using the special tool, measure the clearance at 2 or more points diagonally between the synchronizer cone and the inner synchronizer ring. Install new parts if not within specification.

**NOTE:** If the difference in measurements is greater than 0.2 mm (0.079 in), install new parts.



A0089822

**Fig. 77: Measuring Clearance Between Outer Synchronizer Ring And Synchronizer Cone**

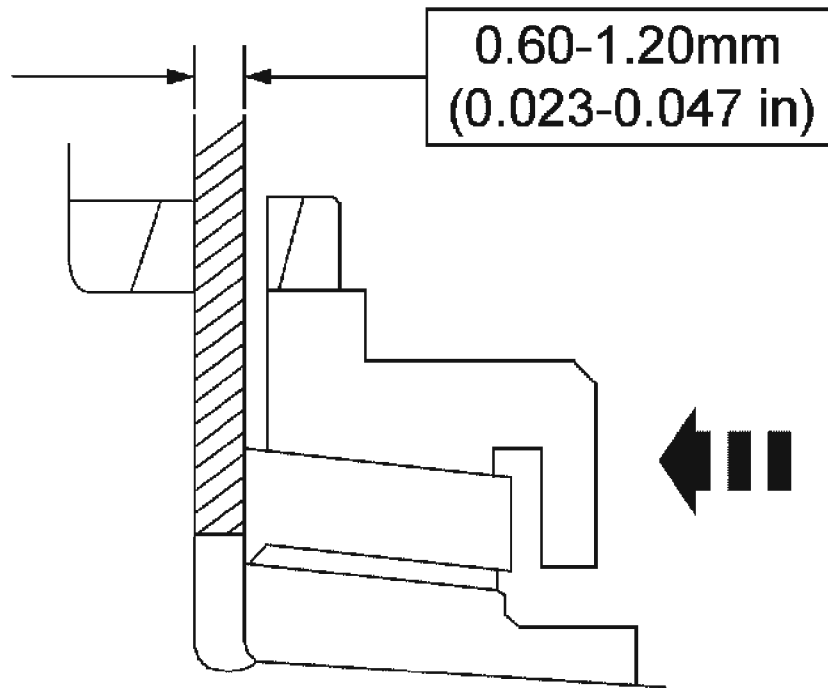
Courtesy of FORD MOTOR CO.

15. Measure the clearance between the outer synchronizer ring and the synchronizer cone at 2 or more points diagonally opposite and calculate the mean value. Install new parts if not within specification.

**CAUTION:** The outer synchronizer ring, synchronizer cone, and inner synchronizer ring have a set control clearance. If the measurement exceeds specification, replace all 3 parts as a set.

16. Check the clearances of the triple cone synchronizer for 2nd gear. If any of the clearances are beyond specification, install new parts as a set.

**NOTE:** If the difference in measurements is greater than 0.3 mm (0.01 in), install new parts.



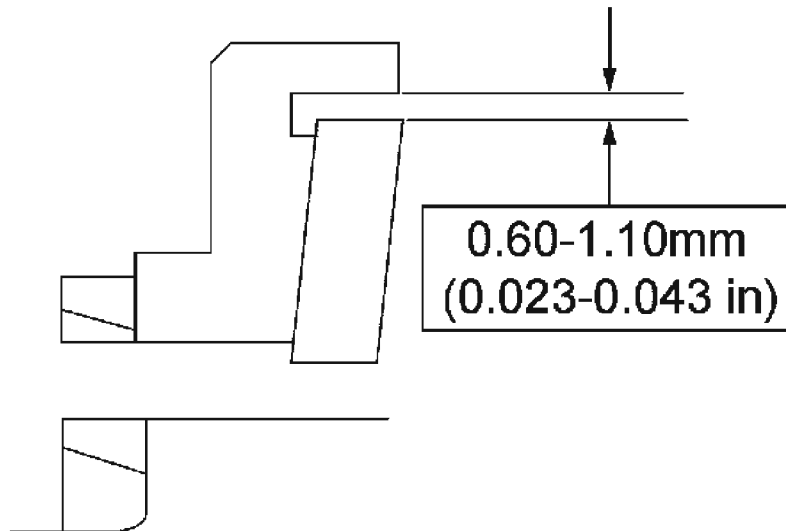
A0089824

**Fig. 78: Measuring Clearance 2 Or More Points Diagonally Opposite And Calculate Mean**

Courtesy of FORD MOTOR CO.

17. Measure the clearance at 2 or more points diagonally opposite and calculate the mean. If the measurement is not within specification, install new parts.

**NOTE:** If the difference in measurements is greater than 0.17 mm (0.007 in) install new parts.



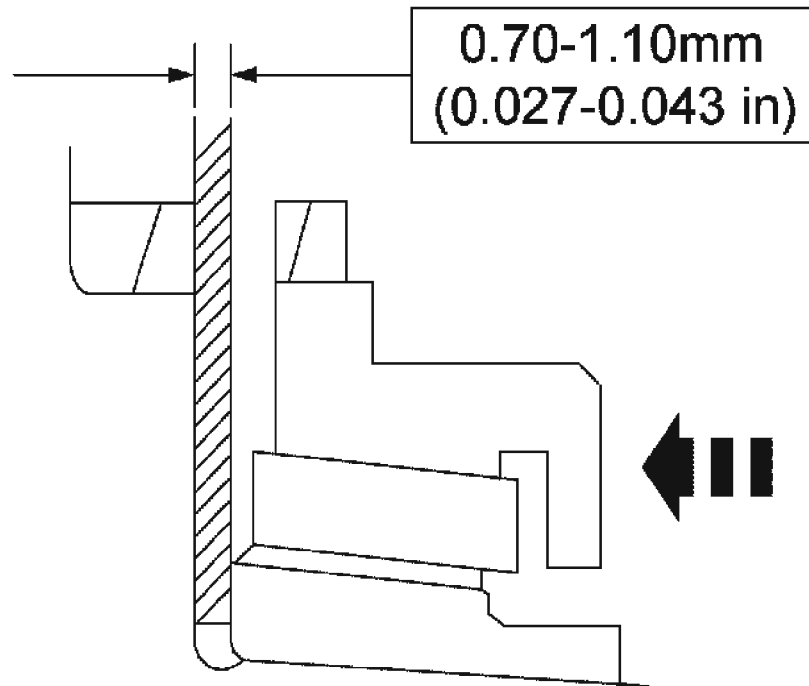
A0089823

**Fig. 79: Measuring Clearance 2 Or More Points Diagonally Opposite And Calculate Mean**

**Courtesy of FORD MOTOR CO.**

18. Measure the clearance at 2 or more points diagonally opposite and calculate the mean. If the measurement is not within specification, install new parts.

**NOTE:** If the difference in measurements is greater than 0.3 mm (0.01 in), install new parts.



A0089825

**Fig. 80: Measuring Clearance 2 Or More Points Diagonally Opposite And Calculate Mean**

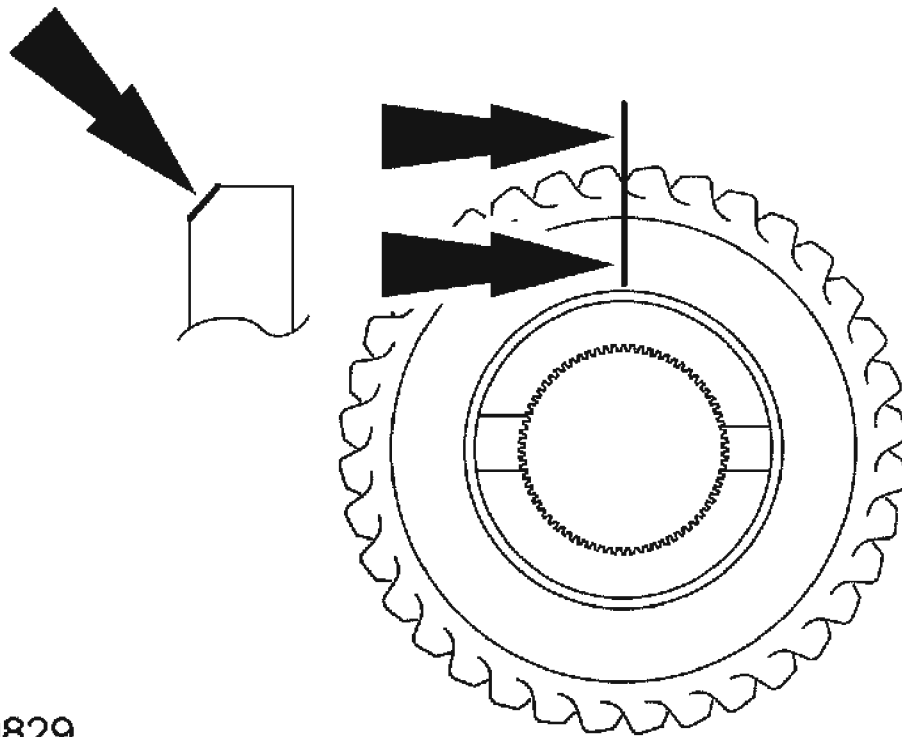
**Courtesy of FORD MOTOR CO.**

19. Measure the clearance at 2 or more points diagonally opposite and calculate the mean. If the measurement is not within specification, install new parts.

Assembly

**CAUTION: Be careful with the orientation of the reverse main gear.**

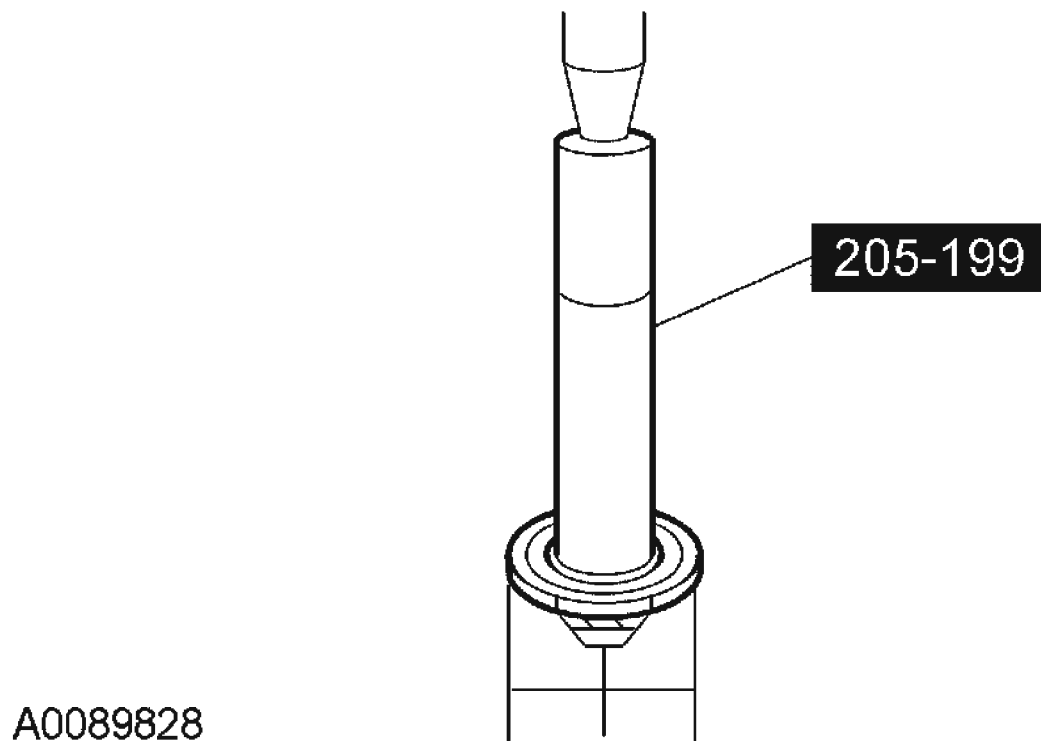




A0089829

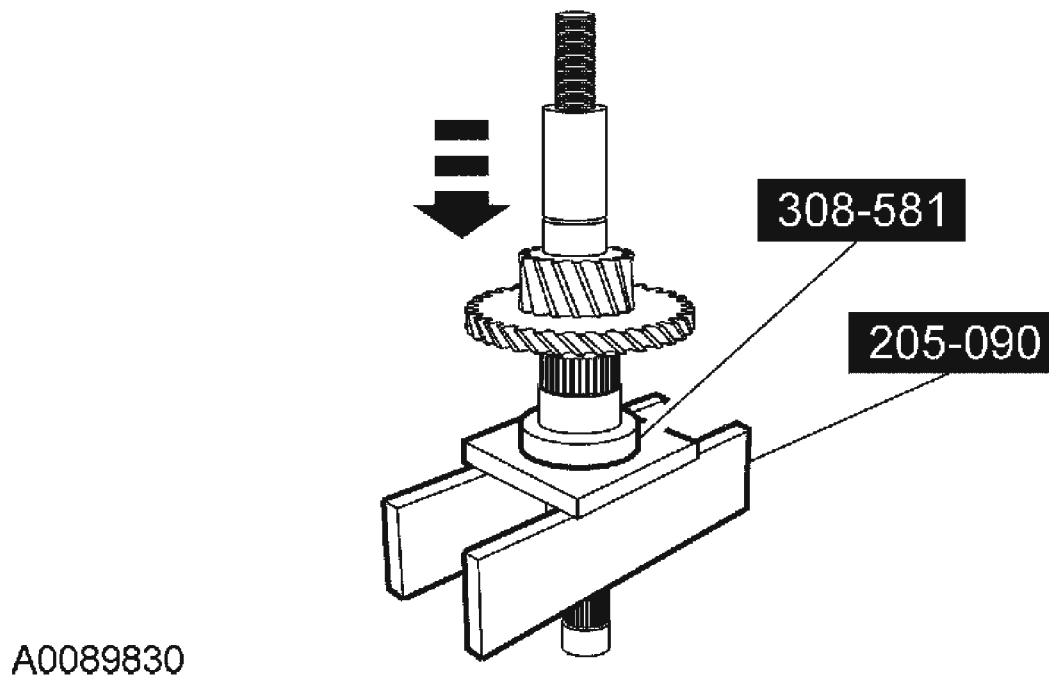
**Fig. 81: Positioning Reverse Main Gear On Mainshaft**  
**Courtesy of FORD MOTOR CO.**

1. Position the reverse main gear on the mainshaft.
2. Using the special tool, install a new reverse main gear.



**Fig. 82: Installing New Reverse Main Gear**  
Courtesy of FORD MOTOR CO.

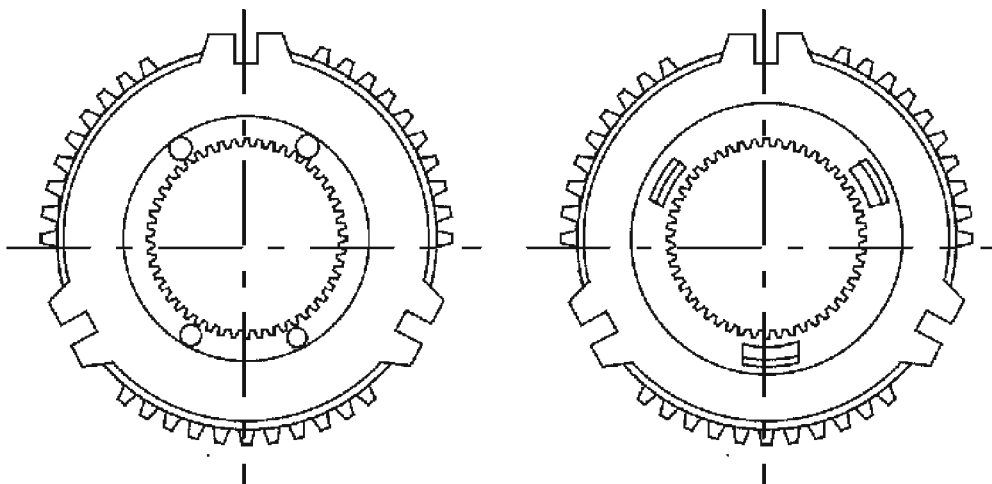
3. Install the 1st main gear.
4. Using the special tools, install the 1st main gear bushing.



**Fig. 83: Installing 1st Main Gear Bushing**  
Courtesy of FORD MOTOR CO.

5. Install the 1st gear needle bearing.
6. Install the 1st gear synchronizer ring.

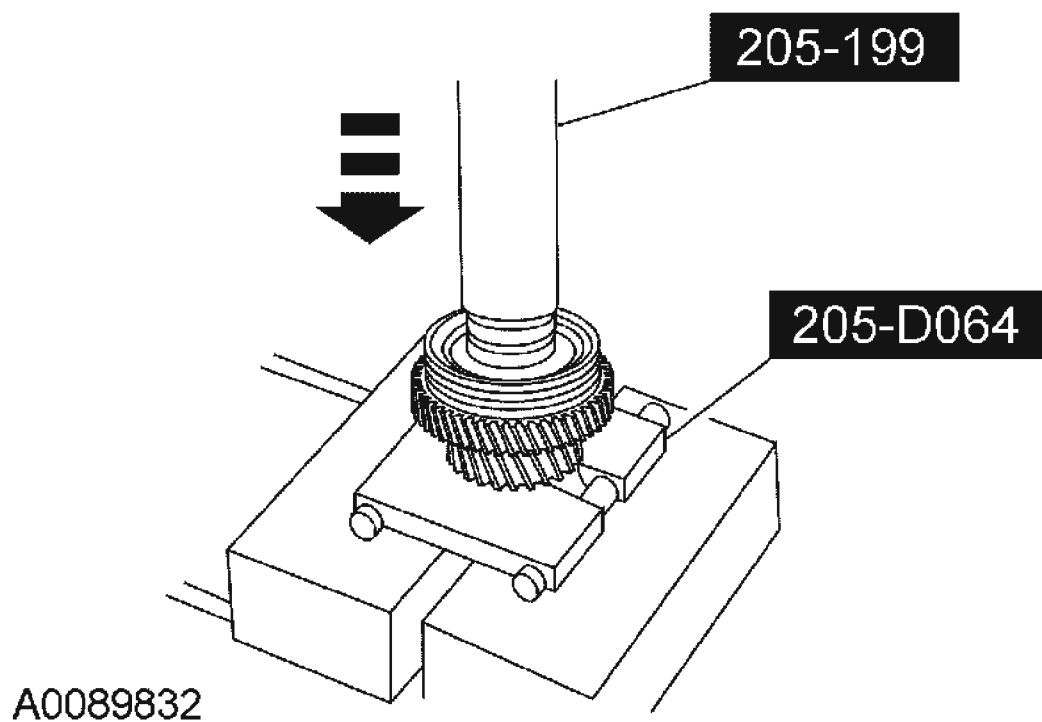
**CAUTION:** Make sure the synchronizer side with 3 notches is facing 1st gear and the synchronizer side with 4 notches is facing 2nd gear.



A0089735

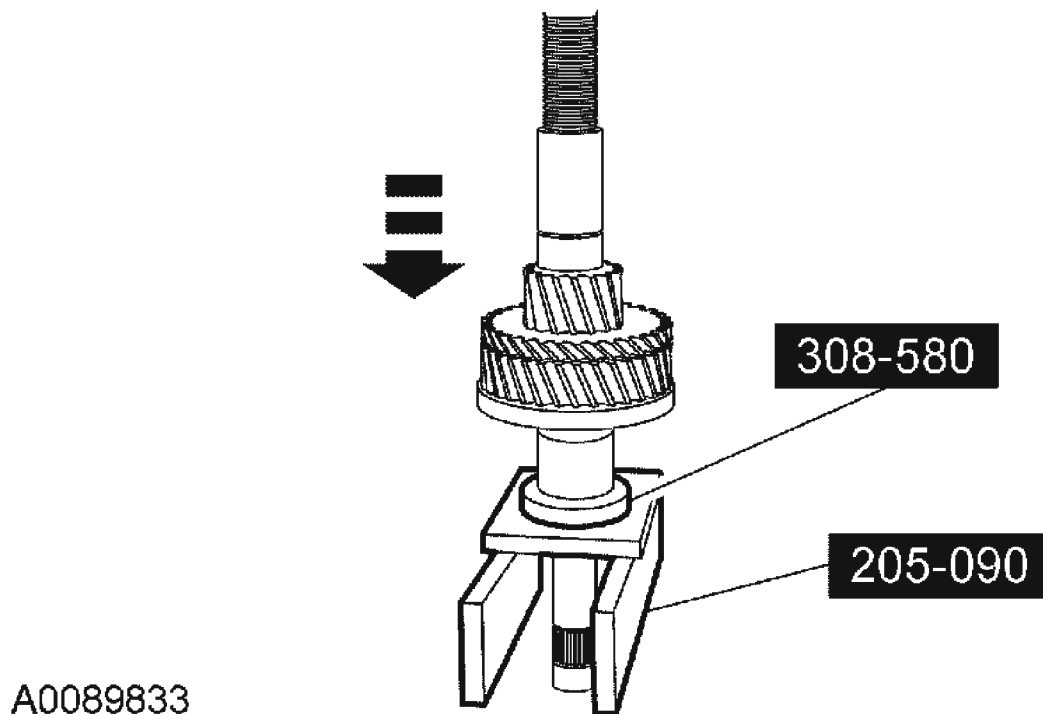
**Fig. 84: Positioning New 1st And 2nd Gear Synchronizer Assembly On Mainshaft**  
**Courtesy of FORD MOTOR CO.**

7. Position a new 1st and 2nd gear synchronizer assembly on the mainshaft.
8. Using the special tools, install the 1st and 2nd gear synchronizer assembly.



**Fig. 85: Installing 1st And 2nd Gear Synchronizer Assembly**  
**Courtesy of FORD MOTOR CO.**

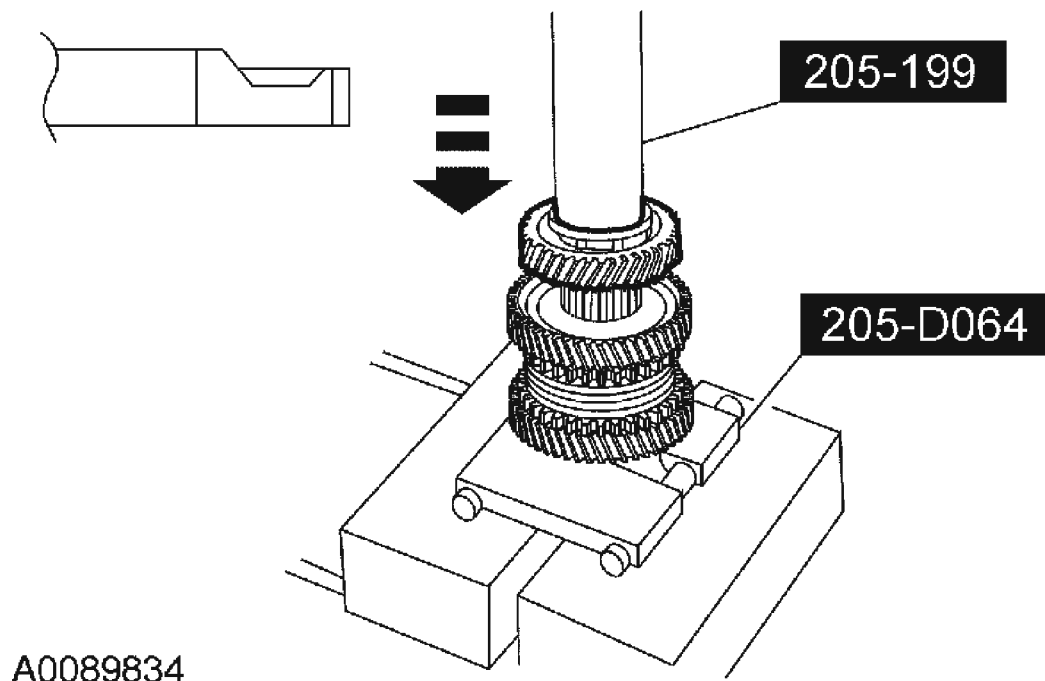
9. Install the 2nd gear synchronizer ring.
10. Using the special tools, install the 2nd gear bushing.



**Fig. 86: Installing 2nd Gear Bushing**  
Courtesy of FORD MOTOR CO.

11. Install the 2nd gear needle bearing.
12. Install the 2nd main gear.

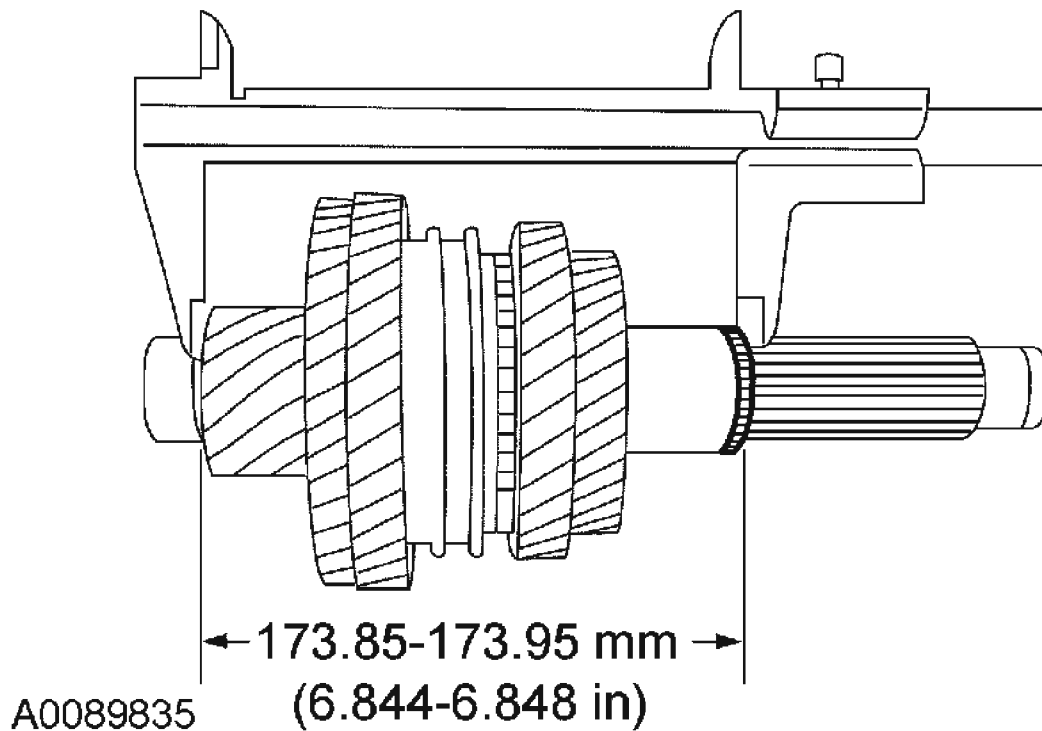
**CAUTION:** Be careful with the orientation of the 3rd main gear.



**Fig. 87: Installing New 3rd Main Gear**  
Courtesy of FORD MOTOR CO.

13. Using the special tools, install a new 3rd main gear.
14. Install the 3rd/4th main gear shaft spacer.

**CAUTION: Only one adjusting shim can be installed.**



**Fig. 88: Measuring Mainshaft Components Select 4th Main Gear Adjusting Shim**  
Courtesy of FORD MOTOR CO.

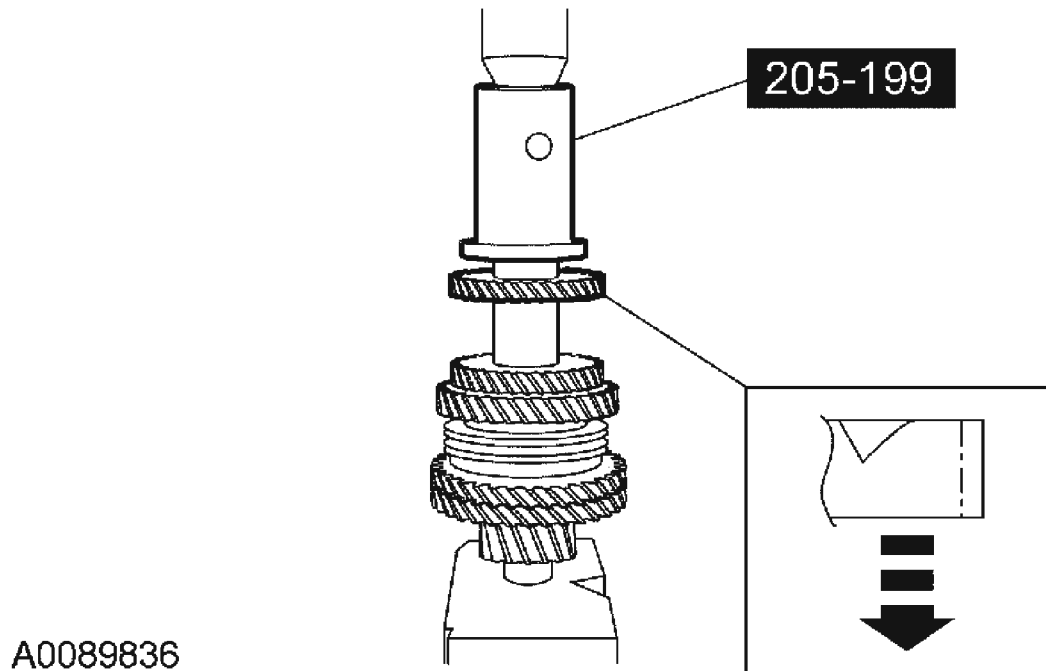
15. Measure the mainshaft components as indicated to select the appropriate 4th main gear adjusting shim. Refer to **4TH MAIN GEAR ADJUSTING SHIM SPECIFICATIONS** for shim thicknesses and install the 4th main gear adjusting shim:

**4TH MAIN GEAR ADJUSTING SHIM SPECIFICATIONS**

mm	in
0.52	0.021
0.60	0.024
0.68	0.027
0.76	0.030
0.84	0.033
0.92	0.036
1.00	0.039
1.08	0.043

**CAUTION:** Be careful with the orientation of the 4th main gear.

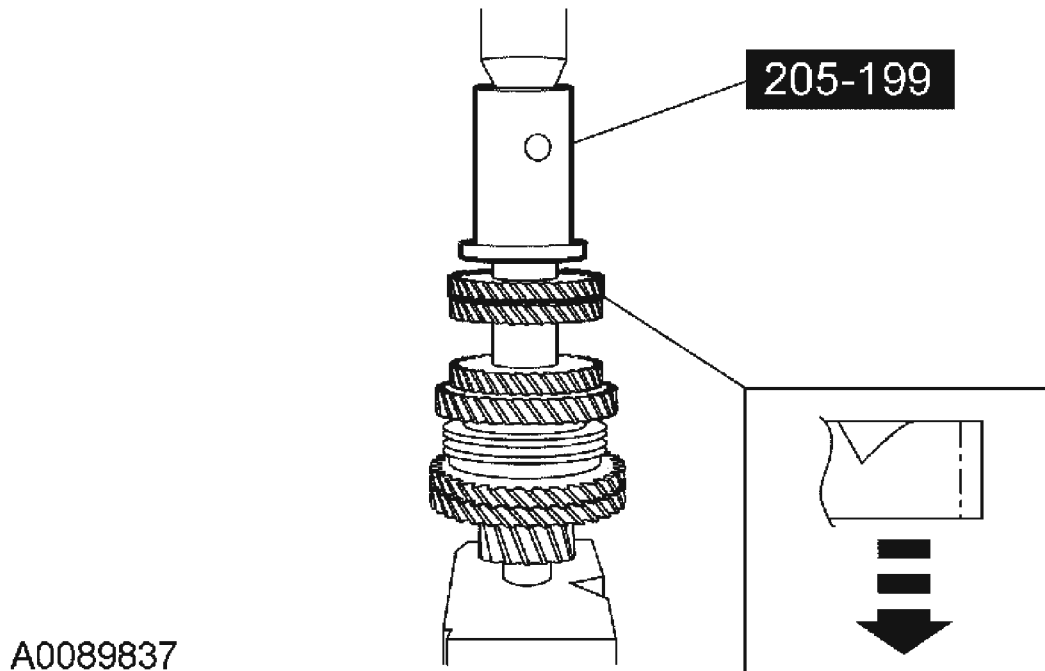




**Fig. 89: Installing New 4th Main Gear**  
Courtesy of FORD MOTOR CO.

16. Using the special tool, install a new 4th main gear.

**CAUTION:** Be careful with the orientation of the 5th main gear.

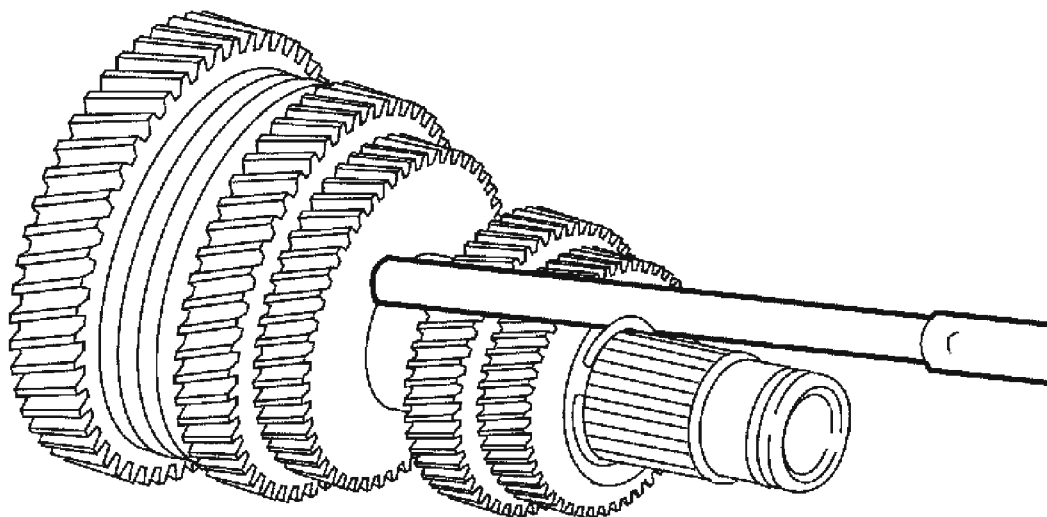


**Fig. 90: Installing New 5th Main Gear**  
Courtesy of FORD MOTOR CO.

17. Using the special tool, install a new 5th main gear.
18. Measure the gap between the snap ring and the 5th main gear. The end play should be less than 0.1 mm (0.0039 in). Refer to the following **SNAP RING SPECIFICATIONS** to select the appropriate snap ring thickness and install a new snap ring:

#### **SNAP RING SPECIFICATIONS**

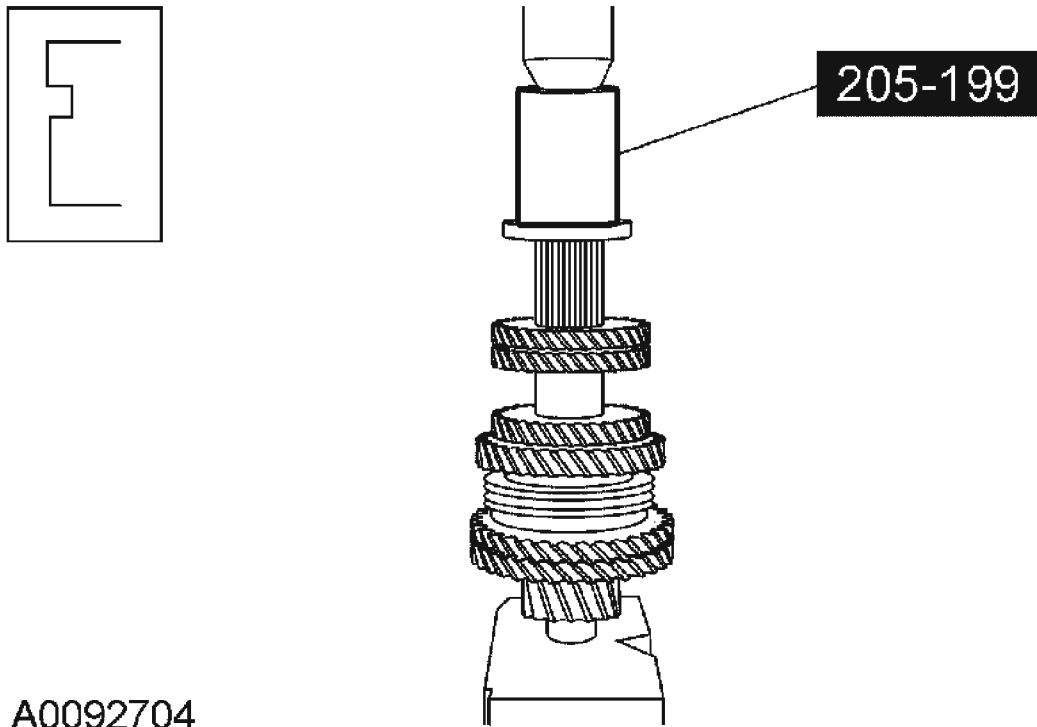
mm	in
1.85	0.073
1.90	0.075
1.95	0.077
2.00	0.079
2.05	0.081
2.10	0.083
2.15	0.085
2.20	0.087



A0089838

**Fig. 91: Measuring Gap Between Snap Ring And 5th Main Gear**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Be careful with the orientation of the mainshaft rear bearing.



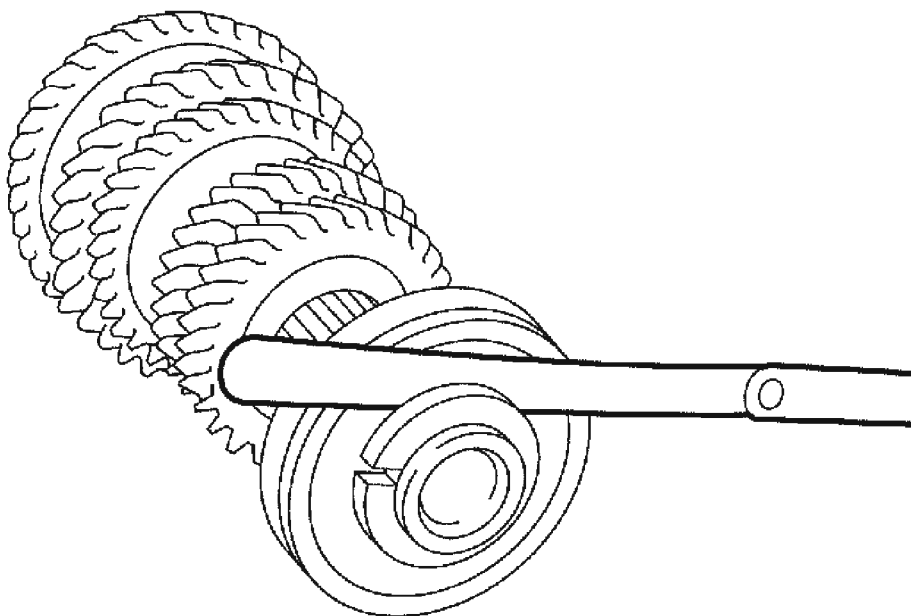
**Fig. 92: Installing Mainshaft Rear Bearing**  
Courtesy of FORD MOTOR CO.

19. Using the special tool, install the mainshaft rear bearing.
20. Measure the gap between the mainshaft C-ring and the mainshaft rear bearing. Refer to the following **C-RING THICKNESS SPECIFICATIONS** to select the appropriate C-ring thickness and install the C-ring:

**C-RING THICKNESS SPECIFICATIONS**

mm	in
2.535	0.0998
2.565	0.1010
2.595	0.1022
2.625	0.1033
2.655	0.1045
2.685	0.1057
2.715	0.1069
2.745	0.1081
2.775	0.1093
2.805	0.1104

2.835	0.1116
2.865	0.1128
2.895	0.1140
2.925	0.1152
2.955	0.1163
2.985	0.1175
3.015	0.1187
3.045	0.1199
3.075	0.1211

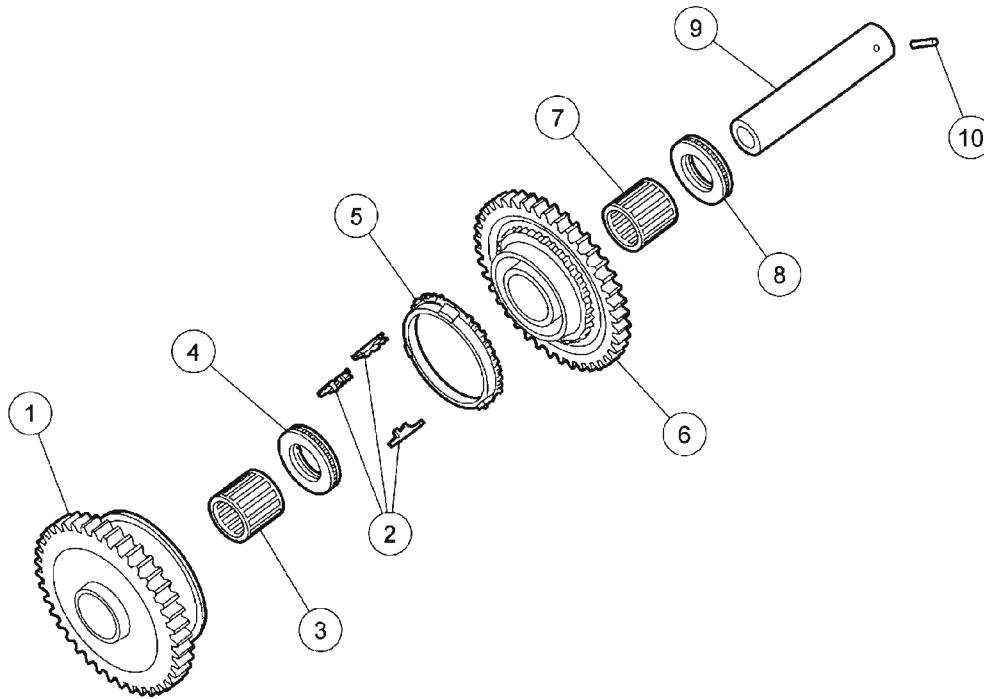


A0089840

**Fig. 93: Measuring Gap Between Mainshaft C-Ring And Mainshaft Rear Bearing**  
Courtesy of FORD MOTOR CO.

21. Install the C-ring holder.
22. Install a new snap ring.

#### REVERSE IDLER GEAR



A0095310

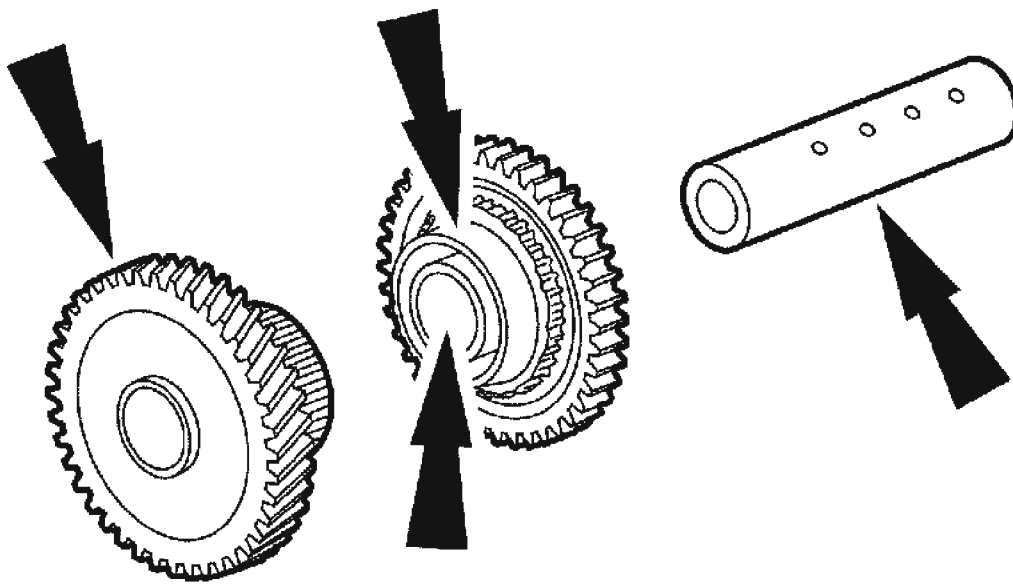
Item	Part Number	Description
1	7141	Reverse idler rear gear and reverse coupling sleeve
2	7C397	Insert springs (3 required)
3	7143	Reverse idler gear needle bearing
4	7C432	Reverse idler gear thrust bearing
5	7107	Reverse gear synchronizer ring
6	7142	Reverse idler front gear
7	7143	Reverse idler gear needle bearing
8	7C432	Reverse idler thrust bearing
9	7140	Reverse idler shaft
10	7K218	Roll pin

**Fig. 94: Identifying Reverse Idler Gear Component**  
 Courtesy of FORD MOTOR CO.

#### Disassembly and Assembly

1. Remove the reverse idler rear gear and reverse coupling sleeve.
2. Remove the 3 insert springs.
3. Remove the reverse idler gear needle bearing.
4. Remove the reverse idler gear thrust bearing.
5. Remove the reverse idler gear synchronizer ring.

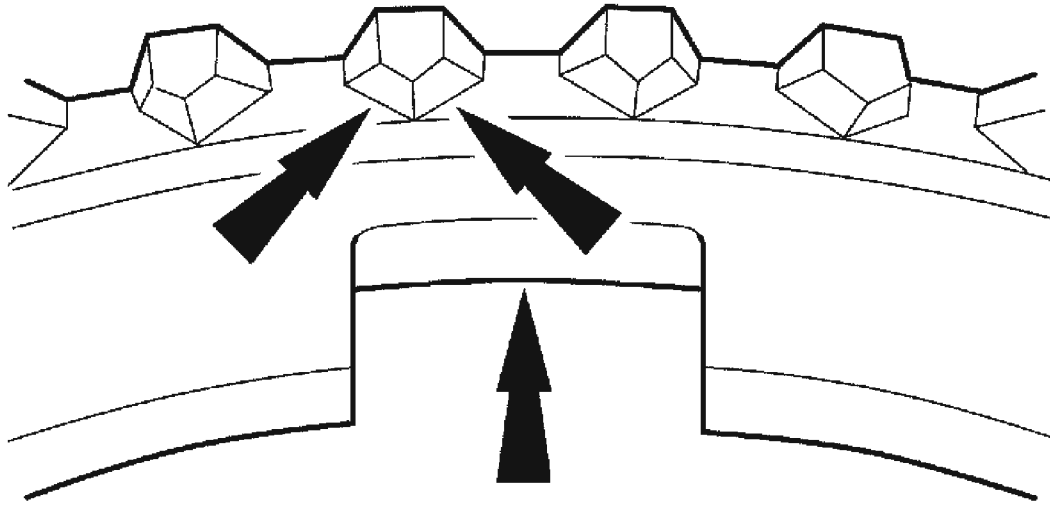
6. Remove the reverse idler front gear.
7. Remove the reverse idler gear needle bearing.
8. Remove the reverse idler gear thrust bearing.
9. Remove and discard the roll pin.
10. Inspect all the reverse idler shaft parts for damage, peeling, dents, uneven wear, bending, etc. Install new parts as necessary.



A0089843

**Fig. 95: Inspecting All Reverse Idler Shaft Parts For Damage, Peeling And Dents**  
Courtesy of FORD MOTOR CO.

11. Inspect the synchronizer rings for damage. Install new parts as necessary.

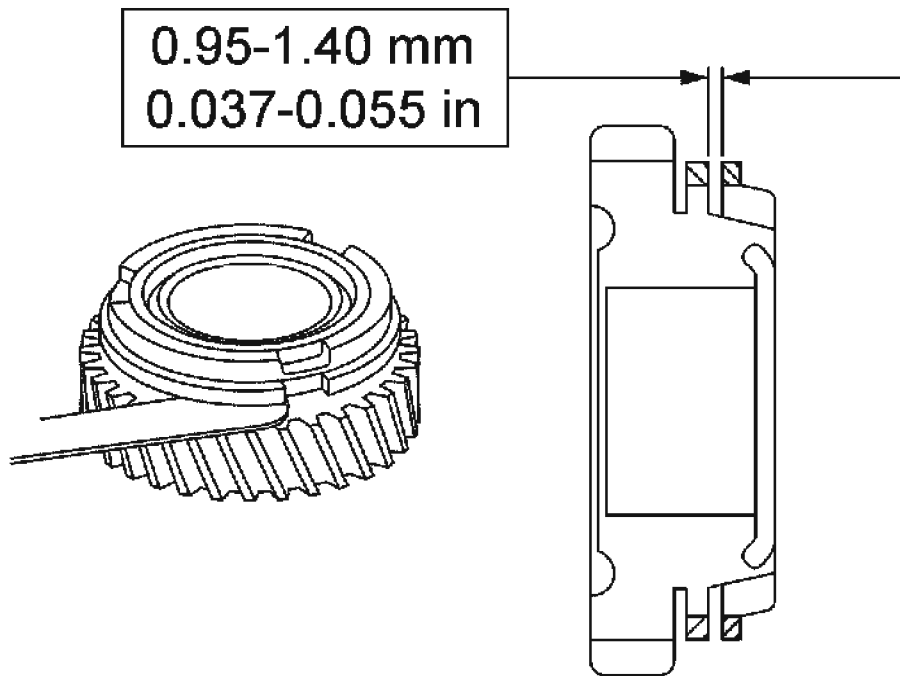


A0090164

**Fig. 96: Inspecting Synchronizer Rings For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Limit value: 0.7 mm (0.02 in).





A0089844

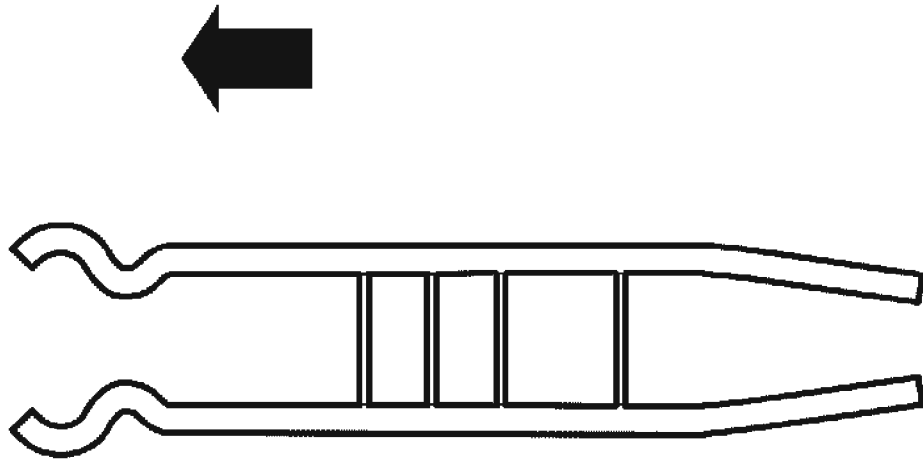
**Fig. 97: Measuring Clearance Between Synchronizer Ring And Flank Surface Of Gear**

Courtesy of FORD MOTOR CO.

12. Press the synchronizer ring against the cone and measure the clearance between the synchronizer ring and the flank surface of the gear. Install a new synchronizer ring if the measurement is not within specification.

**CAUTION: Be careful with the orientation of the insert springs.**

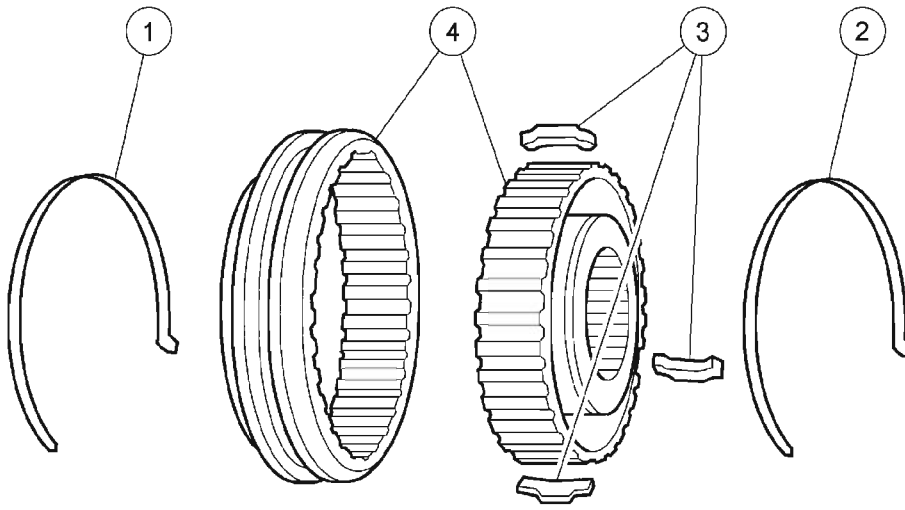
13. To assemble, reverse the disassembly procedure.
  - Install the insert springs in the correct orientation toward the engine.



A0089842

**Fig. 98: Installing Insert Springs Correct Orientation Toward Engine**  
Courtesy of FORD MOTOR CO.

## SYNCHRONIZERS



A0095325

Item	Part Number	Description
1	7109	Synchronizer spring
2	7109	Synchronizer spring
3	7C396	Synchronizer keys (3 required)
4	7C115	Synchronizer shift ring and hub assembly

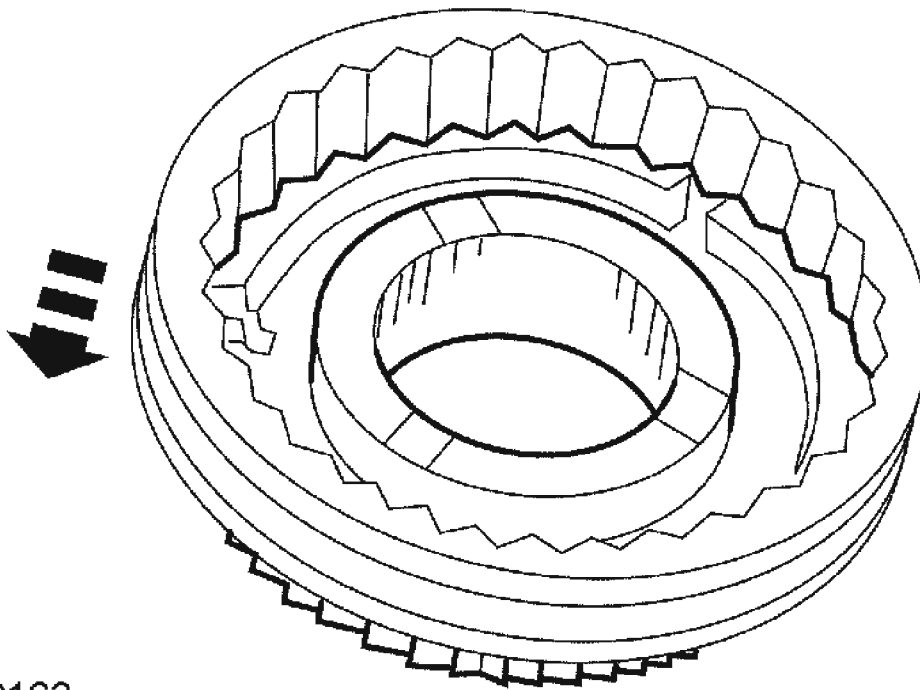
**Fig. 99: Identifying Synchronizers Spring And Ring Component**  
**Courtesy of FORD MOTOR CO.**

#### Disassembly

1. Remove the synchronizer springs.
2. Remove the 3 synchronizer keys.
3. Discard the synchronizer shift ring and hub assembly.

#### Assembly

1. Inspect the new synchronizer shift ring and hub assembly for damage. Make sure they move freely.

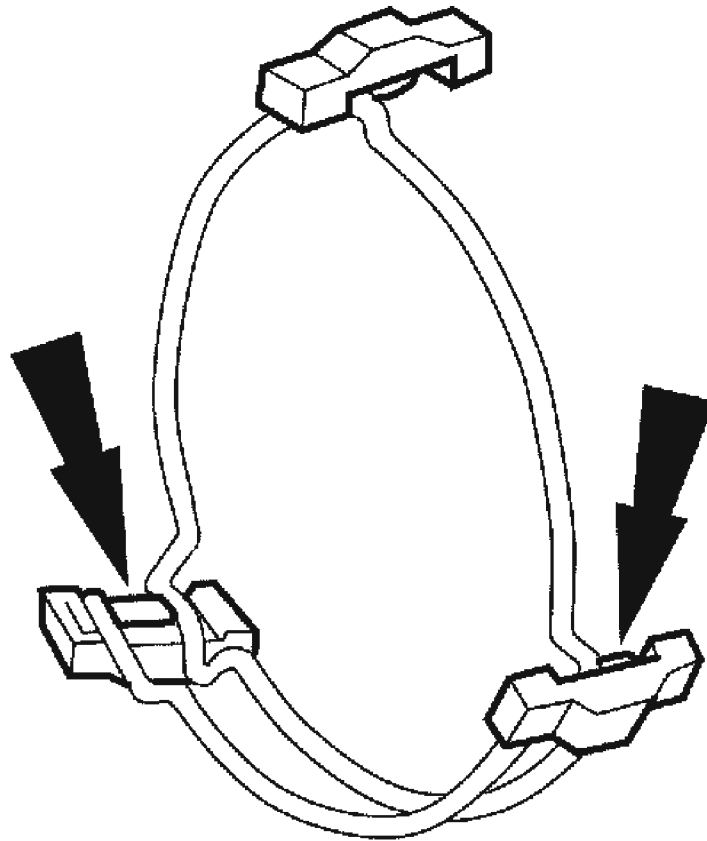


A0090163

**Fig. 100: Inspecting New Synchronizer Shift Ring And Hub Assembly**  
Courtesy of FORD MOTOR CO.

2. Install the 3 synchronizer keys.

**CAUTION:** When assembling the synchronizer springs make sure the springs are offset from one another.



A0090165

**Fig. 101: Installing Synchronizer Springs**  
Courtesy of FORD MOTOR CO.

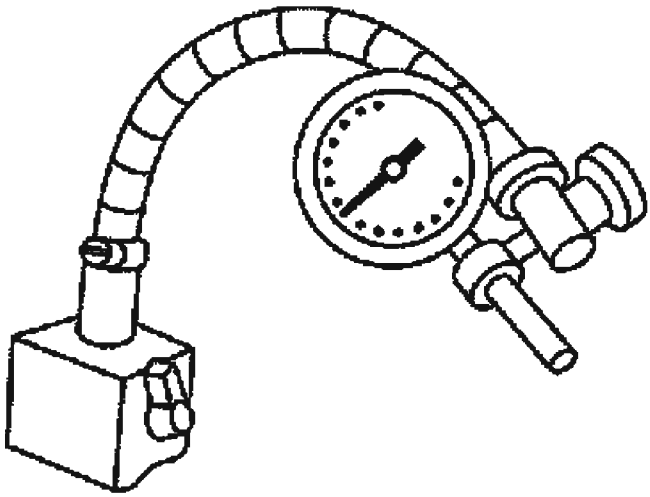
3. Install the synchronizer springs.

#### **DIFFERENTIAL - FWD**

Special Tool(s)

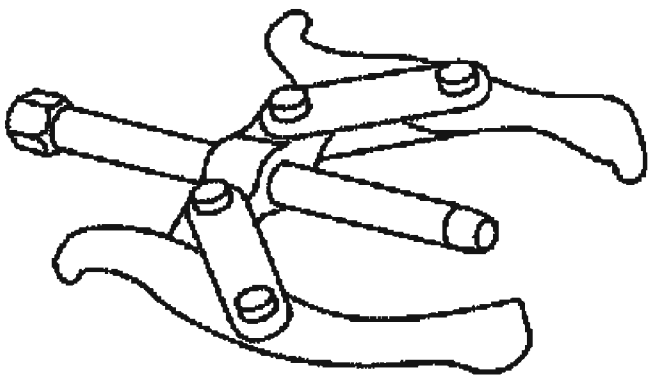
#### **SPECIAL TOOL DESCRIPTION**

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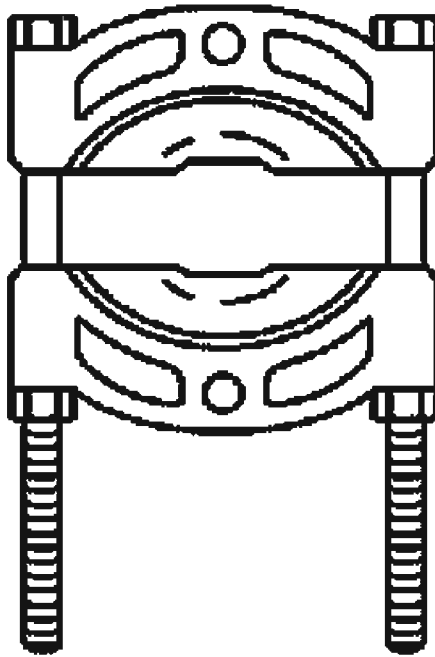
**ST1266-A**

Dial Indicator Gauge with Holding  
Fixture 100-D002 or equivalent



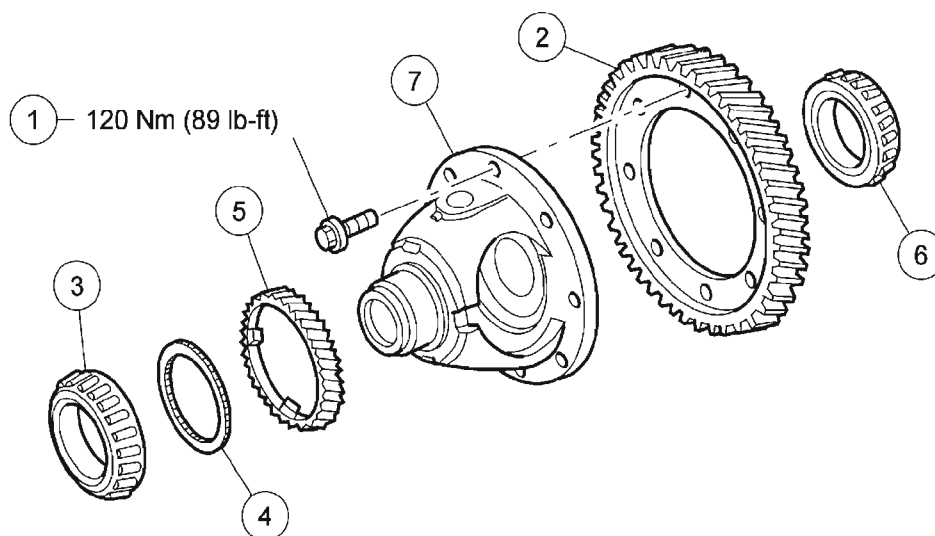
**ST1220-A**

2-Jaw Puller 205-D035 or equivalent



**ST1368-A**

Bearing Puller 205-D064 or  
equivalent



A0095321

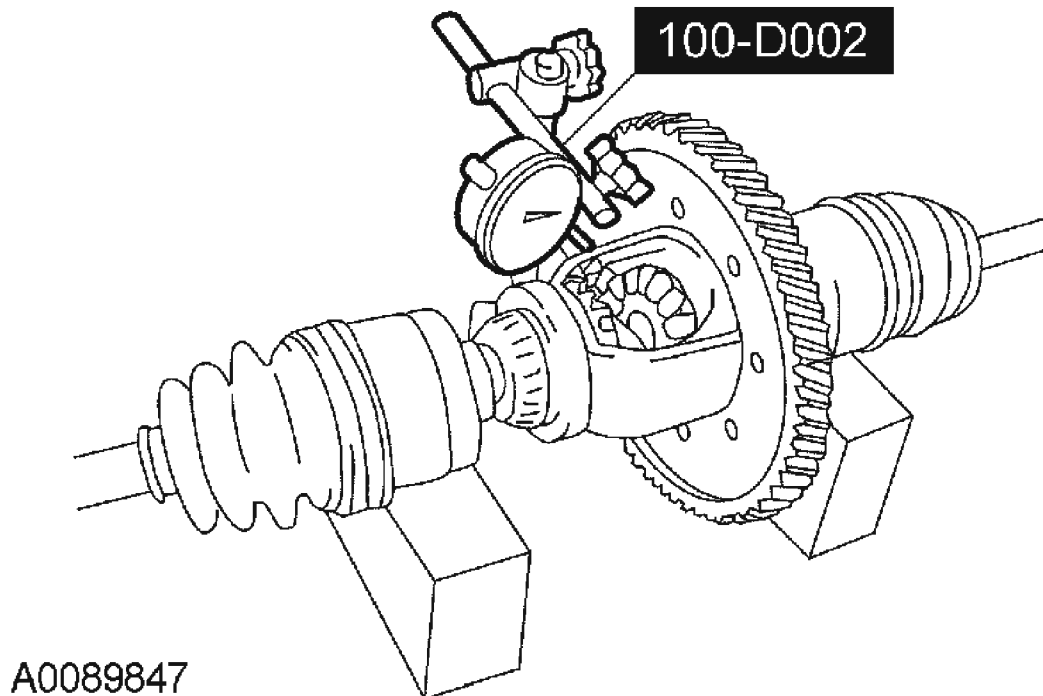
Item	Part Number	Description
1	99784	Final drive gear bolt (10 required)
2	7F343	Final drive gear
3	3N305	Differential side bearing
4	7N112	Spacer
5	17285	Vehicle speed sensor (VSS) drive gear
6	3N305	Differential side bearing
7	4026	Differential case assembly

**Fig. 102: Identifying Differential - FWD**  
Courtesy of FORD MOTOR CO.

#### Disassembly

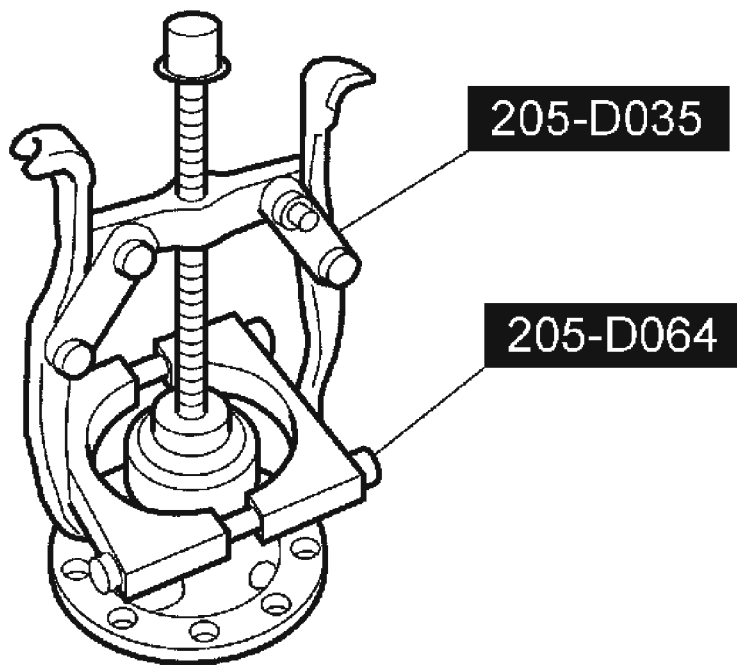
**NOTE:** Backlash specification: 0.02-0.08 mm (0.0008-0.0031 in).





**Fig. 103: Measuring And Record Backlash For Differential Side Gears**  
Courtesy of FORD MOTOR CO.

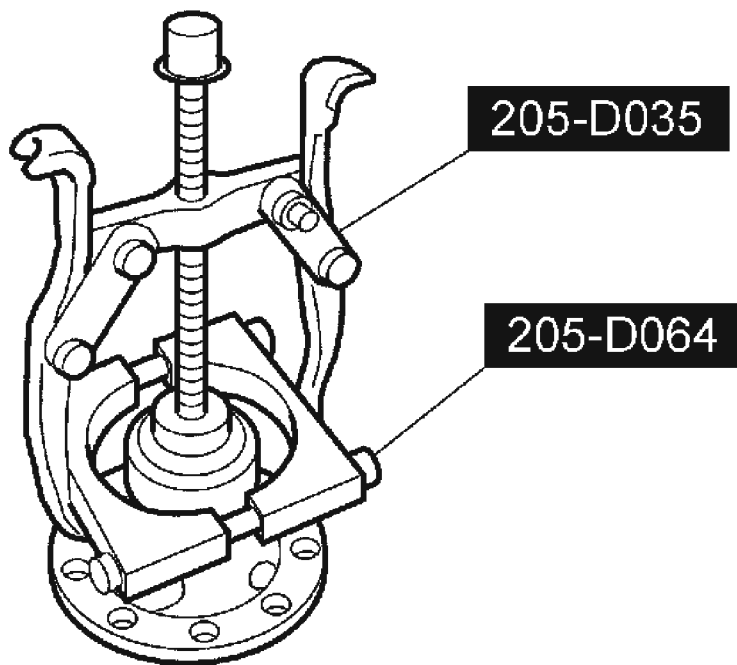
1. Using the special tool, measure and record the backlash for the differential side gears. Install a new differential if beyond specification.
2. Remove the 10 bolts and the final drive gear.
3. Using the special tools, remove the differential side bearing.
  - Discard the differential side bearing.



A0090162

**Fig. 104: Removing Differential Side Bearing**  
Courtesy of FORD MOTOR CO.

4. Remove the spacer.
5. Remove the vehicle speed sensor (VSS) drive gear.
6. Using the special tools, remove the differential side bearing.
  - Discard the differential side bearing.

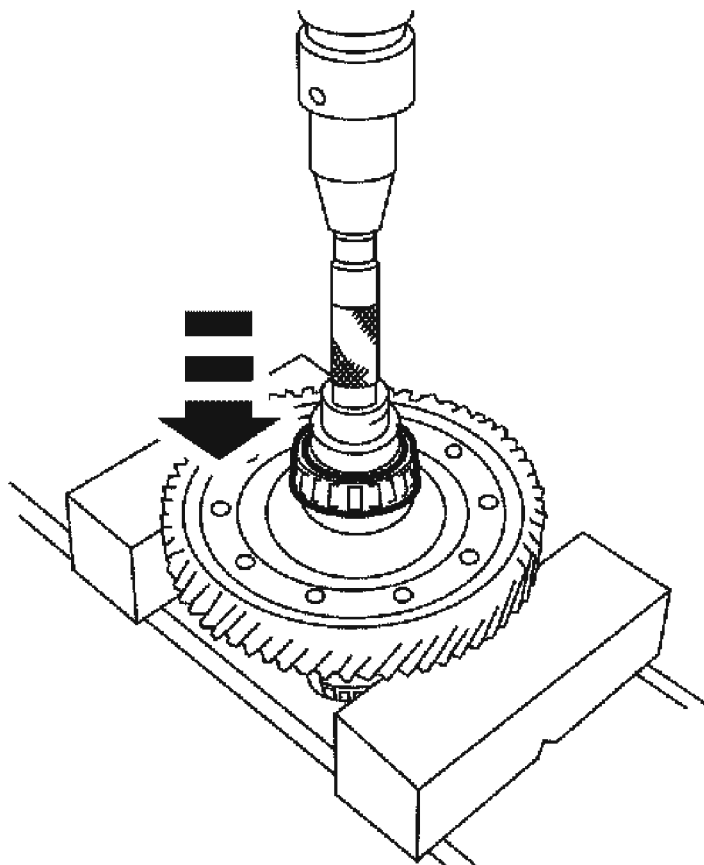


A0090162

**Fig. 105: Removing Differential Side Bearing, Using Special Tools**  
Courtesy of FORD MOTOR CO.

Assembly

**CAUTION:** Be careful not to crush the bearing while pressing it onto the differential case.

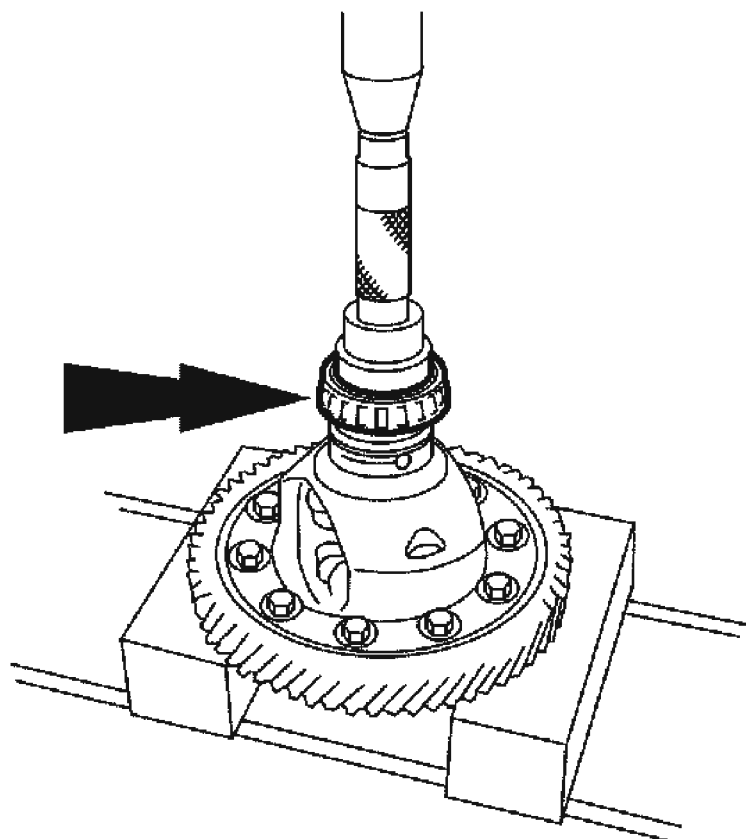


A0089848

**Fig. 106: Pressing Differential Case**  
Courtesy of FORD MOTOR CO.

1. Install a new differential side bearing.
2. Install the VSS drive gear.
3. Install the spacer.

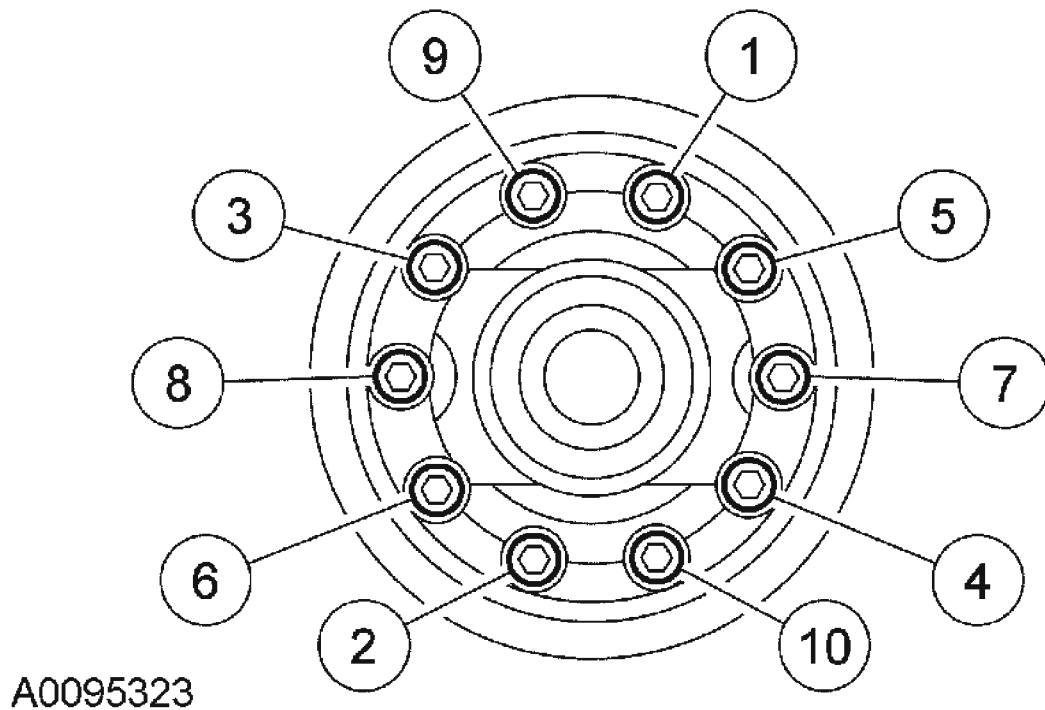
**CAUTION:** Be careful not to crush the bearing while pressing it onto the differential case.



A0089849

**Fig. 107: Installing New Differential Side Bearing**  
**Courtesy of FORD MOTOR CO.**

4. Install a new differential side bearing.
5. Install the final drive gear and the 10 bolts.
  - Tighten in sequence to 120 Nm (89 lb-ft).



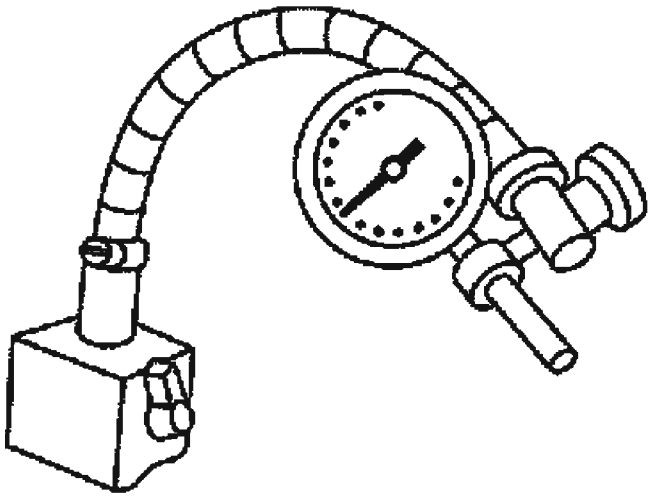
**Fig. 108: Installing Final Drive Gear And Bolts**  
 Courtesy of FORD MOTOR CO.

#### DIFFERENTIAL - 4WD

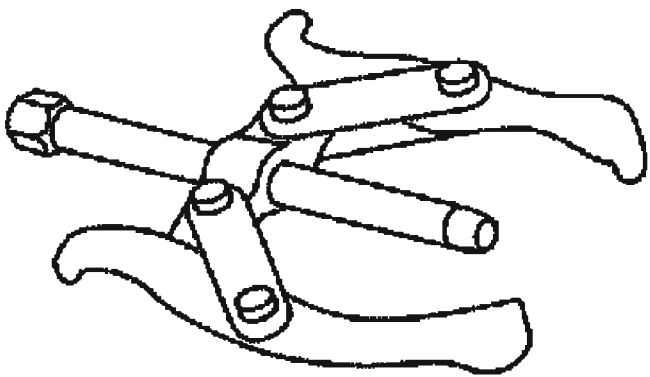
Special Tool(s)

#### SPECIAL TOOL DESCRIPTION

Dial Indicator Gauge with Holding  
 Fixture 100-D002 or equivalent

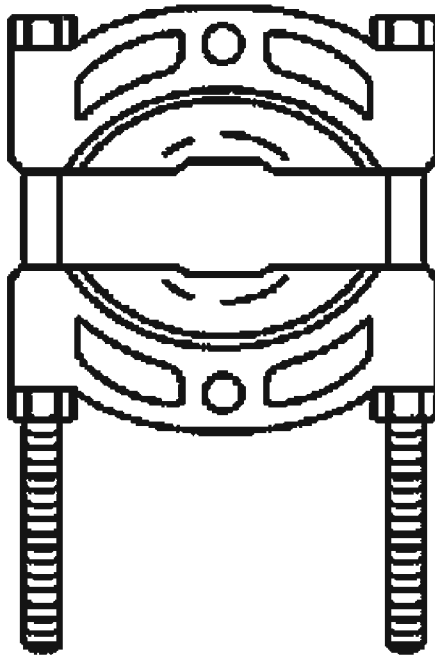


**ST1266-A**



**ST1220-A**

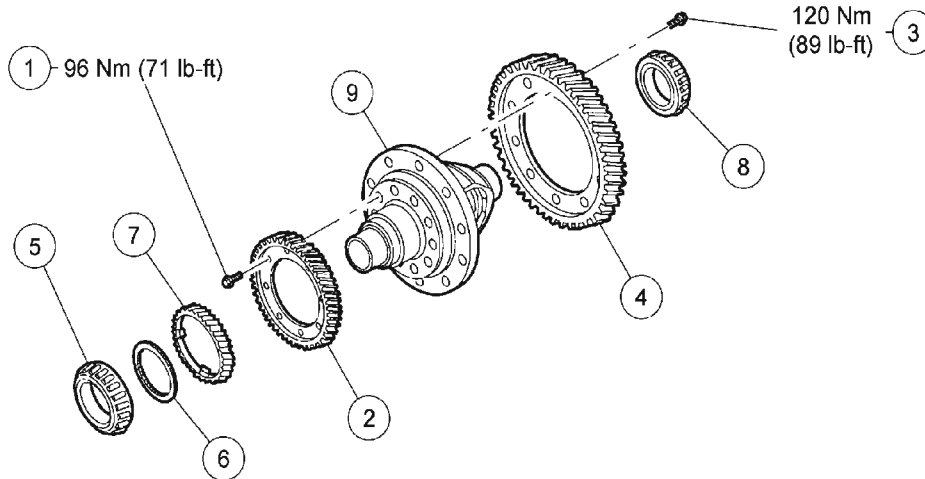
2-Jaw Puller 205-D035 or equivalent



**ST1368-A**

Bearing Puller 205-D064 or  
equivalent





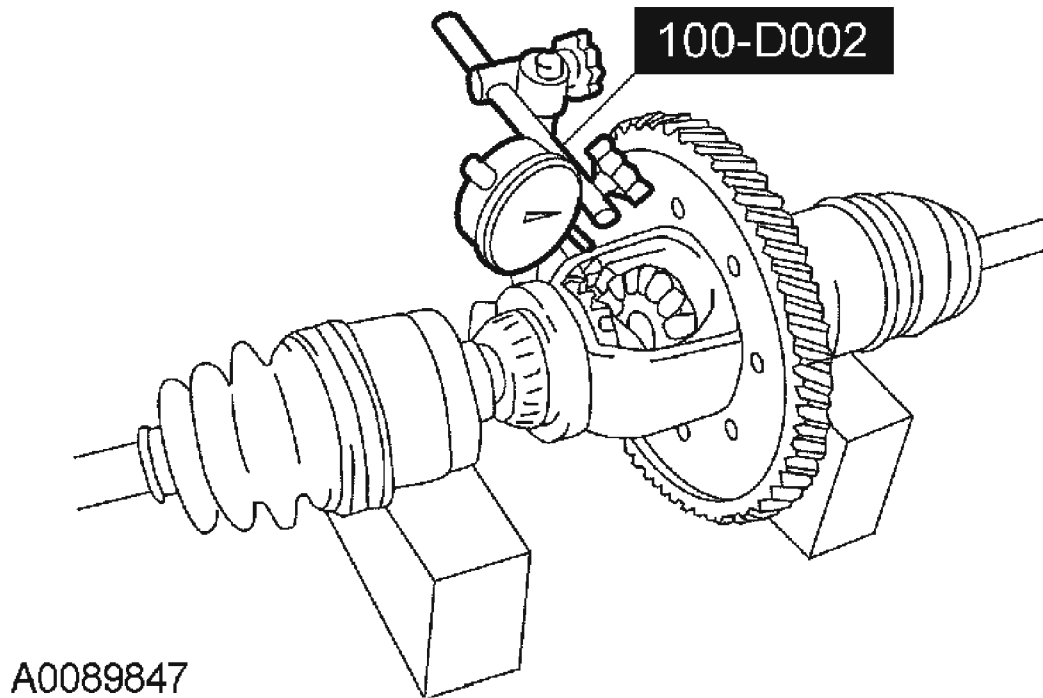
A0095322

Item	Part Number	Description
1	99784	Reduction gear bolt (10 required)
2	7789	Reduction gear
3	99784	Final drive gear bolts (10 required)
4	7F343	Final drive gear
5	3N305	Differential side bearing
6	7N112	Spacer
7	17285	Vehicle speed sensor (VSS) drive gear
8	3N305	Differential side bearing
9	4026	Differential case assembly

**Fig. 109: Identifying Differential - 4WD Component With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

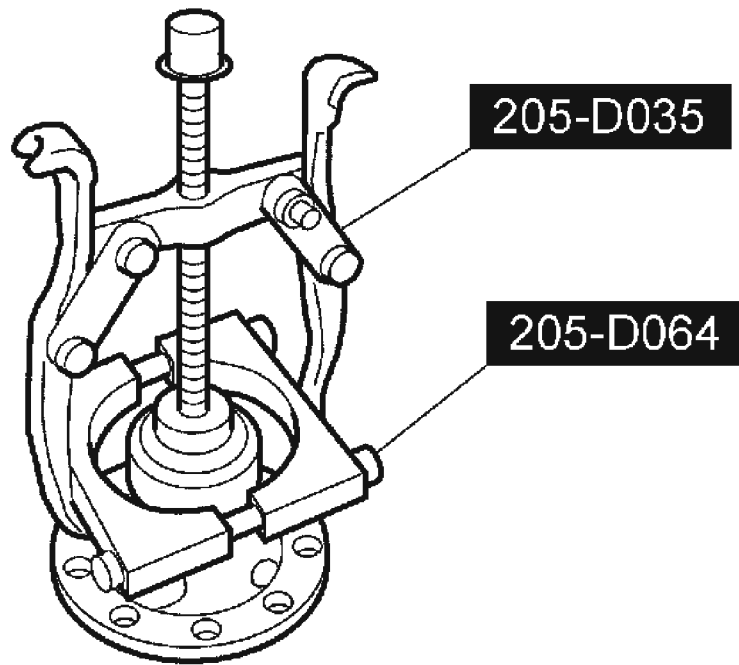
#### Disassembly

**NOTE:** Backlash specification: 0.02-0.08 mm (0.0008-0.0031 in).



**Fig. 110: Measuring And Record Backlash For Differential Side Gears**  
**Courtesy of FORD MOTOR CO.**

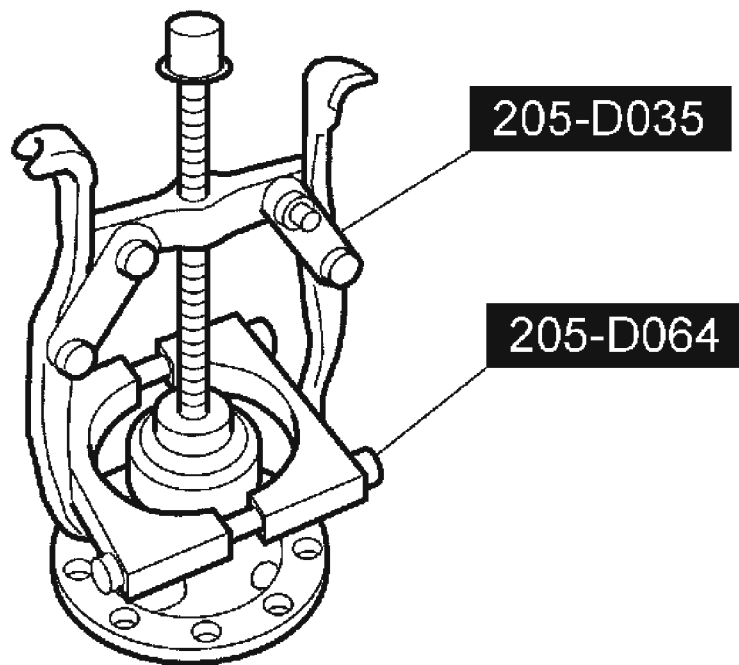
1. Using the special tool, measure and record the backlash for the differential side gears. Install a new differential if beyond specification.
2. Remove the 10 reduction gear bolts.
3. Remove the reduction gear.
4. Remove the 10 final drive gear bolts.
5. Remove the final drive gear.
6. Using the special tools, remove the differential side bearing.
  - Discard the differential side bearing.



A0090162

**Fig. 111: Removing Differential Side Bearing, Using Special Tools**  
Courtesy of FORD MOTOR CO.

7. Remove the spacer.
8. Remove the vehicle speed sensor (VSS) drive gear.
9. Using the special tools, remove the differential side bearing.
  - Discard the differential side bearing.

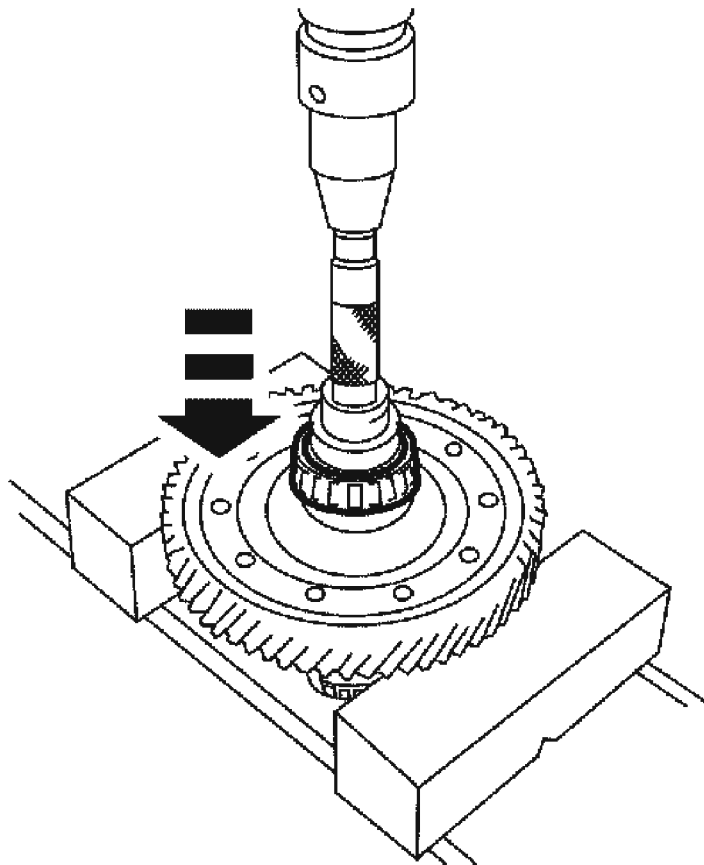


A0090162

**Fig. 112: Discarding Differential Side Bearing**  
Courtesy of FORD MOTOR CO.

Assembly

**CAUTION:** Be careful not to crush the bearing while pressing it onto the differential case.

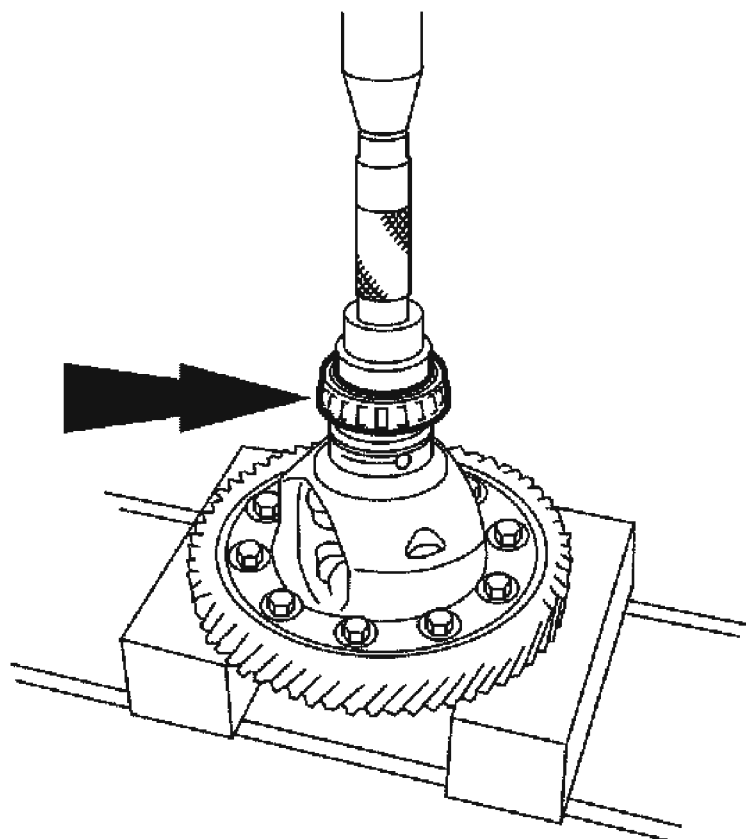


A0089848

**Fig. 113: Pressing Onto Differential Case**  
Courtesy of FORD MOTOR CO.

1. Install a new differential side bearing.
2. Install the VSS drive gear.
3. Install the spacer.

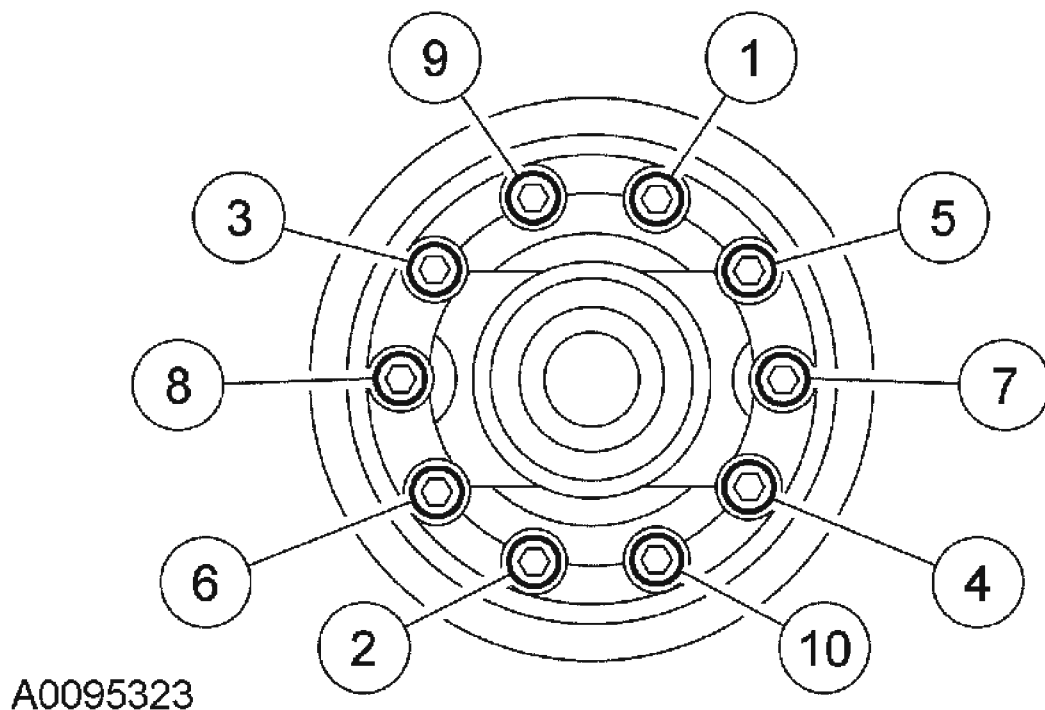
**CAUTION:** Be careful not to crush the bearing while pressing it onto the differential case.



A0089849

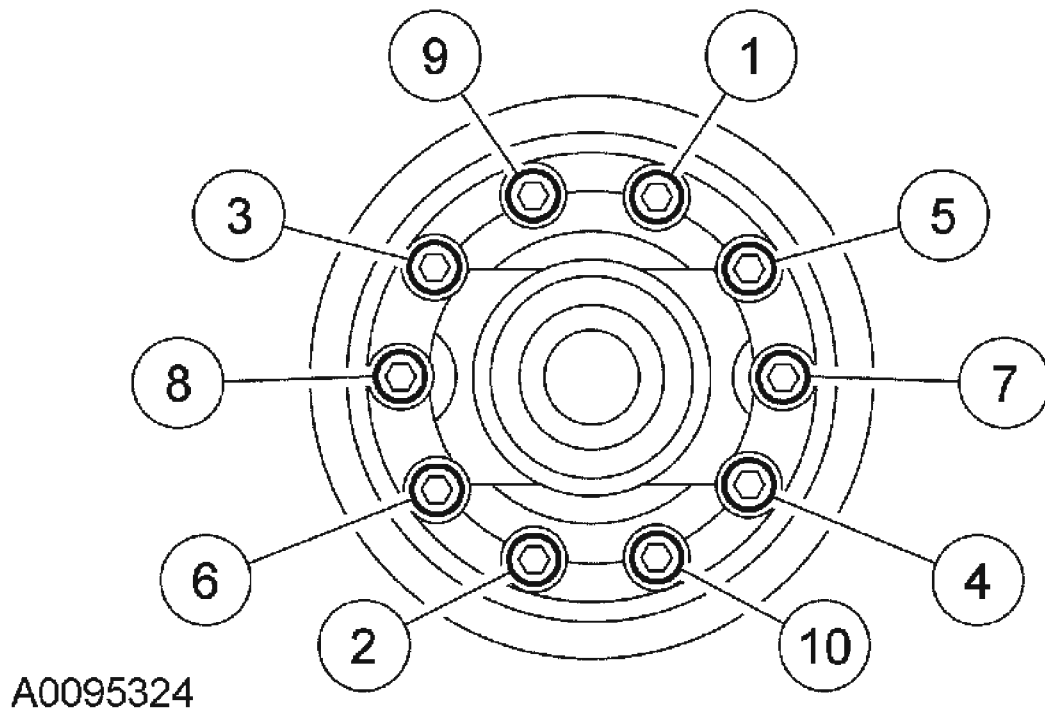
**Fig. 114: Installing New Differential Side Bearing**  
Courtesy of FORD MOTOR CO.

4. Install a new differential side bearing.
5. Install the final drive gear.
6. Install the 10 final drive gear bolts.
  - Tighten in the sequence shown in **Fig. 115** to 120 Nm (89 lb-ft).



**Fig. 115: Installing Final Drive Gear Bolts**  
Courtesy of FORD MOTOR CO.

7. Install the reduction gear.
8. Install the 10 reduction gear bolts.
  - Tighten in the sequence shown in **Fig. 116** to 96 Nm (71 lb-ft).



**Fig. 116: Installing Reduction Gear Bolts**  
Courtesy of FORD MOTOR CO.

## ASSEMBLY

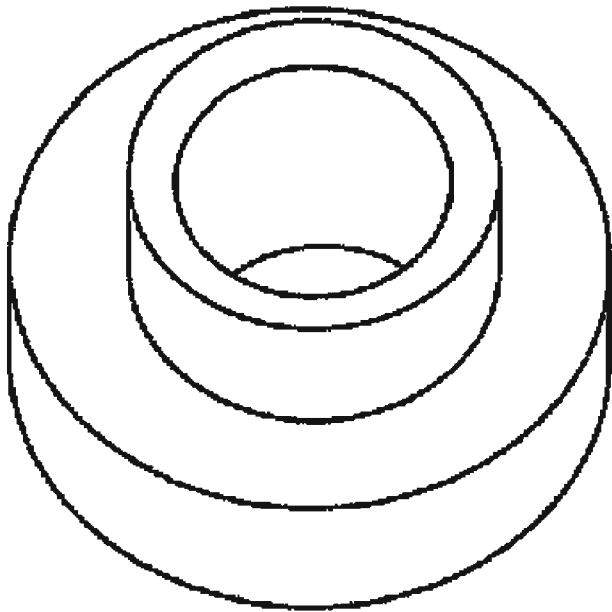
### TRANSAXLE

Special Tool(s)

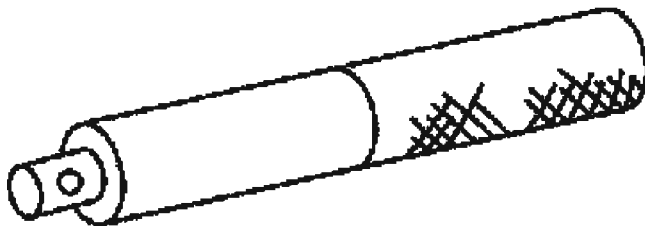
### SPECIAL TOOL DESCRIPTION

Installer, Oil Seal 308-097 (T85T-7011-A)



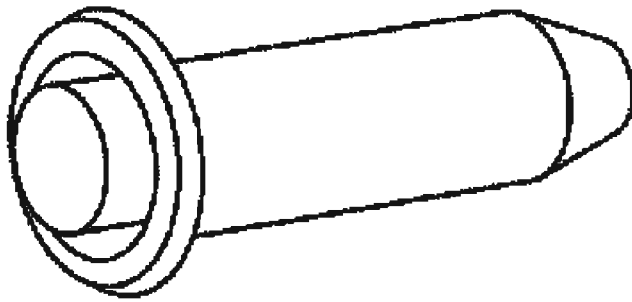


**ST2277-A**



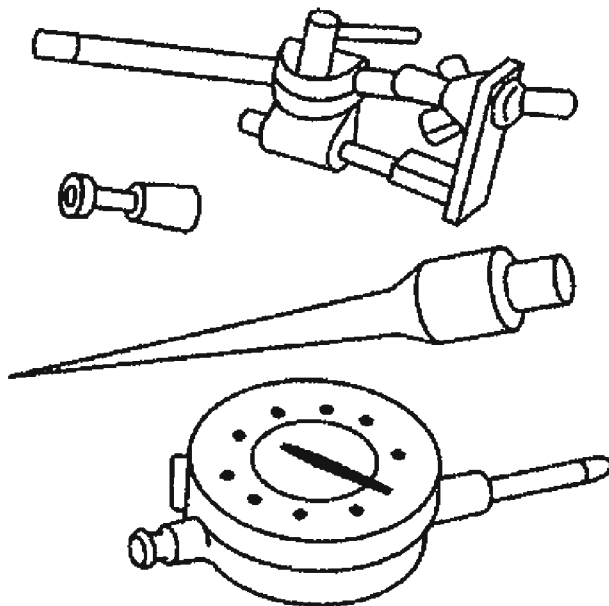
Adapter Handle 205-153 (T80T-4000-W)

**ST1653-A**



**ST1642-A**

or equivalent



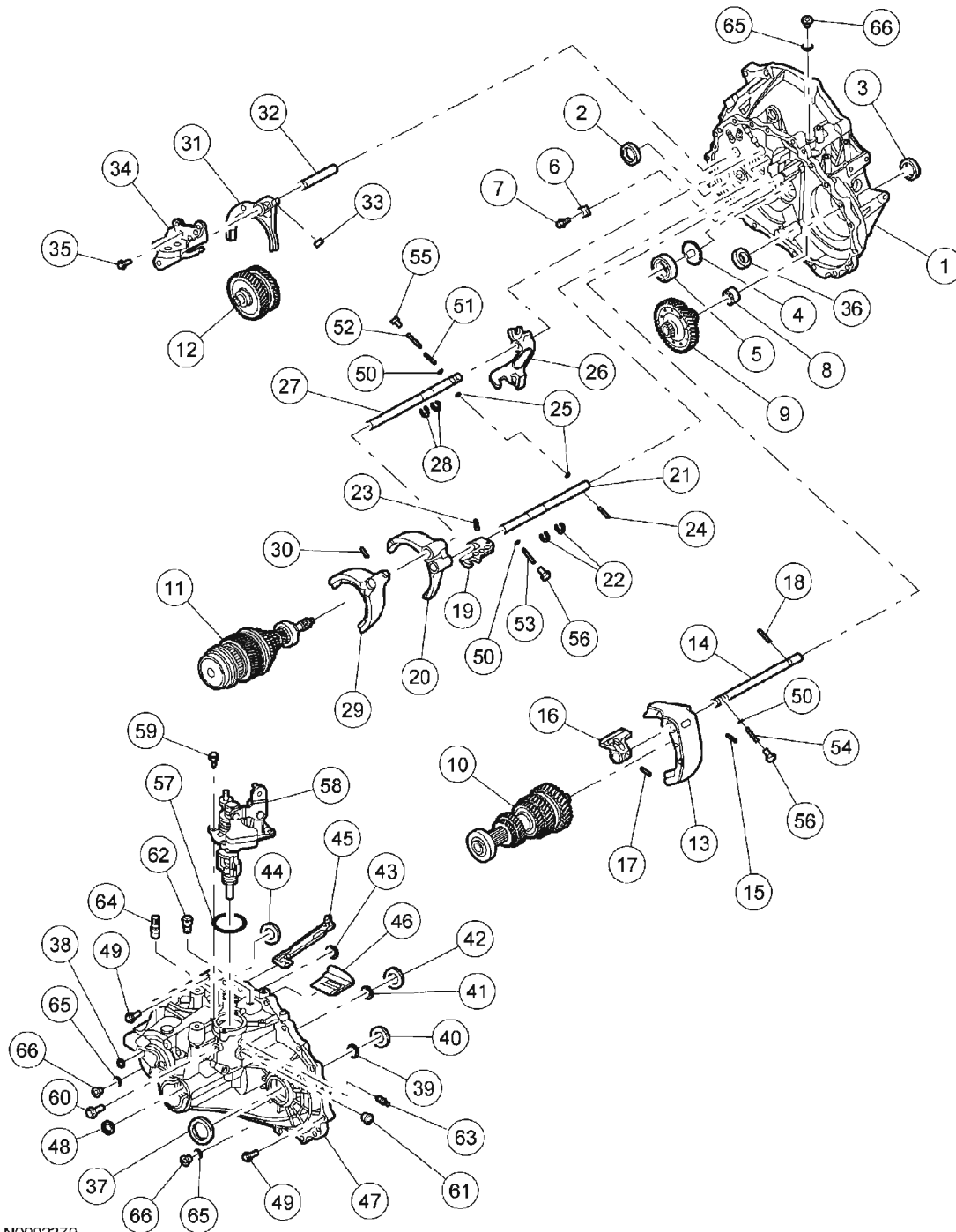
**ST1214-A**

Dial Indicator Gauge with Holding  
Fixture 100-002 (TOOL-4201-C)

#### Material

#### MATERIAL

Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4



N0002379

**Fig. 117: Exploded View Of Transaxle Assembly (1 Of 2)**  
 Courtesy of FORD MOTOR CO.

## 2005 Ford Escape

### 2005 TRANSMISSIONS Manual Transaxle/Transmission - Escape & Mariner

Item	Part Number	Description	Item	Part Number	Description
1	7F096	Clutch housing	35	—	Reverse lever bracket bolt (2 required)
2	7048	Input shaft oil seal	36	7L027	Magnet
3	1177	RH intermediate shaft oil seal	37	1177	LH halfshaft oil seal
4	—	Funnel	38	6K277	Plug
5	7065	Mainshaft bearing	39	3C362	Differential side bearing adjustment shim
6	7A284	Mainshaft bearing retainer	40	—	Differential side bearing outer race
7	99784	Mainshaft bearing retainer bolt	41	7L172	Mainshaft adjustment shim
8	—	Differential side bearing outer race	42	—	Mainshaft snap ring
9	—	Differential assembly	43	7013	Input shaft adjustment shim
10	—	Mainshaft assembly	44	—	Reverse idler gear adjustment shim
11	—	Input shaft assembly	45	7L276	Oil gutter
12	—	Reverse gear idler shaft assembly	46	7L276	Baffle plate
13	7C114	1st/2nd gear shift fork	47	7005	Transaxle case
14	7328	1st/2nd gear shift rod	48	—	Bore plug
15	0414	1st/2nd gear shift fork roll pin	49	99784	Transaxle case-to-clutch housing bolts (20 required)
16	7K130	1st/2nd gear shift finger	50	7A082	Check balls (3 required)
17	0414	1st/2nd gear shift finger roll pin	51	—	5th/Reverse gear shift check sleeve
18	—	1st/2nd gear check sleeve	52	7A082	Spring (yellow)
19	7K131	3rd/4th gear shift finger	53	7A082	Spring (blue)
20	7230	3rd/4th gear shift fork	54	7A082	Spring (white)
21	7326	3rd/4th gear shift rod	55	99784	Check plug (internal) hex
22	4097	Circlips (2 required)	56	99784	Check plugs (external) hex (2 required)
23	0414	3rd/4th gear shift finger roll pin	57	7288	O-ring seal
24	—	3rd/4th gear shift roll pin	58	7F116	Shift assembly
25	7D105	Interlock pins (2 required)	59	99784	Shift assembly bolts (4 required)
26	7K001	5th/reverse gear bracket	60	—	Stopper bolt
27	7L044	5th/reverse gear shift rod	61	—	Shift check bolt
28	4097	Circlips (2 required)	62	7034	Breather
29	7F470	5th gear shift fork	63	15520	Reverse switch
30	0414	5th gear shift roll pin	64	—	Neutral switch
31	7L063	Reverse gear shift fork	65	3972	Washers
32	7B112	Reverse gear shift fork rod	66	7E380	Plugs
33	0414	Shifter cap			
34	—	Reverse lever bracket			

**Fig. 118: Exploded View Of Transaxle Assembly (2 Of 2)**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Assembly should only be carried out in a clean environment or damage to the transaxle may occur.

**CAUTION:** Be careful not to scratch the sliding face or mating faces or damage to the transaxle may occur.

**CAUTION:** Visually inspect all parts for any damage, deformation or

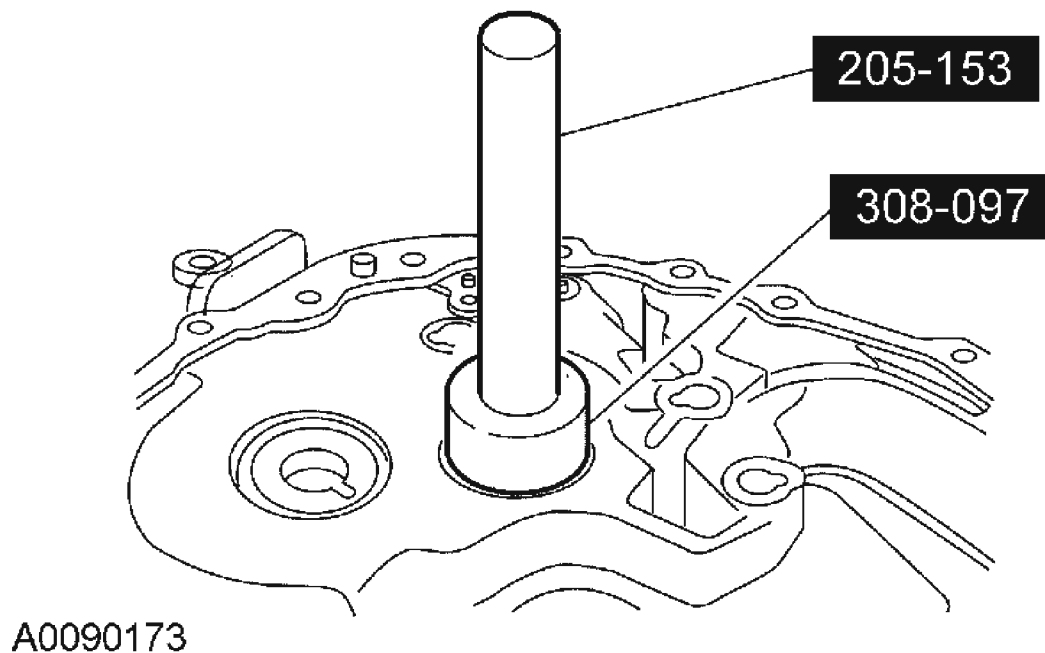
**abnormal wear. Replace any unsuitable parts with new parts only or damage to the transaxle may occur.**

**CAUTION:** Do not work on the transaxle with cotton gloves. Cotton threads could become dislodged and damage to the transaxle may occur.

**CAUTION:** Replace all retaining pins, oil seals, and bearings with new parts or damage to the transaxle may occur.

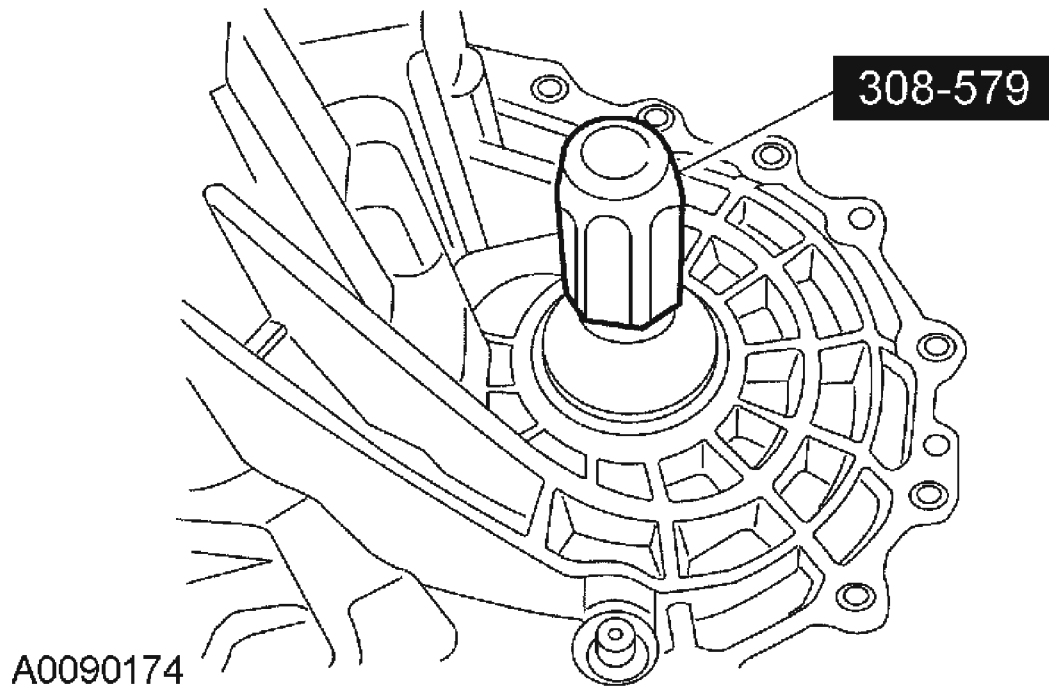
**CAUTION:** Make sure to clean the old sealant from the mating threads of any sealed bolt or damage to the transaxle may occur.

1. Using the special tools, install a new input shaft oil seal.



**Fig. 119: Installing New Input Shaft Oil Seal**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, install a new RH intermediate shaft oil seal.



**Fig. 120: Installing New RH Intermediate Shaft Oil Seal**  
Courtesy of FORD MOTOR CO.

3. Install the funnel.
4. Install the mainshaft bearing.
5. Install the mainshaft bearing retainer and bolt.

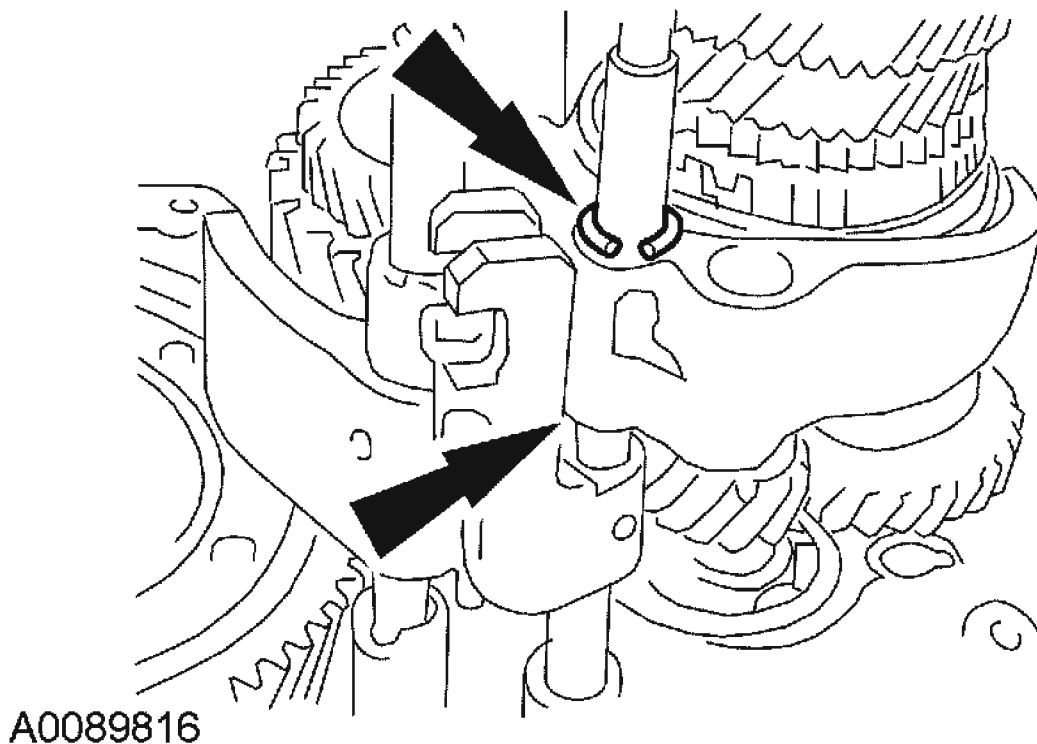
**CAUTION: Do not exceed 120°C (248°F) or damage to the clutch housing may occur.**

6. Heat the clutch housing to 100°C (212°F) and install a new differential side bearing outer race.
7. Install the differential assembly.

**CAUTION: Make sure to install the mainshaft straight in. Failure to install the mainshaft correctly may result in damage to the funnel on the clutch housing.**

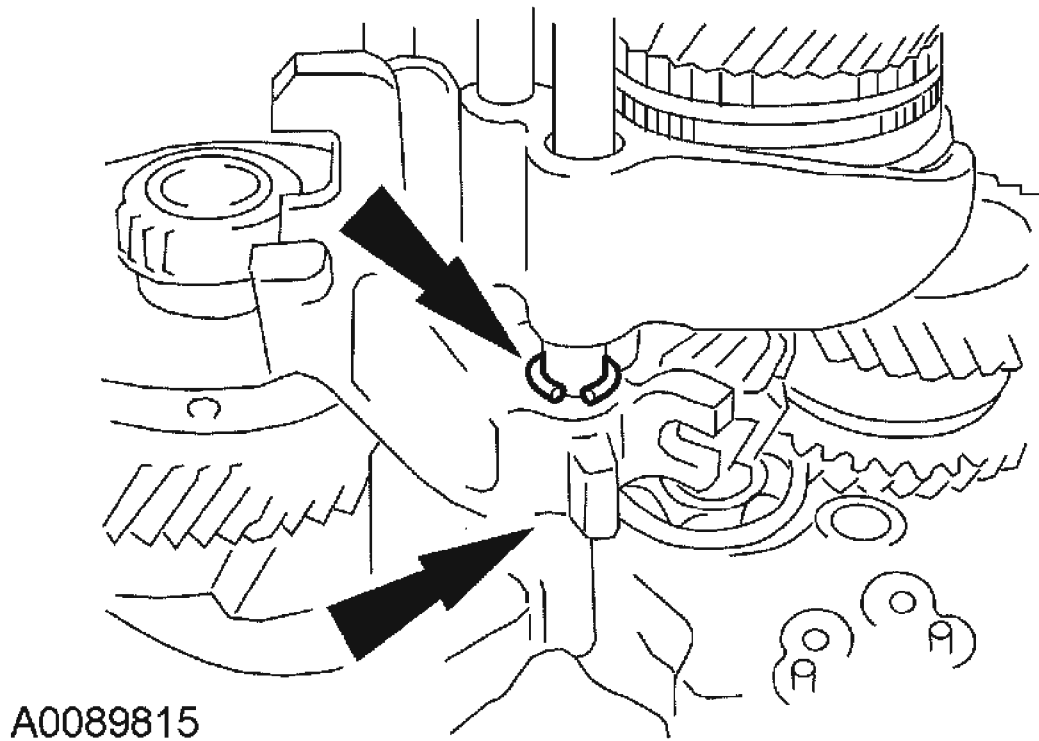
8. Install the input shaft assembly, mainshaft assembly, and reverse gear idler shaft assembly as a set.
9. Install the 1st/2nd gear shift fork.
10. Install the 1st/2nd gear shift rod.

11. Install a new 1st/2nd gear shift fork roll pin.
12. Install the 1st/2nd gear shift finger.
13. Install a new 1st/2nd gear shift finger roll pin.
14. Install the 1st/2nd gear check sleeve.
15. Install the 3rd/4th gear shift finger.
16. Install the 3rd/4th gear shift fork.
17. Install the 3rd/4th gear shift rod.
18. Install 2 new circlips.



**Fig. 121: Installing New Circlips**  
**Courtesy of FORD MOTOR CO.**

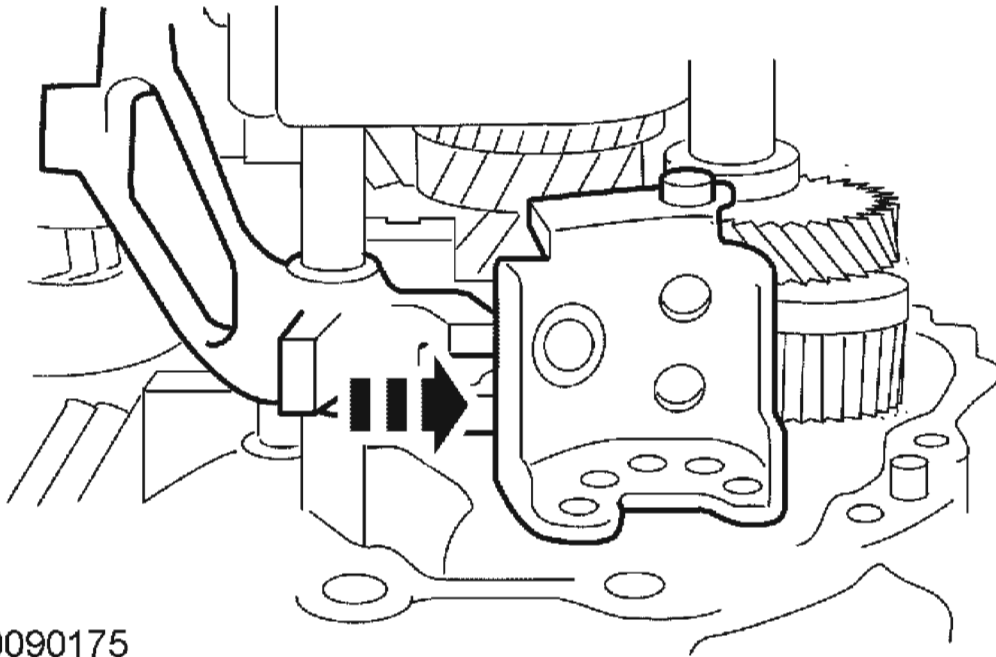
19. Install a new 3rd/4th gear shift finger roll pin.
20. Install the 3rd/4th gear shift rod roll pin.
21. Install the 2 interlock pins.
22. Install the 5th/reverse gear bracket.
23. Install the 5th/reverse gear shift rod.
24. Install 2 new circlips.



**Fig. 122: Installing 5th/Reverse Gear Shift Rod And New Circlips**  
Courtesy of FORD MOTOR CO.

25. Install the 5th gear shift fork.
26. Install a new 5th gear shift fork roll pin.
27. Install the reverse gear shift fork.
28. Install the reverse gear shift fork rod.
29. Install the shifter cap.
30. Lift the reverse gear shift fork and insert the cam part of the 5th/reverse gear bracket into the reverse level bracket.



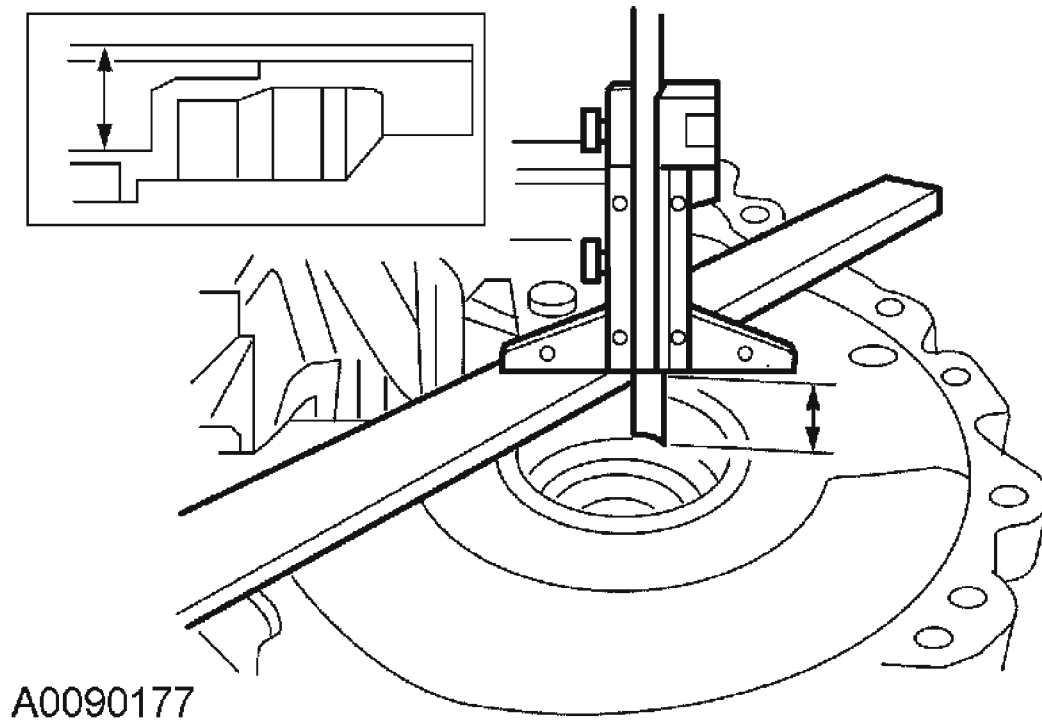


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**Fig. 123: Inserting Cam Part Of 5th/Reverse Gear Bracket Into Reverse Level Bracket**

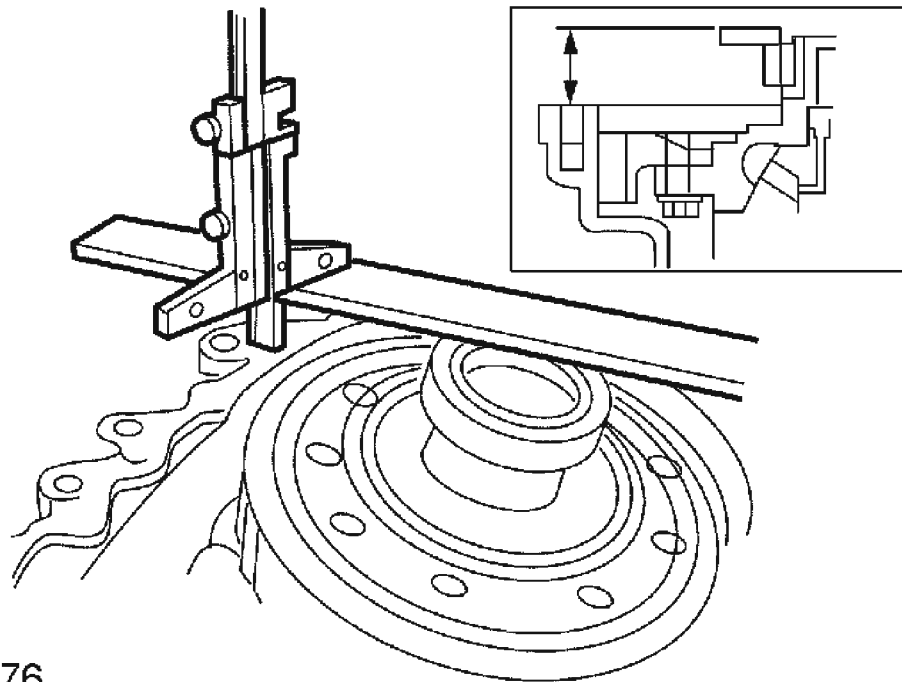
**Courtesy of FORD MOTOR CO.**

31. Install the reverse lever bracket bolts.
  - Tighten to 14 Nm (10 lb-ft).
32. Install the magnet.
33. Install a new LH halfshaft oil seal.
34. Install a new plug.
35. Using a depth micrometer and a straight edge, measure and record the depth from the mating surface of the transaxle case to the differential side bearing adjustment shim mounting surface. Record this measurement as L1.



**Fig. 124: Measuring And Record Depth From Mating Surface Of Transaxle Case**  
Courtesy of FORD MOTOR CO.

36. Using a depth micrometer and a straight edge, measure and record the depth from the mating surface of the clutch housing to the differential side bearing outer race outer surface. Record this measurement as L2.
- Install the differential side bearing outer race on the differential bearing.
  - Holding the outer race in position using hand pressure, rotate the differential 5 times to seat the bearing races.



A0090176

**Fig. 125: Measuring And Record Depth From Mating Surface Clutch Housing To Differential Side Bearing**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not use more than 2 shims to achieve the desired shim thickness.

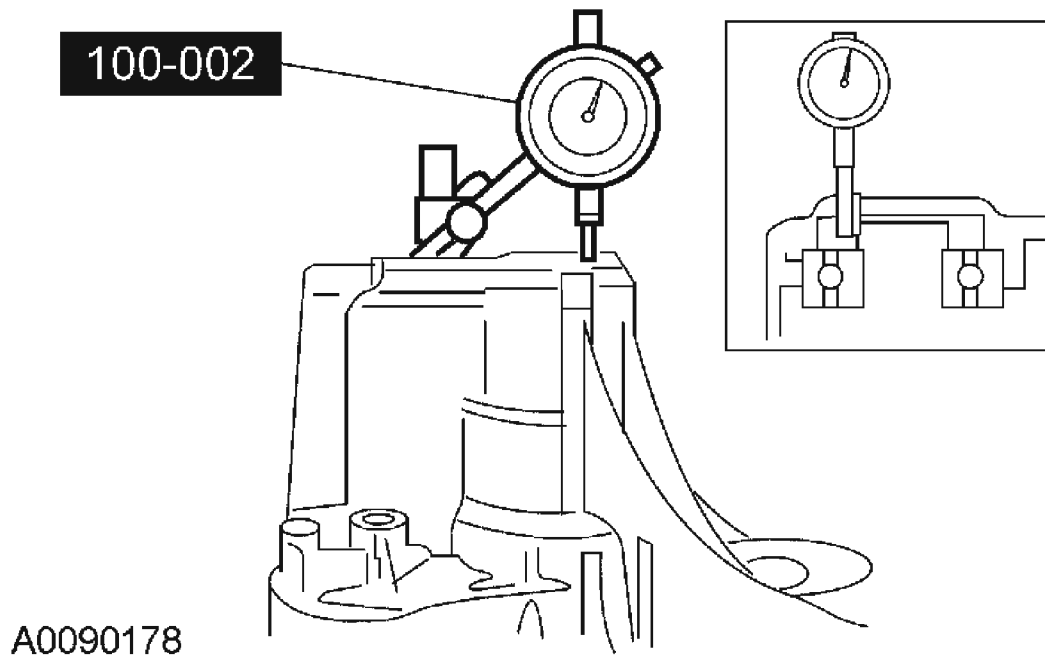
**NOTE:** Shims are available in thicknesses from 0.48 - 0.92 mm (0.0189- 0.0366 in) in 0.04 mm (0.00157 in) increments.

37. Select the shims to allow a preload of 0.15 - 0.21 mm (0.0059- 0.0083 in) using the following formula:  $\text{shim thickness} = (L1 - L2) + \text{Preload}$ .
38. Install the differential side bearing adjustment shim.

**CAUTION:** Do not exceed 120°C (248°F) or damage to the transaxle case may occur.

39. Heat the transaxle case to 100°C (212°F) and install a new differential side bearing outer race.
40. Temporarily install the mainshaft, mainshaft bearing and circlip.
41. Temporarily assemble the transaxle case.
42. Temporarily install and tighten the transaxle case bolts

43. Using the special tool, measure and record the depth of the transaxle case to the mainshaft bearing surface when the circlip is expanded and mainshaft is raised to contact the transaxle case.



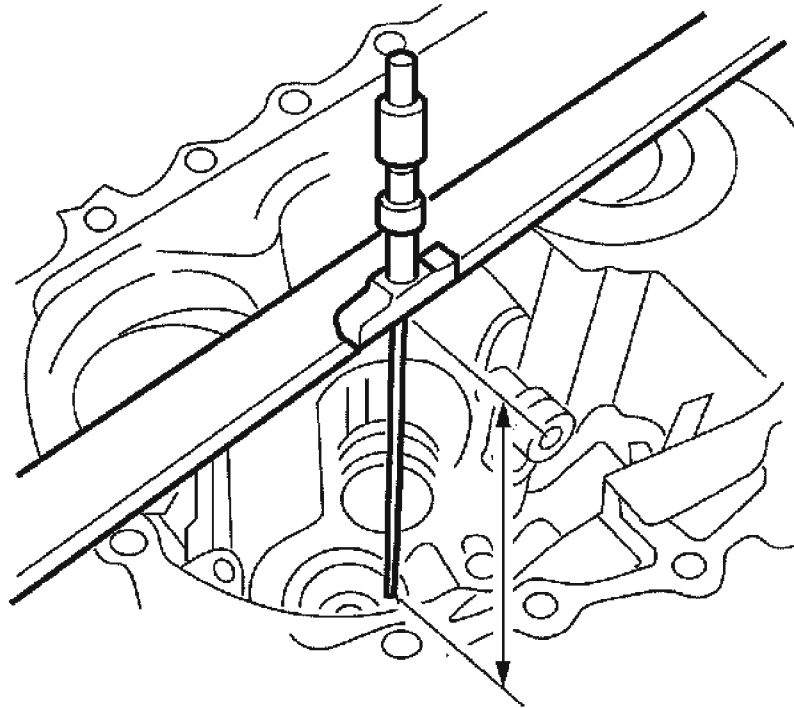
**Fig. 126: Measuring Depth Of Transaxle Case To Mainshaft Bearing Surface**  
Courtesy of FORD MOTOR CO.

44. Release the circlip and allow the mainshaft to lower and engage the circlip. Measure and record the depth of the transaxle case to the mainshaft bearing surface.

**NOTE:** Do not use more than 1 shim to achieve the desired shim thickness.

**NOTE:** Shims are available in thicknesses from 0.44 - 1.08 mm (0.017 - 0.043 in) in 0.04 mm (0.00157 in) increments.

45. Select the correct shim to allow an end play of 0.00-0.06 mm (0.00-0.0024 in).  
46. Remove the transaxle case.  
47. Install the mainshaft adjustment shim.  
48. Install a new snap ring.  
49. Using a depth micrometer and a straight edge, measure and record the depth from the mating surface of the transaxle case to the input shaft adjustment shim mounting surface. Record this measurement as L1.

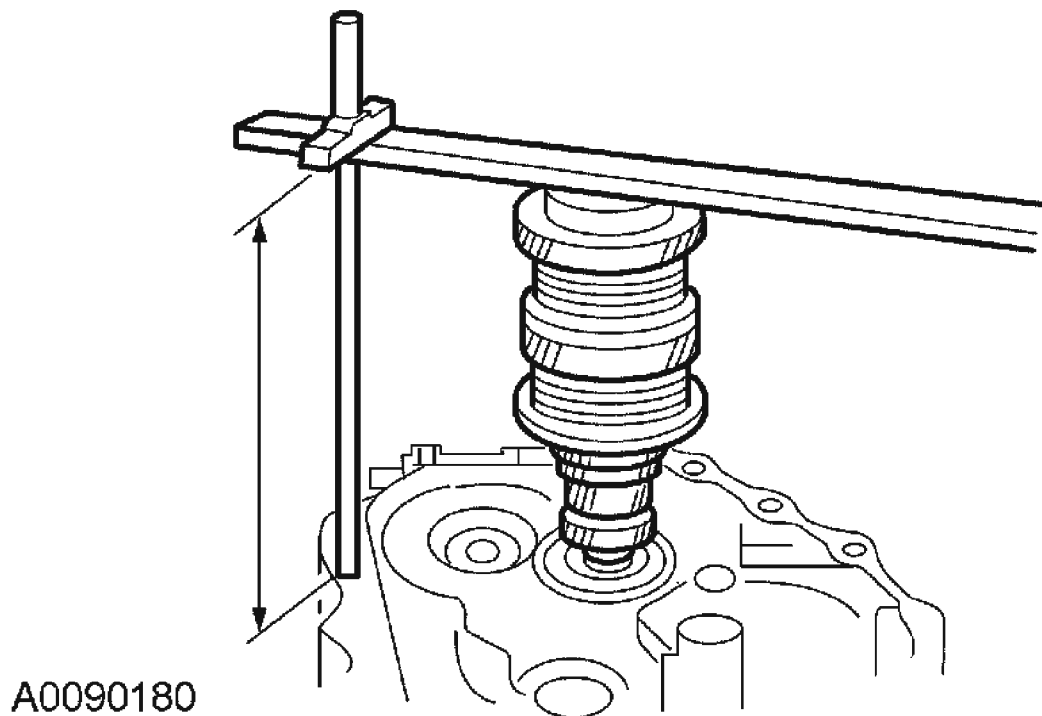


A0090179

**Fig. 127: Measuring And Record Depth From Mating Surface Of Transaxle Case To Input Shaft**

**Courtesy of FORD MOTOR CO.**

50. Using a depth micrometer and a straight edge, measure and record the depth from the mating surface of the clutch housing to the input shaft bearing outer race outer surface. Record this measurement as L2.



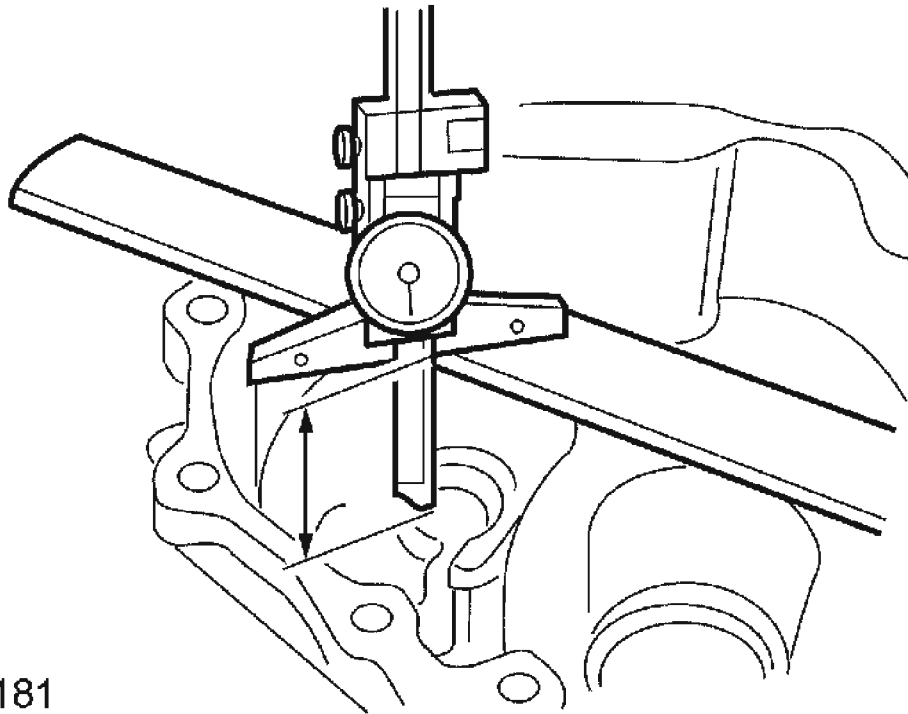
**Fig. 128: Measuring And Record Depth From Mating Surface Of Clutch Housing To Input Shaft Bearing**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not use more than 1 shim to achieve the desired shim thickness.

**NOTE:** Shims are available in thicknesses from 0.40 - 1.72 mm (0.016 - 0.068 in) in 0.04 mm (0.00157 in) increments.

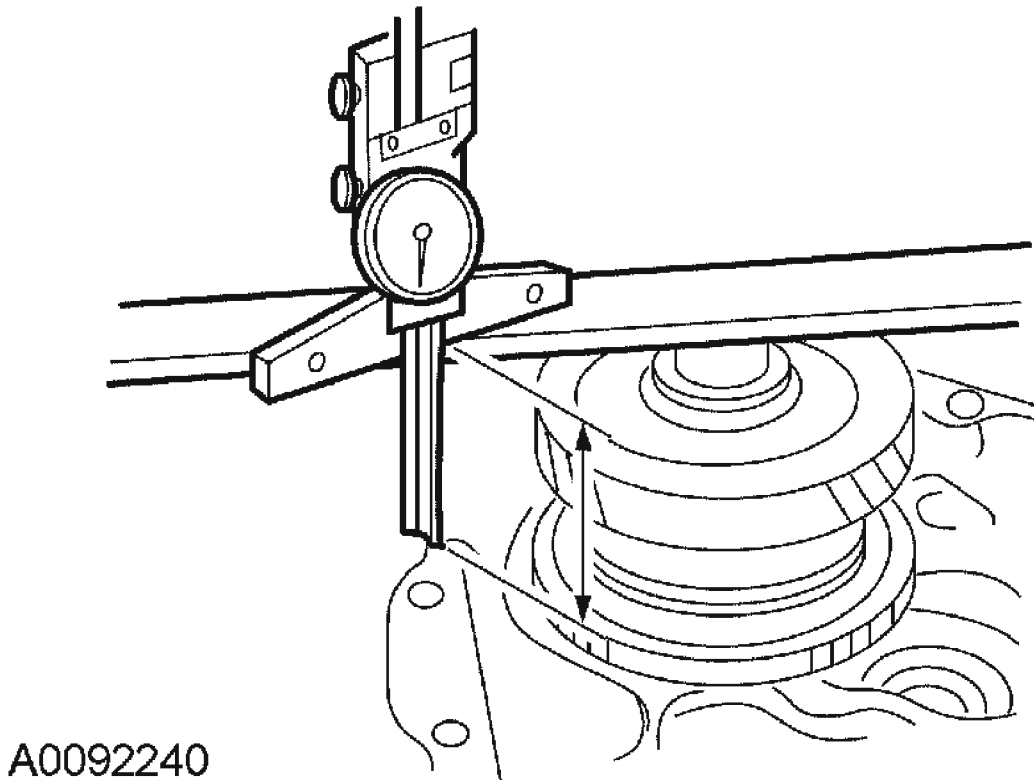
51. Select the shims to allow an end play of 0.00-0.06 mm (0.00-0.0024 in) using the following formula:  $\text{shim thickness} = (L1 - L2) - \text{endplay}$ .
52. Install the input shaft adjustment shim.
53. Using a depth micrometer and a straight edge, measure and record the depth from the mating surface of the transaxle case to the reverse idler shaft adjustment shim mounting surface. Record this measurement as L1.



A0090181

**Fig. 129: Measuring Mating Surface Of Transaxle Case To Reverse Idler Shaft**  
Courtesy of FORD MOTOR CO.

54. Using a depth micrometer and a straight edge, measure and record the depth from the mating surface of the clutch housing to the reverse idler shaft bearing surface. Record this measurement as L2.



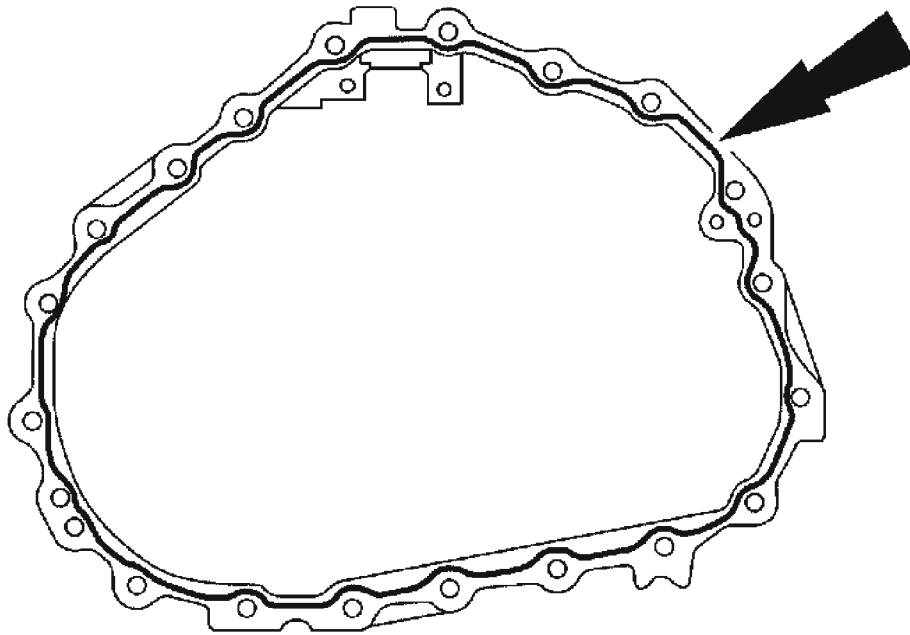
**Fig. 130: Measuring Depth From Mating Surface Of Clutch Housing**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not use more than 1 shim to achieve the desired shim thickness.

**NOTE:** Shims are available in thicknesses from 1.76 - 2.64 mm (0.069 - 0.104 in) in 0.04 mm (0.00157 in) increments.

55. Select the shims to allow an end play of 0.04 - 0.14 mm (0.001 - 0.005 in) using the following formula:  $\text{shim thickness} = (L1-L2) - \text{endplay}$ .
56. Install the reverse idler shaft adjustment shim.
57. Install the oil gutter.
58. Install the baffle plate.
59. Apply a continuous bead of silicone gasket and sealant.





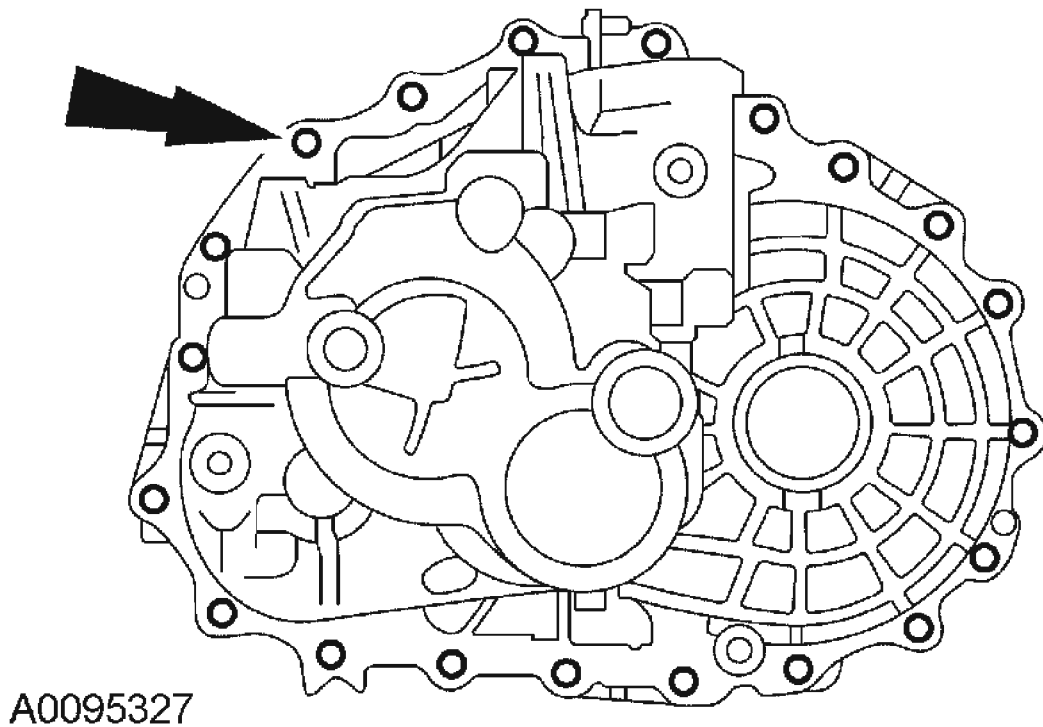
A0090183

**Fig. 131: Installing Baffle Plate**  
**Courtesy of FORD MOTOR CO.**

60. Spread the circlip and install the transaxle case.
61. Install a new bore plug.

**NOTE:**      **The black colored bolt must be installed new, in the correct position, and tightened to 65 Nm (48 lb-ft).**

62. Install the transaxle case bolts.
  - Tighten to 52 Nm (38 lb-ft) in a cross pattern.



**Fig. 132: Installing Transaxle Case Bolts**  
 Courtesy of FORD MOTOR CO.

63. Install the 3 check balls.
64. Install the 5th/reverse gear shift check sleeve.
65. Install the springs. Refer to **COLOR LOCATION SPECIFICATION** for the correct color and location:

#### **SPRING COLOR & LOCATION SPECIFICATIONS**

<b>Color</b>	<b>Location</b>
Yellow	5th/reverse gear shift rod
Blue	3rd/4th gear shift rod
White	1st/2nd gear shift rod

66. Install a new check plug in the 5th/reverse gearshift rod.
67. Install new check plugs in the 1st/2nd gear shift rod and the 3rd/4th gear shift rod.
68. Install a new shift assembly O-ring seal.
69. Install the shift assembly.
70. Install 4 new shift assembly bolts.

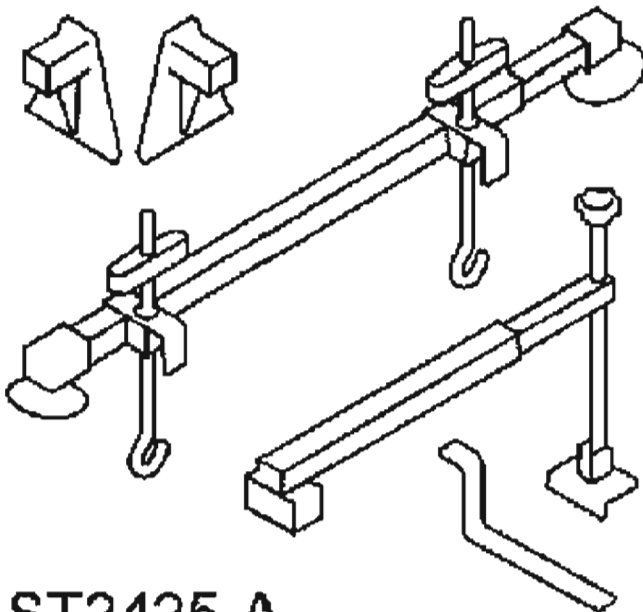
- Tighten to 7 Nm (62 lb-in).
71. Install a new stopper bolt.
    - Tighten to 28 Nm (21 lb-ft).
  72. Install a new shift check bolt.
    - Tighten to 24 Nm (18 lb-ft).
  73. Install a new breather.
  74. Install the reverse switch.
  75. Install the neutral switch.
  76. Install the transaxle drain plug, the fill plug, and the fill level inspection plug.
    - Install new plug washers.
    - Tighten the drain plug and the fill level inspection plug to 35 Nm (26 lb-ft).
    - Tighten the transaxle fill plug to 35 Nm (26 lb-ft).

## INSTALLATION

### TRANSAXLE

#### Special Tool(s)

#### SPECIAL TOOL DESCRIPTION



**ST2425-A**

Three-Bar Engine Support Kit 303-F072 or equivalent

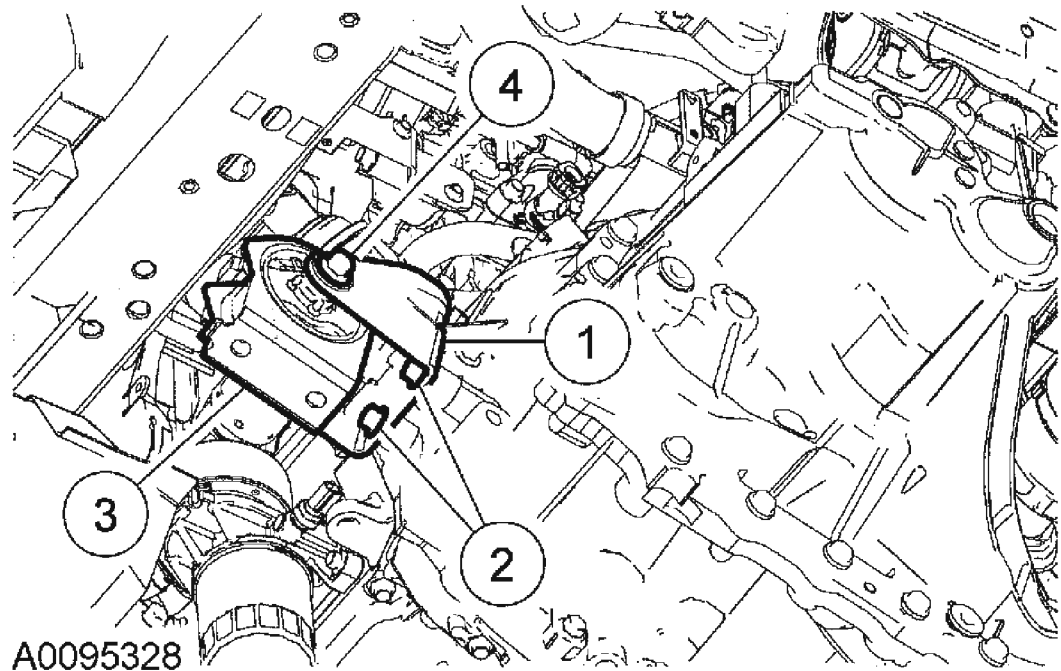
**MATERIAL**

Item	Specification
Premium Long-Life Grease XG-1-C or XG-1-K (Canada CXG-1-C)	ESA-M1C75-B

1. Do not lubricate the splines on the input shaft.

**WARNING:** Secure the transaxle to the transmission jack with a safety chain. Failure to follow these instructions may result in personal injury.

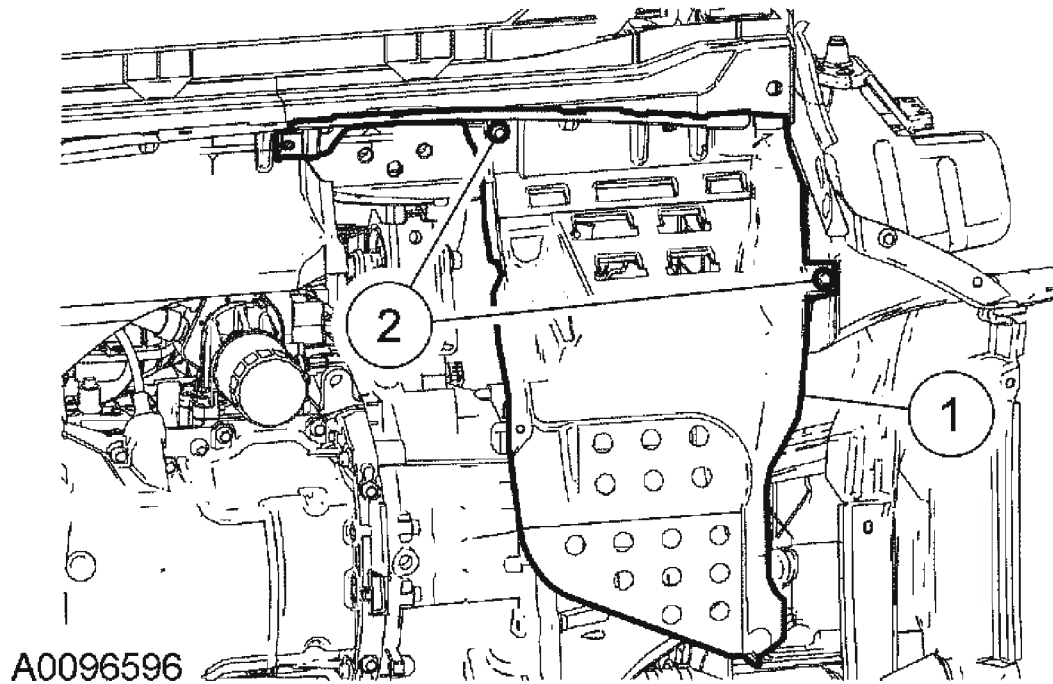
2. Raise and position the transaxle.
3. Install the 3 short transaxle-to-engine bolts.
  - Tighten to 47 Nm (35 lb-ft).
4. Install the long transaxle-to-engine bolt.
  - Tighten to 47 Nm (35 lb-ft).
5. Install the exhaust outlet pipe. For additional information, refer to **EXHAUST SYSTEM**.
6. Install the transaxle front support insulator bracket.
  1. Install the transaxle front support insulator bracket.
  2. Install the 3 bolts.
    - Tighten to 55 Nm (41 lb-ft).
  3. Install the transaxle front support insulator.
  4. Install the through-bolt.
    - Tighten to 90 Nm (66 lb-ft).



**Fig. 133: Installing Through-Bolt**  
Courtesy of FORD MOTOR CO.

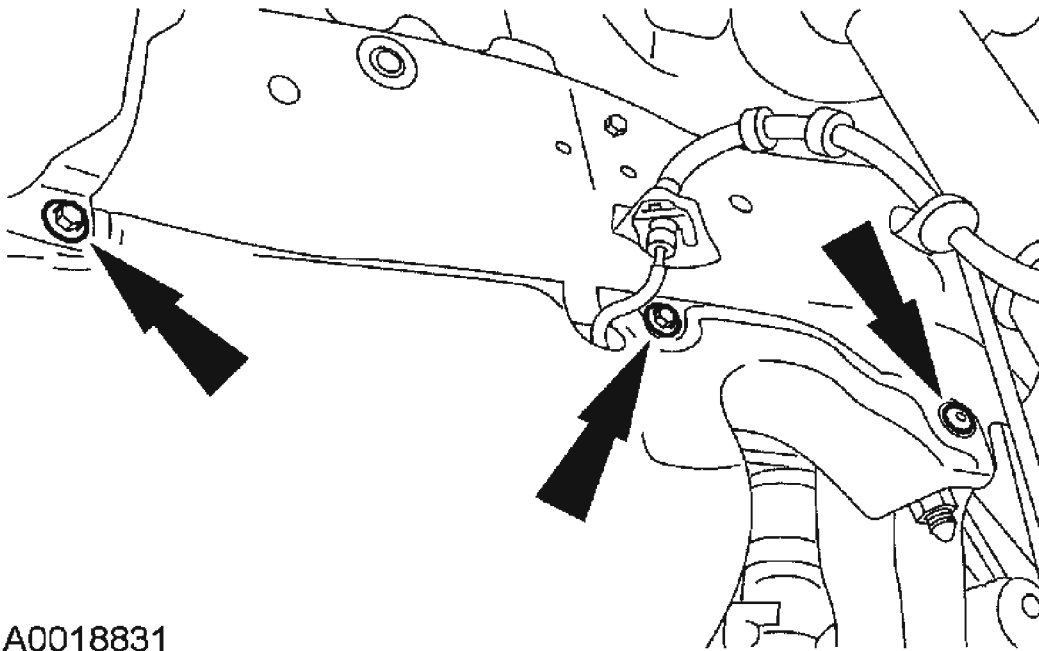
**CAUTION:** Make sure to use the seal protector when installing the RH intermediate shaft and the LH halfshaft. Failure to use the seal protector may result in transmission oil leaks.

7. Install the RH intermediate axleshaft and the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS**.
8. If equipped, install the transfer case. For additional information, refer to **TRANSFER CASE-POWER TRANSFER UNIT (PTU)**.
9. Install the starter motor assembly. For additional information, refer to **STARTING SYSTEM**.
10. Install the LH side splash shield.
  1. Position the LH splash shield.
  2. Install the 2 screws.



**Fig. 134: Positioning LH Splash Shield**  
Courtesy of FORD MOTOR CO.

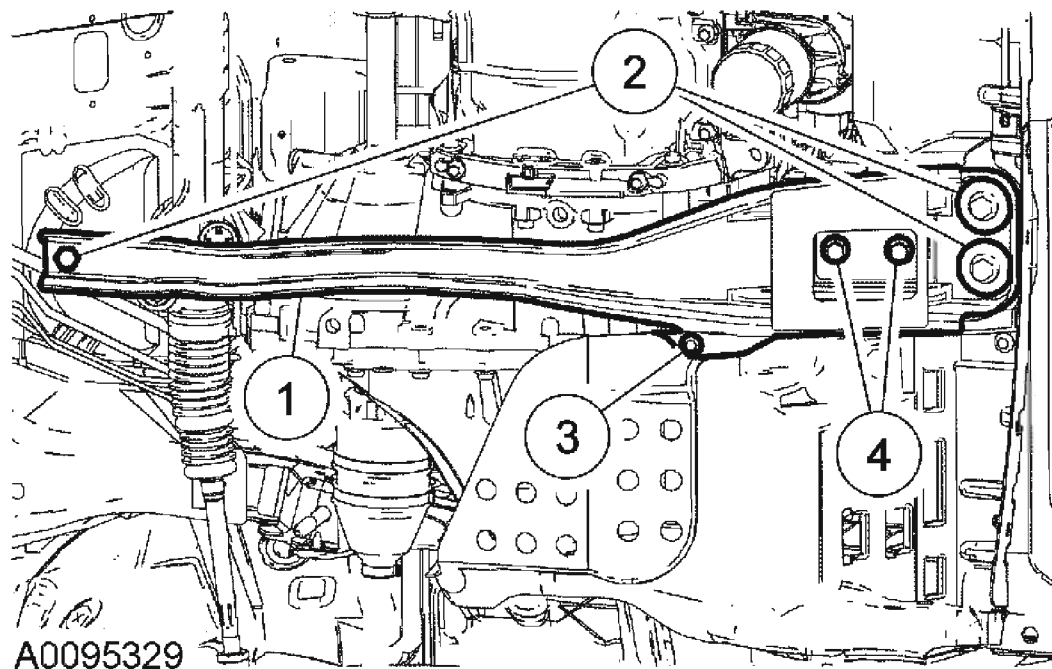
11. Install the 3 LH splash shield screws.



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**Fig. 135: Installing LH Splash Shield Screws**  
**Courtesy of FORD MOTOR CO.**

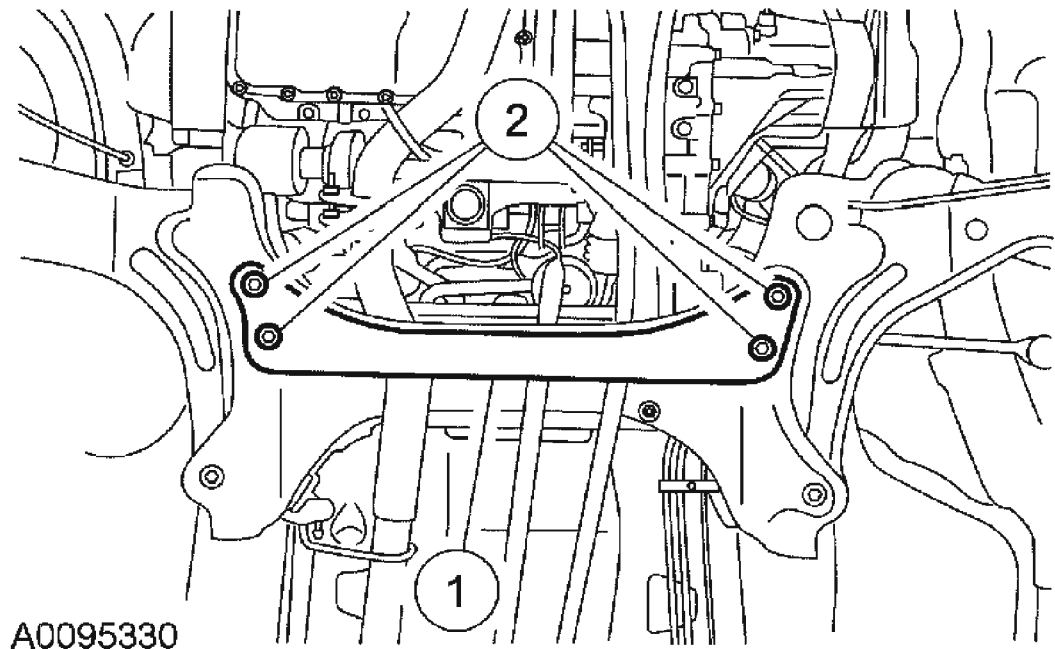
12. Install the front-to-aft crossmember.
  1. Position the crossmember.
  2. Install the 2 front-to-aft crossmember bolts and nut.
    - Tighten to 90 Nm (66 lb-ft).
  3. Install the splash shield screw.
  4. Install the 2 transaxle front support insulator bolts.
    - Tighten to 90 Nm (66 lb-ft).



**Fig. 136: Installing Transaxle Front Support Insulator Bolts**  
Courtesy of FORD MOTOR CO.

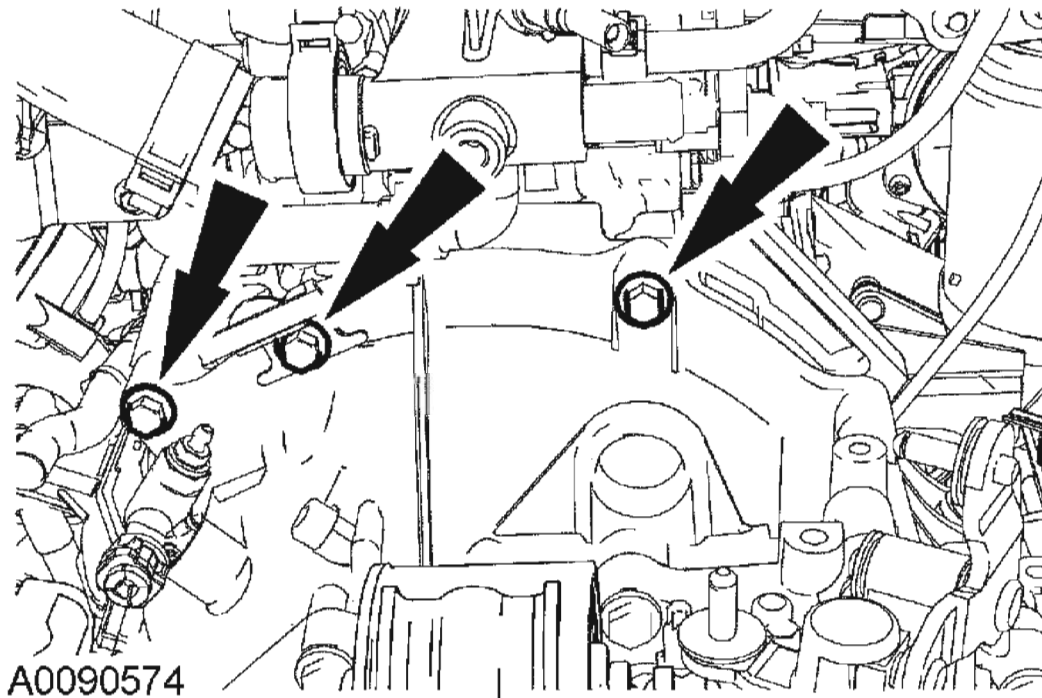
13. Install the crossmember.
  1. Position the crossmember.
  2. Install the bolts.
    - Tighten to 115 Nm (85 lb-ft).





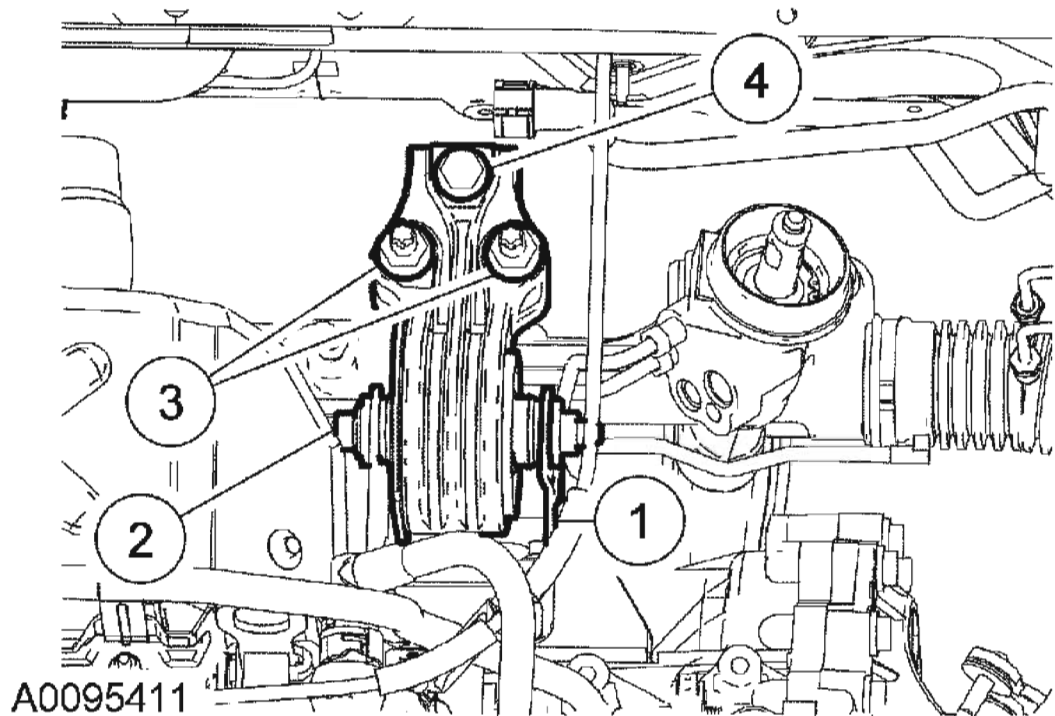
**Fig. 137: Installing Bolts**  
**Courtesy of FORD MOTOR CO.**

14. Install the 3 upper transaxle-to-engine bolts. Tighten the bolts to 45 Nm (33 lb-ft).



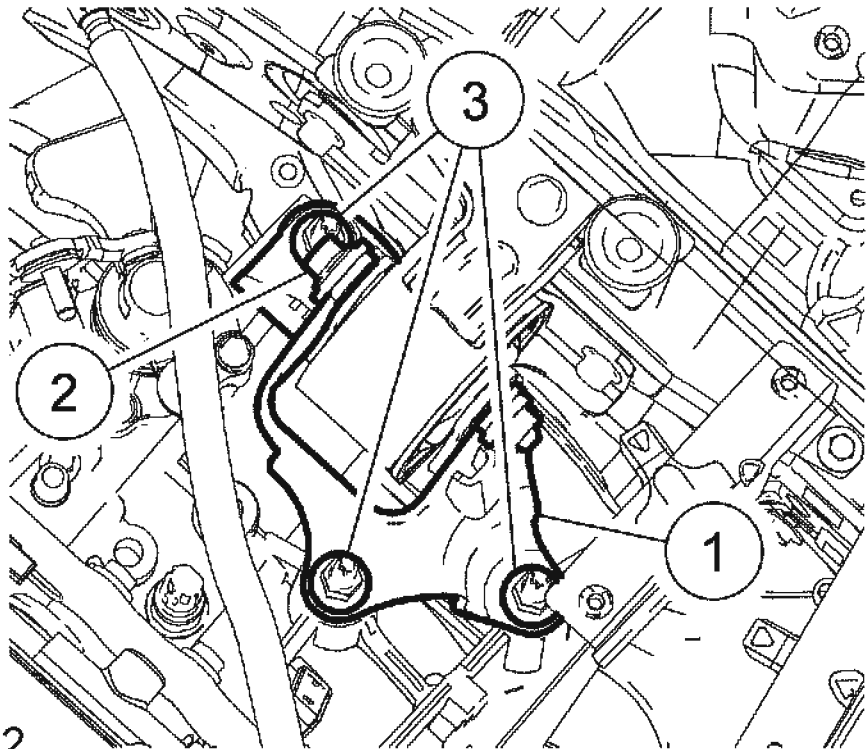
**Fig. 138: Installing Upper Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

15. Install the transaxle rear support insulator.
  1. Position the transaxle rear support insulator.
  2. Install the through-bolt.
    - Tighten to 90 Nm (66 lb-ft).
  3. Install the nuts.
    - Tighten to 90 Nm (66 lb-ft).
  4. Install the bolt.
    - Tighten to 90 Nm (66 lb-ft).



**Fig. 139: Installing Bolt**  
Courtesy of FORD MOTOR CO.

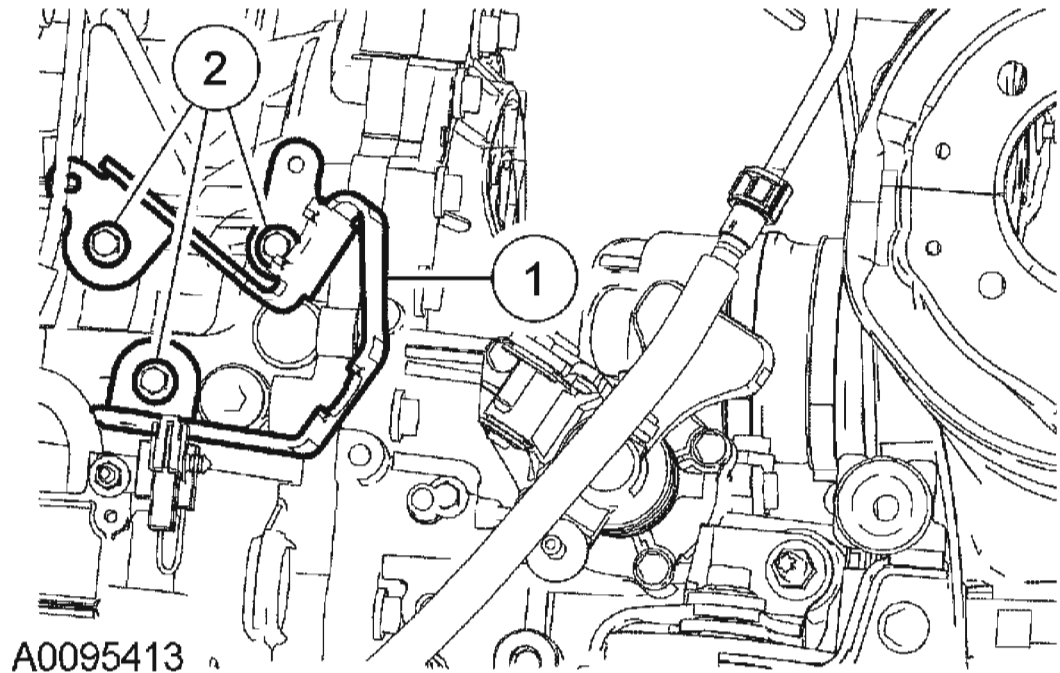
16. Install the LH transaxle support insulator bracket.
  1. Position the LH transaxle support insulator bracket.
  2. Install the through-bolt.
    - Tighten to 90 Nm (66 lb-ft).
  3. Install the 3 nuts.
    - Tighten to 90 Nm (66 lb-ft).



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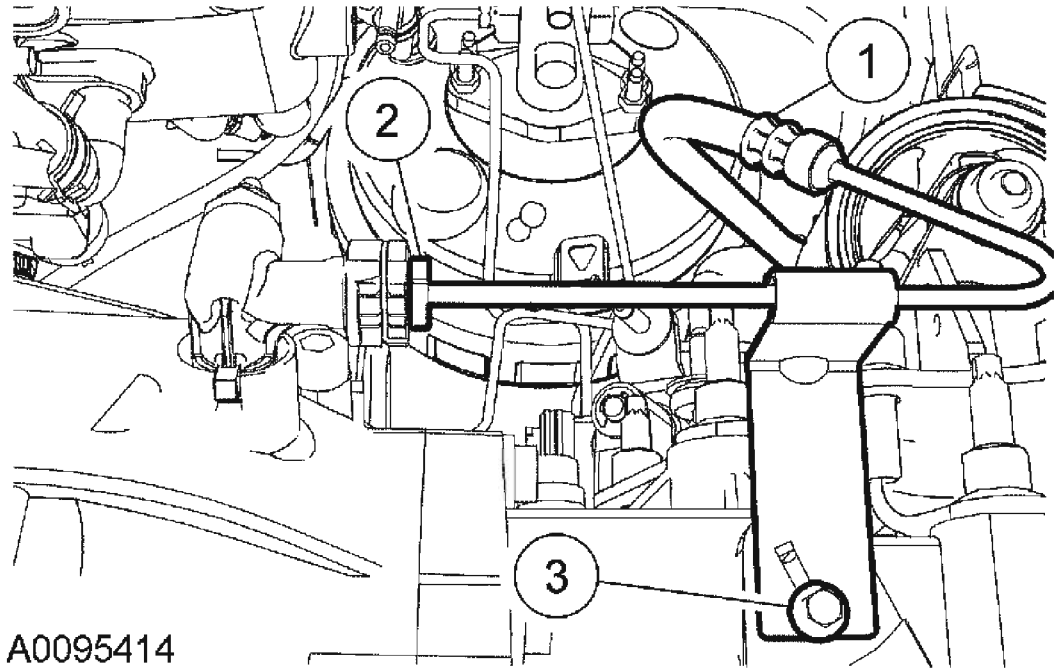
**Fig. 140: Installing Nuts**  
**Courtesy of FORD MOTOR CO.**

17. Install the shift cable bracket.
  1. Position the shift cable bracket.
  2. Install the 3 bolts.
    - Tighten to 22 Nm (16 lb-ft).



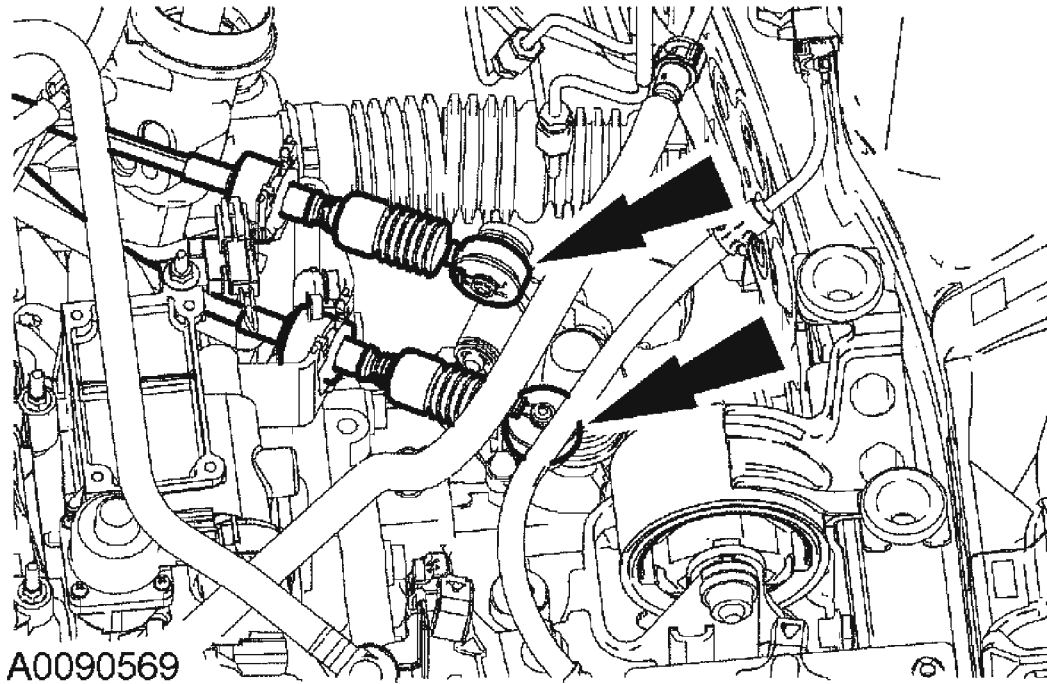
**Fig. 141: Installing Bolts**  
**Courtesy of FORD MOTOR CO.**

18. Connect the clutch hydraulic line.
  1. Position the clutch hydraulic line.
  2. Connect the clutch hydraulic line from the clutch slave cylinder.
  3. Install the clutch hydraulic line bracket-to-transaxle bolt.
    - Tighten to 2.5 Nm (22 lb-in).



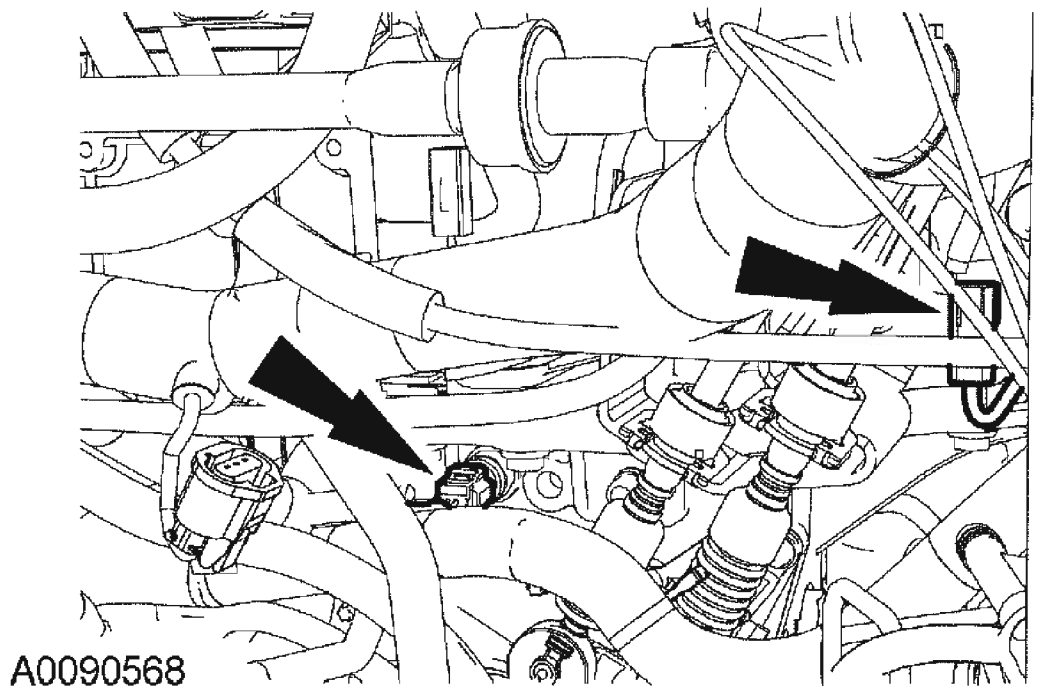
**Fig. 142: Installing Clutch Hydraulic Line Bracket-To-Transaxle Bolt**  
Courtesy of FORD MOTOR CO.

19. Connect the shift cables.



**Fig. 143: Connecting Shift Cables**  
**Courtesy of FORD MOTOR CO.**

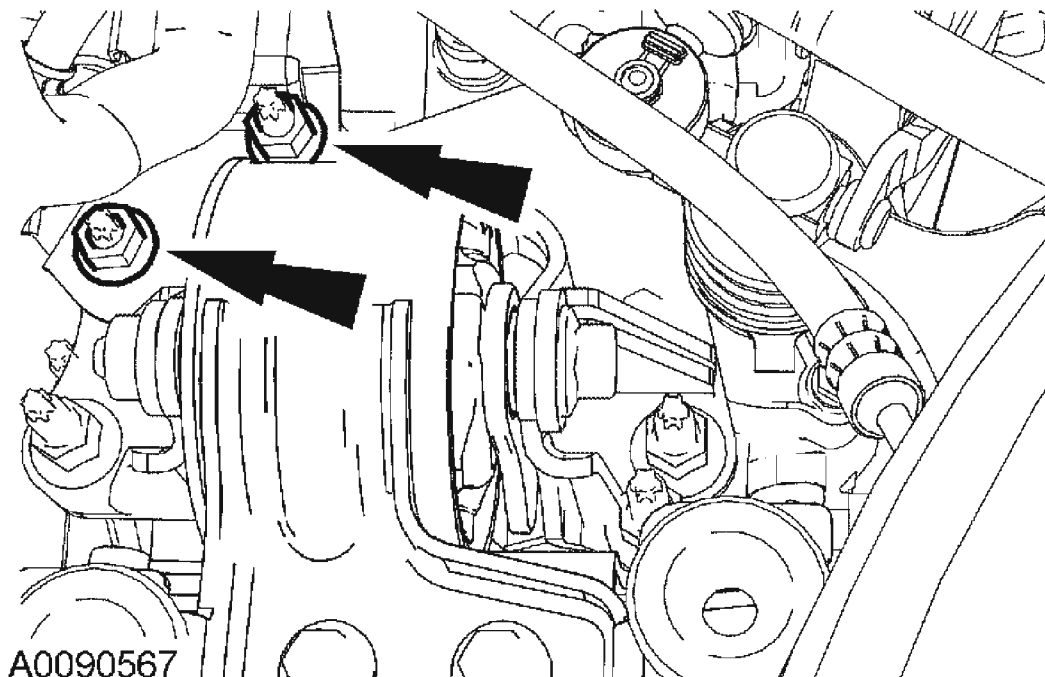
20. Connect the reverse switch and vehicle speed sensor (VSS) connectors.



**Fig. 144: Connecting Reverse Switch And Vehicle Speed Sensor (VSS) Connectors**  
Courtesy of FORD MOTOR CO.

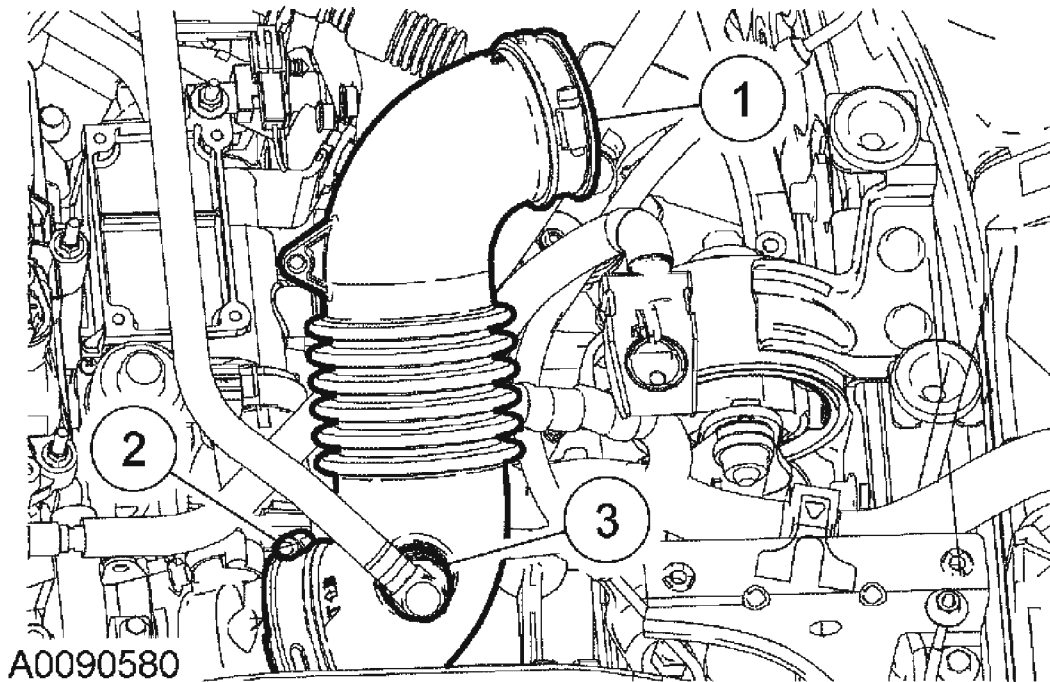
21. Install the wiring harness bracket nuts.
  - Tighten to 12 Nm (9 lb-ft).





**Fig. 145: Installing Wiring Harness Bracket Nuts**  
Courtesy of FORD MOTOR CO.

22. Install the air cleaner outlet tube.
  1. Install the air cleaner outlet tube.
  2. Tighten the clamp.
  3. Connect the emission management tube and hose.



**Fig. 146: Connecting Emission Management Tube And Hose**  
Courtesy of FORD MOTOR CO.

23. Install the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
24. Install the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** .
25. Fill the transaxle fluid. For additional information, refer to **TRANSAXLE DRAINING AND FILLING**.
26. Fill and bleed the clutch. For additional information, refer to **MANUAL TRANSAXLE-TRANSMISSION AND CLUTCH - GENERAL INFORMATION** .
27. Adjust the shift cables.

**2005 Ford Escape**

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape &amp; Mariner

**2005 TRANSMISSIONS****Automatic Transaxle/Transmission - CD4E - Escape & Mariner****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
<b>Fluid</b>	
Motorcraft MERCON® Multi-Purpose (ATF) Transmission Fluid XT-2-QDX	MERCON®
<b>Fluid Capacity</b>	
All	9.5L (10 quarts)
<b>Lubricant</b>	
Multi-Purpose Grease XG-4	ESB-M1C93-B
<b>Sealant</b>	
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

**END PLAY SPECIFICATIONS****END PLAY SPECIFICATIONS**

Description	mm	inch
Low/intermediate carrier assembly pinion gear end play	0.15 - 0.72	0.005 - 0.028
Final drive carrier assembly pinion gear end play	0.17 - 0.65	0.006 - 0.025

**BAND AND CLUTCH APPLICATION CHART A****BAND AND CLUTCH APPLICATION CHART A**

Selector Position	(2/4) Band	Forward Clutch	Direct Clutch	Coast Clutch	Low/Rev Clutch	Reverse Clutch
REV					X	X
1ST		X				
2ND	X	X				
3RD		X	X			
4TH	X	X/I	X			
M - 3RD		X	X	X		
M - 2ND	X	X		X		

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

M - 1ST		X		X	X	
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X = Transmits torque  
I = Ineffective

### BAND AND CLUTCH APPLICATION CHART B

### BAND AND CLUTCH APPLICATION CHART B

Selector Position	Forward One-Way Clutch		Low One-Way Clutch		Engine Braking
	Drive	Coast	Drive	Coast	
REV				X/I	Yes
1ST	X	OR	X	OR	No
2ND	X	OR	OR	OR	No
3RD	X	OR	OR	OR	No
4TH	OR	OR	OR	OR	Yes
M -3RD	X		OR	OR	Yes
M -2ND	X		OR	OR	Yes
M- 1ST	X		X		Yes

X = Transmits torque  
OR = Overrunning  
I = Ineffective

### LINE PRESSURE CHART

### LINE PRESSURE CHART

Line Pressure	Idle		Stall	
Range Selector Position	kPa	psi	kPa	psi
PARK, NEUTRAL	441 - 524	64 - 76	1,786 - 2,027	259 - 294
REVERSE	441 - 524	64 - 76	1,158 - 1,269	168 - 184
D	324 - 372	47 - 54	1,158 - 1,269	168 - 184
2	324 - 372	47 - 54	1,158 - 1,269	168 - 184
1	324 - 372	47 - 54	1,158 - 1,269	168 - 184

### FORWARD/COAST CLUTCH PACK

### FORWARD/COAST CLUTCH PACK SPECIFICATIONS

Description	mm	inch
Clutch pack clearance	0.23 - 0.96	0.009 - 0.037
Retaining ring thickness	1.43 - 1.53	0.056 - 0.060
Retaining ring thickness	1.59 - 1.69	0.062 - 0.066
Retaining ring thickness	1.75 - 1.85	0.068 - 0.072
Retaining ring thickness	1.92 - 2.02	0.075 - 0.079

**2005 Ford Escape**

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape &amp; Mariner

**REVERSE CLUTCH PACK****REVERSE CLUTCH PACK SPECIFICATIONS**

Description	mm	inch
Clutch plate to retaining ring	0.33 - 0.89	0.013 - 0.035
Retaining ring thickness	1.39 - 1.49	0.054 - 0.058
Retaining ring thickness	1.53 - 1.63	0.060 - 0.064
Retaining ring thickness	1.68 - 1.78	0.066 - 0.070

**DIRECT CLUTCH PACK****DIRECT CLUTCH PACK SPECIFICATIONS**

Description	mm	inch
Clutch plate to retaining ring	0.73 - 1.42	0.028 - 0.055
Retaining ring thickness	1.28 - 1.38	0.050 - 0.054
Retaining ring thickness	1.39 - 1.49	0.054 - 0.058
Retaining ring thickness	1.52 - 1.62	0.060 - 0.063
Retaining ring thickness	1.65 - 1.75	0.064 - 0.068

**LOW/REVERSE CLUTCH PACK****LOW/REVERSE CLUTCH PACK SPECIFICATIONS**

Description	mm	inch
Clutch plate to retaining ring	0.30 - 1.10	0.012 - 0.043
Pressure plate sizes	2.57-2.47	0.101-0.097
Pressure plate sizes	2.36-2.26	0.092-0.088
Pressure plate sizes	2.16-2.06	0.085-0.081

**INTERMEDIATE AND OVERDRIVE SERVO****INTERMEDIATE AND OVERDRIVE SERVO SPECIFICATION**

Description	mm	inch
Servo travel, wide groove	2.44 - 4.94	0.096 - 0.194

**INTERMEDIATE/OVERDRIVE SERVO APPLY ROD****INTERMEDIATE/OVERDRIVE SERVO APPLY ROD SPECIFICATIONS**

Part Number	Number of Rings	Rod Length
F3RP-7H188-CB	0	108.1 mm (4.25 in)
F3RP-7H188-BB	1	107.1 mm (4.21 in)
F3RP-7H188-AB	2	105.7 mm (4.16 in)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

### REVERSE/OVERDRIVE CARRIER ASSEMBLY PINION GEAR

### REVERSE/OVERDRIVE CARRIER ASSEMBLY PINION GEAR SPECIFICATION

Description	mm	inch
End play	0.15 - 0.72	0.005 - 0.028

### GEAR RATIOS

### GEAR RATIOS CHART

Gear Range	Ratios
1ST	2.889:1
2ND	1.571:1
3RD	1:1
4TH	0.689:1
REVERSE	2.31:1
FINAL DRIVE	3.77:1

### PUMP GEAR END

### PUMP GEAR END SPECIFICATION

Description	mm	inch
Drive gear clearance	0.05 - 0.08	0.002 - 0.003

### DRIVE SPROCKET ALIGNMENT NO. 10 THRUST WASHER

### DRIVE SPROCKET ALIGNMENT NO 10 THRUST WASHER SPECIFICATIONS

Description	mm	inch
Drive sprocket-to-converter housing thrust washer AA	1.51-1.41	0.059-0.052
Drive sprocket-to-converter housing thrust washer BA	1.77-1.67	0.069-0.065
Drive sprocket-to-converter housing thrust washer CA	2.03-1.93	0.079-0.075
Drive sprocket-to-converter housing thrust washer DA	2.29-2.19	0.090-0.086
Distance measured during gauging procedure and appropriate thrust washer AA	1.12-0.86	0.044-0.033
Distance measured during gauging procedure and appropriate thrust washer BA	0.85-0.60	0.033-0.023
Distance measured during gauging procedure and appropriate thrust washer CA	0.59-0.34	0.023-0.013
Distance measured during gauging procedure and	0.33-0.08	0.012-0.003

**2005 Ford Escape**

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape &amp; Mariner

appropriate thrust washer DA

**DRIVEN SPROCKET ALIGNMENT NO. 11 SHIM****DRIVEN SPROCKET ALIGNMENT NO 11 SHIM SPECIFICATIONS**

Description	mm	inch
Transaxle case-to-driven sprocket/final drive sun gear thrust bearing shim AB	2.20-2.10	0.086-0.082
Transaxle case-to-driven sprocket/final drive sun gear thrust bearing shim BB	2.02-1.92	0.079-0.075
Transaxle case-to-driven sprocket/final drive sun gear thrust bearing shim CB	1.85-1.75	0.072-0.068
Transaxle case-to-driven sprocket/final drive sun gear thrust bearing shim DB	1.67-1.57	0.065-0.061
Transaxle case-to-driven sprocket/final drive sun gear thrust bearing shim EB	1.50-1.40	0.059-0.052
Transaxle case-to-driven sprocket/final drive sun gear thrust bearing shim FB	1.32-1.22	0.051-0.048
Distance measured during gauging procedure and appropriate thrust bearing shim AB	14.34-14.1	0.564-0.557
Distance measured during gauging procedure and appropriate thrust bearing shim BB	14.16-14.00	0.557-0.551
Distance measured during gauging procedure and appropriate thrust bearing shim CB	13.99-13.83	0.551-0.544
Distance measured during gauging procedure and appropriate thrust bearing shim DB	13.82-13.66	0.544-0.537
Distance measured during gauging procedure and appropriate thrust bearing shim EB	13.65-13.49	0.537-0.531
Distance measured during gauging procedure and appropriate thrust bearing shim FB	13.48-13.32	0.531-0.524

**DIFFERENTIAL END PLAY NO. 14 SHIM****DIFFERENTIAL END PLAY NO 14 SHIM SPECIFICATIONS**

Description	mm	inch
Differential case-to-converter housing thrust bearing shim AA (sizes)	1.08-0.98	0.042-0.038
Differential case-to-converter housing thrust bearing shim BA (sizes)	1.38-1.28	0.054-0.050
Differential case-to-converter housing thrust bearing shim CA (sizes)	1.67-1.57	0.065-0.061
Differential case-to-converter housing thrust bearing shim	1.97-1.87	0.077-0.074

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DA (sizes)		
Differential case-to-converter housing thrust bearing shim	2.27-2.17	0.089-0.085
EA (sizes)		
Distance measured during gauging procedure and appropriate thrust bearing shim AA	130.76-130.46	5.148-5.136
Distance measured during gauging procedure and appropriate thrust bearing shim BA	130.45-130.16	5.135-5.124
Distance measured during gauging procedure and appropriate thrust bearing shim CA	130.15-129.87	5.124-5.112
Distance measured during gauging procedure and appropriate thrust bearing shim DA	129.88-129.57	5.112-5.101
Distance measured during gauging procedure and appropriate thrust bearing shim EA	129.56-129.27	5.100-5.089

**PUMP ASSEMBLY ROTATING TORQUE****PUMP ASSEMBLY ROTATING TORQUE SPECIFICATION**

Description	Nm	inch
Drive shaft rotational torque	0.3	2.6

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

Description	Nm	lb-ft	lb-in
Accumulator body transfer plate bolts	12	9	-
Drain plug	25	18	-
Cooler line fittings	40	30	-
Differential lube tube bolt	13	10	-
Filler tube bolt	8	-	71
Line pressure port plug	25	18	-
Main control valve body cover bolts	13	10	-
Manual control lever bolt	27	20	-
Shift cable bracket bolts	23	17	-
Manual valve detent lever ball stud nut	12	9	-
Parking pawl shaft retainer bolt	8	-	71
Manual control lever shaft nut	74	55	-
Pressure tap plate bolts	8	-	71
Pump assembly bolts	11	8	-



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Pump support bolts	13	10	-
Solenoid valve body bolts	10	-	89
Thermostatic fluid level control valve bolt	12	9	-
Transmission range (TR) sensor bolts	11	8	-
Transaxle case-to-engine bolts	40	30	-
Turbine shaft speed (TSS) sensor bolt	12	9	-
Output shaft speed (OSS) sensor bolt	12	9	-
Rear cross brace bolts	40	35	-
Cross brace bolts	90	66	-
Cross brace nut	150	111	-
Transaxle support brackets	48	35	-
Rear engine support center bolt	115	85	-
Transaxle cooler lines	23	17	-
Manual control lever	27	20	-
Torque converter nuts	40	30	-
Rear driveshaft flange	20	15	-
Roll restrictor-to-case bolts	90	66	-
Transmission filler tube bolt	8	-	71
Intermediate shaft bearing bracket bolts	27	20	-
Exhaust flange retainers	29	21	-
Lower control arm-to-body bolt	115	200	-
LH support insulator bracket nuts	40	30	-
LH support insulator through bolt	103	76	-
Torque converter pump rotational torque	0.3	-	2.65
Torque converter housing to case bolts	22	16	-
Power take off bracket bolts	40	30	-
Power take off-to-transaxle bolt	45	33	-
Lower rear mount bolt	55	41	-
Ground wire nut	27	20	-
Cooler tube bracket bolt	13	10	-
Starter motor bolts	35	26	-
Outer halfshaft spindle nut	290	214	-

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Front mount bracket bolt	90	66	-
Battery tray bracket bolts	10	-	89

## DESCRIPTION AND OPERATION

### TRANSAXLE DESCRIPTION

This automatic transaxle is a 4-speed, front wheel drive automatic transaxle with electronic controls for:

- electronic pressure control (EPC) solenoid for shift quality.
- shift scheduling.
- 3-2 shift timing.
- coast braking.
- torque converter clutch control.

The transaxle features a 4 element torque converter with a torque clutch and a geartrain that includes:

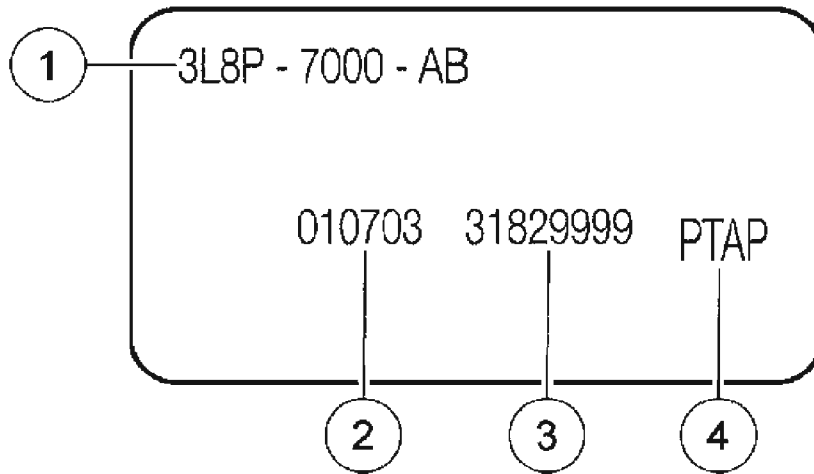
- compound planetary gearset.
- chain drive.
- planetary gearset final drive.
- pinion and side gear differential.

The hydraulic control system of the transaxle has 5 solenoids that control:

- shift feel, through line pressure control.
- shift scheduling, through shift valve positioning control.
- modulated application of the torque converter clutch.
- timing of 3-2 shifts.
- engine braking during coast operation.

### IDENTIFICATION TAGS

When servicing the automatic transaxle, refer to the **IDENTIFICATION TAG** located on the case.



N0024414

Item	Part Number	Description
1	—	Transmission assembly part number
2	—	Sample build date code (DDMMYY)
3	—	Sample Julian build date and build number (YDDDDXXX)
4	—	Service model code

**Fig. 1: Identifying Identification Tags**  
 Courtesy of FORD MOTOR CO.

#### RANGE SELECTION

The transaxle range selector lever has 6 positions: P, R, N, (D), 2, 1. In addition, a transmission control switch (TCS) allows the driver to prevent a shift to 4th gear (Overdrive) and uses engine compression to help slow the vehicle (engine braking) in 2nd and 3rd gear.

**AD1964-A**

**Fig. 2: Identifying Range Selector Positions**  
**Courtesy of FORD MOTOR CO.**

**Park**

No power flow is transferred through the transaxle in PARK. A shift lever connected to a set of cams presses the parking pawl into the park gear on the driven sprocket. This locks the final drive and prevents the vehicle from rolling. For safety reasons, always apply the parking brake whenever the vehicle is parked.

**Reverse**

REVERSE allows the vehicle to be operated in a rearward direction, at a reduced gear ratio. Engine braking is provided in REVERSE.

**Neutral**

As in PARK, there is no power transferred through the transaxle in NEUTRAL. However, the final drive is not locked by the parking pawl, so the wheels are free to rotate. The vehicle may be started in NEUTRAL.

**Drive**

The DRIVE position provides all automatic shifts (1st through 4th), apply and release of the torque converter clutch, and maximum fuel economy during normal operation. Engine braking is provided in the 4th gear. Fourth gear (Overdrive) may be canceled by depressing the transmission control switch (TCS) that is located on the transmission range selector. Engine braking is also provided in 2nd and 3rd gear with the TCS on.

**Second Gear Position**

SECOND provides a 2nd gear hold position after automatic or manual upshift or downshift. When SECOND is selected from a stop, the transaxle will start in 2nd gear for maximum traction on slippery surfaces. Engine braking is provided in 2nd gear when in the SECOND position.

**Low Position**

MANUAL LOW provides a 1st gear hold after automatic or manual downshift. The transaxle is prevented from downshifting into 1st gear above a specific speed approximately 48 km/h (30 mph) to protect the powertrain from over speeding. Engine braking is provided in MANUAL LOW position making it especially useful for descending steep grades.

**SHIFT PATTERNS****Upshifts**

The powertrain control module (PCM) has an adaptive learn strategy to electronically control the transaxle. The adaptive learn strategy will automatically adjust the shift feel to the driver demands. The first few hundred miles of operation the transaxle may have abrupt shifts, this is a normal operation and will correct itself. If the battery has been disconnected for longer than 20 minutes the shift tables will reset and need to be relearned. Upshifting is controlled by the PCM. The PCM receives inputs from various engine and vehicle sensors along with driver demands to control shift scheduling, shift feel and torque converter clutch operation.

**Downshifts**

Under certain conditions the transaxle will downshift automatically to a lower gear range (without moving the transaxle range selector lever). There are 3 categories of automatic downshifts: coastdown, torque demand and forced or kickdown shifts.

**Coastdown**

The coastdown downshift occurs as the name indicates, when the vehicle is coasting down to a stop.

**Torque Demand**

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

**Kickdown**

For maximum acceleration, the driver can force a downshift by pressing the accelerator pedal to the floor. A forced downshift into 2nd gear is possible below 88 km/h (55 mph). Below approximately 40 km/h (25 mph) a forced kickdown to 1st gear will occur. For all

## 2005 Ford Escape

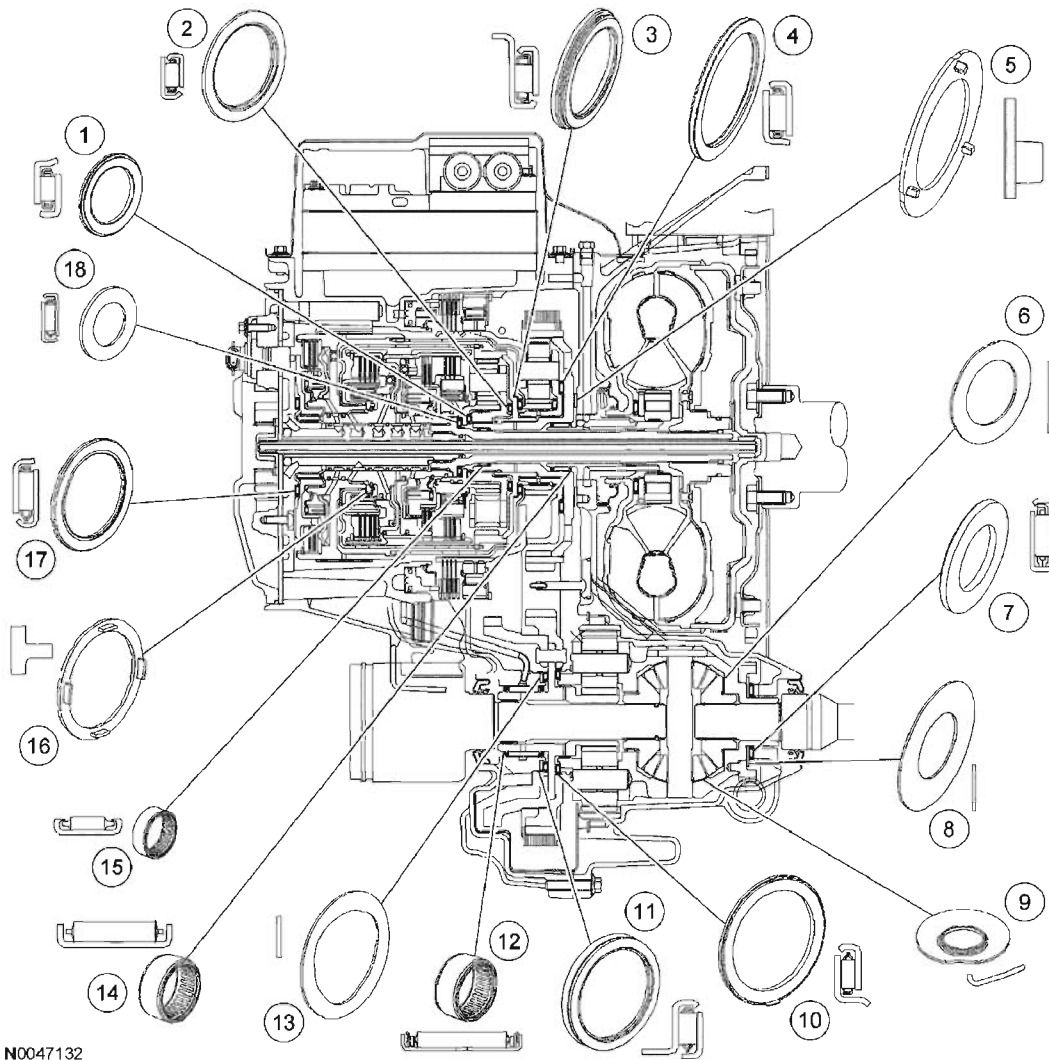
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shift speeds, specifications are subject to variation due to tire size and engine calibration requirements.

### **BUSHINGS, BEARING AND THRUST WASHER LOCATOR**

## 2005 Ford Escape

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N0047132

Item	Part Number	Description
1	7I1207	Bearing — low/intermediate sun gear thrust (No. 5)
2	7H028	Bearing — low/intermediate carrier thrust (No. 6)
3	7D234	Bearing — reverse/overdrive sun gear thrust (No. 7)
4	7H030	Bearing — reverse/overdrive ring gear thrust (No. 9)
5	7G099	Washer — drive sprocket thrust (No. 10)
6	4228	Washer — differential side gear thrust
7	7G112	Bearing — differential (No. 15)
8	7F119	Shim — differential bearing (No. 14)
9	4230	Washer — differential pinion thrust

Item	Part Number	Description
10	7G233	Washer — driven sprocket thrust (No. 13)
11	7G247	Bearing — driven sprocket (No. 12)
12	7G355	Bearing — driven sprocket (No. 18)
13	7H086	Shim — driven sprocket (No. 11)
14	7H032	Bearing — stator support (No. 17)
15	7H029	Bearing — reverse/overdrive ring gear (No. 16)
16	7G116	Washer — direct clutch thrust (No. 2)
17	7H241	Bearing — pump support thrust (No. 1)
18	7H026	Bearing — turbine shaft thrust (No. 4)

**Fig. 3: Identifying Bushings, Bearing And Thrust Washer Location**  
 Courtesy of FORD MOTOR CO.

## **TORQUE CONVERTER**

The torque converter is a 4 element assembly. The torque converter contains an impeller, a turbine, a reactor and a torque converter clutch (TCC) for increased fuel economy. It couples the engine to the turbine shaft assembly, provides torque multiplication and absorbs engine shock of gear shifting.

### **Impeller and Cover**

The impeller and cover assembly drives the impeller blades and pump assembly. The impeller is primarily responsible for driving the turbine with hydraulic fluid by means of centrifugal force. The cover provides a mating surface for the torque converter clutch piston plate and dampener assembly.

### **Turbine**

The turbine is driven by centrifugal fluid force from the impeller. The turbine transmits input torque to the drive chain and driven sprocket through the turbine shaft.

### **Reactor**

The reactor redirects fluid flow from the turbine back to the impeller so that fluid rotates in the same direction as the impeller. This action also assists in torque multiplication.

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

The torque converter clutch (TCC) provides a mechanical link or direct drive between the engine crankshaft and turbine shaft when applied. The application of the TCC is controlled by the powertrain control module (PCM). Under certain conditions, the PCM sends the appropriate signal to the TCC solenoid, which allows fluid pressure within the torque converter to force the TCC piston plate and dampener assembly against the cover creating a mechanical link between the engine and transaxle.

### **Turbine Shaft**

The turbine shaft connects the torque converter stator with the forward/coast/direct clutch cylinder. When applied, the forward/coast/direct clutch cylinder transmits input torque to the reverse/overdrive ring gear assembly, which also acts as the drive sprocket. This allows input torque to be transmitted from the torque converter to the drive chain and driven sprocket.

## **GEARTRAIN**

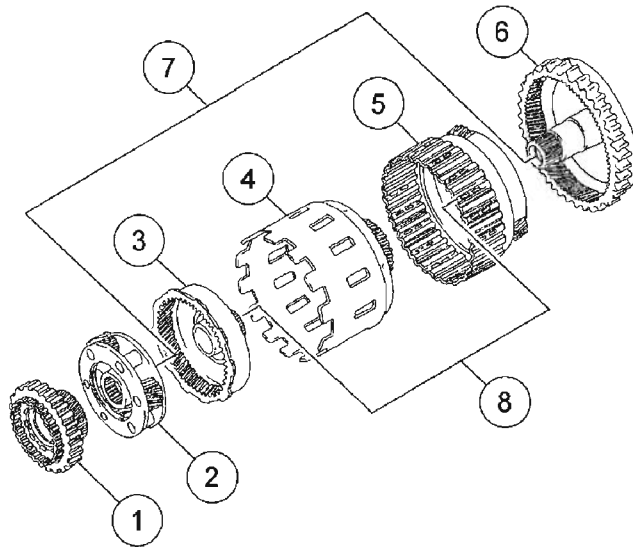
The geartrain includes the planetary gearsets, apply components and final drive gearset and differential.

### **Planetary Gearsets**



The automatic transaxle has 2 planetary gearsets to provide operation in reverse and 4 forward speeds. The gearsets are comprised of the following components:

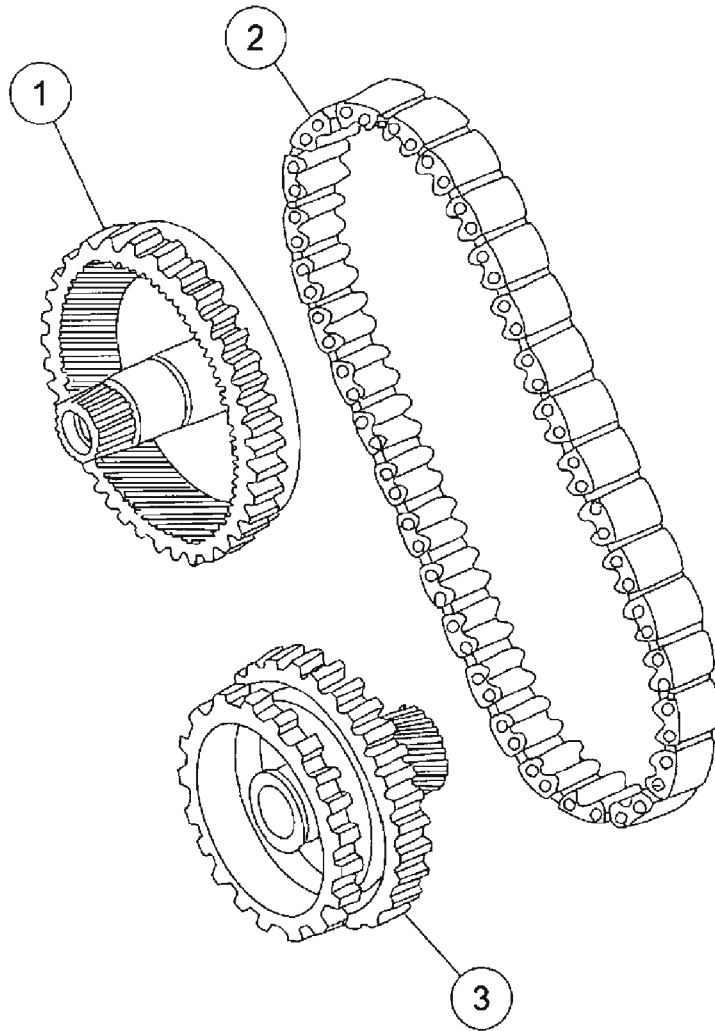
- Low/intermediate sun gear assembly
- Low/intermediate carrier assembly
- Low/intermediate ring gear assembly
- Reverse/overdrive sun gear and shell assembly
- Reverse/overdrive carrier assembly
- Reverse/overdrive ring gear assembly



N0024415

Item	Part Number	Description
1	7H229	Sun gear assembly — low/intermediate
2	7A398	Carrier assembly — low/intermediate
3	7A153	Ring gear assembly — low/intermediate
4	7A626	Sun gear and shell assembly — reverse/overdrive
5	7D066	Carrier assembly — reverse/overdrive
6	7A153	Ring gear assembly — reverse/overdrive
7	—	Splined together
8	—	Splined together

**Fig. 4: Identifying Planetary Gearsets**  
**Courtesy of FORD MOTOR CO.**



N0024416

Item	Part Number	Description
1	7A153	Ring gear assembly — reverse/overdrive
2	7G249	Drive chain
3	7G132	Driven sprocket assembly

**Fig. 5: Identifying Drive Chain Assembly Components**  
 Courtesy of FORD MOTOR CO.

#### Drive Chain and Sprockets

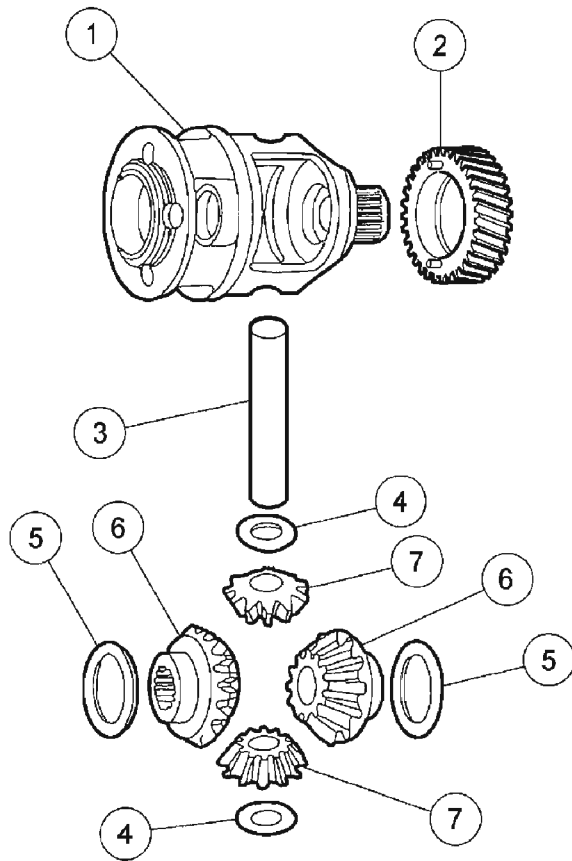
A chain drive transfers torque from the torque converter turbine to the planetary gearsets. The chain drive is composed of the following components:

- Reverse/overdrive ring gear assembly which acts as a drive sprocket
- Driven sprocket
- Drive chain

The drive chain connects the reverse/overdrive sun gear with the driven sprocket. The final drive sun gear located on top of the driven sprocket meshes with the final drive gearset.

The final drive consists of a planetary gearset that transfers and multiplies torque from the planetary gearsets to the differential. The final drive consists of the following components:

- Final drive sun gear: is chain driven by the reverse/overdrive ring gear assembly and transfers torque to the final drive carrier.
- Final drive carrier: the final drive carrier acts as the driven member and is part of the differential case.
- Final drive ring gear: is held by the converter housing and is always the held member of the final drive planetary gearset.



N0024417

Item	Part Number	Description
1	4204	Differential case (with final drive carrier)
2	7F453	Ring gear — final drive
3	4211	Pinion shaft — differential
4	4230	Pinion thrust washer — differential
5	4228	Side gear thrust washer — differential
6	4236	Side gear — differential
7	4215	Pinion gear — differential

**Fig. 6: Identifying Differential Components**  
**Courtesy of FORD MOTOR CO.**

The differential assembly drives the differential pinion gears and the differential side gears, which in turn, drive the front wheel driveshaft and joints and provides differential action if driving wheels are turning at different speeds. The differential assembly consists of the following components:

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

## **APPLY COMPONENTS**

### **Intermediate and Overdrive Band**

The intermediate and overdrive band assembly holds the reverse clutch drum assembly to the transaxle case in 2nd and 4th gear. This action causes the reverse/overdrive sun gear and shell assembly to be held stationary in 2nd and 4th gears.

### **Intermediate and Overdrive Servo**

The intermediate and overdrive servo is the hydraulic actuator which applies the intermediate and overdrive band assembly. Line pressure is applied through the servo apply circuit where it works on one side of the servo piston. This forces the piston to move up the servo bore in the transaxle case, which moves the servo apply rod against one end of the intermediate and overdrive band assembly. Because the other end of the intermediate and overdrive band assembly is anchored to the transaxle case, the ends of the intermediate and overdrive band assembly are squeezed around the reverse clutch drum assembly, holding the reverse clutch drum assembly stationary.

### **Forward Clutch**

The forward clutch connects the turbine shaft to the outer race of the forward one-way clutch, which in turn drives the low/intermediate sun gear in all forward gear ranges. However, in 4th gear, the forward clutch transmits no power because the forward one-way clutch is overrunning. The forward clutch is a multi-disc clutch and is contained in the forward/coast/direct clutch cylinder assembly.

### **Direct Clutch**

The direct clutch connects the turbine shaft to the low/intermediate ring gear assembly when the vehicle is in 3rd and 4th gears. It is a multi-disc clutch and is contained in the forward/coast/direct clutch cylinder assembly.

### **Reverse Clutch Coast Clutch**

The reverse clutch connects the turbine shaft to the reverse/overdrive sun gear and shell assembly when it is in reverse gear. It is a multi-disc clutch and is contained in the reverse clutch drum assembly.

The coast clutch is a multi-disc clutch located beneath the forward clutch in the forward/coast/direct clutch cylinder assembly. It connects the low/intermediate sun gear assembly to the turbine shaft assembly when the transmission control switch is ON in the

DRIVE position or when any manual gear is selected.

**Low/Reverse Clutch**

The low/reverse clutch holds the reverse/overdrive carrier assembly to the transaxle case when the transaxle is shifted into the R or 1 position. The low/reverse clutch is splined to the transaxle case and is a multi-disc clutch.

**Forward One-Way Clutch (OWC)**

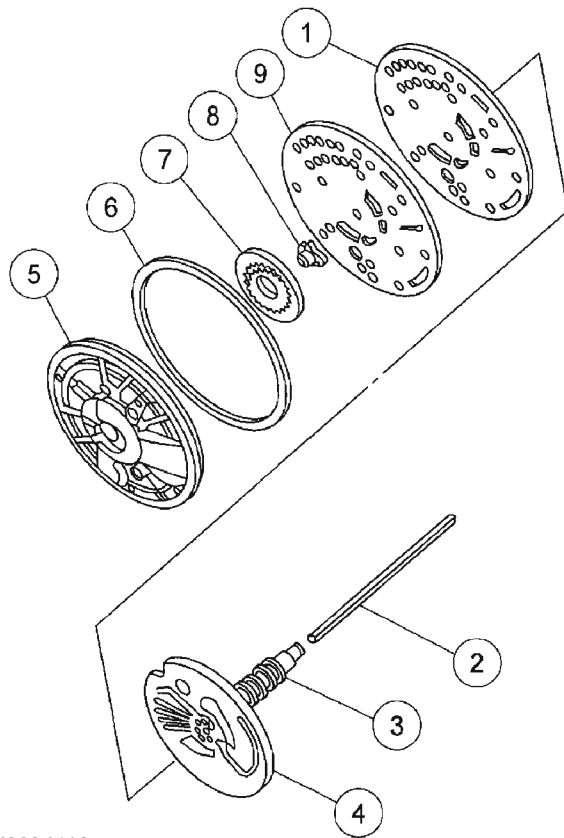
The forward one-way clutch (OWC) is either a sprag or mechanical diode type, one-way clutch. The forward OWC combines with the forward clutch to connect the turbine shaft assembly to the low/intermediate sun gear assembly in 1st, 2nd and 3rd gears. The forward OWC overruns during all coasting operations and is always overrunning in 4th gear.

**Low One-Way Clutch**

The low OWC is a roller type OWC which allows the transaxle case to hold the reverse/overdrive carrier stationary when the transaxle is in 1st gear. The low OWC will only hold the reverse/overdrive carrier assembly during acceleration. When coasting, the low OWC will overrun, disconnecting the final drive from the compound planetary gearset.

**HYDRAULIC SYSTEM**

The hydraulic system uses transmission fluid to cool, lubricate and provide hydraulic pressure to the hydraulic circuits within the transaxle.



N0024418

Item	Part Number	Description
1	7G331	Gasket — pump body separator
2	7B328	Shaft — pump drive
3	7H114	Seal — pump support (6 required)
4	7A103	Support assembly — pump
5	7F370	Body — pump assembly
6	7A248	Seal — pump
7	—	Gears — pump (part of 7A103)
8	7F402	Insert — pump drive gear
9	7A142	Plate — pump body separator

**Fig. 7: Identifying Fluid Pump Assembly Components**  
**Courtesy of FORD MOTOR CO.**

### Fluid Pump

The pump provides the volume of fluid required to charge the torque converter, main control valve body, cooling system, lubrication system and hydraulic apply devices. The transaxle



uses a positive displacement gear and crescent-type pump which is shaft-driven by the torque converter.

#### **Fluid Level and Filter**

Fluid from the sump area (formed by the transaxle case and converter housing) flows through a filter to the pump. The filter has a recirculation port connected to the main control area of the case and receives fluid from the main regulator exhaust. This provides fluid under pressure to aid the pump in higher efficiency operation. A thermostatic fluid control valve prevents foaming of fluid by maintaining a sump level below the rotating components. The 2-piece chain drive cover prevents foaming by not allowing the chain to rotate in the fluid. A magnet on the underside of the chain cover collects unwanted magnetic material.

#### **Main Control**

The main control houses the hydraulic valves and solenoid valves. These valves direct fluid flow, restrict fluid flow and change fluid pressure. The main control receives signals from the solenoid valve body and changes those signals into hydraulic actions. These actions control the operation of the hydraulic clutches and intermediate and overdrive band assembly, and supply lubrication to the transaxle.

#### **Low/Reverse Accumulator**

The low/reverse accumulator cushions the application of the low/reverse clutch when the transaxle is shifted to reverse gear.

#### **2-4 Accumulator**

The 2 - 4 accumulator cushions the shift feel during intermediate and overdrive band applications.

#### **Forward Accumulator**

The forward accumulator cushions the application of the forward clutch when the transaxle is shifted into (D), 2 or 1.

### **TRANSAXLE ELECTRONIC CONTROL SYSTEM**

Shift timing, shift feel (line pressure) and torque converter clutch (TCC) control in the automatic transaxle are controlled electronically by the powertrain control module (PCM) and its input/output network. The transaxle control is separate from the engine control strategy in the PCM, although some of the input signals are shared. Some input signals come from the engine-related sensors, mass air flow (MAF) sensor or engine coolant temperature (ECT) sensor to give the PCM an idea of the load and climate under which the engine is operating. Some other inputs are based on driver inputs, such as accelerator pedal position which is relayed to the PCM by the throttle position (TP) sensor. Still other inputs are provided by the transaxle itself, from sensors such as the transmission range (TR) sensor

(controlled by the placement of the transaxle range selector) and the transmission fluid temperature (TFT) sensor. Using all of these input signals, the PCM can determine when the time and conditions are right for a shift or converter clutch application. The PCM can also determine the line pressure needed to optimize shift feel. To accomplish these functions, the PCM controls 5 electronic solenoids, 2 ON/OFF solenoids for shifting, one pulse width modulating (PWM) solenoid for torque converter clutch control, an electronic pressure control (EPC) solenoid for line pressure control and a 3-2 timing/coast clutch solenoid to control the release of the coast clutch and the coordinated release of the direct clutch and the apply of the low and intermediate band, during a 3-2 downshift.

### **Powertrain Control Module (PCM)**

The operation of the transaxle is controlled by the PCM. Many input sensors provide information to the PCM. The PCM then controls the actuators which affect transaxle operation.

### **Air Conditioning (A/C) Clutch**

The A/C cycling switch is located on the suction accumulator/drier of an original equipment manufacture (OEM) factory-installed air conditioning system. When the air conditioning clutch cycling switch contacts close, the PCM receives a signal voltage from the A/C clutch switch indicating that the A/C compressor clutch is engaged. The PCM uses the A/C clutch cycling switch signal to adjust line pressure to compensate for the additional engine load.

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

The BPP switch signals the PCM when the brakes are applied. The BPP switch is closed when the brakes are depressed and open when they are released. The BPP switch will also disengage TCC when brake is applied.

### **Engine Coolant Temperature (ECT) Sensor**

The ECT detects the temperature of the engine coolant and supplies the information to the PCM. The PCM uses the ECT sensor to control torque converter clutch (TCC) operation.

### **Electronic Ignition (EI) System**

The electronic ignition system consists of the PCM, a crankshaft position (CKP) sensor and one multi-tower ignition coil. The CKP sensor sends a crankshaft position signal to the PCM. The PCM then sends the appropriate ignition signal to the ignition coil. The PCM uses this signal in the transaxle shift strategy, as well as TCC control and electronic pressure control. Wide open throttle (WOT) shift control is also affected by the EI system input.

### **Mass Air Flow (MAF) Sensor**

The MAF directly measures the mass of the air flowing into the engine. The MAF sensor output is a D.C. (analog) signal ranging from about 0.5 volt to 5.0 volts used by the PCM to

calculate the injector pulse width for air/fuel ratio. For transaxle strategies, the MAF sensor is used for electronic pressure control (EPC), shift and TCC scheduling.

#### **Transmission Control Switch (TCS)**

The TCS is a momentary contact switch. When the TCS switch is pressed, a signal is sent to the PCM. The PCM then energizes the transmission control indicator lamp (TCIL) and engages or disengages 4th gear operation and provides coast braking in 2nd and 3rd.

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

The TCIL is located in the instrument panel and is labeled O/D OFF. The transmission control switch (TCS) controls the ON/OFF operation of the TCIL. When the driver initially presses the button of the TCS, the TCIL turns ON to indicate that transaxle operation in 4th gear is disabled. When the driver presses the TCS again, the TCIL turns OFF.

#### **Throttle Position (TP) Sensor**

The TP sensor is a potentiometer mounted on the throttle body. The TP sensor detects the position of the throttle plate and sends this information to the PCM as a varying voltage signal. If a fault occurs in the TP sensor circuit, the PCM will recognize that the TP sensor signal is out of specification. The PCM will then operate the transaxle at a high EPC pressure to prevent transaxle damage. The PCM also uses this signal for shift scheduling, EPC and TCC control.

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

The TFT sensor is located on the solenoid valve body. It is a temperature-sensitive device called a thermistor. The resistance value of the TFT sensor will vary with temperature. The PCM monitors the voltage across the TFT sensor to determine the temperature of the transmission fluid. The PCM uses this signal to determine shift scheduling and to control line pressure for cold and hot temperature operation. The PCM also inhibits TCC operation at low transmission temperature and adjusts electronic pressure control (EPC) pressures for temperature.

#### **Transmission Range (TR) Sensor**

The PCM sends a voltage signal to the TR sensor. The TR sensor incorporates a series of step down resistors which act as a voltage divider. The PCM monitors this voltage, which corresponds to the position of the transmission range selector lever (P, R, N, (D), 2, 1) to determine desired gear and EPC pressure. The TR sensor is located on the top of the transaxle, and also contains the neutral/start, and reverse lamp circuits.

#### **Turbine Speed Shaft (TSS) Sensor**

The TSS sensor is a magnetic pickup that sends a signal to the PCM that indicates turbine shaft input speed. The TSS sensor provides converter turbine shaft speed information for

TCC control strategy. Also used in determining static EPC pressure setting during shifts.

#### **Output Shaft Speed (OSS) Sensor**

The OSS sensor is a magnetic pick-up which detects the park gear teeth rotation and sends a signal to the PCM as an indicator of the transaxle output shaft speed. The OSS signal is processed by the PCM for shift scheduling and inputs to other control modules such as: Electronic Speedometer, Trip Computer, Speed Control, Adaptive Damping, Auxiliary Warning and Radio CD.

#### **Solenoid Valve Body Assembly**

The solenoid valve body assembly contains the transmission fluid temperature sensor (TFT) sensor, as well as 5 PCM controlled output devices:

- Electronic pressure control (EPC) solenoid
- Shift solenoid A (SSA)
- Shift solenoid B (SSB)
- 3-2 timing/coast clutch solenoid (3-2 T/CCS)
- Torque converter clutch (TCC) solenoid

#### **Powertrain Control Module (PCM)**

The PCM controls the operation of the transaxle through wiring to the solenoid valve body assembly mounted on the main control assembly. An electrical connector from the solenoid valve body assembly fastens to the top of the transaxle case, where it connects to PCM wiring. The solenoid valve body assembly is serviced as one part when any new components are installed.

#### **Electronic Pressure Control (EPC) Solenoid**

The EPC solenoid is a variable force style (VFS) solenoid. The VFS type solenoid is an electro-hydraulic actuator combining a solenoid and a regulating valve. This solenoid provides electronic pressure control (EPC) which regulates line pressure (LP) and line modulator (LM) pressure. This is controlled by producing a resisting pressure to the main regulator and line modulator circuits. The LP and LM pressures control the clutch application pressures.

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

The TCC solenoid is a pulse width modulating (PWM) style solenoid. The PWM solenoid is used to control the apply and release of the bypass clutch in the torque converter. By modulating the pulse width of the TCC solenoid, the pressure in the S4 circuit varies modulating the apply and release of the bypass clutch in the torque converter.

#### **3-2 Timing/Coast Clutch Solenoid (3-2 T/CCS)**

The 3-2 T/CCS is a VFS. The VFS type solenoid is an electro-hydraulic actuator combining a solenoid and a regulating valve. It supplies pressure to the S3 circuit to control the release of the direct clutch and to apply the intermediate and overdrive band during a 3-2 downshift. This solenoid also regulates the pressure in the S3 circuit to control the application and release of the coast clutch.

#### Shift Solenoid Assembly (SSA, SSB)

Shift solenoids A and B provide gear selection of 1st through 4th gears by providing ON/OFF pressure control to the shift valves.

## DIAGNOSIS AND TESTING

### DIAGNOSTIC STRATEGY

**NOTE:**      **Do not take short cuts or assume that critical 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, the technician may have to use the following:

- Engine Performance articles
- Technical Service Bulletins (TSBs)
- Wiring Diagrams
- Transmission Tester Manual

This information provides the information required when diagnosing transaxle concerns.

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

#### Preliminary Inspection

- Know and understand the customer concern.
- Verify the concern by operating the vehicle.
- Check fluid level and condition.
- Check non-factory add-on items.
- Check shift linkages for correct adjustment.
- Check TSBs for the concern.

#### Diagnostics

- Carry out on-board diagnostic procedures; Key On/Engine Off (KOEO) and Key On/Engine Running (KOER).
- Record all diagnostic trouble codes (DTCs).
- Repair all non-transaxle codes first.
- Repair all transaxle codes second.
- Erase all continuous codes and attempt to repeat them.
- Repair all continuous codes.
- If only pass codes, proceed to diagnosis by symptom charts for further information and diagnosis.

By following the diagnostic sequence, the repair technician will be able to diagnose and repair the concern the first time.

## DIAGNOSTIC FLOW CHART

## DIAGNOSTIC FLOW CHART

1) Did you record any Diagnostic Trouble Codes?	Yes	<ul style="list-style-type: none"> <li>Repair all hard Diagnostic Trouble Codes. Follow the pinpoint tests. For non-transmission related DTCs, refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION-HYBRID ESCAPE</u></b> article for Escape (Hybrid) article, then this article for transmission related DTCs.</li> </ul>
	No	<ul style="list-style-type: none"> <li>Refer to <b><u>DIAGNOSIS BY SYMPTOM</u></b>, then GO to Step 5.</li> </ul>
2) Are any continuous test memory codes present?	Yes	<ul style="list-style-type: none"> <li>Clear codes and carry out drive cycle test.</li> </ul>
	No	<ul style="list-style-type: none"> <li>GO to Step 4.</li> </ul>
3) Did the continuous test memory codes reappear?	Yes	<ul style="list-style-type: none"> <li>Repair all continuous test memory codes. Follow the pinpoint tests. For non-transmission related DTCs, refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for</li> </ul>

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	No	<p>Escape (gasoline) and Mariner or <b>INTRODUCTION-HYBRID ESCAPE</b> article for Escape (Hybrid), then this article for transmission related DTCs, then GO to Step 4.</p> <ul style="list-style-type: none"> <li>• GO to Step 4.</li> </ul>
4) Is the concern repaired?	Yes	<ul style="list-style-type: none"> <li>• Carry out the final quick test to verify that no Diagnostic Trouble Codes are present. Clear memory codes. Return vehicle to customer.</li> </ul>
	No	<ul style="list-style-type: none"> <li>• Refer to <b>DIAGNOSIS BY SYMPTOM</b>.</li> </ul>
5) Are there any electrical concerns?	Yes	<ul style="list-style-type: none"> <li>• Install the scan tool and carry out output state control test, then GO to Step 6.</li> </ul>
	No	<ul style="list-style-type: none"> <li>• Refer to the hydraulic and mechanical routine to diagnose and repair the concern, then GO to Step 7.</li> </ul>
6) Was the transaxle concern corrected when the scan tool was installed?	Yes	<ul style="list-style-type: none"> <li>• Refer to <b>PINPOINT TEST Z: INTERMITTENT</b> in INTRODUCTION - GASOLINE article for Escape (gasoline) and Mariner or <b>Z: INTERMITTENT</b> in INTRODUCTION- HYBRID ESCAPE article for Escape (Hybrid), intermittent fault diagnosis and use the scan tool to diagnose cause of concern in the processor, vehicle harness or external inputs (sensors or switches).</li> </ul>
	No	<ul style="list-style-type: none"> <li>• Refer to the hydraulic and mechanical routine to diagnose the concern, then GO to Step 7.</li> </ul>
7) Is the concern repaired?	Yes	<ul style="list-style-type: none"> <li>• Carry out the final quick test to verify that no diagnostic</li> </ul>

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	No	<p>trouble codes are present. Clear memory codes. Return the vehicle to the customer.</p> <ul style="list-style-type: none"><li>• No further testing is available. Repeat procedures as necessary.</li></ul>
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### PRELIMINARY INSPECTION

The following items must be checked before proceeding:

#### 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 or unloaded

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

#### Verification of Condition

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

The following procedures must be used when verifying customer concerns for the transaxle:

#### Determine Customer Concerns

**NOTE:** If noise/vibration, check for dependencies: rpm, vehicle speed, shift, gear, range or temperature.

**NOTE:** Some transaxle conditions may cause engine concerns. The torque converter clutch not disengaging will stall the engine.

- Hot or cold vehicle operating temperature
- Hot or cold ambient temperature
- 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 Fluid Level and Condition**

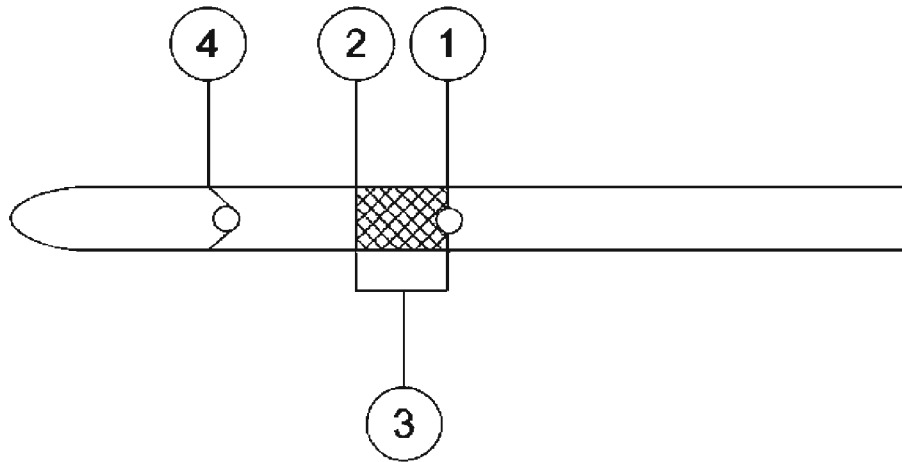
**CAUTION:** The vehicle should not be driven if the fluid level is below the bottom hole on the fluid level indicator and the outside temperature is above 10°C (50°F).

**NOTE:** Automatic transmission fluid expands when warmed. If your vehicle has been operated for an extended period at high speeds, in city traffic, during hot weather or while pulling a trailer, the vehicle should be turned off for about 30 minutes to allow the fluid to cool before checking.

The transmission fluid level should be checked at normal operating temperatures, 66°C-77°C (150°F-170°F), on a level surface. You can check the fluid level without driving if the outside temperature is above 10°C (50°F). When the vehicle has not been driven, and the outside temperature is above 10°C (50°F), the fluid level should be between the holes on the indicator. If the transmission fluid is to be checked when the fluid is at room temperature, the fluid level indicator could indicate that fluid should be added if the indicator is misread. If fluid is added at this time, an overfill condition could result when the vehicle reaches operating temperature of 66°C-77°C (150°F-170°F).

**Fluid Level Check**

1. Park the vehicle on a level surface and engage the parking brake.
2. With your foot on the brake, start the engine and move the range selector lever through all the gear ranges. Allow sufficient time for each gear to engage.
3. Place the range selector in PARK (P) and leave the engine running.
4. Remove the fluid level indicator and wipe it clean with a clean cloth.
5. Install the fluid level indicator, making sure that it is fully seated in the filler tube.
6. Remove the fluid level indicator. The fluid should be in the designated areas for normal and room temperature.



N0024419

Item	Part Number	Description
1	—	Do not add if above the crosshatched area
2	—	Fluid level at room temperature 10°C-35°C (50°F-95°F) (Do not add fluid)
3	—	Fluid level at operating temperature 66°C-77°C (150°F-170°F)
4	—	Do not drive if below this area and outside temperatures are above 10°C (50°F)

**Fig. 8: Identifying Fluid Level Indicator**  
 Courtesy of FORD MOTOR CO.

#### High Fluid Level

Fluid levels above the safe range may result in transmission failure. An overfill condition of transmission fluid may cause shift or engagement concerns and possible damage. High fluid levels can be caused by an overheating condition. A fluid level that is too high may cause the fluid to become aerated due to the churning action of the rotating internal parts. This will

cause erratic control pressure, foaming, loss of fluid from the vent tube and possible transmission malfunction and/or damage. If an overfill reading is indicated, drain and refill the transmission.

#### **Low Fluid Level**

Do not drive the vehicle if the fluid level is below the hole at the bottom of the fluid level indicator, or not on the fluid level indicator and the outside temperatures are above 10°C (50°F). A low fluid level could result in poor transmission engagement, slipping, malfunction and/or damage. This could also indicate a leak in one of the transmission seals or gaskets.

#### **Adding Fluid**

**CAUTION: The use of any other type of transmission fluid than specified could result in transmission malfunction and/or damage. An overfill condition of transmission fluid may cause shift or engagement concerns and possible damage.**

Before adding fluid make sure that the correct type is being used. The type of fluid that should be used is found on the fluid level indicator, on the handle, in the owner manual and in the Specification section in this article.

If fluid needs to be added, add fluid in 0.25L (1/2 pint) increments through the filler tube. Do not overfill the fluid.

#### **Fluid Condition Check**

1. Check the fluid level.
2. Observe the color and the odor. The color under normal circumstances should be dark reddish, not brown or black.
3. Hold the fluid level indicator over a white facial tissue and allow the 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 transmission. The engine cooling system should also be inspected at this time.
6. If fluid contamination or transmission failure is confirmed by the sediment in the bottom of the transmission fluid pan, the transmission must be disassembled and completely cleaned. This includes the torque converter and cooler lines.
7. Carry out diagnostic checks and adjustments. For additional information, refer to **DIAGNOSIS BY SYMPTOM**.

#### **ROAD TESTING VEHICLE**

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

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

### SHIFT POINT ROAD TEST

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

1. Bring the engine and transaxle up to normal operating temperature.
2. Operate the vehicle with the transaxle range selector lever in the (D) position.
3. Apply minimum throttle and observe the speeds at which upshift occurs and torque converter engages. Refer to the following **SHIFT SPEED REFERENCE CHART**.

**CAUTION:** Do not exceed posted speed limits when carrying out this test.

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

### SHIFT SPEED REFERENCE CHART

Throttle Position	OD Position Shift	3.0L Km/h (mph)	2.3L Km/h (mph)
Closed	4-3	61 (38)	45 (28)
	3-2	32 (20)	27 (17)
	2-1	13 (8)	13 (8)
Minimum Monitor PID TP Volt 1.25	1-2	21 - 26 (13 - 16)	16 - 24 (10 - 15)
	2-3	37 - 43 (23 - 27)	30 - 34 (19 - 21)
	3-4	68 - 71 (42 - 44)	51 - 55 (32 - 34)
Wide Open Throttle	1 - 2	72 (45)	68 (42)
	2 - 3	129 (80)	114 (71)
	3 - 4	-	-

4. Coasting 2-1 downshift procedure: accelerate the vehicle from a stop to 19-24 km/h (12-15 mph). Release the accelerator and coast down or lightly brake the vehicle. The coast downshift may be nearly imperceptible to the driver.
5. With the vehicle in (D)(4th gear), depress the transmission control switch. The transaxle should downshift to 3rd gear. Remove foot from the accelerator pedal; engine braking should occur. The torque converter clutch will not reapply with closed throttle. Depending on vehicle speed, the torque converter clutch should disengage and then reapply after the accelerator pedal has been pressed.

6. Depress the accelerator pedal to the floor. Depending on vehicle speed, the transaxle should shift from 3rd to 2nd gear, or 3rd to 1st.
7. With the vehicle in (D) range above 80 km/h (50 mph) and less than half throttle, move the transaxle range selector lever from (D) range to manual 2 range and remove foot from the accelerator pedal. The transaxle should immediately downshift into 2nd gear. With the vehicle remaining in manual 2 range, move the transaxle range selector lever into manual 1 range and release the accelerator pedal. The transaxle should downshift into 1st gear at speeds below 48-56 km/h (28-32 mph) for 3.0L engine and 43 km/h (27 mph) for the 2.3L engine.
8. If the transaxle fails to upshift/downshift or the torque converter does not apply and release, refer to the **DIAGNOSIS BY SYMPTOM** for possible causes.

## **TORQUE CONVERTER DIAGNOSIS**

Prior to installing a new or remanufactured torque converter, 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 Customers Concern.
3. Verify the Concern - Carry out the Torque Converter Operation Test.
4. Carry out Diagnostic Procedures.
  - Carry out On-Board Diagnostics. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid).
    - Repair all non-transmission related DTCs first.
    - Repair all transmission DTCs.
    - Rerun on-board diagnostics 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 Diagnosis by Symptom Routines. Refer to **DIAGNOSIS BY SYMPTOM**.
    - Use the index to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed, diagnose and repair as required, before repairing the torque converter.

This test verifies that the torque converter clutch control system and the torque converter are operating correctly. Carry out the test as follows:

1. Carry out On-Board Diagnostic Test. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid).
2. Connect a tachometer to the engine.
3. Bring engine to normal operating temperature by driving the vehicle at highway speeds for approximately 15 minutes in (D) position.
4. After normal operating temperatures are reached, maintain a constant vehicle speed of about 80 km/h (50 mph) and tap the brake pedal with the left foot.
5. Engine rpm should increase when the brake pedal is tapped, and should decrease about 5 seconds after the brake pedal is released. If this does not occur, see **TORQUE CONVERTER OPERATION CONCERNS**. Refer to **DIAGNOSIS BY SYMPTOM**. If the vehicle is at a stop and stalls in (D) at idle, move the transaxle range selector lever to the manual 1 position, see **TORQUE CONVERTER OPERATION CONCERNS**. Refer to **DIAGNOSIS BY SYMPTOM**. Repair as required. If the vehicle does not stall in manual 1, refer to **DIAGNOSIS BY SYMPTOM**.

## VISUAL INSPECTION

This inspection will identify modifications or additions to the vehicle operating system that can affect diagnosis.

- Vehicle modification
  - Electronic add-on items
  - Air conditioning
  - Generators (alternators)
  - Engine turbo
  - Cellular telephone
  - Cruise control
  - CB radio
  - Linear boosters
  - Backup alarm signals
  - Computer
1. The above items, if not correctly installed, will affect powertrain control module (PCM) or transaxle function. Pay particular attention to add-on wiring splices in the PCM harness or transaxle wiring harness, abnormal tire size or axle ratio changes.
  2. Leaks. Refer to **LEAKAGE INSPECTION**.

3. Correct linkage adjustments. Refer to **AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E** .

**Shift Linkage Check**

Check for a misadjustment in the shift linkage by matching the detents in the transmission range selector lever with those in the transaxle. If they match, the misadjustment is in the indicator. Do not adjust the shift linkage.

Hydraulic leakage at the manual control valve can cause delay in engagement and/or slipping while operating if the linkage is not correctly adjusted. Correctly adjust the shift linkage. Refer to **AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E** .

**Check TSBs**

Refer to all Technical Service Bulletins which pertain to the transaxle concern and follow the procedures as outlined.

**Carry Out On-Board Diagnostics**

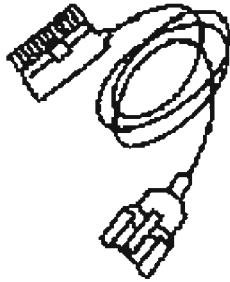
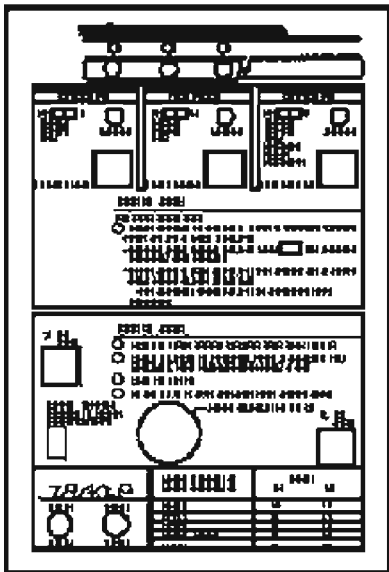
After a road test, with the vehicle warm and before disturbing any connectors, carry out the Quick Test using the scan tool. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid).

**DIAGNOSTICS****Special Tool(s)****SPECIAL TOOLS DESCRIPTION**

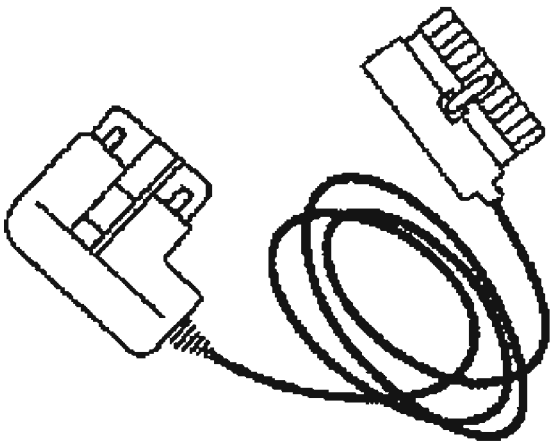
	CD4E Cable 418-F113 (007-00125) or equivalent
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ST1644-A



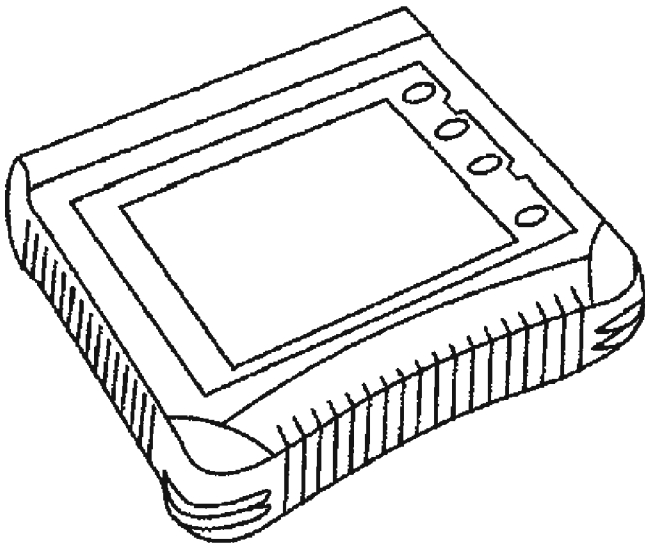
ST1645-A

MLP-D Cable 418-F117 (007-00129)  
or equivalent



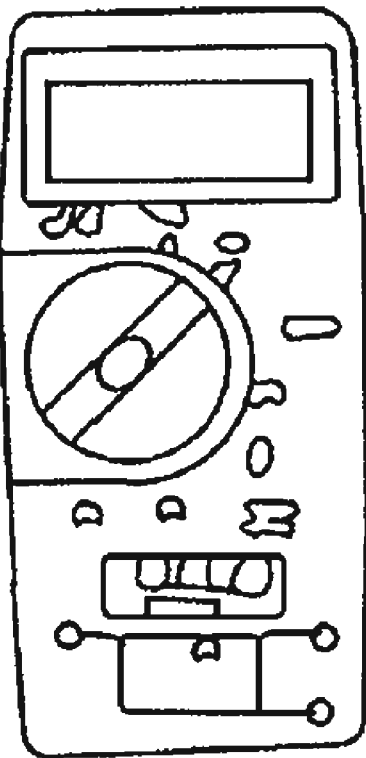
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**ST2332-A**

Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

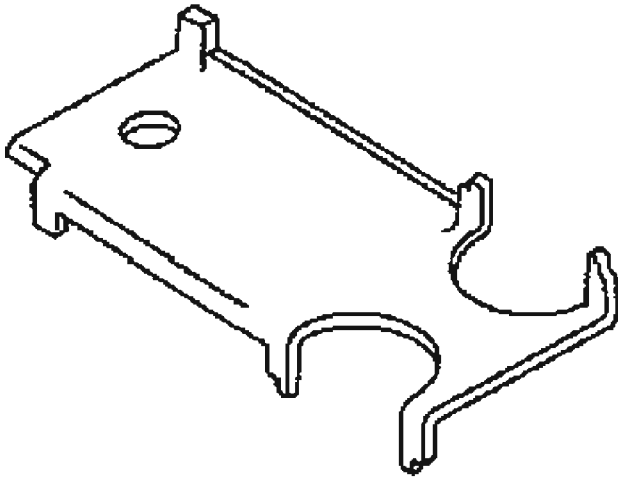


**ST1137-A**

73 III Digital Multimeter 105-R0057 or equivalent

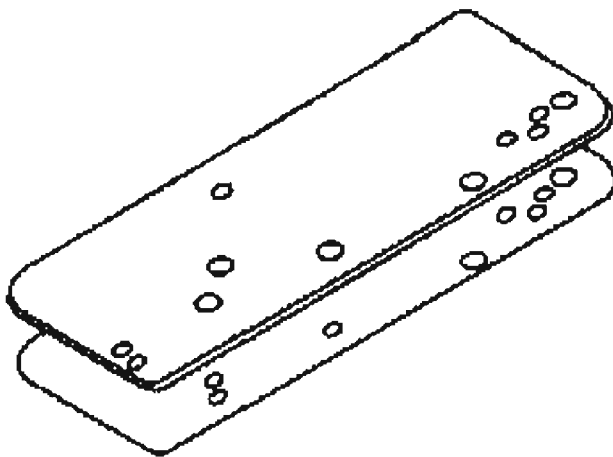
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**ST1633-A**

Alignment Gauge, TR Sensor 307-351 (T97L-70010-A)

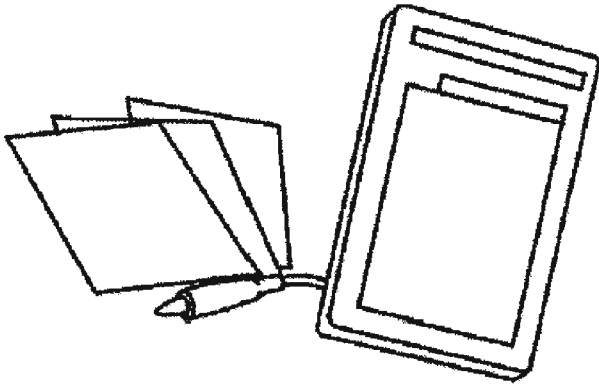


**ST1801-A**

Air Test Plate, Transmission 307-301 (T94P-77000-S)

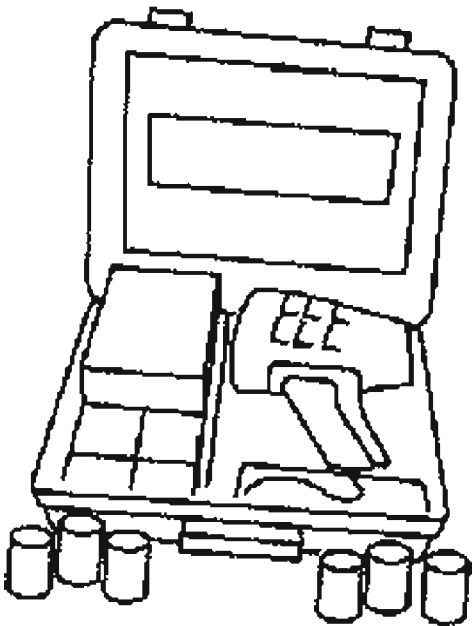
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Transmission Tester 307-F016 (007-00130) or equivalent

**ST1389-A**



12 Volt UV Spot Lamp 164-R0751 or equivalent

**ST1300-A**

Diagnosing an electronically controlled automatic transaxle is simplified by using the following procedures. One of the most important things to remember is that there is a definite procedure. Do not take short cuts or assume that critical checks or adjustments have already been made. Follow the procedures as written to avoid missing critical components or steps. By following the diagnostic sequence, the repair technician will be able to diagnose

and repair the concern the first time.

#### On-Board Diagnostics With Diagnostic Tool

**NOTE:** For detailed instructions and other diagnostic methods using the diagnostic tool, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid) or diagnostic tool instruction guide.

**NOTE:** If using a generic diagnostic tool, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid) article diagnostic tool instruction guide.

The Quick Tests can be used to diagnose the powertrain control module, sensors and actuators of this transaxle.

The following is a guide for using the on-board diagnostic (OBD) Quick Tests and the diagnostic tool.

- Quick Test 1.0 - Visual Inspection
- Quick Test 2.0 - Set Up
- Quick Test 3.0 - Key On/Engine Off
- Quick Test 4.0 - Continuous Memory
- Quick Test 5.0 - Key On/Engine Running
- Special Test Mode
  - Wiggle Test Mode
  - Output Test Mode
- PCM Reset Mode
- Clearing DTCs
- OBD II Drive Cycle
- Other Diagnostic Tool Features

For additional information on other diagnostic testing features using the diagnostic tool, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid). Other diagnostic methods include the following:

- Parameter identification (PID) access mode, used to monitor sensors and actuators.
- Freeze frame data access mode, used to view emission-related data values from specific PIDs

- Oxygen sensor monitor mode, used to monitor the oxygen sensor.

## OUTPUT STATE CONTROL (OSC) MODE

**NOTE:** Retrieve continuous codes and carry out a KOEO & KOER On-Demand Self Test before using output state control (OSC). Any diagnostic trouble codes (DTCs) related to the transmission range (TR) sensor, output shaft speed (OSS) sensor or the vehicle speed sensor (VSS) must be fixed first or the powertrain control module (PCM) will not allow the OSC to operate.

OSC on the scan tool allows the technician to easily and quickly control the main functions and components of this transmission. OSC is used to help test the electrical, hydraulic or mechanical concerns related to the transmission. The scan tool also provides PID information, along with the OSC functions, to accurately diagnose the transmission. For example, OSC allows the technician to shift the transmission, engage the converter clutch, or command line pressure or turn a solenoid off and on. OSC has 2 menus for operation, the BENCH mode and the DRIVE mode.

### OSC - Bench Mode

The BENCH mode is functional only when the gear selector is in PARK or NEUTRAL. The BENCH mode may be used when the engine is either ON (running) or OFF. The BENCH mode allows the technician to function the following components:

- SS1 - Directs PCM to command Shift Solenoid A OFF or ON
- SS2 - Directs PCM to command Shift Solenoid B OFF or ON
- SSB\_AMP - Directs PCM to command the current to the 3-2 Timing/Coast Clutch Solenoid
- TCC - Directs PCM to command the Torque Converter Solenoid OFF or ON (OFF = 0% duty cycle and ON = 100% duty cycle)
- LINEDSD - Directs PCM to command line pressure to either 50, 75, 100, 125, 150, 175, 200 PSI. The PCM will command the appropriate PCA current to obtain the commanded line pressure.

### SS1, SS2, SSB\_AMP and TCC in Bench Mode

These OSC functions are used to command SS1, SS2, SSB\_AMP and TCC solenoids OFF and ON when carrying out an electrical circuit check.

The OSC functions for parameters SS1, SS2 and TCC allows the technician to choose the following options:

- OFF - Directs PCM to command the solenoid OFF.

- ON - Directs PCM to command the solenoid ON.
- XXX - Cancels OSC command (returns solenoid to normal operation).

The OSC options to control SSB\_AMP for the 3-2 Timing/Coast Clutch Solenoid in BENCH mode are as follows:

- 0 - Commands TCM to control current to zero amps.
- 0.25 - Commands TCM to control current to 1/4 amp or 250 milliamper.
- 0.50 - Commands TCM to control current to 1/2 amp or 500 milliamper.
- 0.75 - Commands TCM to control current to 3/4 amp or 750 milliamper.
- 1 - Commands TCM to control current to 1 amp or 1000 milliamper.
- XXX - Cancels OSC and allows the PCM/TCM normal control of the VFS solenoids.

Controlling the solenoids allows the technician to measure the circuit current using an inductive pickup or to measure the circuit voltage when carrying out electrical tests.

The vehicle requirements for SENDING an OSC value for SS1, SS2, SSB\_AMP or TCC are as follows:

- Key on/engine off or key on/engine running at idle.
- Gear selector in PARK or NEUTRAL.

The vehicle requirements must be met when sending the OSC value for SS1, SS2, SSB\_AMP and TCC solenoids. If the vehicle requirements are not met when sending the OSC value, an ERROR MESSAGE will appear. When the ERROR MESSAGE is received, OSC is aborted and must be restarted. After sending the OSC value, if the vehicle requirements are no longer met the ERROR MESSAGE will not appear but the OSC value will be canceled by the PCM (monitoring corresponding PID). The OSC value XXX may be sent anytime to cancel OSC.

#### **LINEDSD in Bench Mode**

The LINEDSD in BENCH mode may be used when carrying out an electrical check on the EPC solenoid or used to test the functionality of the transmission's electronic control of the line pressure. When testing the EPC for controlling the line pressure the technician is required to run the engine greater than 1500 rpm. The hookup of a hydraulic pressure gauge is required to actually test whether the transmission line pressure is correct. This will test whether the hydraulic pump, the pressure regulator and the EPC solenoid and other associated mechanical and hydraulic components are working properly.

The line pressure may be commanded between 60 psi and 180 psi. When carrying out an electrical test on the EPC solenoid, set LINEDSD to 180 psi to command the EPC solenoid OFF and 75 psi to command the PCA solenoid ON. Commanding the 180 psi may not

electrically turn the pressure solenoid completely off and commanding 75 psi may not electrically turn the pressure solenoid completely on.

The OSC functions for the parameter LINEDSD allows the technician to choose the following options:

- 75 - Directs PCM to command line pressure to 75 psi.
- 100 - Directs PCM to command line pressure to 100 psi.
- 125 - Directs PCM to command line pressure to 125 psi.
- 150 - Directs PCM to command line pressure to 150 psi.
- 175 - Directs PCM to command line pressure to 175 psi.
- XXX - Cancels OSC command line pressure (returns to normal operation).

The vehicle requirements for sending an OSC value for LINEDSD in BENCH mode is as follows:

- Key on/engine off or key on/engine running (engine speed greater than 1500 rpm).
- Gear selector in PARK or NEUTRAL.

The vehicle requirements must be met when sending the OSC value for PCA. If the vehicle requirements are not met when sending the OSC value, an ERROR MESSAGE will appear. When the ERROR MESSAGE is received, OSC is aborted and must be restarted. After the OSC value for PCA is sent, if the vehicle requirements are no longer met the ERROR MESSAGE will not appear but the OSC value will be canceled by the PCM (monitoring corresponding PID). The OSC value XXX may be sent anytime to cancel OSC.

#### **OSC - Drive Mode**

The DRIVE mode allows control of 2 transmission functions. Each OSC function has a unique set of vehicle operating requirements that the technician is required to meet before he/she is allowed to operate OSC. The recommended procedure, when using the DRIVE mode, is to command one parameter at a time. The DRIVE mode allows the technician to control the following OSC functions on the transmission:

- OSCGEAR - Directs the PCM to upshift or down shift.
- OSCTCC - Directs the PCM to engage or disengage the torque converter clutch.

#### **OSCGEAR in Drive Mode**

This OSC function is used to test the transmission gear changes. The advantage of using OSC for changing gears is to allow the technician to easily test a specific gear and/or upshift or down shift that has been identified as the customer complaint. When using the OSC to command a shift change, the PCM should command the correct or normal pressure for that shift. The transmission will remain in the gear that OSC has commanded until OSC

commands another gear or OSC is cancelled.

The OSC functions for the OSCGEAR parameter allow the technician to choose the following options:

- 1 - Directs PCM to command 1st gear.
- 2 - Directs PCM to command 2nd gear.
- 3 - Directs PCM to command 3rd gear.
- 4 - Directs PCM to command 4th gear.
- XXX - Cancels OSC command for GEAR (returns to normal operation).

The vehicle requirements must be met when sending the OSC value for GEAR. If the vehicle requirements are not met when sending the OSC value, an ERROR MESSAGE will appear. When the ERROR MESSAGE is received, OSC is aborted and must be restarted. After the OSC value for GEAR is sent, if the vehicle requirements are no longer met the ERROR MESSAGE will not appear but the OSC value will be canceled by the PCM (monitoring corresponding PID). The OSC value XXX may be sent anytime to cancel OSC.

It is recommended to use the OSCTCC parameter in OSC to first turn off the converter clutch when testing the transmission gear changes. This will allow the technician to evaluate just the gear changes. If the torque converter clutch is not turned off, then the PCM may command the torque converter clutch to engage during a shift. This could make it more difficult for the technician to determine whether a bad shift is the result of the torque converter engaging or the actual gear change.

The vehicle requirements for SENDING a OSCGEAR value is as follows:

- Engine is running
- Gear selector is in (D)
- Vehicle speed is greater than 3 km/h (2 mph)
- Vehicle speed must be lower than 48 km/h (30 mph) to command a downshift to 1st gear
- Vehicle speed must be lower than 96 km/h (60 mph) to command a downshift to 2nd gear
- Vehicle speed must be lower than 145 km/h (90 mph) to command a downshift to 3rd gear
- Vehicle speed must be greater than 48 km/h (30 mph) to command an upshift to 4th gear

#### **OSCTCC in Drive Mode**

This function is used to test whether the torque converter clutch is locking and unlocking correctly.



The OSC functions for the TCC parameter allows the technician to choose the following:

- ON - Commands TCC solenoid ON (100% duty cycle) to engage the converter clutch.
- OFF - Commands TCC solenoid OFF (0% duty cycle) to disengage the converter clutch.
- XXX - Cancels OSC for TCC (returns to normal operation)

The vehicle requirements must be met when sending the OSC value for TCC. If the vehicle requirements are not met when sending the OSC value, an ERROR MESSAGE will appear. When the ERROR MESSAGE is received, OSC is aborted and must be restarted. After the OSC value for TCC is sent, if the vehicle requirements are no longer met the ERROR MESSAGE will not appear but the OSC value will be canceled by the PCM (monitoring corresponding PID). The OSC value XXX may be sent anytime to cancel OSC.

The vehicle requirements for SENDING the OSCTCC value OFF is as follows:

- Engine is running
- Gear selector is in Overdrive
- Vehicle speed is greater than 3 km/h (2 mph)

The vehicle requirements for SENDING the OSCTCC value ON is as follows:

- Engine is running
- Gear selector is in (D)
- Vehicle speed is greater than 3 km/h (2 mph)
- Transmission fluid temperature (TFT) is between 16°C (60°F) and 116°C (240°F)
- Brake is off when vehicle speed is below 32 km/h (20 mph)
- Not an excessive load on the engine
- Not during an upshift or downshift
- Engine speed is greater then 1,500 rpm

#### Using Output State Control (OSC) and Monitoring PIDs

To confirm that the OSC value was sent by the scan tool and the PCM has accepted the OSC command, a corresponding PID for each OSC parameter must be monitored. After sending the OSC value, the corresponding PID value should be the same as the OSC value. Additional PIDS should be monitored to help the technician accurately diagnose the transmission. The following is a list of PIDs to monitor while using OSC.

#### OSC PARAMETER REFERENCE

OSC Parameter	Corresponding PID	Additional PIDs

**2005 Ford Escape**

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SS1	SS1	SS1F
SS2	SS2	SS2F
TCC	TCC	TCCF
SSB_AMP	SSB_AMP	SSPCB
LINEDSD	LINEDSD	PCA, PCA_AMP, SSPCB-F
OSCTCC	OSCTCC	TCC, TCCF, TCCCMD, TCCACT
OSCGEAR	OSCGEAR	GEAR, TP, RP, TSS, OSS, TR, TF, TRANRAT and VS

**PID DESCRIPTION**

<b>PID Name</b>	<b>PID Description</b>
PCA	Electronic pressure control commanded pressure (not actual) - PSI
GEAR	GEAR commanded state (not actual) - 1st, 2nd, 3rd or 4th
LINEDSD	Line pressure commanded (not actual)
OSS	Output shaft speed sensor input - RPM
RPM	Engine speed sensor input - RPM
SS1	Shift solenoid A commanded state (not actual) - ON or OFF
SS2	Shift solenoid B commanded state (not actual) - ON or OFF
SS1F	Shift solenoid A circuit fault - YES or NO
SS2F	Shift solenoid B circuit fault - YES or NO
TCCACT	Torque converter clutch slippage (engine speed minus turbine speed) - RPM
TCCCMD	Torque converter clutch solenoid commanded state - duty cycle
TCCF	Torque converter clutch solenoid circuit fault - YES or NO
TFT	Transmission fluid temperature - °F or voltage
TP	Throttle position - voltage
TR	Transmission range sensor - PARK, REVERSE, NEUTRAL, (D), etc.
TRANRAT	Actual transmission gear ratio - numeric ratio indicated.
TSS	Turbine shaft speed sensor input - RPM
VS	Vehicle speed sensor input - MPH

**TRANSAXLE DRIVE CYCLE TEST**

**NOTE:** The Transaxle Drive Cycle Test must be carried out exactly. Faults have to occur consecutively for codes P0731, P0732, P0733 and P0734 to be set, and 5 times consecutively for continuous codes P0741 and P1741.

**NOTE:** When carrying out the Transaxle Drive Cycle Test, refer to the SOLENOID OPERATION CHART for correct solenoid operation.

**For additional information, refer to PINPOINT TESTS - NON OSC EQUIPPED VEHICLE.**

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With transaxle in (D) position, press transmission control switch (TCS) (LED lamp should illuminate) and moderately accelerate from a stop to 64 km/h (40 mph). This allows the transaxle to shift into 3rd gear. Hold the speed and throttle opening steady for a minimum of 15 seconds (30 seconds above an altitude of 4000 feet above sea level).
5. Press TCS (LED lamp should turn off) and accelerate from 64 km/h (40 mph) to 80 km/h (50 mph). This allows the transaxle to shift into 4th gear. Hold the speed and throttle opening steady for a minimum of 15 seconds.
6. With the transaxle in 4th gear and maintaining steady speed and throttle opening, lightly apply brake pedal (to operate stop lamps). Then hold the speed and throttle steady for an additional 5 seconds (minimum).
7. Brake to a stop and remain stopped for a minimum of 20 seconds.
8. Repeat Steps 4 through 6 at least 5 times.
9. Carry out Quick Test and record continuous codes.

**DIAGNOSTIC TROUBLE CODE (DTC) CHARTS**

**DIAGNOSTIC TROUBLE CODE CHART**

Four-Digit DTC	Component	Description	Condition	Symptom	Action
P1116	ECT	ECT out of self-test range.	ECT temperature higher or lower than expected during KOEO and KOER.	Rerun self-test at normal operating temperature.	Refer to <b>INTRODU - GASOLIN</b> article for E (gasoline) a Mariner or <b>INTRODU HYBRID I</b> article for E (Hybrid).
		ECT indicates 125°C	ECT temperature higher or lower than	Torque converter clutch will	Refer to <b>INTRODU - GASOLIN</b> article for E (gasoline) a

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P0117	ECT	(254°F).	expected during KOEO and KOER.	always be off, resulting in poor fuel economy.	Mariner or <b>INTRODU HYBRID I</b> article for E (Hybrid).
P0118	ECT	ECT indicates -40°C (-40°F).	ETC temperature higher or lower than expected during KOEO and KOER.	Torque converter clutch will always be off, resulting in poor fuel economy.	Refer to <b>INTRODU - GASOLI</b> article for E (gasoline) a Mariner or <b>INTRODU HYBRID I</b> article for E (Hybrid).
P1124	TP	TP voltage high/low for self-test.	TP was not in the correct position for self-test.	Rerun at appropriate TP position per application.	Refer to <b>INTRODU - GASOLI</b> article for E (gasoline) a Mariner or <b>INTRODU HYBRID I</b> article for E (Hybrid).
P0122, P0123, P1120, P1121, P1125	TP	TP fault codes.	Processor assembly has detected an error. This error may cause a transaxle concern. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION-HYBRID ESCAPE</b> article for Escape (Hybrid) for diagnosis.	Harsh engagements, firm shift feel, abnormal shift schedule, torque converter clutch does not engage. Torque converter clutch cycling.	Processor a has detected error. This e may cause a transaxle cc Refer to <b>INTRODU - GASOLI</b> article for E (gasoline) a Mariner or <b>INTRODU HYBRID I</b> article for E (Hybrid).
			MAF system has a fault which may	Incorrect shift	Refer to

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P0102, P0103, P1100, P1101	MAF	MAF fault codes.	cause a transaxle concern. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION-HYBRID ESCAPE</u></b> article for Escape (Hybrid) for diagnosis.	schedule, high/low EPC pressure. Incorrect converter engagement scheduling, symptoms similar to a TPS failure.	<b><u>INTRODUCTION - GASOLINE</u></b> article for E (gasoline) a Mariner or <b><u>INTRODUCTION-HYBRID ESCAPE</u></b> article for E (Hybrid) for diagnosis.
P0300, P0308, P0320, P0340, P1351, P1364	El System	El system fault codes.	Ignition system has a fault which may cause a transaxle concern. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION-HYBRID ESCAPE</u></b> article for Escape (Hybrid) for diagnosis.	Engine fault, no torque converter engagement, late WOT shifts.	Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for E (gasoline) a Mariner or <b><u>INTRODUCTION-HYBRID ESCAPE</u></b> article for E (Hybrid).
P1705	TR	TR not in PARK.	Self-test not run in PARK.	Rerun self-test in PARK.	GO to <b><u>PIN TEST D.</u></b>
P1703	BPP	Brake not actuated during self-test.	Brake not cycled during KOER.	Failed on or not connected - converter clutch will not engage at less than 1/3 throttle.	Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for E (gasoline) a Mariner or <b><u>INTRODUCTION-HYBRID ESCAPE</u></b> article for E (Hybrid).
			Brake pedal position	Failed off - converter clutch will	Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for E

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P1703	BPP	BPP switch circuit failed.	switch circuit failure.	not disengage when brake is applied.	(gasoline) a Mariner or <b><u>INTRODU HYBRID I</u></b> article for E (Hybrid).
P1460	A/C	A/C switch error.	A/C or defrost on condition may result from A/C clutch being on during quick test.	Failed ON - EPC pressure slightly low with A/C off. Failed off - EPC pressure slightly low with A/C on.	Refer to <b><u>INTRODU - GASOLI</u></b> article for E (gasoline) a Mariner or <b><u>INTRODU HYBRID I</u></b> article for E (Hybrid).
P0962, P0748	EPC	EPC solenoid circuit failure, shorted to ground.	Voltage through EPC solenoid is checked and compared to a voltage through solenoid after a time delay. An error will be noted if tolerance is exceeded. KOEO and continuous self-test.	Short to ground: limit engine torque (partial fuel shut-off, heavy misfire). Minimum line pressure.	GO to <b><u>PINI TEST E.</u></b>
P0960 (1)	EPC	EPC solenoid circuit failure, open circuit.	Voltage through EPC solenoid is checked and compared to a voltage through solenoid after a time delay. An error will be noted if tolerance is exceeded. KOEO and continuous self-test.	Open circuit - causes maximum EPC pressure, harsh engagements and shifts.	GO to <b><u>PINI TEST E.</u></b>
				Harsh shifts. Incorrect gear selection depending on	

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P0731 (2)	SSA, SSB, or internal parts	1st gear failure.	No 1st gear.	condition mode and manual lever position: see <b><u>SOLENOID ON/OFF CHART.</u></b> Shift errors may also be due to other internal transaxle concerns (such as stuck valves, damaged friction material).	GO to <b><u>PIN1 TEST A.</u></b>
P0732 (2)	SSA, SSB, or internal parts	2nd gear failure.	No 2nd gear.	Harsh shifts. Incorrect gear selection depending on condition mode and manual lever position: see <b><u>SOLENOID ON/OFF CHART.</u></b> Shift errors may also be due to other internal transaxle concerns (such as stuck valves, damaged friction material).	GO to <b><u>PIN1 TEST A.</u></b>
				Harsh shifts. Incorrect	

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P0733 (2)	SSA, SSB, or internal parts	3rd gear failure.	No 3rd gear.	gear selection depending on condition mode and manual lever position: see <b><u>SOLENOID ON/OFF CHART.</u></b> Shift errors may also be due to other internal transaxle concerns (such as stuck valves, damaged friction material).	GO to <b><u>PIN1 TEST A.</u></b>
P0734 (2)	SSA, SSB or internal parts	4th gear failure.	No 4th gear.	Harsh shifts. Incorrect gear selection depending on condition mode and manual lever position: see <b><u>SOLENOID ON/OFF CHART.</u></b> Shift errors may also be due to other internal transaxle concerns (such as stuck valves, damaged friction material).	GO to <b><u>PIN1 TEST A.</u></b>



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P1780	TCS	Transmission control switch not changing states during self-test.	Transmission control switch not cycled during self-test. Circuit open or shorted.	No overdrive cancel when switch is cycled.	Rerun self-test cycle switch to <b>INTRODU - GASOLI</b> article for E (gasoline) a Mariner or <b>INTRODU HYBRID I</b> article for E (Hybrid).
P0707	TR	TR out of range. Shorted circuit or sensor.	TR sensor, circuit or powertrain control module shorted to ground.	Harsh shifts or engagements.	GO to <b>PINI TEST D.</b>
P0708	TR	TR out of range. Open circuit or sensor.	TR sensor, circuit or powertrain control module indicate open.	Harsh shifts or engagements.	GO to <b>PINI TEST D.</b>
P1702	TR	Transmission range sensor circuit.	Transmission range sensor circuit intermittent.	Harsh shifts or engagements.	GO to <b>PINI TEST D.</b>
P0966 (1)	3-2T/CCS	3-2T/CCS solenoid circuit failure - short.	3-2T/CCS circuit fails to provide voltage drop across solenoid. Circuit shorted during self-test.	Failed on - no engine braking (except in (D)), delayed 3-2 downshifts.	GO to <b>PINI TEST G.</b>
P0964 (1)	3-2T/CCS	3-2T/CCS solenoid circuit failure - open.	3-2T/CCS circuit fails to provide voltage drop across solenoid. Circuit open or processor drive circuit failure during self-test.	Failed off - engine braking in second/third gears, firm or flared 3-2 downshifts. Harsh 4-3 downshifts.	GO to <b>PINI TEST G.</b>
P1742, P1743	TCC	TCC solenoid failed	TCC solenoid has failed ON or OFF by electrical,	Harsh shifts or engagements. Engine RPM	GO to <b>PINI</b>

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(3)		ON or OFF.	mechanical or hydraulic concern.	higher or lower than expected.	<b>TEST C.</b>
P0743 (1), P0740 (3)	TCC	Torque converter clutch solenoid circuit failure, open or shorted.	TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open, shorted or processor drive failure.	Harsh shifts or engagements. Engine RPM higher or lower than expected.	GO to <b>PIN1</b> <b>TEST C.</b>
P1744, P0741 (3)	TCC	TCC function check.	Excessive slip detected during full TCC engagement.	Harsh shifts or engagements. Engine RPM higher or lower than expected.	GO to <b>PIN1</b> <b>TEST C.</b>
P0750 (1), P0753 (3)	SSA	SSA solenoid circuit failure, open or shorted.	Solenoid A circuit failed to provide voltage drop across solenoid. Circuit open or shorted or processor driver failure during self-test.	Incorrect gear selection depending on condition mode and manual lever position.	See the <b>SOLENOID OPERATING CHART</b> , re <b>PINPOINT - NON OSCILLATION EQUIPMENT VEHICLE PINPOINT A.</b>
P1714	SSA	SSA fault.	Mechanical failure of the solenoid detected.	Incorrect gear selection depending on condition, mode and manual lever position.	See the <b>SOLENOID OPERATING CHART</b> , re <b>PINPOINT - NON OSCILLATION EQUIPMENT VEHICLE PINPOINT H.</b>
P1715	SSB	SSB fault.	Mechanical failure of the solenoid detected.	Incorrect gear selection depending on condition,	See the <b>SOLENOID OPERATING CHART</b> , re <b>PINPOINT - NON OSCILLATION EQUIPMENT VEHICLE PINPOINT H.</b>

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				mode and manual lever position.	<b><u>EQUIPPEI</u></b> <b><u>VEHICLE</u></b> <b><u>PINPOINT</u></b> <b><u>H.</u></b>
P0755 (1), P0758 (3)	SSB	SSB solenoid circuit failure, open or shorted.	Solenoid B circuit failed to provide voltage drop across solenoid. Circuit open or shorted or processor driver failure during self-test.	Incorrect gear selection depending on condition mode and manual lever position.	See the <b><u>SOLENOID OPERATING CHART</u></b> , re <b><u>PINPOINT - NON OSC</u></b> <b><u>EQUIPPEI</u></b> <b><u>VEHICLE</u></b> <b><u>PINPOINT</u></b> <b><u>A.</u></b>
P0721	OSS	OSS signal noisy.	PCM has detected a noisy OSS sensor signal.	Harsh shifts, abnormal shift schedule operation.	GO to <b><u>PINPOINT TEST F.</u></b>
P0720	OSS	Insufficient input from OSS sensor.	PCM has detected a loss of OSS signal during operation.	Harsh shift, abnormal shift schedule operation.	GO to <b><u>PINPOINT TEST F.</u></b>
P0722	OSS	OSS signal intermittent.	PCM has detected an intermittent OSS signal.	Harsh shift, abnormal shift schedule operation.	GO to <b><u>PINPOINT TEST F.</u></b>
P0717	TSS	Turbine shaft speed sensor circuit - signal.	PCM has detected NO TSS signal.	Possible harsh shifts, converter locks, or engagements.	GO to <b><u>PINPOINT TEST F.</u></b>
P0715	TSS	Insufficient input from turbine speed sensor.	PCM detected a loss of TSS signal during operation.	No torque converter engagements or harsh shifts. No 4th gear operation and engine braking in	GO to <b><u>PINPOINT TEST F.</u></b>

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				2nd and 3rd gear.	
P0718	TSS	Turbine shaft speed sensor circuit intermittent.	PCM has detected a noisy TSS signal.	Possible harsh shifts, converter locks or engagements.	GO to <b><u>PINI TEST F.</u></b>
P0711	TFT	Transmission Temperature sensor in range failure.	The PCM has detected no change in TFT during normal operation.	Substitute ECT temperature reading.	GO to <b><u>PINI TEST B.</u></b>
P0712	TFT	150°C (302°F) indicated TFT sensor circuit grounded.	Voltage drop across TFT sensor exceeds temperature of 150°C (302°F).	Incorrect torque converter clutch operation. Incorrect EPC pressure control.	GO to <b><u>PINI TEST B.</u></b>
P0713	TFT	-40°C (-40°F) indicated TFT sensor circuit open.	Voltage drop across TFT sensor exceeds scale set for temperature -40°C (-40°F).	Incorrect torque converter clutch operation. Incorrect EPC pressure control.	GO to <b><u>PINI TEST B.</u></b>
P1711	TFT	TFT out of ST range.	Transaxle not at operating temperature during self-test.	Warm or cool transaxle to normal operating temperature.	GO to <b><u>PINI TEST B.</u></b>
P1783	TFT	Transmission overtemp condition indicated.	Transmission fluid temperature exceeded 127°C (270°F).	Increased line pressure.	GO to <b><u>PINI TEST B.</u></b>
P1636	Inductive signature	Inductive signature clip communication.	PCM has detected an internal error.	-	Refer to <b><u>INTRODU - GASOLI</u></b> article for E (gasoline) a Mariner or

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	clip				<b>INTRODU</b> <b>HYBRID I</b> article for E (Hybrid).
P1782	P/E switch	Performance/economy switch circuit out of self-test range (if equipped).	P/E switch not cycled during self- test or shorted/opened.	No change in states when cycled.	Rerun self-t cycle switcl to <b>INTRODU</b> <b>- GASOLI</b> article for E (gasoline) a Mariner or <b>INTRODU</b> <b>HYBRID I</b> article for E (Hybrid).
P1501	VSS	VSS input Out of Self-Test Range.	PCM detected presence of a VSS signal during self- test.	No transmission symptom.	Refer to <b>INTRODU</b> <b>- GASOLI</b> article for E (gasoline) a Mariner or <b>INTRODU</b> <b>HYBRID I</b> article for E (Hybrid).
P0963	EPC	EPC solenoid circuit failure, short circuit to VBAT.	Voltage through EPC solenoid is checked. An error will be noted if tolerance is exceeded.	Short to VBAT: maximum EPC pressure, harsh engagements and shifts. May flash the TCIL.	GO to <b>PINI</b> <b>TEST E.</b>
P0778	3-2 T/CCS solenoid	3-2 T/CCS solenoid or circuit electrical intermittent failures detected.	Voltage through 3- 2T/CCS solenoid and circuit are checked. An error will be noted if tolerance is exceeded.	May flash the TCIL.	GO to <b>PINI</b> <b>TEST G.</b>

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P0967	3-2 T/CCS solenoid	3-2 TCCS solenoid circuit failure, short circuit to VBAT.	Voltage through 3-2T/CCS solenoid and circuit are checked. An error will be noted if tolerance is exceeded.	May flash the TCIL.	GO to <b><u>PINI TEST G.</u></b>
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(1) Output circuit check, generated only by electrical symptoms.

(2) May also be generated by some other non-electric transaxle hardware system.

(3) The TCIL code will set on the first fault occurrence. On the second fault occurrence plus second power up, the MIL and TCIL will illuminate.

### ROTUNDA TRANSMISSION TESTER

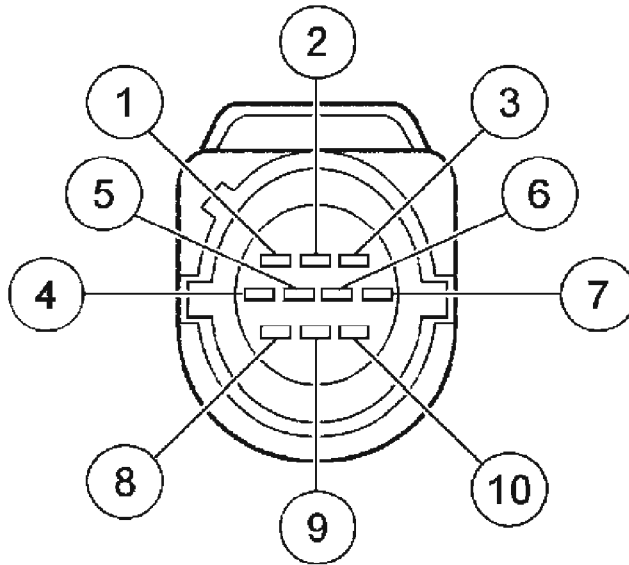
The Rotunda Transmission Tester is used to diagnose electronically controlled transaxle and is used in conjunction with the pinpoint tests. The tests should be carried out in order. Installing the Rotunda Transmission Tester allows separation of the vehicle electronics and the transaxle electronics. Refer to the Rotunda Transmission Tester manual for these tests.

- Bench Testing - Engine Off
- Resistance/Continuity Test
- Solenoid Voltage Test
- Dynamic Testing - Engine On
- EPC Solenoid
- Transaxle Engagement
- Upshifts/Downshifts
- Torque Converter Clutch (TCC) Engagement
- Coast Clutch Engagement
- Turbine Shaft Speed (TSS) Sensor
- Output Shaft Speed (OSS) Sensor
- Transmission Range (TR) Sensor
- Switch Test - Park/Neutral, Backup Lamp and Optional Circuits

### TRANSAXLE CONNECTOR LAYOUTS

**NOTE:** This vehicle is equipped with a new style powertrain control module. This is a 50-pin control module with 3 separate connectors. One connector for the chassis (C), one for the transaxle (T) and one for the body (B). The pin numbers listed throughout these pinpoint tests will have the letter C and T to

designate the connector.

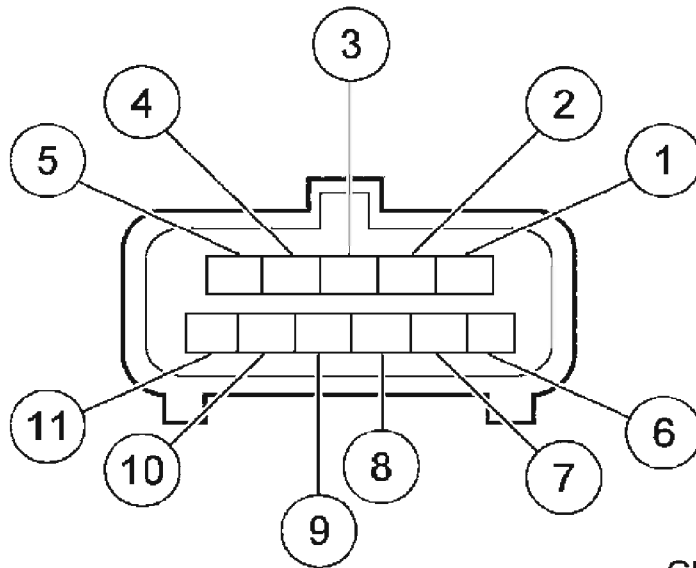


GD1814-A

Pin	Description	PCM Pin Number
1	TCC power	C35, C36
2	Signal return	T41
3	TFT signal	T29
4	SSA signal	T42
5	Solenoid power	C35, C36
6	SSB signal	T43
7	TCC signal	T46
8	EPC signal	T11
9	EPC power	C35, C36
10	3-2 T/CCS signal	T23

**Fig. 9: Identifying Transaxle Vehicle Harness Connector**

Courtesy of FORD MOTOR CO.

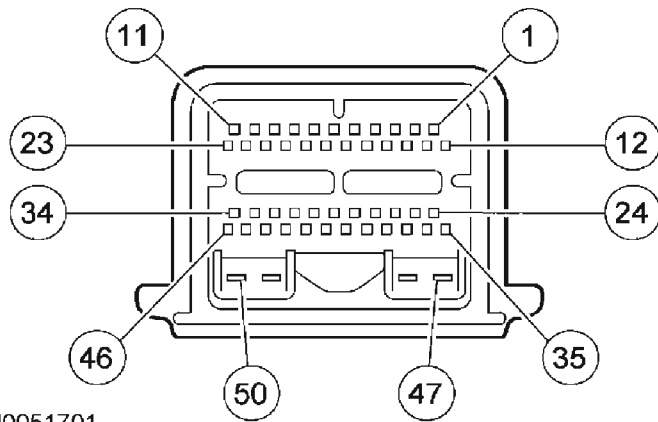


GD1815-A

Pin	Circuit Function	PCM Pin Number
1	Ground	—
2	Overdrive	—
3	Backup lamps	—
4	Starter	—
5	TR sensor signal return	T41
6	Low (L)	—
7	Second (2)	—
8	Neutral (N)	—
9	Starter Relay Coil	—
10	PCM TR sensor signal	T27
11	Park (P)	—

**Fig. 10: Identifying Transmission (TR) Sensor Connector**  
 Courtesy of FORD MOTOR CO.





N0051701

Pin Number	Circuit	Circuit Function
T4	—	Output shaft speed sensor signal
T11	—	EPC signal
T15	—	Turbine shaft speed sensor signal
T23	—	3-2 T/CCS signal
T27	—	PCM TR sensor signal
T29	—	TFT signal
T41	—	TR sensor signal return
T42	—	SSA signal
T43	—	SSB signal
T46	—	TCC signal
C35	—	TCC power, solenoid power, EPC power
C36	—	TCC power, solenoid power, EPC power
C50	—	TSS and OSS signal return

**Fig. 11: Identifying Powertrain Control Module (PCM) Connector**  
Courtesy of FORD MOTOR CO.

## PINPOINT TESTS - NON OSC EQUIPPED VEHICLE

### Solenoid Operation Chart

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

### SOLENOID OPERATION CHART

Transaxle Range Selector Lever Position	PCM Commanded Gear	SSA	SSB	3-2T/CCS	TCC
P/N	-	OFF	ON	ON	OFF
R	-	OFF	ON/OFF	ON	(1)
(D)	1	ON	ON	ON	(1)
	2	OFF	ON	ON	(2)
	3	OFF	OFF	ON	(2)
	4	ON	OFF	ON	(2)
D OD cancelled	1	OFF	ON	OFF	(1)
	2	OFF	ON	OFF	(2)
	3	OFF	OFF	OFF	(2)
2	2	OFF	ON	OFF	(2)
2 <sup>(3)</sup>	3	OFF	OFF	OFF	(2)
1	1	ON	ON	OFF	(1)
1 <sup>(3)</sup>	2	OFF	ON	OFF	(2)
1 <sup>(3)</sup>	3	OFF	OFF	OFF	(2)
<p>(1) Not allowed by hydraulics.</p> <p>(2) Powertrain control module (PCM) commanded.</p> <p>(3) When a manual pull-in occurs above a calibrated speed, the transaxle will not downshift from the higher gear until the vehicle speed drops below this calibrated speed.</p>					

### Shift Solenoid Failure Mode Chart "Always OFF"

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

### SHIFT SOLENOID FAILURE MODE CHART - ALWAYS OFF

SSA Always OFF	Gear Selected Position			
	(D)	D <sup>(1)</sup>	2	1 <sup>(2)</sup>
PCM Gear Commanded	Actual Gear Obtained			
1	2	2	-	2

**2005 Ford Escape**

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape &amp; Mariner

2	2	2	2	2
3	3	3	3	3
4	3	-	-	-
(1) Overdrive canceled				
(2) When a manual pull-in occurs above a calibrated speed, the transaxle will not downshift from the higher gear until the vehicle speed drops below this calibrated speed.				

**SHIFT SOLENOID FAILURE MODE CHART - ALWAYS OFF**

SSA Always OFF	Gear Selected Position			
	(D)	D <sup>(1)</sup>	2	1 <sup>(2)</sup>
PCM Gear Commanded	Actual Gear Obtained			
1	4	2	-	4 <sup>(3)</sup>
2	3	3	3	3
3	3	3	3	3
4	4	-	-	-
(1) Overdrive canceled				
(2) When a manual pull-in occurs above a calibrated speed, the transaxle will not downshift from the higher gear until the vehicle speed drops below this calibrated speed.				
(3) No forward movement.				

**Shift Solenoid Failure Mode Chart "Always ON"**

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

**SHIFT SOLENOID FAILURE MODE CHART - ALWAYS ON**

SSA Always ON	Gear Selected Position			
	(D)	D <sup>(1)</sup>	2	1 <sup>(2)</sup>
PCM Gear Commanded	Actual Gear Obtained			
1	1	1	-	1
2	1	1	1	1
3	4	4	4	4 <sup>(3)</sup>
4 Also No Reverse	4	-	-	-
(1) Overdrive canceled				
(2) When a manual pull-in occurs above a calibrated speed, the transaxle will not				

downshift from the higher gear until the vehicle speed drops below this calibrated speed.

(3) No forward movement.

### SHIFT SOLENOID FAILURE MODE CHART - ALWAYS ON

SSA Always ON	Gear Selected Position			
	(D)	D <sup>(1)</sup>	2	1 <sup>(2)</sup>
PCM Gear Commanded	Actual Gear Obtained			
1	1	1	-	1
2	2	2	2	2
3	2	2	2	2
4	1	-	-	-

(1) Overdrive canceled

(2) When a manual pull-in occurs above a calibrated speed, the transaxle will not downshift from the higher gear until the vehicle speed drops below this calibrated speed.

#### Pinpoint Tests

#### PINPOINT TEST A: SHIFT SOLENOIDS

**NOTE:** Refer to Fig. 9 preceding these pinpoint tests.

#### A1 ELECTRONIC DIAGNOSTICS

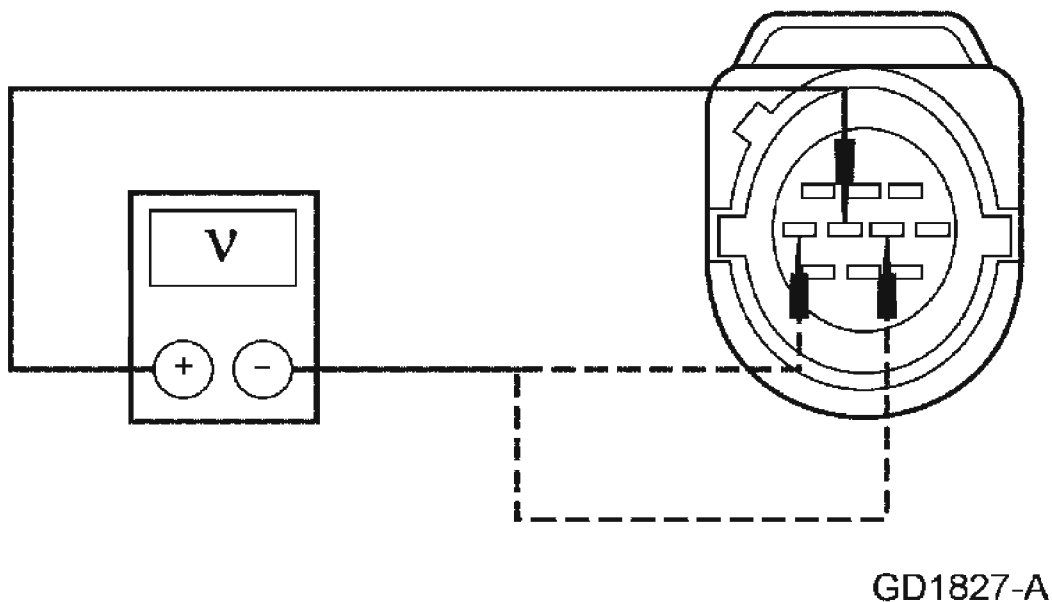
- Key in OFF position.
- Make sure the transaxle vehicle harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Connect the scan tool.
- Key in ON position.
- Carry out KOEO Test until continuous DTCs have been displayed.
- Enter Output Test Mode (OTM). Refer to **ON-BOARD DIAGNOSTICS**.
- Select the mode ALL ON. Push START to turn outputs on. Push STOP to turn outputs off.
- **Does the vehicle enter OTM?**

**Yes :** REMAIN in OTM. GO to A2.

**No :** PRESS START. If vehicle does not enter OTM, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION-HYBRID ESCAPE** article for Escape (Hybrid).

**A2 CHECK ELECTRICAL SIGNAL OPERATION**

- Key in OFF position.
- Disconnect: Transaxle Connector.
- Use a mirror to inspect both ends of the transaxle connector for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Key in ON position.
- Measure the voltage between pin 5 and solenoid circuit pins 4 and 6 at the transaxle vehicle harness connector.



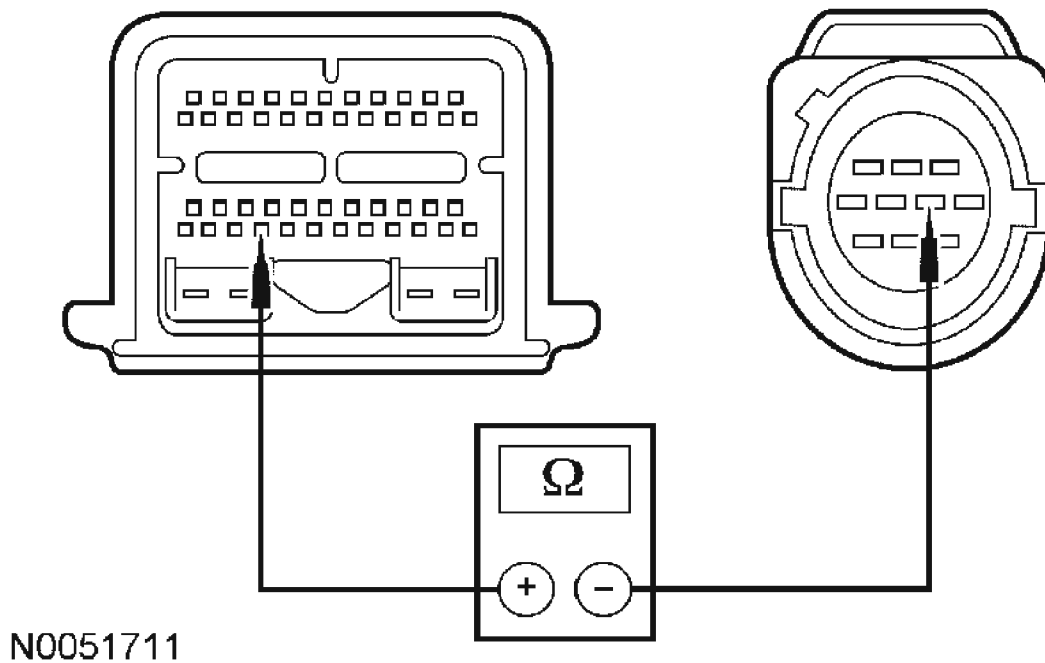
**Fig. 12: Measuring Voltage At Transaxle Vehicle Harness Connector**  
Courtesy of FORD MOTOR CO.

- While observing the VOM, press START and STOP to cycle the solenoid output on and off.
- **Does the suspected solenoid output voltage change at least 0.5 volt?**  
Yes : GO to A5.  
No : GO to A3.

**A3 CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUITS**

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

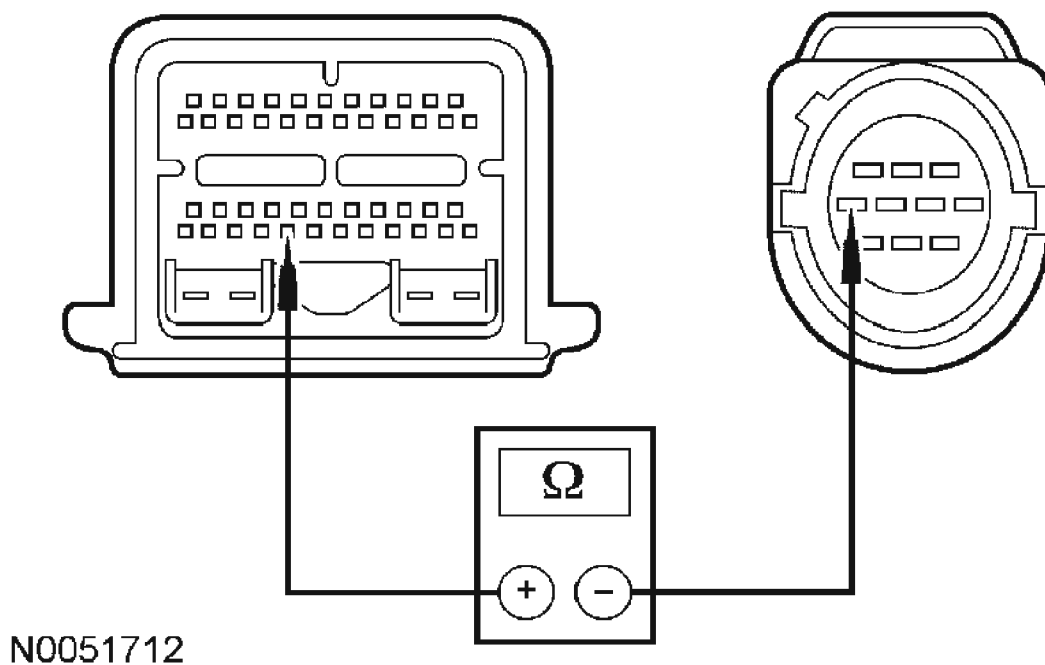
- Inspect for damaged or pushed-out pins, corrosion or loose wires.
- Measure the resistance between the PCM connector pin T43 and the transaxle vehicle harness connector pin 6.



**Fig. 13: Measuring Resistance Between PCM And Transaxle Vehicle Harness Connector**

**Courtesy of FORD MOTOR CO.**

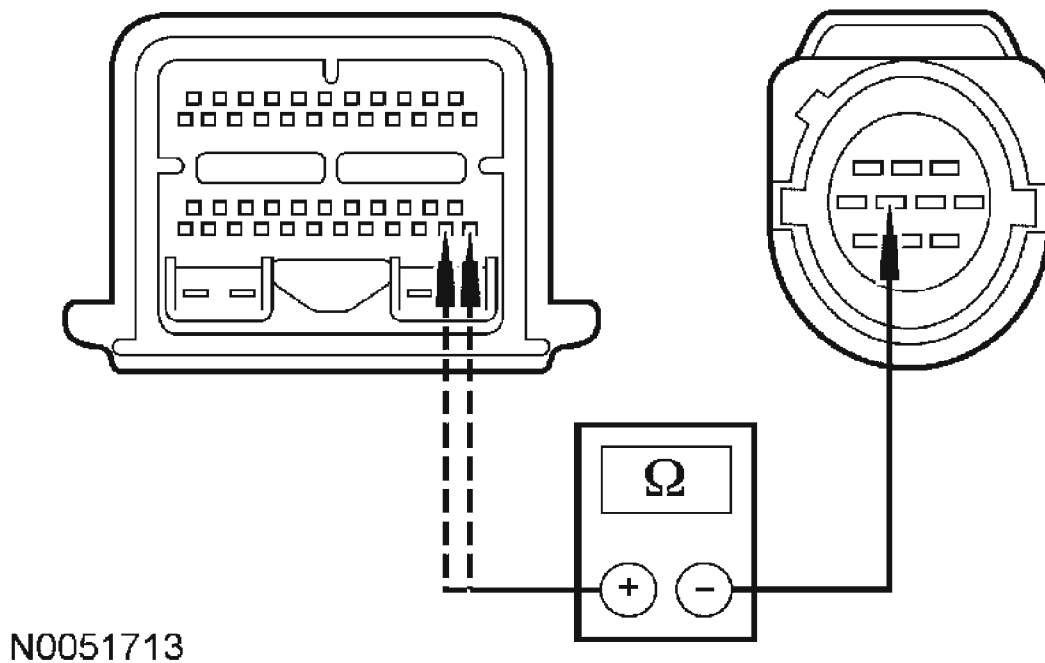
- Measure the resistance between the PCM connector pin T42 and the transaxle vehicle harness connector pin 4.



**Fig. 14: Measuring Resistance Between PCM And Transaxle Vehicle Harness Connector**

**Courtesy of FORD MOTOR CO.**

- Measure the resistance between the PCM connector pins C35 and C36 and the transaxle vehicle harness connector pin 5.



**Fig. 15: Measuring Resistance Between PCM And Transaxle Vehicle Harness Connector**

Courtesy of FORD MOTOR CO.

- Is each resistance less than 5 ohms?

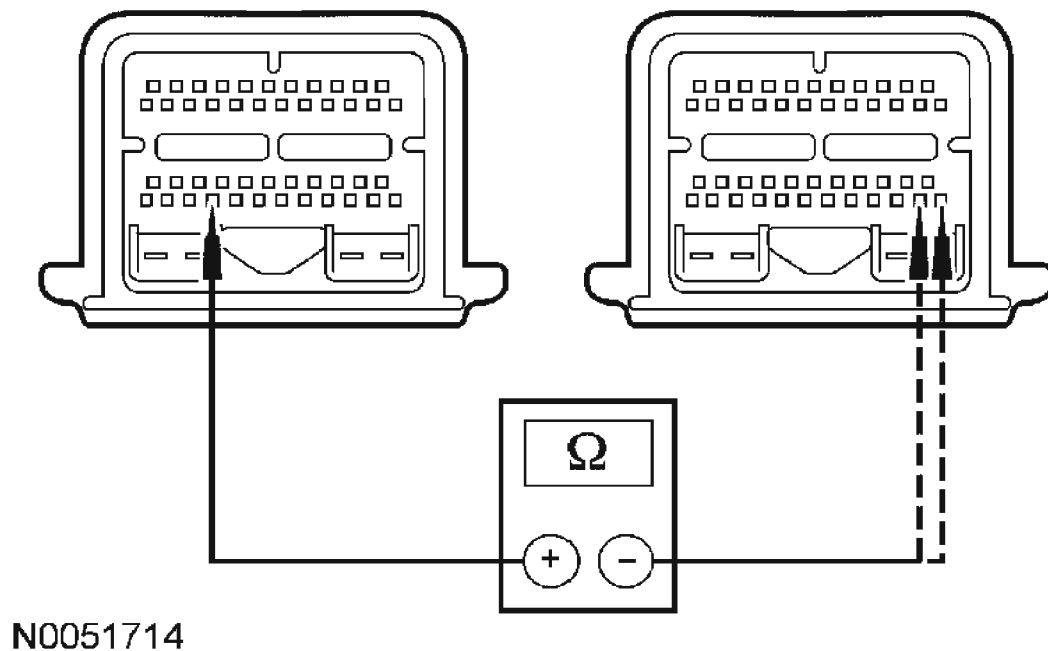
**Yes** : GO to A4.

**No** : REPAIR open circuit(s). RECONNECT all components. RERUN Quick Test.

#### **A4 CHECK SOLENOID HARNESS FOR SHORT TO POWER AND GROUND**

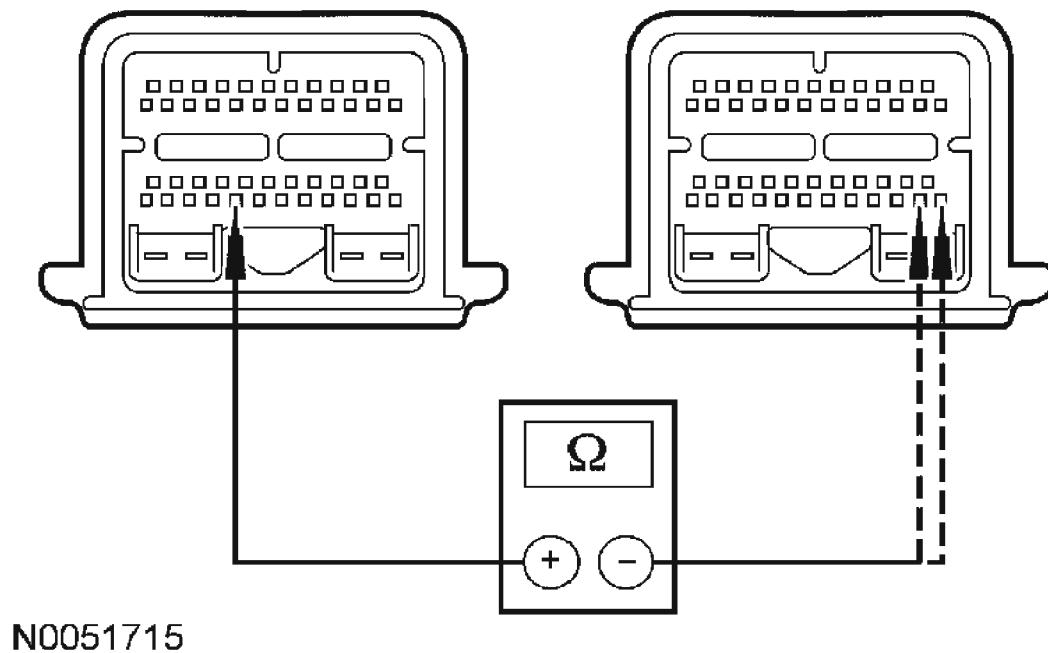
- Measure the resistance between the PCM connector pin T43 and the PCM connector pins C35 and C36.





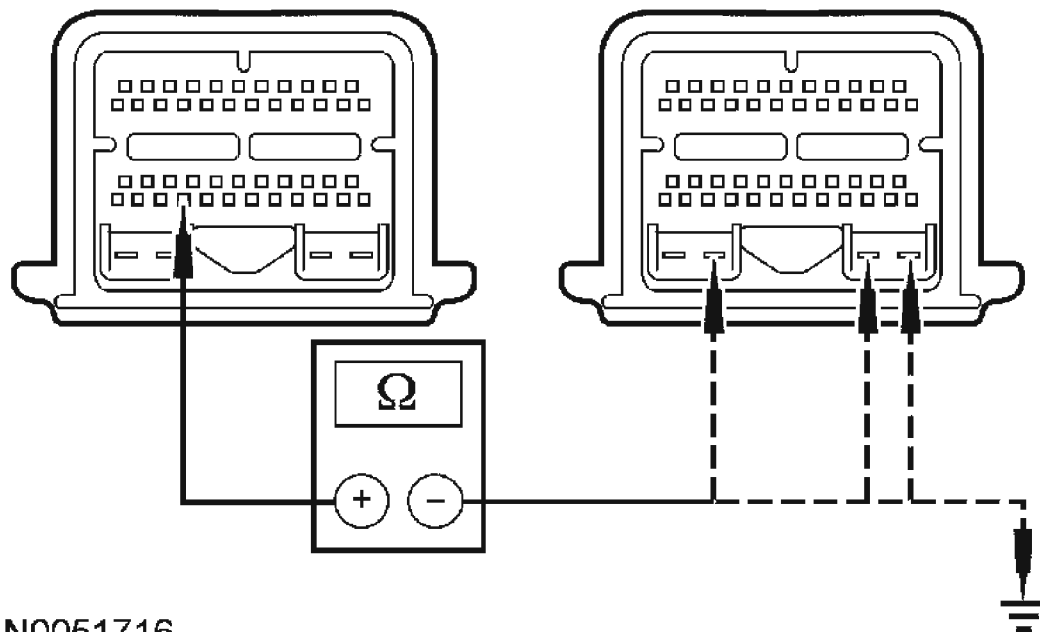
**Fig. 16: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM connector pin T42 and the PCM connector pins C35 and C36.



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

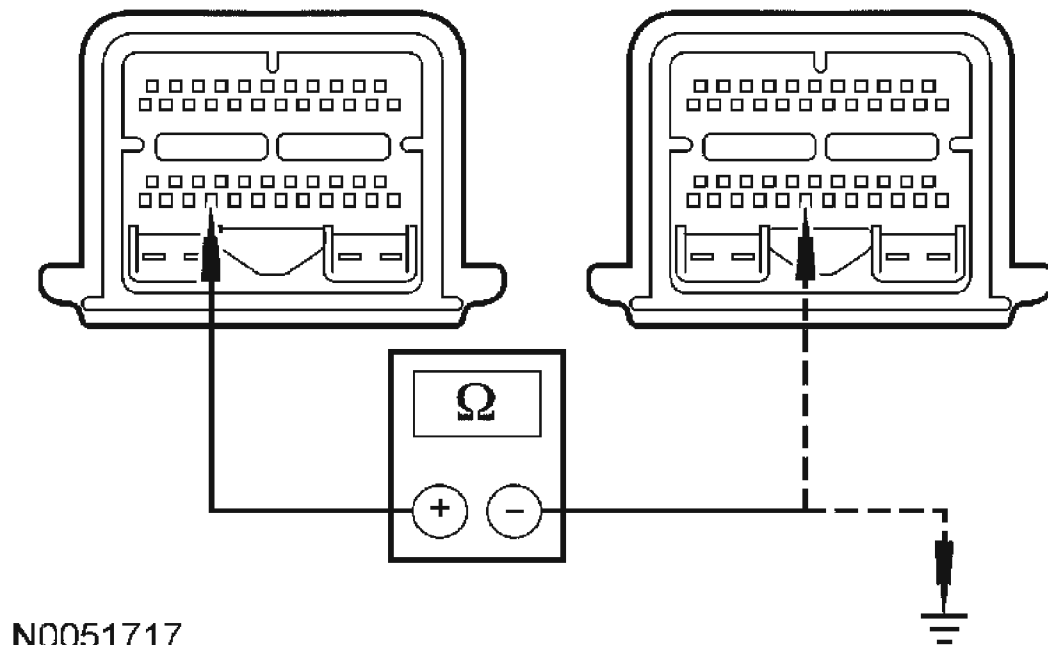
- Measure the resistance between the PCM connector pin T43 and the PCM connector pins C47, C48, C49 and chassis ground.



N0051716

**Fig. 18: Measuring Resistance Between PCM And Ground**  
Courtesy of FORD MOTOR CO.

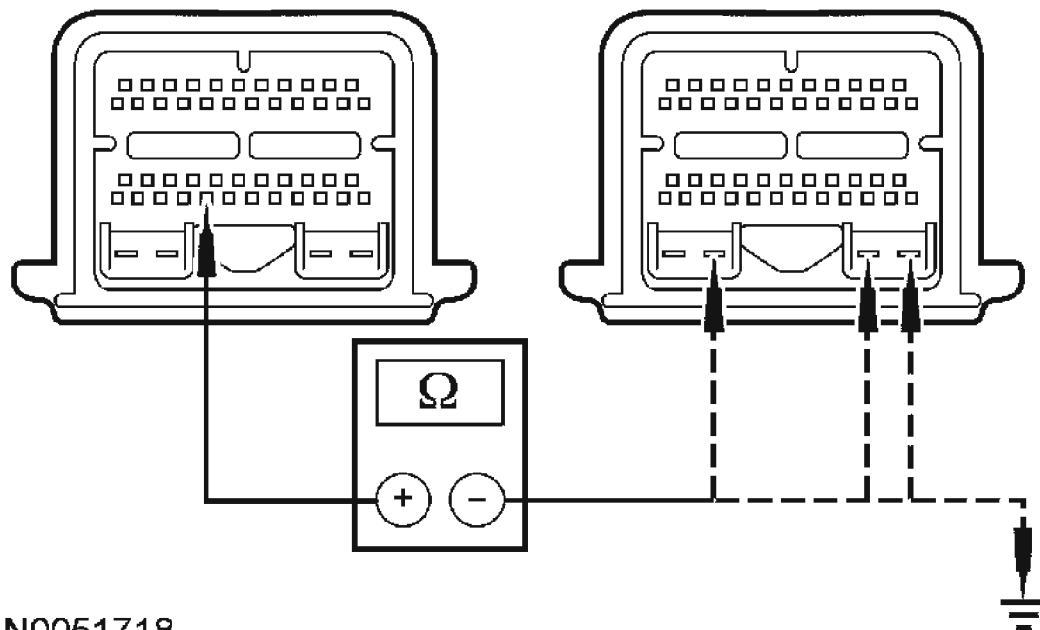
- Measure the resistance between the PCM connector pin T43 and the PCM connector pin T41 and chassis ground.



N0051717

**Fig. 19: Measuring Resistance Between PCM and Ground**  
Courtesy of FORD MOTOR CO.

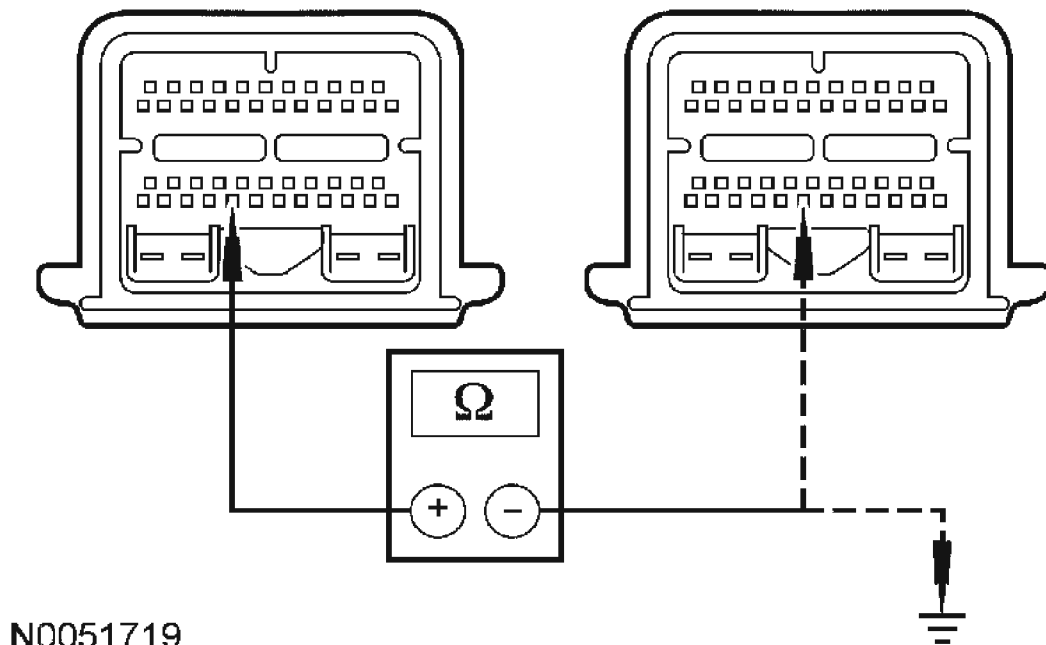
- Measure the resistance between the PCM connector pin T42 and the PCM connector pins C47, C48, C49 and chassis ground.



N0051718

**Fig. 20: Measuring Resistance Between PCM and Ground**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM connector pin T42 and the PCM connector pin T41 and chassis ground.



**Fig. 21: Measuring Resistance Between PCM and Ground**  
Courtesy of FORD MOTOR CO.

- Is each resistance greater than 10,000 ohms?

Yes : GO to A5.

No : REPAIR short circuit(s). RECONNECT all components. RERUN Quick Test.

#### A5 TRANSAXLE FUNCTIONAL TEST

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.

**NOTE:** LED will turn GREEN when solenoid activates and turn OFF when deactivated. LED will turn RED if an activated solenoid/harness is shorted to B+. LED will remain OFF if an activated solenoid/harness is shorted to ground or no continuity (open circuit).

- Disconnect: Transaxle Harness.
- Connect: Transmission Tester.
- Carry out the Solenoid Function Tests as outlined in the Transmission Tester

Manual.

- **Do the solenoids (LED) activate (LED green)?**

**Yes** : GO to A6.

**No** : GO to A7.

## A6 TRANSAXLE DRIVE CYCLE TEST

- Connect: PCM.
- Carry out the Dynamic Testing - Engine On as outlined in the Transmission Tester Manual.

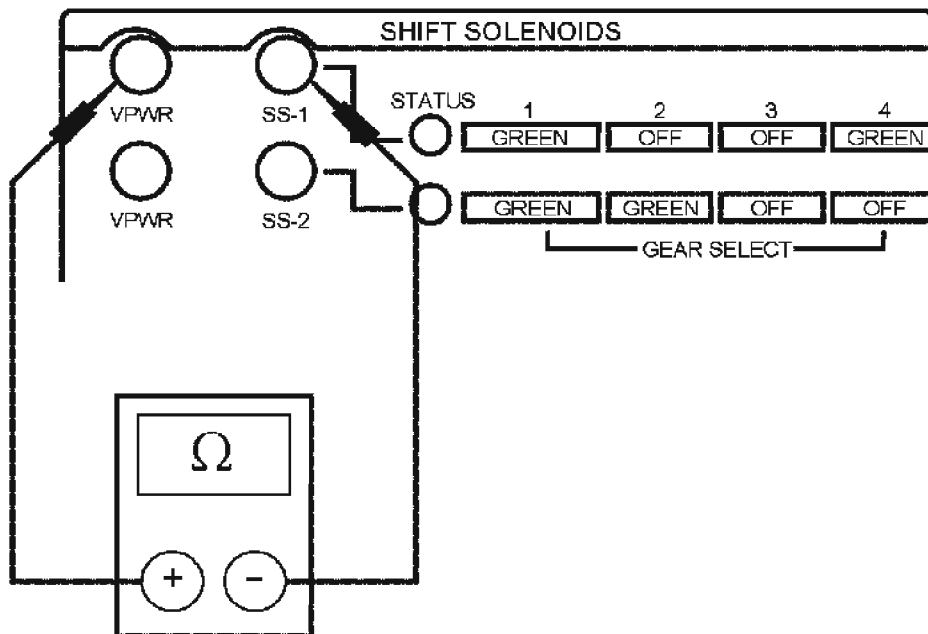
- **Does the vehicle upshift when commanded by the tester?**

**Yes** : INSTALL a new PCM. RECONNECT all components. RERUN On-Board Diagnostics Tests. If symptoms are still present, REFER to **DIAGNOSIS BY SYMPTOM**.

**No** : GO to A7.

## A7 CHECK RESISTANCE OF SOLENOID/HARNESS

- Place the Bench/Drive switch in BENCH mode.
- Rotate solenoid select switch to OHMS CHECK position.
- Measure the resistance between SS-1 jack and VPWR jack on tester.

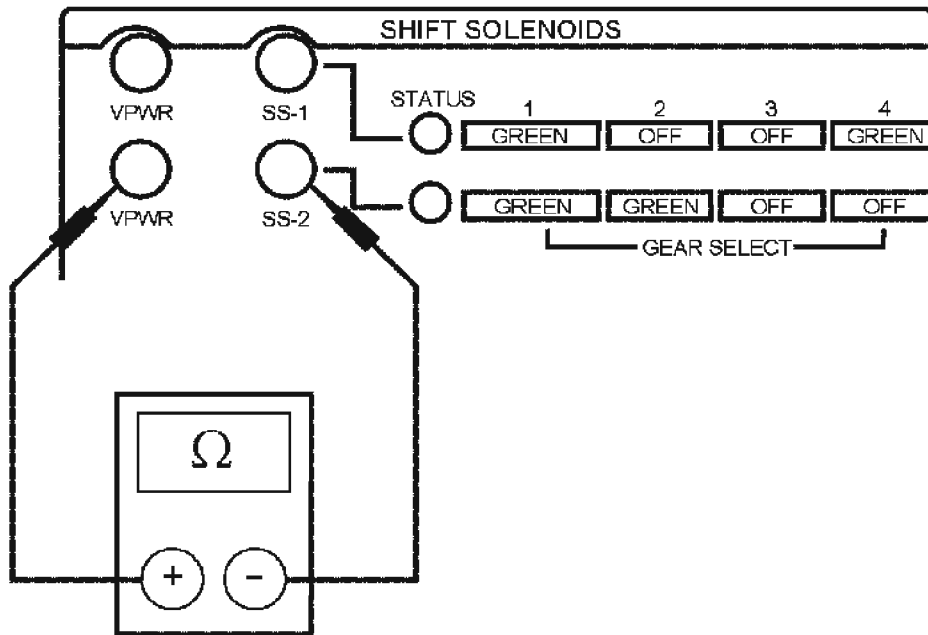


GD1836-A

**Fig. 22: Measuring Resistance Between SS-1 Jack And VPWR Jack On Tester**

Courtesy of FORD MOTOR CO.

- Measure the resistance between SS-2 jack and VPWR jack on tester.



GD1837-A

**Fig. 23: Measuring Resistance Between SS-2 Jack And VPWR Jack On Tester**

Courtesy of FORD MOTOR CO.

- Is the resistance for both solenoids between 12 and 22 ohms?

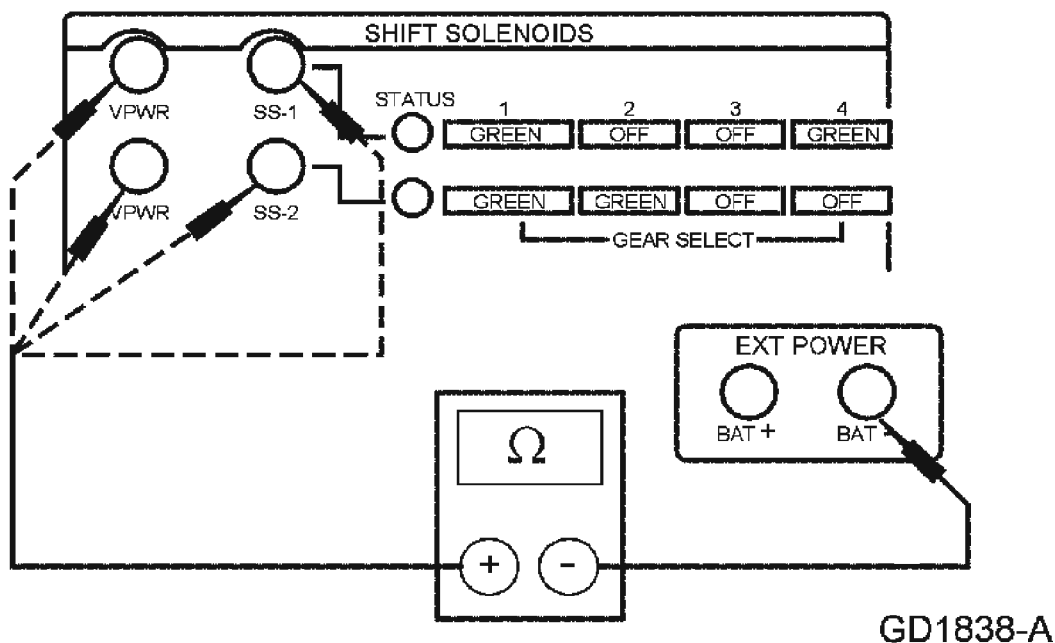
**Yes** : GO to A8.

**No** : INSTALL a new solenoid body assembly. RECORD and CLEAR the DTCs. RERUN On-Board Diagnostics tests.

#### **A8 CHECK SOLENOID/HARNESS FOR SHORT TO GROUND**

- Measure the resistance of each solenoid between BAT (-) jack (engine ground) and each appropriate jack.





**Fig. 24: Measuring Resistance Of Each Solenoid Between BAT (-) Jack (Engine Ground) And Each Appropriate Jack**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms (no continuity)?

Yes : REFER to **DIAGNOSIS BY SYMPTOM**.

No : INSTALL a new solenoid body assembly. RECORD and CLEAR the DTCs. RERUN On-Board Diagnostics tests.

#### PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

**NOTE:** Refer to **Fig. 9** preceding these pinpoint tests.

#### B1 ELECTRONIC DIAGNOSTICS

- Make sure the transaxle vehicle harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.

- Have the items been checked?

Yes : GO to B2.

No : CARRY OUT checks. CLEAR the DTCs. RERUN Quick Test.

#### B2 ELECTRONIC DIAGNOSTICS

- Key in OFF position.
- Connect the scan tool.

- Key in ON position.
- Select Diagnostic Data Link.
- Select PCM.
- Select PID/Data Monitor and Record.
- Enter the following diagnostic mode on the scan tool: PIDs; TFT, TFTV.
- **Does the vehicle enter PID/Data Monitor and Record?**

**Yes** : REMAIN in PID/Data Control. GO to B3.

**No** : REPEAT procedure to enter PID. If vehicle did not enter PID, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid).

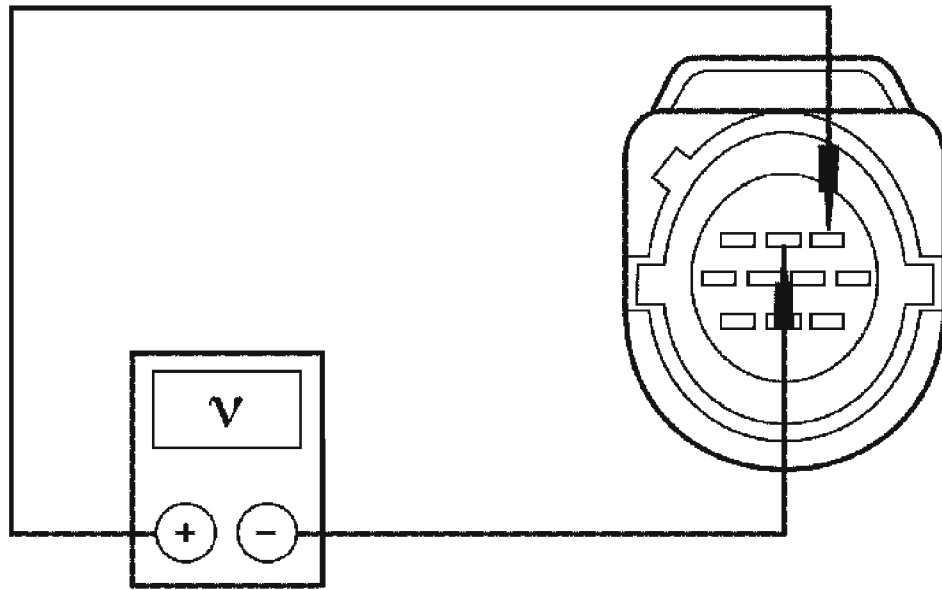
### **B3 CHECK ELECTRICAL SIGNAL OPERATION**

- While monitoring the TFT PIDs, carry out the following test: If transmission is cold, run transmission to warm it up. If transmission is warm, allow transmission to cool down.
- **Do the TFT PIDs increase as the transmission is warmed or decrease as the transmission is cooled or does the TFT or TFTV drop in and out of range?**  
**Yes** : If the TFT PIDs increase as the transmission is warmed or decrease as the transmission is cooled, CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to **DIAGNOSIS BY SYMPTOM** to diagnose transmission overheating. If the TFT or TFTV is in and out of range, INSPECT for intermittent concern in the internal/external harness, sensor or connector.  
**No** : GO to B4.

### **B4 CHECK ELECTRICAL SIGNAL OPERATION**

**CAUTION: Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.**

- Key in OFF position.
- Disconnect: Transaxle Connector.
- Use a mirror to inspect both ends of the connector for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Measure the voltage between pin 3 and pin 2 of the transaxle vehicle harness connector.



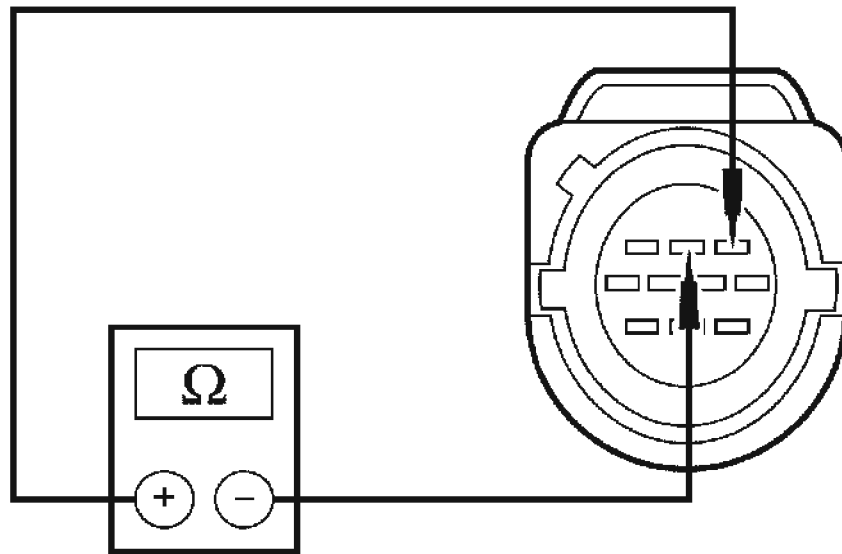
GD1840-B

**Fig. 25: Measuring Voltage Of Transaxle Vehicle Harness Connector**  
Courtesy of FORD MOTOR CO.

- Key in ON position.
- **Is the voltage between 4.75 and 5.25 volts?**  
Yes : GO to B7.  
No : GO to B5.

#### **B5 CHECK RESISTANCE OF TFT SENSOR**

- Disconnect: Transaxle Connector.
- Measure the resistance between pin 3 and pin 2 of the transaxle vehicle harness connector.



A0021508

**Fig. 26: Measuring Resistance Between Of Transaxle Vehicle Harness Connector**

Courtesy of FORD MOTOR CO.

- Record the resistance.
- The resistance should be approximately within the following range.

#### TRANSMISSION FLUID TEMPERATURE REFERENCE

°C	°F	Resistance (Ohms)
-40° to -20°	-40° to -4°	967 - 284
-19° to -1°	-3° to 31°	284 - 100
0° - 20°	32° - 68°	100 - 37
21° - 40°	69° - 104°	37- 16
41° - 70°	105° - 158°	16 - 5
71° - 90°	159° - 194°	5 - 2.7
91° - 110°	159° - 230°	2.7 - 1.5
111° - 130°	231° - 266°	1.5 - 0.8

131° - 150°	267° - 302°	0.8 - 0.54
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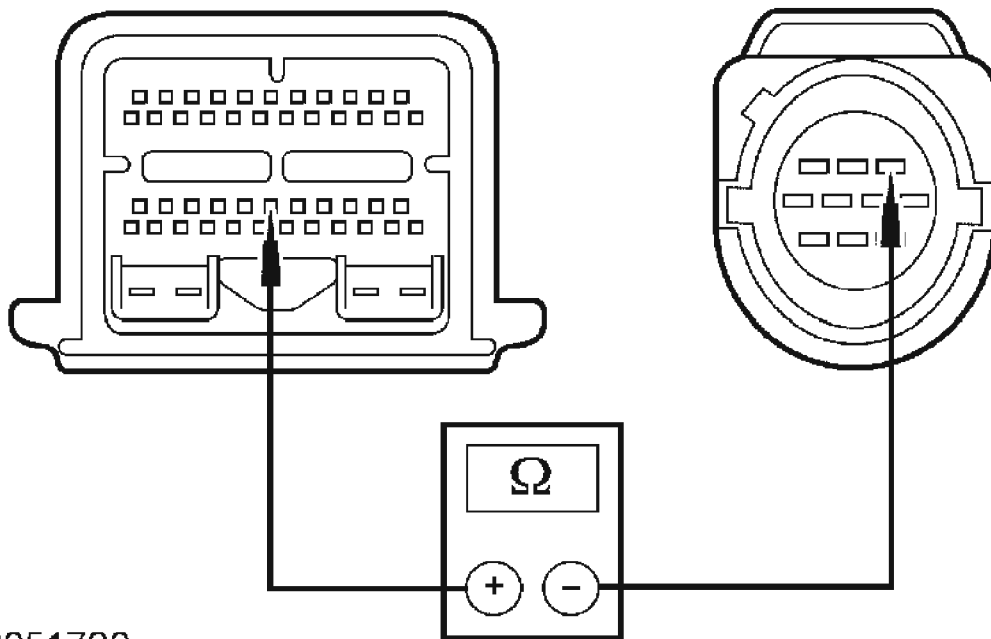
• **Is the resistance within range?**

**Yes** : REFER to **DIAGNOSIS BY SYMPTOM**.

**No** : GO to B6.

**B6 CHECK CONTINUITY OF TFT AND SIGNAL RTN CIRCUITS**

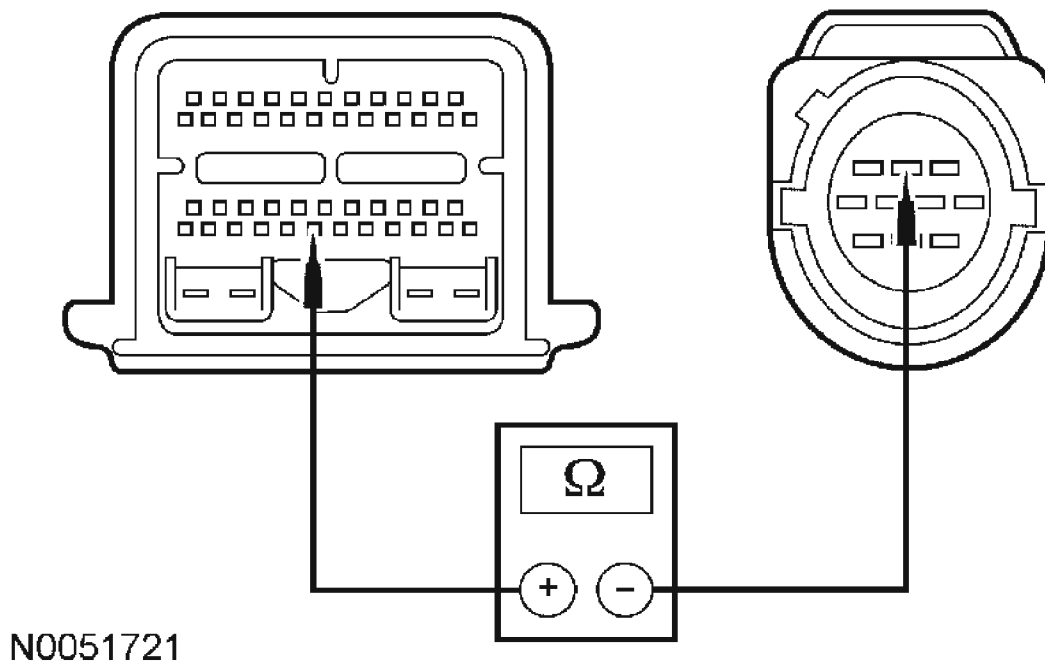
- Key in OFF position.
- Disconnect: Transaxle Connector.
- Disconnect: PCM.
- Measure the resistance between the PCM pin T29 and the transaxle connector signal pin 3 harness side.



N0051720

**Fig. 27: Measuring Resistance Between PCM And Transaxle Connector**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T41 and the transaxle connector signal pin 2 harness side.



**Fig. 28: Measuring Resistance Between PCM And Transaxle Connector**  
Courtesy of FORD MOTOR CO.

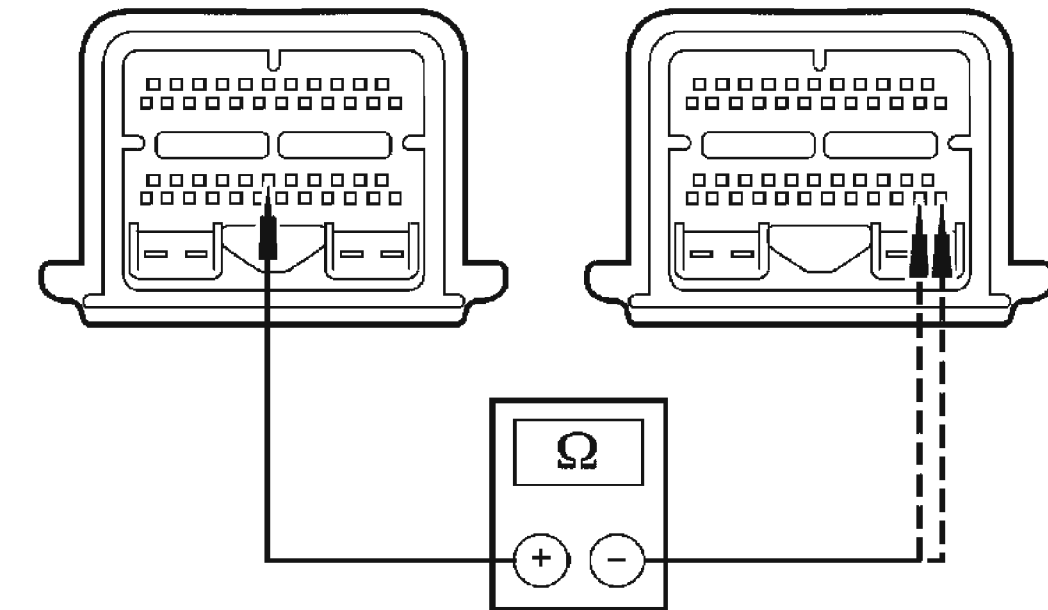
- Are both resistances less than 5 ohms?

**Yes :** GO to B7.

**No :** REPAIR open circuit(s). RECONNECT all components. CLEAR the DTCs.  
RERUN Quick Test.

#### **B7 CHECK TFT CIRCUIT FOR SHORT TO VPWR AND GROUND**

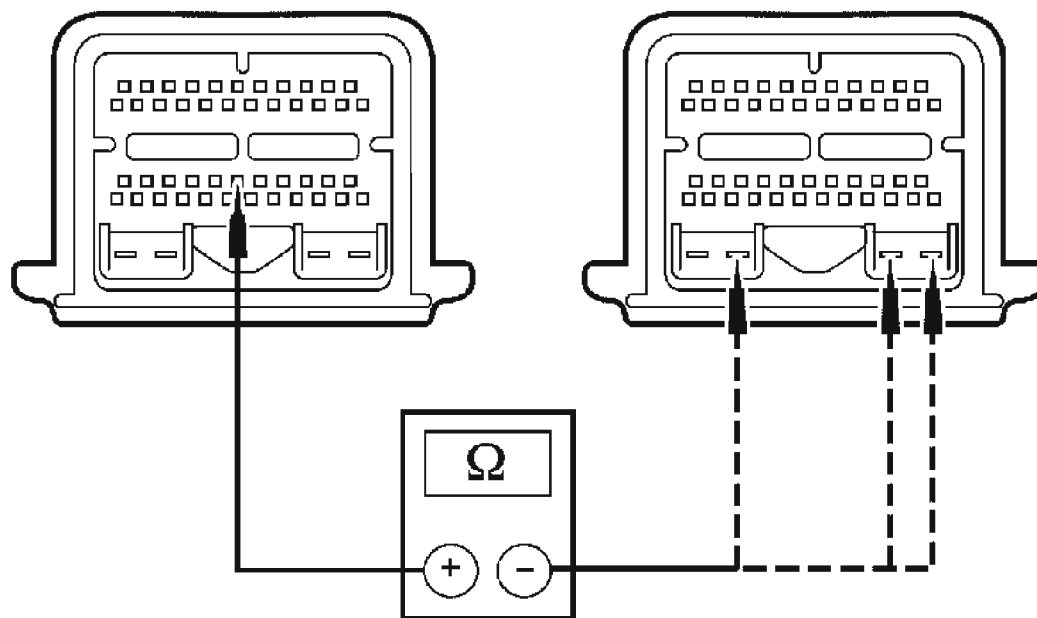
- Measure the resistance between the PCM pin T29 and the PCM pins C35 and C36.



N0051722

**Fig. 29: Measuring Resistance In PCM**  
Courtesy of FORD MOTOR CO.

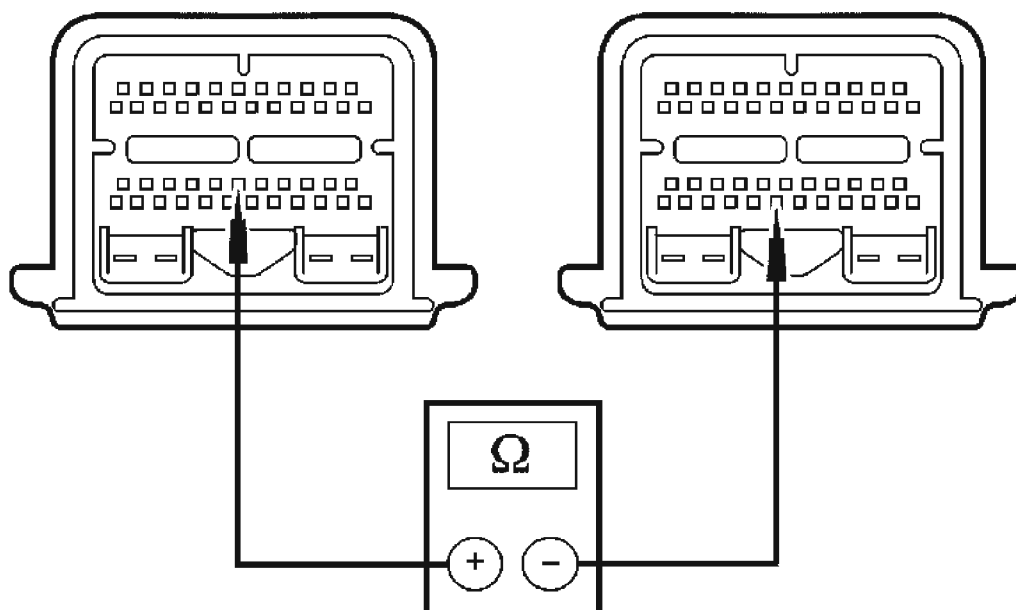
- Measure the resistance between the PCM pin T29 and the PCM pins C47, C48 and C49.



N0051723

**Fig. 30: Measuring Resistance In PCM**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T29 and the PCM pin T41.



N0051724



**Fig. 31: Measuring Resistance In PCM**  
Courtesy of FORD MOTOR CO.

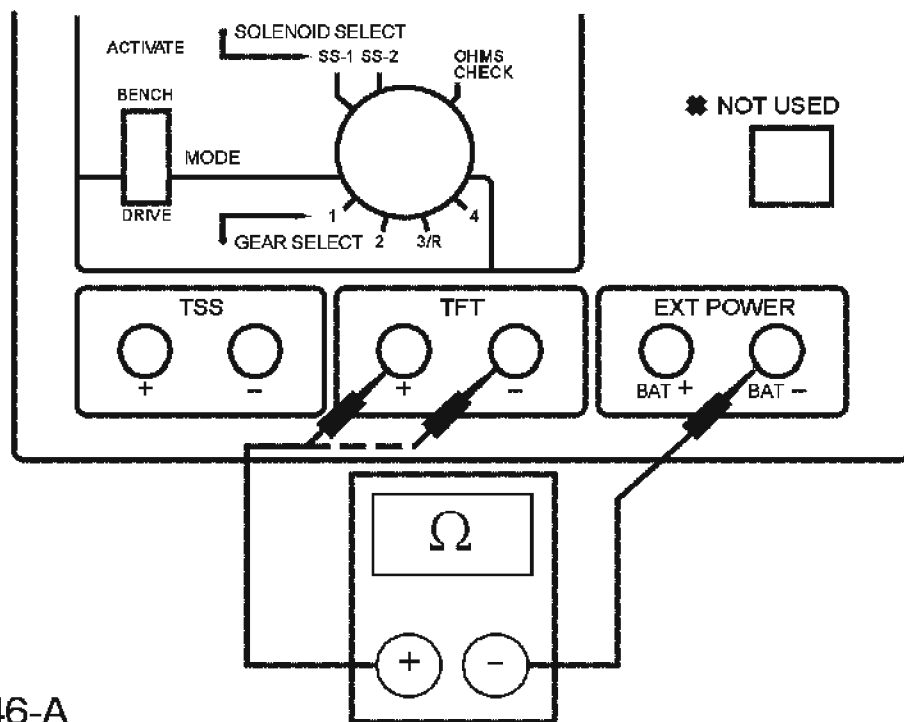
- Is each resistance greater than 10,000 ohms?

Yes : GO to B8.

No : REPAIR shorted circuit(s). RECONNECT all components. CLEAR the DTCs. RERUN Quick Test.

### B8 CHECK TFT SENSOR/HARNESS FOR SHORT TO GROUND

- Disconnect: Transaxle Connector.
- Connect: Transmission Tester.
- Measure the resistance between BAT- jack (engine ground) and appropriate jack (-TFT and +TFT).



**Fig. 32: Measuring Resistance Between BAT- Jack (Engine Ground) And Appropriate Jack (-TFT And +TFT)**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

Yes : INSTALL a new solenoid assembly. RERUN On-Board Diagnostics test.

No : RERUN On-Board Diagnostics test. INSTALL a new powertrain control

module.

#### PINPOINT TEST C: TORQUE CONVERTER CLUTCH (TCC) SOLENOID

**NOTE:** Refer to **Fig. 9** preceding these pinpoint tests.

### C1 ELECTRONIC DIAGNOSTICS

- Key in OFF position.
- Make sure the transaxle vehicle harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Connect the scan tool.
- Key in ON position.
- Carry out KOEO Test until continuous DTCs have been displayed.
- Select Output State Test Mode (OTM).
- Select the mode ALL ON. Push START to turn outputs on. Push STOP to turn outputs off.
- **Does vehicle enter OTM?**

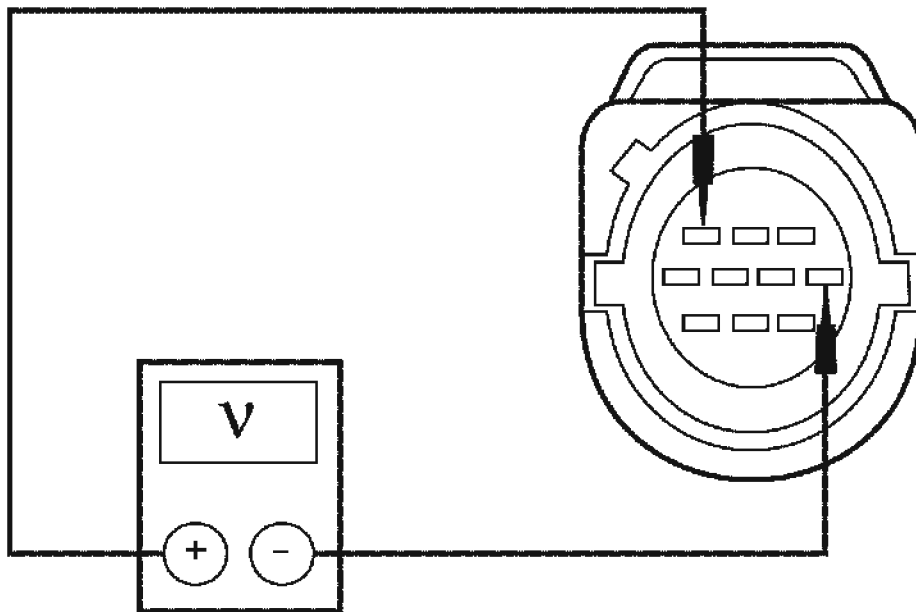
**Yes :** REMAIN in OTM. GO to C2.

**No :** PRESS START. If vehicle does not enter OTM, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION-HYBRID ESCAPE** article for Escape (Hybrid).

### C2 CHECK ELECTRICAL SIGNAL OPERATION

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.

- Key in OFF position.
- Disconnect: Transaxle Connector.
- Use a mirror to inspect both ends of the connector for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Key in ON position.
- Measure the voltage between pin 1 and pin 7 of the transaxle vehicle harness connector.



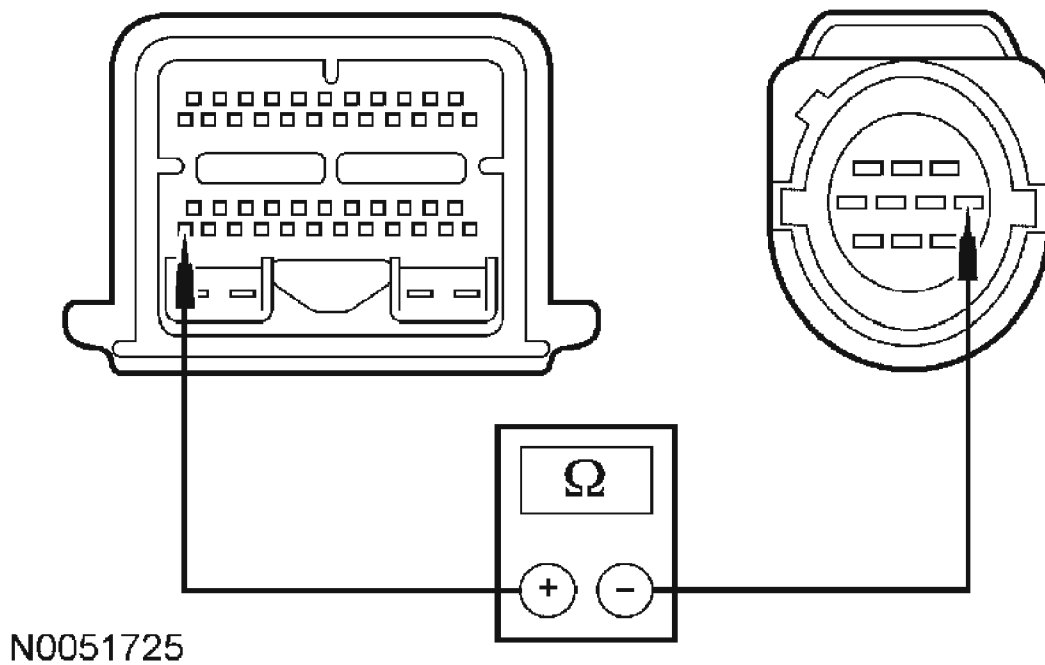
GD1848-A

**Fig. 33: Measuring Voltage Of Transaxle Vehicle Harness Connector**  
Courtesy of FORD MOTOR CO.

- While observing the VOM, press STAR and STOP to cycle solenoid output on and off.
- **Does the suspected solenoid output voltage change at least 0.5 volt?**  
**Yes :** GO to C5.  
**No :** GO to C3.

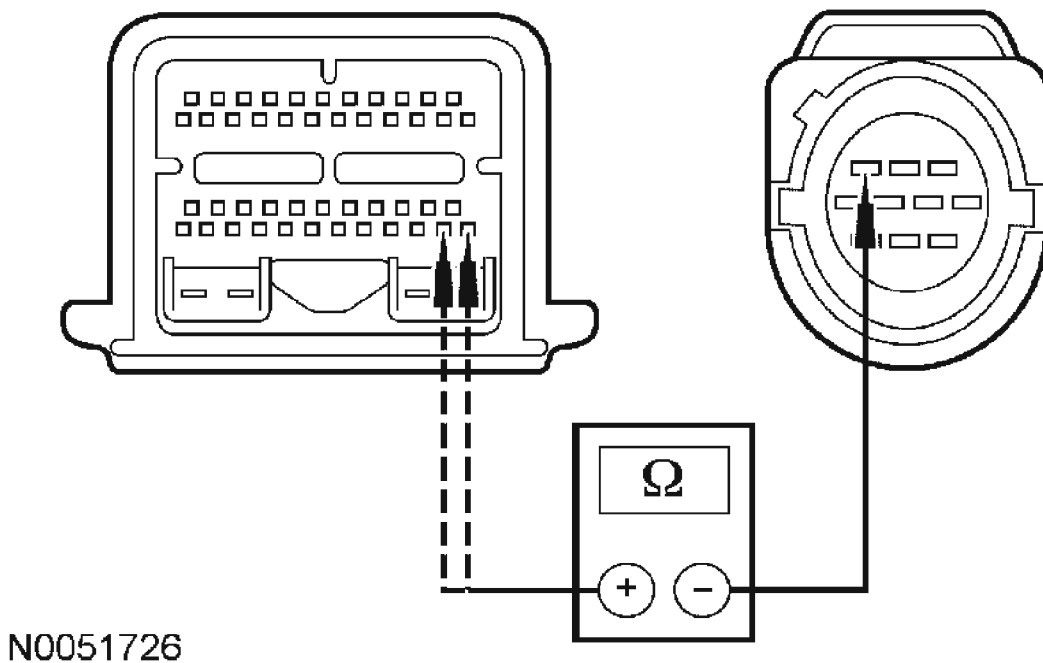
### **C3 CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUITS**

- Key in OFF position.
- Disconnect: PCM.
- Disconnect: Transaxle Connector.
- Measure the resistance between the PCM pin T46 and the transaxle harness connector pin 7.



**Fig. 34: Measuring Resistance Between PCM And Transaxle Harness**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin C35 and C36 and the transaxle harness connector pin 1.



**Fig. 35: Measuring Resistance Between PCM And Transaxle Harness**  
Courtesy of FORD MOTOR CO.

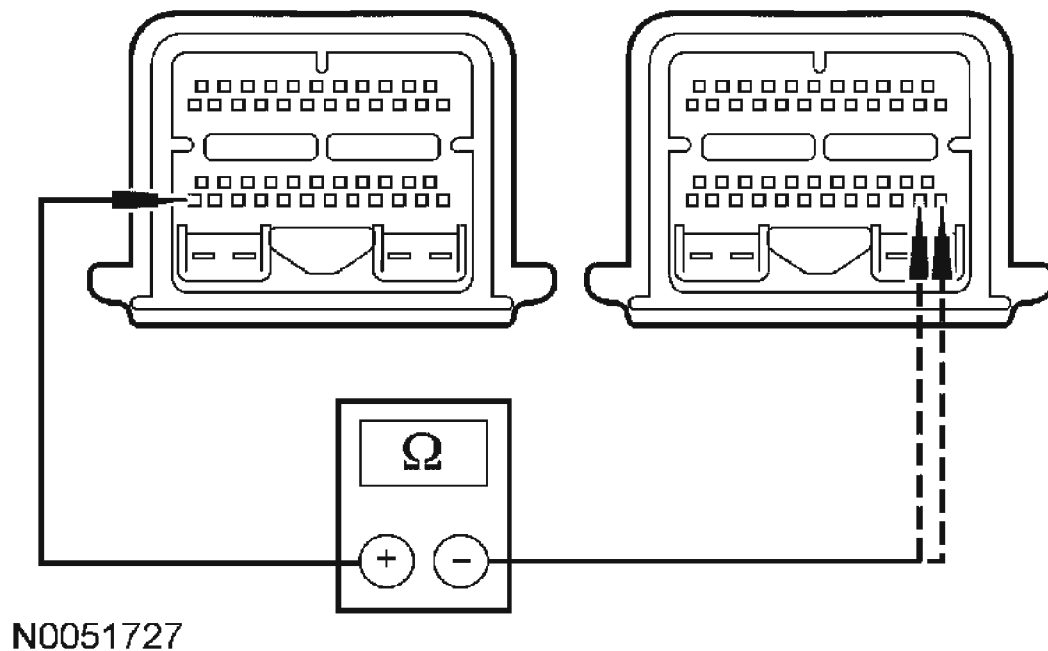
- Is each resistance less than 5 ohms?

**Yes :** GO to C4.

**No :** REPAIR open circuit(s). RECONNECT all components. RERUN Quick Test.

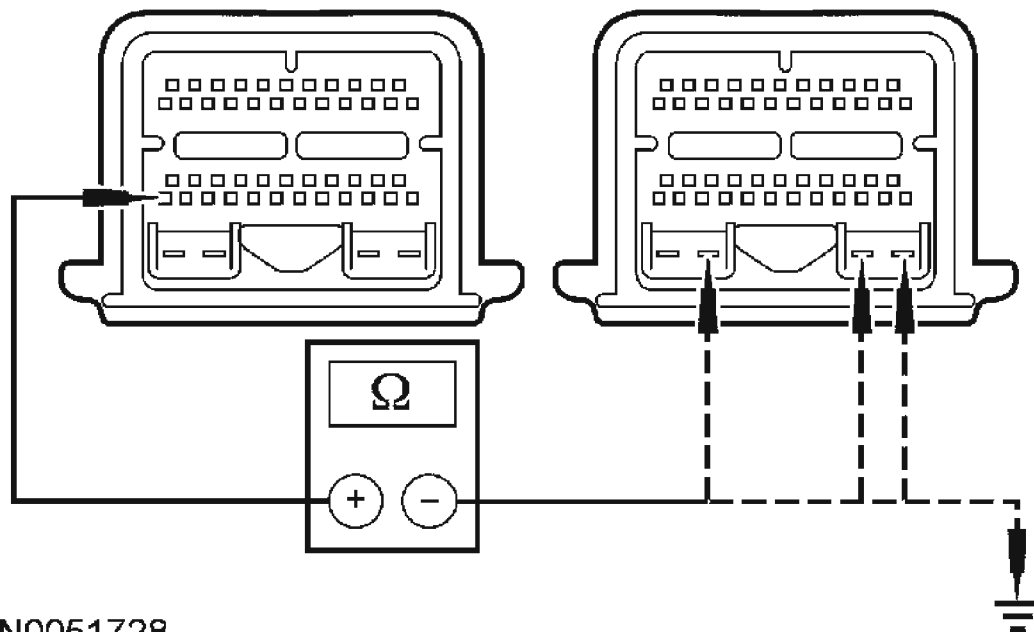
#### **C4 CHECK SOLENOID/HARNESS FOR SHORTS TO POWER AND GROUND**

- Disconnect: PCM.
- Disconnect: Transaxle Connector.
- Measure the resistance between the PCM pin T46 and the PCM pins C35 and C36.



**Fig. 36: Measuring Resistance Of PCM**  
Courtesy of FORD MOTOR CO.

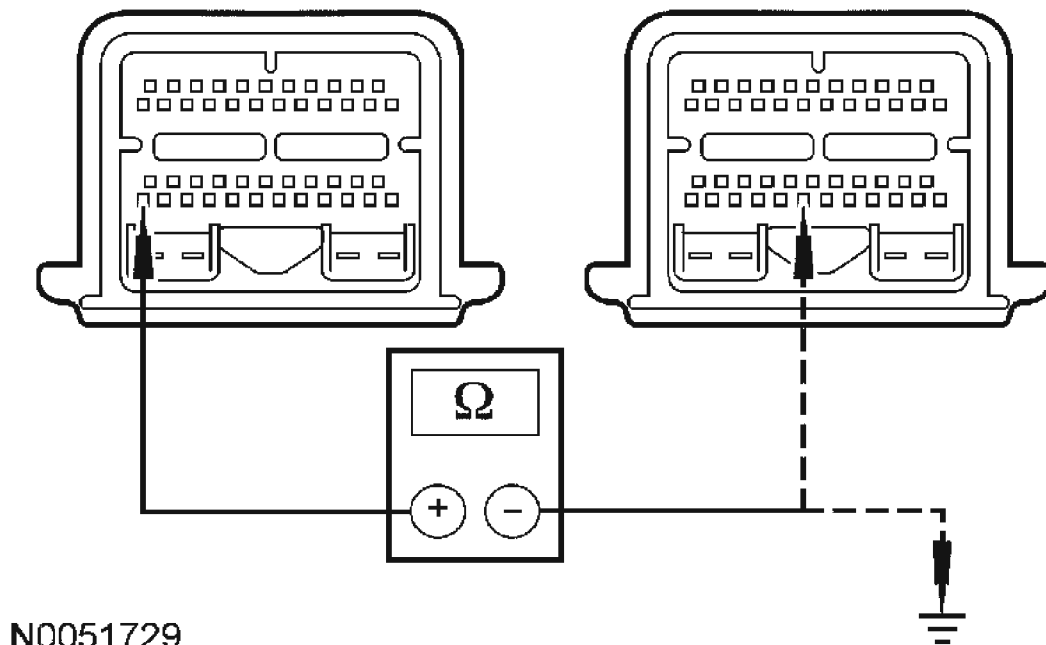
- Measure the resistance between the PCM pin T46 and the PCM pins C47, C48 and C49 and chassis ground.



N0051728

**Fig. 37: Measuring Resistance Between PCM And Chassis Ground**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T46 and the PCM pin T4 and chassis ground.



N0051729

**Fig. 38: Measuring Resistance Between PCM And Chassis Ground**  
Courtesy of FORD MOTOR CO.

- Is each resistance less than 10,000 ohms?

Yes : GO to C5.

No : REPAIR short circuit(s). RECONNECT all components. RERUN Quick Test.

## C5 TRANSAXLE FUNCTIONAL TEST

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.

**NOTE:** LED will turn GREEN when solenoid activates and turns OFF when deactivated. LED will turn RED if an activated solenoid/harness is shorted to B+. LED will remain OFF if an activated solenoid/harness is shorted to ground or no continuity (open circuit).

- Disconnect: Transaxle Connector.
- Connect: Transmission Tester.



Carry out the TCC Solenoid Function Test as outlined in the Transmission Tester Manual.

- **Does TCC (LED green) activate when tester switch is pressed?**

**Yes** : GO to C6.

**No** : GO to C7.

## C6 TRANSAXLE DRIVE CYCLE TEST

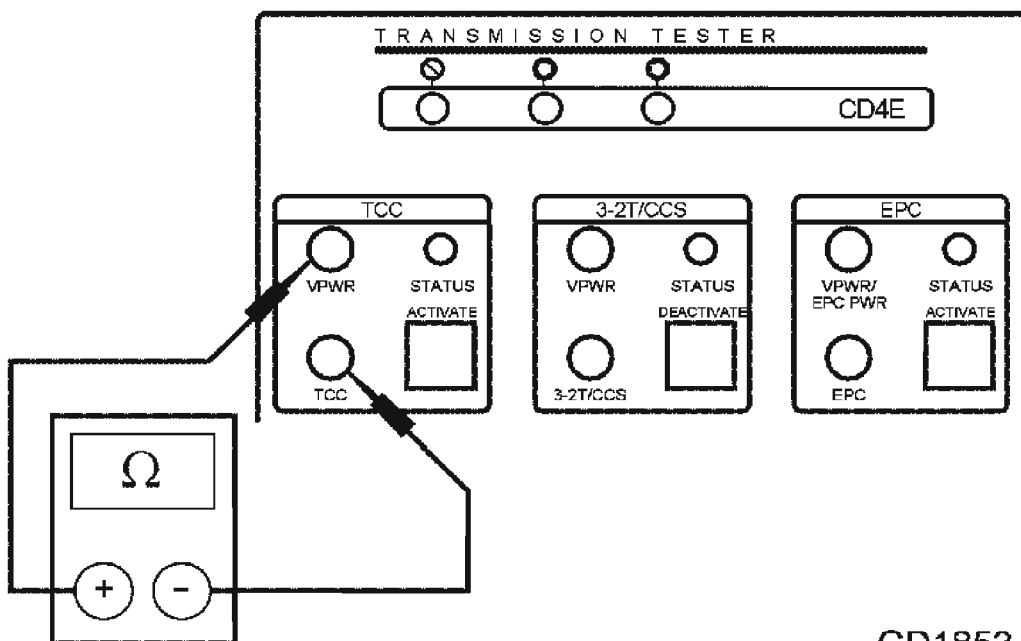
- Connect: PCM.
- Carry out Dynamic Testing as outlined in the Transmission Tester Manual.
- **Does TCC activate (LED green) and engine rpm drop?**

**Yes** : INSTALL a new PCM. RECONNECT all components. RERUN On-Board Diagnostic tests. If symptoms are still present, REFER to **DIAGNOSIS BY SYMPTOM**.

**No** : GO to C7.

## C7 CHECK RESISTANCE OF SOLENOID/HARNESS

- Set Bench/Drive switch to BENCH mode.
- Rotate gear select switch to OHMS CHECK position.
- Measure the resistance between TCC jack and VPWR jack on the Transmission Tester.



GD1853-A

**Fig. 39: Measuring Resistance Between TCC Jack And VPWR Jack On**

### Transmission Tester

Courtesy of FORD MOTOR CO.

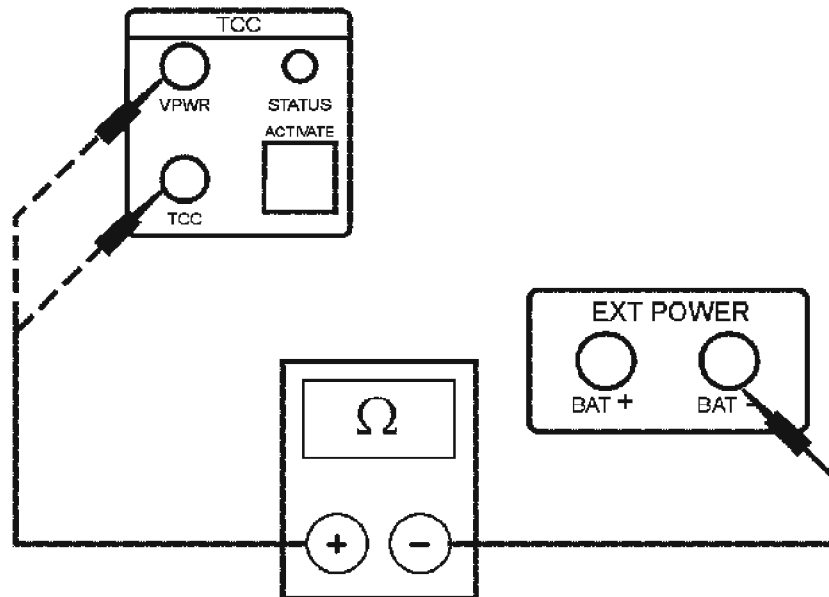
- Is the resistance between 12.5 and 19.0 ohms?

Yes : GO to C8.

No : INSTALL a new solenoid body assembly.

### C8 CHECK SOLENOID/HARNESS FOR SHORT TO GROUND

- Measure the resistance between BAT - jack (engine ground) and TCC jack, and VPWR jack on Transmission Tester.



GD1854-A

**Fig. 40: Measuring Resistance Between BAT - Jack (Engine Ground) And TCC Jack, And VPWR Jack On Transmission Tester**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

Yes : INSTALL a new solenoid body assembly.

No : REFER to DIAGNOSIS BY SYMPTOM to diagnose torque converter clutch.

### PINPOINT TEST D: TRANSMISSION RANGE (TR) SENSOR

#### D1 VERIFY TRANSMISSION RANGE (TR) SENSOR ALIGNMENT

- Make sure the TR sensor harness connector is fully seated, terminals are fully

engaged in connector and in good condition before proceeding.

- Verify shift linkage adjustment in the DRIVE position.
- Key in OFF position.
- Apply parking brake.
- Place the transaxle range selector lever in NEUTRAL.
- Verify that the TR sensor is correctly adjusted.
- **Is the TR sensor correctly adjusted?**

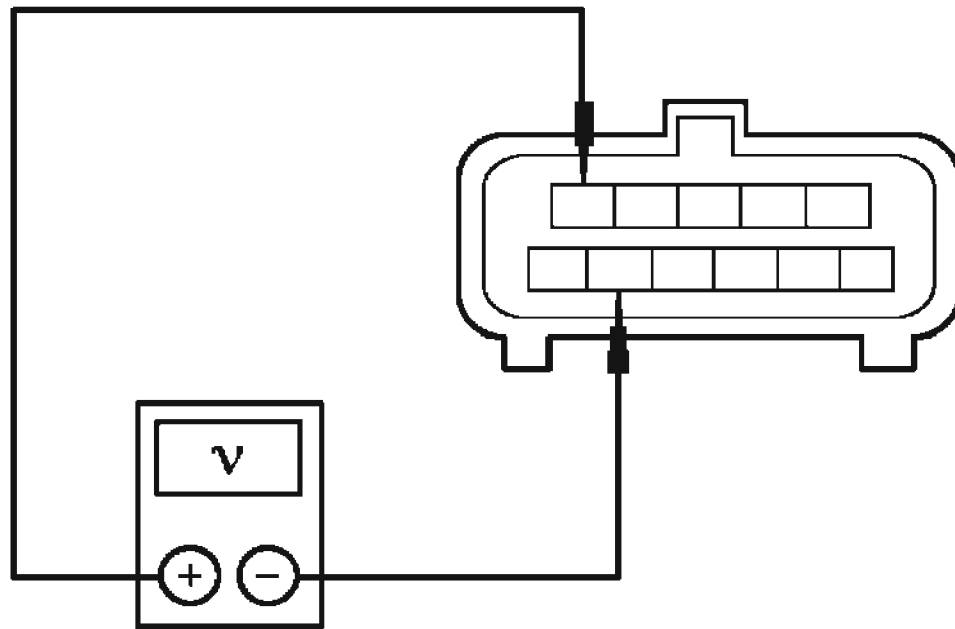
**Yes :** GO to D2.

**No :** ADJUST TR sensor. REFER to **TRANSMISSION RANGE (TR) SENSOR**. PLACE transaxle range selector in PARK. CLEAR the DTCs and RERUN the Quick Test.

## **D2 CHECK ELECTRICAL SIGNAL OPERATION**

**CAUTION: Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.**

- Disconnect: TR Sensor.
- Use mirror to inspect both ends of the connector for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Measure the voltage between pin 5 and pin 10 of the TR sensor harness connector.



GD3624-A

**Fig. 41: Measuring Voltage Of TR Sensor Harness Connector**  
Courtesy of FORD MOTOR CO.

- Key in ON position.
- **Is the voltage between 4.75 and 5.25 volts?**

**Yes :** GO to D3.

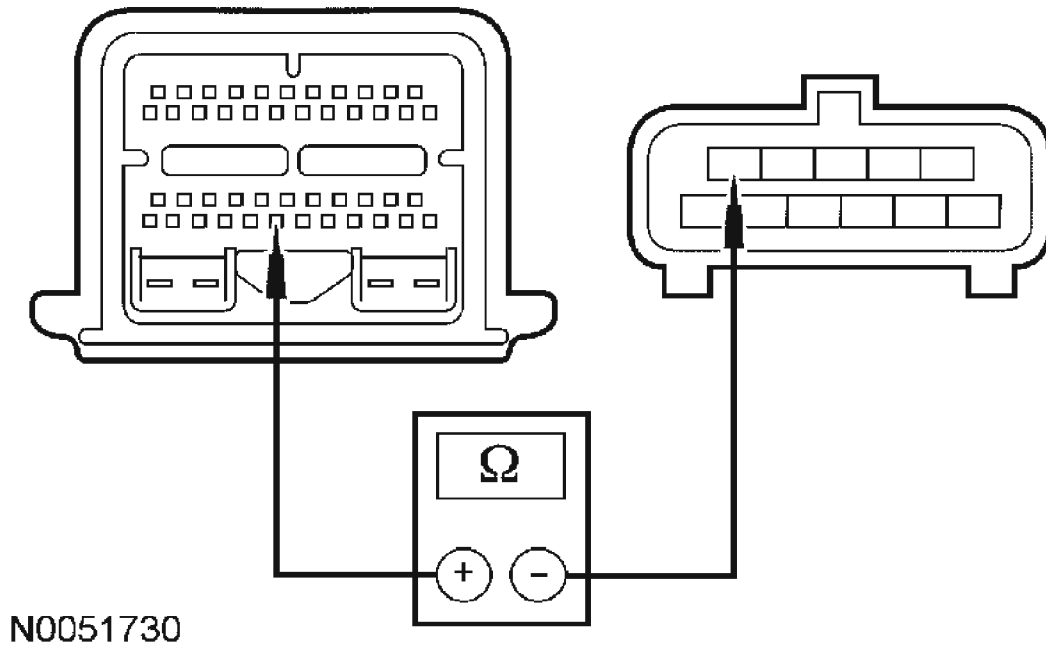
**No :** refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid).

### **D3 CHECK CONTINUITY OF TR SENSOR HARNESS CIRCUITS**

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.

- Key in OFF position.
- Disconnect: TR Sensor.
- Inspect for damaged or pushed-out pins, corrosion or loose wires.
- Disconnect: PCM.
- Measure the resistance between the PCM pin T41 and the TR sensor vehicle

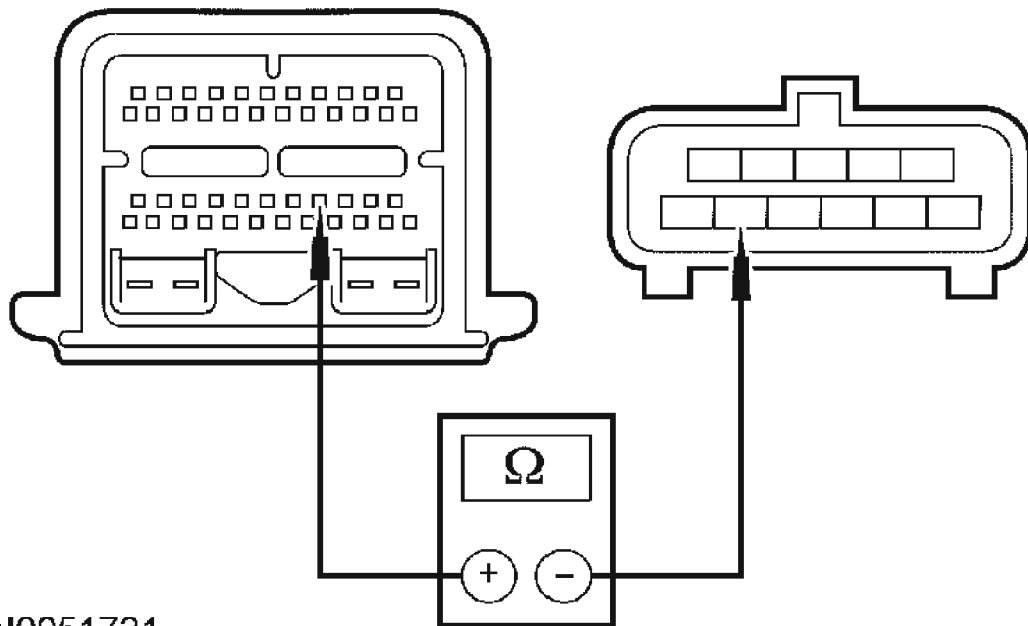
harness connector pin 5.



**Fig. 42: Measuring Resistance Between PCM And TR Sensor Vehicle Harness**

**Courtesy of FORD MOTOR CO.**

- Measure the resistance between the PCM pin T27 and the TR sensor vehicle harness connector pin 10.



N0051731

**Fig. 43: Measuring Resistance Between PCM And TR Sensor Vehicle Harness**

Courtesy of FORD MOTOR CO.

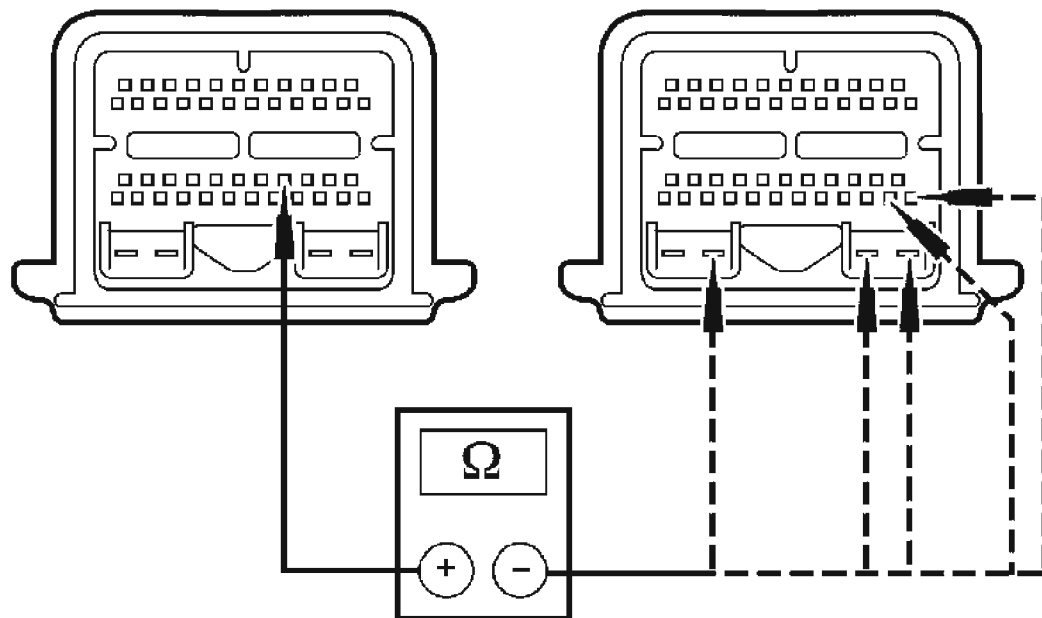
- Is each resistance less than 5 ohms?

Yes : GO to D4.

No : REPAIR open circuit(s). RECONNECT all components. CLEAR the DTCs. RERUN Quick Test.

#### **D4 CHECK TR SENSOR CIRCUIT FOR SHORTS TO POWER AND GROUND**

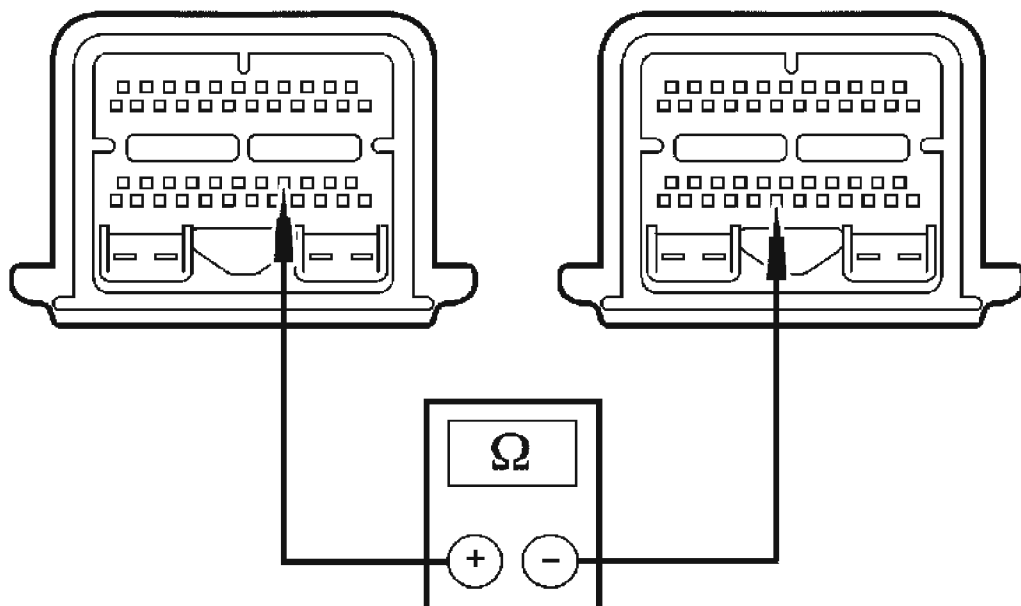
- Disconnect: PCM.
- Disconnect: TR Sensor.
- Measure the resistance between the PCM pin T27 and the PCM pins B35, B36, B47, B48 and B49.



N0051732

**Fig. 44: Measuring Resistance Of PCM**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T27 and the PCM pin T41.



N0051733

**Fig. 45: Measuring Resistance Of PCM**  
**Courtesy of FORD MOTOR CO.**

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

**Yes** : GO to D5.

**No** : REPAIR short circuit. RECONNECT all components. CLEAR the DTCs. RERUN Quick Test.

**D5 CHECK TRANSMISSION RANGE (TR) SENSOR RESISTANCE**

- Disconnect: TR Sensor.
- Install the transmission tester.
- Connect MLP-D cable to TR sensor and Transmission Tester.
- Install appropriate overlay into the transmission tester.
- Measure the resistance between TR and SRTN of the TR Sensor. Verify the sensor resistance values in all gear positions. Refer to following table.

**TR SENSOR RESISTANCE**

Range Selector Position	Resistance (Ohms)	Volts
P	3770 - 4607	4.41
R	1304 - 1593	3.60
N	660 - 807	2.93
(D)	361 - 442	2.09
2	190 - 232	1.37
1	78 - 95	0.68

- **Are all resistance values within specification?**

**Yes** : INSTALL a new the PCM. CLEAR the DTCs, RERUN Quick Test, then GO to D6.

**No** : INSTALL a new TR Sensor and ADJUST. REFER to **TRANSMISSION RANGE (TR) SENSOR**. CLEAR the DTCs and RERUN Quick Tests.

**D6 CHECK PARK/NEUTRAL CIRCUITS OF SENSOR**

- Carry out the procedures outlined on the transmission tester overlay to verify the sensor PARK/NEUTRAL circuits in all gear positions.
- Monitor the status lamp on the tester for correct indications.
- **Do the PARK/NEUTRAL circuits operate correctly and only in the correct gear position?**

**Yes** : GO to D7. If diagnosing a PARK/NEUTRAL circuit or starting system concern, REFER to **ENGINE - 2.3L** or **ENGINE - 3.0L (4V)** .

**No** : INSTALL a new TR sensor and ADJUST. REFER to **TRANSMISSION**



**RANGE (TR) SENSOR**. CLEAR the DTCs and RERUN Quick Tests.

## **D7 CHECK REVERSE/BACKUP LAMP CIRCUITS OF SENSOR**

- Carry out the procedures outlined on the tester overlay to verify the sensor REVERSE/BACKUP circuits in all gear positions.
- Monitor the status lamp on the tester for correct indications.
- **Do the REVERSE/BACKUP circuits operate correctly and only in the correct gear position?**

**Yes** : If diagnosing a REVERSE/BACKUP circuit concern, REFER to **EXTERIOR LIGHTING** .

**No** : INSTALL a new TR sensor and ADJUST. REFER to **TRANSMISSION RANGE (TR) SENSOR**. CLEAR the DTCs and RERUN Quick Tests.

## **PINPOINT TEST E: ELECTRONIC PRESSURE CONTROL (EPC) SOLENOID**

### **E1 ELECTRONIC DIAGNOSTICS**

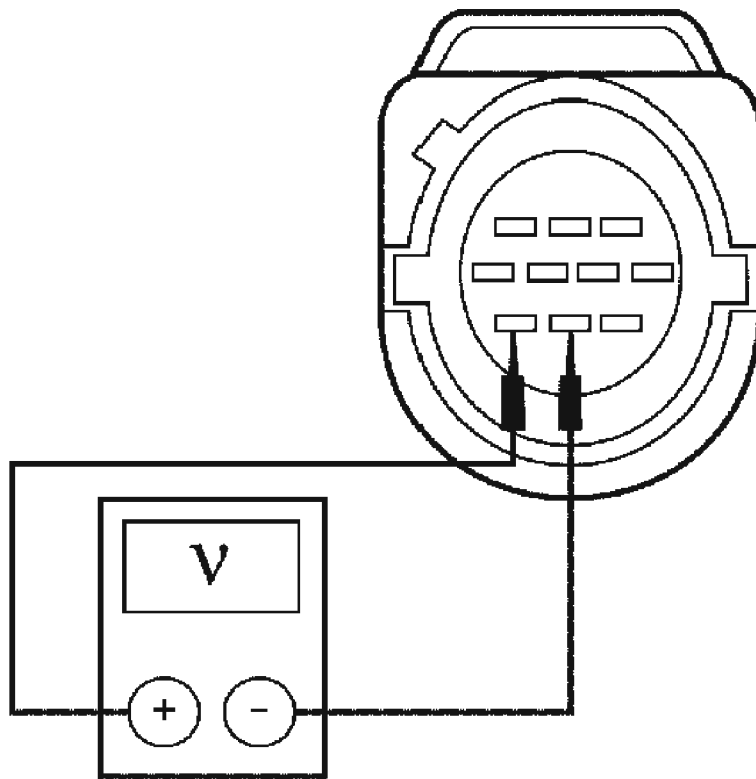
- Key in OFF position.
- Make sure the transaxle vehicle harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Connect the scan tool.
- Key in ON position.
- Carry out KOEO Test until continuous DTCs have been displayed.
- Enter Output Test Mode (OTM). Refer to **ON-BOARD DIAGNOSTICS**.
- Select the mode ALL ON. Push START to turn outputs on. Push STOP to turn outputs off.
- **Does vehicle enter OTM?**  
**Yes** : REMAIN in OTM. GO to E2.  
**No** : PRESS START. If vehicle does not enter OTM, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION-HYBRID ESCAPE** article for Escape (Hybrid).

### **E2 CHECK ELECTRICAL SIGNAL OPERATION**

**CAUTION: Do not pry on the connector. Pull up on the transaxle vehicle harness connector.**

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

- Measure the voltage between pin 8 and pin 9 of the transaxle vehicle harness connector.



GD1863-A

**Fig. 46: Measuring Voltage Between Pin 8 And Pin 9 Of Transaxle Vehicle Harness Connector**

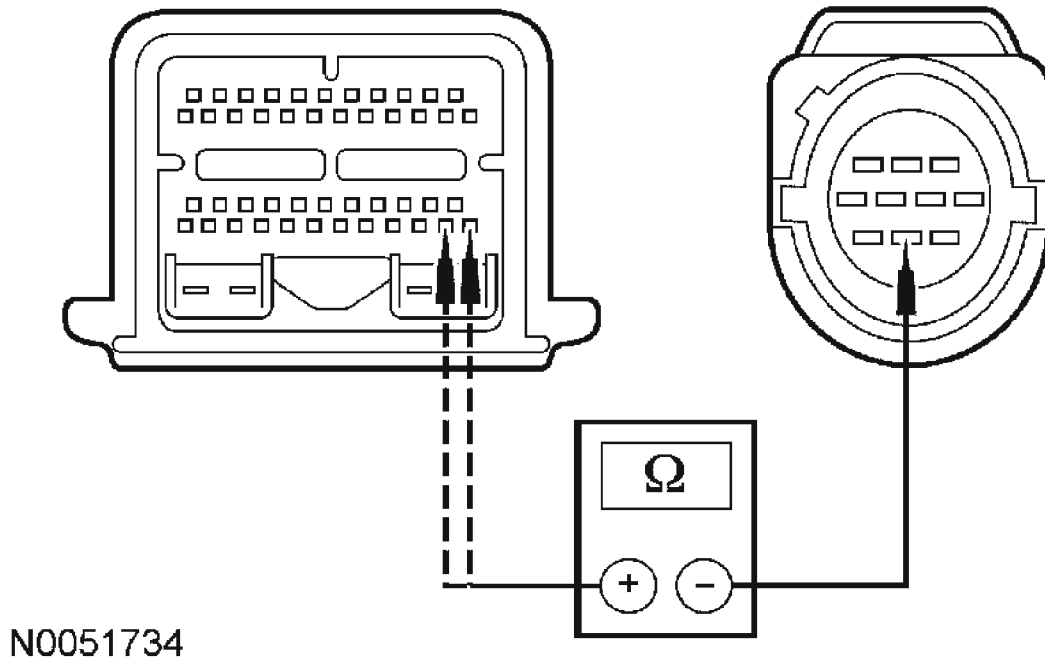
Courtesy of FORD MOTOR CO.

- While observing VOM, press START and STOP to cycle solenoid output on and off.
- **Does the suspect solenoid output voltage change at least 0.5 volt?**  
Yes : GO to E5.  
No : GO to E3.

### **E3 CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUITS**

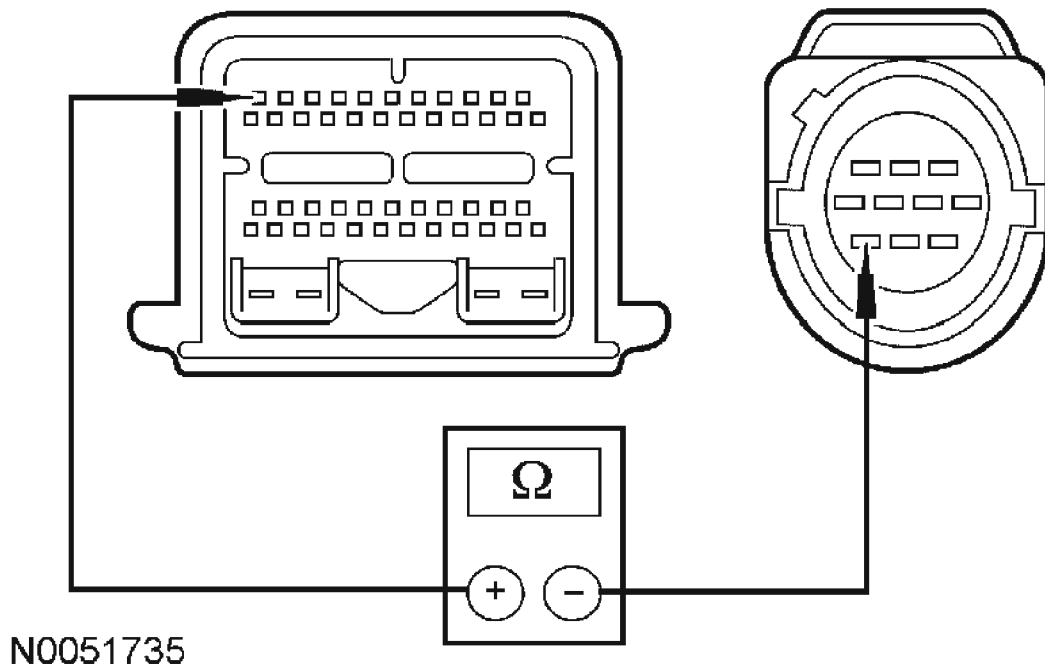
- Key in OFF position.
- Disconnect: PCM.
- Inspect for damaged or pushed-out pins, corrosion or loose wires.
- Measure the resistance between the PCM pins C35 and C36 and the transaxle

harness connector pin 9.



**Fig. 47: Measuring Resistance Between PCM Pins C35 And C36 And Transaxle Harness Connector Pin 9**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T11 and the transaxle harness connector pin 8.



**Fig. 48: Measuring Resistance Between PCM And Transaxle Harness**  
Courtesy of FORD MOTOR CO.

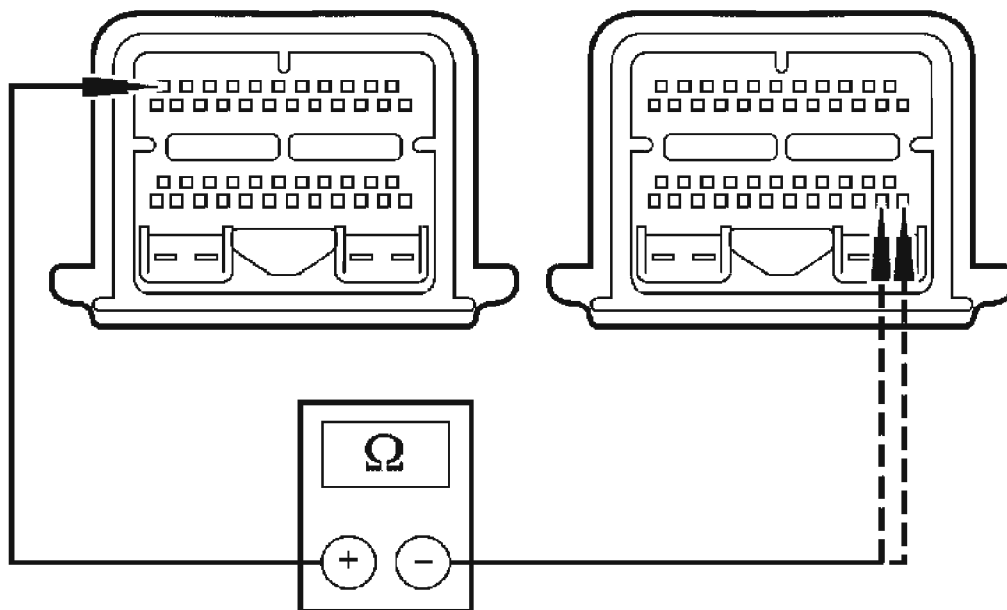
- Is each resistance less than 5 ohms?

**Yes :** GO to E4.

**No :** REPAIR open circuit(s). RECONNECT all components. CLEAR the DTCs and RERUN On-Board Diagnostics.

#### **E4 CHECK HARNESS FOR SHORT TO POWER AND GROUND**

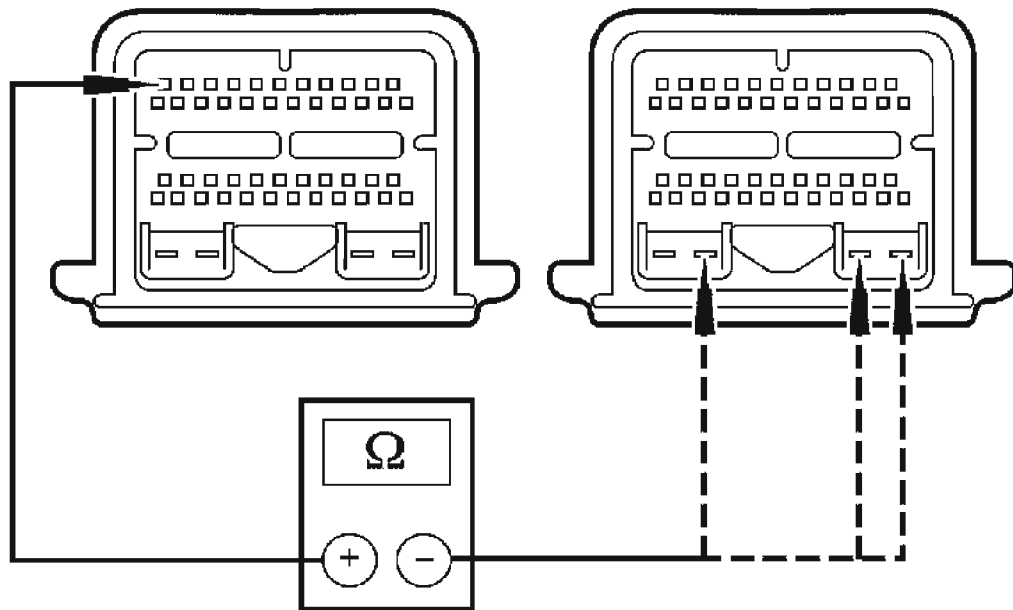
- Key in OFF position.
- Disconnect: Transaxle Connector.
- Measure the resistance between the PCM pin T11 and the PCM pins C35 and C36.



N0051736

**Fig. 49: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

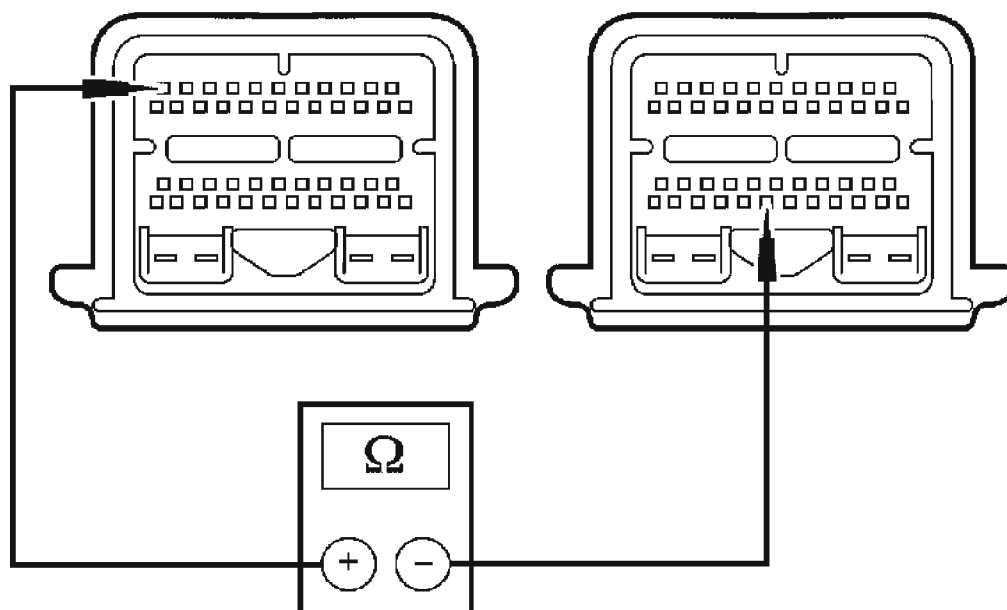
- Measure the resistance between the PCM pin T11 and the PCM pins C47, C48 and C49.



N0051737

**Fig. 50: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T11 and the PCM pin T41.



N0051738

**Fig. 51: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

- Is each resistance greater than 10,000 ohms?

Yes : GO to E5.

No : REPAIR short circuit(s). RECONNECT all components. CLEAR the DTCs and RERUN On-Board Diagnostics.

## E5 TRANSAXLE FUNCTIONAL TEST

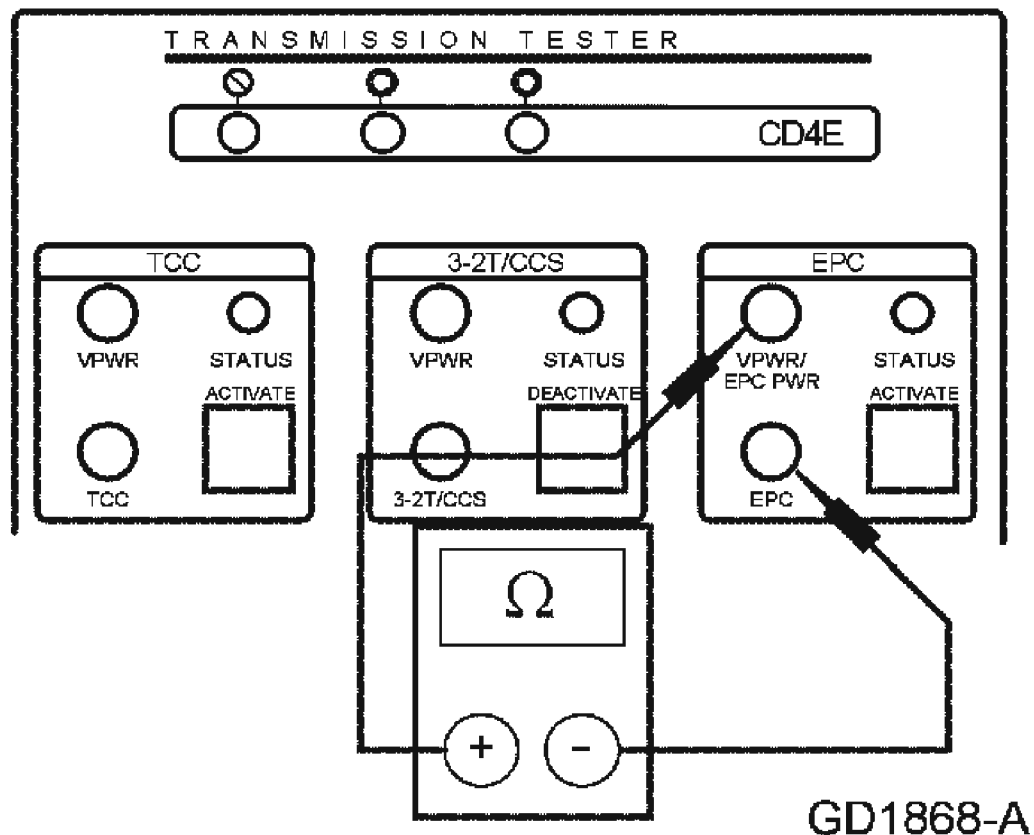
**NOTE:** LED will turn GREEN when solenoid activates and turn OFF when deactivated. LED will turn RED if activated solenoid/harness is shorted to B+. LED will remain OFF if an activated solenoid/harness is shorted to ground or no continuity (open circuit).

- Connect: PCM.
- Disconnect: Transaxle Connector.
- Install line pressure gauge at line tap on case.
- Connect: Transmission Tester.
- Set Bench/Drive switch to DRIVE mode.
- Rotate gear selector switch to 1st gear position.
- Carry out the EPC Functional Test as outlined in Transmission Tester Manual.

- Observe line pressure on gauge while pressing the EPC switch (engine must be running).
- **Does EPC (LED) activate when EPC switch is pressed and line pressure drops?**  
**Yes :** INSTALL a new PCM. RERUN On-Board Diagnostics.  
**No :** GO to E6.

## E6 CHECK RESISTANCE OF SOLENOID/HARNESS

- Set Bench/Drive switch to BENCH mode.
- Rotate gear select switch to OHMS CHECK position.
- Measure the resistance between EPC jack and VPWR jack on the Transmission Tester.



**Fig. 52: Measuring Resistance Between EPC Jack And VPWR Jack On Transmission Tester**  
 Courtesy of FORD MOTOR CO.

- Is resistance between 3.75 - 5.92 ohms?



## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

**Yes** : GO to E7.

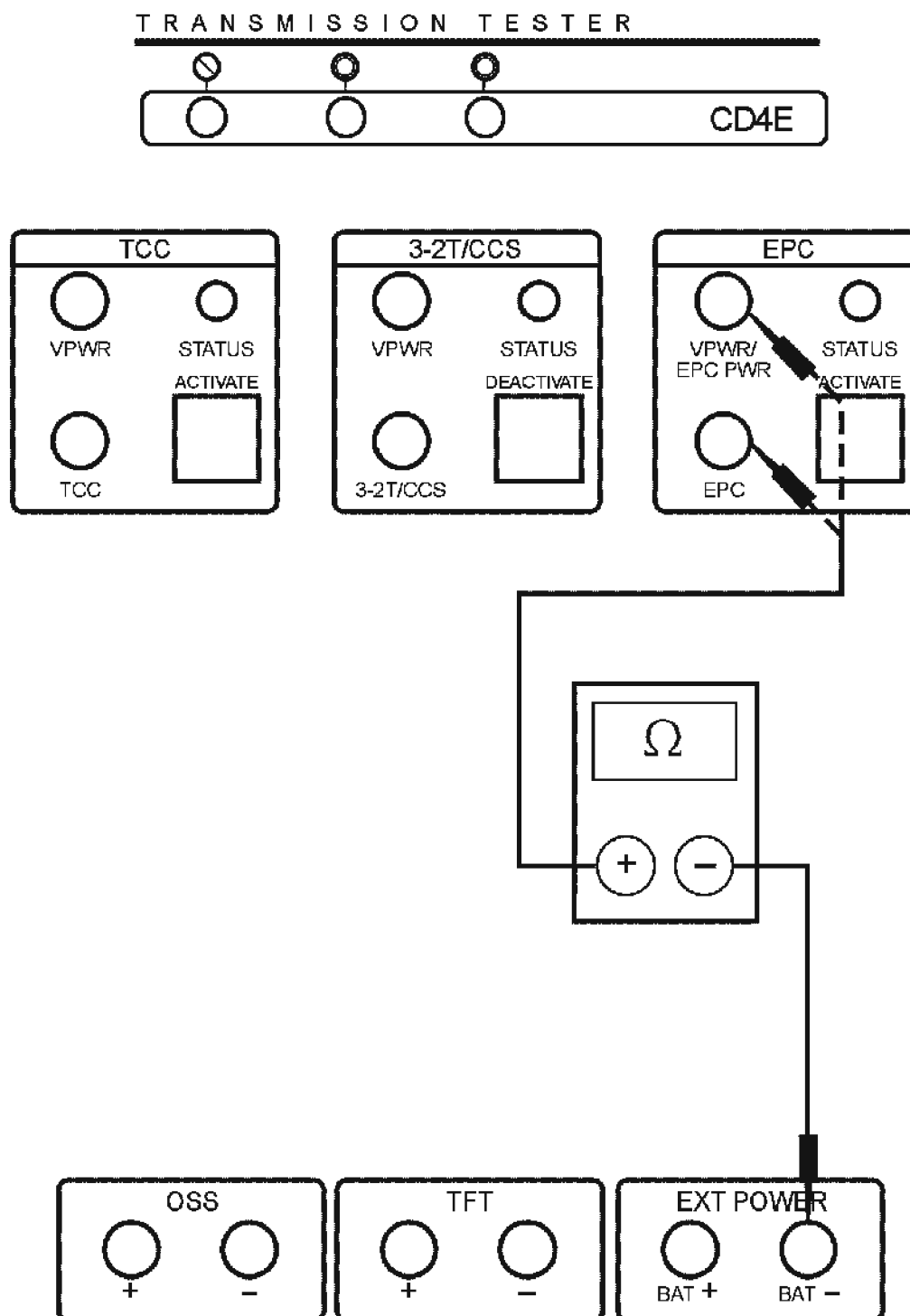
**No** : INSTALL a new solenoid body assembly. CLEAR the DTCs. RERUN On-Board Diagnostics tests.

### **E7 CHECK SOLENOID/HARNESS FOR SHORT TO GROUND**

- Measure the resistance between BAT - jack (engine ground) and EPC, and VPWR/EPC PWR on the transmission tester.

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



GD3627-A

**Fig. 53: Measuring Resistance Between BAT - Jack (Engine Ground) And**

**EPC, And VPWR/EPC PWR On Transmission Tester**  
**Courtesy of FORD MOTOR CO.****• Is the resistance greater than 10,000 ohms?**

**Yes :** INSTALL a new solenoid body assembly. REFER to **MAIN CONTROL VALVE BODY**. RECORD and CLEAR the DTCs. RERUN On-Board Diagnostics tests.

**No :** REFER to **DIAGNOSIS BY SYMPTOM**.

**PINPOINT TEST F: TURBINE SHAFT SPEED (TSS) SENSOR AND OUTPUT SHAFT SPEED (OSS) SENSOR**

**NOTE:** Refer to **Fig. or Fig.** preceding these pinpoint tests.

**F1 ELECTRONIC DIAGNOSTICS**

- Check to make sure the transmission harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Connect the scan tool.
- Key in ON position.
- Enter the following diagnostic mode on the scan tool: Diagnose Data Link.
- Enter the following diagnostic mode on the scan tool: PCM.
- Select PID/Data Monitor and Record.
- Select the following PIDs: TSS, OSS.
- **Does the vehicle enter PID/Data Monitor and Record?**

**Yes :** REMAIN in PID/DATA. GO to F2.

**No :** RERUN procedure to enter PID. If vehicle did not enter PID, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid).

**F2 DRIVE CYCLE TEST**

- While monitoring the appropriate sensor PID, drive the vehicle so that the transaxle upshifts and downshifts through all the gears.
- **Does the TSS or OSS Speed PID increase and decrease with engine and vehicle speed or is the sensor signal erratic (drop to zero or near zero and return to normal operation)?**

**Yes :** If the TSS or OSS Speed PID increase and decrease with engine and vehicle speed, CLEAR all DTCs. ROAD TEST, to VERIFY if concern is still present. If concern is still present, REFER to **DIAGNOSIS BY SYMPTOM**.

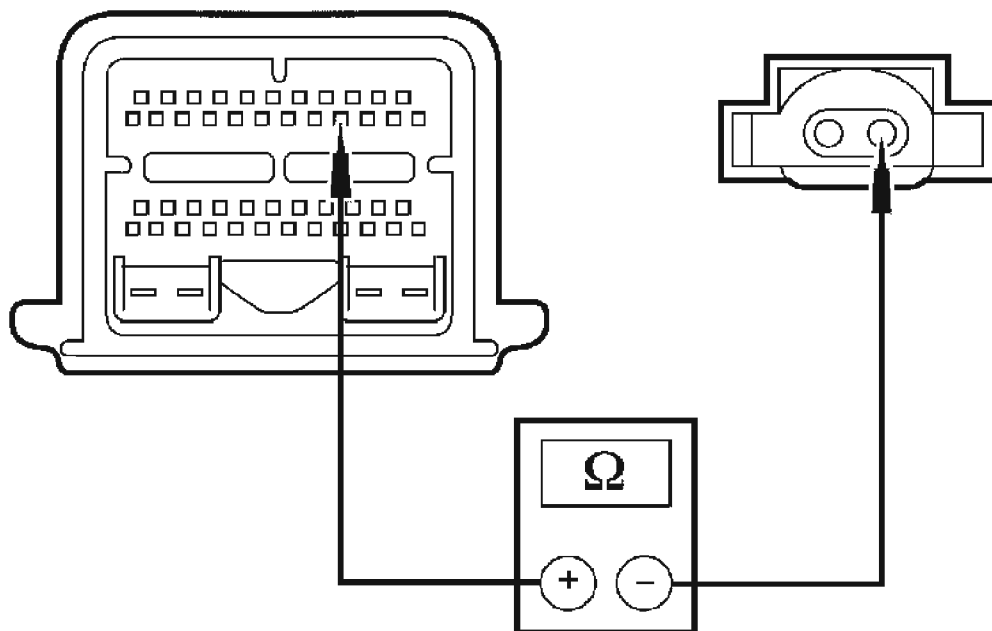
If the sensor signal is erratic, INSPECT for intermittent concern in the external harness, sensor, PCM or connector.

**No** : If the TSS or OSS Speed PID does not increase and decrease with engine and vehicle speed, the sensor signal is steady. INSPECT for open or short in vehicle harness, sensor, a PCM concern or internal hardware concern. GO to F3.

### F3 CHECK CONTINUITY OF TSS OR OSS HARNESS CIRCUITS

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press button and pull up on the transaxle vehicle harness connector.

- Key in OFF position.
- Disconnect: OSS or TSS Sensor.
- Disconnect: PCM.
- Inspect for damaged or pushed-out pins, corrosion or loose wires.
- Measure the resistance between the PCM pin T15 and TSS (+) signal circuit, harness side pin 1.

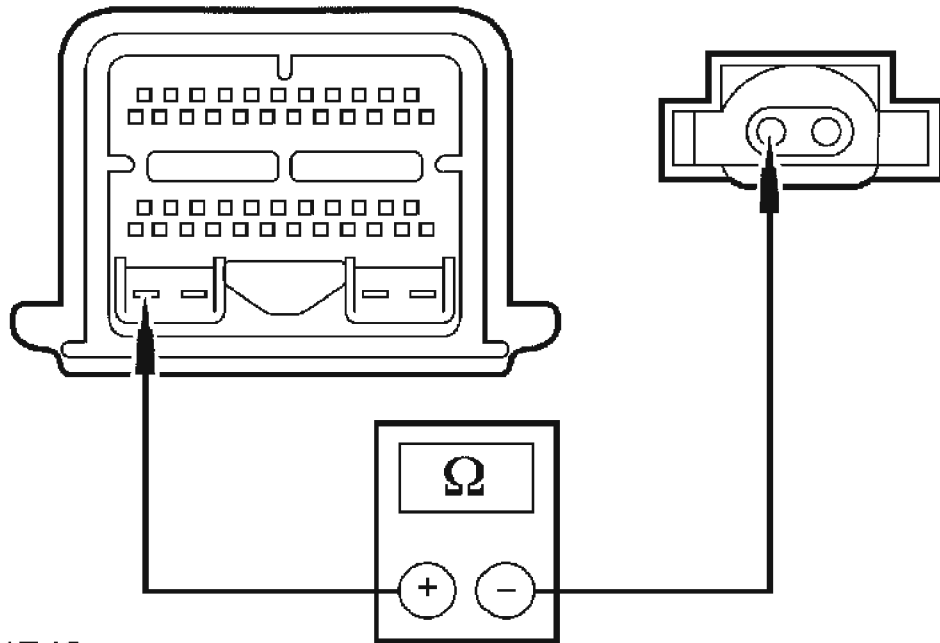


N0051739

**Fig. 54: Measuring Resistance Between PCM Pin T15 And TSS (+) Signal Circuit, Harness Side Pin 1**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin C50 and TSS (-) signal circuit,

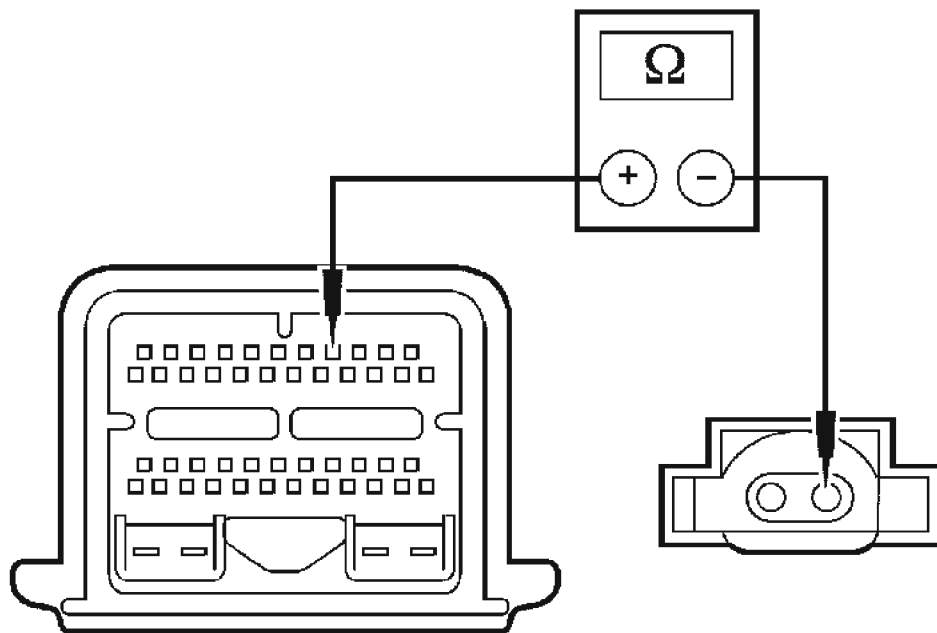
harness side pin 2.



N0051740

**Fig. 55: Measuring Resistance Between PCM Pin C50 And TSS (-) Signal Circuit, Harness Side Pin 2**  
Courtesy of FORD MOTOR CO.

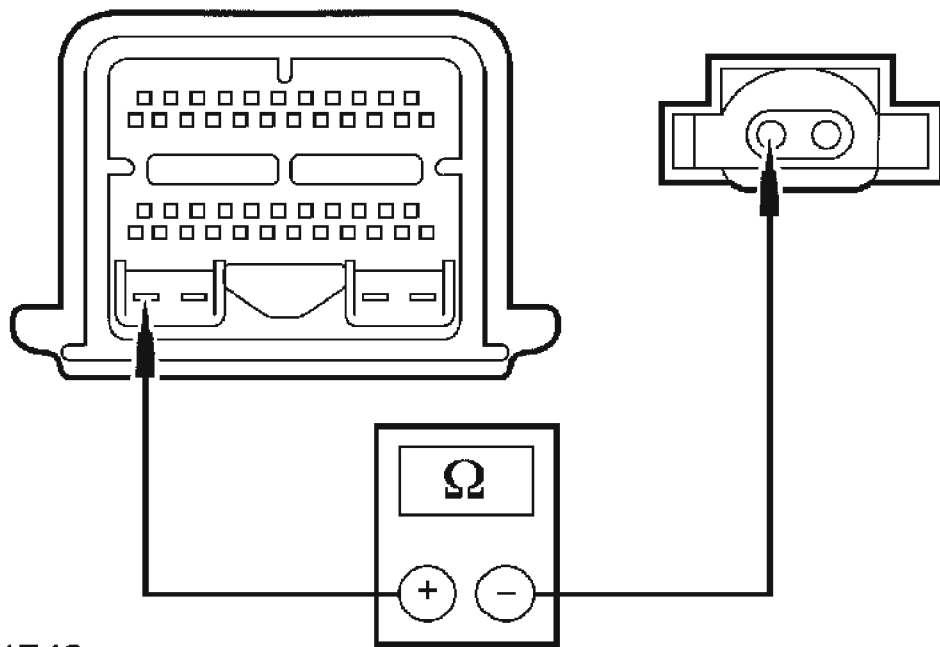
- Measure the resistance between the PCM pin T4 and OSS (+) signal circuit, harness side pin 2.



N0051741

**Fig. 56: Measuring Resistance Between PCM Pin T4 And OSS (+) Signal Circuit, Harness Side Pin 2**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin C50 and OSS (-) signal circuit, harness side pin 1.



N0051740

**Fig. 57: Measuring Resistance Between PCM Pin C50 And OSS (-) Signal Circuit, Harness Side Pin 1**  
 Courtesy of FORD MOTOR CO.

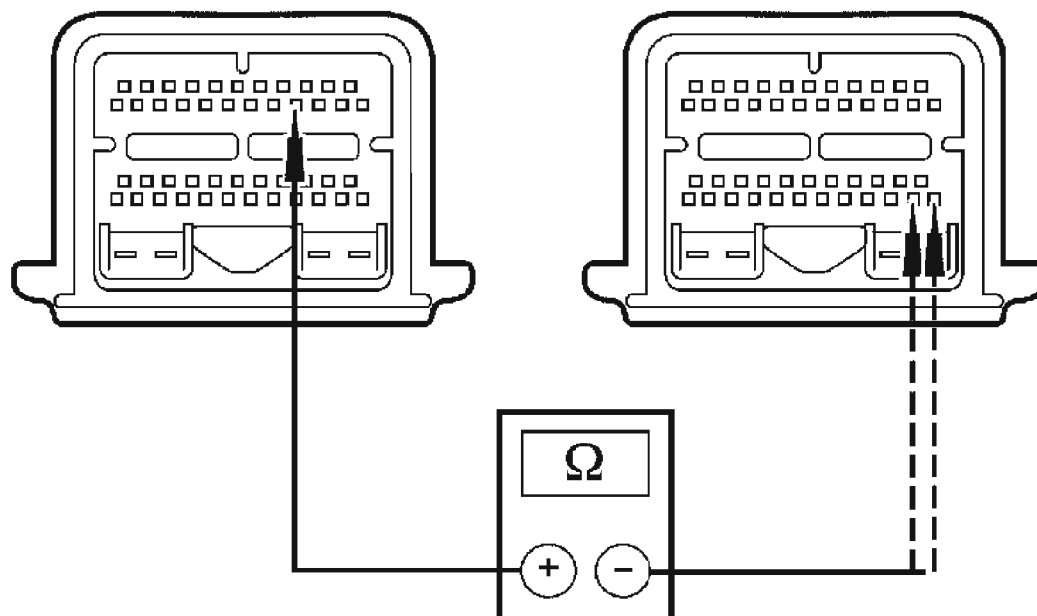
- Is each resistance less than 5 ohms?

**Yes :** GO to F4.

**No :** REPAIR open circuit(s). RECONNECT all components. CLEAR the DTCs. RERUN On-Board Diagnostics.

#### **F4 CHECK TSS CIRCUITS OR OSS CIRCUITS FOR SHORT TO POWER AND GROUND**

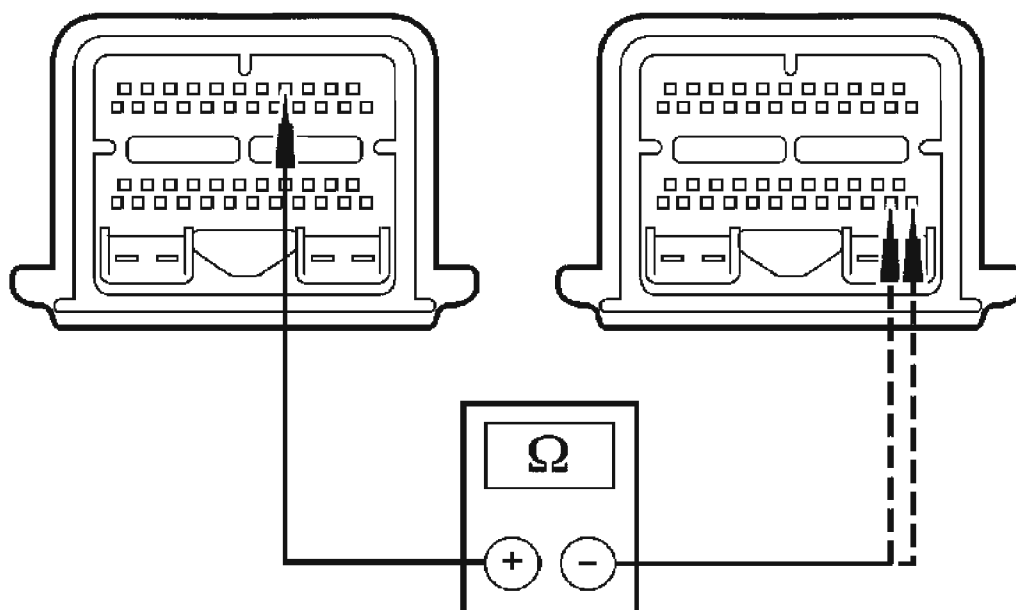
- Key in OFF position.
- Disconnect: TSS or OSS.
- Measure the resistance between the PCM pin T15 and the PCM pins C35 and C36.



N0051742

**Fig. 58: Measuring Resistance Between PCM Pins**  
 Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T4 and the PCM pins C35 and C36.

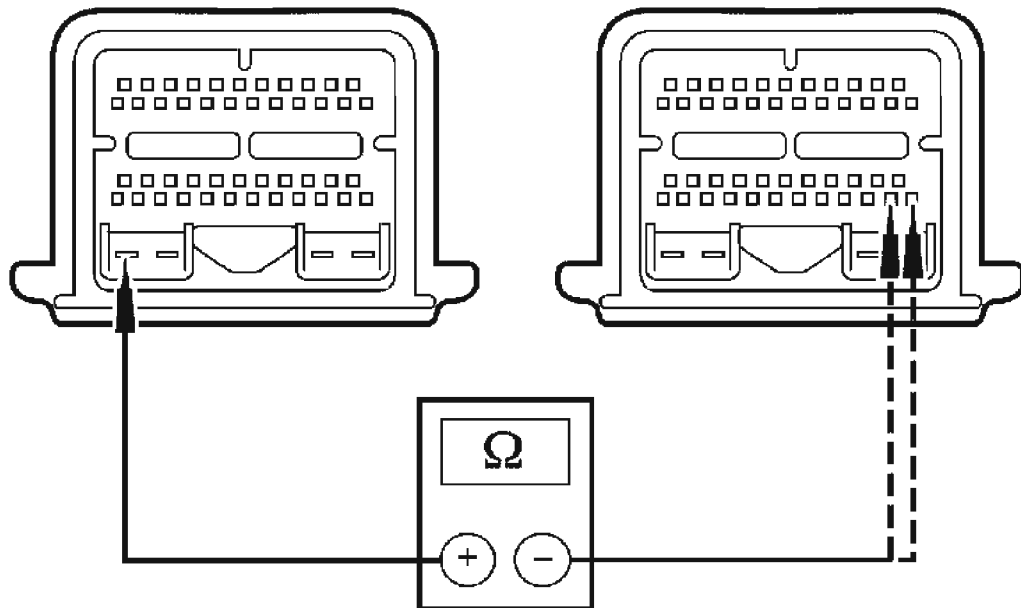


N0051743



**Fig. 59: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

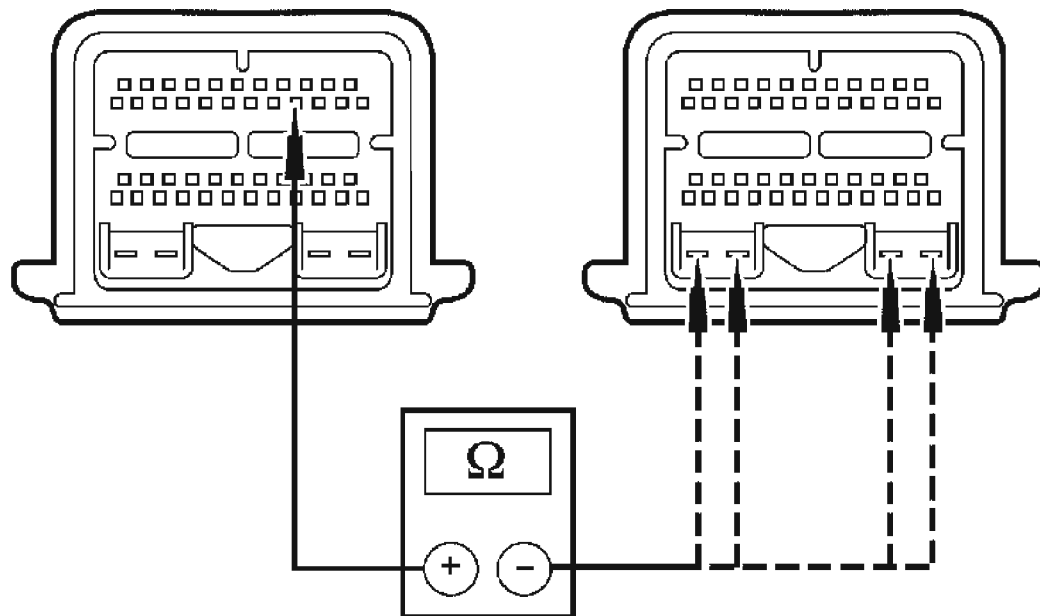
- For the TSS and OSS (-), measure the resistance between the PCM pin C50 and the PCM pins C35 and C36.



N0051744

**Fig. 60: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

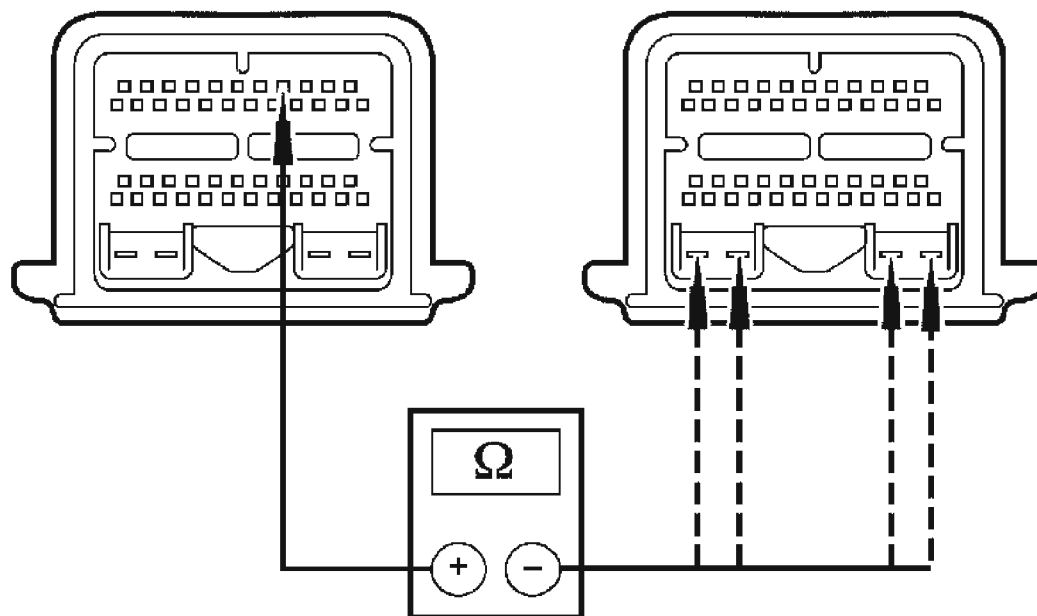
- Measure the resistance between the PCM pin T15 and the PCM pins C47, C48, C49 and C50.



N0051745

**Fig. 61: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T4 and the PCM pins C47, C48, C49 and C50.



N0051746

**Fig. 62: Measuring Resistance Between PCM Pins**  
 Courtesy of FORD MOTOR CO.

- Is each resistance greater than 10,000 ohms?

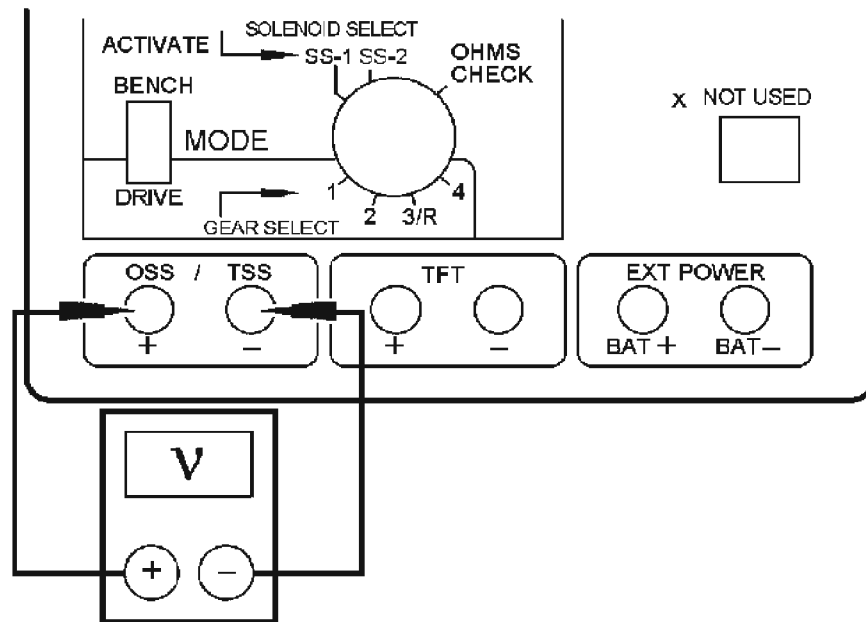
**Yes :** GO to F5.

**No :** REPAIR short circuit(s). RECONNECT all components. ERASE DTCs and RERUN On-Board Diagnostics.

#### F5 TSS OR OSS FUNCTIONAL TEST

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Press and pull transaxle vehicle harness connector.

- Connect: PCM.
- Disconnect: TSS or OSS.
- Connect: Transmission Tester.
- Connect the transmission tester to the TSS or OSS sensor.
- Measure the voltage between +TSS or +OSS to -TSS or -OSS. Set VOM to AC.



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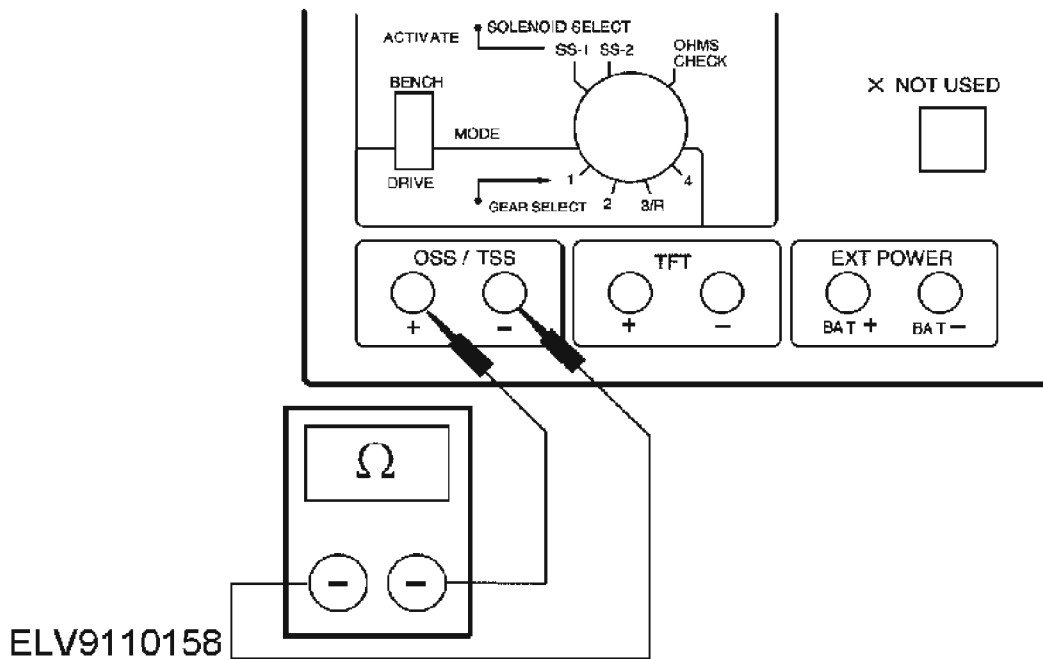
**Fig. 63: Measuring Voltage Between +TSS Or +OSS To -TSS Or -OSS Set VOM To AC**  
 Courtesy of FORD MOTOR CO.

- Does voltage increase with an increase in vehicle speed?  
 Yes : INSTALL a new PCM.  
 No : GO to F6.

#### F6 CHECK RESISTANCE OF TSS OR OSS SENSOR

**NOTE:** Refer to Transmission Tester for terminal locations.

- Measure the resistance between +TSS/+OSS jack and -TSS/-OSS jack on the Transmission Tester.



**Fig. 64: Measuring Resistance Between +TSS/+OSS Jack And -TSS/-OSS Jack On Transmission Tester**  
 Courtesy of FORD MOTOR CO.

- Record the resistance.

#### SENSOR RESISTANCE

Sensor	Resistance (Ohms)
TSS	625 - 1,150
OSS	503 - 1,010

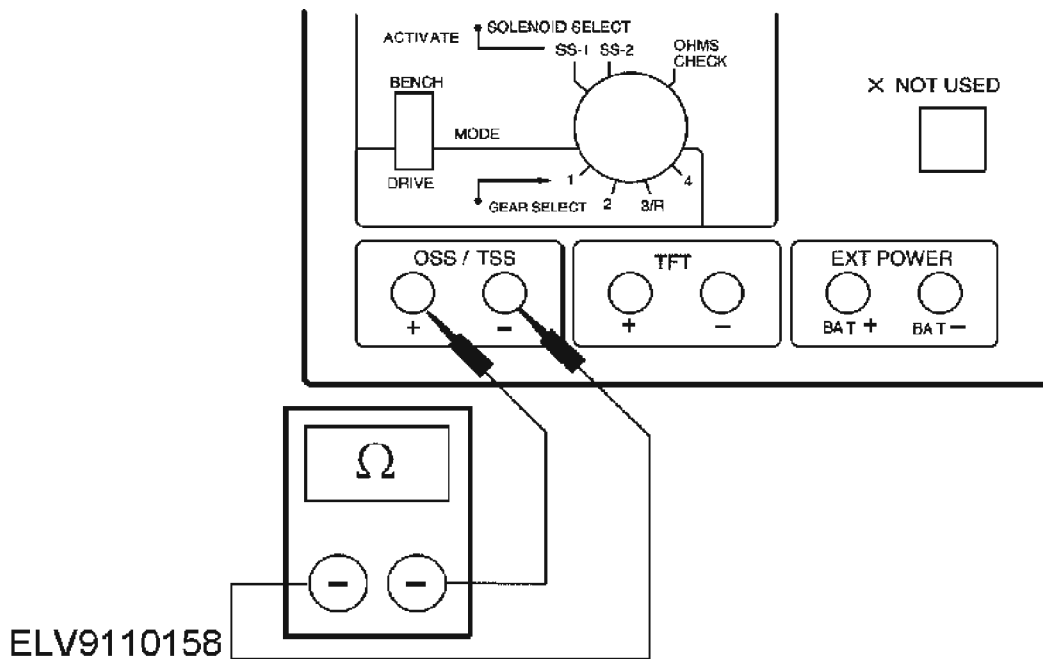
- Is resistance within specification for the appropriate sensor?

**Yes :** GO to F7.

**No :** INSTALL a new TSS/OSS sensor. REFER to **TURBINE SHAFT SPEED (TSS) SENSOR** or **OUTPUT SHAFT SPEED (OSS) SENSOR**. TEST the system for normal operation.

#### F7 CHECK SENSOR FOR SHORT TO GROUND

- Measure the resistance between BAT-jack (engine ground) and OSS/TSS (+), OSS/TSS (-) jack on the Transmission Tester.



**Fig. 65: Measuring Resistance Between BAT-Jack (Engine Ground) And OSS/TSS (+), OSS/TSS (-) Jack On Transmission Tester**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

Yes : For TSS, GO to F8.

For OSS, GO to F10.

No : INSTALL a new TSS or OSS sensor. REFER to **TURBINE SHAFT SPEED (TSS) SENSOR** or **OUTPUT SHAFT SPEED (OSS) SENSOR**. GO to F5.

#### **F8 CHECK TSS MAGNETISM**

- Remove the TSS sensor from transaxle.
- Place the TSS sensor against a metal surface to which it should stick. The TSS sensor should be magnetized and stick to the metal surface.
- Does TSS sensor stick?

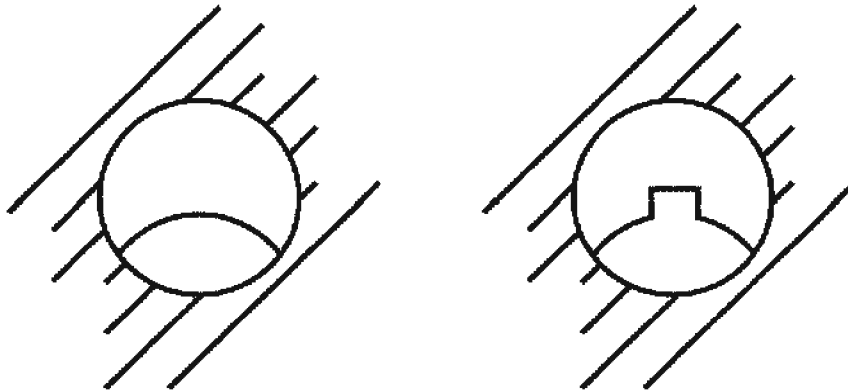
Yes : GO to F9.

No : INSTALL a new TSS sensor. REFER to **TURBINE SHAFT SPEED (TSS) SENSOR**. GO to F5.

#### **F9 CHECK EXCITER WHEEL**

**NOTE:**      **Make sure a tooth is visible. The exciter wheel will always be visible through the TSS sensor hole.**

- Remove the TSS sensor.
- With a remote starter switch, start and stop engine until a tooth of the exciter wheel is visible through the TSS sensor hole.



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**Fig. 66: Checking Exciter Wheel**  
Courtesy of FORD MOTOR CO.

- **Are all 4 teeth present?**

**Yes :** INSTALL a new TSS sensor. REFER to **TURBINE SHAFT SPEED (TSS) SENSOR**. TEST the system for normal operation.

**No :** REPAIR or INSTALL a new exciter wheel as necessary. TEST the system for normal operation.

#### **F10 CHECK OSS MAGNETISM**

- Remove OSS sensor from transaxle.
- Place the OSS sensor against a metal surface to which it should stick. The OSS sensor should be magnetized and stick to the metal surface.

- **Does the OSS sensor stick?**

**Yes :** The concern is not in the OSS sensor system. REFER to **DIAGNOSIS BY SYMPTOM** shift concerns for further diagnosis.

**No :** INSTALL a new OSS sensor. REFER to **OUTPUT SHAFT SPEED (OSS) SENSOR**.

**PINPOINT TEST G: TIMING/COAST CLUTCH SOLENOID (3-2T/CCS)****G1 ELECTRONIC DIAGNOSTICS**

- Key in OFF position.
- Connect: Transaxle Connector.
- Connect the scan tool.
- Key in ON position.
- Carry out KOEO Test until continuous DTCs have been displayed.
- Enter Output Test Mode (OTM). Refer to **ON-BOARD DIAGNOSTICS**.
- Select the mode ALL ON. Push START to turn outputs on. Push STOP to turn outputs off.

**• Does vehicle enter OTM?**

**Yes** : REMAIN in OTM. GO to G2.

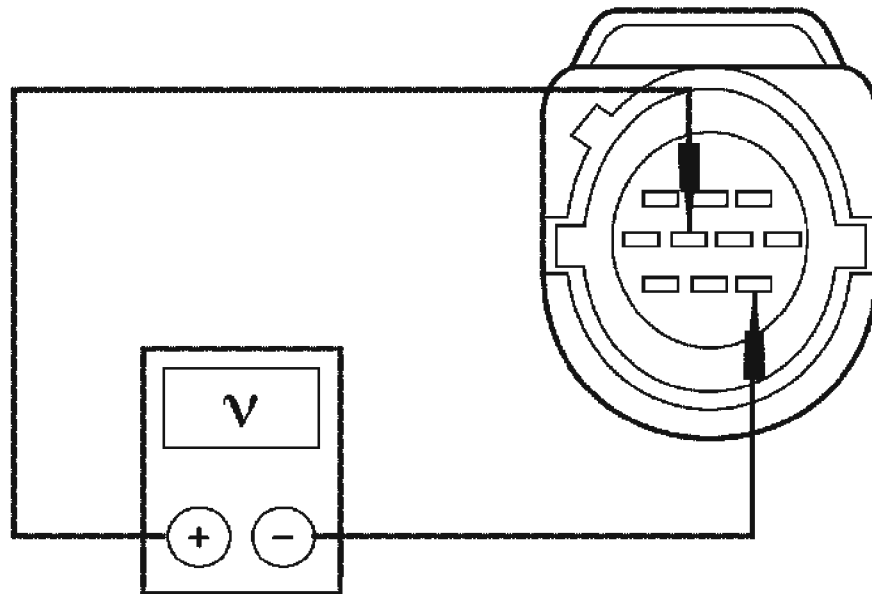
**No** : PRESS START. If vehicle does not enter OTM, refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION-HYBRID ESCAPE** article for Escape (Hybrid).

**G2 CHECK ELECTRICAL SIGNAL OPERATION**

**CAUTION: Do not try to remove the connector with a screwdriver, press and pull transaxle vehicle harness connector.**

- Key in OFF position.
- Disconnect: Transaxle Connector.
- Use a mirror to inspect both ends of connector for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Key in ON position.
- Measure the voltage between pin 5 and pin 10 at the transaxle vehicle harness connector.





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**Fig. 67: Measuring Voltage Between Pin 5 And Pin 10 At Transaxle Vehicle Harness Connector**

**Courtesy of FORD MOTOR CO.**

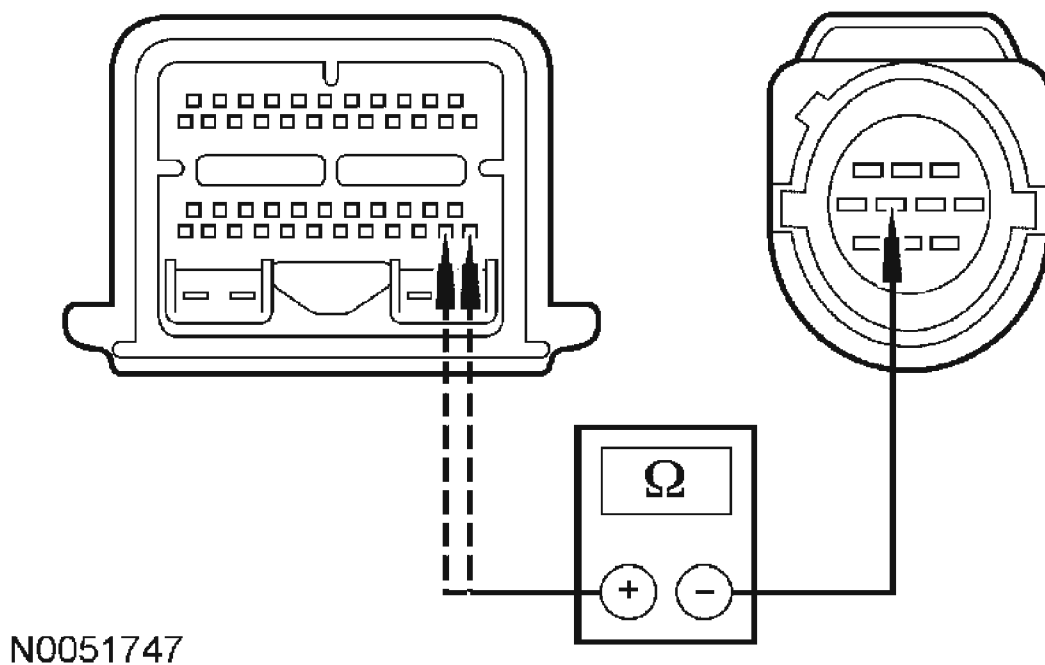
- Observe voltmeter and press START and STOP to cycle solenoid output on and off.
- **Does the suspect solenoid output voltage change at least 0.5 volt?**

**Yes :** GO to G6.

**No :** GO to G3.

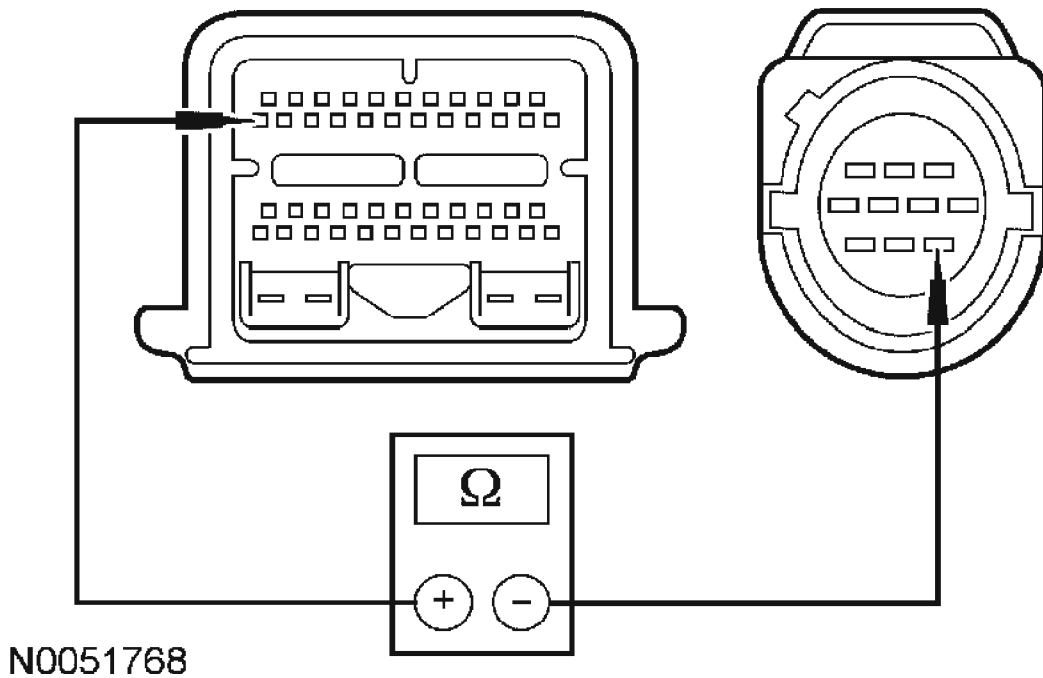
### **G3 CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUIT**

- Key in OFF position.
- Disconnect: PCM.
- Inspect for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Measure the resistance between the PCM pins C35 and C36 and transaxle vehicle harness connector pin 5.



**Fig. 68: Measuring Resistance Between PCM And Transaxle Vehicle Harness**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T23 and the transaxle vehicle harness connector pin 10.



**Fig. 69: Measuring Resistance Between PCM And Transaxle Vehicle Harness**  
Courtesy of FORD MOTOR CO.

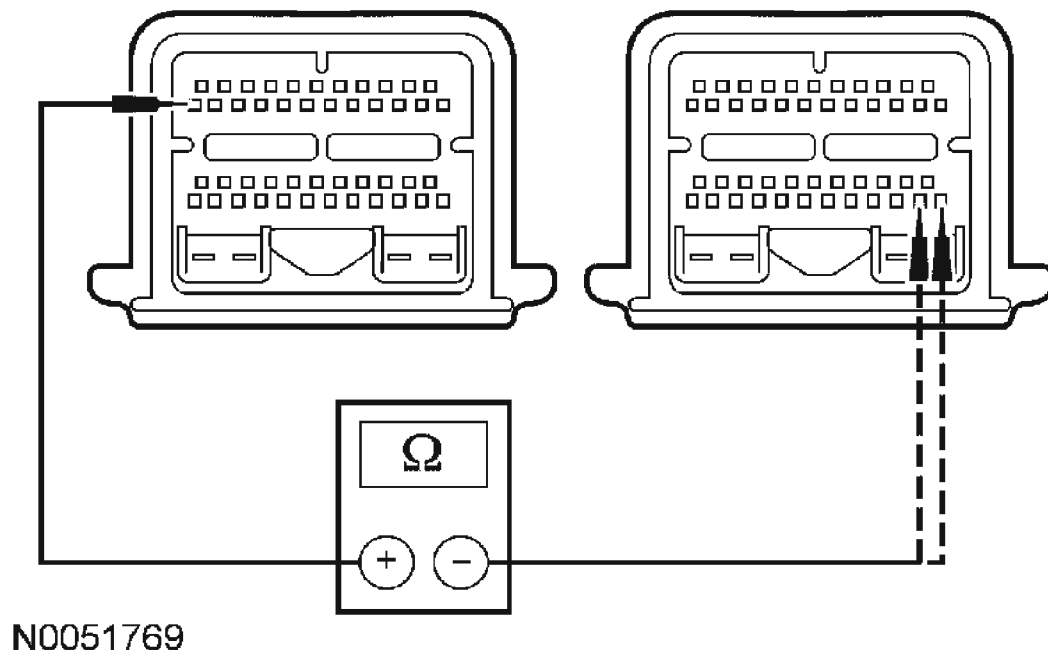
- Is each resistance less than 5 ohms?

Yes : GO to G4.

No : REPAIR the circuit(s). RECONNECT all components. CLEAR the DTCs.  
RERUN On-Board Diagnostics tests.

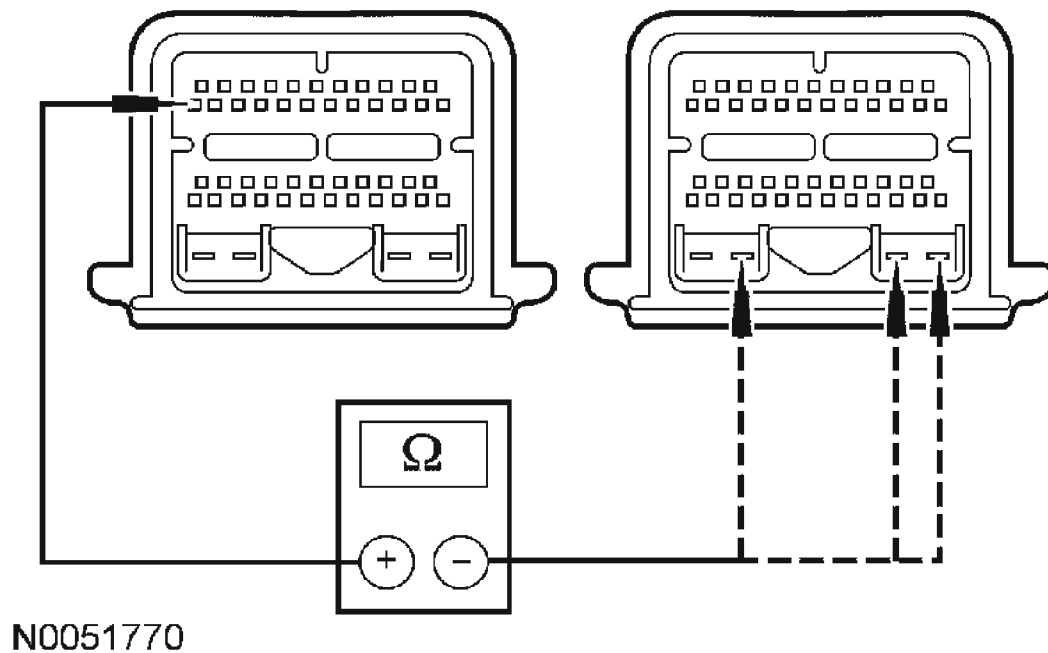
#### **G4 CHECK HARNESS FOR SHORT TO POWER OR GROUND**

- Disconnect: PCM.
- Disconnect: Transaxle Harness.
- Measure the resistance between the PCM pin T23 and the PCM pins C35 and C36.



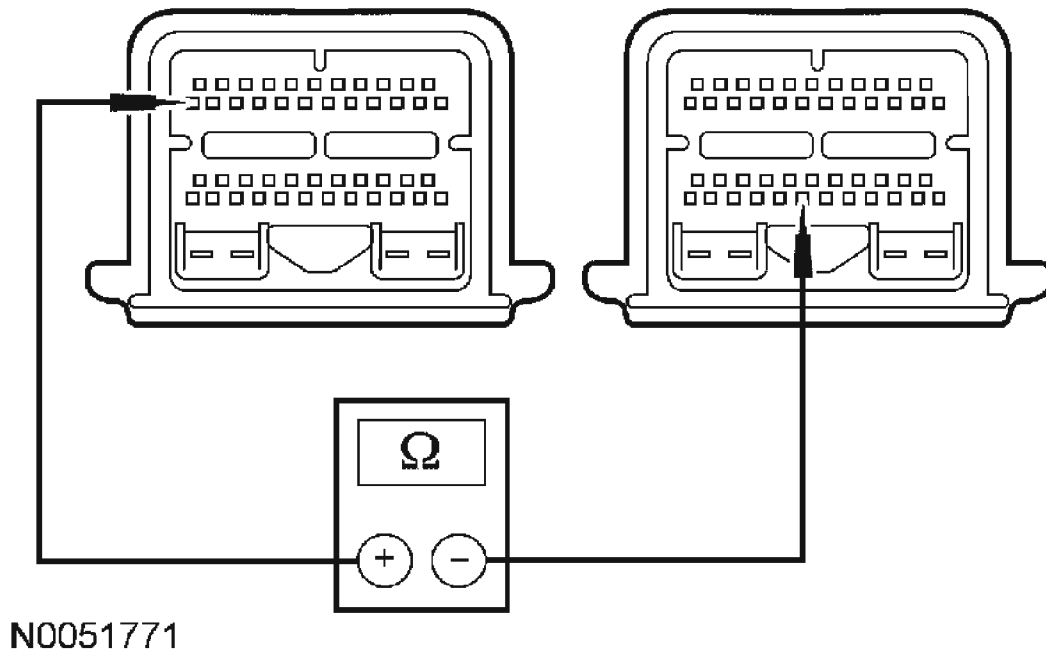
**Fig. 70: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T23 and the PCM pins C47, C48 and C49.



**Fig. 71: Measuring Resistance Between PCM Pins**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the PCM pin T23 and the PCM pin T41.



**Fig. 72: Measuring Resistance Between PCM Pins**  
 Courtesy of FORD MOTOR CO.

- Is each resistance greater than 10,000 ohms?

Yes : GO to G5.

No : REPAIR the circuit. RECONNECT all components. RERUN On-Board Diagnostics tests.

### G5 TRANSAXLE FUNCTIONAL TEST

**CAUTION:** Do not pry on the connector. This will damage the connector and can result in a transaxle concern. Pull on the connector harness.

**NOTE:** LED will turn GREEN when solenoid activates and turn OFF when deactivated. LED will turn RED if an activated solenoid/harness is shorted to battery positive. LED will remain OFF if an activated solenoid/harness is shorted to ground or no continuity (open circuit).

- Disconnect: Transaxle Harness Connector.
- Connect: Transmission Tester.
- Carry out all Static Testing - Engine OFF procedures for the shift solenoids.

- **Does solenoid (LED green) activate?**

**Yes** : GO to G6.

**No** : GO to G7.

**G6 TRANSAXLE DRIVE TEST**

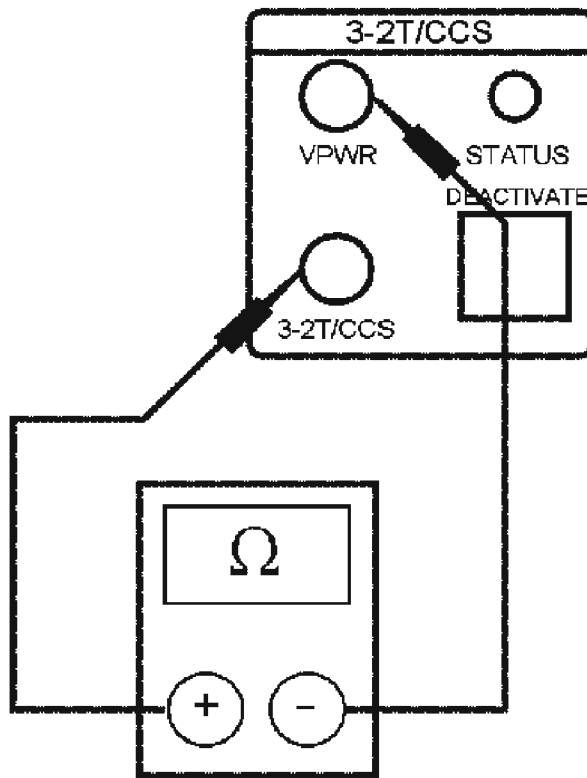
- Connect: PCM.
- Disconnect: Transaxle Harness.
- Connect: Transmission Tester.
- Set Bench/Drive switch to DRIVE mode.
- Rotate gear selector switch to 1st gear position.
- Carry out the 3-2T/CCS Function Test outlined in the Transmission Tester manual.
- **When the 3-2T/CCS switch is released, does engine braking occur and does the 3-2T/CCS engage (LED OFF)?**

**Yes** : INSTALL a new PCM. RERUN On-Board Diagnostics tests.

**No** : GO to G7.

**G7 CHECK RESISTANCE OF SOLENOID**

- Measure the resistance between VPWR jack and 3-2T/CCS jack on the Transmission Tester.



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**Fig. 73: Measuring Resistance Between VPWR Jack And 3-2T/CCS Jack On Transmission Tester**

Courtesy of FORD MOTOR CO.

- Is the resistance between 3.75-5.92 ohms?

**Yes** : GO to G8.

**No** : INSTALL a new solenoid body assembly. REFER to **MAIN CONTROL VALVE BODY**. CLEAR the DTCs. RERUN On-Board Diagnostics tests.

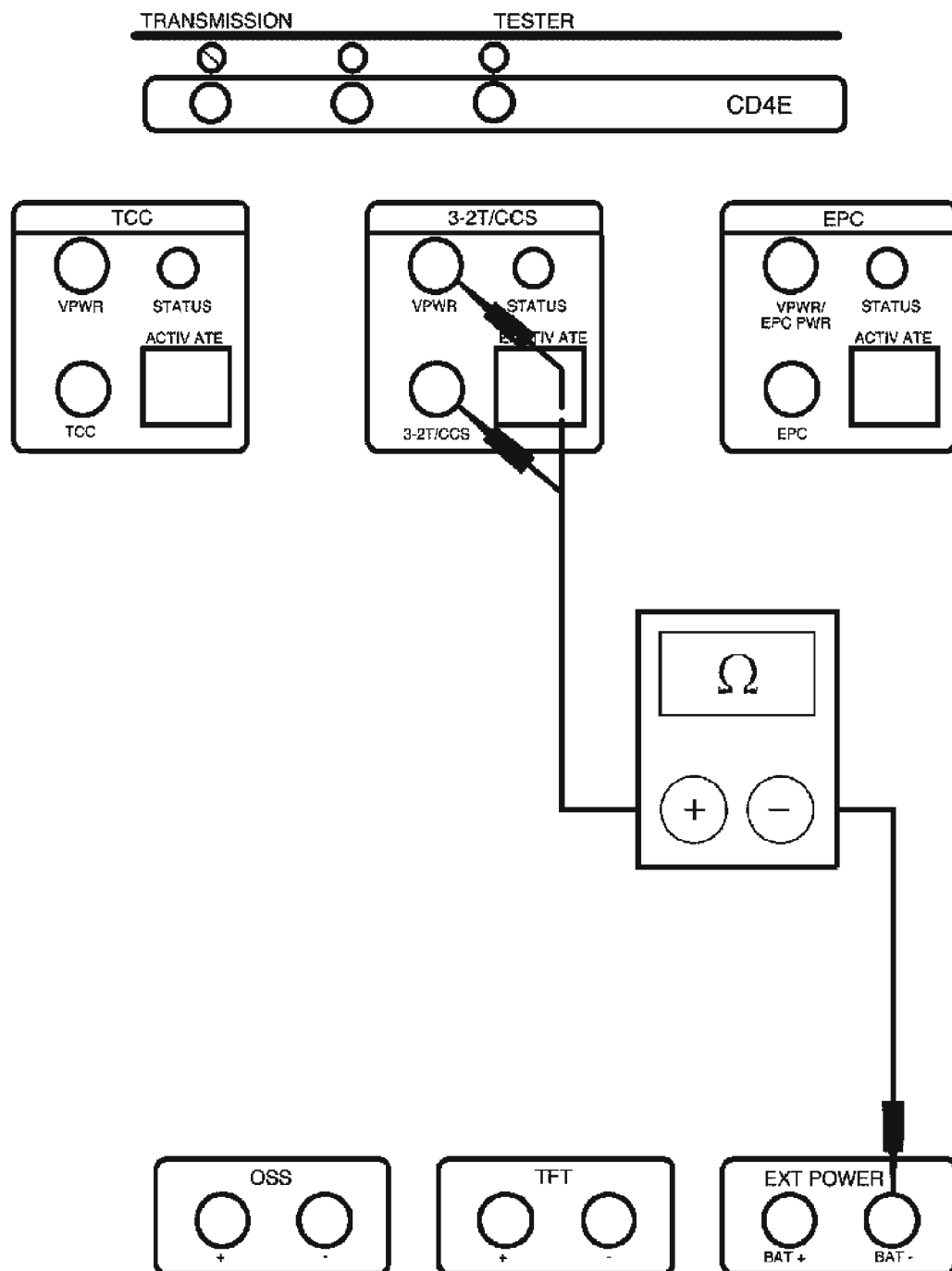
#### **G8 CHECK SOLENOID FOR SHORT TO GROUND**

- Measure the resistance between jack BAT- (engine ground) and VPWR jack and 3-2T/CCS jack on the Transmission Tester.



## 2005 Ford Escape

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**Fig. 74: Measuring Resistance Between Jack BAT- (Engine Ground) And VPWR Jack And 3-2T/CCS Jack On Transmission Tester**  
Courtesy of FORD MOTOR CO.

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

**Yes :** INSTALL a new solenoid body assembly. REFER to **MAIN CONTROL VALVE BODY**. CLEAR the DTCs. RERUN On-Board Diagnostics tests.

**No :** REFER to **DIAGNOSIS BY SYMPTOM**.

**PINPOINT TEST H: SOLENOID MECHANICAL FAILURE**

**NOTE:**      **Repair all other DTCs before repairing the following DTCs: P1714, P1715.**

**H1 ELECTRONICS DIAGNOSIS**

- Disconnect the scan tool.
- Select PARK.
- Key in ON position.
- Carry out KOEO Test until continuous DTCs have been displayed.
- If P1714, P1715 DTCs are present, continue with this test.
- **Are other DTCs present for TFT or shift solenoids?**

**Yes :** REPAIR the DTCs for TFT or shift solenoids first. CLEAR the DTCs and CARRY OUT Transmission Drive Cycle Test. RERUN Quick Test.

**No :** INSTALL a new solenoid and/or body. REFER to **MAIN CONTROL VALVE BODY**. GO to H2.

**H2 TRANSAXLE DRIVE CYCLE TEST**

- Carry out Transaxle Drive Test. Refer to **TRANSAXLE DRIVE CYCLE TEST**.
- **Does the vehicle upshift and downshift OK?**

**Yes :** GO to H3.

**No :** REFER to **DIAGNOSIS BY SYMPTOM** to diagnose shift concerns.

**H3 RETRIEVE DTCs**

- Connect the scan tool.
- Select PARK.
- Key in ON position.
- Carry out KOEO Test until continuous DTCs have been displayed.
- **Are DTCs P1714, P1715 still present?**

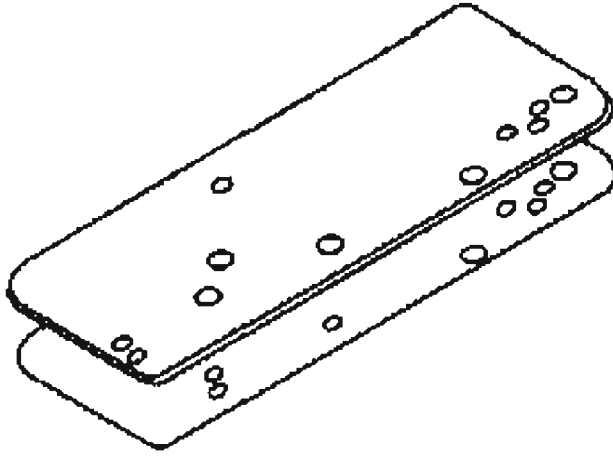
**Yes :** INSTALL a new PCM. ROAD TEST and RERUN Quick Test.

**No :** Testing completed. If a concern still exists. REFER to **DIAGNOSIS BY SYMPTOM**.

**SPECIAL TESTING PROCEDURES**

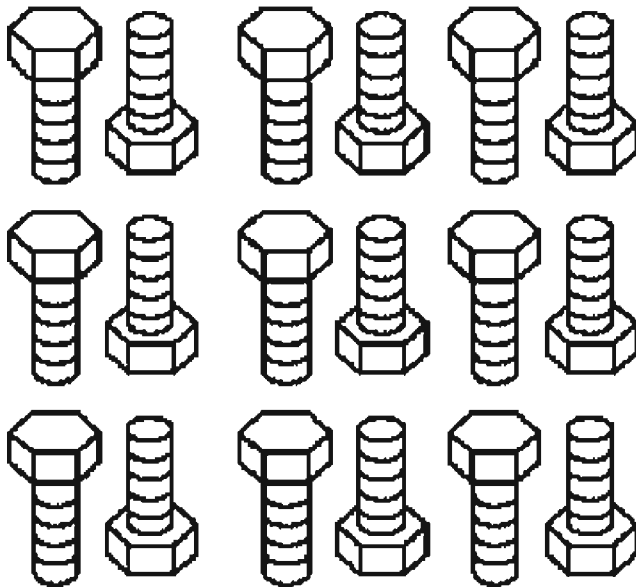
Special Tool(s)

## SPECIAL TOOLS DESCRIPTION



Air Test Plate, Transmission 307-301  
(T94P-77000-S)

**ST1801-A**



Test Plate Screw Set, Transmission  
307-126 (T82P-7006-C)

**ST1940-A**

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

Engine Idle Speed Check

Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid) for the engine idle speed adjustment procedure.

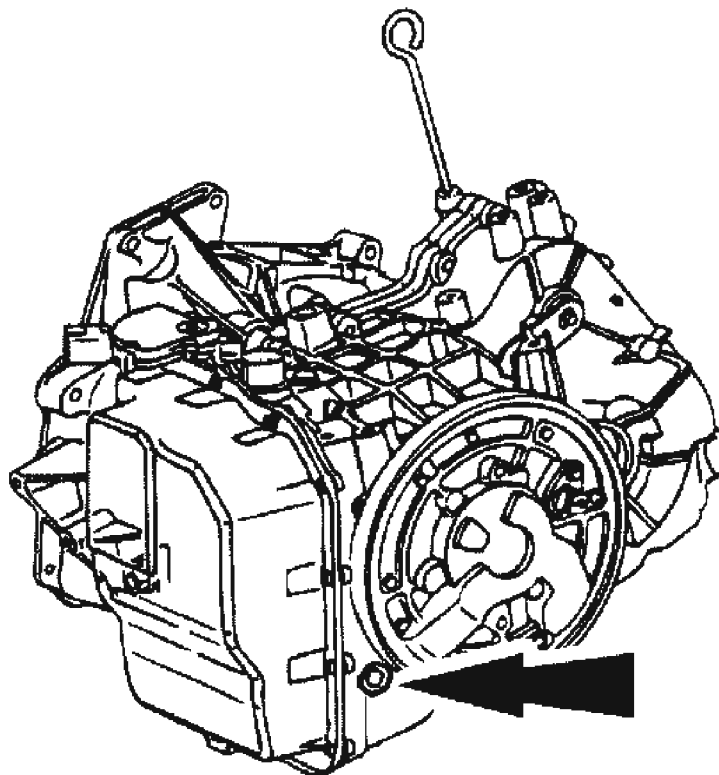
#### Line Pressure Test

**CAUTION:** Carry out Line Pressure Test before carrying out Stall Speed Test. If line pressure is low at stall, do not carry out stall test or further transaxle damage can occur. Do not maintain WOT in any gear range for more than 5 seconds.

**CAUTION:** The Transmission Tester must be removed from the transaxle and the vehicle harness connected to verify these pressures.

The Line Pressure Test verifies that the line pressure is within specifications.

1. Connect pressure gauge to line pressure tap.



**Fig. 75: Identifying Line Pressure Tap**

**Courtesy of FORD MOTOR CO.**

2. Start engine and check line pressures. Refer to following the **LINE PRESSURE CHART** to determine if line pressure is within specifications.
3. If line pressure is not within specifications, carry out on-board diagnostics and pinpoint test, air pressure check and repair main control system or pump as required.

**Line Pressure Chart (2.3L and 3.0L)****LINE PRESSURE CHART (2.3L AND 3.0L)**

Gear	Line Pressure at Idle		Line Pressure at Stall	
	kPa	psi	kPa	psi
P/N	441 - 524	64 - 76	-	-
R	441 - 524	64 - 76	1786 - 2027	259 - 294
D	324 - 372	47 - 54	1158 - 1269	168 - 184
2	324 - 372	47 - 54	1158 - 1269	168 - 184
1	324 - 372	47 - 54	1158 - 1269	168 - 184

**Line Pressure Diagnosis**

If the line pressure is low at idle in all ranges check the following items:

- Low fluid level
- Restricted inlet filter
- Loose main body
- Solenoid body or accumulator body to case bolts
- Excessive leakage in pump
- Case
- Control bodies
- Sticking main regulator valve or damaged inlet tube seal on inlet filter
- Damaged gaskets or separator plate

If the line pressure is high at idle in all ranges then check the following items:

- Main regular valve
- Solenoid body and wiring harness
- Run Quick Test referred to in electrical diagnosis in this article

**Stall Speed Test**

The Stall Speed Test checks the operation of the following items:

- Torque converter one-way clutch
- Forward clutch
- Low/reverse one-way clutch
- Reverse clutch
- Forward one-way clutch
- Engine driveability concerns

**WARNING:** Apply the service and parking brakes firmly while carrying out each stall test. Failure to set brakes can result in death or bodily injury.

**CAUTION:** Carry out Line Pressure Test before carrying out the stall test. If line pressure is low at stall, do not carry out stall test or further transaxle damage can occur.

**NOTE:** The stall test should only be carried out with the engine and transaxle at normal operating temperatures.

1. Connect a tachometer to the engine.

**CAUTION:** Do not maintain wide open throttle (WOT) in any gear range for more than 5 seconds.

**CAUTION:** If engine rpm recorded by the tachometer exceeds maximum specified rpm, release accelerator pedal immediately. Clutch or band slippage is indicated.

2. Press accelerator pedal to floor (WOT) in each range. Record rpm reached in each range. Stall speeds should be in appropriate range.

#### Stall Speed Chart

#### STALL SPEED CHART

Engine	RPM
3.0L	2451 - 2870
2.3L	2095 - 2467

After testing DRIVE (D) and REVERSE (R), move transaxle range selector lever to NEUTRAL (N) and run engine for about 15 seconds to allow torque converter to cool before testing next range.

If the stall speeds were too high, refer to the following **STALL SPEED DIAGNOSIS**

**CHART.** If the stall speeds were too low, first check engine tune-up. If engine is OK, remove torque converter and check torque converter one-way clutch for slippage.

#### Stall Speed Diagnosis Chart

#### STALL SPEED DIAGNOSIS CHART

Range	Possible Source
D, 2, 1	Forward Clutch Forward One-Way Clutch Low One-Way Clutch
R	Reverse Clutch Low/Reverse Clutch

#### Air Pressure Tests

A no-drive condition can exist even with correct transmission fluid pressure because of inoperative clutches or bands. Refer to the **BAND AND CLUTCH APPLICATION CHARTS A** and **BAND AND CLUTCH APPLICATION CHART B** to determine the appropriate elements. A clutch concern can be located by substituting air pressure for oil pressure to determine the location of the malfunction.

For example, when the transaxle range selector lever is in a forward gear range ((D), 2, 1), a no-drive condition can be caused by an inoperative forward clutch.

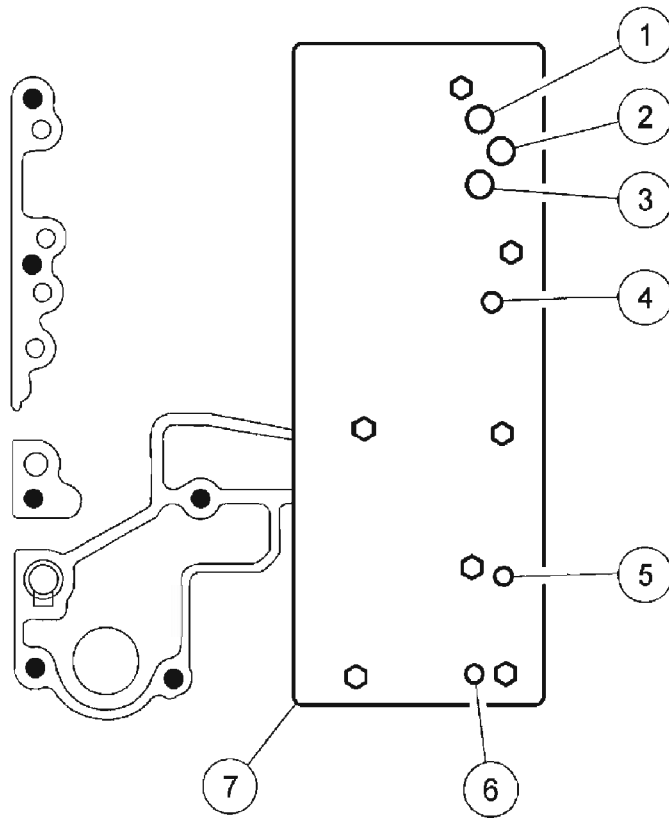
#### Test Procedures

Carry out the following procedures:

1. Drain the transaxle. Remove main control cover.
2. Remove the main control as an assembly with the solenoid body assembly.
3. The inoperative clutches can be located by applying air pressure into the appropriate clutch port. Refer to **AIR PRESSURE TEST** Port Locations diagram.
4. Install the transmission test plate using 6 bolts.
  - Tighten to 12 Nm (9 lb-ft).

**CAUTION:** The coast clutch circuit should not be applied unless air pressure is maintained in the forward clutch circuit. Failure to do so can result in the coast clutch piston coming out of the forward clutch piston.

**NOTE:** Refer to the **BAND AND CLUTCH APPLICATION CHARTS A** and **BAND AND CLUTCH APPLICATION CHART B**.



N0024421

Item	Part Number	Description
1	—	Test port — reverse clutch
2	—	Test port — forward clutch
3	—	Test port — direct clutch
4	—	Test port — low/reverse clutch
5	—	Test port — servo release
6	—	Test port — servo apply
7	307-301	Test plate — transmission

**Fig. 76: Identifying Air Pressure Test Ports Location**  
 Courtesy of FORD MOTOR CO.

5. Apply air pressure 275 kPa (40 psi) to the appropriate clutch port (refer to **AIR PRESSURE TEST PORT** Locations diagram). A dull thud may be heard, or movement felt when the clutch piston is applied. If clutch seals or check balls are leaking, a hissing may be heard.



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### Air Pressure Test Results

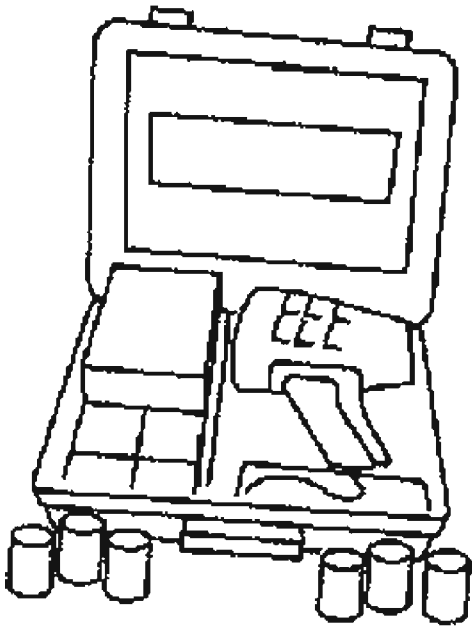
If the servos do not operate, disassemble, clean and inspect them to locate the source of the concern.

If air pressure applied to the clutch passages fails to operate a clutch or operates clutches simultaneously, inspect the fluid passages in the case.

If air pressure applied to the accumulator fails to operate an accumulator, remove and inspect case passages and piston.

### LEAKAGE INSPECTION

### SPECIAL TOOLS DESCRIPTION



**ST1300-A**

100W/12 Volt DC UV Lamp 164-R0751

Leakage at the main control cover gasket often can be stopped by tightening the main control cover bolts to 16 Nm (12 lb-ft). If necessary, install a new main control cover gasket.

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

Check the cooler lines and fittings between the transaxle and the cooler in the radiator for looseness, wear or damage. If leakage cannot be stopped by tightening a tube nut, install new parts. When fluid is found leaking between the case and the fluid tube connector, check for a

missing or damaged O-ring, then tighten the fitting to maximum specification. Do not try to stop the fluid leak by increasing the torque beyond specification. This can cause damage to the case threads. If the leak continues, install a new fluid tube connector and tighten to specification. The same procedure should be followed for fluid leaks between the radiator and the fluid tube connector.

Check the engine coolant in the radiator. If 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 fluid cooler tubes for the fluid tube connectors and applying no more than 345 kPa (50 psi) air pressure to the fluid tube connectors. Remove the radiator cap to relieve the pressure buildup at the exterior of the fluid cooler tank. If the cooler is leaking or will not hold pressure, install a new cooler.

If leakage is found at the manual control lever, install a new manual control lever seal.

Check for fluid leaking from the differential seal. Leakage can result from a damaged seal, missing garter spring or worn front wheel driveshaft and joint. Install a new seal assembly or front wheel driveshaft and joint as necessary.

Check for fluid leaks in the pump to case interface. A leak may be due to a rolled pump lip seal or a damaged seal. Repair the pump assembly.

#### **External Sealing**

This transaxle has the following parts to prevent external fluid leakages:

- Gaskets
- Lip type seals
- O-rings
- Seal rings

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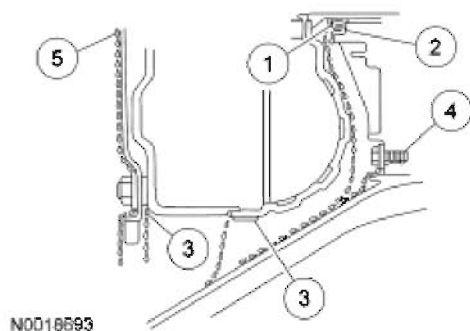
<http://vnx.su>

### **Fig. 77: Identifying External Sealing Locations** **Courtesy of FORD MOTOR CO.**

#### **Fluid Leakage in Torque Converter Area**

Use the following procedures to locate the exact source of leakage in the torque converter area. Leakage at the front of transaxle, as evidenced by fluid around the 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 can take to reach the bottom of the converter housing are as follows:



**Fig. 78: Identifying Torque Converter Fluid Leakage Area**  
Courtesy of FORD MOTOR CO.

1. Fluid leaking by the converter impeller hub seal lip will tend to move along the drive hub and onto the back of the impeller housing. Except in the case of a total seal failure, fluid leakage by the lip of the seal will be deposited on the inside of the converter housing only, near the outside diameter of the housing.
2. Fluid leakage by the outside diameter of the converter impeller hub seal and the case will follow the same path as leaks by the inside diameter of the seal.
3. Fluid leakage from the converter-to-flexplate stud weld will appear at the outside diameter of the torque converter, on the back face of flexplate and in the converter housing only near the flexplate. If a converter-to-flexplate stud leak is suspected, remove converter and pressure check.
4. Engine oil leaks are sometimes incorrectly diagnosed as transaxle pump seal leaks. The following areas of possible leakage should be checked to determine if engine oil leakage is causing the concern.
5. Leakage at the valve cover may allow oil to flow over the converter housing or seep down between the converter housing and cylinder block causing oil to be present in or at the bottom of the converter housing.
  - Oil plug leaks will allow oil to flow down the rear face of the cylinder block to the converter housing.
  - Leakage at the crankshaft seal will work back to the flexplate and then into the converter housing.

#### Leak Check Test

The following procedures should be used to determine the cause of the leakage before repair is made.

1. Remove the fluid level indicator and note the color of the fluid. Original factory fill fluid is dyed red to aid in determining if leakage is from the engine or transaxle. Unless a considerable amount of makeup fluid has been added or the fluid has been changed, the red color should assist in pinpointing the leak.

2. Remove the dust cover. Clean off any fluid from the top and bottom of the converter housing, 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 converter housing and the front of the flexplate. The converter housing can be washed out using cleaning solvent and a squirt-type oil can. Blow dry all washed areas with compressed air.
4. Start and run the engine until the transaxle reaches normal operating temperature. Observe the back of the block and top of the converter housing for evidence of fluid leakage. Raise the vehicle on a hoist. 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 block (in as far as possible) and inside the converter housing and front of the case. Run the engine until fluid leakage is evident and the source of leakage can be determined.

#### Leak Check Test With Black Light

Oil-soluble aniline or fluorescent dyes premixed at the rate of 2.5 ml (1/2 teaspoon) of dye powder to 0.23 liter (1/2 pint) of transmission fluid have proven helpful in locating the source of fluid leakage. Such dyes can be used to determine whether an engine oil or transmission fluid leak is present, or if the fluid in the transmission fluid cooler leaks into the engine coolant system. A black light must be used with the fluorescent dye solution.

#### TRANSMISSION FLUID COOLER

##### Material

#### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®

**CAUTION:** Whenever a transaxle has been disassembled to install new parts or because the valve body sticks from foreign material, the torque converter and transmission fluid cooler must be cleaned by using a suitable cleaner. Under no circumstances should an attempt be made to clean converters by hand agitation with solvent.

When internal wear or damage has occurred in the transaxle, metal particles, clutch plate material or band material can be carried into the torque converter and transmission fluid cooler. These contaminants are a major cause of recurring transaxle concerns and must be removed from the system before the transaxle is returned for repair.

## Transmission Fluid Cooler Flow Test

**NOTE:** The transaxle linkage adjustment, fluid level and line pressure must be within specification before carrying out this test. Refer to **AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E** for transaxle linkage adjustment procedure. For transmission fluid level checking procedures, refer to **PRELIMINARY INSPECTION**. For transaxle line pressure testing, refer to **SPECIAL TESTING PROCEDURES**.

1. Check the transmission fluid level and fill as necessary.
2. Remove the transmission fluid level indicator from fluid filler tube and install funnel in fluid filler tube.
3. With the vehicle in NEUTRAL, position it on a hoist. Refer to **JACKING AND LIFTING**. Inspect the transmission fluid cooler lines for damage. Install new transmission fluid cooler lines as needed.
4. Disconnect cooler return line (rear line) by separating the tubing from the cooler line rubber hose.
5. Plug the cooler line to avoid transmission fluid loss.
6. Connect one end of a hose to the cooler return line hose and route the other end of the hose up to a point where it can be inserted into the funnel at the fluid filler tube.
7. Start the engine and run at idle with transaxle in NEUTRAL range until the automatic transmission fluid is warm. Temperature is important to the flow rate measurement. Carry out the Fluid Cooler Flow Test.
  - Option 1: Once fluid flow no longer has air bubbles in it, remove the rubber hose from the funnel and insert it into liter container. After 15 seconds, install the hose into the funnel and measure the amount of automatic transmission fluid in the container. The rate of flow should be approximately 28 - 34 oz. (0.83 - 1.0 liter) in 15 seconds.
  - Option 2: Once fluid flow no longer has air bubbles in it, remove the rubber hose from the funnel and insert it into a liter container. As soon as one liter (1.06 quart) is dispensed into the container, install the hose into the funnel. One liter of automatic transmission fluid should flow through the cooling system in approximately 15 - 17 seconds.
8. Once adequate flow is determined, shut off the engine, remove the extension hose and reassemble the cooler line with the constant tension clamp.
9. If flow is not adequate, stop the engine. Disconnect the hose from the cooler return line and connect it to the converter-out line. If flow is now liberal, carry out backflushing and cleaning procedure. Refer to **TRANSMISSION FLUID COOLER - BACKFLUSHING AND CLEANING**. Refer to transaxle fluid cooler diagnosis in **TRANSMISSION FLUID COOLER**. If flow is still not liberal, repair the pump or converter.

10. Check the transmission fluid level and adjust as required.

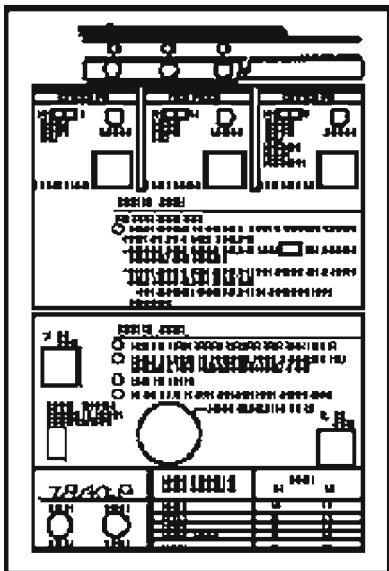
### Transmission Fluid Cooler Tube Replacement

When fluid leakage is found at the transmission fluid cooler tubes or installation of new cooler tubes is necessary, refer to **TRANSAXLE-TRANSMISSION COOLING - CD4E**.

### DIAGNOSIS BY SYMPTOM

#### Special Tool(s)

#### SPECIAL TOOLS DESCRIPTION



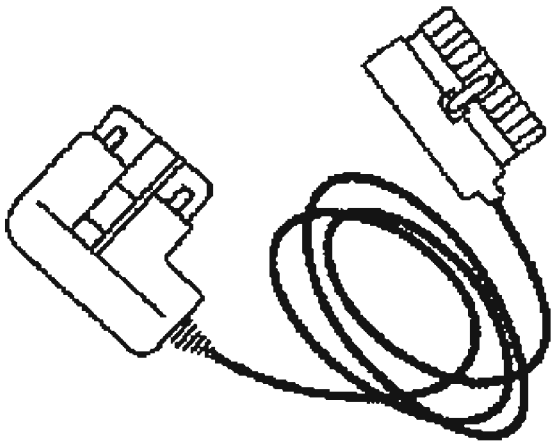
**ST1644-A**

CD4E Cable 418-F113 (007-00125)  
or equivalent

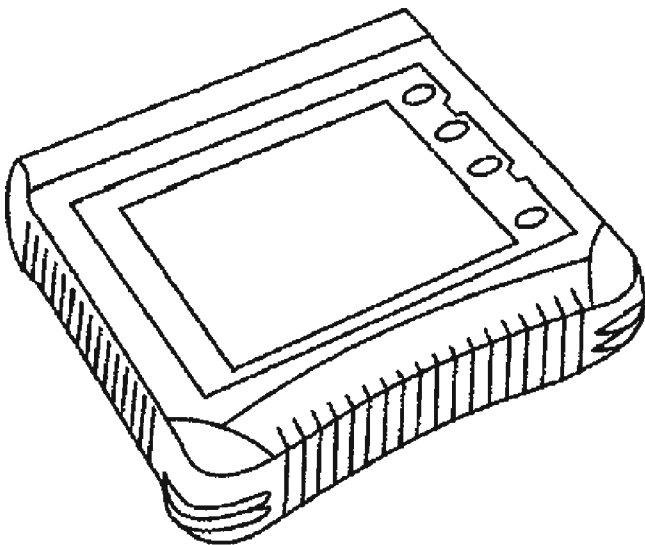
MLP-D Cable 418-F117 (007-00129)  
or equivalent

## 2005 Ford Escape

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**ST1645-A**



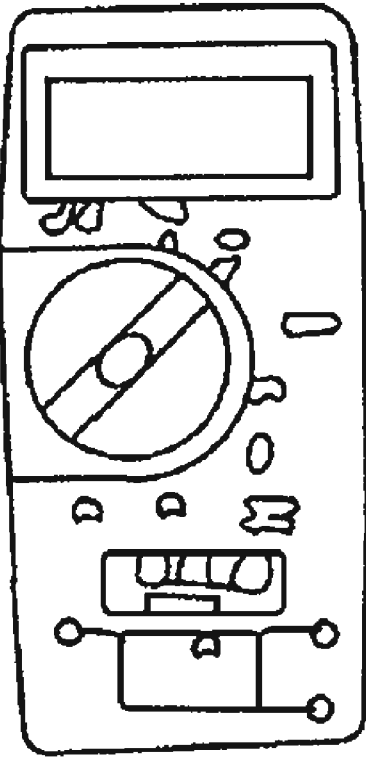
**ST2332-A**

Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool



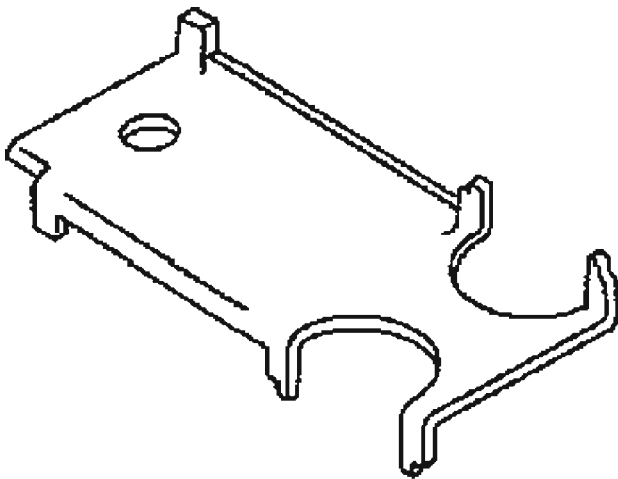
## 2005 Ford Escape

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**ST1137-A**

73 III Digital Multimeter 105-R0057  
or equivalent

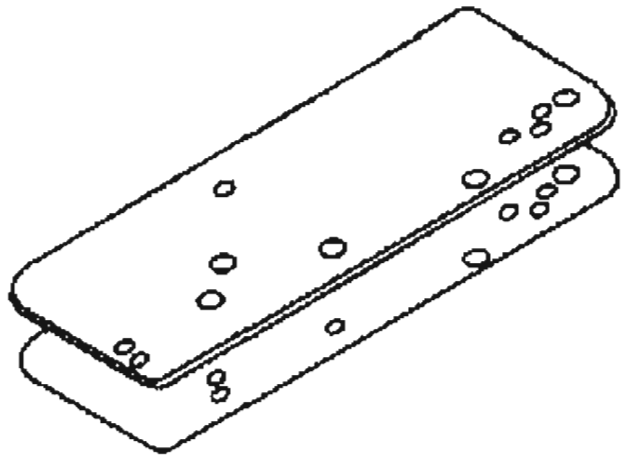


**ST1633-A**

Alignment Gauge, TR Sensor 307-  
351 (T97L-70010-A)

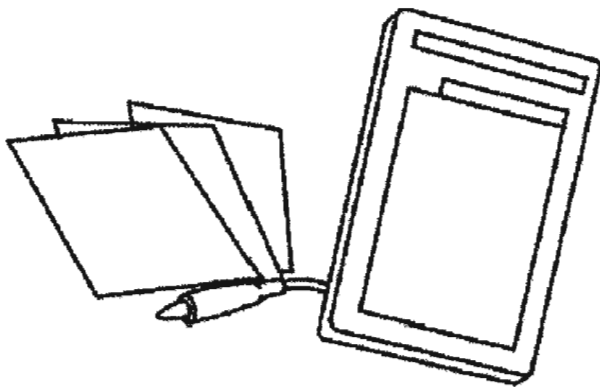
## 2005 Ford Escape

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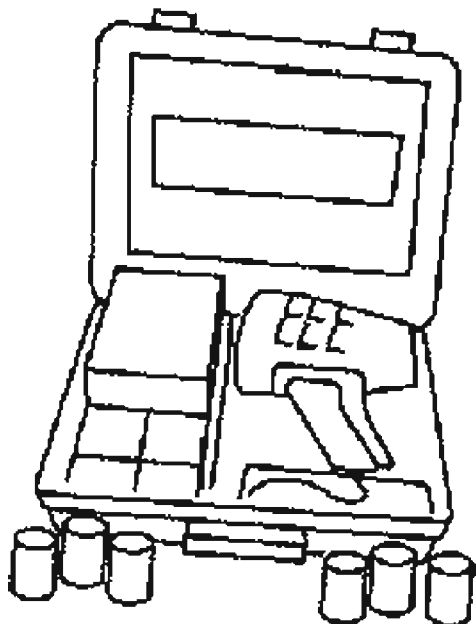
Air Test Plate, Transmission 307-301  
(T94P-77000-S)

**ST1801-A**



Transmission Tester 307-F016 (007-  
00130) or equivalent

**ST1389-A**



ST1300-A

12 Volt UV Spot Lamp 164-R0751  
or equivalent

#### Diagnosis by Symptom Chart Directions

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

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

**NOTE:** The powertrain control module (PCM) has an adaptive learn strategy to electronically control the transaxle. The adaptive learn strategy will automatically adjust the shift feel to the driver demands. The first few hundred miles of operation the transaxle may have abrupt shifts, this is a normal operation and will correct itself. If the battery has been disconnected for longer than 20 minutes the shift tables will reset and need to be relearned. Upshifting is controlled by the PCM. The PCM receives inputs from various engine and vehicle sensors along with driver demands to control shift scheduling, shift feel and torque converter clutch operation.

1. Use the index and select the symptom/concern that best describes the condition.
2. Turn to the routine indicated in the index.
3. Always begin diagnosis of a symptom by using the following:
  - Preliminary inspections
  - Verification of condition
  - Fluid level check
  - Other test procedures as directed
4. Begin with the electrical routine if indicated. Follow the reference or action required statements. Always carry out the On-Board Diagnostic Tests as required. Never skip steps. Repair as required. If the concern is still present after electrical diagnosis, proceed to the hydraulic/mechanical routine listed.

**NOTE:** Not all concerns and conditions with electrical components will set a diagnostic trouble code (DTC). Be aware that components listed can still be the cause. Verify correct function of those components prior to proceeding 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 likely." All components listed must be inspected to verify correct servicing is carried out.

#### Diagnosis by Symptom Index

#### DIAGNOSIS BY SYMPTOM INDEX

Title	Routines	
	Electrical (1)	Hydraulic/Mechanical
<b>Engagement Concerns</b>		
No Forward Only	201	301
No Reverse Only	202	302
Harsh Reverse or Forward	203	303
Delayed/Soft Reverse or Forward	205	305
No Forward and No Reverse	207	307
<b>Shift Concerns</b>		
Some or All Shifts Missing	210	310
Shift Timing - Early/Late	211	311
Timing - Erratic/Hunting	212	312
Feel - Soft/Slipping	213	313
Feel - Harsh	214	314

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No 1st Gear, Engages in Higher Gear ("D" Position)	215	315
No Manual 1st Gear (First in "D", OK)	216	316
<b>Torque Converter Operation Concerns</b>		
No Apply	240	340
Always Applied/May Stall Engine	241	341
Cycling Shudder Chatter	242	342
<b>Other Shift Concerns</b>		
Shift Lever Effort High	251	351
External Leaks	252	352
Vehicle Driveability Concerns	253	353
Noise/Vibration - Forward/Reverse	254	354
Engine will Not Crank	255	355
No PARK Range	256	356
Transaxle Overheating	257	357
No Engine Braking in Manual 1st Position	258	358
No Engine Braking in DRIVE (TCS ON) or Manual 2nd Position	259	359
Vehicle Movement with Gear Selector in the "N" Position	262	362
(1) Carry out electrical routines first.		

### Diagnostic Routines

**ENGAGEMENT CONCERN: NO FORWARD**

### DIAGNOSTIC ROUTINES - ENGAGEMENT CONCERN NO FORWARD

Possible Component	Reference/Action
<b>201 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control Systems</b>	
<ul style="list-style-type: none"> <li>No Electrical Concerns</li> </ul>	
<b>301 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Shift Linkage</b>	<ul style="list-style-type: none"> <li>Inspect and repair as required. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li> </ul>
<ul style="list-style-type: none"> <li>Damaged, out of adjustment, misassembled</li> </ul>	
<b>Pump Assembly</b>	

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Porosity/cross leaks or ball plug missing or leaking, or a plugged hole</li><li>• Pump support seal ring, No. 3 or No. 4, damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for porosity and leaks. Install new as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged or leaking</li><li>• Pressure tap plate/gasket damaged or leaking</li><li>• Separator plates damaged</li><li>• Hydraulic passages damaged</li><li>• Main regulator valve stuck, damaged or misassembled</li><li>• Forward accumulator leaking</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Forward Clutch and Coast Clutch Assembly</b> <ul style="list-style-type: none"><li>• Seals or pistons damaged</li><li>• Forward clutch return spring damaged</li><li>• Ball check valve damaged</li><li>• Friction elements severely damaged or worn</li><li>• Forward/coast/direct clutch cylinder damaged, leaking, misassembled or binding</li><li>• Cylinder to hub weld broken or splines damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test. Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for mislocation, poor seating, damage. Install new piston as necessary.</li><li>• Check for abnormal wear, damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Low One-Way Clutch</b>	

## 2005 Ford Escape

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<b>Assembly</b> <ul style="list-style-type: none"><li>• Worn</li><li>• Damaged</li><li>• Misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Forward One-Way Clutch Assembly</b> <ul style="list-style-type: none"><li>• Worn</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<ul style="list-style-type: none"><li>• Damaged</li><li>• Misassembled</li></ul>	
<b>Low Intermediate Carrier</b> <ul style="list-style-type: none"><li>• Damaged</li><li>• Missassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>

ENGAGEMENT CONCERN: NO REVERSE ONLY

### DIAGNOSTIC ROUTINES - ENGAGEMENT CONCERN NO REVERSE ONLY

Possible Component	Reference/Action
<b>202 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, SSA on, transmission range (TR) sensor</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid) for diagnosis. GO to <b>PINPOINT TEST A</b> and GO to <b>PINPOINT TEST D</b>.</li></ul>
<b>302 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>External Shift Linkage</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Incorrect Pressures</b>	<ul style="list-style-type: none"><li>• Check pressure at line pressure tap. Carry out Line Pressure and Stall Speed Tests. Refer to <b>SPECIAL TESTING</b></li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"><li>• Low line pressure</li></ul>	<p><b>PROCEDURES.</b> If pressure is low, check the following possible components: main control, pump assembly, reverse clutch assembly, low/reverse clutch assembly.</p>
<p><b>Internal Shift Linkages</b></p> <ul style="list-style-type: none"><li>• Damaged, disconnected</li></ul>	<ul style="list-style-type: none"><li>• Inspect and service as required. If servicing the linkage, verify that the TR sensor is correctly adjusted. Refer to <b>TRANSMISSION RANGE (TR) SENSOR.</b></li></ul>
<p><b>Main Controls</b></p> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket damaged</li><li>• 1 - 2 shift valve, SSA, main regulator valve, low/reverse modulator valve, low/reverse accumulator piston, pressure tap plate damaged, missing, stuck, misassembled</li><li>• Separator plates damaged</li><li>• Hydraulic passages damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<p><b>Pump Assembly</b></p> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket damaged</li><li>• Porosity/cross leaks/ball plug missing or leaking, plugged hole</li><li>• Pump support seal rings, No. 6 or No. 7, damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Install a new pump assembly.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<p><b>Reverse Clutch Assembly</b></p> <ul style="list-style-type: none"><li>• Seals, piston damaged</li><li>• Ball check valve damaged</li><li>• Friction elements worn, severely damaged or misassembled</li><li>• Piston return spring damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>



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<ul style="list-style-type: none"> <li>Reverse clutch hub to forward/coast/direct hub splines damaged</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Low/Reverse Clutch Assembly</b> <ul style="list-style-type: none"> <li>Seals or piston damaged</li> <li>Friction elements worn or severely damaged</li> <li>Piston return spring damaged</li> <li>Wave springs missing</li> <li>Piston bore damaged</li> </ul>	<ul style="list-style-type: none"> <li>Carry out Air Pressure Test.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Forward/Coast/Direct Clutch Cylinder</b> <ul style="list-style-type: none"> <li>Reverse seal rings damaged, missing, misassembled</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Case</b> <ul style="list-style-type: none"> <li>Reverse to low/reverse clutch feeds have severe cross-leakage or porosity</li> </ul>	<ul style="list-style-type: none"> <li>Carry out Air Pressure Test.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Reverse/Overdrive Gear Set</b> <ul style="list-style-type: none"> <li>Damaged</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary.</li> </ul>

**ENGAGEMENT CONCERN: HARSH REVERSE OR FORWARD**

### DIAGNOSTIC ROUTINES - ENGAGEMENT CONCERN HARSH REVERSE OR FORWARD

Possible Component	Reference/Action
<b>203 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, transmission fluid temperature (TFT) sensor, 3-2 timing/coast clutch solenoid (3-2T/CCS)</li> </ul>	<ul style="list-style-type: none"> <li>Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid) for diagnosis. GO to <b>PINPOINT TEST B</b> and GO to <b>PINPOINT TEST E</b>.</li> </ul>
<b>303 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid</b>	

## 2005 Ford Escape

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<ul style="list-style-type: none"><li>• Level</li><li>• Condition</li></ul>	<ul style="list-style-type: none"><li>• Fill to correct level.</li><li>• Inspect fluid condition. For additional information, refer to <b><u>PRELIMINARY INSPECTION</u></b>.</li></ul>
<b>CV Joints/Front Wheel Driveshaft and Joint</b> <ul style="list-style-type: none"><li>• Splines damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Powertrain Mounts</b> <ul style="list-style-type: none"><li>• Loose, broken, missing or misaligned</li><li>• Powertrain contacting other vehicle components</li></ul>	<ul style="list-style-type: none"><li>• Inspect mounts. Repair as necessary.</li><li>• Inspect for contact. Repair as necessary.</li></ul>
<b>External Shift Linkage</b> <ul style="list-style-type: none"><li>• Damaged, out of alignment</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Incorrect Pressures</b> <ul style="list-style-type: none"><li>• Incorrect line pressure</li></ul>	<ul style="list-style-type: none"><li>• Check pressure at line tap. Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If high, verify engagements at minimum EPC using the Transmission Tester. If line remains high, check the following components: main control.</li></ul>
<b>Internal Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, disconnected</li></ul>	<ul style="list-style-type: none"><li>• Inspect and service as required. If servicing the linkage, verify that the TR sensor is correctly adjusted. Refer to <b><u>TRANSMISSION RANGE (TR) SENSOR</u></b>.</li></ul>
<b>Fluid Filter and Seal Assembly</b> <ul style="list-style-type: none"><li>• Filter/seal damaged, plugged</li><li>• Recirculation seal damaged, plugged or out of position</li></ul>	<ul style="list-style-type: none"><li>• Install a new filter and seal assembly.</li><li>• Install a new recirculation seal.</li></ul>
<b>Main Controls</b>	

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Low/reverse accumulator piston and spring (reverse), main regulator valve, forward accumulator piston and spring misassembled, stuck or damaged</li><li>• EPC solenoid stuck or damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage, contamination. Activate solenoid using transmission tester. Repair as necessary.</li></ul>
<b>Forward Clutch Assembly (Forward Only)</b> <ul style="list-style-type: none"><li>• Forward clutch cylinder damaged</li><li>• Piston bore damaged</li><li>• Friction elements damaged, worn</li><li>• Forward clutch return spring damaged or missing</li><li>• Ball check damaged</li><li>• Piston or seal damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Reverse Clutch Assembly (Reverse Only)</b> <ul style="list-style-type: none"><li>• Seal or piston damaged</li><li>• Reverse piston damaged</li><li>• Friction elements damaged, worn, misassembled</li><li>• Return spring assembly damaged, worn</li><li>• Ball check damaged, missing</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Low/Reverse Clutch Assembly (Reverse Only)</b> <ul style="list-style-type: none"><li>• Seals or reverse clutch piston damaged</li><li>• Wave spring damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

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<ul style="list-style-type: none"><li>• Friction elements damaged, worn, misassembled</li><li>• Return spring assembly damaged, worn or misassembled</li><li>• Piston bore damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Direct Clutch Assembly (Reverse Only)</b> <ul style="list-style-type: none"><li>• Friction elements severely damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

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

### DIAGNOSTIC ROUTINES - ENGAGEMENT CONCERN DELAYED/SOFT REVERSE OR FORWARD

Possible Component	Reference/Action
<b>305 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid</b> <ul style="list-style-type: none"><li>• Incorrect level, low</li><li>• Condition</li></ul>	<ul style="list-style-type: none"><li>• Fill to correct level.</li><li>• Inspect fluid level and condition. Refer to <b><u>PRELIMINARY INSPECTION</u></b>.</li></ul>
<b>External Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment or misassembly</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Incorrect Pressures</b> <ul style="list-style-type: none"><li>• Low line pressure</li></ul>	<ul style="list-style-type: none"><li>• Check pressure at line tap. Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If pressure is low, check the following possible components: main control, pump assembly, clutch assemblies, fluid filter and seal assembly, recirculating seal.</li></ul>
<b>Internal Shift Linkages</b>	<ul style="list-style-type: none"><li>• Inspect and service as required. If servicing the linkage, verify that the TR sensor is correctly</li></ul>

## 2005 Ford Escape

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<ul style="list-style-type: none"><li>• Damaged, disconnected</li></ul>	adjusted. Refer to <b>TRANSMISSION RANGE (TR) SENSOR</b> .
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Porosity/cross leaks/ball plug missing or leaking, or passage blockage</li><li>• Pump support seal rings, No. 3 or No. 4 (Forward), or No. 6 or No. 7 (Reverse), damaged</li><li>• Pump gear/pocket damaged</li><li>• Separator plate damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Install a new pump assembly.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Fluid Filter and Seal Assembly</b> <ul style="list-style-type: none"><li>• Filter/seal damaged, plugged</li><li>• Recirculating seal damaged or out of position</li></ul>	<ul style="list-style-type: none"><li>• Install new filter and seal assembly.</li><li>• Install new recirculating seal.</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Manual valve, main regulator valve, low/reverse modulator valve stuck, damaged or misassembled</li><li>• Separator plates damaged</li><li>• Pressure tap plate/gasket leaks, damaged, misassembled</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>
<b>Low/Reverse Clutch Assembly (Reverse Only)</b>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li></ul>

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<ul style="list-style-type: none"><li>• Piston or seals damaged</li><li>• Friction elements damaged, worn</li><li>• Return spring damaged</li><li>• Piston bore damaged</li><li>• Excessive clutch pack end clearance</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Reverse Clutch Assembly (Reverse Only)</b> <ul style="list-style-type: none"><li>• Seals or piston damaged</li><li>• Check ball damaged</li><li>• Friction elements damaged, worn</li><li>• Return spring worn, damaged</li><li>• Piston bore damaged</li><li>• Excessive clutch pack end clearance</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Forward Clutch Assembly (Forward Only)</b> <ul style="list-style-type: none"><li>• Seals or piston damaged</li><li>• Ball check damaged, missing or not seating correctly</li><li>• Friction elements damaged, worn or excessive end clearance</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage, correct seating or missing. Install new cylinder as necessary.</li><li>• Inspect for damage and end clearance. Repair as necessary.</li></ul>
<b>Forward/Coast/Direct Clutch Cylinder Assembly</b> <ul style="list-style-type: none"><li>• Reverse seal ring damaged or missing</li><li>• Cylinder damaged or leaking</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

ENGAGEMENT CONCERN: NO FORWARD AND NO REVERSE

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**DIAGNOSTIC ROUTINES - ENGAGEMENT CONCERN NO FORWARD AND NO REVERSE**

Possible Component	Reference/Action
<b>207 - ELECTRICAL ROUTINE</b>	
• No Electrical Concerns	
<b>307 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid</b> <ul style="list-style-type: none"><li>• Incorrect level</li></ul>	<ul style="list-style-type: none"><li>• Fill to correct level.</li></ul>
<b>External Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment or misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Incorrect Pressures</b> <ul style="list-style-type: none"><li>• Low or no line pressure</li></ul>	<ul style="list-style-type: none"><li>• Check pressure at line tap. Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If pressure is low, check the following possible components: fluid filter and seal assembly, main controls, pump assembly. If OK, proceed to turbine shaft.</li></ul>
<b>Internal Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, disconnected</li></ul>	<ul style="list-style-type: none"><li>• Inspect and service as required. If servicing the linkage, verify that the TR sensor is correctly adjusted. Refer to <b><u>TRANSMISSION RANGE (TR) SENSOR</u></b>.</li></ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket damaged, missing</li><li>• Porosity/cross leaks/passage(s) blocked</li><li>• Pump support seal ring missing</li><li>• Pump shaft broken, damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for porosity, leaks, blockage. Install new pump assembly as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Fluid Filter and Seal</b>	

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<b>Assembly</b> <ul style="list-style-type: none"><li>• Filter/seal damaged, plugged, or missing</li><li>• Recirculating seal damaged or out of position</li></ul>	<ul style="list-style-type: none"><li>• Install new filter and seal assembly.</li><li>• Install new recirculating seal.</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Pressure plate/gasket damaged or missing</li><li>• Main regulator valve, manual valve stuck, damaged, plugged, missing, link not connected</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Flexplate (Starter Gear)</b> <ul style="list-style-type: none"><li>• Damaged, broken</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Torque Converter Assembly</b> <ul style="list-style-type: none"><li>• Pump drive shaft insert damaged</li><li>• Studs broken or damaged</li><li>• Splines damaged</li><li>• Internal blades damaged, broken</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect torque converter. If damaged, install new.</li></ul>
<b>Turbine Shaft to Forward/Coast/Direct Clutch Cylinder Housing</b> <ul style="list-style-type: none"><li>• Splines damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Chain and Sprocket Assembly</b> <ul style="list-style-type: none"><li>• Broken, damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Park Mechanism</b> <ul style="list-style-type: none"><li>• Parking pawl return spring damaged, missing misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>



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<b>Front Wheel Drive Shafts and Joints</b> <ul style="list-style-type: none"><li>• Broken or splines damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Final Drive and Differential Assembly</b> <ul style="list-style-type: none"><li>• Splines damaged</li><li>• Gearset damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Planetary Gearset</b> <ul style="list-style-type: none"><li>• Gear teeth, carriers, splines damaged or broken</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>

SHIFT CONCERNS: SOME OR ALL SHIFTS MISSING

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOME OR ALL SHIFTS MISSING

Possible Component	Reference/Action
<b>210 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module (PCM), shift solenoids, transmission range (TR) sensor, throttle position (TP) sensor, output shaft speed (OSS) sensor, TCS</li></ul>	<ul style="list-style-type: none"><li>• Carry out Shift Point Road Test. Refer to <b><u>SHIFT POINT ROAD TEST</u></b>.</li><li>• Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST A</u></b> and GO to <b><u>PINPOINT TEST D</u></b>.</li></ul>
<b>310 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid</b> <ul style="list-style-type: none"><li>• Incorrect level</li></ul>	<ul style="list-style-type: none"><li>• Fill to correct level.</li></ul>
<b>Internal and External Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment, misassembled or internal linkage disconnected.</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range</li></ul>

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	(TR) sensor is correctly adjusted.
<ul style="list-style-type: none"><li>• For diagnosis related to a specific gear use diagnostic tool to determine gear</li><li>• Shift Concern: No 1 - 2 Shift</li><li>• Shift Concern: No 2 - 3 Shift</li><li>• Shift Concern: No 3 - 4 Shift</li></ul>	<ul style="list-style-type: none"><li>• Refer to the following shift routine(s) for further diagnosis:</li><li>• Routine 220/320</li><li>• Routine 221/321</li><li>• Routine 222/322</li></ul>

### SHIFT CONCERNS: SHIFT TIMING - EARLY/LATE

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS SHIFT TIMING - EARLY/LATE

Possible Component	Reference/Action
<b>211 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, throttle position sensor, output shaft speed (OSS) sensor, transmission fluid temperature (TFT) sensor</li></ul>	<ul style="list-style-type: none"><li>• Carry out Shift Point Road Test. Refer to <b><u>SHIFT POINT ROAD TEST</u></b>.</li><li>• Run-On Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST B</u></b>.</li></ul>
<b>311 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Other</b> <ul style="list-style-type: none"><li>• Tire size change</li></ul>	<ul style="list-style-type: none"><li>• Refer to the <b><u>SPECIFICATION DECAL</u></b> on door panel and verify that vehicle has original equipment. Changes in tire size or speedometer gear will affect shift timing.</li></ul>

### SHIFT CONCERNS: TIMING - ERRATIC/HUNTING

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS TIMING - ERRATIC/HUNTING

Possible Component	Reference/Action
<b>212 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Engine concerns</li></ul>	<ul style="list-style-type: none"><li>• Refer to <b><u>ENGINE SYSTEM-GENERAL INFORMATION</u></b> to diagnose erratic engine operations.</li><li>• Carry out Shift Point Test. Refer to <b><u>SHIFT POINT ROAD TEST</u></b>.</li></ul>

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- Electrical inputs/outputs, vehicle harnesses, powertrain control module, shift solenoids, transmission range sensor, stop lamp switch, TCC solenoid, output shaft speed (OSS) sensor, throttle position sensor, TSS, EPC, 3-2T/CCS

- Run On-Board Diagnostics Tests. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid). GO to **PINPOINT TEST A**, GO to **PINPOINT TEST C**, GO to **PINPOINT TEST D**, GO to **PINPOINT TEST F** and GO to **PINPOINT TEST G**.

### 312 - HYDRAULIC/MECHANICAL ROUTINE

#### Fluid

- Incorrect level
- Condition
- Fill to correct level.
- Inspect fluid level and condition. Refer to **PRELIMINARY INSPECTION**.

#### Main Control

- Bolts out of torque specification
- Gaskets damaged
- 3-2 timing valve, pull-in valve, 2 - 4 accumulator, servo release shuttle valve, 3-2 control valve stuck, damaged, misassembled
- Solenoid screen blocked
- Separator plates damaged, blocked
- Pressure tap plate/gasket damaged
- SSA, SSB, 3-2T/CCS solenoid not functioning correctly, stuck, damaged
- Adjust bolts to specification.
- Inspect for damage. Install new as necessary.
- Inspect for damage. Repair as necessary.
- Clean or install a new screen.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Activate solenoids using transmission tester. Inspect for damage. Repair as necessary.

#### Specific Shifts

- Shift Concern: No 1 - 2 Shift
- Shift Concern: No 2 - 3 Shift
- Shift Concern: No 3 - 4 Shift
- Shift Concern: Soft/Slip 1 - 2
- Refer to the following shift routine(s) for further diagnosis:
- Routine 220/320
- Routine 221/321
- Routine 222/322
- Routine 226/326

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Shift	
• Shift Concern: Soft/Slip 2 - 3 Shift	• Routine 227/327
• Shift Concern: Soft/Slip 3 - 4 Shift	• Routine 228/328
• Shift Concern: Soft/Slip 4-3 Shift	• Routine 229/329
• Shift Concern: Soft/Slip 3-2 Shift	• Routine 230/330
• Shift Concern: Soft/Slip 2-1 Shift	• Routine 231/331
• Shift Concern: Harsh 1 - 2 Shift	• Routine 232/332
• Shift Concern: Harsh 2 - 3 Shift	• Routine 233/333
• Shift Concern: Harsh 3 - 4 Shift	• Routine 234/334
• Shift Concern: Harsh 4-3 Shift	• Routine 235/335
• Shift Concern: Harsh 3-2 Shift	• Routine 236/336

### SHIFT CONCERNS: FEEL - SOFT/SLIPPING

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS FEEL - SOFT/SLIPPING

Possible Component	Reference/Action
<b>213 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, transmission fluid temperature (TFT) sensor, throttle position sensor, mass air flow sensor</li> </ul>	<ul style="list-style-type: none"> <li>Carry out Shift Point Road Test. Refer to <b><u>SHIFT POINT ROAD TEST</u></b>.</li> <li>Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST B</u></b> and GO to <b><u>PINPOINT TEST E</u></b>.</li> </ul>
<b>Fluid</b> <ul style="list-style-type: none"> <li>Incorrect level</li> <li>Condition</li> </ul>	<ul style="list-style-type: none"> <li>Fill to correct level.</li> <li>Inspect fluid level and condition. Refer to <b><u>PRELIMINARY INSPECTION</u></b>.</li> </ul>

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<b>External Shift Linkage</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range sensor is correctly adjusted.</li></ul>
<b>Incorrect Pressures</b> <ul style="list-style-type: none"><li>• Low line pressure</li></ul>	<ul style="list-style-type: none"><li>• Check pressures at line tap. Carry out Line Pressure Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If pressures are low or all shifts are soft/slipping, check the following components: main control, pump assembly, fluid filter/seal assembly. If pressures are OK and a specific shift is soft/slipping, refer to the appropriate routine(s) for additional diagnosis.</li><li>• Soft/Slip 1 - 2 Shift, Routine 226/326</li><li>• Soft/Slip 2 - 3 Shift, Routine 227/327</li><li>• Soft/Slip 3 - 4 Shift, Routine 228/328</li><li>• Soft/Slip 4-3 Shift, Routine 229/329</li><li>• Soft/Slip 3-2 Shift, Routine 230/330</li><li>• Soft/Slip 2-1 Shift, Routine 231/331</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Main regulator valve, line modulator valve stuck, damaged or misassembled or springs missing, tangled or damaged</li><li>• EPC solenoid stuck or damaged</li><li>• Separator plates damaged, blocked</li><li>• Pressure tap plate/gasket damaged or missing</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect gaskets. Install new as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage, contamination. Activate solenoid using Transmission Tester. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Pump Assembly</b>	

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<ul style="list-style-type: none"> <li>• Bolts out of torque specification</li> <li>• Gaskets damaged</li> <li>• Porosity/cross leaks</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust bolts to specification.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Fluid Filter/Seal Assembly</b> <ul style="list-style-type: none"> <li>• Filter/seal damaged, plugged or missing</li> <li>• Recirculating seal damaged or out of position</li> </ul>	<ul style="list-style-type: none"> <li>• Install new filter and seal assembly.</li> <li>• Install new recirculating seal.</li> </ul>

**SHIFT CONCERNS: FEEL - HARSH**

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS FEEL - HARSH

Possible Component	Reference/Action
<b>214 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, electronic pressure control (EPC) solenoid, transmission fluid temperature (TFT) sensor, throttle position (TP) sensor, mass air flow sensor (MAF), torque converter clutch (TCC) solenoid, transmission range (TR) sensor, 3-2T/CCS</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out Torque Converter Operation Test. Refer to <b><u>PRELIMINARY INSPECTION</u></b>.</li> <li>• Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). 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>, GO to <b><u>PINPOINT TEST E</u></b>, GO to <b><u>PINPOINT TEST F</u></b> and GO to <b><u>PINPOINT TEST G</u></b>.</li> </ul>
<b>314 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid</b> <ul style="list-style-type: none"> <li>• Incorrect level</li> <li>• Condition</li> </ul>	<ul style="list-style-type: none"> <li>• Fill to correct level.</li> <li>• Inspect fluid level and condition. Refer to <b><u>PRELIMINARY INSPECTION</u></b>.</li> </ul>
<b>CV Joint/Front Wheel Driveshaft and Joints</b> <ul style="list-style-type: none"> <li>• Splines damaged, loose</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Powertrain Mounts</b>	

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<ul style="list-style-type: none"><li>• Damaged, loose, missing</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Incorrect Pressures</b> <ul style="list-style-type: none"><li>• High line pressure</li></ul>	<ul style="list-style-type: none"><li>• Check pressure at line tap. Carry out Line Pressure Test and Stall Speed Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If pressures are high or all shifts are harsh, go to <b><u>MAIN CONTROL</u></b>.</li><li>• If pressures are OK and a specific shift is harsh, refer to the appropriate shift routine for additional diagnosis.</li><li>• Harsh 1 - 2 Shift, Routine 232/332</li><li>• Harsh 2 - 3 Shift, Routine 233/333</li><li>• Harsh 3 - 4 Shift, Routine 234/334</li><li>• Harsh 4-3 Shift, Routine 235/335</li><li>• Harsh 3-2 Shift, Routine 236/336</li><li>• Harsh 2-1 Shift, Routine 237/337</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Main regulator valve, bypass valve, line modulator valve stuck, damaged or misassembled. Springs tangled, missing, damaged</li><li>• EPC solenoid stuck or damaged</li><li>• Hydraulic passages damaged</li><li>• Separator plate damaged, blocked</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage, contamination. Activate solenoid using Transmission Tester. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Torque Converter Assembly</b> <ul style="list-style-type: none"><li>• Piston damaged</li><li>• Pump support seal No. 1 (CBY circuit) leaking, missing or damaged</li><li>• Case leaking</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

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- |                              |   |
|------------------------------|---|
| • Converter assembly damaged | • If heat stained, install a new converter. |
|------------------------------|---|

**SHIFT CONCERNS: NO 1ST GEAR, ENGAGES IN HIGHER GEAR ("D" POSITION)**

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS NO 1ST GEAR, ENGAGES IN HIGHER GEAR (D POSITION)

Possible Component	Reference/Action
<b>215 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, shift solenoids, transmission range (TR) sensor</li></ul>	<ul style="list-style-type: none"><li>Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST A</u></b> and GO to <b><u>PINPOINT TEST D</u></b>.</li></ul>
<b>315 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>External Shift Linkages</b> <ul style="list-style-type: none"><li>Damaged, out of adjustment or misassembled</li></ul>	<ul style="list-style-type: none"><li>Inspect for correct adjustment. Repair as necessary. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>Bolts out of torque specification</li><li>Gaskets damaged</li><li>Pull-in valve, solenoid regulator valve, shift valves stuck, damaged, misassembled</li><li>Solenoid filter gasket damaged or misassembled</li><li>Hydraulic passages damaged</li><li>SSA, SSB solenoid not functioning</li></ul>	<ul style="list-style-type: none"><li>Adjust bolts to specification.</li><li>Inspect for damage. Repair as necessary.</li><li>Inspect for damage. Repair as necessary.</li><li>Inspect for damage. Repair as necessary.</li><li>Inspect for damage. Repair as necessary.</li><li>Activate solenoid using the Transmission Tester. Repair as necessary.</li></ul>
<ul style="list-style-type: none"><li>For diagnosis related to a specific gear, use the</li></ul>	



## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

Transmission Tester to determine gear	<ul style="list-style-type: none"><li>• Refer to the following routines:</li><li>• No. 1 - 2 Shift, Routine 220/320</li><li>• No. 2 - 3 Shift, Routine 221/321</li><li>• No. 3 - 4 Shift, Routine 222/322</li></ul>
<b>Mechanical</b> <ul style="list-style-type: none"><li>• Seals, clutches damaged, worn</li><li>• Direct clutch, 2/4 band, 2/4 servo damaged, stuck on</li></ul>	<ul style="list-style-type: none"><li>• Repair as necessary.</li><li>• Repair as necessary.</li></ul>

**SHIFT CONCERNS: NO MANUAL 1ST GEAR (1st in "D" is OK)**

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS NO MANUAL 1ST GEAR (1ST IN D IS OK)

Possible Component	Reference/Action
<b>216 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, shift solenoids, transmission range (TR) sensor.</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics Tests. Refer to <u><b>INTRODUCTION - GASOLINE</b></u> article for Escape (gasoline) and Mariner or <u><b>INTRODUCTION- HYBRID ESCAPE</b></u> article for Escape (Hybrid). GO to <b>PINPOINT TEST A</b> and GO to <b>PINPOINT TEST D</b>.</li></ul>
<b>316 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Internal and External Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment or misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <u><b>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</b></u> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Main Controls</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Pull-in valve stuck, damaged</li><li>• SSB stuck "ON"</li><li>• Hydraulic passages damaged</li><li>• Separator plates damaged, blocked</li></ul> | <ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Activate solenoid using Transmission Tester. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul> |
|--|--|

SHIFT CONCERNS: NO 1-2 SHIFT (AUTOMATIC)

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS NO 1-2 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>220 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, shift solenoids, transmission range (TR) sensor</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST A</u></b> and GO to <b><u>PINPOINT TEST D</u></b>.</li></ul>
<b>320 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Incorrect Pressures</b> <ul style="list-style-type: none"><li>• Line pressure</li></ul>	<ul style="list-style-type: none"><li>• Check pressure at line tap. Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If not OK, check the following component: main control.</li></ul>
<b>Main Control</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• 1 - 2 shift valve, 2 - 4 accumulator, main regulator valve stuck, damaged or misassembled</li><li>• SSA not functioning correctly</li><li>• Pressure tap plate/gasket</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Activate solenoid using the Transmission Tester.</li></ul>

## 2005 Ford Escape

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<p>damaged</p> <ul style="list-style-type: none"> <li>• Separator plates damaged</li> <li>• Hydraulic passages damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<p><b>Intermediate Overdrive Band and Servo Assembly</b></p> <p><b>NOTE:</b> <b>Also no 4th gear</b></p> <ul style="list-style-type: none"> <li>• Seals damaged, missing</li> <li>• Piston damaged</li> <li>• Band damaged</li> <li>• Springs damaged</li> <li>• Servo rod or rod bore damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<p><b>Low One-Way Clutch Assembly</b></p> <ul style="list-style-type: none"> <li>• Assembly</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<p><b>OD/Reverse Sun Gear and Shell</b></p> <ul style="list-style-type: none"> <li>• Damaged, weld broken</li> <li>• Lugs damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<p><b>Case</b></p> <ul style="list-style-type: none"> <li>• Low and intermediate band anchor area damaged</li> <li>• Porosity/leakage in servo apply, servo release circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. If damaged, install a new case.</li> <li>• Inspect the case for leakage/porosity. Carry out Air Pressure Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. Install a new case as required.</li> </ul>

SHIFT CONCERNS: NO 2-3 SHIFT (AUTOMATIC)

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS NO 2-3 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>221 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
<ul style="list-style-type: none"> <li>• Electrical inputs/outputs,</li> </ul>	<ul style="list-style-type: none"> <li>• Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article</li> </ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

vehicle wiring harnesses,  
powertrain control module,  
shift solenoids, transmission  
range (TR) sensor

for Escape (gasoline) and Mariner or  
**INTRODUCTION- HYBRID ESCAPE**  
article for Escape (Hybrid). GO to  
**PINPOINT TEST A** and GO to  
**PINPOINT TEST D**.

### 321 - HYDRAULIC/MECHANICAL ROUTINE

#### Incorrect Pressures

- Line pressure

- Check pressure at line pressure tap. Carry out Line Pressure Tests. Refer to **SPECIAL TESTING PROCEDURES**. If not OK, check the following components: main control.

#### Main Control

- Bolts out of torque specification
- Gasket leaks
- 2 - 3 shift valve (also no 4th), main regulator valve stuck, damaged, misassembled
- SSB not functioning correctly (also no 4th)
- Separator plates damaged
- Pressure tap plate/gasket leaks
- Hydraulic passages damaged

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Activate solenoid using Transmission Tester.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Pump Assembly

- Bolts out of torque specification
- Gaskets damaged
- Porosity/cross leaks
- Pump support seal rings, No. 4 or No. 5, damaged

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Direct Clutch Assembly

- Seals or piston damaged
- Piston bore damaged
- Friction severely damaged, worn
- Ball check not seating correctly

- Carry out Air Pressure Tests.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"> <li>• Return spring assembly</li> <li>• Cylinder bore/splines damaged</li> <li>• Shell/hub damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Intermediate/Overdrive Servo</b> <ul style="list-style-type: none"> <li>• Piston or piston bore damaged</li> <li>• Rod bore or rod damaged, leaking</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Case</b> <ul style="list-style-type: none"> <li>• Leakage in the servo apply, servo release or direct clutch circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect case for damage. Repair or install new as necessary. Carry out Air Pressure Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>.</li> </ul>

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

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS NO 3-4 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>222 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, shift solenoids, transmission range (TR) sensor, transmission control switch (TCS)</li> </ul>	<ul style="list-style-type: none"> <li>• Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST A</u></b> and GO to <b><u>PINPOINT TEST D</u></b>.</li> </ul>
<b>322 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Incorrect Pressures</b> <ul style="list-style-type: none"> <li>• Line pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Check pressure at line tap. Carry out Line Pressure Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. If out of specification, check Main Control.</li> </ul>
<b>Main Control</b> <ul style="list-style-type: none"> <li>• Bolts out of torque specification</li> <li>• Gasket leaks</li> <li>• 3 - 4 shift valve, main regulator valve stuck, damaged or misassembled</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust bolts to specification.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"> <li>• SSA not functioning correctly (also no 1st)</li> <li>• Separator plates damaged or orifice blocked</li> </ul>	<ul style="list-style-type: none"> <li>• Activate solenoid using the Transmission Tester. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Intermediate/Overdrive Band and Servo Assembly</b> <ul style="list-style-type: none"> <li>• Intermediate overdrive band damaged, worn</li> <li>• Servo rod or rod bore damaged</li> <li>• Servo piston or cover damaged or leaking</li> <li>• Springs damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Coast Clutch Assembly</b> <ul style="list-style-type: none"> <li>• Seals damaged, missing</li> <li>• Piston damaged</li> <li>• Friction severely damaged, worn</li> <li>• Check ball severely damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Forward One-Way Clutch Assembly</b> <ul style="list-style-type: none"> <li>• Damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Case</b> <ul style="list-style-type: none"> <li>• Band anchor damaged</li> <li>• Servo apply and servo release circuits leaking</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Carry out Air Pressure Tests.</li> <li>• Inspect for damage. Repair as required.</li> </ul>

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

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOFT/SLIP 1-2 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>226 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	<ul style="list-style-type: none"> <li>• Run On-Board Diagnostic Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). Carry out Stall</li> </ul>
<ul style="list-style-type: none"> <li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, transmission</li> </ul>	

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

fluid temperature (TFT)  
sensor

Speed Tests. Refer to **SPECIAL TESTING PROCEDURES**. GO to **PINPOINT TEST B** and GO to **PINPOINT TEST E**.

### 326 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control

- Bolts out of torque specification
- Gaskets damaged
- 2-4 accumulator piston plug and seal (also soft 3 - 4 shift), main regulator valve, line modulator valve (also soft 3 - 4 shift) stuck, damaged or misassembled
- Hydraulic passages damaged
- Pressure tap plate/gasket damaged
- Separator plates damaged

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Intermediate/Overdrive Band and Servo Assembly

- Piston out of torque specification
- Servo rod or rod bore damaged
- Intermediate overdrive band or reverse clutch drum assembly worn, damaged or misassembled
- Springs damaged
- Servo cover and seal damaged

- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Forward One-Way Clutch Assembly (Slips in 1st)

- Not holding or damaged
- Forward clutch assembly (slips in 1st)
- Seals damaged
- Return spring damaged
- Friction elements damaged

- Inspect for damage. Repair as necessary.
- Carry out Air Pressure Test.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"> <li>• Pump support seals No. 3, No. 4 damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Low One-Way Clutch Assembly</b> <ul style="list-style-type: none"> <li>• Not overrunning, damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Low Reverse Clutch Assembly</b> <ul style="list-style-type: none"> <li>• Friction elements severely damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Case</b> <ul style="list-style-type: none"> <li>• Band anchor damaged</li> <li>• Porosity/leakage in servo apply, servo release circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. If damaged, install a new case.</li> <li>• Inspect the case for leakage/porosity. Carry out Air Pressure Tests. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>. Install a new case as necessary.</li> </ul>

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

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOFT/SLIP 2-3 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>227 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, transmission fluid temperature (TFT) sensor</li> </ul>	<ul style="list-style-type: none"> <li>• Run On-Board Diagnostics Tests. Carry out Stall Speed Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST B</u></b> and GO to <b><u>PINPOINT TEST E</u></b>.</li> </ul>
<b>327 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Pump Assembly</b> <ul style="list-style-type: none"> <li>• Bolts out of torque specification</li> <li>• Gaskets damaged</li> <li>• Pump support seals No. 4 or No. 5 damaged, missing</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust bolts to specification.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<b>Main Control</b>	
<ul style="list-style-type: none"> <li>• Bolts out of torque</li> </ul>	



## 2005 Ford Escape

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<p>specification</p> <ul style="list-style-type: none"><li>• Gasket leaks</li><li>• Line modulator valve (also soft 1 - 2 and 3 - 4 shifts), servo release shuttle valve stuck, damaged or misassembled</li><li>• Hydraulic passages damaged</li><li>• Separator plates damaged</li><li>• Pressure tap plate/gasket leaks</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>
<p><b>Direct Clutch Assembly</b></p> <ul style="list-style-type: none"><li>• Seals or piston damaged</li><li>• Piston bore damaged</li><li>• Friction elements damaged, worn or excessive end clearance</li><li>• Check ball not seating correctly</li><li>• Return spring assembly damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Check end clearance. Repair as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>
<p><b>Intermediate/Overdrive Servo</b></p> <ul style="list-style-type: none"><li>• Piston or piston bore damaged</li><li>• Servo rod or rod bore damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>
<p><b>Case</b></p> <ul style="list-style-type: none"><li>• Leakage in the servo apply, servo release or direct clutch circuits</li></ul>	<ul style="list-style-type: none"><li>• Inspect for case damage. Carry out Air Pressure Test.</li></ul>
<p><b>Forward One-Way Clutch Assembly</b></p>	

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

- Not holding, damaged

- Inspect for damage. Install new as necessary.

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

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOFT/SLIP 2-3 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>228 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoids, transmission fluid temperature (TFT) sensor</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST B</u></b> and GO to <b><u>PINPOINT TEST E</u></b>.</li></ul>
<b>328 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket leaks</li><li>• Line modulator valve, 2 - 4 accumulator valve plug and seal (also soft 1 - 2 shift), stuck, damaged or misassembled</li><li>• Pressure tap plate/gasket leaks</li><li>• Hydraulic passages damaged</li><li>• Separator plates damaged or orifice blocked</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specifications.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>
<b>Intermediate/Overdrive Band and Servo Assembly</b> <ul style="list-style-type: none"><li>• Intermediate overdrive band or reverse clutch drum assembly worn, damaged or misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Install new as necessary.</li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"> <li>• Piston, seals or piston bore damaged, missing</li> <li>• Servo cover or seal damaged</li> <li>• Servo rod or rod bore damaged</li> <li>• Springs damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> <li>• Carry out Air Pressure Test. Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<b>Direct Clutch Assembly</b>  <b>NOTE:</b> <b>May also have third gear slip.</b> <ul style="list-style-type: none"> <li>• Carry out Air Pressure Test.</li> <li>• Seals damaged, missing</li> <li>• Piston damaged</li> <li>• Check ball damaged, missing or leaking</li> <li>• Return spring damaged</li> <li>• Friction elements damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Install new as necessary.</li> </ul>
<b>Case</b>  <ul style="list-style-type: none"> <li>• Band anchor damaged</li> <li>• Servo apply and servo release circuits leaking</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for damage. Carry out Air Pressure Test. Install new as necessary.</li> </ul>

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

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOFT/SLIP 4-3 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>229 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>  <ul style="list-style-type: none"> <li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, output shaft speed sensor, mass air</li> </ul>	<ul style="list-style-type: none"> <li>• Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID</b></li> </ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

flow sensor, throttle position  
sensor

**ESCAPE** article for Escape (Hybrid).  
GO to **PINPOINT TEST E**.

### 329 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control

- Bolts out of torque specification
  - Gasket leaks
  - Servo release shuttle valve, main regulator valve stuck, damaged or misassembled
  - Hydraulic passages damaged
  - Pressure tap plate/gasket leaks or damage
  - Separator plates damaged, blocked
- Adjust bolts to specification.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.

#### Intermediate/Overdrive Band and Servo Assembly

- Intermediate overdrive band and reverse clutch drum assembly worn, damaged or misassembled
  - Servo return spring broken
  - Servo rod damaged
  - Piston seal damaged
- Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.

#### Direct Clutch Assembly

- Seals damaged, missing
  - Piston damaged
  - Check ball damaged, missing or leaking
  - Return spring damaged
  - Friction elements damaged
- Carry out Air Pressure Test.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.

#### Forward/Coast Clutch Assembly

- Seals damaged, missing
  - Piston damaged
  - Friction elements worn, damaged
  - Check ball not functioning
- Carry out Air Pressure Test.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.
  - Inspect for damage. Repair as necessary.

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"><li>• Forward clutch piston and return spring damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Case</b> <ul style="list-style-type: none"><li>• Porosity/cross leaks in servo apply, servo release, direct clutch circuits</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Carry out Air Pressure Test. Repair as necessary.</li></ul>

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

### **DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOFT/SLIP 3-2 SHIFT ONLY (AUTOMATIC)**

Possible Component	Reference/Action
<b>230 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, throttle position sensor, output shaft speed sensor, mass air flow sensor, 3-2 timing/coast clutch solenoid (3-2T/CCS)</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostic tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION-HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST E</b> and GO to <b>PINPOINT TEST G</b>.</li></ul>
<b>330 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket damaged</li><li>• 3-2 timing valve, solenoid regulator valve, 3-2 control valve stuck, damaged or misassembled</li><li>• 3-2T/CCS solenoid not functioning correctly</li><li>• Pressure tap plate/gasket leaks or damaged</li><li>• Separator plates damaged, blocked</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Activate solenoid using the Transmission Tester. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Direct Clutch Assembly</b> <ul style="list-style-type: none"><li>• Return spring damaged, broken</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"><li>• Friction elements damaged, worn</li><li>• Ball check not releasing</li><li>• Piston or seal damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Intermediate/Overdrive Band and Servo Assembly</b> <ul style="list-style-type: none"><li>• Intermediate overdrive band or reverse clutch drum assembly worn, damaged or misassembled</li><li>• Servo piston damaged</li><li>• Servo return and cushion springs damaged, misassembled</li><li>• Springs damaged, misassembled</li><li>• Servo rod bent, damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Porosity/cross leaks</li><li>• Pump support seal rings No. 4, No. 5, No. 6 damaged or misassembled</li><li>• Forward to direct passage leaks</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for porosity, leaks. Install new pump assembly as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Case</b> <ul style="list-style-type: none"><li>• Band anchor damaged</li><li>• Leakage in servo apply/release circuits</li><li>• Case bore damaged (servo rod)</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Carry out Air Pressure Test. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

SHIFT CONCERNS: SOFT/SLIP 2-1 SHIFT ONLY (AUTOMATIC OR KICKDOWN)

## DIAGNOSTIC ROUTINES - SHIFT CONCERNS SOFT/SLIP 2-1 SHIFT ONLY (AUTOMATIC OR KICKDOWN)

Possible Component	Reference/Action
<b>231 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, transmission fluid temperature (TFT) sensor, throttle position sensor, mass air flow sensor</li> </ul>	<ul style="list-style-type: none"> <li>Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST B</b> and GO to <b>PINPOINT TEST E</b>.</li> </ul>
<b>331 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Pump Assembly</b> <ul style="list-style-type: none"> <li>Gaskets damaged</li> <li>Porosity/cross leaks</li> <li>Pump support seals No. 3 or No. 4 leaking, misassembled, damaged</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Install new as necessary.</li> <li>Inspect for leaks/porosity. Install new as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Intermediate/Overdrive Servo and Band Assembly</b> <ul style="list-style-type: none"> <li>Servo piston damaged</li> <li>Servo piston return spring damaged</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary</li> <li>Inspect for damage. Repair as necessary</li> </ul>
<b>Forward Clutch Assembly</b> <ul style="list-style-type: none"> <li>Piston or seals damaged</li> <li>Friction elements damaged</li> </ul>	<ul style="list-style-type: none"> <li>Carry out Air Pressure Test.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Low One-Way Clutch</b> <ul style="list-style-type: none"> <li>Damaged, not holding</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary.</li> </ul>

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

## DIAGNOSTIC ROUTINES - SHIFT CONCERNS HARSH 1-2 SHIFT ONLY (AUTOMATIC)

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

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

- Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoids, transmission fluid temperature (TFT) sensor, TSS, throttle position sensor, mass air flow sensor, TCC solenoid, transmission range (TR) sensor

- Run On-Board Diagnostics Tests. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid). GO to **PINPOINT TEST B**, GO to **PINPOINT TEST C**, GO to **PINPOINT TEST D**, GO to **PINPOINT TEST E** and GO to **PINPOINT TEST F**.

### 332 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control

- Bolts out of torque specification
- Gasket leaks
- 2 - 4 accumulator valve, 3-2 control valve (also harsh 3 - 4 shift) stuck, damaged or misassembled
- Separator plates damaged
- Hydraulic passages damaged

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Pump Assembly

- Bolts out of torque specification
- Gasket damaged
- Pump support seal rings No. 3 or No. 4 damaged
- Porosity/cross leaks

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Intermediate/Overdrive Band and Servo Assembly

- Cushion return springs damaged
- Intermediate overdrive band damaged, worn
- Intermediate overdrive band or reverse clutch drum assembly worn, damaged or misassembled

- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Forward Clutch Assembly

- Seals damaged
- Return spring damaged

- Carry out Air Pressure Test.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.



## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"><li>• Friction elements damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Case</b> <ul style="list-style-type: none"><li>• Band anchor area damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. If damaged, install a new case.</li></ul>

**SHIFT CONCERNS: HARSH 2-3 SHIFT ONLY (AUTOMATIC)**

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS HARSH 2-3 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>233 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC solenoid, transmission range (TR) sensor, transmission fluid temperature (TFT) sensor, mass air flow sensor, TCC solenoid, turbine shaft speed (TSS) sensor</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST B</b>, GO to <b>PINPOINT TEST C</b>, GO to <b>PINPOINT TEST D</b>, GO to <b>PINPOINT TEST E</b> and GO to <b>PINPOINT TEST F</b>.</li></ul>
<b>333 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket leaks</li><li>• Line modulator valve (also 1 - 2 and 3 - 4 harsh shift), servo release shuttle valve stuck, damaged or misassembled</li><li>• Separator plates damaged</li><li>• Hydraulic passages damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket damaged</li><li>• Porosity/cross leaks</li><li>• Pump support seal rings No. 4 or No. 5 damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Direct Clutch Assembly</b>	

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"> <li>• Carry out Air Pressure Test.</li> <li>• Piston or piston bore damaged</li> <li>• Friction elements damaged, worn</li> <li>• Ball check not seating correctly</li> <li>• Return spring damaged</li> <li>• Clutch cylinder splines damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Intermediate/Overdrive Servo</b> <ul style="list-style-type: none"> <li>• Servo piston or piston bore damaged</li> <li>• Servo rod damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Case</b> <ul style="list-style-type: none"> <li>• Leakage in the servo apply, servo release or direct clutch circuits</li> <li>• Servo rod bore damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect case for damage. Carry out Air Pressure Test. Repair or install a new case as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>

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

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS HARSH 3-4 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>234 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, EPC Solenoid, 3-2T/CCS, transmission range (TR) sensor, transmission fluid temperature (TFT) sensor, TSS, throttle position sensor, mass air flow sensor, TCC solenoid</li> </ul>	<ul style="list-style-type: none"> <li>• Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST B</b>, GO to <b>PINPOINT TEST C</b>, GO to <b>PINPOINT TEST D</b>, GO to <b>PINPOINT TEST E</b>, GO to <b>PINPOINT TEST F</b> and GO to <b>PINPOINT TEST G</b>.</li> </ul>
<b>334 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control</b> <ul style="list-style-type: none"> <li>• Bolts out of torque specification</li> <li>• Gasket leaks</li> <li>• Line modulator valve (also 1 - 2</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust bolts to specification.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<p>and 2 - 3 harsh shift), 3-2 control valve, 2 - 4 accumulator valve, coast clutch valve, stuck, damaged or misassembled</p> <ul style="list-style-type: none"><li>• Hydraulic passages damaged</li><li>• Separator plates damaged, blocked</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gaskets damaged</li><li>• Porosity/cross leaks</li><li>• Coast clutch Teflon® seals damaged</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Intermediate/Overdrive Band and Servo Assembly</b> <ul style="list-style-type: none"><li>• Intermediate overdrive band and reverse clutch drum assembly, damaged, worn, misassembled</li><li>• Servo piston or cover damaged or leaking</li><li>• Springs damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Coast Clutch Assembly</b> <ul style="list-style-type: none"><li>• Piston or seals damaged, missing</li><li>• Friction elements damaged, worn</li><li>• Check ball not functioning</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Direct Clutch Assembly</b> <ul style="list-style-type: none"><li>• Piston or seals damaged, missing</li><li>• Check ball damaged, missing or leaking</li><li>• Return spring damaged</li><li>• Friction elements damaged</li><li>• Clutch cylinder splines damaged</li></ul>	<ul style="list-style-type: none"><li>• Carry out Air Pressure Test.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Case</b> <ul style="list-style-type: none"><li>• Band anchor damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>

## DIAGNOSTIC ROUTINES - SHIFT CONCERNS HARSH 4-3 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>235 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, electronic pressure control (EPC) solenoid, transmission range (TR) sensor, 3-2T/CCS, transmission fluid temperature (TFT) sensor, OSS, TSS, throttle position sensor, mass air flow sensor, TCC solenoid</li> </ul>	<ul style="list-style-type: none"> <li>Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION-HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST B</b>, GO to <b>PINPOINT TEST C</b>, GO to <b>PINPOINT TEST D</b>, GO to <b>PINPOINT TEST E</b>, GO to <b>PINPOINT TEST F</b> and GO to <b>PINPOINT TEST G</b>.</li> </ul>
<b>335 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control</b> <ul style="list-style-type: none"> <li>Bolts out of torque specification</li> <li>Gasket leaks</li> <li>Servo release shuttle valve, 3-2 timing/coast valve stuck, damaged or misassembled</li> <li>Hydraulic passages damaged</li> <li>Separator plates damaged, blocked</li> </ul>	<ul style="list-style-type: none"> <li>Adjust bolts to specification.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"> <li>Bolts out of torque specification</li> <li>Porosity/cross leaks, seal rings damaged, missing or leaking ball plug</li> <li>Gasket damaged</li> <li>Pump support seal rings No. 2, No. 3, No. 4 or No. 5 (coast and direct clutch circuits) damaged</li> </ul>	<ul style="list-style-type: none"> <li>Adjust bolts to specification.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Intermediate/Overdrive Band and Servo Assembly</b> <ul style="list-style-type: none"> <li>Servo rod bent, damaged</li> <li>Servo return spring broken</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Coast Clutch Assembly</b>	

## 2005 Ford Escape

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<ul style="list-style-type: none"><li>• Seals damaged, missing</li><li>• Piston damaged</li><li>• Friction elements worn, damaged</li><li>• Check ball not functioning</li><li>• Forward clutch piston and return spring damaged</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>
<b>Case</b> <ul style="list-style-type: none"><li>• Porosity/cross leaks in servo apply, servo release, direct clutch, coast clutch circuits</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Carry out Air Pressure Test. Repair as necessary.</li></ul>

**SHIFT CONCERNS: HARSH 3-2 SHIFT ONLY (AUTOMATIC)**

### DIAGNOSTIC ROUTINES - SHIFT CONCERNS HARSH 3-2 SHIFT ONLY (AUTOMATIC)

Possible Component	Reference/Action
<b>236 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, electronic pressure control (EPC) solenoid, transmission range (TR) sensor, 3-2T/CCS, transmission fluid temperature (TFT) sensor, OSS, TSS, throttle position sensor, mass air flow sensor, TCC solenoid</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION-HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST B</b>, GO to <b>PINPOINT TEST C</b>, GO to <b>PINPOINT TEST D</b>, GO to <b>PINPOINT TEST E</b>, GO to <b>PINPOINT TEST F</b> and GO to <b>PINPOINT TEST G</b>.</li></ul>
<b>336 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control</b> <ul style="list-style-type: none"><li>• Bolts out of torque specification</li><li>• Gasket damaged</li><li>• 3-2 timing valve, solenoid regulator valve, 3-2 control valve stuck, damaged, misassembled</li><li>• Hydraulic passages damaged</li><li>• Separator plates damaged or blocked</li></ul>	<ul style="list-style-type: none"><li>• Adjust bolts to specification.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li><li>• Inspect for damage. Repair as necessary.</li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<ul style="list-style-type: none"> <li>• 3-2T/CCS solenoid not functioning correctly</li> </ul>	<ul style="list-style-type: none"> <li>• Activate solenoid using Transmission Tester. If coast clutch operation is OK, proceed to direct clutch assembly.</li> </ul>
<b>Direct Clutch Assembly</b> <ul style="list-style-type: none"> <li>• Return spring damaged, broken</li> <li>• Friction elements damaged, worn</li> <li>• Check ball not exhausting</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out Air Pressure Test.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Intermediate/Overdrive Band and Servo Assembly</b> <ul style="list-style-type: none"> <li>• Intermediate overdrive band or reverse clutch drum assembly damaged, worn or misassembled</li> <li>• Servo piston damaged</li> <li>• Servo return and cushion springs damaged, misassembled</li> <li>• Springs damaged, misassembled</li> <li>• Servo rod bent or damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"> <li>• Bolts out of torque specification</li> <li>• Gaskets damaged</li> <li>• Porosity/cross leaks</li> <li>• Pump support seal rings damaged or misassembled</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust bolts to specification.</li> <li>• Inspect for damage. Install new as necessary.</li> <li>• Inspect for porosity, leaks. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Case</b> <ul style="list-style-type: none"> <li>• Band anchor damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> </ul>

**TORQUE CONVERTER OPERATION CONCERNS: NO APPLY**

**DIAGNOSTIC ROUTINES - TORQUE CONVERTER OPERATION CONCERNS  
NO APPLY**

Possible Component	Reference/Action
<b>240 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>• Electrical inputs/outputs,</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out Torque Converter Operation Test. Refer to <b>TORQUE CONVERTER</b></li> </ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

vehicle wiring harnesses, powertrain control module, transmission fluid temperature (TFT) sensor, TCC solenoid, brake pedal position (BPP) switch, OSS, TSS

**DIAGNOSIS.** Run On-Board Diagnostics Tests. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid). GO to **PINPOINT TEST B**, GO to **PINPOINT TEST C**, and GO to **PINPOINT TEST F**.

### 340 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control

- Bolts out of torque specification
- Gasket damaged
- Solenoid pressure regulator valve, bypass clutch control valve and plunger, converter regulator valve stuck, damaged, misassembled
- TCC solenoid not functioning correctly
- Hydraulic passages damaged
- Separator plates damaged or blocked

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Activate solenoid using the Transmission Tester. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Torque Converter Assembly

- Leakage, internal damage

- Inspect for damage and leakage. Carry out Torque Converter Operation Test. Refer to **TORQUE CONVERTER DIAGNOSIS**.

**TORQUE CONVERTER OPERATION CONCERNS: ALWAYS APPLIED/MAY STALL ENGINE**

### DIAGNOSTIC ROUTINES - TORQUE CONVERTER OPERATION CONCERNS ALWAYS APPLIED/MAY STALL ENGINE

Possible Component	Reference/Action
<b>241 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module (PCM),</li></ul>	<ul style="list-style-type: none"><li>• Carry out Torque Converter Operation Tests. Refer to <b>TORQUE CONVERTER DIAGNOSIS</b>. Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or</li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

transmission fluid  
temperature (TFT) sensor,  
TCC solenoid

**INTRODUCTION- HYBRID ESCAPE** article  
for Escape (Hybrid). GO to **PINPOINT TEST B**  
and GO to **PINPOINT TEST C**.

### 341 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control

- Bolts out of torque specification
- Gasket damaged
- Bypass clutch control valve and plunger (always applied), converter regulator valve stuck, damaged, misassembled
- Separator plates damaged, blocked
- TCC solenoid not functioning correctly.  
NOTE: Converter clutch not applied in 1st gear or reverse gear
- Pressure tap plate/gasket damaged
- Hydraulic passages damaged

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Activate solenoid using the Transmission Tester.  
Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Pump Assembly

- Bolts out of torque specification
- Gaskets damaged
- Pump support No. 1 seal ring damaged, missing, misassembled

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Torque Converter Assembly

- Internal seals damaged
- Piston plate damaged/stuck to cover

- Inspect for damage. Repair as necessary.
- If cover is heat stained, install a new torque converter.

#### Case

- Porosity/cross leaks from the clutch bypass circuit

- Inspect for porosity/leaks. Repair or install new as necessary.



**TORQUE CONVERTER CLUTCH CONCERNS: CYCLING SHUDDER CHATTER****DIAGNOSTIC ROUTINES - TORQUE CONVERTER CLUTCH CONCERNS  
CYCLING SHUDDER CHATTER**

Possible Component	Reference/Action
<b>242 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"> <li>Electrical inputs/outputs, TCC solenoid, transmission range (TR) sensor, throttle position (TP) RPM, PCM calibration may not be at current level</li> </ul>	<ul style="list-style-type: none"> <li>Carry out Torque Converter Operation Tests. Refer to <b>TORQUE CONVERTER DIAGNOSIS</b>. Clear codes. Run On-Board Diagnostics Tests. Refer to <b>TORQUE CONVERTER DIAGNOSIS</b>. Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST C</b>.</li> </ul>
<b>342 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid Condition</b> <ul style="list-style-type: none"> <li>Condition</li> </ul>	<ul style="list-style-type: none"> <li>Inspect fluid condition. For additional information, refer to <b>PRELIMINARY INSPECTION</b>.</li> </ul>
<b>Main Control</b> <ul style="list-style-type: none"> <li>Bolts out of torque specification</li> <li>Gasket damaged</li> <li>TCC solenoid malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Adjust bolts to specification.</li> <li>Inspect for damage. Repair as necessary.</li> <li>Activate solenoid using the Transmission Tester. Repair as necessary.</li> </ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"> <li>Bolts out of torque specification</li> <li>Cross leaks</li> <li>Gaskets, seals damaged</li> </ul>	<ul style="list-style-type: none"> <li>Adjust bolts to specification.</li> <li>Inspect for porosity leaks, gasket damage, install a new pump as required</li> <li>Inspect for damage. Repair as necessary.</li> </ul>
<b>Torque Converter Assembly</b> <ul style="list-style-type: none"> <li>Internal seals damaged</li> <li>Piston plate damaged/stuck to cover</li> </ul>	<ul style="list-style-type: none"> <li>Inspect for damage. Repair as necessary.</li> <li>If cover is heat stained, install a new torque converter.</li> </ul>

**OTHER CONCERNS: SHIFT LEVER EFFORT IS HIGH**

**2005 Ford Escape**

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape &amp; Mariner

**DIAGNOSTIC ROUTINES - OTHER CONCERNS SHIFT LEVER EFFORT IS HIGH**

Possible Component	Reference/Action
<b>251 - ELECTRICAL ROUTINE</b>	
<ul style="list-style-type: none"> <li>No Electrical Concerns</li> </ul>	
<b>351 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Brake Shift Interlock Solenoid</b> <ul style="list-style-type: none"> <li>Out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Refer to <u><b>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</b></u> .</li> </ul>
<b>Internal and External Shift Linkages</b> <ul style="list-style-type: none"> <li>Damaged, out of adjustment or misassembled</li> <li>Manual control lever damaged, park mechanism damaged, shaft bent, detent lever shaft bore (in case) damaged, detent spring bent/damaged, nut loose</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and repair as required. Verify linkage adjustment. Refer to <u><b>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</b></u> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li> <li>Inspect for damage. Repair as required.</li> </ul>
<b>Main Control</b> <ul style="list-style-type: none"> <li>Bolts out of torque specification</li> <li>Manual valve stuck, damaged</li> </ul>	<ul style="list-style-type: none"> <li>Adjust bolts to specification.</li> <li>Inspect for damage. Repair as necessary.</li> </ul>

**OTHER CONCERNS: EXTERNAL LEAKS****DIAGNOSTIC ROUTINES - OTHER CONCERNS EXTERNAL LEAKS**

Possible Component	Reference/Action
<b>252 - ELECTRICAL ROUTINE</b>	
<ul style="list-style-type: none"> <li>No Electrical Concerns</li> </ul>	
<b>352 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Fluid</b> <ul style="list-style-type: none"> <li>Incorrect level</li> </ul>	<ul style="list-style-type: none"> <li>Fill to correct level.</li> </ul>
<b>Seals/Gaskets</b>	<ul style="list-style-type: none"> <li>Locate source of leak. Repair as required.</li> </ul>

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<ul style="list-style-type: none"> <li>Differential seals, speedometer gear, retainer seal, pump assembly, main control cover, servo cover, split flange gasket, converter impeller hub, manual lever shaft seal, fluid level indicator tube</li> </ul>	<p>If differential seal or converter impeller hub is leaking, inspect drain back holes in case/converter housing, inspect surface of linkshaft or front wheel driveshaft and joint for a rough surface. Rough surface may cause seal leakage. Repair as necessary.</p>
<p><b>Other</b></p> <ul style="list-style-type: none"> <li>Fluid tube fitting, line pressure tap, pressure port plugs, drain plug, cooler tubes, case porosity, cracked case, cooler bypass valve</li> <li>Vent blocked or damaged</li> <li>Bolts at split flange or main control cover leaking</li> </ul> <p><b>Sensors/Connectors</b></p> <ul style="list-style-type: none"> <li>Transmission connectors, transmission range (TR) sensor. TSS sensor or seal</li> </ul>	<ul style="list-style-type: none"> <li>Locate source of leak. Repair as necessary.</li> <li>Check vent for damage or blockage. Repair as necessary.</li> <li>Inspect for leaks. Repair as necessary.</li> <li>Locate source of leak. Repair as necessary.</li> </ul>

### OTHER CONCERNS: VEHICLE DRIVEABILITY

### DIAGNOSTIC ROUTINES - OTHER CONCERNS VEHICLE DRIVEABILITY

Possible Component	Reference/Action
<b>253 - ELECTRICAL ROUTINE</b>	
<p><b>Powertrain Control System</b></p> <ul style="list-style-type: none"> <li>Base engine concerns</li> <li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, transmission fluid temperature (TFT) sensor, TCC solenoid, transmission range (TR) sensor, throttle position sensor</li> </ul>	<ul style="list-style-type: none"> <li>Refer to <b><u>ENGINE SYSTEM-GENERAL INFORMATION</u></b> .</li> <li>Carry out Torque Converter Operation Test. Refer to <b><u>TORQUE CONVERTER DIAGNOSIS</u></b>. Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). 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>.</li> </ul>
<b>353 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Internal and External Shift</b>	

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### Linkages or Gearshift Position Sensor

- Damaged, out of adjustment or misassembled
- Verify correct shift points and engagements

- Inspect and repair as required. Verify linkage adjustment. Refer to **AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E** . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.
- Refer to **ROAD TESTING VEHICLE**.

### Torque Converter

- Torque converter clutch always applied
- Torque converter one-way clutch
- Damaged

- Go to Routine 341.
- Inspect torque converter. Repair or install new as necessary.
- Inspect torque converter. Repair or install new as necessary.

**OTHER CONCERNS: NOISE/VIBRATION - FORWARD/REVERSE**

### DIAGNOSTIC ROUTINES - OTHER CONCERNS NOISE/VIBRATION - FORWARD/REVERSE

Possible Component	Reference/Action
<b>254 - ELECTRICAL ROUTINES</b>	
• No Electrical Concerns	
<b>354 - HYDRAULIC/MECHANICAL ROUTINES</b>	
<b>For Noises/Vibrations That Change With Engine Speed:</b>	
<ul style="list-style-type: none"><li>• Torque converter components</li><li>• Fluid level (low) pump cavitation</li><li>• Pump assembly</li><li>• Engine drive accessories</li><li>• Cooler tubes grounding out</li><li>• Flexplate</li></ul>	<ul style="list-style-type: none"><li>• Locate source of disturbance. Repair as necessary.</li><li>• Adjust fluid to correct level.</li><li>• Refer to <b><u>PUMP ASSEMBLY</u></b>.</li><li>• Refer to <b><u>ENGINE - 2.3L</u></b> or <b><u>ENGINE - 3.0L (4V)</u></b> .</li><li>• Refer to <b><u>TRANSAXLE-TRANSMISSION COOLING - CD4E</u></b> .</li><li>• Refer to <b><u>ENGINE - 2.3L</u></b> or <b><u>ENGINE - 3.0L (4V)</u></b> .</li></ul>

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<ul style="list-style-type: none"><li>• Inspection cover</li></ul>	<ul style="list-style-type: none"><li>• Locate source of disturbance. Repair as necessary.</li></ul>
<b>For Noises That Change With Vehicle Speed</b> <ul style="list-style-type: none"><li>• Powertrain mounts loose, damaged</li><li>• Tires</li><li>• Driveline concerns: front wheel driveshaft and joint or linkshaft, differential: final drive/chain, suspension, modifications</li><li>• Planetary gear sets</li><li>• Chain grounding to chain pan</li><li>• Forward one-way clutch</li><li>• Torque converter assembly</li></ul>	<ul style="list-style-type: none"><li>• Locate source of disturbance. Repair as necessary.</li><li>• Refer to <b><u>SUSPENSION SYSTEM-GENERAL INFORMATION</u></b> .</li><li>• Refer to <b><u>SUSPENSION SYSTEM-GENERAL INFORMATION</u></b> .</li><li>• Refer to <b><u>PLANETARY GEARSETS AND CHAIN DRIVE PARTS</u></b>.</li><li>• Inspect chain pan for signs of damage or wrong installation. Repair as necessary.</li><li>• Refer to <b><u>REVERSE ONE-WAY CLUTCH - SPRAG TYPE</u></b>, or <b><u>LOW REVERSE ONE-WAY CLUTCH - MECHANICAL DIODE TYPE</u></b>.</li><li>• Refer to <b><u>TORQUE CONVERTER</u></b>.</li></ul>
<b>Other Noises/Vibrations</b> <ul style="list-style-type: none"><li>• Speedometer cable or gears</li><li>• Shift cable and bracket vibration, grounding</li></ul>	<ul style="list-style-type: none"><li>• Locate source of disturbance. Repair as necessary.</li><li>• Locate source of disturbance. Repair as necessary.</li></ul>

**OTHER CONCERNS: ENGINE WILL NOT CRANK**

### DIAGNOSTIC ROUTINES - OTHER CONCERNS ENGINE WILL NOT CRANK

Possible Component	Reference/Action
<b>255 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Base engine concerns</li><li>• Electrical inputs/outputs, vehicle wiring harnesses,</li></ul>	<ul style="list-style-type: none"><li>• Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid).</li><li>• Run On-Board Diagnostics Tests. Refer to <b><u>INTRODUCTION - GASOLINE</u></b> article for</li></ul>

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

powertrain control module, transmission range (TR) sensor damaged, misadjusted	Escape (gasoline) and Mariner or <b><u>INTRODUCTION- HYBRID ESCAPE</u></b> article for Escape (Hybrid). GO to <b><u>PINPOINT TEST D.</u></b>
<b>355 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Starter/Flexplate</b> <ul style="list-style-type: none"><li>Damaged or misassembled</li></ul>	<ul style="list-style-type: none"><li>Inspect for damage, misassembly. Repair as necessary.</li></ul>
<b>Internal and External Shift Linkages or Transmission Range (TR) Sensor</b> <ul style="list-style-type: none"><li>Damaged, out of adjustment or misassembled</li></ul>	<ul style="list-style-type: none"><li>Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>

**OTHER CONCERNS: NO PARK RANGE**

### DIAGNOSTIC ROUTINES - OTHER CONCERNS NO PARK RANGE

Possible Component	Reference/Action
<b>256 - ELECTRICAL ROUTINE</b>	
<ul style="list-style-type: none"><li>No Electrical Concerns</li></ul>	
<b>356 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Shift Linkages</b> <ul style="list-style-type: none"><li>Internal or external shift linkages damaged, misassembled, misadjusted</li></ul>	<ul style="list-style-type: none"><li>Inspect and repair as required. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Park Mechanism</b> <ul style="list-style-type: none"><li>Park gear on driven sprocket assembly, parking pawl return spring, park pawl ratchet springs, parking pawl shaft, manual control lever, cam apply lever, manual lever detent spring, transmission range</li></ul>	<ul style="list-style-type: none"><li>Inspect for damage. Repair as necessary.</li></ul>

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2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

(TR) sensor, parking pawl apply cam, manual shaft nut damaged, missing or misassembled

### OTHER CONCERNS: TRANSAXLE OVERHEATING

### DIAGNOSTIC ROUTINES - OTHER CONCERNS TRANSAXLE OVERHEATING

Possible Component	Reference/Action
<b>257 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, TCC solenoid, transmission fluid temperature (TFT) sensor, OSS, TSS</li></ul>	<ul style="list-style-type: none"><li>Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST B</b>, GO to <b>PINPOINT TEST C</b> and GO to <b>PINPOINT TEST F</b>.</li></ul>

### OTHER CONCERNS: TRANSAXLE OVERHEATING

### DIAGNOSTIC ROUTINES - OTHER CONCERNS TRANSAXLE OVERHEATING

Possible Component	Reference/Action
<b>357 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Vehicle Overheating</b> <ul style="list-style-type: none"><li>Engine overheating</li></ul>	<ul style="list-style-type: none"><li>Refer to <b>ENGINE COOLING</b> .</li></ul>
<b>Fluid</b> <ul style="list-style-type: none"><li>Incorrect level</li><li>Condition</li></ul>	<ul style="list-style-type: none"><li>Adjust to correct level.</li><li>Inspect fluid level and condition. Refer to <b>PRELIMINARY INSPECTION</b>. If fluid is aerated, check thermal valve and filter seals. Repair as necessary.</li></ul>
<b>Cooler Tubes</b> <ul style="list-style-type: none"><li>Damaged, blocked, reversed</li></ul>	<ul style="list-style-type: none"><li>Inspect for damage. Repair as necessary.</li></ul>
<b>Intake Cooler</b> <ul style="list-style-type: none"><li>Damaged, blocked, restricted or leaking</li></ul>	<ul style="list-style-type: none"><li>Inspect for damage. Repair as necessary.</li></ul>
<b>Auxiliary Cooler (If Equipped)</b> <ul style="list-style-type: none"><li>Damaged, blocked, restricted or leaking</li></ul>	<ul style="list-style-type: none"><li>Inspect for damage or incorrect installation. Repair as necessary.</li></ul>
<b>Main Control</b>	

## 2005 Ford Escape

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<ul style="list-style-type: none"> <li>• Bolts out of torque specification</li> <li>• Main regulator valve, bypass clutch control valve, converter regulator valve stuck, damaged, misassembled</li> <li>• Hydraulic passages damaged</li> <li>• Separator plates/gaskets damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust bolts to specification.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Torque Converter Clutch</b> <ul style="list-style-type: none"> <li>• TCC solenoid not functioning correctly (off)</li> <li>• No Apply</li> </ul>	<ul style="list-style-type: none"> <li>• Activate solenoid using the Transmission Tester. Repair as necessary.</li> <li>• Go to Routine 240/340.</li> </ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"> <li>• Gasket damaged</li> <li>• Rear lube passage blocked</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Chain Pan</b> <ul style="list-style-type: none"> <li>• Missing</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for missing pan. Install pan if missing.</li> </ul>
<b>Thermostatic Fluid Level Control Valve</b> <ul style="list-style-type: none"> <li>• Stuck open or damaged</li> <li>• Gasket damaged or missing</li> <li>• Bolt or bracket damaged, missing, or incorrect installed</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> <li>• Inspect for damage. Repair as necessary.</li> </ul>
<b>Case/Converter Housing/Stator Support</b> <ul style="list-style-type: none"> <li>• Front lube passage blocked or restricted</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect passages. Carry out Air Pressure Test. Refer to <b><u>SPECIAL TESTING PROCEDURES</u></b>.</li> </ul>

**OTHER CONCERNS: NO ENGINE BRAKING IN MANUAL 1ST POSITION**

### DIAGNOSTIC ROUTINES - OTHER CONCERNS NO ENGINE BRAKING IN MANUAL 1ST POSITION

Possible Component	Reference/Action
<b>258 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	



## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

- Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, 3-2 timing/coast clutch solenoid

- Run On-Board Diagnostics Tests. Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid). GO to **PINPOINT TEST G.**

### 358 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Controls

- Bolts out of specification
- Gaskets damaged
- Low/reverse modulator valve, coast clutch valve stuck, damaged or misassembled
- 3-2 timing/coast clutch solenoid stuck or damaged
- Hydraulic passages damaged
- Pressure tap plate/gasket damaged
- Separator plate/gasket damaged

- Adjust bolts to specification.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage, contamination. Activate solenoid using the Transmission Tester. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Coast Clutch Assembly

- Assembly misassembled, damaged
- Forward clutch hub seal damaged
- Piston or seals damaged
- Check ball damaged, missing

- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Low/Reverse Clutch Assembly

- Assembly misassembled, damaged
- Piston or seals damaged

- Carry out Air Pressure Test.
- Inspect for damage. Repair as necessary.
- Inspect for damage. Repair as necessary.

#### Pump Assembly

- Pump support No. 2 or No.

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

3 seal rings for the coast clutch circuit damaged, missing

- Inspect for damage. Repair as necessary.

**OTHER CONCERNS: NO ENGINE BRAKING IN DRIVE (TCS ON) OR MANUAL 2ND POSITION**

### DIAGNOSTIC ROUTINES - OTHER CONCERNS NO ENGINE BRAKING IN DRIVE (TCS ON) OR MANUAL 2ND POSITION

Possible Component	Reference/Action
<b>259 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b> <ul style="list-style-type: none"><li>• Electrical inputs/outputs, vehicle wiring harnesses, powertrain control module, 3-2 timing/coast clutch solenoid</li></ul>	<ul style="list-style-type: none"><li>• Run On-Board Diagnostics Tests. Refer to <b>INTRODUCTION - GASOLINE</b> article for Escape (gasoline) and Mariner or <b>INTRODUCTION- HYBRID ESCAPE</b> article for Escape (Hybrid). GO to <b>PINPOINT TEST G</b>. Carry out Stall Speed Tests. Refer to <b>SPECIAL TESTING PROCEDURES</b>.</li></ul>
<b>359 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Internal or External Shift Linkages</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment or misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as necessary. Verify linkage adjustment. Refer to <b>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Pump support No. 2 or No. 3 seal rings for the coast clutch circuit damaged, missing</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Repair as necessary.</li></ul>

**OTHER CONCERNS: VEHICLE MOVEMENT WITH GEAR SELECTOR IN THE "N" POSITION**

### DIAGNOSTIC ROUTINES - OTHER CONCERNS VEHICLE MOVEMENT WITH GEAR SELECTOR IN N POSITION

Possible Component	Reference/Action
<b>262 - ELECTRICAL ROUTINE</b>	
<ul style="list-style-type: none"><li>• No Electrical Concerns</li></ul>	
<b>362 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Internal or External Shift</b>	

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

<b>Linkages</b> <ul style="list-style-type: none"><li>• Damaged, out of adjustment or misassembled</li></ul>	<ul style="list-style-type: none"><li>• Inspect and repair as required. Verify linkage adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION EXTERNAL CONTROLS - CD4E</u></b> . After repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted.</li></ul>
<b>Pump Assembly</b> <ul style="list-style-type: none"><li>• Gaskets severely damaged</li><li>• Pump support seal ring No. 2, leakage from lube circuit into forward clutch circuit</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>
<b>Forward/Coast Clutch Assembly</b> <ul style="list-style-type: none"><li>• Friction plates severely damaged</li><li>• Return spring damaged</li><li>• Check ball damaged, missing</li></ul>	<ul style="list-style-type: none"><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li><li>• Inspect for damage. Install new as necessary.</li></ul>

<http://vnx.su>

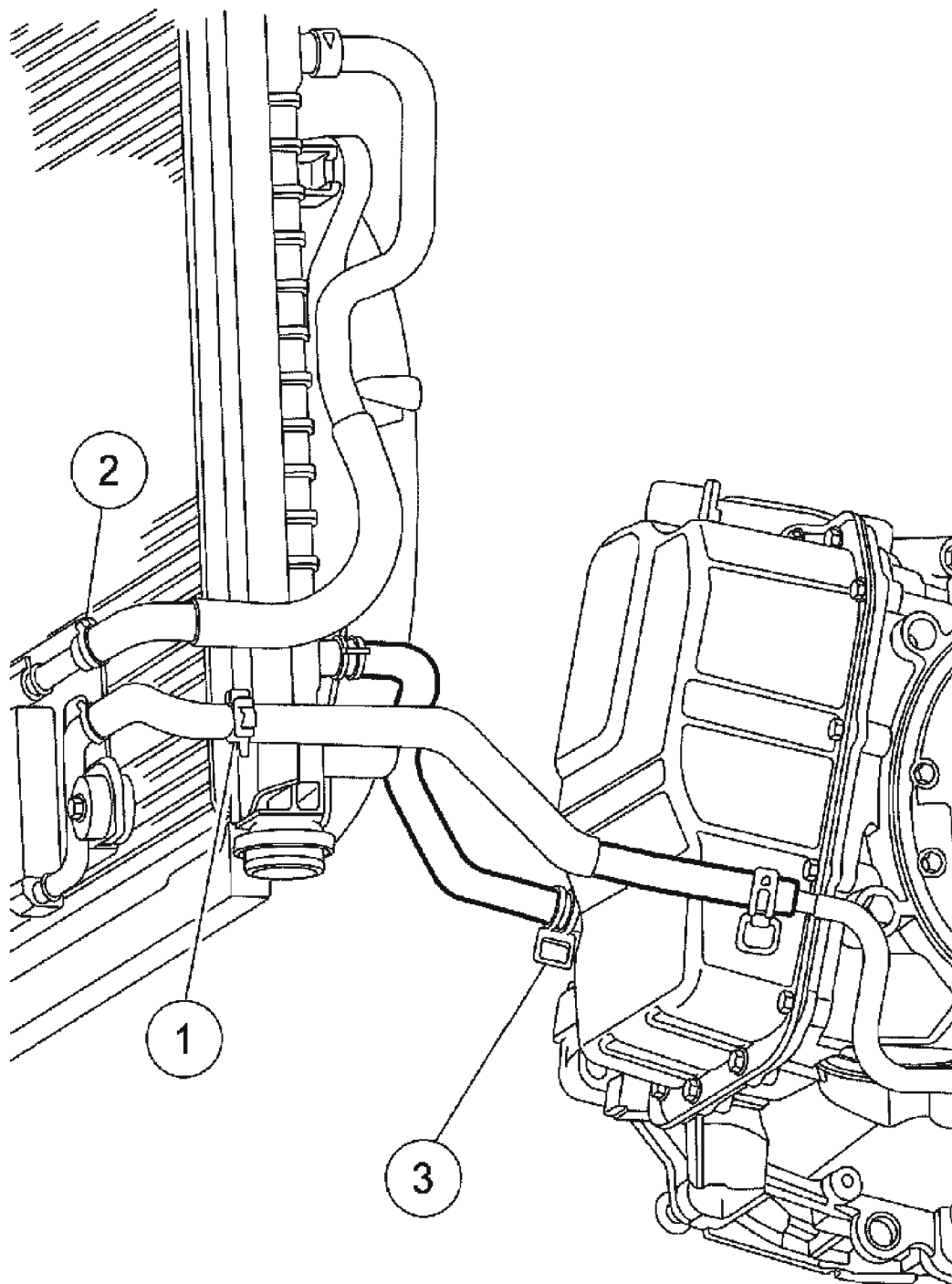
## GENERAL PROCEDURES

### TRANSMISSION FLUID COOLER - BACKFLUSHING AND CLEANING

**CAUTION:** Do not exceed 40 psi (276 kPa) of air pressure when flushing the cooler or damage to the internal cooler fins will occur.

**CAUTION:** Flush with clean transmission fluid only. Do not use solvents, mineral spirits or water-based cleaners.

**NOTE:** Rubber hoses must be attached to the ends of the fluid cooler tubes, to aid in connecting them to the cleaner.



N0014665

**Fig. 79: Connecting Flushing Machine Pressure Line To Number 1 And Return Line To Number 2**

**Courtesy of FORD MOTOR CO.**

1. Backflush any contaminants out of the oil-to-air cooler by connecting the flushing

machine pressure line to number 1 and the return line to number 2.

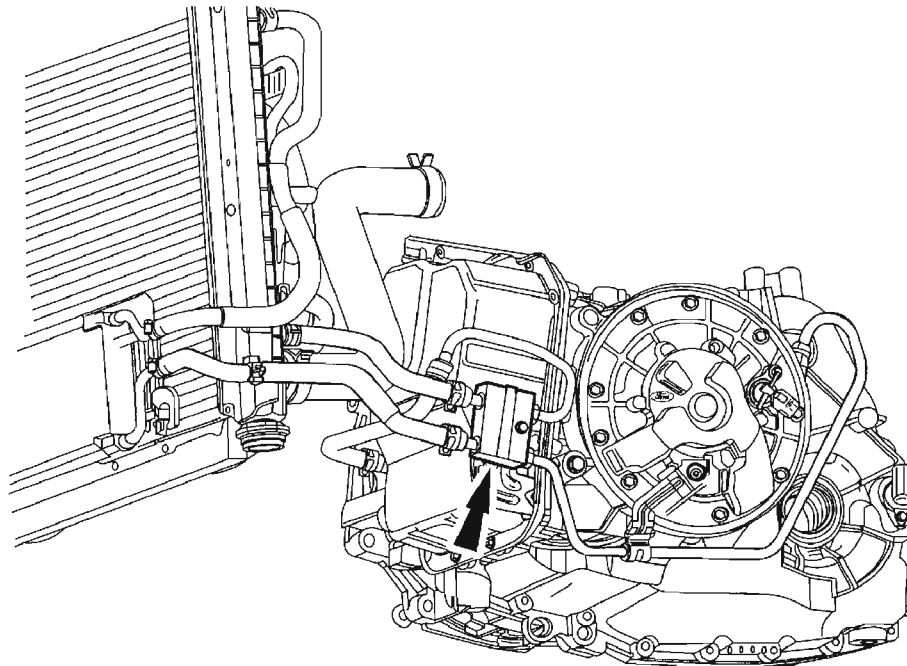
After 5 minutes, stop the machine, reverse the hoses and repeat the flushing.

2. Backflush any contaminants out of the radiator in-tank cooler by connecting the flushing machine pressure line to number 2 and the return line to number 3.

After 5 minutes, stop the machine, reverse the hoses and repeat the flushing.

**CAUTION: Do not exceed 276 kPa (40 psi) of air pressure when flushing the cooler. Damage to the cooler will occur.**

**NOTE:** Some vehicles are equipped with a cold weather bypass valve which cannot be cleaned or flushed. A new valve should be installed as part of an overhaul or prior to the installation of a remanufactured transaxle.



N0014664

**Fig. 80: Identifying Cold Weather Bypass Valve Location**  
**Courtesy of FORD MOTOR CO.**

3. Using compressed air, blow through the coolers until all fluid is removed.

## Material

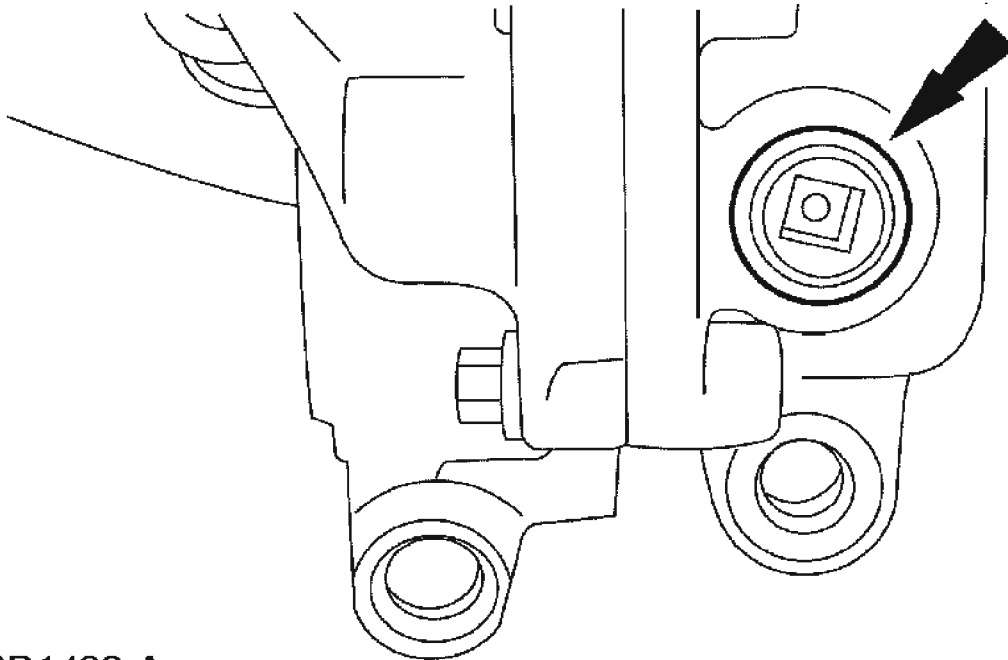
### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

## Draining

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

**NOTE:** If an internal problem is suspected, drain the 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.



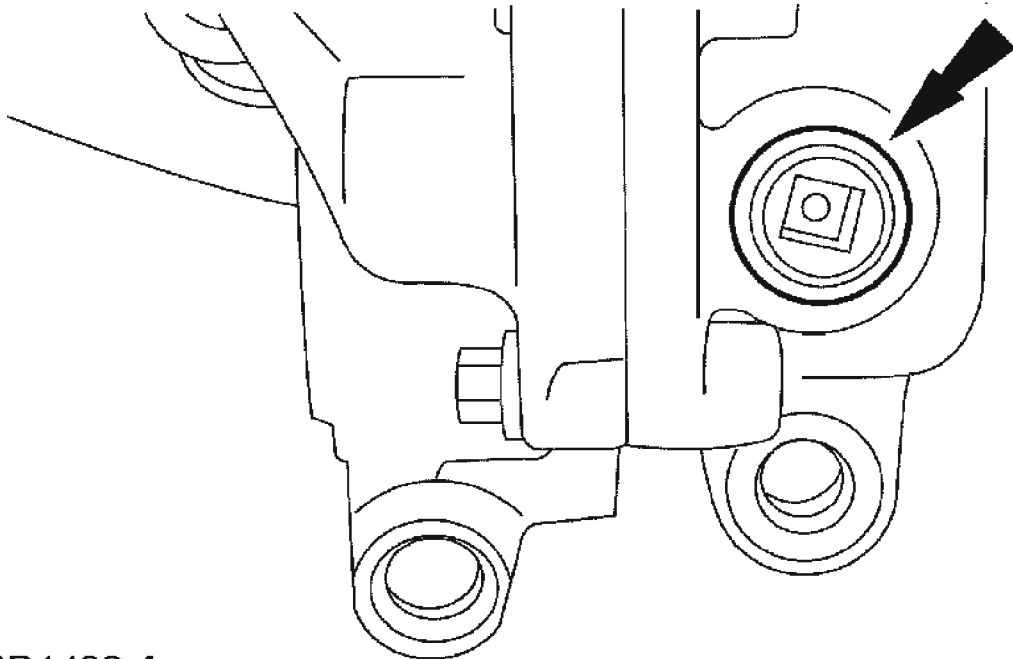
GD1438-A

**Fig. 81: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

2. Remove the transaxle drain plug.

**Refill**

1. Using a small amount of thread sealant on the threads, install the transaxle drain plug.
  - Tighten to 25 Nm (18 lb-ft).



GD1438-A

**Fig. 82: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

2. Fill the transaxle with clean automatic transmission fluid.
3. Start the engine and run through all the gears and check fluid 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 stud or studs, 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**

**CAUTION: 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 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 (spec of any kind). Examine the fluid level indicator for signs of antifreeze (gum or varnish). If particles are present in the fluid or there is evidence of engine coolant or water, 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 1.9 liter (2 qt.) of clean automatic transmission fluid into the converter and agitate by hand.
7. Thoroughly drain the fluid.

## **IN-VEHICLE REPAIR**

### **MAIN CONTROL COVER**

#### **Material**

### **MATERIAL SPECIFICATION CHART**

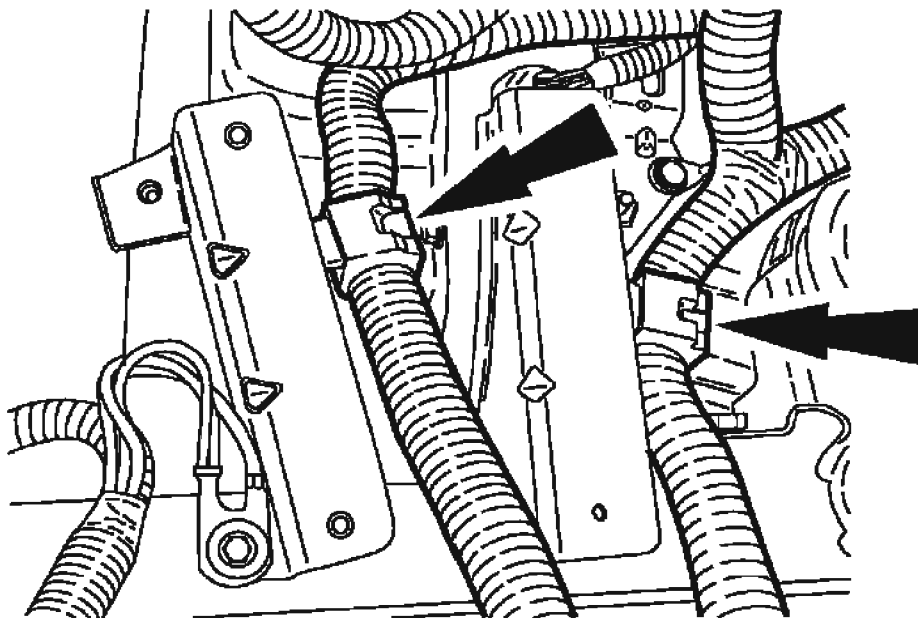
Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®



Thread Sealant with PTFE TA-24

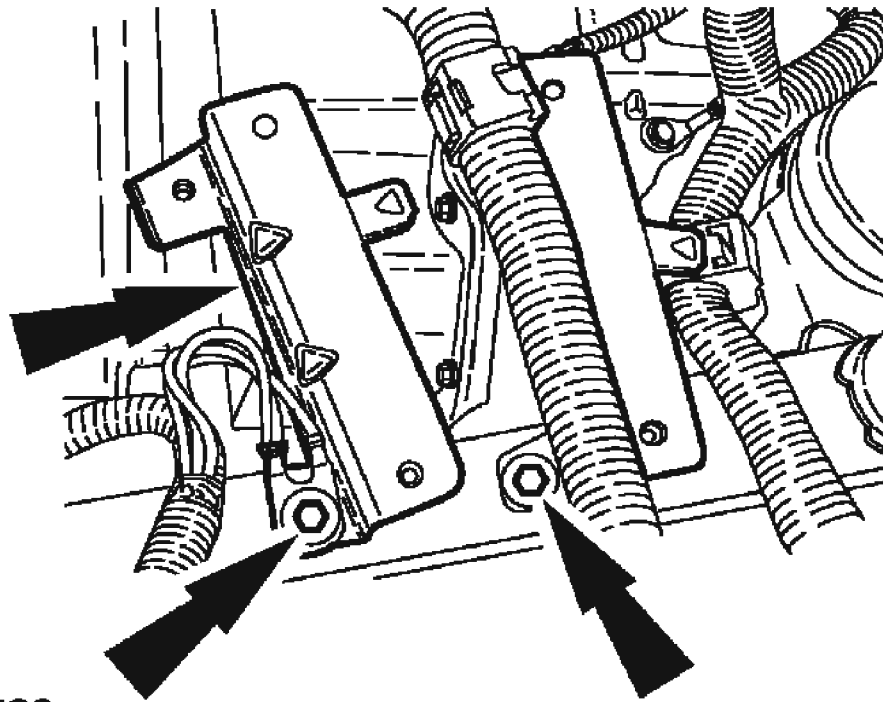
WSK-M2G350-  
A2**Removal**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** .
2. Drain the engine coolant. For additional information, refer to **ENGINE COOLING** .
3. Remove the battery tray. For additional information, refer to **CHARGING SYSTEM - GENERAL INFORMATION** .
4. Disconnect the wiring harness from the battery tray bracket.

**A0075532**

**Fig. 83: Disconnecting Wiring Harness From Battery Tray Bracket**  
Courtesy of FORD MOTOR CO.

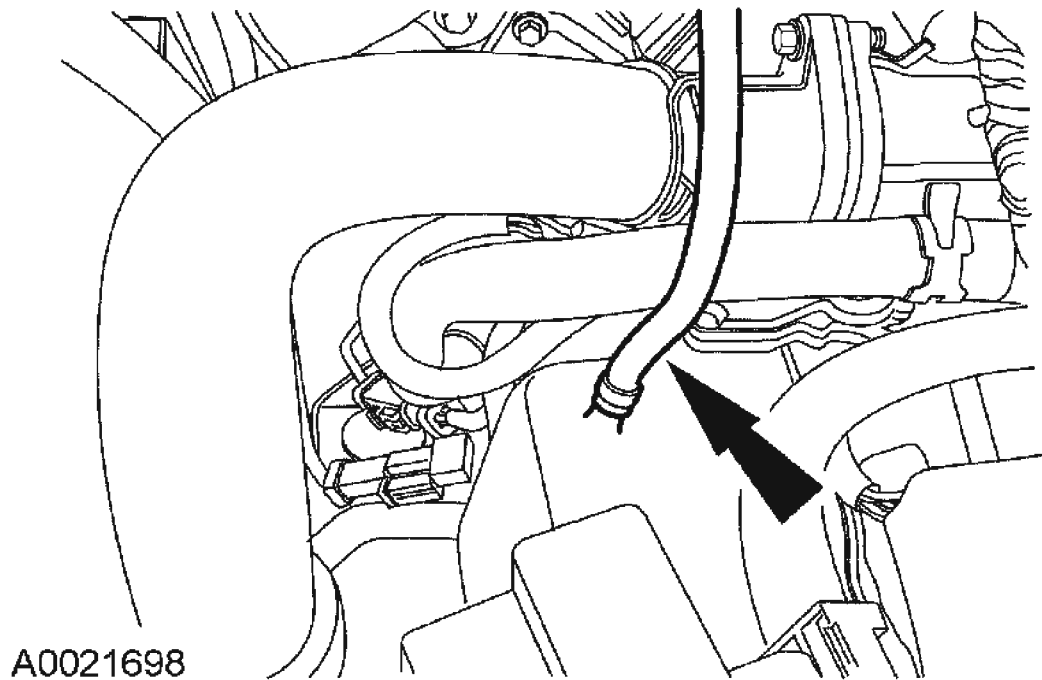
5. Remove the battery tray bracket.



**A0075533**

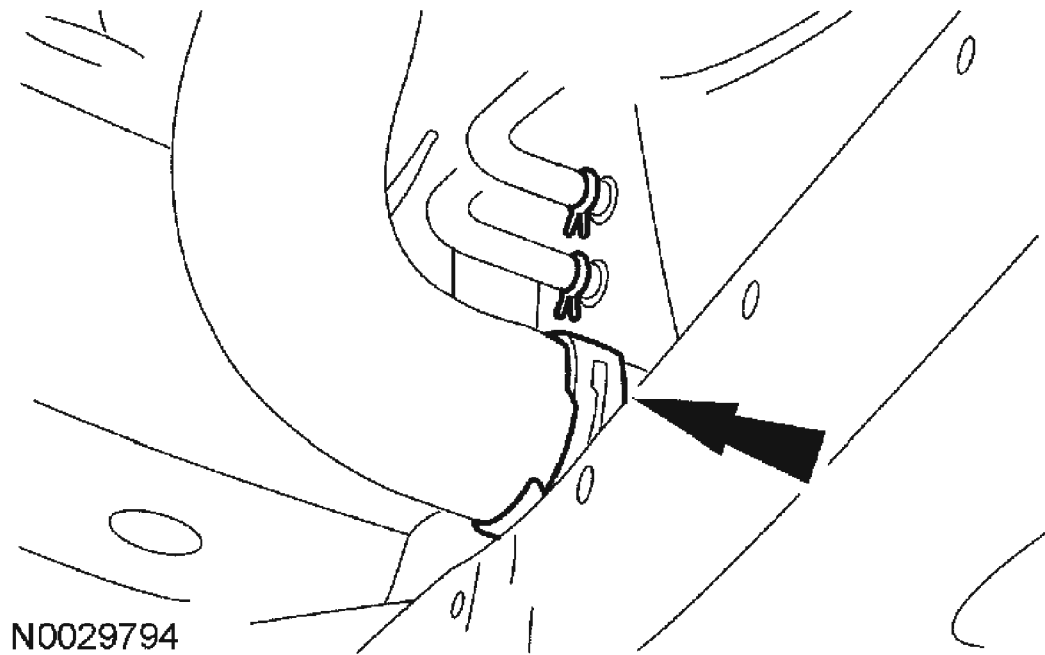
**Fig. 84: Removing Battery Tray Bracket**  
**Courtesy of FORD MOTOR CO.**

6. Disconnect the vent hose from the main control cover.



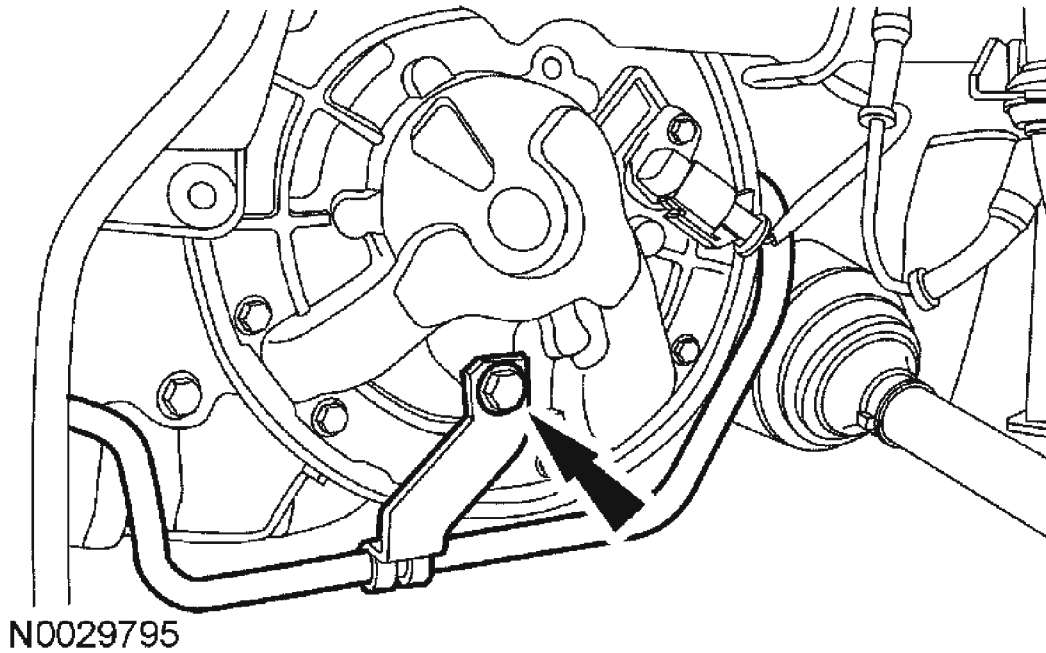
**Fig. 85: Disconnecting Vent Hose From Main Control Cover**  
Courtesy of FORD MOTOR CO.

7. Remove the lower radiator hose and position aside.



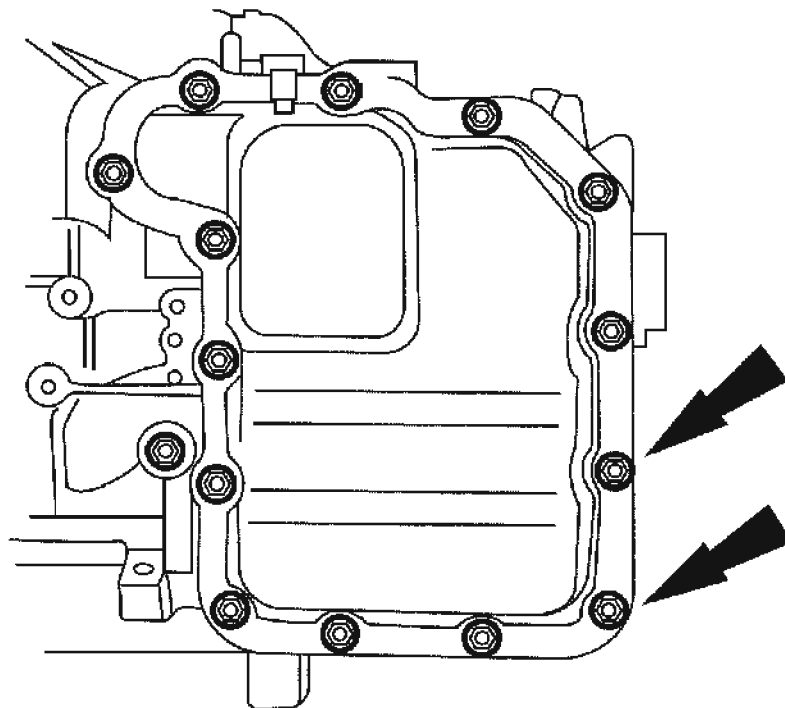
**Fig. 86: Removing Lower Radiator Hose And Position Aside**  
Courtesy of FORD MOTOR CO.

8. Remove the transmission fluid cooler tube bracket bolt.



**Fig. 87: Removing Transmission Fluid Cooler Tube Bracket Bolt**  
Courtesy of FORD MOTOR CO.

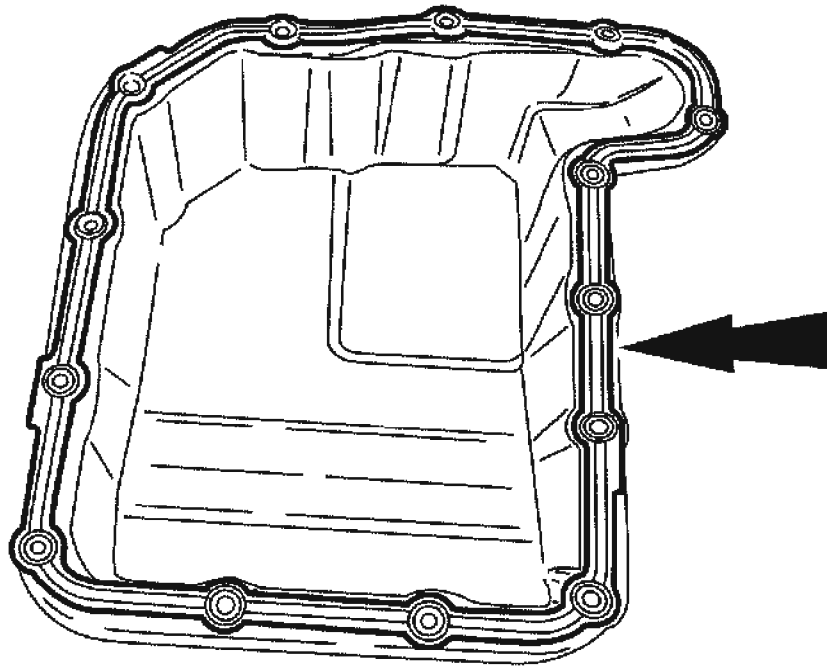
9. Remove the main control cover bolts, cooler bypass studs and the cover.



N0014663

**Fig. 88: Removing Main Control Cover Bolts, Cooler Bypass Studs And Cover**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not discard the gasket. It is a reusable type. Inspect the gasket for damage. Install a new gasket as necessary.



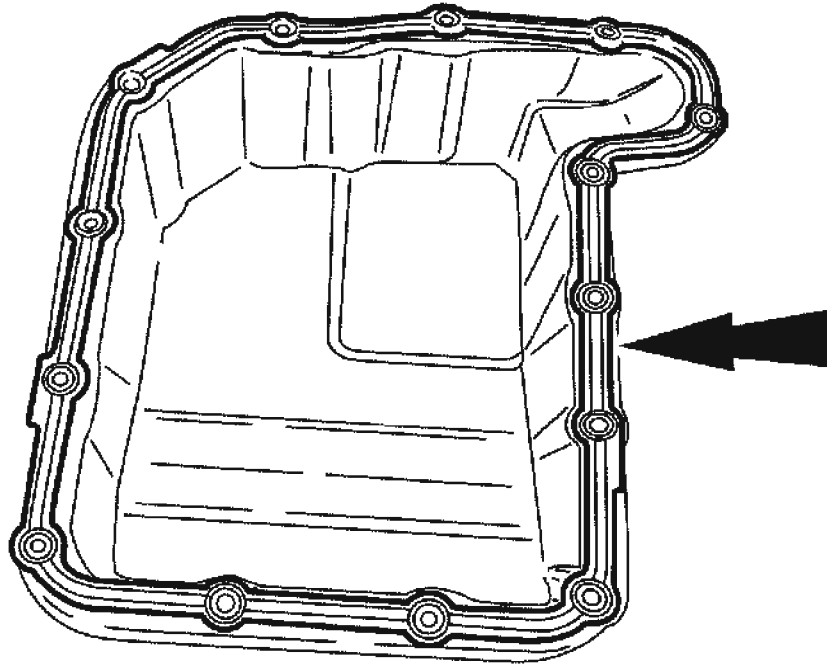
A0075576

**Fig. 89: Removing Main Control Cover Gasket**  
Courtesy of FORD MOTOR CO.

10. Remove the main control cover gasket.

#### Installation

**NOTE:** The main control cover gasket is a reusable type. Inspect the gasket for damage. Install a new gasket as necessary.



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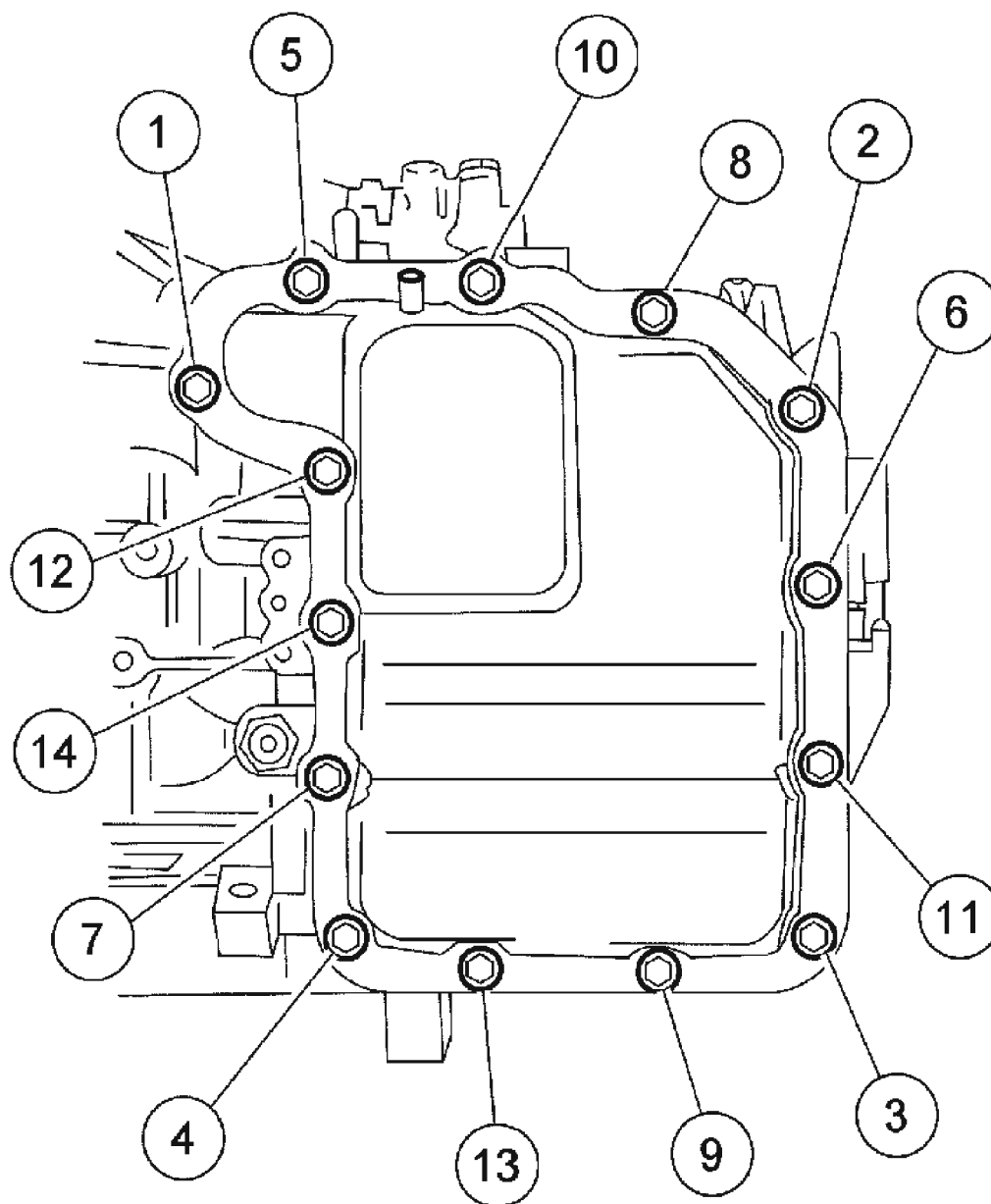
**Fig. 90: Installing Main Control Cover Gasket**  
Courtesy of FORD MOTOR CO.

1. Install the main control cover gasket.

**NOTE:**      **Install studs in locations 3 and 11.**

2. Install the main control cover.
  - Tighten to 13 Nm (10 lb-ft), in sequence shown in **Fig. 91**.

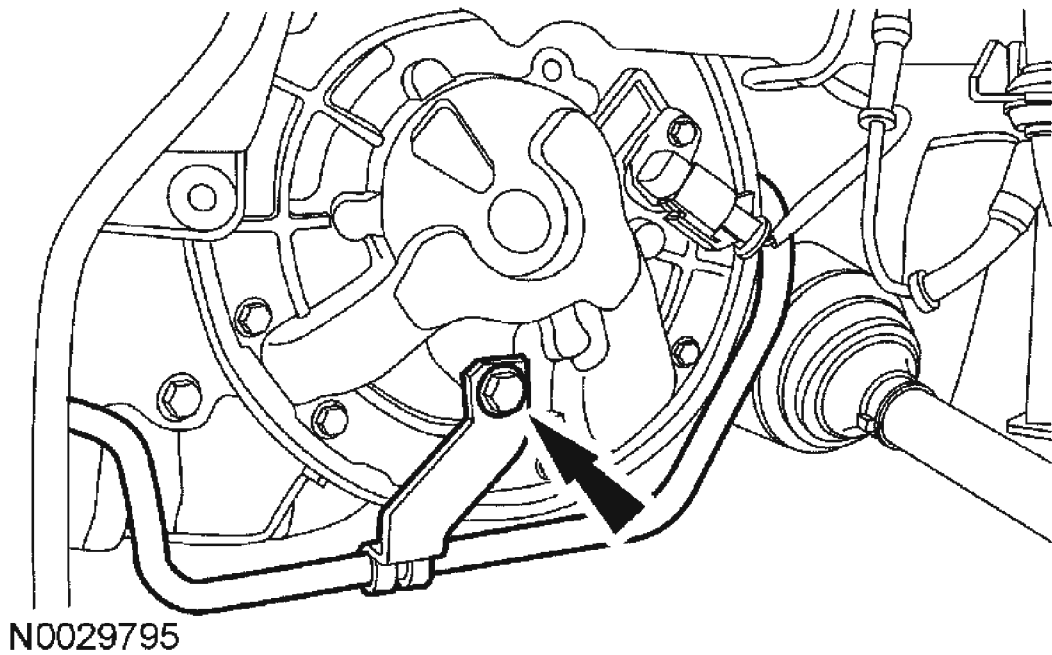




A0100508

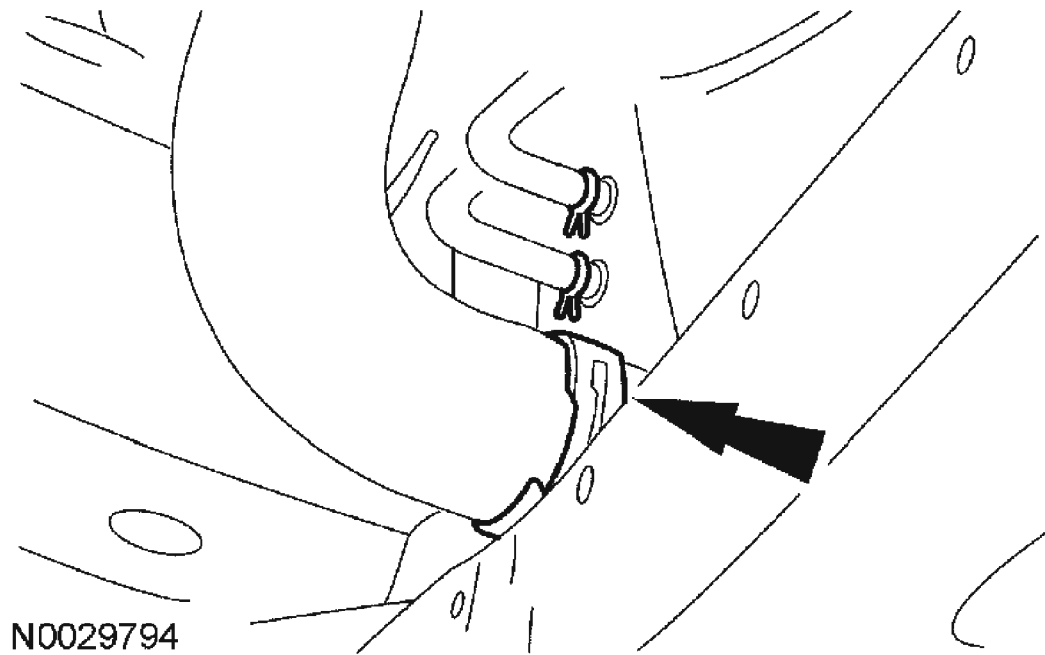
**Fig. 91: Installing Main Control Cover**  
Courtesy of FORD MOTOR CO.

3. Position the transmission fluid cooler tube in place and install the bolt.
  - Tighten to 25 Nm (18 lb-ft).



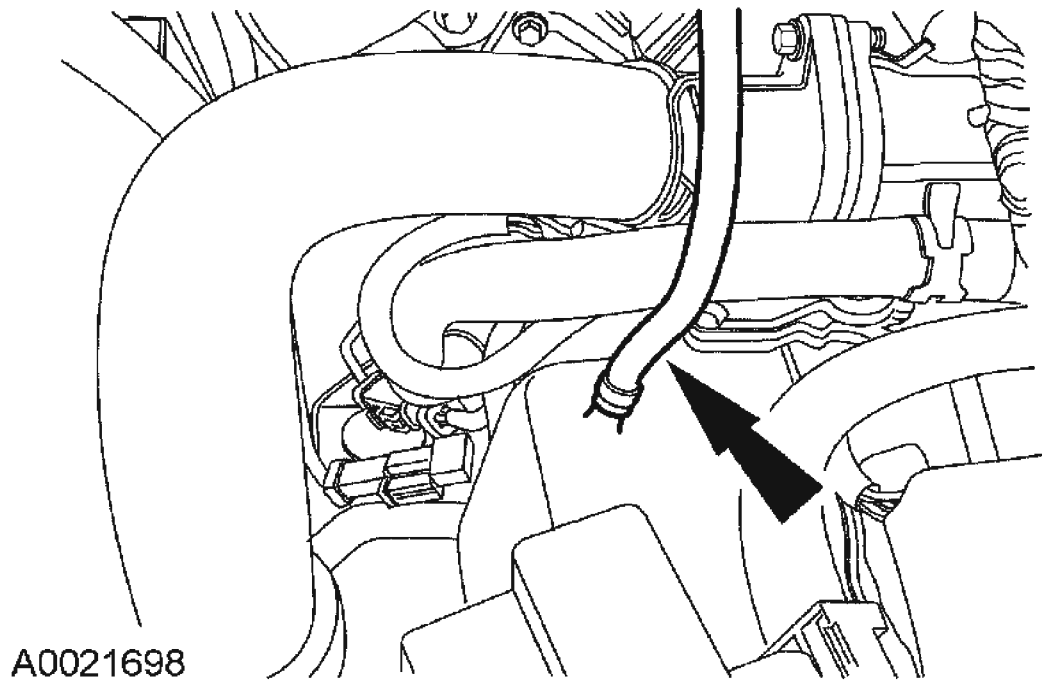
**Fig. 92: Installing Bolt**  
Courtesy of FORD MOTOR CO.

4. Install the lower radiator hose.



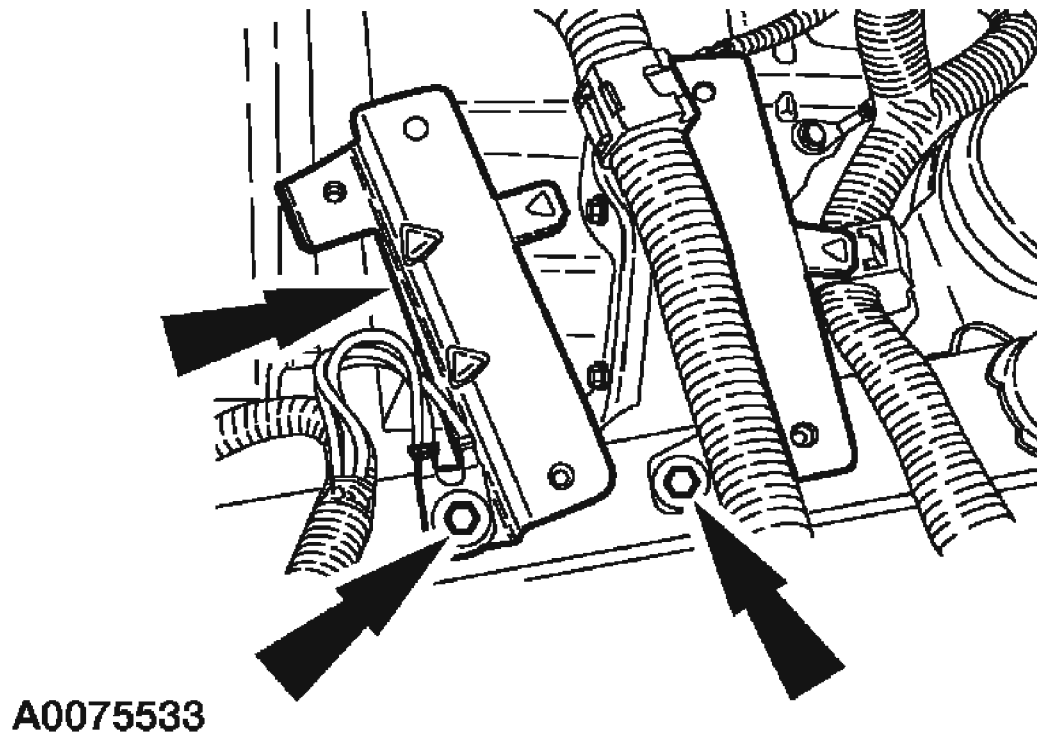
**Fig. 93: Installing Lower Radiator Hose**  
**Courtesy of FORD MOTOR CO.**

5. Connect the vent hose to the main control cover.



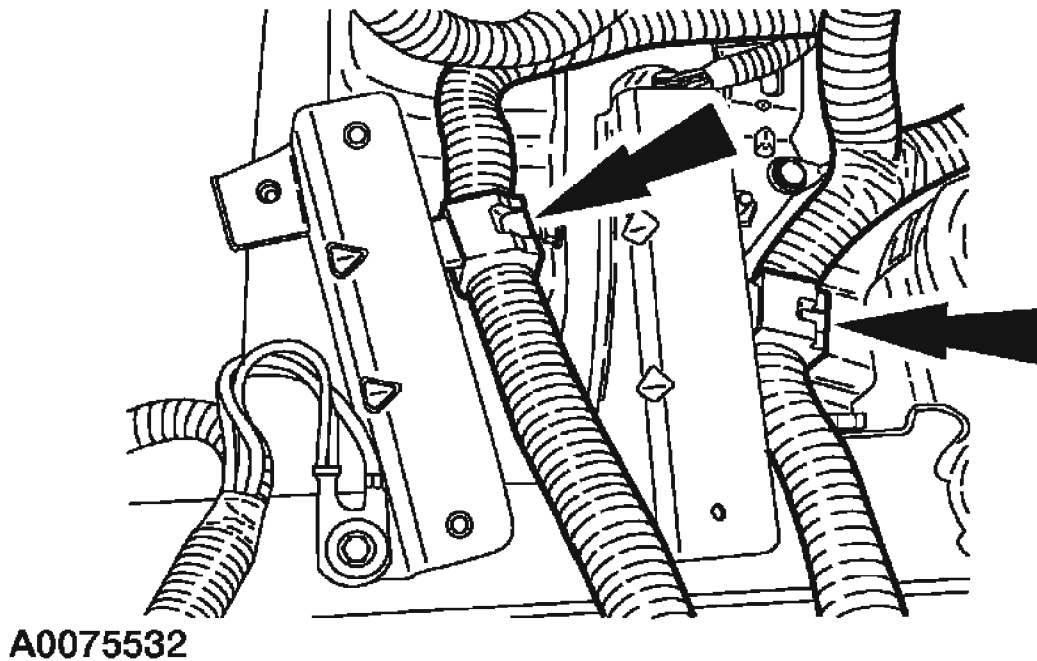
**Fig. 94: Connecting Vent Hose To Main Control Cover**  
Courtesy of FORD MOTOR CO.

6. Install the battery tray bracket.
  - Tighten to 10 Nm (89 lb-in).



**Fig. 95: Installing Battery Tray Bracket**  
**Courtesy of FORD MOTOR CO.**

7. Connect the wiring harness to the battery tray bracket.



**Fig. 96: Connecting Wiring Harness To Battery Tray Bracket**  
 Courtesy of FORD MOTOR CO.

8. Install the battery tray. For additional information, refer to **CHARGING SYSTEM - GENERAL INFORMATION**.
9. Fill the transaxle with clean automatic transmission fluid.
10. Fill the engine cooling system. For additional information, refer to **ENGINE COOLING**.
11. Start the engine, run through all of the gears and check the fluid level.

## MAIN CONTROL VALVE BODY

### Material

### MATERIAL SPECIFICATION CHART

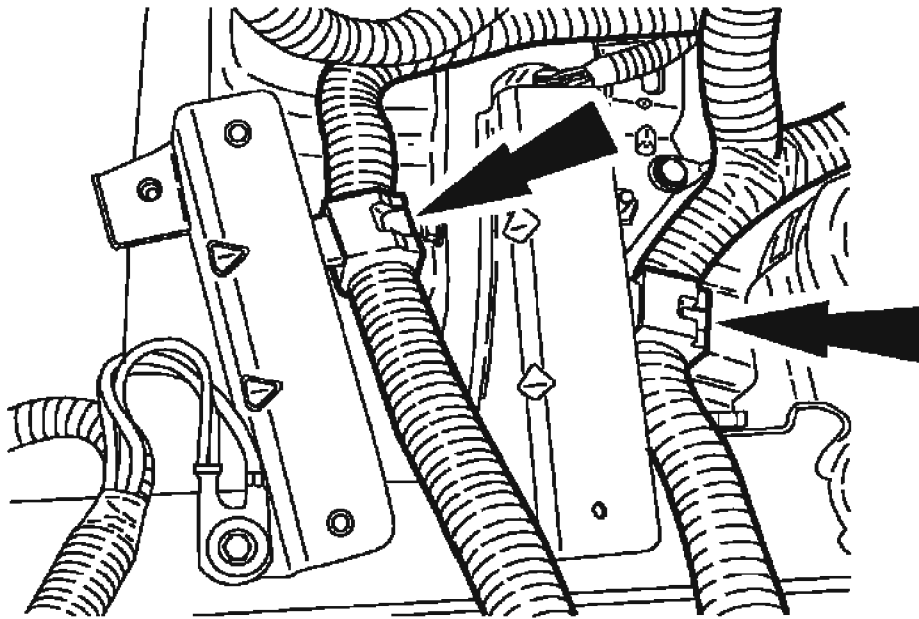
Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

### Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer

to **JACKING AND LIFTING** .

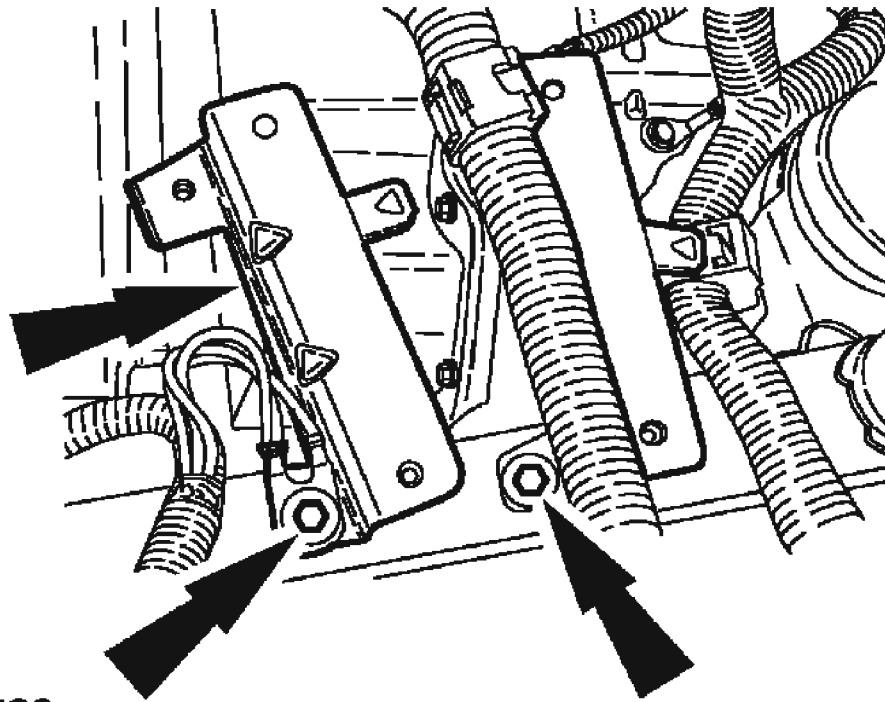
2. Drain the engine coolant. For additional information, refer to **ENGINE COOLING** .
3. Remove the battery and tray. For additional information, refer to **CHARGING SYSTEM - GENERAL INFORMATION** .
4. Disconnect the wiring harness from the battery tray bracket.



A0075532

**Fig. 97: Disconnecting Wiring Harness From Battery Tray Bracket**  
Courtesy of FORD MOTOR CO.

5. Remove the battery tray bracket.

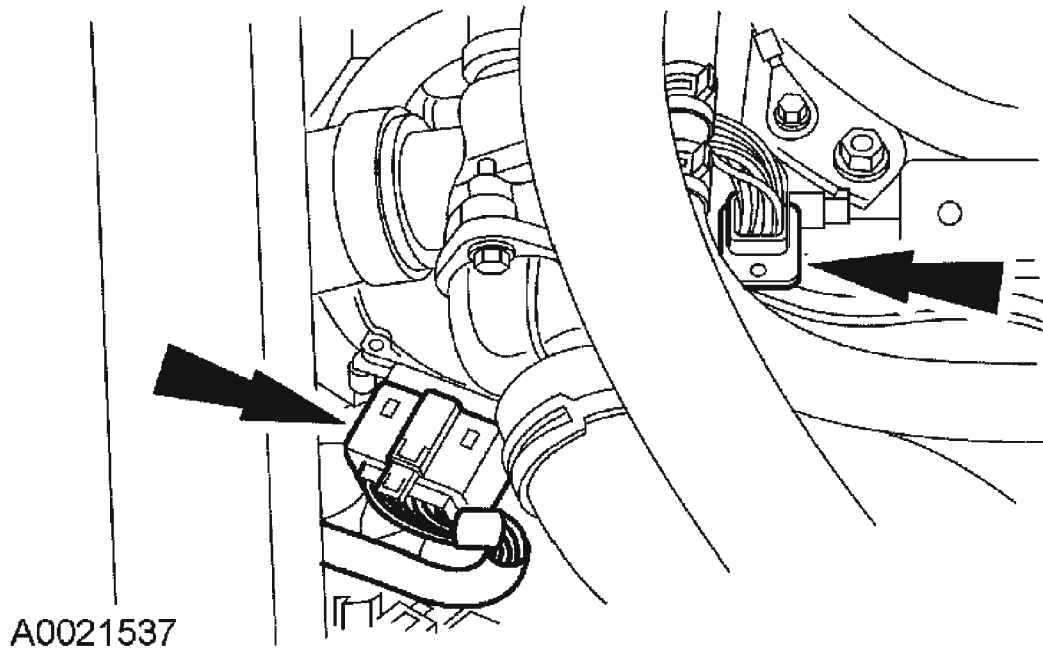


**A0075533**

**Fig. 98: Removing Battery Tray Bracket**  
**Courtesy of FORD MOTOR CO.**

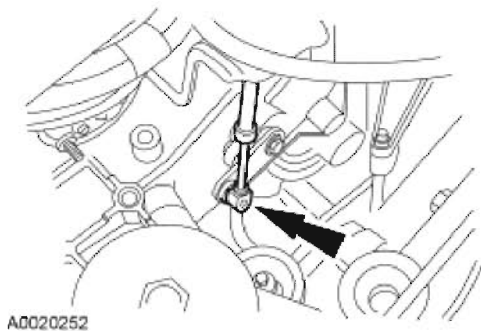
6. Disconnect the transaxle wiring harness electrical connector and the transmission range (TR) sensor electrical connector.





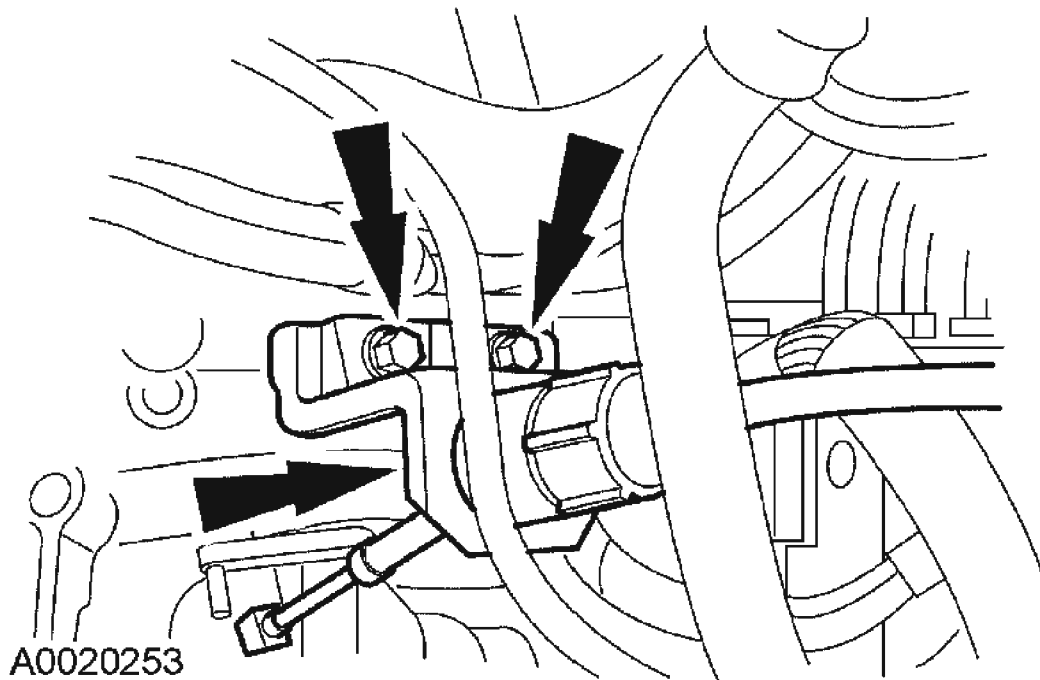
**Fig. 99: Disconnecting Transaxle Wiring Harness Electrical Connector And Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

7. Disconnect the shift cable.



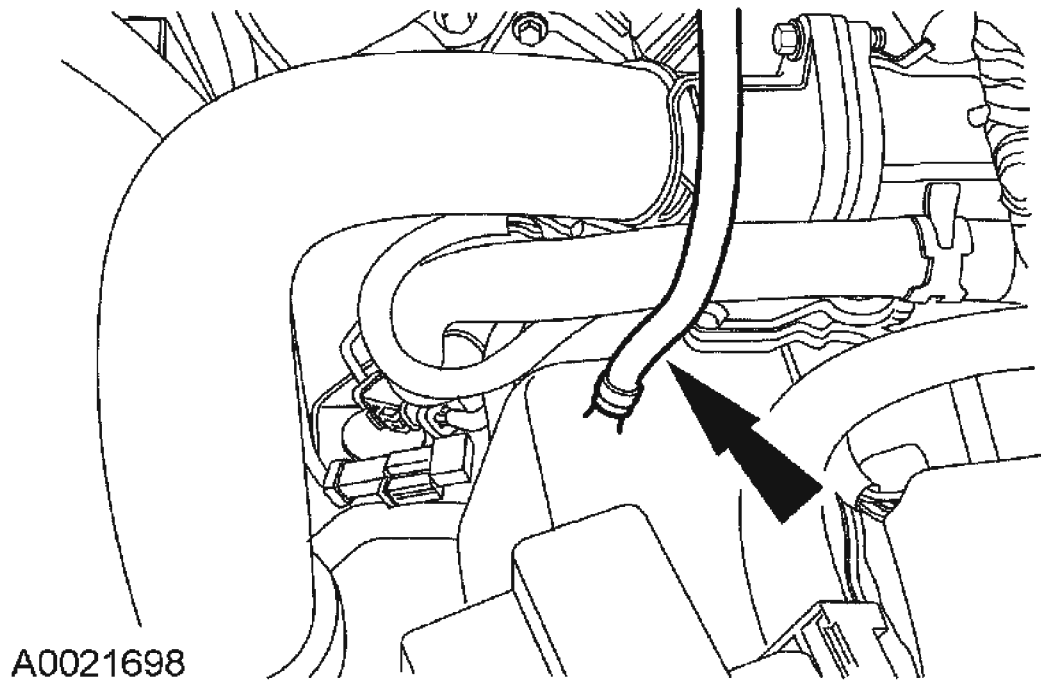
**Fig. 100: Locating Shift Cable End At Manual Lever**  
Courtesy of FORD MOTOR CO.

8. Remove the shift cable and bracket and position it aside.



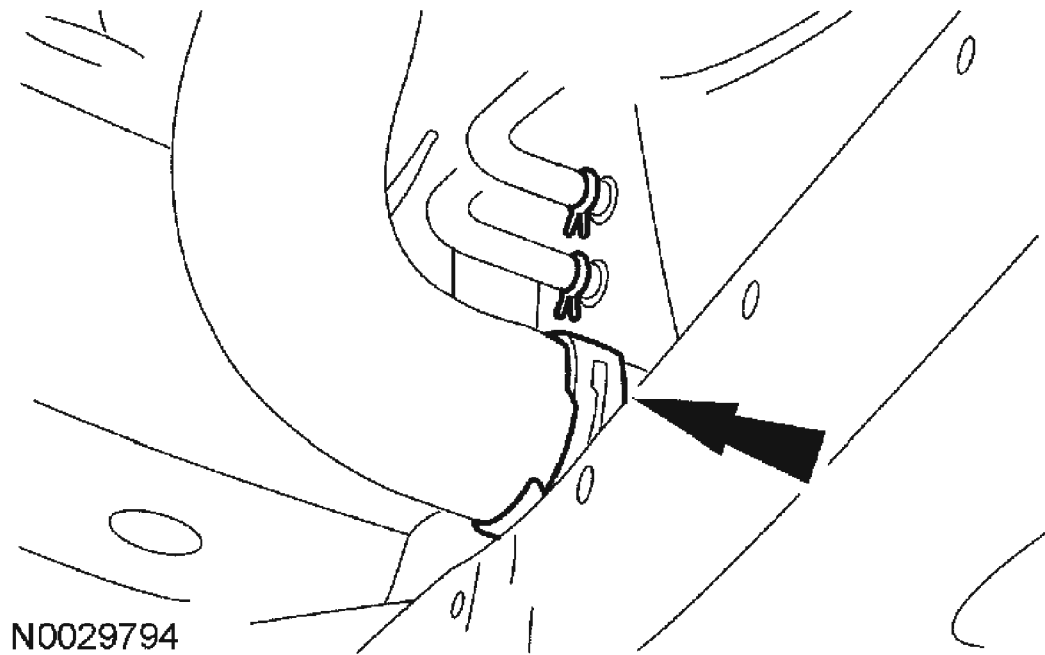
**Fig. 101: Removing Shift Cable And Bracket And Position It Aside**  
Courtesy of FORD MOTOR CO.

9. Remove the vent tube hose from the main control cover.



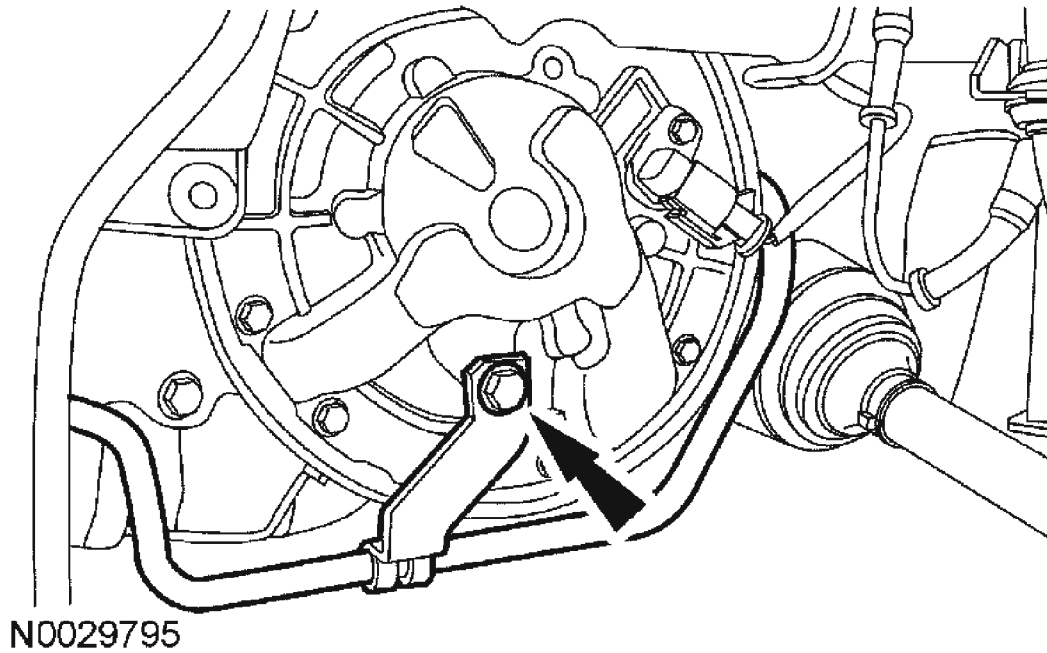
**Fig. 102: Removing Vent Tube Hose From Main Control Cover**  
Courtesy of FORD MOTOR CO.

10. Remove the lower radiator hose and position aside.



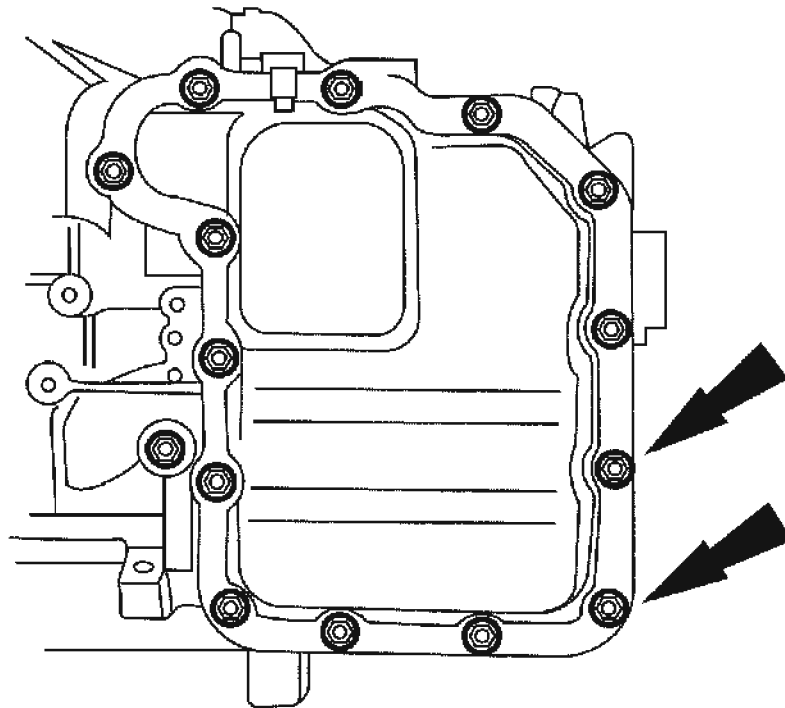
**Fig. 103: Removing Lower Radiator Hose And Position Aside**  
Courtesy of FORD MOTOR CO.

11. Remove the transmission fluid cooler tube bracket bolt.



**Fig. 104: Removing Transmission Fluid Cooler Tube Bracket Bolt**  
Courtesy of FORD MOTOR CO.

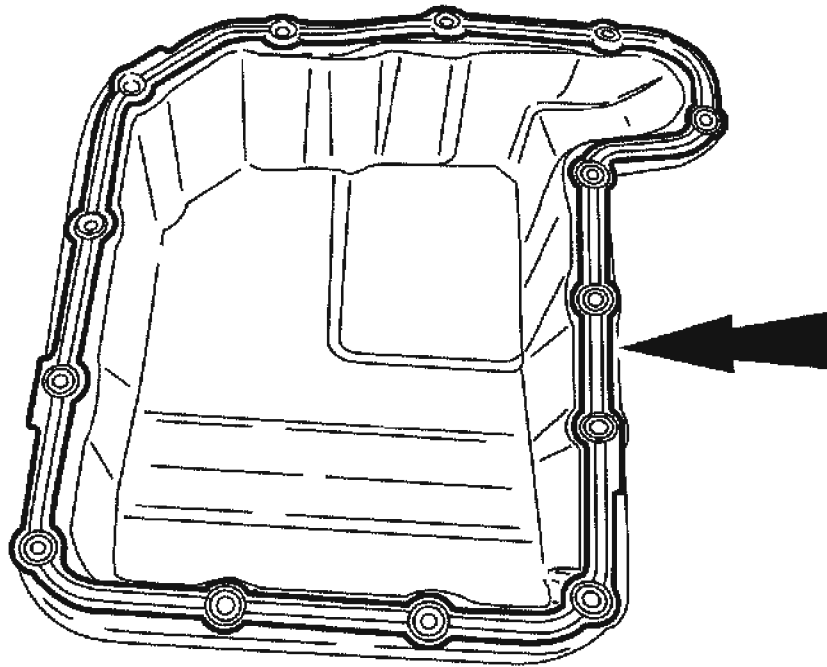
12. Remove the main control cover bolts, studs and the cover.



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**Fig. 105: Removing Main Control Cover Bolts, Studs And Cover**  
Courtesy of FORD MOTOR CO.

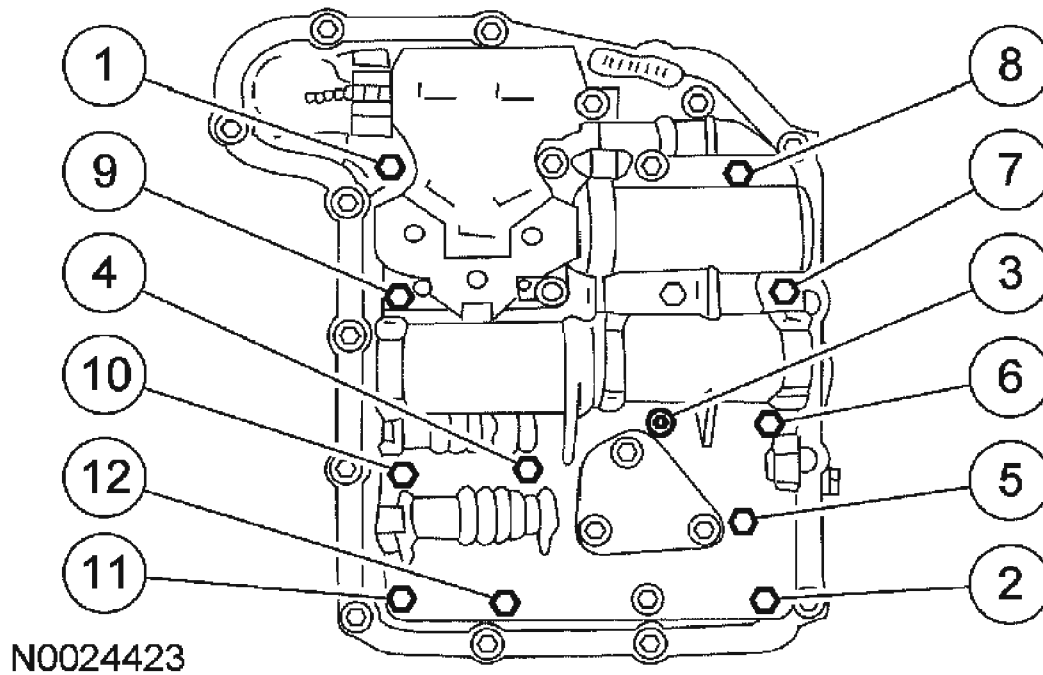
**NOTE:** Do not discard the gasket. It is a reusable type. Inspect the gasket for damage.  
Install a new gasket as necessary.



A0075576

**Fig. 106: Removing Main Control Cover Gasket**  
**Courtesy of FORD MOTOR CO.**

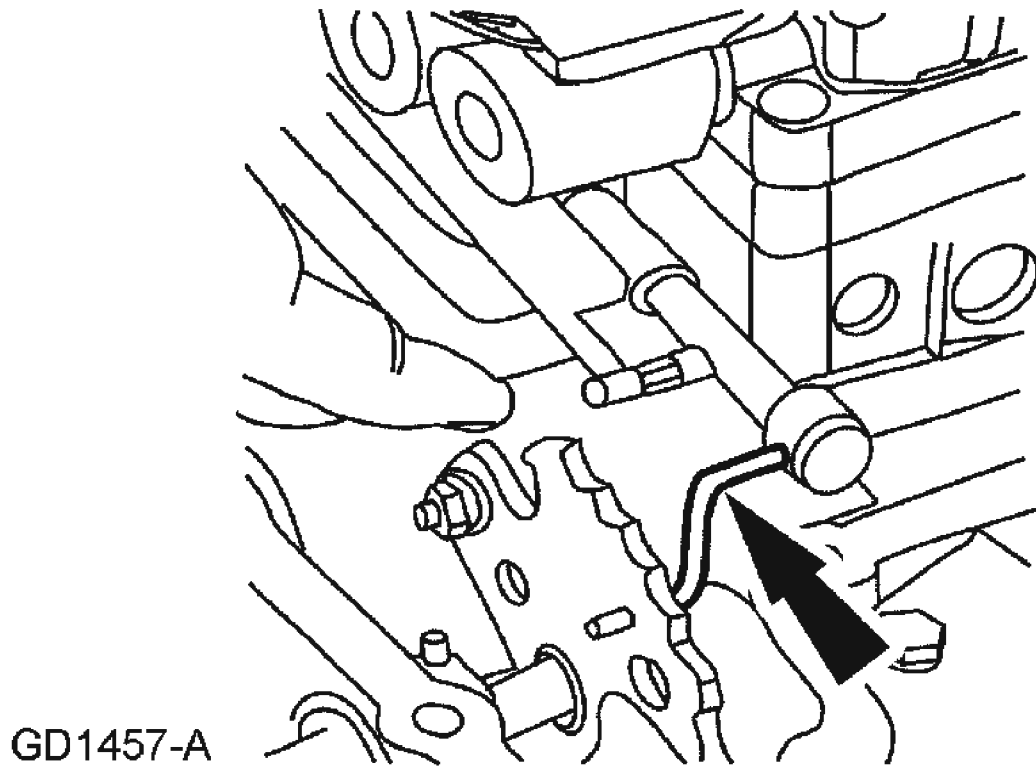
13. Remove the main control cover gasket.
14. Remove the main control valve body bolts.



**Fig. 107: Removing Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

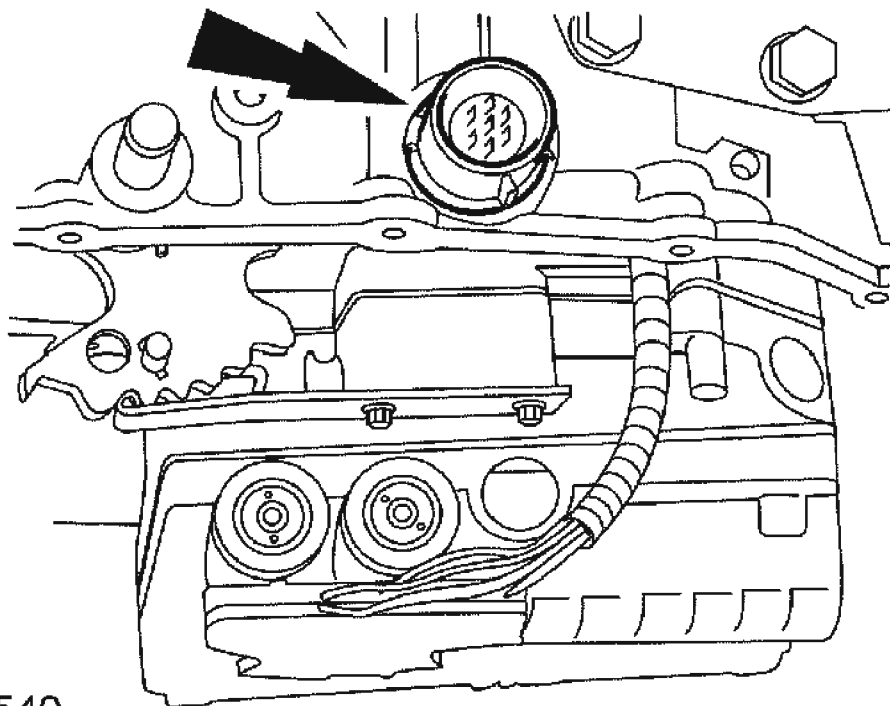
**NOTE:** Do not damage the manual valve.





**Fig. 108: Disconnecting Manual Valve Link**  
Courtesy of FORD MOTOR CO.

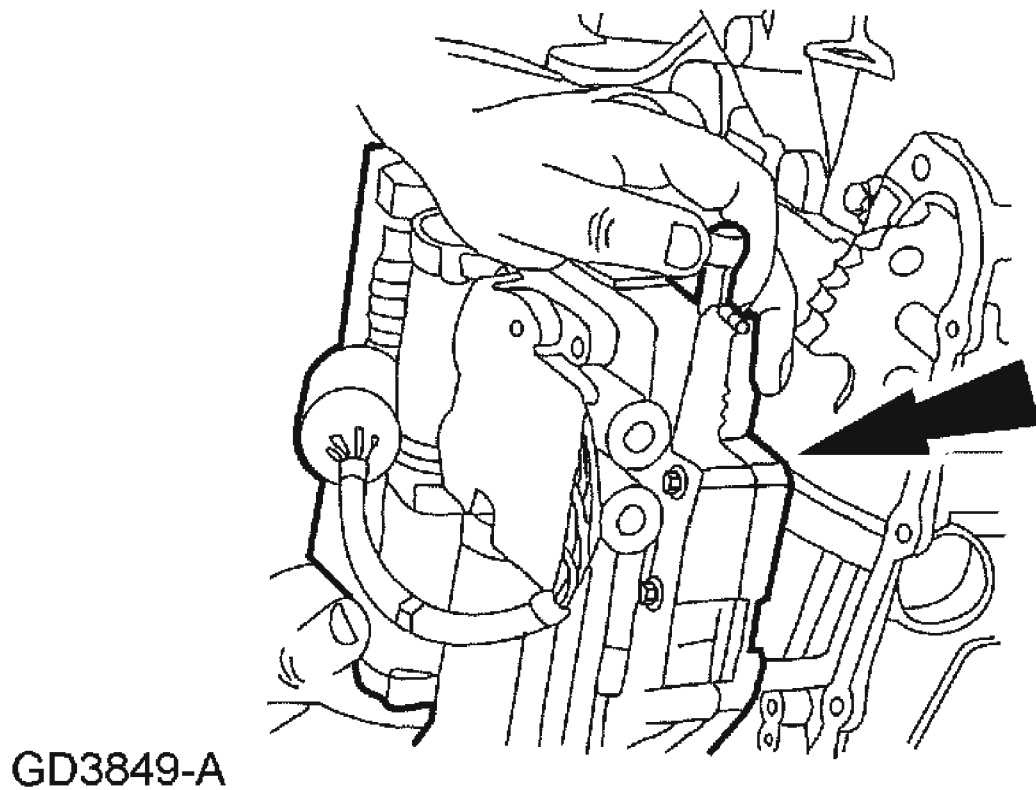
15. Lift the main control valve body while disconnecting the manual valve link.
16. Depress the retaining tabs and push the solenoid valve body electrical connector down through the transaxle case.



A0021540

**Fig. 109: Installing Solenoid Valve Body Electrical Connector**  
Courtesy of FORD MOTOR CO.

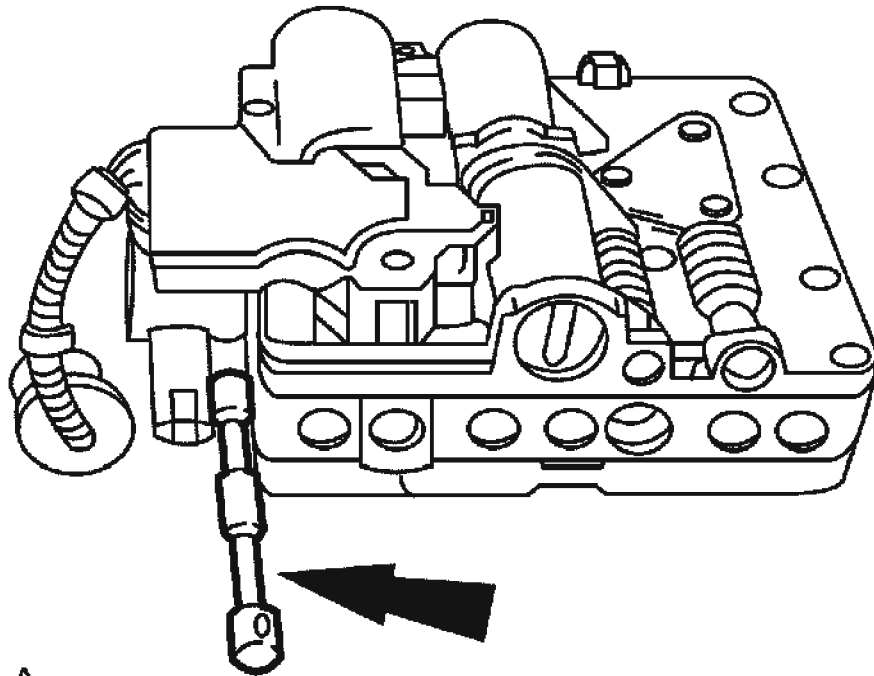
17. Make sure the manual valve does not fall out of the main control valve body while removing from the vehicle.



**Fig. 110: Removing Main Control Valve Body**  
Courtesy of FORD MOTOR CO.

**Installation**

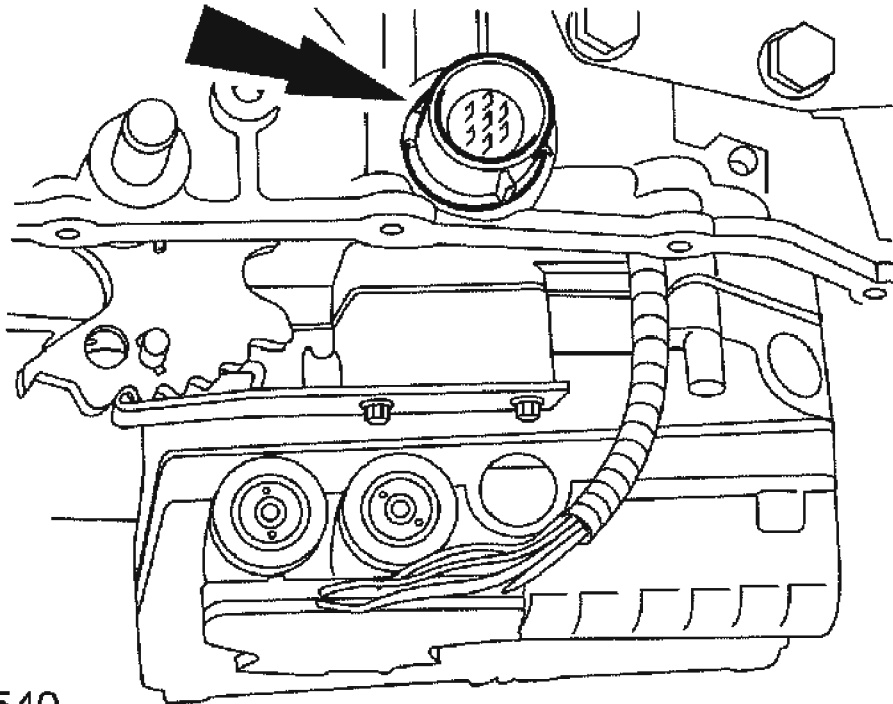
1. Install the manual control lever in the main control valve body.



GD2908-A

**Fig. 111: Installing Manual Control Lever In Main Control Valve Body**  
Courtesy of FORD MOTOR CO.

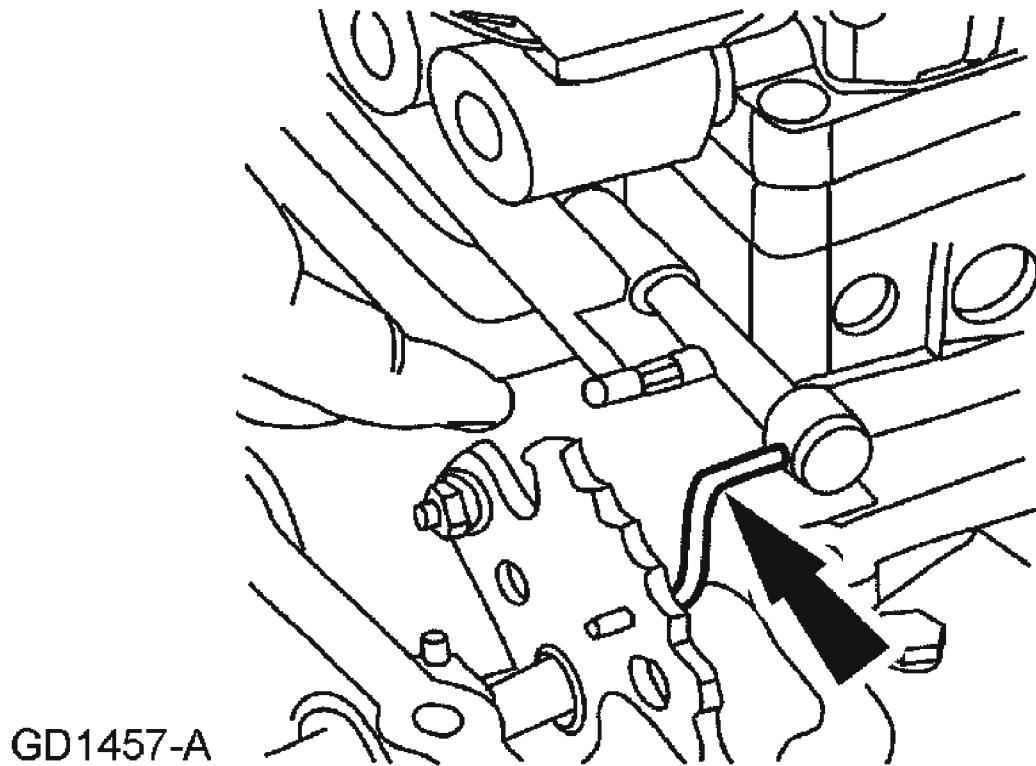
**NOTE:**      Inspect the solenoid valve body harness connector O-ring seal for damage. If damaged, install a new O-ring seal, before installing the connector into the case.



A0021540

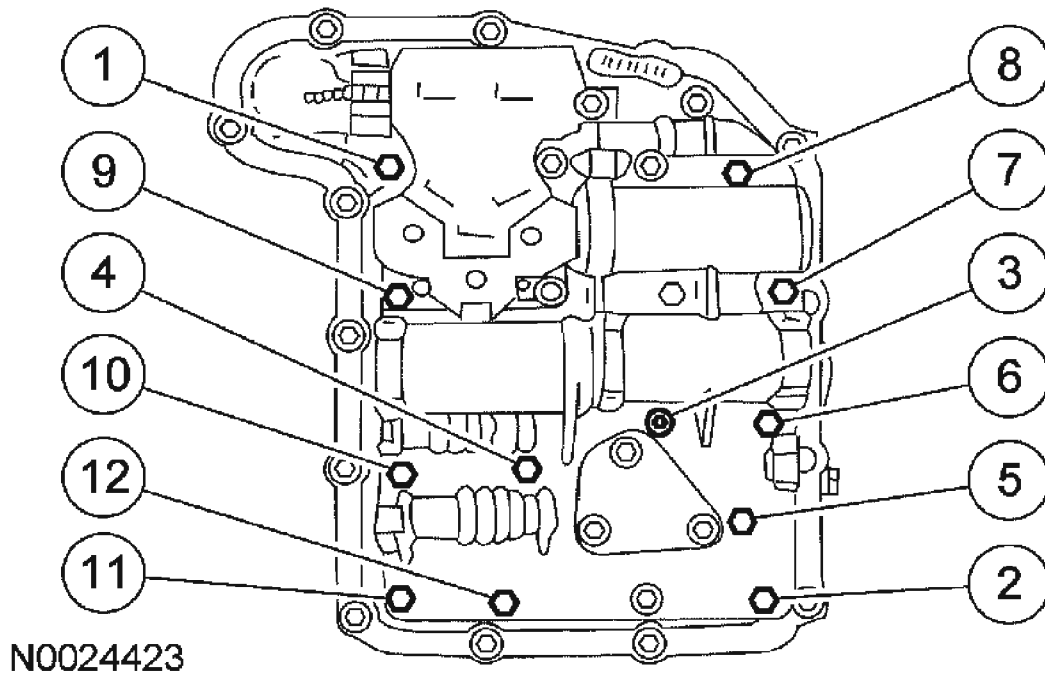
**Fig. 112: Installing Solenoid Valve Body Electrical Connector**  
Courtesy of FORD MOTOR CO.

2. Depress the retaining tabs and push the solenoid valve body electrical connector up through the transaxle case.
3. Position the main control valve body in place while connecting the manual valve link.



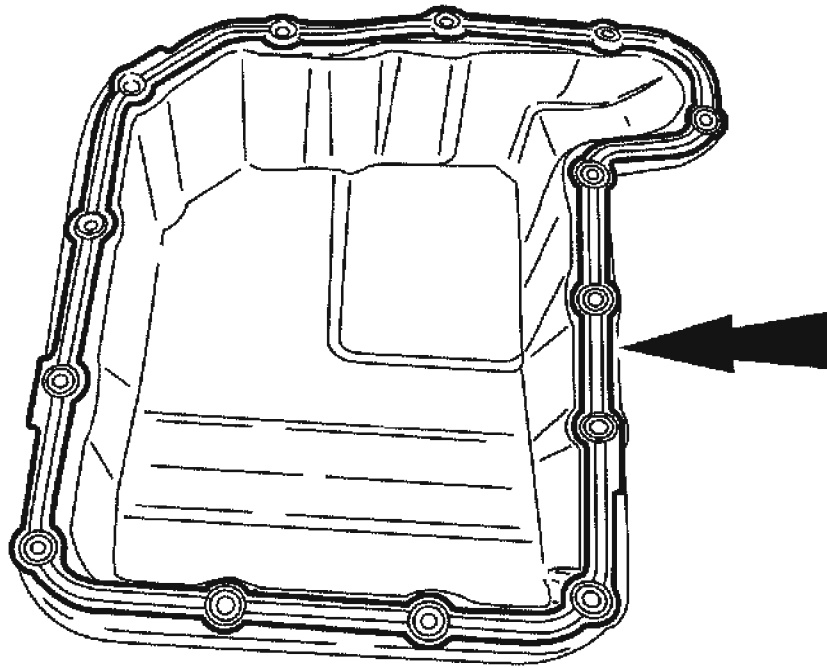
**Fig. 113: Positioning Main Control Valve Body**  
Courtesy of FORD MOTOR CO.

4. Install the main control valve body assembly. Tighten the bolts in the sequence indicated.
  - Tighten to 10 Nm (89 lb-in).



**Fig. 114: Identifying Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

**NOTE:** The main control cover gasket is a reusable type. Inspect the gasket for damage. Install a new gasket as necessary.



A0075576

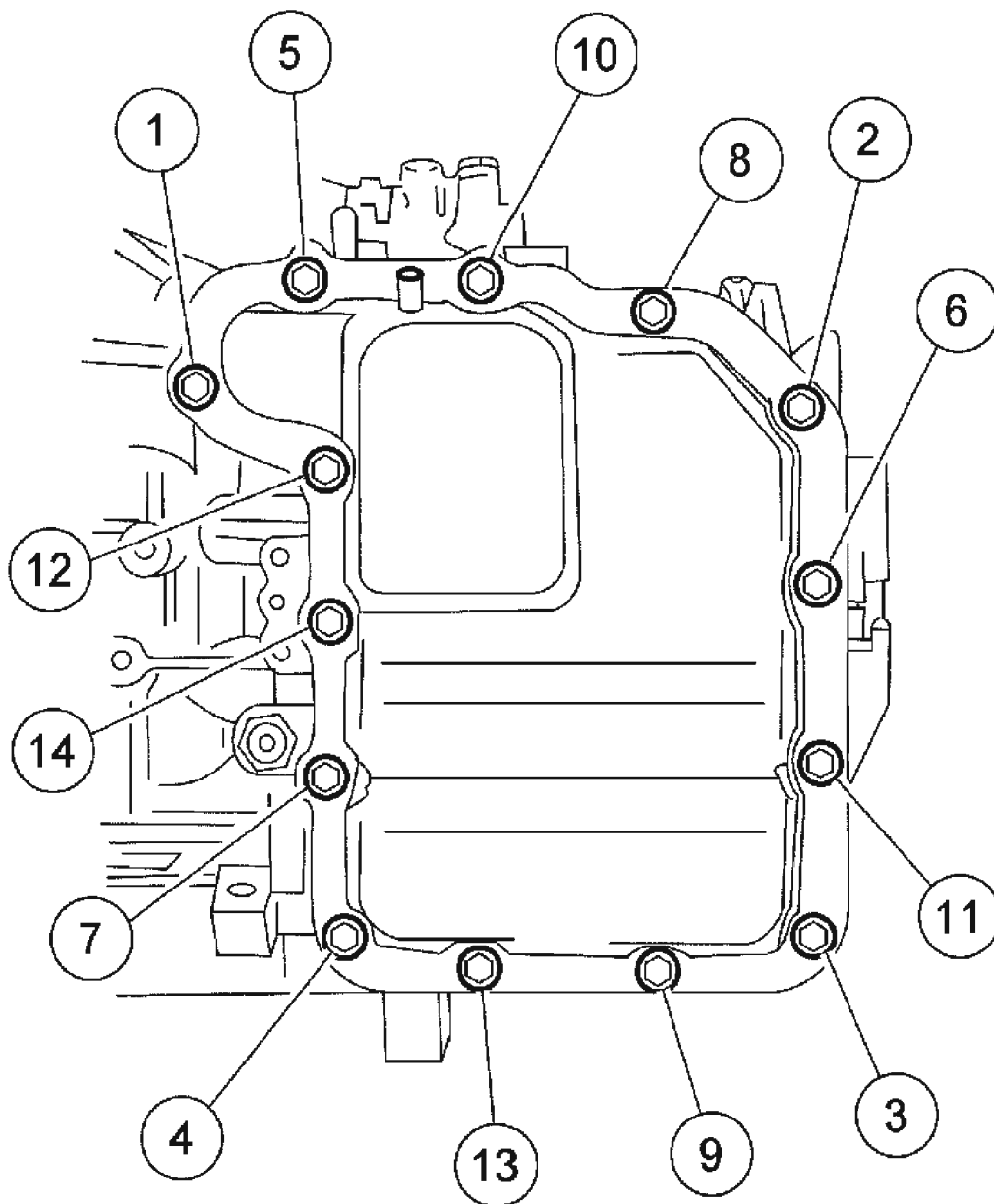
**Fig. 115: Installing Main Control Cover Gasket**  
Courtesy of FORD MOTOR CO.

5. Install the main control cover gasket.

**NOTE:** Install the cooler bypass valve studs in locations 3 and 11.

6. Install the main control cover. Tighten the bolts and studs in the indicated sequence.
  - Tighten to 13 Nm (10 lb-ft).

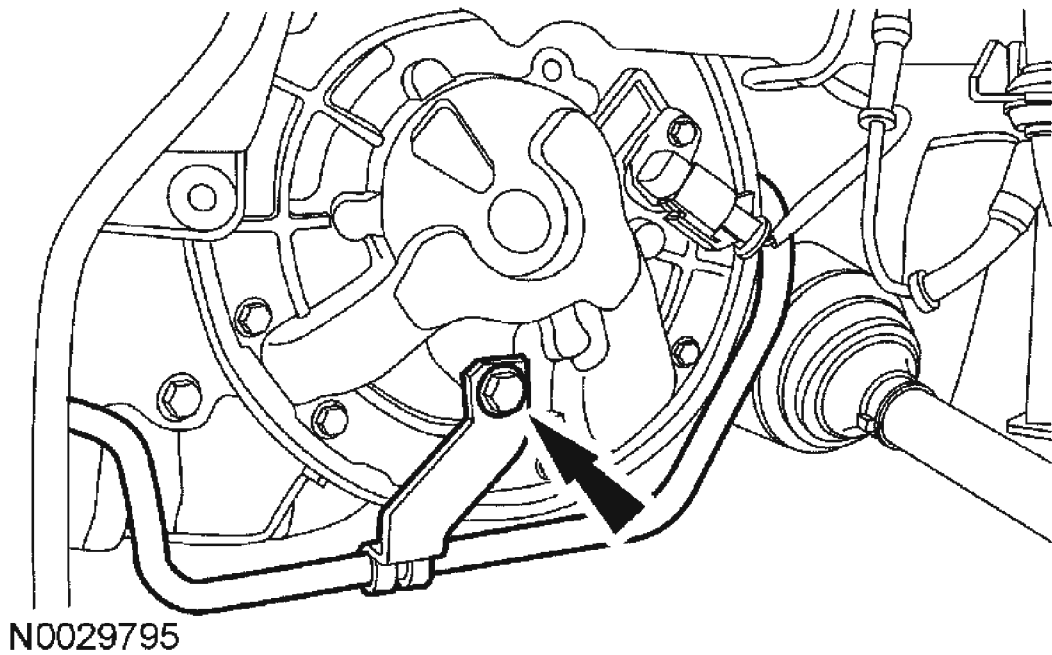




A0100508

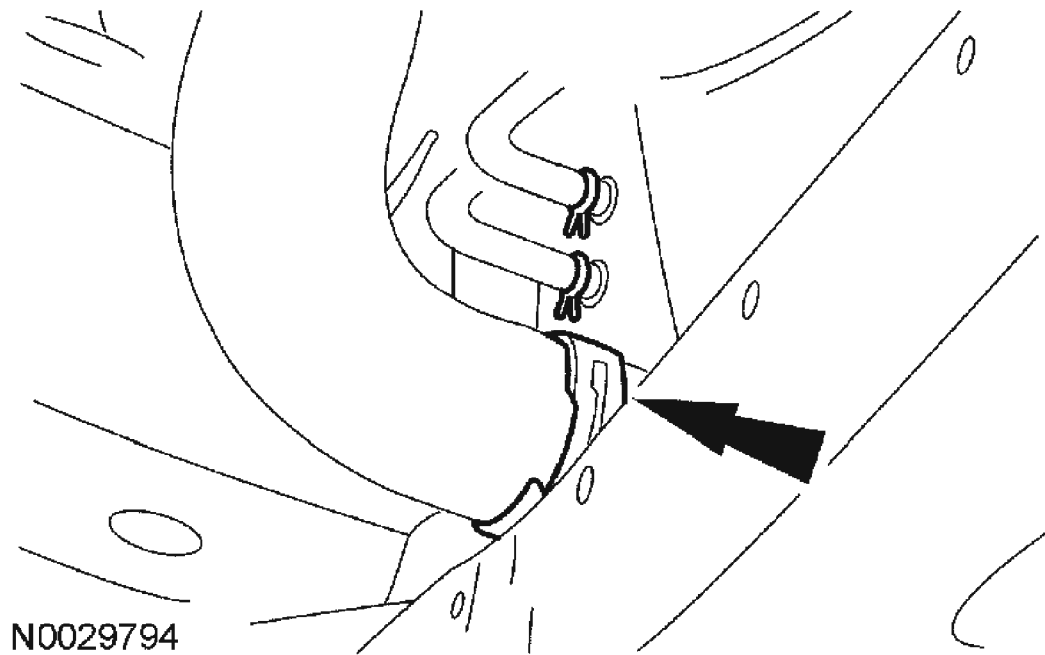
**Fig. 116: Identifying Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

7. Position the transmission fluid cooler tube in place and install the bolt.
  - Tighten to 25 Nm (18 lb-ft).



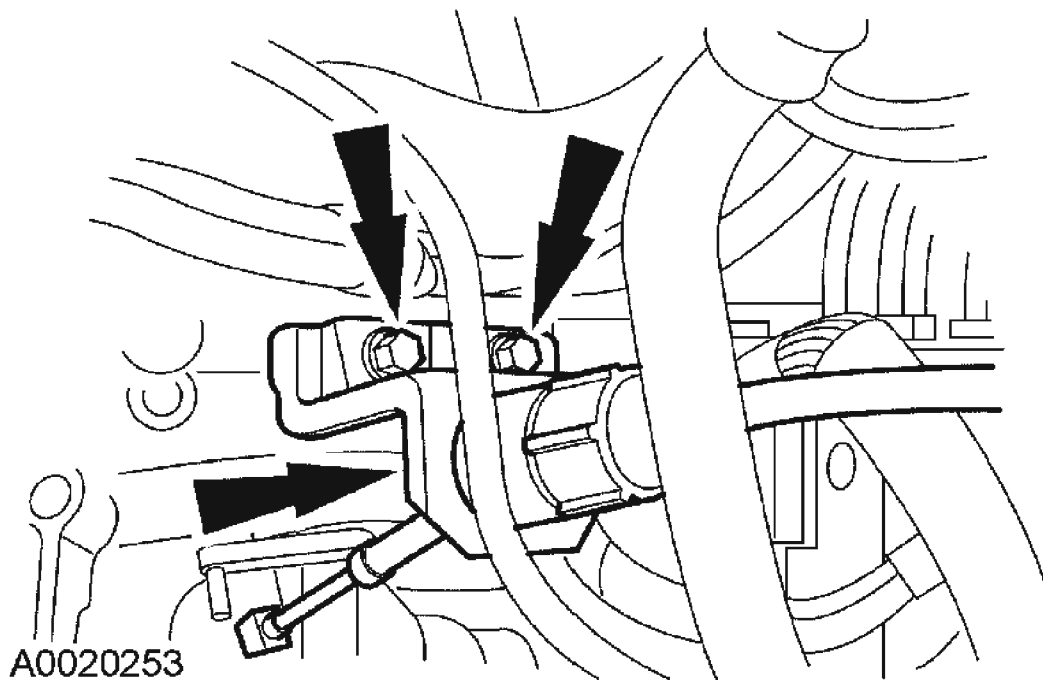
**Fig. 117: Installing Bolt**  
Courtesy of FORD MOTOR CO.

8. Install the lower radiator hose.



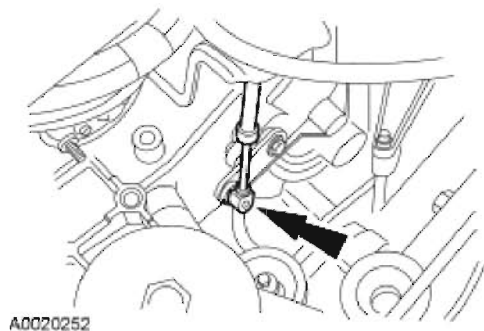
**Fig. 118: Installing Lower Radiator Hose**  
**Courtesy of FORD MOTOR CO.**

9. Install the shift cable and bracket.
  - Tighten to 23 Nm (17 lb-ft).



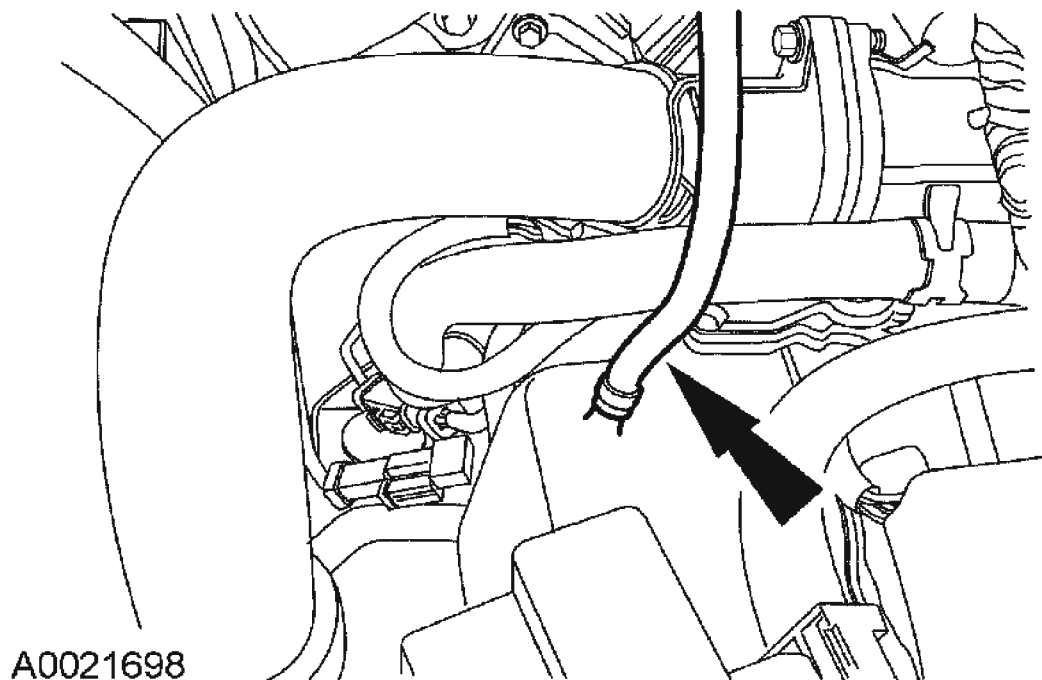
**Fig. 119: Installing Shift Cable And Bracket**  
Courtesy of FORD MOTOR CO.

10. Connect the shift cable end.



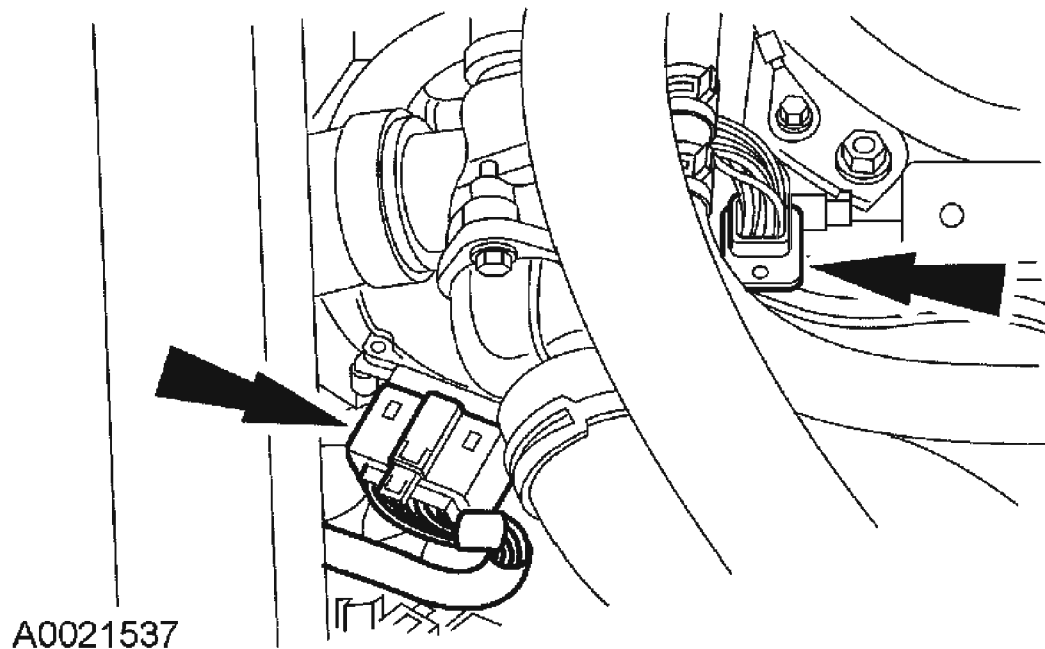
**Fig. 120: Locating Shift Cable End At Manual Lever**  
Courtesy of FORD MOTOR CO.

11. Connect the vent hose to the main control cover.



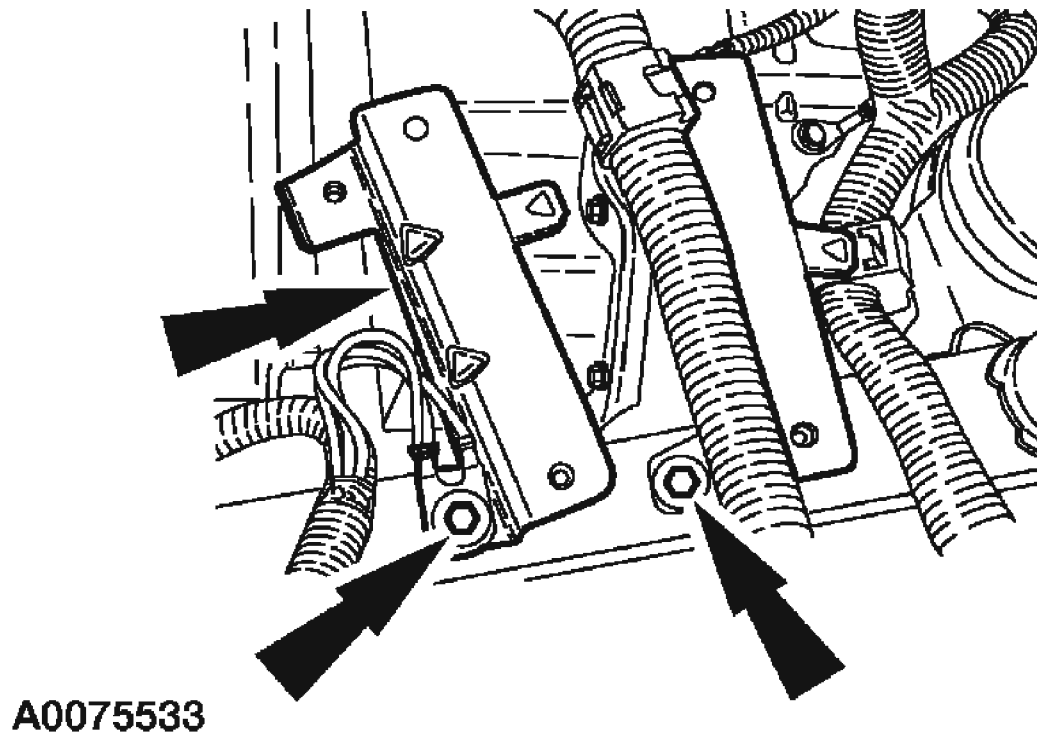
**Fig. 121: Connecting Vent Hose To Main Control Cover**  
Courtesy of FORD MOTOR CO.

12. Connect the transaxle wiring harness electrical connector and the transmission range (TR) sensor electrical connector.



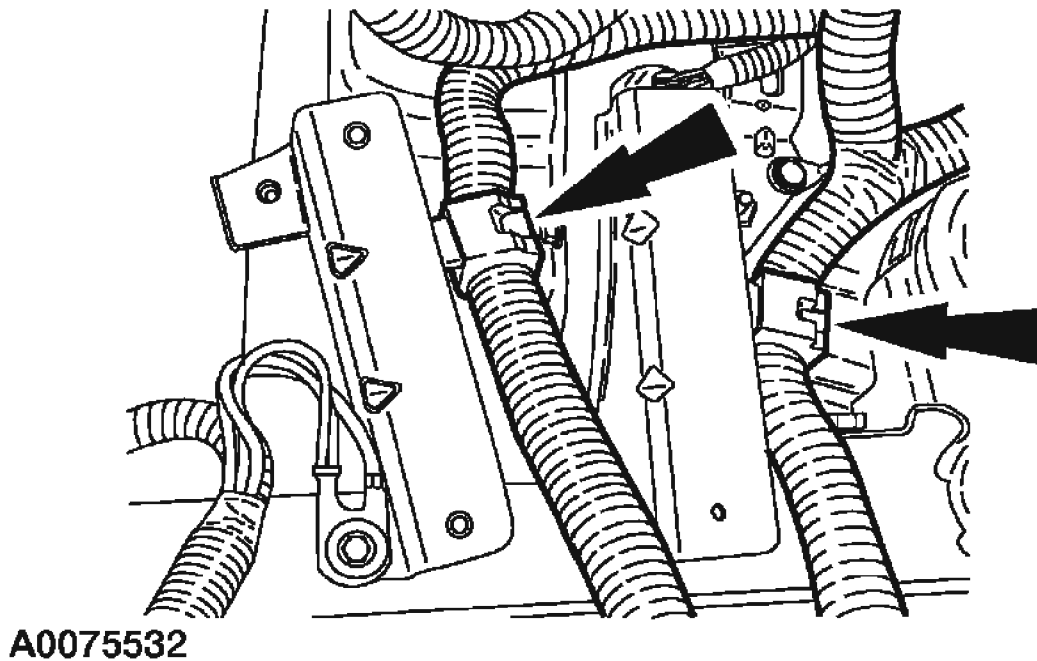
**Fig. 122: Connecting Transaxle Wiring Harness Electrical Connector And Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

13. Install the battery tray bracket.
  - Tighten to 10 Nm (89 lb-in).



**Fig. 123: Installing Battery Tray Bracket**  
**Courtesy of FORD MOTOR CO.**

14. Connect the wiring harness to the battery tray bracket.



**Fig. 124: Connecting Wiring Harness To Battery Tray Bracket**  
Courtesy of FORD MOTOR CO.

15. Install the battery tray. For additional information, refer to **CHARGING SYSTEM - GENERAL INFORMATION** .
16. Fill the transaxle with clean automatic transmission fluid.
17. Fill the engine coolant. For additional information, refer to **ENGINE COOLING** .
18. Start the engine and run through all the gears and check fluid level.

#### **TURBINE SHAFT SPEED (TSS) SENSOR**

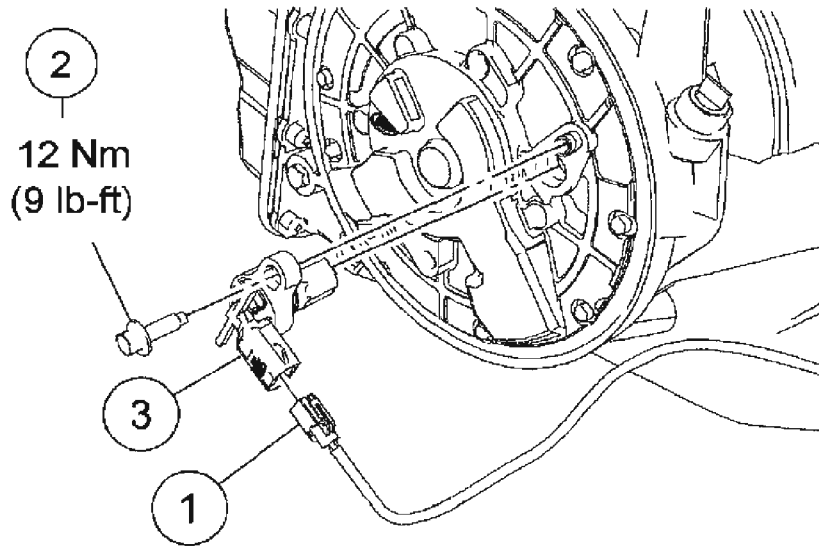
##### **Material**

#### **MATERIAL SPECIFICATION CHART**

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®

##### **Removal and Installation**





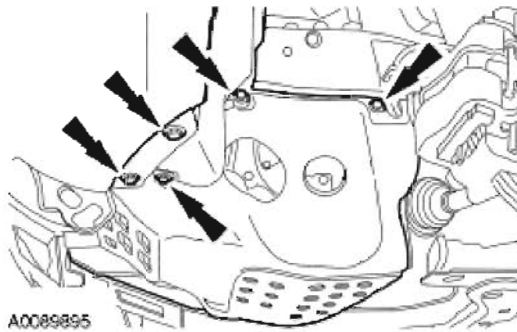
N0029914

Item	Part Number	Description
1	—	Turbine shaft speed (TSS) electrical connector
2	—	TSS sensor bolt
3	—	TSS sensor

**Fig. 125: Removing/Installing Turbine Shaft Speed (TSS) Sensor With Torque Specifications**

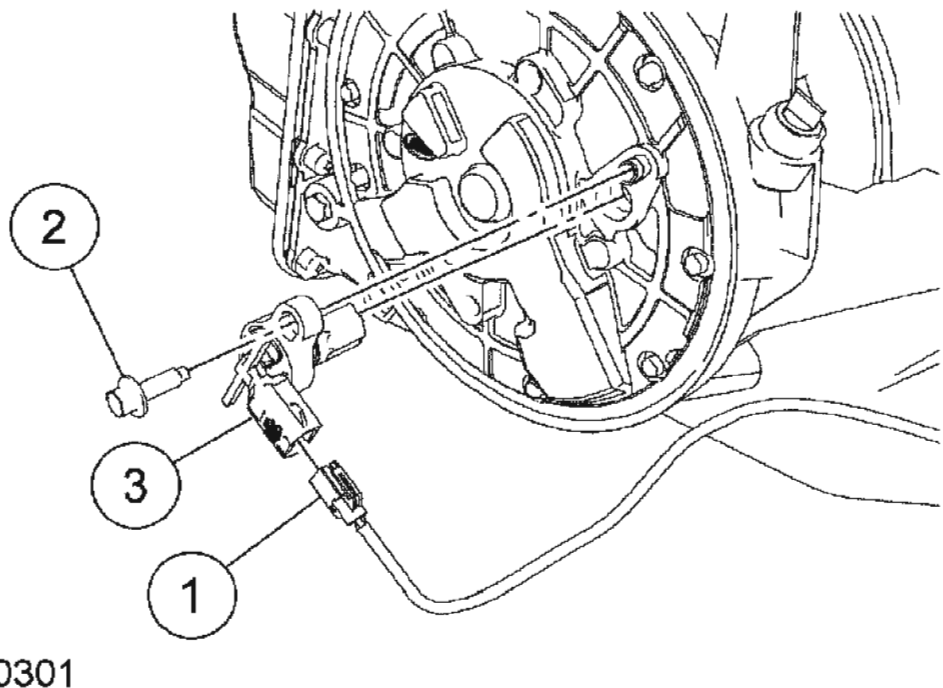
Courtesy of FORD MOTOR CO.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 7 retainers and the LH splash shield.
  - To install, tighten to 10 Nm (89 lb-in).



**Fig. 126: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

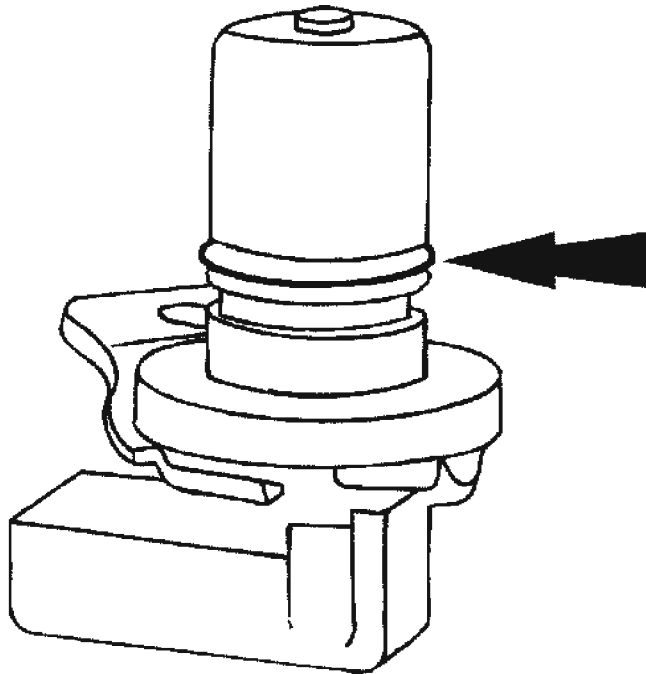
3. Remove the turbine shaft speed (TSS) sensor
  1. Disconnect the TSS electrical connector.
  2. Remove the TSS sensor bolt.
  3. Remove the TSS sensor.
    - To install, tighten to 12 Nm (9 lb-ft).



**Fig. 127: Removing Turbine Shaft Speed (TSS) Sensor**  
Courtesy of FORD MOTOR CO.

**NOTE:** When installing the sensor, lubricate the O-ring seal with

clean transmission fluid.



GD3777-A

**Fig. 128: Inspecting O-Ring Seal**  
Courtesy of FORD MOTOR CO.

4. Inspect the O-ring seal for nicks or cuts. Install a new O-ring seal as necessary.
5. To install, reverse the removal procedure.

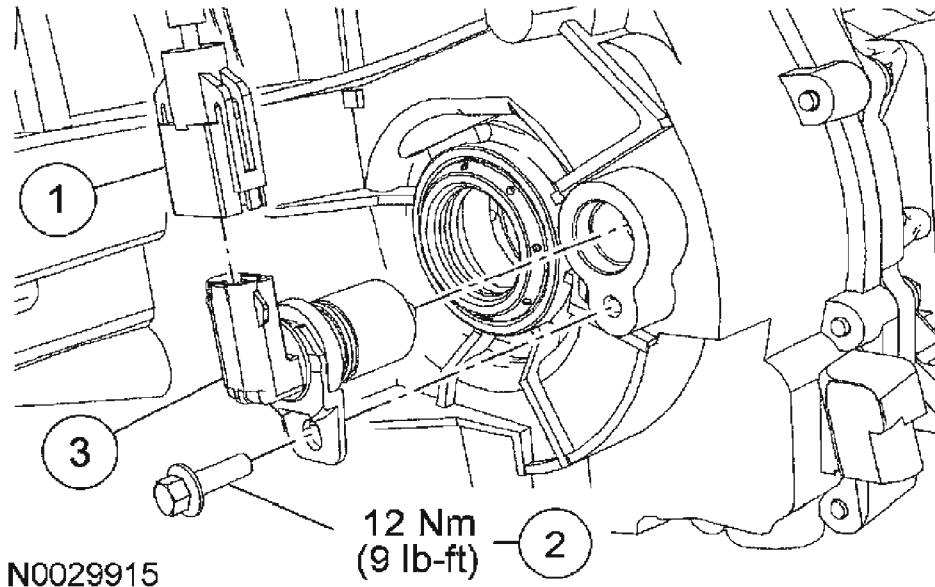
#### OUTPUT SHAFT SPEED (OSS) SENSOR

##### Material

#### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®

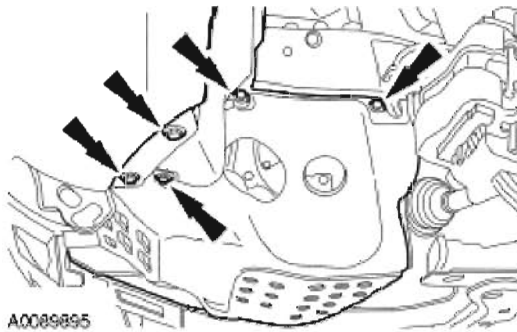
##### Removal and Installation



Item	Part Number	Description
1	—	Output shaft speed (OSS) electrical connector
2	—	OSS sensor bolt
3	—	OSS sensor

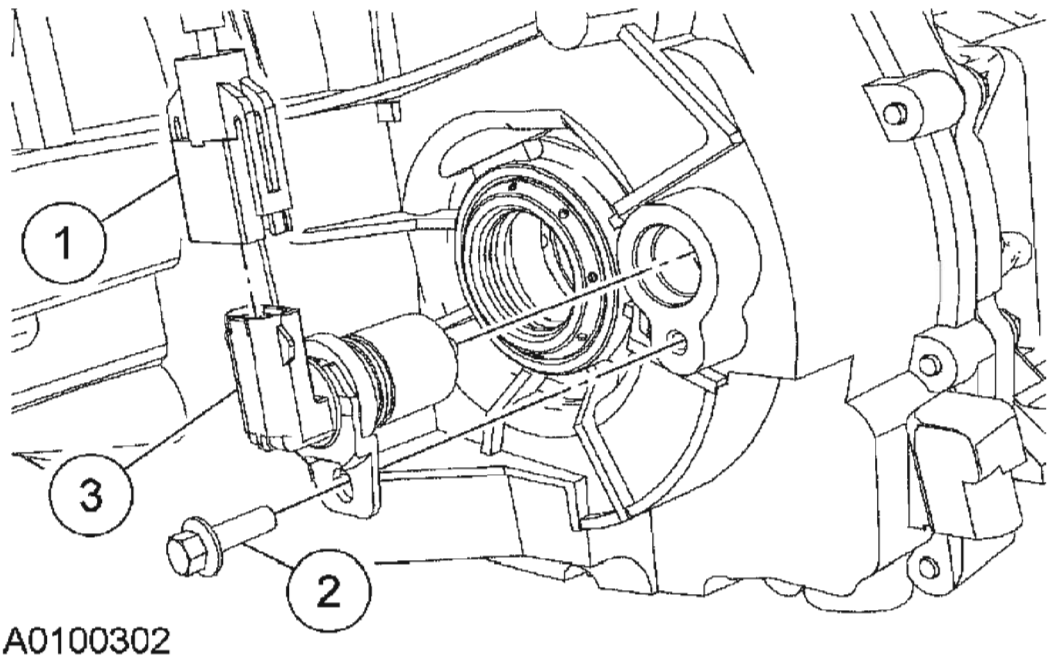
**Fig. 129: Removing Output Shaft Speed (OSS) Sensor**  
 Courtesy of FORD MOTOR CO.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 7 retainers and the LH splash shield.
  - To install, tighten to 10 Nm (89 lb-in).



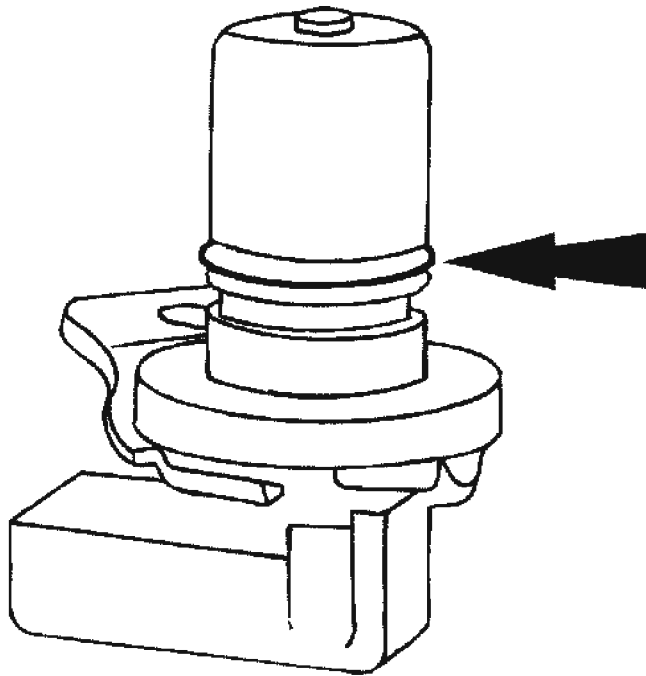
**Fig. 130: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

3. Remove the output shaft speed (OSS) sensor
  1. Disconnect the OSS electrical connector.
  2. Remove the OSS sensor bolt.
  3. Remove the OSS sensor.
    - To install, tighten to 12 Nm (9 lb-ft).



**Fig. 131: Removing Output Shaft Speed (OSS) Sensor**  
Courtesy of FORD MOTOR CO.

**NOTE:** When installing the sensor, lubricate the O-ring seal with clean transmission fluid.



GD3777-A

**Fig. 132: Inspecting O-Ring Seal**  
**Courtesy of FORD MOTOR CO.**

4. Inspect the O-ring seal for nicks or cuts. Install a new O-ring seal as necessary.
5. To install, reverse the removal procedure.

#### **DIFFERENTIAL SEALS - LH**

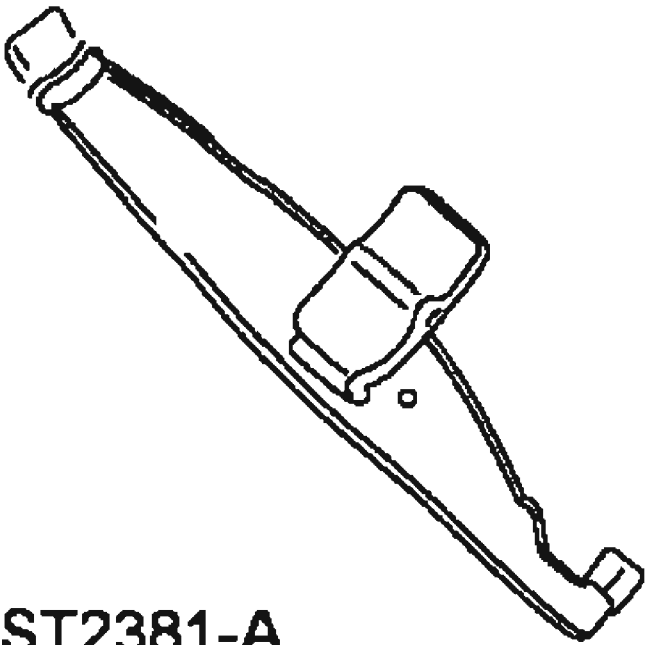
**Special Tool(s)**

#### **SPECIAL TOOLS DESCRIPTION**

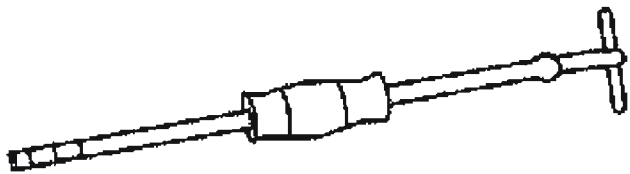
	Remover, Input Shaft Oil Seal 308-375
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## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2381-A**



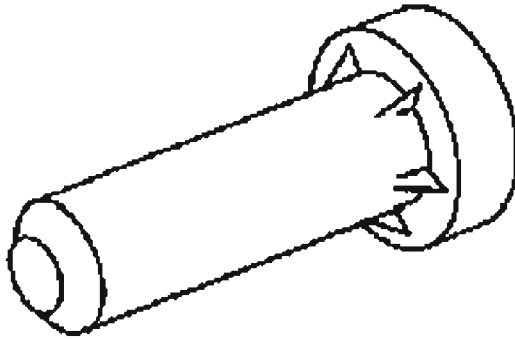
**ST1185-A**

Slide Hammer 100-001 (T50T-100-A)

Installer, Halfshaft Output Fluid Seal

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1957-A**

307-157 (T86P-1177-B)

### Material

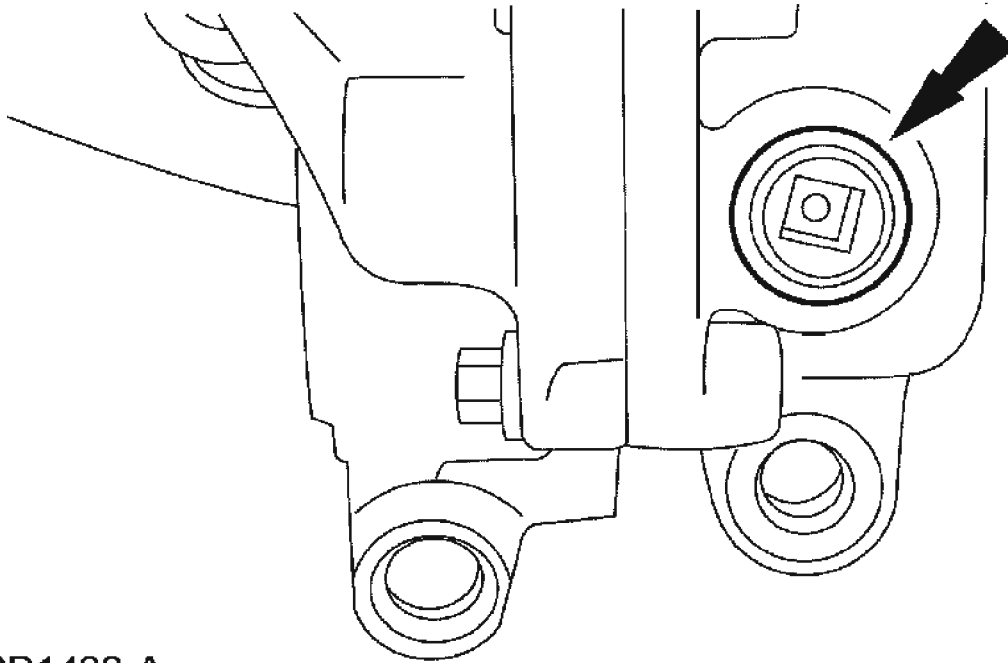
### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

### Removal

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

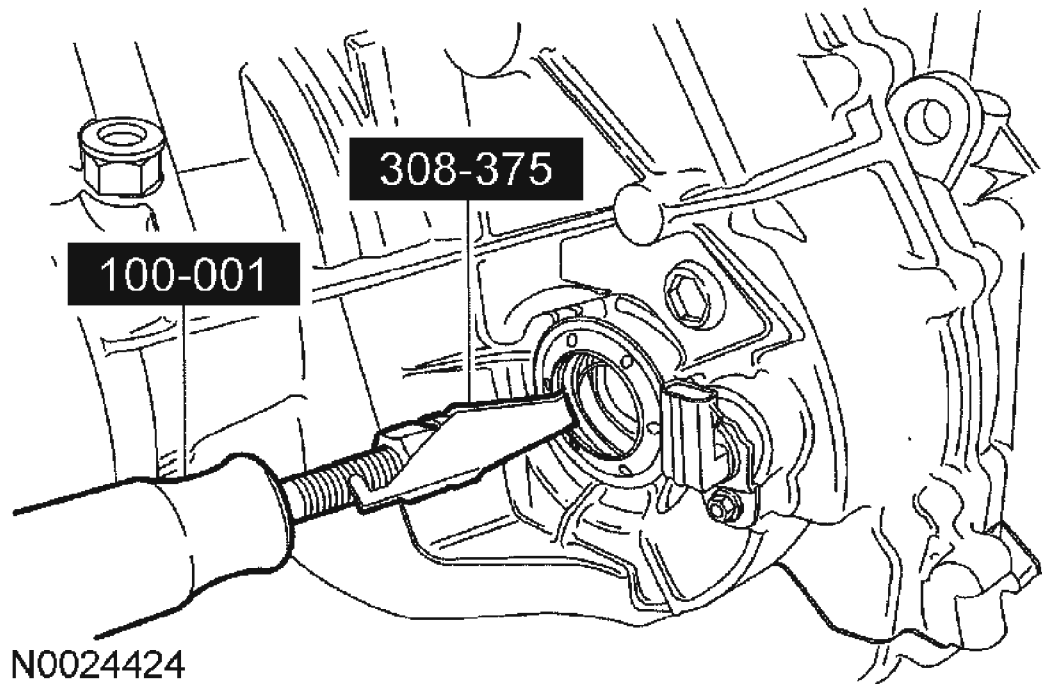




GD1438-A

**Fig. 133: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

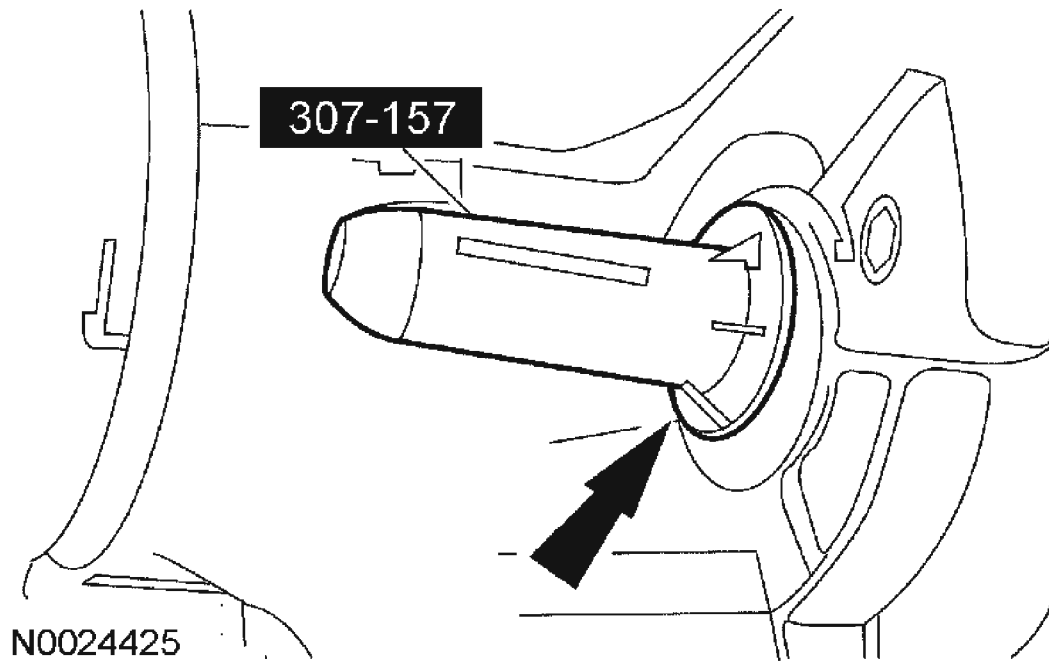
3. Remove the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** .
4. Using the special tools, remove and discard the LH differential seal.



**Fig. 134: Removing LH Differential Seal**  
Courtesy of FORD MOTOR CO.

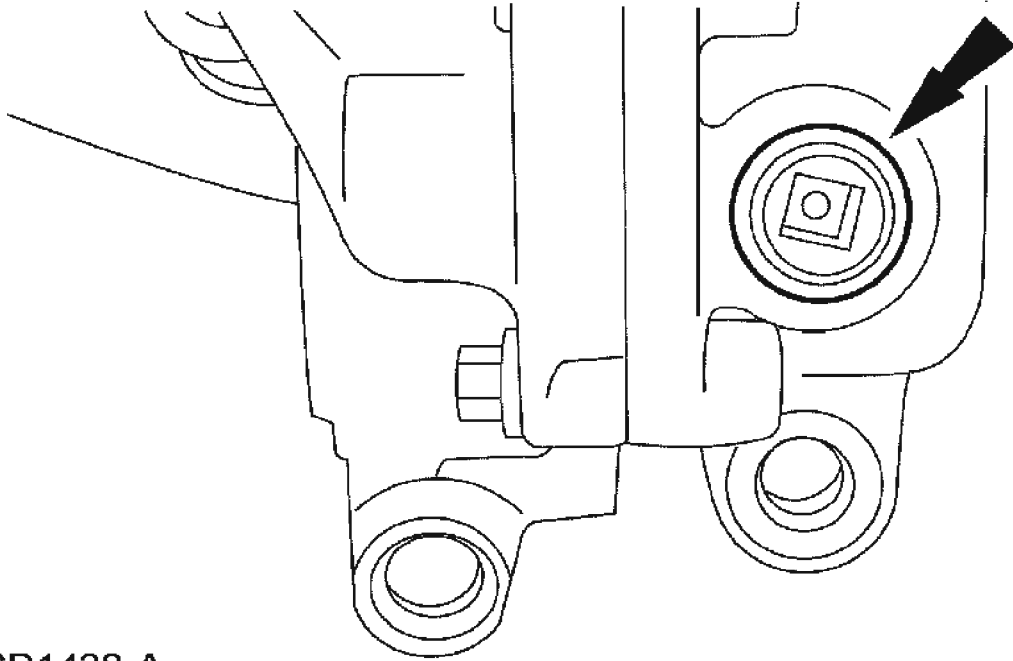
**Installation**

1. Using the special tool, install the LH differential seal.



**Fig. 135: Installing LH Differential Seal**  
Courtesy of FORD MOTOR CO.

2. Install the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** .
3. Using a small amount of thread sealant on the threads, install the transaxle drain plug.
  - Tighten to 25 Nm (18 lb-ft).



GD1438-A

**Fig. 136: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

4. Fill the transaxle with clean automatic transmission fluid.
5. Start the engine and run through all the gears and check fluid level.

#### **DIFFERENTIAL SEALS - RH**

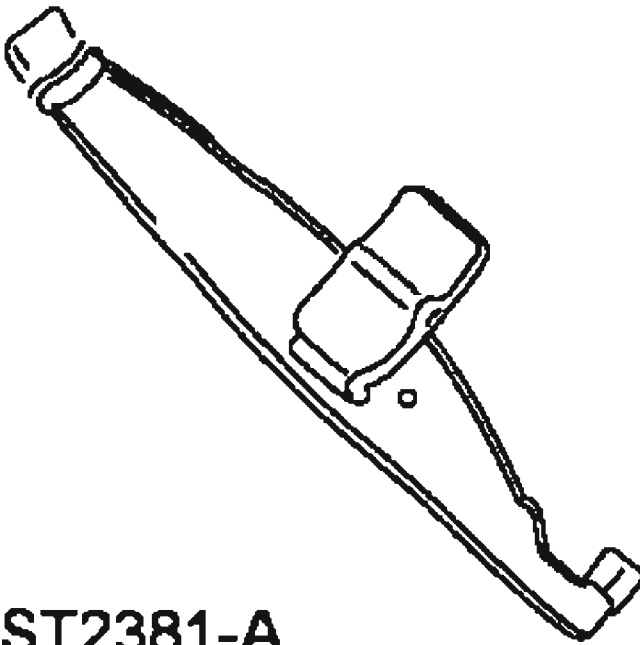
Special Tool(s)

#### **SPECIAL TOOLS DESCRIPTION**

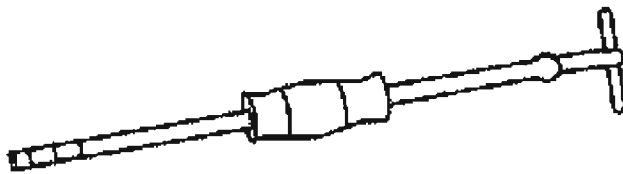
	Remover, Input Shaft Oil Seal 308-375
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## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2381-A**



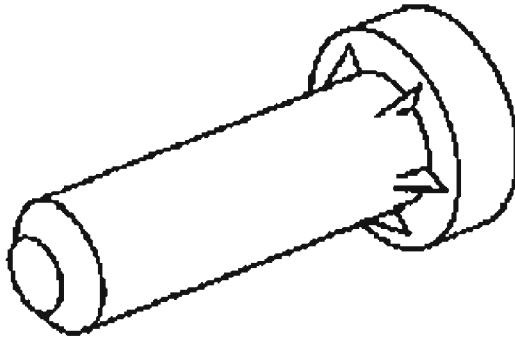
**ST1185-A**

Slide Hammer 100-001 (T50T-100-A)

Installer, Halfshaft Output Fluid Seal

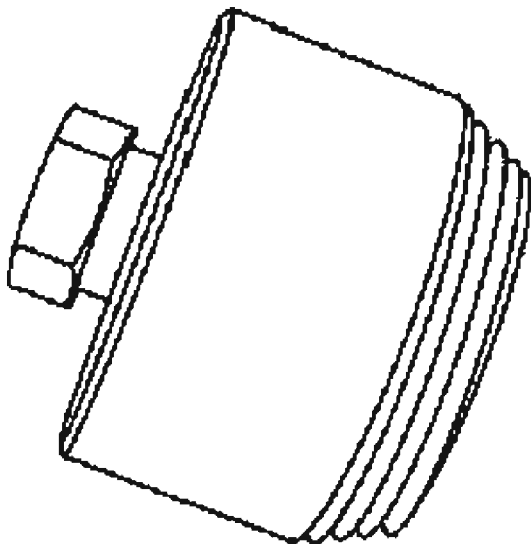
**2005 Ford Escape**

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



307-157 (T86P-1177-B)

**ST1957-A**

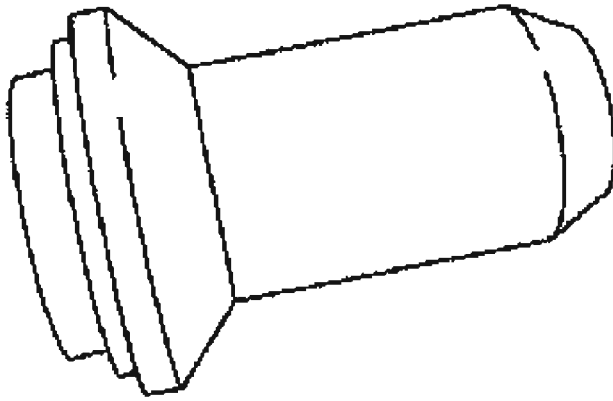


Remover, RH Halfshaft Fluid Seal  
307-429

**ST2526-A**

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2525-A**

Installer, RH Halfshaft Fluid Seal  
307-428

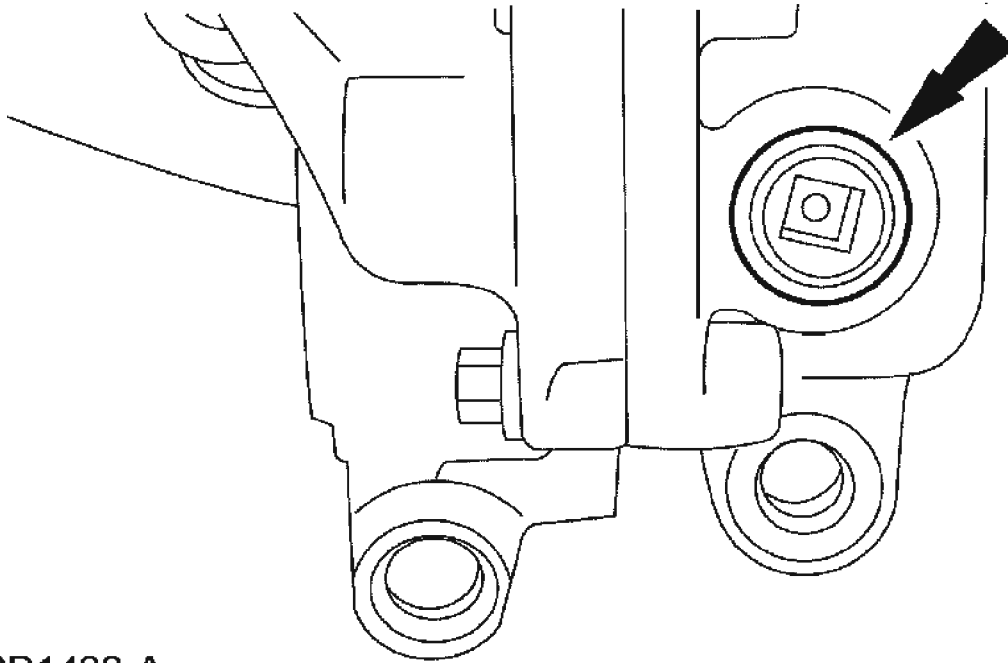
### Material

### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

### Removal

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

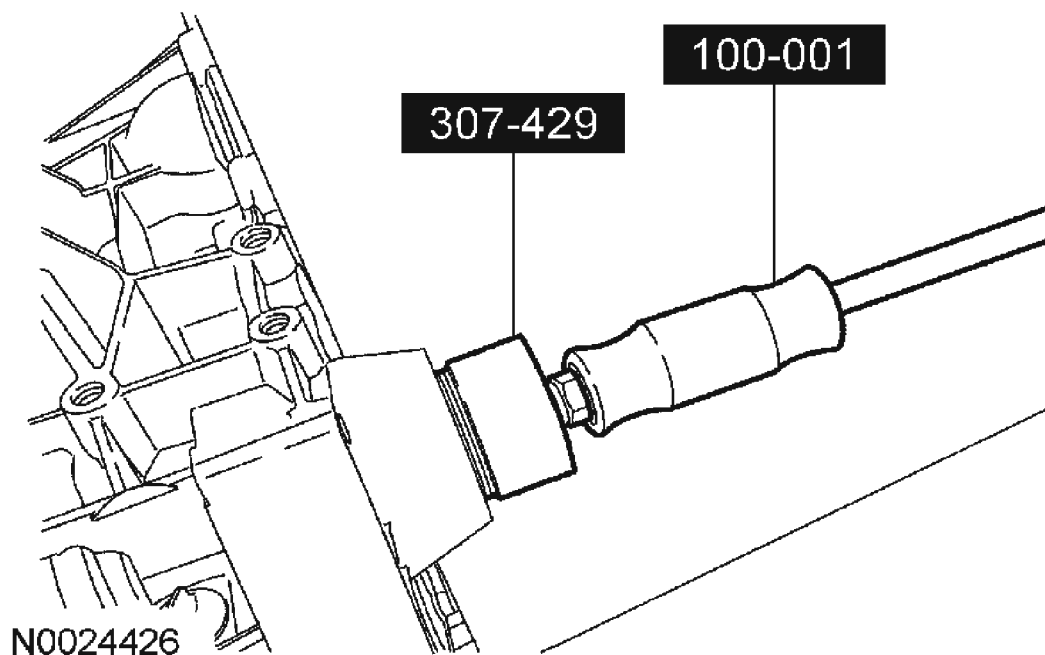


GD1438-A

**Fig. 137: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

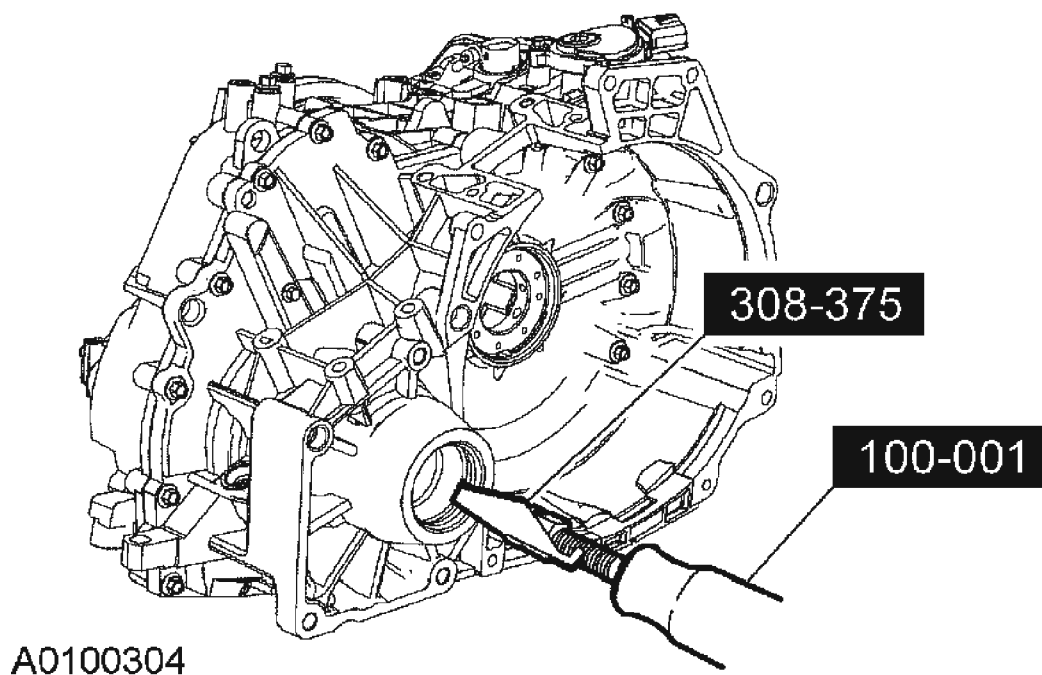
3. Remove the RH halfshaft and intermediate shaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** .
4. If equipped, remove the power takeoff (PTO). For additional information, refer to **TRANSFER CASE-POWER TRANSFER UNIT (PTU)** .
5. If the vehicle is equipped with a PTO, use the special tools to remove the RH differential seal.





**Fig. 138: Removing RH Differential Seal**  
**Courtesy of FORD MOTOR CO.**

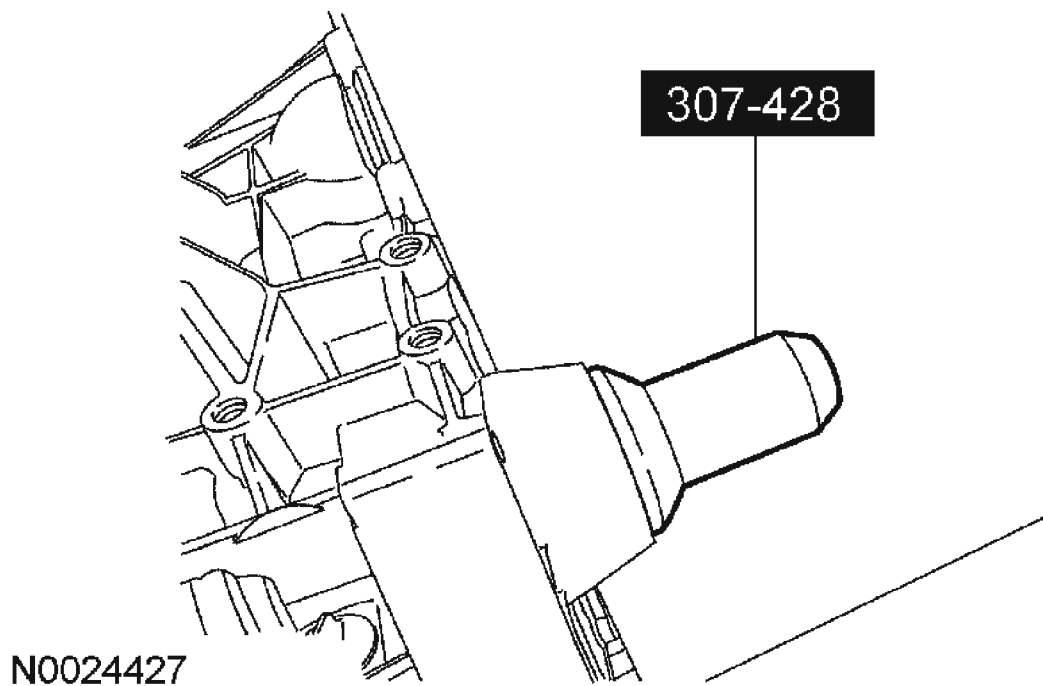
6. If the vehicle is not equipped with a PTO, use the special tools to remove the RH differential seal.



**Fig. 139: Removing RH Differential Seal**  
Courtesy of FORD MOTOR CO.

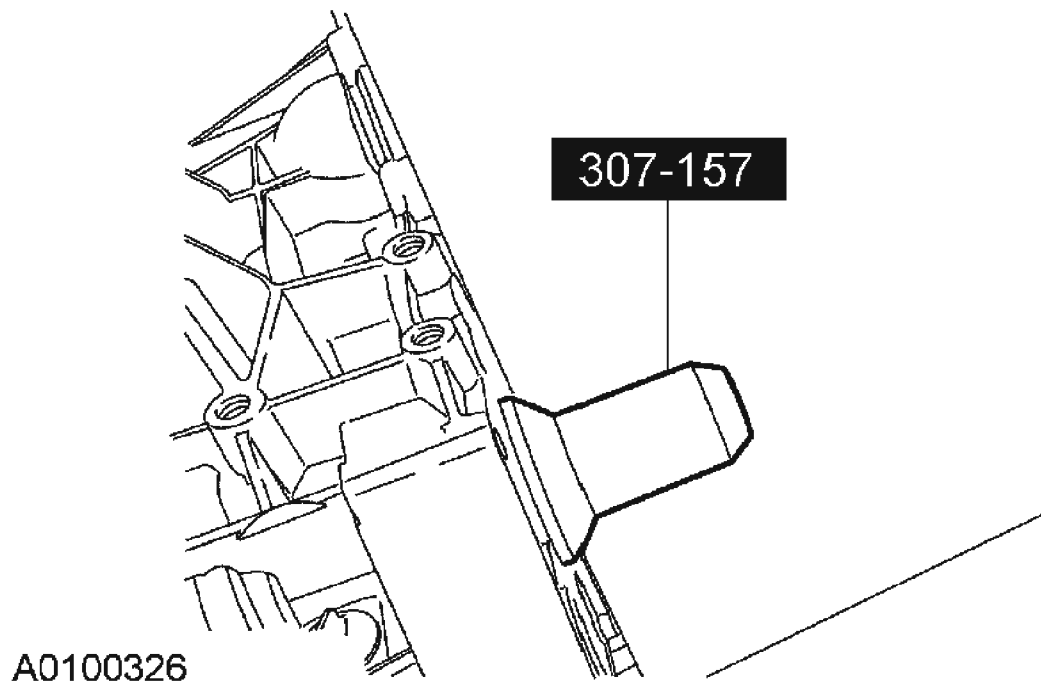
#### Installation

1. If the vehicle is equipped with a PTO, use the special tools to install the RH differential seal.



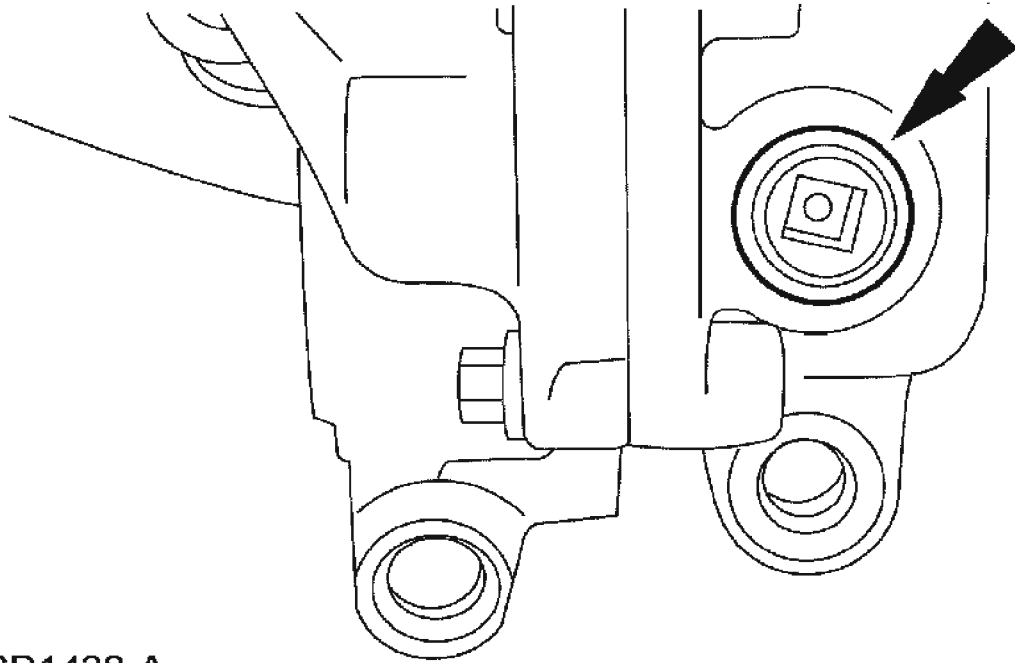
**Fig. 140: Installing RH Differential Seal**  
**Courtesy of FORD MOTOR CO.**

2. If the vehicle is not equipped with a PTO, use the special tools to install the RH differential seal.



**Fig. 141: Installing RH Differential Seal**  
**Courtesy of FORD MOTOR CO.**

3. If equipped, install the PTO. For additional information, refer to **TRANSFER CASE-POWER TRANSFER UNIT (PTU)** .
4. Install the RH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** .
5. Using a small amount of thread sealant on the threads, install the transaxle drain plug.
  - Tighten to 25 Nm (18 lb-ft).



GD1438-A

**Fig. 142: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

6. Fill the transaxle with clean automatic transmission fluid.
7. Start the engine and run through all the gears and check fluid level.

#### TRANSMISSION RANGE (TR) SENSOR

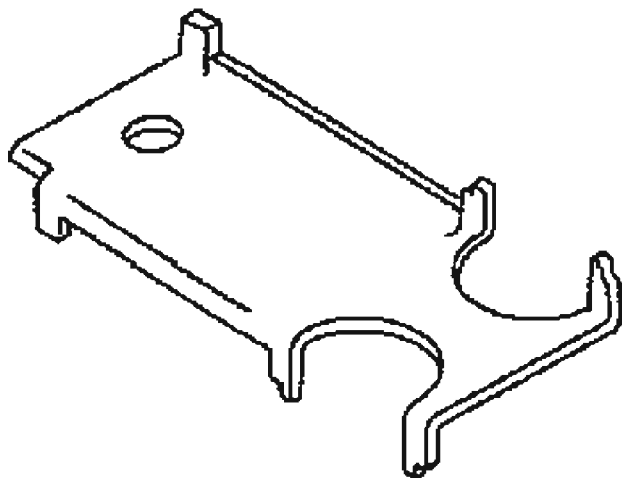
Special Tool(s)

#### SPECIAL TOOLS DESCRIPTION

	Alignment Gauge, TR Sensor 307-351 (T97L-70010-A)
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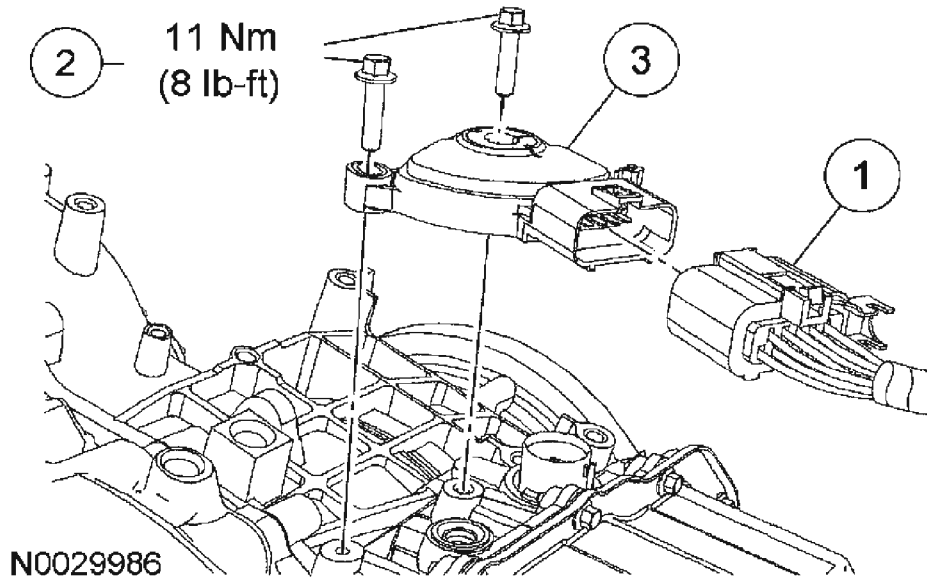
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1633-A**

**Removal**

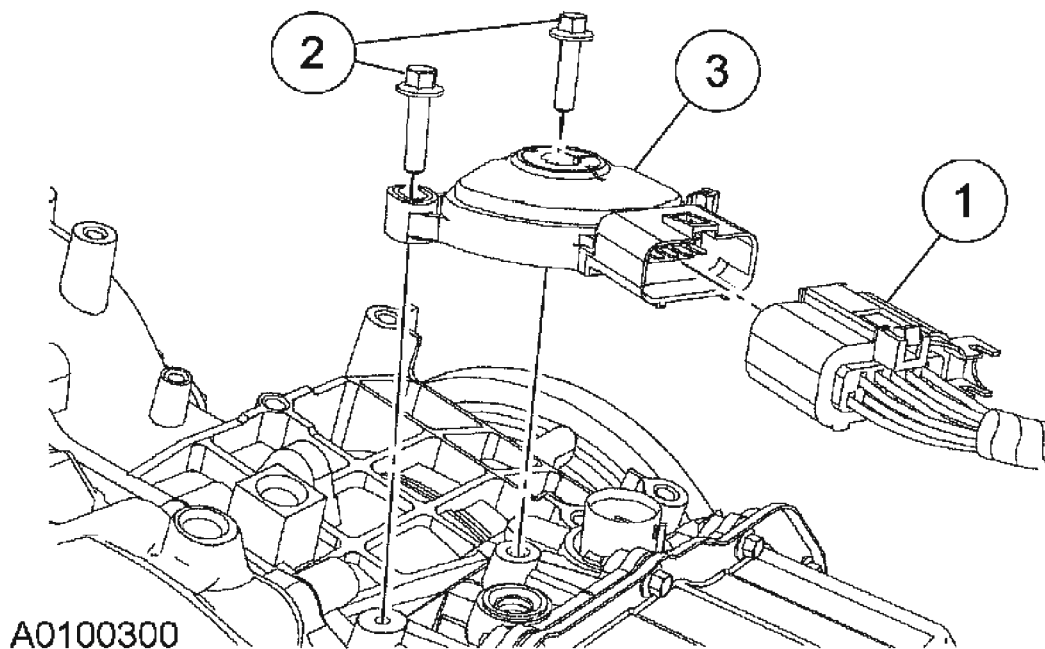


Item	Part Number	Description
1	—	Transmission range (TR) sensor electrical connector
2	—	TR sensor bolts
3	—	TR sensor

**Fig. 143: Removing/Installing Transmission Range (TR) Sensor With Torque Specifications**

Courtesy of FORD MOTOR CO.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the battery and tray. For additional information, refer to **CHARGING SYSTEM - GENERAL INFORMATION**.
3. Remove the transmission range (TR) sensor.
  1. Disconnect the TR sensor electrical connector.
  2. Remove the TR sensor retaining bolts.
  3. Remove the TR sensor.

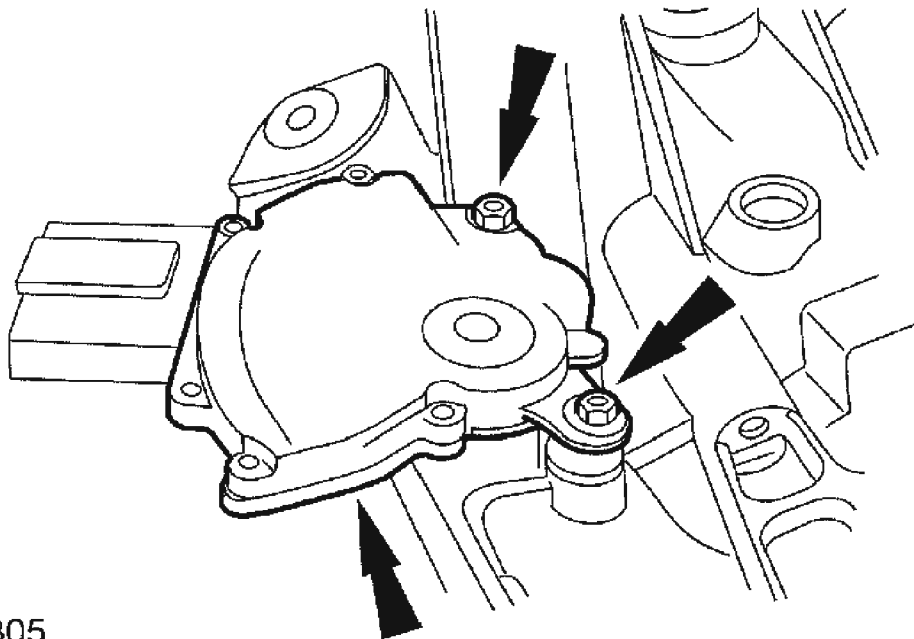


**Fig. 144: Removing Transmission Range (TR) Sensor**  
Courtesy of FORD MOTOR CO.

**Installation**

**NOTE:** Make sure the transaxle is in the NEUTRAL position.

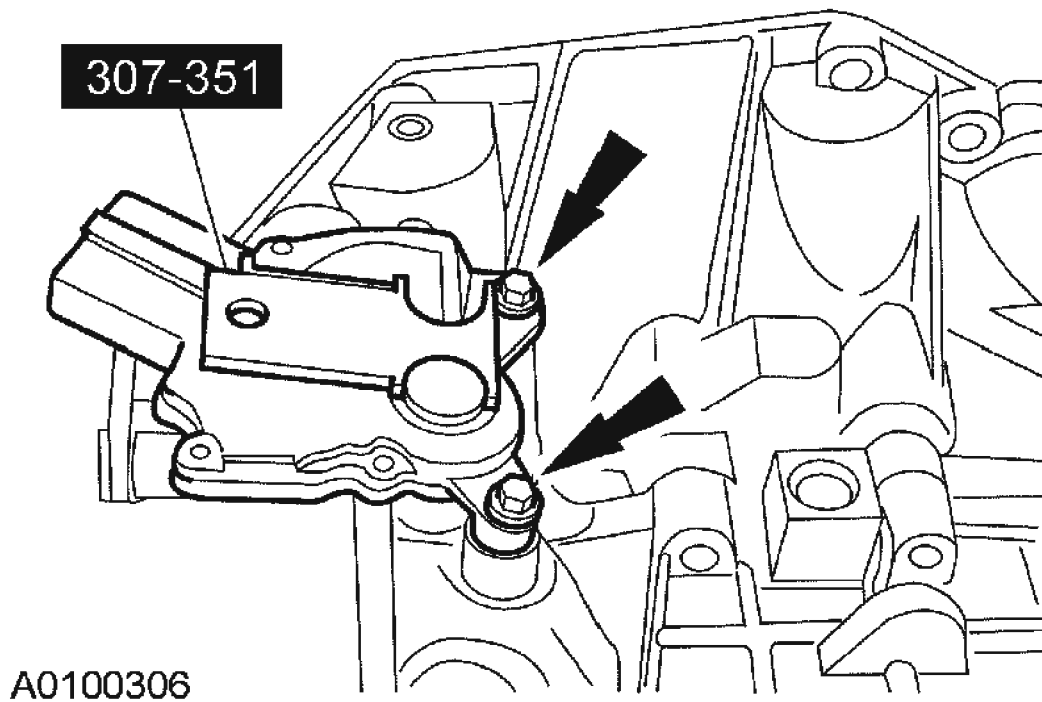




A0100305

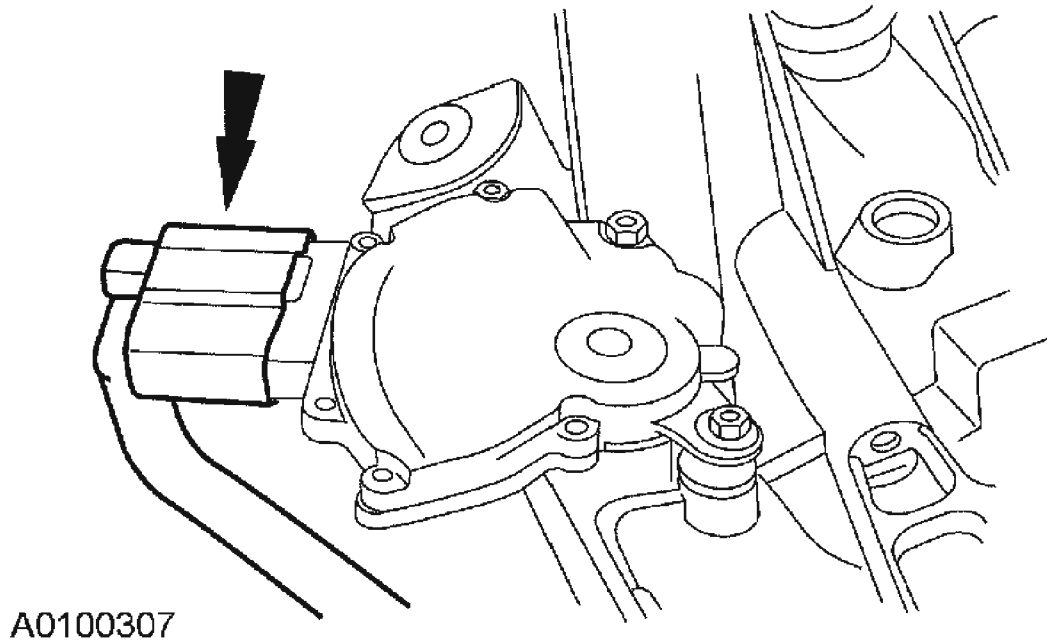
**Fig. 145: Installing TR Sensor And Bolts**  
**Courtesy of FORD MOTOR CO.**

1. Install the TR sensor and loosely install the bolts.
2. Using the special tool, align the TR sensor and tighten the bolts.
  - Tighten to 11 Nm (8 lb-ft).



**Fig. 146: Aligning TR Sensor**  
Courtesy of FORD MOTOR CO.

3. Connect the TR sensor electrical connector.



**Fig. 147: Connecting TR Sensor Electrical Connector**  
 Courtesy of FORD MOTOR CO.

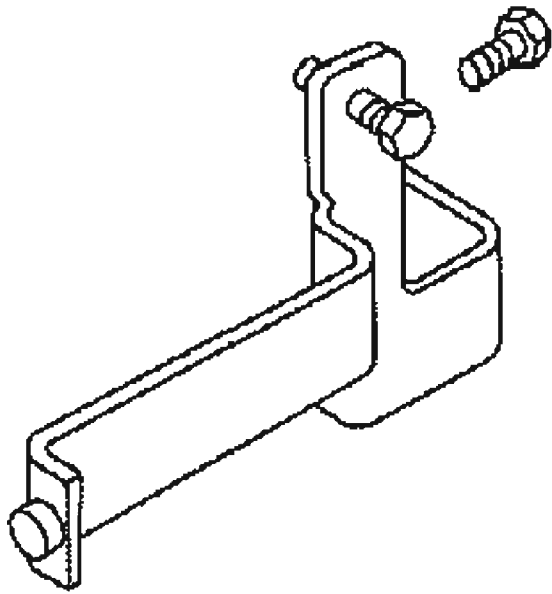
4. Install the battery and tray. For additional information, refer to **CHARGING SYSTEM - GENERAL INFORMATION**.
5. Check the correct operation. The engine should start only in PARK or NEUTRAL. The reverse lamps should illuminate in the REVERSE position.

## OVERDRIVE SERVO

### Special Tool(s)

### SPECIAL TOOLS DESCRIPTION

	Remover/Installer, Servo Cover 307-295 (T94P-77000-L)
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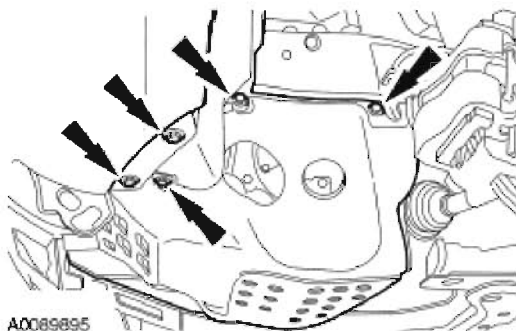


ST1845-A

## Removal

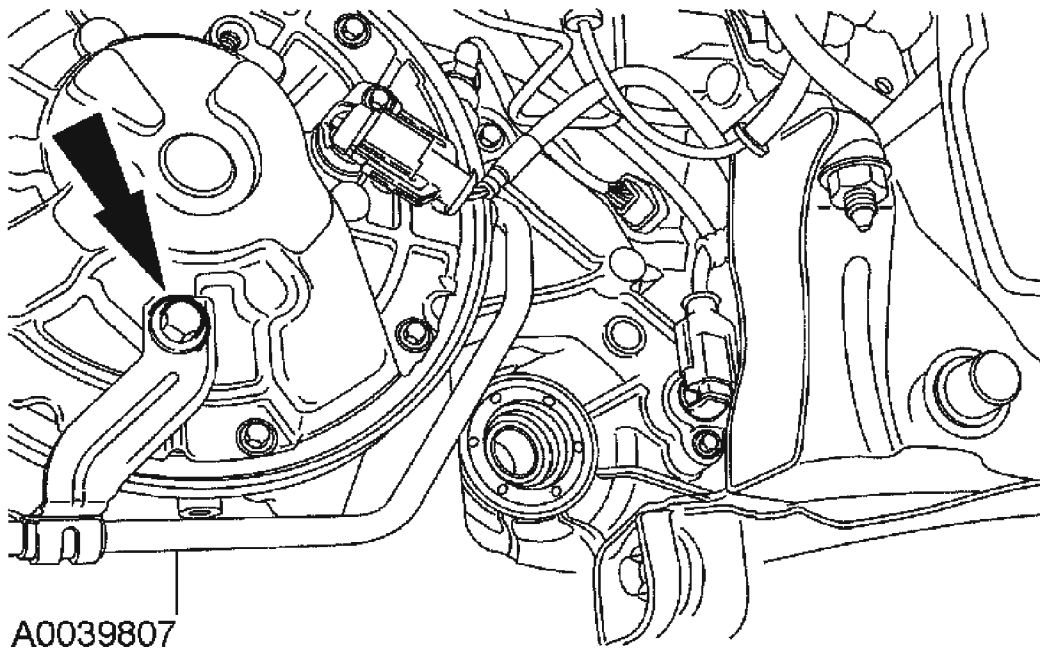
**NOTE:** Servicing the intermediate/overdrive servo in the vehicle is only recommended in the event of a leak. If the servo has failed it will be necessary to remove and disassemble the transaxle to inspect the intermediate/overdrive band assembly and direct clutch for damage.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 7 retainers and the LH splash shield.



**Fig. 148: View Of LH Splash Shield And Retainers**  
 Courtesy of FORD MOTOR CO.

3. Remove the transmission fluid cooler line bracket and bolt and position it aside.



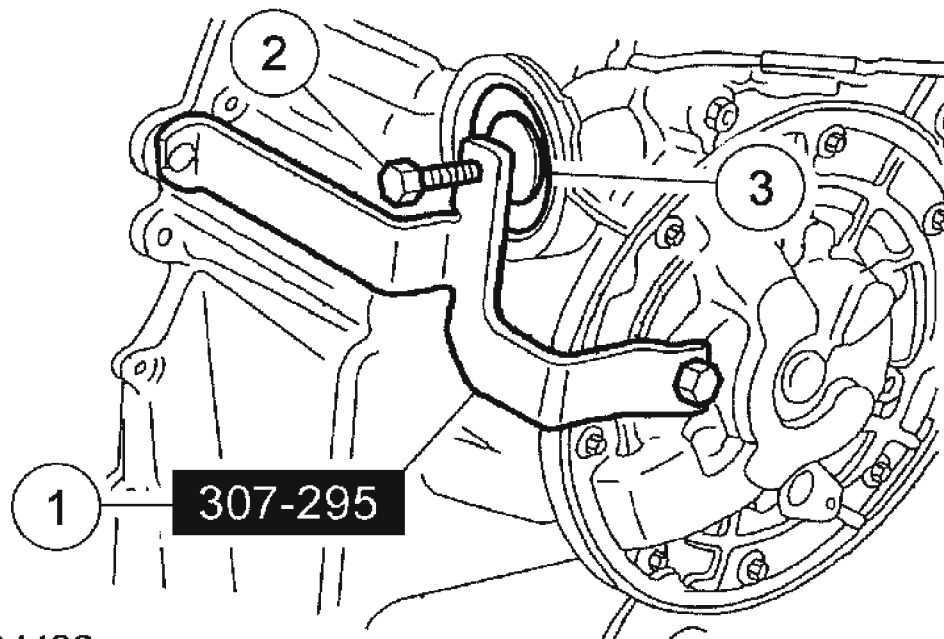
**Fig. 149: Removing Transmission Fluid Cooler Line Bracket And Bolt And Position It Aside**

Courtesy of FORD MOTOR CO.

**WARNING:** The servo is under pressure. Servo and servo cover are under high spring force. Use caution when removing servo cover. Failure to follow these instructions may result in personal injury.

**CAUTION:** Do not use a screwdriver to remove the retaining ring or damage to the case may occur. Use only snap ring pliers to remove the retaining ring.

4. Using the special tool, remove the servo retaining ring.
  1. Install the special tool.
  2. Compress the servo assembly by tightening the bolt.
  3. Remove the retaining ring.



**Fig. 150: Removing Servo Retaining Ring**  
Courtesy of FORD MOTOR CO.

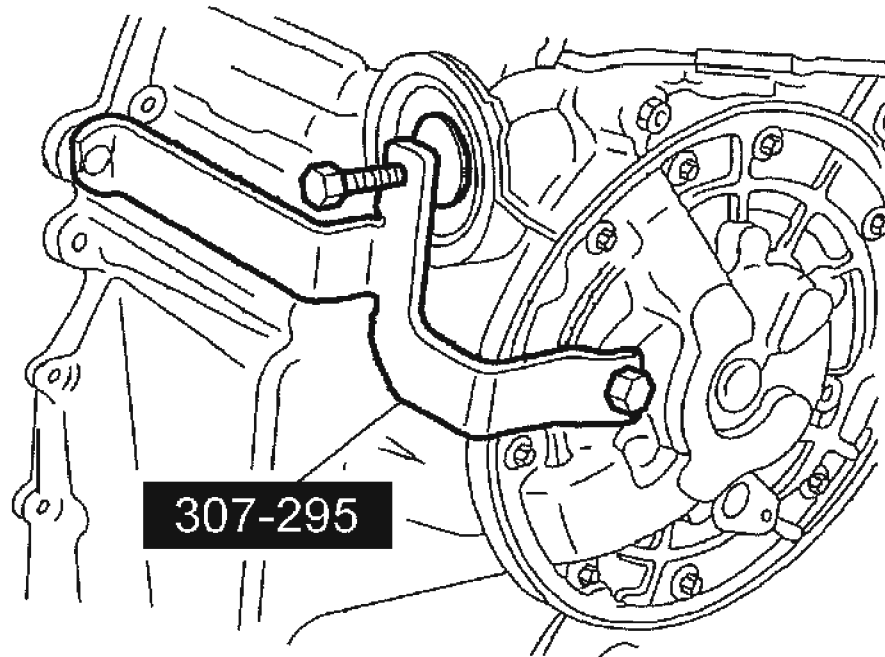
5. Remove the servo cover assembly.
6. Remove the intermediate and overdrive servo piston and return spring.
7. Wipe the servo piston and the servo cover cap with a lint free cloth.

**CAUTION: Do not clean the rubber sealing surfaces of the servo piston and the servo cover cap with cleaning solvent or damage to the sealing surface may result.**

8. Inspect the servo piston for cracks on its pressure surfaces and in the sealing area. Look for damage near the point where the servo piston is attached to the servo rod.
9. Squeeze the servo piston lip for flexibility. If the lip feels brittle, install a new piston.
10. Inspect the servo retainer spring for cracks, breaks or deformation.

#### Installation

1. Install the return spring and the intermediate overdrive servo piston.
2. Install the servo cover cap.
3. Install the special tool.



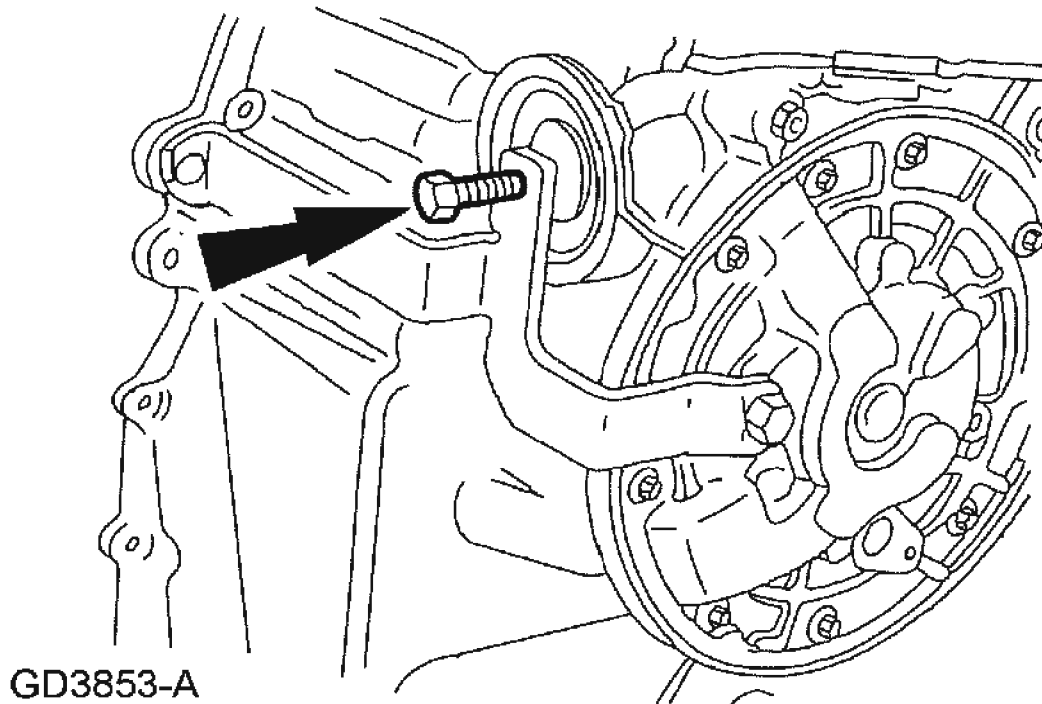
N0024441

**Fig. 151: Installing Special Tool**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use a screwdriver to install the retaining ring or damage to the case may occur. Use only snap ring pliers to install the retaining ring.

**NOTE:** If the servo cover will not seat deep enough in the bore to install the servo cover retaining ring, use a blunt punch or small hammer and gently tap the cover around the outer edge until the servo cover retaining ring can be installed.

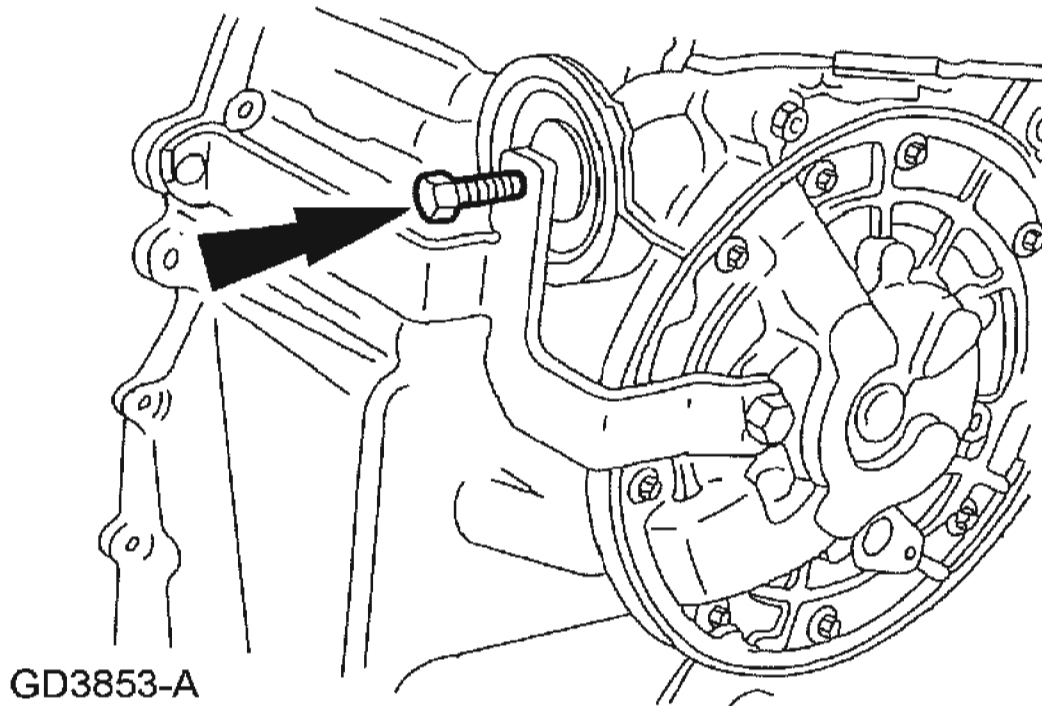
4. Tighten the special tool bolt.
  - Install the servo cover retaining ring.



**Fig. 152: Tightening Special Tool Bolt**  
**Courtesy of FORD MOTOR CO.**

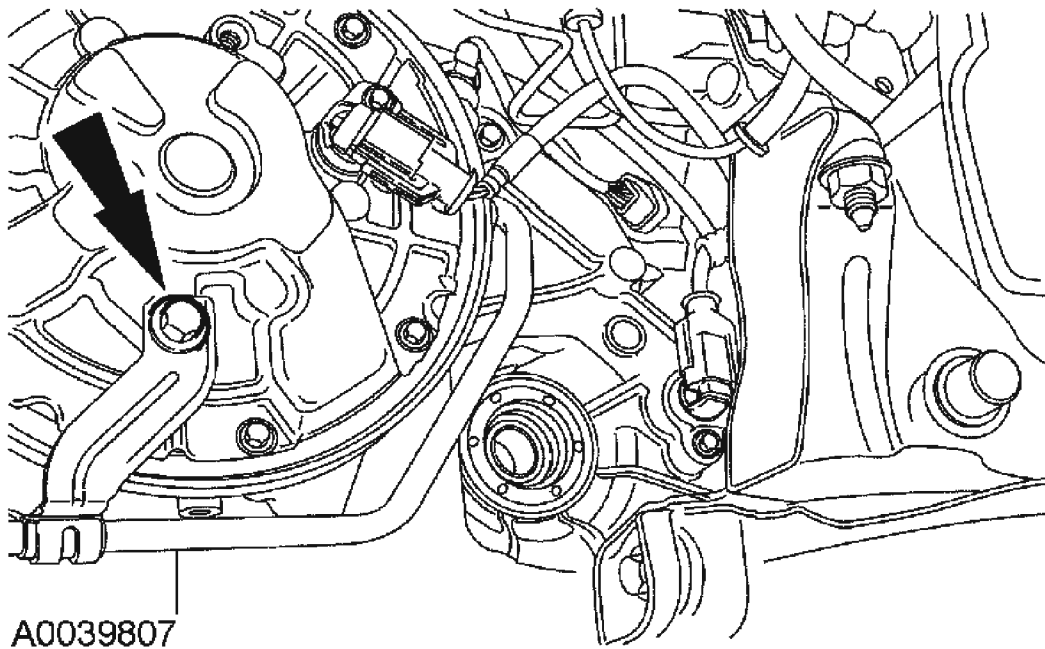
5. If the case is stamped "WG", install a wide-groove snap ring, or the servo will be damaged.
6. Loosen the special tool bolt.
  - When the spring tension is released, remove the special tool.





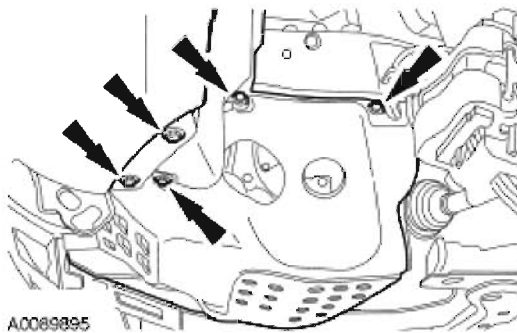
**Fig. 153: Loosening Special Tool Bolt**  
**Courtesy of FORD MOTOR CO.**

7. Install the transmission fluid cooler line and bolt.
  - Tighten to 13 Nm (10 lb-ft).



**Fig. 154: Installing Transmission Fluid Cooler Line And Bolt**  
Courtesy of FORD MOTOR CO.

8. Install the LH splash shield and the 7 retainers.
  - Tighten to 10 Nm (89 lb-in).



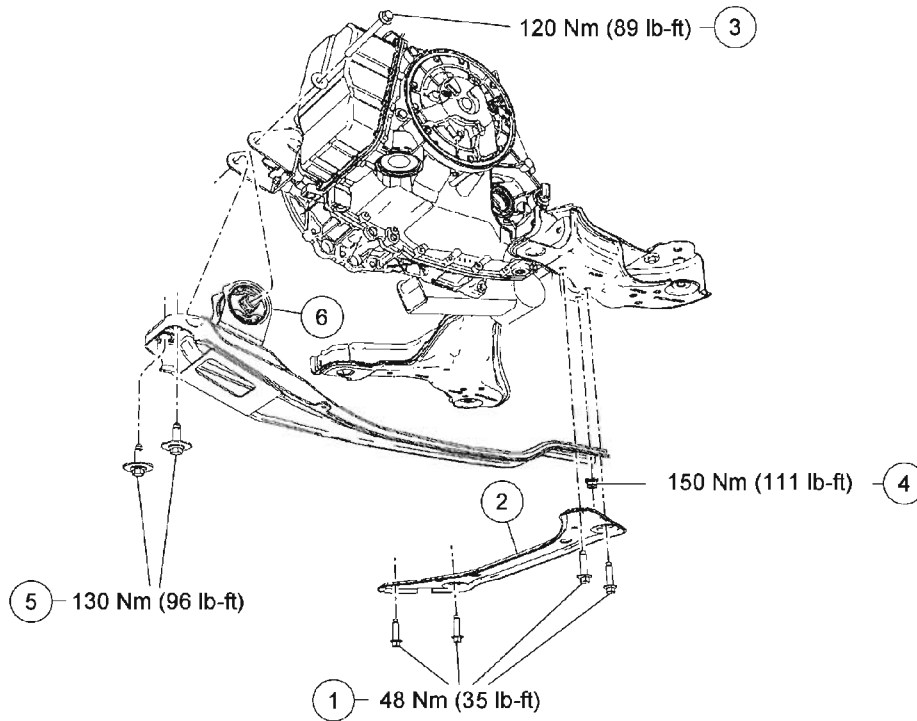
**Fig. 155: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

9. Start the vehicle. Place the transmission range selector lever in each gear and allow to engage. Check for leaks.
10. Check the transmission fluid.

**TRANSAXLE SUPPORT INSULATOR - LOWER, FRONT**

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



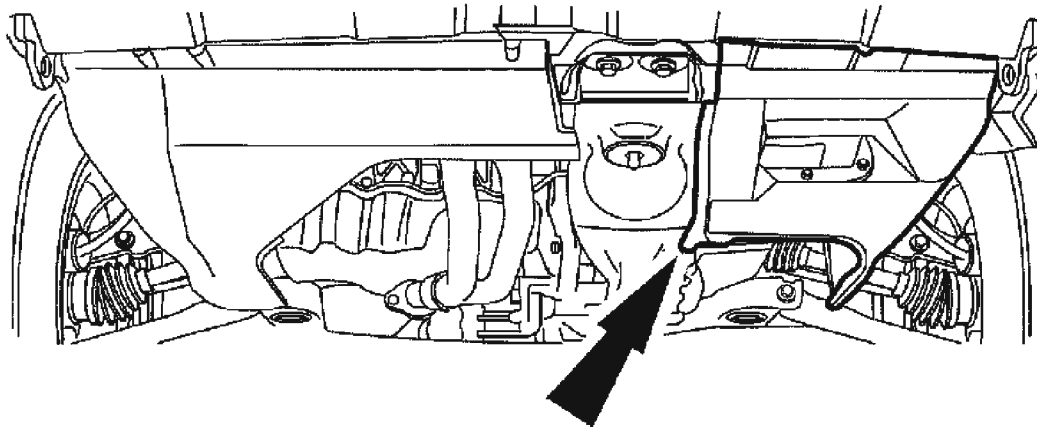
N0018850

Item	Part Number	Description
1	W710173	Cross brace retaining bolts
2	—	Cross brace
3	W500743	Front engine support bolt
4	W520415	Engine support brace nut
5	W710173	Engine support brace bolts
6	6E037	Engine support crossmember

**Fig. 156: Identifying Transaxle Support Insulator Components - Lower, Front With Torque Specifications**  
Courtesy of FORD MOTOR CO.

### Removal

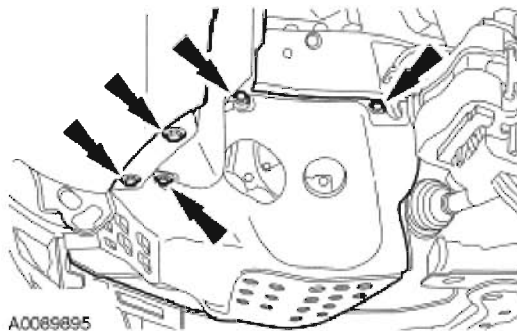
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the LH splash shield.



A0021538

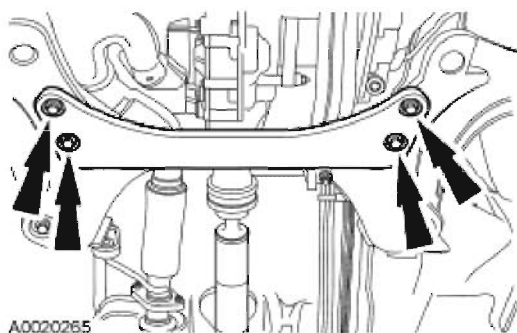
**Fig. 157: Removing LH Splash Shield**  
Courtesy of FORD MOTOR CO.

3. Remove the 7 retainers and the LH splash shield.



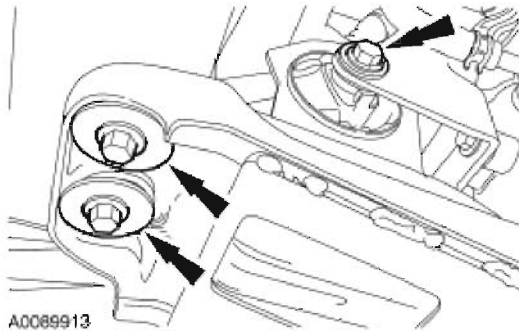
**Fig. 158: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

4. Remove the 4 bolts and the cross brace.



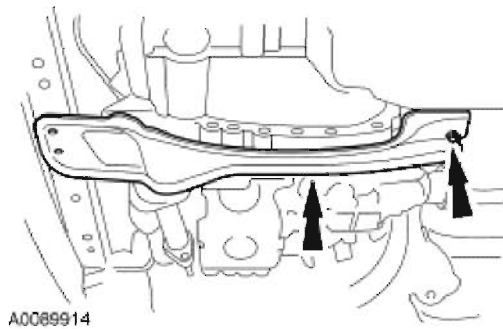
**Fig. 159: Locating Cross Brace & Bolts**  
Courtesy of FORD MOTOR CO.

5. Remove the bolt for the mount and the 2 bolts for the brace.



**Fig. 160: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**  
Courtesy of FORD MOTOR CO.

6. Remove the rear bolt and remove the brace.

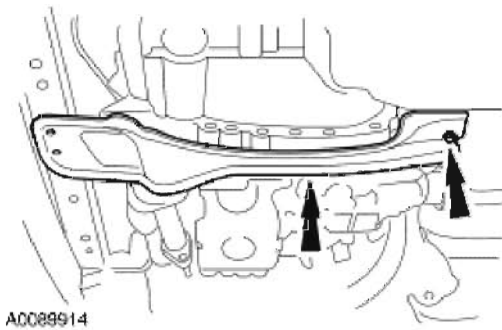


**Fig. 161: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

7. Remove the 2 bolts from the mount and remove the mount.

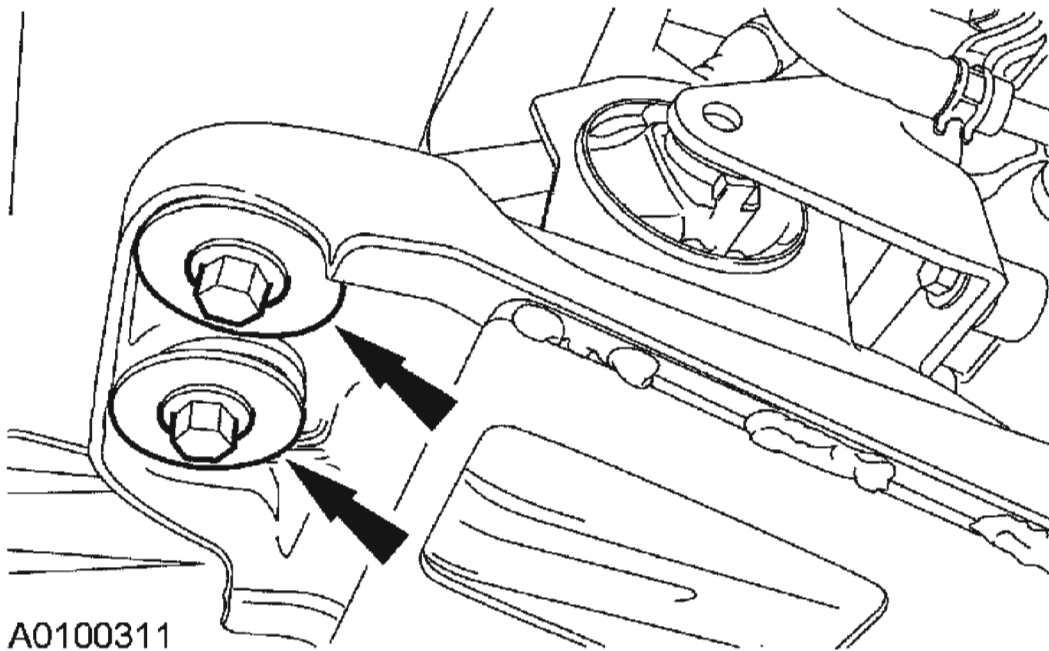
#### Installation

1. Install a new mount onto the brace and install the bolts.
  - Tighten to 40 Nm (30 lb-ft).
2. Position the brace in place and install the nut.
  - Tighten to 150 Nm (111 lb-ft).



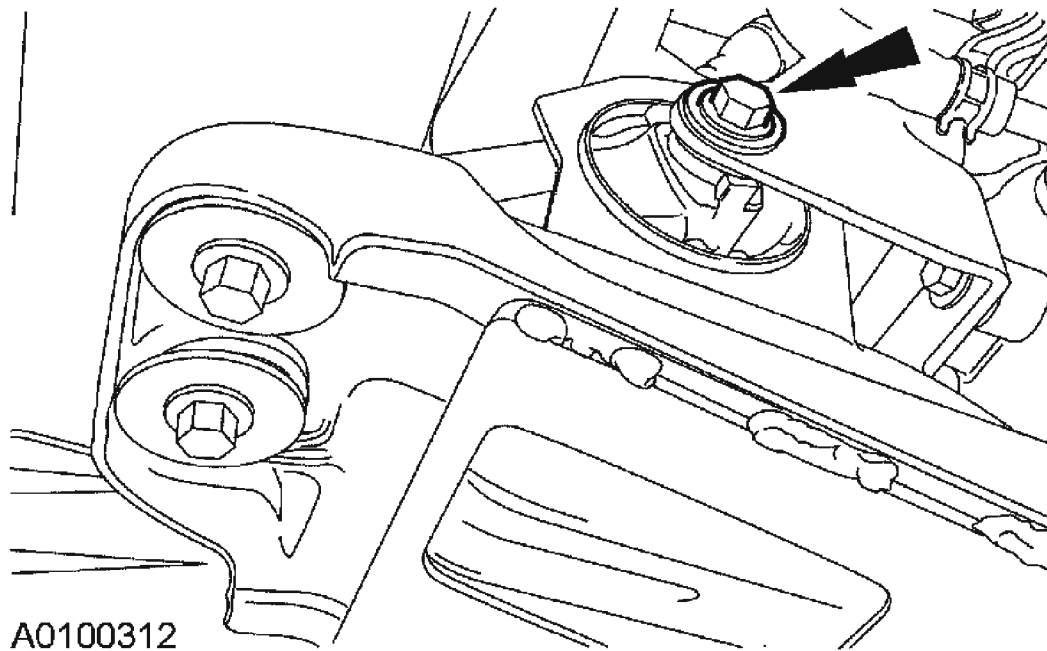
**Fig. 162: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

3. Install the 2 bolts for the brace.
  - Tighten to 90 Nm (66 lb-ft).



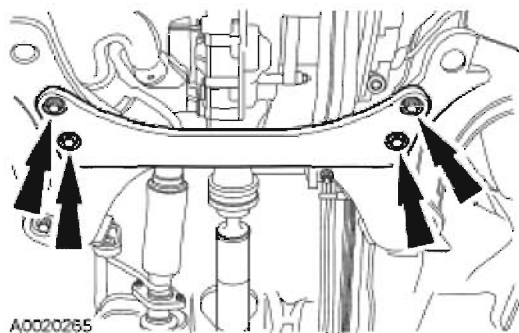
**Fig. 163: Installing Bolts For Brace**  
Courtesy of FORD MOTOR CO.

4. Install the bolt for the mount.
  - Tighten to 115 Nm (85 lb-ft).



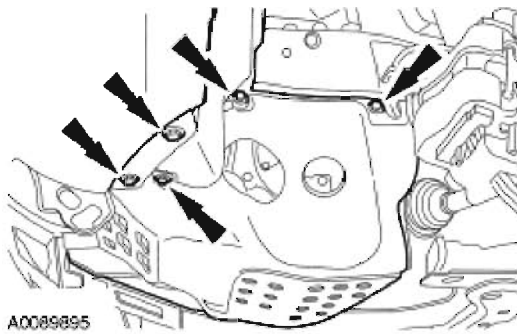
**Fig. 164: Installing Bolt For Mount**  
Courtesy of FORD MOTOR CO.

5. Install the cross brace and the 4 bolts.
  - Tighten to 48 Nm (35 lb-ft).



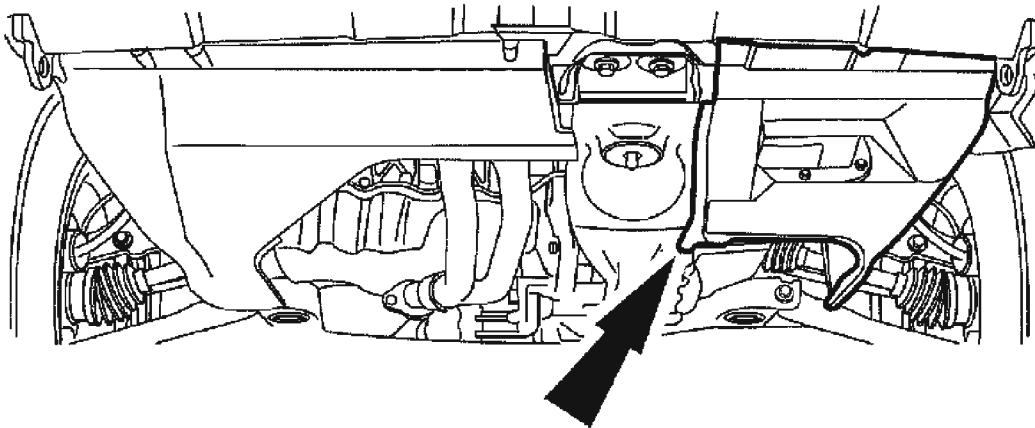
**Fig. 165: Locating Cross Brace & Bolts**  
Courtesy of FORD MOTOR CO.

6. Install the LH splash shield and the 7 retainers.
  - Tighten to 10 Nm (89 lb-in).



**Fig. 166: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

7. Install the LH splash shield.



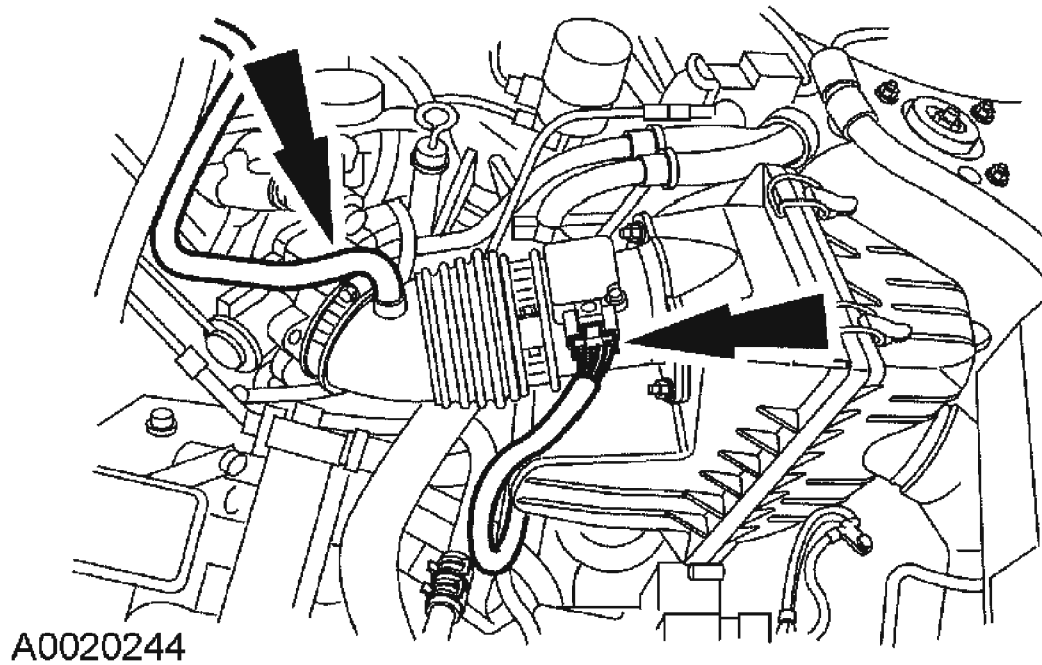
**Fig. 167: Installing LH Splash Shield**  
Courtesy of FORD MOTOR CO.

#### TRANSAXLE SUPPORT INSULATOR - LOWER, REAR, 3.0L DOHC

##### Removal and Installation

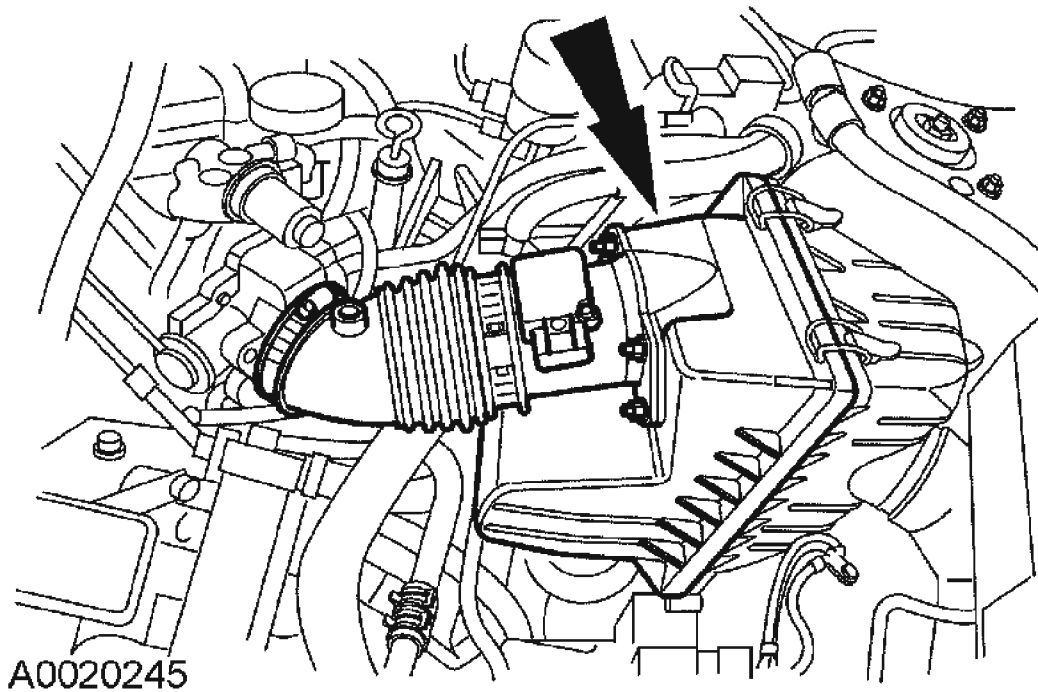
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Disconnect the breather tube and mass air flow (MAF) sensor.





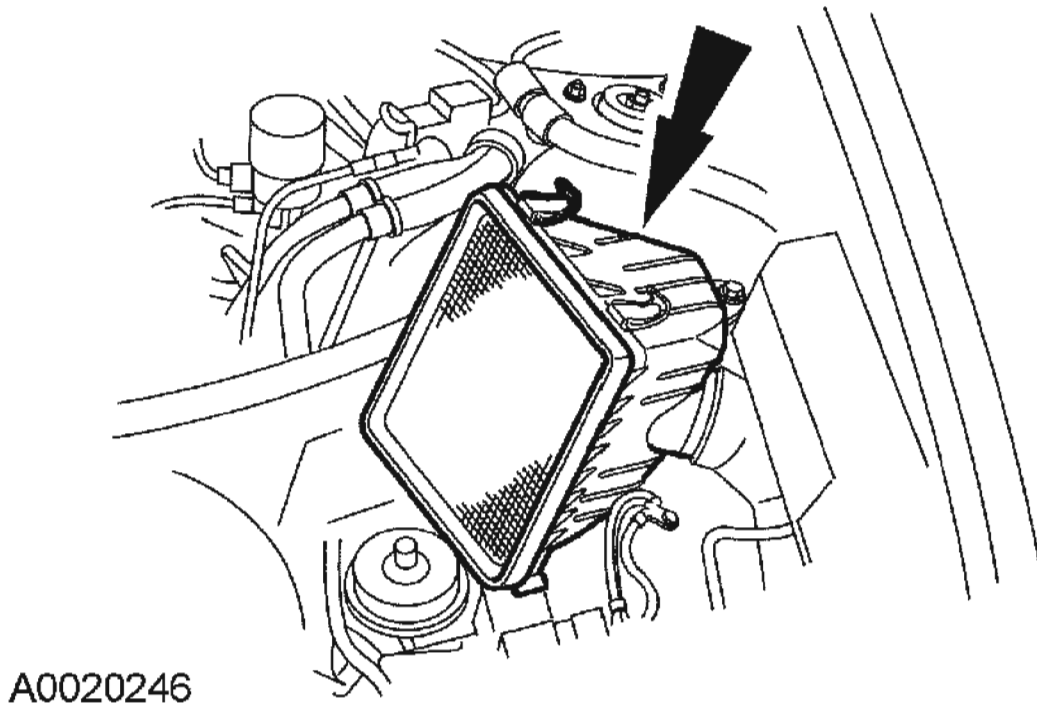
**Fig. 168: Disconnecting Breather Tube And Mass Air Flow (MAF) Sensor**  
Courtesy of FORD MOTOR CO.

3. Remove the intake tube and air cleaner cover.



**Fig. 169: Removing Intake Tube And Air Cleaner Cover**  
Courtesy of FORD MOTOR CO.

4. Remove the air cleaner assembly.



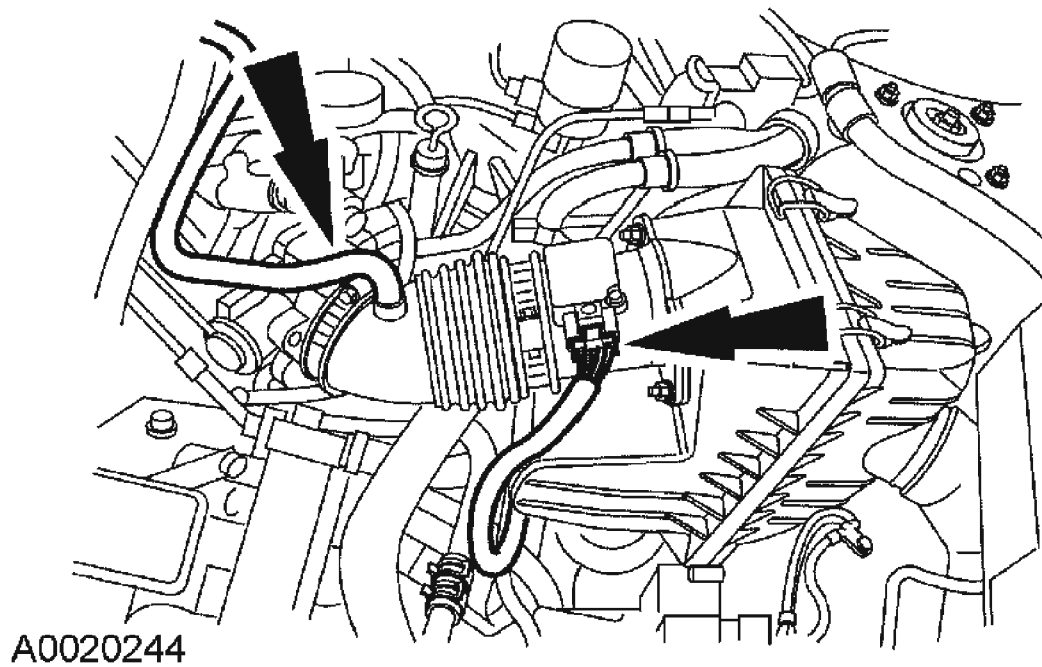
**Fig. 170: Removing Air Cleaner Assembly**  
Courtesy of FORD MOTOR CO.

5. Remove the mount through bolt.
  - To install, tighten to 120 Nm (89 lb-ft).
6. Remove the 1 retaining bolt and the 2 nuts for the mount and remove the mount.
  - To install, tighten to 90 Nm (66 lb-ft).
7. To install, reverse the removal procedure.

#### **TRANSAXLE SUPPORT INSULATOR - LOWER, REAR, 2.3L**

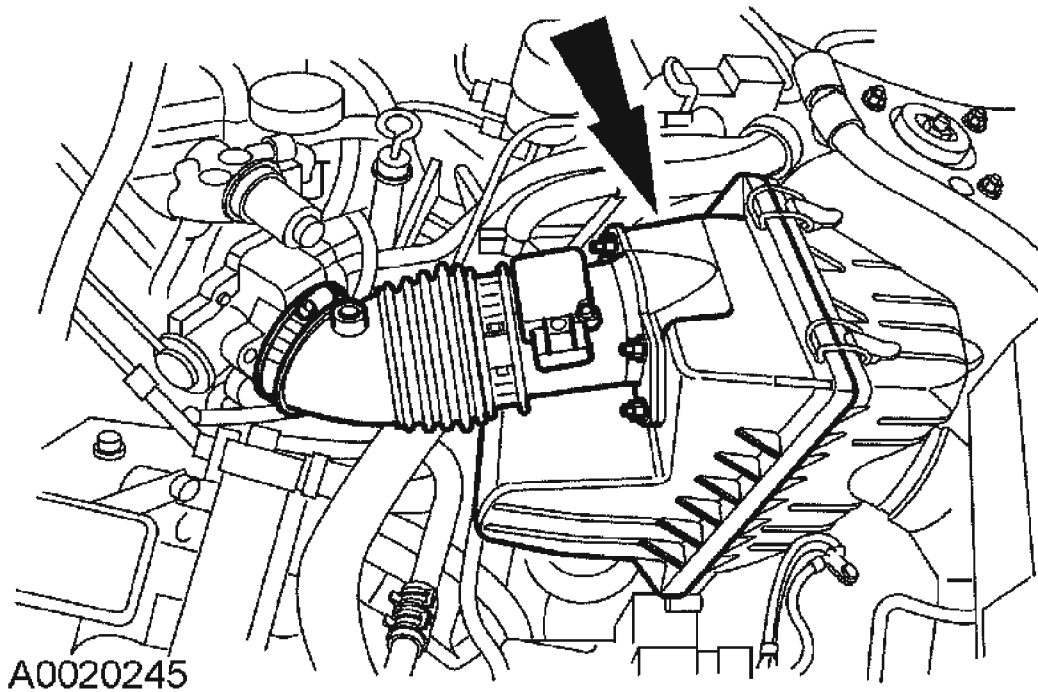
##### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Disconnect the breather tube and mass air flow (MAF) sensor.



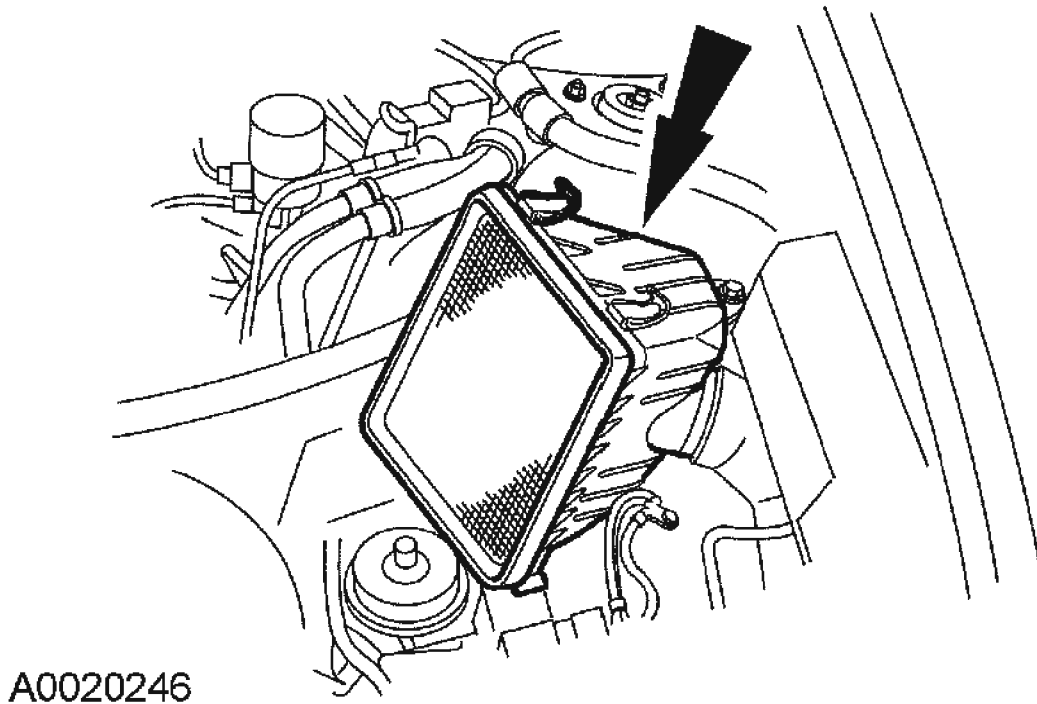
**Fig. 171: Disconnecting Breather Tube And Mass Air Flow (MAF) Sensor**  
Courtesy of FORD MOTOR CO.

3. Remove the intake tube and air cleaner cover.



**Fig. 172: Removing Intake Tube And Air Cleaner Cover**  
Courtesy of FORD MOTOR CO.

4. Remove the air cleaner assembly.



**Fig. 173: Removing Air Cleaner Assembly**  
**Courtesy of FORD MOTOR CO.**

5. Remove the mount through bolt.
  - To install, tighten to 120 Nm (89 lb-ft).
6. Remove the 1 retaining bolt and the 2 nuts for the mount and remove the mount.
  - To install, tighten to 90 Nm (66 lb-ft).
7. To install, reverse the removal procedure.

#### TRANSAXLE SUPPORT INSULATOR - LH

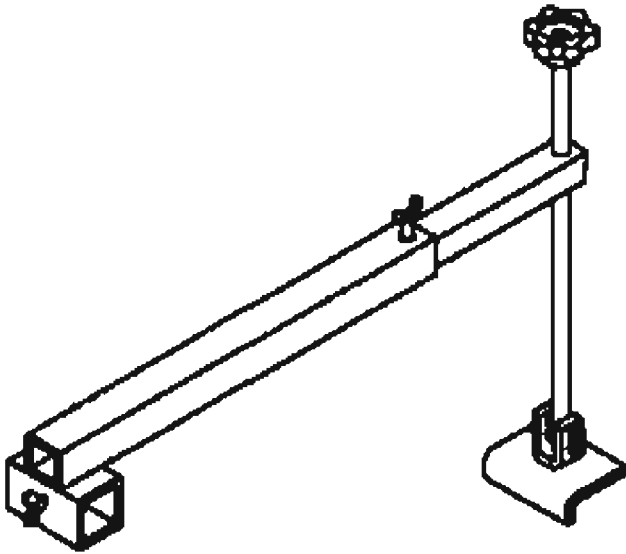
Special Tool(s)

#### SPECIAL TOOLS DESCRIPTION

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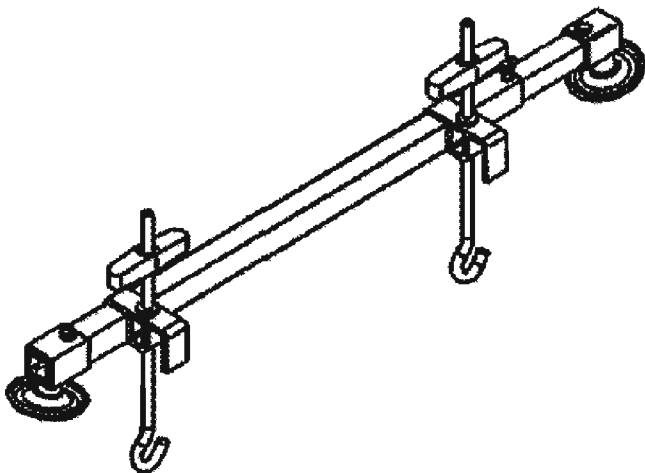
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2379-A**

Adapter for 303-290A (Support Leg)  
303-290A-03A

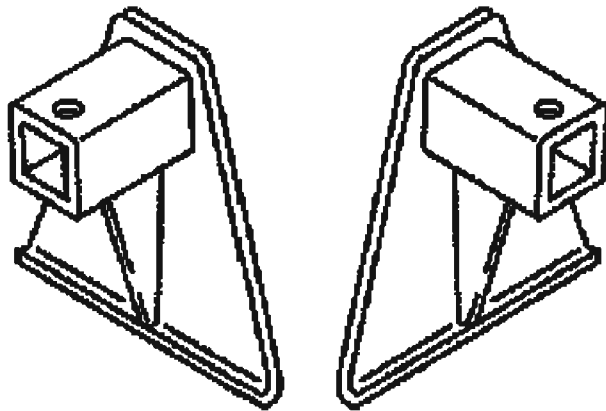


**ST2363-A**

Support Bar, Engine 303-290A

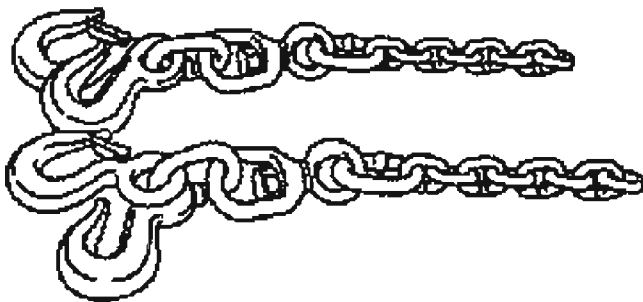
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Adapters for 303-290 303-290A-01

**ST2378-A**



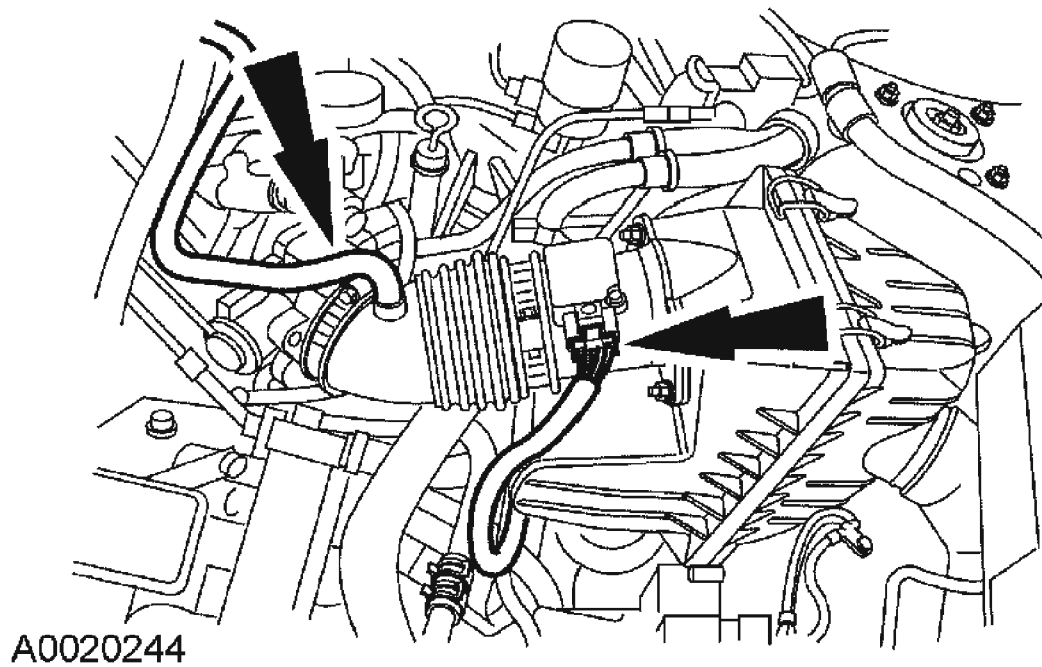
Engine Lifting Chains (Part of Spreader Bar) 303-D089 (D93P-6001-A3) or equivalent

**ST2524-A**

### Removal and Installation

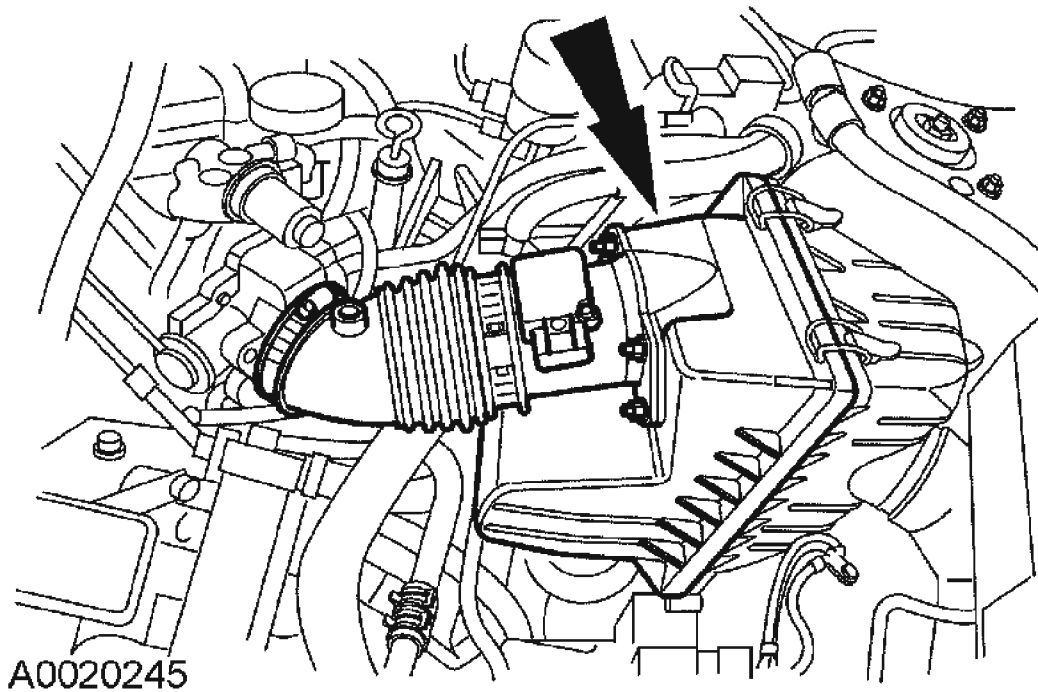
1. Disconnect the breather tube and mass air flow (MAF) sensor.





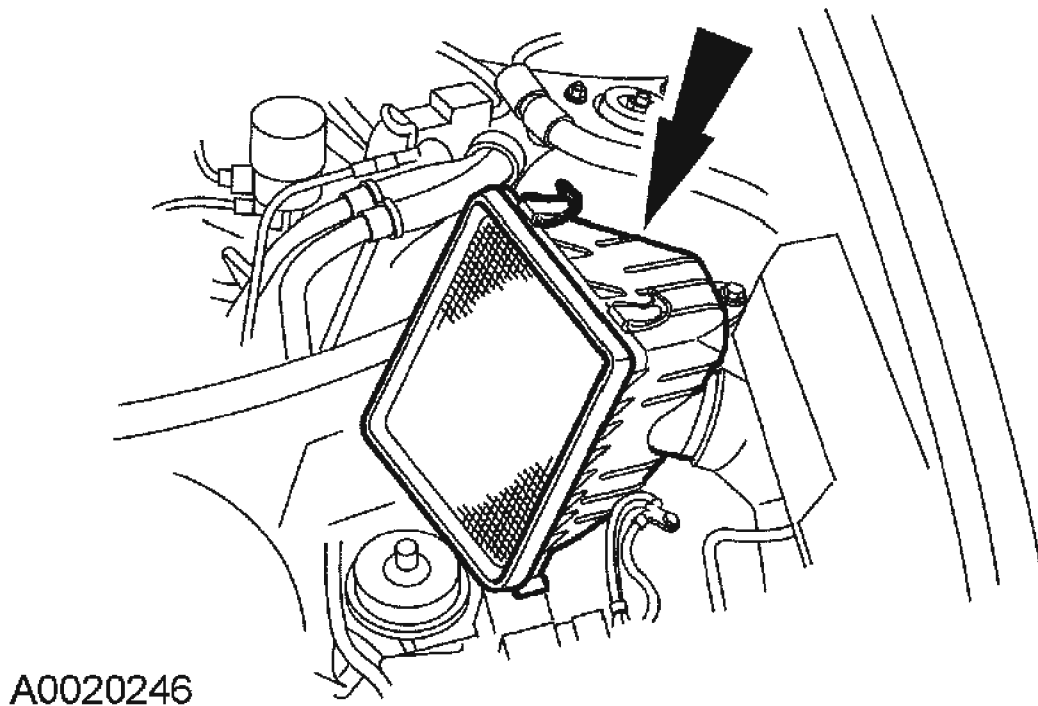
**Fig. 174: Disconnecting Breather Tube And Mass Air Flow (MAF) Sensor**  
Courtesy of FORD MOTOR CO.

2. Remove the intake tube and air cleaner cover.



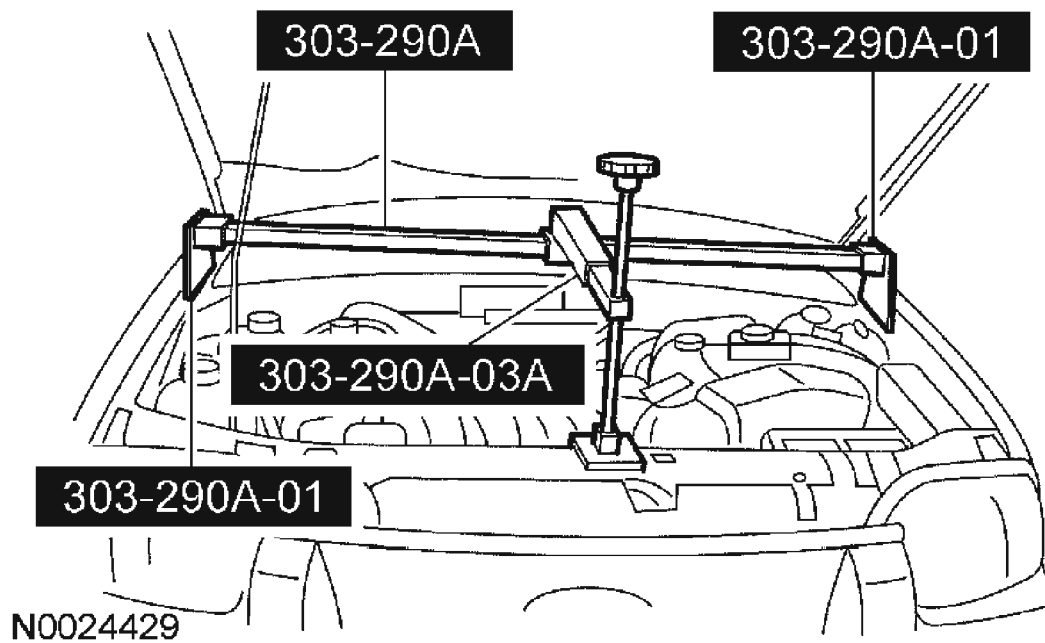
**Fig. 175: Removing Intake Tube And Air Cleaner Cover**  
Courtesy of FORD MOTOR CO.

3. Remove the air cleaner as an assembly.



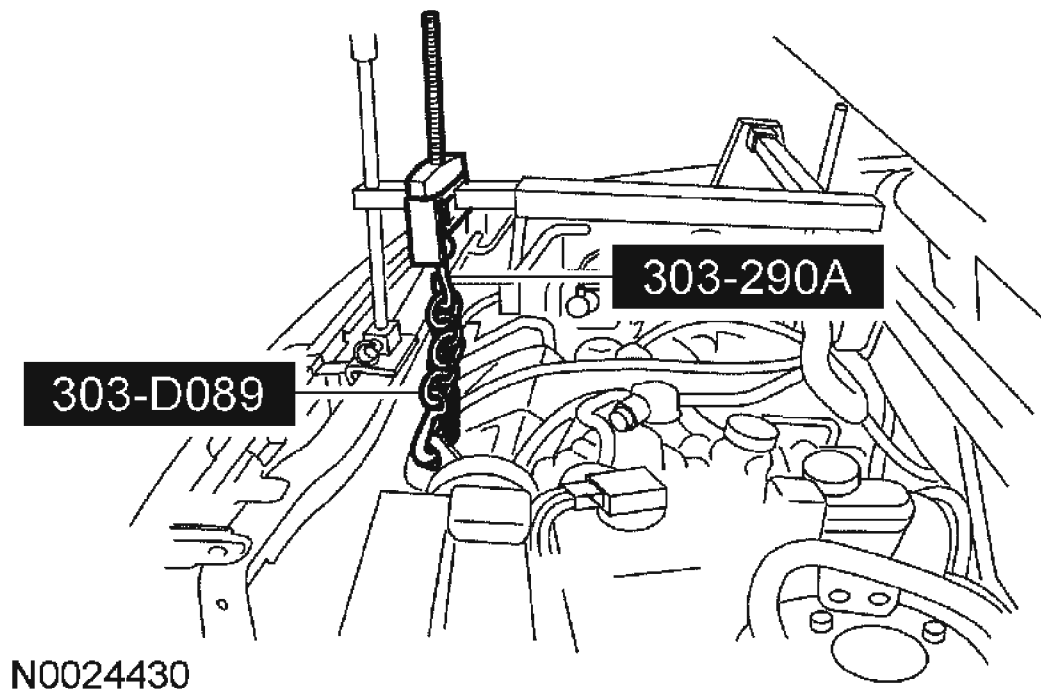
**Fig. 176: Removing Air Cleaner As Assembly**  
**Courtesy of FORD MOTOR CO.**

4. Install the special tools.



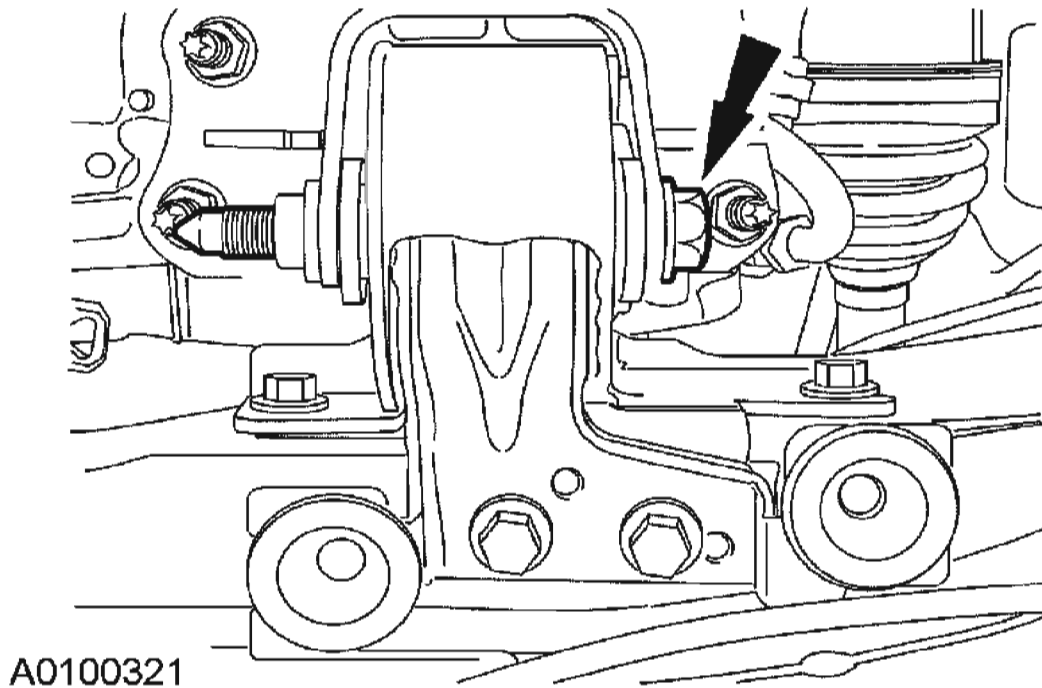
**Fig. 177: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

5. Install the special tools.



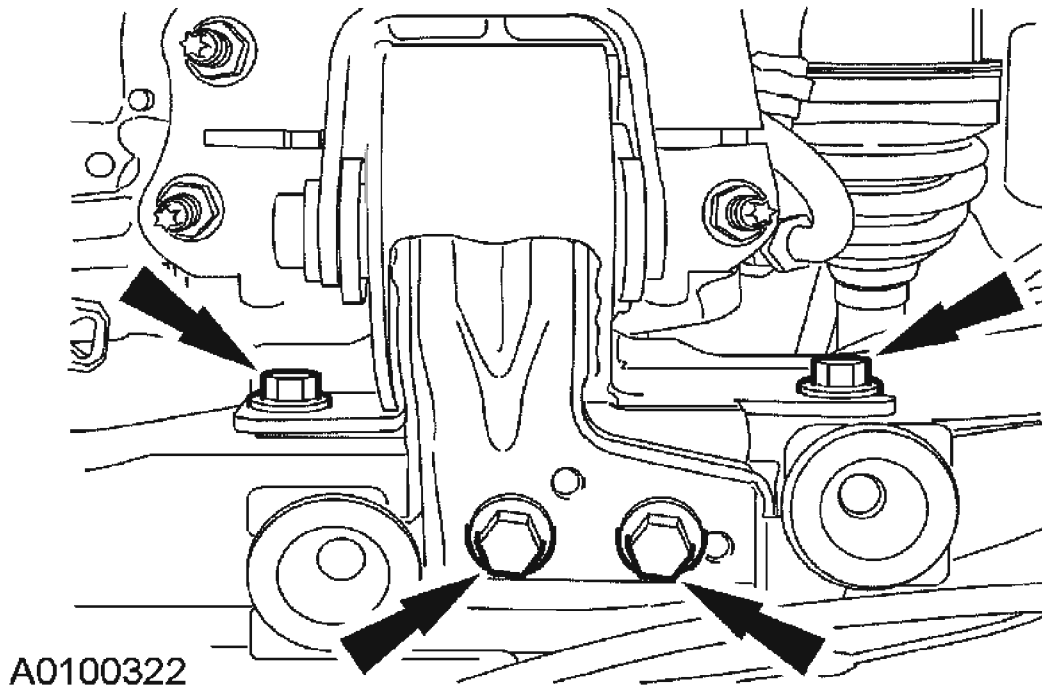
**Fig. 178: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

6. Remove the upper transaxle mount through bolt.
  - To install, tighten to 103 Nm (76 lb-ft).



**Fig. 179: Removing Upper Transaxle Mount Through Bolt**  
Courtesy of FORD MOTOR CO.

7. Remove the 4 upper transaxle mount bolts and remove the mount.
  - To install, tighten to 55 Nm (41 lb-ft).



**Fig. 180: Removing Upper Transaxle Mount Bolts And Mount**  
Courtesy of FORD MOTOR CO.

8. To install, reverse the removal procedure.

## REMOVAL

TRANSAXLE - 2.3L

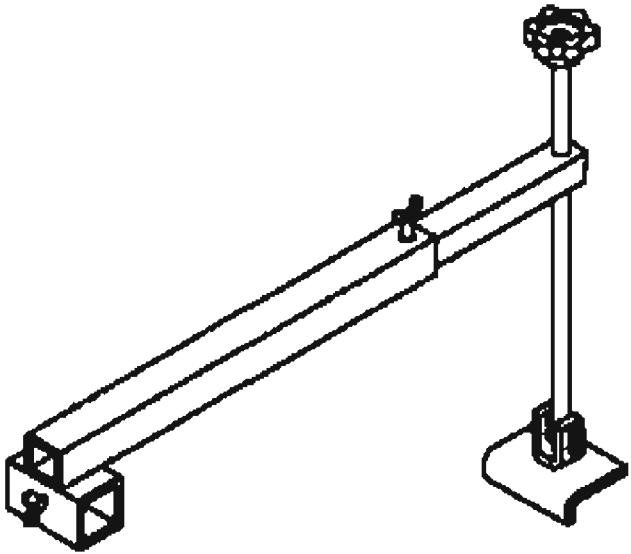
Special Tool(s)

## SPECIAL TOOLS DESCRIPTION

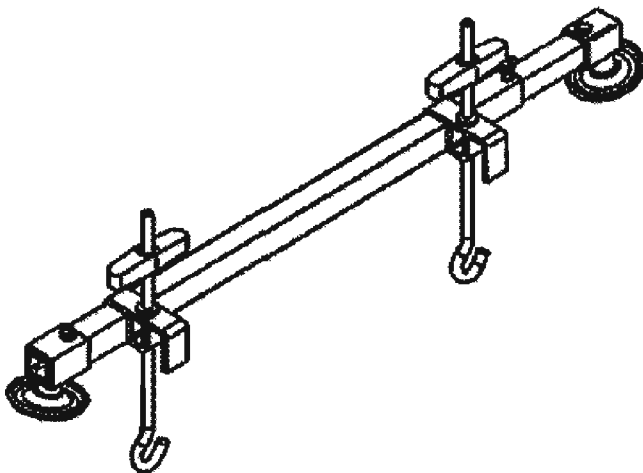
	Adapter for 303-290A (Support Leg) 303-290A-03A
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## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2379-A**



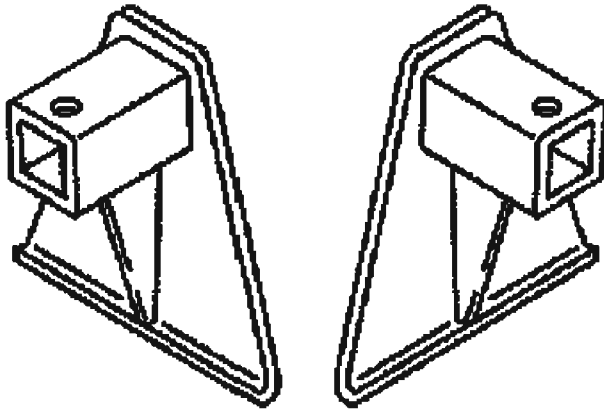
**ST2363-A**

Support Bar, Engine 303-290A



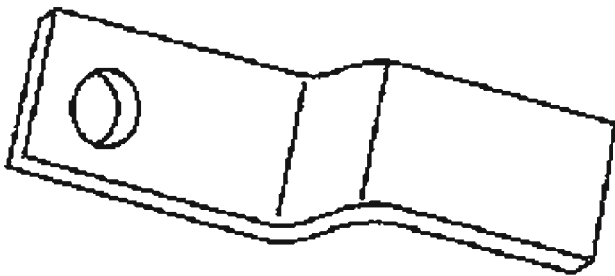
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Adapters for 303-290 303-290A-01

**ST2378-A**



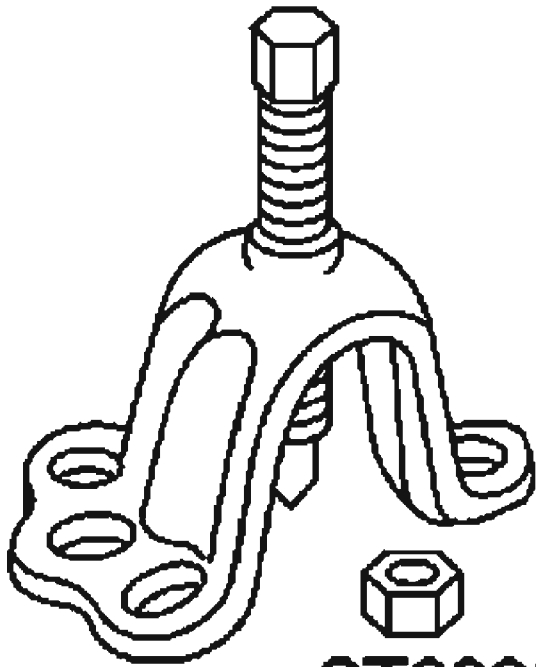
Retainer, Torque Converter 307-346  
(T97T-7902-A)

**ST1636-A**

Front Hub Remover 205-D070

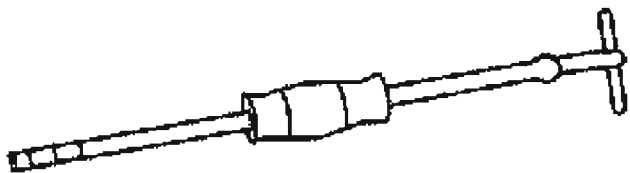
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2330-A**

(D93P-1175-B) or equivalent

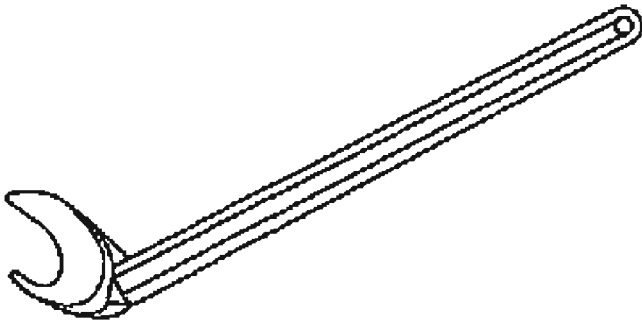


**ST1185-A**

Slide Hammer 100-001 (T50T-100-A)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



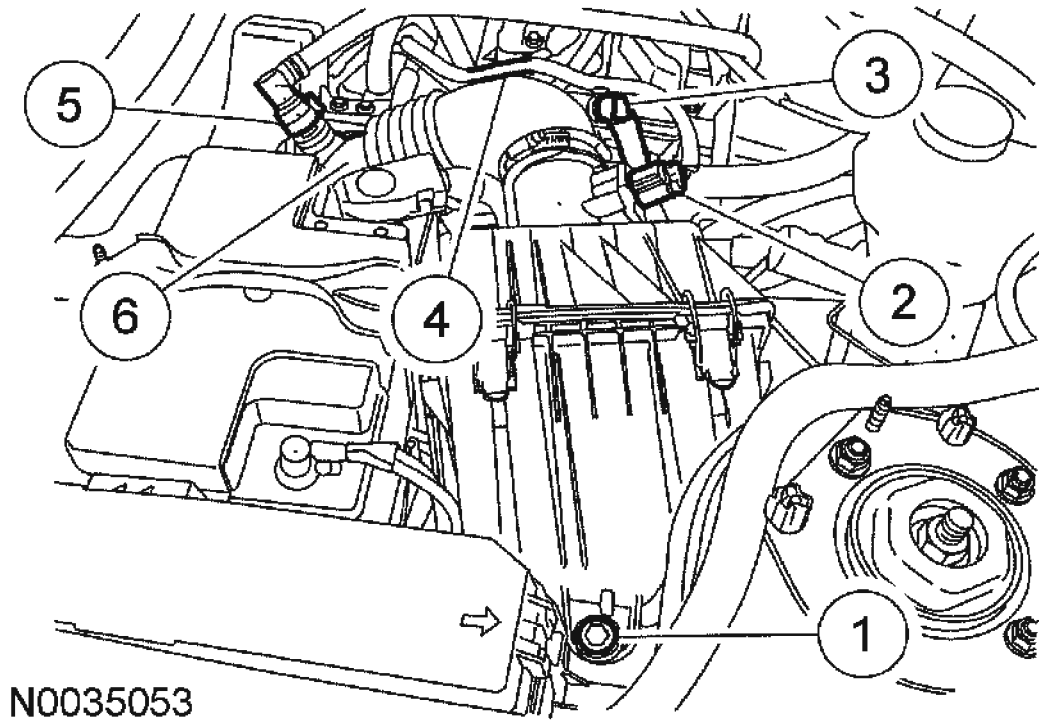
Remover, Halfshaft 205-241 (T86P-3541-A)

**ST1582-A**

### Removal

#### All vehicles

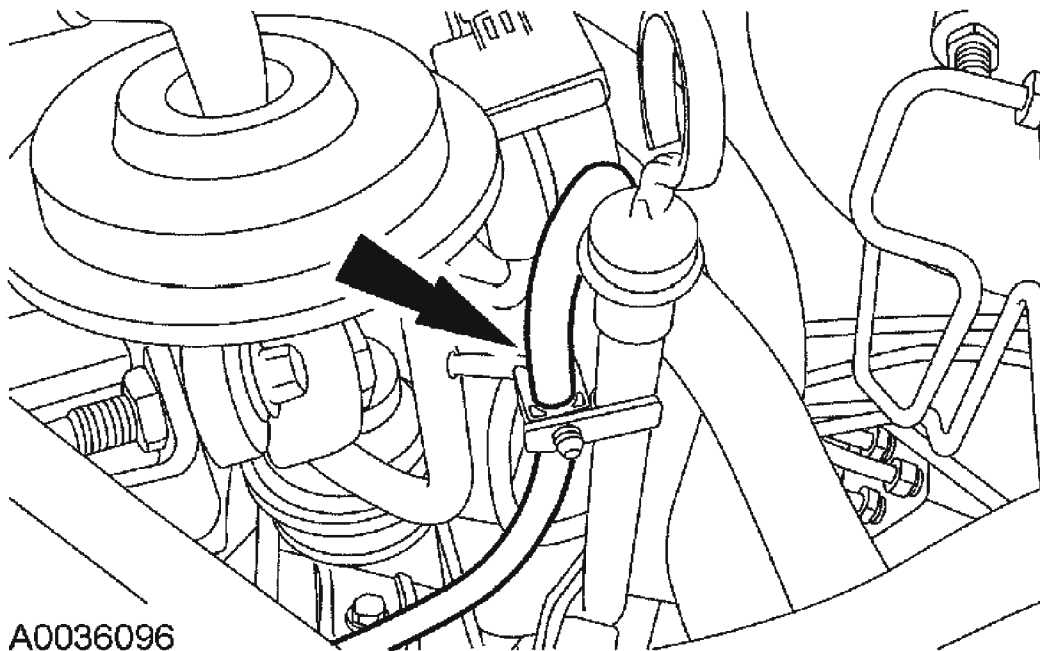
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the battery and the battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
3. Remove the air cleaner as an assembly.
  1. Remove the bolt.
  2. Disconnect the mass air flow (MAF) sensor electrical connector.
  3. Disconnect the brake booster vacuum hose.
  4. Disconnect the wiring harness retainer.
  5. Disconnect the breather tube.
  6. Loosen the clamp and remove the air cleaner assembly.



**Fig. 181: Removing Air Cleaner As Assembly**  
Courtesy of FORD MOTOR CO.

**4x4 vehicles**

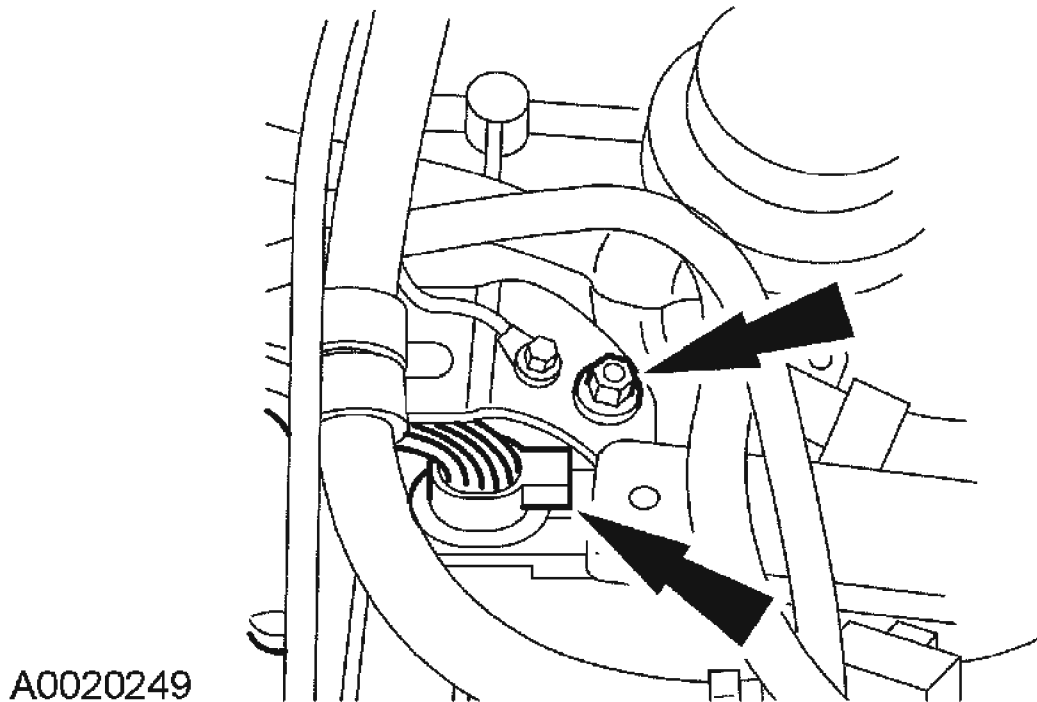
4. Disconnect the power take-off (PTO) vent hose from the clip located on the fill tube.



**Fig. 182: Disconnecting Power Take-Off (PTO) Vent Hose**  
Courtesy of FORD MOTOR CO.

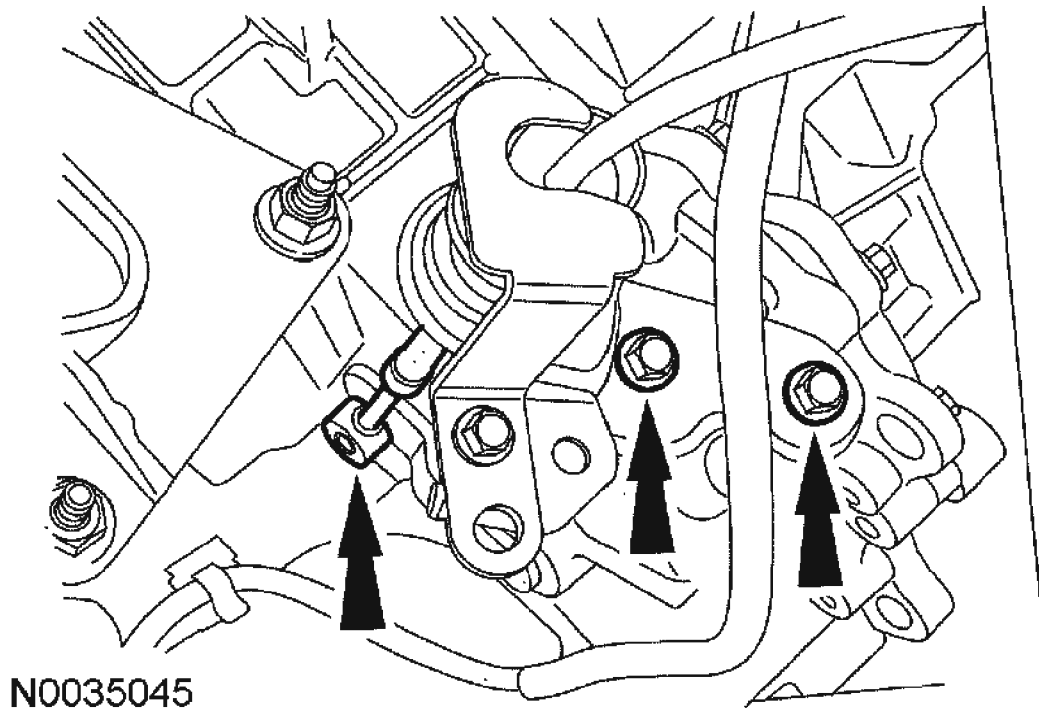
**All vehicles**

5. Remove the nut holding the wiring harness bracket and unplug the bulkhead electrical connector.



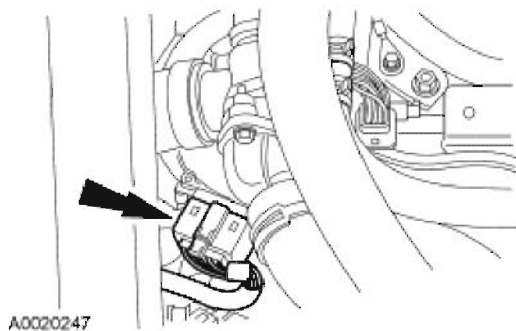
**Fig. 183: Removing Nut Holding Wiring Harness Bracket**  
Courtesy of FORD MOTOR CO.

6. Remove the 2 bolts from the shift cable bracket and disconnect the shift cable from the manual lever.



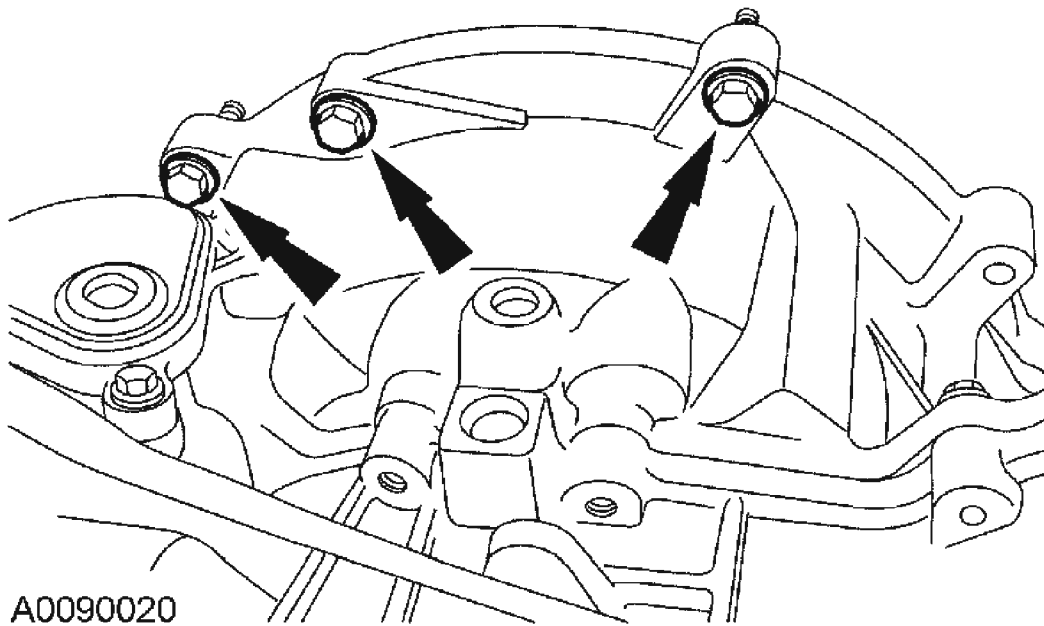
**Fig. 184: Disconnecting Shift Cable From Manual Lever**  
Courtesy of FORD MOTOR CO.

7. Disconnect the transmission range (TR) sensor electrical connector.



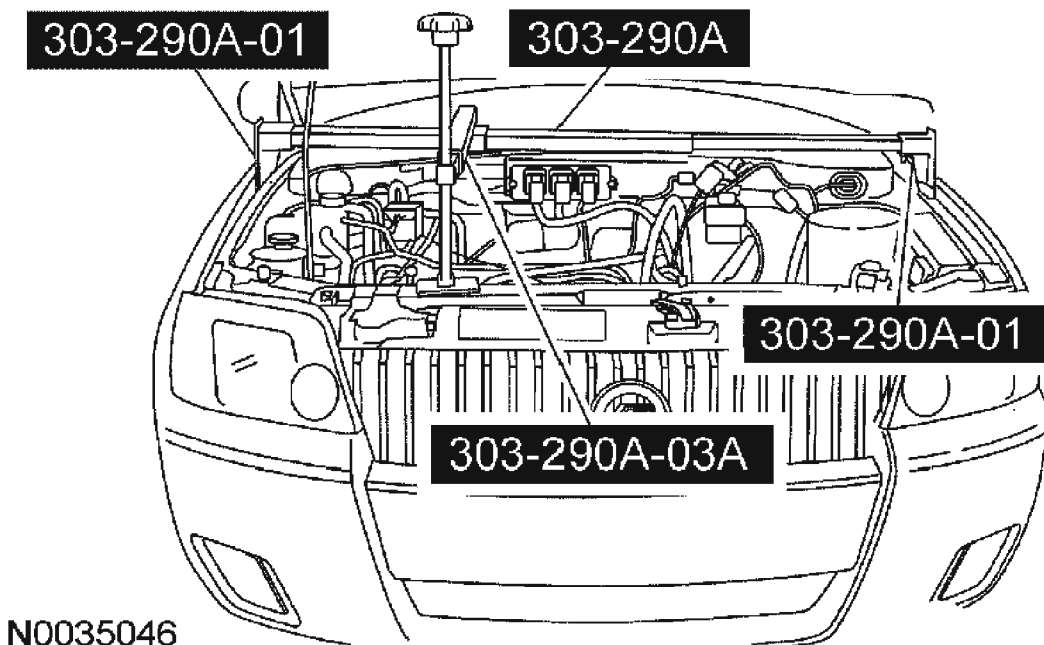
**Fig. 185: Locating Transmission Range (TR) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

8. Remove the 3 upper transaxle retaining bolts.



**Fig. 186: Removing Upper Transaxle Retaining Bolts**  
Courtesy of FORD MOTOR CO.

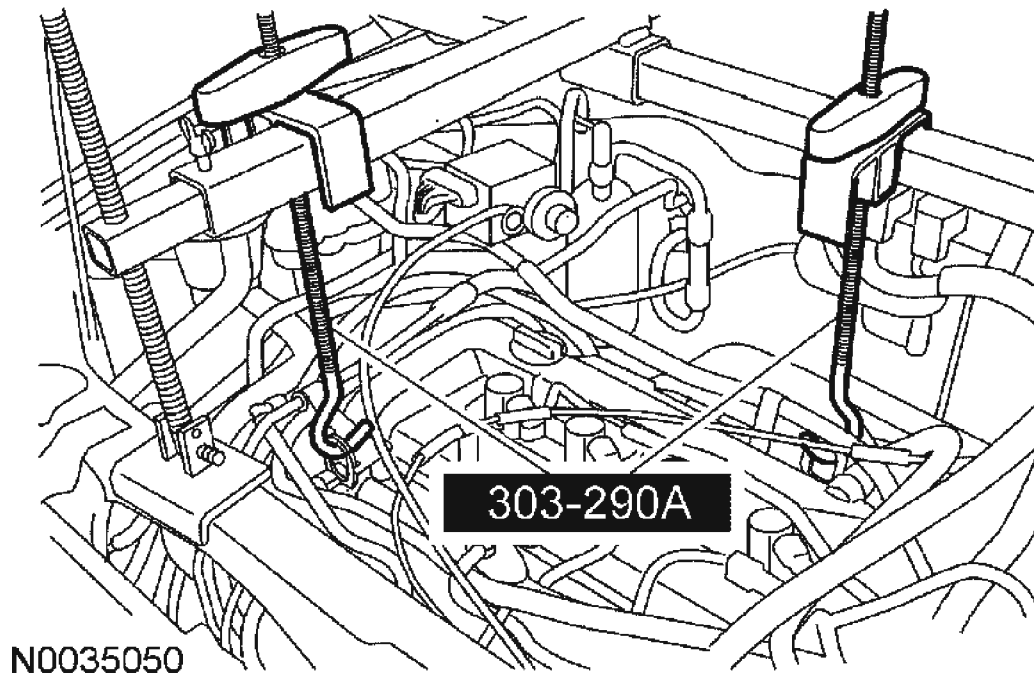
9. Install the special tools.





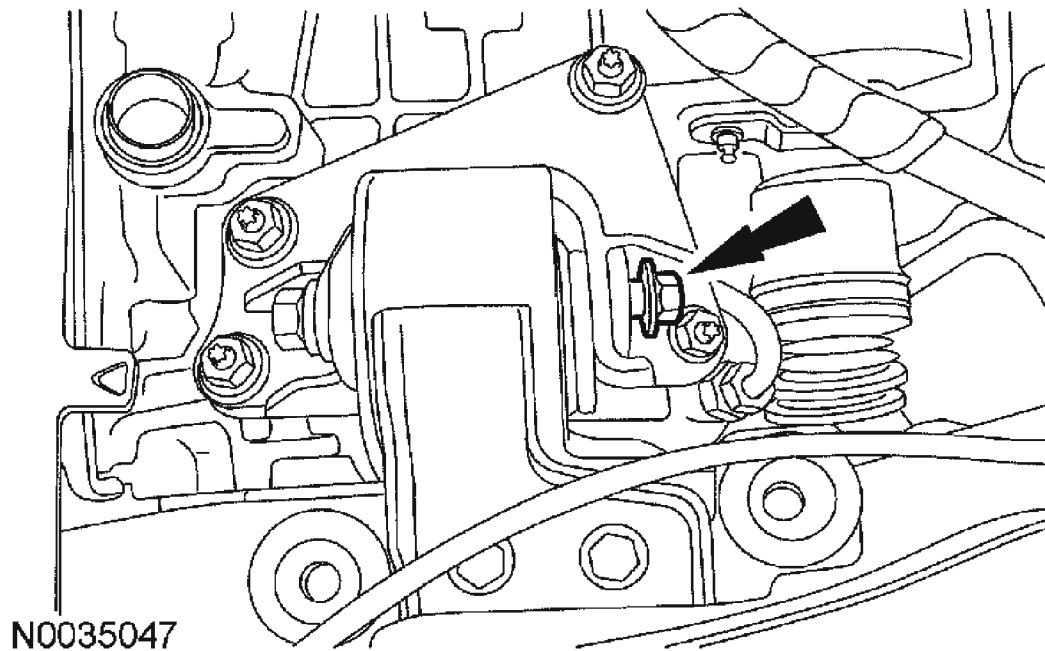
**Fig. 187: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

10. Install the special tools.



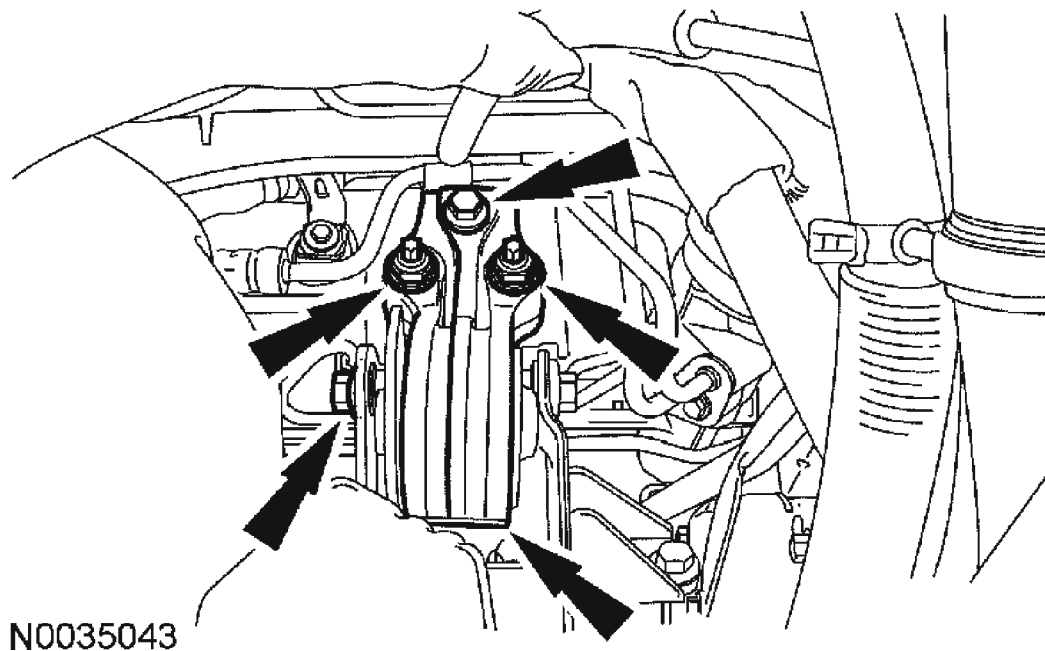
**Fig. 188: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

11. Remove the LH transaxle mount through bolt.



**Fig. 189: Removing LH Transaxle Mount Through Bolt**  
Courtesy of FORD MOTOR CO.

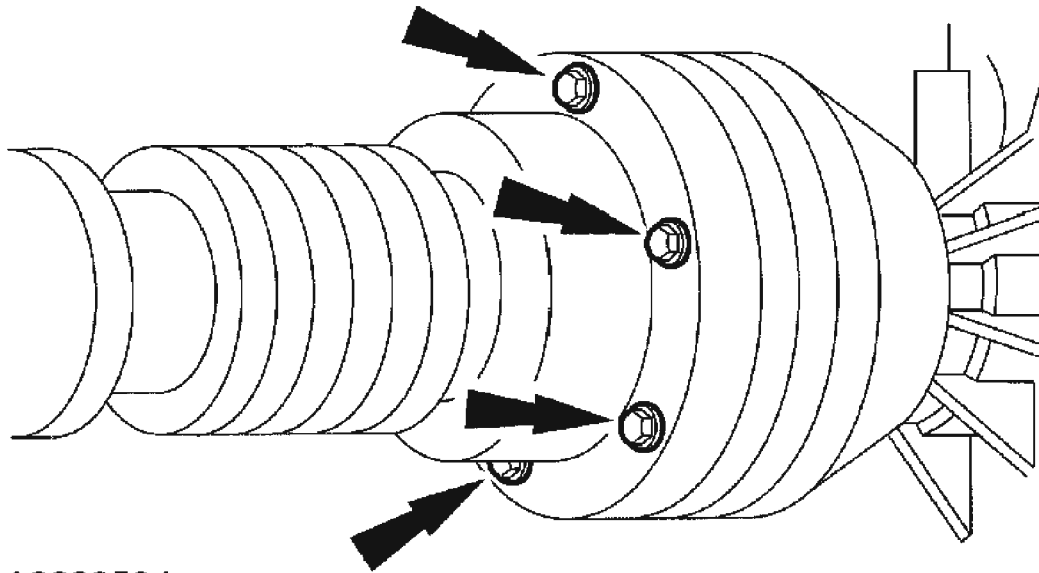
12. Remove the 2 nuts, the bolt and the through bolt and remove the rear transaxle mount.



**Fig. 190: Removing Rear Transaxle Mount**  
Courtesy of FORD MOTOR CO.

**4x4 vehicles**

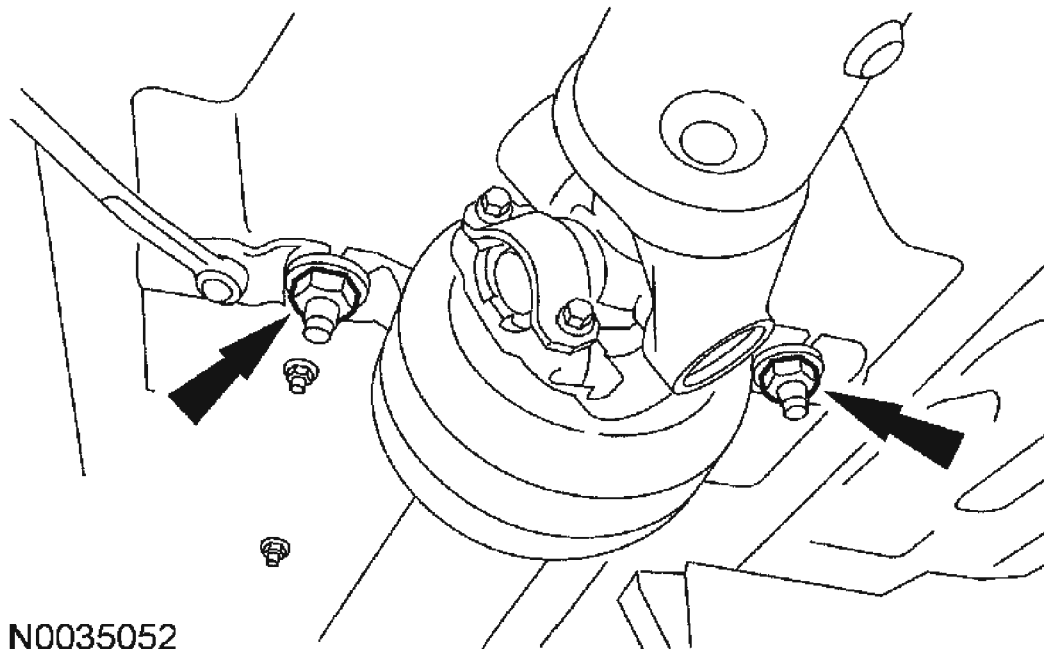
13. Remove the 6 bolts holding the driveshaft to the PTO.



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**Fig. 191: Removing Bolts Holding Driveshaft To PTO**  
Courtesy of FORD MOTOR CO.

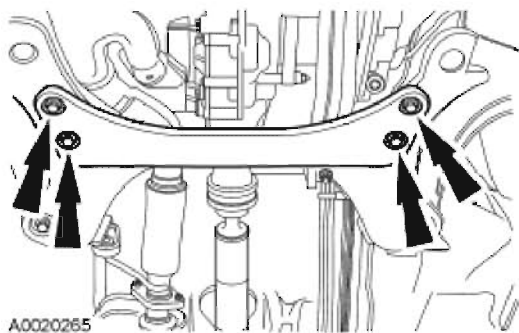
14. Remove the 2 center bearing nuts and position the driveshaft aside with mechanic's wire.



**Fig. 192: Removing Center Bearing Nuts**  
Courtesy of FORD MOTOR CO.

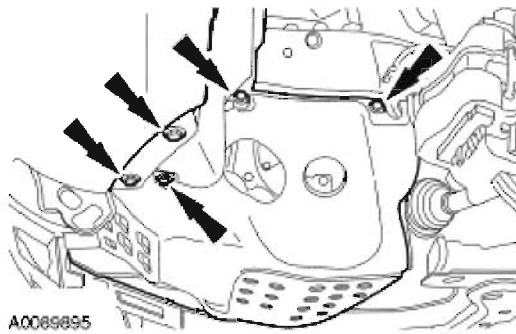
**All vehicles**

15. Remove the 4 bolts and remove the cross brace.



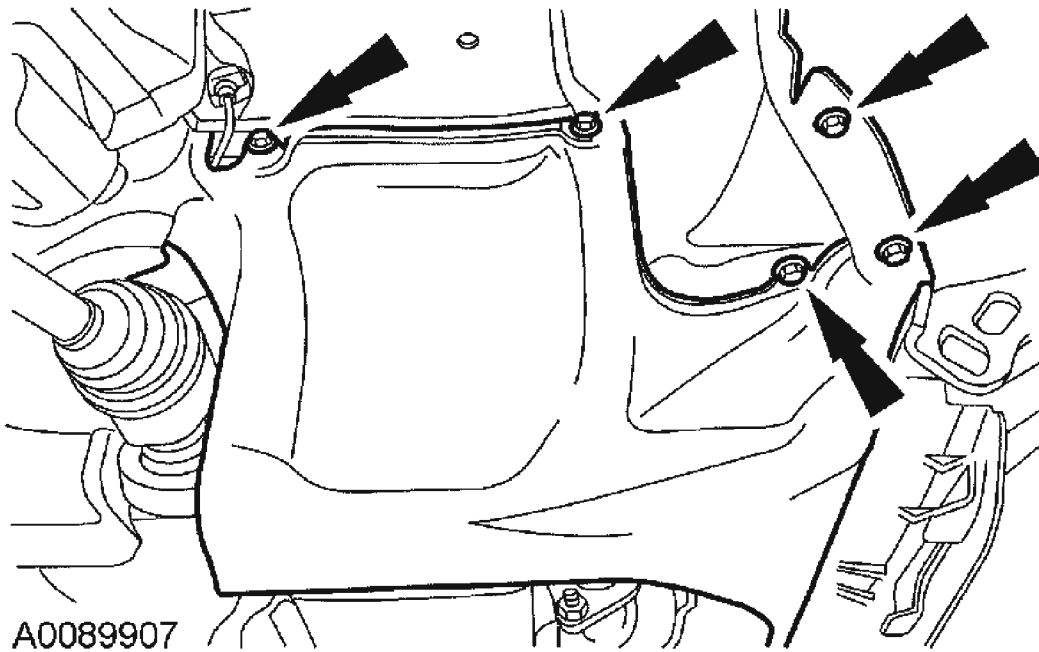
**Fig. 193: Locating Cross Brace & Bolts**  
Courtesy of FORD MOTOR CO.

16. Remove the 7 retainers and the LH splash shield.



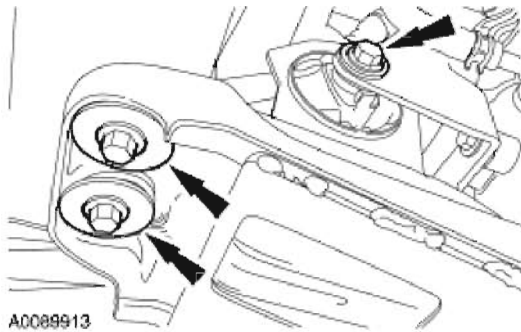
**Fig. 194: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

17. Remove the 5 retainers and the RH splash shield.



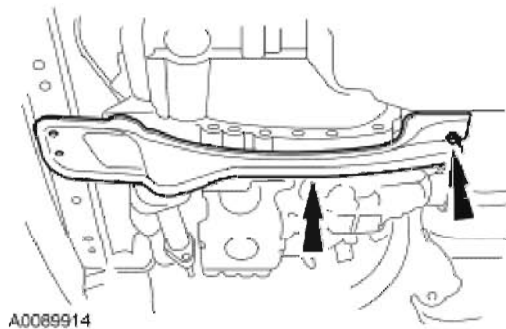
**Fig. 195: Removing Retainers And RH Splash Shield**  
Courtesy of FORD MOTOR CO.

18. Remove the bolt for the mount and the 2 bolts from the cross brace.



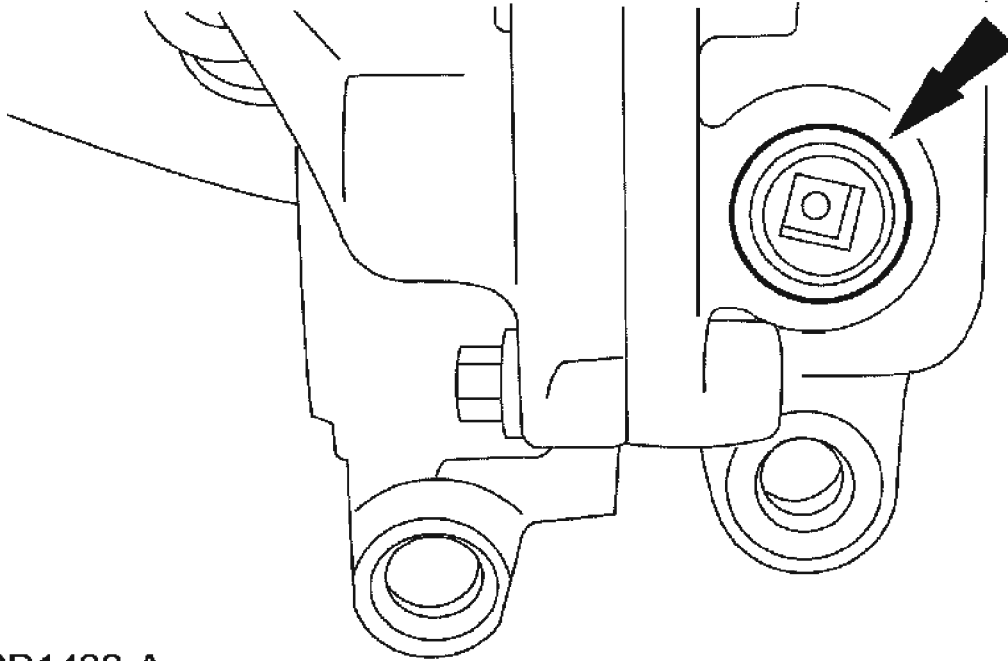
**Fig. 196: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**  
Courtesy of FORD MOTOR CO.

19. Remove the rear nut and the cross brace.



**Fig. 197: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

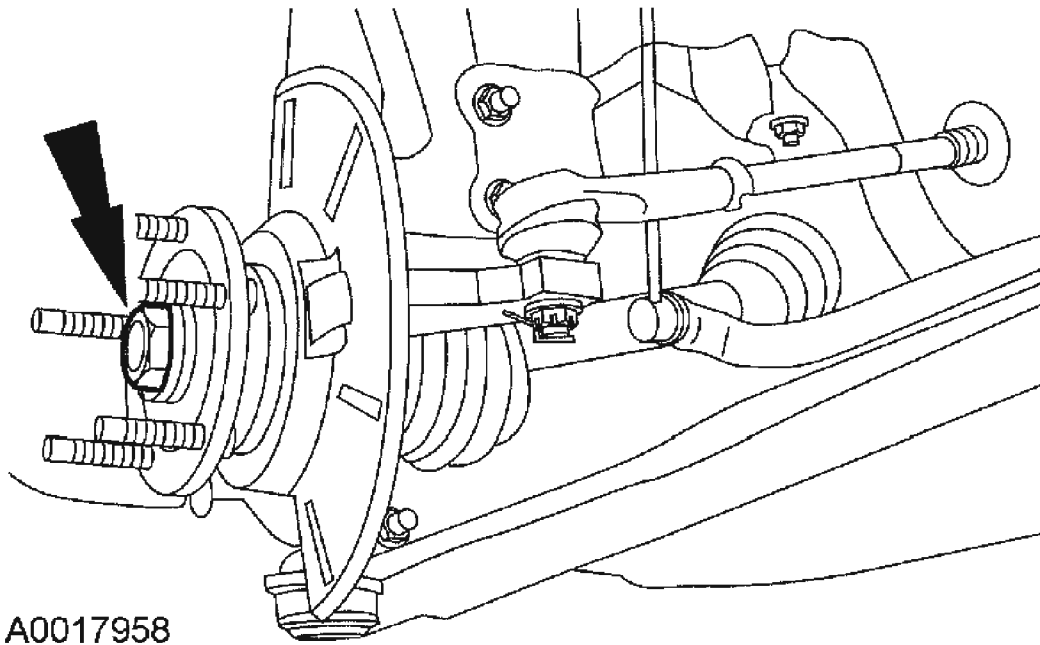
**NOTE:** If transmission disassembly or installation of a new transmission is necessary, the transmission fluid will need to be drained.



GD1438-A

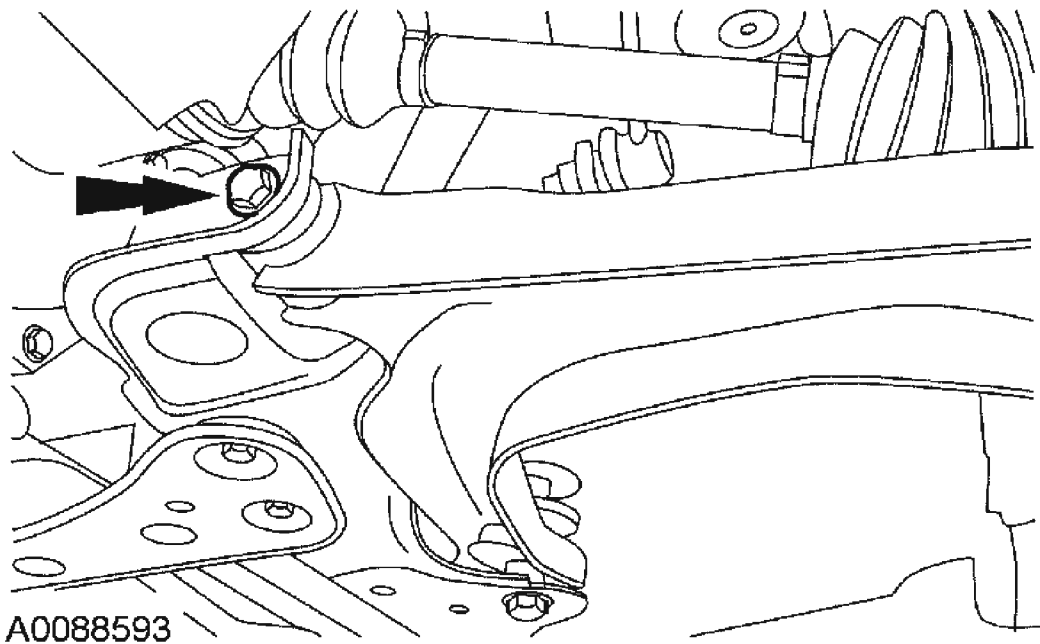
**Fig. 198: Identifying Transaxle Drain Plug**  
Courtesy of FORD MOTOR CO.

20. Remove the drain plug and drain the fluid.
21. Remove and discard the LH front axle wheel hub nut.



**Fig. 199: Removing LH Front Axle Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

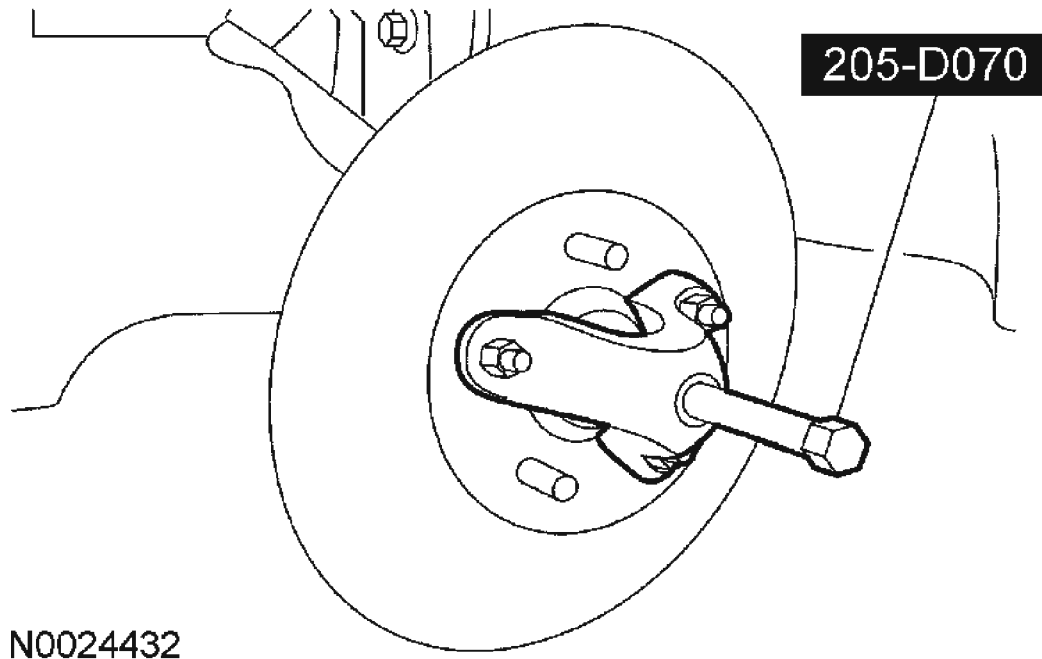
22. Remove the frame bolt from the LH and RH control arms.





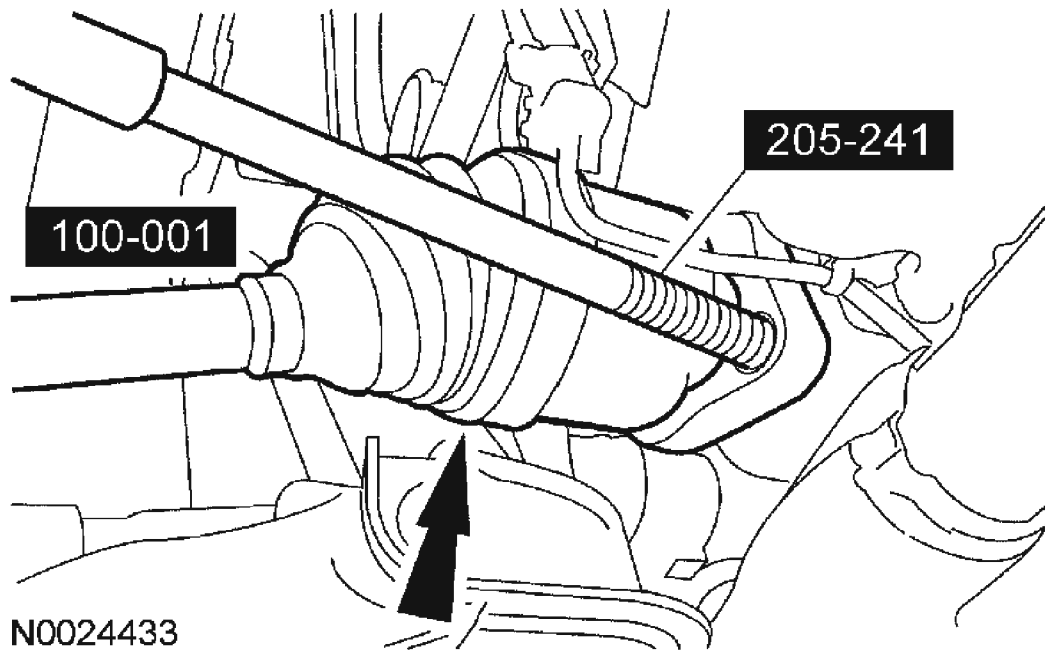
**Fig. 200: Removing Frame Bolt From LH And RH Control Arms**  
Courtesy of FORD MOTOR CO.

23. Using the special tool, separate the LH half shaft from the front wheel knuckle.



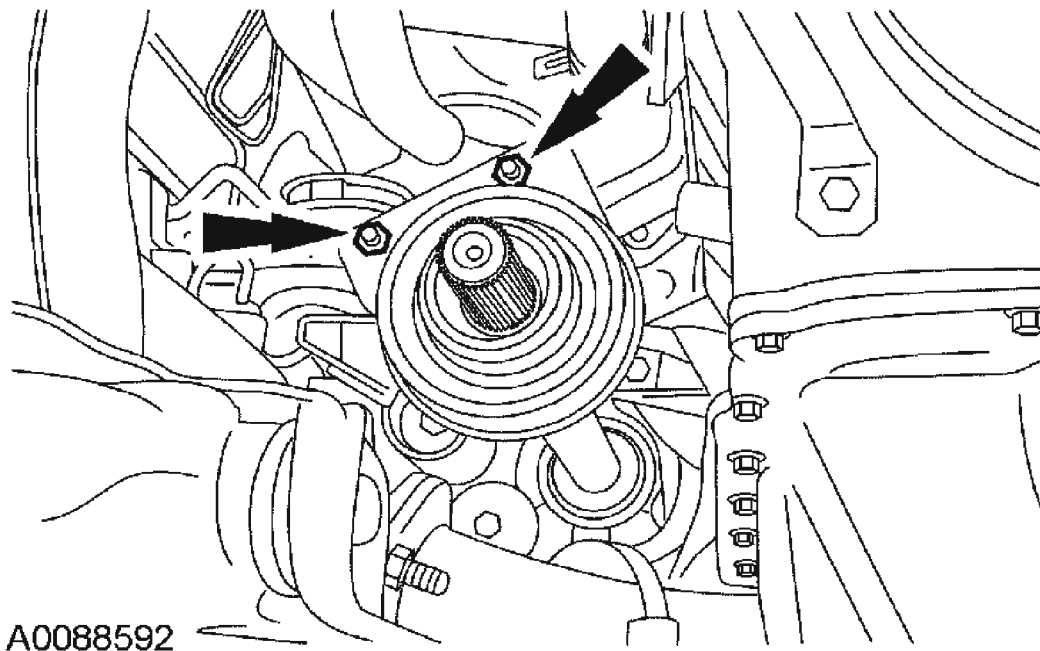
**Fig. 201: Separating LH Half Shaft From Front Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

24. Using the special tools, remove the LH halfshaft and disconnect the RH halfshaft from the intermediate shaft.



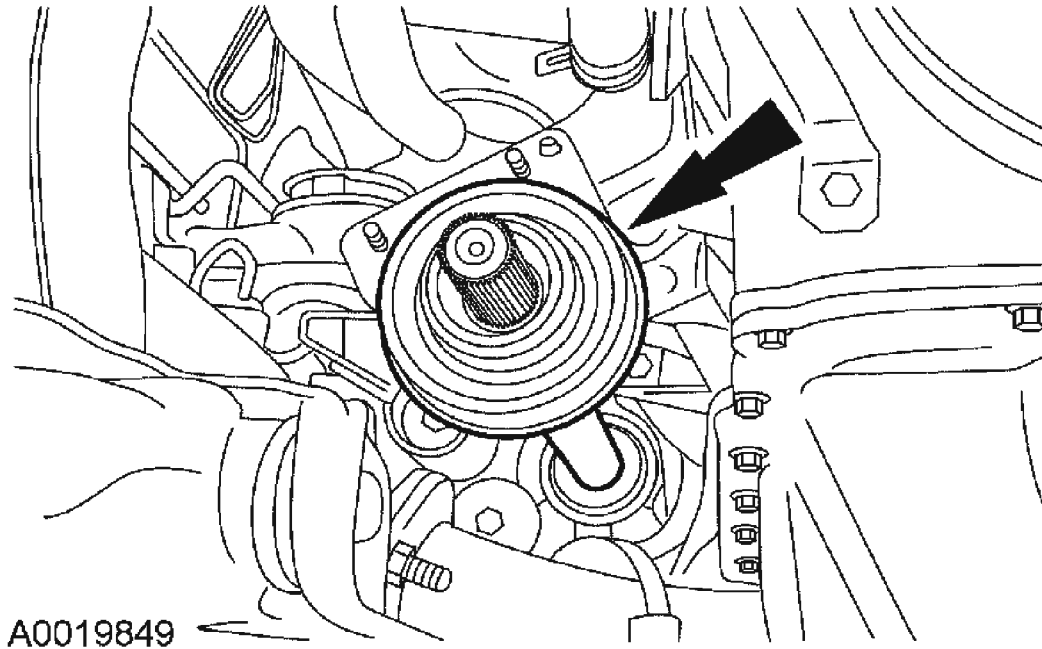
**Fig. 202: Removing LH Halfshaft**  
Courtesy of FORD MOTOR CO.

25. Remove the 2 intermediate shaft retaining nuts.



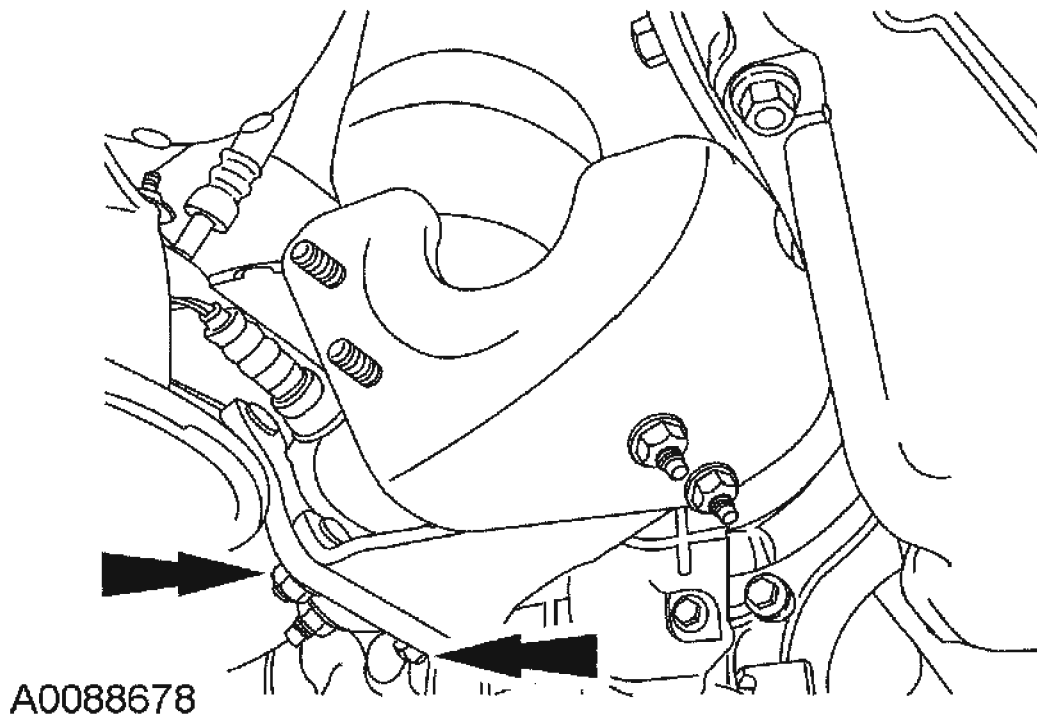
**Fig. 203: Removing Intermediate Shaft Retaining Nuts**  
Courtesy of FORD MOTOR CO.

26. Remove the intermediate shaft.



**Fig. 204: Removing Intermediate Shaft**  
Courtesy of FORD MOTOR CO.

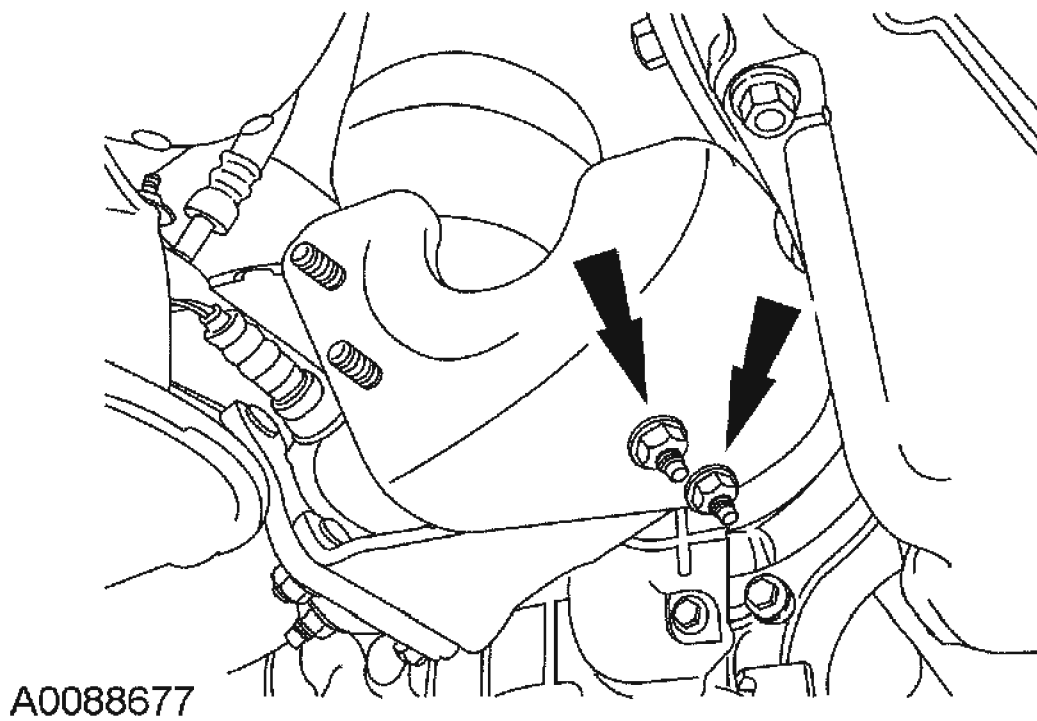
27. Remove the 2 bolts which hold the exhaust bracket to the intermediate shaft bracket.



**Fig. 205: Removing Bolts Which Hold Exhaust Bracket To Intermediate Shaft Bracket**

Courtesy of FORD MOTOR CO.

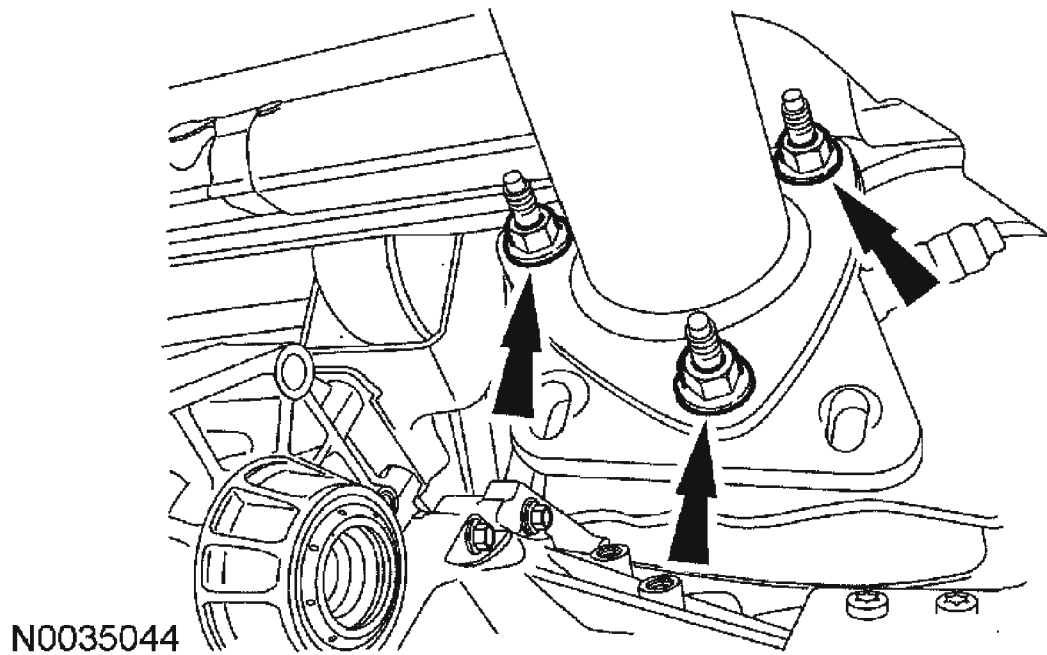
28. Remove the 2 nuts on the other end of the exhaust-to-intermediate shaft bracket and remove the bracket.



**Fig. 206: Removing Nuts On Other End Of Exhaust-To-Intermediate Shaft Bracket**

Courtesy of FORD MOTOR CO.

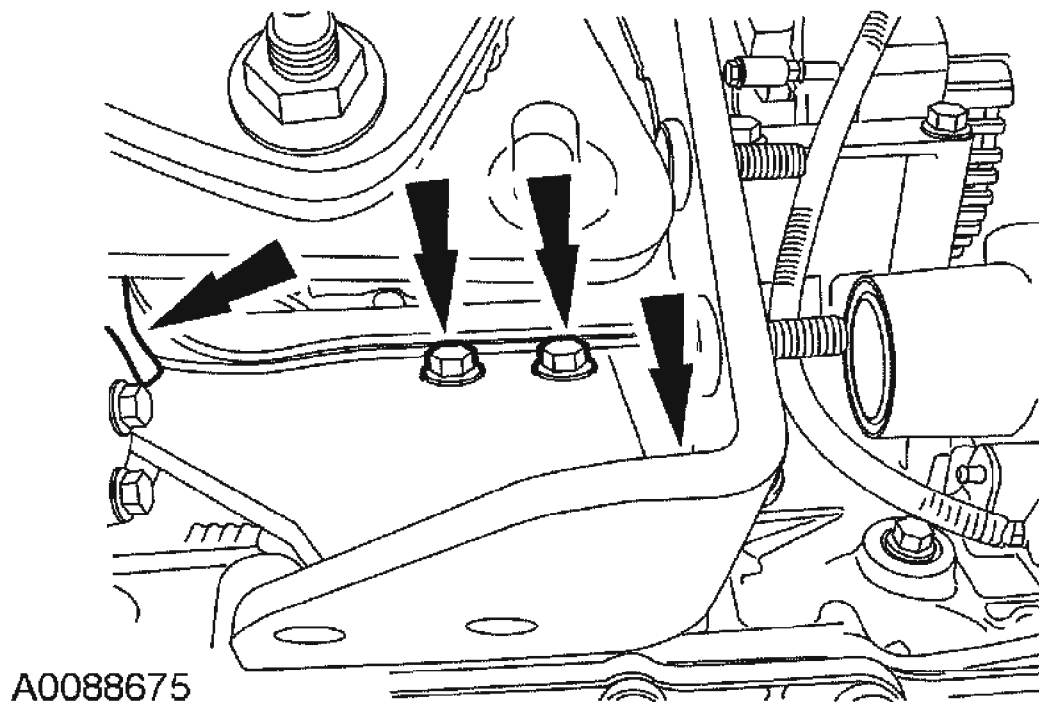
29. Remove the 3 nuts and separate the flexpipe from the exhaust manifold.



**Fig. 207: Separating Flexpipe From Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

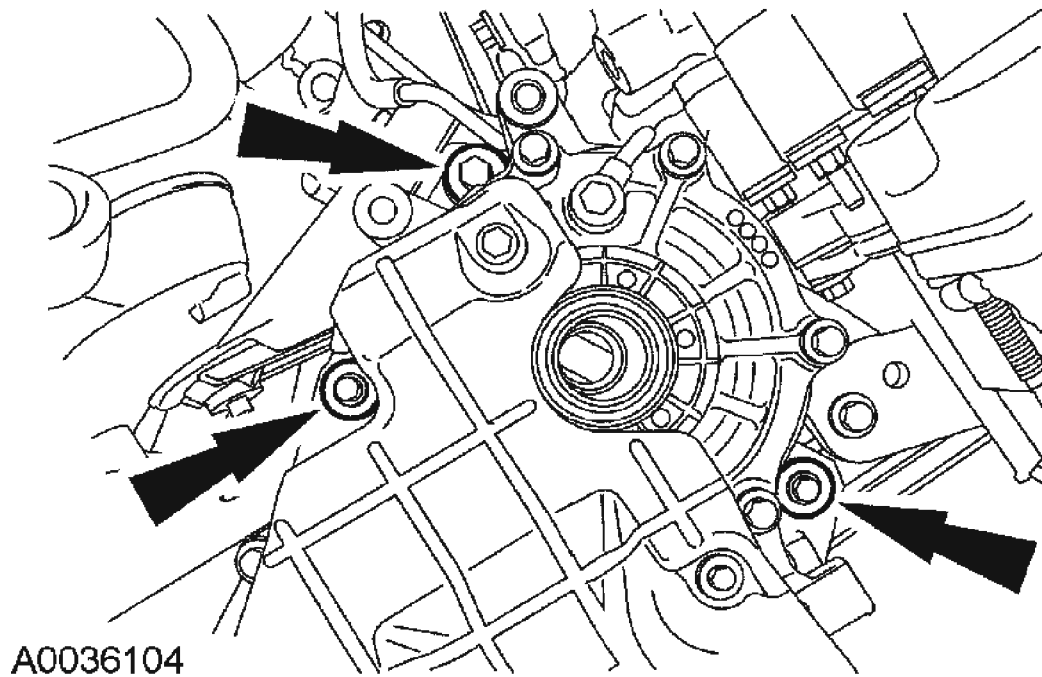
**4x4 vehicles**

30. Remove the 6 bolts holding the engine bracket to the PTO and remove the bracket.



**Fig. 208: Removing Bolts Holding Engine Bracket To PTO**  
Courtesy of FORD MOTOR CO.

31. Remove the 3 bolts and the PTO assembly.

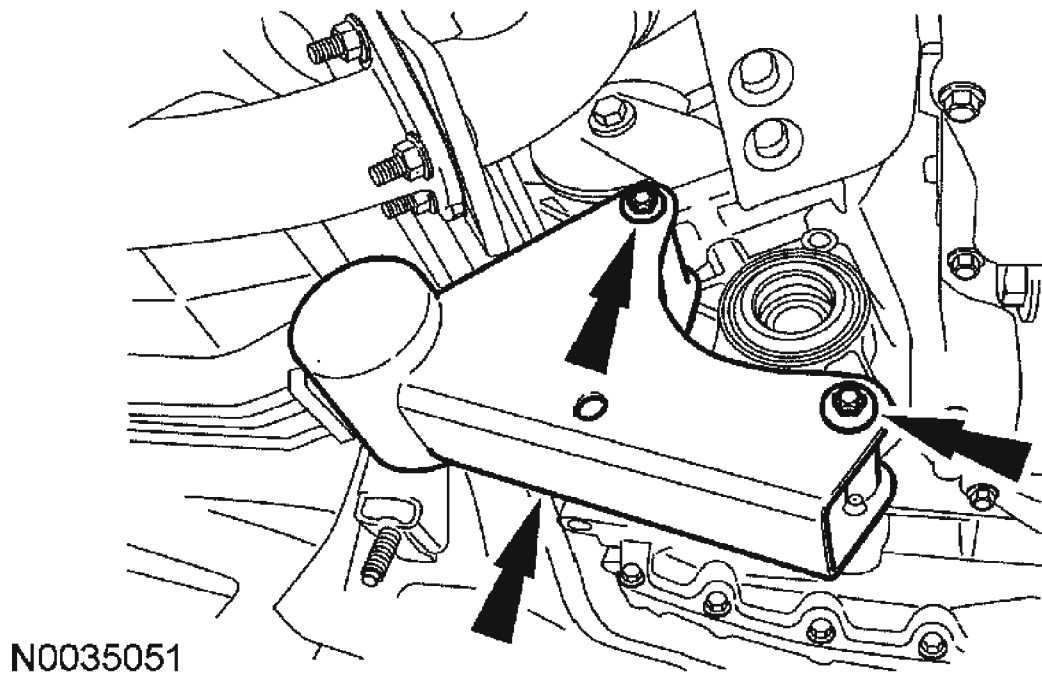


**Fig. 209: Removing Bolts And PTO Assembly**  
**Courtesy of FORD MOTOR CO.**

**4x2 vehicles**

32. Remove the 3 bolts and the dampener.

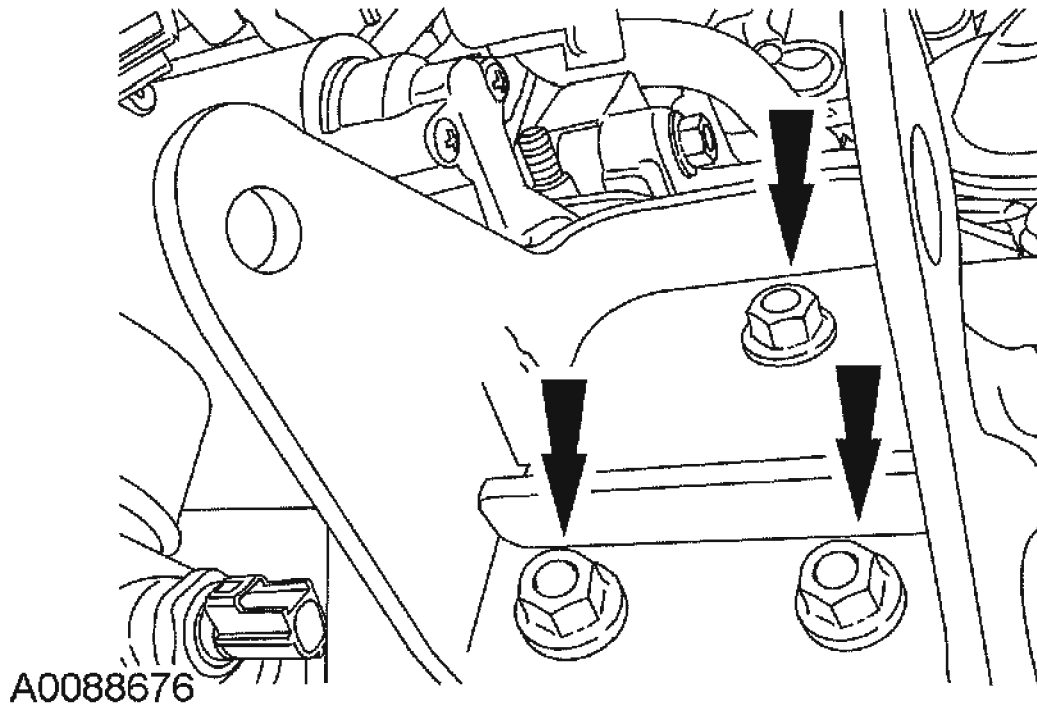




**Fig. 210: Removing Bolts And Dampener**  
**Courtesy of FORD MOTOR CO.**

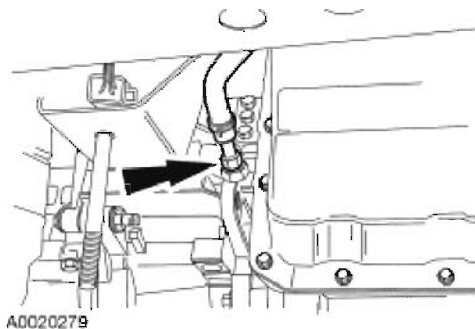
**All vehicles**

33. Remove the 3 bolts holding the transaxle front mount plate.



**Fig. 211: Removing Bolts Holding Transaxle Front Mount Plate**  
Courtesy of FORD MOTOR CO.

34. Remove the fluid cooler line.

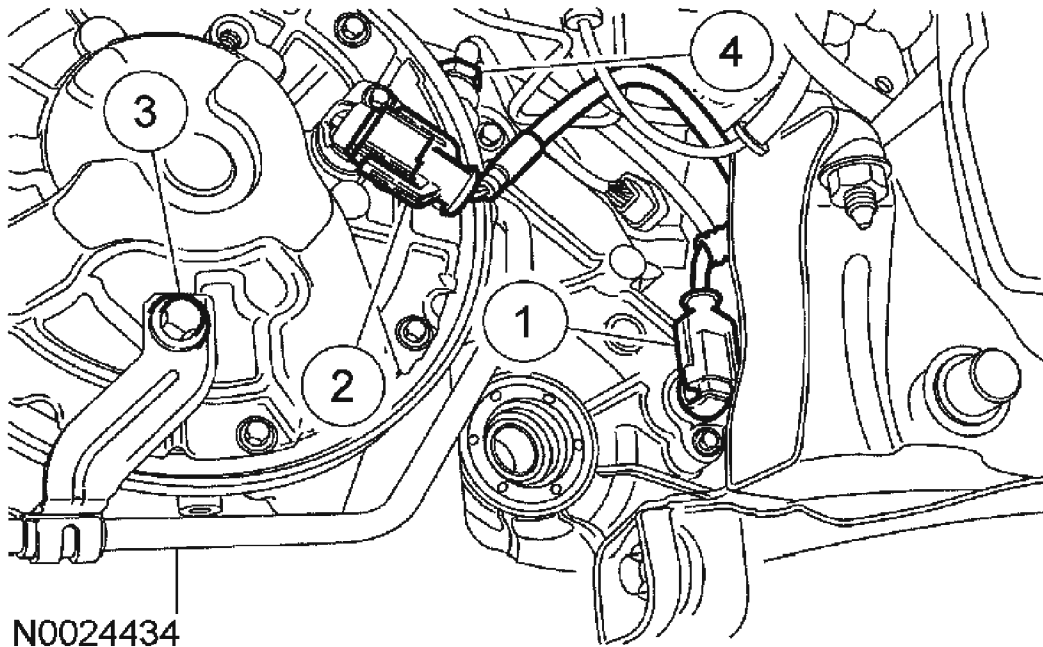


**Fig. 212: Locating Transmission Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

35. Remove the fluid cooler tube.

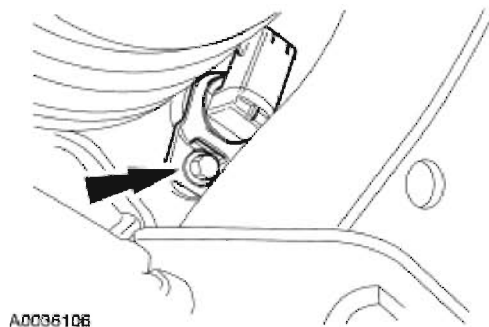
1. Disconnect the output shaft speed (OSS) sensor electrical connector (black).
2. Disconnect the turbine shaft speed (TSS) sensor electrical connector (white).
  - Disconnect the wiring harness retainer from the transmission case and position the harness aside.

3. Remove the transmission fluid cooler line retaining bracket bolt.
4. Remove the fluid cooler tube and position it aside.



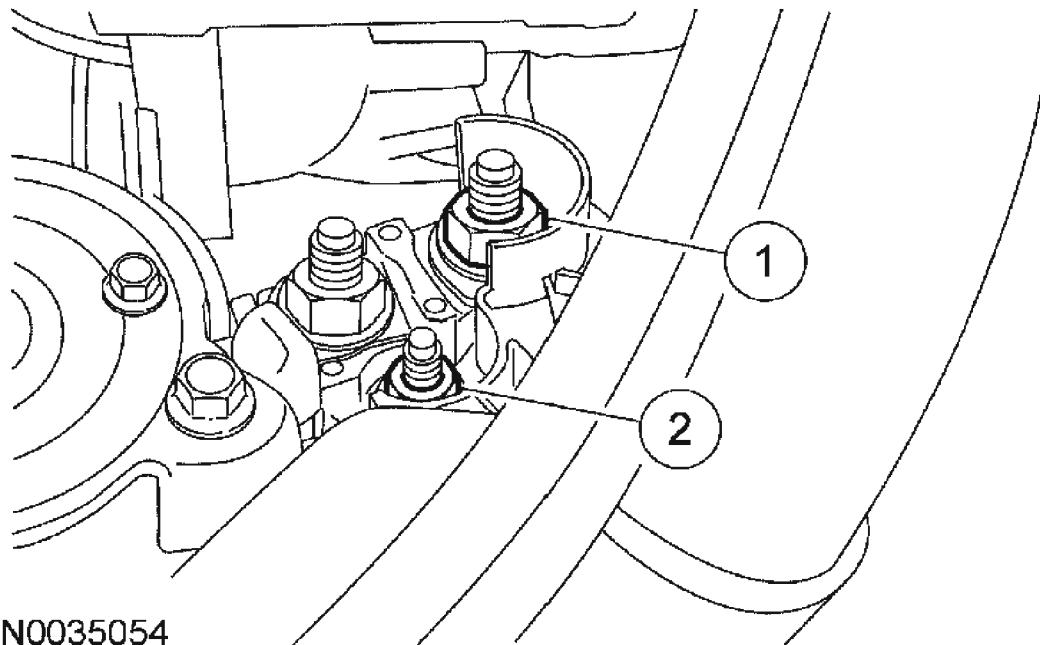
**Fig. 213: Disconnecting Output And Turbine Shaft Speed (TSS) Sensor Electrical Connector (White)**  
Courtesy of FORD MOTOR CO.

36. Remove the OSS sensor.



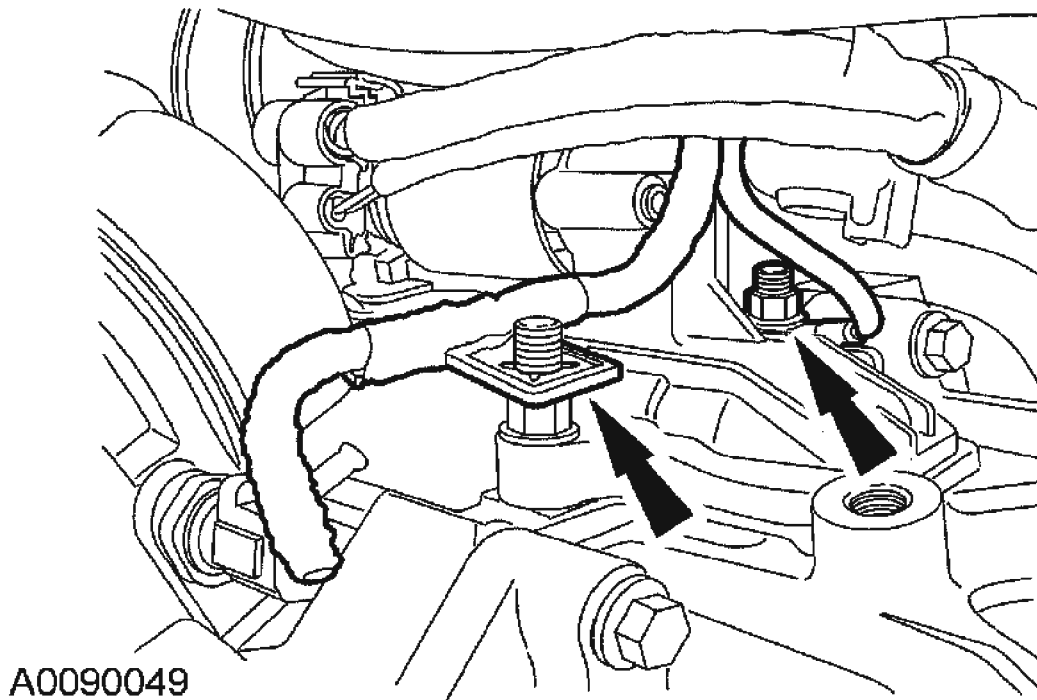
**Fig. 214: Locating OSS Sensor Bolt**  
Courtesy of FORD MOTOR CO.

37. Disconnect the starter terminals.
  1. Remove the battery cable nut.
  2. Remove the starter solenoid terminal nut.



**Fig. 215: Removing Starter Solenoid Terminal Nut**  
Courtesy of FORD MOTOR CO.

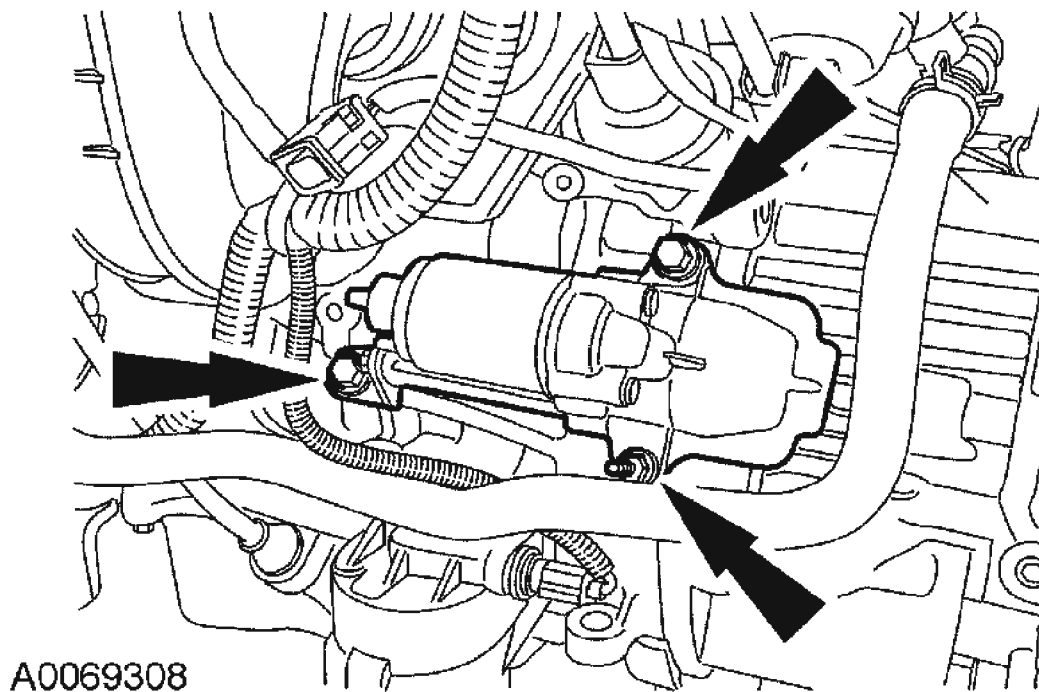
38. Remove the wire harness clip retainer and the ground wire from the starter bolts.



**Fig. 216: Removing Wire Harness Clip Retainer And Ground Wire From Starter Bolts**

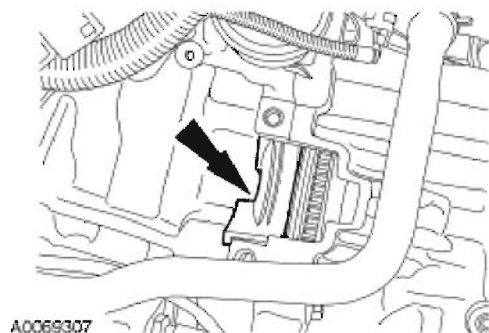
**Courtesy of FORD MOTOR CO.**

39. Remove the 3 bolts and remove the starter.



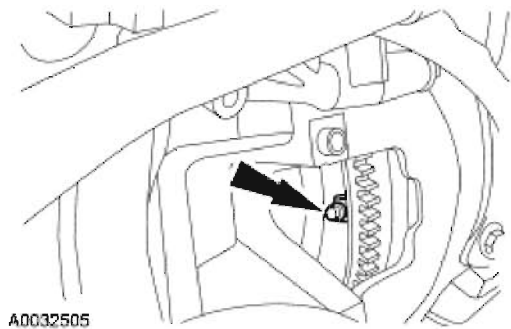
**Fig. 217: Removing Bolts And Starter**  
Courtesy of FORD MOTOR CO.

40. Remove the starter motor isolator.



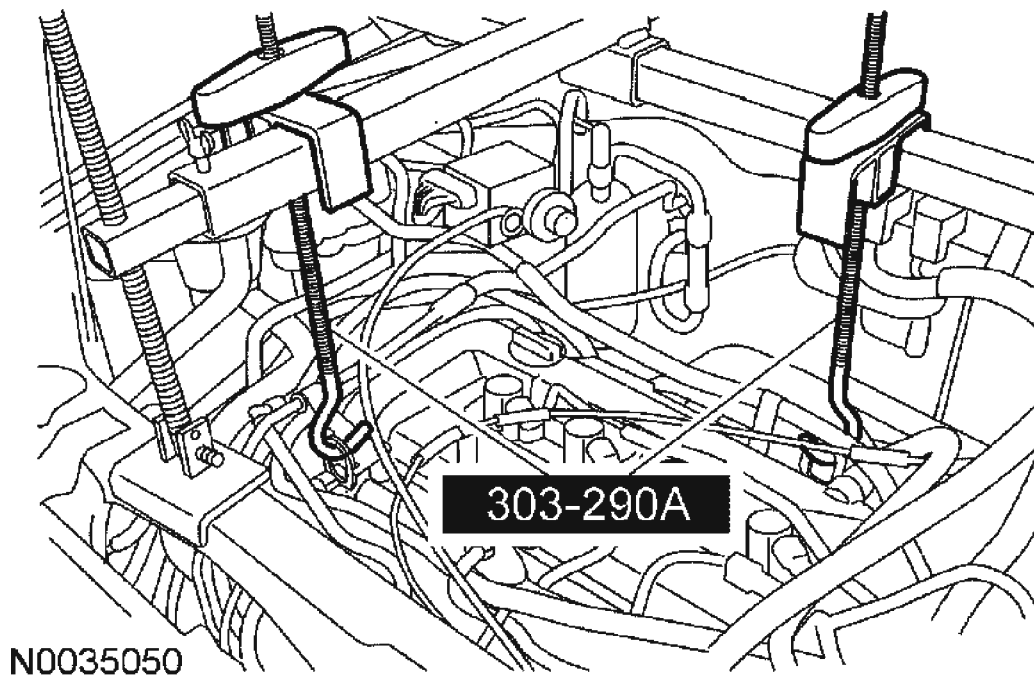
**Fig. 218: Identifying Starter Motor Isolator**  
Courtesy of FORD MOTOR CO.

41. Remove and discard the 4 torque converter nuts.



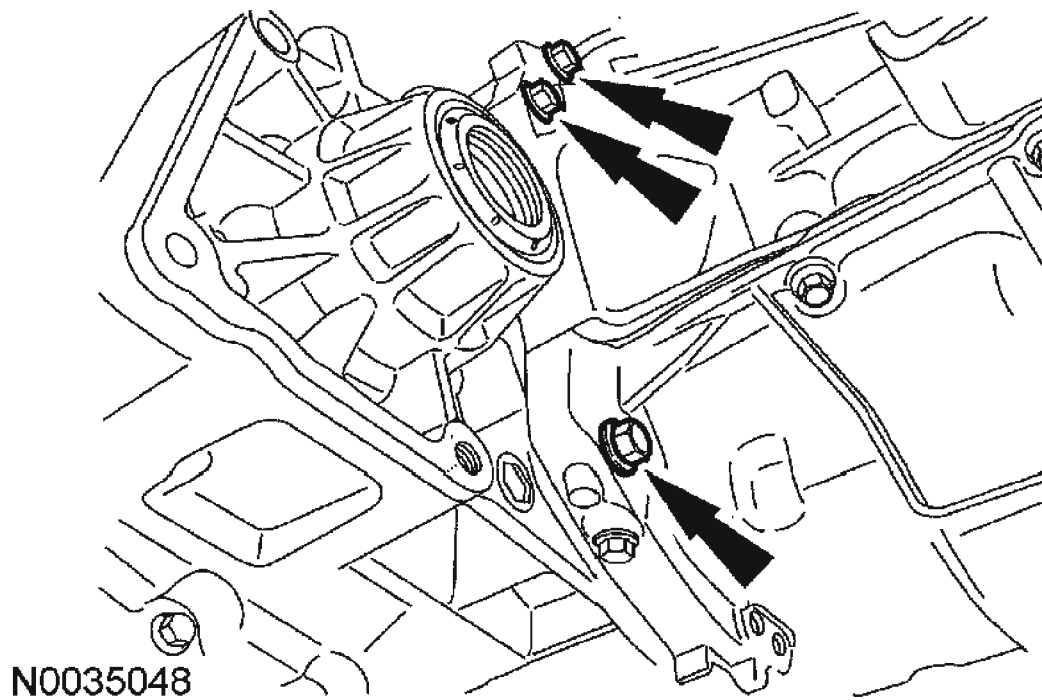
**Fig. 219: Locating Torque Converter Nut**  
Courtesy of FORD MOTOR CO.

42. Using the special tool, lower the transmission.



**Fig. 220: Lowering Transmission**  
Courtesy of FORD MOTOR CO.

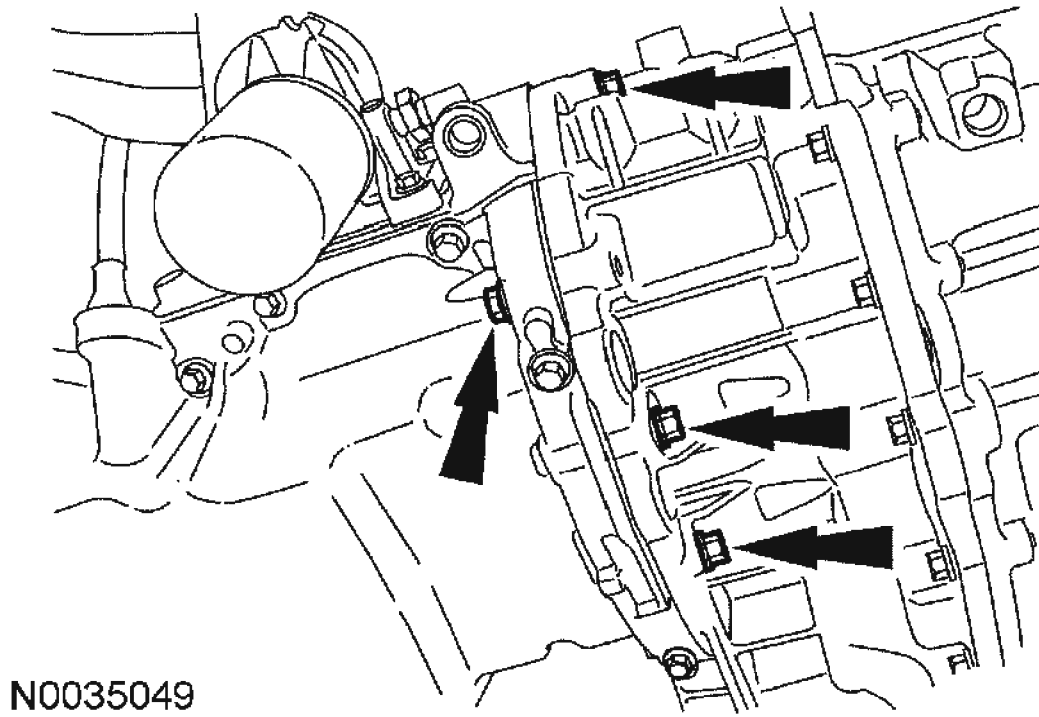
43. Push the converter back from the flexplate. Use a suitable transmission jack to support the transaxle and remove the 3 rear bellhousing bolts.



**Fig. 221: Removing Rear Bellhousing Bolts**  
Courtesy of FORD MOTOR CO.

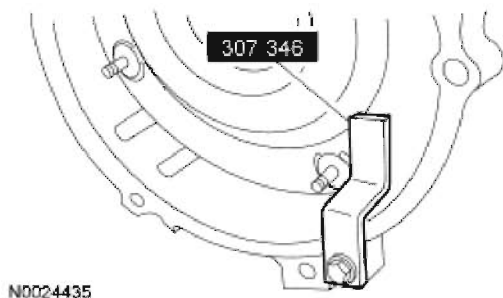
44. Remove the 4 remaining transaxle-to-engine bolts.





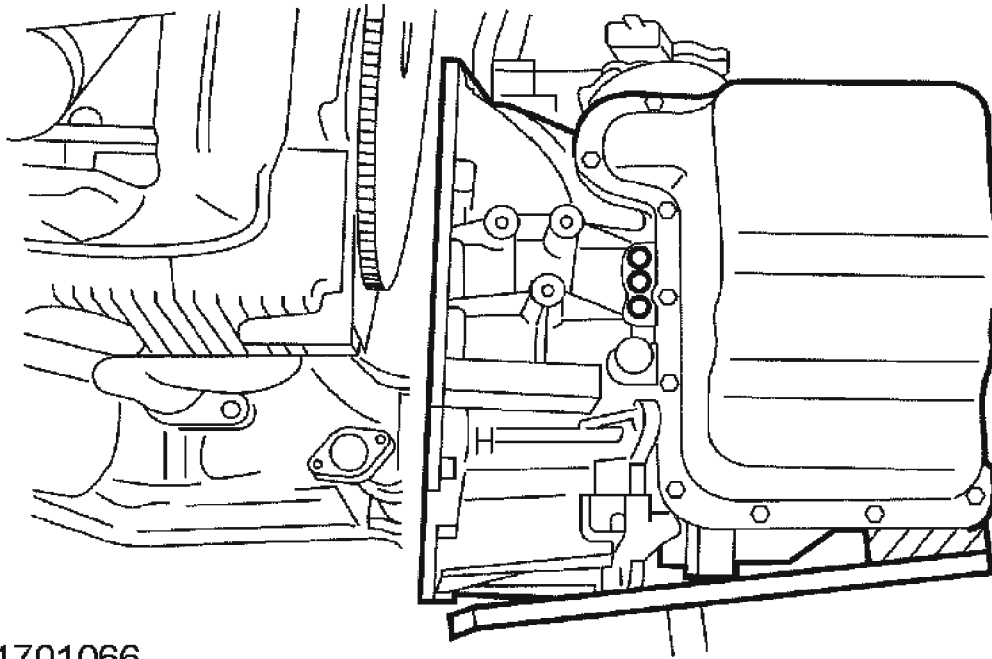
**Fig. 222: Removing Remaining Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The torque converter is heavy. Install the special tool before lowering the transaxle.



**Fig. 223: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

45. Move the transaxle back far enough to install the special tool.
46. Lower the transaxle from the engine compartment.



M1701066

**Fig. 224: Lowering Transaxle From Engine Compartment**  
Courtesy of FORD MOTOR CO.

TRANSAXLE - 3.0L

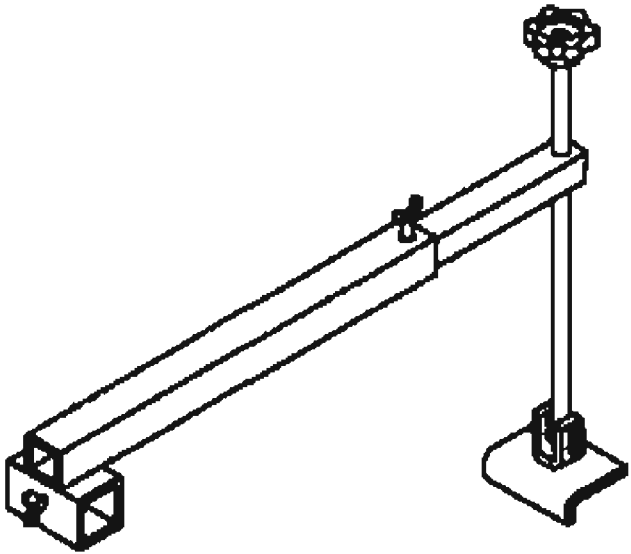
Special Tool(s)

**SPECIAL TOOLS DESCRIPTION**

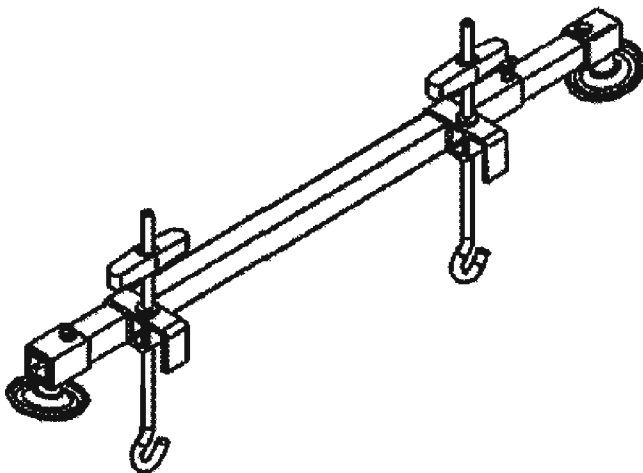
	Adapter for 303-290-A (Support Leg) 303-290A-03A
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## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2379-A**

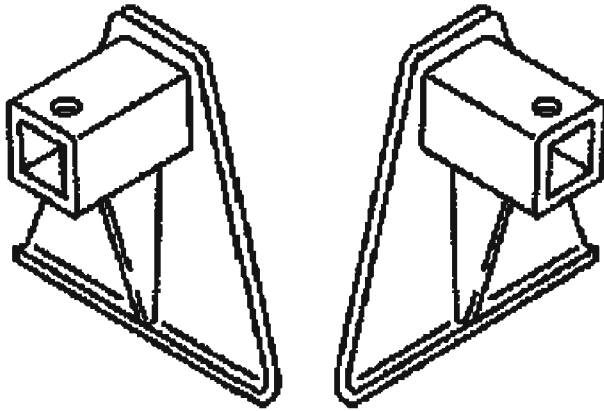


**ST2363-A**

Support Bar, Engine 303-290A

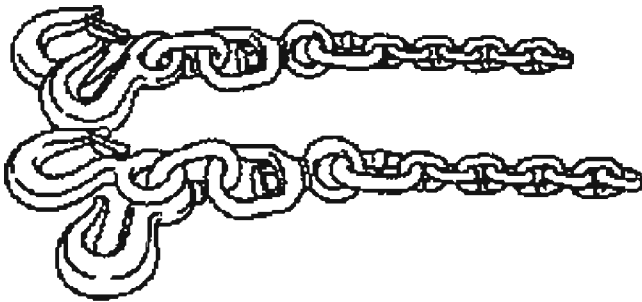
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Adapters for 303-290 303-290A-01

**ST2378-A**



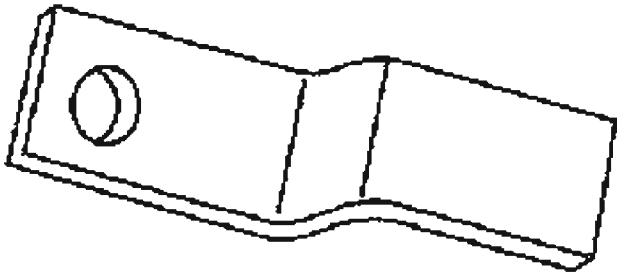
Engine Lifting Chains (Part of  
Spreader Bar) 303-D089 (D93P-  
6001-A3) or equivalent

**ST2524-A**

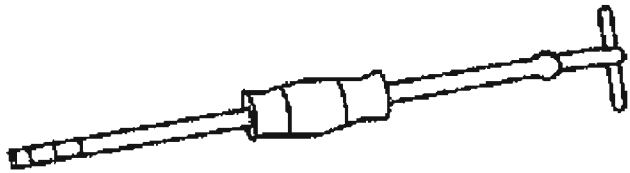
Retainer, Torque Converter 307-346  
(T97T-7902-A)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1636-A**



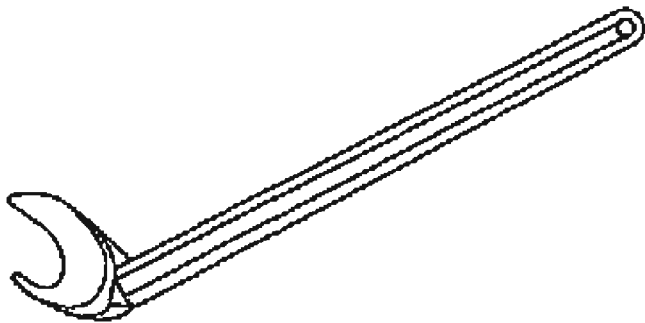
**ST1185-A**

Slide Hammer 100-001 (T50T-100-A)

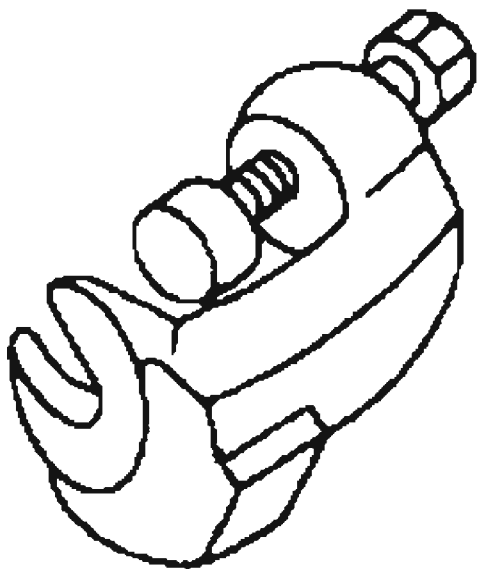
Remover, Halfshaft 205-241 (T86P-3541-A)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1582-A**



**ST1408-A**

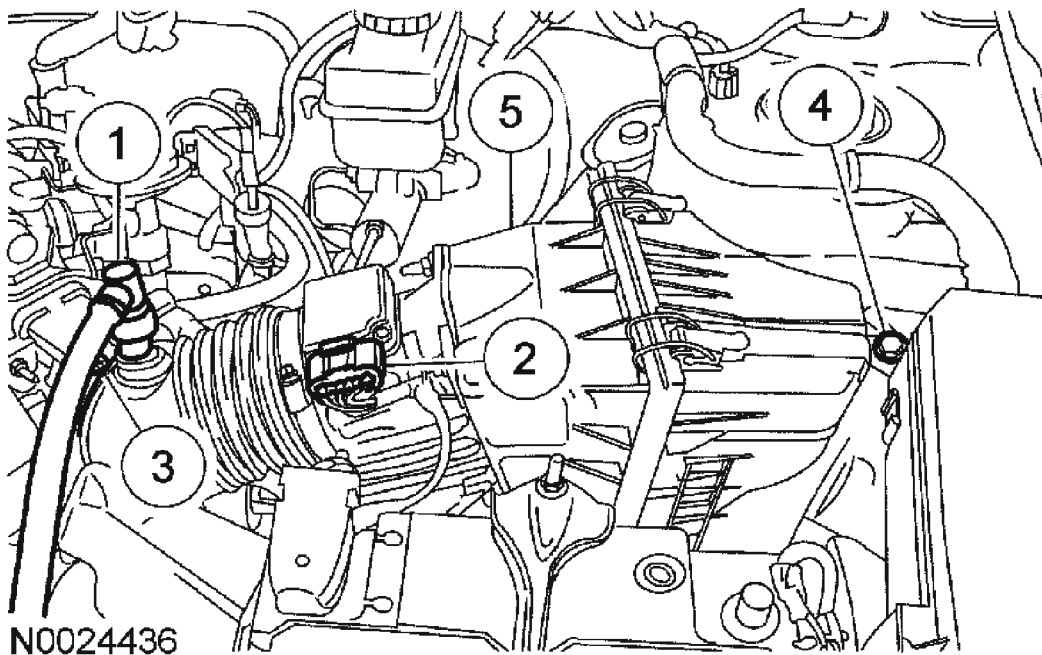
Tie Rod End Remover 211-105  
(T85M-3395-A)

### Removal

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

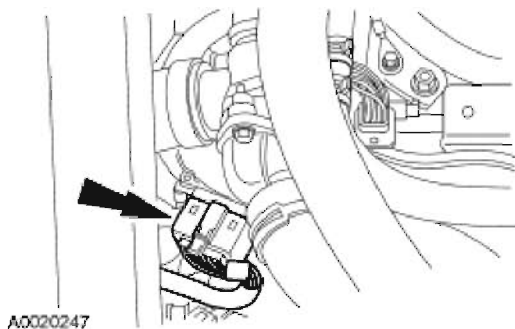
**BATTERY, MOUNTING AND CABLES .**

3. Remove the air cleaner as an assembly.
  1. Disconnect the breather tube.
  2. Disconnect the mass air flow (MAF) sensor electrical connector.
  3. Remove the air intake tube.
  4. Remove the air cleaner assembly retaining bolt.
  5. Remove the air cleaner assembly.



**Fig. 225: Removing Air Cleaner As Assembly**  
Courtesy of FORD MOTOR CO.

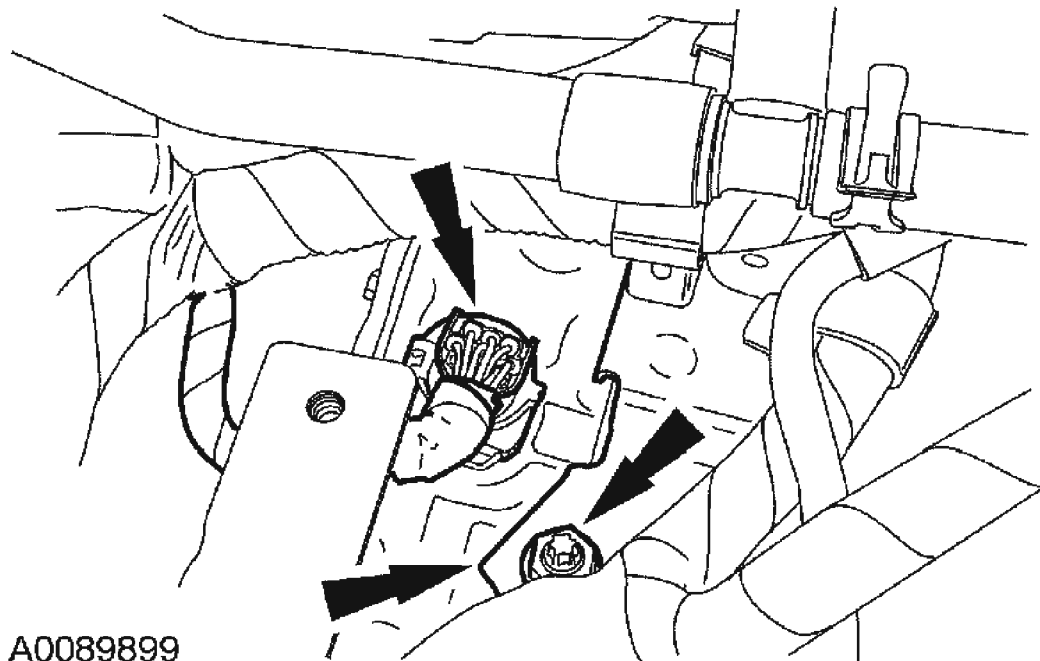
4. Disconnect the transmission range (TR) sensor.



**Fig. 226: Locating Transmission Range (TR) Sensor Electrical Connector**

Courtesy of FORD MOTOR CO.

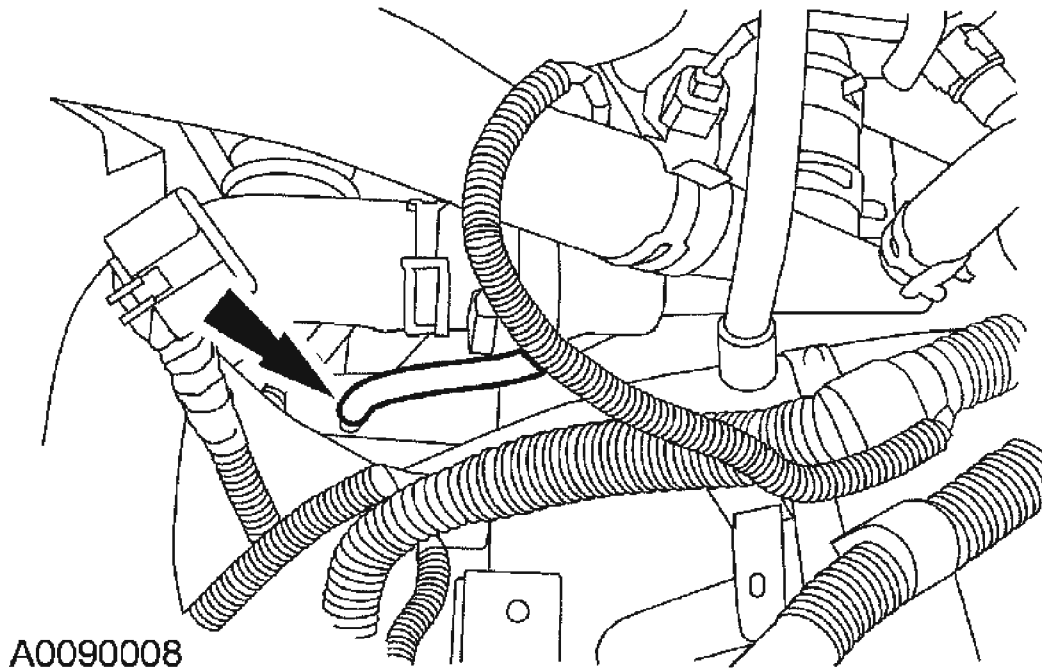
5. Disconnect the transaxle harness connector, remove the wire harness bracket nut and position the harness bracket aside.



**Fig. 227: Disconnecting Transaxle Harness Connector**  
Courtesy of FORD MOTOR CO.

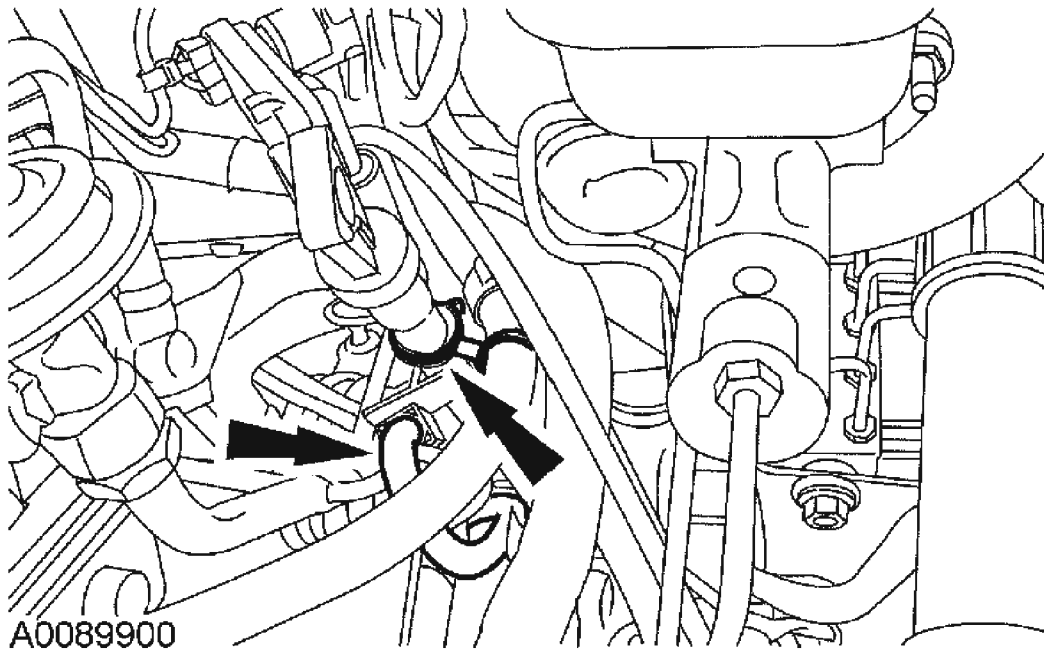
6. Remove the main control cover vent tube.





**Fig. 228: Removing Main Control Cover Vent Tube**  
Courtesy of FORD MOTOR CO.

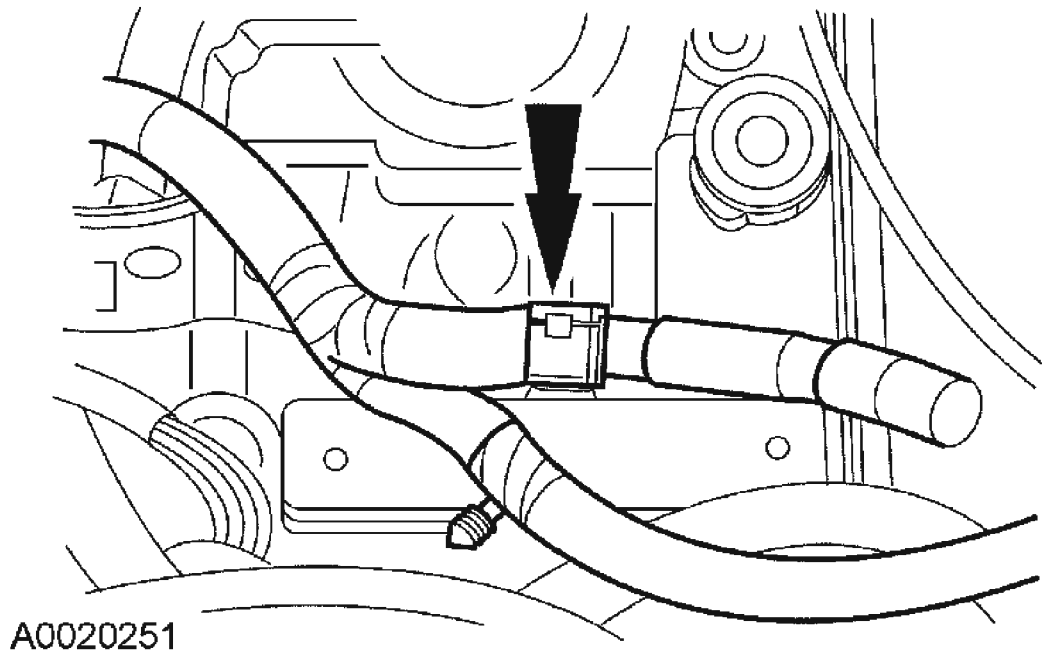
7. Disconnect the EVAP and power takeoff (PTO) vent hoses from the transmission filler tube.



**Fig. 229: Disconnecting EVAP And Power Takeoff (PTO) Vent Hoses From Transmission Filler Tube**

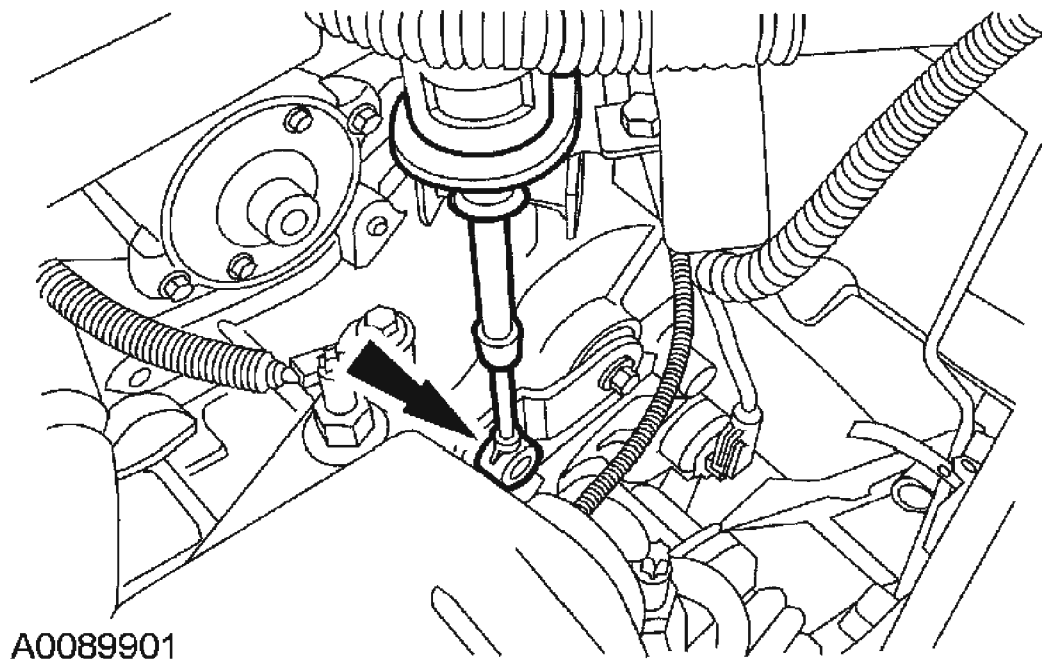
**Courtesy of FORD MOTOR CO.**

8. Disconnect the wire harness from the battery tray hold-down bracket.



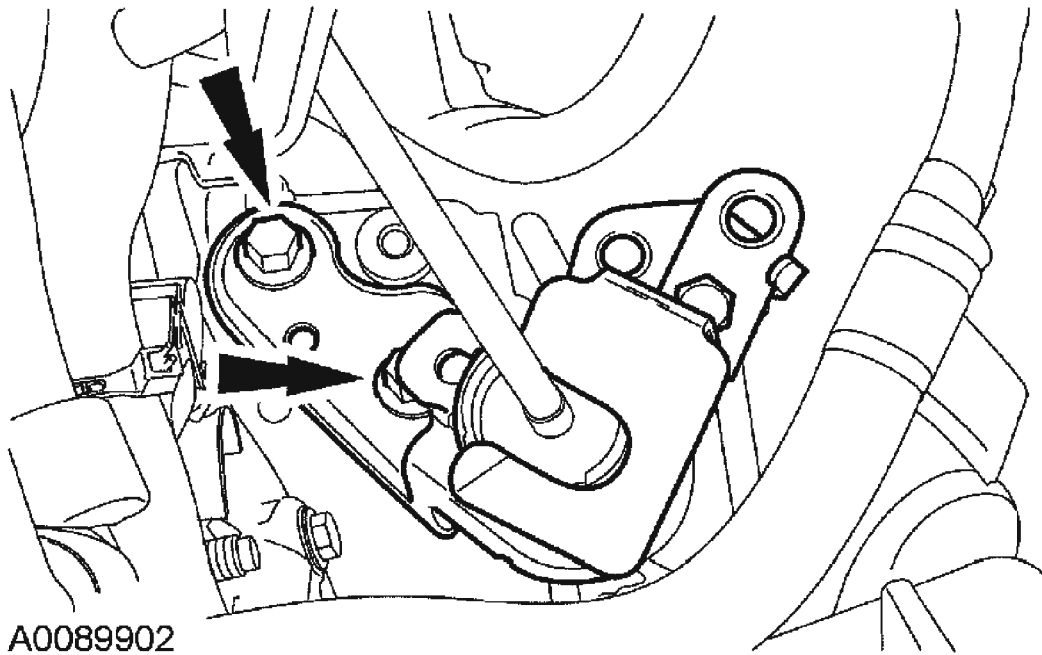
**Fig. 230: Disconnecting Wire Harness From Battery Tray Hold-Down Bracket**  
Courtesy of FORD MOTOR CO.

9. Disconnect the shift cable from the manual lever.



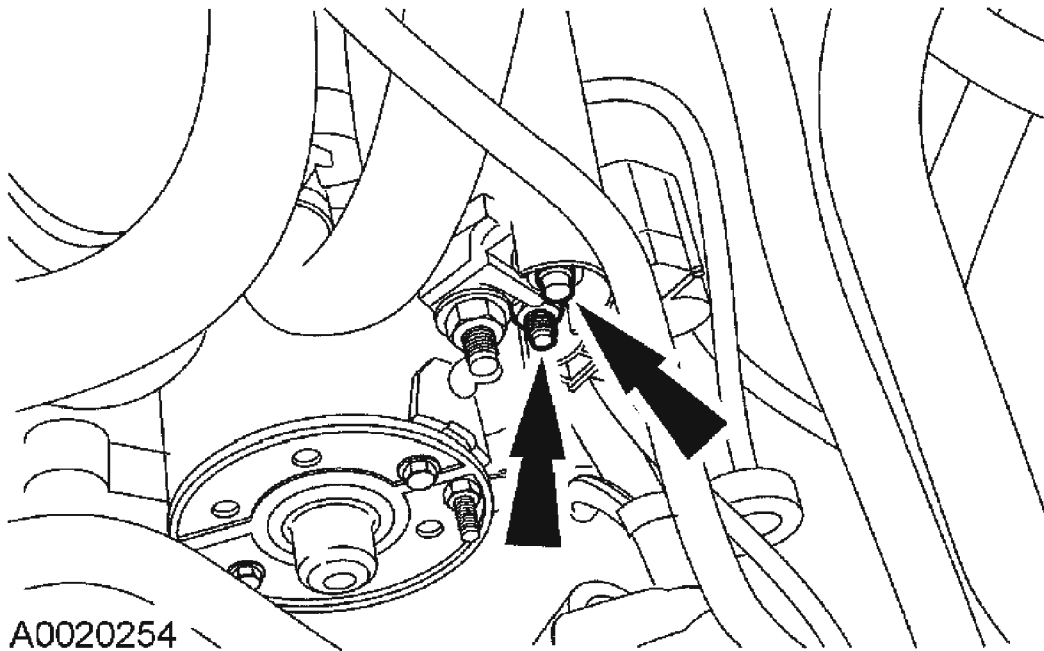
**Fig. 231: Disconnecting Shift Cable From Manual Lever**  
Courtesy of FORD MOTOR CO.

10. Remove the 2 retaining bolts from the shift cable bracket, and position the cable and bracket aside.



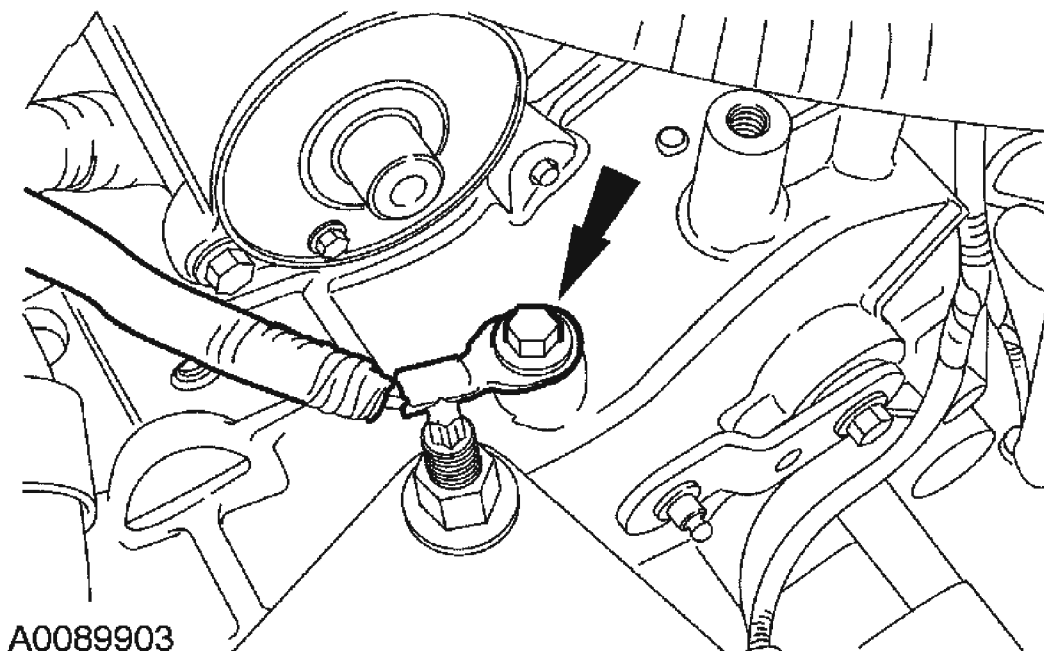
**Fig. 232: Removing Retaining Bolts From Shift Cable Bracket**  
Courtesy of FORD MOTOR CO.

11. Disconnect the starter motor harness connector.



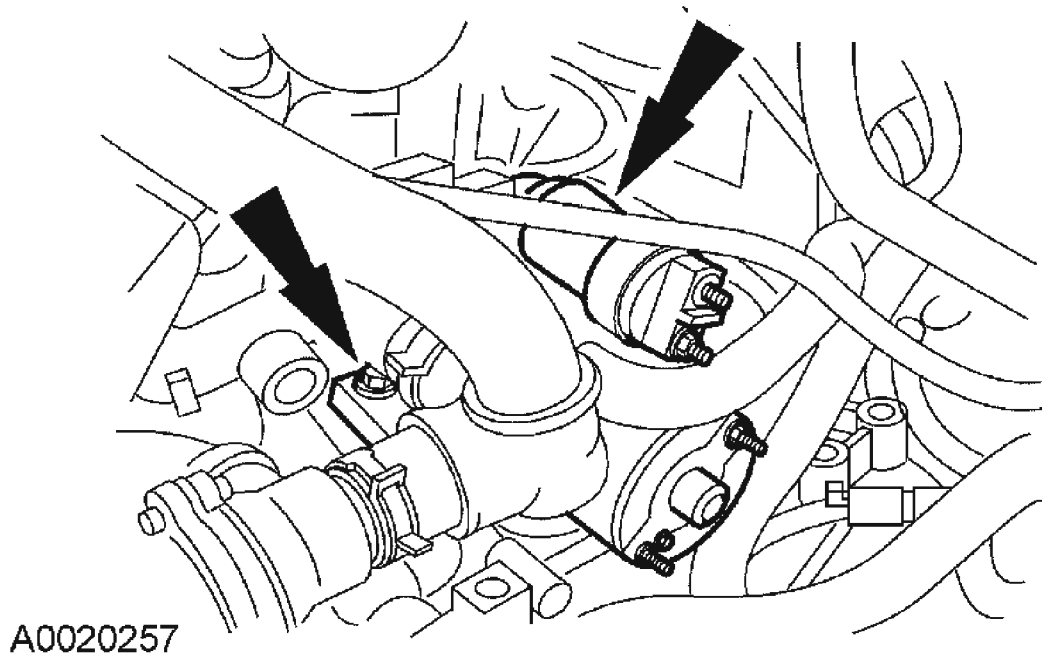
**Fig. 233: Disconnecting Starter Motor Harness Connector**  
Courtesy of FORD MOTOR CO.

12. Disconnect the ground wire.



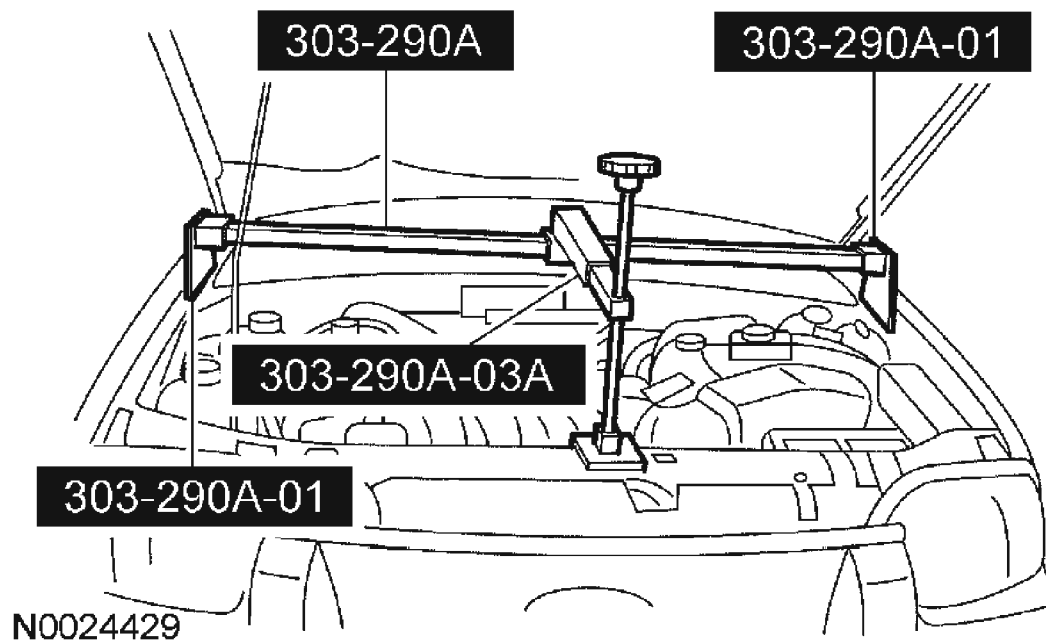
**Fig. 234: Disconnecting Ground Wire**  
Courtesy of FORD MOTOR CO.

13. Remove the 2 starter bolts and remove the starter motor.



**Fig. 235: Removing Starter Bolts And Starter Motor**  
Courtesy of FORD MOTOR CO.

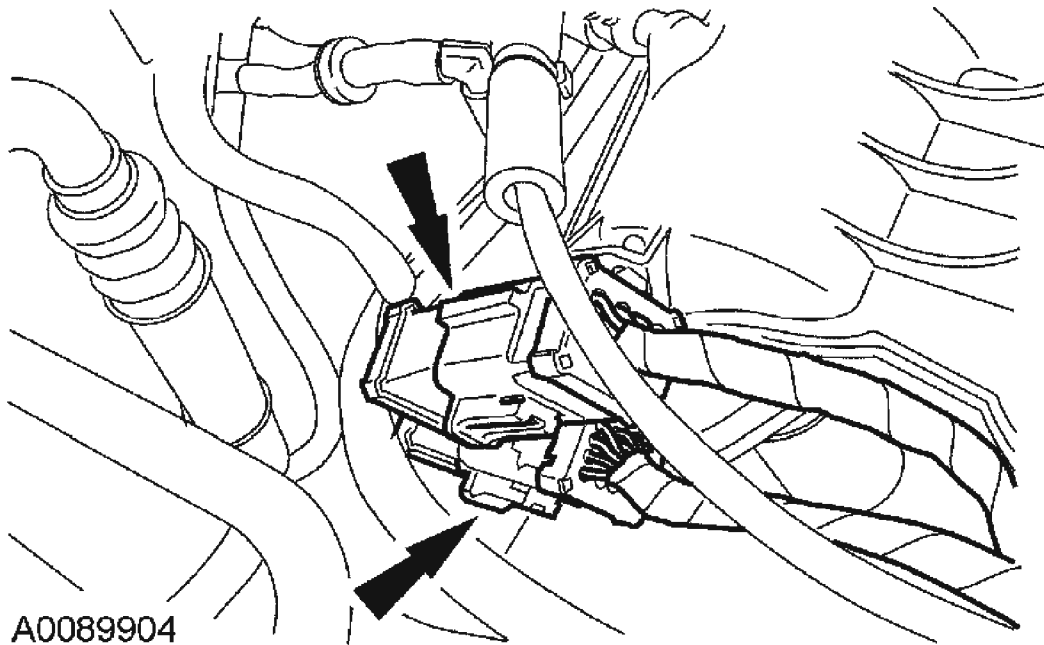
14. Install the special tools.



**Fig. 236: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

15. Remove and disconnect both electrical connectors from the upper intake to gain access to the engine for installing the lifting bracket.

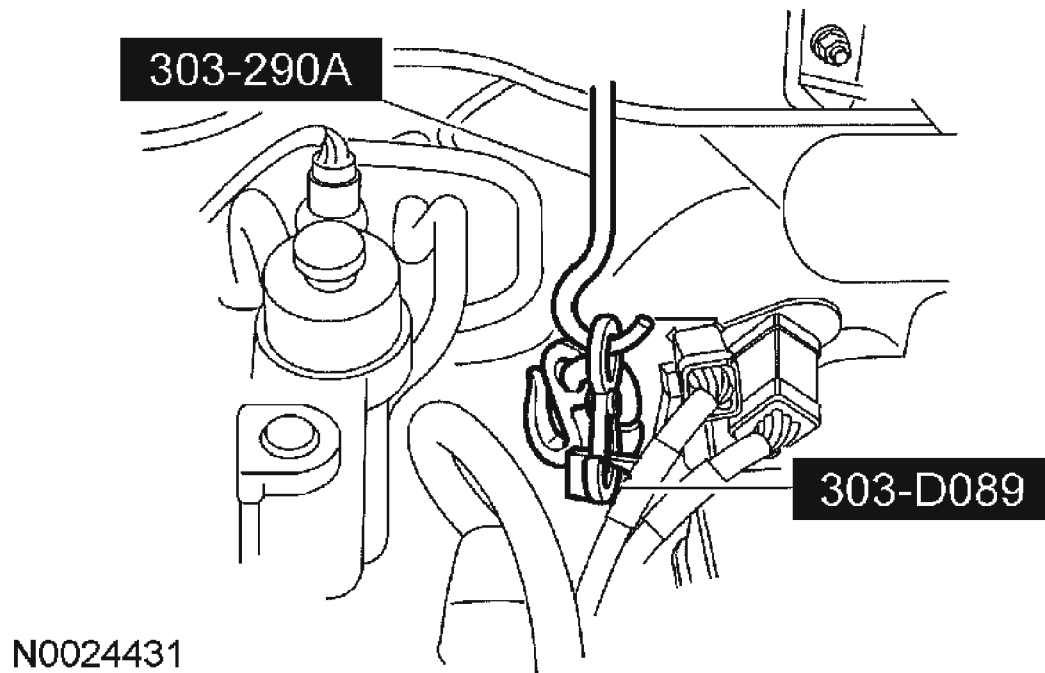




**Fig. 237: Disconnecting Electrical Connectors From Upper Intake To Gain Access To Engine**

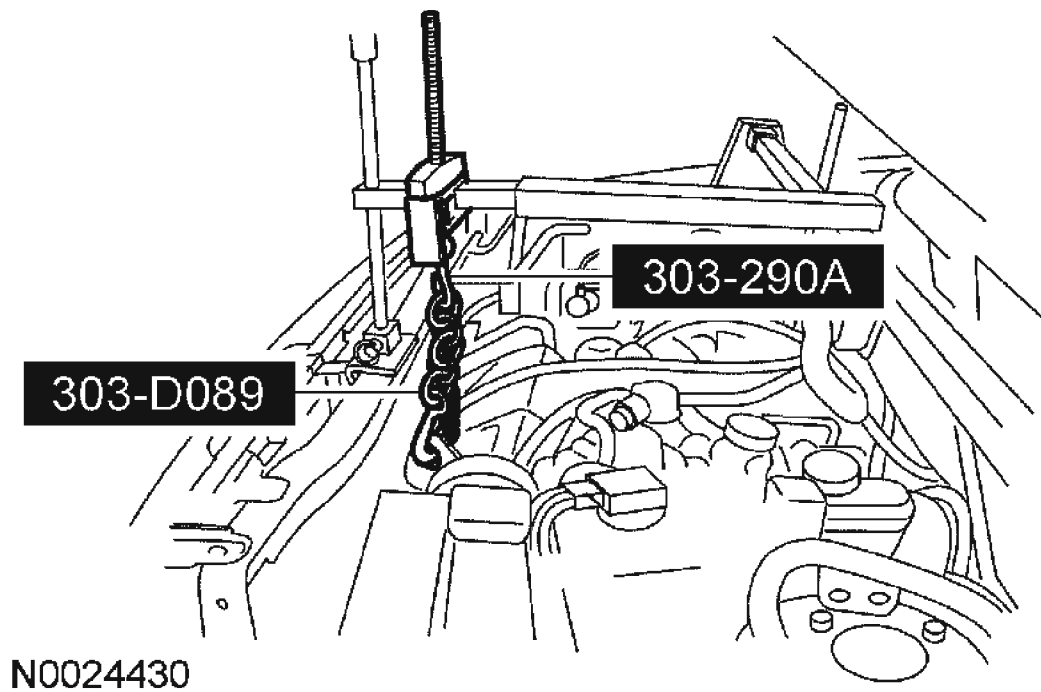
**Courtesy of FORD MOTOR CO.**

16. Install the special tools.



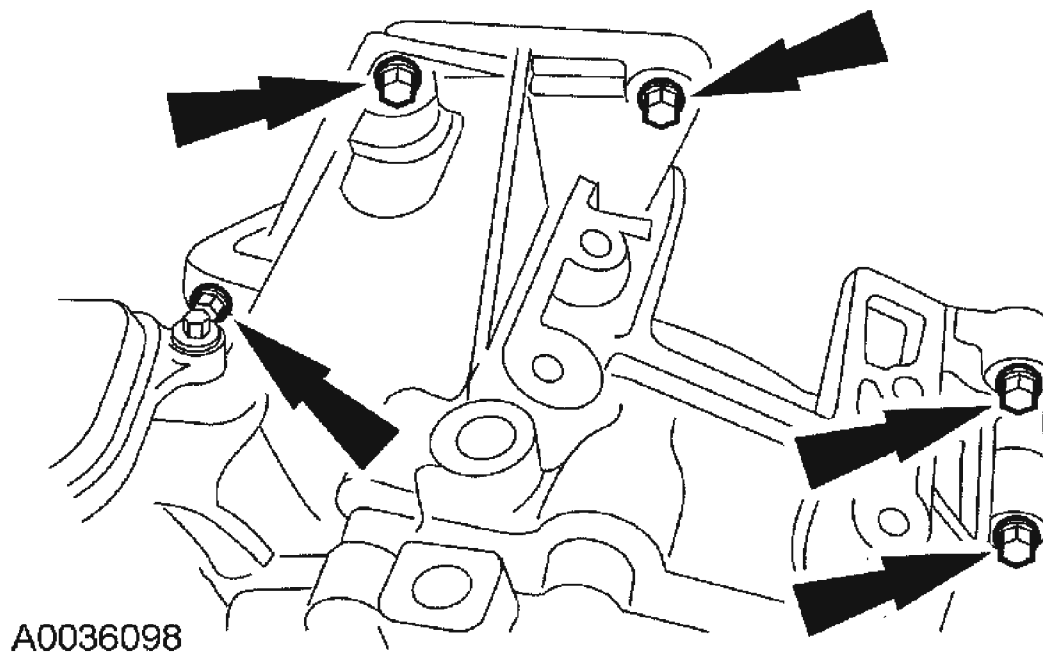
**Fig. 238: Installing Special Tools**  
**Courtesy of FORD MOTOR CO.**

17. Install the special tools.



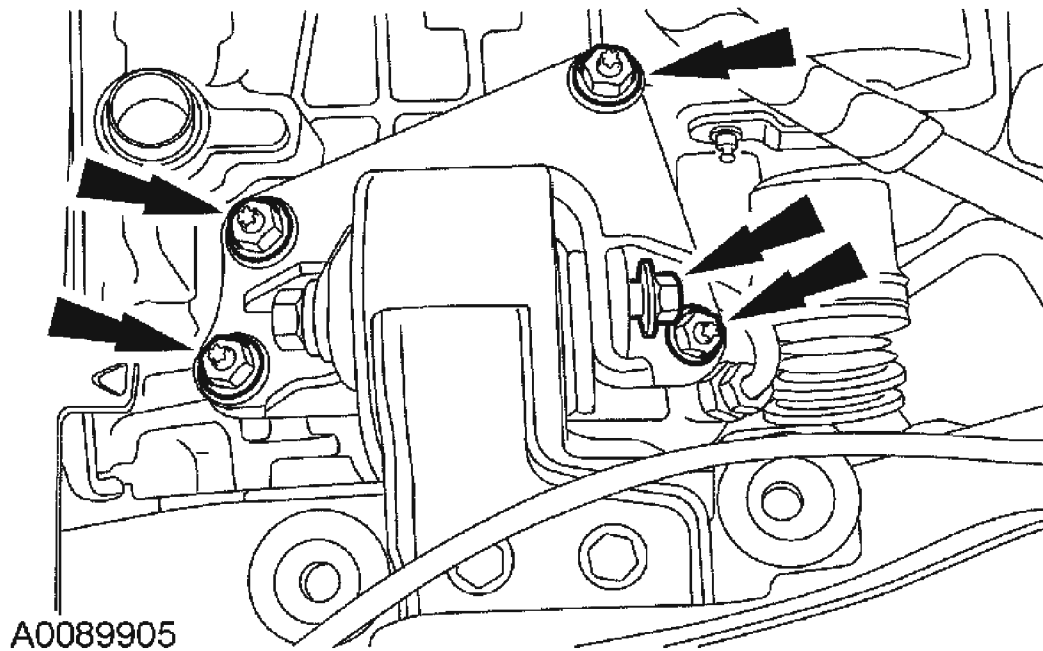
**Fig. 239: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

18. Remove the upper transaxle retaining bolts.



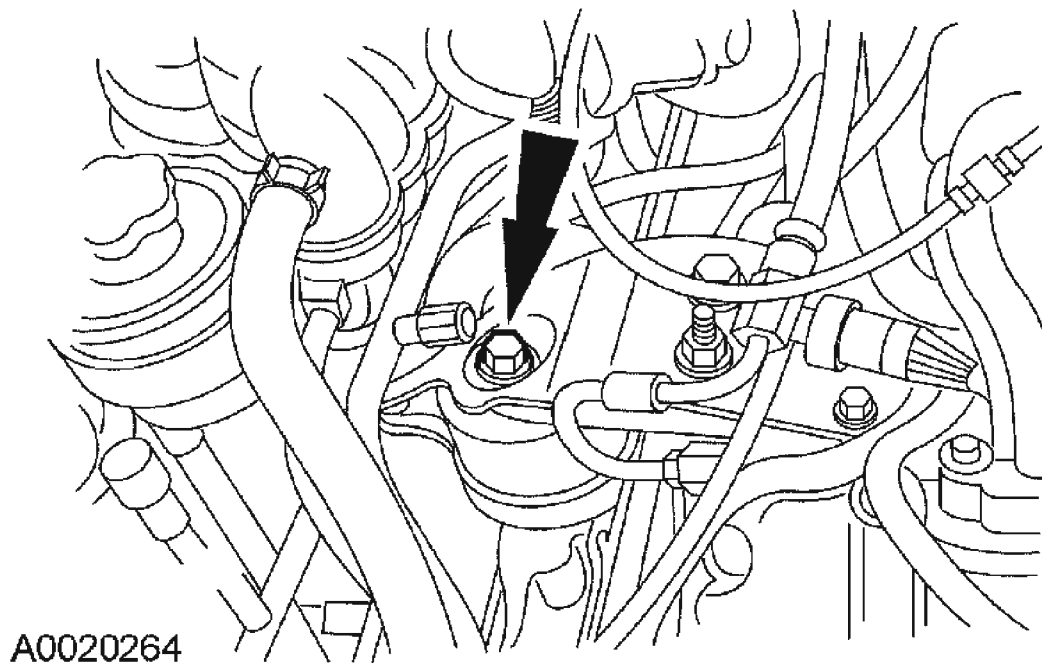
**Fig. 240: Removing Upper Transaxle Retaining Bolts**  
Courtesy of FORD MOTOR CO.

19. Loosen, but do not remove, the 4 retaining nuts holding the bracket to the transaxle case. Remove the LH upper transaxle mount bolt.



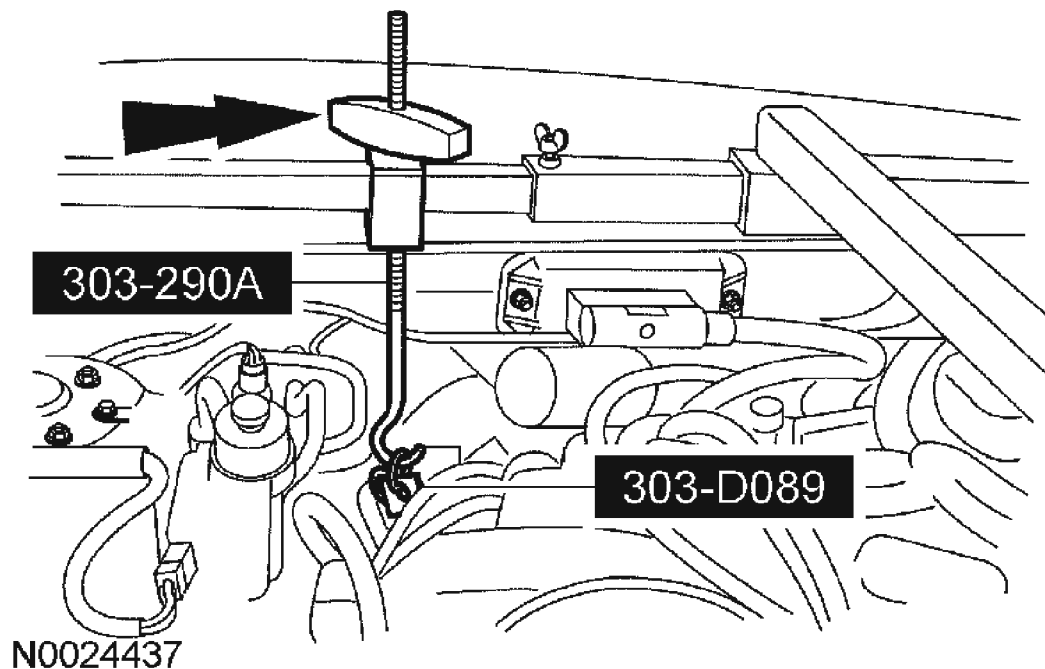
**Fig. 241: Removing LH Upper Transaxle Mount Bolt**  
**Courtesy of FORD MOTOR CO.**

20. Remove the RH upper engine mount bolt.



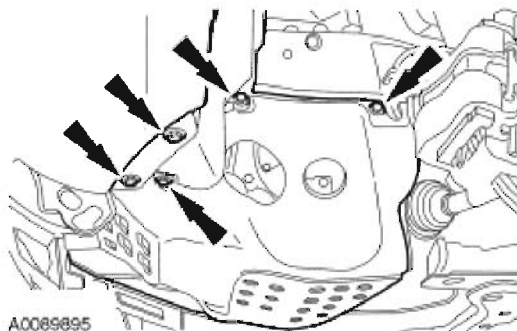
**Fig. 242: Removing RH Upper Transaxle Mount Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** It is necessary to raise the engine a couple of inches in order to remove the transaxle.



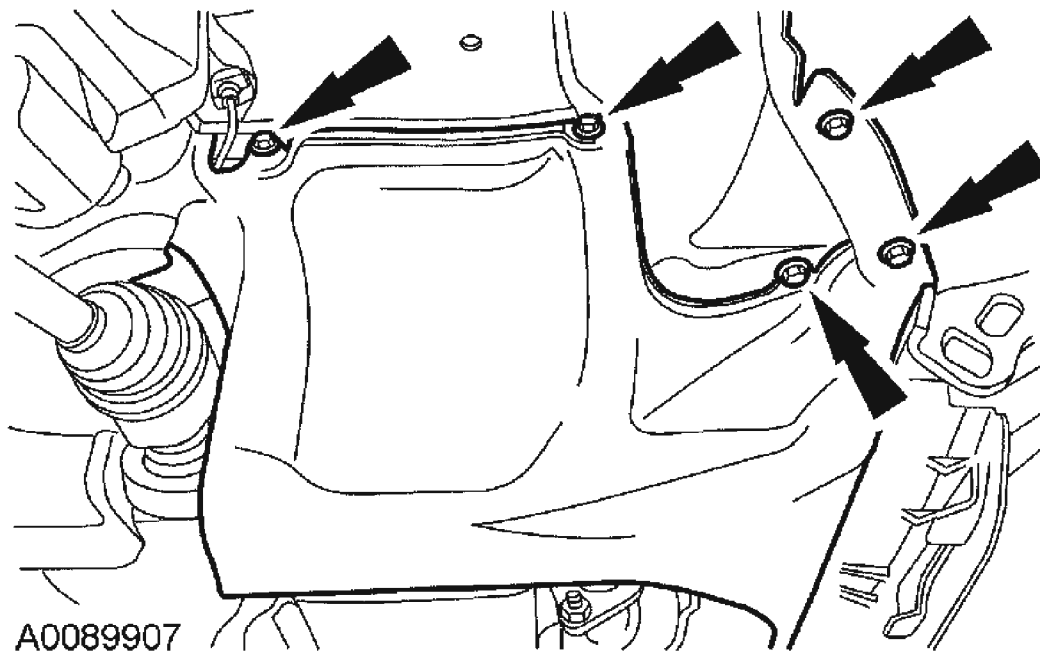
**Fig. 243: Raising Front Of Engine**  
Courtesy of FORD MOTOR CO.

21. Using the special tool, raise the front of the engine.
22. Remove the 7 retainers and the LH splash shield.



**Fig. 244: View Of LH Splash Shield And Retainers**  
Courtesy of FORD MOTOR CO.

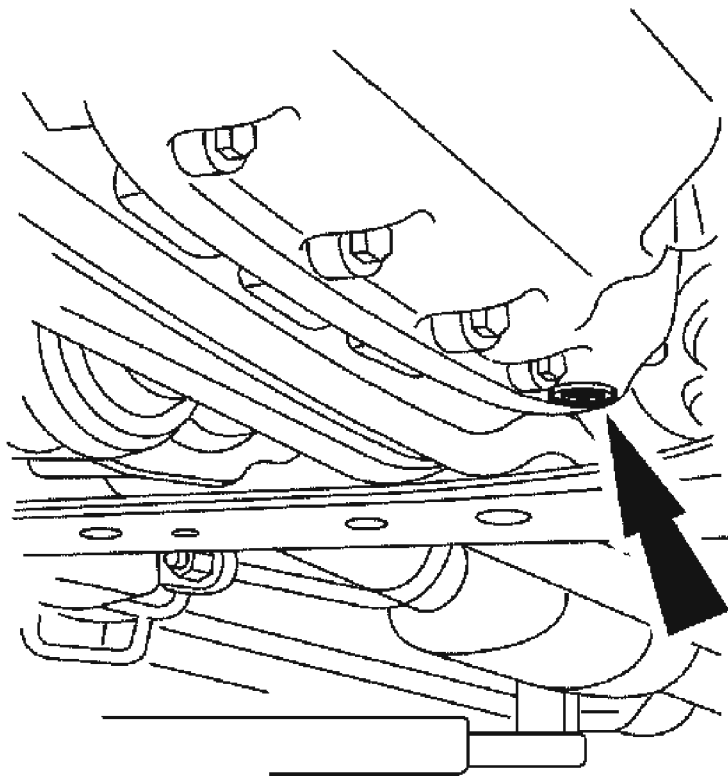
23. Remove the 7 retainers and the RH splash shield.



**Fig. 245: Removing Retainers And RH Splash Shield**  
**Courtesy of FORD MOTOR CO.**

24. If transaxle disassembly is necessary, remove the drain plug and drain the transmission fluid. After the fluid has drained, install the drain plug.

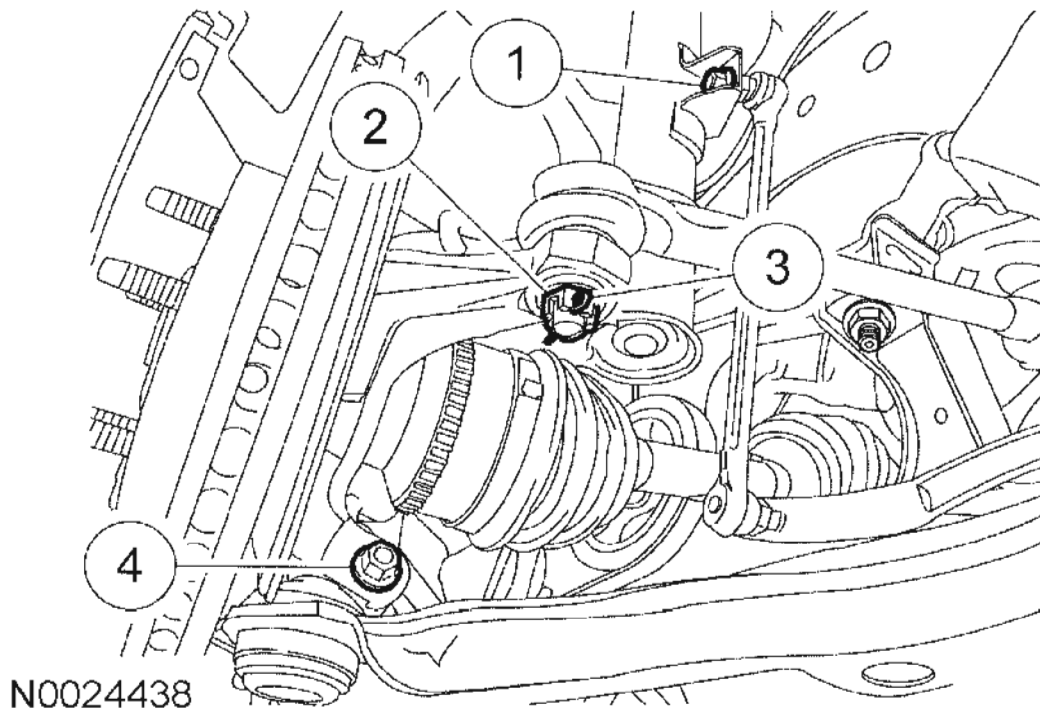




A0019938

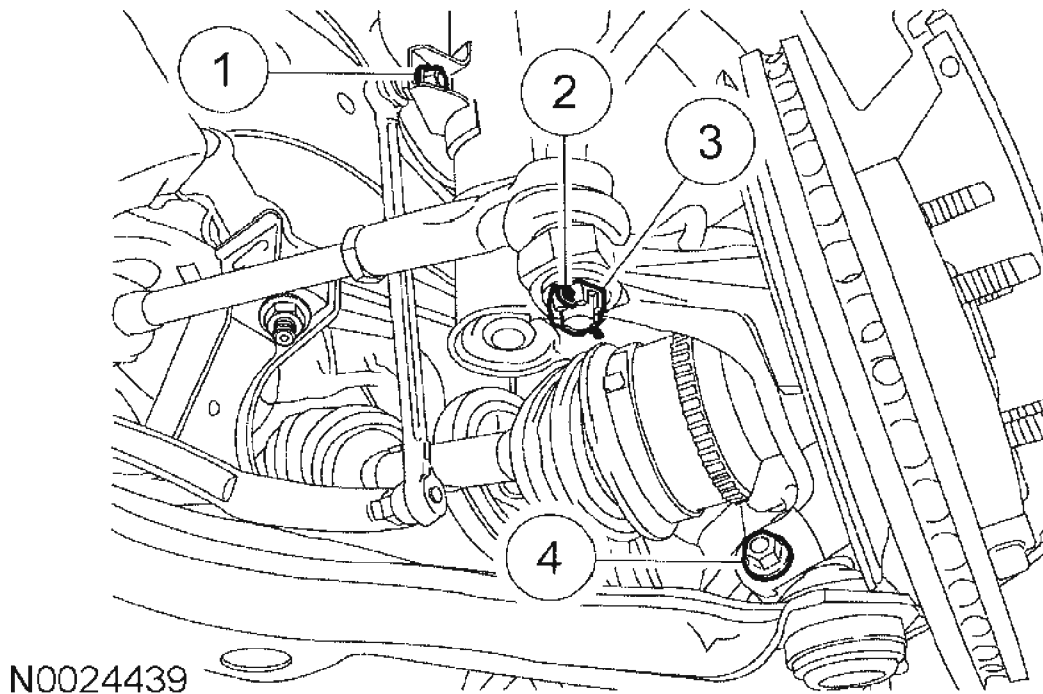
**Fig. 246: Installing Drain Plug**  
**Courtesy of FORD MOTOR CO.**

25. Disconnect the LH suspension.
  1. Disconnect the sway bar link.
  2. Remove the tie rod end nut cotter pin.
  3. Remove the tie rod end retaining nut.
  4. Remove the lower knuckle bolt.



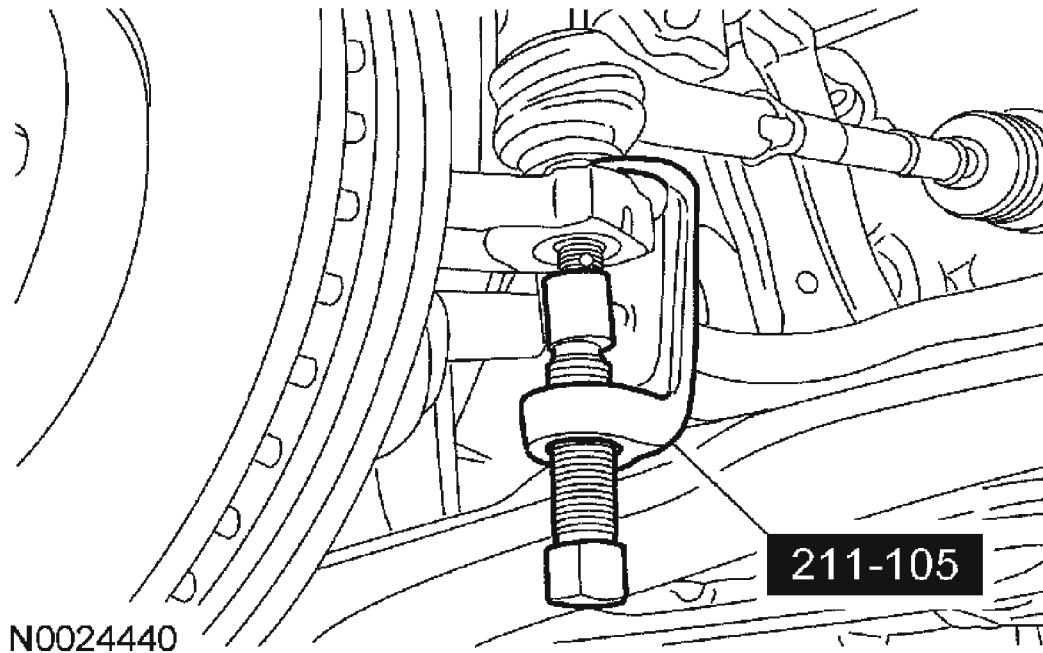
**Fig. 247: Disconnecting LH Suspension**  
Courtesy of FORD MOTOR CO.

26. Disconnect the RH suspension.
1. Disconnect the sway bar link.
  2. Remove the tie rod end nut cotter pin.
  3. Remove the tie rod end retaining nut.
  4. Remove the lower control arm knuckle bolt.



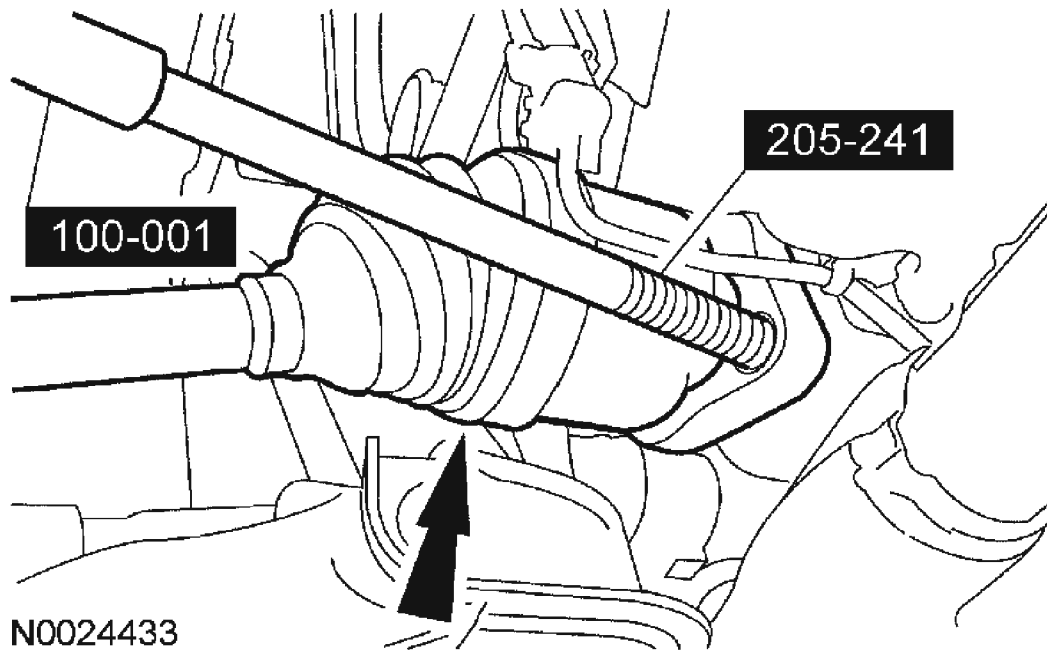
**Fig. 248: Disconnecting RH Suspension**  
Courtesy of FORD MOTOR CO.

27. Using the special tool, disconnect the LH and RH tie rod end from the steering knuckle.



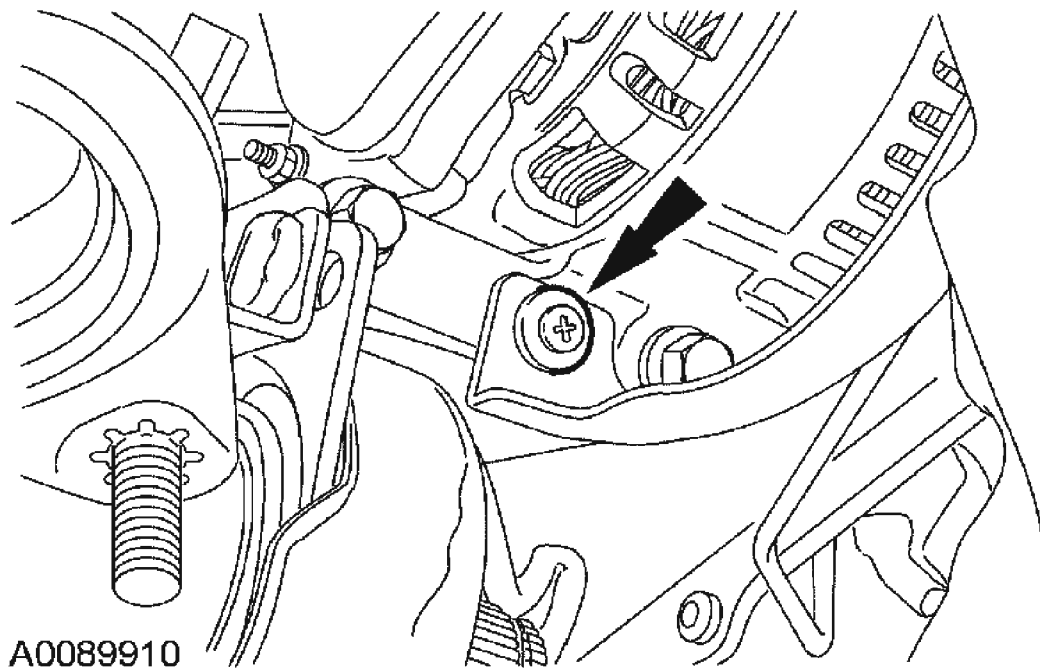
**Fig. 249: Disconnecting LH And RH Tie Rod End From Steering Knuckle**  
Courtesy of FORD MOTOR CO.

28. Carefully pry down on the LH and RH lower control arms and disconnect the steering knuckle from the lower ball joint and position the steering knuckle aside.
29. Using the special tool, remove the RH outer halfshaft.



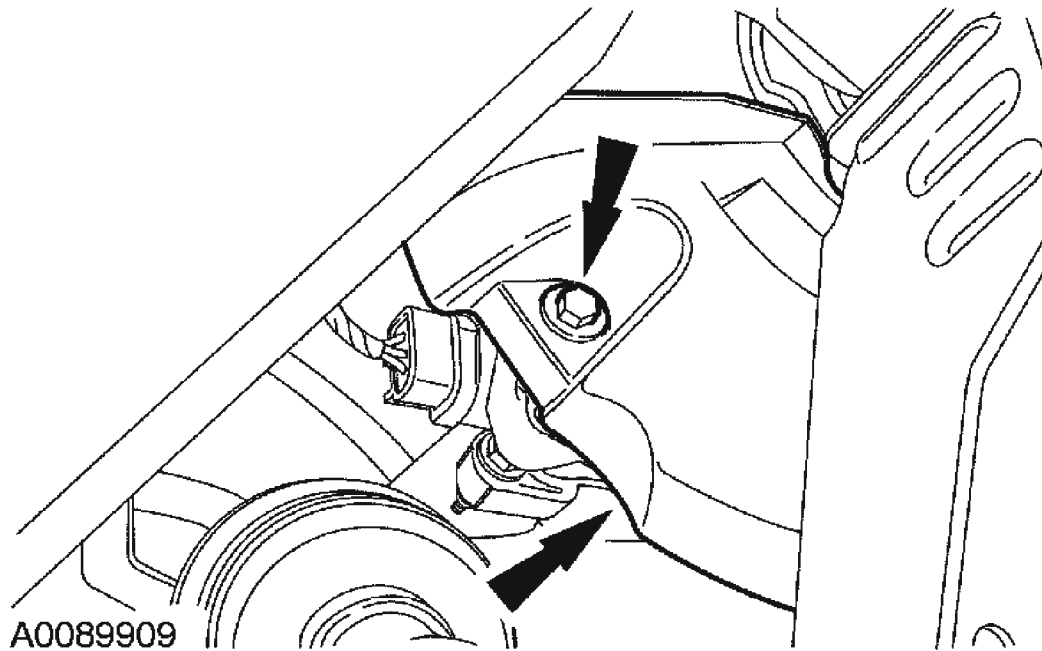
**Fig. 250: Removing RH Outer Halfshaft**  
Courtesy of FORD MOTOR CO.

30. Using a pry bar between the transaxle case and the LH axle shaft, carefully disconnect the halfshaft from the transaxle case.
31. Remove the retaining screw for the generator shield.



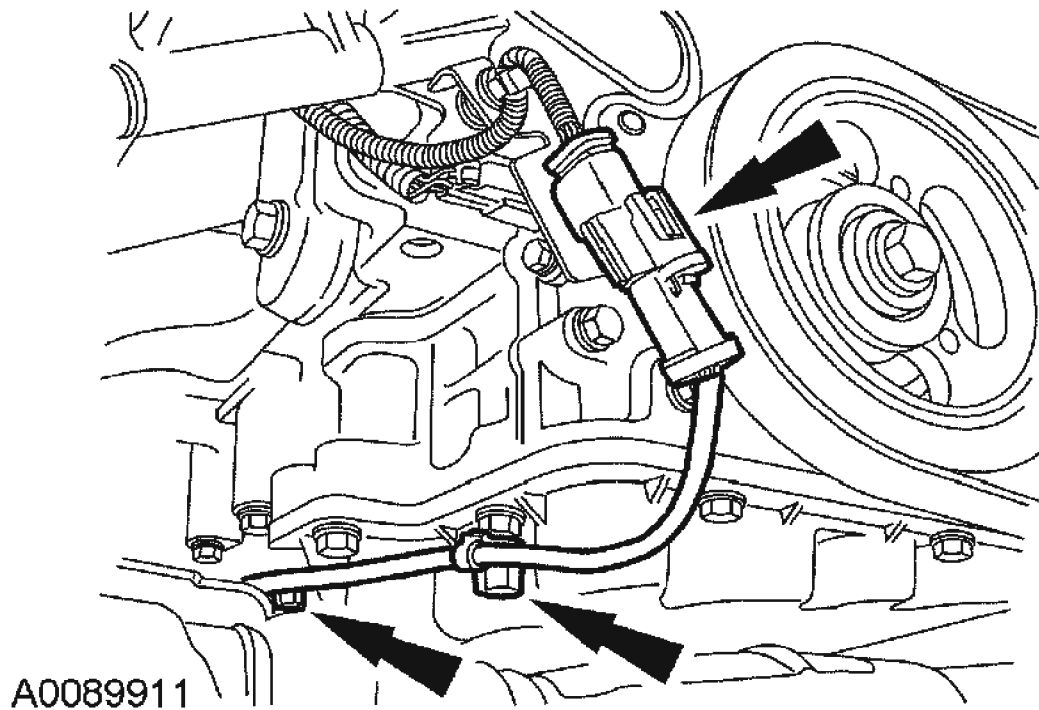
**Fig. 251: Removing Retaining Screw For Generator Shield**  
Courtesy of FORD MOTOR CO.

32. Remove the retaining bolt for the generator shield and remove the shield.



**Fig. 252: Removing Retaining Bolt For Generator Shield And Shield**  
Courtesy of FORD MOTOR CO.

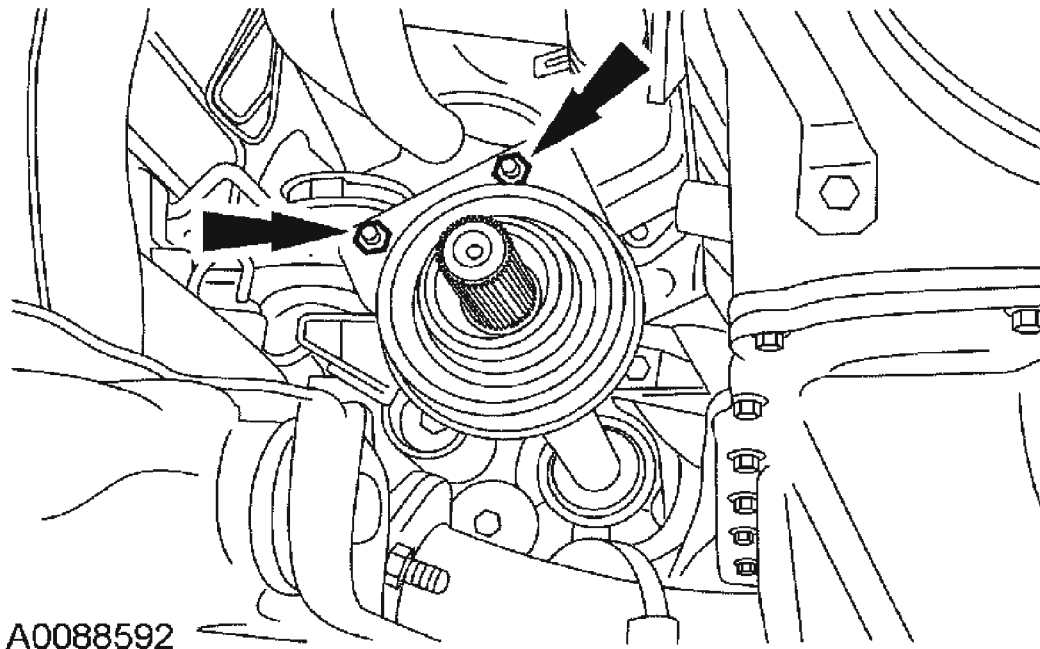
33. Disconnect the HO2S sensor connector and remove the 2 clips from the oil pan bolt studs.



**Fig. 253: Disconnecting HO2S Sensor Connector**  
Courtesy of FORD MOTOR CO.

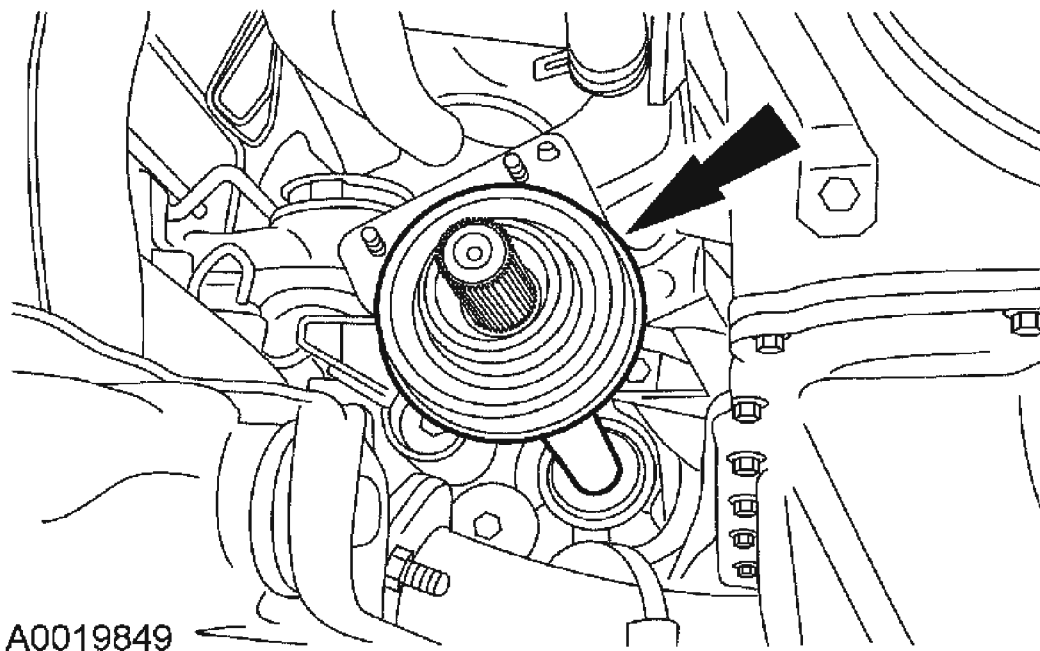
34. Remove the 2 intermediate shaft retaining nuts.





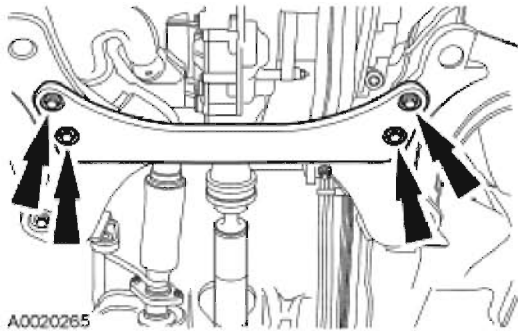
**Fig. 254: Removing Intermediate Shaft Retaining Nuts**  
Courtesy of FORD MOTOR CO.

35. Remove the intermediate shaft.



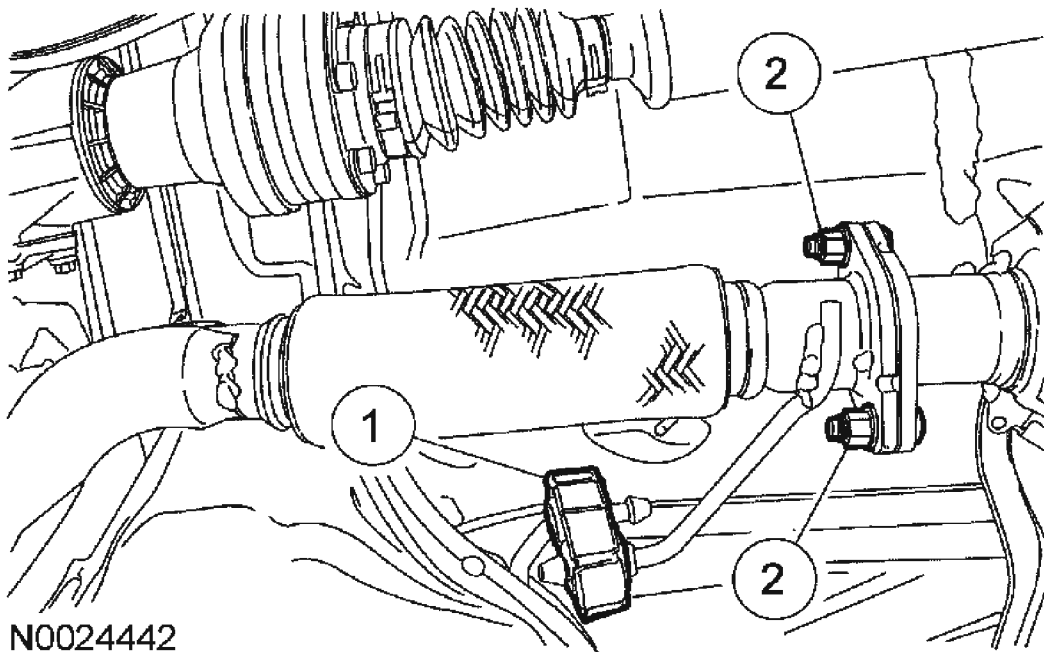
**Fig. 255: Removing Intermediate Shaft**  
Courtesy of FORD MOTOR CO.

36. Remove the cross brace.



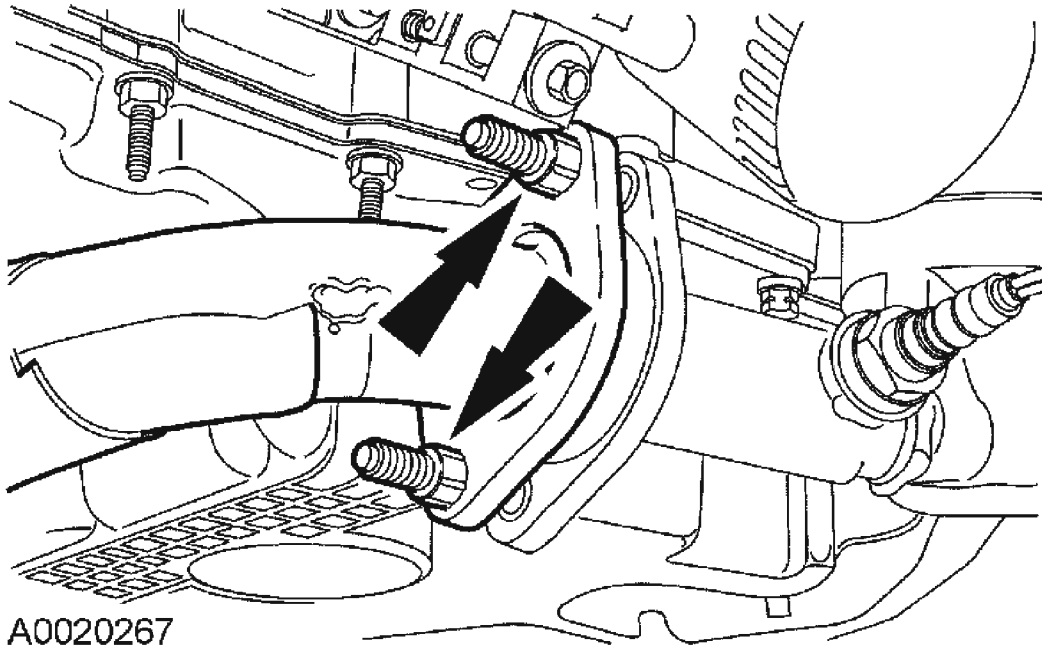
**Fig. 256: Locating Cross Brace & Bolts**  
Courtesy of FORD MOTOR CO.

37. Disconnect the exhaust pipe.
1. Remove the rubber hanger.
  2. Remove the nuts and disconnect the pipe.



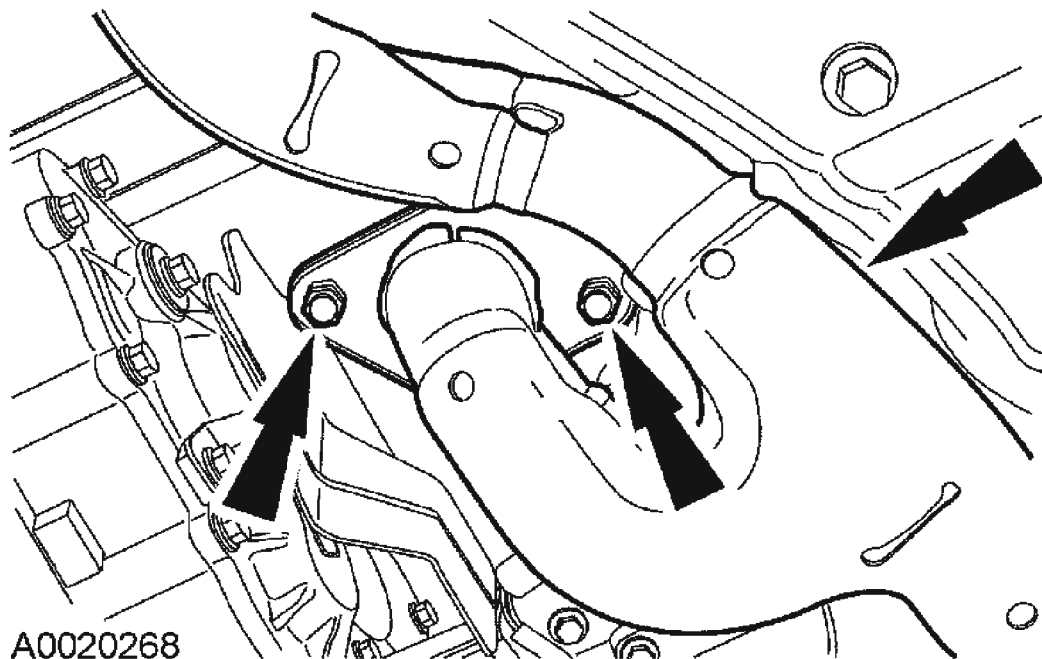
**Fig. 257: Disconnecting Exhaust Pipe**  
Courtesy of FORD MOTOR CO.

38. Disconnect the front exhaust pipe flange.



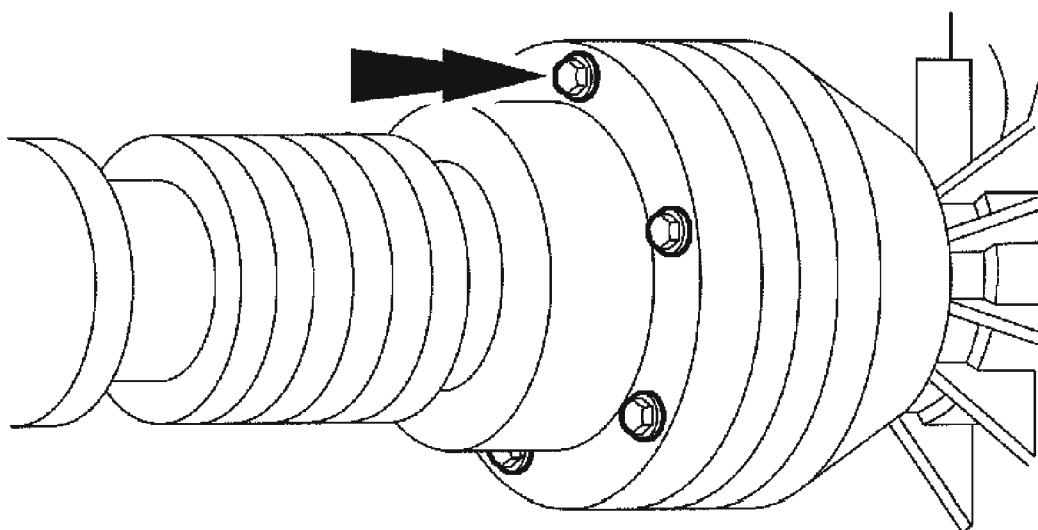
**Fig. 258: Disconnecting Front Exhaust Pipe Flange**  
Courtesy of FORD MOTOR CO.

39. Disconnect the rear exhaust pipe flange and remove the exhaust pipe.



**Fig. 259: Disconnecting Rear Exhaust Pipe Flange And Removing Exhaust Pipe**  
Courtesy of FORD MOTOR CO.

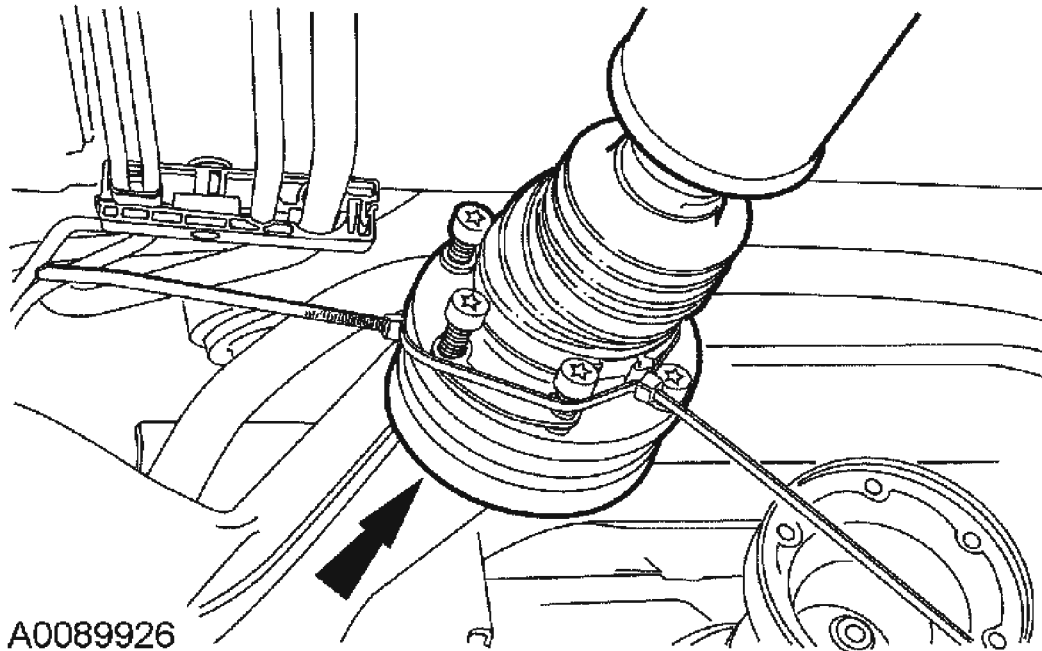
40. For vehicles equipped with a PTO, remove the rear driveshaft bolts and separate the driveshaft from the PTO.



A0052598

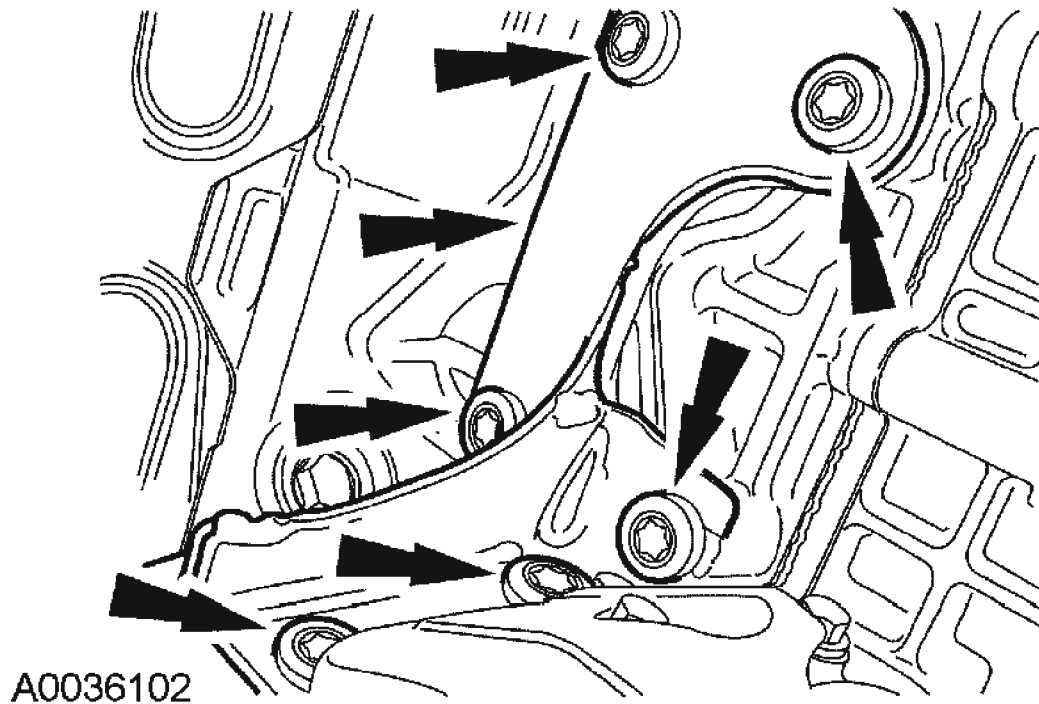
**Fig. 260: Removing Rear Driveshaft Bolts**  
Courtesy of FORD MOTOR CO.

41. Position the driveshaft aside.



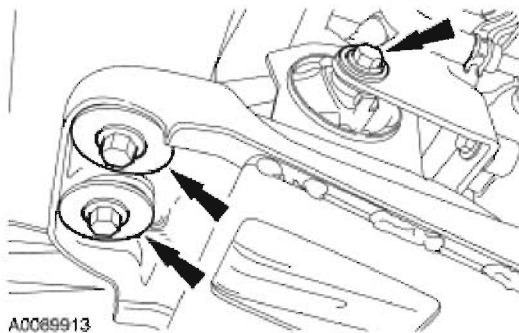
**Fig. 261: Positioning Driveshaft Aside**  
Courtesy of FORD MOTOR CO.

42. Vehicles equipped with a PTO, remove the RH catalytic converter to gain access to the PTO bracket. For additional information, refer to **EXHAUST SYSTEM**.
43. Remove the bolts and the bracket.



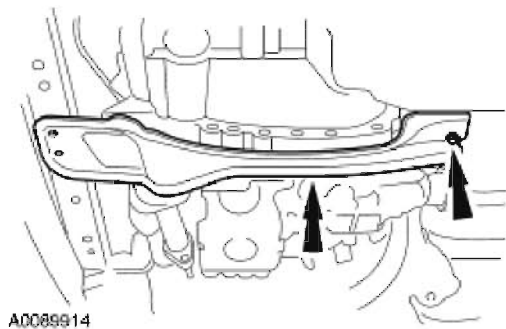
**Fig. 262: Removing Bolts And Bracket**  
Courtesy of FORD MOTOR CO.

44. Remove the bolt for the mount and the 2 bolts for the cross brace.



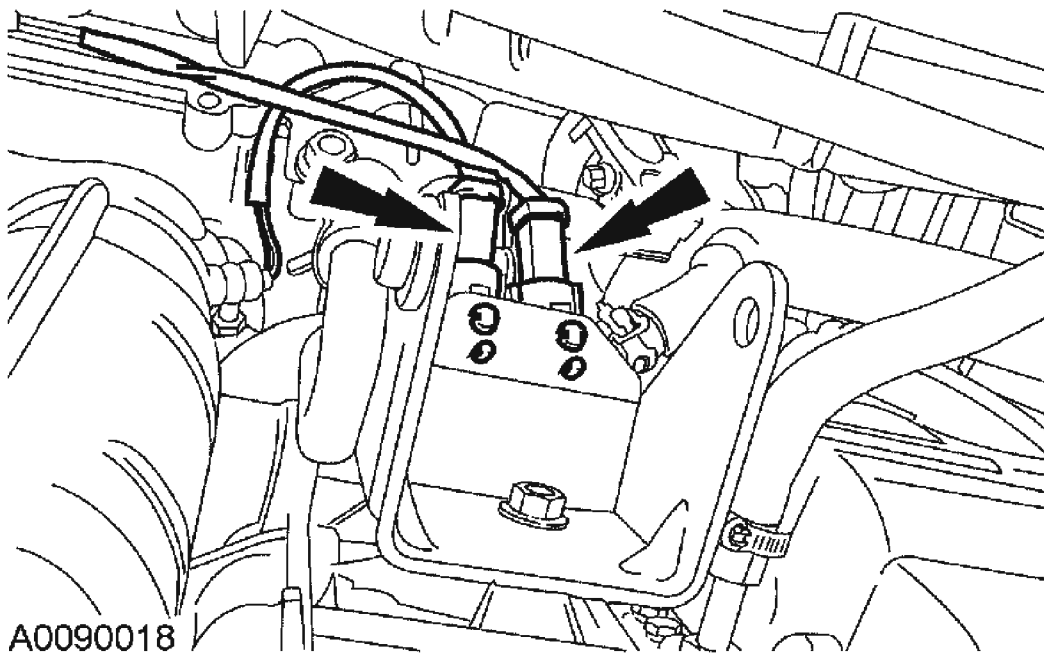
**Fig. 263: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember**  
Courtesy of FORD MOTOR CO.

45. Remove the rear nut and the cross brace.



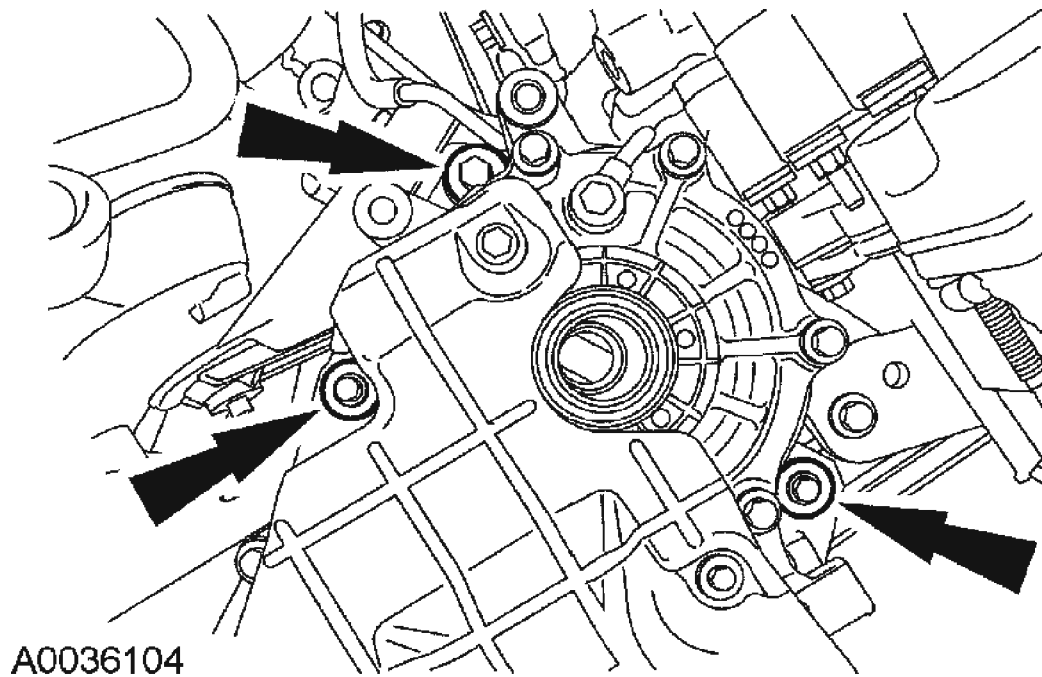
**Fig. 264: Identifying Cross Brace And Rear Nut**  
Courtesy of FORD MOTOR CO.

46. Remove the electrical connectors from the lower mount bracket.



**Fig. 265: Removing Electrical Connectors From Lower Mount Bracket**  
Courtesy of FORD MOTOR CO.

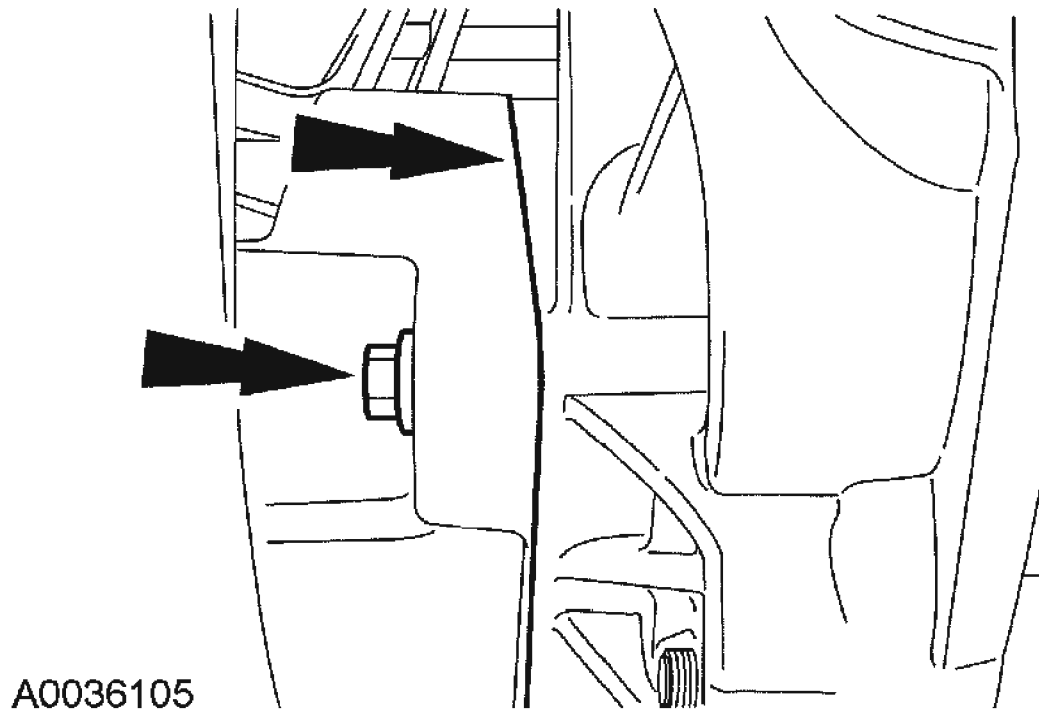
47. Vehicles not equipped with a PTO, remove the dampener.
48. Remove the bolts from the transfer case unit.



**Fig. 266: Removing Bolts From Transfer Case Unit**  
**Courtesy of FORD MOTOR CO.**

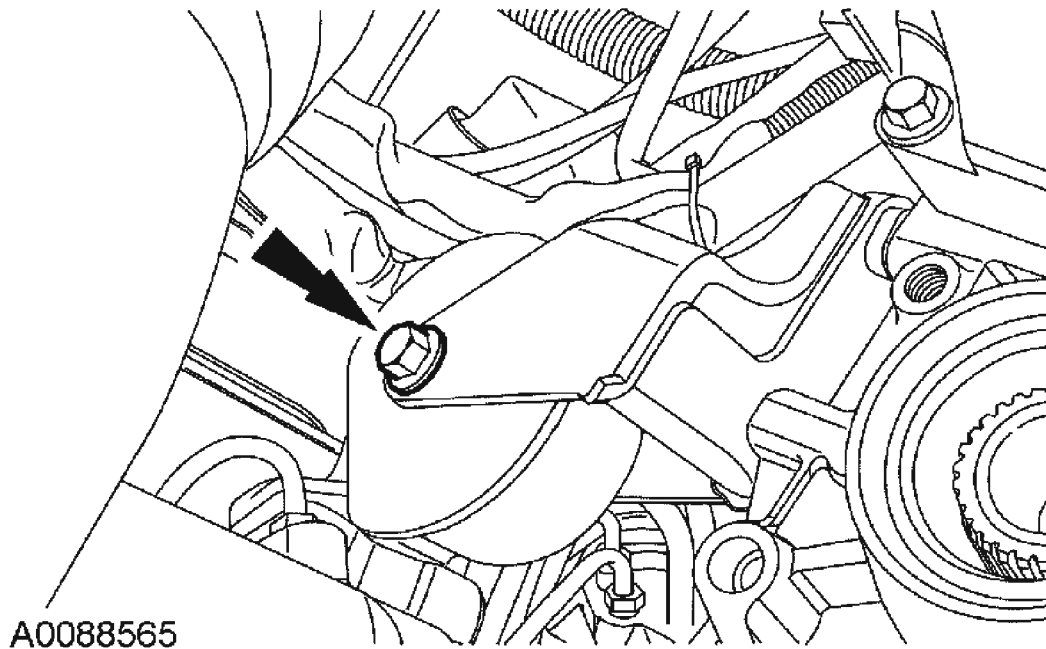
49. Remove the transfer case bolt and remove the transfer case unit.





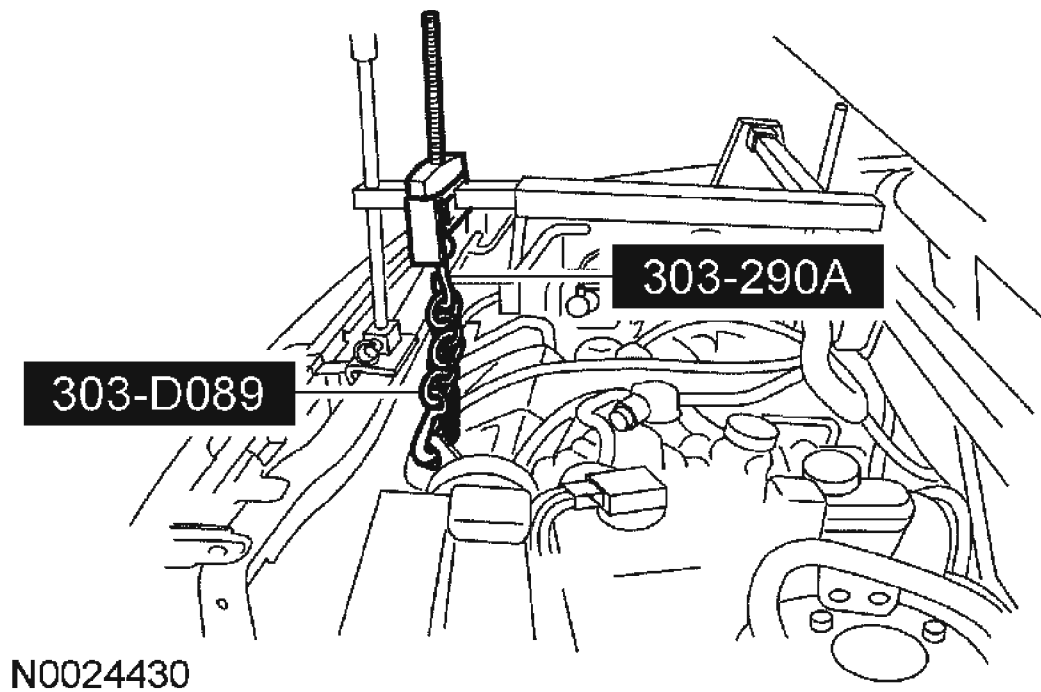
**Fig. 267: Removing Transfer Case Bolt And Transfer Case Unit**  
Courtesy of FORD MOTOR CO.

50. Remove the center bolt from the rear transaxle mount.



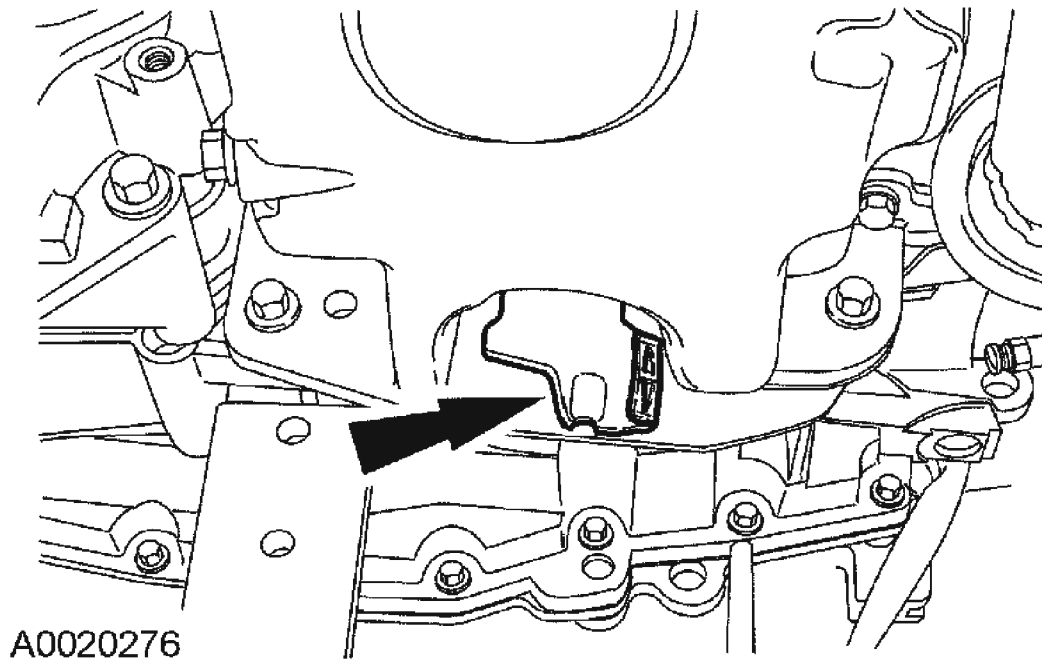
**Fig. 268: Removing Center Bolt From Rear Transaxle Mount**  
Courtesy of FORD MOTOR CO.

**NOTE:** It is necessary to lower the transaxle in order to clear the subframe to remove the transaxle.



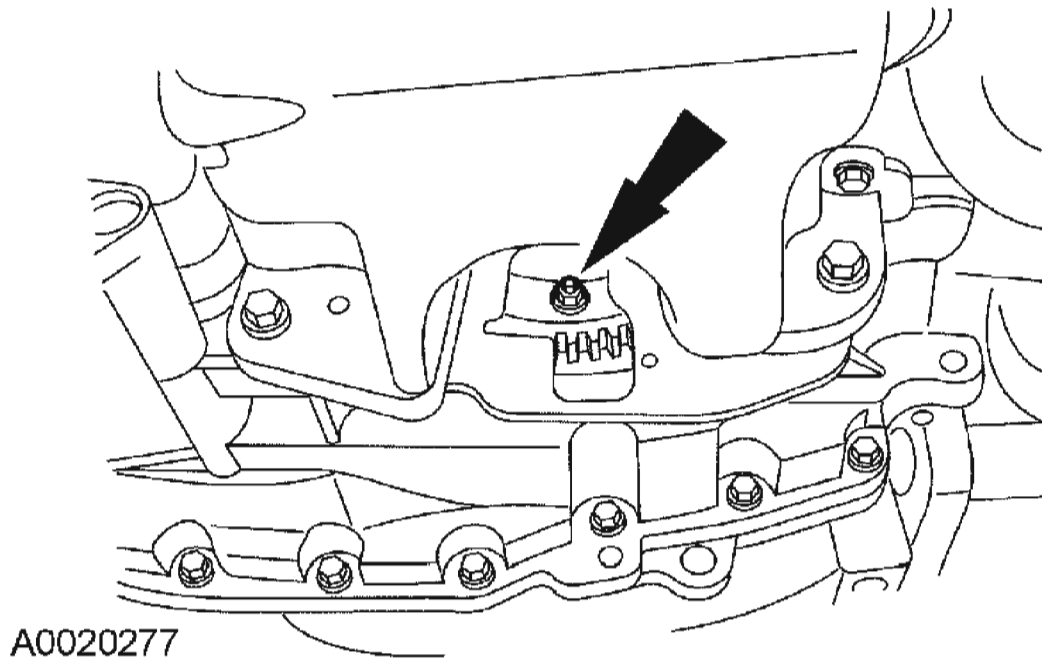
**Fig. 269: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

51. Lower the transaxle enough to clear the frame.
52. Remove the access cover.



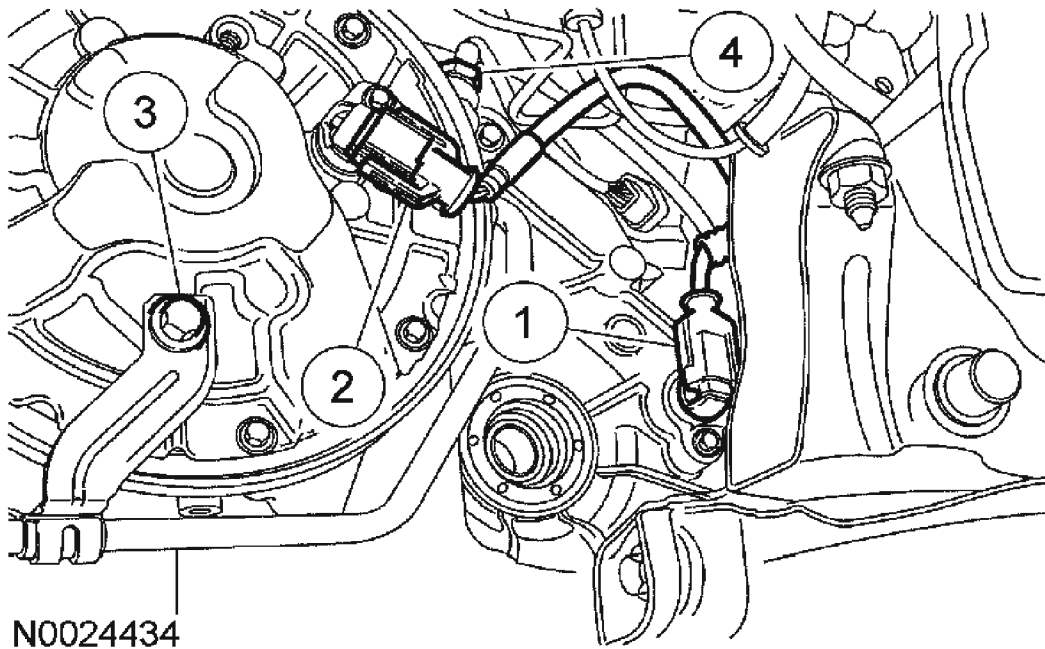
**Fig. 270: Removing Access Cover**  
**Courtesy of FORD MOTOR CO.**

53. Remove and discard the 4 torque converter nuts.



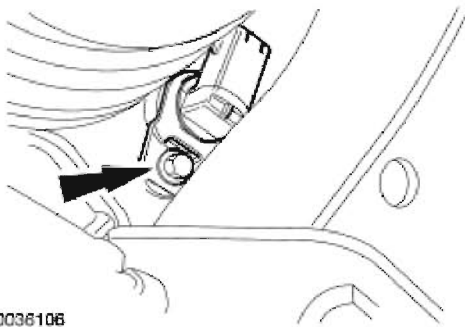
**Fig. 271: Removing Torque Converter Nuts**  
Courtesy of FORD MOTOR CO.

54. Remove the fluid cooler tube.
  1. Disconnect the output shaft speed (OSS) sensor.
  2. Disconnect the turbine shaft speed (TSS) sensor (white connector).
  3. Remove the bolt.
  4. Remove the fluid cooler tube and position it aside.



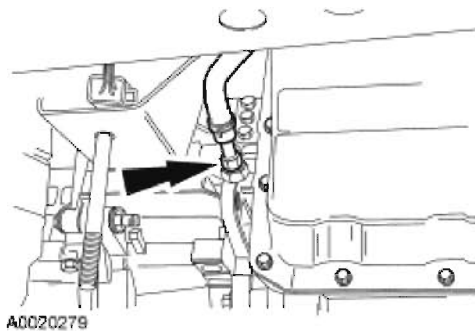
**Fig. 272: Disconnecting Turbine And Output Shaft Speed (OSS) Sensor**  
Courtesy of FORD MOTOR CO.

55. Remove the OSS sensor.



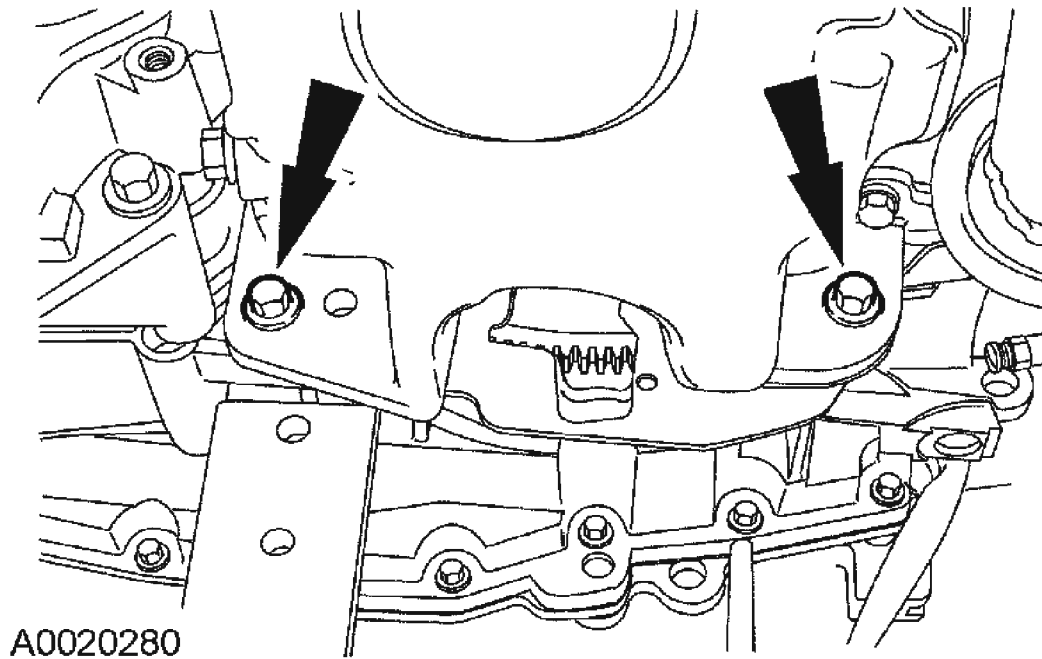
**Fig. 273: Locating OSS Sensor Bolt**  
Courtesy of FORD MOTOR CO.

56. Remove the fluid cooler tube.



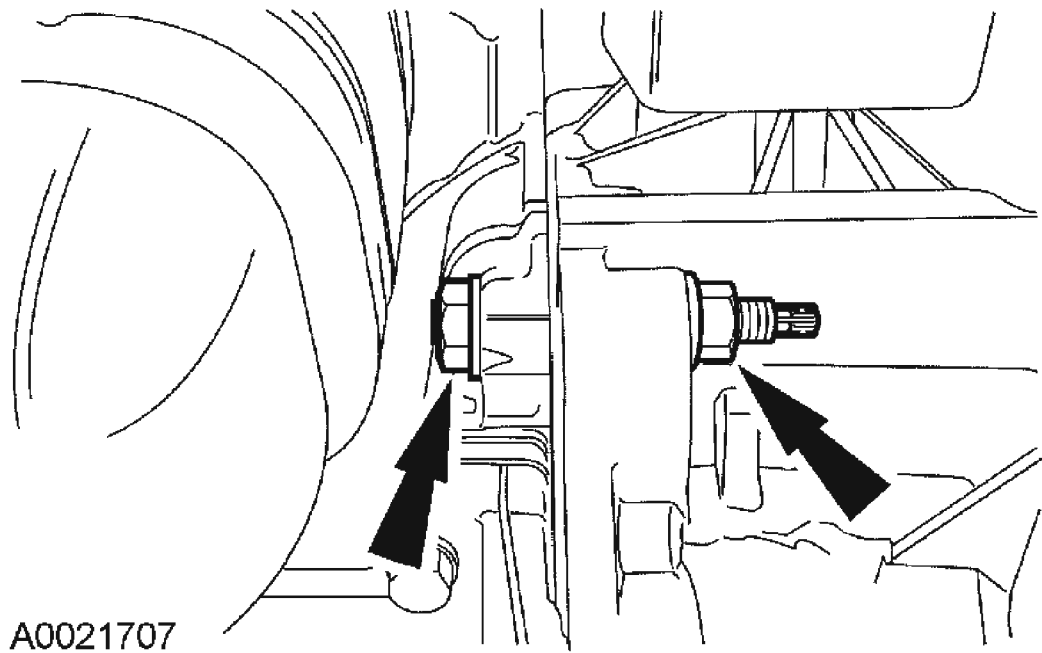
**Fig. 274: Locating Transmission Fluid Cooler Tube**  
Courtesy of FORD MOTOR CO.

57. Support the transaxle with a high-lift jack.
58. Remove the bolts.



**Fig. 275: Removing Bolts**  
Courtesy of FORD MOTOR CO.

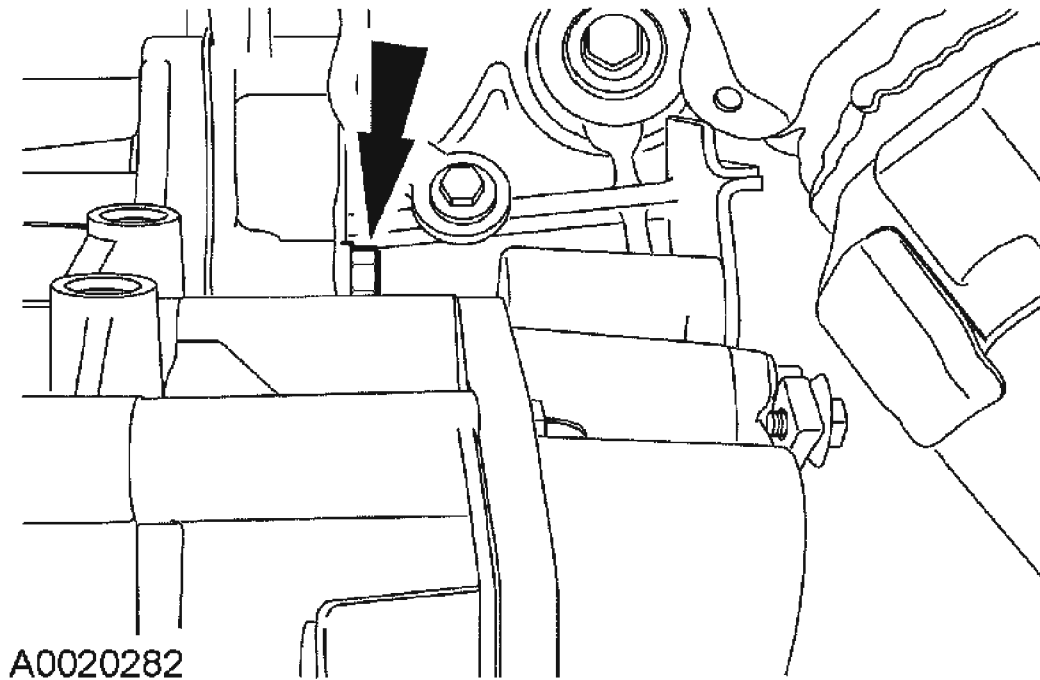
59. Remove the bolt.



**Fig. 276: Removing Bolts**  
Courtesy of FORD MOTOR CO.

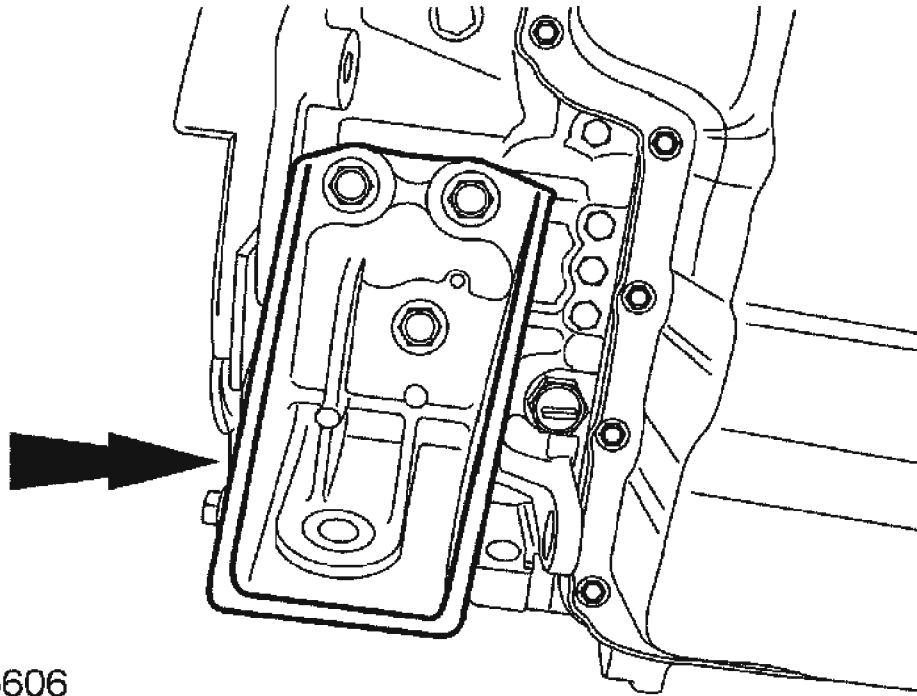
60. Remove the bolt.





**Fig. 277: Removing Bolts**  
**Courtesy of FORD MOTOR CO.**

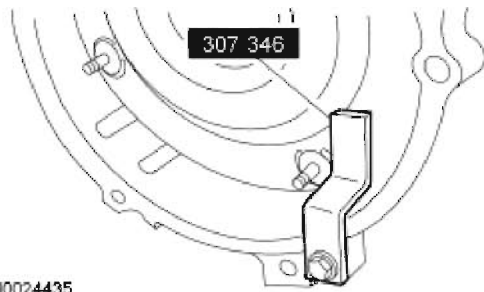
61. Remove the transaxle mount bracket.



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**Fig. 278: Removing Transaxle Mount Bracket**  
Courtesy of FORD MOTOR CO.

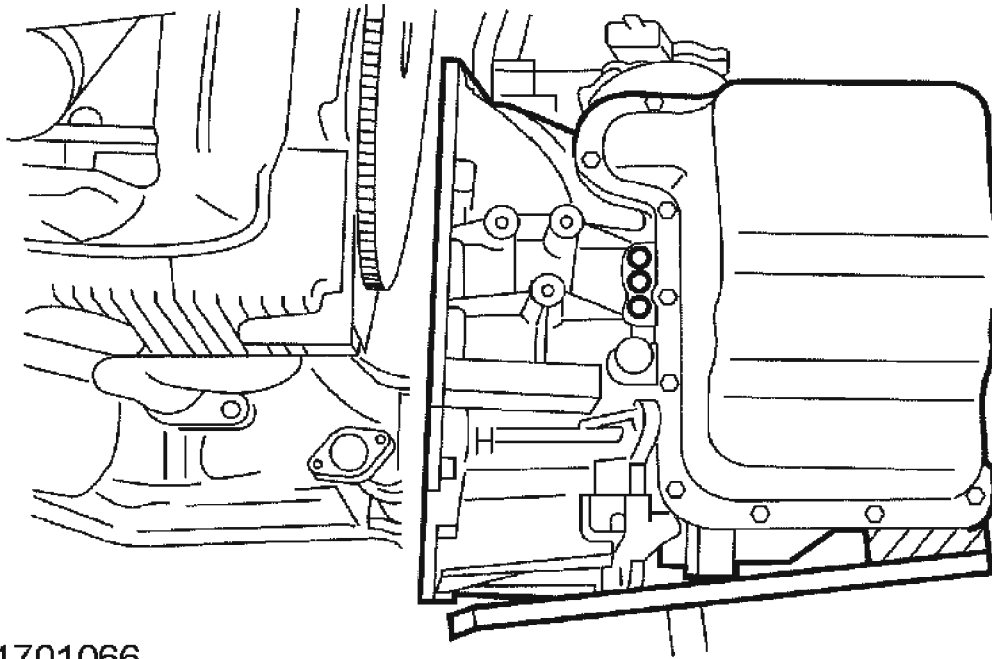
**CAUTION:** The torque converter is heavy. Install the special tool before lowering the transaxle.



N0024435

**Fig. 279: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

62. Move the transaxle back far enough to install the special tool.
63. Lower the transaxle from the engine compartment.



M1701066

**Fig. 280: Lowering Transaxle From Engine Compartment**  
Courtesy of FORD MOTOR CO.

## DISASSEMBLY

### TRANSAXLE

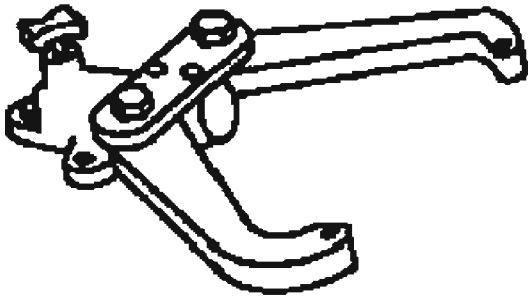
Special Tool(s)

### SPECIAL TOOLS DESCRIPTION

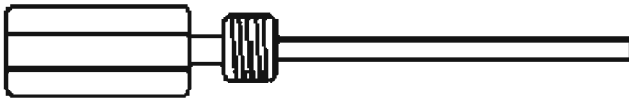
	Holding Fixture, Transmission 307-003 (T57L-500-B)
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## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1186-A**



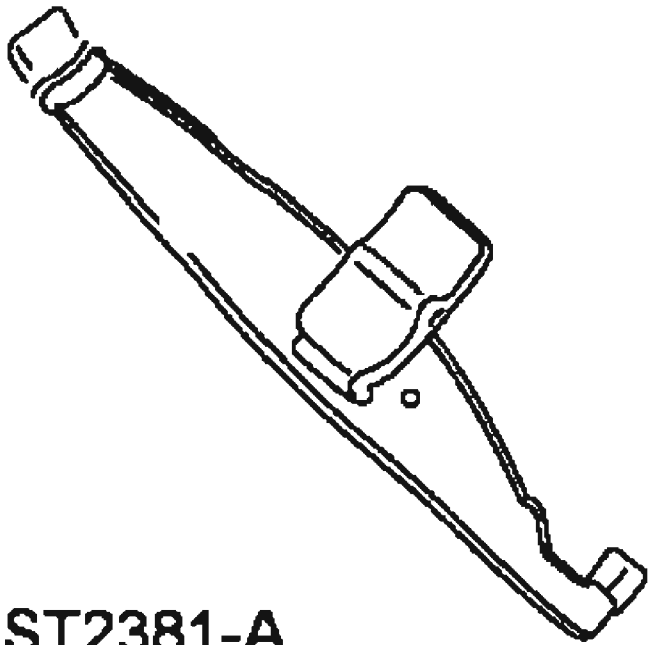
**ST1987-A**

Actuator Pin (Dia 3/16 Inch) 3O3-D011 (D80L-100-G)

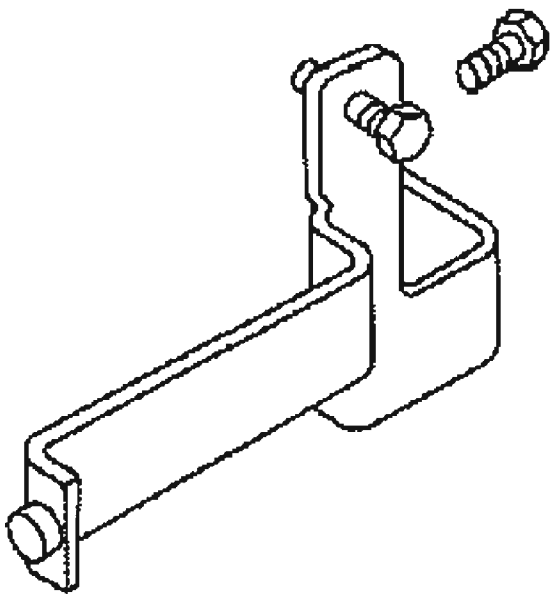
Remover, Input Shaft Oil Seal 308-375

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2381-A**

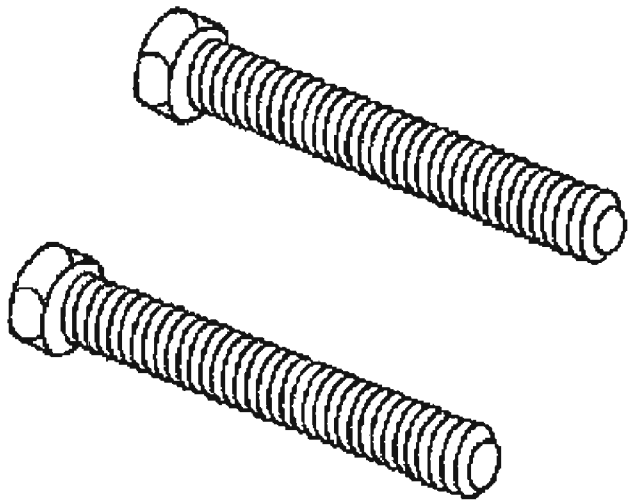


**ST1845-A**

Remover/Installer, Servo Cover 307-295 (T94P-77000-L)

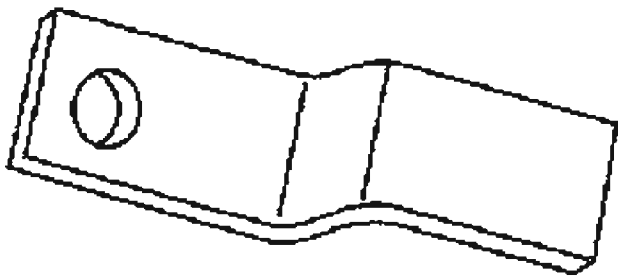
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1990-A**

Remover, Transmission Fluid Pump  
307-289 (T94P-77000-G)



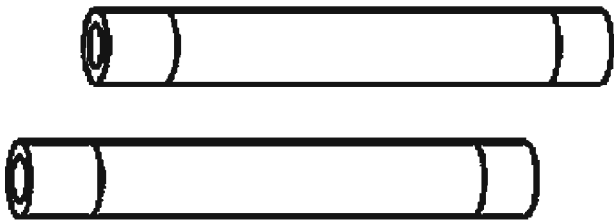
**ST1636-A**

Retainer, Torque Converter 307-346  
(T97T-7902-A)

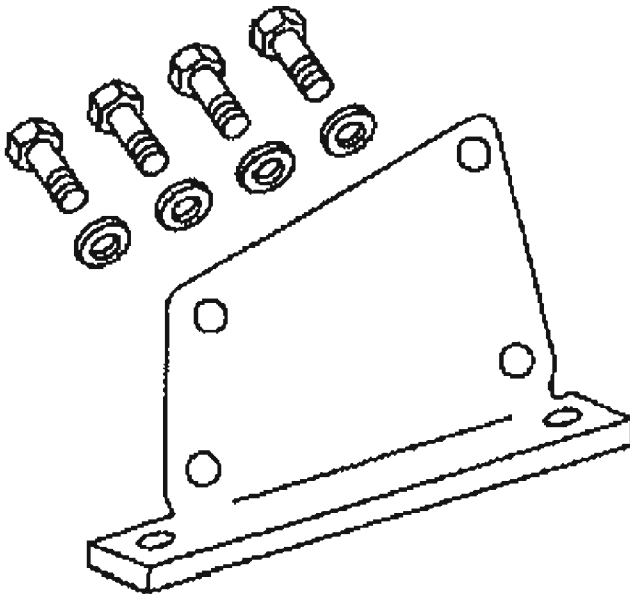
Handle, Torque Converter 307-091  
(T81P-7902-C)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1631-A**

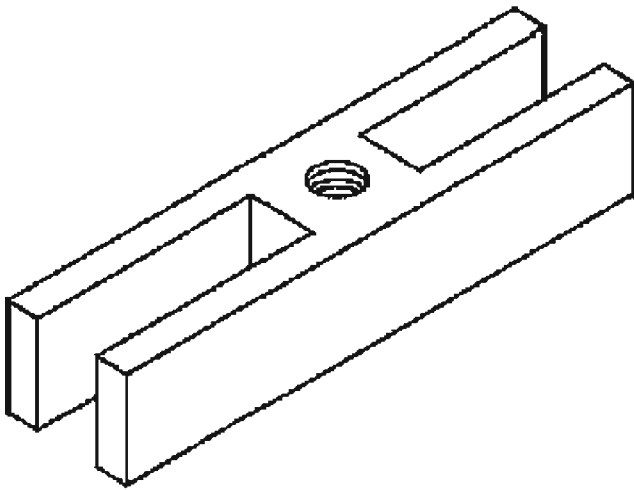


**ST2529-A**

Holding Fixture, Transmission 307-288 (T94P-77000-F)

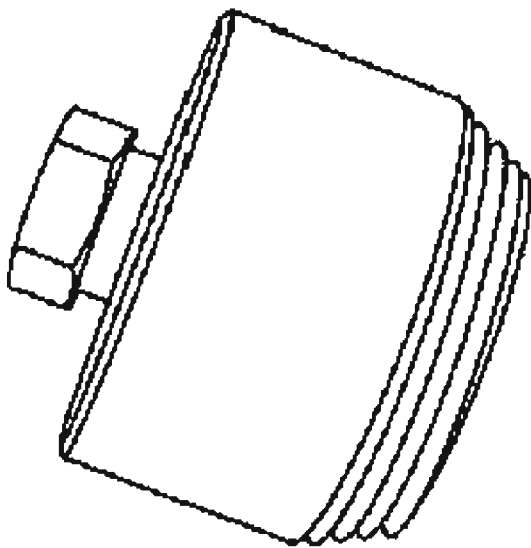
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Cross Block 307-109 (T81P-78103-A)

**ST2066-A**



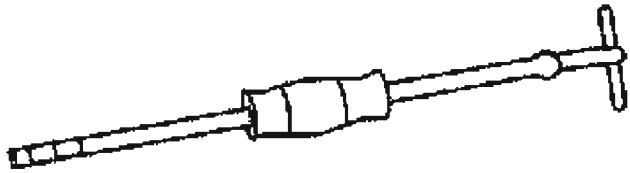
Remover, RH Halfshaft Fluid Seal  
307-429

**ST2526-A**



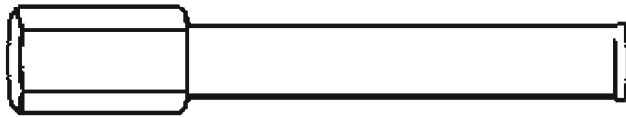
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



ST1185-A

Slide Hammer 100-001 (T50T-100-A)



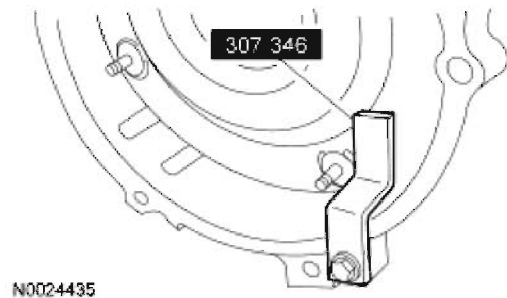
ST1988-A

Collet, 3/4 to 7/8 Inch 303-D019  
(D80L-100-Q)

### Disassembly

**NOTE:** Clean the transaxle assembly to prevent the entry of dirt when reassembling.

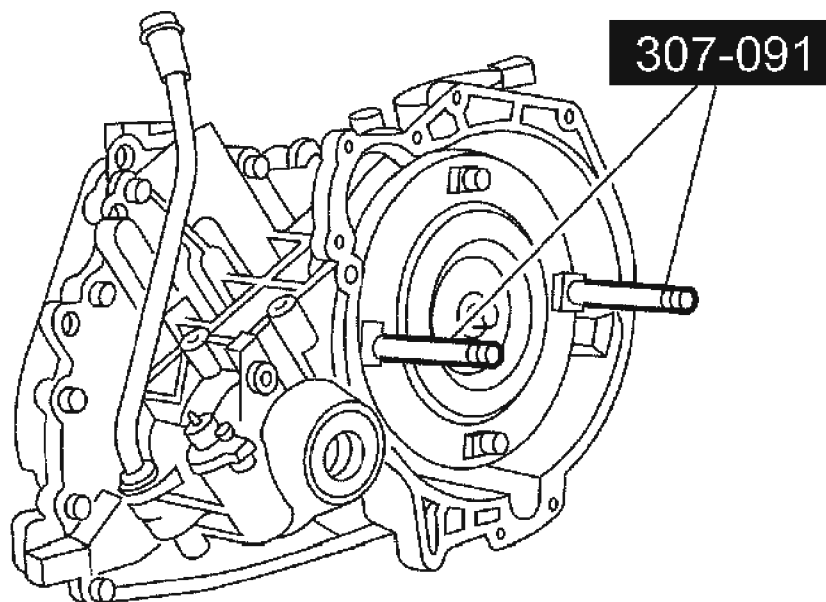
1. Inspect transaxle during disassembly.
2. Remove the special tool.



**Fig. 281: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not tilt the torque converter when removing it. This can damage the torque converter hub.

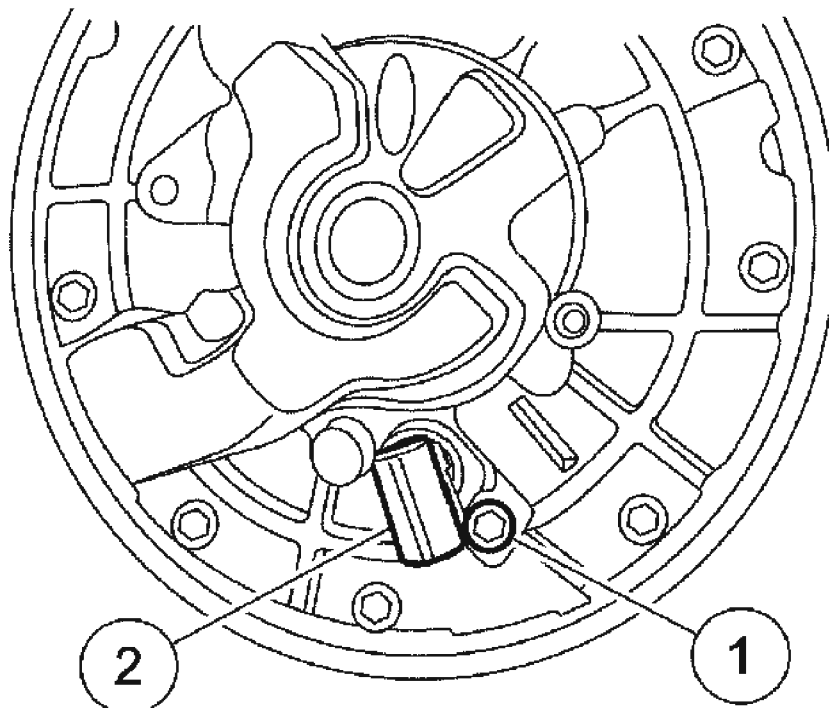
**NOTE:** The torque converter is filled with fluid. Position it on a table so that fluid will drain out of the torque converter into a drain pan.



**Fig. 282: Removing Torque Converter**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, remove the torque converter.
4. Remove the turbine shaft speed (TSS) sensor.

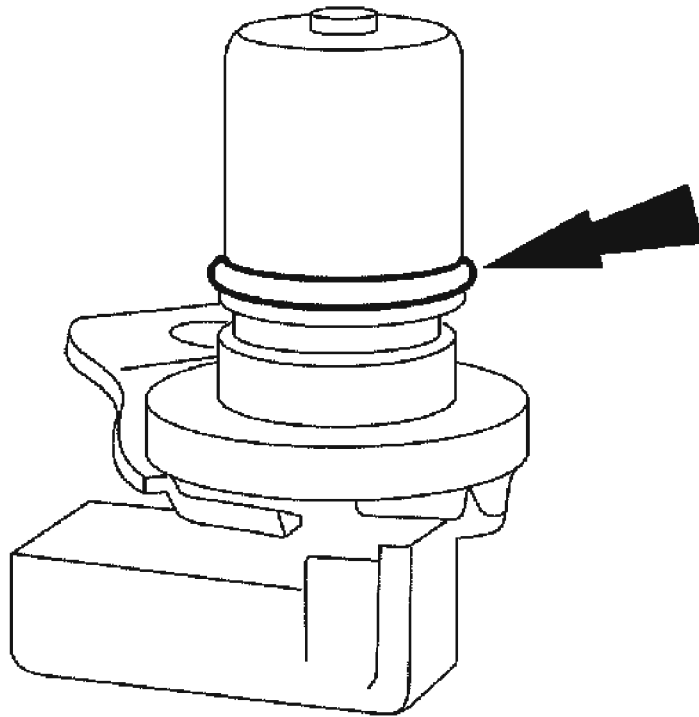
1. Remove the bolt.
2. Remove the TSS sensor.



N0024444

**Fig. 283: Removing Turbine Shaft Speed (TSS) Sensor**  
Courtesy of FORD MOTOR CO.

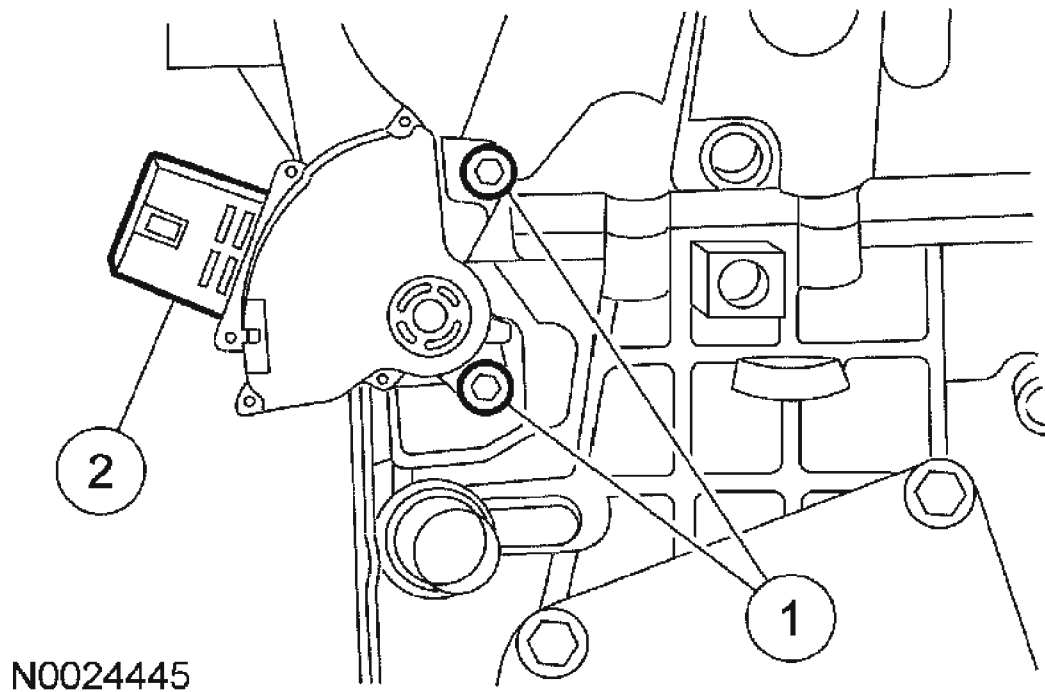
5. Remove and discard the TSS and OSS sensor O-ring seals.



GD2738-A

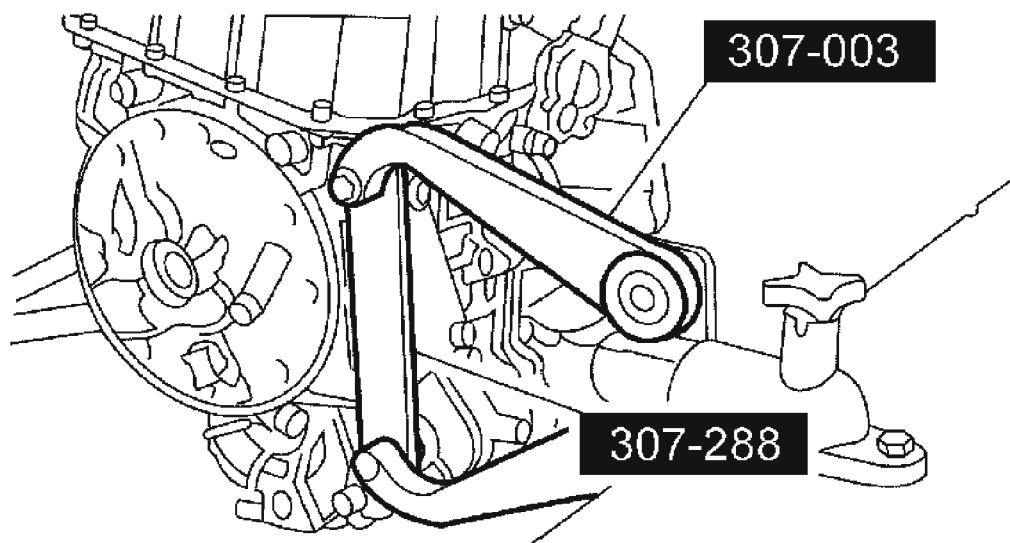
**Fig. 284: Removing TSS And OSS Sensor O-Ring Seals**  
**Courtesy of FORD MOTOR CO.**

6. Remove the transmission range (TR) sensor.
  1. Remove the bolts.
  2. Remove the TR sensor from the manual valve detent lever shaft.



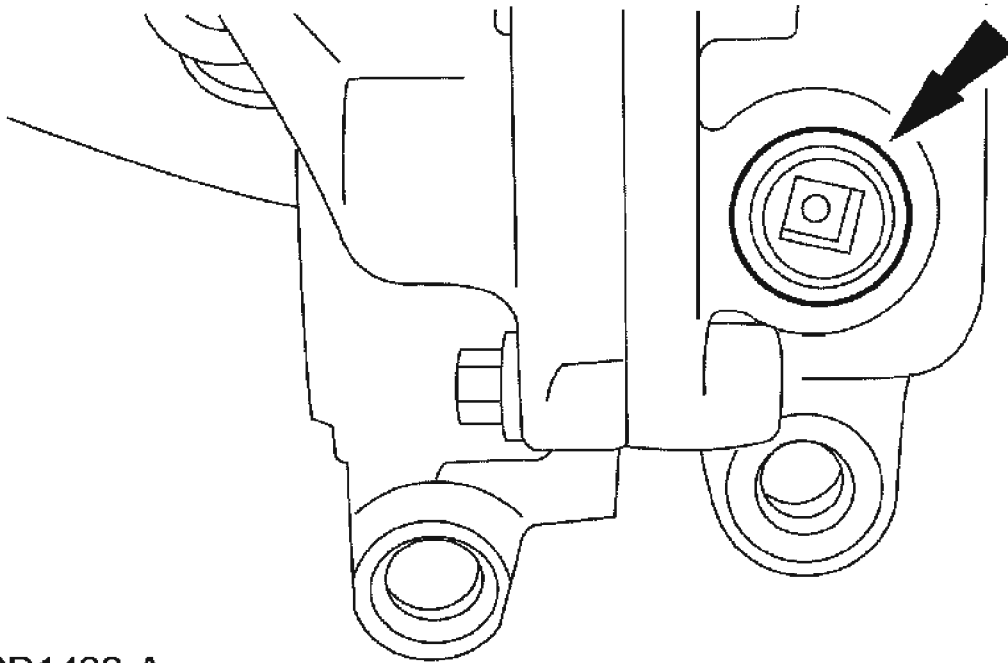
**Fig. 285: Removing Transmission Range (TR) Sensor**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, secure the transaxle to the bench.



**Fig. 286: Securing Transaxle To Bench**  
**Courtesy of FORD MOTOR CO.**

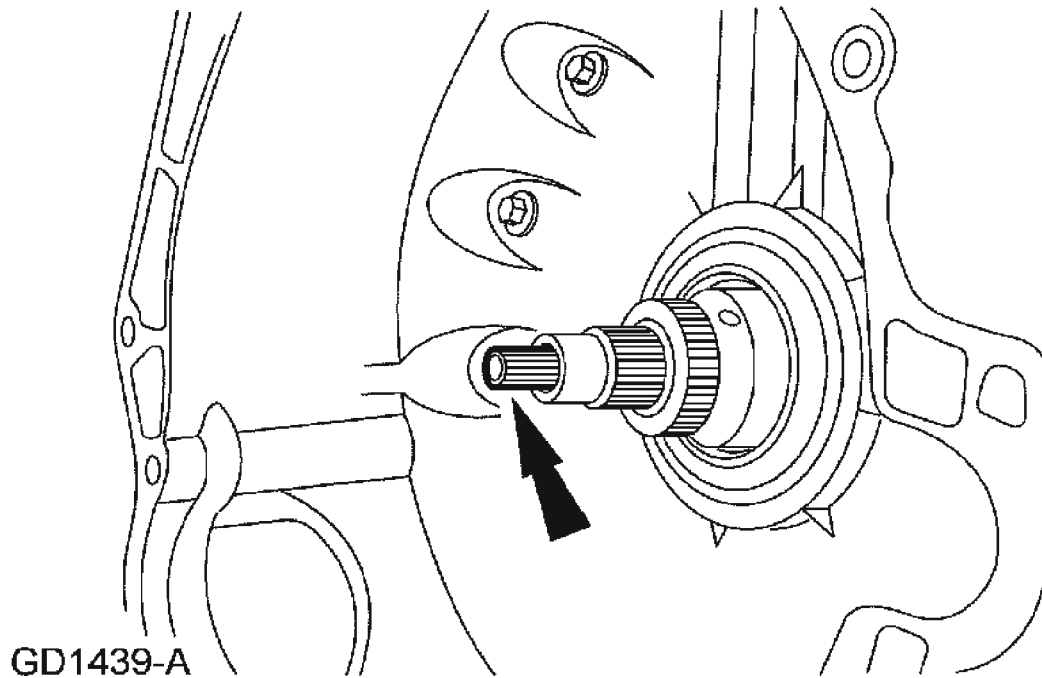
8. Position the drain pan under the transaxle, remove the drain plug, and drain the transmission fluid.



GD1438-A

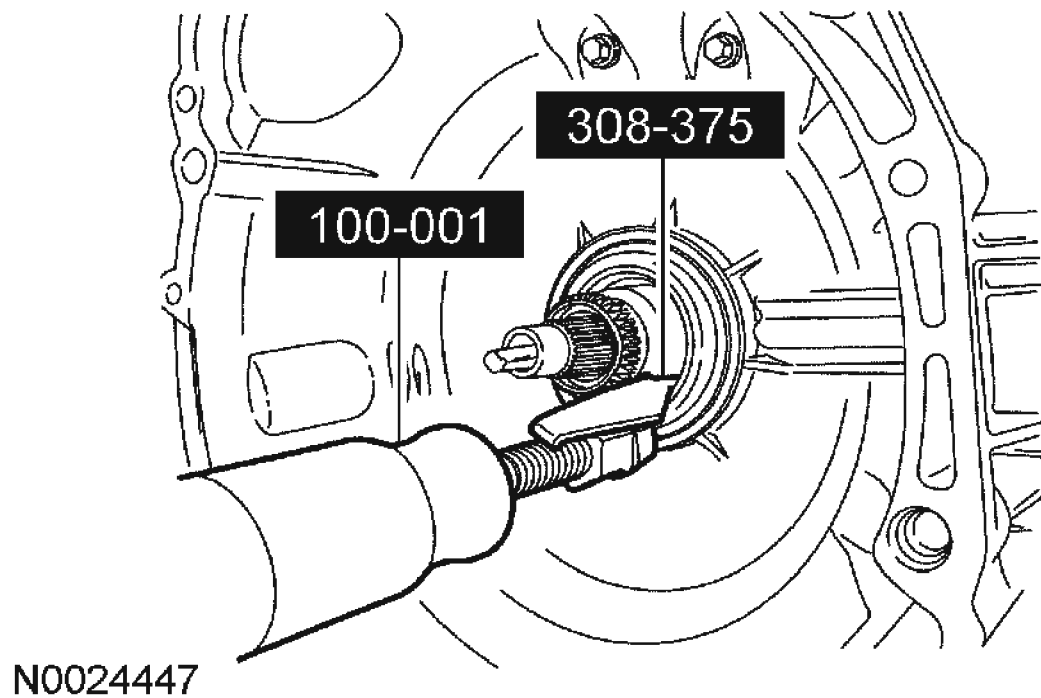
**Fig. 287: Removing Drain Plug**  
**Courtesy of FORD MOTOR CO.**

9. Remove the pump assembly driveshaft.



**Fig. 288: Removing Pump Assembly Driveshaft**  
Courtesy of FORD MOTOR CO.

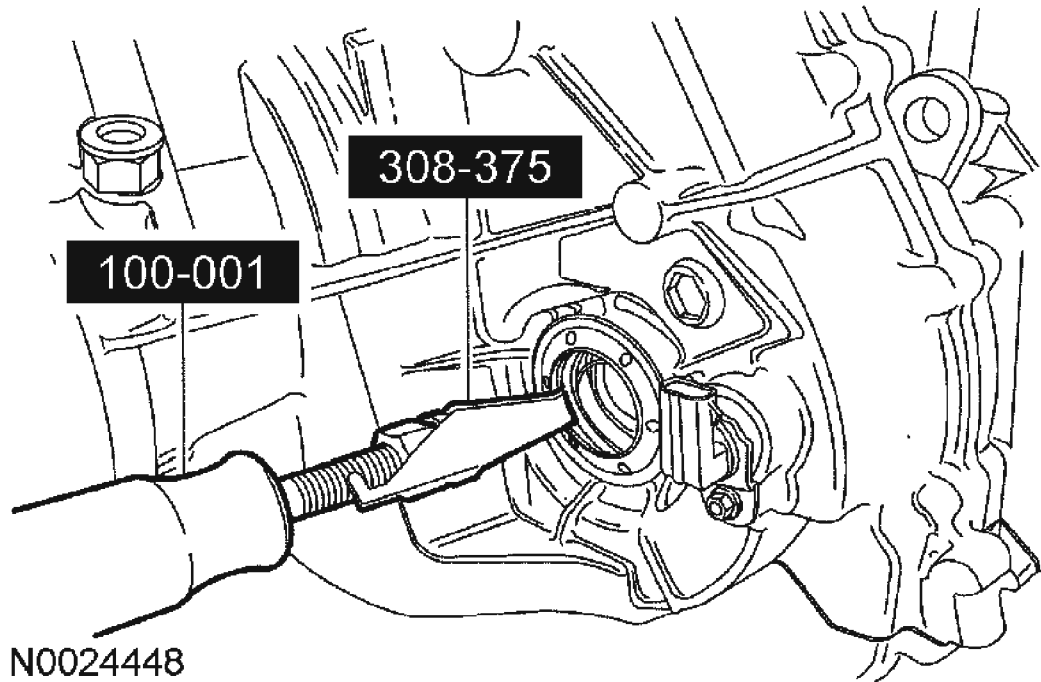
10. Using the special tools, remove and discard the torque converter impeller hub seal.



**Fig. 289: Removing Torque Converter Impeller Hub Seal**  
**Courtesy of FORD MOTOR CO.**

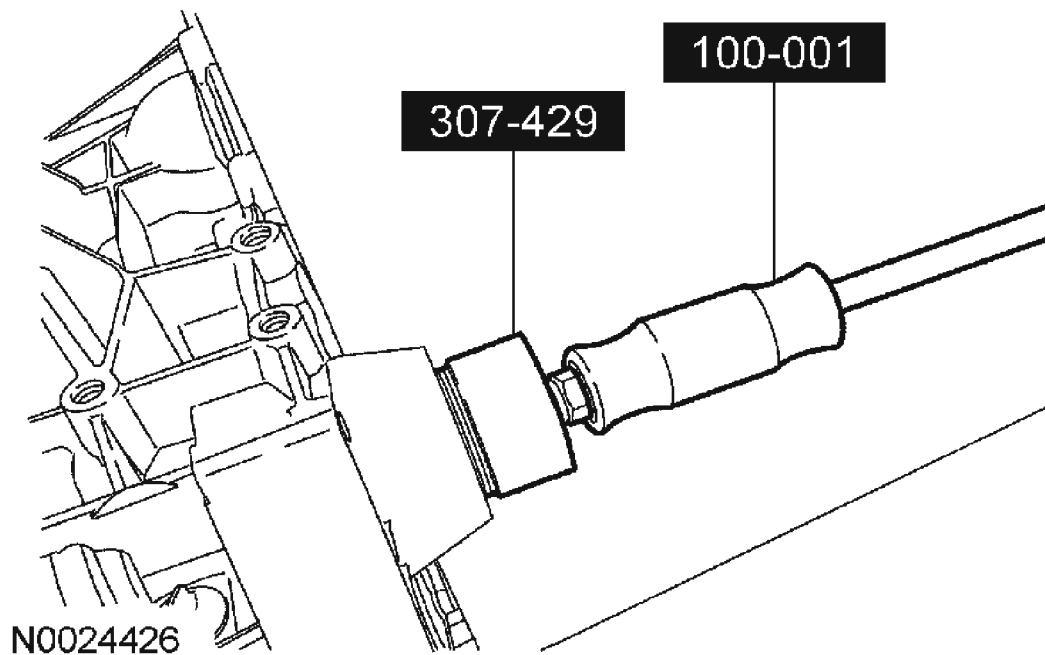
11. Using the special tools, remove the LH differential seal.





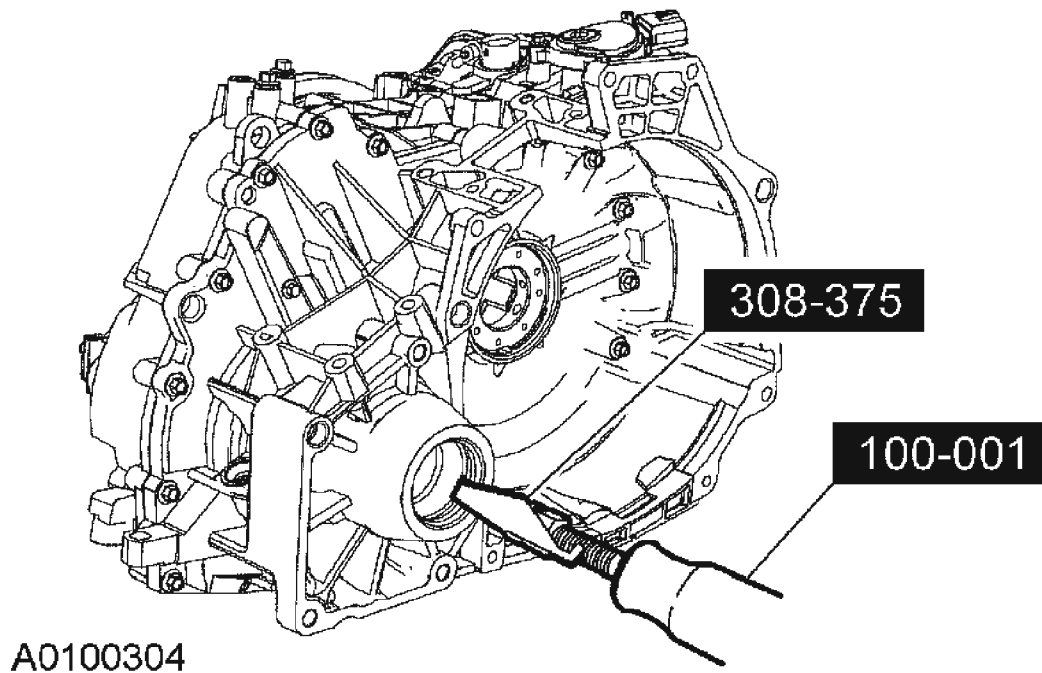
**Fig. 290: Removing LH Differential Seal**  
Courtesy of FORD MOTOR CO.

12. If the vehicle is equipped with a PTO, use the special tools to remove the RH differential seal.



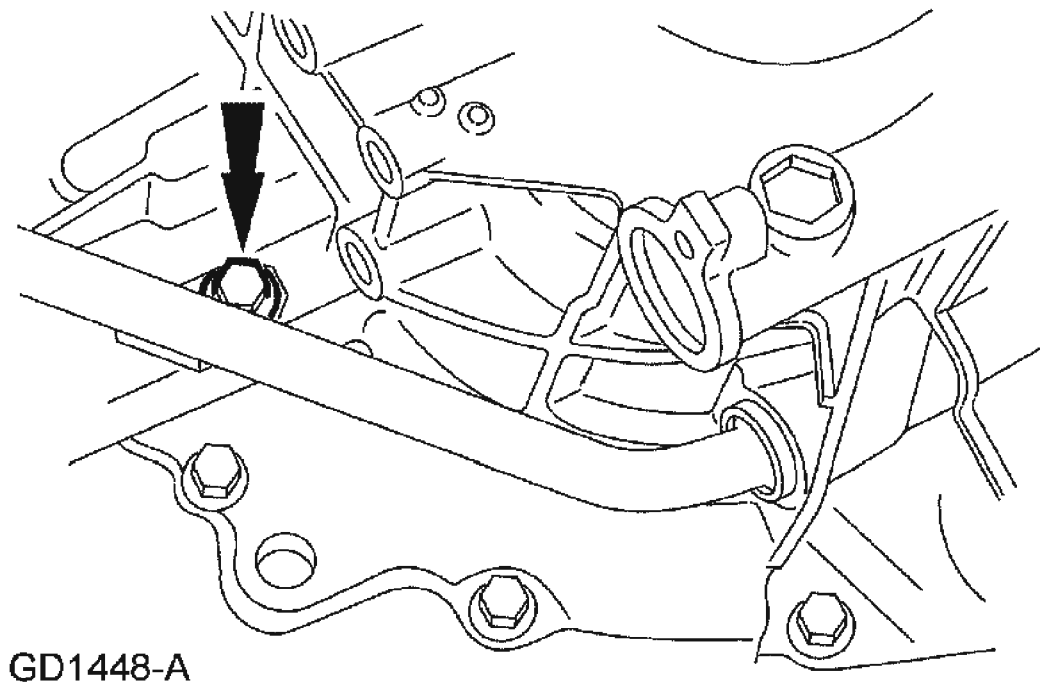
**Fig. 291: Removing RH Differential Seal**  
Courtesy of FORD MOTOR CO.

13. If the vehicle is not equipped with a PTO, use the special tools to remove the RH differential seal.



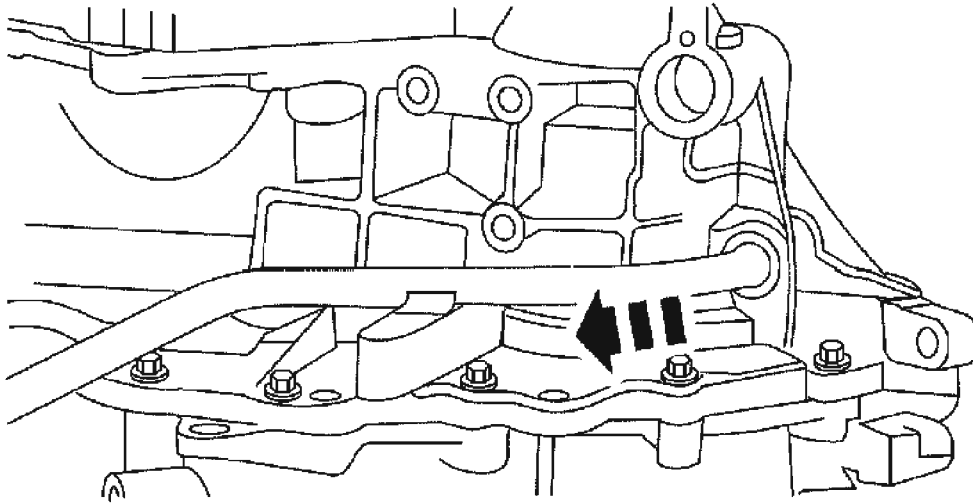
**Fig. 292: Removing RH Differential Seal**  
Courtesy of FORD MOTOR CO.

14. Remove the transaxle fluid filler tube bolt.



**Fig. 293: Removing Transaxle Fluid Filler Tube Bolt**  
Courtesy of FORD MOTOR CO.

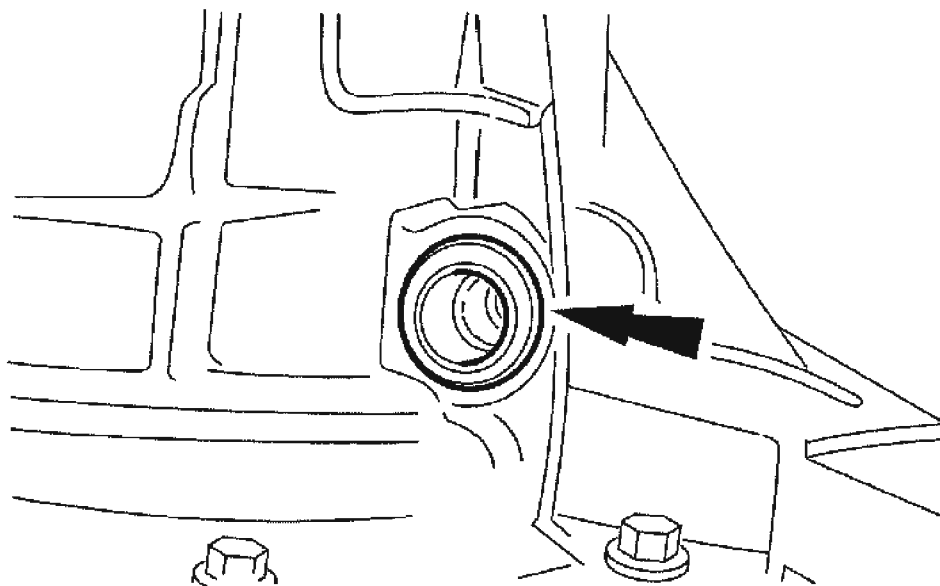
15. Remove the transaxle fluid filler tube.



GD1449-A

**Fig. 294: Removing Transaxle Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

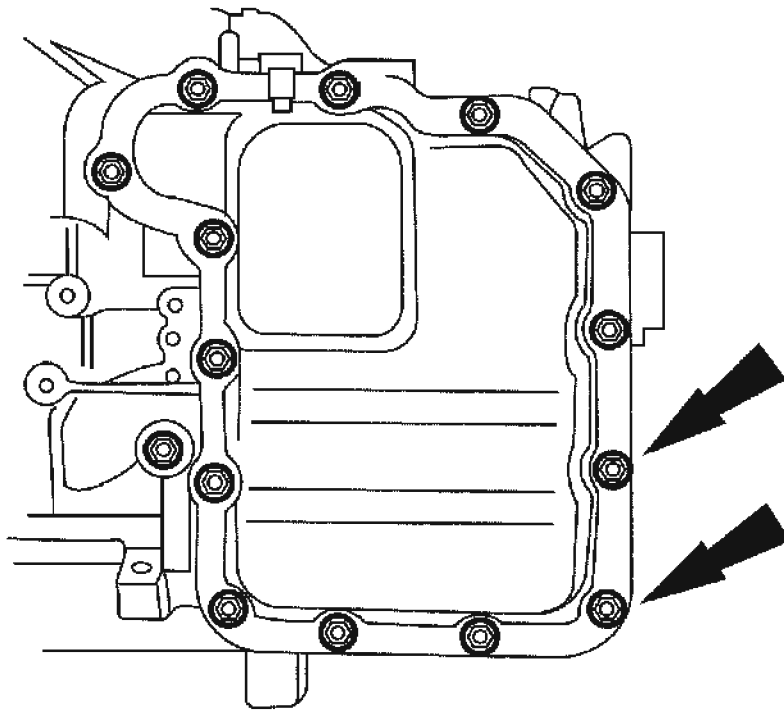
16. Remove and discard the transaxle filler tube grommet.



GD1450-A

**Fig. 295: Removing Transaxle Filler Tube Grommet**  
Courtesy of FORD MOTOR CO.

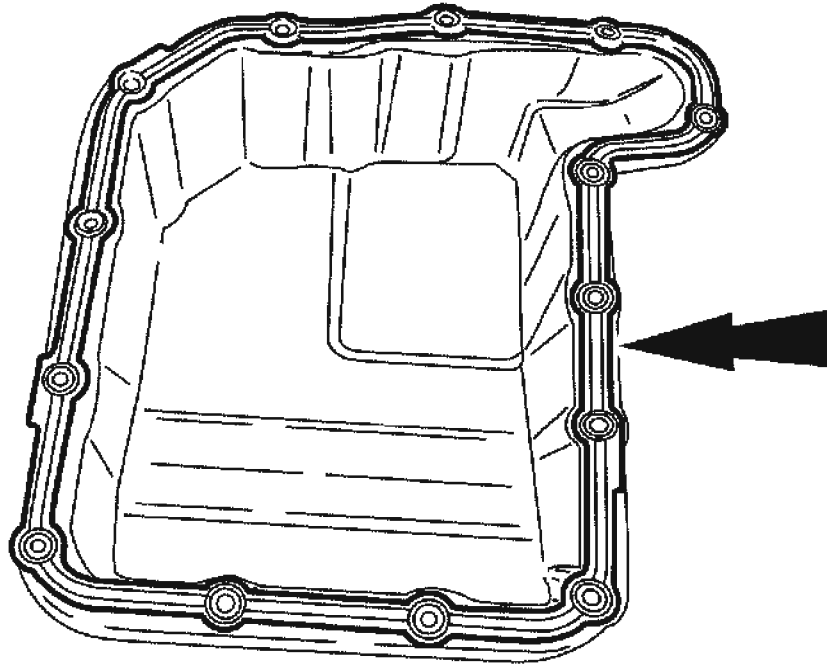
17. Remove the main control cover bolts, studs and cover.



N0014663

**Fig. 296: Removing Main Control Cover Bolts, Studs And Cover**  
Courtesy of FORD MOTOR CO.

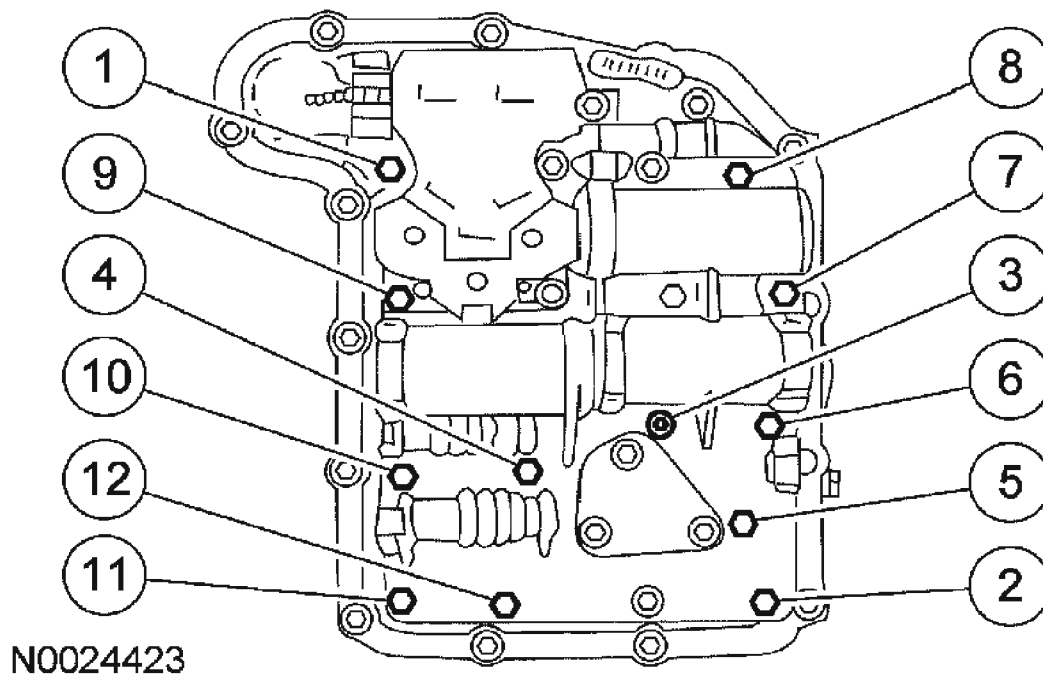
18. Remove the gasket.



A0075576

**Fig. 297: Removing Gasket**  
**Courtesy of FORD MOTOR CO.**

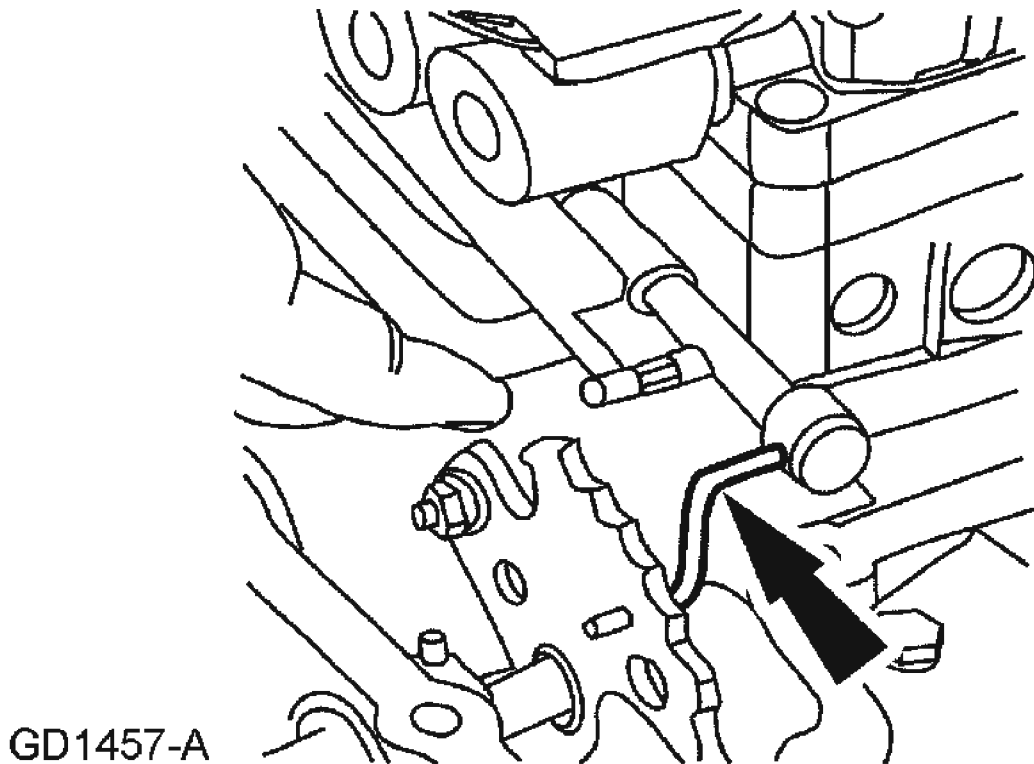
19. Inspect the fitting of the main control cover vent tube for blockage.
20. Remove the main control valve body bolts.



**Fig. 298: Removing Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

21. Disconnect the manual valve link from the manual valve when lifting the main control valve body from the case.

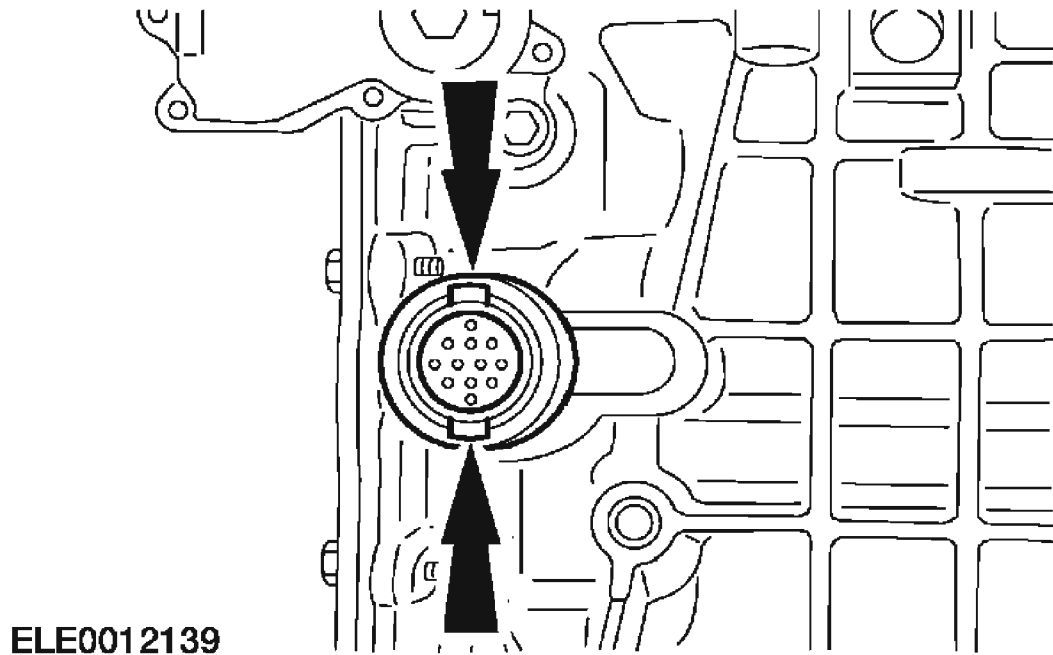




**Fig. 299: Disconnecting Manual Valve Link From Manual Valve**  
Courtesy of FORD MOTOR CO.

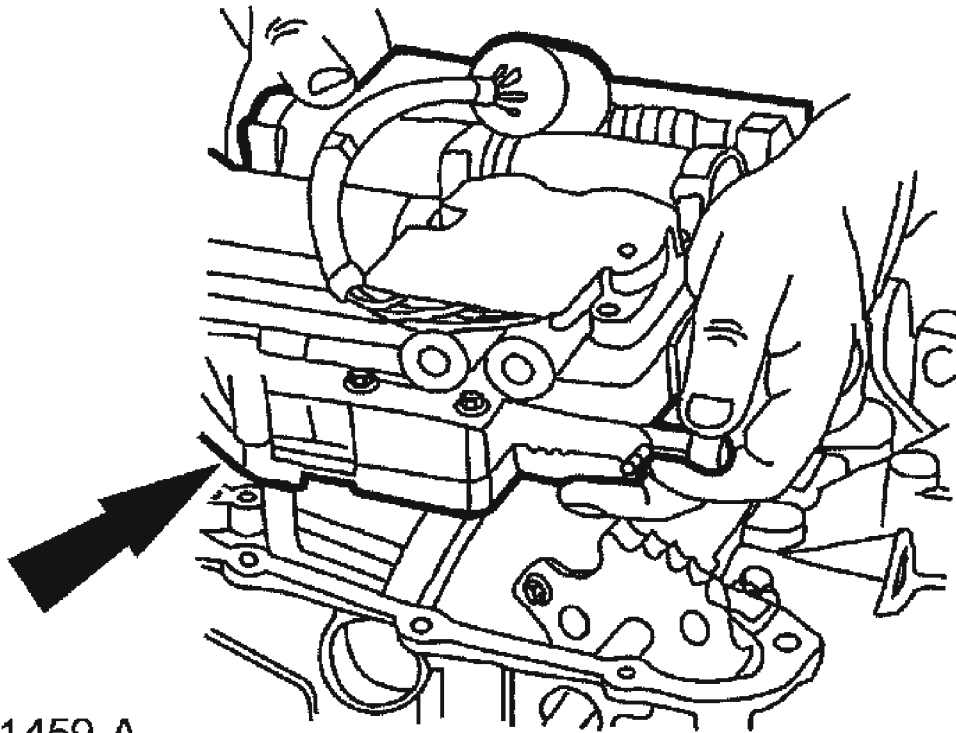
**CAUTION:** Do not pull on solenoid body electrical connector wires, or use a hammer on the electrical connector.

22. Remove the solenoid body electrical connector.
  - Release the retaining tabs and push the connector through the transaxle case.



**Fig. 300: Removing Solenoid Body Electrical Connector**  
Courtesy of FORD MOTOR CO.

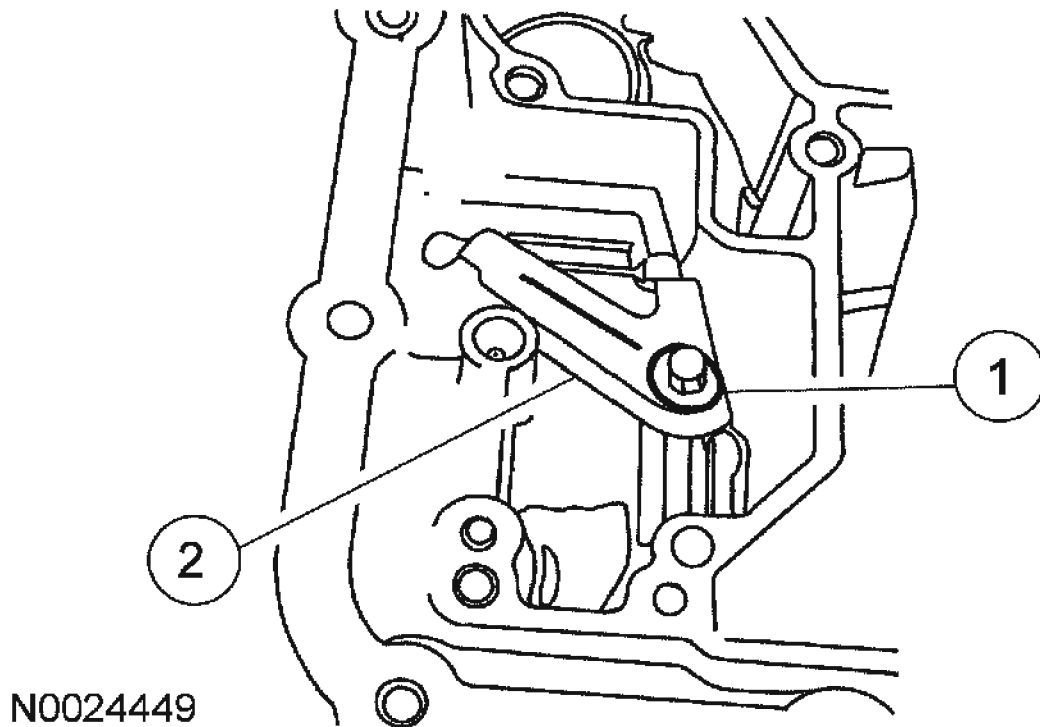
23. Support the manual valve and remove the main control.



GD1459-A

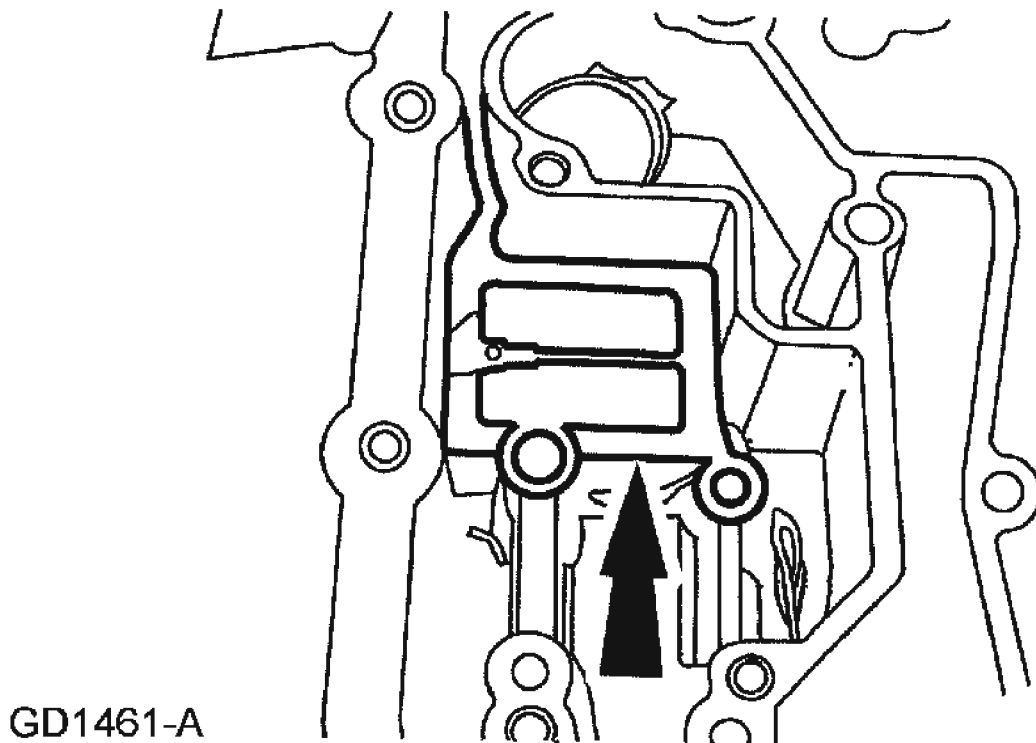
**Fig. 301: Removing Main Control**  
Courtesy of FORD MOTOR CO.

24. Remove the thermostatic fluid level control valve bracket.
  1. Remove the bolt.
  2. Remove the bracket.



**Fig. 302: Removing Thermostatic Fluid Level Control Valve Bracket**  
Courtesy of FORD MOTOR CO.

25. Remove the thermostatic fluid level control valve.

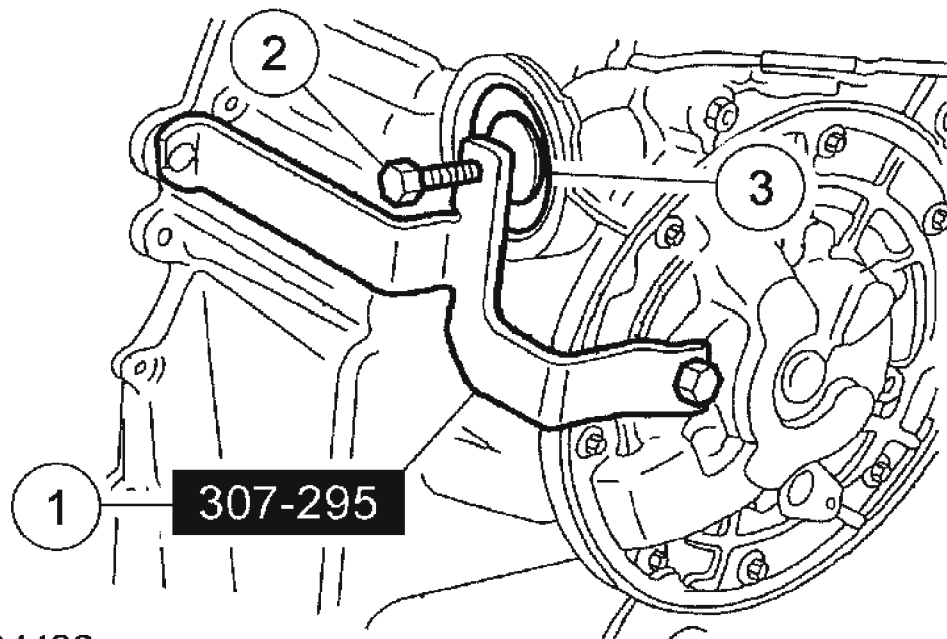


**Fig. 303: Removing Thermostatic Fluid Level Control Valve**  
Courtesy of FORD MOTOR CO.

**WARNING:** The servo and servo cover are under high spring force. Use caution when removing servo cover. Failure to follow these instructions can result in personal injury.

**CAUTION:** Do not use a screwdriver to remove the retaining ring or damage to the case can occur. Use only snap ring pliers to remove the retaining ring.

26. Using the special tool, remove the servo assembly.
  1. Install the special tool.
  2. Compress the servo assembly by tightening the bolt.
  3. Remove the retaining ring.



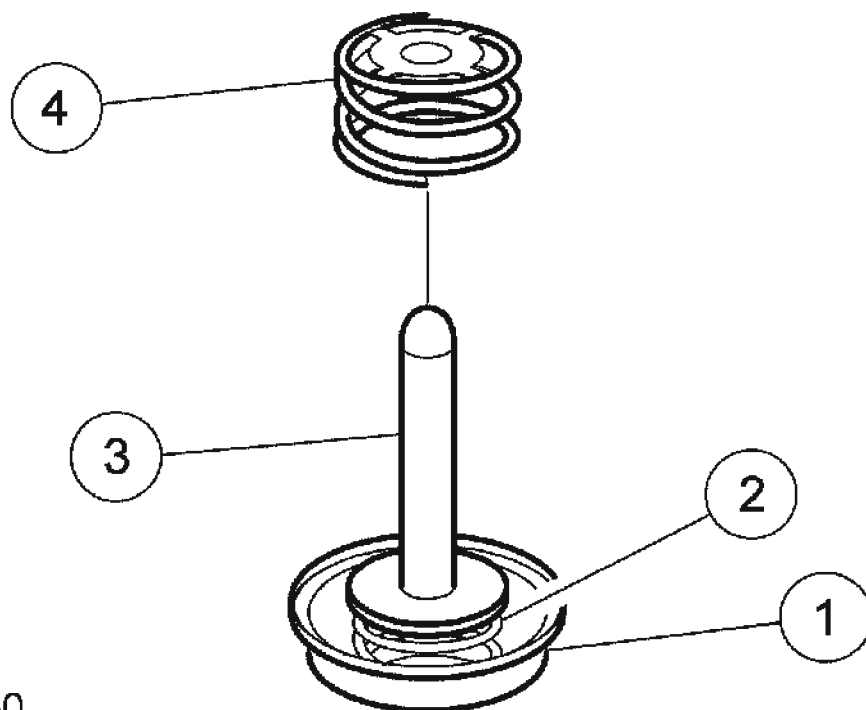
N0024428

**Fig. 304: Removing Servo Assembly**  
Courtesy of FORD MOTOR CO.

27. Remove the servo cover assembly.
28. Remove the intermediate and overdrive servo piston and return spring.

**NOTE:** If the bonded seal is damaged, install a new servo assembly.

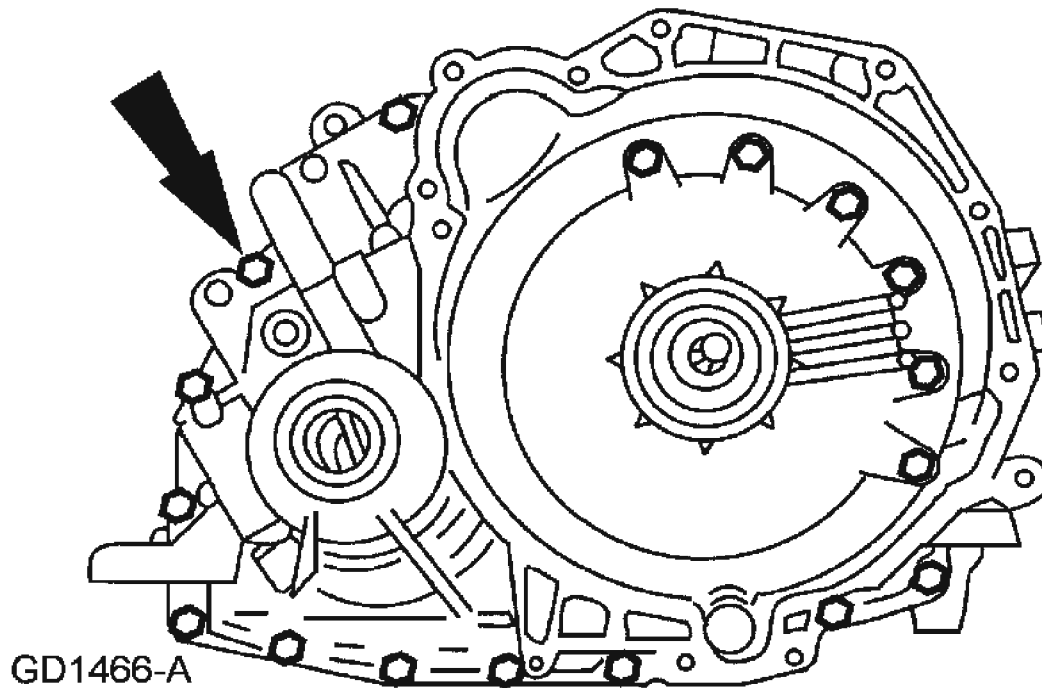
29. Inspect the intermediate and overdrive servo assembly and bore for damage or wear.
  1. Servo cover with bonded seal.
  2. Cushion spring
  3. Servo apply rod
  4. Servo return spring
    - Case servo bore



N0024450

**Fig. 305: Inspecting Intermediate And Overdrive Servo Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Position the transaxle with the torque converter housing facing upward.



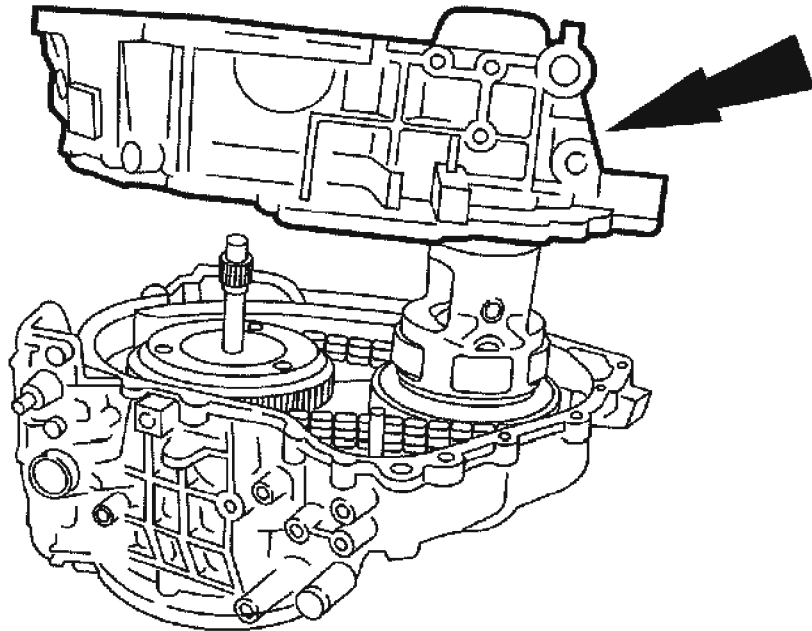
**Fig. 306: Removing Bolts**  
Courtesy of FORD MOTOR CO.

30. Remove the 20 bolts.

**NOTE:** Place the torque converter housing on the engine flange side after removal to prevent damage to the lube tube.

31. Separate the torque converter housing from the transaxle case.
  - Remove and discard the transaxle split flange gasket.

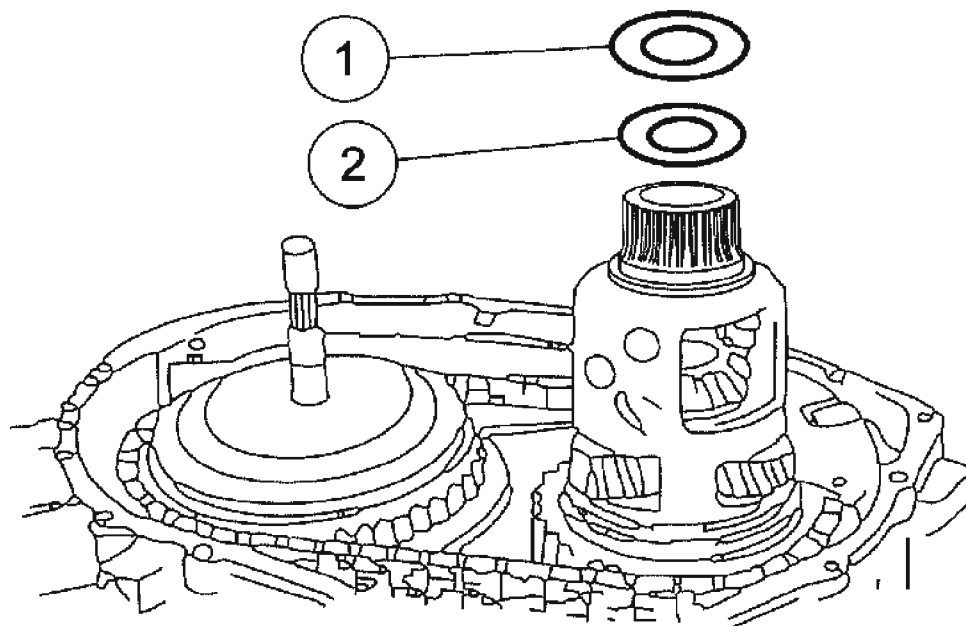




GD3391-A

**Fig. 307: Separating Torque Converter Housing From Transaxle Case**  
**Courtesy of FORD MOTOR CO.**

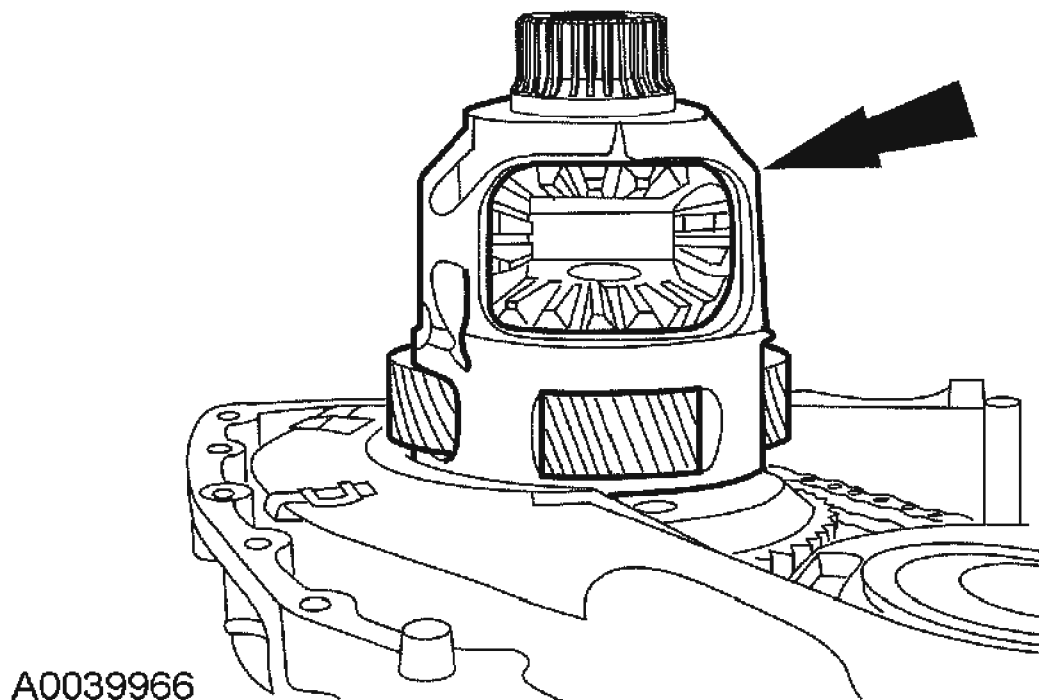
32. Remove the differential bearing and shim.
  1. Remove the No. 15 differential bearing.
  2. Remove the No. 14 differential bearing shim.



N0024451

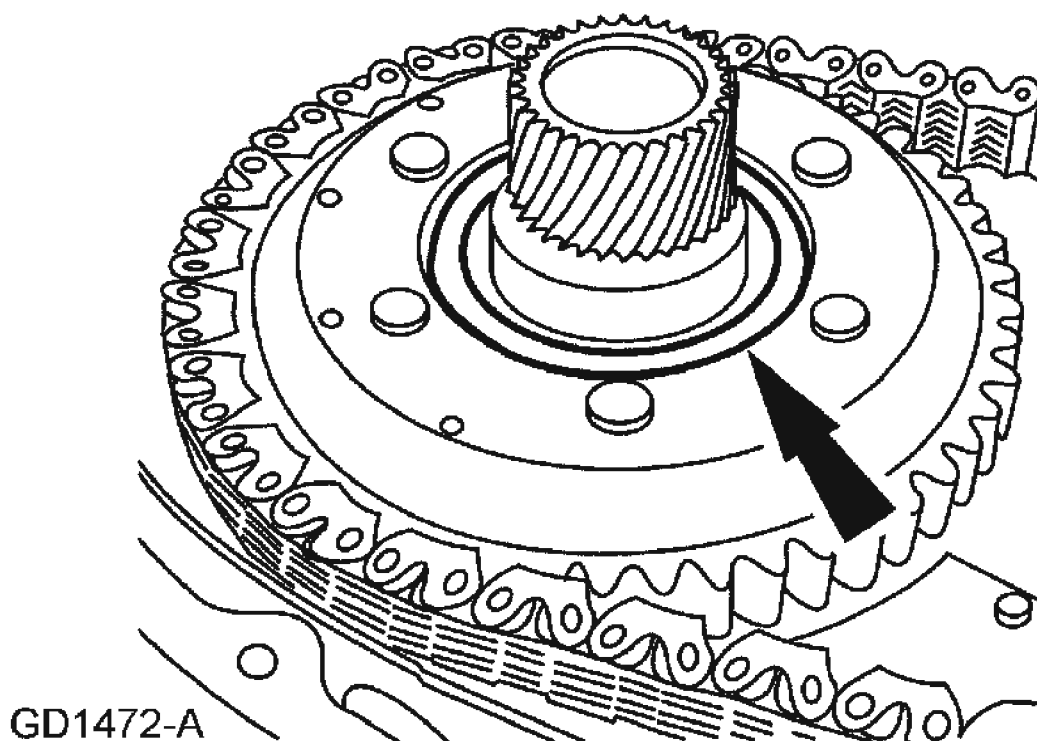
**Fig. 308: Removing Differential Bearing And Shim**  
Courtesy of FORD MOTOR CO.

**NOTE:** The all wheel drive differential is shown. The front wheel drive differential may or may not have splines.



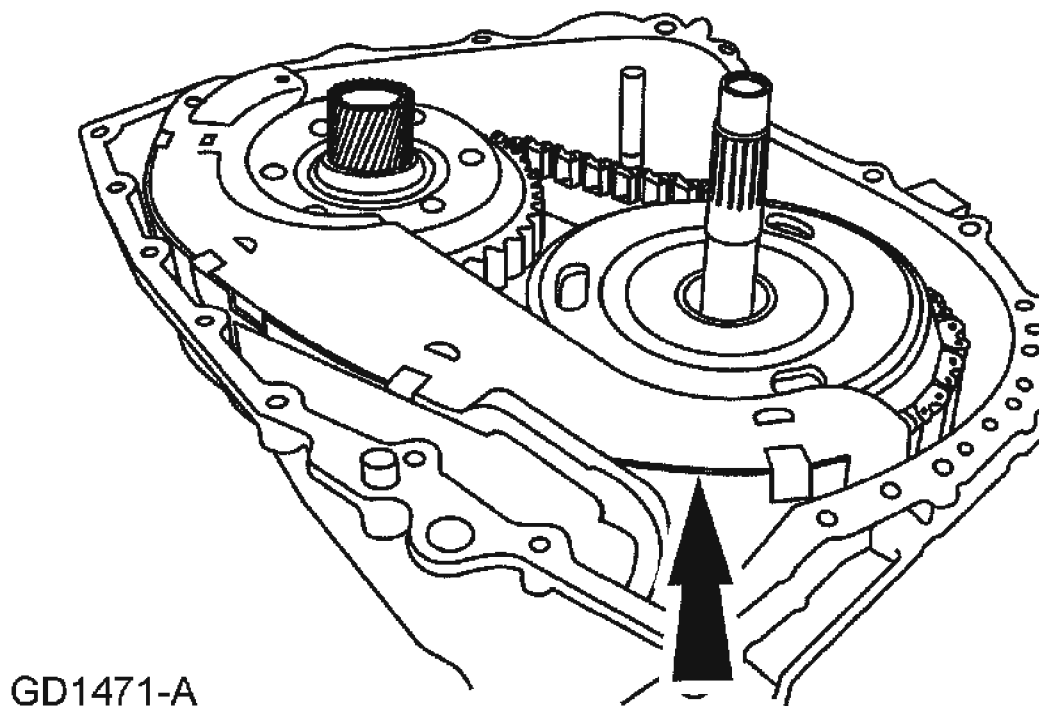
**Fig. 309: Removing Final Drive Carrier And Differential Assembly**  
Courtesy of FORD MOTOR CO.

33. Remove the final drive carrier and differential assembly.
34. Remove the No. 13 driven sprocket thrust bearing.



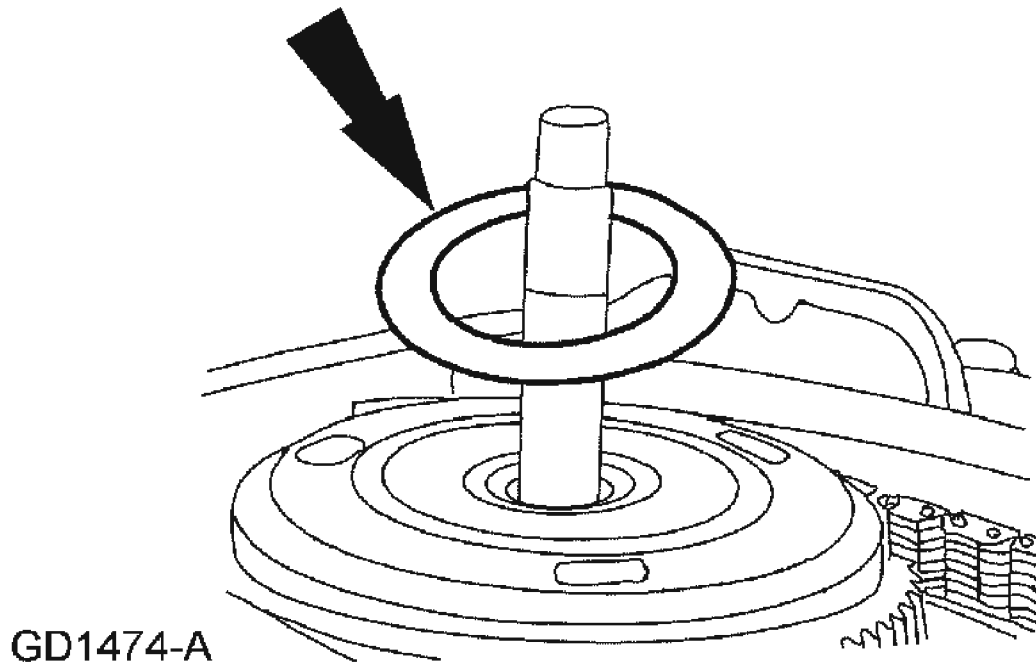
**Fig. 310: Removing No 13 Driven Sprocket Thrust Bearing**  
**Courtesy of FORD MOTOR CO.**

35. Unclip and remove the chain pan cover.



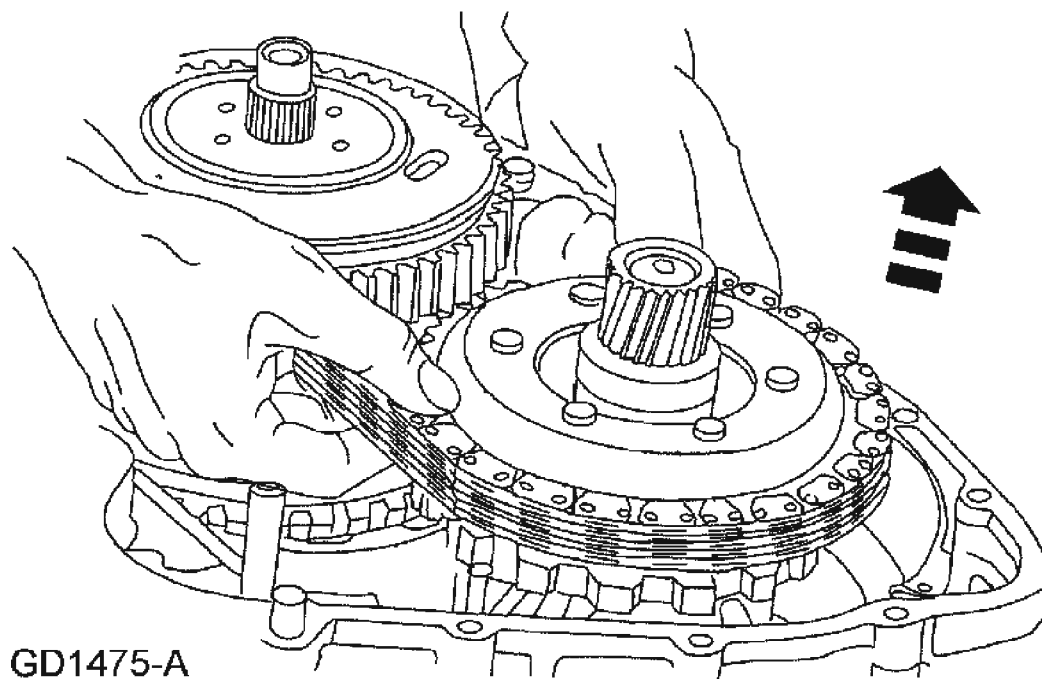
**Fig. 311: Removing Chain Pan Cover**  
Courtesy of FORD MOTOR CO.

**NOTE:** The driven sprocket thrust washer may adhere to the converter housing.



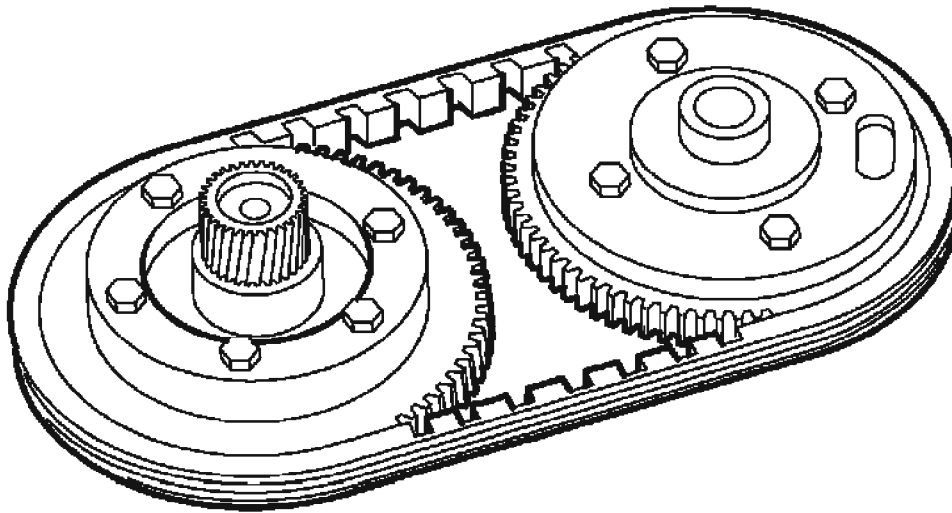
**Fig. 312: Removing No 10 Driven Sprocket Thrust Washer From Reverse/Overdrive Ring Gear Assembly**  
Courtesy of FORD MOTOR CO.

36. Remove the No. 10 driven sprocket thrust washer from the reverse/overdrive ring gear assembly.
37. Remove the chain drive, reverse/overdrive ring gear and driven sprocket assembly.



**Fig. 313: Removing Chain Drive**  
Courtesy of FORD MOTOR CO.

38. Separate the drive chain assembly from the driven sprocket assembly and reverse/overdrive ring gear assembly.

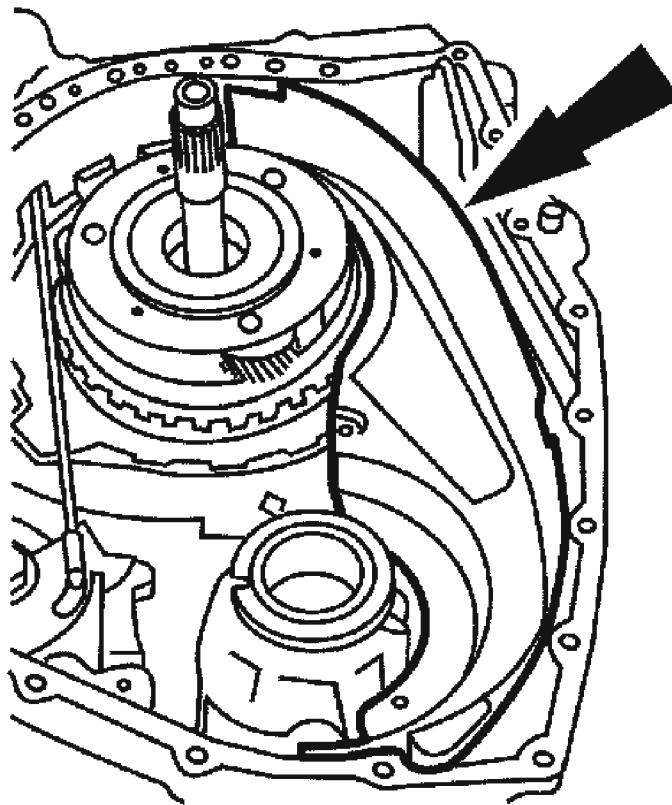


ELE0012143

**Fig. 314: Separating Drive Chain Assembly From Driven Sprocket Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:**      Inspect the magnet located on the chain pan for excessive metal particles.

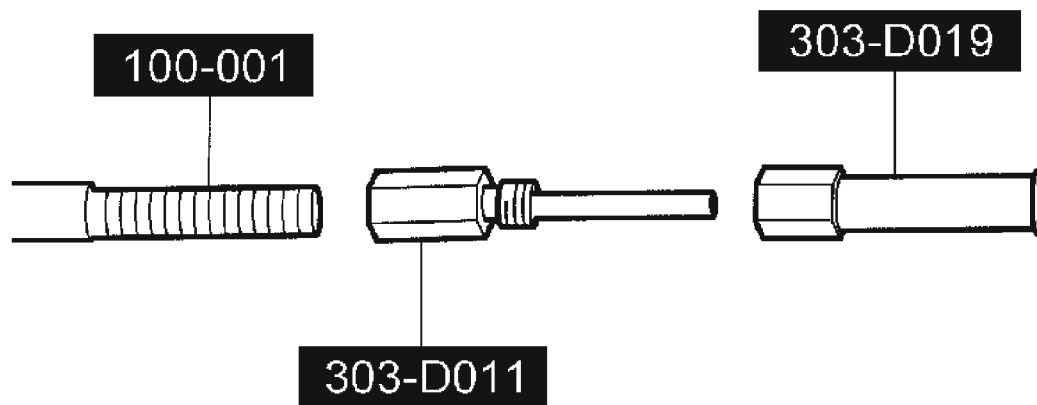




GD1477-A

**Fig. 315: Removing Chain Pan (With Magnet Retained) From Transaxle Case**  
Courtesy of FORD MOTOR CO.

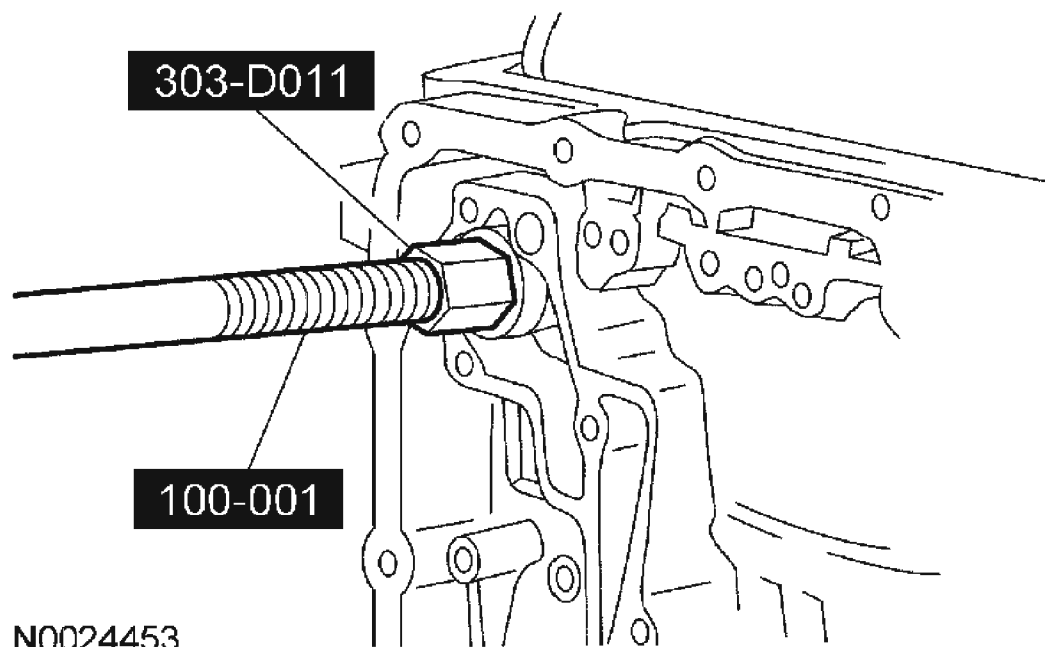
39. Remove the chain pan (with the magnet retained) from the transaxle case.
40. Assemble the special tools.



N0024452

**Fig. 316: Assembling Special Tools**  
Courtesy of FORD MOTOR CO.

41. Using the special tools, remove and discard fluid filter recirculating regulator exhaust seal.

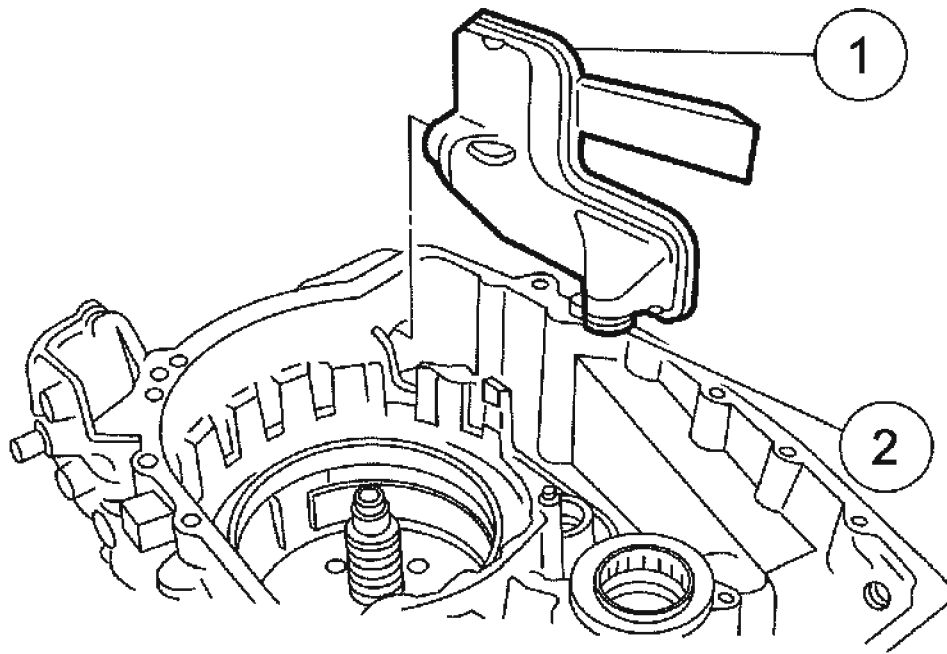


N0024453

**Fig. 317: Removing Fluid Filter Recirculating Regulator Exhaust Seal**

Courtesy of FORD MOTOR CO.

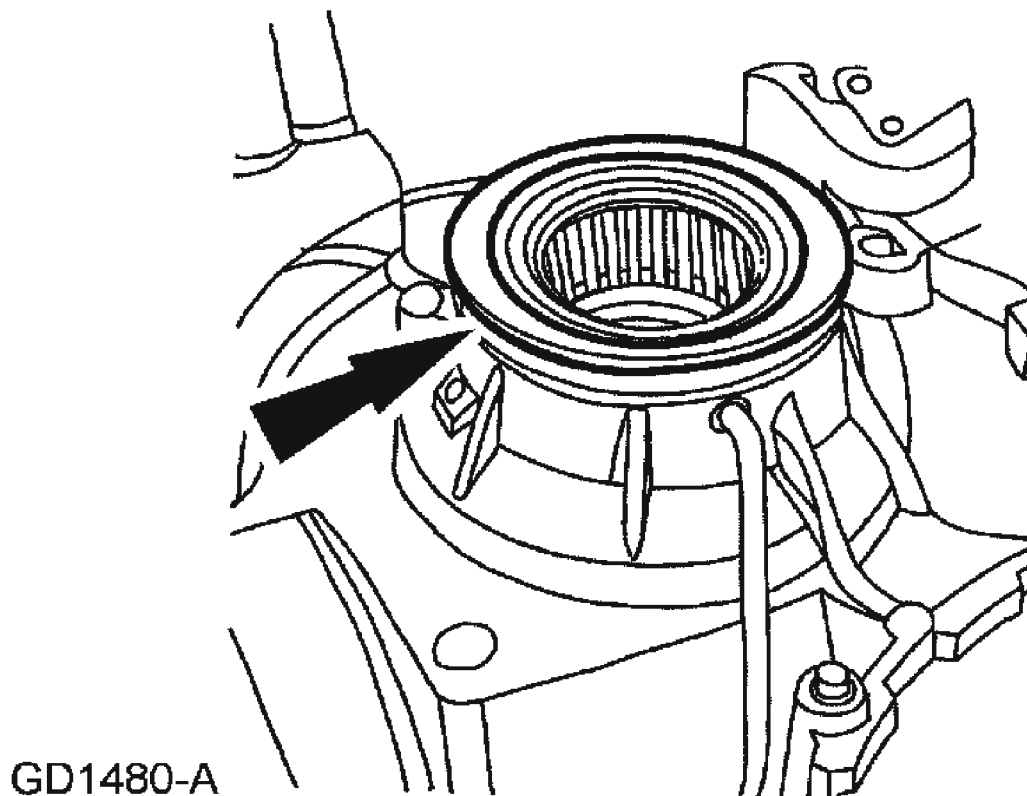
42. Remove the fluid filter and seal assembly.
  1. Discard the fluid filter.
  2. Discard the fluid filter seal.



N0024454

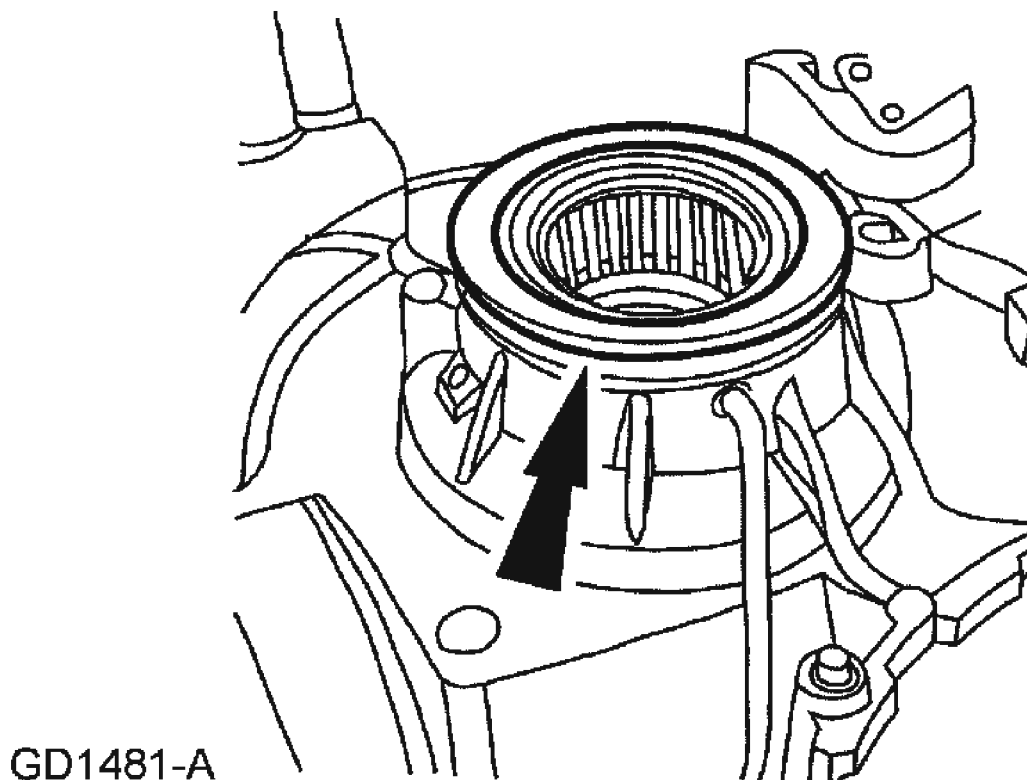
**Fig. 318: Removing Fluid Filter And Seal Assembly**  
Courtesy of FORD MOTOR CO.

43. Remove the No. 12 driven sprocket bearing.



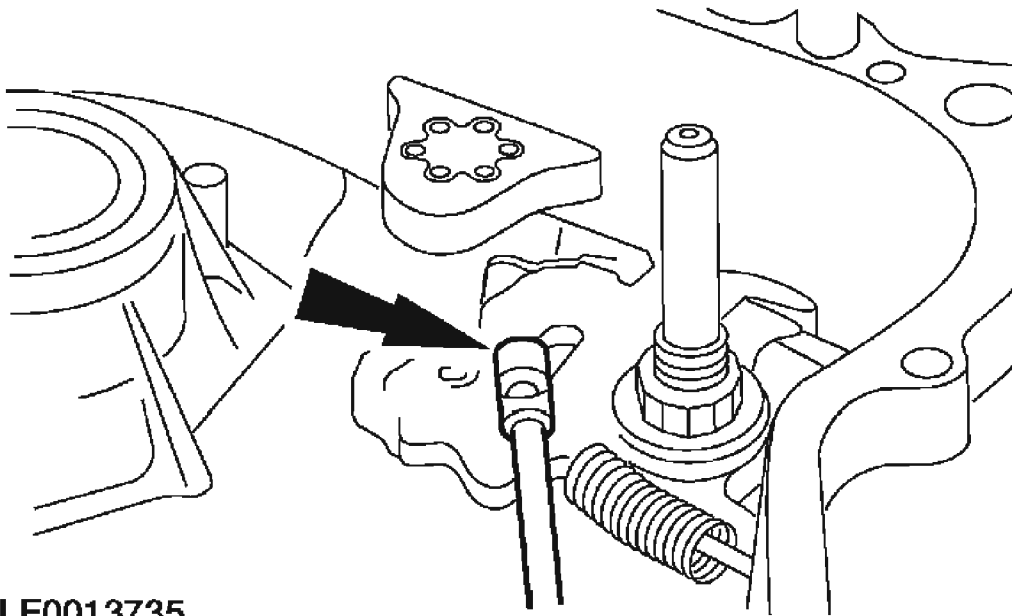
**Fig. 319: Removing No 12 Driven Sprocket Bearing**  
**Courtesy of FORD MOTOR CO.**

44. Remove the No. 11 driven sprocket shim (selective fit).



**Fig. 320: Removing No 11 Driven Sprocket Shim (Selective Fit)**  
**Courtesy of FORD MOTOR CO.**

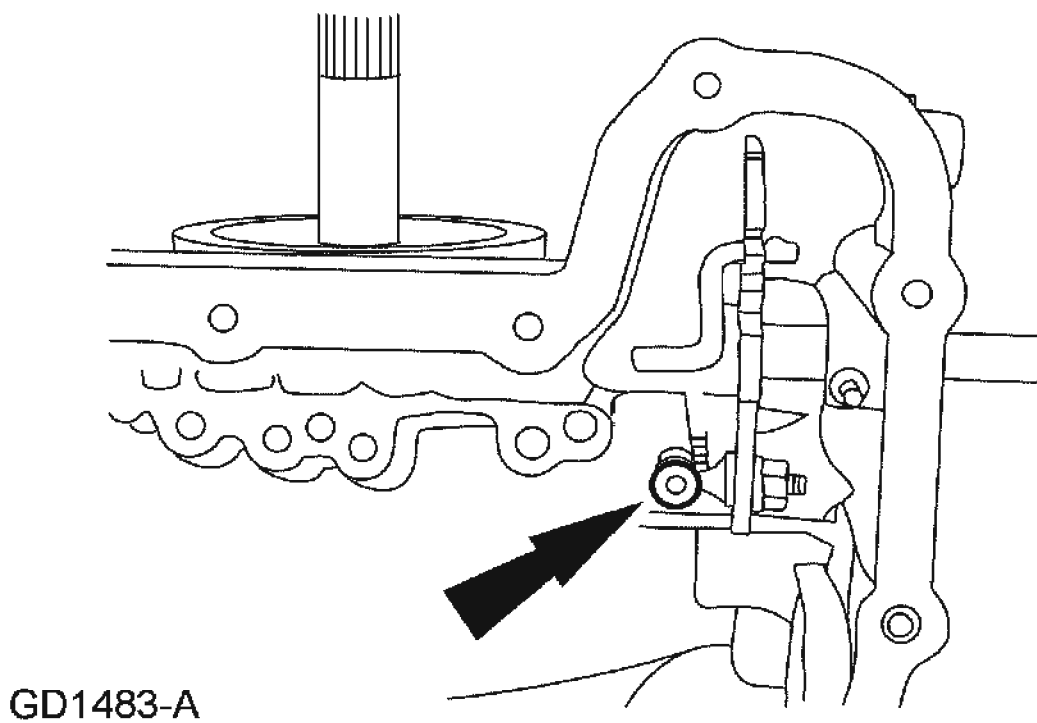
45. Disconnect the parking lever actuating rod from the parking cam actuator lever assembly.



ELE0013735

**Fig. 321: Disconnecting Parking Lever Actuating Rod From Parking Cam Actuator Lever Assembly**  
Courtesy of FORD MOTOR CO.

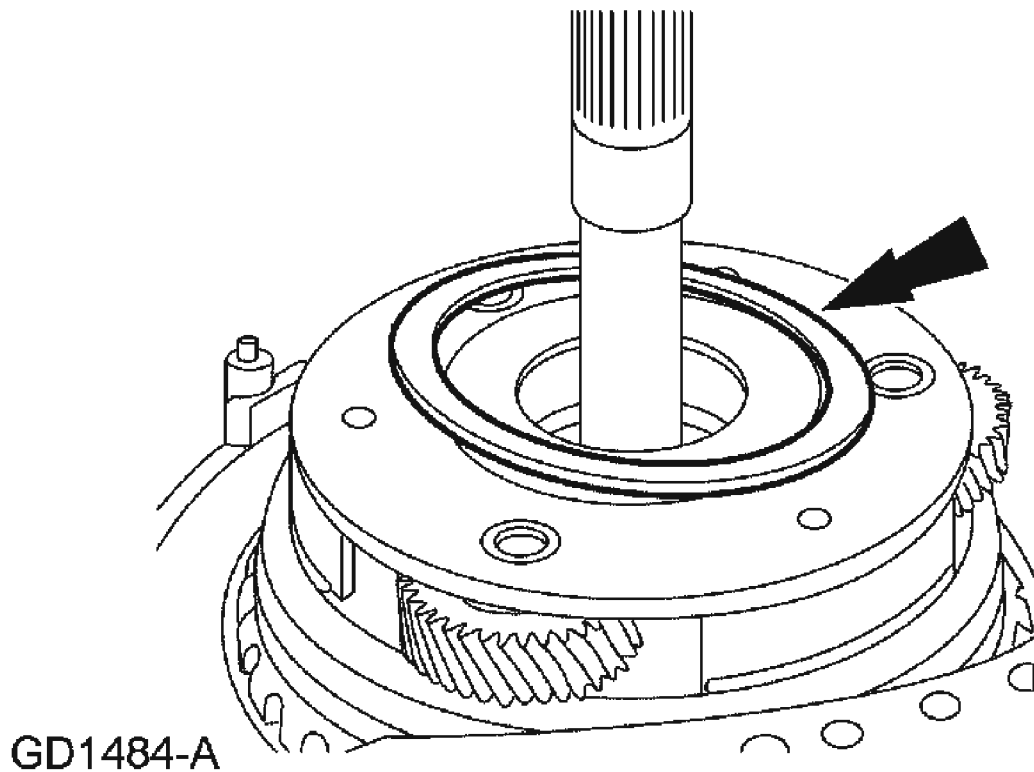
46. Disconnect the parking lever actuation rod from the manual valve detent lever, and remove the parking lever actuation rod.



**Fig. 322: Disconnecting Parking Lever Actuation Rod From Manual Valve Detent Lever**

Courtesy of FORD MOTOR CO.

**NOTE:** The thrust bearing may adhere to the reverse/overdrive sprocket.

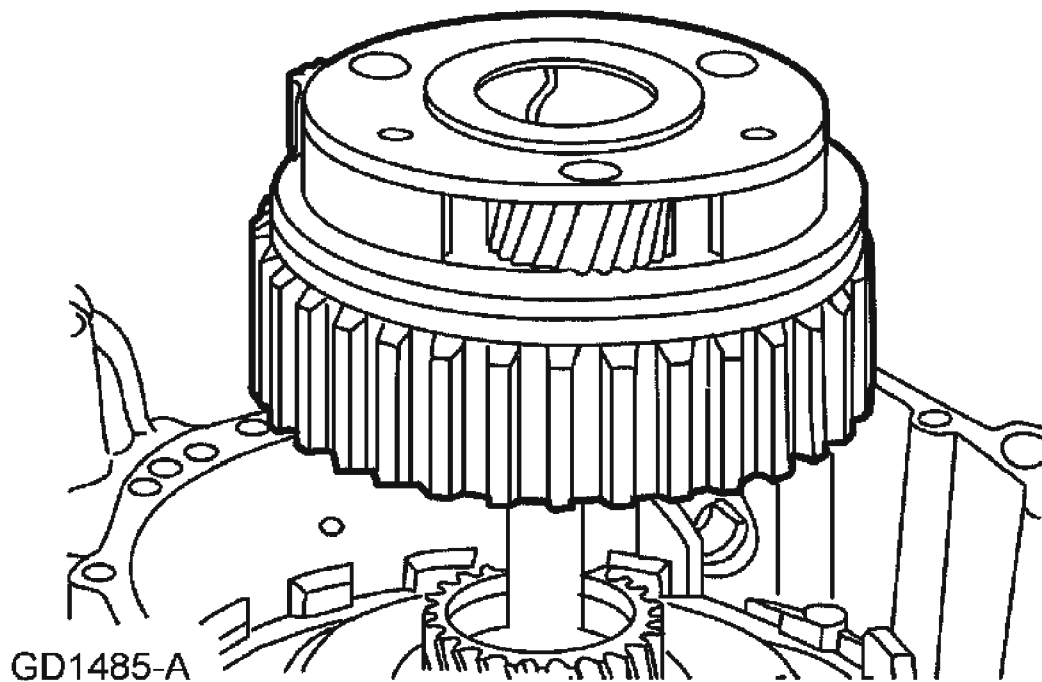


**Fig. 323: Removing No 9 Reverse/Overdrive Ring Gear Thrust Bearing**  
Courtesy of FORD MOTOR CO.

47. Remove the No. 9 reverse/overdrive ring gear thrust bearing.

**NOTE:** The thrust bearing is part of the reverse/overdrive carrier assembly.

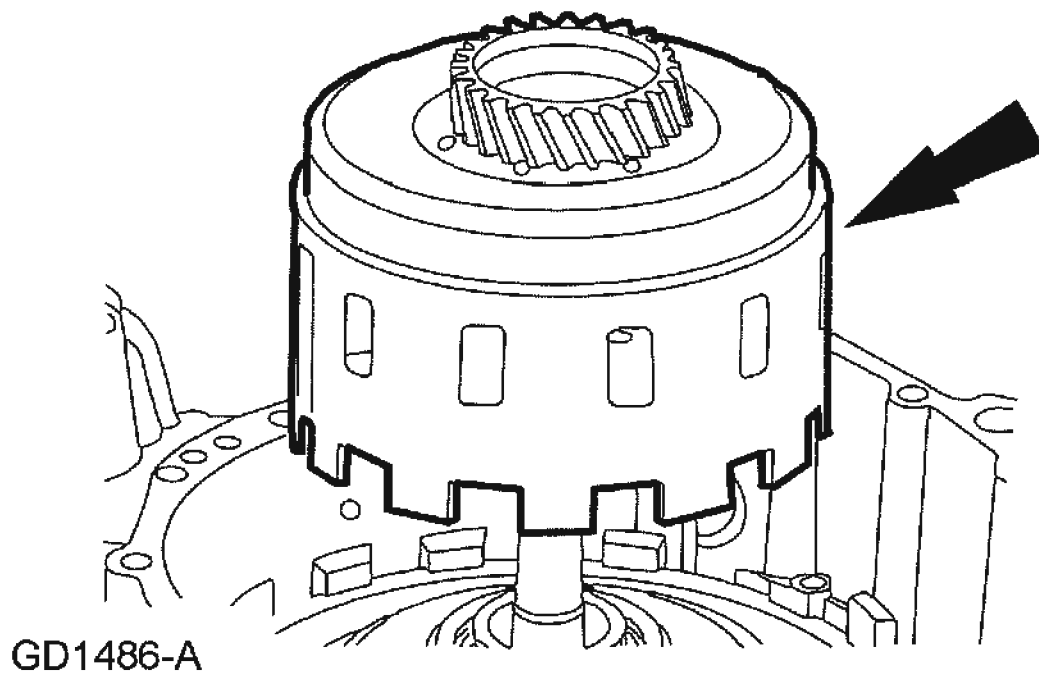




**Fig. 324: Removing Reverse/Overdrive Carrier Assembly With Captured No 8 Thrust Bearing**

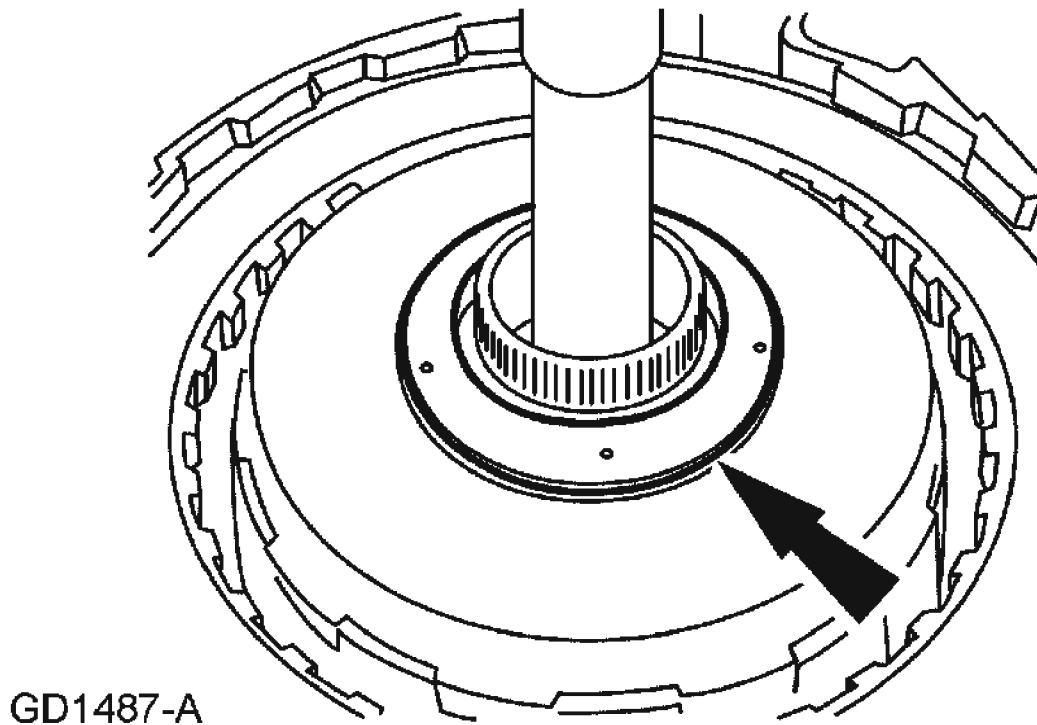
**Courtesy of FORD MOTOR CO.**

48. Remove the reverse/overdrive carrier assembly with captured No. 8 thrust bearing.
49. Remove the reverse/overdrive sun gear and shell assembly.



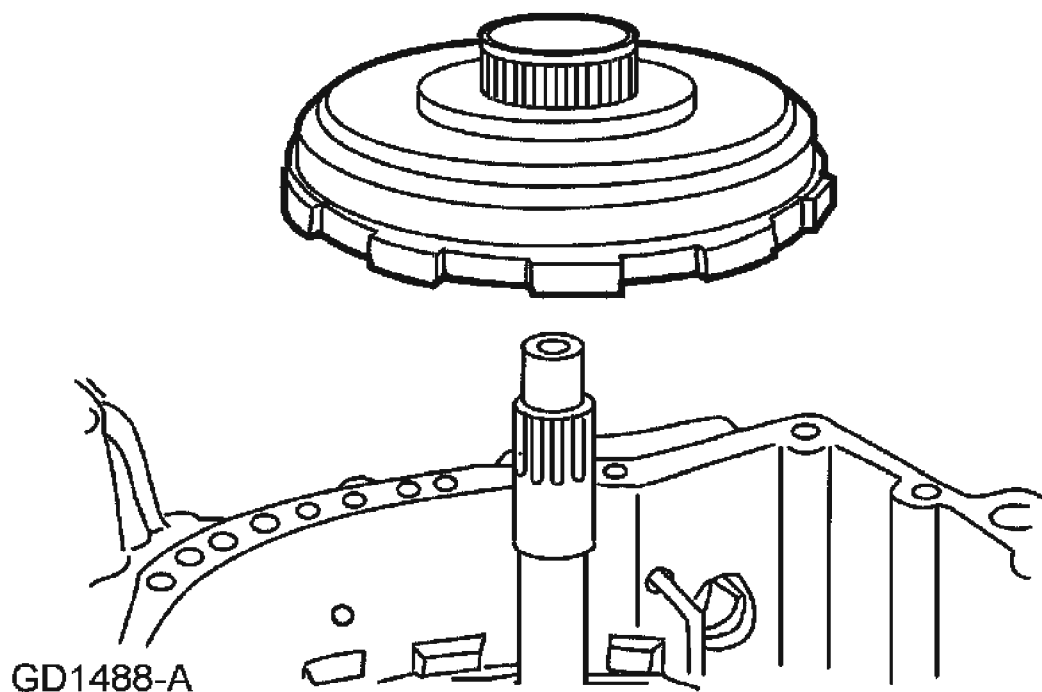
**Fig. 325: Removing Reverse/Overdrive Sun Gear And Shell Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** The thrust bearing may adhere to the reverse/overdrive sun gear and shell.



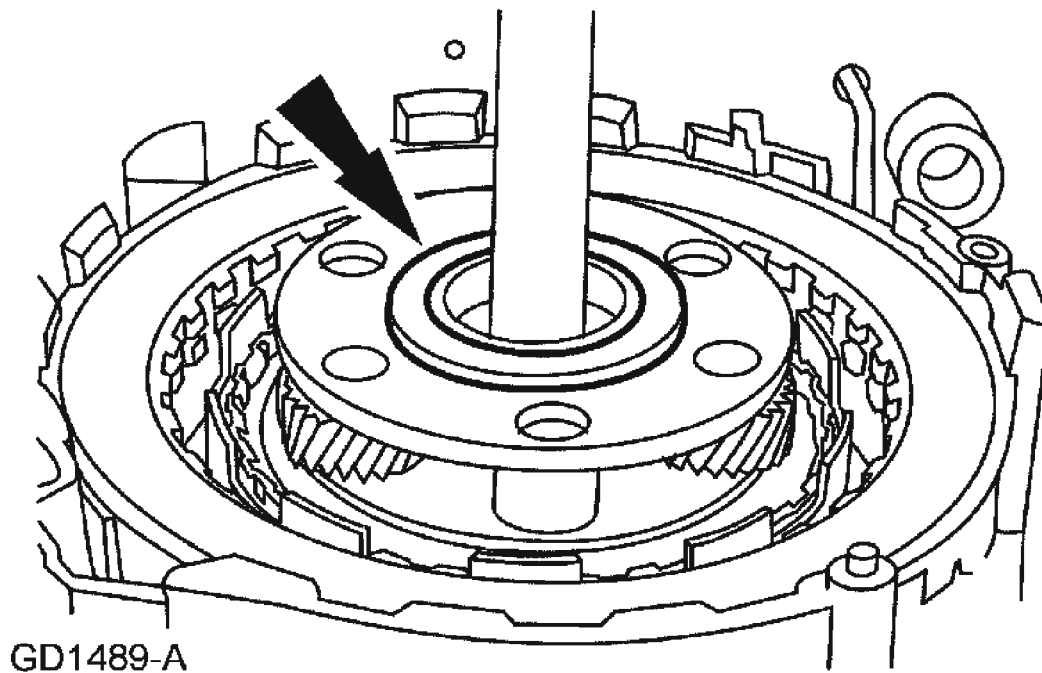
**Fig. 326: Removing Reverse/Overdrive Sun Gear And No 7 Shell Thrust Bearing**  
Courtesy of FORD MOTOR CO.

50. Remove the reverse/overdrive sun gear and No. 7 shell thrust bearing.
51. Remove the low/intermediate ring gear assembly.



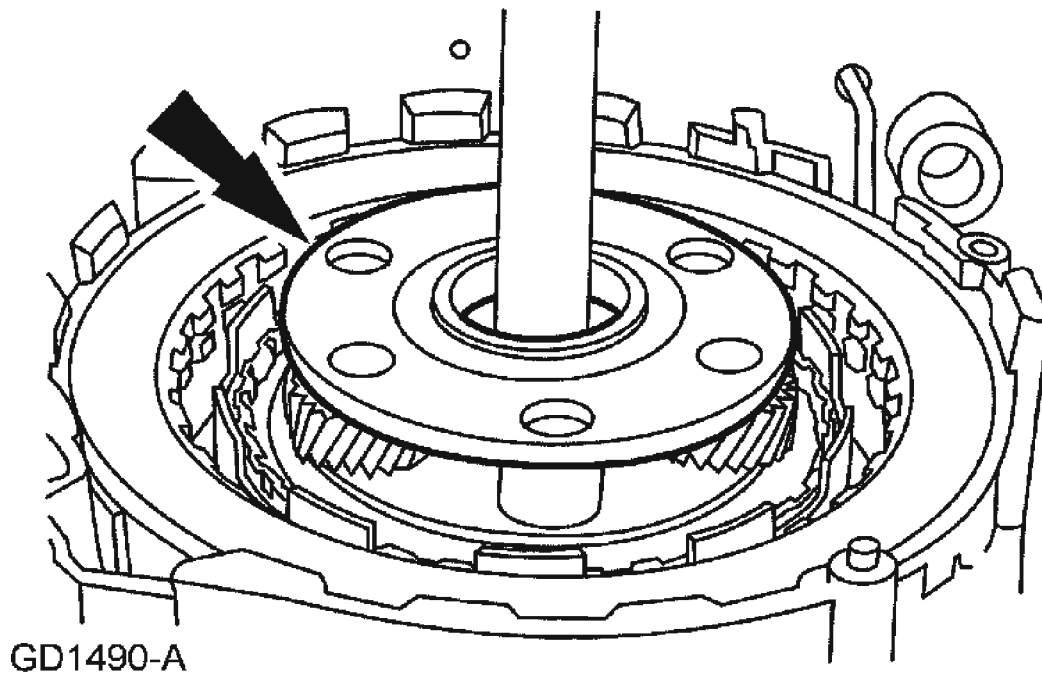
**Fig. 327: Removing Low/Intermediate Ring Gear Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** The low/intermediate carrier thrust bearing may adhere to the low/intermediate ring gear.



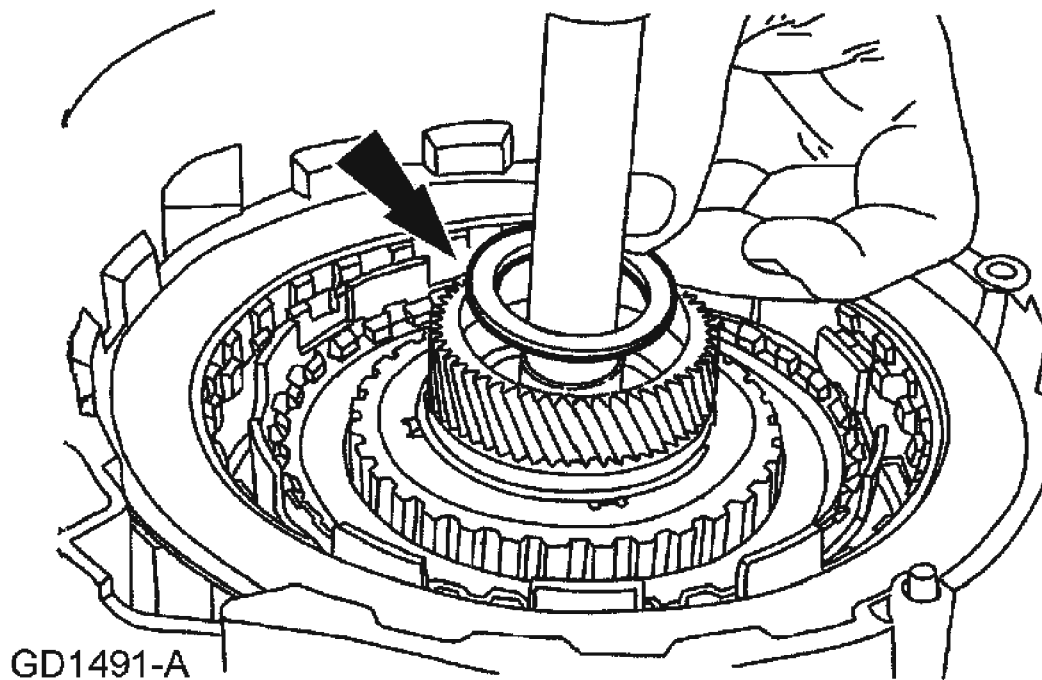
**Fig. 328: Removing No 6 Low/Intermediate Carrier Thrust Bearing**  
**Courtesy of FORD MOTOR CO.**

52. Remove the No. 6 low/intermediate carrier thrust bearing.
53. Remove the low/intermediate carrier assembly.



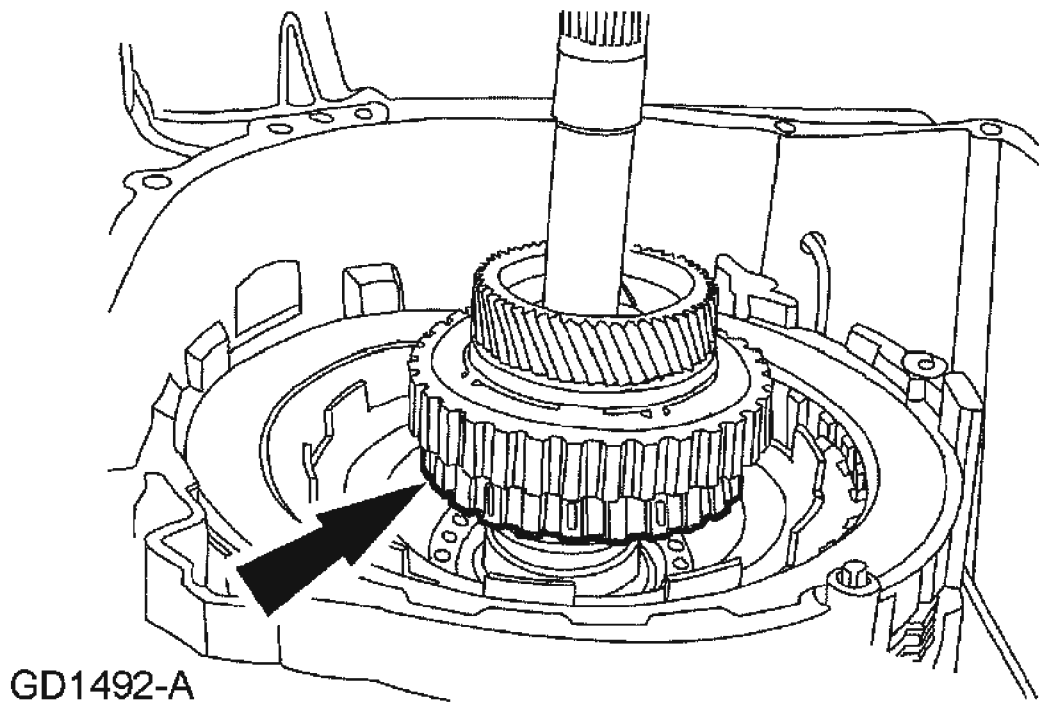
**Fig. 329: Removing Low/Intermediate Carrier Assembly**  
Courtesy of FORD MOTOR CO.

54. Remove the No. 5 low/intermediate sun gear thrust bearing and tag for installation.



**Fig. 330: Removing No 5 Low/Intermediate Sun Gear Thrust Bearing And Tag For Installation**  
Courtesy of FORD MOTOR CO.

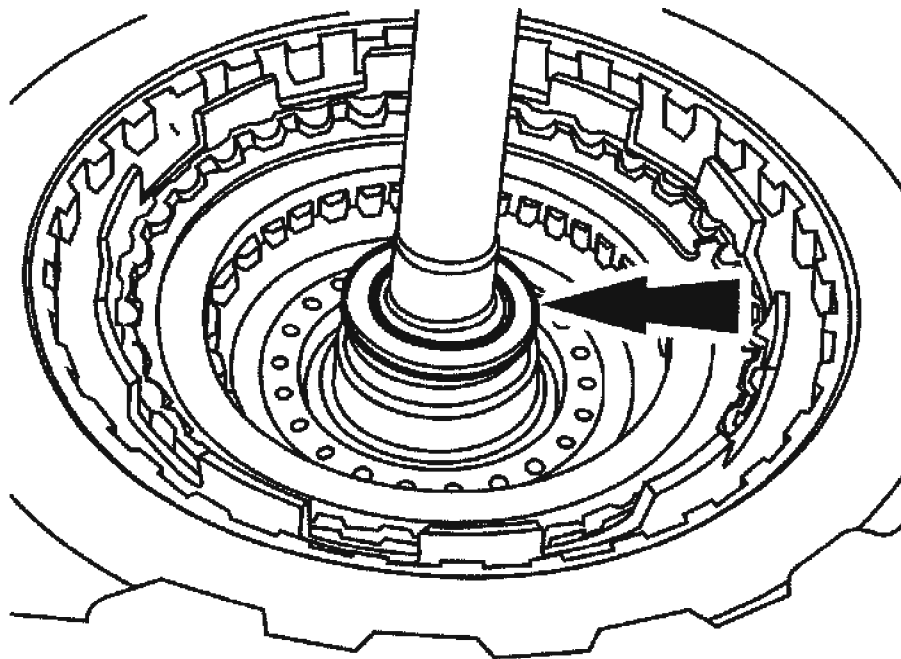
55. Remove the forward one-way clutch and low/intermediate sun gear.



**Fig. 331: Removing Forward One-Way Clutch And Low/Intermediate Sun Gear**  
Courtesy of FORD MOTOR CO.

**NOTE:** The turbine shaft thrust bearing may adhere to the forward one-way clutch and low/intermediate sun gear.

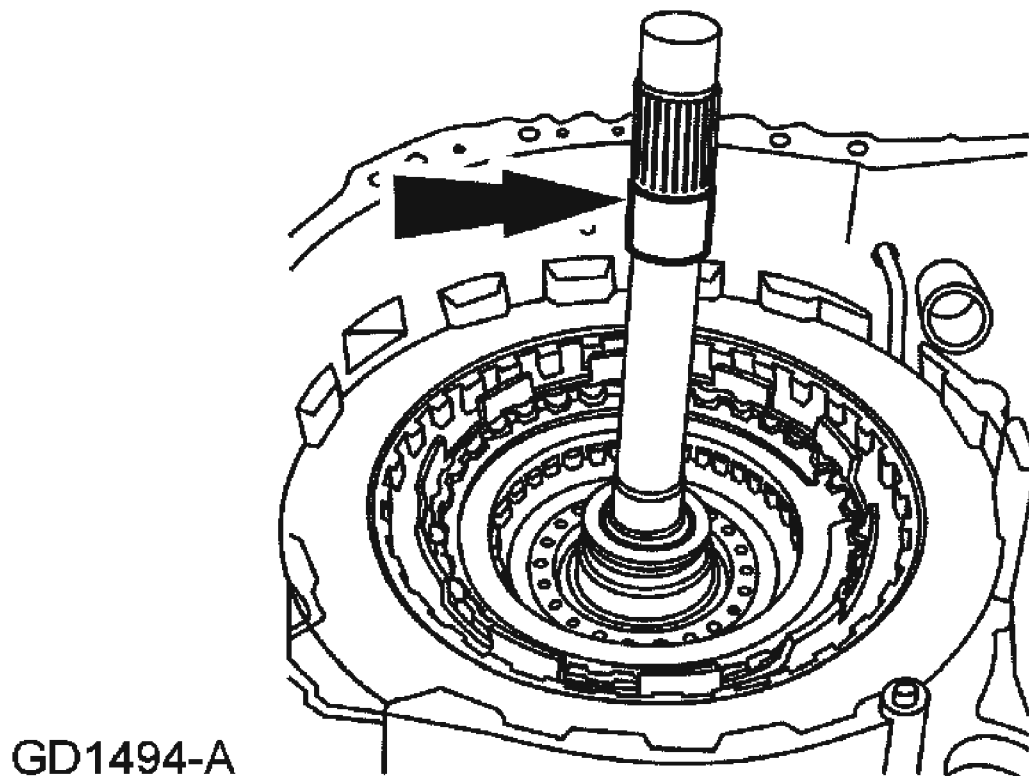




GD1493-A

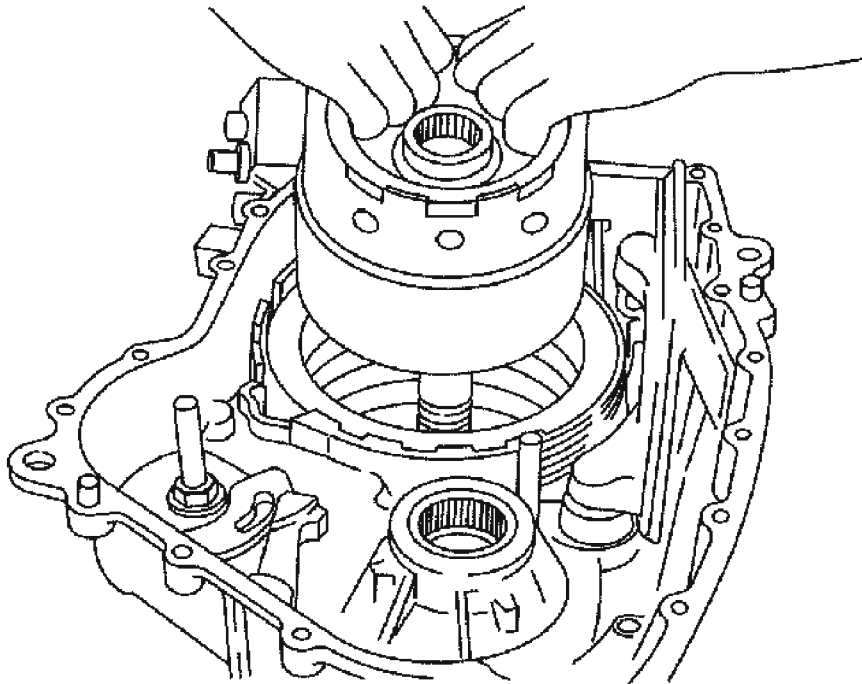
**Fig. 332: Removing No 4 Turbine Shaft Thrust Bearing**  
Courtesy of FORD MOTOR CO.

56. Remove the No. 4 turbine shaft thrust bearing.
57. Remove the turbine shaft assembly.



**Fig. 333: Removing Turbine Shaft Assembly**  
Courtesy of FORD MOTOR CO.

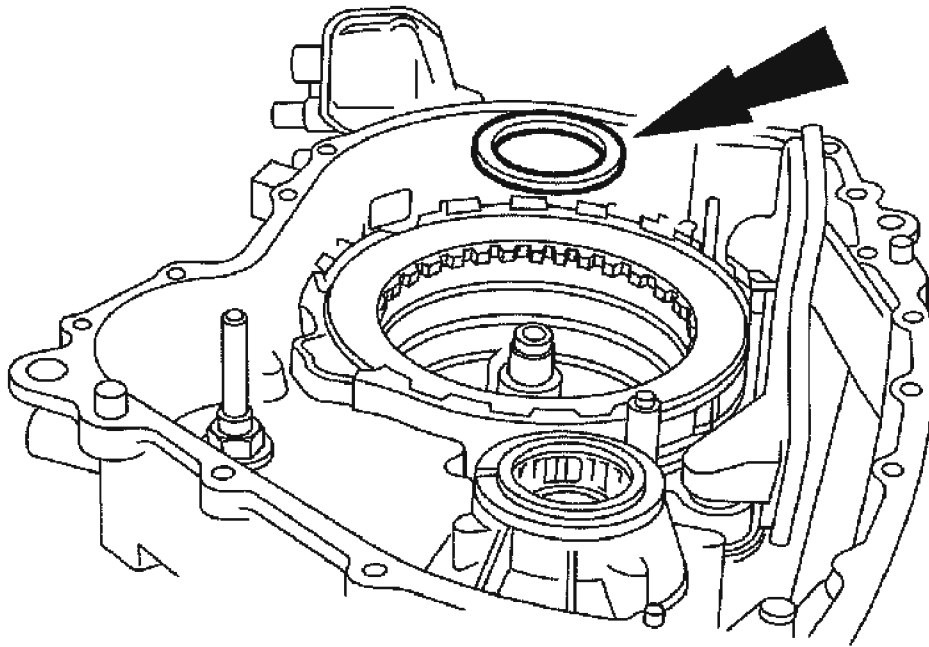
58. Remove the forward/coast/direct cylinder assembly and reverse clutch drum assembly from the transaxle.



GD3394-A

**Fig. 334: Removing Forward/Coast/Direct Cylinder Assembly And Reverse Clutch Drum Assembly From Transaxle**  
Courtesy of FORD MOTOR CO.

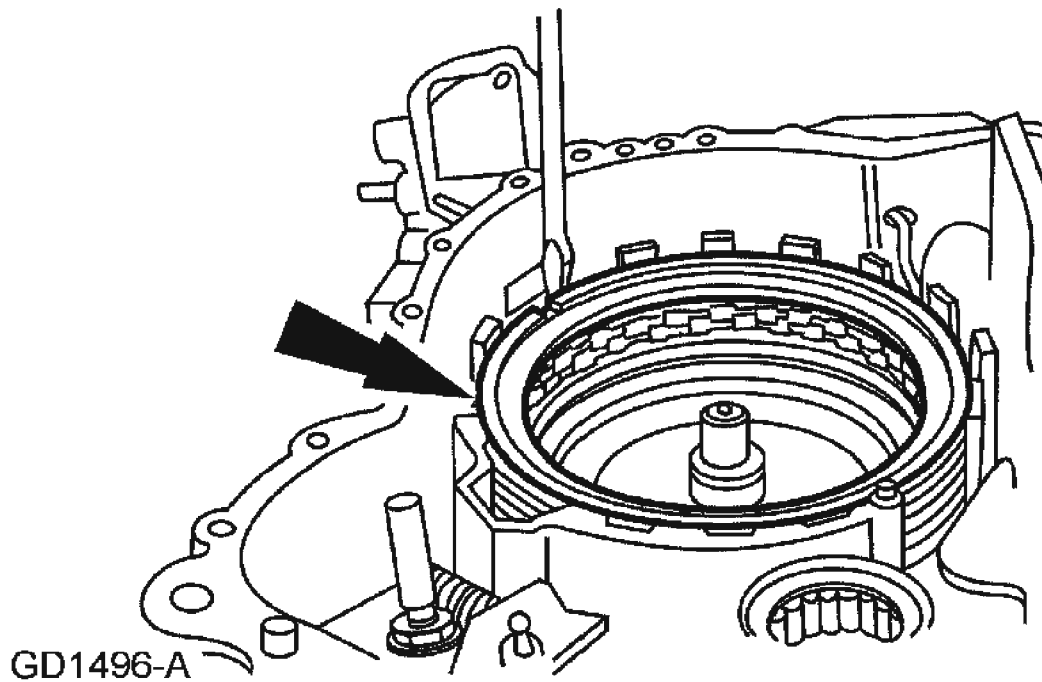
**NOTE:** The pump support thrust bearing assembly may adhere to the reverse clutch drum assembly.



GD3392-A

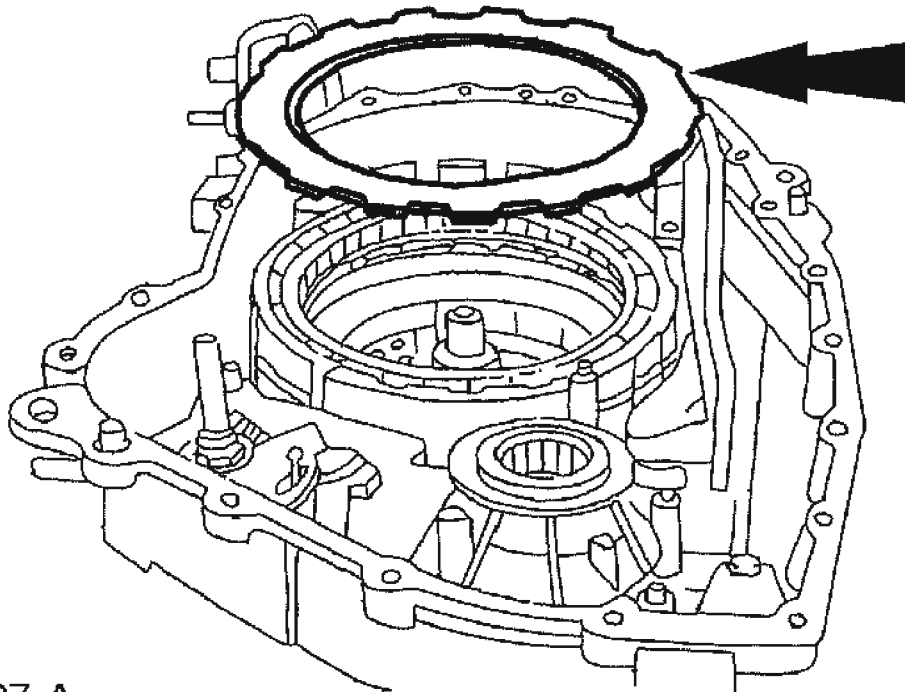
**Fig. 335: Removing No 1 Pump Support Thrust Bearing And Tag For Installation**  
Courtesy of FORD MOTOR CO.

59. Remove the No. 1 pump support thrust bearing and tag for installation.
60. Remove the low one-way clutch retaining ring.



**Fig. 336: Removing Low One-Way Clutch Retaining Ring**  
Courtesy of FORD MOTOR CO.

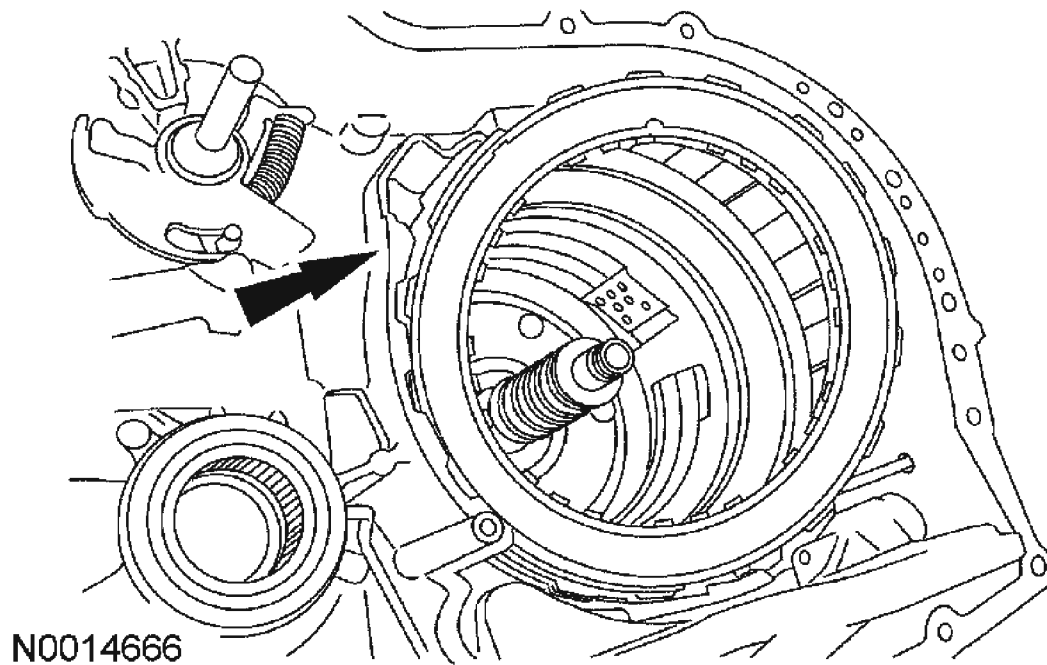
61. If equipped with a sprag-type one-way clutch, remove the low one-way clutch thrust plate.



GD1497-A

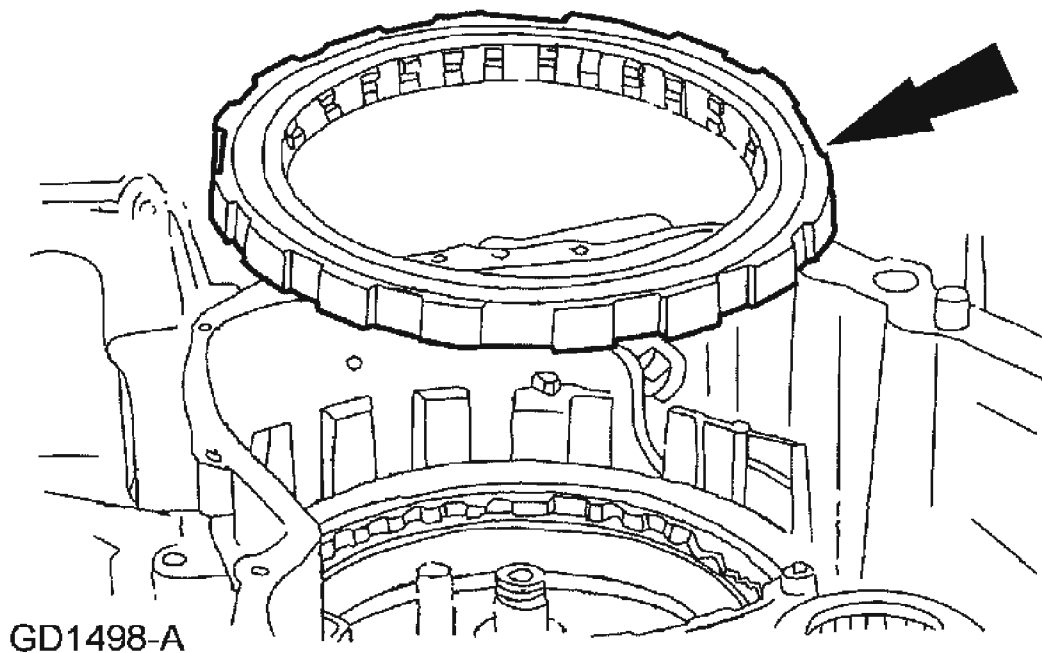
**Fig. 337: Removing Low One-Way Clutch Thrust Plate**  
**Courtesy of FORD MOTOR CO.**

62. If equipped with a mechanical diode, there is no thrust plate.



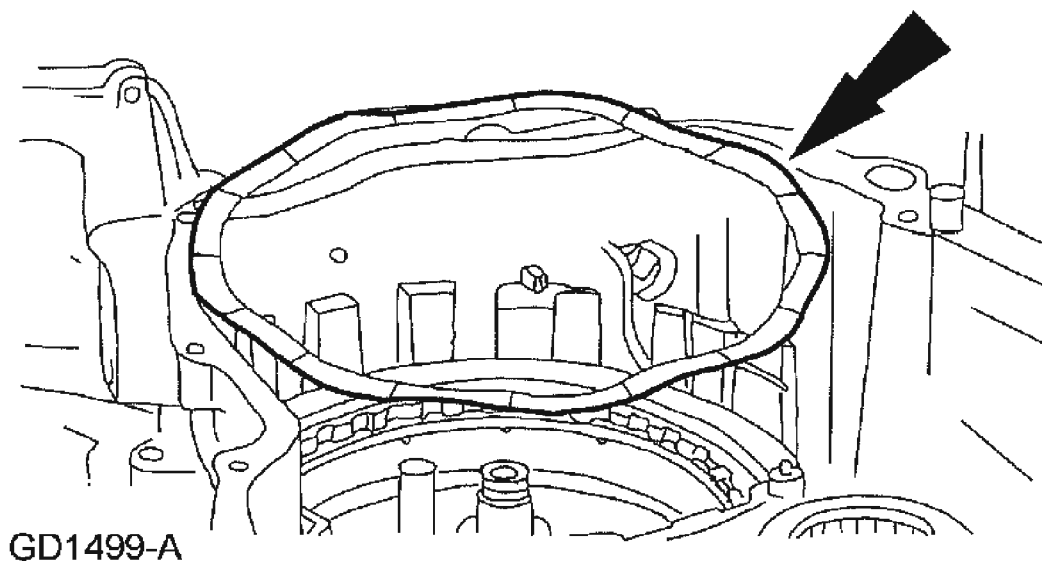
**Fig. 338: Identifying Transfer Equipped With Mechanical Diode**  
Courtesy of FORD MOTOR CO.

**NOTE:** The low one-way clutch assembly should be removed as an assembly.



**Fig. 339: Removing Low One-Way Clutch Assembly**  
Courtesy of FORD MOTOR CO.

63. Remove the low one-way clutch assembly.
64. Remove the thin, 8-wave low/reverse clutch wave spring.

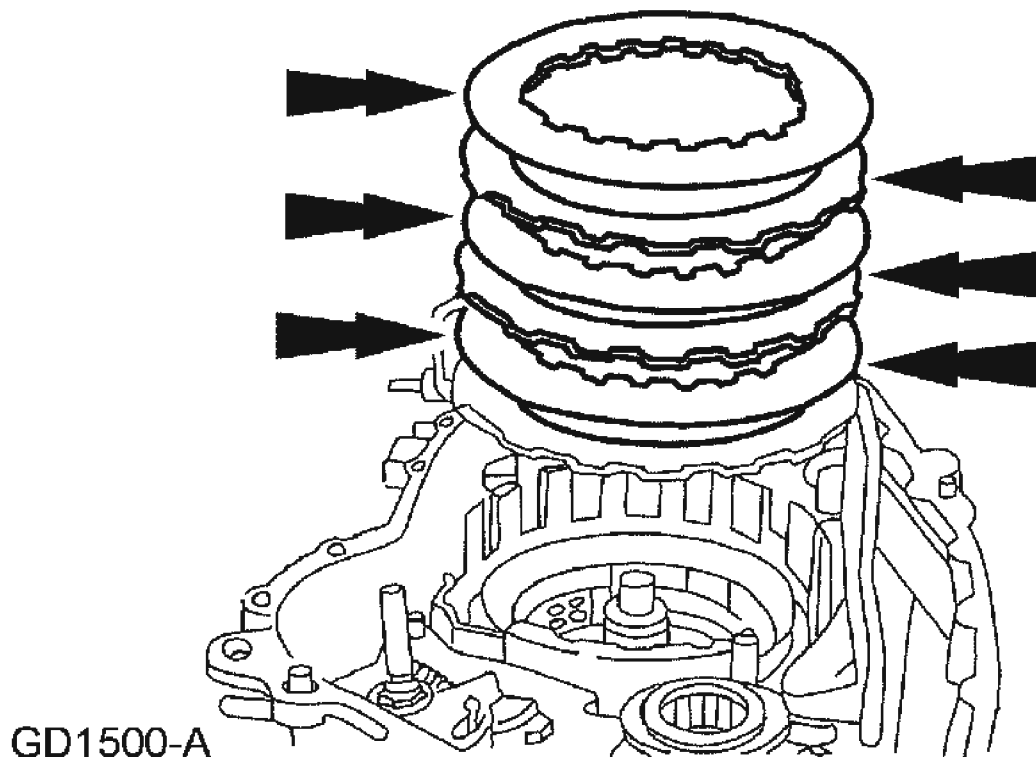




**Fig. 340: Removing Thin, 8-Wave Low/Reverse Clutch Wave Spring**  
Courtesy of FORD MOTOR CO.

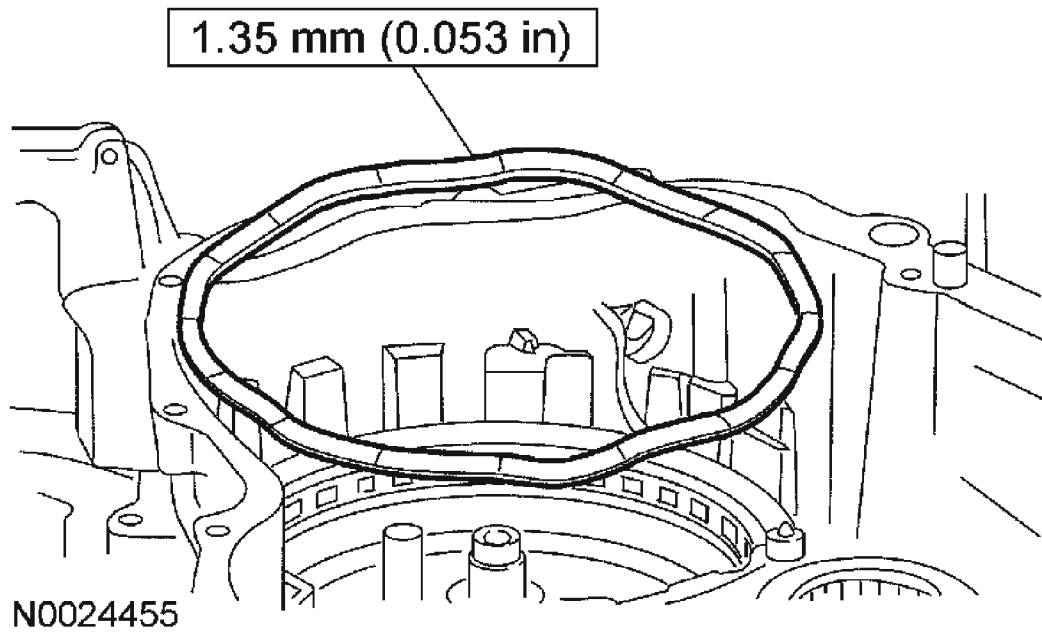
65. Remove the low/reverse clutch plates.

- Inspect the friction plates for partially stripped, broken or bent spline teeth, burnt, worn or flaked-off friction material and warped or bent friction discs.
- Inspect the steel plates for heat discoloration or warpage.



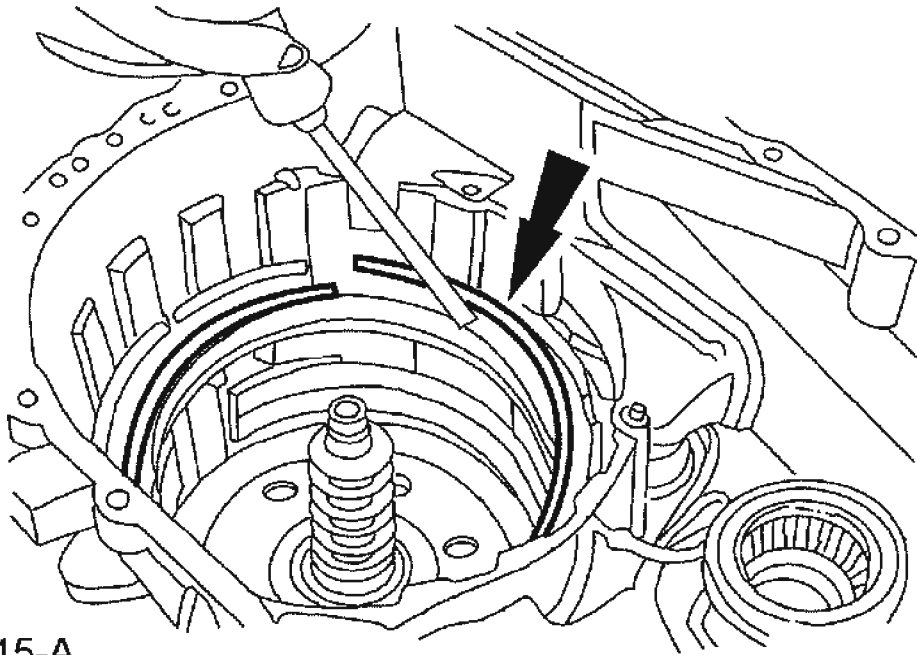
**Fig. 341: Inspecting Steel Plates**  
Courtesy of FORD MOTOR CO.

66. Remove the thick, 10-wave low/reverse clutch wave spring.



**Fig. 342: Removing Thick, 10-Wave Low/Reverse Clutch Wave Spring**  
Courtesy of FORD MOTOR CO.

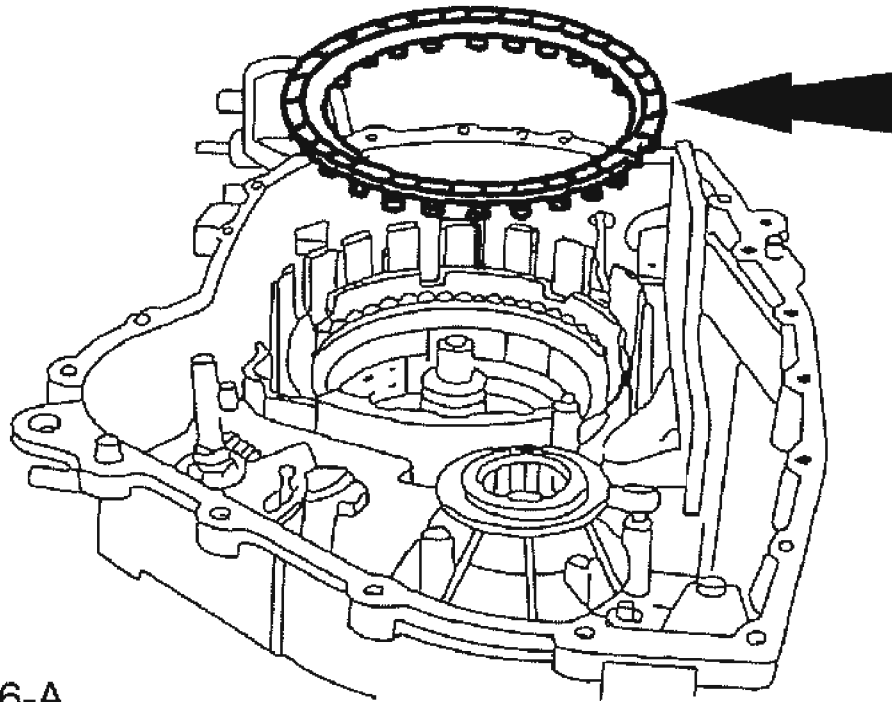
67. Remove the low/reverse clutch return spring retaining ring.



GD1915-A

**Fig. 343: Removing Low/Reverse Clutch Return Spring Retaining Ring**  
Courtesy of FORD MOTOR CO.

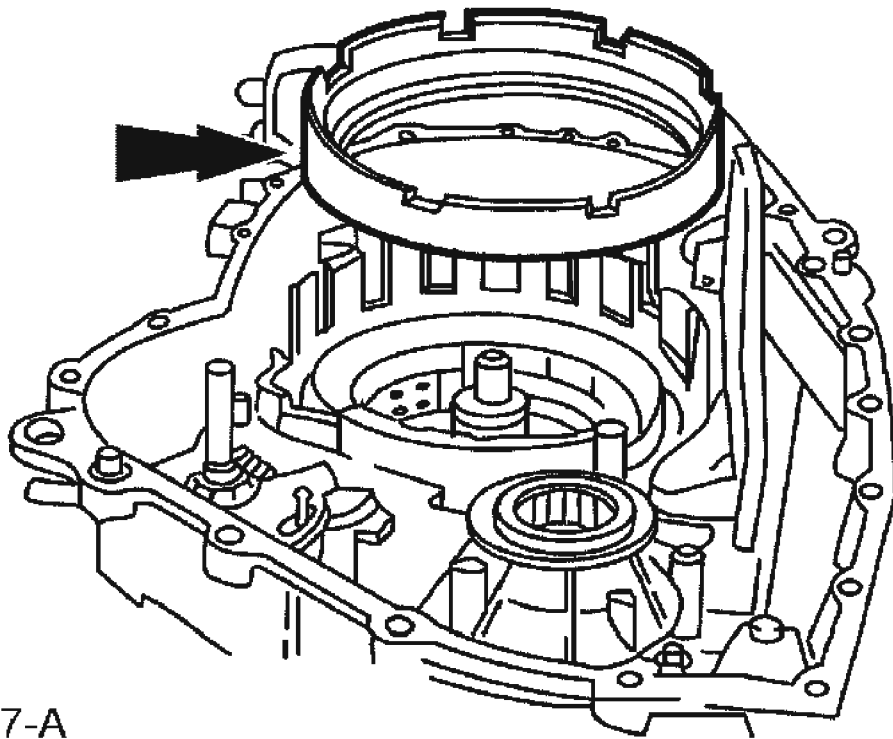
68. Remove the low/reverse clutch return spring assembly.



GD1916-A

**Fig. 344: Removing Low/Reverse Clutch Return Spring Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Rotate the low/reverse clutch piston while pulling upward.

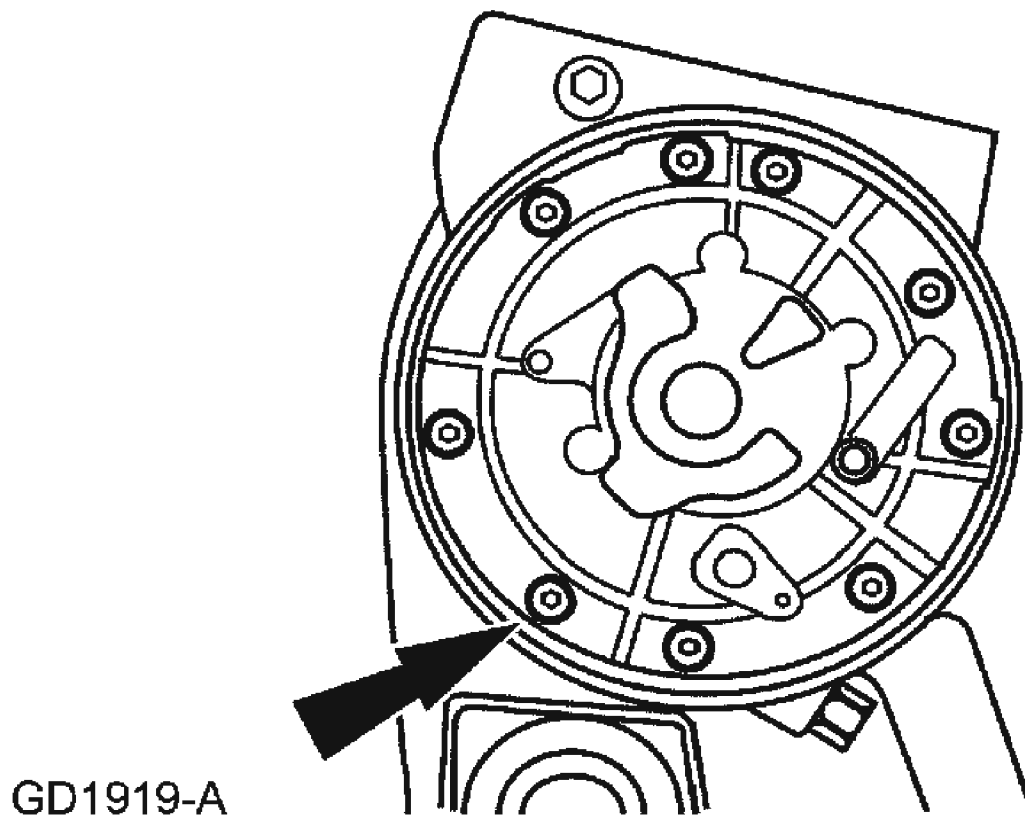


GD1917-A

**Fig. 345: Removing Low/Reverse Clutch Piston**  
Courtesy of FORD MOTOR CO.

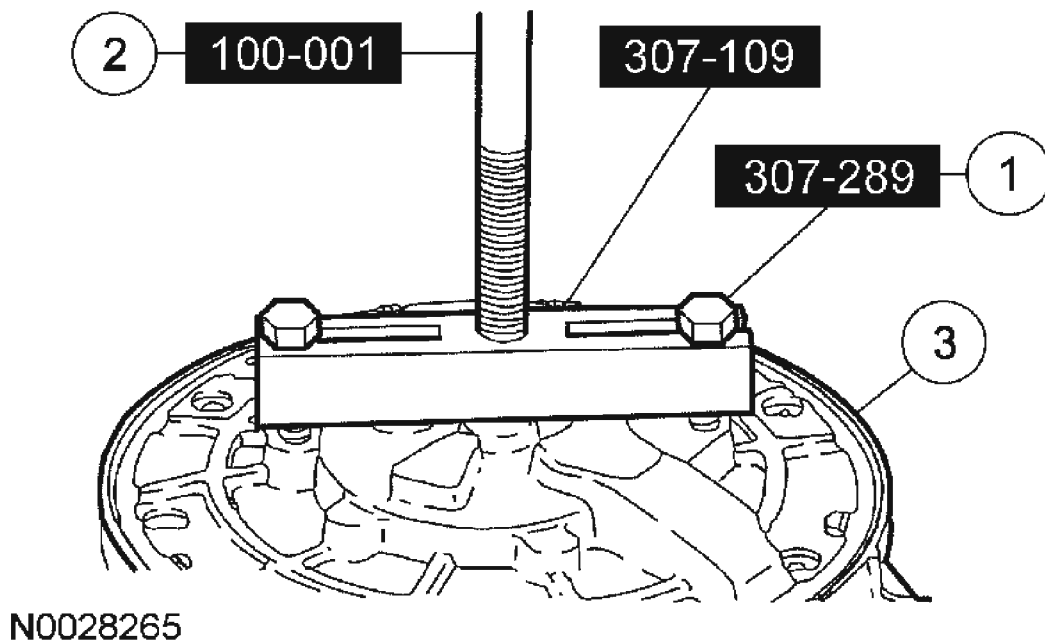
69. Remove the low/reverse clutch piston.

**NOTE:** Position the transaxle so the pump assembly is facing upward.



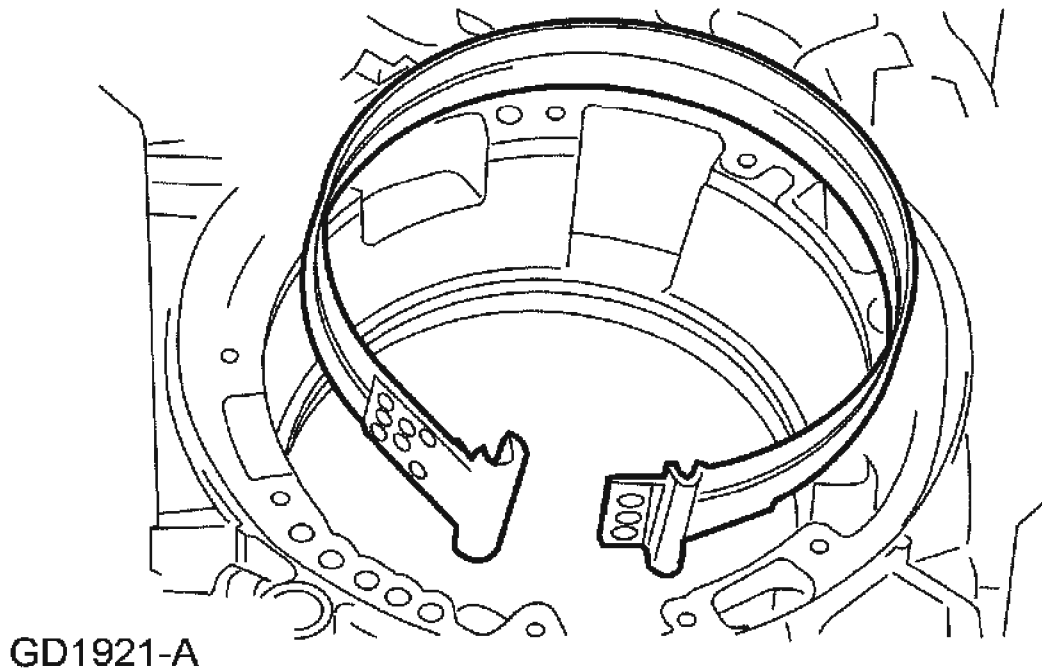
**Fig. 346: Removing Pump Assembly Bolts**  
**Courtesy of FORD MOTOR CO.**

70. Remove the pump assembly bolts.
71. Using the special tools, remove the pump assembly.
  1. Install the special tool.
  2. Assemble the special tools.
  3. Using the special tools, remove the pump assembly.



**Fig. 347: Removing Pump Assembly**  
Courtesy of FORD MOTOR CO.

72. Remove the intermediate and overdrive band assembly from the case.
- Inspect the intermediate and overdrive band assembly for damage and wear.



**Fig. 348: Inspecting Intermediate And Overdrive Band Assembly**  
Courtesy of FORD MOTOR CO.

## DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

### CHAIN SPROCKETS

Special Tool(s)

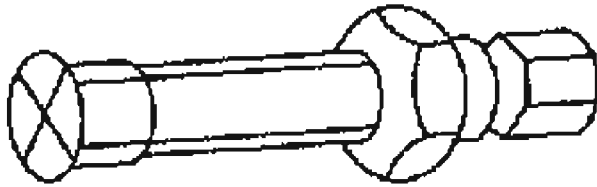
### SPECIAL TOOLS DESCRIPTION

	Remover, Transfer Case Bearing Cup 308-125 (T87P-7120-D)
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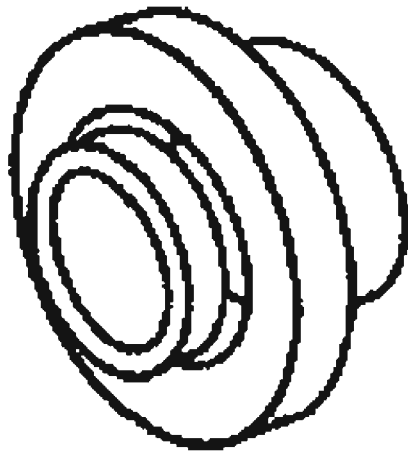


## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2059-A**



**ST1955-A**

Installer, Needle Bearing 307-294  
(T94P-77000-K)

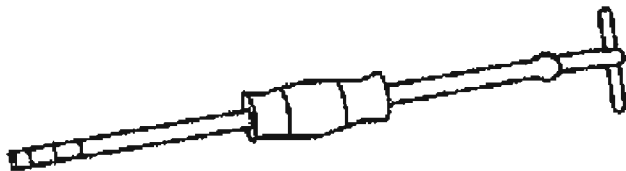
Adapter for 303-224 (Handle) 205-  
153 (T80T-4000-W)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



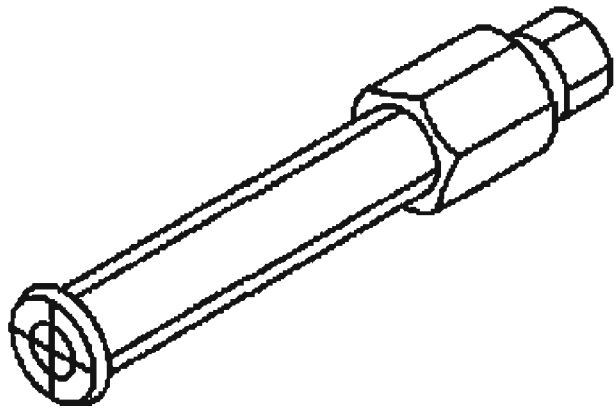
ST1255-A



ST1185-A

Slide Hammer 100-001 (T50T-100-A)

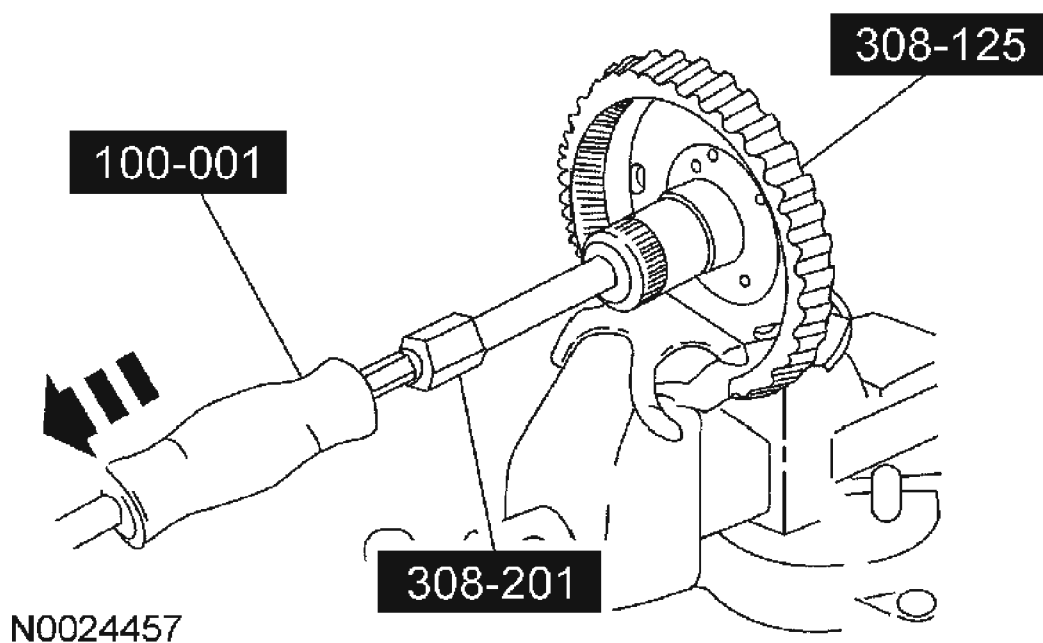
Remover, Input Shaft Bearing 308-201 (T91T-7127-A)



**ST2058-A**

Disassembly

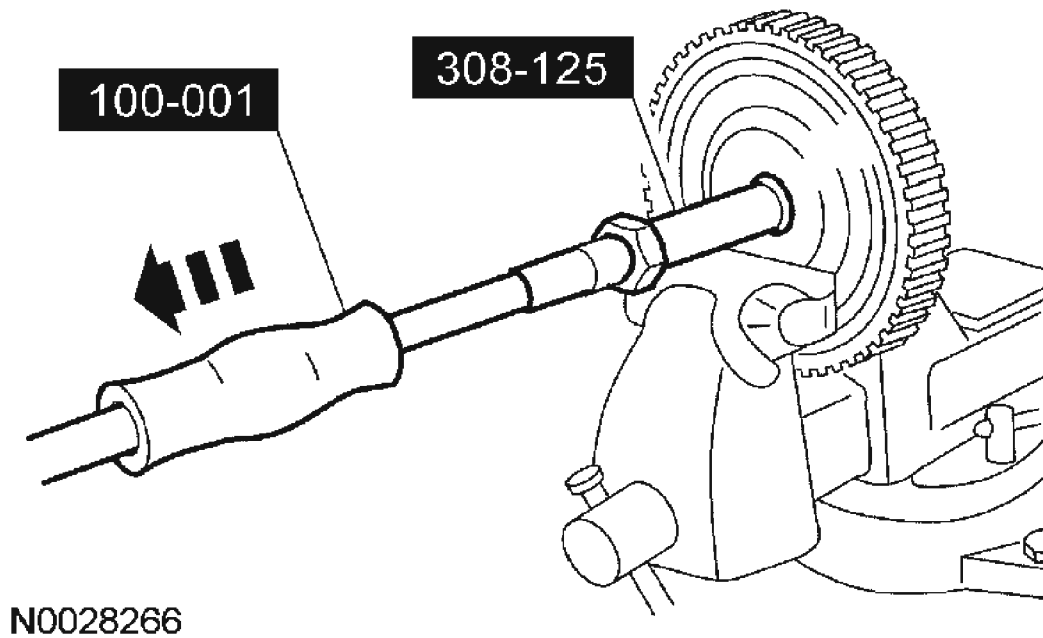
**CAUTION:** Clamp the sprocket in a soft-jawed vise.



**Fig. 349: Removing No 16 Reverse/Overdrive Ring Gear Bearing**

**Courtesy of FORD MOTOR CO.**

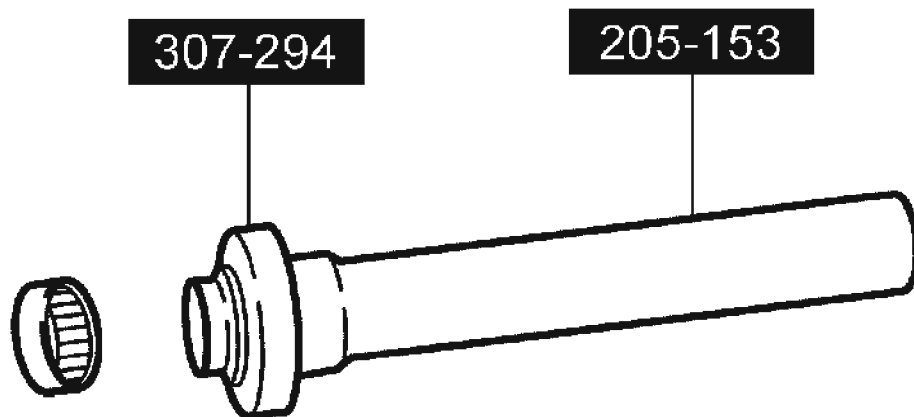
1. Using the special tools, remove the No. 16 reverse/overdrive ring gear bearing, as necessary.
2. Using the special tools, remove the No. 17 stator support bearing, as necessary.



**Fig. 350: Removing No 17 Stator Support Bearing**  
**Courtesy of FORD MOTOR CO.**

**Assembly**

1. Position the No. 16 reverse/overdrive ring gear bearing on the special tools.
  - Position the bearing with the part number facing toward the handle of the special tool.

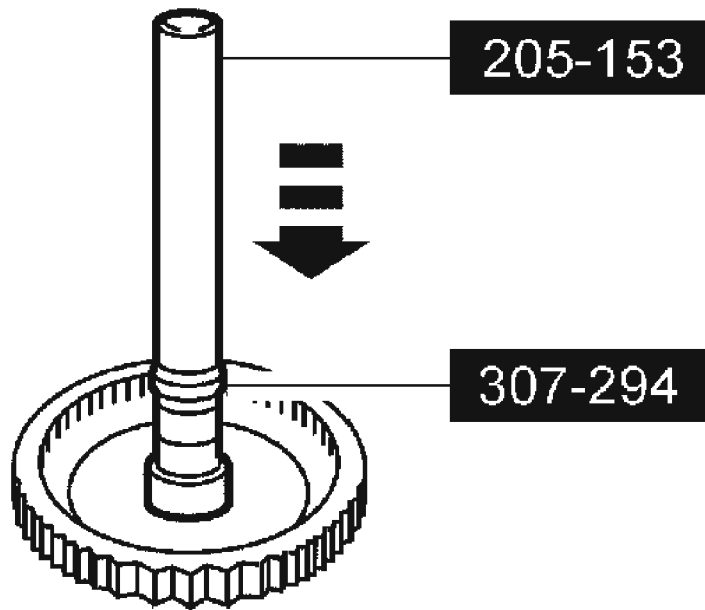


N0028267

**Fig. 351: Positioning No 16 Reverse/Overdrive Ring Gear Bearing On Special Tools**

Courtesy of FORD MOTOR CO.

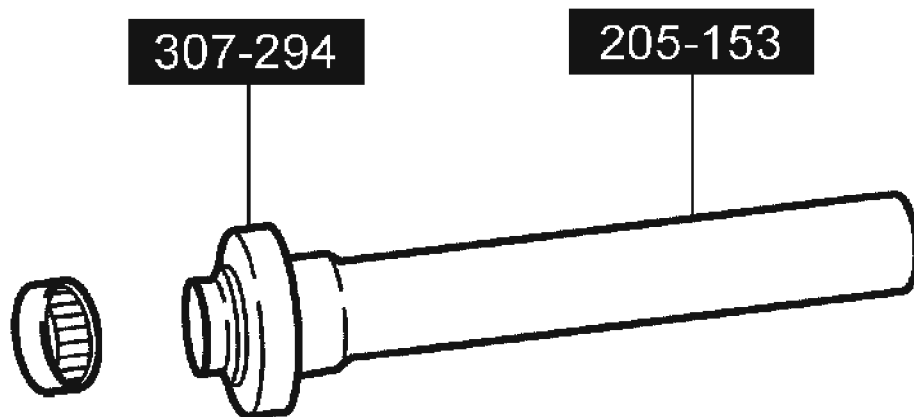
**NOTE:** The identification stamping of the bearing goes to the outboard side of the reverse/overdrive ring gear.



N0028268

**Fig. 352: Installing No 16 Reverse/Overdrive Ring Gear Bearing**  
Courtesy of FORD MOTOR CO.

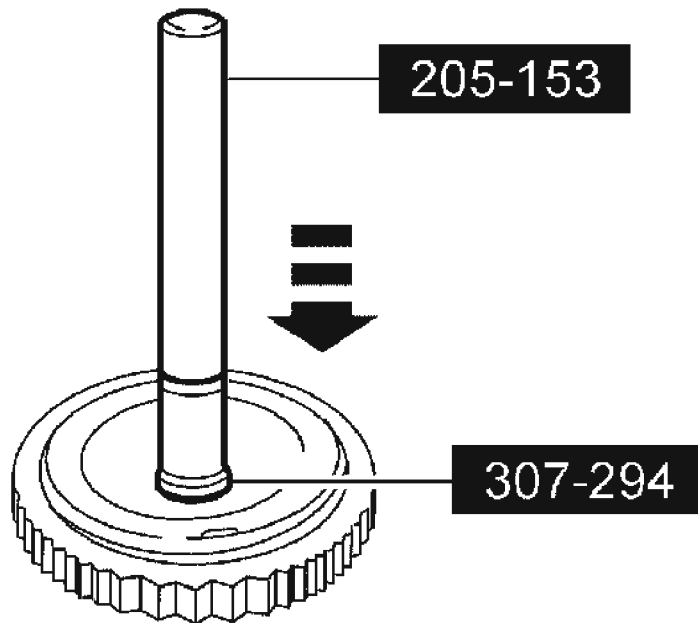
2. Using the special tools, install the No. 16 reverse/overdrive ring gear bearing.
3. Position the No. 17 stator support bearing on the special tools.
  - Position the bearing with the part number facing toward the handle of the special tool.



N0028267

**Fig. 353: Positioning No 17 Stator Support Bearing On Special Tools**  
Courtesy of FORD MOTOR CO.

**NOTE:** The identification stamping of the bearing goes to the outboard side of the reverse/overdrive ring gear.



N0024461

**Fig. 354: Installing No 17 Stator Support Bearing Into Stator Support Sprocket**  
 Courtesy of FORD MOTOR CO.

- Using the special tools, install the No. 17 stator support bearing into the stator support sprocket.

## TORQUE CONVERTER HOUSING

Special Tool(s)

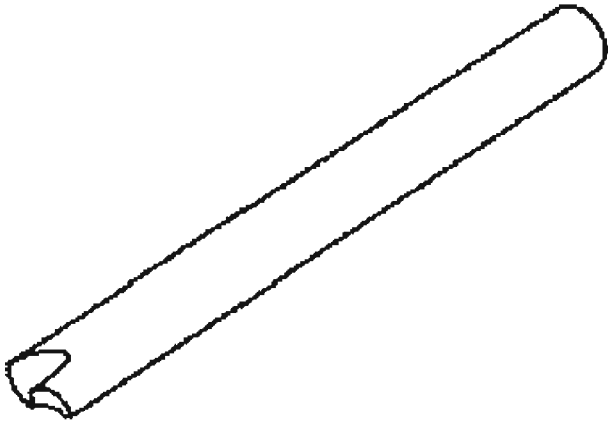
## SPECIAL TOOLS DESCRIPTION

Installer, Lube Tube 307-306 (T94P-77000-U1)



## 2005 Ford Escape

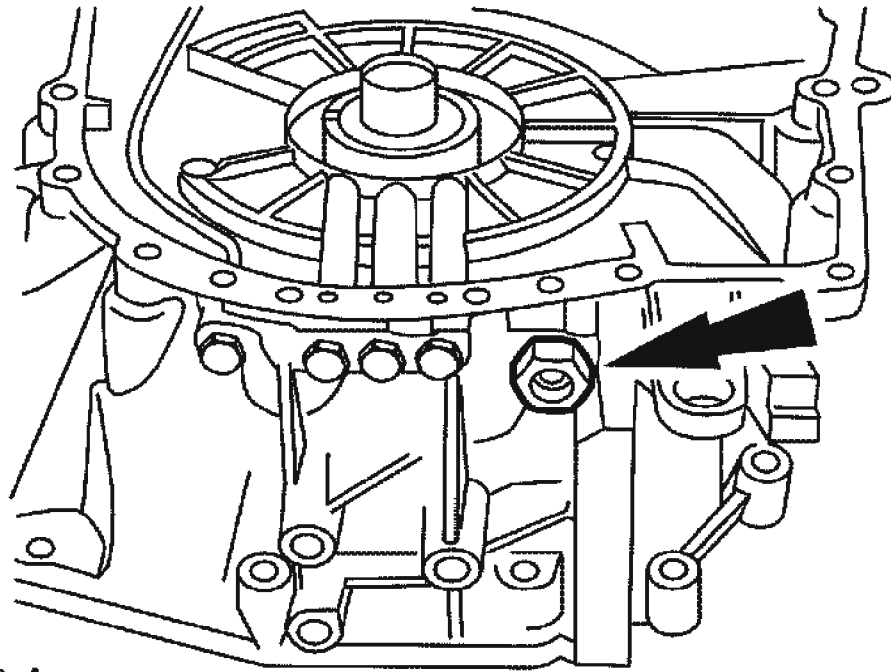
2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1848-A**

### Disassembly

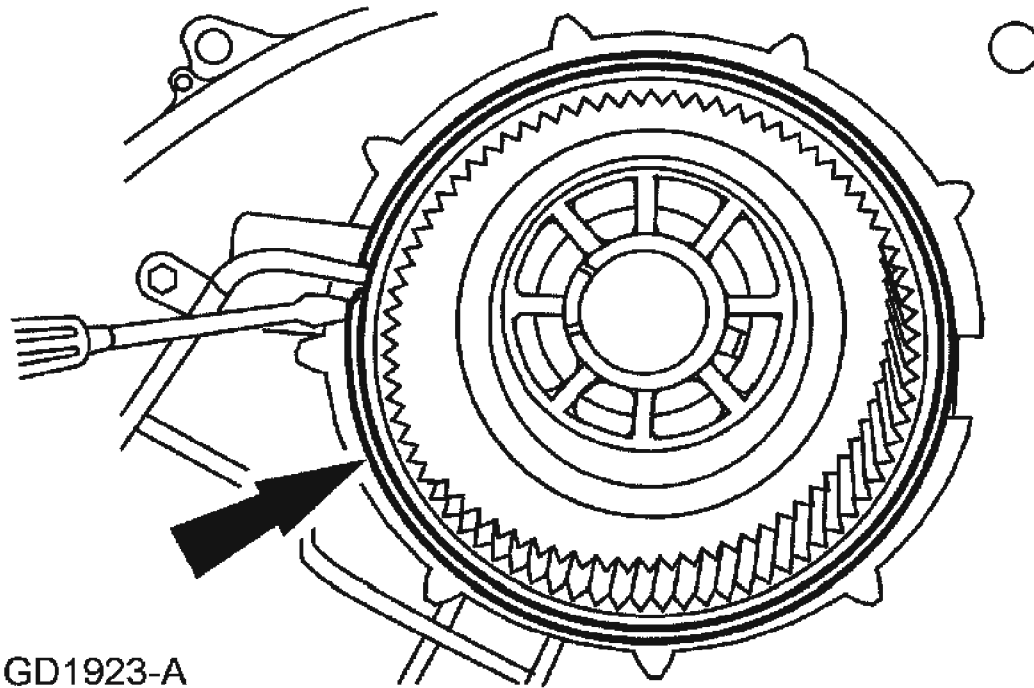
1. Remove and discard the cooler tube fitting.



GD1922-A

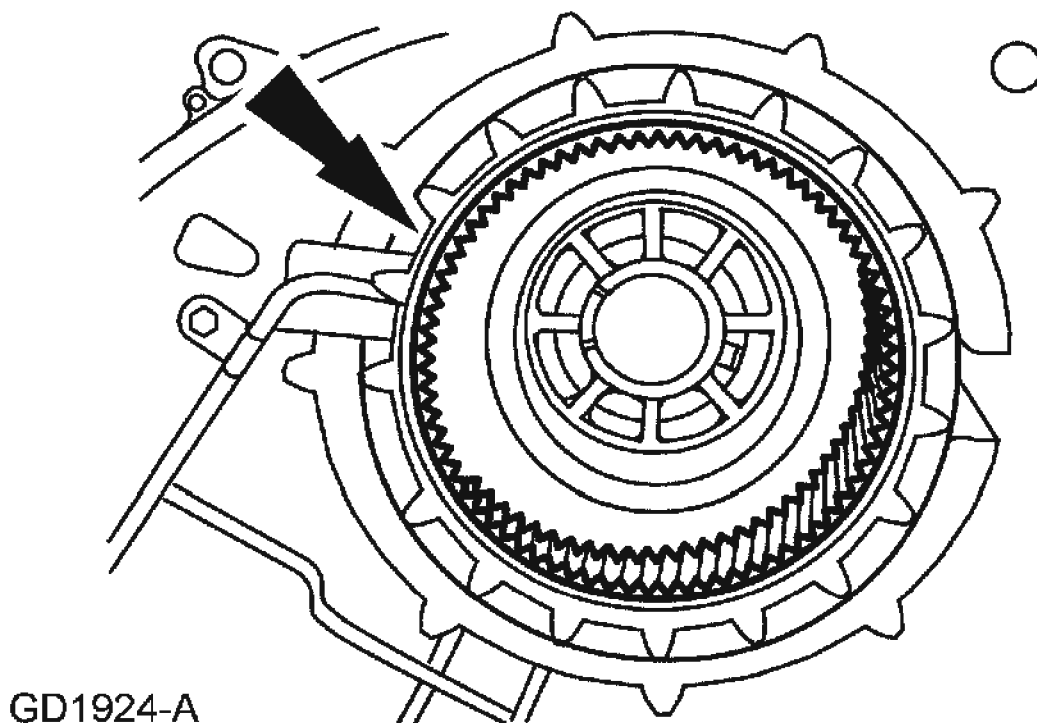
**Fig. 355: Removing Cooler Tube Fitting**  
Courtesy of FORD MOTOR CO.

2. Remove the final drive ring gear retaining ring.



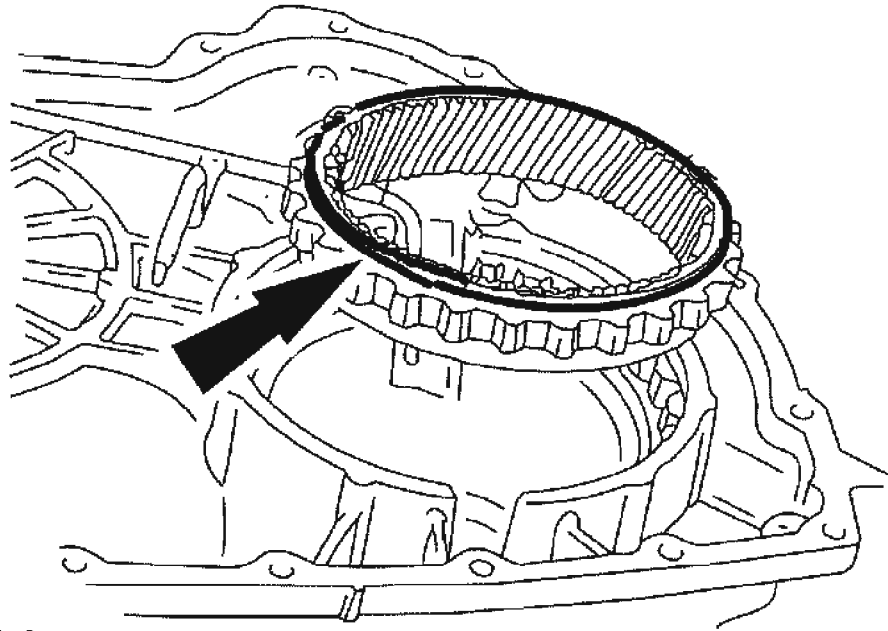
**Fig. 356: Removing Final Drive Ring Gear Retaining Ring**  
Courtesy of FORD MOTOR CO.

3. Remove the final drive ring gear.



**Fig. 357: Removing Final Drive Ring Gear**  
Courtesy of FORD MOTOR CO.

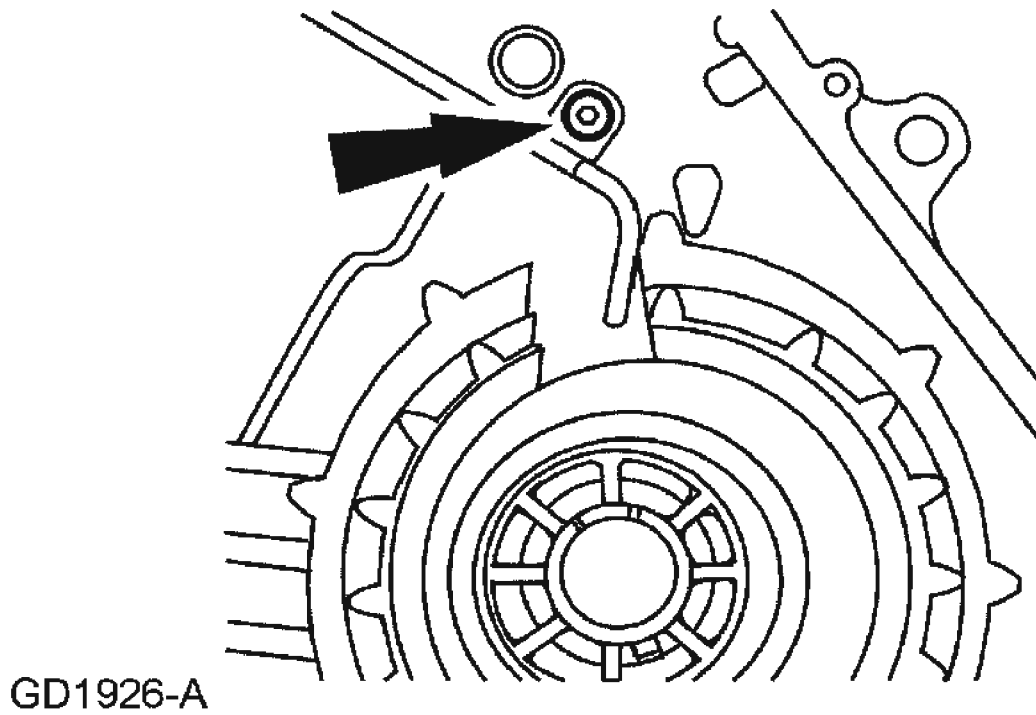
4. Inspect the final drive ring gear, housing lug teeth and final drive ring gear teeth for damage or wear.



GD1925-A

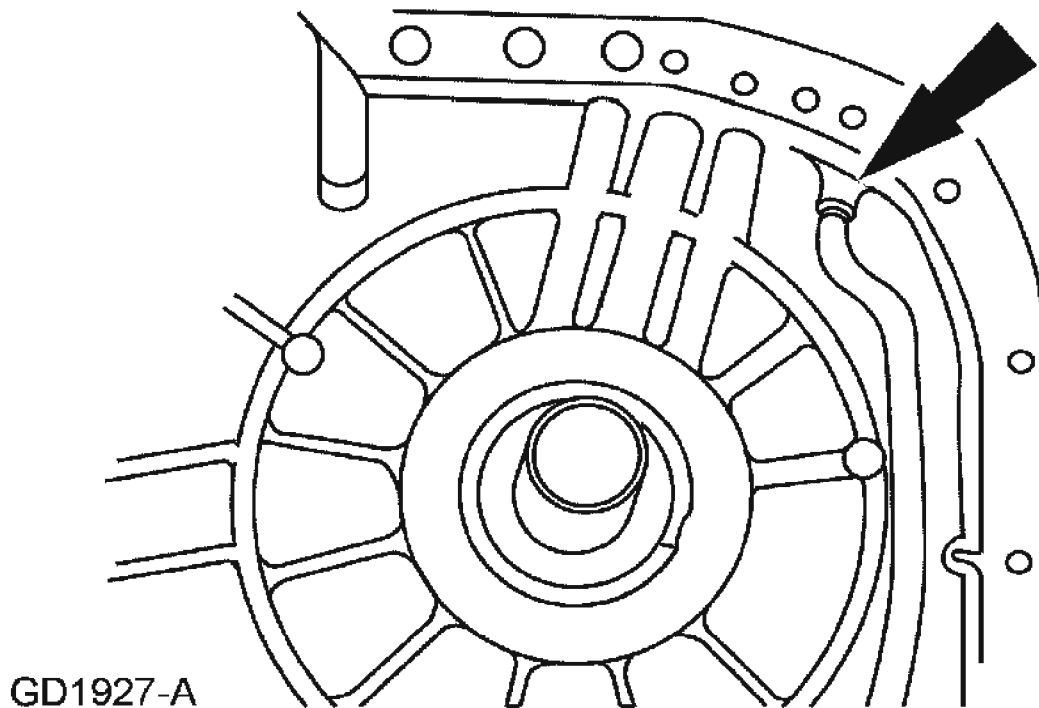
**Fig. 358: Inspecting Final Drive Ring Gear, Housing Lug Teeth And Final Drive Ring Gear Teeth**  
Courtesy of FORD MOTOR CO.

5. Remove the differential lube tube bolt.



**Fig. 359: Removing Differential Lube Tube Bolt**  
Courtesy of FORD MOTOR CO.

6. Pull the differential lube tube from the housing.



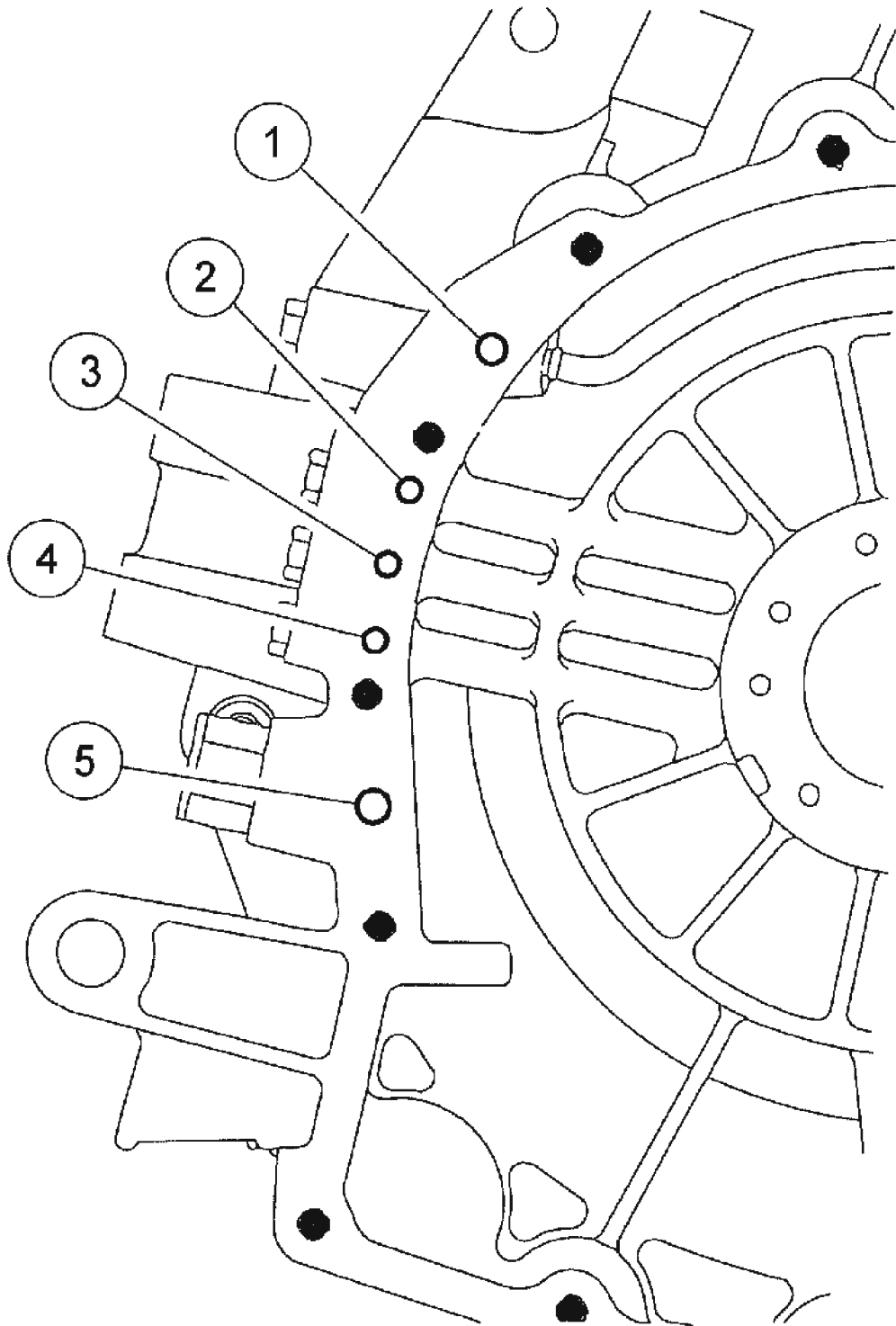
**Fig. 360: Removing Differential Lube Tube From Housing**  
Courtesy of FORD MOTOR CO.

**WARNING:** In order to avoid injury, eye protection should be worn when cleaning components with compressed air. Failure to follow these instructions can result in personal injury.

**NOTE:** Clean all components with a suitable solvent and use moisture-free compressed air to dry all parts and clean fluid passages.

7. Inspect the converter housing for:
  - stator support area wear.
  - case mating surfaces for nicks or deformation.
  - differential bushing wear.
8. Check the converter housing hydraulic passages for blockage.
  1. Differential lubrication passage
  2. Front lubrication passage
  3. Converter turbine passage

4. Converter impeller passage
5. Cooler passage

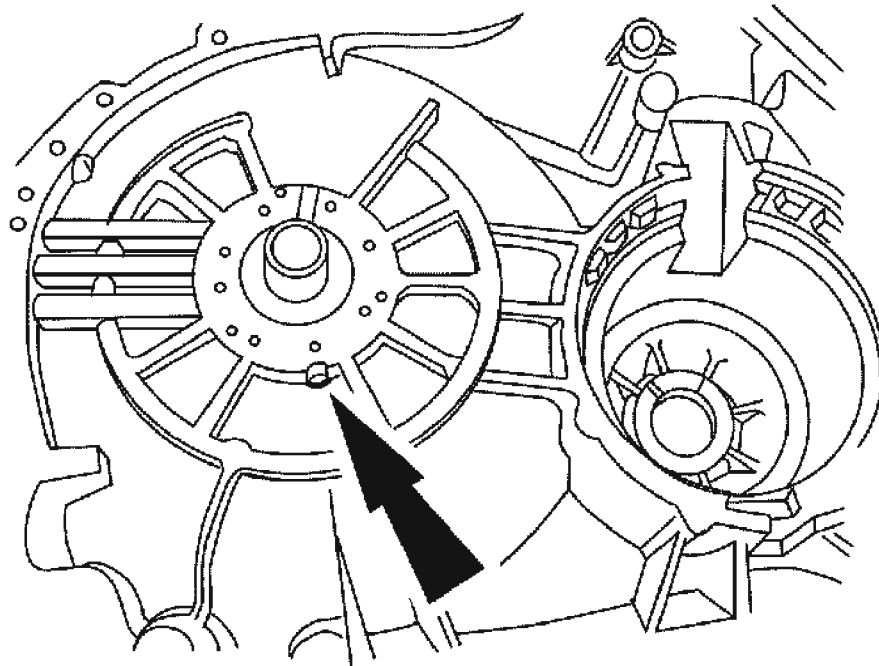


N0024462



**Fig. 361: Checking Converter Housing Hydraulic Passages**  
Courtesy of FORD MOTOR CO.

9. Check for blockage at the converter seal return hole.

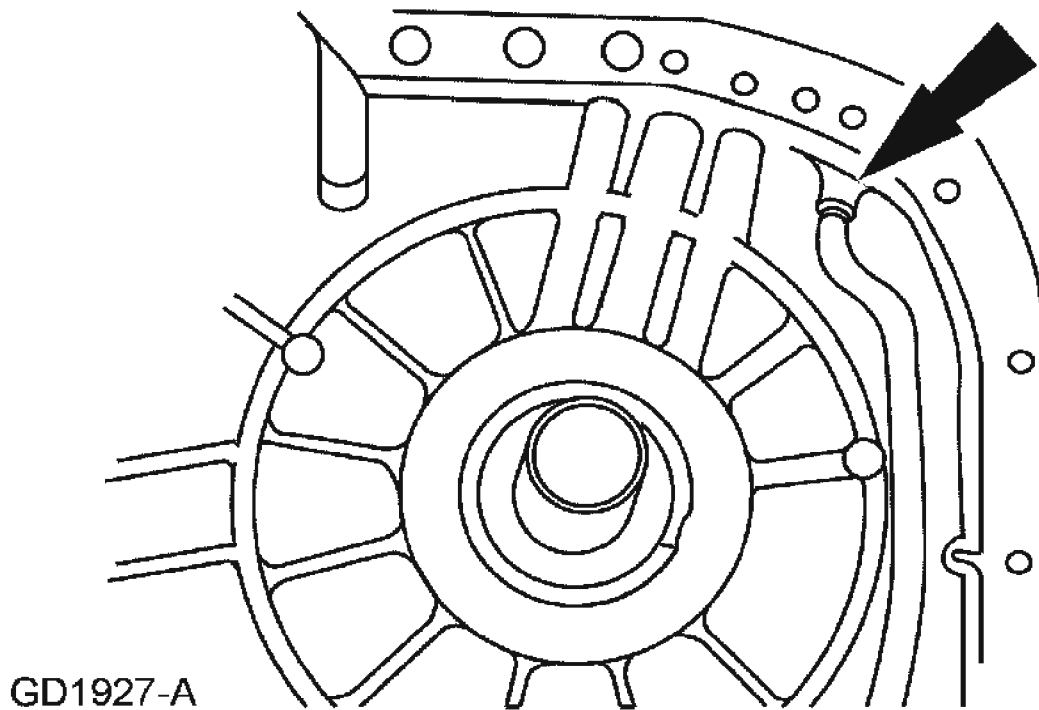


GD3831-A

**Fig. 362: Checking Blockage At Converter Seal Return Hole**  
Courtesy of FORD MOTOR CO.

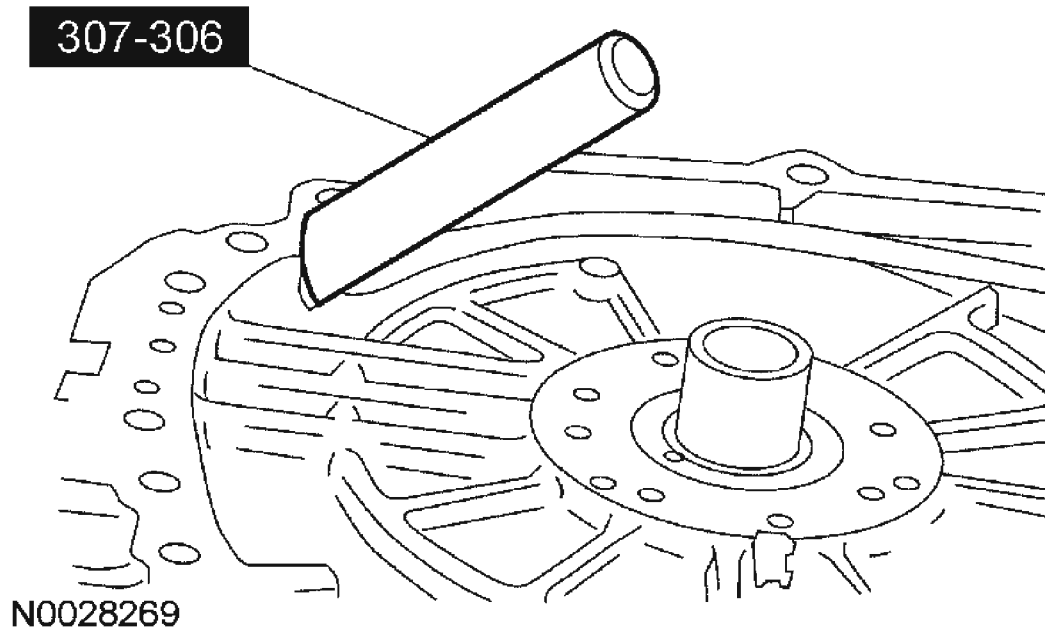
**Assembly**

1. Position a new differential lube tube in the torque converter housing.



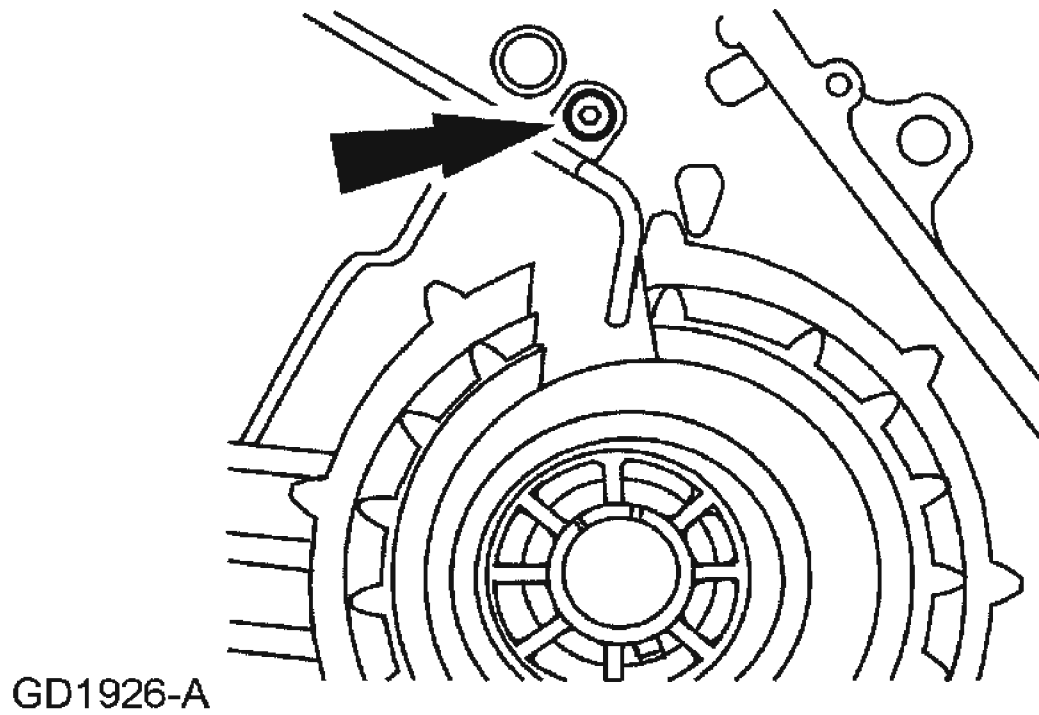
**Fig. 363: Positioning Differential Lube Tube In Torque Converter Housing**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the differential lube tube.



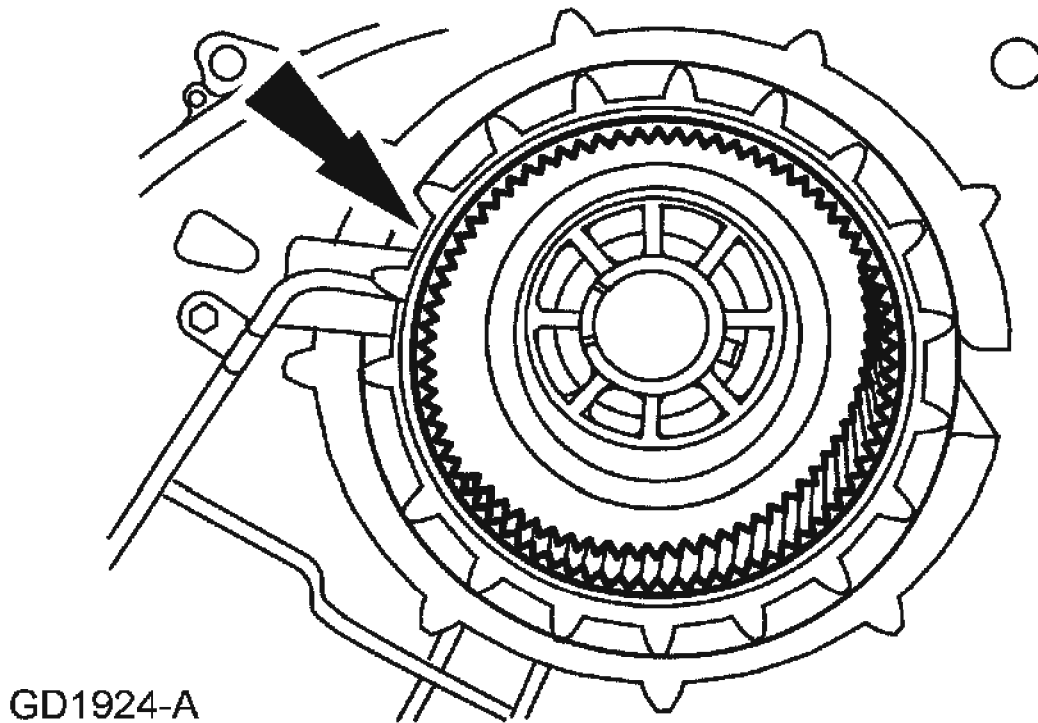
**Fig. 364: Installing Differential Lube Tube**  
Courtesy of FORD MOTOR CO.

3. Install the differential lube tube bolt.
  - Tighten to 13 Nm (10 lb-ft).



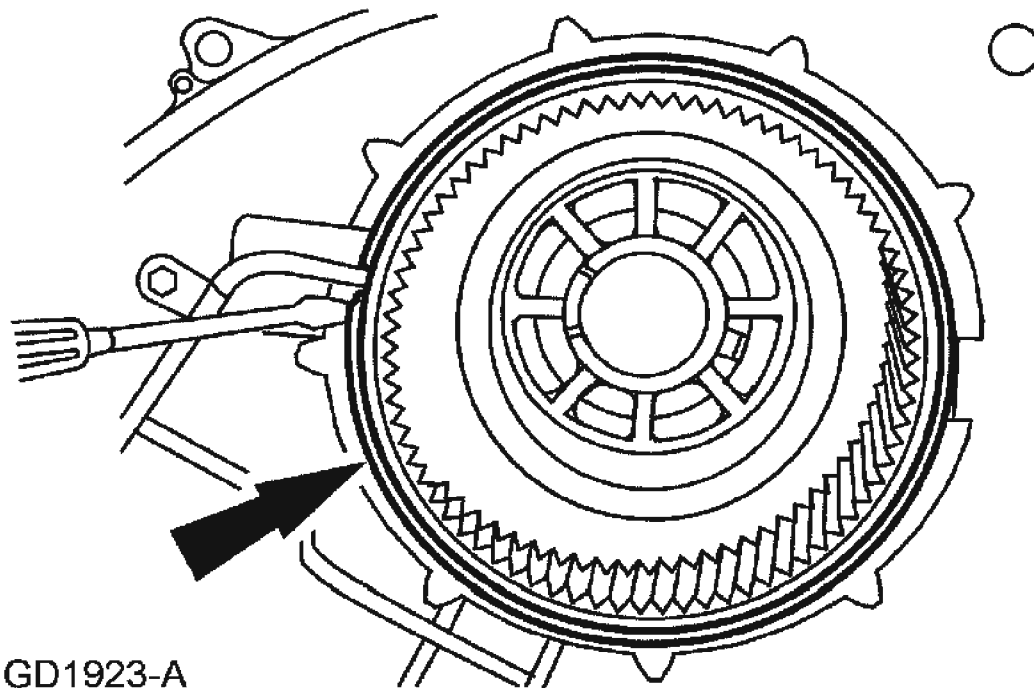
**Fig. 365: Installing Differential Lube Tube Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** The final drive ring gear is installed with the lug end up.



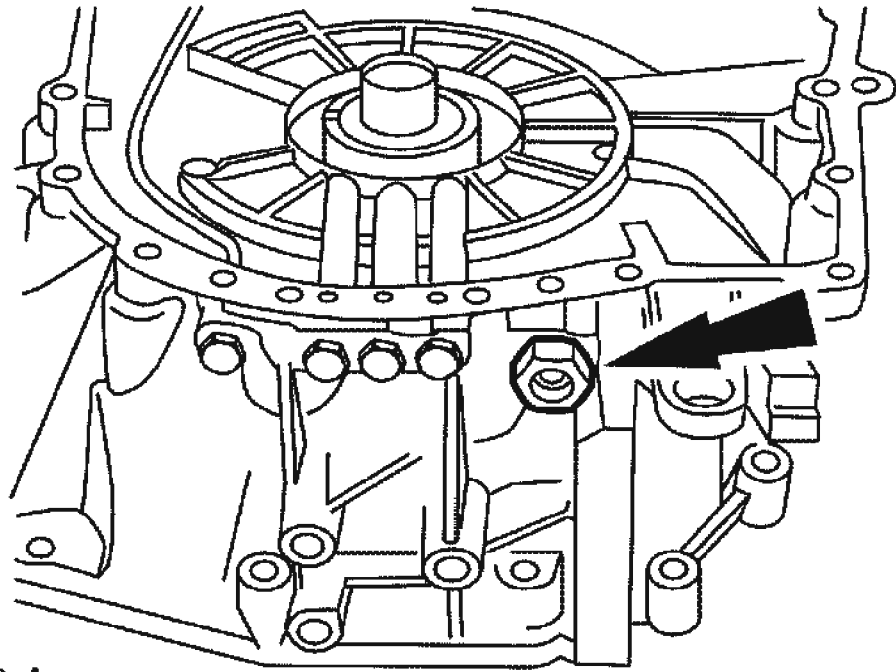
**Fig. 366: Installing Final Drive Ring Gear**  
**Courtesy of FORD MOTOR CO.**

4. Install the final drive ring gear.
5. Install the final drive ring gear retaining ring.



**Fig. 367: Installing Final Drive Ring Gear Retaining Ring**  
Courtesy of FORD MOTOR CO.

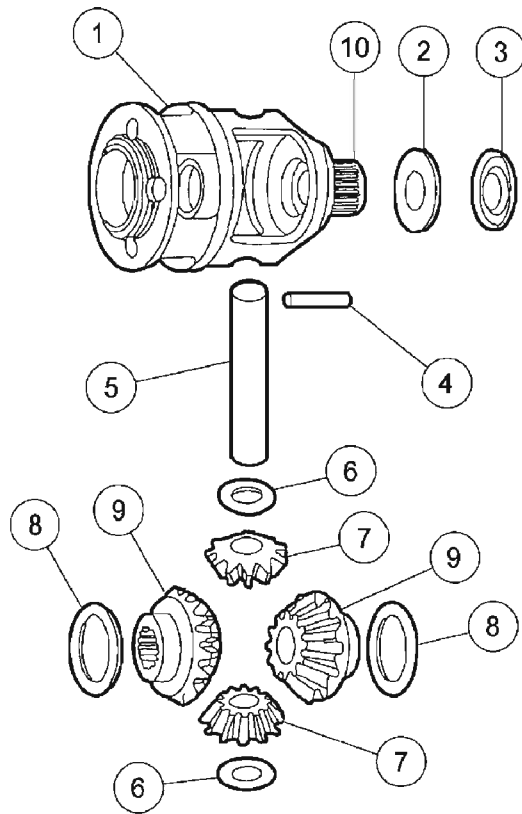
6. Install the cooler tube fitting.
  - Tighten to 48 Nm (35 lb-ft).



GD1922-A

**Fig. 368: Installing Cooler Tube Fitting**  
Courtesy of FORD MOTOR CO.

**FINAL DRIVE CARRIER AND DIFFERENTIAL ASSEMBLY**



A0087487

Item	Part Number	Description
1	4204	Differential housing
2	4067	Differential bearing shim
3	4221	Differential housing bearing
4	67847-S	Pinion shaft roll pin
5	4211	Pinion shaft
6	4230	Pinion thrust washer
7	4215	Pinion gear
8	4228	Side gear thrust washer
9	4236	Differential side gear
10	—	Differential case all wheel drive splines (if equipped)

**Fig. 369: Identifying Final Drive Carrier And Differential Assembly**  
Courtesy of FORD MOTOR CO.

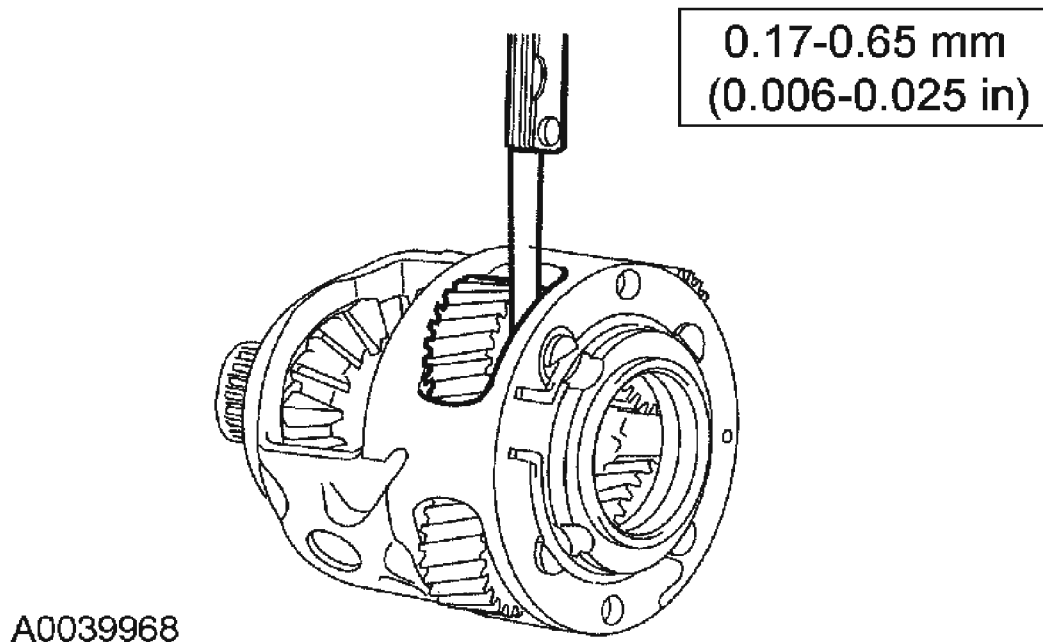
#### Disassembly

1. Inspect the differential for wear or damage. Install new components as required.



**CAUTION:** Do not disassemble the planet carrier.

**NOTE:** If the measurement exceeds specification, install a new complete final drive carrier. If the measurement is within specification, continue with the diagnostic procedure.

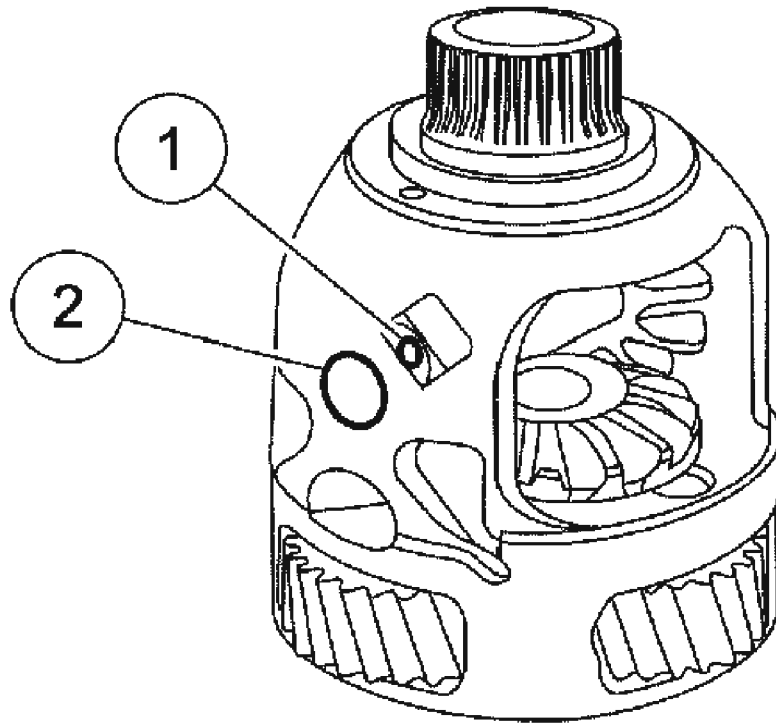


**Fig. 370: Measuring Final Drive Planet Gear End Play With Feeler Gauge**  
Courtesy of FORD MOTOR CO.

2. Measure the final drive planet gear end play with a feeler gauge.

**NOTE:** Do not remove the final drive pinion shaft retaining ring.

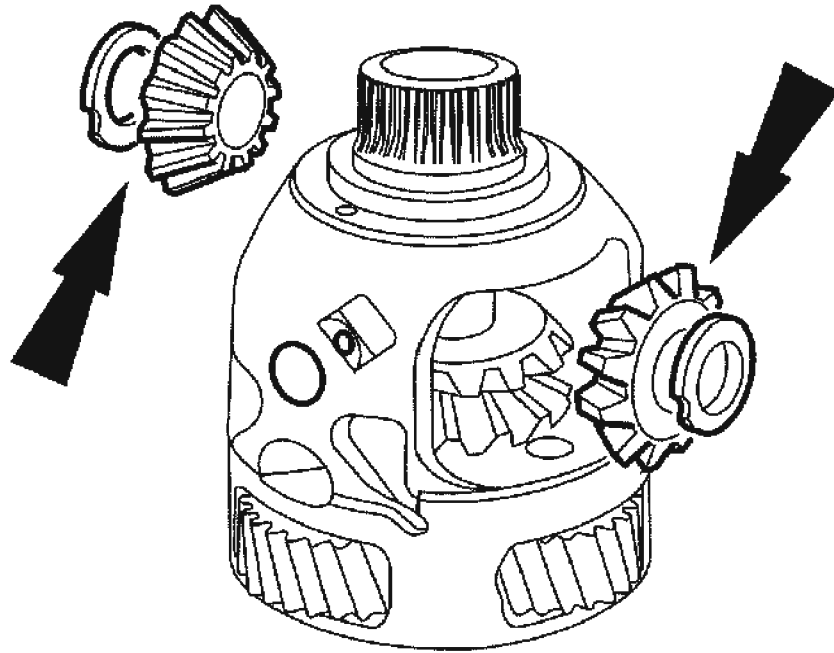
3. Remove the differential pinion shaft.
  1. Remove the pinion shaft roll pin.
  2. Remove the differential pinion shaft.



N0024464

**Fig. 371: Removing Differential Pinion Shaft**  
Courtesy of FORD MOTOR CO.

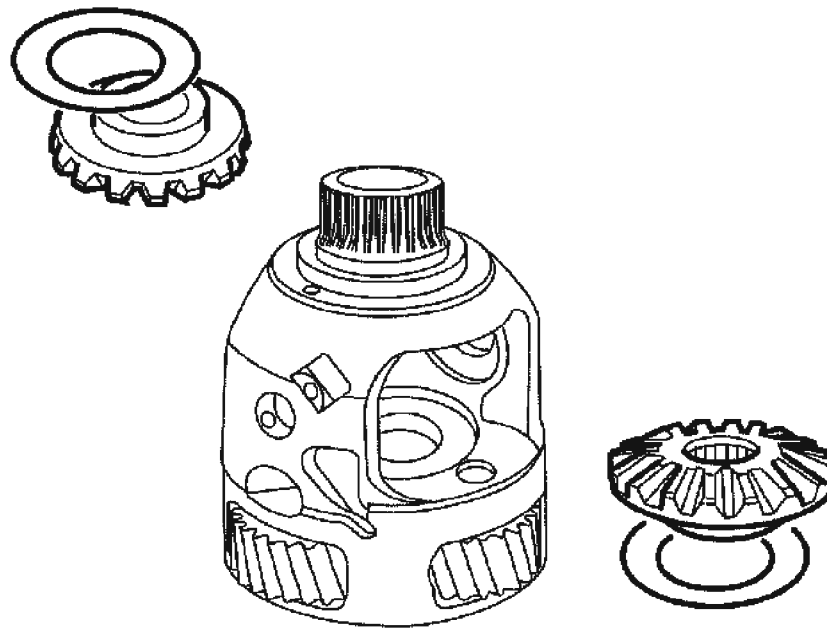
4. Remove the pinion gears and thrust washers.
  - Turn the differential pinion gears 90 degrees and remove.



A0039995

**Fig. 372: Removing Pinion Gears And Thrust Washers**  
Courtesy of FORD MOTOR CO.

5. Remove the differential side gears and differential side gear thrust washers.

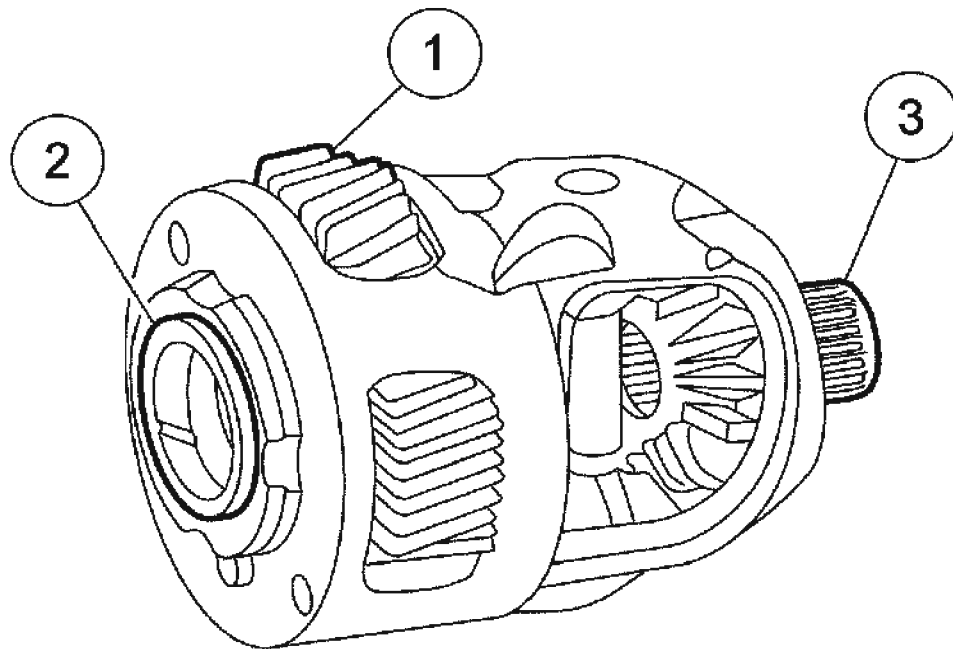


A0039996

**Fig. 373: Removing Differential Side Gears And Differential Side Gear Thrust Washers**

**Courtesy of FORD MOTOR CO.**

6. Clean all parts thoroughly in clean solvent and blow dry with moisture-free regulated compressed air.
7. Inspect the differential parts for damage and wear.
  - Gear teeth
  - Thrust washer surface
  - Thrust bearing surface
  - Pinion shaft
8. Inspect the final drive planet and carrier.
  1. Pinion gear teeth
  2. Thrust bearing surfaces
  3. Bushing surfaces

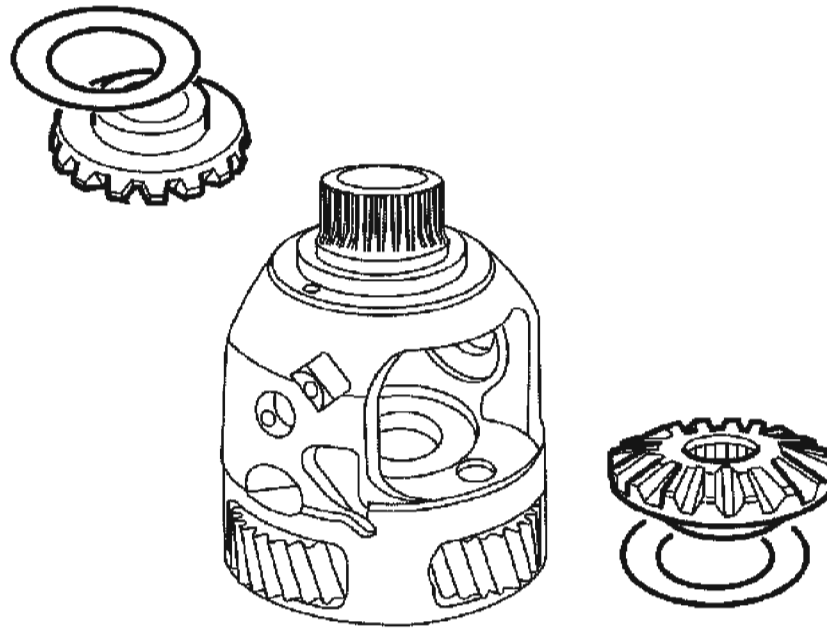


N0024465

**Fig. 374: Inspecting Final Drive Planet And Carrier**  
Courtesy of FORD MOTOR CO.

**Assembly**

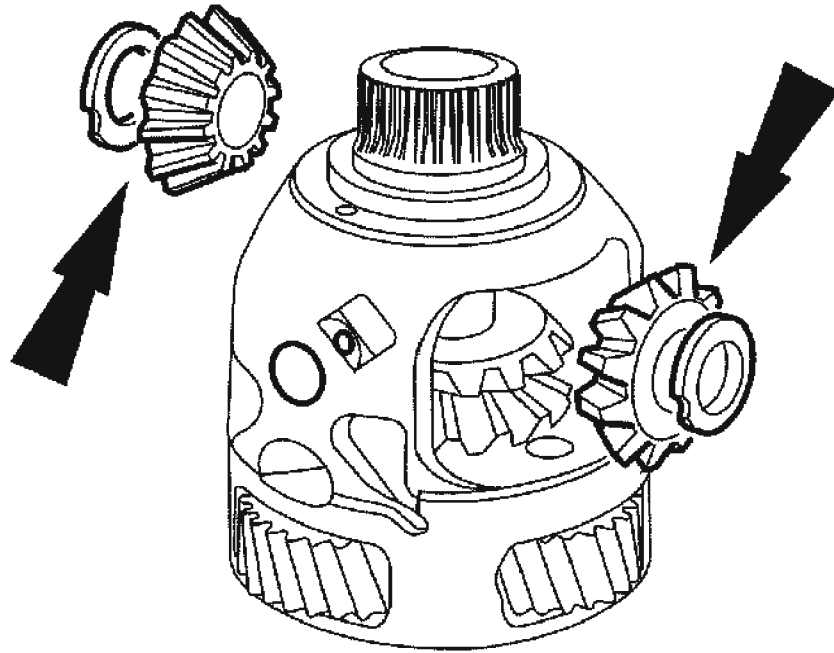
1. Install the differential side gears and thrust washers.



A0039996

**Fig. 375: Installing Differential Side Gears And Thrust Washers**  
Courtesy of FORD MOTOR CO.

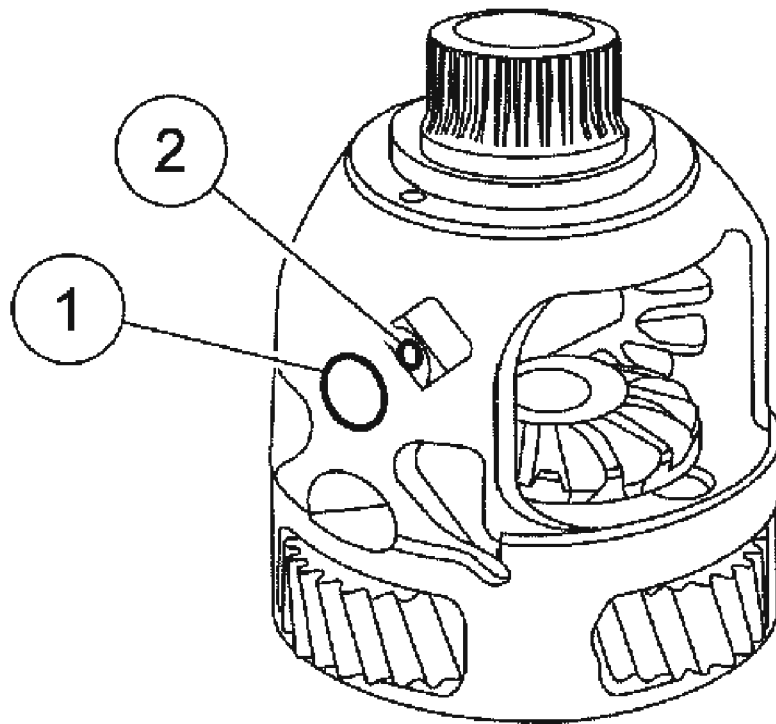
2. Install the differential pinion gears and thrust washers.
  - Rotate the differential pinion gears 90 degrees.



A0039995

**Fig. 376: Installing Differential Pinion Gears And Thrust Washers**  
Courtesy of FORD MOTOR CO.

3. Install the differential pinion shaft.
  1. Push the pinion shaft in place.
  2. Install the roll pin.



N0024470

**Fig. 377: Installing Differential Pinion Shaft**  
Courtesy of FORD MOTOR CO.

**REVERSE ONE-WAY CLUTCH - SPRAG TYPE**

Special Tool(s)

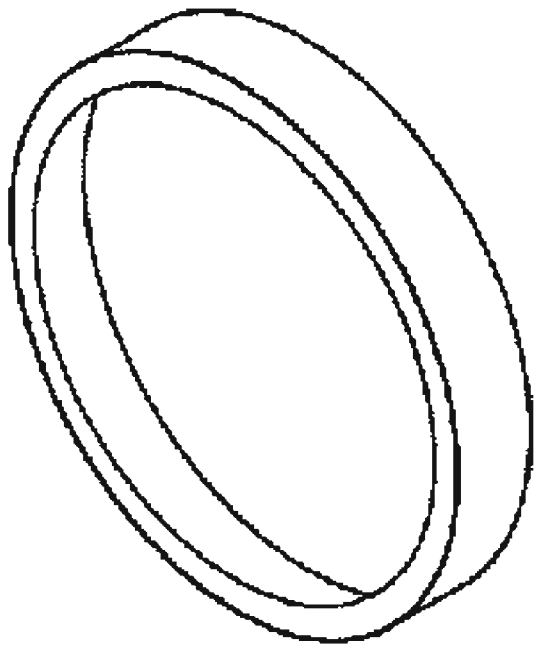
**SPECIAL TOOLS DESCRIPTION**

Installer, Transmission Sprag 307-293 (T94P-77000-J)



## 2005 Ford Escape

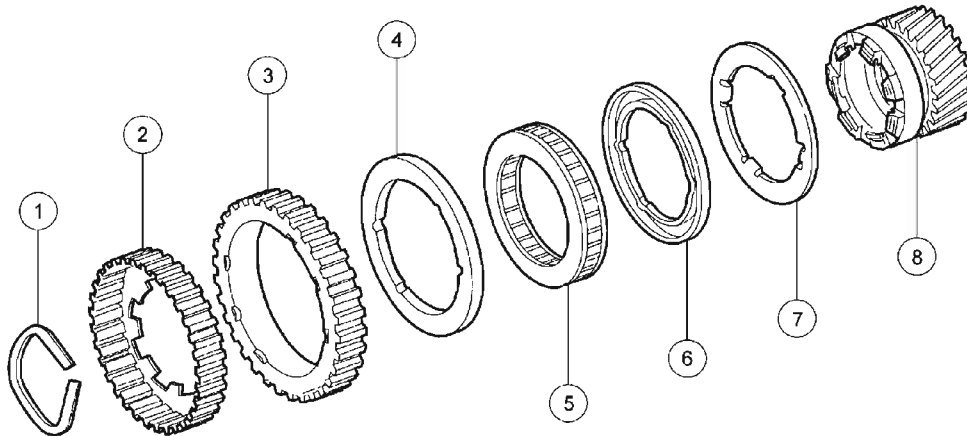
2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1967-A**

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



N0024466

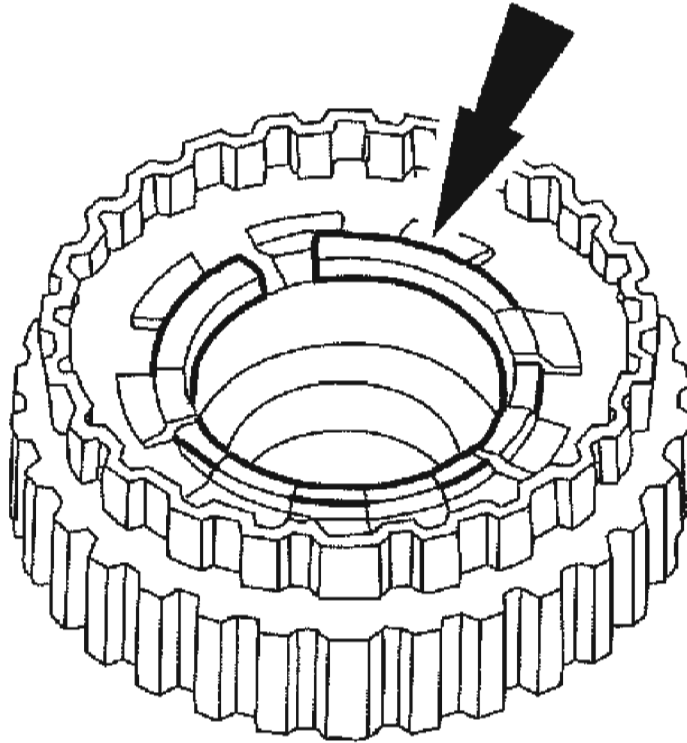
Item	Part Number	Description
1	7C122	Coast clutch hub retaining ring
2	7H214	Coast clutch hub
3	7G439	Forward one-way clutch outer race
4	—	Forward one-way clutch end cap (part of 7H218)

Item	Part Number	Description
5	7H218	Forward one-way clutch sprag assembly
6	—	Forward one-way clutch end cap (part of 7H218)
7	7H219	Forward one-way clutch retainer
8	7H229	Low and intermediate sun gear, race and bushing assembly

**Fig. 378: Identifying Reverse One-Way Clutch Components - Sprag Type**  
Courtesy of FORD MOTOR CO.

### Disassembly

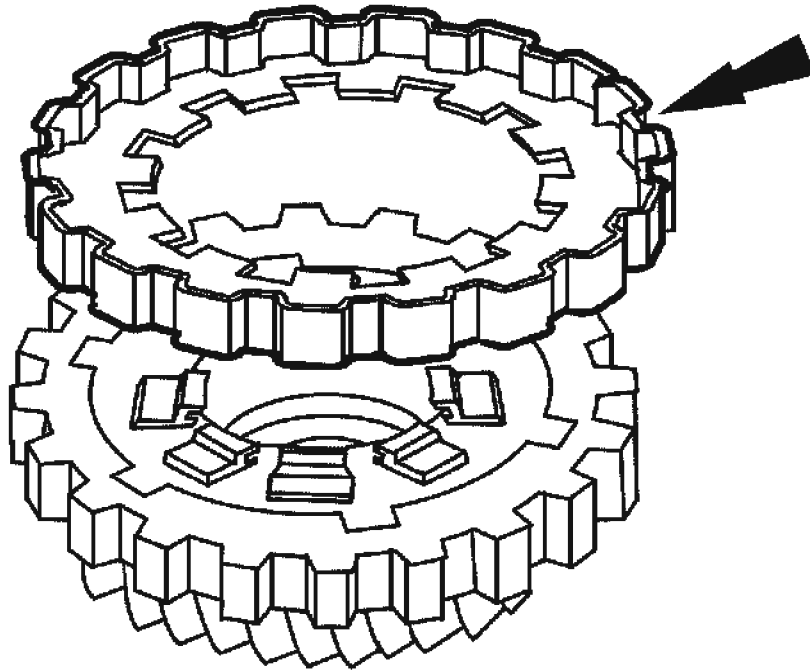
1. Remove the coast clutch hub retaining ring.



GD2781-A

**Fig. 379: Removing Coast Clutch Hub Retaining Ring**  
Courtesy of FORD MOTOR CO.

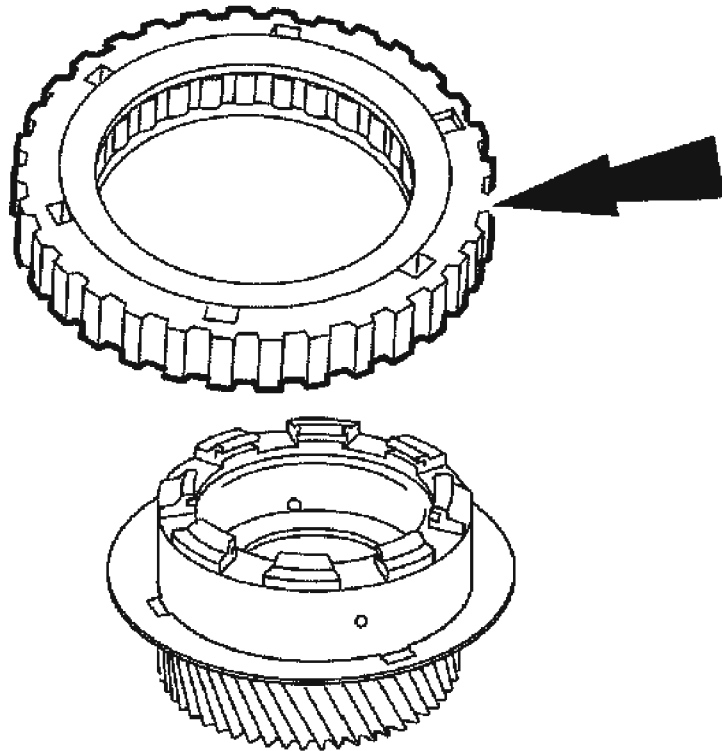
2. Remove the coast clutch hub.



GD2782-A

**Fig. 380: Removing Coast Clutch Hub**  
**Courtesy of FORD MOTOR CO.**

3. Remove the forward one-way clutch outer race and sprag assembly with end caps.

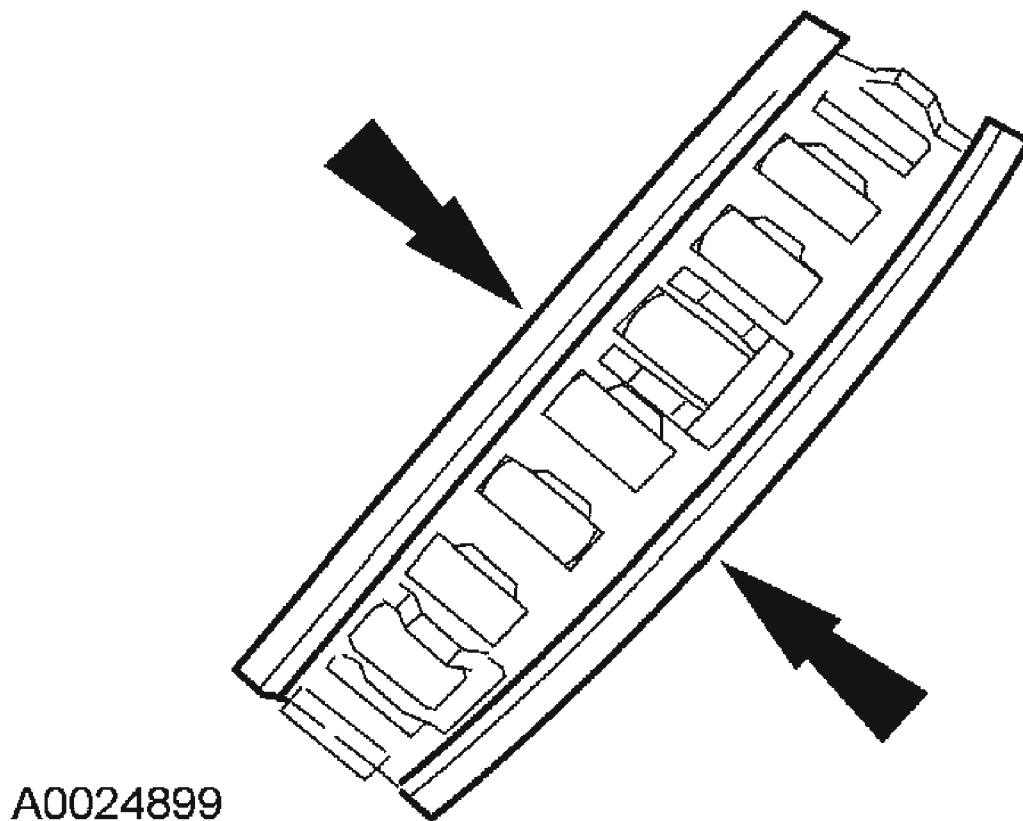


GD2783-A

**Fig. 381: Removing Forward One-Way Clutch Outer Race And Sprag Assembly With End Caps**

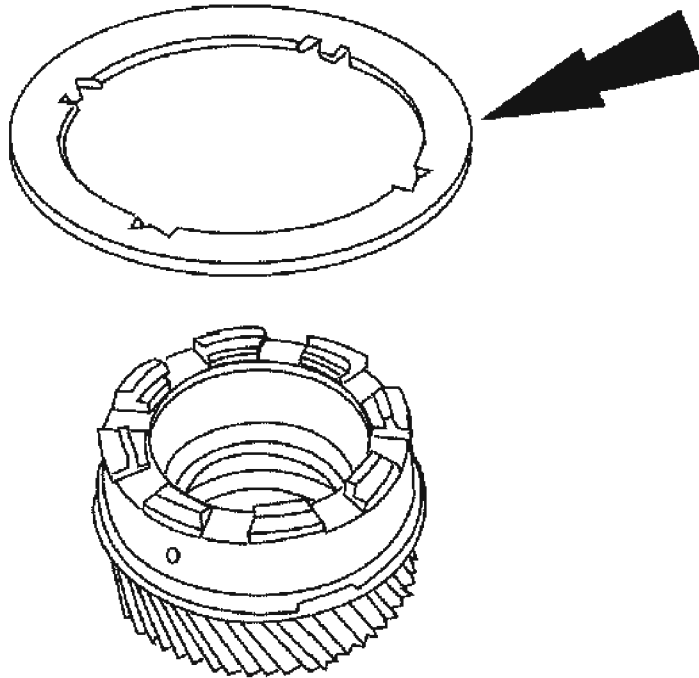
Courtesy of FORD MOTOR CO.

**NOTE:** Orientation of end caps to sprag assembly. New design end caps are the same thickness and interchangeable (but not reversible).



**Fig. 382: Removing Forward One-Way Clutch End Caps From Sprag Assembly**  
Courtesy of FORD MOTOR CO.

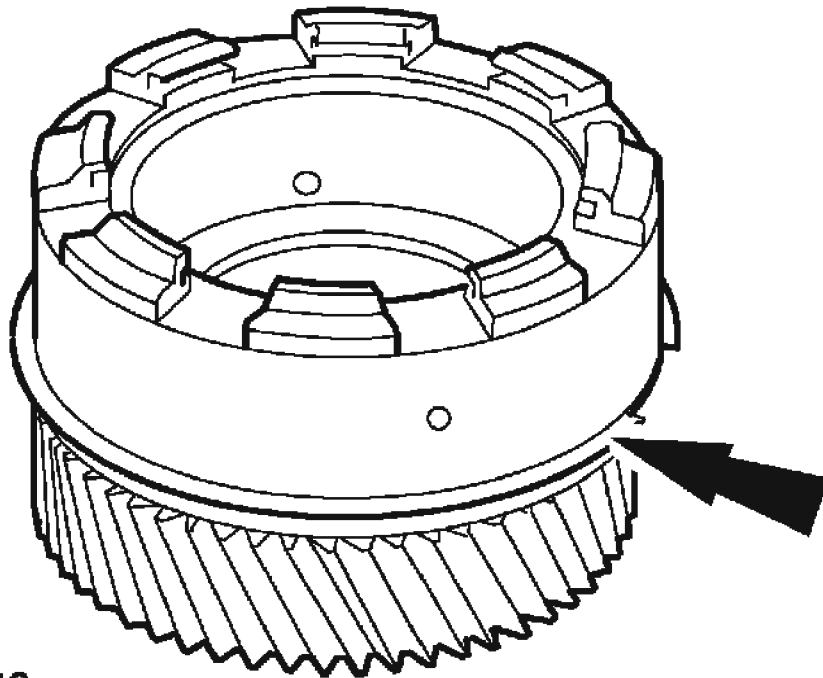
4. Remove the forward one-way clutch end caps from the sprag assembly.
5. Remove the forward one-way clutch retainer.



GD2786-A

**Fig. 383: Removing Forward One-Way Clutch Retainer**  
Courtesy of FORD MOTOR CO.

6. Remove the retaining ring down over the gear.



ELE0012148

**Fig. 384: Removing Retaining Ring Down Over Gear**  
Courtesy of FORD MOTOR CO.

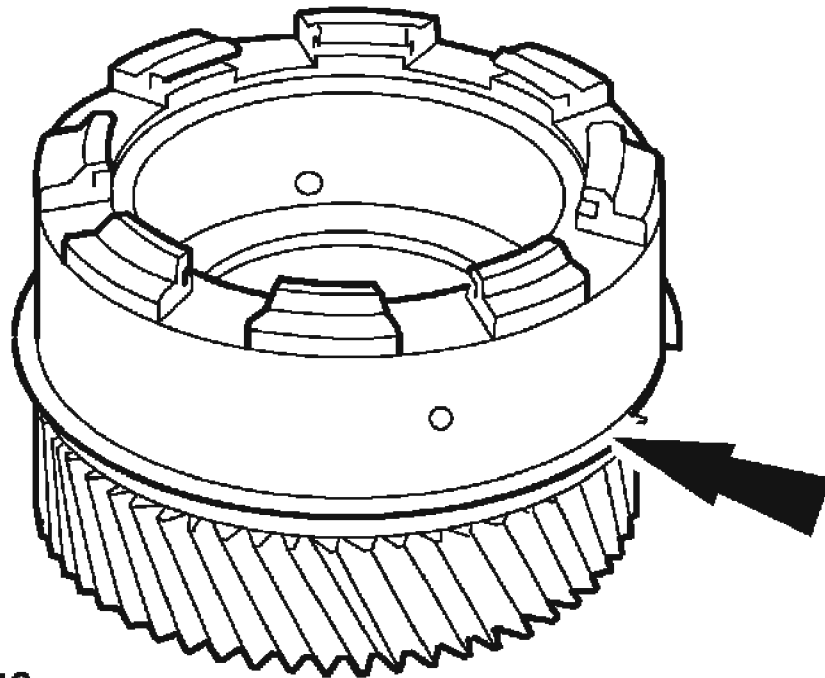
**WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air. Failure to follow these instructions can result in personal injury.

7. Clean all parts thoroughly in clean solvent and blow dry with moisture-free compressed air.
8. Inspect the forward one-way clutch parts for damage and wear.
  - Outer race
  - Sprag assembly and end caps
  - Inner race and low-intermediate sun gear assembly
  - Lube holes
  - Coast clutch hub

#### Assembly

1. Install the retaining ring.

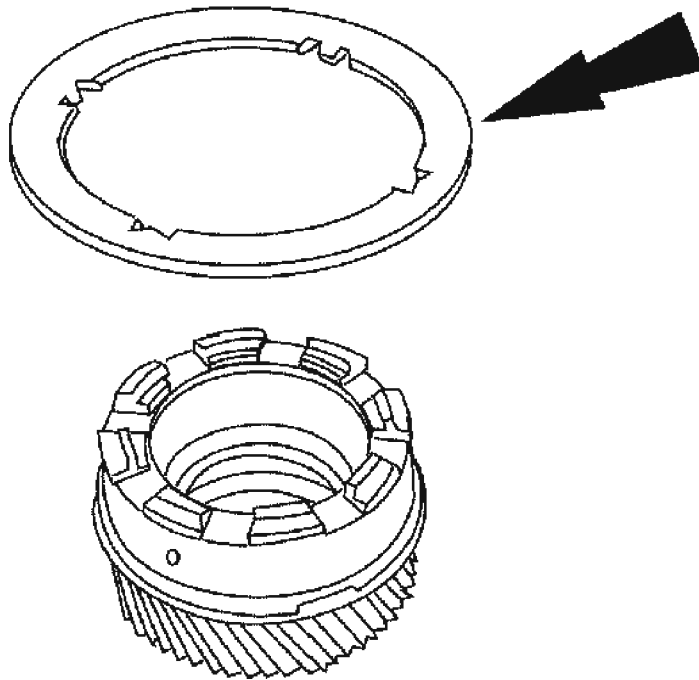




ELE0012148

**Fig. 385: Installing Retaining Ring**  
Courtesy of FORD MOTOR CO.

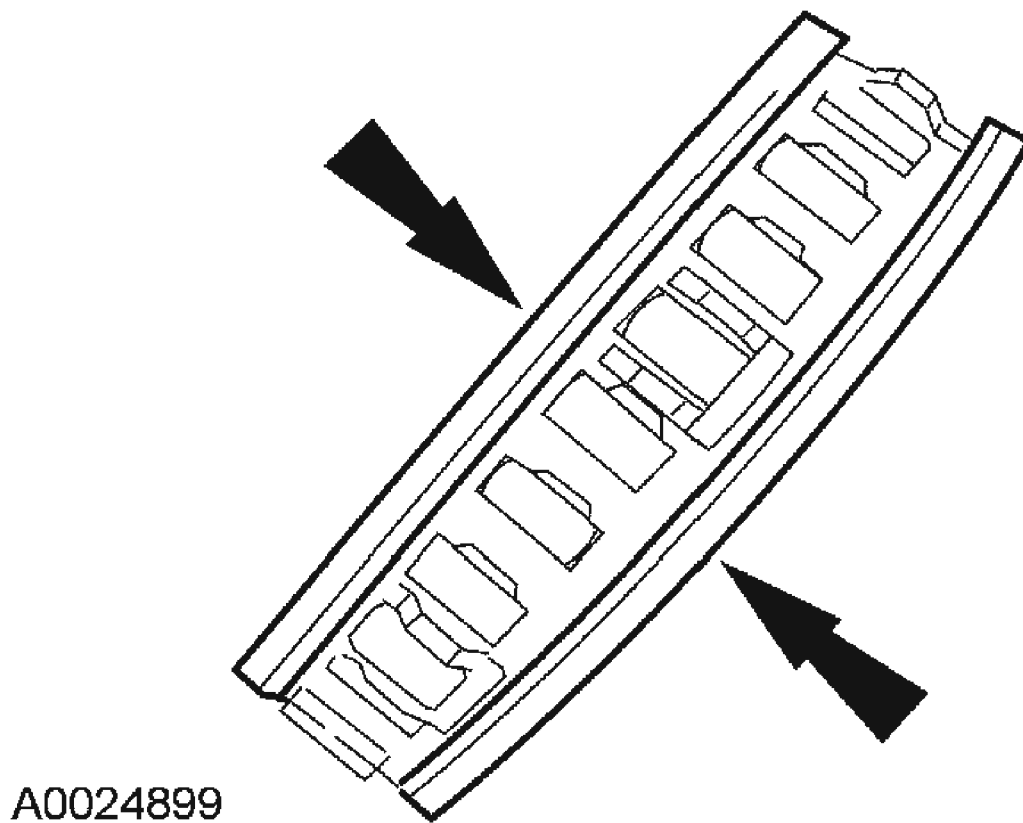
**NOTE:** The tabs on the retainer face downward.



GD2786-A

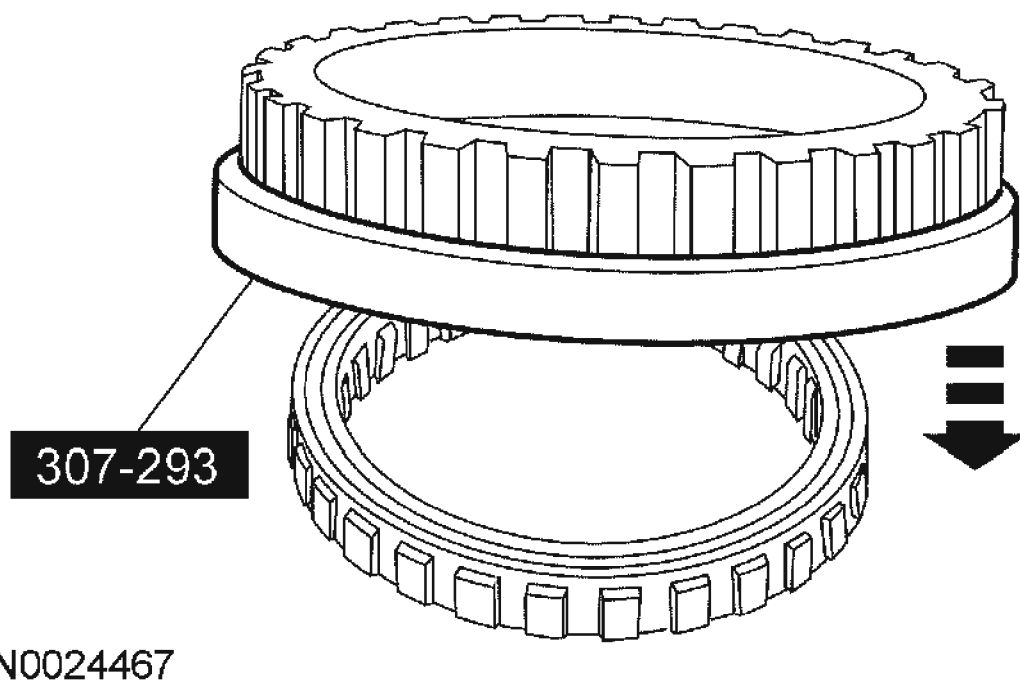
**Fig. 386: Installing Forward One-Way Clutch Retainer**  
**Courtesy of FORD MOTOR CO.**

2. Install the forward one-way clutch retainer.
3. Install the forward one-way clutch end caps onto the sprag assembly.



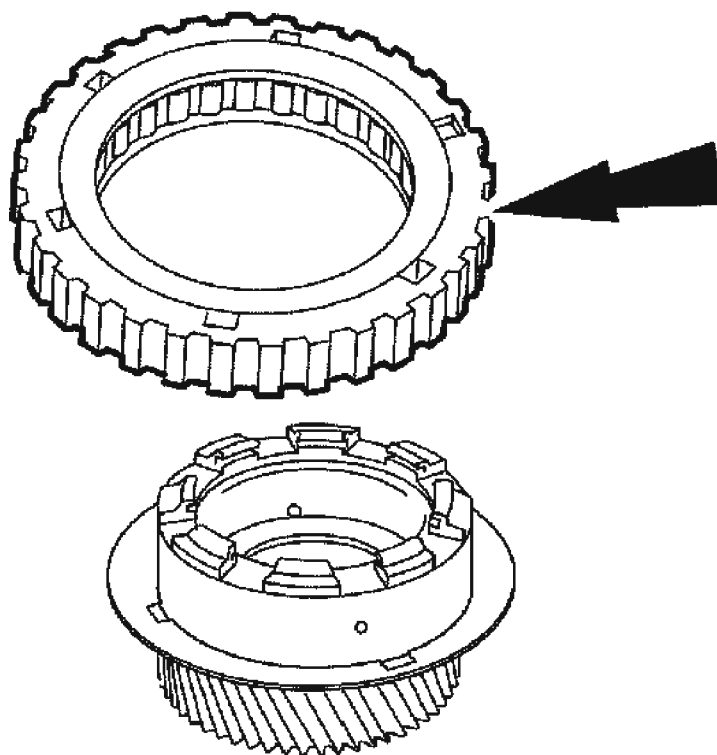
**Fig. 387: Installing Forward One-Way Clutch End Caps Onto Sprag Assembly**  
Courtesy of FORD MOTOR CO.

4. Using the special tool, install the one-way clutch bearing into the one-way outer race.



**Fig. 388: Installing One-Way Clutch Bearing Into One-Way Outer Race**  
Courtesy of FORD MOTOR CO.

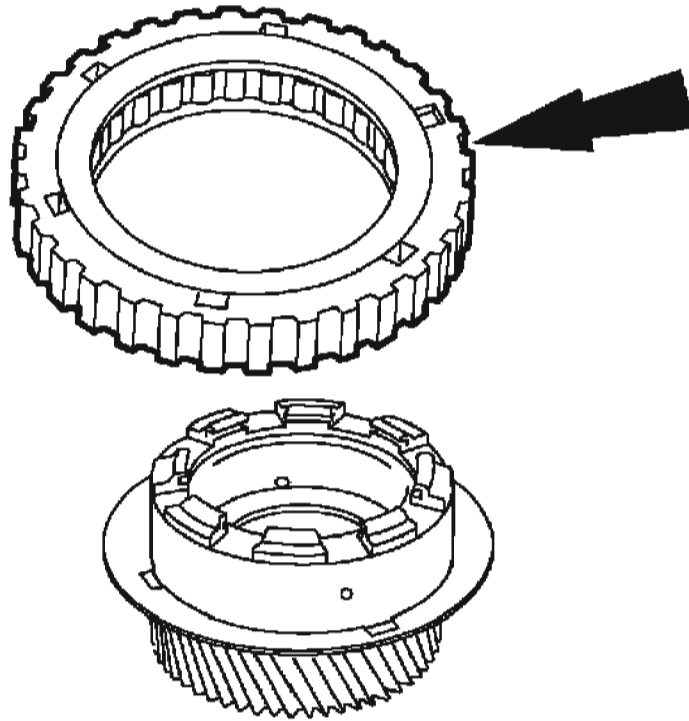
5. Install the sprag assembly and end caps in the outer race.



GD2783-A

**Fig. 389: Installing Sprag Assembly And End Caps In Outer Race**  
Courtesy of FORD MOTOR CO.

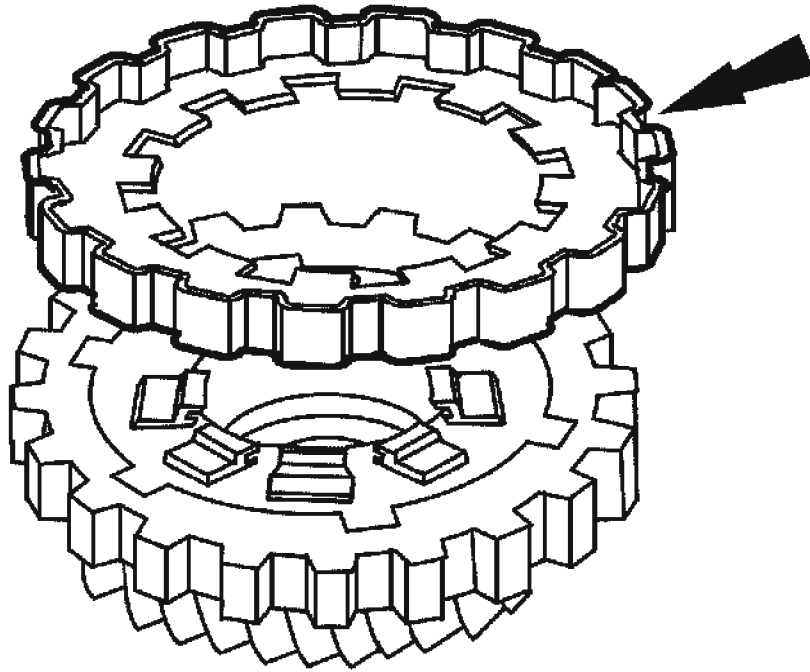
**NOTE:** Lube grooves face upward (away from the sun gear).



ELE0012149

**Fig. 390: Installing One-Way Clutch Bearing Into One-Way Outer Race**  
Courtesy of FORD MOTOR CO.

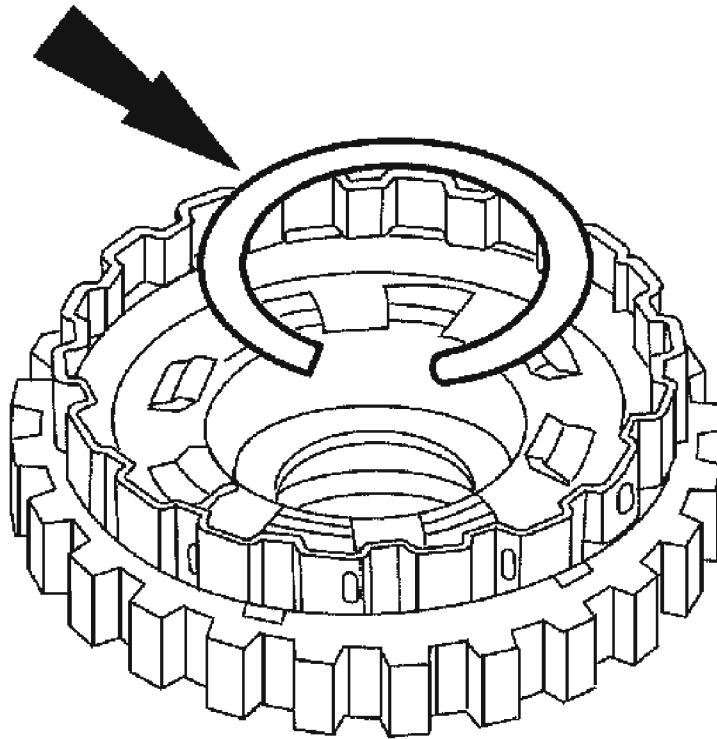
6. Rotate the outer race and sprag assembly (with end caps) over and install it on the forward one-way clutch inner race.
7. Install the coast clutch hub.



GD2782-A

**Fig. 391: Installing Coast Clutch Hub**  
Courtesy of FORD MOTOR CO.

- NOTE:** The ends of the retaining ring should point toward the coast clutch hub.
- NOTE:** Make sure the retaining ring is fully seated upon installation.

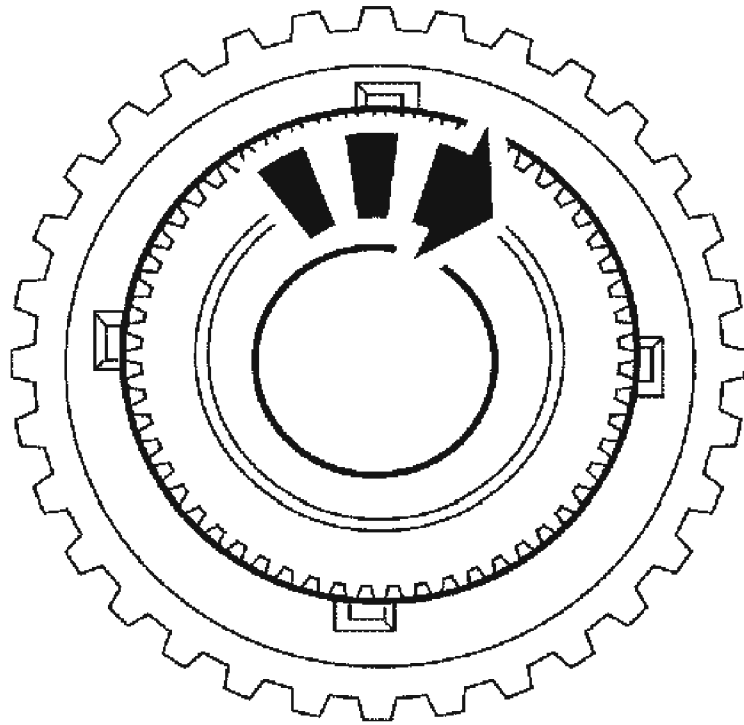


GD2789-A

**Fig. 392: Installing Coast Clutch Hub Retaining Ring**  
Courtesy of FORD MOTOR CO.

8. Install the coast clutch hub retaining ring.
9. Check the operation of the forward one-way clutch with the low/intermediate sun gear facing upward.
  - Hold the outer race firmly.
  - Rotate the low/intermediate sun gear clockwise.
  - The low/intermediate sun gear should rotate with a slight drag without attempting to rotate the outer race.
  - Rotate the low/intermediate sun gear counterclockwise. The low/intermediate sun gear should rotate the outer race.





GD2790-A

**Fig. 393: Rotating Low/Intermediate Sun Gear Counterclockwise**  
Courtesy of FORD MOTOR CO.

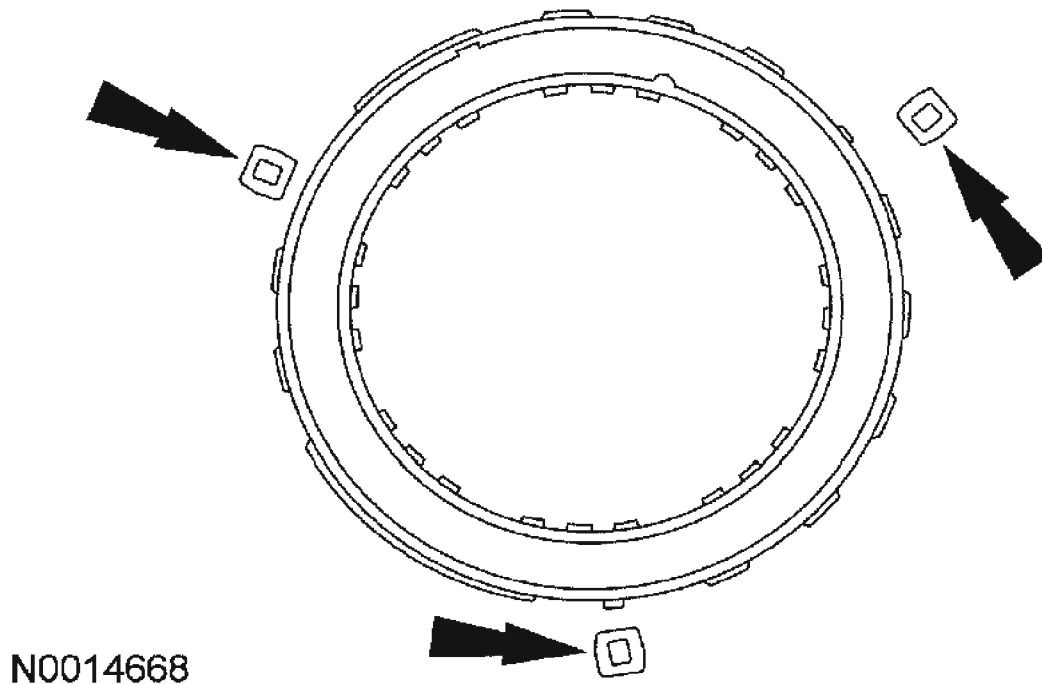
**LOW REVERSE ONE-WAY CLUTCH - MECHANICAL DIODE TYPE**

**CAUTION:** Do not clean in water or with water-based solvents.

**NOTE:** The mechanical diode type one-way clutch does not use a thrust plate.

**NOTE:** The mechanical diode type one-way clutch cannot be disassembled.

1. Inspect the one-way clutch for cracks and damaged splines. Make sure 3 rubber insulators are present. Install new rubber insulators if any damage is found. The internal splined section should rotate clockwise and lock when rotated counterclockwise. If any damage is found or the clutch does not rotate or lock, install a new mechanical diode type one-way clutch.

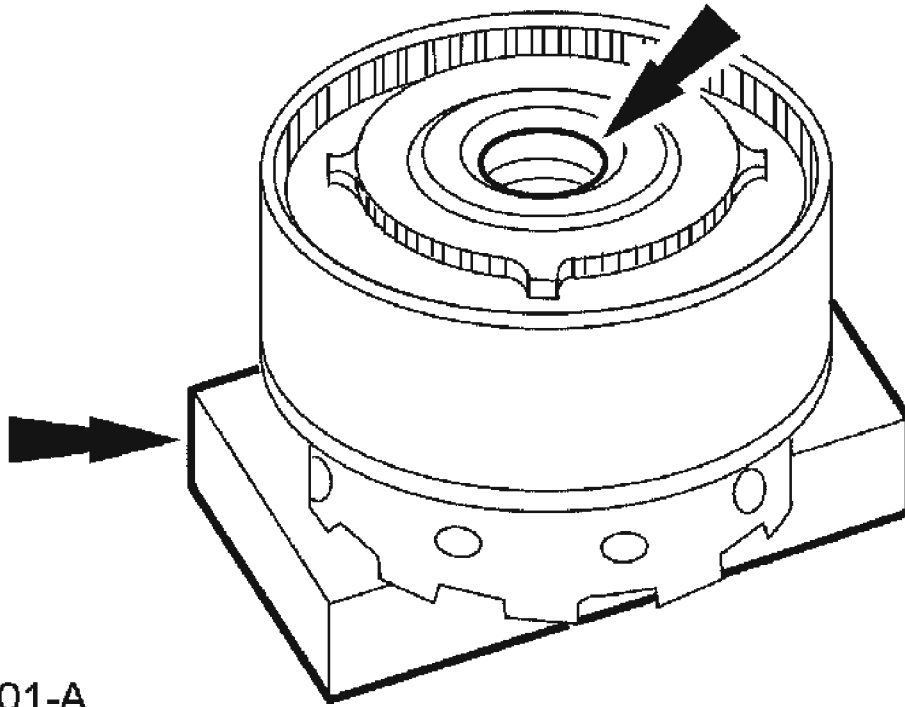


**Fig. 394: Identifying One-Way Clutch For Cracks And Damaged Splines**  
Courtesy of FORD MOTOR CO.

**FORWARD/COAST/DIRECT CLUTCH CYLINDER AND REVERSE CLUTCH DRUM -  
DISASSEMBLY**

**Disassembly**

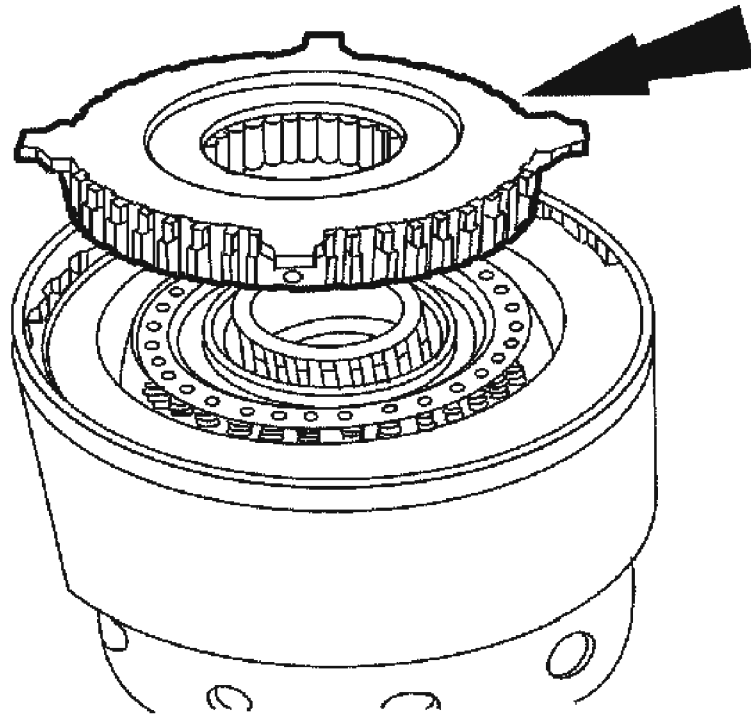
**NOTE:** Support the assembly of the forward/coast/direct clutch cylinder assembly and reverse clutch drum assembly on a block of wood so that the reverse clutch hub faces upward. This will ease the reverse clutch hub retaining ring removal.



GD2801-A

**Fig. 395: Removing Reverse Clutch Hub Retaining Ring**  
Courtesy of FORD MOTOR CO.

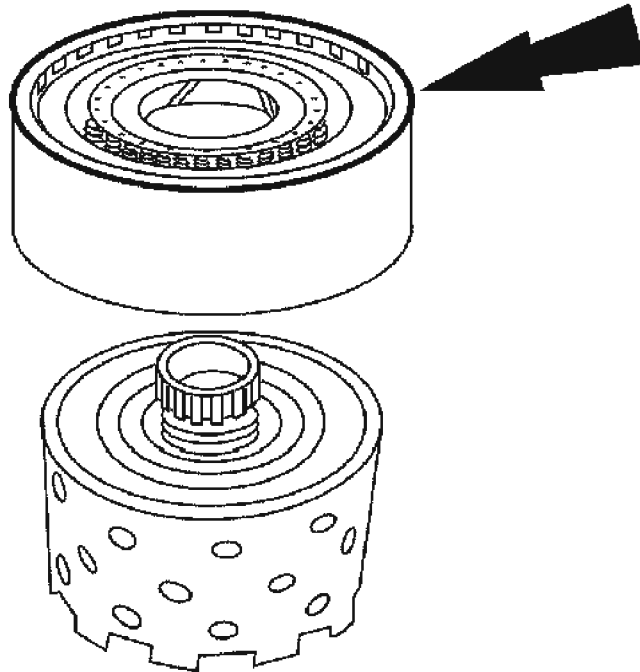
1. Remove the reverse clutch hub retaining ring.
2. Remove the reverse clutch hub.



GD2802-A

**Fig. 396: Removing Reverse Clutch Hub**  
Courtesy of FORD MOTOR CO.

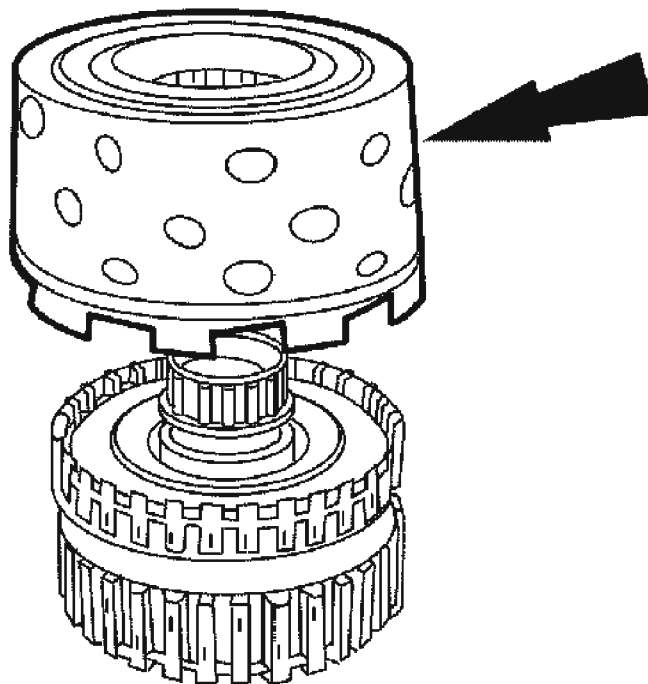
3. Remove the reverse clutch drum assembly.



GD2803-A

**Fig. 397: Removing Reverse Clutch Drum Assembly**  
Courtesy of FORD MOTOR CO.

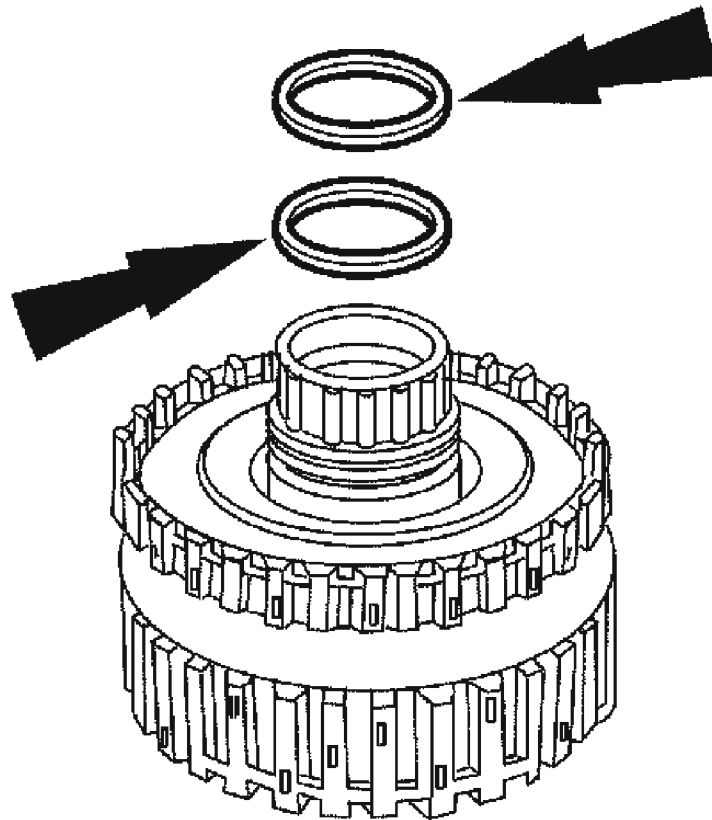
4. Remove the direct clutch hub and shell from the forward/coast/direct clutch cylinder.



GD2804-A

**Fig. 398: Removing Direct Clutch Hub And Shell From Forward/Coast/Direct Clutch Cylinder**  
Courtesy of FORD MOTOR CO.

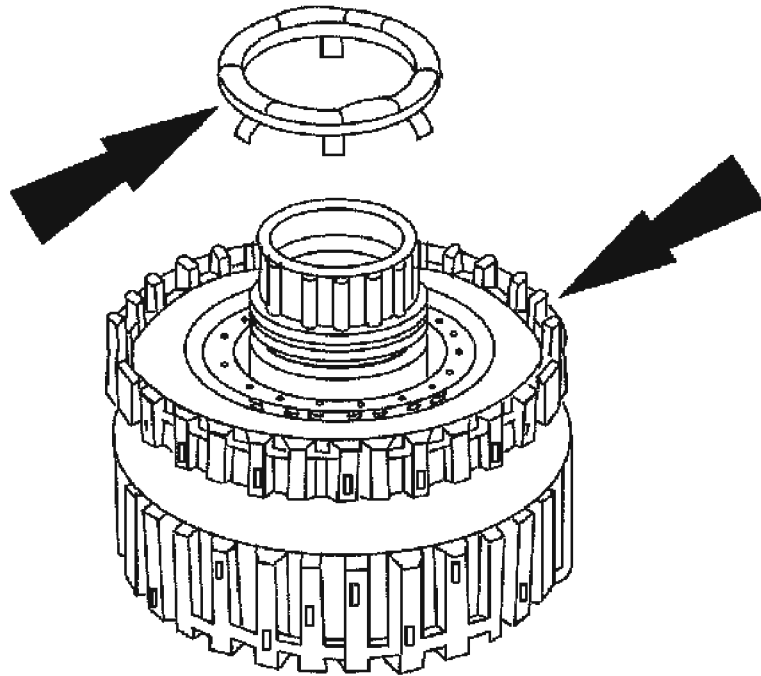
5. Remove and discard the 2 reverse clutch cylinder seals from the forward/coast/direct clutch cylinder assembly.



GD2805-A

**Fig. 399: Removing Reverse Clutch Cylinder Seals From Forward/Coast/Direct Clutch Cylinder Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Observe the tab orientation of the No. 2 direct clutch thrust washer during disassembly for correct installation.

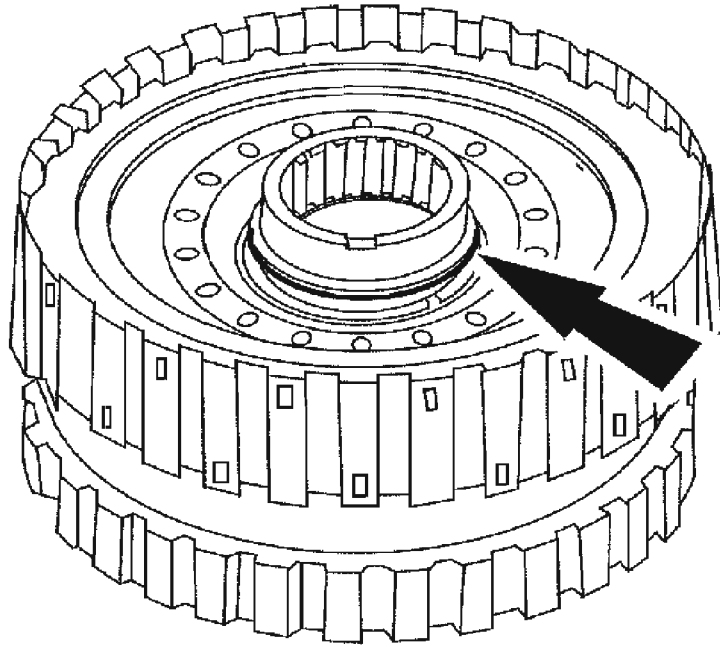


GD2806-A

**Fig. 400: Removing No 2 Direct Clutch Thrust Washer From Forward/Coast/Direct Clutch Cylinder**  
Courtesy of FORD MOTOR CO.

6. Remove the No. 2 direct clutch thrust washer from the forward/coast/direct clutch cylinder.
7. Remove and discard the forward/coast/direct clutch cylinder hub seal ring.





GD3841-A

**Fig. 401: Removing Forward/Coast/Direct Clutch Cylinder Hub Seal Ring**  
Courtesy of FORD MOTOR CO.

#### FORWARD/COAST/DIRECT CLUTCHES

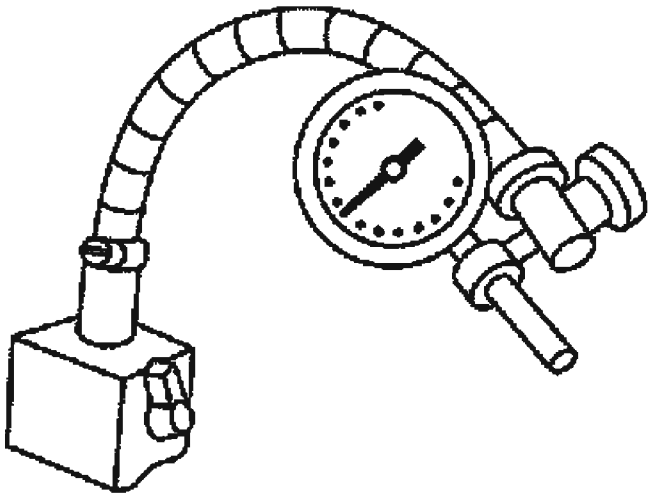
Special Tool(s)

#### SPECIAL TOOLS DESCRIPTION

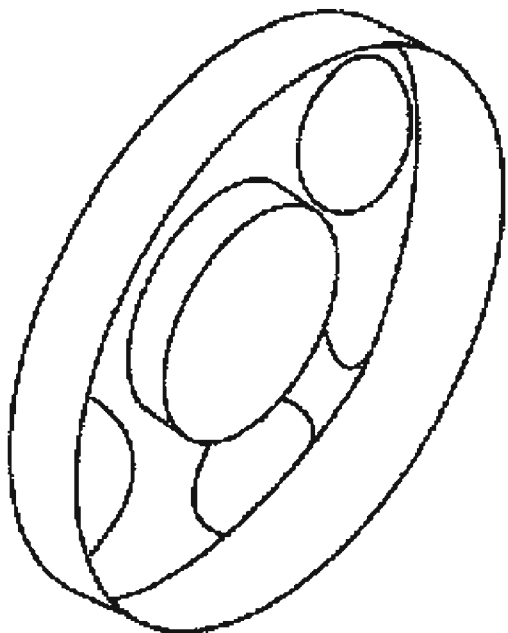
Dial Indicator Gauge with Holding  
Fixture 100-D002 (D78P-4201-B)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1266-A**

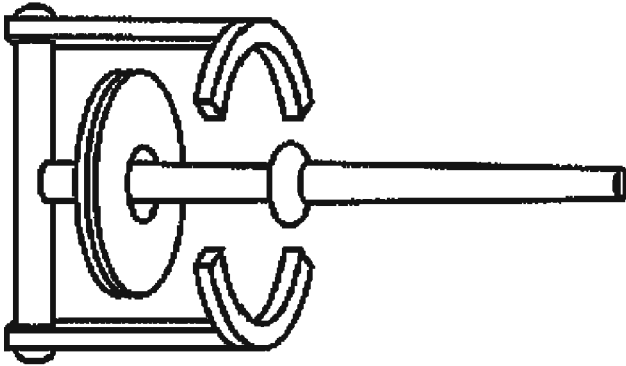


**ST1989-A**

Protector, Piston Seal 307-282  
(T94P-77000-D3)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Compressor, Clutch Spring 307-015  
(T65L-77515-A)

**ST1190-A**



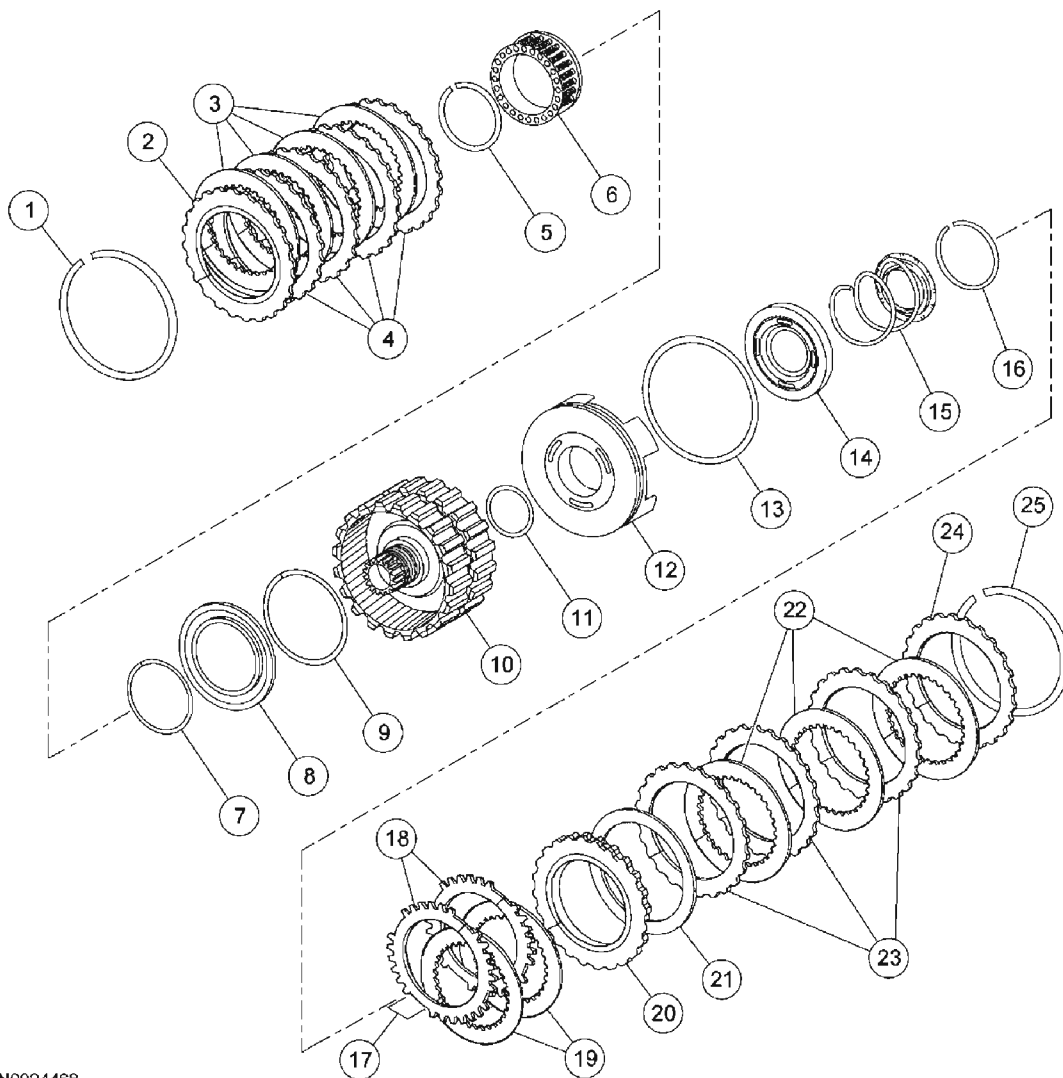
Remover, O-Ring Seal 100-010  
(T71P-19703-C)

**ST1219-A**

### Material

### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®

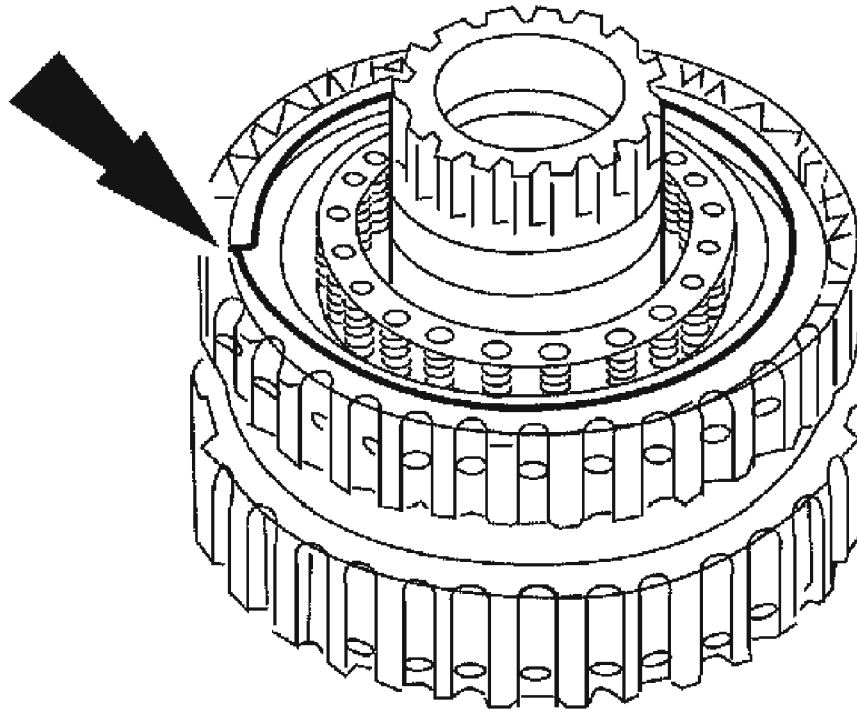


N0024468

**Fig. 402: Disassembling Forward/Coast/Direct Clutches**  
 Courtesy of FORD MOTOR CO.

#### Disassembly

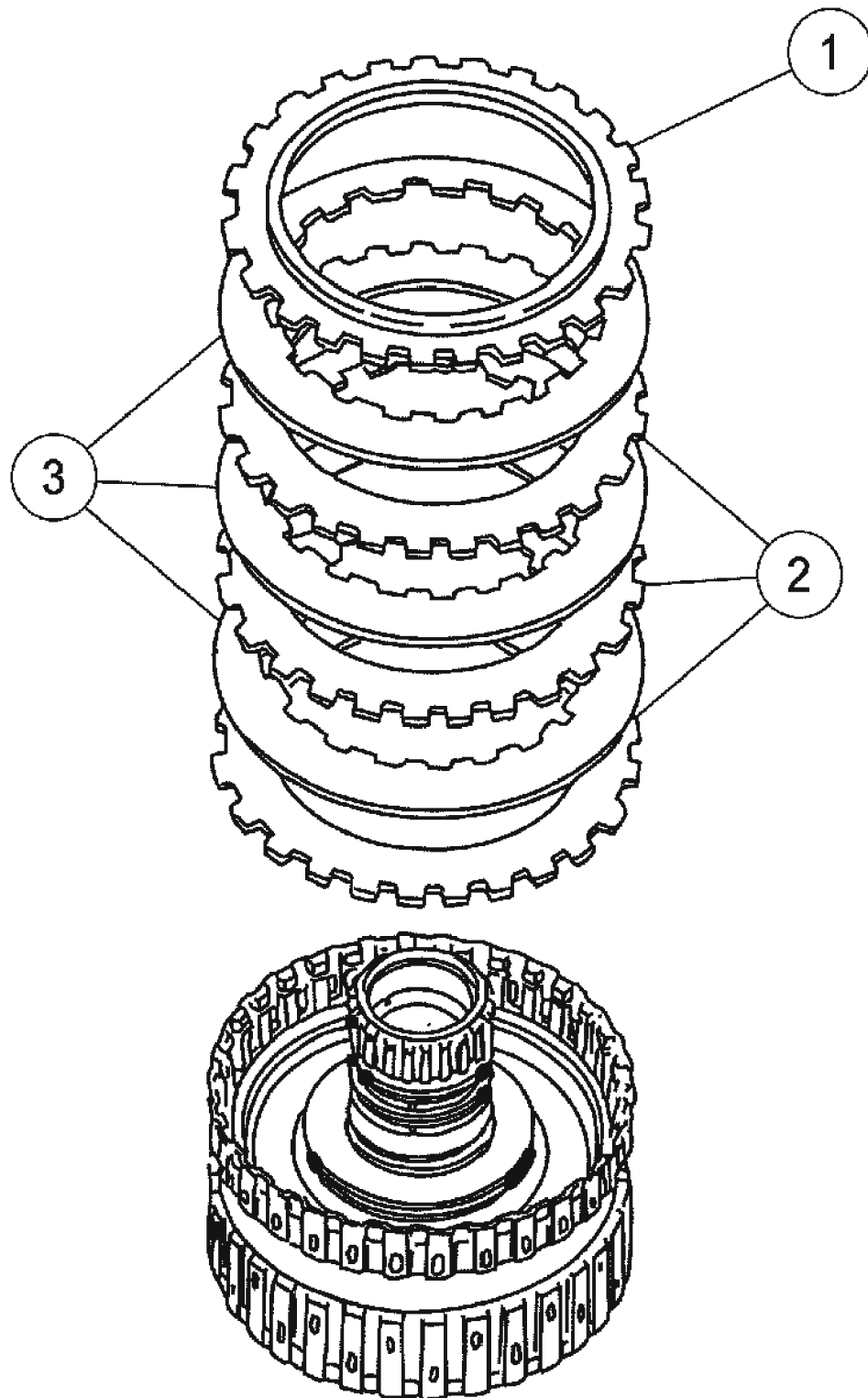
1. Remove the direct clutch pressure plate retaining ring.



GD2832-A

**Fig. 403: Removing Direct Clutch Pressure Plate Retaining Ring**  
Courtesy of FORD MOTOR CO.

2. Disassemble the direct clutch pack.
  1. Remove the direct clutch pressure plate.
  2. Remove the direct clutch steel plates.
  3. Remove the direct clutch friction plates.



N0024469

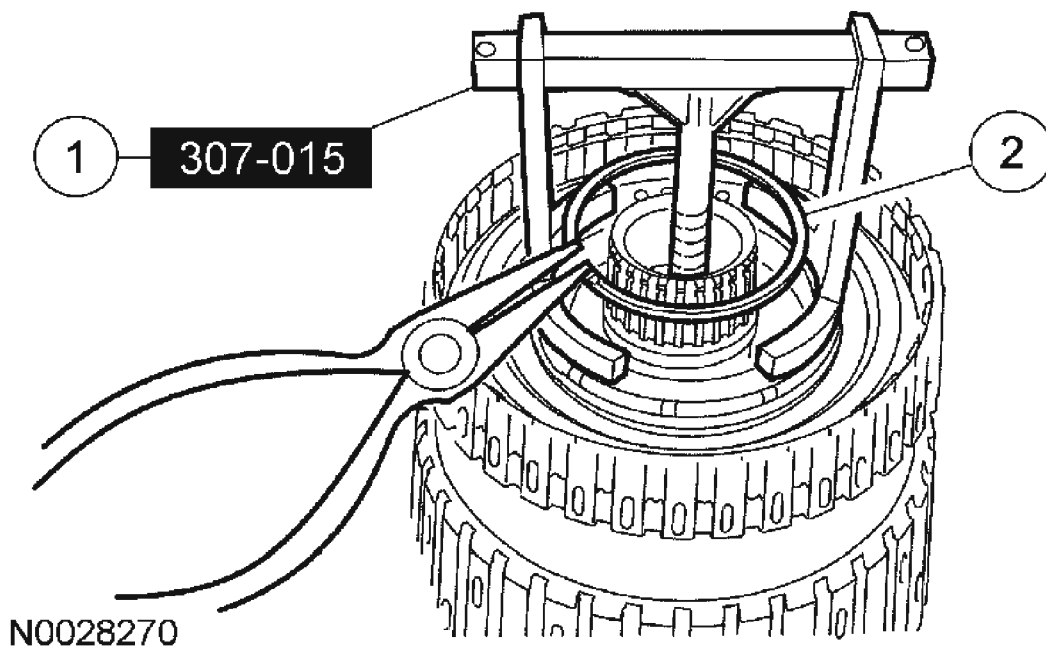
**Fig. 404: Disassembling Direct Clutch Pack**

Courtesy of FORD MOTOR CO.

**WARNING:** Use caution when releasing tool pressure on the clutch piston springs. Failure to follow these instructions may result in personal injury.

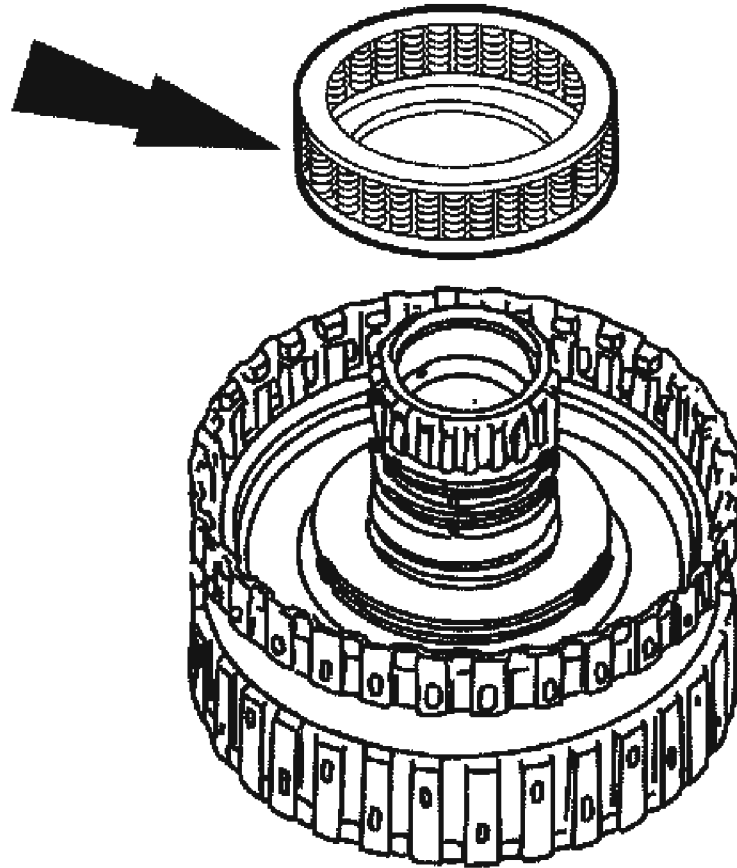
**CAUTION:** Do not compress the direct clutch return springs completely.

3. Remove the direct clutch spring retaining ring.
  1. Using the special tool, compress the direct clutch return springs.
  2. Remove the direct clutch return spring retaining ring.



**Fig. 405: Removing Direct Clutch Spring Retaining Ring**  
Courtesy of FORD MOTOR CO.

4. Remove the direct clutch return spring assembly.

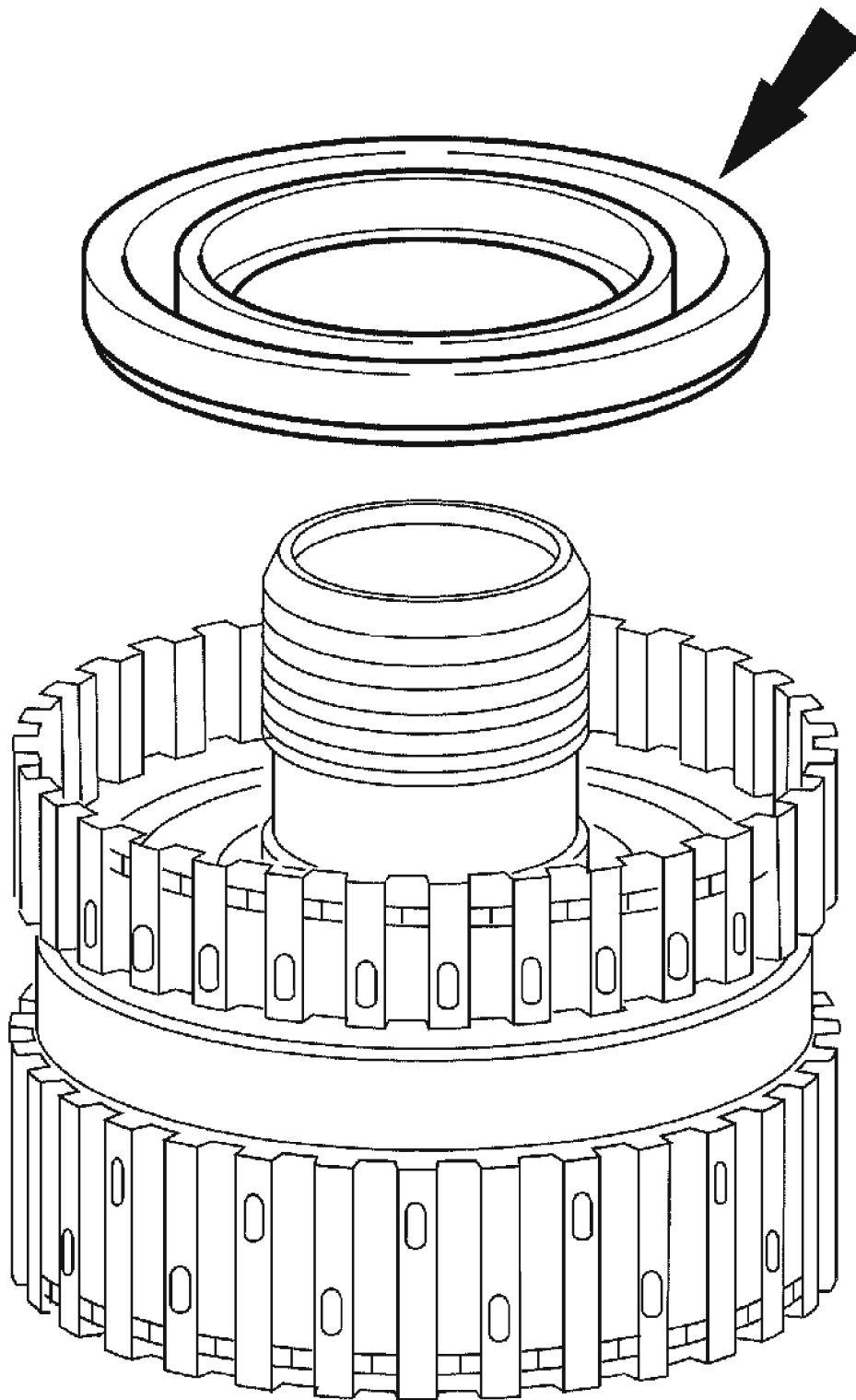


GD2834-A

**Fig. 406: Removing Direct Clutch Return Spring Assembly**  
Courtesy of FORD MOTOR CO.

5. Remove the direct clutch piston assembly.



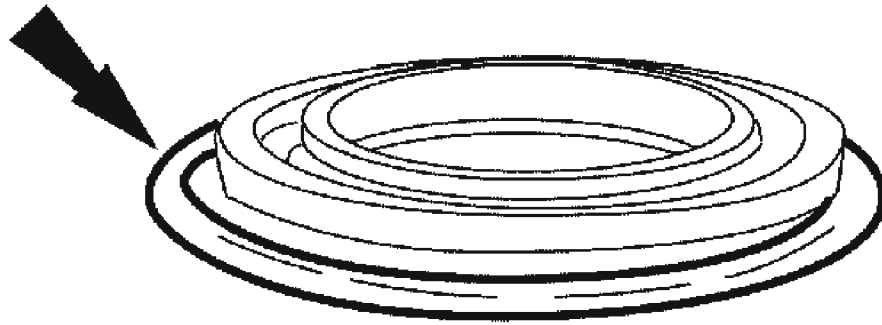


ELV9010202

**Fig. 407: Removing Direct Clutch Piston Assembly**

Courtesy of FORD MOTOR CO.

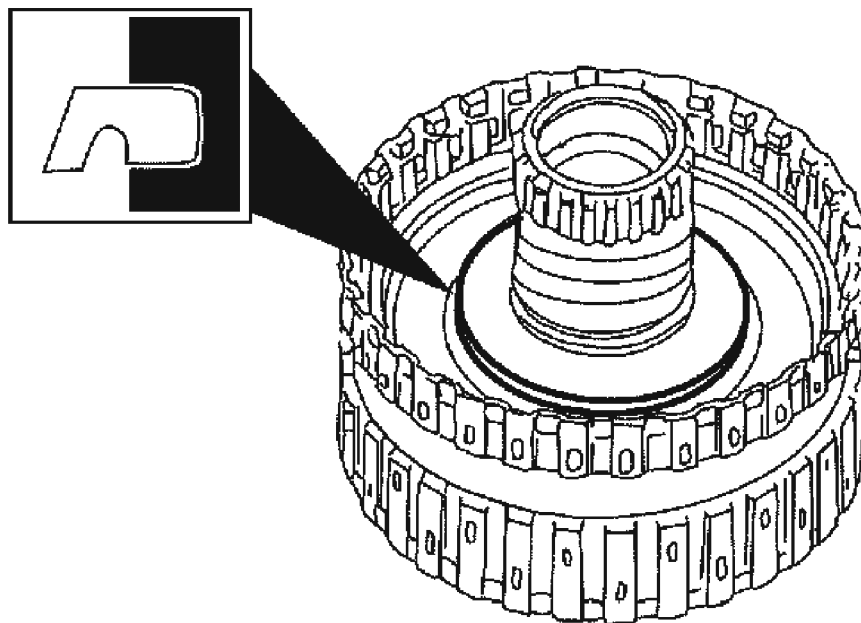
6. Remove and discard the direct clutch piston outer lip seal.



GD2836-A

**Fig. 408: Removing Direct Clutch Piston Outer Lip Seal**  
Courtesy of FORD MOTOR CO.

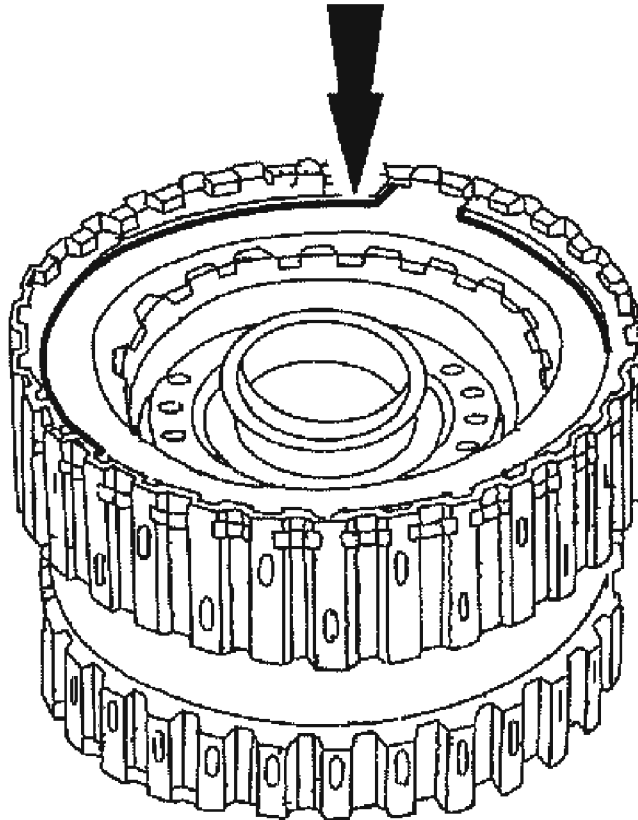
7. Remove and discard the direct clutch piston inner lip seal from the forward/coast/direct clutch cylinder assembly.



GD2837-A

**Fig. 409: Removing Direct Clutch Piston Inner Lip Seal From Forward/Coast/Direct Clutch Cylinder Assembly**  
Courtesy of FORD MOTOR CO.

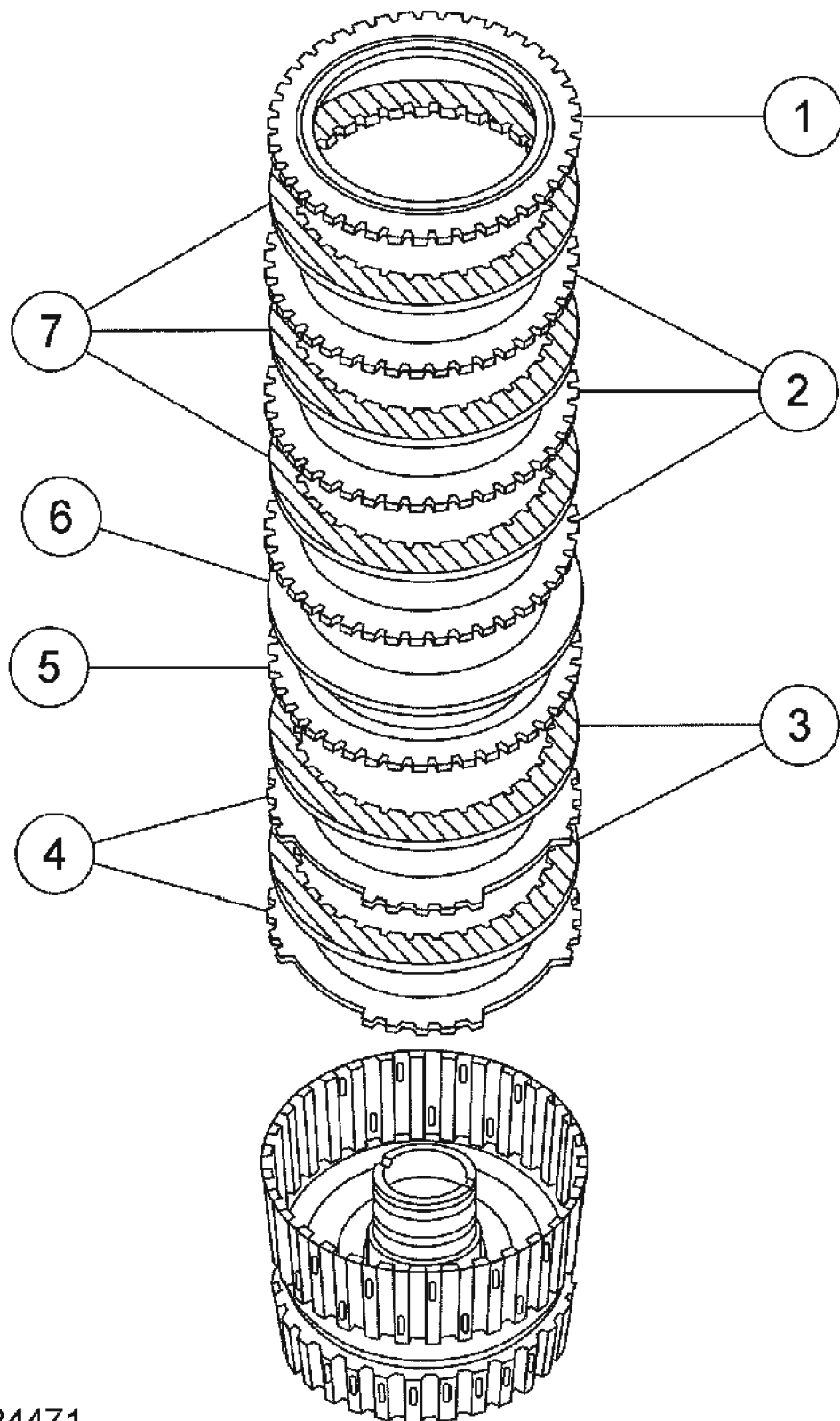
8. Remove the forward clutch pressure plate retaining ring.



GD2838-A

**Fig. 410: Removing Forward Clutch Pressure Plate Retaining Ring**  
Courtesy of FORD MOTOR CO.

9. Remove the forward and coast clutch plates.
  1. Forward clutch pressure plate
  2. Forward clutch external spline clutch plates (steel)
  3. Coast clutch internal spline clutch plates (friction)
  4. Coast clutch external spline clutch plates (steel)
  5. Coast clutch pressure plate
  6. Forward clutch wave spring
  7. Forward clutch internal spline clutch plates (friction)



N0024471

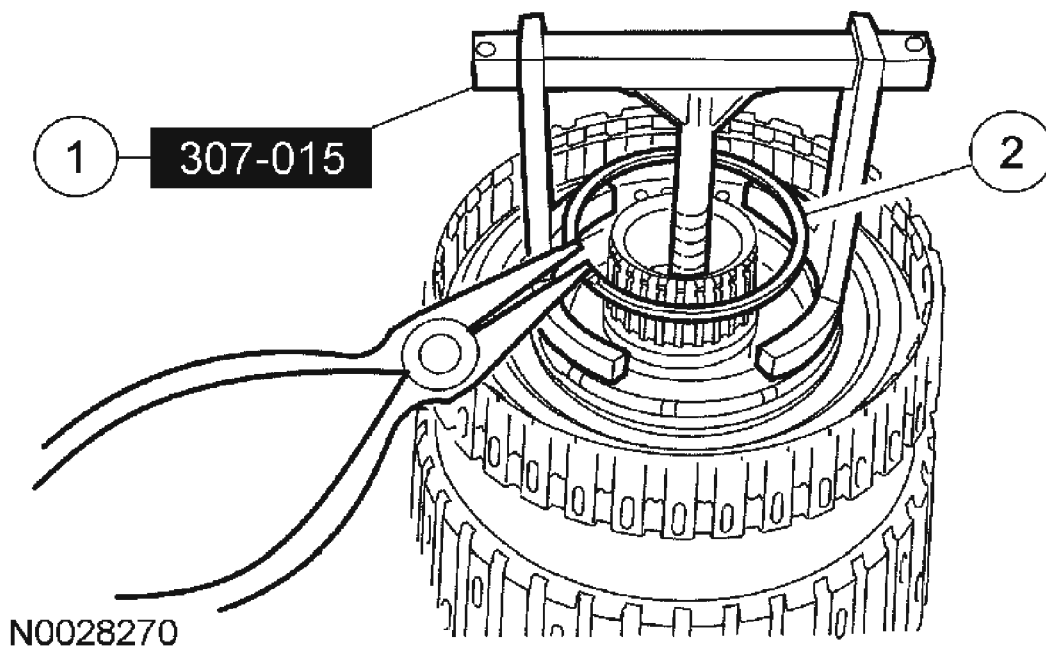
Fig. 411: Removing Forward And Coast Clutch Plates

Courtesy of FORD MOTOR CO.

**WARNING:** Use caution when releasing tool pressure on the clutch piston springs. Failure to follow these instructions can result in personal injury.

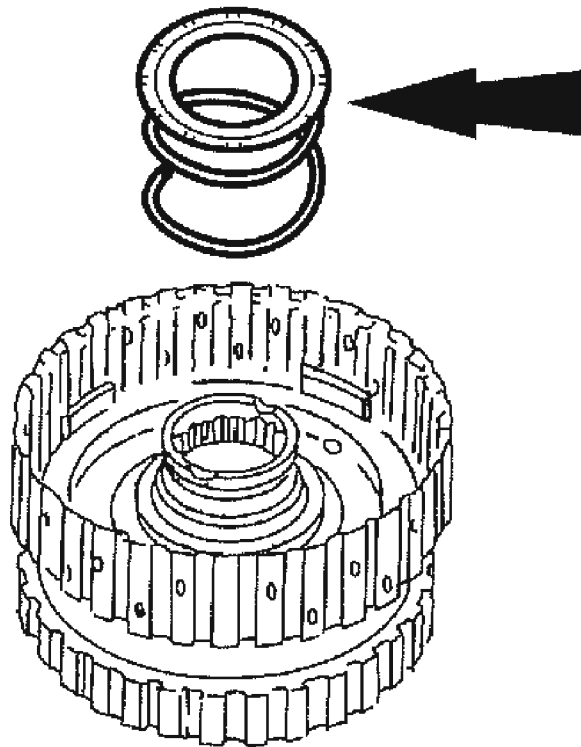
**CAUTION:** Do not compress the return springs completely.

10. Remove the forward/coast clutch return spring retaining ring.
  1. Using the special tool, compress the return spring.
  2. Remove the retaining ring.



**Fig. 412: Removing Forward/Coast Clutch Return Spring Retaining Ring**  
Courtesy of FORD MOTOR CO.

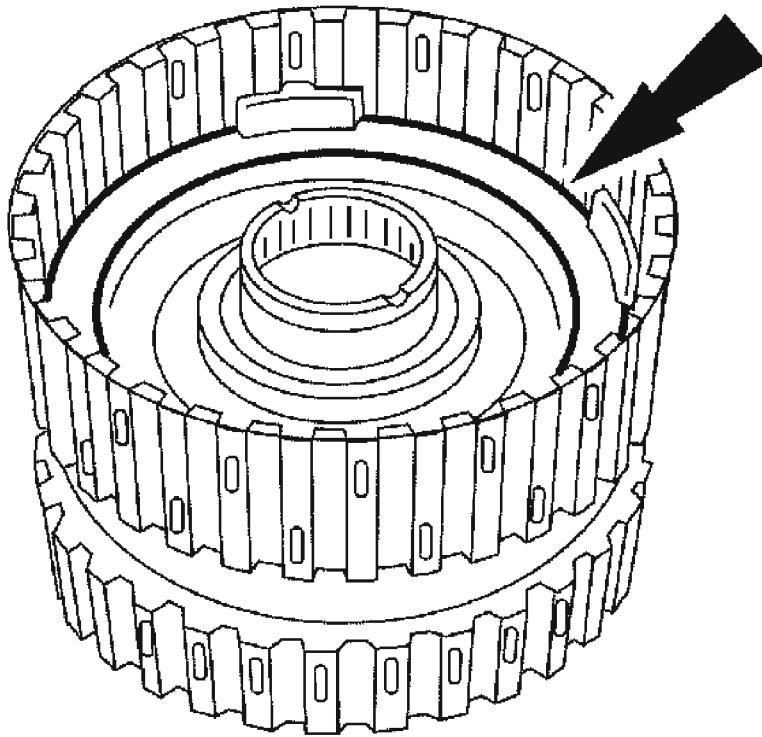
11. Remove the forward/coast clutch return spring assembly.



ELV9010153

**Fig. 413: Removing Forward/Coast Clutch Return Spring Assembly**  
Courtesy of FORD MOTOR CO.

12. Remove the forward and coast clutch pistons.

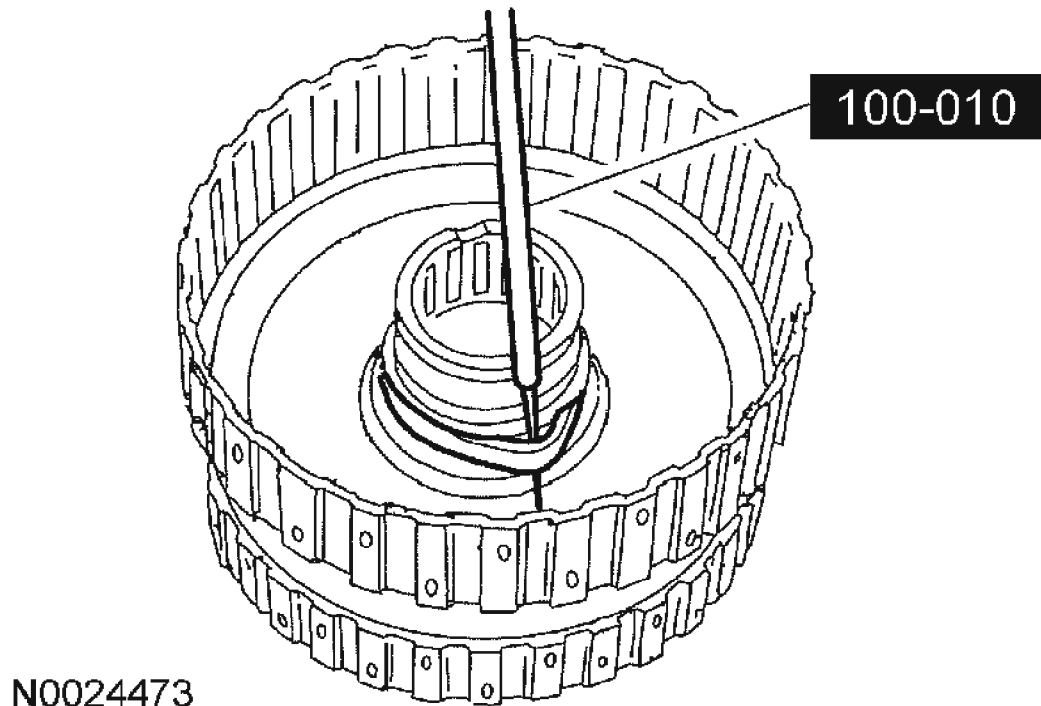


GD2842-A

**Fig. 414: Removing Forward And Coast Clutch Pistons**  
**Courtesy of FORD MOTOR CO.**

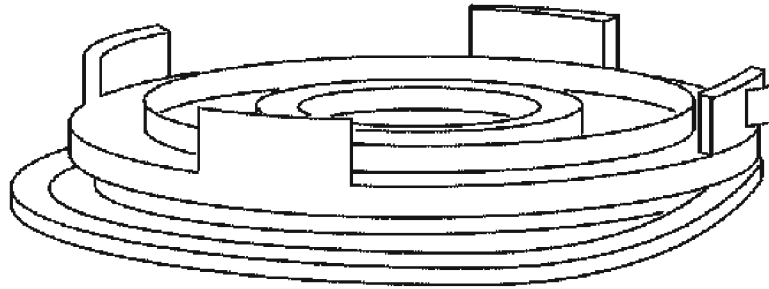
13. Using the special tool, remove and discard the forward clutch piston inner seal from the forward/coast/direct clutch cylinder assembly.





**Fig. 415: Removing Forward Clutch Piston Inner Seal From Forward/Coast/Direct Clutch Cylinder Assembly**  
Courtesy of FORD MOTOR CO.

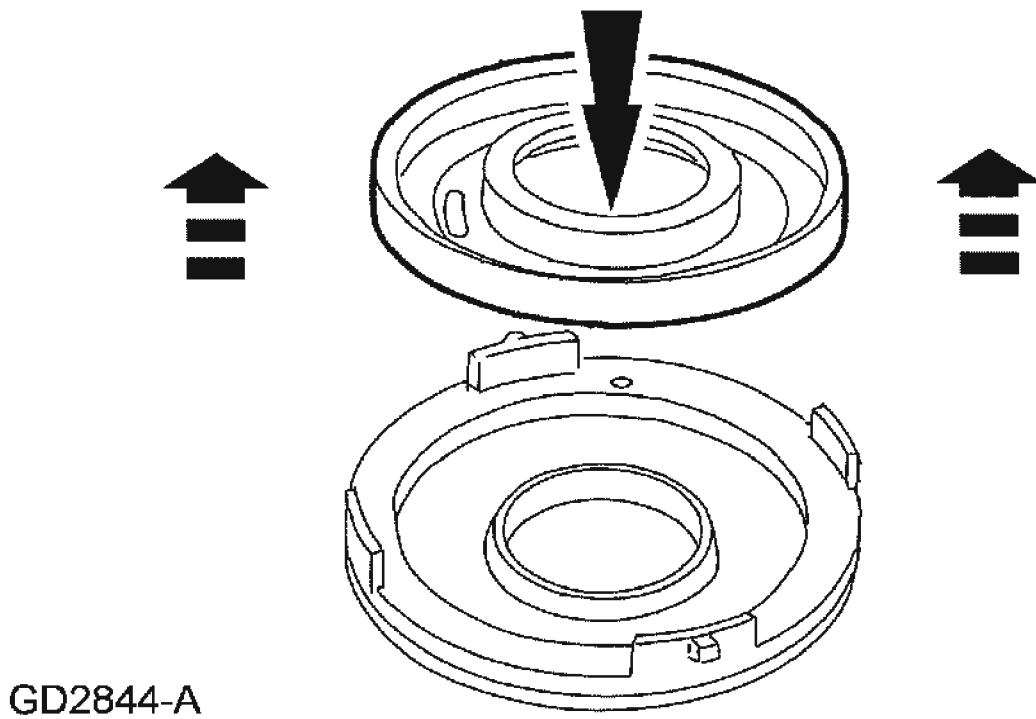
14. Remove and discard the forward clutch piston outer lip seal.



GD3335-A

**Fig. 416: Removing Forward Clutch Piston Outer Lip Seal**  
**Courtesy of FORD MOTOR CO.**

15. Separate the coast clutch piston assembly from the forward clutch piston assembly.



GD2844-A

**Fig. 417: Removing Coast Clutch Piston Assembly From Forward Clutch Piston Assembly**

Courtesy of FORD MOTOR CO.

**WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air. Failure to follow these instructions can result in personal injury.

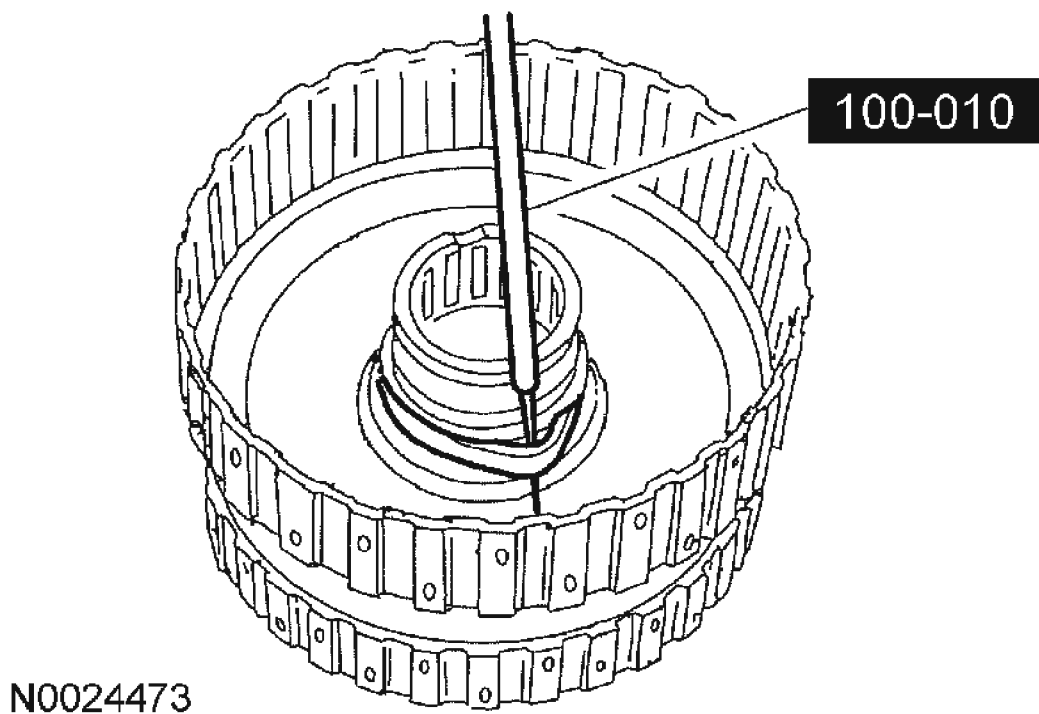
**NOTE:** Do not clean the clutch plates in a vapor degreaser or in any other type of detergent solution.

16. Clean all parts thoroughly in a clean automatic transmission fluid and blow dry with moisture-free regulated compressed air.
  - Clean the steel clutch plates with a lint-free cloth.
  - Soak the new clutch plates in the specified transmission fluid before assembly.
17. Inspect the parts for damage, cracks or wear.
  - Spline teeth
  - Clutch plates
  - Seals
  - Bushing

- Check balls in pistons
- Piston bore
- Passages and lubrication holes in the forward/coast/direct clutch cylinder
- Center hub weld
- Large snap ring grooves

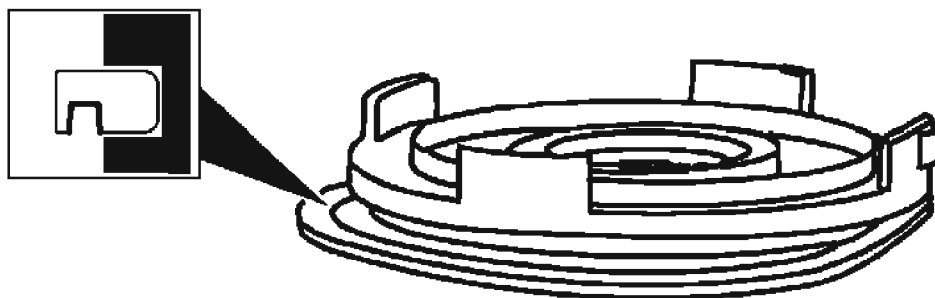
#### Assembly

1. Soak the internal spline clutch plates in clean automatic transmission fluid.
2. Install the forward clutch piston inner seal on the forward/coast/direct clutch cylinder assembly.



**Fig. 418: Installing Forward Clutch Piston Inner Seal On Forward/Coast/Direct Clutch Cylinder Assembly**  
Courtesy of FORD MOTOR CO.

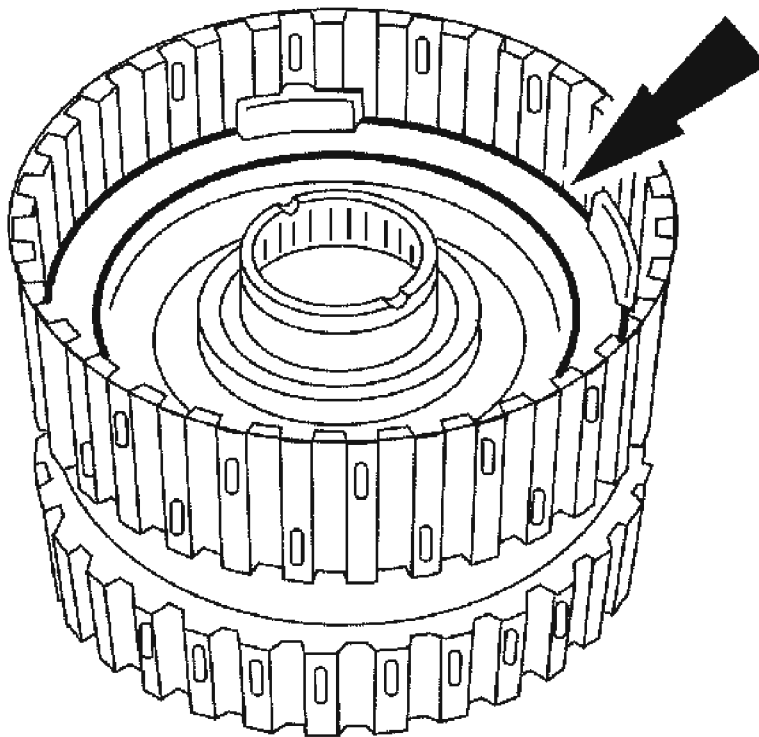
3. Install the forward clutch piston outer lip seal on the forward clutch piston assembly.



**ELE0012150**

**Fig. 419: Installing Forward Clutch Piston Outer Lip Seal On Forward Clutch Piston Assembly**  
**Courtesy of FORD MOTOR CO.**

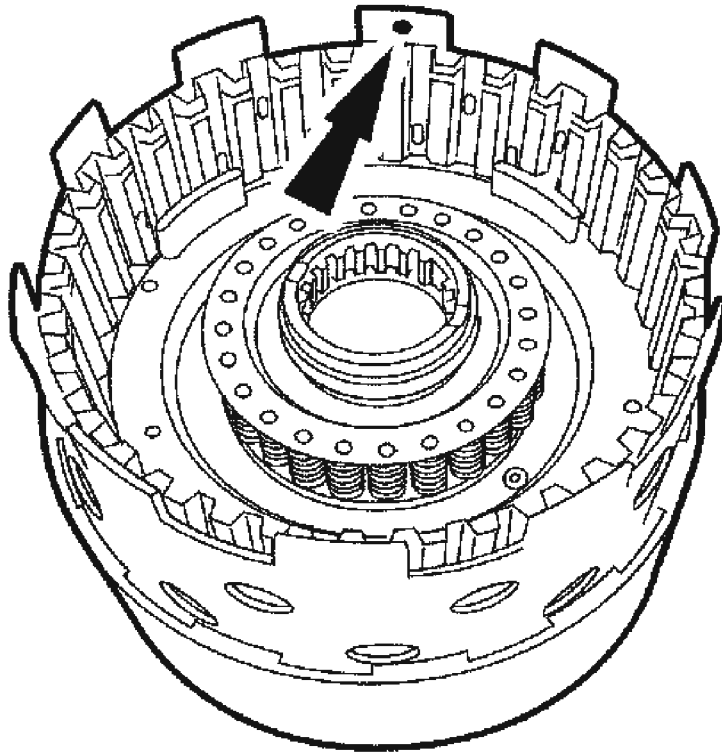
4. Install the forward clutch piston assembly in the forward/coast/direct clutch cylinder assembly.



GD2842-A

**Fig. 420: Installing Forward Clutch Piston Assembly In Forward/Coast/Direct Clutch Cylinder Assembly**  
Courtesy of FORD MOTOR CO.

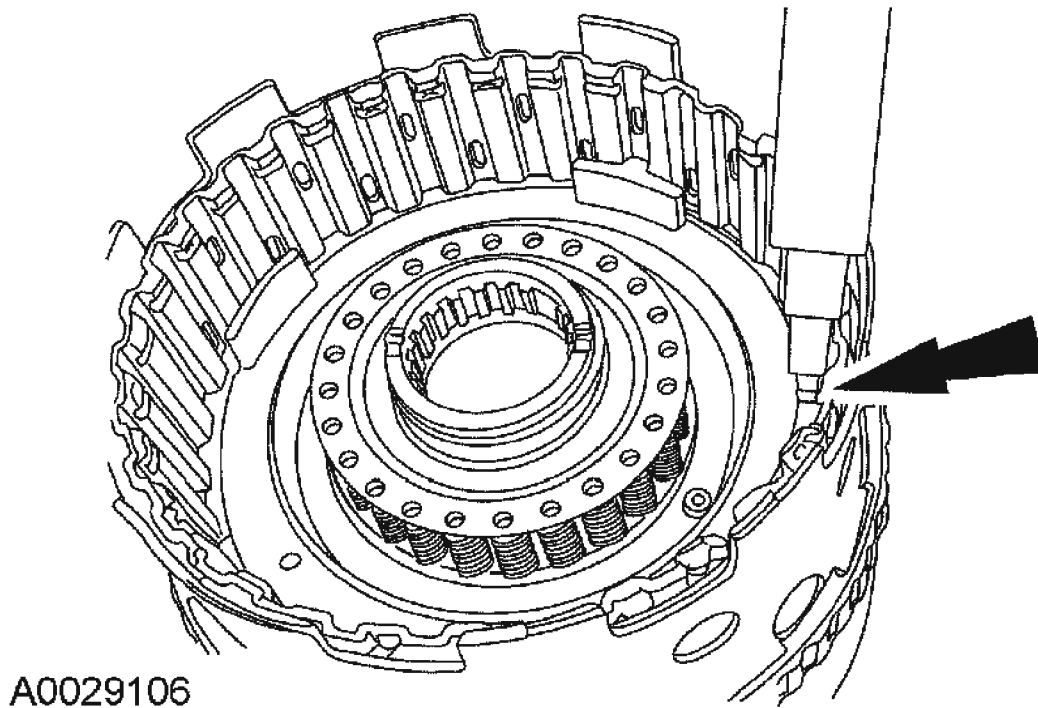
5. Mark the center of 2 adjacent legs on the top of the cylinder.



A0087486

**Fig. 421: Marking Center Of Adjacent Legs On Top Of Cylinder**  
Courtesy of FORD MOTOR CO.

6. Find the center between the marks (45 degrees from either leg) and mark the cylinder.

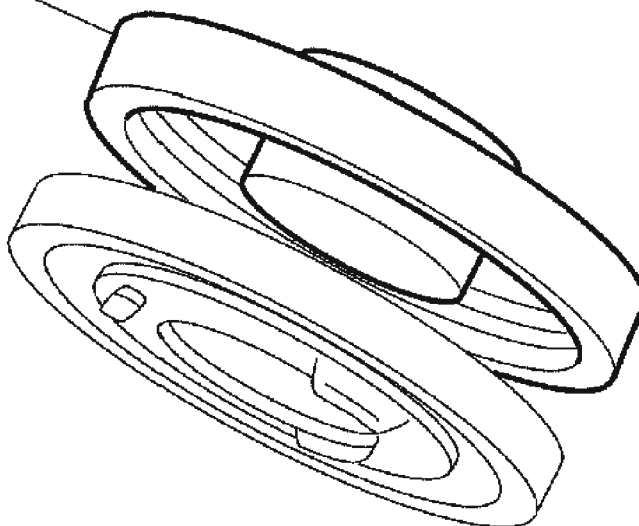


**Fig. 422: Finding Center Between Marks (45 Degrees From Either Leg) And Mark Cylinder**  
**Courtesy of FORD MOTOR CO.**

7. Install the coast clutch piston assembly onto the special tool.



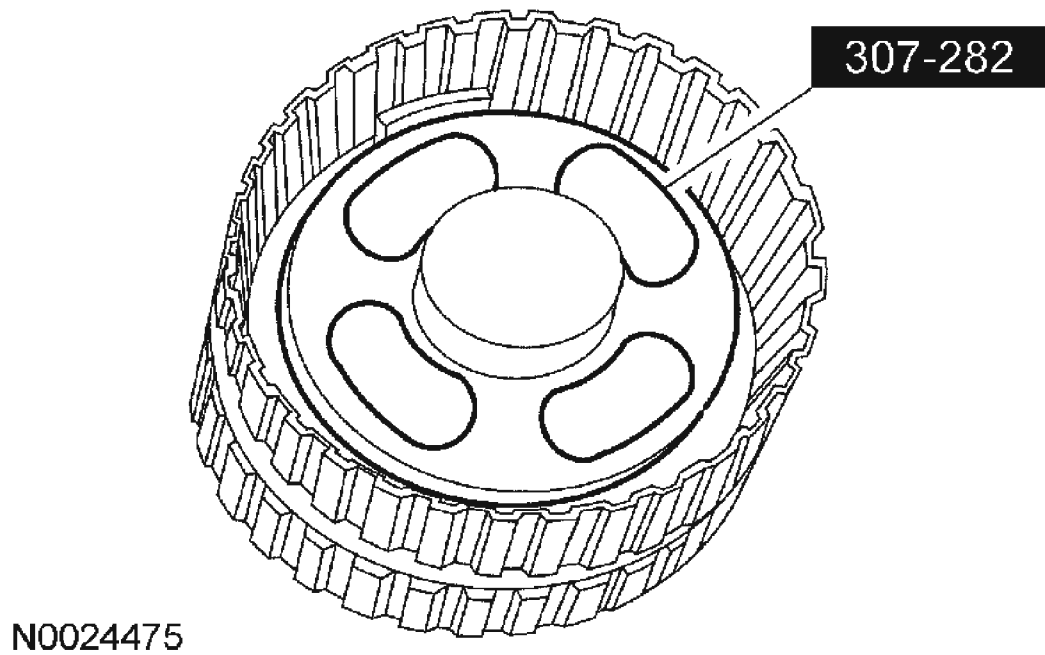
307-282



N0024474

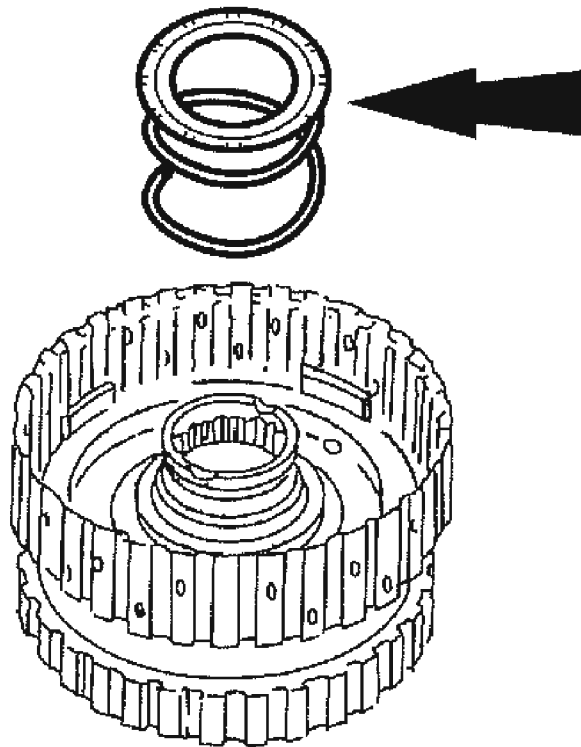
**Fig. 423: Installing Coast Clutch Piston Assembly Onto Special Tool**  
Courtesy of FORD MOTOR CO.

8. Using the special tool, install the coast clutch piston into the forward clutch piston assembly.



**Fig. 424: Installing Coast Clutch Piston Into Forward Clutch Piston Assembly**  
Courtesy of FORD MOTOR CO.

9. Install the forward/coast clutch return spring assembly.

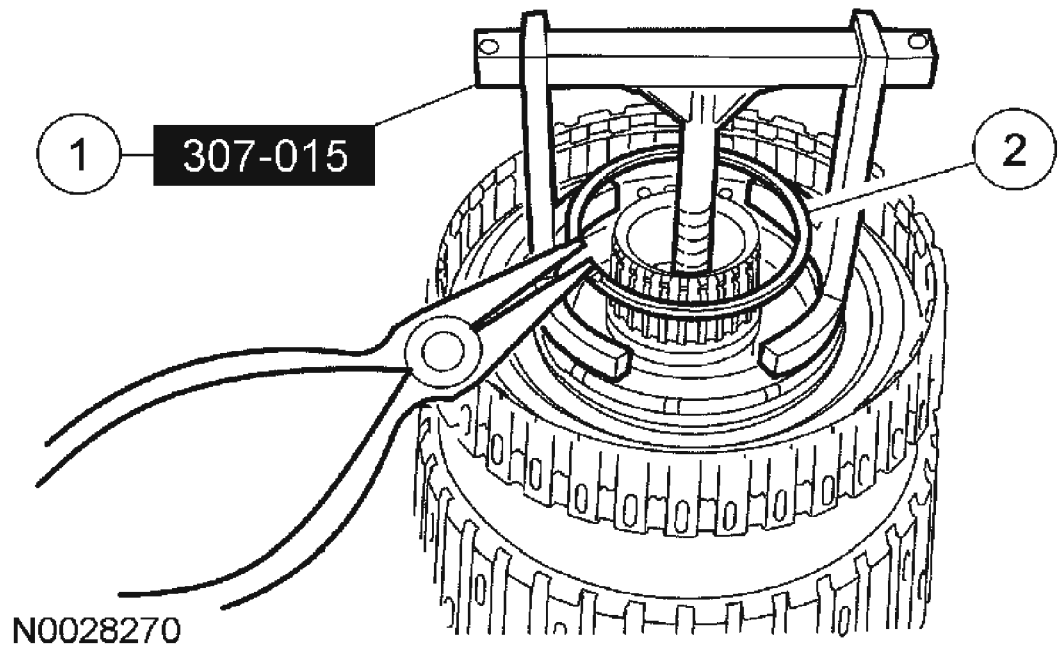


ELV9010153

**Fig. 425: Installing Forward/Coast Clutch Return Spring Assembly**  
Courtesy of FORD MOTOR CO.

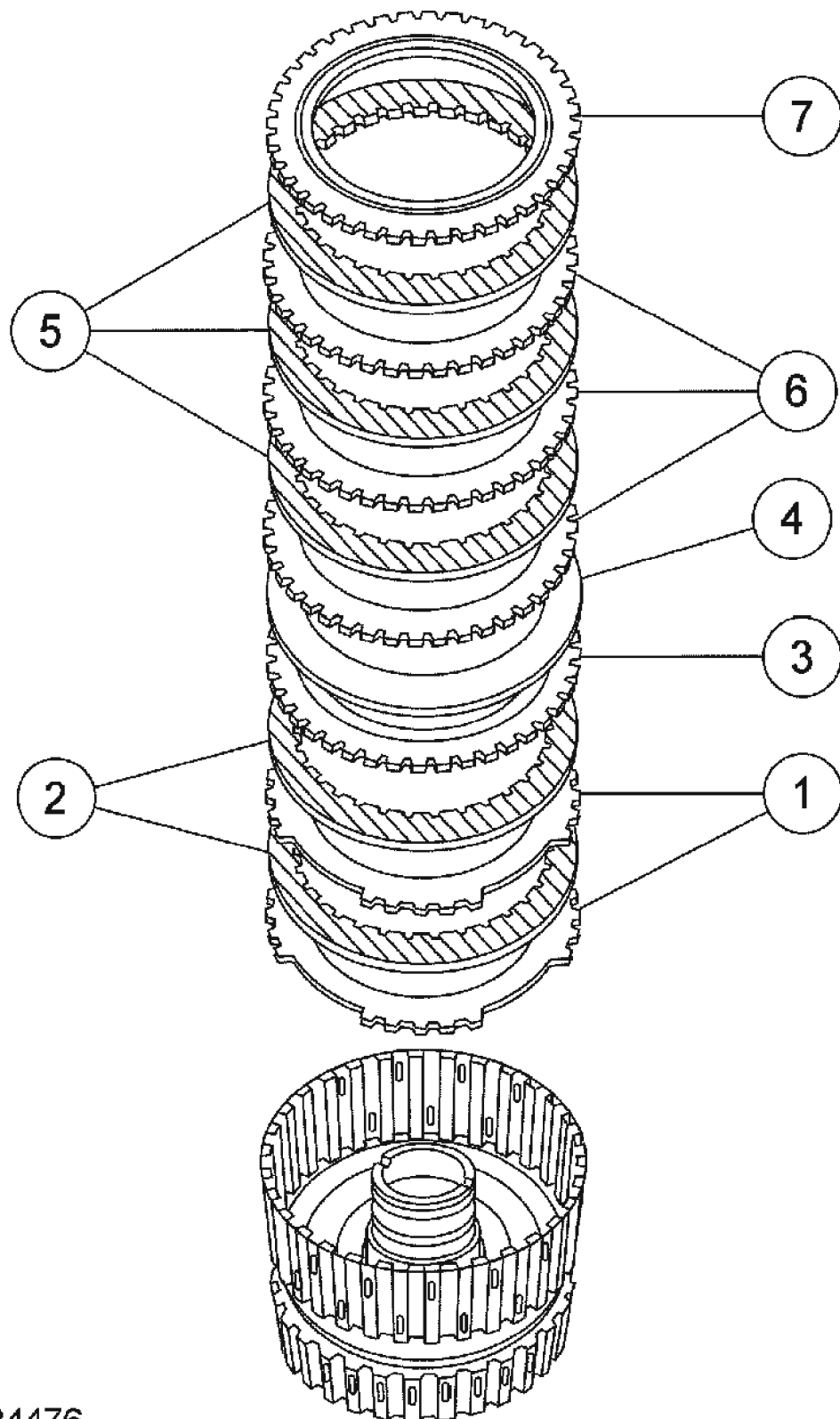
**WARNING:** Use caution when releasing tool pressure on the clutch piston springs. Failure to follow these instructions can result in personal injury.

10. Install the forward/coast clutch return spring retaining ring.
  1. Using the special tool, compress the return spring.
  2. Install the forward/coast clutch retaining ring.
    - Orient the gap between the piston legs.



**Fig. 426: Installing Forward/Coast Clutch Return Spring Retaining Ring**  
Courtesy of FORD MOTOR CO.

11. Install the forward and coast clutch plates in the sequence shown in **Fig. 427**.
  1. Coast clutch external spline clutch plates (steel)
  2. Coast clutch internal spline clutch plates (friction)
  3. Coast clutch pressure plate
  4. Forward clutch wave spring
  5. Forward clutch internal spline clutch plates (friction)
  6. Forward clutch external spline clutch plates (steel)
  7. Forward clutch pressure plate

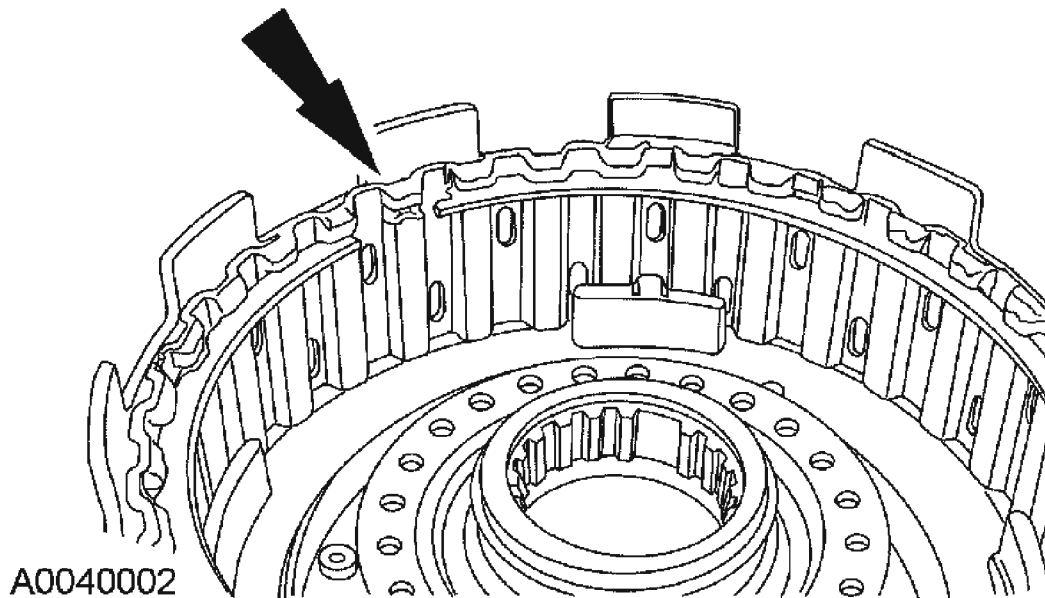


N0024476

Fig. 427: Installing Forward And Coast Clutch Plates

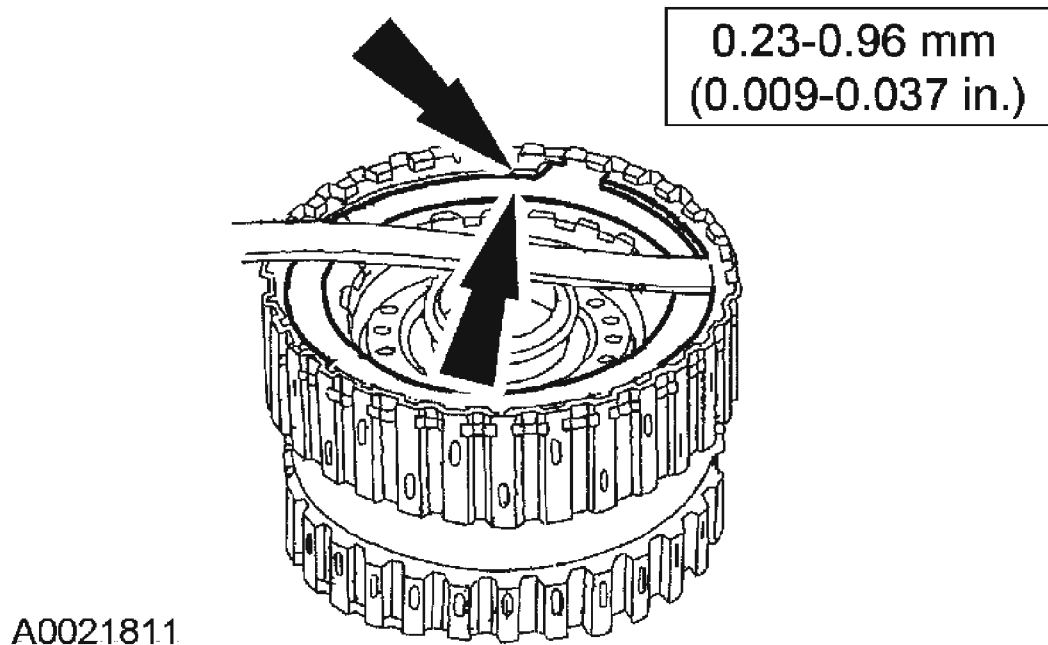
**Courtesy of FORD MOTOR CO.**

12. Install the forward clutch pressure plate retaining ring.
  - Center the select fit retaining ring on the 45 degree mark between the 2 adjacent legs.



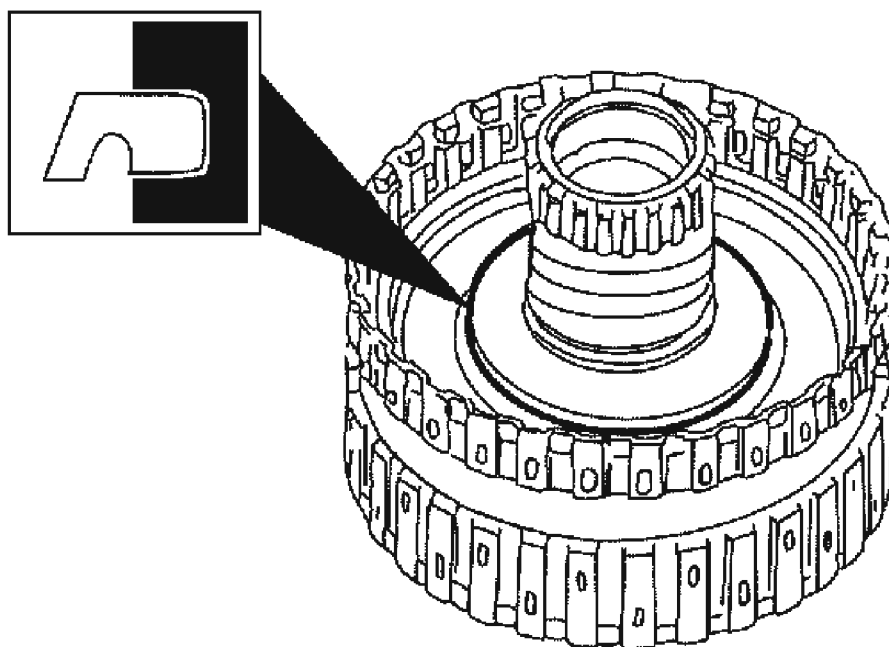
**Fig. 428: Installing Forward Clutch Pressure Plate Retaining Ring**  
**Courtesy of FORD MOTOR CO.**

13. Using a feeler gauge, measure the clearance between the forward clutch pressure plate and the forward clutch pressure plate retaining ring.
  - Take a second measurement on the opposite side.
  - Average the 2 measurements to get the clearance.
  - If the clearance is not within specification, select and install the correct thickness retaining ring to obtain the standard clearance.
  - Retaining ring sizes:
    - 1.43 - 1.53 mm (0.056 - 0.060 in).
    - 1.59 - 1.69 mm (0.062 - 0.066 in).
    - 1.75 - 1.85 mm (0.069 - 0.073 in).
    - 1.92 - 2.02 mm (0.075 - 0.079 in).



**Fig. 429: Measuring Clearance Between Forward Clutch Pressure Plate And Forward Clutch Pressure Plate Retaining Ring**  
Courtesy of FORD MOTOR CO.

14. Install the direct clutch piston inner lip seal on the direct clutch cylinder assembly.



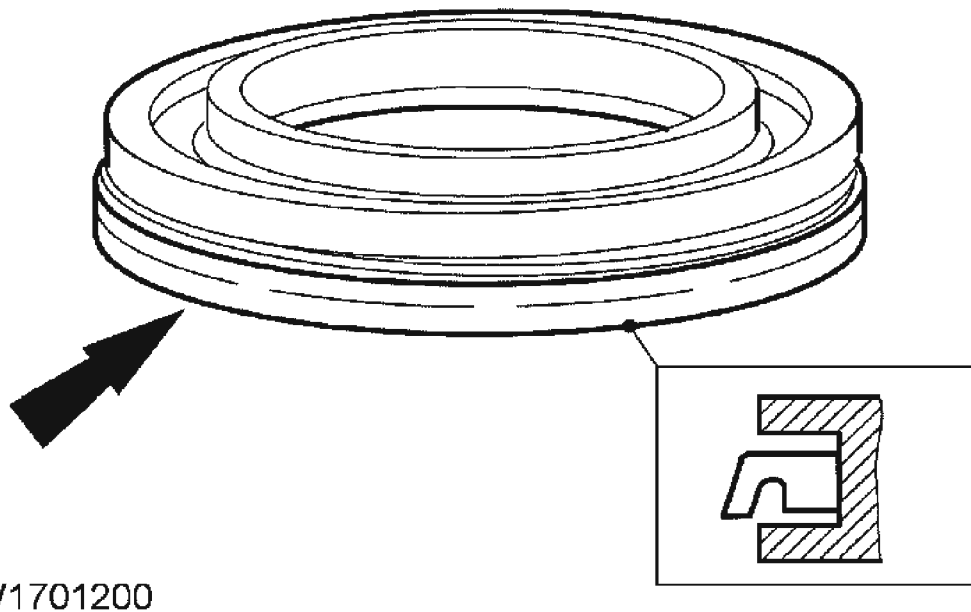
GD2837-B

**Fig. 430: Installing Direct Clutch Piston Inner Lip Seal On Direct Clutch Cylinder Assembly**

**Courtesy of FORD MOTOR CO.**

15. Install the direct clutch piston outer seal on the direct clutch piston assembly.

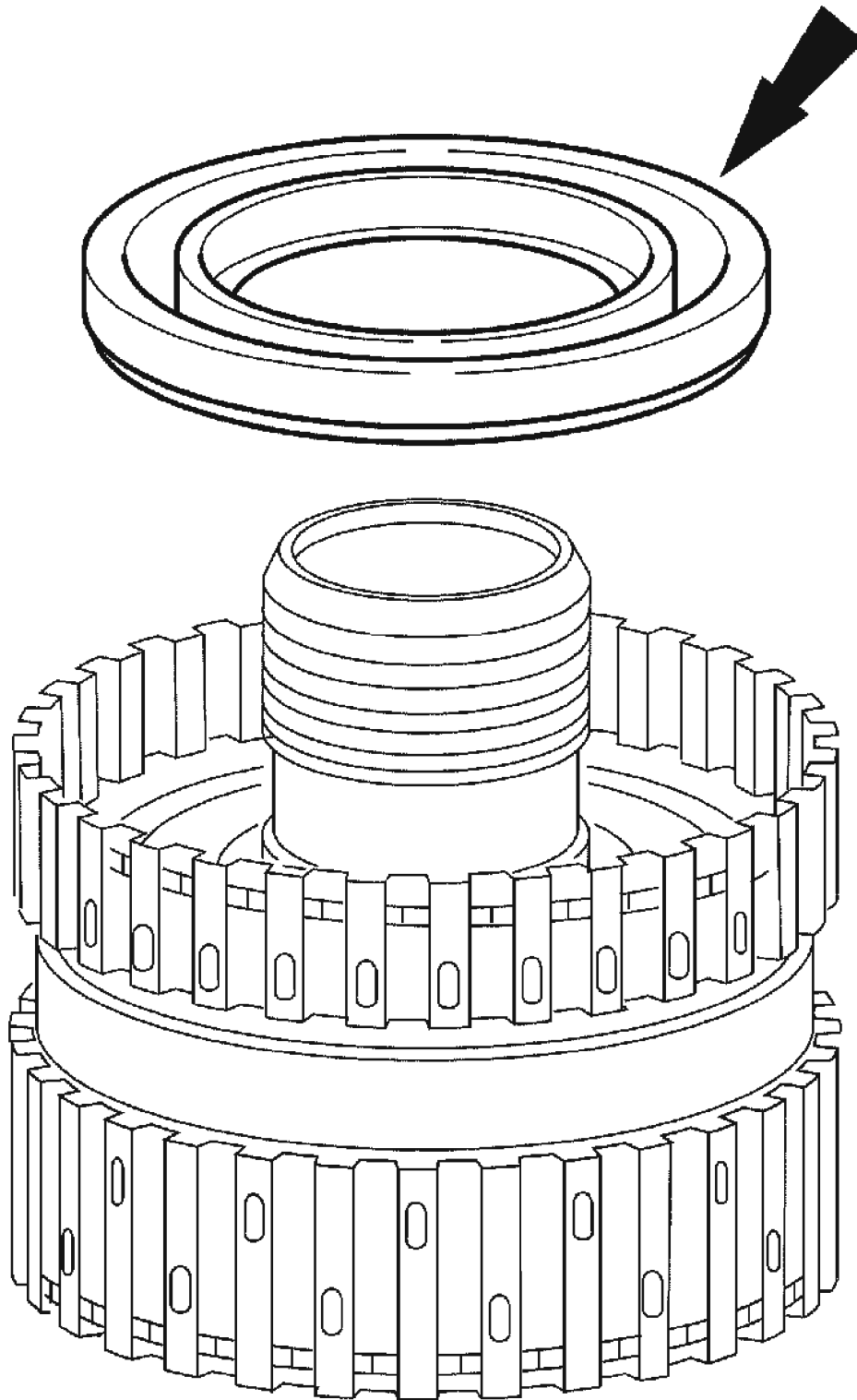




**Fig. 431: Installing Direct Clutch Piston Outer Seal On Direct Clutch Piston Assembly**

Courtesy of FORD MOTOR CO.

**NOTE:** Position the lip seal facing down.

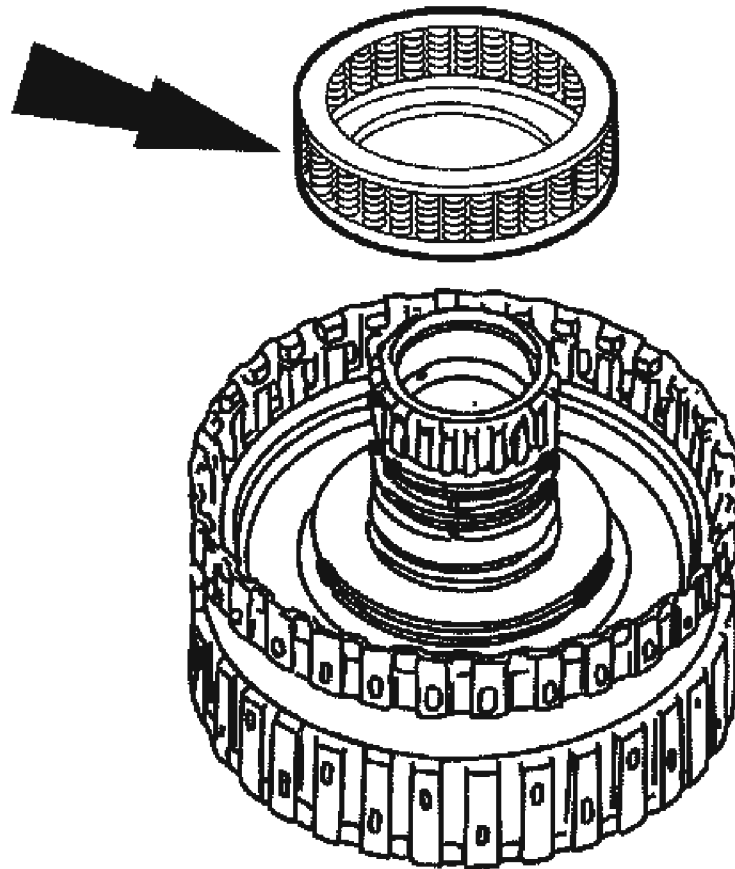


ELV9010202

**Fig. 432: Installing Direct Clutch Piston Assembly In Forward/Coast/Direct**

**Clutch Cylinder Assembly**  
**Courtesy of FORD MOTOR CO.**

16. Install the direct clutch piston assembly in the forward/coast/direct clutch cylinder assembly.
17. Install the direct clutch return spring assembly.



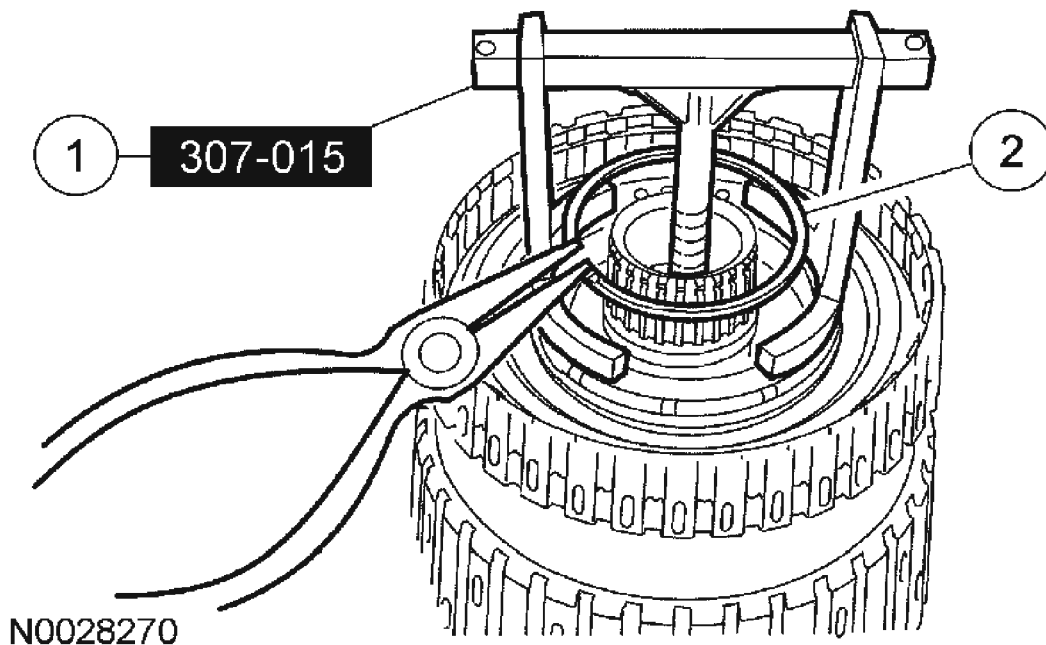
GD2834-A

**Fig. 433: Installing Direct Clutch Return Spring Assembly**  
**Courtesy of FORD MOTOR CO.**

**WARNING:** Use caution when releasing tool pressure on the clutch piston springs. Failure to follow these instructions can result in personal injury.

**CAUTION:** Do not compress the direct clutch return springs completely.

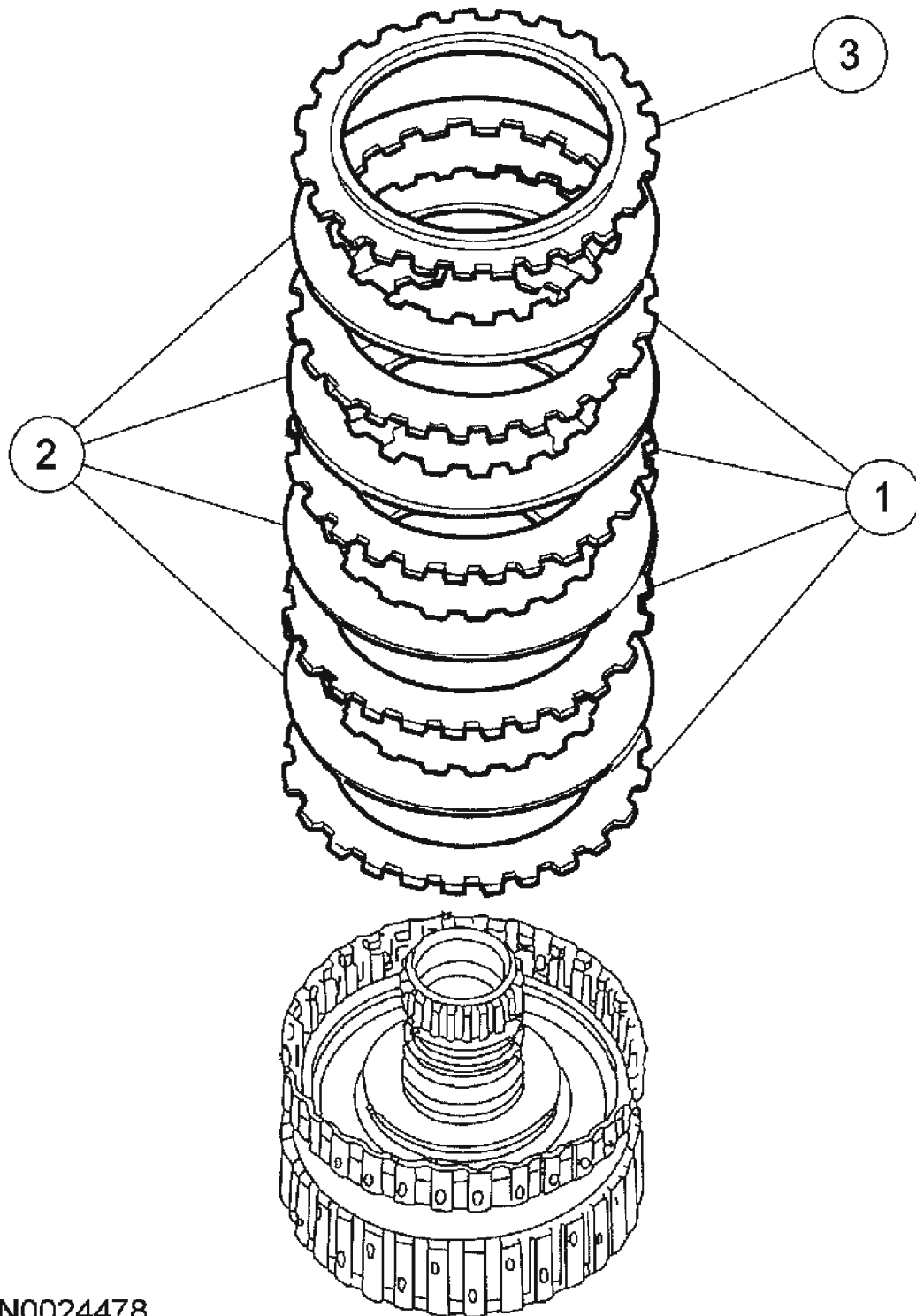
18. Install the direct clutch return spring retaining ring.
  1. Using the special tool, compress the direct clutch return springs.
  2. Install the direct clutch return spring retaining ring.



**Fig. 434: Installing Direct Clutch Return Spring Retaining Ring**  
Courtesy of FORD MOTOR CO.

**NOTE:** Quantity of plates are model dependent.

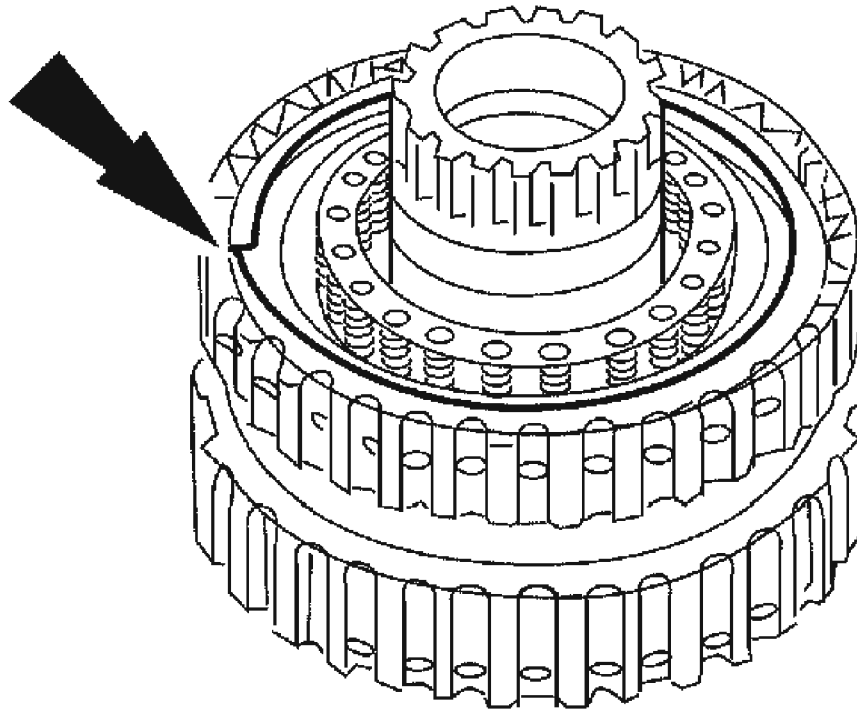
19. Install the direct clutch plates.
  1. Install the direct clutch external spline (steel) clutch plates.
  2. Install the direct clutch internal spline (friction) clutch plates.
  3. Install the direct clutch pressure plate.



N0024478

**Fig. 435: Installing Direct Clutch Plates**  
Courtesy of FORD MOTOR CO.

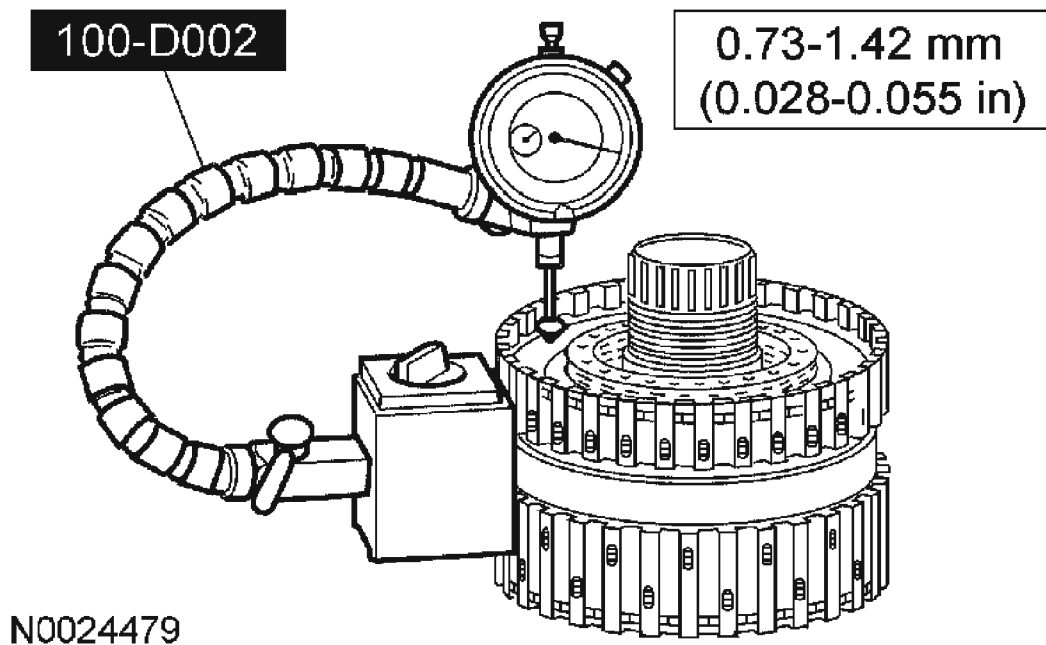
20. Install the direct clutch pressure plate retaining ring.



GD2832-A

**Fig. 436: Installing Direct Clutch Pressure Plate Retaining Ring**  
Courtesy of FORD MOTOR CO.

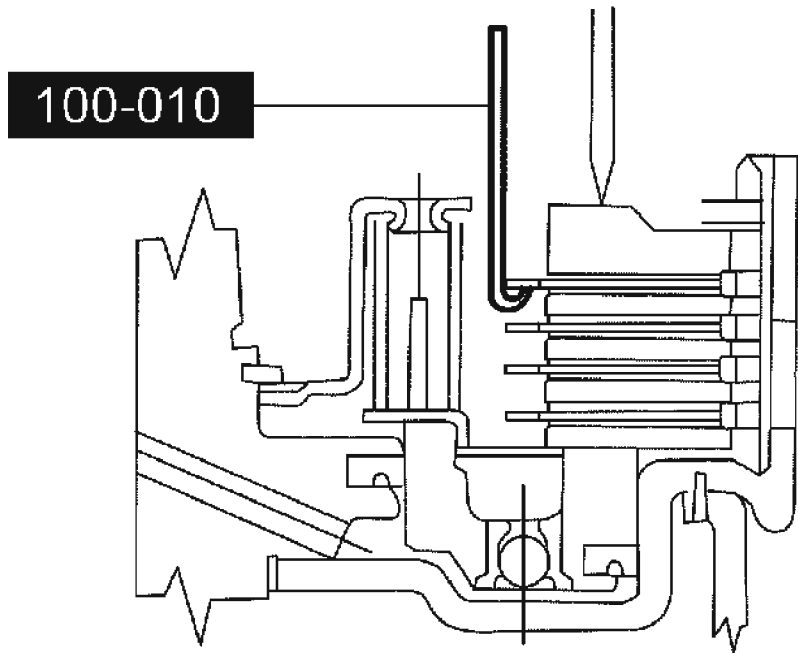
21. Measure the direct clutch clearance as follows:
- Install the special tool.
  - Zero the dial on the direct clutch pressure plate.
  - Pull the direct clutch pressure plate upward, and record the reading.



**Fig. 437: Measuring Direct Clutch Clearance**  
Courtesy of FORD MOTOR CO.

22. Make a second measurement on the opposite side. Average the 2 measurements to get the clearance. If the clearance is not within the specification, select and install, using the special tool, the correct thickness direct clutch pressure plate retainer snap ring to obtain the standard clearance.

- Retaining ring sizes:
  - 1.28 - 1.38 mm (0.050 - 0.054 in).
  - 1.39 - 1.49 mm (0.054 - 0.058 in).
  - 1.52 - 1.62 mm (0.059 - 0.063 in).
  - 1.65 - 1.75 mm (0.064 - 0.069 in).



N0024480

**Fig. 438: Inspecting Correct Thickness Direct Clutch Pressure Plate Retainer Snap Ring**  
Courtesy of FORD MOTOR CO.

**FORWARD/COAST/DIRECT CLUTCH CYLINDER AND REVERSE CLUTCH DRUM - ASSEMBLY**

Special Tool(s)

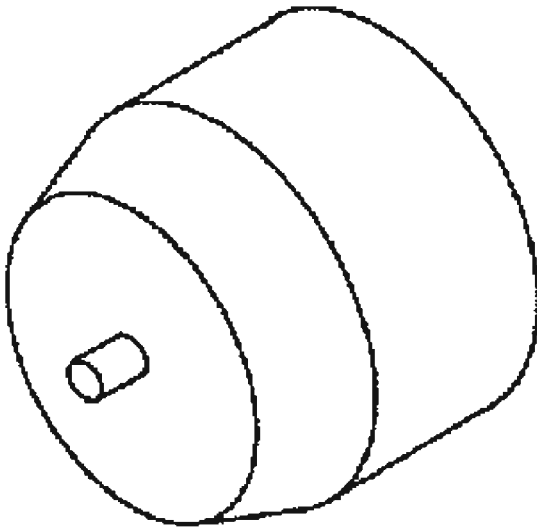
**SPECIAL TOOLS DESCRIPTION**

	Sizer, Hub Seal 307-283 (T94P-77000-D4)
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## 2005 Ford Escape

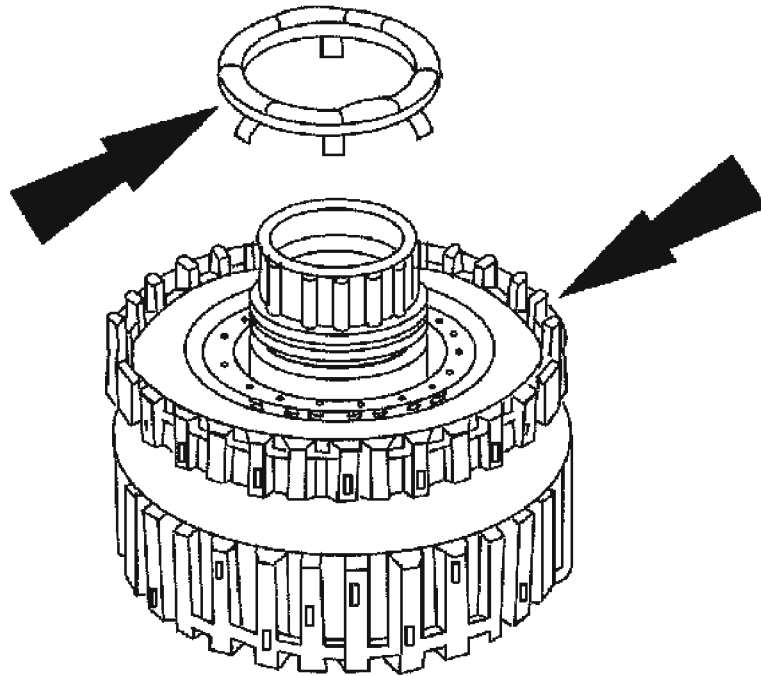
2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1952-A**

Assembly

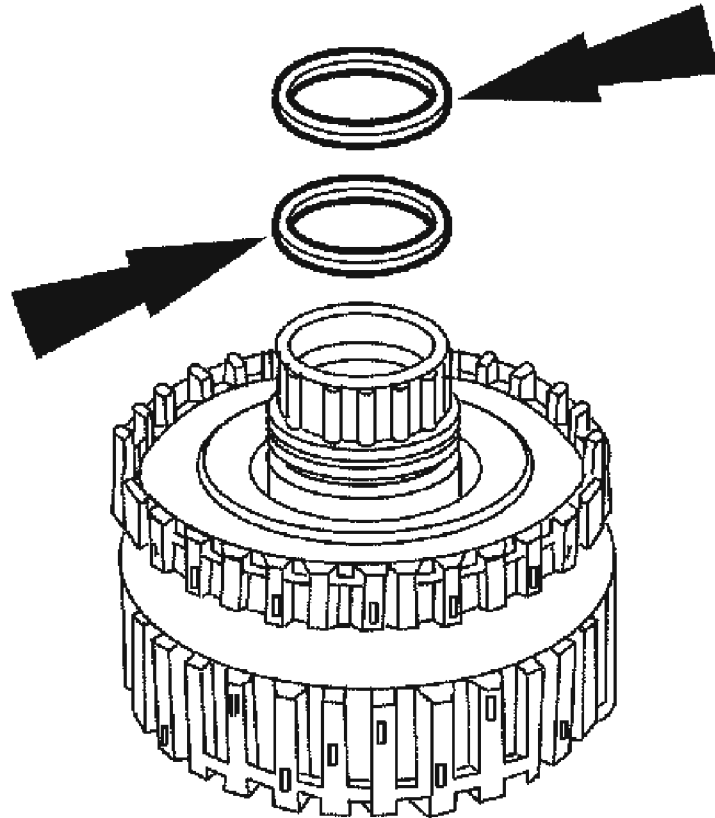
**CAUTION:** The tabs on the No. 2 direct clutch thrust washer must be seated in the direct clutch support and spring.



GD2806-A

**Fig. 439: Installing No 2 Direct Clutch Thrust Washer On Forward/Coast/Direct Clutch Cylinder With Tabs Facing Downward**  
Courtesy of FORD MOTOR CO.

1. Install the No. 2 direct clutch thrust washer on the forward/coast/direct clutch cylinder with the tabs facing downward.
2. Install the 2 reverse clutch cylinder seals.

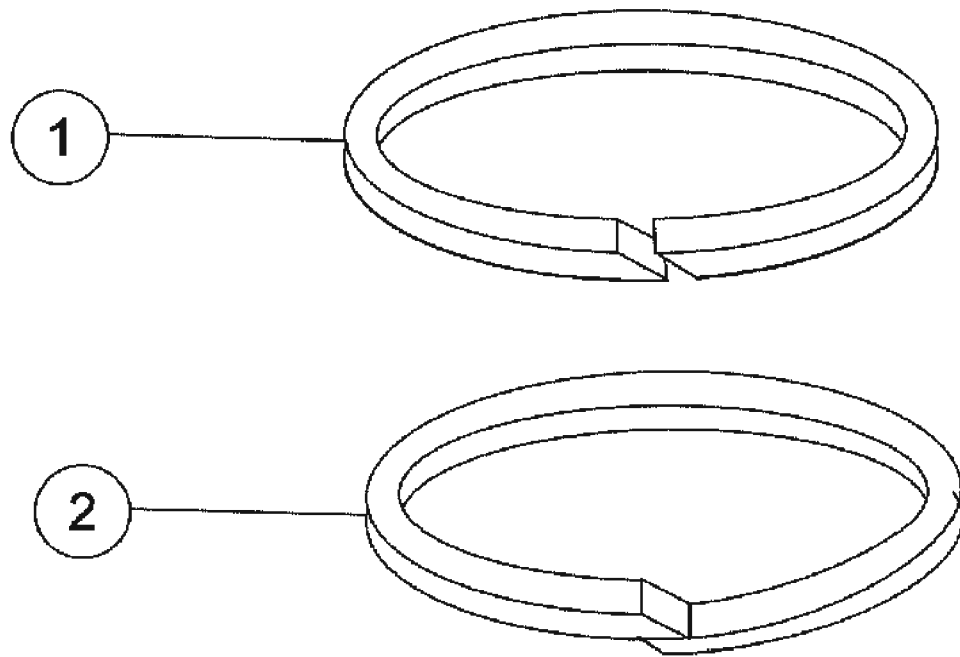


GD2805-A

**Fig. 440: Installing Reverse Clutch Cylinder Seals**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the reverse clutch cylinder seals are overlapped correctly.

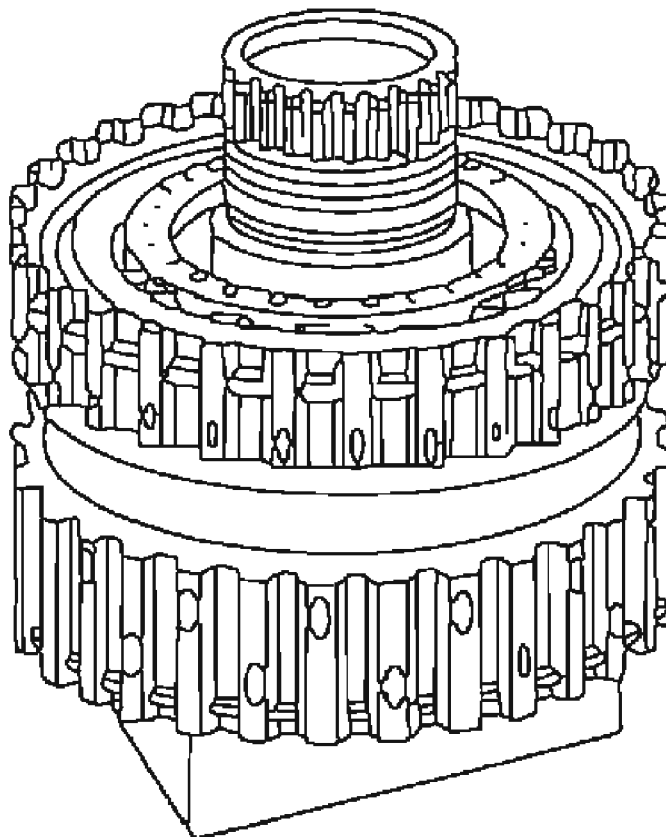
3. Position the reverse clutch cylinder seals.
  1. Correct installation.
  2. Incorrect installation.



N0024481

**Fig. 441: Positioning Reverse Clutch Cylinder Seals**  
**Courtesy of FORD MOTOR CO.**

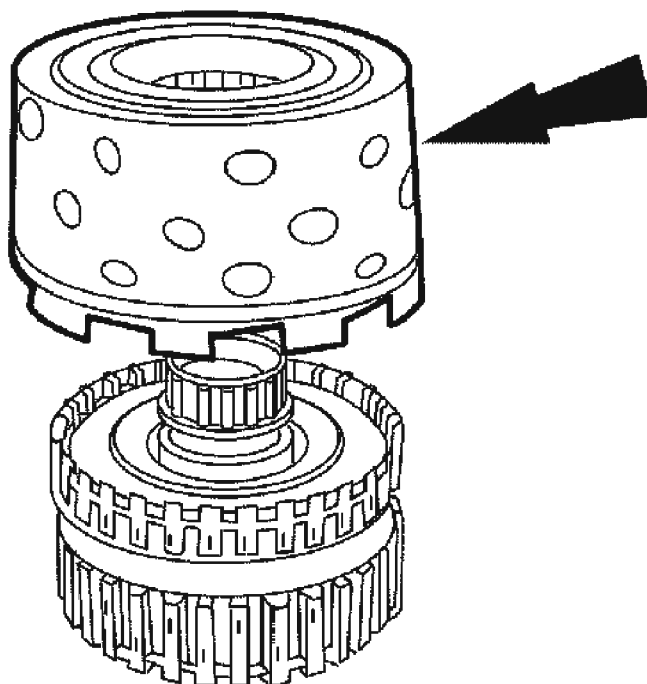
4. Support the forward/coast/direct clutch cylinder assembly on a block of wood so that the direct clutch faces upward.



**ELE0012152**

**Fig. 442: Supporting Forward/Coast/Direct Clutch Cylinder Assembly On Block Of Wood So That Direct Clutch Faces Upward**  
Courtesy of FORD MOTOR CO.

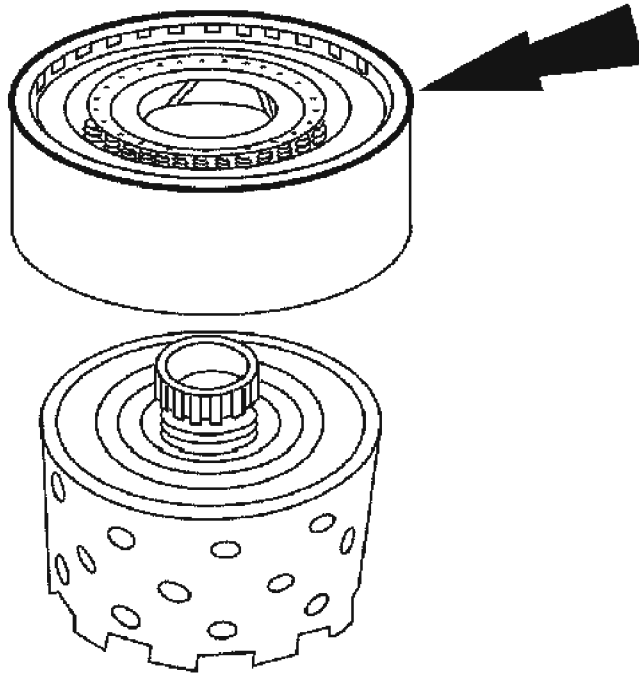
5. Install the direct clutch hub and shell on the forward/coast/direct clutch cylinder.



GD2804-A

**Fig. 443: Installing Direct Clutch Hub And Shell On Forward/Coast/Direct Clutch Cylinder**  
Courtesy of FORD MOTOR CO.

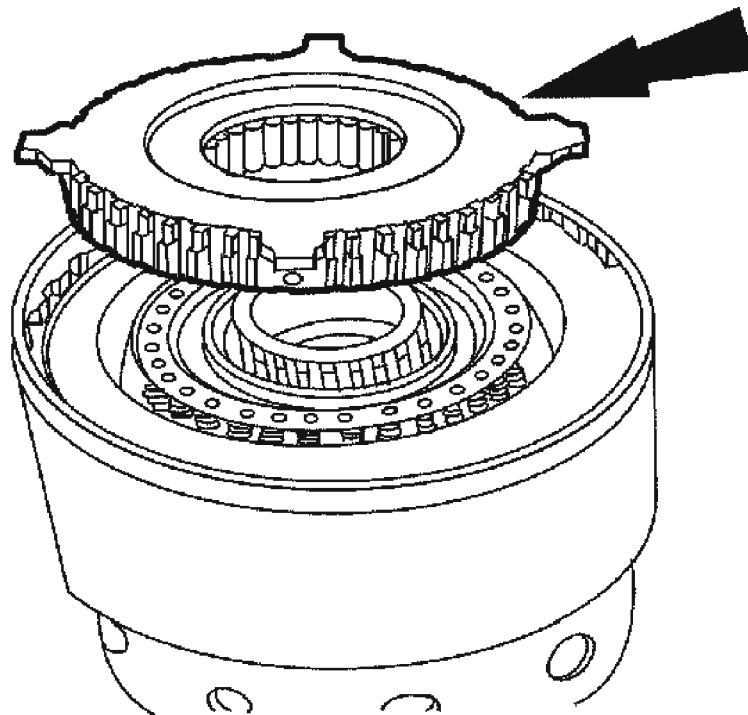
6. Install the reverse clutch drum assembly.



GD2803-A

**Fig. 444: Installing Reverse Clutch Drum Assembly**  
Courtesy of FORD MOTOR CO.

7. Install the reverse clutch hub.

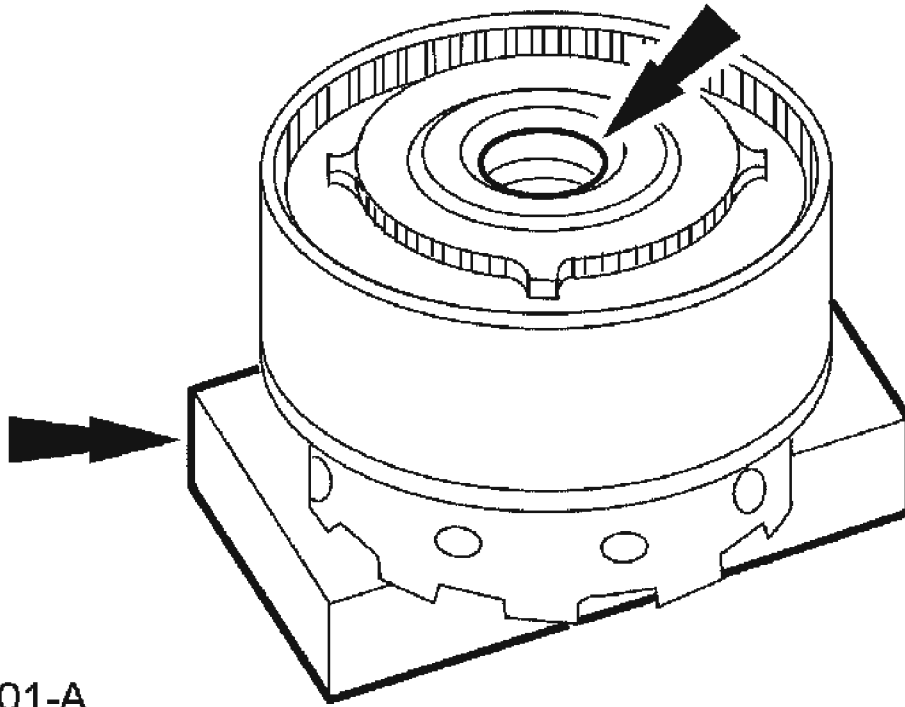


GD2802-A

**Fig. 445: Installing Reverse Clutch Hub**  
**Courtesy of FORD MOTOR CO.**

8. Support the reverse clutch drum on a block of wood while installing the reverse clutch hub retaining ring.

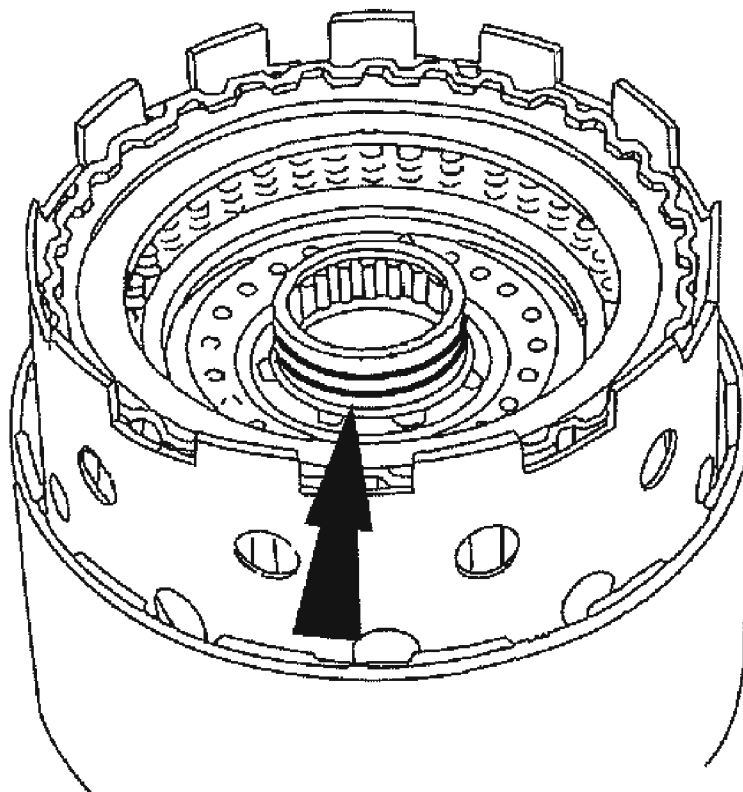




GD2801-A

**Fig. 446: Supporting Reverse Clutch Drum On Block Of Wood**  
Courtesy of FORD MOTOR CO.

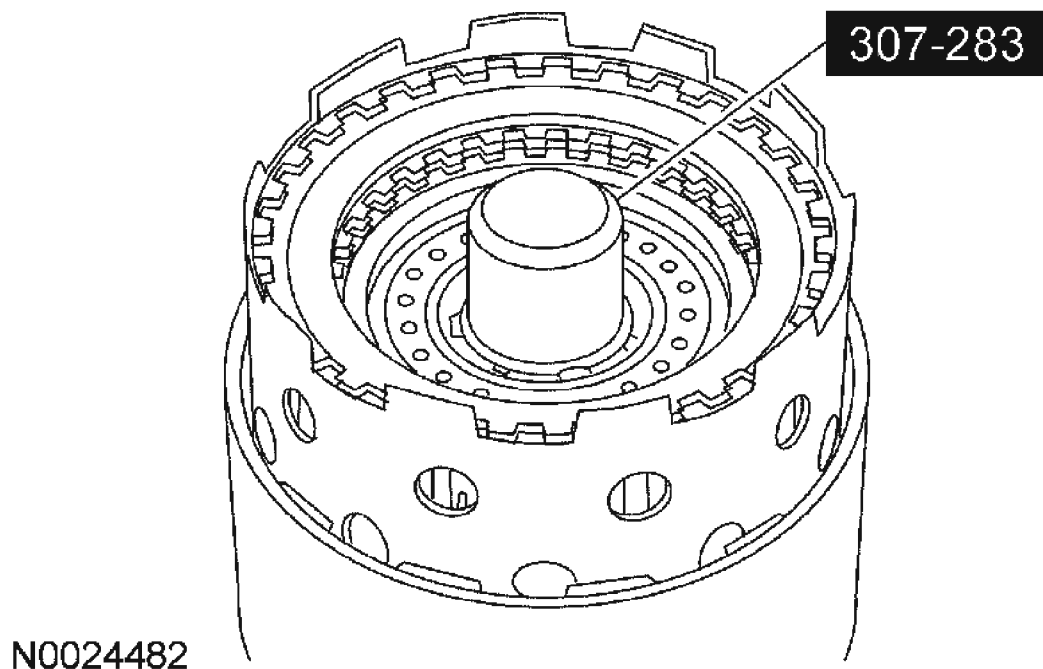
9. Install the forward/coast/direct clutch cylinder hub seal.



GD2852-A

**Fig. 447: Installing Forward/Coast/Direct Clutch Cylinder Hub Seal**  
Courtesy of FORD MOTOR CO.

10. Leave special tool attached until the forward/coast/direct clutch cylinder is installed into the transaxle housing.



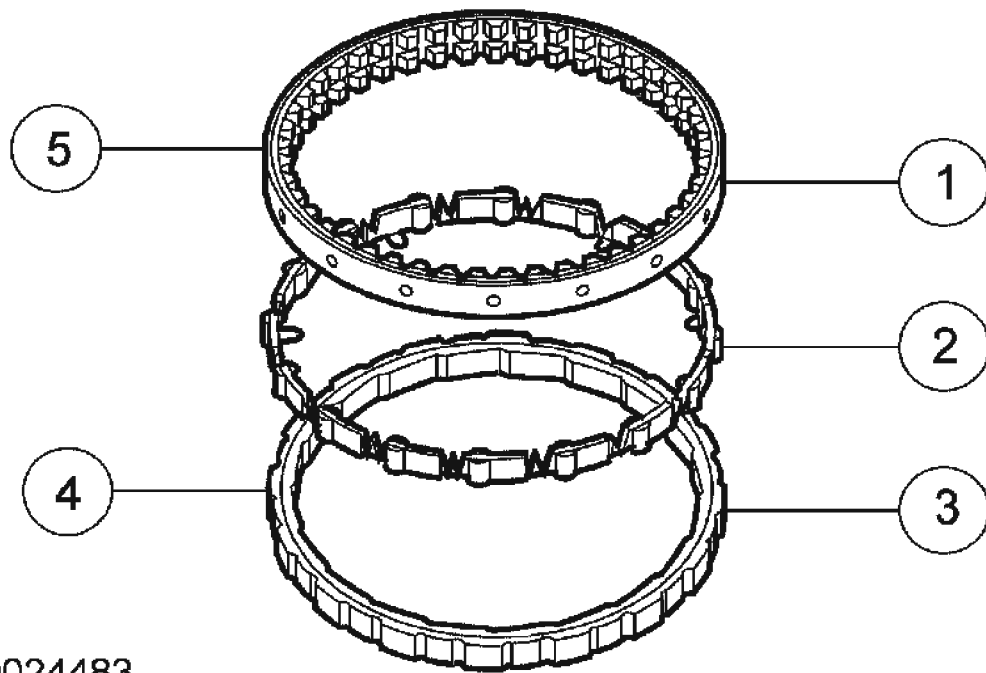
**Fig. 448: Identifying Special Tool Attached To Forward/Coast/Direct Clutch Cylinder**

Courtesy of FORD MOTOR CO.

## LOW ONE-WAY CLUTCH ASSEMBLY

### Disassembly

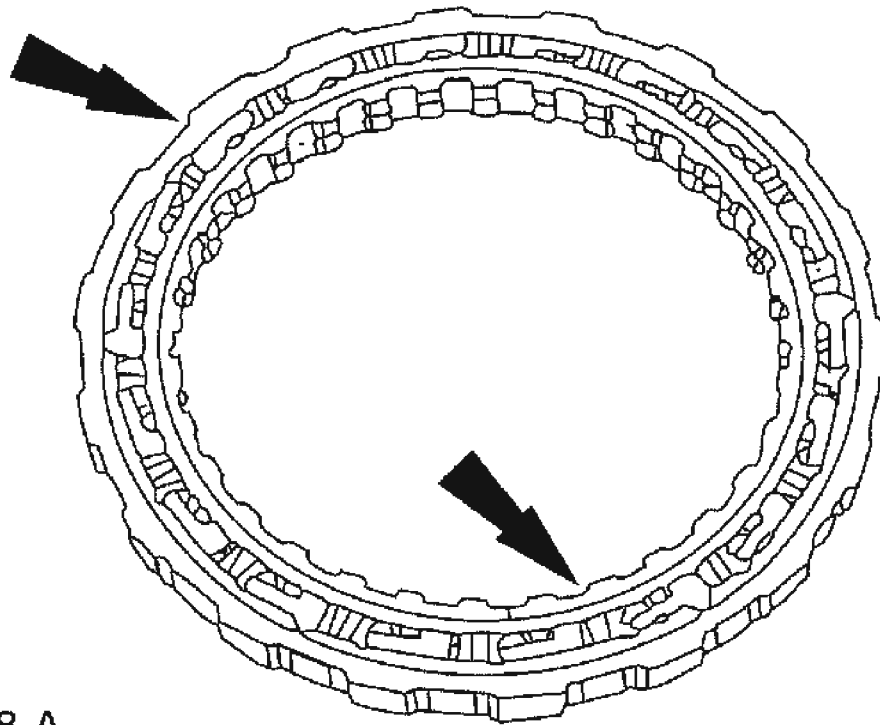
1. Inspect the low one-way clutch components:
  1. Low one-way clutch inner race
  2. Roller assemble
  3. Low one-way clutch outer race
  4. Outer race groove
  5. Inner race groove



N0024483

**Fig. 449: Inspecting Low One-Way Clutch**  
Courtesy of FORD MOTOR CO.

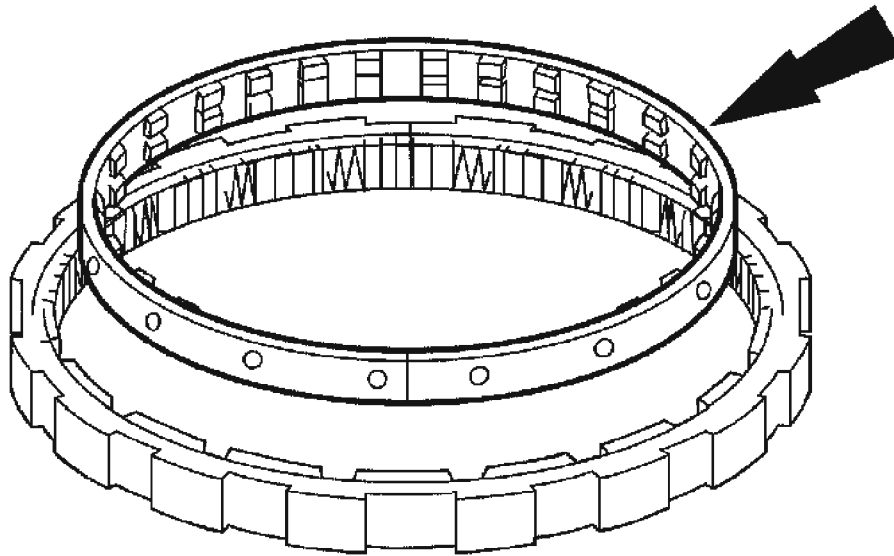
2. Position the low one-way clutch so the inner and outer race grooves are facing upward.



GD3038-A

**Fig. 450: Positioning Low One-Way Clutch So Inner And Outer Race Grooves Are Facing Upward**  
Courtesy of FORD MOTOR CO.

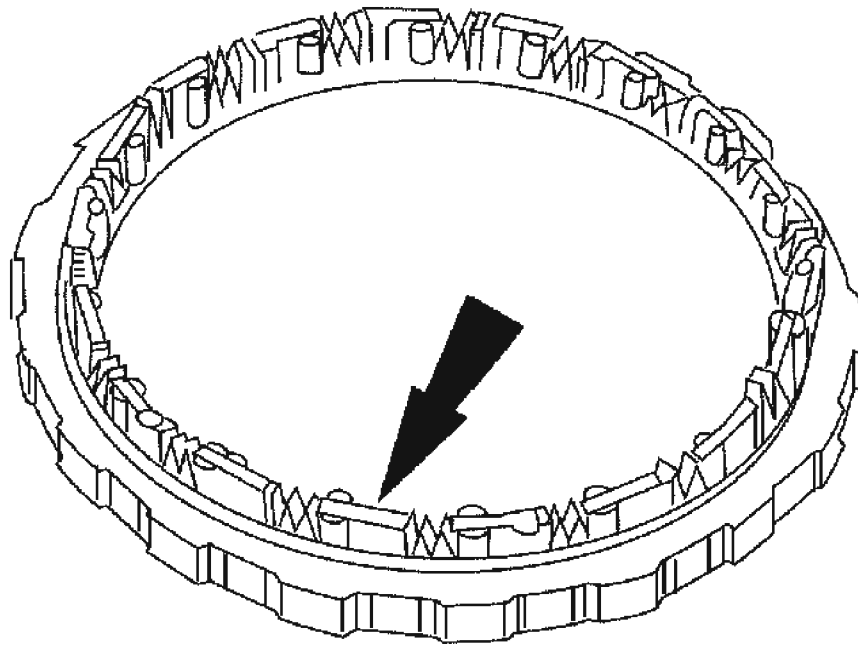
3. Remove the inner race.



GD2791-A

**Fig. 451: Removing Inner Race**  
Courtesy of FORD MOTOR CO.

4. Remove the roller assembly.



GD2792-A

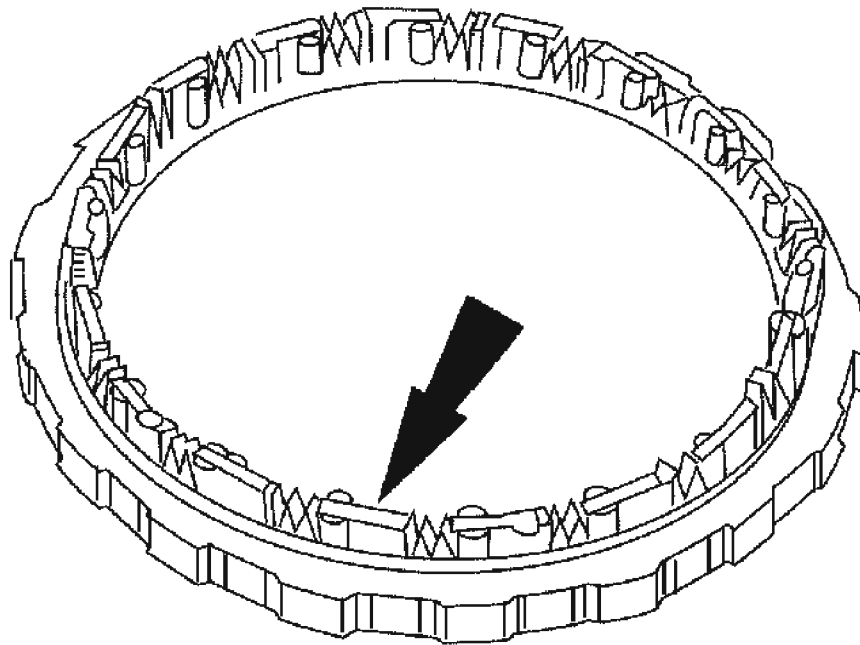
**Fig. 452: Removing Roller Assembly**  
Courtesy of FORD MOTOR CO.

**WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air. Failure to follow these instructions can result in personal injury.

5. Clean all parts thoroughly in clean solvent and blow dry with moisture-free regulated compressed air.
6. Inspect the low one-way clutch parts for damage and wear.
  - Outer race
  - Sprag assembly
  - Inner race
  - Lubrication holes

Assembly

**NOTE:** Outer tabs of the roller assembly must face up.



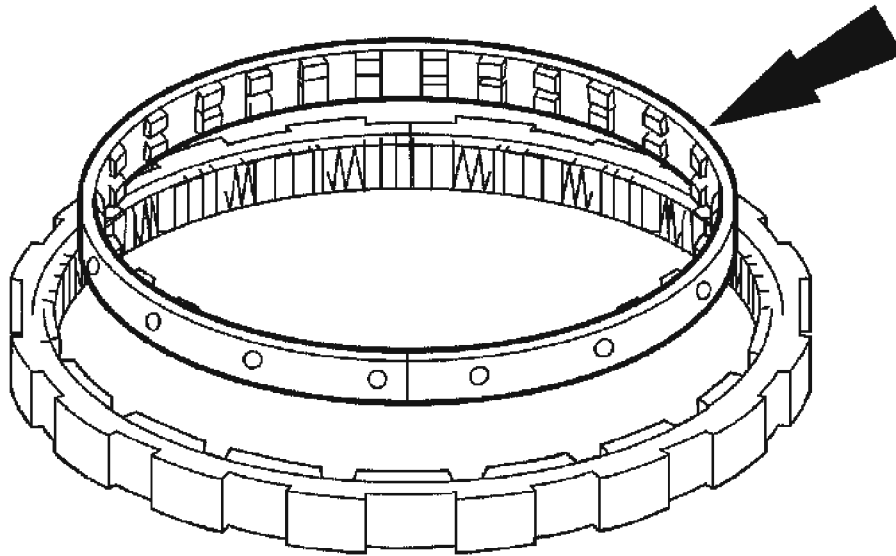
GD2792-A

**Fig. 453: Installing Roller Assembly Into Outer Race With Groove Facing Up**  
Courtesy of FORD MOTOR CO.

1. Install the roller assembly into the outer race with the groove facing up.

**NOTE:** To aid in inner race installation, rotate the inner race clockwise during installation.

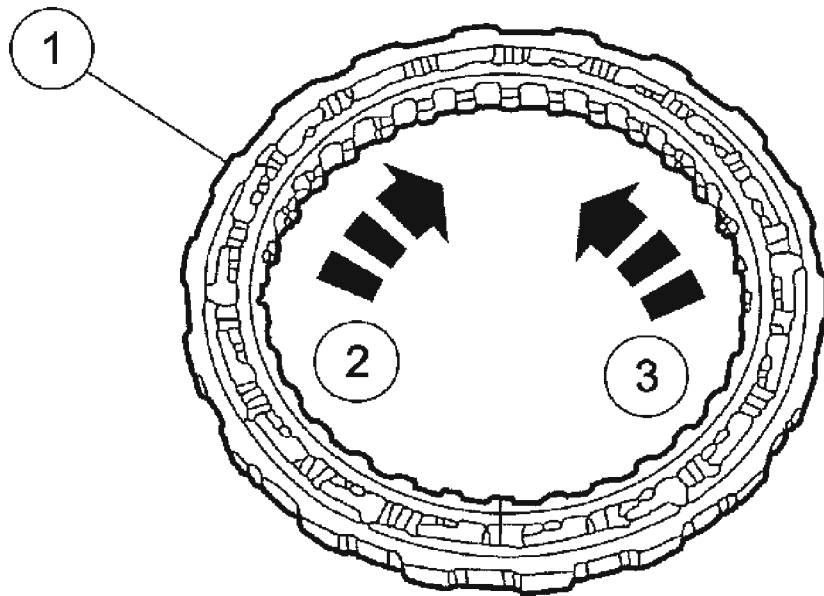




GD2791-A

**Fig. 454: Installing Inner Race With Grooves Facing Up**  
Courtesy of FORD MOTOR CO.

2. Install the inner race with the grooves facing up.
3. Check the operation of the one-way clutch as follows:
  1. Hold the outer race.
  2. Rotate the inner race clockwise. It should rotate with a slight drag without attempting to rotate the outer race.
  3. Rotate the inner race counterclockwise. The inner race should rotate the outer race.



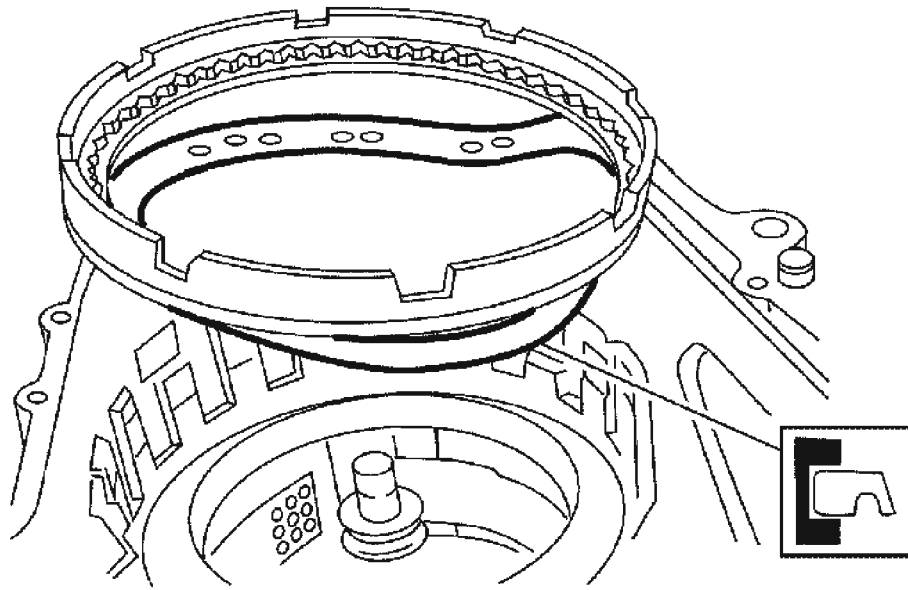
N0024484

**Fig. 455: Checking Operation Of One-Way Clutch**  
Courtesy of FORD MOTOR CO.

## LOW/REVERSE PISTON

### Disassembly

1. Remove and discard the low/reverse clutch piston outer seal on the low/reverse clutch piston.

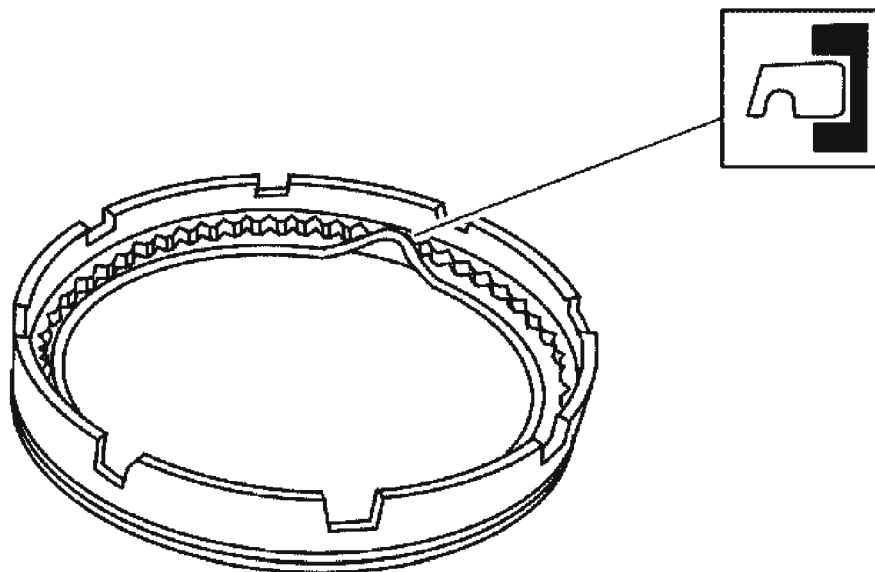


GD2854-A

**Fig. 456: Removing Low/Reverse Clutch Piston Outer Seal On Low/Reverse Clutch Piston**

**Courtesy of FORD MOTOR CO.**

2. Remove and discard the low/reverse clutch piston inner seal on the low/reverse clutch piston.



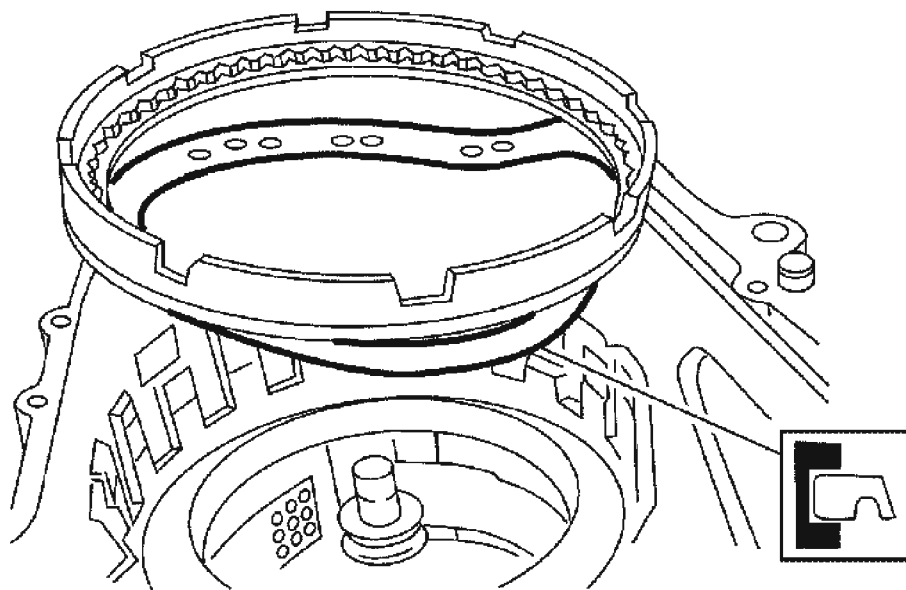
GD2855-A

**Fig. 457: Removing Low/Reverse Clutch Piston Inner Seal On Low/Reverse Clutch Piston**

**Courtesy of FORD MOTOR CO.**

**Assembly**

1. Install the low/reverse clutch piston outer seal on the low/reverse clutch piston.

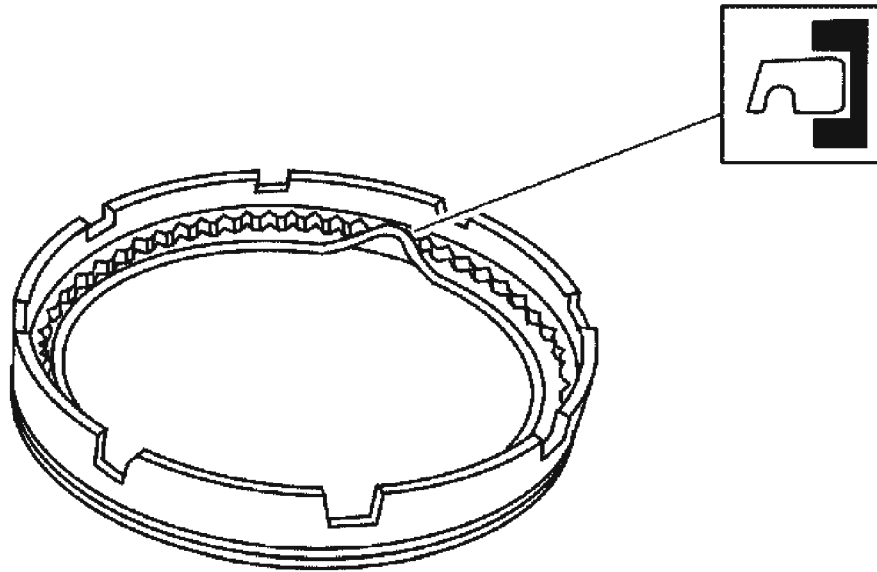


GD2854-A

**Fig. 458: Installing Low/Reverse Clutch Piston Outer Seal On Low/Reverse Clutch Piston**

**Courtesy of FORD MOTOR CO.**

2. Install the low/reverse clutch piston inner seal on the low/reverse clutch piston.



GD2855-A

**Fig. 459: Installing Low/Reverse Clutch Piston Inner Seal On Low/Reverse Clutch Piston**

Courtesy of FORD MOTOR CO.

#### MAIN CONTROL VALVE BODY

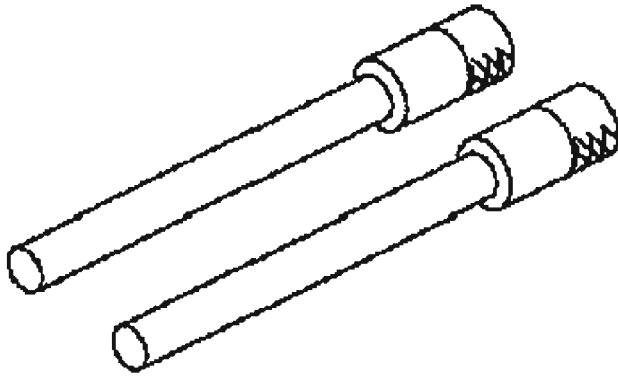
Special Tool(s)

#### SPECIAL TOOLS DESCRIPTION

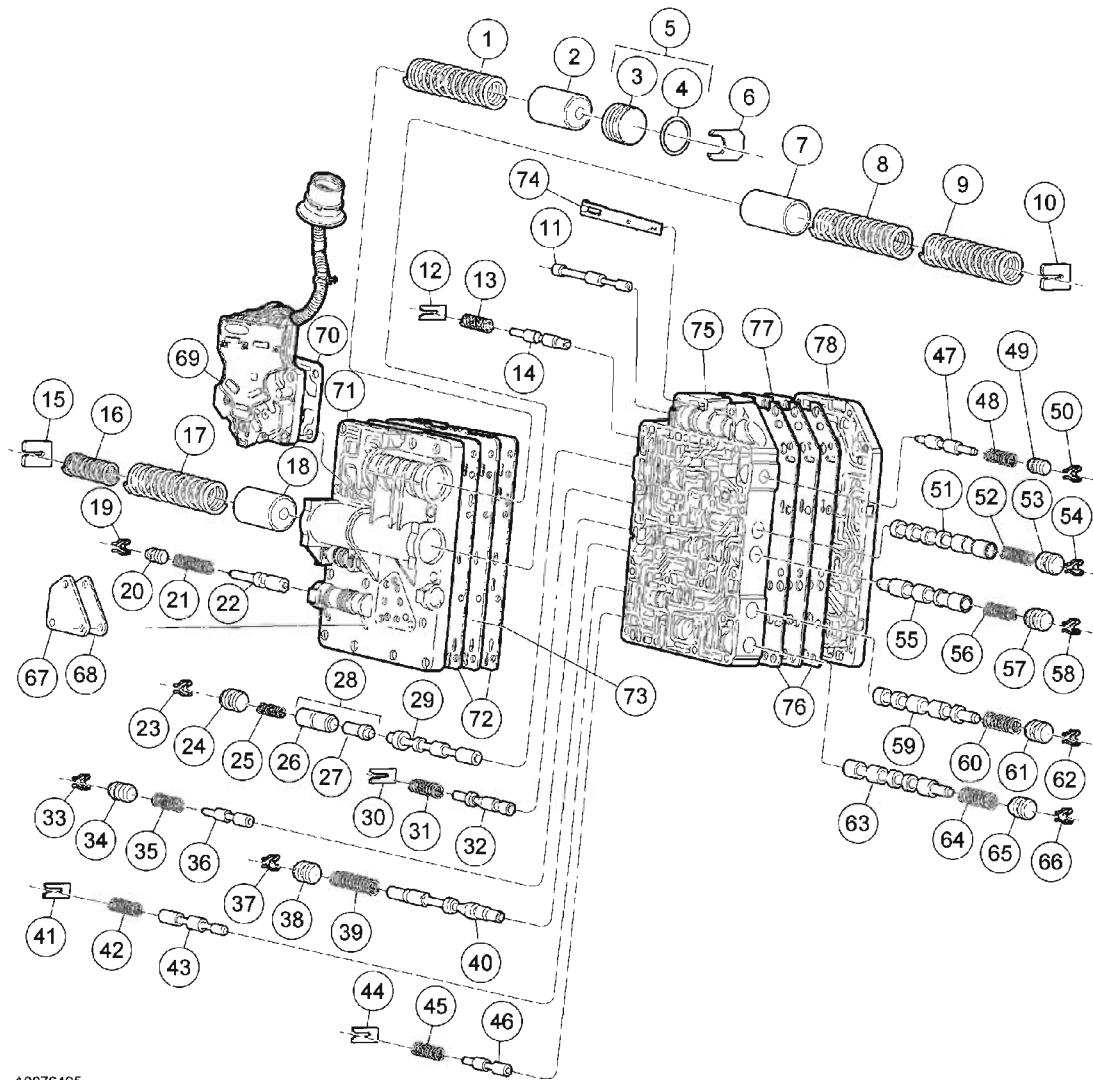
Alignment Pins, Valve Body 307-299  
(T94P-77000-N)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2535-A**



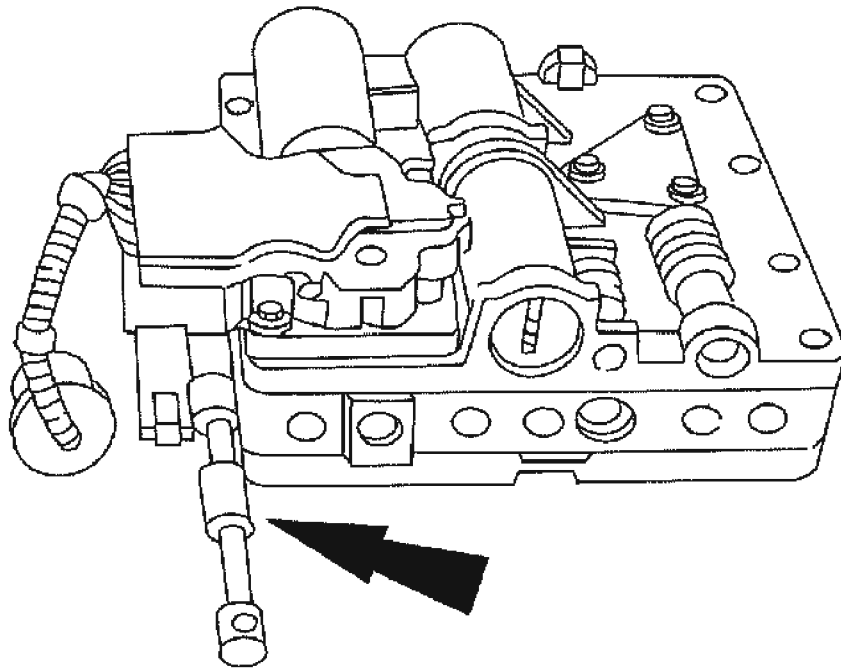
A0076495

**Fig. 460: Identifying Automatic Transaxle/Transmission - CD4E Components**  
 Courtesy of FORD MOTOR CO.

#### Disassembly

1. Remove the manual valve.

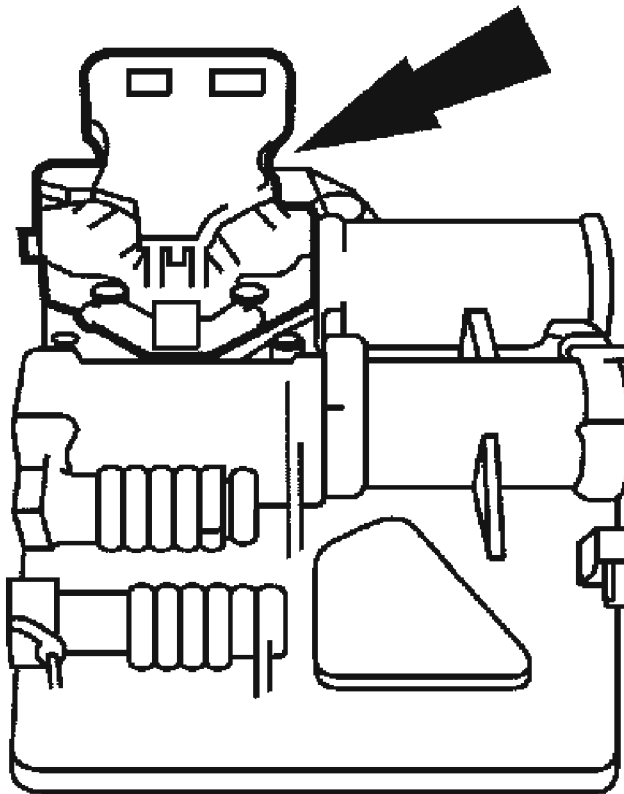




GD2879-A

**Fig. 461: Removing Manual Valve**  
Courtesy of FORD MOTOR CO.

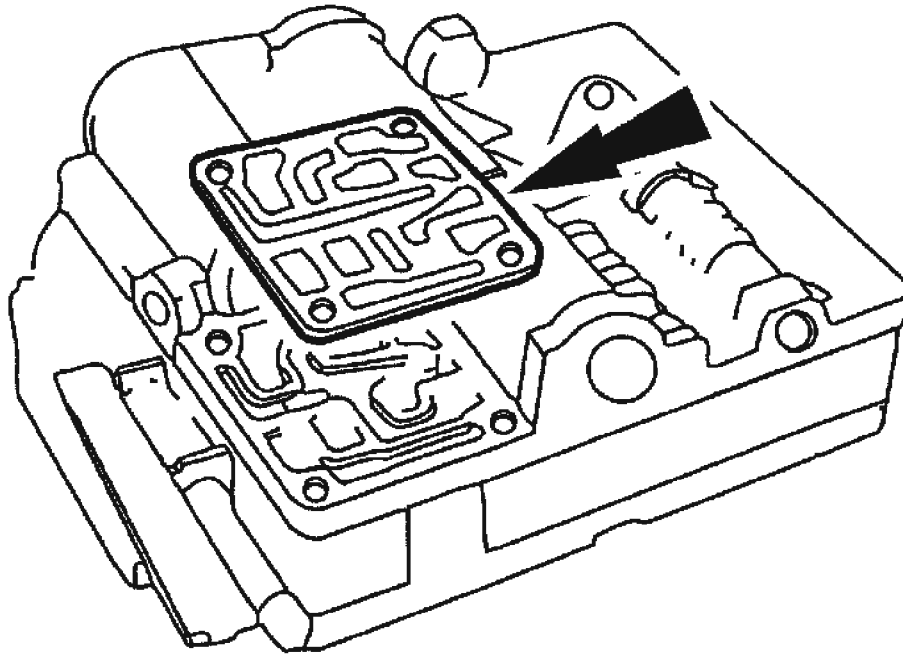
**CAUTION:** Do not attempt to remove the solenoid valve body wiring cover.



GD2880-A

**Fig. 462: Removing Solenoid Valve Body Bolts And Solenoid Valve Body**  
Courtesy of FORD MOTOR CO.

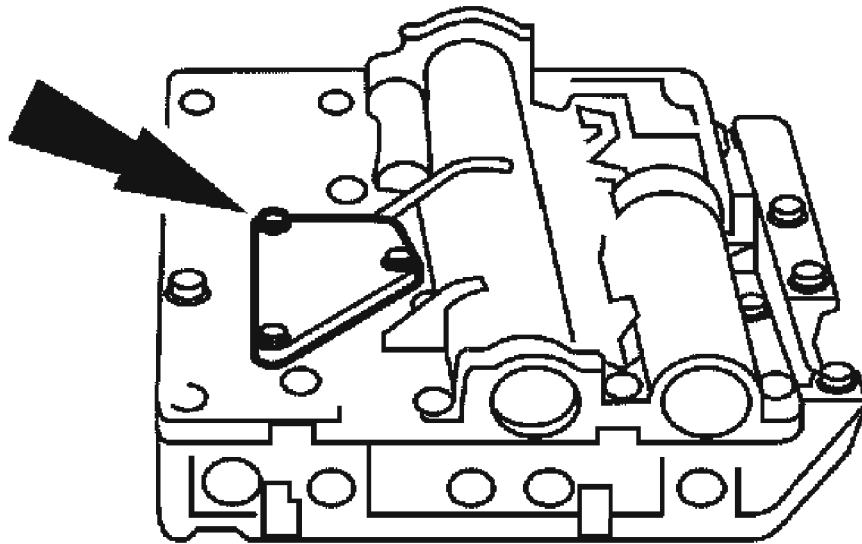
2. Remove the 2 solenoid valve body bolts and the solenoid valve body.
3. Remove and discard the solenoid valve body gasket.



GD2881-A

**Fig. 463: Removing Solenoid Valve Body Gasket**  
Courtesy of FORD MOTOR CO.

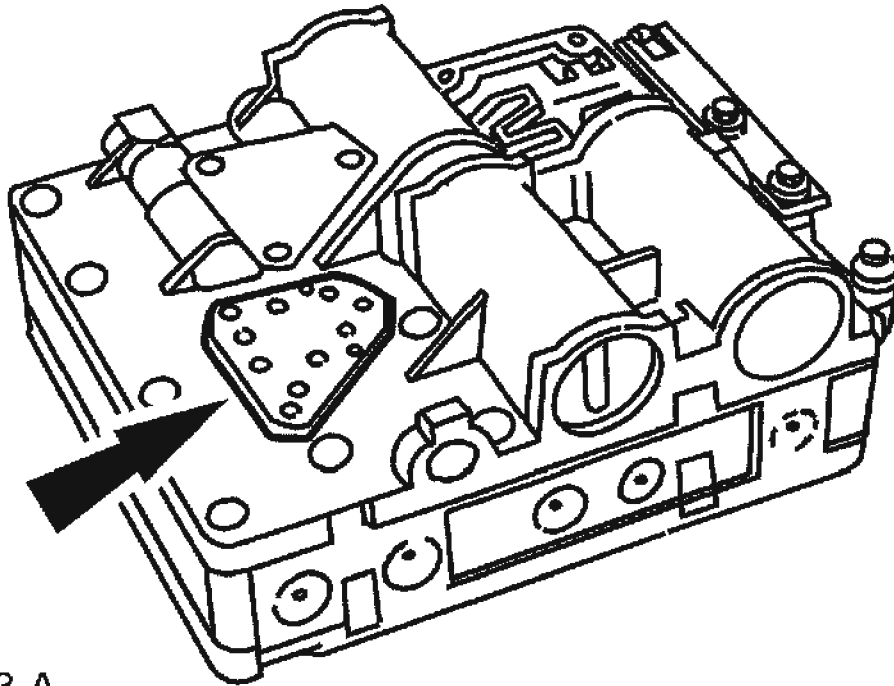
4. Remove the 3 pressure tap plate bolts and the pressure tap plate.



GD2882-A

**Fig. 464: Removing Pressure Tap Plate Bolts And Pressure Tap Plate**  
Courtesy of FORD MOTOR CO.

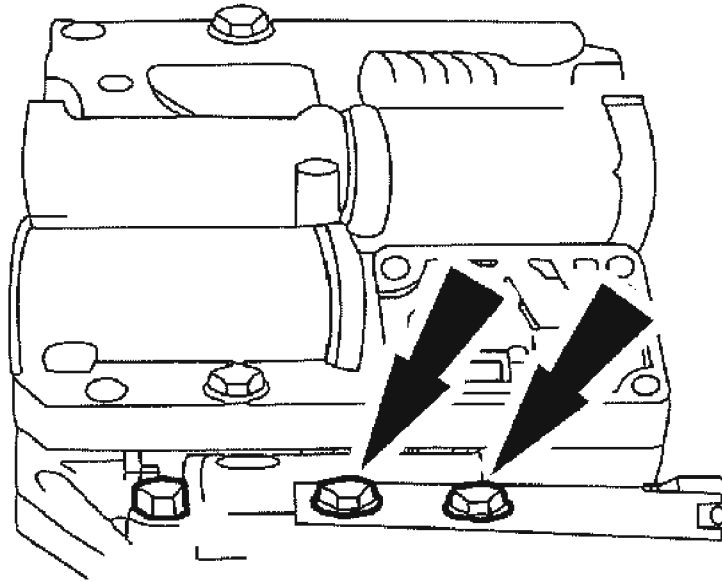
5. Remove and discard the pressure plate tap gasket.



GD2883-A

**Fig. 465: Removing Pressure Plate Tap Gasket**  
Courtesy of FORD MOTOR CO.

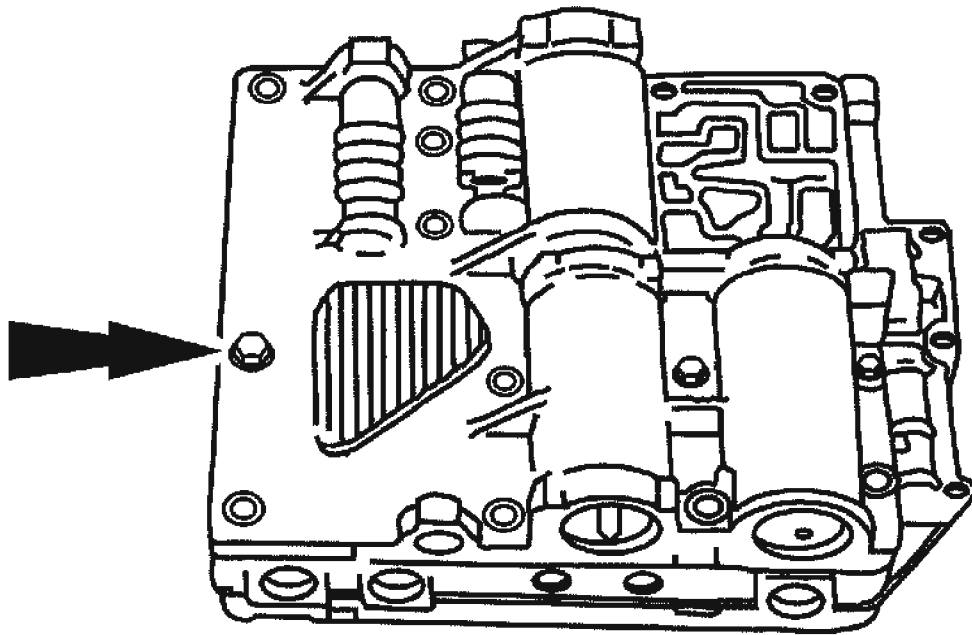
6. Remove the control valve body to transfer plate bolts, and remove the manual valve detent spring assembly.



A0054780

**Fig. 466: Removing Control Valve Body To Transfer Plate Bolts**  
Courtesy of FORD MOTOR CO.

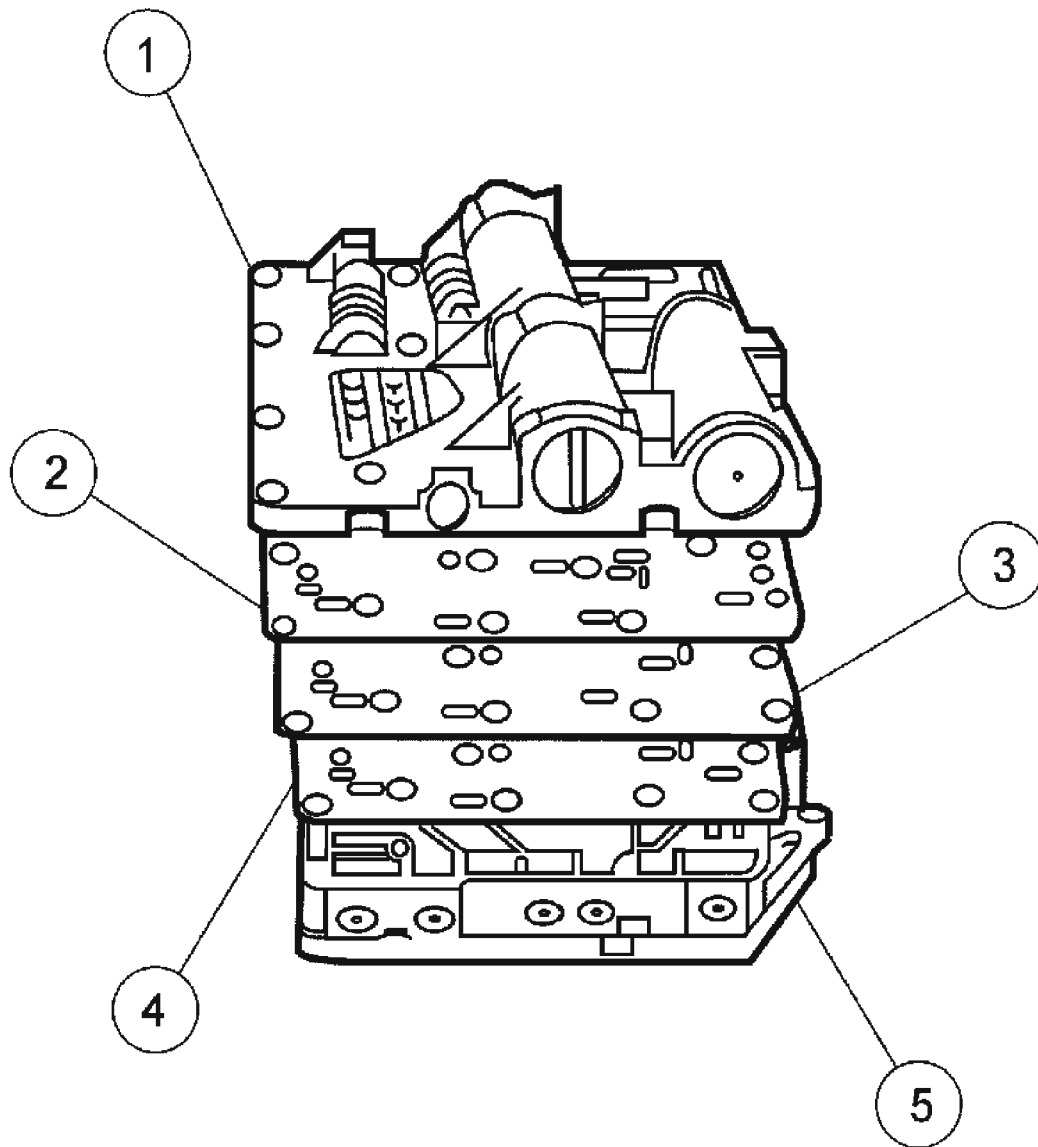
7. Remove the accumulator body-to-transfer plate bolts.



GD2885-A

**Fig. 467: Removing Accumulator Body-To-Transfer Plate Bolts**  
Courtesy of FORD MOTOR CO.

8. Separate the accumulator body from the main control valve body.
  1. Remove the accumulator body assembly.
  2. Remove and discard the accumulator body separator gasket.
  3. Remove the accumulator body separator plate.
  4. Remove and discard the accumulator body separator gasket.
  5. Remove the main control valve body.



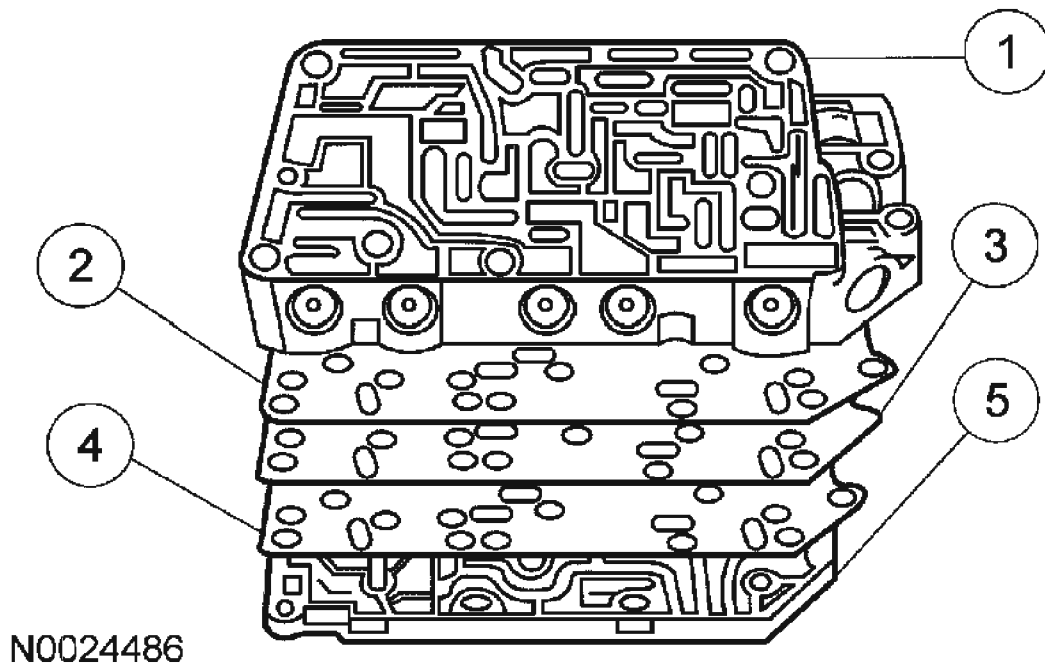
N0024485

**Fig. 468: Separating Accumulator Body From Main Control Valve Body**  
Courtesy of FORD MOTOR CO.

9. Separate the transfer plate from the main control valve body.
  1. Remove the main control valve body.
  2. Remove and discard the valve body separator plate gasket.

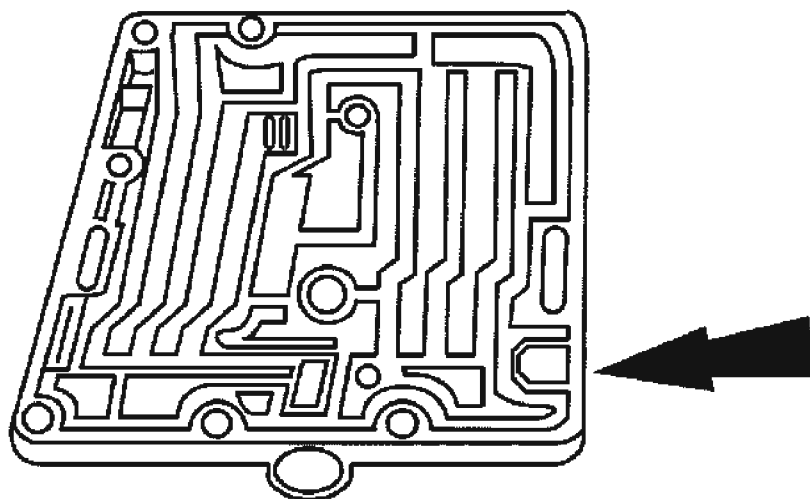


3. Remove the valve body separator plate.
4. Remove and discard the valve body separator plate gasket.
5. Remove the transfer plate.



**Fig. 469: Separating Transfer Plate From Main Control Valve Body**  
Courtesy of FORD MOTOR CO.

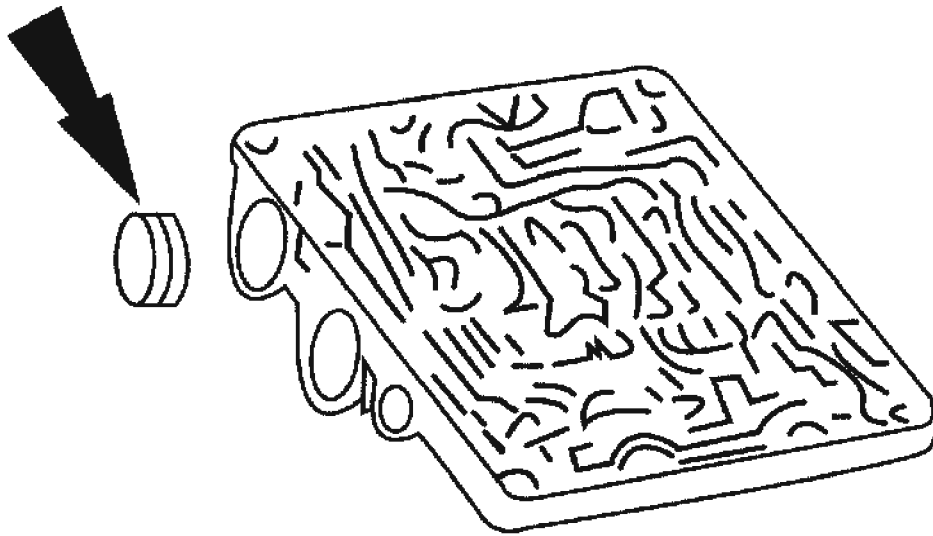
10. Remove the intermediate and overdrive accumulator valve plug retaining plate from the accumulator body assembly.



GD2894-A

**Fig. 470: Removing Intermediate And Overdrive Accumulator Valve Plug Retaining Plate From Accumulator Body Assembly**  
Courtesy of FORD MOTOR CO.

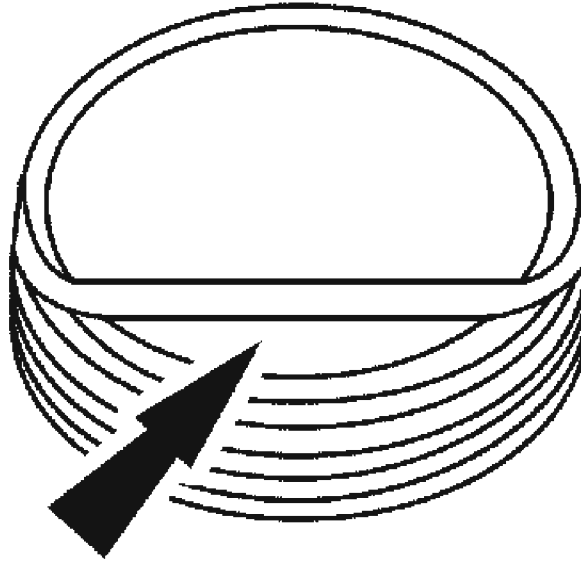
11. Remove the intermediate and overdrive accumulator valve plug.



GD2895-A

**Fig. 471: Removing Intermediate And Overdrive Accumulator Valve Plug**  
Courtesy of FORD MOTOR CO.

12. Remove and discard the intermediate and overdrive accumulator plug seal.



GD2896-A

**Fig. 472: Removing Intermediate And Overdrive Accumulator Plug Seal**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Remove, note location and clean one valve at a time to avoid incorrect installation.

13. As necessary, disassemble the parts of the accumulator body and main control valve body assemblies.
  - Lubricate and reassemble the parts as soon as possible to avoid accidental damage or incorrect installation.

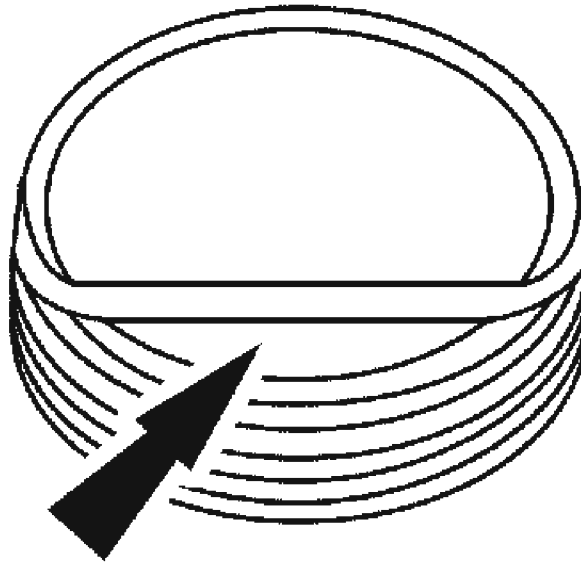
Assembly

**WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air. Failure to follow these instructions can result in personal injury.

**CAUTION:** If the valve sticks in its bore and cannot be freed, install a new main control valve body.

**NOTE:** Clean the main control valve body and accumulator body

assembly of the main control in cleaning solvent. Blow dry with moisture-free regulated compressed air. The solenoid valve body should not be cleaned in cleaning solvent. It may be blown clean with compressed air or wiped clean with a lint-free cloth.

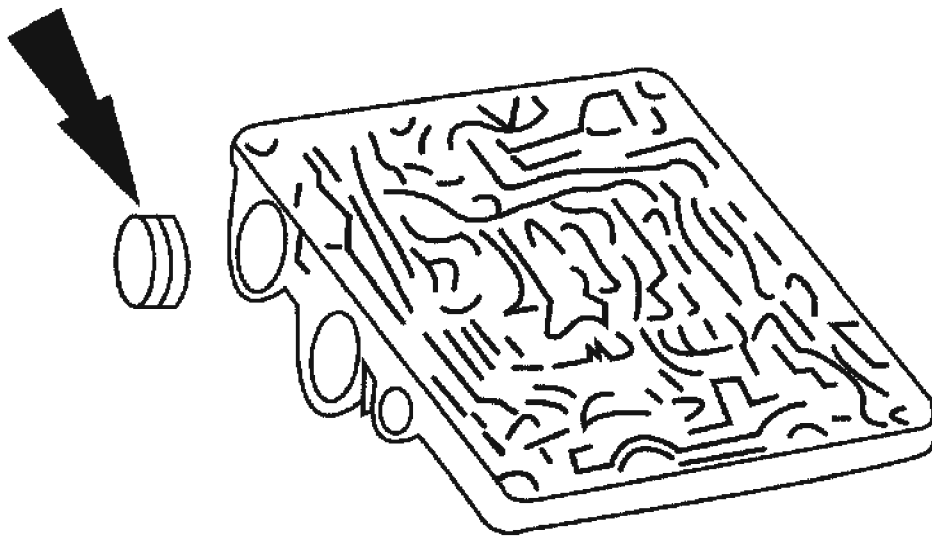


GD2896-A

**Fig. 473: Installing Intermediate And Overdrive Accumulator Plug Seal And Coat With Petroleum Jelly**  
Courtesy of FORD MOTOR CO.

1. Install a new intermediate and overdrive accumulator plug seal and coat with petroleum jelly.

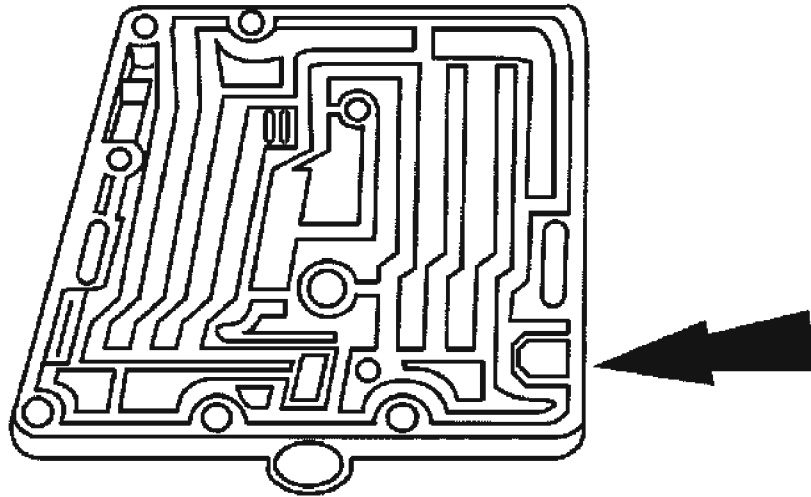
**CAUTION:** Do not install the intermediate and overdrive accumulator valve plug and seal too far into the bore and damage the seal. Only push the intermediate and overdrive accumulator valve plug until it is flush with the accumulator body assembly.



GD2895-A

**Fig. 474: Installing Intermediate And Overdrive Accumulator Valve Plug**  
Courtesy of FORD MOTOR CO.

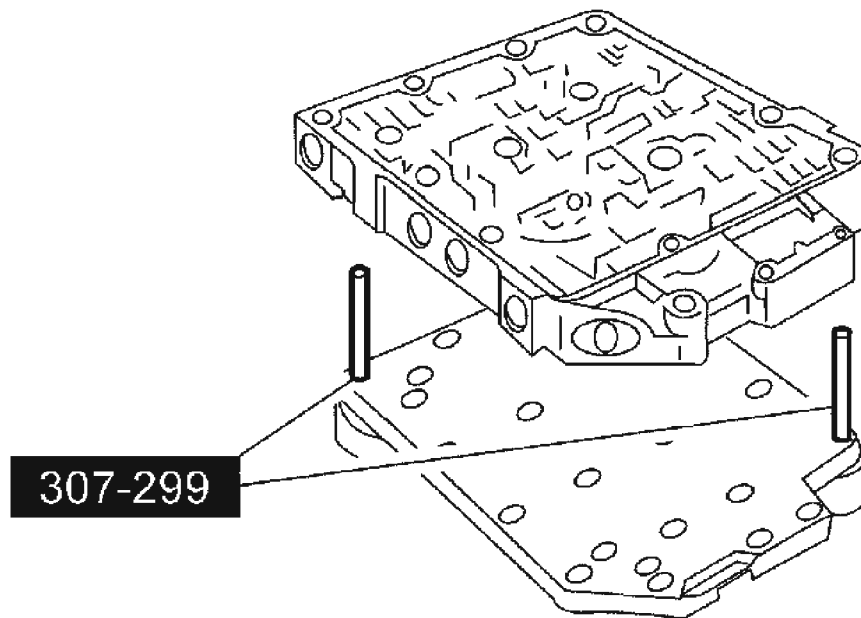
2. Install the intermediate and overdrive accumulator valve plug.
3. Install the intermediate and overdrive accumulator valve plug retaining plate.



GD2894-A

**Fig. 475: Installing Intermediate And Overdrive Accumulator Valve Plug Retaining Plate**  
Courtesy of FORD MOTOR CO.

4. Install the special tool.

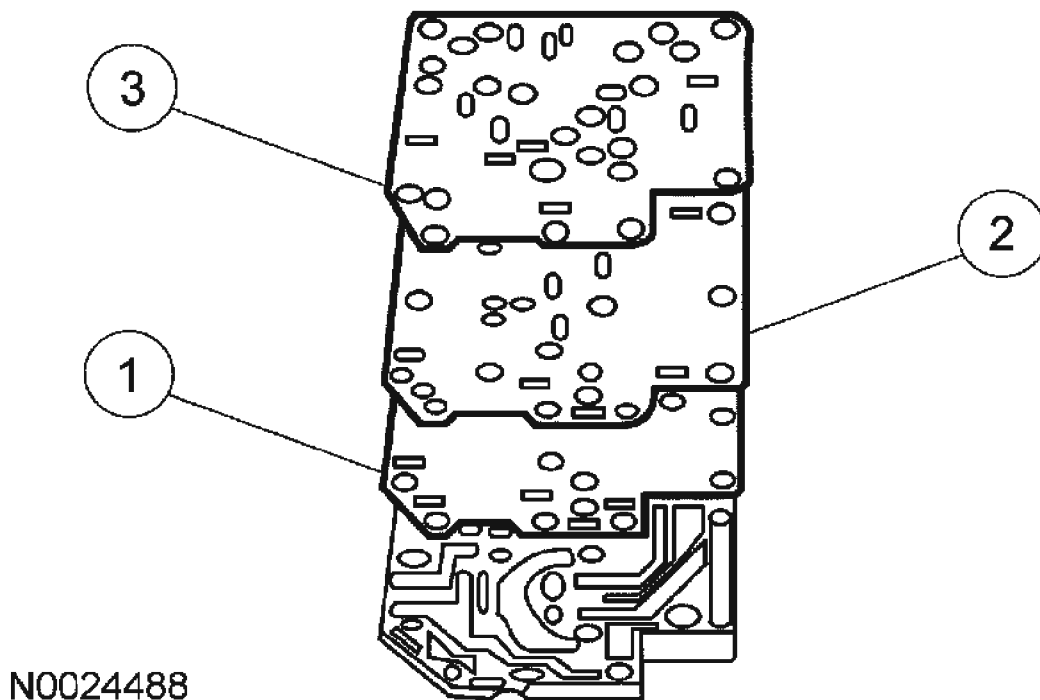


N0024487

**Fig. 476: Installing Special Tool**  
**Courtesy of FORD MOTOR CO.**

5. Using the special tool, install the valve body separator plate gaskets and valve body separator plate.
  1. Install a new valve body separator plate gasket.
  2. Install the valve body separator plate.
  3. Install a new valve body separator plate gasket.

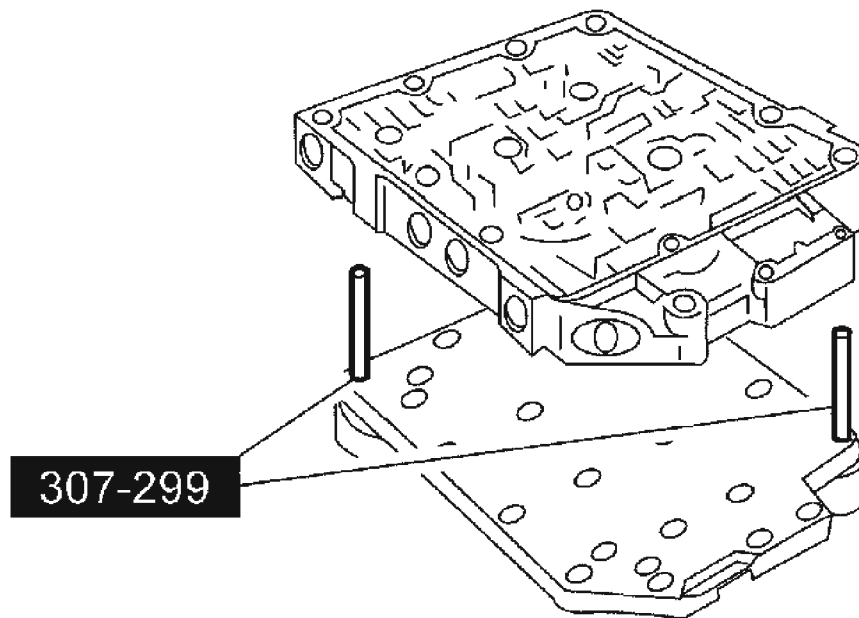




**Fig. 477: Installing Valve Body Separator Plate Gaskets And Valve Body Separator Plate**

Courtesy of FORD MOTOR CO.

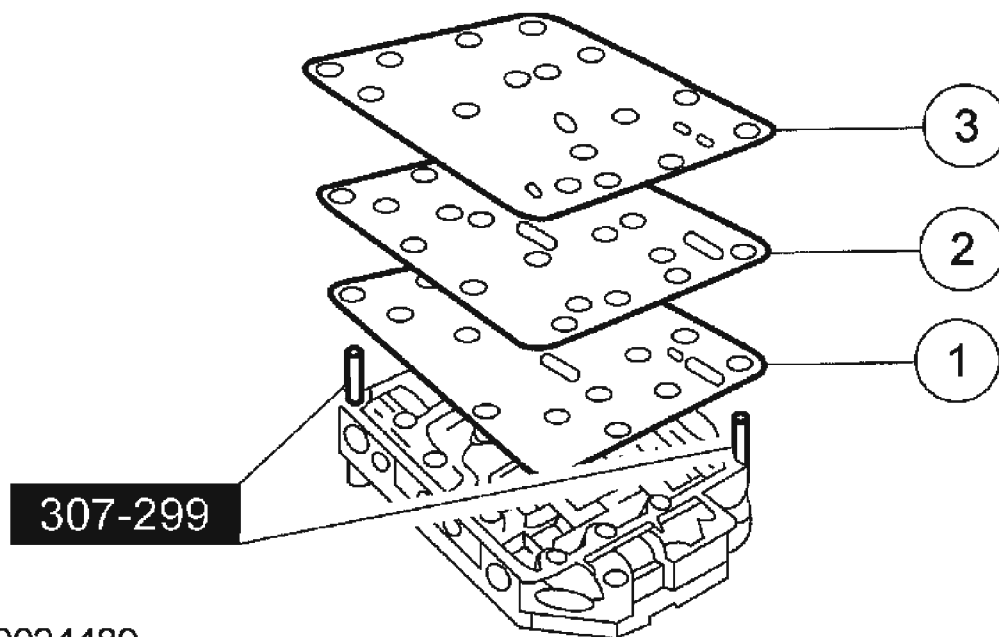
6. Using the special tool, install the main control valve body.



N0024487

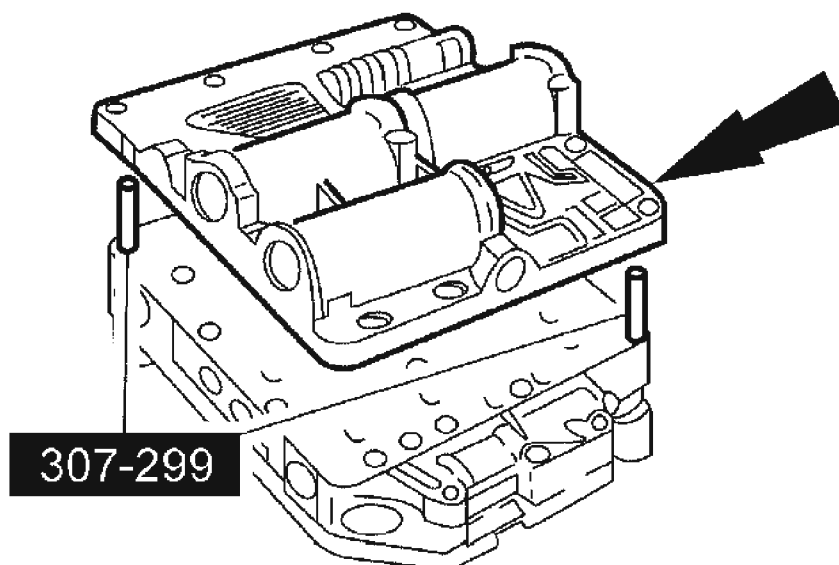
**Fig. 478: Installing Main Control Valve Body**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, install the accumulator body separator plate and gaskets.
  1. Install a new accumulator body separator plate gasket.
  2. Install the accumulator body separator plate.
  3. Install a new accumulator body separator plate gasket.



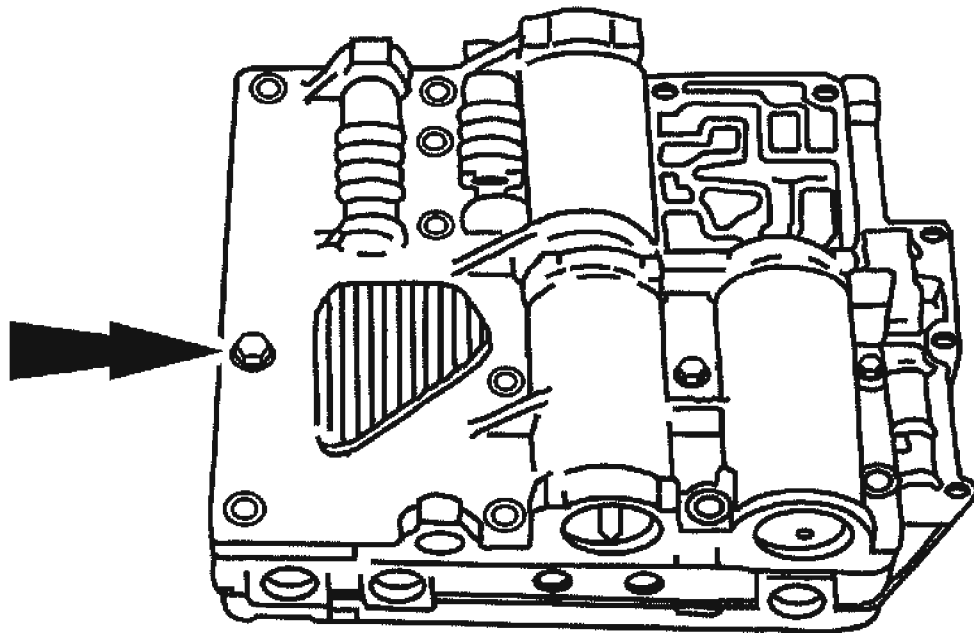
**Fig. 479: Installing Accumulator Body Separator Plate And Gaskets**  
Courtesy of FORD MOTOR CO.

8. Using the special tool, install the accumulator body assembly.



**Fig. 480: Installing Accumulator Body Assembly**  
Courtesy of FORD MOTOR CO.

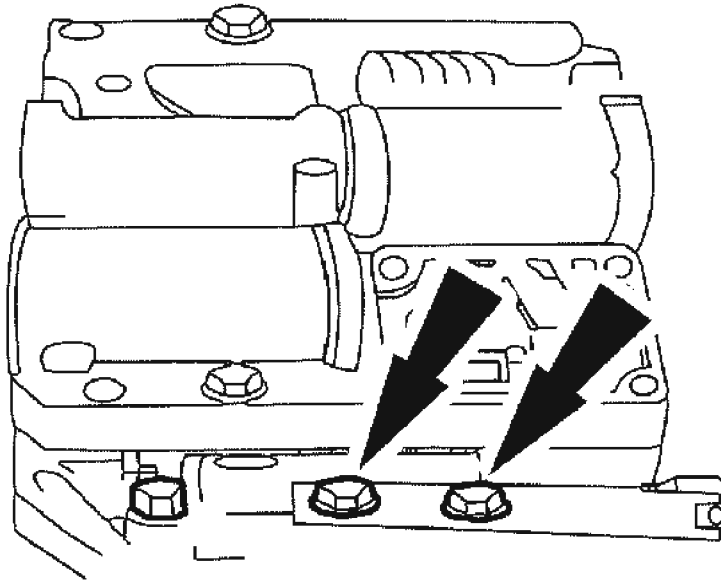
9. Starting with the bolts in the middle and working outward, install the accumulator body transfer plate.
  - Tighten to 12 Nm (9 lb-ft).



GD2885-A

**Fig. 481: Installing Accumulator Body Transfer Plate**  
Courtesy of FORD MOTOR CO.

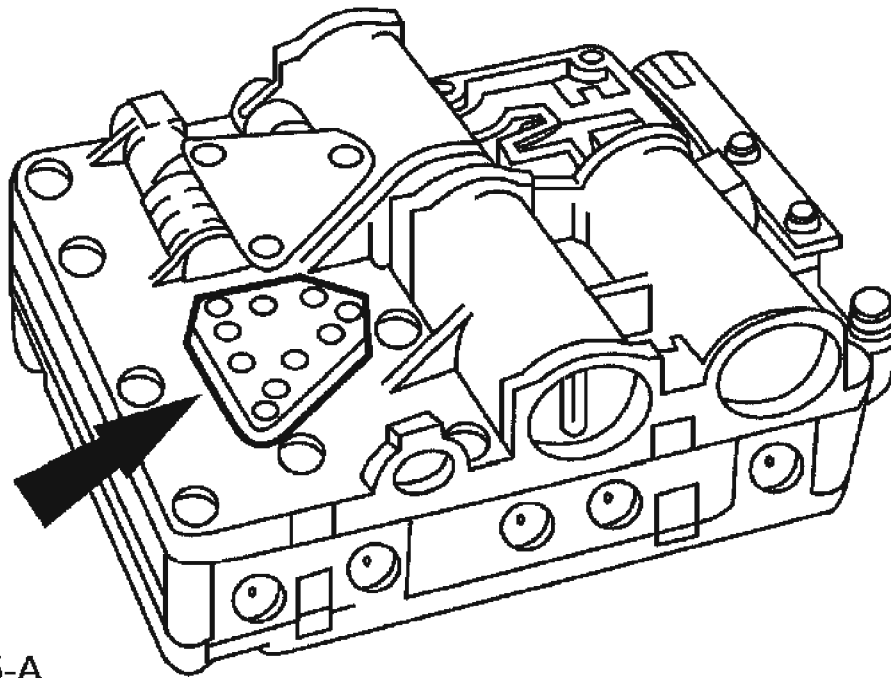
10. Starting with the bolts in the middle and working outward, install the main control valve body to transfer plate and install the detent spring.
  - Tighten to 12 Nm (9 lb-ft).



A0054780

**Fig. 482: Installing Detent Spring**  
Courtesy of FORD MOTOR CO.

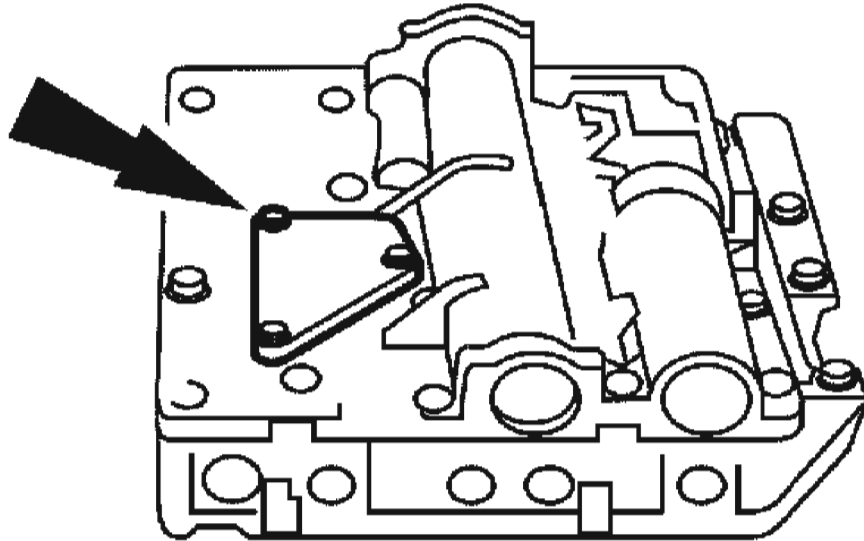
11. Install a new pressure tap plate gasket.



GD2905-A

**Fig. 483: Installing Pressure Tap Plate Gasket**  
Courtesy of FORD MOTOR CO.

12. Install the pressure tap plate and bolts.
  - Tighten to 8 Nm (71 lb-in).

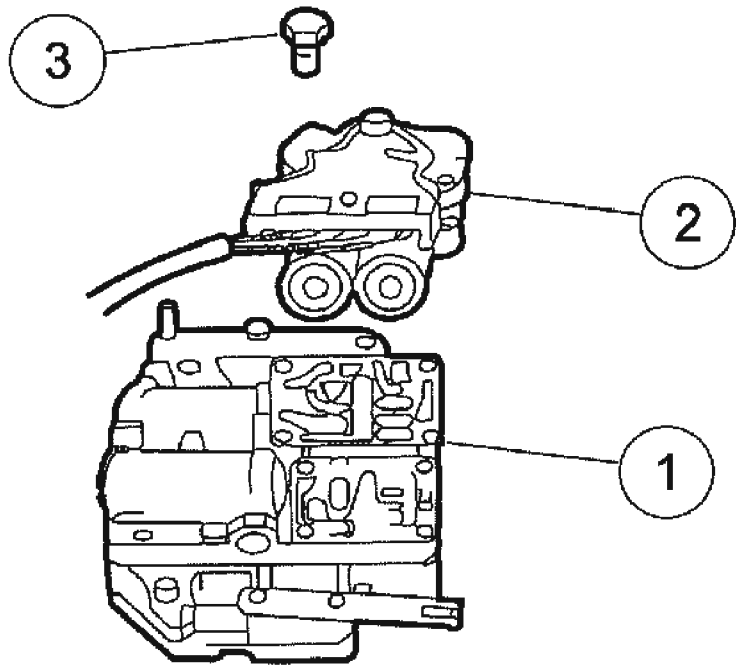


GD2882-A

**Fig. 484: Installing Pressure Tap Plate And Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Match the solenoid valve body gasket to passages.

13. Install the solenoid valve body.
  1. Install the solenoid valve body gasket.
  2. Install the solenoid valve body.
  3. Install the 2 solenoid valve body bolts.
    - Tighten to 10 Nm (89 lb-in).



N0024491

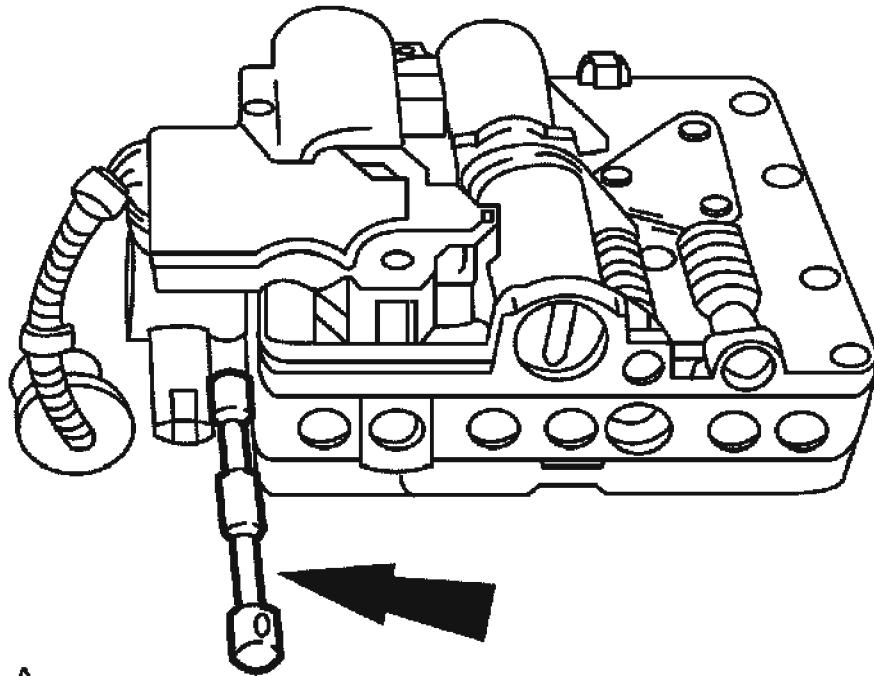
**Fig. 485: Installing Solenoid Valve Body**  
Courtesy of FORD MOTOR CO.

14. Install the manual valve.



## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



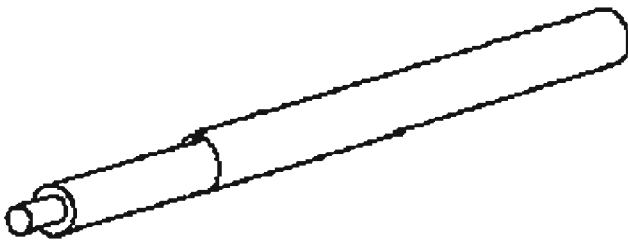
GD2908-A

**Fig. 486: Installing Manual Valve**  
Courtesy of FORD MOTOR CO.

### TRANSAXLE CASE

Special Tool(s)

### SPECIAL TOOLS DESCRIPTION

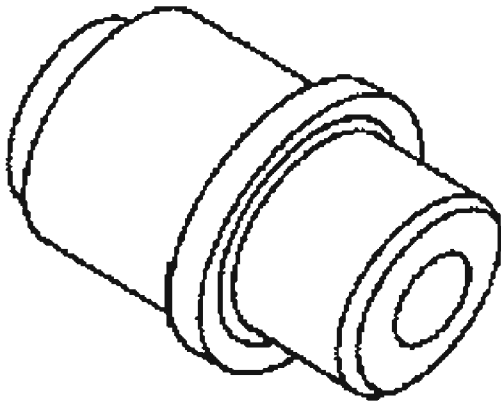


**ST2056-A**

Installer, Lube Tube Fluid Seal 307-240 (T91P-76085-A)

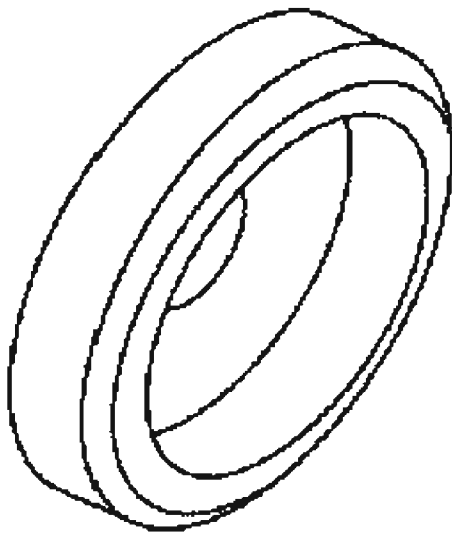
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Remover/Installer, Needle Bearing  
307-286 (T94P-77000-E1)

**ST2053-A**

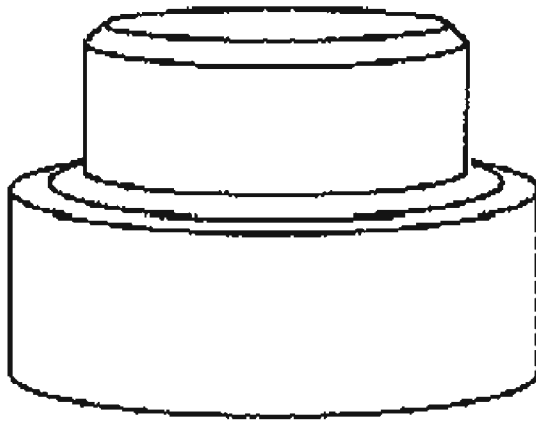


Remover/Installer Servo Plug 307-  
287 (T94P-77000-ER2)

**ST2054-A**

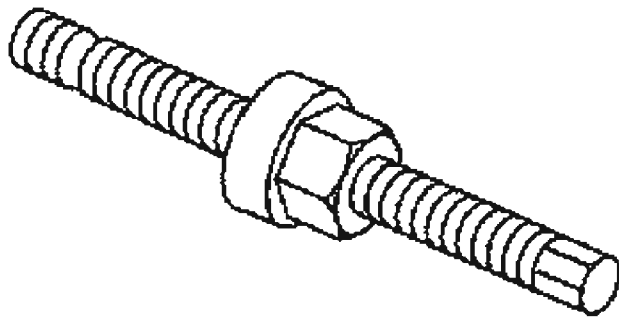
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



Installer, Throttle Shaft Fluid Seal  
307-097 (T81P-70337-A)

**ST2536-A**

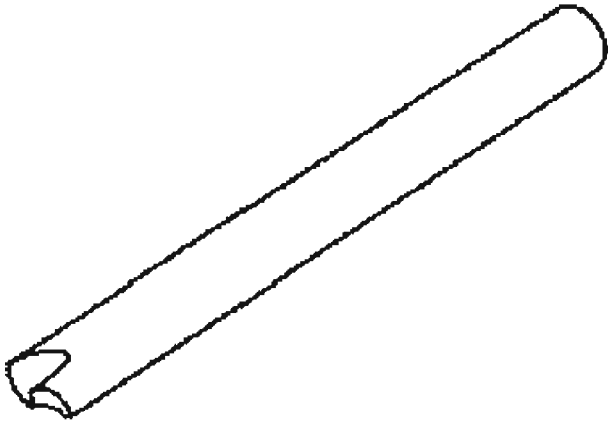


Drawbar, Rear Axle 205-098 (T75T-1176-A)

**ST1287-A**

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

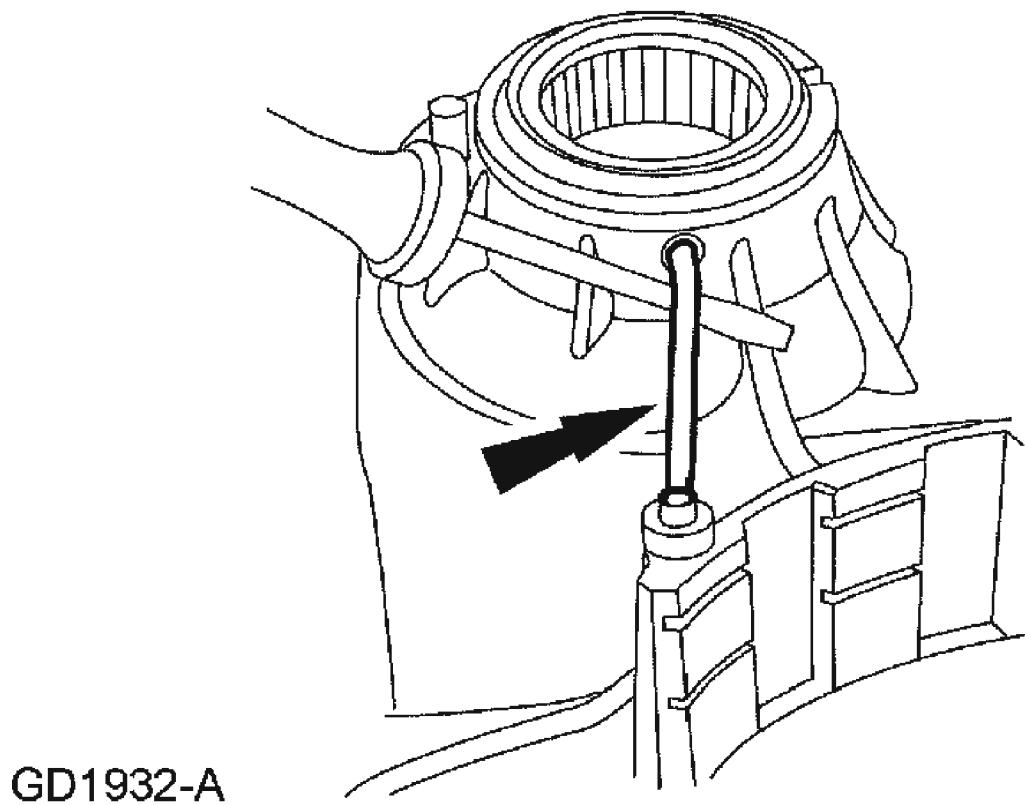


**ST1848-A**

Installer, Lube Tube 307-307 (T94P-77000-U2)

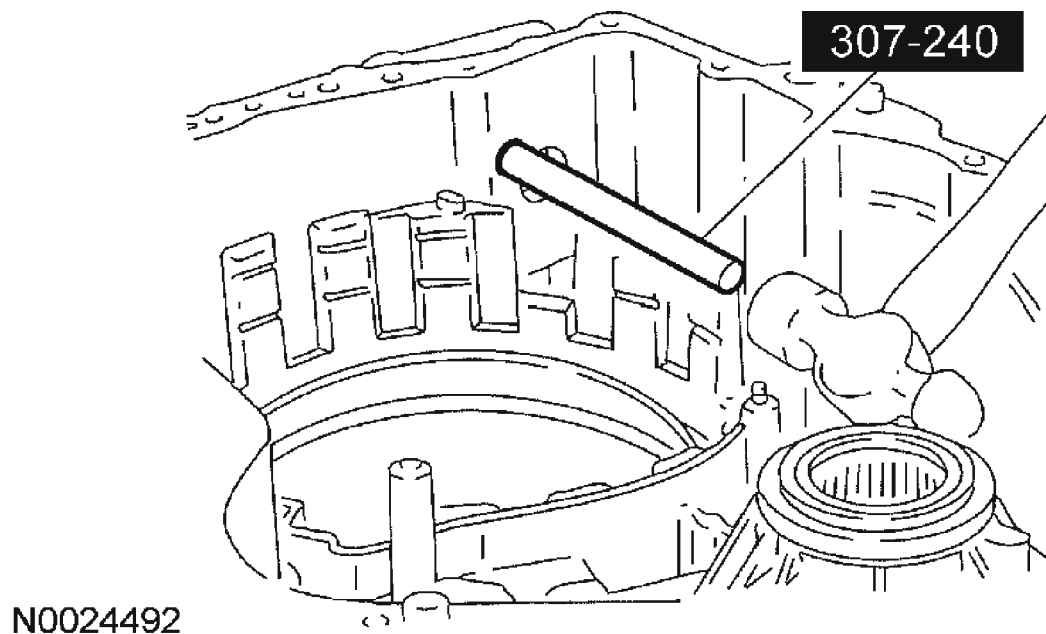
### Disassembly

1. Remove and discard the final drive lube tube.



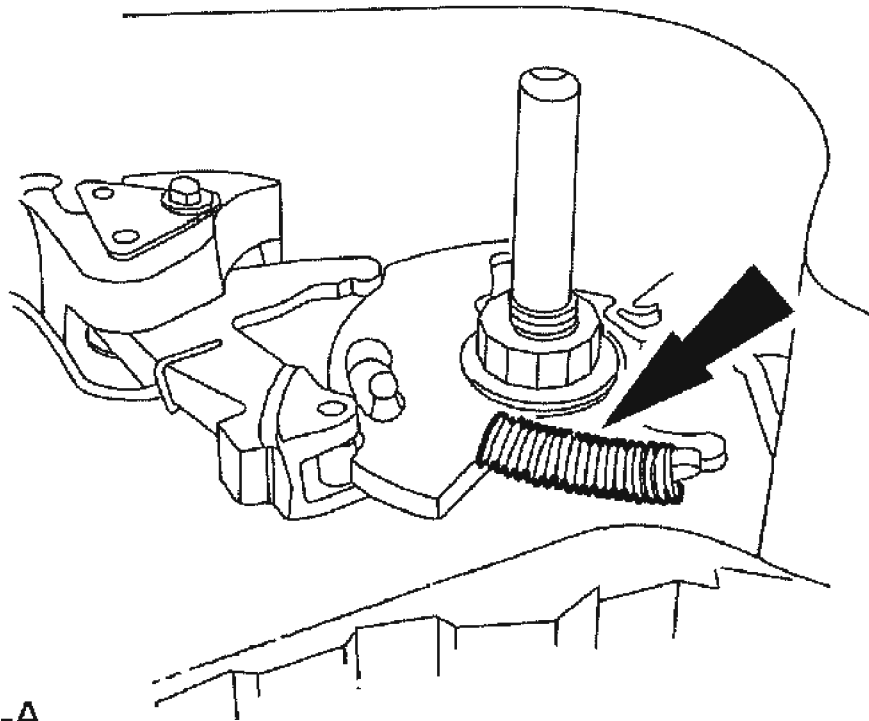
**Fig. 487: Removing Final Drive Lube Tube**  
**Courtesy of FORD MOTOR CO.**

2. Using the special tool, remove and discard the final drive lube tube seal.



**Fig. 488: Removing Final Drive Lube Tube Seal**  
**Courtesy of FORD MOTOR CO.**

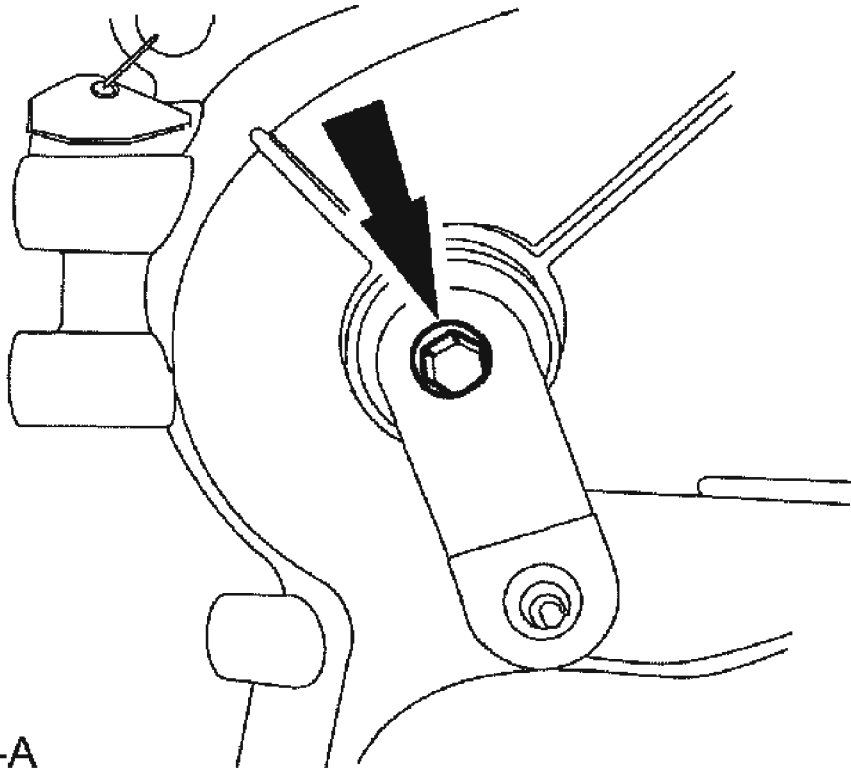
3. Remove the parking pawl ratchet spring.



GD3879-A

**Fig. 489: Removing Parking Pawl Ratchet Spring**  
Courtesy of FORD MOTOR CO.

4. Remove the manual control lever outer assembly.

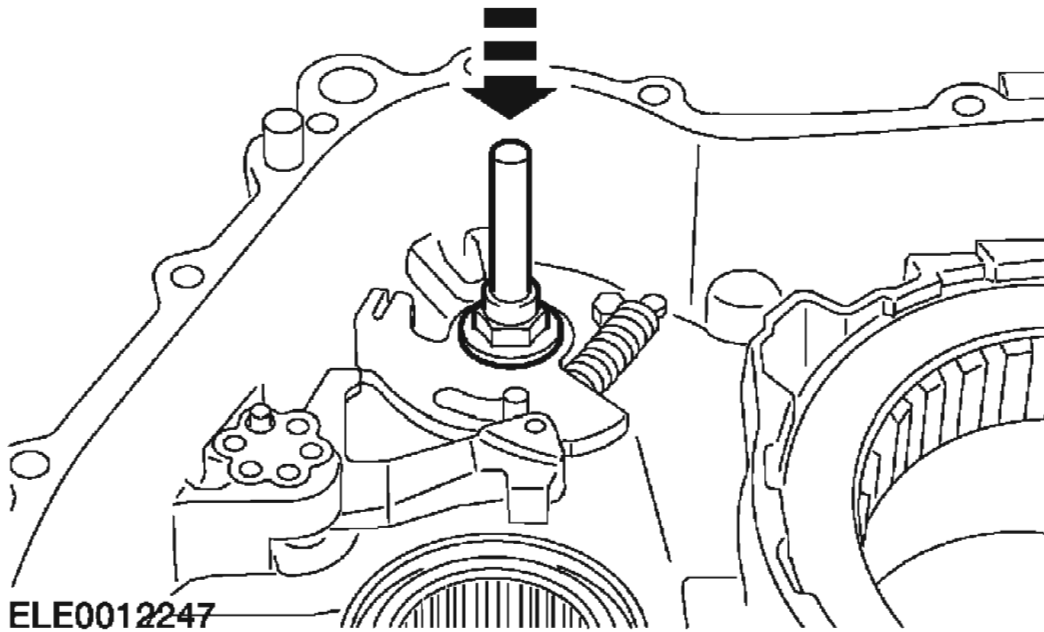


GD1935-A

**Fig. 490: Removing Manual Control Lever Outer Assembly**  
Courtesy of FORD MOTOR CO.

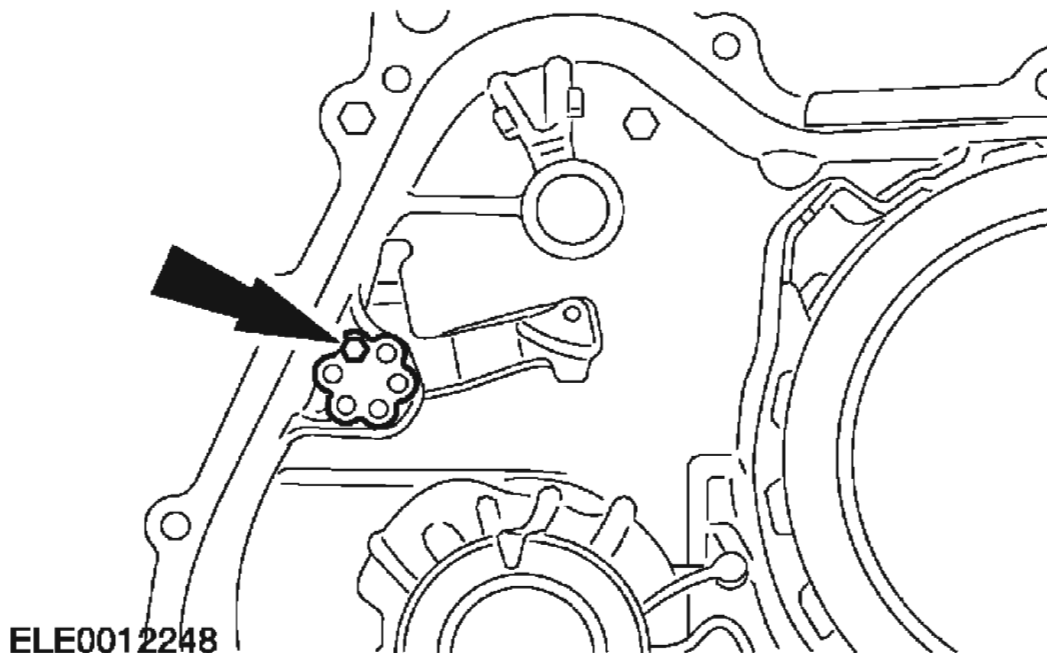
5. Remove the manual control lever shaft assembly.





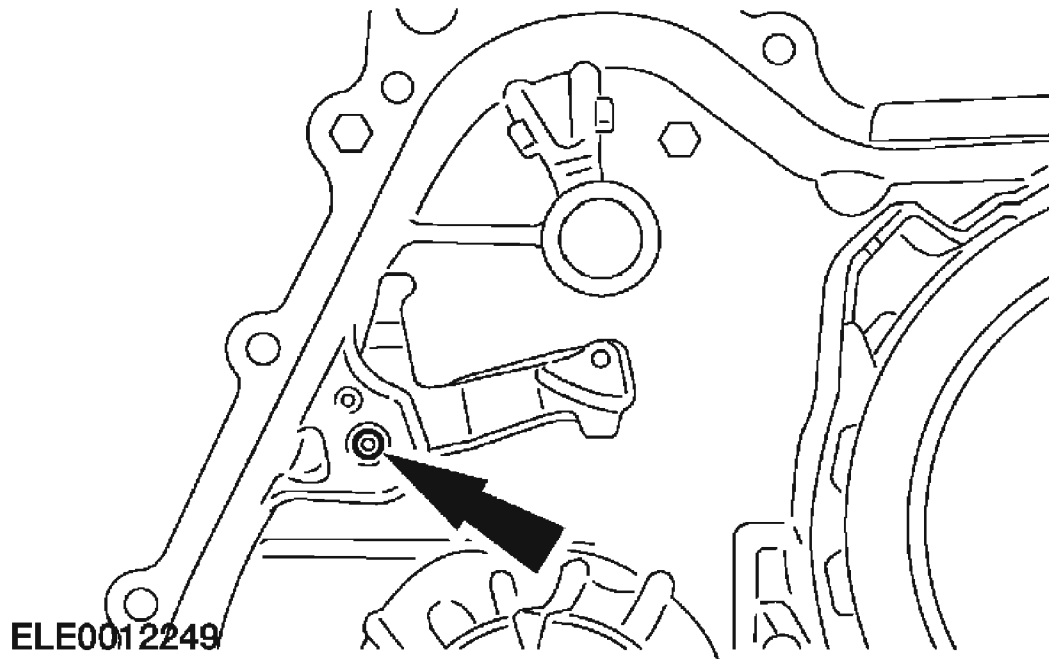
**Fig. 491: Removing Manual Control Lever Shaft Assembly**  
Courtesy of FORD MOTOR CO.

6. Remove the parking pawl shaft retainer and bolt.



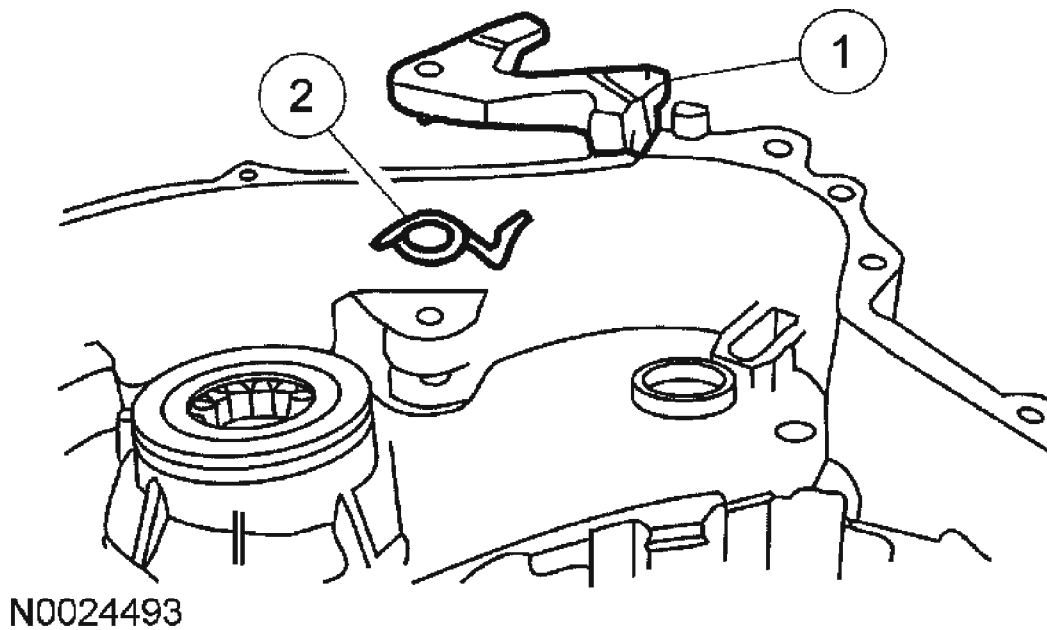
**Fig. 492: Removing Parking Pawl Shaft Retainer And Bolt**  
Courtesy of FORD MOTOR CO.

7. Remove the parking pawl shaft.



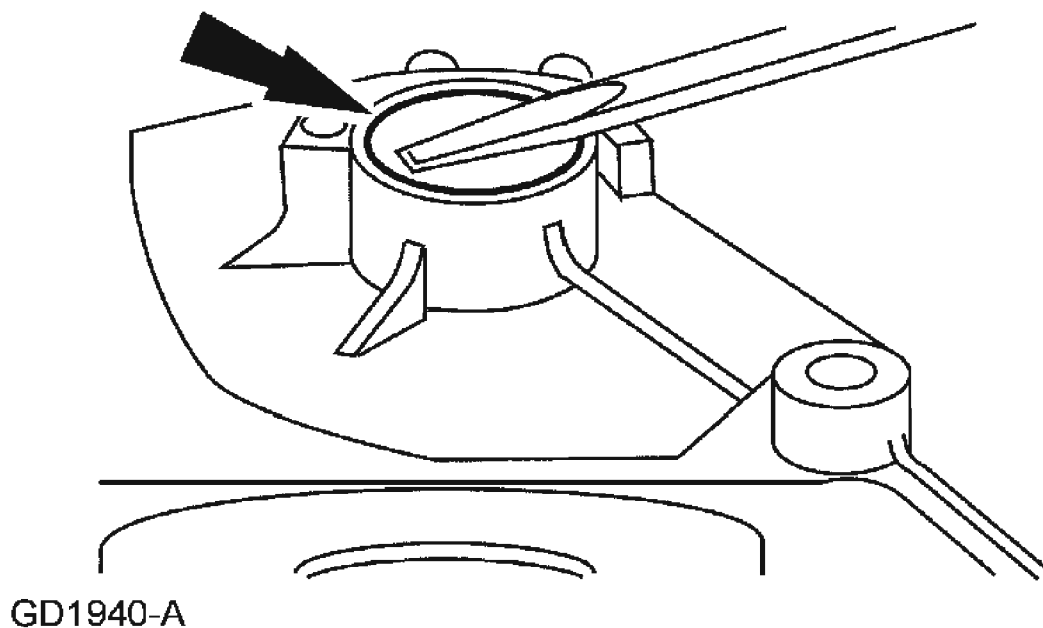
**Fig. 493: Removing Parking Pawl Shaft**  
Courtesy of FORD MOTOR CO.

8. Remove the parking pawl assembly.
  1. Remove the parking pawl.
  2. Remove the parking pawl return spring.



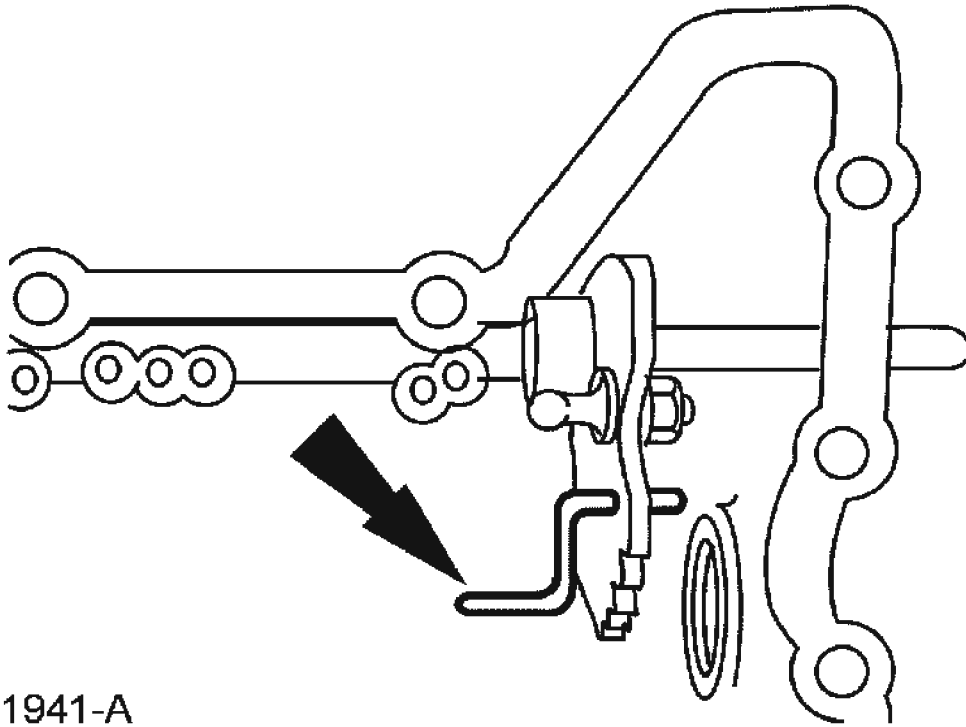
**Fig. 494: Removing Parking Pawl Assembly**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not damage the transaxle case bore during seal removal.



**Fig. 495: Removing Manual Control Lever Seal**  
Courtesy of FORD MOTOR CO.

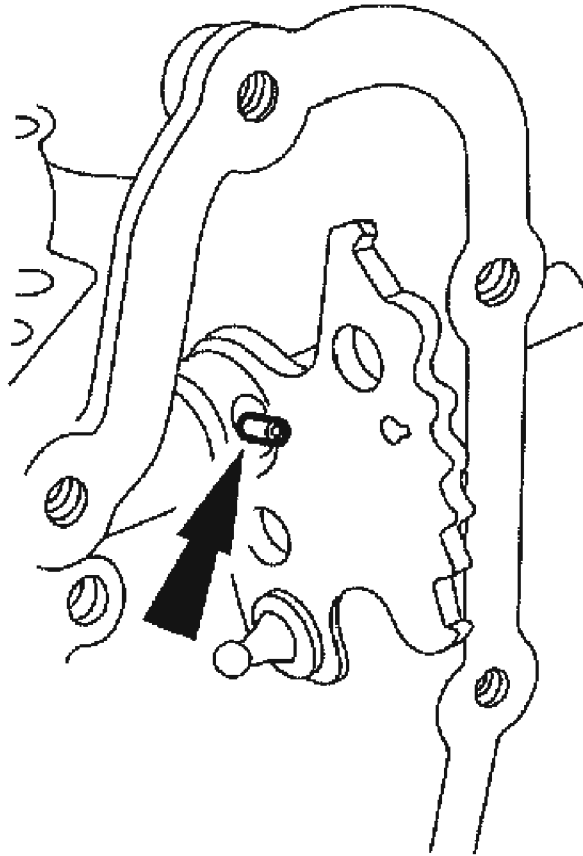
9. Remove and discard the manual control lever seal.
10. Remove the manual valve actuator rod (manual valve link).



GD1941-A

**Fig. 496: Removing Manual Valve Actuator Rod (Manual Valve Link)**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not damage the transaxle case sealing surface.



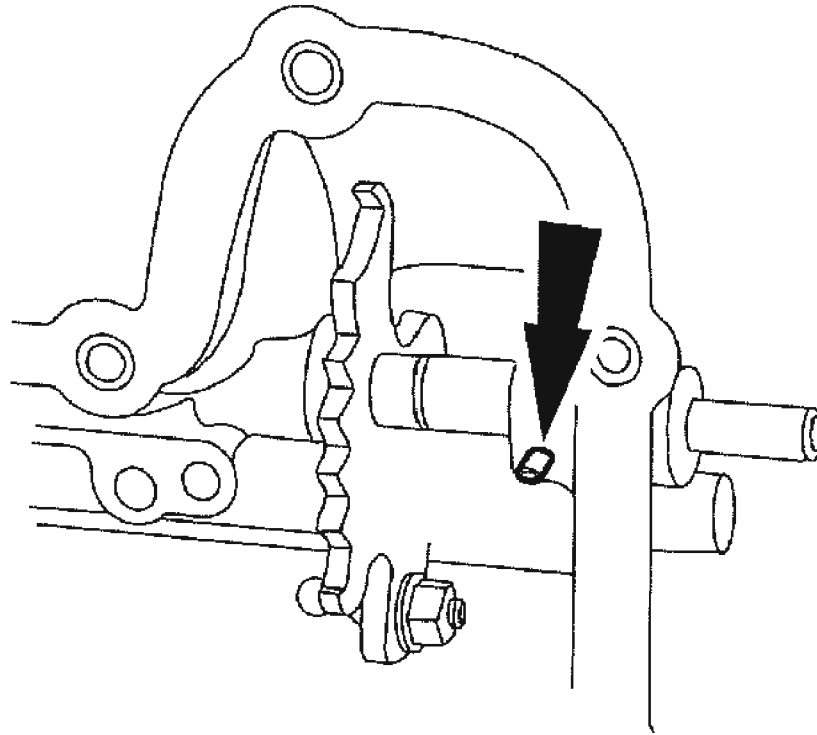
GD1957-A

**Fig. 497: Removing Manual Valve Detent Lever Shaft Retaining Pin**  
Courtesy of FORD MOTOR CO.

11. Remove and discard the manual valve detent lever shaft retaining pin.

**CAUTION:** Do not damage the transaxle case sealing surface.

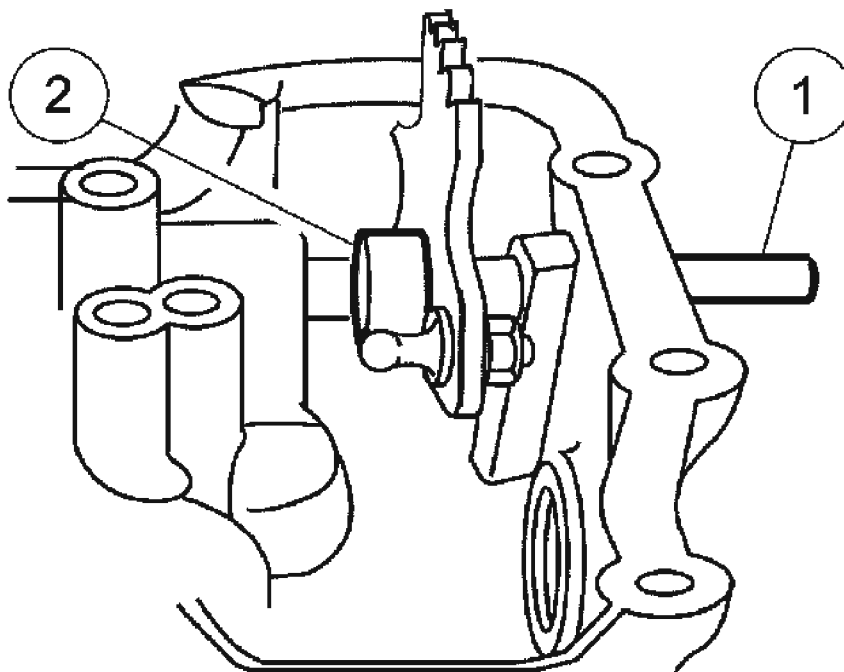
**NOTE:** There are 2 retaining pins, one on either side of the manual valve detent lever.



GD1956-A

**Fig. 498: Removing Manual Valve Detent Lever Shaft Retaining Pin**  
Courtesy of FORD MOTOR CO.

12. Remove the manual valve detent lever shaft retaining pin.
13. Remove the manual valve detent lever and shaft assembly.
  1. Pull the manual valve detent lever and manual valve detent lever shaft from the transaxle case.
  2. Lift the manual valve detent lever from the transaxle case.

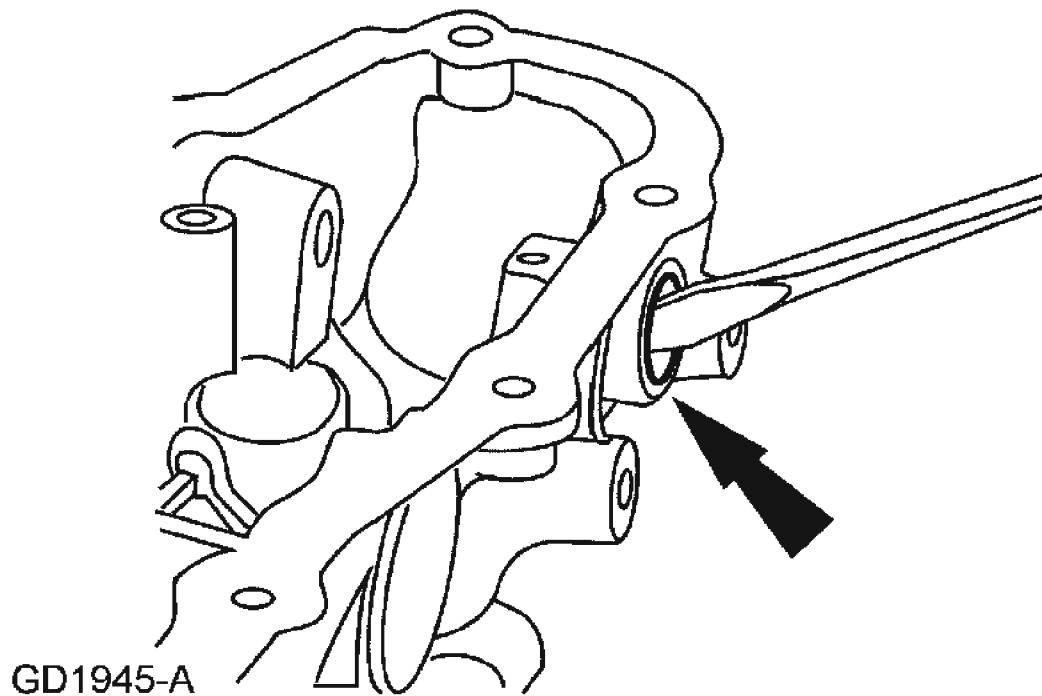


N0024494

**Fig. 499: Removing Manual Valve Detent Lever And Shaft Assembly**  
Courtesy of FORD MOTOR CO.

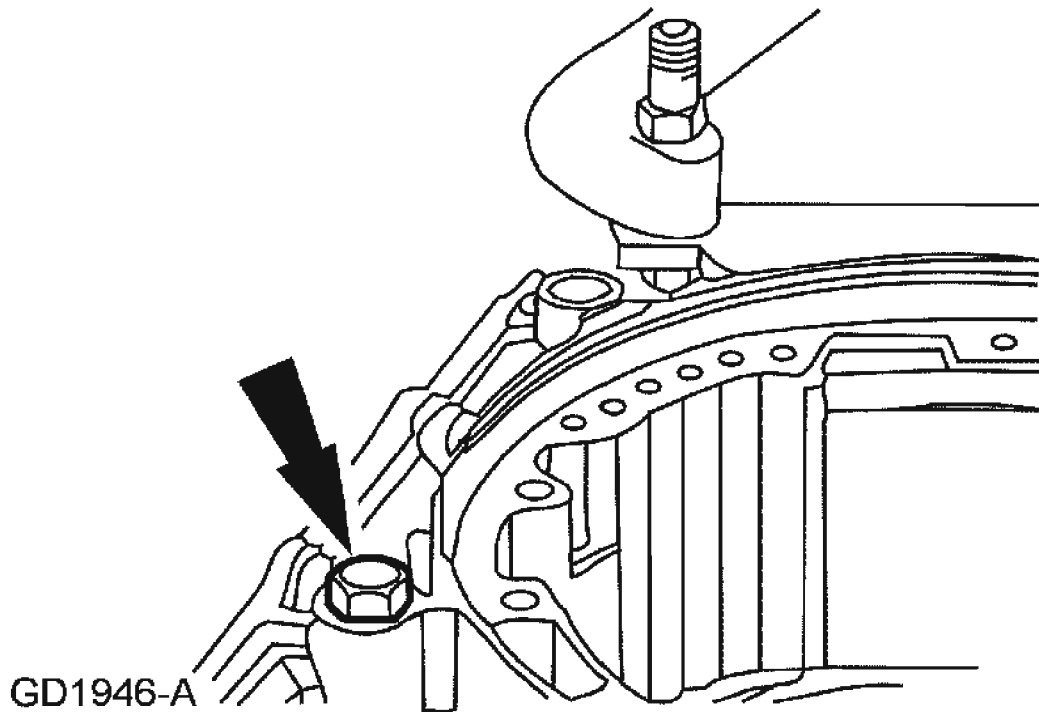
**CAUTION:** Do not damage the seal bore in the case during seal removal.





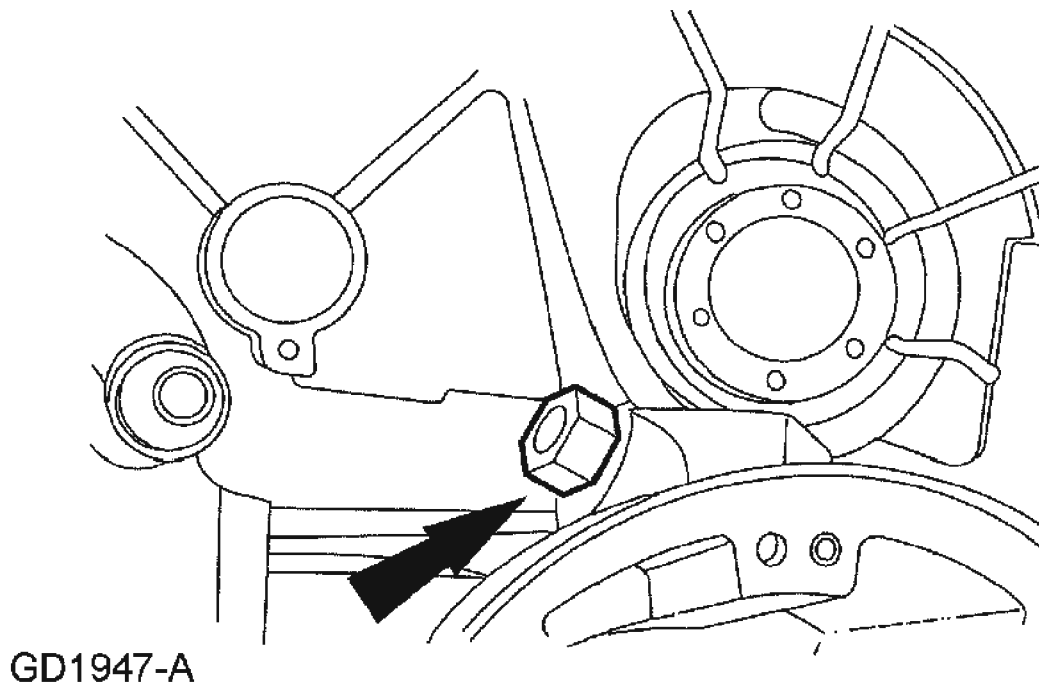
**Fig. 500: Removing Manual Control Seal**  
Courtesy of FORD MOTOR CO.

14. Remove and discard the manual control seal.
15. If a new case is being installed, remove the line pressure port plug.



**Fig. 501: Removing Line Pressure Port Plug**  
Courtesy of FORD MOTOR CO.

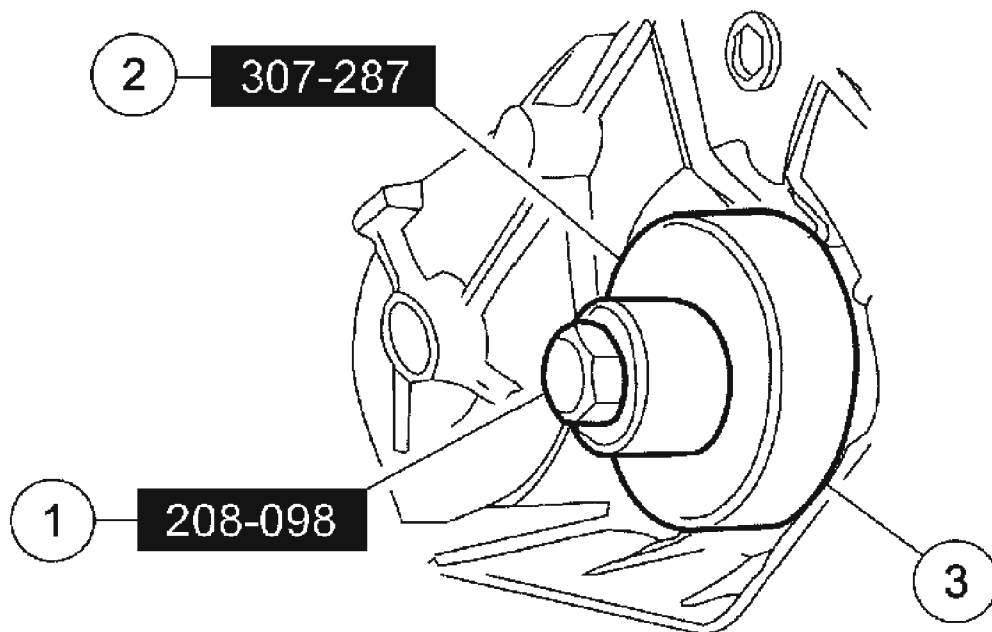
16. If a new case is being installed, remove and discard the cooler tube fitting.



**Fig. 502: Removing Cooler Tube Fitting**  
Courtesy of FORD MOTOR CO.

**NOTE:** The driven sprocket bearing No. 18 can only be installed new once. If the bearing has been installed new once before, a new transaxle case must be used.

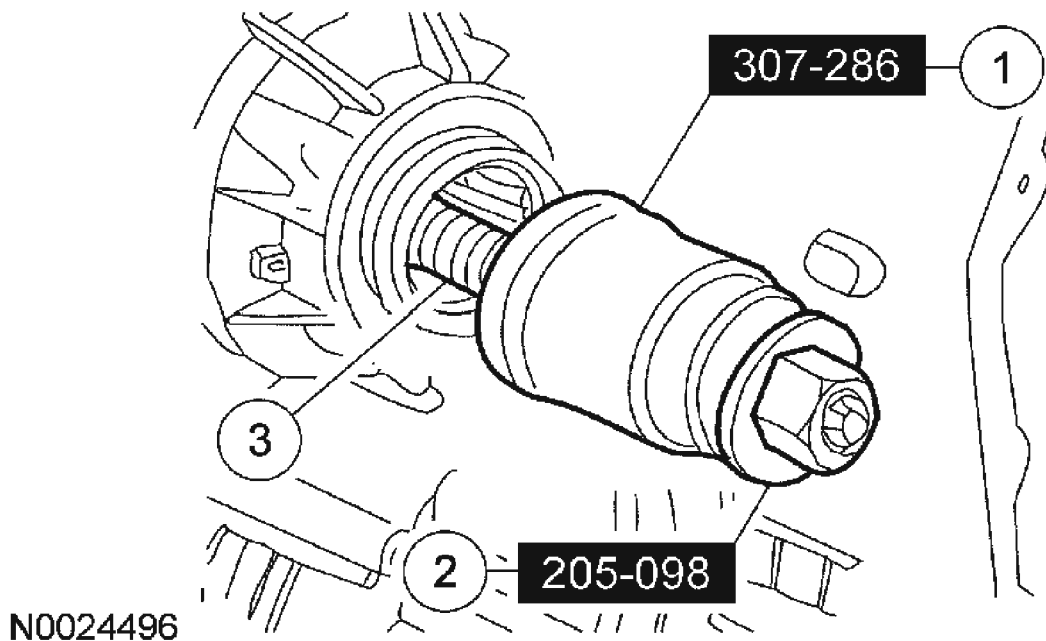
17. As necessary, remove the No. 18 driven sprocket bearing assembly from transaxle case.
  1. Install the special tool into the transaxle.
  2. Position the special tool.
  3. Remove the bearing.



N0024495

**Fig. 503: Installing Special Tool Into Transaxle**  
**Courtesy of FORD MOTOR CO.**

18. Using the special tools, remove the No. 18 driven sprocket bearing assembly.
  1. Position the special tool.
  2. Position the special tool.
  3. Remove the No. 18 driven sprocket bearing.



**Fig. 504: Removing No 18 Driven Sprocket Bearing Assembly**  
Courtesy of FORD MOTOR CO.

**WARNING:** In order to avoid injury, eye protection should be worn when cleaning components with compressed air. Failure to follow these instructions can result in personal injury.

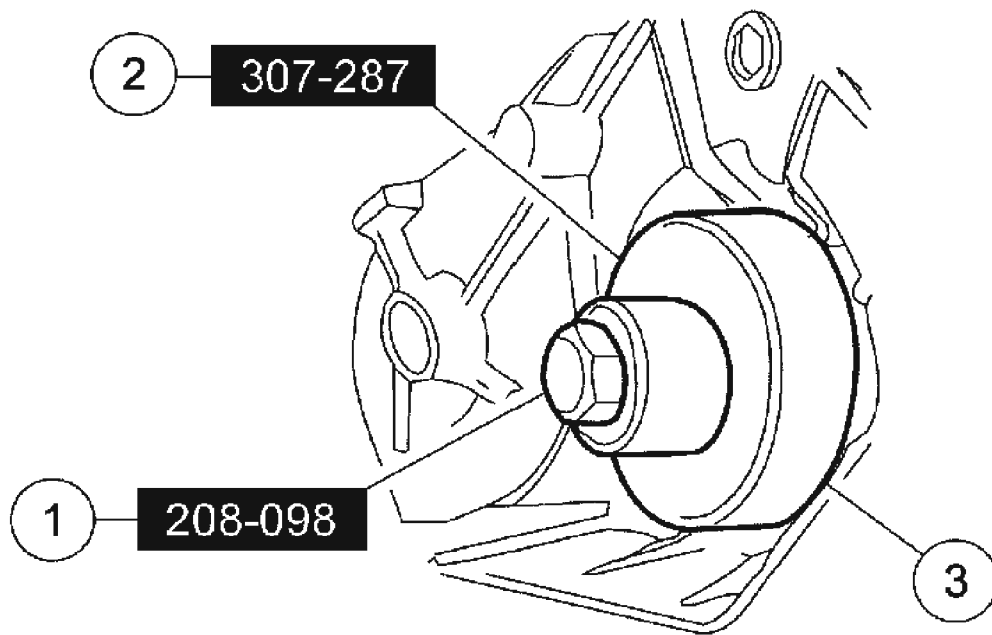
19. Clean all components with a suitable solvent and use moisture-free compressed air to dry all parts and clean fluid passages. Check the following before assembling:
  - Final drive lubrication tube for damage
  - Manual control linkage for damage or wear
  - Case mating surfaces for nicks or deformation
  - Bearing wear
  - Support area wear

#### Assembly

**NOTE:** The driven sprocket bearing No. 18 can only be installed new once. If the bearing has been installed new once before, a new transaxle case must be used.

1. As necessary, install the No. 18 driven sprocket bearing into the transaxle case.

1. Position the special tool.
2. Position the special tool.
3. Install new bearing.



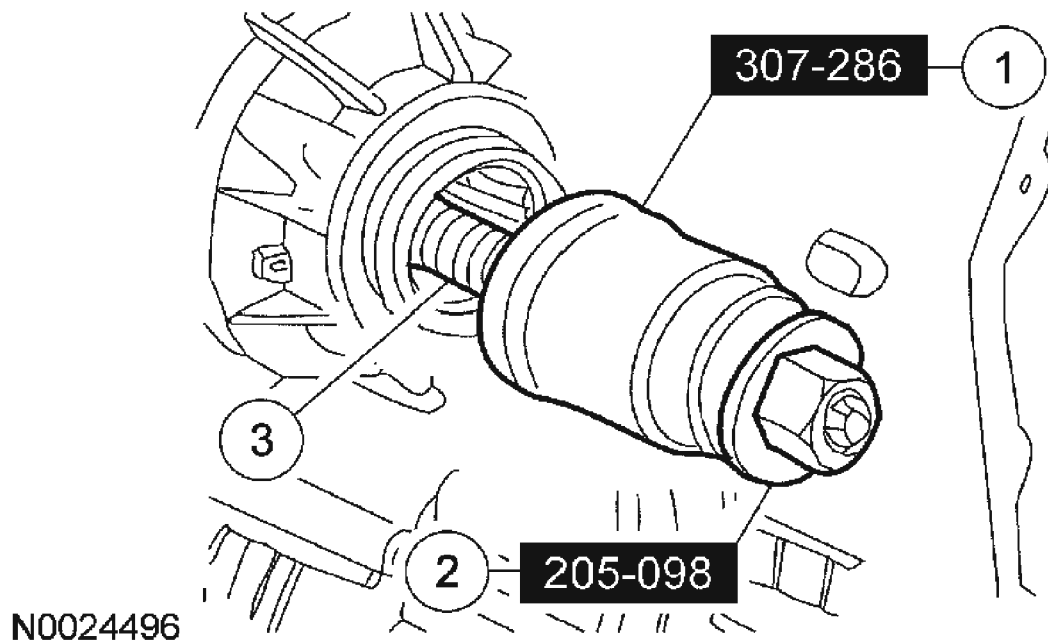
N0024495

**Fig. 505: Installing No 18 Driven Sprocket Bearing Into Transaxle Case**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not lubricate the outer surface of the No. 18 driven sprocket bearing assembly.

**NOTE:** The No. 18 driven sprocket bearing must be installed with the lettering on the needle bearing surface facing toward the needle bearing replacer.

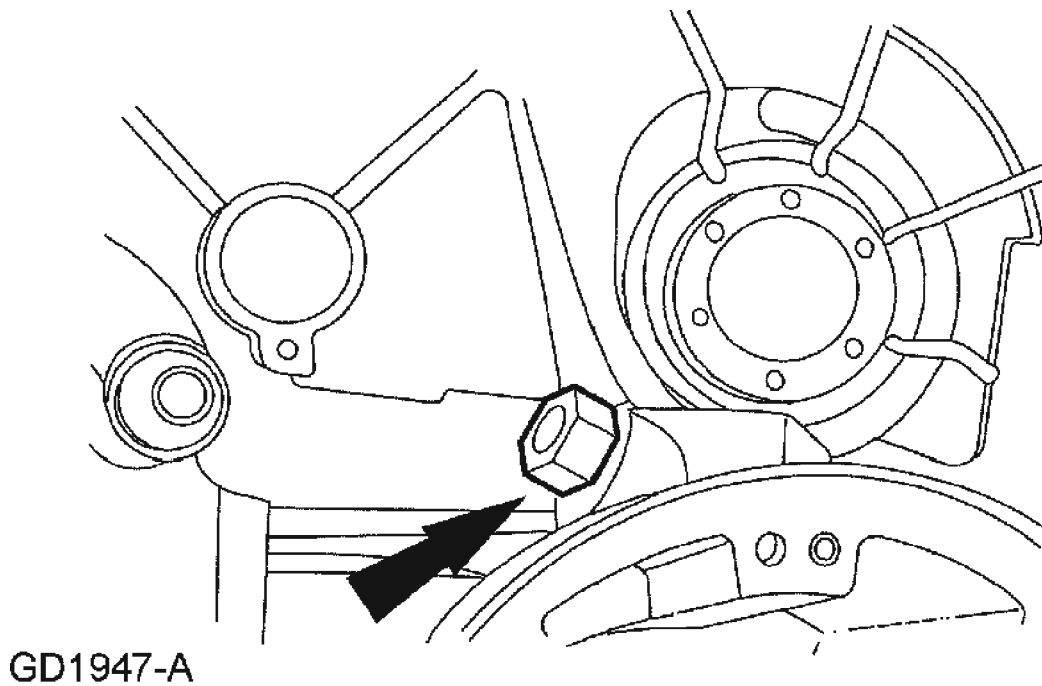
2. Using the special tools, install the No. 18 driven sprocket bearing assembly by pressing it into the transaxle case.
  1. Install the bearing on the special tool.
  2. Position the special tool.
  3. Install the No. 18 driven sprocket bearing.



**Fig. 506: Installing No 18 Driven Sprocket Bearing Assembly By Pressing It Into Transaxle Case**

**Courtesy of FORD MOTOR CO.**

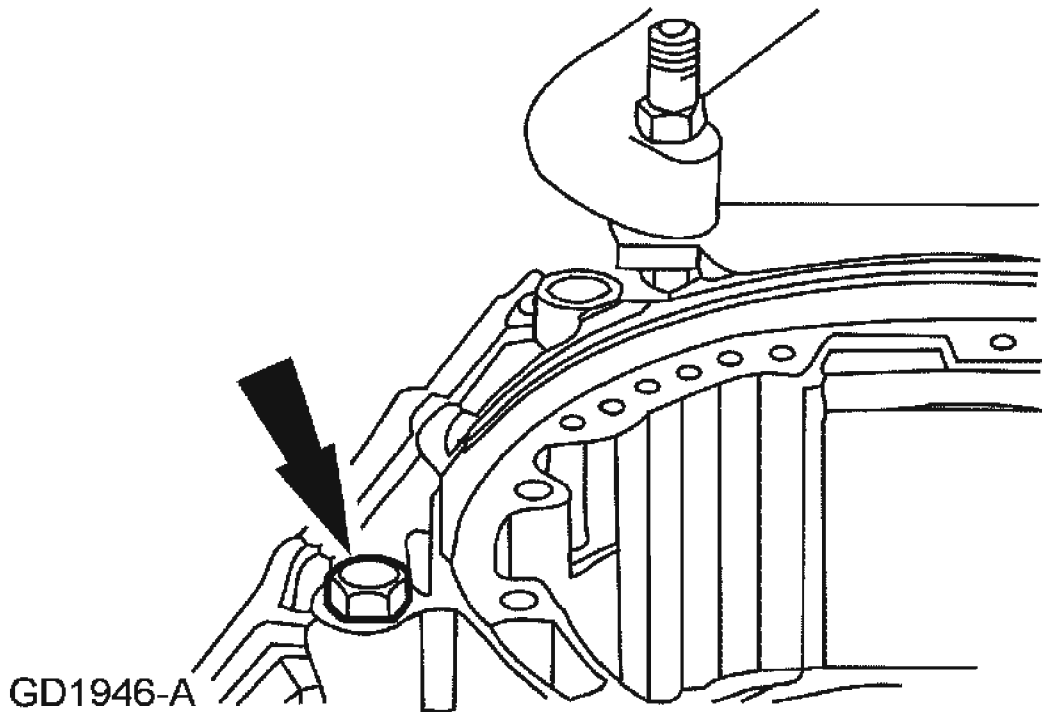
3. Install the cooler tube fitting.
  - Tighten to 40 Nm (30 lb-ft).



**Fig. 507: Installing Cooler Tube Fitting**  
Courtesy of FORD MOTOR CO.

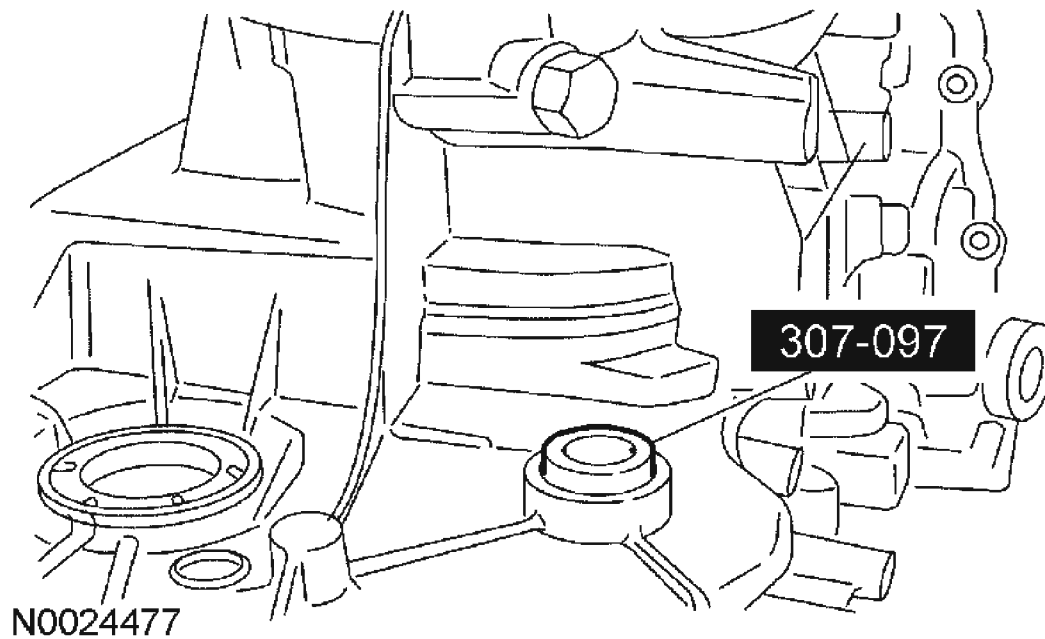
4. Install the line pressure port plug.
  - Tighten to 24 Nm (18 lb-ft).





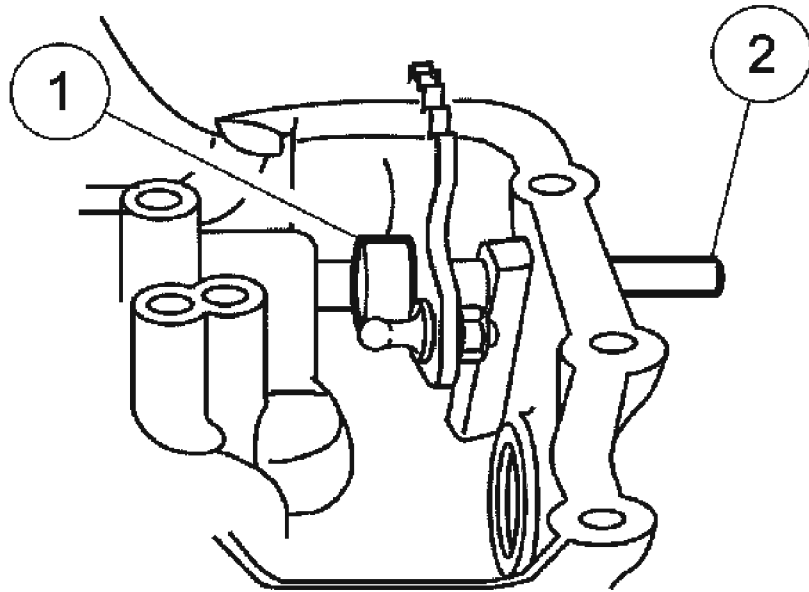
**Fig. 508: Installing Line Pressure Port Plug**  
Courtesy of FORD MOTOR CO.

5. Using the special tool, install a new manual control seal.



**Fig. 509: Installing Manual Control Seal**  
Courtesy of FORD MOTOR CO.

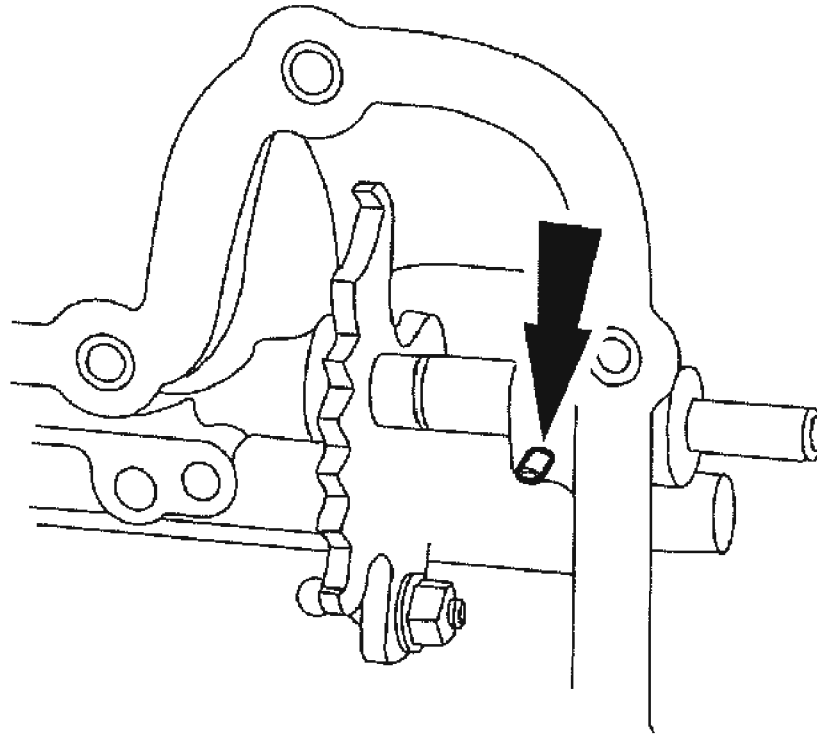
6. Install the manual valve detent lever assembly and the manual valve detent lever shaft assembly.
  1. Position the manual valve detent lever into the transaxle case.
  2. Install the manual valve detent lever shaft into the transaxle case and lever.



N0024543

**Fig. 510: Installing Manual Valve Detent Lever Assembly And Manual Valve Detent Lever Shaft Assembly**  
Courtesy of FORD MOTOR CO.

7. Install a new manual shaft retaining pin.

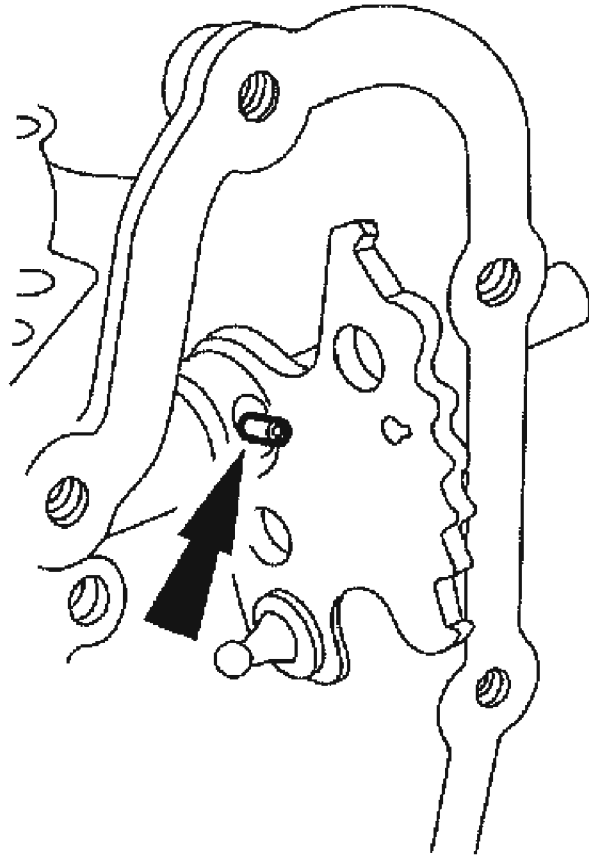


GD1956-A

**Fig. 511: Installing Manual Shaft Retaining Pin**  
Courtesy of FORD MOTOR CO.

**CAUTION: Do not allow the manual shaft retaining pin to contact the transaxle case.**

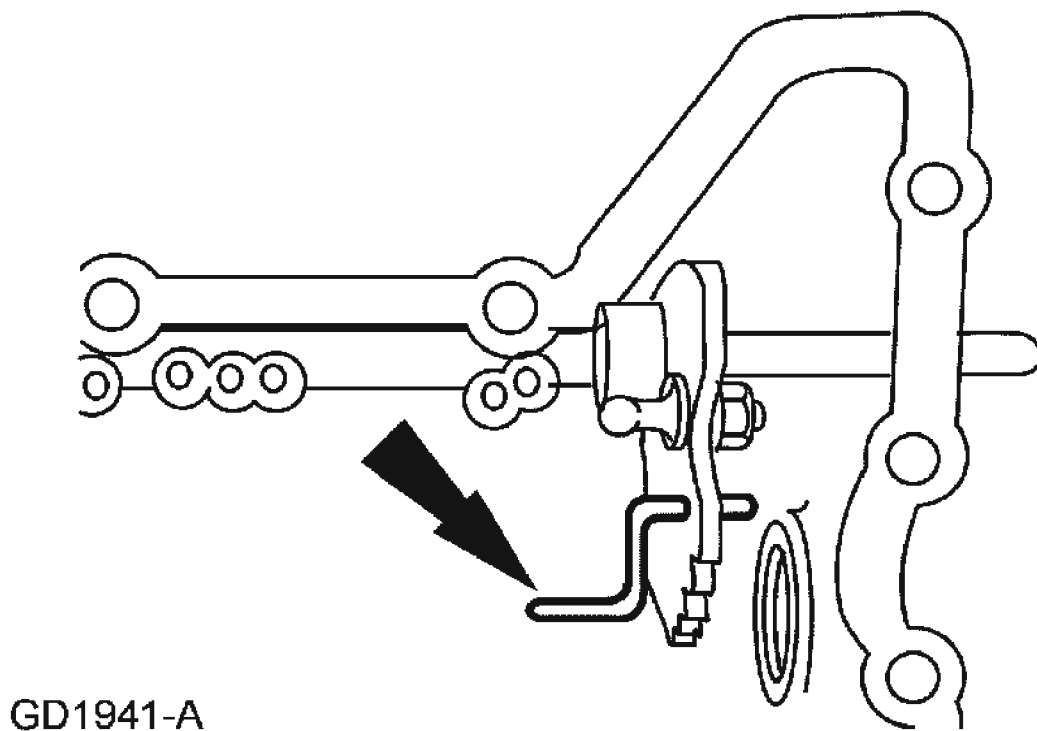
8. Install a new manual valve detent lever shaft retaining pin.
  - Verify that the manual valve detent lever shaft rotates without binding.



GD1957-A

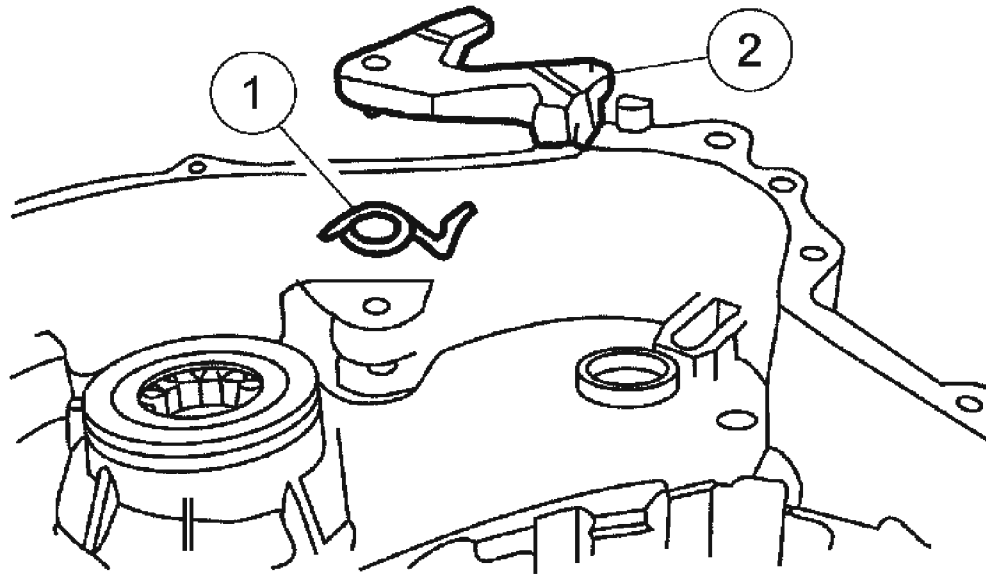
**Fig. 512: Installing Manual Valve Detent Lever Shaft Retaining Pin**  
Courtesy of FORD MOTOR CO.

9. Install the manual valve actuator rod (manual valve link).



**Fig. 513: Installing Manual Valve Actuator Rod (Manual Valve Link)**  
Courtesy of FORD MOTOR CO.

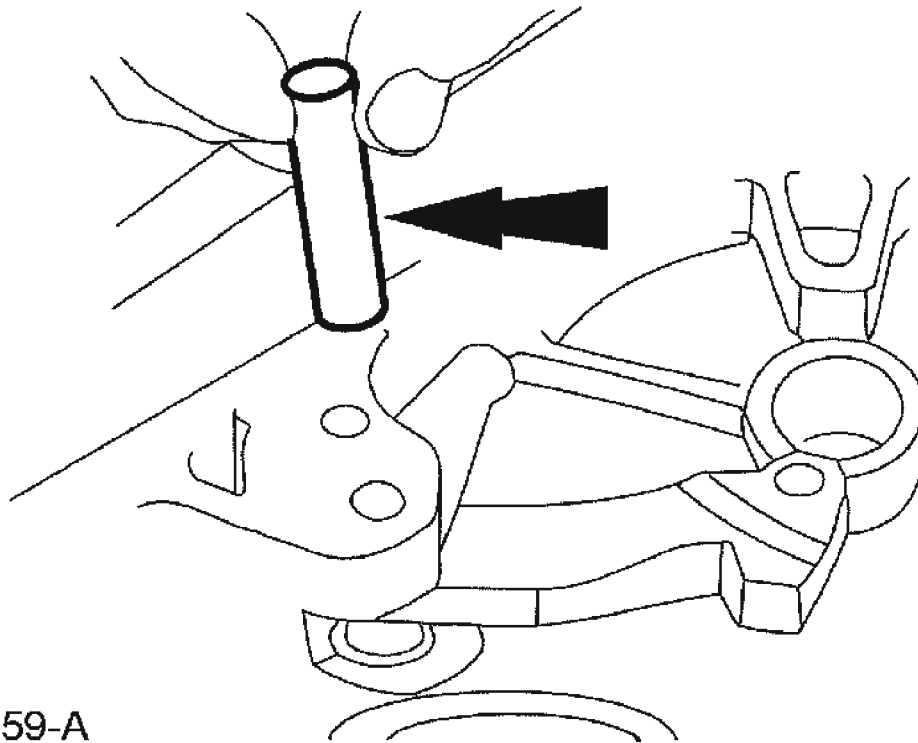
10. Install the parking pawl assembly.
  1. Install the parking pawl return spring.
  2. Install the parking pawl.



N0024544

**Fig. 514: Installing Parking Pawl Assembly**  
Courtesy of FORD MOTOR CO.

11. Install the parking pawl shaft.

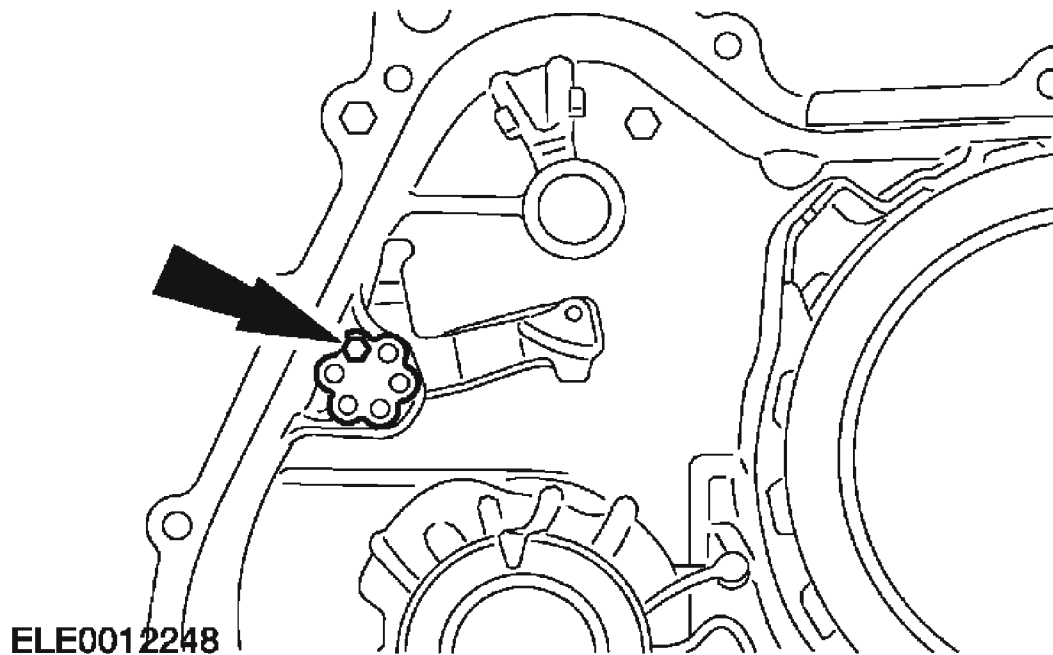


GD1959-A

**Fig. 515: Installing Parking Pawl Shaft**  
Courtesy of FORD MOTOR CO.

12. Install the parking pawl shaft retainer and bolt.
  - Tighten to 8 Nm (71 lb-in).

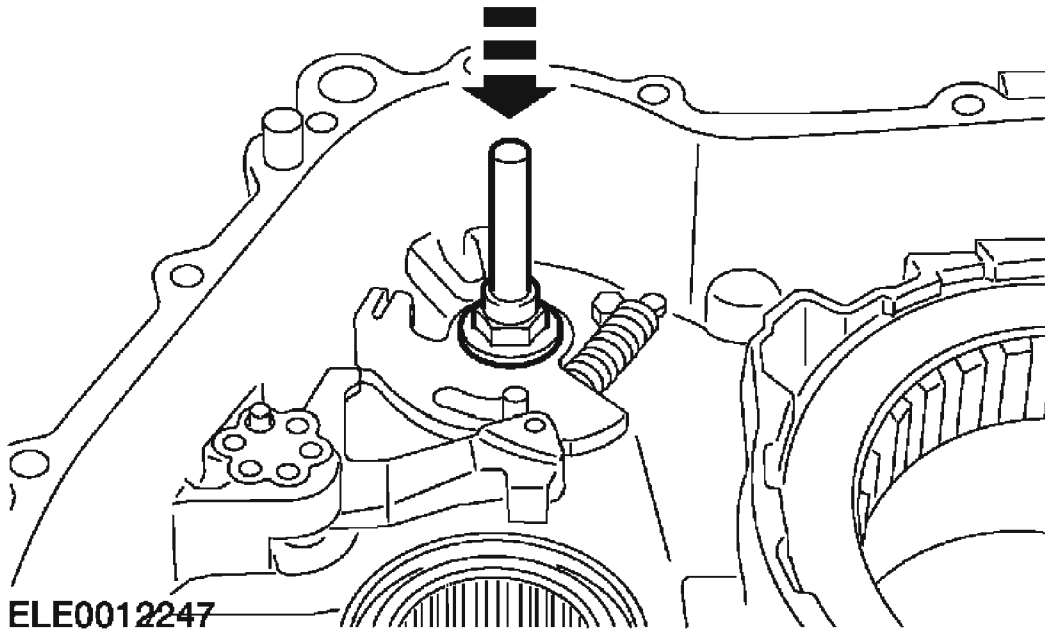




**Fig. 516: Installing Parking Pawl Shaft Retainer And Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** Lubricate the manual control lever inner shaft prior to installation.

13. Install the manual control lever shaft assembly.
  - Tighten to 74 Nm (55 lb-ft).

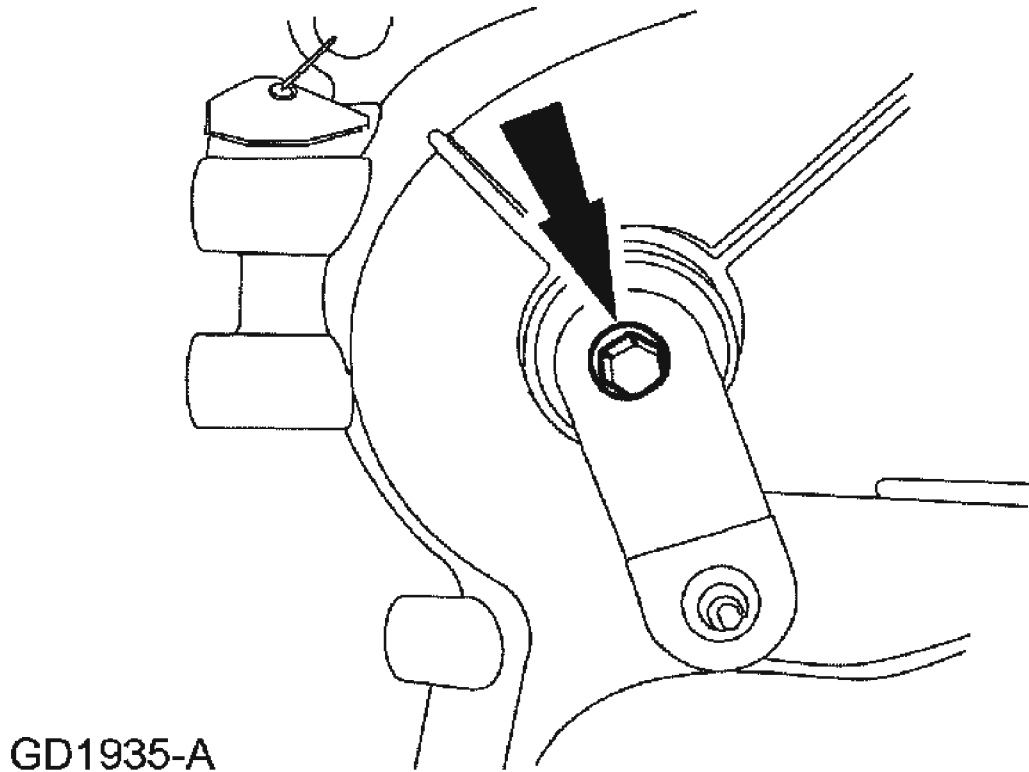


**Fig. 517: Installing Manual Control Lever Shaft Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Verify that the actuating cam rotates freely.

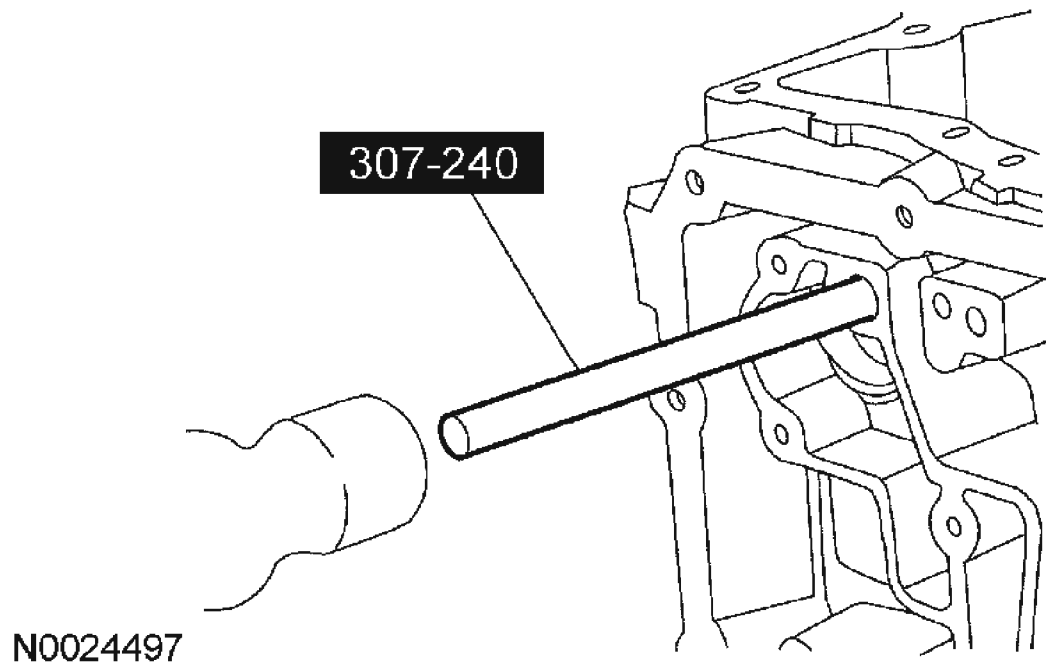
14. Install the parking pawl ratchet spring.

**NOTE:** Hand-tighten the manual control lever bolt; it will be tightened after linkage adjustment.



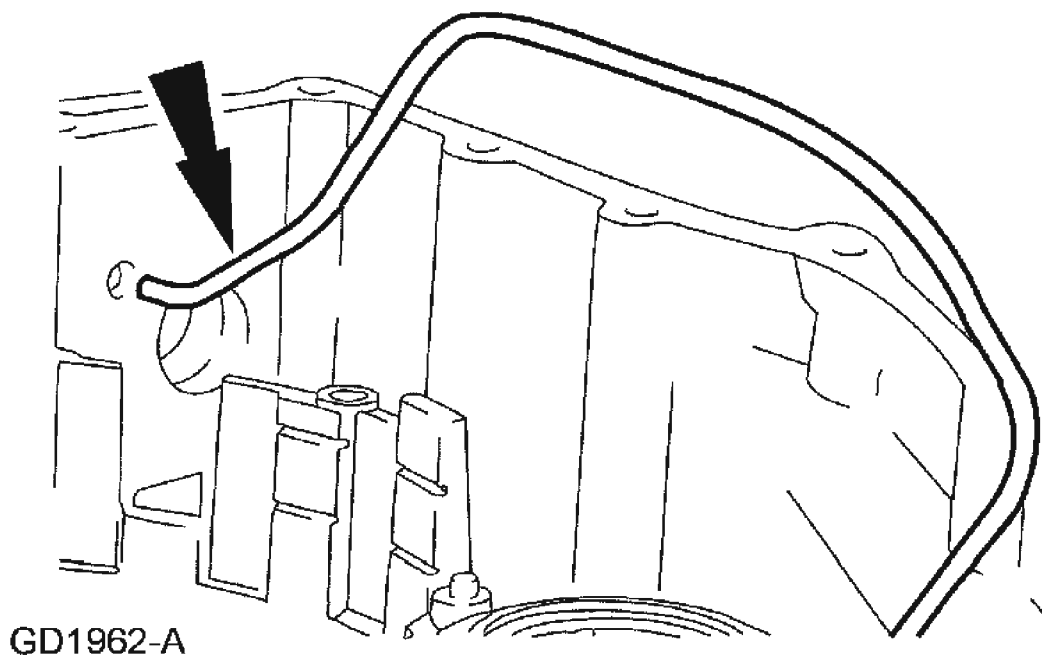
**Fig. 518: Installing Manual Control Lever Outer Assembly And Bolt**  
Courtesy of FORD MOTOR CO.

15. Install the manual control lever outer assembly and bolt.
16. Using the special tool, install a new final drive lube tube seal.



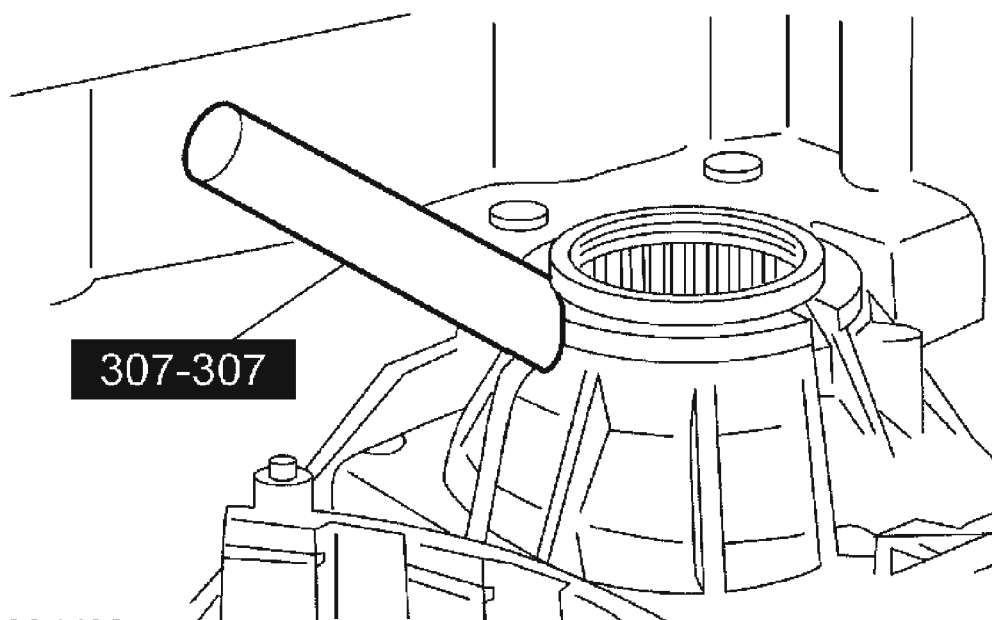
**Fig. 519: Installing Final Drive Lube Tube Seal**  
**Courtesy of FORD MOTOR CO.**

17. Install the final drive lube tube into the seal.



**Fig. 520: Installing Final Drive Lube Tube Into Seal**  
Courtesy of FORD MOTOR CO.

18. Using the special tool, install the final drive lube tube into the case.

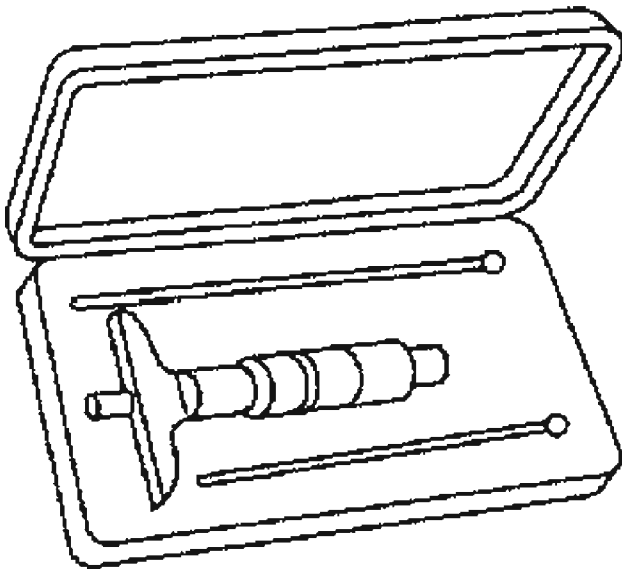


**Fig. 521: Installing Final Drive Lube Tube Into Case**  
 Courtesy of FORD MOTOR CO.

**PUMP ASSEMBLY**

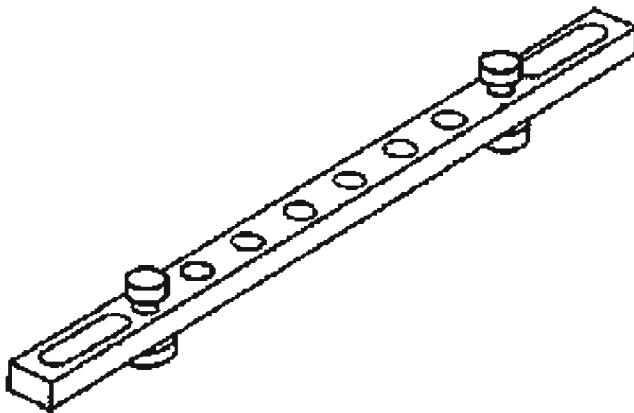
Special Tool(s)

**SPECIAL TOOLS DESCRIPTION**



**ST1274-A**

Depth Micrometer 303-D026 (D80P-4201-A)

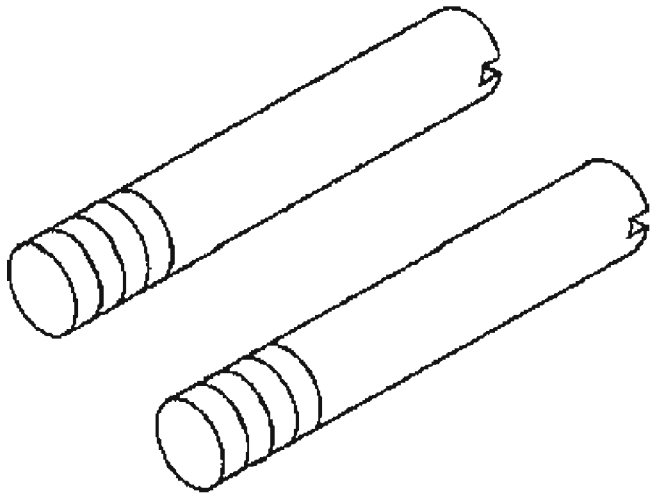


**ST1954-A**

Shim Selection Gauge 307-300  
 (T94P-77000-Q)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST1953-A**

Alignment Pins, Transmission Main  
Control Body 307-127 (T94P-77000-  
P)

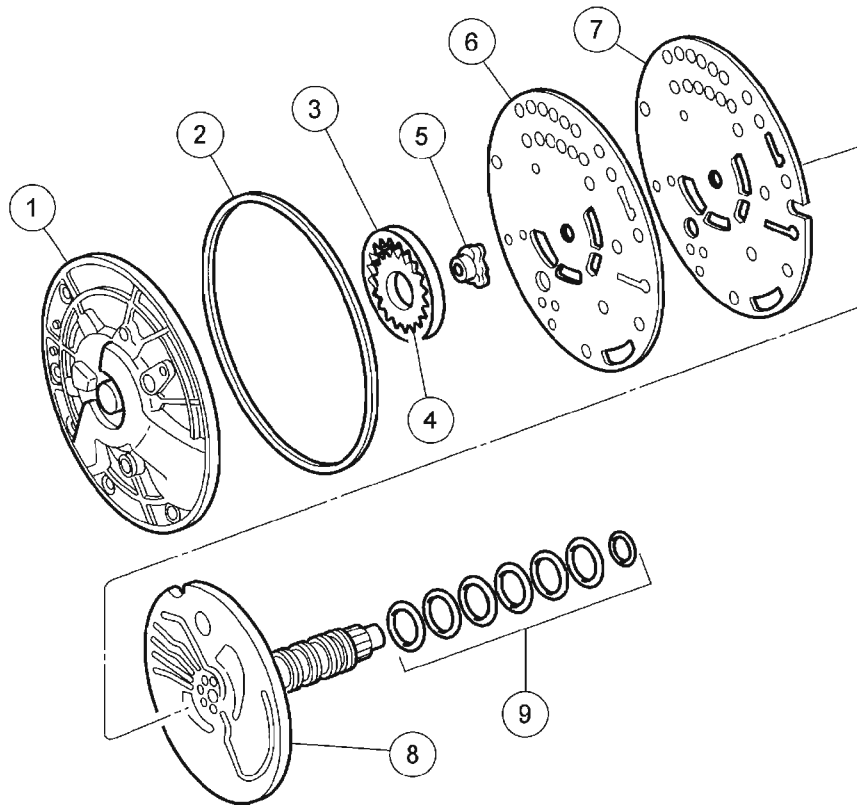
### Material

### MATERIAL SPECIFICATION CHART

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



N0024499

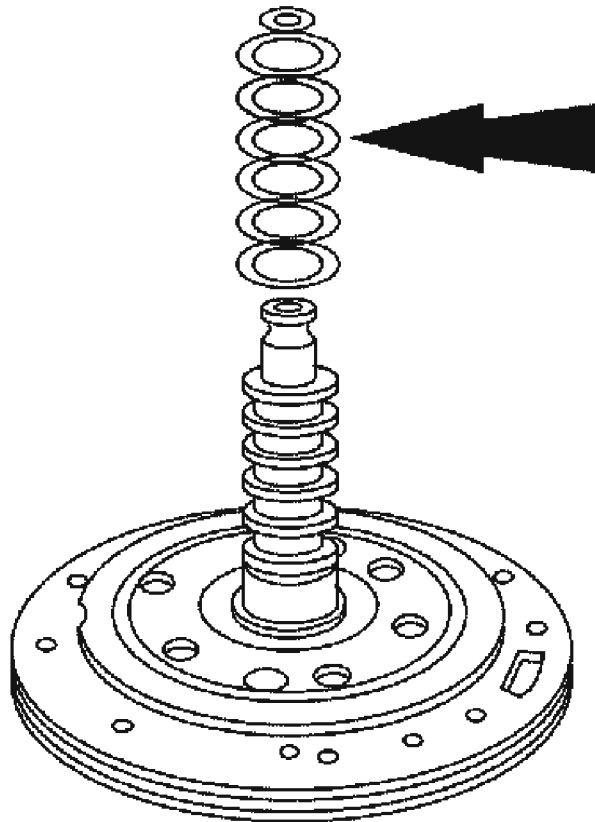
Item	Part Number	Description
1	7F370	Pump body — front
2	7A248	O-ring — pump seal
3	7C011	Driven gear — pump
4	7C009	Drive gear — pump
5	7F402	Drive gear insert — pump
6	7A142-AA	Separator plate — pump body
7	7G331-AA	Separator plate gasket — pump body
8	7A108	Pump support — front
9	—	Pump seals — front

**Fig. 522: Identifying Pump Assembly Components**  
Courtesy of FORD MOTOR CO.

### Disassembly

1. Remove and discard the 7 pump support seal rings from the pump support.

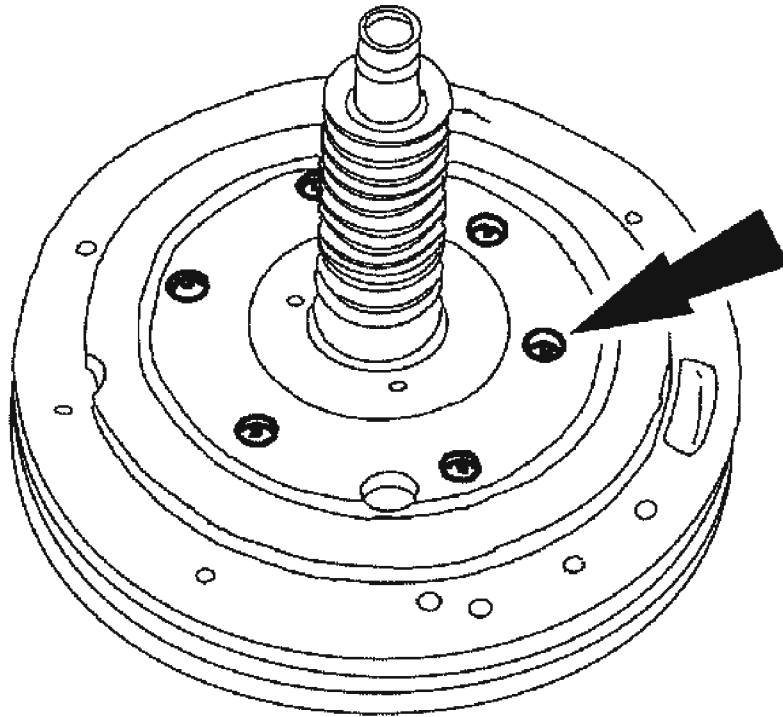




GD2856-A

**Fig. 523: Removing Pump Support Seal Rings From Pump Support**  
Courtesy of FORD MOTOR CO.

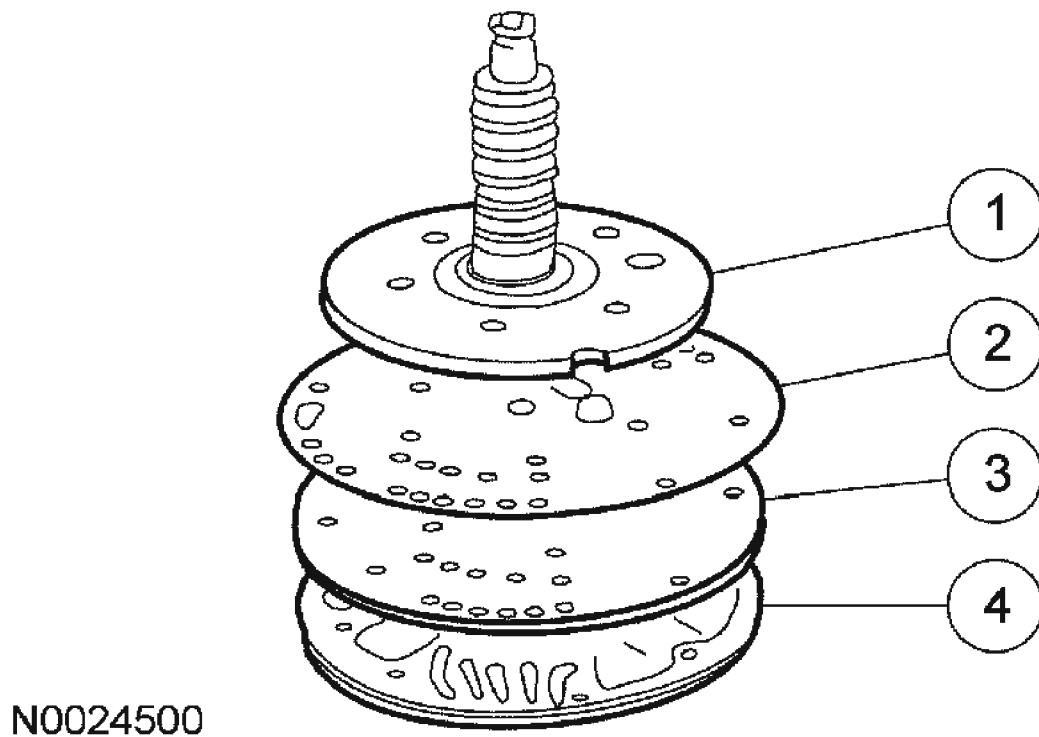
2. Remove the 6 pump support bolts.



GD2857-A

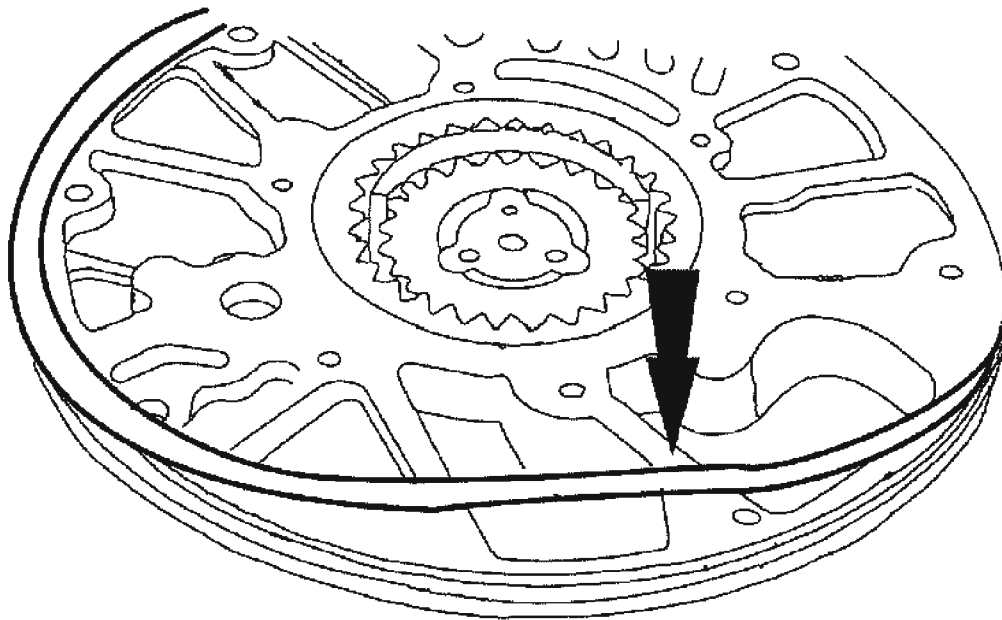
**Fig. 524: Removing Pump Support Bolts**  
Courtesy of FORD MOTOR CO.

3. Separate the pump support and body assembly.
  1. Remove the pump support.
  2. Remove the pump body separator plate gasket.
  3. Remove the pump body separator plate.
  4. Remove the pump body.



**Fig. 525: Separating Pump Support And Body Assembly**  
Courtesy of FORD MOTOR CO.

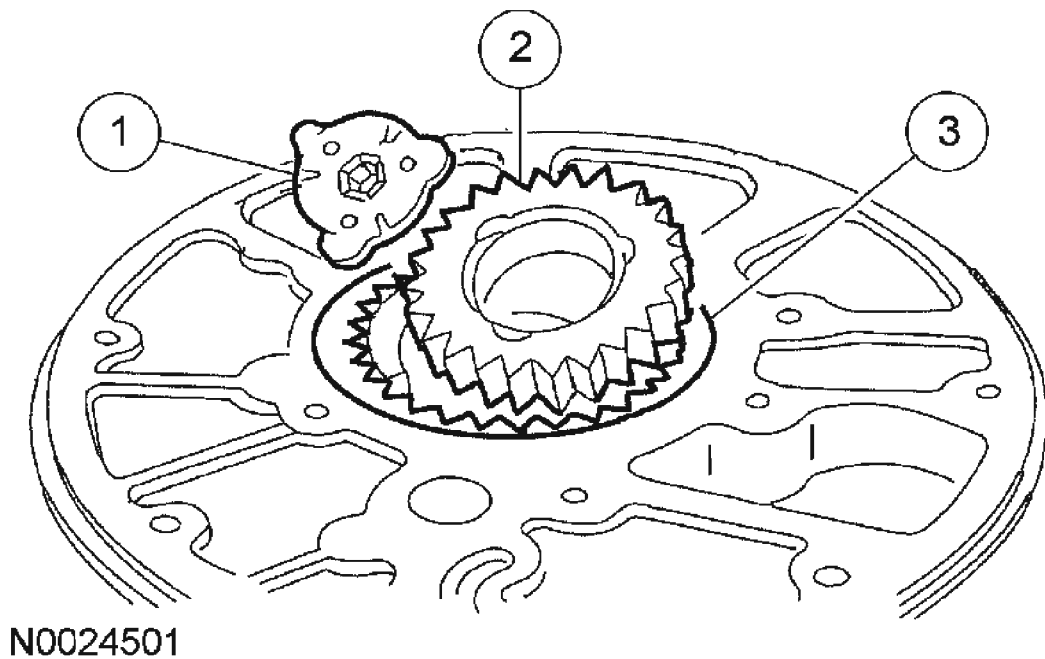
4. Remove and discard the pump seal.



GD2859-A

**Fig. 526: Removing Pump Seal**  
Courtesy of FORD MOTOR CO.

5. Remove the pump drive gear assembly.
  1. Remove the pump drive gear insert.
  2. Remove the pump drive gear.
  3. Remove the pump driven gear.



**Fig. 527: Removing Pump Drive Gear Assembly**  
Courtesy of FORD MOTOR CO.

**WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air. Failure to follow these instructions can result in personal injury.

6. Clean all parts thoroughly in clean solvent and blow dry with moisture-free regulated compressed air.
7. Inspect the pump body and gears for damage and wear.
  - Driven gear teeth
  - Drive gear teeth
  - Gear bore
  - Crescent
  - Lubrication passages and holes
8. Inspect the pump support apply circuit passages and lubrication passages.
  1. Rear lube (from cooler TC circuit)
  2. Reverse clutch (RC)
  3. Direct clutch (DC)
  4. Forward clutch (FC)
  5. Coast clutch (CC)

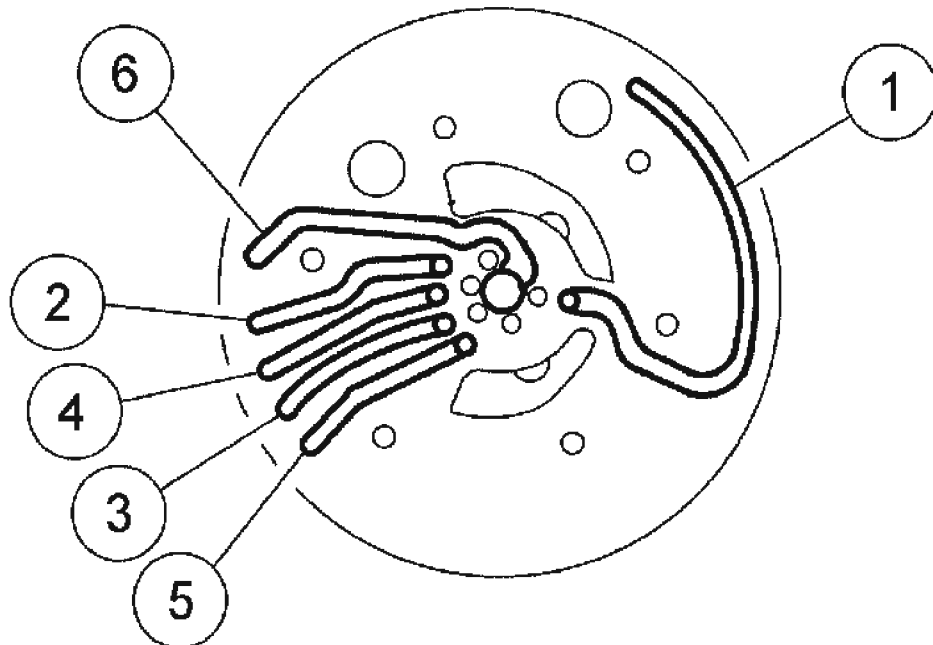
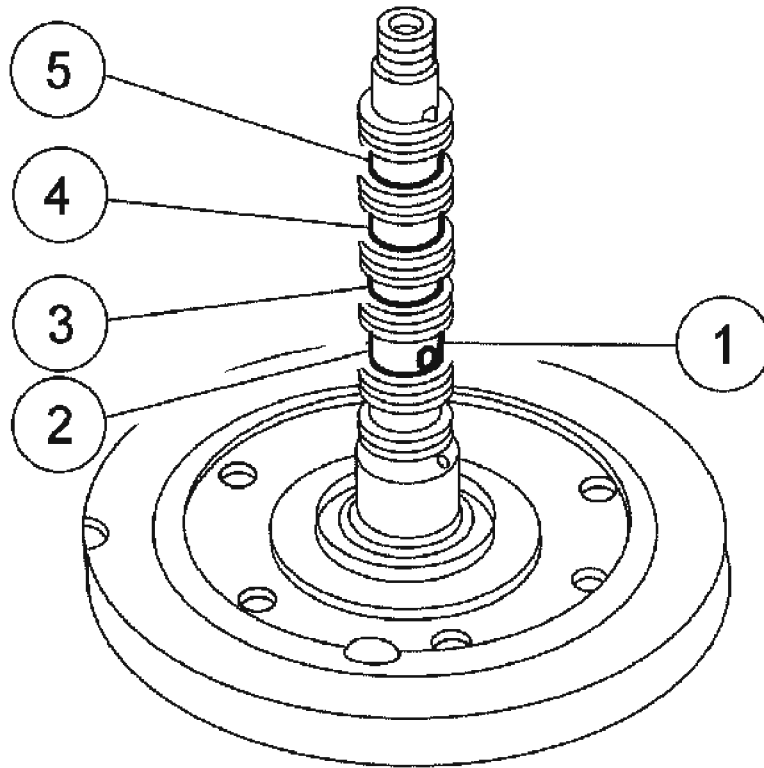
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner

### 6. Converter clutch bypass (CBY)

## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



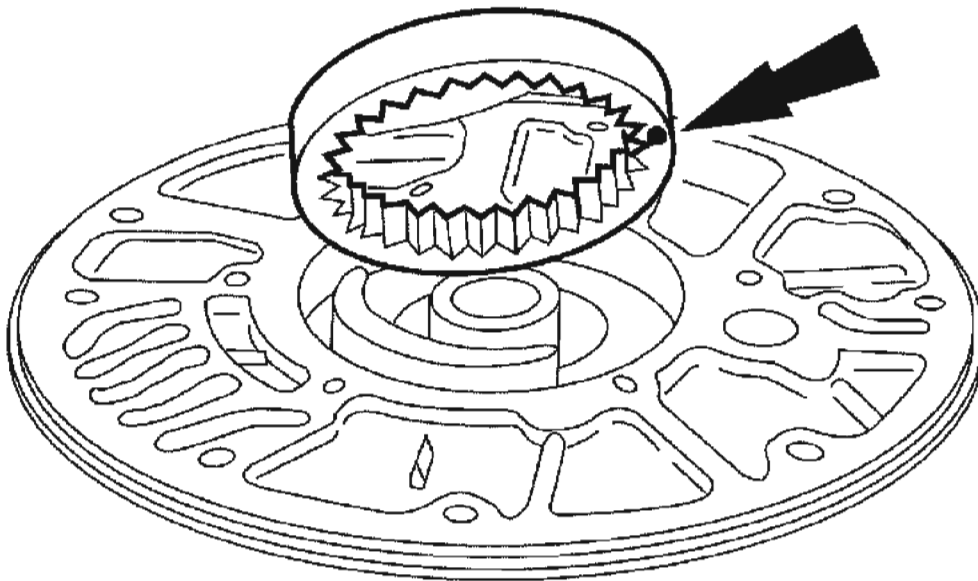
N0024502

**Fig. 528: Inspecting Pump Support Apply Circuit Passages And Lubrication Passages**

Courtesy of FORD MOTOR CO.

Assembly

**NOTE:** The identification dot on the pump driven gear must face downward.



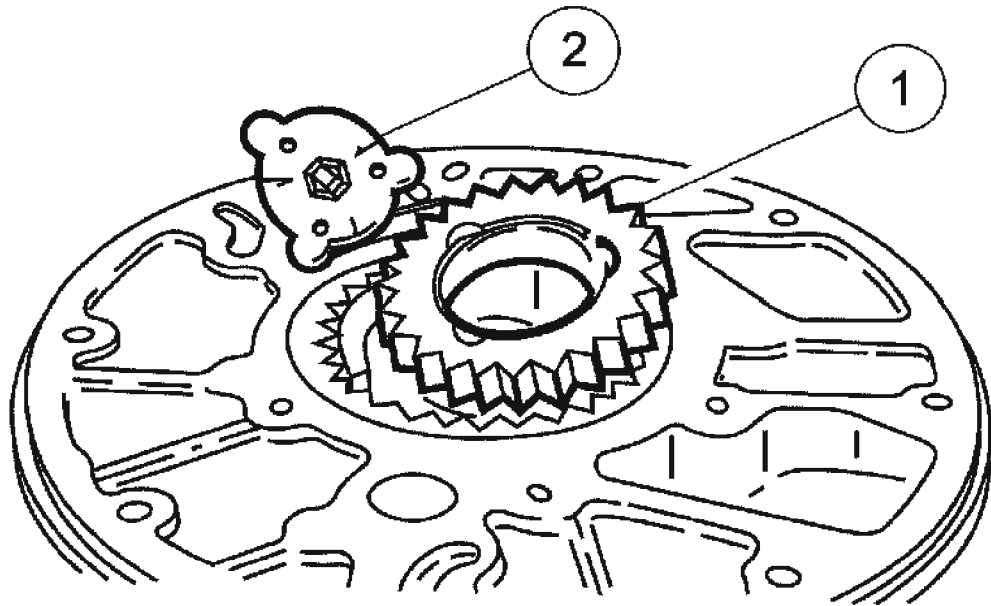
ELV9410158

**Fig. 529: Installing Pump Driven Gear**

Courtesy of FORD MOTOR CO.

1. Install the pump driven gear.
2. Install the pump drive gear assembly.
  1. Install the pump drive gear.
  2. Install the pump drive gear insert.

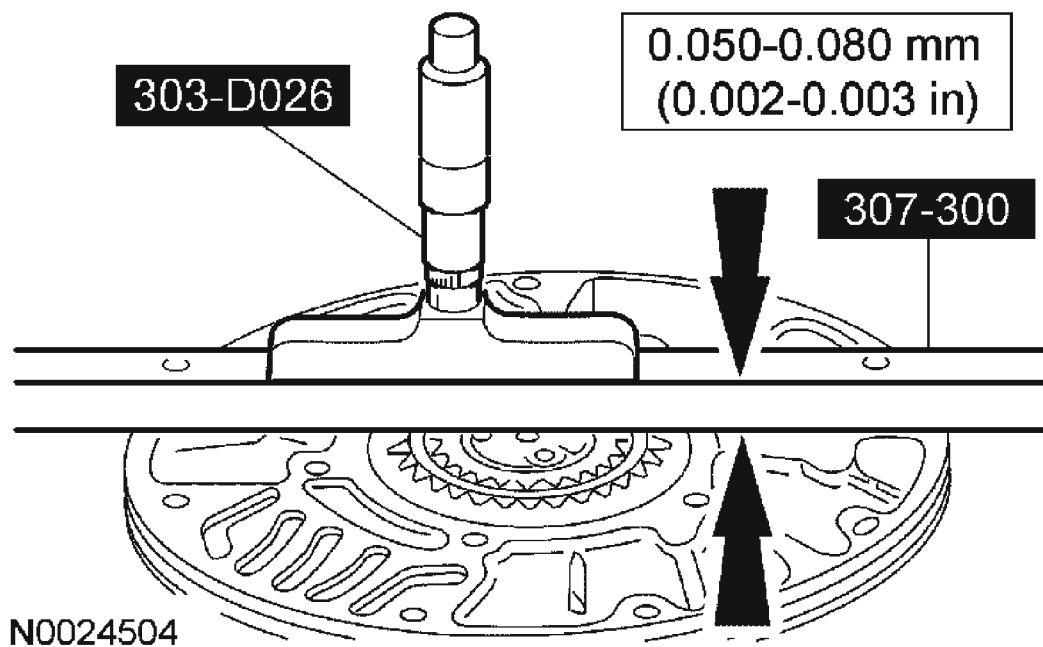




N0024503

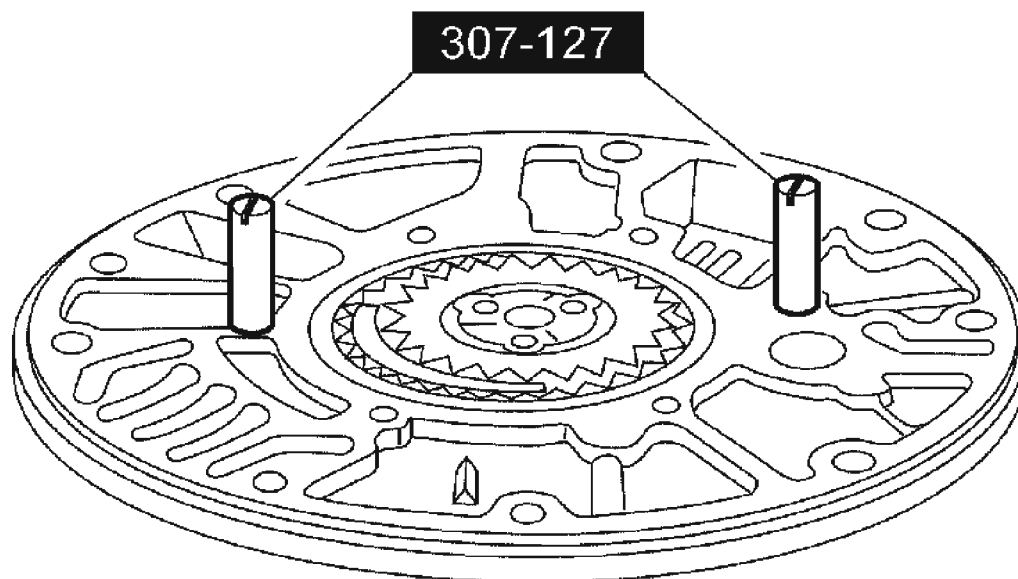
**Fig. 530: Installing Pump Drive Gear Assembly**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, measure the clearance between each gear and the pump body face.
  - If the clearance exceeds specification, install a new pump assembly.



**Fig. 531: Measuring Clearance Between Each Gear And Pump Body Face**  
Courtesy of FORD MOTOR CO.

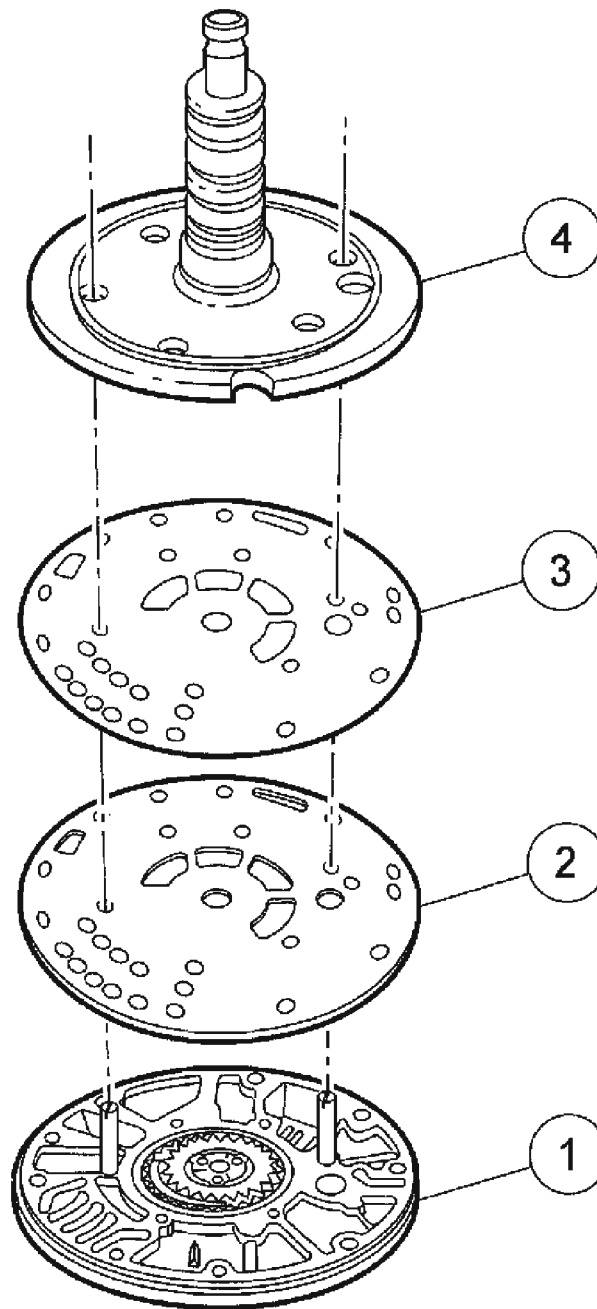
4. Install the special tool.



N0024505

**Fig. 532: Installing Special Tool**  
**Courtesy of FORD MOTOR CO.**

5. Align the pump support assembly. Fill the pump gear cavity with clean automatic transmission fluid to the top of the gears. Align the pump guide screws.
  1. Install the pump body.
  2. Install the pump body separator plate.
  3. Install the pump body separator plate gasket onto the pump body.
  4. Install the pump support.



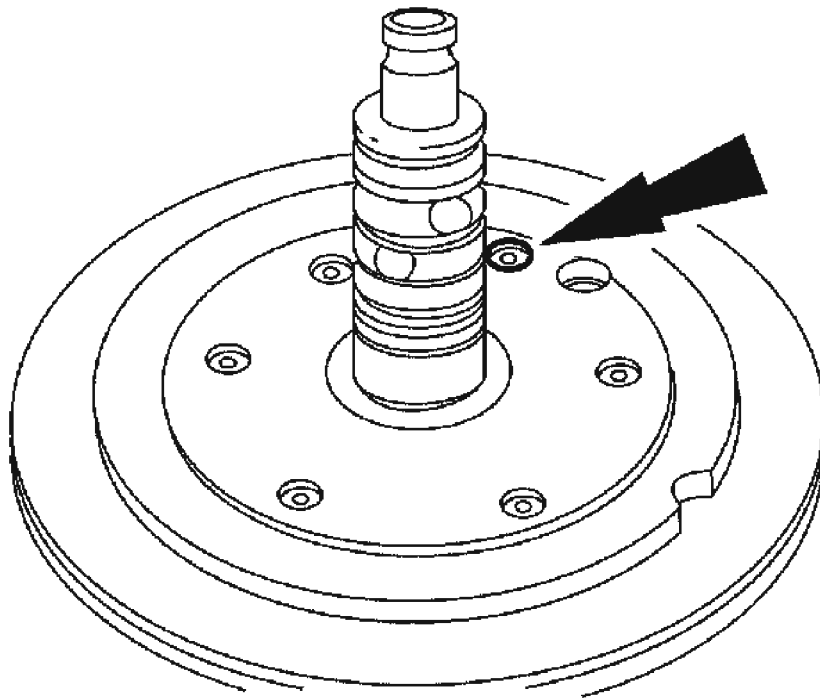
N0024506

**Fig. 533: Installing Pump Support**  
Courtesy of FORD MOTOR CO.

**NOTE:** Install the 4 pump support bolts in the pump support holes, and remove the special tool. Then install the last 2 bolts.

6. Install the 6 pump support bolts.

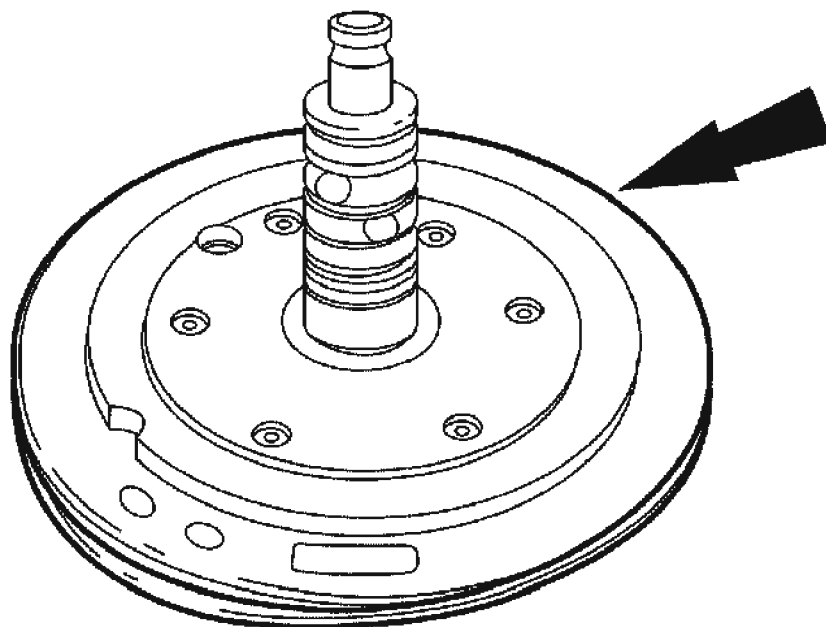
- Tighten to 13 Nm (10 lb-ft).



A0100324

**Fig. 534: Installing Pump Support Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the white stripe on the pump seal is visible around the pump body circumference.

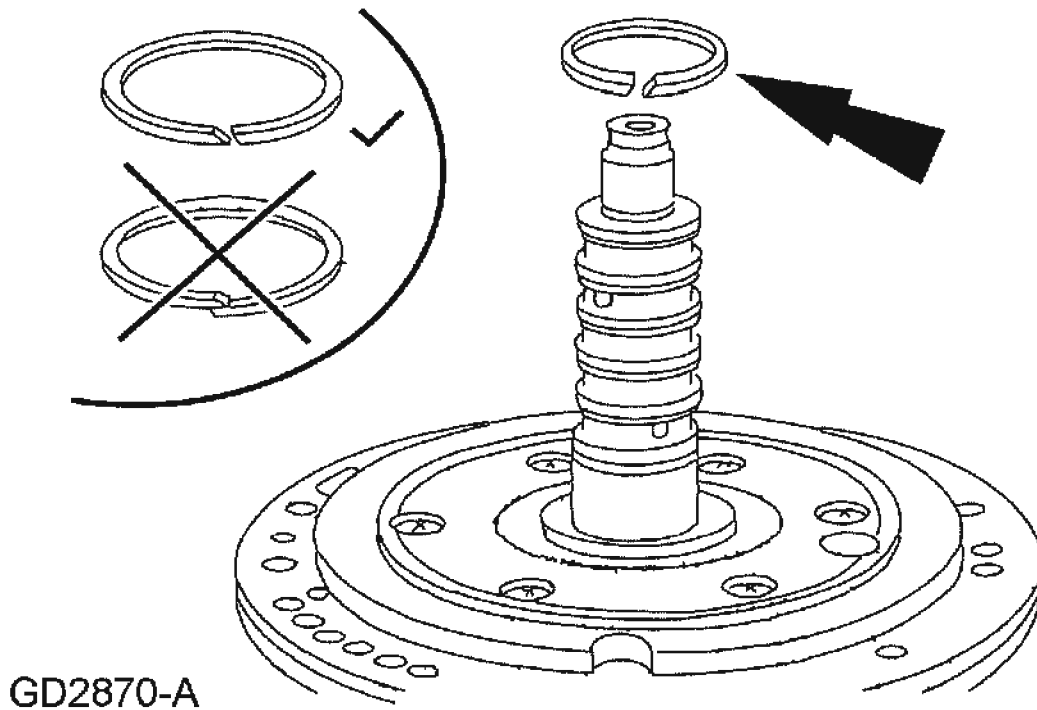


GD2869-A

**Fig. 535: Installing Pump Seal On Pump Body**  
Courtesy of FORD MOTOR CO.

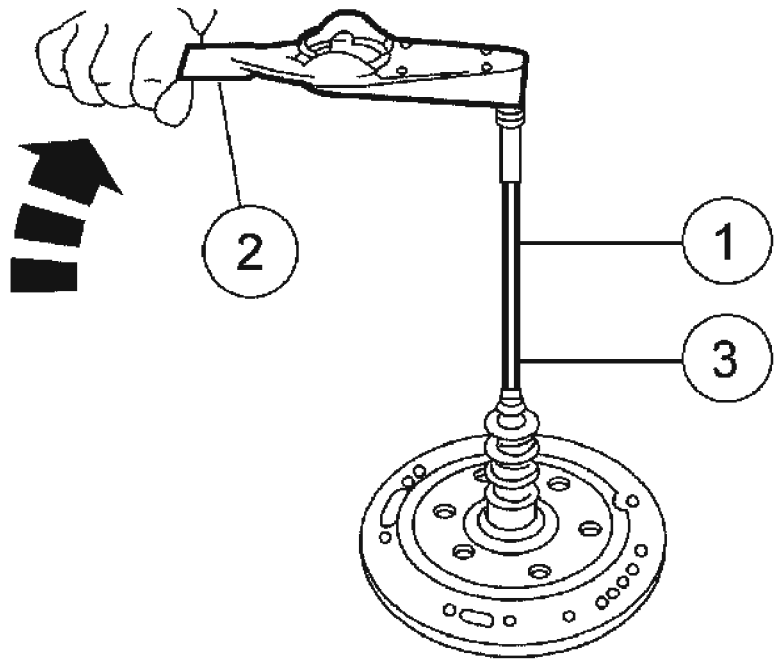
7. Install the pump seal on the pump body.

**NOTE:**      **Make sure the pump support seal rings are overlapped correctly.**



**Fig. 536: Installing Pump Support Seal Rings**  
**Courtesy of FORD MOTOR CO.**

8. Install the 7 pump support seal rings.
9. Measure the pump rotational torque.
  1. Install the pump drive shaft.
  2. Measure the pump rotational torque.
    - Tighten to 0.3 Nm (2.65 lb-in).
  3. Remove the pump drive shaft.
    - If rotational torque exceeds the specification, disassemble and inspect the pump assembly for contamination or incorrect end clearance.

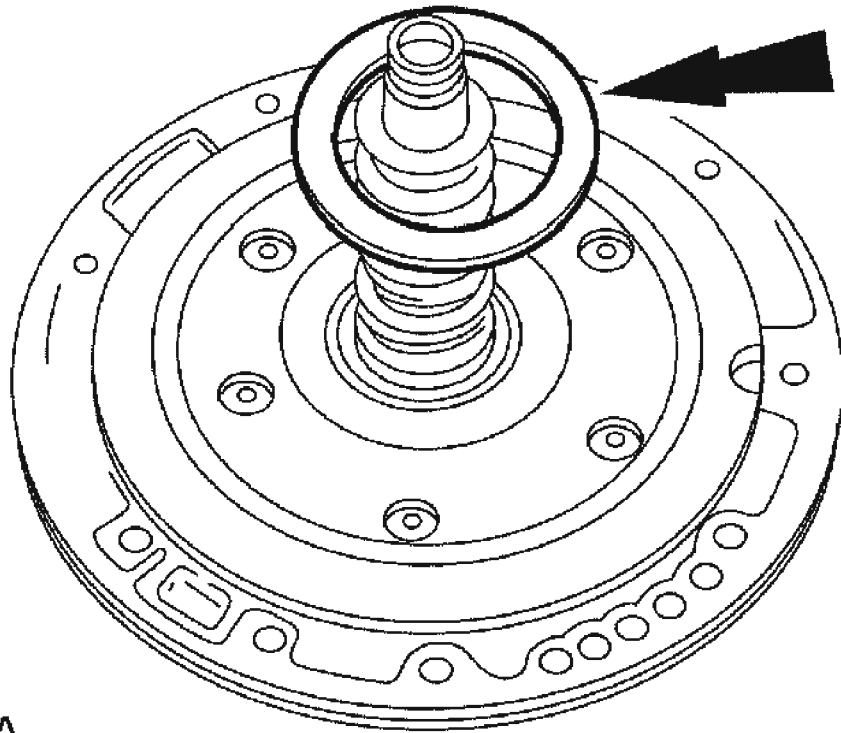


N0024507

**Fig. 537: Measuring Pump Rotational Torque**  
Courtesy of FORD MOTOR CO.

10. Install the No. 1 pump support thrust bearing.
  - Lubricate the seal rings with clean automatic transmission fluid.





GD2872-A

**Fig. 538: Installing No 1 Pump Support Thrust Bearing**  
Courtesy of FORD MOTOR CO.

11. Install the forward/coast/direct clutch cylinder and reverse clutch drum on the pump support.

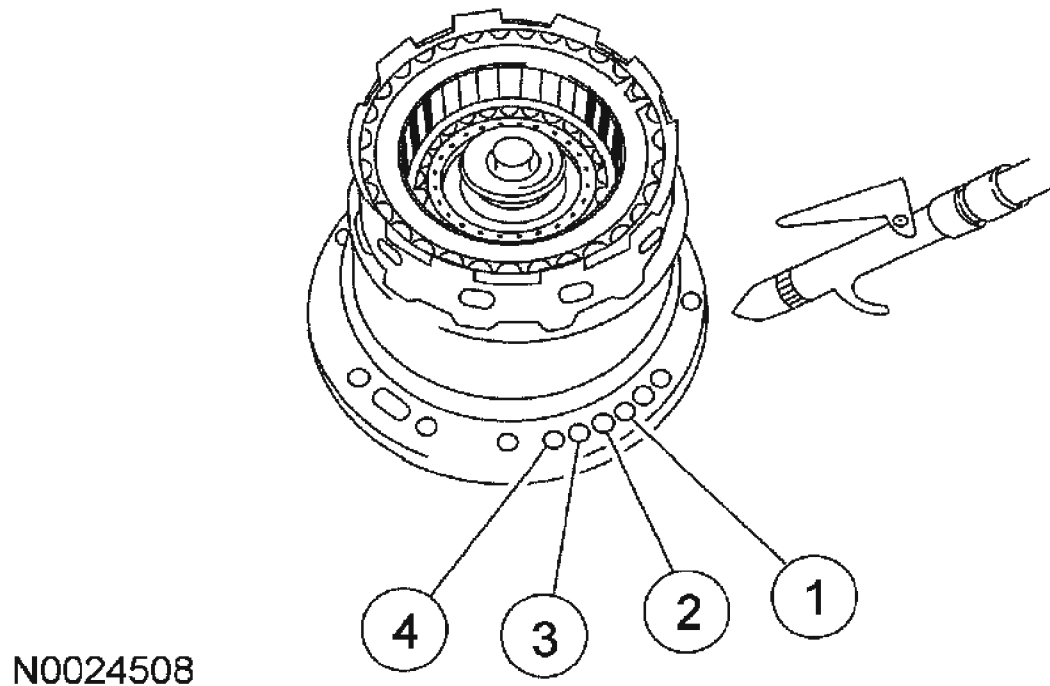
**WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air. Failure to follow these instructions can result in personal injury.

**NOTE:** With each application of air, you should hear the clutch pack apply. A hissing or high-pitched squeal indicates that a seal is damaged or torn. Inspect to find the source and repair as necessary.

12. Check the following passages of the forward/coast/direct clutch cylinder and reverse clutch drum with moisture-free compressed air, regulated to 276 kPa (40 psi).
  1. Reverse clutch passage
  2. Forward clutch passage
  3. Direct clutch passage

4. Coast clutch passage

- Converter bypass (located on the bottom)



N0024508

**Fig. 539: Checking Passages Of Forward/Coast/Direct Clutch Cylinder And Reverse Clutch Drum With Moisture-Free Compressed Air**  
Courtesy of FORD MOTOR CO.

**REVERSE CLUTCH**

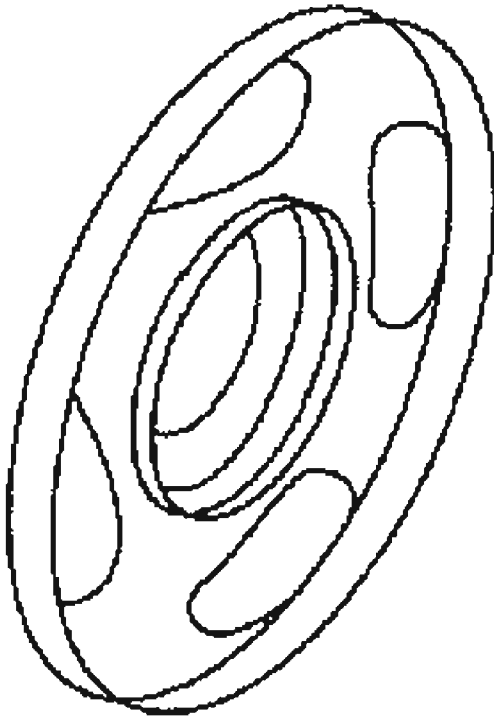
Special Tool(s)

**SPECIAL TOOLS DESCRIPTION**

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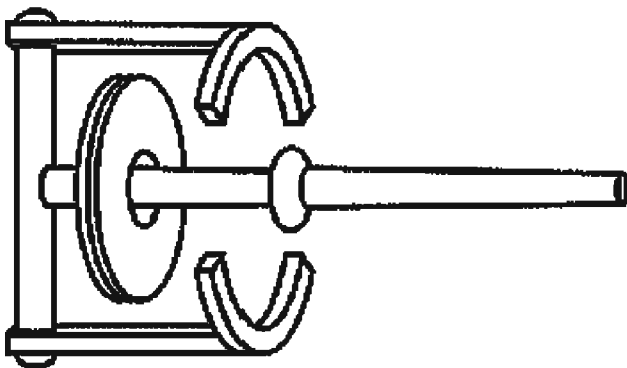
## 2005 Ford Escape

2005 TRANSMISSIONS Automatic Transaxle/Transmission - CD4E - Escape & Mariner



**ST2057-A**

Protector, Piston Seal 307-281  
(T94P-77000-D2)



**ST1190-A**

Compressor, Clutch Spring 307-015  
(T65L-77515-A)

## 2003-04 DRIVE AXLES

### Axle Shafts - Front & Rear - Escape

## DESCRIPTION & OPERATION

**CAUTION:** An inspection of the outer and inner boots is necessary so that if damage or grease leakage is evident, installation of a new axle shaft can take place immediately. Continued operation with damage or grease leakage will result in Constant Velocity (CV) joint wear and noise due to contamination and loss of the CV joint grease

**CAUTION:** Never pick up or hold the axle shaft only by the inner or outer CV joint. Do not over-angle the CV joints. Damage will occur to an assembled inner CV joint if it is over-plunged outward from the joint housing. Never use a hammer to remove or install the axle shafts. Never use the axle shaft assembly as a lever to position other components. Always support the free end of the axle shaft. Do not allow the boots to contact sharp edges or hot exhaust components. Handle the axle shaft only by the interconnecting shaft to avoid pull-apart and potential damage to the CV joints. Do not drop assembled axle shafts. The impact will cut the boots from the inside without evidence of external damage.

### AXLE SHAFTS (FRONT)

The front wheel drive axle shafts consist of the following components:

- Inner CV Joints
- Outer CV Joints
- Inner Shaft/Bearing
- Axle Shaft

The intermediate shaft contains a pressed on bearing which can only be repaired as an assembly.

The front wheel axle shaft joints consist of the following components:

- Inner CV Joints
- Outer CV Joints
- Axle Shaft Joint Boot Clamps

- Axle Shaft Joint Boots
- Tripod Joint Housings
- Retainer Circlips

## **AXLE SHAFTS (REAR)**

- The right and left axle shafts are the same length.
- Inner and outer CV joints connect to a splined shaft. A circlip stopper holds the cross groove inner race assembly (inner CV joint) together.
- An axle circlip retains the splined inner CV joint to the differential side gear. Install a new axle circlip each time the axle shaft is removed from the vehicle.
- A rear axle wheel hub nut secures the side shaft assembly (interconnecting shaft and outer CV joint) to the rear hub. Install a new rear axle wheel hub nut each time the axle shaft is removed from the vehicle.

## **LUBRICATION**

Front hub bearings are a cartridge design and require no scheduled maintenance. CV joint assemblies, use Ford High Temp Constant Velocity Joint Grease (E43Z-19590-A), or equivalent.

## **TROUBLE SHOOTING**

**NOTE:**      **New Constant Velocity (CV) joints must not be installed unless disassembly and inspection reveals unusual wear.**

### **CLICKING, POPPING OR GRINDING NOISES WHILE TURNING**

#### **Inadequate Or Contaminated Lubricant In Inner/Outer Axle Shaft CV Joint**

Inspect the boots for indentations ("dimples") in the boot convolutions. Indentations must be removed. Inspect the boots for evidence of cracks, tears, or splits. Inspect the underbody for any indication of grease splatter near the boots outer and inner locations. This is an indication of boot/clamp damage. Inspect, clean and lubricate inner/outer axle shaft CV joint as necessary.

#### **Another Component Contacting Axle Shaft Assembly**

Inspect and repair as necessary.

#### **Brake Components**

Inspect, and repair as necessary. See **DISC & DRUM** article in BRAKES.

#### **Wheel Bearings, Suspension Or Steering Components**

Inspect and repair wheel bearings, suspension or steering components as necessary. See **FRONT** article in SUSPENSION.

### **SHUDDER VIBRATION DURING ACCELERATION**

#### **High CV Joint Operating Angles Caused By Incorrect Ride Height**

Check the ride height, and verify the spring rate. See **SPECIFICATION & PROCEDURES** article under WHEEL ALIGNMENT in SUSPENSION. Repair appropriate suspension component(s) as necessary. See appropriate **FRONT** article in SUSPENSION.

#### **Front Suspension Components**

Check for worn suspension bushings and component damage. Repair appropriate suspension component(s) as necessary. See **FRONT** article in SUSPENSION.

#### **Excessively Worn Or Damaged Inner Or Outer CV Joint**

Inspect and install NEW CV joint(s) as necessary. See **AXLE SHAFT (FRONT)** or **AXLE SHAFTS (REAR)** under REMOVAL & INSTALLATION.

### **VIBRATION AT SPEEDS GREATER THAN 35 MPH**

**WARNING:** Do not balance the wheels and tires while they are mounted on the vehicle. Possible tire disintegration/differential/axle shaft failure could result, causing personal injury/extensive component damage. Use an off-vehicle wheel and tire balancer only.

#### **Out Of Balance Or Out-Of-Round Tires**

Balance the wheel and tire assemblies or install new wheels or tires as necessary.

#### **Incorrectly Seated Outer CV Joint In Front Wheel Hub**

Repair or install NEW outer CV joint or front wheel hub component(s) as necessary. See **AXLE SHAFT (FRONT)** under REMOVAL & INSTALLATION.

#### **Lateral & Radial Tire & Wheel Runout**

Repair or install NEW tires or wheels as necessary.

#### **Worn CV Joint**

Install NEW axle shaft. See **AXLE SHAFT (FRONT)** or **AXLE SHAFTS (REAR)** under REMOVAL & INSTALLATION.

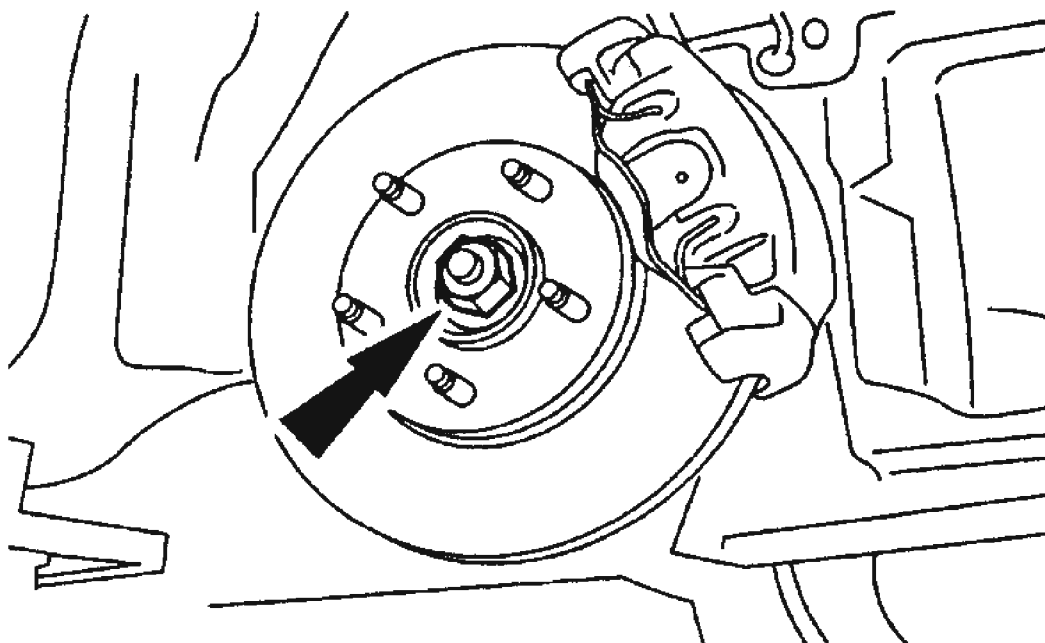
## REMOVAL & INSTALLATION

### AXLE SHAFT (FRONT)

#### Removal

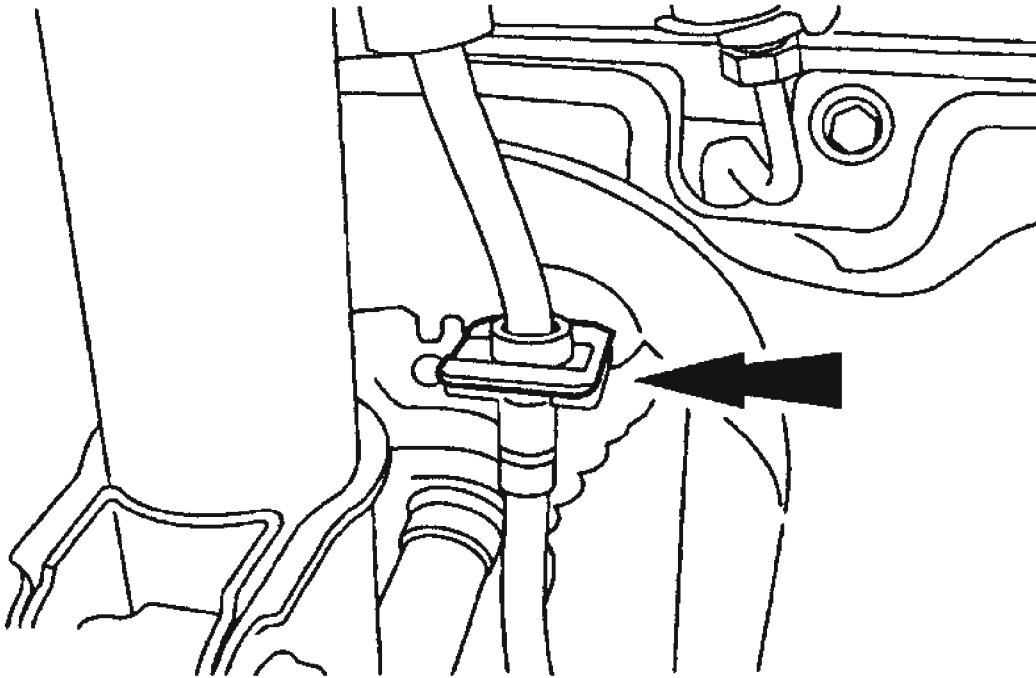
**NOTE:** Right side is shown; left side is similar. Numbers in parenthesis refer to numbers in figures.

1. Raise and support the vehicle. Remove the wheel and tire assembly. Remove and discard the front axle shaft wheel hub nut. See **Fig. 1**.
2. Remove the brake hose retainer clip. See **Fig. 2**. Remove the pinch bolt (1) and nut. Separate the lower control arm (2) from the front wheel knuckle. See **Fig. 3**.
3. Using Front Hub Remover (205-D070, D93P-1175-B) or equivalent, separate the axle shaft from the front wheel knuckle. See **Fig. 4**.
4. Using Front Drive Axle Shaft Remover (205-241, T86P-3514-A) and Slide Hammer (100-001, T50T-100-A), remove the axle shaft. See **Fig. 5**.



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**Fig. 1: Locating Front Axle Shaft Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.



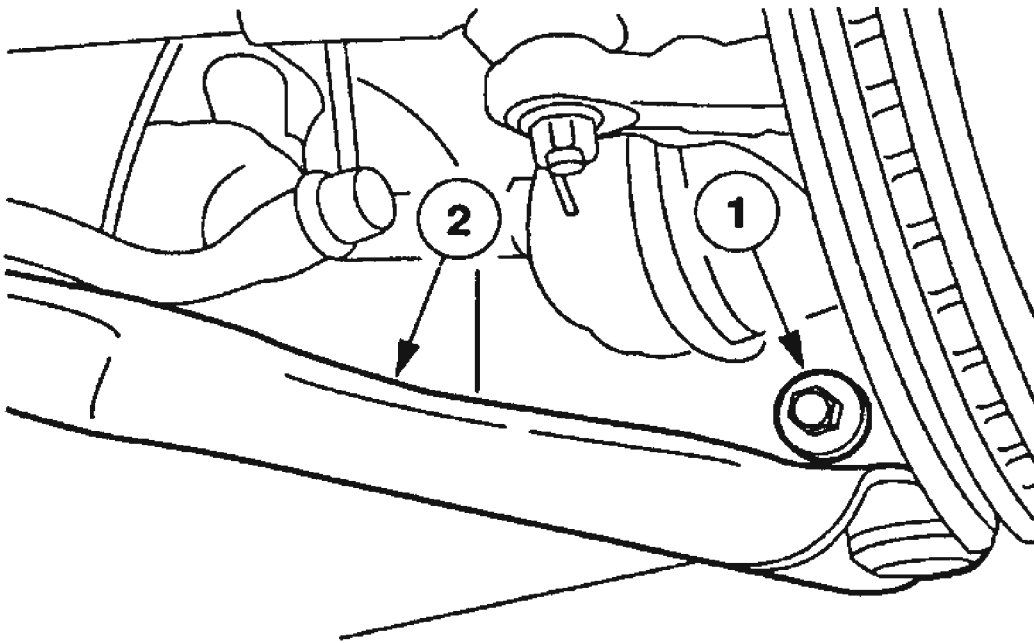
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**Fig. 2: Locating Front Brake Hose Retaining Clip**  
**Courtesy of FORD MOTOR CO.**



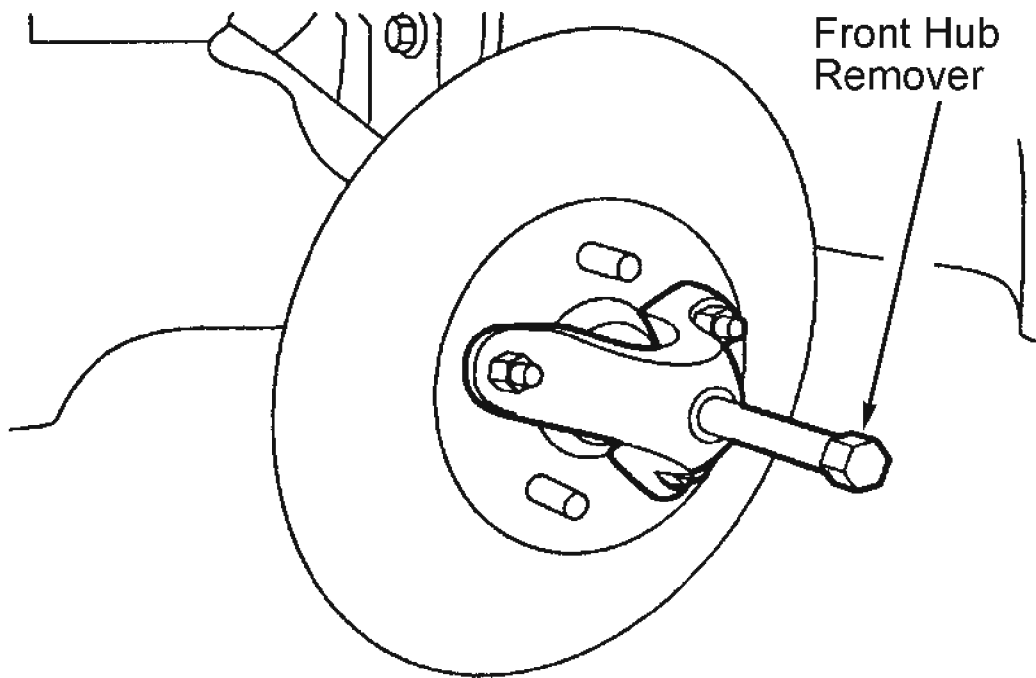
## 2004 Ford Escape

2003-04 DRIVE AXLES Axle Shafts - Front & Rear - Escape



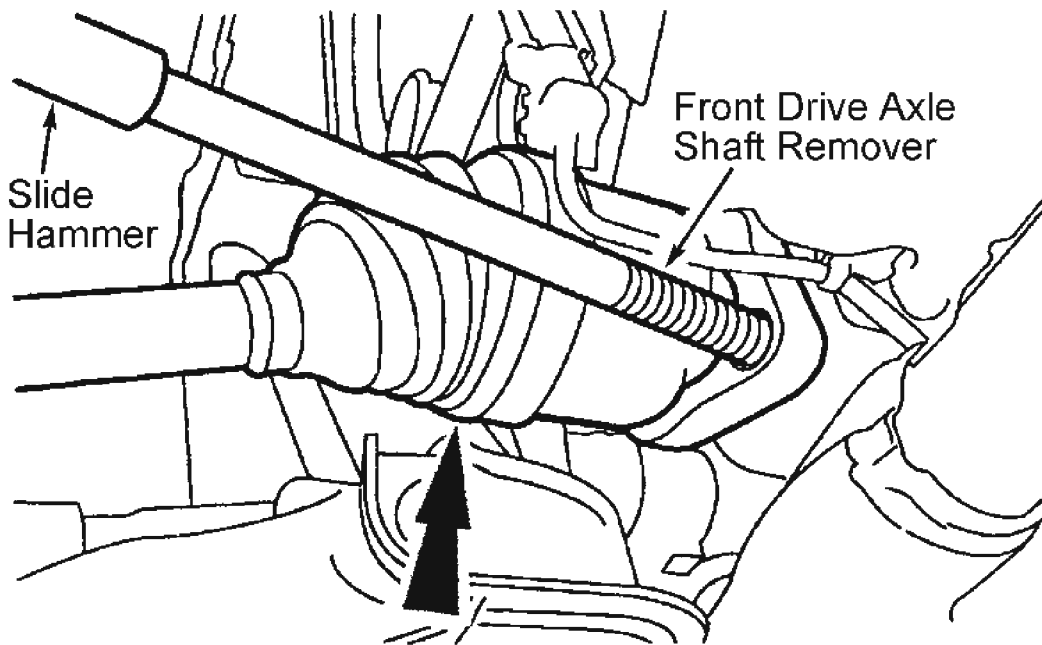
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**Fig. 3: Separating Lower Control Arm From Front Wheel**  
Courtesy of FORD MOTOR CO.



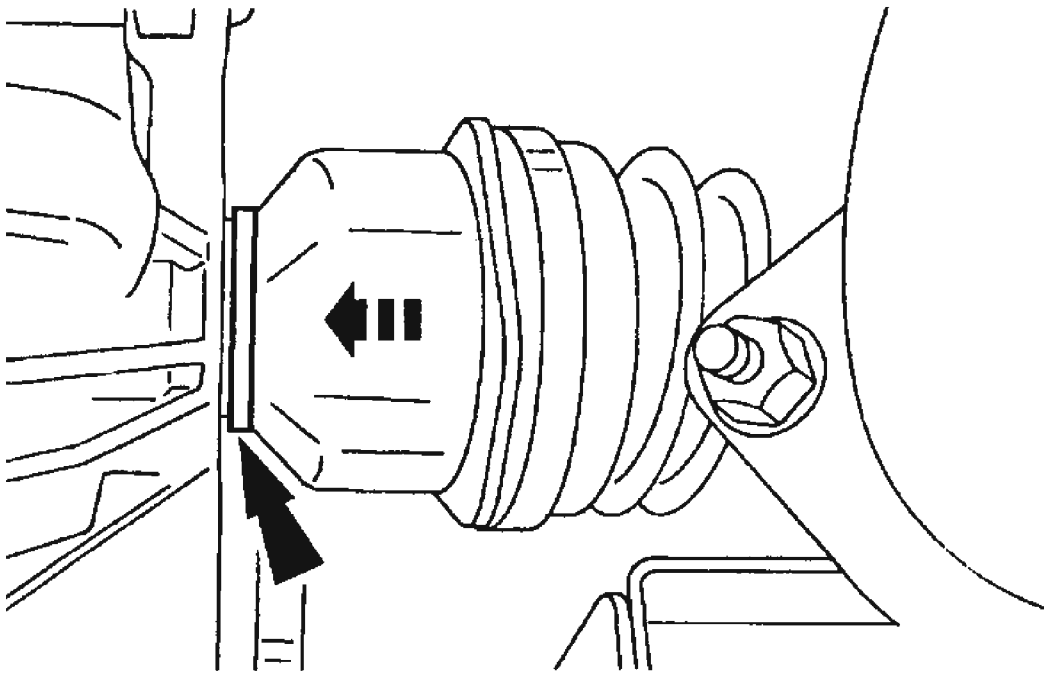
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**Fig. 4: Separating Axle Shaft From Front Wheel Knuckle**  
Courtesy of FORD MOTOR CO.



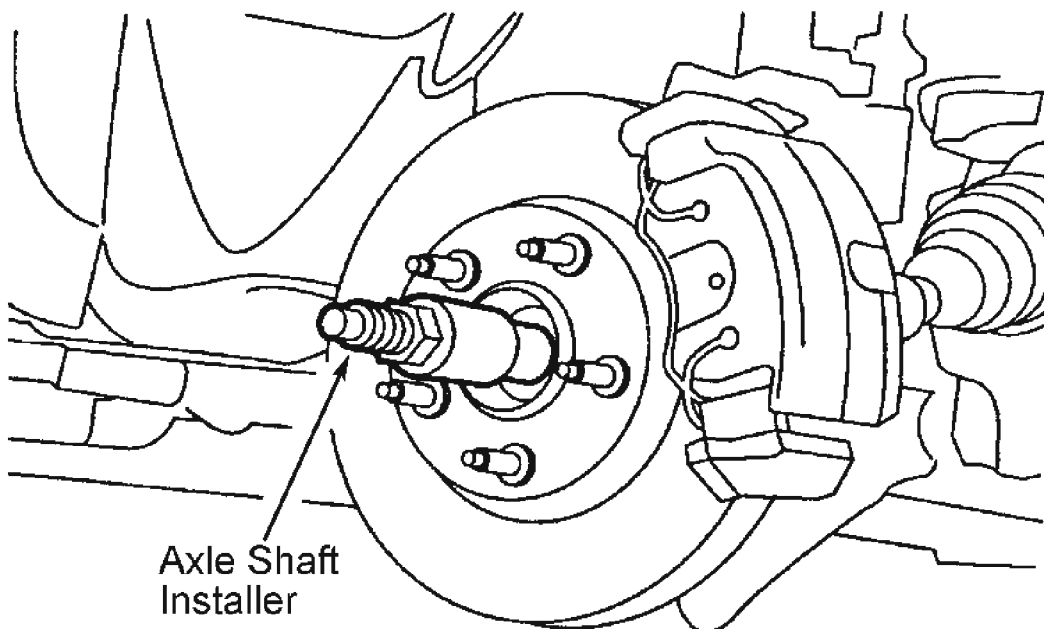
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**Fig. 5: Removing Axle Shaft**  
Courtesy of FORD MOTOR CO.



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**Fig. 6: Installing Axle Shaft Into Differential Side Gear**  
Courtesy of FORD MOTOR CO.



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**Fig. 7: Positioning Axle Shaft Into Front Wheel Knuckle**  
**Courtesy of FORD MOTOR CO.**

**Installation**

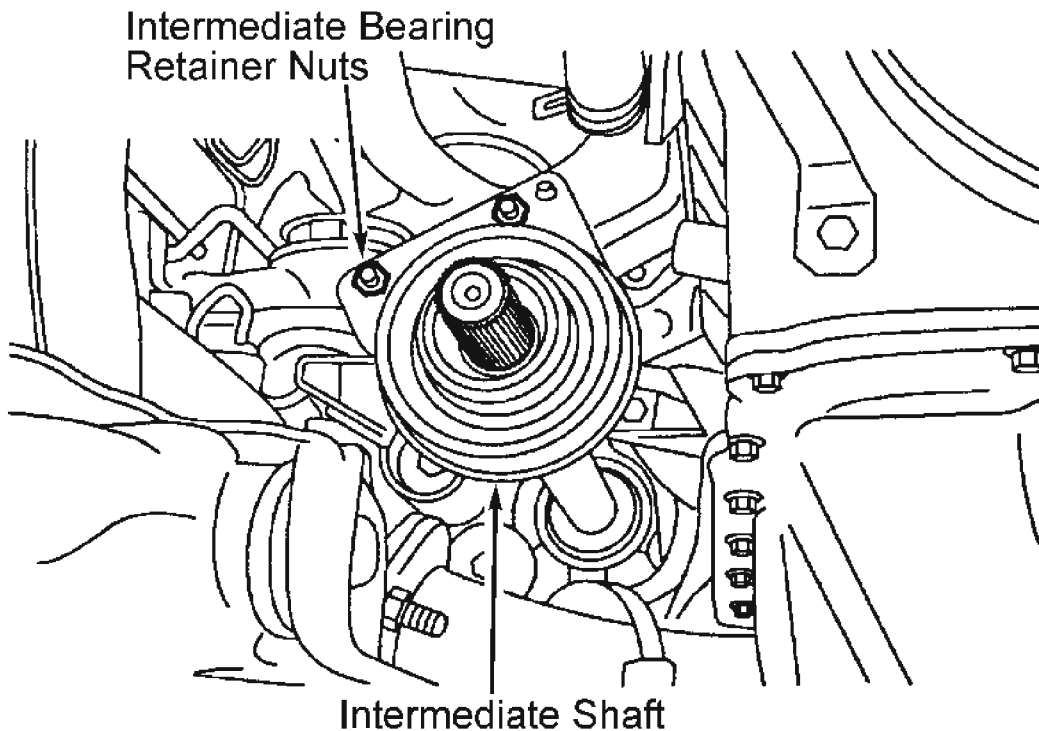
**NOTE:** When seated correctly, the axle shaft bearing retainer circlip can be felt as it snaps into the differential side gear groove.

1. Position the front wheel intermediate shaft and joint so the splines line up with the differential side gear splines. Push the front wheel intermediate shaft and joint into the differential side gear. See **Fig. 6** .
2. Using Axle Shaft Installer (204-161, T97P-1175-A) or equivalent, position the axle shaft into the front wheel knuckle. See **Fig. 7** .
3. Install the lower control arm and the ball joint pinch bolt and nut. Tighten pinch bolt nut to specification. See **TORQUE SPECIFICATIONS** .
4. Install the brake hose retainer clip. See **Fig. 2** . Install a new front axle wheel hub nut. Tighten front axle wheel hub nut to specification. Install the front wheels and tires. Tighten wheel lug nuts to specification. Check and refill the transaxle fluid.

**INTERMEDIATE SHAFT**

**Removal & Installation**

1. Remove the right front axle shaft. See **AXLE SHAFT (FRONT)** under REMOVAL & INSTALLATION. Remove the two intermediate shaft bearing retainer nuts. See **Fig. 8** .
2. Remove the intermediate shaft. To install, reverse the removal procedure. Tighten nuts to specification. See **TORQUE SPECIFICATIONS** .



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**Fig. 8: Locating Intermediate shaft Bearing Retainer Nuts**  
Courtesy of FORD MOTOR CO.

## AXLE SHAFTS (REAR)

### Removal

1. Remove the rear coil spring. See appropriate REAR article in SUSPENSION. Remove and discard the axle shaft wheel nut. See **Fig. 9** .

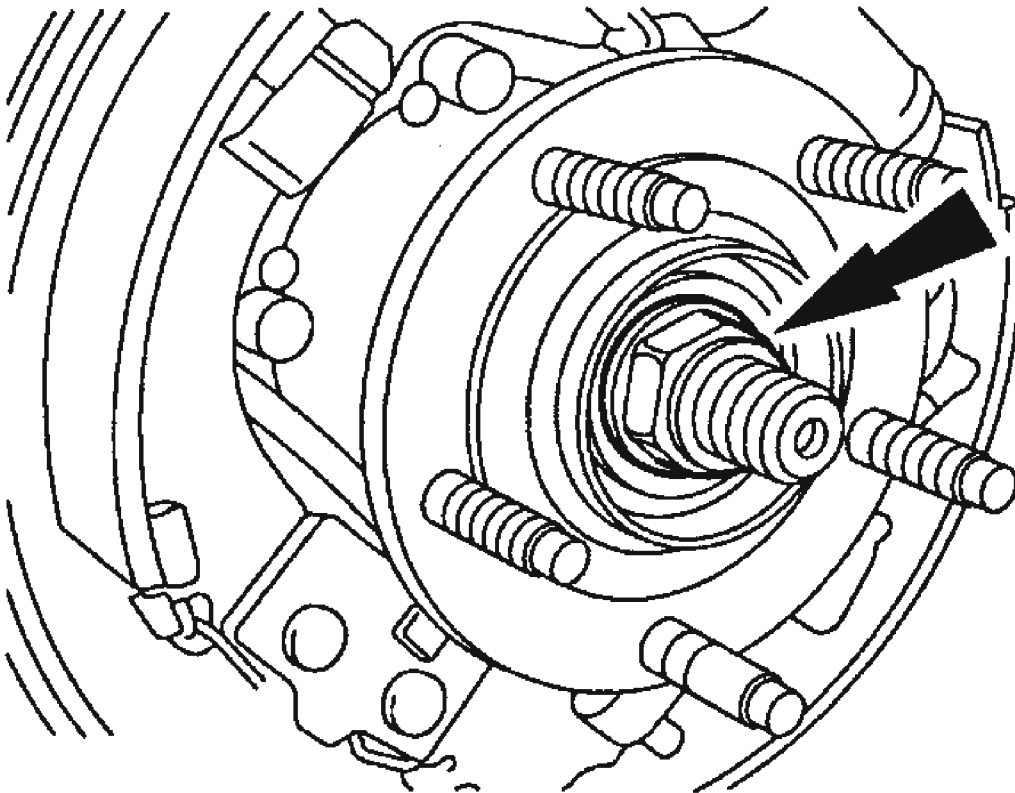
**CAUTION: Make sure to support the wheel knuckle.**

2. Remove the lower ball joint nut and separate the lower ball joint. See **Fig. 10** . Using Front Hub Remover (205-D070, D93P-1175-B) or equivalent, separate the axle shaft from the knuckle. See **Fig. 11** .
3. Using CV Joint Puller (205-241, T86P-3514-A), remove the axle shaft. See **Fig. 12** .

### Installation

1. Install the axle shaft into the differential. See **Fig. 13** . Using Axle Shaft Installer (204-161, T97P-1175-A), install the axle shaft end into the hub assembly. See **Fig. 14** .

2. Position the lower ball joint and install the nut. See **Fig. 10** . Tighten lower ball joint nut to specification. See **TORQUE SPECIFICATIONS** .
3. Install the axle shaft nut and tighten nut to specification. See **Fig. 9** . Install the rear coil spring. See appropriate REAR article in SUSPENSION.

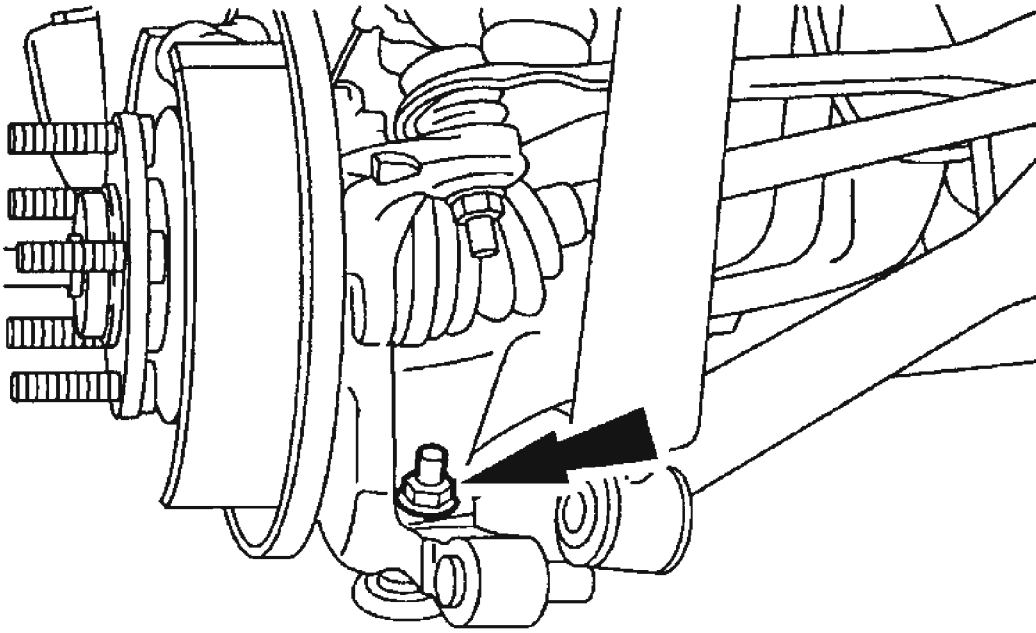


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**Fig. 9: Locating Rear Axle Shaft Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

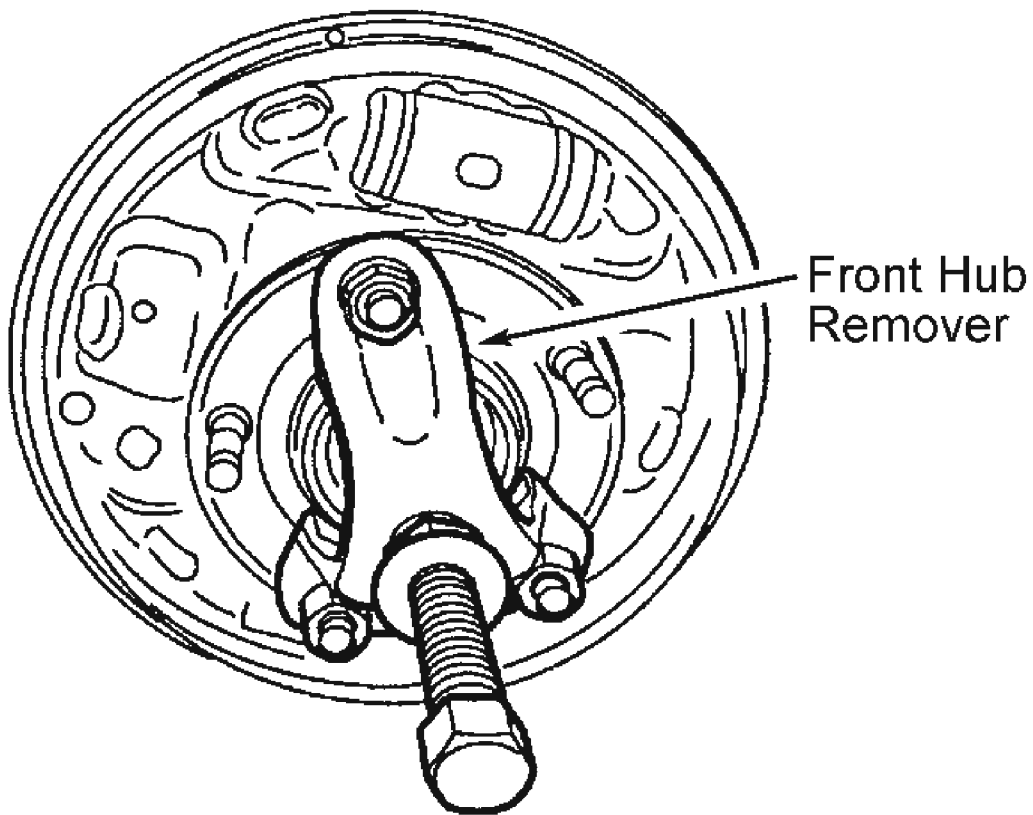
2003-04 DRIVE AXLES Axle Shafts - Front & Rear - Escape



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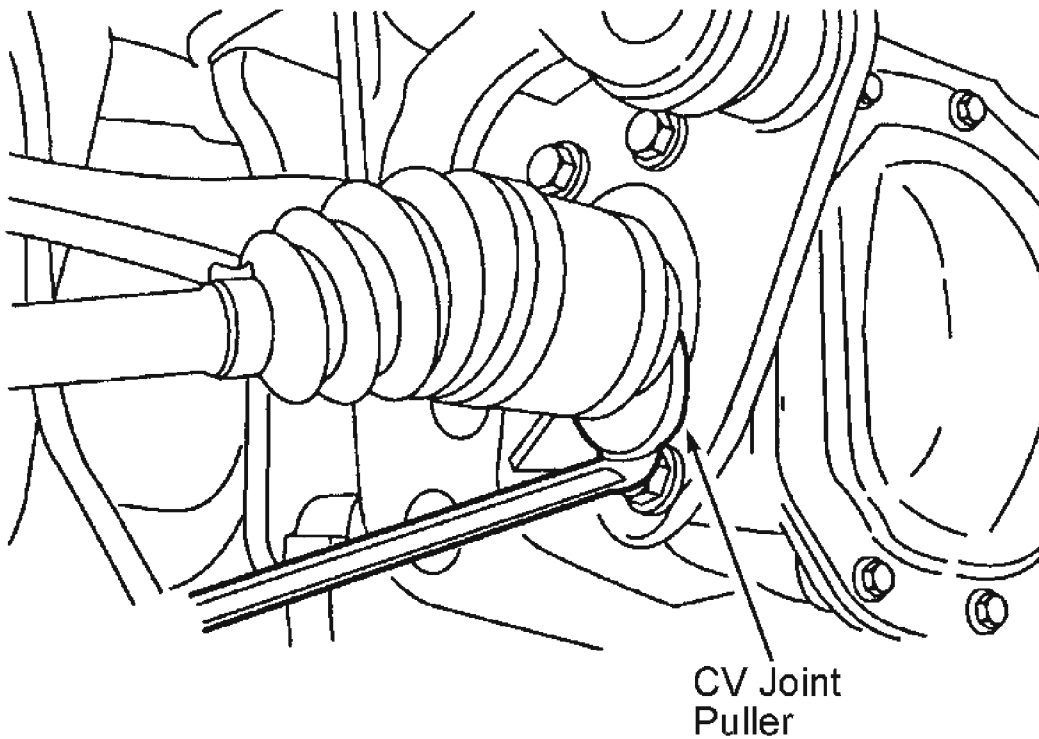
**Fig. 10: Locating Rear Suspension Lower Ball Joint Nut**  
Courtesy of FORD MOTOR CO.





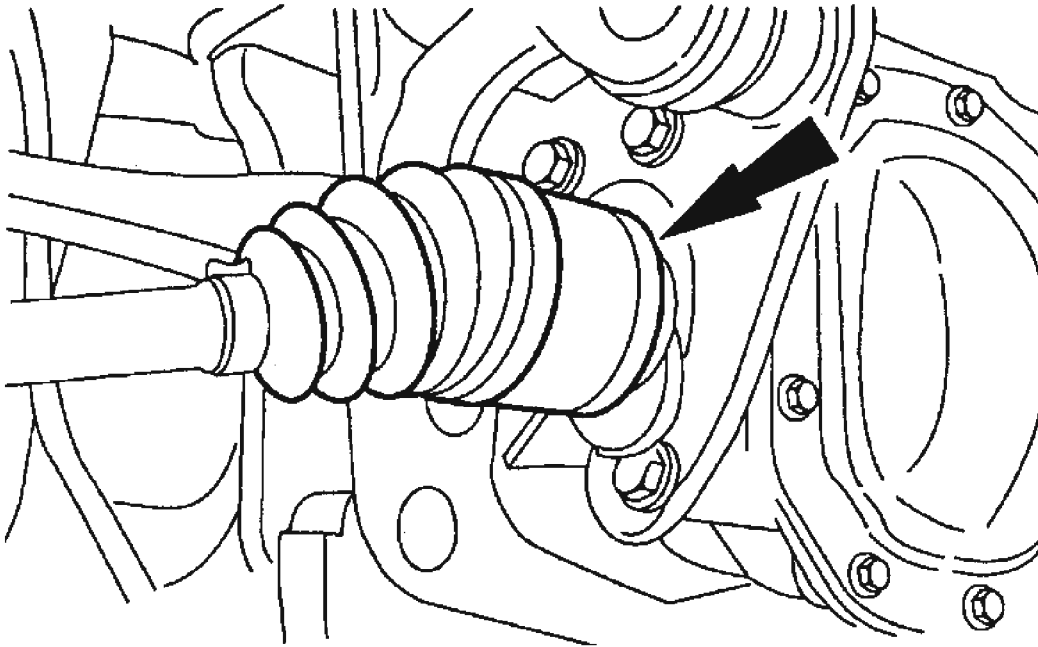
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**Fig. 11: Removing Rear Axle Shaft From Wheel Hub**  
Courtesy of FORD MOTOR CO.



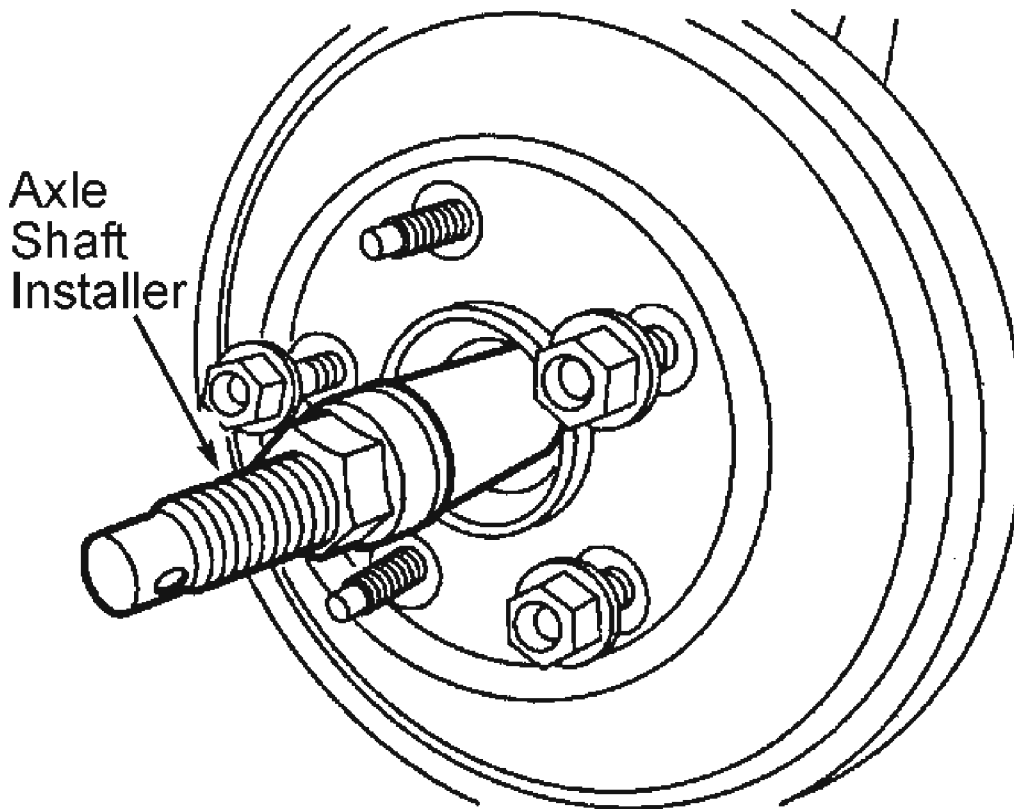
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**Fig. 12: Removing Rear Axle Shaft From Differential**  
Courtesy of FORD MOTOR CO.



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**Fig. 13: Installing Axle Shaft Into Differential**  
**Courtesy of FORD MOTOR CO.**



G00315293

**Fig. 14: Installing Rear Axle Shaft Into Wheel Hub**  
Courtesy of FORD MOTOR CO.

## OVERHAUL

### AXLE SHAFTS (FRONT)

#### Disassembly (Inner Joint)

1. Remove the axle shaft from the vehicle. See **AXLE SHAFT (FRONT)** under REMOVAL & INSTALLATION.
2. Secure the axle shaft and Constant Velocity (CV) joint in a vise using protective jaw covers. See **Fig. 15**.
3. Remove the inner boot clamps. See **Fig. 16**. Slide the inner axle shaft boot off the inner CV joint housing. See **Fig. 17**.
4. Separate the tripod joint from the CV joint housing. See **Fig. 18**. Index-mark the shaft and the inner tripod joint for correct alignment during assembly. See **Fig. 19**. Remove the snap ring. See **Fig. 20**. Remove the tripod joint. See **Fig. 21**.

5. Remove the stop ring. See **Fig. 22** . Remove the inner CV boot from the shaft assembly.

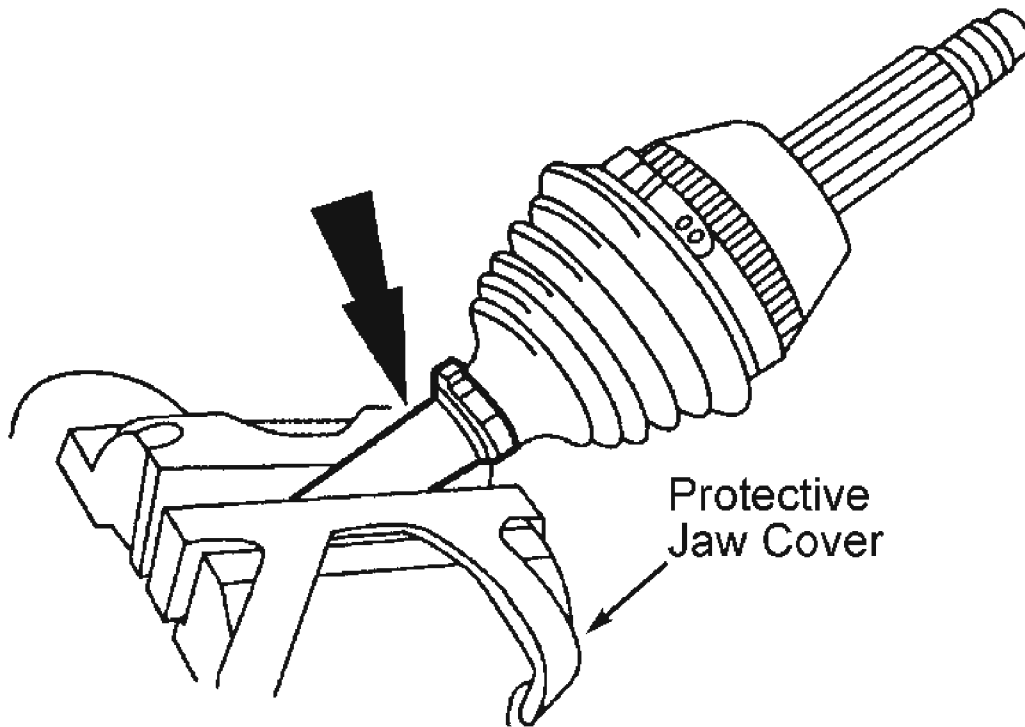
**Reassembly**

**NOTE:**      **Numbers in parenthesis refer to numbers in illustration.**

1. Position the inner axle shaft clamp and boot. See **Fig. 23** . Install the stop ring. See **Fig. 22** . Align the index marks on the axle shaft and the tripod joint. See **Fig. 19** . Install the tripod joint on the axle shaft. Install the snap ring. See **Fig. 20** .
2. Lubricate the three CV joint needle bearings. See **Fig. 24** . Use Ford High Temp Constant Velocity Joint Grease Motorcraft XG-2 or equivalent.
3. Fill the inner CV joint housing with Ford High Temp Constant Velocity Joint Grease Motorcraft XG-2 or equivalent.
4. Position the CV joint housing onto the CV joint. See **Fig. 18** . Remove any excess grease from the inner axle shaft boot mating surface before positioning it into place. Position the inner axle shaft boot (1) into place. See **Fig. 25** . Position the boot clamp (2).
5. Seat the boot in the joint boot groove. Remove any excess air trapped in the outer axle shaft boot using a cloth covered screwdriver after adjusting the outer axle shaft boot spacing. See **Fig. 26** .

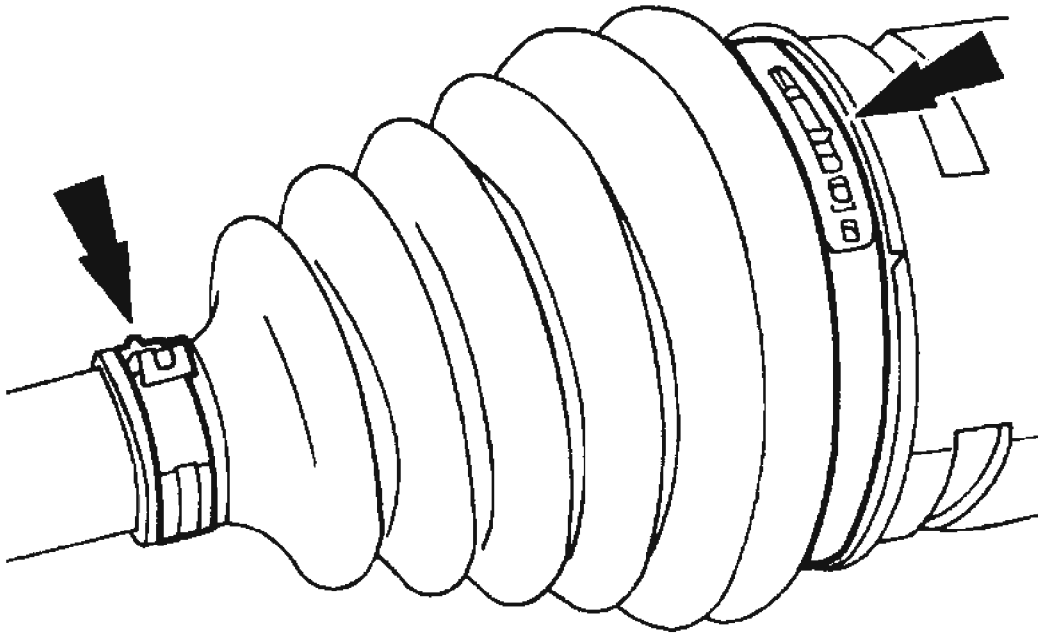
**NOTE:**      **Tighten the through-bolt until the tool is in the closed position.**

6. Using CV Boot Clamp (205-343, T95P-3514-A), install the two inner boot clamps. See **Fig. 27** .
7. Install the axle shaft in the vehicle. See **AXLE SHAFT (FRONT)** under REMOVAL & INSTALLATION.



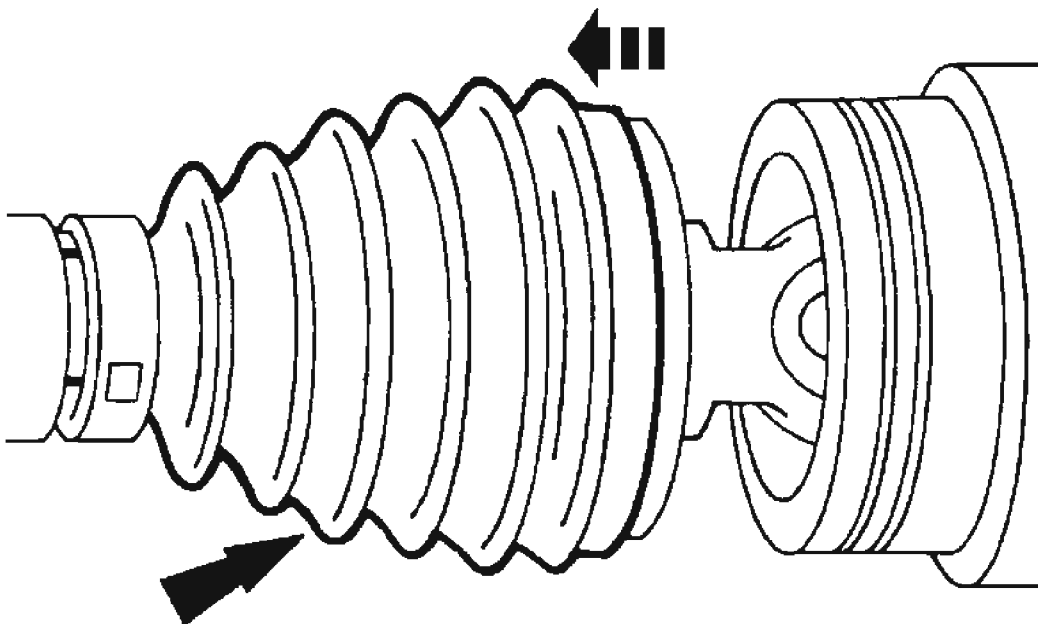
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**Fig. 15: Securing Front Axle Shaft In Vise**  
Courtesy of FORD MOTOR CO.



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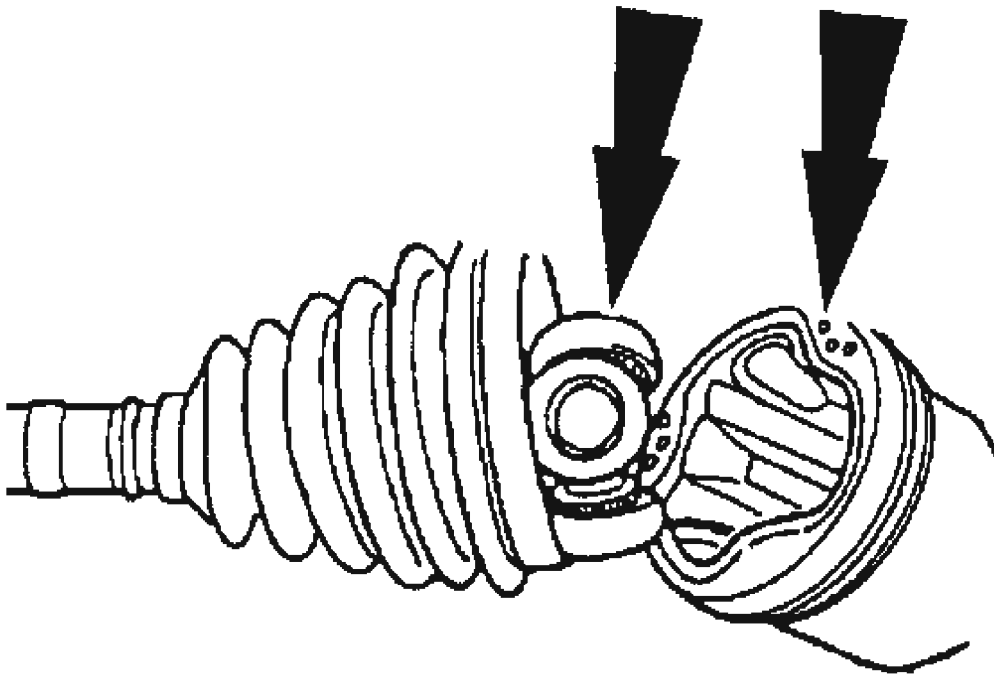
**Fig. 16: Locating Inner CV Joint Boot Clamps**  
Courtesy of FORD MOTOR CO.



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**Fig. 17: Separating Boot From CV Joint Housing**

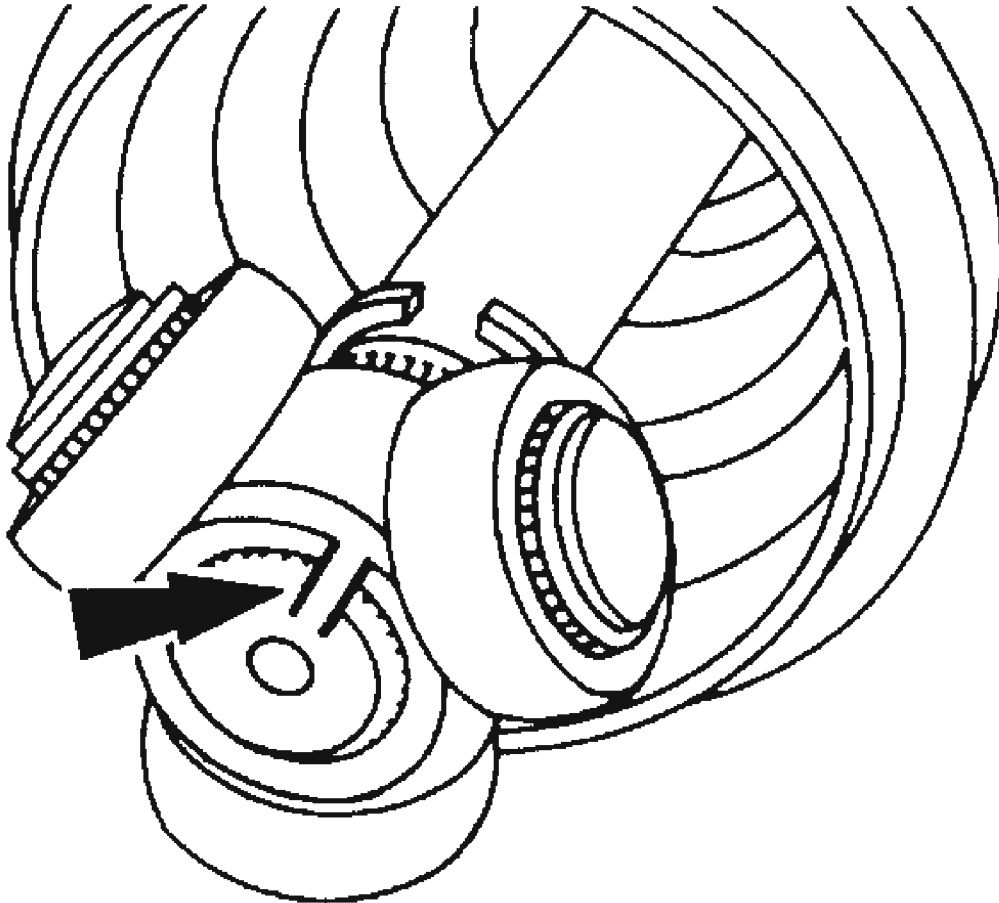
Courtesy of FORD MOTOR CO.



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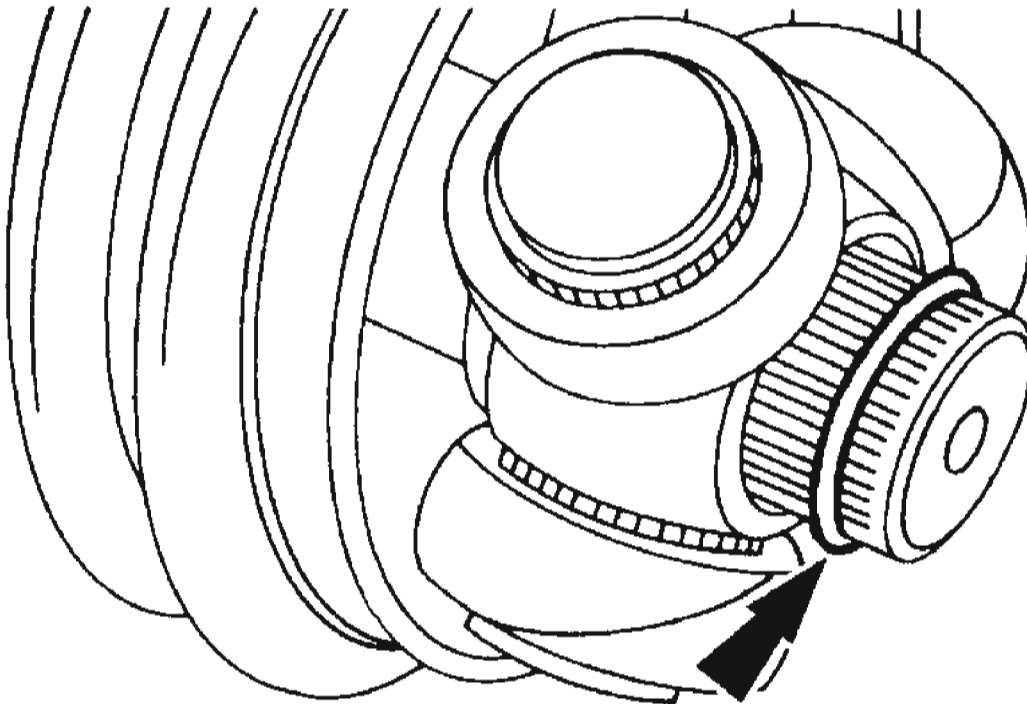
**Fig. 18: Removing/Installing CV Joint At CV Housing**  
Courtesy of FORD MOTOR CO.





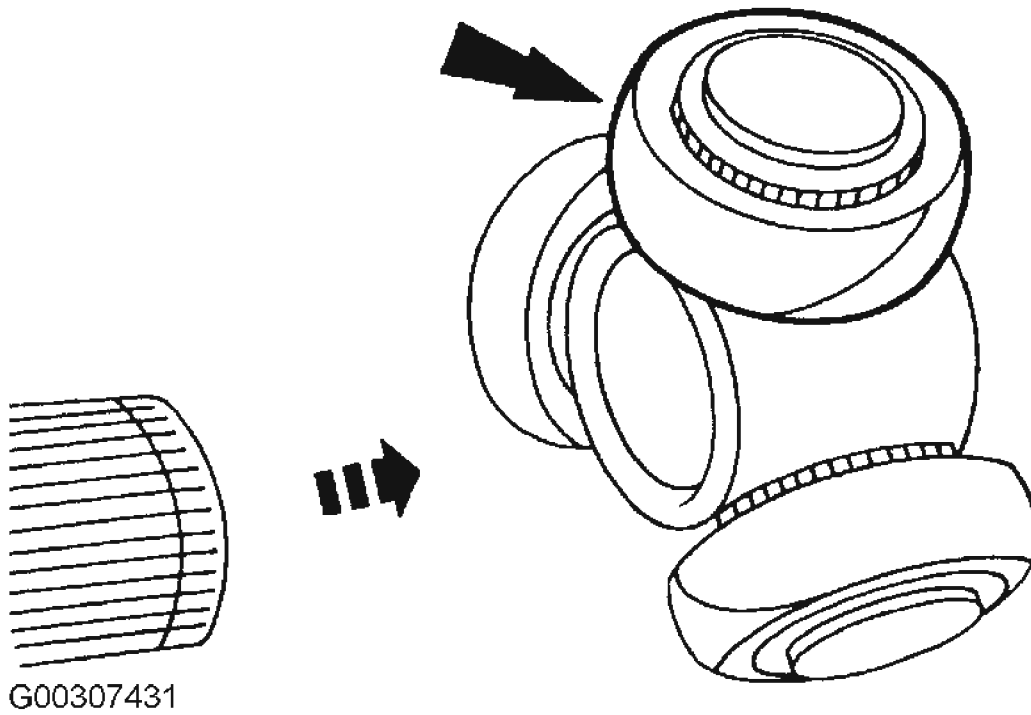
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**Fig. 19: Index-Marking Shaft & Inner CV Joint**  
Courtesy of FORD MOTOR CO.

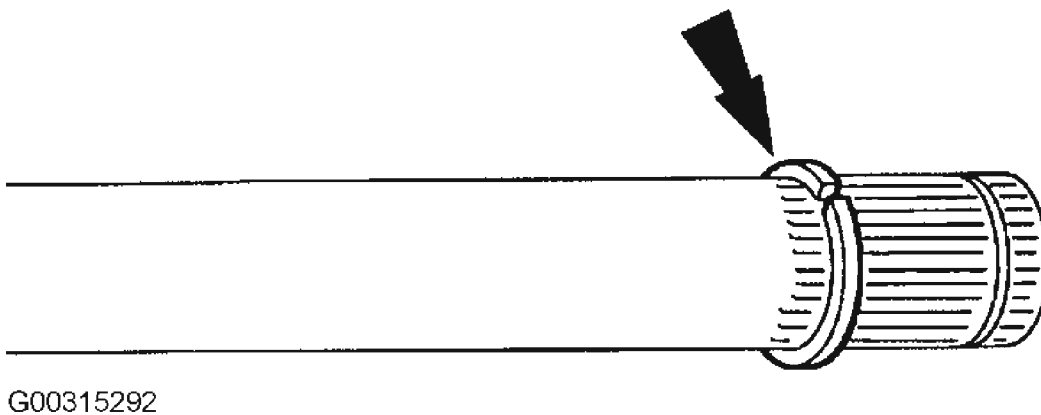


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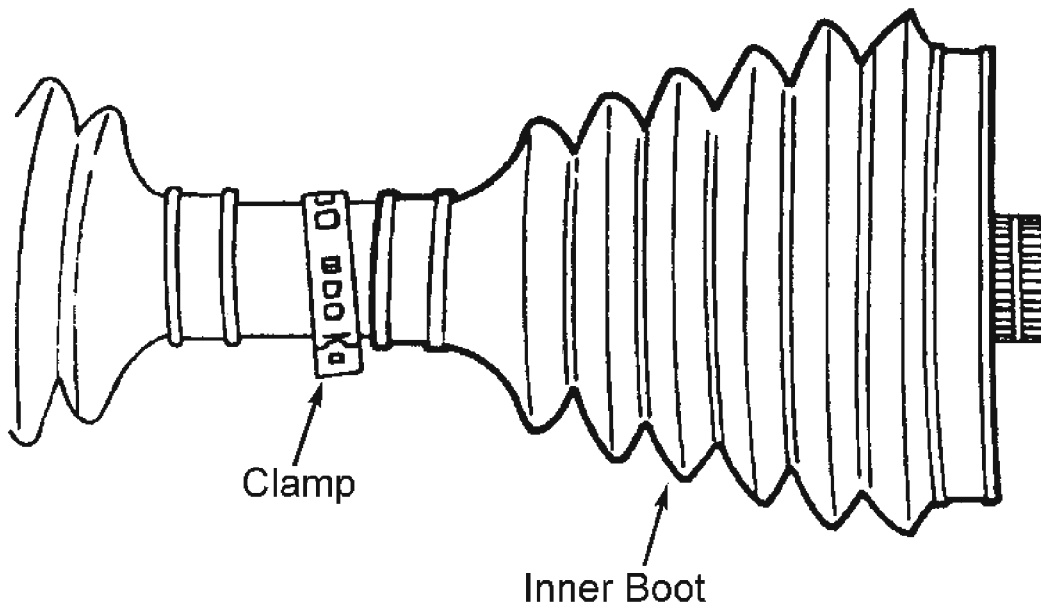
**Fig. 20: Locating Snap Ring**  
Courtesy of FORD MOTOR CO.



**Fig. 21: Removing Inner CV Joint From Axle Shaft**  
Courtesy of FORD MOTOR CO.

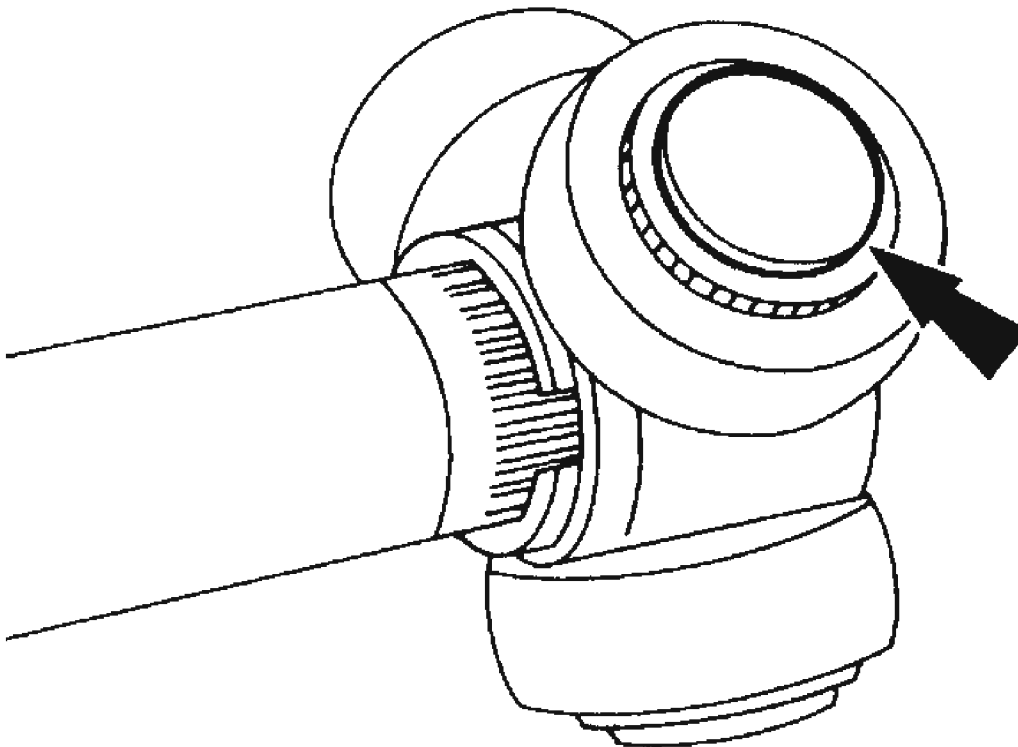


**Fig. 22: Identifying Stop Ring**  
Courtesy of FORD MOTOR CO.



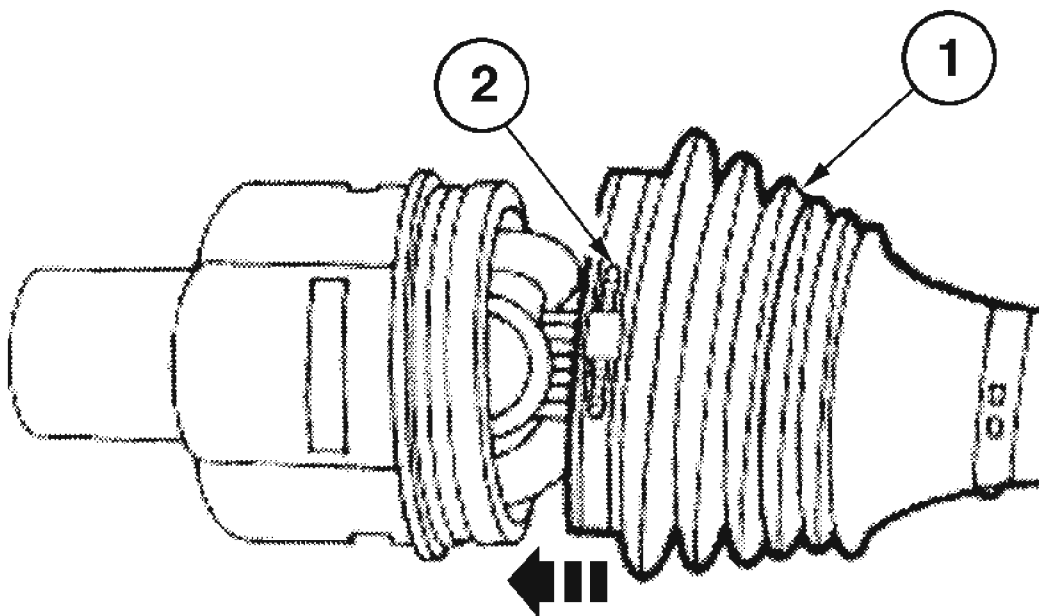
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**Fig. 23: Positioning Inner Axle Shaft Boot & Clamp**  
Courtesy of FORD MOTOR CO.



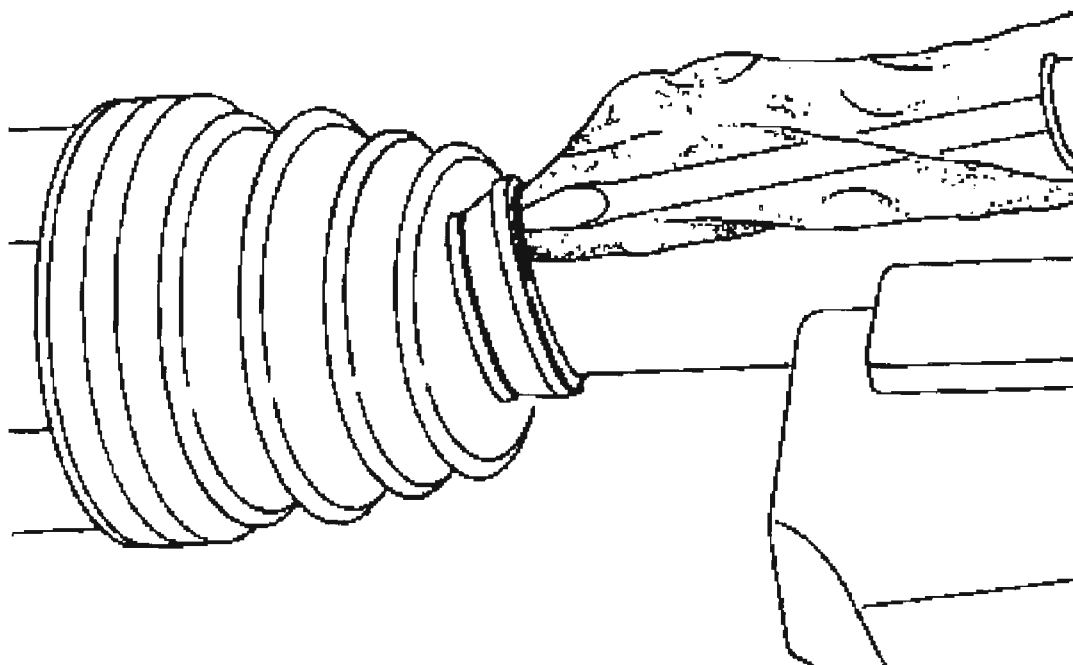
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**Fig. 24: Lubricating 3 CV Joint Needle Bearings**  
Courtesy of FORD MOTOR CO.



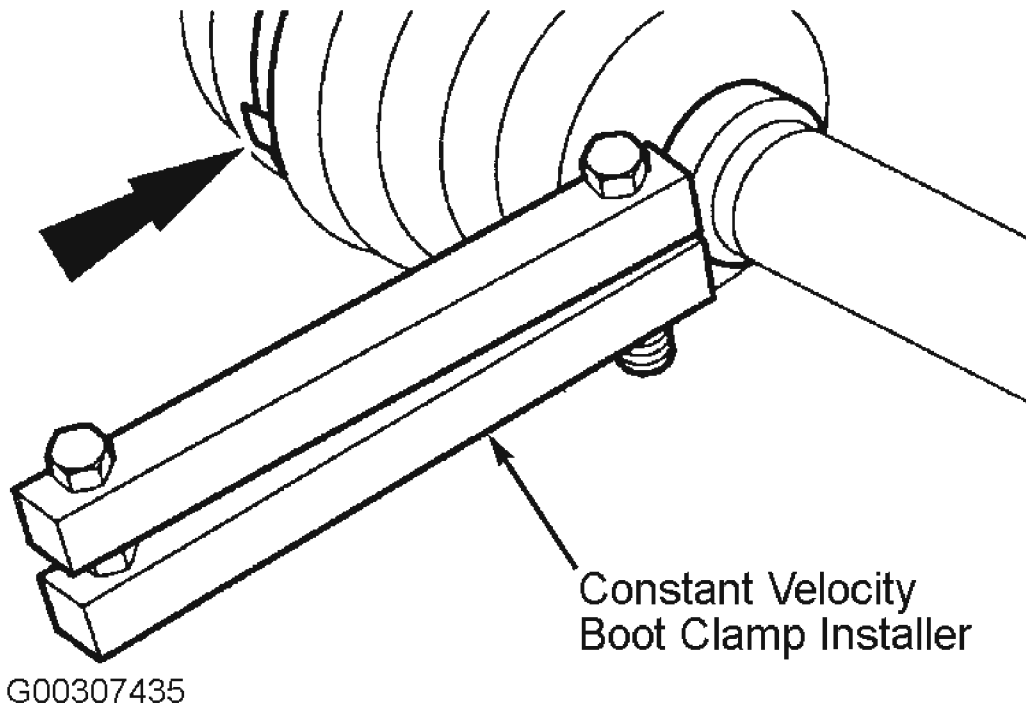
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**Fig. 25: Assembling Inner CV Joint**  
Courtesy of FORD MOTOR CO.



G00183629

**Fig. 26: Removing Excess Air From CV Boot**  
Courtesy of FORD MOTOR CO.



**Fig. 27: Installing Inner Boot Clamps**  
Courtesy of FORD MOTOR CO.

#### Disassembly (Outer Joint)

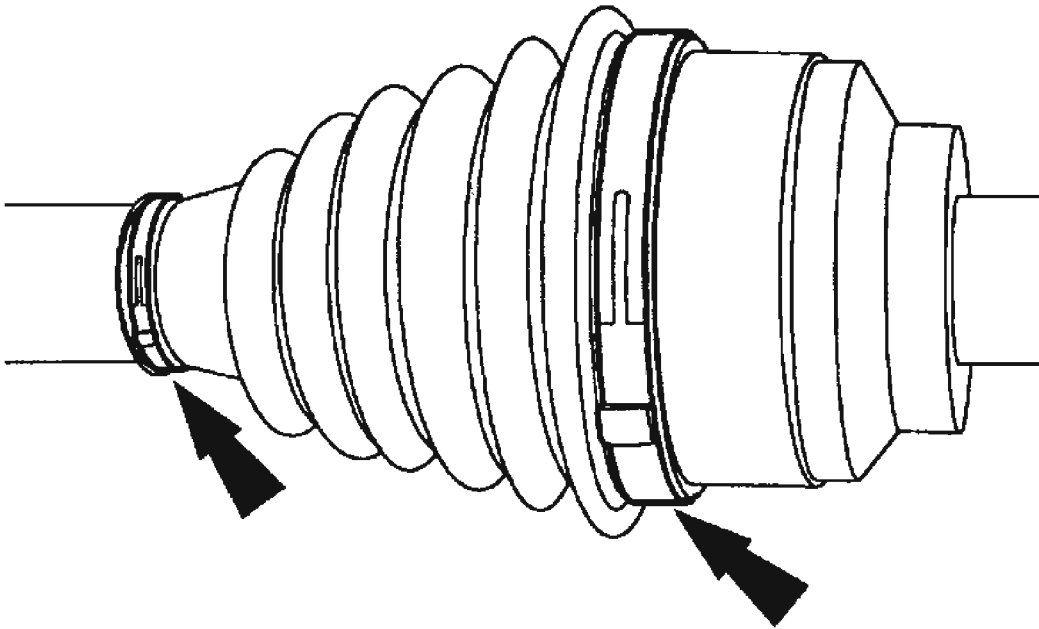
1. Remove the axle shaft from the vehicle. See **AXLE SHAFT (FRONT)** under REMOVAL & INSTALLATION.
2. Secure the axle shaft and Constant Velocity (CV) joint in a vise using protective jaw covers. See **Fig. 15**.
3. Remove the two outer axle shaft boot clamps. See **Fig. 28**. Slide the outer axle shaft joint boot back out of the way exposing the outer CV joint. See **Fig. 29**.
4. If reinstalling the original outer CV joint, mark the outer CV joint and axle shaft to ensure correct installation. See **Fig. 30**.
5. Use a soft-face hammer to separate the outer CV joint by gently tapping it off the axle shaft. See **Fig. 31**.
6. Remove the axle shaft bearing retainer circlip and discard. See **Fig. 32**. Slide the outer axle shaft boot off of the axle shaft.

#### Reassembly

**NOTE:** Make sure all components are clean and free of foreign

**material.**

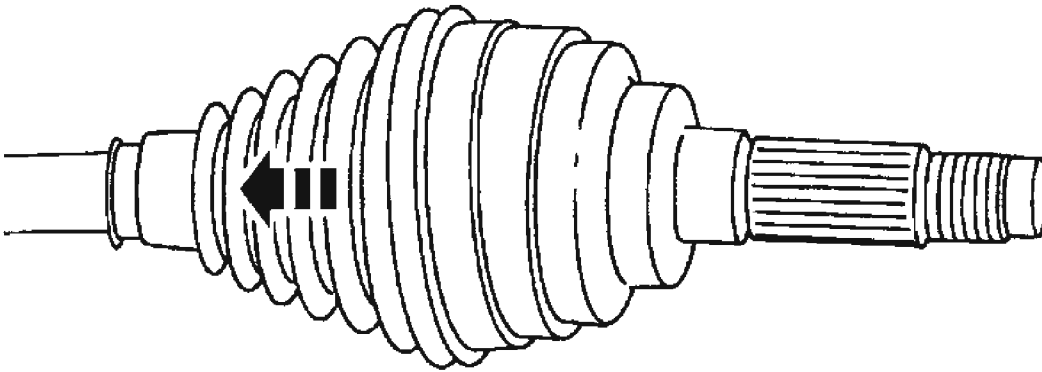
1. Lubricate the outer CV joint with Ford High Temperature Constant Velocity Joint Grease (E43Z-19590-A) or equivalent. See **Fig. 33** .
2. Install the outer axle shaft boot. See **Fig. 32** . Install a new axle shaft bearing retainer circlip.
3. Use a soft-face hammer to install the outer CV joint by gently tapping it onto the axle shaft. Spread any remaining grease evenly inside the boot.
4. Remove any excess grease on the mating surfaces and slide the outer axle shaft joint boot forward onto the outer CV joint. See **Fig. 34** .
5. Remove any excess air trapped in the outer axle shaft boot using a cloth covered screwdriver after adjusting the outer axle shaft boot spacing. See **Fig. 26** .
6. Using CV Boot Clamp (205-343, T95P-3514-A), install two new outer axle shaft boot clamps. See **Fig. 35** .



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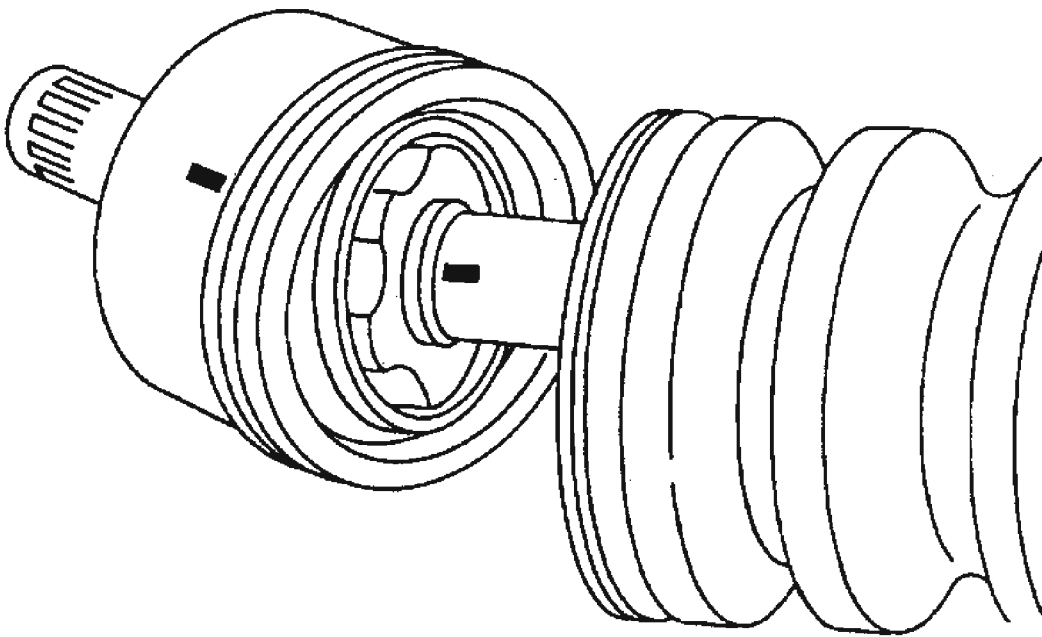
**Fig. 28: Identifying Outer CV Boot Clamps**  
Courtesy of GENERAL MOTORS CORP.





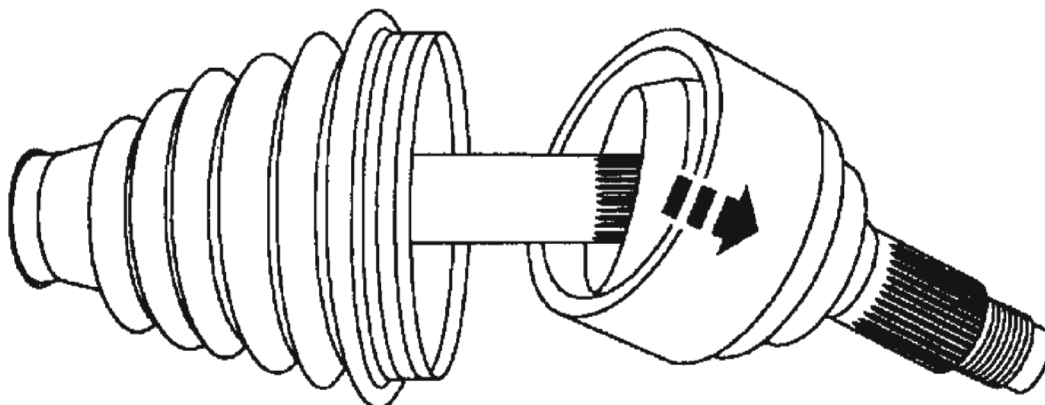
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**Fig. 29: Sliding Outer CV Joint Boot Back**  
Courtesy of FORD MOTOR CO.



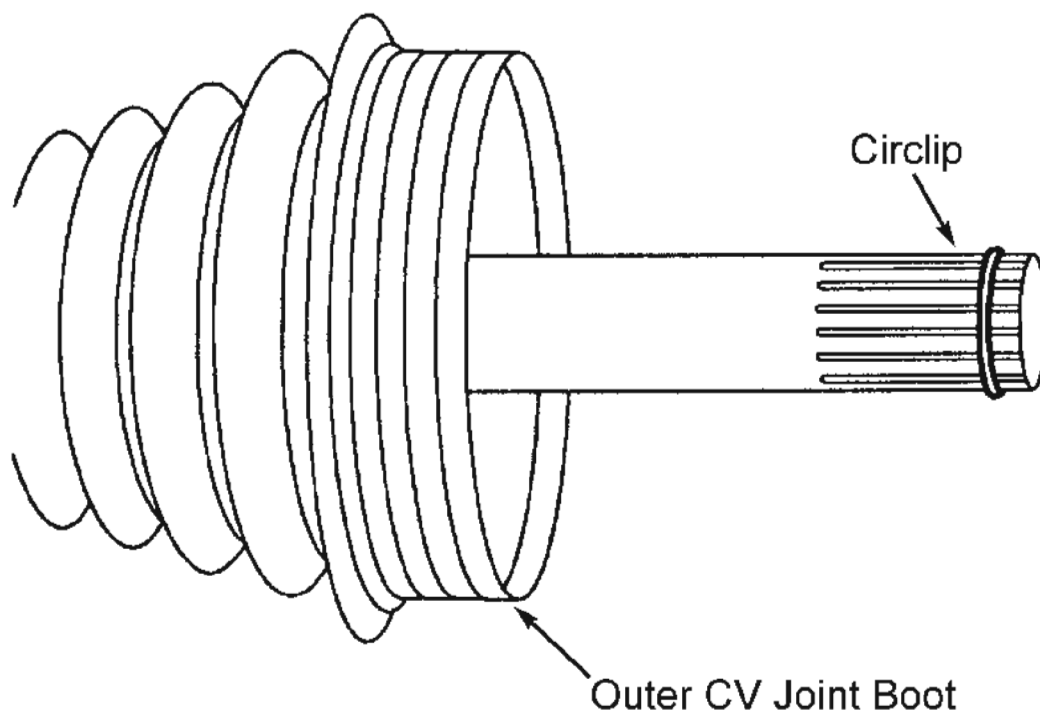
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**Fig. 30: Marking Outer CV Joint & Axle Shaft For Installation**  
Courtesy of FORD MOTOR CO.



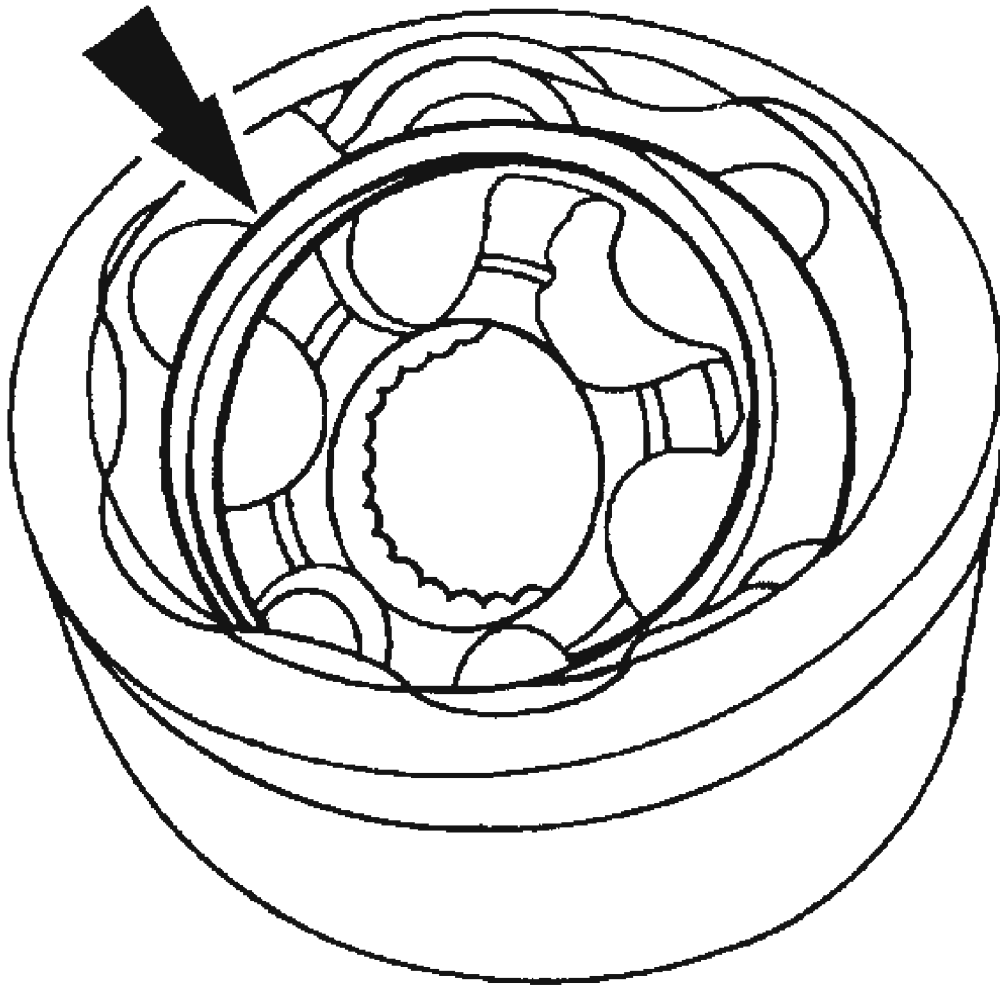
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**Fig. 31: Removing Outer CV Joint From Axle Shaft**  
Courtesy of FORD MOTOR CO.



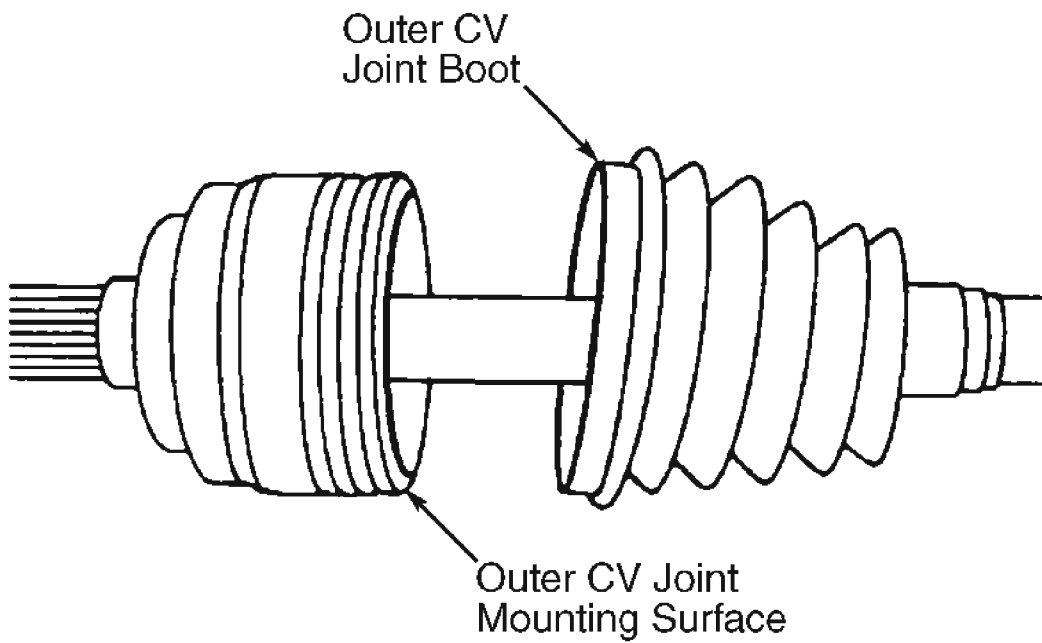
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**Fig. 32: Identifying Outer Axle Shaft Bearing Retainer Circlip**  
Courtesy of FORD MOTOR CO.



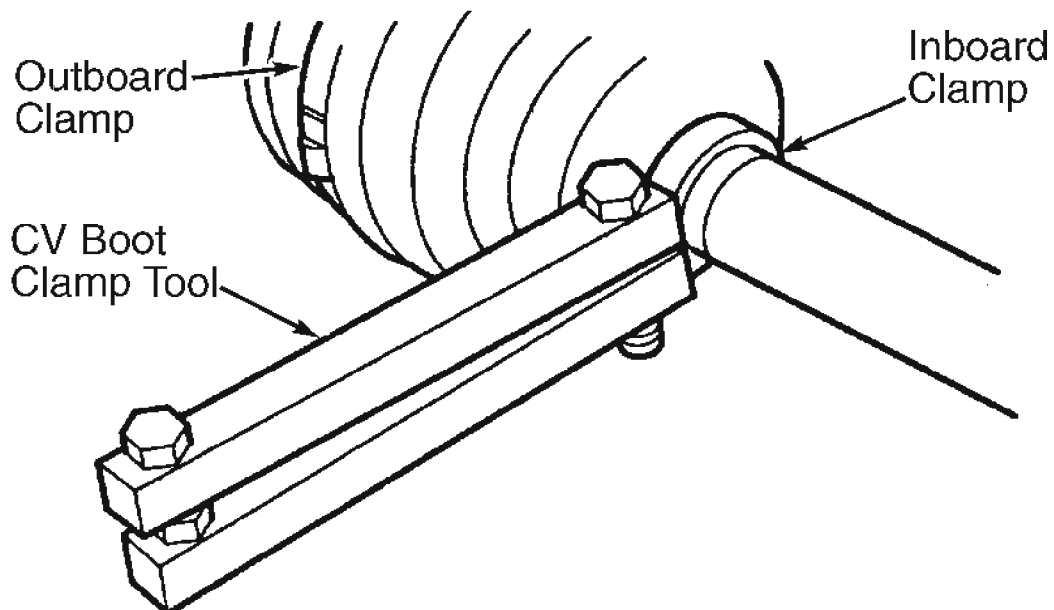
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**Fig. 33: Lubricating Outer CV Joint**  
Courtesy of FORD MOTOR CO.



G00307391

**Fig. 34: Installing Outer CV Joint Boot**  
Courtesy of FORD MOTOR CO.



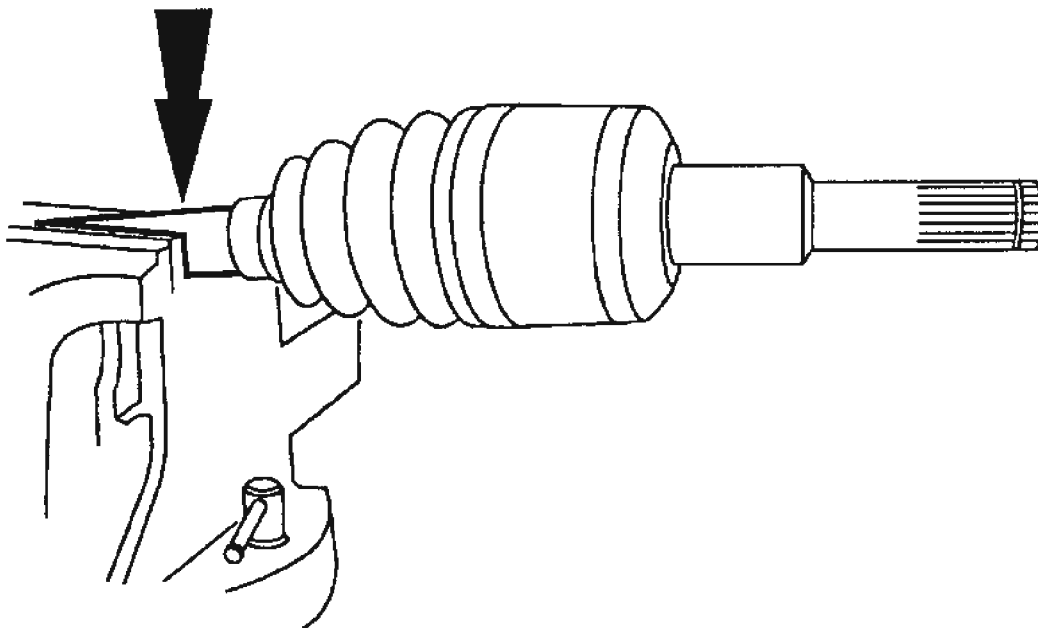
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**Fig. 35: Installing Outer CV Joint Boot Clamps**  
Courtesy of FORD MOTOR CO.

### AXLE SHAFTS (REAR)

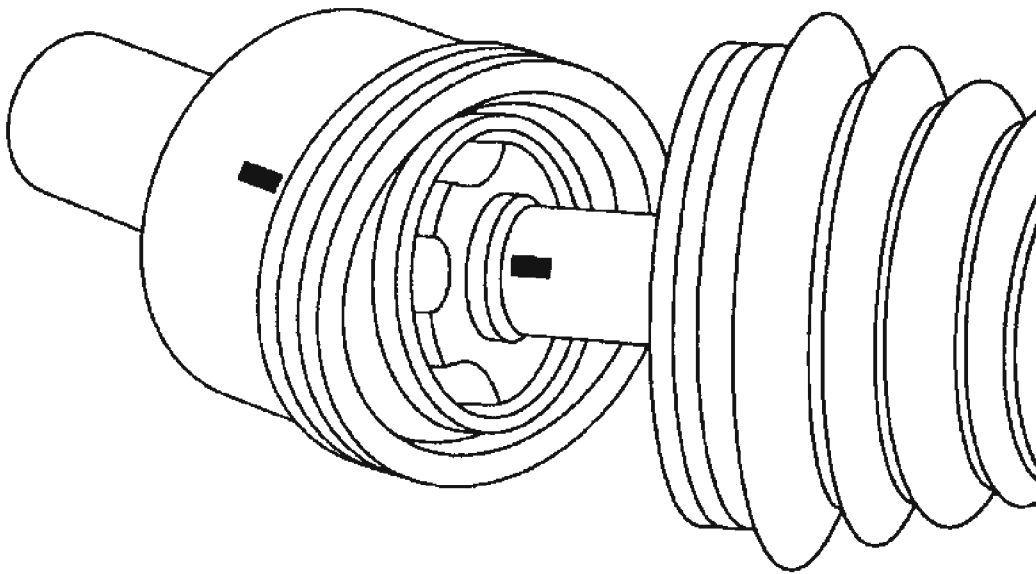
#### Disassembly (Inner Joint)

1. Remove the rear axle shaft assembly from the vehicle. See **AXLE SHAFTS (REAR)** under REMOVAL & INSTALLATION.
2. Secure the axle shaft and Constant Velocity (CV) joint in a vise using protective jaw covers. See **Fig. 36**.
3. Remove the inner axle shaft boot clamps. See **Fig. 16**. Slide the inner axle shaft boot off the inner CV joint housing. See **Fig. 17**.
4. If reinstalling the original inner joint, mark the inner joint and the axle shaft to make sure of correct installation. See **Fig. 37**.
5. Using a soft face hammer, separate the axle shaft from the inner joint housing. See **Fig. 38**.
6. Remove and discard the bearing retainer circlip. See **Fig. 39**. Remove the snap ring from the axle shaft. Remove the inner axle shaft boot from the axle shaft. See **Fig. 40**.



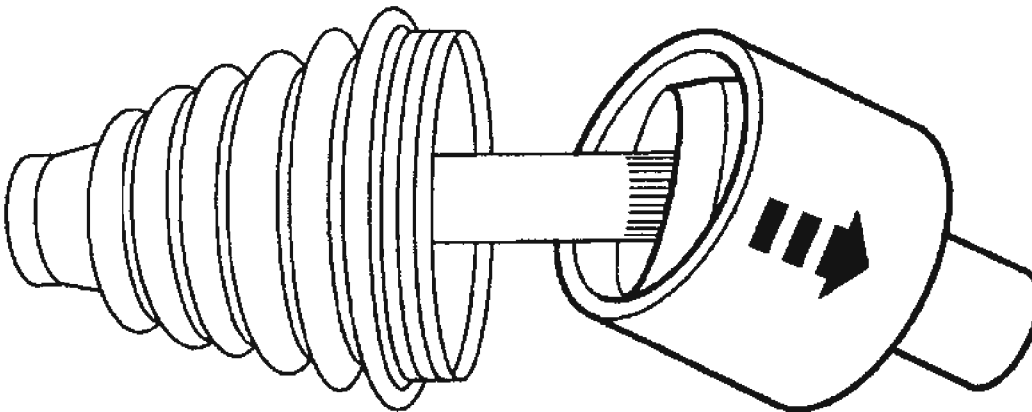
G00315303

**Fig. 36: Securing Rear Axle Shaft In Vise**  
Courtesy of FORD MOTOR CO.



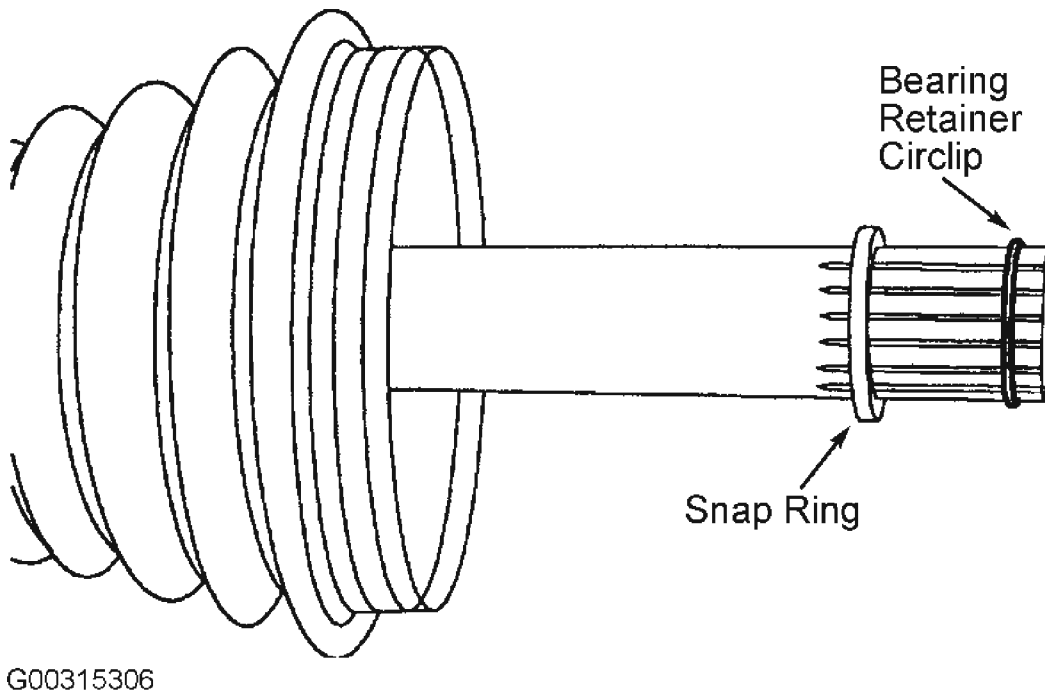
G00315304

**Fig. 37: Marking Rear Inner CV Joint & Axle Shaft**  
Courtesy of FORD MOTOR CO.

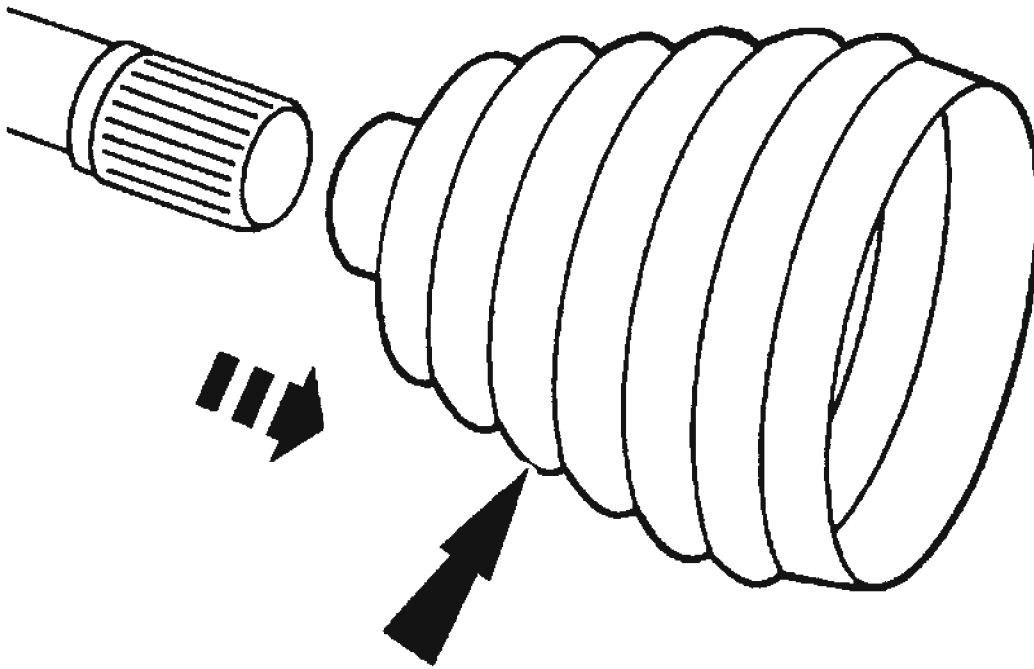


G00315305

**Fig. 38: Separating Rear Inner CV Joint From Axle Shaft**  
Courtesy of FORD MOTOR CO.



**Fig. 39: Identifying Rear Axle Shaft Inner CV Joint Bearing & Snap Ring**  
Courtesy of FORD MOTOR CO.



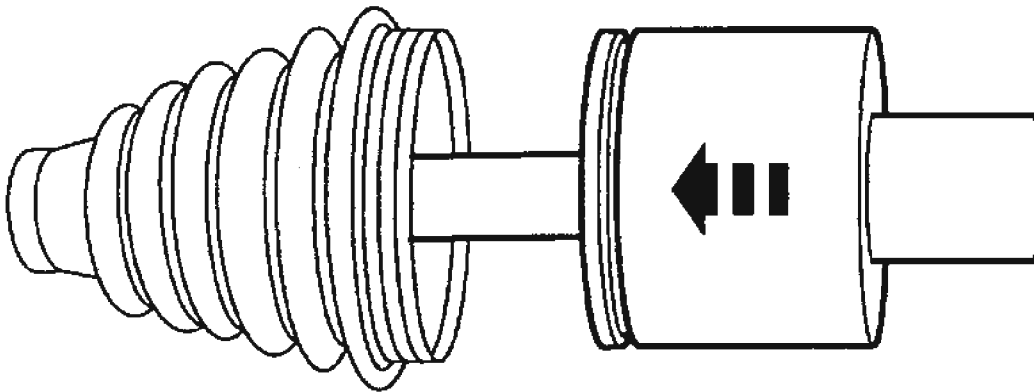
G00315307

**Fig. 40: Removing Rear Axle Shaft Inner Boot**  
Courtesy of FORD MOTOR CO.

#### Reassembly

1. Lubricate the inner CV joint with joint grease. Position the inner CV joint boot onto axle shaft. See **Fig. 23** . Install the snap ring. See **Fig. 39** . Install the bearing retainer circlip.
2. Using a soft face hammer, install the inner joint on the axle shaft. See **Fig. 41** . Spread any remaining grease evenly inside the boot. Position the inner CV joint boot.
3. Remove any excess air trapped in the boot using a cloth covered screwdriver after adjusting the axle shaft boot spacing. See **Fig. 26** .
4. Using CV Boot Clamp (205-343, T95P-3514-A), install the two inner boot clamps. See **Fig. 27** .
5. Install the rear axle shaft assembly in the vehicle. See **AXLE SHAFTS (REAR)** under REMOVAL & INSTALLATION.





G00315308

**Fig. 41: Installing Inner CV Joint Onto Rear Axle Shaft**  
Courtesy of FORD MOTOR CO.

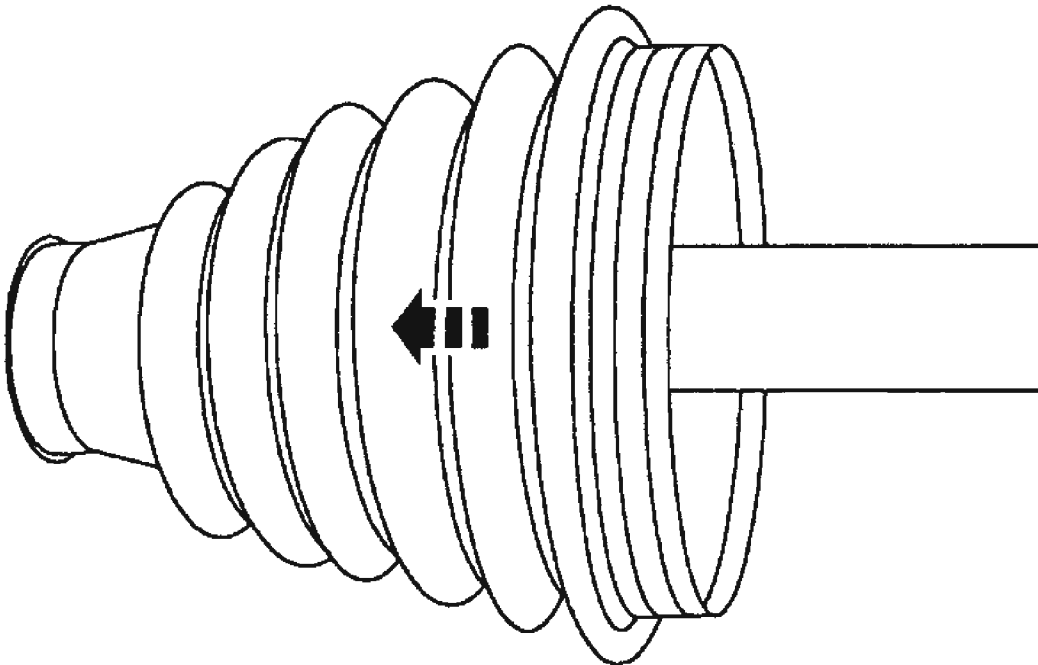
#### Disassembly (Outer Joint)

1. Remove the rear axle shaft assembly from the vehicle. See **AXLE SHAFTS (REAR)** under REMOVAL & INSTALLATION.
2. Secure the axle shaft and Constant Velocity (CV) joint in a vise using protective jaw covers. See **Fig. 36**.
3. Remove the two outer axle shaft boot clamps. See **Fig. 28**. Slide the outer axle shaft joint boot back out of the way exposing the outer CV joint. See **Fig. 29**.
4. If reinstalling the original outer CV joint, mark the outer CV joint and axle shaft to make sure of correct installation. See **Fig. 30**.
5. Use a soft-face hammer to separate the outer CV joint by gently tapping it off the axle shaft. See **Fig. 31**.
6. Remove the axle shaft bearing retainer circlip and discard. See **Fig. 39**. Remove the snap ring from the axle shaft. Slide the outer axle shaft boot off of the axle shaft.

#### Reassembly

1. Lubricate the outer CV joint with joint grease. Install the outer axle shaft boot. See **Fig. 42**.
2. Install the snap ring on the axle shaft. See **Fig. 39**. Install a new axle shaft bearing retainer circlip.
3. Use a soft-face hammer to install the outer CV joint by gently tapping it onto the axle shaft. See **Fig. 43**. Spread any remaining grease evenly inside the boot.
4. Remove any excess grease on the mating surfaces and slide the outer axle shaft joint boot forward onto the outer CV joint. See **Fig. 34**.

5. Remove any excess air trapped in the outer axle shaft boot using a cloth covered screwdriver after adjusting the outer axle shaft boot spacing. See **Fig. 26** .
6. Using CV Boot Clamp (205-343, T95P-3514-A), install two new outer axle shaft boot clamps. See **Fig. 35** .
7. Install the rear axle shaft assembly in the vehicle. See **AXLE SHAFTS (REAR)** under REMOVAL & INSTALLATION.

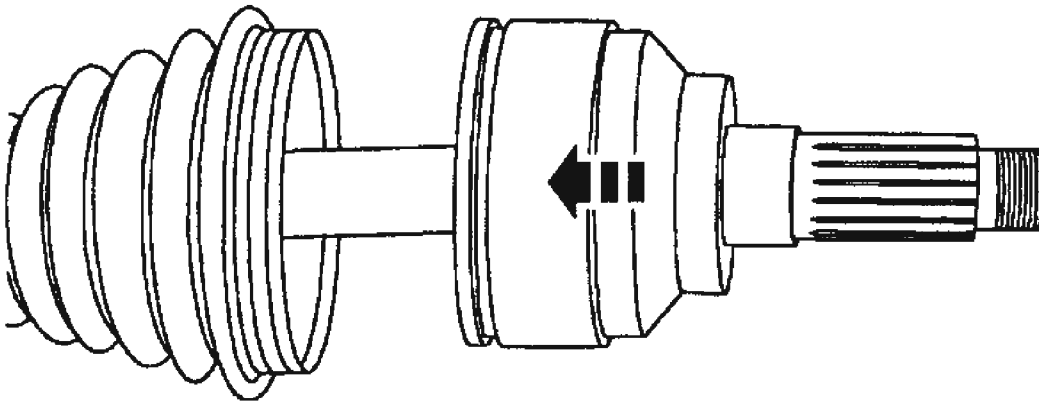


G00315309

**Fig. 42: Installing Outer CV Boot Onto Axle Shaft**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

2003-04 DRIVE AXLES Axle Shafts - Front & Rear - Escape



G00315310

**Fig. 43: Installing Outer CV Joint Onto Axle Shaft**  
Courtesy of FORD MOTOR CO.

### TORQUE SPECIFICATIONS

#### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Front Axle Shaft Hub Nut	214 (290)
Front Intermediate Shaft Bearing Nuts	20 (27)
Front Lower Ball Joint Pinch Nut	52 (70)
Front Tie Rod End Nut	41 (55)
Rear Axle Wheel Hub Nut	214 (290)
Rear Knuckle Bolt	85 (115)
Rear Lower Ball Joint Nut	85 (115)
Wheel Lug Nuts	98 (133)

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Front Drive Halfshafts - Escape

## 2004 DRIVELINE/AXLE

### Front Drive Halfshafts - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Lubricants</b>	
High Temperature Constant Velocity Joint Grease E43Z-19590-A	ESP-M1C207-A

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Ball joint pinch nut	70	52	-
Inner halfshaft bearing nuts	27	20	-
Wheel hub nut	290	214	-
Tie rod and nut	55	41	-

## DESCRIPTION AND OPERATION

### FRONT DRIVE HALFSHAFTS

The front wheel drive halfshafts consist of the following components:

- inboard CV joints
- outboard CV joints
- intermediate shaft/bearing
- halfshaft

The intermediate shaft contains a pressed on bearing which is can only be repaired as an assembly.

### HALFSHAFT JOINT

The front wheel halfshaft joints consist of the following components:

- inboard CV joints
- outboard CV joints

- halfshaft joint boot clamps
- halfshaft joint boots
- tripod joint housings
- retainer circlips

## **DIAGNOSIS AND TESTING**

### **FRONT DRIVE HALFSHAFTS**


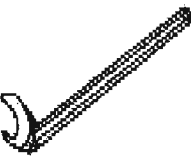
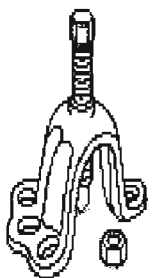

Refer to **DRIVELINE SYSTEM-GENERAL INFORMATION** .

## **REMOVAL AND INSTALLATION**

### **HALFSHAFT**

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Front Drive Halfshafts - Escape

	Slide Hammer 100-001 (T50T-100-A)
	Front Drive Halfshaft Remover 205-241 (T86P-3514-A)
	Front Hub Remover 205-D070 (D93P-1175-B) or equivalent
	Installer, Halfshaft 204-161 (T97P-1175-A) or equivalent

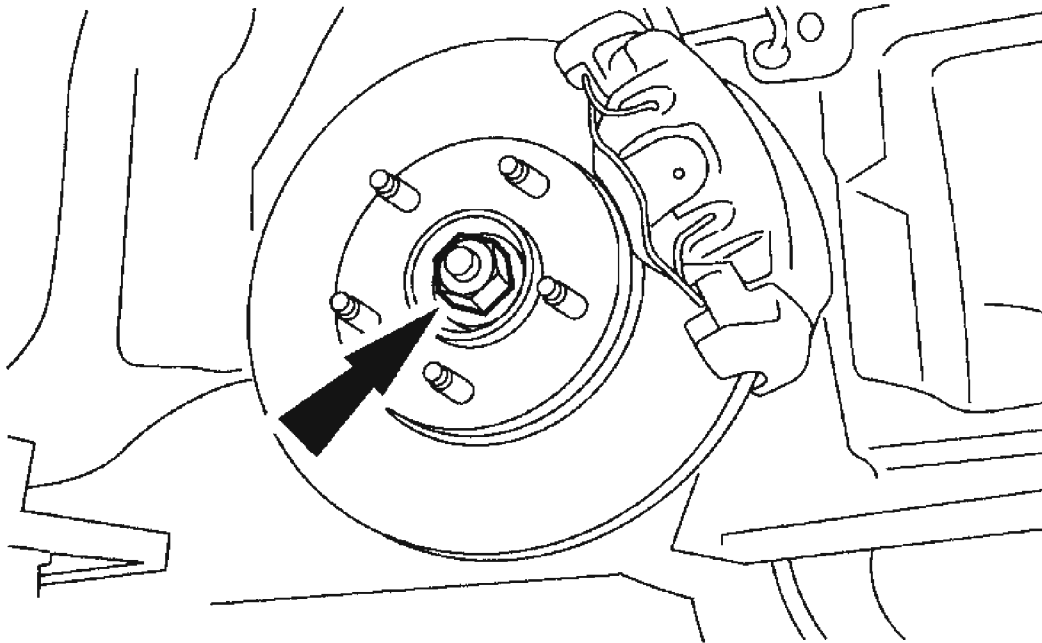
G02743625

**Fig. 1: Identifying Special Tool(s)**  
Courtesy of FORD MOTOR CO.

#### Removal

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

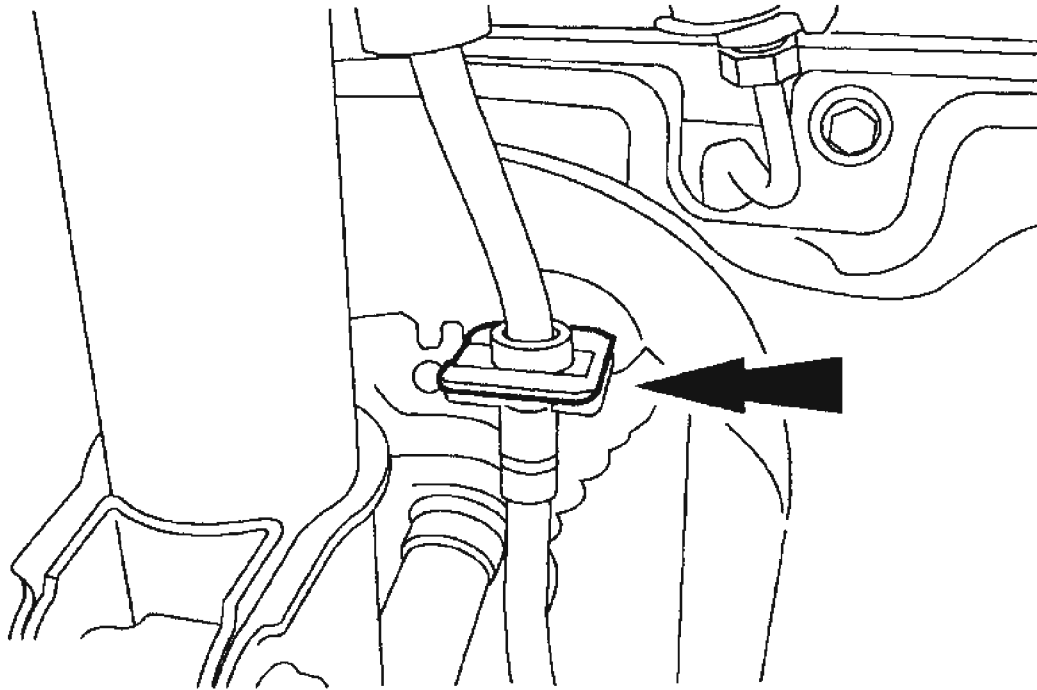
1. Remove the front wheels and tires. .
2. Remove and discard the front axle wheel hub nut.



G02743626

**Fig. 2: Removing Front Axle Wheel Hub Nut**  
**Courtesy of FORD MOTOR CO.**

3. Remove the clip.



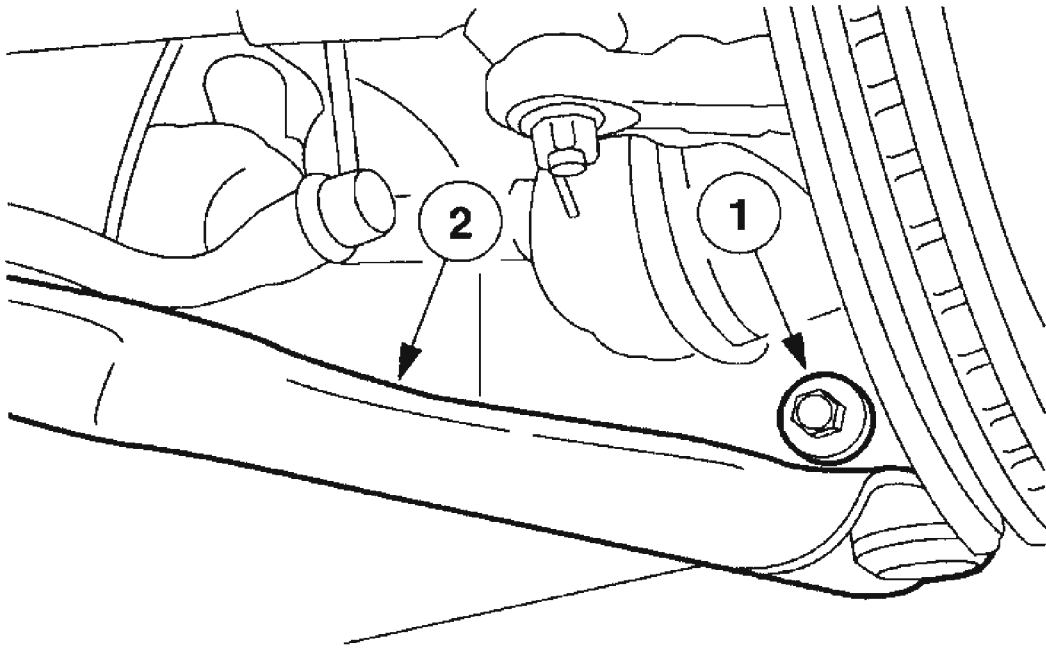
G02743627

**Fig. 3: Removing Clip**

**Courtesy of FORD MOTOR CO.**

4. Separate the lower control arm from the front wheel knuckle.
  1. Remove the pinch bolt and nut.
  2. Separate the lower control arm from the front wheel knuckle.

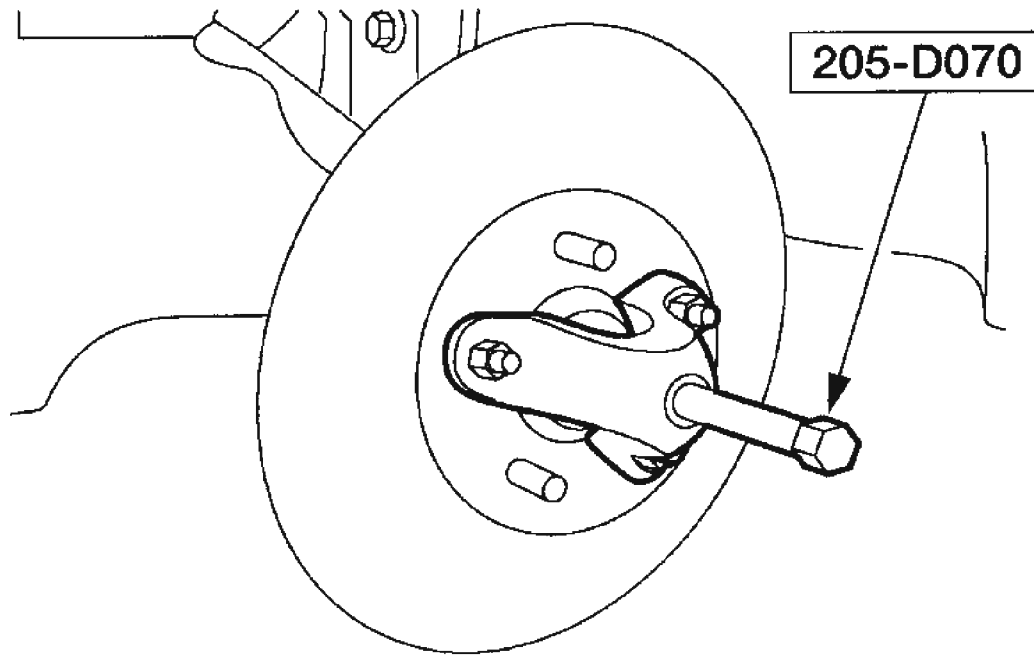




G02743628

**Fig. 4: Separating The Lower Control Arm From The Front Wheel Knuckle**  
**Courtesy of FORD MOTOR CO.**

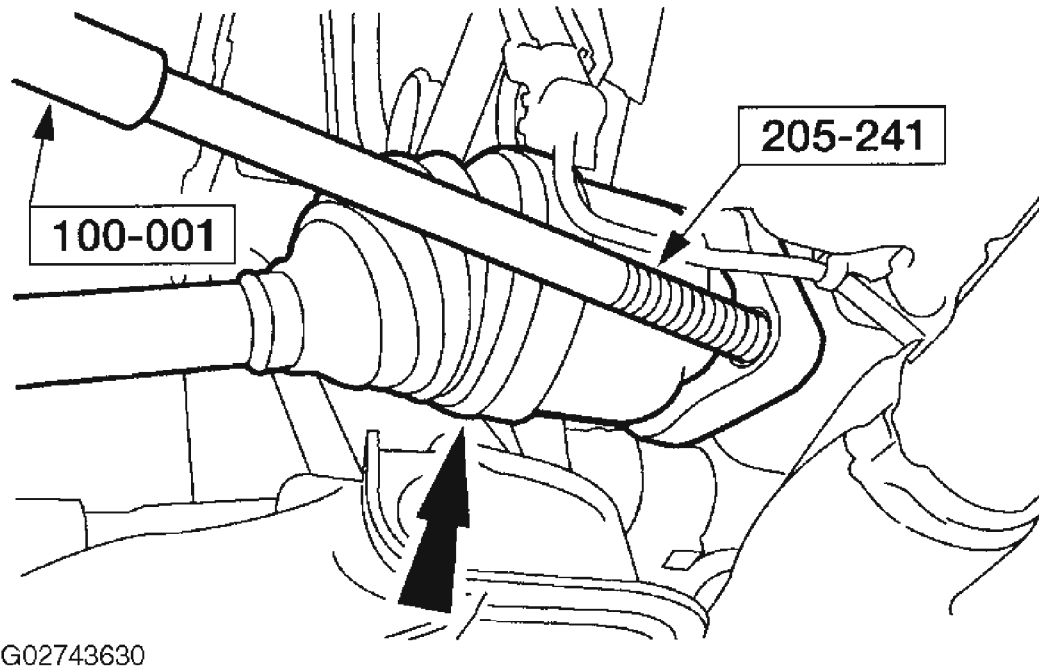
5. Using the special tool, separate the halfshaft from the front wheel knuckle.



G02743629

**Fig. 5: Separating Halfshaft From Front Wheel Knuckle**  
Courtesy of FORD MOTOR CO.

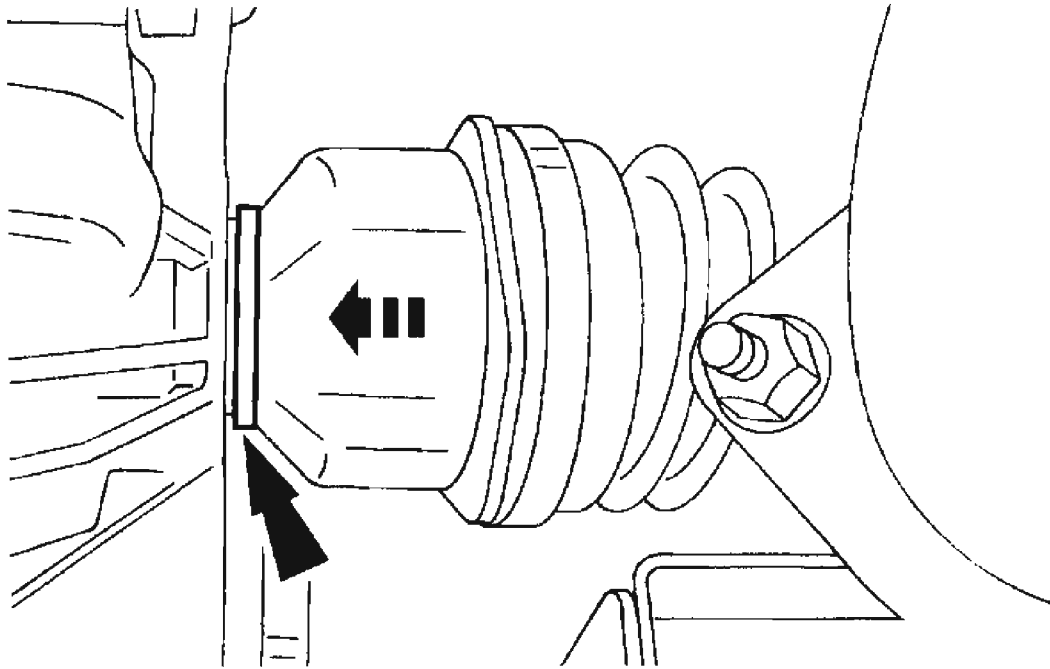
6. Using the special tools, remove the halfshaft.



**Fig. 6: Removing Halfshaft**  
Courtesy of FORD MOTOR CO.

**Installation**

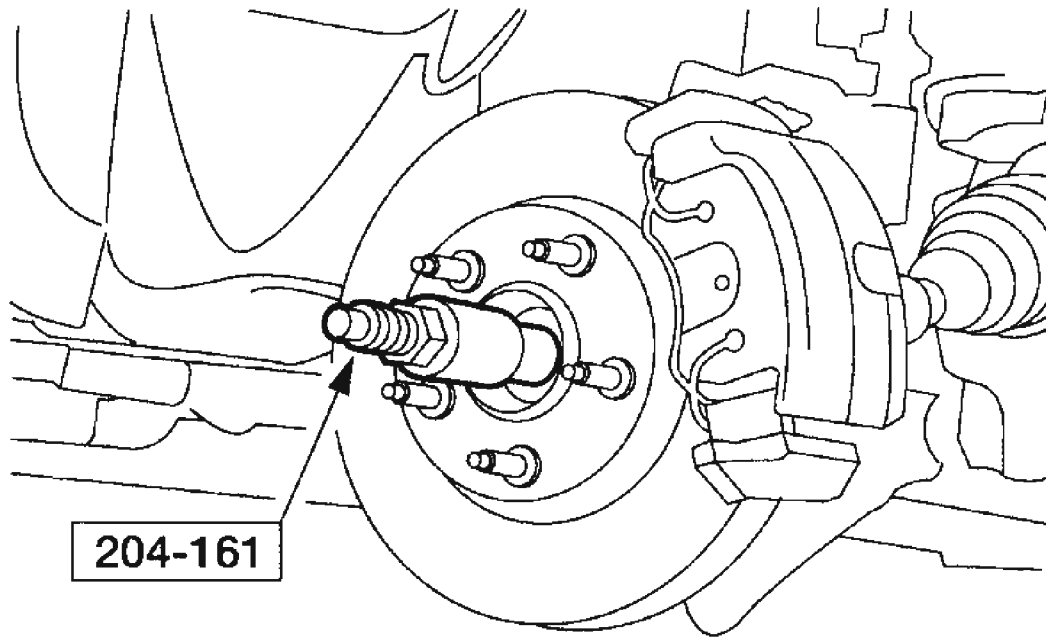
**NOTE:** When seated correctly, the driveshaft bearing retainer circlip can be felt as it snaps into the differential side gear groove.



G02743631

**Fig. 7: Positioning Front Wheel Driveshaft**  
**Courtesy of FORD MOTOR CO.**

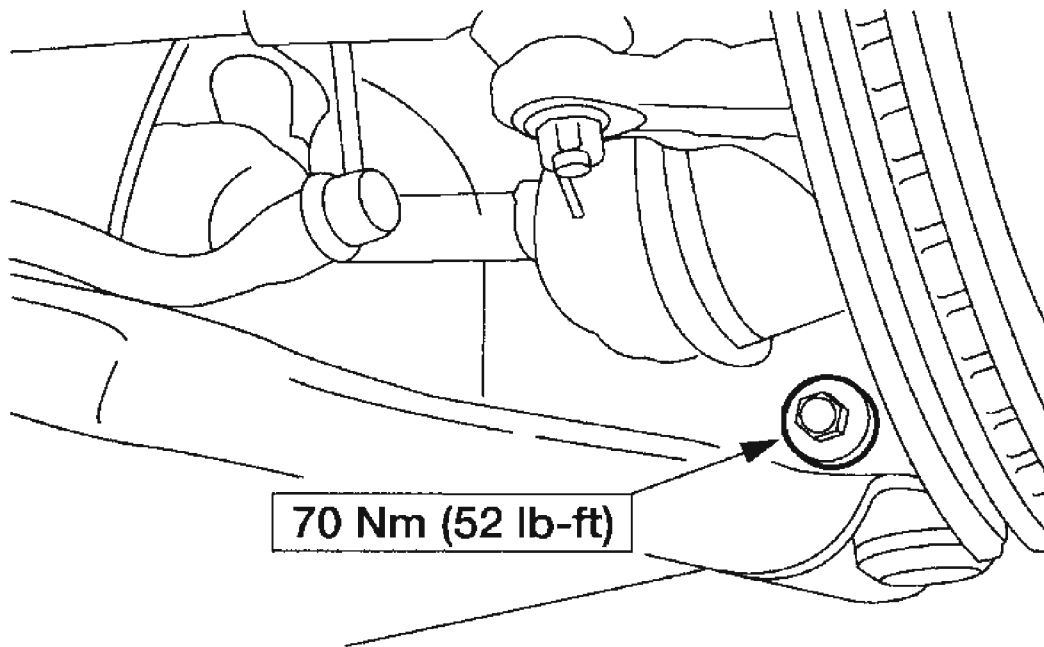
1. Position the front wheel driveshaft and joint so the splines line up with the differential side gear splines. Push the front wheel driveshaft and joint into the differential side gear.
2. Using the special tool, position the halfshaft into the front wheel knuckle.



G02743632

**Fig. 8: Positioning Halfshaft Into Front Wheel Knuckle**  
**Courtesy of FORD MOTOR CO.**

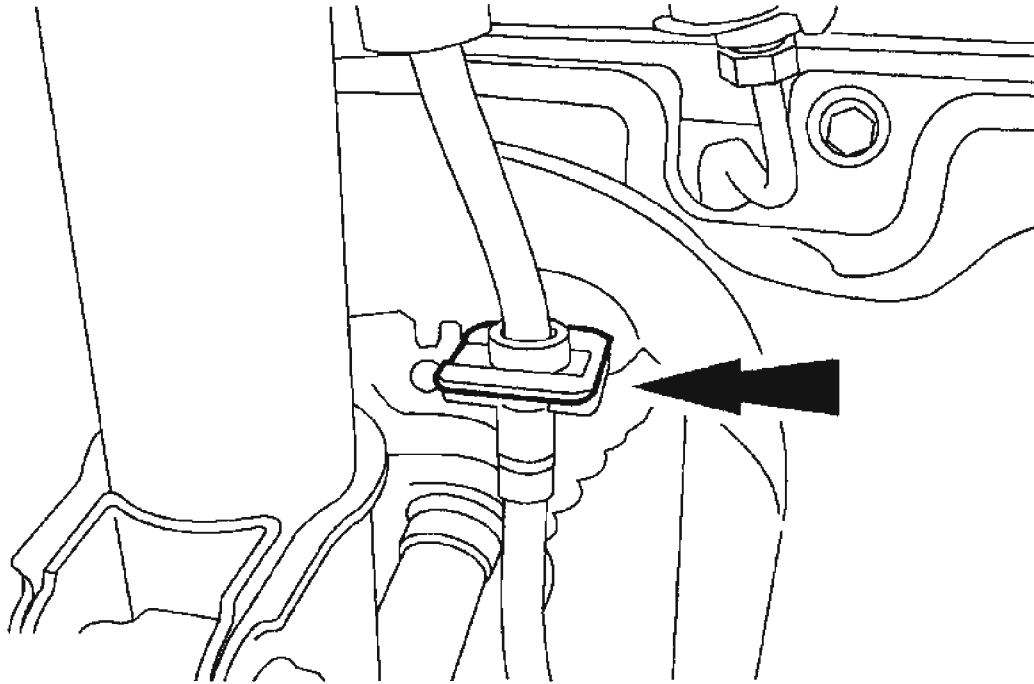
3. Install the lower control arm and the ball joint pinch bolt and nut.



G02743633

**Fig. 9: Installing Lower Control Arm And Ball Joint Pinch Bolt And Nut**  
Courtesy of FORD MOTOR CO.

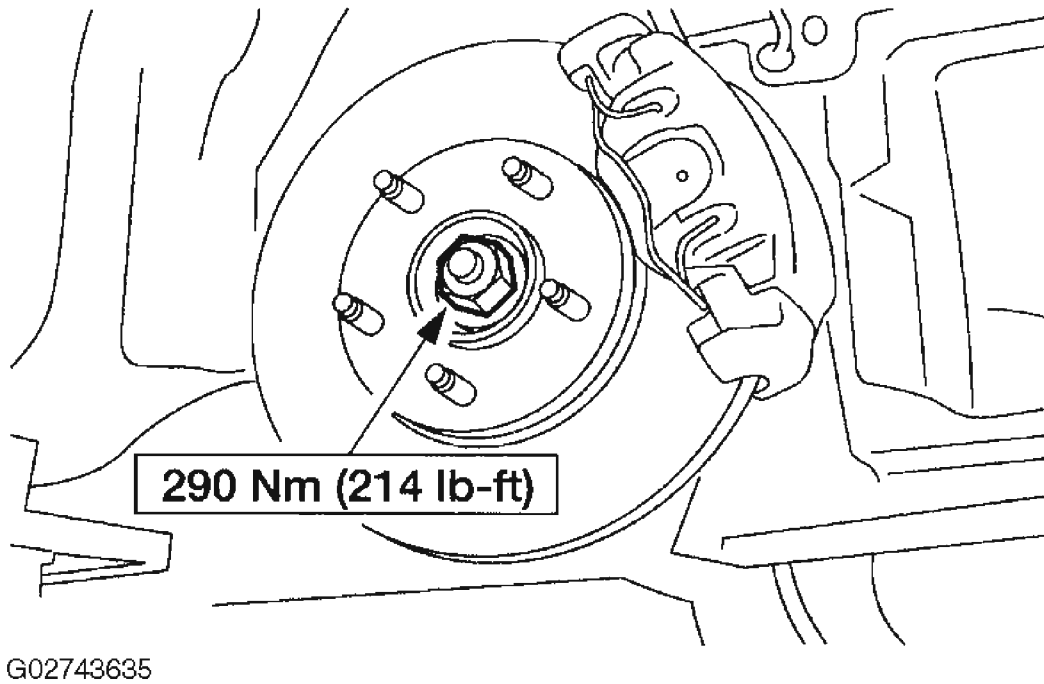
4. Install the clip.



G02743634

**Fig. 10: Installing Clip**  
**Courtesy of FORD MOTOR CO.**

5. Install a new front axle wheel hub nut.



**Fig. 11: Installing Front Axle Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

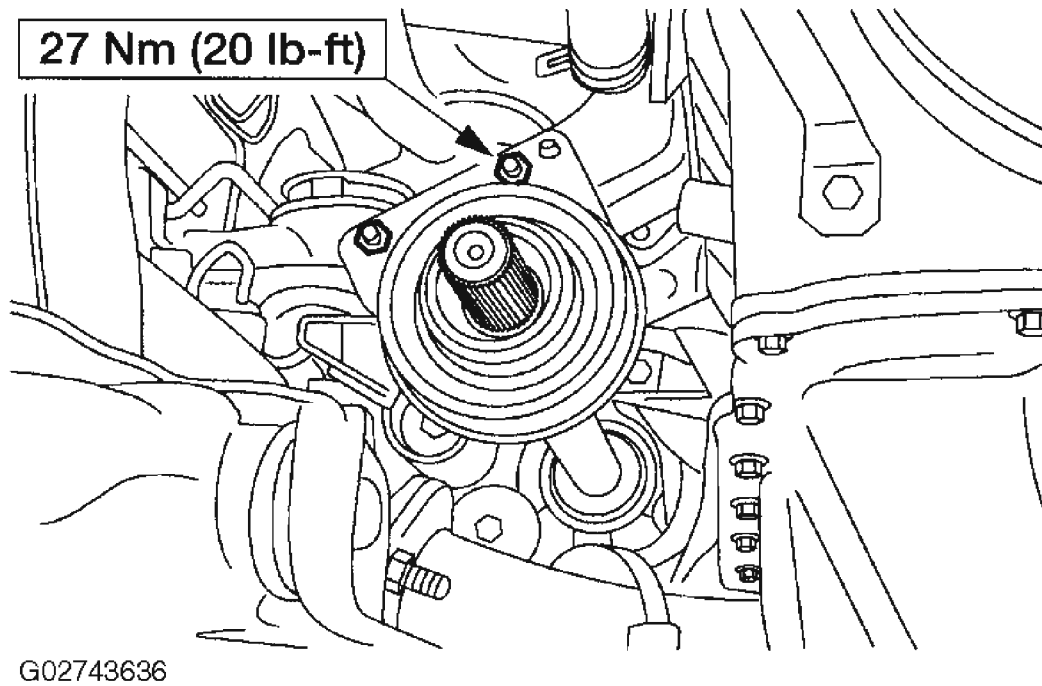
6. Install the front wheels and tires. Tighten wheel lug nuts to specification. For additional information, refer to **FRONT** article in Suspension
7. Check and refill the transaxle fluid. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION** or **MANUAL TRANSAXLE/TRANSMISSION** .

## INTERMEDIATE SHAFT

### Removal And Installation

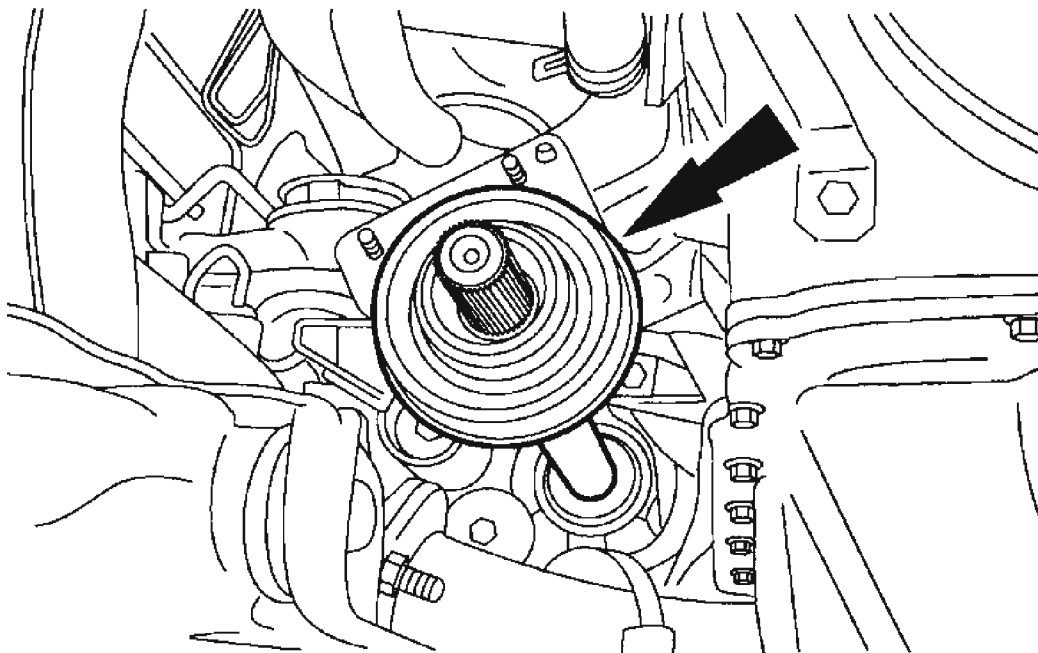
1. Remove the RH front drive halfshaft. For additional information, refer to **HALFSHAFT** .
2. Remove the two inner halfshaft bearing retainer nuts.





**Fig. 12: Removing Inner Halfshaft Bearing Retainer Nuts**  
Courtesy of FORD MOTOR CO.

3. Remove the inner halfshaft.



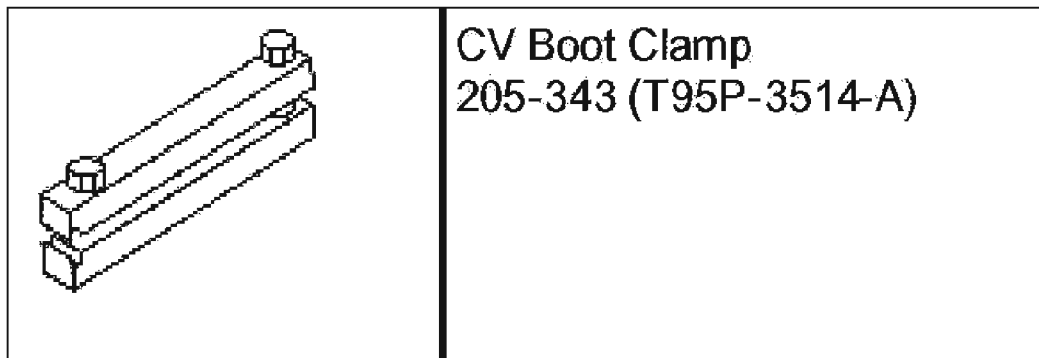
G02743637

**Fig. 13: Removing Inner Halfshaft**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## DISASSEMBLY AND ASSEMBLY

### HALFSHAFT



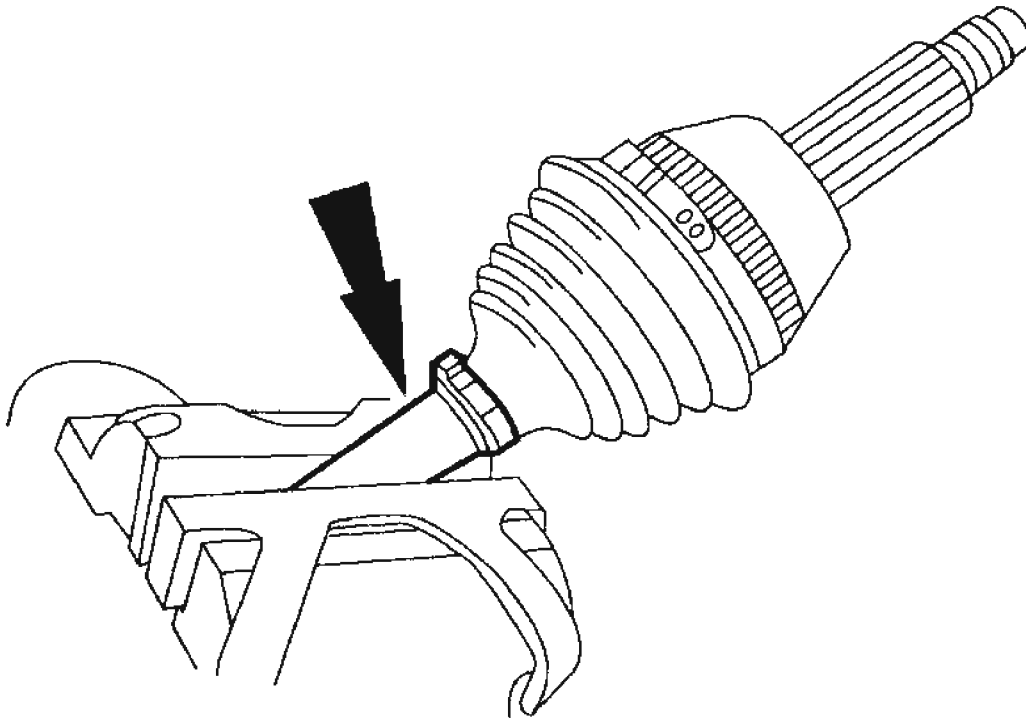
G02743638

**Fig. 14: Identifying Special Tool(s)**

Courtesy of FORD MOTOR CO.

**Disassembly**

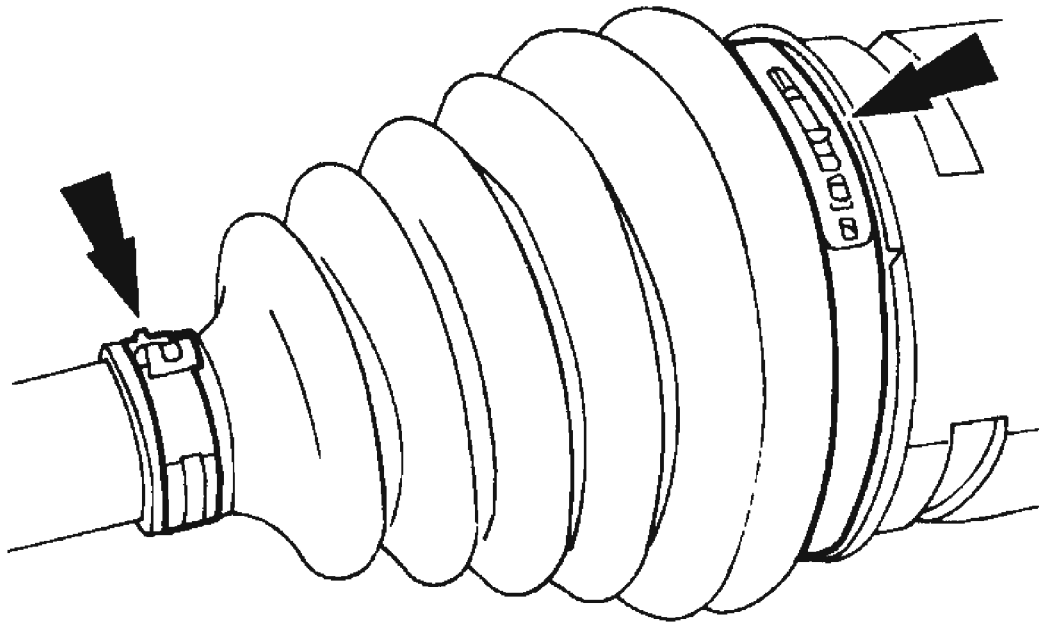
1. Remove the halfshaft. For additional information, refer to **HALFSHAFT** .
2. Secure the halfshaft and constant velocity (CV) joint in a vise using protective jaw covers.



G02743639

**Fig. 15: Disassembling Halfshaft And Constant Velocity (CV) Joint**  
Courtesy of FORD MOTOR CO.

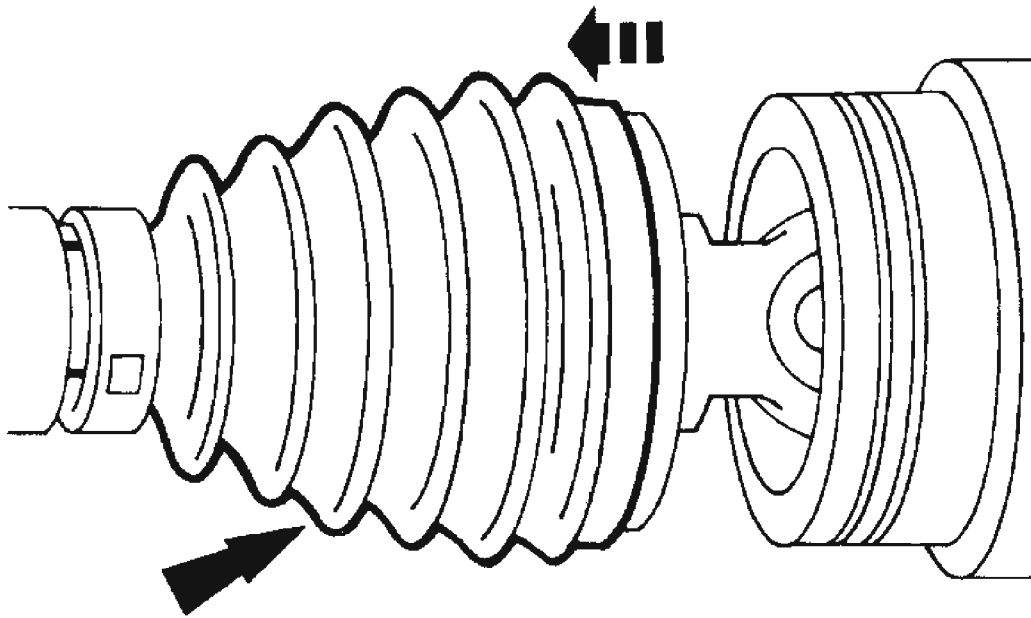
3. Remove the inboard halfshaft boot clamps.



G02743640

**Fig. 16: Removing Inboard Halfshaft Boot Clamps**  
Courtesy of FORD MOTOR CO.

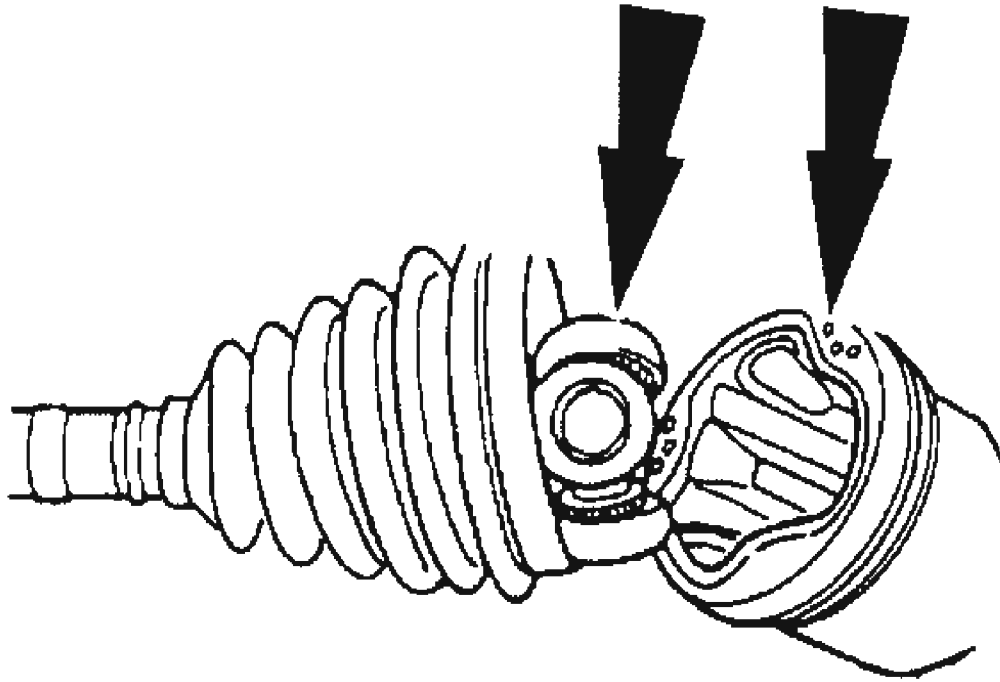
4. Slide the inboard halfshaft boot off the inboard CV joint housing.



G02743641

**Fig. 17: Sliding Inboard Halfshaft Boot Off Inboard CV Joint Housing**  
Courtesy of FORD MOTOR CO.

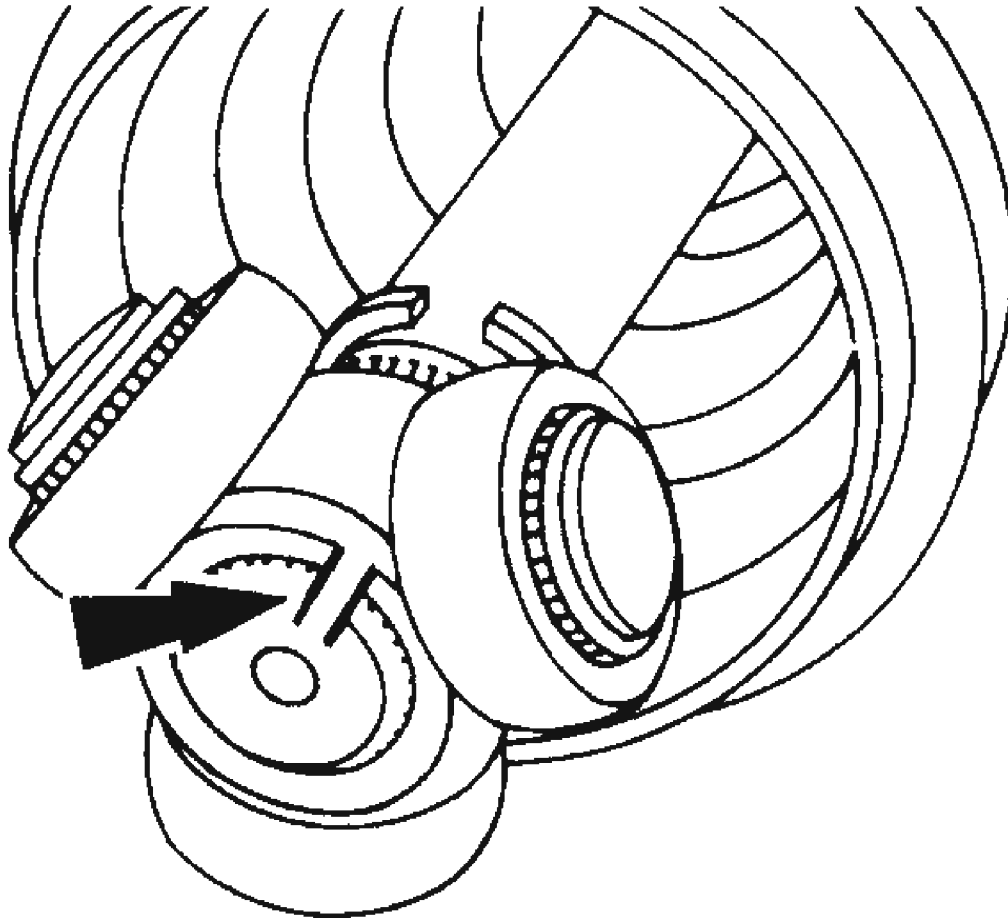
5. Separate the tripod joint from the inboard CV joint housing.



G02743642

**Fig. 18: Separating Tripod Joint From Inboard CV Joint Housing**  
**Courtesy of FORD MOTOR CO.**

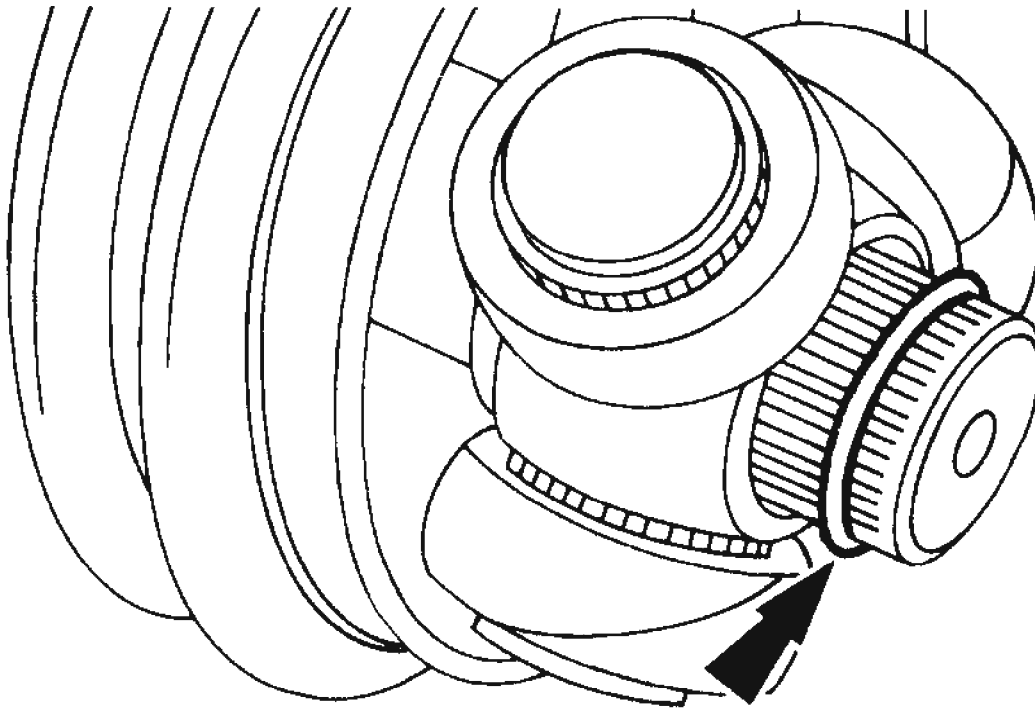
6. If reinstalling the original tripod joint, mark the tripod joint and the halfshaft to make sure of correct installation.



G02743643

**Fig. 19: If Reinstalling Original Tripod Joint, Mark Tripod Joint & The Halfshaft To Ensure Correct Installation**  
Courtesy of FORD MOTOR CO.

7. Remove the snap ring.

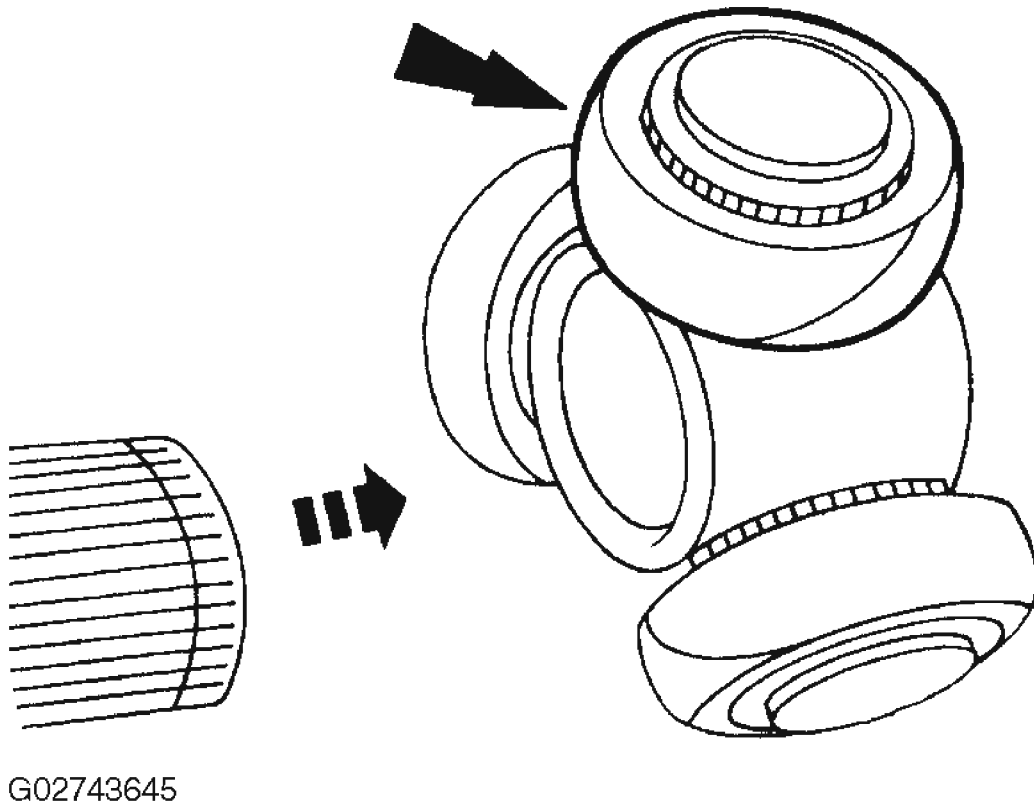


G02743644

**Fig. 20: Removing Snap Ring**  
**Courtesy of FORD MOTOR CO.**

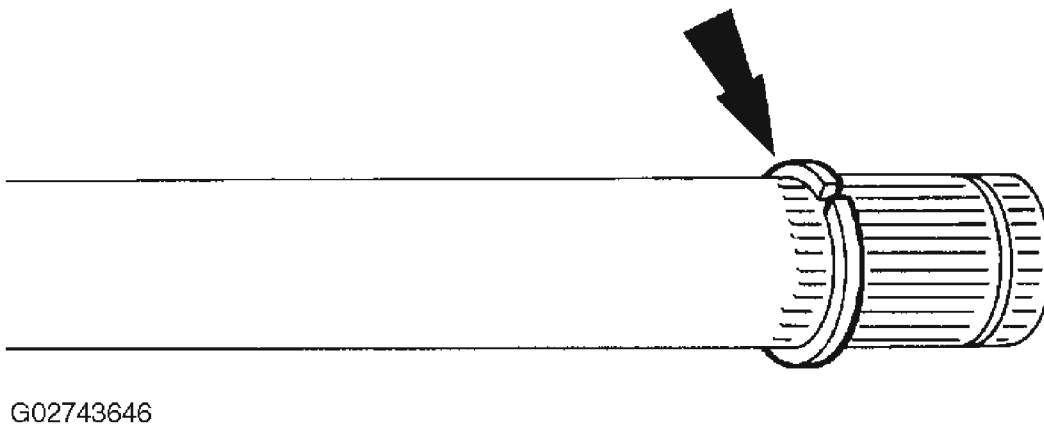
8. Remove the tripod joint.





**Fig. 21: Removing Tripod Joint**  
Courtesy of FORD MOTOR CO.

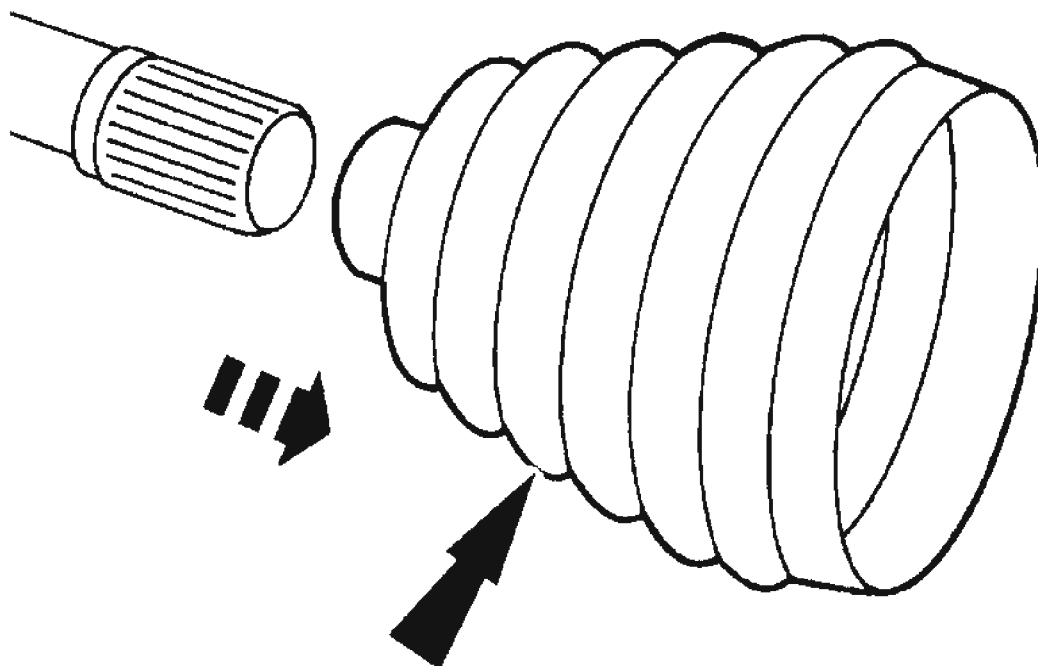
9. Remove the snap ring.



**Fig. 22: Removing Snap Ring**

Courtesy of FORD MOTOR CO.

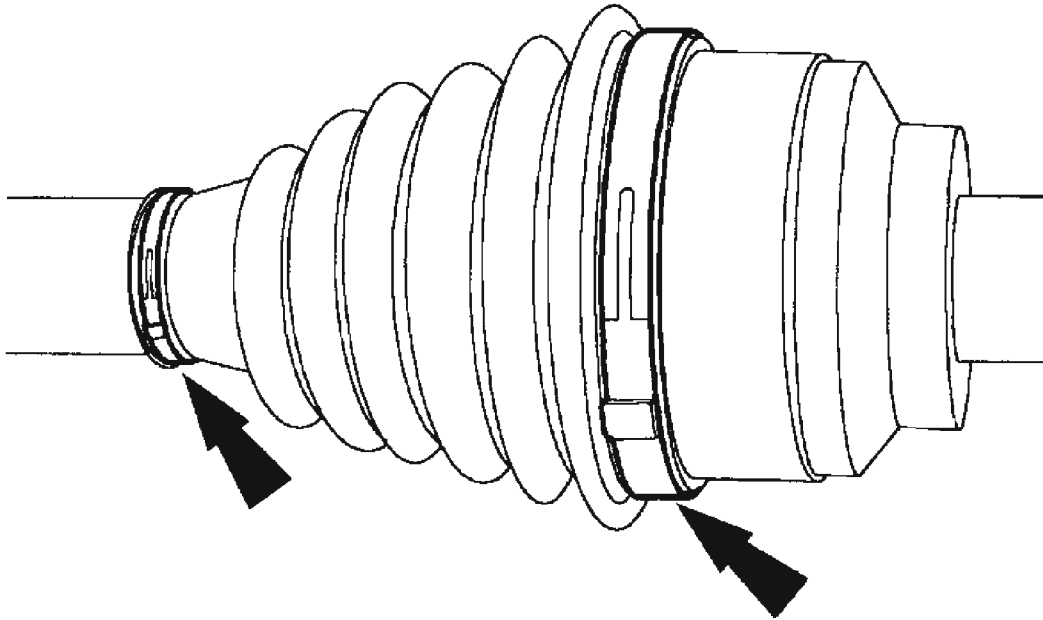
10. Remove the inboard halfshaft boot from the halfshaft.



G02743647

**Fig. 23: Removing Inboard Halfshaft Boot From Halfshaft**  
Courtesy of FORD MOTOR CO.

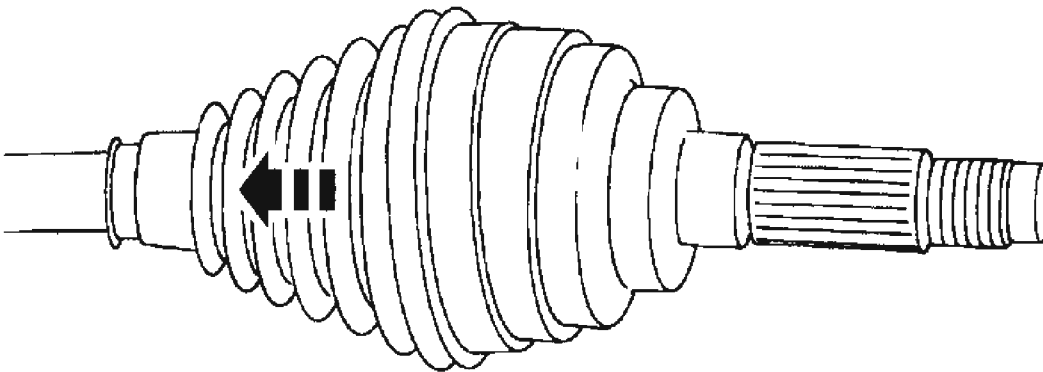
11. Remove the two outboard halfshaft boot clamps.



G02743648

**Fig. 24: Removing Outboard Halfshaft Boot Clamps**  
Courtesy of FORD MOTOR CO.

12. Slide the outboard halfshaft joint boot back out of the way exposing the outboard CV joint.

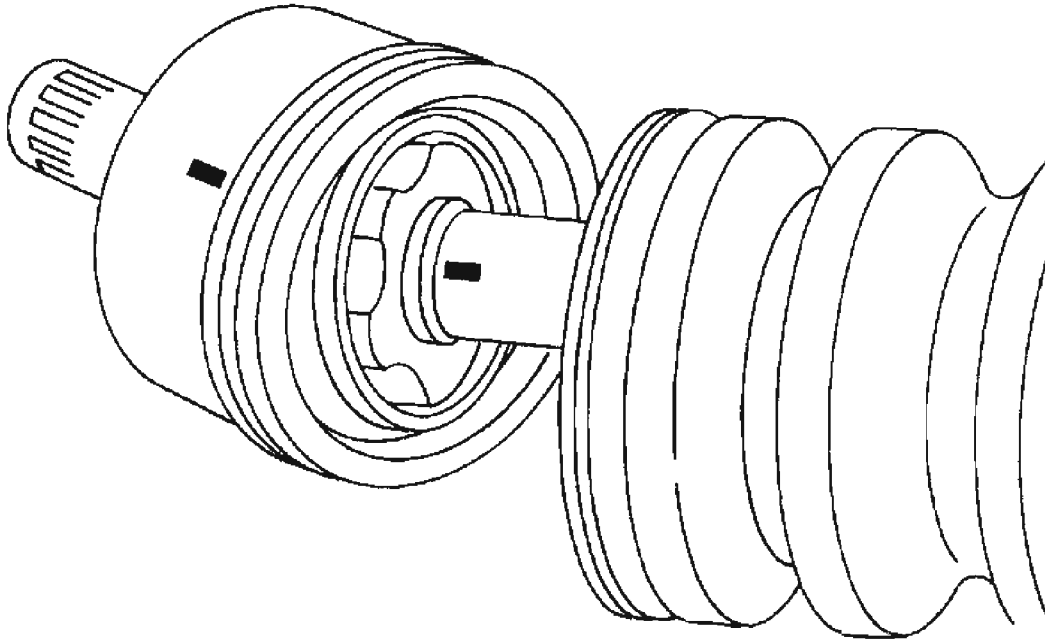


G02743649

**Fig. 25: Sliding Outboard Halfshaft Joint Boot Back**  
Courtesy of FORD MOTOR CO.

13. If reinstalling the original outboard CV joint, mark the outboard CV joint and halfshaft

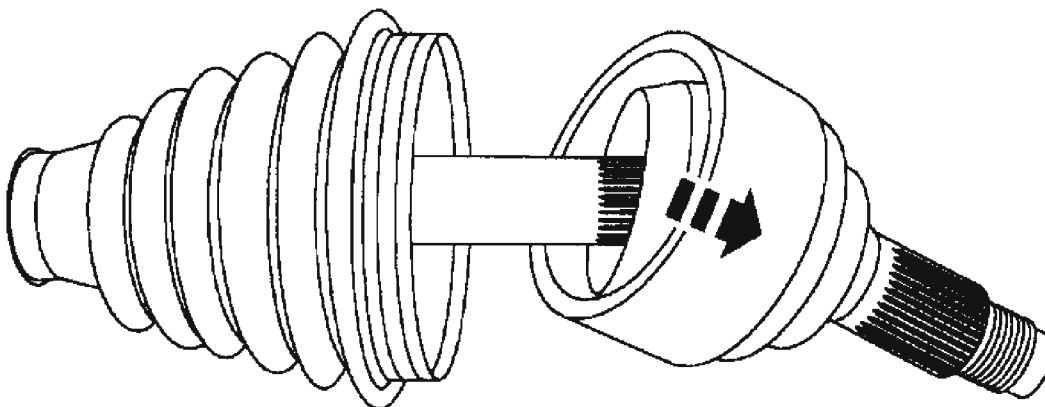
to make sure of correct installation.



G02743650

**Fig. 26: If Reinstalling Original Outboard CV Joint, Mark Outboard CV Joint & Halfshaft To Ensure Correct Installation**  
Courtesy of FORD MOTOR CO.

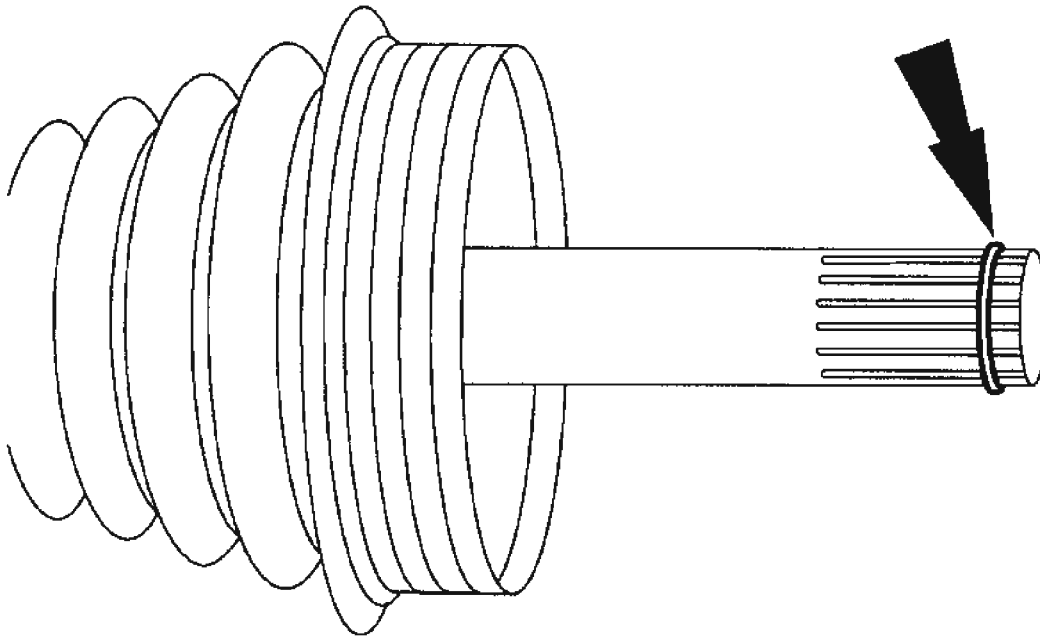
14. Use a soft-face hammer to separate the outboard CV joint by gently tapping it off the halfshaft.



G02743651

**Fig. 27: Using Soft-Face Hammer To Separate Outboard CV Joint**  
Courtesy of FORD MOTOR CO.

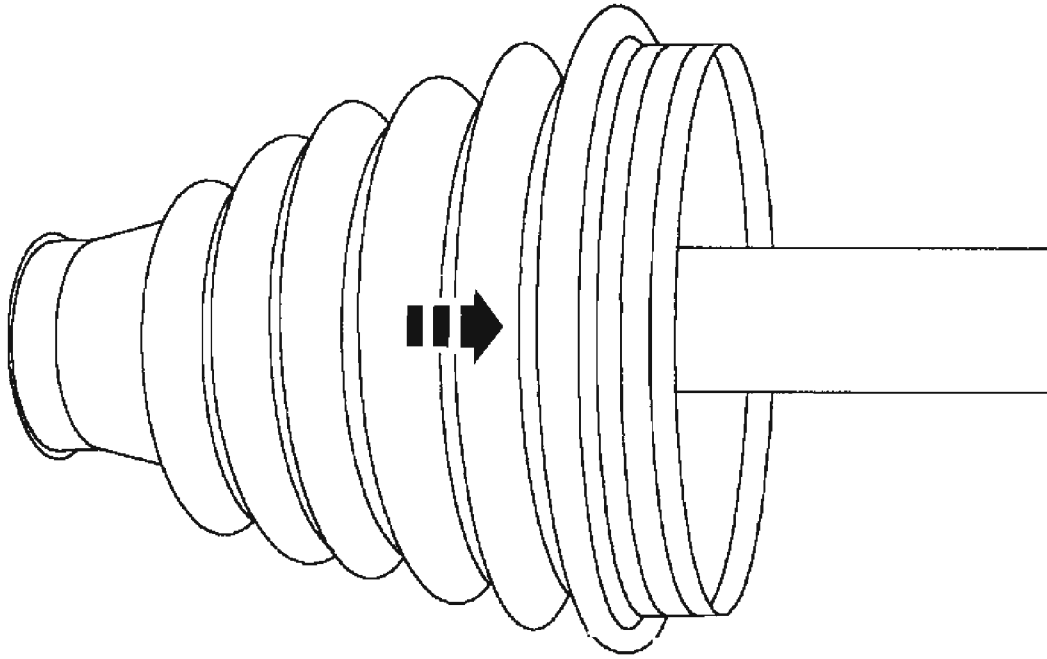
15. Remove the halfshaft bearing retainer circlip and discard.



G02743652

**Fig. 28: Removing Halfshaft Bearing Retainer Circlip And Discard**  
Courtesy of FORD MOTOR CO.

16. Slide the outboard halfshaft boot off of the halfshaft.



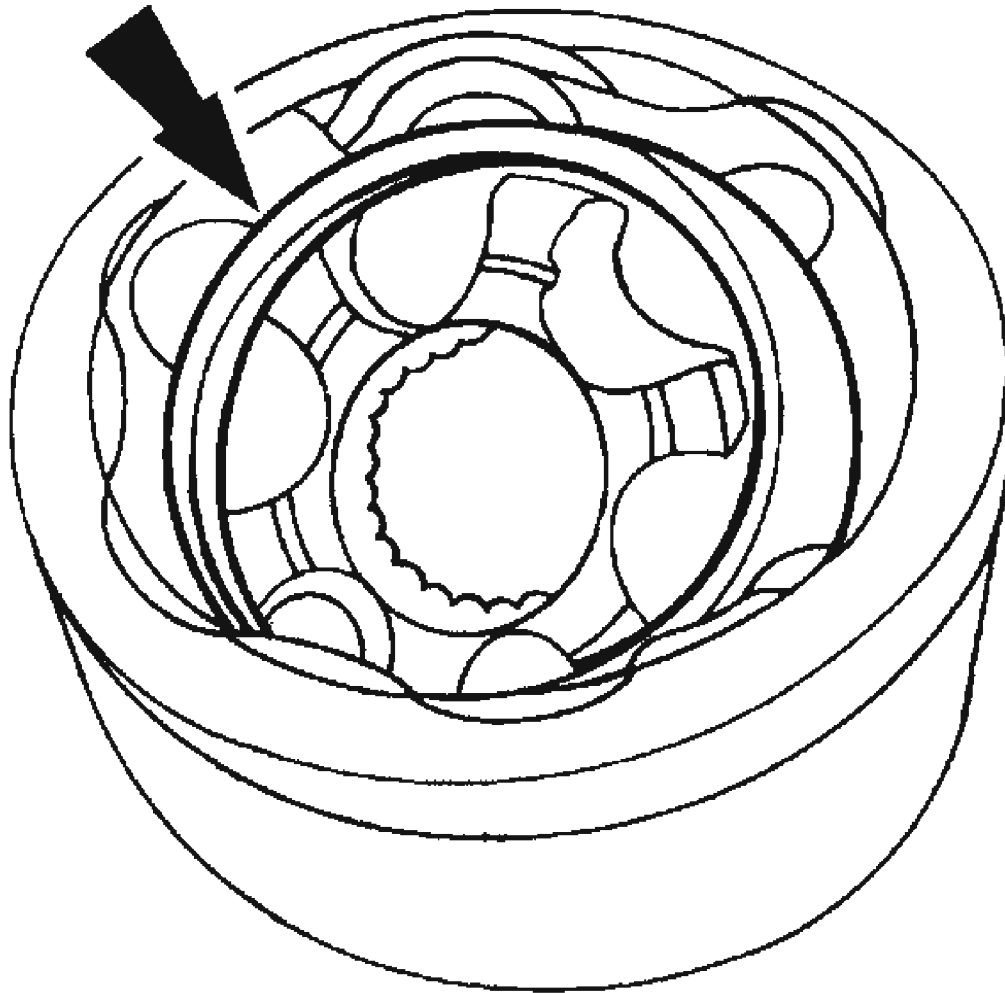
G02743653

**Fig. 29: Sliding Outboard Halfshaft Boot Off Of Halfshaft**  
Courtesy of FORD MOTOR CO.

Assembly

**NOTE:**      **Make sure all components are clean and free of foreign material.**

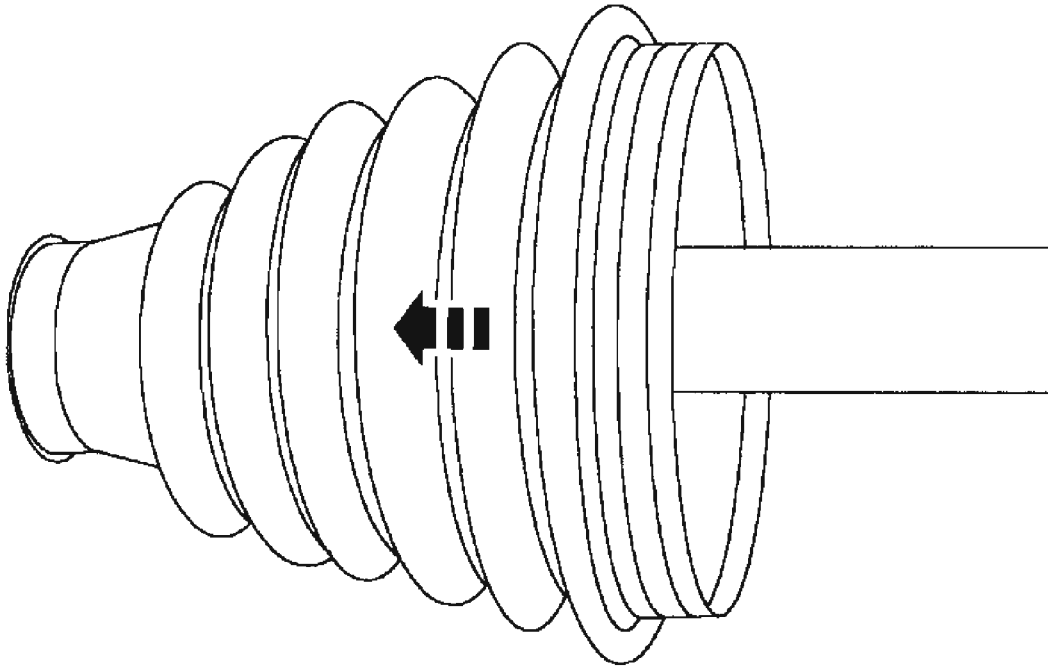
1. Lubricate the outboard CV joint with Ford High Temperature Constant Velocity Joint Grease E43Z-19590-A or equivalent meeting Ford specification ESP-M1C207-A.



G02743654

**Fig. 30: Lubricating Outboard CV Joint**  
Courtesy of FORD MOTOR CO.

2. Install the outboard halfshaft boot.

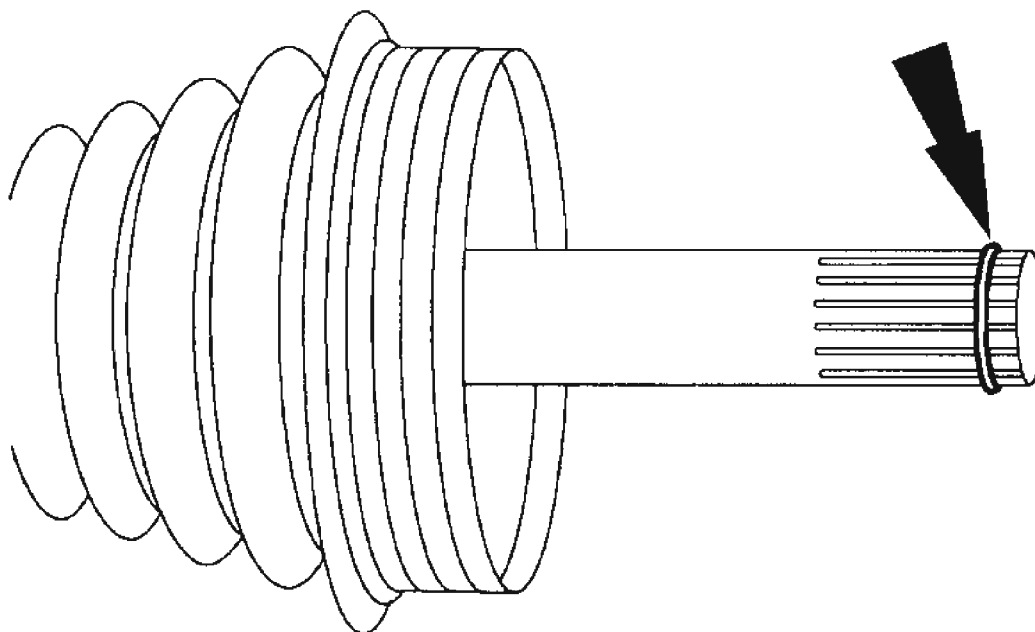


G02743655

**Fig. 31: Installing Outboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

3. Install a new halfshaft shaft bearing retainer circlip.

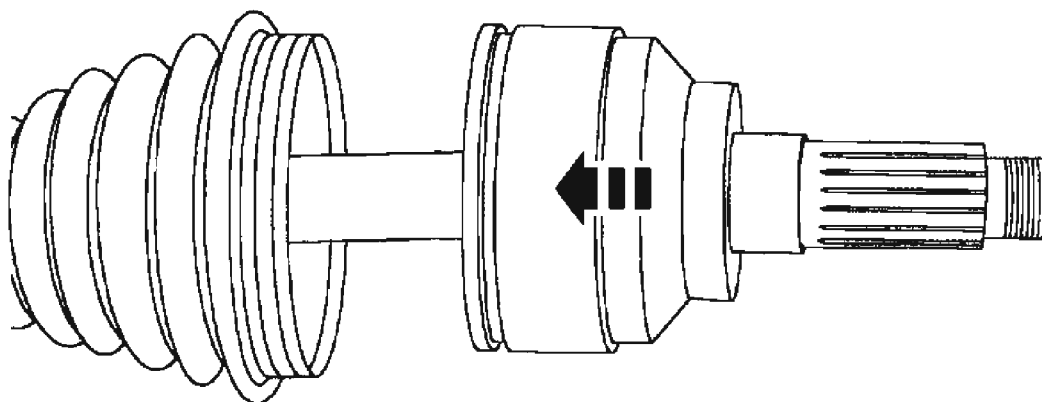




G02743656

**Fig. 32: Installing New Halfshaft Shaft Bearing Retainer Circlip**  
Courtesy of FORD MOTOR CO.

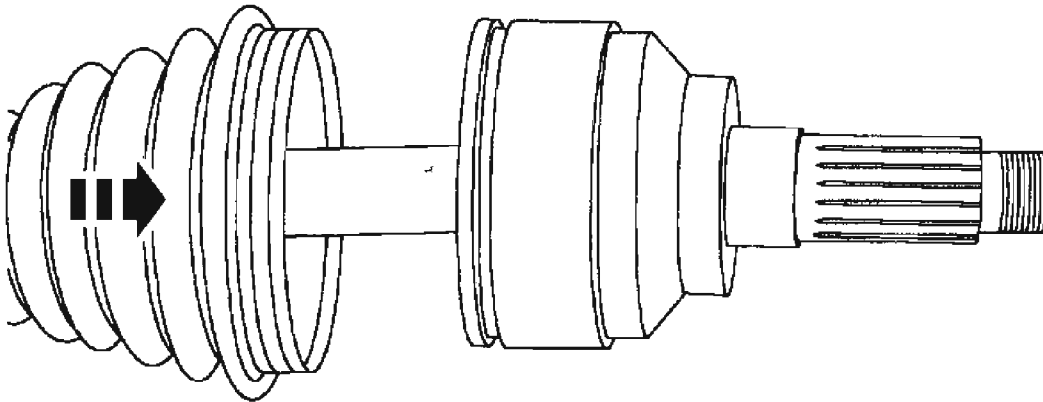
4. Use a soft-face hammer to install the outboard CV joint by gently tapping it onto the halfshaft.



G02743657

**Fig. 33: Installing Outboard CV Joint**  
Courtesy of FORD MOTOR CO.

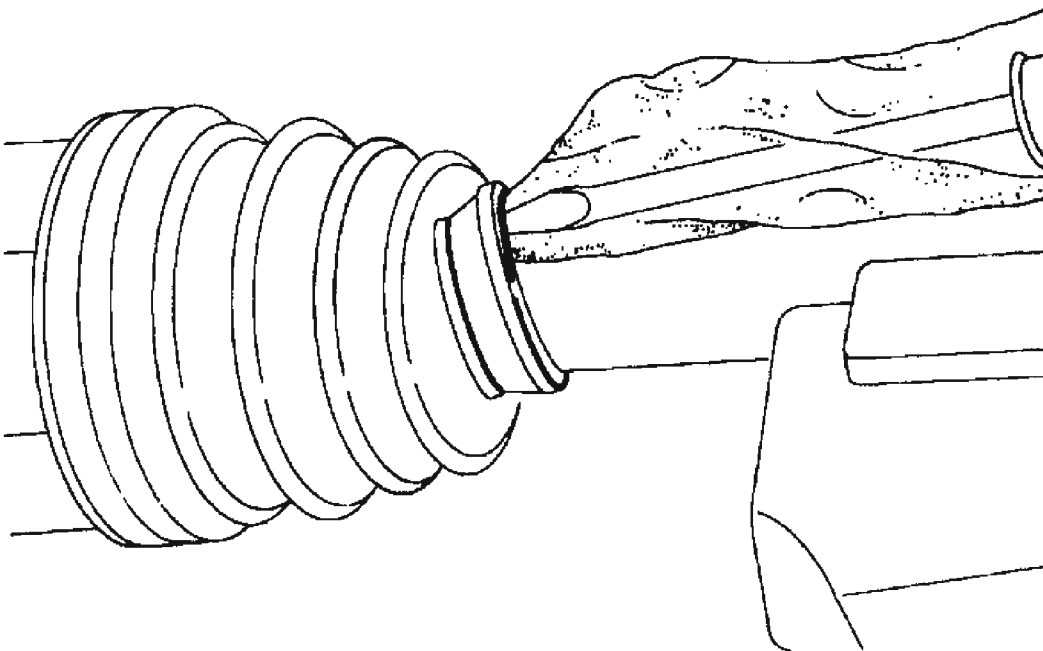
5. Remove any excess grease on the mating surfaces and slide the outboard halfshaft joint boot forward onto the outboard CV joint.



G02743658

**Fig. 34: Removing Excess Grease On Mating Surfaces**  
Courtesy of FORD MOTOR CO.

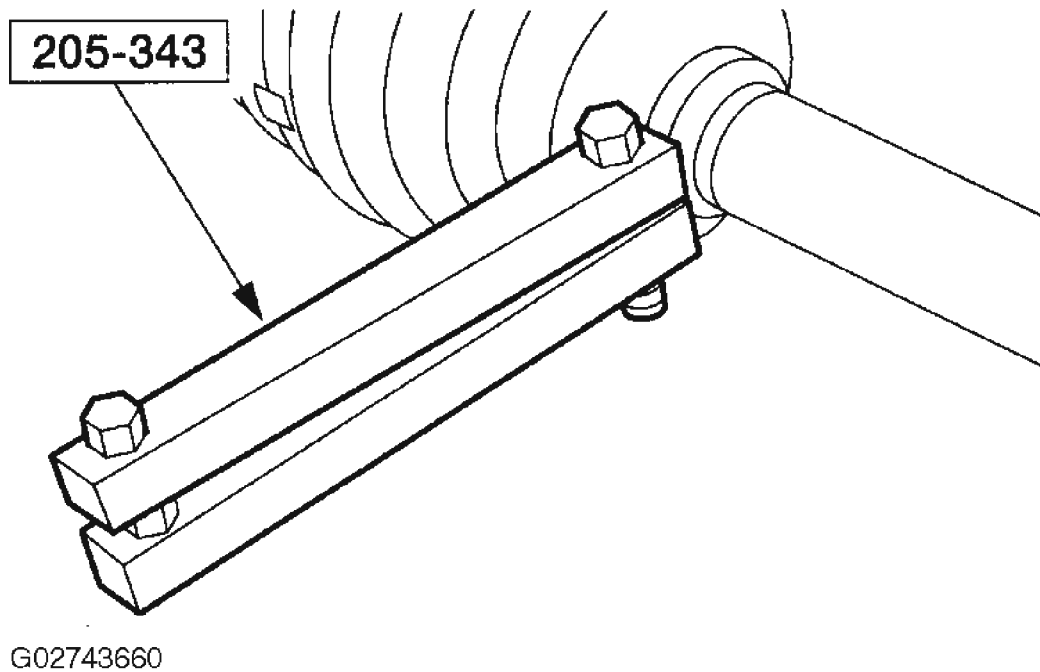
6. Remove any excess air trapped in the outboard halfshaft boot using a cloth covered screwdriver after adjusting the outboard halfshaft boot spacing.



G02743659

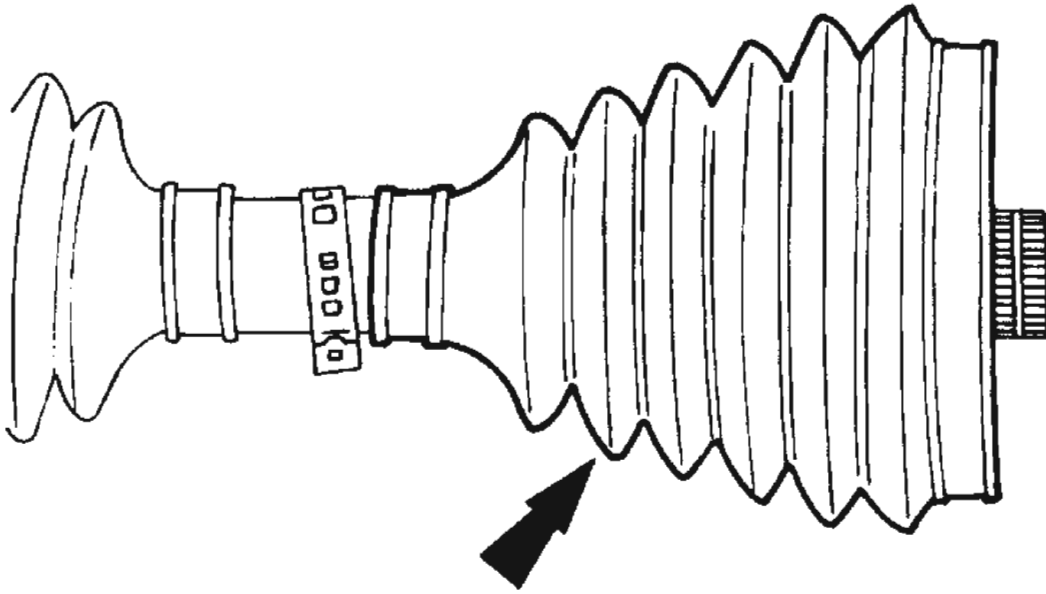
**Fig. 35: Removing Excess Air Trapped In Outboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, install two new outboard halfshaft boot clamps.



**Fig. 36: Installing Outboard Halfshaft Boot Clamps**  
Courtesy of FORD MOTOR CO.

8. Position the inboard halfshaft boot.



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**Fig. 37: Positioning Inboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

9. Install the snap ring.

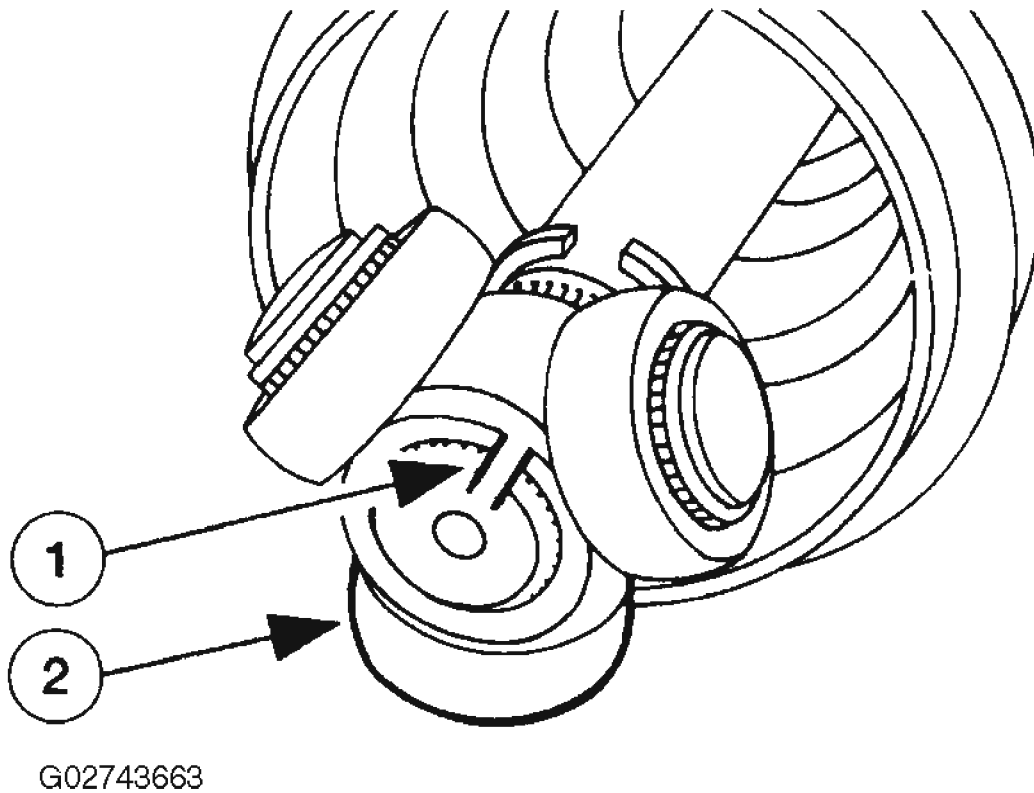


G02743662

**Fig. 38: Installing Snap Ring**  
Courtesy of FORD MOTOR CO.

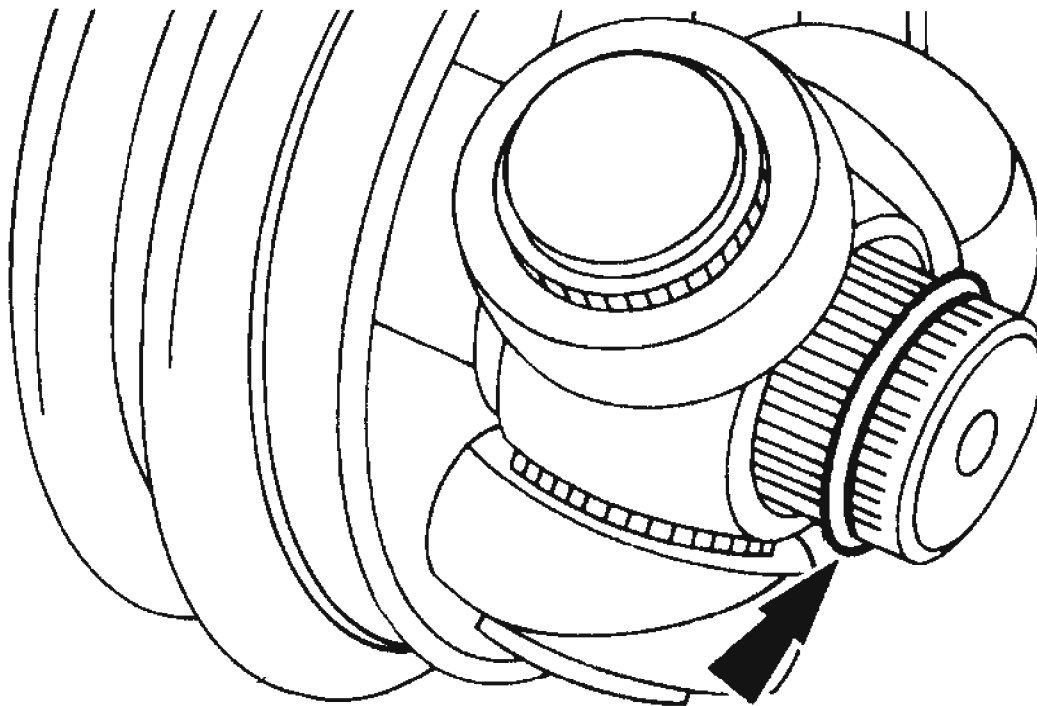
10. Install the tripod joint on the halfshaft.
  1. Line up the marks on the halfshaft and tripod joint.

2. Install the tripod joint on the halfshaft.



**Fig. 39: Installing Tripod Joint On Halfshaft**  
Courtesy of FORD MOTOR CO.

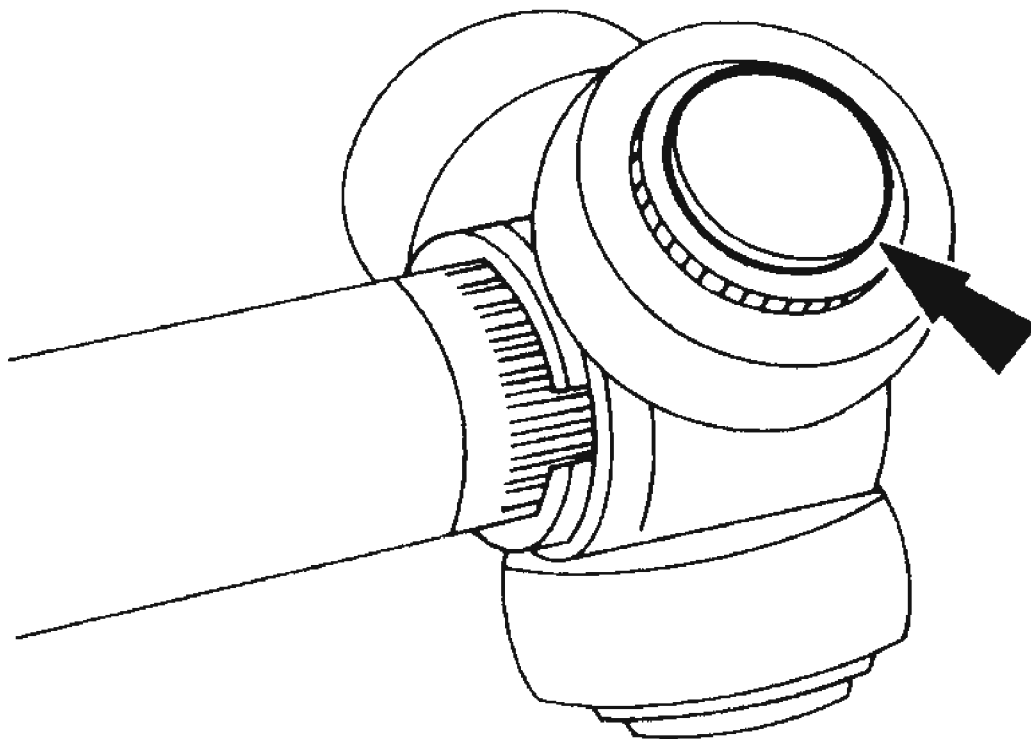
11. Install the snap ring.



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**Fig. 40: Installing Snap Ring**  
Courtesy of FORD MOTOR CO.

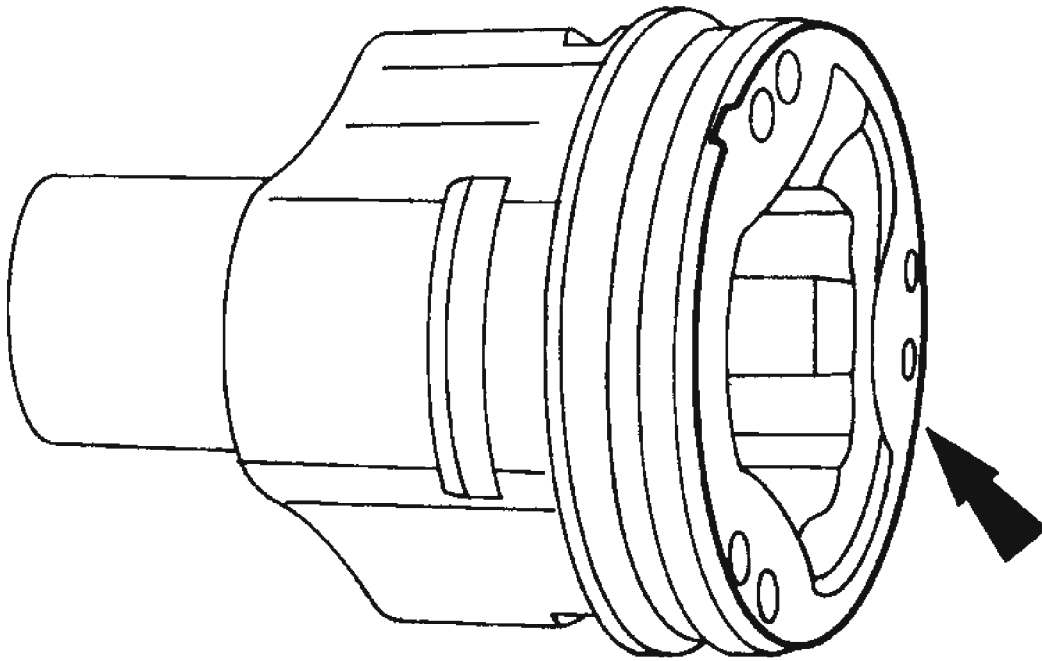
12. Lubricate the three tripod joint needle bearings.
  - Use Ford High Temp Constant Velocity Joint Grease E43Z-19590-A or equivalent meeting Ford specification ESP-M1C207A.



G02743665

**Fig. 41: Lubricating Three Tripod Joint Needle Bearings**  
**Courtesy of FORD MOTOR CO.**

13. Fill the tripod joint housing with Ford High Temp Constant Velocity Joint Grease E43Z-19590-A or equivalent meeting Ford specification ESP-M1C207A.

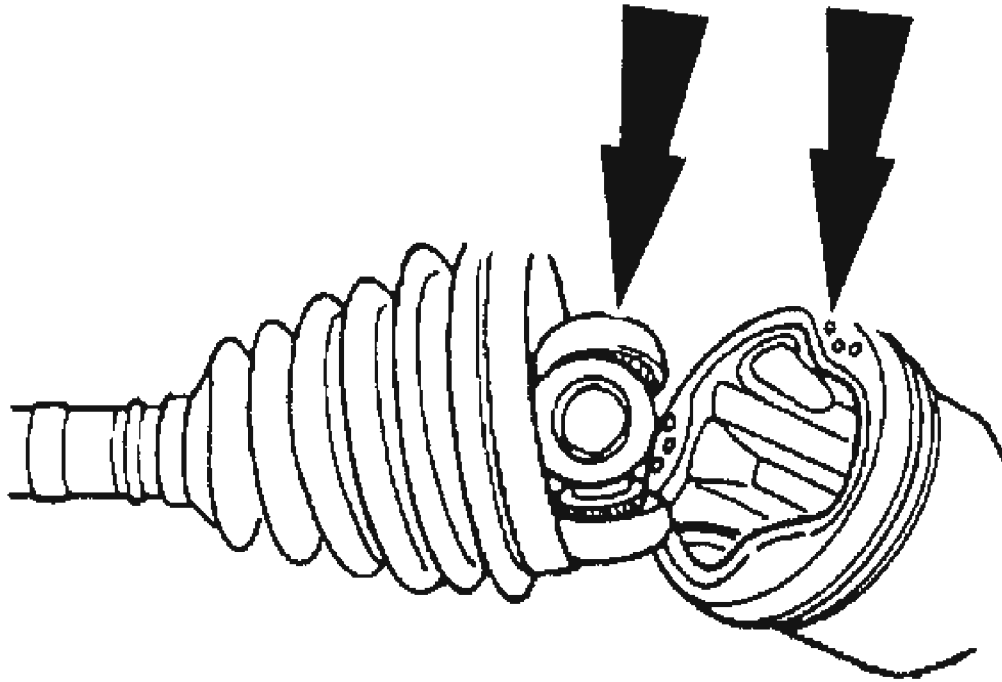


G02743666

**Fig. 42: Filling Tripod Joint Housing**  
**Courtesy of FORD MOTOR CO.**

14. Position the tripod housing onto the tripod.

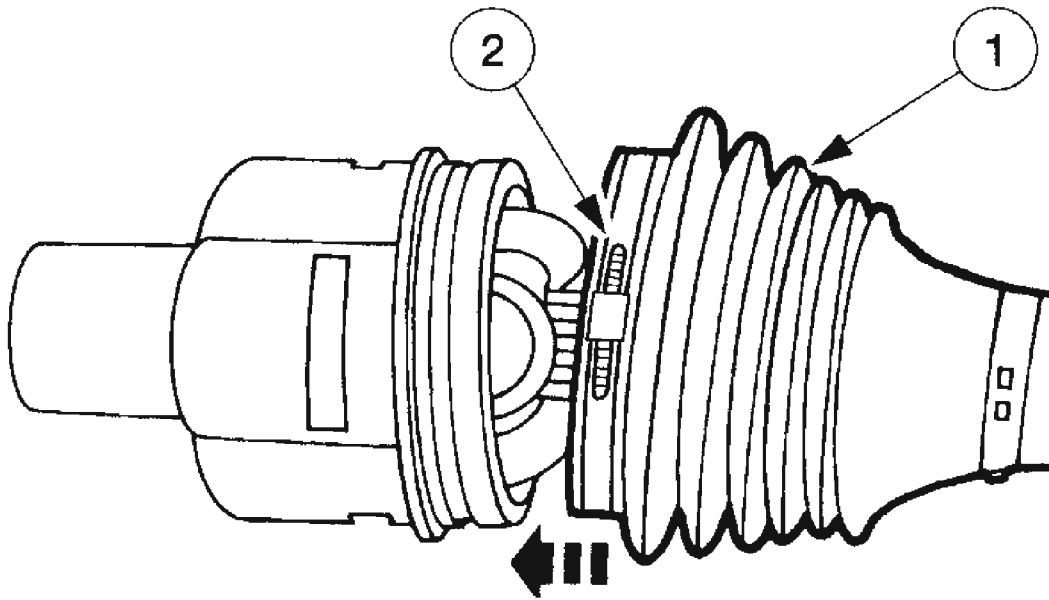




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**Fig. 43: Positioning Tripod Housing Onto Tripod**  
Courtesy of FORD MOTOR CO.

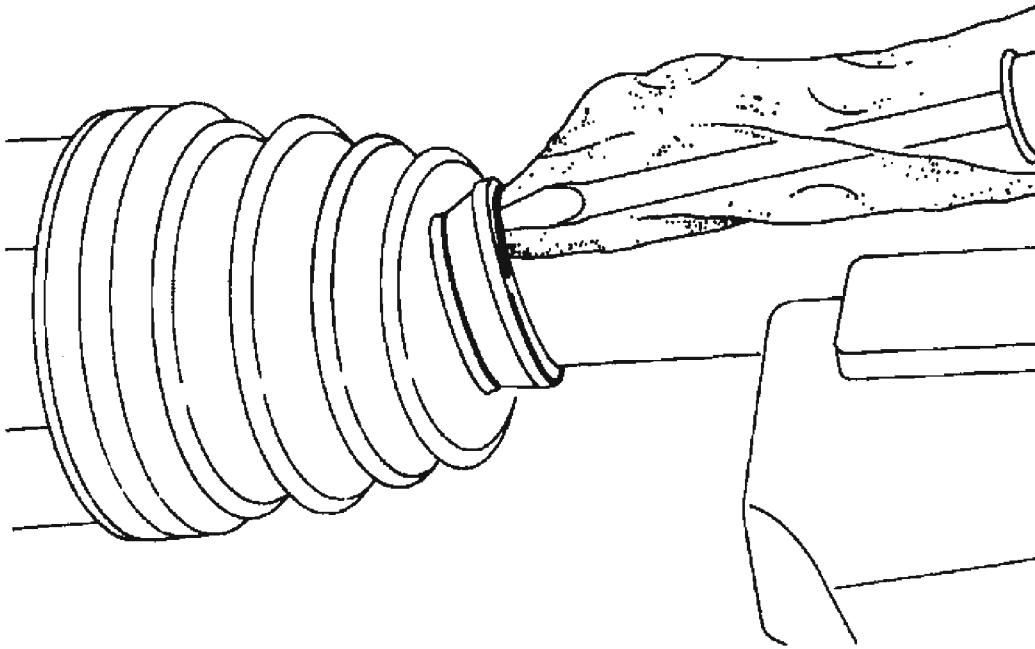
15. Position the inboard halfshaft boot.
  1. Position the inboard halfshaft boot.
  2. Position the inboard halfshaft boot clamp.



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**Fig. 44: Positioning Inboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

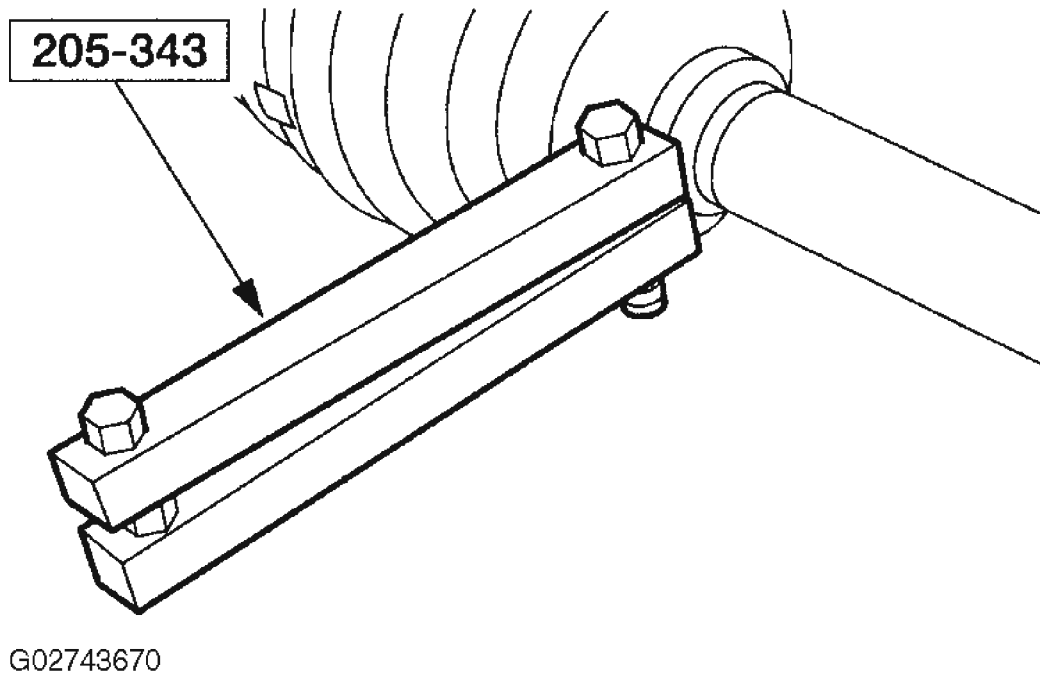
16. Remove any excess air trapped in the halfshaft boot using a cloth covered screwdriver after adjusting the halfshaft boot spacing.



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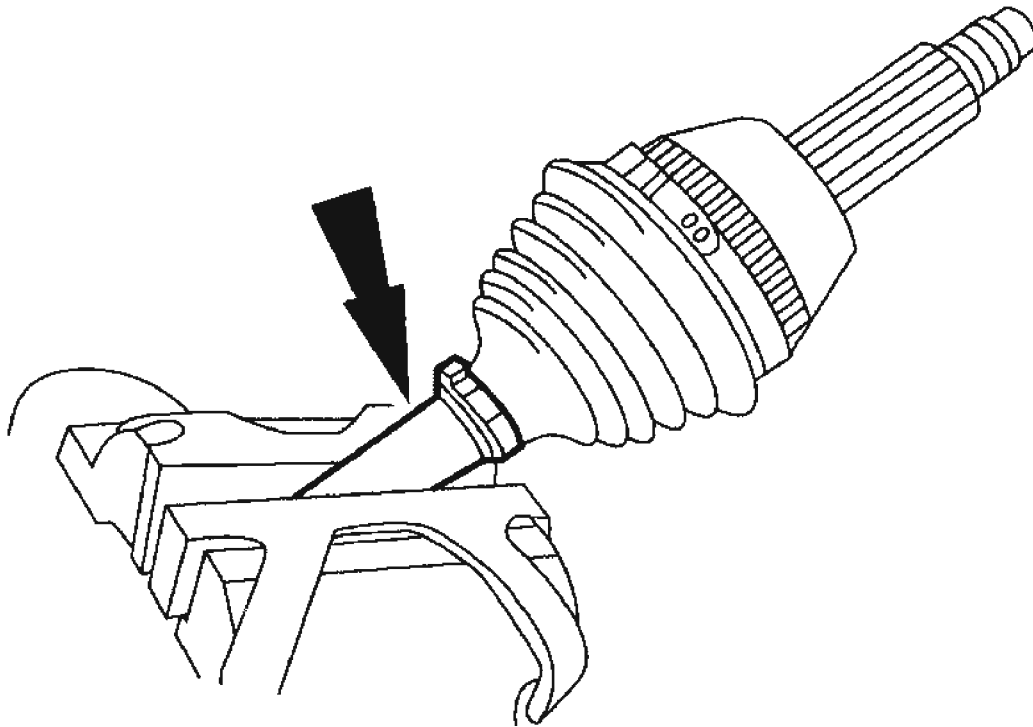
**Fig. 45: Removing Excess Air Trapped In Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

17. Using the special tool, install two new outboard joint boot clamps.



**Fig. 46: Installing Outboard Joint Boot Clamps**  
Courtesy of FORD MOTOR CO.

18. Remove the halfshaft from the vise.



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**Fig. 47: Removing Halfshaft From Vise**  
**Courtesy of FORD MOTOR CO.**

19. Install the front wheel halfshaft. For additional information, refer to **HALFSHAFT** .

## 2004 Ford Escape

2004 DRIVELINE/AXLE Driveshaft - Escape

### 2004 DRIVELINE/AXLE

#### Driveshaft - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Driveshaft runout	0.89 mm (0.03 in)

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft
Center bearing mount nuts	48	35
Universal joint cap bolts	23	17
Ground wire to body bolt	40	30
Driveshaft to power take off bolts	37	27

## DESCRIPTION AND OPERATION

### DRIVESHAFT

**CAUTION:** All driveshaft assemblies are balanced. If undercoating the vehicle, protect the driveshaft to prevent overspray of any undercoating material.

**CAUTION:** Manual and automatic transmission driveshafts are different. Make sure that the driveshaft being installed is compatible with the vehicle or damage to the vehicle may occur.

The driveshaft has traditional balance weights attached (spot-welded) by the manufacturer.

### UNIVERSAL JOINTS

The center and rear joints are:

- a lubed-for-life design that requires no periodic lubrication.
- equipped with nylon thrust washers, located at the base of each bearing cup, which control end play, position the needle bearings and improve grease movement.

## DIAGNOSIS AND TESTING

### DRIVESHAFT

Refer to DRIVELINE SYSTEM-GENERAL INFORMATION .

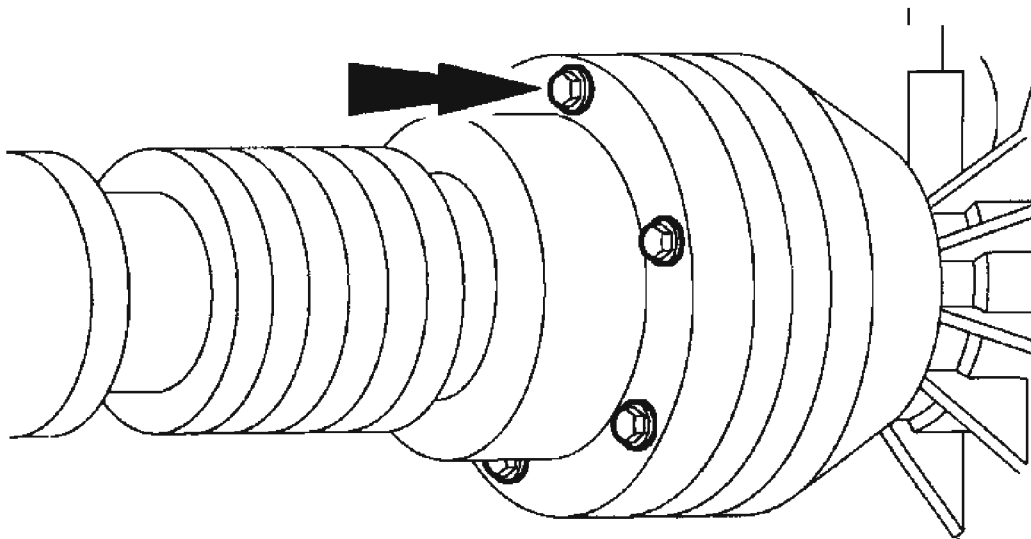
## GENERAL PROCEDURE

### DRIVESHAFT INDEXING

**NOTE:** If indexing the driveshaft does not eliminate the vibration, balance the driveshaft. Refer to DRIVESHAFT RUNOUT AND BALANCING .

1. Raise and support the vehicle. For additional information, refer to JACKING & LIFTING .

**CAUTION:** Do not reuse the CV joint bolts and washers. Install new bolts and washers only or damage to the vehicle may occur.

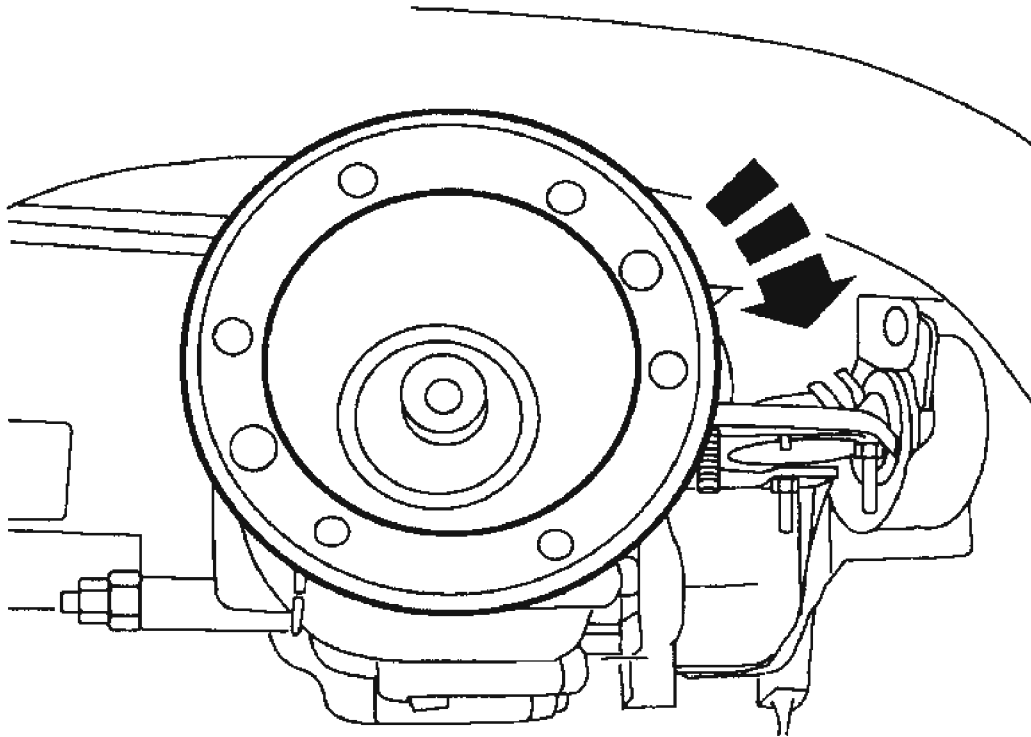


G02743531

**Fig. 1: Removing Front Driveshaft To Power Take Off Bolts And Washers**  
Courtesy of FORD MOTOR CO.

2. Remove the six front driveshaft to power take off bolts and washers.
  - Discard the bolts and washers.

3. Rotate the flange 60 degrees.

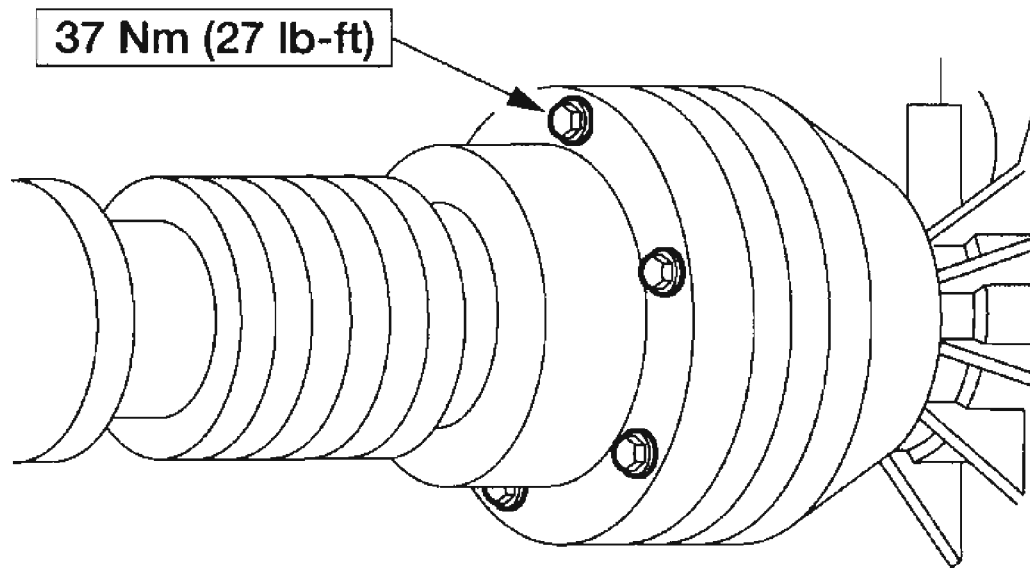


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**Fig. 2: Rotating The Flange**  
Courtesy of FORD MOTOR CO.

4. Connect the front driveshaft and install the new bolts and washers.

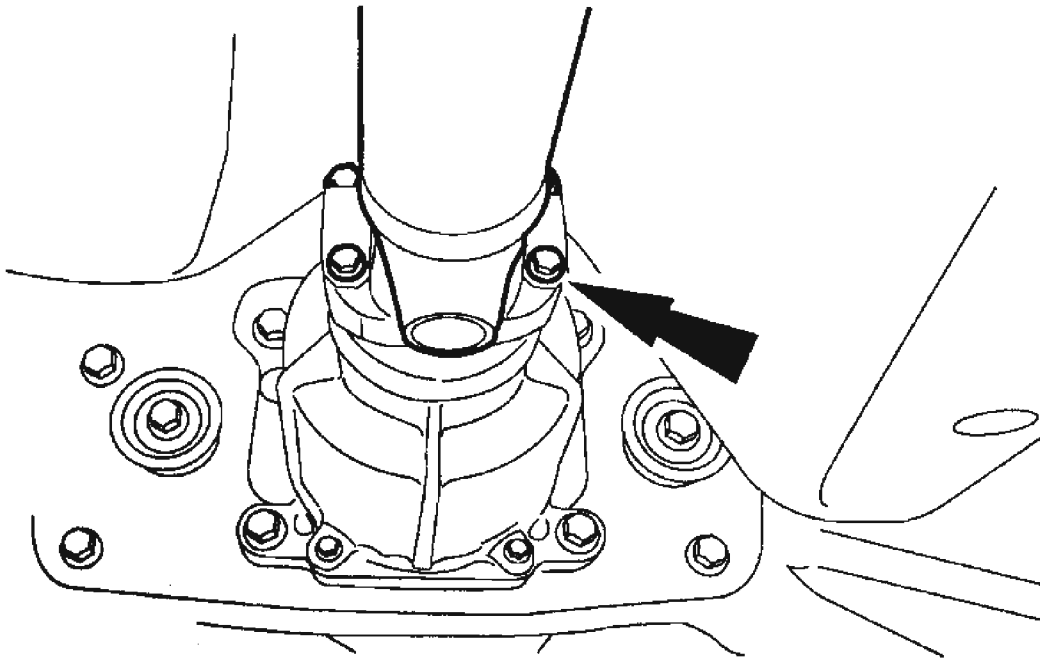




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**Fig. 3: Installing Bolts And Washers**  
Courtesy of FORD MOTOR CO.

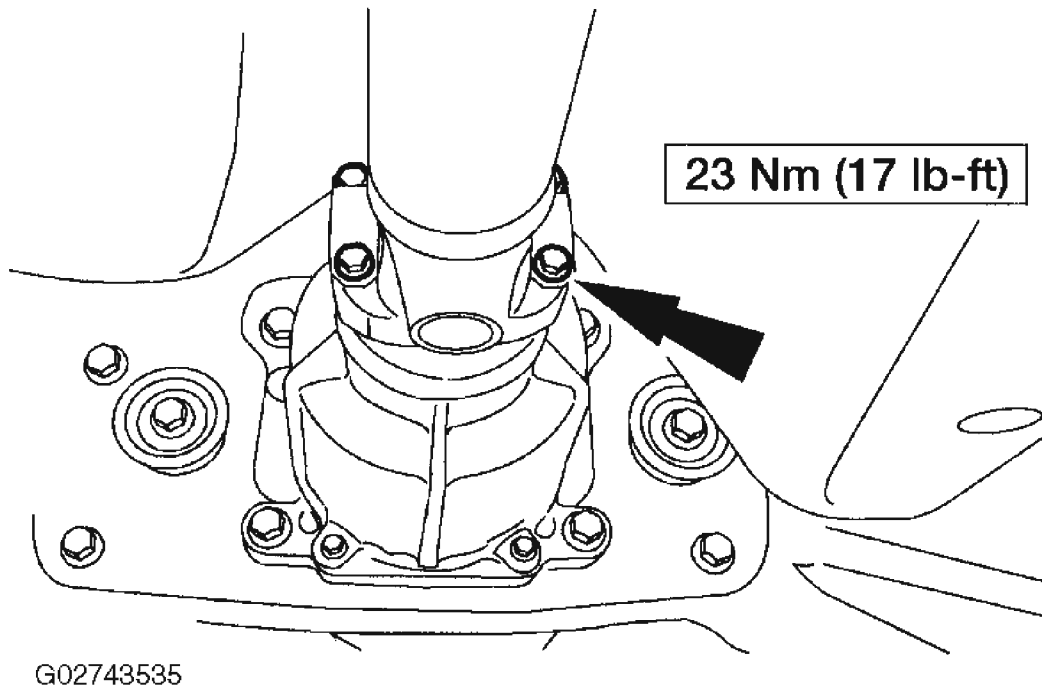
**CAUTION:** Do not reuse the bolts and straps for the pinion yoke. Install new bolts and straps or damage to the vehicle may occur.



G02743534

**Fig. 4: Disconnect Rear Driveshaft Universal Joint.**  
Courtesy of FORD MOTOR CO.

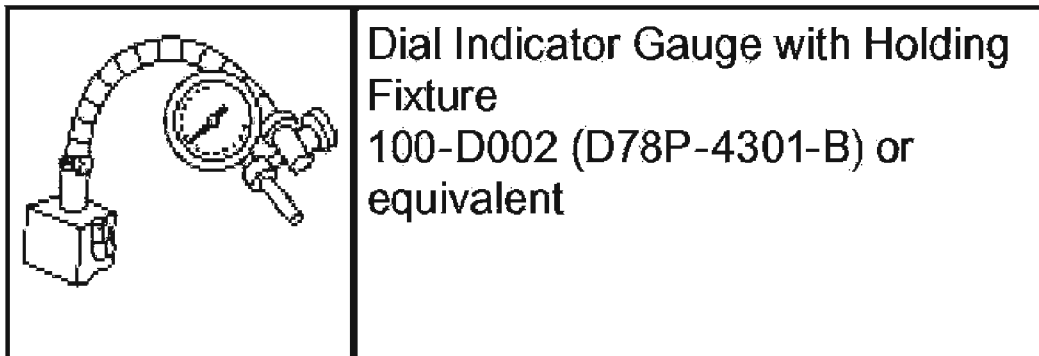
5. Disconnect the rear driveshaft universal joint.
  - Discard the bolts and straps.
6. Rotate the rear pinion yoke 180 degrees.
7. Connect the rear driveshaft and install new bolts and straps.



**Fig. 5: Connecting Rear Driveshaft**  
Courtesy of FORD MOTOR CO.

8. Lower the vehicle and test drive.
9. Repeat the procedure if necessary.

#### DRIVESHAFT RUNOUT AND BALANCING

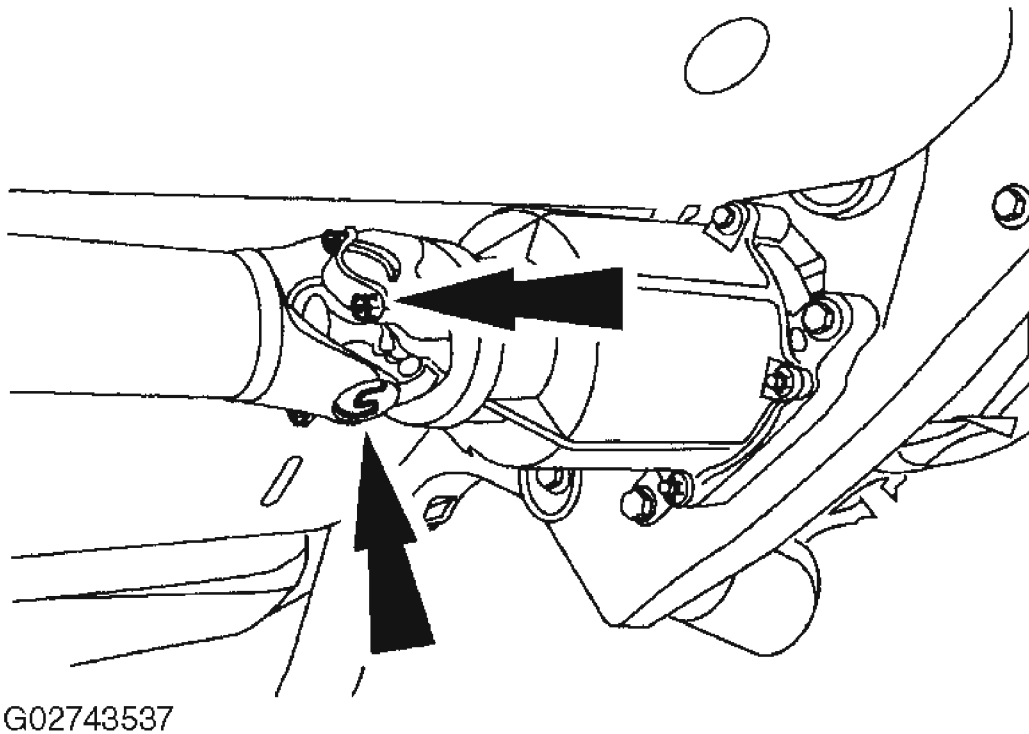


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**Fig. 6: Identifying Special Tool(s)**

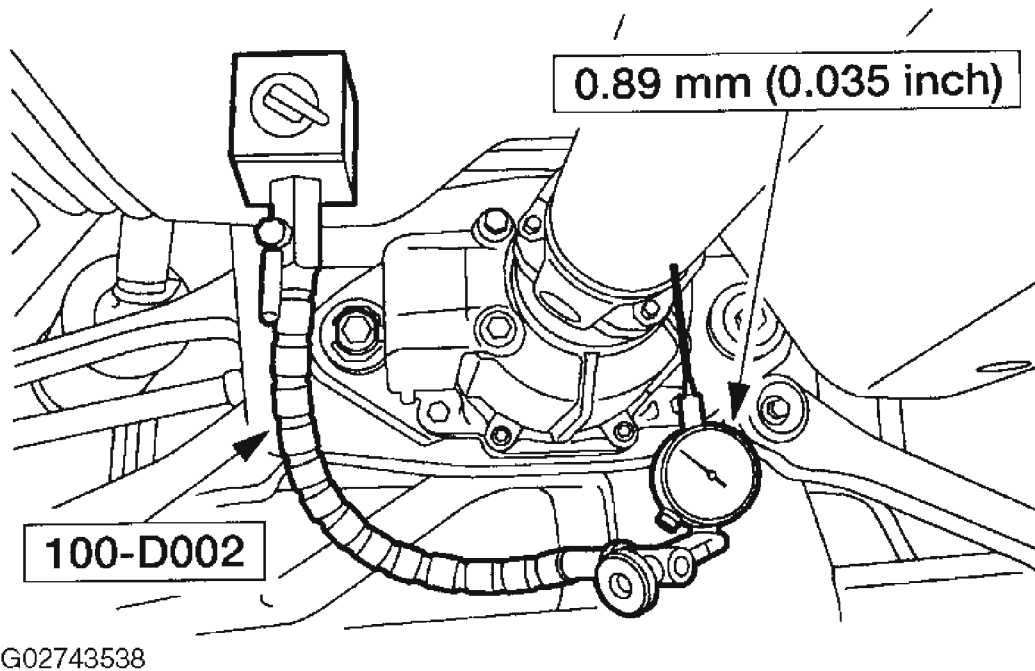
Courtesy of FORD MOTOR CO.

1. Remove the rear tires.
  - Install the lug nuts to retain the brake drums.
2. Check the rear driveshaft attachment. If there are any worn parts, new parts need to be installed.



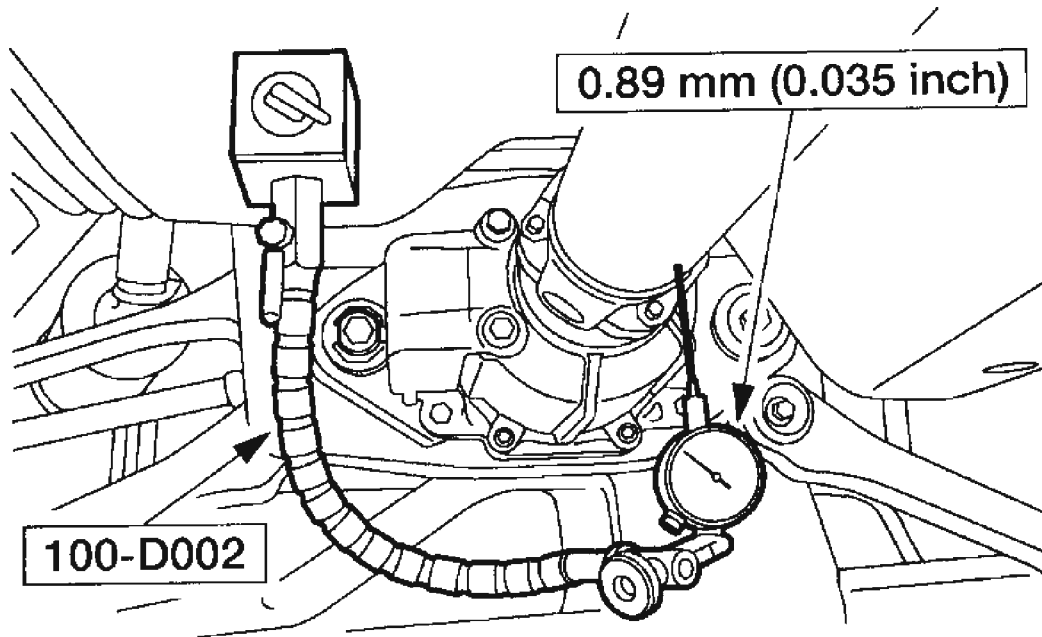
**Fig. 7: Checking Rear Driveshaft Attachment**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, measure the runout at the front, the center, and the rear of the driveshaft.



**Fig. 8: Measuring Driveshaft Runout**  
Courtesy of FORD MOTOR CO.

4. If the runout measurements are within specifications, proceed to Step 13 .
5. If the runout measurements exceed the specifications at the front or the center, then install a new driveshaft. For additional information, refer to **DRIVESHAFT** .
6. If the runout measurement exceeds the specifications at the rear, mark the rear runout high point on the driveshaft.
7. Scribe alignment marks on the driveshaft and the axle pinion flange.
8. Index the driveshaft. For additional information, refer to **DRIVESHAFT INDEXING** .
9. Using the special tool, measure the runout at the rear of the driveshaft.



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**Fig. 9: Measuring Runout At Rear Of Driveshaft**  
Courtesy of FORD MOTOR CO.

10. If the runout measurement still exceeds the specification at the rear, mark the rear runout high point on the driveshaft.
11. If the runout measurement is within specifications, proceed to Step 13 .

**NOTE:** Excessive driveshaft runout may originate in the driveshaft itself or in the axle pinion flange.

12. Compare the two high points marked in Steps 6 and 10.
  - If the marks are within 25 mm (1 in), then install a new driveshaft. For additional information, refer to **DRIVESHAFT** .
  - If the marks are not within 25 mm (1 in), balance the driveshaft. Proceed to Step 13.

**CAUTION:** To prevent overheating, do not run the vehicle on the hoist for an extended period of time.

13.
  - Record baseline speed with the transmission in gear.
  - Increase the vehicle speed to the maximum vibration level.

- Record the speed of the vibration as a baseline.

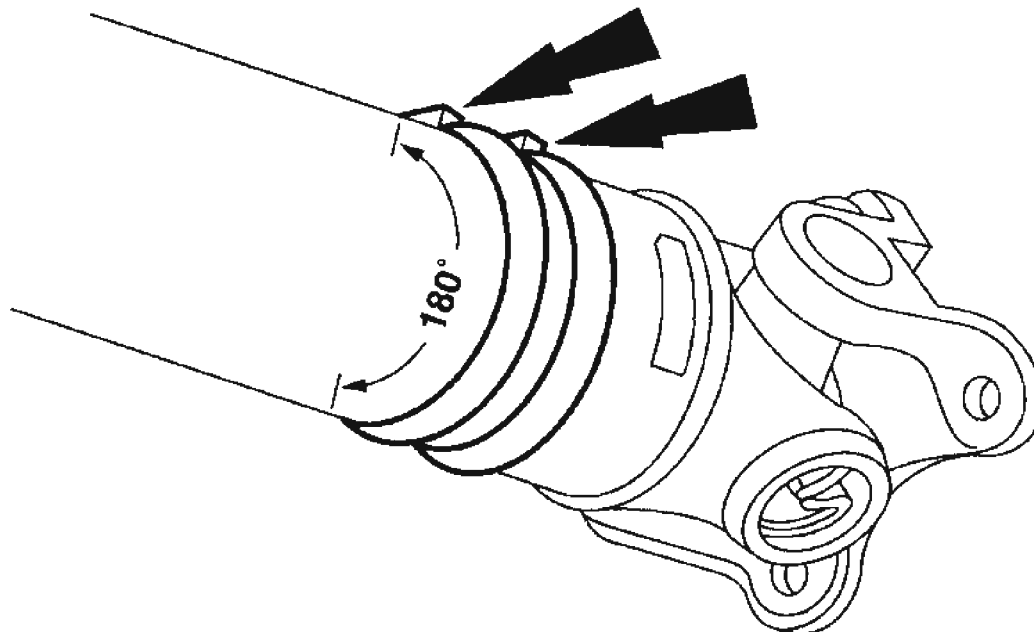
**WARNING:** Keep hands away from the balance weights while the driveshaft is rotating.

14. With the transmission in gear, run the vehicle with the driveshaft rotating 97-113 km/h (60-70 mph).

**WARNING:** Keep hands away from the balance weights while the driveshaft is rotating.

15. Have an assistant contact the driveshaft with a marker in the rear, middle and front end to indicate heavy spots.

**WARNING:** Keep hands away from the balance weights while the driveshaft is rotating.

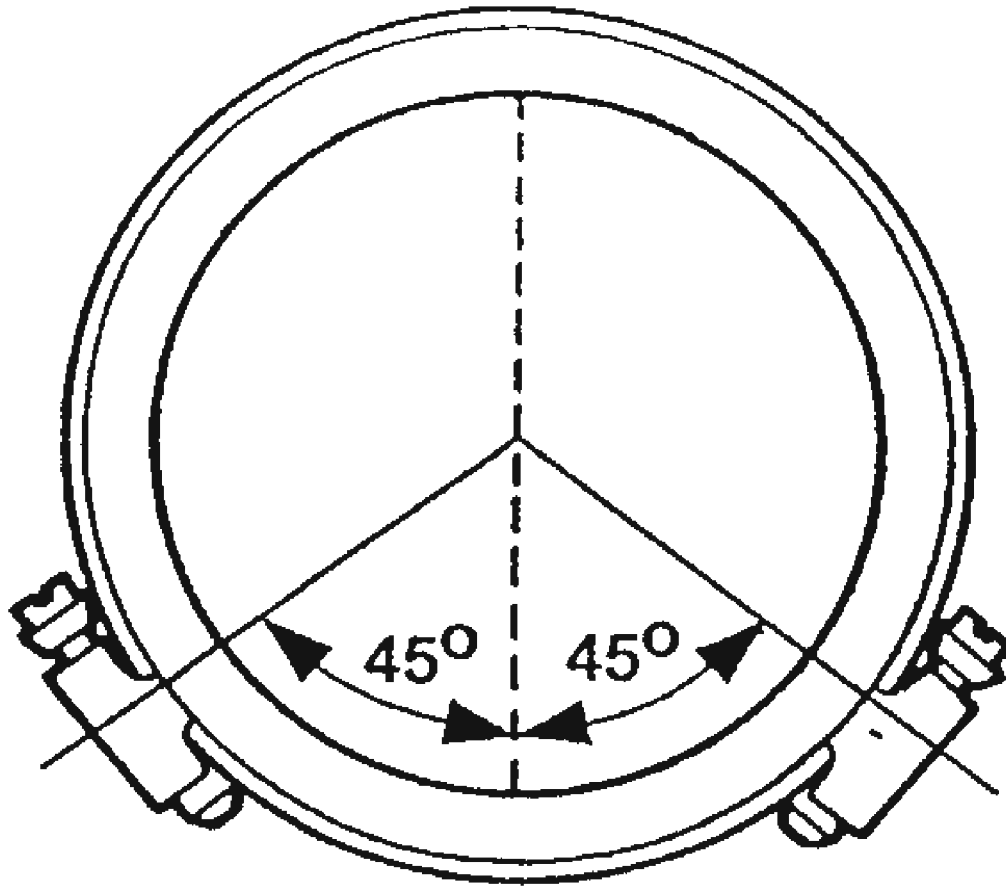


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**Fig. 10: Installing Screw-Type Hose Clamps On The Driveshaft**  
Courtesy of FORD MOTOR CO.

16. To balance the driveshaft, install two screw-type hose clamps on the driveshaft and rotate them in 90 degree intervals. Check the vibration for each position and place the screws at the position that produces the least vibration.

17. Run the vehicle at the baseline speed.
18. If the vibration is still evident, rotate the clamps away from each other until the driveshaft is balanced.



**Fig. 11: Driveshaft Balance Angle**  
Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

### DRIVESHAFT

#### Removal And Installation

**WARNING:** The normal operating temperature of the exhaust system is very high. Never attempt to remove any part of the system



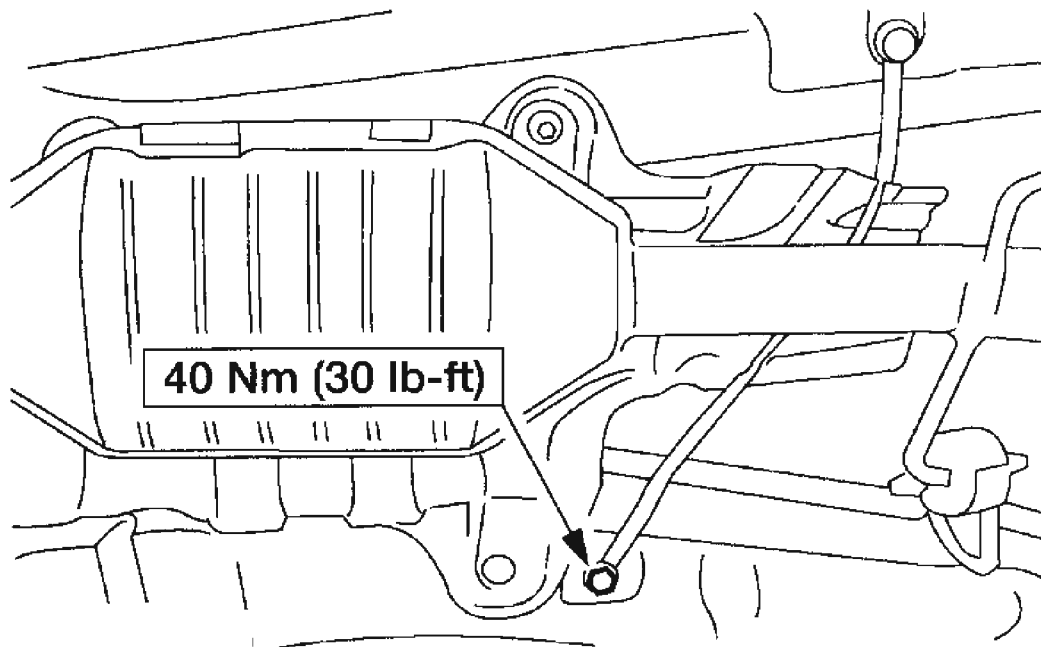
until it has cooled. Be especially careful when working around the catalytic converters. The temperature of the converter rises to a high level after only a few minutes of engine operation. Failure to follow these instructions may result in personal injury.

### Front Driveshaft And Driveshaft Assembly

1. Place the selector lever in NEUTRAL.
2. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**

### Driveshaft Assembly

3. Remove the ground strap bolt.



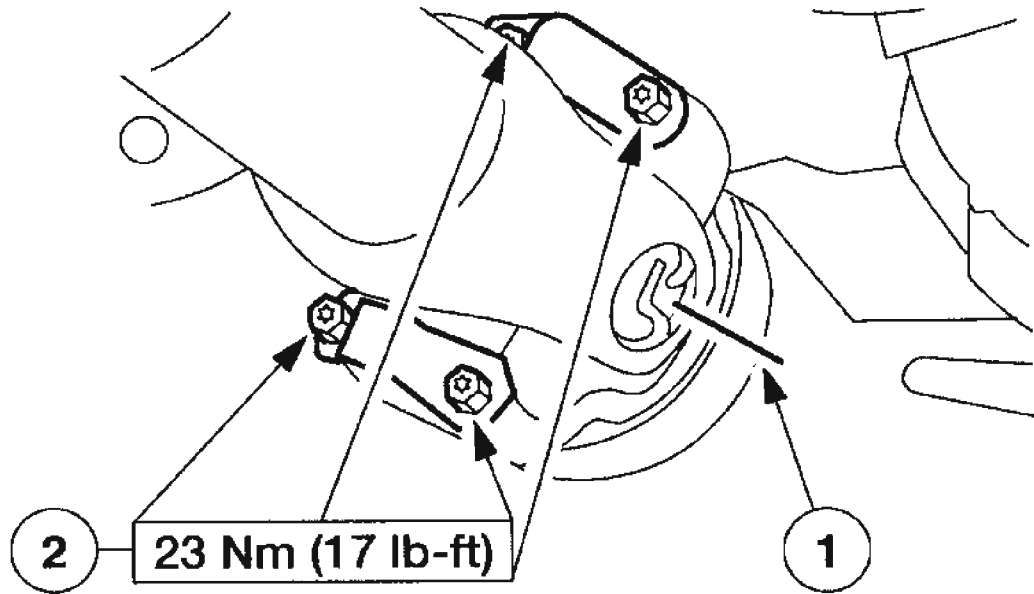
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**Fig. 12: Removing Ground Strap Bolt**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not reuse the bolts and straps for the pinion yoke.  
Install new bolts and straps.

**NOTE:** There is a difference in the length of the head of the

replacement yoke strap bolts from the production bolts. The longer head pinion bolts can be used in either location.



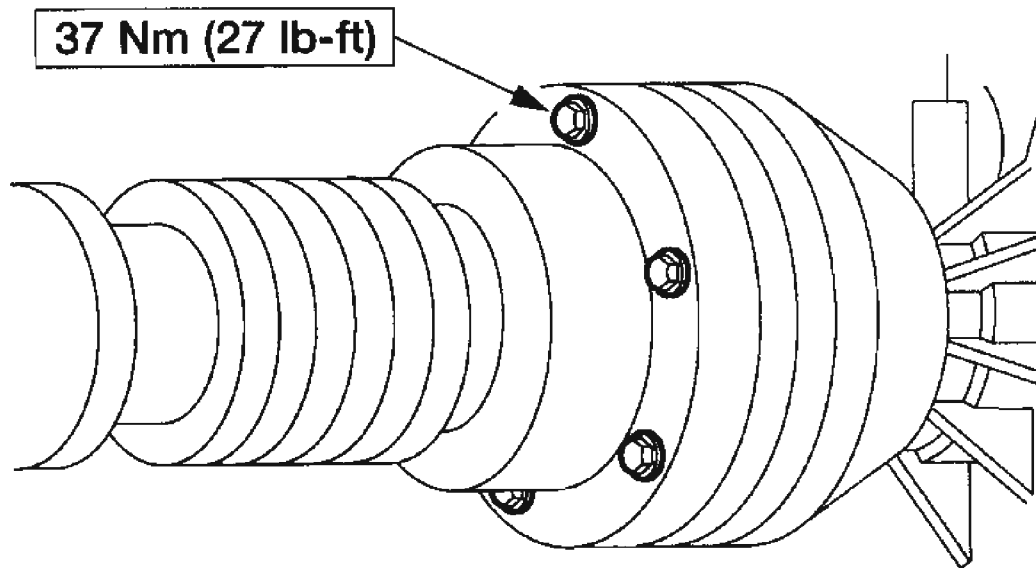
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**Fig. 13: Removing Rear Driveshaft Universal Joint Caps**  
Courtesy of FORD MOTOR CO.

4. Remove the rear driveshaft universal joint caps.
  1. Index-mark the pinion and yoke to the rear of the driveshaft.
  2. Remove and discard the bolts and straps.

#### Front Driveshaft And Driveshaft Assembly

**CAUTION:** Do not reuse the CV joint bolts and washers. Install new bolts and washers only or damage to the vehicle may occur.



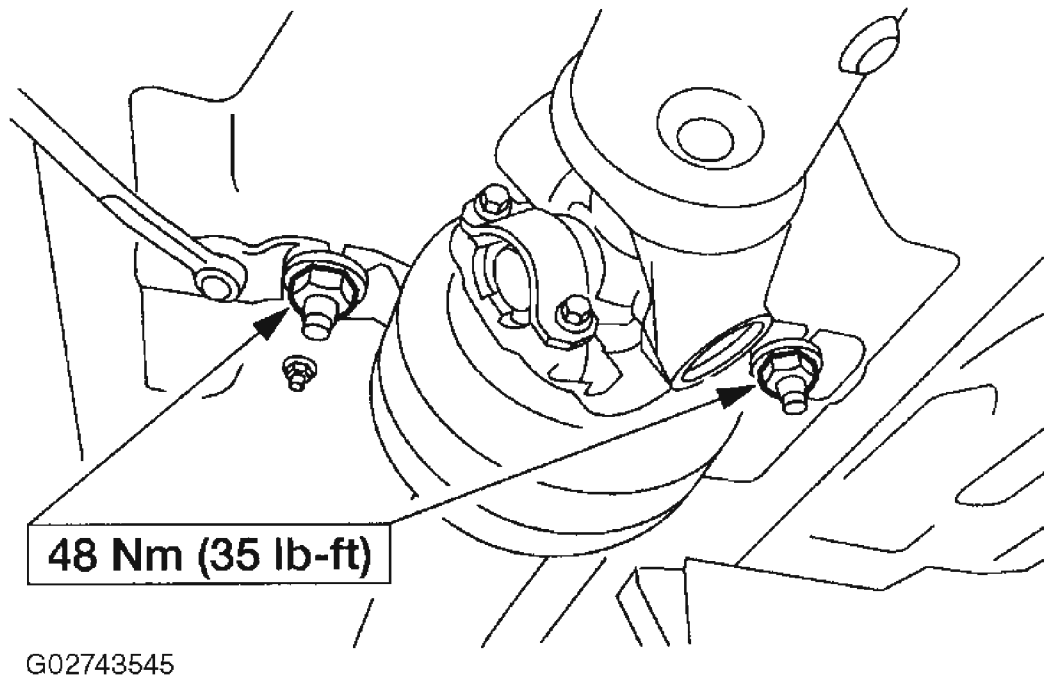
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**Fig. 14: Removing Front Driveshaft-To-Power Take Off Bolts**  
**Courtesy of FORD MOTOR CO.**

5. Remove the six front driveshaft to power take off bolts and washers.
  - Discard the bolts and washers.

### **Driveshaft Assembly**

6. With the help of an assistant, remove the driveshaft.
  - Remove the center bearing nuts.

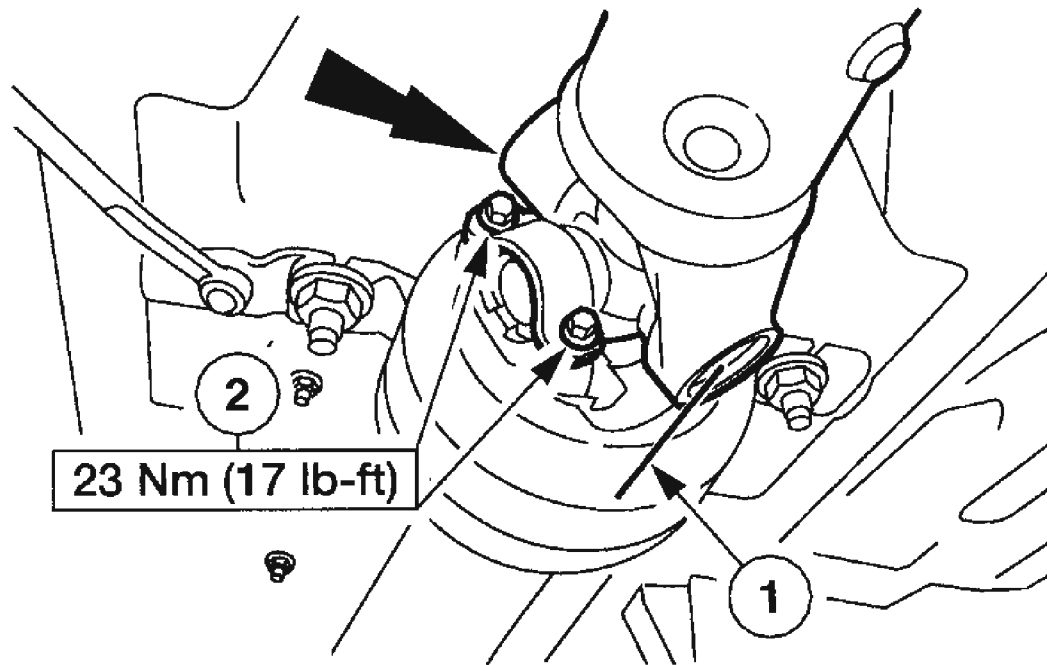


**Fig. 15: Removing 2 Center Bearing Nuts**  
Courtesy of FORD MOTOR CO.

#### Front Driveshaft

**CAUTION:** Do not reuse the bolts and straps for the center U-joint. Install new bolts and straps or damage to the vehicle may occur.

**NOTE:** There is a difference in the length of the head of the replacement yoke strap bolts from the production bolts. The longer head pinion bolts can be used in either location.



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**Fig. 16: Removing Front Driveshafts**  
Courtesy of FORD MOTOR CO.

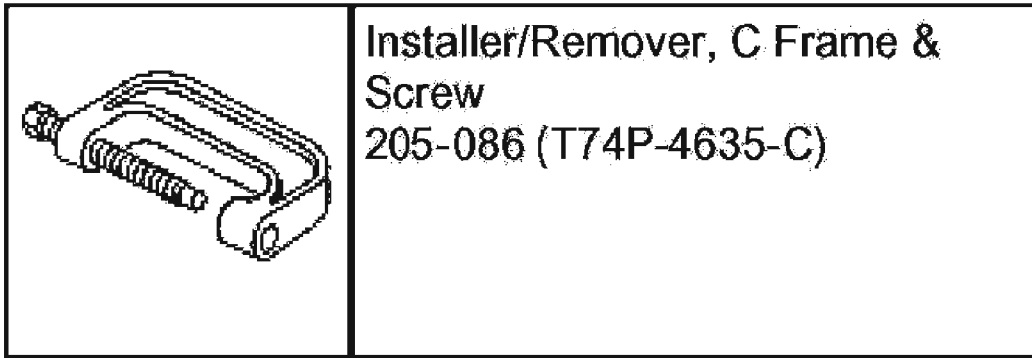
7. Remove the front driveshaft.
  1. Index-mark the front driveshaft to the center bearing.
  2. Remove and discard the bolts and caps.

#### Front Driveshaft And Driveshaft Assembly

**NOTE:** If a driveshaft is installed and driveshaft vibration is encountered after installation, index the driveshaft. For additional information, refer to DRIVESHAFT INDEXING .

8. To install, reverse the removal procedure.

#### UNIVERSAL JOINT-CENTER AND REAR



G02743547

**Fig. 17: Identifying Special Tool(s)**  
Courtesy of FORD MOTOR CO.

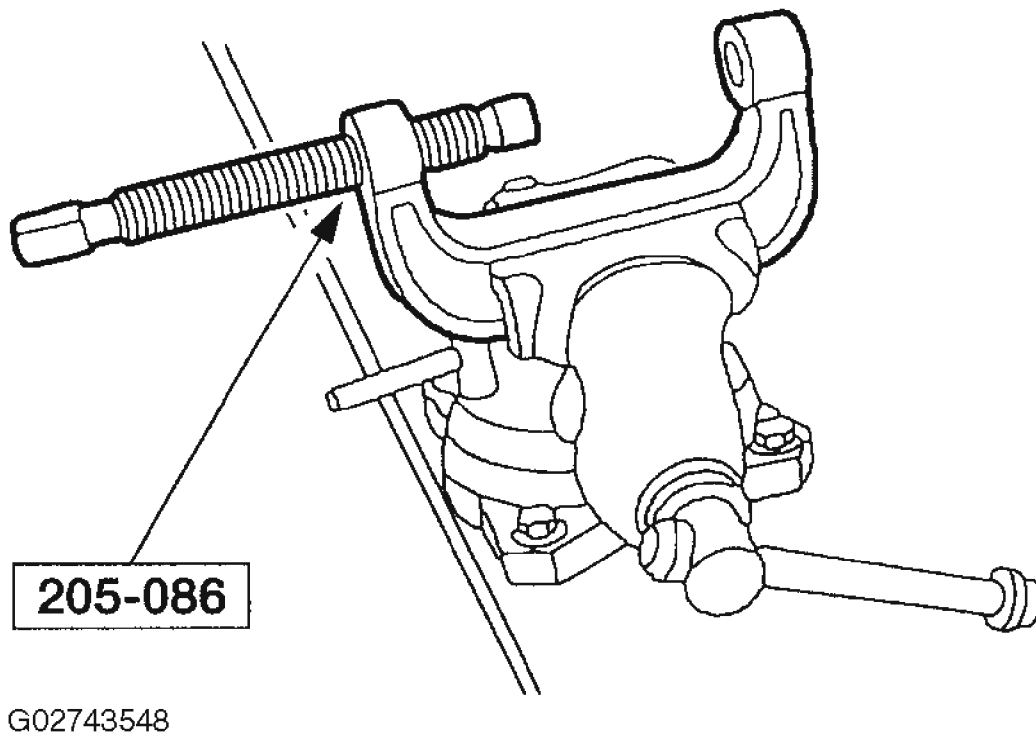
**Removal And Installation**

**CAUTION:** Do not reuse the bolts and straps for either of the center U-joint or the pinion yoke U-joint. Install new bolts and straps or damage to the vehicle may occur.

**NOTE:** There is a difference in length of the head of the replacement yoke strap bolts from the production bolts. The longer head pinion bolts can be used in either location.

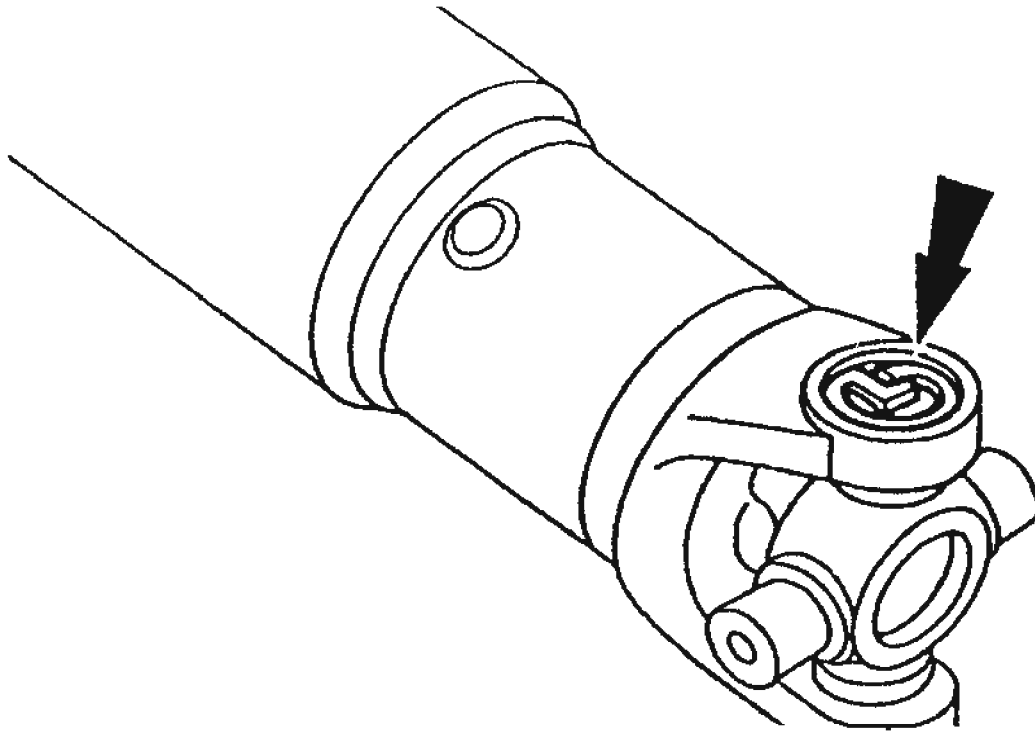
**NOTE:** Index the driveshaft yoke to the driveshaft.

1. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** .
2. Clamp the special tool into a vise.



**Fig. 18: Clamping The Special Tool Into Vise**  
Courtesy of FORD MOTOR CO.

3. Remove the snap rings.

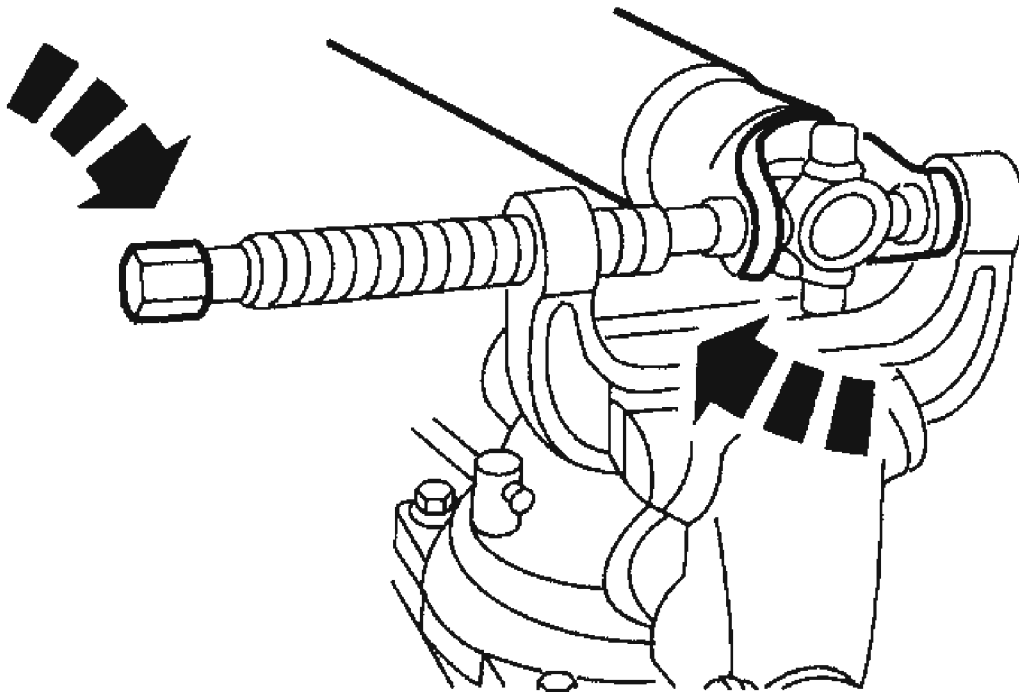


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**Fig. 19: Removing Snap Rings**  
Courtesy of FORD MOTOR CO.

4. Press out the bearing cups.
  - Rotate the driveshaft 180 degrees and repeat.





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**Fig. 20: Pressing Out The Bearing Cups**  
**Courtesy of FORD MOTOR CO.**

5. To install, reverse the removal procedure.

## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner

### 2005 TRANSMISSIONS

#### Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Fluid Type</b>	
Automatic PTU Motorcraft SAE 75W-140 High Performance Rear Axle Lubricant XY-75W140-QL	WSL-M2C192-A
Manual PTU Motorcraft 80W-90 Manual PTU Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A
<b>Fluid Oil Capacity</b>	
Manual PTU	0.35 liter (12 oz.)
Automatic PTU	0.35 liter (12 oz.)
Pipe Sealant with Teflon(R) TA-24	WSK-M2G350-A2
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
<b>Transfer Case Vent</b>	
Installed height mm (in)	(1)
(1) Refer to the <b>PROCEDURES</b> in this article.	

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Drain plug (automatic transaxle transfer case)	10	-	89
Transfer case-to-transaxle bolts	45	33	-
Transfer case-to-transaxle nuts	45	33	-
Fill plug (automatic transaxle transfer case)	16	12	-
Fill plug (manual transaxle transfer case)	49	36	-
Crossmember brace bolts	40	30	-
Transfer case cover bolts (automatic	32	24	-

## 2005 Ford Escape

### 2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner

transaxle transfer case)			
Transfer case heat shield bolts (automatic transaxle transfer case)	14	10	-
Transfer case vent tube bolts (automatic transaxle transfer case)	30	22	-

## DESCRIPTION AND OPERATION

### POWER TRANSFER UNIT (PTU)

The transfer case is a gearbox that attaches to the transaxle. On automatic transaxle vehicles, the RH halfshaft passes through the transfer case and engages the differential side gear as in normal 4x2 applications. The transfer case directs power to the rear driveshaft through a helical gear spline coupled to the transaxle differential case, a helical gear drop (idler gear), and hypoid/helical ring gear assembly and pinion set.

**NOTE:** Repair of the transfer case is limited to seals, gaskets, and output flanges on automatic vehicles only. In vehicles equipped with a manual transaxle, or if any of the geared components, bearings, case cover, or internal shafts fail, a new transfer case must be installed.

The transfer case is sealed from the transaxle and has its own oil sump. The transfer case on an automatic transaxle vehicle uses 0.35 liters (12 oz.) of Motorcraft SAE 75W-140 synthetic gear lubricant. The transfer case on a manual transaxle vehicle uses 0.35 liters (12 oz.) of Motorcraft 80W-90 synthetic gear lubricant.

## DIAGNOSIS AND TESTING

### POWER TRANSFER UNIT (PTU)

Refer to **FOUR-WHEEL DRIVE SYSTEMS**.

## GENERAL PROCEDURES

### POWER TRANSFER UNIT (PTU) DRAINING AND FILLING - AUTOMATIC TRANSAXLE

#### Material

### MATERIALS

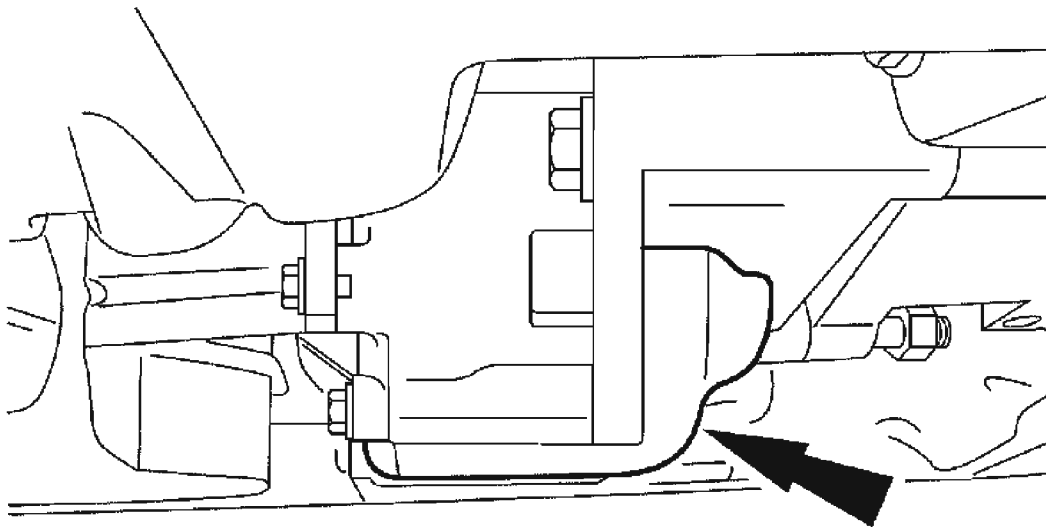
Item	Specification
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Motorcraft SAE 75W-140 High Performance Rear Axle Lubricant	WSL-M2C192-A

XY-75W140-QL

**CAUTION:** New transfer case lubricant must be installed any time the transfer case has been submerged in water.

**NOTE:** The transfer case is lubricated for life and is not to be checked unless a leak is suspected or a repair is necessary.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the drain plug and drain the transfer case.
3. Apply silicone sealant to the drain plug threads and install the drain plug.
  - Tighten to 10 Nm (89 lb-in).



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**Fig. 1: Applying Silicone Sealant To Drain Plug Threads**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Transfer case failure can result if the correct fill procedures are not followed.

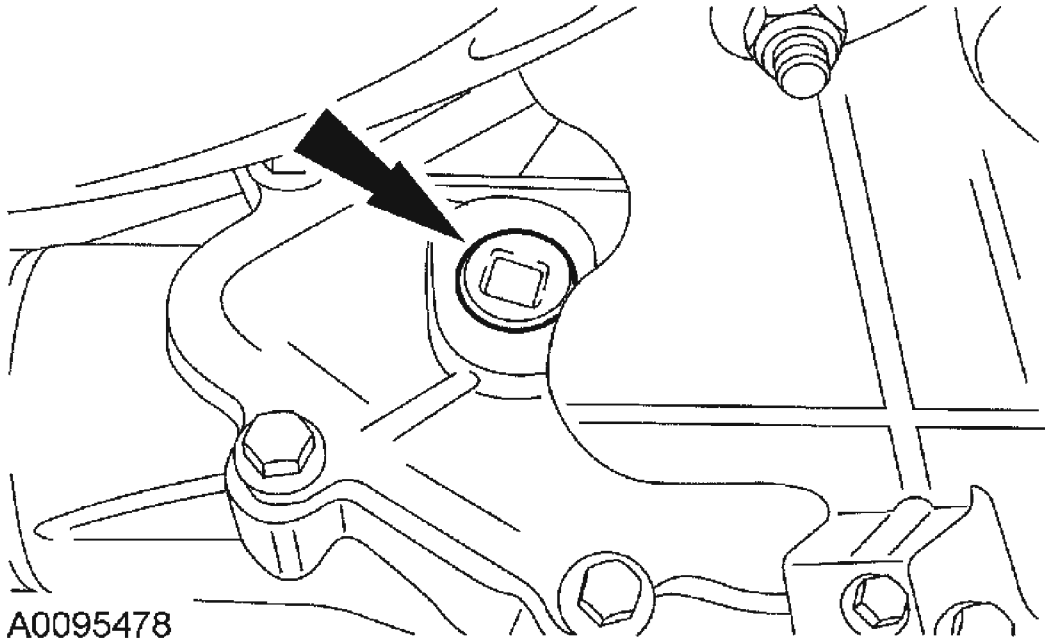
**NOTE:** The fluid level must be even with the bottom of the filler hole with the vehicle on flat, level ground.

4. Remove the fill plug and fill the transfer case with rear axle lubricant.

## 2005 Ford Escape

### 2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner

5. Apply silicone sealant to the fill plug and install the plug.
  - Tighten to 16 Nm (12 lb-ft).



**Fig. 2: Applying Silicone Sealant To Fill Plug**  
Courtesy of FORD MOTOR CO.

#### POWER TRANSFER UNIT (PTU) DRAINING AND FILLING - MANUAL TRANSAXLE

##### Material

##### MATERIALS

Item	Specification
Motorcraft 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A

**CAUTION:** New transfer case lubricant must be installed any time the transfer case has been submerged in water.

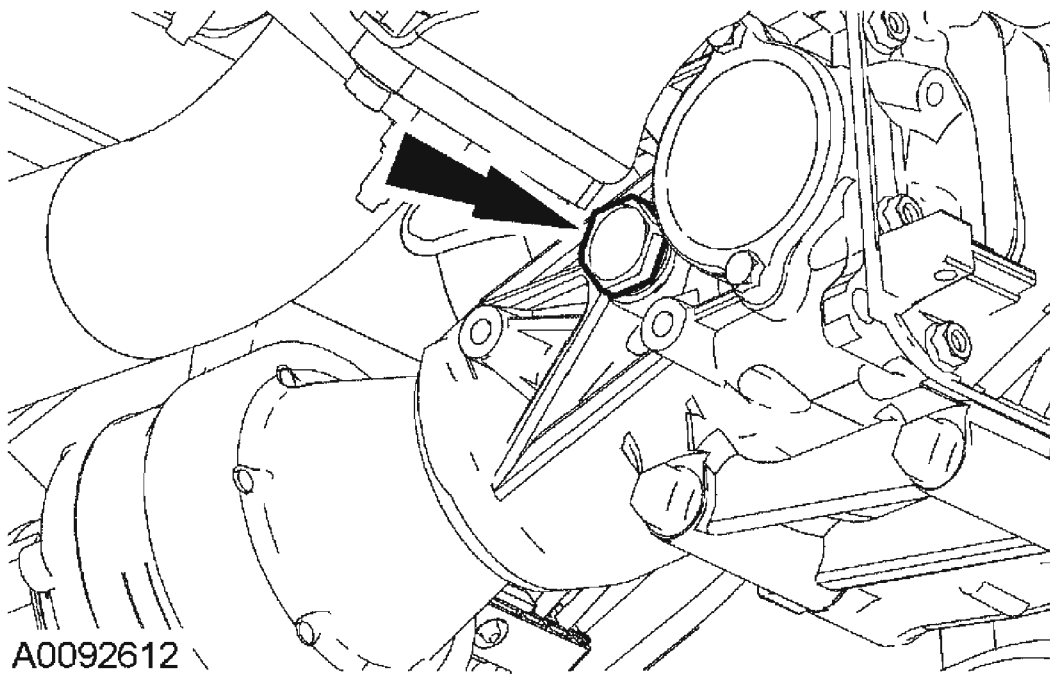
**NOTE:** The transfer case is lubricated for life and is not to be checked unless a leak is suspected. To drain the transfer case fluid, the transfer case must be removed from the vehicle. For additional information, refer to **POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE**.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer

to **JACKING AND LIFTING** .

**CAUTION:** Transfer case failure can result if the correct fill procedures are not followed.

**NOTE:** The fluid level must be even with the bottom of the filler hole with the vehicle on flat, level ground.



**Fig. 3: Removing Fill Plug And Fill Transfer Case With Rear Axle Lubricant**  
Courtesy of FORD MOTOR CO.

2. Remove the fill plug and fill the transfer case with rear axle lubricant.
3. Install the fill plug and gasket.
  - Tighten to 49 Nm (36 lb-ft).

## IN-VEHICLE REPAIR

### OUTPUT SHAFT SEAL

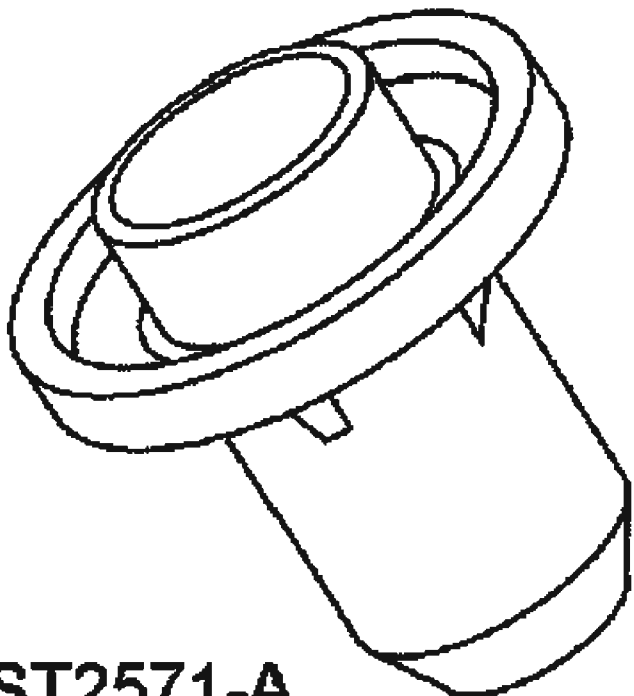
Special Tool(s)

### SPECIAL TOOL(S) CHART

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## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner

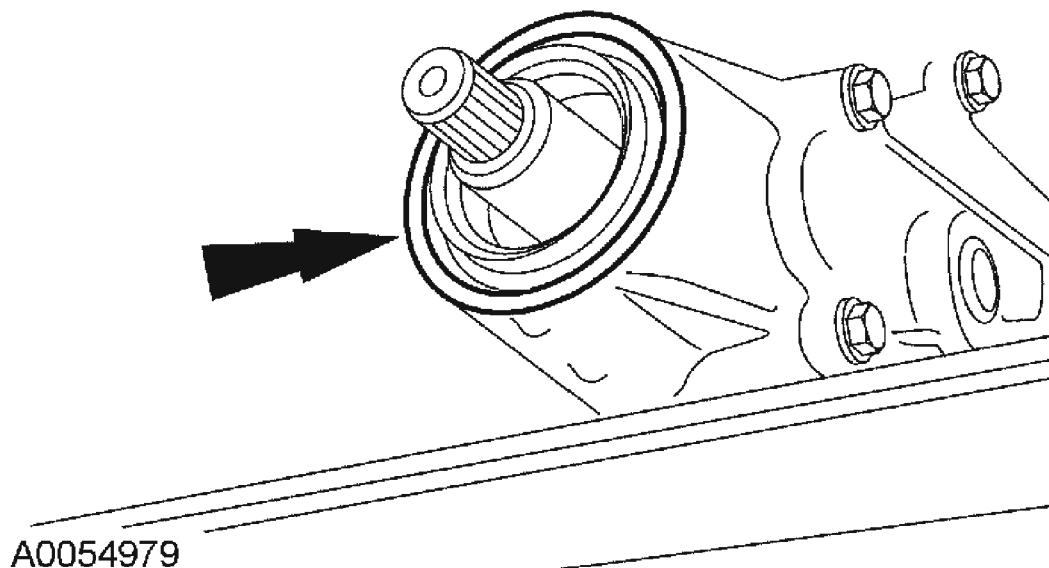


**ST2571-A**

Installer, PTO Drive Gear Outer Oil  
Seal 308 - 430 or equivalent

### Removal

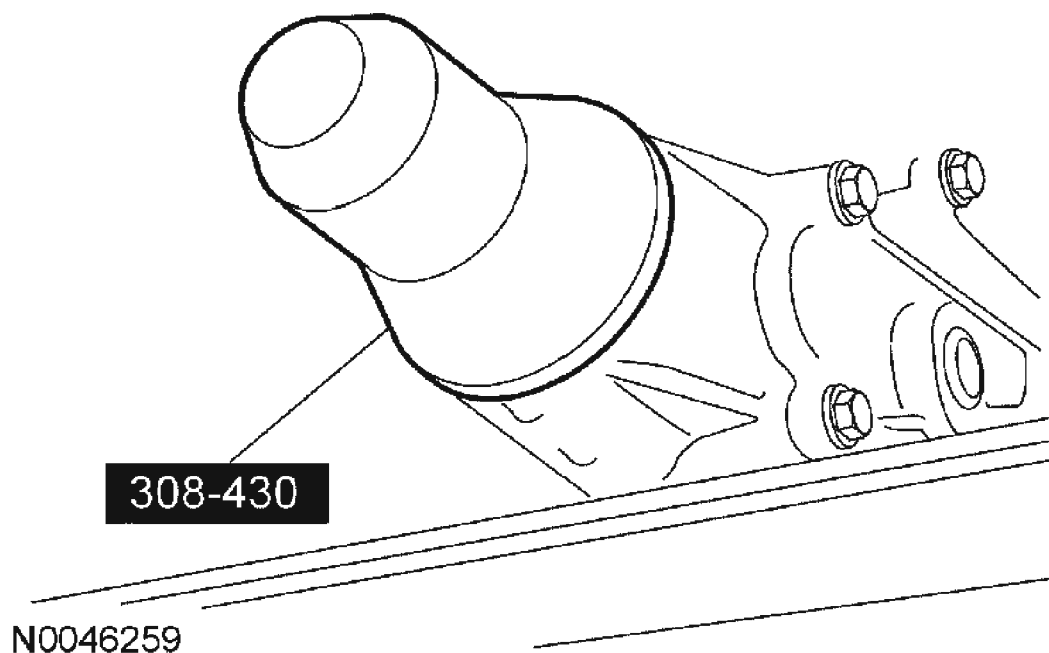
1. Remove the transfer case rear output shaft flange. For additional information, refer to **OUTPUT FLANGE**.
2. Remove the transfer case rear output shaft oil (pinion) seal.



**Fig. 4: Removing Transfer Case Rear Output Shaft Oil (Pinion) Seal**  
Courtesy of FORD MOTOR CO.

**Installation**

1. Using the special tool, install the transfer case rear output shaft oil (pinion) seal.





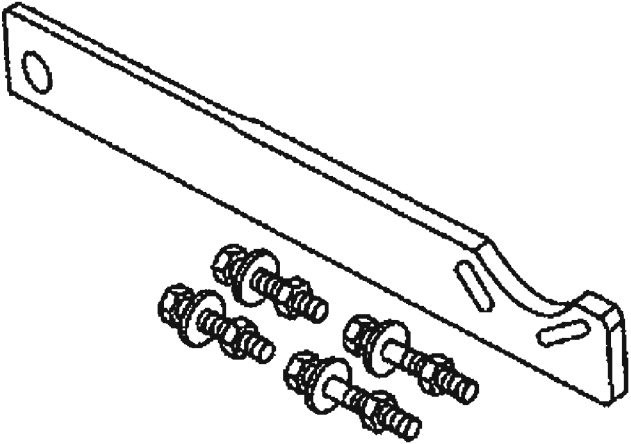
**Fig. 5: Installing Transfer Case Rear Output Shaft Oil**  
**Courtesy of FORD MOTOR CO.**

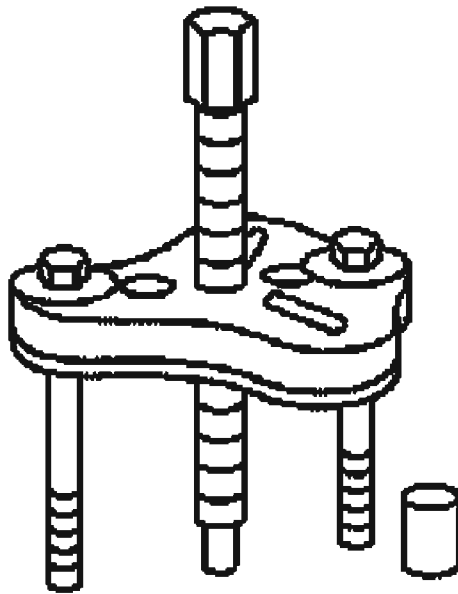
2. Install the transfer case rear output shaft flange. For additional information, refer to **OUTPUT FLANGE**.

## OUTPUT FLANGE

Special Tool(s)

## SPECIAL TOOL(S) CHART

 <p><b>ST1257-A</b></p>	<p>Holding Fixture, Drive Pinion Flange  205-126 (T78P-4851-A)</p>
	<p>Remover, Steering Wheel 211-014  (T67L-3600-A)</p>

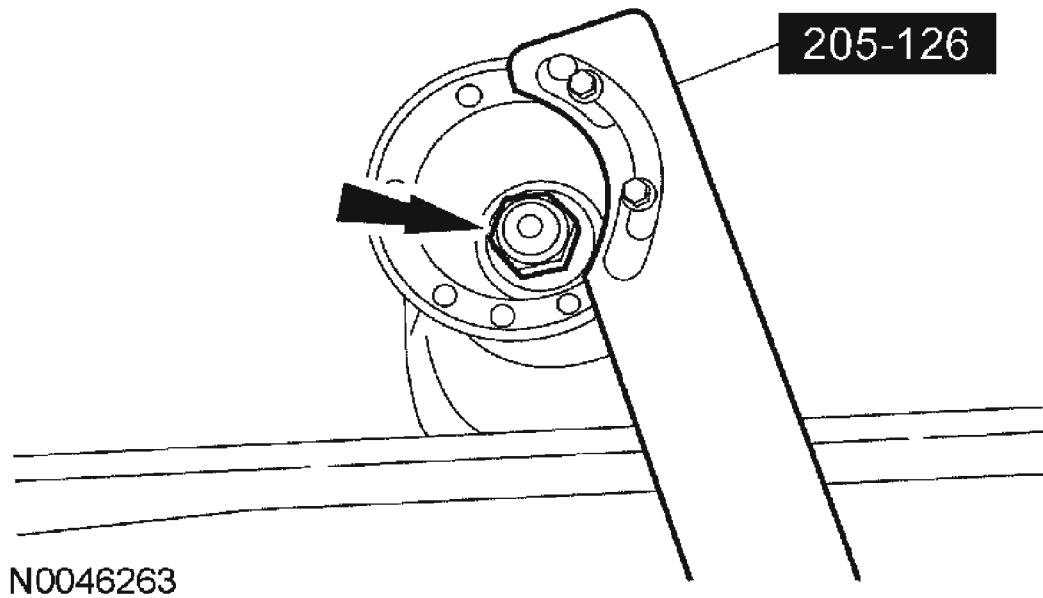


**ST1488-A**

#### Removal

1. Remove the transfer case. For additional information, refer to **POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE** or **POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE**.

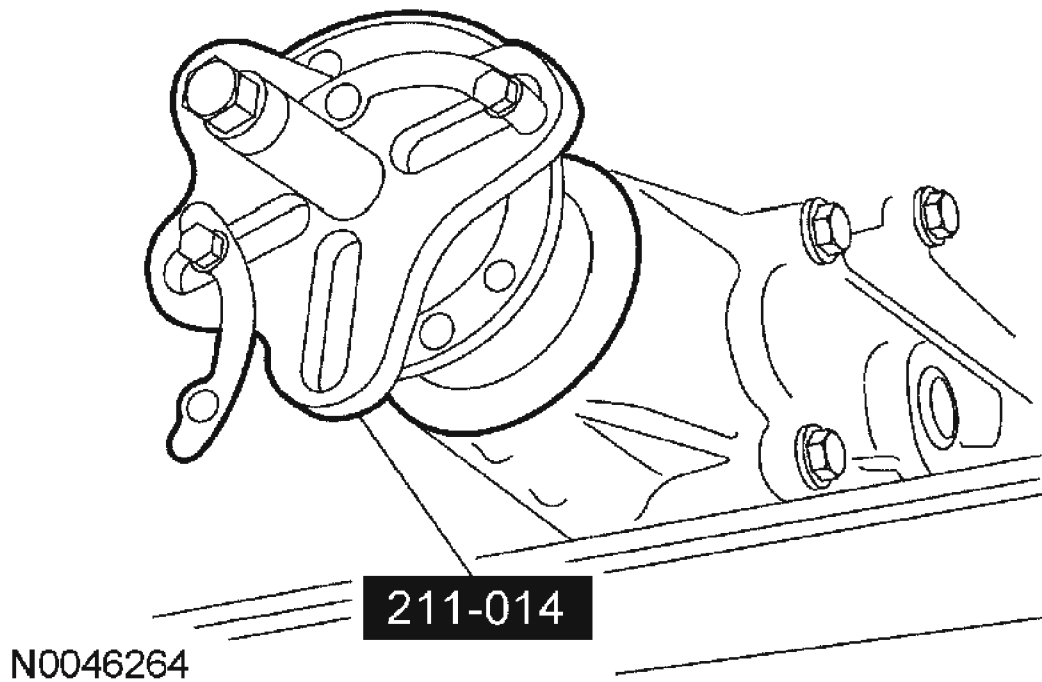
**CAUTION:** Rotational torque of the transfer case rear output shaft flange must be measured and recorded using an in-lb torque wrench for correct pinion bearing preload when reassembled.



**Fig. 6: Removing Pinion Nut**  
Courtesy of FORD MOTOR CO.

2. Using the special tool to hold the flange, remove the pinion nut.

**CAUTION:** Mark the transfer case rear output shaft flange relative to the pinion spline.



**Fig. 7: Removing Transfer Case Rear Output Shaft Flange**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, remove the transfer case rear output shaft flange.

#### Installation

**CAUTION:** Install the transfer case rear output shaft flange to engage the spline as previously marked.

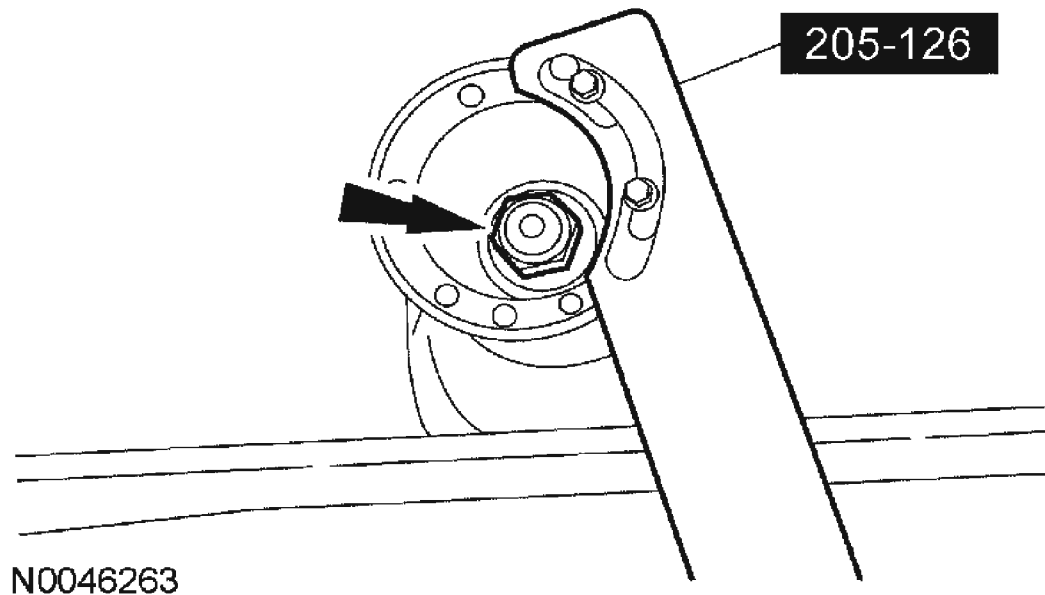
1. Install the transfer case rear output shaft flange.

**CAUTION:** Do not over-tighten the pinion nut.

**CAUTION:** Refer to the rotational torque previously recorded with an in-lb torque wrench.

**CAUTION:** If the rotational torque is less than specification, tighten the drive pinion nut in small increments until it is within specification. Do not tighten the drive pinion nut more than 678 Nm (500 lb-ft) or the collapsible spacer will be damaged. If the rotation torque is higher

than specification, the collapsible spacer has been compressed too far and a new collapsible spacer must be installed.



**Fig. 8: Installing Pinion Nut**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the pinion nut.
3. Install the transfer case. For additional information, refer to **POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE** or **POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE**.

#### TRANSFER CASE VENT

Special Tool(s)

#### SPECIAL TOOL(S) CHART

	Installer, Vent Tube 308-584 or equivalent
--	--

## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



**ST1228-A**

### General Equipment

#### GENERAL EQUIPMENT REFERENCE

Slide hammer with a 3-jaw puller attachment

### Material

#### MATERIAL ITEM SPECIFICATION

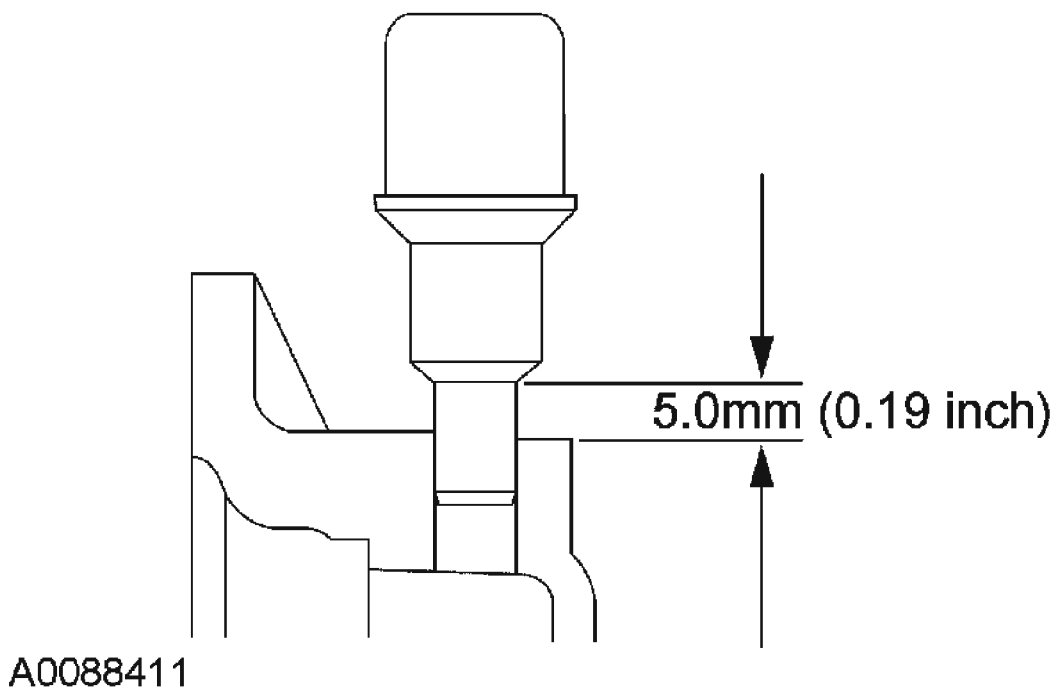
Item	Specification
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4

### Removal

1. Remove the transfer case. For additional information, refer to **POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE** or **POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE**.
2. Using the slide hammer with a 3-jaw puller attachment, remove the transfer case tube.

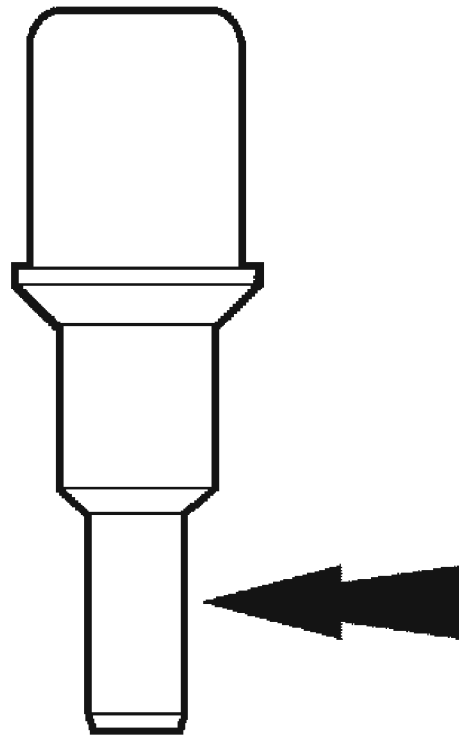
### Installation

1. Inspect the condition of the transfer case vent hole.
  - By hand, insert the new transfer case vent into the transfer case cover and measure the distance between the transfer case cover and the vent as indicated.
  - If the measurement is less than specification, install a new transfer case.



**Fig. 9: Installing A New Transfer Case**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not apply silicone sealant to the transfer case vent hole as it may cause damage to the transfer case internal components.



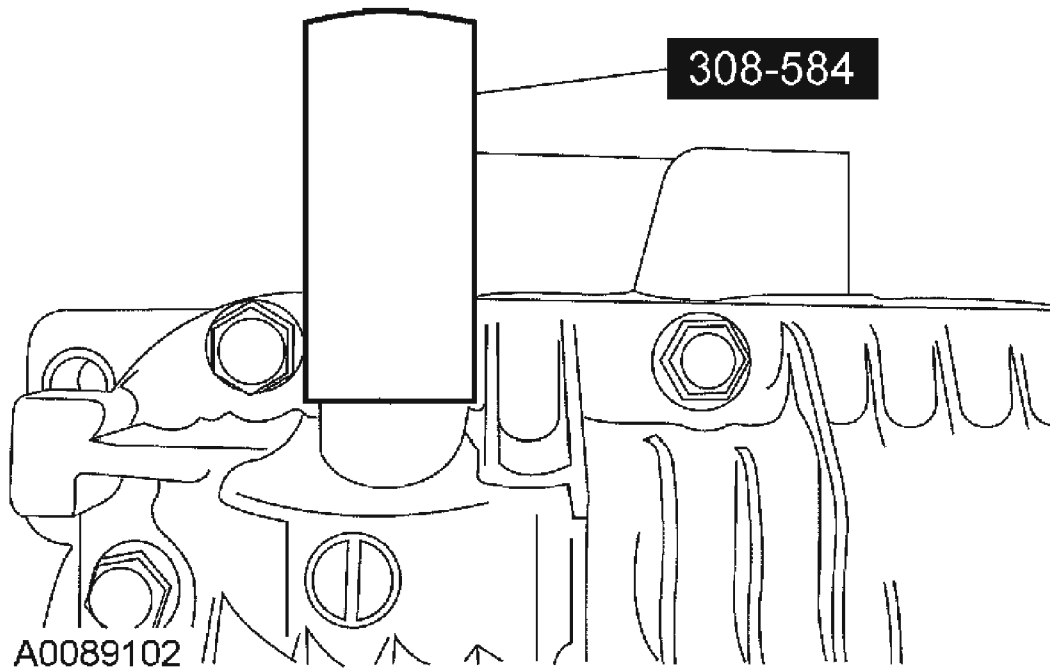
A0088415

**Fig. 10: Applying A Bead Of Silicone Gasket And Sealant To Transfer Case Vent**  
Courtesy of FORD MOTOR CO.

2. Apply a bead of silicone gasket and sealant to the transfer case vent where indicated.

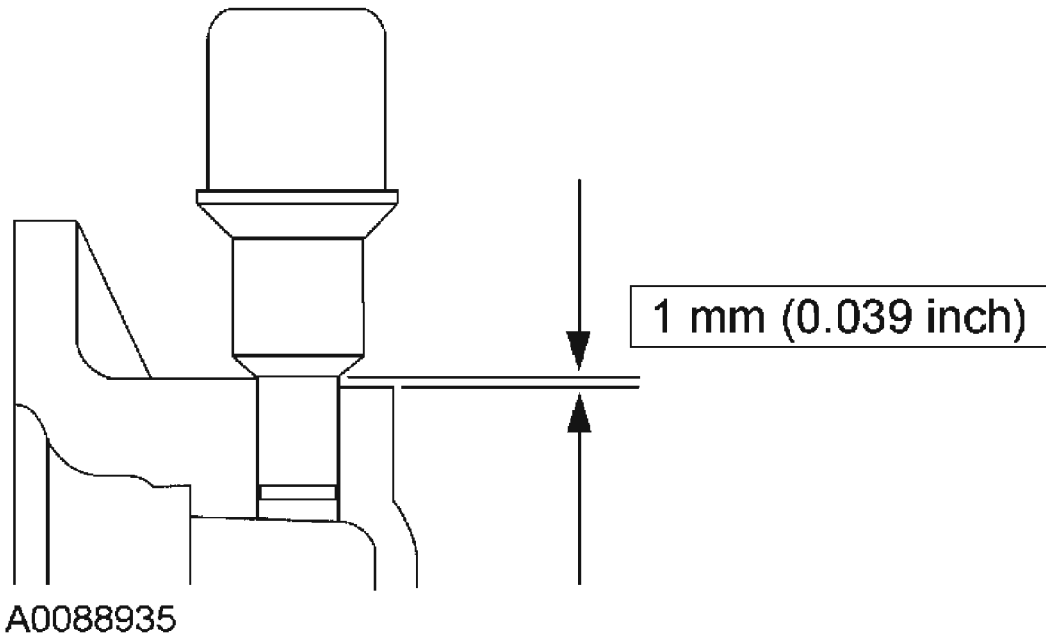
**NOTE:** Drive the transfer case vent in until the special tool bottoms out against the transfer case rear cover boss.





**Fig. 11: Installing Transfer Case Vent**  
Courtesy of FORD MOTOR CO.

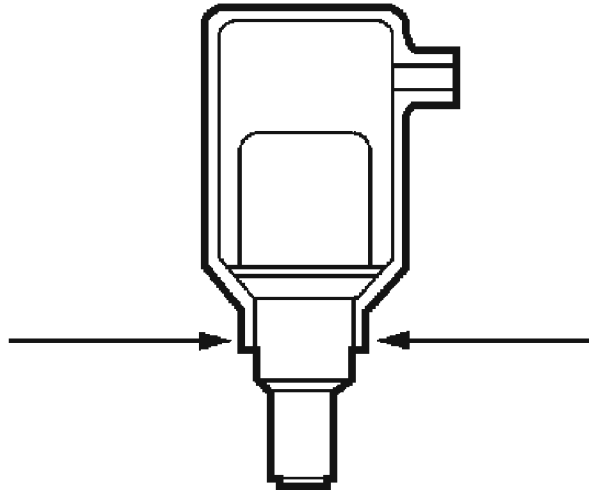
3. Using the special tool, install the transfer case vent.
4. Measure the depth of the transfer case vent.
  - If the vent is too high, repeat Step 3.



**Fig. 12: Measuring Depth Of Transfer Case Vent**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure the transfer case vent boot is correctly aligned.

**NOTE:** Use a soapy water solution to lubricate the transfer case breather boot.



A0088936

**Fig. 13: Installing Transfer Case Vent Boot**  
Courtesy of FORD MOTOR CO.

5. Install the transfer case vent boot.
6. Install the transfer case. For additional information, refer to **POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE** or **POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE**.

## REMOVAL

### POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE

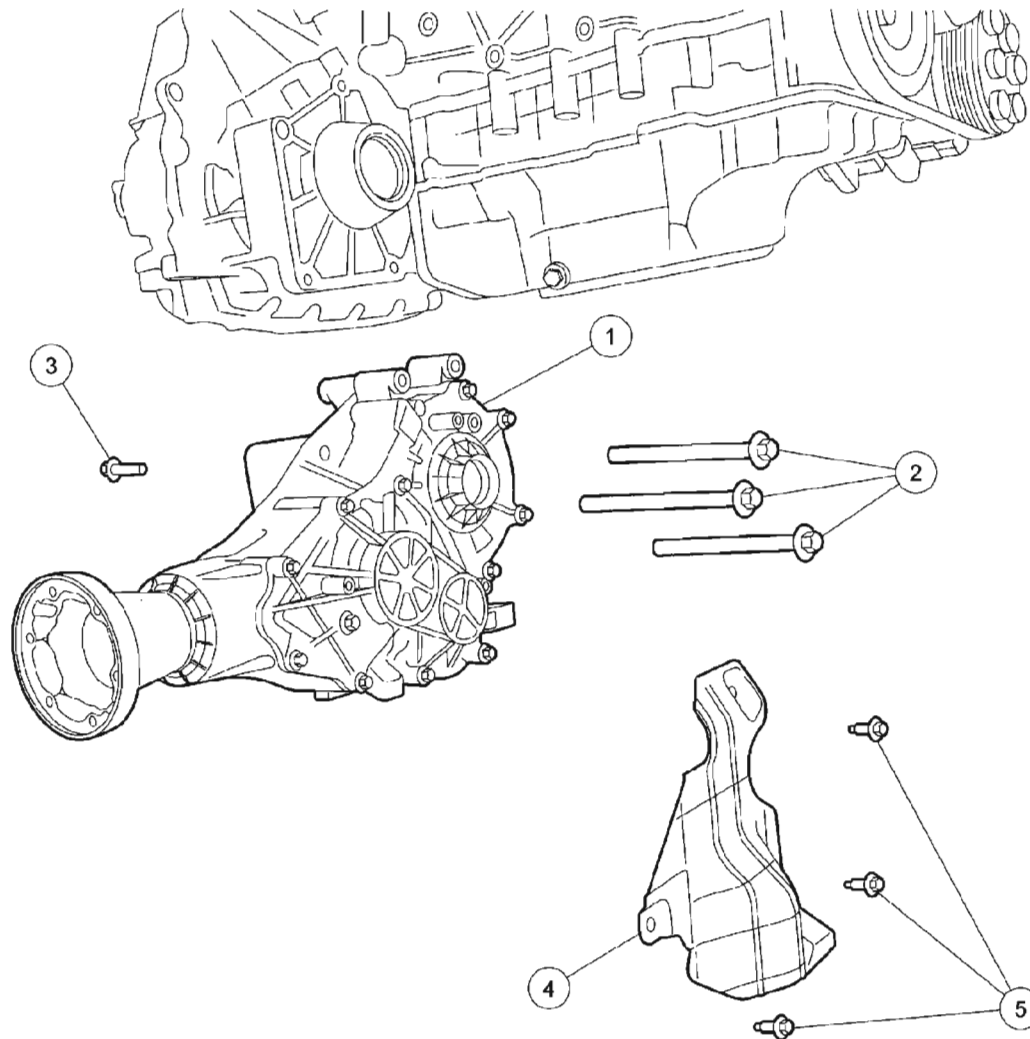
#### Material

#### MATERIAL ITEM SPECIFICATION

Item	Specification
Motorcraft SAE 75W-140 High Performance Rear Axle Lubricant XY-75W140-QL	WSL-M2C192-A

## 2005 Ford Escape

### 2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



A0096582

Item	Part Number	Description
1	7251	Transfer case
2	W500121-S	Transfer case-to-transaxle bolts (3 required)
3	W706822-S	Transfer case-to-transaxle bolt
4	7F469	Transfer case heat shield
5	W500210-S	Transfer case heat shield bolts (3 required)

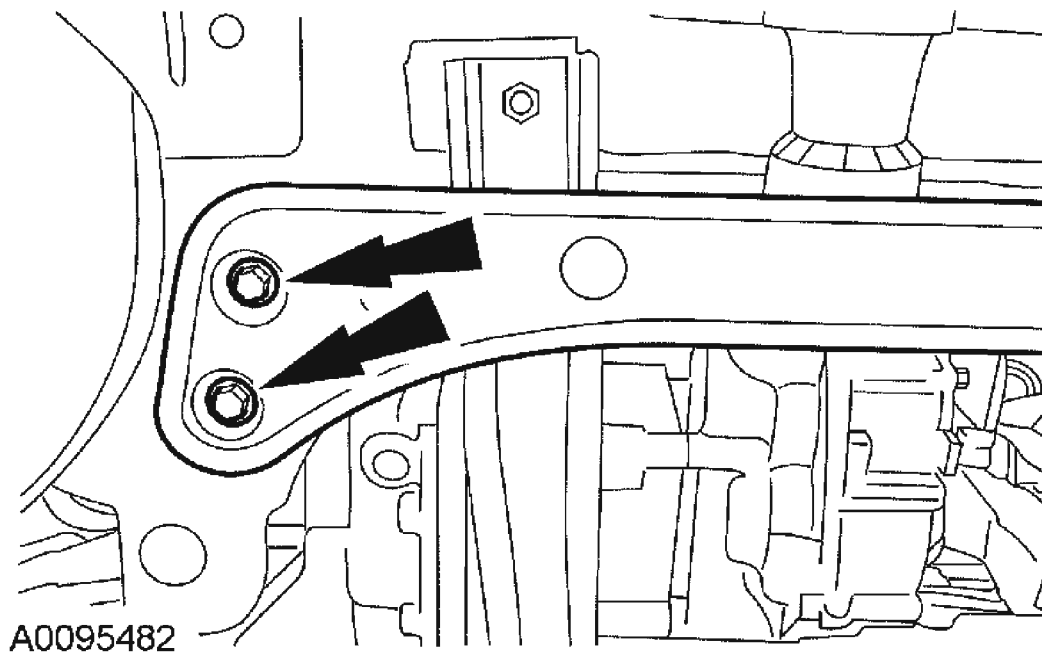
**Fig. 14: Removing Power Transfer Unit (PTU) - Automatic Transaxle**  
Courtesy of FORD MOTOR CO.

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

3. Drain the transfer case. For additional information, refer to **POWER TRANSFER UNIT (PTU) DRAINING AND FILLING - AUTOMATIC TRANSAXLE**.

**CAUTION: A new transfer case inner halfshaft seal must be installed whenever the intermediate shaft or transfer case is removed from the vehicle.**

4. Remove the front RH intermediate shaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS**.
5. Remove the driveshaft. For additional information, refer to **DRIVESHAFT**.
6. Remove the 4 bolts and the crossmember brace.

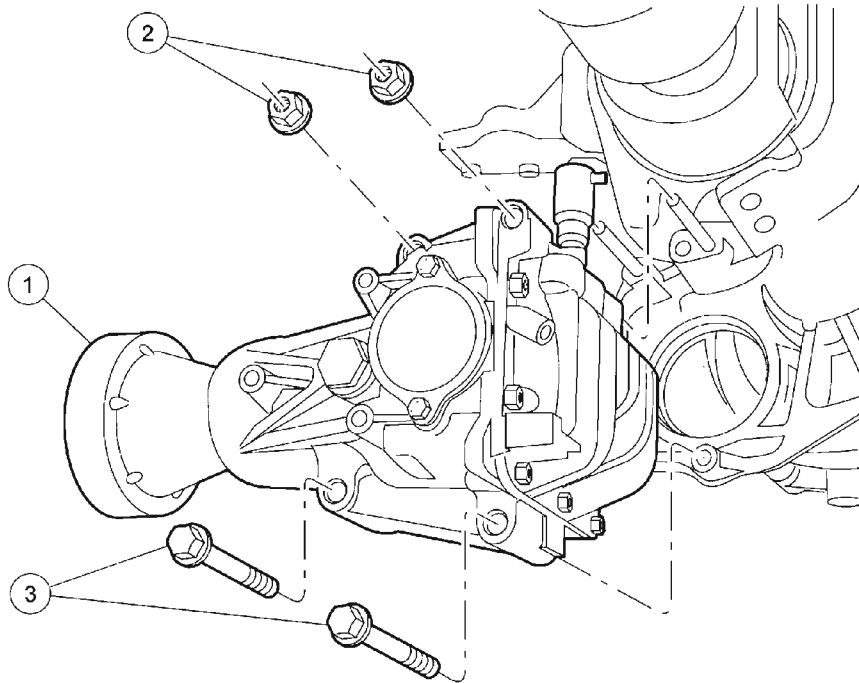


**Fig. 15: Removing 4 Bolts And Crossmember Brace**  
Courtesy of FORD MOTOR CO.

7. Remove the generator. For additional information, refer to **GENERATOR AND REGULATOR**.
8. Remove the exhaust as required. For additional information, refer to **EXHAUST SYSTEM**.
9. Remove the 3 transfer case heat shield bolts and the transfer case heat shield.
10. Remove the transfer case-to-engine brace.
11. Disconnect the transfer case vent hose and position it aside.

12. Remove the 4 transfer case-to-transaxle bolts.
13. Remove the transfer case.

### POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE

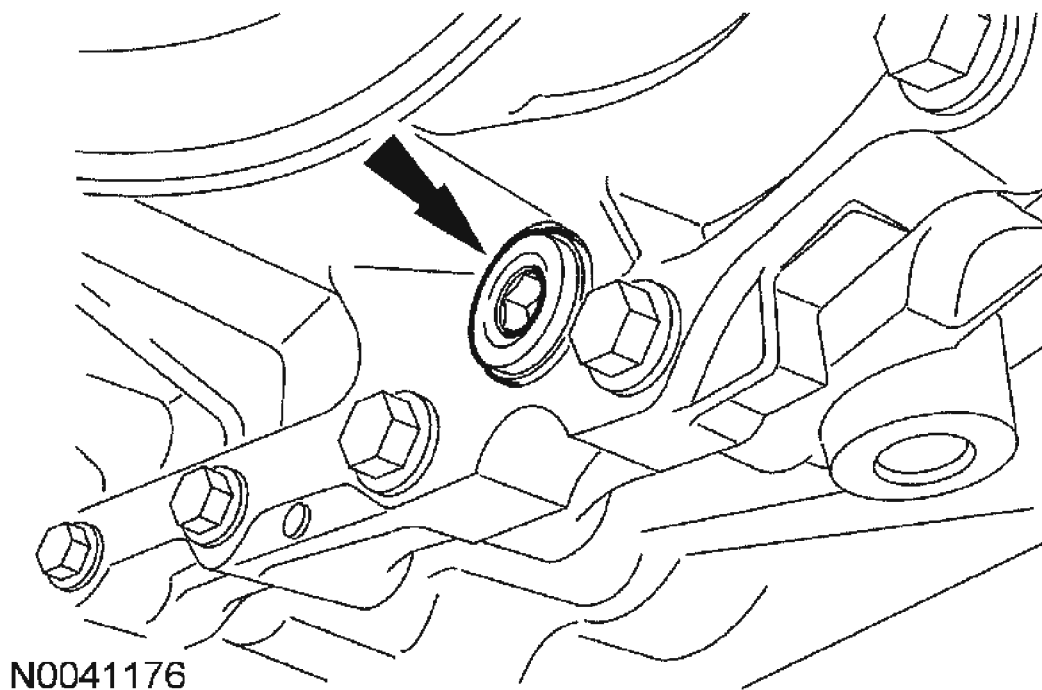


A0096583

Item	Part Number	Description
1	33100-3A310	Transfer case
2	32155-3A310	Transfer case-to-transaxle nuts (2 required)
3	33315-3A310	Transfer case-to-transaxle bolts (2 required)

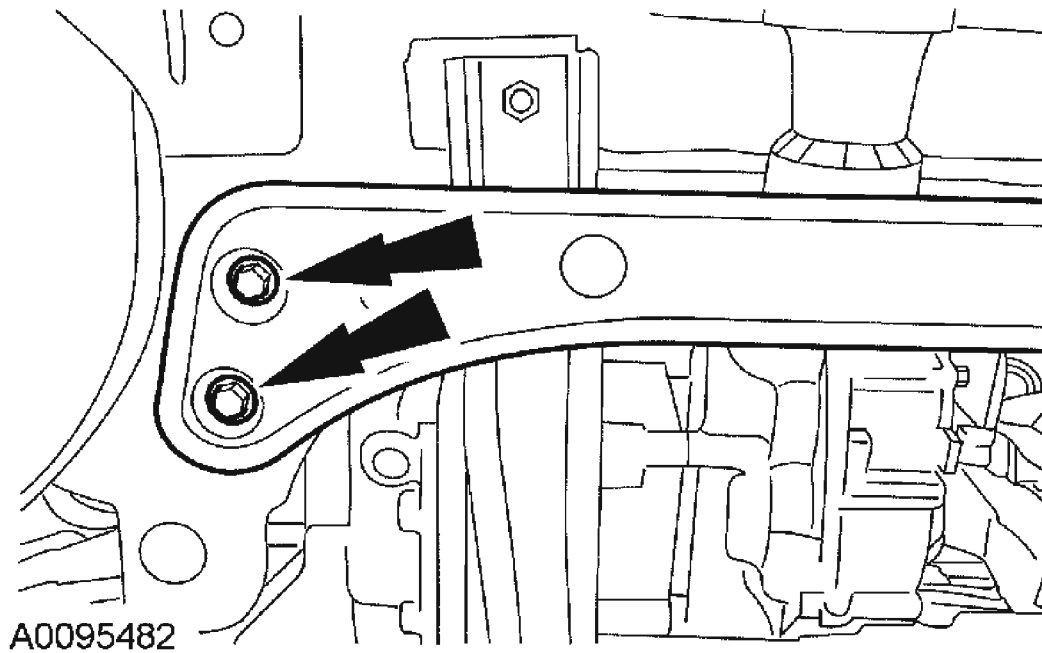
**Fig. 16: Identifying Power Transfer Unit (PTU) - Manual Transaxle**  
**Courtesy of FORD MOTOR CO.**

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



**Fig. 17: Removing Drain Plug And Drain Transaxle Fluid**  
Courtesy of FORD MOTOR CO.

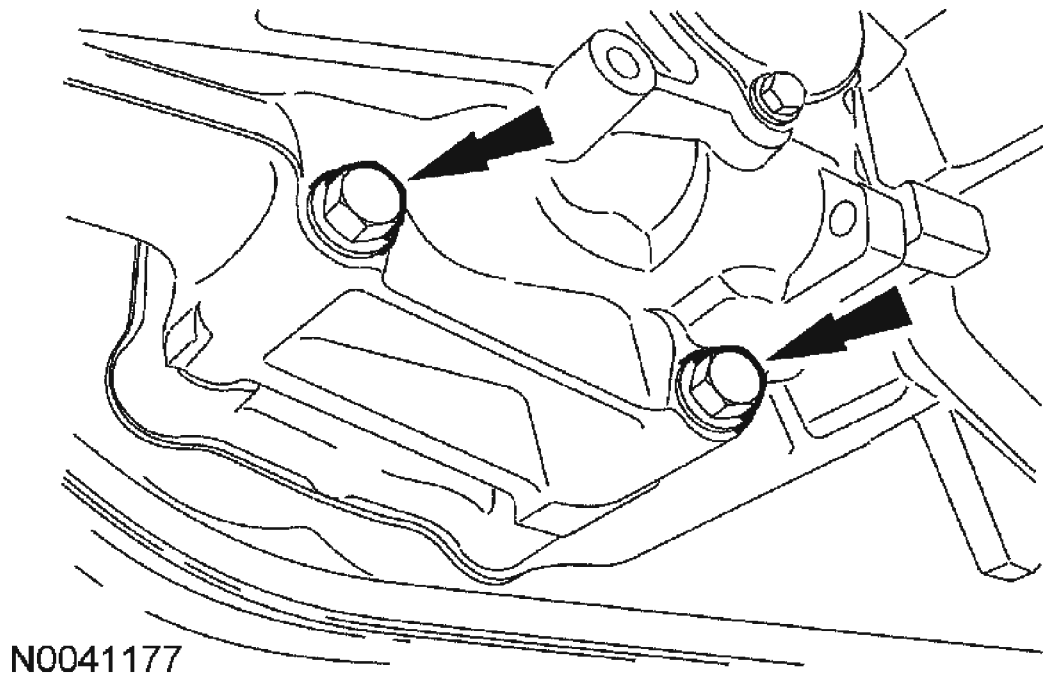
3. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** .
4. Remove the 4 bolts and the crossmember brace.



**Fig. 18: Removing Bolts And Crossmember Brace**  
Courtesy of FORD MOTOR CO.

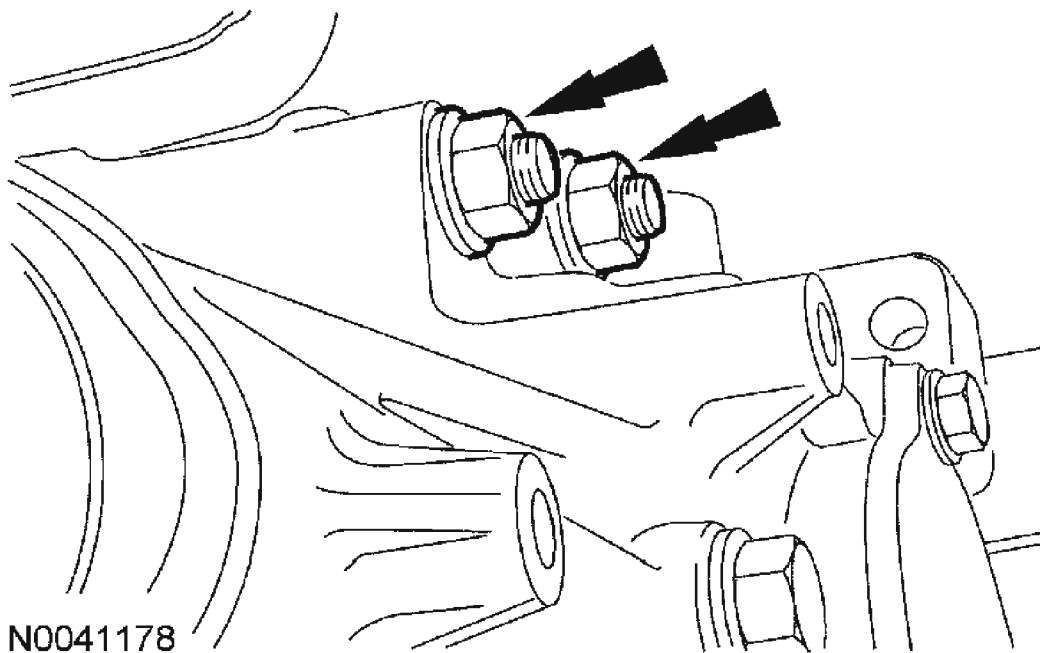
5. Remove the 2 transfer case-to-transaxle bolts.





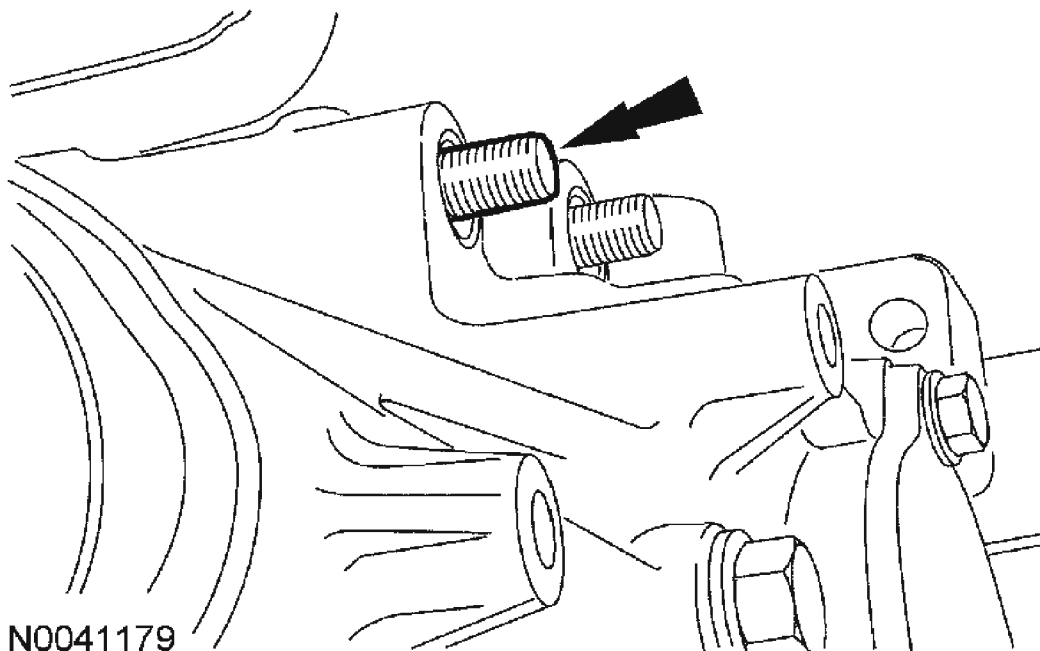
**Fig. 19: Removing Transfer Case-To-Transaxle Bolts**  
Courtesy of FORD MOTOR CO.

6. Remove the 2 transfer case-to-transaxle nuts.



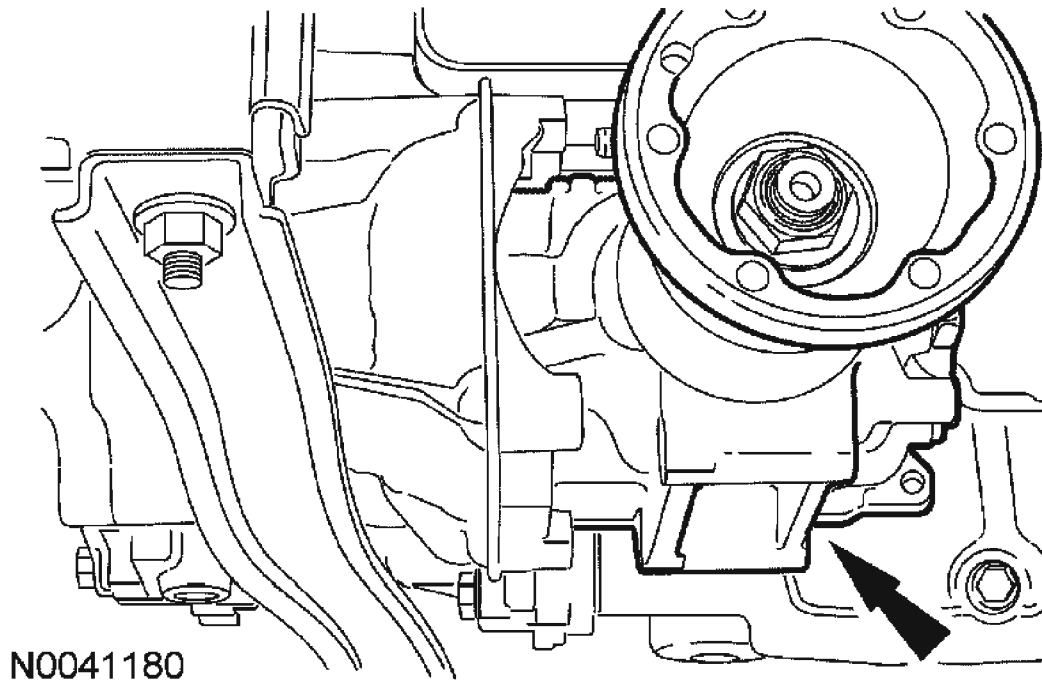
**Fig. 20: Removing Transfer Case-To-Transaxle Nuts**  
Courtesy of FORD MOTOR CO.

7. Using a suitable stud remover, remove the front stud.



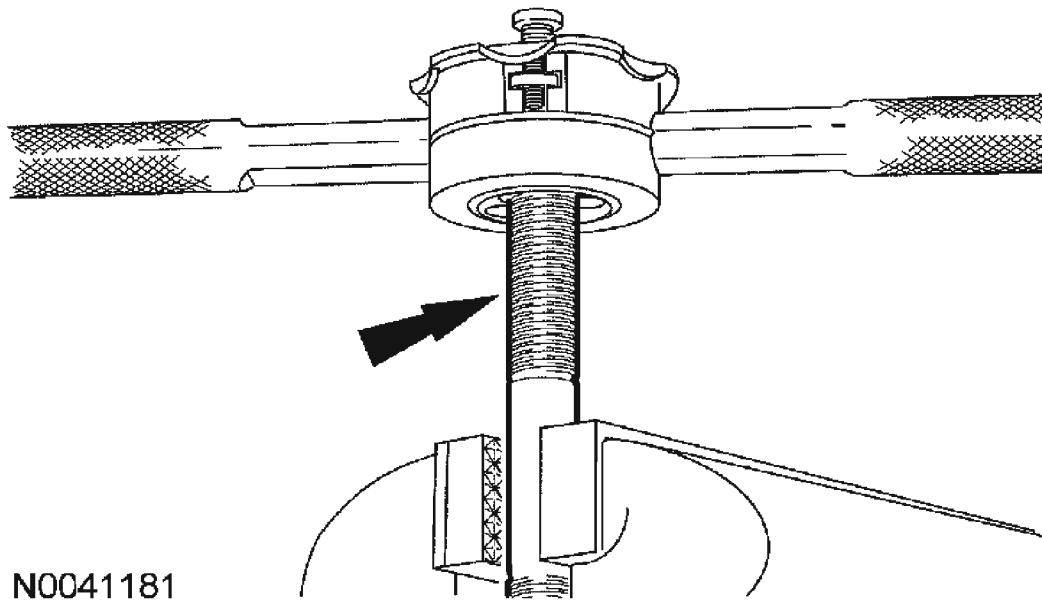
**Fig. 21: Removing Front Stud**  
Courtesy of FORD MOTOR CO.

8. Pull the transfer case outward, off the rear stud. Maneuver the transfer case away from the exhaust and remove from the vehicle.



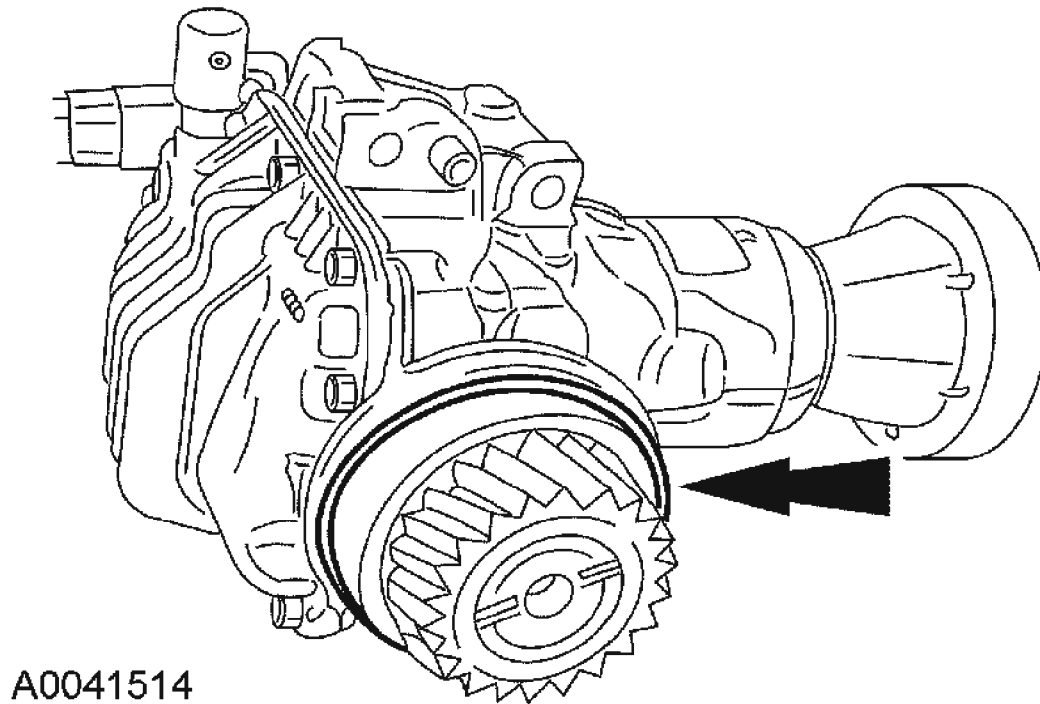
**Fig. 22: Pulling Transfer Case Outward Off Rear Stud**  
Courtesy of FORD MOTOR CO.

9. If necessary, clean the threads of the front stud.



**Fig. 23: Cleaning Threads Of Front Stud**  
Courtesy of FORD MOTOR CO.

10. Remove and discard the O-ring seal.



**Fig. 24: Removing And Discard O-Ring Seal**  
Courtesy of FORD MOTOR CO.

#### POWER TRANSFER UNIT (PTU) SEALS

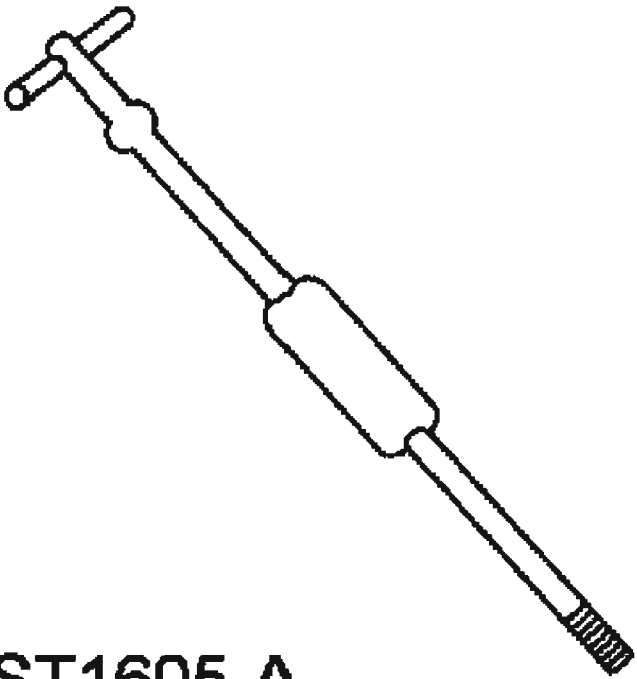
Special Tool(s)

#### SPECIAL TOOL(S) CHART

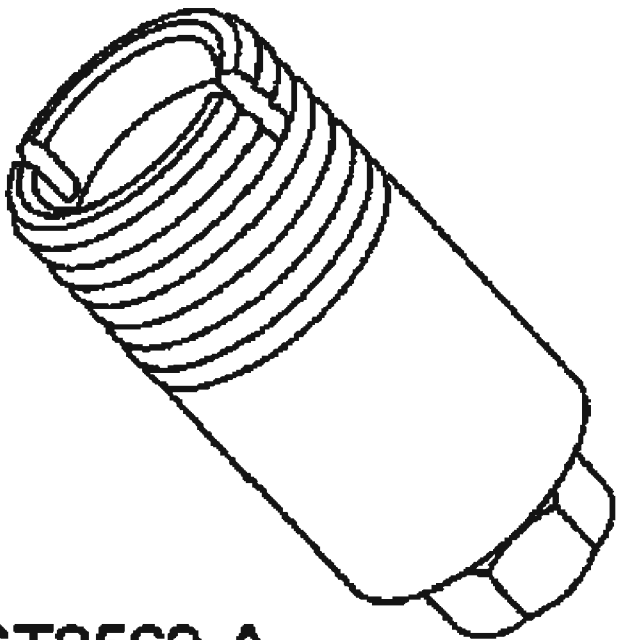
	Slide Hammer 100-001 (T50T-100-A)
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## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



**ST1605-A**

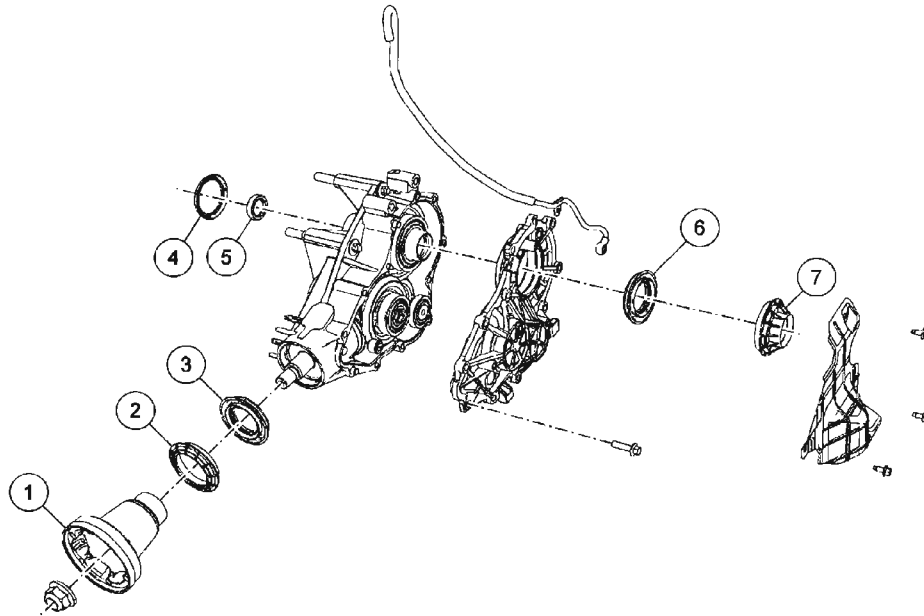


**ST2569-A**

Remover, Halfshaft Oil Seal 308-428  
(1 Of 2)

## 2005 Ford Escape

### 2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



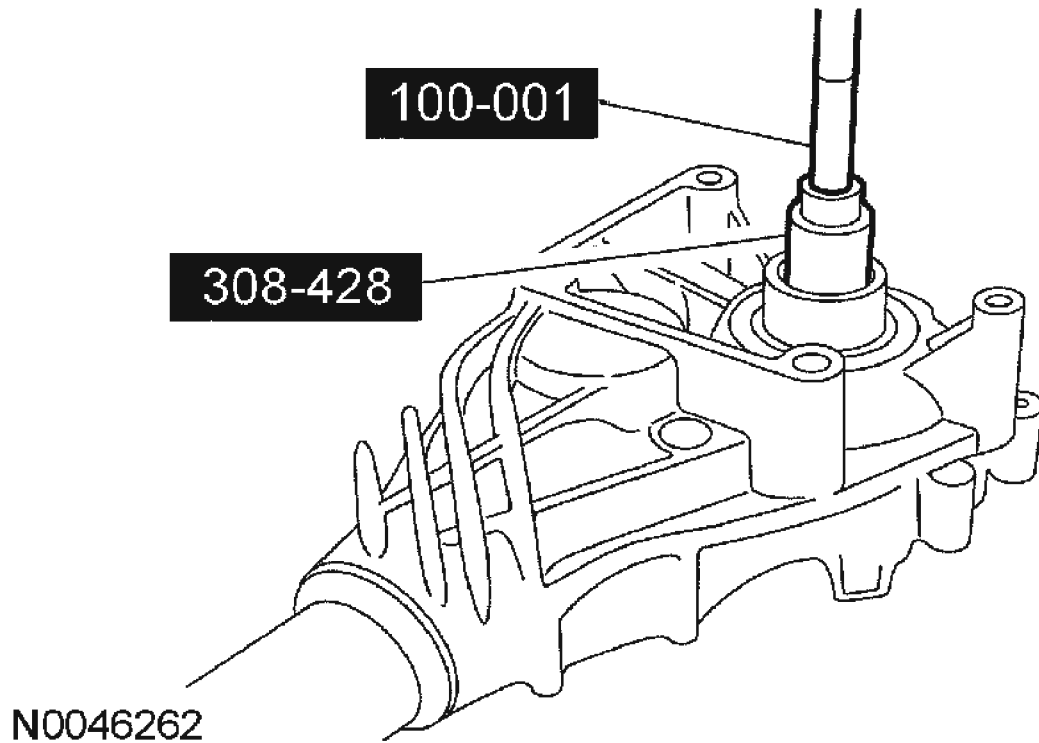
N0050682

Item	Part Number	Description
1	7H457	Output flange
2	4859	Dust cover
3	7H426	Output seal

Item	Part Number	Description
4	7H429	Outer input seal
5	7H469	Inner input seal
6	7H426	Halfshaft seal
7	7H459	Dust cover

**Fig. 25: Identifying Power Transfer Unit (PTU) Seals**  
Courtesy of FORD MOTOR CO.

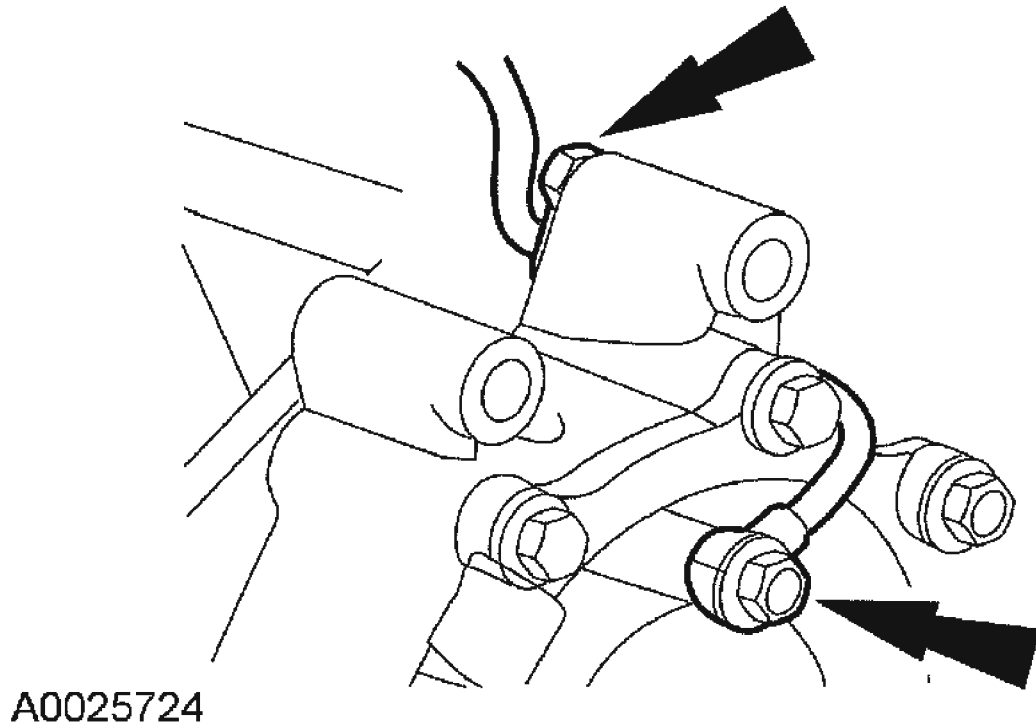
1. Remove the PTU from the vehicle. For additional information, refer to **POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE** or **POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE**.
2. Using the special tools, remove the outer input seal.



**Fig. 26: Removing Outer Input Seal**  
Courtesy of FORD MOTOR CO.

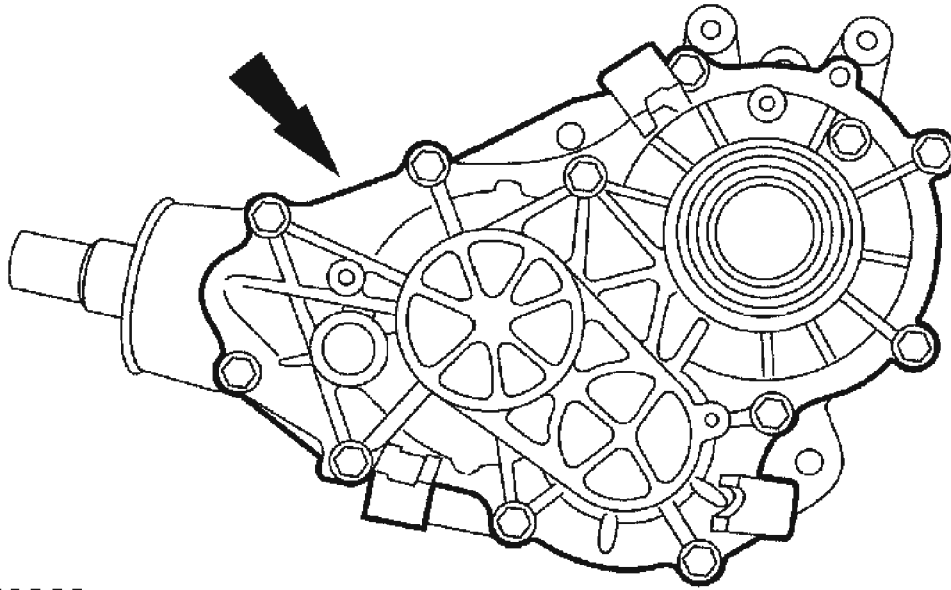
3. Remove the dust cover and the halfshaft seal.
4. Remove the dust cover and the output seal.
5. Remove the PTU vent tube.





**Fig. 27: Removing Dust Cover And Halfshaft Seal**  
Courtesy of FORD MOTOR CO.

6. Remove the PTU cover bolts and the PTU cover, then remove the gears.



N0050683

**Fig. 28: Removing PTU Cover Bolts And PTU Cover**  
Courtesy of FORD MOTOR CO.

7. Remove the inner input seal.
8. Clean the PTU sealing surface.

## INSTALLATION

### POWER TRANSFER UNIT (PTU) - AUTOMATIC TRANSAXLE

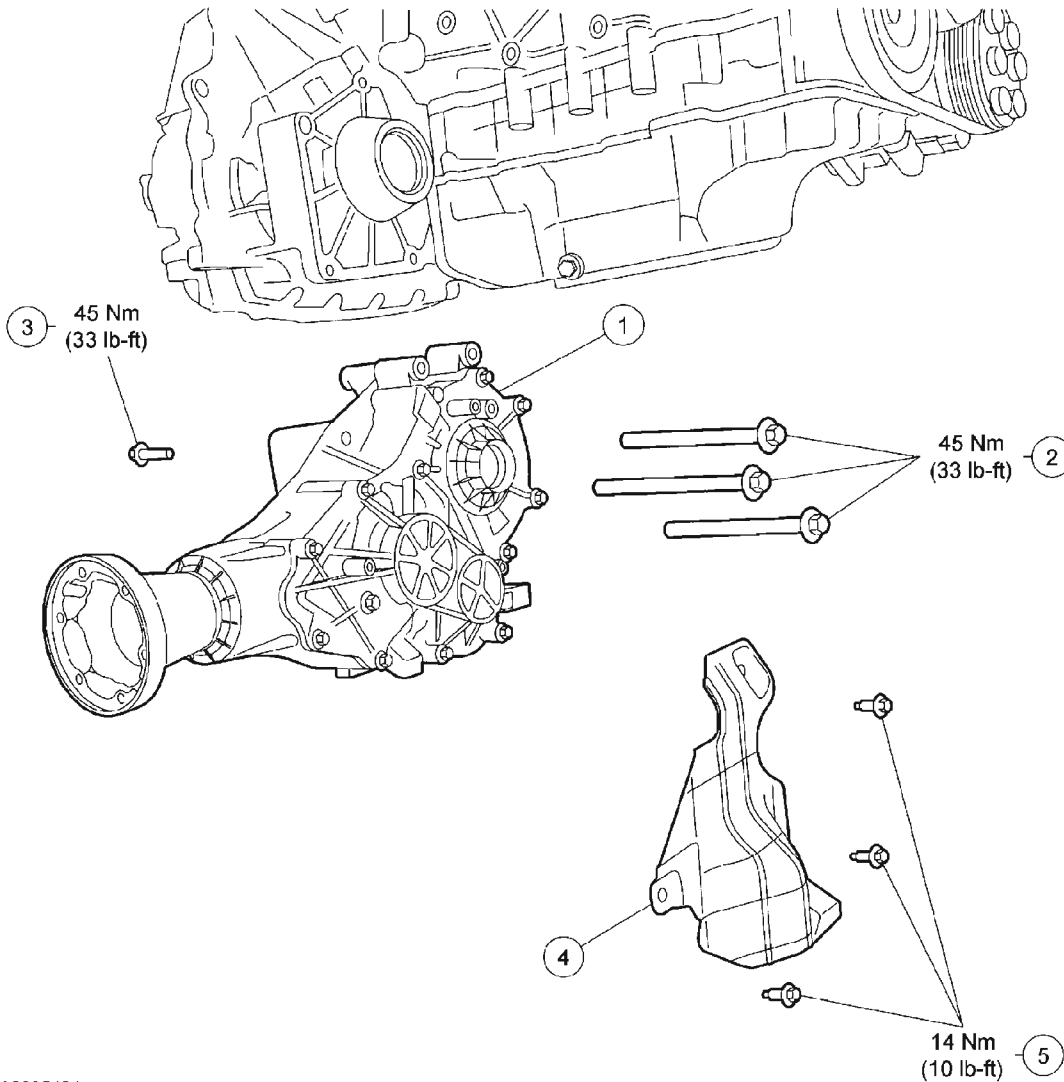
#### Material

#### MATERIAL ITEM SPECIFICATION

Item	Specification
Motorcraft SAE 75W-140 High Performance Rear Axle Lubricant XY-75W140-QL	WSL-M2C192- A

## 2005 Ford Escape

### 2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



A0095484

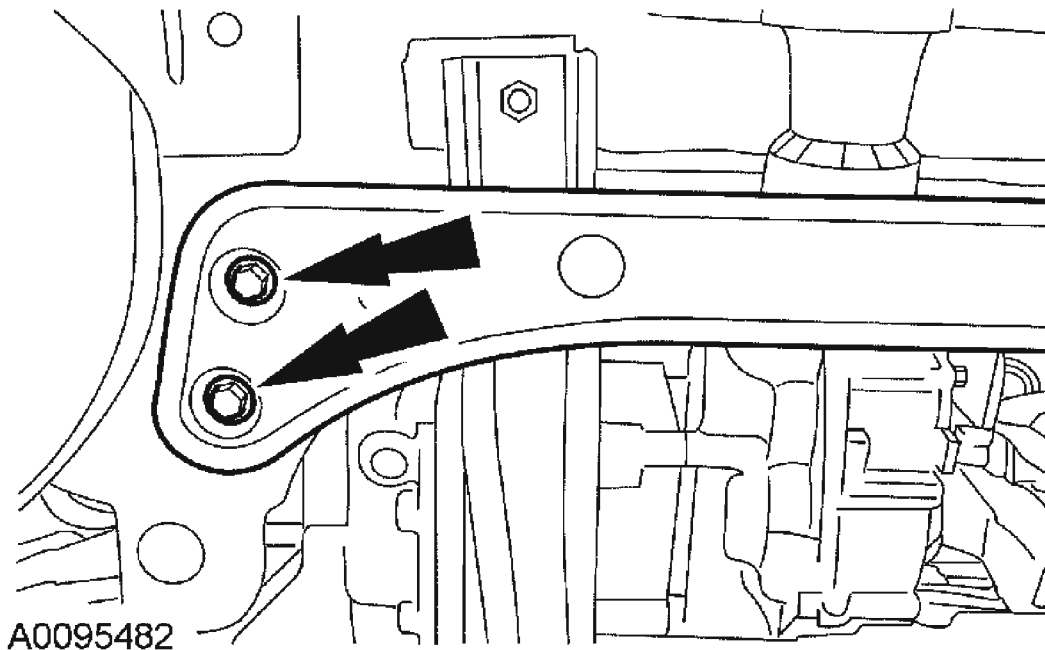
Item	Part Number	Description
1	7251	Transfer case
2	W706822-S	Transfer case-to-transaxle bolts (3 required)
3	W500121-S	Transfer case-to-transaxle bolt
4	7F496	Transfer case heat shield
5	W500210-S	Transfer case heat shield bolts (3 required)

**Fig. 29: Installing Power Transfer Unit (PTU) - Automatic Transaxle**  
Courtesy of FORD MOTOR CO.

**CAUTION:** A new transfer case inner halfshaft seal must be installed whenever the intermediate shaft or transfer case is removed from the vehicle.

**NOTE:** If necessary, install a new RH differential fluid seal. For additional information, refer to AUTOMATIC TRANSAXLE-TRANSMISSION - CD4E or AUTOMATIC TRANSAXLE-TRANSMISSION - ELECTRONICALLY CONTROLLED CONTINUOUSLY VARIABLE TRANSMISSION (ECVT) .

1. Position the transfer case to the transaxle.
2. Install the transfer case-to-engine brace.
3. Connect the transfer case vent hose.
4. Install the 4 transfer case-to-transaxle bolts.
  - Tighten to 45 Nm (33 lb-ft).
5. Install the transfer case heat shield and the 3 transfer case heat shield bolts.
  - Tighten to 14 Nm (10 lb-ft).
6. Install the generator. For additional information, refer to GENERATOR AND REGULATOR .
7. Install the crossmember brace and the 4 bolts.
  - Tighten the bolts to 40 Nm (30 lb-ft).



**Fig. 30: Installing Transfer Case Heat Shield And Transfer Case Heat Shield**  
Courtesy of FORD MOTOR CO.

8. Install the driveshaft. For additional information, refer to DRIVESHAFT .

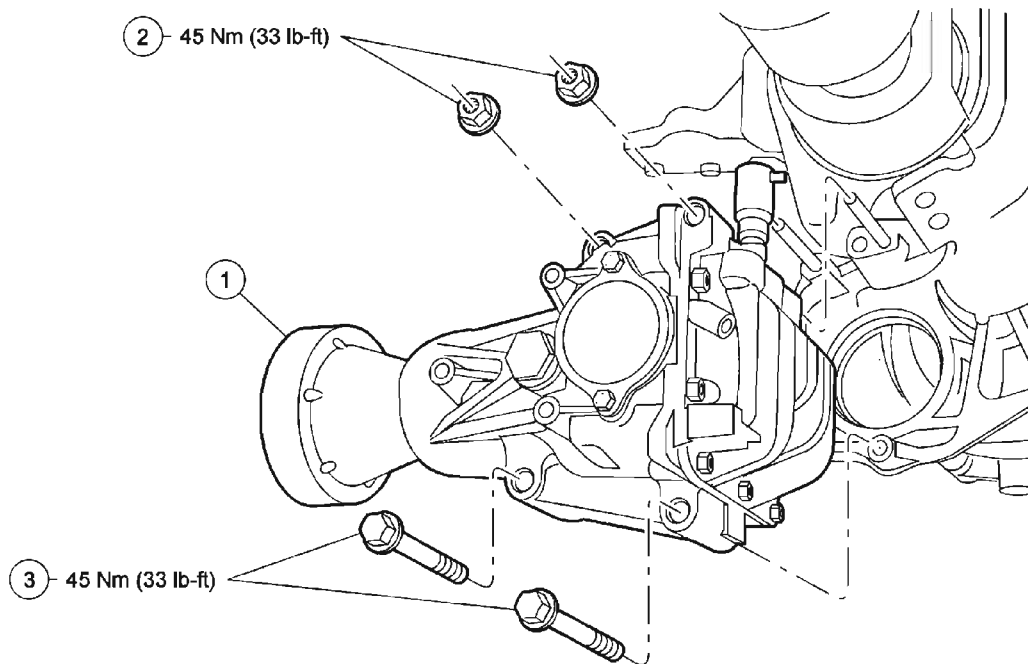
9. Install the front RH intermediate shaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** .
10. Install the exhaust as required. For additional information, refer to **EXHAUST SYSTEM** .
11. Fill the transfer case. For additional information, refer to **POWER TRANSFER UNIT (PTU) DRAINING AND FILLING - AUTOMATIC TRANSAXLE**.
12. Check the transaxle fluid level. For additional information, refer to **AUTOMATIC TRANSAXLE-TRANSMISSION - CD4E** or **AUTOMATIC TRANSAXLE-TRANSMISSION - ELECTRONICALLY CONTROLLED CONTINUOUSLY VARIABLE TRANSMISSION (ECVT)** .

### POWER TRANSFER UNIT (PTU) - MANUAL TRANSAXLE

#### Material

#### MATERIAL ITEM SPECIFICATION

Item	Specification
Motorcraft 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A



A0095485

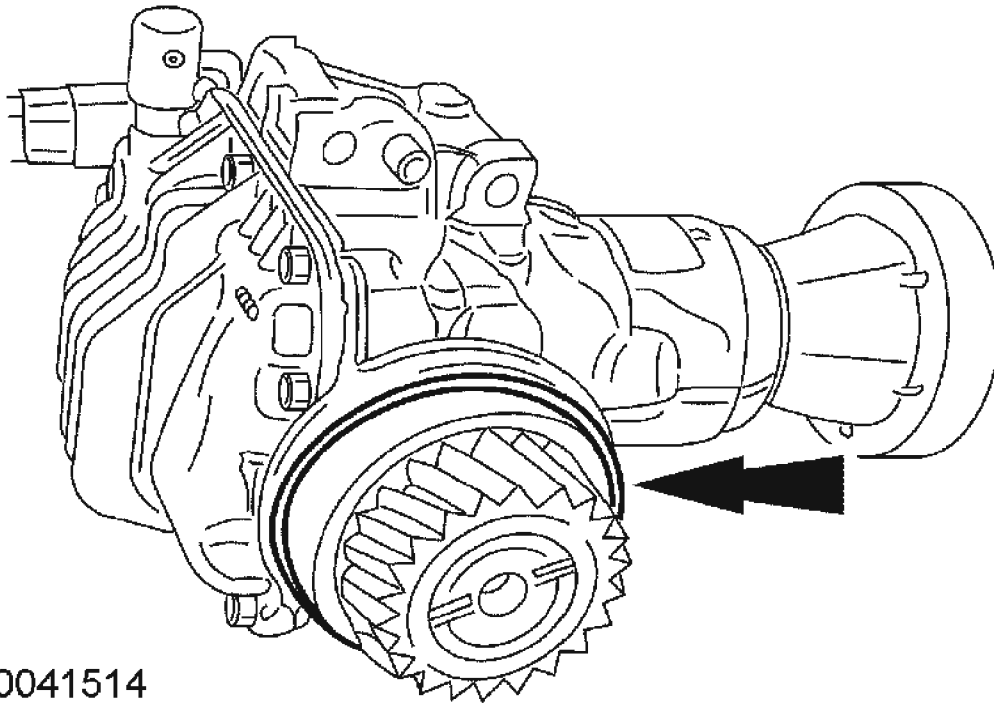
Item	Part Number	Description
1	33100-3A310	Transfer case
2	32155-3A310	Transfer case-to-transaxle nuts (2 required)

Item	Part Number	Description
3	33315-3A310	Transfer case-to-transaxle bolts (2 required)

**Fig. 31: Identifying Power Transfer Unit (PTU) - Manual Transaxle Components With Torque Specifications**

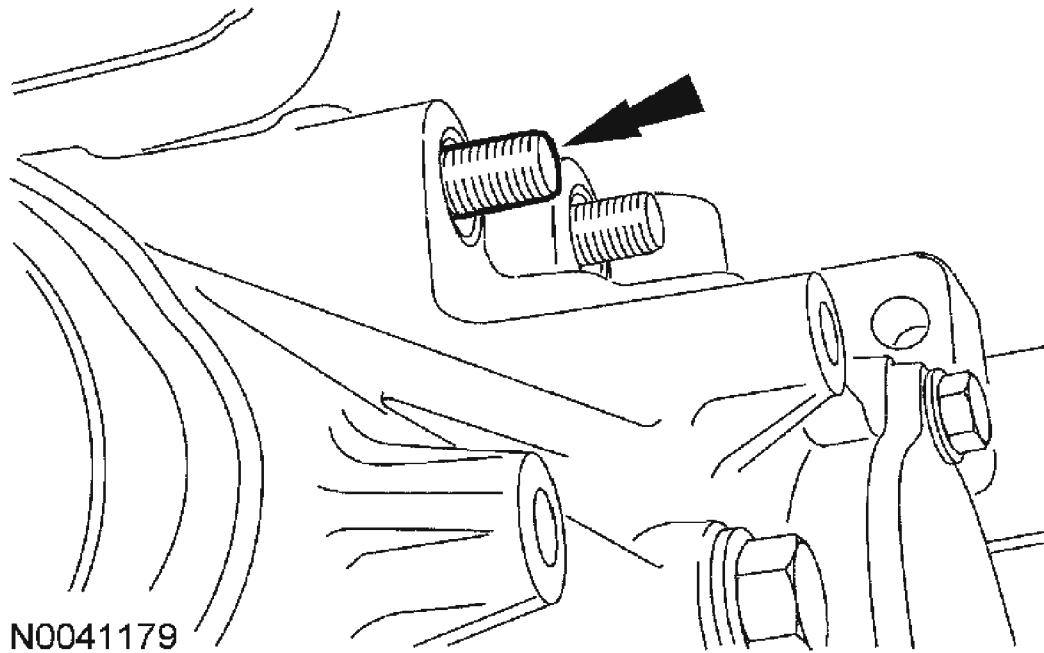
Courtesy of FORD MOTOR CO.

**CAUTION:** The O-ring must be correctly installed before mating the transfer case to the manual transaxle. Failure to correctly install the O-ring may cause the O-ring to be damaged, resulting in a transaxle fluid leak.



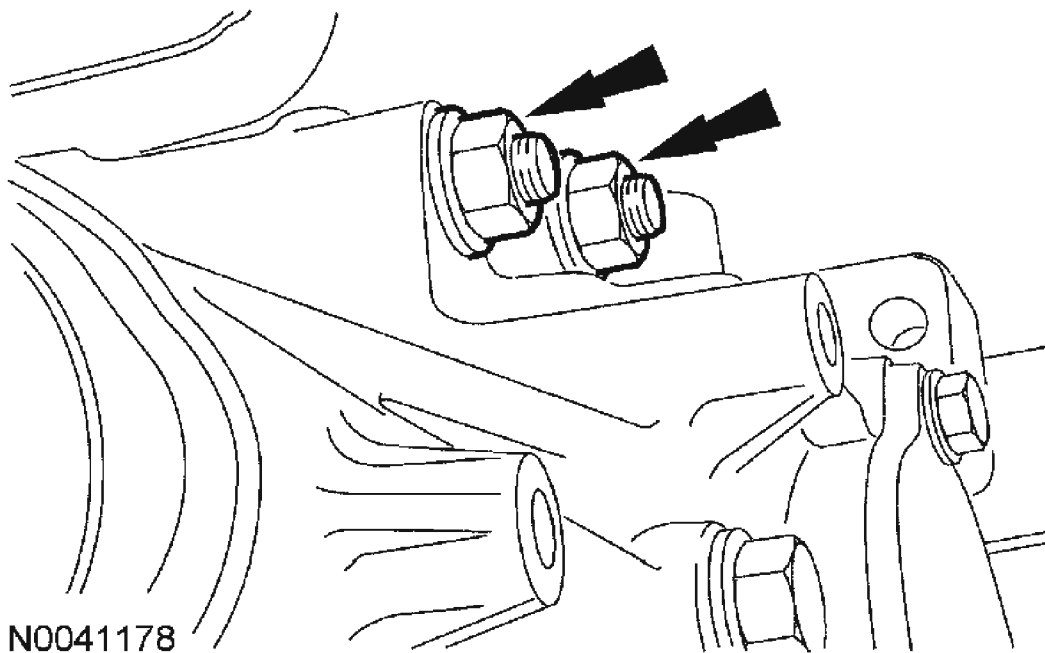
**Fig. 32: Installing A New O-Ring Seal**  
Courtesy of FORD MOTOR CO.

1. Install a new O-ring seal.
2. Position the transfer case to the transaxle.
3. Install the front stud.



**Fig. 33: Installing Front Stud**  
Courtesy of FORD MOTOR CO.

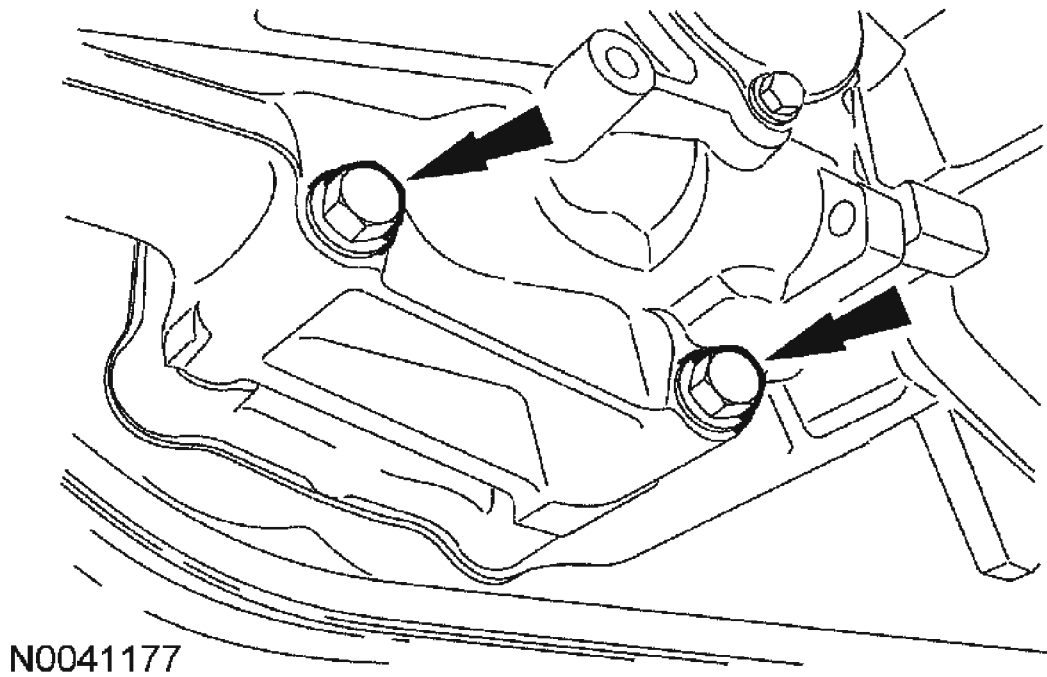
4. Install the 2 transfer case-to-transaxle nuts.
  - Tighten to 45 Nm (33 lb-ft).



**Fig. 34: Installing Transfer Case-To-Transaxle Nuts**  
Courtesy of FORD MOTOR CO.

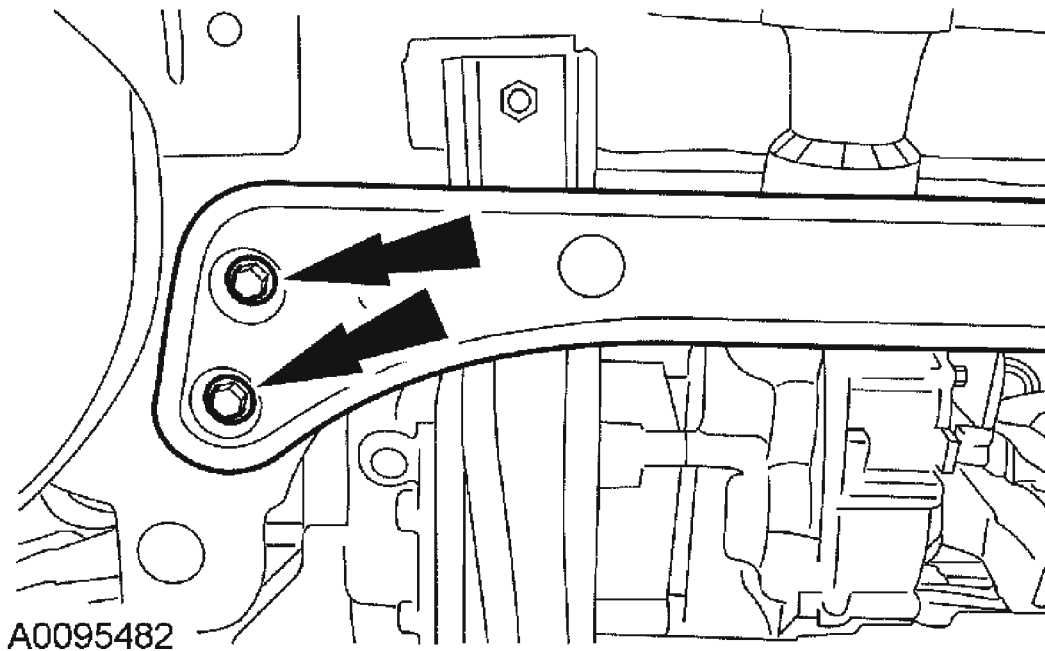
5. Install the 2 transfer case-to-transaxle bolts.
  - Tighten to 45 Nm (33 lb-ft).





**Fig. 35: Installing Transfer Case-To-Transaxle Bolts**  
Courtesy of FORD MOTOR CO.

6. Install the crossmember brace and the 4 bolts.
  - Tighten to 40 Nm (30 lb-ft).



**Fig. 36: Installing Crossmember Brace And Bolts**  
Courtesy of FORD MOTOR CO.

7. Install the driveshaft. For additional information, refer to **DRIVESHAFT** .
8. Fill the transaxle. For additional information, refer to Transaxle Draining and Filling in **MANUAL TRANSAXLE-TRANSMISSION** .

#### POWER TRANSFER UNIT (PTU) SEALS

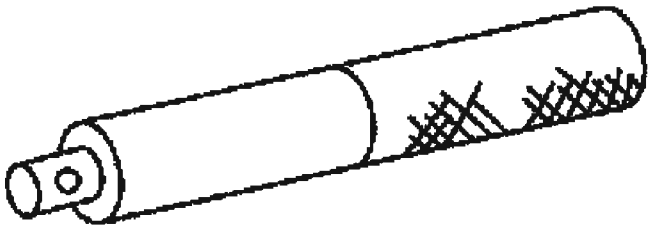
Special Tool(s)

#### SPECIAL TOOL(S) CHART

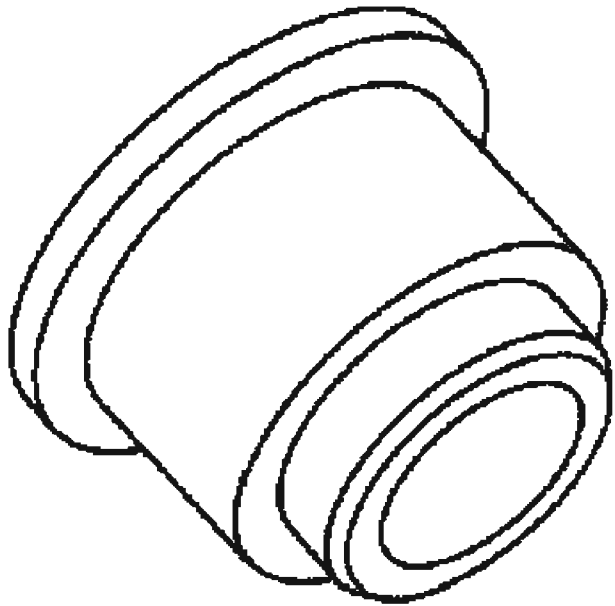
	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
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## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



**ST1653-A**

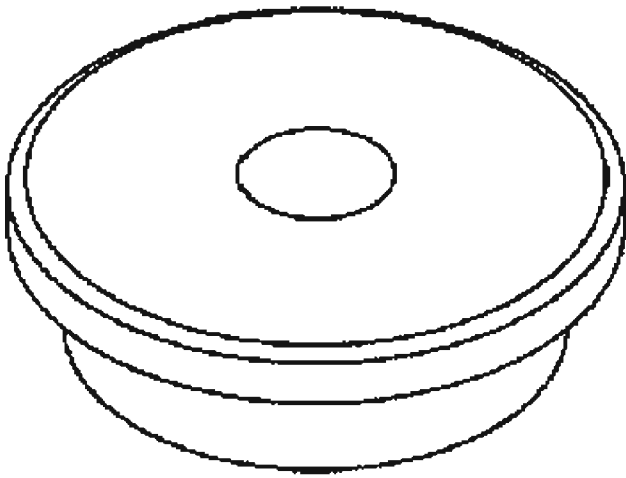


**ST2570-A**

Installer, Halfshaft Oil Seal 308-429

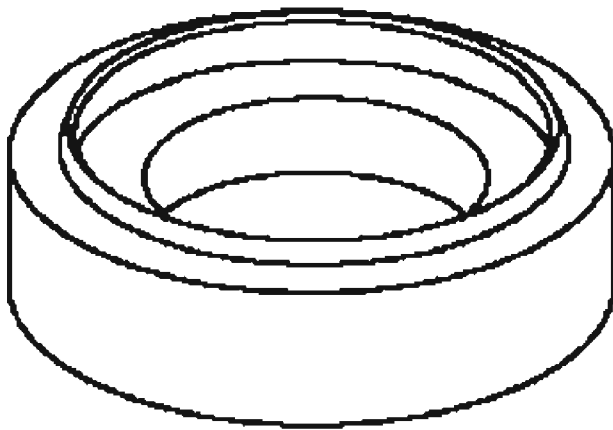
## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



**ST1783-A**

Installer, Rear Axle Oil Seal 205-155  
(T80T-4000-Y)

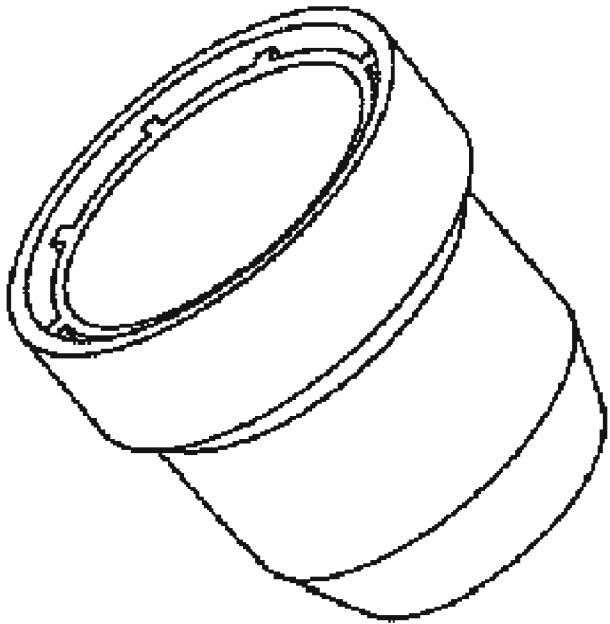


**ST2572-A**

Installer, Halfshaft Oil Seal 308-431

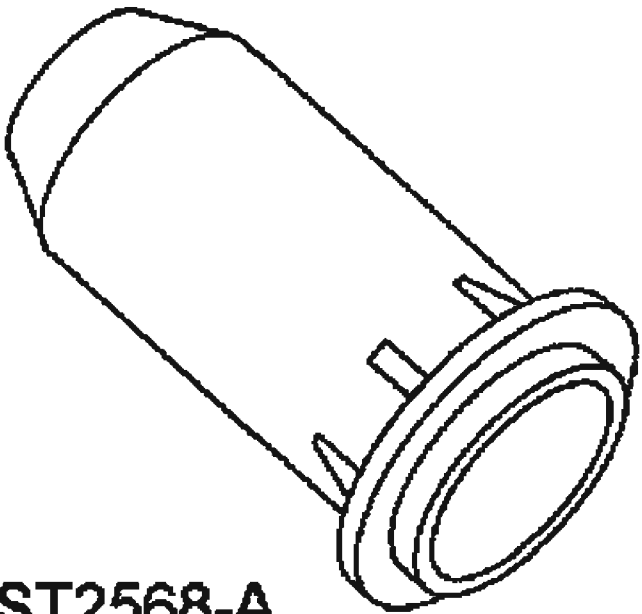
## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



**ST2573-A**

Installer, PTO Dust Flange 308 - 432

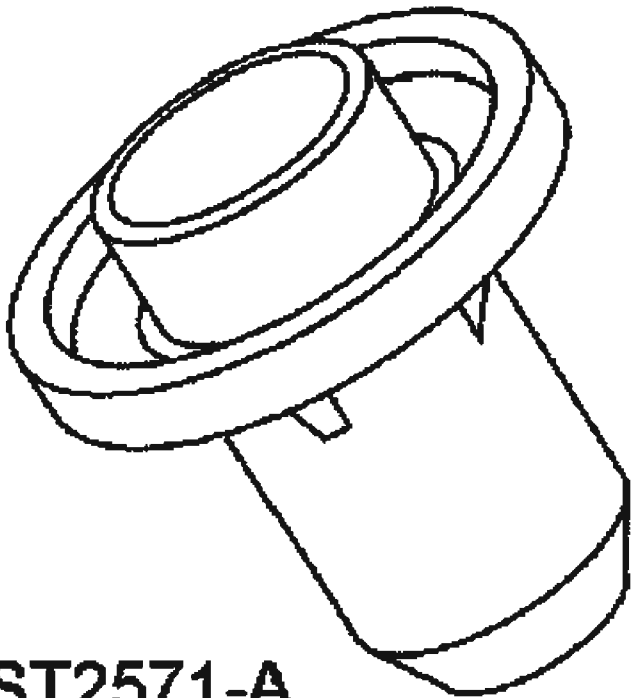


**ST2568-A**

Installer, Driven Gear Oil Seal 308-427

## 2005 Ford Escape

2005 TRANSMISSIONS Transfer Case-Power Transfer Unit (PTU) - Escape & Mariner



**ST2571-A**

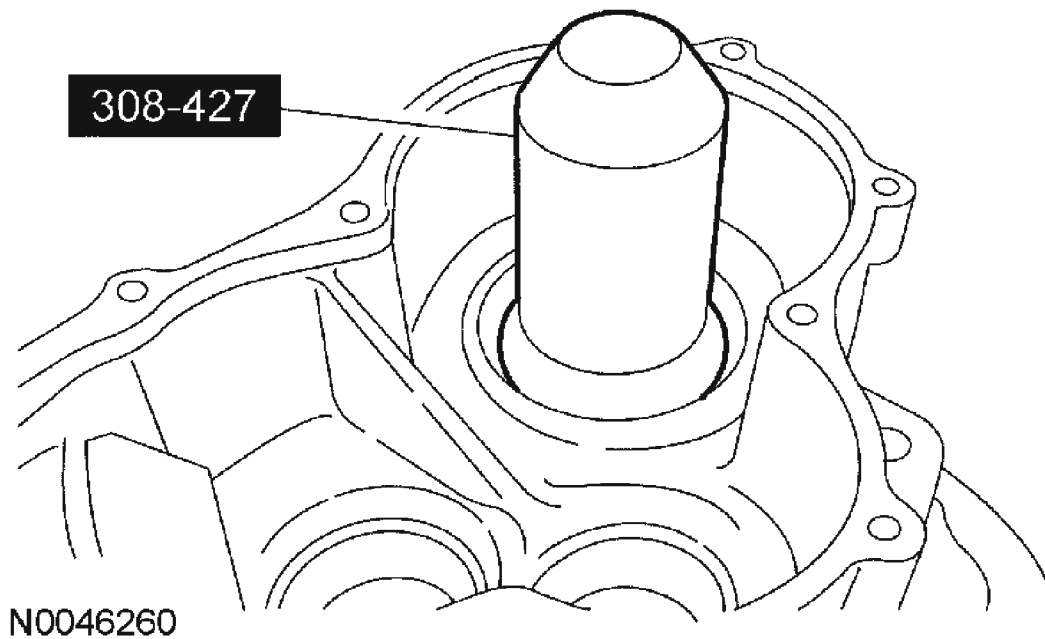
Installer, PTO Drive Gear Outer Oil  
Seal 308-430

### Material

#### MATERIAL ITEM SPECIFICATION

Item	Specification
Motorcraft SAE 75W-140 High Performance Rear Axle Lubricant XY-75W140-QL	WSL-M2C192-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSL-M2C197-A

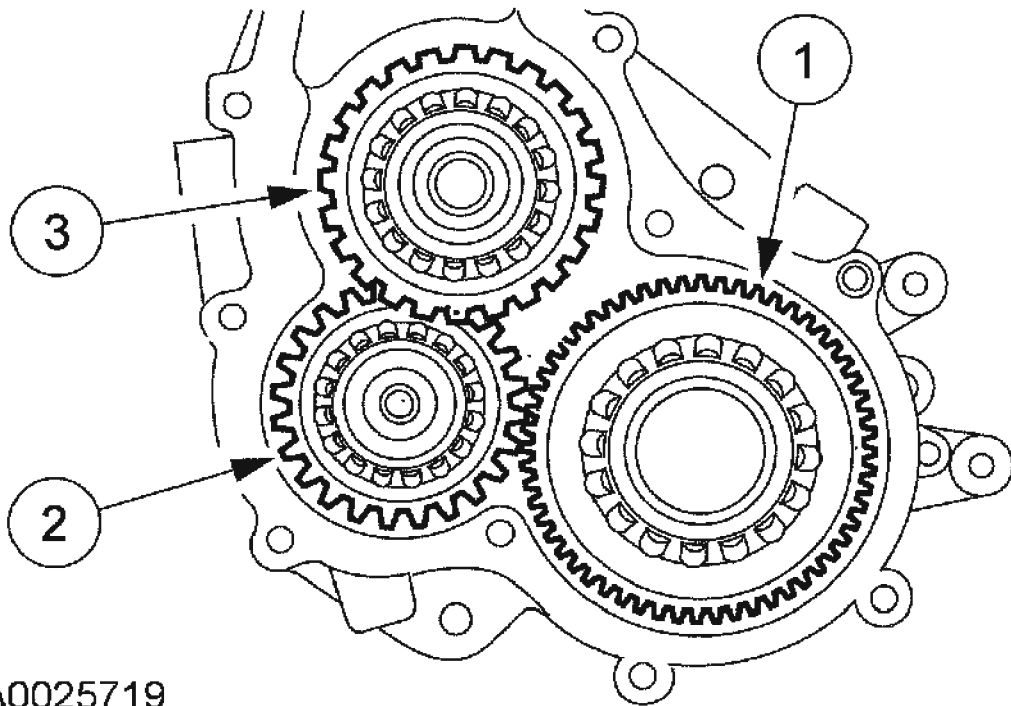
1. Using the special tools, install the inner input seal.



**Fig. 37: Installing Inner Input Seal**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure not to roll the inner input seal sealing lip when installing the drive gear.

2. Install the gears.
  1. Install the drive gear. Use a slight rotation to prevent damaging the inner input seal.
  2. Install the idler gear.
  3. Install the driven gear.

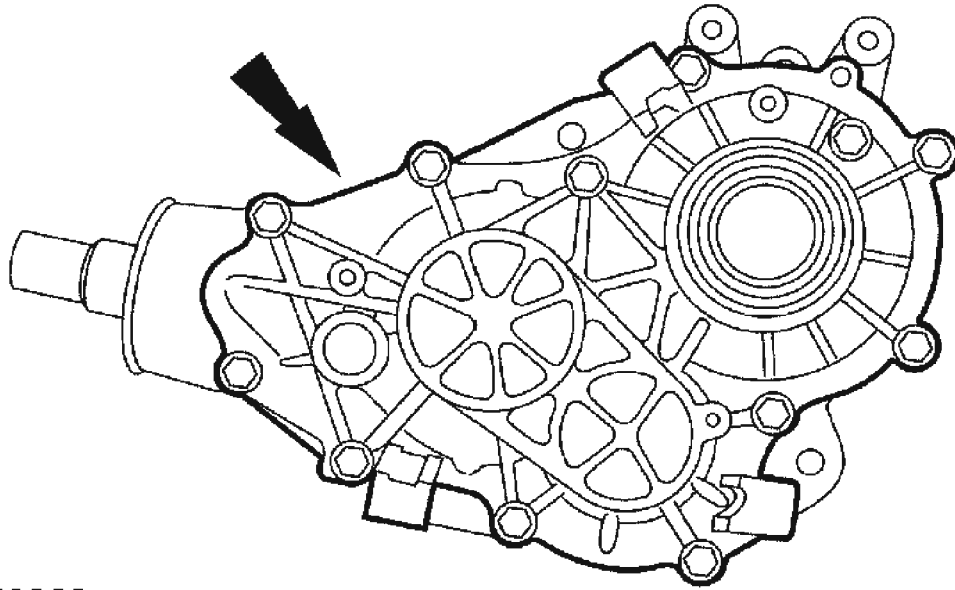


**Fig. 38: Installing Gears**  
Courtesy of FORD MOTOR CO.

**CAUTION:** The PTU cover and case sealing surfaces must be free of oil before applying new sealant.

3. Apply a 3 mm (0.11 in) bead of silicone sealant to the sealing surface of the PTU cover. Install the PTU cover and tighten the PTU cover bolts in a star pattern.
  - Tighten to 32 Nm (24 lb-ft).



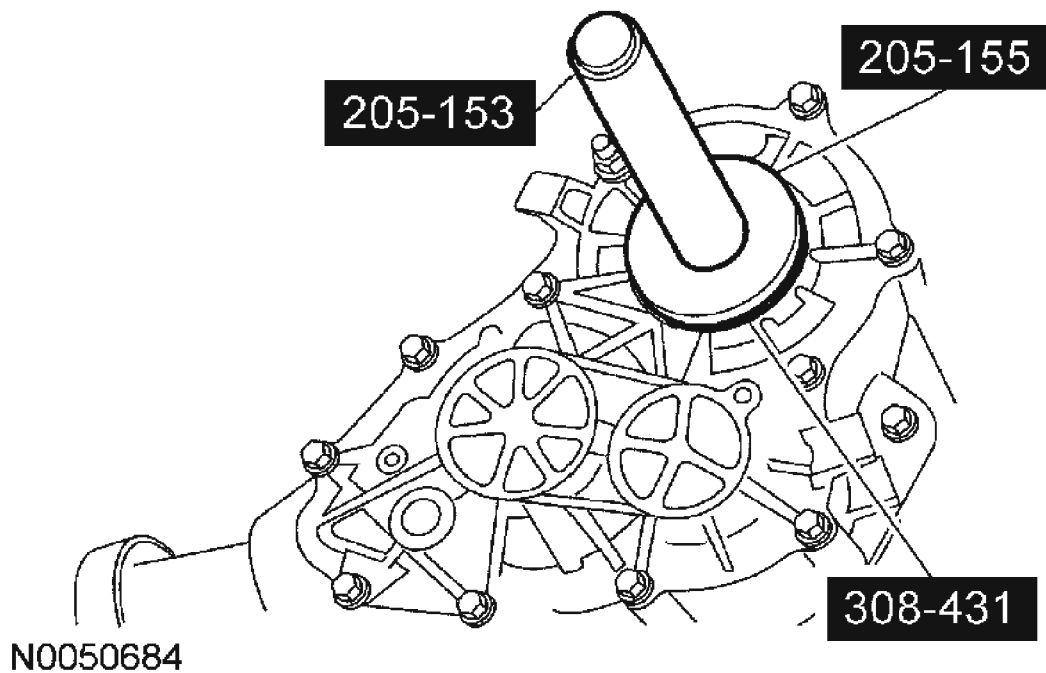


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**Fig. 39: Applying A 3 Mm (0.11 In) Bead Of Silicone Sealant To Sealing Surface Of PTU Cover**

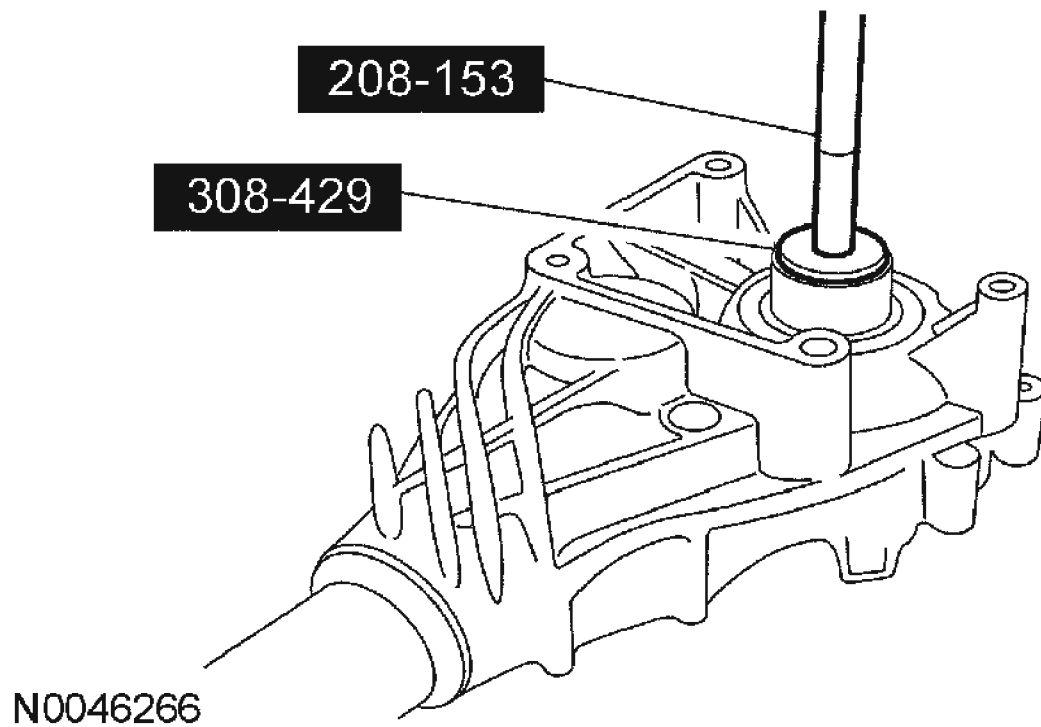
**Courtesy of FORD MOTOR CO.**

4. Install the PTU vent tube and the 2 PTU vent tube bolts.
  - Tighten to 30 Nm (22 lb-ft).
5. Using the special tools, install the halfshaft seal.
  - The seal is correctly installed if it is flush with the PTU case cover.



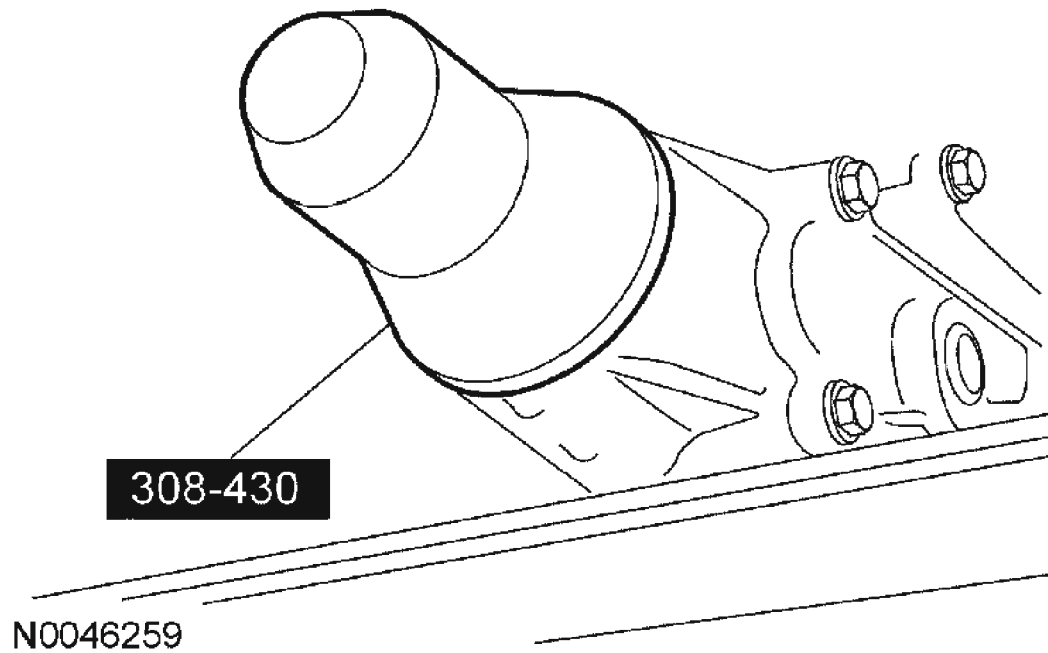
**Fig. 40: Installing Halfshaft Seal**  
Courtesy of FORD MOTOR CO.

6. Install the halfshaft seal dust cover.
  - Press the dust shield firmly to snap into position.
7. Using the special tools, install the outer input seal.



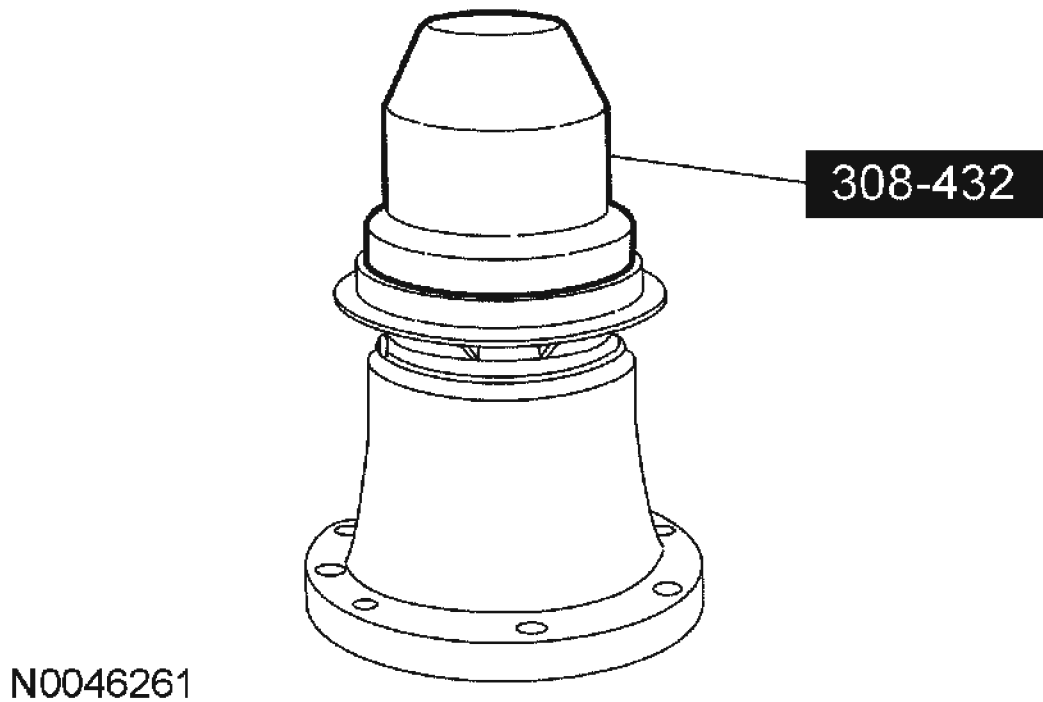
**Fig. 41: Installing Outer Input Seal**  
Courtesy of FORD MOTOR CO.

8. Using the special tools, install the output seal.



**Fig. 42: Installing Output Seal**  
**Courtesy of FORD MOTOR CO.**

9. Using the special tools, install the dust cover onto the output flange.
  - Tighten to 22 Nm (16 lb-ft).



**Fig. 43: Installing Dust Cover Onto Output Flange**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

### 2004 DRIVELINE/AXLE

#### Rear Drive Axle/Differential - Escape

## SPECIFICATION

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Description	mm	inches
<b>Clearance, Tolerance and Adjustments</b>		
Maximum aluminum carrier spread	0.25	0.010
Backlash between ring gear and pinion teeth	0.13-0.20	0.005-0.008
Preferred backlash	0.165	0.006
Maximum backlash variation between teeth	0.08	0.003
Available drive pinion bearing adjustment shim in steps of 0.051 mm (0.002 inch)	0.533-1.092	0.021-0.043

### LUBRICANT CAPACITIES

### LUBRICANT CAPACITIES SPECIFICATION

Liters	Pints
1.4	2.95 <sup>(1)</sup>
(1) Use SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL or equivalent meeting Ford specification WSP-M2C197-A. Fill the rear axle 3-5 mm (1/8-3/16 inch) from the bottom of filler hole.	

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>Lubricants/Sealants</b>	
Premium Long-Life Grease XG-1-C	ESA-M1C75-B
SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A
Clear Silicone Rubber F7AZ-19554-CA	ESB-M4G92-A

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

#### TORQUE SPECIFICATIONS

#### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Bearing cap bolt	51	38	-
Ring gear bolt	109	80	-
Differential housing cover retaining bolt	23	17	-
Filler plug	27	20	-
Differential housing-to-front insulator bracket bolts	80	59	-
Differential housing-to-side insulator bracket bolts	80	59	-
Front insulator bracket-to-subframe bolts	115	85	-
Side insulator bracket-to-subframe bolt	115	85	-
Rotary blade coupling bolts	32	24	-
Pinion nut <sup>(1)</sup>	678 max	500 max	-
Pinion bearing preload - (drive pinion collapsible spacer) used bearings New bearings	0.68-1.13 1.7-3.4	- -	6-10 15-30

(1) Refer to procedure for correct tightening sequence.

#### DESCRIPTION AND OPERATION

#### REAR DRIVE AXLE AND DIFFERENTIAL

The rear axle assembly contains the following features:

- integral-type housing hypoid gear design has the centerline of pinion set below the centerline of ring gear.
- hypoid ring gear and pinion which consists of a ring gear and an overhung drive pinion which is supported by two opposed tapered roller bearings.

- pinion bearing preload is maintained by a drive pinion collapsible spacer on the pinion shaft and adjusted by the pinion nut.
- rear axle housing assembly which consists of a cast aluminum center section and a stamped-steel rear differential housing cover.
- differential housing cover which uses a silicone sealant rather than a gasket.
- aluminum rear axle housing that must be spread in order to remove the differential case.
- differential case which is a one-piece design with two openings to allow for assembly of internal components and lubricant flow.
- differential pinion shaft which is retained by a threaded differential pinion shaft lock bolt assembled to the differential case.
- differential case which is mounted in the rear axle housing between two opposed differential bearings.
- differential bearings which are retained in the rear axle housing by removable bearing caps.

Differential bearing preload and ring gear backlash are adjusted by differential bearing shims located between the differential bearing cup and the rear axle housing.

The use of a pinion depth gauge is required for correct differential ring gear and pinion adjustment.

The halfshafts are held in the differential case by a driveshaft bearing retainer circlip that is located on the inboard CV joint stub shaft pilot bearing housing. When each halfshaft is installed, the driveshaft bearing retainer circlip engages a step in the differential side gear.

The rear drive axle operates as follows:

- The rear axle drive pinion receives power from the engine through the transmission, transfer case, driveshaft and rotary blade coupling (when engaged).
- The pinion gear rotates the differential case, which is bolted to the differential case outer flange.
- Inside the differential case, two differential pinion gears are mounted on a differential pinion shaft which is pinned to the differential case.
- These differential pinion gears are engaged with the differential side gears to which the halfshafts are splined.
- As the differential case turns, it rotates the halfshafts and rear wheels.
- When it is necessary for one wheel and halfshaft to rotate faster than the other, the faster turning differential side gear causes the differential pinion gears to roll on the slower turning differential side gear. This allows differential action between the two halfshafts.



The rotary blade coupling is not repairable and is installed as an assembly.

## **DIAGNOSIS AND TESTING**

### **REAR DRIVE AXLE AND DIFFERENTIAL**


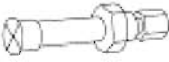
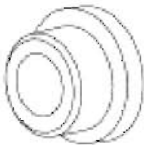
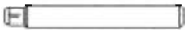
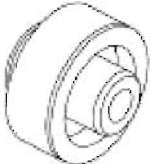
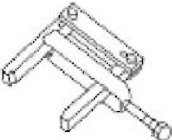
Refer to **DRIVELINE SYSTEM-GENERAL INFORMATION** .

## **IN-VEHICLE REPAIR**

### **STUB SHAFT PILOT BEARING AND SEAL**

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

	Slide Hammer 100-001 (T50T-100-A)
	Remover, Transfer Case Bearing Cup 308-125 (T87P-7120-D)
	Installer, Axle Bearing 205-195 (T83T-1244-A)
	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
	Installer, Front Axle Oil Seal 205-350 (T95T-3010-A)
	Remover, Torque Converter Fluid Seal 307-309 (T94P-77001 -BH)

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**Fig. 1: Identifying Special Tool(s)**  
Courtesy of FORD MOTOR CO.

#### Material

#### MATERIALS

Item	Specification

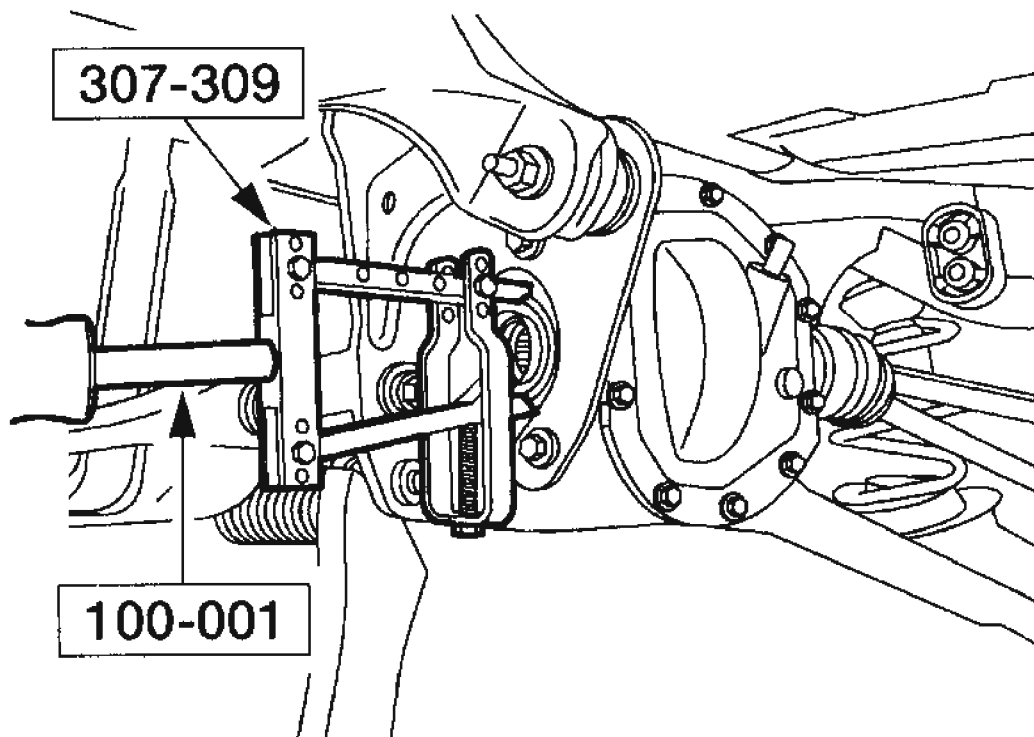
## 2004 Ford Escape

2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

Premium Long Life Grease XG-1-C	ESA-M1C75-B
SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A

### Removal

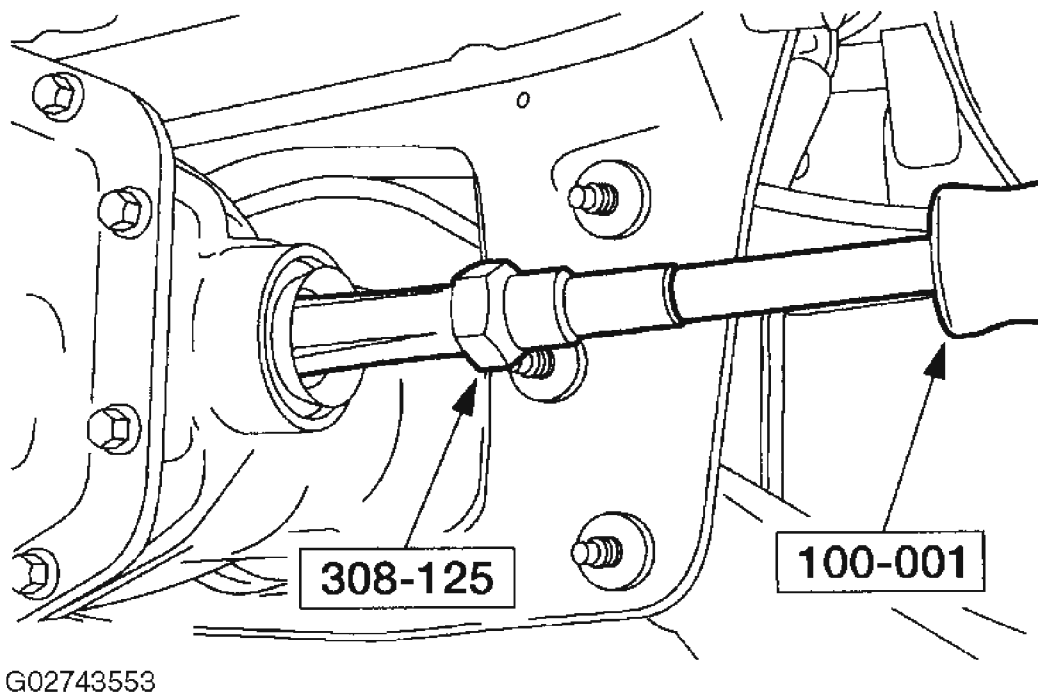
1. Remove the halfshaft assembly. For additional information, refer to **REAR DRIVE HALFSHAFTS**.
2. To remove the seal only, use the special tool and remove the stub shaft seal.



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**Fig. 2: Removing Stub Shaft Seal**  
Courtesy of FORD MOTOR CO.

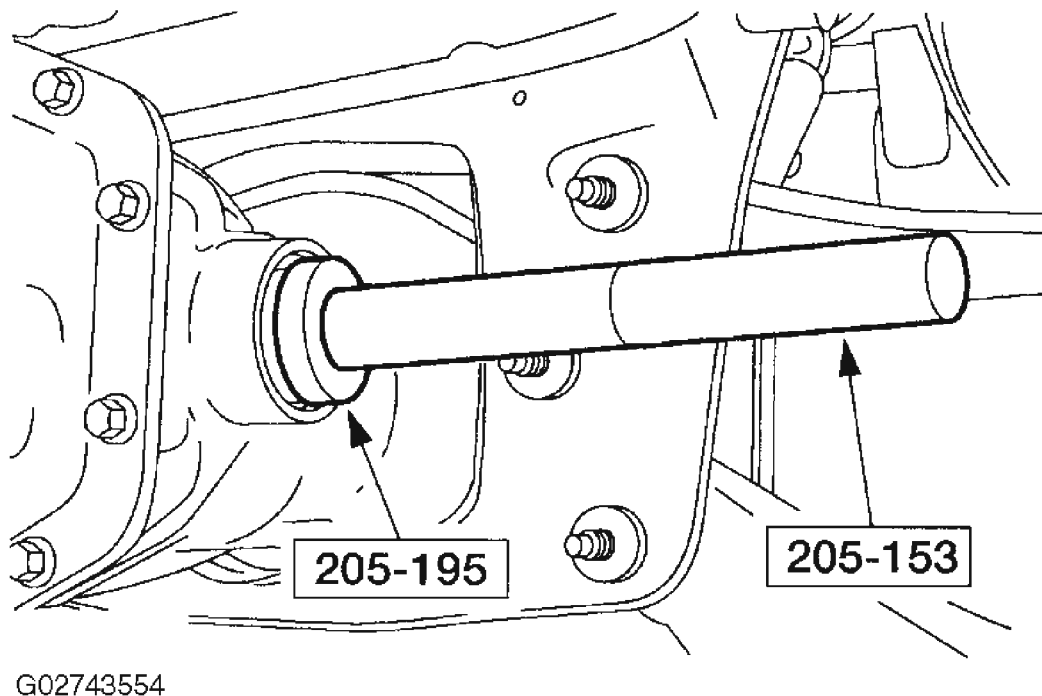
3. To remove the bearing and seal use the special tools and remove the stub shaft pilot bearing and seal.



**Fig. 3: Removing Bearing And Seal**  
Courtesy of FORD MOTOR CO.

**Installation**

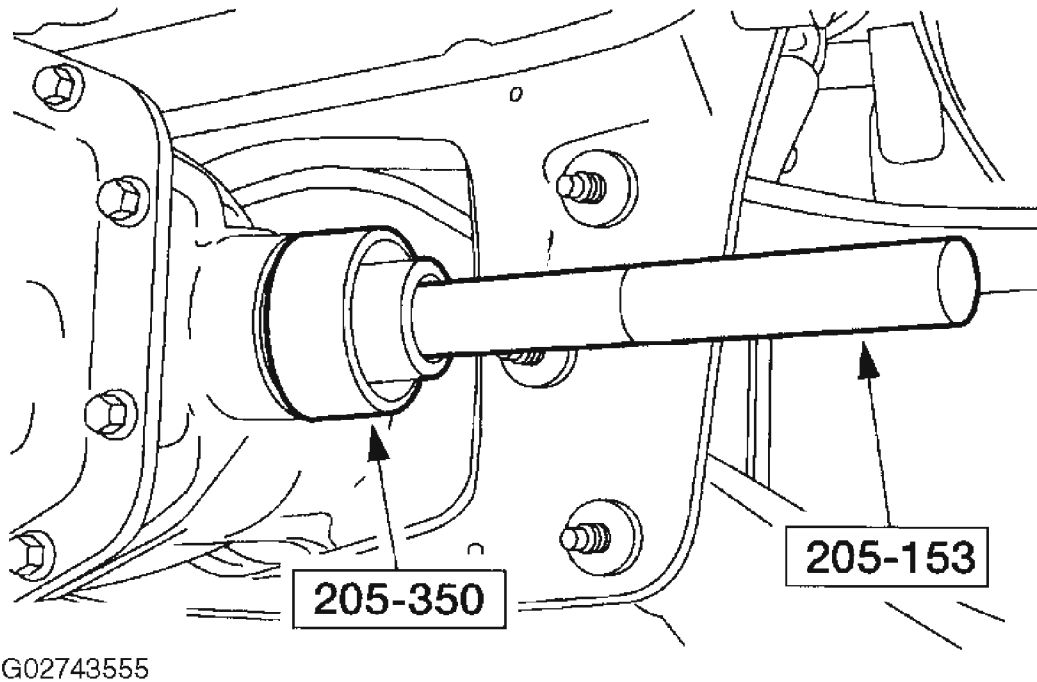
**NOTE:** Lubricate the new stub shaft pilot bearing with rear axle lubricant.



**Fig. 4: Installing Stub Shaft Pilot Bearing**  
Courtesy of FORD MOTOR CO.

1. To install the bearing, use the special tools and install the stub shaft pilot bearing.

**NOTE:** Lubricate the new stub shaft pilot bearing housing seal with grease.



**Fig. 5: Installing Stub Shaft Pilot Bearing Housing Seal**  
Courtesy of FORD MOTOR CO.

2. To install the seal, use the special tools and install the stub shaft pilot bearing housing seal.



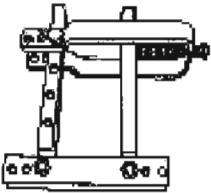
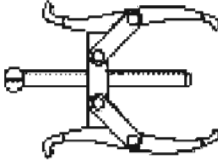
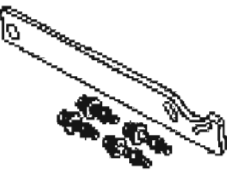
**CAUTION:** Inspect the inboard CV joint seal journal for rust or nicks/scratches prior to installing the halfshaft. If necessary, polish the seal journal with fine crocus cloth.

3. Install the halfshaft assembly. For additional information, refer to **REAR DRIVE HALFSHAFTS**.

#### **DRIVE PINION SEAL**

## 2004 Ford Escape

2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

	Slide Hammer 100-001 (T50T-100-A)
	Pinion Seal Replacer 205-133 (T79P-4676-A)
	Converter Seal Remover 307-009 (T94P-77001-BH)
	2 Jaw Puller 205-D072 (D97L-4221-A) or equivalent
	Holding Fixture, Drive Pinion Flange 205-126 (T78P-4851-A)

G02743556

**Fig. 6: Identifying Special Tool(s)**  
Courtesy of FORD MOTOR CO.

Material

### MATERIALS

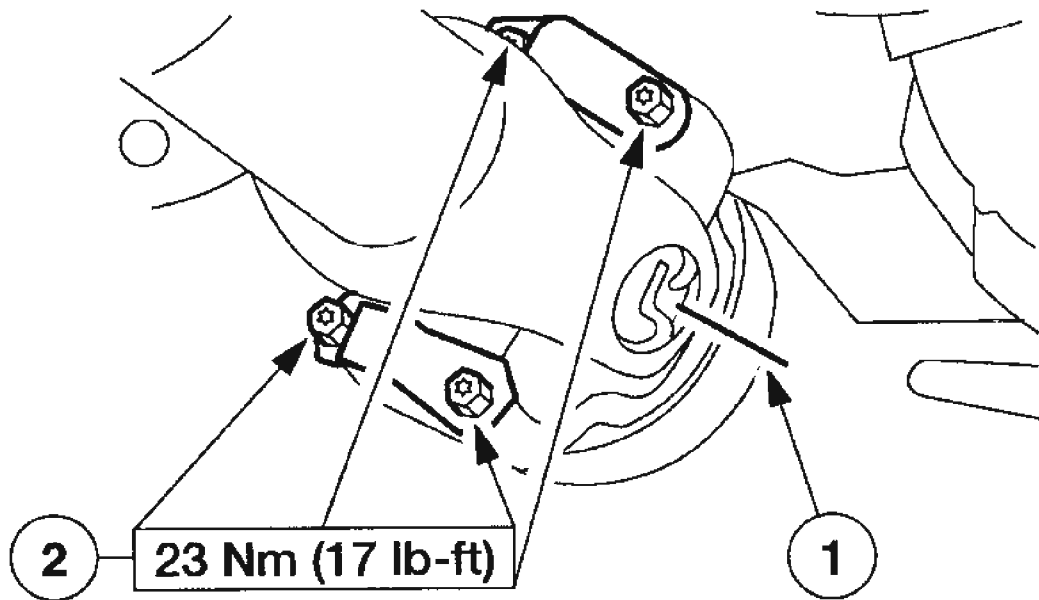
Item	Specification

Premium Long Life GreaseXG-1-C

ESA-M1C75-B

**Removal And Installation**

1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**
2. Remove the rear driveshaft universal joint caps.
  1. Index-mark the pinion and pinion flange to the rear of the driveshaft.
  2. Remove the bolts.
    - Support the driveshaft.



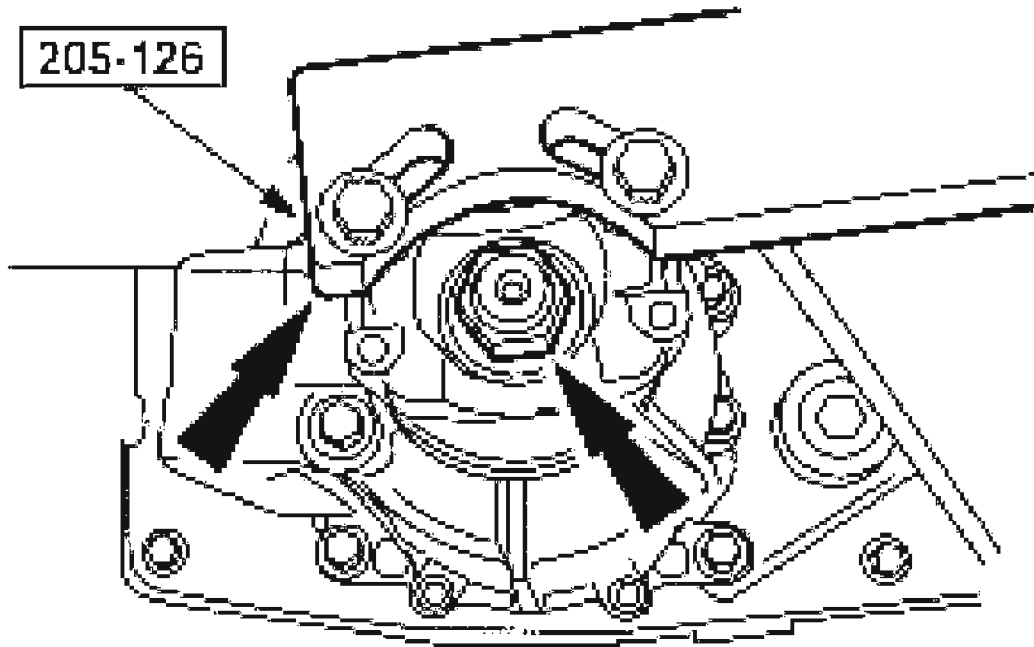
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**Fig. 7: Removing Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Discard the nut after removing it. Install a new nut during installation.



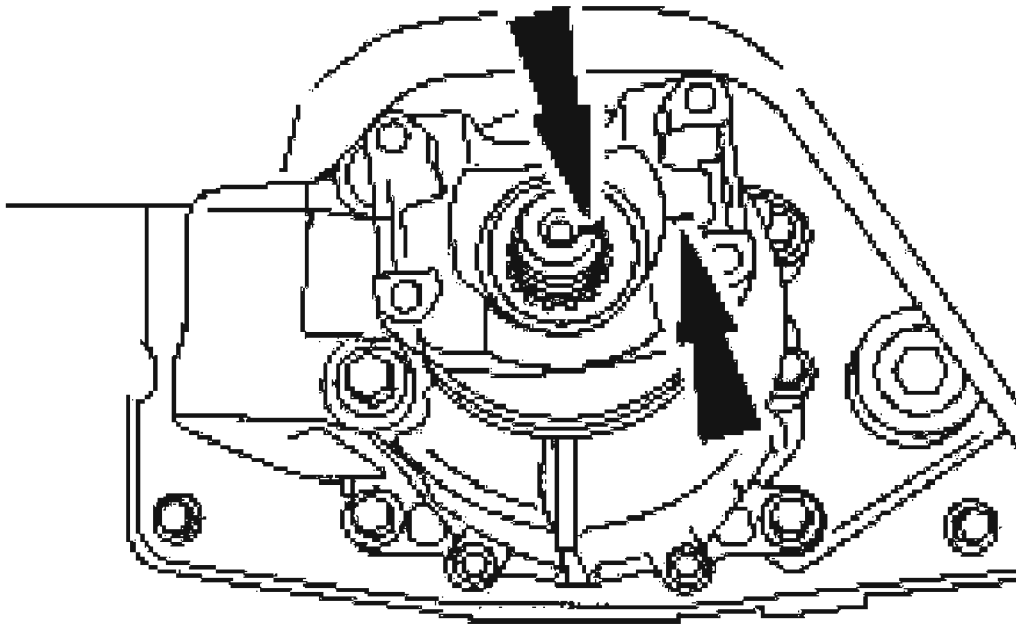


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**Fig. 8: Removing Nut**

**Courtesy of FORD MOTOR CO.**

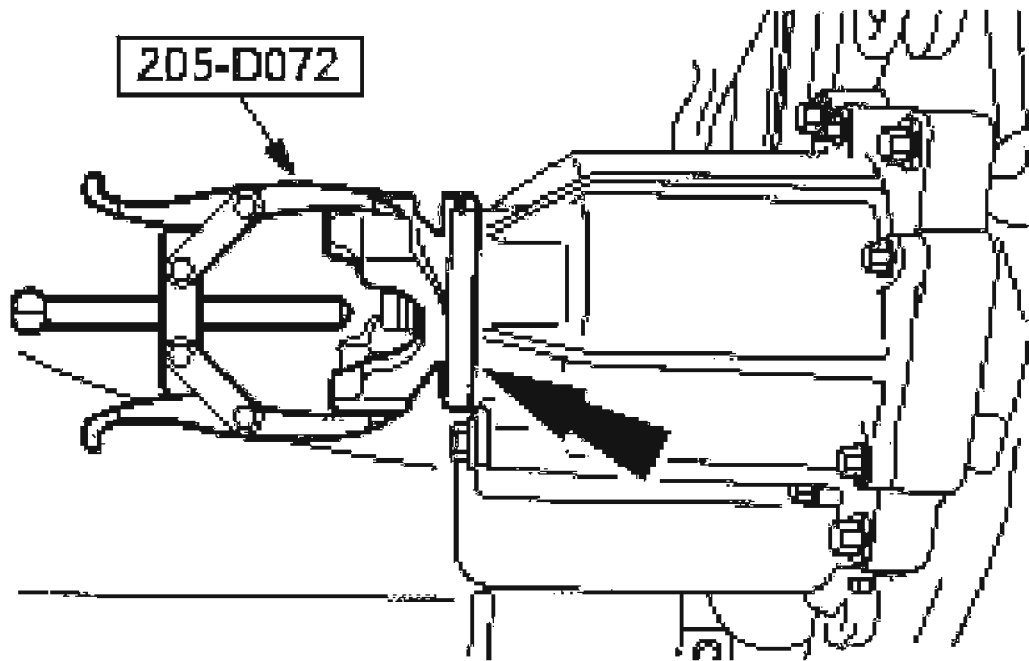
3. Using the special tool, hold the pinion flange while removing the nut.
  - Remove the nut.
4. Index-mark the location of the pinion to the yoke.



**G02743559**

**Fig. 9: Index-Marking Pinion-To-Yoke**  
**Courtesy of FORD MOTOR CO.**

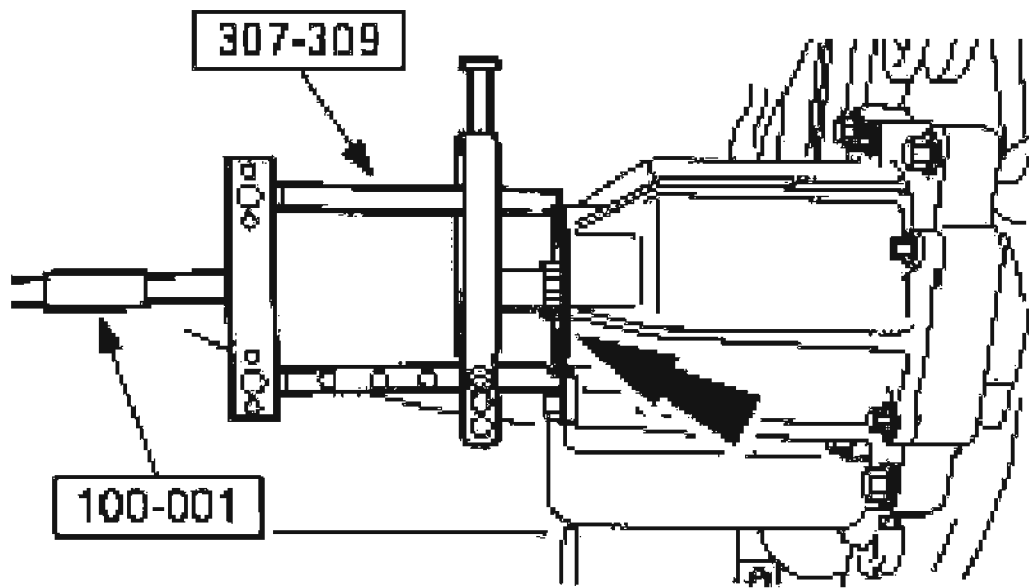
5. Using the special tool, remove the pinion flange.



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**Fig. 10: Removing Pinion Flange**  
Courtesy of FORD MOTOR CO.

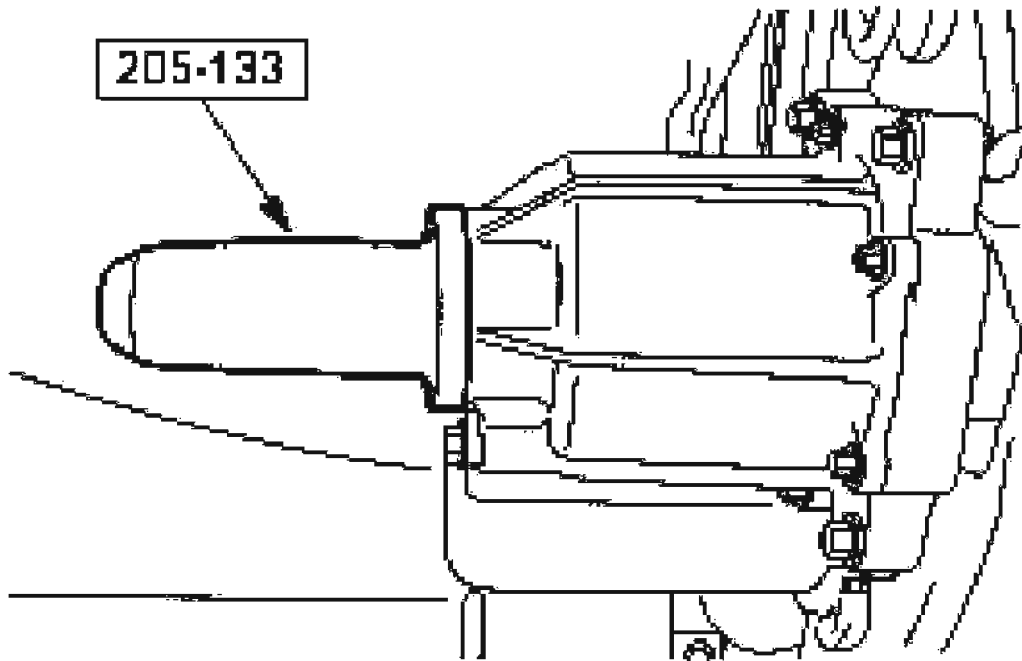
6. Using the special tool, remove the seal.



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**Fig. 11: Removing Seal**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the mating surface is clean before installing the new seal.

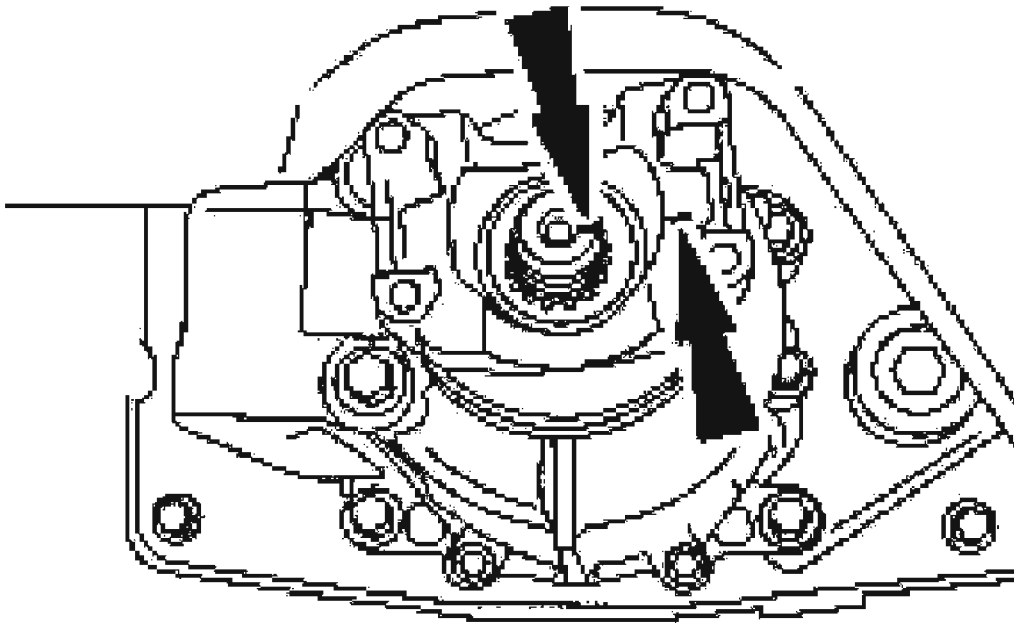


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**Fig. 12: Installing Seal**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, install the seal.

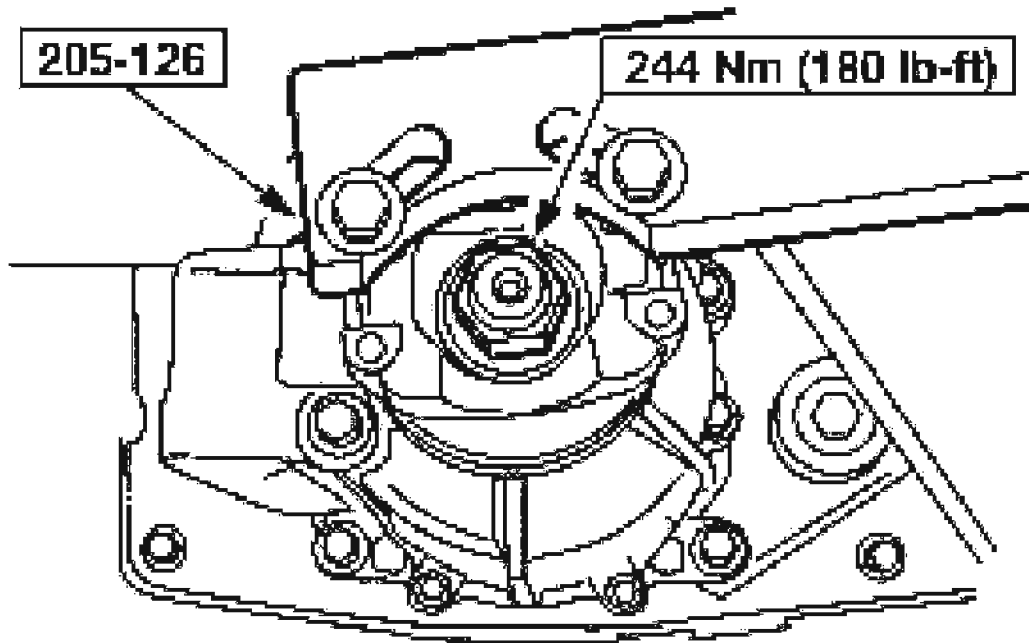
**NOTE:** Lubricate the pinion flange with premium long-life grease.



G02743563

**Fig. 13: Aligning Index Marks**  
Courtesy of FORD MOTOR CO.

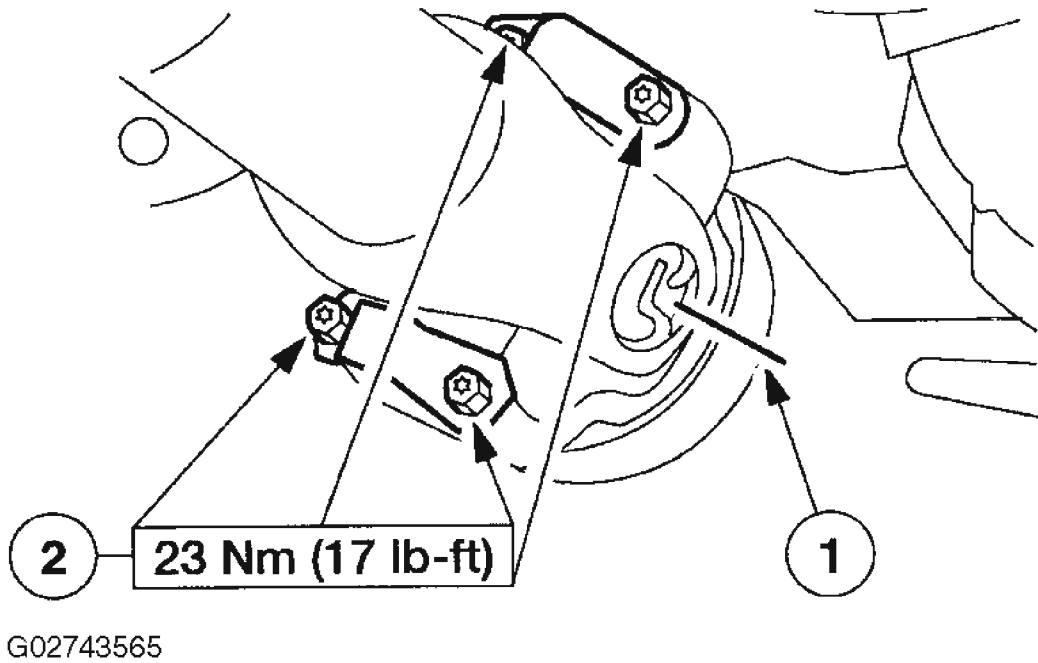
8. Line up the index marks and position the pinion flange.
9. Using the special tool, install the nut.



G02743564

**Fig. 14: Installing Nut**  
Courtesy of FORD MOTOR CO.

10. Install the rear driveshaft universal joint.
  1. Line up the index marks.
  2. Install the caps and bolts.



**Fig. 15: Installing Caps And Bolts**  
Courtesy of FORD MOTOR CO.

## DIFFERENTIAL HOUSING COVER

### Material

### MATERIAL

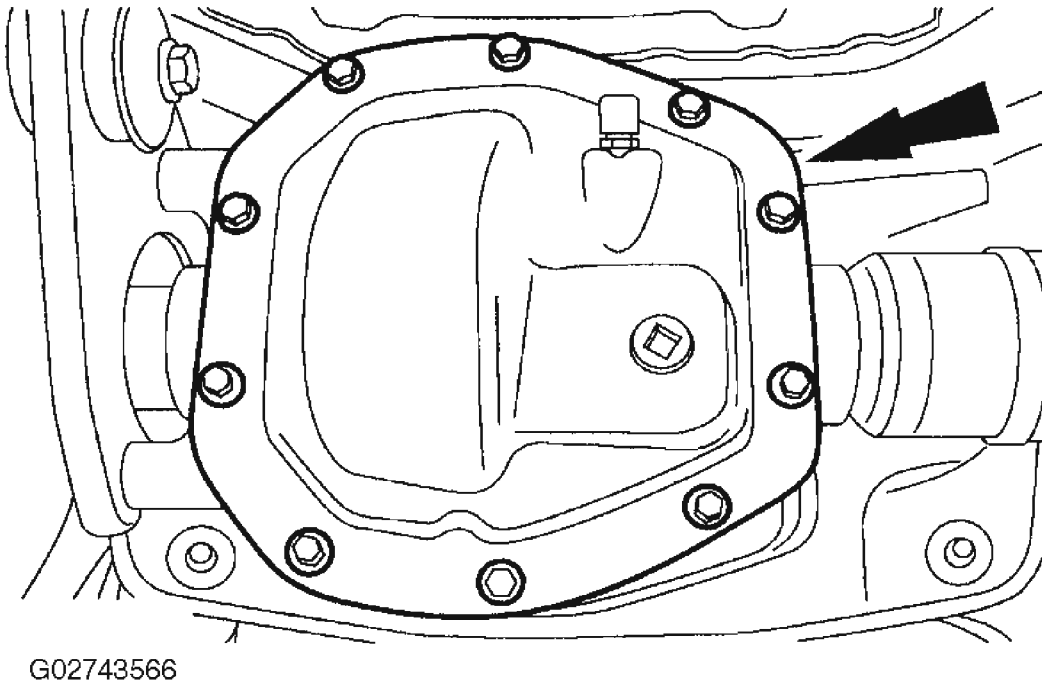
Item	Specification
Clear Silicone Rubber F7AZ-19554-CA	ESB-M4G92-A
SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A

### Removal

1. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING**.

**NOTE:** Drain the differential fluid into a suitable drain pan.





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**Fig. 16: Removing Bolts And Rear Differential Cover**  
Courtesy of FORD MOTOR CO.

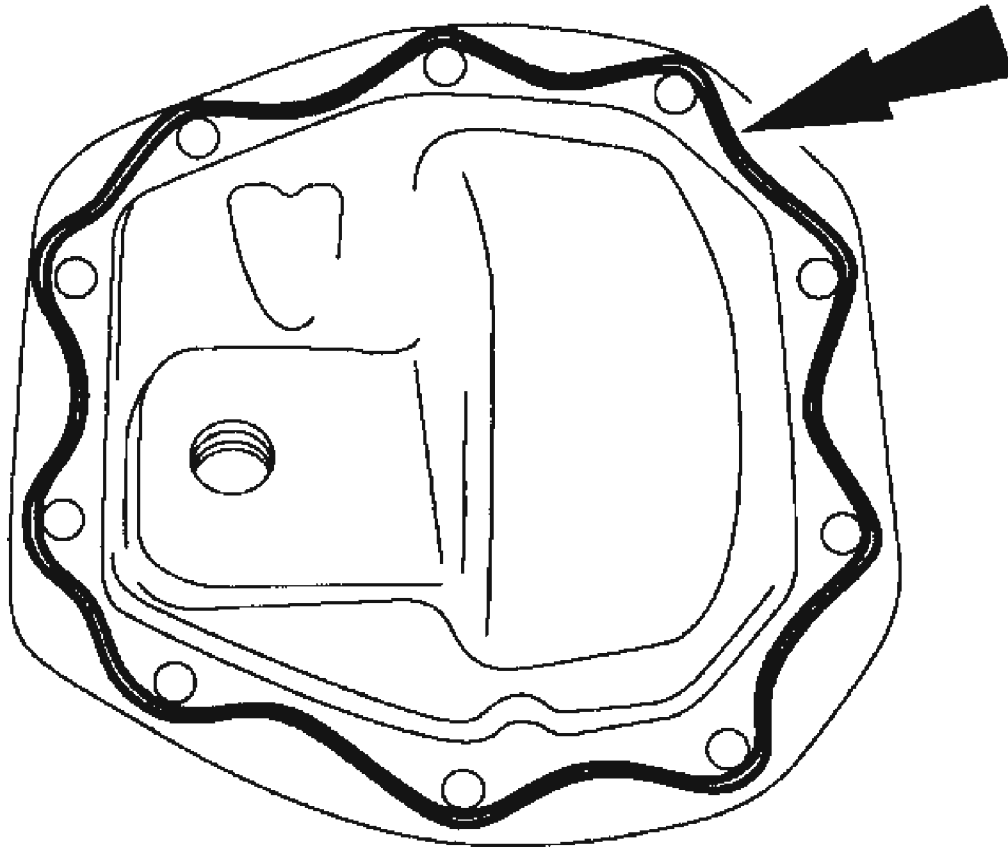
2. Remove the bolts and the rear differential cover.
  - Drain the differential fluid from the housing.

#### Installation

**CAUTION:** Make sure the machined surfaces on the rear axle housing, the differential housing cover and the rotary blade coupling housing are clean and free of oil before installing the new silicone sealant. The inside of the rear axle must be covered when cleaning the machined surface to prevent contamination.

1. Clean the gasket mating surfaces of the differential housing, the differential housing cover and the rotary blade coupling housing.

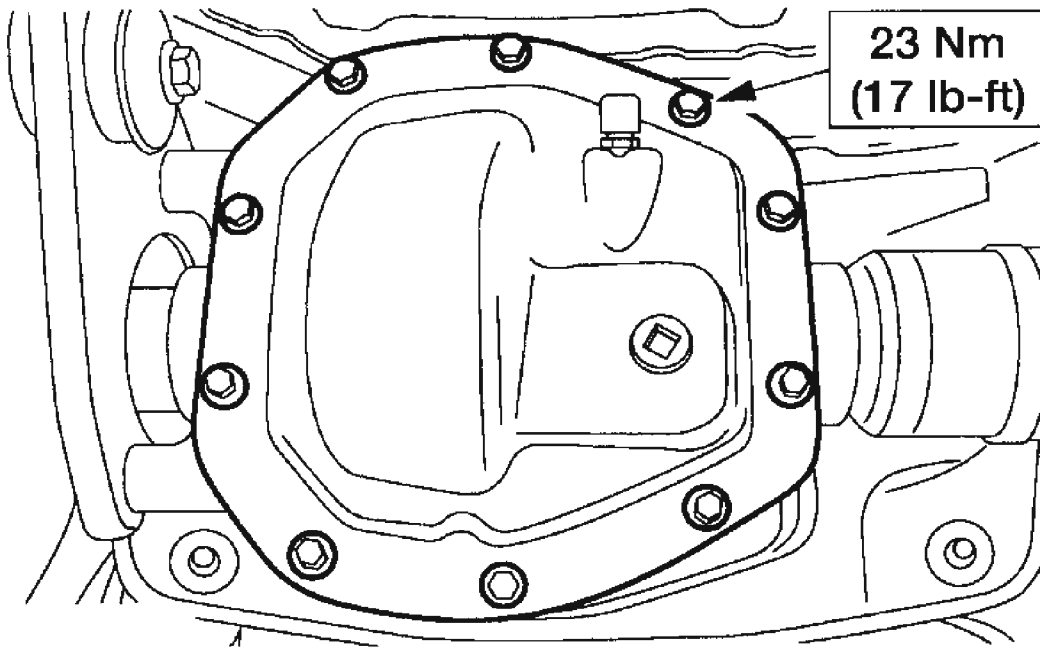
**NOTE:** The differential housing cover must be installed within 15 minutes of application of the silicone, or new sealant must be applied. If possible, allow one hour before filling with lubricant to make sure the silicone sealant has correctly cured.



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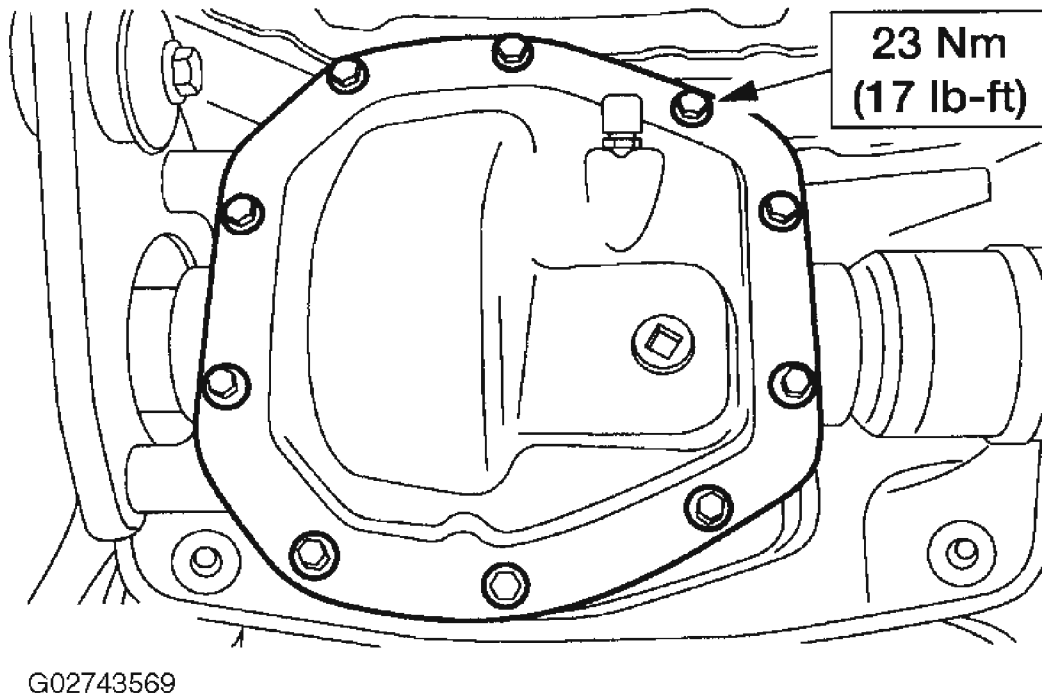
**Fig. 17: Applying Continuous Bead Of Clear Silicone Rubber**  
**Courtesy of FORD MOTOR CO.**

2. Apply a new continuous bead of clear silicone rubber as shown in the illustration.
3. Install the differential housing cover and bolts.



**Fig. 18: Installing Differential Housing Cover And Bolts**  
Courtesy of FORD MOTOR CO.

4. Fill the rear axle with 1.4 liters (2.95 pints) of rear axle lubricant.
  - Tighten the filler plug.



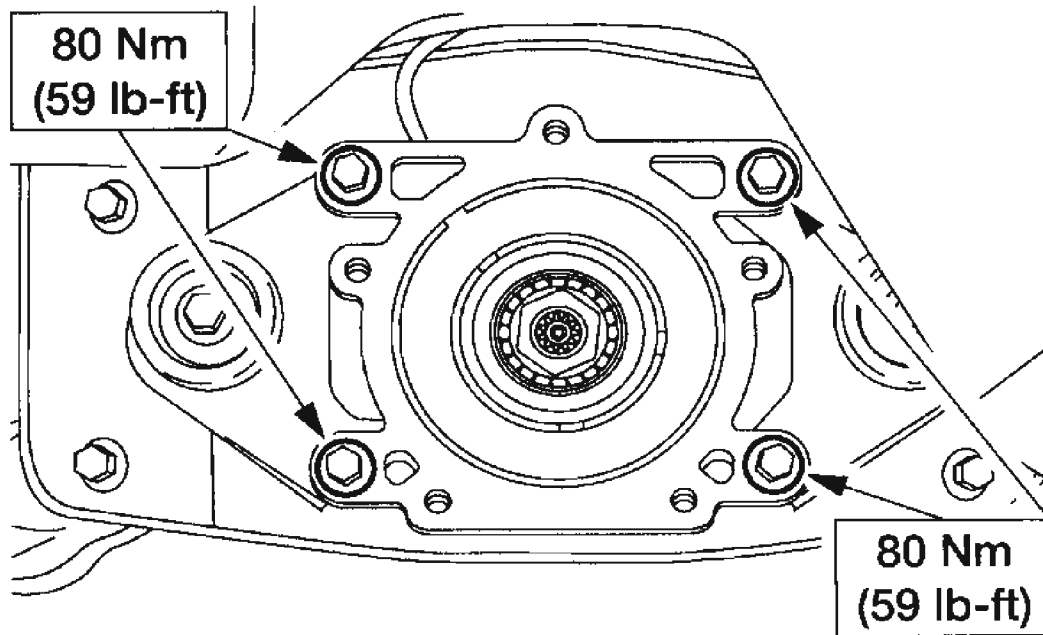
**Fig. 19: Tightening Filler Plug**  
Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

### AXLE ASSEMBLY

#### Removal And Installation

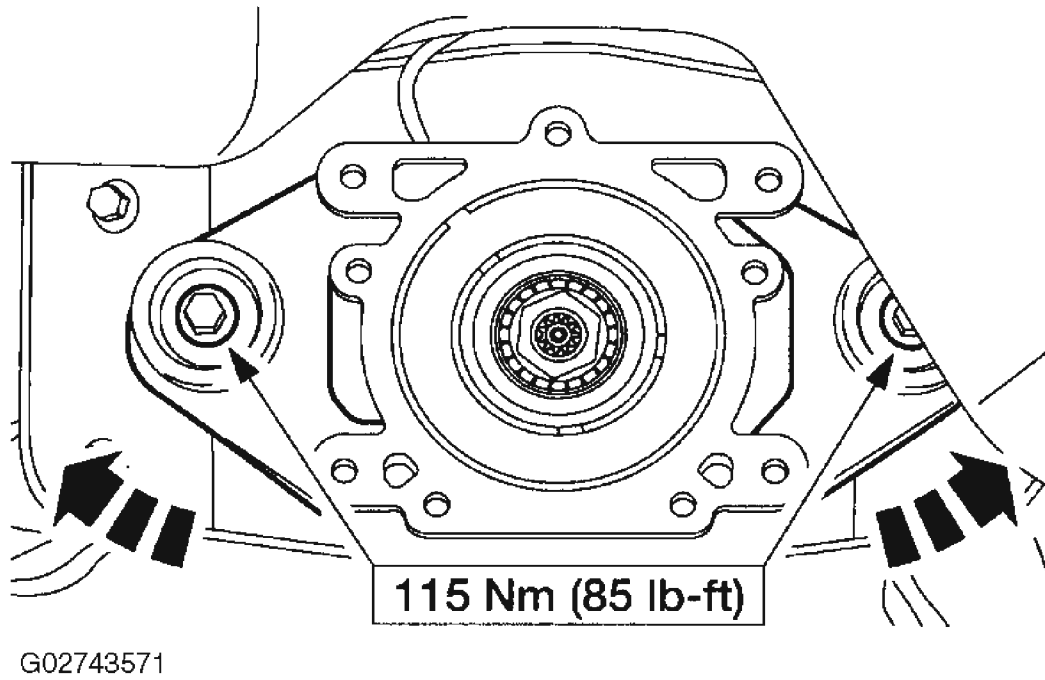
1. Remove the rotary blade coupling. For additional information, refer to **ROTARY BLADE COUPLING** .
2. Remove the rear halfshafts. For additional information, refer to **REAR DRIVE HALFSHAFTS** .
3. Remove the differential housing-to-front insulator bracket bolts.



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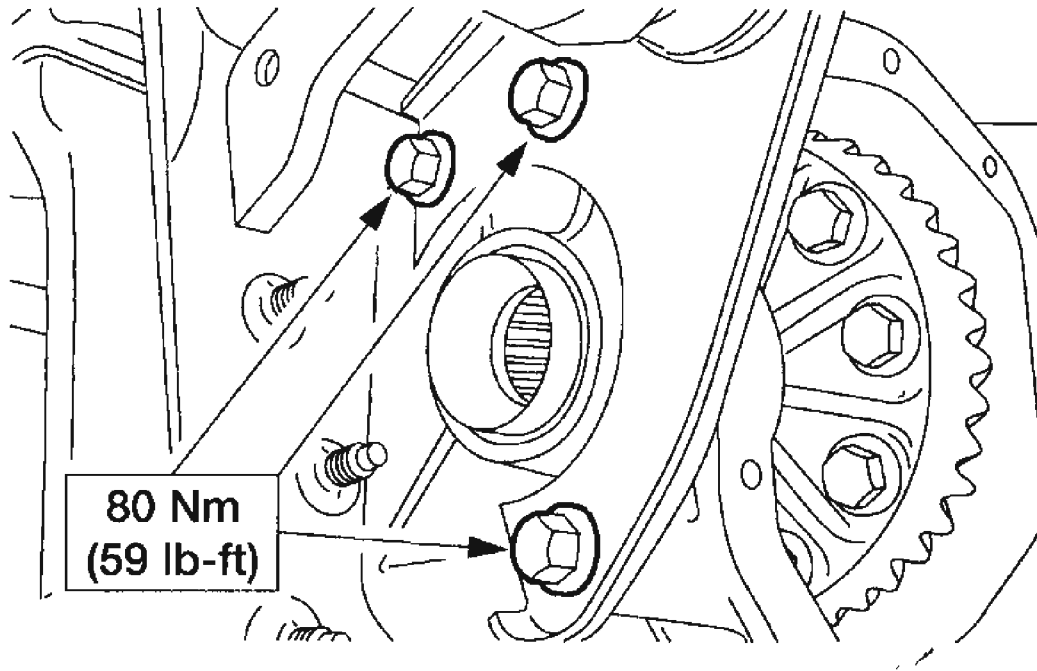
**Fig. 20: Removing Differential Housing-To-Front Insulator Bracket Bolts**  
Courtesy of FORD MOTOR CO.

4. Loosen the front insulator bracket-to-subframe bolts, and rotate the brackets aside.



**Fig. 21: Loosening Front Insulator Bracket-To-Subframe Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step requires an assistant.



G02743572

**Fig. 22: Removing Differential Housing-To-Side Insulator Bracket Bolts**  
Courtesy of FORD MOTOR CO.

5. Remove the differential housing-to-side insulator bracket bolts and the axle assembly.
6. To install, reverse the removal procedure.

## ROTARY BLADE COUPLING

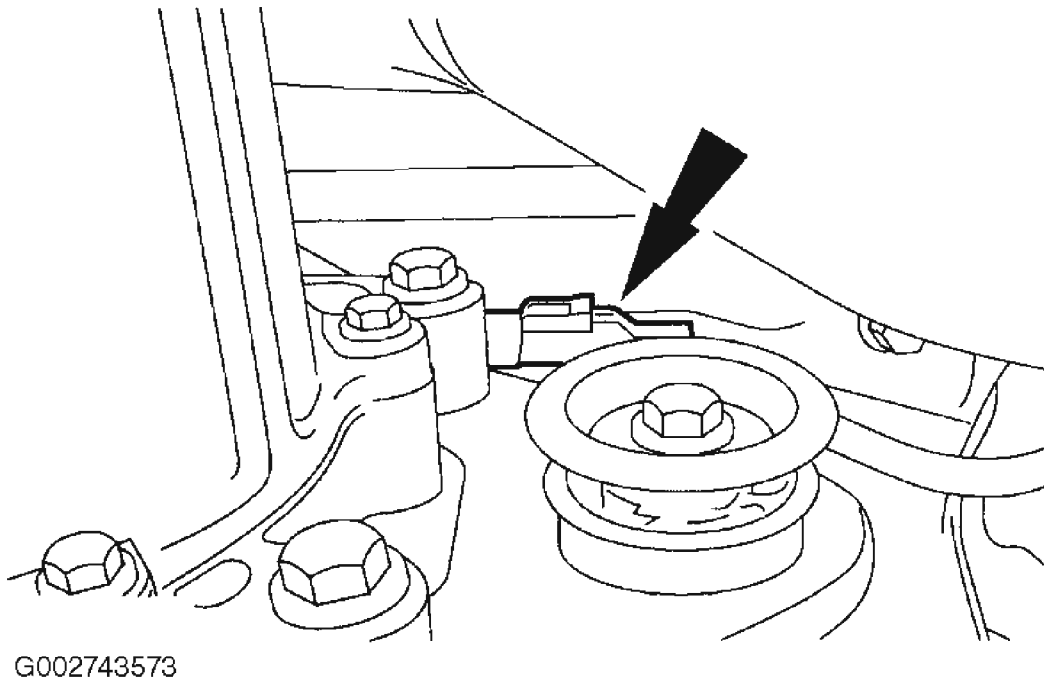
### Material

### MATERIAL

Item	Specification
Clear Silicone Rubber F7AZ-19554-CA	ESB-M4G92-A
SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A

### Removal

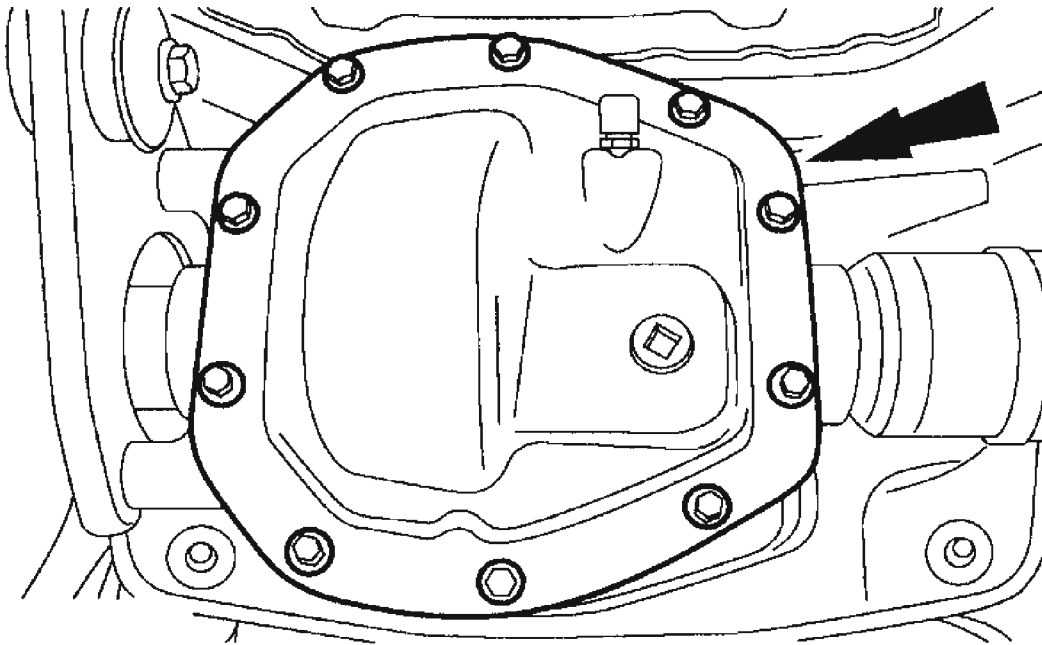
1. Remove the driveshaft. For additional information, refer to **DRIVESHAFT**.
2. Disconnect the electrical connector.



**Fig. 23: Disconnecting Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** Drain the differential fluid into a suitable drain pan.

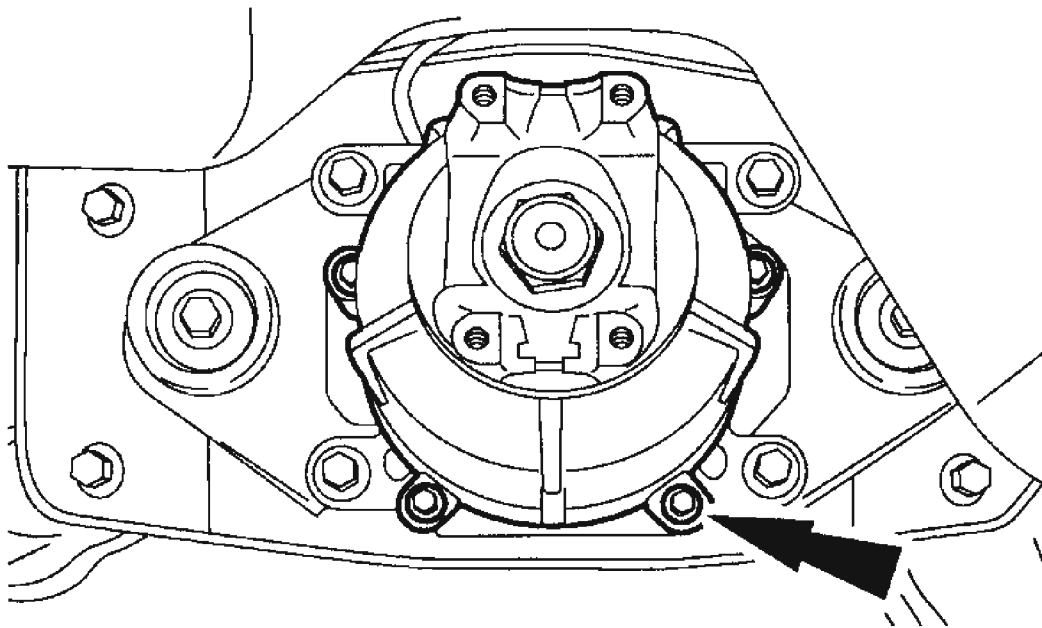




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**Fig. 24: Removing Bolts And Rear Differential Cover**  
**Courtesy of FORD MOTOR CO.**

3. Remove the bolts and the rear differential cover.
  - Drain the differential fluid from the housing.
4. Remove the six bolts and rotary blade coupling assembly.



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**Fig. 25: Removing Bolts And Rotary Blade Coupling Assembly**  
Courtesy of FORD MOTOR CO.

#### Installation

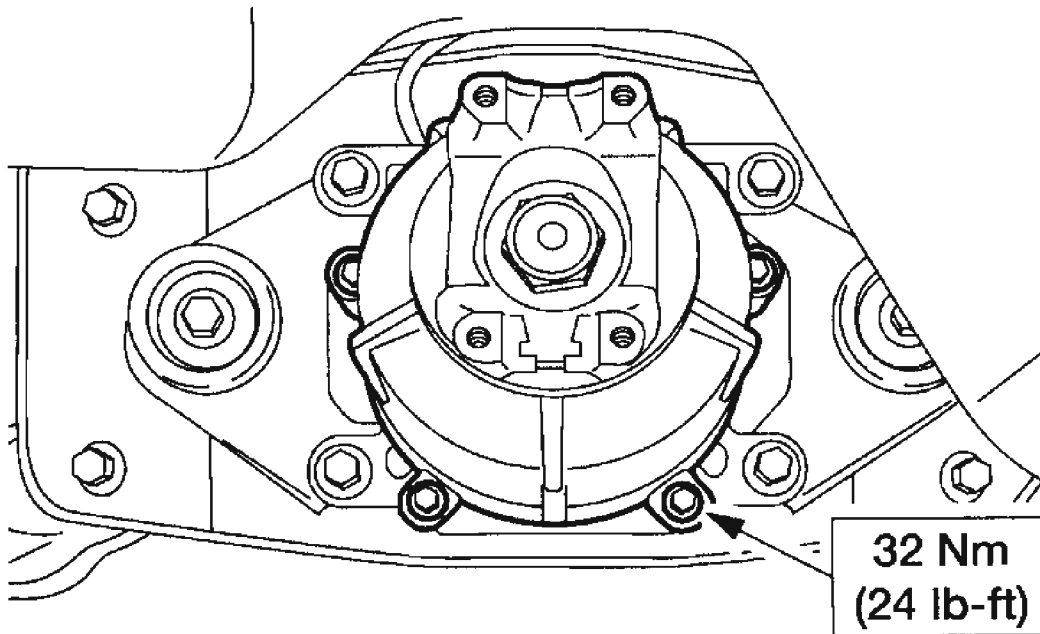
**CAUTION:** Make sure the machined surfaces on the rear axle housing, the differential housing cover and the rotary blade coupling housing are clean and free of oil before installing the new silicone sealant. The inside of the rear axle must be covered when cleaning the machined surface to prevent contamination.

1. Clean the gasket mating surfaces of the differential housing, the differential housing cover and the rotary blade coupling housing.

**NOTE:** Make sure the grommet is seated all the way in the slot.

**NOTE:** The rotary blade coupling assembly must be installed within 15 minutes of application of the silicone, or new sealant must be applied. If possible, allow one hour before filling with lubricant to make sure the silicone sealant has properly cured.

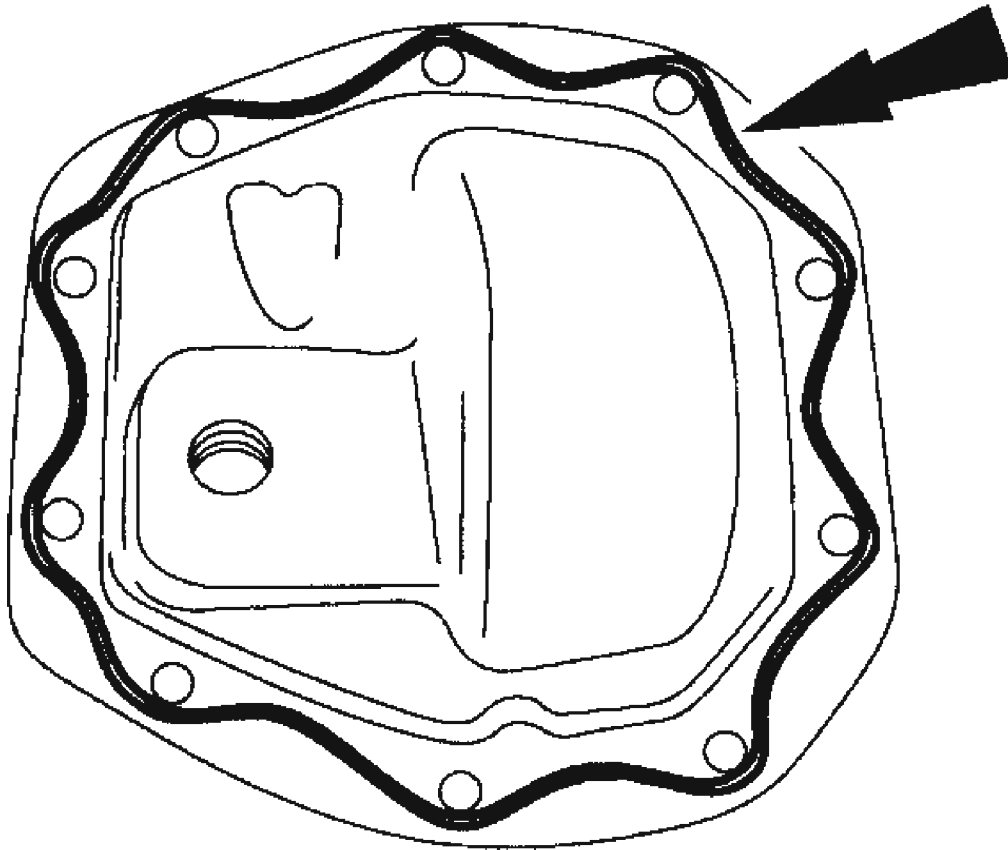
2. Apply a new continuous bead of clear silicone rubber to the rotary blade coupling housing.
3. Install the rotary blade coupling assembly and six bolts.



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**Fig. 26: Installing Rotary Blade Coupling Assembly And Bolts**  
Courtesy of FORD MOTOR CO.

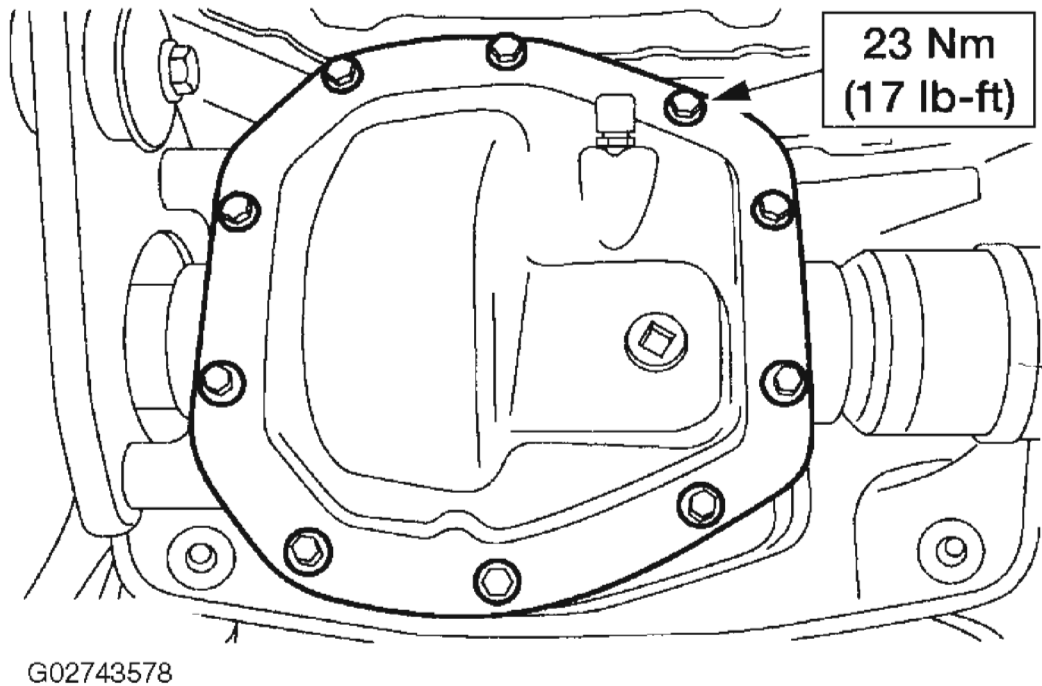
**NOTE:** The differential housing cover must be installed within 15 minutes of application of the silicone, or new sealant must be applied. If possible, allow one hour before filling with lubricant to make sure the silicone sealant has properly cured.



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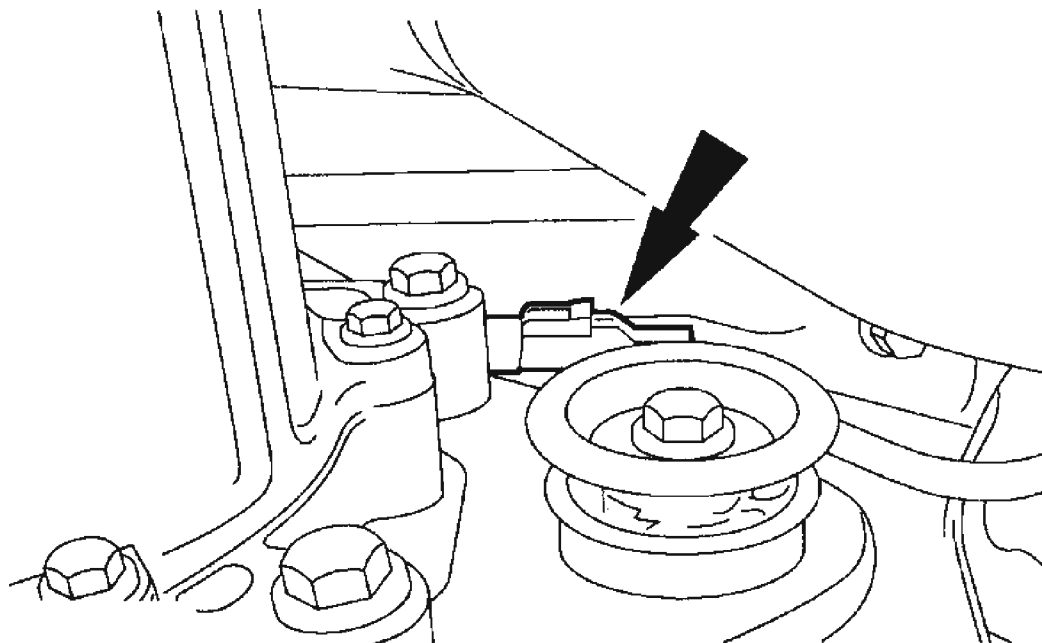
**Fig. 27: Applying Continuous Bead Of Clear Silicone Rubber**  
**Courtesy of FORD MOTOR CO.**

4. Apply a new continuous bead of clear silicone rubber to the differential housing cover as shown in the illustration.
5. Install the differential housing cover and bolts.



**Fig. 28: Installing Differential Housing Cover And Bolts**  
**Courtesy of FORD MOTOR CO.**

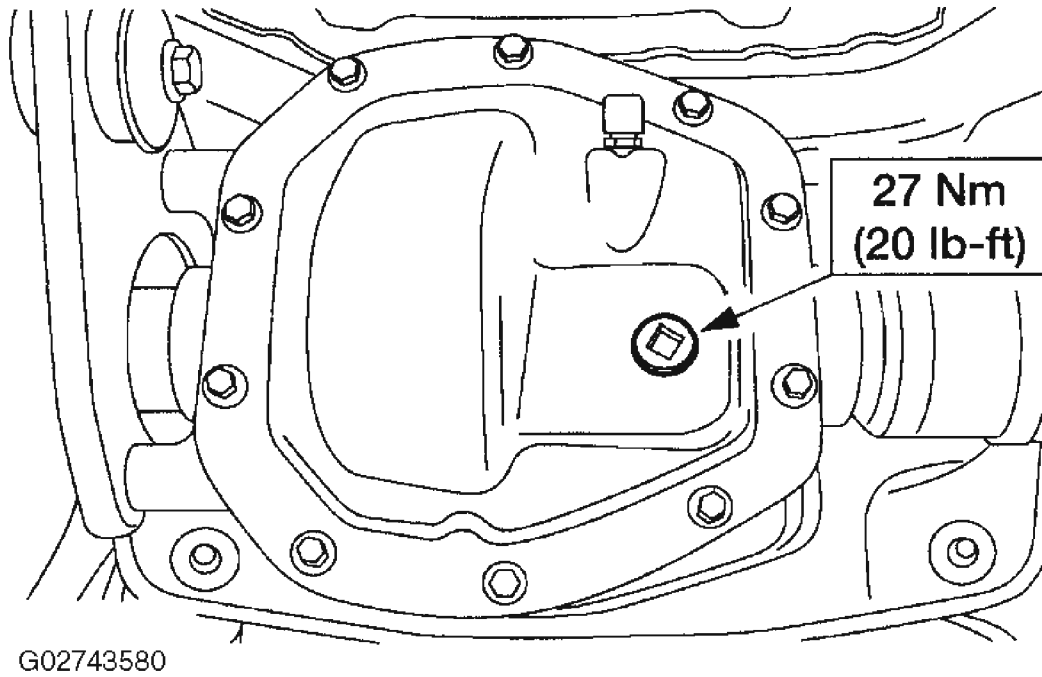
6. Connect the electrical connector.



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**Fig. 29: Connecting Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

7. Install the driveshaft. For additional information, refer to **DRIVESHAFT**
8. Fill the rear axle with 1.4 liters (2.95 pints) of rear axle lubricant.
  - Tighten the filler plug.



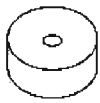


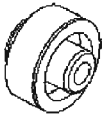
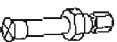
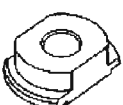


**Fig. 30: Tightening Filler Plug**  
Courtesy of FORD MOTOR CO.

## DISASSEMBLY AND ASSEMBLY

### AXLE

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

	Adapter for 205-S127 205-104 (T76P-4020-A1)
	Installer, Axle Bearing 205-195 (T83T-1244-A)
	Plate, Bearing/Oil Seal 205-090 (T75L-1165-B)
	Installer, Front Axle Oil Seal 205-350 (T95T-3010-A)
	Remover, Transfer Case Bearing Cup 308-125 (T87P-7120-D)
	Remover, Drive Pinion Inner Bearing 205-248 (T86T-4628-AH)
	Installer, Drive Pinion Bearing Cup 205-054 (T71P-4616-A)
	Installer, Differential Bearing 205-206 (T83T-4221-A)

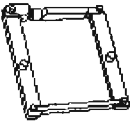
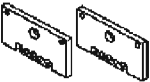


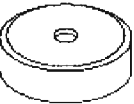
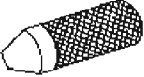
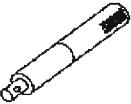

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**Fig. 31: Identifying Special Tool(s) (1 Of 3)**  
Courtesy of FORD MOTOR CO.



## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

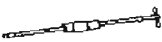








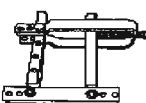
	Spreader, Differential Carrier 205-001 (TOOL-4000-E) or equivalent
	Adapter for 205-001 205-001-1
	Adapter for 205-S217 205-108 (T76P-4020-A7)
	Adapter for 205-S127 205-110 (T76P-4020-A10)
	Adapter for 205-S156 205-204 (T83T-4020-F57)
	Adapter for 205-S127 205-111 (T76P-4020-A11)
	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
	Holding Fixture, Transmission 307-003 (T57L-500-B)

G02743582

**Fig. 32: Identifying Special Tool(s) (2 Of 3)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

	Slide Hammer 100-001 (T50T-100-A)
	Gauge, Differential Bearing 205-207A
	Holding Tool, Drive Pinion Nut 205-503
	Remover, Drive Pinion Outer Bearing 205-249 (T86T-4628-BH)
	Puller, Drive Pinion/Differential Carrier 205-D036 (D81L-4220-A)
	Installer, Drive Pinion Bearing Cone 205-011 (T57L-4621-B)
	Socket, Drive Pinion Nut 205-175
	Adapter for 205-S127 205-109 (T76P-4020-A9)
	Step Plate 205-D016 (D80L-630-5) or equivalent
	Remover, Torque Converter Fluid Seal 307-309 (T94P-77001-BH)

G02743583

**Fig. 33: Identifying Special Tool(s) (3 Of 3)**  
Courtesy of FORD MOTOR CO.

Material

## MATERIAL

Item	Specification

## 2004 Ford Escape

2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

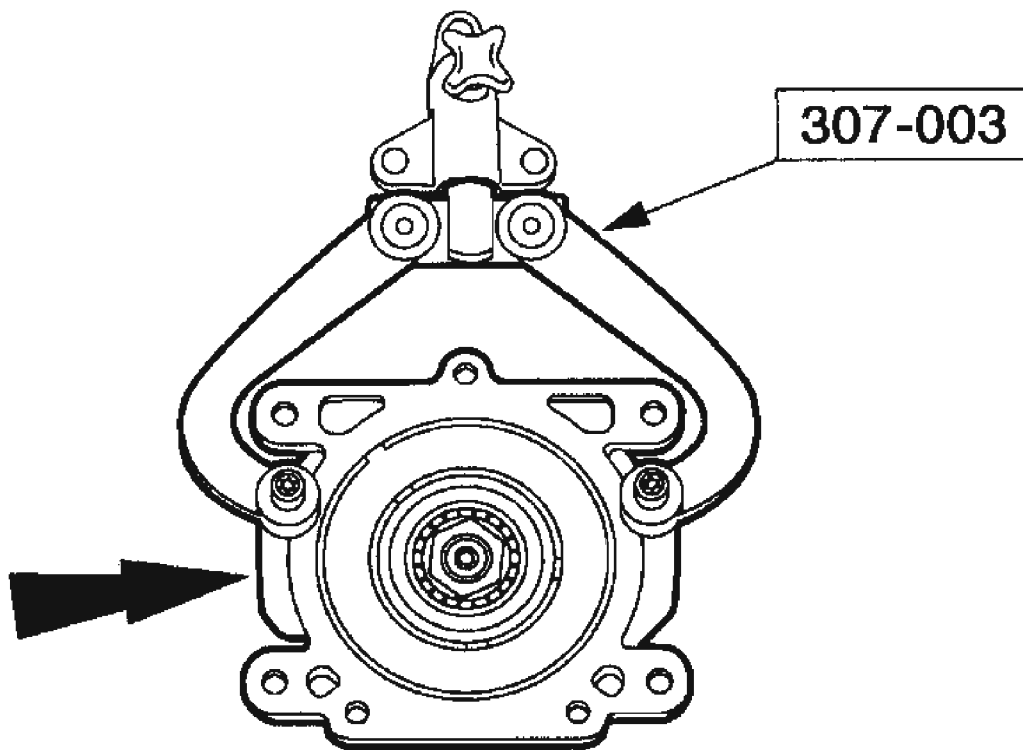
SAE 80W-90 Premium Rear Axle  
Lubricant XY-80W90-QL

WSP-M2C197-A

### Disassembly

**CAUTION:** Extreme care must be taken not to damage aluminum axle housing while carrying out these procedures.

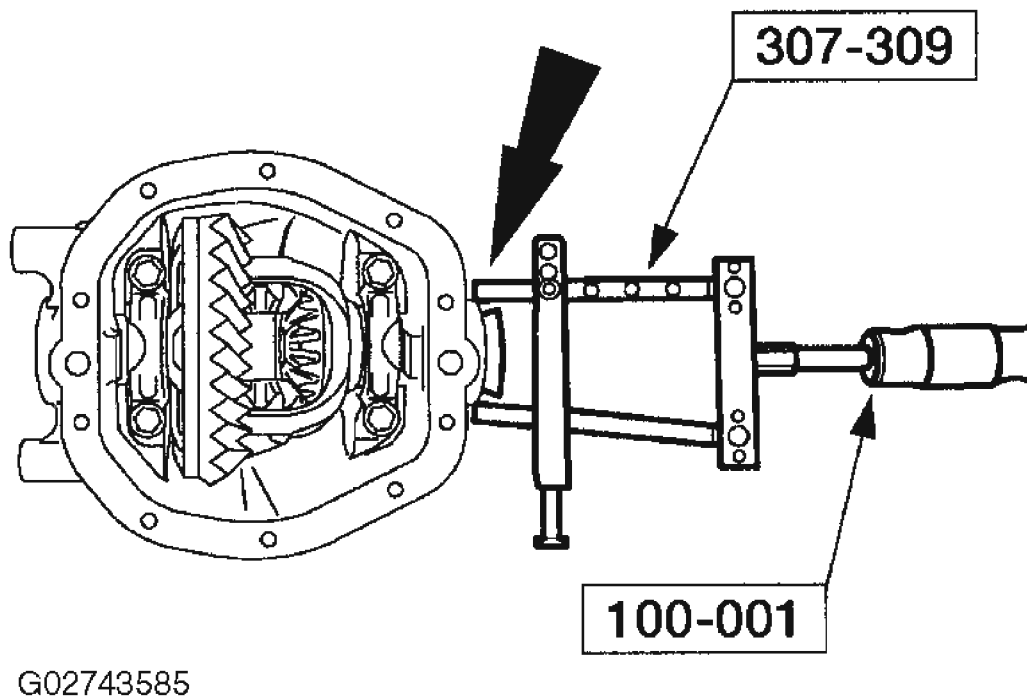
1. Using the special tool, mount the axle housing to a bench.



G02743584

**Fig. 34: Mount Axle Housing To A Bench**  
Courtesy of FORD MOTOR CO.

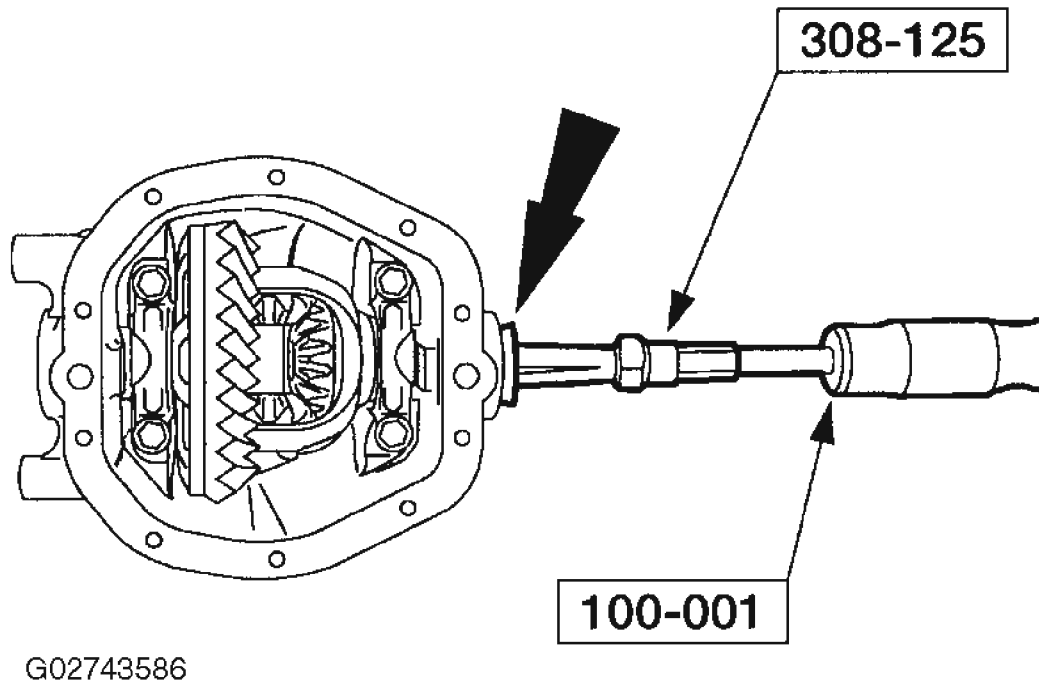
**NOTE:** RH shown; LH  
similar.



**Fig. 35: Removing Halfshaft Seals**  
Courtesy of FORD MOTOR CO.

2. Using the special tools, remove the two halfshaft seals.

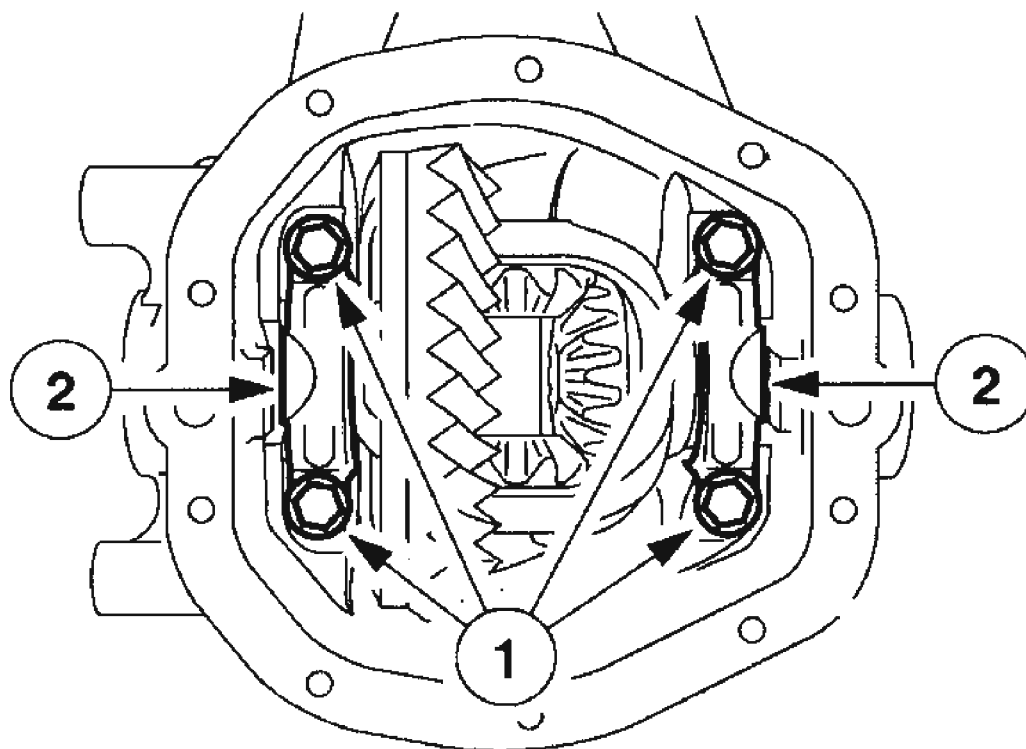
**NOTE:** RH shown; LH similar.



**Fig. 36: Removing Halfshaft Bearing Assemblies**  
Courtesy of FORD MOTOR CO.

3. Using the special tools, remove the two halfshaft bearing assemblies.

**CAUTION:** The letters or numbers stamped on the cap and carrier must be matched upon assembly.

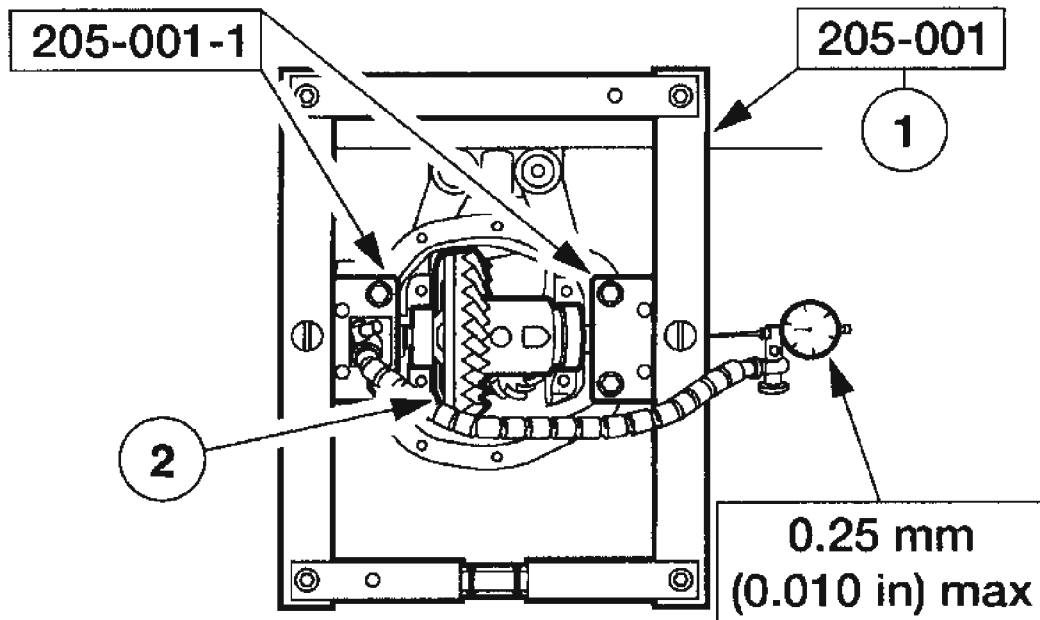


G02743587

**Fig. 37: Removing Bolts & Bearing Caps**  
Courtesy of FORD MOTOR CO.

4. Remove the bearing caps.
  1. Remove the bolts.
  2. Remove the bearing caps.

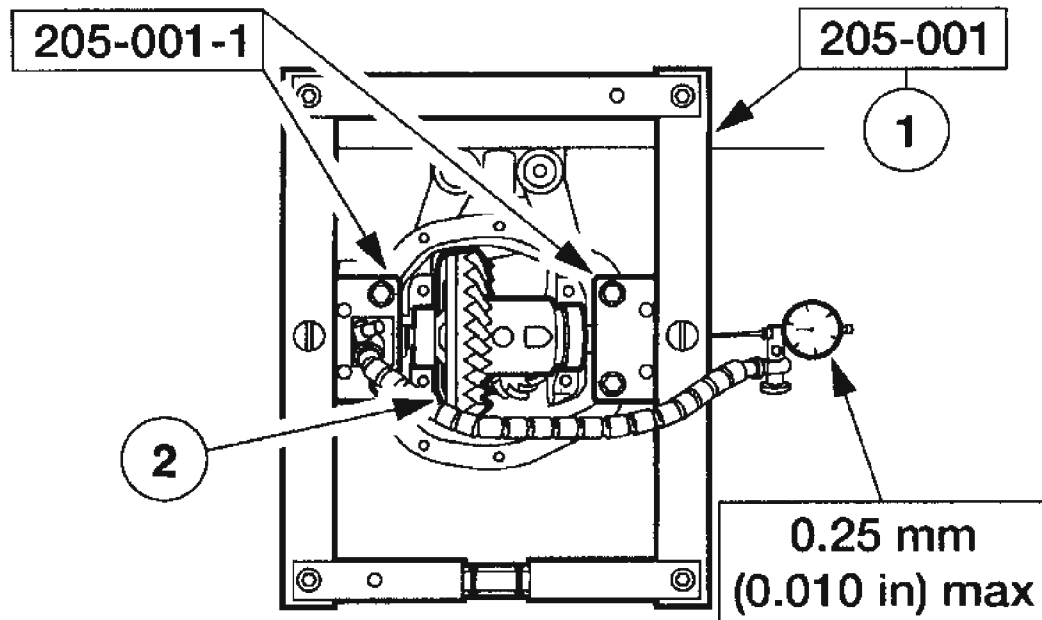
**CAUTION: Overspreading can damage the axle housing.**



G02743588

**Fig. 38: Removing Differential Case**  
Courtesy of FORD MOTOR CO.

5. Using the special tools, remove the differential case.
  1. Spread the axle housing.
  2. Remove the differential case and tag the bearing cups to indicate which side of the carrier they were removed from.
6. Remove the special tools.



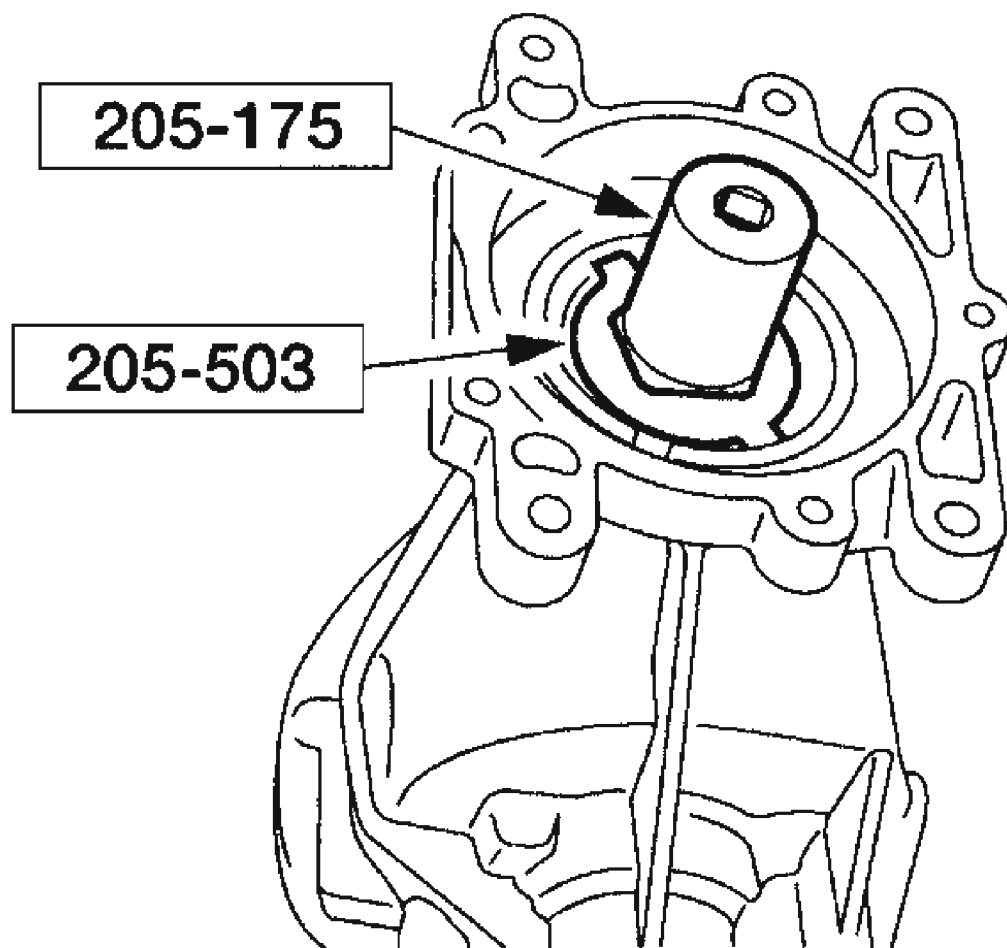
G02743589

**Fig. 39: Removing Special Tools**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure the drive pinion does not fall out of the axle case when the drive pinion nut is removed.

**NOTE:** The drive pinion nut is staked in the groove of the drive pinion shaft. There may be metal left in the groove that must be removed.



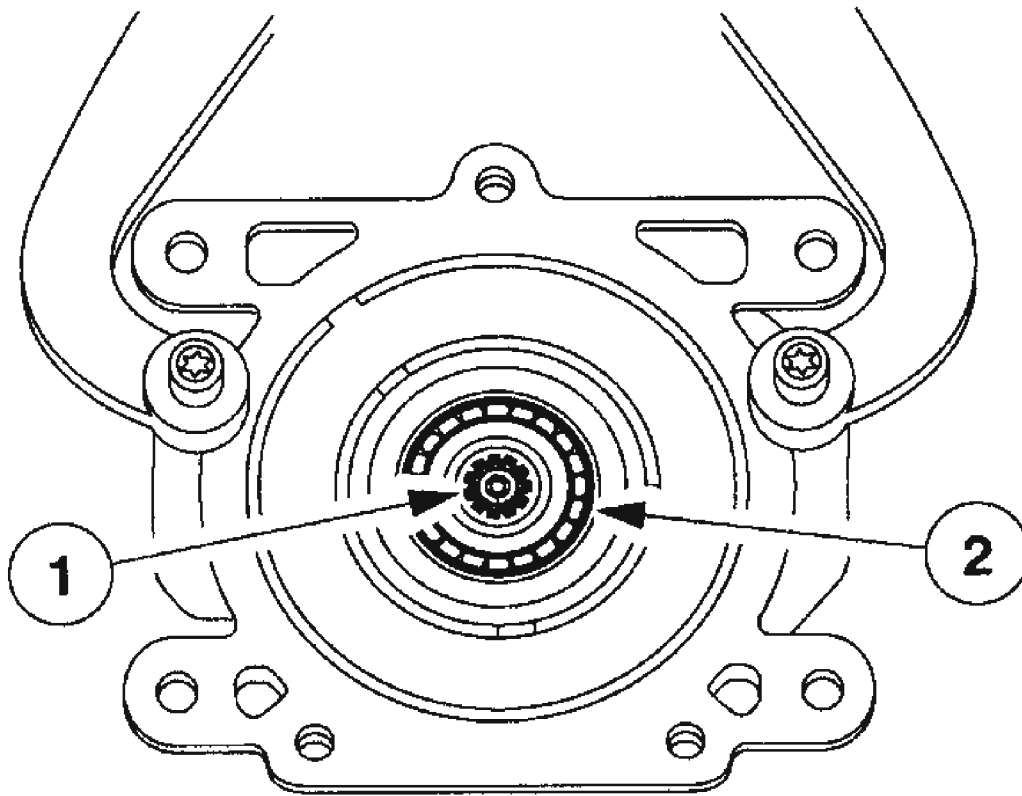


G02743590

**Fig. 40: Removing Drive Pinion Nut**  
Courtesy of FORD MOTOR CO.

7. Using the special tools, remove the drive pinion nut.

**WARNING:** Gear teeth have sharp edges. Use care when handling the drive pinion. Failure to follow these instructions may result in personal injury.

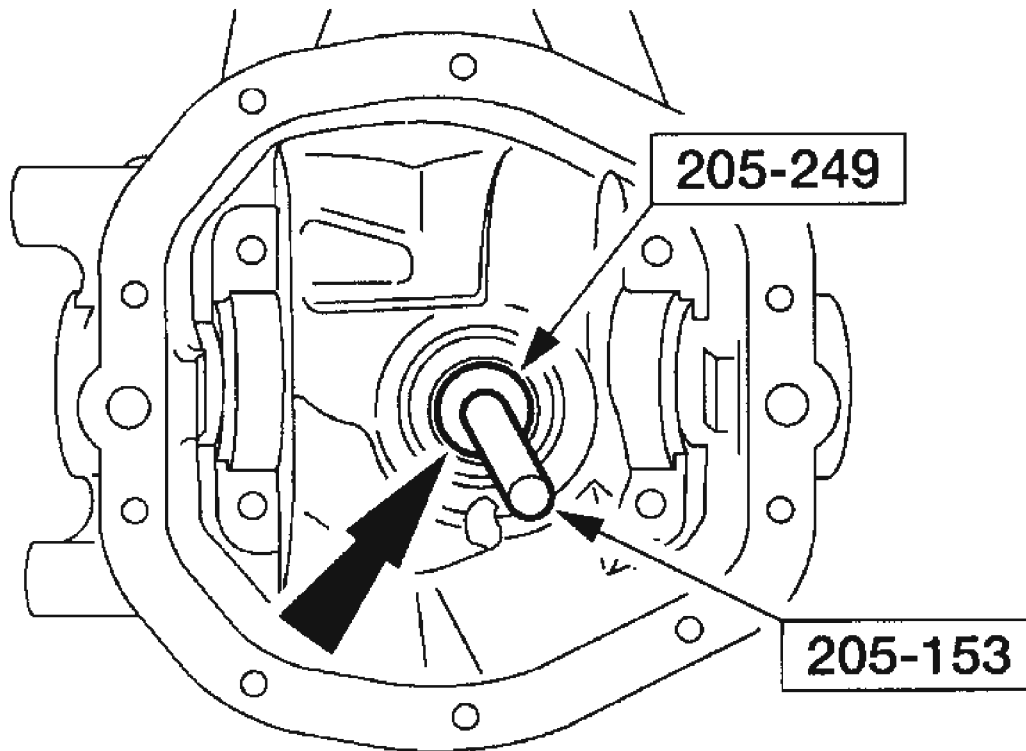


G02743591

**Fig. 41: Removing Drive Pinion, Collapsible Spacer And Inner Drive Pinion Bearing**

**Courtesy of FORD MOTOR CO.**

8. Remove the drive pinion, collapsible spacer and drive pinion bearings.
  1. Remove the drive pinion, collapsible spacer and inner drive pinion bearing.
  2. Remove the outer drive pinion bearing.
    - Discard the collapsible spacer.
9. Using the special tools, remove the outer drive pinion bearing cup.

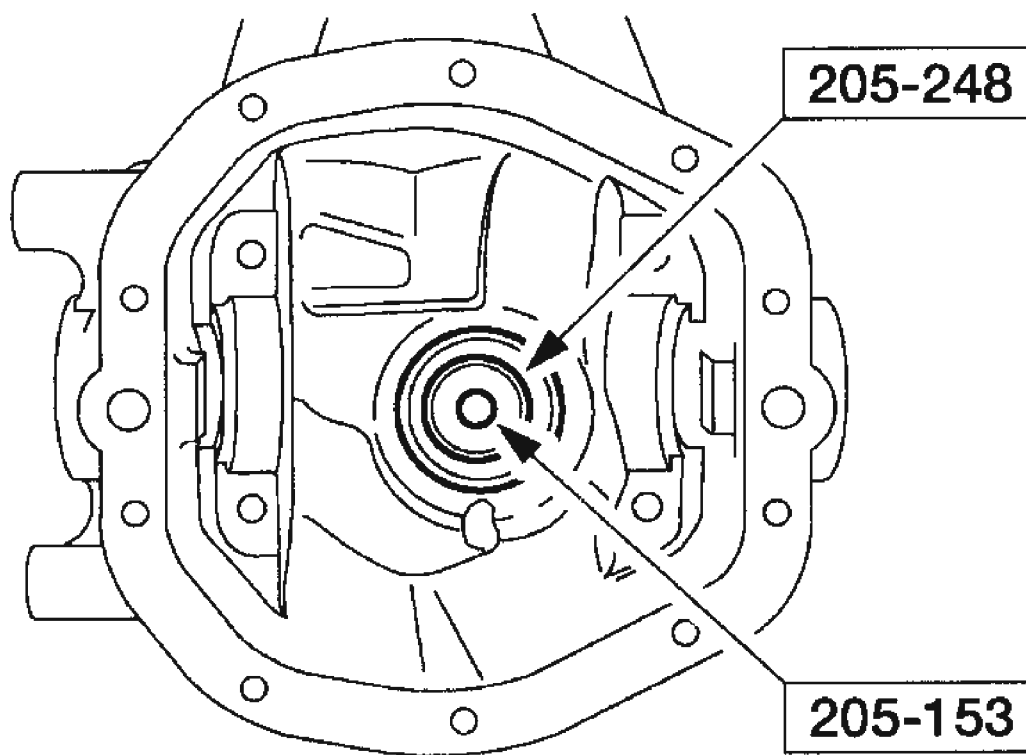


G02743592

**Fig. 42: Removing Outer Drive Pinion Bearing Cup**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure not to damage the axle housing when removing the inner drive pinion bearing cup.

**CAUTION:** A new oil baffle located between the inner drive pinion bearing cup and the axle housing bore must be installed at the time of assembly.

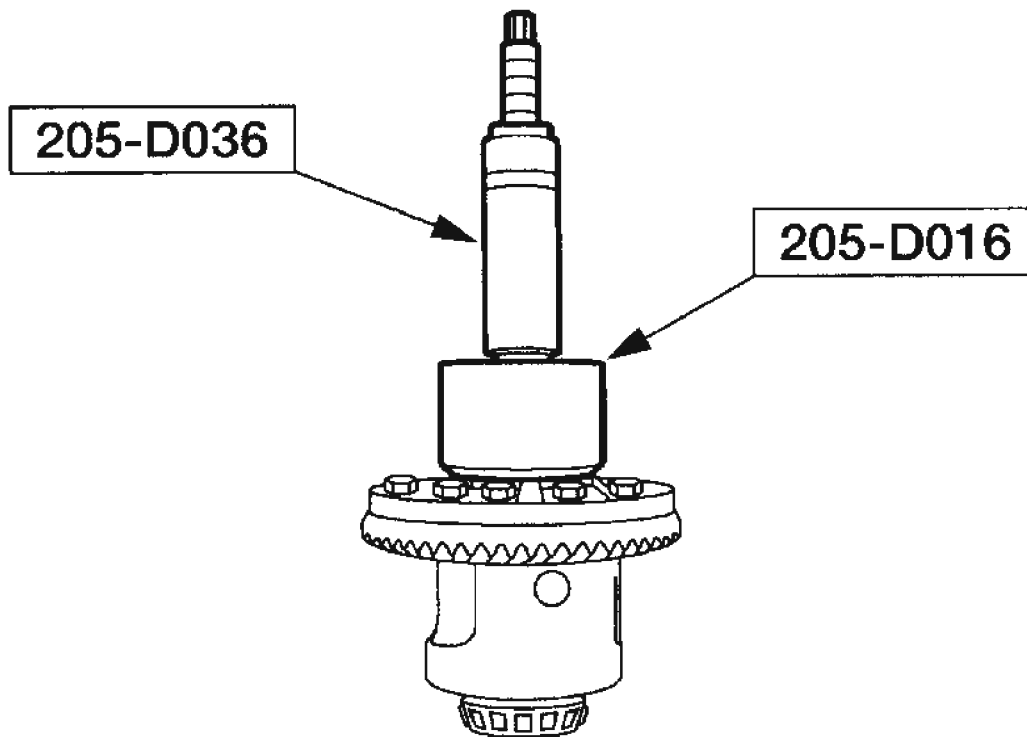


G02743593

**Fig. 43: Removing Inner Drive Pinion Bearing Cup And Oil Baffle**  
Courtesy of FORD MOTOR CO.

10. Using the special tools, remove the inner drive pinion bearing cup and oil baffle.

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

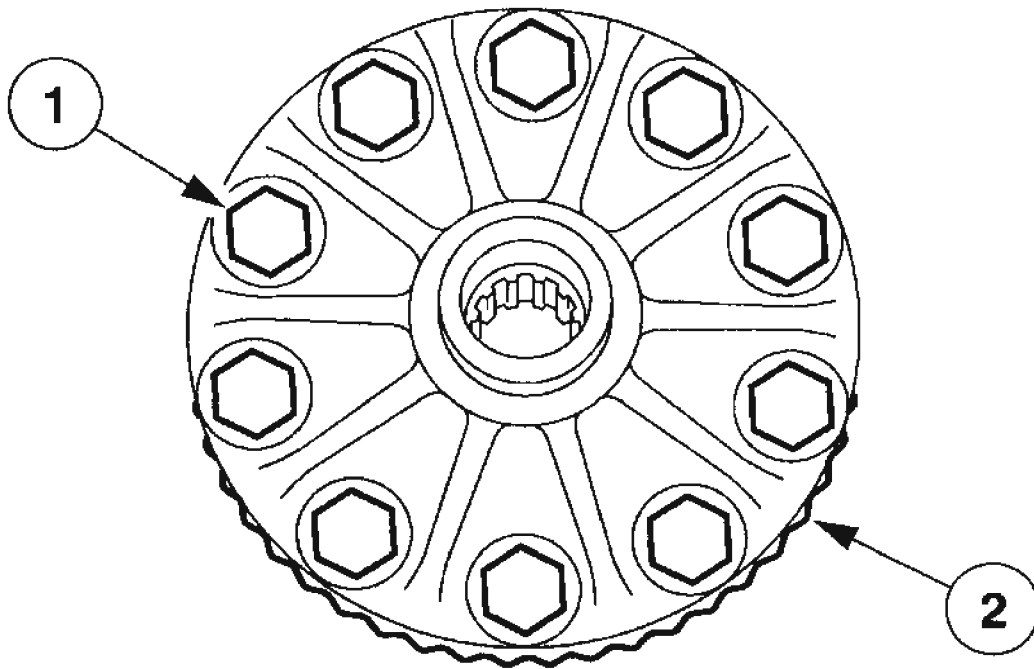


G02743594

**Fig. 44: Removing Differential Case Bearings And Shims**  
Courtesy of FORD MOTOR CO.

11. Using the special tools, remove the differential case bearings and shims.
  - Tag the bearing cups and cones together to indicate which side of the carrier they were removed from.
  - Discard any damaged shims.

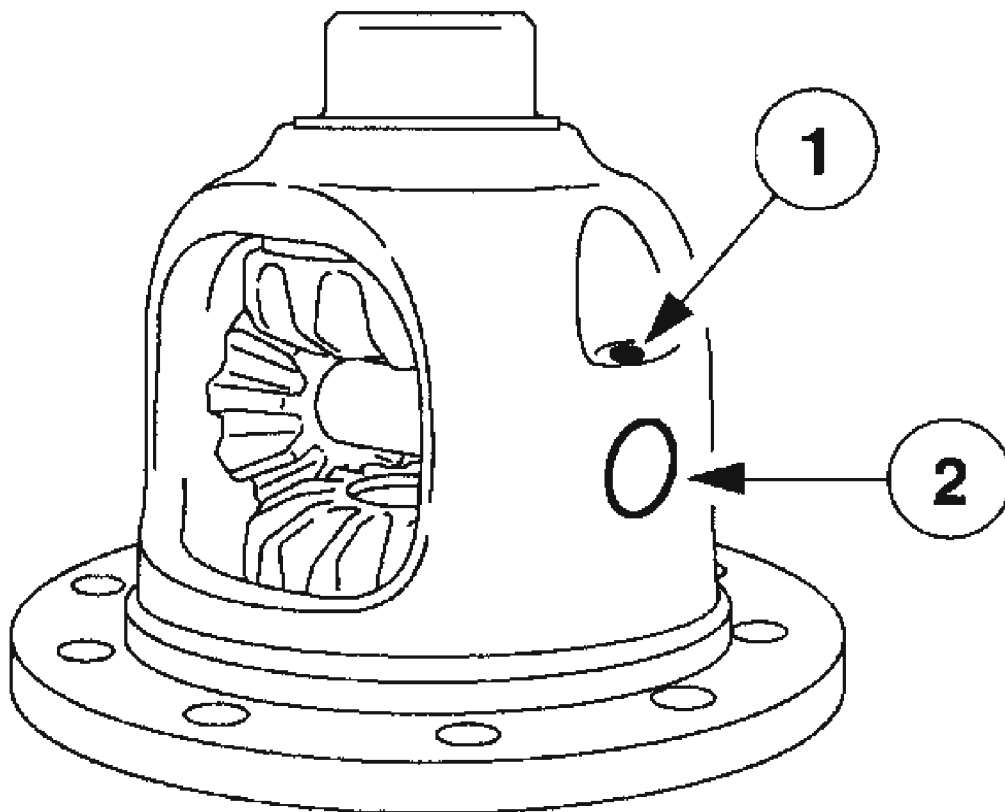
**WARNING:** Gear teeth have sharp edges. Use care when handling the drive pinion. Failure to follow these instructions may result in personal injury.



G02743595

**Fig. 45: Removing And Discarding Bolts**  
**Courtesy of FORD MOTOR CO.**

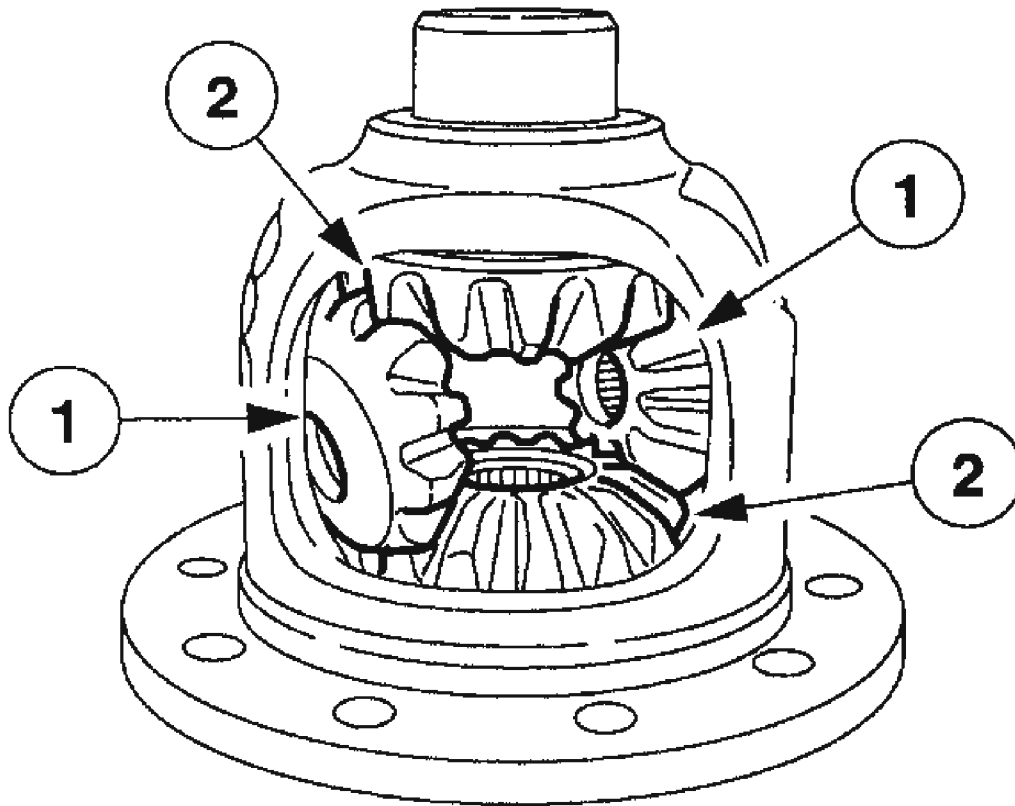
12. Remove the ring gear.
  1. Remove and discard the bolts.
  2. Remove the ring gear.
13. Remove the differential pinion shaft.
  1. Remove the differential pinion shaft lock pin.
  2. Remove the differential pinion shaft.



G02743596

**Fig. 46: Removing Differential Pinion Shaft Lock Pin**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure to note the location of the pinion gears, side gears and thrust washers to assemble in the same locations.

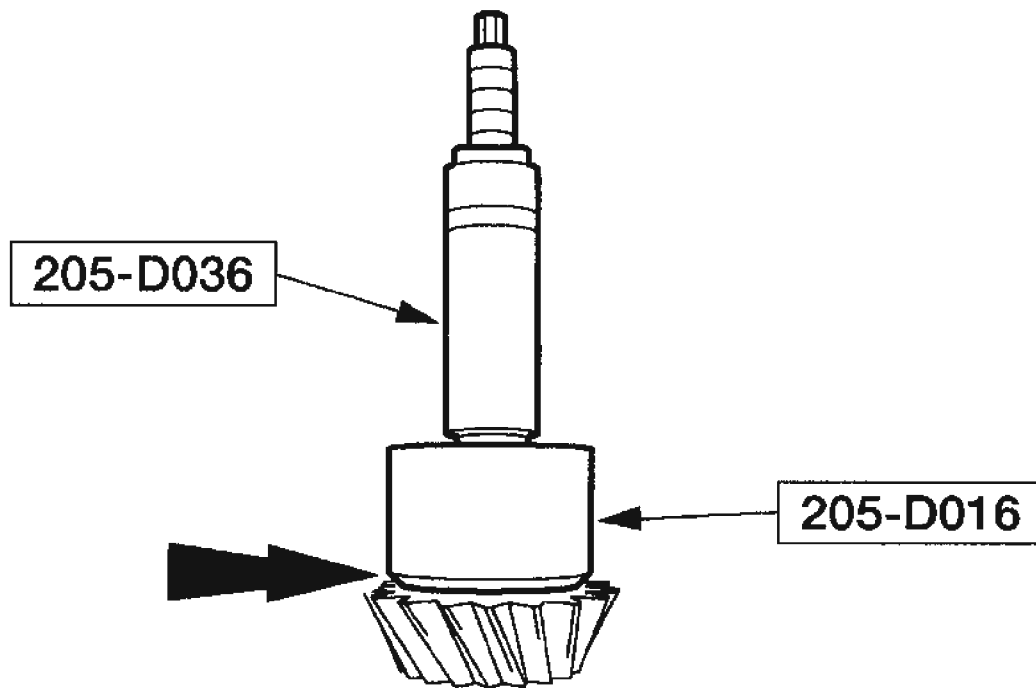


G02743597

**Fig. 47: Removing Pinion Gears, Two Side Gears And Four Thrust Washers**  
Courtesy of FORD MOTOR CO.

14. Remove the two pinion gears, two side gears and four thrust washers.
  1. Rotate the pinion gears and pinion gear thrust washers to the window and remove.
  2. Remove the side gears and side gear thrust washers.
15. Using the special tool, remove the drive pinion bearing and drive pinion position shim.



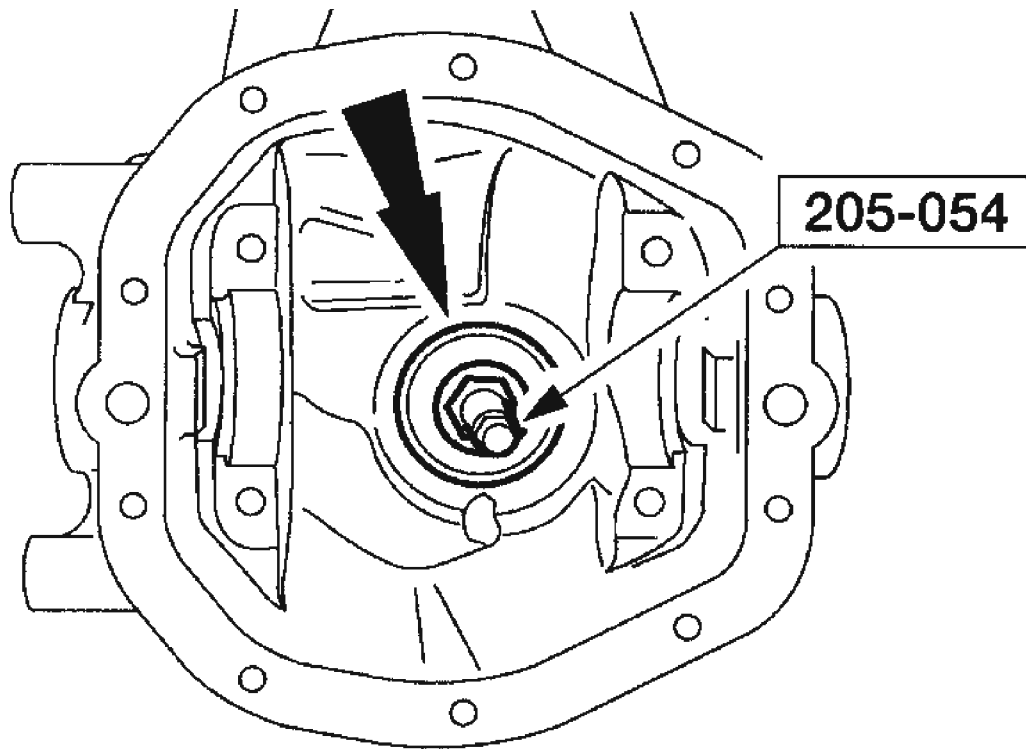


G02743598

**Fig. 48: Removing Drive Pinion Bearing And Drive Pinion Position Shim**  
Courtesy of FORD MOTOR CO.

Assembly

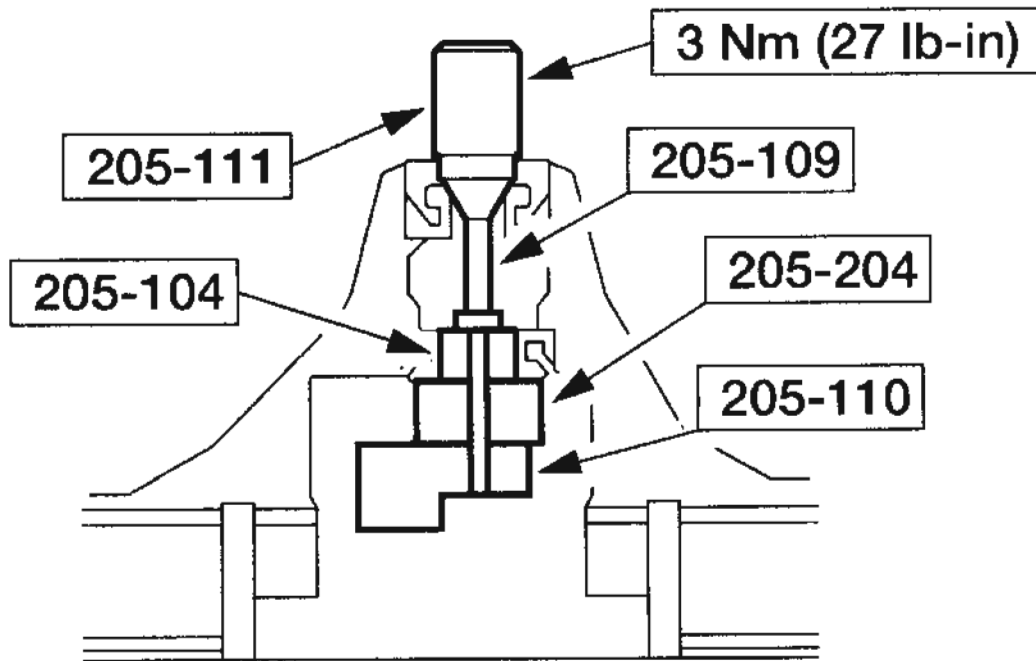
**CAUTION:** A new oil baffle must be installed located between the inner drive pinion bearing cup and the axle housing bore.



G02743599

**Fig. 49: Installing Oil Baffle, Inner And Outer Drive Pinion Bearing Cups**  
Courtesy of FORD MOTOR CO.

1. Using the special tool, install a new oil baffle, inner and the outer drive pinion bearing cups.
  - Apply a light coat of rear axle lubricant to the drive pinion bearing cup bore.
2. Install the special tools, inner and outer drive pinion bearings.
  - Preload the drive pinion bearings.

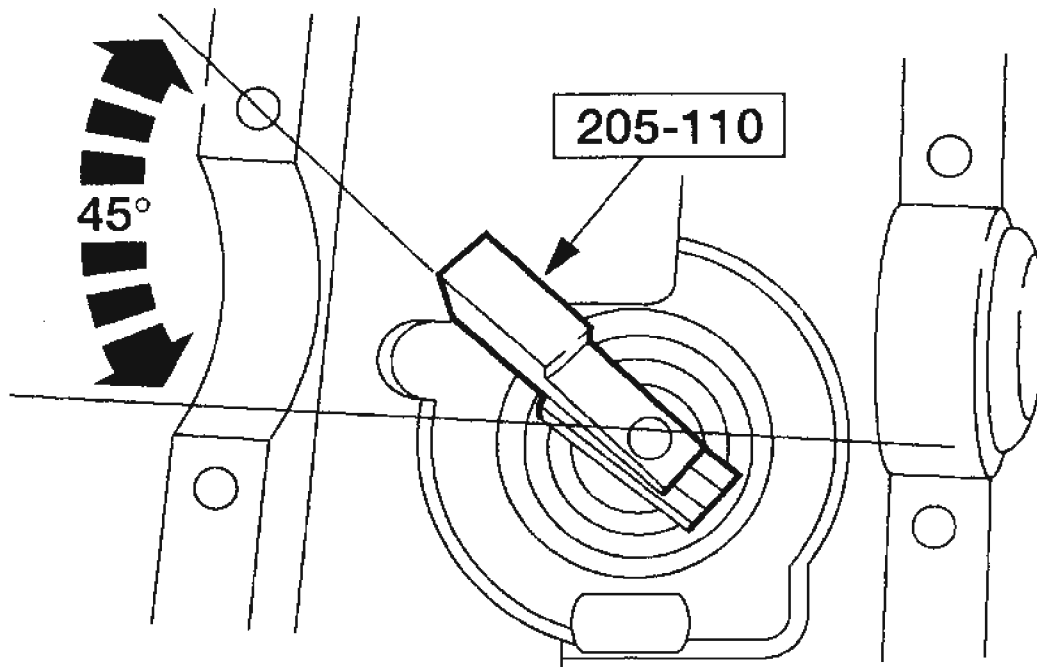


G02743600

**Fig. 50: Installing Special Tools, Inner And Outer Drive Pinion Bearings**  
Courtesy of FORD MOTOR CO.

**NOTE:** The special tool must be offset to obtain an accurate reading.

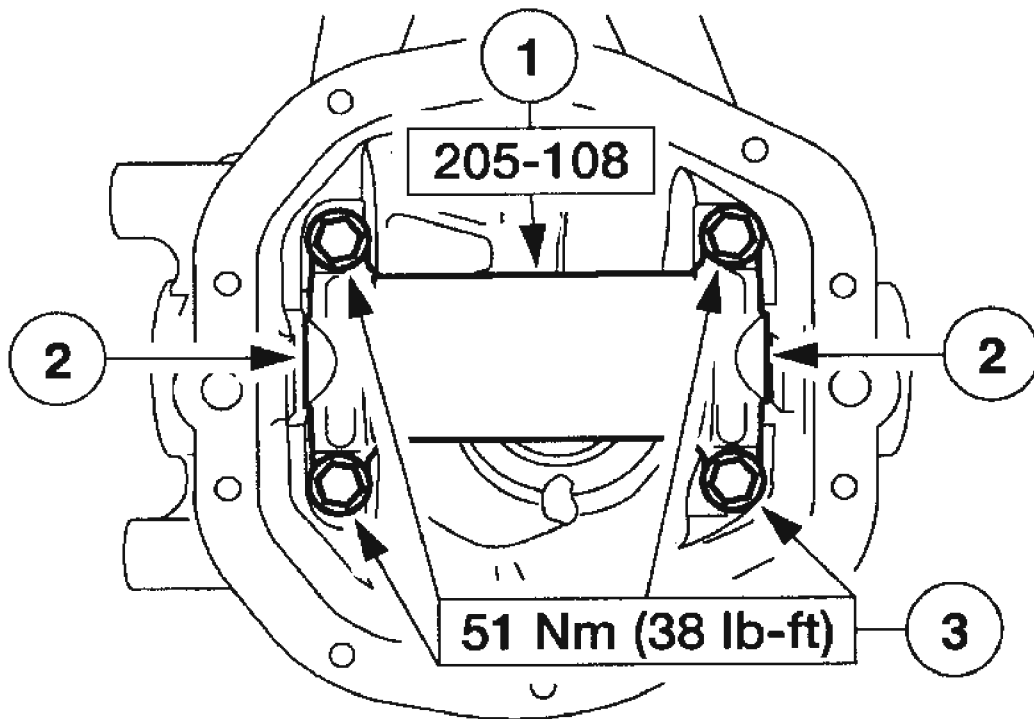
**NOTE:** Rotate the special tool several half turns to correctly seat the drive pinion bearings.



G02743601

**Fig. 51: Positioning Special Tool At 45 Degrees**  
**Courtesy of FORD MOTOR CO.**

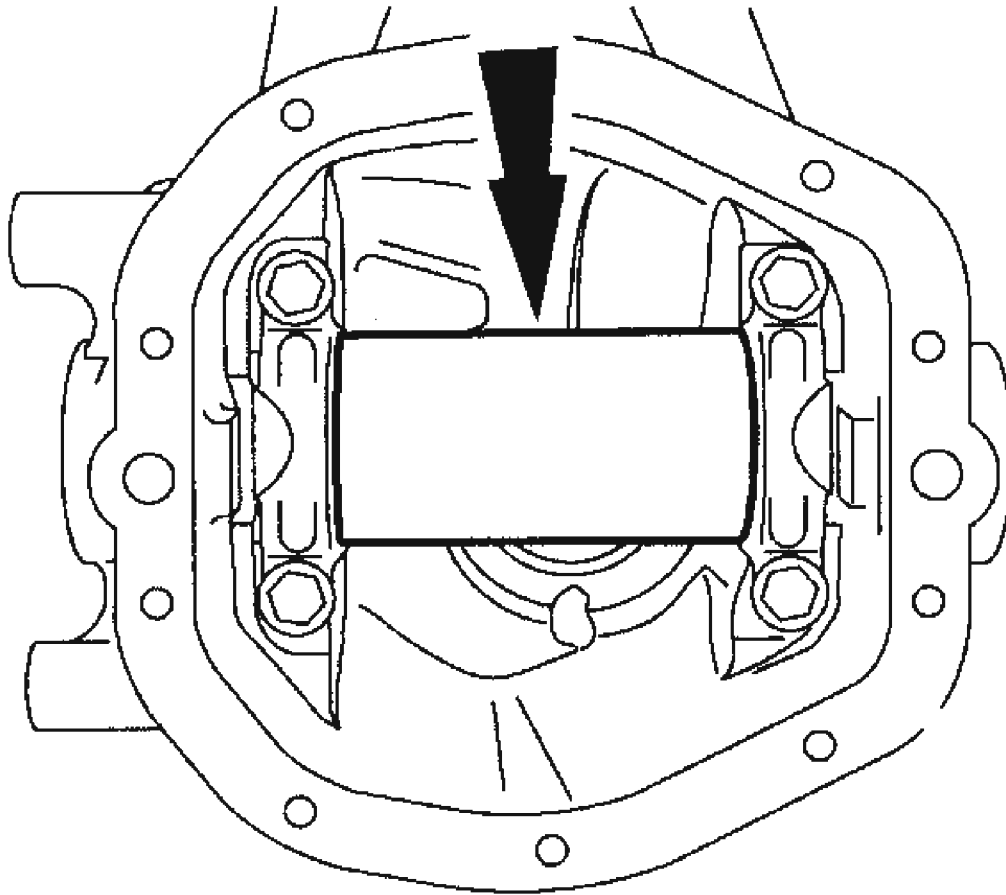
3. Position the special tool at 45 degrees as shown.
4. Install the special tool.
  1. Position the special tool.
  2. Position the bearing caps.
  3. Install the bolts.



G02743602

**Fig. 52: Installing Special Tool, Bearing Caps & Bolts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** If the drive pinion is marked with a plus (+) reading, this amount must be subtracted from the thickness measured. If the drive pinion is marked with a minus (-) reading, this amount must be added to the thickness measured.

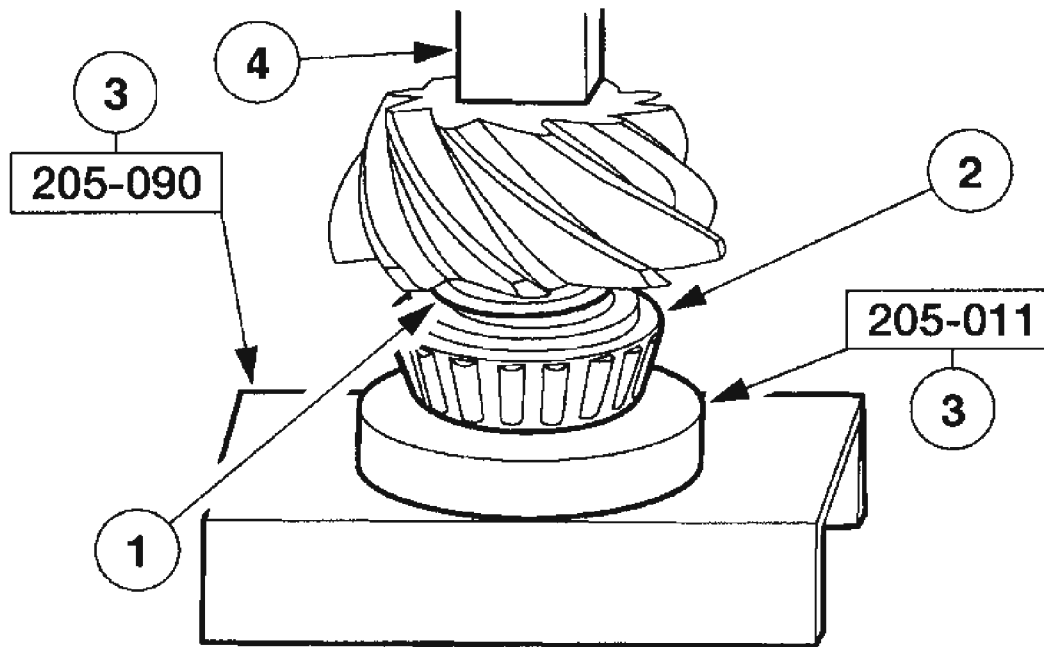


G02743603

**Fig. 53: Measuring Clearance Between Gauge Tube And Gauge Block**  
Courtesy of FORD MOTOR CO.

5. Measure and record the clearance between the gauge tube and the gauge block.
  - Select and check the correct drive pinion position shim as necessary.

**CAUTION:** The same drive pinion bearings and drive pinion bearing cups used in the drive pinion position shim selection procedure must be used in the final axle assembly.

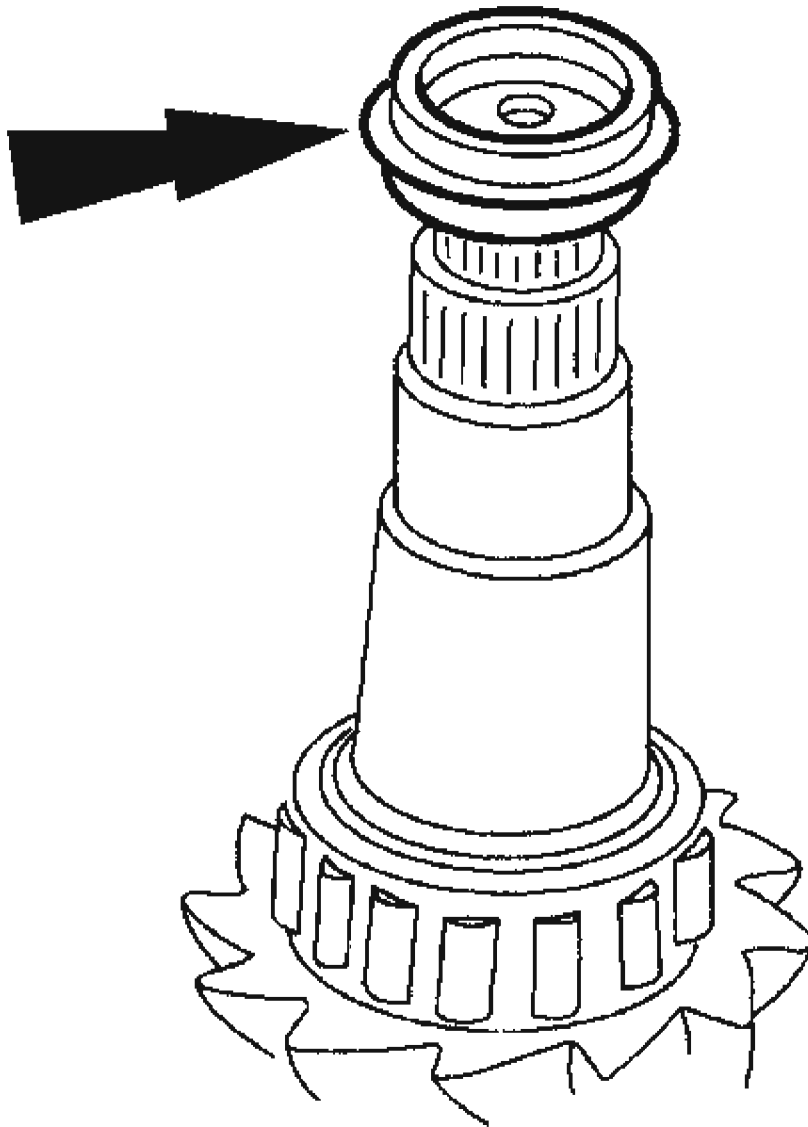


G02743604

**Fig. 54: Installing Drive Pinion Position Shim And Bearing Onto Drive Pinion**  
Courtesy of FORD MOTOR CO.

6. Using the special tools, install the drive pinion position shim and the bearing onto the drive pinion.
  1. Position the drive pinion position shim.
  2. Position the drive pinion bearing.
  3. Position the special tools.
  4. Using a press, firmly seat the drive pinion bearing on the drive pinion.

**CAUTION: Do not reuse the old collapsible spacer.**

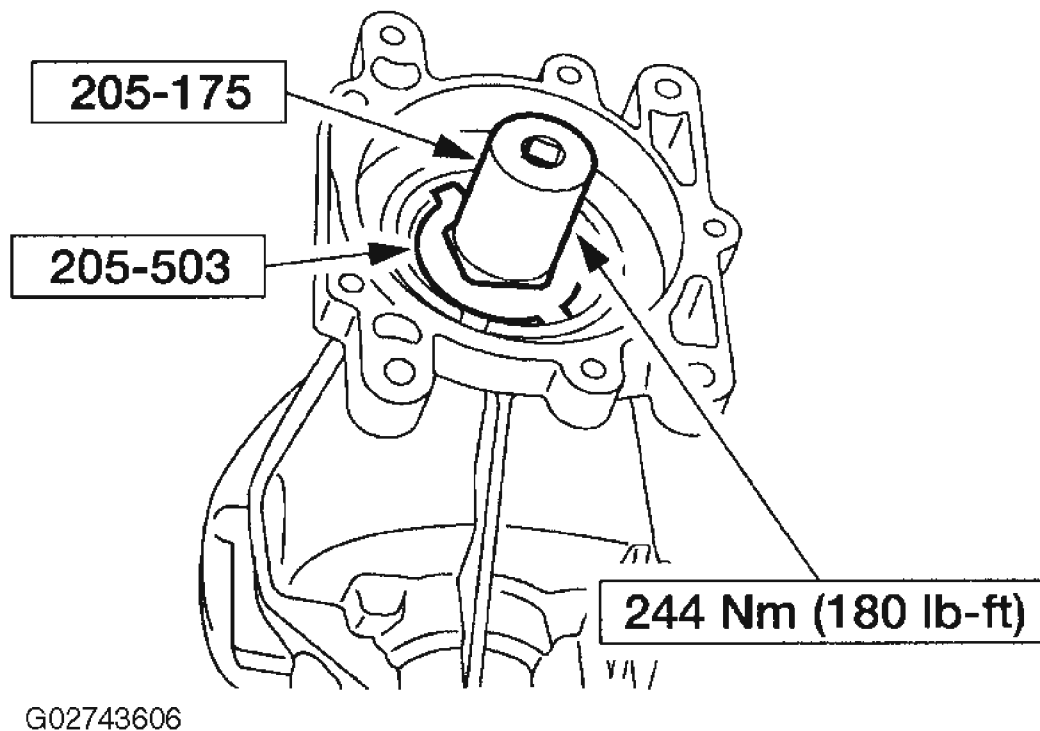


G02743605

**Fig. 55: Installing Collapsible Spacer**  
**Courtesy of FORD MOTOR CO.**

7. Install a new collapsible spacer.
8. Using the special tools, install the drive pinion and a new drive pinion nut.
  - Rotate the drive pinion counterclockwise until all end play is removed then tighten the drive pinion nut.



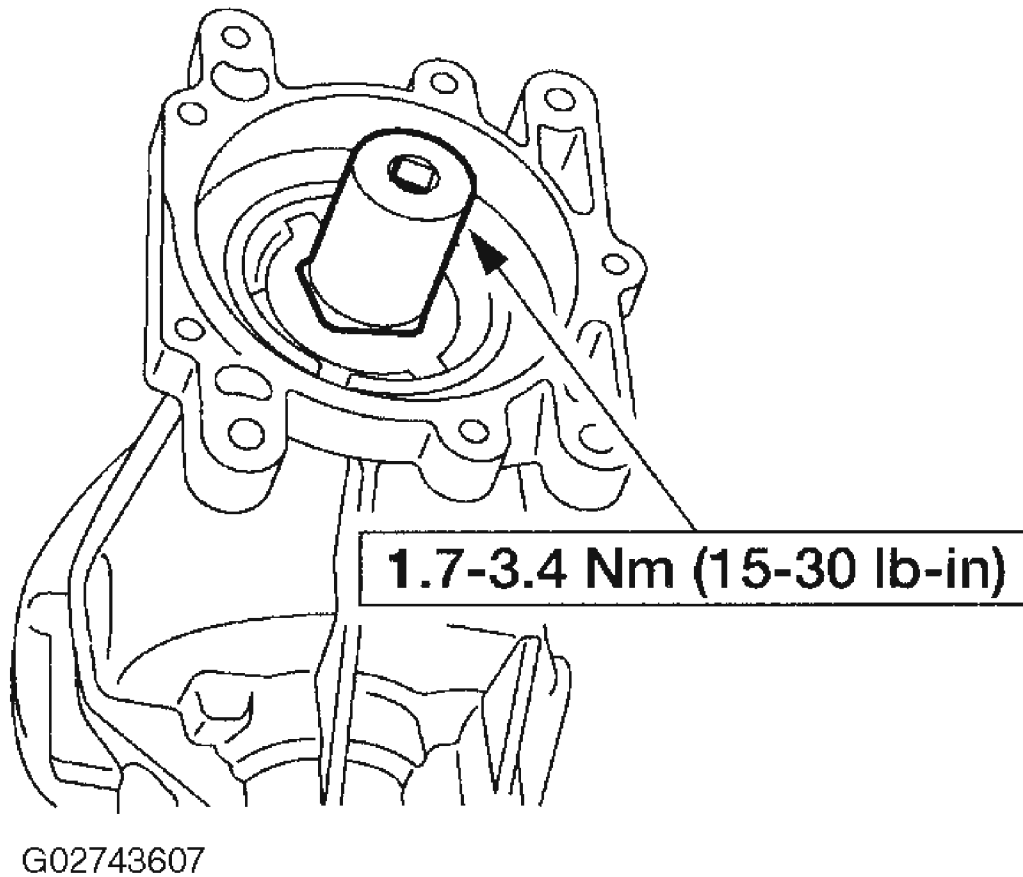


**Fig. 56: Installing Drive Pinion And Drive Pinion Nut**  
Courtesy of FORD MOTOR CO.

**CAUTION:** If the rotational torque is less than specification, tighten the drive pinion nut in small increments until it is within specification. Do not tighten the drive pinion nut more than 678 Nm (500 lb-ft) or the collapsible spacer will be damaged. If the rotation torque is higher than specification, the collapsible spacer has been compressed too far and a new collapsible spacer must be installed.

**NOTE:** When tightening the drive pinion nut to remove initial end play, torque may exceed the maximum specification. Once end play is removed and the collapsible spacer has started to collapse, the torque should drop into the specified range.

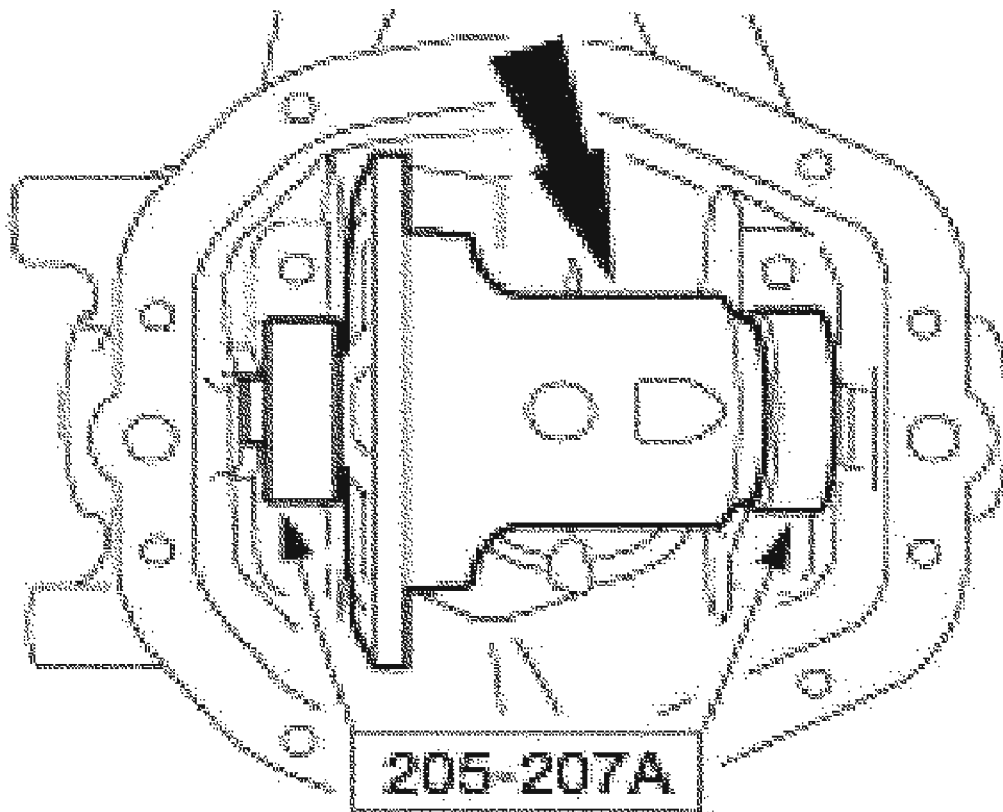
**NOTE:** Rotate the drive pinion 10 revolutions before taking the reading.



**Fig. 57: Checking Drive Pinion Rotational Torque And Adjust**  
Courtesy of FORD MOTOR CO.

9. Check the drive pinion rotational torque and adjust as necessary.

**NOTE:** The differential case should move freely in the axle housing.

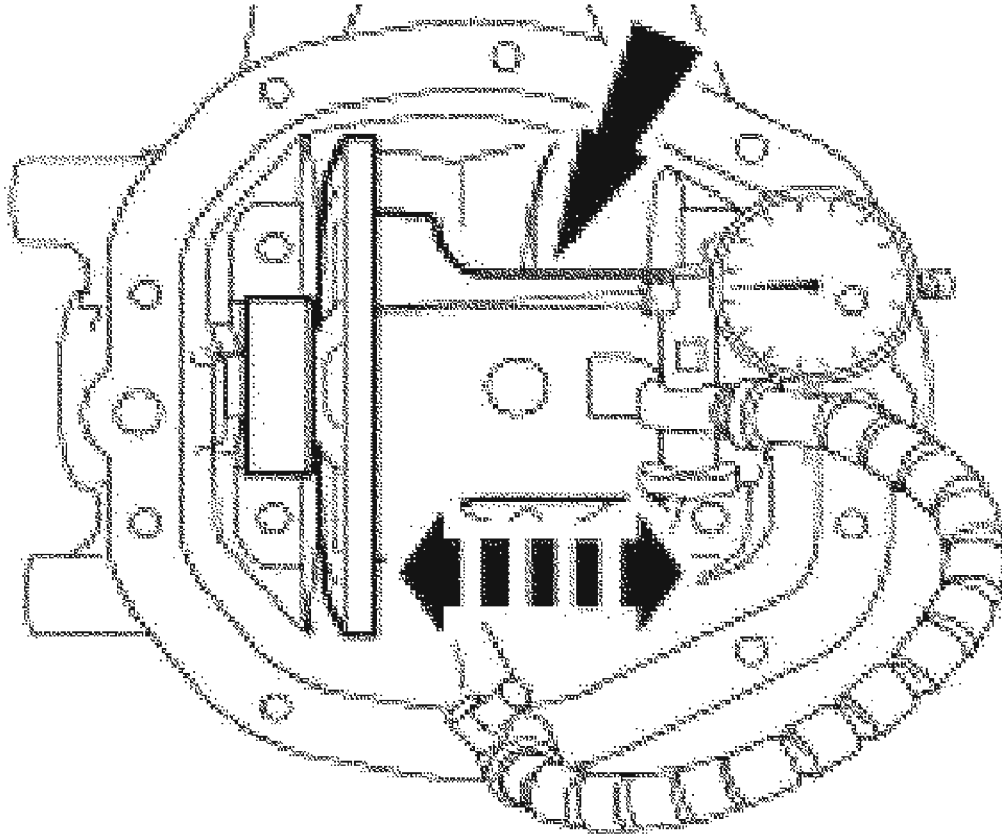


G02743608

**Fig. 58: Installing Differential Case Into Axle Housing**  
Courtesy of FORD MOTOR CO.

10. Using the special tools, install the differential case into the axle housing.

**NOTE:** Repeat this step until a same reading is obtained twice.

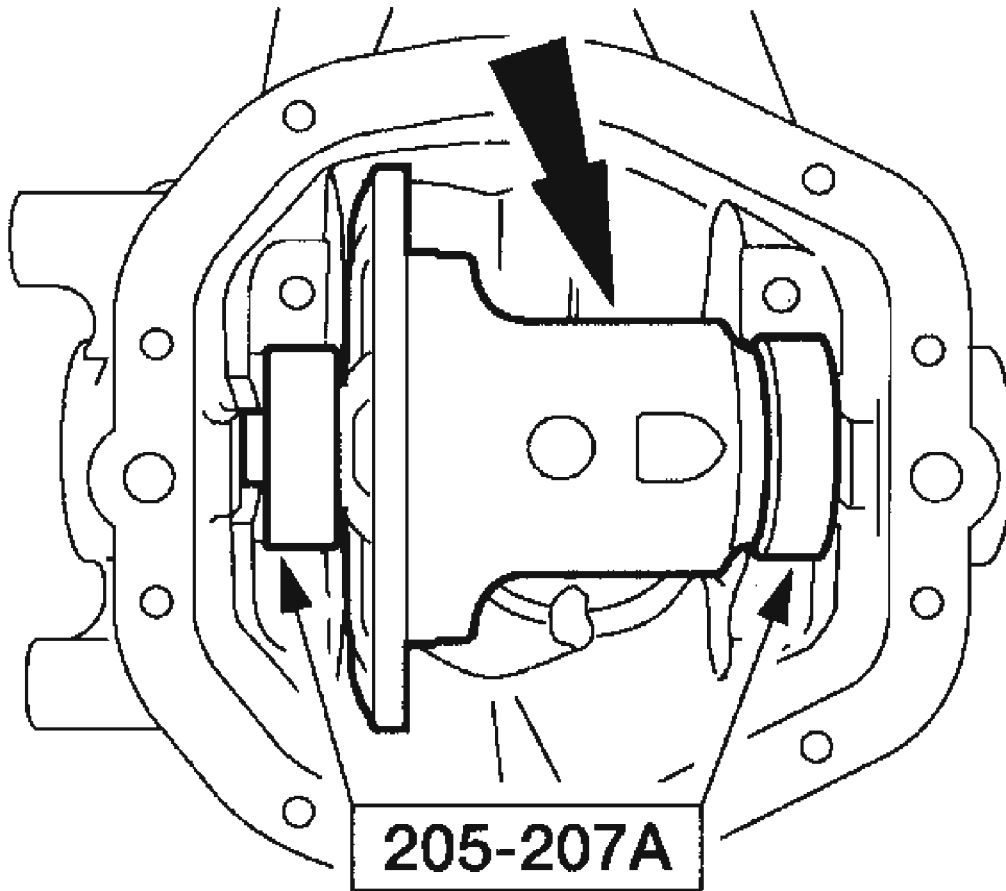


G02743609

**Fig. 59: Measuring Differential Case Total End Play**  
Courtesy of FORD MOTOR CO.

11. Seat the differential case away from the drive pinion then push the differential case toward the drive pinion while measuring and recording the differential case total end play.

**NOTE:** Take note which side each special tool was removed from so they can be installed on the same side of differential case for the next measurement with the ring gear installed.

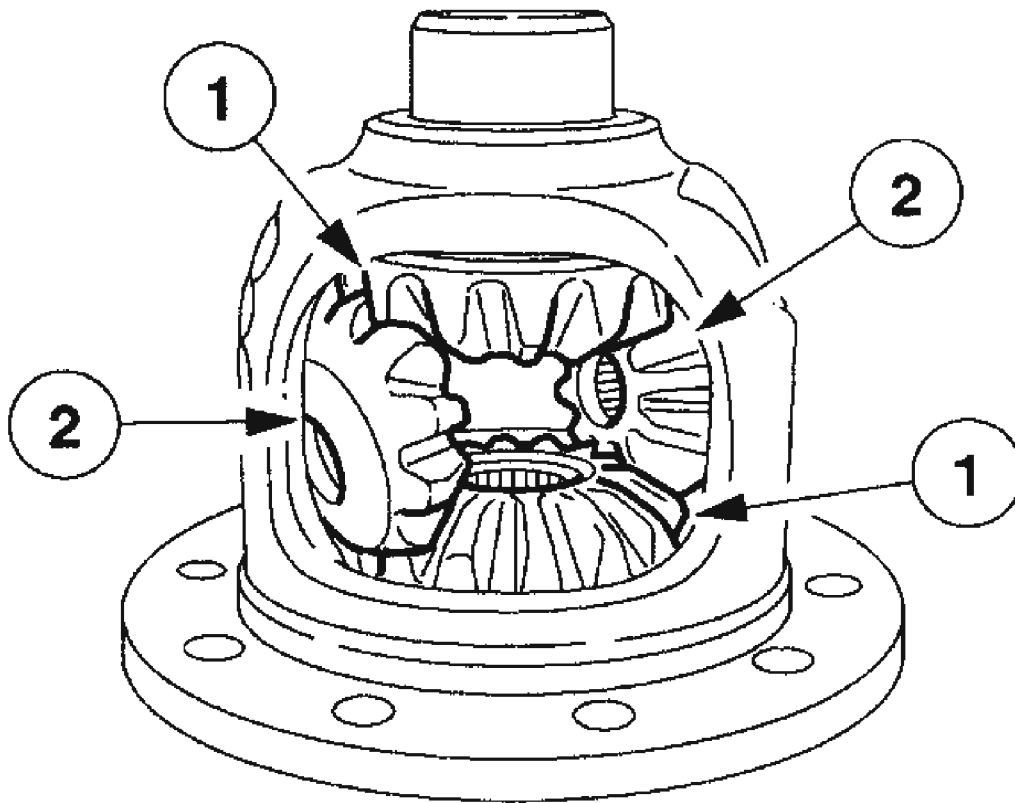


G02743610

**Fig. 60: Removing Differential Case And Special Tools**  
Courtesy of FORD MOTOR CO.

12. Remove the differential case and the special tools.

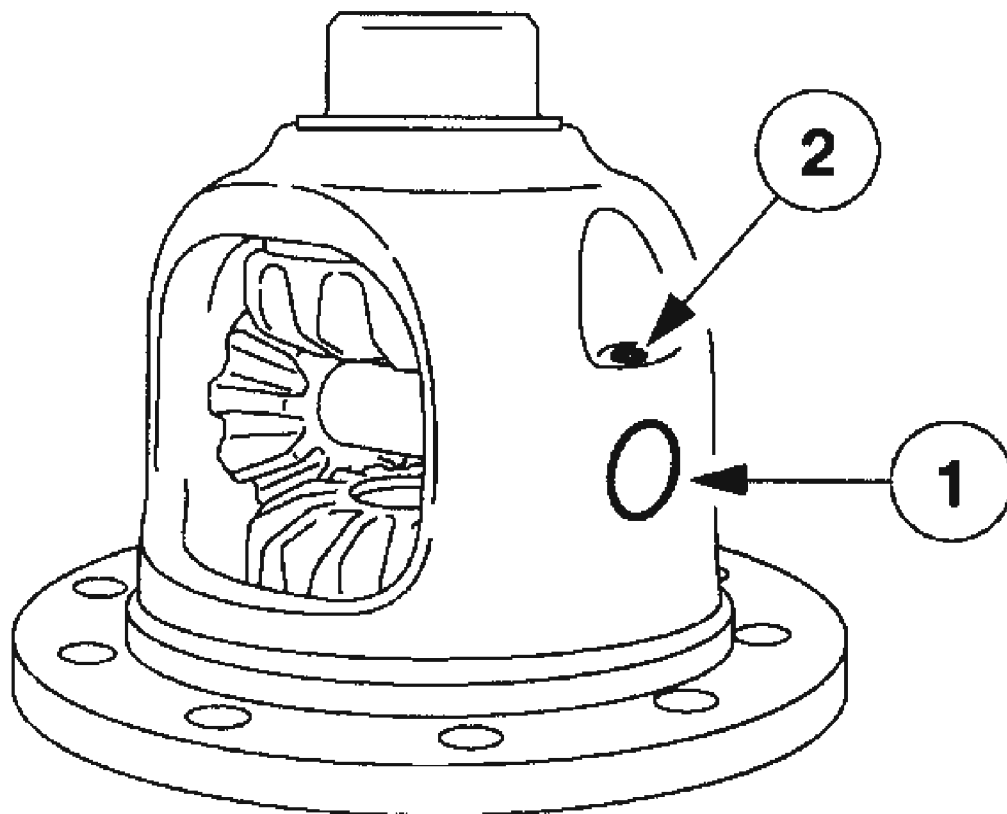
**CAUTION:** If reusing original pinion gears, side gears or thrust washers, install in the same locations that they were removed.



G02743611

**Fig. 61: Installing Pinion Gears, Side Gears And Thrust Washers**  
Courtesy of FORD MOTOR CO.

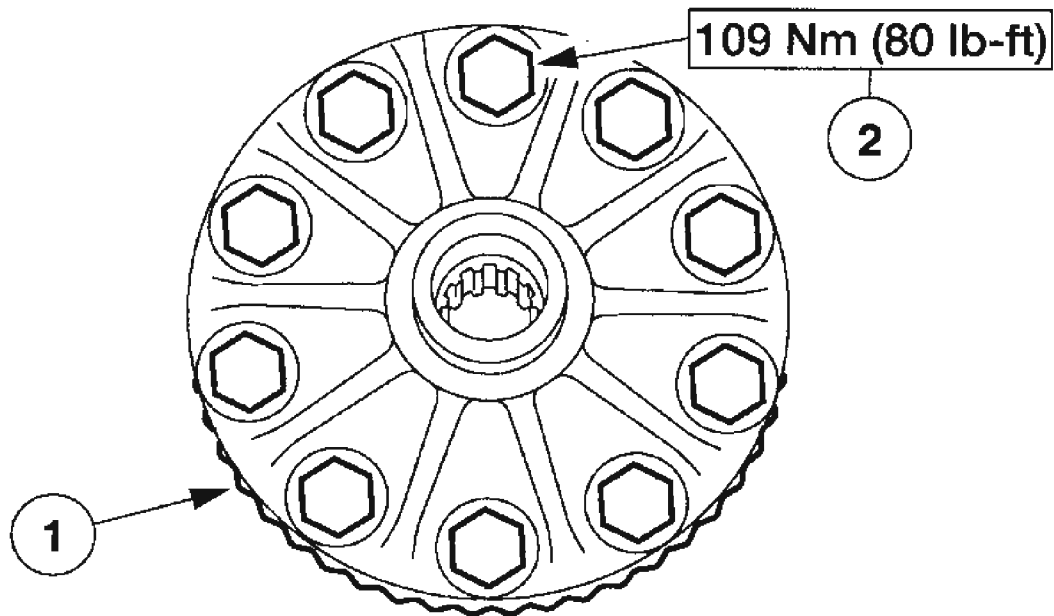
13. Install the two pinion gears, two side gears and four thrust washers.
  1. Position the side gears and side gear thrust washers.
  2. Rotate the pinion gears and pinion gear thrust washers to the differential pinion shaft hole in the differential case.
    - Apply rear axle lubricant to the pinion gears, side gears and thrust washers.
14. Install the differential pinion shaft.
  1. Install the differential pinion shaft.
  2. Install the differential pinion shaft lock pin.



G02743612

**Fig. 62: Installing Differential Pinion Shaft Lock Pin**  
Courtesy of FORD MOTOR CO.

**WARNING:** Gear teeth have sharp edges. Use care when handling the drive pinion. Failure to follow these instructions may result in personal injury.

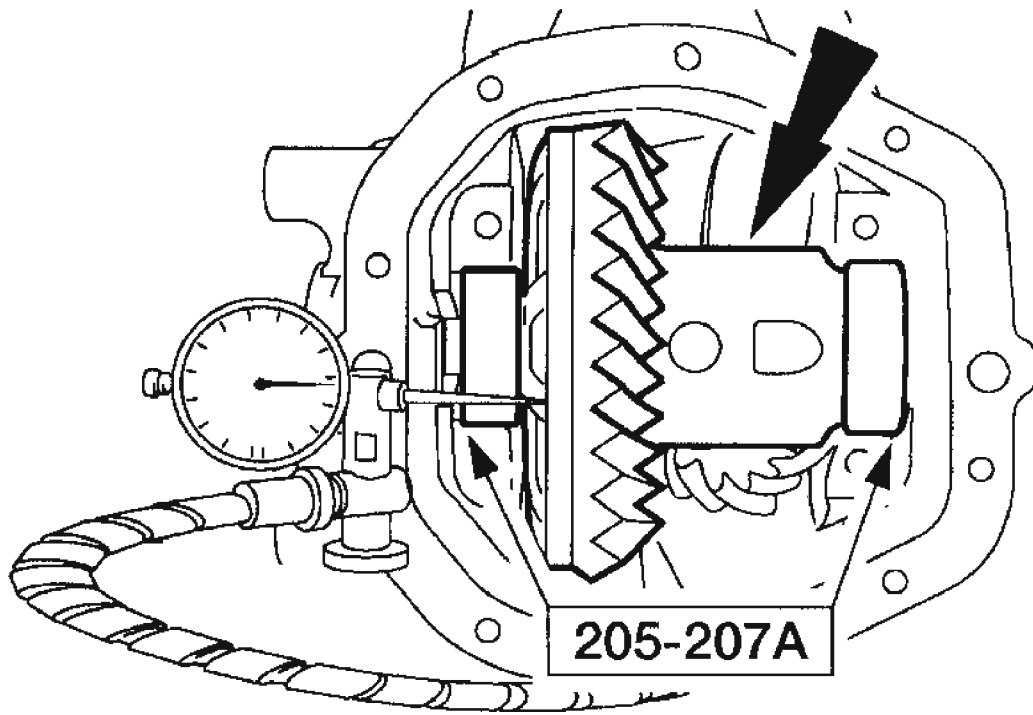


G02743613

**Fig. 63: Installing Ring Gear**  
Courtesy of FORD MOTOR CO.

15. Install the ring gear.
  1. Position the ring gear.
  2. Install new ring gear bolts in an alternately and evenly pattern.
16. Using the special tools, install the differential case into the axle housing.
  - Install the special tools on the same ends of the differential case as they were previously installed.
  - Locate the tip of the dial indicator on the flat surface of one of the ring gear bolts.

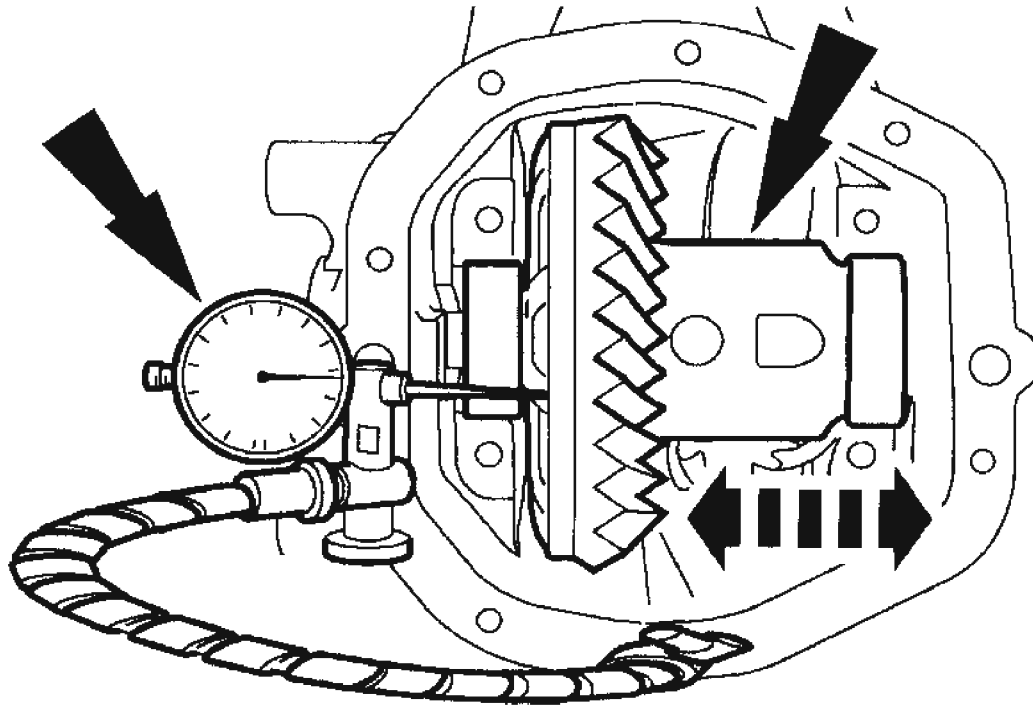




G0274614

**Fig. 64: Setting Up Dial Indicator On Flat Surface Of One Of Ring Gear Bolts**  
Courtesy of FORD MOTOR CO.

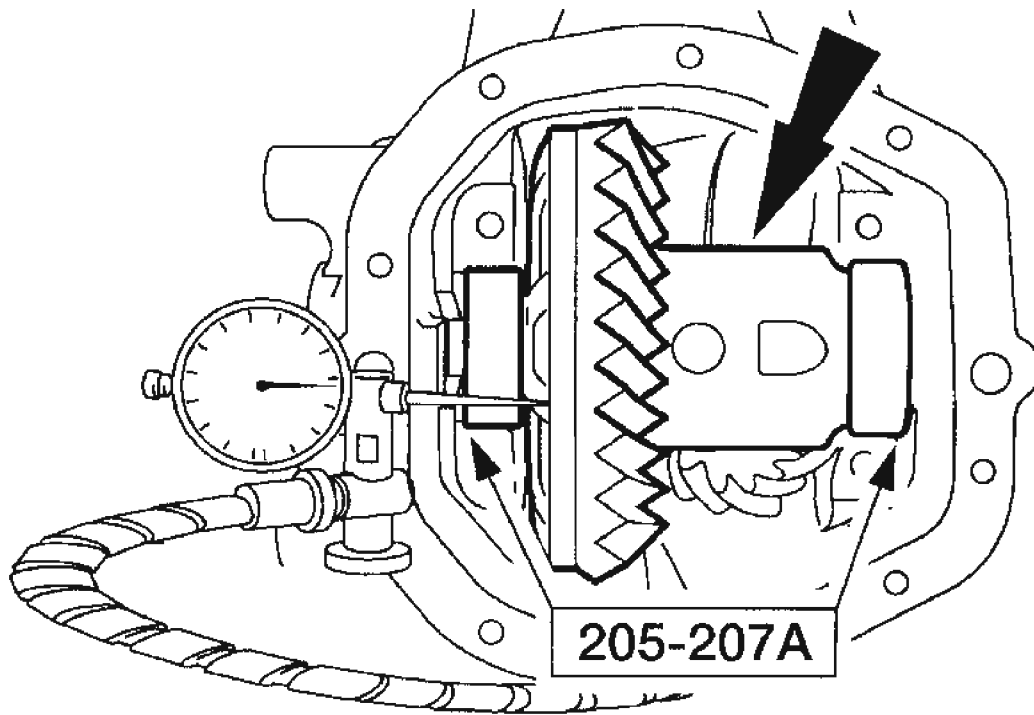
**NOTE:** Repeat this step until a same reading is obtained twice.



G02743615

**Fig. 65: Measuring Differential Case Total End Play**  
**Courtesy of FORD MOTOR CO.**

17. Seat the differential case away from the drive pinion then push the differential case toward the drive pinion while measuring and recording the differential case total end play.
18. Remove the differential case and special tools.



G02743616

**Fig. 66: Removing Differential Case And Special Tools**  
 Courtesy of FORD MOTOR CO.

19. Calculate for the differential case bearing shims as follows:

#### DIFFERENTIAL CASE BEARING SHIMS

Differential case shim selection	Value
Total differential case end play without ring gear installed	
Total differential case end play with ring gear installed	
Step One minus Step Two	
Total shims necessary for the ring gear side of differential case (Step Two plus 0.076 mm [ 0.003 in])	

## 2004 Ford Escape

2004 DRIVELINE/AXLE Rear Drive Axle/Differential - Escape

Total shims necessary for the opposite side of the ring gear of differential case (Step Three plus 0.25 mm [0.01 in])	
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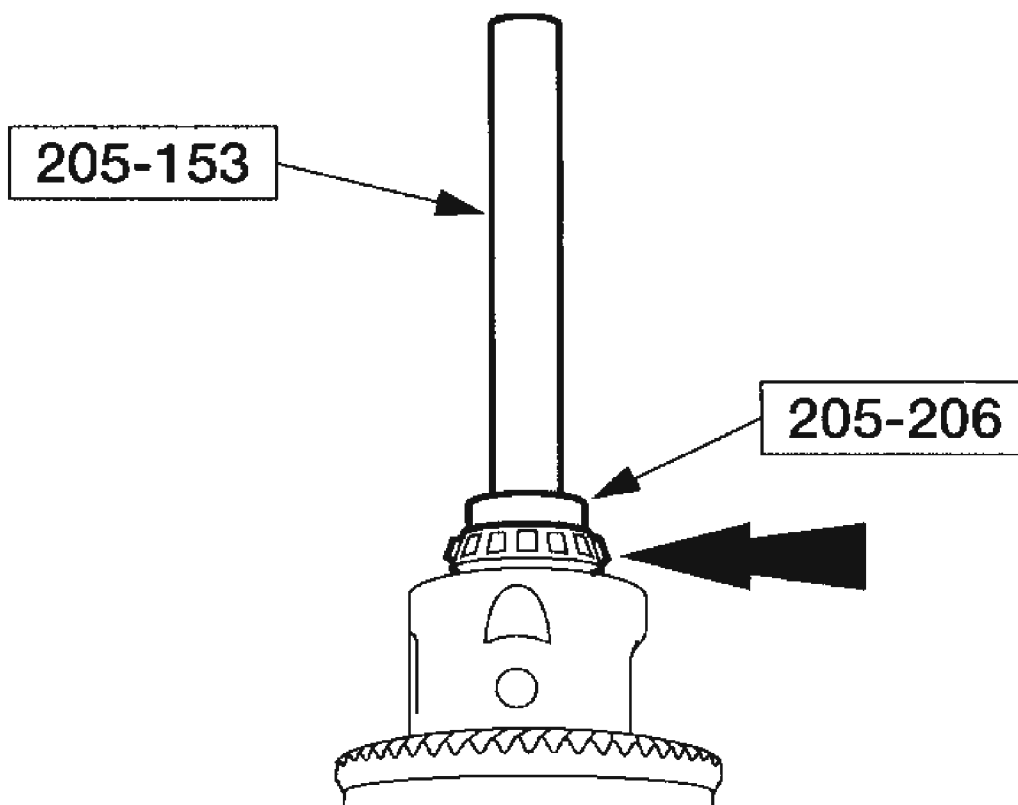
### DIFFERENTIAL CASE BEARING SHIMS SPECIFICATION EXAMPLE

Differential case shim selection	Value
Total differential case end play without ring gear installed	1.066 mm (0.042 in)
Total differential case end play with ring gear installed	0.660 mm (0.026 in)
Step One minus Step Two	0.406 mm (0.016 in)
Total shims necessary for the ring gear side of differential case (Step two plus 0.076 mm [0.003 in])	0.736 mm (0.029 in)
Total shims necessary for the opposite side of the ring gear of differential case (Step three plus 0.25 mm [0.01 in])	0.660 mm (0.026in)

**NOTE:** If the special tools do not measure 18.136 mm (0.714 in) + or - 0.025 mm (0.001 in), the numbers in Step One will be overstated by the difference measured on each special tool. The number in Step Two will be overstated by the difference measured on special tool. Adjustments to the shim pack will have to be made in order to prevent bearing pre-loads from becoming excessive.

20. Measure the width of the special tools used on the ends of the differential case and select the differential case bearing shims as necessary.

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

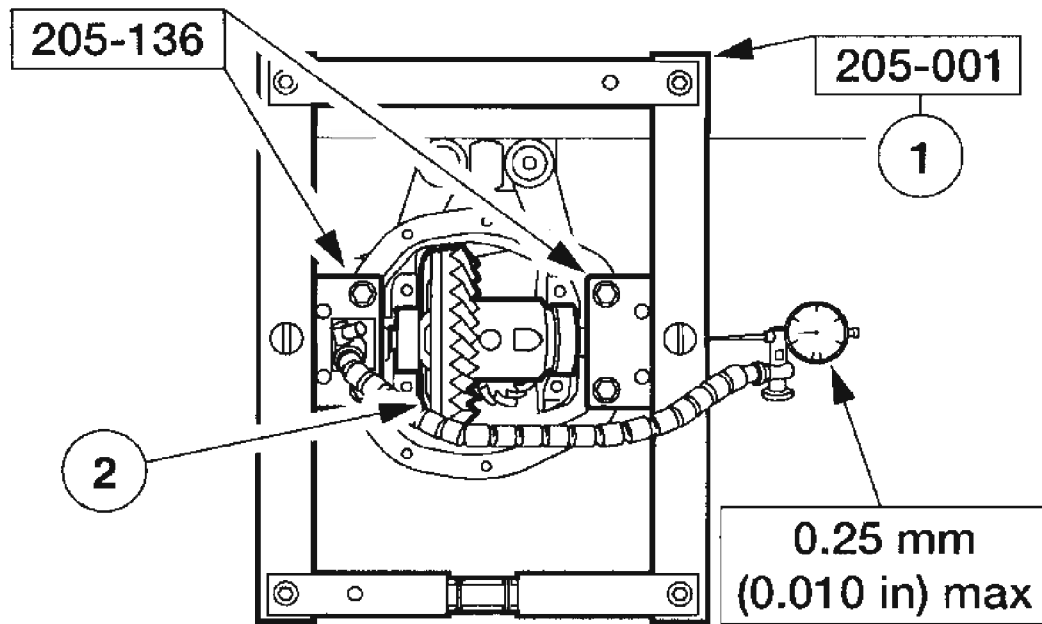


G02743617

**Fig. 67: Installing Differential Case Bearings And Correct Shims**  
Courtesy of FORD MOTOR CO.

21. Using the special tools, install the differential case bearings and correct shims.

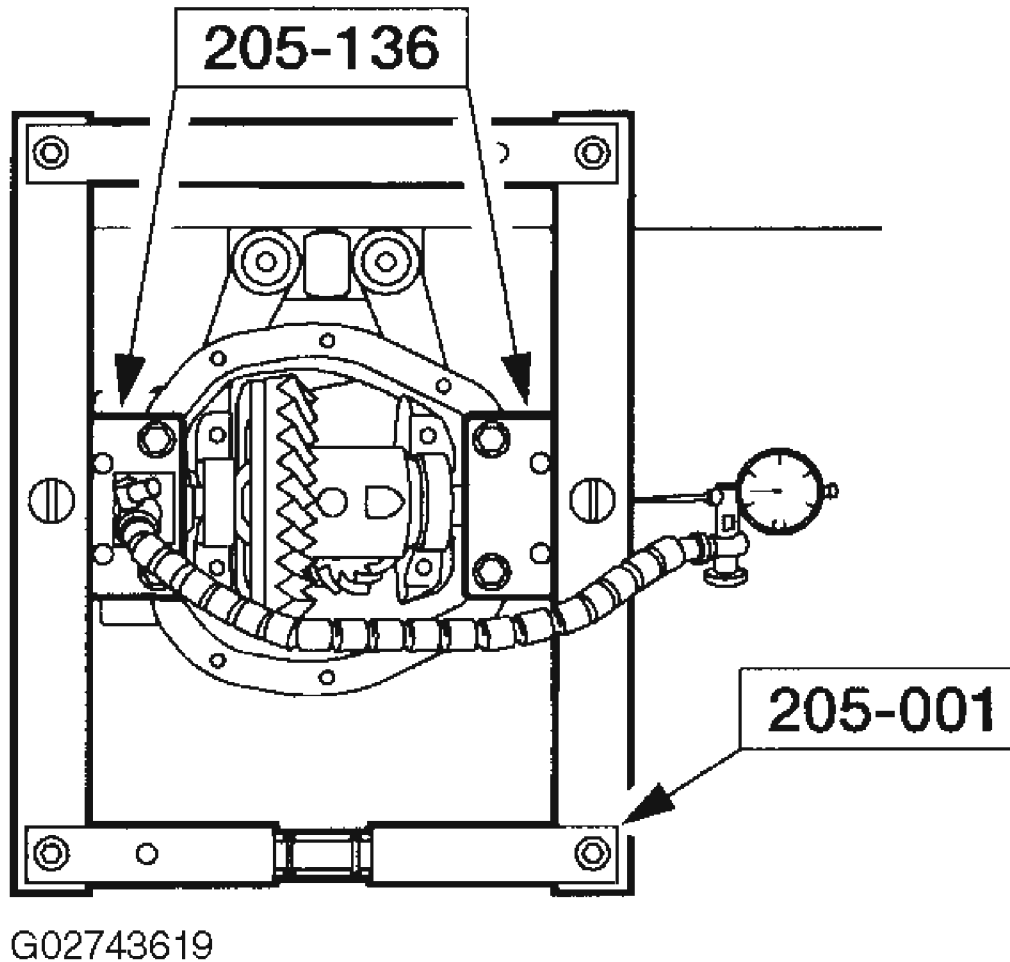
**CAUTION: Overspreading can damage the axle housing.**



G0274318

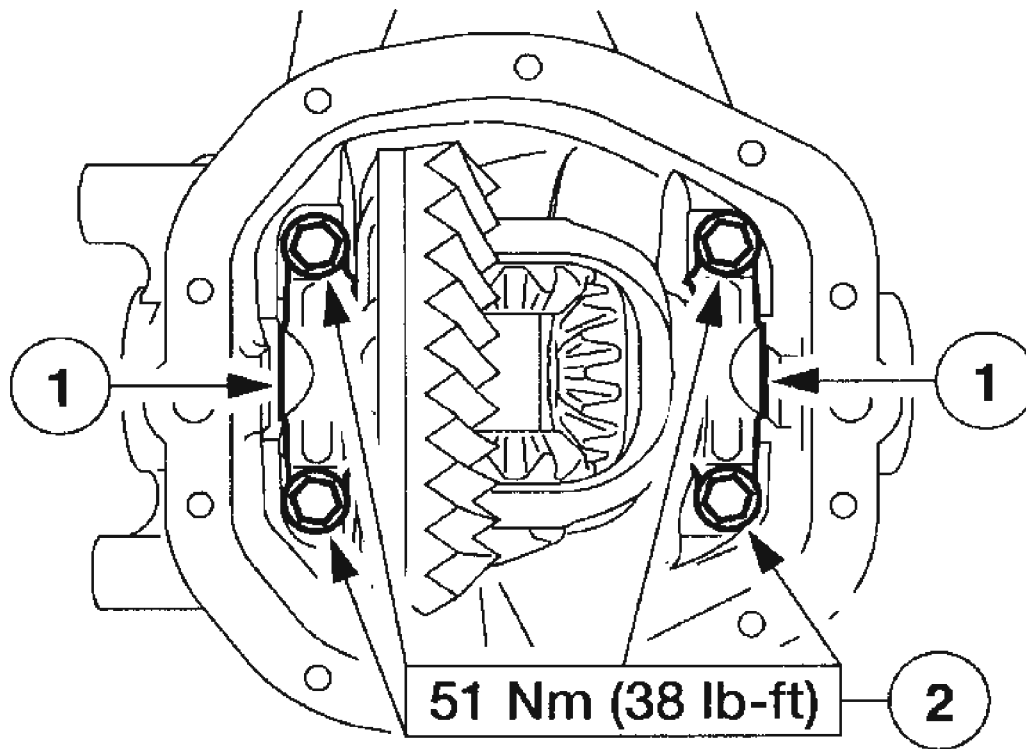
**Fig. 68: Installing Differential Case**  
Courtesy of FORD MOTOR CO.

22. Using the special tools, install the differential case.
  1. Spread the axle housing.
  2. Install the differential case.
23. Remove the special tools.



**Fig. 69: Installing Special Tools**  
Courtesy of FORD MOTOR CO.

24. Install the bearing caps.
  1. Position the bearing caps in the position they were removed.
  2. Install the bolts.

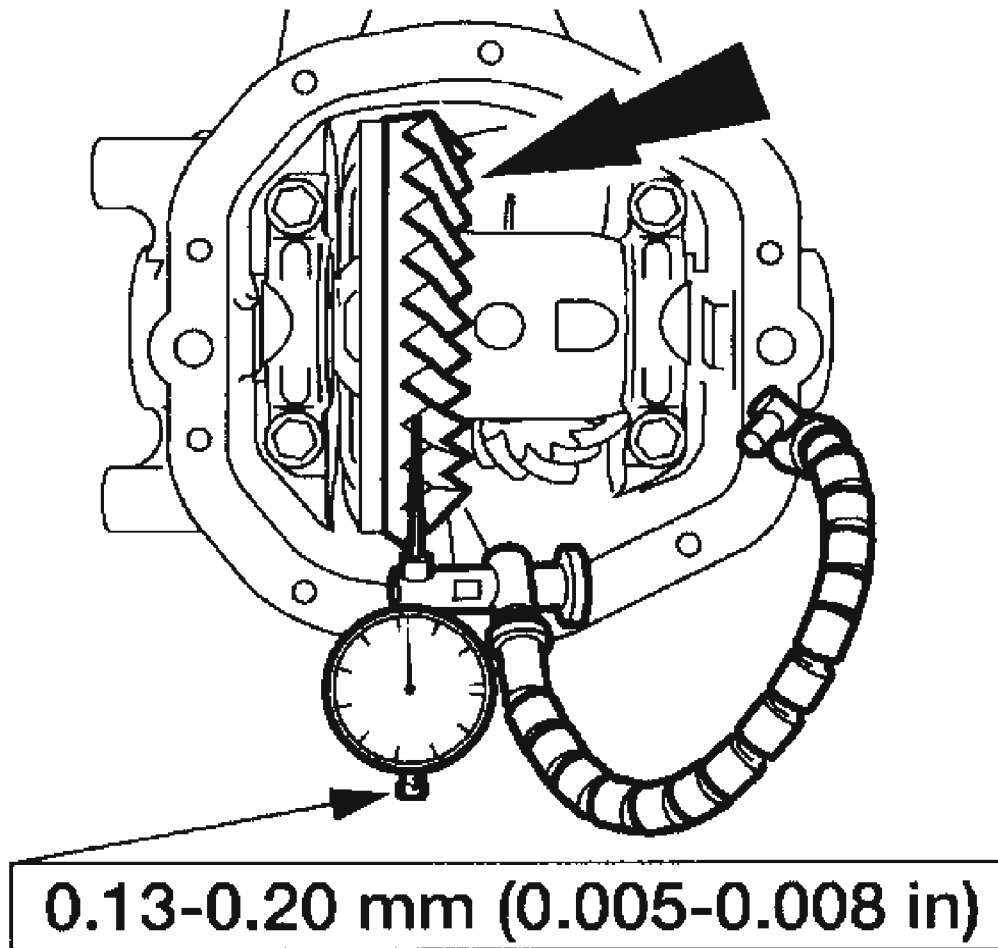


G02743620

**Fig. 70: Installing Bearing Caps & Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** The ring gear backlash should be measured at three equally spaced points on the ring gear. If the reading is high, the ring gear must be moved closer to the drive pinion by moving shims to the ring gear side from the opposite side. If the readings are low, the ring gear must be moved away from the drive pinion by moving shims from the ring gear side to the opposite side.



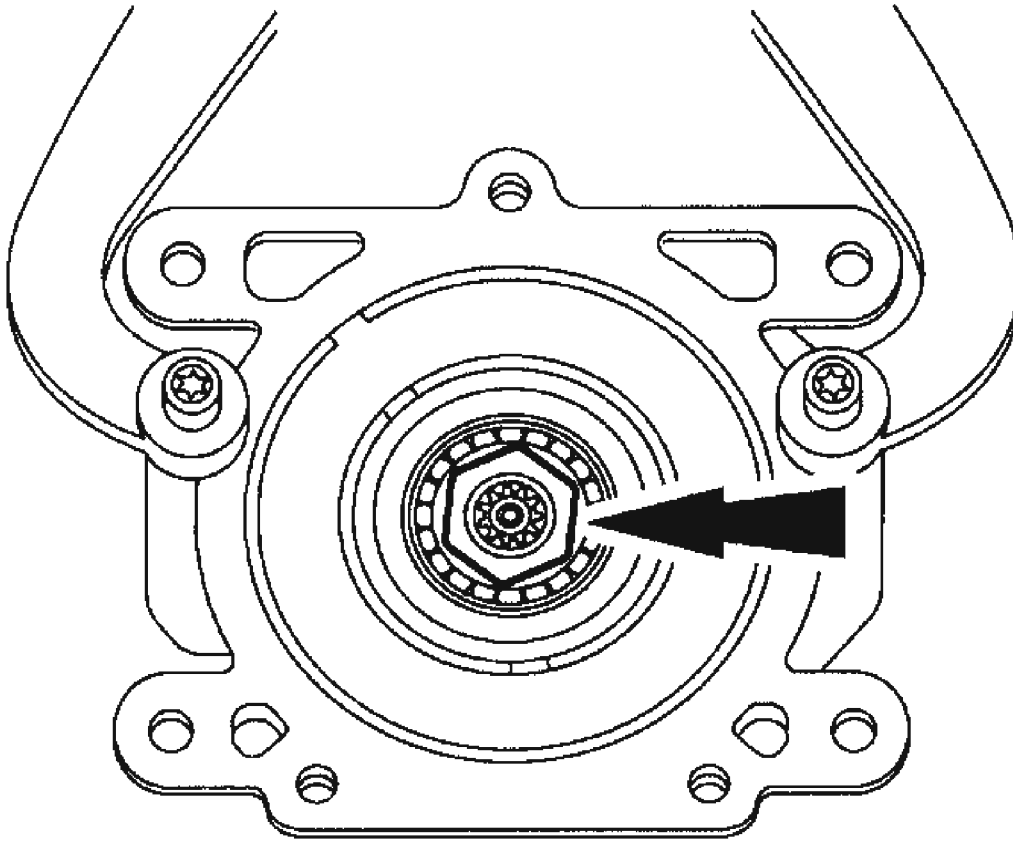


G02743621

**Fig. 71: Measuring Ring Gear Backlash**  
Courtesy of FORD MOTOR CO.

25. Measure and adjust the ring gear backlash as necessary.
26. Position the axle assembly with the drive pinion stem facing upward.

**NOTE:** The total turning torque should be the drive pinion rotational torque plus 0.68 -1.13 Nm (6-10 in-lb). If the total turning torque is too high, subtract an equal amount of shims from each side of the differential case. If the total turning torque is too low, add an equal amount of shims to both sides of the differential case.



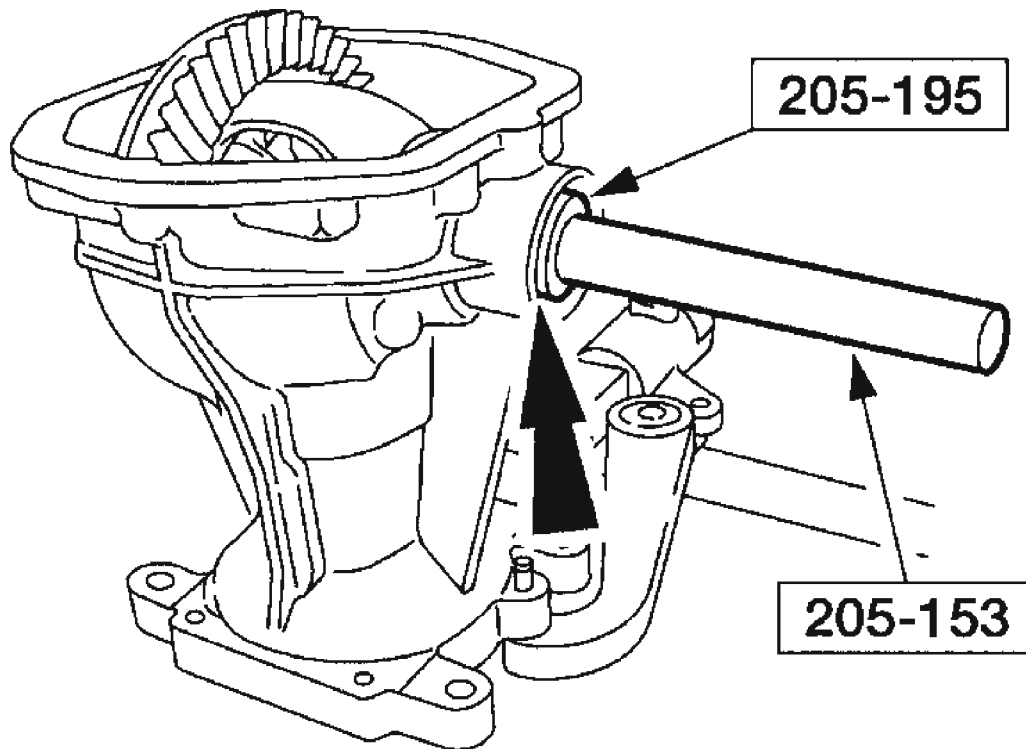
G021743622

**Fig. 72: Measuring Total Turning Torque To Rotate Drive Pinion**  
Courtesy of FORD MOTOR CO.

27. Measure and record the total turning torque to rotate the drive pinion and adjust as necessary.

**CAUTION:** Lubricate the needle bearings with premium long-life grease prior to installation.

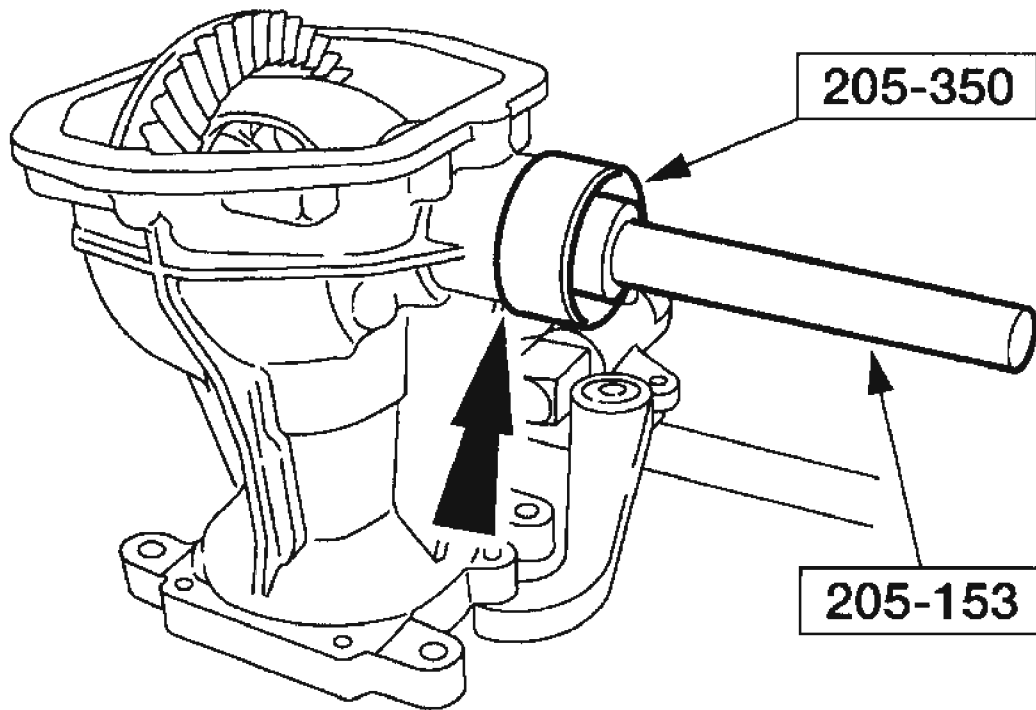
**NOTE:** RH shown; LH similar.



G02743623

**Fig. 73: Installing Halfshaft Bearings**  
**Courtesy of FORD MOTOR CO.**

28. Using the special tools, install the halfshaft bearings.
29. Using the special tools, install the halfshaft seals.



G02743624

**Fig. 74: Installing Halfshaft Seals**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 DRIVELINE/AXLE Rear Drive Halfshafts - Escape

## 2004 DRIVELINE/AXLE

### Rear Drive Halfshafts - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Constant Velocity Joint Grease (High Temp) E43Z-19590-A	ESP-M1C207-A

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Ball joint nuts	115	85	-
Knuckle bolt	115	85	-
Rear axle wheel hub nut	290	214	-

## DESCRIPTION AND OPERATION

### REAR DRIVE HALFSHAFTS

**CAUTION:** An inspection of the outer and inner boots is necessary so that if damage or grease leakage is evident, installation of a new halfshaft can take place immediately. Continued operation with damage or grease leakage will result in CV joint wear and noise due to contamination and loss of the CV joint grease.

- The RH and LH halfshafts are the same length.
- Inboard and outboard CV joints connect to a splined shaft. A circlip stopper holds the cross groove inboard race assembly (inboard CV joint) together.
- An axle circlip (4B422) retains the splined inboard CV joint to the differential side gear. Install a new axle circlip each time the halfshaft is removed from the vehicle.
- A rear axle wheel hub nut secures the side shaft assembly (interconnecting shaft and outboard CV joint) to the rear hub. Install a new rear axle wheel hub nut each time the halfshaft is removed from the vehicle.

### Halfshaft Handling

**CAUTION:** Never pick up or hold the halfshaft only by the inboard or outboard CV joint.

**CAUTION:** Do not over-angle the CV joints.

**CAUTION:** Damage will occur to an assembled inboard CV joint if it is over-plunged outward from the joint housing.

**CAUTION:** Never use a hammer to remove or install the halfshafts.

**CAUTION:** Never use the halfshaft assembly as a lever to position other components. Always support the free end of the halfshaft.

**CAUTION:** Do not allow the boots to contact sharp edges or hot exhaust components.

**CAUTION:** Handle the halfshaft only by the interconnecting shaft to avoid pull-apart and potential damage to the CV joints.

**CAUTION:** Do not drop assembled halfshafts. The impact will cut the boots from the inside without evidence of external damage.

Handle all halfshaft components carefully during removal and installation procedures.

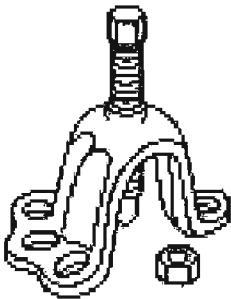
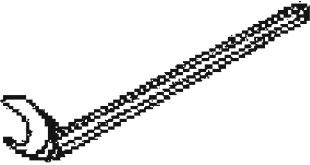

## **DIAGNOSIS AND TESTING**

### **REAR DRIVE HALFSHAFTS**

For additional information, refer to **DRIVELINE SYSTEM-GENERAL INFORMATION** .

## **REMOVAL AND INSTALLATION**

### **HALFSHAFT**

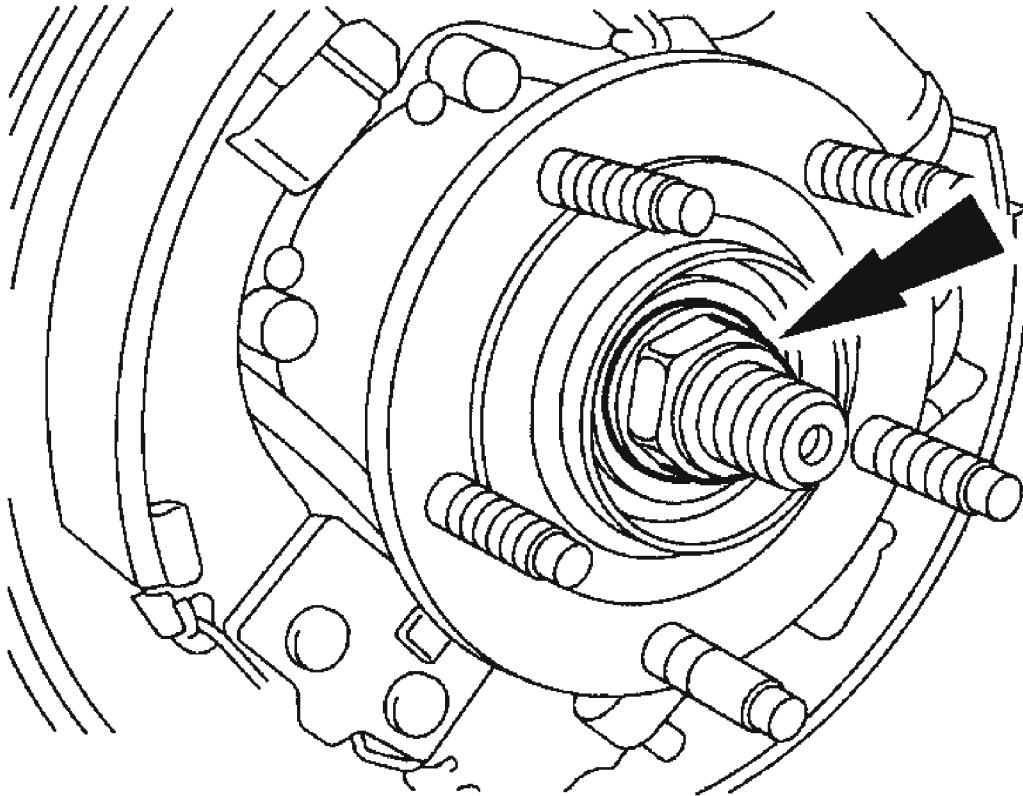
	<b>Front Hub Remover</b> 205-D070 (D93P-1175-B) or equivalent
	<b>CV Joint Puller</b> 205-241 (T86P-3514-A)
	<b>Halfshaft Installer</b> 204-161 (T97P-1175-A)

G02743672

**Fig. 1: Identifying Special Tool(s)**  
Courtesy of FORD MOTOR CO.

#### Removal

1. Remove the rear coil spring. For additional information, refer to **REAR** article in SUSPENSION .
2. Remove and discard the nut.

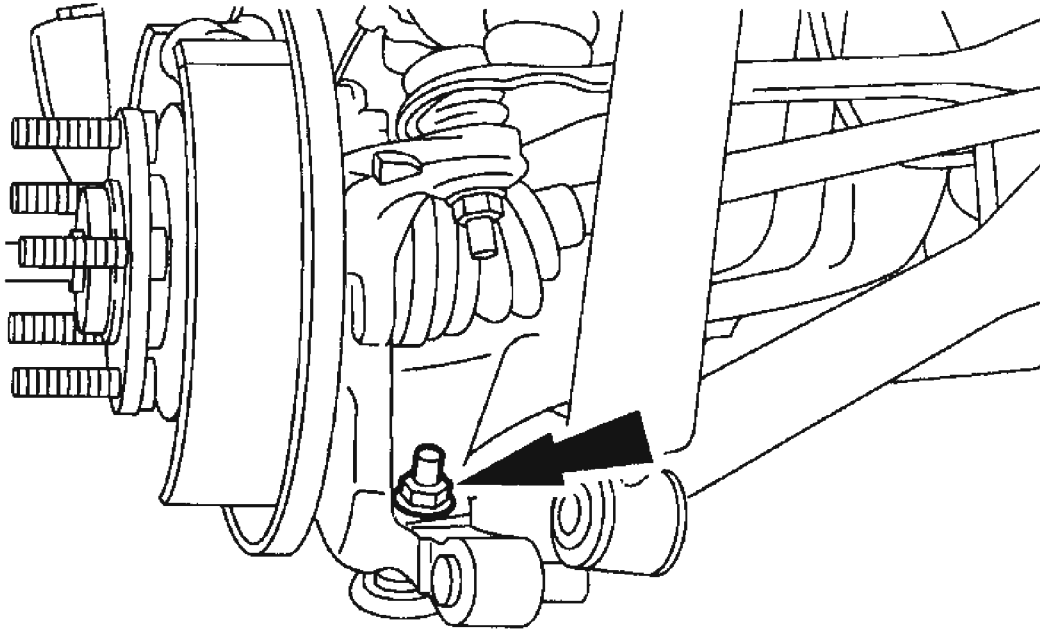


G02743673

**Fig. 2: Removing Halfshaft Nut**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Make sure to support the wheel knuckle.

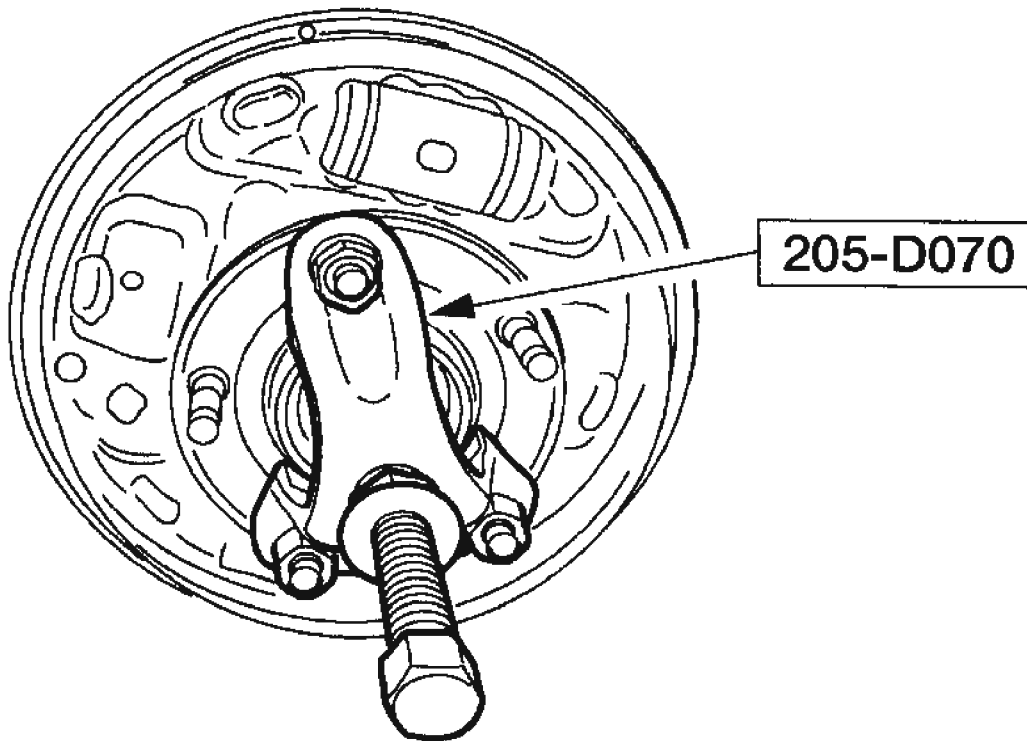




G02743674

**Fig. 3: Removing Nut And Separate Lower Ball Joint**  
**Courtesy of FORD MOTOR CO.**

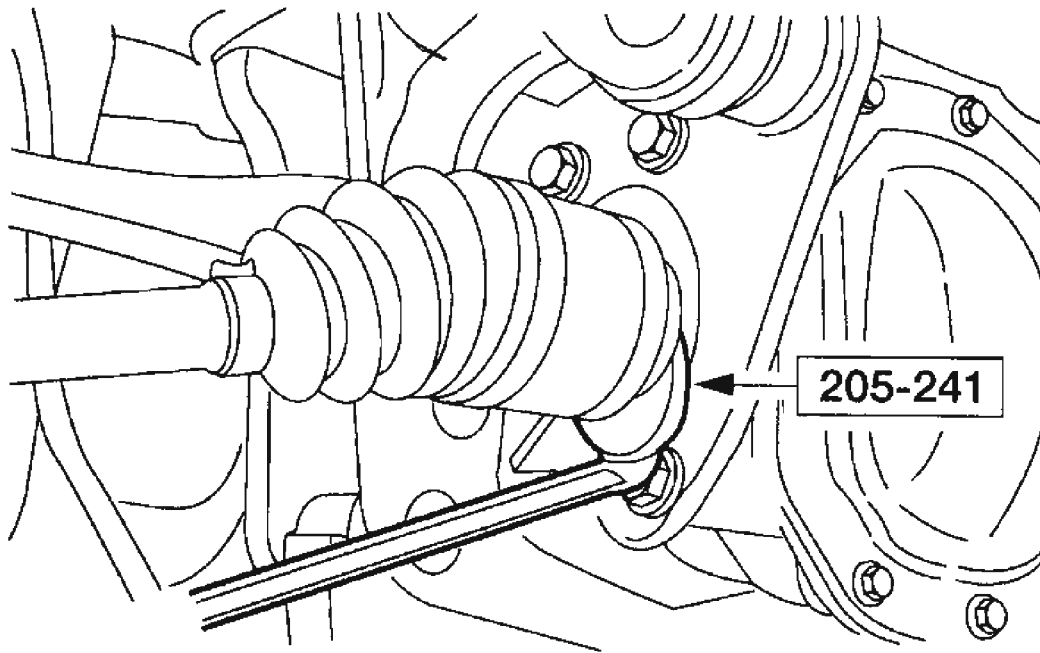
3. Remove the nut and separate the lower ball joints.
4. Using the special tool, separate the halfshaft from the knuckle.



G02743675

**Fig. 4: Separating The Halfshaft From The Knuckle**  
Courtesy of FORD MOTOR CO.

5. Using the special tool, remove the halfshaft.

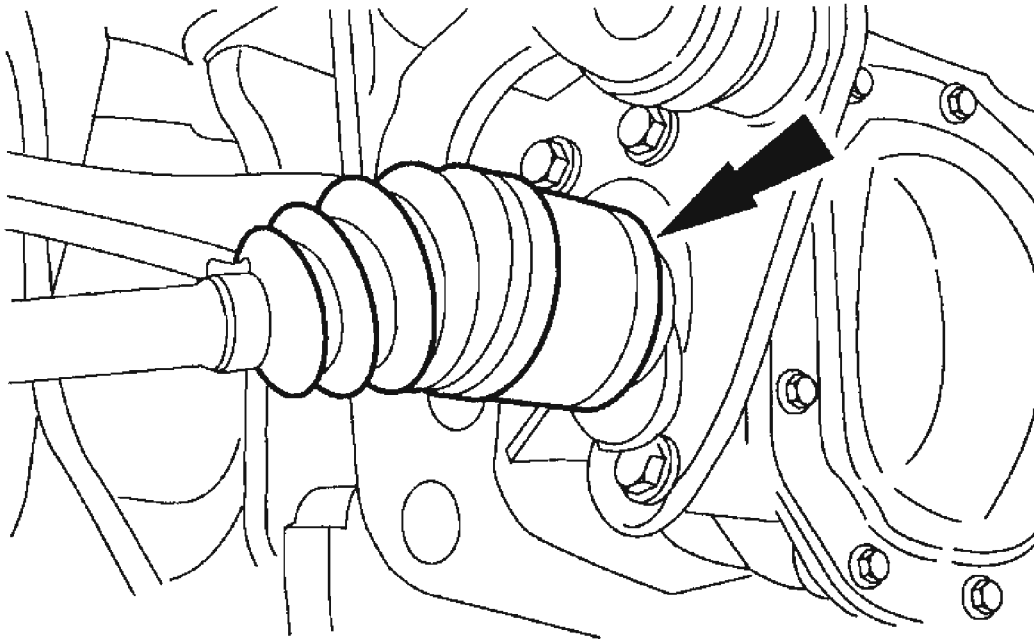


G02743676

**Fig. 5: Removing Halfshaft**  
Courtesy of FORD MOTOR CO.

#### Installation

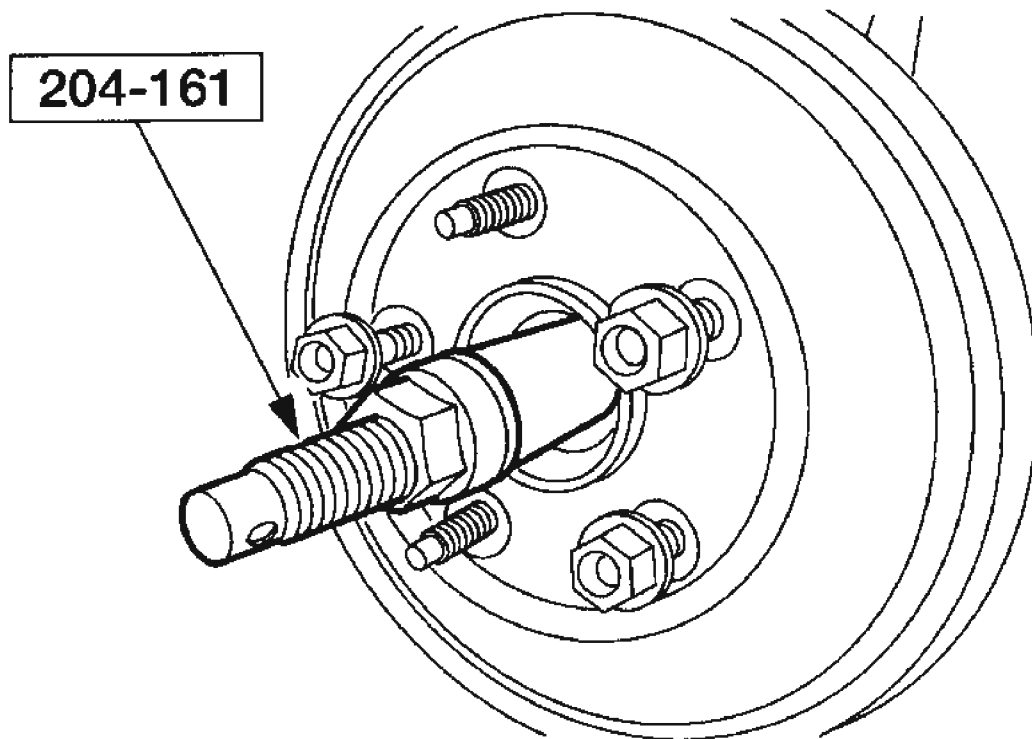
1. Install the halfshaft into the differential.



G02743677

**Fig. 6: Installing Halfshaft Into The Differential**  
**Courtesy of FORD MOTOR CO.**

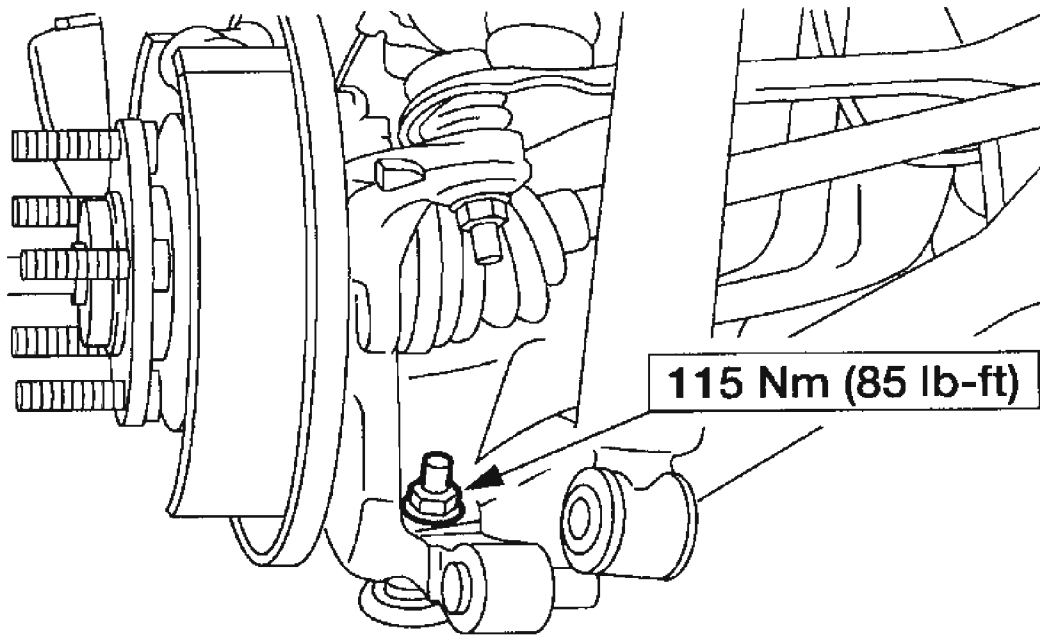
2. Using the special tool, install the halfshaft end into the hub assembly.



G02743678

**Fig. 7: Installing Halfshaft End Into The Hub Assembly**  
Courtesy of FORD MOTOR CO.

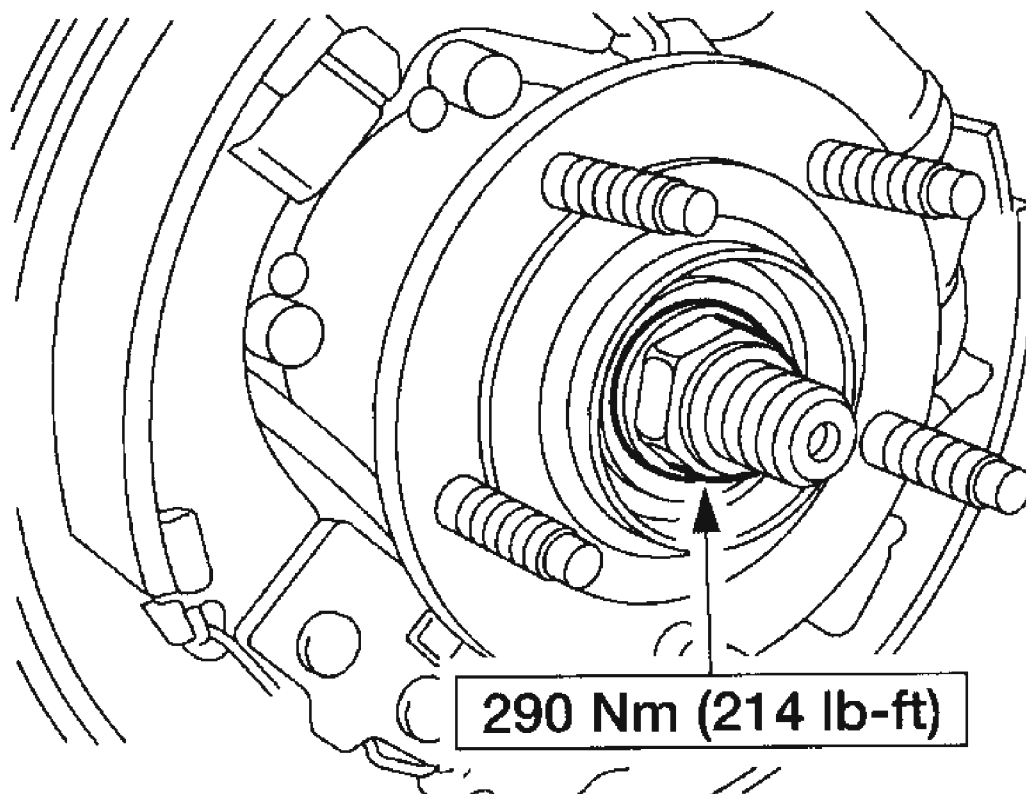
3. Position the lower ball joint and install the nut.



G02743679

**Fig. 8: Positioning The Lower Ball Joint And Installing The Nut**  
Courtesy of FORD MOTOR CO.

4. Install the halfshaft nut.



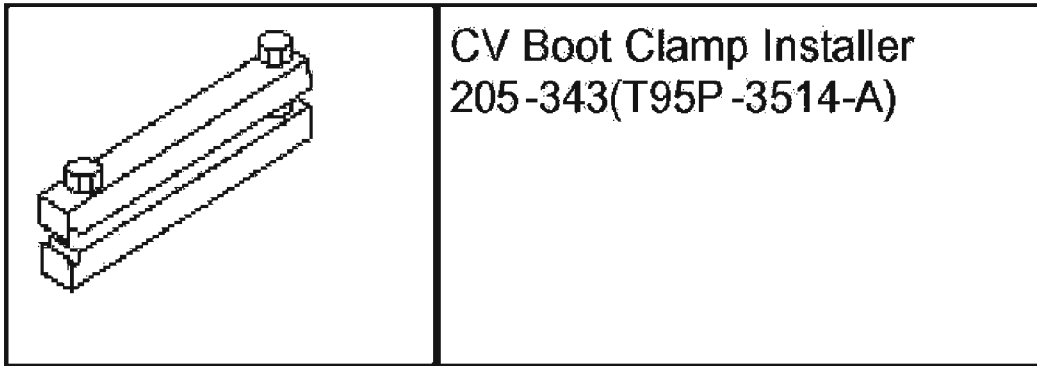
G02743680

**Fig. 9: Installing Halfshaft Nut**  
Courtesy of FORD MOTOR CO.

5. Install the rear coil spring. For additional information, refer to **REAR** article in SUSPENSION .

## DISASSEMBLY AND ASSEMBLY

### HALFSHAFT JOINT

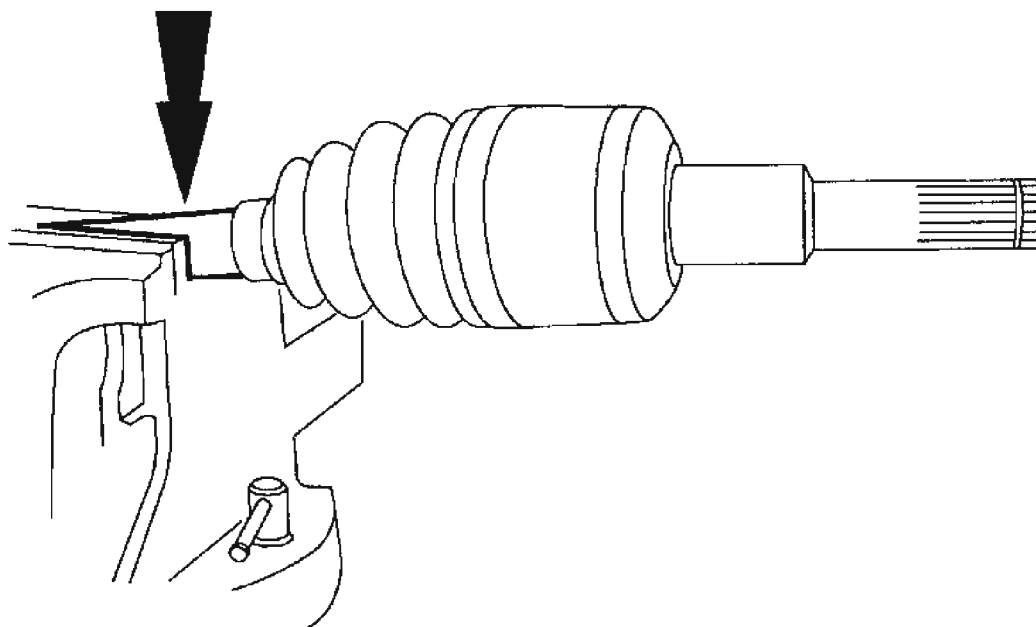


G02743681

**Fig. 10: Identifying Special Tool(s)**  
Courtesy of FORD MOTOR CO.

**Disassembly**

1. Remove the halfshaft. For additional information, refer to **HALFSHAFT** .
2. Secure the halfshaft and constant velocity (CV) joint in a vise using protective jaw covers.



G02743682

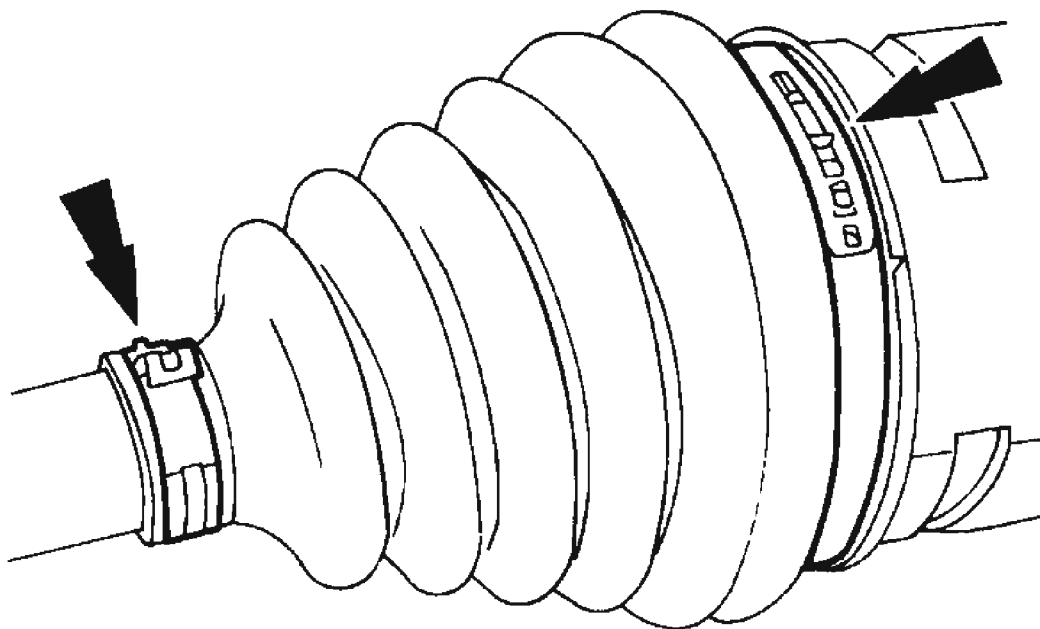
**Fig. 11: Securing Halfshaft & Constant Velocity (CV) Joint In A Vise Using**



**Protective Jaw Covers**

Courtesy of FORD MOTOR CO.

3. Remove the inboard halfshaft boot clamps.

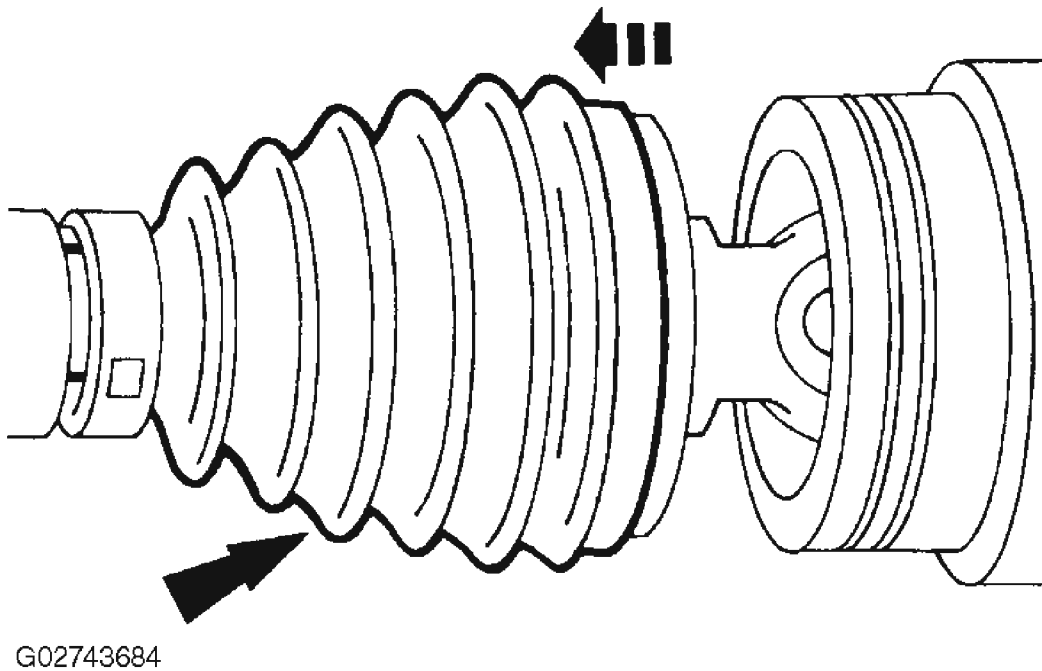


G02743683

**Fig. 12: Removing Inboard Halfshaft Boot Clamps**

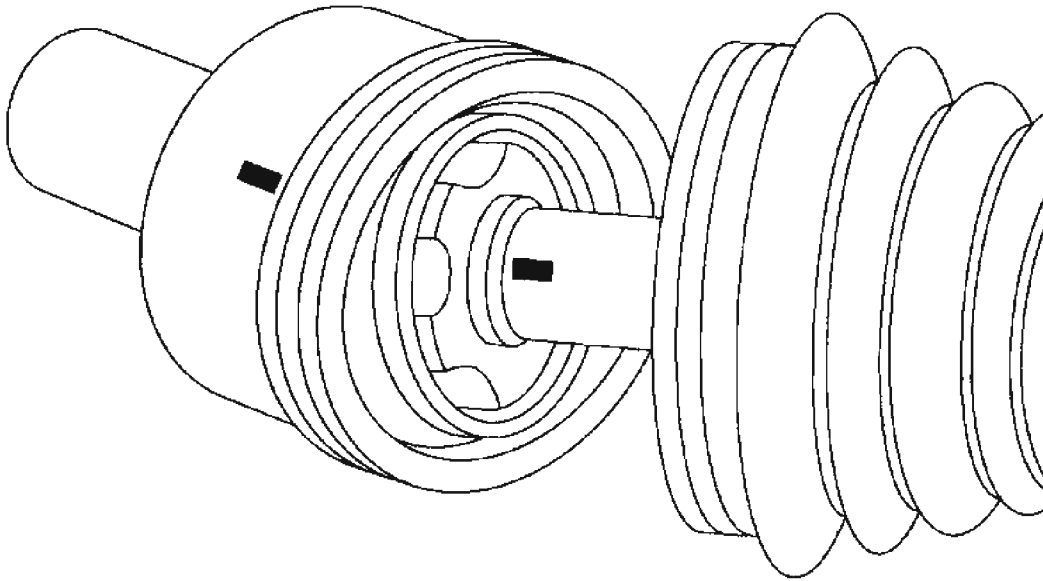
Courtesy of FORD MOTOR CO.

4. Slide the inboard halfshaft boot off the inboard CV joint housing.



**Fig. 13: Sliding The Inboard Halfshaft Boot Off The Inboard CV Joint Housing**  
Courtesy of FORD MOTOR CO.

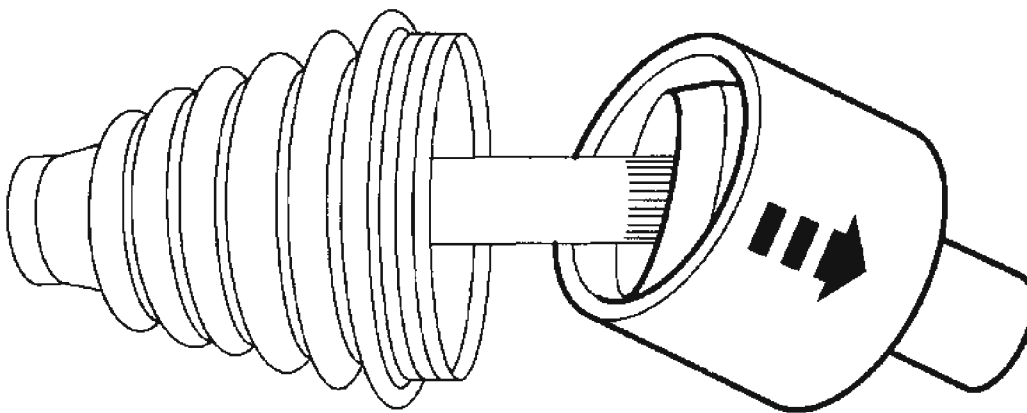
5. If reinstalling the original inner joint, mark the inner joint and the halfshaft to make sure of correct installation.



G02743685

**Fig. 14: Marking Inner Joint And The Halfshaft For Installation Reference**  
Courtesy of FORD MOTOR CO.

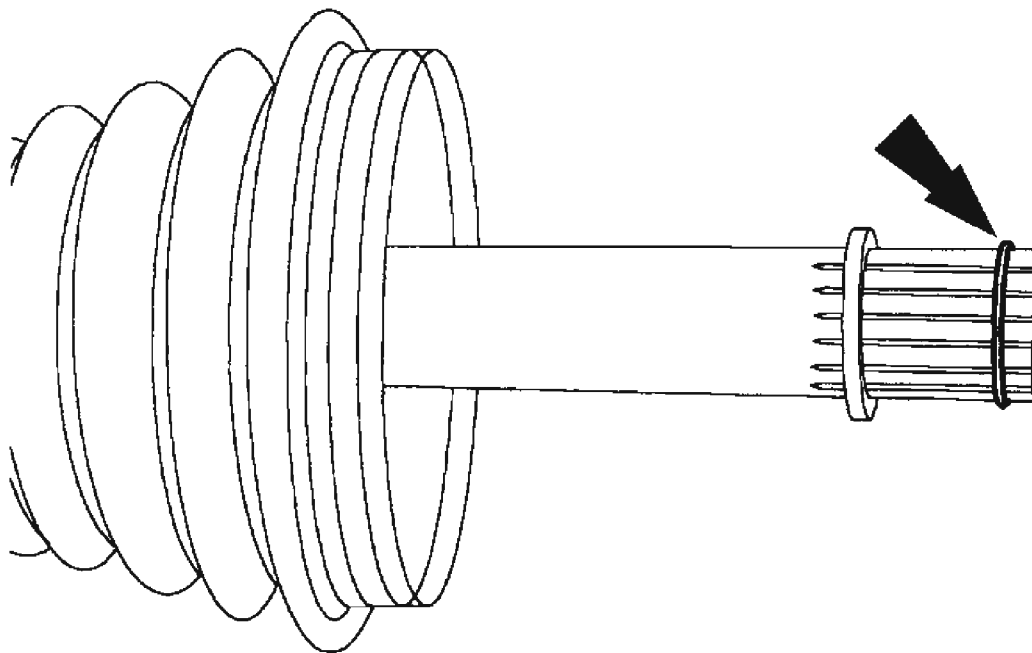
6. Using a soft face hammer, separate the halfshaft from the inboard joint housing.



G02743686

**Fig. 15: Separating Halfshaft From Inboard Joint Housing**  
Courtesy of FORD MOTOR CO.

7. Remove and discard the bearing retainer circlip.



G02743687

**Fig. 16: Removing Bearing Retainer Circlip**  
Courtesy of FORD MOTOR CO.

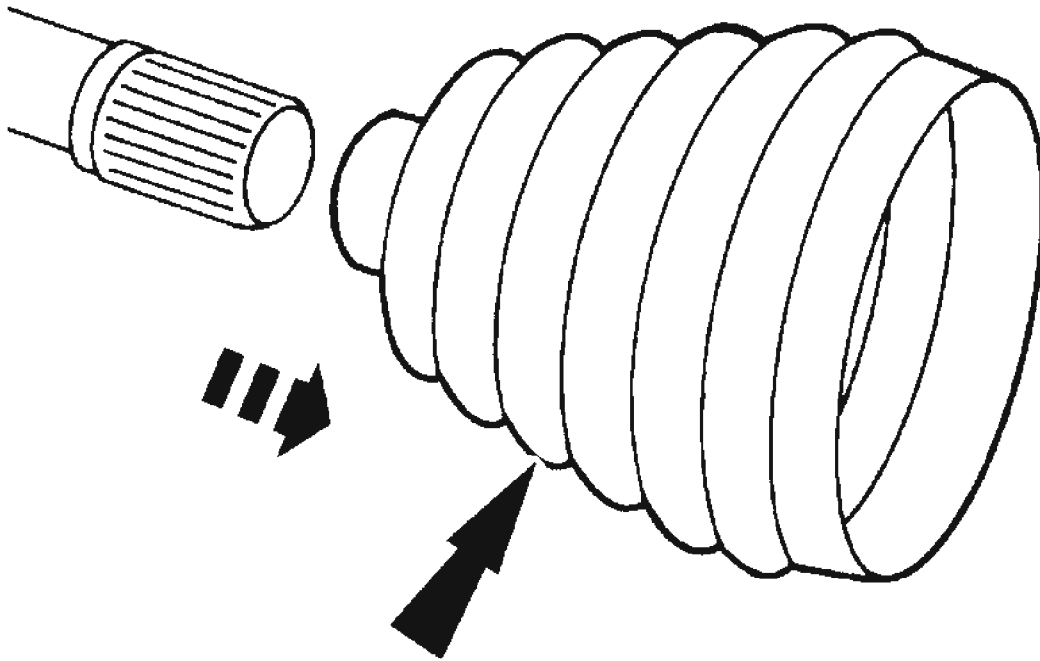
8. Remove and discard the snap ring.



G02743688

**Fig. 17: Removing Snap Ring**  
Courtesy of FORD MOTOR CO.

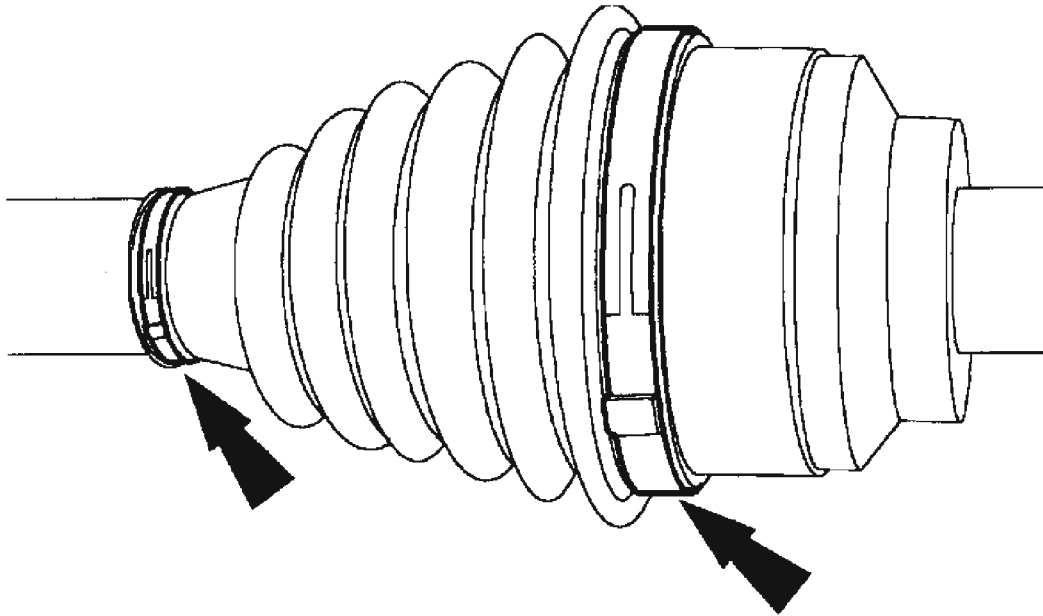
9. Remove the inboard halfshaft boot from the halfshaft.



G02743689

**Fig. 18: Removing Inboard Halfshaft Boot From Halfshaft**  
Courtesy of FORD MOTOR CO.

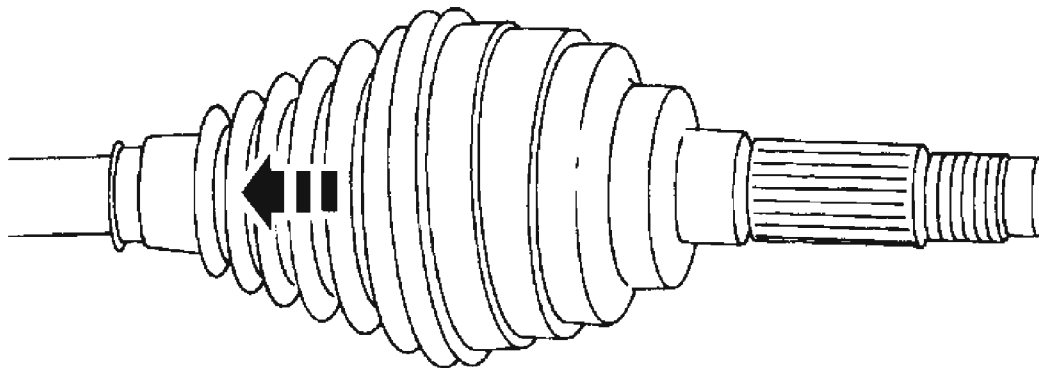
10. Remove the two outboard halfshaft boot clamps.



G02743690

**Fig. 19: Removing Outboard Halfshaft Boot Clamps**  
Courtesy of FORD MOTOR CO.

11. Slide the outboard halfshaft joint boot back out of the way exposing the outboard CV joint.

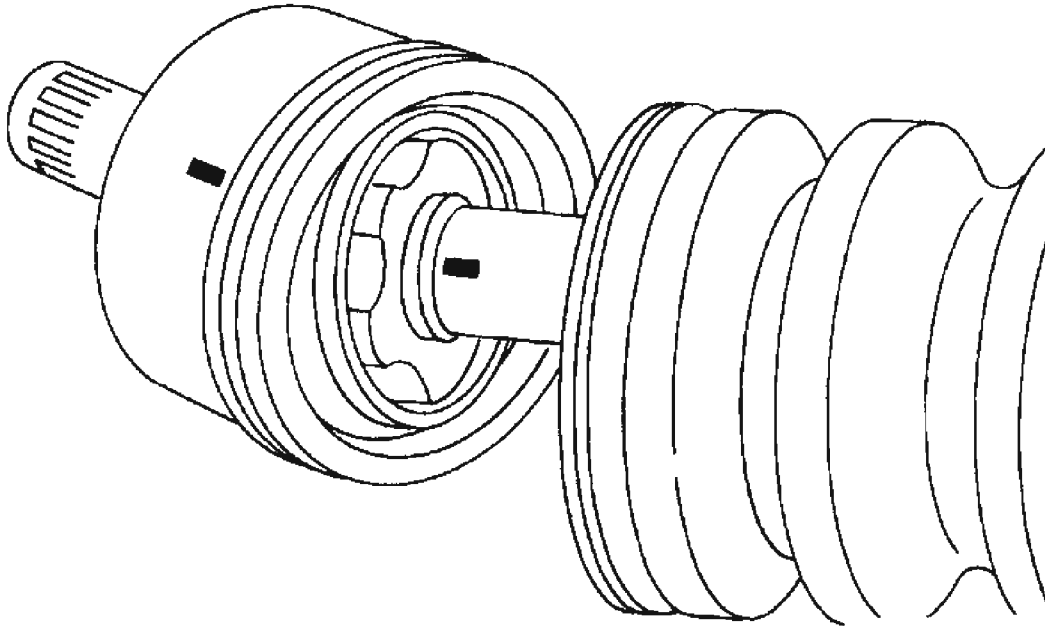


G02743691

**Fig. 20: Sliding Outboard Halfshaft Joint Boot Back**  
Courtesy of FORD MOTOR CO.

12. If reinstalling the original outboard CV joint, mark the outboard CV joint and halfshaft

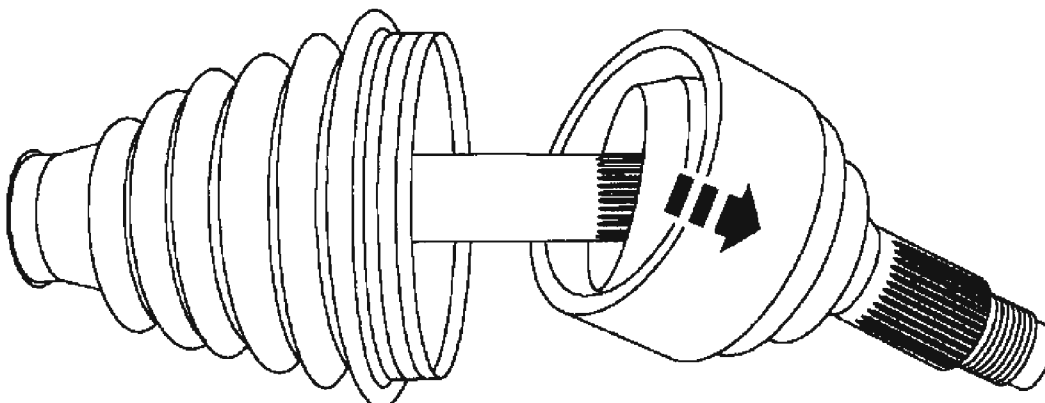
to make sure of correct installation.



G02743692

**Fig. 21: Marking Outboard CV Joint And Halfshaft For Installation Reference**  
Courtesy of FORD MOTOR CO.

13. Use a soft-face hammer to separate the outboard CV joint by gently tapping it off the halfshaft.

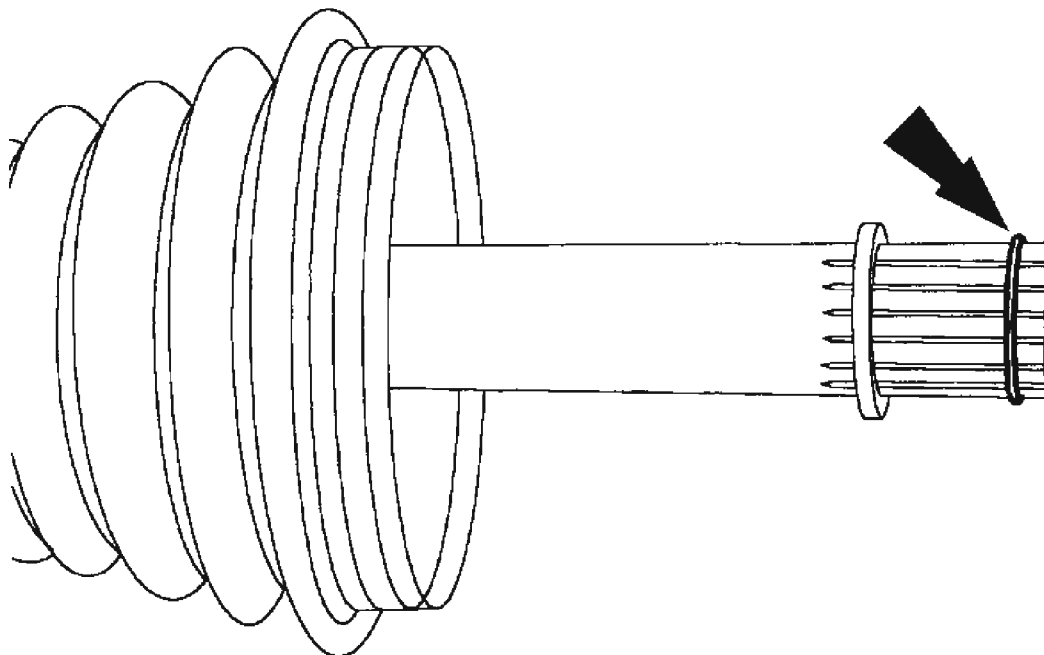


G02743693

**Fig. 22: Separating Outboard CV Joint**

Courtesy of FORD MOTOR CO.

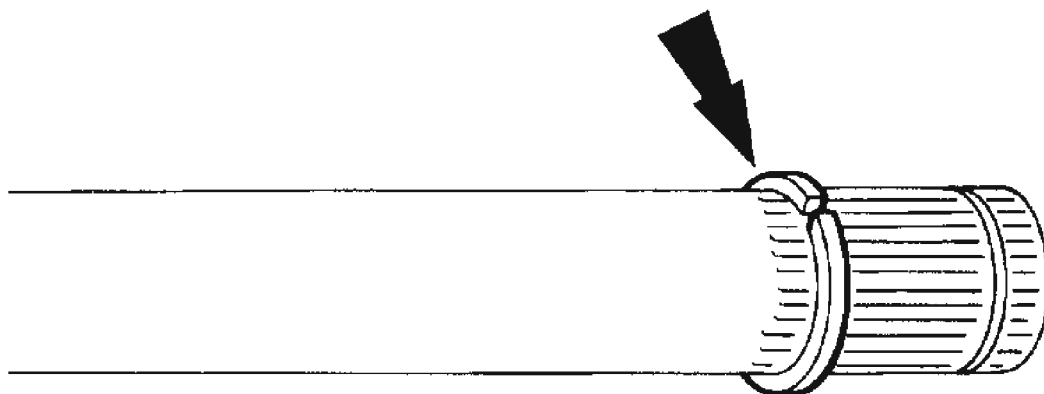
14. Remove the halfshaft bearing retainer circlip and discard.



G02743694

**Fig. 23: Removing Halfshaft Bearing Retainer Circlip**  
Courtesy of FORD MOTOR CO.

15. Remove the snap ring from the halfshaft.

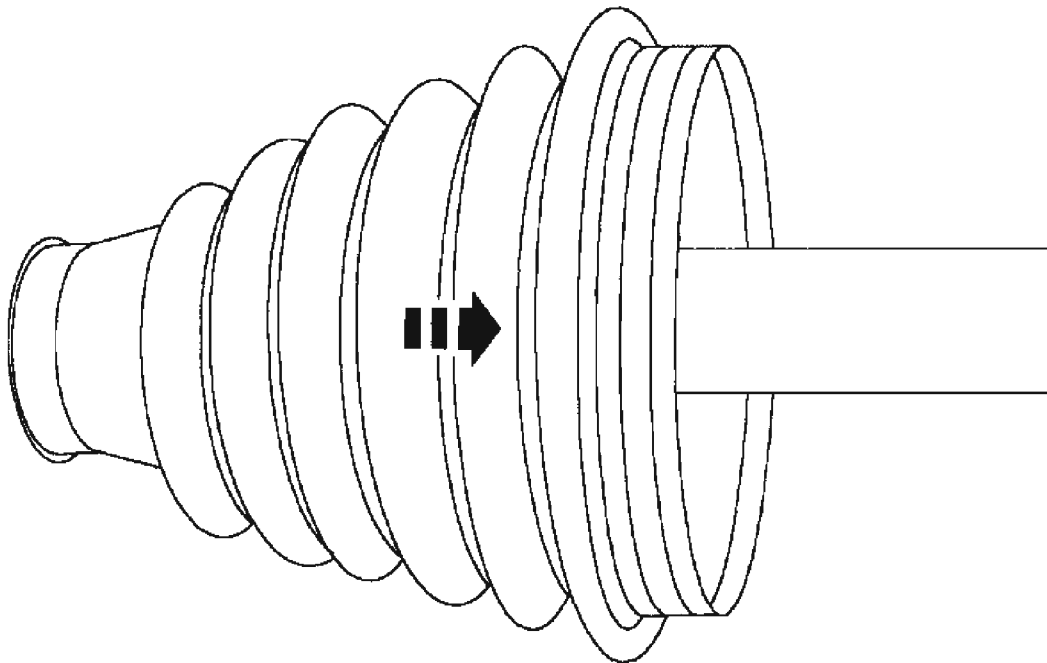


G02743695



**Fig. 24: Removing Snap Ring From Halfshaft**  
Courtesy of FORD MOTOR CO.

16. Slide the outboard halfshaft boot off of the halfshaft.

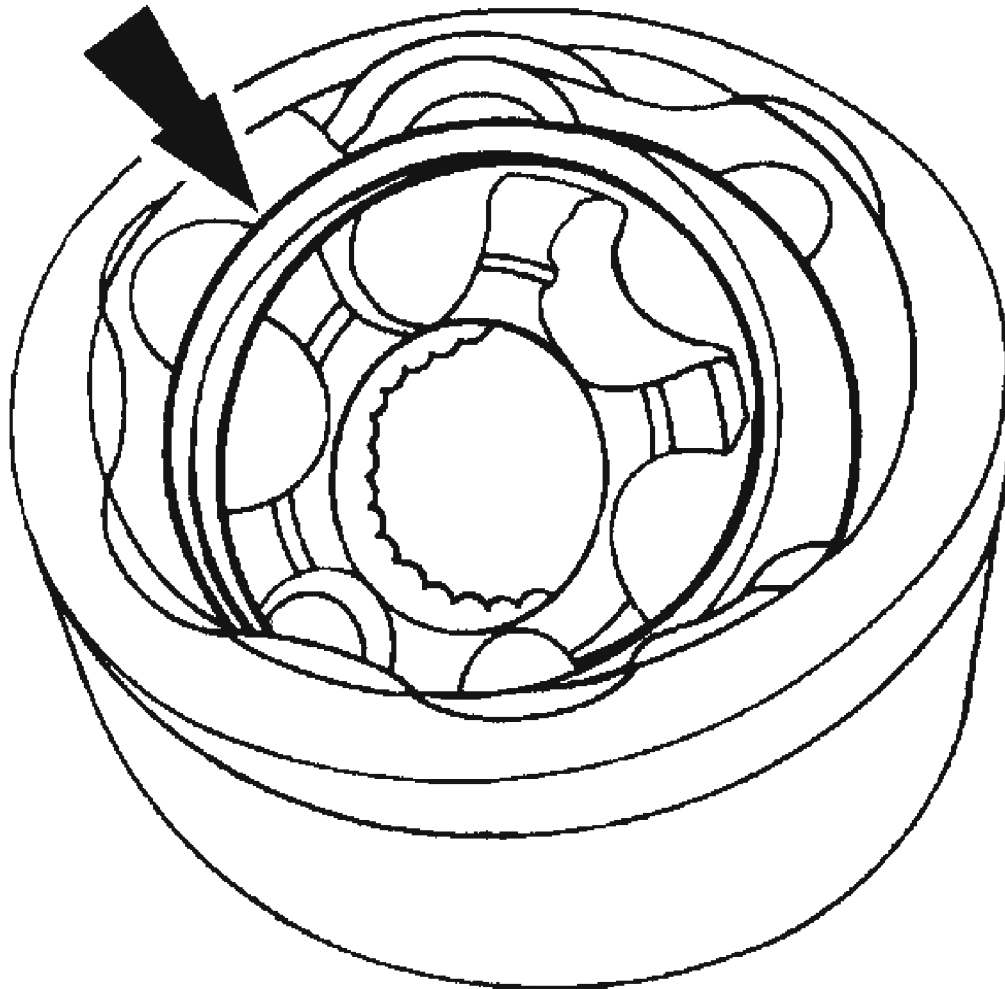


G02743696

**Fig. 25: Sliding Outboard Halfshaft Boot Off Halfshaft**  
Courtesy of FORD MOTOR CO.

**Assembly**

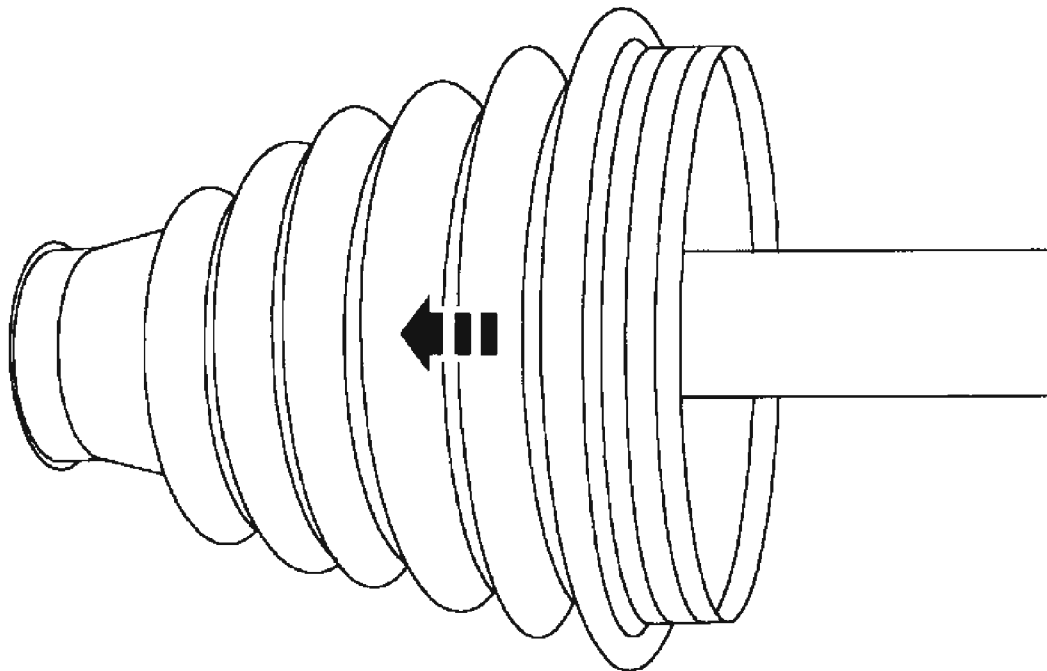
1. Lubricate the inboard and outboard CV joint with joint grease.



G02743697

**Fig. 26: Lubricating Inboard And Outboard CV Joint With Joint Grease**  
**Courtesy of FORD MOTOR CO.**

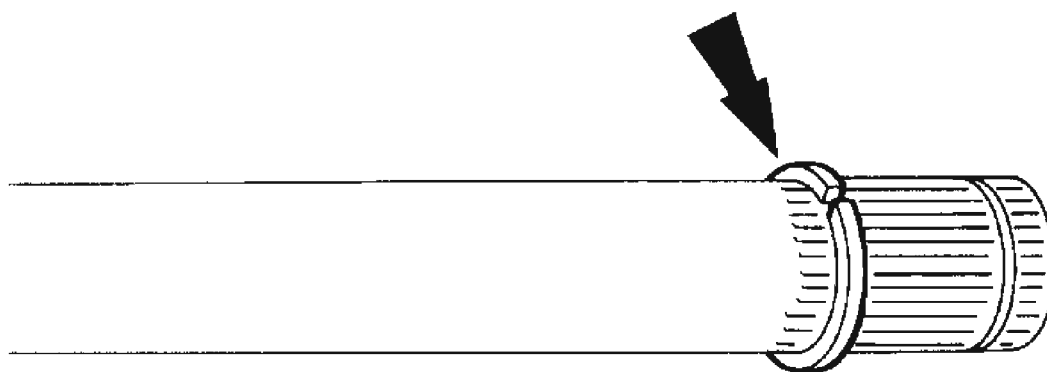
2. Install the outboard halfshaft boot.



G02743698

**Fig. 27: Installing Outboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

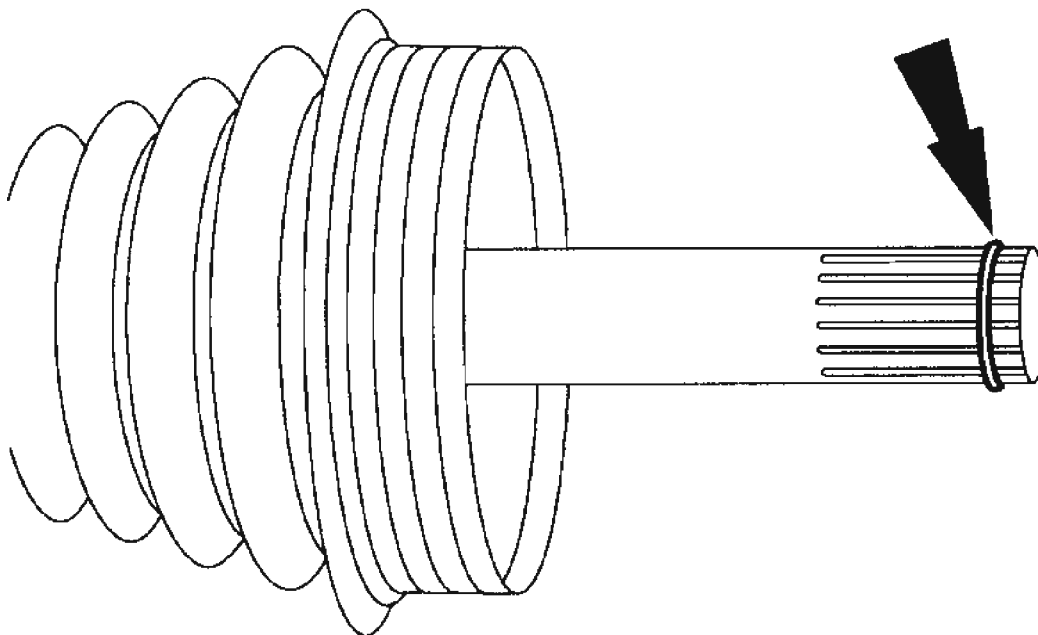
3. Install the snap ring on the halfshaft.



G02743699

**Fig. 28: Installing Snap Ring On Halfshaft**  
Courtesy of FORD MOTOR CO.

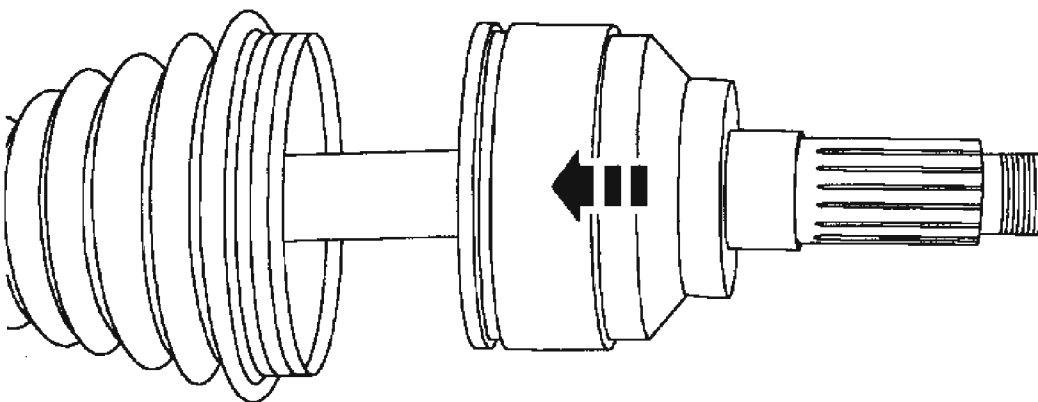
4. Install a new halfshaft shaft bearing retainer circlip.



G002743700

**Fig. 29: Installing New Halfshaft Shaft Bearing Retainer Circlip**  
Courtesy of FORD MOTOR CO.

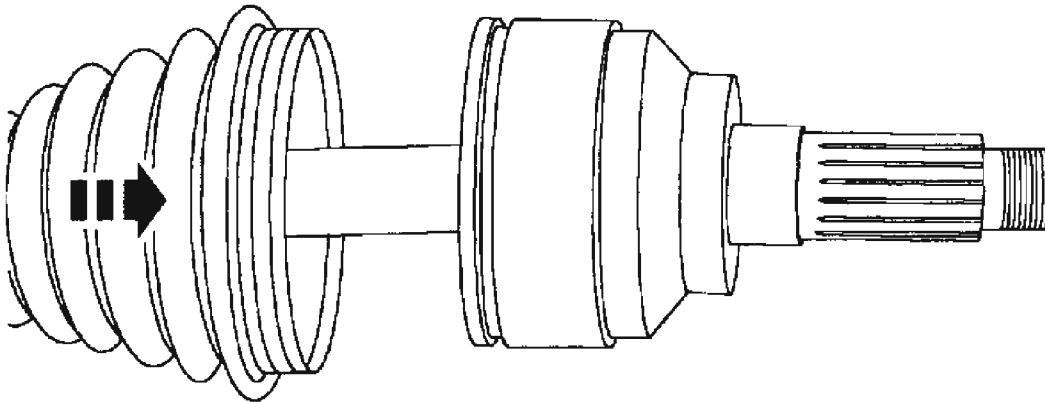
5. Use a soft-face hammer to install the inboard CV joint by gently tapping it onto the halfshaft.



G02743701

**Fig. 30: Installing Inboard CV Joint**  
Courtesy of FORD MOTOR CO.

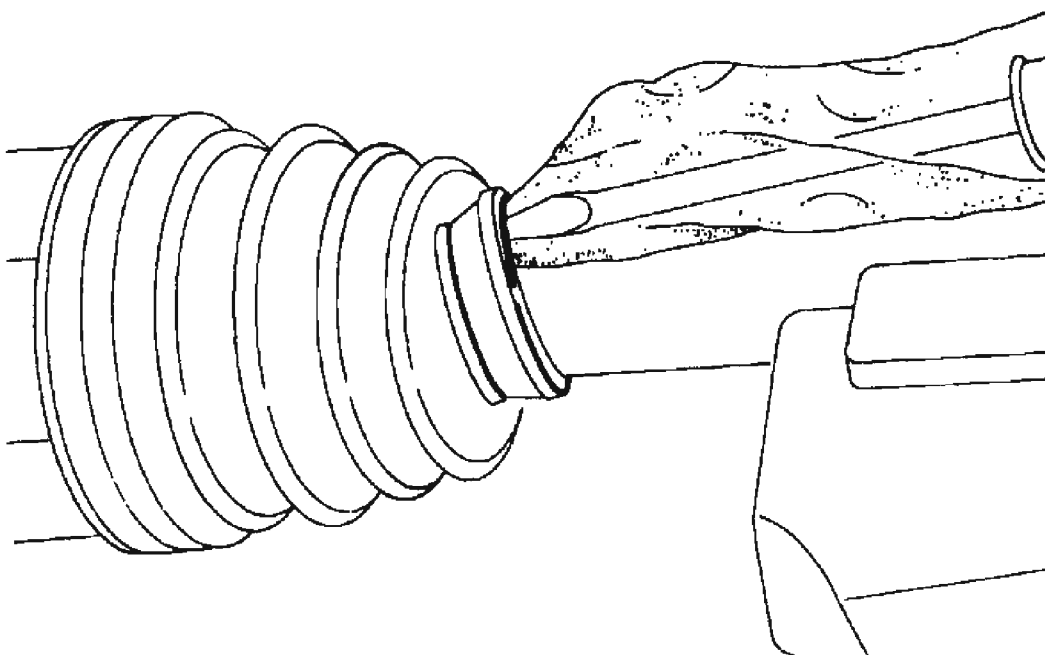
6. Remove any excess grease on the mating surfaces and slide the outboard halfshaft joint boot forward onto the outboard CV joint.



G02743702

**Fig. 31: Sliding Outboard Halfshaft Joint Boot Forward Onto Outboard CV Joint**  
Courtesy of FORD MOTOR CO.

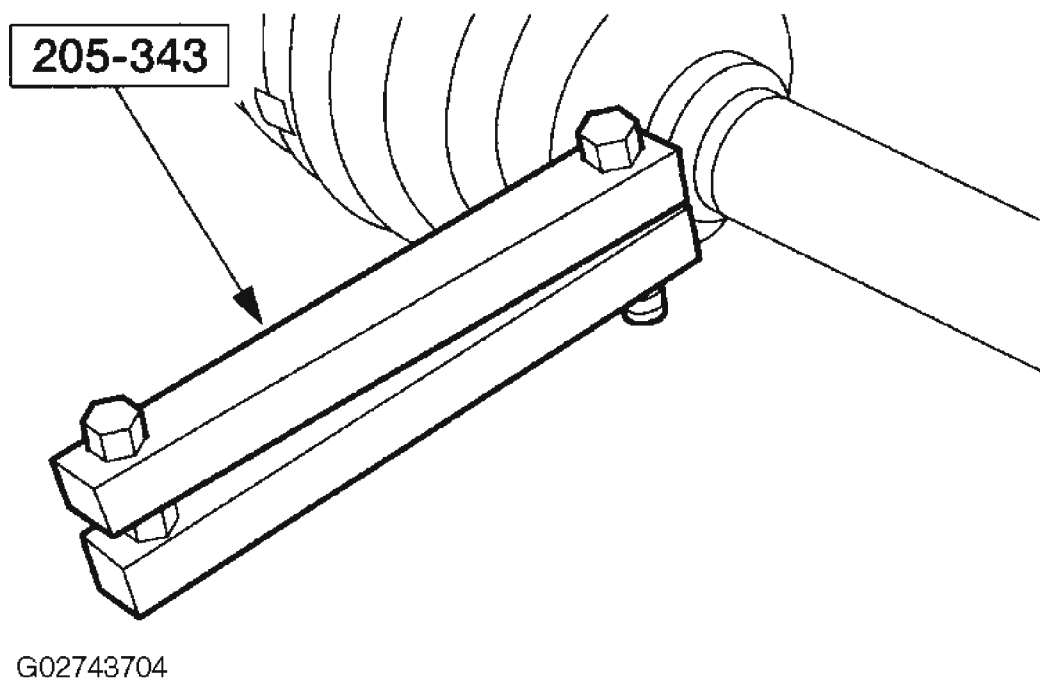
7. Remove any excess air trapped in the outboard halfshaft boot using a cloth covered screwdriver after adjusting the outboard halfshaft boot spacing.



G02743703

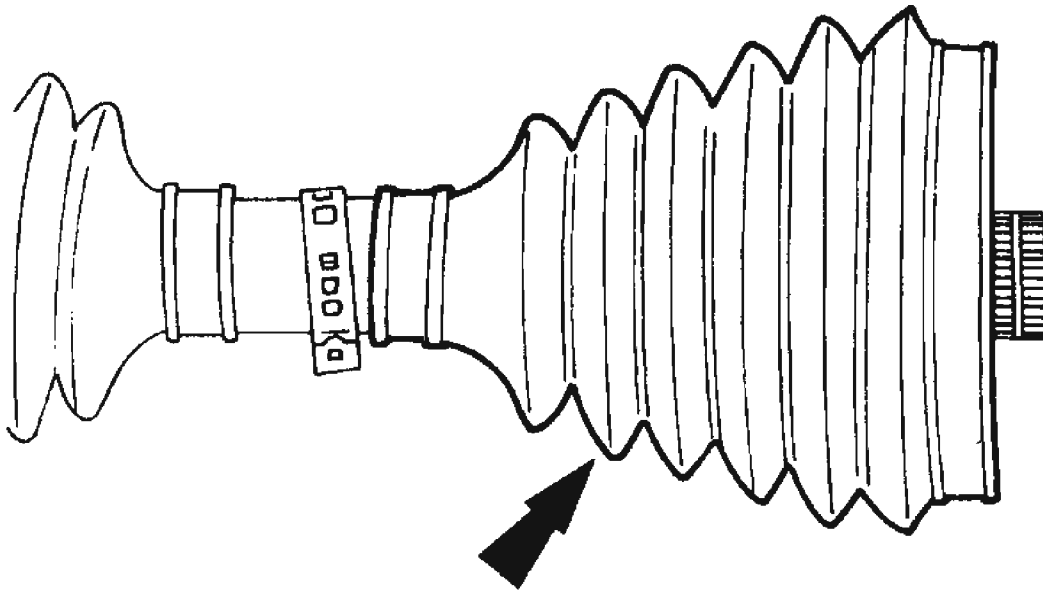
**Fig. 32: Removing Excess Air Trapped In Outboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

8. Using the special tool, crimp two new outboard halfshaft boot clamps.



**Fig. 33: Crimp Outboard Halfshaft Boot Clamps**  
Courtesy of FORD MOTOR CO.

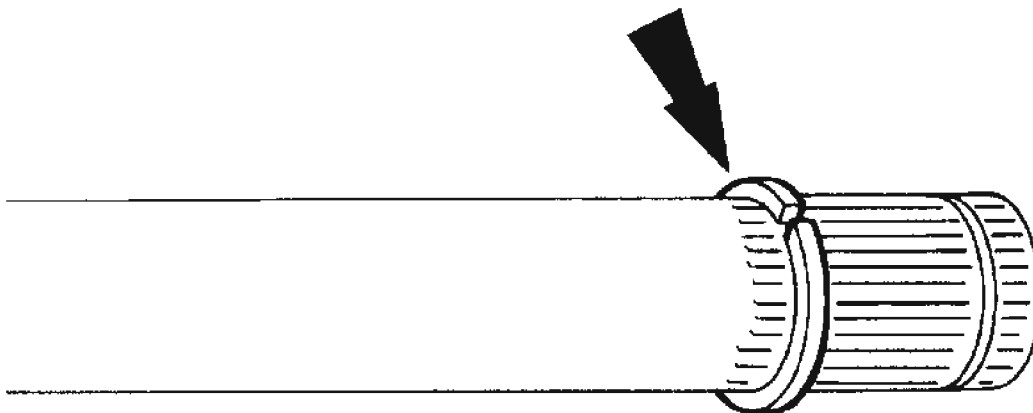
9. Position the inboard halfshaft boot.



G02743705

**Fig. 34: Positioning Inboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

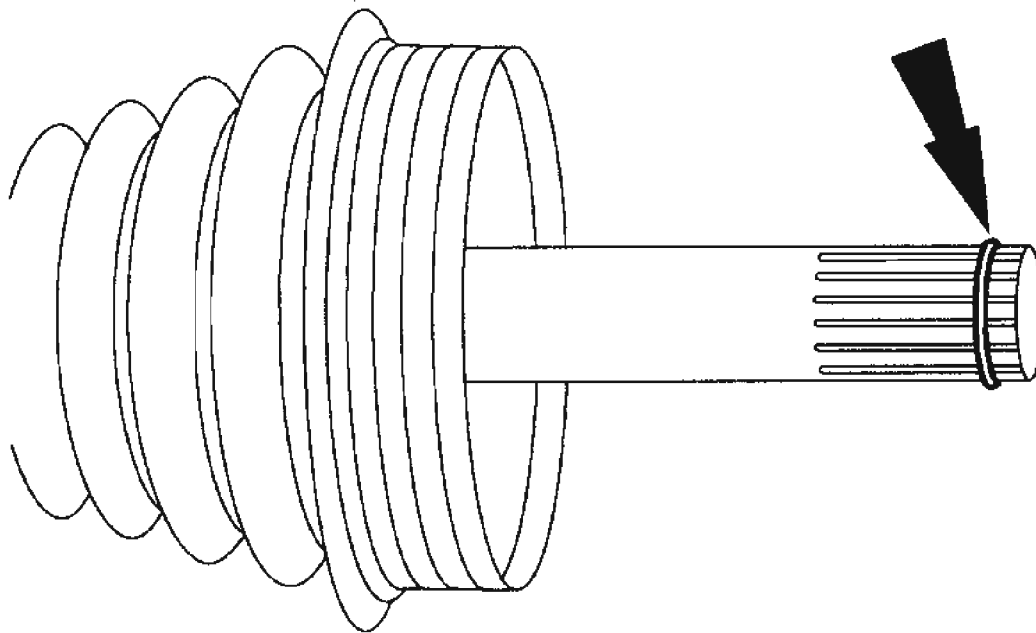
10. Install the snap ring.



G02743706

**Fig. 35: Installing Snap Ring**  
Courtesy of FORD MOTOR CO.

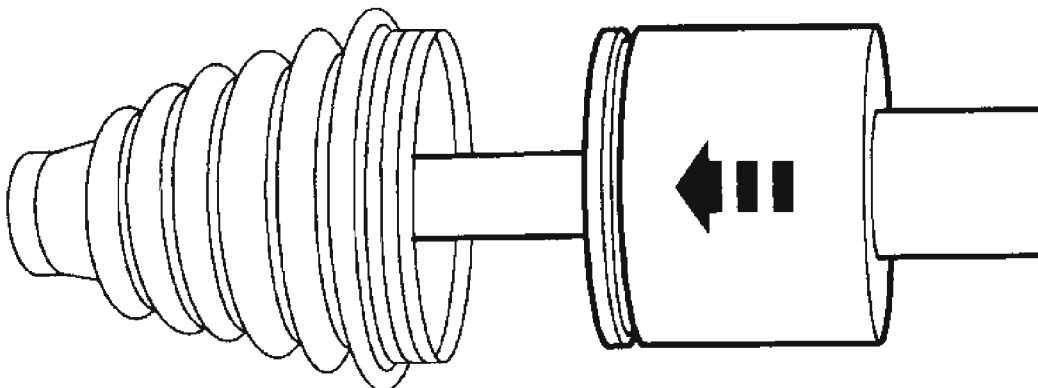
11. Install the bearing retainer circlip.



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**Fig. 36: Installing Bearing Retainer Circlip**  
Courtesy of FORD MOTOR CO.

12. Using a soft face hammer, install the halfshaft on the inboard joint.

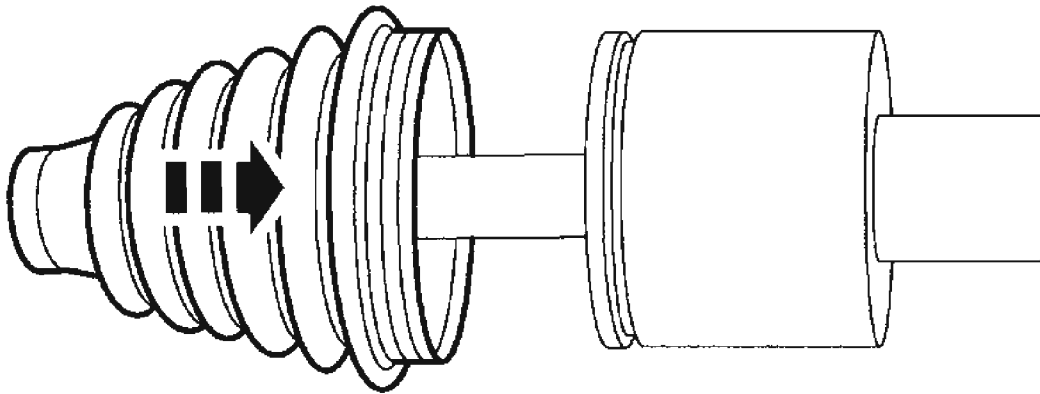


G02743708

**Fig. 37: Installing Halfshaft On Inboard Joint**  
Courtesy of FORD MOTOR CO.

13. Position the inboard halfshaft boot.

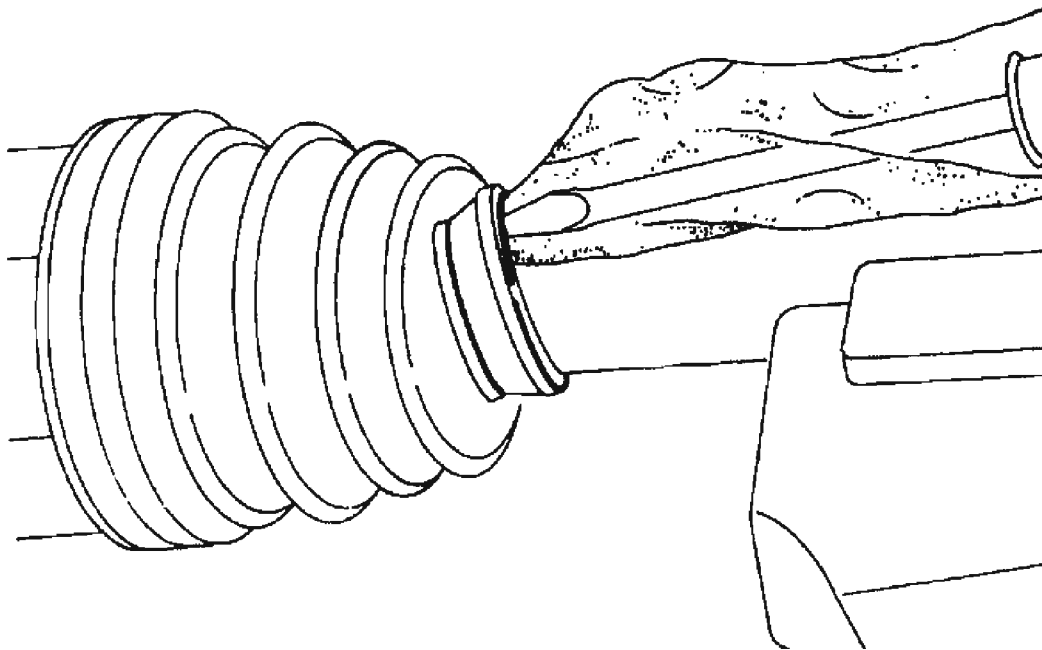




G02743709

**Fig. 38: Positioning Inboard Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

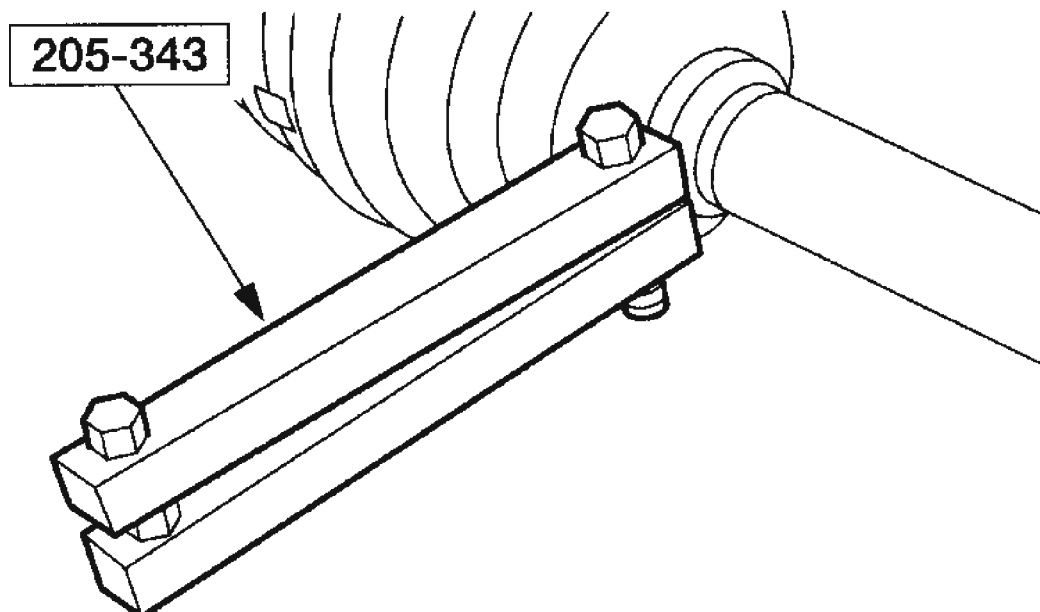
14. Remove any excess air trapped in the halfshaft boot using a cloth covered screwdriver after adjusting the halfshaft boot spacing.



G02743710

**Fig. 39: Removing Excess Air Trapped In Halfshaft Boot**  
Courtesy of FORD MOTOR CO.

15. Using the special tool, install two new inboard joint boot clamps.



G02743711

**Fig. 40: Installing Inboard Joint Boot Clamps**  
Courtesy of FORD MOTOR CO.

16. Install the front wheel halfshaft. For additional information, refer to **HALFSHAFT**.

## 2005 Ford Escape

### 2005 TRANSMISSIONS Four-Wheel Drive Systems - Escape & Mariner

## 2005 TRANSMISSIONS

### Four-Wheel Drive Systems - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

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Item	Specification
SAE 75W-140 High Performance Rear Axle Lubricant XY-75W140-QL	WSL-M2C192-A
SAE Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A

### TORQUE SPECIFICATIONS

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Description	Nm	lb-in
Four-wheel drive (4WD) control module nuts	10	89

## DESCRIPTION AND OPERATION

### FOUR-WHEEL DRIVE SYSTEMS

The vehicle is equipped with an intelligent 4-wheel drive (4WD) system that is always active and requires no driver input. The system has no mode select switch. The system combines transparent all-surface operation with highly capable 4WD, and is capable of handling all road conditions, including street and highway driving as well as off-road and winter driving.

The 4WD system continuously monitors vehicle conditions and automatically adjusts the torque distribution between the front and rear wheels. During normal operation, most of the torque is sent to the front wheels. If wheel slip between the front and rear wheels is detected, or if the vehicle is under heavy acceleration (high throttle position), the 4WD system increases torque to the rear wheels to prevent or control wheel slip.

The 4WD system consists of a transfer case, rear driveshaft, coupling device, coupling device control module (4WD control module) and rear axle.

The 4WD control module varies the torque sent to the rear wheels by sending a duty cycle (percentage of time the coupling is turned ON) to the active torque coupling device located inside the rear axle. The 4WD control module also provides the brake system with its current clutch duty cycle and whether or not the brake system may take command of the clutch duty cycle.

**NOTE:** The active torque coupling is not repairable. If replacement is required, the active torque coupling and rear axle are replaced as an assembly. For additional information, refer to REAR DRIVE AXLE-DIFFERENTIAL .

The transfer case is a gearbox that attaches to the transaxle. On automatic transaxle vehicles, the right hand halfshaft passes through the transfer case and engages the differential side gear as in normal FWD applications. The transfer case directs power to the rear driveshaft through a helical gear spline coupled to the transaxle differential case, a helical gear drop (idler gear) and a hypoid/helical ring gear assembly and pinion set.

**NOTE:** Repair of the transfer case is limited to seals, gaskets and output flanges. If any of the geared components, bearings, case cover or internal shafts fail, a new transfer case must be installed.

The transfer case is sealed from the transaxle and has its own oil sump. The transfer case on an automatic transaxle vehicle uses 350 ml (12 oz.) of SAE 75W-140 gear lubricant. The transfer case on a manual transaxle vehicle uses 350 ml (12 oz.) of SAE 80W-90 gear lubricant.

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

- throttle position.
- transaxle range from the powertrain control module (PCM).
- brake system status from the anti-lock brake system (ABS).
- wheel speed from all 4 wheels from the ABS. Some outputs of the 4WD control module are:
- solid-state clutch (pulse-width modulated signal) to the active torque coupling.
- 4WD indicator received by the instrument cluster.
- percent of torque transfer commanded signal to the PCM.
- torque request available signal to the ABS.

#### Heat Protection Mode

During very extreme off-road operation, the 4WD system has a heat protection system to protect the active torque coupling from damage. If the system detects an overheat condition, it enters a locked mode and turns on the 4WD indicator light in the instrument cluster. If the heat in the system continues to rise once in the locked mode, the 4WD control module disables the active torque coupling and causes the 4WD indicator light to flash continuously.

**4WD Indicator Light**

4WD - Illuminates continuously when the 4WD system is locked into permanent 4WD due to its heat protection mode. In the locked mode the vehicle resists turning and binds up when driven on dry pavement. To exit the locked mode, stop the vehicle and allow it to cool. When the 4WD indicator turns OFF, normal 4WD system function is restored.

4WD - Blinks continuously when the 4WD system is disabled due to its heat protection mode. To exit the disabled mode, stop the vehicle and allow it to cool. When the indicator turns OFF, normal 4WD system function is restored.

4WD - Blinks 3, 6, 8 or 10 times every minute when the 4WD system requires service. Use a diagnostic tool to check for diagnostic trouble codes (DTCs). Refer to the **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE DIAGNOSTIC TROUBLE CODE (DTC) INDEX**.

**4WD INDICATOR LIGHT CODE DEFINITIONS**

Blinks	Cause
3	Cluster is not receiving the 4WD indicator message from the 4WD control module
6	Invalid throttle position data received from the PCM
8	Invalid wheel speed data received from the ABS module
10	Active torque coupling circuit fault

**4WD Messages in Message Center**

SERVICE 4WD - Displayed when the 4WD system requires service. Use a diagnostic tool to check for DTCs. Refer to the **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE DIAGNOSTIC TROUBLE CODE (DTC) INDEX**.

4WD LOCKED TEMPORARILY - Displayed when the 4WD system is locked due to heat protection. In the locked mode the vehicle resists turning and binds up when driven on dry pavement. To exit the locked mode, stop the vehicle and allow it to cool.

4WD DISABLED TEMPORARILY - Displayed when the 4WD system is disengaged due to heat protection. To exit the disabled mode, stop the vehicle and allow it to cool.

4WD AUTO RESTORED - Displayed when normal 4WD system function is restored after a heat protection system occurrence.

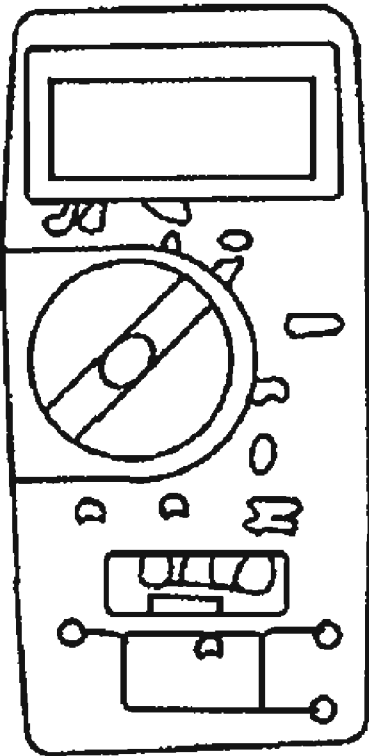
**DIAGNOSIS AND TESTING****FOUR-WHEEL DRIVE SYSTEMS**

Refer to **SYSTEM WIRING DIAGRAMS** for Escape or **SYSTEM WIRING**

**DIAGRAMS** for Mariner for schematic and connector information.

Special Tool(s)

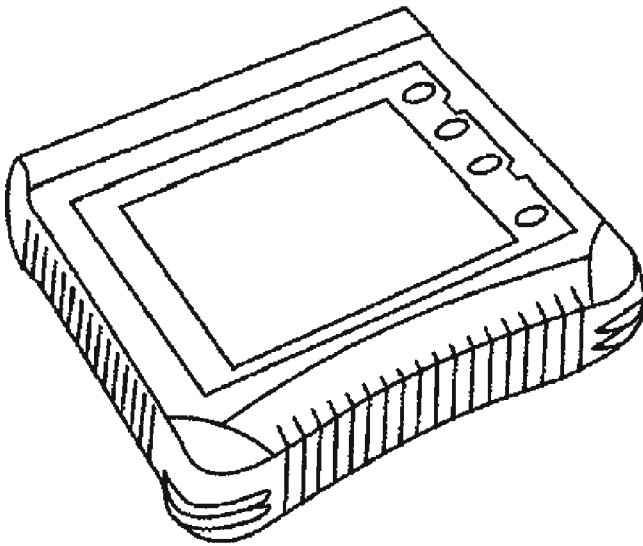
**SPECIAL TOOL(S) CHART**



**ST1137-A**

73III Automotive Meter 105-R0057  
or equivalent

Worldwide Diagnostic System  
(WDS)  
Vehicle Communication Module  
(VCM with appropriate adapters, or  
equivalent diagnostic tool



ST2332-A

#### Inspection and Verification

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

#### VISUAL INSPECTION CHART

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Active torque coupling</li> <li>• Transfer case</li> <li>• Halfshafts and constant velocity (CV) joints</li> <li>• Driveshaft and universal joints</li> <li>• Fluid leaks</li> <li>• Wheel/tire size and brand</li> <li>• Matching tire size and brand</li> <li>• Tire pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Smart junction box (SJB) fuse(s):                             <ul style="list-style-type: none"> <li>• 18 (10A)</li> <li>• 35 (5A)</li> </ul> </li> <li>• Four-wheel drive (4WD) control module</li> <li>• Wiring harness</li> <li>• Connector(s)</li> <li>• Circuitry</li> </ul>

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, connect the diagnostic tool to the data link connector and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:

- check that the program card is correctly installed.
  - check the connections to the vehicle.
  - check the ignition switch position.
5. If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool operating manual.
  6. Carry out the diagnostic tool data link test. If the diagnostic tool responds with:
    - CAN circuit fault; all electronic control units no response/not equipped, refer to **MODULE COMMUNICATIONS NETWORK**.
    - No response/not equipped for 4WD control module, GO to **PINPOINT TEST B**.
    - System passed, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs, and carry out the self-test diagnostics for the 4WD control module.
  7. If the DTCs retrieved are related to the concern, go to the Four-Wheel Drive (4WD) Control Module Diagnostic Trouble Code (DTC) Index.
  8. If no DTCs related to the concern are retrieved, carry out the Functional Test, and GO to **PINPOINT TEST A**.

**Functional Test**

**CAUTION:** This test must be carried out on a hard surface in a vacant area without traffic.

**NOTE:** Conduct steps 1-7 as outlined in Inspection and Verification prior to carrying out this test.

**PINPOINT TEST A: Road Test****A1 CHECK FOR 4WD INDICATOR PROVE-OUT**

- Start the vehicle and observe the 4WD indicator.
- **Does the 4WD indicator illuminate for three seconds and then turn OFF?**  
**Yes :** GO to A2.  
**No :** REFER to **INSTRUMENT CLUSTER** for further diagnosis of the instrument cluster.

**A2 CHECK FOR 4WD INDICATOR FLASHING**

- Allow vehicle to idle for 5 minutes.
- Observe the 4WD indicator.
- **Does the 4WD indicator flash?**  
**Yes :** GO to **PINPOINT TEST H**.  
**No :** Allow vehicle engine to continue idling. GO to A3.



**A3 CHECK FOR 4WD INDICATOR ON CONTINUOUSLY**

- Observe the 4WD indicator.
- **Does the 4WD indicator stay on continuously?**  
Yes : GO to PINPOINT TEST H.  
No : GO to A4.

**A4 CHECK FOR VALID THROTTLE POSITION**

- Key in OFF position.
- Enter the following diagnostic mode on the diagnostic tool: PID/DATA Monitor and Record.
- Key in ON position.
- Monitor the throttle position while opening and closing the throttle.
- **Does the throttle position match the PID value?**  
Yes : GO to A5.  
No : Refer to INTRODUCTION - GASOLINE article for Escape (gasoline) and Mariner or INTRODUCTION- HYBRID ESCAPE article for Escape (Hybrid).

**A5 CHECK FOR CORRECT WHEEL SPEEDS**

- Monitor the wheel speed PIDs while driving the vehicle at a constant speed of 48 km/h (30 mph).
- **Are all 4 wheel speeds within 3 km/h (1.8 mph) of each other?**  
Yes : GO to A6.  
No : GO to PINPOINT TEST J.

**A6 CHECK THE VEHICLE ACCELERATION IN A STRAIGHT LINE**

- Carry out 3 accelerations from 0-48 km/h (0-30 mph) in a straight line (one each with low, medium, and high throttle).
- **Does the vehicle pulsate or shudder while accelerating?**  
Yes : GO to PINPOINT TEST I.  
No : GO to A7.

**A7 CHECK THE VEHICLE TURNING ABILITY**

- Drive the vehicle in a fully locked turn, on dry pavement, at 8 km/h (5 mph).
- **Does the vehicle bind in the turn or resist turning?**  
Yes : GO to PINPOINT TEST I.  
No : GO to A8.

**A8 CHECK FOR TORQUE AT THE REAR WHEELS**

- Enter the following diagnostic mode on the diagnostic tool: Active Commands.
- Command the active torque coupling to a constant 100% applied.
- Drive the vehicle in a fully locked turn, on dry pavement, at 8 km/h (5 mph).

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#### • Does the vehicle bind in the turn or resist turning?

**Yes** : The concern can not be duplicated at this time. RETURN the vehicle to the customer.

**No** : GO to **PINPOINT TEST G.**

#### Four-Wheel Drive (4WD) Control Module Diagnostic Trouble Code (DTC) Index

#### DTC CHART

DTC	Description	Possible Causes	Source	Action
B1317	Battery Voltage High	<ul style="list-style-type: none"> <li>Concern with voltage regulator on generator</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST C.</u></b>
B1318	Battery Voltage Low	<ul style="list-style-type: none"> <li>Blown fuse (B+)</li> <li>Intermittent open on power circuit</li> <li>Relay failure inside module</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST C.</u></b>
B1342	ECU is Defective	<ul style="list-style-type: none"> <li>Microprocessor or internal memory fault</li> </ul>	4WD Control Module	CLEAR the DTCs. REPEAT the self-test. If DTC B1342 is retrieved again, INSTALL a new 4WD control module. REFER to <b><u>FOUR-WHEEL DRIVE (4WD) CONTROL MODULE.</u></b>
P1635	Tire/Axle Out of Acceptable Range	<ul style="list-style-type: none"> <li>Wrong size tire installed on vehicle</li> <li>Wheel speed sensor failure</li> <li>Flat or under inflated tire</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST J.</u></b>
P1824	4WD Clutch Relay Circuit Failure	<ul style="list-style-type: none"> <li>Short to ground on active torque coupling high circuit</li> <li>Electronic control unit (ECU) failure</li> </ul>	4WD Control Module	CHECK SJB fuse 18 (10A). If the fuse is good, GO to <b><u>PINPOINT TEST G.</u></b>
		<ul style="list-style-type: none"> <li>Short to ground on</li> </ul>		

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P1825	4WD Clutch Relay Open Circuit	<ul style="list-style-type: none"> <li>active torque coupling high circuit</li> <li>• Short to ground on active torque coupling low circuit</li> <li>• Open coil inside active torque coupling</li> <li>• Open in active torque coupling low circuit</li> <li>• Short to voltage in active torque coupling low circuit</li> <li>• ECU failure</li> </ul>	4WD Control Module	CHECK SJB fuse 18 (10A). If the fuse is good, GO to <b><u>PINPOINT TEST G.</u></b>
U0100	Lost Communication with PCM	<ul style="list-style-type: none"> <li>• Controller area network (CAN) bus fault</li> <li>• No data received by 4WD control module from powertrain control module (PCM)</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST F.</u></b>
U0121	Lost Communication with Anti-lock Brake System (ABS)	<ul style="list-style-type: none"> <li>• CAN bus fault</li> <li>• No data received by 4WD control module from ABS</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST F.</u></b>
U0401	Invalid Data Received From PCM	<ul style="list-style-type: none"> <li>• Invalid data received from PCM</li> <li>• Data out of range</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST D.</u></b>
U0415	Invalid Data Received From ABS	<ul style="list-style-type: none"> <li>• Invalid data received from ABS module</li> <li>• Data out of range</li> </ul>	4WD Control Module	GO to <b><u>PINPOINT TEST E.</u></b>
U1900	CAN Communication	<ul style="list-style-type: none"> <li>• CAN bus fault</li> </ul>	4WD Control	GO to <b><u>PINPOINT TEST F.</u></b>

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Bus Fault

Module

#### Four-Wheel Drive (4WD) Control Module Symptom Chart

#### Symptom Chart

#### SYMPTOM CHART

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>The concern is unverifiable; no DTCs</li> </ul>	<ul style="list-style-type: none"> <li>The concern description is inaccurate.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST A.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>The transfer case makes noise</li> </ul>	<ul style="list-style-type: none"> <li>Tire inflation pressure.</li> <li>Tire and wheel size.</li> <li>Fluid level.</li> <li>Internal components.</li> </ul>	<ul style="list-style-type: none"> <li>MAKE SURE all tires and wheels are the same size and brand, and the inflation pressures are correct.</li> <li>FILL with the correct type and amount of lubricant. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> <li>OPERATE the vehicle in all transaxle gears. If there is noise in the transaxle in NEUTRAL, or in some gears and not in others, REMOVE and REPAIR the transaxle. REFER to <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION - CD4E</u></b> for automatic transaxle, <b><u>AUTOMATIC TRANSAXLE-TRANSMISSION - ELECTRONICALLY CONTROLLED CONTINUOUSLY VARIABLE TRANSMISSION (ECVT)</u></b> for the electronically controlled continuously variable transmission (ECVT), or <b><u>MANUAL TRANSAXLE-TRANSMISSION</u></b> for manual transaxle. If there is noise in all gears, INSTALL a new transfer case. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> </ul>
		<ul style="list-style-type: none"> <li>DRAIN the fluid to the correct level. REFER to <b><u>TRANSFER CASE-</u></b></li> </ul>

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<ul style="list-style-type: none"> <li>Leaking fluid from the transfer case vent</li> </ul>	<ul style="list-style-type: none"> <li>Transfer case.</li> <li>Vent tube.</li> </ul>	<p><b><u>POWER TRANSFER UNIT (PTU)</u></b> .</p> <ul style="list-style-type: none"> <li>REPAIR or INSTALL a new vent. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> </ul>
<ul style="list-style-type: none"> <li>Leaking automatic transmission fluid</li> </ul>	<ul style="list-style-type: none"> <li>Transfer case driven gear seal.</li> </ul>	<ul style="list-style-type: none"> <li>INSTALL a new transfer case driven gear seal. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> </ul>
<ul style="list-style-type: none"> <li>Leaking gear lubricant from the seals</li> </ul>	<ul style="list-style-type: none"> <li>The vent is plugged.</li> <li>Damaged seals.</li> </ul>	<ul style="list-style-type: none"> <li>INSTALL a new vent. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> <li>For automatic transaxle, INSTALL new seals. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> <li>For manual transaxle, INSTALL a new transfer case. REFER to <b><u>TRANSFER CASE-POWER TRANSFER UNIT (PTU)</u></b> .</li> </ul>
<ul style="list-style-type: none"> <li>No communication with the four-wheel drive (4WD) control module</li> </ul>	<ul style="list-style-type: none"> <li>Smart junction box (SJB) fuse(s):               <ul style="list-style-type: none"> <li>18 (10A).</li> <li>35 (5A).</li> </ul> </li> <li>4WD control module.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST B.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Four-wheel drive (4WD) control module battery voltage is high or low</li> </ul>	<ul style="list-style-type: none"> <li>Concern with voltage regulator or generator.</li> <li>Smart junction box (SJB) fuse 18 (10A).</li> <li>Intermittent open power</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST C.</u></b></li> </ul>

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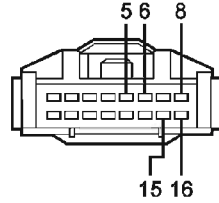
	<ul style="list-style-type: none"> <li>circuit.</li> <li>Relay failure inside 4WD control module.</li> </ul>	
<ul style="list-style-type: none"> <li>Four-wheel drive (4WD) control module received no/invalid data from powertrain control module (PCM)</li> </ul>	<ul style="list-style-type: none"> <li>Invalid data received from PCM.</li> <li>Data out of range.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST D.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Four-wheel drive (4WD) control module received no/invalid data from anti-lock brake system (ABS) module</li> </ul>	<ul style="list-style-type: none"> <li>Invalid data received from the ABS module.</li> <li>Data out of range.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST E.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Controller area network (CAN) communications bus fault</li> </ul>	<ul style="list-style-type: none"> <li>CAN bus fault.</li> <li>Powertrain control module (PCM) fault.</li> <li>Anti-lock brake system (ABS) fault.</li> <li>Four-wheel drive (4WD) control module.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST F.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Vehicle has no or inadequate torque</li> </ul>	<ul style="list-style-type: none"> <li>Rear axle.</li> <li>Tire/wheels.</li> <li>Active torque coupling.</li> <li>Smart junction box (SJB) fuse(s): <ul style="list-style-type: none"> <li>o 18</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>REFER to <b><u>REAR DRIVE AXLE-DIFFERENTIAL .</u></b></li> </ul>

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at rear wheels	<ul style="list-style-type: none"> <li>(10A).               <ul style="list-style-type: none"> <li>o 35 (5A).</li> </ul> </li> <li>Four-wheel drive (4WD) control module.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST G.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>The four-wheel drive (4WD) indicator does not operate correctly</li> </ul>	<ul style="list-style-type: none"> <li>Instrument cluster.</li> <li>4WD control module.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST H.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Vehicle binds in a turn or resists turning</li> </ul>	<ul style="list-style-type: none"> <li>Four-wheel drive (4WD) control module.</li> <li>Active torque coupling.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST I.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Tire/Axle out of acceptable range</li> </ul>	<ul style="list-style-type: none"> <li>Wheels/Tires.</li> <li>Wheel speed sensors.</li> <li>Anti-lock brake system (ABS) module.</li> <li>Four-wheel drive (4WD) control module.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST J.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>Vehicle pulsates or shudders in a straight line</li> </ul>	<ul style="list-style-type: none"> <li>Four-wheel drive (4WD) control module.</li> <li>Active torque coupling.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>GO to <b><u>PINPOINT TEST I.</u></b></li> </ul>

## 4WD Control Module C3253



N0013268

Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
5	1003 (GY/YE) 4WD control module switched power	Greater than 10 volts between the 4WD control module and ground with the ignition switch in START or RUN. Less than 5 ohms between the 4WD control module and the SJB. Greater than 10,000 ohms between the 4WD control module and ground.
6	704 (DG/LG) 4WD control module power	Greater than 10 volts between the 4WD control module and ground. Less than 5 ohms between the 4WD control module and the SJB. Greater than 10,000 ohms between the 4WD control module and ground.
8	772 (LB) active torque coupling high circuit	Less than 5 ohms between the 4WD control module and the active torque coupling. Greater than 10,000 ohms between the 4WD control module and ground with the active torque coupling disconnected.
15	57 (BK) 4WD control module ground	Less than 5 ohms between the 4WD control module and ground.
16	774 (LG) active torque coupling low circuit	Less than 5 ohms between the 4WD control module and the active torque coupling. Greater than 10,000 ohms between the 4WD control module and ground with the 4WD control module and the active torque coupling disconnected.

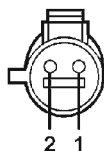
**Fig. 1: Identifying 4WD Control Module C3253 Connector**  
Courtesy of FORD MOTOR CO.

## Active Torque Coupling C3254



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A0088413

Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
1	772 (LB) active torque coupling high	Greater than 10 volts between the active torque coupling and ground with the 4WD control module commanded to 100% apply. Less than 5 ohms between the active torque coupling and the 4WD control module. Greater than 10,000 ohms between the active torque coupling and ground with the active torque coupling disconnected.
2	774 (LG) active torque coupling low	Less than 5 ohms between the active torque coupling and the 4WD control module. Greater than 10,000 ohms between the active torque coupling and ground with the 4WD control module disconnected.

**Fig. 2: Identifying Active Torque Coupling C3254 Connector**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Test B: No Communication With The Four-Wheel Drive (4WD) Control Module

##### Normal Operation

The active, on-demand 4WD system utilizes data from other systems as inputs to the 4WD control module. The 4WD control module uses the inputs to determine the appropriate duty cycle to send to the active torque coupling that delivers the desired torque to the rear wheels. Specific inputs to the 4WD control module are: throttle position output from the PCM, transmission range from the PCM, as well as brake system status and all 4 wheel speeds from the ABS module. Communication between the 4WD control module and other modules is obtained through the high speed controller area network (CAN). If other modules communicate with the diagnostic tool and the 4WD control module cannot, check the power and ground circuits to the 4WD control module before replacement of the module.

##### Possible Causes

- circuit 704 (DG/LG)
- circuit 1003 (GY/YE)
- circuit 57 (BK)
- 4WD control module

#### PINPOINT TEST B: NO COMMUNICATION WITH THE FOUR-WHEEL DRIVE (4WD) CONTROL MODULE

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

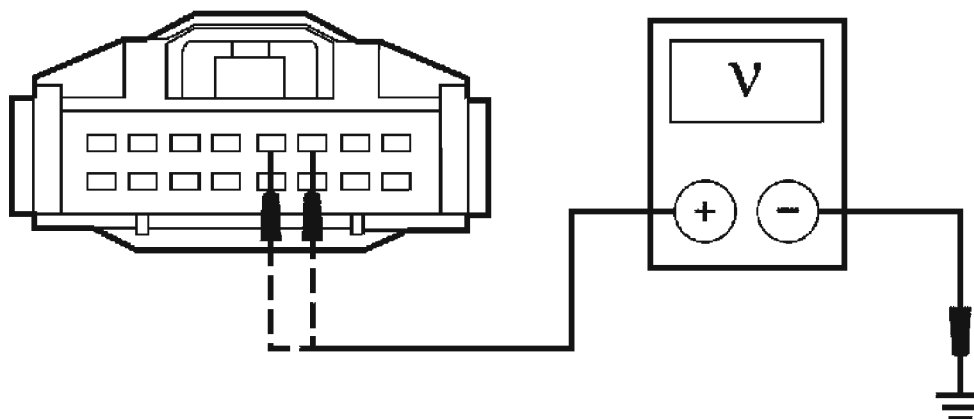
**B1 CHECK FOR COMMUNICATION TO OTHER MODULES**

- Using the diagnostic tool, attempt communication with other modules on the high speed CAN.
- **Does the diagnostic tool communicate with other high speed CAN modules?**  
**Yes** : GO to B2.

**No** : DIAGNOSE the high speed CAN communication network. REFER to **MODULE COMMUNICATIONS NETWORK** .

**B2 CHECK POWER TO THE 4WD CONTROL MODULE**

- Key in OFF position.
- Disconnect: 4WD Control Module C3253.
- Key in ON position.
- Measure the voltage between the 4WD control module C3253-6, circuit 704 (DG/LG), harness side and ground; and between the 4WD control module C3253-5, circuit 1003 (GY/YE), harness side and ground.



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**Fig. 3: Measuring Voltage Between 4WD Control Module C3253-6 Circuit 704**

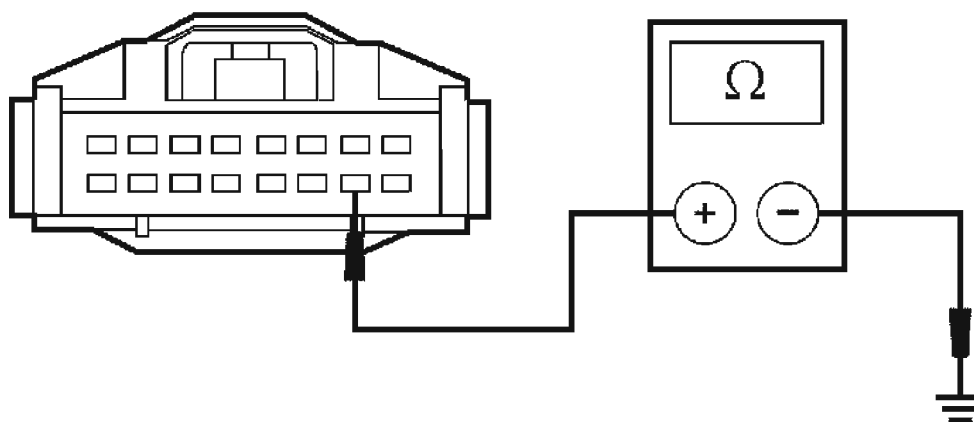
Courtesy of FORD MOTOR CO.

- **Are the voltages greater than 10 volts?**  
**Yes** : GO to B3.

**No** : REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

**B3 CHECK THE 4WD CONTROL MODULE GROUND**

- Key in OFF position.
- Measure the resistance between the 4WD control module C3253-15, circuit 57 (BK), harness side and ground.



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**Fig. 4: Measuring Resistance Between 4WD Control Module C3253-15 Circuit**

Courtesy of FORD MOTOR CO.

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

**Yes** : REFER to **MODULE COMMUNICATIONS NETWORK** to continue diagnosis of the CAN circuits.

**No** : REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

#### **Pinpoint Test C: 4WD Control Module Battery Voltage Is High Or Low**

##### **Normal Operation**

If the 4WD control module observes an over-power or under-power condition, DTCs are set and the 4WD control module may not allow 4WD operation.

##### **Possible Causes**

- SJB fuses 18 (10A) or 35 (5A)
- charging/battery system
- 4WD control module
- circuit 704 (DG/LG) open

- circuit 1003 (GY/YE) open

**PINPOINT TEST C: 4WD CONTROL MODULE BATTERY VOLTAGE IS HIGH OR LOW**

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

**C1 CHECK FOR HIGH BATTERY VOLTAGE**

- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool:
- PID/DATA Monitor and Record.
- Monitor the battery voltage.
- **Is the battery voltage greater than 16 volts?**

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

**No :** GO to C2.

**C2 CHECK FOR LOW VOLTAGE**

- Monitor the battery voltage.
- **Is the battery voltage less than 9 volts?**

**Yes :** GO to C4.

**No :** GO to C3.

**C3 CHECK FOR A BLOWN FUSE**

- Check the following SJB fuse(s):
  - 18 (10A).
  - 35 (5A).
- **Are the fuses open?**

**Yes :** INSTALL a new fuse in question. CLEAR the DTCs. REPEAT the self-test.

**No :** GO to C4.

**C4 CHECK FOR PROPER VOLTAGE AT BATTERY**

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

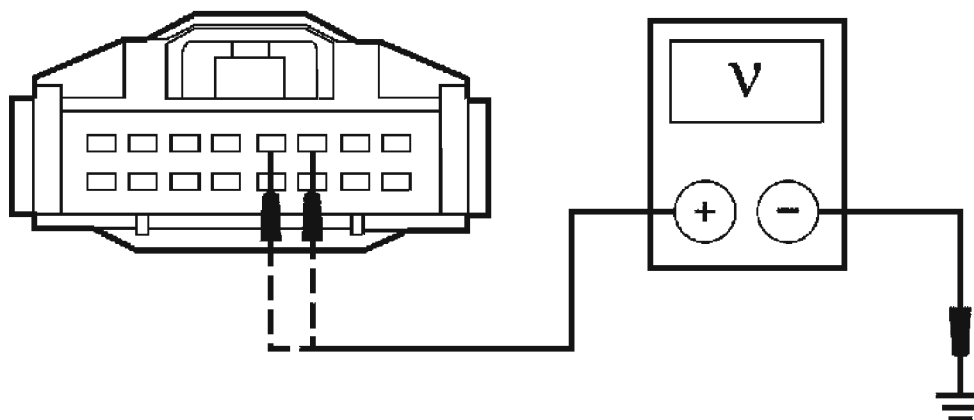
**Yes :** GO to C5.

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

**C5 CHECK THE POWER TO THE 4WD CONTROL MODULE**

- Key in OFF position.
- Disconnect the 4WD control module C3253.

- Key in ON position.
- Measure the voltage between the 4WD control module C3253-6, circuit 704 (DG/LG), harness side and ground; and between the 4WD control module C3253-5, circuit 1003 (GY/YE), harness side and ground.



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**Fig. 5: Measuring Voltage Between 4WD Control Module C3253-6 Circuit 704**

Courtesy of FORD MOTOR CO.

- **Are the voltages greater than 10 volts?**

**Yes :** GO to C6.

**No :** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

#### **C6 CHECK FOR CORRECT 4WD CONTROL MODULE OPERATION**

- Disconnect the 4WD control module.
- Check for:
  - corrosion
  - pushed-out pins
- Connect the 4WD control module and make sure it seats correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

**Yes :** INSTALL a new 4WD control module. REFER to **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**. CLEAR the DTCs. REPEAT the self-test.

**No** : The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

**Pinpoint Test D: 4WD Control Module Received No/Invalid Data From PCM****Normal Operation**

The on-demand 4WD system uses data from other systems as inputs to the 4WD control module. The 4WD control module uses the inputs to determine the appropriate duty cycle to send to the active torque coupling that delivers the desired torque to the rear wheels. Specific inputs to the 4WD control module are: throttle position output from the PCM, transmission range from the PCM, brake system status and all 4 wheel speeds from the ABS module. Communication between the 4WD control module and other modules is obtained through the high speed CAN. If the 4WD control module loses communication with, or receives invalid data from any of the necessary modules, DTCs are set and the 4WD control module may not allow 4WD operation.

**Possible Causes**

- PCM

**PINPOINT TEST D: 4WD CONTROL MODULE RECEIVED NO/INVALID DATA FROM PCM**

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

**D1 CHECK THE THROTTLE POSITION SENSOR**

- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool: PID/DATA Monitor and Record.
- Monitor the throttle position (TP) sensor while pressing down and releasing the accelerator pedal.
- **Does the throttle position agree with the accelerator pedal position?**

**Yes** : The system is operating correctly at this time. CLEAR the DTCs. REPEAT the self-test.

**No** : Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid) for further diagnosis to the electronic engine controls.

**Pinpoint Test E: 4WD Control Module Received No/Invalid Data From ABS Module****Normal Operation**

The on-demand 4WD system uses data from other systems as inputs to the 4WD control

module. The 4WD control module uses the inputs to determine the appropriate duty cycle to send to the active torque coupling that delivers the desired torque to the rear wheels. Specific inputs to the 4WD control module are: throttle position output from the PCM, transmission range from the PCM, brake system status and all 4 wheel speeds from the ABS module. Communication between the 4WD control module and other modules is obtained through the high speed CAN. If the 4WD control module loses communication with, or receives invalid data from any of the necessary modules, DTCs are set and the 4WD control module may not allow 4WD operation.

**Possible Causes**

- ABS module

**PINPOINT TEST E: 4WD CONTROL MODULE RECEIVED NO/INVALID DATA FROM ABS MODULE**

**CAUTION:** This test must be carried out on a hard surface in a vacant area without traffic.

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

**E1 CHECK THE WHEEL SPEED SENSORS**

- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool: PID/DATA Monitor and Record.
- Monitor the wheel speed sensors while driving the vehicle at a constant 32 km/h (20 mph).
- **Do the 4 wheel speed sensors match the speedometer and are they within 3 km/h (1.8 mph) of each other?**

**Yes :** The system is operating correctly at this time. CLEAR the DTCs. REPEAT the self-test.

**No :** REFER to **ANTI-LOCK CONTROL** for further diagnosis of the ABS system.

**Pinpoint Test F: CAN Communications Bus Fault****Normal Operation**

The on-demand 4WD system uses data from other systems as inputs to the 4WD control module. The 4WD control module uses the inputs to determine the appropriate duty cycle to send to the active torque coupling that delivers the desired torque to the rear wheels. Specific inputs to the 4WD control module are: throttle position output from the PCM, transmission range from the PCM, brake system status and all 4 wheel speeds from the ABS module. Communication between the 4WD control module and other modules is obtained through the

high speed CAN. If the 4WD control module loses communication with, or receives invalid data from any of the necessary modules, DTCs are set and the 4WD control module may not allow 4WD operation.

**Possible Causes**

- 4WD control module
- PCM
- ABS module

**PINPOINT TEST F: CAN COMMUNICATIONS BUS FAULT**

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

**F1 CHECK FOR DTCs U1900, U0100 AND U0121 SET TOGETHER**

- Refer to the results of the 4WD control module self-test.
- **Are DTCs U1900, U0100 and U0121 set together?**  
**Yes :** REFER to MODULE COMMUNICATIONS NETWORK to continue diagnosis of the communications network.  
**No :** GO to F2.

**F2 CHECK FOR DTC U0100**

- Refer to the results of the 4WD control module self-test.
- **Is DTC U0100 set, but not U1900?**  
**Yes :** The PCM is not sending any data to the 4WD control module. Refer to INTRODUCTION - GASOLINE article for Escape (gasoline) and Mariner or INTRODUCTION- HYBRID ESCAPE article for Escape (Hybrid) for additional PCM diagnosis.  
**No :** GO to F3.

**F3 CHECK FOR DTC U0121**

- Refer to the results of the 4WD control module self-test.
- **Is DTC U0121 set, but not U1900?**  
**Yes :** The ABS module is not sending any data to the 4WD control module. REFER to ANTI-LOCK CONTROL for additional ABS diagnosis.  
**No :** GO to F4.

**F4 CHECK FOR CORRECT 4WD CONTROL MODULE OPERATION**

- Disconnect the 4WD control module.
- Check for:
  - corrosion
  - pushed-out pins



- Connect the 4WD control module and make sure it seats correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

**Yes :** INSTALL a new 4WD control module. REFER to **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**. CLEAR the DTCs. REPEAT the self-test.

**No :** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

### **Pinpoint Test G: Vehicle Has No Or Inadequate Torque At Rear Wheels**

#### **Normal Operation**

The on-demand 4WD system uses data from other systems as inputs to the 4WD control module. The 4WD control module uses the inputs to determine the appropriate duty cycle to send to the active torque coupling that delivers the desired torque to the rear wheels. If the 4WD control module loses communication with, or receives invalid data from any of the necessary modules, DTCs are set and the 4WD control module may not allow 4WD operation.

#### **Possible Causes**

- tire/axle out of range
- active torque coupling
- 4WD control module
- circuit 57 open
- circuit 704 (DG/LG) open
- circuit 772 (LB) open or short to ground
- circuit 774 (LG) open or short to ground
- circuit 1003 (GY/YE) open

### **PINPOINT TEST G: VEHICLE HAS NO OR INADEQUATE TORQUE AT REAR WHEELS**

**NOTE:**      **Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.**

#### **G1 CHECK FOR 4WD CONTROL MODULE DTCs**

- Carry out the 4WD control module self-test.
- **Are any DTCs received?**

**Yes :** For DTC P1635, GO to G2.

For DTC P1824 or P1825, GO to G3.

For all other DTCs, REFER to the **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE DIAGNOSTIC TROUBLE CODE (DTC) INDEX**.

**No** : GO to G3.

## **G2 CHECK FOR CORRECT WHEEL SPEEDS**

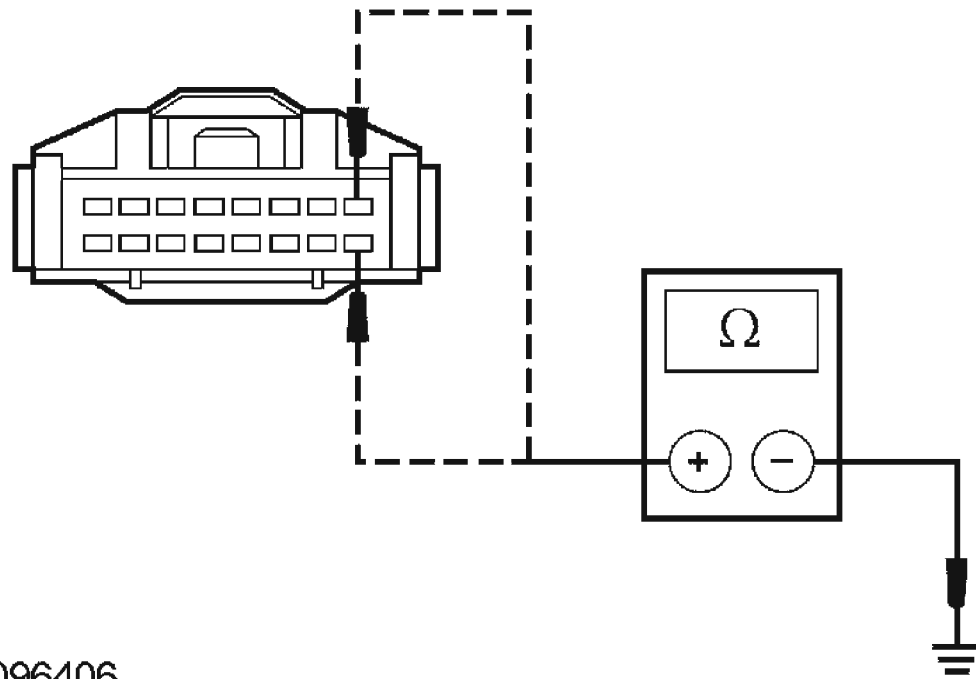
- Enter the following diagnostic mode on the diagnostic tool: PID/DATA Monitor and Record.
- Monitor the wheel speed PIDs while driving the vehicle at a constant speed of 48 km/h (30 mph).
- **Are all four wheel speeds within 3 km/h (1.8 mph) of each other?**

**Yes** : GO to **PINPOINT TEST J**.

**No** : REFER to **ANTI-LOCK CONTROL** for further diagnosis of the anti-lock brake system (ABS).

## **G3 CHECK CIRCUITS 772 (LB) AND 774 (LG) FOR A SHORT TO GROUND WITH ACTIVE TORQUE COUPLING CONNECTED**

- Key in OFF position.
- Disconnect: 4WD Control Module C3253.
- Measure the resistance between the 4WD control module C3253-8, circuit 772 (LB), harness side and ground; and between the 4WD control module C3253-16, circuit 774 (LG), harness side and ground.



**Fig. 6: Measuring Resistance Between 4WD Control Module C3253-8 Circuit**  
Courtesy of FORD MOTOR CO.

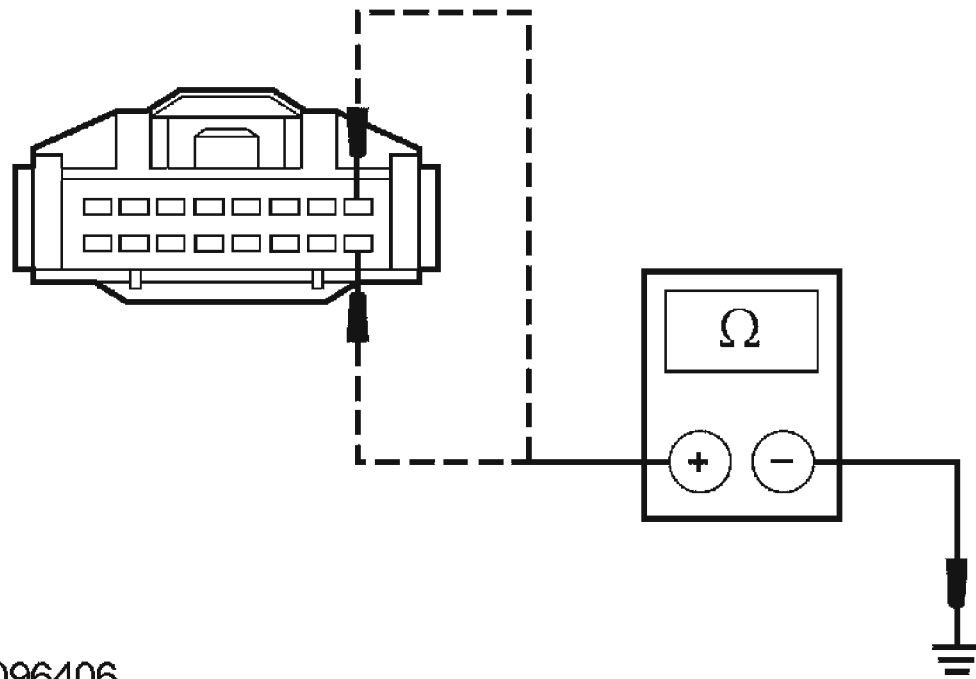
- **Are the resistances greater than 10,000 ohms?**

**Yes :** GO to G5.

**No :** GO to G4.

**G4 CHECK CIRCUITS 772 (LB) AND 774 (LG) FOR A SHORT TO GROUND**

- Disconnect: Active Torque Coupling C3254.
- Measure the resistance between the 4WD control module C3253-8, circuit 772 (LB), harness side and ground; and between the resistance between the 4WD control module C3253-16, circuit 774 (LG), harness side and ground.



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**Fig. 7: Measuring Resistance Between 4WD Control Module C3253-8 Circuit**  
Courtesy of FORD MOTOR CO.

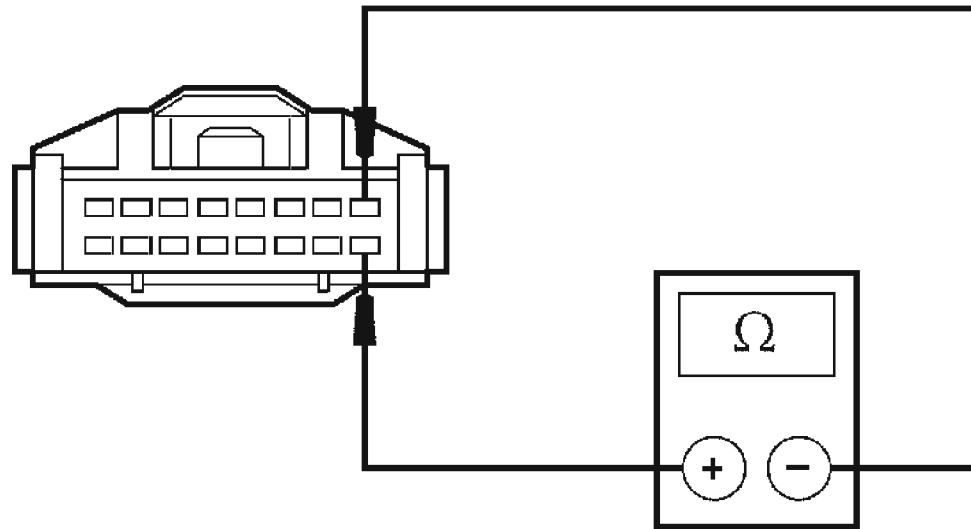
- **Are the resistances greater than 10,000 ohms?**

**Yes** : INSTALL a new rear axle assembly. REFER to **DRIVELINE SYSTEM-GENERAL INFORMATION** . CLEAR the DTCs. REPEAT the self-test.

**No** : REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

**G5 CHECK CIRCUITS 772 (LB) AND 774 (LG) FOR AN OPEN WITH ACTIVE TORQUE COUPLING CONNECTED**

- Measure the resistance between the 4WD control module C3253-8, circuit 772 (LB), harness side and the 4WD control module C3253-16, circuit 774 (LG), harness side.



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**Fig. 8: Measuring Resistance Between 4WD Control Module C3253-8 Circuit 772**

Courtesy of FORD MOTOR CO.

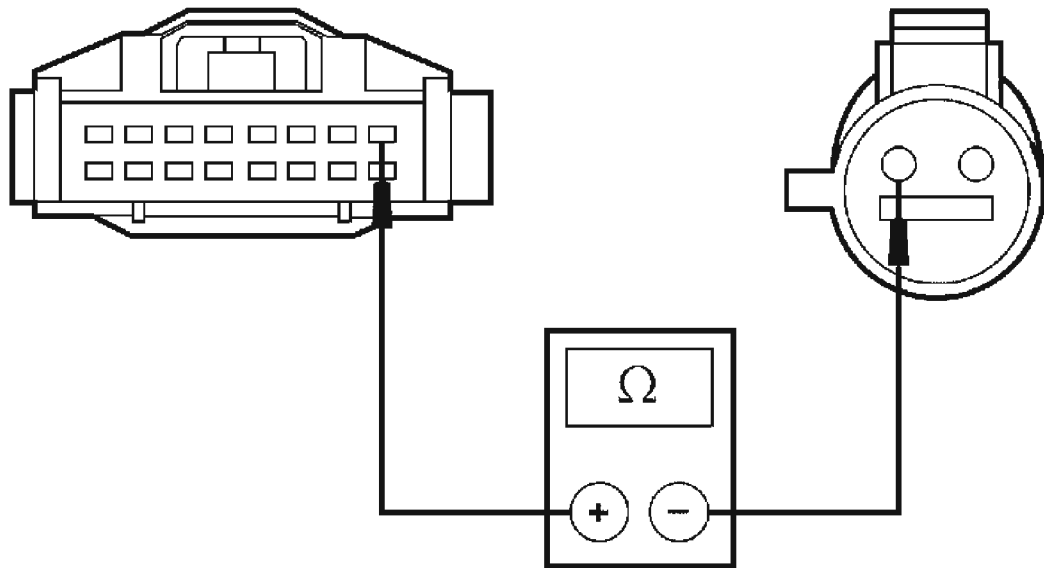
- Is the resistance less than 5 ohms?

Yes : GO to G8.

No : GO to G6.

**G6 CHECK CIRCUIT 772 (LB) AND 774 (LG) FOR AN OPEN**

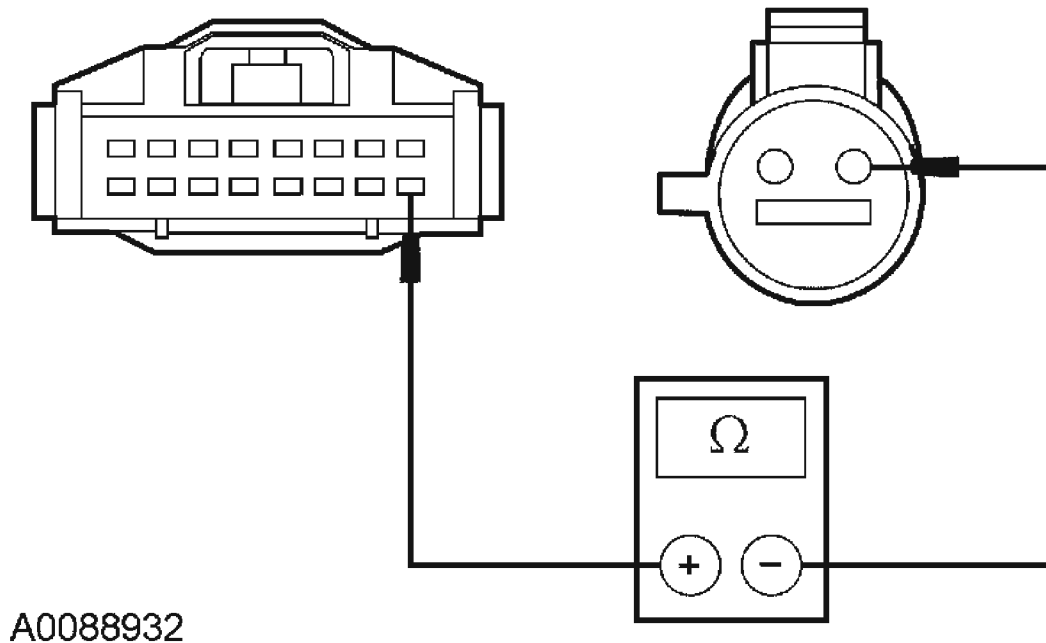
- Disconnect: Active Torque Coupling C3254.
- Measure the resistance between the 4WD control module C3253-8, circuit 772 (LB), harness side and the active torque coupling C3254-1, circuit 774 (LG), harness side.



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**Fig. 9: Measuring Resistance Between 4WD Control Module C3253-8 Circuit**  
**Courtesy of FORD MOTOR CO.**

- Measure the resistance between the 4WD control module C3253-16, circuit 772 (LB), harness side and the active torque coupling C3254-2, circuit 774 (LG), harness side.



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**Fig. 10: Measuring Resistance Between 4WD Control Module C3253-16 Circuit**

Courtesy of FORD MOTOR CO.

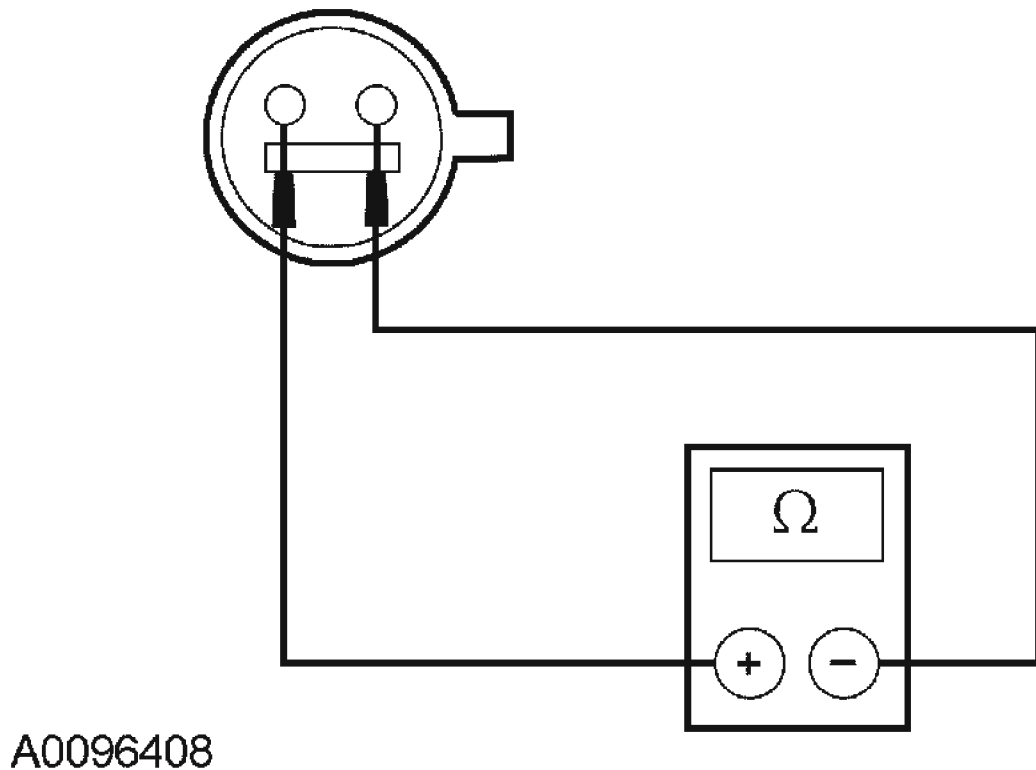
- Are the resistances less than 5 ohms?

Yes : GO to G7.

No : REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

**G7 CHECK THE ACTIVE TORQUE COUPLING FOR AN INTERNAL OPEN**

- Measure the resistance between the active torque coupling C3254-1, circuit 772 (LB), component side, and the active torque coupling C3254-2, circuit 774 (LG), component side.



**Fig. 11: Measuring Resistance Between Active Torque Coupling C3254-1**  
Courtesy of FORD MOTOR CO.

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

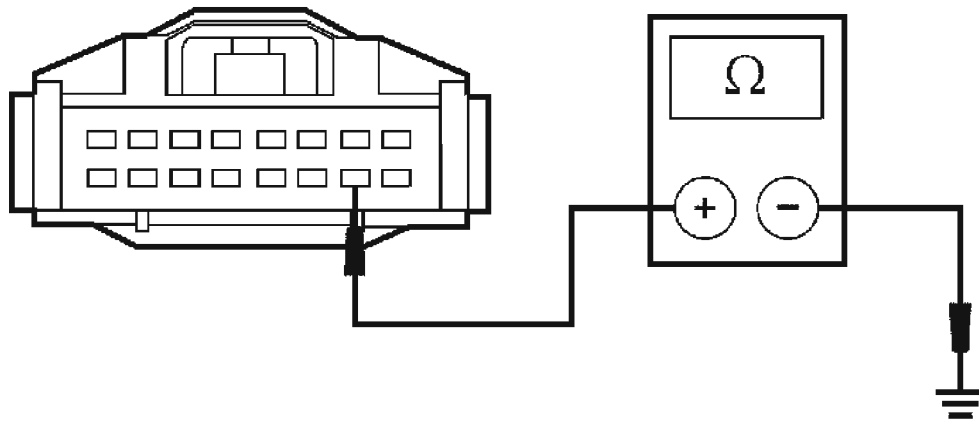
**Yes** : CONNECT the active torque coupling C3254 and make sure the connector seats correctly. GO to G10.

**No** : INSTALL a new rear axle assembly. REFER to **DRIVELINE SYSTEM-GENERAL INFORMATION** . CLEAR the DTCs. REPEAT the self-test.

**G8 CHECK CIRCUIT 57 (BK) FOR AN OPEN**

- Measure the resistance between the 4WD control module C3253-15, circuit 57 (BK), harness side and ground.





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**Fig. 12: Measuring Resistance Between 4WD Control Module C3253-15  
Circuit 57**

Courtesy of FORD MOTOR CO.

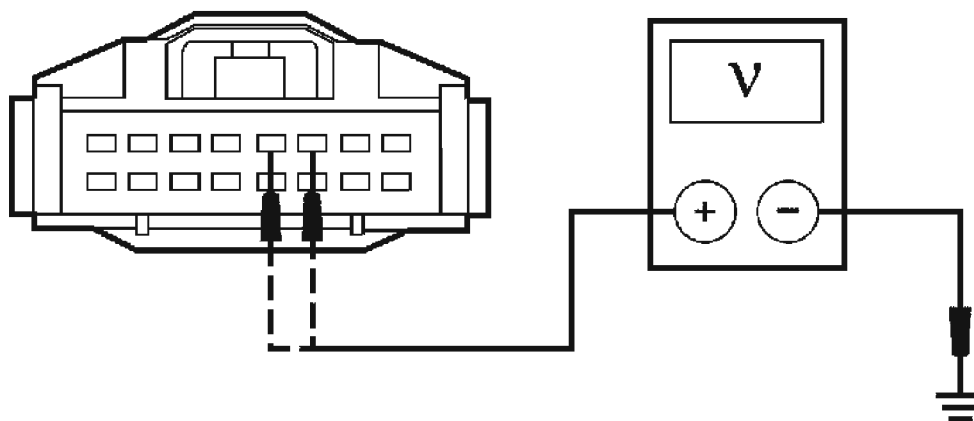
- **Is the resistance less than 5 ohms?**

**Yes :** GO to G9.

**No :** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

#### **G9 CHECK THE 4WD CONTROL MODULE POWER CIRCUITS**

- Key in ON position.
- Measure the voltage between the 4WD control module C3253-6, circuit 704 (DG/LG), harness side and ground; and between the 4WD control module C3253-5, circuit 1003 (GY/YE), harness side and ground.



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**Fig. 13: Measuring Voltage Between 4WD Control Module C3253-6 Circuit 704**

Courtesy of FORD MOTOR CO.

- Are the voltages greater than 10 volts?

**Yes :** GO to G10.

**No :** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

#### **G10 CHECK FOR CORRECT 4WD CONTROL MODULE OPERATION**

- Disconnect the 4WD control module.
- Check for:
  - corrosion
  - pushed-out pins
- Connect the 4WD control module and make sure it seats correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

**Yes :** INSTALL a new 4WD control module. REFER to **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**. CLEAR the DTCs. REPEAT the self-test.

**No :** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

**Normal Operation**

The 4WD control module communicates with the instrument cluster through the high speed CAN. The instrument cluster illuminates the 4WD indicator when as requested by the 4WD control module. Problems with either the high speed CAN or the instrument cluster can effect 4WD operation.

4WD - Illuminates continuously when the 4WD system is locked into permanent four-wheel drive due to heat protection mode. In the locked mode the vehicle resists turning and binds up when driven on dry pavement. To exit the locked mode, stop the vehicle and allow it to cool. When the 4WD indicator turns off, normal 4WD system function is restored.

4WD - Blinks continuously when the 4WD system is disabled due to its heat protection mode. To exit the disabled mode, stop the vehicle and allow it to cool. When the indicator turns off, normal 4WD system function is restored.

4WD - Blinks 3, 6, 8 or 10 times every minute when the 4WD system requires service. Use a diagnostic tool to check for DTCs. Refer to the **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE DIAGNOSTIC TROUBLE CODE (DTC) INDEX**.

**4WD INDICATOR CODE DESCRIPTIONS**

Blinks	Cause
3	Cluster is not receiving the 4WD indicator message from the 4WD control module
6	Invalid throttle position data received from the PCM
8	Invalid wheel speed data received from the ABS module
10	Active torque coupling circuit fault

**Possible Causes**

- SJB fuse(s) 18 (10A), 35 (5A)
- 4WD control module
- instrument cluster
- circuitry

**PINPOINT TEST H: THE 4WD INDICATOR DOES NOT OPERATE CORRECTLY**

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

**H1 CHECK FOR 4WD INDICATOR PROVE OUT**

- Key in OFF position.
- Key in ON position.

- Observe the 4WD indicator.
- **Did the 4WD indicator illuminate for the prove out?**

**Yes** : GO to H2.

**No** : REFER to INSTRUMENT CLUSTER for additional instrument cluster diagnosis.

## H2 CHECK FOR A FLASHING 4WD INDICATOR

- Observe the 4WD indicator.
- **Is the 4WD indicator flashing 3, 6, 8, or 10 times per minute?**

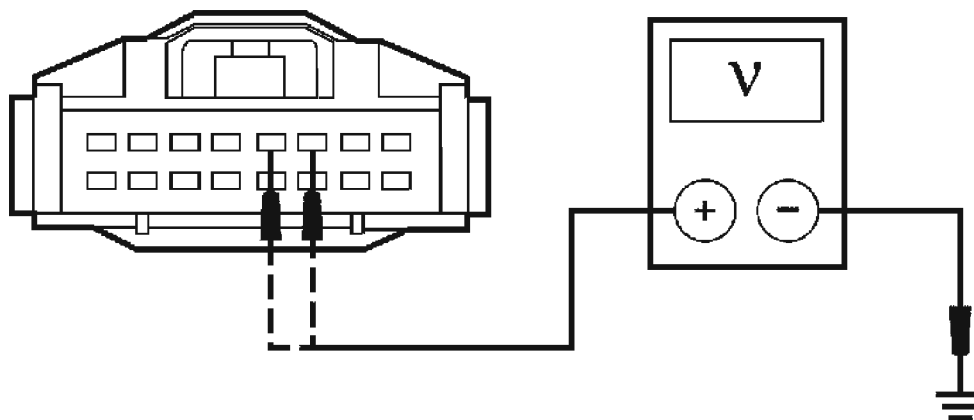
**Yes** : For an indicator flashing 3 times per minute, GO to H3.

For an indicator flashing 6, 8, or 10 times per minute, COMPLETE the self-test and REFER to the FOUR-WHEEL DRIVE (4WD) CONTROL MODULE DIAGNOSTIC TROUBLE CODE (DTC) INDEX.

**No** : GO to H5.

## H3 CHECK THE 4WD CONTROL MODULE POWER CIRCUITS

- Key in OFF position.
- Disconnect: 4WD Control Module C3253.
- Key in ON position.
- Measure the voltage between the 4WD control module C3253-6, circuit 704 (DG/LG), harness side and ground; and between the 4WD control module C3253-5, circuit 1003 (GY/YE), harness side and ground.



**Fig. 14: Measuring Voltage Between 4WD Control Module C3253-6 Circuit 704 (DG/LG)**

Courtesy of FORD MOTOR CO.

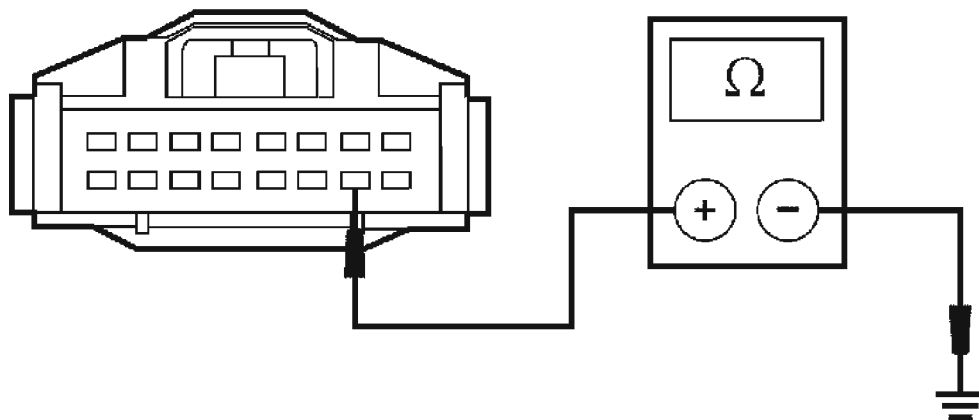
- Are the voltages greater than 10 volts?

Yes : GO to H4.

No : REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

#### **H4 CHECK CIRCUIT 57 (BK) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between the 4WD control module C3254-15, circuit 57 (BK), harness side and ground.



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**Fig. 15: Measuring Resistance Between 4WD Control Module C3254-15 Circuit 57 (BK)**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

Yes : GO to H8.

No : REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

#### **H5 CHECK FOR A CONTINUOUSLY FLASHING 4WD INDICATOR**

- Key in ON position.
- Observe the 4WD indicator.
- Is the 4WD indicator continuously flashing?

Yes : A continuously flashing 4WD indicator indicates the vehicle may have

experienced an over-heating condition in the active torque coupling. Allow the vehicle time to cool. CLEAR the DTCs. REPEAT the self test.

**No** : GO to H6.

### **H6 CHECK FOR A CONTINUOUSLY ON 4WD INDICATOR**

- Observe the 4WD indicator.
- **Is the 4WD indicator continuously ON?**

**Yes** : A continuously ON 4WD indicator indicates the vehicle may have experienced an over-heating condition in the active torque coupling. Allow the vehicle time to cool. CLEAR the DTCs. REPEAT the self test.

**No** : GO to H7.

### **H7 CHECK FOR CORRECT 4WD INDICATOR OPERATION**

- Enter the following diagnostic mode on the diagnostic tool: Active Commands.
- Observe the 4WD indicator while commanding the instrument cluster to turn the lamp ON and OFF.
- **Does the 4WD indicator agree with the diagnostic tool commands?**

**Yes** : GO to H8.

**No** : REFER to **INSTRUMENT CLUSTER** for additional instrument cluster diagnosis.

### **H8 CHECK FOR CORRECT 4WD CONTROL MODULE OPERATION**

- Disconnect the 4WD control module.
- Check for:
  - corrosion
  - pushed-out pins
- Connect the 4WD control module and make sure it seats correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

**Yes** : INSTALL a new 4WD control module. REFER to **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**. CLEAR the DTCs. REPEAT the self-test.

**No** : The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

### **Pinpoint Test I: Vehicle Binds In A Turn Or Resists Turning**

#### **Normal Operation**

The vehicle is equipped with an on-demand 4WD system that is always active and requires no driver input. The system has no mode select switch. The system combines transparent all-surface operation with highly capable four-wheel drive, and is capable of handling all road

conditions, including street and highway driving as well as off-road and winter operation.

The 4WD system continuously monitors vehicle conditions and automatically adjusts the torque distribution between the front and rear wheels. During normal operation, most of the torque is sent to the front wheels. If wheel slip between the front and rear wheels is detected, or if the vehicle is under heavy acceleration, the 4WD system will increase the torque to the rear wheels to prevent or control wheel slip.

The 4WD control module varies the torque sent to the rear wheels by sending a duty cycle to the active torque coupling located inside the rear axle. The 4WD control module also provides the brake system with its current clutch duty cycle and whether or not the brake system may take command of the clutch duty cycle.

#### **Possible Causes**

- rear axle
- wheels/tires
- PCM
- ABS module
- 4WD control module
- circuitry

#### **PINPOINT TEST I: VEHICLE BINDS IN A TURN OR RESISTS TURNING**

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

#### **I1 CHECK FOR TORQUE AT THE REAR WHEELS**

- Key in OFF position.
- Disconnect: Active Torque Coupling C3254.
- Drive the vehicle in a straight line on dry pavement.
- **Is a pulsation or shudder still present?**

**Yes :** REFER to **DRIVELINE SYSTEM-GENERAL INFORMATION** for additional axle diagnosis.

**No :** GO to I2.

#### **I2 CHECK TO SEE IF THE ACTIVE TORQUE COUPLING SOLENOID IS BEING COMMANDED ON**

- Connect: Active Torque Coupling C3254.
- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool: PID/DATA Monitor and Record.

- Drive the vehicle in tight turns on dry pavement while monitoring the active torque coupling duty cycle.

- **Is the duty cycle greater than 20%?**

**Yes** : GO to I3.

**No** : GO to **PINPOINT TEST G.**

### **I3 CHECK FOR THE CORRECT WHEEL SPEEDS**

- Monitor the wheel speed PIDs while driving the vehicle at a constant speed of 48 km/h (30 mph).

- **Are all four wheel speeds within 3 km/h (1.8 mph) of each other?**

**Yes** : GO to I4.

**No** : GO to **PINPOINT TEST J.**

### **I4 CHECK FOR A VALID THROTTLE POSITION**

- Key in OFF position.
- Key in the ON position with the engine OFF.
- Monitor the throttle position while opening and closing the throttle.
- **Does the throttle position match the PID value?**

**Yes** : GO to I5.

**No** : Refer to **INTRODUCTION - GASOLINE** article for Escape (gasoline) and Mariner or **INTRODUCTION- HYBRID ESCAPE** article for Escape (Hybrid) to diagnose the engine control system.

### **I5 CHECK FOR CORRECT 4WD CONTROL MODULE OPERATION**

- Disconnect the 4WD control module.
- Check for:
  - corrosion
  - pushed-out pins
- Connect the 4WD control module, and make sure it seats correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

**Yes** : INSTALL a new 4WD control module. REFER to **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**. CLEAR the DTCs. REPEAT the self-test.

**No** : The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.



The 4WD system continuously monitors vehicle conditions and automatically adjusts the torque distribution between the front and rear wheels. During normal operation, most of the torque is sent to the front wheels. If wheel slip between the front and rear wheels is detected, or if the vehicle is under heavy acceleration, the 4WD system increases the torque to the rear wheels to prevent or control wheel slip.

The 4WD control module varies the torque sent to the rear wheels by sending a duty cycle to the active torque coupling located inside the rear axle. The 4WD control module also provides the brake system with its current clutch duty cycle and whether or not the brake system may take command of the clutch duty cycle.

**Possible Causes**

- wheels/tires
- wheel speed sensors
- ABS module
- 4WD control module

**PINPOINT TEST J: TIRE/AXLE OUT OF ACCEPTABLE RANGE**

**CAUTION:** This test must be carried out on a hard surface in a vacant area without traffic.

**NOTE:** Conduct steps 1-7 outlined in Inspection and Verification prior to performing this test.

**J1 CHECK THE RECENT TIRE USAGE**

- Check with customer about recent tire usage or installation.
- **Has a tire been installed on the vehicle recently that was not originally supplied with the vehicle?**

**Yes :** INFORM the customer to only use tires of the type supplied with the vehicle. CLEAR the DTCs. REPEAT the self-test.

**No :** GO to J2.

**J2 CHECK TIRE SIZE AND BRAND**

- Check the tire size and the brand of tire.
- **Are all four tires the same size and brand?**

**Yes :** GO to J3.

**No :** INSTALL tires that are the same size and brand. INFORM the customer to only use the same size tires and brand. CLEAR the DTCs. REPEAT the self-test.

**J3 CHECK TIRE PRESSURES**

- Check the tire pressure in all 4 tires.

- **Are all 4 tires at the recommended tire pressure?**

**Yes** : GO to J4.

**No** : ADJUST the tire pressures. CLEAR the DTCs. REPEAT the self-test.  
INFORM the customer to maintain the proper tire pressure.

#### **J4 CHECK FOR CORRECT WHEEL SPEEDS**

- Monitor the wheel speed PIDs while driving the vehicle at a constant speed of 48 km/h (30 mph).

- **Are all four wheel speeds within 3 km/h (1.8 mph) of each other?**

**Yes** : GO to J5.

**No** : The ABS module is sending invalid wheel speed data to the 4WD control module. REFER to **ANTI-LOCK CONTROL** for additional ABS diagnosis.

#### **J5 CHECK FOR CORRECT 4WD CONTROL MODULE OPERATION**

- Disconnect the 4WD control module.
- Check for:
  - corrosion
  - pushed-out pins
- Connect the 4WD control module, and make sure it seats correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

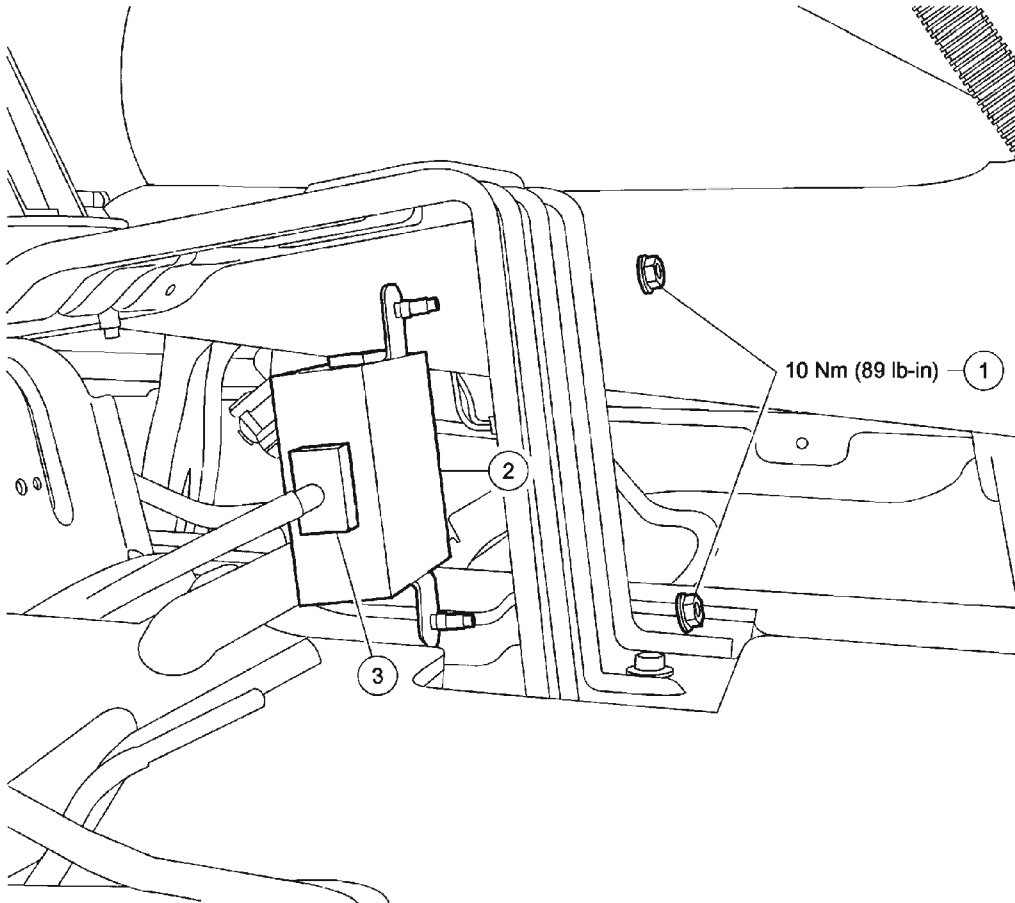
**Yes** : INSTALL a new 4WD control module. REFER to **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**. CLEAR the DTCs. REPEAT the self-test.

**No** : The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

## **REMOVAL AND INSTALLATION**

### **FOUR-WHEEL DRIVE (4WD) CONTROL MODULE**

#### **Removal and Installation**



A0096096

Item	Part Number	Description
1	3A310	4WD control module nuts (2 required)
2	7H417	4WD control module

Item	Part Number	Description
3	—	Electrical connector (part of 14405)

**Fig. 16: Exploded View Of Four-Wheel Drive (4WD) Control Module With Torque Specifications**

Courtesy of FORD MOTOR CO.

1. Remove the floor console. For additional information, refer to **INSTRUMENT PANEL AND CONSOLE**.
2. Remove the 4WD control module nuts.
  - To install, tighten to 10 Nm (89 lb-in).
3. Remove the 4WD control module.
  - Disconnect the electrical connector.
4. To install, reverse the removal procedure.

## 2002 MANUAL A/C-HEATER SYSTEMS

## Escape

## SPECIFICATIONS

**WARNING:** Vehicle is equipped with Supplemental Inflatable Restraint (SIR) system. When servicing vehicle, use care to avoid accidental air bag deployment. SIR system-related components are located in various locations throughout interior and exterior of vehicle, depending on application. Do not use electrical test equipment on or near these circuits. If necessary, deactivate SIR system before servicing components. See appropriate AIR BAG RESTRAINT SYSTEMS article in RESTRAINTS.

## SPECIFICATIONS

Application	Specification
Compressor Type	Ford FS-10 10-Cyl.
Compressor Belt Tension	(1)
Compressor Oil Capacity	(2)
System Oil Capacity <sup>(3)</sup>	9.0 ozs.
Refrigerant (R-134a) Capacity	30 ozs.
System Operating Pressures <sup>(4)</sup>	
High Side	125-225 psi (8.8-15.8 kg/cm <sup>2</sup> )
Low Side	24-45 psi (1.7-3.2 kg/cm <sup>2</sup> )

(1) Belt tension is automatically adjusted by belt tensioner. Tension should be within tensioner indicator marks.

(2) Rotate compressor shaft six to eight revolutions while collecting oil in a clean measuring device. If amount of oil drained from old compressor is between 3-5 ounces (85-142 ml), pour same amount plus one ounce (30 ml) of clean PAG Compressor Oil or equivalent into new compressor. If amount of oil that was removed from old compressor is greater than 5 ounces (142 ml), pour same amount drained of clean PAG Compressor Oil into new compressor. If amount of oil that was removed from old compressor is less than 3 ounces (85 ml), pour 3 ounces (85 ml) of clean PAG Compressor Oil into new compressor.

(3) Use YN-12C PAG Oil (Part No. WSH-M1C231-B).

(4) Approximate operating pressures with ambient temperature of 80°F (27°C).

## DESCRIPTION

**NOTE:** For description and operation not covered in this article, see DESCRIPTION & OPERATION in **ESCAPE** article in **HEATER SYSTEMS**.

The A/C-heater system is a blend-air type, consisting of a control panel, compressor and clutch, blower motor, evaporator core, condenser core, accumulator-drier and plenum assembly. System is controlled by a clutch cycling pressure switch and a high-pressure cut-off switch. Function selector switch is a vacuum and electrical switch, which controls compressor and air distribution. Temperature control switch uses a cable to control air temperature door position.

Blower motor is located in plenum assembly, under instrument panel. Plenum assembly contains evaporator core, heater core, floor/defrost door, panel/defrost door and cable operated temperature blend door. See VACUUM DIAGRAMS.

## OPERATION

### COMPRESSOR RELIEF VALVE

Compressor relief valve is incorporated into compressor manifold and tube assembly to relieve unusually high system discharge pressure buildups of 550 psi (38.7 kg/cm<sup>2</sup>) or more. Compressor relief valve prevents damage to compressor and other system components, as well as avoiding total loss of refrigerant by closing after excess pressure is relieved.

### CLUTCH CYCLING SWITCH

Clutch cycling switch is mounted on a Schrader valve-type fitting on top of accumulator-drier. Electrical contacts inside clutch cycling switch are normally open when pressure is 22-28 psi (1.5-2.0 kg/cm<sup>2</sup>). Contacts close and energize compressor clutch when low-side pressure reaches 40-47 psi (2.8-3.3 kg/cm<sup>2</sup>). When working properly, clutch cycling switch maintains evaporator core temperature just above freezing.

### HIGH-PRESSURE CUT-OFF SWITCH

The high pressure cut-off switch (dual-pressure switch) is mounted on a Schrader valve-type fitting on high-pressure side of condenser to evaporator line, and is used to interrupt compressor clutch operation in case of high system discharge pressures. High pressure cut-off switch has 2 sets of contacts. One contact is normally closed. When system discharge pressure increases to about 450 psi (31.6 kg/cm<sup>2</sup>), normally closed switch contacts open and

compressor clutch will be disengaged. When discharge pressure decreases to 250 psi (17.6 kg/cm<sup>2</sup>), switch contact close allowing compressor operation.

A second set of contacts in high-pressure cut-off switch is used for high speed fan control. When compressor discharge pressure reaches 325 psi (22.8 kg/cm<sup>2</sup>), normally open switch contacts close engaging high speed fan control. When pressure drops to 275 psi (19.3 kg/cm<sup>2</sup>), switch contacts will open disengaging high speed fan control.

### **BLOWER MOTOR RESISTOR & THERMAL LIMITER**

Blower motor resistor assembly (located on evaporator core housing behind glove box) allows 4-speed operation and contains a thermal limiter, which serves as a temperature protection fuse. Thermal limiter is located at a preset distance from resistor coils. If temperature of thermal limiter reaches about 250°F (121°C), limiter contacts will open. This interrupts all blower speed operations. If thermal limiter opens, resistor assembly must be replaced.

### **CONTROL PANEL ASSEMBLY**

#### **Temperature Control**

Temperature control uses a cable to control temperature blend door. Temperature blend door actuator provides a variable number of temperature blend door positions. When temperature control knob is in cool position, temperature blend door shuts off airflow to heater core. When knob is in warm position, air is directed through heater core. When knob is in intermediate positions, heated air is blended with cooler incoming air to achieve desired temperature.

#### **Function Selector Switch**

Function selector switch combines a vacuum selector valve with 2 electrical switches to supply power to clutch circuit and blower motor control circuit. Function selector knob can be placed in MAX A/C, A/C, PANEL, OFF, PANEL & FLOOR, FLOOR, FLR & DEF (floor and defrost) and DEF (defrost) positions. MAX A/C and A/C positions control compressor operation. PANEL, PANEL & FLOOR, FLOOR, FLR & DEF (floor and defrost) and DEF (defrost) positions direct airflow to chosen outlets. Defrost position activates compressor to dehumidify air directed at windshield. Function selector knob position determines which mode doors are open, partially open or closed. Mode doors direct airflow to selected outlets. See **VACUUM DIAGRAMS**.

When function selector knob is in maximum A/C position, air inlet blend door is at full vacuum, closing off outside air and allowing only recirculated air. See **Fig. 1**. Defrost blend door is at full vacuum while footwell blend door is at no vacuum, closing both doors. Vent/register blend door is at partial vacuum, directing airflow to driver side, passenger side and center registers. Temperature control is usually set for maximum cold but may be heated

if selected. Air is picked up at recirculation opening by blower motor. With temperature control set for maximum cold, air flows across evaporator core, diverting past heater core and then directed into passenger compartment through driver side, passenger side and center registers. Compressor is enabled when MAX A/C is selected. Blower motor is on.

When function selector knob is in A/C position, air inlet blend door is set at no vacuum, blocking recirculation passage and admitting outside air. See **Fig. 2** . All other door positions are same as described under MAX A/C. Temperature setting can be changed manually. Compressor is enabled when A/C is selected. Blower motor is on.

When function selector knob is in panel position, air inlet blend door, with no vacuum being applied, blocks recirculated air and allows outside air. See **Fig. 3** . Air flows through system to driver, passenger and center registers. Vent/register blend door is at partial vacuum to direct airflow to driver, passenger and center registers. Defrost blend is at full vacuum and defrost airflow door is at no vacuum, closing off airflow to windshield defroster hose nozzles and footwell ducts. Temperature setting can be changed manually to heat air but air cannot be cooled below outside temperature. Compressor is disabled when VENT is selected. Blower motor is on.

When function selector knob is in off position, air inlet blend door is at full vacuum, closing off outside air and allowing only recirculated air. See **Fig. 4** . Vent/register blend door is at no vacuum and defrost, footwell and blend airflow doors are at no vacuum, closing off passages to driver, passenger and center registers. Blower motor and compressor are off.

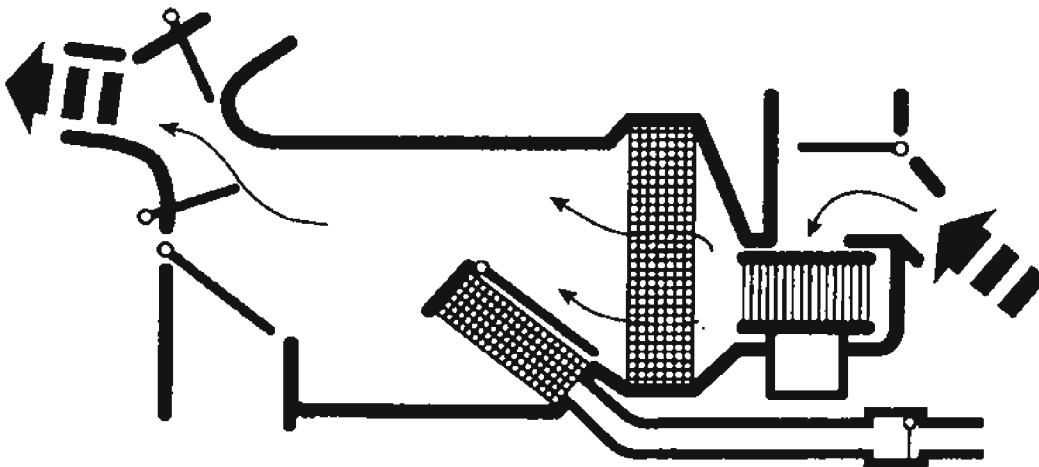
When function selector knob is in panel/floor position, air inlet blend door is set at no vacuum, blocking recirculation passage and allowing outside air. See **Fig. 5** . Footwell blend door is in full vacuum position, and panel airflow door is in full vacuum position allowing airflow to blend between panel vents and footwell ducts. Defrost airflow door is at full vacuum, closing off airflow to windshield defroster hose nozzle and directing airflow to heater outlet footwell duct. Compressor is enabled when PANEL/FLOOR is selected. Blower motor is on.

When function selector knob is in floor position, air inlet blend door is in no vacuum position, blocking recirculation air and allowing outside air. See **Fig. 6** . Footwell airflow door is at full vacuum position, opening door and allowing airflow through footwell ducts. Defrost airflow door and vent/register blend door are in no vacuum position, closing off airflow to windshield defroster hose nozzles and driver, passenger and center registers. Temperature control can be positioned to mix air flowing through and around heater core to achieve selected temperature level. Compressor is disabled when FLOOR is selected. Blower motor is on.

When function selector knob is in floor/defrost position, air inlet blend door is in no vacuum position blocking recirculation air and allowing outside air. See **Fig. 7** . Footwell blend door is at full vacuum allowing air to flow through footwell ducts. Defrost blend door is in no vacuum position, allowing airflow to both windshield defroster hose nozzle and side window

demister hose nozzle ducts. Vent/register blend door is in no vacuum position. Compressor is enabled when FLOOR/DEFROST is selected to dehumidify air and reduce windshield fogging. Blower motor is on.

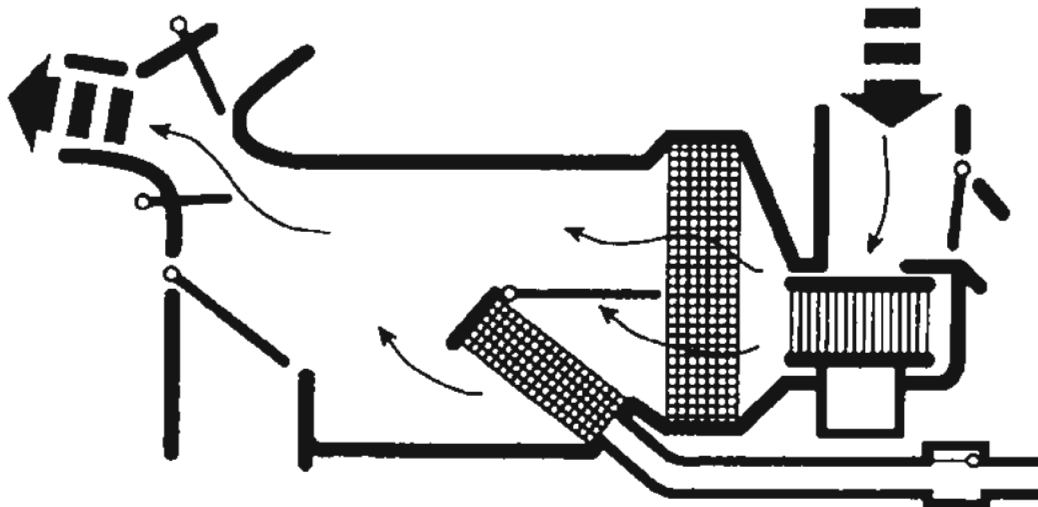
When function selector knob is in defrost position, air inlet blend door is in no vacuum position, allowing outside air. See **Fig. 8**. Defrost blend door is at no vacuum, directing airflow to windshield through defroster ducts and side windows through demister ducts. Panel airflow door and footwell airflow door are in no vacuum position so that most of incoming air is directed to windshield defroster hose nozzle. There is also airflow to side window demister and hose. Temperature control knob setting will determine amount of air that is directed through heater core and amount that bypasses heater core. Compressor is enabled when DEFROST is selected to dehumidify air and reduce windshield fogging. Blower motor is on.



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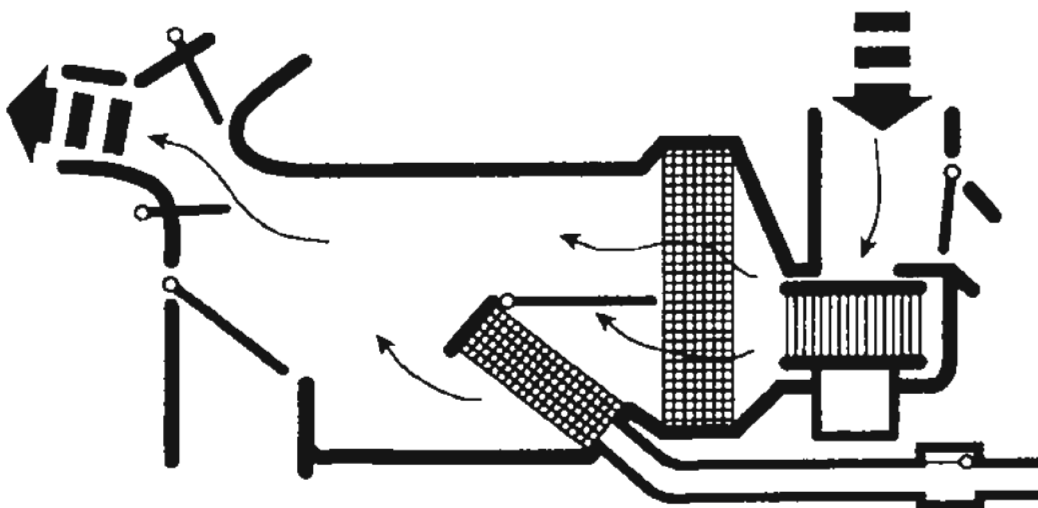
**Fig. 1: Identifying Airflow In Max A/C Position**  
Courtesy of FORD MOTOR CO.





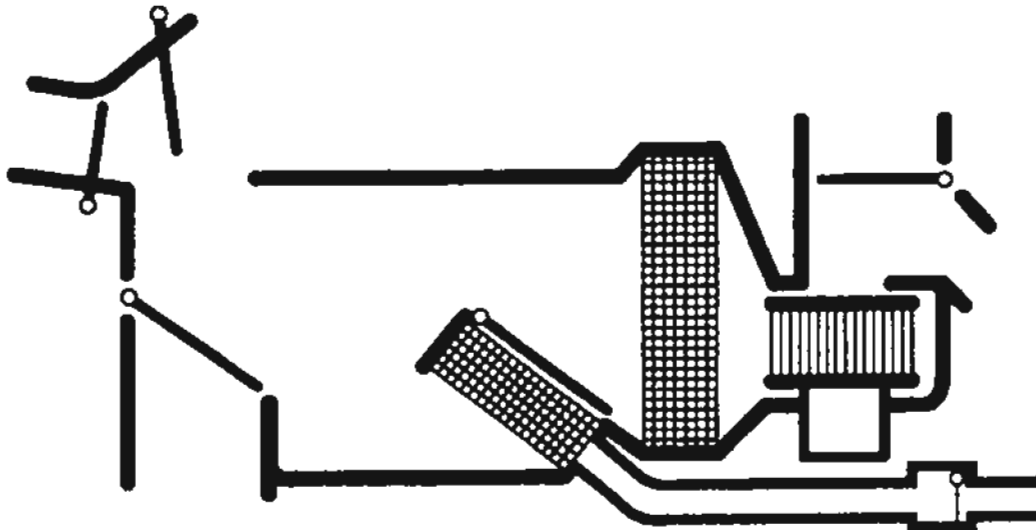
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**Fig. 2: Identifying Airflow In A/C Position**  
Courtesy of FORD MOTOR CO.



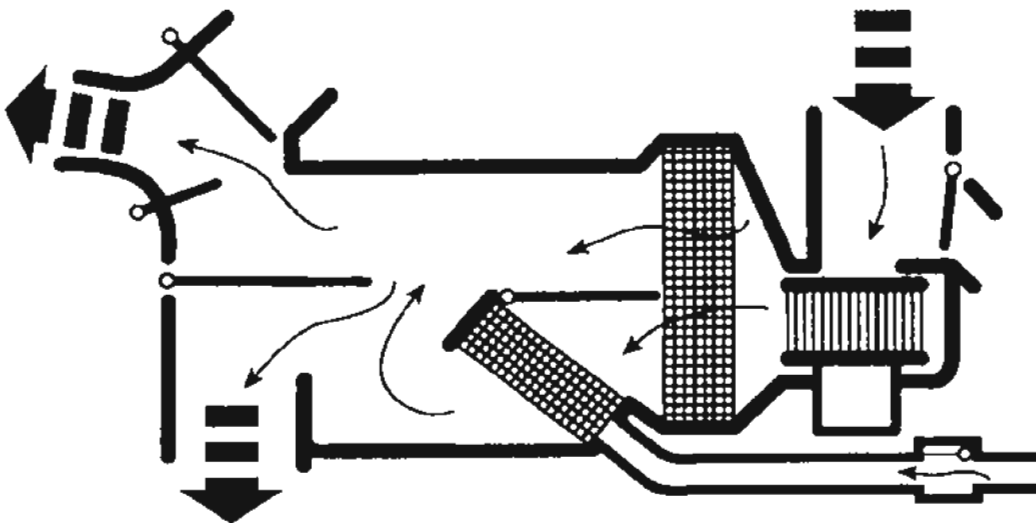
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**Fig. 3: Identifying Airflow In Panel Position**  
Courtesy of FORD MOTOR CO.



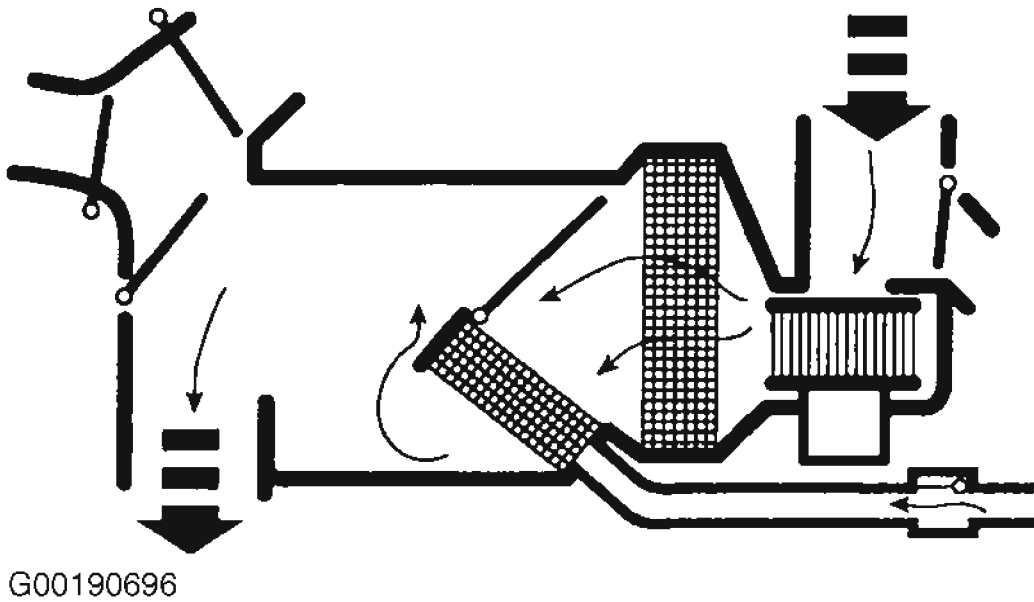
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**Fig. 4: Identifying Airflow In Off Position**  
Courtesy of FORD MOTOR CO.

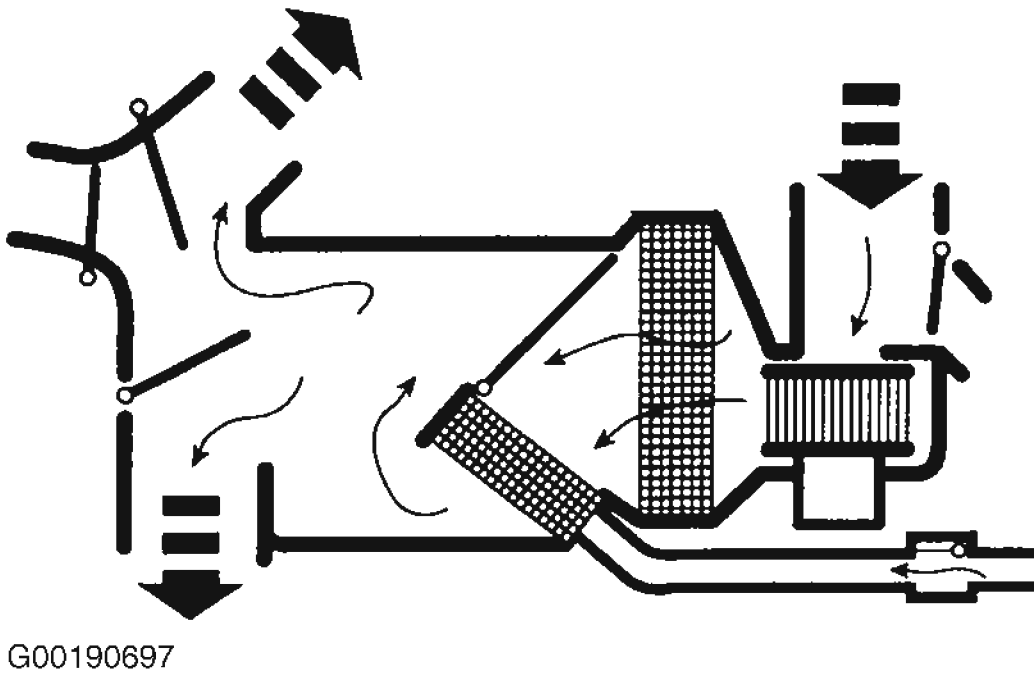


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**Fig. 5: Identifying Airflow In Panel/Floor Position**  
Courtesy of FORD MOTOR CO.

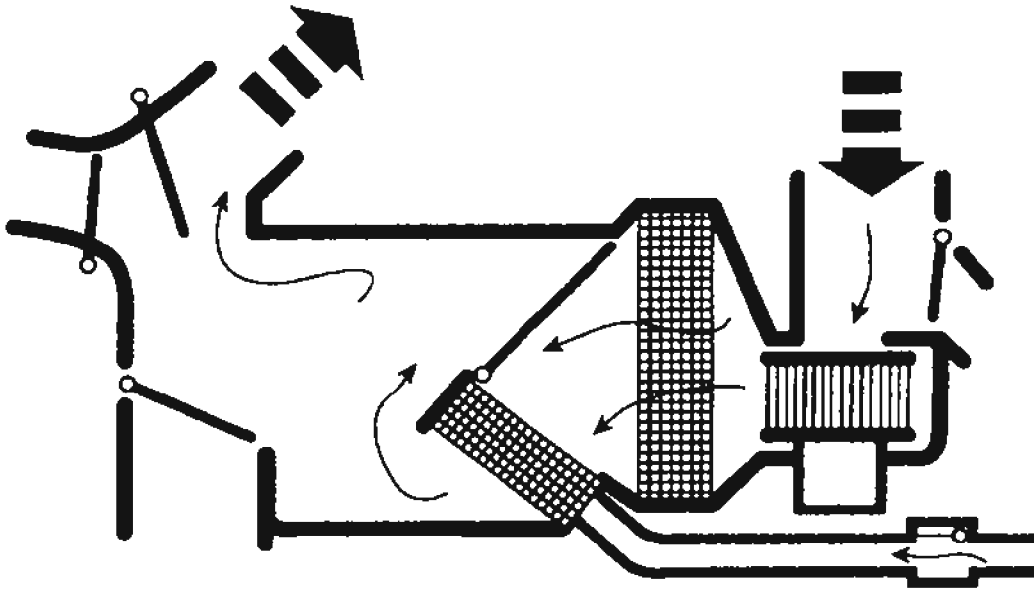


**Fig. 6: Identifying Airflow In Floor Position**  
 Courtesy of FORD MOTOR CO.



**Fig. 7: Identifying Airflow In Floor/Defrost Position**

Courtesy of FORD MOTOR CO.



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**Fig. 8: Identifying Airflow In Defrost Position**  
Courtesy of FORD MOTOR CO.

#### Blower Motor Switch

Blower motor switch controls operating speeds (low, medium-low, medium-high and high) by adding or by-passing resistors in blower motor resistor.

#### EVAPORATOR CORE ORIFICE TUBE

The evaporator core orifice tube for this system is color coded Green and has an orifice diameter of 0.052" (1.25 mm). Located in condenser to evaporator line, orifice tube changes high-pressure liquid refrigerant into a low-pressure liquid. Orifice tube has filter screens on inlet and outlet ends of orifice body to filter any debris in system. "O" rings on orifice tube prevent high-pressure liquid from by-passing orifice tube. Orifice tube is not serviceable and must be replaced. A NEW orifice tube should be installed whenever a NEW compressor is installed.

### COMPONENT LOCATIONS

#### COMPONENT LOCATIONS

Component	Location
Battery Junction Box	Left Front Corner Of Engine Compartment

## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

Compressor Clutch Cycling Pressure Switch	Right Side Of Engine Compartment Near Strut Tower
Compressor Clutch Diode	Battery Junction Box
Compressor Clutch Relay	Battery Junction Box
Cylinder Head Temperature Sensor	Right Front Of Cylinder Head
Dual Pressure Switch	Lower Right Front Of Engine Compartment
Powertrain Control Module	In Recess On Upper Center Of Firewall

## TROUBLE SHOOTING

### PRELIMINARY INSPECTION

1. Verify customer complaints by operating system in all available modes. Carefully check following for possible cause of problems and repair as necessary:
  - A/C compressor.
  - A/C compressor drive belt.
  - A/C clutch.
  - Vacuum lines.
  - Vacuum control motor.
  - Refrigerant lines.
  - Coolant level.
  - Heater hoses.
  - Radiator.
  - Condenser.
  - Suction accumulator.
  - Battery Junction Box (BJB) fuses: 17 (15A), 23 (40A), 25 (40A) or 26 (40A).
  - Central Junction Box (CJB) fuses: 2 (5A), 7 (10A) or 9 (3A).
  - Engine cooling fans.
  - Blower motor.
  - Circuitry.
  - Electrical connectors.
2. If symptom(s) remain after preliminary inspection, connect New Generation Star (NGS) Tester (007-00500), or scan tool, to Data Link Connector (DLC). Perform DATA LINK DIAGNOSTIC test. See appropriate MODULE COMMUNICATIONS NETWORK article in ACCESSORIES & EQUIPMENT.
3. If scan tool displays CKT 914 and CKT 915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, see appropriate MODULE COMMUNICATIONS NETWORK article in ACCESSORIES & EQUIPMENT. Test and repair these circuits before proceeding.

4. If scan tool displays NO RESP/NOT EQUIP for powertrain control module (PCM), turn function selector switch to OFF and perform Powertrain Control Module (PCM) self test. See **SYSTEM TESTS** in SELF-DIAGNOSTICS - EEC-V - GASOLINE & NGV article in ENGINE PERFORMANCE.
5. If scan tool displays SYSTEM PASSED, retrieve and record continuous diagnostic trouble codes (DTCs), erase continuous DTCs and perform PCM self test. See **SELF-DIAGNOSTICS** article in ENGINE PERFORMANCE.
6. If any Diagnostic Trouble Codes (DTC's) are retrieved, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under SELF-DIAGNOSTIC SYSTEM. If symptom remains after repairs have been made, diagnose by symptom. See **SYMPTOM TESTS**.

## PERFORMANCE TESTS

### A/C SYSTEM PERFORMANCE

**NOTE:** If ambient temperature exceeds 100°F (38°C), run engine at idle speed.

1. Park vehicle out of direct sunlight. Connect manifold gauge set to service valves. Close all doors and windows. Insert thermometer in center vent.
2. Place A/C-heater control panel at MAX A/C position and highest blower speed setting. Operate engine at 1500 RPM for 10 minutes to allow A/C system to stabilize.
3. Temperature at center vent must be within 35-49°F (1.7-9.4°C). Ensure high side pressure is within specifications. See **A/C SYSTEM HIGH SIDE PRESSURE SPECIFICATIONS** table. Low side pressure must remain constant at 24-45 psi (2.0-3.0 kg/cm<sup>2</sup>) throughout normal operating range. If temperature or pressures are not as specified, go to **TEST E: INSUFFICIENT A/C COOLING** under SYMPTOM TESTS.

### A/C SYSTEM HIGH SIDE PRESSURE SPECIFICATIONS

Ambient Temp. - °F (°C)	Pressure - psi (kg/cm <sup>2</sup> )
60 (16)	75-175 (5.3-12.3)
70 (21)	100-200 (7.0-14.1)
80 (27)	125-225 (8.8-15.8)
90 (32)	150-250 (10.5-17.6)

## SELF-DIAGNOSTIC SYSTEM

### RETRIEVING DIAGNOSTIC TROUBLE CODES

For retrieving diagnostic trouble codes procedure, see **SELF DIAGNOSTIC SYSTEM** in

SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

## DIAGNOSTIC TROUBLE CODE DEFINITIONS

### DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC <sup>(1)</sup>	Description
P1460	WOT A/C Cutout Internal Driver Malfunction
P1464	A/C Demand Out Of Test Range
P1469	Low A/C Cycling Period
P1474	Low Speed Fan Internal Driver Failure
P1479	High Speed Fan Internal Driver Failure
(1) See <b>DIAGNOSTIC TROUBLE CODES</b> in SELF DIAGNOSTICS article in ENGINE PERFORMANCE.	

## CLEARING DIAGNOSTIC TROUBLE CODES

For clearing diagnostic trouble codes procedure, see **SELF DIAGNOSTIC SYSTEM** in SELF DIAGNOSTICS article in ENGINE PERFORMANCE.

## SUMMARY

If no hard DTCs are present, and symptoms or intermittent DTCs exist, attempt diagnosis by symptom, or by testing individual components related to system fault. See **TROUBLE SHOOTING** and/or **COMPONENT TESTS** . If no problem is found, verify proper system operation. See **A/C SYSTEM PERFORMANCE** under SYSTEM TESTS.

**NOTE:** Always clear DTCs once repairs are complete. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Road test vehicle and retrieve DTCs to determine if complaint or DTC is repaired.

## SYMPTOM TESTS

**NOTE:** For symptom tests not covered in this article, see **SYMPTOM TESTS** in **HEATER SYSTEMS** article.

## SYMPTOM TEST DIRECTORY

Symptom	Perform Test
A/C Inoperative Or Does Not Operate Properly	<b>C</b>
A/C Always On	<b>D</b>
Insufficient A/C Cooling	<b>E</b>
Engine Cooling Fan Inoperative Or Does Not Operate Properly	(1)

(1) See appropriate ELECTRIC COOLING FANS article in ENGINE COOLING.

### TEST C: A/C INOPERATIVE OR DOES NOT OPERATE PROPERLY

**NOTE:** For circuit reference, see WIRING DIAGRAMS .



#### Possible Causes

- Open fuse No. 17 (15 amp), located in Battery Junction Box (BJB).
- Open fuse 2 (5 amp), 7 (10 amp) or 9 (3 amp), located in Central Junction Box (CJB).
- Circuitry short/open.
- A/C clutch relay.
- A/C cycling switch.
- A/C system discharged/low charge.
- Function selector switch.

#### Diagnostic Procedure

For testing procedure, see **Fig. 9 -Fig. 21** .

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

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C1 CHECK PID ACCS WITH A/C ON</b>	
<div><div><div>1</div></div><div>Diagnostic Tool</div></div> <div><div>2</div></div>	<div><div>3</div>Turn the function selector switch to the A/C position.</div>

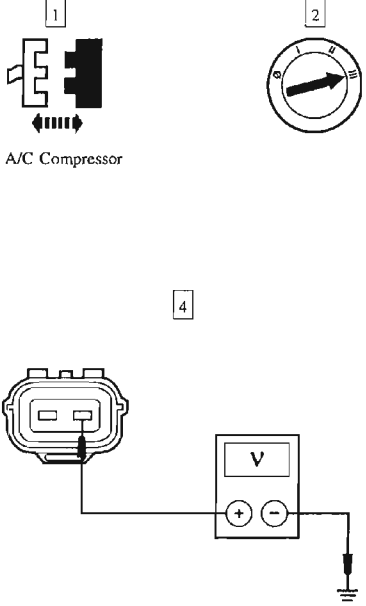
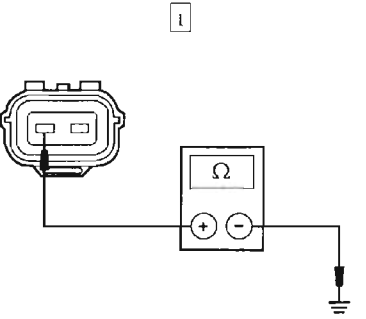
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**Fig. 9: Test C (1 Of 13 - Step C1)**  
Courtesy of FORD MOTOR CO.



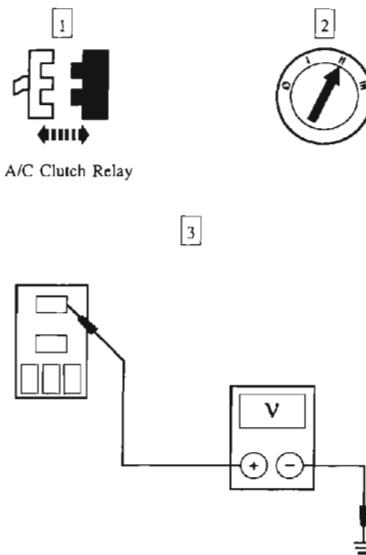
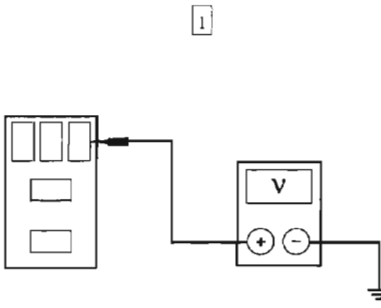
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<http://vnx.su>

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C3 CHECK THE A/C COMPRESSOR CIRCUIT 321 (GY/WH) FOR POWER</b>	
 <p>1</p> <p>2</p> <p>A/C Compressor</p> <p>4</p>	<p>3 Turn the function selector switch to the A/C position.</p> <p>4 Measure the voltage between the A/C compressor clutch Connector pin 1, circuit 321 (GY/WH), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C4.</p> <p>→ <b>No</b> GO to C5.</p>
<b>C4 CHECK CIRCUIT 57 (BK/OG) FOR OPEN</b>	
 <p>1</p>	<p>1 Measure the resistance between the A/C compressor clutch Connector pin 2, circuit 57 (BK), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less then 5 ohms?</li> </ul> <p>→ <b>Yes</b> INSTALL a new clutch field coil.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

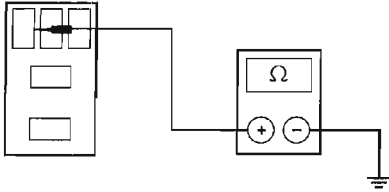
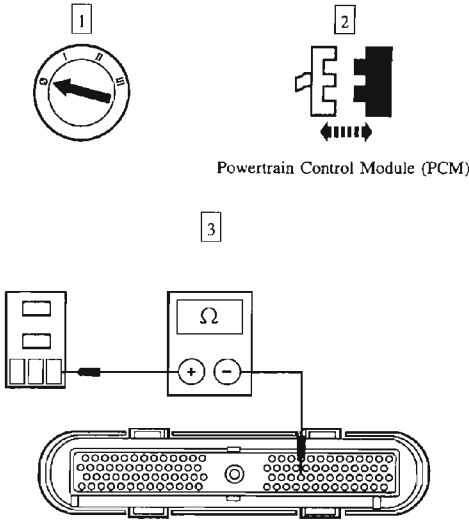
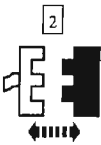
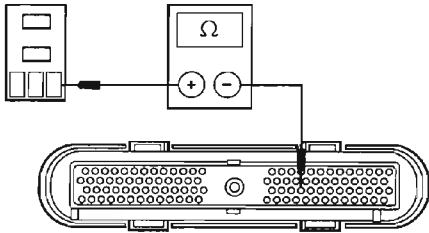
G00190608

**Fig. 11: Test C (3 Of 13 - Steps C3-C4)**  
**Courtesy of FORD MOTOR CO.**

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C5 CHECK CIRCUIT 883 (PK/LB) FOR POWER</b>	
 <p>The diagram shows an A/C Clutch Relay (labeled 1) and a voltmeter (labeled 2). A third label (3) points to the harness side of the relay connector. The voltmeter is connected to pin 3 of the relay connector and ground to measure the voltage of circuit 883 (PK/LB).</p>	<p>3 Measure the voltage between the A/C clutch relay Connector pin 3, circuit 883 (PK/LB), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C6.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>C6 CHECK THE A/C CLUTCH RELAY CIRCUIT 296 (WH/PK) FOR POWER</b>	
 <p>The diagram shows a voltmeter (labeled 1) connected to pin 1 of the A/C clutch relay connector and ground to measure the voltage of circuit 296 (WH/VT).</p>	<p>1 Measure the voltage between A/C clutch relay Connector pin 1, circuit 296 (WH/VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C7.</p> <p>→ <b>No</b> GO to C16.</p>

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**Fig. 12: Test C (4 Of 13 - Steps C5-C6)**  
Courtesy of FORD MOTOR CO.

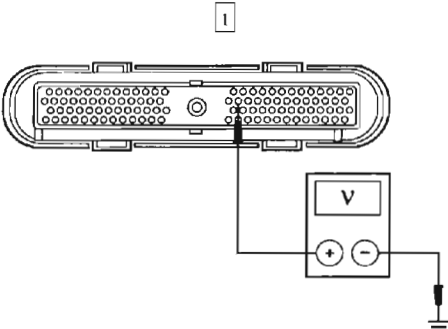
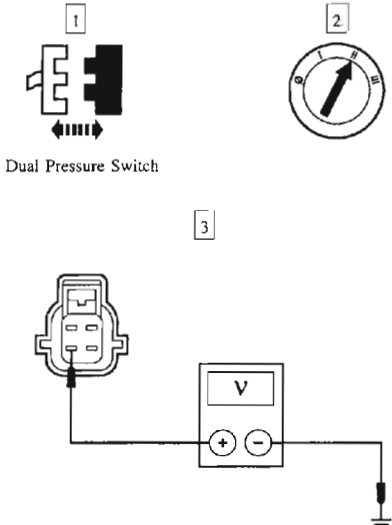
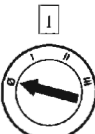
CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C7 CHECK A/C CLUTCH RELAY FOR GROUND</b>	
<p>1</p> 	<p>1 Measure the resistance between the A/C clutch relay Connector pin 2, circuit 331 (PK/YE), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul> <p>→ <b>Yes</b> INSTALL a new A/C clutch relay. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to C8.</p>
<b>C8 CHECK CIRCUIT 331 (PK/YE) FOR OPEN</b>	
<p>1</p>  <p>2</p>  <p>Powertrain Control Module (PCM)</p> <p>3</p> 	<p>3 Measure the resistance between the powertrain control module (PCM) Connector pin 69, circuit 331 (PK/YE), harness side and the A/C clutch relay Connector pin 2, circuit 331 (PK/YE), harness side.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul> <p>→ <b>Yes</b> GO to C9.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

G00190610

**Fig. 13: Test C (5 Of 13 - Steps C7-C8)**  
**Courtesy of FORD MOTOR CO.**

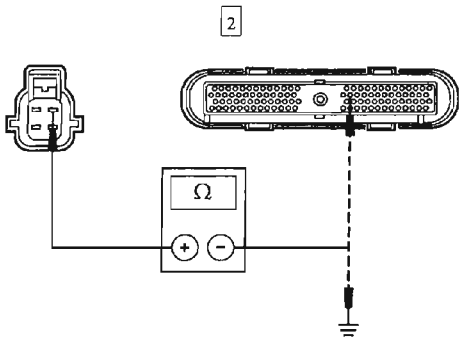
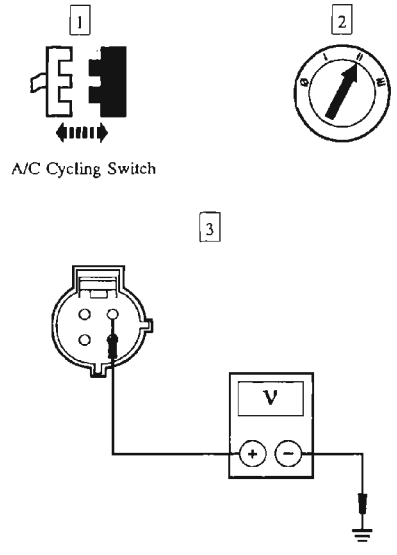
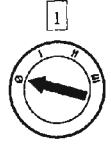
## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C9 CHECK CIRCUIT 198 (DG/OG) FOR POWER</b>	
	<p>1 Measure the voltage between the PCM Connector pin 41, circuit 198 (DG/OG), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C22.</p> <p>→ <b>No</b> GO to C10.</p>
<b>C10 CHECK THE DUAL PRESSURE SWITCH</b>	
	<p>3 Measure the voltage between the dual pressure switch Connector pin 4, circuit 441 (RD/YE), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C11.</p> <p>→ <b>No</b> GO to C12.</p>
<b>C11 CHECK CIRCUIT 198 (DG/OG) FOR OPEN OR SHORT TO GROUND</b>	
	

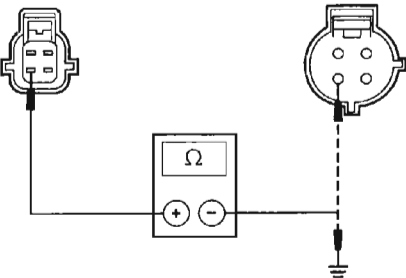
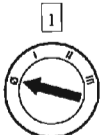

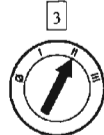
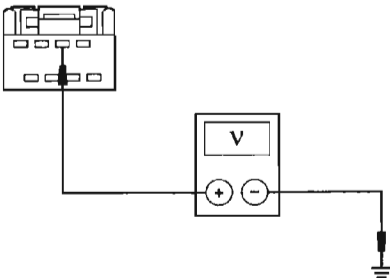
G00190611

**Fig. 14: Test C (6 Of 13 - Steps C9-C10)**  
Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C11 CHECK CIRCUIT 198 (DG/OG) FOR OPEN OR SHORT TO GROUND (Continued)</b>	
	<p>2 Measure the resistance between the dual pressure switch Connector pin 1, circuit 198 (DG/OG), harness side and the PCM Connector pin 41, circuit 198 (DG/OG), harness side; and between the dual pressure switch Connector pin 1, circuit 198 (DG/OG), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less then 5 ohms between the dual pressure switch and the PCM; and greater than 10,000 ohms between the dual pressure switch and ground?</li> </ul> <p>→ <b>Yes</b> INSTALL a new dual pressure switch. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to C12.</p>
<b>C12 CHECK CIRCUIT 348 (PK) FOR POWER</b>	
	<p>3 Measure the voltage between the A/C cycling switch Connector pin 1, circuit 348 (VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C13.</p> <p>→ <b>No</b> GO to C14.</p>
<b>C13 CHECK CIRCUIT 441 (RD/YE) FOR OPEN OR SHORT TO GROUND</b>	
	

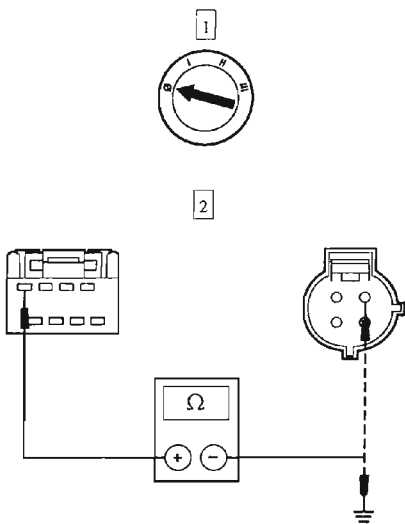

G00190812

**Fig. 15: Test C (7 Of 13 - Steps C11-C13)**  
Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C13 CHECK CIRCUIT 441 (RD/YE) FOR OPEN OR SHORT TO GROUND (Continued)</b>	
<p>2</p> 	<p>2 Measure the resistance between the dual pressure switch Connector pin 4, circuit 441 (RD/YE), harness side and the A/C cycling switch Connector pin 4, circuit 441 (RD/YE), harness side; and between the dual pressure switch Connector pin 4, circuit 441 (RD/YE), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms between the dual pressure switch and the A/C cycling switch; and greater than 10,000 ohms between the dual pressure switch and ground?</li> </ul> <p>→ <b>Yes</b> INSTALL a new dual pressure switch. TEST the system for normal operation.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>C14 CHECK THE SUPPLY TO THE FUNCTION SELECTOR SWITCH</b>	
<p>1</p>  <p>2</p>  <p>3</p>  <p>4</p> 	<p>4 Measure the voltage between function selector switch Connector pin 2, circuit 41 (BK/LB), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C15.</p> <p>→ <b>No</b> GO to C16.</p>

G00190613

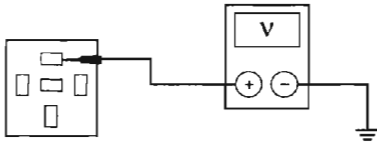
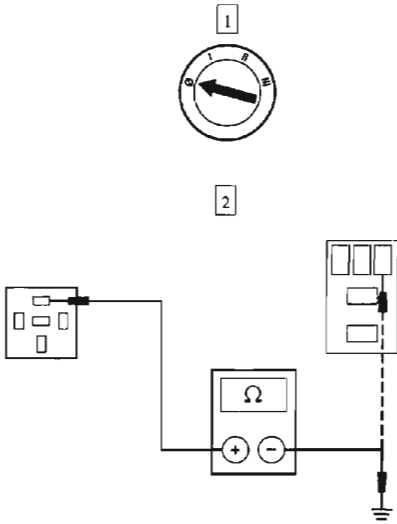
**Fig. 16: Test C (8 Of 13 - Steps C13 Cont.-C14)**  
Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C15 CHECK CIRCUIT 348 (VT) FOR OPEN OR SHORT TO GROUND</b>	
	<p>2 Measure the resistance between the function selector switch Connector pin 4, circuit 348 (VT), harness side and the A/C cycling switch Connector pin 1, circuit 348 (VT), harness side; and between the function selector switch Connector pin 4, circuit 348 (VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms between the function selector switch and the A/C cycling switch; and greater than 10,000 ohms between the function selector switch and ground?</li> </ul> <p>→ <b>Yes</b> INSTALL a new function selector switch. TEST the system for normal operation.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>C16 CHECK THE IGNITION RELAY CIRCUIT 296 (WH/VT) FOR POWER</b>	
 <p>Ignition Relay</p>	

G00190614

**Fig. 17: Test C (9 Of 13 - Steps C15-C16)**  
**Courtesy of FORD MOTOR CO.**



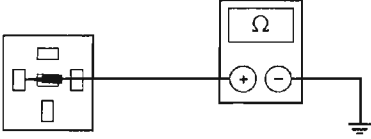
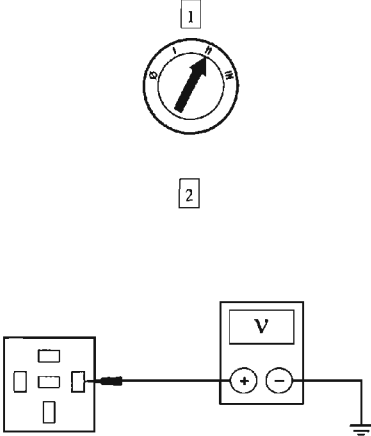
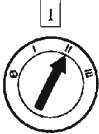
CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C16 CHECK THE IGNITION RELAY CIRCUIT 296 (WH/VT) FOR POWER (Continued)</b>	
<p>3</p> 	<p>3 Measure the voltage between the ignition relay Connector pin 87, circuit 296 (WH/VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C17.</p> <p>→ <b>No</b> GO to C18.</p>
<b>C17 CHECK CIRCUIT 296 (WH/VT) FOR OPEN OR SHORT TO GROUND</b>	
<p>1</p> 	<p>2 Measure the resistance between the ignition relay Connector pin 87, circuit 296 (WH/VT), harness side and the A/C clutch relay Connector pin 1, circuit 296 (WH/VT), harness side; and between the ignition relay Connector pin 87, circuit 296 (WH/VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms between the ignition relay and the A/C clutch relay; and greater than 10,000 ohms between the ignition relay and ground?</li> </ul> <p>→ <b>Yes</b> GO to C18.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

G00190615

**Fig. 18: Test C (10 Of 13 - Steps C16 Cont.-C17)**  
**Courtesy of FORD MOTOR CO.**

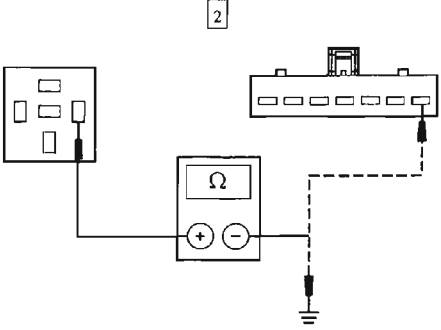
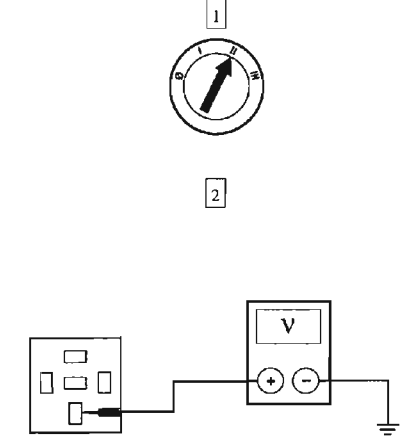
## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C18 CHECK CIRCUIT 57 (BK) FOR OPEN</b>	
<p>1</p> 	<p>1 Measure the resistance between the ignition relay Connector pin 85, circuit 57 (BK), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul> <p>→ <b>Yes</b> GO to C19.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>C19 CHECK THE CIRCUIT 1050 (LG/VT) FOR POWER</b>	
<p>1</p>  <p>2</p>	<p>2 Measure the voltage between the ignition relay Connector pin 86, circuit 1050 (LG/VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to C21.</p> <p>→ <b>No</b> GO to C20.</p>
<b>C20 CHECK THE IGNITION RELAY CIRCUIT 1050 (LG/VT) FOR OPEN OR SHORT TO GROUND</b>	
<p>1</p> 	

G00190616

**Fig. 19: Test C (11 Of 13 Steps C18-C20)**  
**Courtesy of FORD MOTOR CO.**

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C20 CHECK THE IGNITION RELAY CIRCUIT 1050 (LG/VT) FOR OPEN OR SHORT TO GROUND (Continued)</b>	
	<p><b>2</b> Measure the resistance between the ignition relay Connector pin 86, circuit 1050 (LG/VT), harness side and the ignition switch Connector pin 1, circuit 1050 (LG/VT), harness side; and between the ignition relay Connector pin 86, circuit 1050 (LG/VT), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms between ignition relay and the ignition switch; and greater than 10,000 ohms between the ignition relay and ground?</li> </ul> <p>→ <b>Yes</b> GO to C21.</p> <p>→ <b>No</b> Repair the circuit. TEST the system for normal operation.</p>
<b>C21 CHECK CIRCUIT 37 (YE) FOR POWER</b>	
	<p><b>2</b> Measure the voltage between the ignition relay Connector pin 30, circuit 37 (YE), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> INSTALL a new ignition relay. TEST the system for normal operation.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>C22 CHECK FOR CORRECT POWERTRAIN CONTROL MODULE (PCM) OPERATION</b>	
	<p><b>1</b> Disconnect all PCM connectors.</p> <p><b>2</b> Check for:</p> <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul>

G00190617

**Fig. 20: Test C (12 Of 13 - Steps C20 Cont.-C22)**  
Courtesy of FORD MOTOR CO.

## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>C22</b> CHECK FOR CORRECT POWERTRAIN CONTROL MODULE (PCM) OPERATION (Continued)	
	<div><div>3</div>Connect all PCM connectors and make sure they seat correctly.</div> <div><div>4</div>Operate the system and verify the concern is still present.<ul style="list-style-type: none"><li>Is the concern still present?</li></ul><div>→ <b>Yes</b> INSTALL a new PCM. TEST the system for normal operation.</div><div>→ <b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</div></div>

G00190618

**Fig. 21: Test A (13 Of 13 - Step C22 Cont.)**  
Courtesy of FORD MOTOR CO.

#### TEST D: A/C ALWAYS ON

**NOTE:** For circuit reference, see WIRING DIAGRAMS .

#### Possible Causes

- Circuitry short/open.
- A/C clutch relay.
- Function selector switch.

#### Diagnostic Procedure

For testing procedure, see Fig. 22 -Fig. 27 .


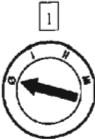


CONDITIONS	DETAILS/RESULTS/ACTIONS
<p><b>D1</b> RETRIEVE AND RECORD THE DTCs FROM THE CONTINUOUS AND ON DEMAND SELF-TEST—POWERTRAIN CONTROL MODULE (PCM)</p> <div> <p>1</p> </div> <div> <p>3</p> </div> <div> <p>4</p> </div> <p>PCM Self-Test</p>	<div> <p>2</p> </div> <p>Make sure the function selector switch is in the OFF position.</p>

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**Fig. 22: Test D (1 Of 6 - Step D1)**  
**Courtesy of FORD MOTOR CO.**

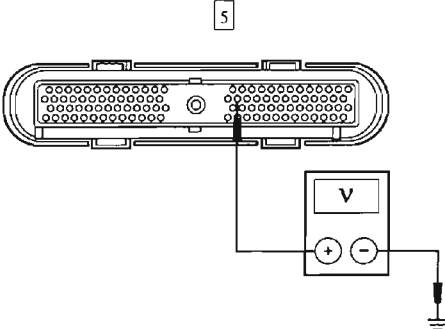
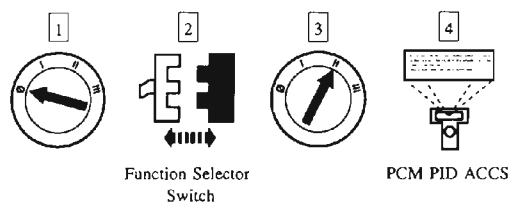
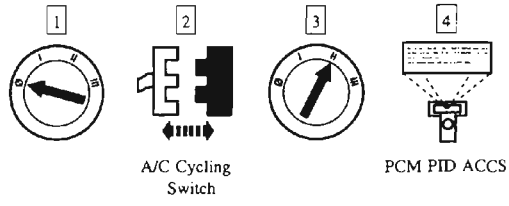
## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>D1 RETRIEVE AND RECORD THE DTCS FROM THE CONTINUOUS AND ON DEMAND SELF-TEST—POWERTRAIN CONTROL MODULE (PCM) (Continued)</b>	
	<p>5 Retrieve and document the continuous DTCs.</p> <ul style="list-style-type: none"> <li>Is DTC P1464 retrieved?</li> </ul> <p>→ <b>Yes</b> GO to <b>D2</b>.</p> <p>→ <b>No</b> GO to <b>D7</b>.</p>
<b>D2 MONITOR THE PID ACCS WITH THE A/C OFF</b>	
<p>1</p>  <p>PCM PID ACCS</p>	<p>2 Turn the function selector switch to the OFF position.</p> <ul style="list-style-type: none"> <li>Does the PCM PID ACCS read ON?</li> </ul> <p>→ <b>Yes</b> GO to <b>D3</b>.</p> <p>→ <b>No</b> GO to <b>D7</b>.</p>
<b>D3 CHECK FOR A FALSE INPUT SIGNAL TO THE POWERTRAIN CONTROL MODULE (PCM)</b>	
<p>1</p>  <p>2</p>  <p>3</p>  <p>Powertrain Control Module (PCM)</p>	<p>4 Turn the function selector switch to the OFF position.</p>

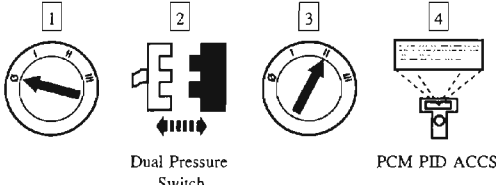

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**Fig. 23: Test D (2 Of 6 - Steps D1 Cont.-D3)**  
Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>D3 CHECK FOR A FALSE INPUT SIGNAL TO THE POWERTRAIN CONTROL MODULE (PCM)</b> (Continued)	
	<p>5 Measure the voltage between the powertrain control module (PCM) Connector pin 41, circuit 198 (DG/OG), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to D4.</p> <p>→ <b>No</b> GO to D6.</p>
<b>D4 CHECK THE FUNCTION SELECTOR SWITCH FOR A SHORT TO POWER</b>	
 <p>Function Selector Switch</p> <p>PCM PID ACCS</p>	<ul style="list-style-type: none"> <li>Does the PCM PID ACCS read ON?</li> </ul> <p>→ <b>Yes</b> GO to D5.</p> <p>→ <b>No</b> INSTALL a new function selector switch. TEST the system for normal operation.</p>
<b>D5 CHECK CIRCUIT 348 (PK) FOR A SHORT TO POWER</b>	
 <p>A/C Cycling Switch</p> <p>PCM PID ACCS</p>	<ul style="list-style-type: none"> <li>Does the PCM PID ACCS read ON?</li> </ul> <p>→ <b>Yes</b> GO to D6.</p> <p>→ <b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 24: Test D (3 Of 6 - Steps D3 Cont.-D5)**  
 Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>D6 CHECK CIRCUIT 198 (DG/OG) FOR SHORT TO POWER</b>	
 <p>Dual Pressure Switch</p> <p>PCM PID ACCS</p>	<ul style="list-style-type: none"> <li>Does PCM PID ACCS read ON?</li> </ul> <p>→ <b>Yes</b> REPAIR the circuit 198 (DG/OG) for a short to power. TEST the system for normal operation.</p> <p>→ <b>No</b> REPAIR circuit 441 (RD/YE) for a short to power. TEST the system for normal operation.</p>
<b>D7 CHECK FOR A SHORTED A/C CLUTCH RELAY</b>	
 <p>A/C Clutch Relay</p>	<p>3 Observe the A/C compressor.</p> <ul style="list-style-type: none"> <li>Is the A/C compressor operating?</li> </ul> <p>→ <b>Yes</b> RECONNECT the A/C relay. GO to D11.</p> <p>→ <b>No</b> GO to D8.</p>
<b>D8 CHECK A/C CLUTCH RELAY</b>	
	<p>1 Carry out the A/C clutch relay component test.</p> <ul style="list-style-type: none"> <li>Is the A/C clutch relay OK?</li> </ul> <p>→ <b>Yes</b> GO to D9.</p> <p>→ <b>No</b> INSTALL a new A/C clutch relay. TEST the system for normal operation.</p>

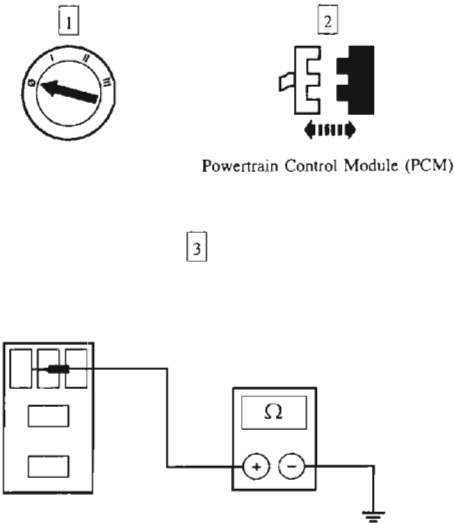
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**Fig. 25: Test D (4 Of 6 - Steps D6-D8)**  
Courtesy of FORD MOTOR CO.



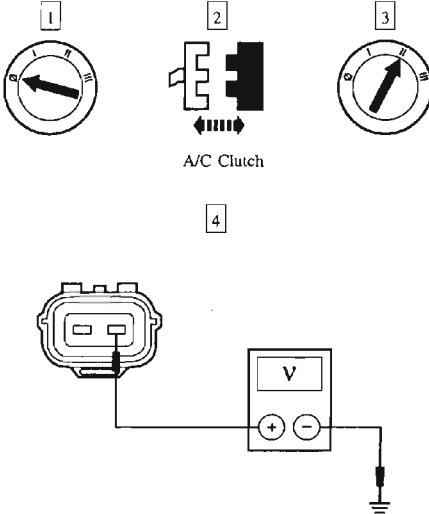
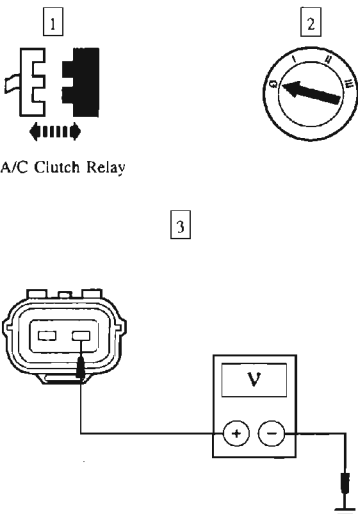
# 2002 Ford Escape

## 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>D9 CHECK CIRCUIT 331 (PK/YE) FOR SHORT TO GROUND</b>	
 <p>Powertrain Control Module (PCM)</p>	<p><b>3</b> Measure the resistance between the A/C clutch relay Connector pin 2, circuit 331 (PK/YE), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul> <p>→ <b>Yes</b> REPAIR the circuit. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to <b>D10</b>.</p>
<b>D10 CHECK FOR CORRECT POWERTRAIN CONTROL MODULE (PCM) OPERATION</b>	
	<p><b>1</b> Disconnect all PCM connectors.</p> <p><b>2</b> Check for:</p> <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> <p><b>3</b> Connect all PCM connectors and make sure they seat correctly.</p> <p><b>4</b> Operate the system and verify the concern is still present.</p> <ul style="list-style-type: none"> <li>Is the concern still present?</li> </ul> <p>→ <b>Yes</b> INSTALL a new PCM. TEST the system for normal operation.</p> <p>→ <b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>

G00190623

**Fig. 26: Test D (5 Of 6 - Steps D9-D10)**  
Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>D11 CHECK FOR A SHORTED A/C CLUTCH INPUT</b>	
 <p>A/C Clutch</p>	<p>4 Measure the voltage between the A/C clutch Connector pin 1, circuit 321 (GY/WH), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul> <p>→ <b>Yes</b> GO to D12.</p> <p>→ <b>No</b> CHECK the clutch air gap.</p>
<b>D12 CHECK CIRCUIT 321 (GY/WH) FOR SHORT TO POWER</b>	
 <p>A/C Clutch Relay</p>	<p>3 Measure the voltage between the A/C clutch Connector pin 1, circuit 321 (GY/WH), harness side and ground.</p> <ul style="list-style-type: none"> <li>Is there voltage present?</li> </ul> <p>→ <b>Yes</b> REPAIR the circuit. TEST the system for normal operation.</p> <p>→ <b>No</b> INSTALL a new A/C clutch relay. TEST the system for normal operation.</p>

G00190624

**Fig. 27: Test D (6 Of 6 - Steps D11-D12)**  
**Courtesy of FORD MOTOR CO.**

### TEST E: INSUFFICIENT A/C COOLING

**NOTE:** For circuit reference, see **WIRING DIAGRAMS**.

#### Possible Causes

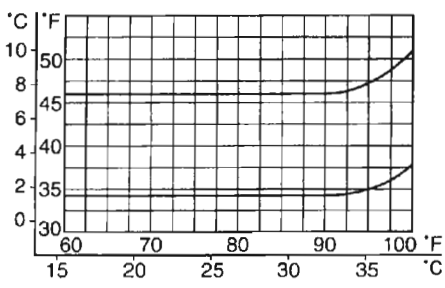
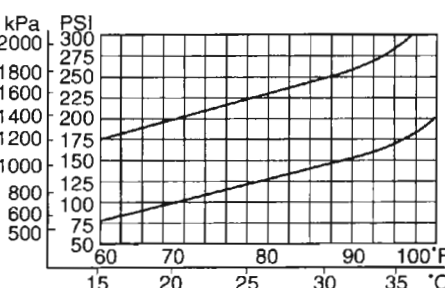
- Restricted orifice tube.

- Open fuse 2 (5 amp), 7 (10 amp) or 9 (3 amp), located in Central Junction Box (CJB).
- A/C system discharged/low charge.
- A/C cycling switch.
- Inoperative cooling fans.

### Diagnostic Procedure

For testing procedure, see **Fig. 28 -Fig. 33**.

**NOTE:** Verify the cooling fans are operating correctly. If the cooling fans are inoperative, high system pressures and insufficient cooling will result.

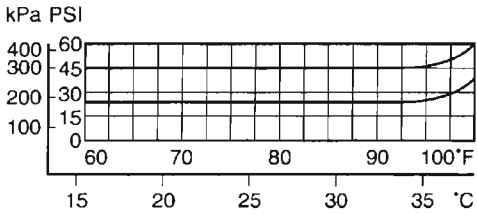
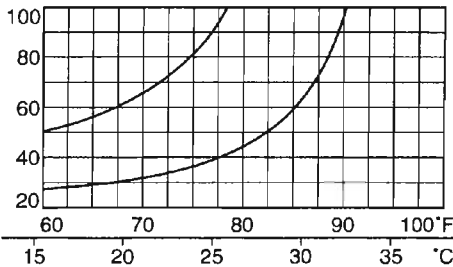
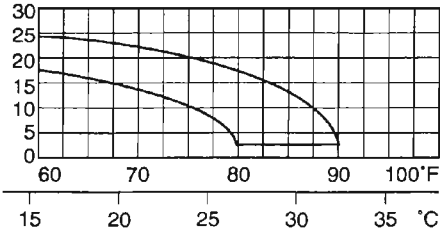
CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>E1 CHECK THE CENTER A/C REGISTER DISCHARGE TEMPERATURE</b>	
<p>2</p> 	<p>1 Carry out the refrigerant system tests; refer to Refrigerant System Tests in this section.</p> <p>2 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for center A/C register discharge temperature.</p> <ul style="list-style-type: none"> <li>• Is the intersection of the two lines within the upper and lower limits?</li> </ul> <p>→ <b>Yes</b> The tests indicate that the system is functioning normally.</p> <p>→ <b>No</b> GO to E2.</p>
<b>E2 CHECK FOR NORMAL DISCHARGE PRESSURE</b>	
<p>1</p> 	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for compressor discharge (high) pressure.</p> <ul style="list-style-type: none"> <li>• Is the intersection of the two lines within the upper and lower limits?</li> </ul> <p>→ <b>Yes</b> GO to E3.</p> <p>→ <b>No</b> GO to E8.</p>

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**Fig. 28: Test E (1 Of 6 - Steps E1-E2)**  
Courtesy of FORD MOTOR CO.

# 2002 Ford Escape

## 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>E3 EVALUATE THE SYSTEM LOW PRESSURE PERFORMANCE</b>	
<p>1</p> 	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for compressor suction (low) pressure.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines within the upper and lower limits?</li> </ul> <p>→ <b>Yes</b> GO to E4.</p> <p>→ <b>No</b> GO to E6.</p>
<b>E4 CHECK FOR A SLOW OR CONTINUOUS RUN A/C CLUTCH CYCLE RATE</b>	
<p>1</p> 	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for total A/C clutch cycle time (time ON plus time OFF) in seconds.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines above the upper limit?</li> </ul> <p>→ <b>Yes</b> GO to E5.</p> <p>→ <b>No</b> INSTALL a new A/C evaporator core due to a partially restricted or plugged condition. TEST the system for normal operation.</p>
<b>E5 CHECK FOR A LONG OR CONTINUOUS A/C CLUTCH OFF TIME</b>	
<p>1</p> 	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for A/C clutch OFF time in seconds.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines above the upper limit?</li> </ul> <p>→ <b>Yes</b> DISCHARGE and RECOVER the system to remove excessive moisture or refrigerant oil. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to E7.</p>

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**Fig. 29: Test E (2 Of 6 - Steps E3-E5)**  
Courtesy of FORD MOTOR CO.

## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>E6 CHECK FOR A HIGH SUCTION PRESSURE</b>	
	<p>1 Refer to the data plot used to evaluate the system low pressure performance in Step E3.</p> <ul style="list-style-type: none"><li>Is the intersection of the two lines above the upper limit?</li></ul> <p>→ <b>Yes</b> REMOVE the A/C evaporator core orifice to install new O-ring seals if seals are missing or damaged (leaking). TEST the system for normal operation.</p> <p>→ <b>No</b> INSTALL a new A/C cycling switch when the intersection of the two lines is below the lower limit. TEST the system for normal operation.</p>
<b>E7 CHECK THE AMBIENT TEMPERATURE</b>	
	<p>1 Refer to the data plot used to evaluate the system A/C clutch OFF time in Step E5.</p> <ul style="list-style-type: none"><li>Is the ambient temperature above 26°C (80°F)?</li></ul> <p>→ <b>Yes</b> This is normal operation for the refrigerant system in high humidity conditions.</p> <p>→ <b>No</b> DISCHARGE and RECOVER the system to correct an overcharge condition. TEST the system for normal operation.</p>
<b>E8 CHECK FOR A HIGH DISCHARGE PRESSURE</b>	
	<p>1 Refer to the data plot used to evaluate the system high pressure performance in Step E2.</p> <ul style="list-style-type: none"><li>Is the intersection of the two lines above the upper limit?</li></ul> <p>→ <b>Yes</b> GO to <b>E9</b>.</p> <p>→ <b>No</b> GO to <b>E11</b>.</p>

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**Fig. 30: Test E (3 Of 6 - Steps E6-E8)**  
Courtesy of FORD MOTOR CO.

# 2002 Ford Escape

## 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>E9 CHECK FOR A NORMAL LOW PRESSURE</b>	
<p>1</p>	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for compressor suction (low) pressure.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines within the upper and lower limits?</li> </ul> <p>→ <b>Yes</b> Diagnose engine cooling system. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to E10.</p>
<b>E10 CHECK FOR A NORMAL-TO-LOW SUCTION PRESSURE</b>	
	<p>1 Refer to the data plot used to evaluate the system low pressure performance in Step E9.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines below the lower limit?</li> </ul> <p>→ <b>Yes</b> INSTALL a new A/C evaporator core orifice due to a partially restricted or plugged condition. TEST the system for normal operation.</p> <p>→ <b>No</b> INSPECT the A/C condenser core (19712) for a partially blocked or inadequate airflow. TEST the system for normal operation.</p>
<b>E11 CHECK FOR A NORMAL SUCTION PRESSURE</b>	
<p>1</p>	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for compressor suction (low) pressure.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines within the upper and lower limits?</li> </ul> <p>→ <b>Yes</b> GO to E12.</p> <p>→ <b>No</b> GO to E15.</p>

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**Fig. 31: Test E (4 Of 6 - Steps E9-E11)**  
Courtesy of FORD MOTOR CO.

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>E12 CHECK FOR A SLOW A/C CLUTCH CYCLE RATE</b>	
<p>1</p>	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for total A/C clutch cycle time (time ON plus time OFF) in seconds.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines above the upper limit?</li> </ul> <p>→ <b>Yes</b> INSTALL a new evaporator to compressor suction line due to a partially restricted or plugged condition. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to <b>E13</b>.</p>
<b>E13 CHECK FOR A NORMAL A/C CLUTCH OFF TIME</b>	
<p>1</p>	<p>1 Use the recorded data from the refrigerant system tests to plot a vertical line for ambient temperature and a horizontal line for A/C clutch OFF time in seconds.</p> <ul style="list-style-type: none"> <li>Is the intersection of the two lines within the upper and lower limits?</li> </ul> <p>→ <b>Yes</b> INSPECT the A/C evaporator core due to a low or restricted airflow. TEST the system for normal operation.</p> <p>→ <b>No</b> GO to <b>E14</b>.</p>

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**Fig. 32: Test E (5 Of 6 - Steps E12-E13)**  
**Courtesy of FORD MOTOR CO.**

## 2002 Ford Escape

### 2002 MANUAL A/C-HEATER SYSTEMS Escape

CONDITIONS	DETAILS/RESULTS/ACTIONS
<b>E14 CHECK FOR A LONG A/C CLUTCH OFF TIME</b>	
	<div><div>1</div><div>Refer to the data plot used to evaluate the system A/C clutch OFF time performance in Step E13.<ul style="list-style-type: none"><li>Is the intersection of the two lines above the upper limit?<div><div>→</div><div><b>Yes</b> INSTALL a new A/C condenser core due to a partially restricted or plugged condition. TEST the system for normal operation.</div></div></li><li>→ <b>No</b> EVALUATE and RECHARGE the system when the intersection of the two lines is below the lower limit. TEST the system for normal operation.</li></ul></div></div>
<b>E15 CHECK FOR A MISSING A/C EVAPORATOR CORE ORIFICE</b>	
	<div><div>1</div><div>Remove the A/C evaporator core orifice; refer to Section 412-03.<ul style="list-style-type: none"><li>Is the A/C evaporator core orifice missing?<div><div>→</div><div><b>Yes</b> INSTALL a new A/C evaporator core orifice. TEST the system for normal operation.</div></div></li><li>→ <b>No</b> INSTALL a new A/C compressor due to low performance. TEST the system for normal operation.</li></ul></div></div>

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**Fig. 33: Test E (6 Of 6 - Steps E14-E15)**

Courtesy of FORD MOTOR CO.

## COMPONENT TESTS

**NOTE:** For component tests not covered in this article, see **COMPONENT TESTS** article in **HEATER SYSTEMS**.

### A/C EVAPORATOR/CONDENSER CORE, ON-VEHICLE LEAK TEST

**NOTE:** DO NOT leak test an evaporator core with accumulator-drier attached to core tubes.

**NOTE:** The automatic shut-off valves on some gauge set hoses do not open when connected to test fittings. If available, use hoses without shut-off valves. If hoses with shut-off valves are used, make sure valve opens when attached to test fittings or install an adapter which will activate valve. Test is not valid if shut-off valve



**does not open.**

1. Discharge A/C system, using approved recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.
2. Disconnect evaporator core or condenser core from A/C system.
3. Clean spring lock couplings. See **CLEANING SPRING LOCK COUPLINGS** under ON VEHICLE SERVICE. Connect appropriate test fittings to evaporator or condenser tube connections.
4. Connect red and blue hoses from R-134a Manifold Gauge Set to test fittings on evaporator core or condenser core. Connect yellow hose to a known good vacuum pump.
5. Open both gauge set valves and start vacuum pump. Allow vacuum pump to operate for a minimum of 45 minutes after gauge set low pressure gauge indicates 30 in-Hg (101 kPa). A 45 minute evacuation is necessary to remove any refrigerant from oil left in evaporator core or condenser core. If refrigerant is not completely removed from oil, out-gassing will degrade vacuum and appear as a refrigerant leak.
6. If low pressure gauge reading will not drop to 30 in-Hg (101 kPa) when valves on gauge and manifold set are open and vacuum pump is operating, close gauge set valves and observe low pressure gauge. If pressure rises rapidly to zero, a large leak is indicated. Recheck test fitting connections and gauge set connections before replacing evaporator core or condenser core.
7. After evacuating for 45 minutes, close gauge set valves and stop vacuum pump. Observe low pressure gauge, it should remain at 30 in-Hg (101 kPa) mark.
8. If low pressure gauge reading rises 10 or more in-Hg (34 or more kPa) of vacuum from 30 in-Hg (101 kPa) position in 10 minutes, a leak is indicated.
9. If a very small leak is suspected, wait 30 minutes and observe vacuum gauge.
10. If a small amount of vacuum is lost, operate vacuum pump with gauge valves open for an additional 30 minutes to remove any remaining refrigerant from oil in evaporator core or condenser core. Then recheck for loss of vacuum.
11. If a very small leak is suspected, allow system to set overnight with vacuum applied and check for vacuum loss.
12. If evaporator core or condenser core does leak, as verified by above procedure, install a NEW evaporator core or condenser core.

#### **A/C COMPRESSOR, EXTERNAL LEAK TEST**

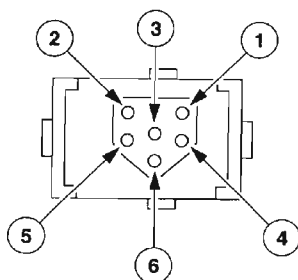
1. Install A/C pressure test adapter on rear head of compressor using existing manifold retaining bolt.
2. Connect high and low pressure lines of a manifold gauge set to corresponding fittings on A/C pressure test adapter.

3. Attach center hose of manifold gauge set to a refrigerant container standing in an upright position.
4. Hand-rotate compressor shaft 10 complete revolutions to distribute oil inside compressor.
5. Open low pressure gauge valve, high pressure gauge valve and valve on refrigerant container to allow refrigerant vapor to flow into compressor.
6. Using Automatic Calibration Halogen Leak Detector, check for leaks at compressor shaft seal and compressor center seal.
7. If a shaft seal leak is found, install a NEW shaft seal. If an external leak is found at center joint of compressor, install a NEW compressor.
8. When leak test is complete, recover refrigerant from compressor.

### FUNCTION CONTROL SWITCH

**NOTE:** For circuit reference, see WIRING DIAGRAMS.

To check function control switch operation, see **Fig. 34**.



**NOTE:** A leak in the vacuum control circuits will send all airflow to the defroster outlets. This condition may occur during acceleration indicating a slow leak, exist at all times indicating a large leak, or it may exist only when specific functions are selected indicating a leak in that portion of the circuit.

Switch Port	Color	Function	Function Selector Switch Position							
			MAX A/C	A/C	Panel	Floor/Panel	OFF	Floor	Floor/Defrost	Defrost
1	White	Recirc/fresh	V	NV	NV	NV	V	NV	V	V
2	Yellow	Defrost	V	V	V	V	V	V	NV	NV
3	Red	Floor	NV	NV	NV	V	V	V	V	NV
4	Orange	Panel/Floor	V	V	V	V	NV	NV	NV	NV
5	Black	Vacuum source	V	V	V	V	V	V	V	V
6	Not Used	Not Used	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

V=Vacuum

NV=No vacuum

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**Fig. 34: Testing Function Control Switch**  
Courtesy of FORD MOTOR CO.

## ON VEHICLE SERVICE

**NOTE:** For general service procedures such as system flushing, leak testing, etc., see appropriate procedure in **GENERAL SERVICING PROCEDURES** article in **GENERAL SERVICING**.

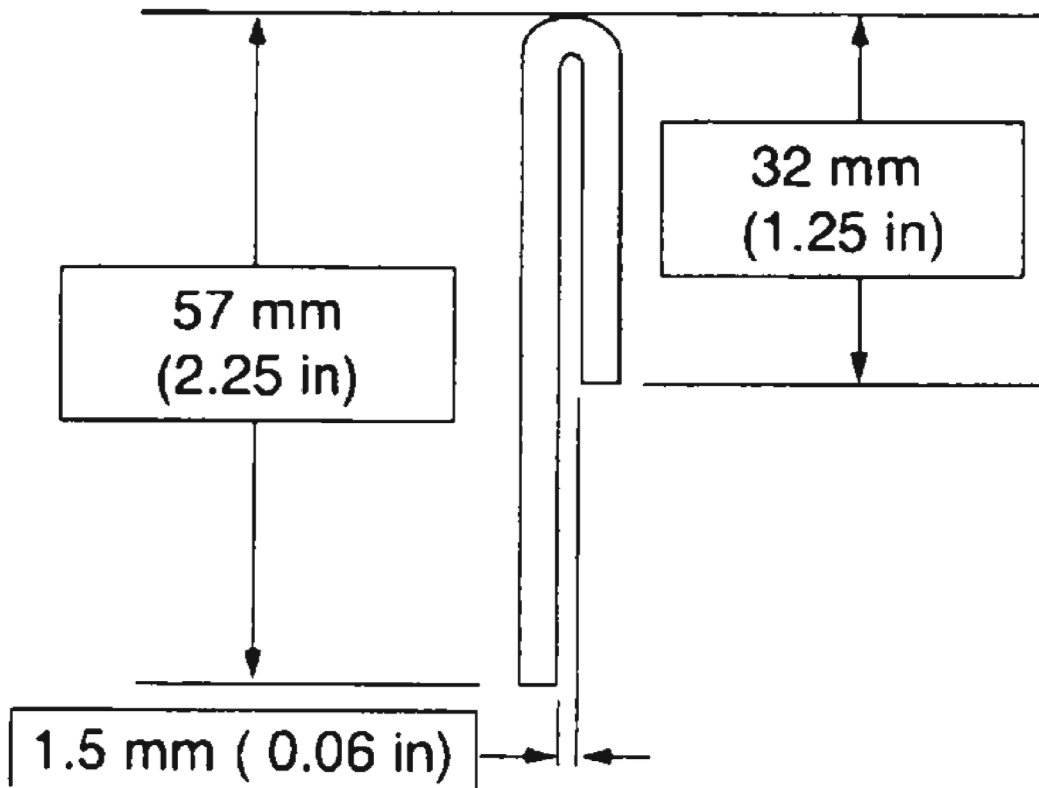
### CLEANING SPRING LOCK COUPLINGS

**CAUTION:** Maintain low speed drill rotation when inserting or removing cleaning tool to prevent axial scratches which may cause future leaks.

1. Fabricate a cleaning tool from a 1/8 inch diameter brazing rod. See **Fig. 35** . Cut an abrasive pad from maroon colored 3M Scotch Brite(R) with dimensions corresponding to coupling size. See **ABRASIVE PAD SIZE** table. Assemble pad to tool. See **Fig. 36** .
2. Coat abrasive pad with PAG Refrigerant Compressor Oil or equivalent. Roll pad on tool and install it in a variable speed drill motor.
3. Polish for one minute at moderate speed (less than 1,500 RPM) or until surface is clean and free of scratches or foreign material. See **Fig. 37** .
4. Clean fitting with a lint-free cloth. Inspect surface for grooves or scratches. If grooves and scratches are still present, install a NEW component. Clean "O" ring seal grooves with a 12 inch (300 mm) length of natural fiber string. Loop string around grooves and pull string back and forth. See **Fig. 38** .
5. Remove any foreign material from grooves with a lint-free cloth.

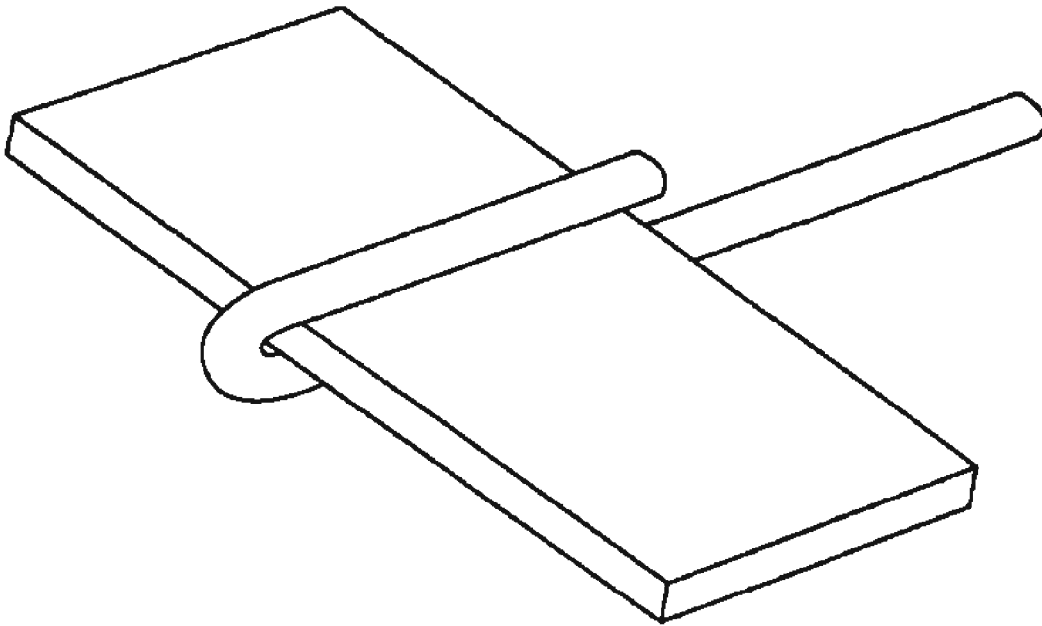
### ABRASIVE PAD SIZE

Coupling Size	Pad Size
3/8"	1 x 2" (25 x 50 mm)
1/2"	1 x 2" (25 x 50 mm)
5/8"	1 x 3" (25 x 76 mm)
3/4"	1 x 4" (25 x 102 mm)



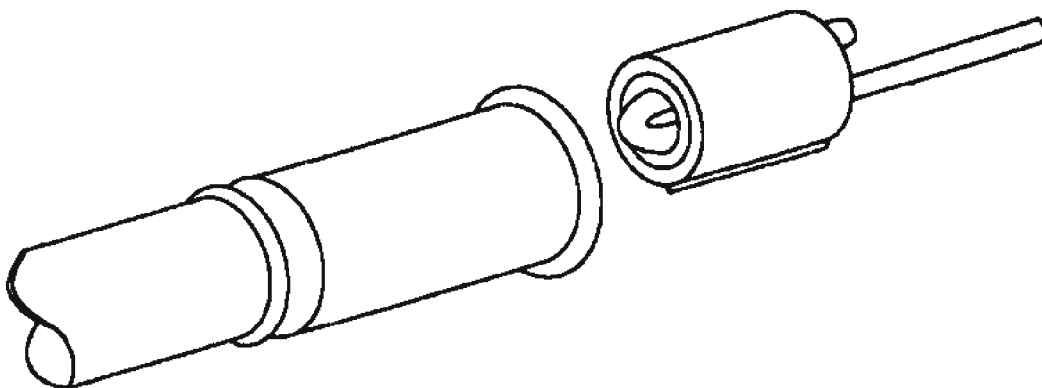
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**Fig. 35: Identifying Brazing Rod Dimensions**  
Courtesy of FORD MOTOR CO.



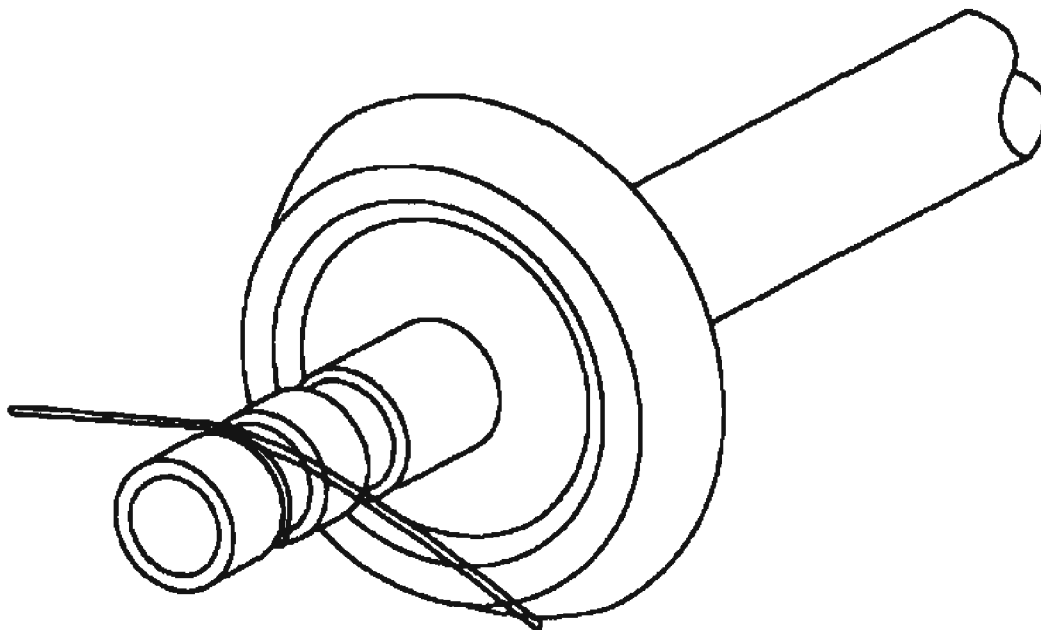
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**Fig. 36: Assembling Cleaning Tool**  
Courtesy of FORD MOTOR CO.



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**Fig. 37: Cleaning Spring Lock Coupling**  
Courtesy of FORD MOTOR CO.



G00168115

**Fig. 38: Cleaning "O" Ring Groove**  
Courtesy of FORD MOTOR CO.

## REMOVAL & INSTALLATION

**WARNING:** Vehicle is equipped with Supplemental Inflatable Restraint (SIR) system. When servicing vehicle, use care to avoid accidental air bag deployment. SIR system-related components are located in various locations throughout interior and exterior of vehicle, depending on application. Do not use electrical test equipment on or near these circuits. If necessary, deactivate SIR system before servicing components. See appropriate AIR BAG RESTRAINT SYSTEMS article in RESTRAINTS.

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

**NOTE:** For removal and installation procedures not covered in this

article, see **REMOVAL & INSTALLATION** in **HEATER SYSTEMS** article, or **COMPRESSOR SERVICING** article in **GENERAL SERVICING**.

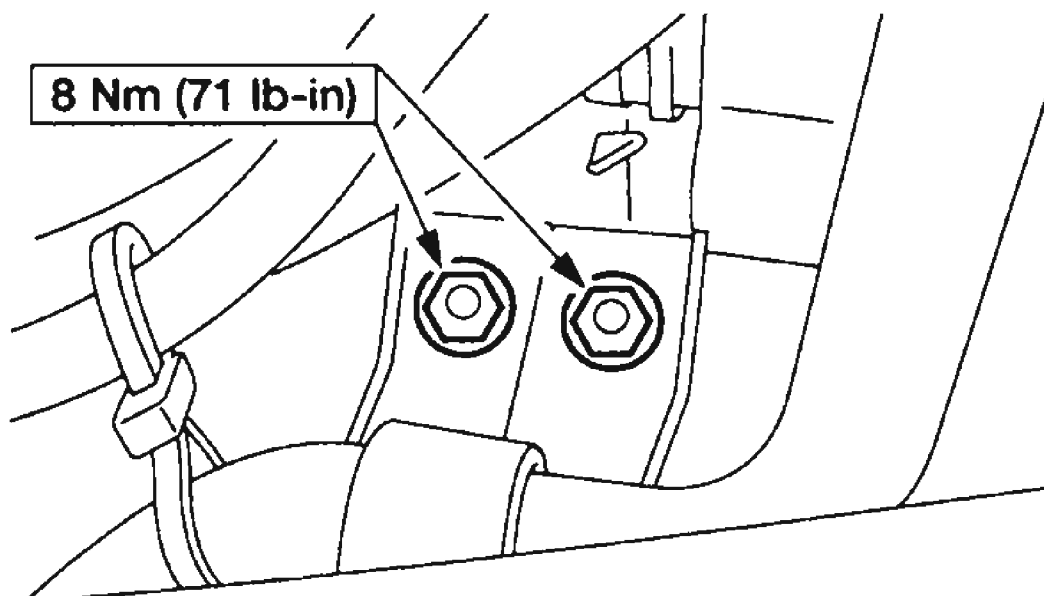
## ACCUMULATOR-DRIER

### Removal

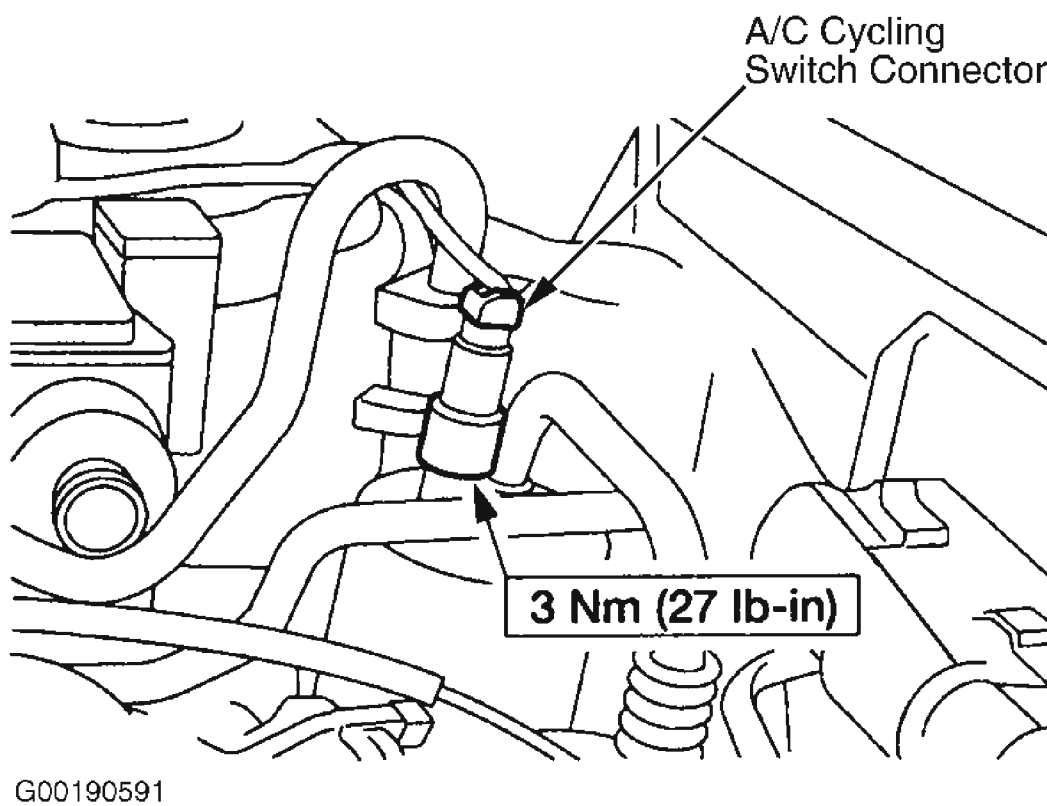
1. Disconnect battery. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See **RECOVERY, EVACUATION & RECHARGING** in **GENERAL SERVICING PROCEDURES** article in **GENERAL SERVICING**. Remove clutch cycling switch. See **CLUTCH CYCLING SWITCH & HIGH-PRESSURE CUT-OFF SWITCH**.
2. Remove nuts from compressor manifold and tube assembly mounting bracket. See **Fig. 39**. Disconnect compressor manifold and tube assembly from accumulator-drier. See **Fig. 40**. Plug all openings.
3. Remove 2 accumulator-drier mounting bracket nuts. See **Fig. 41**. Disconnect suction line from evaporator core. See **Fig. 42**. Plug all openings. Remove accumulator-drier.

**NOTE:** If replacing Accumulator, go to next step.

4. Drill two 1/2 inch holes in suction accumulator/drier cylinder and drain oil into a calibrated container.

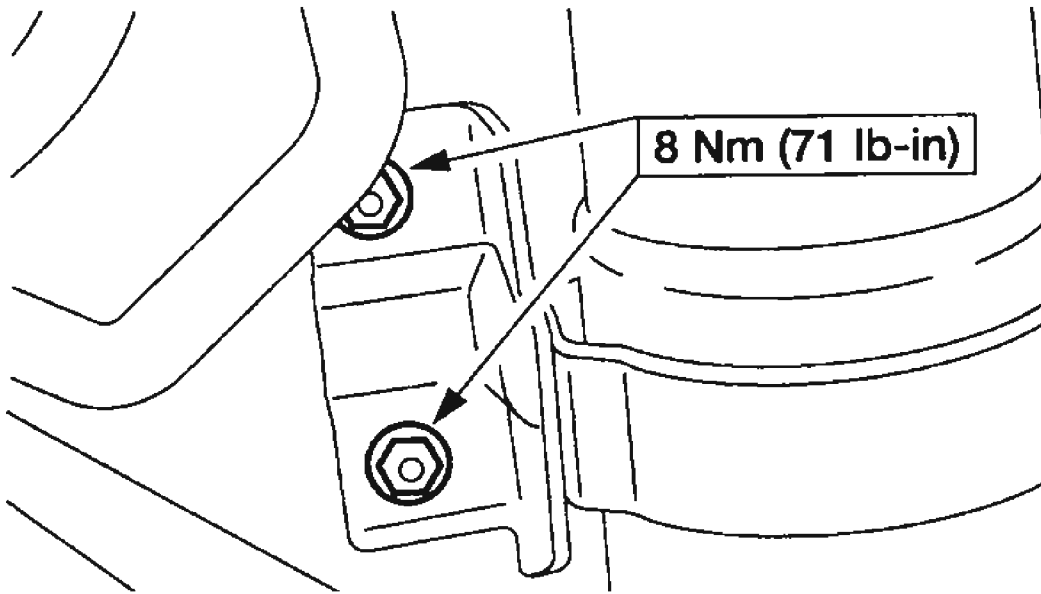


**Fig. 39: Removing Compressor Manifold & Tube Assembly Mounting Bracket Nuts**  
Courtesy of FORD MOTOR CO.



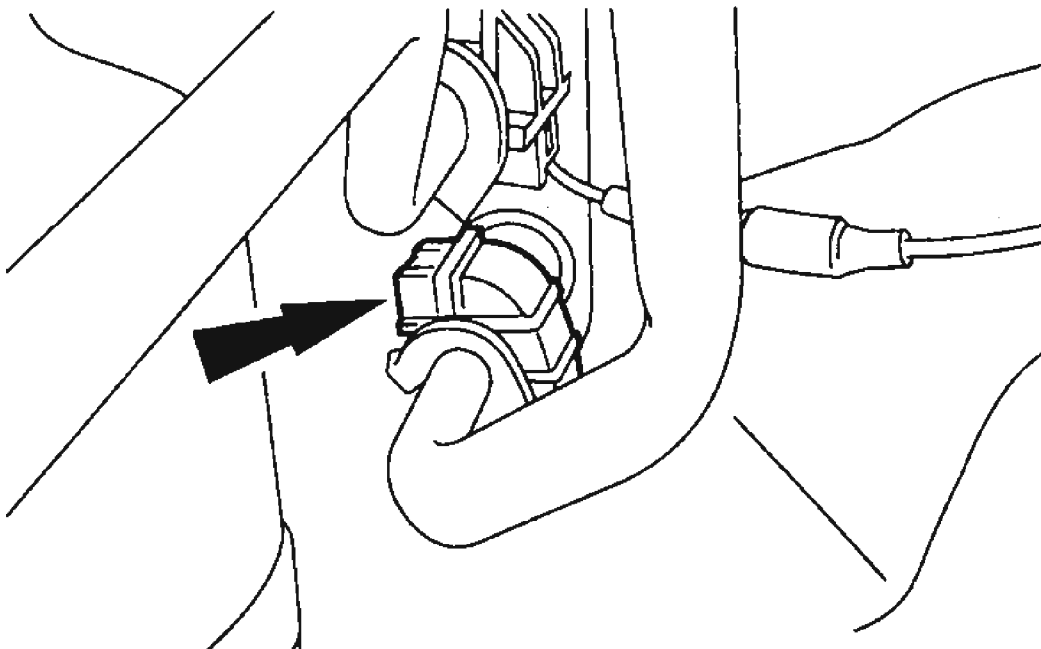
**Fig. 40: Disconnecting Compressor Manifold & Tube Assembly**  
Courtesy of FORD MOTOR CO.





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**Fig. 41: Removing Accumulator-Drier Mounting Bracket Nuts**  
Courtesy of FORD MOTOR CO.



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**Fig. 42: Disconnecting Evaporator Core Suction Line**

Courtesy of FORD MOTOR CO.

#### Installation

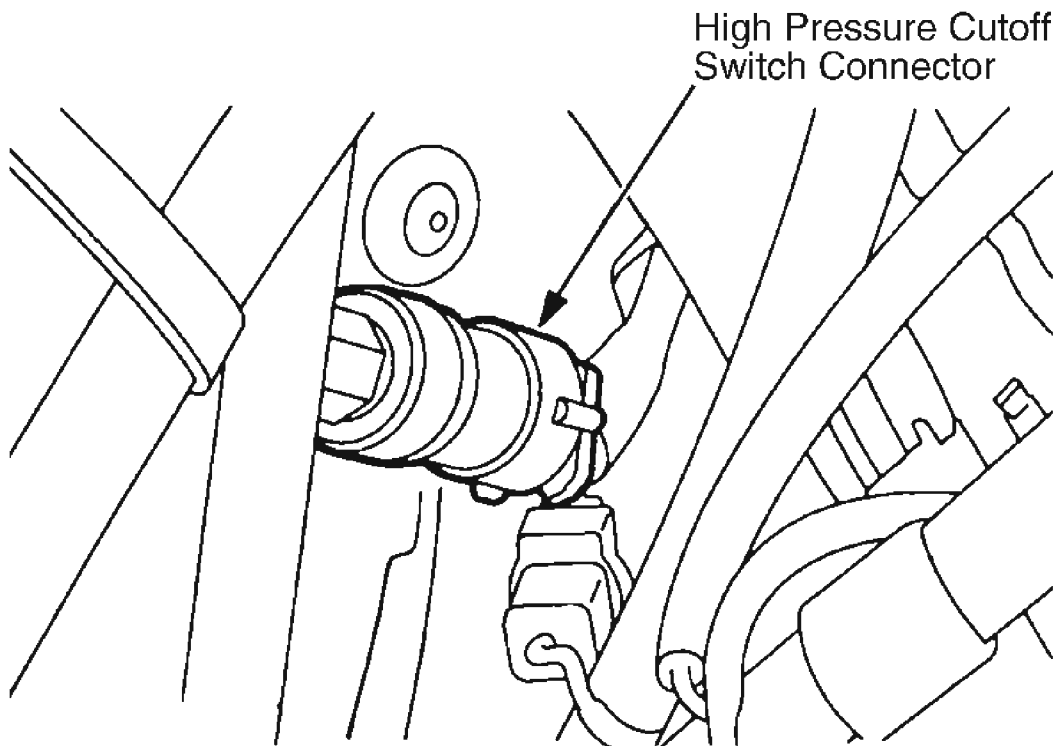
To install, reverse removal procedure. Add a quantity of NEW oil to match that drained from old suction accumulator/drier plus 2 ounces (60 ml) of clean PAG Refrigerant Oil.

#### CLUTCH CYCLING SWITCH & HIGH-PRESSURE CUT-OFF SWITCH

**NOTE:** It is not necessary to discharge A/C system to remove clutch cycling pressure switch or high-pressure cut-off switch. Switches are mounted on Schrader valve-type fittings.

#### Removal & Installation

Disconnect wiring harness from switch. See **Fig. 40** or **Fig. 43** . Remove switch from accumulator-drier or high side line. To install, reverse removal procedure. Use NEW "O" rings lubricated with clean refrigerant oil.



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**Fig. 43: Removing High-Pressure Cut-Off Switch**  
Courtesy of FORD MOTOR CO.

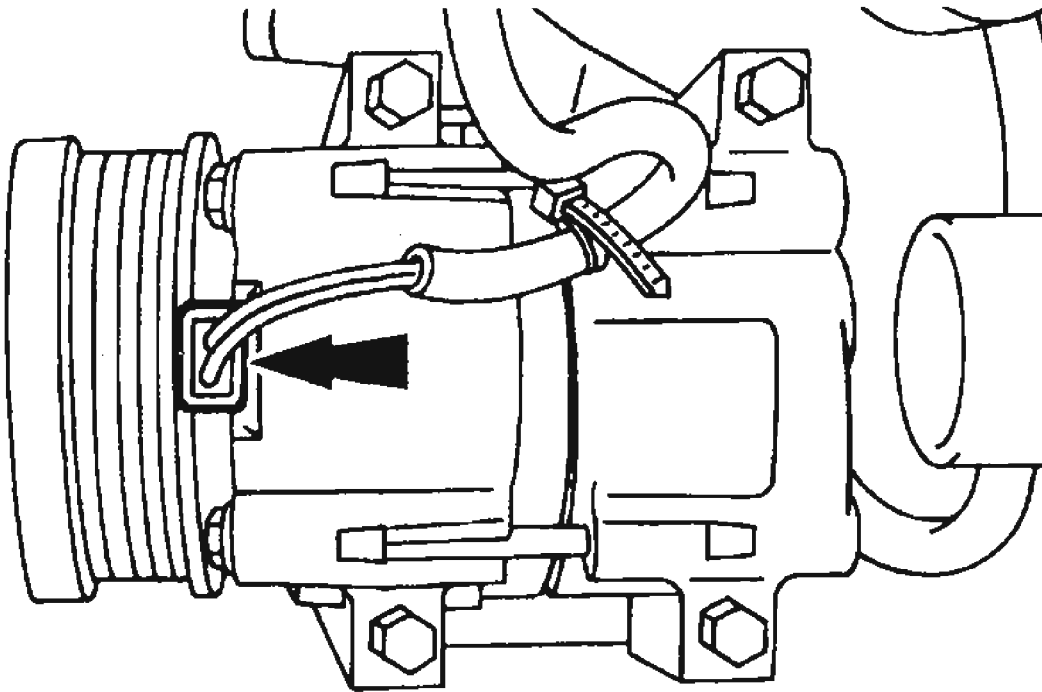
## COMPRESSOR

**NOTE:** Installation of a **NEW** suction accumulator is not necessary when repairing air conditioning system except when there is physical evidence of system contamination from a failed compressor or damage to suction accumulator.

**NOTE:** If an A/C flusher is available, carry out A/C system flushing general procedure. If A/C flusher is not available, carry out refrigerant system filtering following A/C component installation general procedure. See **FORD - FILTERING PROCEDURES** article in **GENERAL SERVICING PROCEDURES**.

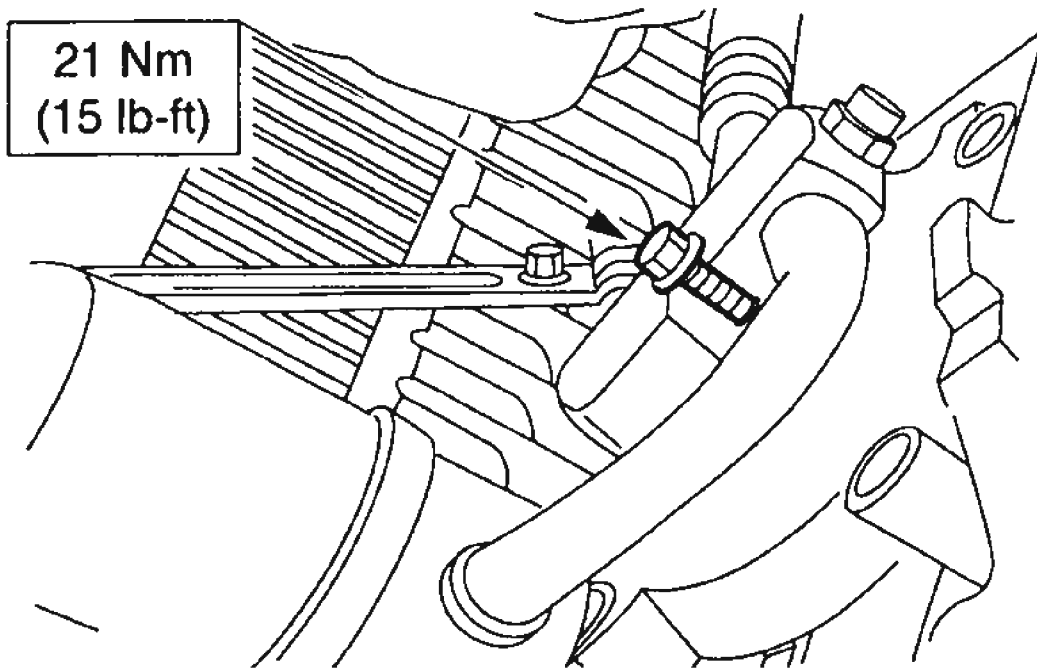
### Removal (2.0L Engine)

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See **RECOVERY, EVACUATION & RECHARGING** in **GENERAL SERVICING PROCEDURES** article in **GENERAL SERVICING**. Remove drive belt. Disconnect compressor clutch harness connector. See **Fig. 44**.
2. Remove compressor manifold and tube assembly. See **Fig. 45**. Plug all ports to prevent contamination from dirt or moisture. Remove 4 compressor attaching bolts, and remove compressor. See **Fig. 46**. Rotate compressor shaft six to eight revolutions while collecting oil in a clean measuring device.



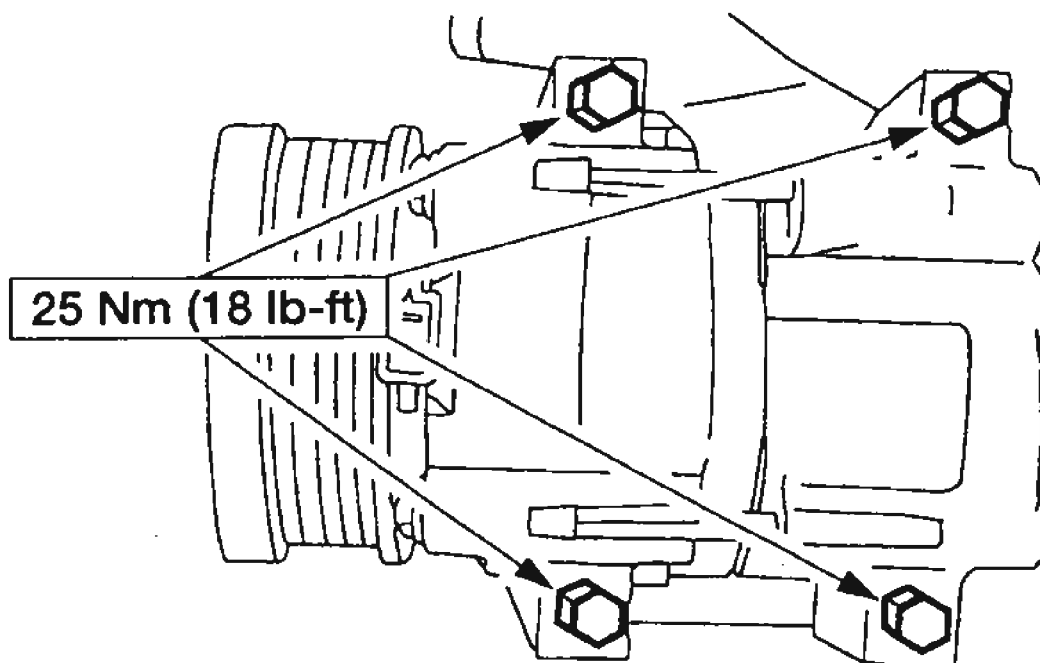
G00190596

**Fig. 44: Disconnecting Compressor Clutch Connector (2.0L Engine)**  
Courtesy of FORD MOTOR CO.



G00190597

**Fig. 45: Removing Compressor Manifold & Tube Assembly (2.0L Engine)**  
Courtesy of FORD MOTOR CO.



G00190598

**Fig. 46: Removing Compressor (2.0L Engine)**  
Courtesy of FORD MOTOR CO.

#### Installation

1. To install, reverse removal procedure. Install NEW orifice tube. See **ORIFICE TUBE** . Ensure NEW compressor has proper amount of refrigerant oil. Use NEW "O" rings lubricated with clean refrigerant oil. Apply pipe sealant with Teflon(R) or equivalent to threads of compressor manifold and tube assembly bolt.
2. If amount of oil drained from old compressor is between 3-5 ounces (85-142 ml), pour same amount plus 1 ounce (30 ml) of clean PAG Refrigerant Oil or equivalent into NEW compressor. If amount of oil that was removed from old compressor is greater than 5 ounces (142 ml), pour same amount drained of clean PAG Refrigerant Oil into NEW compressor. If amount of oil that was removed from old compressor is less than 3 ounces (85 ml), pour 3 ounces (85 ml) of clean PAG Refrigerant Oil into NEW compressor.
3. Evacuate, charge, and leak test A/C system. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.

#### Removal (3.0L Engine)

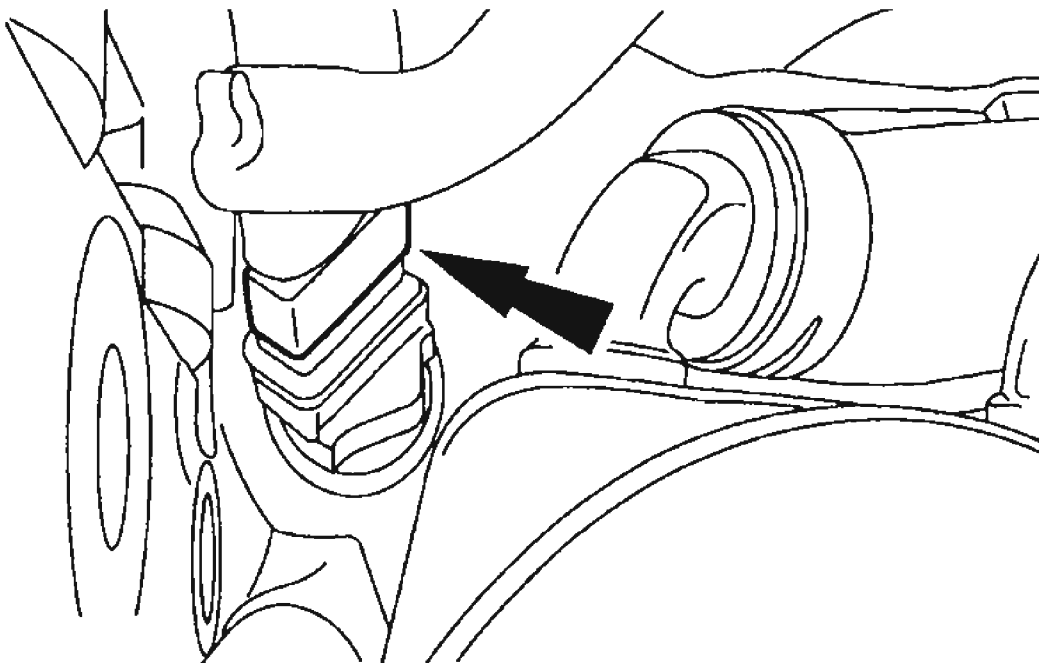
1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant

recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.

Remove drive belt. Disconnect engine block heater harness connector (if equipped).

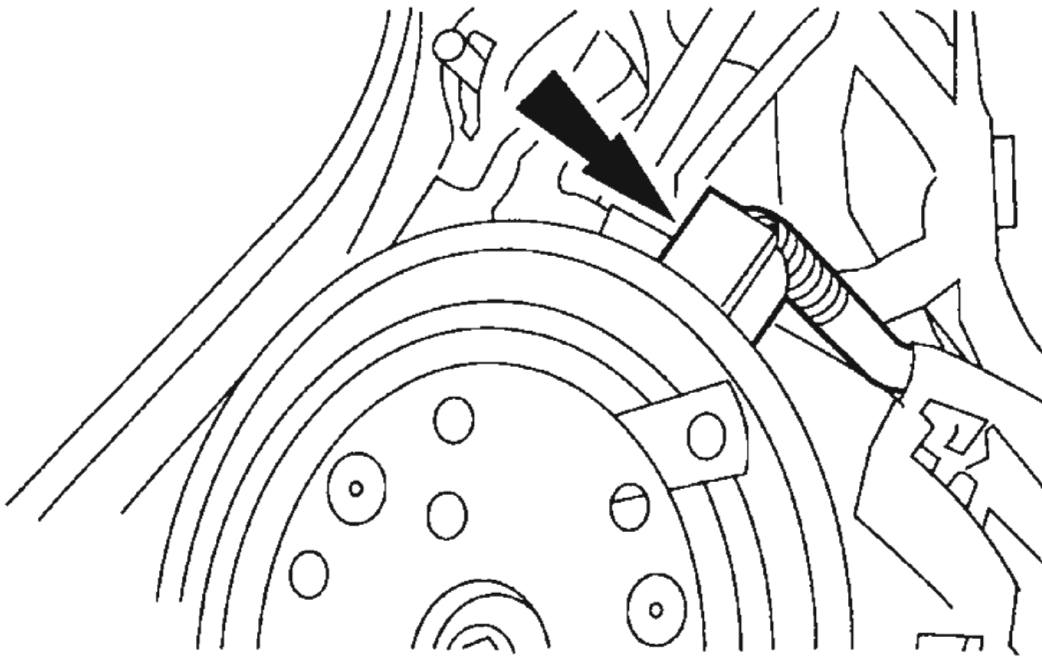
See **Fig. 47** . Disconnect compressor clutch harness connector. See **Fig. 48** .

2. Remove compressor manifold and tube assembly bolt from top of compressor, and disconnect compressor manifold and tube assembly. See **Fig. 49** . Remove 3 compressor attaching bolts, and remove compressor. See **Fig. 50** . Rotate compressor shaft six to eight revolutions while collecting oil in a clean measuring device.



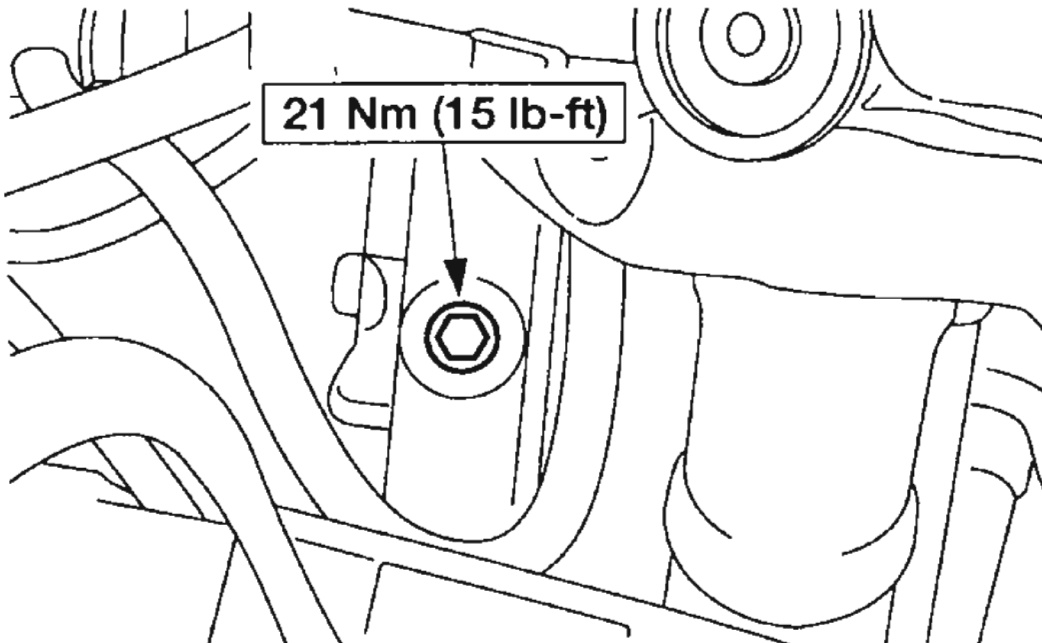
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**Fig. 47: Disconnecting Engine Block Heater Connector (3.0L Engine)**  
Courtesy of FORD MOTOR CO.



G00190592

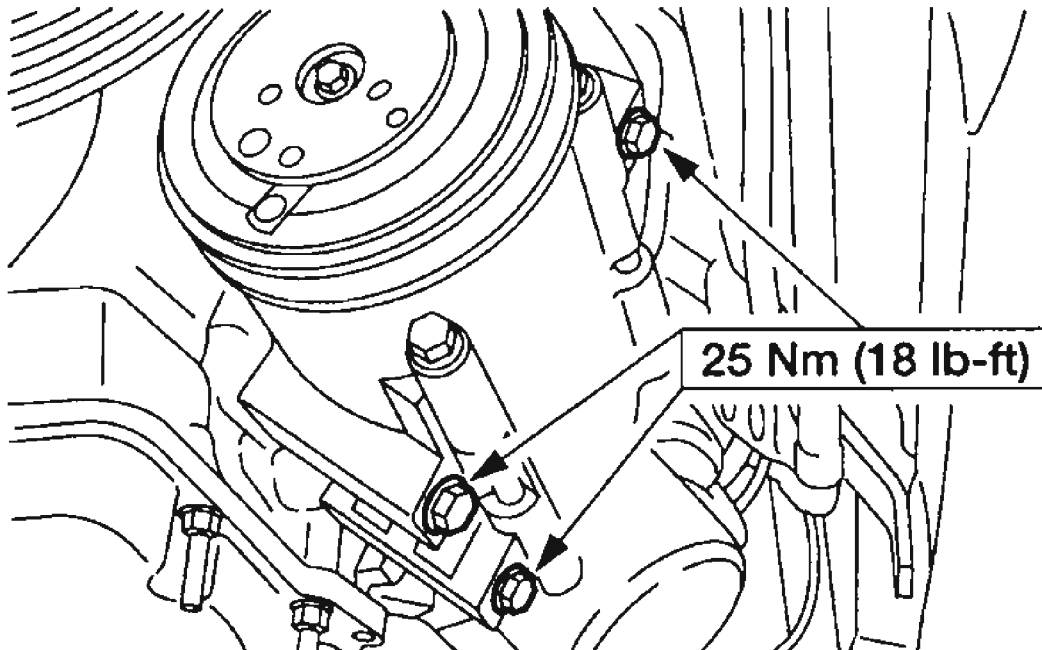
**Fig. 48: Disconnecting Compressor Clutch Connector (3.0L Engine)**  
Courtesy of FORD MOTOR CO.



G00190593



**Fig. 49: Removing Compressor Manifold & Tube Assembly (3.0L Engine)**  
Courtesy of FORD MOTOR CO.



G00190594

**Fig. 50: Removing Compressor (3.0L Engine)**  
Courtesy of FORD MOTOR CO.

#### Installation

1. To install, reverse removal procedure. Install NEW orifice tube. See **ORIFICE TUBE** . Ensure NEW compressor has proper amount of refrigerant oil. Use NEW "O" rings lubricated with clean refrigerant oil. Apply pipe sealant with Teflon(R) or equivalent to threads of compressor manifold and tube assembly bolt.
2. If amount of oil drained from old compressor is between 3-5 ounces (85-142 ml), pour same amount plus 1 ounce (30 ml) of clean PAG Refrigerant Oil or equivalent into NEW compressor. If amount of oil that was removed from old compressor is greater than 5 ounces (142 ml), pour same amount drained of clean PAG Refrigerant Oil into NEW compressor. If amount of oil that was removed from old compressor is less than 3 ounces (85 ml), pour 3 ounces (85 ml) of clean PAG Refrigerant Oil into NEW compressor.
3. Evacuate, charge, and leak test A/C system. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.

## COMPRESSOR MANIFOLD & TUBE ASSEMBLY

### Removal & Installation

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING. Remove nuts from compressor manifold and tube assembly mounting bracket. See **Fig. 39** . Disconnect compressor manifold and tube assembly from suction accumulator. Plug all ports to prevent contamination from dirt or moisture.
2. Raise and support vehicle. Remove 6 pin-type retainers from fender well. See **Fig. 51** . Remove 4 front bumper cover bolts. See **Fig. 52** . Remove and discard 2 front bumper cover-to-front fender pin-type retainers. See **Fig. 53** . If equipped, disconnect fog lamp electrical connectors. Remove lower front bumper cover bolts. See **Fig. 54** . Remove pin-type retainers located at bottom of front bumper cover. See **Fig. 55** . Lower vehicle. Remove 2 upper bolts and front bumper cover. See **Fig. 56** .
3. Remove nut and disconnect compressor manifold and tube assembly to condenser core air conditioning line (peanut) fitting. See **Fig. 57** . Plug all ports to prevent contamination from dirt or moisture. Disconnect speed control actuator electrical connector. Disconnect electrical harness pin-type retainers. Remove nuts and position aside speed control actuator assembly.
4. Raise and support vehicle. Remove right splash shield. If equipped, disconnect engine block heater electrical connector. Disconnect clutch field coil electrical connector. Remove compressor manifold and tube assembly bolt. Remove compressor manifold and tube assembly through bottom of vehicle.
5. To install, reverse removal procedure. When installing front bumper cover, ensure to position front bumper cover into bumper slides. Use NEW "O" rings lubricated with clean refrigerant oil. Apply pipe sealant with Teflon(R) or equivalent to threads of compressor manifold and tube assembly bolt. Add 2 ounces (60 ml) of clean PAG Refrigerant Oil.

## CONDENSER

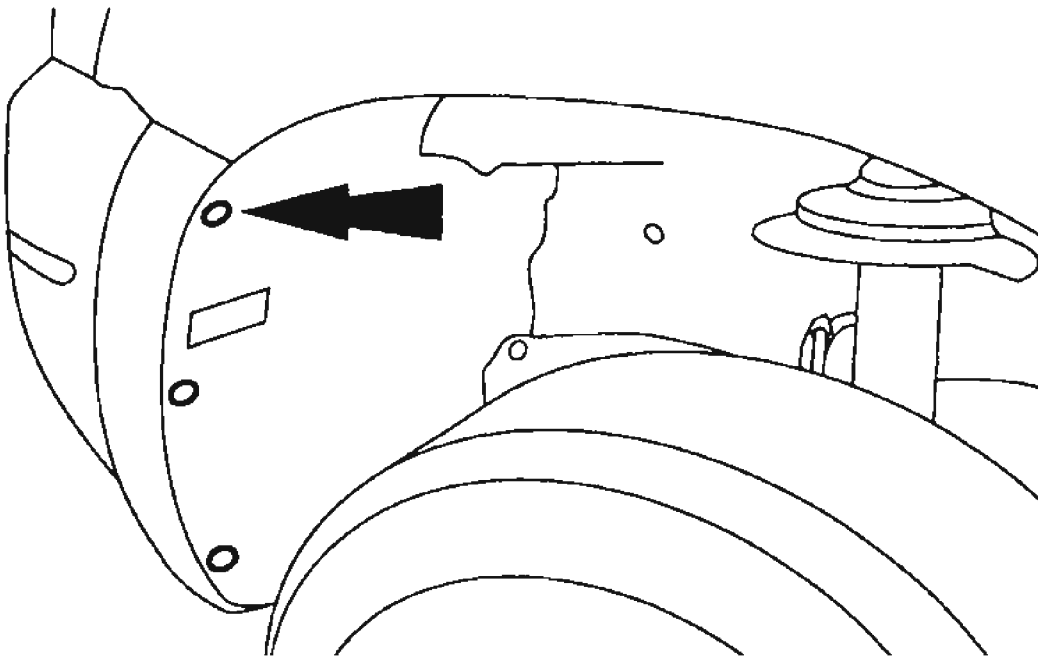
**NOTE:** If an condenser core leak is suspected, condenser core must be leak tested before it is removed from vehicle. See A/C EVAPORATOR/CONDENSER CORE, ON-VEHICLE LEAK TEST under **COMPONENT TESTS**.

### Removal

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.
2. Raise and support vehicle. Remove 6 pin-type retainers from fender well. See **Fig. 51** .

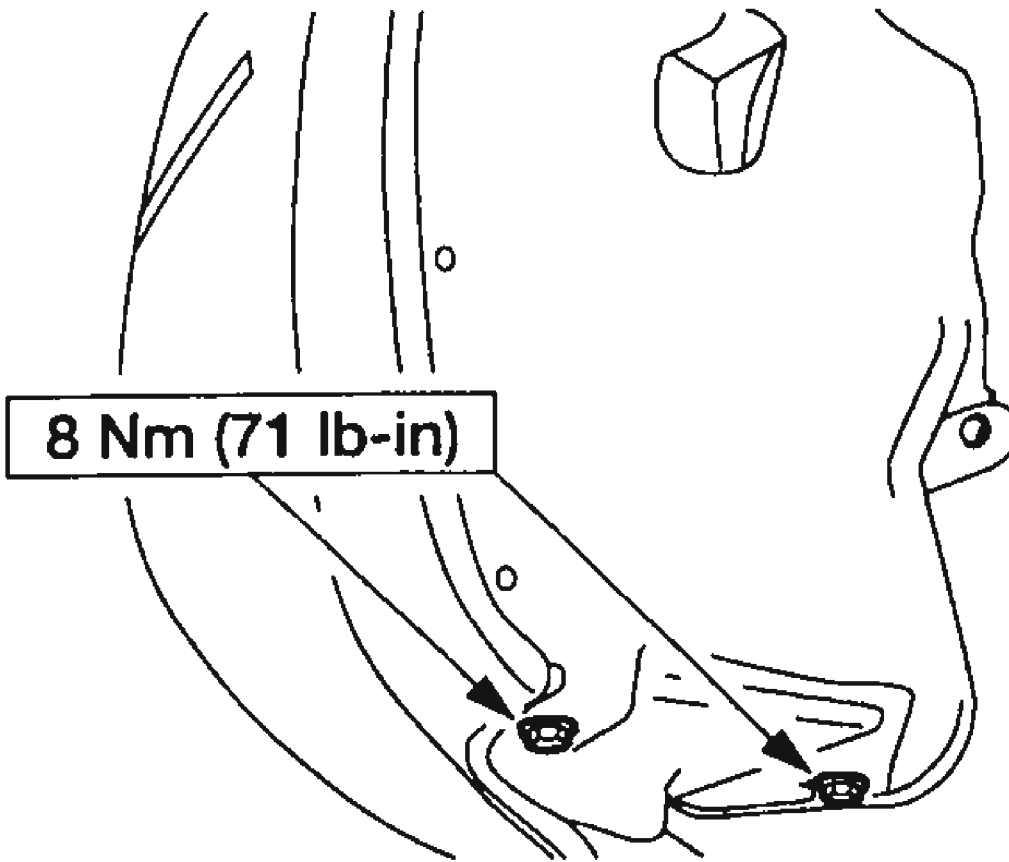
Remove 4 front bumper cover bolts. See **Fig. 52** . Remove and discard 2 front bumper cover-to-front fender pin-type retainers. See **Fig. 53** . If equipped, disconnect fog lamp electrical connectors. Remove lower front bumper cover bolts. See **Fig. 54** . Remove pin-type retainers located at bottom of front bumper cover. See **Fig. 55** . Lower vehicle. Remove 2 upper bolts and front bumper cover. See **Fig. 56** .

3. Remove 2 nut retaining refrigerant line peanut fittings. See **Fig. 57** . Plug all openings. Remove screws and condenser core brackets. See **Fig. 58** . Disconnect 2 air conditioning line fittings from condenser core and remove condenser.



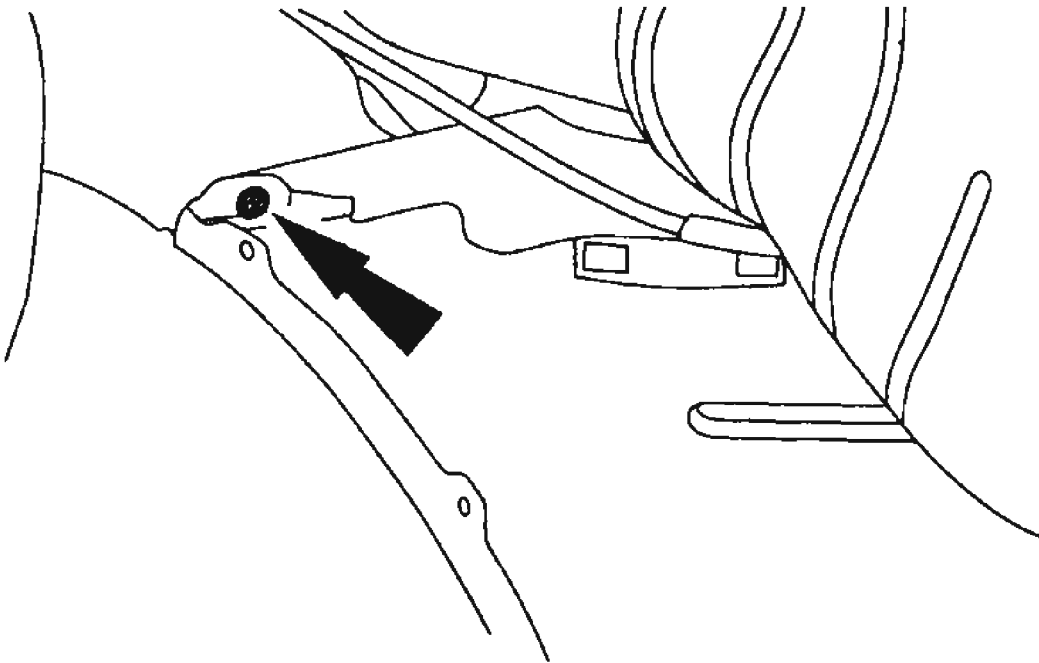
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**Fig. 51: Removing Retainers From Fender Well**  
Courtesy of FORD MOTOR CO.



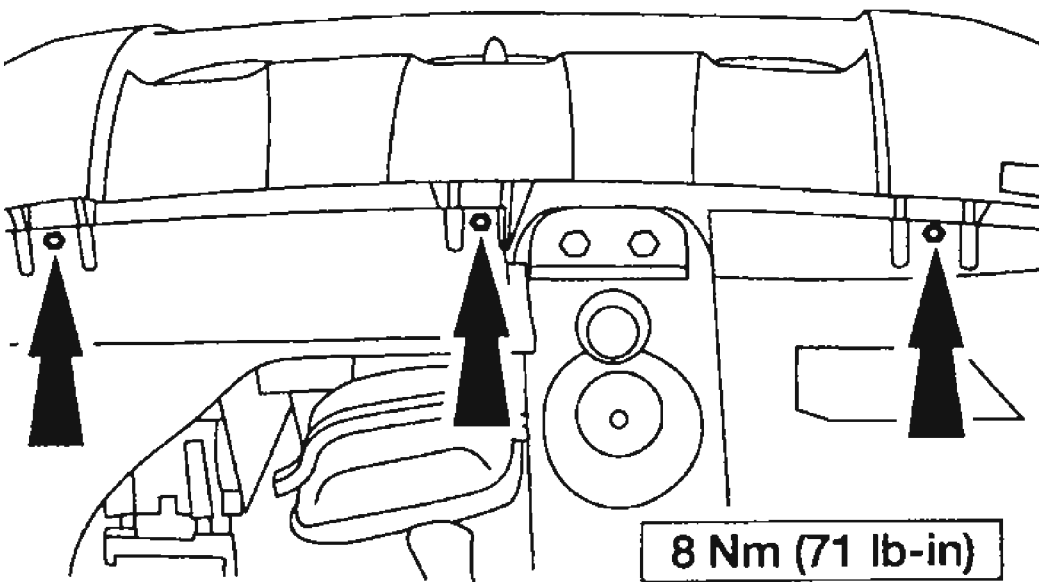
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**Fig. 52: Removing Front Bumper Cover Bolts**  
Courtesy of FORD MOTOR CO.



G00190747

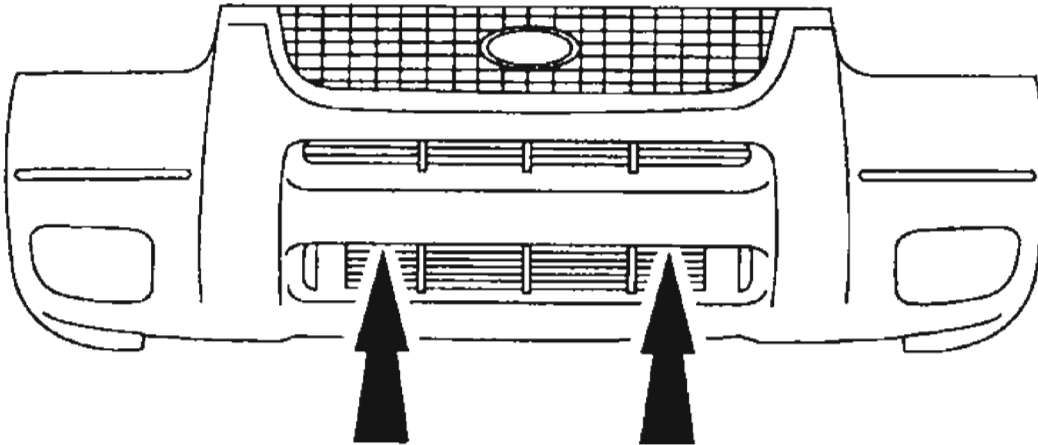
**Fig. 53: Removing Front Bumper Cover-To-Front Fender Retainers**  
Courtesy of FORD MOTOR CO.



G00190631

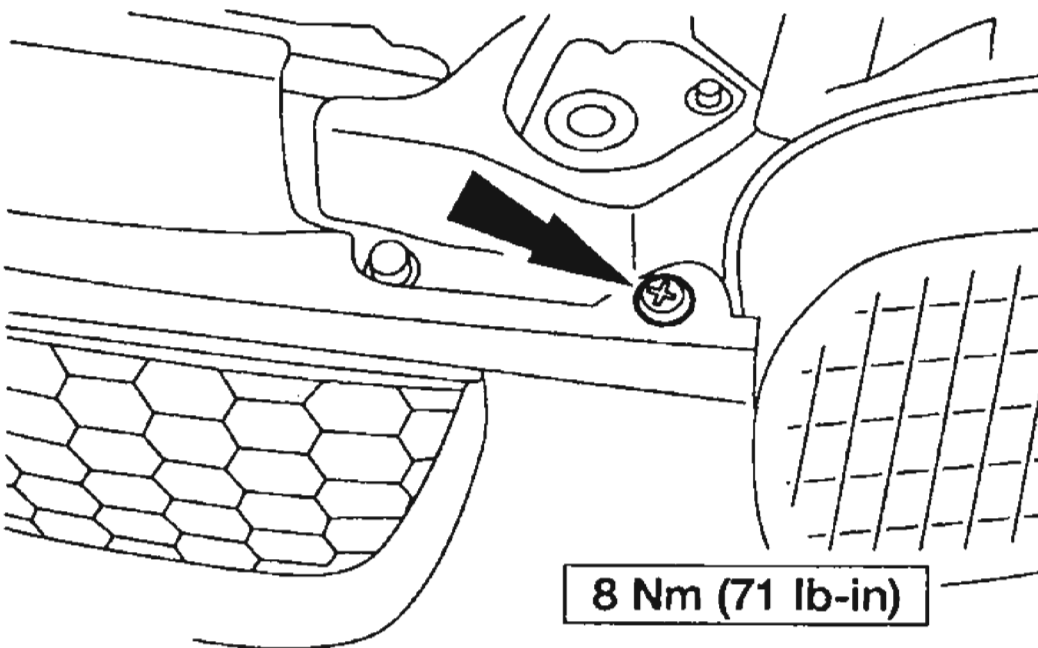
**Fig. 54: Removing Lower Front Bumper Cover Bolts**

Courtesy of FORD MOTOR CO.



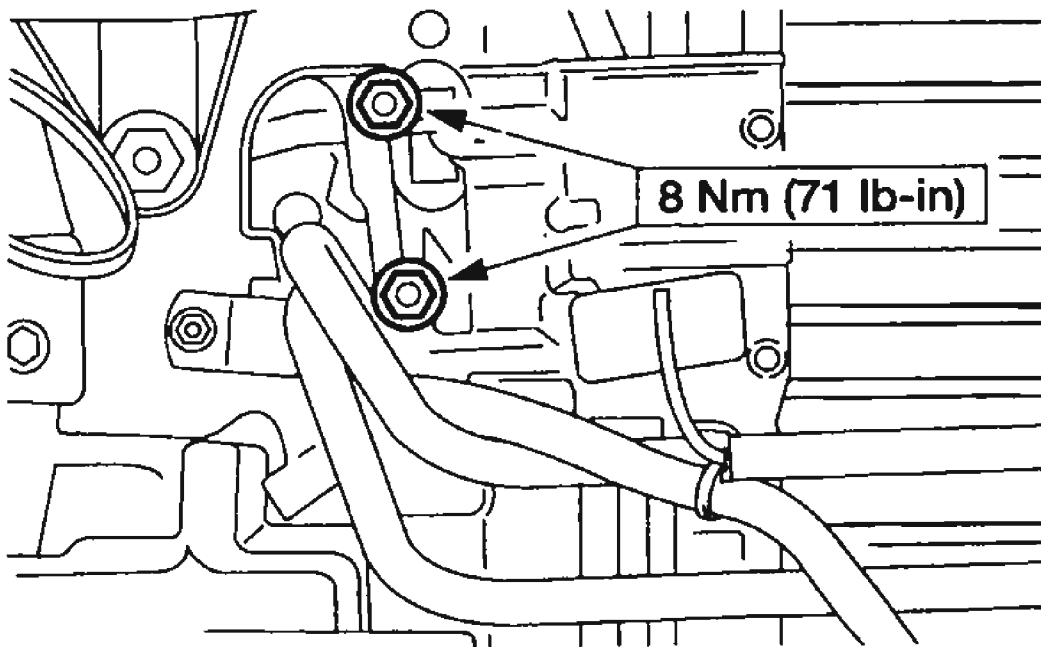
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**Fig. 55: Removing Retainer From Below Front Bumper Cover**  
Courtesy of FORD MOTOR CO.



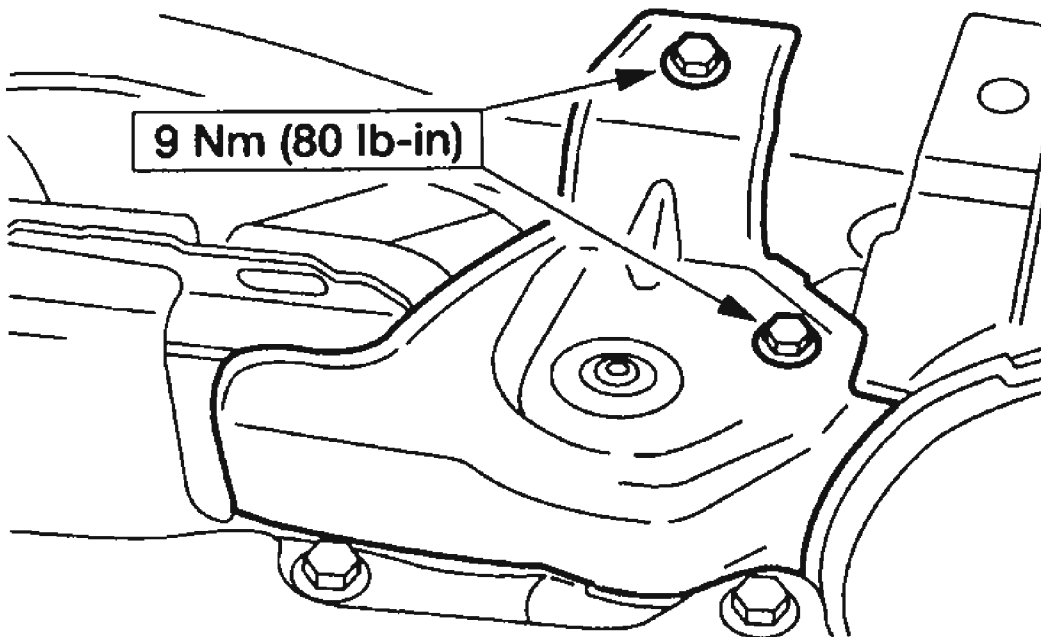
G00190633

**Fig. 56: Removing Upper Front Bumper Cover Bolts**  
Courtesy of FORD MOTOR CO.



G00190634

**Fig. 57: Removing Refrigerant Line Peanut Fittings Retainers**  
Courtesy of FORD MOTOR CO.



G00190635

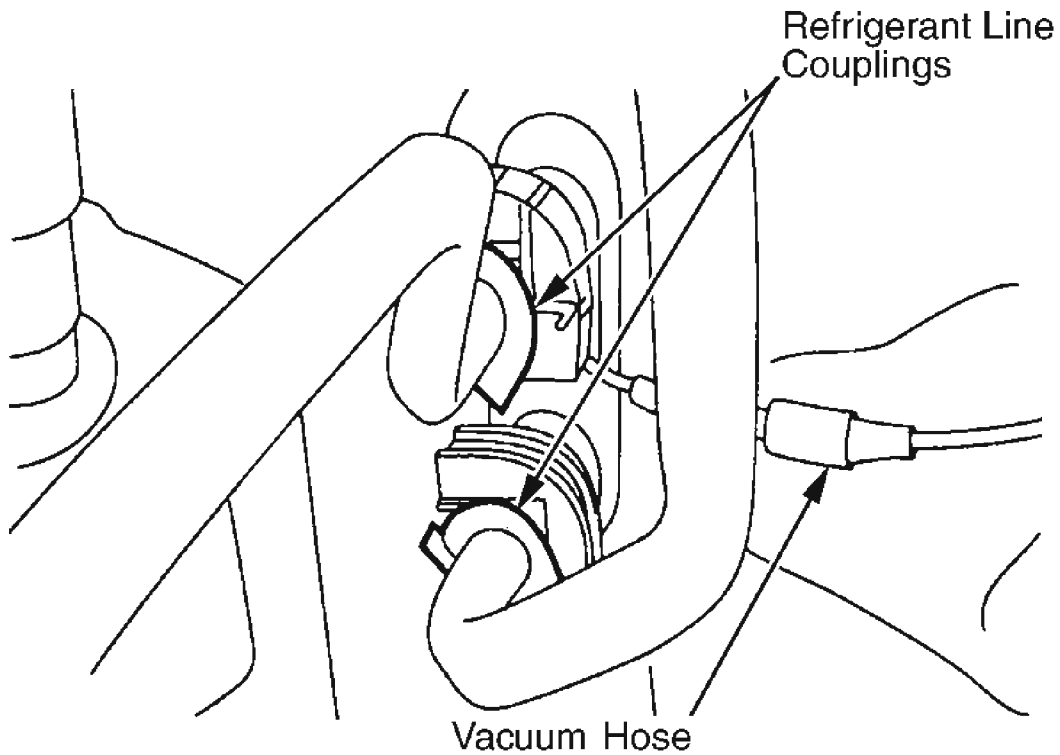
**Fig. 58: Removing Condenser Core Bracket Screws**  
**Courtesy of FORD MOTOR CO.****Installation**

To install, reverse removal procedure. When installing front bumper cover, ensure to position front bumper cover into bumper slides. Use NEW "O" rings lubricated with clean refrigerant oil. Add one ounce (30 ml) of clean PAG Refrigerant Oil to condenser core or suction accumulator/drier inlet tube.

**EVAPORATOR CORE & HOUSING****Removal**

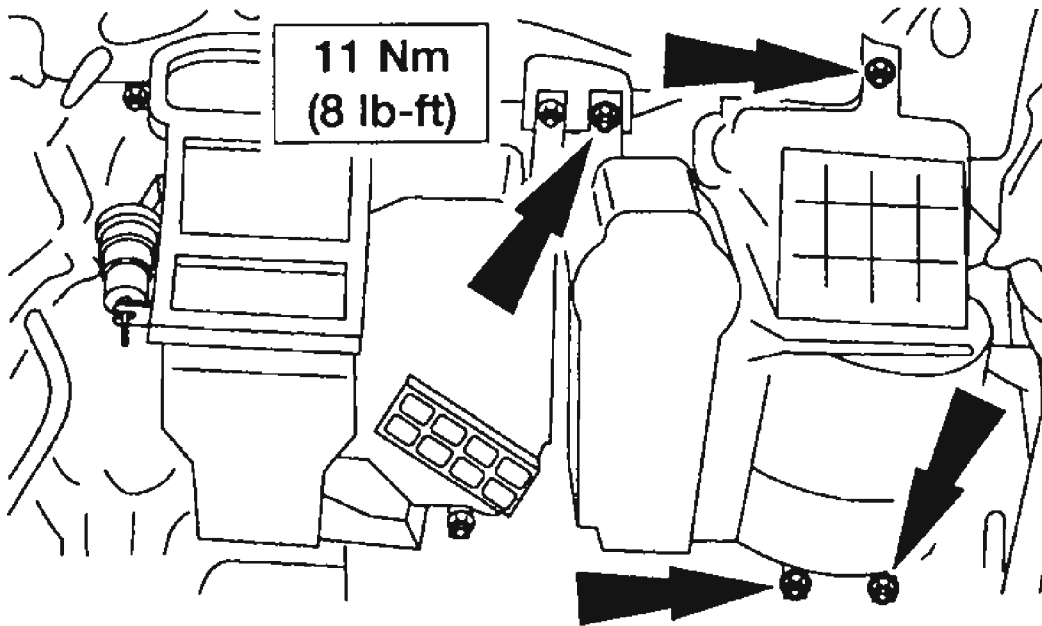
1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.
2. Remove instrument panel. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. Disconnect evaporator core refrigerant lines at firewall. See **Fig. 59** . Disconnect vacuum hoses.
3. Remove 4 evaporator core housing nuts and carefully remove evaporator core housing to avoid spilling oil. See **Fig. 60** . Transfer components from old evaporator core housing to NEW evaporator core housing.





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**Fig. 59: Disconnecting Evaporator Lines**  
Courtesy of FORD MOTOR CO.



G00190637

**Fig. 60: Removing Evaporator Core Housing**  
Courtesy of FORD MOTOR CO.

#### Installation

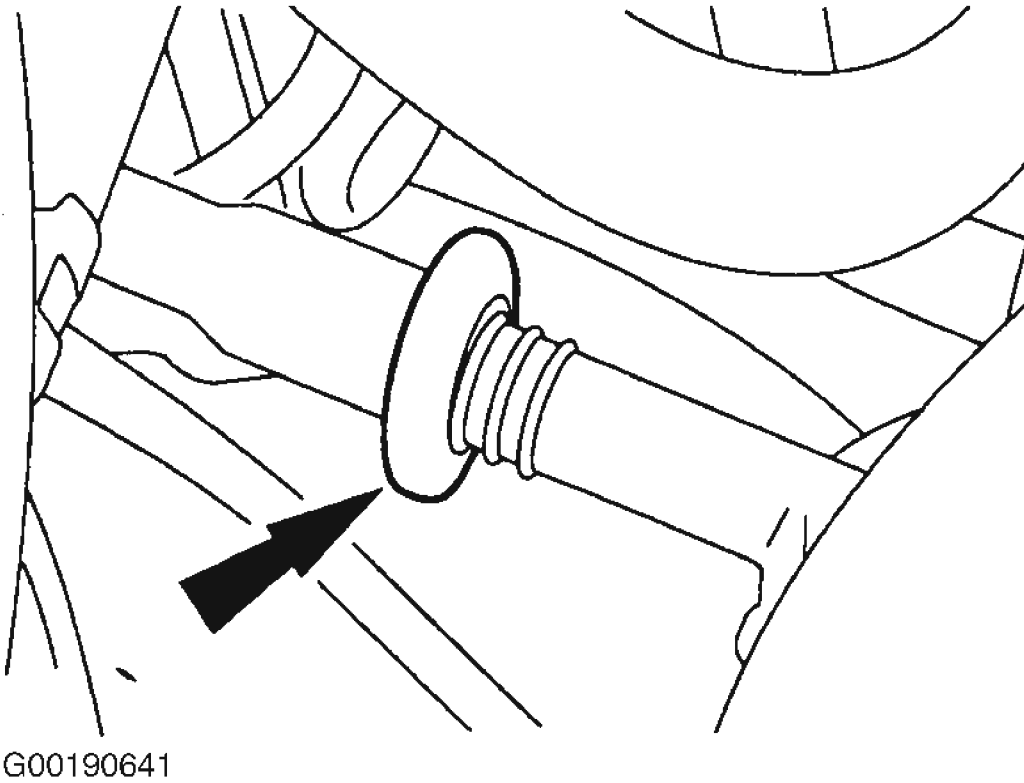
To install, reverse removal procedure. Feed vacuum hose through opening in cowl while installing housing. Before installing temperature control cable, ensure that blend door, cable and temperature switch are correctly positioned. Add 3 ounces (89 ml) of clean PAG Refrigerant Oil to suction accumulator/drier inlet tube.

#### ORIFICE TUBE

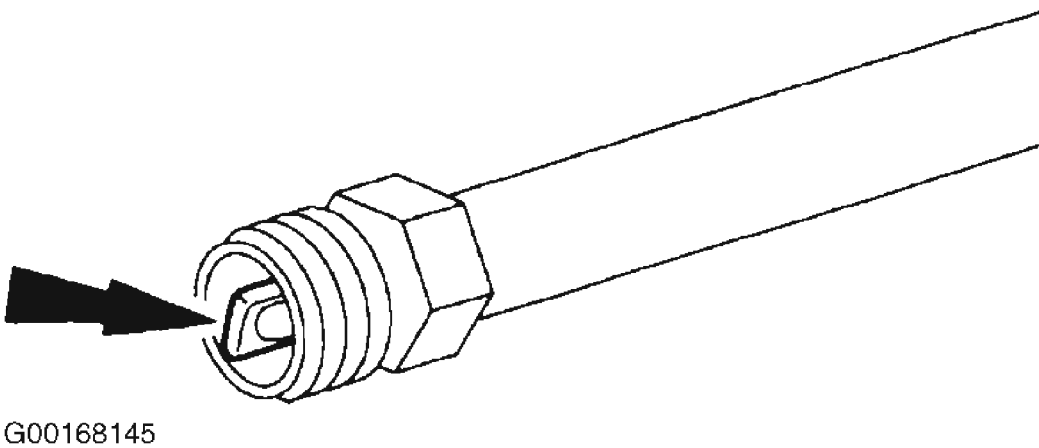
##### Removal

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING. Disconnect refrigerant line from evaporator core. See **Fig. 61** . Cap line to protect against dirt and moisture entering system. Inspect orifice tube condition. See **Fig. 62** .
2. If orifice tube is broken, using Orifice Tube Remover (T83L-19990-B), screw end of remover into broken orifice tube. See **Fig. 64** . Hold "T" handle while rotating orifice tube remover body to remove broken orifice tube. See **Fig. 65** .
3. If orifice tube is not broken, using Orifice Tube Remover (T83L-19990-A), engage tube inside refrigerant line. See **Fig. 63** . Hold "T" handle while rotating orifice tube

remover body to remove orifice tube. See **Fig. 65** .

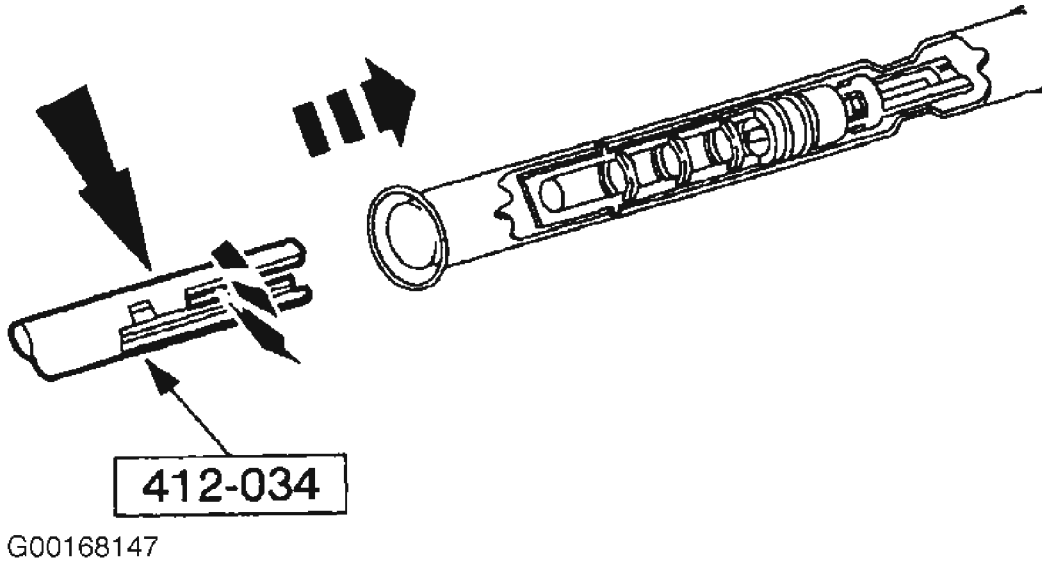


**Fig. 61: Disconnecting Refrigerant Line From Evaporator**  
Courtesy of FORD MOTOR CO.

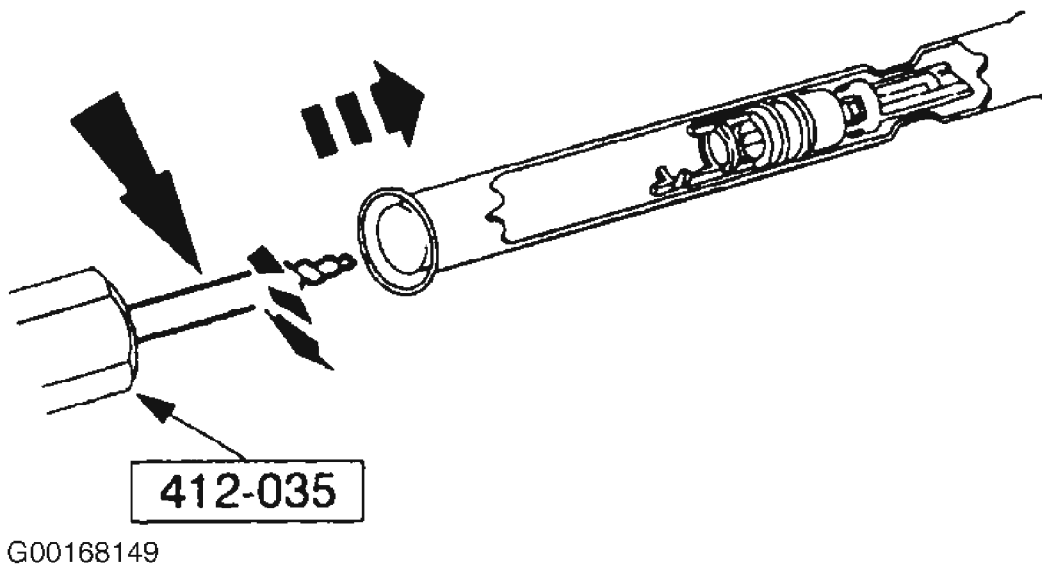


**Fig. 62: Inspecting Orifice Tube**

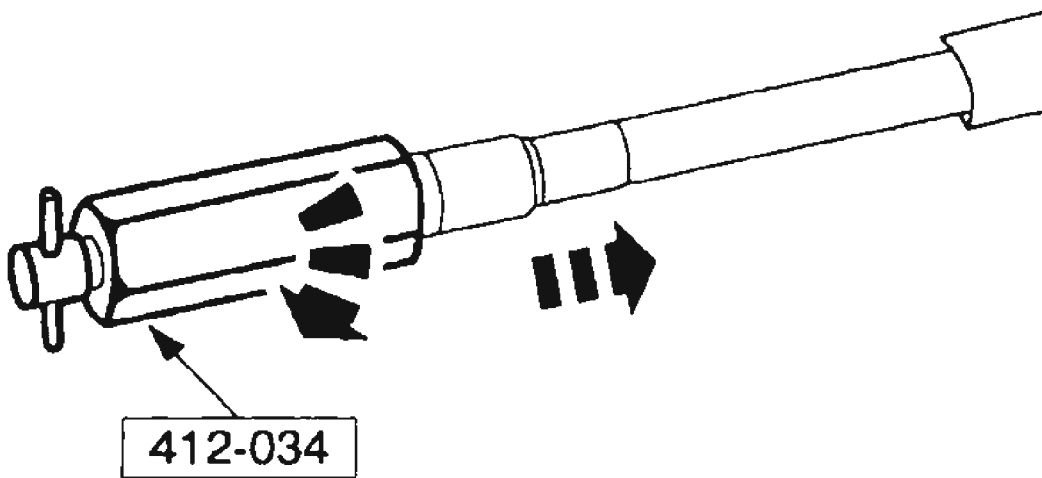
Courtesy of FORD MOTOR CO.



**Fig. 63: Removing Orifice Tube**  
Courtesy of FORD MOTOR CO.

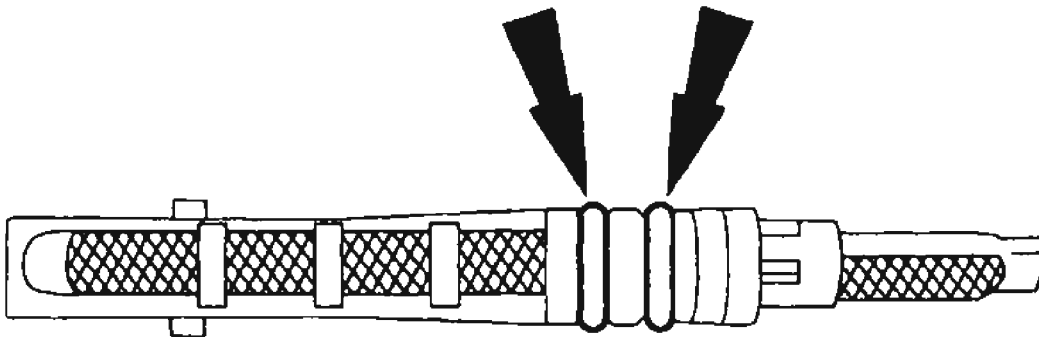


**Fig. 64: Removing Broken Orifice Tube**  
Courtesy of FORD MOTOR CO.



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**Fig. 65: Using Orifice Tube Remover (T83L-19990-B)**  
Courtesy of FORD MOTOR CO.



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**Fig. 66: Locating Orifice Tube "O" Rings**  
Courtesy of FORD MOTOR CO.

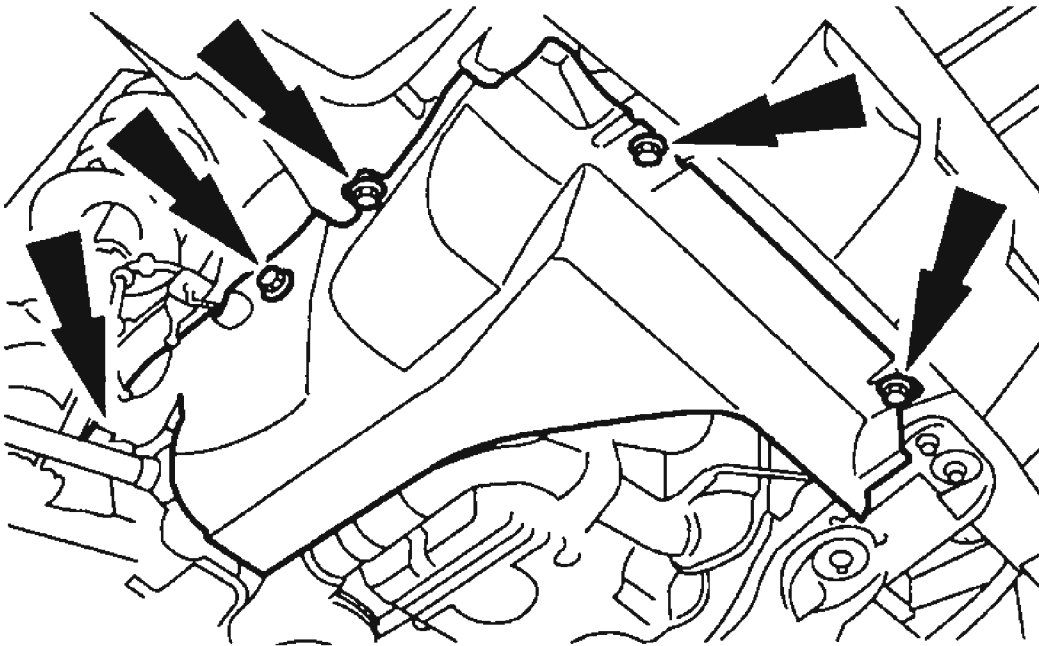
#### Installation

To install, reverse removal procedure. Coat NEW "O" rings with clean refrigerant oil. See **Fig. 66** . Add 2 ounces (60 ml) of clean PAG Refrigerant Compressor Oil or equivalent to accumulator-drier inlet tube. Evacuate, charge, and leak test A/C system. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING.

## PRESSURE RELIEF VALVE

### Removal & Installation

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. See RECOVERY, EVACUATION & RECHARGING in GENERAL SERVICING PROCEDURES article in GENERAL SERVICING. Raise and support vehicle. Remove right side splash shield. See **Fig. 67** .
2. Disconnect engine block heater harness connector (if equipped). See **Fig. 47** . On 3.0L engine equipped models, remove compressor manifold and tube assembly bolt and disconnect compressor manifold and tube assembly. See **Fig. 49** .
3. On all models, remove compressor pressure relief valve. See **Fig. 45** . To install, reverse removal procedure. Use NEW "O" rings lubricated with clean refrigerant oil.



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**Fig. 67: Removing Splash Shield**  
Courtesy of FORD MOTOR CO.

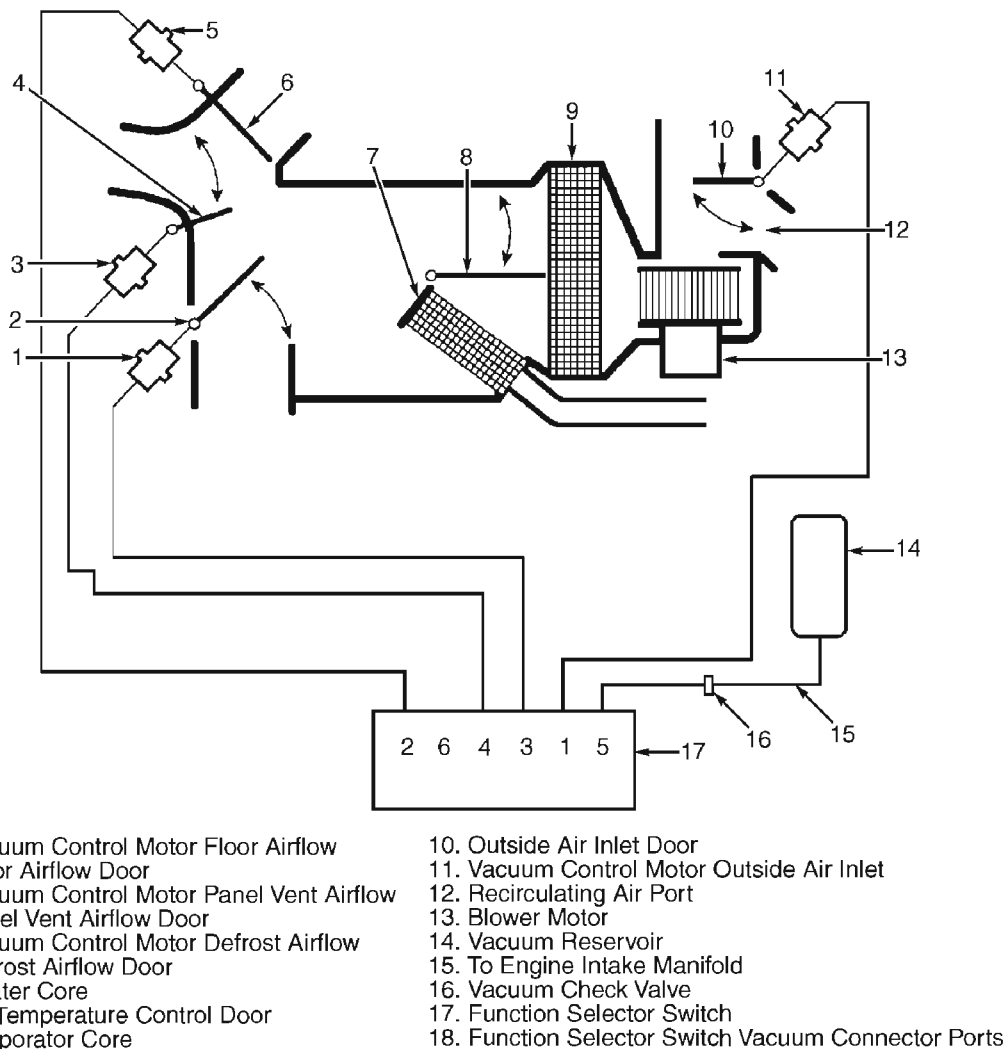
## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Compressor Bolts	18 (24)
Manifold-To-Compressor	15 (21)

	INCH Lbs. (N.m)
Accumulator Bracket Nut	71 (8)
Condenser Mounting Brackets	80 (9)
Cycling Switch	27 (3)
Evaporator & Heater Core Housing Support Nuts	97 (11)
Instrument Panel Nut	80 (9)
Instrument Panel Cowl Side Bolts	80 (9)
Instrument Panel Cowl Top Bolt	53 (6)
Peanut Fitting Nut	71 (8)

## VACUUM DIAGRAMS



G00190745

**Fig. 68: Vacuum Schematic**  
 Courtesy of FORD MOTOR CO.

## **WIRING DIAGRAMS**

**NOTE:** See **AIR CONDITIONING** in **SYSTEM WIRING DIAGRAMS** article in **WIRING DIAGRAMS**.



## 2004 Ford Escape

### 2004 HVAC Air Conditioning - Escape

## 2004 HVAC

### Air Conditioning - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### AIR CONDITIONING GENERAL SPECIFICATIONS

Description	Specification
<b>A/C Compressor FS-10</b>	
Displacement	170 cc (10.4 cubic inches)
Cylinder bore	29.0 mm (1.14 in)
Cylinder stroke Rotation	25.7 mm (1.0 in) Clockwise
<b>Magnetic Clutch</b>	
Air gap between pulley and hub	0.35 mm-0.75 mm (0.014 in 0.029 in)
<b>A/C cycling switch</b>	
Close	276-324 kPa (40-47 psi)
Open	152-193 kPa (22-28 psi)
<b>A/C pressure relief valve</b>	
Open	3,792 kPa (550 psi) minimum
<b>Lubricants</b>	
PAG Compressor Oil YN-12-C	WSH-M1C231-B
Refrigerant R-134a YN-19	WSH-M17B19-A
<b>Adhesives</b>	
Pipe Sealant with Teflon(R) D8AZ-19554-A	WSK-M2G350-A2 and ESR-M18P7-A

### TORQUE SPECIFICATIONS

### AIR CONDITIONING TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
A/C compressor bolts	25	18	-
A/C compressor bracket bolts	25	18	-
A/C compressor bracket nuts	48	35	-
A/C compressor clutch bolt	13	10	-
Suction accumulator mounting bracket nuts	8	6	-
A/C manifold and tube assembly bolt	21	15	-
A/C manifold and tube mounting bracket nuts	8	6	-
A/C condenser core air conditioning line (peanut) fittings	8	-	71
A/C condenser core bracket screws	9	-	80

A/C cycling switch

3

-

27

## DIAGNOSIS AND TESTING

### AIR CONDITIONING

For additional information, refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .

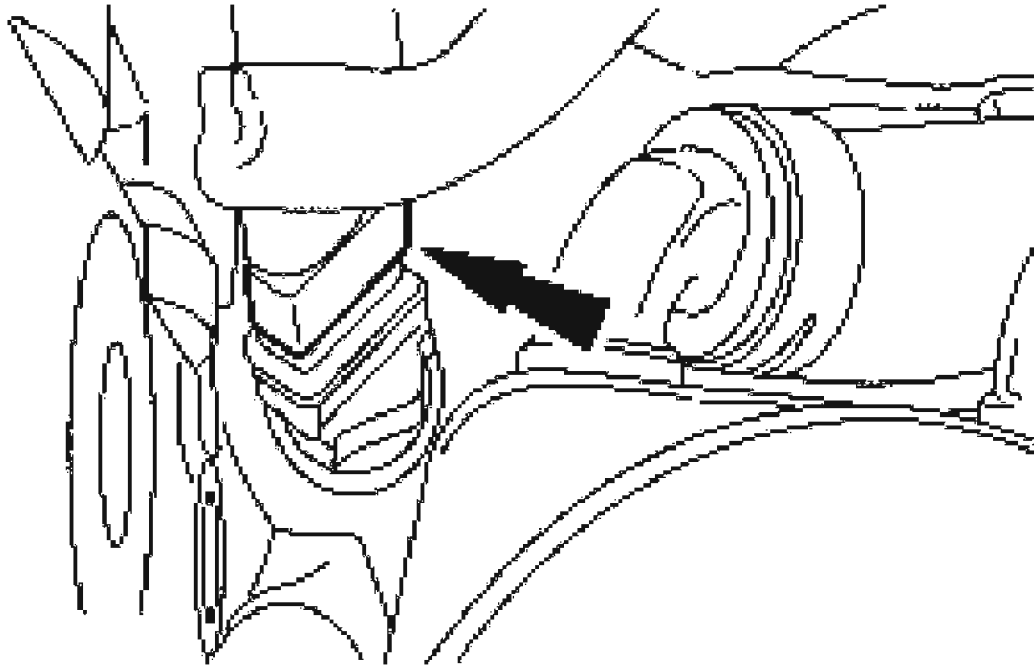
## REMOVAL AND INSTALLATION

### AIR CONDITIONING (A/C) COMPRESSOR - 3.0L (4V)

#### Removal and Installation

**CAUTION:** To prevent refrigerant system contamination, if you are installing a new A/C compressor because the A/C compressor has failed internally, you must use the following procedures:

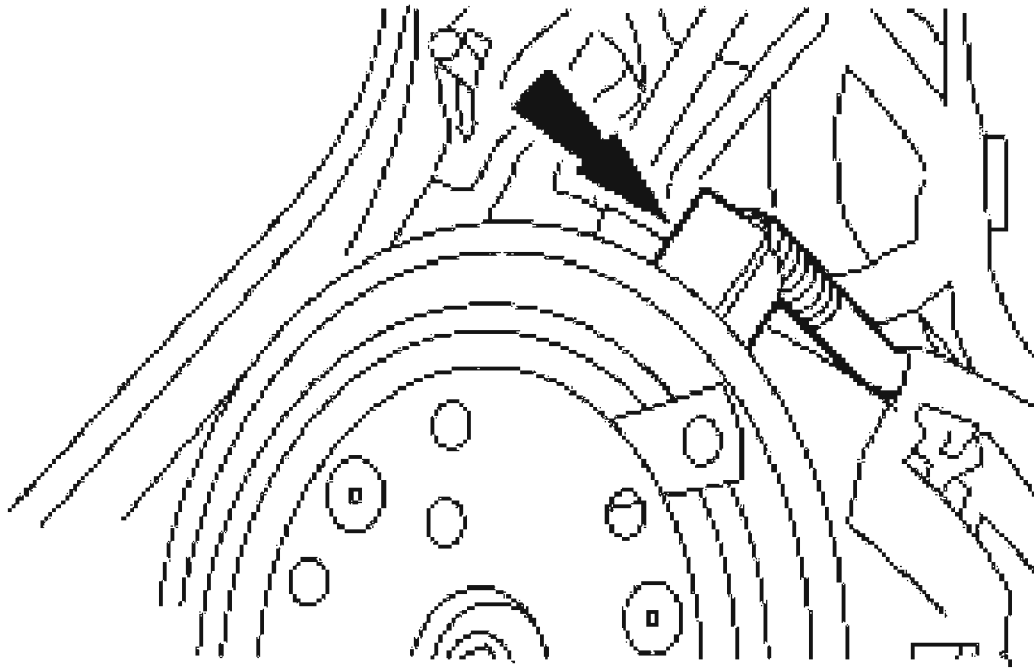
- NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.
- NOTE:** If an A/C Flusher is available, carry out the air conditioning (A/C) system flushing general procedure. For additional information, refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .
- NOTE:** If the A/C Flusher is not available, carry out the refrigerant system filtering following air conditioning (A/C) component installation general procedure. For additional information, refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .
1. Install a new A/C evaporator core orifice. For additional information, refer to EVAPORATOR CORE ORIFICE .
  2. Remove the drive belt. For additional information, refer to ACCESSORY DRIVE .
  3. If equipped, disconnect the engine block heater electrical connector.



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**Fig. 1: Disconnecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

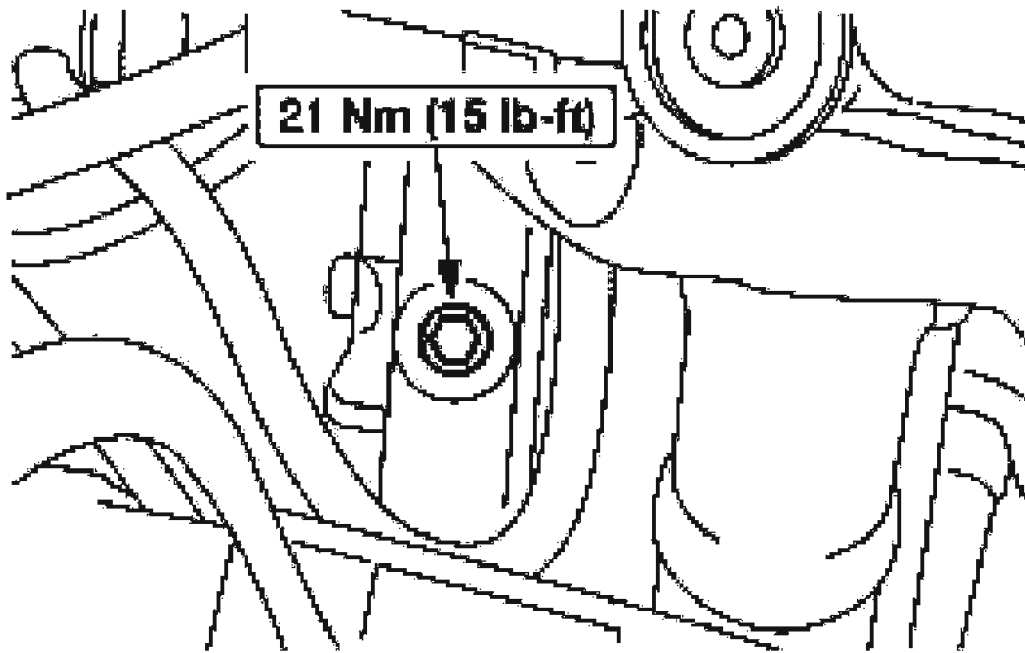
4. Disconnect the A/C clutch field coil electrical connector.



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**Fig. 2: Disconnecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.

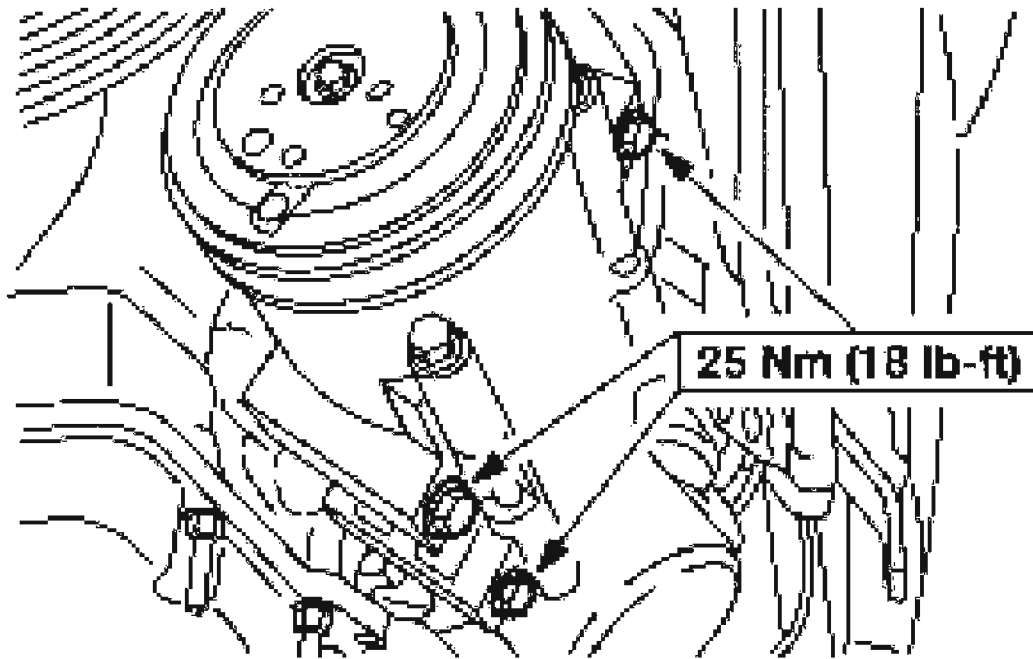


G02742479

**Fig. 3: Removing A/C Manifold And Tube Assembly Bolt From Top Of A/C Compressor**

**Courtesy of FORD MOTOR CO.**

5. Remove the A/C manifold and tube assembly bolt from the top of the A/C compressor and disconnect the A/C manifold and tube assembly.
6. Remove the bolts and the A/C compressor.



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**Fig. 4: Removing A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.

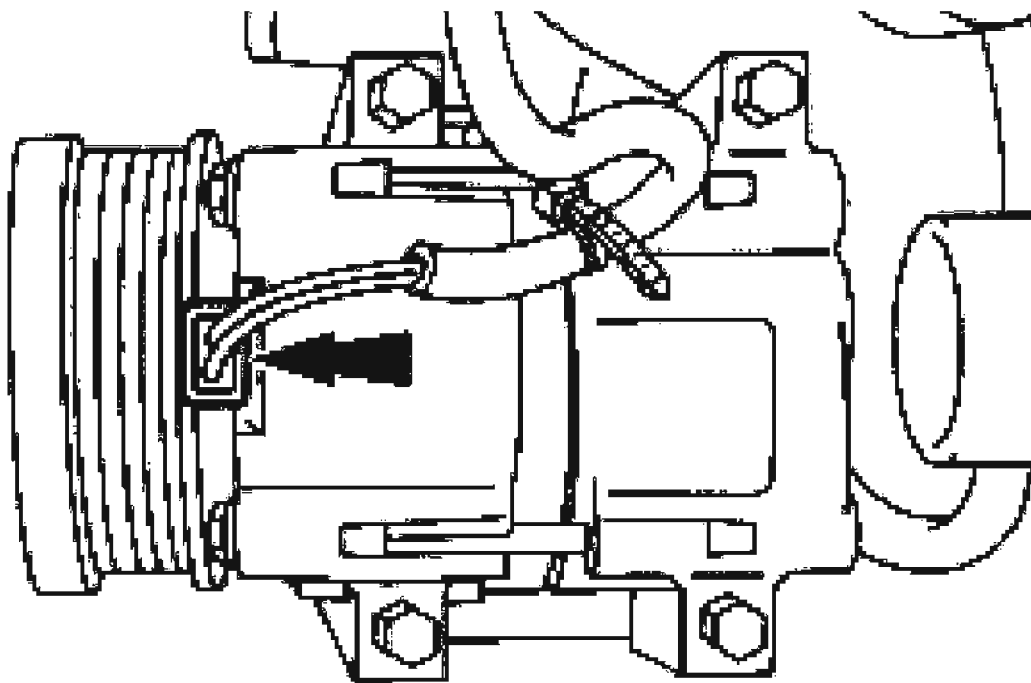
- Lubricate the new A/C compressor with the correct amount of PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
- Lubricate the new A/C manifold O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.
- Apply Pipe Sealant with Teflon(R) D8AZ -19554-A or equivalent meeting Ford specifications WSK-M2G350-A2 and ESR-M18P7-A to the threads of the A/C manifold and tube assembly bolt.

#### AIR CONDITIONING (A/C) COMPRESSOR - 2.0L ZETEC

##### Removal and Installation

**CAUTION:** To prevent refrigerant system contamination, if you are installing a new A/C compressor because the A/C compressor has failed internally, you must use the following procedures:

- NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.
- NOTE:** If an A/C Flusher is available, carry out the air conditioning (A/C) system flushing general procedure. For additional information, refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .
- NOTE:** If the A/C Flusher is not available, carry out the refrigerant system filtering following air conditioning (A/C) component installation general procedure. For additional information, refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .
1. Install a new A/C evaporator core orifice. For additional information, refer to EVAPORATOR CORE ORIFICE .
  2. Remove the drive belt. For addition, refer to ACCESSORY DRIVE .
  3. Disconnect the A/C clutch field coil electrical connector.

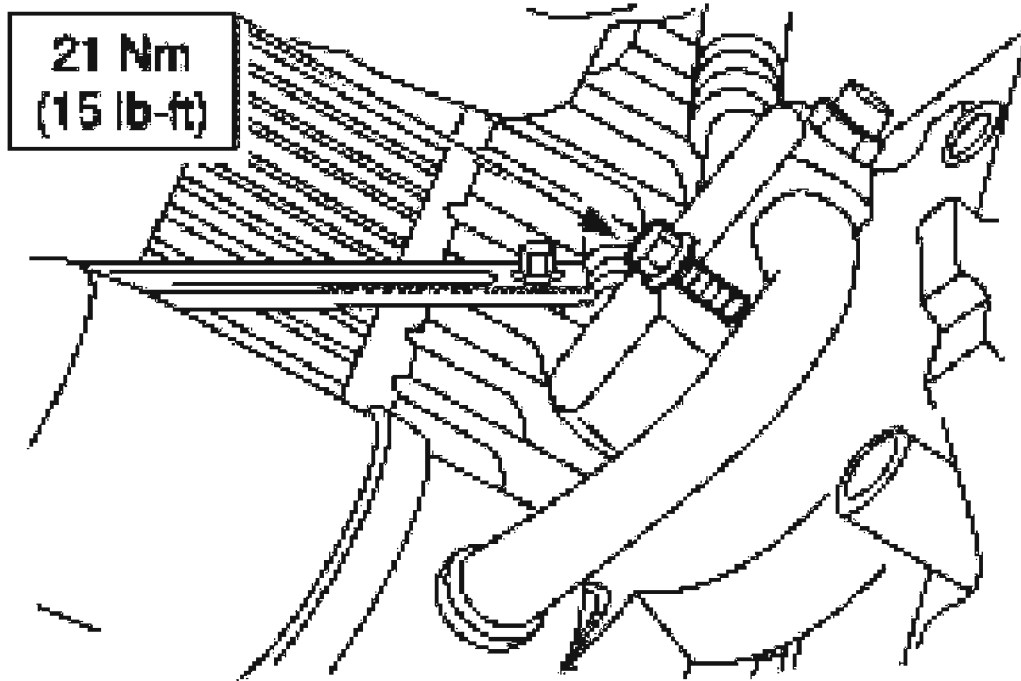


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**Fig. 5: Disconnecting A/C Clutch Field Coil Electrical Connector**

Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.

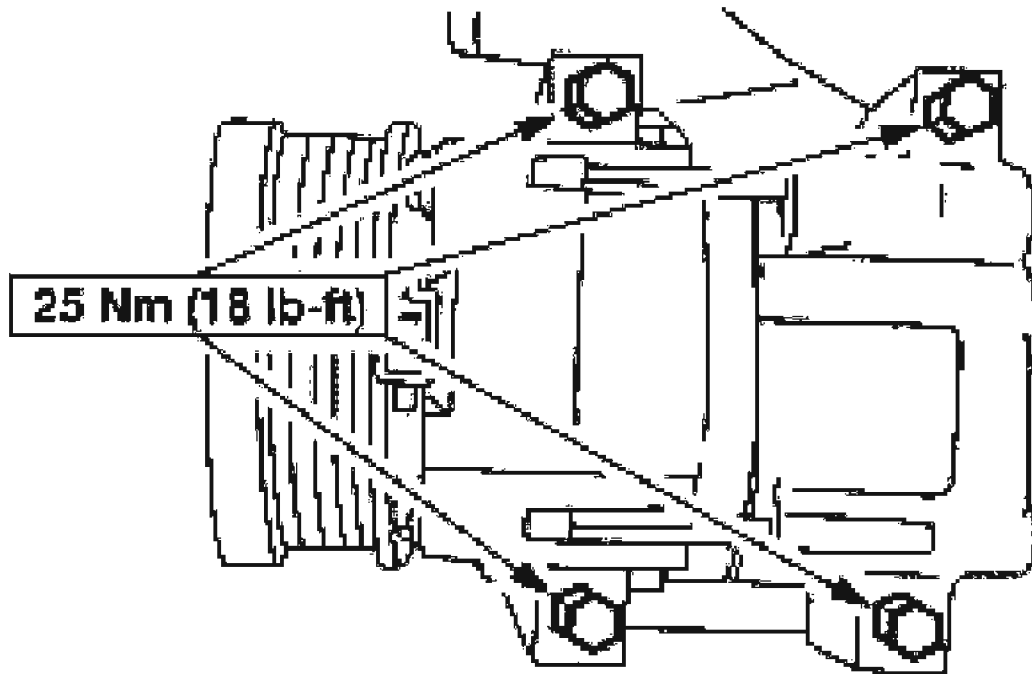


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**Fig. 6: Removing A/C Manifold And Tube Assembly Bolt**  
Courtesy of FORD MOTOR CO.

4. Remove the A/C manifold and tube assembly bolt and disconnect the A/C manifold and tube assembly.
5. Remove the bolts and the A/C compressor.





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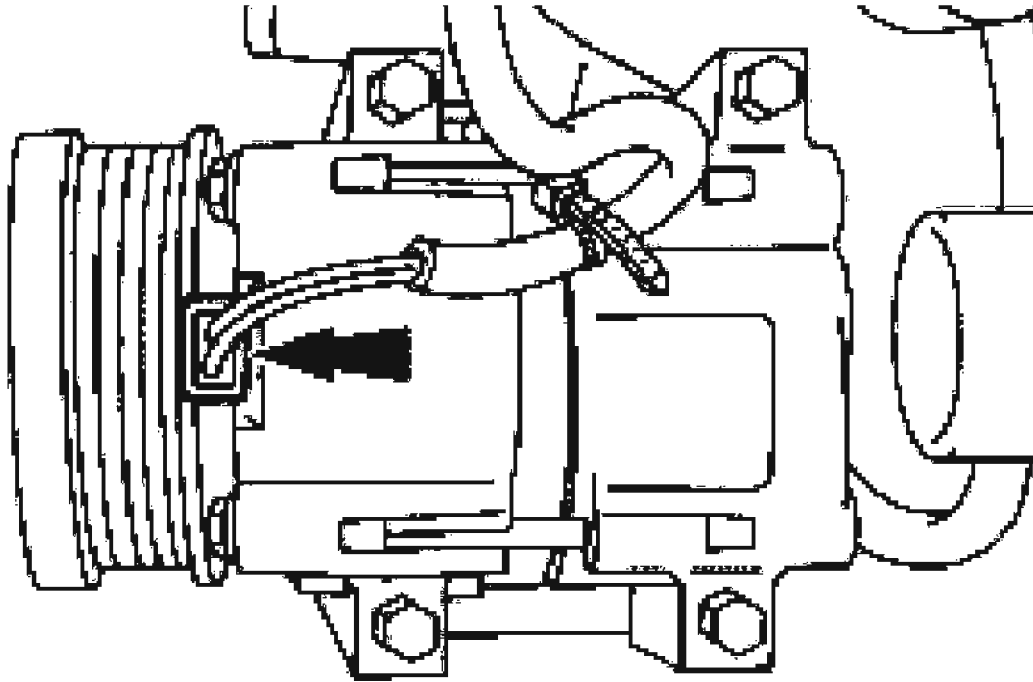
**Fig. 7: Removing A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.
  - Lubricate the new A/C compressor with the correct amount of PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C321-B. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
  - Lubricate the new A/C manifold O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.
  - Apply Pipe Sealant with Teflon(R) D8AZ-19554-A or equivalent meeting Ford specifications WSK-M2G350-A2 and ESR-M18P7-A to the threads of the A/C manifold and tube assembly bolt.

## AIR CONDITIONING (A/C) COMPRESSOR BRACKET

### Removal and Installation

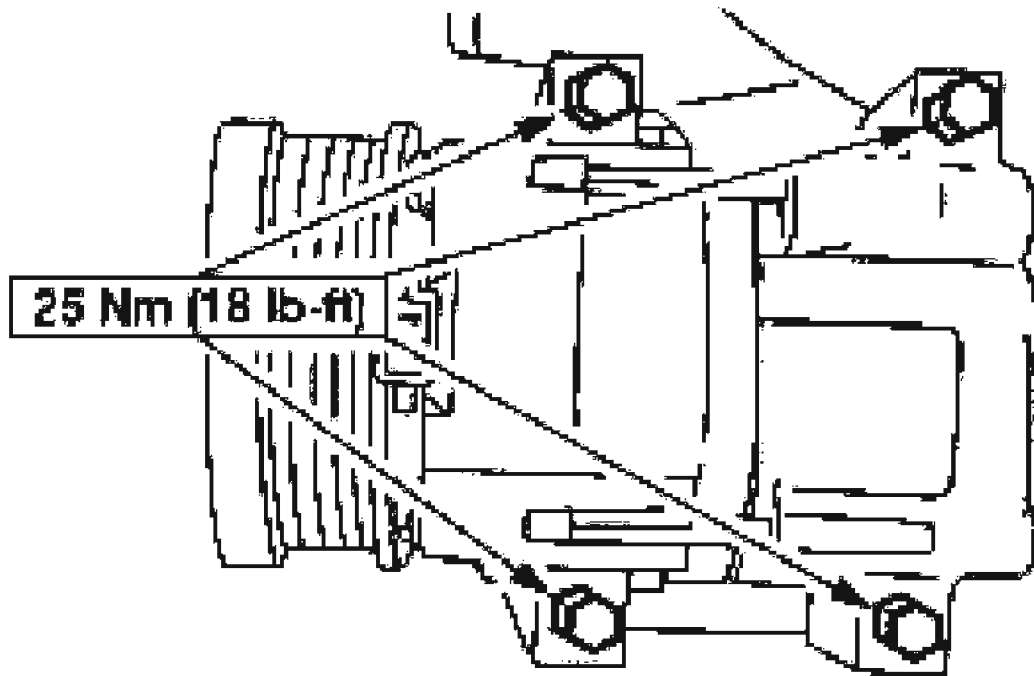
1. Remove the drive belt. For additional information, refer to **ACCESSORY DRIVE**.
2. Disconnect the A/C clutch field coil electrical connector.



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**Fig. 8: Disconnecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

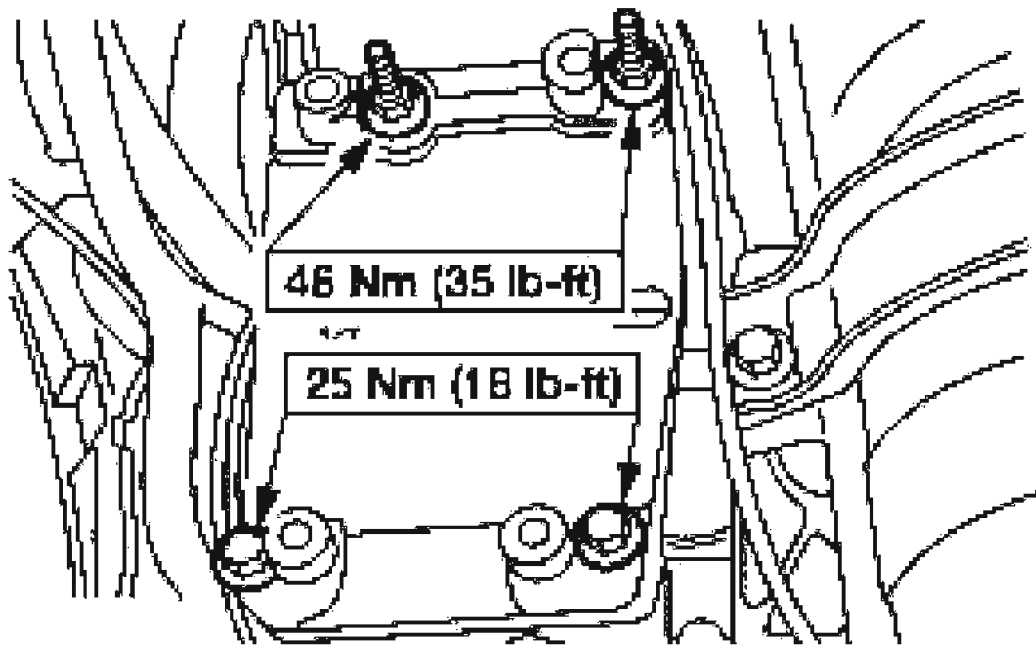
3. Remove the bolts and position the A/C compressor aside.



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**Fig. 9: Removing A/C Compressor Bolts**  
Courtesy of FORD MOTOR CO.

4. Remove the nuts, the bolts, and the A/C compressor bracket.



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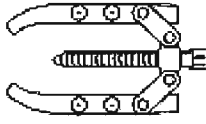
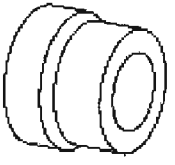



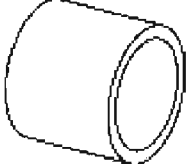
**Fig. 10: Removing A/C Compressor Bracket Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

#### **CLUTCH AND CLUTCH FIELD COIL**

## 2004 Ford Escape

### 2004 HVAC Air Conditioning - Escape

	2-Jaw Puller 205-D026 (D80L-1002-L) or equivalent
	Coil Replacer 412-065 (T89P-19623-EH)
	Compressor Clutch Holding Tool 412-098 (T94P-19703-AH)
	Differential Bearing Cone Remover 205-116 (T77F-4220-B1)
	Field Coil Replacer 412-078 (T91L-19623-CH)
	Field Coil Remover 412-067 (T89P-19623-FH)

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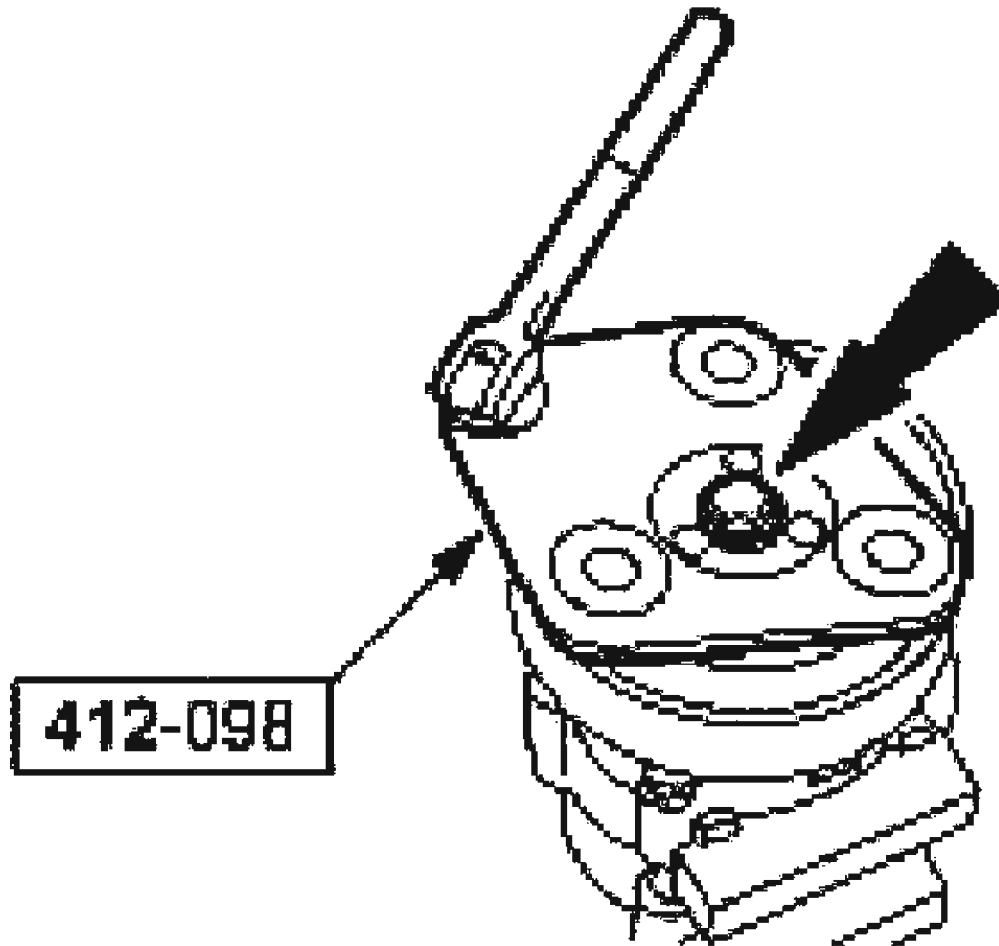
**Fig. 11: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

1. Remove the A/C compressor. For additional information, refer to **AIR CONDITIONING (A/C) COMPRESSOR - 3.0L (4V)** or **AIR CONDITIONING**

**(A/C) COMPRESSOR - 2.0L ZETEC .**

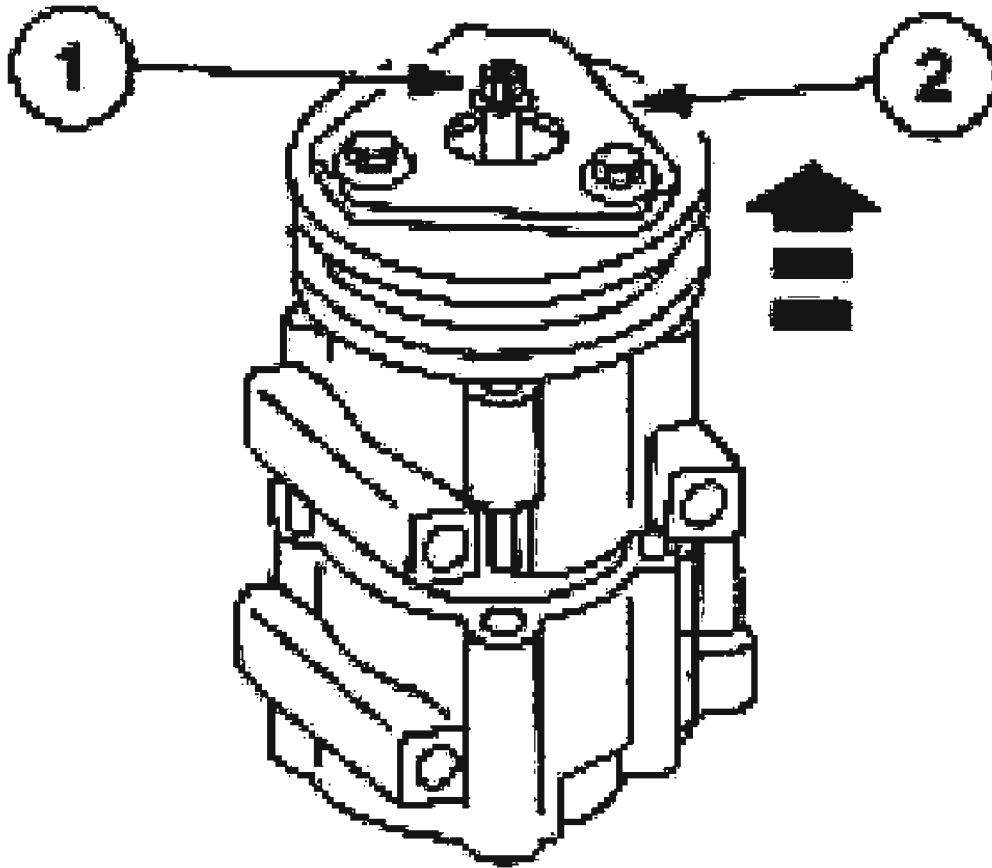
2. Using the special tool, remove the A/C clutch bolt.



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**Fig. 12: Removing A/C Clutch Bolt**  
Courtesy of FORD MOTOR CO.

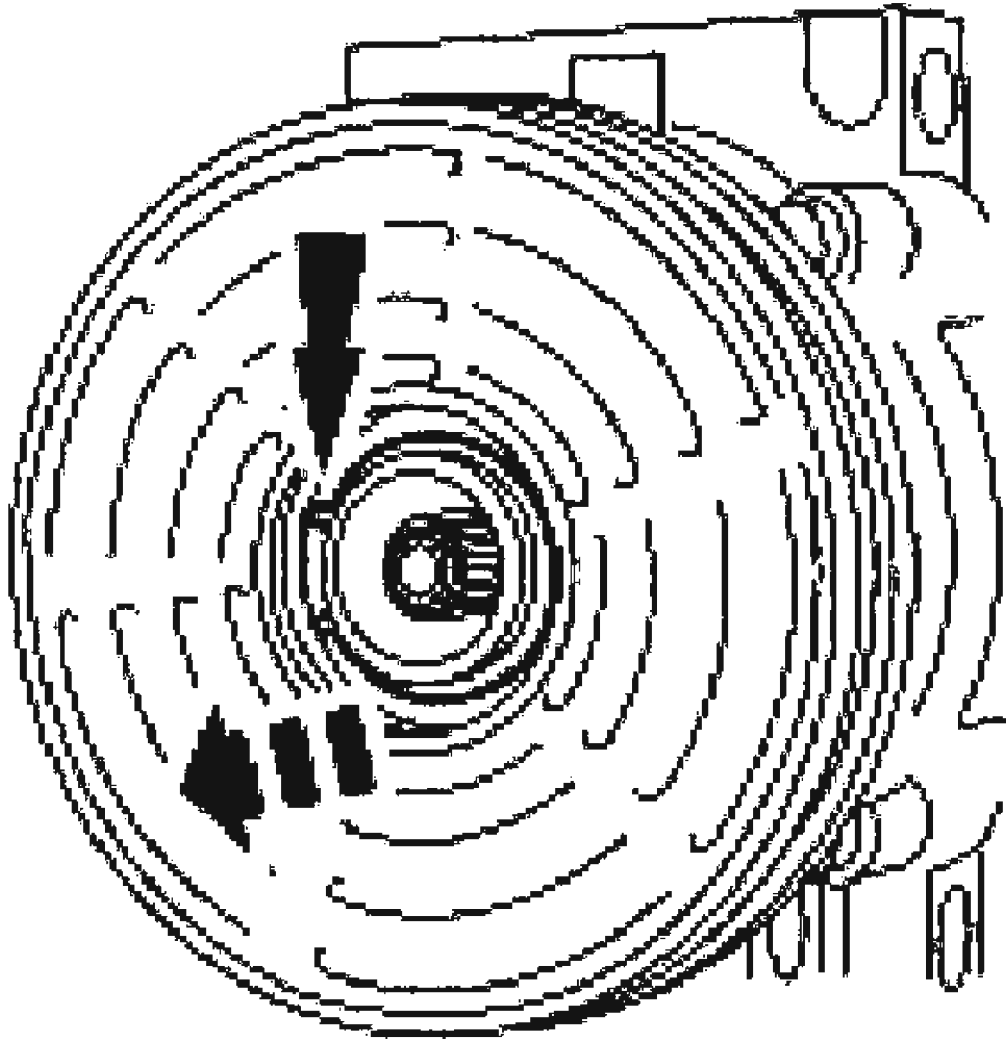
3. Remove the disk and hub assembly and the A/C clutch hub spacer.
  1. Thread an 8 x 1.25 mm bolt into the A/C clutch to force it from the compressor shaft.
  2. Lift the disk and hub assembly and the A/C clutch hub spacer from the compressor shaft.



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**Fig. 13: Removing Disk & Hub Assembly And A/C Clutch Hub Spacer**  
Courtesy of FORD MOTOR CO.

4. Remove the pulley snap ring.

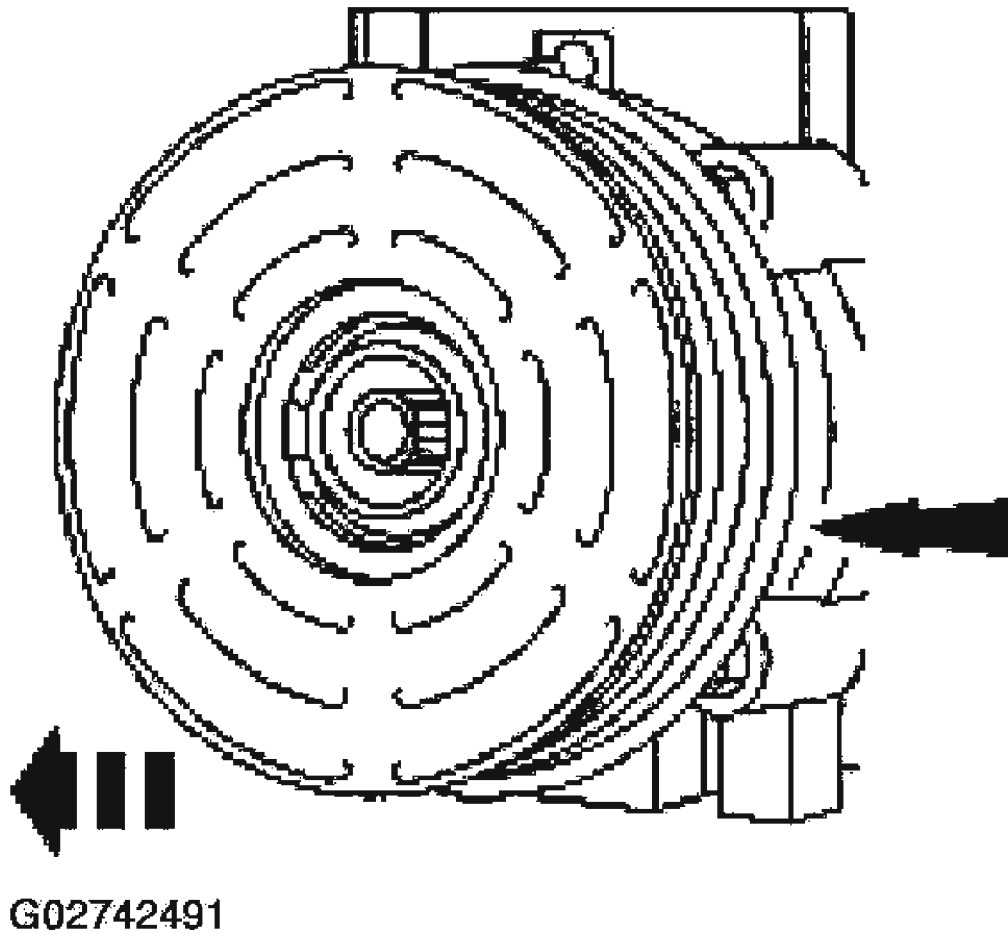


G02742490

**Fig. 14: Removing Pulley Snap Ring**  
Courtesy of FORD MOTOR CO.

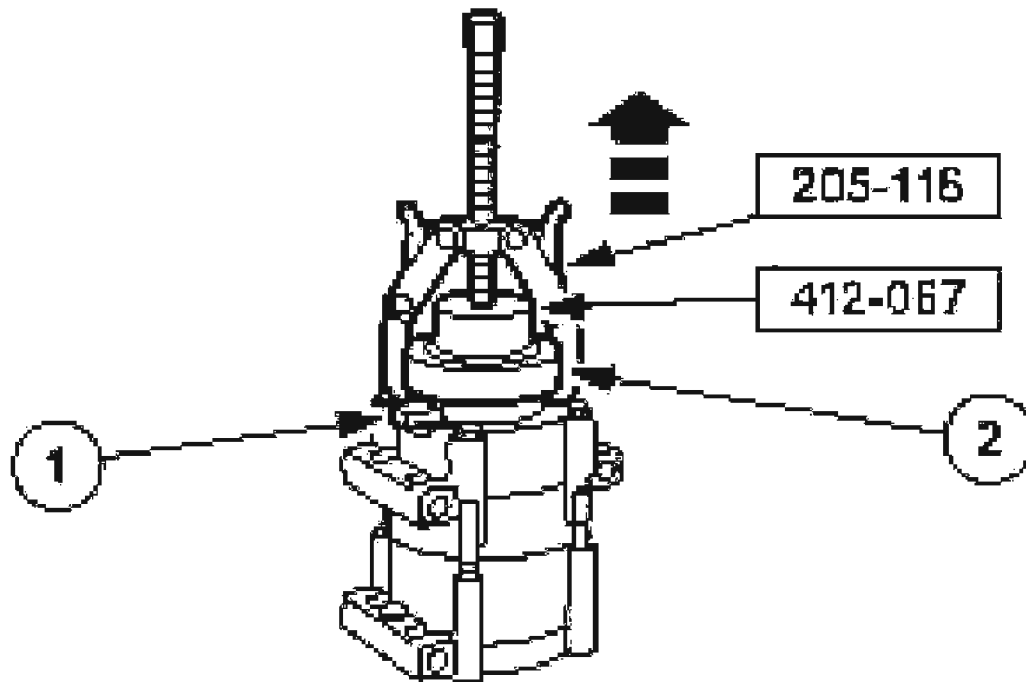
5. Remove the A/C clutch pulley.





**Fig. 15: Removing A/C Clutch Pulley**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use air tools. The A/C clutch field coil can be easily damaged.



G02742492

**Fig. 16: Removing A/C Clutch Field Coil**  
Courtesy of FORD MOTOR CO.

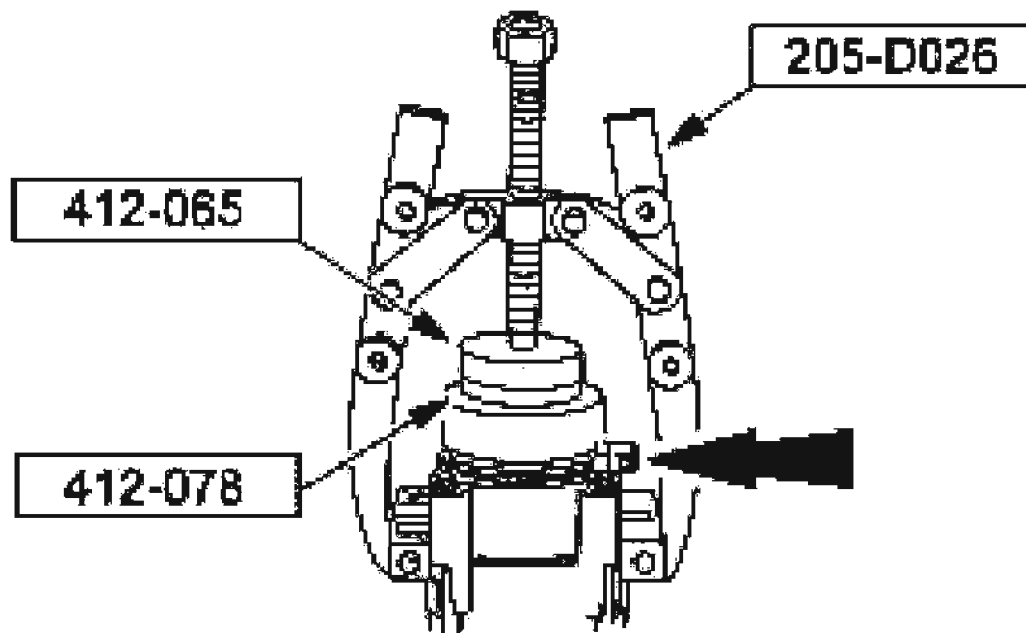
6. Remove the A/C clutch field coil.
  1. Note the location of the A/C clutch field coil electrical connector.
  2. Using the special tools, remove the A/C clutch field coil.

**Installation**

1. Clean the A/C clutch field coil and pulley mounting surfaces.

**CAUTION: Do not use air tools. The A/C clutch field coil can be easily damaged.**

**NOTE:** Position the clutch field coil on the A/C compressor as previously marked.

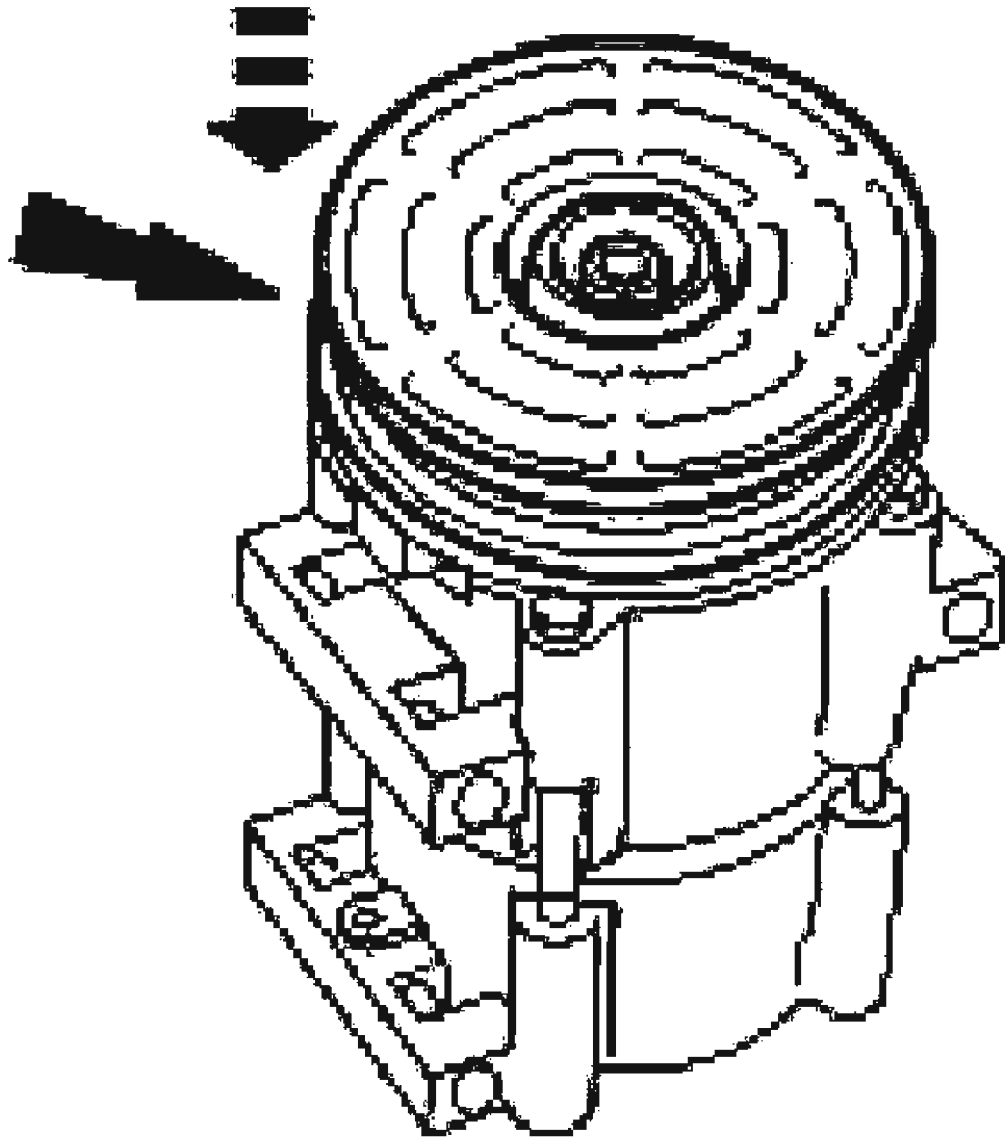


G02742493

**Fig. 17: Installing A/C Clutch Field Coil**  
Courtesy of FORD MOTOR CO.

2. Using the special tools, install the A/C clutch field coil.

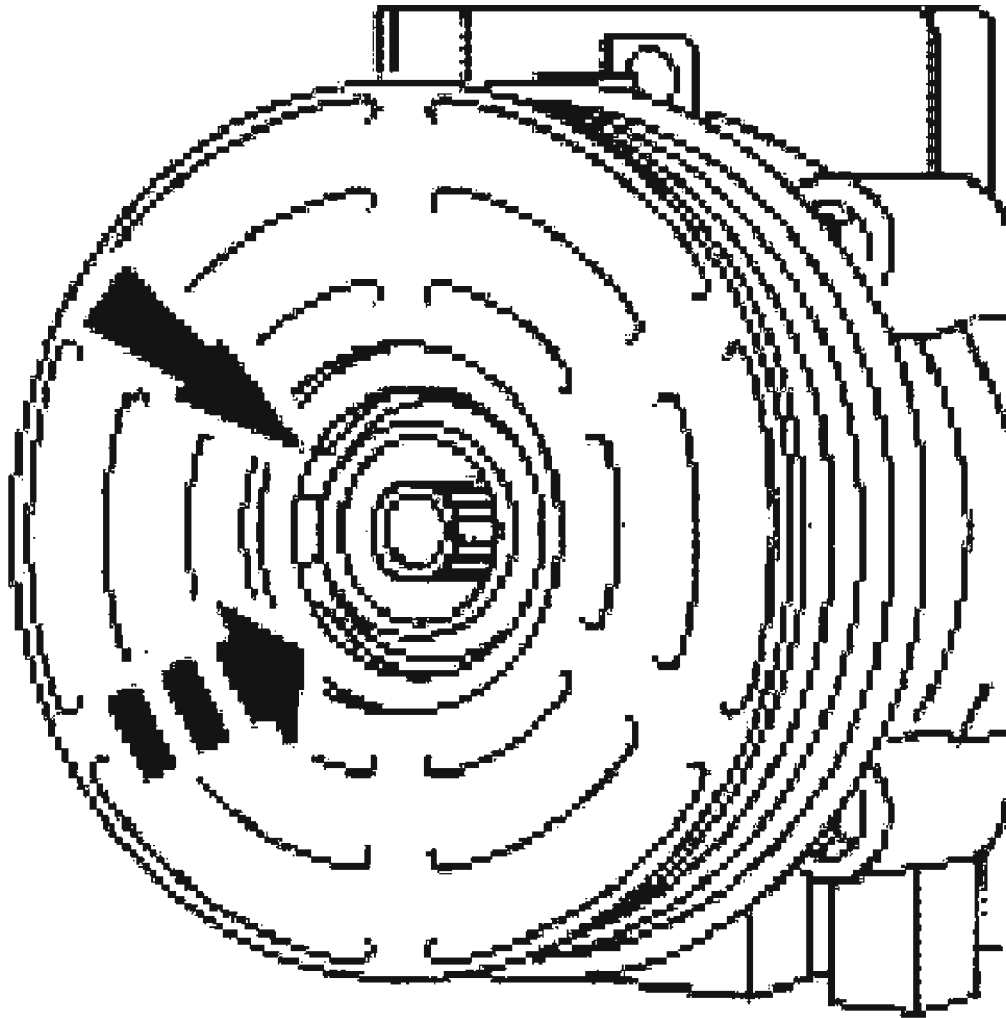
**NOTE:** The A/C clutch pulley is a tight fit on the A/C compressor head. It must be correctly aligned during installation.



G02742494

**Fig. 18: Installing A/C Clutch Pulley**  
Courtesy of FORD MOTOR CO.

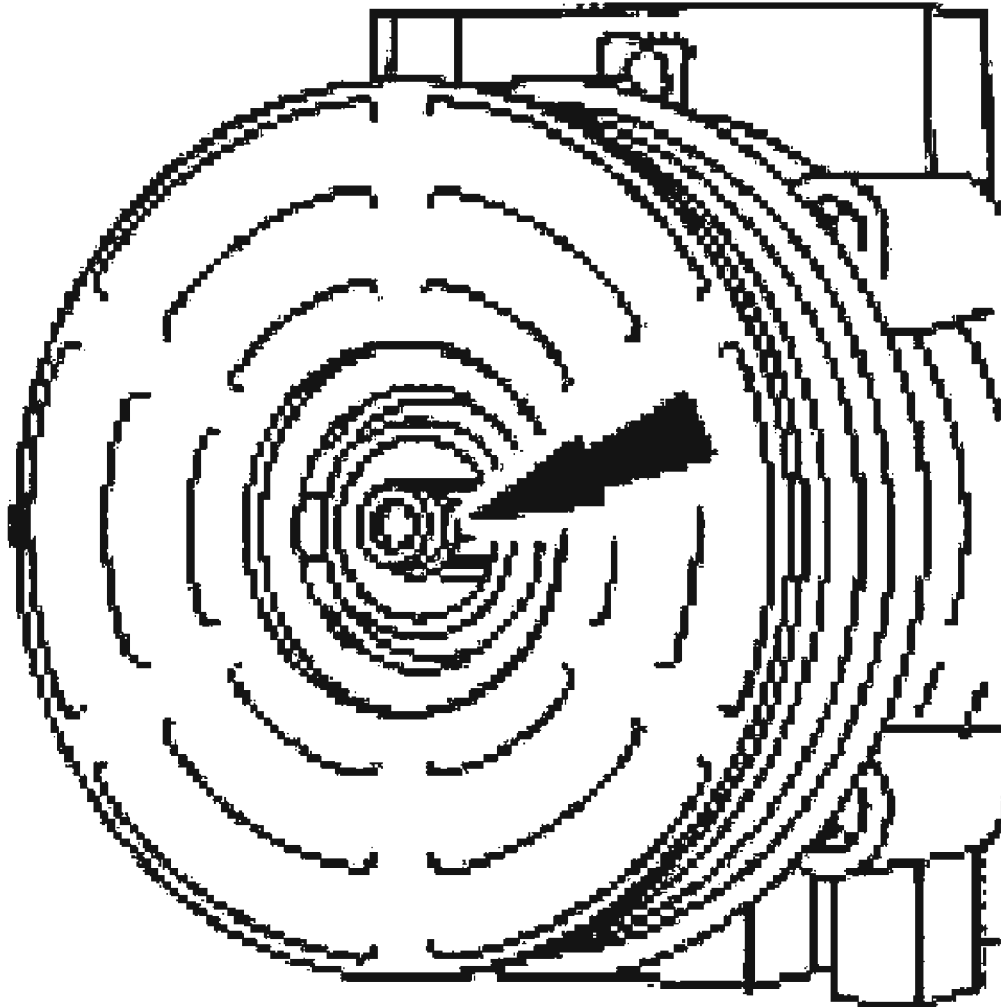
3. Install the A/C clutch pulley.
4. Install the pulley snap ring with the bevel side out.



G02742495

**Fig. 19: Installing Pulley Snap Ring**  
Courtesy of FORD MOTOR CO.

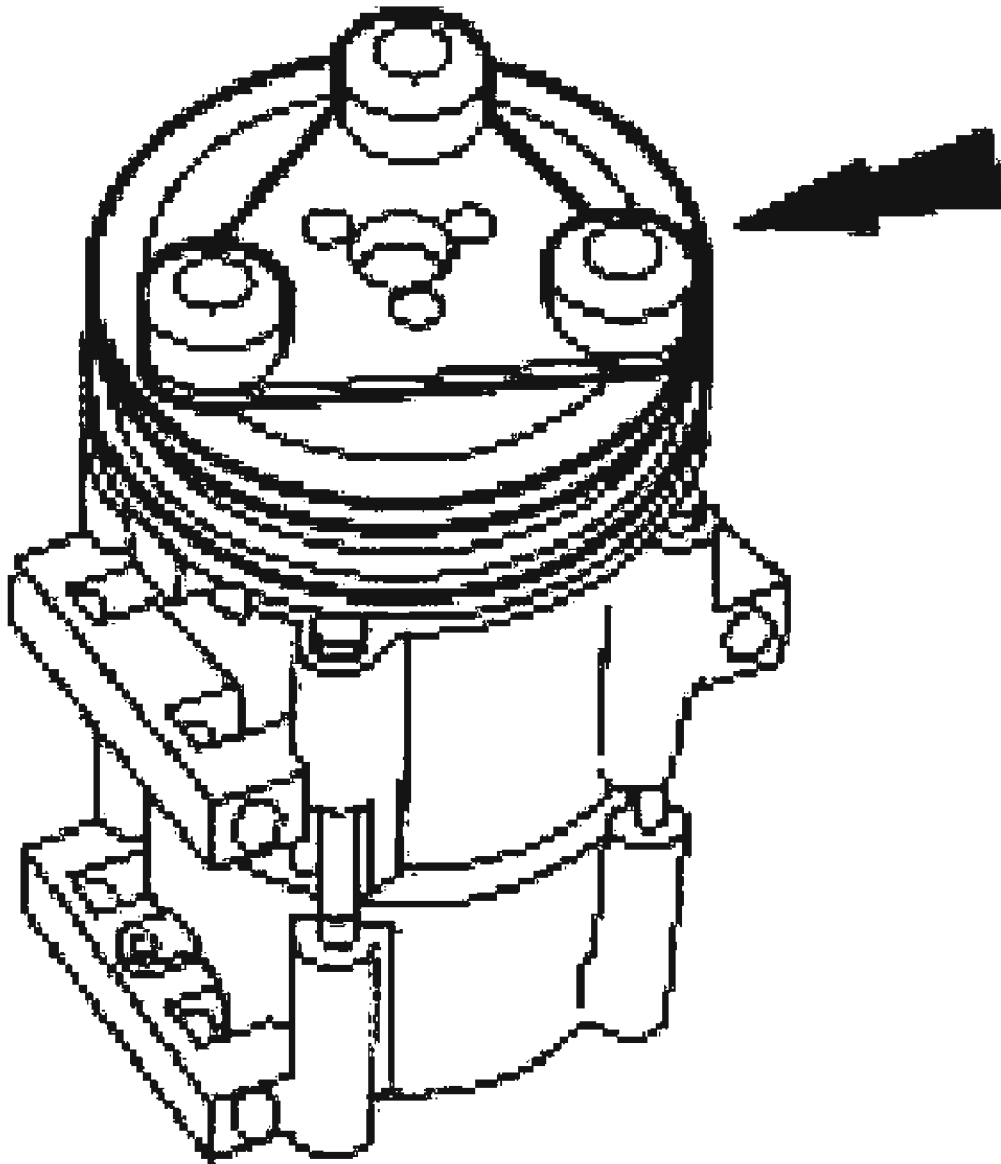
5. Place one nominal thickness A/C clutch hub spacer inside the clutch hub spline opening.



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**Fig. 20: Installing A/C Clutch Hub Spacer Inside Clutch Hub Spline Opening**  
Courtesy of FORD MOTOR CO.

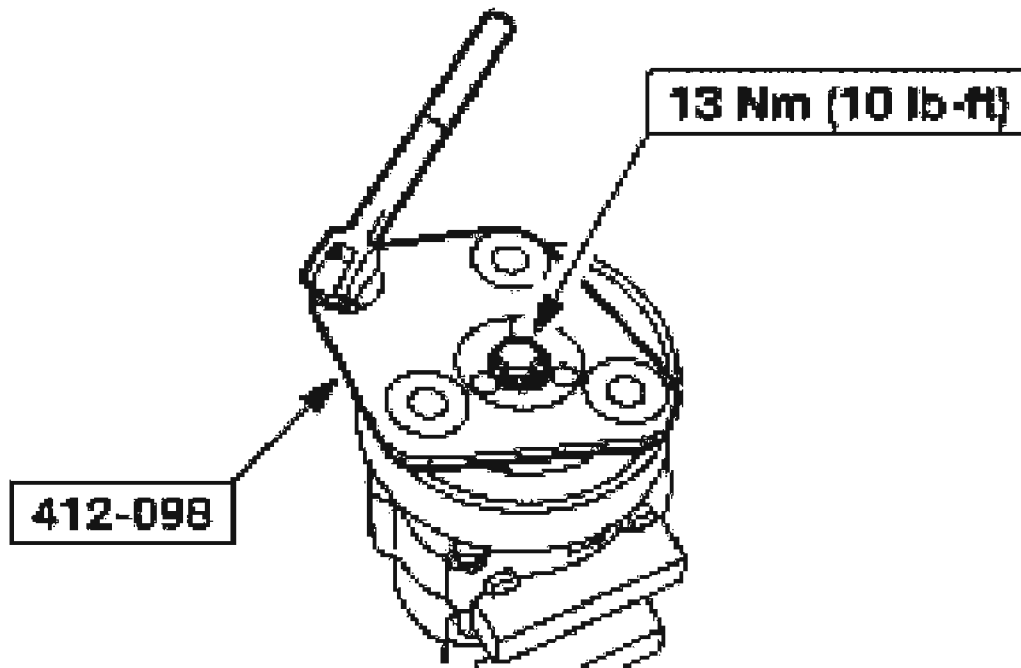
6. Install the disk and hub assembly.



G02742497

**Fig. 21: Installing Disk And Hub Assembly**  
Courtesy of FORD MOTOR CO.

7. Using the special tool, install and tighten the A/C clutch bolt.

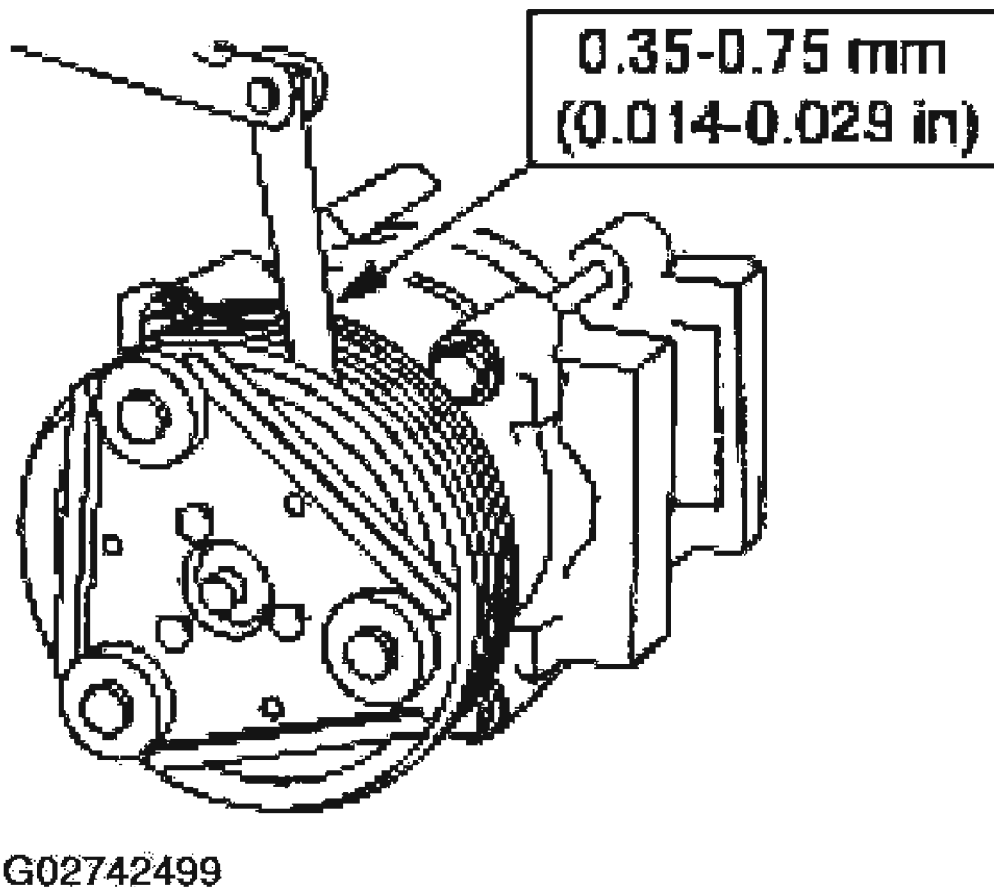


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**Fig. 22: Tightening A/C Clutch Bolt**  
Courtesy of FORD MOTOR CO.

8. Measure and adjust the clutch air gap by removing or adding A/C clutch hub spacers.






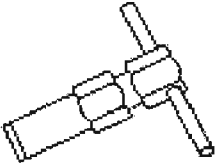



**Fig. 23: Measuring Clutch Air Gap**  
Courtesy of FORD MOTOR CO.

9. Install the A/C compressor. For additional information, refer to **AIR CONDITIONING (A/C) COMPRESSOR - 3.0L (4V)** or **AIR CONDITIONING (A/C) COMPRESSOR - 2.0L ZETEC** .

**AIR CONDITIONING (A/C) COMPRESSOR SHAFT SEAL**

## 2004 Ford Escape

### 2004 HVAC Air Conditioning - Escape

	Seal Protector 412-061 (T89P-19623-CH)
	Compressor Seal Remover 412-059 (T89P-19623-BH)
	Shaft Seal Installer 412-058 (T89P-19623-AH)
	Snap Ring Remover 412-063 (T89P-19623-DH)
	O-Ring Seal Remover 100-010 (T71P-19703-C)

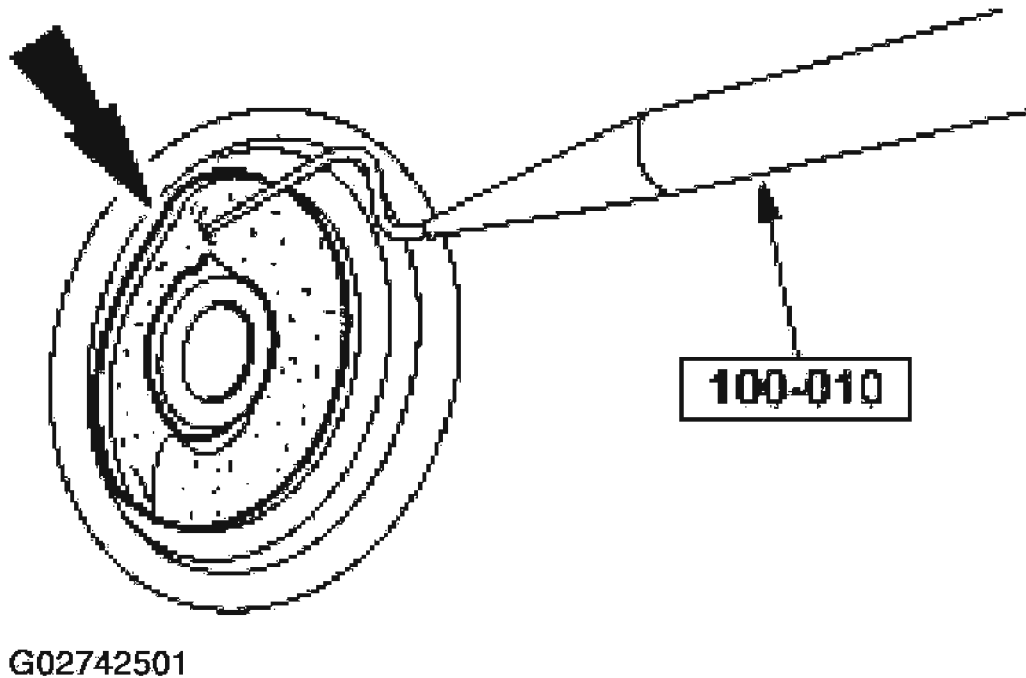
G02742500

**Fig. 24: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

1. Remove the disk and hub assembly from the A/C compressor. For additional information, refer to **CLUTCH AND CLUTCH FIELD COIL** .

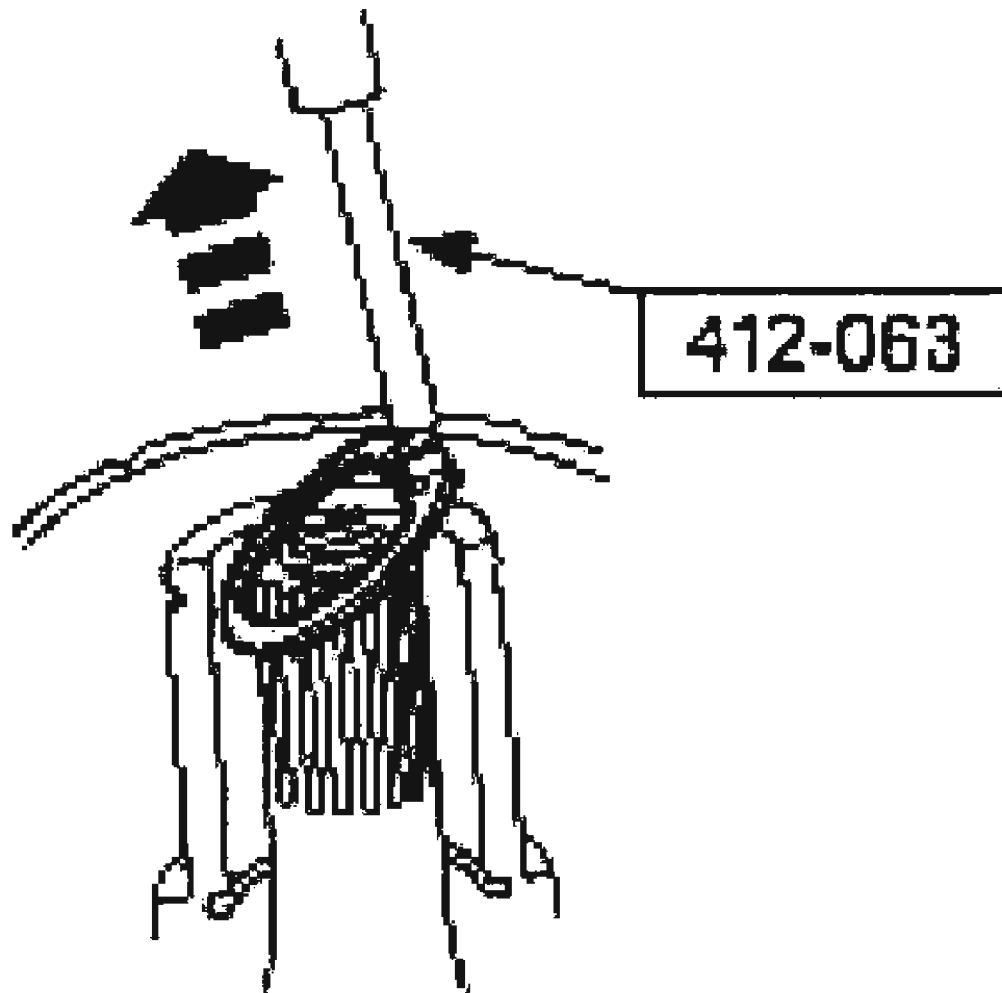
2. Using the special tool, remove the shaft seal felt from the nose of the A/C compressor.



**Fig. 25: Removing Shaft Seal Felt From Nose Of A/C Compressor**  
Courtesy of FORD MOTOR CO.

**CAUTION:** To prevent refrigerant system contamination, do not allow dirt or other foreign materials to enter the A/C compressor.

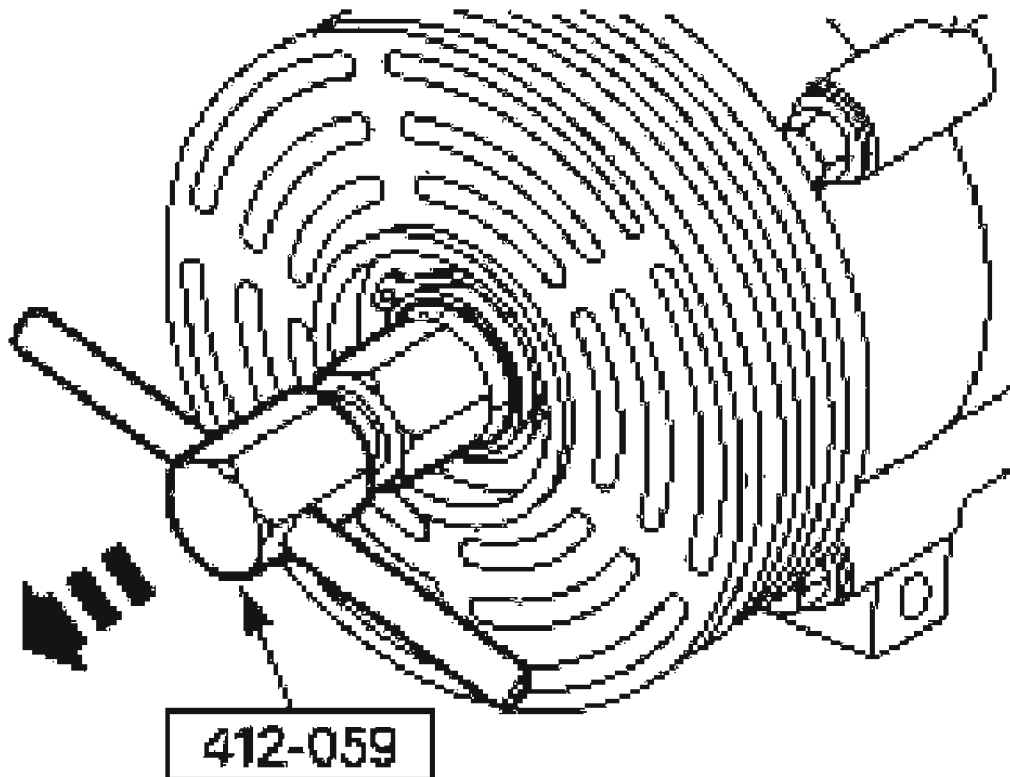
3. Clean the compressor nose area.
4. Using the special tool, remove the shaft seal snap ring.



G02742502

**Fig. 26: Removing Shaft Seal Snap Ring**  
Courtesy of FORD MOTOR CO.

5. Using the special tool, remove the shaft seal from the A/C compressor.



G02742503

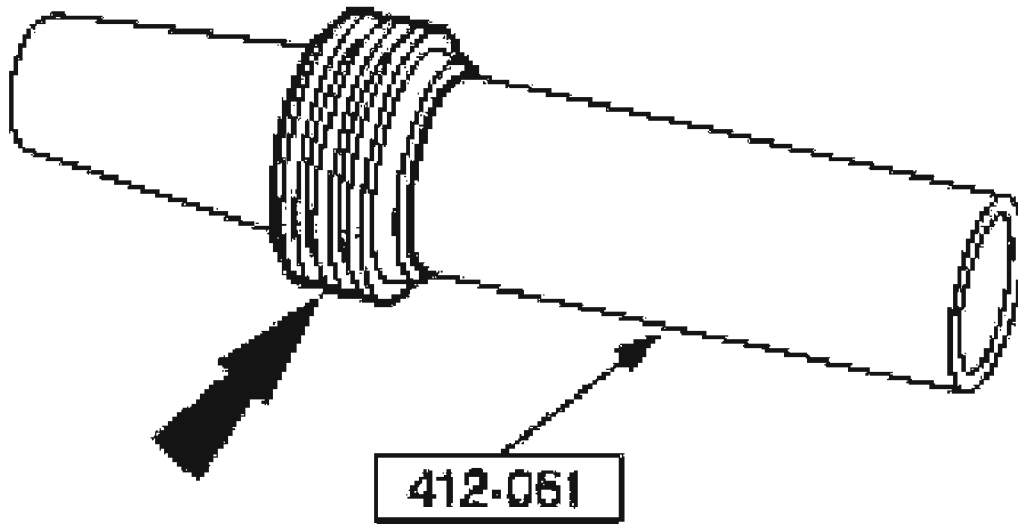
**Fig. 27: Removing Shaft Seal From A/C Compressor**  
Courtesy of FORD MOTOR CO.

#### Installation

**CAUTION:** To prevent refrigerant system contamination, do not allow dirt or other foreign materials to enter the A/C compressor.

1. Clean the A/C compressor nose area.
2. Lubricate the shaft seal and special tool with PAG Compressor Oil YN-12-C or equivalent meeting

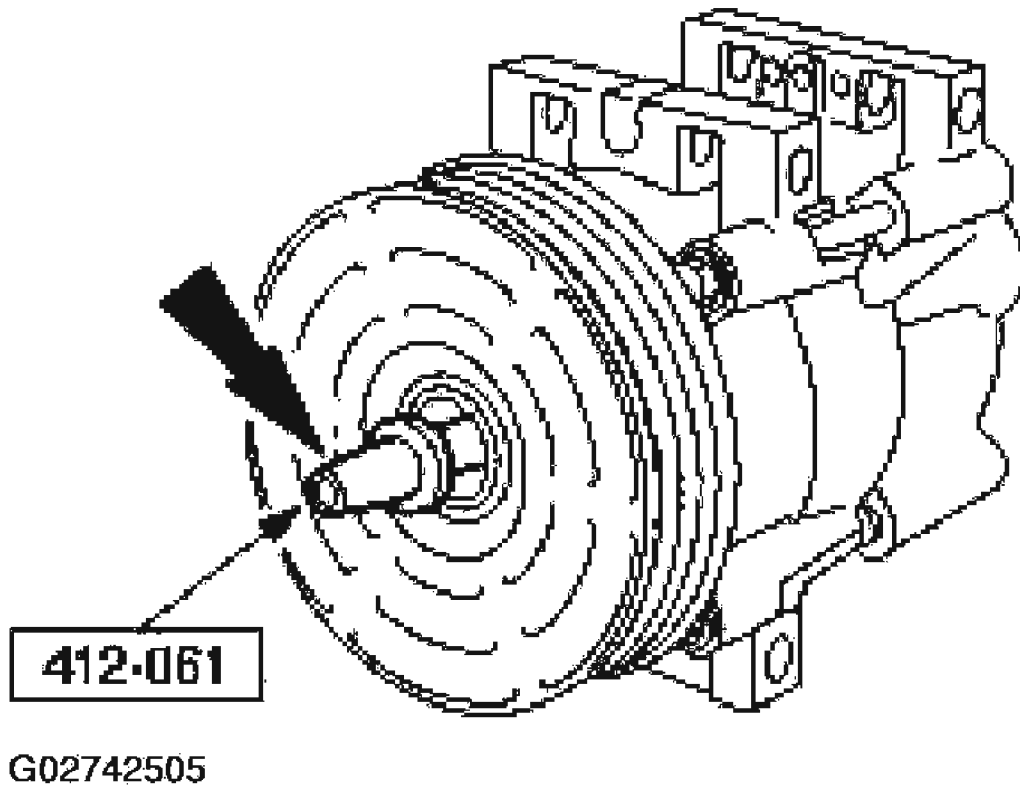
Ford specification WSH-M1C231-B. Place the shaft seal on the special tool.



G02742504

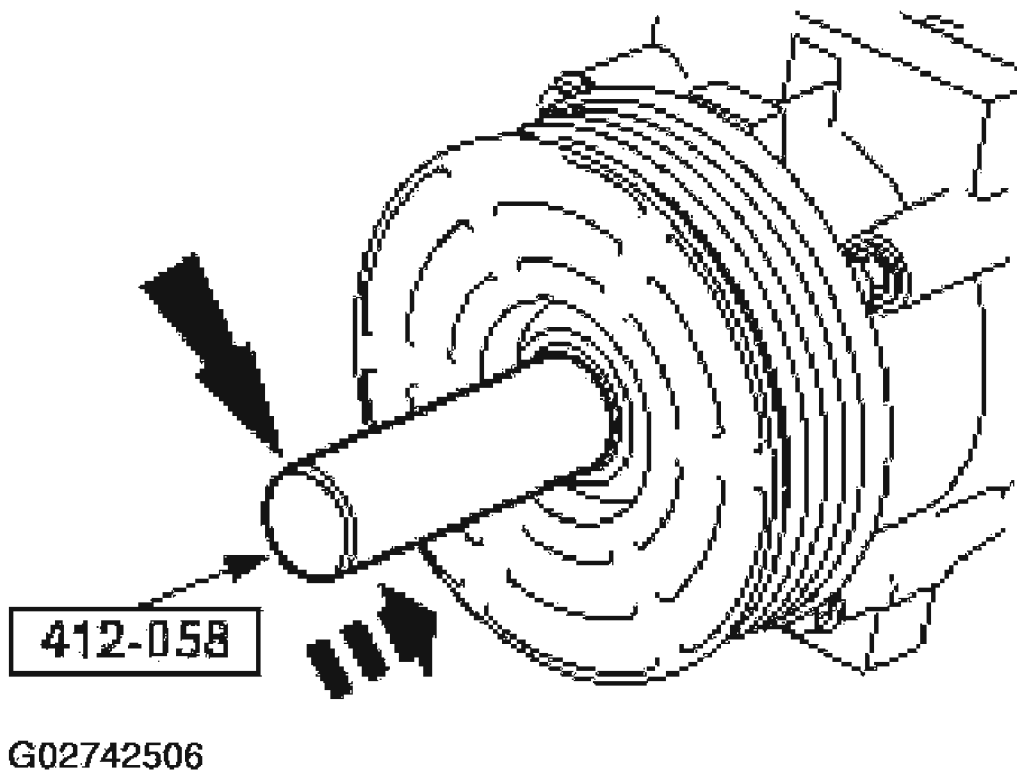
**Fig. 28: Lubricating Shaft Seal And Special Tool**  
Courtesy of FORD MOTOR CO.

3. Position the special tool, with the shaft seal, over the A/C compressor shaft.



**Fig. 29: Positioning Special Tool With Shaft Seal Over A/C Compressor Shaft**  
Courtesy of FORD MOTOR CO.

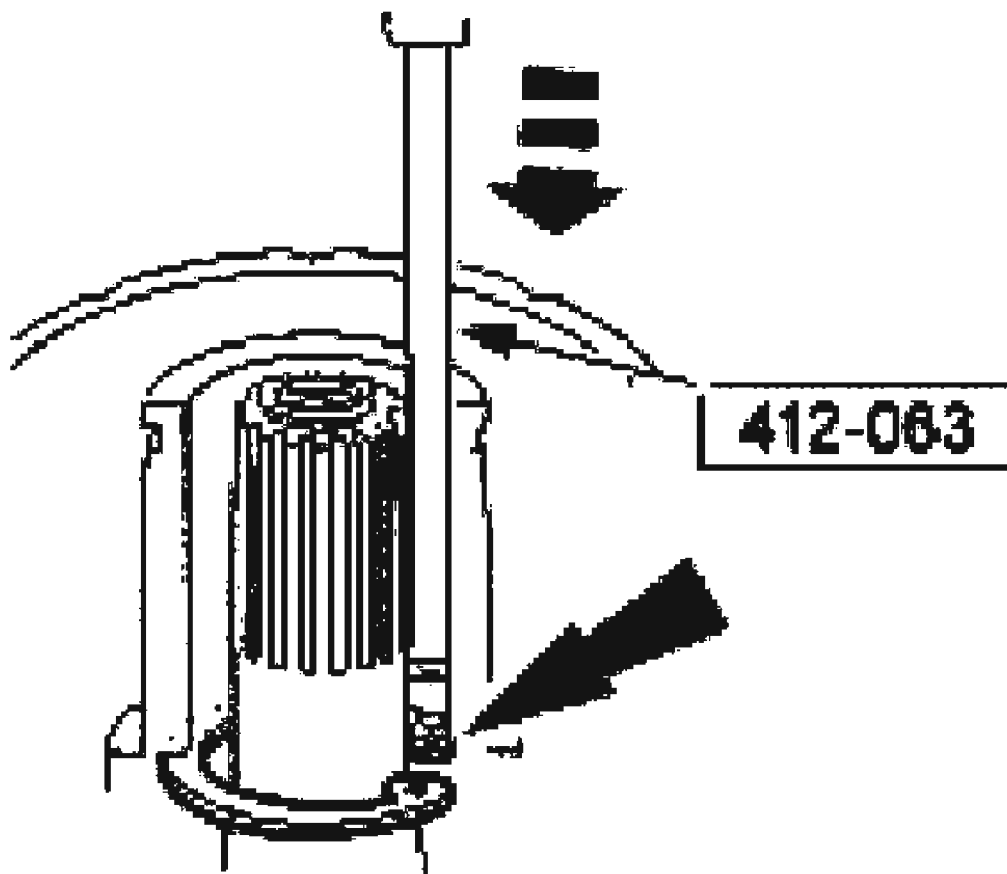
4. Using the special tool, push the shaft seal onto the A/C compressor shaft until seated.



**Fig. 30: Installing Shaft Seal**  
Courtesy of FORD MOTOR CO.

5. Using the special tool, install the shaft seal snap ring.

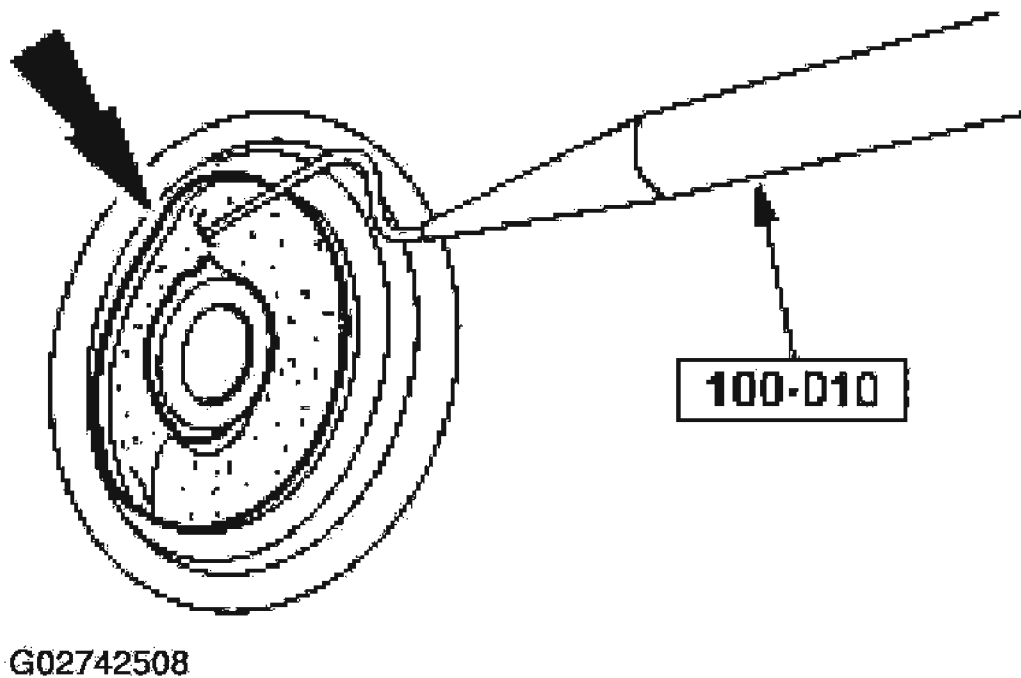




G02742507

**Fig. 31: Installing Shaft Seal Snap Ring**  
Courtesy of FORD MOTOR CO.

6. Carry out the A/C compressor external leak test. For additional information, refer to Component Tests in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
7. Using the special tool, install the shaft seal felt.



**Fig. 32: Installing Shaft Seal Felt**  
Courtesy of FORD MOTOR CO.

8. Install the disk and hub assembly. For additional information, refer to **CLUTCH AND CLUTCH FIELD COIL** .



## EVAPORATOR CORE

### Removal and Installation

- NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C component or damage to the suction accumulator.
- NOTE:** If an A/C evaporator core leak is suspected, the A/C evaporator core must be leak tested before it is removed from the vehicle. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
- NOTE:** The evaporator core and evaporator housing must be installed as a complete unit.

1. Remove the A/C evaporator core housing. For additional information, refer to **HEATING & VENTILATION** .
2. Transfer, the components from the old evaporator core housing to the new evaporator core housing.
3. To install, reverse the removal procedure.
  - Lubricate the new A/C evaporator core with the correct amount of PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .

**EVAPORATOR CORE ORIFICE**

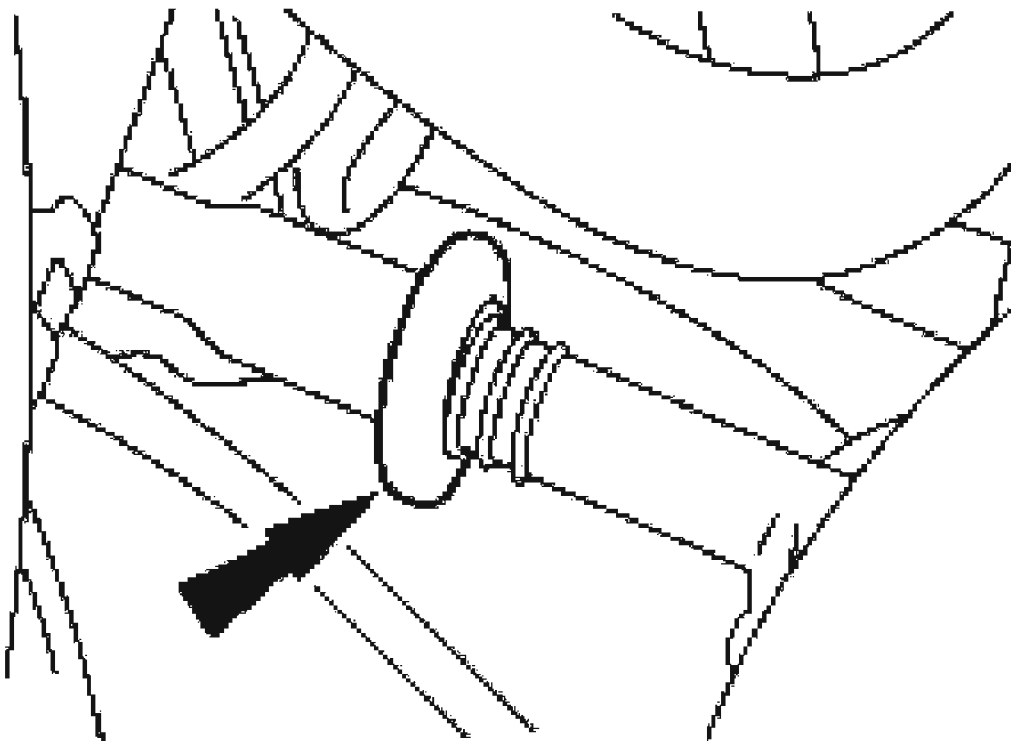
	Broken Orifice Extractor 412-035 (T83L-19990-B)
	Fixed Orifice Tube Tool 412-034 (T83L-19990-A)

G02742509

**Fig. 33: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

**Removal**

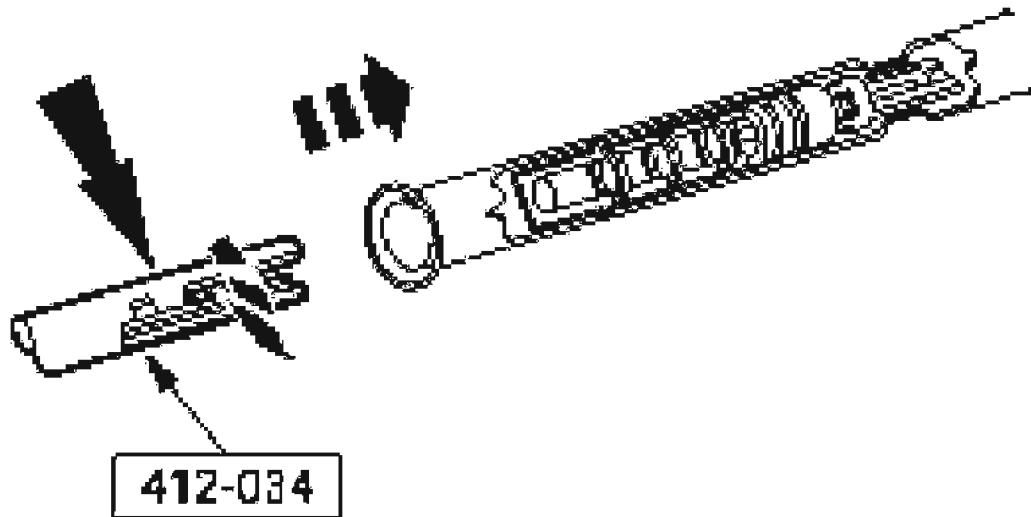
**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.



G02742510

**Fig. 34: Disconnecting Condenser To Evaporator Line At Orifice Tube**  
Courtesy of FORD MOTOR CO.

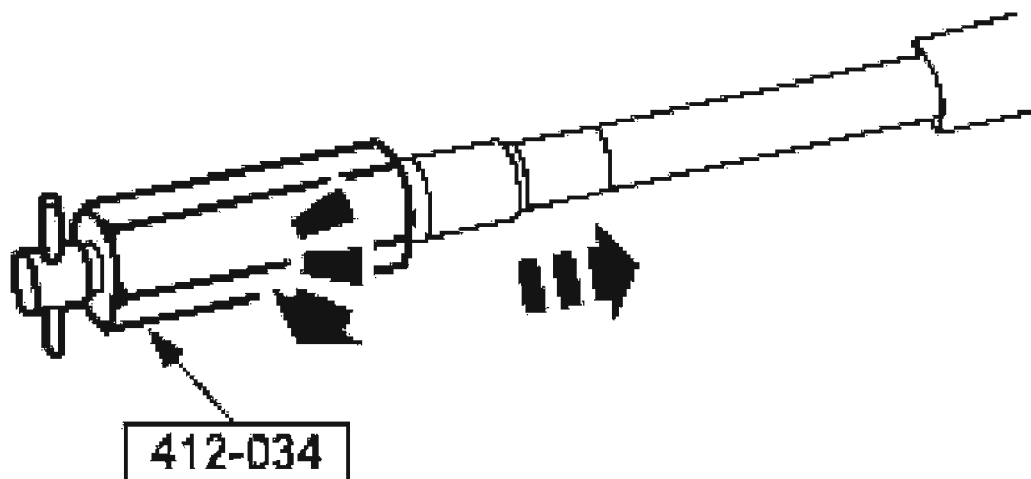
1. Disconnect the condenser to evaporator line at the orifice tube. For additional information, refer to spring lock coupling general procedure in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
2. Engage the special tool onto the A/C evaporator core orifice.



G02742511

**Fig. 35: Engaging Special Tool Onto A/C Evaporator Core Orifice**  
Courtesy of FORD MOTOR CO.

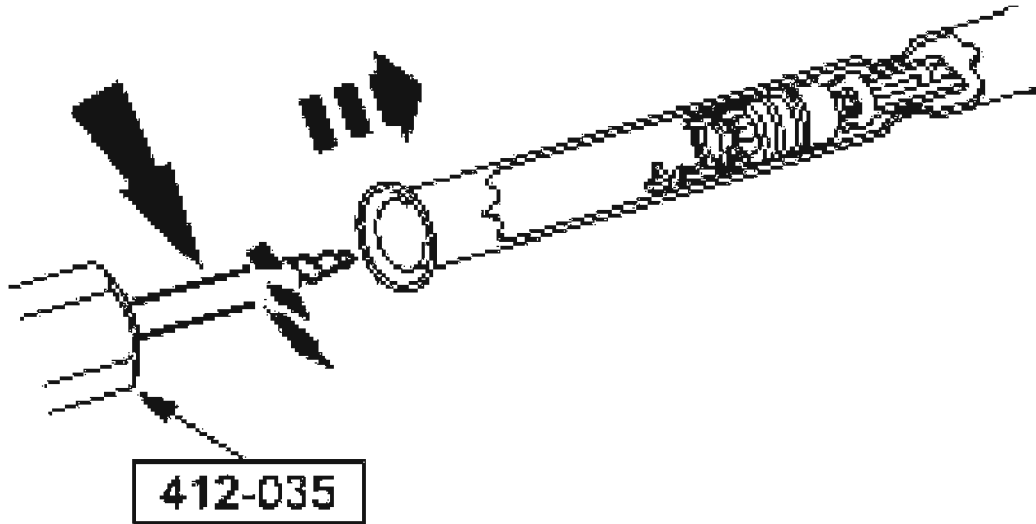
3. Hold the special tool T-handle stationary and rotate the special tool body to remove the A/C evaporator core orifice.



G02742512

**Fig. 36: Removing A/C Evaporator Core Orifice**  
Courtesy of FORD MOTOR CO.

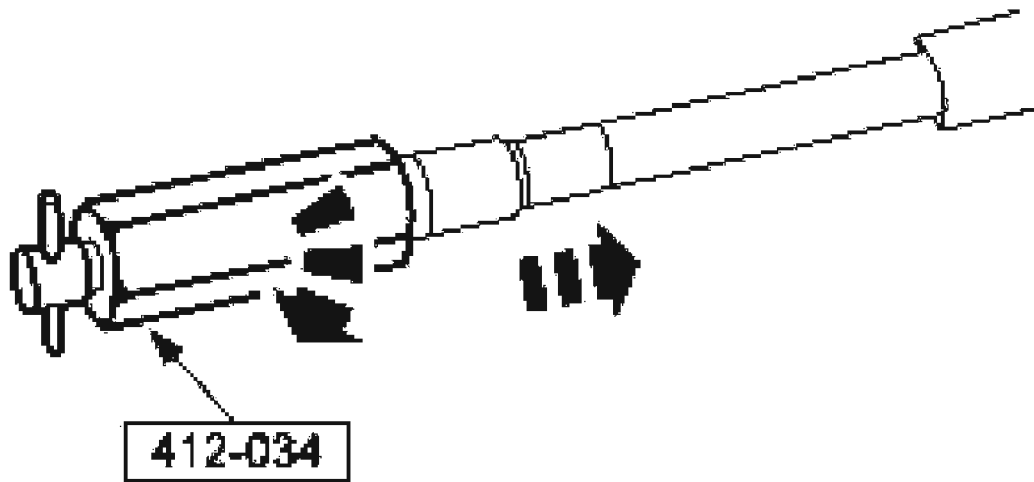
4. If the A/C evaporator core orifice is broken, screw the end of the special tool into the broken A/C evaporator core orifice.



G02742513

**Fig. 37: Screwing End Of Special Tool Into Broken A/C Evaporator Core Orifice**  
Courtesy of FORD MOTOR CO.

5. Hold the special tool T -handle stationary and rotate the special tool body to remove the broken A/C evaporator core orifice.

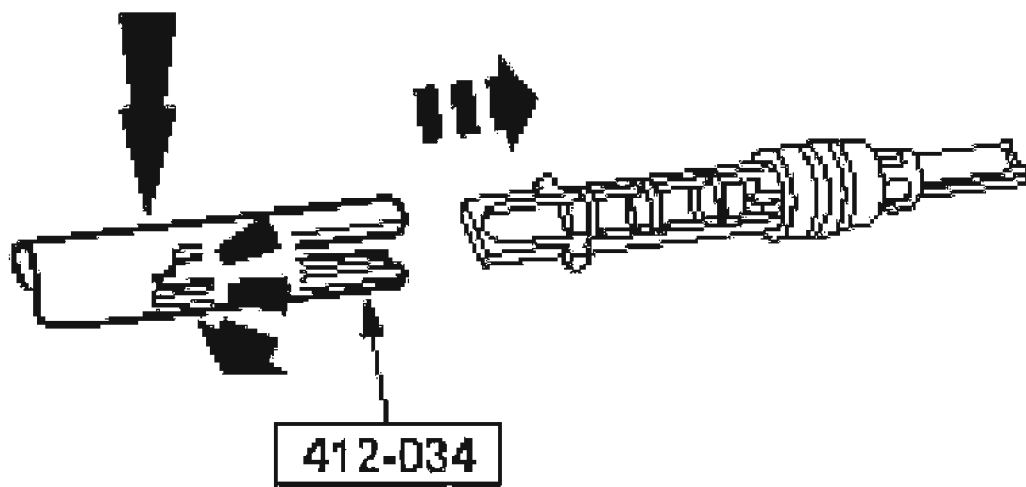


G02742514

**Fig. 38: Removing Broken A/C Evaporator Core Orifice**  
Courtesy of FORD MOTOR CO.

#### Installation

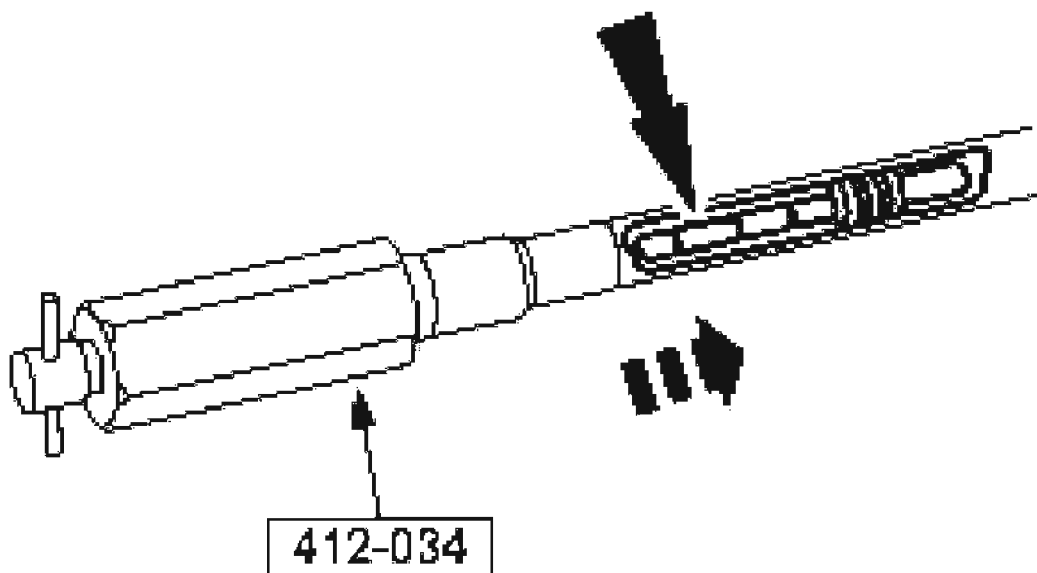
1. Lubricate and install the O-ring seals on the A/C evaporator core orifice.
  - Use PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.
2. Place the A/C evaporator core orifice into the special tool.



G02742515

**Fig. 39: Placing A/C Evaporator Core Orifice Into Special Tool**  
Courtesy of FORD MOTOR CO.

3. Using the special tool, insert the A/C evaporator core orifice into the condenser to evaporator line until seated.



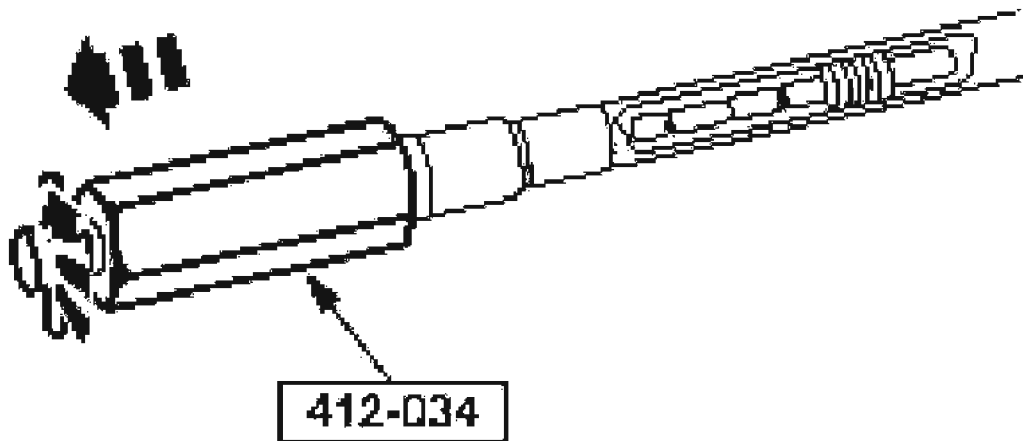
G02742516



**Fig. 40: Inserting A/C Evaporator Core Orifice Into Condenser To Evaporator Line**

Courtesy of FORD MOTOR CO.

4. Remove the special tool.

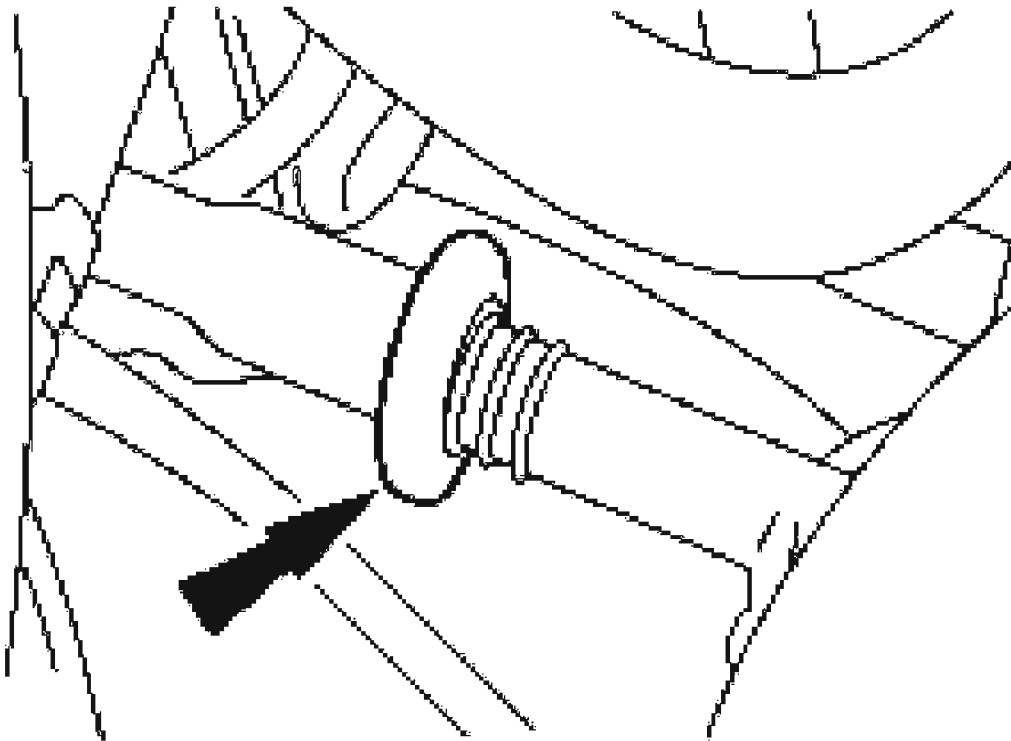


G02742517

**Fig. 41: Removing Special Tool**

Courtesy of FORD MOTOR CO.

5. Connect the condenser to evaporator line at the orifice tube. For additional information, refer to spring lock coupling general procedure in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .



G02742518

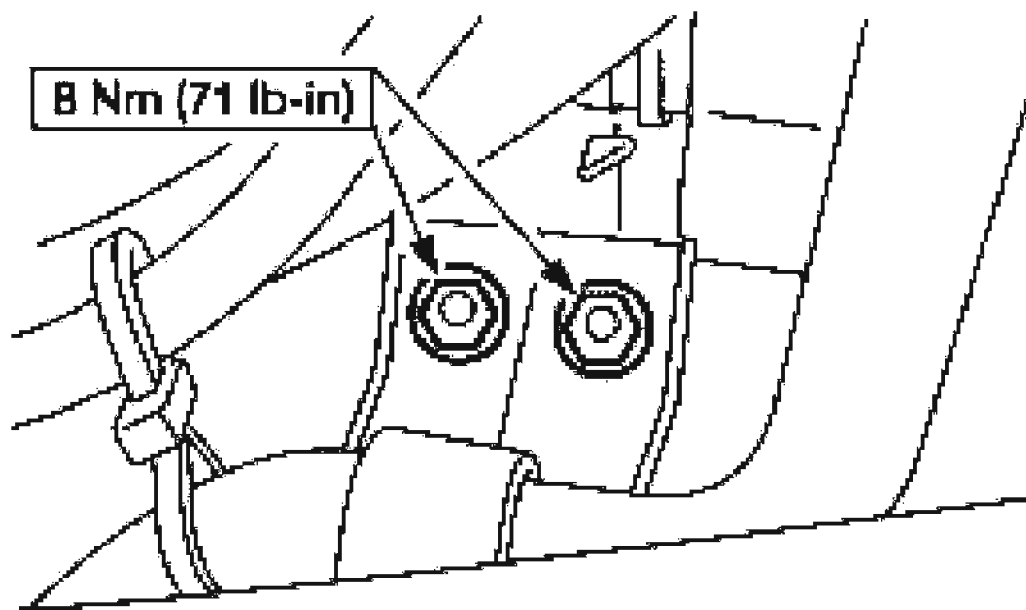
**Fig. 42: Connecting Condenser To Evaporator Line At Orifice Tube**  
Courtesy of FORD MOTOR CO.

6. Recharge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .

## SUCTION ACCUMULATOR

### Removal and Installation

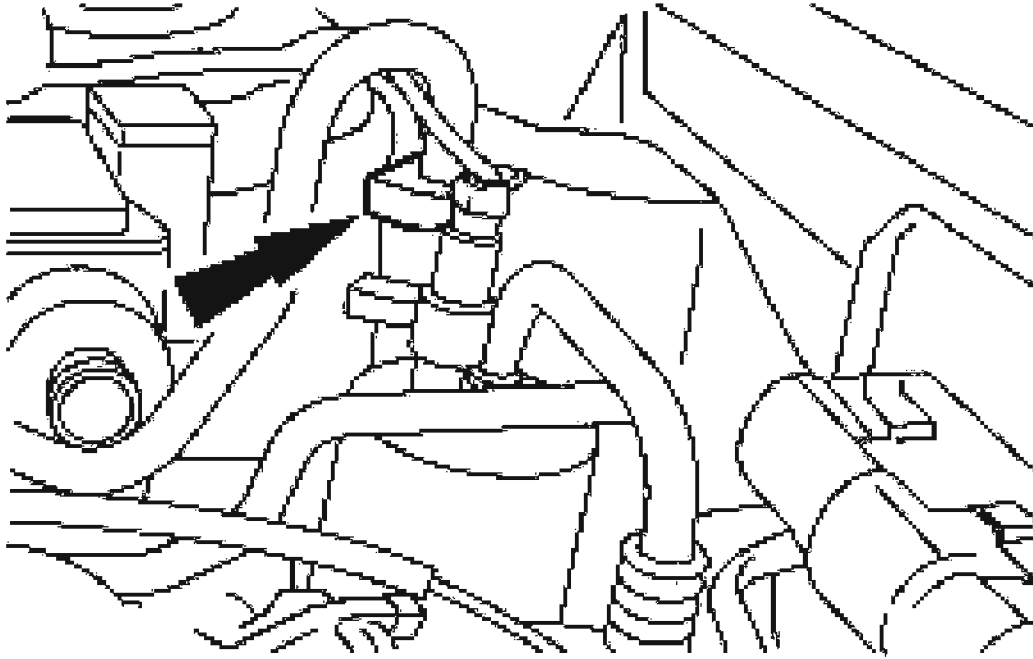
1. Recover the refrigerant. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
2. Remove the A/C cycling switch. For additional information, refer to **AIR CONDITIONING (A/C) CYCLING SWITCH** .
3. Remove the nuts from the A/C manifold and tube mounting bracket.



G02742519

**Fig. 43: Removing Nuts From A/C Manifold And Tube Mounting Bracket**  
Courtesy of FORD MOTOR CO.

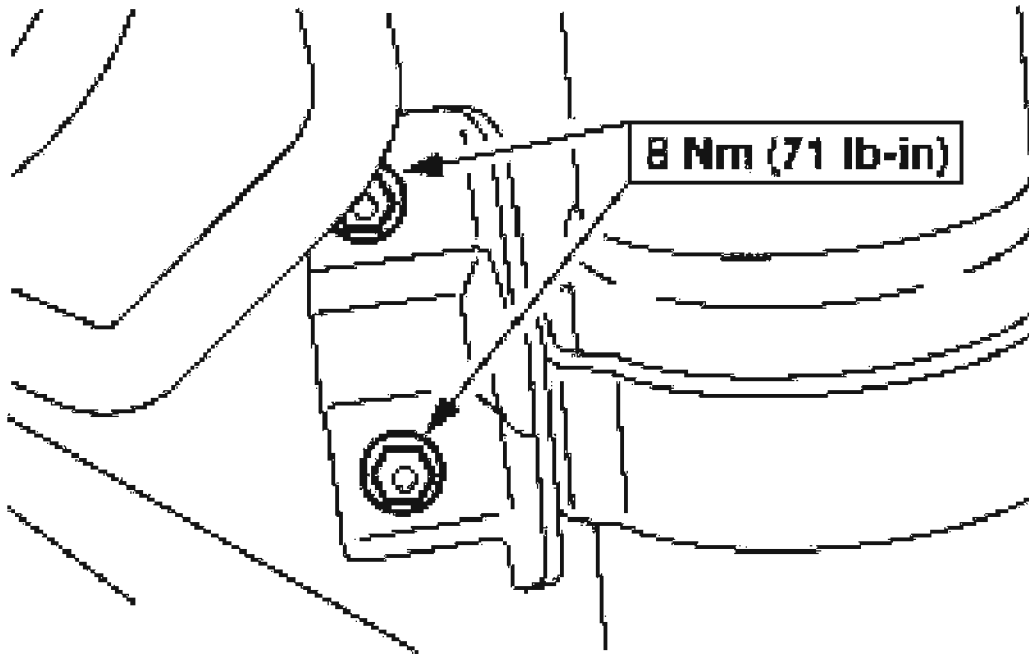
**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.



G02742520

**Fig. 44: Disconnecting A/C Manifold And Tube From Suction Accumulator**  
Courtesy of FORD MOTOR CO.

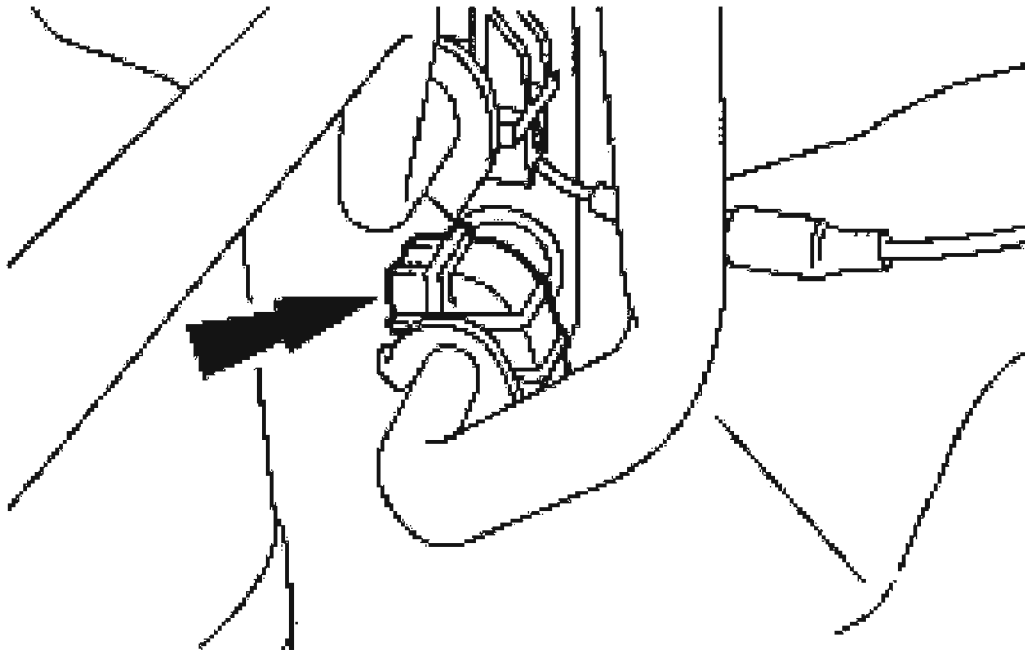
4. Disconnect the A/C manifold and tube from the suction accumulator. For additional information, refer to spring lock coupling general procedure in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
5. Remove the two suction accumulator mounting bracket nuts.



G02742521

**Fig. 45: Removing Suction Accumulator Mounting Bracket Nuts**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.



G02742522

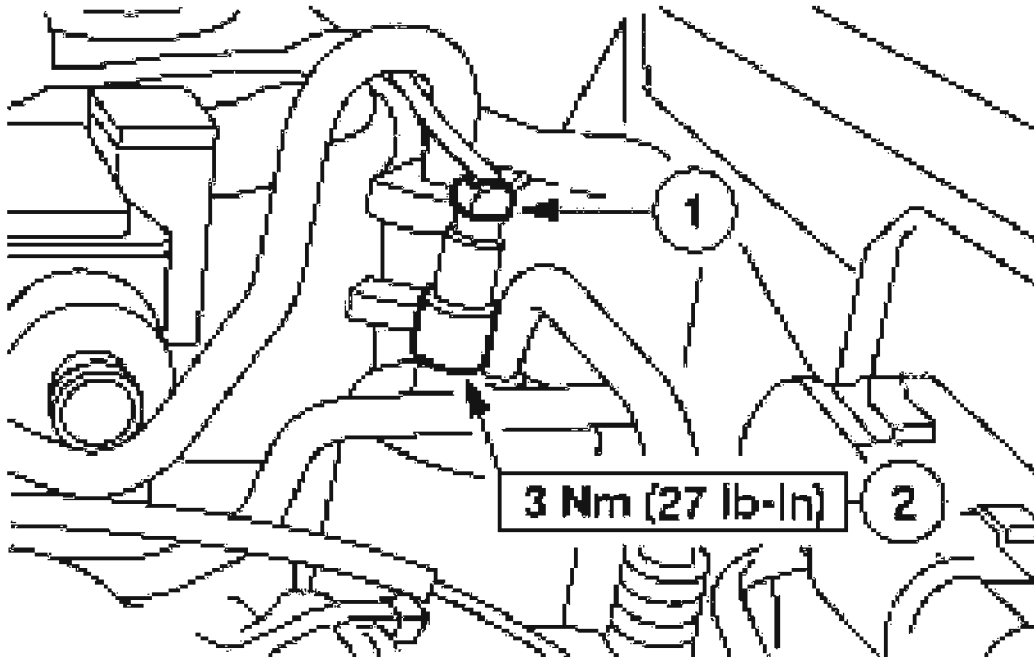
**Fig. 46: Disconnecting Suction Line From A/C Evaporator Core**  
Courtesy of FORD MOTOR CO.

6. Disconnect the suction line from the A/C evaporator core. For additional information, refer to spring lock coupling general procedure in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
7. Remove the suction accumulator.
8. To install, reverse the removal procedure.
  - Lubricate the new suction accumulator with the correct amount of PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.

## AIR CONDITIONING (A/C) CYCLING SWITCH

### Removal and Installation

1. Remove the A/C cycling switch.
  1. Disconnect the A/C cycling switch electrical connector.
  2. Remove the A/C cycling switch.



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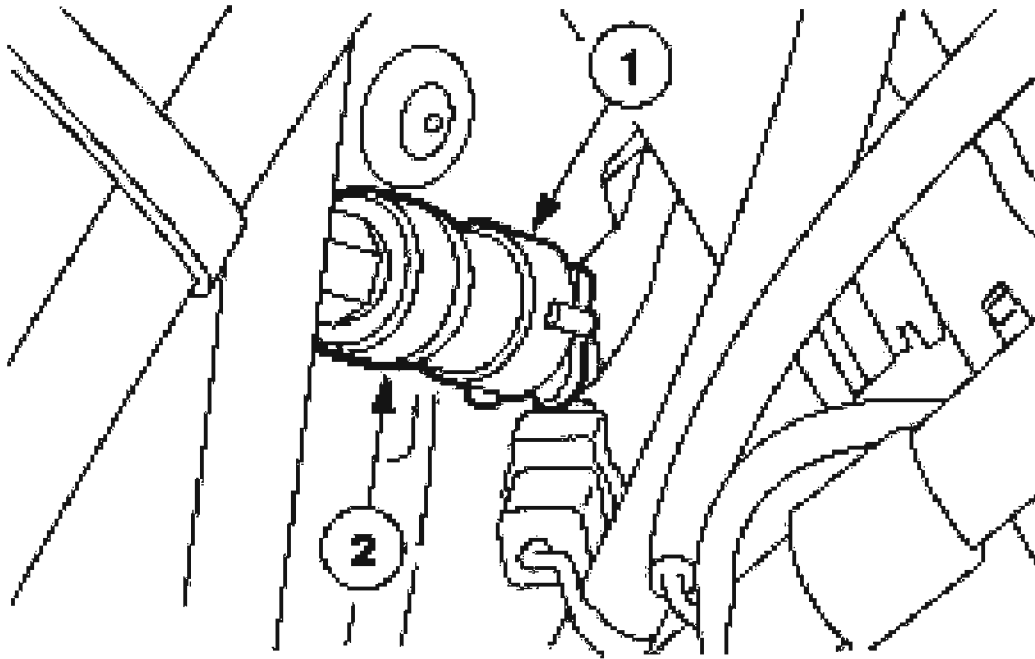
**Fig. 47: Removing A/C Cycling Switch**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.
  - Lubricate the O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.

## PRESSURE CUTOFF SWITCH

### Removal and Installation

1. Remove the pressure cut-off switch.
  1. Disconnect the A/C pressure cut-off switch electrical connector.
  2. Remove the A/C pressure cut-off switch.



G02742524

**Fig. 48: Removing Pressure Cut-Off Switch**  
Courtesy of FORD MOTOR CO.

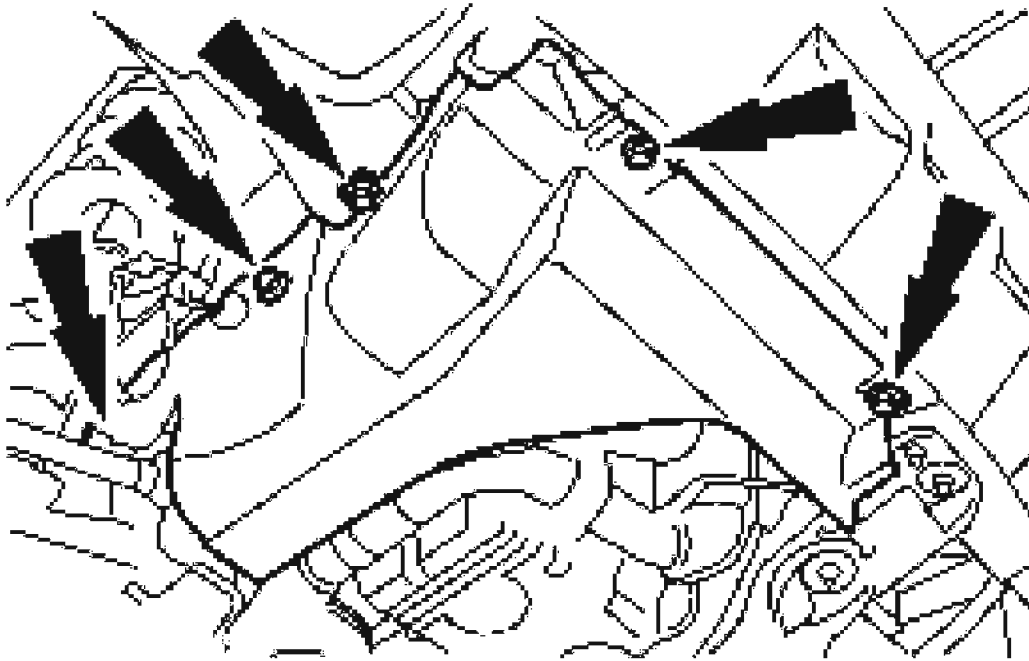
2. To install, reverse the removal procedure.
  - Lubricate the O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.

#### **AIR CONDITIONING (A/C) PRESSURE RELIEF VALVE**

##### **Removal and Installation**

1. Recover the refrigerant. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
2. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING** .
3. Remove the RH splash shield.

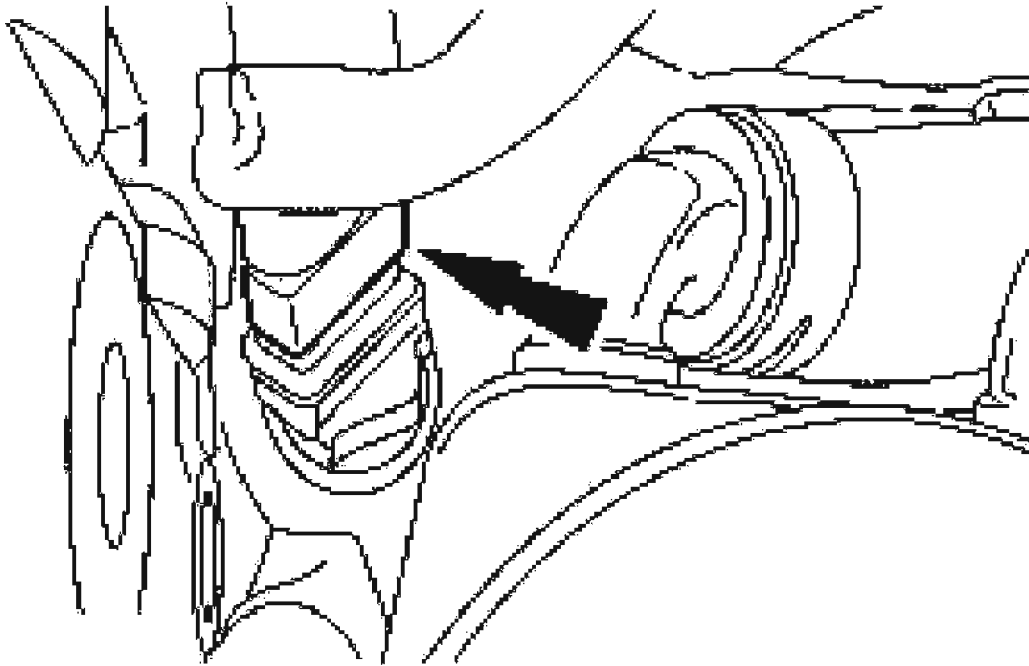




G02742525

**Fig. 49: Locating RH Splash Shield Bolts**  
**Courtesy of FORD MOTOR CO.**

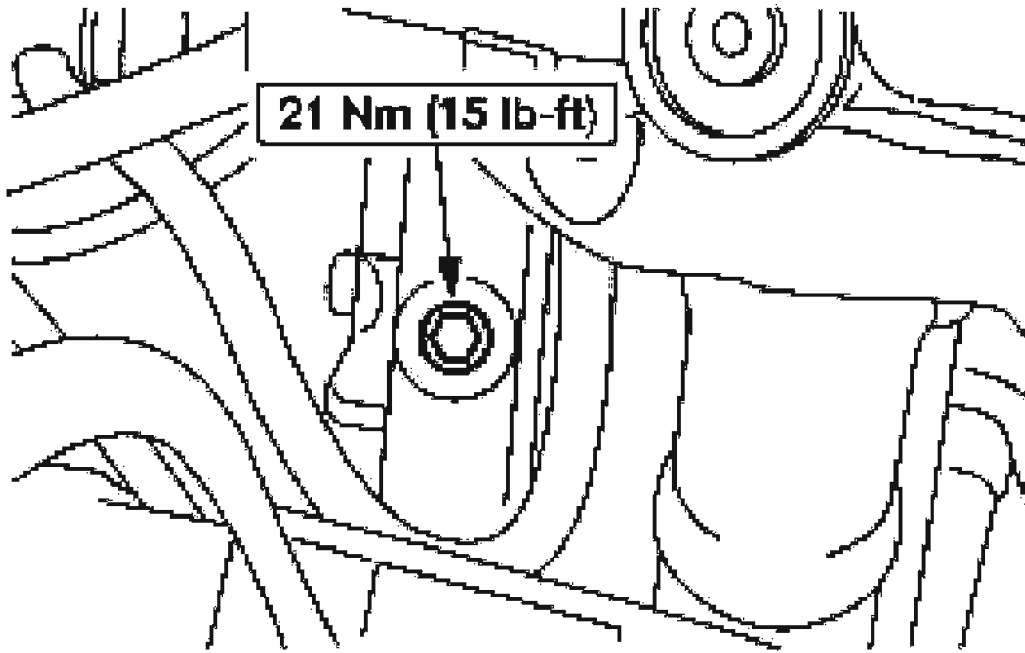
4. If equipped, disconnect the engine block heater electrical connector.



G02742526

**Fig. 50: Disconnecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.

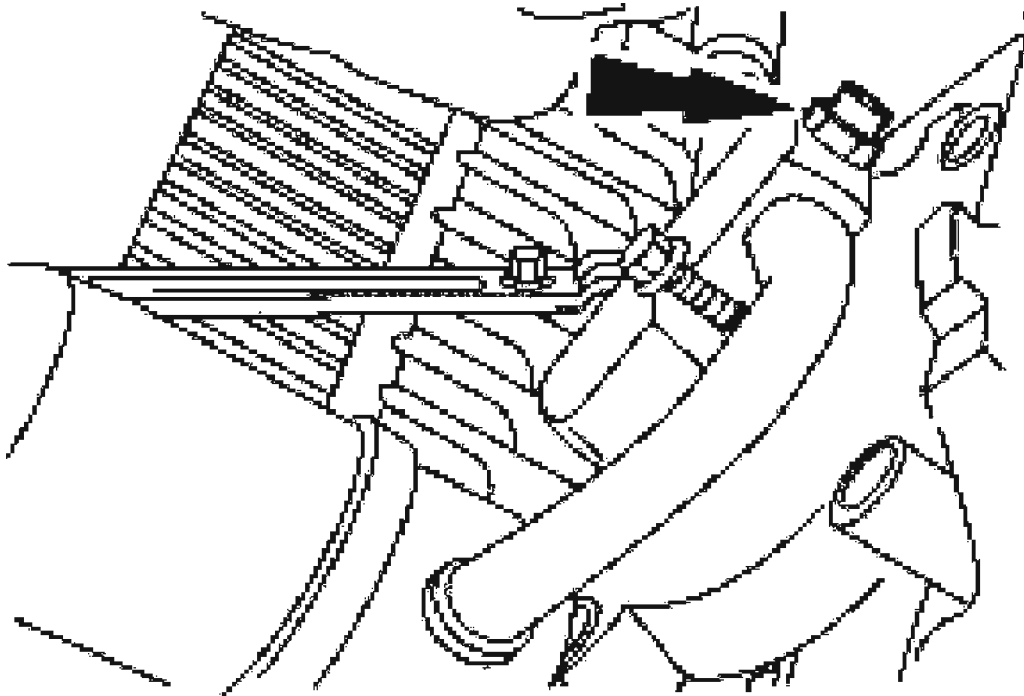


G02742527

**Fig. 51: Removing A/C Manifold And Tube Assembly Bolt**  
Courtesy of FORD MOTOR CO.

5. If equipped with the 3.0L (4V) engine, remove the A/C manifold and tube assembly bolt and disconnect the A/C manifold and tube.

**NOTE:** Vehicles with the 2.0L Zetec engine shown, vehicles with the 3.0L (4V) engine similar.



G02742528

**Fig. 52: Removing A/C Compressor Pressure Relief Valve**  
Courtesy of FORD MOTOR CO.

6. Remove the A/C compressor pressure relief valve.
7. To install, reverse the removal procedure.
  - Lubricate the O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.

## CONDENSER CORE

### Removal and Installation

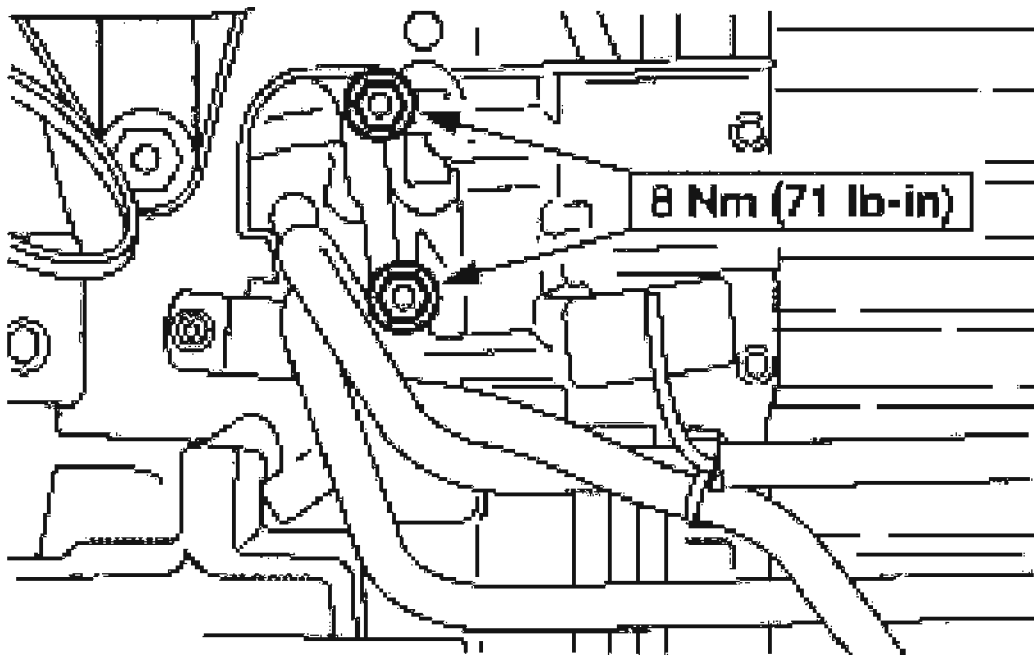
**NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.

**NOTE:** If an A/C condenser core leak is suspected, the A/C condenser core must be leak tested before it is removed from the vehicle. For additional information, refer to CLIMATE CONTROL SYSTEM-

## **GENERAL INFORMATION .**

1. Recover the refrigerant. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
2. Remove the front bumper cover. For additional information, refer to **BUMPERS** .

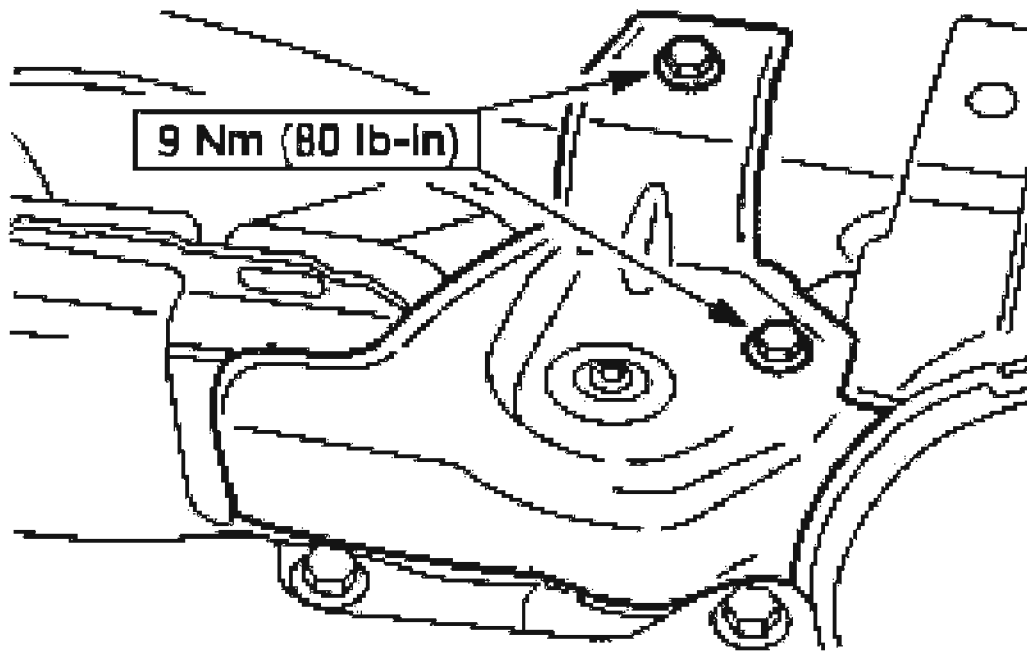
**CAUTION: Plug all ports to prevent contamination from dirt or moisture.**



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**Fig. 53: Removing Nuts From Condenser Core Air Conditioning Line Fittings**  
Courtesy of FORD MOTOR CO.

3. Remove the nuts from the two condenser core air conditioning line (peanut) fittings.
4. Remove the screws and the A/C condenser core brackets.



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**Fig. 54: Removing A/C Condenser Core Brackets Screws**  
Courtesy of FORD MOTOR CO.

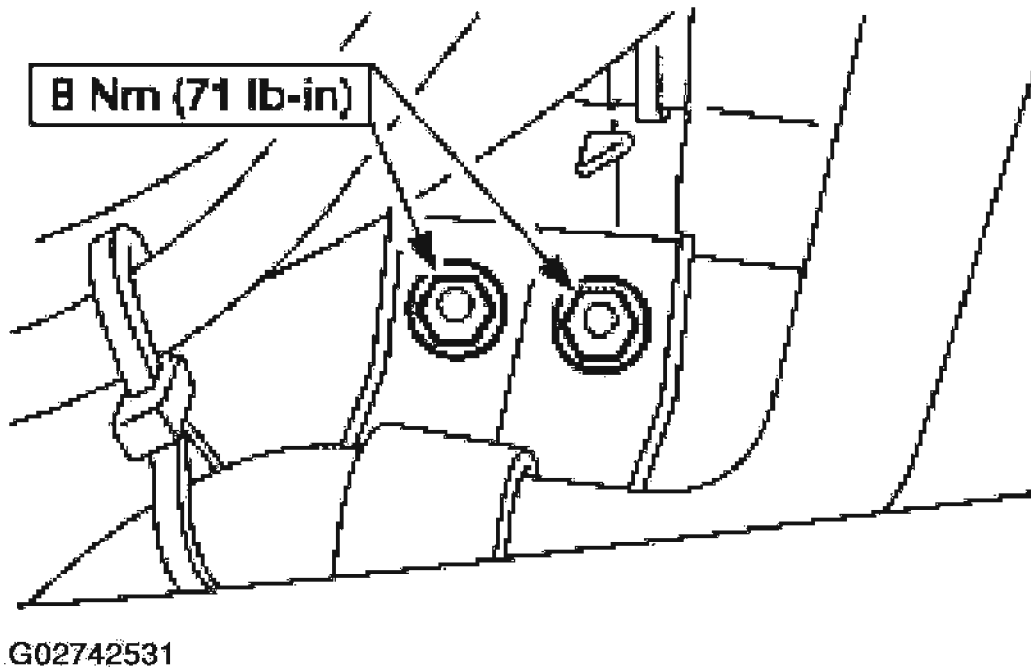
**NOTE:** When removing the A/C condenser core, disconnect the two air conditioning line (peanut) fittings from the A/C condenser core.

5. Remove the A/C condenser core.
6. To install, reverse the removal procedure.
  - Lubricate the new A/C condenser core with the correct amount of PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B. For additional information, refer to **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION**.
  - Lubricate the O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.

## MANIFOLD AND TUBE ASSEMBLY

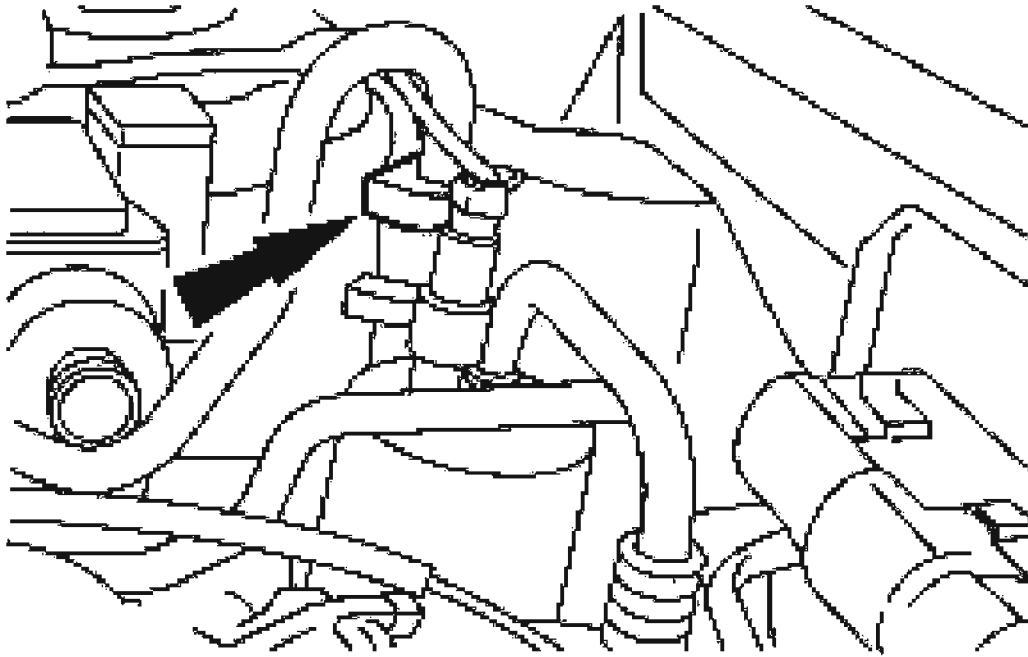
### Removal and Installation

1. Remove the nuts from the A/C manifold and tube mounting bracket.



**Fig. 55: Removing Nuts From A/C Manifold And Tube Mounting Bracket**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.



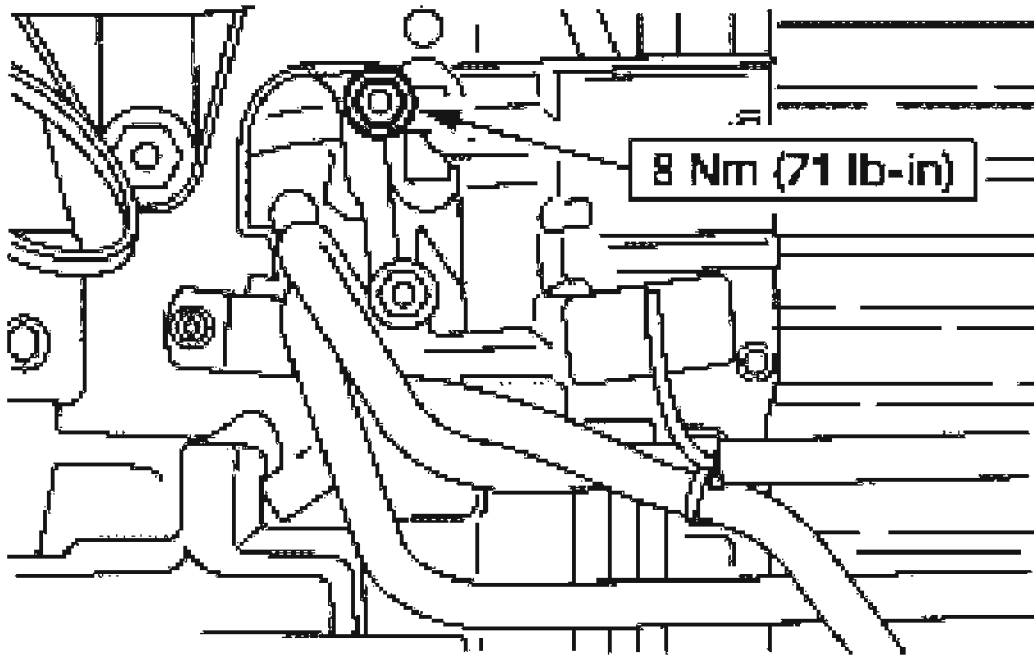
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**Fig. 56: Disconnecting A/C Manifold And Tube From Suction Accumulator**  
Courtesy of FORD MOTOR CO.

2. Disconnect the A/C manifold and tube from the suction accumulator. For additional information, refer to spring lock coupling general procedure in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
3. Remove the front bumper cover. For additional information, refer to **BUMPERS** .

**CAUTION: Plug all ports to prevent contamination from dirt or moisture.**



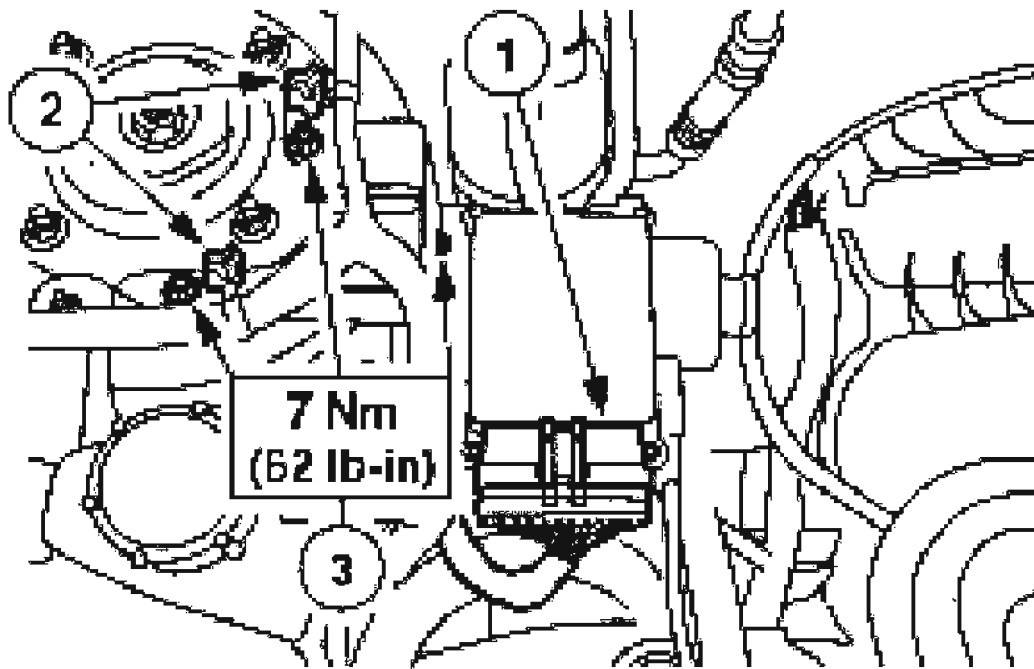


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**Fig. 57: Locating Nut**

Courtesy of FORD MOTOR CO.

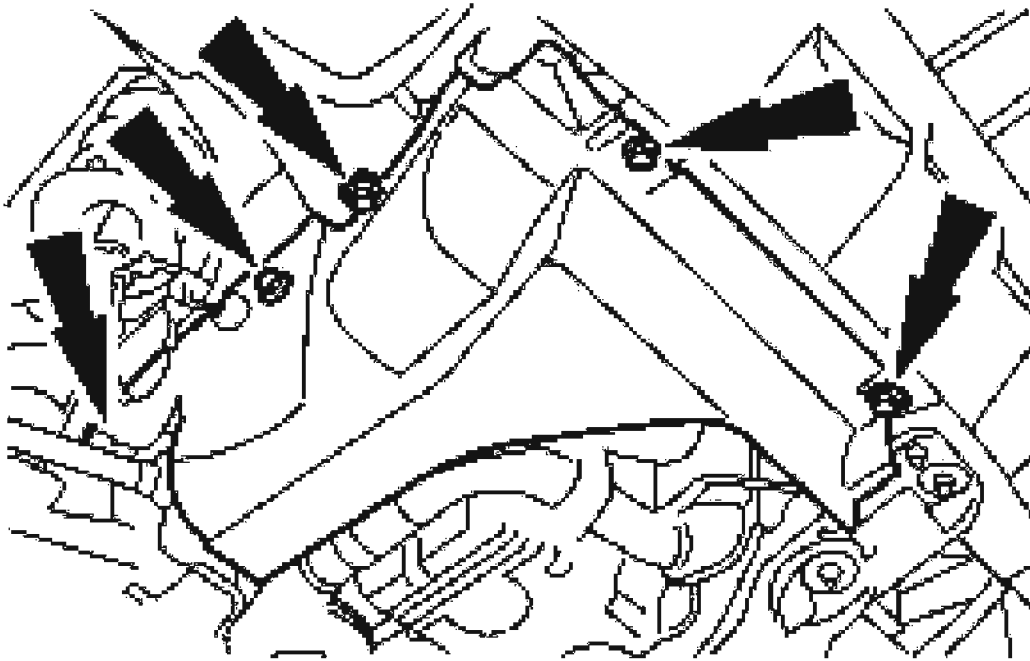
4. Remove the nut and disconnect the A/C manifold and tube to A/C condenser core air conditioning line (peanut) fitting.
5. Position aside the speed control actuator assembly.
  1. Disconnect the electrical connector.
  2. Disconnect the electrical harness pin-type retainers.
  3. Remove the nuts.



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**Fig. 58: Removing Speed Control Actuator Assembly**  
Courtesy of FORD MOTOR CO.

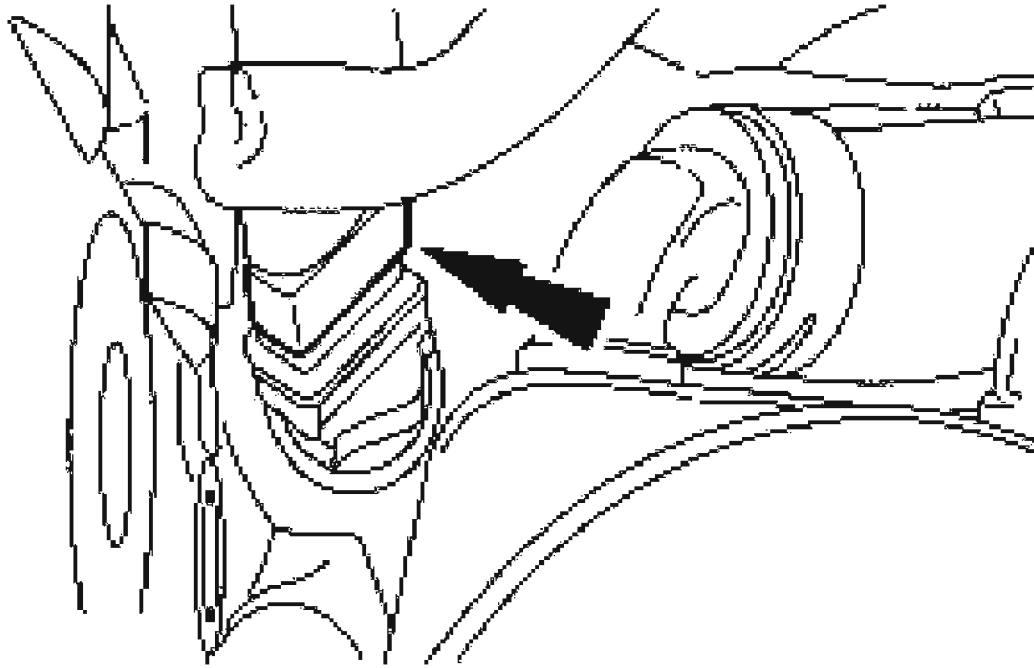
6. Raise and support the vehicle. For additional information, refer to **JACKING & LIFTING** .
7. Remove the RH splash shield.



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**Fig. 59: Locating RH Splash Shield Bolts**  
Courtesy of FORD MOTOR CO.

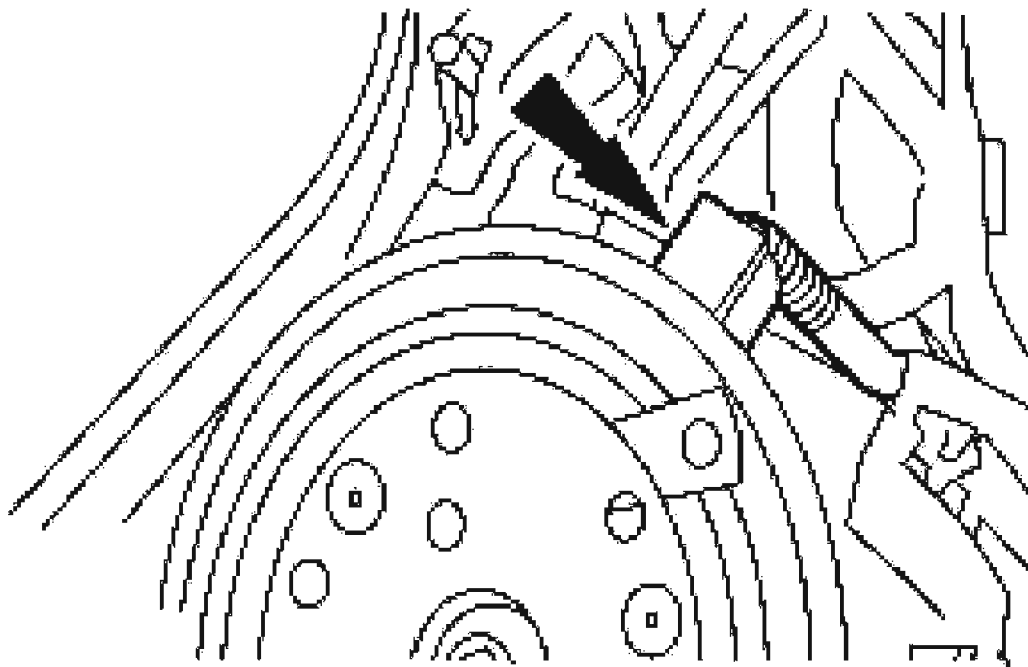
8. If equipped, disconnect the engine block heater electrical connector.



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**Fig. 60: Disconnecting Engine Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

9. Disconnect the A/C clutch field coil electrical connector.

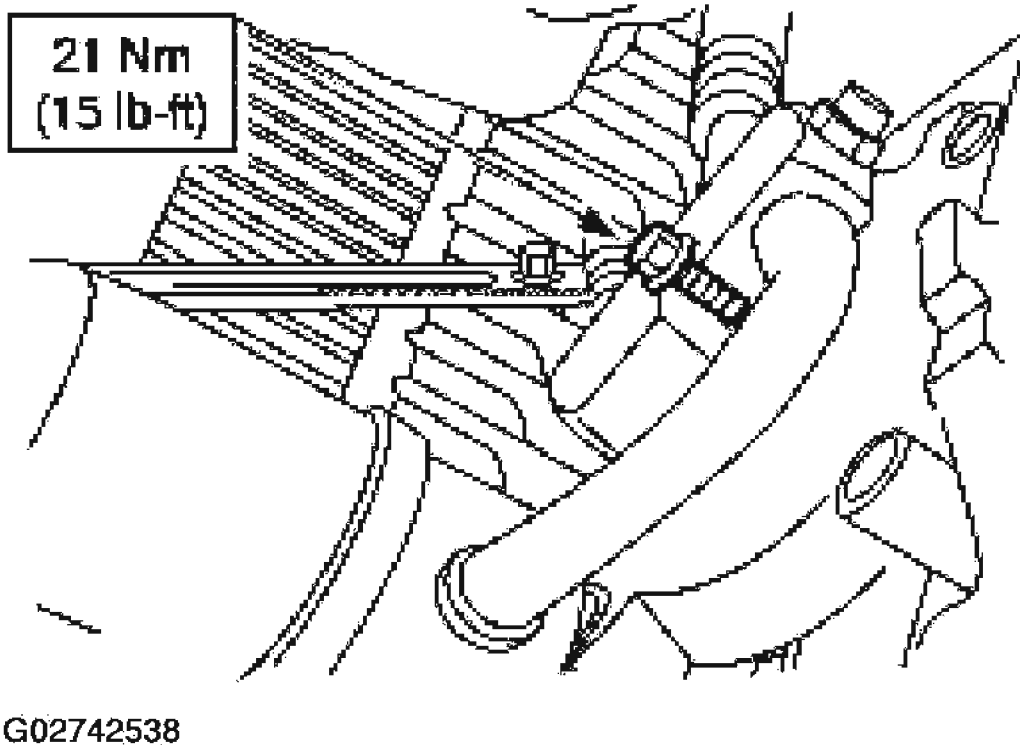


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**Fig. 61: Disconnecting A/C Clutch Field Coil Electrical Connector**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.

**NOTE:** Vehicles with 2.0L Zetec engine shown, vehicles with 3.0L (4V) engine similar.



**Fig. 62: Removing A/C Manifold And Tube Assembly Bolt**  
Courtesy of FORD MOTOR CO.

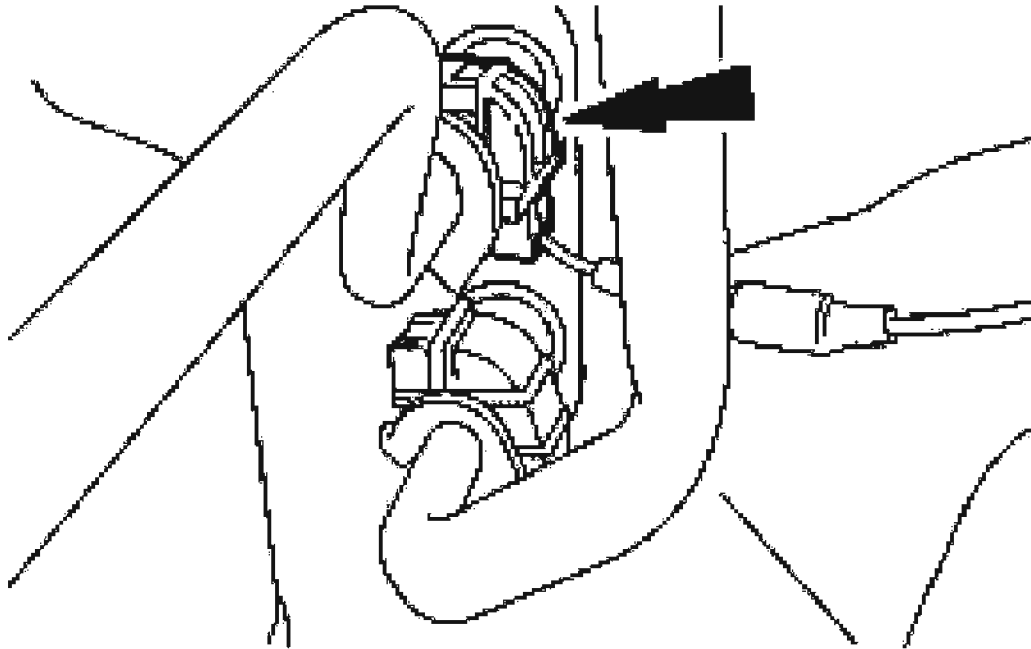
10. Remove the A/C manifold and tube assembly bolt.
11. Remove the A/C manifold and tube assembly through the bottom of the vehicle.
12. To install, reverse the removal procedure.
  - Lubricate the O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B.
  - Apply Pipe Sealant with Teflon(R) D8AZ -19554-A or equivalent meeting Ford specifications WSK-M2G350-A2 and ESR-M18P7-A to the threads of the A/C manifold retaining bolt.

## CONDENSER TO EVAPORATOR LINE

### Removal and Installation

1. Remove the A/C pressure cut-off switch. For additional information, refer to **PRESSURE CUTOFF SWITCH**.
2. Remove the evaporator core orifice. For additional information, refer to **EVAPORATOR CORE ORIFICE**.

**CAUTION: Plug all ports to prevent contamination from dirt or moisture.**

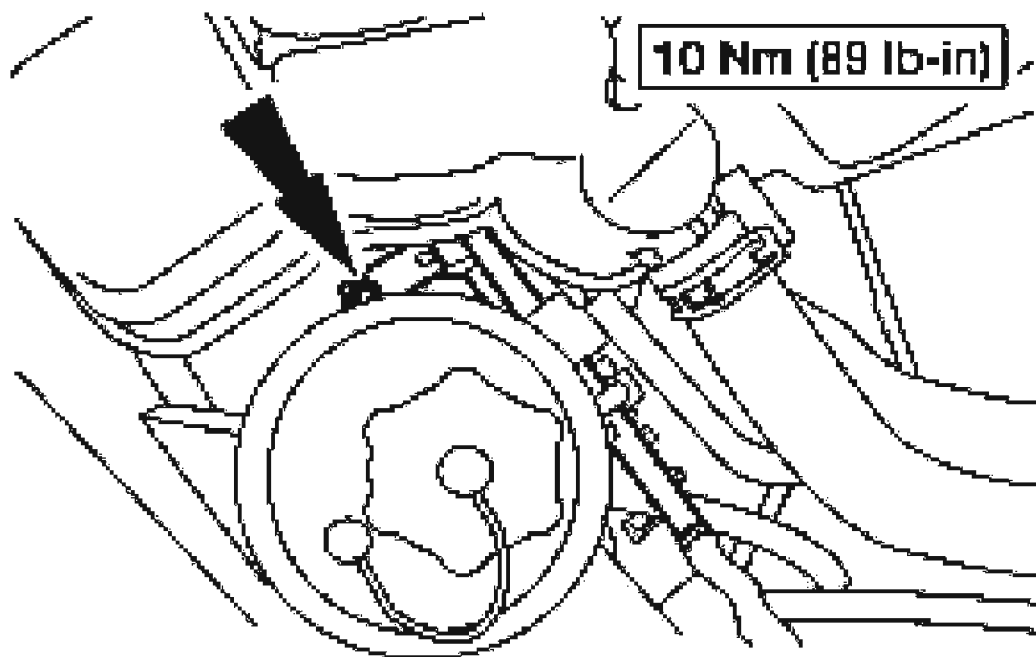


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**Fig. 63: Disconnecting Condenser To Evaporator Line From A/C Evaporator Core**

**Courtesy of FORD MOTOR CO.**

3. Disconnect the condenser to evaporator line from the A/C evaporator core. For additional information, refer to spring lock coupling general procedure in **CLIMATE CONTROL SYSTEM-GENERAL INFORMATION** .
4. Remove the evaporator line support nut and remove the line from the A/C evaporator core.



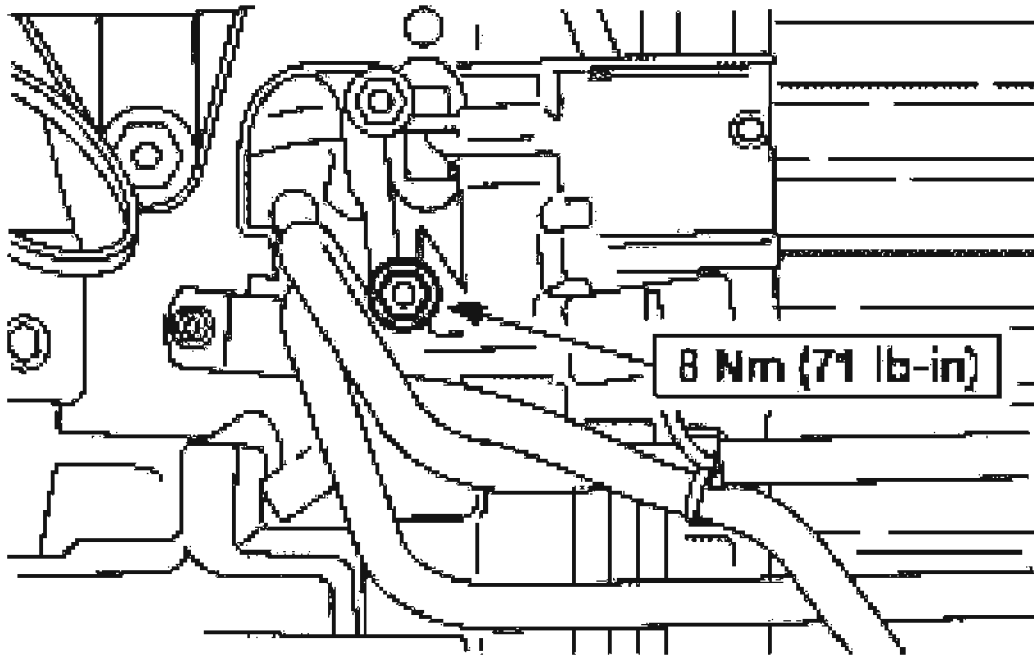
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**Fig. 64: Removing Evaporator Line From A/C Evaporator Core**  
Courtesy of FORD MOTOR CO.

5. Remove the front bumper cover. For additional information, refer to **BUMPERS** .

**CAUTION:** Plug all ports to prevent contamination from dirt or moisture.





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**Fig. 65: Locating Nut**

Courtesy of FORD MOTOR CO.

6. Remove the nut and disconnect the condenser to evaporator line from the A/C condenser core and remove the condenser to evaporator line.
7. To install, reverse the removal procedure.
  - Lubricate the O-ring seals with PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B. For additional information, refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .

## DESCRIPTION AND OPERATION

### AIR CONDITIONING

The A/C refrigerant system is a clutch cycling orifice tube type. The system consists of the following components:

- A/C compressor
- A/C clutch
- A/C condenser core
- A/C evaporator core

- A/C charge port valve (high side)
- A/C charge port valve (low side)
- connecting refrigerant lines
- suction accumulator

The refrigerant system operation is controlled by the following:

- A/C evaporator core orifice
- A/C cycling switch
- A/C compressor pressure relief valve
- A/C pressure cut-off switch

The refrigerant system incorporates an A/C compressor controlled by an A/C cycling switch.

The A/C cycling switch senses A/C evaporator core pressure to control A/C compressor operation.

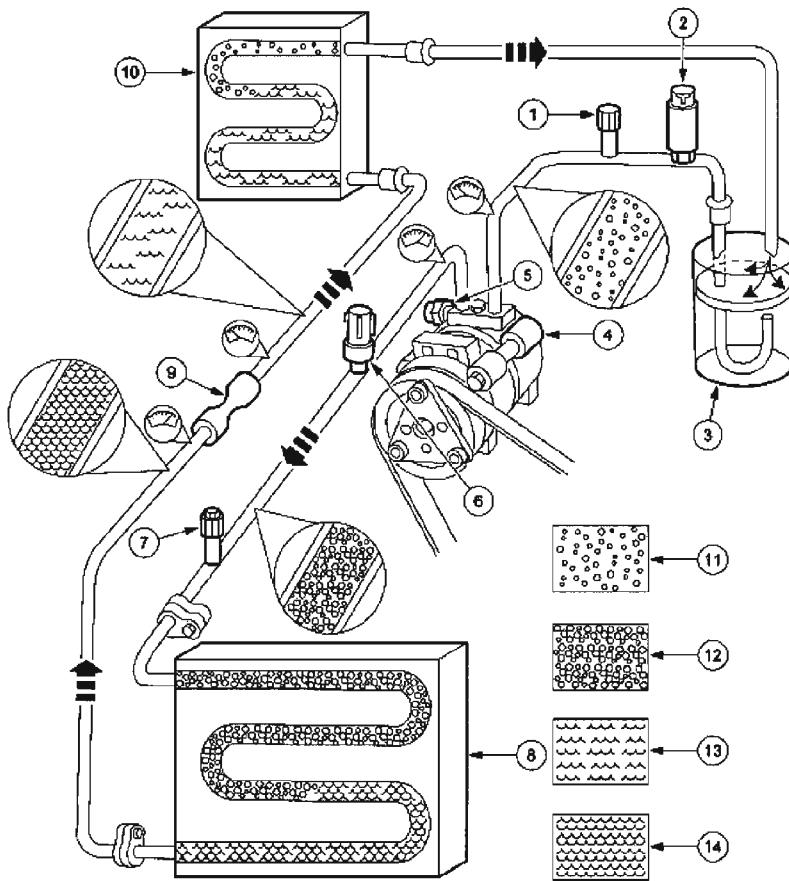
An A/C compressor pressure relief valve is installed in the A/C manifold and tube assembly to protect the refrigerant system against excessively high refrigerant pressures.

An A/C evaporator core orifice is installed in the condenser to evaporator line to meter the liquid refrigerant into the A/C evaporator core.

**Clutch Cycling Orifice Tube Refrigerant System Components**

## 2004 Ford Escape

### 2004 HVAC Air Conditioning - Escape

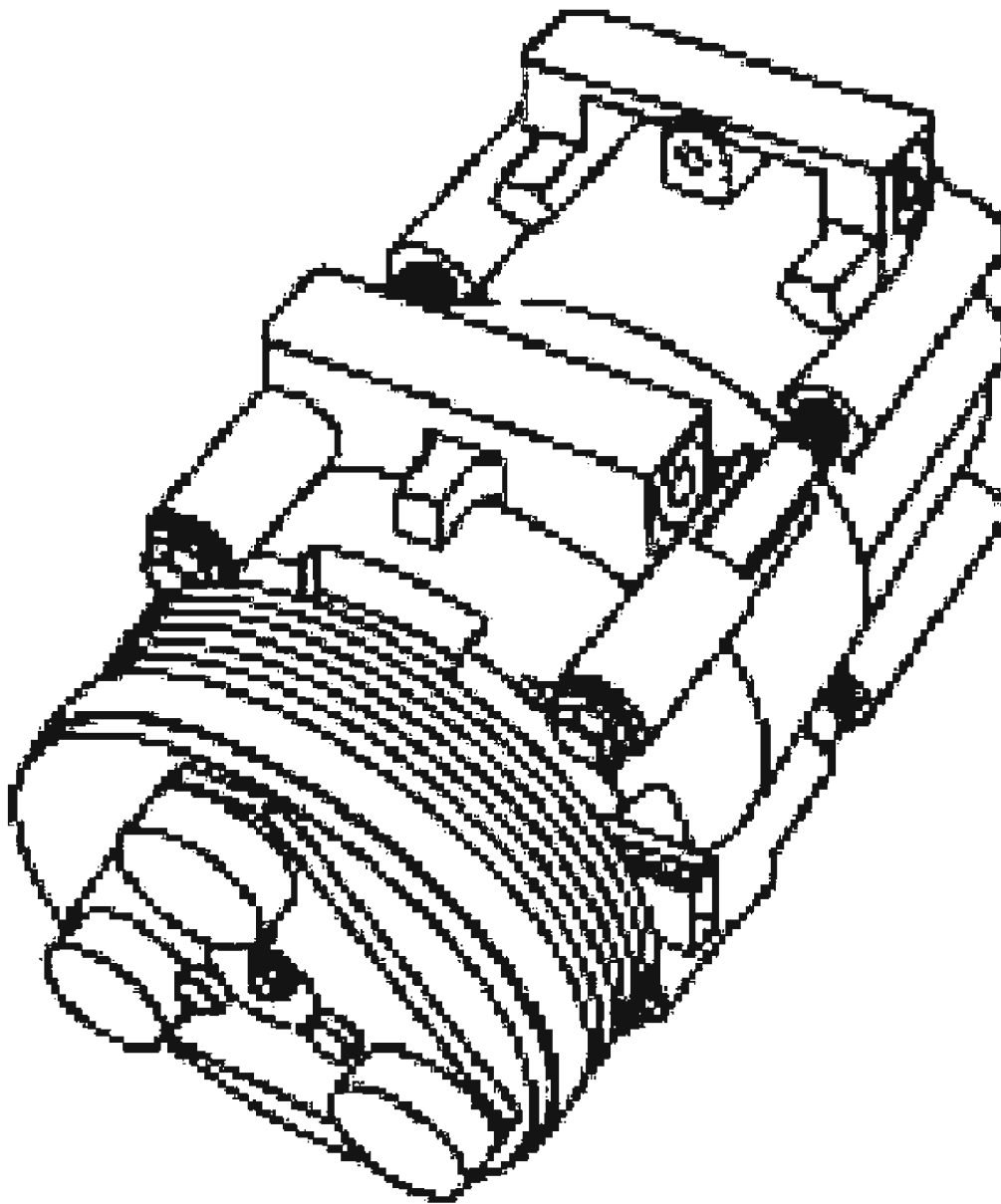


Item	Part Number	Description
1	19E762	A/C charge valve port (low side)
2	19E561	A/C cycling switch
3	19C836	Suction accumulator
4	19703	A/C compressor
5	19D644	A/C compressor pressure relief valve
6	19D594	A/C pressure cut-off switch
7	19E762	A/C charge valve port (high side)
8	19712	A/C condenser core
9	19D990	A/C evaporator core orifice
10	19860	A/C evaporator core
11	—	Low pressure vapor
12	—	High pressure vapor
13	—	Low pressure liquid
14	—	High pressure liquid

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**Fig. 66: Identifying Clutch Cycling Orifice Tube Refrigerant System Components**  
**Courtesy of FORD MOTOR CO.**

A/C Compressor and Clutch Assembly



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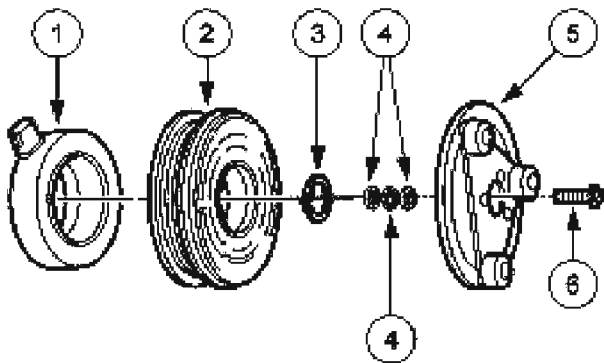
**Fig. 67: Identifying A/C Compressor And Clutch Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Internal A/C compressor components are not repaired separately. Install a new FS-10 A/C compressor only as an assembly. The A/C clutch, A/C clutch pulley, A/C clutch field coil and the shaft seals are repairable.

**NOTE:**      **Installation of a new suction accumulator is not required when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.**

The FS-10 A/C compressor has the following characteristics:

- a 10-cylinder swashplate design utilizing the tangential design mount
- displacement of 170 cc (10.4 cubic inches)
- A one-piece lip-type seal (repaired from the front of the A/C compressor) is used to seal it at the shaft opening in the assembly.
- Five double-acting pistons operate within the cylinder assembly. The pistons are actuated by a swashplate that changes the rotating action of the shaft to a reciprocating force.
- Reed-type discharge valves are located between the cylinder assembly and the head at each end of the A/C compressor.
- The A/C compressor uses PAG Compressor Oil YN-12-C or equivalent meeting Ford specification WSH-M1C231-B. This oil contains special additives necessary for the A/C compressor.
- The A/C compressor oil from vehicles equipped with an FS-10 A/C compressor may have a dark color while maintaining a normal oil viscosity. This is normal for this A/C compressor because carbon from the piston rings will discolor the oil.



Item	Part Number	Description
1	19D798	A/C clutch field coil
2	19D784	A/C clutch pulley
3	N805338-S100	Pulley snap ring
4	19D648	A/C clutch hub spacer
5	19D786	Disk and hub assembly
6	N805332-S58	A/C clutch bolt

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**Fig. 68: Identifying A/C Clutch Assembly Components**  
Courtesy of FORD MOTOR CO.

The magnetic A/C clutch has the following characteristics:

- It drives the compressor shaft.
- When battery positive voltage (B+) is applied to the A/C clutch field coil, the clutch disc and hub assembly is drawn toward the A/C clutch pulley.
- The magnetic force locks the clutch disc and hub assembly and the A/C clutch pulley together as one unit, causing the compressor shaft to rotate.
- When B+ is removed from the A/C clutch field coil, springs in the clutch disc and hub assembly move the clutch disc away from the A/C clutch pulley.

#### A/C Compressor Pressure Relief Valve

An A/C compressor pressure relief valve is incorporated in the compressor A/C manifold and tube to:

- relieve unusually high refrigerant system discharge pressure buildups of (3,792 kPa [550 psi] and above).
- prevent damage to the A/C compressor and other system components.

- avoid total refrigerant loss by closing after the excessive pressure has been relieved.

#### A/C Condenser Core

**NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.

The A/C condenser core has the following characteristics:

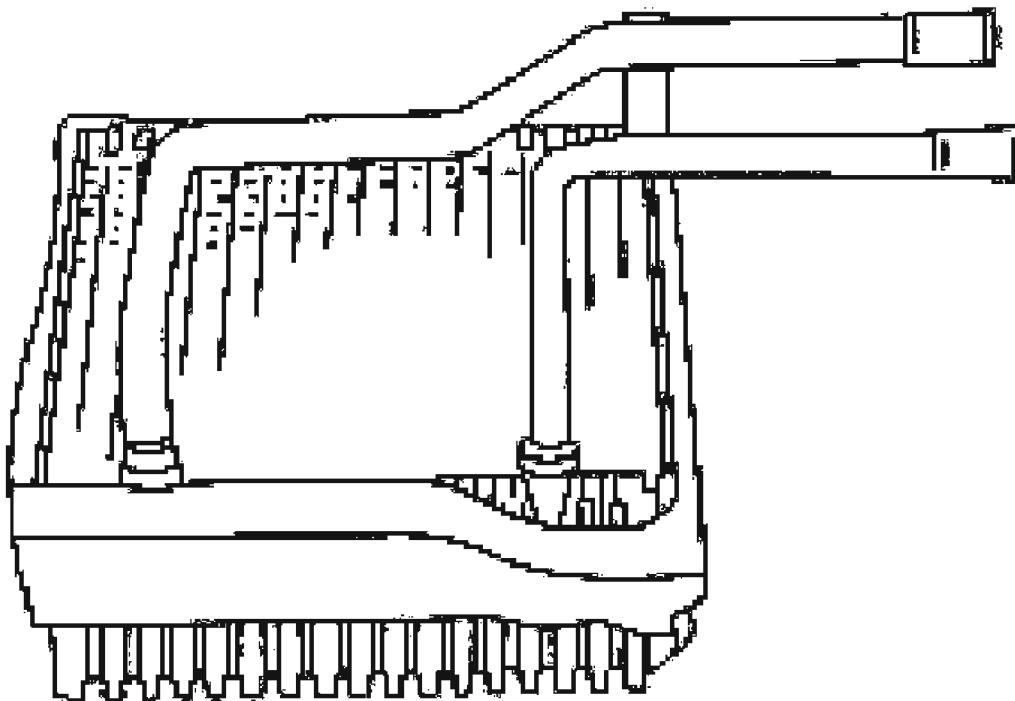
- It is an aluminum fin-and-tube design heat exchanger located in front of the vehicle radiator.
- It cools compressed refrigerant gas by allowing air to pass over the fins and tubes to extract heat and by condensing gas to liquid refrigerant as it is cooled.

#### Refrigerant Lines

**NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.

The condenser to evaporator line contains high-pressure liquid refrigerant upstream of the A/C evaporator core orifice. The A/C manifold and tube assembly is attached to the A/C compressor with O-ring seals.

#### A/C Evaporator Core



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**Fig. 69: Identifying A/C Evaporator Core**  
Courtesy of FORD MOTOR CO.

**NOTE:** Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C component or damage to the suction accumulator.

The A/C evaporator housing contains the A/C evaporator core. The A/C evaporator core is the plate/fin type with a unique refrigerant flow path.

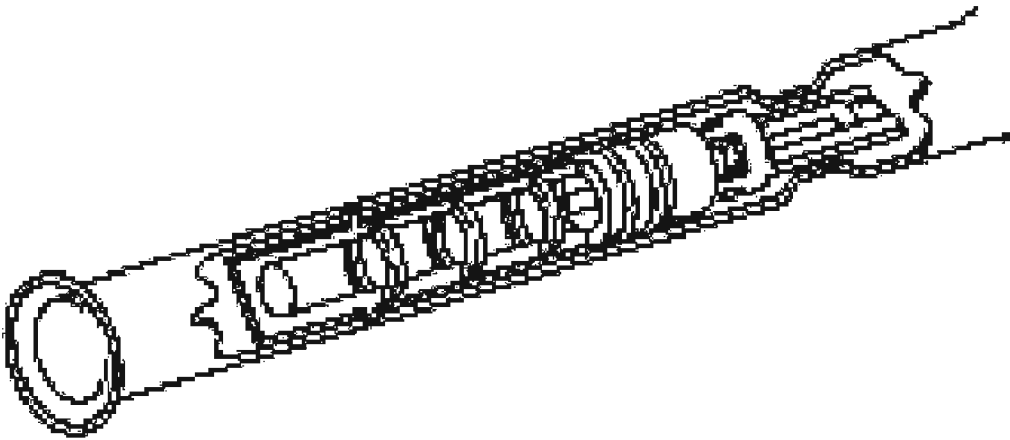
- A mixture of refrigerant and oil enters the bottom of the A/C evaporator core through the A/C evaporator core inlet tube and is routed so it flows through the partitioned first four plate/fin sections.
- The next four plate/fin sections are partitioned to force the refrigerant to flow toward the other end of the A/C evaporator core.
- The next five plate/fin sections are partitioned to force the refrigerant to flow toward the bottom of the A/C evaporator core.
- Refrigerant then continues through to the remaining five plate/fin sections and then



moves out of the A/C evaporator core through the A/C evaporator core outlet tube.

- This W-pass flow pattern transfers the flow of refrigerant and oil through the A/C evaporator core.

#### A/C Evaporator Core Orifice



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**Fig. 70: Identifying A/C Evaporator Core Orifice**  
Courtesy of FORD MOTOR CO.

**NOTE:** Install a new A/C evaporator core orifice whenever a new A/C compressor is installed.

The A/C evaporator core orifice has the following characteristics:

- color-coded orange
- an orifice diameter of 1.45 mm (0.057 inch)
- located in the condenser to evaporator line
- Changes the high-pressure liquid refrigerant into a low-pressure liquid.
- filter screens located on the inlet and outlet ends of the orifice body
- The inlet filter screen acts as a strainer for the liquid refrigerant flowing through the A/C evaporator core orifice.
- O-ring seals on the A/C evaporator core orifice prevent the high-pressure liquid refrigerant from bypassing the A/C evaporator core orifice.
- Adjustment or repair cannot be made to the A/C evaporator core orifice. A new A/C evaporator core orifice must be installed.

**Suction Accumulator**

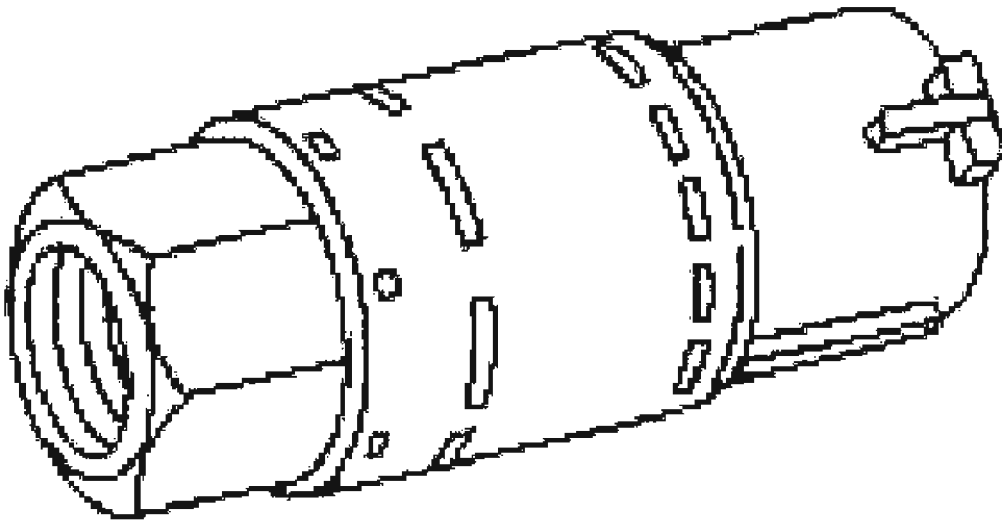
**NOTE:**      **Installation of a new suction accumulator is not necessary when repairing the air conditioning system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the suction accumulator.**

The suction accumulator is mounted to the A/C accumulator bracket. The inlet tube of the suction accumulator is connected to the A/C evaporator outlet tube. The outlet tube is connected to the A/C manifold and tube assembly.

After entering the inlet of the suction accumulator, heavier oil-laden refrigerant contacts an internally mounted dome (which serves as an umbrella) and drips down onto the bottom of the canister.

- A small diameter oil bleed hole, in the bottom of the vapor return tube, allows the accumulated heavier liquid refrigerant and oil mixture to re-enter the compressor suction line at a controlled rate.
- As the heavier mixture passes through the small diameter liquid bleed hole, it has a second chance to vaporize and recirculate through the A/C compressor without causing compressor damage due to slugging.
- A fine mesh screened filter fits tightly around the bottom of the vapor return tube to filter out refrigerant system contaminant particles.
- A desiccant bag is mounted inside the canister to absorb any moisture which may be in the refrigerant system.
- A fitting located on the top of the suction accumulator is used to attach the A/C cycling switch. A longtravel Schrader-type valve stem core is installed in the fitting so that the A/C cycling switch can be removed without discharging the A/C system.

**A/C Cycling Switch**



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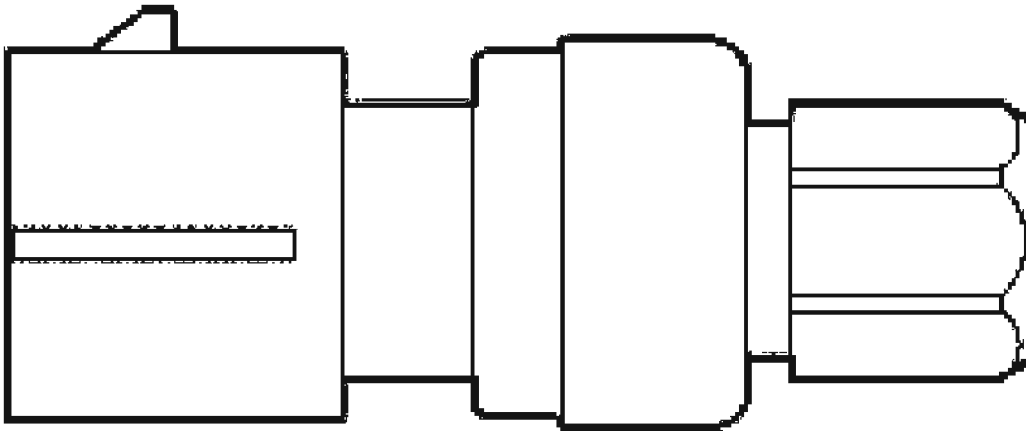
**Fig. 71: Identifying A/C Cycling Switch**  
Courtesy of FORD MOTOR CO.

The A/C cycling switch is mounted on a Schrader valve-type fitting on the top of the suction accumulator.

- A valve depressor, located inside the threaded end of the A/C cycling switch, presses in on the Schrader valve stem.
- This allows the suction pressure inside the suction accumulator to control the operation of the A/C cycling switch.
- The electrical switch contacts open when the suction pressure drops to 152-193 kPa (22-28 psi).
- The contacts close when the suction pressure rises to 276-324 kPa (40-47 psi).
- When the A/C cycling switch contacts close, the signal to energize the A/C clutch is sent to the powertrain control module (PCM) which energizes the A/C relay and supplies B+ voltage to the A/C clutch field coil.
- When the A/C cycling switch contacts open, the A/C clutch field coil is deenergized and compressor operation stops.
- The A/C cycling switch will control the A/C evaporator core pressure at a point where the plate/fin surface temperature will be maintained slightly above freezing.
- This prevents icing of the A/C evaporator core and blockage of airflow.
- It is not necessary to discharge the refrigerant system to remove the A/C cycling

switch.

#### A/C Pressure Cut-Off Switch



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**Fig. 72: Identifying A/C Pressure Cut-Off Switch**  
Courtesy of FORD MOTOR CO.

The A/C pressure cut-off switch is used to interrupt A/C compressor operation in the event of high system discharge pressures.

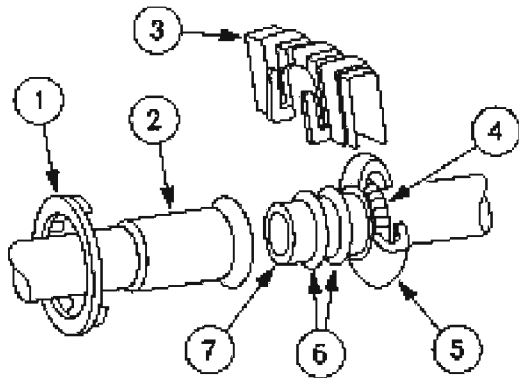
- The A/C pressure cut-off switch is mounted on a Schrader valve-type fitting on the high pressure side of the condenser to evaporator line.
- A valve depressor, located inside the threaded end of the A/C pressure cut-off switch, is used to monitor the compressor discharge pressure.
- It is not necessary to discharge the refrigerant system to remove the A/C pressure cut-off switch.
- The A/C pressure cut-off switch has two sets of contacts. One electrical contact is normally closed.
- When the compressor discharge pressure rises to approximately 3,103 kPa (450 psi), the switch contacts open, disengaging the A/C compressor.
- When the pressure drops to approximately 1,724 kPa (250 psi), the contacts close to allow operation of the A/C compressor.

The switch contains a second set of electrical contacts used for high-speed fan control.

- When the compressor discharge pressure reaches approximately 2,241 kPa (325 psi), these contacts close and engage the high-speed fan control.

- When the pressure drops to approximately 1,896 kPa (275 psi), the contacts again open and the high speed fan control is disengaged.

### Spring Lock Coupling



Item	Part Number	Description
1	—	Plastic indicator ring
2	—	Female fitting
3	19E746	A/C tube lock coupling clip
4	19E576	A/C tube lock coupling spring
5	—	Cage
6	—	O-ring seals
7	—	Male fitting

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**Fig. 73: Identifying Spring Lock Coupling Components**  
 Courtesy of FORD MOTOR CO.

The spring lock coupling is a refrigerant line coupling held together by a garter spring inside a circular cage.

- When the coupling is connected together, the flared end of the female fitting slips behind the garter spring inside the cage of the male fitting.
- The garter spring and cage then prevent the flared end of the female fitting from pulling out of the cage.
- The O-ring seals are green in color and are made of a special material.
- Use only the green O-ring seals listed in the Ford Master Parts Catalog for the spring lock coupling.
- A plastic indicator ring is used on the spring lock couplings of the A/C evaporator core to indicate, during vehicle assembly, that the coupling is connected. Once the coupling

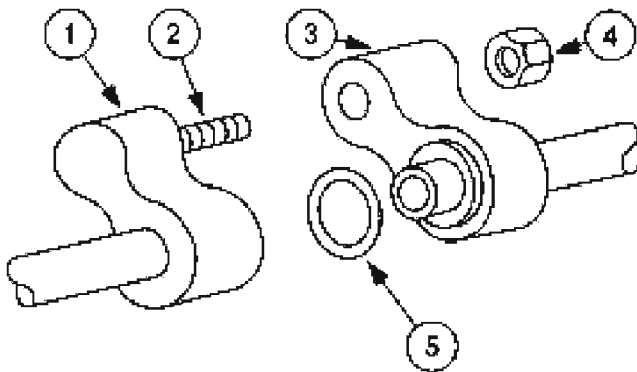
is connected, the indicator ring is no longer necessary but will remain captive by the coupling near the cage opening.

- An A/C tube lock coupling clip may be used to secure the coupling but is not necessary.

#### Air Conditioning Line (Peanut) Fitting

The air conditioning line (peanut) fitting is an integral part of the refrigeration line or component.

- The male and female blocks of the air conditioning line (peanut) fitting are retained with a nut.
- An O-ring seal is installed around the tube on the male block.
- The female block is welded to the tube and is not adjustable.
- Support the female fittings with a wrench to prevent twisting of the tubes.
- The male block will pivot around the tube to allow for alignment with the female block during assembly.
- When correctly assembled the male and female fittings should be flush.



Item	Part Number	Description
1	—	Female block (part of tube assy)
2	W701890-S426	Stud (part of female block)
3	—	Male block (part of 19712)
4	W520413-S301	Nut
5	—	O-ring seal

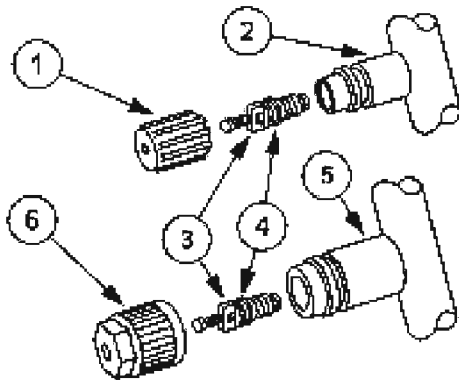
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**Fig. 74: Identifying Air Conditioning Line (Peanut) Fitting**  
 Courtesy of FORD MOTOR CO.

### Gauge Port Valves

The high-pressure gauge port valve is located on the condenser to evaporator line.

The low-pressure gauge port valve is located on the A/C manifold and tube assembly.



Item	Part Number	Description
1	19D702	A/C charging valve cap
2	—	Low pressure gauge port valve
3	—	Schrader -type valve
4	—	O-ring seal
5	—	High pressure gauge port valve
6	19D702	A/C charging valve cap

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**Fig. 75: Identifying Gauge Port Valves**  
 Courtesy of FORD MOTOR CO.

The fitting is an integral part of the refrigeration line or component.

- Special couplings are required for both the high-side and low-side gauge ports.
- The Schrader-type valve core can be repaired if the seal leaks.
- Always install the A/C charging valve cap on the gauge port valves after repairing the refrigerant system.

**2004 HVAC****Control Components - Escape****DESCRIPTION AND OPERATION****CONTROL COMPONENTS****Manual A/C**

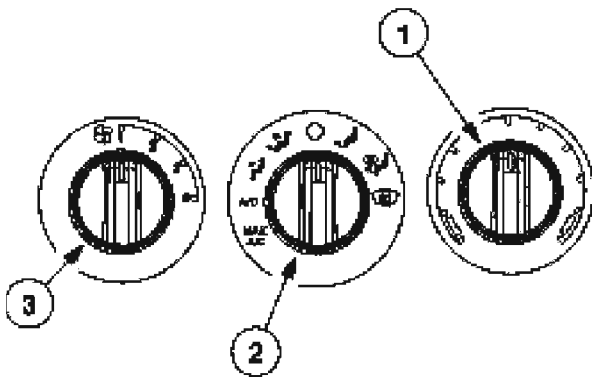
The manual climate control system heats or cools the vehicle interior depending on the position of the function selector switch and the temperature selected. The position of the function selector switch determines heating or cooling and air distribution. The temperature control setting determines air temperature.

The manual climate control system components include:

- blower motor switch resistor
- vacuum reservoir tank
- climate control assembly
- blower motor relay
- A/C compressor clutch relay
- footwell vent vacuum control motor
- defrost vacuum control motor
- panel vent vacuum control motor
- outside air inlet vacuum control motor
- temperature blend door control cable

**Control System Inputs****Climate Control Assembly**





Item	Part Number	Description
1	—	Temperature control switch
2	—	Function selector switch
3	—	Blower motor switch

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**Fig. 1: Identifying Temperature Control Switch, Function Selector Switch And Blower Motor Switch**

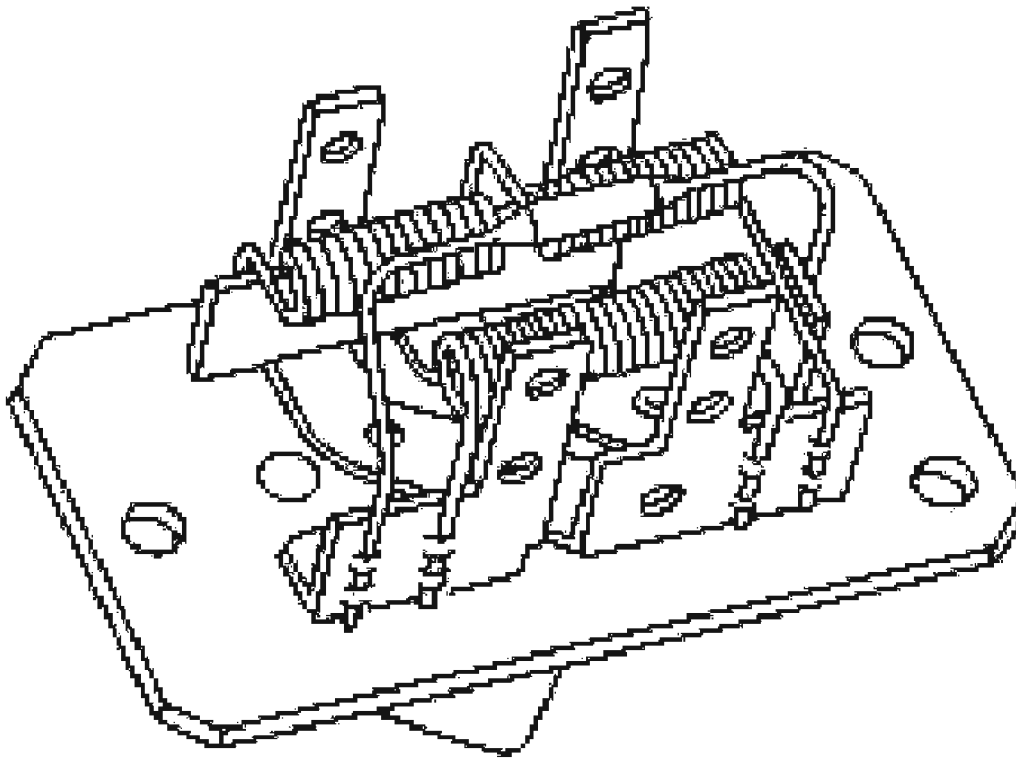
Courtesy of FORD MOTOR CO.

The climate control assembly has three system controls:

- The A/C heater function selector switch combines a vacuum selector valve with two electrical switches to supply battery positive voltage (B+) to the A/C clutch circuit and the blower motor control circuit.
- The temperature selection is accomplished through cable-controlled positioning of the temperature blend door located in the heater core housing.
- The blower motor switch controls the blower motor speed by adding or bypassing resistors in the heater blower motor switch resistor.

#### Control System Outputs

##### Blower Motor Switch Resistor

**G02742553**

**Fig. 2: Identifying Blower Motor Switch Resistor**  
**Courtesy of FORD MOTOR CO.**

The four-speed operation of the blower motor is achieved through the blower motor switch resistor and contains a thermal limiter which is used as a temperature protecting fuse. The assembly is located on the passenger side on the evaporator core housing behind the glove compartment.

#### **Blower Motor Relay**

The blower motor relay supplies voltage to the blower motor and is activated when the key is ON and the function selector switch is in any position besides OFF. The blower motor relay is located under the instrument panel next to the steering column.

#### **A/C Compressor Clutch Relay**

The A/C compressor clutch relay supplies voltage to the A/C compressor clutch and is located in the battery junction box (BJB). The power control module (PCM) can interrupt the A/C compressor operation through the A/C compressor clutch relay under the following conditions:

- during engine start-up
- wide open throttle (WOT)
- low engine idle conditions
- excessively high engine temperatures

## DIAGNOSIS AND TESTING

### CONTROL COMPONENTS

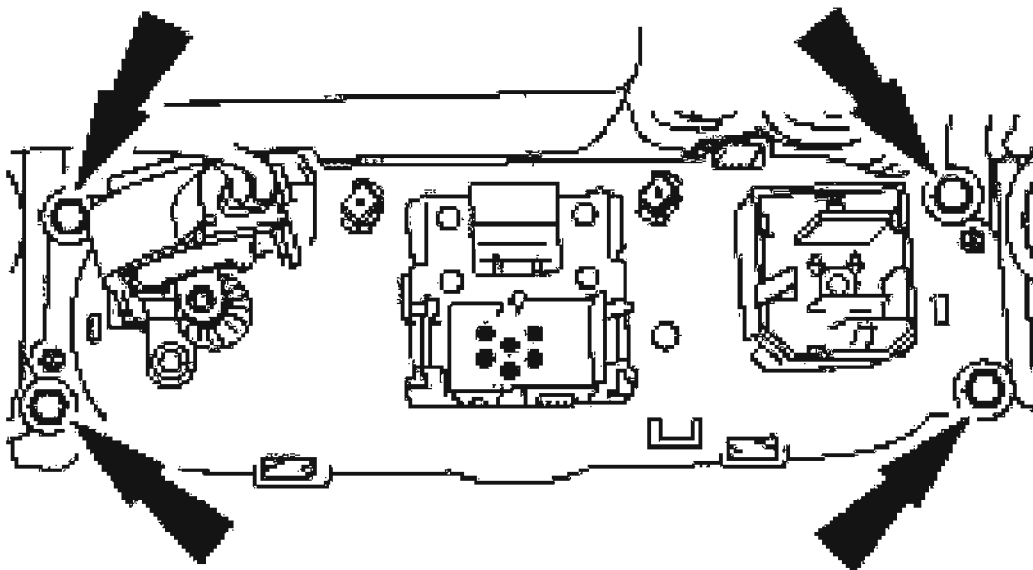
Refer to CLIMATE CONTROL SYSTEM-GENERAL INFORMATION .

## REMOVAL AND INSTALLATION

### CLIMATE CONTROL ASSEMBLY

#### Removal and Installation

1. Remove the instrument panel center finish panel. For additional information, refer to INSTRUMENT PANEL AND CONSOLE .
2. Remove the four screws and the climate control assembly.

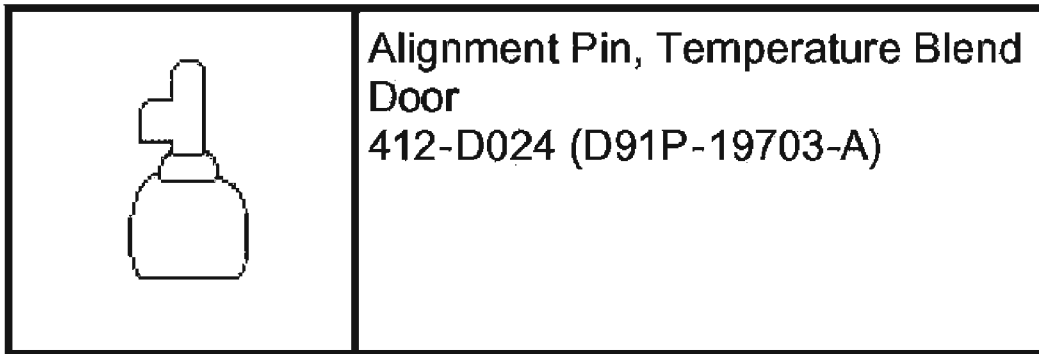


G02742554

**Fig. 3: Removing Climate Control Assembly Screws**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### TEMPERATURE CONTROL SWITCH

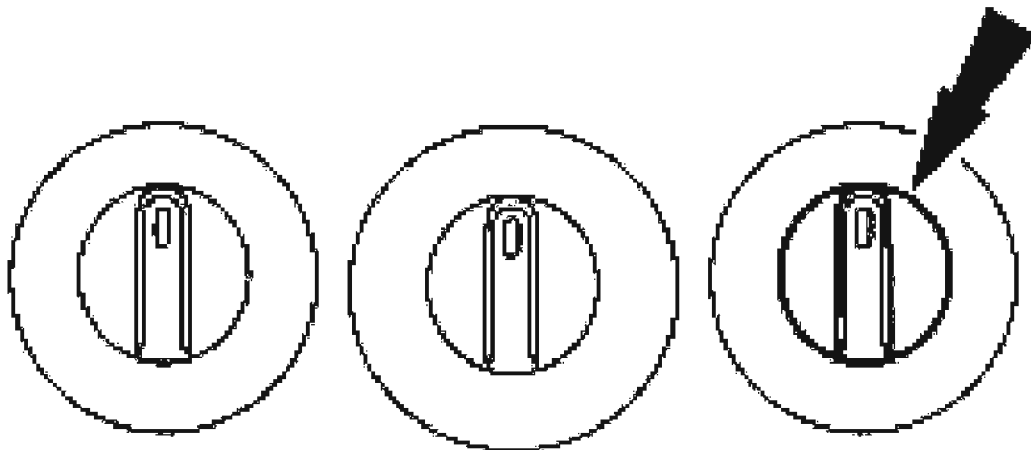


G02742555

**Fig. 4: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

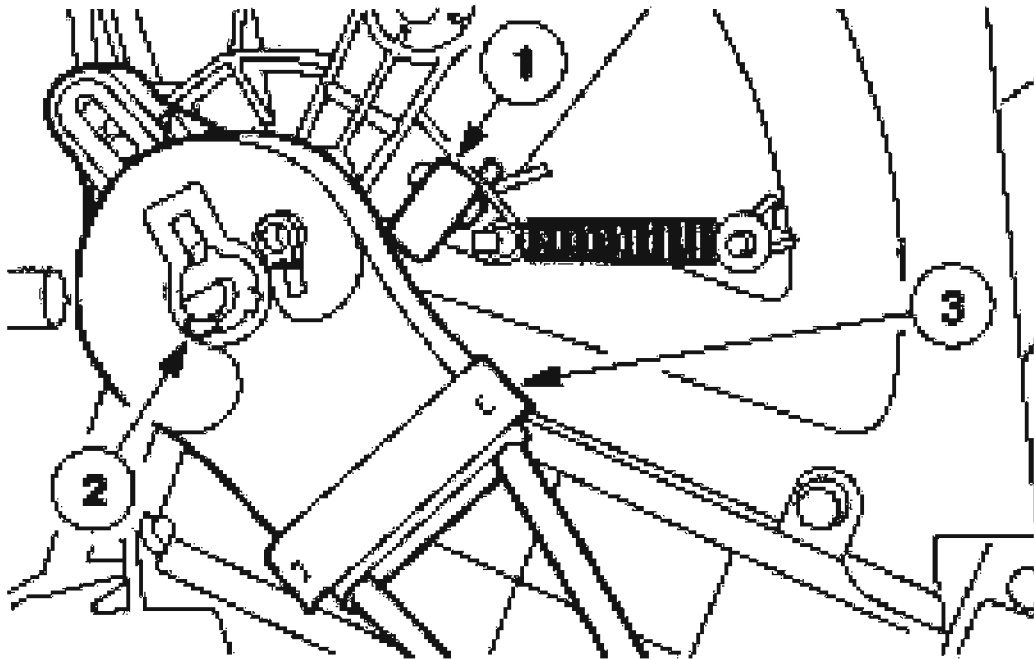
1. Remove the instrument panel center finish panel. For additional information, refer to **INSTRUMENT PANEL AND CONSOLE**.
2. Remove the temperature control switch knob.



G02742556

**Fig. 5: Identifying Temperature Control Switch Knob**  
Courtesy of FORD MOTOR CO.

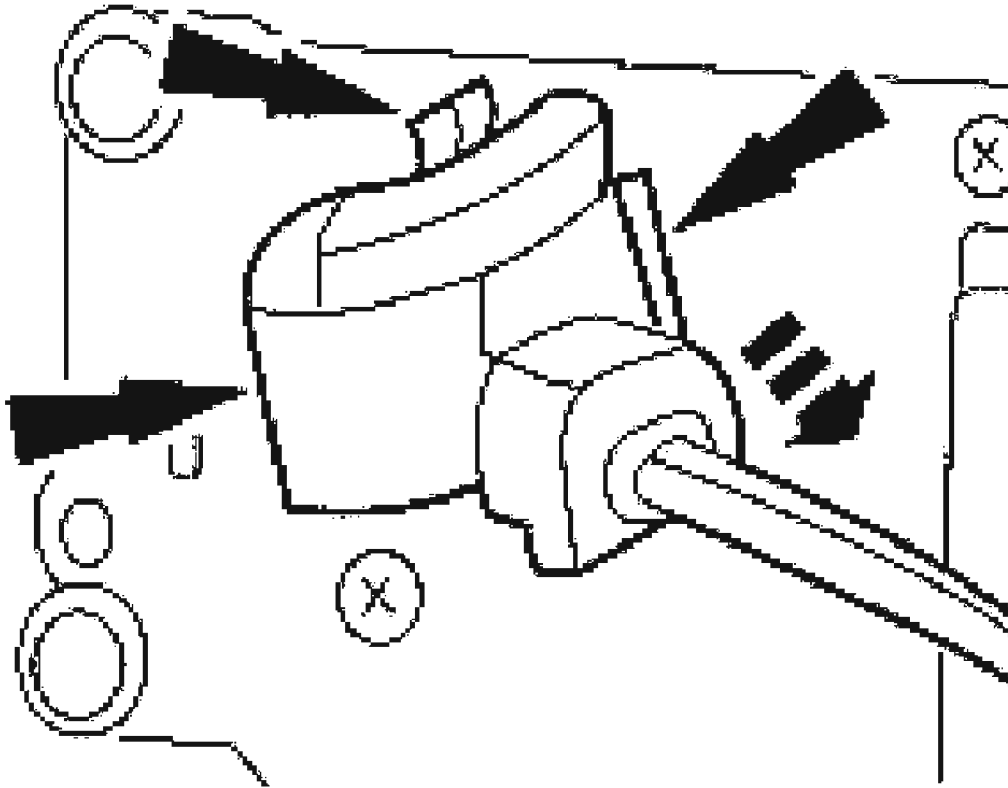
3. Disconnect the temperature blend door control cable.
  1. Align the locator holes and insert the special tool.
  2. Release the locking tab.
  3. Remove the temperature blend door control cable from the blend door shaft.



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**Fig. 6: Disconnecting Temperature Blend Door Control Cable**  
Courtesy of FORD MOTOR CO.

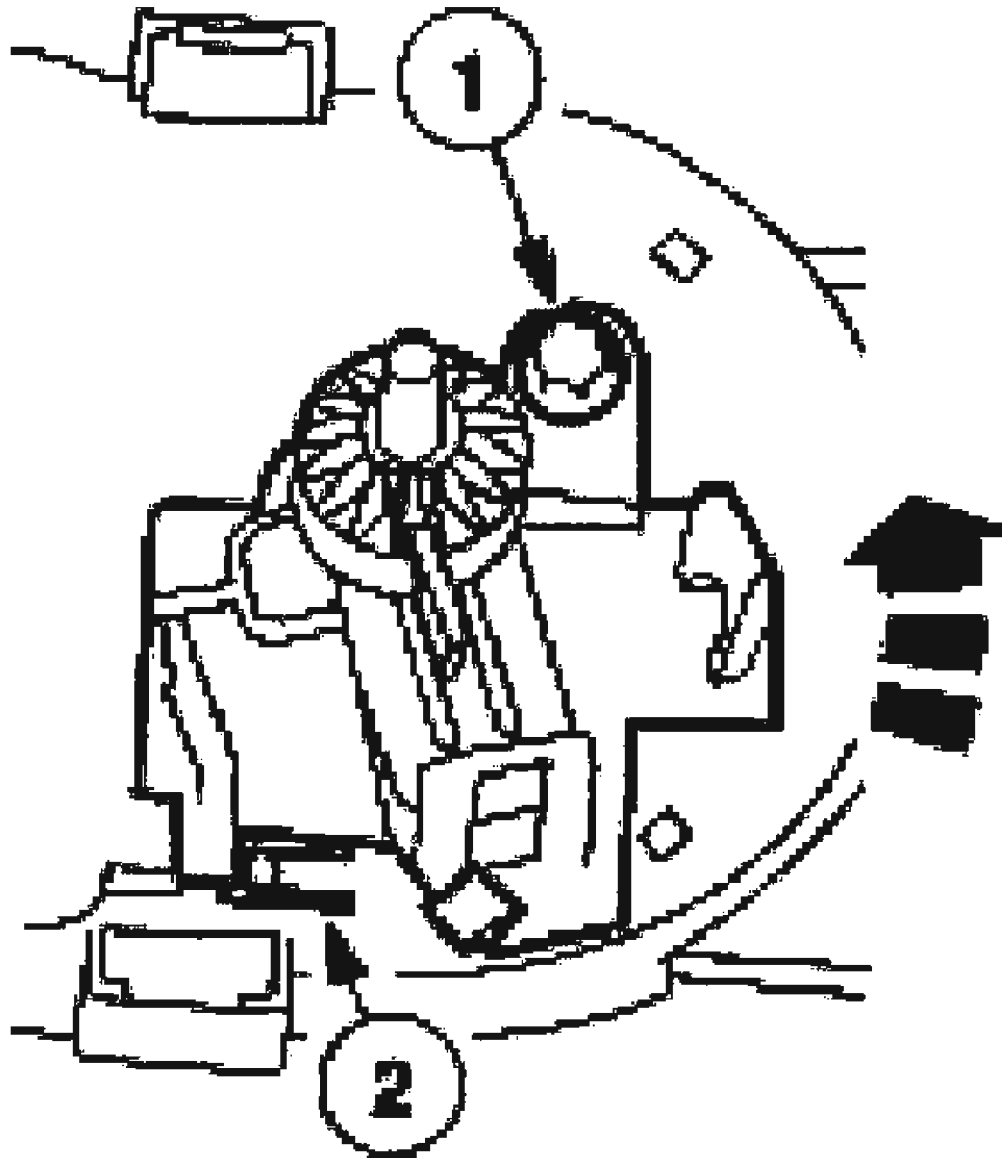
4. Depress the three tabs and remove the temperature blend door control cable.



G02742558

**Fig. 7: Removing Temperature Blend Door Control Cable**  
Courtesy of FORD MOTOR CO.

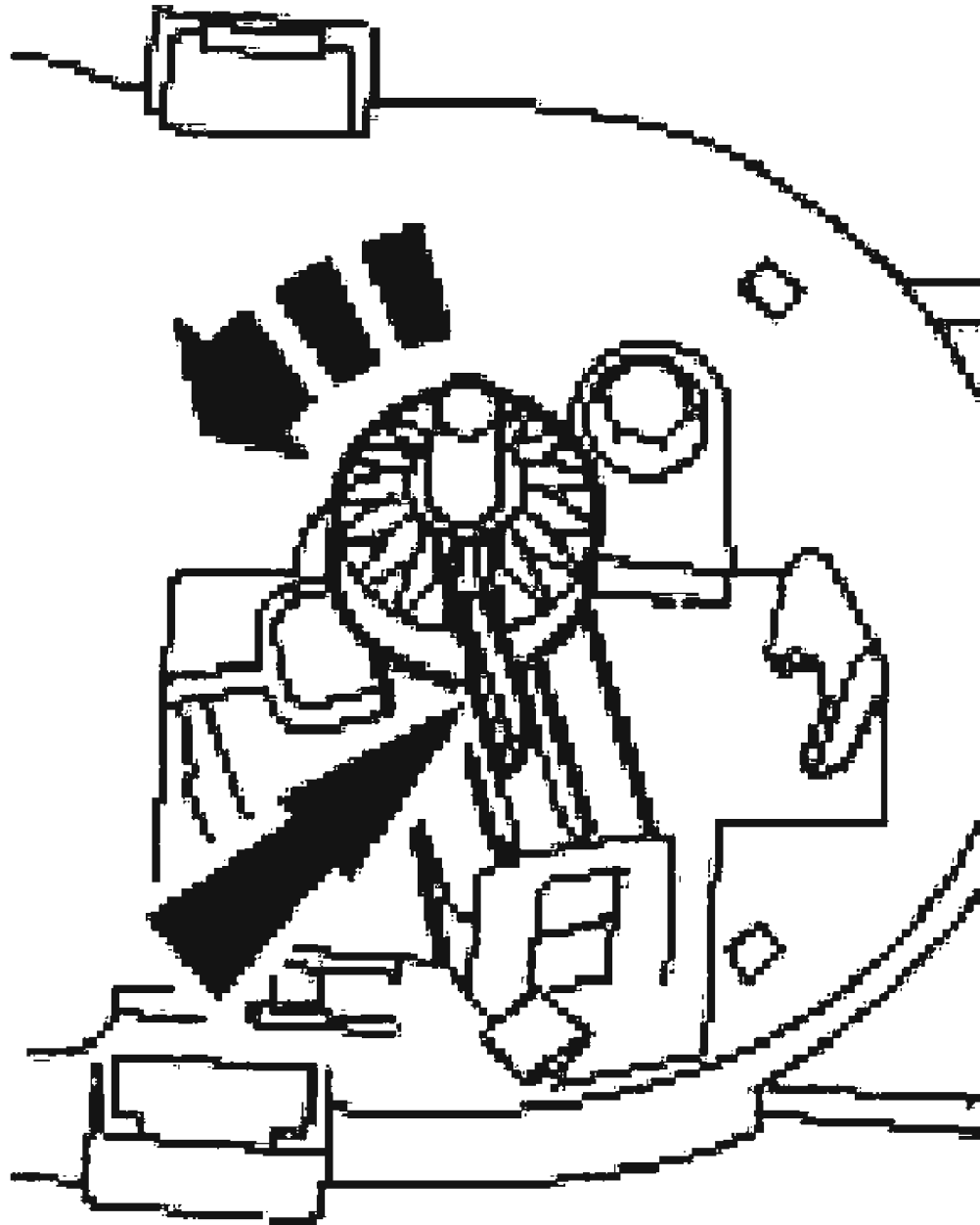
5. Remove the temperature control switch.
  1. Remove the screw.
  2. Depress the tab and rotate the temperature control switch counterclockwise.



G02742559

**Fig. 8: Removing Temperature Control Switch**  
Courtesy of FORD MOTOR CO.

**NOTE:** Rotate the gear to align the locking tab with the notch in the gear before installing.



G02742560

**Fig. 9: Installing Temperature Control Switch**  
Courtesy of FORD MOTOR CO.

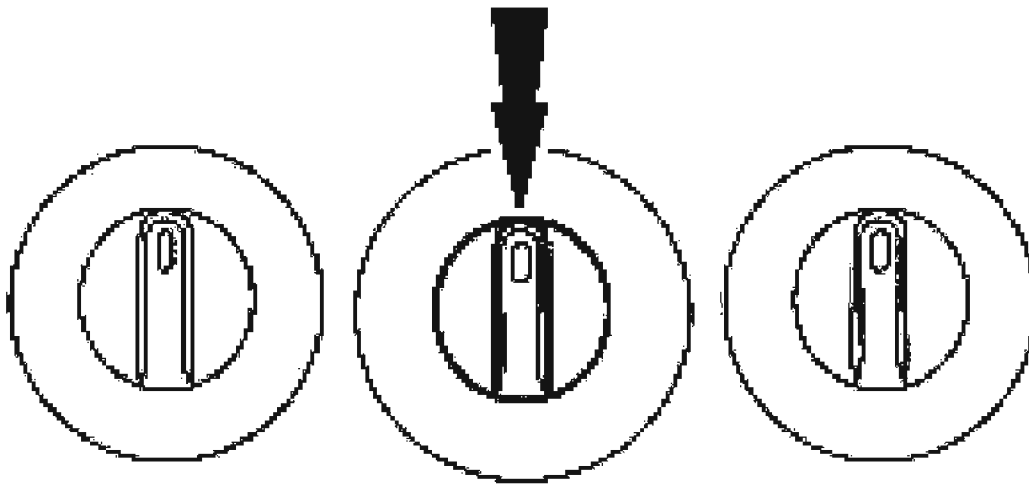
6. To install, reverse the removal procedure.

#### **FUNCTION SELECTOR SWITCH**



### Removal and Installation

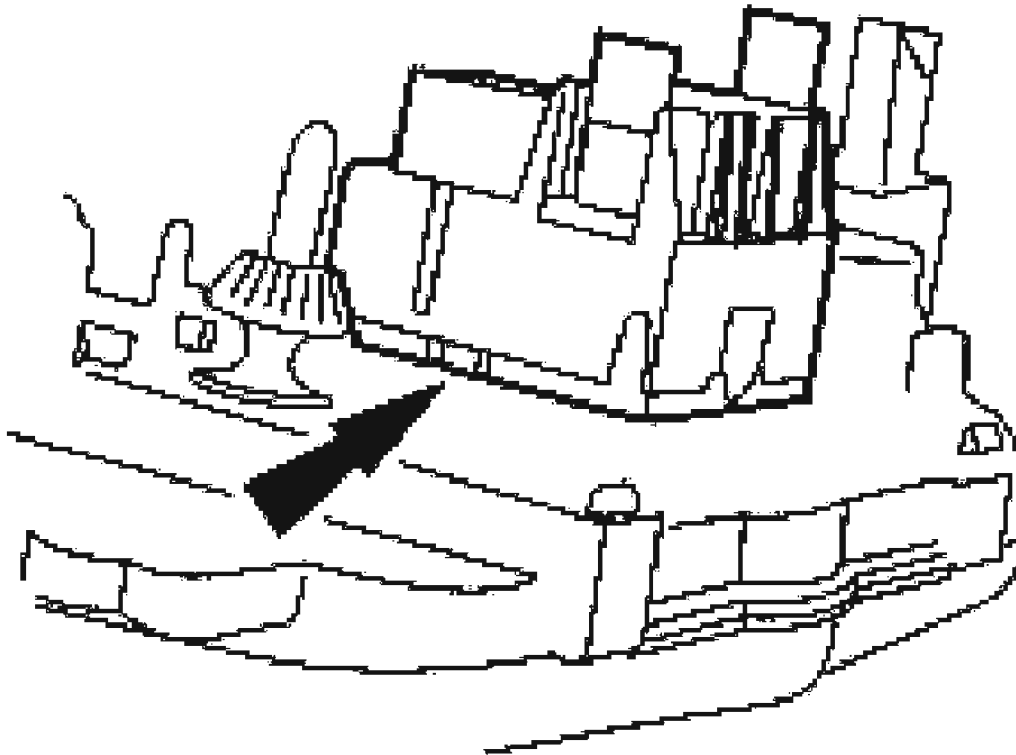
1. Remove the instrument panel center finish panel. For additional information, refer to **INSTRUMENT PANEL AND CONSOLE**.
2. Remove the function selector switch knob.



G02742561

**Fig. 10: Identifying Function Selector Switch Knob**  
Courtesy of FORD MOTOR CO.

3. Remove the function selector switch.
  - Push in the locking tab on one side of the function selector switch.



G02742562

**Fig. 11: Removing Function Selector Switch**  
Courtesy of FORD MOTOR CO.

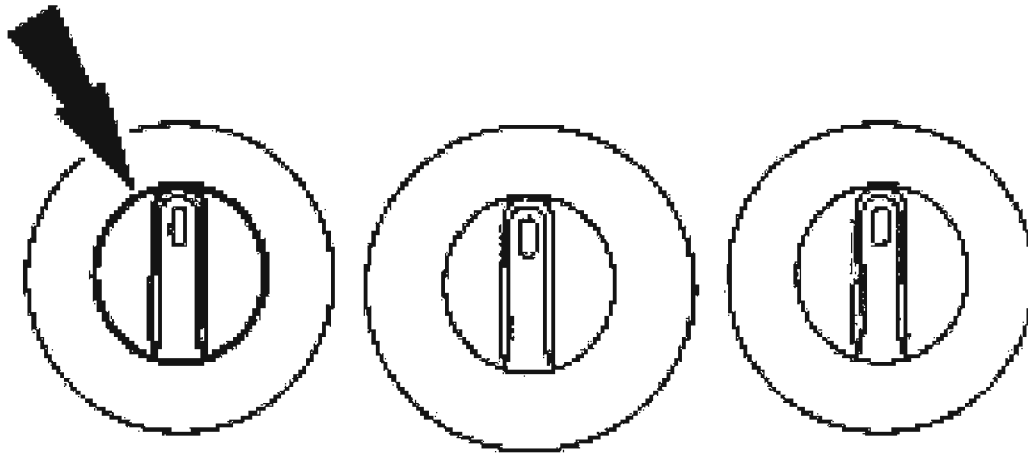
**NOTE:** Align the function selector switch locking tabs with the holes in the housing and press the function selector into the housing. Verify that both locking tabs are secured.

4. To install, reverse the removal procedure.

## **BLOWER MOTOR SWITCH**

### **Removal and Installation**

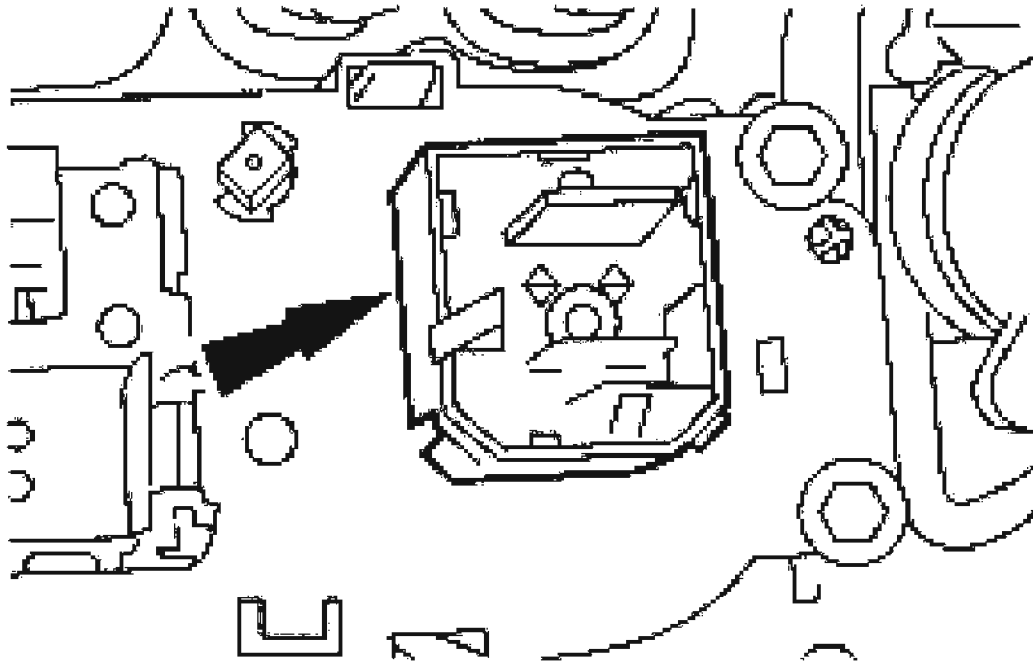
1. Remove the instrument panel center finish panel. For additional information, refer to **INSTRUMENT PANEL AND CONSOLE**.
2. Remove the blower motor switch knob.



G02742563

**Fig. 12: Identifying Blower Motor Switch Knob**  
Courtesy of FORD MOTOR CO.

3. Remove the blower motor switch.
  - Depress the locking tab.

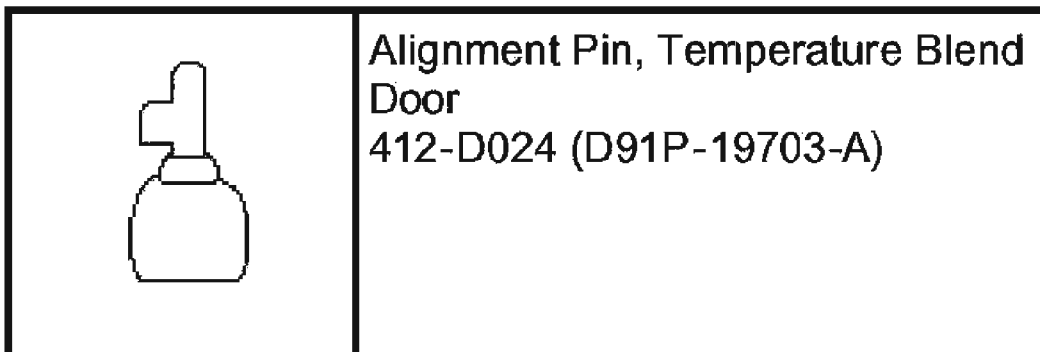


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**Fig. 13: Removing Blower Motor Switch**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

**TEMPERATURE BLEND DOOR CONTROL CABLE**



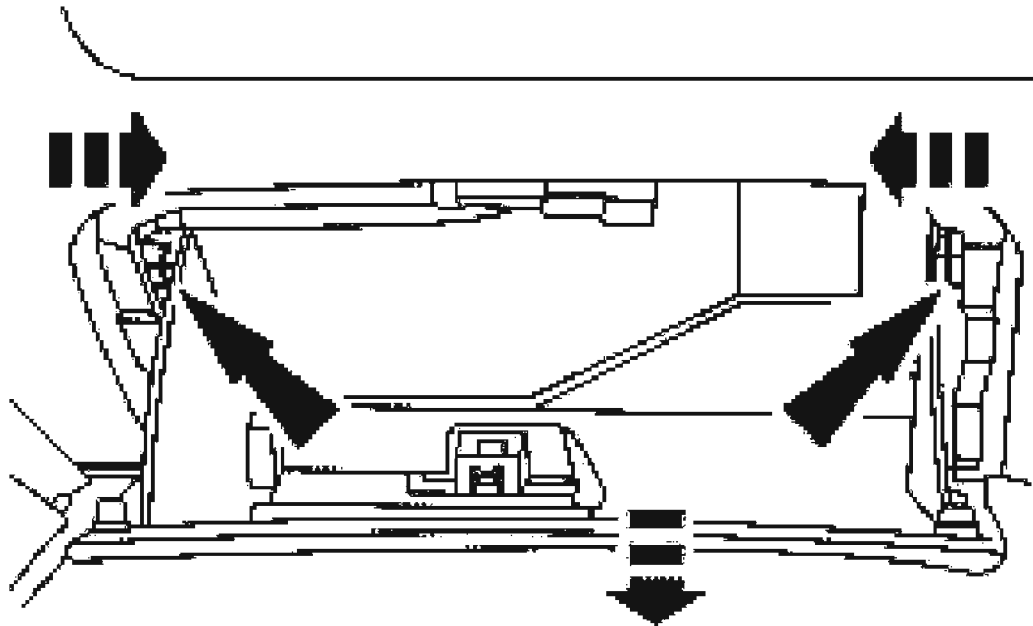
G02742565

**Fig. 14: Identifying Special Tool**

Courtesy of FORD MOTOR CO.

#### Removal and Installation

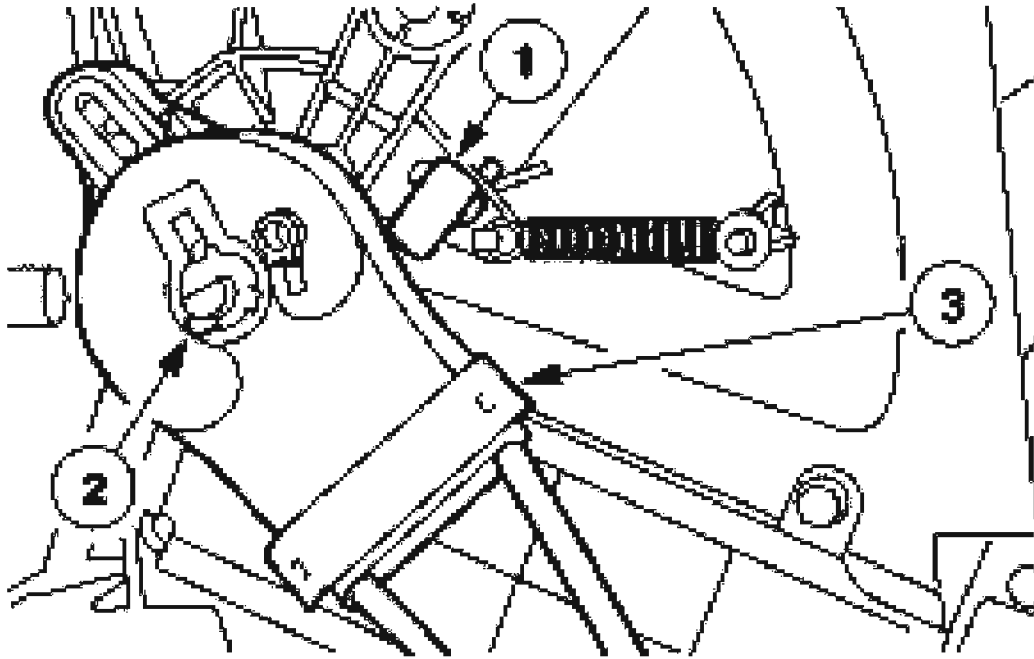
1. Disconnect the negative battery cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Lower the glove compartment door.
  - Press the glove compartment release tabs inward while pulling downward on the glove compartment.



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**Fig. 15: Lowering Glove Compartment Door**  
Courtesy of FORD MOTOR CO.

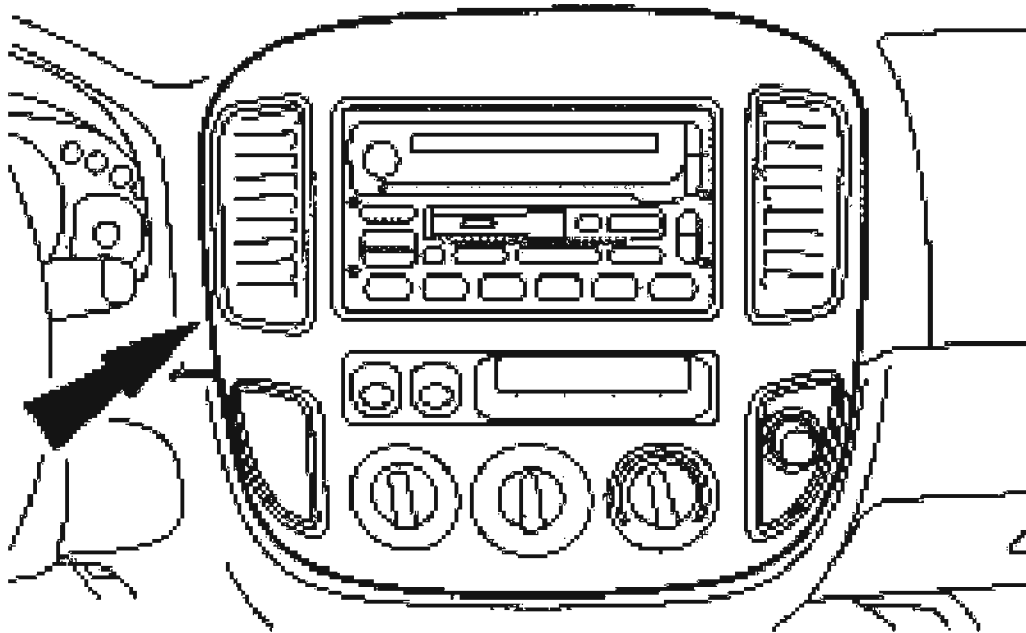
3. Disconnect the temperature blend door control cable.
  1. Align the locator holes and insert the special tool.
  2. Release the locking tab.
  3. Remove the temperature blend door control cable from the blend door shaft.



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**Fig. 16: Disconnecting Temperature Blend Door Control Cable**  
Courtesy of FORD MOTOR CO.

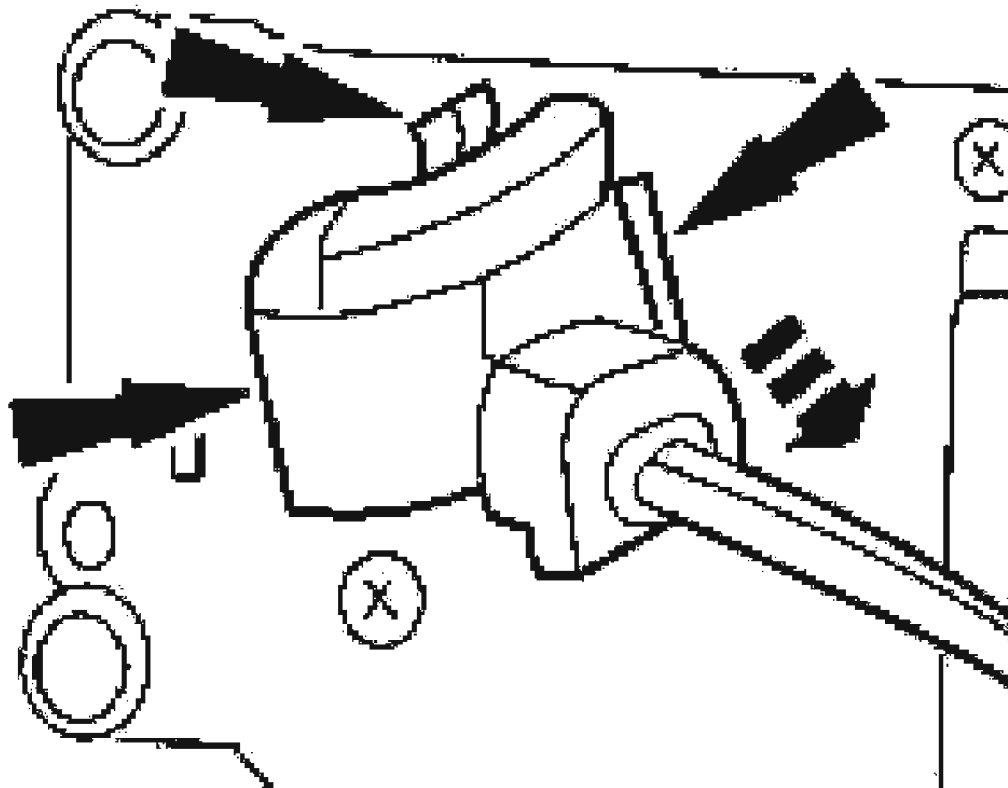
4. Remove the instrument panel center finish panel.
  - Disconnect the electrical connectors.



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**Fig. 17: Removing Instrument Panel Center Finish Panel**  
Courtesy of FORD MOTOR CO.

5. Depress the three tabs and remove the temperature blend door control cable.

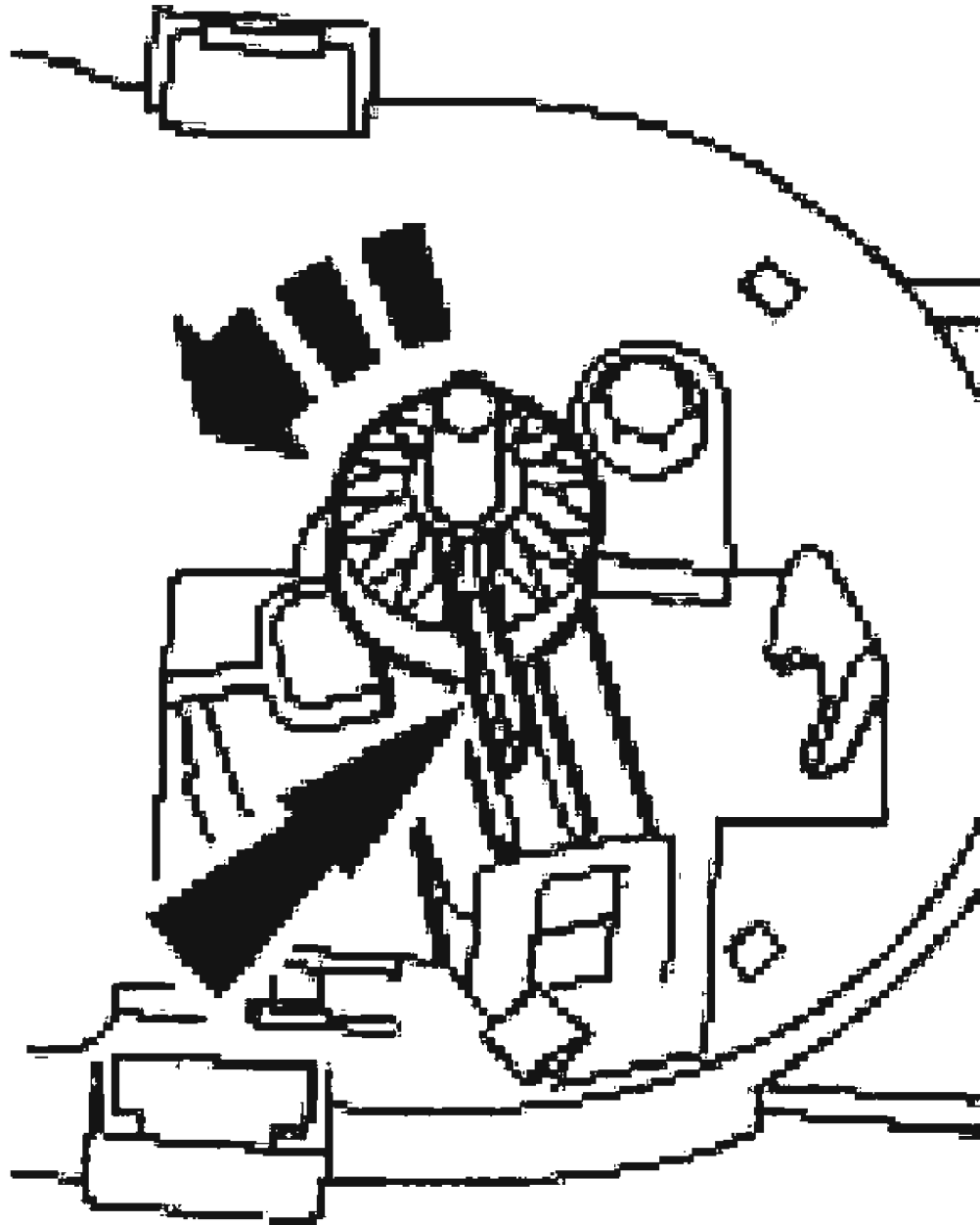


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**Fig. 18: Removing Temperature Blend Door Control Cable**  
Courtesy of FORD MOTOR CO.

**NOTE:** Rotate the gear to align the locking tab with the notch in the gear before installing.





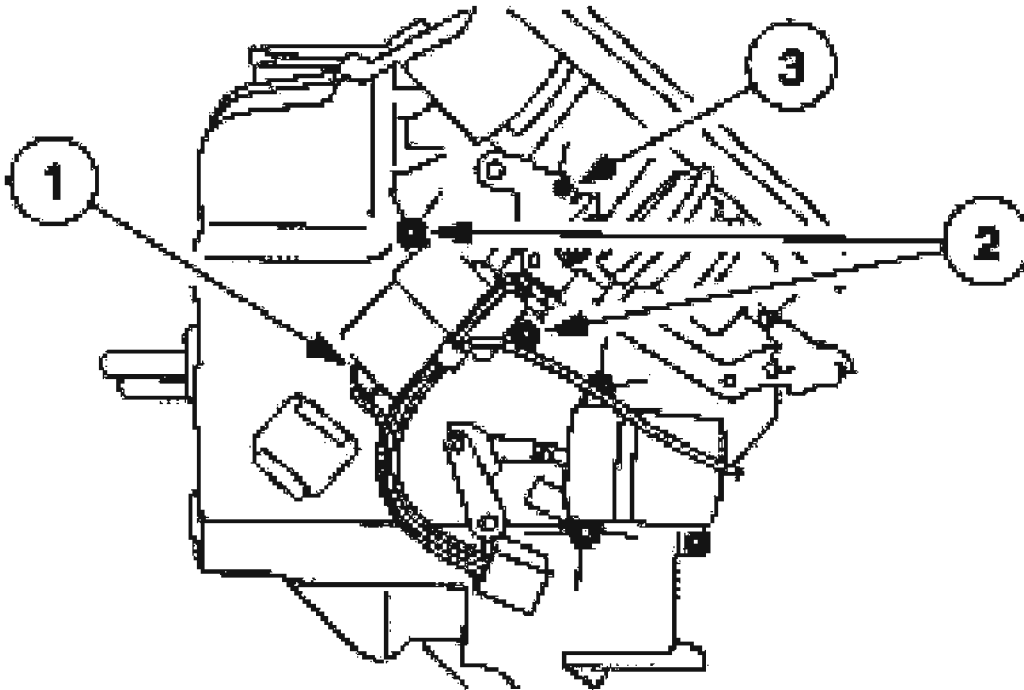
G02742570

**Fig. 19: Installing Temperature Control Switch**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.

**Removal and Installation**

1. Remove the vacuum control motor.
  1. Disconnect the vacuum line.
  2. Remove the two screws.
  3. Disconnect the vacuum control motor from the door lever.



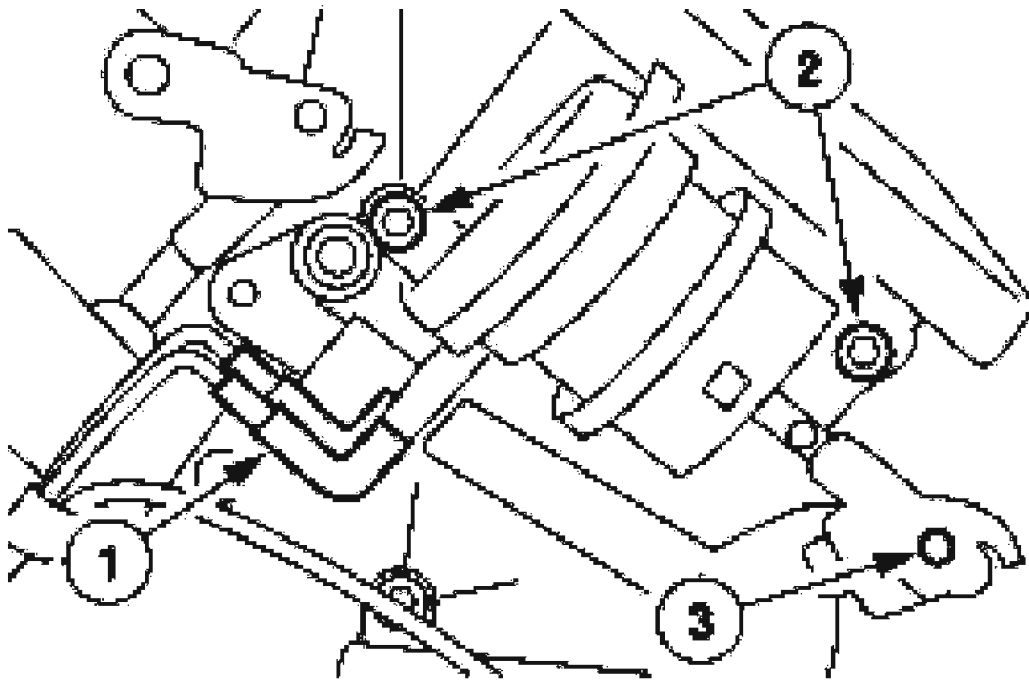
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**Fig. 20: Removing Vacuum Control Motor (Defrost)**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.

**VACUUM CONTROL MOTOR-PANEL VENT****Removal and Installation**

1. Remove the vacuum control motor.
  1. Disconnect the vacuum line.
  2. Remove the two screws.
  3. Disconnect the vacuum control motor from the door lever.



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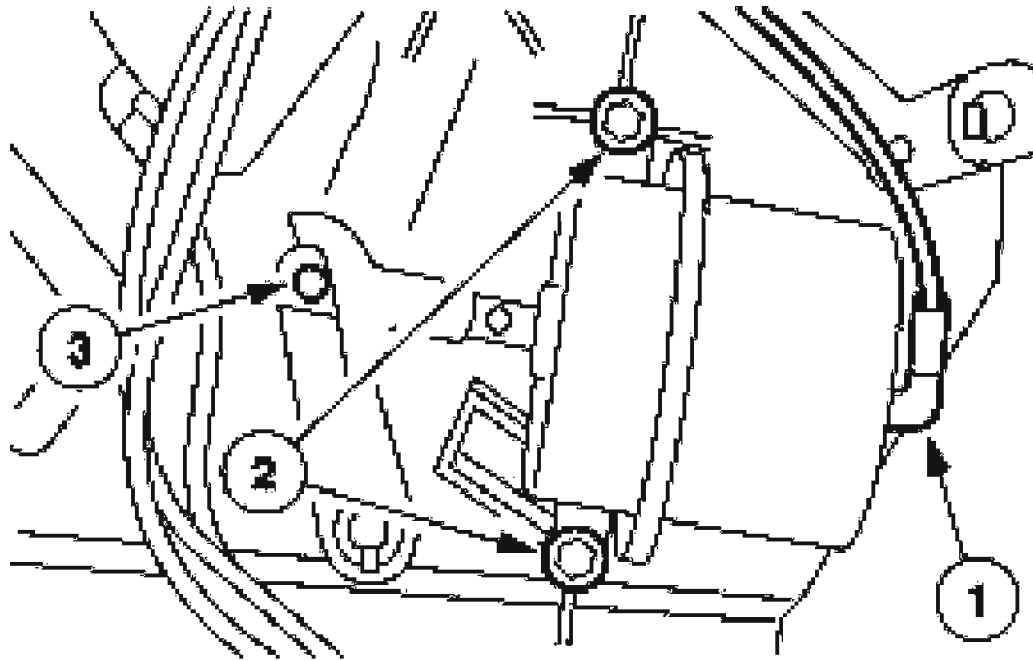
**Fig. 21: Removing Vacuum Control Motor (Panel Vent)**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.

#### **VACUUM CONTROL MOTOR-FOOTWELL VENT**

##### **Removal and Installation**

1. Remove the vacuum control motor.
  1. Disconnect the vacuum line.
  2. Remove the two screws.
  3. Disconnect the vacuum control motor from the door lever.



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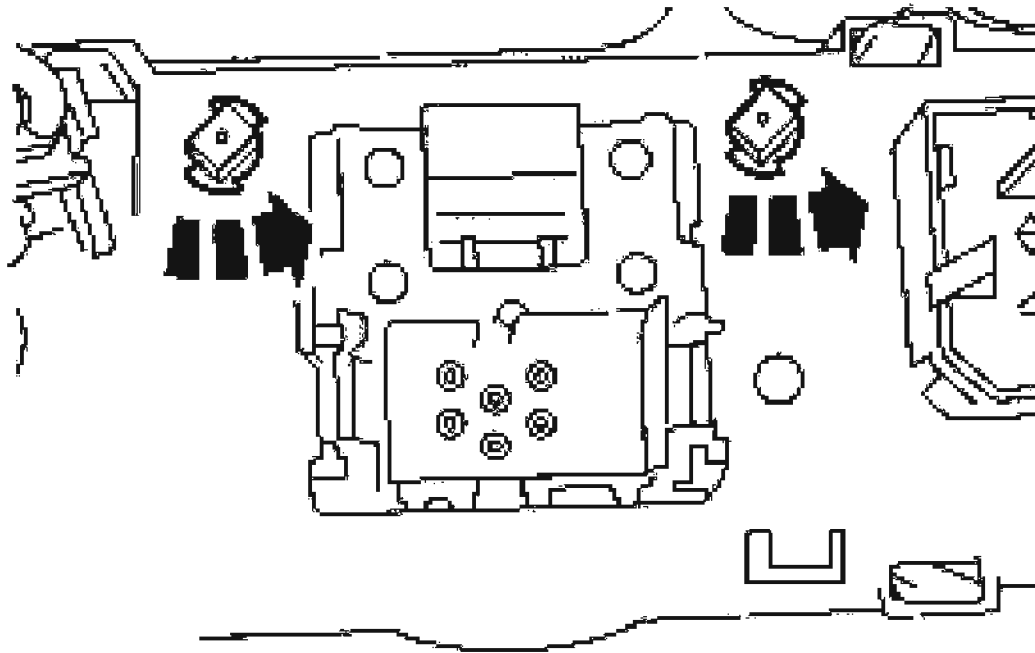
**Fig. 22: Removing Vacuum Control Motor (Footwell Vent)**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.

#### **CLIMATE CONTROL ASSEMBLY ILLUMINATION BULBS**

##### **Removal and Installation**

1. Remove the instrument panel center finish panel. For additional information refer to **INSTRUMENT PANEL AND CONSOLE**.
2. Remove the illumination bulb(s) by turning a quarter turn counterclockwise and lifting straight up.



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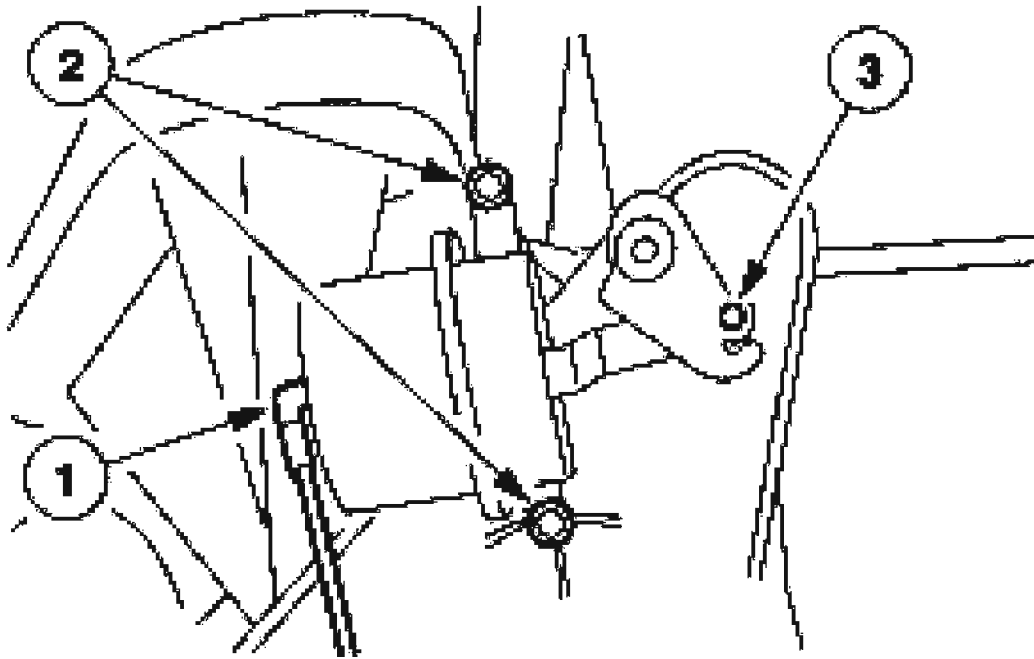
**Fig. 23: Removing Illumination Bulbs**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### **VACUUM CONTROL MOTOR-OUTSIDE AIR INLET**

##### **Removal and Installation**

1. Remove the instrument panel. For additional information, refer to **INSTRUMENT PANEL AND CONSOLE**.
2. Remove the vacuum control motor.
  1. Disconnect the vacuum line.
  2. Remove the two screws.
  3. Disconnect the vacuum control motor from the door lever.



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**Fig. 24: Removing Vacuum Control Motor (Outside Air Inlet)**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

## 2006 Ford Escape

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### 2006 HVAC

#### Climate Control System - General Information & Diagnostics - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
<b>A/C Compressor FS-10</b>	
Displacement	170 cc (10.4 cubic inches)
Cylinder bore	29.0 mm (1.14 in)
Cylinder stroke	25.7 mm (1.0 in)
Rotation	Clockwise
<b>Magnetic clutch</b>	
Air gap between pulley and hub mm (inches)	0.35-0.75 mm (0.014-0.029 in)
<b>A/C cycling switch - 2.3L, 3.0L (4V)</b>	
Close	138-165 kPa (20-24 psi)
Open	200-317 kPa (29-46 psi)
<b>High Pressure Cut-Off Switch</b>	
Fan ON (closed contacts)	2,241 kPa (325 psi)
Fan OFF (open contacts)	1,896 kPa (275 psi)
A/C clutch cut-out (open contacts)	3,103 kPa (450 psi)
A/C clutch cut-in (closed contacts)	1,724 kPa (250 psi)
<b>Evaporator core orifice tube size/color</b>	
Color	Orange
Diameter	1.44 mm (0.057 in)
<b>A/C pressure relief valve</b>	
Open	3,792 kPa (550 psi) minimum
<b>Lubricant</b>	
PAG Refrigerant Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B
Capacity - 2.3L, 3.0L (4V)	207 ml (7 oz)
<b>Refrigerant</b>	
R-134a Refrigerant YN-19 (US); CYN-16-P or CYN-16-R (Canada)	WSH-M17B19-A
Capacity - 2.3L, 3.0L (4V)	907 g (2 lb)
<b>Cleaner</b>	

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A/C System Flushing Solvent YN-23

-

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	N.m	lb-ft	lb-in
A/C line peanut fitting	8	-	71

## DESCRIPTION AND OPERATION

### CLIMATE CONTROL SYSTEM

#### Manual Climate Control System

The manual climate control system heats or cools the vehicle interior depending on the position of the function selector switch and the temperature selected. The position of the function selector switch determines heating or cooling and air distribution. The temperature control setting determines air temperature.

The blower motor switch:

- sets the blower motor speed.
- directs the blower motor path to ground through the blower motor resistor to allow blower motor operation in LO, M2 (medium-low) and M1 (medium-high).
- gives the blower motor a direct path to ground through the blower motor switch, which allows the blower motor to operate in HI.

The temperature control switch actuates a cable attached directly to the temperature blend door located in the heater core housing.

The function selector switch:

- determines where the system airflow is directed.
- enables blower motor operation.
- combines a vacuum with 2 electrical switches.
- supplies power to the A/C clutch circuit in the MAX A/C, A/C, FLOOR/DEFROST and DEFROST positions.

#### System Airflow Description

##### MAX A/C

When MAX A/C is selected:

- The air inlet blend door is at full vacuum, closing off outside air and allowing only



recirculated air.

- The defrost blend door is at full vacuum while the footwell blend door is at no vacuum, closing both doors.
- The vent/register blend door is at partial vacuum, directing airflow to the driver side, passenger side and center registers.
- Temperature control is usually set for maximum cold but may be heated if selected.
- Air is picked up at the recirculation opening by the blower motor. With the temperature control set for maximum cold, air flows across the A/C evaporator core, diverting past the heater core, and is then directed into the passenger compartment through the driver side, passenger side and center registers.
- The A/C compressor is enabled.
- The blower motor is ON.

#### **A/C**

When A/C is selected:

- The air inlet blend door is at no vacuum, blocking the recirculation passage and admitting outside air.
- All other door positions are the same as described under MAX A/C.
- The temperature setting can be changed manually.
- The A/C compressor is enabled.
- The blower motor is ON.

#### **PANEL**

When PANEL is selected:

- The air inlet blend door, with no vacuum being applied, blocks recirculated air and allows outside air. Air flows through the system to the driver, passenger and center registers.
- The vent/register blend door is at partial vacuum to direct airflow to the driver, passenger and center registers.
- The defrost blend door is at full vacuum and the defrost airflow door is at no vacuum, closing off airflow to the windshield defroster hose nozzles and footwell ducts.
- The temperature setting can be changed manually to heat the air, but air cannot be cooled below the outside temperature.
- The A/C compressor is disabled when VENT is selected.
- The blower motor is ON.

#### **PANEL/FLOOR**

When PANEL/FLOOR is selected:

- The air inlet blend door is at no vacuum, blocking the recirculation passage and allowing outside air.
- The footwell blend door and the panel airflow door are in the full vacuum position, allowing airflow to blend between the panel vents and the footwell ducts.
- The defrost airflow door is at full vacuum, closing off airflow to the windshield defroster hose nozzle and directing airflow to the heater outlet footwell duct.
- The A/C compressor is disabled.
- The blower motor is ON.

#### **OFF**

When OFF is selected:

- The air inlet blend door is at full vacuum, closing off outside air and allowing only recirculated air.
- The vent/register blend door and the defrost, footwell and blend airflow doors are at no vacuum, closing off the passages to the driver, passenger and center registers.
- The blower motor and the A/C compressor are off.

#### **FLOOR**

When FLOOR is selected:

- The air inlet blend door is at no vacuum, blocking recirculated air and allowing outside air.
- The footwell airflow door is at the full vacuum position, opening the door and allowing airflow through the footwell ducts.
- The defrost airflow door and the vent/register blend door are in the no vacuum position, closing off airflow to the windshield defroster hose nozzles and driver, passenger and center registers.
- The temperature control can be positioned to mix air flowing through and around the heater core to achieve the selected temperature level.
- The A/C compressor is disabled.
- The blower motor is ON.

#### **FLOOR/DEFROST**

When FLOOR/DEFROST is selected:

- The air inlet blend door is in the no vacuum position, blocking recirculated air and allowing outside air.

- The footwell blend door is at full vacuum allowing air to flow through the footwell ducts.
- The defrost blend door is at no vacuum, allowing airflow to both the windshield defroster hose nozzle and side window demister hose nozzle ducts.
- The vent/register blend door is at no vacuum.
- The A/C compressor is enabled to dehumidify the air and reduce windshield fogging.
- The blower motor is on.

**DEFROST**

When DEFROST is selected:

- The air inlet blend door is at no vacuum, allowing outside air to enter the system.
- The defrost blend door is at no vacuum, directing the airflow to the windshield through the defroster ducts and the side windows through the demister ducts.
- The panel airflow door and the footwell airflow door are at no vacuum, so that most of the incoming air is directed to the windshield defroster hose nozzle. There is also airflow to the side window demister and hose.
- The temperature control knob setting determines the amount of air that is directed through the heater core and the amount that bypasses the heater core.
- The A/C compressor is enabled to dehumidify the air and reduce windshield fogging.
- The blower motor is on.

**Air Distribution**

There are 2 sources of air available to the air distribution system:

- Outside air
- Recirculated air

Recirculated air is only used when the manual climate control mode selector is set in the MAX A/C or OFF modes.

Air distribution within the vehicle is determined by the function selector switch position. Air flow control doors are used to direct air flow within the A/C evaporator housing and heater. Vacuum control motors are used to position these air flow control doors.

The air distribution system is designed to provide air flow from the defrost nozzle when no vacuum is applied to any of the vacuum control motors. This is done to prevent a situation where defrost cannot be obtained due to a system vacuum leak.

Air enters the passenger compartment from the:

- instrument panel register.
- heater outlet floor duct.
- windshield defroster hose nozzle.
- side window demisters.
- rear footwell duct.

Passenger compartment air is exhausted from the vehicle through open windows or through the air extractors located in the rear of the vehicle.

#### **Refrigerant System Dye**

Fluorescent refrigerant system dye is added to the refrigerant system at the factory to assist in refrigerant system leak diagnosis using an approved ultraviolet blacklight. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. New suction accumulators are shipped with a fluorescent dye wafer included in the desiccant bag which dissolves after approximately 30 minutes of continued A/C operation. It is not necessary to add dye after flushing or filtering the refrigerant system because a new suction accumulator is installed as part of the flushing or filtering procedure. Additional refrigerant system dye should only be added if more than 50% of the refrigerant system lubricant capacity has been lost due to a fitting separation, hose rupture or other damage. For additional information, refer to **FLUORESCENT DYE LEAK DETECTION**.

#### **Control Components**

##### **Manual Climate Control**

The manual climate control components are used to select:

- air inlet source (outside or recirculated).
- blower motor speed.
- discharge air temperature (temperature blend).
- discharge air location (defrost, panel, floor).
- A/C compressor operation.

##### **Control System Inputs**

The climate control assembly has 3 system control inputs.

##### **Function Selector Switch**

The function selector switch combines a vacuum selector valve that determines air distribution and an electrical switch to supply battery voltage to the A/C compressor circuit and the blower motor circuit. When the function selector switch is in the MAX A/C, A/C,

FLOOR/DEFROST or DEFROST positions, the A/C compressor will be operational. The function selector switch can be replaced separately from the climate control head unit.

#### **Temperature Control Switch**

The temperature control switch setting determines air temperature. Temperature selection is accomplished through a cable connected to the temperature blend door. Movement of the temperature control switch from COOL (blue) to WARM (red) causes a corresponding movement of the temperature blend door and determines the air discharge temperature that the air distribution system will maintain. The temperature control switch can be replaced separately from the climate control head unit.

#### **Blower Motor Switch**

The blower motor switch controls blower motor speed by adding or bypassing resistors in the blower motor switch resistor in all function selector switch positions except OFF. The blower motor switch can be replaced separately from the climate control head unit.

#### **Control System Outputs**

##### **Blower Motor Resistor**

The blower motor resistor:

- is located on the evaporator core housing behind the glove compartment.
- has 3 resistor elements mounted on the resistor board to provide 4 blower motor speeds.
- depending on the blower motor switch position, series resistance is added or bypassed in the blower motor circuit to decrease or increase the blower motor speed.
- has an overheating device (thermal limiter) that will open the resistor coil when the temperature reaches approximately 184°C (363°F), interrupting the blower motor operation in all speeds except high.
- is replaced as an assembly. The thermal limiter cannot be reset and cannot be repaired.

##### **Temperature Blend Door Actuator**

The temperature blend door actuator:

- is connected between the temperature control switch and the temperature blend door.
- moves the temperature blend door on the command of the temperature control switch.

##### **Vacuum Control Motors**

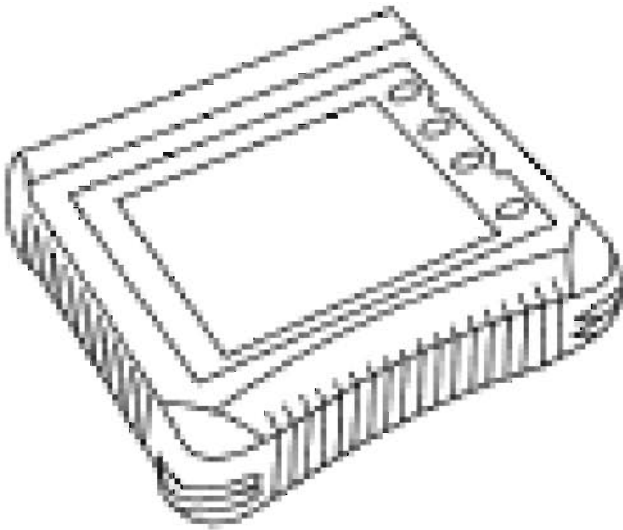
The vacuum control motors:

- direct system airflow to the vehicle interior as determined by the function selector switch.

## DIAGNOSIS AND TESTING

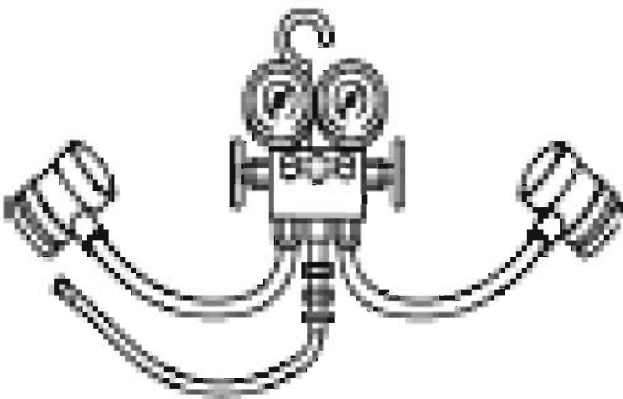
### CLIMATE CONTROL SYSTEM

#### SPECIAL TOOL(S)



ST2332-A

Worldwide Diagnostic System (WDS)  
Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

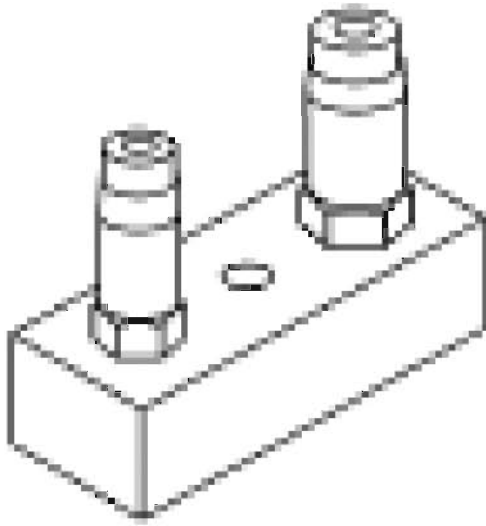


ST1928-A

R-134a Manifold Gauge Set  
176-R032A or equivalent

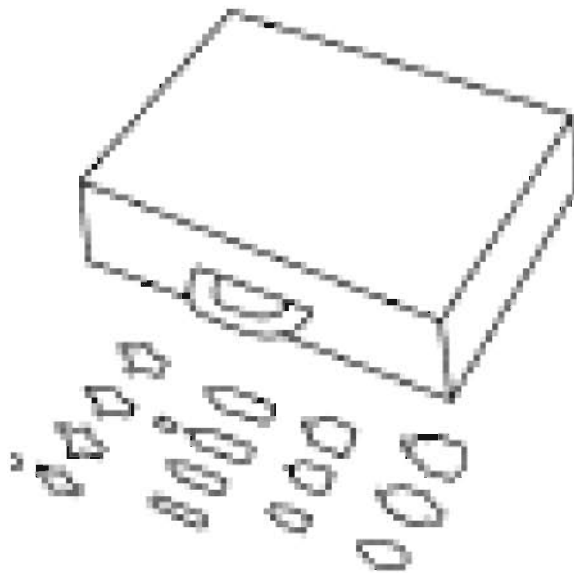
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Connector, Refrigerant Pressure Line  
412-093 (T94P-19623-E)

**ST1501-A**



Set, A/C Fittings  
412-DS028 (D93L-19703-B) or  
equivalent

**ST1252-A**

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**ST2351-A**

Refrigerant Leak Detector  
216-00001 or equivalent



**ST1137-A**

73111 Automotive Meter 105-R0057  
or equivalent



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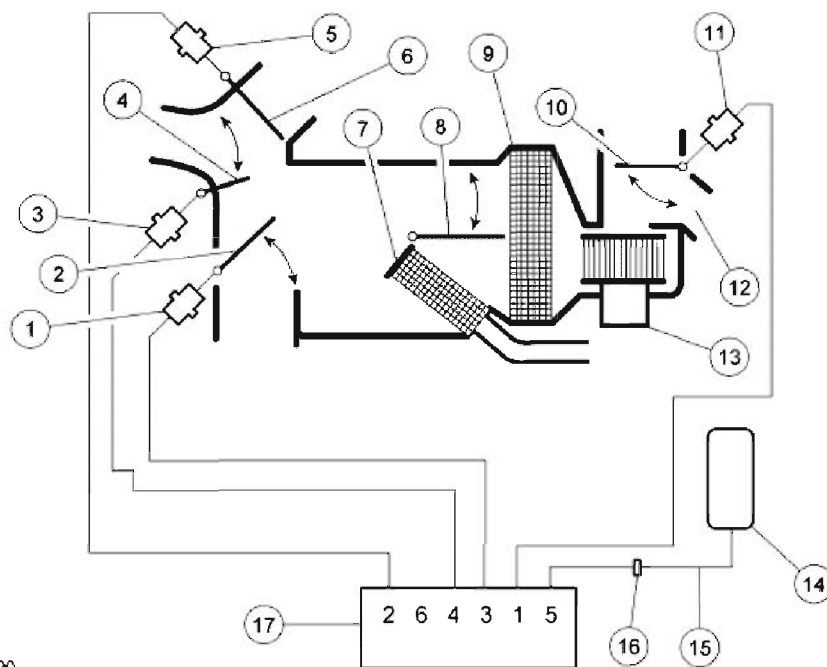


**ST1176-A**

Vacuum Pump Kit  
416-D002 (D95L-7559-A) or  
equivalent

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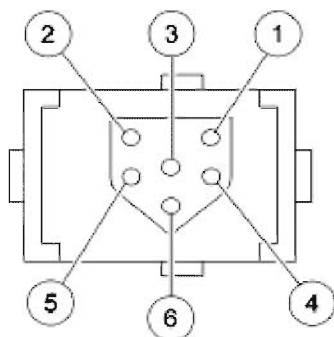


N0028690

Item	Part Number	Description
1	—	Vacuum control motor (footwell airflow door)
2	—	Floor airflow door
3	—	Vacuum control motor (panel vent airflow door)
4	—	Panel vent airflow door
5	—	Vacuum control motor (defroster airflow door)
6	—	Defrost airflow door
7	—	Heater core
8	—	Air temperature control door
9	—	Evaporator core
10	—	Outside air inlet door
11	—	Vacuum control motor (outside air inlet door)
12	—	Recirculating air port
13	—	Blower motor

Item	Part Number	Description
14	—	A/C vacuum reservoir
15	—	To A/C vacuum reservoir
16	—	A/C vacuum check valve
17	—	A/C function selector switch

**Fig. 1: Climate Control System Vacuum Schematic Diagram**  
 Courtesy of FORD MOTOR CO.



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**Fig. 2: Identifying Function Selector Switch Vacuum Connector Pinouts**  
**Courtesy of FORD MOTOR CO.**

**Function Selector Switch Vacuum Application Table**

**NOTE:** A leak in the vacuum control circuit may occur during acceleration (slow leak) or may exist at all times (large leak) and may exist only when specific functions are selected (indicating a leak in that portion of the circuit). The vacuum hoses used in the passenger compartment control circuit are constructed from PVC plastic material. The vacuum hoses used in the engine compartment are constructed of Hytrel®. Because of the materials used, never pinch off the vacuum hoses to locate a leak during diagnosis. A golf tee can be used as a plug when it is necessary to plug one end of the vacuum hose for leak test purposes.

**FUNCTION SELECTOR SWITCH VACUUM APPLICATION TABLE**

Switch Port	Color	Function	Function Selector Switch Position							
			MAX A/C	A/C	Panel	Floor/Panel	OFF	Floor	Floor/Defrost	Def
1	White	Recirc/fresh	V	NV	NV	NV	V	NV	NV	N
2	Yellow	Defrost	V	V	V	V	V	NV	V	N
3	Red	Floor	NV	NV	NV	V	V	V	V	N
4	Orange	Panel/Floor	V	V	V	V	NV	NV	NV	N
5	Black	Vacuum source	V	V	V	V	V	V	V	N
6	Not Used	Not Used	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N

V=Vacuum

NV=No vacuum

#### Principles of Operation

#### **WARNING:**

Carbon monoxide is colorless, odorless and dangerous. If it is necessary to operate the engine with the vehicle in a closed area such as a garage, always use an exhaust collector to vent the exhaust gases outside the closed area. Failure to follow these instructions may result in personal injury.

R-134a is classified as a safe refrigerant, but misuse can make it dangerous. The following precautions

must be observed. Failure to follow these instructions may result in personal injury.

- Always wear safety goggles when repairing an air conditioning system.
- Avoid contact with liquid refrigerant R-134a. R-134a vaporizes at approximately -25°C (-13°F) under atmospheric pressure and it will freeze skin tissue.
- Never allow refrigerant R-134a gas to escape in quantity in an occupied space. R-134a is non-toxic, but it will displace the oxygen needed to support life.
- Never use a torch in an atmosphere containing R-134a gas. R-134a is non-toxic at all normal conditions, but when it is exposed to high temperatures, such as a torch flame, it decomposes. During decomposition it releases irritating and toxic gases (as described in the material safety and data sheet (MSDS) from the manufacturer). The decomposition products are hydrofluoric acid, carbon dioxide and water.
- Do not allow any portion of the charged air conditioning system to become too hot. The pressure in an air conditioning system rises as the temperature rises and temperatures of approximately 85°C (185°F) can be dangerous.
- Allow the engine to cool sufficiently prior to carrying out maintenance or serious burns and injury can occur.

**CAUTION:**

To avoid damaging the vehicle or A/C components, the following precautions must be observed.

- The A/C refrigerant of all vehicles must be identified and analyzed prior to refrigerant charging. Failure to do so can contaminate the shop bulk refrigerant and other vehicles.
- Do not add R-12 refrigerant to an A/C system that requires the use of R-134a refrigerant. These two types of refrigerant must never be mixed. Doing so can damage the A/C system.
- Charge the A/C system with the engine running

only at the low-pressure side to prevent refrigerant slugging from damaging the A/C compressor.

- Use only R-134a refrigerant. Due to environmental concerns, when the air conditioning system is drained, the refrigerant must be collected using refrigerant recovery/recycling equipment. Federal law **REQUIRES** that R-134a be recovered into appropriate recovery equipment and the process be conducted by qualified technicians who have been certified by an approved organization, such as MACS, ASI, etc. Use of a recovery machine dedicated to R-134a is necessary to reduce the possibility of oil and refrigerant incompatibility concerns. Refer to the instructions provided by the equipment manufacturer when removing refrigerant from or charging the air conditioning system.
- Refrigerant R-134a must not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. R-134a is combustible when mixed with high concentrations of air and higher pressures.
- A number of manufacturers are producing refrigerant products that are described as direct substitutes for refrigerant R-134a. The use of any unauthorized substitute refrigerant can severely damage the A/C components. If repair is required, use only new or recycled R-134a.

To avoid contamination of the A/C system:

- Never open or loosen a connection before recovering the refrigerant.
- When loosening a connection, if any residual pressure is evident, allow it to leak out before opening the fitting.
- Evacuate a system that has been opened to install a new component or one that has discharged through leakage before charging.
- Seal open fittings with a cap or plug immediately after disconnecting a component from the system.
- Clean the outside of the fittings thoroughly before disconnecting a component from the system.

- **Do not remove the sealing caps from a new component until ready to install.**
- **Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open an oil container until ready to use and install the cap immediately after using. Store the oil in a clean, moisture-free container.**
- **Install a new O-ring seal before connecting an open fitting. Coat the fitting and O-ring seal with mineral oil before connecting.**
- **When installing a refrigerant line, avoid sharp bends. Position the line away from the exhaust or any sharp edges that can chafe the line.**
- **Tighten threaded fittings only to specifications. The steel and aluminum fittings used in the refrigerant system will not tolerate over-tightening.**
- **When disconnecting a fitting, use a wrench on both halves of the fitting to prevent twisting of the refrigerant lines or tubes.**
- **Do not open a refrigerant system or uncap a new component unless it is as close as possible to room temperature. This will prevent condensation from forming inside a component that is cooler than the surrounding air.**

There are 4 main principles involved with the basic theory of operation:

- Heat transfer
- Latent heat of vaporization
- Relative humidity
- Effects of pressure

#### **Heat Transfer**

If 2 substances of different temperature are placed near each other, the heat in the warmer substance will transfer to the colder substance.

#### **Latent Heat of Vaporization**

When a liquid boils (converts to gas) it absorbs heat without raising the temperature of the resulting gas. When the gas condenses (converts back to a liquid), it gives off heat without lowering the temperature of the resulting liquid.

## **Relative Humidity**

The amount of moisture (water vapor content) that the air can hold is directly related to the air temperature. The more heat there is in the air, the more moisture the air can hold. The lower the moisture content in the air, the more comfortable you feel. Removing the moisture from the air lowers its relative humidity and improves personal comfort.

## **Effects of Pressure on Boiling or Condensation**

As the pressure is increased on a liquid, the temperature at which the liquid boils (converts to gas) also increases. Conversely, when the pressure on a liquid is reduced, its boiling point is also reduced. When in the gas state, an increase in pressure causes an increase in temperature, while a decrease in pressure will decrease the temperature of the gas.

## **Compressor Anti-Slugging Strategy**

Liquid refrigerant may accumulate in the A/C compressor under certain conditions. To alleviate damage to the A/C compressor, compressor anti-slugging strategy (CASS) is used.

CASS is initiated only under specific conditions:

- the ignition is off for more than 8 hours
- the ambient temperature is above -4°C (25 °F)
- battery voltage is greater than 8.5 volts during engine cranking

When these conditions are present, the powertrain control module (PCM) will activate the A/C control relay prior to engine cranking. The A/C control relay engages the A/C compressor for approximately 4-15 A/C compressor revolutions or a maximum of 2 seconds (depending upon vehicle application), allowing the liquid refrigerant to be pushed from the A/C compressor. CASS is initiated by the PCM regardless of the function selector switch position.

## **The Refrigerant Cycle**

During stabilized conditions (A/C system shutdown), the refrigerant is in a vaporized state and pressures are equal throughout the system. When the A/C compressor is in operation, it increases pressure on the refrigerant vapor, raising its temperature. The high-pressure and high-temperature vapor is then released into the top of the condenser core.

The condenser core, being close to ambient temperature, causes the refrigerant vapor to condense into a liquid when heat is removed from the refrigerant by ambient air passing over the fins and tubing. The now liquid refrigerant, still at high pressure, exits from the bottom of the condenser core and enters the inlet side of the evaporator core orifice.

The evaporator core orifice is the restriction in the refrigerant system that creates the low pressure drop in the evaporator core and separates the high and low pressure sides of the A/C

system. As the liquid refrigerant leaves this restriction, its pressure and boiling point are reduced.

The liquid refrigerant is now at its lowest pressure and temperature. As it passes through the evaporator core, it absorbs heat from the passenger compartment airflow passing over the plate/fin sections of the evaporator core. This addition of heat causes the refrigerant to boil (convert to gas). The now cooler passenger compartment air can no longer support the same humidity level of the warmer air and this excess moisture condenses on the exterior of the evaporator coils and fins and drains outside the vehicle.

The suction accumulator is designed to remove moisture from the refrigerant and to prevent any liquid refrigerant that may not have been vaporized in the evaporator core from reaching the A/C compressor. The A/C compressor is designed to pump refrigerant vapor only, as liquid refrigerant will not compress and can damage the A/C compressor.

The refrigerant cycle is now repeated with the A/C compressor again increasing the pressure and temperature of the refrigerant.

The A/C cycling switch interrupts compressor operation before the external temperature of the evaporator core gets low enough to cause the condensed water vapor (excess humidity) to turn to ice. It does this by monitoring low side line pressure. It is known that a refrigerant pressure of approximately 210 kPa (30 psi) will yield an operating temperature of 0°C (32°F). The A/C cycling switch controls system operation in an effort to maintain this temperature.

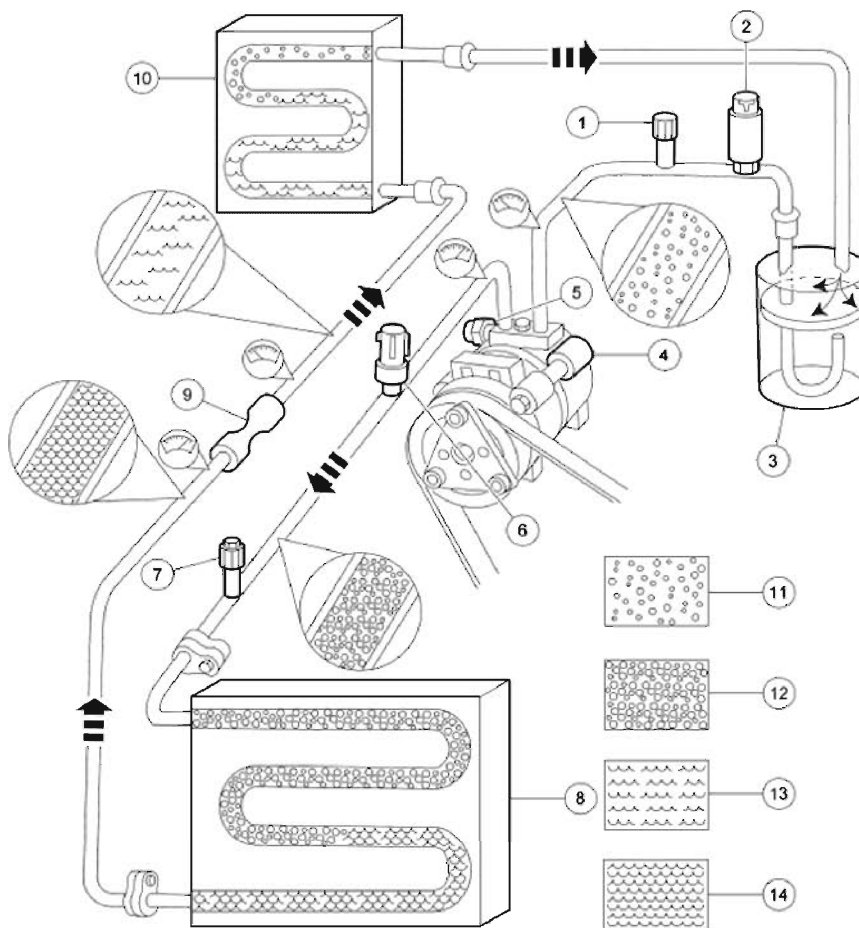
The high side line pressure is also monitored so that A/C compressor operation can be interrupted if the system pressure becomes too high. When the A/C compressor discharge pressure rises, the A/C high pressure cutoff switch contacts open, disengaging the A/C compressor. When the pressure drops, the contacts close to allow operation of the A/C compressor.

The A/C pressure relief valve will open and vent refrigerant to relieve unusually high system pressure.



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NO028691

Item	Part Number	Description
1	19E762	A/C charge valve port (low side)
2	19E561	A/C cycling switch
3	19C836	Suction accumulator
4	19703	A/C compressor
5	19D644	A/C compressor pressure relief valve
6	19D594	A/C high pressure cutoff switch
7	19E762	A/C charge valve port (high side)
8	19712	Condenser core
9	19D990	Evaporator core orifice tube
10	19860	Evaporator core
11	---	Low pressure vapor
12	---	High pressure vapor
13	---	Low pressure liquid
14	---	High pressure liquid

**Fig. 3: Clutch Cycling Orifice Tube Type Refrigerant System Diagram**  
Courtesy of FORD MOTOR CO.

#### Inspection and Verification

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

**VISUAL INSPECTION CHART**

<b>Mechanical</b>	<b>Electrical</b>
<ul style="list-style-type: none"> <li>• A/C compressor</li> <li>• A/C compressor drive belt</li> <li>• A/C clutch</li> <li>• Vacuum lines</li> <li>• Vacuum control motor</li> <li>• Refrigerant lines</li> <li>• Coolant level</li> <li>• Heater hoses</li> <li>• Radiator</li> <li>• Condenser</li> <li>• Suction accumulator</li> </ul>	<ul style="list-style-type: none"> <li>• Battery junction box (BJB) fuses:               <ul style="list-style-type: none"> <li>• 14 (15A)</li> <li>• 18 (40A)</li> </ul> </li> <li>• Smart junction box (SJB) fuse 26 (5A)</li> <li>• Engine cooling fans</li> <li>• Blower motor</li> <li>• Circuitry</li> </ul>

- As pinpoint tests and measurements are being carried out, be sure to inspect for any disconnected, loose-fitting or incorrectly installed component, module or in-line electrical connectors and pins.
- If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- If the cause is not visually evident, connect the diagnostic tool to the data link connector and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
  - check that the program card is correctly installed.
  - check the connections to the vehicle.
  - check the ignition switch position.
- If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool operating manual.
- Carry out the diagnostic tool data link test. If the diagnostic tool responds with:
  - CAN or ISO circuit fault; all electronic control units no response/not equipped, refer to **MODULE COMMUNICATIONS NETWORK**.
  - No response/not equipped for the PCM, refer to **MODULE COMMUNICATIONS NETWORK**.
  - System passed; retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs, and carry out self-test diagnostics for the PCM.
- If the DTCs retrieved are related to the concern, go to the **POWERTRAIN CONTROL MODULE (PCM) DIAGNOSTIC TROUBLE CODE (DTC) INDEX**.

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9. If no DTCs related to the concern are retrieved, GO to **SYMPTOM CHART**.

### Powertrain Control Module (PCM) Diagnostic Trouble Code (DTC) Index

### POWERTRAIN CONTROL MODULE (PCM) DIAGNOSTIC TROUBLE CODE (DTC) INDEX

DTC	Description	Action
P1460	WOT A/C cutout internal driver malfunction	REFER to the <b><u>DTC P1460: A/C CLUTCH RELAY (A/CCR) PRIMARY CIRCUIT MALFUNCTION (ALSO REFERRED TO AS WAC CIRCUIT)</u></b> to continue diagnosis.
P1461	A/C pressure sensor high voltage detected	REFER to the <b><u>DTC P1461: AIR CONDITIONING PRESSURE (A/CP) SENSOR HIGH VOLTAGE DETECTED</u></b> to continue diagnosis.
P1462	A/C pressure sensor low voltage detected	REFER to the <b><u>DTC P1462: AIR CONDITIONING PRESSURE (A/CP) SENSOR LOW VOLTAGE DETECTED</u></b> to continue diagnosis.
P1463	A/C pressure sensor insufficient pressure	REFER to the <b><u>DTC P1463: AIR CONDITIONING PRESSURE SENSOR (A/CP) INSUFFICIENT PRESSURE CHANGE</u></b> to continue diagnosis.
P1464	A/C demand out of self-test range	REFER to the <b><u>DTC P1464: A/C DEMAND OUT OF SELF-TEST RANGE</u></b> to continue diagnosis.
P1469	Low A/C cycling period	REFER to the <b><u>DTC P1469: LOW A/C CYCLING PERIOD</u></b> to continue diagnosis.
P1474	Low speed fan internal driver failure	REFER to the <b><u>DTC P1474: LOW FAN CONTROL (LFC)/FAN CONTROL 1 (FC1) PRIMARY CIRCUIT MALFUNCTION</u></b> to continue diagnosis.
P1479	High speed fan internal driver failure	REFER to the <b><u>DTC P1479: HIGH FAN CONTROL (HFC)/FAN CONTROL 3 (FC3) PRIMARY CIRCUIT MALFUNCTION</u></b> to continue diagnosis.

### Symptom Chart

### SYMPTOM CHART

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>Incorrect/erratic direction of airflow from outlets</li></ul>	<ul style="list-style-type: none"><li>No vacuum to the function selector switch</li><li>Function selector switch</li><li>Vacuum hose</li><li>Vacuum control motor</li><li>A/C vacuum check valve</li></ul>	<ul style="list-style-type: none"><li>GO to <b><u>PINPOINT TEST A.</u></b></li></ul>

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	<ul style="list-style-type: none"><li>• A/C vacuum reservoir tank</li><li>• Vacuum motor actuator arm</li></ul>	
<ul style="list-style-type: none"><li>• Insufficient, erratic or no heat</li></ul>	<ul style="list-style-type: none"><li>• Engine cooling system</li><li>• Heater core</li><li>• Temperature blend door</li><li>• Temperature control cable</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST B.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The air conditioning (A/C) is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Fuse</li><li>• Circuitry</li><li>• A/C clutch relay</li><li>• A/C cycling switch</li><li>• A/C system discharged/low charge</li><li>• Function selector switch</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST C.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The air conditioning (A/C) is always on</li></ul>	<ul style="list-style-type: none"><li>• Circuitry</li><li>• A/C clutch relay</li><li>• Function selector switch</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST D.</u></b></li></ul>
<ul style="list-style-type: none"><li>• Temperature control is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Temperature select switch</li><li>• Temperature control cable</li><li>• Temperature blend door</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST E.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The blower motor is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Fuse</li><li>• Circuitry</li><li>• Blower motor switch</li><li>• Blower motor resistor</li><li>• Blower motor relay</li><li>• Blower motor</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST F.</u></b></li></ul>
<ul style="list-style-type: none"><li>• No operation in high blower setting</li></ul>	<ul style="list-style-type: none"><li>• Circuitry</li><li>• Blower motor switch</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST G.</u></b></li></ul>
<ul style="list-style-type: none"><li>• No operation in lower speeds</li></ul>	<ul style="list-style-type: none"><li>• Circuitry</li><li>• Blower motor resistor</li><li>• Blower motor switch</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST H.</u></b></li></ul>

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- No operation in some blower speeds

- Circuitry
- Blower motor resistor
- Blower motor switch

- GO to **PINPOINT TEST I.**

#### Pinpoint Tests

##### Pinpoint Test A: Incorrect/Erratic Direction of Air Flow From Outlets

#### Normal Operation

The function selector switch directs vacuum to the appropriate vacuum control motor(s), controlling the door movement.

#### Possible Causes

- Vacuum hose(s) restricted or broken
- Vacuum control motor
- Airflow control door(s)
- Function selector switch
- A/C vacuum check valve
- A/C vacuum reservoir tank
- Stuck or bound linkage or blend door

#### PINPOINT TEST A: INCORRECT/ERRATIC DIRECTION OF AIR FLOW FROM OUTLETS

**NOTE:** Because of the materials used in construction of the vacuum hoses, never pinch off the vacuum hoses to locate a leak during diagnosis. A golf tee can be used as a plug when it is necessary to plug one end of a vacuum hose for leak test purposes.

#### A1 CHECK THE SYSTEM AIRFLOW

- Key in ON position.
- With the engine running, set the blower motor speed to maximum.
- Check for correct airflow in each function selector position at engine idle.
- **Is there airflow only from the defroster outlets in each function switch position?**

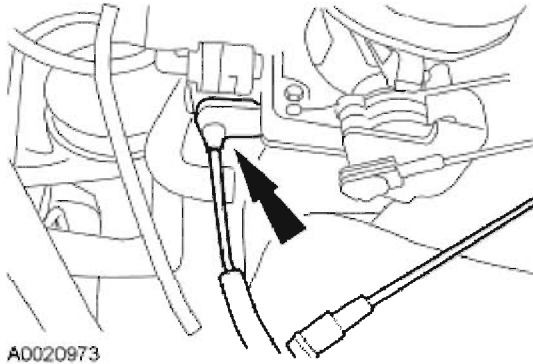
**Yes:** GO to A2.

**No:** GO to A13.

#### A2 CHECK THE VACUUM SUPPLY HOSE CONNECTIONS

- Key in OFF position.

- Check for a disconnected vacuum supply hose between the engine intake manifold and the A/C vacuum reservoir.



**Fig. 4: Checking Vacuum Supply Hose Connections**  
Courtesy of FORD MOTOR CO.

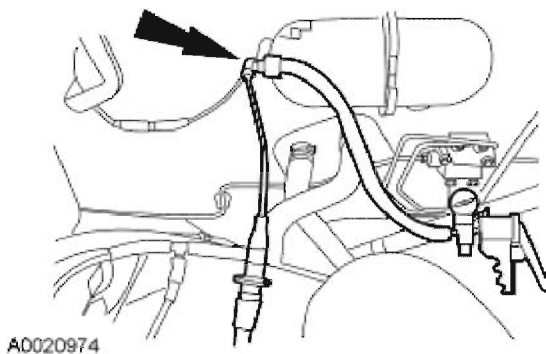
- Is the hose disconnected?

**Yes:** CONNECT the hose. TEST the system for normal operation.

**No:** GO to A3.

### **A3 CHECK THE SUPPLY HOSE FOR BLOCKAGE**

- Disconnect: Vacuum Reservoir.
- Connect a vacuum pump to the reservoir side of the supply hose and try to pull a vacuum. If the pump can pull a vacuum, the hose is plugged. If the pump pulls a partial vacuum, the hose is restricted.



**Fig. 5: Checking Supply Hose For Blockage**  
Courtesy of FORD MOTOR CO.

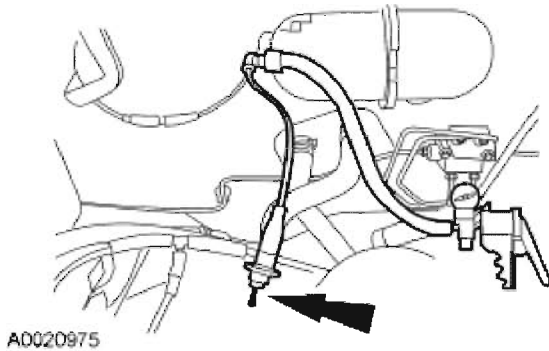
- Is the hose plugged or restricted?

**Yes:** INSTALL a new supply hose. TEST the system for normal operation.

**No:** CONNECT the vacuum hose. GO to A4.

#### **A4 LEAK CHECK THE VACUUM SUPPLY HOSE**

- Disconnect: Vacuum Supply Hose.
- Plug the intake manifold end of the supply hose and connect the vacuum pump to the reservoir side of the supply hose.



**Fig. 6: Checking Vacuum Supply Hose For Leak**  
Courtesy of FORD MOTOR CO.

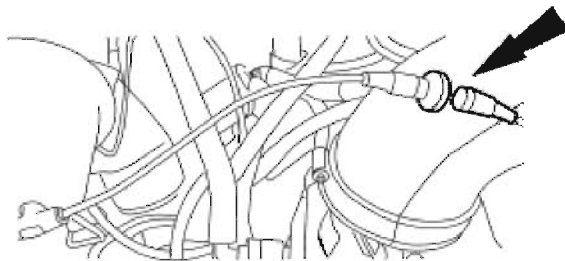
- Apply a vacuum to the hose while checking for leaks.
- **Does the hose leak?**

**Yes:** INSTALL a new vacuum hose. TEST the system for normal operation.

**No:** CONNECT the vacuum supply hose to the intake manifold. GO to A5.

#### **A5 CHECK THE VACUUM CHECK VALVE**

- START the vehicle.
- Check the A/C vacuum check valve for blockage by removing the reservoir hose from the A/C vacuum check valve. Check for vacuum.



**Fig. 7: Checking Vacuum Check Valve**  
Courtesy of FORD MOTOR CO.

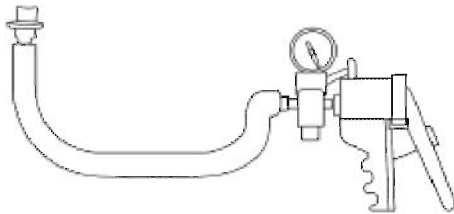
- **Is vacuum available at the check valve port?**

**Yes:** GO to A6.

**No:** INSTALL a new A/C vacuum check valve. TEST the system for normal operation.

#### **A6 LEAK TEST THE VACUUM CHECK VALVE**

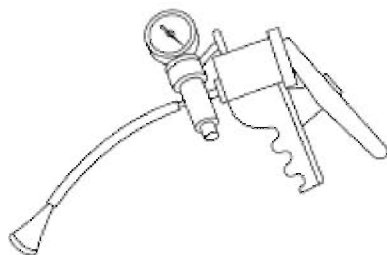
- Key in OFF position.
- Disconnect: A/C Vacuum Check Valve.
- Connect the A/C vacuum check valve to a vacuum pump.



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**Fig. 8: Testing Vacuum Check Valve Leak (1 Of 2)**  
Courtesy of FORD MOTOR CO.

- Pump 51 kPa (15 in-Hg) vacuum on the A/C vacuum check valve and observe the gauge reading.
- If the vacuum loss exceeds 3.37 kPa (1 in-Hg) per minute, remove the A/C vacuum check valve from the pump and plug the vacuum hose. Pull a vacuum with the pump to be certain that the hose and pump are not the cause of the leak.



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**Fig. 9: Testing Vacuum Check Valve Leak (2 Of 2)**  
Courtesy of FORD MOTOR CO.

- **Does the A/C vacuum check valve lose more than 3.37 kPa (1 in-Hg) of vacuum in one minute?**

**Yes:** INSTALL a new A/C vacuum check valve. TEST the system for normal

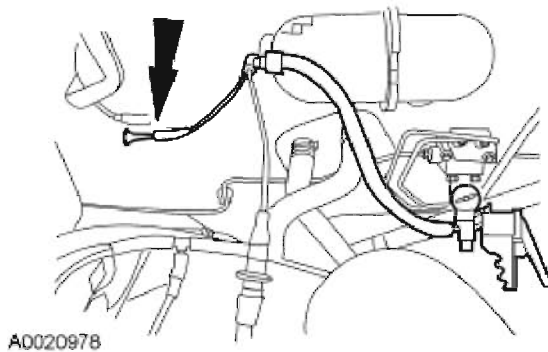


operation.

**No:** CONNECT the A/C vacuum check valve. GO to A7.

### **A7 CHECK THE VACUUM RESERVOIR**

- Disconnect: A/C Vacuum Reservoir Tank.
- Use a vacuum pump to leak test the A/C vacuum reservoir tank.



**Fig. 10: Checking Vacuum Reservoir**  
Courtesy of FORD MOTOR CO.

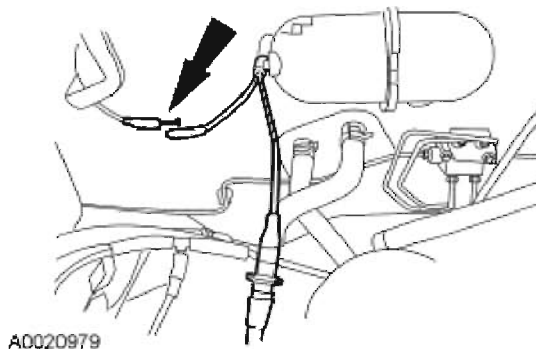
- Does the reservoir leak?

**Yes:** INSTALL a new A/C vacuum reservoir tank. TEST the system for normal operation.

**No:** GO to A8.

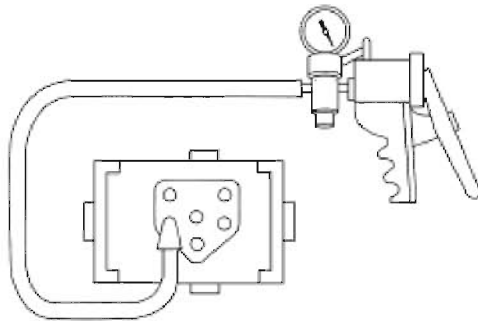
### **A8 CHECK THE VACUUM SUPPLY HOSE FOR LEAKS**

- Disconnect: Function Selector Switch Vacuum Harness.
- Plug the vacuum supply hose at the supply connection.



**Fig. 11: Checking Vacuum Supply Hose For Leaks (1 Of 2)**  
Courtesy of FORD MOTOR CO.

- Use a vacuum pump to leak test the vacuum harness supply hose.



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**Fig. 12: Checking Vacuum Supply Hose For Leaks (2 Of 2)**  
**Courtesy of FORD MOTOR CO.**

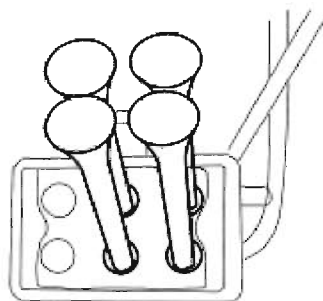
- **Does the vacuum harness supply hose leak?**

**Yes:** REPAIR or INSTALL a new vacuum harness. TEST the system for normal operation.

**No:** CONNECT the vacuum harness. GO to A9.

### **A9 CHECK THE FUNCTION SELECTOR SWITCH**

- Disconnect: In-Line Vacuum Harness.
- Disconnect: In-Line Vacuum Supply Harness.
- Plug the 4 vacuum ports in the function selector switch side of the in-line vacuum harness.



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**Fig. 13: Checking Function Selector Switch (1 Of 2)**  
**Courtesy of FORD MOTOR CO.**

- Connect a vacuum pump to the black hose of the in-line supply harness, function selector switch side.
  - At each function selector switch position, apply 51 kPa (15 in-Hg) of

vacuum and check for vacuum leakage.



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**Fig. 14: Checking Function Selector Switch (2 Of 2)**  
Courtesy of FORD MOTOR CO.

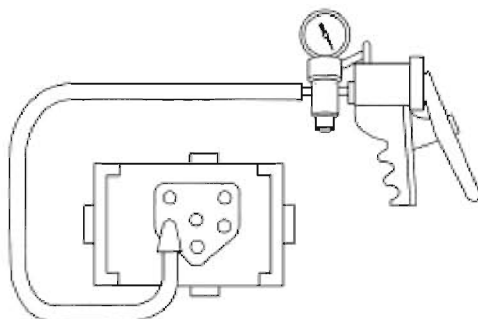
- Does the vacuum leakage exceed 3.37 kPa (1 in-Hg) per minute?

**Yes:** NOTE the function selector switch position(s) where the vacuum leaks occurred and GO to A11.

**No:** CONNECT the in-line vacuum harness connectors. GO to A10.

#### **A10 CHECK THE VACUUM SUPPLY HOSE FOR BLOCKAGE**

- Disconnect: Function Selector Switch Vacuum Harness.
- Connect a vacuum pump to the function selector switch supply hose and try to pull a vacuum. If the pump can pull a vacuum, the hose is plugged. If the pump pulls a partial vacuum, the hose is restricted.



AL0529-A

**Fig. 15: Checking Vacuum Supply Hose For Blockage**  
Courtesy of FORD MOTOR CO.

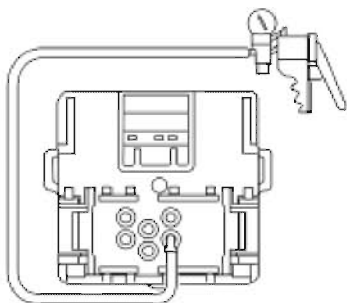
- Is the hose plugged or restricted?

**Yes:** INSTALL a new vacuum harness. TEST the system for normal operation.

**No:** CONNECT the function selector switch vacuum harness. GO to A15.

### A11 LEAK TEST THE FUNCTION SELECTOR SWITCH

- Disconnect: Function Selector Switch Vacuum Harness.
- Connect a vacuum pump to the function selector switch vacuum supply port and plug the control port that indicated a leak in Step A9.



A0020982

**Fig. 16: Testing Function Selector Switch For Leak**  
Courtesy of FORD MOTOR CO.

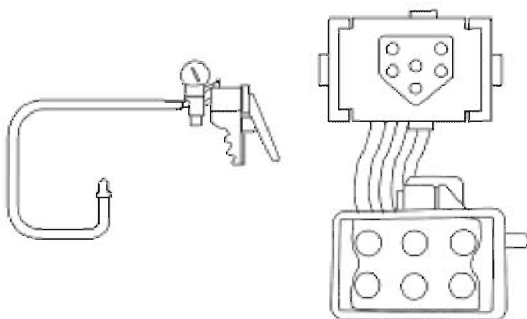
- Does the vacuum drop exceed 1.68 kPa (0.5 in-Hg) per minute?

**Yes:** INSTALL a new function selector switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to A12.

### A12 LEAK TEST THE JUMPER VACUUM HARNESS

- Plug one end of the suspect hose and attach a vacuum pump to the other end. Apply 51 kPa (15 in-Hg) of vacuum to the hose.



A0020983

**Fig. 17: Testing Jumper Vacuum Harness For Leak**  
Courtesy of FORD MOTOR CO.

- Is there vacuum leakage?

**Yes:** REPAIR or INSTALL a new vacuum jumper harness. TEST the system for

normal operation.

**No:** INSTALL a new function selector switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

### **A13 EVALUATE THE SYSTEM AIRFLOW**

- Evaluate the system airflow; refer to **PRINCIPLES OF OPERATION**, System Air Flow Description in this article.
- **Is the airflow in Step A1 correct for each function selector switch position?**

**Yes:** GO to A14.

**No:** GO to A15.

### **A14 ISOLATE THE LEAKING VACUUM CIRCUIT(S)**

- Check for correct airflow in each function selector switch position during engine acceleration.
- **Does the airflow go to the defroster outlets during acceleration in all function selector switch positions?**

**Yes:** GO to A15.

**No:** The system is OK.

### **A15 CHECK THE VACUUM HARNESS**

- Compare the vacuum hose color in each vacuum harness to the Function Selector Switch Vacuum Connector end view.
- **Does the hose color agree with the chart?**

**Yes:** GO to A16.

**No:** INSTALL a new vacuum harness. TEST the system for normal operation.

### **A16 CHECK THE A/C VACUUM CIRCUIT(S)**

- Check the A/C vacuum circuit for a pinched or kinked vacuum hose.
- **Is the hose pinched or kinked?**

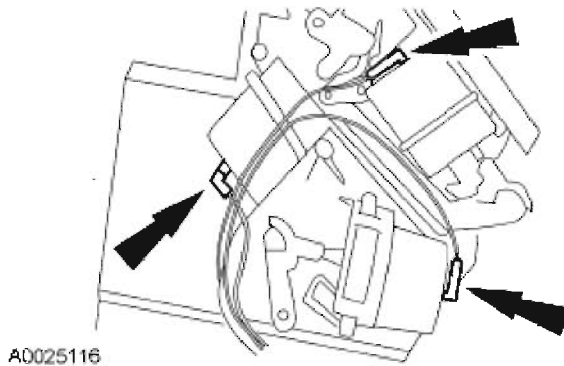
**Yes:** REPOSITION the vacuum hose. TEST the system for normal operation.

**No:** GO to A17.

### **A17 CHECK THE VACUUM CIRCUIT CONNECTIONS**

- Check each vacuum hose connection to determine if it is partially connected or

disconnected.



A0025116

**Fig. 18: Checking Vacuum Circuit Connections**  
Courtesy of FORD MOTOR CO.

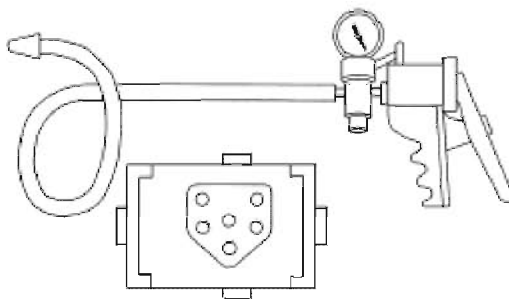
- **Is a vacuum hose disconnected or partially connected?**

**Yes:** CONNECT the hose. TEST the system for normal operation.

**No:** GO to A18.

#### **A18 CHECK THE VACUUM HOSE**

- Disconnect: Function Selector Switch Vacuum Harness.
- Disconnect the suspect hose at the respective vacuum motor.
- Plug one end of the hose and attach a vacuum pump to the other end. Check for a leak in the hose.



AL0533-A

**Fig. 19: Checking Vacuum Hose**  
Courtesy of FORD MOTOR CO.

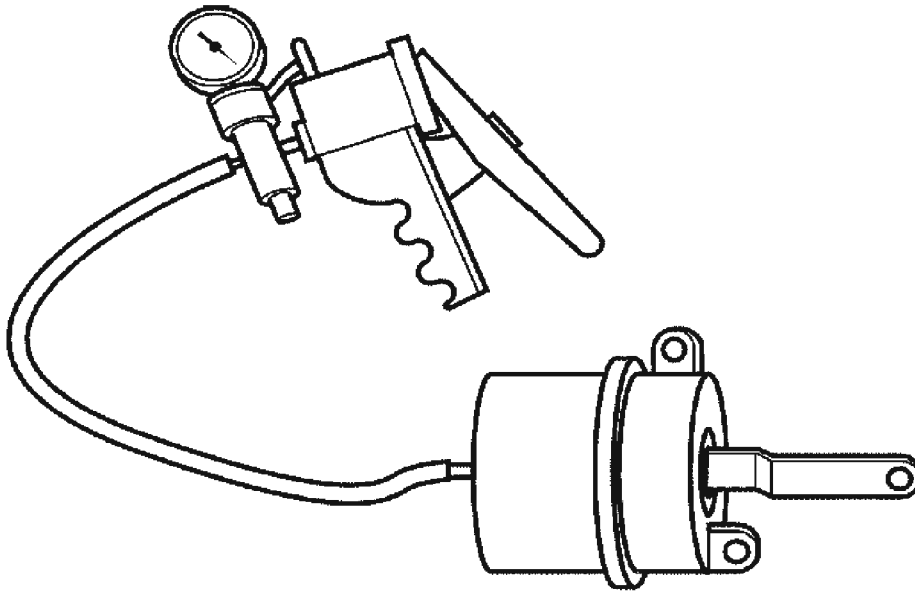
- **Does the vacuum hose leak?**

**Yes:** REPAIR or INSTALL a new hose. TEST the system for normal operation.

**No:** GO to A19.

**A19 CHECK THE VACUUM CONTROL MOTOR**

- Disconnect: Vacuum Control Motor.
- Connect a vacuum pump to the vacuum control motor. Apply 51 kPa (15 in-Hg) of vacuum.



AL0136-A

**Fig. 20: Checking Vacuum Control Motor**  
Courtesy of FORD MOTOR CO.

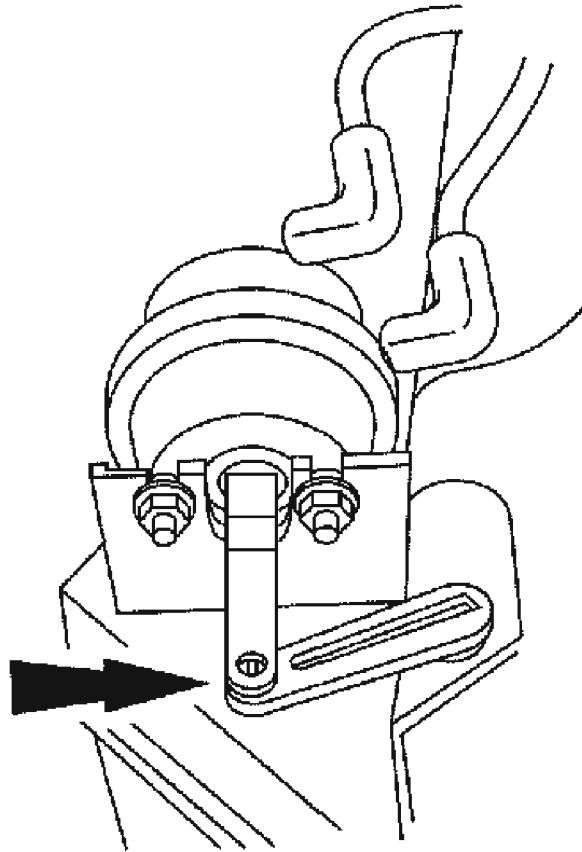
- Does the vacuum drop exceed 1.68 kPa (0.5 in-Hg) per minute?

**Yes:** INSTALL a new vacuum control motor. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to A20.

**A20 CHECK THE VACUUM CONTROL MOTOR INSTALLATION**

- Check the attachment of the vacuum control motor arm to the damper door.



AL0158-A

**Fig. 21: Locating Vacuum Control Motor Arm Attachment To Mode Door**  
Courtesy of FORD MOTOR CO.

- **Is the vacuum control motor arm attached to the door or the door crank arm?**

**Yes:** REPAIR the damper door. TEST the system for normal operation.

**No:** CONNECT the vacuum control motor arm to the door crank arm. TEST the system for normal operation.

**Pinpoint Test B: Insufficient, Erratic, or No Heat**

**Normal Operation**

Under normal operation, when heat is selected on the temperature control switch and the blower motor switch is turned on, the blower motor directs air through the heater core. The heater core is filled with heated engine coolant.



**Possible Causes**

- Engine cooling system
- Temperature control switch
- Temperature control cable

**PINPOINT TEST B: INSUFFICIENT, ERRATIC, OR NO HEAT****B1 CHECK FOR CORRECT ENGINE COOLANT LEVEL**

- Key in OFF position.
- Check the engine coolant level when the engine is hot and cold.
- **Is the engine coolant at the correct level (hot/cold) in the radiator coolant recovery reservoir?**

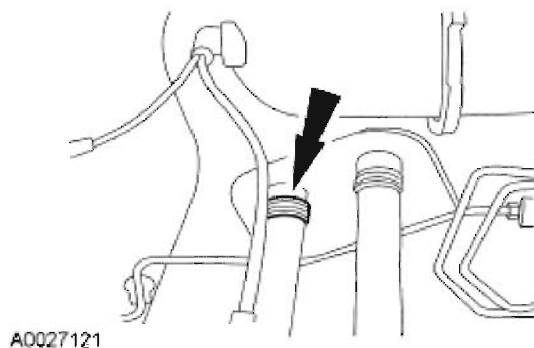
**Yes:** GO to B2.

**No:** GO to B3.

**B2 CHECK FOR HOT WATER TO THE HEATER CORE INLET HOSE**

**WARNING:** The heater core hoses will become too hot to handle and may cause serious burns if the system is working correctly.

- Key in ON position.
- With the engine running, allow the engine to reach a normal operating temperature.
- Feel the heater core inlet hose.



**Fig. 22: Checking For Hot Water To Heater Core Inlet Hose**  
Courtesy of FORD MOTOR CO.

- **Is the heater core inlet hose too hot to handle?**

**Yes:** GO to B4

**No:** REFER to ENGINE COOLING .

### **B3 CHECK THE COOLANT SYSTEM INCLUDING THE RADIATOR CAP FOR LEAKS**

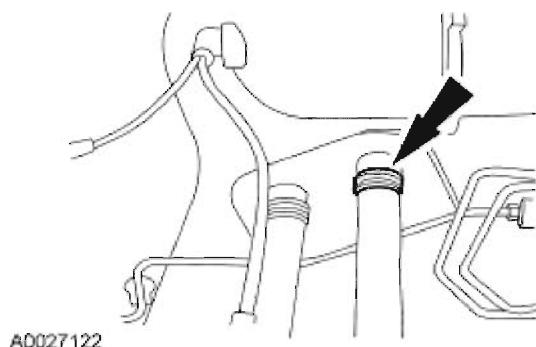
- Fill the engine cooling system to the specified level.
- Pressure check the engine cooling system; refer to ENGINE COOLING . It is not necessary to check components separately at this time.
- **Does the engine cooling system, including the radiator cap, hold pressure?**

**Yes:** GO to B4.

**No:** PRESSURE TEST the heater core. REFER to the COMPONENT TESTS. REPAIR as necessary.

### **B4 CHECK THE HEATER CORE OUTLET HOSE FOR HOT WATER**

- Key in ON position.
- With the engine running, allow the engine to reach a normal operating temperature.
- Feel the heater core outlet hose.



**Fig. 23: Checking Heater Core Outlet Hose For Hot Water**  
Courtesy of FORD MOTOR CO.

- **Is the heater core outlet hose warm or hot?**

**Yes:** GO to PINPOINT TEST E.

**No:** TEST the heater core for a plugged or partially plugged condition. REFER to the COMPONENT TESTS.

**Pinpoint Test C: The Air Conditioning (A/C) is Inoperative**

Refer to AIR CONDITIONING - ESCAPE or AIR CONDITIONING - MARINER for schematic and connector information.

**Normal Operation**

Under normal operation, the A/C system is activated when the function selector switch is in the NORMAL A/C, MAX A/C, FLOOR/DEFROST or DEFROST modes. The PCM controls the cycling of the A/C compressor clutch.

**Possible Causes**

- Fuse
- Circuit 57 (BK) open
- Circuit 198 (DG/OG) open or short to ground
- Circuit 321 (GY/WH) open
- Circuit 331 (PK/YE) open
- Circuit 347 (BK/YE) open or short to power
- Circuit 348 (VT) open or short to ground
- Circuit 361 (RD) open
- Circuit 441 (RD/YE) open or short to ground
- Circuit 570 (BK/WH) open
- Circuit 883 (PK/LB) open
- A/C cycling switch
- Dual pressure switch
- A/C clutch solenoid
- A/C compressor clutch
- A/C clutch relay
- PCM
- Function selector switch

**PINPOINT TEST C: THE AIR CONDITIONING (A/C) IS INOPERATIVE****C1 CHECK THE A/C CYCLING SWITCH PID WITH THE A/C ON**

- Connect the scan tool.
- Key in ON position.
- With the engine running, turn the function selector switch to the MAX A/C position.
- Enter the following diagnostic mode on the scan tool: PCM PIDs.
- Monitor the PCM A/C cycling switch PID.
- **Does the PCM A/C cycling switch PID read ON?**

**Yes:** GO to C3.

**No:** GO to C2.

## **C2 CHECK THE REFRIGERANT PRESSURE**

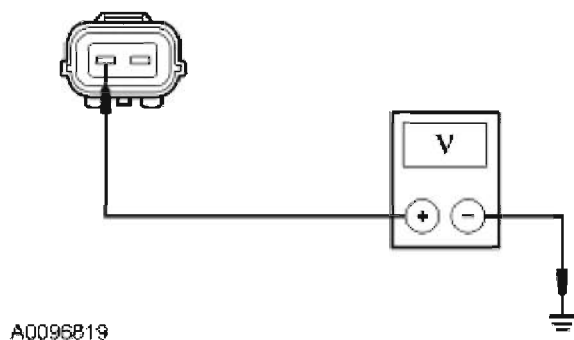
- Key in OFF position.
- Connect the manifold set to the service ports.
- **Is the pressure 345-1,724 kPa (50-250 psi)?**

**Yes:** GO to C9.

**No:** CHECK the system for refrigerant leaks. Refer to **ELECTRONIC LEAK DETECTION** or **FLUORESCENT DYE LEAK DETECTION**.

## **C3 CHECK CIRCUIT 321 (GY/WH) FOR POWER**

- Disconnect: A/C Clutch Field Coil C100.
- Key in ON position.
- Turn the function selector switch to MAX A/C position.
- Measure the voltage between A/C clutch field coil C100-a, circuit 321 (GY/WH), harness side and ground.



**Fig. 24: Checking Circuit 321 (GY/WH) For Power**  
Courtesy of FORD MOTOR CO.

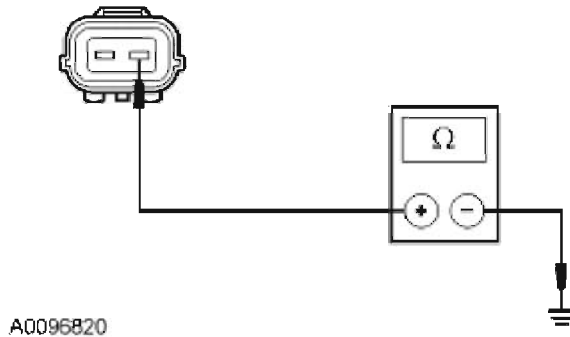
- **Is the voltage greater than 10 volts?**

**Yes:** GO to C4.

**No:** GO to C5.

## **C4 CHECK CIRCUIT 57 (BK) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between A/C clutch field coil C100-b, circuit 57 (BK), harness side and ground.



**Fig. 25: Checking Circuit 57 (BK) For An Open**  
Courtesy of FORD MOTOR CO.

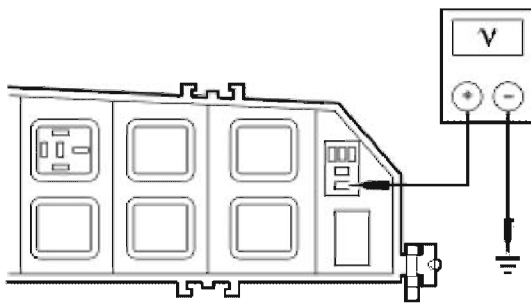
- Is the resistance less than 5 ohms?

**Yes:** INSTALL a new A/C clutch field coil. REFER to **INSTALLATION** .

**No:** REPAIR the circuit. TEST the system for normal operation.

### C5 CHECK CIRCUIT 883 (PK/LB) FOR POWER

- Key in OFF position.
- Disconnect: A/C Clutch Relay C1008.
- Measure the voltage between A/C clutch relay C1008-3, circuit 883 (PK/LB), harness side and ground.



**Fig. 26: Checking Circuit 883 (PK/LB) For Power**  
Courtesy of FORD MOTOR CO.

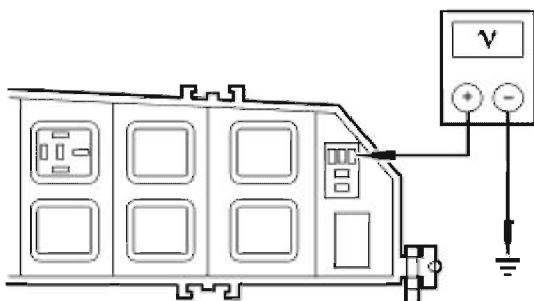
- Is the voltage greater than 10 volts?

**Yes:** GO to C6.

**No:** INSPECT battery junction box (BJB) fuse 14 (15A) for an open. If OK, REPAIR the circuit. TEST the system for normal operation.

### C6 CHECK CIRCUIT 361 (RD) FOR POWER

- Key in ON position.
- Measure the voltage between A/C clutch relay C1008-1, circuit 361 (RD), harness side and ground.



**Fig. 27: Checking Circuit 361 (RD) For Power**  
Courtesy of FORD MOTOR CO.

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

**Yes:** GO to C7.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### **C7 CHECK THE A/C COMPRESSOR CLUTCH RELAY**

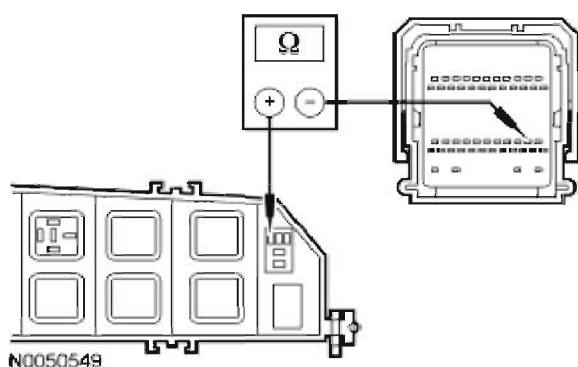
- Carry out the A/C clutch relay component test. Refer to **COMPONENT TESTING** for component testing.
- **Is the relay OK?**

**Yes:** GO to C8.

**No:** INSTALL a new A/C clutch relay. TEST the system for normal operation.

#### **C8 CHECK CIRCUIT 331 (PK/YE) FOR AN OPEN**

- Key in OFF position.
- Disconnect: PCM C175b.
- Measure the resistance between A/C clutch relay C1008-2, circuit 331 (PK/YE), harness side and PCM C175b-25, circuit 331 (PK/YE), harness side.



**Fig. 28: Checking Circuit 331 (PK/YE) For Open**  
Courtesy of FORD MOTOR CO.

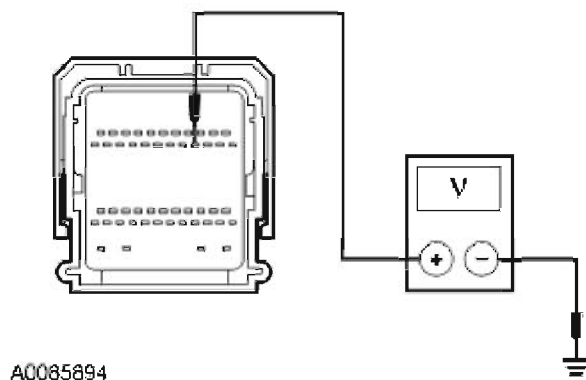
- Is the resistance less than 5 ohms?

**Yes:** GO to C18.

**No:** REPAIR the circuit. TEST the system for normal operation.

### C9 CHECK CIRCUIT 198 (DG/OG) FOR POWER

- Disconnect: PCM C175b.
- Key in ON position.
- TURN the function selector switch to the MAX A/C position.
- Measure the voltage between PCM C175b-15, circuit 198 (DG/OG), harness side and ground.



**Fig. 29: Checking Circuit 198 (DG/OG) For Power**  
Courtesy of FORD MOTOR CO.

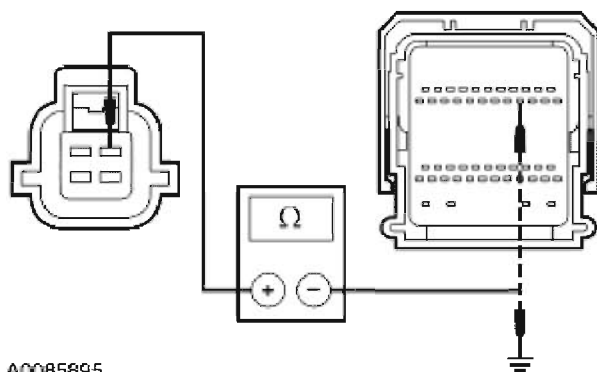
- Is the voltage greater than 10 volts?

**Yes:** GO to C12.

**No:** GO to C10.

**C10 CHECK CIRCUIT 198 (DG/OG) FOR AN OPEN OR A SHORT TO GROUND**

- Key in OFF position.
- Disconnect: Dual Pressure Switch C1062.
- Measure the resistance between dual pressure switch C1062-1, circuit 198 (DG/OG), harness side and PCM C175-15, circuit 198 (DG/OG), harness side; and between dual pressure switch C1062-1 circuit 198 (DG/OG), harness side and ground.



**Fig. 30: Checking Circuit 198 (DG/OG) For Open Or Short To Ground**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms between the components, and greater than 10,000 ohms to ground?

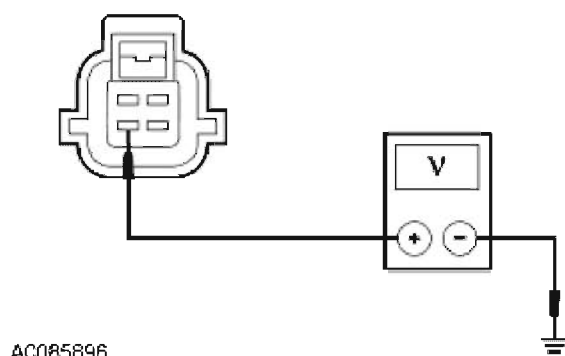
**Yes:** GO to C11.

**No:** REPAIR the circuit. TEST the system for normal operation.

**C11 CHECK CIRCUIT 441 (RD/YE) FOR POWER**

- Key in ON position.
- TURN the function selector switch to the MAX A/C position.
- Measure the voltage between dual pressure switch C1062-4, circuit 441 (RD/YE), harness side and ground.





**Fig. 31: Checking Circuit 441 (RD/YE) For Power**  
Courtesy of FORD MOTOR CO.

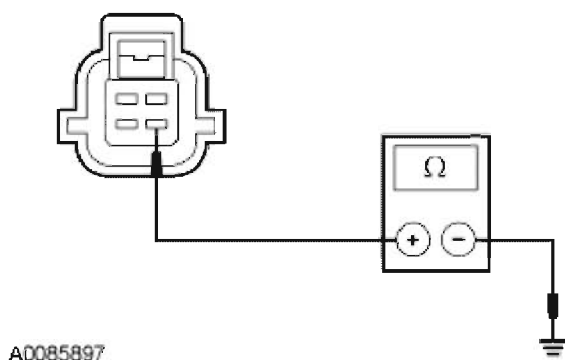
- Is the voltage greater than 10 volts?

**Yes:** INSTALL a new dual pressure switch. REFER to CLIMATE CONTROL .  
TEST the system for normal operation.

**No:** GO to C14.

#### **C12 CHECK CIRCUIT 570 (BK/WH) FOR AN OPEN**

- Key in OFF position.
- Disconnect: Dual Pressure Switch C1062.
- Measure the resistance between dual pressure switch C1062-3, circuit 570 (BK/WH), harness side and ground.



**Fig. 32: Checking Circuit 570 (BK/WH) For Open**  
Courtesy of FORD MOTOR CO.

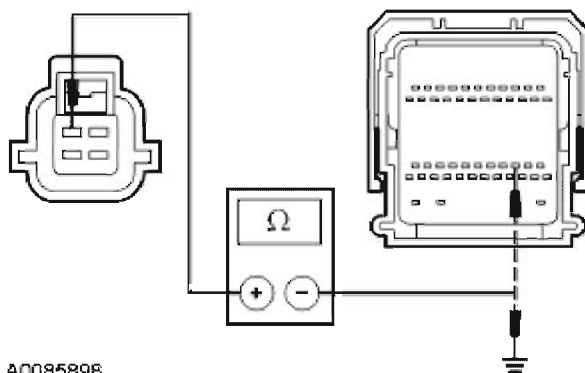
- Is the resistance less than 5 ohms?

**Yes:** GO to C13.

**No:** REPAIR the circuit. TEST the system for normal operation.

### C13 CHECK CIRCUIT 347 (BK/YE) FOR AN OPEN OR A SHORT TO GROUND

- Measure the resistance between dual pressure switch C1062-2, circuit 347 (BK/YE), harness side and PCM C175b-26, circuit 347 (BK/YE), harness side; and between dual pressure switch C1062-2 circuit 347 (BK/YE), harness side and ground.



A0085896

**Fig. 33: Checking Circuit 347 (BK/YE) For Open Or Short To Ground**  
Courtesy of FORD MOTOR CO.

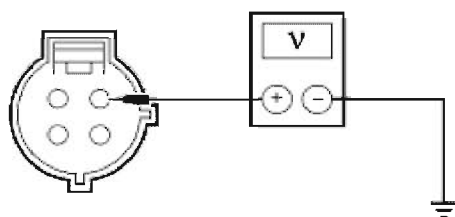
- Is the resistance less than 5 ohms between the components, and greater than 10,000 ohms to ground?

**Yes:** GO to C14.

**No:** REPAIR the circuit. TEST the system for normal operation.

### C14 CHECK CIRCUIT 348 (VT) FOR POWER

- Key in OFF position.
- Disconnect: A/C Cycling Switch C130.
- Key in ON position.
- Measure the voltage between A/C cycling switch C130-1, circuit 348 (VT), harness side and ground.



A0013801

**Fig. 34: Checking Circuit 348 (VT) For Power**

Courtesy of FORD MOTOR CO.

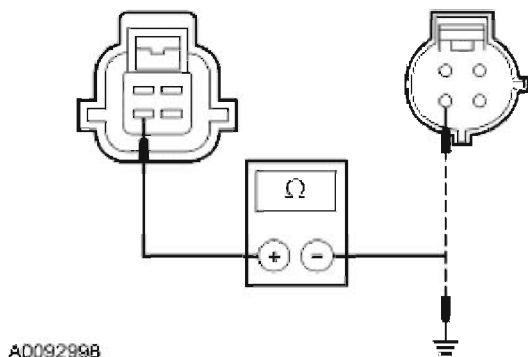
- Is the voltage greater than 10 volts?

**Yes:** GO to C15.

**No:** GO to C16.

### C15 CHECK CIRCUIT 441 (RD/YE) FOR AN OPEN OR A SHORT TO GROUND

- Key in OFF position.
- Measure the resistance between dual pressure switch C1062-4, circuit 441 (RD/YE), harness side and the A/C cycling switch C130-4, circuit 441 (RD/YE), harness side; and between dual pressure switch C1062-4 circuit 441 (RD/YE), harness side and ground.



**Fig. 35: Checking Circuit 441 (RD/YE) For Open Or Short To Ground**  
Courtesy of FORD MOTOR CO.

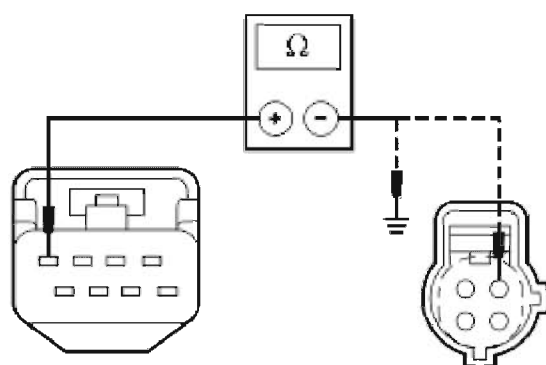
- Is the resistance less than 5 ohms between the components, and greater than 10,000 ohms to ground?

**Yes:** INSTALL a new A/C cycling switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** REPAIR the circuit. TEST the system for normal operation.

### C16 CHECK CIRCUIT 348 (VT) FOR AN OPEN OR A SHORT TO GROUND

- Key in OFF position.
- Measure the resistance between function selector switch C294a-4, circuit 348 (VT), harness side and A/C cycling switch C130-1, circuit 348 (VT), harness side; and between function selector switch C294a-4 circuit 348 (VT), harness side and ground.



A0085901

**Fig. 36: Checking Circuit 348 (VT) For Open Or Short To Ground**  
 Courtesy of FORD MOTOR CO.

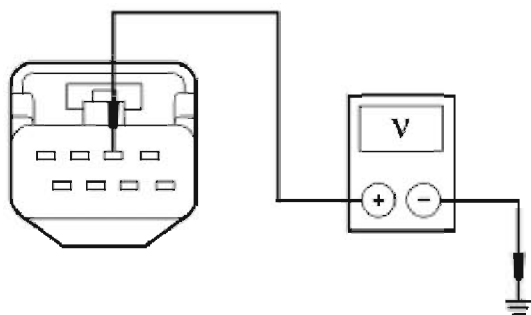
- Is the resistance less than 5 ohms between the components, and greater than 10,000 ohms to ground?

**Yes:** GO to C17.

**No:** REPAIR the circuit. TEST the system for normal operation.

### C17 CHECK FOR POWER TO THE FUNCTION SELECTOR SWITCH

- Key in OFF position.
- Disconnect: Function Selector Switch C294a.
- Key in ON position.
- Measure the voltage between function selector switch C294a-2, circuit 41 (BK/LB), harness side and ground.



A0085902

**Fig. 37: Checking For Power To Function Selector Switch**  
 Courtesy of FORD MOTOR CO.

- Is the voltage greater than 10 volts?

**Yes:** INSTALL a new function selector switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** INSPECT smart junction box (SJB) fuse 26 (5A) for an open. If OK, REPAIR the circuit. TEST the system for normal operation.

### **C18 CHECK FOR CORRECT PCM OPERATION**

- Disconnect all PCM connectors.
- Check for:
  - corrosion.
  - pushed-out pins.
- Connect all PCM connectors and make sure they seat correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

**Yes:** INSTALL a new PCM. REFER to INSTALLATION or INSTALLATION . TEST the system for normal operation.

**No:** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

#### **Pinpoint Test D: The Air Conditioner (A/C) is Always On**

Refer to AIR CONDITIONING - ESCAPE or AIR CONDITIONING - MARINER for schematic and connector information.

#### **Normal Operation**

Under normal operation, the A/C system is activated when the function selector switch is in the NORMAL A/C, MAX A/C, FLOOR/DEFROST or DEFROST modes. The PCM controls the cycling of the A/C compressor clutch.

#### **Possible Causes**

- Circuit 198 (DG/OG) short to power
- Circuit 321 (GY/WH) short to power
- Circuit 331 (PK/YE) short to ground
- Circuit 348 (VT) short to power
- Circuit 441 (RD/YE) short to power
- A/C clutch relay
- A/C compressor clutch
- Function selector switch
- PCM

#### **PINPOINT TEST D: THE AIR CONDITIONER (A/C) IS ALWAYS ON**

**D1 RETRIEVE AND RECORD THE DTCS FROM THE CONTINUOUS AND ON DEMAND SELF-TEST-PCM**

- Connect the scan tool.
- Make sure the function selector switch is in the OFF position.
- Key in ON position.
- Enter the following diagnostic mode on the scan tool: PCM Self-Test.
- Retrieve and document the continuous DTCs.
- **Is DTC P1464 retrieved?**

**Yes:** GO to D2.

**No:** GO to D7.

**D2 CHECK THE A/C CYCLING SWITCH PID WITH THE A/C OFF**

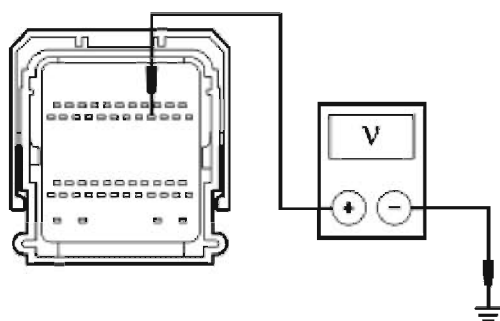
- Enter the following diagnostic mode on the scan tool: PCM PIDs.
- Turn the function selector switch to the OFF position.
- Monitor the PCM A/C cycling switch PID.
- **Does the PCM A/C cycling switch PID read ON?**

**Yes:** GO to D3.

**No:** GO to D7.

**D3 CHECK FOR A FALSE INPUT SIGNAL TO THE PCM**

- Key in OFF position.
- Disconnect: PCM C175b.
- Key in ON position.
- Turn the function selector switch to the OFF position.
- Measure the voltage between PCM C175b-15, circuit 198 (DG/OG), harness side and ground.



A0085903

**Fig. 38: Checking For False Input Signal To PCM**

**Courtesy of FORD MOTOR CO.**

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

**Yes:** GO to D4.

**No:** GO to D6.

#### **D4 CHECK THE FUNCTION SELECTOR SWITCH FOR A SHORT TO POWER**

- Key in OFF position.
- Disconnect: Function Selector Switch C294a.
- Key in ON position.
- Enter the following diagnostic mode on the scan tool: PCM PIDs.
- **Does the PCM A/C cycling switch PID read ON?**

**Yes:** GO to D5.

**No:** INSTALL a new function selector switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

#### **D5 CHECK CIRCUIT 348 (VT) FOR A SHORT TO POWER**

- Key in OFF position.
- Disconnect: A/C Cycling Switch C130.
- Key in ON position.
- Enter the following diagnostic mode on the scan tool: PCM PIDs.
- **Does the PCM A/C cycling switch PID read ON?**

**Yes:** GO to D6.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### **D6 CHECK CIRCUIT 198 (DG/OG) FOR A SHORT TO POWER**

- Key in OFF position.
- Disconnect: Dual Pressure Switch C1062.
- Key in ON position.
- Enter the following diagnostic mode on the scan tool: PCM PIDs.
- **Does the PCM A/C cycling switch PID read ON?**

**Yes:** REPAIR circuit 198 (DG/OG). TEST the system for normal operation.

**No:** REPAIR circuit 441 (RD/YE). TEST the system for normal operation.

**D7 CHECK FOR A SHORTED A/C CLUTCH RELAY**

- Disconnect: A/C Clutch Relay C1008.
- Start the vehicle.
- Observe the A/C compressor.
- **Is the A/C compressor clutch engaged?**

**Yes:** CONNECT the A/C relay. GO to D11.

**No:** GO to D8.

**D8 CHECK A/C CLUTCH RELAY**

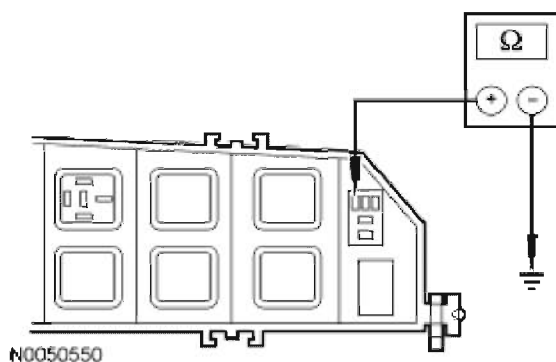
- Carry out the A/C clutch relay component test. Refer to **COMPONENT TESTING** for component testing.
- **Is the A/C clutch relay OK?**

**Yes:** GO to D9.

**No:** INSTALL a new A/C clutch relay. TEST the system for normal operation.

**D9 CHECK CIRCUIT 331 (PK/YE) FOR A SHORT TO GROUND**

- Key in OFF position.
- Disconnect: PCM C175b.
- Measure the resistance between A/C clutch relay C1008-2, circuit 331 (PK/YE), harness side and ground.



**Fig. 39: Checking Circuit 331 (PK/YE) For Short To Ground**  
Courtesy of FORD MOTOR CO.

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

**Yes:** REPAIR the circuit. TEST the system for normal operation.

**No:** GO to D10.



**D10 CHECK FOR CORRECT PCM OPERATION**

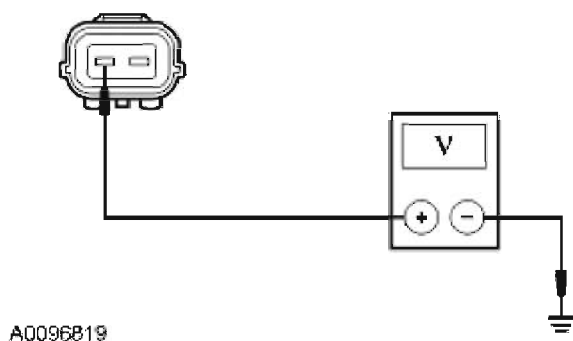
- Disconnect all PCM connectors.
- Check for:
  - corrosion.
  - pushed-out pins.
- Connect all PCM connectors and make sure they seat correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

**Yes:** INSTALL a new PCM. REFER to **INSTALLATION - 2.3L** or **INSTALLATION - 3.0L** . TEST the system for normal operation.

**No:** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

**D11 CHECK CIRCUIT 321 (GY/WH) FOR A SHORT TO POWER**

- Key in OFF position.
- Disconnect: A/C Clutch Field Coil C100.
- Key in ON position.
- Measure the voltage between A/C clutch field coil CJ100-1, circuit 321 (GY/WH), harness side and ground.



**Fig. 40: Checking Circuit 321 (GY/WH) For Short To Power**  
Courtesy of FORD MOTOR CO.

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

**Yes:** REPAIR the circuit. TEST the system for normal operation.

**No:** CHECK the clutch air gap. REFER to **AIR CONDITIONING (A/C) CLUTCH AIR GAP ADJUSTMENT**.

**Normal Operation**

Under normal operation, the temperature control switch actuates the temperature blend door through the temperature blend door actuator cable.

**Possible Causes**

- Temperature control switch
- Temperature blend door actuator cable
- Heater core
- Stuck or bound temperature blend door

**PINPOINT TEST E: TEMPERATURE CONTROL IS INOPERATIVE****E1 CHECK THE HEATER TEMPERATURE CABLE SYSTEM**

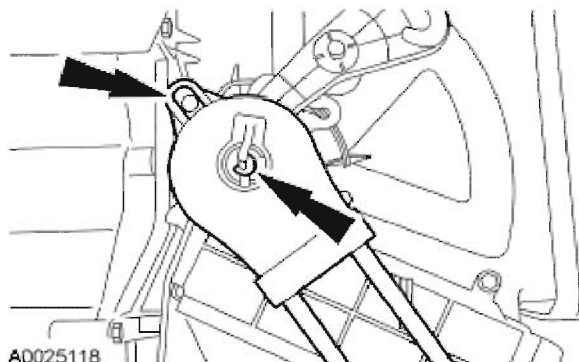
- Key in ON position.
- Allow the engine to reach a normal operating temperature.
- Set the function selector switch to the MAX A/C position. Adjust the temperature control switch to full COOL (left) and check for cool air discharge.
- Adjust the temperature control switch to full WARM (right) and check for warm air discharge.
- Vary the temperature control switch from full WARM to full COOL.
- **Did the air temperature change?**

**Yes:** The system is fully functional.

**No:** GO to E2.

**E2 CHECK FOR A DISCONNECTED TEMPERATURE BLEND DOOR ACTUATOR CONTROL**

- Inspect the temperature blend door actuator control cable installation on the heater core housing. Verify that it is in mid-position, fully seated on the shaft and correctly located on the housing. Refer to CLIMATE CONTROL .



**Fig. 41: Checking For Disconnected Temperature Blend Door Actuator Control**

Courtesy of FORD MOTOR CO.

- Is the temperature blend door actuator control cable fully seated on the shaft, in the mid-position and correctly located on the housing?

**Yes:** GO to E3.

**No:** CONNECT the temperature blend door actuator control cable correctly. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**E3 CHECK THE TEMPERATURE BLEND DOOR ACTUATOR CONTROL CABLE OPERATION**

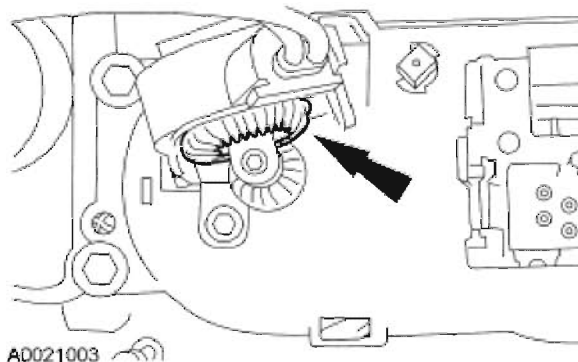
- Rotate the temperature control switch from full WARM to full COOL while observing the heater temperature cable.
- Is there corresponding movement from full warm to full cold between the temperature control switch and the heater temperature cable at the heater core housing?

**Yes:** INSTALL a new heater core housing due to a damaged air temperature blend door. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to E4.

**E4 CHECK THE TEMPERATURE CONTROL OPERATION**

- Inspect the temperature blend door actuator control cable installation on the temperature control switch.



**Fig. 42: Checking Temperature Control Operation**  
Courtesy of FORD MOTOR CO.

- Is the temperature blend door actuator control cable connected?

**Yes:** GO to E5.

**No:** CONNECT the temperature blend door actuator control cable. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

### **E5 CHECK THE TEMPERATURE CONTROL SWITCH**

- Rotate the temperature control switch from full WARM to full COOL while observing the heater temperature cable.
- **Is there corresponding movement from full warm to full cold between the temperature control switch and the heater temperature cable at the temperature control switch?**

**Yes:** INSTALL a new heater temperature cable. REFER to **CLIMATE CONTROL** . TEST the system for normal operation.

**No:** INSTALL a new temperature control switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

#### **Pinpoint Test F: The Blower Motor is Inoperative**

Refer to **AIR CONDITIONING - ESCAPE** or **AIR CONDITIONING - MARINER** for schematic and connector information.

#### **Normal Operation**

When the function selector switch is placed in any position except OFF, the blower motor will operate at the desired speed according to the position of the blower motor switch.

#### **Possible Causes**

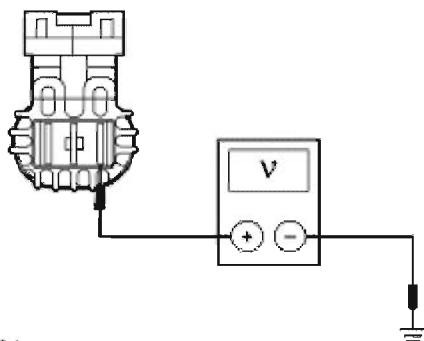
- Circuit 41 (BK/LB) open
- Circuit 57 (BK) open
- Circuit 87 (TN/YE) open
- Circuit 261 (OG/BK) open
- Circuit 399 (BN/YE) open or short to ground
- Blower motor switch
- Blower motor
- Blower motor relay
- Function selector switch

#### **PINPOINT TEST F: THE BLOWER MOTOR IS INOPERATIVE**

### **F1 CHECK CIRCUIT 87 (TN/YE) FOR POWER**

- Key in OFF position.

- Disconnect: Blower Motor C2066.
- Key in ON position.
- Position the function selector switch in any position except OFF.
- Measure the voltage between blower motor C2066-1, circuit 87 (TN/YE), harness side and ground.



A0021004

**Fig. 43: Checking Circuit 87 (TN/YE) For Power**  
Courtesy of FORD MOTOR CO.

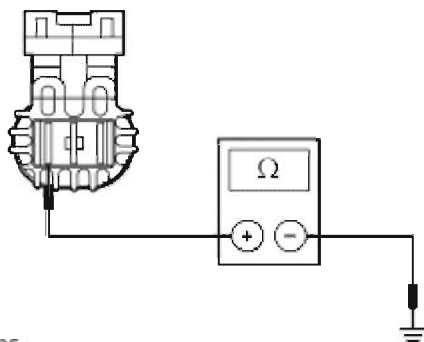
- Is the voltage greater than 10 volts?

**Yes:** GO to F2.

**No:** GO to F3.

## **F2 CHECK CIRCUIT 261 (OG/BK) FOR AN OPEN**

- Key in OFF position.
- Position the blower motor switch on high.
- Measure the resistance between blower motor 22066-2, circuit 261 (OG/BK), harness side and ground.



A0021005

**Fig. 44: Checking Circuit 261 (OG/BK) For Open**  
Courtesy of FORD MOTOR CO.

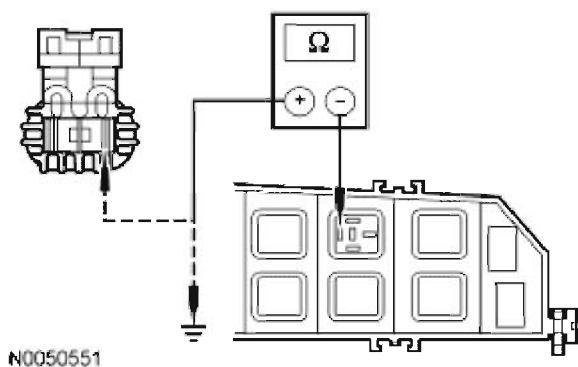
- Is the resistance less than 5 ohms?

**Yes:** INSTALL a new blower motor. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to F9.

### F3 CHECK CIRCUIT 87 (TN/YE) FOR AN OPEN

- Key in OFF position.
- Disconnect: Blower Motor Relay C2017.
- Measure the resistance between blower motor relay C2017-87, circuit 87 (TN/YE), harness side and blower motor C2066-1, circuit 87 (TN/YE), harness side; and between blower motor relay C2017-87, circuit 87 (TN/YE), harness side and ground.



**Fig. 45: Checking Circuit 87 (TN/YE) For Open**  
Courtesy of FORD MOTOR CO.

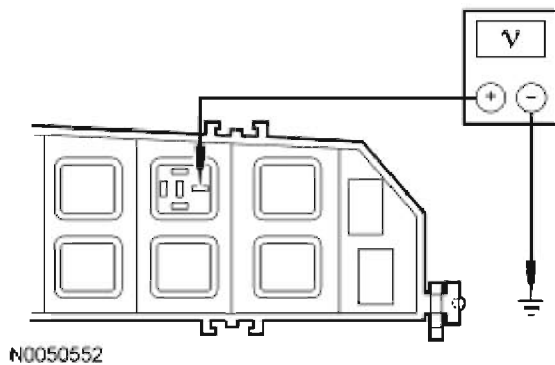
- Is the resistance less than 5 ohms between the blower motor relay and the blower motor, and greater than 10,000 ohms to ground?

**Yes:** GO to F4.

**No:** REPAIR the circuit. TEST the system for normal operation.

### F4 CHECK FOR VOLTAGE TO THE BLOWER MOTOR RELAY

- Key in OFF position.
- Measure the voltage between blower motor relay C2017-30, circuit 364 (BK/LG), harness side and ground.



**Fig. 46: Checking For Voltage To Blower Motor Relay**  
Courtesy of FORD MOTOR CO.

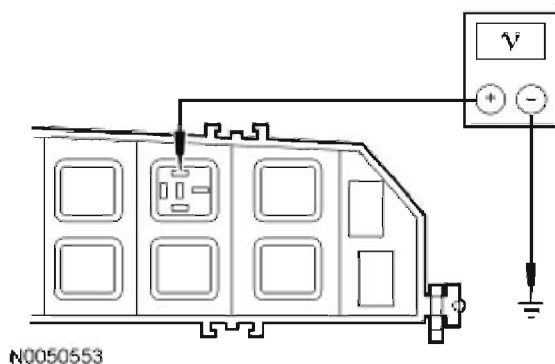
- Is the voltage greater than 10 volts?

**Yes:** GO to F5.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### **F5 CHECK CIRCUIT 399 (BN/YE) FOR VOLTAGE**

- Key in ON position.
- Position the function selector switch in any position except OFF.
- Measure the voltage between blower motor relay C2017-86, circuit 399 (BN/YE), harness side and ground.



**Fig. 47: Checking Circuit 399 (BN/YE) For Voltage**  
Courtesy of FORD MOTOR CO.

- Is the voltage greater than 10 volts?

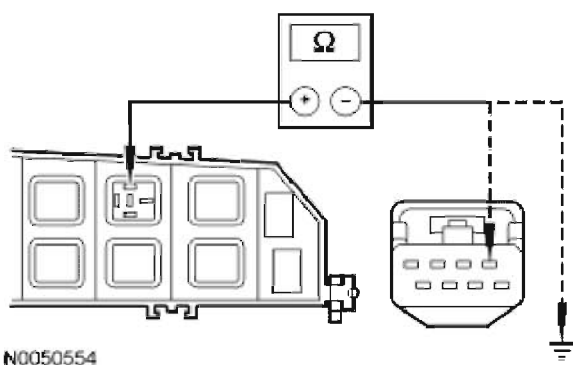
**Yes:** GO to F8.

**No:** GO to F6.

#### **F6 CHECK CIRCUIT 399 (BN/YE) FOR AN OPEN OR A SHORT TO**

**GROUND**

- Key in OFF position.
- Disconnect: Function Selector Switch C294a.
- Measure the resistance between blower motor relay C2017-86, circuit 399 (BN/YE), harness side and function selector switch C294a-1, circuit 399 (BN/YE), harness side; and between blower motor relay C2017-86, circuit 399 (BN/YE), harness side and ground.



**Fig. 48: Checking Circuit 399 (BN/YE) For Open Or Short To Ground**  
Courtesy of FORD MOTOR CO.

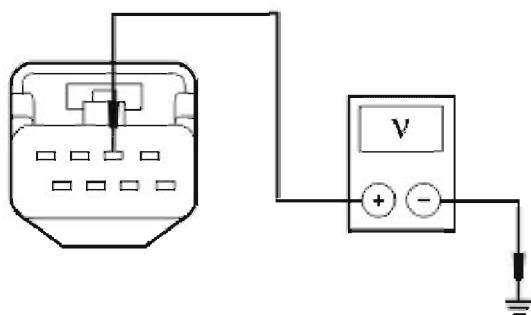
- Is the resistance less than 5 ohms between the components; and greater than 10,000 ohms between the blower motor relay and ground?

**Yes:** GO to F7.

**No:** REPAIR the circuit. TEST the system for normal operation.

**F7 CHECK CIRCUIT 41 (BK/LB) FOR AN OPEN**

- Key in ON position.
- Measure the voltage between function selector switch C294a-2, circuit 41 (BK/LB), harness side and ground.



**Fig. 49: Checking Circuit 41 (BK/LB) For Open**



**Courtesy of FORD MOTOR CO.**

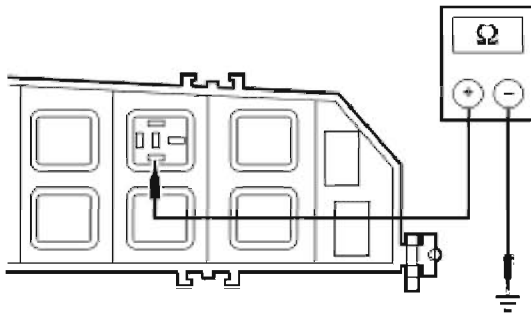
- Is the voltage greater than 10 volts?

**Yes:** INSTALL a new function selector switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** INSPECT smart junction box (SJB) fuse 26 (5A) for an open. If OK, REPAIR the circuit. TEST the system for normal operation.

**F8 CHECK CIRCUIT 57 (BK) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between blower motor relay C2017-85, circuit 57 (BK), harness side and ground.



**Fig. 50: Checking Circuit 57 (BK) For Open**  
Courtesy of FORD MOTOR CO.

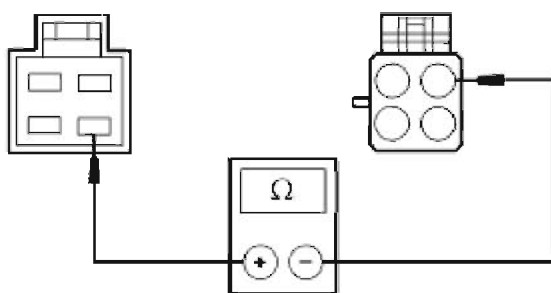
- Is the resistance less than 5 ohms?

**Yes:** INSTALL a new blower motor relay. TEST the system for normal operation.

**No:** REPAIR the circuit. TEST the system for normal operation.

**F9 CHECK CIRCUIT 261 (OG/BK) FOR AN OPEN**

- Key in OFF position.
- Disconnect: Blower Motor Switch C294b.
- Measure the resistance between blower motor resistor C293-4, circuit 261 (OG/BK), harness side and blower motor switch C294b-a, circuit 261 (OG/BK), harness side.



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**Fig. 51: Checking Circuit 261 (OG/BK) For Open**  
Courtesy of FORD MOTOR CO.

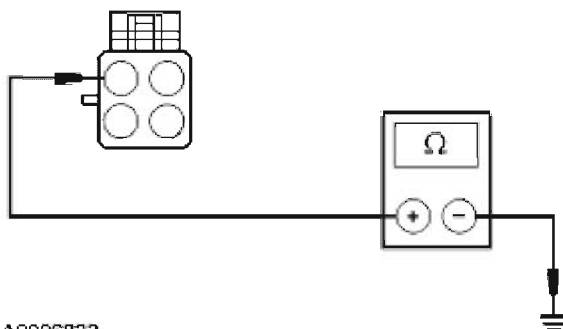
- Is the resistance less than 5 ohms?

**Yes:** GO to F10.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### **F10 CHECK CIRCUIT 57 (BK) FOR AN OPEN**

- Measure the resistance between blower motor switch C294b-b, circuit 57 (BK), harness side and ground.



A0096822

**Fig. 52: Checking Circuit 57 (BK) For Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

**Yes :** INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No :** REPAIR the circuit. TEST the system for normal operation.

#### **Pinpoint Test G: No Operation in High Blower Setting**

Refer to **AIR CONDITIONING - ESCAPE** or **AIR CONDITIONING - MARINER** for schematic and connector information.

**Normal Operation**

When the blower motor switch is placed in high and the function selector switch is in any position except OFF, the blower motor switch creates a direct link to ground for the blower motor, resulting in high speed operation.

**Possible Causes**

- Blower motor switch
- Circuit 261 (OG/BK) open

**PINPOINT TEST G: NO OPERATION IN HIGH BLOWER SETTING****G1 CHECK THE BLOWER MOTOR SPEED**

- Key in ON position.
- Turn the function selector switch to the FLOOR position.
- Set the blower motor speed to maximum.
- **Does the blower motor operate at maximum speed?**

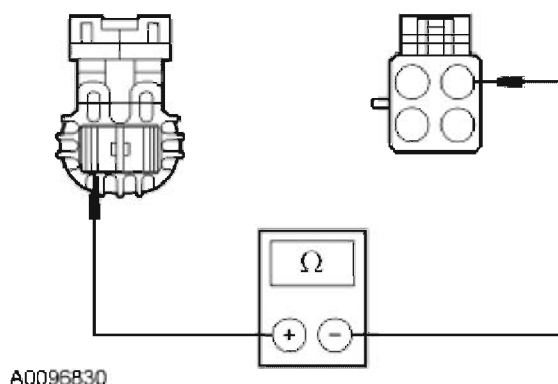
**Yes:** CYCLE the heater blower motor switch from high to low several times. If the blower motor operates correctly each time, ADVISE the owner of system operation.

If the blower motor does not operate correctly each time, INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to G2.

**G2 CHECK CIRCUIT 261 (OG/BK) FOR AN OPEN**

- Key in OFF position.
- Disconnect: Blower Motor Resister C293.
- Disconnect: Blower Motor C2066.
- Measure the resistance between blower motor C2066-2, circuit 261 (OG/BK), harness side and blower motor switch C294b-a, circuit 261 (OG/BK).



**Fig. 53: Checking Circuit 261 (OG/BK) For Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

**Yes:** INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### Pinpoint Test H: No Operation in Lower Speeds

Refer to **AIR CONDITIONING - ESCAPE** or **AIR CONDITIONING - MARINER** for schematic and connector information.

#### Normal Operation

Under normal conditions, when the blower motor switch is placed in the low, M1 or M2 positions and the function selector switch is in any position except OFF, the blower motor switch completes the circuit 261 (OG/BK) from the blower motor through the blower motor resistor, and to ground. The current flows through 1 to 3 resistors, depending on the selected blower motor speed.

#### Possible Causes

- Blower motor resistor
- Circuit 261 (OG/BK) short to ground
- Blower motor switch

#### PINPOINT TEST H: NO OPERATION IN LOWER SPEEDS

#### H1 CHECK THE BLOWER MOTOR SPEED

- Key in ON position.
- Turn the function selector switch to any position except OFF.
- Cycle the blower motor switch from high to low several times.

- **Does the blower motor operate at all speeds?**

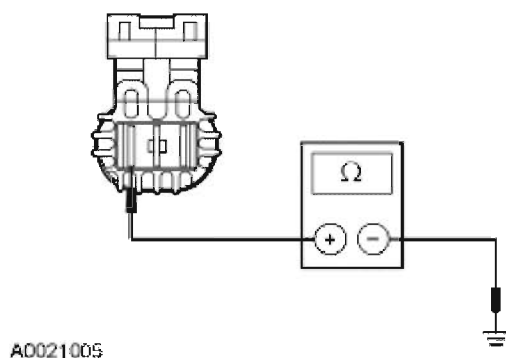
**Yes:** If the blower motor operates correctly each time, ADVISE the owner of system operation.

If the blower motor does not operate correctly each time, INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to H2.

## **H2 CHECK CIRCUIT 261 (OG/BK) FOR A SHORT TO GROUND**

- Key in OFF position.
- Disconnect: Blower Motor C2066.
- Disconnect: Blower Motor Resistor C293.
- Turn the blower motor switch to the low position.
- Measure the resistance between blower motor C2066-2, circuit 261 (OG/BK), harness side and ground.



**Fig. 54: Checking Circuit 261 (OG/BK) For Short To Ground**  
Courtesy of FORD MOTOR CO.

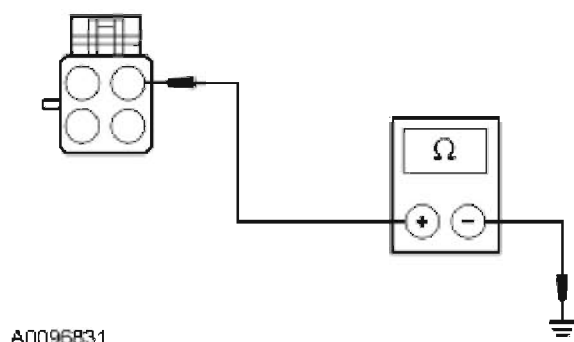
- **Is the resistance greater than 10,000 ohms?**

**Yes:** INSTALL a new blower motor resistor. TEST the system for normal operation.

**No:** GO to H3.

## **H3 CHECK THE BLOWER MOTOR SWITCH FOR AN INTERNAL SHORT**

- Disconnect: Blower Motor Switch C294b.
- Measure the resistance between blower motor switch C294b-a, circuit 261 (OG/BK), harness side and ground.



**Fig. 55: Checking Blower Motor Switch For Internal Short**  
**Courtesy of FORD MOTOR CO.**

- Is the resistance greater than 10,000 ohms?

**Yes:** INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** REPAIR the circuit. TEST the system for normal operation.

**Pinpoint Test I: No Operation in Some Blower Speeds**

Refer to **AIR CONDITIONING - ESCAPE** or **AIR CONDITIONING - MARINER** for schematic and connector information.

**Normal Operation**

Under normal conditions, when the function selector switch is in any position except OFF, the blower motor switch completes the circuit 261 (OG/BK) from the blower motor through either the blower motor resistor, or directly to ground.

**Possible Causes**

- Circuit 57 (BK) open
- Circuit 261 (OG/BK) open
- Circuit 752 (YE/RD) open
- Circuit 754 (LG/WH) open
- Blower motor resistor
- Blower motor switch

**PINPOINT TEST I: NO OPERATION IN SOME BLOWER SPEEDS**

**I1 CHECK THE BLOWER MOTOR SPEEDS**

- Key in ON position.
- Turn the function selector switch to any position except OFF.

- Cycle the blower motor switch from high to low several times.
- **Does the blower motor operate at all speeds?**

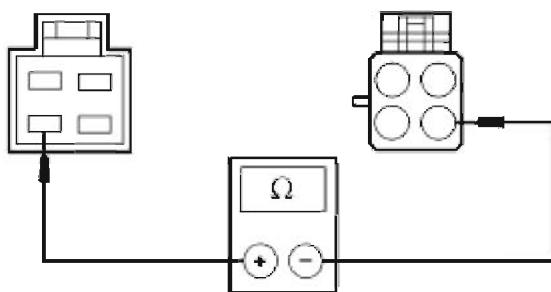
**Yes:** If the blower motor operates correctly each time, ADVISE the owner of system operation.

If the blower motor does not operate correctly each time, INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**No:** GO to I2.

## I2 CHECK CIRCUIT 754 (LG/WH) FOR AN OPEN

- Key in OFF position.
- Disconnect: Blower Motor Resistor C293.
- Disconnect: Blower Motor Switch C294b.
- Measure the resistance between blower motor resistor C293-3, circuit 754 (LG/WH), harness side and blower motor switch C294b-c, circuit 754 (LG/WH), harness side.



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**Fig. 56: Checking Circuit 754 (LG/WH) For Open**  
Courtesy of FORD MOTOR CO.

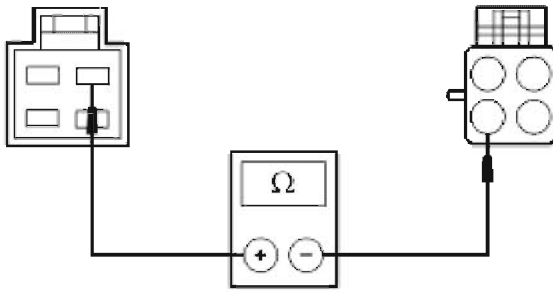
- **Is the resistance less than 5 ohms?**

**Yes:** GO to I3.

**No:** REPAIR the circuit. TEST the system for normal operation.

## I3 CHECK CIRCUIT 752 (YE/RD) FOR AN OPEN

- Measure the resistance between blower motor resistor C293-2, circuit 752 (YE/RD), harness side and blower motor switch C294b-d, circuit 752 (YE/RD), harness side.



A0096833

**Fig. 57: Checking Circuit 752 (YE/RD) For Open**  
Courtesy of FORD MOTOR CO.

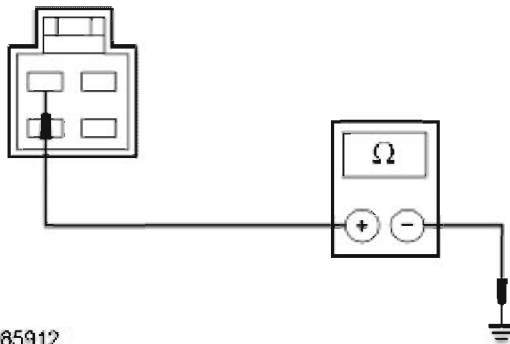
- Is the resistance less than 5 ohms?

**Yes:** GO to I4.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### I4 CHECK CIRCUIT 57 (BK) FOR AN OPEN

- Measure the resistance between blower motor resistor C293-1, circuit 57 (BK), harness side and ground.



A0085912

**Fig. 58: Checking Circuit 57 (BK) For Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

**Yes:** GO to I5.

**No:** REPAIR the circuit. TEST the system for normal operation.

#### I5 CHECK THE BLOWER MOTOR SWITCH

- Key in OFF position.
- Measure the resistance of the blower motor switch, component side. Refer to the table shown in **BLOWER MOTOR SWITCH TEST REFERENCE TABLE**.



**BLOWER MOTOR SWITCH TEST REFERENCE TABLE**

Switch Position	Terminals
Low	None
M1	A and C only
M2	A and D only
High	A and B only

- **Is the blower motor switch OK?**

**Yes:** INSTALL a new blower motor resistor. TEST the system for normal operation.

**No:** INSTALL a new blower motor switch. REFER to **REMOVAL AND INSTALLATION** . TEST the system for normal operation.

**Component Tests****Resistor - Blower Motor****PINOUTS REFERENCE TABLE**

Blower Motor Resistor Pins	Resistance
1 and 2	1.38 ohms
2 and 3	0.62 ohms
3 and 4	0.33 ohms

**Heater Core**

**WARNING:** Carbon monoxide is colorless, odorless and dangerous. If it is necessary to operate the engine with the vehicle in a closed area such as a garage, always use an exhaust collector to vent the exhaust gases outside the closed area.

**NOTE:** Testing of returned heater cores reveals that a large percentage of heater cores were good and did not require replacement. If a heater core leak is suspected, the heater core must be tested by carrying out the plugged heater core component test before the heater core pressure test. Carry out a system inspection by checking the heater system thoroughly as follows:

1. Inspect for evidence of coolant leakage at the heater water hose-to-heater core attachments. A coolant leak in the heater water hose could follow the heater core tube

to the heater core and appear as a leak in the heater core.

**NOTE:**      **Spring-type clamps are installed as original equipment. Installation and overtightening of non-specification clamps can cause leakage at the heater water hose connection and damage the heater core.**

2. Check the integrity of the heater water hose clamps.

#### Heater Core - Plugged

**WARNING:** The heater core inlet hose will become too hot to handle if the system is working correctly.

1. Verify the engine coolant is at the correct level.
2. Start the engine and turn on the heater.
3. When the engine coolant reaches a normal operating temperature, feel the heater core inlet and outlet hoses to see if they are hot.

If the inlet hose is not hot:

- the thermostat is not working correctly.

If the outlet hose is not hot:

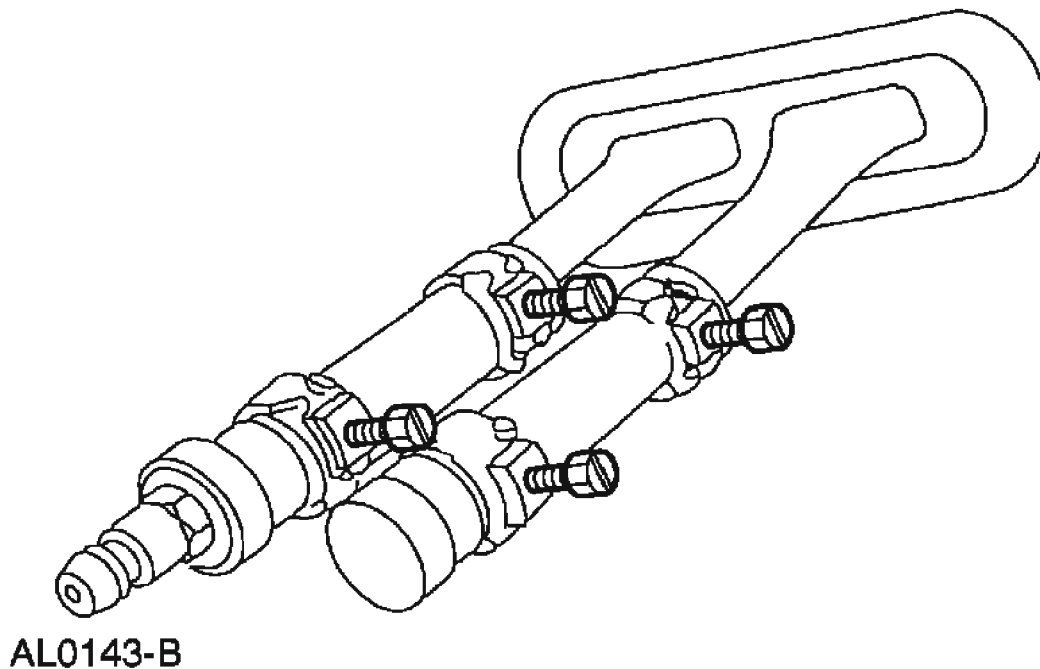
- the heater core may have an air pocket.
- the heater core may be restricted or plugged.

#### Heater Core - Pressure Test

Use the pressure tester to carry out the pressure test.

**NOTE:**      **Due to space limitations, a bench test may be necessary for pressure testing.**

1. Clamp off the heater hoses.
2. Disconnect the heater water hoses from the heater core.
3. Install a short piece of heater water hose approximately 101 mm (4 inches) long on each heater core tube.
4. Fill the heater core and heater water hoses with water and install plug BT-7422-B and adapter BT-7422-A from the pressure tester in the heater water hose ends. Secure the heater water hoses, the plug, and the adapter with hose clamps.

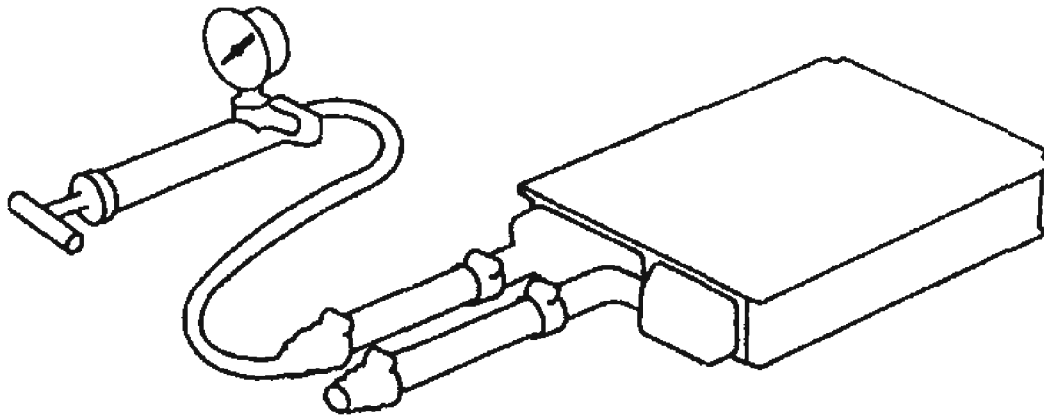


**Fig. 59: Identifying Heater Water Hoses, Plug And Adapter With Hose Clamps**  
Courtesy of FORD MOTOR CO.

5. Attach the pump and gauge assembly from the pressure tester to the adapter.
6. Close the bleed valve at the base of the gauge. Pump 138 kPa (20 psi) of air pressure into the heater core.
7. Observe the pressure gauge for a minimum of 3 minutes.
8. If the pressure drops, check the heater water hose connections to the core tubes for leaks. If the heater water hoses do not leak, remove the heater core from the vehicle and perform the bench test.

#### **Heater Core - Bench Test**

1. Remove the heater core from the vehicle. For additional information, refer to **REMOVAL AND INSTALLATION**.
2. Drain all of the coolant from the heater core.
3. Connect the 101 mm (4 in) test heater water hoses with plug and adapter to the core tubes. Then connect the pressure tester to the adapter.
4. Apply 138 kPa (20 psi) of air pressure to the heater core. Submerge the heater core in water.
5. If a leak is observed, install a new heater core.



L10130-A

**Fig. 60: Applying Air Pressure To Heater Core**  
Courtesy of FORD MOTOR CO.

**A/C Evaporator/Condenser Core - On Vehicle Leak Test**

1. Recover the refrigerant. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.

**NOTE:**      **DO NOT** leak test an A/C evaporator core with the suction accumulator/drier attached to the core tubes.

2. Disconnect the suspect A/C evaporator core or A/C condenser core from the A/C system. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Clean the spring lock couplings. For additional information, refer to **SPRING LOCK COUPLING**.
4. Connect the appropriate test fittings from the A/C Fittings Set to the evaporator or condenser tube connections.

**NOTE:**      **The automatic shut-off valves on some gauge set hoses do not open when connected to the test fittings. If available, use hoses without shut-off valves. If hoses with shut-off valves are used, make sure the valve opens when attached to the test fittings or install an adapter that activates the valve. The test is not valid if the shut-off valve does not open.**

5. Connect the red and blue hoses from the R-134a gauge set to the test fittings on the A/C evaporator core or A/C condenser core. Connect the yellow hose to a known good

vacuum pump.

6. Open both gauge set valves and start the vacuum pump. Allow the vacuum pump to operate for a minimum of 45 minutes after the gauge set low pressure gauge indicates 101 kPa (30 in-Hg). The 45 minute evacuation is necessary to remove any refrigerant from oil left in the A/C evaporator core or A/C condenser core. If the refrigerant is not completely removed from the oil, outgassing will degrade the vacuum and appear as a refrigerant leak.
7. If the low pressure gauge reading will not drop to 101 kPa (30 in-Hg) when the valves on the gauge and manifold set are open and the vacuum pump is operating, close the gauge set valves and observe the low pressure gauge. If the pressure rises rapidly to zero, a large leak is indicated. Recheck the test fitting connections and gauge set connections before installing a new A/C evaporator core or A/C condenser core.
8. After evacuating for 45 minutes, close the gauge set valves and stop the vacuum pump. Observe the low pressure gauge; it should remain at the 101 kPa (30 in-Hg) mark.
  - If the low pressure gauge reading rises 34 or more kPa (10 or more in-Hg) of vacuum from the 101 kPa (30 in-Hg) position in 10 minutes, a leak is indicated.
  - If a very small leak is suspected, wait 30 minutes and observe the vacuum gauge.
  - If a small amount of vacuum is lost, operate the vacuum pump with the gauge valves open for an additional 30 minutes to remove any remaining refrigerant from the oil in the A/C evaporator core or A/C condenser core. Then check for a loss of vacuum.
  - If a very small leak is suspected, allow the system to set overnight with vacuum applied and check for a vacuum loss.
9. If the A/C evaporator core or A/C condenser core leaks, as verified by the above procedure, install a new A/C evaporator core or A/C condenser core. For additional information, refer to **REMOVAL AND INSTALLATION**.

#### A/C Compressor - External Leak Test

1. Install the A/C Pressure Test Adapter on the rear head of the A/C compressor using the existing manifold retaining bolt.
2. Connect the high and low pressure lines of a manifold gauge set or a refrigerant recovery/recycling station such as the R-134a A/C Service Center to the corresponding fittings on the A/C Pressure Test Adapter.
3. Attach the center hose of the manifold gauge set to a refrigerant container standing in an upright position.
4. Hand-rotate the compressor shaft 10 complete revolutions to distribute the oil inside the A/C compressor.
5. Open the low pressure gauge valve, the high pressure gauge valve and the valve on the refrigerant container to allow the refrigerant vapor to flow into the A/C compressor.
6. Using the Refrigerant Leak Detector, check the entire A/C compressor for leaks.

## 2006 Ford Escape

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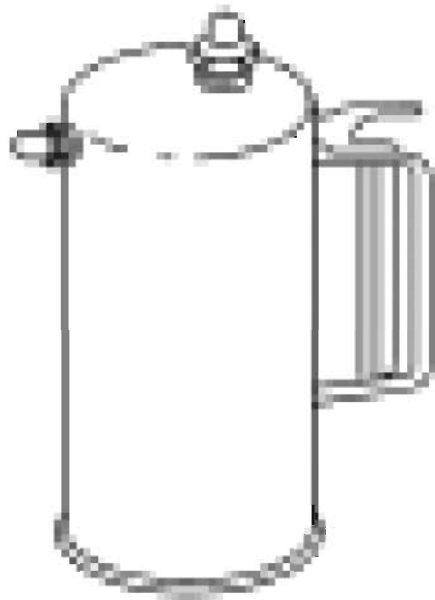
7. If an external leak is found, install a new A/C compressor. For additional information, refer to **CLIMATE CONTROL** .
8. When the leak test is complete, recover the refrigerant from the compressor.

## GENERAL PROCEDURES

### AIR CONDITIONING (A/C) ODOR TREATMENT

#### Special Tool(s)

#### SPECIAL TOOL(S)



**ST2813-A**

30oz Sure Shot Pressure  
Sprayer  
167-R4700 or equivalent

#### Materials

### MATERIALS

Item	Specification
A/C Cooling Coil Coating YN-29	-

#### A/C Odor Treatment

#### **WARNING:**

**Avoid contact with eyes and skin. Contact with eyes and skin will cause irritation. Wear chemical goggles when using the A/C cooling coil coating. Failure to**

**follow these instructions may result in serious injury or death.**

**This procedure should only be carried out in ventilated areas. Open all windows and doors of the vehicle. Leave doors and windows open during the entire procedure. Avoid breathing vapors. Failure to follow these instructions may result in serious injury or death.**

**Read all instructions and warnings packaged with the A/C cooling coil coating. For additional information, see the material safety data sheet (MSDS) for this product. Failure to follow these instructions may result in serious injury or death.**

**NOTE: There are typically 4 types of objectionable odors found in a vehicle:**

- Chemical odors
- Environmental odors
- Human and other interior-generated odors
- Microbiological odors

Before determining that A/C odor treatment is required, the source and the circumstances under which the odor occurs must be determined.

Chemical odors are usually constant regardless of the climate control system setting although they may be enhanced by A/C operation. Most chemical odors are caused by fluid leaks or incorrectly cured adhesives. Chemical odors can be eliminated by repairing the leaking component and removing any residue.

Environmental odors usually occur for a short time and diminish after the vehicle passes through the affected area. These odors are typically only detected when the vehicle windows are open, or when the climate control system is operating in a mode that allows for fresh air. Environmental odors cannot be eliminated because they are external in source, but they may be minimized by switching to a climate control setting that uses recirculated air.

Human and other interior generated odors occur while the source is present and may linger for a short time after. These odors may be more noticeable during A/C operation. Human odors may be eliminated by removing the source and cleaning the affected area.

Microbiological odors, if in the A/C system, usually last for about 30 seconds after the system is turned on. They will be detected while the A/C is turned on using either outside or recirculated air. Microbiological odors that occur in areas other than the A/C system (for

example, water in doors or wet carpeting) may last indefinitely and will be more intense when recirculated air is used. Microbiological odors will not be present at temperatures at or below 10°C (50°F).

Microbiological odors can be eliminated by removing the source and treating the affected area. Standing water must be allowed to drain and dry out. A/C systems may be treated by using the A/C cooling coil coating as described in the procedure below.

Microbiological odors result from microbial growth supported by warm temperatures and moisture. Microbiological odors are described as musty/mildew type smells and may occur on/in:

- form seals.
  - rubber seals.
  - adhesives.
  - standing water.
  - water-soaked carpet/trim.
1. Identify the type of odor present in the vehicle. Do not proceed with A/C odor treatment if the odor source is found to be outside of the A/C system. Refer to **ODOR DESCRIPTION TABLE** for examples.

#### ODOR DESCRIPTION TABLE

Odor Source	Odor Description
<b>Chemical Odors</b>	
Coolant	Sweet smell
Fuel	Gasoline or diesel fuel smell
Oil	Oil-type or burning smell
Power steering fluid	Oil-type or burning smell
Transmission fluid	Oil-type or burning smell
Washer fluid	Alcohol-type smell
Gear lube	Garlic/sulfur smell
Refrigerant oil	Alcohol-type smell
Carpet/trim adhesives	Fishy, urine or sweet smell
Evaporator core coating	Wet cement-type smell
<b>Environmental Odors</b>	
Exhaust	Exhaust, fuel or burning type smell
Industrial pollutants	Various smells
Dust	Musty, mildew or wet cement type smell
Pollen	Sweet smell
Tobacco	Burning, tar smell



Human and Other Interior-Generated Odors	
Body secretions	Body odor
Perfuming agents	Sweet or fragrance smell
Clothing	Musty, mildew or body odors
Food/Beverage	Sweet, musty, mildew or fishy smell
Microbiological Odors	
Microbiological odors occurring inside of A/C system	Musty, mildew smell lasting about 30 seconds after A/C is turned on
Microbiological odors occurring outside of A/C system	Musty, mildew smell lasting indefinitely and possibly more pronounced when using recirculated air

2. Identify the source of the odor.
  - Check the passenger and driver side carpet for moisture.
  - Check the blower motor and blower motor cover (if equipped) for moisture resulting from water bypassing the cowl baffling system.
  - Check the evaporator core drain tube for restriction.
  - Check the cowl top panel and air inlet screen for standing water or foreign material. Remove any standing water and clean the air inlet screen using a wet/dry vacuum.
3. Open all vehicle windows.
4. Disconnect the low-side A/C pressure cycling switch electrical connector.
5. Set the following.
  - Enable the A/C using FRESH air inlet.
  - Adjust the temperature setting to full WARM.
  - Adjust the blower motor speed to HI.
6. Run the engine for 25 minutes to dry out the A/C system.
7. Turn the ignition OFF.
8. Remove the blower motor.

**NOTE:** Blower motor speed controls that are mounted outside of the evaporator core housing and not exposed to the blower motor airflow do not need to be removed.

9. Remove the blower motor resistor.

**CAUTION:** To avoid damage to the vehicle interior, do not spill or spray this product on any interior surface.

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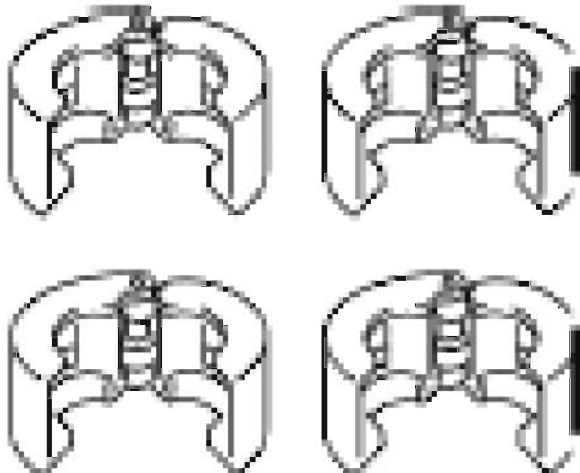
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10. Add 1 full bottle of approved A/C cooling coil coating to the sprayer.
11. Insert the sprayer nozzle into the evaporator housing and direct the spray toward the evaporator core face. Spray the entire evaporator core face until empty.
12. Install the blower motor and blower motor resistor (if equipped) or blower motor speed control (if equipped).
13. Repeat Steps 6 through 8 to cure the evaporator core coating.
14. Connect the A/C pressure cycling switch electrical connector.

### SPRING LOCK COUPLING

#### Special Tool(s)

#### SPECIAL TOOL(S)

 <b>ST2352-A</b>	Remover, Refrigerant Coupling Spring 412-039 (T84L-19623-B)
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#### Materials

#### MATERIALS

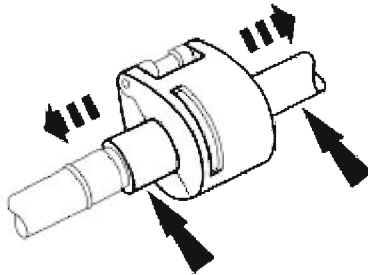
Item	Specification
PAG Refrigerant Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B

#### Disconnect

1. Remove the spring lock coupling clip, if equipped.

**CAUTION:** Do not use metal tools to remove the O-ring seals. They can cause axial scratches across the O-ring seal grooves, resulting in refrigerant leaks.

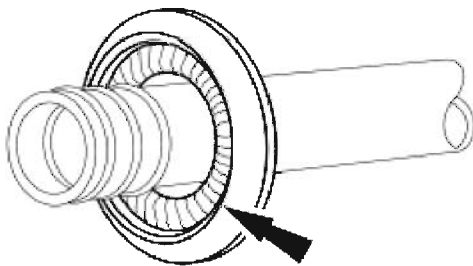
2. Push the tool into the cage opening to release the female fitting from the spring lock coupling spring and pull the fitting apart.
  - Remove the O-ring seals using a non-metallic tool.



A0001997

**Fig. 61: Pulling Spring Lock Coupling Fittings Apart**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use a screwdriver or similar tool to remove the A/C tube lock coupling spring; this can cause axial scratches across the O-ring seal grooves resulting in refrigerant leaks.



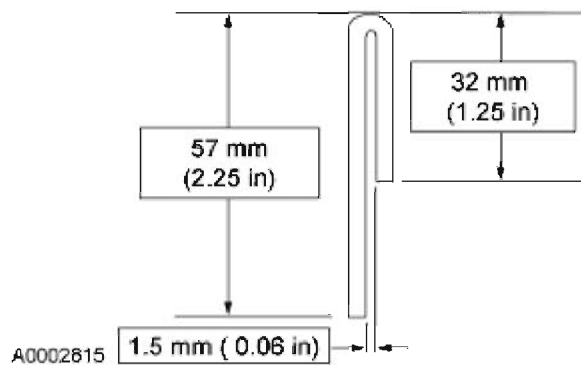
A0051247

**Fig. 62: Identifying Spring Lock Coupling Spring**  
Courtesy of FORD MOTOR CO.

3. Remove the spring lock coupling spring with a small hooked wire.

#### Cleaning

1. Fabricate a cleaning tool from a 1/8-inch diameter brazing rod.



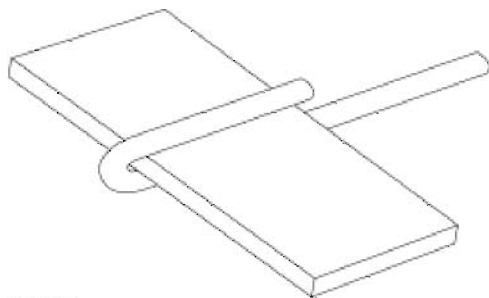
**Fig. 63: Fabricating Cleaning Tool From 1/8-in Diameter Brazing Rod**  
Courtesy of FORD MOTOR CO.

2. Cut an abrasive pad with the dimensions corresponding to the coupling size.

**PAD DIMENSIONS**

Coupling Size	Pad Size
3/8 inch	25 x 50 mm (1x2 inch)
1/2 inch	25 x 50 mm (1x2 inch)
5/8 inch	25 x 76 mm (1x3 inch)
3/4 inch	25 x 102 mm (1 x 4 inch)

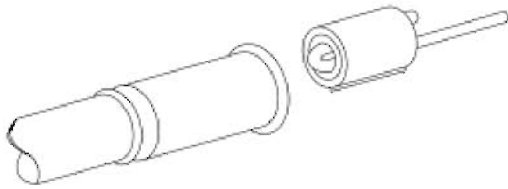
3. Assemble the pad to the tool.



**Fig. 64: Assembling Pad To Tool**  
Courtesy of FORD MOTOR CO.

4. Coat the abrasive pad with mineral oil.
5. Roll the pad on the tool and install it in a variable speed drill motor.

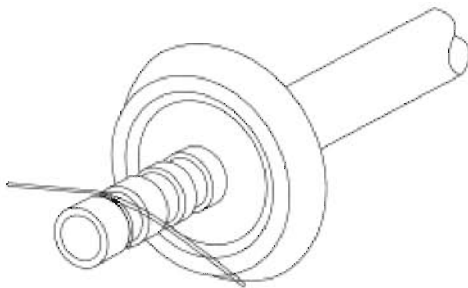
**CAUTION:** Maintain low speed drill rotation when inserting or removing the cleaning tool to prevent axial scratches which may cause future leaks.



A0002002

**Fig. 65: Rolling Pad On Tool**  
**Courtesy of FORD MOTOR CO.**

6. Polish for 1 minute at moderate speed (less than 1,500 rpm) or until the surface is clean and free of scratches or foreign material.
7. Clean the fitting with a lint-free cloth.
8. Inspect the surface for grooves or scratches. If grooves and scratches are still present, install a new component.
9. Clean the O-ring seal grooves with a 30 cm (1 foot) length of natural fiber string.
  - Loop the string around the grooves and pull the string back and forth.



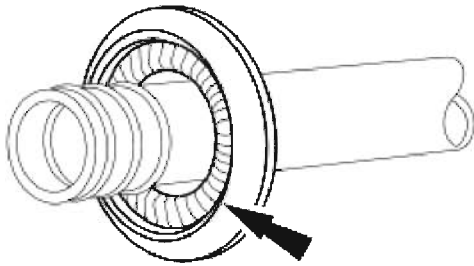
A0051248

**Fig. 66: Cleaning O-ring Seal Grooves With A 300 mm (12 Inch) Length Of Natural Fiber String**  
**Courtesy of FORD MOTOR CO.**

10. Remove any foreign material from the grooves with a lint-free cloth.

**Connect**

1. Install the spring lock coupling spring.



A0051247

**Fig. 67: Identifying Spring Lock Coupling Spring**  
Courtesy of FORD MOTOR CO.

2. Lubricate the inside of the coupling with mineral oil.

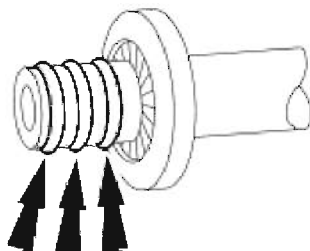


A0002004

**Fig. 68: Identifying Coupling Inside Area For Lubrication**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Use only new, green, O-ring seals. The use of any O-ring seals other than specified may result in intermittent leakage during vehicle operation.

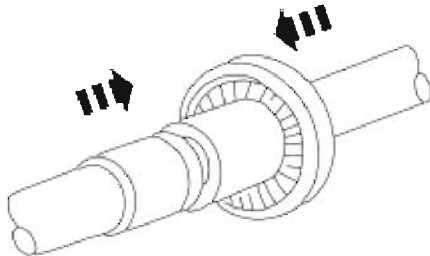
3. Install the O-ring seals.
  - Lubricate the O-ring seals with mineral oil.



A0051245

**Fig. 69: Identifying O-Ring Seals**  
Courtesy of FORD MOTOR CO.

4. Connect the spring lock coupling fittings with a twisting motion until the spring lock coupling spring snaps over the flared end of the female fitting.



A0002006

**Fig. 70: Connecting Spring Lock Coupling Fittings**  
Courtesy of FORD MOTOR CO.

5. Install the spring lock coupling clip.

#### AIR CONDITIONING LINE (PEANUT) FITTING

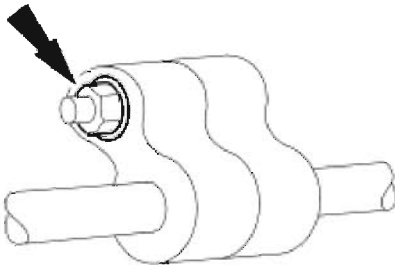
##### Materials

##### MATERIALS

Item	Specification
PAG Refrigerant Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B

##### Disconnect

1. Remove the nut and separate the 2 halves of the peanut fitting.

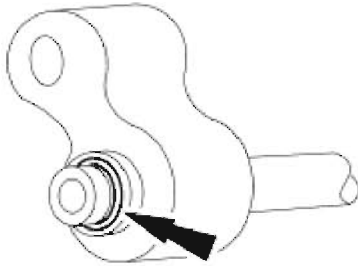


A0002008

**Fig. 71: Identifying Male And Female Halves Of Peanut Fitting**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not use metal tools to remove the O-ring seal. They can cause axial scratches across the O-ring seal

groove, resulting in refrigerant leaks.



A0002010

**Fig. 72: Locating O-Ring Seal**  
Courtesy of FORD MOTOR CO.

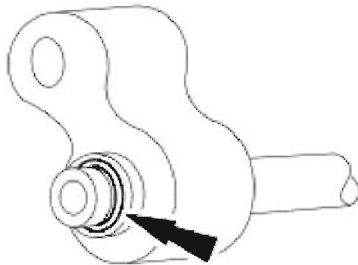
2. Remove the O-ring seal with a non-metallic tool.

**Connect**

1. Clean all dirt or foreign material from the fittings.

**CAUTION:** Use only new, green, O-ring seals. The use of any O-ring seals other than those specified may result in intermittent leakage during vehicle operation.

2. Install the O-ring seal.
  - Lubricate the O-ring seal with mineral oil.



A0002010

**Fig. 73: Locating O-Ring Seal**  
Courtesy of FORD MOTOR CO.

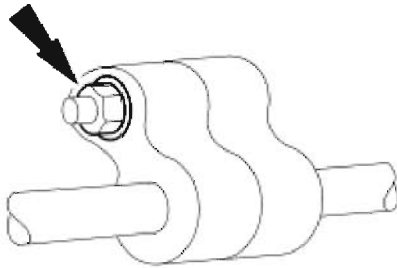
3. Lubricate the inside of the fittings with mineral oil.

**NOTE:** When correctly assembled, the male and female fittings should be flush.

4. Assemble the male and female fittings together.



- Tighten to 8 N.m (71 lb-in).



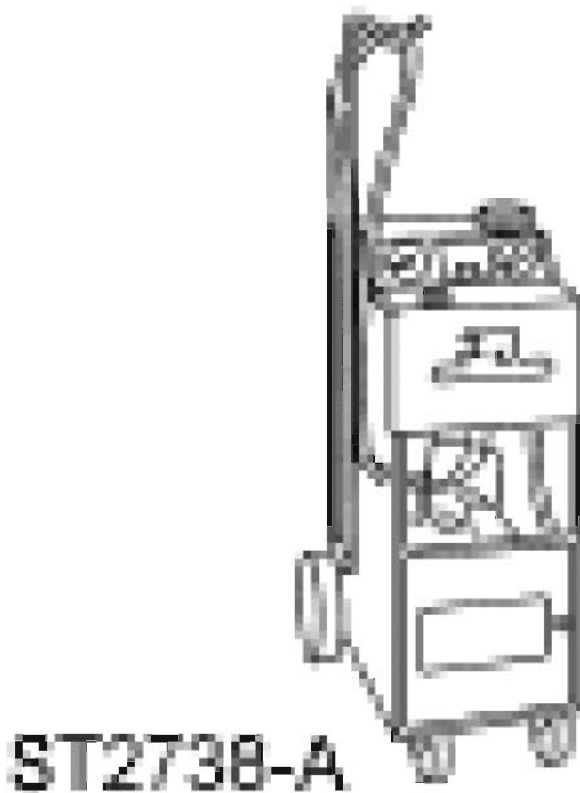
A0002008

**Fig. 74: Identifying Male And Female Halves Of Peanut Fitting**  
Courtesy of FORD MOTOR CO.

## REFRIGERANT SYSTEM TESTS

Special Tool(s)

### SPECIAL TOOL(S)



R-134a Refrigerant Center  
176-00002 or equivalent

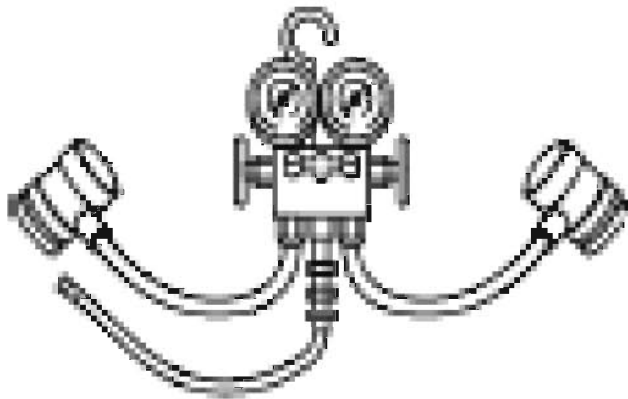
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ST2739A

R-134a Refrigerant Center  
023-00174 or equivalent



ST1928-A

R-134a Manifold Gauge Set  
023-00047 or equivalent

Procedure 1 - Ambient Temperature At or Below 38°C (100°F)

### NOTE:

The system performance can be evaluated and diagnosed by analysis of the compressor suction and discharge pressures. The following procedure is used to determine if the system is

**operating at normal pressures.**

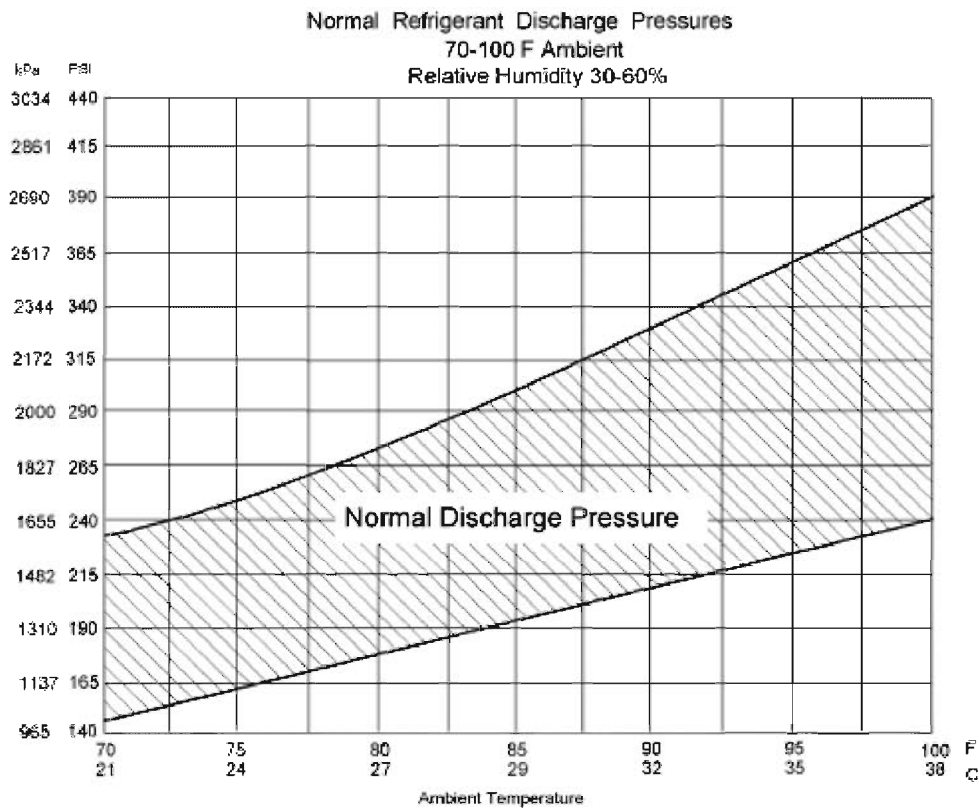
**The procedure varies depending on the ambient temperature. If the ambient temperature is 38°C (100°F) or less, follow Procedure 1. If the ambient temperature is greater than 38°C (100°F), follow Procedure 2.**

**If the A/C compressor cycles at any time during this test, refer to the DIAGNOSTIC TABLE.**

1. Drive the vehicle or run the engine until it reaches a normal operating temperature.
2. Connect a manifold gauge set or refrigerant center with high-pressure and low-pressure gauges to the refrigerant system.
3. Set the climate controls.
  - Set the A/C controls to MAX A/C, full COOL temperature and the blower motor to HI.
4. Open all the vehicle windows and leave the hood open for the test. Open the rear hatch and the rear doors.
5. Confirm the compressor clutch is engaged and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.
6. Record the ambient temperature.
7. Record the discharge pressure. If the pressure is fluctuating, record the average value.
8. Determine if the discharge pressure falls within the normal operating limits using **Fig. 75**.

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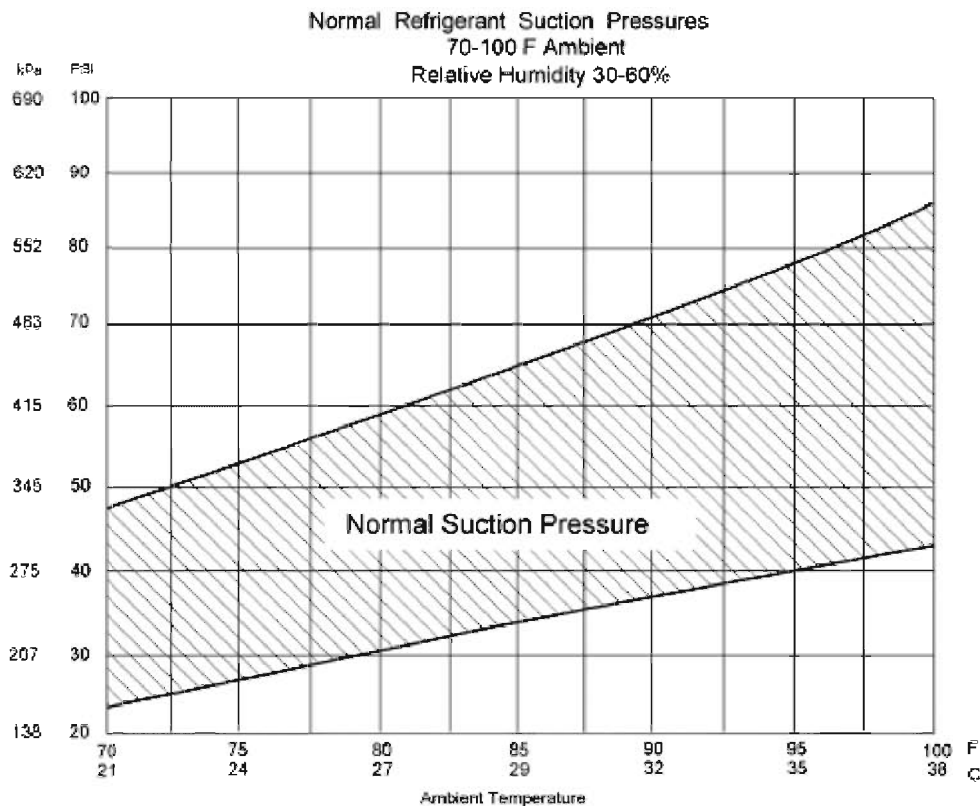


**Fig. 75: Pressures Graph (Normal Refrigerant Discharge Pressures)**  
Courtesy of FORD MOTOR CO.

9. Record the suction pressure. If the pressure is fluctuating, record the average value.
10. Determine if the suction pressure falls between normal operating limits using **Fig. 76**.

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**Fig. 76: Pressures Graph (Normal Refrigerant Suction Pressures)**  
Courtesy of FORD MOTOR CO.

11. Proceed to the **DIAGNOSTIC TABLE**.

Procedure 2 - Ambient Temperature Above 38°C (100°F)

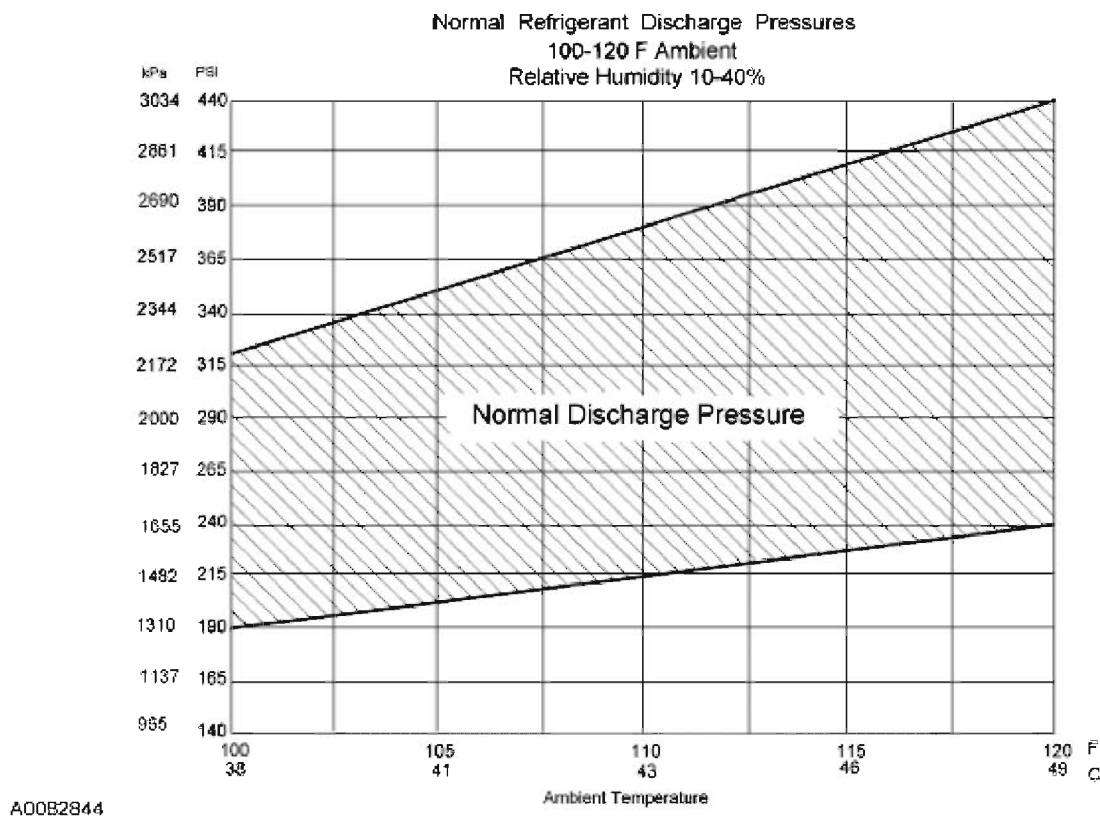
**NOTE:**

The system performance can be evaluated and diagnosed by analysis of the compressor suction and discharge pressures. The following procedure is used to determine if the system is operating at normal pressures.

The procedure varies depending on the ambient temperature. If the ambient temperature is 38°C (100°F) or less, follow Procedure 1. If the ambient temperature is greater than 38°C (100°F), follow Procedure 2.

1. Drive the vehicle or run the engine until it reaches a normal operating temperature.
2. Connect a manifold gauge set or refrigerant center with high-pressure and low-pressure gauges to the refrigerant system.
3. Set the climate controls.
  - Set the A/C controls to MAX A/C mode, full COOL temperature and the blower motor to MED LO.

4. Open all the vehicle windows and leave the hood open for the test. Open the rear hatch and/or rear doors (if equipped).
5. Confirm the compressor clutch is engaged and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.
6. Record the ambient temperature.
7. Record the discharge pressure. If the pressure is fluctuating, record the average value.
8. Determine if the discharge pressure falls within the normal operating limits using **Fig. 77**.

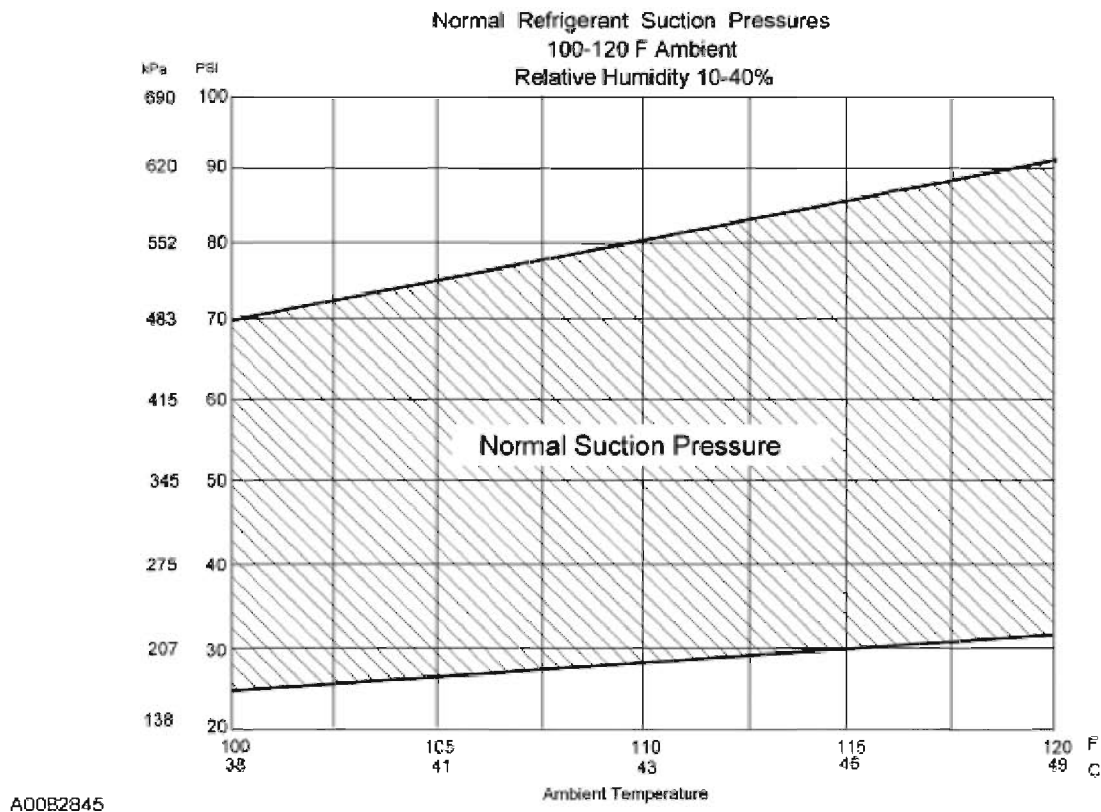


**Fig. 77: Pressures Graph (Refrigerant Discharge Pressures)**  
Courtesy of FORD MOTOR CO.

9. Record the suction pressure. If the pressure is fluctuating, record the average value.
10. Determine if the suction pressure falls between normal operating limits using **Fig. 78**.

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**Fig. 78: Pressures Graph (Refrigerant Suction Pressures)**  
Courtesy of FORD MOTOR CO.

11. Proceed to the **DIAGNOSTIC TABLE**.

#### Diagnostic Table

**NOTE:** The following table is used to guide diagnosis of the refrigerant system if the operating pressures are outside the normal limits.

1. Proceed to the **DIAGNOSTIC TABLE**.

#### DIAGNOSTIC

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
High or clutch cycling	High	Condenser - inadequate airflow
High	Normal to high	Engine - overheating
Normal to high	Normal	Refrigerant overcharge - air in refrigerant

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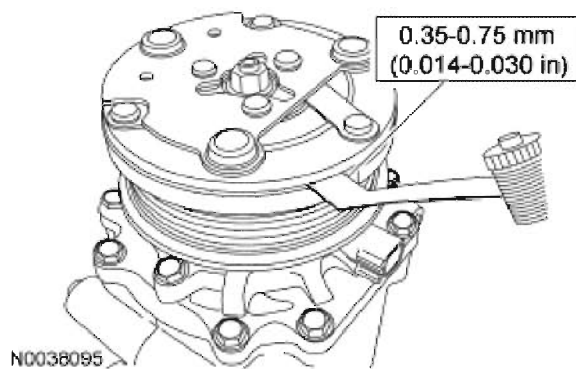
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Normal to low	High	Fixed orifice tube - missing O-rings leaking/missing
Normal to low	Normal to high	A/C suction line - partially restricted or plugged <sup>(1)</sup>
Normal to low	Low or clutch cycling	Low refrigerant charge, A/C suction line - partially restricted or plugged <sup>(2)</sup> A/C cycling switch - sticking closed
Erratic operation or compressor not running		A/C cycling switch - poor connection at the A/C clutch connector or clutch cycling switch connector. A/C electrical circuit erratic - see the wiring diagram in <b>AIR CONDITIONING - ESCAPE</b> or <b>AIR CONDITIONING - MARINER</b> .
Normal to low	High	Compressor - low performance
<b>Additional Possible Cause Components Associated With Inadequate Compressor Operation</b>		
<ul style="list-style-type: none"><li>• Compressor drive belt - loose</li><li>• Compressor clutch - slipping</li><li>• Clutch coil open - shorted, or loose mounting</li><li>• Control assembly switch - dirty contacts or sticking open</li><li>• Clutch wiring circuit - high resistance, open or blown fuse</li><li>• Compressor operation interrupted by the PCM</li></ul>		
<b>Additional Possible Cause Components Associated With a Damaged Compressor</b>		
<ul style="list-style-type: none"><li>• Incorrect clutch air-gap</li><li>• Suction accumulator - refrigerant oil bleed hose plugged</li><li>• Refrigerant leaks</li></ul>		
<p>(1) Low pressure reading will be normal to high if the pressure is taken at the accumulator and if the restriction is downstream of the access valve.</p> <p>(2) Low pressure reading will be low if the pressure is taken near the compressor and the restriction is upstream of the access valve</p>		

### AIR CONDITIONING (A/C) CLUTCH AIR GAP ADJUSTMENT

1. Check the A/C clutch air gap at 3 equally spaced places between the clutch plate and the A/C clutch pulley.



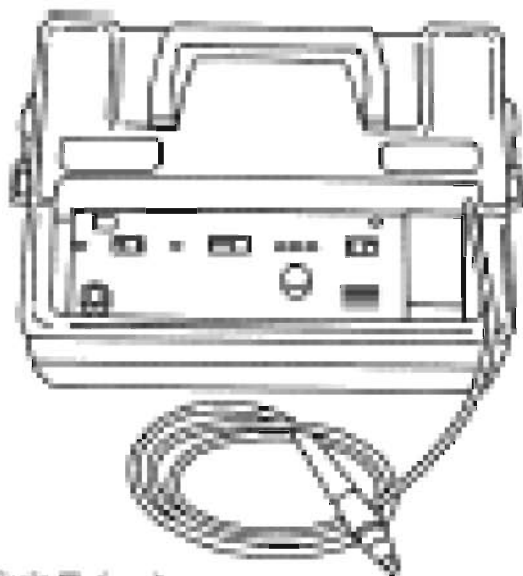


**Fig. 79: Checking A/C Clutch Air Gap**  
Courtesy of FORD MOTOR CO.

2. If the A/C clutch air gap is out of range, remove the clutch plate. Add or remove spacers between the clutch plate hub and the compressor shaft until the clearance is within specification.

## ELECTRONIC LEAK DETECTION

### SPECIAL TOOL(S)



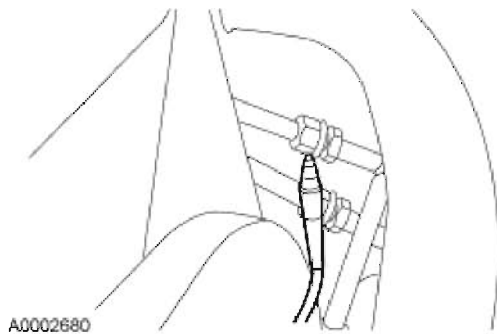
ST2351-A

H10PM Refrigerant Leak  
Detector With Battery  
216-00001 or equivalent

**CAUTION:** Good ventilation is necessary in the area where electronic A/C leak testing is to be carried out. If the surrounding air is contaminated with refrigerant gas, the leak detector will indicate this gas all the time. Odors from other chemicals such as antifreeze, diesel fuel, disc brake cleaner, or other cleaning solvents can cause the same problem. Using a fan

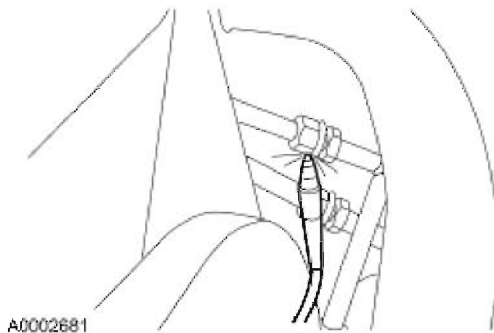
to ventilate the area to be tested before proceeding with the leak detection procedure is helpful in removing small traces of contamination from the air, but the fan should be turned off during the actual testing.

**NOTE:** The system pressure should be between 413-551 kPa (60-80 psi) at 24°C (75°F) with the engine off.



**Fig. 80: Checking Refrigerant System Leakage Using Leak Detector**  
Courtesy of FORD MOTOR CO.

1. Leak test the refrigerant system using the refrigerant leak detector. Follow the instructions included with the leak detector for handling and operation techniques.
2. If a leak is found, recover the refrigerant. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.
  - Repair the system.
  - Test the system for normal operation.



**Fig. 81: Checking Refrigerant System Leakage Using Refrigerant Leak Detector**  
Courtesy of FORD MOTOR CO.

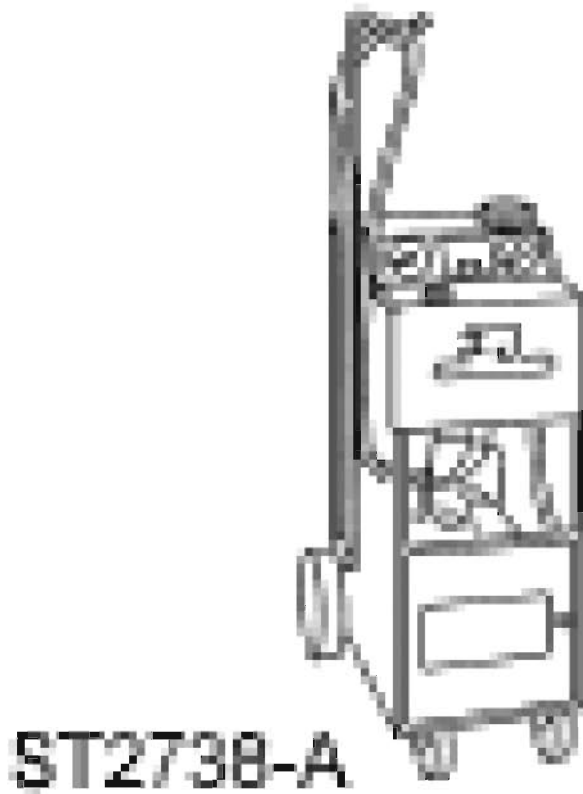
## FLUORESCENT DYE LEAK DETECTION

Special Tool(s)

## 2006 Ford Escape

2006 HVAC Climate Control System - General Information & Diagnostics - Escape & Mariner

### SPECIAL TOOL(S)

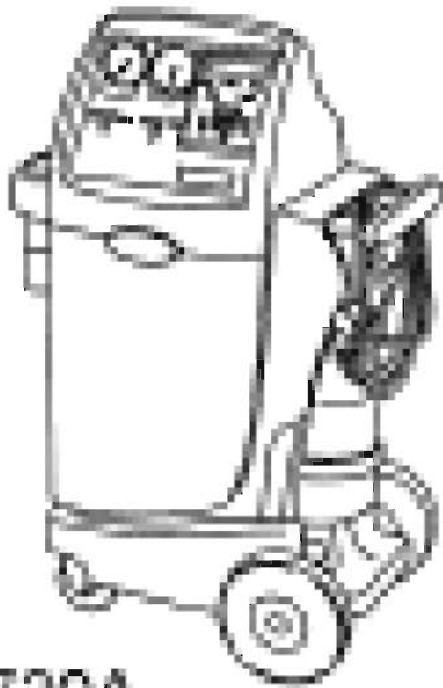


R-134a Refrigerant Center  
176-00002 or equivalent

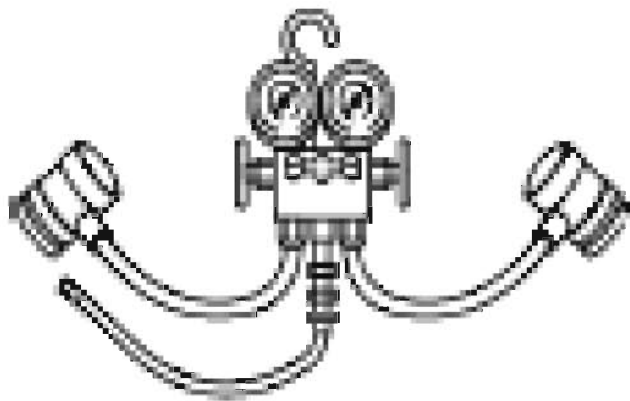
R-134a Refrigerant Center  
023-00174 or equivalent

## 2006 Ford Escape

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ST2739A



ST1928-A

R-134a Manifold Gauge Set  
023-00047 or equivalent

## 2006 Ford Escape

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**ST1261-A**

120 Watt UV Spot Lamp  
164-R0721 or equivalent



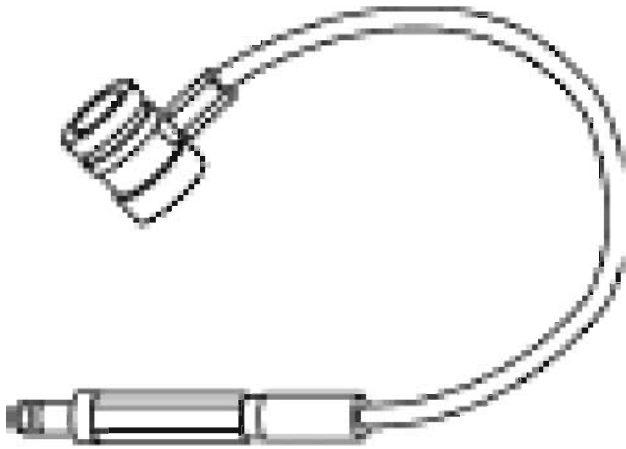
**ST2651-A**

High Intensity UV Lamp - 12 Volt  
164-R6000 or equivalent

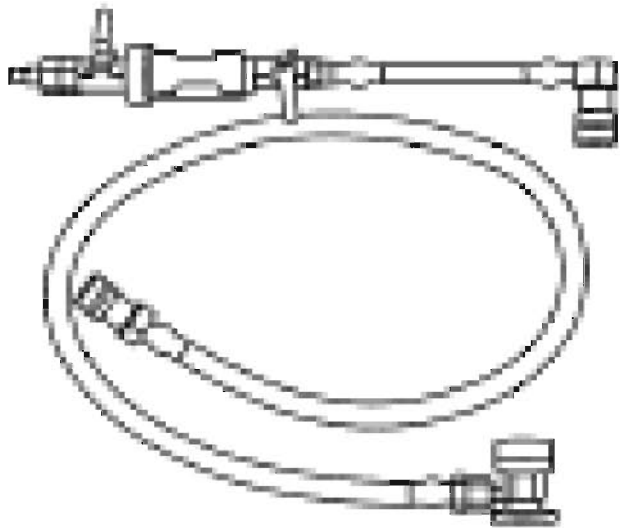
R-134a Fluorescent Dye Injector  
164-R0775 or equivalent

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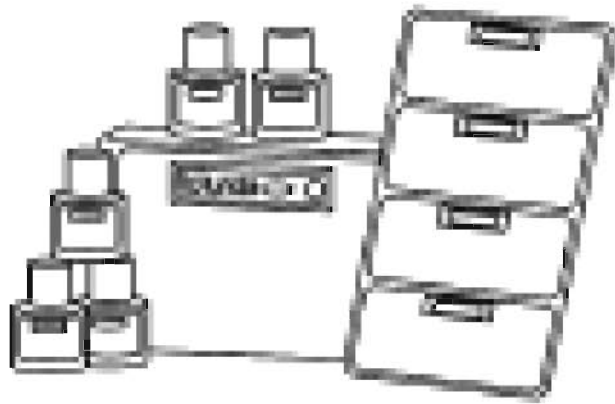
**ST1705-B**



**ST2649-A**

Deluxe Loop Kit  
219-00069 or equivalent

R-134a Leak Detection Dye  
164-R6060

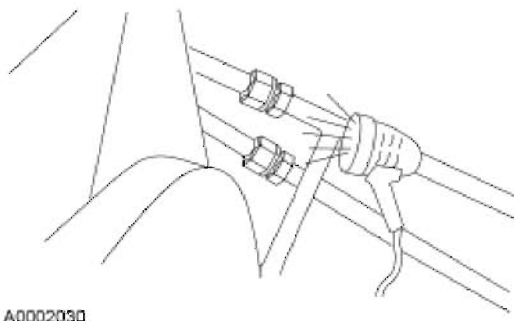


ST2650-A

#### Fluorescent Dye Detection

**NOTE:** Vehicles are manufactured with R-134a fluorescent dye installed in the refrigerant system from the factory. The location of leaks can be pinpointed by the bright yellow-green glow of the fluorescent dye under a UV lamp. Since more than one leak can exist, make sure to inspect each component, line, and fitting in the refrigerant system for a leak.

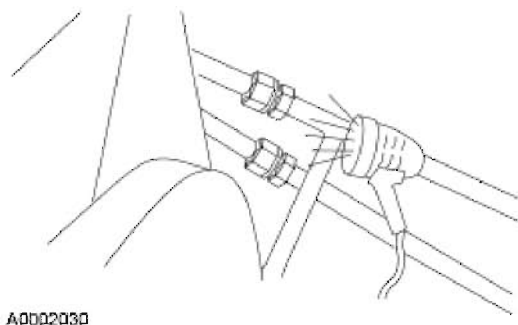
1. Check for leaks using an approved UV lamp.
  - Inspect all the components, lines and fittings of the refrigerant system.



**Fig. 82: Checking For Leaks Using Rotunda-Approved UV Lamp**  
 Courtesy of FORD MOTOR CO.

2. If a leak is found, recover the refrigerant. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING.**

3. Repair the refrigerant system leak(s).
4. Evacuate and charge the refrigerant system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.
5. After the leak(s) is/are repaired, remove any traces of fluorescent dye with a general purpose oil solvent.
6. Verify the repair by running the vehicle for a short period of time and rechecking the area of the leak with an approved UV lamp.



**Fig. 83: Checking For Leaks Using Rotunda-Approved UV Lamp**  
Courtesy of FORD MOTOR CO.

Fluorescent Dye Injection - Using an A/C Center and Dye Injector

**NOTE:**

Fluorescent refrigerant system dye is added to the refrigerant system at the factory to assist in refrigerant system leak diagnosis using an approved ultraviolet blacklight. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. New suction accumulators and receiver/driers are shipped with a fluorescent dye wafer included in the desiccant bag which will dissolve after approximately 30 minutes of continued A/C operation. It is not necessary to add dye after flushing or filtering the refrigerant system because a new suction accumulator or receiver/drier is installed as part of the flushing or filtering procedure. Additional refrigerant system dye should only be added if more than 50% of the refrigerant system lubricant capacity has been lost due to a fitting separation, hose rupture or other damage.

Before using the R-134a fluorescent dye injector for the first time, refer to the manufacturer instructions on evacuation of any non-condensable gasses from the hoses.

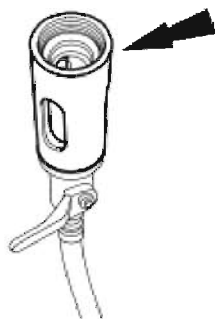
Only connect the R-134a fluorescent dye injector to a



**manifold and gauge set or R-134a refrigerant center when fluorescent dye is to be injected. The R-134a fluorescent dye injector has a one-way check valve that will prevent refrigerant system recovery and evacuation.**

**The refrigerant system pressure should be between 413-551 kPa (60-80 psi) at 24°C (75°F) with the engine off.**

1. Connect an R-134a A/C center or a manifold and gauge set to the refrigerant system port valves.
2. Verify that the valves on the fluorescent dye injector are closed.
3. Fill the fluorescent dye injector reservoir with 7 ml (0.25 oz) of fluorescent dye.



A0039090

**Fig. 84: Identifying Deluxe Injector Loop Kit Reservoir**  
**Courtesy of FORD MOTOR CO.**

4. Install the fluorescent dye injector between the low-pressure gauge port valve and the R-134a refrigerant center or manifold gauge set.
5. Open all the valves and inject the fluorescent dye into the refrigerant system.
6. When the fluorescent dye injection is complete, close all the valves.
7. Recover the refrigerant from the R-134a fluorescent dye injector.
8. Remove the fluorescent dye injector from the low-pressure gauge port valve and the R-134a A/C center or manifold gauge set.

#### **Fluorescent Dye Injection - Using a Dye Injector Loop Kit**

#### **NOTE:**

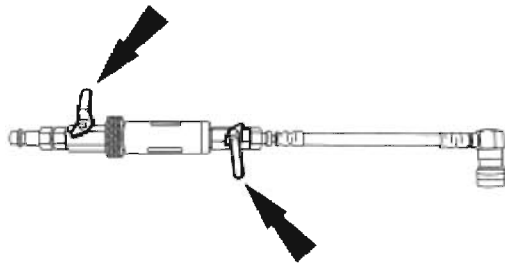
**Fluorescent refrigerant system dye is added to the refrigerant system at the factory to assist in refrigerant system leak diagnosis using an approved ultraviolet blacklight. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. New suction accumulators and receiver/driers are shipped with a fluorescent dye wafer included in the desiccant bag which will dissolve after approximately 30 minutes of continued A/C**

operation. It is not necessary to add dye after flushing or filtering the refrigerant system because a new suction accumulator or receiver/drier is installed as part of the flushing or filtering procedure. Additional refrigerant system dye should only be added if more than 50% of the refrigerant system lubricant capacity has been lost due to a fitting separation, hose rupture or other damage.

Before using the R-134a fluorescent dye injector for the first time, refer to the equipment manufacturer instructions on evacuation of non-condensable gasses from the hoses.

The refrigerant system pressure should be between 413-551 kPa (60-80 psi) at 24°C (75°F).

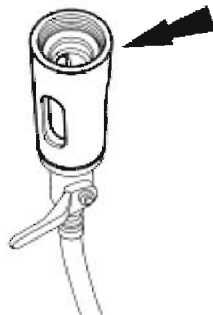
1. Verify that the valves on the injector loop kit are closed.



A0039089

**Fig. 85: Identifying Valves On Fluorescent Dye/Lubricant Injector**  
Courtesy of FORD MOTOR CO.

2. Fill the injector loop kit reservoir with 7 ml (0.24 oz) of fluorescent dye.



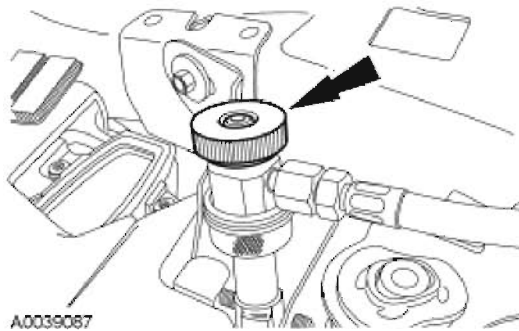
A0039090

**Fig. 86: Identifying Deluxe Injector Loop Kit Reservoir**  
Courtesy of FORD MOTOR CO.

3. Install the injector loop kit between the high-pressure and low-pressure gauge port valves.

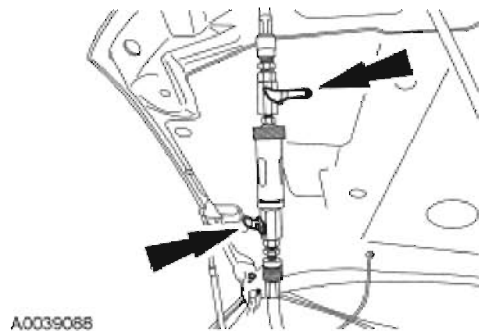
**CAUTION: Make sure all tools and hoses are clear of the engine cooling fan and drive belt before starting the engine.**

4. Start the engine.
5. Open the high-pressure valve.



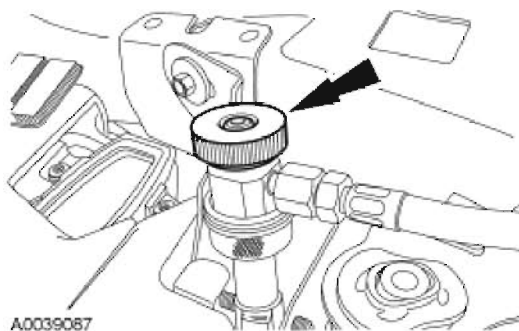
**Fig. 87: Identifying High-Pressure Service Valve**  
Courtesy of FORD MOTOR CO.

6. Open the injector loop kit valves and inject the fluorescent dye into the refrigerant system.



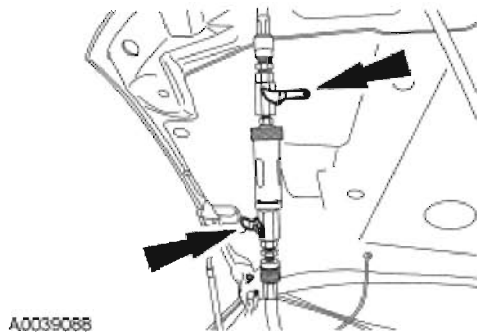
**Fig. 88: Locating Valves On Deluxe Injector Loop Kit**  
Courtesy of FORD MOTOR CO.

7. Close the high-pressure valve to allow the pressure inside the injector loop kit to equalize with the suction side of the refrigerant system.



**Fig. 89: Identifying High-Pressure Service Valve**  
Courtesy of FORD MOTOR CO.

**NOTE:** Close the valves on the injector loop kit while the A/C compressor is operating.



**Fig. 90: Locating Valves On Deluxe Injector Loop Kit**  
Courtesy of FORD MOTOR CO.

8. Close the valves on the injector loop kit.

**NOTE:** Leave all the valves on the special tool closed when not in use.

9. Disconnect the high-pressure and low-pressure valves and remove the injector loop kit from the vehicle.

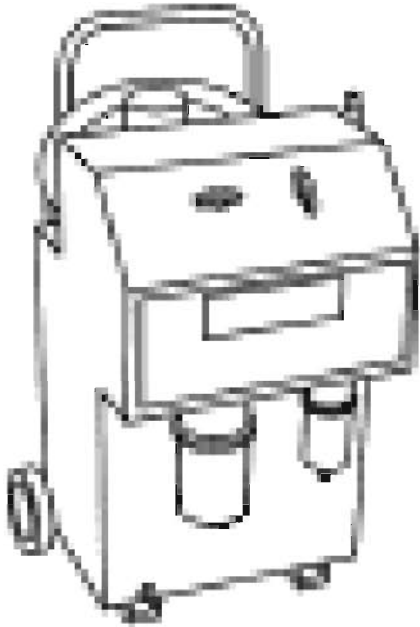
## AIR CONDITIONING (A/C) SYSTEM FLUSHING

### SPECIAL TOOL(S)

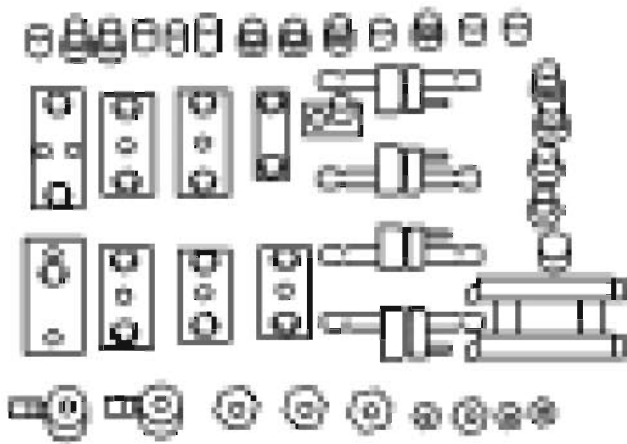
A/C Flush and Purge Machine  
219-00022 (part of 219-00023) or  
equivalent

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**ST2466-A**



**ST2469-A**

A/C Flush and Purge Fitting Kit  
219-00024 (part of 219-00023) or  
equivalent

## MATERIALS

Item	Specification
A/C Systems Flushing Solvent YN-23	-
PAG Refrigerant Compressor Oil (R-134a Systems)	WSH-M1C231-B

YN-12-D

**WARNING:**

Use extreme care and observe all safety and repair precautions related to the use of refrigerants. Failure to follow these instructions may result in serious injury or death.

Due to refrigerant hazards, always wear safety goggles and non-penetrable gloves when working on or flushing A/C systems. Failure to follow these instructions may result in serious injury or death.

**CAUTION:**

An A/C refrigerant analyzer must be used before the recovery of any vehicle A/C refrigerant. Failure to do so puts the shop bulk refrigerant at risk of contamination. If the vehicle A/C refrigerant is contaminated, refer the customer to the repair facility that carried out the last A/C repair. All contaminated A/C refrigerant must be disposed of as hazardous waste. For all equipment, follow the equipment manufacturer procedures and instructions.

Suction accumulator or receiver/drier, evaporator core orifice, and hoses with mufflers, should be removed when flushing the A/C system. Internal plumbing of these devices makes it impossible to correctly remove any residual-flushing agent. These components are typically discarded after A/C system contamination. Hoses without mufflers can normally be reused unless they are clogged with foreign material.

**NOTE:**

Prior to using the A/C Flush and Purge Machine 219-00022 for the first time, review the operating instructions.

Only the A/C Flush and Purge Machine kit, which includes A/C Flush and Purge Machine, A/C Flush and Purge Fitting Kit and the A/C Systems Flushing Solvent, is approved for use. No other flushing device or solvent is approved for flushing heat exchangers (A/C condenser, A/C evaporator). Use of any other flusher or solvent may cause damage to the A/C system and the flushing unit.

Ford Motor Company has approved a procedure to provide technicians with a non-CFC method of flushing contaminated A/C system heat exchangers. The procedure allows the

**specific components to be cleaned and flushed while installed in their normal in-vehicle location. The types of contamination flushed include particle matter that results from A/C compressor or desiccant failure and gummy residue that can form when refrigerant oil is overheated during A/C compressor seizure. The flushing process is a 2-step procedure that involves the use of an A/C Flush and Purge Machine to:**

- circulate the flushing solvent through the heat exchanger in the reverse direction of normal refrigerant flow (back-flushing). Particulate matter picked up during flushing is filtered from the returning solvent before the solvent is returned to the reservoir for continued circulation.
  - remove the flushing solvent from the heat exchanger. In this step of the procedure, pressurized air 621-862 kPa (90-125 psi) is used to push and evaporate any remaining flush solvent from the heat exchanger.
1. Recover the refrigerant. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.
  2. Disconnect the refrigerant lines from the heat exchanger(s) to be flushed.
  3. Connect the A/C flush and purge machine fitting kit and the A/C flush and purge machine to the heat exchanger to be flushed. Do not flush through the evaporator core orifice or hoses. The internal plumbing and material make-up of these components make it impossible to correctly remove foreign material or residual flushing solvent.

**NOTE: Flush the heat exchanger for a minimum of 15 minutes. The flush solvent may be used for one or both heat exchangers in the A/C system. However, the flush solvent and the flushing unit filter is intended for one vehicle only.**

4. Flush the heat exchanger for a minimum of 15 minutes.
5. Apply 621-862 kPa (90-125 psi) of pressurized air to the component for a minimum of 30 minutes. The 30-minute purge time is required to force and evaporate all residual solvent from the A/C system component. Failure to successfully remove all residual solvent within the component can result in system damage when reconnected and operated. Dispose of the used flush solvent and filter in accordance with local, state and federal regulations.

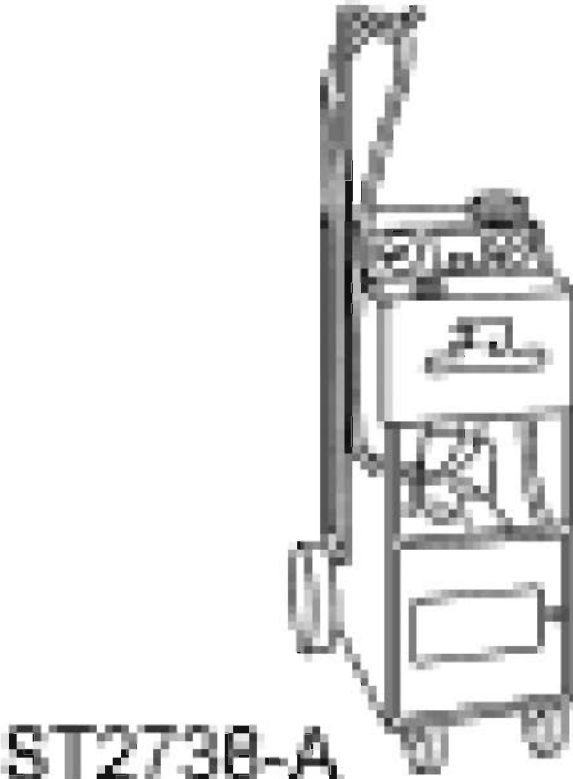
**NOTE: A/C system filtering as described in this article is optional if system flushing is carried out. However, the filter kit use is recommended after flushing if the A/C system contamination is extensive.**

6. Install a new A/C evaporator core orifice in any vehicle being repaired for an internal A/C compressor or desiccant failure.
7. Install new refrigerant hoses if clogged with foreign material.
8. Install a new suction accumulator in any vehicle being repaired for an internal A/C compressor or desiccant failure.
9. Reconnect the heat exchanger being repaired.
10. If a new A/C compressor is not to be installed, lubricate the refrigerant system with the correct amount of clean PAG oil. For additional information, refer to **REFRIGERANT OIL ADDING**.
11. If a new A/C compressor is not to be installed, evacuate, leak test, and charge the A/C system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.

#### AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING

##### Special Tool(s)

##### SPECIAL TOOL(S)

 <p>ST2738-A</p>	<p>R-134a Refrigerant Center 176-00002 or equivalent</p>



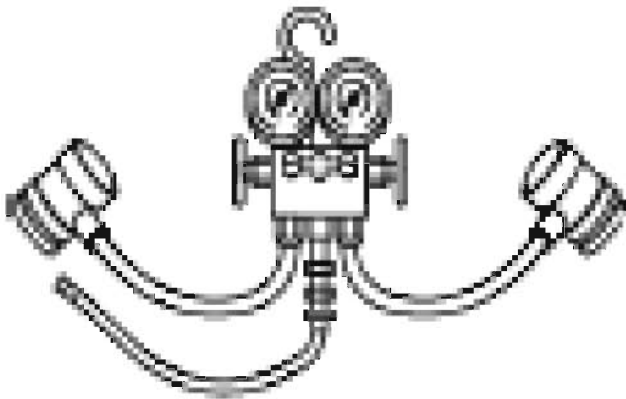
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**ST2739A**

R-134a Refrigerant Center  
023-00174 or equivalent

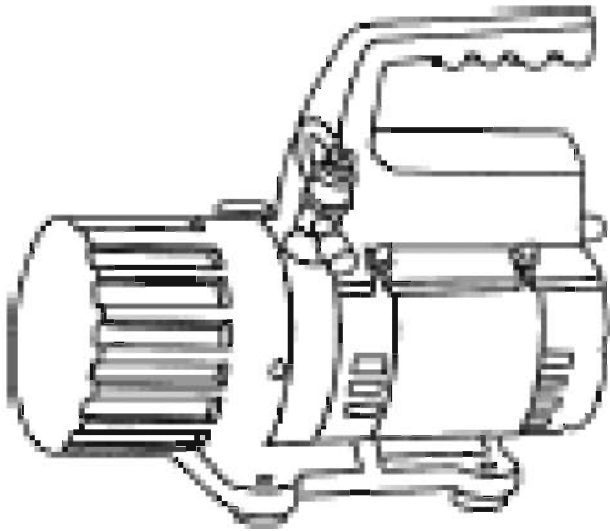


**ST1928-A**

R-134a Manifold Gauge Set  
023-00047 or equivalent

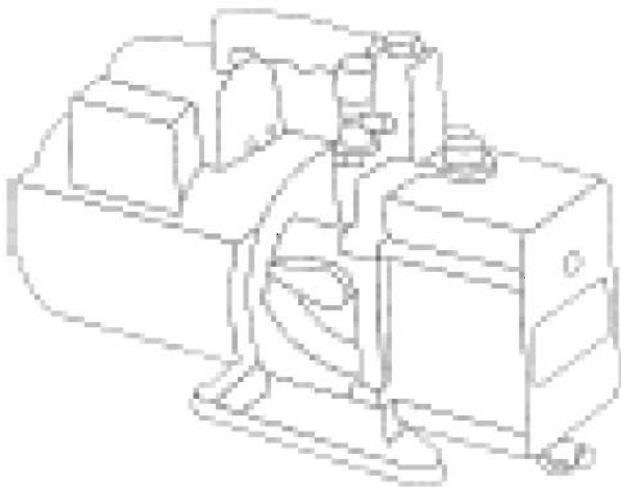
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**ST1685-A**

1.2 CFM Vacuum Pump  
023-00162 or equivalent



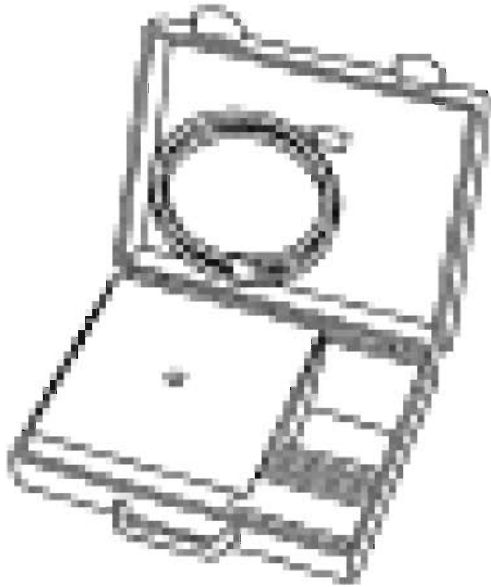
**ST1686-A**

4.0 CFM Vacuum Pump  
023-00163 or equivalent

Automatic Refrigerant Charging

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**ST2742-A**

Meter  
023-00155 or equivalent

### Materials

#### MATERIALS

Item	Specification
PAG Refrigerant Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B

### Refrigerant System Recovery

#### NOTE:

Use of a refrigerant center is recommended to carry out recovery, evacuation and charging of the refrigerant system. If a refrigerant center is not available, refrigerant system recovery, evacuation and charging may be accomplished using a separate recovery station, vacuum pump, charging meter and manifold gauge set.

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

1. Prior to recovery, you must verify the purity of the refrigerant. For additional information, refer to **REFRIGERANT IDENTIFICATION TESTING**.

2. Connect an R-134a refrigerant center to the low- and high-pressure gauge port valves following the operating instructions provided by the equipment manufacturer.
3. Recover the refrigerant from the system following the operating instructions provided by the equipment manufacturer.
4. Once the refrigerant has been recovered, switch the power supply OFF.
5. Allow the system to set for approximately 2 minutes and observe the system vacuum reading. If the vacuum is not lost, disconnect the recovery equipment.
6. If the system does lose vacuum, repeat Steps 3 through 5 until the vacuum level remains stable for 2 minutes.
7. Carry out the required repairs.

**Refrigerant System Evacuation Using an R-134a Refrigerant Center****NOTE:**

**Use of a refrigerant center is recommended to carry out recovery, evacuation and charging of the refrigerant system. If a refrigerant center is not available, refrigerant system recovery, evacuation and charging may be accomplished using a separate recovery station, vacuum pump, charging meter and manifold gauge set.**

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

1. Connect an R-134a refrigerant center to the low pressure and high pressure gauge port valves following the operating instructions provided by the equipment manufacturer.
2. Evacuate the system until the low-pressure gauge reads at least 99.4 kPa (29.5 in-Hg) of vacuum and as close to 101.1 kPa (30 in-Hg) as possible. Continue to operate the vacuum pump for a minimum of 45 minutes.
3. Turn off the vacuum pump. Observe the low-pressure gauge for 5 minutes to make sure that the system vacuum is held. If vacuum is not held for 5 minutes, leak test the system, repair the leak and evacuate the system again.

**Refrigerant System Evacuation Using an R-134a Manifold Gauge Set****NOTE:**

**Use of a refrigerant center is recommended to carry out recovery, evacuation and charging of the refrigerant system. If a refrigerant center is not available, refrigerant system recovery, evacuation and charging may be accomplished using a separate recovery station, vacuum pump, charging meter and manifold gauge set.**

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

1. Connect the R-134a manifold gauge set to the low-side and high-side gauge port valves.
2. Connect the center (yellow) hose from the manifold gauge set to the suction port on the vacuum pump.
3. Open all valves on the R-134a manifold gauge set and both gauge port valves.
4. Turn on the vacuum pump and evacuate the system until the low-pressure gauge reads at least 99.4 kPa (29.5 in-Hg) of vacuum and as close to 101.1 kPa (30 in-Hg) as possible. Continue to operate the vacuum pump for a minimum of 45 minutes.
5. Close the high-side and low-side valves on the manifold gauge set (not the gauge port valves) and turn off the vacuum pump.
6. Observe the low-pressure gauge for 5 minutes to make sure that the system vacuum is held. If vacuum is not held for 5 minutes, leak test the system, repair the leak and evacuate the system again.

#### Refrigerant System Charging Using an R-134a Refrigerant Center

##### NOTE:

**Use of a refrigerant center is recommended to carry out recovery, evacuation and charging of the refrigerant system. If a refrigerant center is not available, refrigerant system recovery, evacuation and charging may be accomplished using a separate recovery station, vacuum pump, charging meter and manifold gauge set.**

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

1. Lubricate the refrigerant system with the correct amount of clean PAG oil. For additional information, refer to **REFRIGERANT OIL ADDING**.
2. Connect an R-134a A/C center to the low-side and high-side gauge port valves following the operating instructions provided by the equipment manufacturer.
3. Set the refrigerant charge amount, and charge the refrigerant system following the instructions provided by the equipment manufacturer.

#### Refrigerant System Charging

**NOTE:**

**Use of a refrigerant center is recommended to carry out recovery, evacuation and charging of the refrigerant system. If a refrigerant center is not available, refrigerant system recovery, evacuation and charging may be accomplished using a separate recovery station, vacuum pump, charging meter and manifold gauge set.**

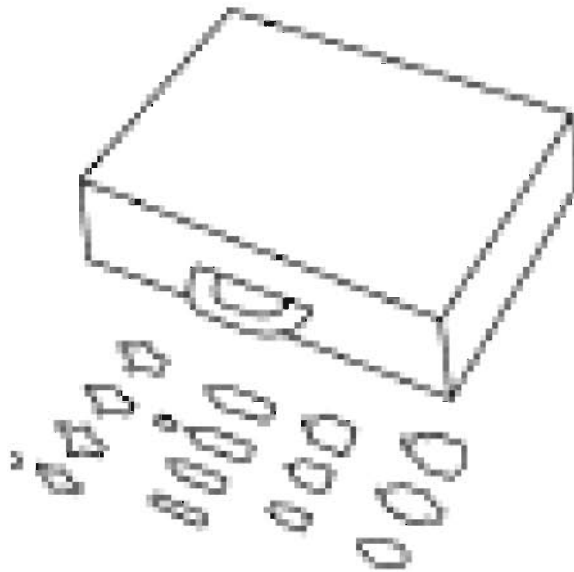
**Leaks in refrigerant system equipment, hoses or gauges can cause a leak in vacuum that may be misinterpreted as a problem with the vehicle refrigerant system. It is necessary to leak-test all refrigerant system equipment, hoses and gauges on a weekly basis to verify that no leaks are present.**

1. Lubricate the refrigerant system with the correct amount of clean PAG oil. For additional information, refer to **REFRIGERANT OIL ADDING**.
2. Assemble the R-134a manifold gauge set, automatic refrigerant charging meter and R-134a supply tank following the automatic refrigerant charging meter operating instructions.
3. Charge the refrigerant system following the automatic refrigerant charging meter operating instructions.
4. If the refrigerant flow stops before the refrigerant charge is complete, start the engine, select A/C operation and allow the refrigerant charge to complete.

**REFRIGERANT SYSTEM FILTERING FOLLOWING AIR CONDITIONING (A/C) COMPRESSOR INSTALLATION**

**SPECIAL TOOL(S)**

Set, A/C Fittings  
412-DS028 (014-00333, D93L-19703-B) or equivalent

**ST1252-A****MATERIALS**

Item	Specification
PAG Refrigerant Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B

**WARNING:**

Use extreme care and observe all safety and repair precautions related to the use of refrigerants. Failure to follow these instructions may result in serious injury or death.

Due to refrigerant hazards, always wear safety goggles and non-penetrable gloves when working on A/C systems. Failure to follow these instructions may result in serious injury or death.

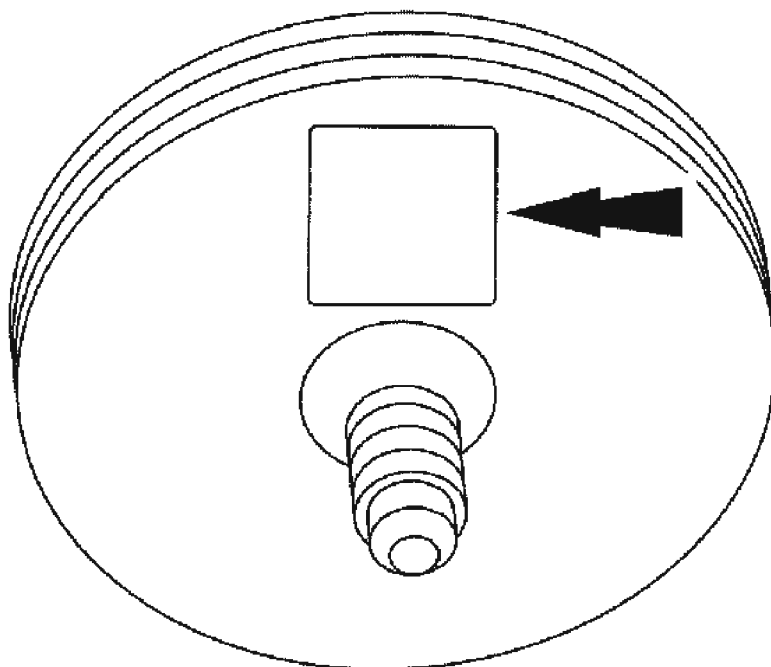
**CAUTION:**

An A/C refrigerant analyzer must be used before the recovery of any vehicle A/C refrigerant. Failure to do so puts the shop bulk refrigerant at risk of contamination. If the vehicle A/C refrigerant is contaminated, refer the customer to the repair facility that carried out the last A/C repair. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering contaminated A/C refrigerant. All contaminated A/C refrigerant must be

disposed of as hazardous waste. For all equipment, follow the equipment manufacturer procedures and instructions.

On vehicles being repaired for an internal compressor or desiccant failure, a new suction accumulator or receiver/drier, thermal expansion valve or evaporator core orifice and any hoses containing mufflers must be installed prior to filtering the A/C system. The internal plumbing of these devices makes it impossible to correctly remove any residual agent. These components are typically discarded after A/C system contamination. Hoses without mufflers can normally be reused unless they are clogged with foreign material. The filter is intended for use on one vehicle only.

1. Orient the filter inlet toward the A/C condenser core.



AL0386-B

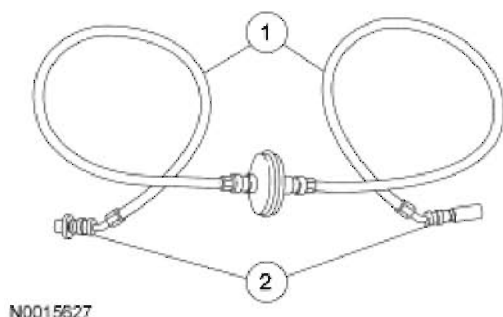
**Fig. 91: Identifying A/C Condenser Core Filter Inlet**  
Courtesy of FORD MOTOR CO.

**NOTE:** The pancake filter is not permanently installed and will be



**removed at the end of this procedure.**

2. Disconnect the condenser outlet fitting and temporarily install the pancake filter between the 2 halves of the fitting.
  1. Use flexible refrigerant hose of 17,238 kPa (2,500 psi) burst rating.
  2. Make the connections using the A/C test fitting set.



**Fig. 92: Identifying Pancake Filter And Lines**  
Courtesy of FORD MOTOR CO.

3. Lubricate the refrigerant system with the correct amount of clean PAG oil. For additional information, refer to **REFRIGERANT OIL ADDING**.
4. Evacuate and charge the refrigerant system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.
5. Check all refrigerant system hoses, lines and the newly installed filters to be sure they do not interfere with other engine compartment components. If necessary, use tie-straps to make adjustments.
6. Provide adequate airflow to the front of the vehicle (with a fan, if necessary). Select A/C operation and set the blower motor speed to maximum. Start the engine and let it idle briefly. Make sure the A/C system is operating correctly.
7. Gradually bring the engine up to 1,200 rpm by running it at lower rpms for short periods (first at 800 rpm, then at 1,000 rpm). Set the engine at 1,200 rpm and run it for 1 hour with the A/C system operating.
8. Stop the engine.
9. Recover the refrigerant. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.
10. Remove the fittings, flexible hoses and pancake filter from between the condenser and the condenser-to-evaporator tube.
11. Discard the pancake filter. It can be used one time only.
12. Install a new pancake filter, and reconnect the flexible hoses and fittings.
13. Evacuate, charge and leak-test the refrigerant system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.

## 2006 Ford Escape



2006 HVAC Climate Control System - General Information & Diagnostics - Escape & Mariner

### CHARGING.

#### REFRIGERANT OIL ADDING

Special Tool(s)

#### SPECIAL TOOL(S)

  <b>ST2740A</b>	Dye/Lubricant Injector 164-R0775
  <b>ST2737-A</b>	Add-On Module Kit 219-00069

Materials

#### MATERIALS

Item	Specification
PAG Refrigerant Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B

Refrigerant Oil Adding

**CAUTION:** During normal A/C operation, oil is circulated through the system with the refrigerant, and a small amount is retained in each component. If certain components of the system are

**removed, some of the refrigerant oil will go with the component. To maintain the original total oil charge, it is necessary to compensate for the oil lost by adding oil to the system with the new part.**

1. Refer to the table below for refrigerant oil adding amounts and methods of installation.

**REFRIGERANT OIL ADDING AMOUNT AND METHOD REFERENCE TABLE**

<b>Component</b>	<b>PAG Oil Amount</b>	<b>Method of Adding</b>
A/C compressor	Varies	Add directly to A/C compressor before installation
Suction accumulator or receiver/drier	Varies	Add directly to the suction accumulator inlet port or inject to the low-side port during system charging
Evaporator core	89 ml (3 ounces) added to the amount collected during refrigerant recovery	Add directly to the evaporator core inlet tube or inject to the low-side port during system charging
Condenser core	60 ml (2 ounces) added to the amount collected during refrigerant recovery	Add directly to the condenser core inlet or inject to the low-side port during system charging
Evaporator core orifice or thermostatic expansion valve	60 ml (2 ounces) added to the amount collected during refrigerant recovery	Inject to the low-side port during system charging
A/C pressure relief valve	60 ml (2 ounces) added to the amount collected during refrigerant recovery	Inject to the low-side port during system charging
Refrigerant hose/line	60 ml (2 ounces) added to the amount collected during refrigerant recovery (1)	Inject to the low-side port during system charging
O-ring leak repair	60 ml (2 ounces) added to the amount collected during refrigerant recovery (2)	Inject to the low-side port during system charging
Port leak repair	60 ml (2 ounces) added to the amount collected during refrigerant recovery	Inject to the low-side port during system charging

(1) If an excessive amount of refrigerant oil is lost due to a hose rupture/separation or other damage, the total system refrigerant oil capacity must be added.

(2) The amount specified may be used for one or multiple O-ring leak repairs. Do not

multiply the refrigerant oil amount by the number of O-ring leaks being repaired.

**Refrigerant Oil Adding for New A/C Compressor Installation**

**NOTE:**     **A/C compressors are shipped without refrigerant oil.**

1. Rotate the old A/C compressor shaft 8 to 10 full rotations clockwise while collecting the refrigerant oil in a clean measuring cup.
  - If the amount of oil drained from the old A/C compressor is between 85-142 ml (3-5 ounces), add the same amount plus the amount collected during refrigerant recovery.
  - If the amount of oil drained from the old A/C compressor is greater than 142 ml (5 ounces), add the same amount plus the amount collected during refrigerant recovery.
  - If the amount of oil drained from the old A/C compressor is less than 85 ml (3 ounces), add 85 ml (3 ounces) plus the amount collected during refrigerant recovery.

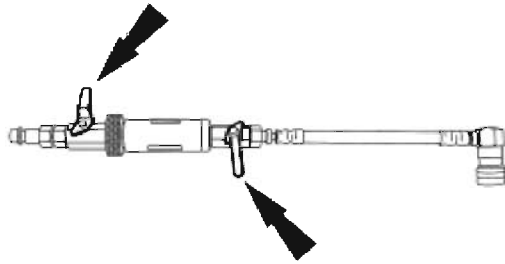
**Refrigerant Oil Adding for New Suction Accumulator or Receiver/Drier Installation**

1. Drill a 1/2 hole in the old suction accumulator or receiver/drier cylinder and drain the oil into a clean measuring cup.
2. Add the quantity of oil drained, plus the amount collected during refrigerant recovery and 60 ml (2 ounces).

**Oil Injection Using a Dye/Lubricant Injector**

**NOTE:**     **If fluorescent leak detection dye is also to be added during A/C charging, the dye may be added to the dye/lubricant injector along with the refrigerant oil.**

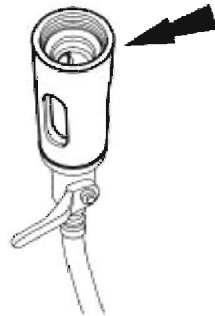
1. Evacuate the refrigerant system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING**.
2. Assemble the dye/lubricant injector using the correct adapters to match the amount of PAG oil to be injected.
3. Verify that all the valves on the dye/lubricant injector are closed.



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**Fig. 93: Identifying Valves On Fluorescent Dye/Lubricant Injector**  
Courtesy of FORD MOTOR CO.

4. Fill the dye/lubricant injector with the correct amount of clean PAG oil.



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**Fig. 94: Identifying Deluxe Injector Loop Kit Reservoir**  
Courtesy of FORD MOTOR CO.

5. Install the dye/lubricant injector between the low-side gauge port valve and the refrigerant station or manifold gauge set.
6. Open all the valves and charge the refrigerant system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING.**

## REFRIGERANT IDENTIFICATION TESTING

Special Tool(s)

## SPECIAL TOOL(S)

--	--

**ST1457-A**

Refrigerant Identifier with Air-Radiator  
198-00003 or equivalent

#### Refrigerant Identification

**NOTE:** An A/C refrigerant analyzer must be used to identify gas samples taken directly from the refrigeration system or storage containers prior to recovering or charging the refrigerant system.

1. Follow the instructions included with the refrigerant identifier to obtain the sample for testing.
2. The diagnostic tool will display 1 of the following:
  - If the purity level of R-134a is 98% or greater by weight, the green PASS light emitting diode (LED) will light. The weight concentrations of R-134a, R-12, R-22, hydrocarbons and air will be displayed on the digital display.
  - If the refrigerant R-134a does not meet the 98% purity level, the red FAIL LED will light and an alarm will sound alerting the user of potential hazards. The weight concentrations of R-134a, R-12, R-22 and hydrocarbons will be displayed on the digital display.
  - If the hydrocarbon concentrations are 2% or greater by weight, the red FAIL LED will light, Hydrocarbon High be displayed on the digital display, and an alarm will sound alerting the user of potential hazards. The weight concentrations of R-134a, R-12, R-22 and hydrocarbons will also be displayed on the digital display.
3. The percentage of air contained in the sample will be displayed if the R-134a content is

98% or greater. The diagnostic tool eliminates the effect of air when determining the refrigerant sample content because air is not considered a contaminant, although air can affect A/C system performance. When the diagnostic tool has determined that a refrigerant source is pure (R-134a is 98% or greater by weight) and the air concentration levels are 2% or greater by weight, the diagnostic tool will prompt the user if an air purge is desired.

4. If contaminated refrigerant is detected, repeat the refrigerant identification test to verify that the refrigerant is indeed contaminated.

#### Contaminated Refrigerant Handling

**CAUTION:** If contaminated refrigerant is detected, DO NOT recover the refrigerant into R-134a recovery/recycling equipment.

**NOTE:** A new suction accumulator or receiver/drier must be installed as directed by the air conditioning system flushing procedure.

1. Recover the contaminated refrigerant using suitable recovery-only equipment designed for capturing and storing contaminated refrigerant only.
  - If this equipment is not available, contact an A/C repair facility in your area with the correct equipment to carry out this repair.
2. Determine and correct the cause of the customer's initial concern.
3. Flush the air conditioning system. For additional information, refer to **AIR CONDITIONING (A/C) SYSTEM FLUSHING**.
4. Dispose of the contaminated refrigerant in accordance with all federal, state and local regulations.

#### VACUUM HOSE REPAIR

#### SPECIAL TOOL(S)

Vacuum Pump Kit  
416-D002 (D95L-7559-A) or  
equivalent



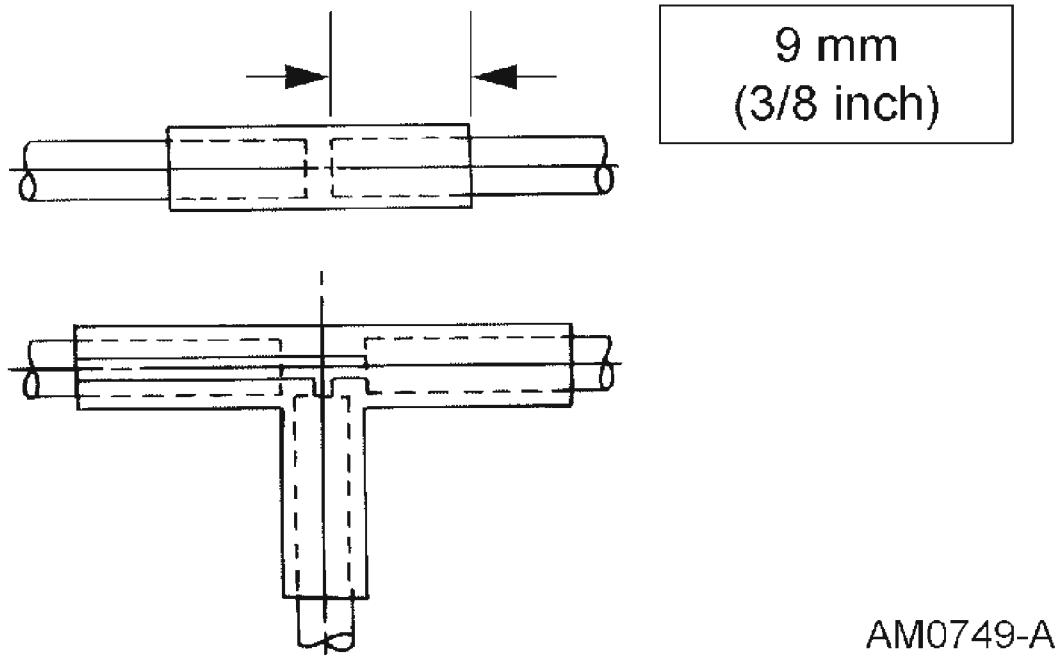
**ST1176-A**

1. Measure the length of the damaged area of the mini-tube vacuum hose.
2. Cut a piece of standard 1/8-inch inner diameter vacuum hose approximately 25 mm (1 inch) longer than the damaged area of the mini-tube vacuum hose.
3. Cut off the mini-tube vacuum hose on each side of the damaged area.

**WARNING: Read the warning information on the product label to prevent possible personal injury.**

4. Dip the mini-tube hose ends in commercially available paint thinner containing methyl ethyl ketone (MEK). This solvent will seal the mini-tube in the vacuum hose.
5. Insert the ends of the mini-tube vacuum hose approximately 9 mm (3/8 inch) into the ends of the standard 1/8-inch repair vacuum hose section.





**Fig. 95: Identifying Insert Dimension Of Mini-Tube Vacuum Hose**  
Courtesy of FORD MOTOR CO.

6. Shake the repair joint after assembly to make sure the solvent is dispersed and the vacuum line is not plugged.
7. Test the system for a vacuum leak in the repair area.
  - Use a vacuum pump.

**2004 ACCESSORIES & EQUIPMENT****Vehicle Speed Control - Escape****SPECIFICATIONS****TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
Engine appearance cover	6	-	53
Speed control actuator bolts	9	-	80
Steering wheel frame nuts	9	-	80
Speed control actuator bracket nuts	7	-	62

**DESCRIPTION AND OPERATION****SPEED CONTROL**


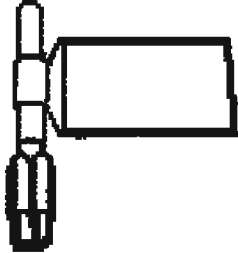
**NOTE:**      **The speed control actuator cable is not adjustable.**

The vehicle speed control system consists of the following components:

- speed control actuator
- speed control cable
- speed control indicator lamp
- speed control actuator switches
- brake pedal position (BPP) switch
- deactivator switch
- clutch pedal position (CPP) switch (manual transmission only)
- powertrain control module (PCM)
- transmission range (TR) sensor (automatic transmission only)

**DIAGNOSIS AND TESTING****SPEED CONTROL**

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

	73III Automotive Meter 105-R0057 or equivalent
	Diagnostic Tool, Restraint System (4 Req'd) 418-F468

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**Fig. 1: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Inspection and Verification

**NOTE:** If any concerns are noted with the speedometer, stoplamps, or horn, address those concerns by referring to their associated articles before continuing speed control diagnosis.

1. Verify the customer concern by operating the speed control system.
2. Visually inspect for obvious signs of mechanical or electrical damage.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

Mechanical	Electrical
<ul style="list-style-type: none"><li>Speed control cable</li></ul>	<ul style="list-style-type: none"><li>Central junction box (CJB) fuses:<ul style="list-style-type: none"><li>5 (5A)</li><li>24 (15A)</li></ul></li><li>Brake pedal position (BPP) switch</li><li>Deactivator switch</li><li>Clutch pedal position switch (manual transmission)</li><li>Transmission range (TR) sensor (automatic transmission)</li><li>Circuitry</li><li>Speed control switches</li></ul>

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**Fig. 2: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. Check the wiring harness for obvious signs of shorts, opens, bad connections, or damage.
4. Verify that the speedometer and stoplamps function correctly.
5. Verify that the throttle cable is adjusted correctly and not holding the throttle open or increasing idle speed.
6. Make sure the throttle linkage operates freely and smoothly when connected to the speed control cable and speed control actuator.
7. If the fault is not visually evident, verify the symptom and proceed to the **SYMPTOM CHART**.

#### Self-Test Diagnostics

**WARNING:** This test is a key on engine off (KOEO) test that is conducted only in park with the parking brake fully engaged.

**NOTE:** On vehicles equipped with a manual transmission, the clutch pedal needs to be applied in order to correctly perform the self-test. On vehicles equipped with an automatic transmission, the transmission selector lever needs to be in the P or N position.

- Enter self-test diagnostics by pressing the speed control OFF switch while turning the ignition key on, making sure the engine does not start and is not running. The speed control indicator lamp on the instrument panel will flash once to indicate that the speed control module has entered the diagnostic mode. Five additional flashes at this point indicate a defective speed control module. Release the OFF switch.

**NOTE:** If the ON switch is not pressed within five seconds after entering diagnostic mode, the module times out and the

**procedure must be started over.**

- Press the remaining switches in this sequence: ON, RSM (resume), CST (coast) and SET/ACCEL.
- The speed control indicator lamp will flash as each switched is pressed. Press each switch in the sequence immediately after the light goes out for the previous switch.

**NOTE:      There will be a slight delay when the last button is pressed and the lamp flashes.**

- A lamp flash with the last button (SET/ACCEL) indicates that the STATIC test has passed. If the lamp does not flash with the last button and there are no additional flashes of the lamp, the switch is defective. If the lamp does not flash with the last button, and additional flashes occur, follow the list below for trouble codes:
  - 2 flashes: Brake pedal position (BPP) switch is defective, circuit is defective or the brake pedal is applied.
  - 3 flashes: Brake deactivation switch is open or circuit is defective.
  - 4 flashes: Clutch/neutral switch circuit is defective, clutch switch is defective or the clutch is not applied.
- Immediately (.25 second) after the static test has passed, the speed control module will carry out a dynamic test automatically by actuating the throttle lever from 1 to 10 mm (.04 to .39 inches) of travel from the idle position. During the dynamic throttle pull, observe throttle movement to witness any binding or sticking of the speed control cable, verify the correct connection of the speed control cable to the throttle lever, and make sure that the throttle returns to the idle position. If incorrect connection and/or binding or sticking of the speed control is observed, go to the **SYMPTOM CHART** .

**Symptom Chart**

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>The speed control is inoperative — no flash codes</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse(s):                             <ul style="list-style-type: none"> <li>5 (5A).</li> <li>24 (15A).</li> </ul> </li> <li>Circuitry.</li> <li>Air bag sliding contact.</li> <li>Brake pedal position (BPP) switch.</li> <li>Clutch pedal position (CPP) switch (manual transmission).</li> <li>Speed control deactivator switch.</li> <li>Speed control switch.</li> <li>Transmission range (TR) sensor (automatic transmission).</li> <li>Powertrain control module (PCM)</li> <li>Speed control actuator.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test A.</a></li> </ul>
<ul style="list-style-type: none"> <li>The set speed fluctuates</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Speed control actuator.</li> <li>PCM.</li> <li>Base engine problem.</li> <li>Loose or binding speed control cable between the speed control actuator and the throttle body.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test B.</a></li> </ul>
<ul style="list-style-type: none"> <li>The speed control does not disengage when the brakes are applied</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Speed control deactivator switch.</li> <li>Brake pedal position (BPP) switch.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test C.</a></li> </ul>
<ul style="list-style-type: none"> <li>The speed control does not disengage when the clutch is applied</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Clutch pedal position (CPP) switch.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test D.</a></li> </ul>
<ul style="list-style-type: none"> <li>The speed control switch is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Speed control switch.</li> <li>Speed control actuator.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test E.</a></li> </ul>
<ul style="list-style-type: none"> <li>Flash with last switch pressed and dynamic pull occurs at throttle</li> </ul>	<ul style="list-style-type: none"> <li>—</li> </ul>	<ul style="list-style-type: none"> <li>Test passed.</li> </ul>
<ul style="list-style-type: none"> <li>Flash with last switch pressed, but no dynamic pull occurs at throttle and the speed control is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Speed control cable.</li> <li>Speed control actuator.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test F.</a></li> </ul>

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**Fig. 3: Symptom Chart (1 Of 2)**  
 Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

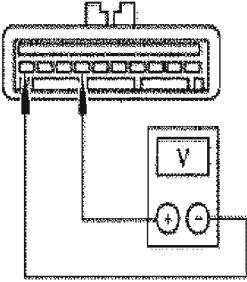
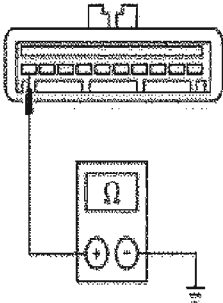
<ul style="list-style-type: none"> <li>Flash with last switch pressed, dynamic pull occurs at throttle and the speed control is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse(s): <ul style="list-style-type: none"> <li>5 (5A).</li> <li>24 (15A).</li> </ul> </li> <li>Circuitry.</li> <li>Air bag sliding contact.</li> <li>Brake pedal position (BPP) switch.</li> <li>Clutch pedal position (CPP) switch.</li> <li>Speed control deactivator switch.</li> <li>Speed control switch.</li> <li>Powertrain control module (PCM)</li> <li>Speed control actuator.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test A.</a></li> </ul>
<ul style="list-style-type: none"> <li>Flash Code 2 — BPP switch circuit failure</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>BPP switch.</li> <li>Speed control actuator.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test G.</a></li> </ul>
<ul style="list-style-type: none"> <li>Flash Code 3 — deactivator switch circuit failure</li> </ul>	<ul style="list-style-type: none"> <li>CJB fuse 24 (15A).</li> <li>Circuitry.</li> <li>Deactivator switch.</li> <li>Speed control actuator.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test H.</a></li> </ul>
<ul style="list-style-type: none"> <li>Flash Code 4 — clutch/neutral switch circuit failure</li> </ul>	<ul style="list-style-type: none"> <li>CPP switch.</li> <li>PCM.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test I.</a></li> </ul>
<ul style="list-style-type: none"> <li>The speed control indicator lamp is always on</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Speed control actuator.</li> <li>Instrument cluster.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test J.</a></li> </ul>

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**Fig. 4: Symptom Chart (2 Of 2)**  
**Courtesy of FORD MOTOR CO.**

#### Pinpoint Tests

#### PINPOINT TEST A: THE SPEED CONTROL IS INOPERATIVE

Test Step	Result / Action to Take
<b>A1 CHECK POWER AND GROUND TO THE SPEED CONTROL ACTUATOR</b> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: Speed Control Actuator C122.</li> <li>• Key in ON position.</li> <li>• Measure the voltage between the speed control actuator C122 pin 7, circuit 601 (LB/PK), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to A3.</p> <p><b>No</b> GO to A2.</p>
<b>A2 CHECK THE SPEED CONTROL ACTUATOR GROUND CIRCUIT</b> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Measure the resistance between the speed control actuator C122 pin 10, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> REPAIR circuit 601 (LB/PK). TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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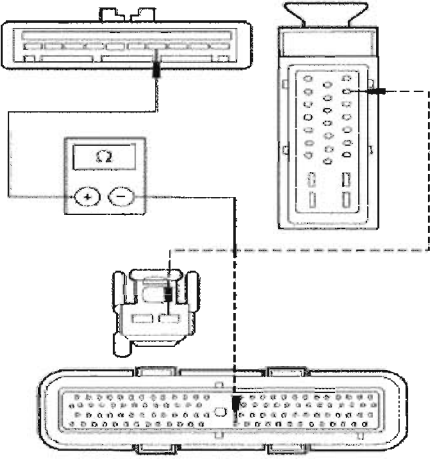
**Fig. 5: Pinpoint Test A: Speed Control Inoperative (Step A1-A2)**  
Courtesy of FORD MOTOR CO.



## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

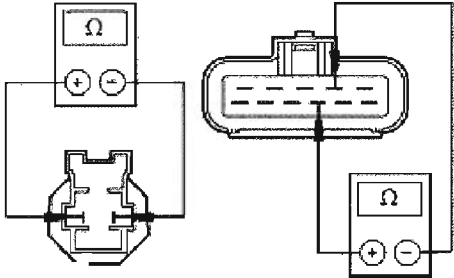
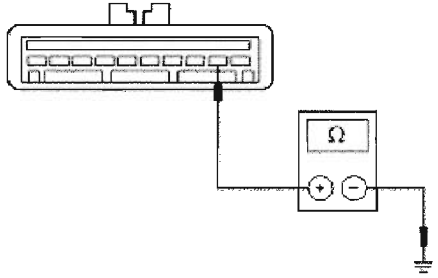
A3 CHECK THE STOPLAMPS FOR CORRECT OPERATION				
<ul style="list-style-type: none"><li>Key in OFF position.</li><li>Check the stoplamps for correct operation by pressing and releasing the brake pedal.</li><li><b>Do the stoplamps operate correctly?</b></li></ul>				
<b>Yes</b> GO to A4.				
<b>No</b> REFER to Exterior Lighting.				
A4 CHECK THE BRAKE CIRCUIT				
<ul style="list-style-type: none"><li>Measure the resistance between the following connectors pins:</li></ul>				
<b>Speed Control Actuator C122</b>	<b>PCM C175</b>	<b>Anti-lock Brake Control Module C155</b>	<b>BPP Switch C278</b>	<b>Circuit</b>
4	92	—	—	511 (LG)
4	—	2	—	511 (LG)
4	—	—	1	511 (LG)

- Are the resistances less than 5 ohms?**

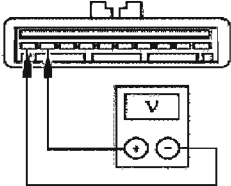
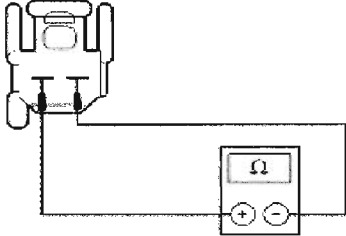
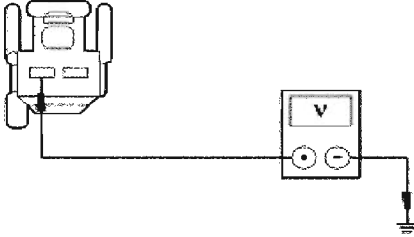
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**Fig. 6: Pinpoint Test A: Speed Control Inoperative (Step A3-A4)**  
Courtesy of FORD MOTOR CO.

<p><b>A5 CHECK THE CLUTCH PEDAL POSITION (CPP) SWITCH OR TRANSMISSION RANGE (TR) SENSOR</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: CPP Switch C2070.</li> <li>• Apply the parking brake.</li> <li>• Select DRIVE.</li> <li>• Disconnect: TR Sensor C167.</li> <li>• On vehicles with a manual transmission, measure the resistance between the CPP switch C2070 pin 4, and the CPP switch C2070 pin 2, component side. On vehicles with an automatic transmission, measure the resistance between the TR sensor C167 pin 9, and the TR sensor C167 pin 4, component side.</li> </ul>  <p>• Is the resistance greater than 10,000 ohms?</p>	<p><b>Yes</b> GO to <u>A6</u>.</p> <p><b>No</b> If manual transmission, <b>INSTALL</b> a new CPP switch. REFER to <u>Starting System</u>.</p> <p>If automatic transmission, <b>INSTALL</b> a new TR sensor. REFER to <u>Automatic Transaxle/Transmission</u>. <b>TEST</b> the system for normal operation.</p>
<p><b>A6 CHECK CIRCUIT 199 (LB/YE) FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Measure the resistance between the speed control actuator C122 pin 2, circuit 199 (LB/YE), harness side and ground.</li> </ul>  <p>• Is the resistance greater than 10,000 ohms?</p>	<p><b>Yes</b> GO to <u>A7</u>.</p> <p><b>No</b> <b>REPAIR</b> the circuit. <b>TEST</b> the system for normal operation.</p>

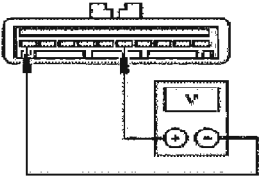
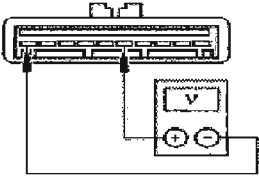
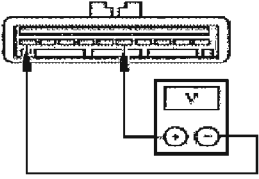
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**Fig. 7: Pinpoint Test A: Speed Control Inoperative (Step A5-A6)**  
**Courtesy of FORD MOTOR CO.**

<p><b>A7 CHECK THE DEACTIVATOR SWITCH INPUT TO THE SPEED CONTROL ACTUATOR</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the voltage between the speed control actuator C122 pin 9, circuit 810 (RD/LG), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li> </ul>  <p>• Is the voltage greater than 10 volts?</p>	<p><b>Yes</b> GO to <u>A10</u>.</p> <p><b>No</b> GO to <u>A8</u>.</p>
<p><b>A8 CHECK THE DEACTIVATOR SWITCH</b></p> <ul style="list-style-type: none"> <li>Disconnect: Deactivator Switch C277.</li> <li>Measure the resistance between the deactivator switch terminal 1, and the deactivator switch terminal 2, component side.</li> </ul>  <p>• Is the resistance less than 5 ohms?</p>	<p><b>Yes</b> GO to <u>A9</u>.</p> <p><b>No</b> INSTALL a new deactivator switch. REFER to <u>Speed Control Deactivator Switch</u> in this section. TEST the system for normal operation.</p>
<p><b>A9 CHECK DEACTIVATOR SWITCH POWER</b></p> <ul style="list-style-type: none"> <li>Measure the voltage between the deactivator switch C277 pin 2, circuit 10 (LG/RD), harness side and ground.</li> </ul>  <p>• Is the voltage greater than 10 volts?</p>	<p><b>Yes</b> REPAIR circuit 810 (RD/LG). TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 10 (LG/RD). TEST the system for normal operation.</p>

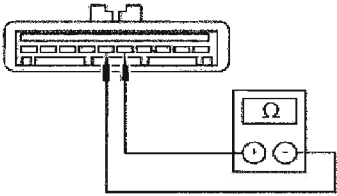
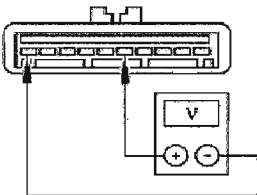
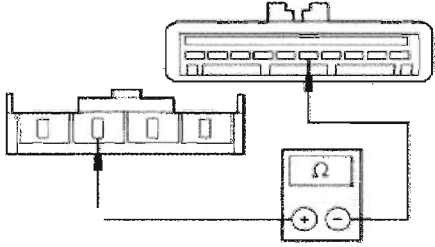
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**Fig. 8: Pinpoint Test A: Speed Control Inoperative (Step A7-A9)**  
**Courtesy of FORD MOTOR CO.**

<p><b>A10 CHECK FOR SHORT TO POWER ON CIRCUIT 151 (LB/BK)</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the voltage between the speed control actuator C122 pin 5, circuit 151 (LB/BK) harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li> </ul>  <p>• Is any voltage indicated?</p>	<p><b>Yes</b> GO to <b>A11</b>.</p> <p><b>No</b> GO to <b>A13</b>.</p>
<p><b>A11 CHECK FOR STUCK SPEED CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Remove the driver air bag. Refer to <u>Air Bag Restraint Systems</u>.</li> <li>Connect: Restraint System Diagnostic Tool 418-F468 or Equivalent.</li> <li>Connect the battery. Refer to <u>Battery, Mounting and Cables</u>.</li> <li>Disconnect: Speed Control Switch.</li> <li>Key in ON position.</li> <li>Measure the voltage between the speed control actuator C122 pin 5, circuit 151 (LB/BK), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li> </ul>  <p>• Is any voltage indicated?</p>	<p><b>Yes</b> GO to <b>A12</b>.</p> <p><b>No</b> INSTALL a new speed control switch. REFER to <u>Speed Control Switch</u> in this section. DISCONNECT the battery. REFER to <u>Battery, Mounting and Cables</u>. INSTALL the driver air bag. REFER to <u>Air Bag Restraint Systems</u>. TEST the system for normal operation.</p>
<p><b>A12 RECHECK CIRCUIT 151 (LB/BK) FOR SHORT TO POWER</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Air Bag Sliding Contact C218.</li> <li>Key in ON position.</li> <li>Measure the voltage between the speed control actuator C122 pin 5, circuit 151 (LB/BK), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li> </ul>  <p>• Is any voltage indicated?</p>	<p><b>Yes</b> REPAIR circuit 151 (LB/BK). DISCONNECT the battery. REFER to <u>Battery, Mounting and Cables</u>. INSTALL the driver air bag. REFER to <u>Air Bag Restraint Systems</u>. TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new air bag sliding contact. REFER to <u>Battery, Mounting and Cables</u>. DISCONNECT the battery. REFER to <u>Battery, Mounting and Cables</u>. INSTALL the driver air bag. REFER to <u>Battery, Mounting and Cables</u>. TEST the system for normal operation.</p>

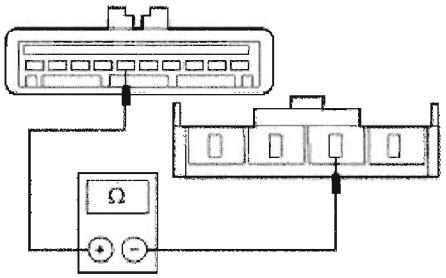
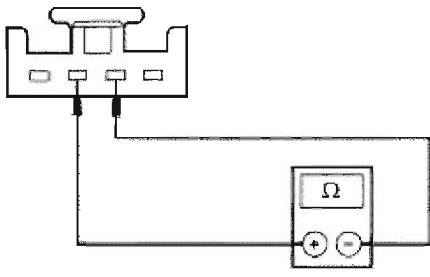
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**Fig. 9: Pinpoint Test A: Speed Control Inoperative (Step A10-A12)**  
Courtesy of FORD MOTOR CO.

<p><b>A13 CHECK THE SPEED CONTROL SWITCH OPERATION</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the speed control actuator C122 pin 5, circuit 151 (LB/BK), harness side and the speed control actuator C122 pin 6, circuit 848 (DG/OG), harness side, while pressing speed control switch SET/ACCEL.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance between 640 and 720 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>A14</u>.</p> <p><b>No</b> GO to <u>A15</u>.</p>
<p><b>A14 CHECK THE SPEED CONTROL SWITCH ON OPERATION</b></p> <ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Measure the voltage between the speed control actuator C122 pin 5, circuit 151 (LB/BK), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side, while pressing the speed control switch ON.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>A18</u>.</p> <p><b>No</b> INSTALL a new speed control switch. REFER to <u>Speed Control Switch</u> in this section. TEST the system for normal operation.</p>
<p><b>A15 CHECK CIRCUIT 151 (LB/BK) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Clockspring C218a.</li> <li>Measure the resistance between the clockspring C218a pin 2, circuit 151 (LB/BK), harness side and the speed control actuator C122 pin 5, circuit 151 (LB/BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>A16</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 10: Pinpoint Test A: Speed Control Inoperative (Step A13-A15)**  
 Courtesy of FORD MOTOR CO.

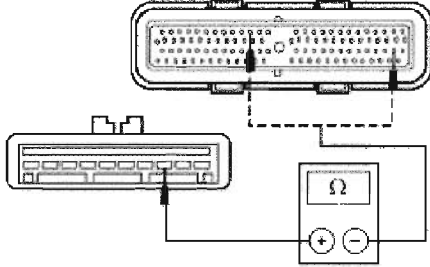
<p><b>A16 CHECK CIRCUIT 848 (DG/OG) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the clockspring C218a pin 3, circuit 848 (DG/OG), harness side and the speed control actuator C122 pin 6, circuit 848 (DG/OG), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <a href="#">A17</a>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>A17 CHECK THE CLOCKSPRING</b></p> <ul style="list-style-type: none"> <li>Remove the driver air bag. Refer to <a href="#">Air Bag Restraint Systems</a>.</li> <li>Disconnect: Speed Control Switch.</li> <li>Measure the resistance between the speed control switch connector pin B, and the speed control switch connector pin C, while pressing the speed control switch SET/ACCEL.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance between 640 and 720 ohms with the speed control actuator switch SET/ACCEL pressed?</li> </ul>	<p><b>Yes</b> INSTALL a new clockspring. REFER to <a href="#">Air Bag Restraint Systems</a>. INSTALL the driver air bag. REFER to <a href="#">Air Bag Restraint Systems</a>. TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new speed control switch. REFER to <a href="#">Speed Control Switch</a> in this section. INSTALL the driver air bag. REFER to <a href="#">Air Bag Restraint Systems</a>. TEST the system for normal operation.</p>
<p><b>A18 CHECK THE SPEEDOMETER OPERATION</b></p> <ul style="list-style-type: none"> <li>Drive the vehicle and observe the speedometer operation.</li> <li>Does the speedometer operate correctly?</li> </ul>	<p><b>Yes</b> GO to <a href="#">A19</a>.</p> <p><b>No</b> REFER to <a href="#">Instrument Cluster</a>.</p>

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**Fig. 11: Pinpoint Test A: Speed Control Inoperative (Step A16-A18)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

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<p><b>A19 CHECK CIRCUIT 679 (GY/BK) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Speed Control Actuator C122.</li> <li>Disconnect: PCM C175.</li> <li>Measure the resistance between the speed control actuator C122 pin 3, circuit 679 (GY/BK), harness side and PCM C175 pin 28 (2.0L Zetec) or pin 68 (3.0L 4V), circuit 679 (GY/BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>A20</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>A20 CHECK THE SPEED CONTROL CABLE/THROTTLE BODY LINKAGE</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Remove the speed control cable from the speed control actuator. Visually inspect the core wire and check the speed control cable by pulling on it and noting the throttle movement.</li> <li>Is the speed control cable and throttle body linkage OK?</li> </ul>	<p><b>Yes</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new speed control cable or REPAIR the throttle body linkage. To install a new speed control cable, REFER to <u>Speed Control Cable</u> in this section. TEST the system for normal operation. For repair of the throttle body linkage, REFER to <u>Acceleration Control</u>. TEST the system for normal operation.</p>

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**Fig. 12: Pinpoint Test A: Speed Control Inoperative (Step A19-A20)**  
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#### PINPOINT TEST B: THE SET SPEED FLUCTUATES

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

Test Step	Result / Action to Take
<b>B1 CHECK THE SPEED CONTROL CABLE/THROTTLE BODY LINKAGE</b>	
<ul style="list-style-type: none"><li>Key in OFF position.</li><li>Remove the speed control cable from the speed control actuator. Visually inspect the core wire and check the speed control cable by pulling on it and noting the throttle movement.</li><li><b>Is the speed control cable and throttle body linkage OK?</b></li></ul>	<p><b>Yes</b> GO to <a href="#">B2</a>.</p> <p><b>No</b> INSTALL a new speed control cable or REPAIR the throttle body linkage. To install a new speed control cable, REFER to <a href="#">Speed Control Cable</a> in this section. TEST the system for normal operation. For repair of the throttle body linkage, REFER to <a href="#">Acceleration Control</a>. TEST the system for normal operation.</p>
<b>B2 CHECK THE SPEEDOMETER OPERATION</b>	
<ul style="list-style-type: none"><li>Drive the vehicle and observe the speedometer operation.</li><li><b>Does the speedometer needle fluctuate?</b></li></ul>	<p><b>Yes</b> REFER to <a href="#">Instrument Cluster</a>.</p> <p><b>No</b> INSTALL a new speed control actuator. REFER to <a href="#">Speed Control Actuator</a> in this article. TEST the system for normal operation.</p>

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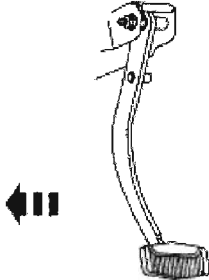
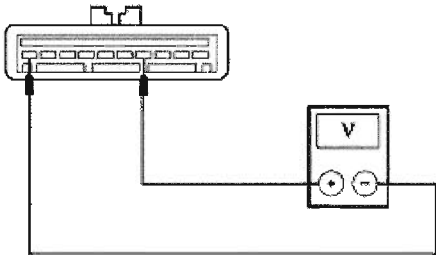
**Fig. 13: Pinpoint Test B: Set Speed Fluctuates (Step B1-B2)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST C: THE SPEED CONTROL DOES NOT DISENGAGE WHEN THE BRAKES ARE APPLIED**



## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

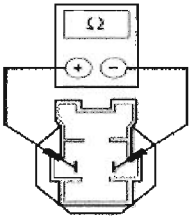
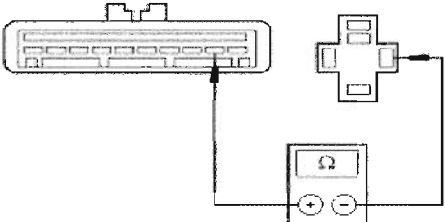
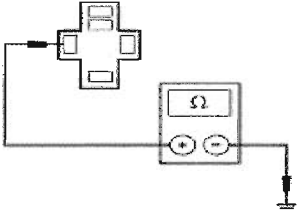
Test Step	Result / Action to Take
<b>C1 CHECK THE STOPLAMPS FOR CORRECT OPERATION</b> <ul style="list-style-type: none"><li>Check the stoplamps for correct operation by pressing and releasing the brake pedal.</li><li><b>Do the stoplamps operate correctly?</b></li></ul>	<b>Yes</b> GO to <u>C2</u> .  <b>No</b> REFER to <u>Exterior Lighting</u> .
<b>C2 CHECK THE BRAKE CIRCUIT</b> <ul style="list-style-type: none"><li>Disconnect: Speed Control Actuator C122.</li></ul>  <ul style="list-style-type: none"><li>Measure the voltage between the speed control actuator C122 pin 4, circuit 511 (LG), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li></ul>  <ul style="list-style-type: none"><li><b>Is the voltage greater than 10 volts?</b></li></ul>	<b>Yes</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this article. TEST the system for normal operation.  <b>No</b> REPAIR circuit 511 (LG). TEST the system for normal operation.

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**Fig. 14: Pinpoint Test C: Speed Control Does Not Disengage When Brakes Are Applied (Step C1-C2)**

Courtesy of FORD MOTOR CO.

**PINPOINT TEST D: THE SPEED CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH IS APPLIED**

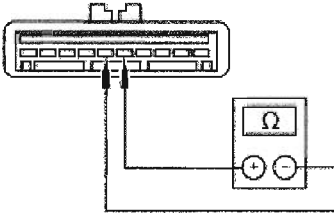
Test Step	Result / Action to Take
<b>D1 CHECK THE CLUTCH PEDAL POSITION (CPP) SWITCH</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: CPP Switch C2070.</li> <li>Clutch is applied.</li> <li>Measure the resistance between the clutch pedal position (CPP) switch terminal A, and the CPP switch terminal B (component side).</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>D2</u>.</p> <p><b>No</b> INSTALL a new CPP switch. REFER to <u>Starting System</u>. TEST the system for normal operation.</p>
<b>D2 CHECK CIRCUIT 199 (LB/YE) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Speed Control Actuator C122.</li> <li>Measure the resistance between the speed control actuator C122 pin 2, circuit 199 (LB/YE), harness side and the CPP switch C2070, circuit 199 (LB/YE), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>D3</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>D3 CHECK CIRCUIT 89 (OG) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Measure the resistance between the CPP switch C2070, circuit 89 (OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new speed control actuator. REFER to Speed Control Actuator in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 15: Pinpoint Test D: Speed Control Does Not Disengage When Clutch Applied (Step D1-D3)**

Courtesy of FORD MOTOR CO.

PINPOINT TEST E: THE SPEED CONTROL SWITCH IS INOPERATIVE

Test Step	Result / Action to Take										
<b>E1 CHECK THE SPEED CONTROL SWITCH</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Speed Control Actuator C122.</li><li>Measure the resistance between the speed control actuator C122 pin 5, circuit 151 (LB/BK), harness side and the speed control actuator C122 pin 6, circuit 848 (DG/OG), harness side while pressing the speed control switch as follows:</li></ul> <table><tr><th>Speed Control Switch</th><th>Resistance Value</th></tr><tr><td>Coast</td><td>Between 114 and 126 ohms</td></tr><tr><td>SET/ACCEL</td><td>Between 646 and 714 ohms</td></tr><tr><td>Resume</td><td>Between 2,090 and 2,310 ohms</td></tr><tr><td>Off</td><td>Less than 5 ohms</td></tr></table>  <ul style="list-style-type: none"><li>Are the speed control switch resistance values OK?</li></ul>	Speed Control Switch	Resistance Value	Coast	Between 114 and 126 ohms	SET/ACCEL	Between 646 and 714 ohms	Resume	Between 2,090 and 2,310 ohms	Off	Less than 5 ohms	<p><b>Yes</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new speed control switch. REFER to <u>Speed Control Switch</u> in this section. TEST the system for normal operation.</p>
Speed Control Switch	Resistance Value										
Coast	Between 114 and 126 ohms										
SET/ACCEL	Between 646 and 714 ohms										
Resume	Between 2,090 and 2,310 ohms										
Off	Less than 5 ohms										

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**Fig. 16: Pinpoint Test E: Speed Control Switch Inoperative (Step E1)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST F: FLASH WITH LAST SWITCH PRESSED, BUT NO DYNAMIC PULL OCCURS AT THE THROTTLE AND THE SPEED CONTROL IS INOPERATIVE**

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

Test Step	Result / Action to Take
<b>F1 CHECK THE SPEED CONTROL CABLE</b> <ul style="list-style-type: none"><li>Check the speed control cable for correct attachment at the speed control actuator and throttle body.</li><li><b>Is the speed control cable attached correctly?</b></li></ul>	<b>Yes</b> GO to <b>F2</b> . <b>No</b> RECONNECT the speed control cable. REPEAT the self-test.
<b>F2 CHECK FOR A STICKING OR BINDING SPEED CONTROL CABLE</b> <ul style="list-style-type: none"><li>Check the speed control cable for sticking or binding.</li><li><b>Is the speed control cable OK?</b></li></ul>	<b>Yes</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this section. TEST the system for normal operation. <b>No</b> REPAIR or INSTALL a new speed control cable. REFER to <u>Speed Control Cable</u> in this section. REPEAT the self-test.

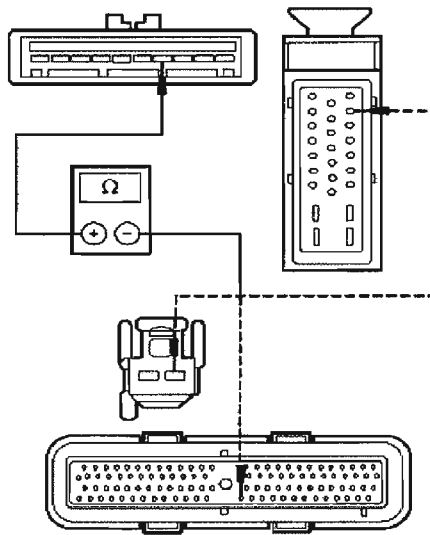
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**Fig. 17: Pinpoint Test F: Flash With Last Switch Pressed, But No Dynamic Pull Occurs At Throttle And Speed Control Inoperative (Step F1-F2)**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST G: FLASH CODE 2 - BPP SWITCH CIRCUIT FAILURE**

# 2004 Ford Escape

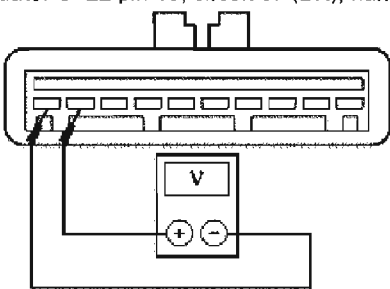
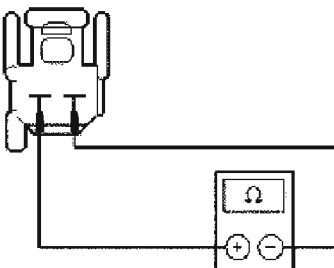
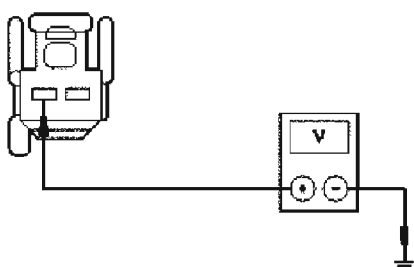
## 2004 ACCESSORIES & EQUIPMENT Vehicle Speed Control - Escape

Test Step	Result / Action to Take																				
<b>G1 CHECK THE STOPLAMP OPERATION</b> <ul style="list-style-type: none"><li>Press and release the brake pedal while observing the stoplamps.</li><li><b>Do the stoplamps operate correctly?</b></li></ul>	<b>Yes</b> GO to <u>G2</u> . <b>No</b> REFER to <u>Exterior Lighting</u> .																				
<b>G2 CHECK THE BRAKE CIRCUIT</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Speed Control Actuator C122.</li><li>Disconnect: PCM C175.</li><li>Disconnect: Anti-lock Brake Control Module C155.</li><li>Disconnect: BPP Switch C278.</li><li>Measure the resistance between the following connectors pins:</li></ul> <table><thead><tr><th>Speed Control Actuator C122</th><th>PCM C175</th><th>Anti-lock Brake Control Module C155</th><th>BPP Switch C278</th><th>Circuit</th></tr></thead><tbody><tr><td>4</td><td>92</td><td>—</td><td>—</td><td>511 (LG)</td></tr><tr><td>4</td><td>—</td><td>2</td><td>—</td><td>511 (LG)</td></tr><tr><td>4</td><td>—</td><td>—</td><td>1</td><td>511 (LG)</td></tr></tbody></table>  <ul style="list-style-type: none"><li><b>Are the resistances less than 5 ohms?</b></li></ul>	Speed Control Actuator C122	PCM C175	Anti-lock Brake Control Module C155	BPP Switch C278	Circuit	4	92	—	—	511 (LG)	4	—	2	—	511 (LG)	4	—	—	1	511 (LG)	<b>Yes</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this article. . TEST the system for normal operation. <b>No</b> REPAIR the circuit. TEST the system for normal operation.
Speed Control Actuator C122	PCM C175	Anti-lock Brake Control Module C155	BPP Switch C278	Circuit																	
4	92	—	—	511 (LG)																	
4	—	2	—	511 (LG)																	
4	—	—	1	511 (LG)																	

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**Fig. 18: Pinpoint Test G: Flash Code 2 - BPP Switch Circuit Failure (Step G1-G2)**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST H: FLASH CODE 3 - DEACTIVATOR SWITCH CIRCUIT FAILURE**

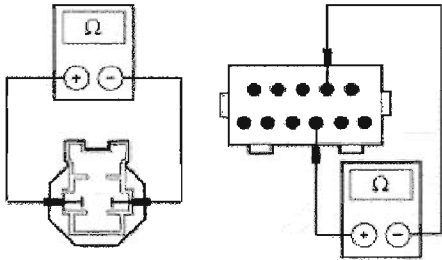
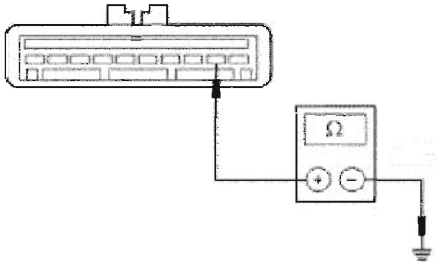
Test Step	Result / Action to Take
<b>H1 CHECK THE DEACTIVATOR SWITCH INPUT TO THE SPEED CONTROL ACTUATOR</b> <ul style="list-style-type: none"> <li>Disconnect: Speed Control Actuator C122.</li> <li>Measure the voltage between the speed control actuator C122 pin 9, circuit 810 (RD/LG), harness side and the speed control actuator C122 pin 10, circuit 57 (BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this section. REPEAT the self-test.</p> <p><b>No</b> GO to H2.</p>
<b>H2 CHECK THE DEACTIVATOR SWITCH</b> <ul style="list-style-type: none"> <li>Disconnect: Deactivator Switch C277.</li> <li>Measure the resistance between the deactivator switch terminal 1, and the deactivator switch terminal 2, component side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to H3.</p> <p><b>No</b> INSTALL a new deactivator switch. REFER to <u>Speed Control Deactivator Switch</u> in this section. REPEAT the self-test.</p>
<b>H3 CHECK DEACTIVATOR SWITCH POWER</b> <ul style="list-style-type: none"> <li>Measure the voltage between the deactivator switch C277 pin 2, circuit 10 (LG/RD), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> REPAIR circuit 810 (RD/LG). REPEAT the self-test.</p> <p><b>No</b> REPAIR circuit 10 (LG/RD). TEST the system for normal operation.</p>

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**Fig. 19: Pinpoint Test H: Flash Code 3 - Deactivator Switch Circuit Failure (Step H1-H3)**

Courtesy of FORD MOTOR CO.

**PINPOINT TEST I: FLASH CODE 4 - CLUTCH/NEUTRAL SWITCH CIRCUIT FAILURE**

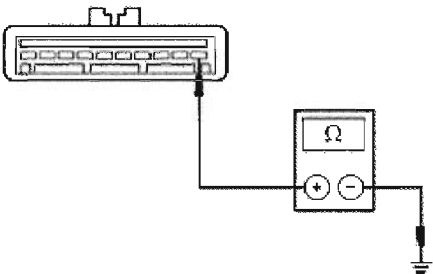
Test Step	Result / Action to Take
<b>I1 CHECK THE CLUTCH PEDAL POSITION (CPP) SWITCH OR TRANSMISSION RANGE (TR) SENSOR</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: CPP Switch C2070 (M/T).</li> <li>Disconnect: TR Sensor C167 (Automatic Transmission).</li> <li>For vehicles with automatic transmission, place the gearshift lever in the D position.</li> <li>Measure the resistance between the CPP switch C2070 pin 4, and the CPP switch C2070 pin 2, component side; or between the TR sensor C167 pin 9, component side and the TR sensor C167 pin 4, component side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>I2</u>.</p> <p><b>No</b> On vehicles with manual transmission, <b>INSTALL</b> a new CPP switch. REFER to <u>Starting System</u>. TEST the system for normal operation.</p> <p>On vehicles with automatic transmission, <b>INSTALL</b> a new TR sensor. REFER to <u>Automatic Transaxle/Transmission</u>. TEST the system for normal operation.</p>
<b>I2 CHECK CIRCUIT 199 (LB/YE) FOR SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between the speed control actuator C122 pin 2, circuit 199 (LB/YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> <b>INSTALL</b> a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this article. REPEAT the self-test.</p> <p><b>No</b> <b>REPAIR</b> the circuit. TEST the system for normal operation.</p>

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**Fig. 20: Pinpoint Test I: Flash Code 4 - Clutch/Neutral Switch Circuit Failure (Step I1 - I2)**

Courtesy of FORD MOTOR CO.

**PINPOINT TEST J: THE SPEED CONTROL INDICATOR LAMP IS ALWAYS ON**

Test Step	Result / Action to Take
<b>J1 CHECK SPEED CONTROL ACTUATOR FOR SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Speed Control Actuator C122.</li> <li><b>Is the indicator lamp illuminated?</b></li> </ul>	<p><b>Yes</b> GO to J2.</p> <p><b>No</b> INSTALL a new speed control actuator. REFER to <u>Speed Control Actuator</u> in this section. TEST the system for normal operation.</p>
<b>J2 CHECK CIRCUIT 203 (OG/LB) FOR SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Disconnect: Instrument Cluster C220b.</li> <li>Measure the resistance between the speed control actuator C122 pin 1, circuit 203 (OG/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Is the resistance greater than 10,000 ohms?</b></li> </ul>	<p><b>Yes</b> INSTALL a new instrument cluster. REFER to <u>Instrument Cluster</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 21: Pinpoint Test J: Speed Control Indicator Lamp Is Always On (Step J1-J2)**  
Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

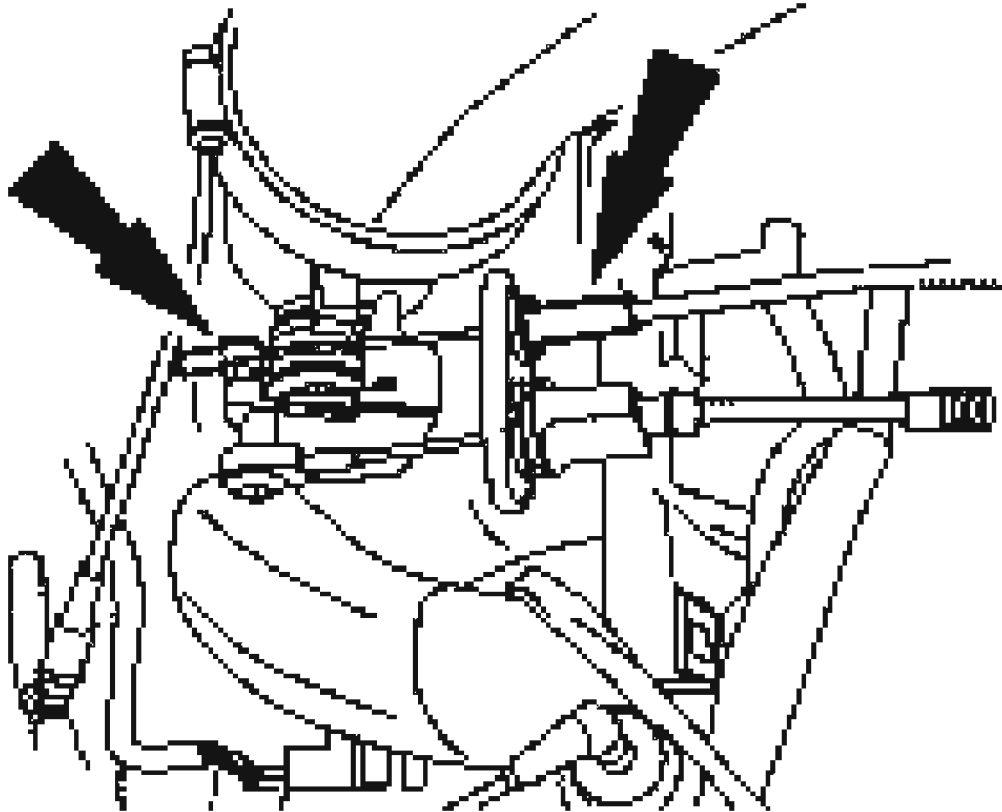
### SPEED CONTROL CABLE

#### Removal and Installation

#### Vehicles equipped with 2.0L Zetec engine

1. Disconnect the speed control cable from the throttle control linkage and bracket.





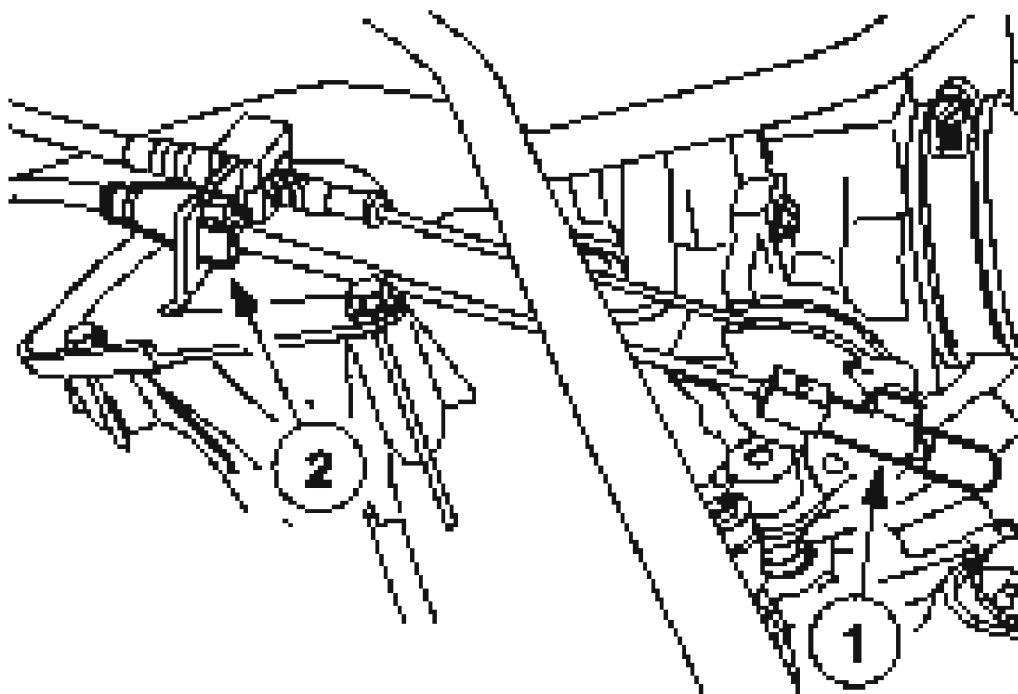
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**Fig. 22: Disconnecting Speed Control Cable From Throttle Control Linkage And Bracket**

Courtesy of FORD MOTOR CO.

**Vehicles equipped with 3.0L (4V) engine**

2. Disconnect the speed control cable from the throttle control linkage and bracket.
  1. Disconnect the cable from the throttle control linkage.
  2. Squeeze the tabs and disconnect the speed control cable from the bracket.

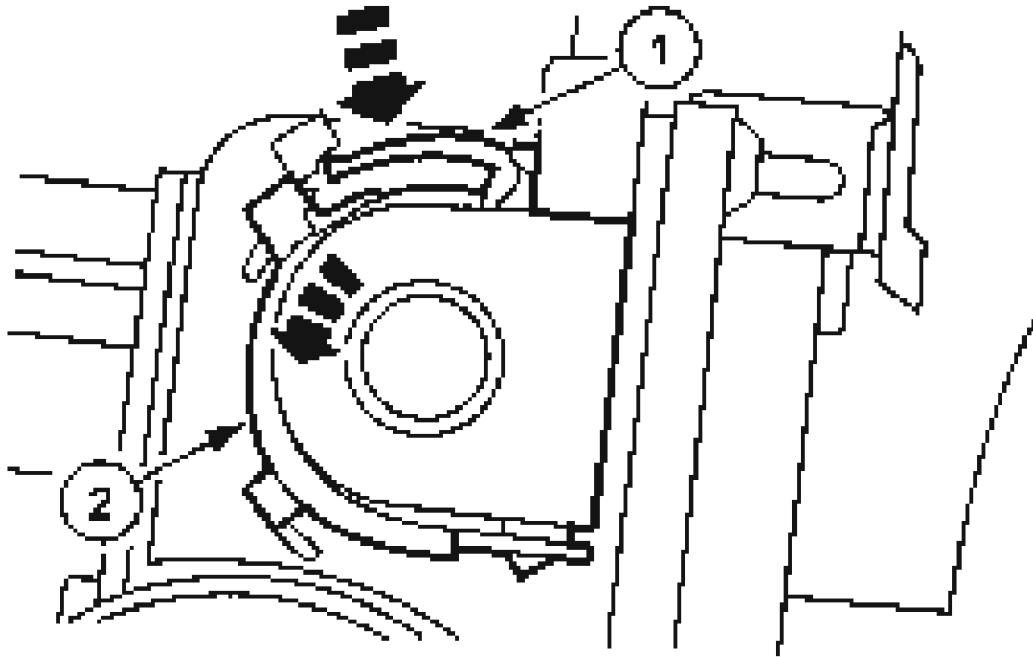


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**Fig. 23: Disconnecting Speed Control Cable From Throttle Linkage & Bracket**  
Courtesy of FORD MOTOR CO.

**All vehicles**

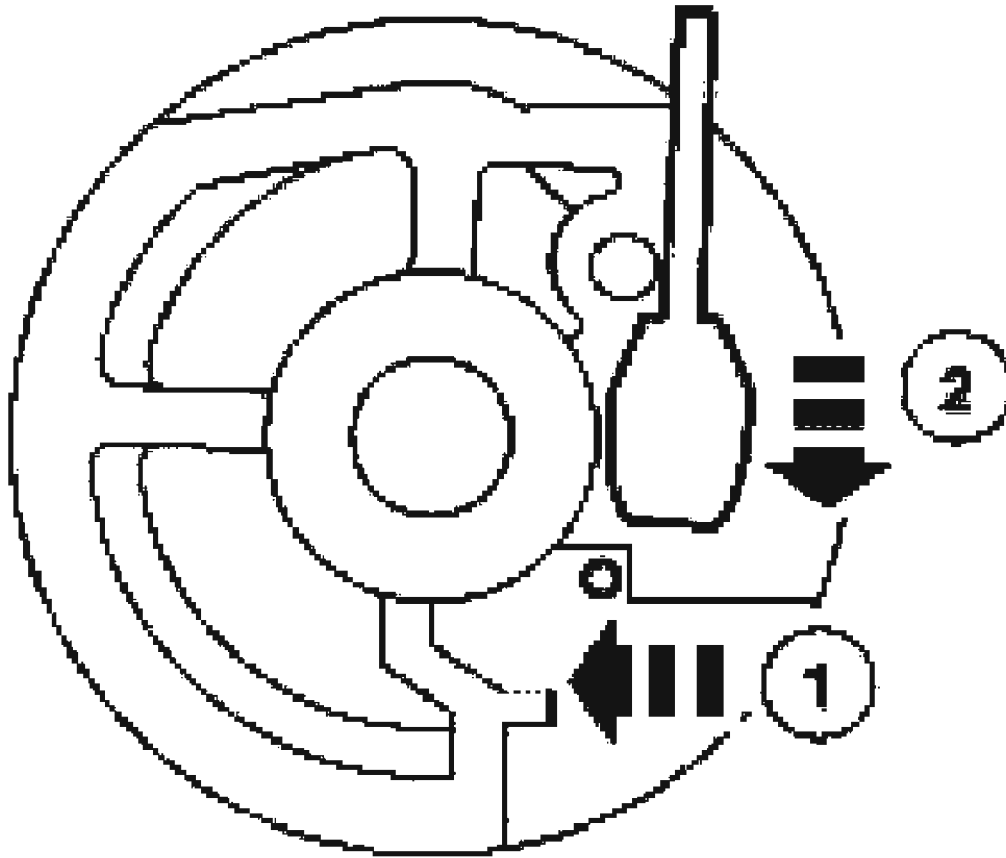
3. Release the speed control cable cap.
  1. Depress the speed control cable cap retaining tab.
  2. Rotate the speed control cable cap.



G02740435

**Fig. 24: Releasing Speed Control Cable Cap**  
Courtesy of FORD MOTOR CO.

4. Remove and discard the speed control cable.
  1. Depress the spring retainer.
  2. Slide the core wire end out of the speed control servo pulley and remove the speed control cable.



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**Fig. 25: Removing Speed Control Cable**  
Courtesy of FORD MOTOR CO.

**CAUTION: A new speed control cable must be installed.**

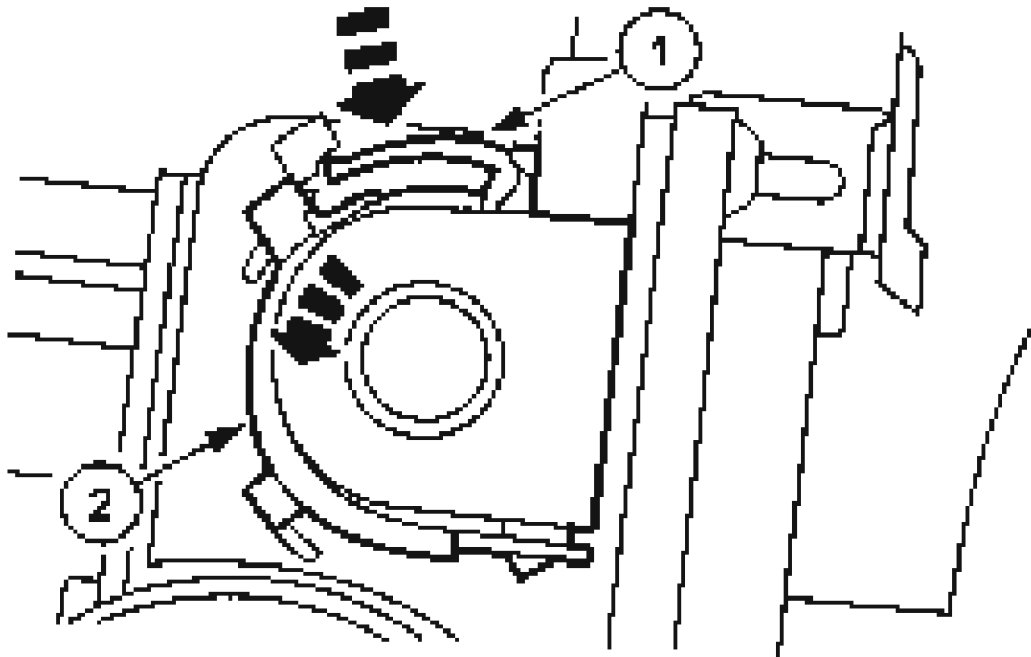
5. To install, reverse the removal procedure.

#### **SPEED CONTROL ACTUATOR**

##### **Removal and Installation**

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Release the speed control cable cap.

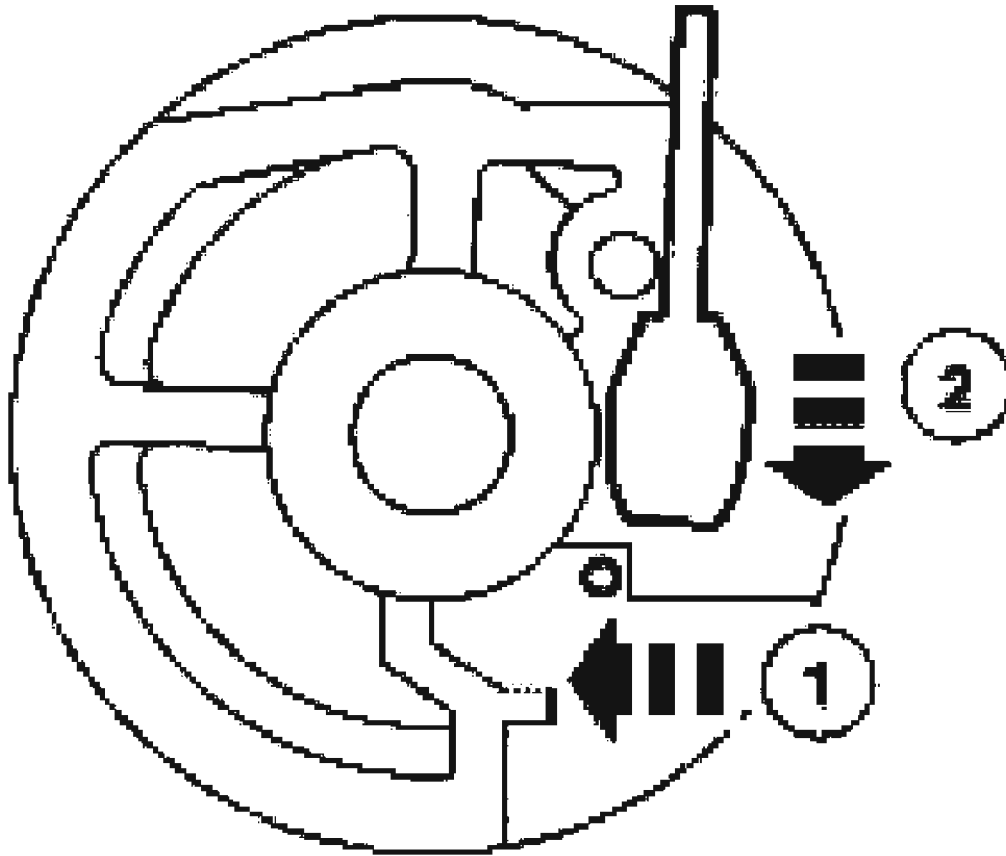
1. Squeeze the speed control cable cap retaining tab.
2. Rotate the speed control cable cap.



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**Fig. 26: Releasing Speed Control Cable Cap**  
Courtesy of FORD MOTOR CO.

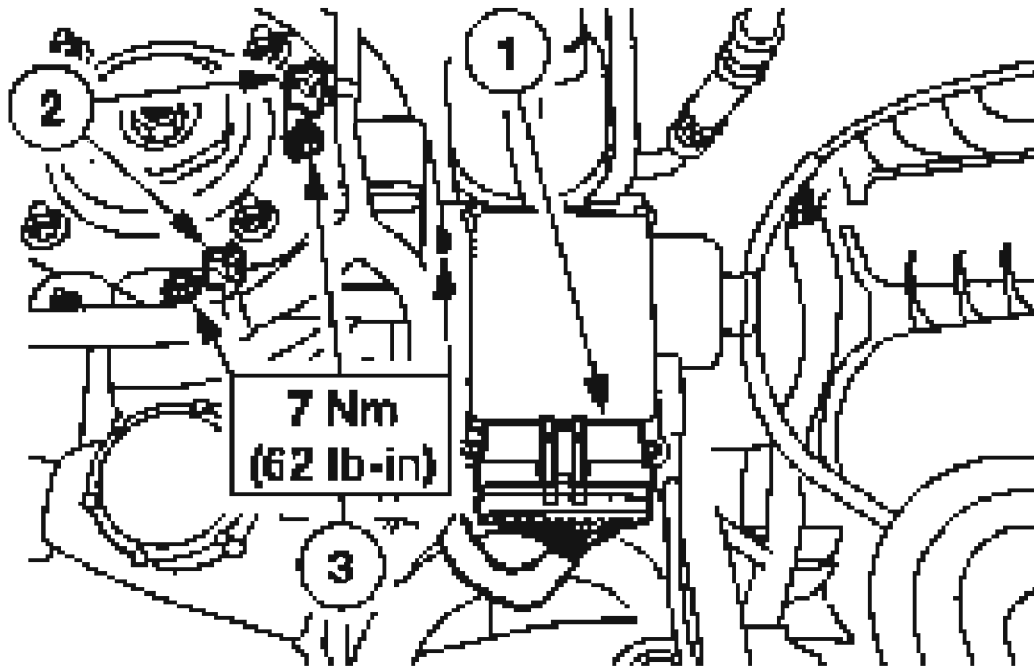
3. Remove the speed control cable.
  1. Depress the spring retainer.
  2. Slide the core wire end out of the speed control servo pulley and remove the speed control cable.



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**Fig. 27: Removing Speed Control Cable**  
Courtesy of FORD MOTOR CO.

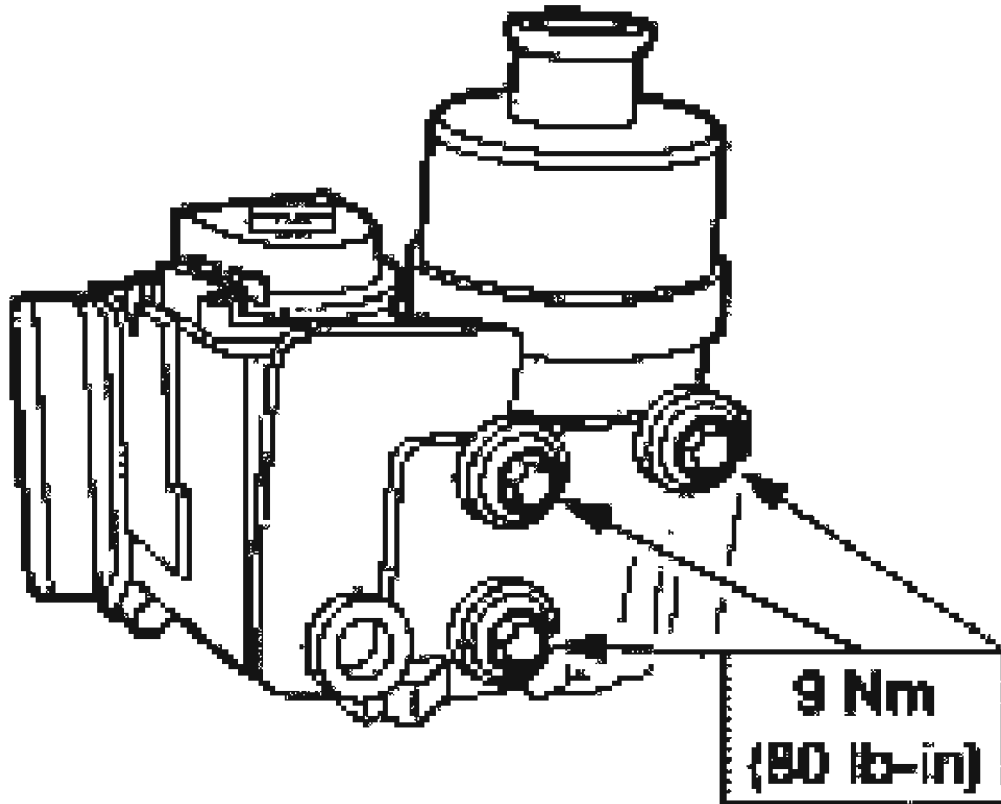
4. Remove the speed control actuator assembly.
  1. Disconnect the electrical connector.
  2. Separate the wire harness from the bracket.
  3. Remove the nuts.



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**Fig. 28: Removing Speed Control Cable Assembly**  
Courtesy of FORD MOTOR CO.

5. Remove the bolts and separate the speed control actuator from the bracket.



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**Fig. 29: Removing Bolts**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.

## **SPEED CONTROL SWITCH**

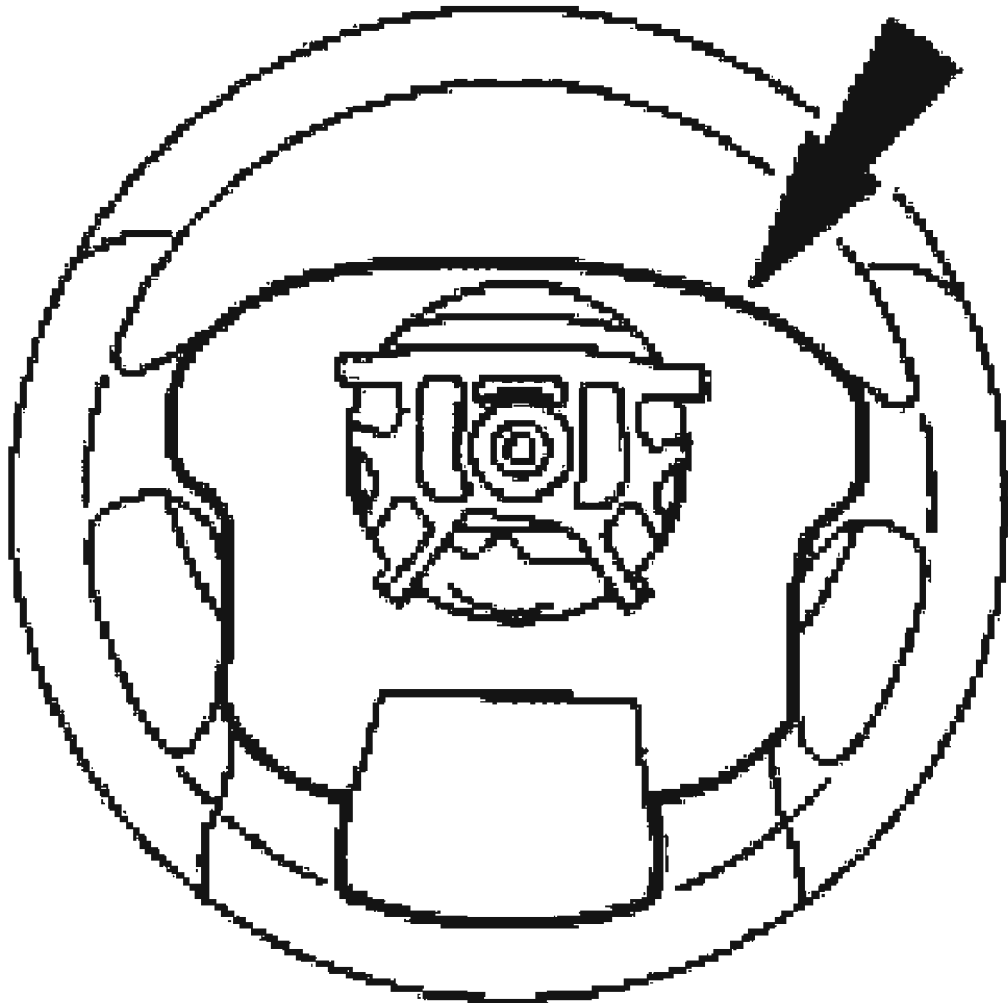
### **Removal and Installation**

1. Remove the steering wheel. For additional information, refer to **STEERING COLUMN**.

**WARNING:** When carrying a live air bag, make sure the bag and trim cover are pointed away from your body. In the unlikely event of an accidental deployment, the bag will then deploy with minimal chance of injury. Failure to follow these instructions may result in personal



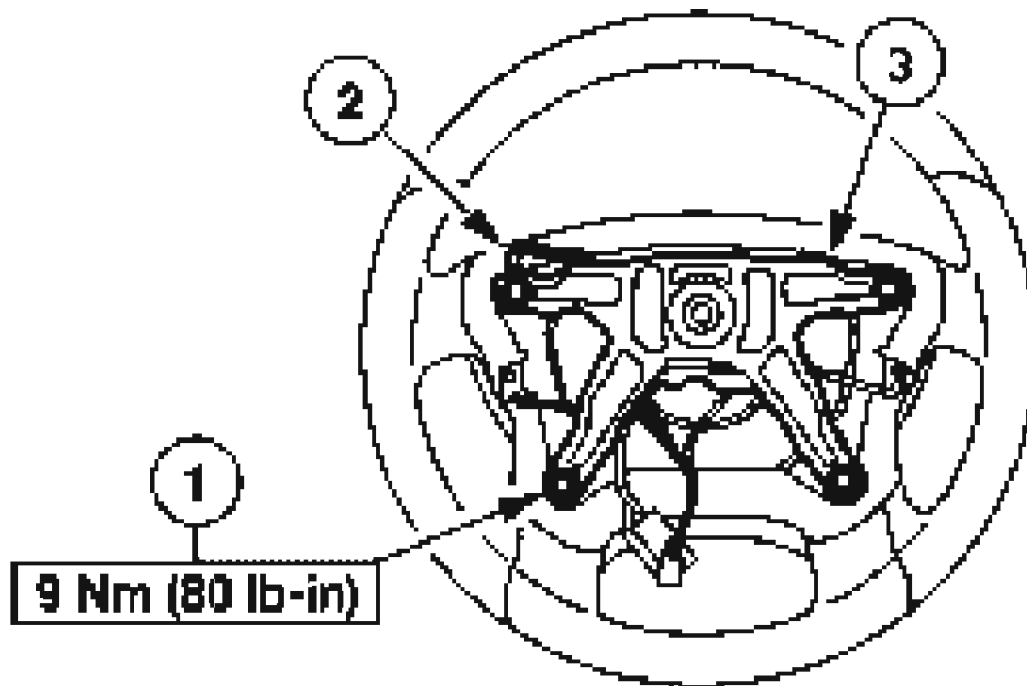
injury.



G02740441

**Fig. 30: Removing Steering Wheel Cover**  
Courtesy of FORD MOTOR CO.

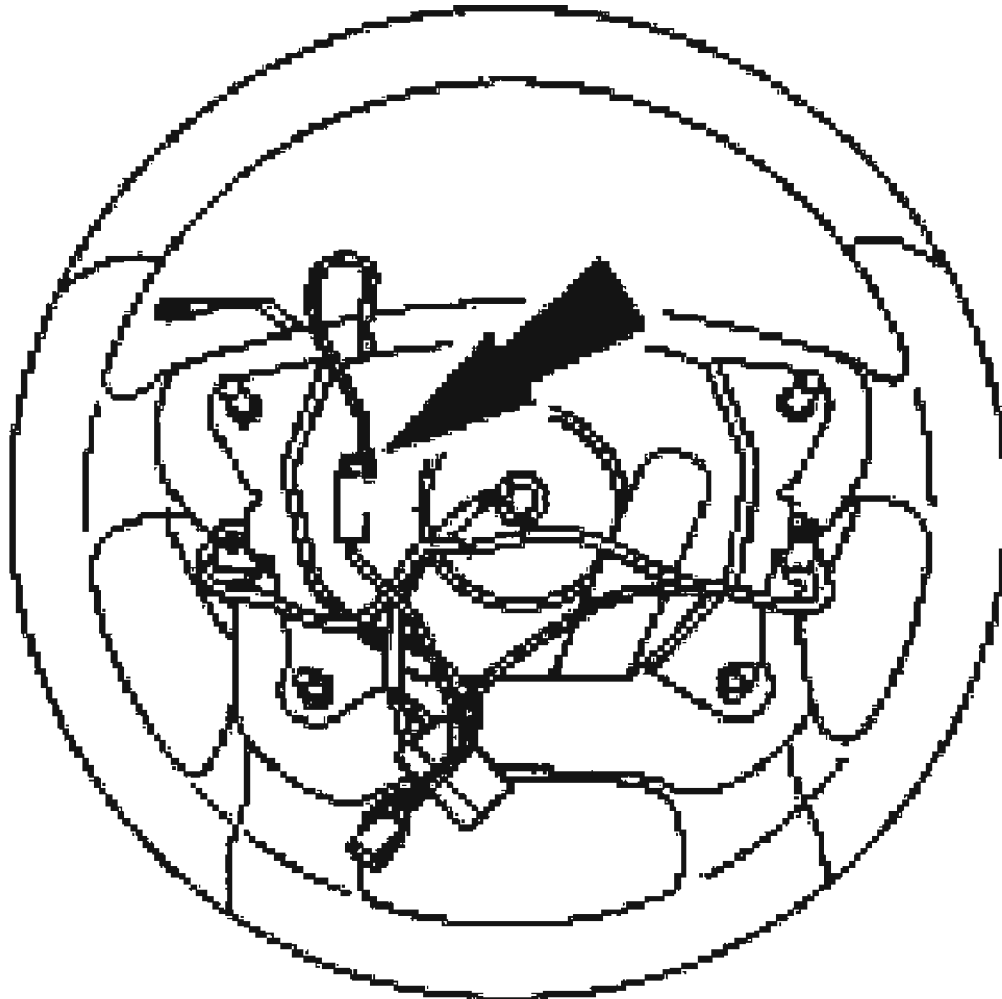
2. Remove the steering wheel cover.
3. Remove the steering wheel frame.
  1. Remove the nuts.
  2. Disconnect the ground wire.
  3. Remove the steering wheel frame.



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**Fig. 31: Removing Steering Wheel Frame**  
Courtesy of FORD MOTOR CO.

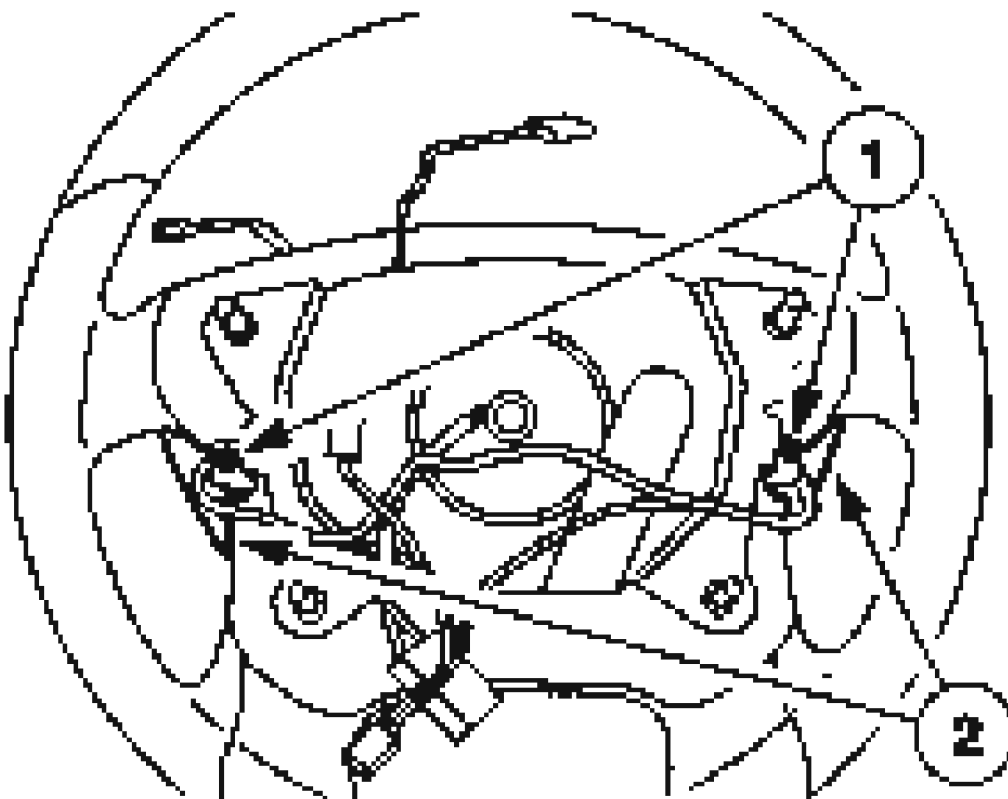
4. Disconnect the speed control switches electrical connector.



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**Fig. 32: Disconnecting Speed Control Switches Electrical Connector**  
Courtesy of FORD MOTOR CO.

5. Remove the speed control switches.
  1. Remove the screws.
  2. Remove the speed control switches.



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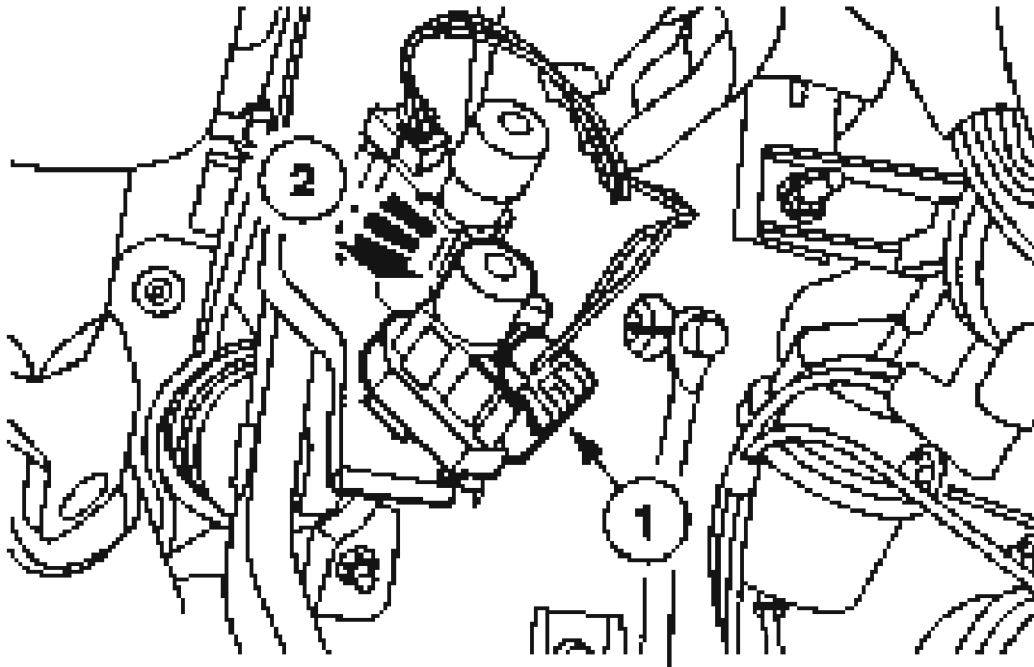
**Fig. 33: Removing Speed Control Switches**  
Courtesy of FORD MOTOR CO.

6. To install, reverse the removal procedure.

#### **SPEED CONTROL DEACTIVATOR SWITCH**

##### **Removal**

1. Remove the deactivator switch.
  1. Disconnect the electrical connector.
  2. Rotate counterclockwise 45 degrees and remove the deactivator switch.



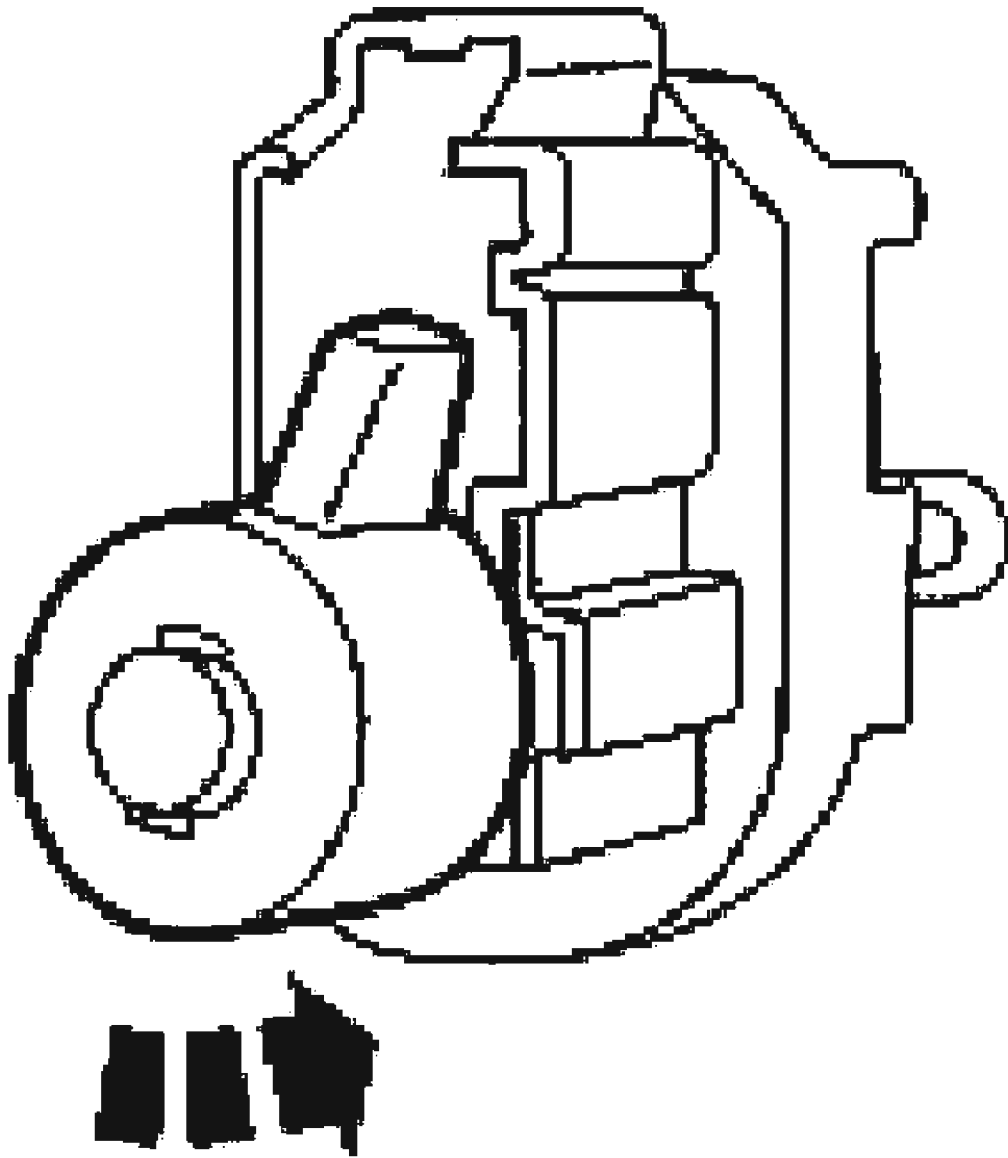
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**Fig. 34: Removing Deactivator Switch**  
Courtesy of FORD MOTOR CO.

#### Installation

**CAUTION:** Initial installation of a deactivator switch allows for one adjustment. If additional adjustments are required, install a new switch.

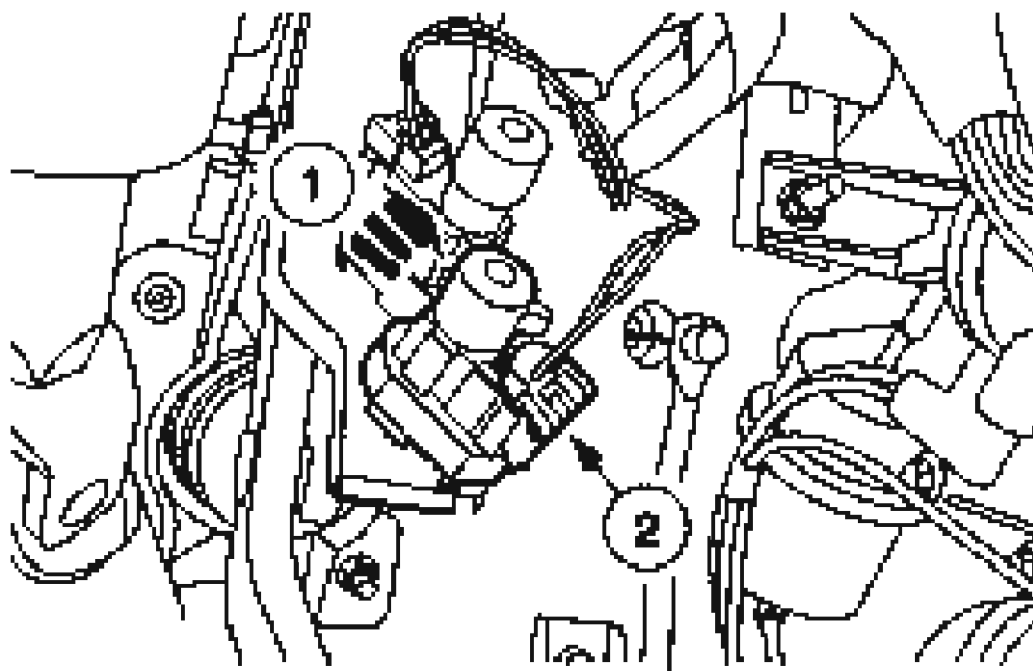
1. Release the plunger lock.
  - Turn the lock knob counterclockwise until the first click is felt.



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**Fig. 35: Releasing Plunger Lock**  
**Courtesy of FORD MOTOR CO.**

2. Depress the brake pedal.
3. Install the deactivator switch.
  1. Position the deactivator switch in the bracket and rotate clockwise 45 degrees.
  2. Connect the electrical connector.



G02740447

**Fig. 36: Installing Deactivator Switch**  
Courtesy of FORD MOTOR CO.

**NOTE:** There should be an extra click heard when tugging on the brake pedal.

4. Slowly release the brake pedal and tug moderately once the pedal reaches the rest position.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

## 2005 RESTRAINTS

### Supplemental Restraint System - Escape & Mariner

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Front impact severity sensor bolt	12	9	-
Hood latch assembly bolts	9	-	80
Hood latch assembly nut	9	-	80
Radiator support bracket bolt	12	9	-
Side impact sensor bolts (B- and C-pillar)	9	-	80
Restraints control module bolts	11	8	-
Steering wheel mounting pinion shaft bolt	12	9	-
Passenger air bag module bolts	8	-	71
Seat cushion bolts	15	11	-
Safety canopy module bolts	8	-	71
Safety belt buckle pretensioner bolt	40	30	-
Side air bag module nuts	5	-	44

## DESCRIPTION AND OPERATION

### AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The air bag supplemental restraint system (SRS) is designed to provide increased collision protection for front seat and second row outboard occupants in addition to that provided by the 3-point safety belt system. The SRS will also provide increased collision protection for the rear occupants when equipped with optional safety canopy modules. Safety belt use is necessary to obtain the best occupant protection and to receive the full advantage of the SRS.

This vehicle line contains dual stage deployment (advanced restraint system) driver and front passenger air bag modules, except for the Escape Hybrid, which has a single stage front passenger air bag module. These vehicles can also be equipped with optional safety canopies that deploy from the A-pillar to the C-pillar upon a side impact or if a rollover condition is detected. Escape Hybrid, Mariner and late build Escape vehicles equipped with safety canopy modules are also equipped with seat side air bag modules. A unique restraints control



## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

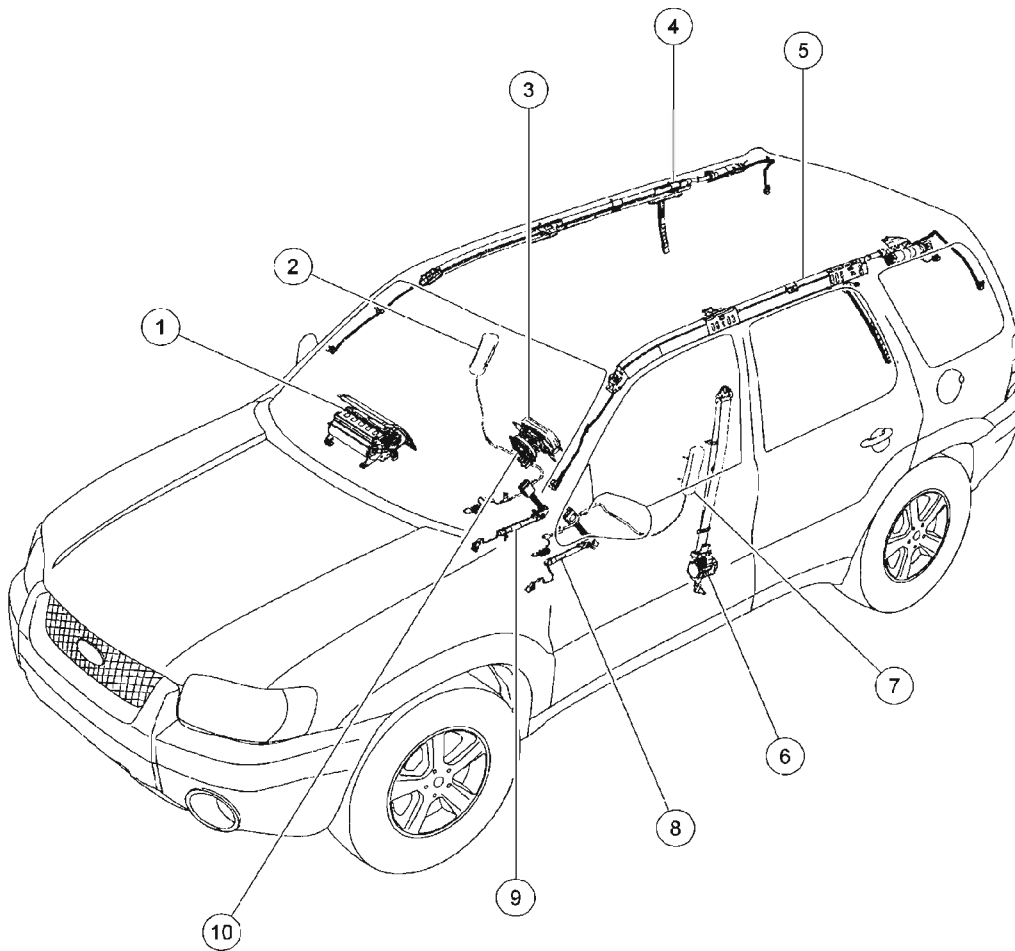
module (RCM) is used on these vehicles which will detect a potential rollover condition. In addition, a front impact severity sensor is mounted to the radiator support bracket, a seat position sensor is mounted to the driver seat and a usage detection switch is added to the front driver and passenger outboard buckles.

Safety canopy modules deploy from the headliner, protecting the first and second row outboard occupants during a side impact or if a rollover condition is detected. Seat side air bag modules deploy from the outboard front seat backrest upon a side impact.

**Before servicing the SRS, the system must be depowered.** For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



N0004611

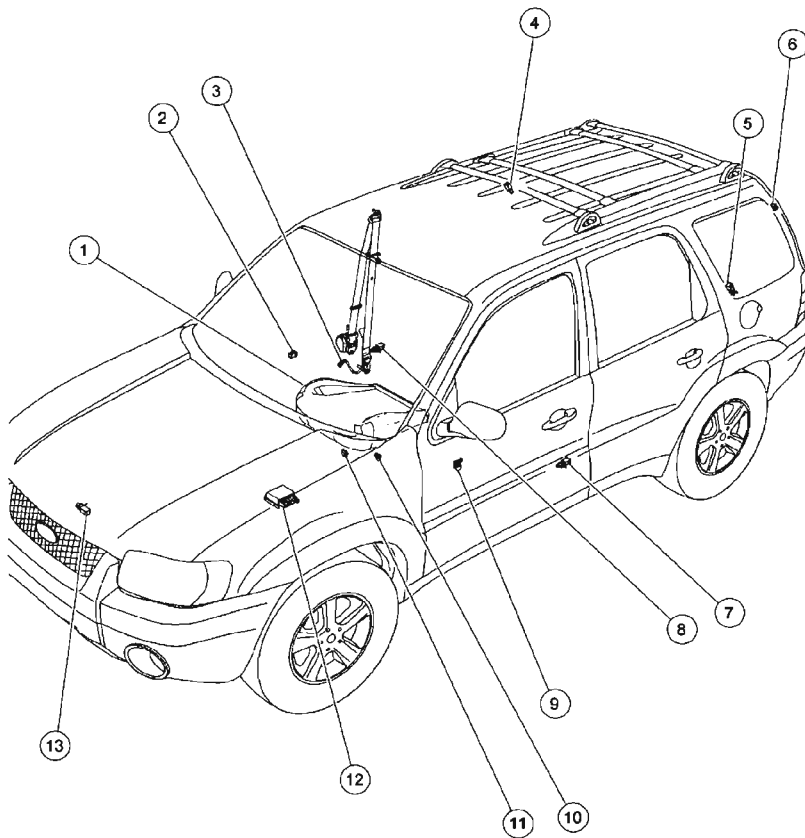
Item	Part Number	Description
1	044A74	Passenger air bag module
2	611D10	Passenger seat side air bag module (if equipped)
3	043B13	Driver air bag module
4	042D94	Passenger safety canopy module (if equipped)
5	042D95	Driver safety canopy module (if equipped)
6	611B09	Driver safety belt retractor pretensioner (Escape Hybrid only)

Item	Part Number	Description
7	611D11	Driver seat side air bag module (if equipped)
8	61203	Driver safety belt buckle pretensioner (includes safety belt buckle switch)
9	61202	Passenger safety belt buckle pretensioner (includes safety belt buckle switch)
10	14A664	Clockspring

**Fig. 1: Identifying Air Bag And Safety Belt Pretensioner Supplemental Restraint System (SRS) Components (1 Of 2)**  
Courtesy of FORD MOTOR CO.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



N0008343

Item	Part Number	Description
1	603B02	Occupant classification sensor (OCS) system
2	—	Passenger air bag deactivation (PAD) indicator
3	611B08	Belt tension sensor (part of passenger safety belt and retractor assembly)
4	14B345	Passenger second row side impact sensor (if equipped)
5	14B345	Driver second row side impact sensor (if equipped)
6	14B022	Safety canopy bridge resistor (if equipped)
7	14B345	Driver first row side impact sensor (if equipped)
8	14B345	Passenger first row side impact sensor (if equipped)
9	14B416	Driver seat position sensor
10	14B022	Driver seat side air bag bridge resistor (if equipped)
11	14B022	Passenger seat side air bag bridge resistor (if equipped)
12	14B321	Restraints control module
13	14B004	Front impact severity sensor

**Fig. 2: Identifying Air Bag And Safety Belt Pretensioner Supplemental Restraint System (SRS) Components (2 Of 2)**  
Courtesy of FORD MOTOR CO.

Clockspring

The clockspring:

- is mounted on the steering column, behind the steering wheel.
- continuously transfers electrical signals from the restraints control module (RCM) to the driver air bag module.

#### Driver Air Bag Module

**NOTE:**      **The driver air bag (soft pack) and steering wheel can only be serviced as an assembly.**

The driver air bag module:

- is installed new as an assembly with the steering wheel.
- is mounted in the center of the steering wheel.
- will deploy upon receiving a flow of current from the restraints control module (RCM).

#### Electrical System

The electrical system that supports the air bag SRS:

- is powered from the battery through the ignition circuit.
- provides the electrical path from the restraints control module (RCM) to the SRS components.
- provides the electrical path from the RCM to the air bag indicator.
- provides the electrical path from the RCM to the data link connector (DLC).
- provides the electrical path from the RCM to the instrument cluster module.

#### Occupant Classification Sensor

**CAUTION:** It is necessary to rezero the OCS system when a front passenger seat cushion is disassembled, a new trim cover installed, or an OCS service kit is installed. A diagnostic tool is used to trigger the active command to carry out rezeroing of the OCS system.

**CAUTION:** There are 2 occupant classification sensor (OCS) system service kits available for this vehicle (base seat and heated seat). Always make sure the correct OCS service kit is installed.

**CAUTION:** Make sure the seat is completely assembled before rezeroing.

**CAUTION:** The following precautions must be taken before rezeroing of the OCS system.

- Make sure the OCS system components are connected and no faults are present.
- Make sure the OCS system is not at a temperature below 0°C (32°F) or above 45°C (113°F) when initiating the rezeroing process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature within the limits, 0°C to 45°C (32°F to 113°F) for a minimum of 30 minutes.
- Make sure nothing is present on the passenger seat before rezeroing and nothing is placed on the seat during the rezeroing process.
- Make sure a minimum 5-second time period has passed after cycling the ignition switch ON before the rezeroing process.

**NOTE:** For best results in rezeroing, the OCS system should be at or near room temperature, 10°C to 29°C (50°F to 85°F).

**NOTE:** When using an NGS+ (NGS with Vehicle Communication Module (VCM) and the latest software update) to rezero the OCS system:

- select "FUNCTION TEST"
- select "SYSTEM RESET"
- view the on-screen information, then press "TRIGGER"

The NGS+ screen will then display "OCS RESET: REZERO." Press "DONE" (button 8) to rezero the OCS system. The NGS+ will display "TEST/FUNCTION SUCCESSFUL" once rezeroing of the OCS system is complete.

**NOTE:** To rezero the OCS system using the Worldwide Diagnostic System (WDS):

- select the "Toolbox" icon
- select "Body" from the menu
- select "Restraints" from the menu
- select "Seat Weight Sensor ReZero"

After selecting "Seat Weight Sensor ReZero", follow the on-screen prompts to carry out

rezeroing of the OCS system.

**NOTE:** To identify between a production OCS system and a OCS system service kit, inspect the OCS ECU electrical connector.

A production OCS system allows the disconnect of the electrical connector from the OCS ECU.

An OCS system service kit (OCS service kit) has the OCS ECU electrical connector glued to the ECU, it cannot and should not be disconnected or altered. An OCS system service kit also has an in-line 10-pin connector between the OCS ECU and the seat wiring harness.

**NOTE:** There was a change to the OCS ECU dependent on the vehicle build date. The OCS ECU will have either a 10-pin connector (early build) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS service kit is being installed. The early build/late build OCS service kits are not interchangeable.

**NOTE:** The heated seat element on the front passenger seat cushion is not serviceable separately. If a new heated seat element is needed on the front passenger seat cushion, a new occupant classification sensor (OCS) service kit equipped with a heated seat element must be installed.

**NOTE:** If the first attempt to rezero the OCS system is unsuccessful, a second attempt must be made.

The seat occupant classification sensor system is found only on the front passenger seat. The front passenger seat occupant classification sensor (OCS) system is comprised of a silicone gel-filled bladder mounted in the seat cushion, a pressure sensor that is mounted to the seat frame and an electronic control unit which is also mounted to the seat frame. Pressure is applied to the OCS bladder when the weight of any occupant or object in the front passenger seat is present. The pressure is then transferred through a tube, is sensed by the OCS pressure sensor, then electronically communicated to the OCS electronic control unit. Based on programmed limits, the OCS electronic control unit will inform the restraints control module (RCM), via a High Speed Controller Area Network (CAN), of the necessary information. The RCM uses this information in determining if the passenger air bag module or passenger seat side air bag module is to be deployed in the event of a deployable collision. The OCS system components (seat cushion foam pad, bladder with pressure sensor and electronic control unit) are calibrated to each other and are serviced as an assembly. **OCS system components are not to be installed separately.** If installing a new OCS system, OCS system component or seat cushion foam pad, a new OCS system service kit (seat cushion

foam pad, bladder with pressure sensor and electronic control unit) must be installed as an assembly.

The OCS system is also used for operation of the passenger Belt Minder. For additional information on the passenger Belt Minder feature, refer to **SAFETY BELT SYSTEM**. To deactivate or reactivate the passenger Belt Minder feature, refer to **WARNING DEVICES** or the owner literature.

#### **Passenger Air Bag Deactivation (PAD) Indicator**

The passenger air bag deactivation (PAD) indicator is a visual indicator used to inform the front seat occupants of the passenger air bag deactivation state. The PAD indicator is a stand-alone lamp installed into the vehicle instrument panel in a position visible to each front seat occupant.

The restraints control module (RCM) controls the state of the PAD indicator through a direct hardwire connection, based on information provided by the occupant classification sensor (OCS) system. The PAD indicator is lit to indicate the passenger air bag module is disabled. An exemption to this is when the front passenger seat is determined to be empty, and therefore indication of a deactivated passenger air bag module is not necessary. In all other cases, the PAD indicator is unlit when the passenger air bag module is enabled.

When the ignition switch is in the ON position, the PAD indicator prove-out period is initiated by the RCM. The RCM briefly activates the PAD indicator to prove-out the indicator function and verify to the front occupants correct functional operation of the PAD indicator.

The PAD indicator will lit/unlit within 1.0 to 1.5 seconds of a change of state from the OCS system.

When an OCS system fault is present the SRS defaults the passenger air bag module to enabled regardless of the size of the occupant in the front outboard passenger seat. The PAD indicator will be unlit. For additional information on the OCS system, refer to **OCCUPANT CLASSIFICATION SENSOR**.

The following table indicates the passenger air bag status and the PAD indicator status based the size of the front outboard passenger occupant.

#### **PASSENGER AIR BAG AND PAD INDICATOR STATUS**

<b>Occupant Size</b>	<b>Passenger Safety Belt Buckle Status</b>	<b>Pass. Air Bag Status</b>	<b>PAD Ind. Status</b>
None	Unbuckled	Disabled	Unlit
None	Buckled	Disabled	Lit
Small	Buckled /Unbuckled	Disabled	Lit

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

Large	Buckled /Unbuckled	Enabled	Unlit
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#### Passenger Air Bag Module

The passenger air bag module:

- is installed new as an assembly.
- is mounted in the passenger side of the instrument panel.
- will deploy upon receiving a flow of current from the restraints control module (RCM).
- is single stage unit on Escape Hybrid vehicles.
- is a dual stage unit on Escape and Mariner vehicles.

#### Restraints Control Module (RCM)

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** The RCM orientation is critical for correct system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) has been involved in a collision in which the center tunnel area has been damaged, inspect the mounting and bracket for deformation. If damaged, a new RCM must be installed whether or not the air bags have deployed. In addition, make sure the area of the RCM mounting is restored to its original condition.

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. If an incorrect RCM is installed, erroneous DTCs will result.



The restraints control module carries out the following functions:

- deploys the air bag(s) in the event of a deployable crash.
- activates the safety belt buckle pretensioners to remove slack from the safety belt.
- monitors the SRS for faults.
- illuminates the air bag indicator if a fault is detected.
- flashes the air bag indicator to indicate the lamp fault code (LFC) detected.
- communicates through the data link connector (DLC) the current or historical diagnostic trouble codes (DTCs).
- signals the instrument cluster module to activate a chime if the air bag indicator is not available and another SRS fault exists.

The RCM monitors the SRS for possible faults. If a fault is detected while the ignition switch is in the ON position, the RCM will illuminate the air bag indicator located in the instrument cluster.

When the ignition is cycled (turned off and then on), the air bag indicator will prove out by lighting for 6 seconds and then off for 2 seconds. After the prove out, the air bag indicator will then flash the 2-digit LFC if a SRS fault exists. The air bag indicator will flash the LFC 5 times, then it will remain illuminated for the rest of the key cycle. The RCM will also communicate the current and historical DTCs through the DLC, to the diagnostic tool. If the air bag indicator does not function, and the system detects a fault condition, the RCM will signal the instrument cluster module to activate an audible chime. The chime is a series of 5 sets of 5 tone bursts. If the chime is heard, the SRS and the air bag indicator require repair.

LFCs are prioritized. If 2 or more faults occur at the same time, the fault having the highest priority will be displayed. After that fault has been corrected, the next highest priority fault will be displayed.

The RCM includes a backup power supply. This feature provides 150 ms of backup power to deploy the front air bags and pretensioners in the event that the ignition circuit is lost or damaged during impact.

The backup power supply will deplete its stored energy approximately 1 minute after the battery ground cable is disconnected.

#### Side Impact Protection

**NOTE:** Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.

This vehicle can be equipped with side impact protection safety package in the following configurations:

- **With** safety canopy modules
- **Without** safety canopy modules, **with** a safety canopy bridge resistor
- **Without** safety canopy modules and side air bag modules, **with** a safety canopy bridge resistor and side air bag bridge resistors
- **With** safety canopy modules and side air bag modules
- **Without** safety canopy modules and side air bag modules and **without** safety canopy/side air bag bridge resistors and the associated wiring

#### Driver Seat Side Air Bag Module (If Equipped)

**NOTE:**        **References to seat side air bag modules refer to the seat-mounted and not to the steering wheel or instrument panel mounted air bag components of the SRS.**

**NOTE:**        **For additional information, when servicing a seat equipped with a seat side air bag module, refer to SEATING .**

A seat side air bag module provides protection of the thorax area (between the neck and abdomen) of the body, working in conjunction with the head protection provided by a safety canopy module. Only Escape Hybrid, Mariner and late build Escape vehicles equipped with safety canopy modules are equipped with seat side air bag modules.

The driver seat side air bag module:

- will deploy upon receiving a flow of current from the RCM initiated by the driver seat side impact sensor and internal RCM circuitry.
- is installed as an assembly.
- is mounted in the driver seat back.
- is used in conjunction with a safety canopy module on Escape Hybrid, Mariner and late build Escape vehicles only (seat side air bag modules are not equipped on early build Escape vehicles).

#### Driver Seat Side Air Bag Bridge Resistor (If Equipped)

**NOTE:**        **Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.**

**NOTE:**        **Do not deactivate the seat side air bag circuit by removing the**

**bridge resistor from the electrical connector.**

If the seat side air bag bridge resistor is removed, an open circuit fault will be generated by the restraints control module (RCM).

If a restraint system diagnostic tool is installed at the seat side air bag electrical connector, a low-resistance fault will be generated.

The driver seat side air bag bridge resistor (if equipped):

- is located beneath the driver seat.
- is equipped on some Escape Hybrid, Mariner and late build Escape vehicles that are not equipped with seat side air bag modules.

**Passenger Seat Side Air Bag Module (If Equipped)**

**NOTE:**      **References to seat side air bag modules refer to the seat-mounted and not to the steering wheel or instrument panel mounted air bag components of the SRS.**

**NOTE:**      **For additional information, when servicing a seat equipped with a seat side air bag module, refer to SEATING .**

A seat side air bag module provides protection of the thorax area (between the neck and abdomen) of the body, working in conjunction with the head protection provided by a safety canopy module. Only Escape Hybrid, Mariner and some Escape vehicles equipped with safety canopy modules are equipped with seat side air bag modules.

The passenger seat side air bag module:

- will deploy upon receiving a flow of current from the RCM initiated by the passenger seat side impact sensor and internal RCM circuitry.
- is installed as an assembly.
- is mounted in the passenger seat back.
- is used in conjunction with a safety canopy module on Escape Hybrid, Mariner and some Escape vehicles only (seat side air bag modules are not equipped on some Escape vehicles that are equipped with safety canopies).

**Passenger Seat Side Air Bag Bridge Resistor (If Equipped)**

**NOTE:**      **Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped**

**with bridge resistor(s) and the associated wiring.**

**NOTE: Do not deactivate the seat side air bag circuit by removing the bridge resistor from the electrical connector.**

If the seat side air bag bridge resistor is removed, an open circuit fault will be generated by the restraints control module (RCM).

If a restraint system diagnostic tool is installed at the seat side air bag electrical connector, a low-resistance fault will be generated.

The passenger seat side air bag bridge resistor (if equipped):

- is located beneath the passenger seat.
- is equipped on some Escape Hybrid, Mariner and Escape vehicles that are not equipped with seat side air bag modules (dependent on vehicle build date).

**Safety Canopy Module (If Equipped)**

**WARNING:** Anytime the safety canopy has deployed, the headliner, and all A-, B- and C-upper trim panels and attaching hardware must be replaced along with any other damaged components and hardware. Failure to do so can result in personal injury in the event of a safety canopy deployment.

**NOTE: If the headliner near each B-pillar has the word "AIRBAG" embossed on it, the vehicle is equipped with safety canopy modules.**

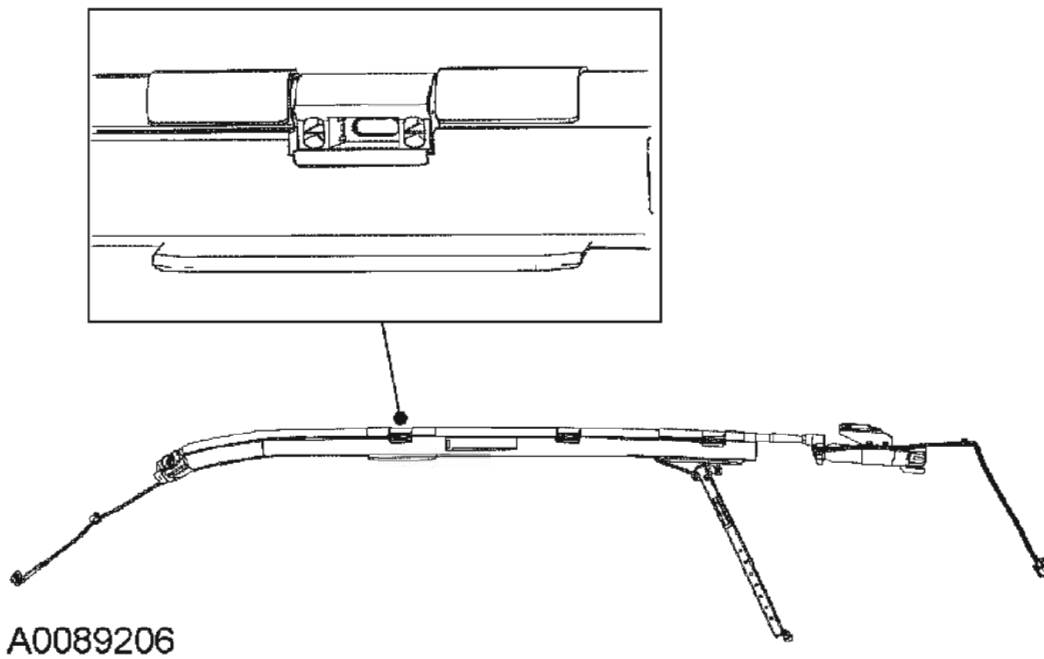
The side air curtain module or safety canopy:

- is installed as an assembly.
- is mounted above the headliner.
- attaches from the A-pillar frame to the C-pillar frame.

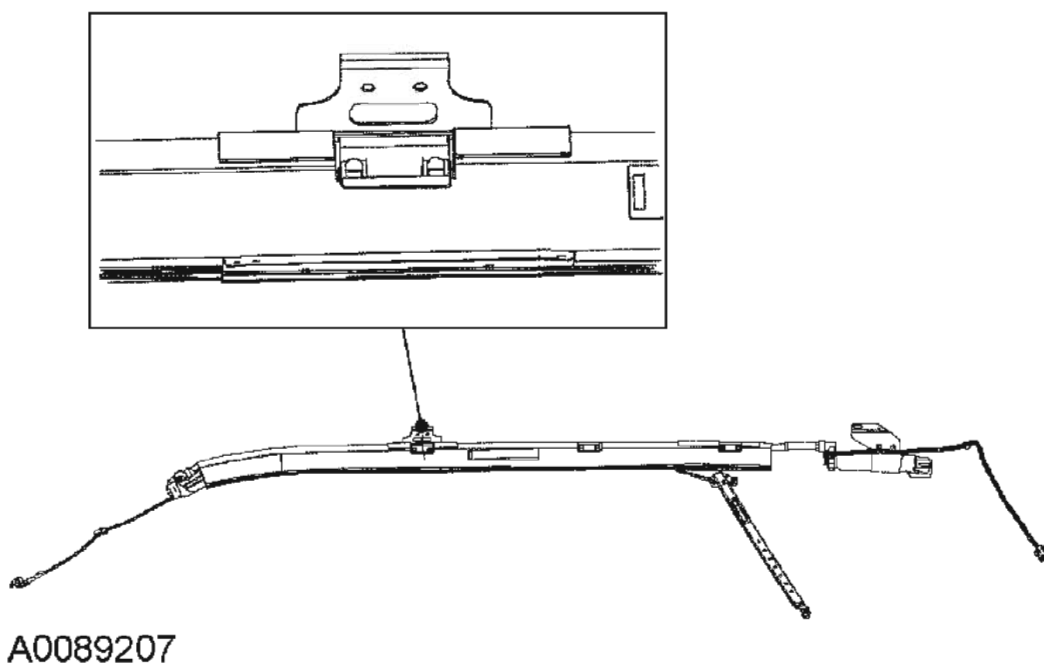
**NOTE: There are 2 different safety canopy modules, 1 for vehicles equipped with a moon roof and 1 for vehicles without a moon roof. The safety canopy modules are NOT interchangeable. If installing a new safety canopy module, the correct safety canopy module MUST be installed for the vehicle application.**

## 2005 Ford Escape

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**Fig. 3: Identifying Vehicles With Moon Roof**  
Courtesy of FORD MOTOR CO.



**Fig. 4: Identifying Vehicles Without Moon Roof**

**Courtesy of FORD MOTOR CO.****Safety Canopy Bridge Resistor (If Equipped)**

**CAUTION:** Do not deactivate the safety canopy module circuit or seat side air bag module circuit by removing the bridge resistor from the electrical connector.

If the safety canopy or seat side air bag bridge resistor is removed, an open circuit fault will be generated by the restraints control module (RCM).

If a restraint system diagnostic tool is installed at the safety canopy or seat side air bag electrical connector, a low-resistance fault will be generated.

**NOTE:** Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.

**NOTE:** If the headliner near each B-pillar has the word "AIRBAG" embossed on it, the vehicle is equipped with safety canopy modules.

The safety canopy bridge resistor (if equipped):

- is equipped on some vehicles without safety canopy modules (dependent on vehicle build date).
- must not be removed during deactivation.
- is attached to the headliner near the LH D-pillar.

**Safety Belt Buckle Switches**

As part of the supplemental restraint system (SRS), the front safety belt buckles are equipped with safety belt buckle switches. The safety belt buckle switches are comprised of integrated circuits called Hall-effect sensors. The safety belt buckle switches (Hall-effect sensors) are located in the driver and passenger safety belt buckles. The safety belt buckle switches indicate to the restraints control module (RCM) whether the safety belts are connected or disconnected. The RCM uses this information in determining the deployment rate of the dual-stage driver and passenger air bag modules. The RCM also communicates the driver safety belt buckle switch status to the instrument cluster module, which monitors the information to control the safety belt warning indicator. Refer to **WARNING DEVICES** for additional information.

**Safety Belt Buckle Pretensioners - All Vehicles**

As part of the SRS, the safety belt buckles are equipped with pretensioners. The safety belt buckle pretensioners remove excess slack from the safety belt webbing. The pretensioners are activated by the restraints control module (RCM) when the module detects a impact event force exceeding a programmed limit.

#### **Safety Belt Retractor Pretensioner - Escape Hybrid Only**

As part of the SRS, the driver safety belt retractor for the Escape Hybrid is equipped with a pretensioner. The pretensioner removes excess slack from the safety belt webbing. The pretensioner is activated by the RCM when the module detects an impact event force exceeding a programmed limit.

#### **Safety Belt Tension Sensor**

**NOTE:** There was a change to the belt tension sensor (BTS) (part of the passenger safety belt retractor assembly) dependent on the vehicle build date. When installing a new passenger safety belt retractor assembly, always make sure the correct passenger safety belt retractor assembly is being installed. The passenger safety belt retractor assemblies are not interchangeable.

The safety belt tension sensor:

- is part of the front outboard passenger safety belt and retractor assembly.
- is located at the safety belt anchor point.
- is used in conjunction with the occupant classification sensor (OCS) system.
- is a 3-wire Hall-effect sensor that is part of the front passenger safety belt and retractor assembly.

The safety belt tension sensor is used by the OCS system to identify the presence of a child safety seat on the front outboard passenger seat, when the child safety seat is installed according to manufacturer instructions. The safety belt tension sensor senses the tension on the safety belt assembly then provides an output to the OCS system electronic control unit (ECU), indicating that the safety belt assembly is cinched. After sensing the weight applied to the seat by the occupant and using the safety belt tension sensor input, the OCS system determines how the occupant should be classified and communicates this information to the restraints control module (RCM). If the occupant is classified to be a child, the RCM will then automatically deactivate the passenger air bag module.

#### **Seat Track Position Sensor**

The seat track position sensor is a Hall-effect sensor located on the driver seat track. The seat track position sensor informs the restraints control module (RCM) of the driver seat position. Based on programmed limits, the seat track position sensor will inform the RCM of the driver seat position. The RCM uses this information in determining the deployment rate of

the dual-stage driver air bag module.

#### Sensors

**WARNING:** The restraints control module (RCM) orientation is critical for correct system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) has been involved in a collision in which the center tunnel area has been damaged, inspect the mounting and bracket for deformation. If damaged, a new RCM must be installed whether or not the air bags have deployed. In addition, make sure the area of the RCM mounting is restored to its original condition.

**WARNING:** Vehicle sensor orientation is critical for correct system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and correctly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed.

For these vehicles, the SRS uses up to 5 satellite sensors in addition to the RCM. The RCM is mounted to the center tunnel beneath the console. All vehicles will have a front impact severity sensor and it is located in the front-center of the vehicle, mounted on the radiator support bracket. If the vehicle is equipped with safety canopies, there are 4 additional side impact sensors. The 4 additional sensors are located at the base of each B-pillar and mounted on the C-pillar. The LH and RH C-pillar mounted side impact sensors are interchangeable. Mounting orientation is critical for correct operation of all impact and rollover sensors.

## DIAGNOSIS AND TESTING

### AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Refer to **SUPPLEMENTAL RESTRAINTS** for Escape or **SUPPLEMENTAL RESTRAINTS** for Mariner for schematic and connector information.

#### Special Tool(s)

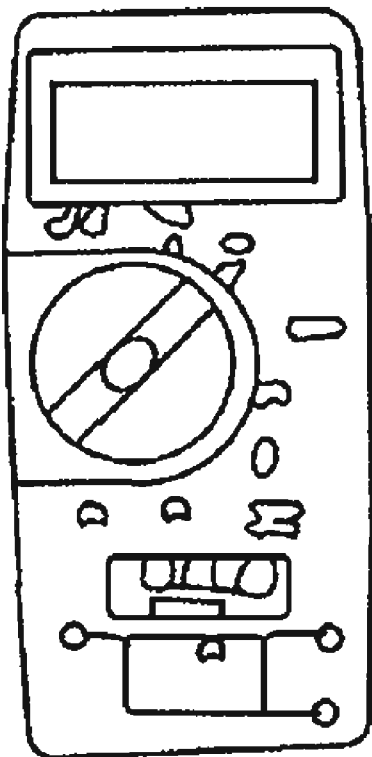
### SPECIAL TOOL SPECIFICATION

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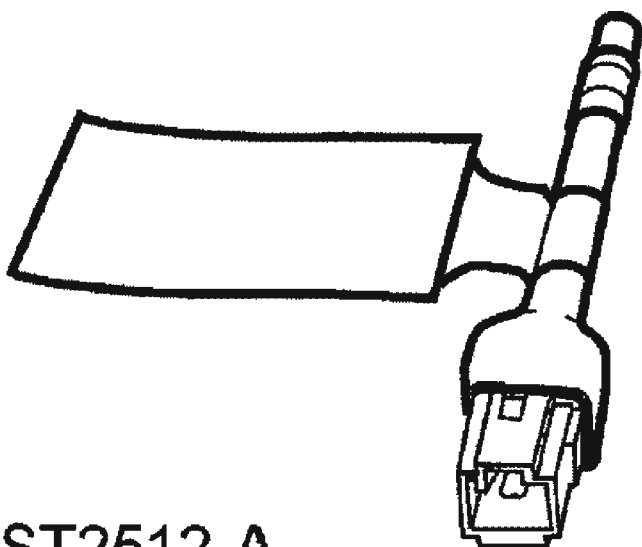
## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



**ST1137-A**

FLUKE 73III Automotive Meter 105-R0057 or equivalent

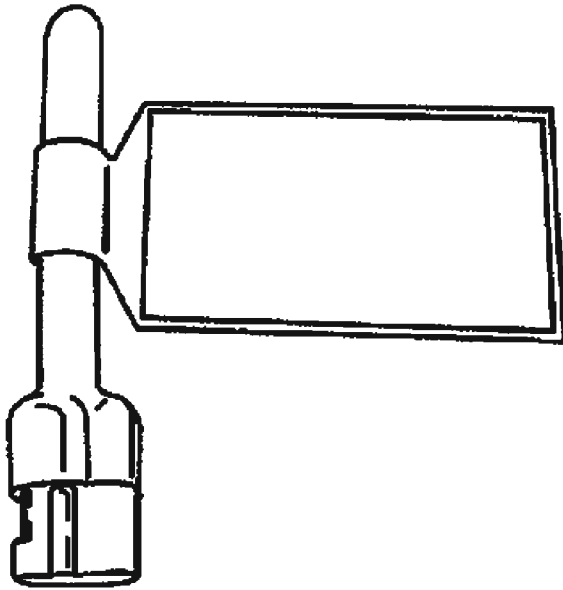


**ST2512-A**

Diagnostic Tool, Restraint System (2 required) 418-F403

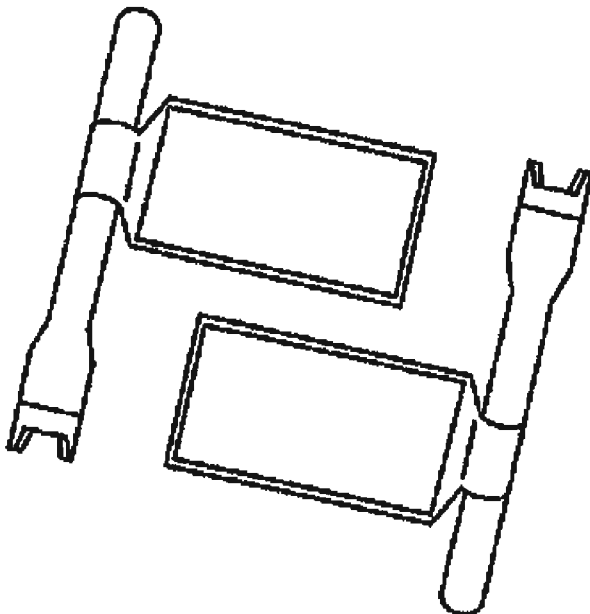
## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



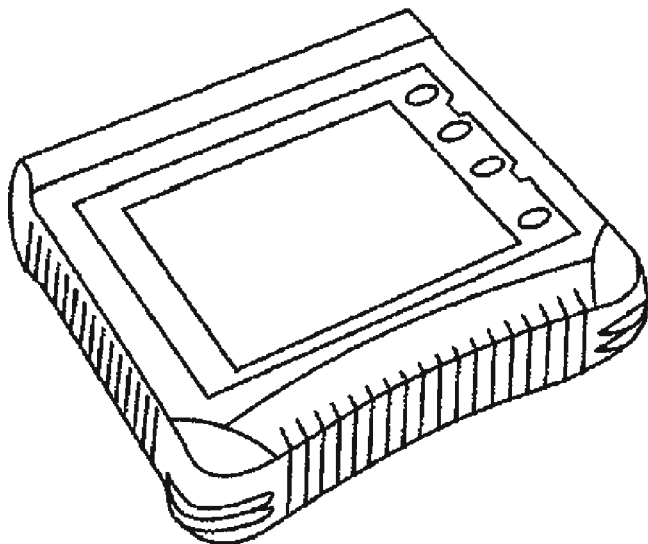
**ST2507-A**

Diagnostic Tool, Restraint System (5 required) 418-133



**ST2621-A**

Diagnostic Tool, Restraint System (1 required) 418-F395



ST2332-A

Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

#### Restraint System Diagnostic Tool Warning

**WARNING:** Restraint system diagnostic tools are for service only. Remove from vehicle prior to road use. Failure to remove could result in personal injury and possible violation of vehicle safety standards.

#### Air Bag Module Second Stage Deployment Check

Because the driver and passenger front air bags each have 2 deployment stages, it is possible that stage one has deployed and the second stage has not.

**NOTE:** The Escape Hybrid vehicle utilizes a single stage front passenger air bag module and does not require remote deployment of the second stage.

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

- For additional information on driver air bag module and/or passenger air bag module remote deployment, refer to **PYROTECHNIC DEVICE DISPOSAL**.

#### Diagnosing Customer Concerns Without Hard DTCs

If a lamp fault code (LFC) is reported by the customer but is not present when the vehicle

comes in for service, follow the Diagnostic Instruction procedures in this article to identify the intermittent DTC.

Once the DTC is known, read the Normal Operation section of the pinpoint test for the DTC involved.

- Follow the deactivation or depowering procedure as directed in this article.
- Determine the location of components involved in creating the DTC.
- Carry out a thorough visual inspection of:
  - components.
  - connectors.
  - splices and wiring harnesses.
  - insulation on conductors.

Refer to the **POSSIBLE CAUSES** of the pinpoint test for the DTC involved, which lists the common concerns that relate to the DTC. Concerns are listed according to priority.

#### **Diagnosing Customer Concerns with Hard DTCs**

Most Supplemental Restraint System (SRS) diagnostic procedures will require deactivation and reactivation or depowering and repowering of the system. Deactivation and reactivation requires the disconnection of most SRS components and the installation of restraint system diagnostic tools. Depowering and repowering requires disconnecting the battery and removal of the restraints control module (RCM) fuse. This reduces the risk of inadvertent deployment of SRS components while diagnostic procedures are being carried out.

Restraint system diagnostic tools are required for the diagnosis and testing of the SRS. It is not acceptable to short-circuit the air bag module connections with a jumper wire. If a jumper wire is used to short-circuit the air bag module connections, a lamp fault code (LFC) will be displayed.

#### **Prove Out Procedure**

Turn the ignition switch from the OFF to the ON position and visually monitor the air bag indicator with all SRS components connected or restraint system diagnostic tools installed. The air bag indicator will light continuously for approximately 6 seconds and then turn off. If an SRS fault is present, the air bag indicator will:

- fail to light.
- remain lit continuously.
- flash.

The flashing might not occur until approximately 30 seconds after the ignition switch has been turned from the OFF to the ON position. This is the time required for the restraints

control module (RCM) to complete the testing of the SRS. If the air bag indicator is inoperative and an SRS fault exists, a chime will sound in a pattern of 5 sets of 5 beeps. If this occurs, the air bag indicator will need to be repaired before diagnosis can continue.

## **Glossary**

### **Secondary Air Bag Warning**

The secondary air bag warning is an audible fault format that consists of 5 sets of 5 tone bursts, with each set of 5 tone bursts separated by a 5-second quiet period. One tone burst cycle will consist of one second ON and one second OFF. This series of 5 activations is repeated every 30 minutes.

### **Air Bag/Pretensioner Restraint System Diagnostic Tools**

Air bag/pretensioner restraint system diagnostic tools are used to simulate the equivalent resistance of an air bag module or safety belt pretensioner during certain diagnostic procedures.

### **Disconnect the Component**

Disconnect the component means to disconnect the component vehicle harness connector, not to remove the component. Do not reconnect a disconnected component unless instructed to do so.

### **Deactivate the System**

Deactivate the system means to carry out a deactivation procedure. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**.

### **Depower the System**

Depower the system means to disconnect the battery and remove the restraints control module (RCM) fuse. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

### **Prove Out the System**

Prove out the system means to turn the ignition switch from the OFF to the ON position, and to visually monitor the air bag indicator with the air bag modules and safety belt pretensioners or restraint system diagnostic tools installed. For additional information, refer to **PROVE OUT PROCEDURE**.

### **Reactivate the System**

Reactivate the system means to carry out the reactivation procedure. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**

## **DEACTIVATION AND REACTIVATION.**

### **Repower the System**

Repower the system means to remove any restraint system diagnostic tools that may have been installed, turn the ignition ON, install the RCM fuse, and connect the battery ground cable. For additional information, refer to **[SUPPLEMENTAL RESTRAINT SYSTEM \(SRS\) DEPOWERING AND REPOWERING.](#)**

### **Reconnect the System**

Reconnect the system means to reconnect all system components. For additional information, refer to **[AIR BAG SYSTEM RECONNECT CHECKLIST.](#)**

### **Install a New Component**

Install a new component means to remove the existing component and install a new authorized part obtained from Ford Customer Service Division.

### **Verify the System**

Verify the system means to prove out the system with restraint system diagnostic tools installed in place of the SRS components.

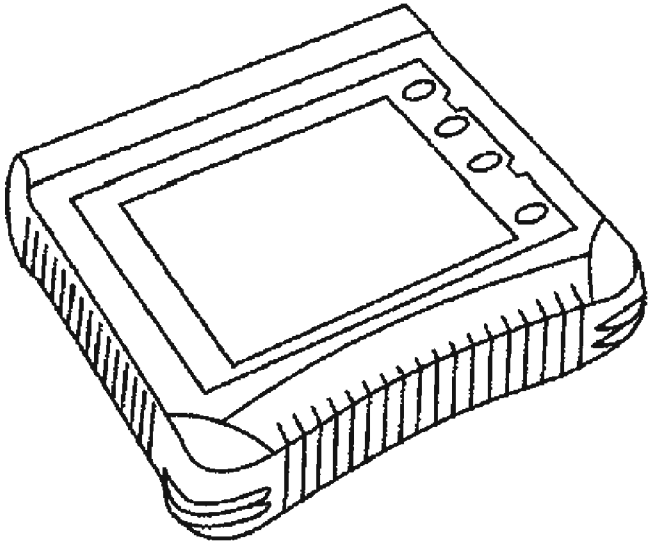
### **Air Bag Reconnect Checklist**

The checklist below should be completed following diagnosis or repair of any air bag system concern:

- All restraint system diagnostic tools removed?
- Clockspring connectors connected?
- All in-seat harness connectors connected?
- Occupant classification sensor (OCS) system connected?
- All air bag modules connected?
- All safety canopy modules connected? (if equipped)
- All safety belt pretensioner connectors connected? Restraints control module (RCM) connected?
- All sensors (front and side impact, seat position and safety belt tension) connected?
- All bridge resistors connected? (if equipped)
- RCM fuse installed?
- Battery connected?

## Special Tool(s)

## SPECIAL TOOL SPECIFICATION

 <p>ST2332-A</p>	<p>Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool</p>
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The symptom chart can be used to help locate supplemental restraint system (SRS) concerns if no diagnostic trouble codes (DTCs) are retrieved and the listed symptoms are observed. Whether or not the listed symptoms are observed, always carry out the following:

1. Retrieve all DTCs stored in the restraints control module (RCM) memory. For additional information, refer to **RETRIEVE/CLEAR CONTINUOUS DTCs**.
2. Run the On-Demand Self Test to determine what DTCs are currently being sensed by the RCM. Refer to **ON-DEMAND SELF TEST**.
3. If the stored DTCs are different than the current DTCs, always repair the current DTCs first.
4. If memory displays different continuous DTCs than the On-Demand Self Test, carry out in the following order:
  - On-Demand Self Test
  - Memory (Retrieve/Clear Continuous DTCs)

A DTC can indicate several concerns. The DTCs are to assist in system diagnosis and are not to be considered definitive. Always refer to the PINPOINT TEST corresponding to the DTC to determine where the concern lies and to repair the concern correctly.

The SRS diagnostics can be divided into 3 sections:

- Diagnostic test modes
- PID/data monitor and record
- Active command modes

#### Diagnostic Test Modes

Two menu options are available under the diagnostic test modes:

- Retrieve/Clear Continuous DTCs
- On-Demand Self Test

#### Retrieve/Clear Continuous DTCs

During vehicle operation the restraints control module (RCM) will detect and store both intermittent and hard failure DTCs in nonvolatile memory. The DTC strategy employed by the RCM incorporates a time-out scheme for determining when a concern exists in the system. This requires a concern to exist for up to 1 minute in the system before the RCM will detect it. For the RCM to determine that a concern no longer exists, the concern must be absent for up to 1 minute. The actual detection time-outs vary with each DTC. The DTCs can be retrieved with a diagnostic tool, using the Retrieve/Clear Continuous DTCs option. Any DTCs stored in the RCM will be displayed on the diagnostic tool along with a brief description of the DTC. If no DTCs are present, the diagnostic tool will display a SYSTEM PASSED message. This option can also be used to clear DTCs from the RCM memory, as long as the concern no longer exists. Once 128 key cycles have been recorded since the concern was last detected, the DTC will automatically be removed from memory.

To retrieve or clear DTCs, follow these steps:

1. Connect the diagnostic tool to the data link connector (DLC).
2. Turn the ignition switch to the ON position.
3. Follow the manufacturer's instructions for the diagnostic tool being used.

**NOTE:** Before proceeding with the clearing operation, make note of the DTCs displayed. Once cleared, DTCs cannot be retrieved.

4. All continuous DTCs will be displayed on the screen.
5. Clear the DTCs. After clearing the DTCs, cycle the key OFF, then ON.
  - Continuous DTCs that have been cleared will **not** reoccur as "continuous" in the same key cycle. Only new DTCs which were **not** present before clearing can occur as "continuous" after clearing.

#### On-Demand Self Test

The On-Demand Self Test option is used to verify that no electrical concerns exist with the



air bag SRS. Upon entering the self test, the restraints control module (RCM) will make an electrical check of each electrical component in the system. If a concern is detected, a DTC is displayed on the diagnostic tool with a brief description of the DTC. Concerns detected during the self test are not stored in memory, unless the same concern was also detected during normal vehicle operation. The self test should always be run after any repair to verify that the repair was successful.

To run the On-Demand Self Test, follow these steps:

1. Connect the diagnostic tool to the data link connector (DLC).
2. Turn the ignition switch to the ON position.
3. Follow the manufacturer's instructions for the diagnostic tool being used.
4. The RCM will run the On-Demand Self Test and display on-demand DTCs (reflecting hard system concerns) on the diagnostic tool.

#### **Bit-Mapped Diagnostic Trouble Codes (DTCs)**

Many of the continuous and on-demand DTCs that can be present in the RCM are bit-mapped DTCs that utilize PIDs (flagged faults). Bit-mapped DTCs are conceptually different from the previous style of DTCs. Previously, DTCs identified a specific concern for a given component and pointed to a particular diagnostic path. In the diagnostic path, PIDs are sometimes used to determine the root cause. Bit-mapped DTCs do not identify the specific concern. A bit-mapped DTC identifies the component(s) in which the concern exists. The next level (PIDs or flagged faults) identifies the specific concern.

A diagnostic tool must be used to view the PIDs (flagged faults) of a bit-mapped DTC. Once a diagnostic tool has retrieved a bit-mapped DTC, the diagnostic tool will provide the option to "FLAG" that DTC. When the option to "FLAG" the DTC is available, it must be carried out to identify the specific concern that is present. When the option to "FLAG" the DTC has been carried out, the diagnostic tool will then display the PIDs (flagged faults) for that DTC, including the status or state that exists (on-demand DTC) or existed (continuous DTC).

To view and flag bit-mapped DTCs, follow these steps:

1. Connect the diagnostic tool to the data link connector (DLC).
2. Turn the ignition switch to the ON position.
3. Follow the manufacturer's instructions for the diagnostic tool being used.
4. Carry out an On-Demand Self Test or retrieve continuous DTCs.
5. Select the DTC and the "FLAG" option on the diagnostic tool.
6. The diagnostic tool will display PIDs for the DTC. Record all flagged faults.

#### **PID/Data Monitor and Record**

The PID/Data Monitor and Record option allows the diagnostic tool operator to read the state of several parameter IDs (PIDs) to aid in diagnosing the system. PIDs are real-time measurements of parameters such as voltages, resistances, etc., calculated by the restraints control module (RCM) and sent to the diagnostic tool for display. Many of the PIDs supported by the RCM are calculated periodically and are, therefore, not true real-time readings.

1. To retrieve PIDs, follow these steps:
2. Connect the diagnostic tool to the data link connector (DLC).
3. Turn the ignition switch to the ON position.
4. Follow the manufacturer's instructions for the diagnostic tool being used.
5. Record all PIDs that are to be retrieved and initiate PID retrieval. PIDs are updated continuously on the display.

#### Active Commands

##### Instrument Cluster Module

These commands allow the technician to verify the operation of instrument cluster module components and subsystems.

##### Restraints Control Module (RCM)

These commands allow the technician to verify operation of the supplemental restraint system (SRS) indicator lamps.

#### Lamp Fault Codes

When the restraints control module (RCM) detects a system fault, it will cause the air bag indicator to flash a coded sequence; a lamp fault code (LFC). The code is 2 digits. The first digit is flashed with a 0.5-second interval between pulses. There is a 2-second pause before the second digit is flashed which also has a 0.5-second interval between pulses. There is a 5-second pause between each display of an LFC.

Each LFC is flashed 5 times after which the air bag indicator will remain lit for the remainder of the key-on cycle. If there are multiple LFCs, each LFC will flash in order of priority.

#### Diagnostic Trouble Codes (DTCs)

While the lamp fault codes (LFCs) are an indication of a general concern in the passive restraints system, the diagnostic trouble codes (DTCs) are more specific. The DTCs can be retrieved from the restraints control module (RCM) with a diagnostic tool via the data link connector (DLC).

#### DIAGNOSTIC TROUBLE CODE CHART

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## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

DTC (1)	LFC (2)	Description	Action To Take
-	Continuous	The Air Bag Indicator is Illuminated Continuously, RCM Disconnected or Inoperative, Loss of Battery Feed, or Loss of Signal Ground	GO to <b><u>PINPOINT TEST A.</u></b>
B1231	13	Crash Data Memory Full	Install a new RCM and impact sensors. REFER to <b><u>INSPECTION AND REPAIR AFTER A SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPLOYMENT.</u></b>
B1317	Continuous	Battery Voltage High	CHECK battery voltage; to be below 16 volts. REFER to <b><u>CHARGING SYSTEM - GENERAL INFORMATION .</u></b>
B1318	Continuous	Battery Voltage Low	CHECK battery voltage; to be above 9.0 volts. REFER to <b><u>CHARGING SYSTEM - GENERAL INFORMATION .</u></b>
B1342	12	RCM Is Faulted	Install a new RCM.
B1869	NONE Continuous lamp Secondary air bag warning sounds if another fault is present	Lamp Air Bag Warning Indicator Circuit Open or Short to Ground	GO to <b><u>PINPOINT TEST B.</u></b>
B1870	NONE Secondary air bag warning sounds if another fault is present	Air Bag Warning Indicator Circuit Short to Battery	GO to <b><u>PINPOINT TEST C.</u></b>
B1884	18	PAD Warning Lamp Circuit Failure	GO to <b><u>PINPOINT TEST D.</u></b>
B1890	18	PAD Warning Lamp Circuit	GO to <b><u>PINPOINT TEST</u></b>

**2005 Ford Escape****2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner**

		Short To Battery	<b><u>E.</u></b>
B1891	53	Air Bag Tone Warning Indicator Circuit Short to Battery	GO to <b><u>PINPOINT TEST F.</u></b>
B1892	53	Air Bag Tone Warning Indicator Circuit Open or Shorted to Ground	GO to <b><u>PINPOINT TEST G.</u></b>
B1921	14	Air Bag Diagnostic Monitor Ground Circuit Open	GO to <b><u>PINPOINT TEST H.</u></b>
B2290	16	Occupant Classification System Fault	GO to <b><u>PINPOINT TEST I.</u></b>
B2292	33	Restraint System - Safety Belt Pretensioner Status (Driver Pretensioner Circuit Fault)	GO to <b><u>PINPOINT TEST J.</u></b>
B2292	34	Restraint System - Safety Belt Pretensioner Status (Passenger Pretensioner Circuit Fault)	GO to <b><u>PINPOINT TEST J.</u></b>
B2292	38	Restraint System - Retractor Pretensioner Status (Driver Retractor Pretensioner Circuit Fault)	GO to <b><u>PINPOINT TEST J.</u></b>
B2293	19	Restraint System - Air Bag Status (Driver Front Air Bag Circuit Fault)	GO to <b><u>PINPOINT TEST K.</u></b>
B2293	21	Restraint System - Air Bag Status (Passenger Front Air Bag Circuit Fault)	GO to <b><u>PINPOINT TEST K.</u></b>
B2294	24	Restraint System - Safety Canopy Module Status (Driver Side Safety Canopy Circuit Fault)	GO to <b><u>PINPOINT TEST L.</u></b>
B2294	25	Restraint System - Safety Canopy Module Status (Passenger Side Safety Canopy Circuit Fault)	GO to <b><u>PINPOINT TEST L.</u></b>
B2295	22	Restraint System - Side Air Bag Module Status (Driver Side Air Bag Module Circuit Fault)	GO to <b><u>PINPOINT TEST M.</u></b>
B2295	23	Restraint System - Side Air	GO to <b><u>PINPOINT TEST</u></b>

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		Bag Module Status (Passenger Side Air Bag Module Circuit Fault)	<u>M.</u>
B2296	42	Restraint System - Impact Sensor Status (Front Impact Severity Sensor Circuit Fault)	GO to <u>PINPOINT TEST</u> <u>N.</u>
B2296	43	Restraint System - Impact Sensor Status (Driver Side Front Row Impact Sensor Circuit Fault)	GO to <u>PINPOINT TEST</u> <u>N.</u>
B2296	45	Restraint System - Impact Sensor Status (Driver Side Second Row Impact Sensor Circuit Fault)	GO to <u>PINPOINT TEST</u> <u>N.</u>
B2296	44	Restraint System - Impact Sensor Status (Passenger Side Front Row Impact Sensor Circuit Fault)	GO to <u>PINPOINT TEST</u> <u>N.</u>
B2296	46	Restraint System - Impact Sensor Status (Passenger Side Second Row Impact Sensor Circuit Fault)	GO to <u>PINPOINT TEST</u> <u>N.</u>
B2434	51	Driver Safety Belt Buckle Switch Circuit Short To Ground	GO to <u>PINPOINT TEST</u> <u>O.</u>
B2435	51	Driver Safety Belt Buckle Switch Circuit Resistance Out Of Range	GO to <u>PINPOINT TEST</u> <u>P.</u>
B2438	52	Passenger Safety Belt Buckle Switch Circuit Short to Ground	GO to <u>PINPOINT TEST</u> <u>Q.</u>
B2439	52	Passenger Safety Belt Buckle Switch Circuit Resistance Out of Range	GO to <u>PINPOINT TEST</u> <u>R.</u>
B2477	Continuous	Module Configuration Error	INSTALL a new RCM.
B2691	51	Driver Safety Belt Buckle Switch Circuit Fault	GO to <u>PINPOINT TEST</u> <u>S.</u>
B2692	52	Passenger Safety Belt Buckle Switch Circuit Fault	GO to <u>PINPOINT TEST</u> <u>T.</u>
B2909	16	Belt Tension Sensor Fault	GO to <u>PINPOINT TEST</u> <u>U.</u>

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C1414	15	Incorrect Vehicle ID	GO to <b><u>PINPOINT TEST V.</u></b>
C1947	49	Seat Track Position Sensor Circuit Short to Ground	GO to <b><u>PINPOINT TEST W.</u></b>
C1948	49	Seat Track Position Sensor Circuit Resistance Out of Range	GO to <b><u>PINPOINT TEST X.</u></b>
C1981	49	Seat Track Position Sensor Circuit Fault	GO to <b><u>PINPOINT TEST Y.</u></b>
-	-	No communication with the restraints control module (RCM).	GO to <b><u>PINPOINT TEST Z.</u></b>
(1) DTC: Diagnostic trouble code, retrieved using diagnostic tool.			
(2) LFC: Lamp fault code, flashed on air bag indicator.			

#### Inspection and Verification

1. Verify the customer concern by checking the air bag indicator in the instrument cluster module. For additional information, refer to **PROVE OUT THE SYSTEM**.
2. Visually inspect for obvious signs of mechanical and electrical damage, using the following chart.

#### VISUAL INSPECTION CHART

Mechanical	Electrical
<ul style="list-style-type: none"><li>• Damaged restraints control module (RCM) bracket</li><li>• Damaged front crash severity sensor or bracket</li><li>• Damaged side impact sensor or bracket</li></ul>	<ul style="list-style-type: none"><li>• Open fuse(s)</li><li>• Damaged wiring harness</li><li>• Loose or corroded connectors</li><li>• Circuitry open/shorted</li><li>• Damaged shorting bars</li></ul>

3. If the concern is not visually evident, use the diagnostic tool to retrieve diagnostic trouble codes (DTCs) and carry out the on-demand self test.
4. If the on-demand self test is passed and no DTCs are retrieved, GO to **SYMPTOM CHART**.
5. If DTCs are retrieved, refer to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE**.

#### Symptom Chart

#### SYMPTOM CHART

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>Air bag warning indicator is illuminated continuously</li></ul>	<ul style="list-style-type: none"><li>Fuse to RCM.</li><li>Wiring, terminals or connectors.</li><li>Faulty diagnostic connector.</li><li>RCM.</li></ul>	<ul style="list-style-type: none"><li>GO to <b><u>PINPOINT TEST A.</u></b></li></ul>
<ul style="list-style-type: none"><li>Air bag indicator flashing</li></ul>	<ul style="list-style-type: none"><li>Air bag/pretensioner supplemental restraint system (SRS) fault.</li></ul>	<ul style="list-style-type: none"><li>REFER to <b><u>RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE.</u></b></li></ul>
<ul style="list-style-type: none"><li>Audible tone - DTCs retrieved</li></ul>	<ul style="list-style-type: none"><li>Air bag SRS system fault.</li></ul>	<ul style="list-style-type: none"><li>REFER to <b><u>RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE.</u></b></li></ul>
<ul style="list-style-type: none"><li>No communication with the restraints control module (RCM)</li></ul>	<ul style="list-style-type: none"><li>Diagnostic tool.</li><li>Data link connector (DLC).</li><li>Circuitry.</li><li>RCM.</li></ul>	<ul style="list-style-type: none"><li>GO to <b><u>PINPOINT TEST Z.</u></b></li></ul>

### PINPOINT TESTS - AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Refer to **SUPPLEMENTAL RESTRAINTS** for Escape or **SUPPLEMENTAL RESTRAINTS** for Mariner or schematic and connector information.

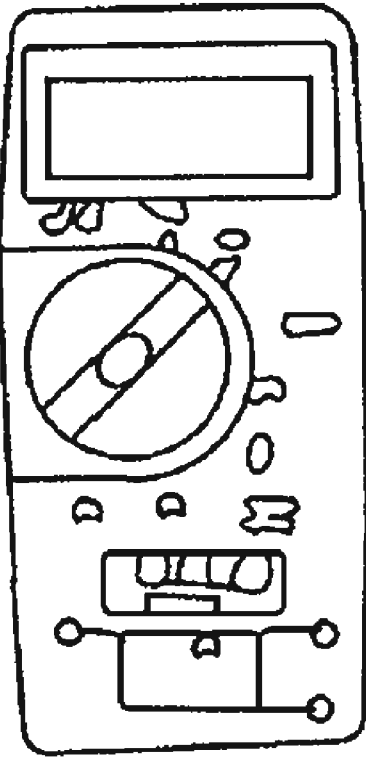
Special Tool(s)

### SPECIAL TOOL SPECIFICATION

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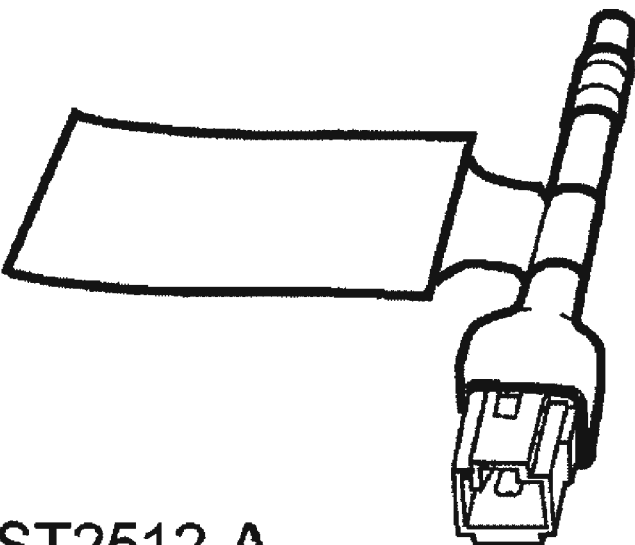
## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



**ST1137-A**

FLUKE 73III Automotive Meter 105-R0057 or equivalent



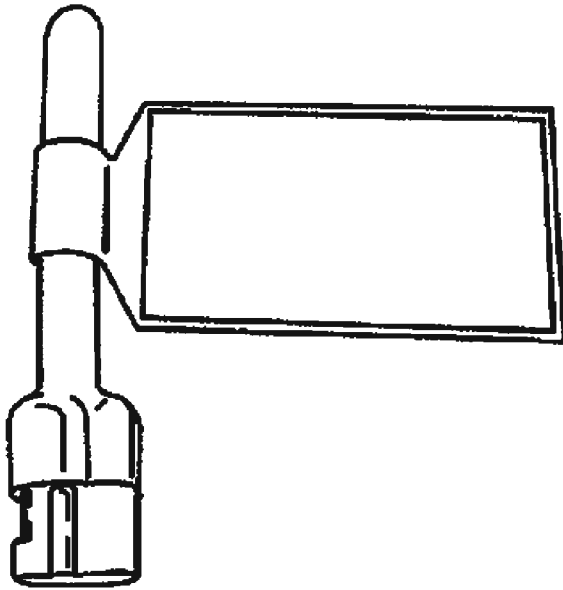
**ST2512-A**

Diagnostic Tool, Restraint System (2 Required) 418-F403



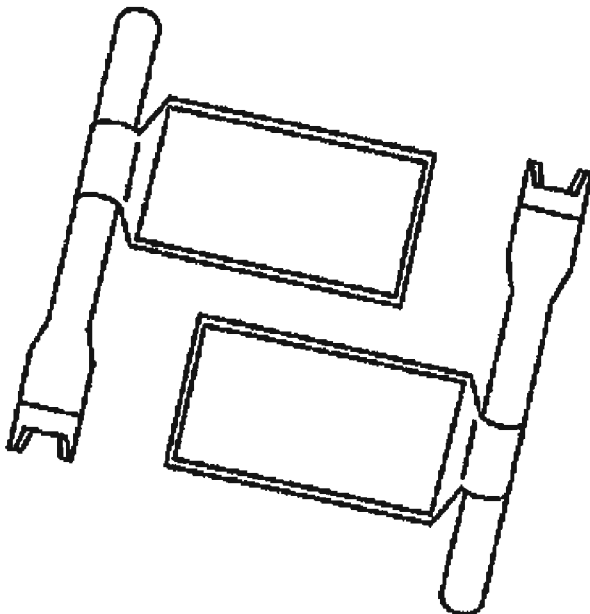
## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



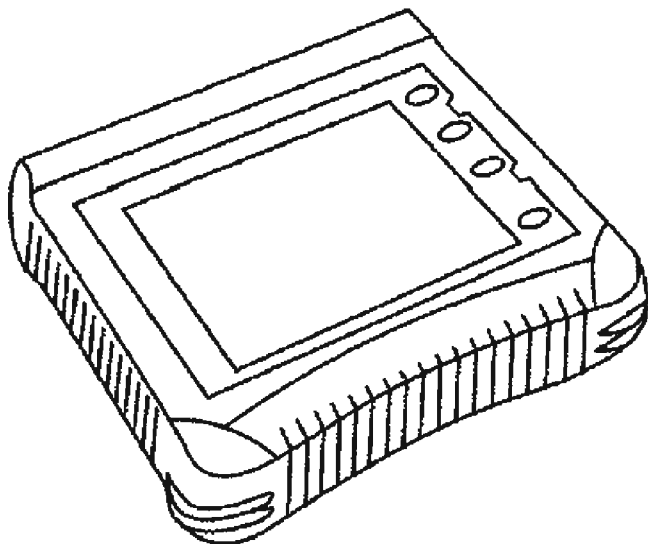
**ST2507-A**

Diagnostic Tool, Restraint System (5 Required) 418-133



**ST2621-A**

Diagnostic Tool, Restraint System (1 required) 418-F395



ST2332-A

Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

#### Restraint System Diagnostic Tool Warning

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**Pinpoint Test A: The Air Bag Warning Indicator Is Illuminated Continuously - RCM Disconnected or Inoperative, Loss of Battery Feed, or Loss of Signal Ground**

#### Normal Operation

**NOTE:** During normal operation, the air bag indicator will illuminate continuously for 6 seconds after the ignition switch is placed to the RUN or ON position and after 5 cycles of a lamp fault code (LFC) if a fault exists. Be sure to cycle the ignition switch and look for a 6-second indicator prove-out without LFCs.

The restraints control module (RCM) will communicate diagnostic trouble codes (DTCs) to the diagnostic tool through the data link connector (DLC). If the diagnostic tool displays NO COMMUNICATION when retrieving continuous DTCs, GO to **PINPOINT TEST Z** to troubleshoot the system.

#### Possible Causes

An air bag indicator that is illuminated continuously can be caused by one of the following:

- Damaged ignition circuit
- RCM disconnected from the vehicle harness
- A loss of RCM signal ground
- Damaged wiring, terminals or connectors
- Loss of RCM battery feed
- Instrument cluster
- RCM is faulted

**PINPOINT TEST A: THE AIR BAG WARNING INDICATOR IS ILLUMINATED CONTINUOUSLY - RCM DISCONNECTED OR INOPERATIVE, LOSS OF BATTERY FEED, OR LOSS OF SIGNAL GROUND**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### **A1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can

result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered. **NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

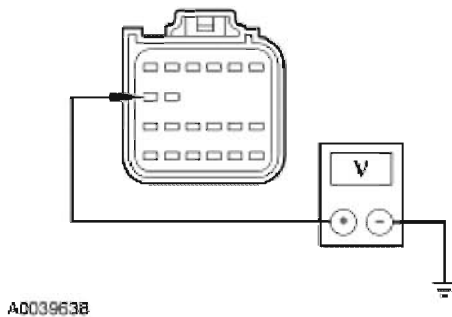
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Were any continuous or on-demand self test DTCs retrieved?**  
**Yes :** If continuous DTCs were retrieved, GO to A2. If on-demand DTCs were retrieved, GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.  
**No :** GO to A2.

## **A2 CHECK THE RCM CONNECTION**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: RCM C2041a.
- **Is RCM C2041a fully connected and the connector locking tab engaged?**  
**Yes :** GO to A3.  
**No :** CONNECT C2041a and ENGAGE the locking tab. GO to A7.

## **A3 CHECK CIRCUIT 1654 (OG/YE) FOR AN OPEN**

- Deactivate the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**.
- Disconnect: RCM C2041a and C2041b.
- Key in ON position.
- Measure the voltage between RCM C2041a pin 12, circuit 1654 (OG/YE), harness side and ground.

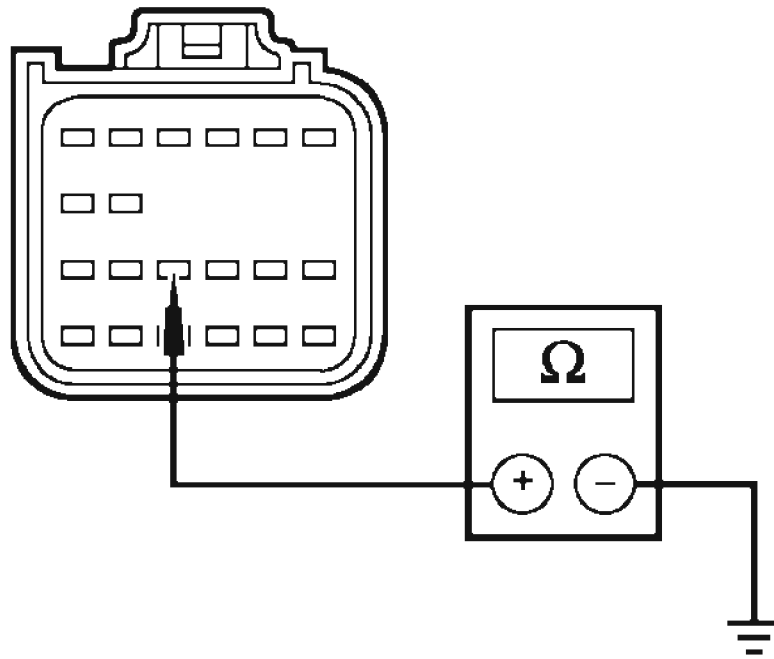


**Fig. 5: Measuring Voltage Between RCM Connector And Ground**  
Courtesy of FORD MOTOR CO.

- Is the voltage between 9 and 16 volts?  
Yes : GO to A4.  
No : REPAIR circuit 1654 (OG/YE). GO to A8.

**A4 CHECK CIRCUIT 1203 (BK/LB) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between RCM C2041a pin 16, circuit 1203 (BK/LB, harness side and ground.

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**Fig. 6: Measuring Resistance Between RCM Connector And Ground**  
Courtesy of FORD MOTOR CO.

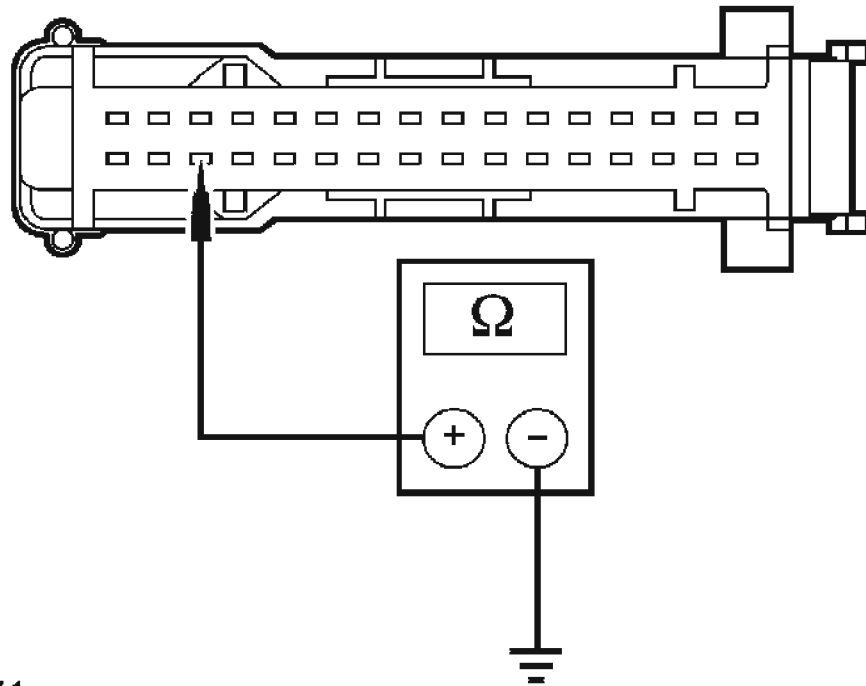
- **Is the resistance less than 5 ohms?**

**Yes :** GO to A5.

**No :** REPAIR circuit 1203 (BK/LB). GO to A8.

**A5 CHECK CIRCUIT 608 (BK/YE) FOR SHORT TO GROUND**

- **Connect:** RCM C2041a and C2041b.
- **Disconnect:** Instrument Cluster C220.
- **Measure** the resistance between instrument cluster C220 pin 3, circuit 608 (BK/YE), harness side and ground.



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**Fig. 7: Measuring Resistance Between Instrument Cluster And Ground**  
Courtesy of FORD MOTOR CO.

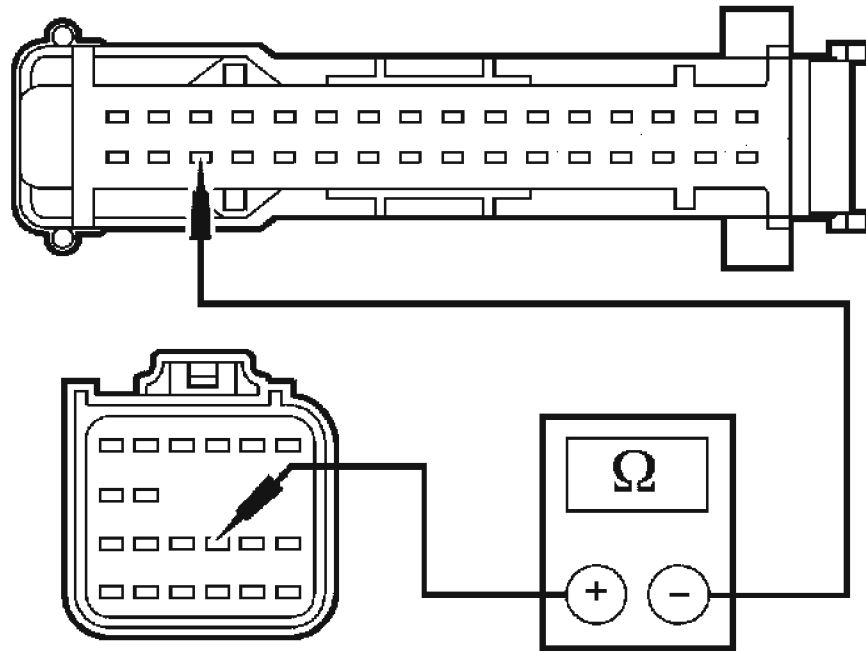
- Is the resistance greater than 10,000 ohms?

Yes : GO to A6.

No : GO to A7.

**A6 CHECK CIRCUIT 608 (BK/YE) FOR AN OPEN**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between instrument cluster module C220 pin 3, circuit 608 (BK/YE), harness side and RCM C2041a pin 15, circuit 608 (BK/YE), harness side.



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**Fig. 8: Measuring Resistance Between Instrument Cluster And RCM**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

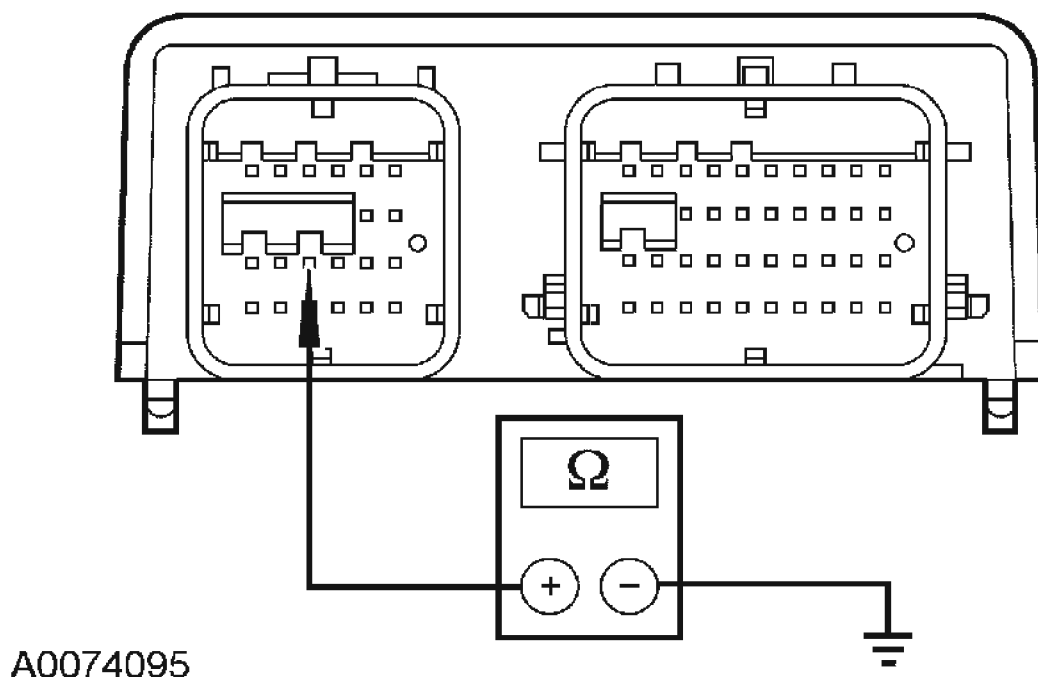
**Yes :** INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to A8.

**No :** REPAIR circuit 608 (BK/YE). GO to A8.

#### **A7 CHECK RCM**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 15, circuit 608 (BK/YE), component side and ground.





**Fig. 9: Measuring Resistance Between RCM And Ground**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?  
 Yes : REPAIR circuit 608 (BK/YE). GO to A8.  
 No : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to A8.

#### **A8 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step A1.
- Were any continuous DTCs retrieved during Step A1  
 Yes : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.  
 No : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Normal Operation**

If the restraints control module (RCM) detects an open or short to ground on the air bag warning indicator circuit, it will store diagnostic trouble code (DTC) B1869 in memory.

**Possible Causes**

An open air bag indicator circuit can be caused by:

- damaged wiring, terminals or connectors.
- an instrument cluster module internal concern.
- RCM is faulted.

**PINPOINT TEST B: DTC B1869 - LAMP AIR BAG WARNING INDICATOR CIRCUIT OPEN OR SHORT TO GROUND**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**B1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can

**result in personal injury.**

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was DTC B1869 retrieved during the on-demand self test?**  
**Yes :** If the air bag indicator lamp **does not** illuminate, GO to B2.

If the air bag indicator **does** illuminate, GO to B4.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to B7.

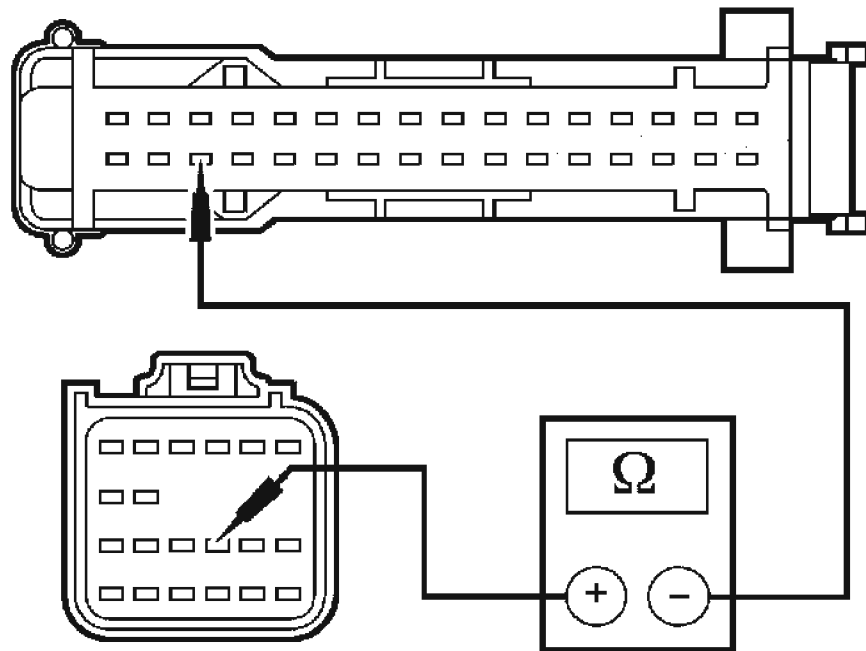
## **B2 CHECK INDICATOR LAMP OPERATION (DRIVE LAMP ON)**

- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

- Key in ON position.
- **Is the indicator lamp on?**  
**Yes** : GO to B6.  
**No** : GO to B3.

**B3 CHECK CIRCUIT 608 (BK/YE) FOR AN OPEN**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Instrument Cluster Module C220.
- Measure the resistance between instrument cluster module C220 pin 3, circuit 608 (BK/YE), harness side and RCM C2041a pin 15, circuit 608 (BK/YE), harness side.



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**Fig. 10: Measuring Resistance Between Instrument Cluster Module And RCM**

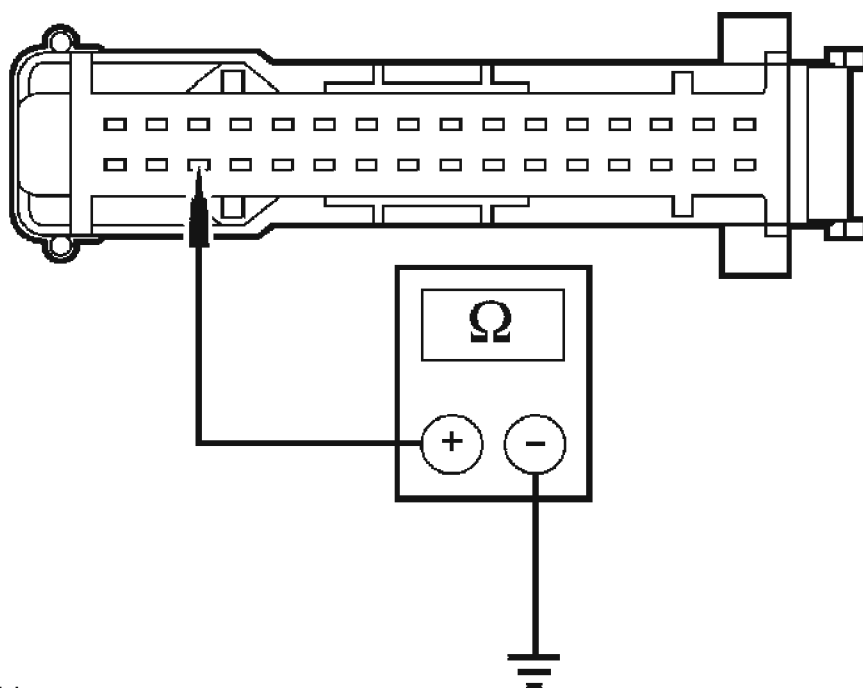
Courtesy of FORD MOTOR CO.

- **Is the resistance less than 0.5 ohm?**  
**Yes** : REPAIR or INSTALL a new instrument cluster module. REFER to **INSTRUMENT CLUSTER** . GO to B8.

No : REPAIR circuit 608 (BK/YE). GO to B8.

#### **B4 CHECK CIRCUIT 608 (BK/YE) FOR SHORT TO GROUND**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Instrument Cluster Module C220.
- Measure the resistance between instrument cluster module C220 pin 3, circuit 608 (BK/YE), harness side and ground.



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**Fig. 11: Measuring Resistance Between Instrument Cluster Module And Ground**

Courtesy of FORD MOTOR CO.

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

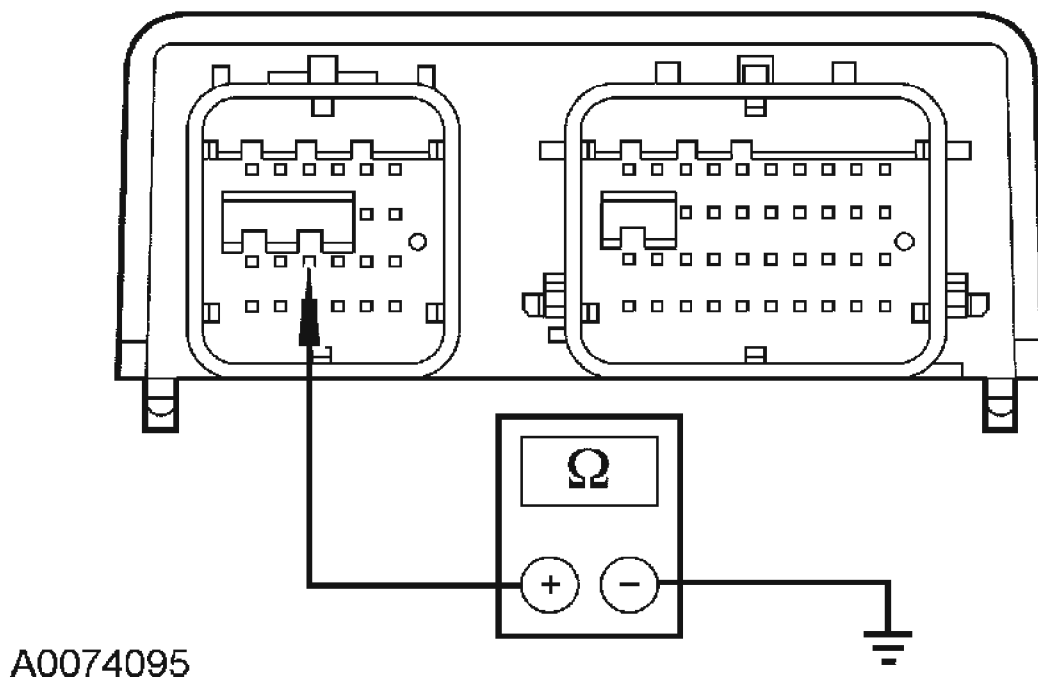
Yes : REPAIR or INSTALL a new instrument cluster module. REFER to **INSTRUMENT CLUSTER** . GO to B8.

No : GO to B5.

#### **B5 CHECK RCM**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 15, circuit 608 (BK/YE),

component side and ground.



**Fig. 12: Measuring Resistance Between RCM And Ground**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?  
Yes : REPAIR circuit 608 (BK/YE). GO to B8.  
No : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to B8.

#### B6 CONFIRM THE RCM FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: Instrument Cluster Module C220.
- Connect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to

**SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1869 retrieved during the on-demand self test?**

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to B8.

**No** : CHECK for causes of intermittent open or short to ground on circuit 608 (BK/YE). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to B8.

**B7 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1869 retrieved during the on-demand self test?**

**Yes** : GO to B2.

**No** : CHECK for causes of intermittent open or short to ground on circuit 608 (BK/YE). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to B8.

**B8 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step B1.
- **Were any continuous DTCs retrieved during Step B1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test C: DTC B1870 - Air Bag Warning Indicator Circuit Short to Battery****Normal Operation**

If the restraints control module detects an open or short to battery on the air bag warning indicator circuit, it will store diagnostic trouble code (DTC) B1870 in memory. If any other DTCs are detected with this DTC active, the secondary air bag warning will be activated.

**Possible Causes**

An air bag indicator circuit short to battery can be caused by:

- damaged wiring, terminals or connectors.
- instrument cluster module is faulted.
- RCM is faulted.

**PINPOINT TEST C: DTC B1870 - AIR BAG INDICATOR CIRCUIT SHORT TO BATTERY**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**C1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor



**pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.**

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

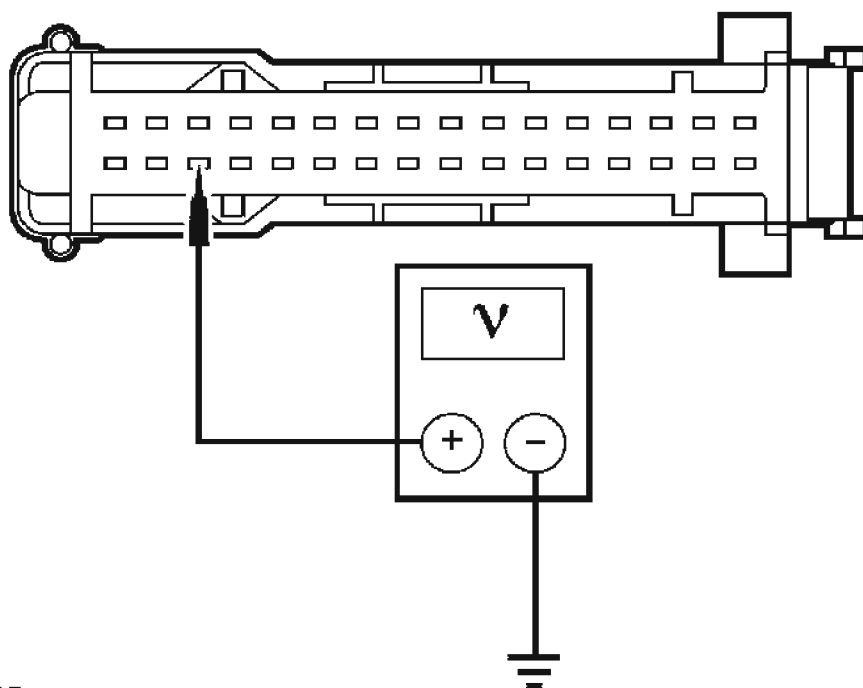
**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was DTC B1870 retrieved during the on-demand self test?**  
**Yes :** GO to C2.  
**No :** This is an intermittent fault. The fault condition is not present at this time. GO to C4.

## **C2 CHECK CIRCUIT 608 (BK/YE) FOR SHORT TO BATTERY**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Instrument Cluster Module C220.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between C220 pin 3, circuit 608 (BK/YE), harness side and ground.



A0088572

**Fig. 13: Measuring Voltage Between C220 Pin 3,Harness Side And Ground**  
 Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?  
 Yes : GO to C3.  
 No : REPAIR circuit 608 (BK/YE). GO to C5.

### C3 CHECK THE RCM

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self-Test.

**NOTE:** DTC B1869 should be retrieved when carrying out the on-demand self test due to an open on circuit 608 (BK/YE). DTC B1870 should not be retrieved at this time.

- Was DTC B1870 retrieved during the on-demand self test?  
 Yes : INSTALL a new RCM. REFER to RESTRAINTS CONTROL MODULE (RCM). GO to C5.  
 No : REPAIR or INSTALL a new instrument cluster module. REFER to INSTRUMENT CLUSTER . GO to C5.

### C4 CHECK FOR AN INTERMITTENT FAULT

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1869 retrieved during the on-demand self test?**

**Yes** : GO to C2.

**No** : CHECK for causes of intermittent short to voltage on circuit 608 (BK/YE). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to C5.

### **C5 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step C1.
- Were any continuous DTCs retrieved during Step C1

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Pinpoint Test D: LFC 18/DTC B1884 - PAD Warning Lamp Circuit Failure**

#### **Normal Operation**

When the ignition is in the ON position, the PAD indicator prove-out period is initiated by the RCM. The RCM briefly activates the PAD indicator to verify to the occupants proper functional operation of the PAD indicator. For additional information, refer to **AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**.

If the restraints control module detects an open or short to ground on the PAD indicator circuit, it will store diagnostic trouble code (DTC) B1884 in memory and flash lamp fault code (LFC) 18 (or higher priority code if one exists) on the air bag indicator.

#### **Possible Causes**

A PAD indicator circuit open or short to ground can be caused by:

- damaged wiring, terminals or connectors.
- a faulted PAD indicator.
- a faulted RCM.

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### D1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

• **Was DTC B1884 retrieved during the on-demand self test?**

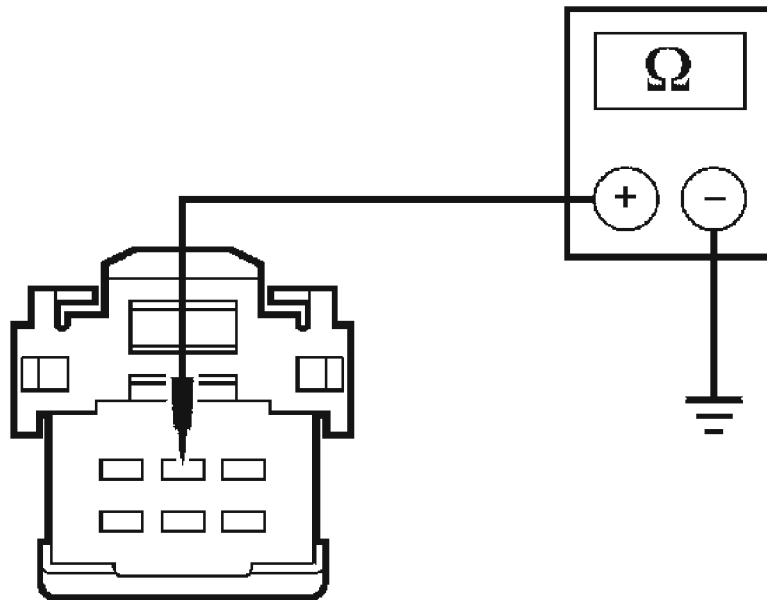
**Yes :** If the PAD indicator does illuminate, GO to D2.

If the PAD indicator does not illuminate, GO to D4.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to D8.

**D2 CHECK CIRCUIT 1632 (TN/LB) FOR SHORT TO GROUND**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: PAD Indicator C2286.
- Measure the resistance between PAD indicator C2286 pin 2, circuit 1632 (TN/LB), harness side and ground.



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**Fig. 14: Measuring Resistance Between Pad Indicator And Ground**  
Courtesy of FORD MOTOR CO.

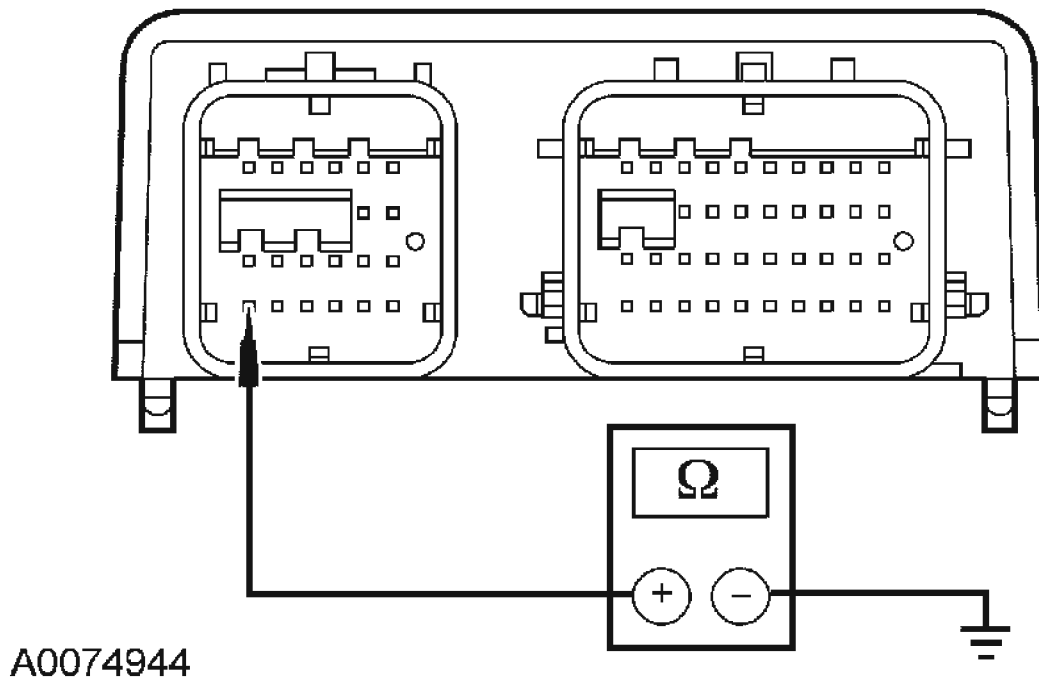
- Is the resistance greater than 10,000 ohms?

Yes : GO to D7.

No : GO to D3.

### D3 CHECK RCM

- Measure the resistance between RCM C2041a pin 19, circuit 1632 (TN/LB), component side and ground.

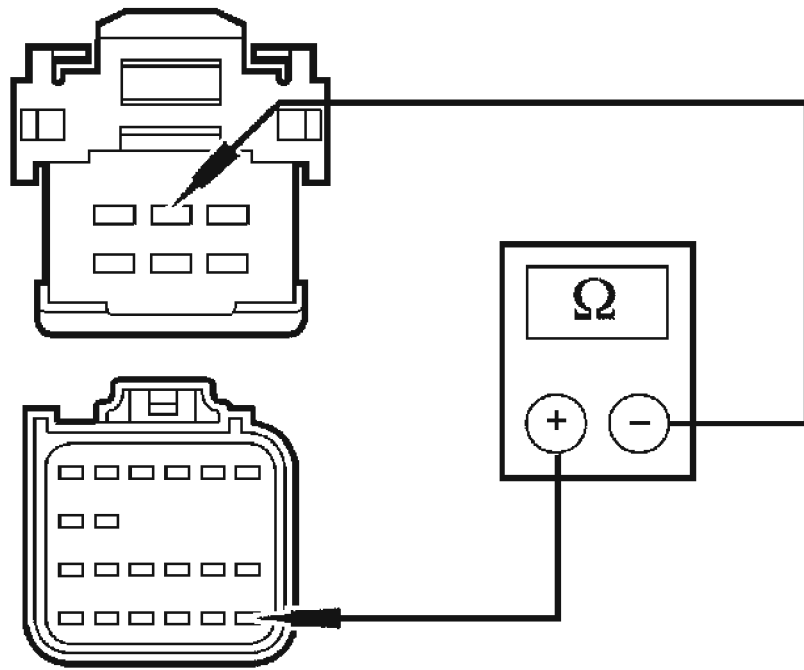


**Fig. 15: Measuring Resistance Between RCM And Ground**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?  
Yes : REPAIR circuit 1632 (TN/LB). GO to D9.  
No : GO to D7.

**D4 CHECK CIRCUIT 1632 (TN/LB) FOR OPEN**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: RCM C2041a and C2041b.
- Disconnect: PAD Indicator C2286.
- Measure the resistance between PAD indicator C2286 pin 2, circuit 1632 (TN/LB), harness side and RCM C2041a pin 19, circuit 1632 (TN/LB), harness side.



A0088574

**Fig. 16: Measuring Resistance Between PAD Indicator And RCM**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

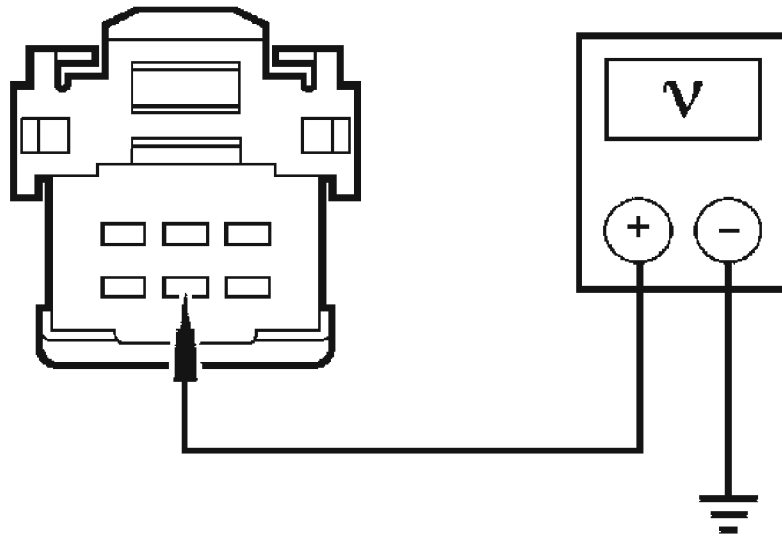
Yes : GO to D5.

No : REPAIR circuit 1632 (TN/LB). GO to D9.

**D5 CHECK CIRCUIT 1654 (OG/YE) FOR OPEN**

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between PAD indicator C2286 pin 5, circuit 1654 (OG/YE), harness side and ground.





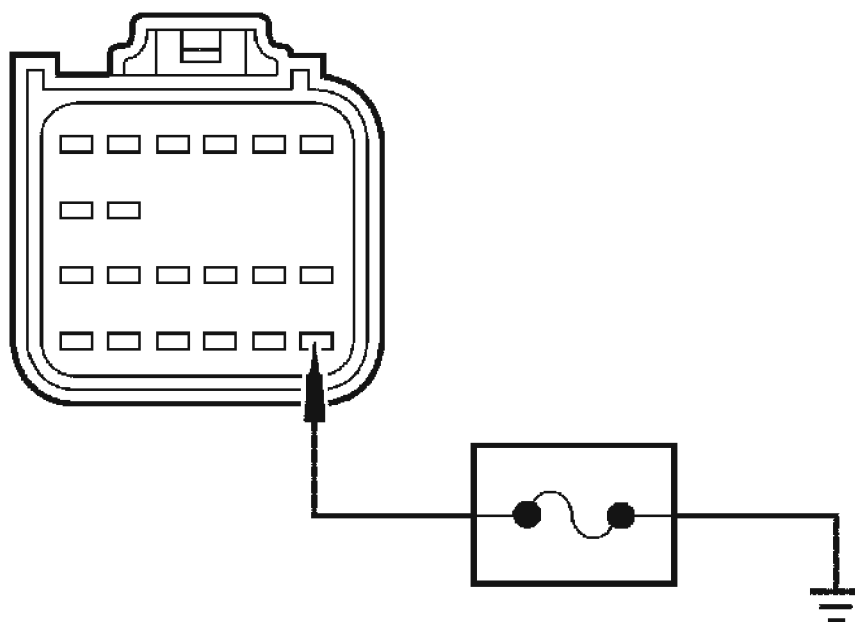
A0088580

**Fig. 17: Measuring Voltage Between PAD Indicator And Ground**  
Courtesy of FORD MOTOR CO.

- Is the voltage greater than 10 volts?  
Yes : GO to D6.  
No : REPAIR circuit 1654 (OG/YE). GO to D9.

#### **D6 CHECK PAD INDICATOR LAMP**

- Key in OFF position.
- Deactivate the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION.**
- Connect: PAD Indicator C2286.
- Key in ON position.
- Connect a fused jumper wire between RCM C2041a pin 19, circuit 1632 (TN/LB), harness side and ground.



A0049155

**Fig. 18: Connecting Fused Jumper Between RCM Connector And Ground**  
 Courtesy of FORD MOTOR CO.

- Does the PAD indicator illuminate?

Yes : GO to D7.

No : INSTALL a new PAD indicator. REFER to **PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR**. GO to D9.

#### D7 CONFIRM THE RCM FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: PAD Indicator C2286 (if disconnected in a previous step).
- Connect: RCM C2041a and C2041b (if disconnected in a previous step).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND**

**REPOWERING.**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1884 retrieved during the on-demand self test?**

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to D9.

**No** : CHECK for causes of intermittent open or short to ground on circuit 1632 (TN/LB). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to D9.

**D8 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1884 retrieved during the on-demand self test?**

**Yes** : GO to D2.

**No** : CHECK for causes of intermittent open or short to ground on circuit 1632 (TN/LB). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to D9.

**D9 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step D1.
- **Were any continuous DTCs retrieved during Step D1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) PRIORITY TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test E: LFC 18/DTC B1890 - PAD Warning Lamp Circuit Short to Battery**

**Normal Operation**

When the ignition is in the ON position, the PAD indicator prove-out period is initiated by the RCM. The RCM briefly activates the PAD indicator to verify to the occupants correct functional operation of the PAD indicator. Refer to **AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**.

If the restraints control module detects a short to battery on the passenger air bag

deactivation (PAD) warning lamp circuit, it will store diagnostic trouble code (DTC) B1890 in memory and flash lamp fault (LFC) 18 (or higher priority code if one exists) on the air bag indicator.

**Possible Causes**

A PAD indicator circuit short to battery can be caused by:

- damaged wiring, terminals or connectors.
- a faulted PAD indicator.
- a faulted RCM.

**PINPOINT TEST E: LFC 18/DTC B1890 - PAD WARNING LAMP CIRCUIT SHORT TO BATTERY**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**E1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can

result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

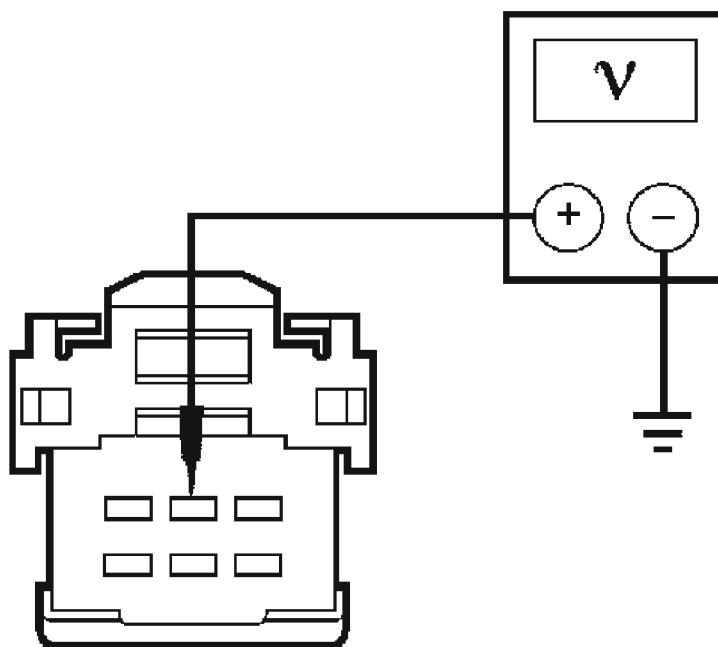
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was DTC B1890 retrieved during the on-demand self test?**  
**Yes :** GO to E2.  
**No :** This is an intermittent fault. The fault condition is not present at this time. GO to E4.

## **E2 CHECK CIRCUIT 1632 (TN/LB) FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: PAD Indicator C2286.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

- Key in ON position.
- Measure the voltage between PAD indicator pin 2, circuit 1632 (TN/LB), harness side and ground.



A0088579

**Fig. 19: Measuring Voltage Between Pad Indicator Pin 2 and Ground**  
Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?  
Yes : GO to E3.  
No : REPAIR circuit 1632 (TN/LB). GO to E5.

### **E3 CHECK THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Connect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.

**NOTE:** DTC B1884 should be retrieved when carrying out the on-demand self test due to an open on circuit 1632 (TN/LB). DTC B1890 should not be retrieved at this time.

- Was DTC B1890 retrieved during the on-demand self test?

**Yes :** INSTALL a new RCM. REFER to RESTRAINTS CONTROL MODULE (RCM). GO to E5.

**No :** INSTALL a new PAD indicator. GO to E5.

#### E4 CHECK FOR AN INTERMITTENT FAULT

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Was DTC B1890 retrieved during the on-demand self test?

**Yes :** GO to E2.

**No :** CHECK for causes of intermittent short to battery on circuit 1632 (TN/LB). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to E5.

#### E5 CHECK FOR ADDITIONAL DTCs

- Refer to the continuous DTCs recorded during Step E1.
- Were any continuous DTCs retrieved during Step E1

**Yes :** Do not clear any DTCs until all DTCs have been resolved. GO to the RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE for pinpoint test direction.

**No :** RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION. REPOWER the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING. PROVE OUT the system. CLEAR all DTCs.

#### Pinpoint Test F: DTC B1891 - Air Bag Tone Warning Indicator Circuit Short to Battery

##### Normal Operation

The restraints control module (RCM) monitors its connection to the instrument cluster module at C2041a pin 22. This connection is used to signal a chime if the air bag indicator is inoperative and another SRS fault exists. If the RCM detects a short to battery on the connection to the instrument cluster module, it will store diagnostic trouble code (DTC) B1891 in memory.

**Possible Causes**

An air bag tone warning indicator circuit short to battery or ignition can be caused by:

- damaged wiring, terminals or connectors.
- a damaged or inoperative instrument cluster module.
- RCM is faulted.

**PINPOINT TEST F: DTC B1891 - AIR BAG TONE WARNING INDICATOR CIRCUIT SHORT TO BATTERY**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**F1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag



equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

• **Was DTC B1891 retrieved during the on-demand self test?**

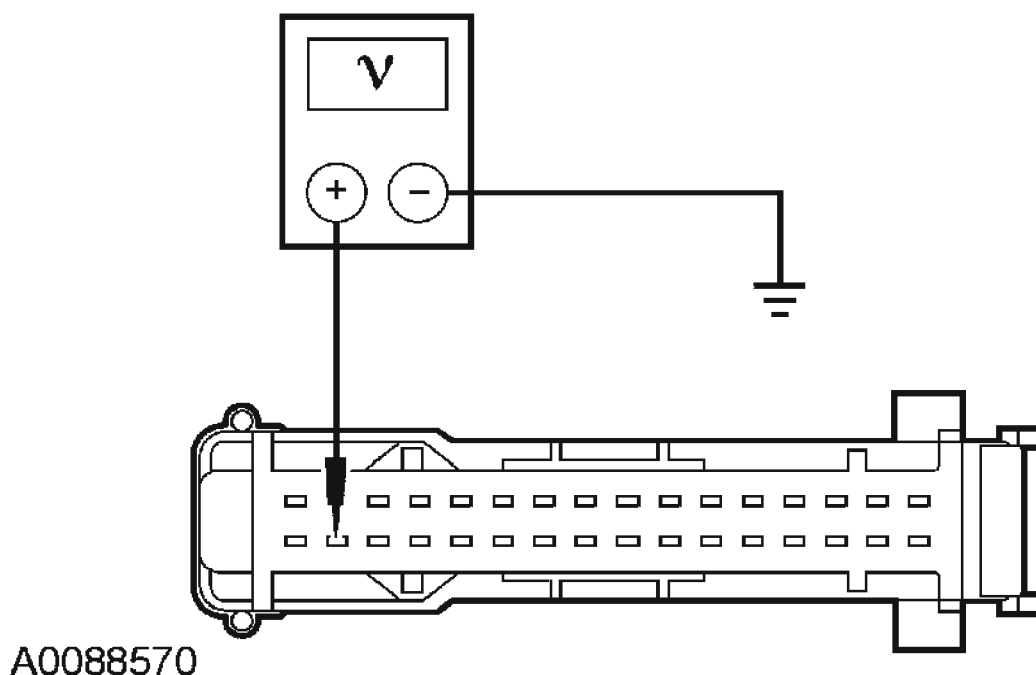
**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to F2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to F4.

## **F2 CHECK THE AIR BAG TONE WARNING INDICATOR CIRCUIT FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Instrument Cluster Module C220.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Key in ON position.

- Measure the voltage between instrument cluster module C220 pin 2, circuit 1083 (LB/PK), harness side and ground.



**Fig. 20: Measuring Voltage Between Instrument Cluster Module And Ground**

Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?  
Yes : GO to F3.  
No : REPAIR circuit 1083 (LB/PK). GO to F5.

### **F3 CHECK THE AIR BAG TONE WARNING INDICATOR CIRCUIT**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Connect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.

**NOTE:** DTC B1892 should be retrieved when carrying out the

**on-demand self test due to an open on circuit 1083 (LB/PK). DTC B1891 should not be retrieved at this time.**

- **Was DTC B1891 retrieved during the on-demand self test?**

**Yes :** INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to F5.

**No :** INSTALL a new instrument cluster module. REFER to **INSTRUMENT CLUSTER** . GO to F5.

#### **F4 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1891 retrieved during the on-demand self test?**

**Yes :** GO to F2.

**No :** CHECK for causes of intermittent short to ground or open on circuit 1083 (LB/PK). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to F5.

#### **F5 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step F1.
- **Were any continuous DTCs retrieved during Step F1 ?**

**Yes :** Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No :** RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test G: LFC 53/DTC B1892 - Air Bag Tone Warning Indicator Circuit Shorted to Ground or Open**

#### **Normal Operation**

The restraints control module (RCM) monitors its connection to the instrument cluster module at C2041a pin 22. This connection is used to signal a chime if the air bag indicator is inoperative and another SRS fault exists. If the RCM detects a short to ground or open on the connection to the cluster, it will store diagnostic trouble code (DTC) B1892 in memory and flash lamp fault code (LFC) 53 (or a higher priority code if one exists) on the air bag indicator.

#### **Possible Causes**

An air bag tone warning indicator circuit short to ground or open can be caused by:

- damaged wiring, terminals or connectors.
- a damaged or inoperative instrument cluster module.
- RCM is faulted.

**PINPOINT TEST G: LFC 53/DTC B1892 - AIR BAG TONE WARNING INDICATOR CIRCUIT SHORTED TO GROUND OR OPEN**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

## **G1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt

**buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.**

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

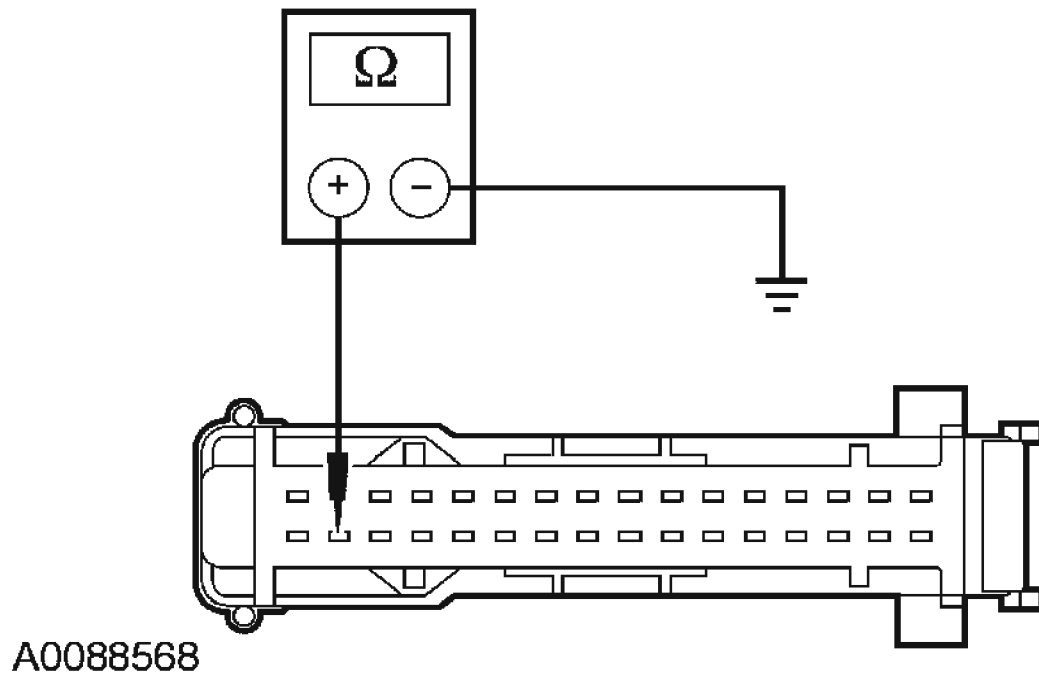
• **Was DTC B1892 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to G2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to G5.

## **G2 CHECK THE AIR BAG TONE WARNING INDICATOR CIRCUIT FOR GROUND SHORT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Instrument Cluster Module C220a.
- Measure the resistance between instrument cluster module C220 pin 2, circuit 1083 (LB/PK), harness side and ground.



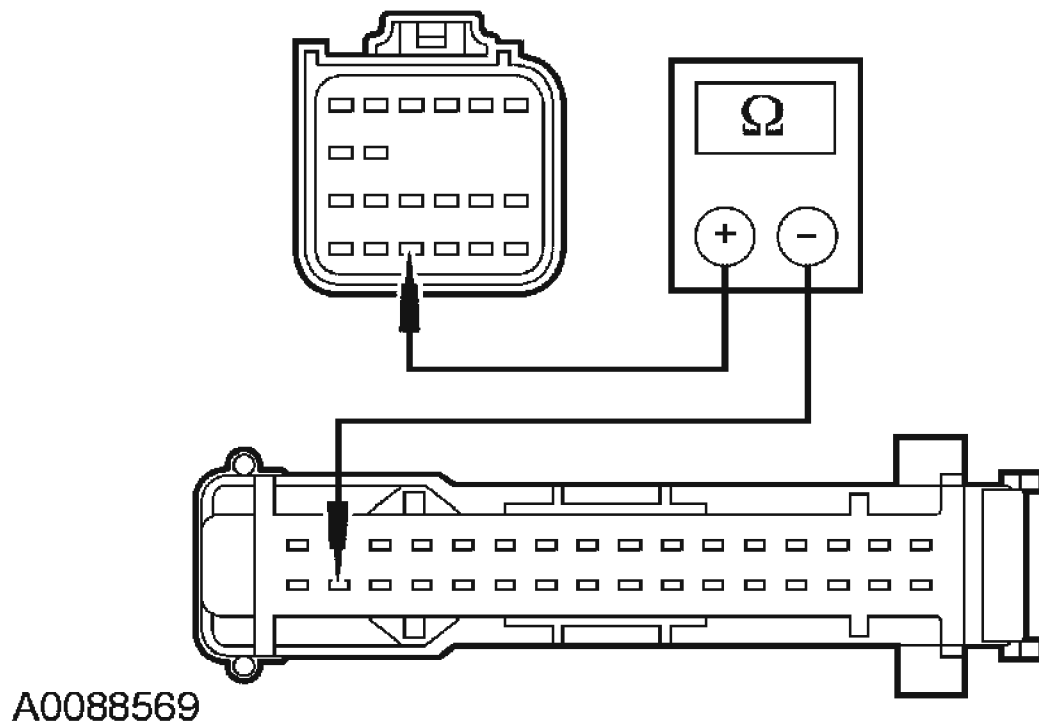
**Fig. 21: Measuring Resistance Between Instrument Cluster Module And Ground**

Courtesy of FORD MOTOR CO.

- **Is the resistance greater than 10,000 ohms?**  
Yes : GO to G3.  
No : REPAIR circuit 1083 (LB/PK). GO to G6.

**G3 CHECK THE AIR BAG TONE WARNING INDICATOR CIRCUIT FOR AN OPEN**

- Measure the resistance between RCM C2041a pin 22, circuit 1083 (LB/PK), harness side and instrument cluster module C220 pin 2, circuit 1083 (LB/PK), harness side.



**Fig. 22: Measuring Resistance Between RCM And Instrument Cluster Module**

Courtesy of FORD MOTOR CO.

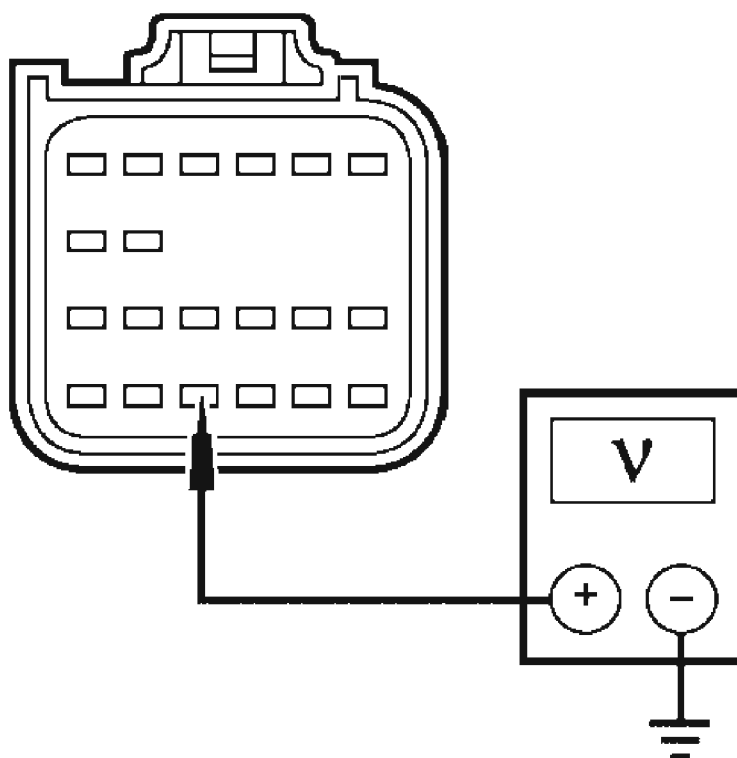
- Is the resistance less than 0.5 ohm?

Yes : GO to G4.

No : REPAIR circuit 1083 (LB/PK). GO to G6.

#### **G4 CHECK THE AIR BAG TONE WARNING INDICATOR**

- Connect: Instrument Cluster Module C220.
- Deactivate the system. Refer to AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS).
- Key in ON position.
- Measure the voltage at RCM C2041a pin 22, circuit 1083 (LB/PK).



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**Fig. 23: Measuring Voltage Between RCM Connector And Ground**  
Courtesy of FORD MOTOR CO.

- Is the voltage greater than 10 volts?

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to G6.

**No** : INSTALL a new instrument cluster module. REFER to **INSTRUMENT CLUSTER** . GO to G6.

#### **G5 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1892 retrieved during the on-demand self test?**

**Yes** : GO to G2.

**No** : CHECK for causes of an intermittent short to ground or open on circuit 1083 (LB/PK). ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to G6.



**G6 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step G1.

- **Were any continuous DTCs retrieved during Step G1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test H: LFC 14/DTC B1921 - Air Bag Diagnostic Monitor Ground Circuit Open**

**Normal Operation**

**WARNING:** The tightening torque of the restraints control module (RCM) retaining bolts is critical for correct air bag supplemental restraint system (SRS) operation. Refer to **RESTRAINTS CONTROL MODULE (RCM)** for correct torque values.

**NOTE:** A resistance difference as low as 10 ohms can set the LFC.

The restraints control module (RCM) monitors the resistance between the ground connections at the mounting bracket and the reference ground at C2041a pin 16, circuit 1203 (BK/LB). If the RCM detects a difference in resistance, it will store diagnostic trouble code (DTC) B1921 in memory and flash lamp fault code (LFC) 14 (or higher priority code if one exists) on the air bag indicator.

**Possible Causes**

A resistance difference between the RCM bracket ground and harness ground can be caused by:

- an RCM or RCM bracket that is not securely mounted.
- damaged wiring, terminals or connectors.
- a faulted RCM.

**PINPOINT TEST H: LFC 14/DTC B1921 - AIR BAG DIAGNOSTIC MONITOR CIRCUIT OPEN**

**CAUTION:** When installing a new restraints control module (RCM),

always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

## **H1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

**• Was DTC B1921 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to H2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to H5.

## **H2 INSPECT THE RCM MOUNTING, MOUNTING BRACKET AND MOUNTING SURFACE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Inspect the RCM mounting and make sure that the retaining bolts are fully seated and tightened correctly.
- Remove the RCM. Refer to **RESTRAINTS CONTROL MODULE (RCM)**.
- Visually inspect the RCM, mounting bracket and mounting surface for damage, corrosion or dirt.
- **Was a significant amount of corrosion or dirt found, the RCM mounting bracket attached to the mounting surface incorrectly or were the RCM bolts not fully seated and tightened correctly?**

**Yes :** CLEAN, TIGHTEN bolts or REPAIR the mounting surface as necessary. REINSTALL the RCM and mounting bracket to the mounting surface. GO to H6.

**No :** GO to H3.

## **H3 INSTALL THE RCM AND CARRY OUT THE ON-DEMAND SELF TEST**

- Clean the RCM mounting surfaces and bolts.
- Install the RCM. Refer to **RESTRAINTS CONTROL MODULE (RCM)**.
- Repower the system. **Do not** prove out the system at this time. Refer to

**SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**

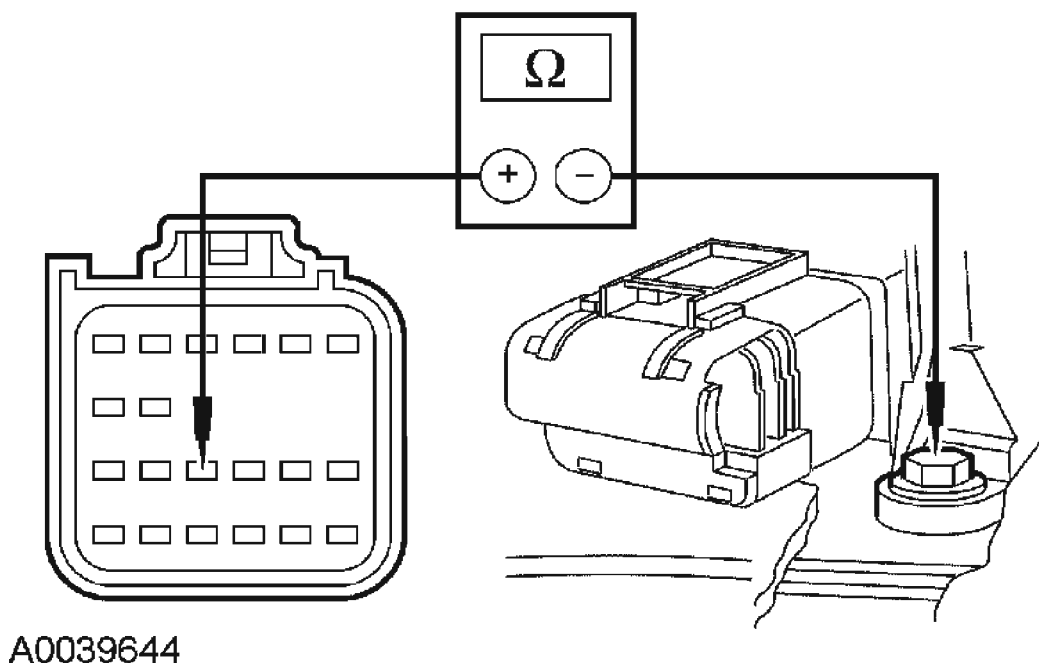
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1921 retrieved during the on-demand self test?**

**Yes** : GO to H4.

**No** : Fault corrected. GO to H6.

**H4 CHECK GROUND CIRCUIT 1203 (BK/LB) FOR HIGH RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 16, circuit 1203 (BK/LB), harness side and the RCM case ground.



**Fig. 24: Measuring Resistance Between RCM Connector & Ground**  
Courtesy of FORD MOTOR CO.

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

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM).** GO to H6.

**No** : REPAIR circuit 1203 (BK/LB). GO to H6.

**H5 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B1921 retrieved during the on-demand self test?**

**Yes** : GO to H2.

**No** : CHECK for causes of intermittent high resistance on circuit 1203 (BK/LB) or the chassis ground. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to H6.

**H6 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step H1.
- **Were any continuous DTCs retrieved during Step H1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test I: LFC 16/DTC B2290 - Occupant Classification System (OCS) Fault****Normal Operation**

**NOTE:** LFC 16 is shared between DTC B2290 and DTC B2909.

**NOTE:** There was a change to the OCS ECU dependent on the vehicle build date. The OCS ECU will have either a 10-pin connector (early build) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS service kit is being installed. The early build/late build OCS service kits are not interchangeable.

The OCS is used to classify the front passenger seat occupant in the event of a deployable impact. Refer to **AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**.

The restraints control module (RCM) monitors for fault conditions reported by the occupant classification sensor (OCS) system. If the RCM detects one of the following faults reported by the OCS system, it will store diagnostic trouble code (DTC) B2290 in memory and flash

lamp fault code (LFC) 16 (or higher priority code if one exists) on the air bag indicator.

The OCS system components (seat cushion foam pad, bladder with pressure sensor, and electronic control unit) are calibrated to each other and are serviced as an assembly. The OCS system components are not to be installed separately. If a new OCS system, OCS system component or seat cushion foam pad are needed, a new OCS system service kit (seat cushion foam pad, bladder with pressure sensor, and electronic control unit) must be installed as an assembly.

#### **Fault Conditions**

The restraints control module (RCM) monitors communications from the OCS system, it will store diagnostic trouble code (DTC) B2290 in memory if there is a loss of communication with the OCS.

The OCS system reports the following fault conditions to the RCM:

- A faulted circuit
- A pressure sensing fault
- A faulted ECU mounting condition
- A communication failure

#### **Possible Causes**

An occupant classification sensor (OCS) fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty OCS system component.
- a faulted RCM.

#### **PINPOINT TEST I: LFC 16/DTC B2290 - OCCUPANT CLASSIFICATION SYSTEM (OCS) FAULT**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

## I1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** To identify between a production OCS system and a service

**OCS system (OCS service kit) inspect the OCS ECU electrical connector. A production OCS system allows the disconnect of the electrical connector from the OCS ECU. A service OCS system (OCS service kit) has the OCS ECU electrical connector glued to the ECU, it cannot and should not be disconnected or altered. NOTE: There was a change to the OCS ECU dependent on the vehicle build date. The OCS ECU will have either a 10-pin connector (early build) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS service kit is being installed. The early build/late build OCS service kits are not interchangeable.**

**NOTE: Mounting and orientation of the OCS ECU is critical for proper system operation. Failure to correctly position and securely fasten the OCS ECU in place can set a diagnostic trouble code (DTC) in the restraints control module (RCM). If the vehicle has been in a collision in which the passenger seat may have been damaged, inspect the OCS ECU mounting area for deformation. If damaged, a new OCS service kit must be installed. In addition, make sure the mounting area of the OCS system is restored to the original production configuration (replace as necessary).**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2290/Record All Flagged Faults.
- Enter the following diagnostic mode on the scan tool: Retrieve/Flag/Record Continuous DTCs.
- **Was DTC B2290 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

Using the flagged faults recorded in step I1, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

### **Vehicles with a production OCS system**

For OCS system with a communications fault, GO to I2.



For OCS system with an internal fault, GO to I19.

For OCS system with a calibration fault, GO to I20.

For OCS system with a pressure sensor fault, GO to I12.

### **Vehicles with a service OCS system**

For OCS system with a communications fault, GO to I2.

For OCS system with an internal fault, GO to I19.

For OCS system with a calibration fault, GO to I20.

For OCS system with a pressure sensor fault, **INSTALL** a new OCS system service kit. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**. GO to I22.

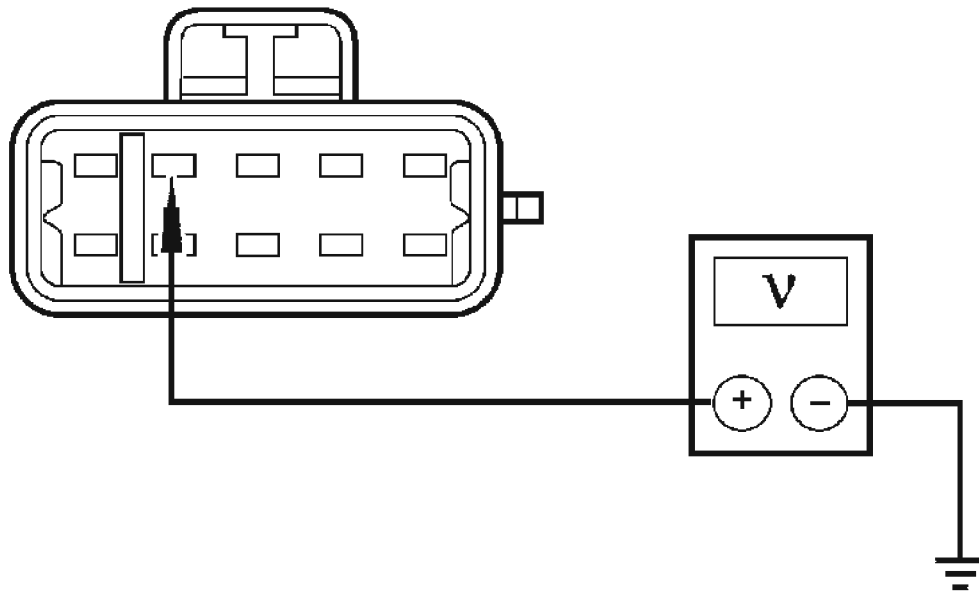
**No** : This is an intermittent fault. The fault condition is not present at this time. GO to I21.

## **I2 CHECK THE SEAT WIRING AND CONNECTORS**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Carry out a thorough visual inspection of the OCS system wiring, terminals and connectors, the RCM wiring and terminals and connectors at C2041b pins 17 and 18, and the related seat wiring harness and body wiring harness terminals and connectors.
- **Were any problems noted?**  
**Yes** : REPAIR the seat connectors and wiring as needed. GO to I22.  
**No** : GO to I3.

## **I3 CHECK IGNITION CIRCUIT 937 (RD/WH) FOR AN OPEN**

- Disconnect: OCS ECU C3159 (Early build).
- Disconnect: OCS ECU C3285 (Late build).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- **Early build vehicles**, measure the voltage between OCS ECU C3159 pin G, circuit 937 (RD/WH), harness side and ground.

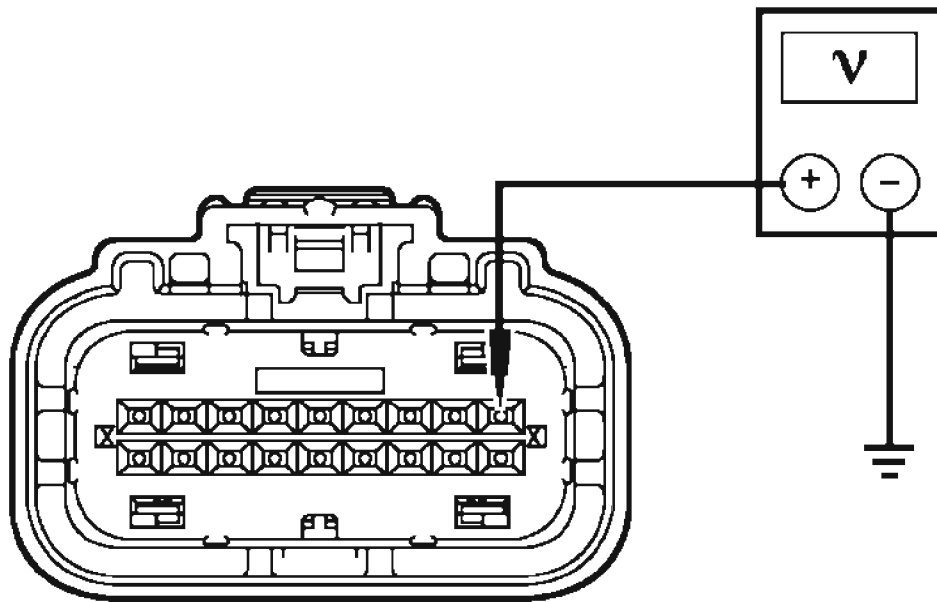


A0029324

**Fig. 25: Measuring Voltage Between OCS ECU And Ground (Early Build Vehicles)**

**Courtesy of FORD MOTOR CO.**

- **Late build vehicles**, measure the voltage between OCS ECU C3285 pin 1, circuit 937 (RD/WH), harness side and ground.



N0003691

**Fig. 26: Measuring Voltage Between OCS ECU C3285 Pin 1, Circuit 937 (RD/WH), Harness Side And Ground (Late Build Vehicles)**  
 Courtesy of FORD MOTOR CO.

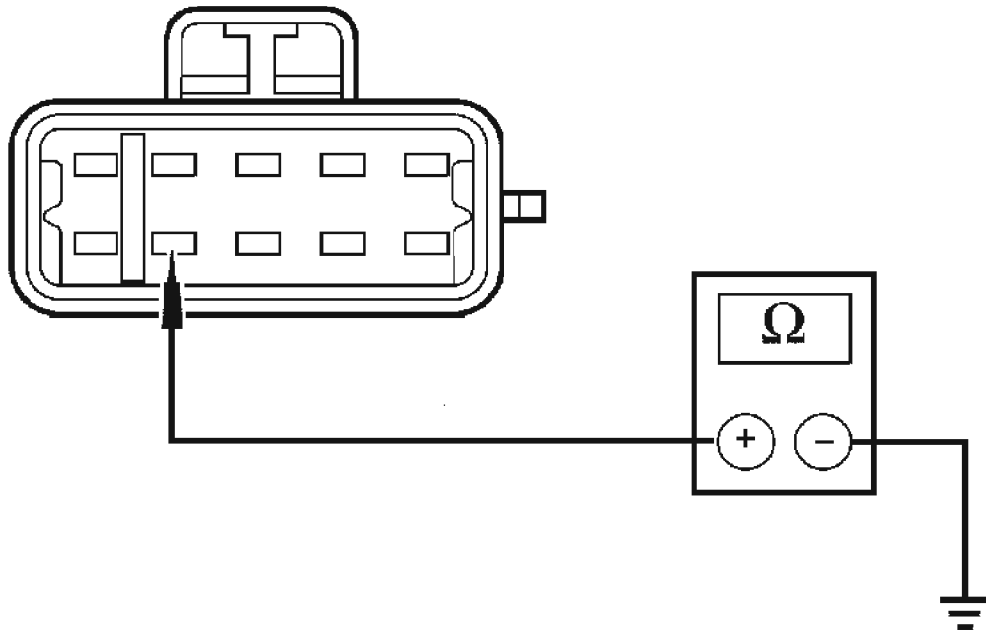
- Is the voltage greater than 10 volts?

Yes : GO to I4.

No : REPAIR circuit 937 (RD/WH). GO to I22.

#### **I4 CHECK GROUND CIRCUIT 1203 (BK/LB) FOR AN OPEN**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- **Early build vehicles**, measure the resistance between OCS ECU C3159 pin D, circuit 1203 (BK/LB), harness side and ground.

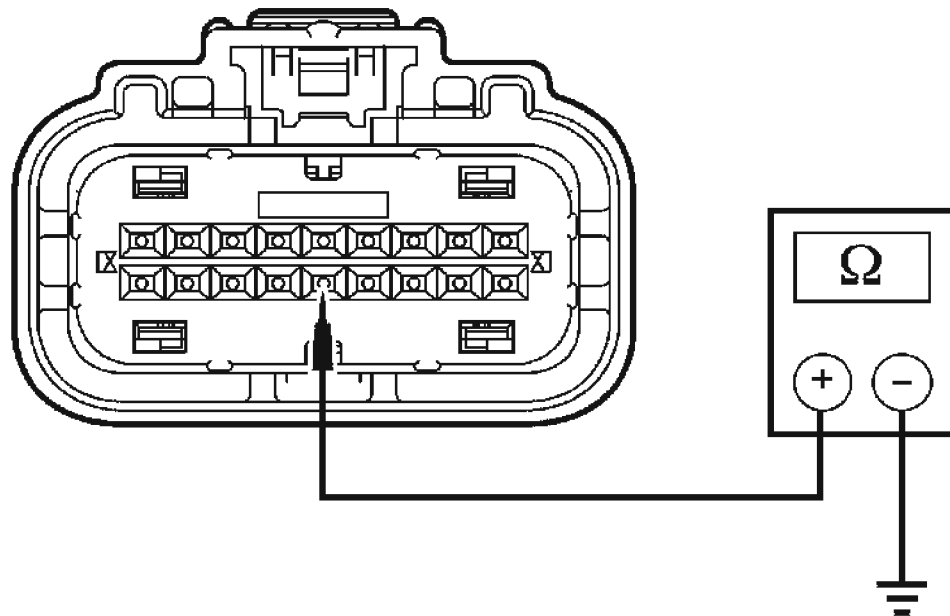


A0029325

**Fig. 27: Measuring Resistance Between OCS ECU And Ground (Early Build Vehicles)**

Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 14, circuit 1203 (BK/LB), harness side and ground.



N0003692

**Fig. 28: Measuring Resistance Between OCS ECU And Ground (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

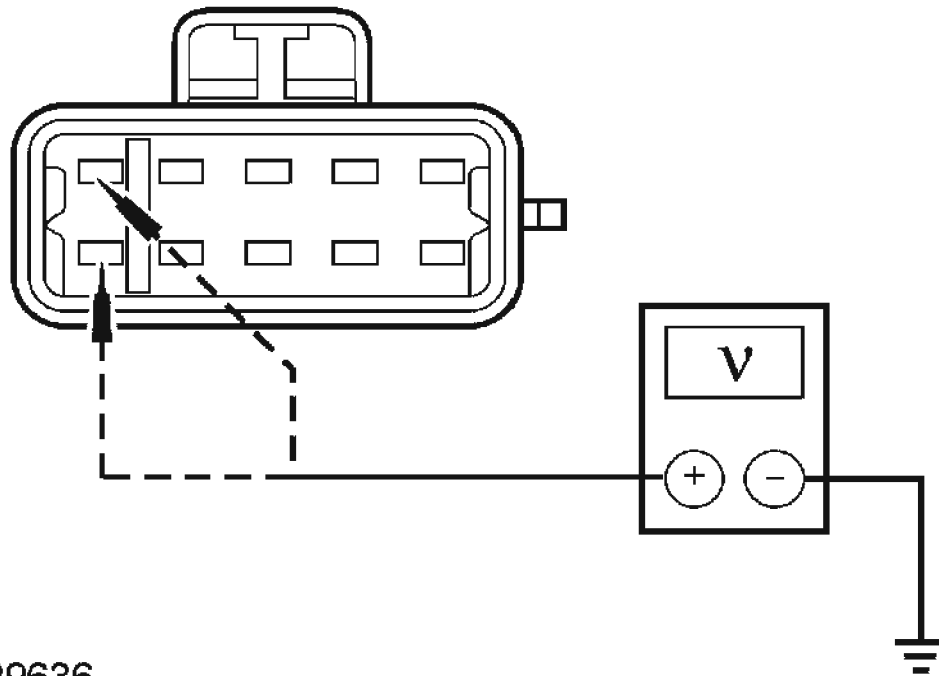
- Is the resistance less than 5 ohms?

Yes : GO to I5.

No : REPAIR circuit 1203 (BK/LB). GO to I22.

**I5 CHECK CIRCUITS 1918 (BN/WH) AND 1919 (PK/OG) FOR A SHORT TO VOLTAGE BETWEEN THE OCS AND THE RCM**

- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Key in ON position.
- **Early build vehicles** , measure the voltage between OCS ECU C3159 pin E, circuit 1918 (BN/WH), harness side and ground; and between OCS ECU C3159 pin F, circuit 1919 (PK/OG), harness side and ground.

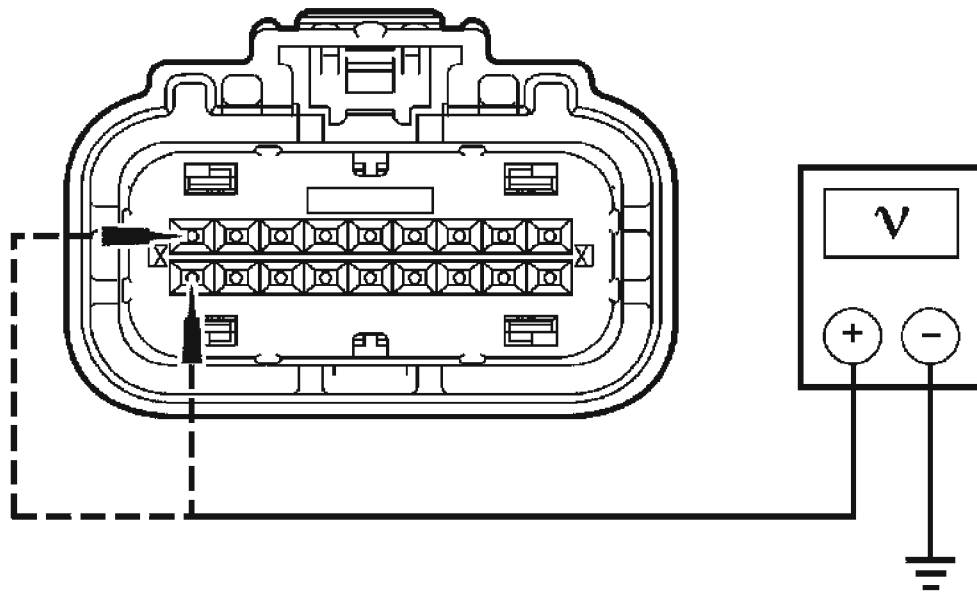


A0029636

**Fig. 29: Measuring Voltage Between OCS ECU And Ground (Early Build Vehicles)**

**Courtesy of FORD MOTOR CO.**

- **Late build vehicles** , measure the voltage between OCS ECU C3285 pin 18, circuit 1918 (BN/WH), harness side and ground; and between OCS ECU C3285 pin 9, circuit 1919 (PK/OG), harness side and ground.



N0003693

**Fig. 30: Measuring Voltage Between OCS ECU And Ground (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

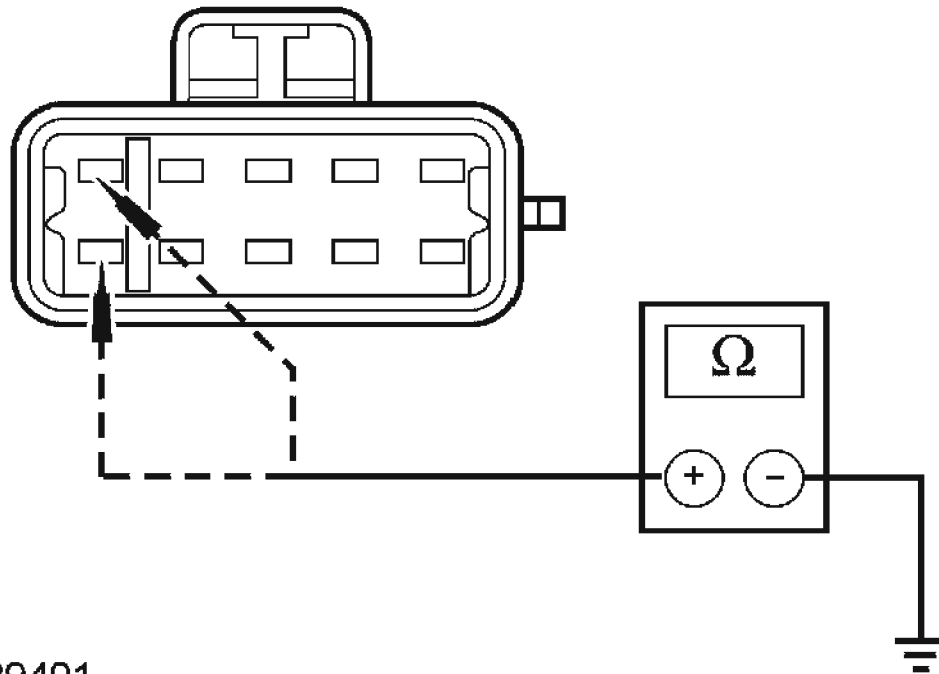
- Are the voltages less than 0.2 volt?

Yes : GO to I6.

No : REPAIR circuit 1918 (BN/WH) or circuit 1919 (PK/OG). GO to I22.

**I6 CHECK CIRCUITS 1918 (BN/WH) AND 1919 (PK/OG) FOR A SHORT TO GROUND BETWEEN THE OCS AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- **Early build vehicles** , measure the resistance between OCS ECU C3159 pin E, circuit 1918 (BN/WH), harness side and ground; and between OCS ECU C3159 pin F, circuit 1919 (PK/OG), harness side and ground.



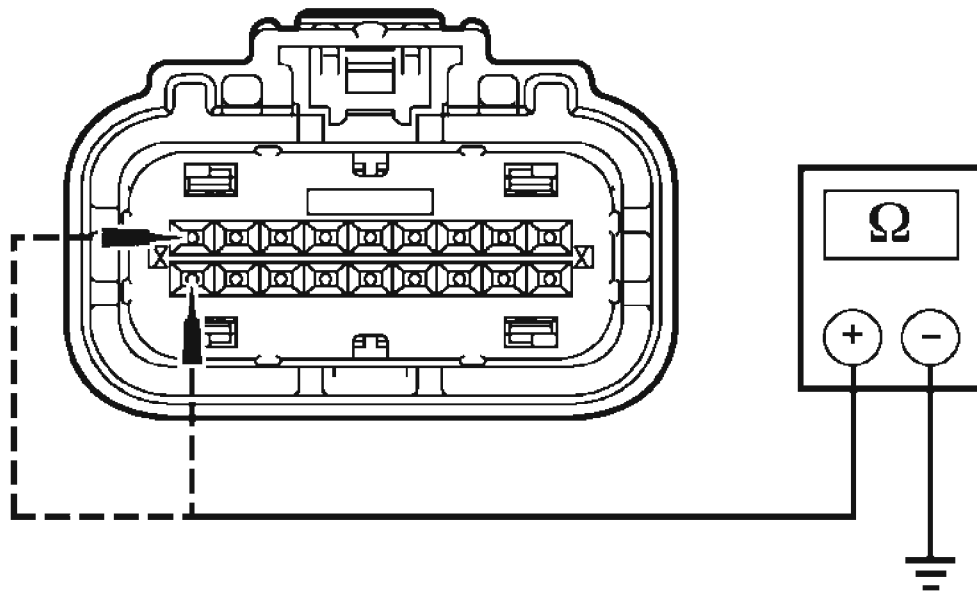
A0029401

**Fig. 31: Measuring Resistance Between OCS ECU And Ground (Early Build Vehicles)**

Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 18, circuit 1918 (BN/WH), harness side and ground; and between OCS ECU C3285 pin 9, circuit 1919 (PK/OG), harness side and ground.





N0003694

**Fig. 32: Measuring Resistance Between OCS ECU And Ground (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

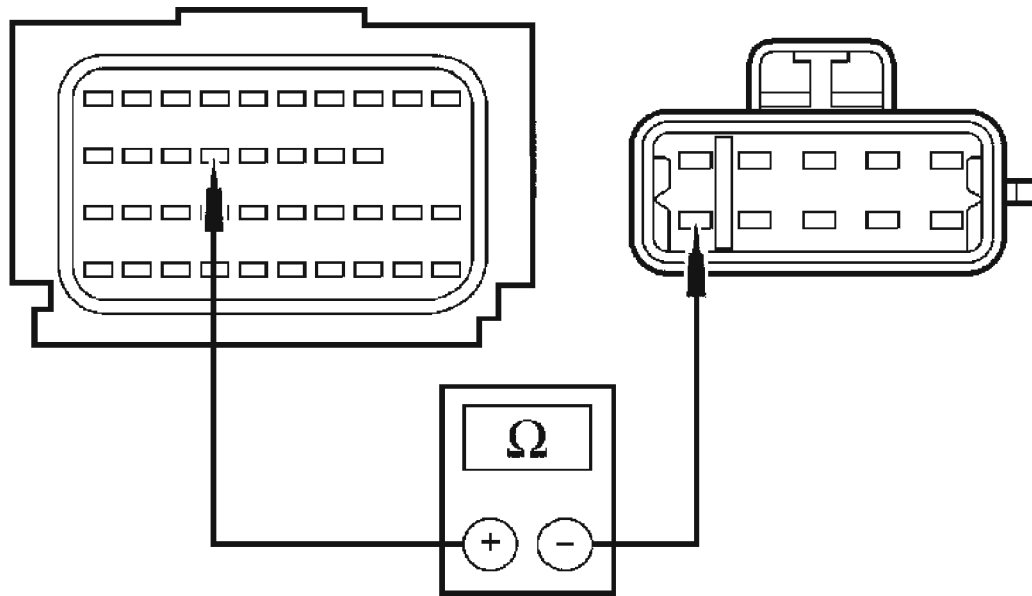
- **Are the resistances greater than 1,000,000 ohms?**

**Yes :** GO to I7.

**No :** REPAIR circuit 1918 (BN/WH) or circuit 1919 (PK/OG). GO to I22.

**I7 CHECK CIRCUIT 1918 (BN/WH) FOR AN OPEN BETWEEN THE OCS AND THE RCM**

- **Early build vehicles** , measure the resistance between RCM C2041b pin 17, circuit 1918 (BN/WH), harness side and OCS ECU C3159 pin E, circuit 1918 (BN/WH), harness side.

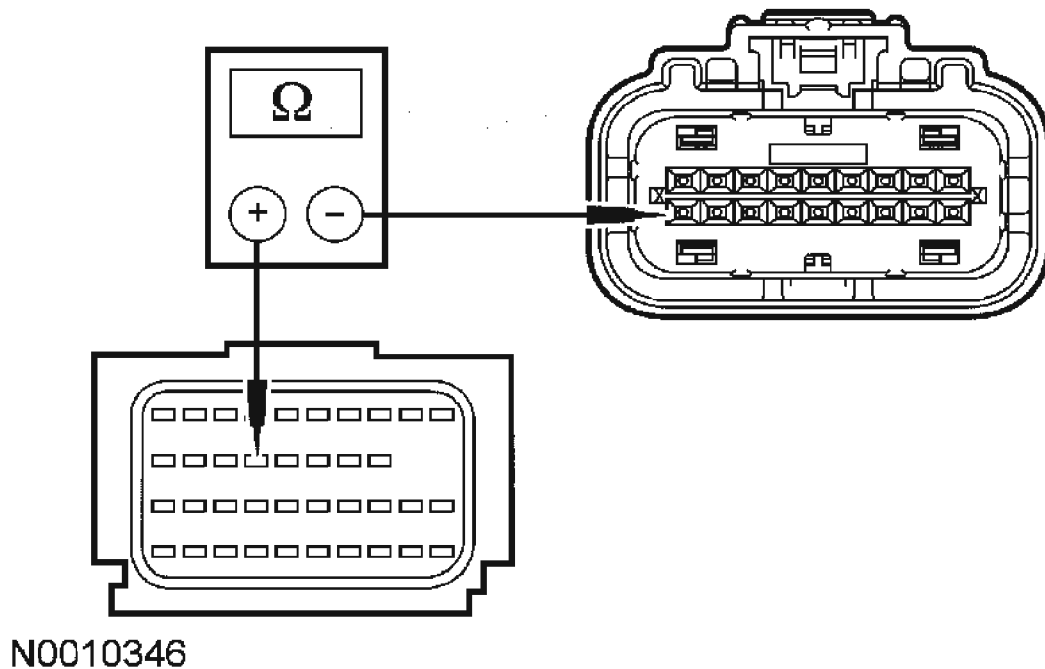


A0057215

**Fig. 33: Measuring Resistance Between RCM And OCS ECU (Early Build Vehicles)**

**Courtesy of FORD MOTOR CO.**

- **Late build vehicles** , measure the resistance between RCM C2041b pin 17, circuit 1918 (BN/WH), harness side and OCS ECU C3285 pin 18, circuit 1918 (BN/WH), harness side.



**Fig. 34: Measuring Resistance Between RCM And OCS (Late Build Vehicles)**  
Courtesy of FORD MOTOR CO.

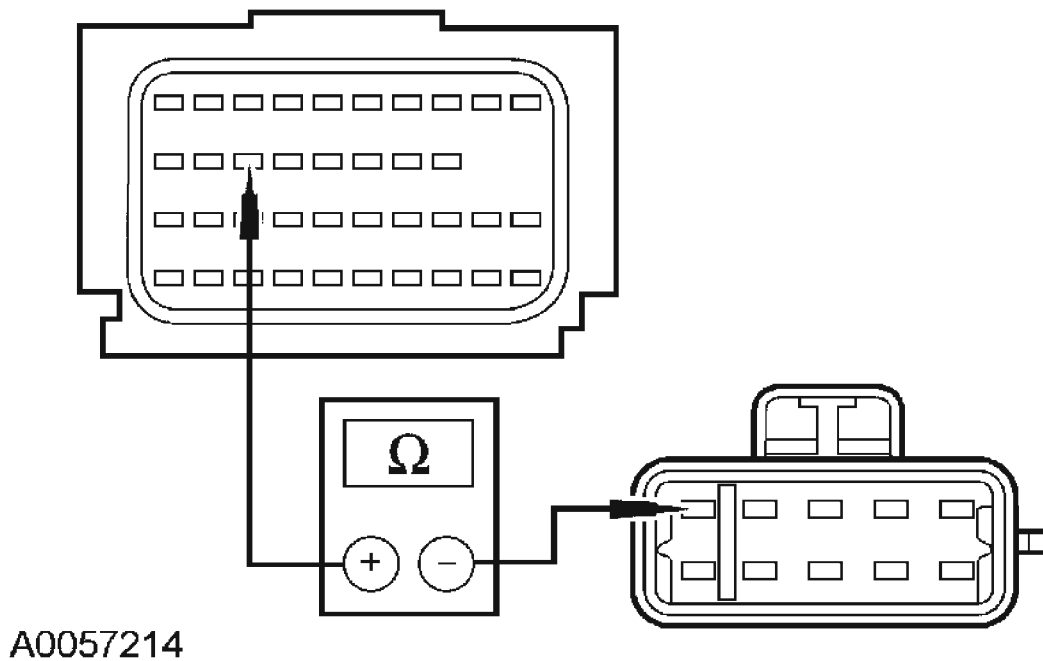
- Is the resistance less than 0.5 ohm?

Yes : GO to I8.

No : REPAIR circuit 1918 (BN/WH). GO to I22.

#### **I8 CHECK CIRCUIT 1919 (PK/OG) FOR AN OPEN BETWEEN THE OCS AND THE RCM**

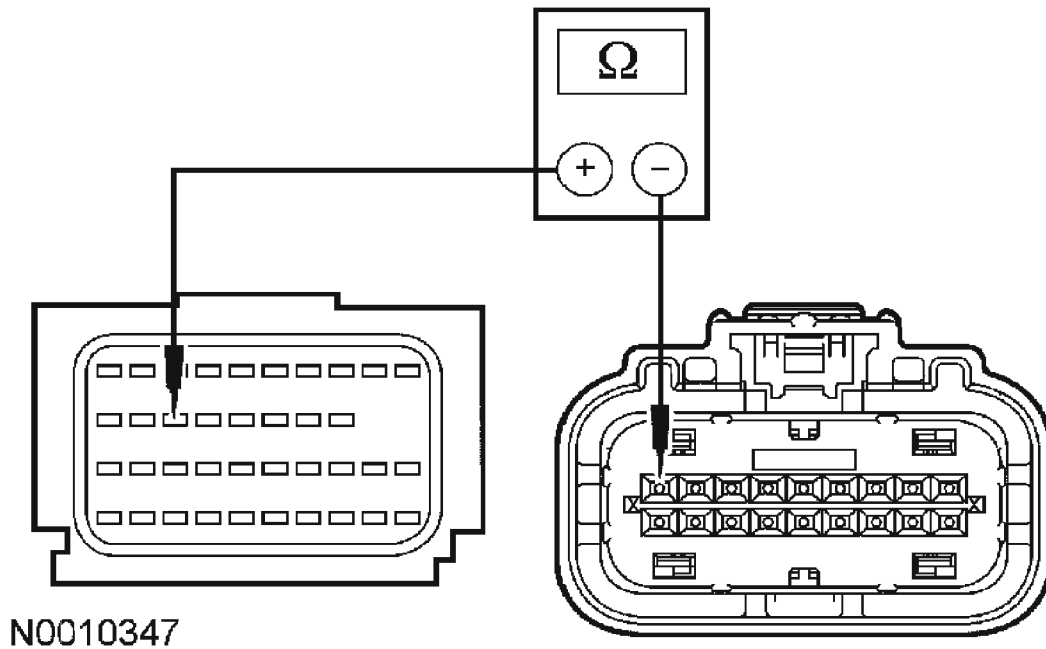
- **Early build vehicles** , measure the resistance between RCM C2041b pin 18, circuit 1919 (PK/OG), harness side and OCS ECU C3159 pin F, circuit 1919 (PK/OG), harness side.



**Fig. 35: Measuring Resistance Between RCM And OCS (Early Build Vehicles)**

**Courtesy of FORD MOTOR CO.**

- **Late build vehicles** , measure the resistance between RCM C2041b pin 18, circuit 1919 (PK/OG), harness side and OCS ECU C3285 pin 9, circuit 1919 (PK/OG), harness side.



**Fig. 36: Measuring Resistance Between RCM And OCS (Late Build Vehicles)**  
Courtesy of FORD MOTOR CO.

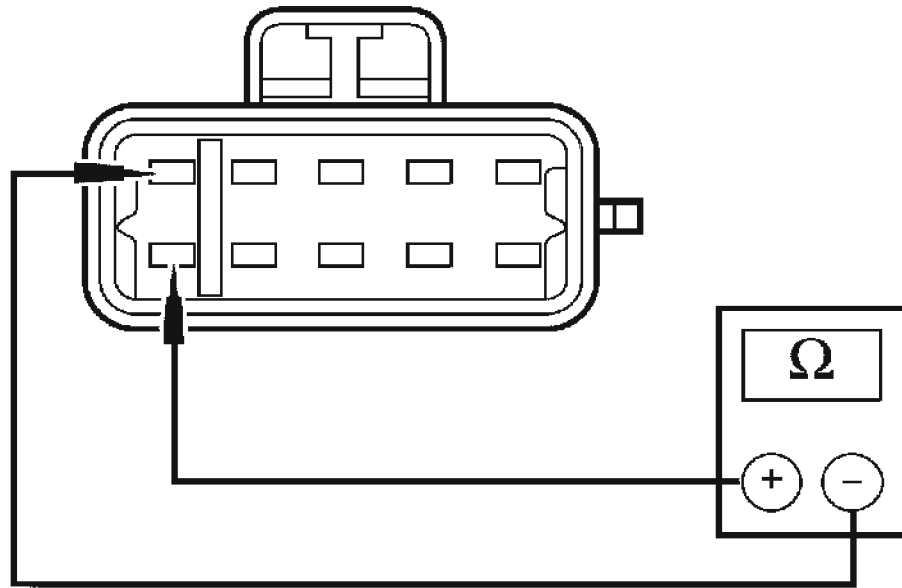
- Is the resistance less than 0.5 ohm?

Yes : GO to I9.

No : REPAIR circuit 1919 (PK/OG). GO to I22.

**I9 CHECK CIRCUIT 1918 (BN/WH) FOR A SHORT TO CIRCUIT 1919 (PK/OG) BETWEEN THE OCS AND THE RCM**

- **Early build vehicles** , measure the resistance between OCS ECU C3159 pin E, circuit 1918 (BN/WH), harness side and OCS ECU C3159 pin F, circuit 1919 (PK/OG), harness side.

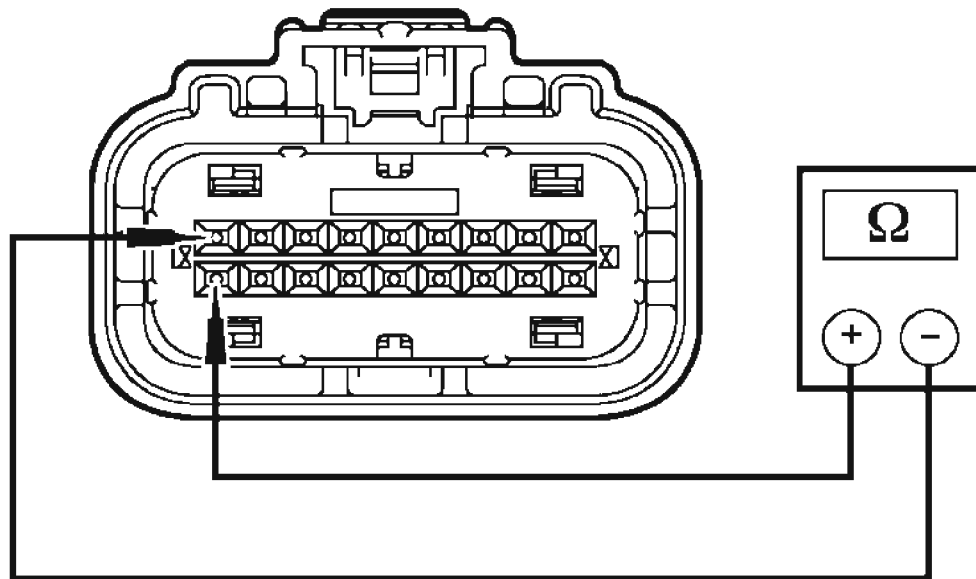


A0058552

**Fig. 37: Measuring Resistance Between OCS ECU And OCS (Early Build Vehicles)**

**Courtesy of FORD MOTOR CO.**

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 18, circuit 1918 (BN/WH), harness side and OCS ECU C3285 pin 9, circuit 1919 (PK/OG), harness side.



N0003697

**Fig. 38: Measuring Resistance Between OCS ECU And OCS (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to I10.

No : REPAIR circuits 1918 (BN/WH) and 1919 (PK/OG). GO to I22.

## I10 CHECK THE RCM

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Install a known good RCM. Refer to **RESTRAINTS CONTROL MODULE (RCM)**.
- Connect: OCS ECU C3159 (Early build).
- Connect: OCS ECU C3285 (Late build).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: FLAG DTC B2290/Record All Flagged Faults.
- **Was DTC B2290 retrieved during the on-demand self test?**  
**Yes** : If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

INSTALL a new OCS service kit. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**. GO to I22.

**No** : Fault corrected. GO to I22.

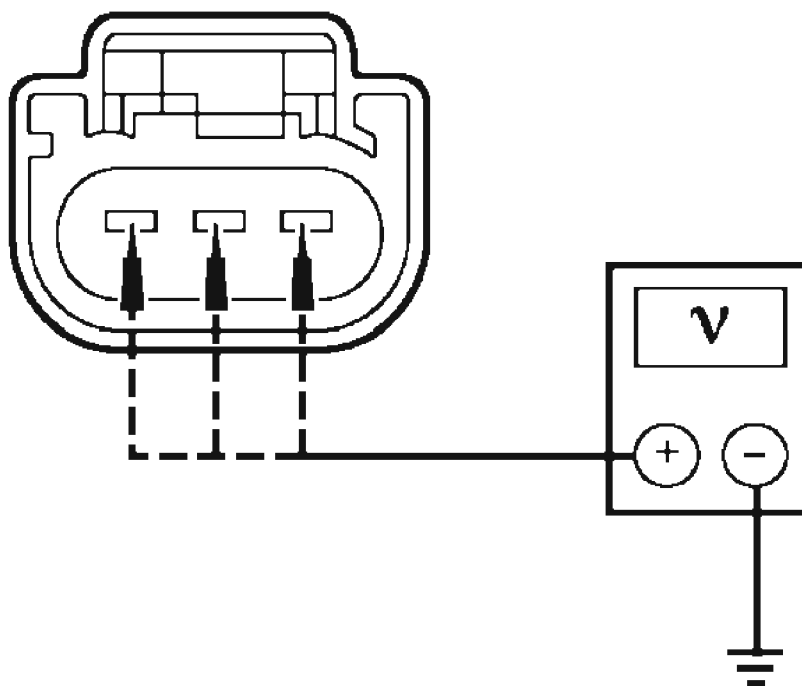
### **I11 CHECK THE SEAT WIRING AND CONNECTORS**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Carry out a thorough visual inspection of the OCS system wiring, terminals and connectors and the related seat wiring harness and body wiring harness terminals and connectors.
- **Were any problems noted?**  
**Yes** : REPAIR the seat connectors and wiring as needed. GO to I22.  
**No** : GO to I12.

### **I12 CHECK CIRCUITS 1568 (RD/WH), 1569 (GY/LB) AND 1570 (TN/BK) FOR A SHORT TO VOLTAGE**

- Disconnect: RCM C2041a and C2041b.
- Disconnect: OCS Pressure Sensor C3042.
- Disconnect: OCS ECU C3159 (Early build).
- Disconnect: OCS ECU C3285 (Late build).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between OCS pressure sensor C3042 pin 1, circuit 1568 (RD/WH), harness side and ground; between OCS pressure sensor C3042 pin 2, circuit 1570 (TN/BK), harness side and ground; and between OCS pressure sensor C3042 pin 3, circuit 1569 (GY/LB), harness side and ground.





A0074066

**Fig. 39: Measuring Voltage Between Connector Terminals And Ground**  
 Courtesy of FORD MOTOR CO.

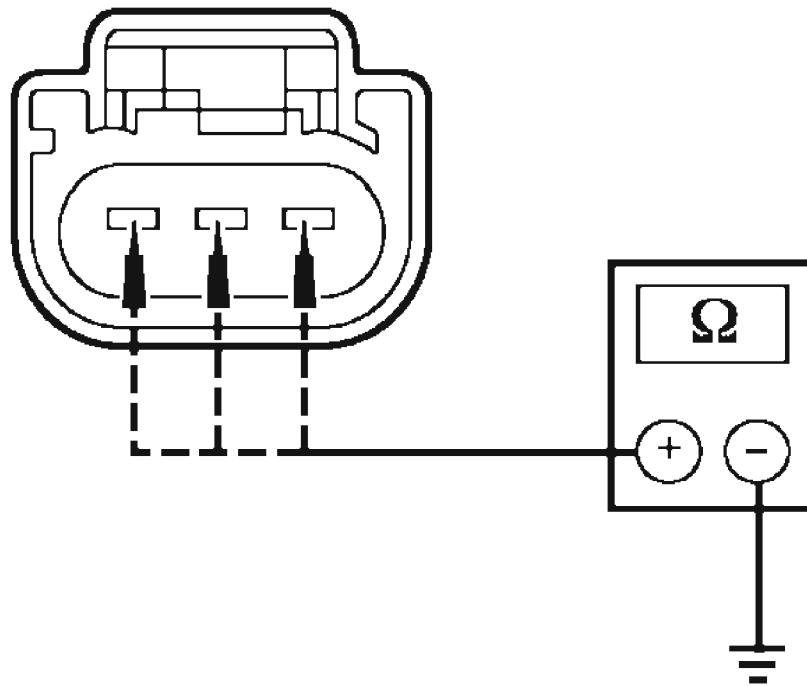
- Are the voltages less than 0.2 volt?

Yes : GO to I13.

No : REPAIR circuit 1568 (RD/WH), circuit 1569 (GY/LB) or circuit 1570 (TN/BK). GO to I22.

### **I13 CHECK CIRCUITS 1568 (RD/WH), 1569 (GY/LB) AND 1570 (TN/BK) FOR A SHORT TO GROUND**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Measure the resistance between OCS pressure sensor C3042 pin 1, circuit 1568 (RD/WH), harness side and ground; between OCS pressure sensor C3042 pin 2, circuit 1570 (TN/BK), harness side and ground; and between OCS pressure sensor C3042 pin 3, circuit 1569 (GY/LB), harness side and ground.



A0074067

**Fig. 40: Measuring Resistance Between Connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

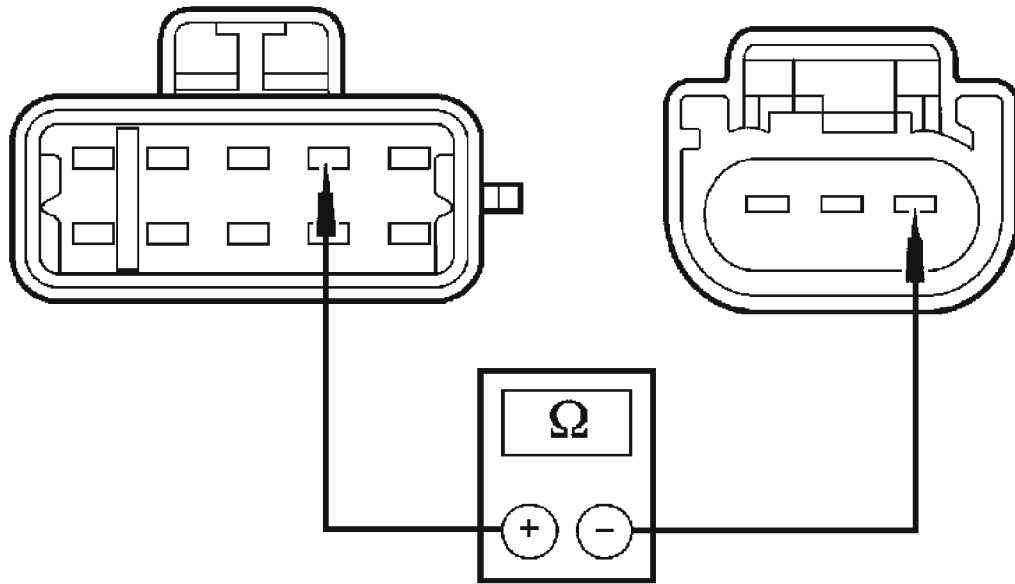
- **Are the resistances greater than 1,000,000 ohms?**

**Yes :** GO to I14.

**No :** REPAIR circuit 1568 (RD/WH), circuit 1569 (GY/LB) or circuit 1570 (TN/BK). GO to I22.

#### **I14 CHECK CIRCUIT 1568 (RD/WH) FOR AN OPEN BETWEEN THE OCS ECU AND PRESSURE SENSOR**

- **Early build vehicles** , measure the resistance between OCS ECU C3159 pin J, circuit 1568 (RD/WH), harness side and OCS pressure sensor C3042 pin 1, circuit 1568 (RD/WH), harness side.

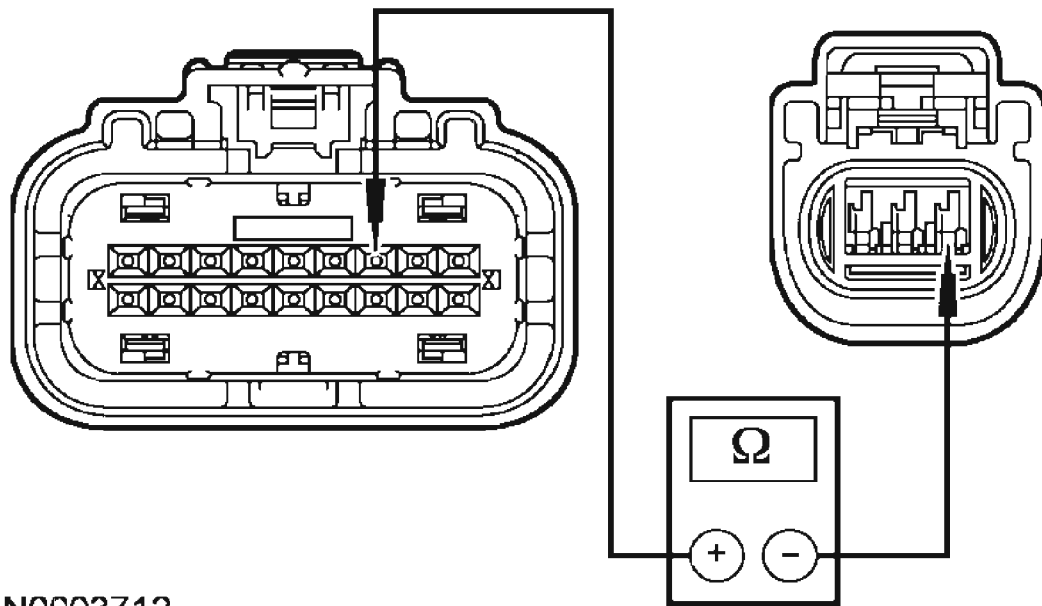


A0074068

**Fig. 41: Measuring Resistance Between OCS ECU And OCS Pressure Sensor (Early Build Vehicles)**

Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 3, circuit 1568 (RD/WH), harness side and OCS pressure sensor C3042 pin 1, circuit 1568 (RD/WH), harness side.



N0003712

**Fig. 42: Measuring Resistance Between OCS ECU And OCS (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

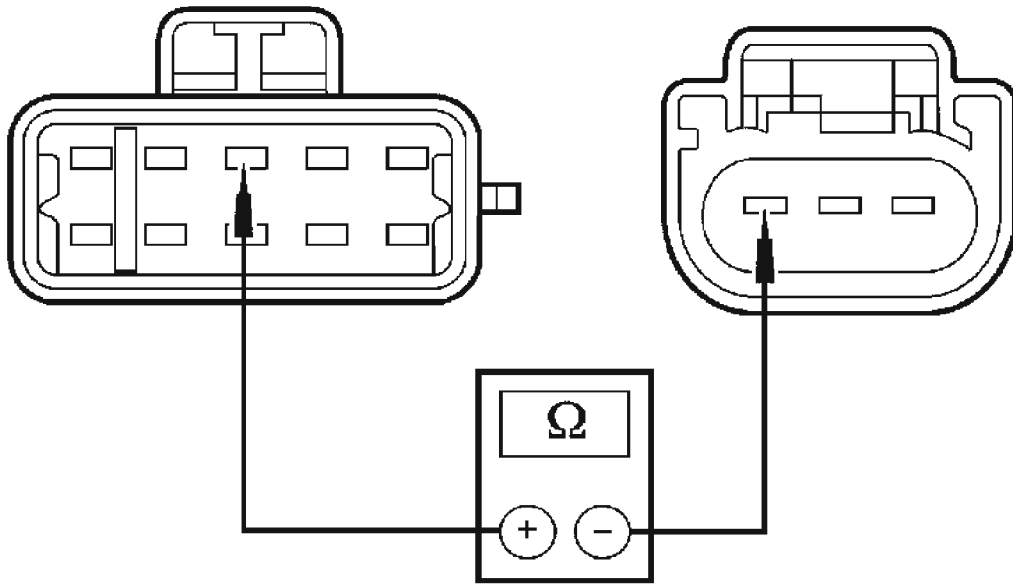
- Is the resistance less than 0.5 ohm?

Yes : GO to I15.

No : REPAIR circuit 1568 (RD/WH). GO to I22.

**I15 CHECK CIRCUIT 1569 (GY/LB) FOR AN OPEN BETWEEN THE OCS ECU AND PRESSURE SENSOR**

- **Early build vehicles** , measure the resistance between OCS ECU C3159 pin H, circuit 1569 (GY/LB), harness side and OCS pressure sensor C3042 pin 3, circuit 1569 (GY/LB), harness side.

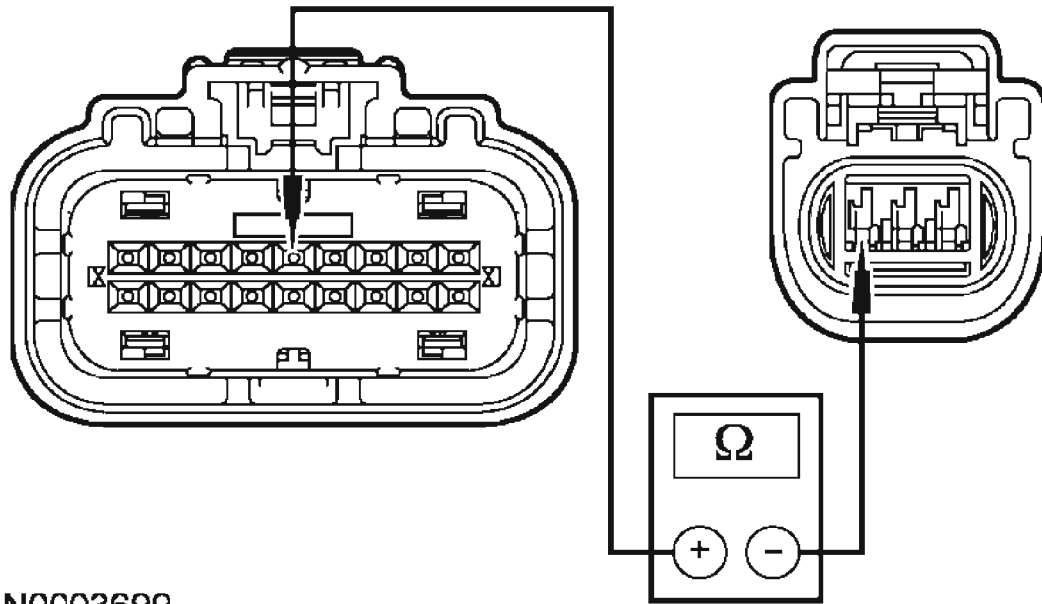


A0074069

**Fig. 43: Measuring Resistance Between OCS ECU And OCS Pressure Sensor (Early Build Vehicles)**

Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 5, circuit 1569 (GY/LB), harness side and OCS pressure sensor C3042 pin 3, circuit 1569 (GY/LB), harness side.



N0003699

**Fig. 44: Measuring Resistance Between OCS ECU And OCS Pressure Sensor (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

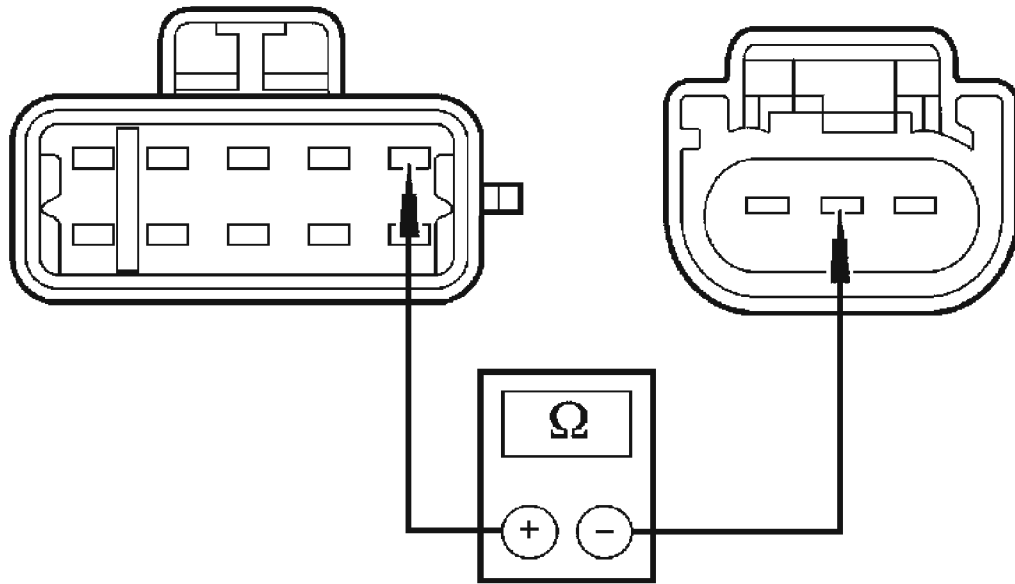
- Is the resistance less than 0.5 ohm?

Yes : GO to I16.

No : REPAIR circuit 1569 (GY/LB). GO to I22.

**I16 CHECK CIRCUIT 1570 (TN/BK) FOR AN OPEN BETWEEN THE OCS ECU AND PRESSURE SENSOR**

- **Early build vehicles** , measure the resistance between OCS ECU C3159 pin K, circuit 1570 (TN/BK), harness side and OCS pressure sensor C3042 pin 2, circuit 1570 (TN/BK), harness side.

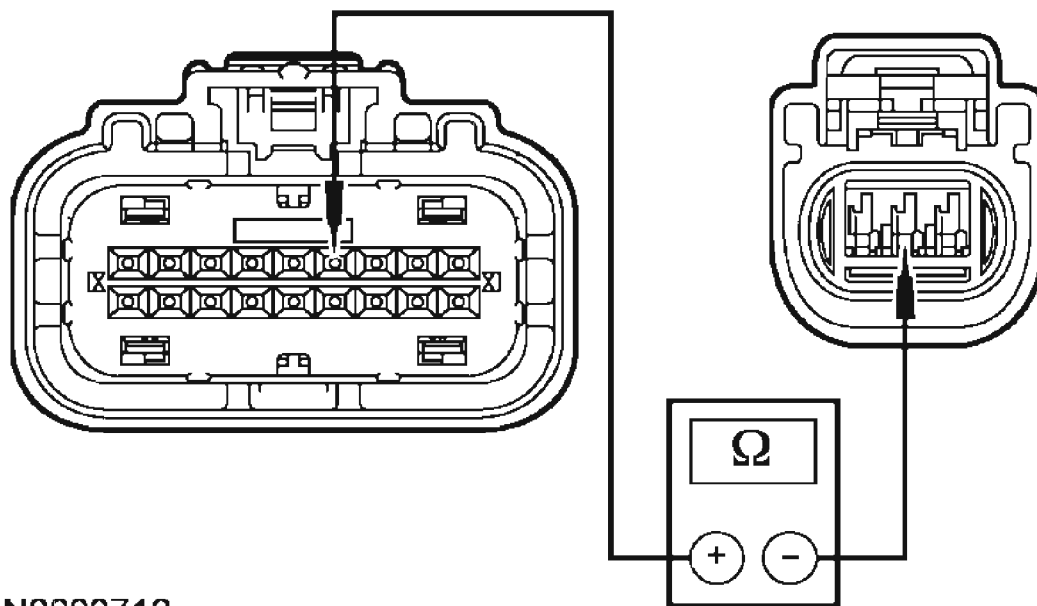


A0074070

**Fig. 45: Measuring Resistance Between OCS ECU And OCS Pressure Sensor (Early Build Vehicles)**

Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 4, circuit 1570 (TN/BK), harness side and OCS pressure sensor C3042 pin 2, circuit 1570 (TN/BK), harness side.



N0003713

**Fig. 46: Measuring Resistance Between OCS ECU And OCS Pressure Sensor (Late Build Vehicles)**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

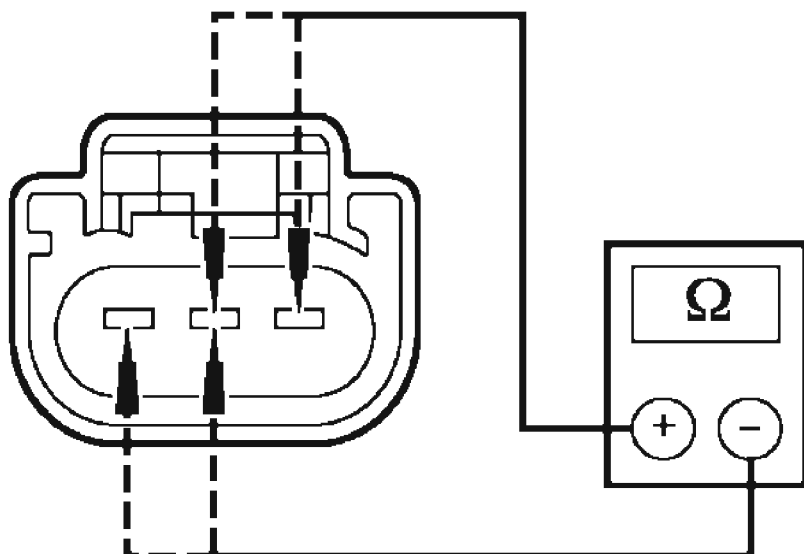
Yes : GO to I17.

No : REPAIR circuit 1570 (TN/BK). GO to I22.

**I17 CHECK CIRCUITS 1568 (RD/WH), 1569 (GY/LB) AND 1570 (TN/BK) FOR A SHORT**

- Measure the resistance between the OCS pressure sensor C3042:
  - pin 1, circuit 1568 (RD/WH), harness side and pin 2, circuit 1570 (TN/BK), harness side.
  - pin 1, circuit 1568 (RD/WH), harness side and pin 3, circuit 1569 (GY/LB), harness side.
  - pin 2, circuit 1570 (TN/BK), harness side and pin 3, circuit 1569 (GY/LB), harness side.





A0074071

**Fig. 47: Measuring Resistance Between Connector Terminals**  
 Courtesy of FORD MOTOR CO.

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

Yes : GO to I18.

No : REPAIR circuit 1568 (RD/WH), circuit 1569 (GY/LB) and/or circuit 1570 (TN/BK). GO to I22.

## I18 CHECK OCS SYSTEM

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Install a new OCS system service kit. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**.
- Connect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.

- Enter the following diagnostic mode on the scan tool: OCS Rezeroing.

**CAUTION:** It is necessary to rezero the OCS system when a front passenger seat cushion is disassembled, a new trim cover installed, or an OCS service kit is installed. A diagnostic tool is used to trigger the active command to carry out rezeroing of the OCS system.

**CAUTION:** Make sure the seat is completely assembled before rezeroing.

**CAUTION:** The following precautions must be taken before rezeroing of the OCS system:

- Make sure the OCS system components are connected and no faults are present.
- Make sure the OCS system is not at a temperature below 0°C (32°F) or above 45°C (113°F) when initiating the rezeroing process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature within the limits, 0 C to 45°C (32°F to 113°F) for a minimum of 30 minutes.
- Make sure nothing is present on the passenger seat before rezeroing and nothing is placed on the seat during the rezeroing process.
- Make sure a minimum eight second time period has passed after cycling the ignition switch ON before the rezeroing process.

**NOTE:** For best results in rezeroing, the OCS system should be at or near room temperature, 10°C to 29°C (50°F to 85°F).

**NOTE:** When using an NGS+ (NGS with Vehicle Communication Module (VCM) and the latest software update) to rezero the OCS system:

- select "FUNCTION TEST"
- select "SYSTEM RESET"

- view the on-screen information, then press "TRIGGER" The NGS+ screen will then display "OCS RESET: REZERO." Press "DONE" (button 8) to rezero the OCS system. The NGS+ will display TEST/FUNCTION SUCCESSFUL" once rezeroing of the OCS system is complete.

**NOTE: To rezero the OCS system using the Worldwide Diagnostic System (WDS):**

- select the "Toolbox" icon
- select "Body" from the menu
- select "Restraints" from the menu
- select "Seat Weight Sensor ReZero"

After selecting "Seat Weight Sensor ReZero", follow the on-screen prompts to carry out rezeroing of the OCS system.

**NOTE: If the first attempt to rezero the OCS system is unsuccessful, a second attempt must be made.**

Using the diagnostic tool, carry out rezeroing of the OCS system.

- Key in OFF position.

**NOTE: The ignition switch must be cycled after rezeroing the OCS system.**

- Key in ON position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2290/Record All Flagged Faults.

**• Was DTC B2290 retrieved during the on-demand self test?**

**Yes :** If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

INSTALL a new RCM. Refer to **RESTRAINTS CONTROL MODULE (RCM)**. GO to I22.

**No :** Fault corrected. GO to I22.

## **I19 CHECK FOR AN OCS MOUNTING FAULT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM**

**(SRS) DEPOWERING AND REPOWERING.**

**NOTE:** The ECU must be correctly positioned and securely fastened in place. Failure to do so can set a diagnostic trouble code (DTC) in the restraints control module (RCM).

- Inspect the OCS ECU for correct mounting location and direction, that the OCS fasteners are tight, there is no damage to the OCS ECU, and no damage to the seat cushion pan.
- **Is the OCS ECU correctly located and are the fasteners tight and is there no damage to components?**

**Yes :** INSTALL a new OCS system service kit. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**. GO to I22.

**No :** REPAIR as necessary. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT** for correct mounting location/direction of the ECU, the correct fasteners for mounting of the ECU. If the seat cushion pan is damaged, refer to the appropriate procedure in **SEATING** for repair. GO to I22.

**I20 CHECK OCS SYSTEM**

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: OCS Rezeroing.

**CAUTION:** It is necessary to rezero the OCS system when a front passenger seat cushion is disassembled, a new trim cover installed, or an OCS service kit is installed. A diagnostic tool is used to trigger the active command to carry out rezeroing of the OCS system.

**CAUTION:** Make sure the seat is completely assembled before rezeroing.

**CAUTION:** The following precautions must be taken before rezeroing of the OCS system:

- Make sure the OCS system components are

connected and no faults are present.

- Make sure the OCS system is not at a temperature below 0°C (32°F) or above 45°C (113°F) when initiating the rezeroing process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature within the limits, 0 C to 45°C (32°F to 113°F) for a minimum of 30 minutes.
- Make sure nothing is present on the passenger seat before rezeroing and nothing is placed on the seat during the rezeroing process.
- Make sure a minimum eight second time period has passed after cycling the ignition switch ON before the rezeroing process.

**NOTE:** For best results in rezeroing, the OCS system should be at or near room temperature, 10°C to 29°C (50°F to 85°F).

**NOTE:** When using an NGS+ (NGS with Vehicle Communication Module (VCM) and the latest software update) to rezero the OCS system:

- select "FUNCTION TEST"
- select "SYSTEM RESET"
- view the on-screen information, then press "TRIGGER" The NGS+ screen will then display "OCS RESET: REZERO." Press "DONE" (button 8) to rezero the OCS system. The NGS+ will display TEST/FUNCTION SUCCESSFUL" once rezeroing of the OCS system is complete.

**NOTE:** To rezero the OCS system using the Worldwide Diagnostic System (WDS):

- select the "Toolbox" icon
- select "Body" from the menu
- select "Restraints" from the menu
- select "Seat Weight Sensor ReZero"

After selecting "Seat Weight Sensor ReZero", follow the on-screen prompts to carry out rezeroing of the OCS system.

**NOTE:**      **If the first attempt to rezero the OCS system is unsuccessful, a second attempt must be made.**

Using the diagnostic tool, carry out rezeroing of the OCS system.

- Key in OFF position.

**NOTE:**      **The ignition switch must be cycled after rezeroing the OCS system.**

- Key in ON position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2290/Record All Flagged Faults.

- **Was DTC B2290 retrieved during the on-demand self test?**

**Yes :** If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

INSTALL a new OCS system service kit. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**. GO to I22.

**No :** Fault corrected. GO to I22.

## **I21 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2290/Record All Flagged Faults.
- **Was DTC B2290 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

Using the flagged faults, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

**Vehicles with a production OCS system**

For OCS system with a communications fault, GO to I2.

For OCS system with an internal fault, GO to I19.

For OCS system with a calibration fault, GO to I20.

For OCS system with a pressure sensor fault, GO to I11.

### **Vehicles with a service OCS system**

For OCS system with a communications fault, GO to I2.

For OCS system with an internal fault, GO to I19.

For OCS system with a calibration fault, GO to I20.

For OCS system with a pressure sensor fault, INSTALL a new OCS system service kit. Refer to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**. GO to I22.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to I22.

### **I22 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step I1.
- **Were any continuous DTCs retrieved during Step I1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Pinpoint Test J: LFC 33, 34 and 38/DTC B2292 - Restraint System Safety Belt Pretensioner Status**

#### **Normal Operation**

The restraints control module (RCM) checks all of the safety belt pretensioners for faults. If the RCM detects one of the following faults on any of the safety belt pretensioner circuits, it will store diagnostic trouble code (DTC) B2292 in memory and flash, depending on the fault indicator. either lamp fault code (LFC) 33, 34 or 38 (or higher priority code if one exists) on

the air bag indicator.

The Escape Hybrid vehicle is equipped with 3 pretensioners. The driver side is equipped with a safety belt buckle pretensioner and a safety belt retractor pretensioner while the passenger side has only a safety belt buckle pretensioner.

**Fault Conditions**

The RCM monitors for the following fault conditions:

- Low resistance
- Circuit open
- Circuit short to voltage
- Circuit short to ground

**Possible Causes**

A safety belt pretensioner status fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty pretensioner.
- a faulted RCM.

**PINPOINT TEST J: LFC 33, 34 AND 38/DTC B2292 - RESTRAINT SYSTEM SAFETY BELT PRETENSIONER STATUS**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**J1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.



**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2292/ Record All Flagged Faults.
- Enter the following diagnostic mode on the scan tool: Retrieve/Flag/ Record Continuous DTCs.
- **Was DTC B2292 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-

demand self test.

Using the flagged faults recorded, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For driver safety belt pretensioner (DF\_PRT) with a low resistance (LOWRES) fault, GO to J2.

For DF\_PRT with an open circuit (O\_CIR) fault, GO to J2.

For DF\_PRT with a short to battery (STB) fault, GO to J6.

For DF\_PRT with a short to ground (STG) fault, GO to J8.

For passenger safety belt pretensioner (PF\_PRT) with a low resistance (LOWRES) fault, GO to J11.

For PF\_PRT with an open circuit (O\_CIR) fault, GO to J11.

For PF\_PRT with a short to battery (STB) fault, GO to J15.

For PF\_PRT with a short to ground (STG) fault, GO to J17.

For all Escape Hybrid driver safety belt retractor pretensioner (DF\_RET) faults, GO to J20.

**No** : This is an intermittent fault. The fault condition is not present at this time. GO to J26.

## **J2 CHECK THE DRIVER SAFETY BELT BUCKLE PRETENSIONER CIRCUITS RESISTANCE**

- Enter the following diagnostic mode on the scan tool: PID/Data Monitor and Record.
- Enter the following diagnostic mode on the scan tool: Select PID D\_PRTNR.
- **Is the resistance greater than 3.2 or less than 1.4 ohms?**

**Yes** : If the PID D\_PRTNR is greater than 3.2 ohms, GO to J4.

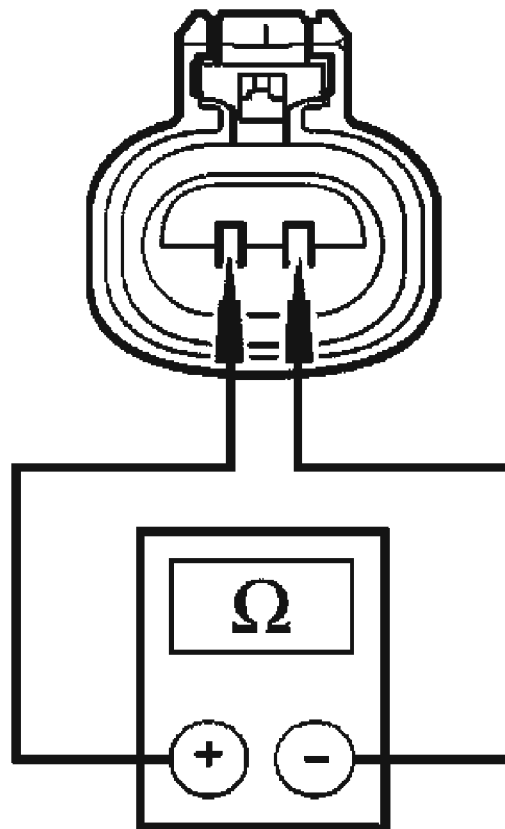
If the PID D\_PRTNR is less than 1.4 ohms, GO to J3.

**No** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to J27.

## **J3 CHECK THE DRIVER SAFETY BELT BUCKLE PRETENSIONER CIRCUIT 1079 (LG/RD) AND CIRCUIT 1080 (LG/BK) FOR LOW**

**RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Belt Buckle Pretensioner C3201.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between driver safety belt buckle pretensioner C3201 pin 1, circuit 1080 (LG/BK), and pin 2, circuit 1079 (LG/RD), harness side.

**A0091743**

**Fig. 48: Measuring Resistance Of Driver Safety Belt Buckle Pretensioner**  
Courtesy of FORD MOTOR CO.

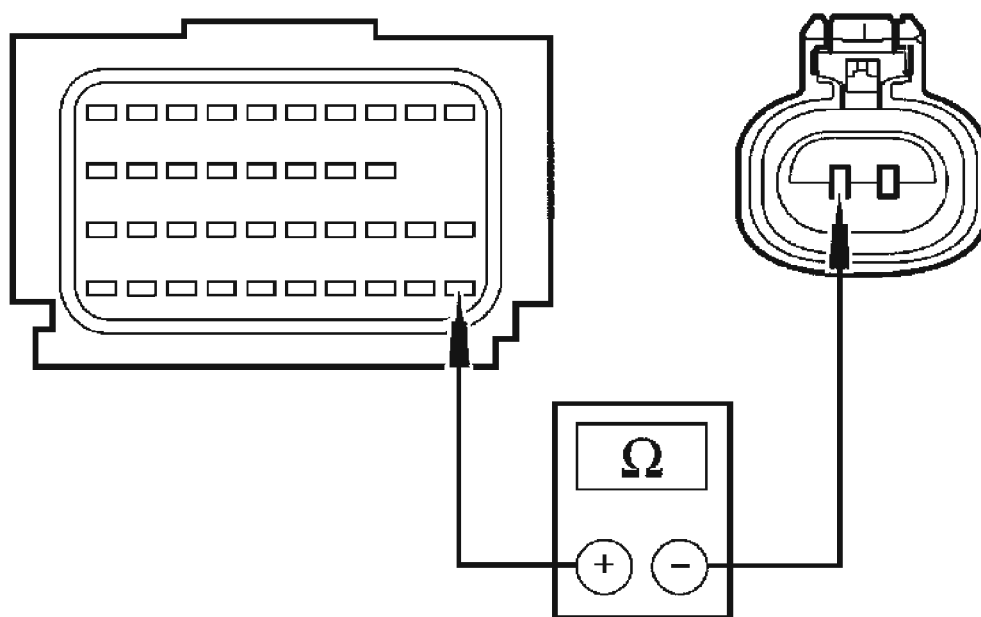
- **Is the resistance greater than 1,000,000 ohms?**  
**Yes :** INSTALL a new driver safety belt buckle pretensioner. REFER to **SAFETY BELT SYSTEM** . GO to J27.

**No** : REPAIR circuit 1079 (LG/RD) and circuit 1080 (LG/BK).

GO to J27.

#### **J4 CHECK CIRCUIT 1079 (LG/RD) FOR AN OPEN**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Belt Buckle Pretensioner C3201.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 31, circuit 1079 (LG/RD), harness side and driver safety belt buckle pretensioner C3201 pin 2, circuit 1079 (LG/RD), harness side.



A0091744

**Fig. 49: Measuring Resistance Between RCM Driver Safety Belt Buckle Pretensioner**

Courtesy of FORD MOTOR CO.

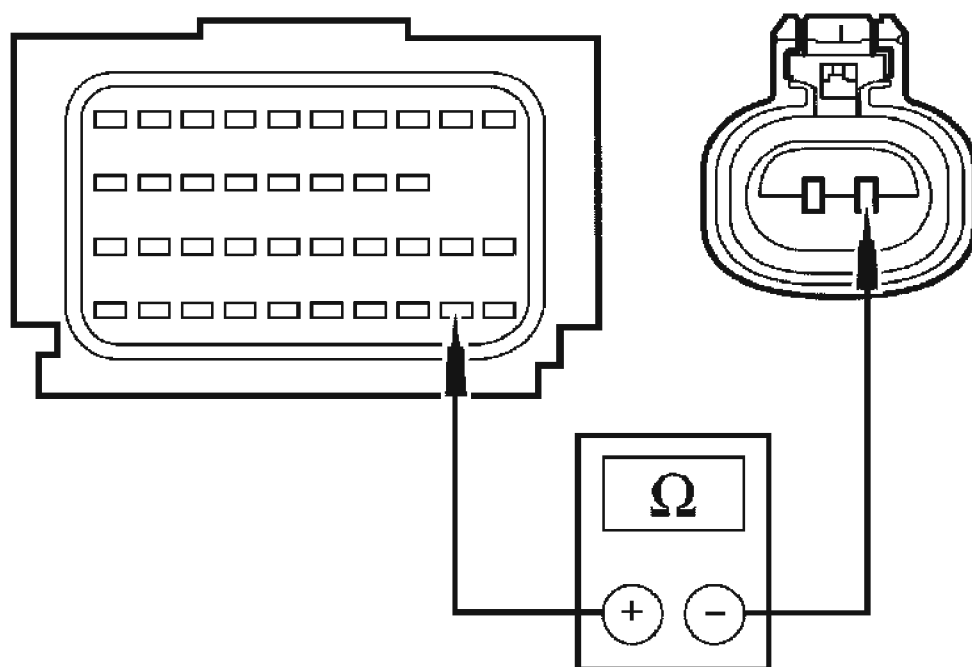
- Is the resistance less than 0.5 ohm?

**Yes** : GO to J5.

**No** : REPAIR circuit 1079 (LG/RD). GO to J27.

#### **J5 CHECK CIRCUIT 1080 (LG/BK) FOR AN OPEN**

- Measure the resistance between RCM C2041b pin 32, circuit 1080 (LG/BK), harness side and driver safety belt buckle pretensioner C3201 pin 1, circuit 1080 (LG/BK), harness side.



A0091745

**Fig. 50: Measuring Resistance Between RCM And Driver Safety Belt Buckle Pretensioner**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

**Yes :** INSTALL a new driver safety belt buckle pretensioner. REFER to SAFETY BELT SYSTEM . GO to J27.

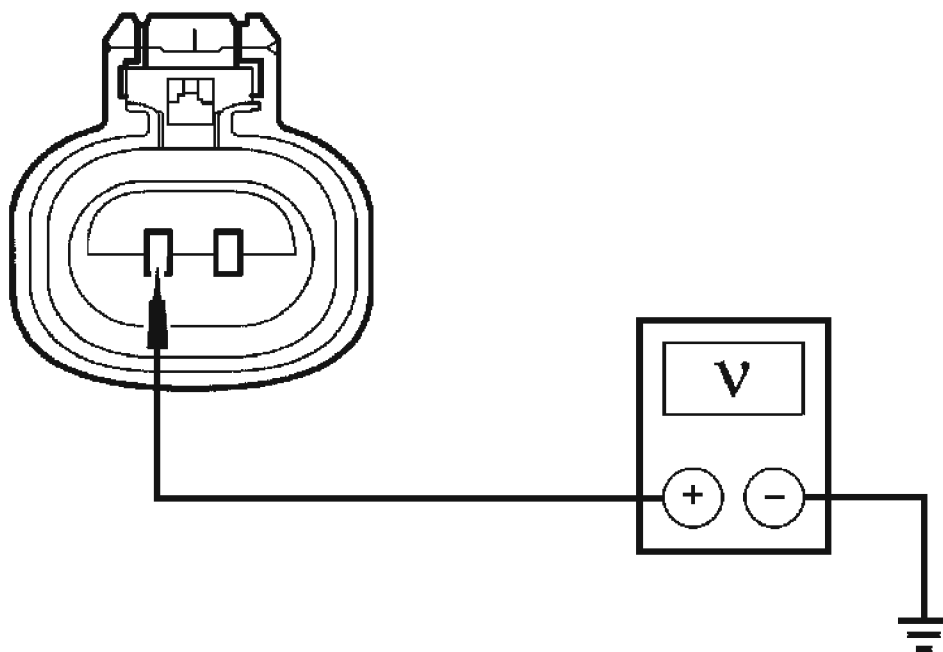
**No :** REPAIR circuit 1080 (LG/BK). GO to J27.

#### **J6 CHECK CIRCUIT 1079 (LG/RD) FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: Driver Safety Belt Buckle Pretensioner C3201.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND

**REPOWERING.**

- Key in ON position.
- Measure the voltage between driver safety belt buckle pretensioner C3201 pin 2, circuit 1079 (LG/RD), harness side and ground.



A0091747

**Fig. 51: Measuring Voltage Between Driver Safety Belt Buckle Pretensioner And Ground**

Courtesy of FORD MOTOR CO.

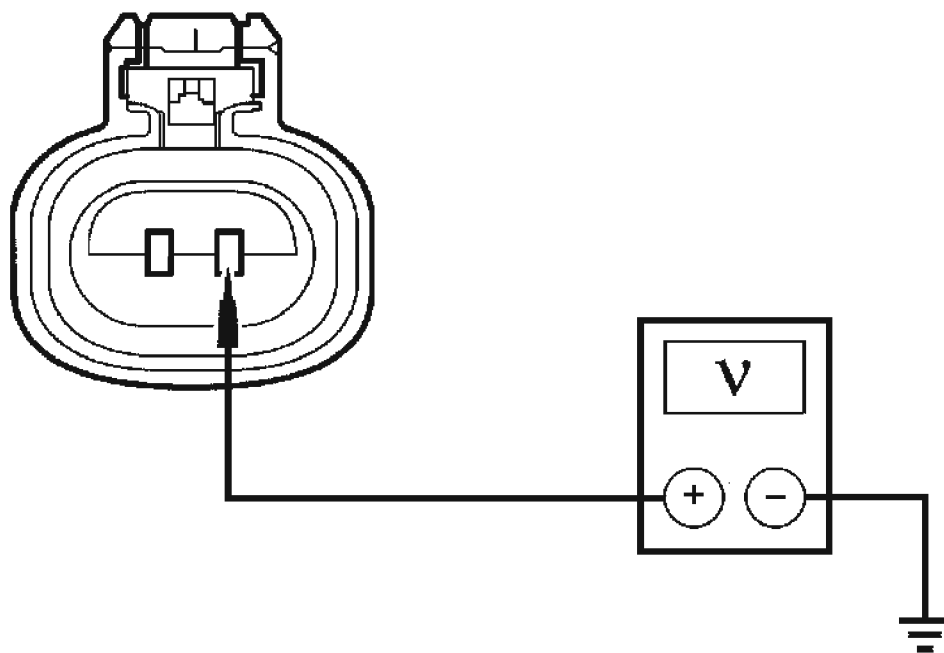
- Is the voltage less than 0.2 volt?

Yes : GO to J7.

No : REPAIR circuit 1079 (LG/RD). GO to J27.

**J7 CHECK CIRCUIT 1080 (LG/BK) FOR A SHORT TO VOLTAGE**

- Measure the voltage between driver safety belt buckle pretensioner C3201 pin 1, circuit 1080 (LG/BK), harness side and ground.



A0091746

**Fig. 52: Measuring Voltage Between Driver Safety Belt Buckle Pretensioner And Ground**

Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?

Yes : GO to J25.

No : REPAIR circuit 1080 (LG/BK). GO to J27.

### J8 CHECK THE DRIVER SAFETY BELT BUCKLE PRETENSIONER

**NOTE:** The ignition key must be cycled when carrying out this step. Otherwise the flagged fault may not report correctly (a "?" may be displayed).

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Belt Buckle Pretensioner C3201.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.

- Enter the following diagnostic mode on the scan tool: Flag DTC B2292/ Record All Flagged Faults.

**NOTE:** When flagging DTC B2292 with the driver buckle pretensioner (DF\_PTR) disconnected, a flagged fault for an open circuit (O\_CIR) is expected to be retrieved.

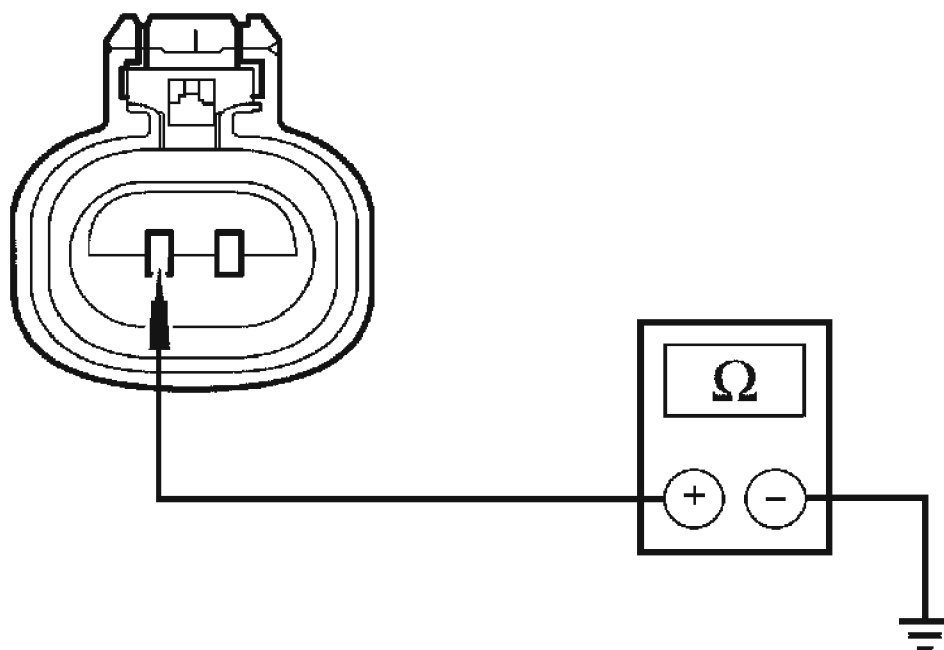
- Was the flagged fault for driver pretensioner (DF\_PTR) with a short to ground (STG) retrieved?

**Yes :** GO to J9.

**No :** INSTALL a new driver safety belt buckle pretensioner. REFER to **SAFETY BELT SYSTEM** . GO to J27.

### J9 CHECK CIRCUIT 1079 (LG/RD) FOR A SHORT TO GROUND

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between driver safety belt buckle pretensioner C3201 pin 2, circuit 1079 (LG/RD), harness side and ground.



A0091749

**Fig. 53: Measuring Resistance Between Driver Safety Belt Buckle**



### **Pretensioner And Ground** Courtesy of FORD MOTOR CO.

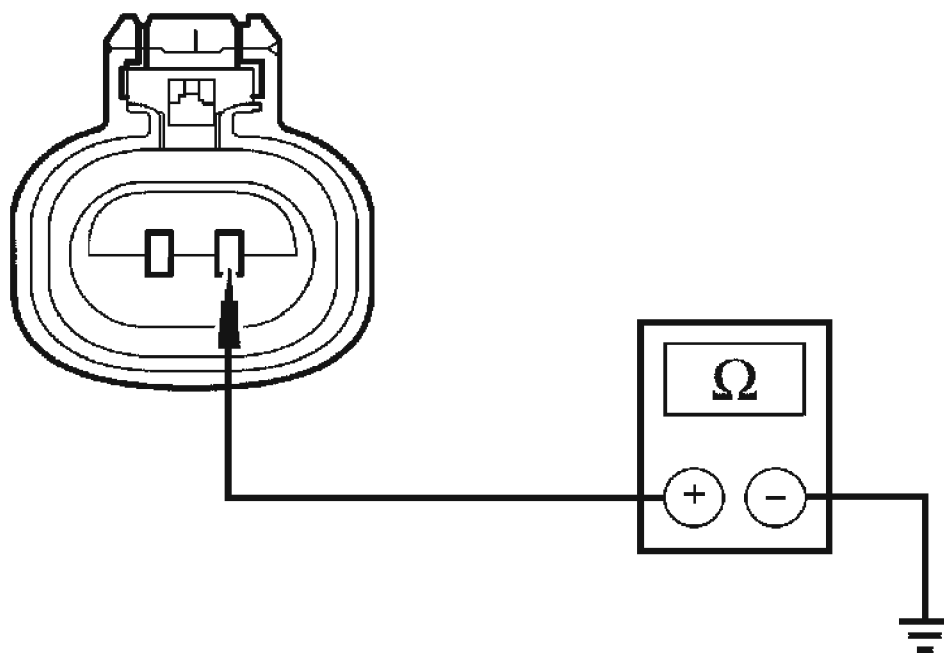
- **Is the resistance greater than 1,000,000 ohms?**

**Yes :** GO to J10.

**No :** REPAIR circuit 1079 (LG/RD). GO to J27.

#### **J10 CHECK CIRCUIT 1080 (LG/BK) FOR A SHORT TO GROUND**

- Measure the resistance between driver safety belt buckle pretensioner C3201 pin 1, circuit 1080 (LG/BK), harness side and ground.



A0091748

**Fig. 54: Measuring Resistance Between Driver Safety Belt Buckle Pretensioner And Ground**  
Courtesy of FORD MOTOR CO.

- **Is the resistance greater than 1,000,000 ohms?**

**Yes :** GO to J25.

**No :** REPAIR circuit 1080 (LG/BK). GO to J27.

#### **J11 CHECK PASSENGER SAFETY BELT BUCKLE PRETENSIONER CIRCUITS RESISTANCE**

- Enter the following diagnostic mode on the scan tool: PID/Data Monitor and Record.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

- Enter the following diagnostic mode on the scan tool: Select PID P\_PRTNR.
- **Is the resistance greater than 3.2 or less than 1.4 ohms?**

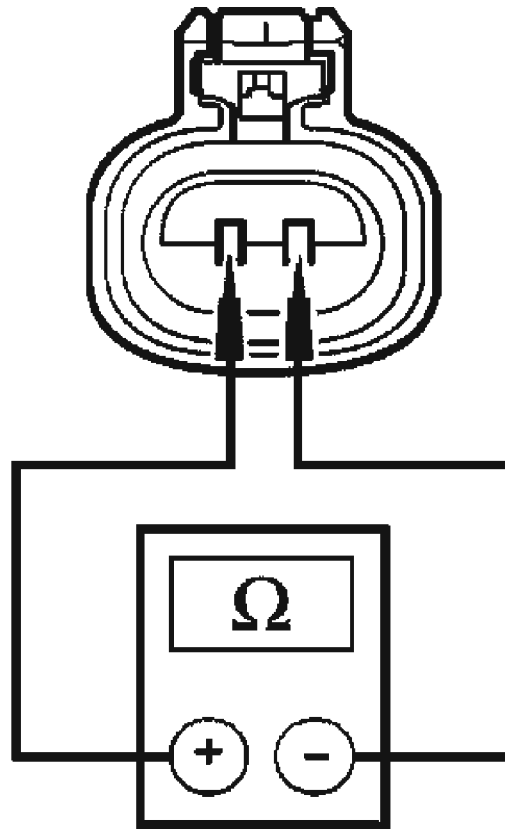
**Yes** : If the PID P\_PRTNR is greater than 3.2 ohms, GO to J13.

If the PID P\_PRTNR is less than 1.4 ohms, GO to J12.

**No** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to J27.

#### **J12 CHECK THE PASSENGER SAFETY BELT BUCKLE PRETENSIONER CIRCUIT 1081 (YE/RD) AND CIRCUIT 1082 (LB/BK) FOR LOW RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Belt Buckle Pretensioner C3202.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between passenger safety belt buckle pretensioner C3202 pin 1, circuit 1082 (LB/BK), and pin 2, circuit 1081 (YE/RD), harness side.



A0091743

**Fig. 55: Measuring Resistance Of Passenger Safety Belt Buckle Pretensioner**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

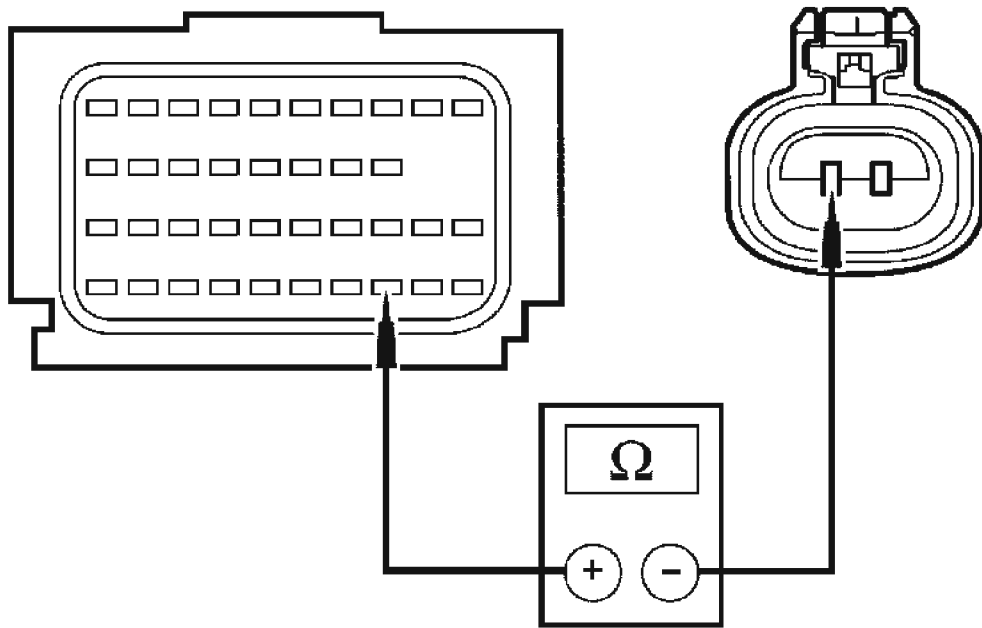
**Yes** : INSTALL a new passenger safety belt buckle pretensioner. REFER to **SAFETY BELT SYSTEM** . GO to J27.

**No** : REPAIR circuit 1082 (LB/BK) and circuit 1081 (YE/RD). GO to J27.

### **J13 CHECK CIRCUIT 1081 (YE/RD) FOR AN OPEN**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Belt Buckle Pretensioner C3202.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 33, circuit 1081 (YE/RD), harness side and passenger safety belt buckle pretensioner C3202 pin 2, circuit

1081 (YE/RD), harness side.



A0091750

**Fig. 56: Measuring Resistance Between RCM And Passenger Safety Belt Buckle Pretensioner**

Courtesy of FORD MOTOR CO.

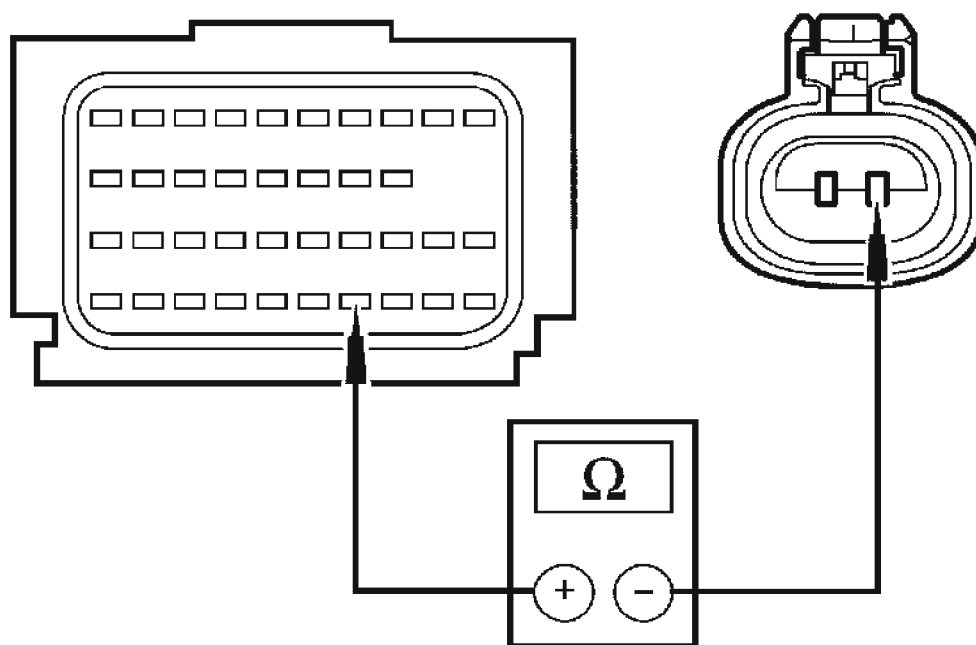
- Is the resistance less than 0.5 ohm?

Yes : GO to J14.

No : REPAIR circuit 1081 (YE/RD). GO to J27.

**J14 CHECK CIRCUIT 1082 (LB/BK) FOR AN OPEN**

- Measure the resistance between RCM C2041b pin 34, circuit 1082 (LB/BK), harness side and passenger safety belt buckle pretensioner C3202 pin 1, circuit 1082 (LB/BK), harness side.



A0091751

**Fig. 57: Measuring Resistance Between RCM And Passenger Safety Belt Buckle Pretensioner**

Courtesy of FORD MOTOR CO.

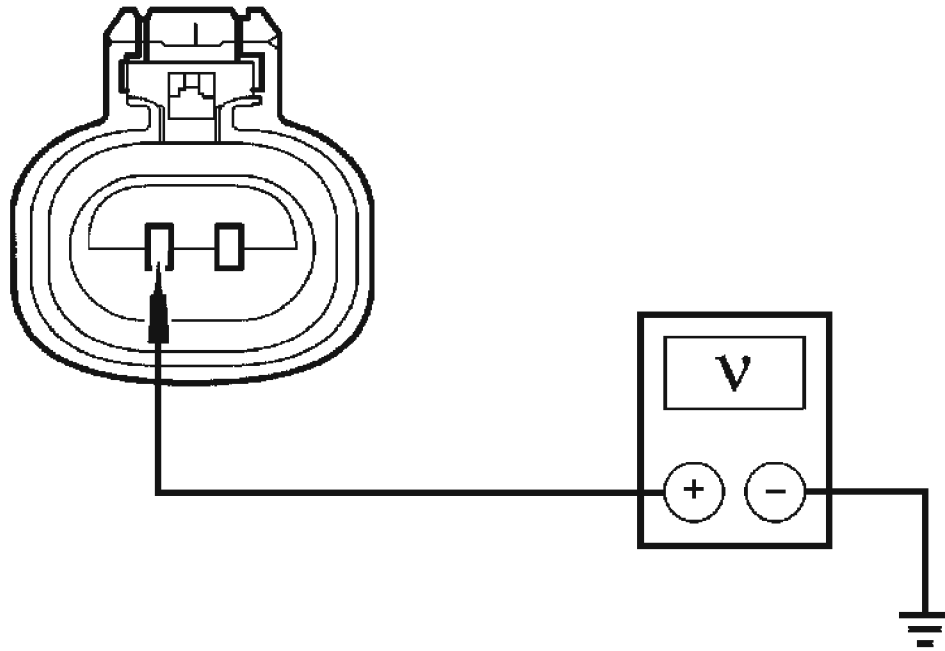
• **Is the resistance less than 0.5 ohm?**

**Yes :** INSTALL a new passenger safety belt pretensioner. REFER to **SAFETY BELT SYSTEM** . GO to J27.

**No :** REPAIR circuit 1082 (LB/BK). GO to J27.

**J15 CHECK CIRCUIT 1081 (YE/RD) FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Belt Buckle Pretensioner C3202.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between passenger safety belt buckle pretensioner C3202 pin 2, circuit 1081 (YE/RD), harness side and ground.



A0091747

**Fig. 58: Measuring Voltage Between Passenger Safety Belt Buckle Pretensioner And Ground**

Courtesy of FORD MOTOR CO.

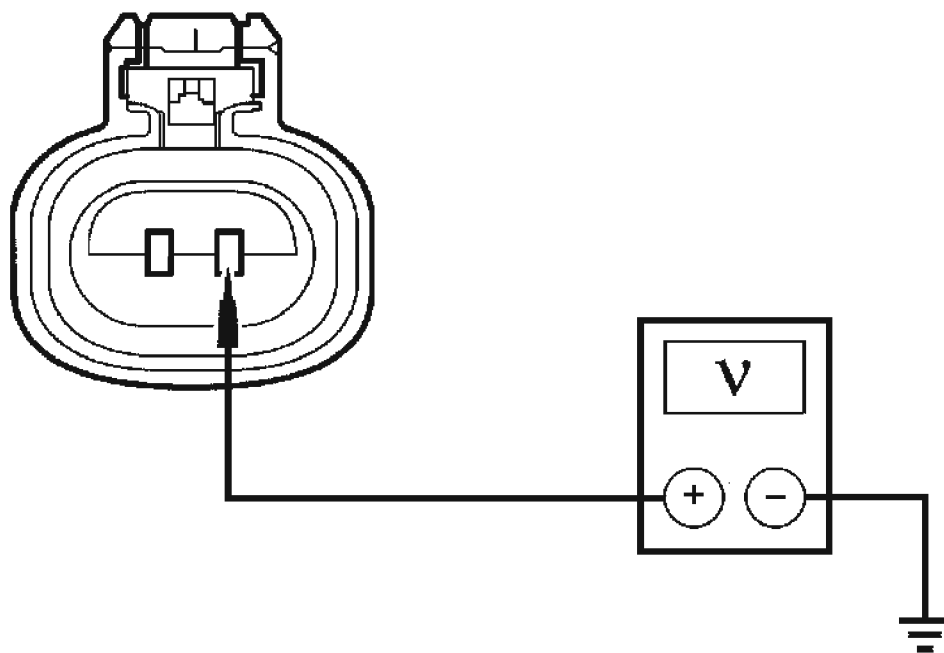
- **Is the voltage less than 0.2 volt?**

**Yes :** GO to J16.

**No :** REPAIR circuit 1081 (YE/RD). GO to J27.

**J16 CHECK CIRCUIT 1082 (LB/BK) FOR A SHORT TO VOLTAGE**

- Measure the voltage between passenger safety belt buckle pretensioner C3202 pin 1, circuit 1082 (LB/BK), harness side and ground.



A0091746

**Fig. 59: Measuring Voltage Between Passenger Safety Belt Buckle Pretensioner C3202 Pin 1, Circuit 1082 (LB/BK), Harness Side And Ground**  
 Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?

Yes : GO to J25.

No : REPAIR circuit 1082 (LB/BK). GO to J27.

#### J17 CHECK THE PASSENGER SAFETY BELT BUCKLE PRETENSIONER

**NOTE:** The ignition key must be cycled when carrying out this step. Otherwise the flagged fault may not report correctly (a "?" may be displayed).

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Belt Buckle Pretensioner C3202.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.

- Enter the following diagnostic mode on the scan tool: Flag DTC B2292/ Record All Flagged Faults.

**NOTE:** When flagging DTC B2292 with the passenger buckle pretensioner (PF\_PTR) disconnected, a flagged fault for an open circuit (O\_CIR) is expected to be retrieved.

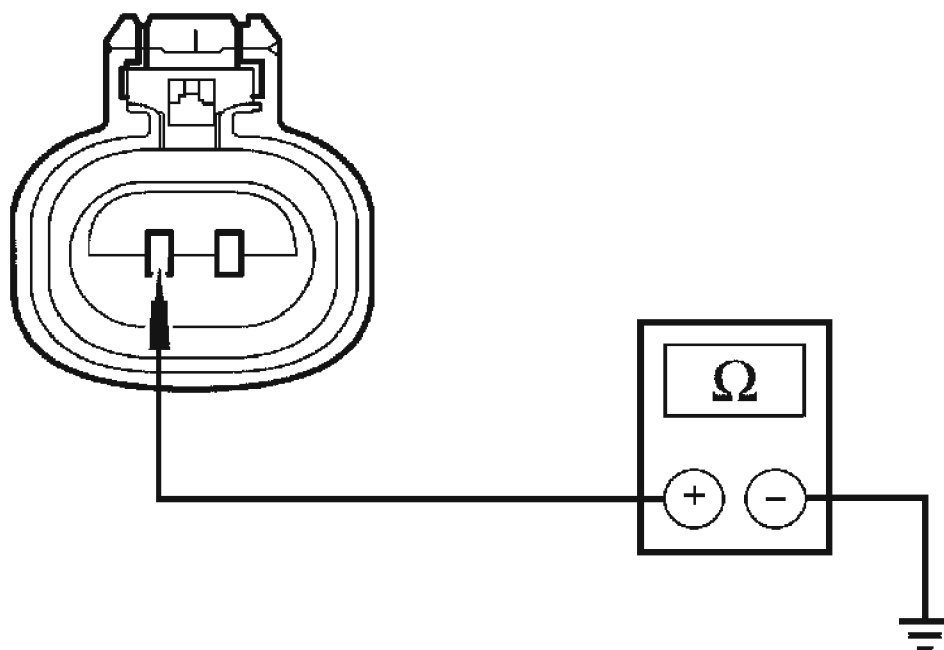
- Was the flagged fault for passenger pretensioner (PF\_PTR) with a short to ground (STG) retrieved?

**Yes :** GO to J18.

**No :** INSTALL a new passenger safety belt buckle pretensioner. REFER to SAFETY BELT SYSTEM . GO to J27.

#### J18 CHECK CIRCUIT 1081 (YE/RD) FOR A SHORT TO GROUND

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between passenger safety belt buckle pretensioner C3202 pin 2, circuit 1081 (YE/RD), harness side and ground.



A0091749

**Fig. 60: Measuring Resistance Between Passenger Safety Belt Buckle**



**Pretensioner And Ground**  
Courtesy of FORD MOTOR CO.

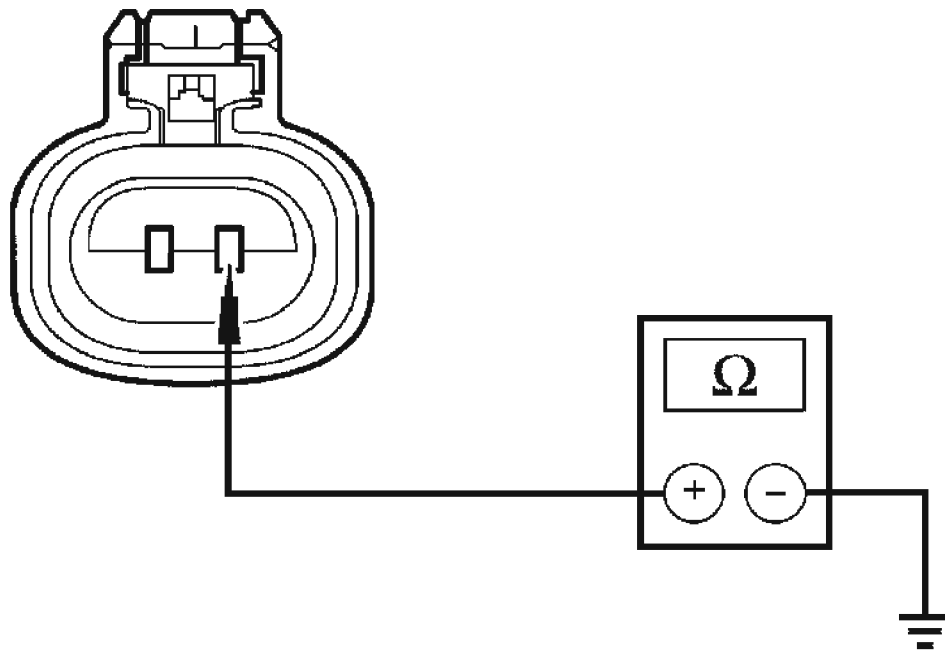
- Is the resistance greater than 1,000,000 ohms?

Yes : GO to J19.

No : REPAIR circuit 1081 (YE/RD). GO to J27.

**J19 CHECK CIRCUIT 1082 (LB/BK) FOR A SHORT TO GROUND**

- Measure the resistance between passenger safety belt buckle pretensioner C3202 pin 1, circuit 1082 (LB/BK), harness side and ground.



A0091748

**Fig. 61: Measuring Resistance Between Passenger Safety Belt Buckle Pretensioner And Ground**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to J25.

No : REPAIR circuit 1082 (LB/BK). GO to J27.

**J20 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER (ESCAPE HYBRID)**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM**

**(SRS) DEPOWERING AND REPOWERING.**

- Disconnect: Driver Safety Belt Retractor Pretensioner C323.
- Connect: Restraint Diagnostic System Tool 418-F395 to Driver Safety Belt Retractor Pretensioner C323.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2292 retrieved during the on-demand self test?**  
**Yes :** For driver safety belt retractor pretensioner (DF\_RET) with a low resistance (LOWRES) fault, GO to J21.

For DF\_RET with an open circuit (O\_CIR) fault, GO to J22.

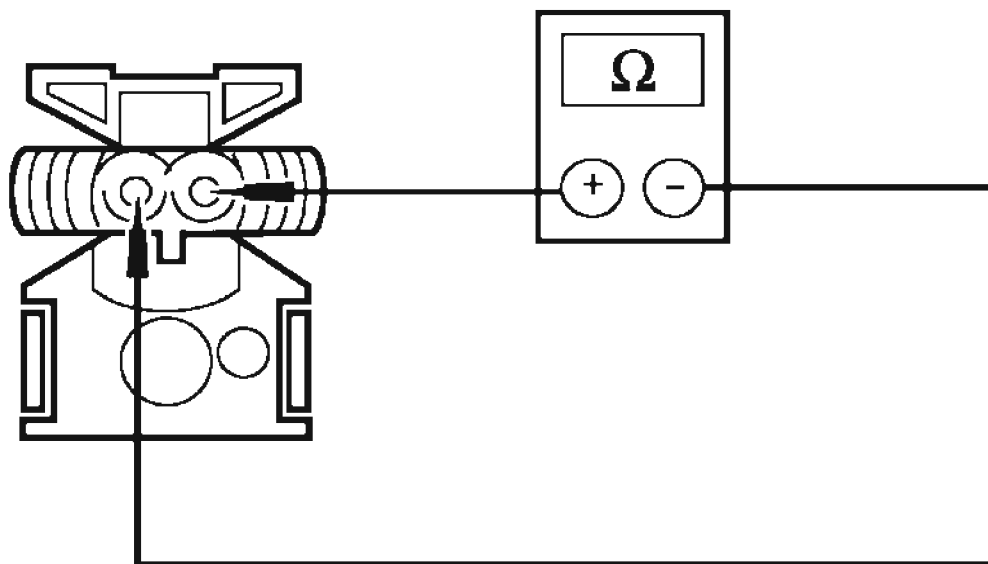
For DF\_RET with a short to battery (STB) fault, GO to J23.

For DF\_RET with a short to ground (STG) fault, GO to J24.

**No :** INSTALL a new driver safety belt retractor pretensioner. REFER to **SAFETY BELT SYSTEM** . GO to J27.

**J21 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR LOW RESISTANCE (ESCAPE HYBRID)**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: Restraint System Diagnostic Tool to Driver Safety Belt Retractor Pretensioner C323.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between driver safety belt retractor pretensioner C323, circuit 1509 (WH), harness side and circuit 1510 (YE), harness side.



A0030495

**Fig. 62: Measuring Resistance Across Connector Terminals**  
 Courtesy of FORD MOTOR CO.

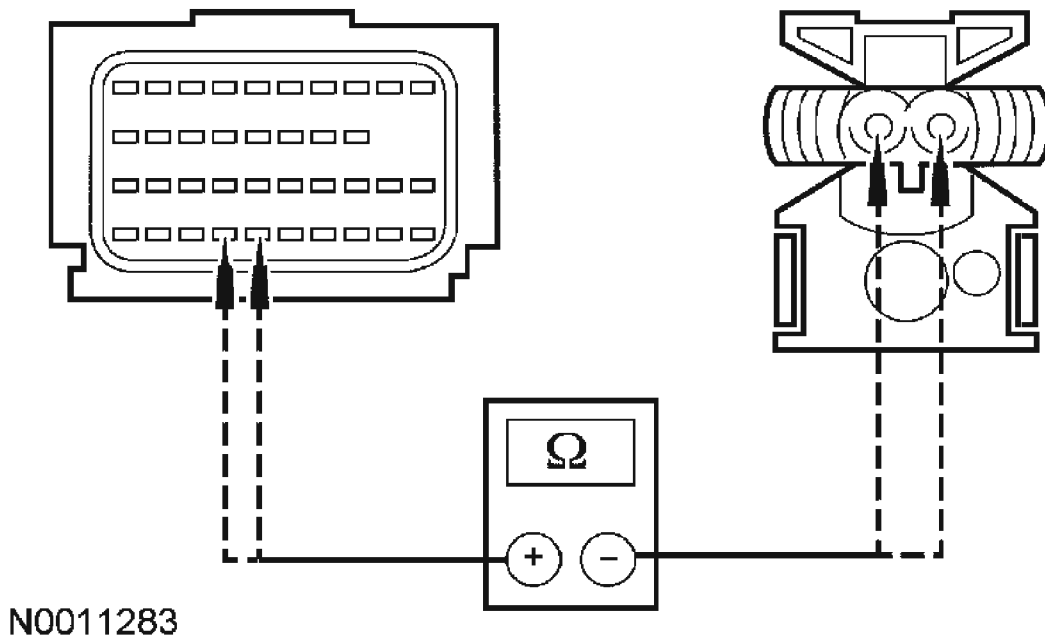
- Is the resistance greater than 1,000,000 ohms?

Yes : GO to J25.

No : REPAIR circuits 1509 (WH) and 1510 (YE). GO to J27.

**J22 CHECK CIRCUIT 1509 (WH) AND CIRCUIT 1510 (YE) FOR AN OPEN (ESCAPE HYBRID)**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Restraint System Diagnostic Tool to Driver Safety Belt Retractor Pretensioner C323.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 35, circuit 1509 (WH), harness side and driver safety belt retractor pretensioner C323, circuit 1509 (WH), harness side; and between RCM C2041b pin 36, circuit 1510 (YE), harness side and driver safety belt retractor pretensioner C323, circuit 1510 (YE), harness side



**Fig. 63: Measuring Resistance Of RCM And Driver Safety Belt Retractor Pretensioner**

Courtesy of FORD MOTOR CO.

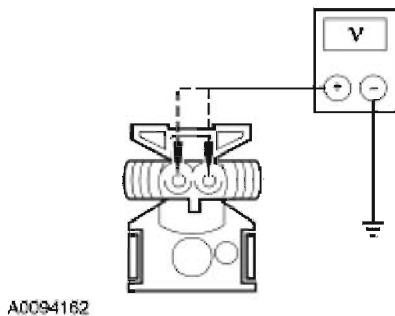
- Are the resistances less than 0.5 ohm?

Yes : GO to J25.

No : REPAIR circuit 1509 (WH) or circuit 1510 (YE). GO to J27.

**J23 CHECK CIRCUIT 1509 (WH) AND CIRCUIT 1510 (YE) FOR A SHORT TO VOLTAGE (ESCAPE HYBRID)**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: Restraint System Diagnostic Tool to Driver Safety Belt Retractor Pretensioner C323.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Key in ON position.
- Measure the voltage between driver safety belt retractor pretensioner C323, circuit 1509 (WH), harness side and ground; and between driver safety belt retractor pretensioner C323, circuit 1510 (YE), harness side and ground.



**Fig. 64: Measuring Voltage Between connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

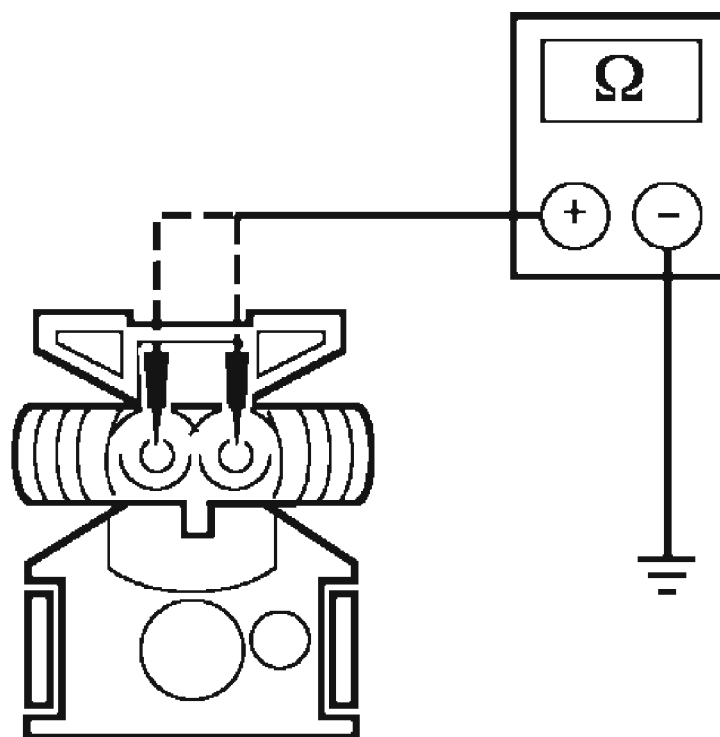
- Are the voltages less than 0.2 volt?

Yes : GO to J25.

No : REPAIR circuit 1509 (WH) or circuit 1510 (YE). GO to J27.

**J24 CHECK CIRCUIT 1509 (WH) AND CIRCUIT 1510 (YE) FOR A SHORT TO GROUND (ESCAPE HYBRID)**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Restraint System Diagnostic Tool to Driver Safety Belt Retractor Pretensioner C323.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between driver safety belt retractor pretensioner C323, circuit 1509 (WH), harness side and ground; and between driver safety belt retractor pretensioner C323, circuit 1510 (YE), harness side and ground.



A0094161

**Fig. 65: Measuring Resistance Between Connector Terminals And Ground**  
 Courtesy of FORD MOTOR CO.

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

Yes : GO to J25.

No : REPAIR circuit 1509 (WH) or circuit 1510 (YE). GO to J27.

#### **J25 CONFIRM THE RCM FAULT**

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: Safety Belt Buckle Pretensioner C3201 (Driver) or C3202 (Passenger).
- Connect: Restraint System Diagnostic Tool 418-F395 to Driver Safety Belt

Retractor Pretensioner C323 (Escape Hybrid).

- Connect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2292/Record All Flagged Faults.

- **Was DTC B2292 retrieved during the on-demand self test?**

**Yes** : If a "?" was flagged by the diagnostic tool, CARRY OUT the entire pinpoint test. INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to J27.

**No** : CHECK for causes of the intermittent fault on the pretensioner circuits. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to [J27](#).

## **J26 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2292/Record All Flagged Faults.
- **Was DTC B2292 retrieved during the on-demand self test?**

**Yes** : This is a hard fault. The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

CHECK for causes of the intermittent fault at or near the affected safety belt pretensioner electrical connector. REPAIR any intermittent concern found.

If an intermittent concern **was** found and repaired, GO to J26.

If an intermittent concern **was not** found and repaired, USE the flagged faults recorded and GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For driver safety belt buckle pretensioner (DF\_PRT) with a low resistance (LOWRES) fault, GO to J2.

For DF\_PRT with an open circuit (O\_CIR) fault, GO to J2.

For DF\_PRT with a short to battery (STB) fault, GO to J6.

For DF\_PRT with a short to ground (STG) fault, GO to J8.

For passenger safety belt buckle pretensioner (PF\_PRT) with a low resistance (LOWRES) fault, GO to J11.

For PF\_PRT with an open circuit (O\_CIR) fault, GO to J11.

For PF\_PRT with a short to battery (STB) fault, GO to J15.

For PF\_PRT with a short to ground (STG) fault, GO to J17.

For all Escape Hybrid driver safety belt retractor pretensioner (DF\_RET) faults, GO to J20.

**No** : If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to J27.

## **J27 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step J1.
- **Were any continuous DTCs retrieved during Step J1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test K: LFC 19 and 21/DTC B2293 - Restraint System Airbag Status**

**Normal Operation**

**NOTE:**      **The Escape Hybrid vehicle utilizes a single squib front passenger air bag module.**

The restraints control module (RCM) checks all of the front air bag circuits for faults. If the RCM detects one of the following faults on any of the front air bag circuits, it will store diagnostic trouble code (DTC) B2293 in memory and, depending on the fault, flash either



lamp fault code (LFC) 19 or 21 (or higher priority code if one exists) on the air bag indicator.

**Fault Conditions**

The RCM monitors for the following fault conditions:

- Low resistance
- Circuit open
- Circuit short to voltage
- Circuit short to ground

**Possible Causes**

A driver air bag status fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty clockspring.
- a faulty driver air bag module.
- a faulted RCM.

A passenger air bag status fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty passenger air bag module.
- a faulted RCM.

**PINPOINT TEST K: LFC 19 AND 21/DTC B2293 - RESTRAINT SYSTEM AIR BAG STATUS**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**K1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2293/Record All Flagged Faults.

- Enter the following diagnostic mode on the scan tool: Retrieve/Flag /Record Continuous DTCs.
- **Was DTC B2293 retrieved during the on-demand self test?**  
**Yes** : This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to K2.  
**No** : This is an intermittent fault. The fault condition is not present at this time. GO to K38.

## **K2 CHECK THE DRIVER AND PASSENGER AIR BAG MODULES**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- If the flagged fault was reported for the driver air bag module:
  - Remove the steering wheel access door to access the driver air bag module electrical connector.
  - Disconnect the driver air bag module electrical connector.
  - Connect restraint system diagnostic tool 418-F403 to the driver air bag module squib connector.
- If the flagged fault was reported for the passenger air bag module:
  - Disconnect the passenger air bag module C256. Refer to **PASSENGER AIR BAG MODULE.**
  - For Escape/Mariner, connect restraint system diagnostic tool 418-F403 to passenger air bag module C256.
  - For the Escape Hybrid, connect restraint system diagnostic tool 418-133 to passenger air bag module C256.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2293 retrieved during the on-demand self test?**  
**Yes** : This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

Using the flagged faults recorded in the Step K1, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

For driver air bag module squib 1 (D\_ABAG) with a short to ground (STG) fault, GO to K3.

For driver air bag module squib 1 (D\_ABAG) with a short to battery (STB) fault, GO to K5.

For driver air bag module squib 1 (D\_ABAG) with an open circuit (O\_CIR) fault, GO to K7.

For driver air bag module squib 1 (D\_ABAG) with a low resistance (LOWRES) fault, GO to K11.

For passenger air bag module squib 1 (P\_ABAG) with a short to ground (STG) fault, GO to K14.

For passenger air bag module squib 1 (P\_ABAG) with a short to battery (STB) fault, GO to K15.

For passenger air bag module squib 1 (P\_ABAG) with an open circuit (O\_CIR) fault, GO to K16.

For passenger air bag module squib 1 (P\_ABAG) with a low resistance (LOWRES) fault, GO to K18.

For driver air bag module squib 2 (D\_ABAG2) with a short to ground (STG) fault, GO to K20.

For driver air bag module squib 2 (D\_ABAG2) with a short to battery (STB) fault, GO to K22.

For driver air bag module squib 2 (D\_ABAG2) with an open circuit (O\_CIR) fault, GO to K24.

For driver air bag module squib 2 (D\_ABAG2) with a low resistance (LOWRES) fault, GO to K28.

For passenger air bag module squib 2 (P\_ABAG2) with a short to ground (STG) fault, GO to K31.

For passenger air bag module squib 2 (P\_ABAG2) with a short to battery (STB) fault, GO to K32.

For passenger air bag module squib 2 (P\_ABAG2) with an open circuit (O\_CIR) fault, GO to K33.

For passenger air bag module squib 2 (P\_ABAG2) with a low resistance (LOWRES) fault, GO to K35.

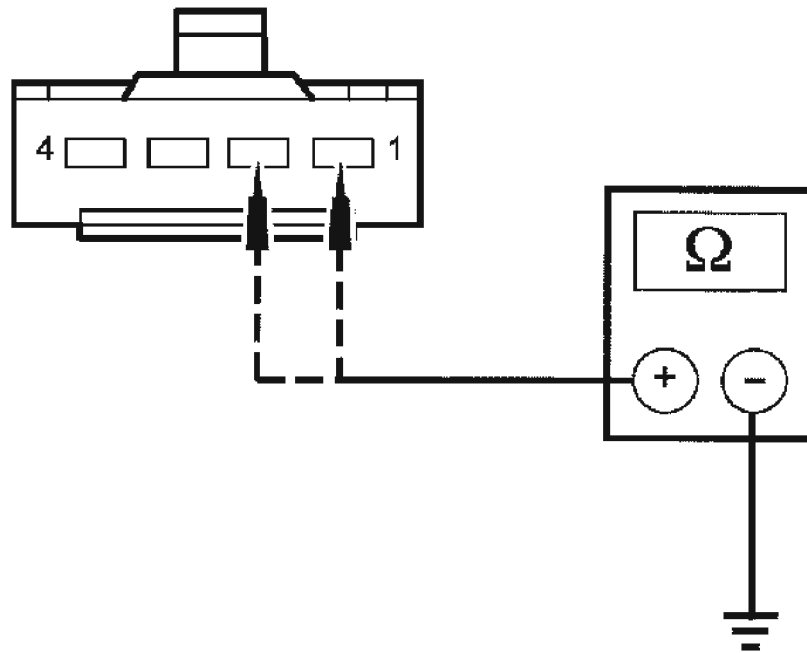
**No** : If a flagged fault of "?" was recorded in Step K1, multiple faults exist and the entire pinpoint test must be carried out.

If a fault was flagged against driver air bag module in Step K1, INSTALL a new driver air bag module. REFER to **DRIVER AIR BAG MODULE**. GO to K39.

If a fault was flagged against passenger air bag module in Step K1, INSTALL a new passenger air bag module. REFER to **PASSENGER AIR BAG MODULE**. GO to K39.

### **K3 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Measure the resistance between driver air bag module electrical connector pin 1, circuit 614 (GY/OG), harness side and ground; and between driver air bag module electrical connector pin 2, circuit 615 (GY/WH), harness side and ground.



A0090687

**Fig. 66: Measuring Resistance Between Driver Air Bag Module Electrical Connector And Ground**  
 Courtesy of FORD MOTOR CO.

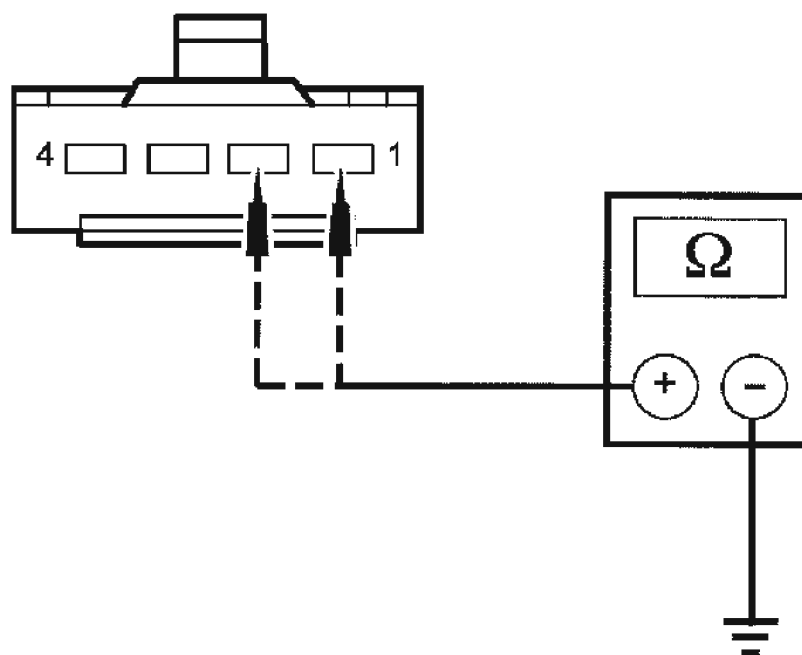
- **Are the resistances greater than 1,000,000 ohms?**

**Yes :** GO to K37.

**No :** GO to K4.

**K4 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE CLOCKSPrING**

- Disconnect: Clockspring C218b.
- Measure the resistance between clockspring C218b pin 1, circuit 614 (GY/OG), harness side and ground; and between clockspring C218b pin 2, circuit 615 (GY/WH), harness side and ground.



A0090687

**Fig. 67: Measuring Resistance Between Clockspring And Ground**  
 Courtesy of FORD MOTOR CO.

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

**Yes :** INSTALL a new clockspring. REFER to **CLOCKSPRING**. GO to K39.

**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar.

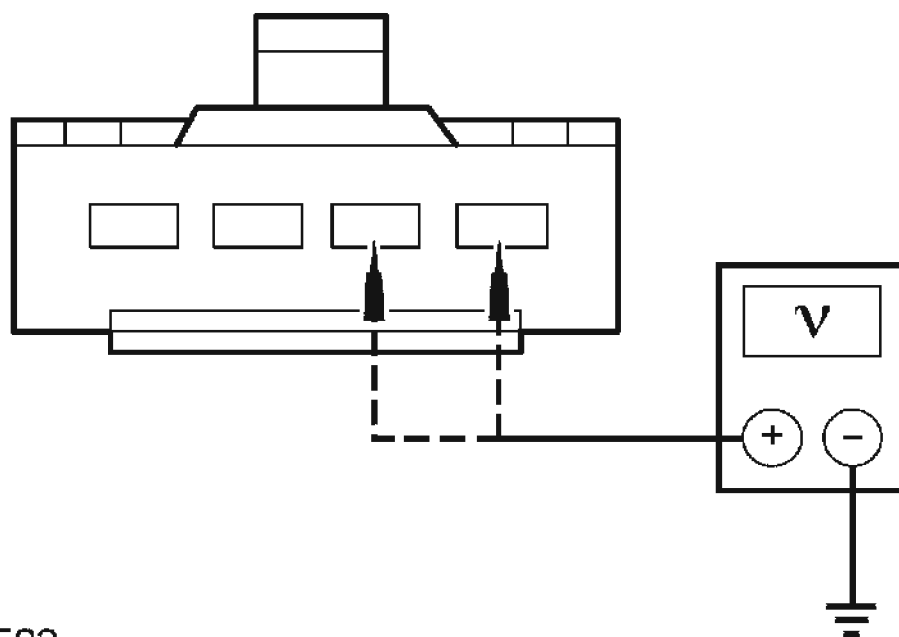
REPAIR circuit 614 (GY/OG) or circuit 615 (GY/WH). GO to K39.

#### **K5 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR A SHORT TO VOLTAGE BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND**

**REPOWERING.**

- Key in ON position.
- Measure the voltage between driver air bag module electrical connector pin 1, circuit 614 (GY/OG), harness side and ground; and between driver air bag module electrical connector pin 2, circuit 615 (GY/WH), harness side and ground.



A0088583

**Fig. 68: Measuring Voltage Between Driver Air Bag Module Electrical Connector And Ground**

Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

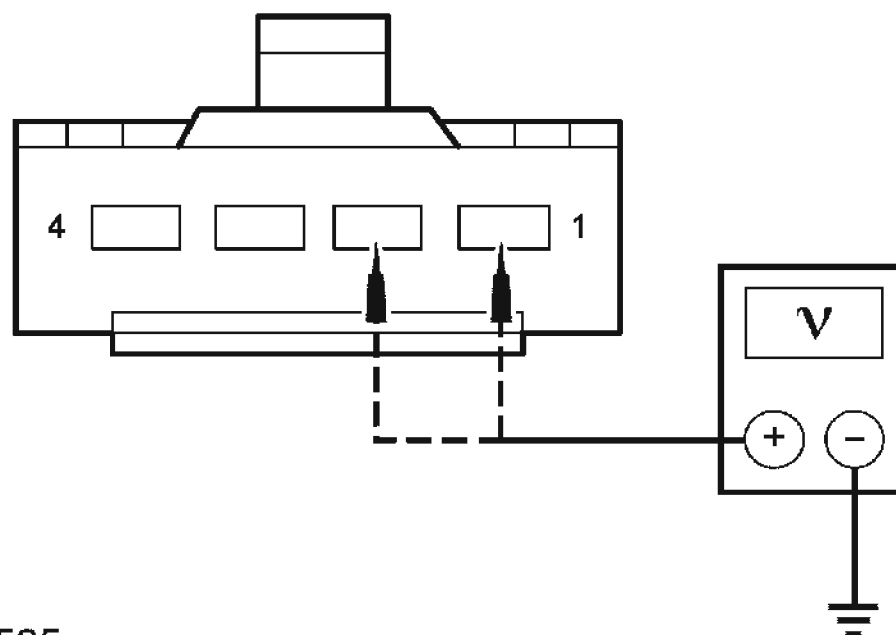
Yes : GO to K37.

No : GO to K6.

**K6 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR A SHORT TO VOLTAGE BETWEEN THE RCM AND THE CLOCKSPrING**

- Key in OFF position.
- Disconnect: Clockspring C218b.
- Key in ON position.
- Measure the voltage between clockspring C218b pin 1, circuit 614 (GY/OG), harness side and ground; and between clockspring C218b pin 2, circuit 615 (GY/WH), harness side and ground.





A0088585

**Fig. 69: Measuring Voltage Between Clockspring And Ground**  
 Courtesy of FORD MOTOR CO.

• **Are the voltages less than 0.2 volt?**

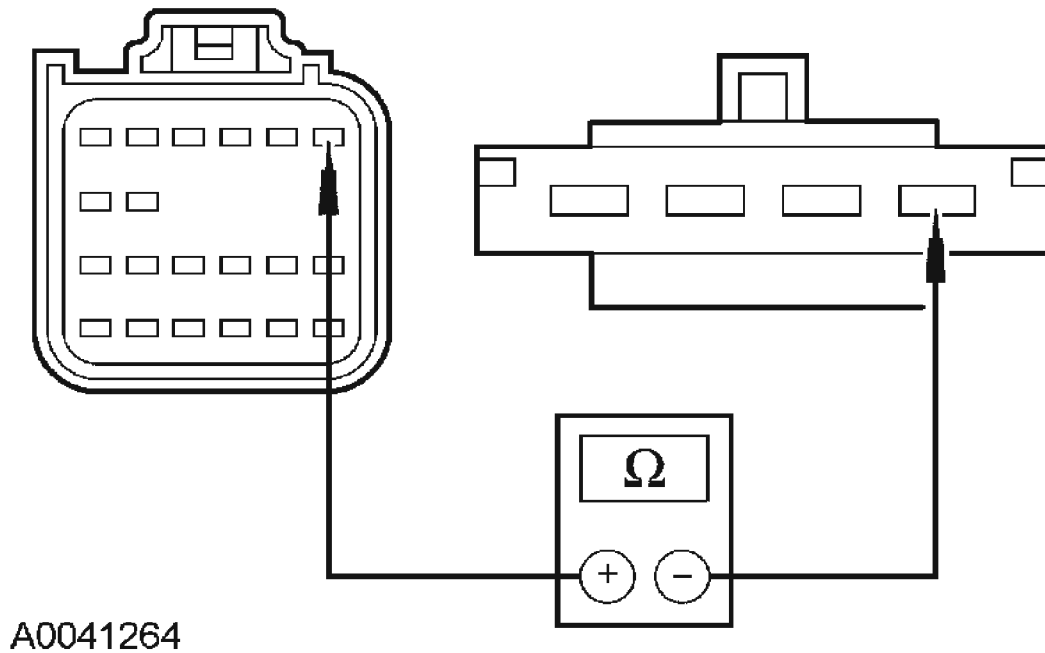
**Yes :** INSTALL a new clockspring. REFER to CLOCKSPRING. GO to K39.

**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar.

REPAIR circuit 614 (GY/OG) or circuit 615 (GY/WH). GO to K39.

**K7 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 1, circuit 614 (GY/OG), harness side and driver air bag module electrical connector pin 1, circuit 614 (GY/OG), harness side.

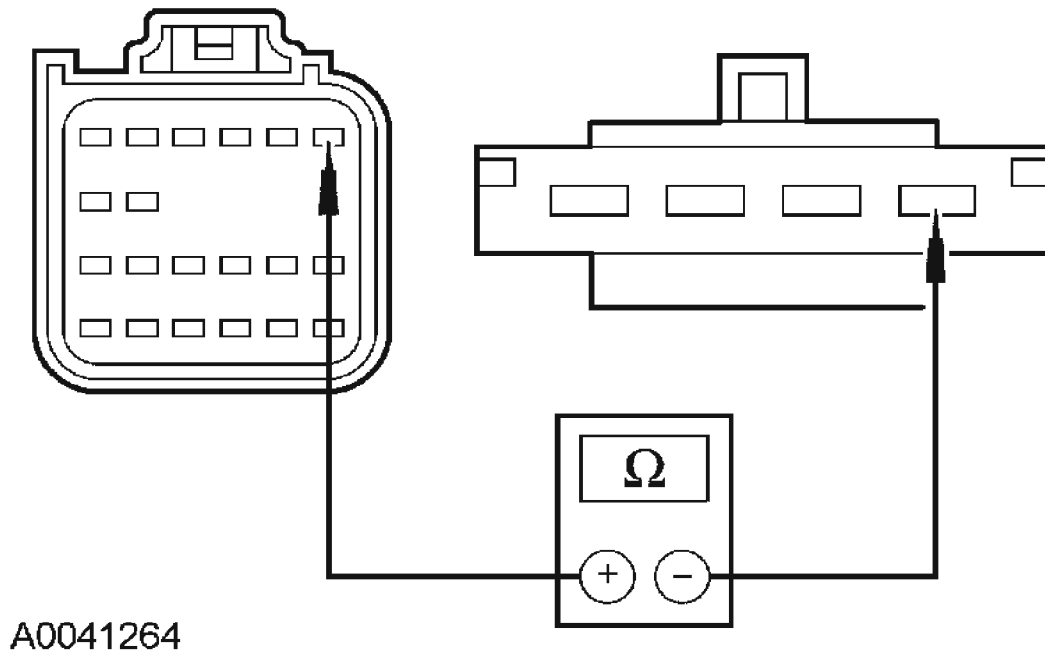


**Fig. 70: Measuring Resistance Between RCM And Driver Air Bag Module Electrical Connector**  
 Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?  
 Yes : GO to K9.  
 No : GO to K8.

**K8 CHECK CIRCUIT 614 (GY/OG) FOR AN OPEN BETWEEN THE RCM AND THE CLOCKSPrING**

- Disconnect: Clockspring C218b.
- Measure the resistance between RCM C2041a pin 1, circuit 614 (GY/OG), harness side and clockspring C218b pin 1, circuit 614 (GY/OG), harness side.



**Fig. 71: Measuring Resistance Between RCM And Clockspring**  
Courtesy of FORD MOTOR CO.

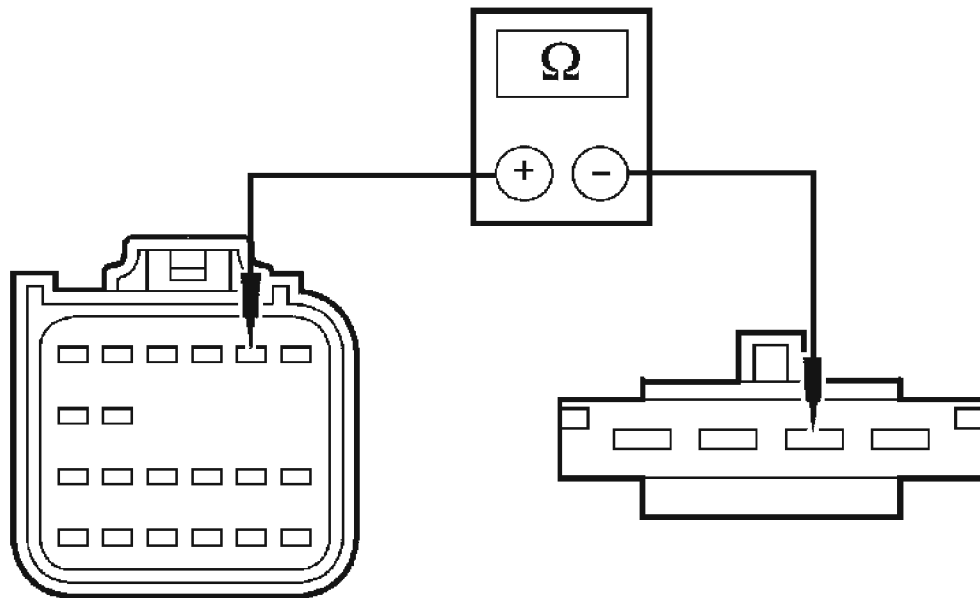
- Is the resistance less than 0.5 ohm?

Yes : INSTALL a new clockspring. REFER to **CLOCKSPRING**. GO to K39.

No : REPAIR circuit 614 (GY/OG). GO to K39.

**K9 CHECK CIRCUIT 615 (GY/WH) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Measure the resistance between RCM C2041a pin 2, circuit 615 (GY/WH), harness side and driver air bag module electrical connector pin 2, circuit 615 (GY/WH), harness side.



A0041265

**Fig. 72: Measuring Resistance Between RCM And Driver Air Bag Module Electrical Connector**

Courtesy of FORD MOTOR CO.

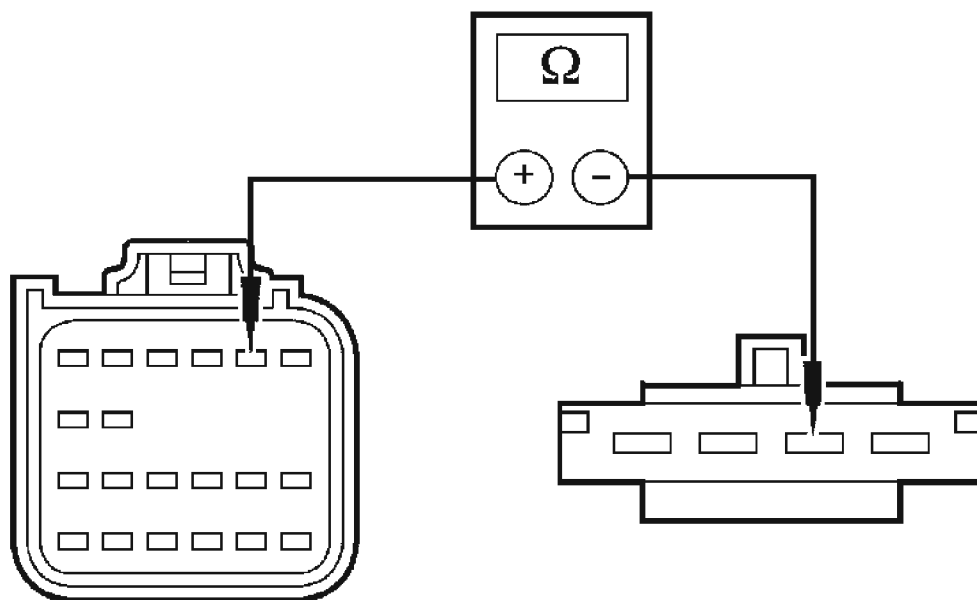
- Is the resistance less than 0.5 ohm?

Yes : GO to K37.

No : GO to K10.

**K10 CHECK CIRCUIT 615 (GY/WH) FOR AN OPEN BETWEEN THE RCM AND THE CLOCKSPrING**

- Disconnect: Clockspring C218b.
- Measure the resistance between RCM C2041a pin 2, circuit 615 (GY/WH), harness side and clockspring C218b pin 2, circuit 615 (GY/WH), harness side.



A0041265

**Fig. 73: Measuring Resistance Between RCM And Clockspring**  
 Courtesy of FORD MOTOR CO.

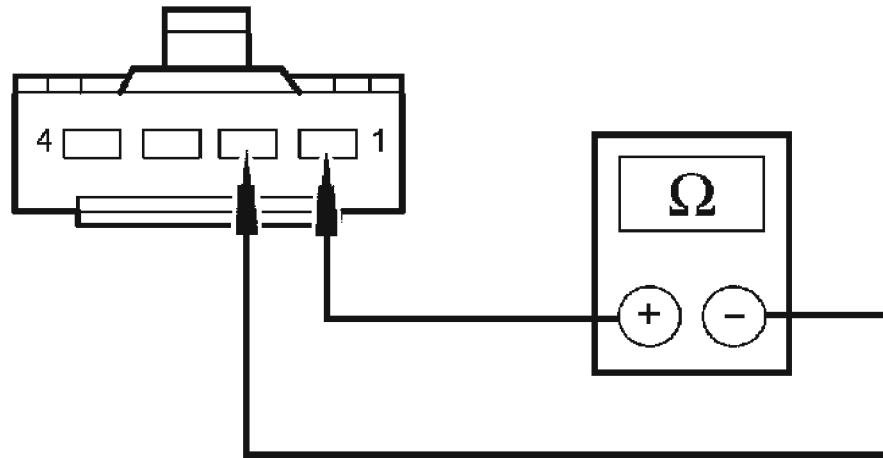
- Is the resistance less than 0.5 ohm?

**Yes :** INSTALL a new clockspring. REFER to CLOCKSPRING. GO to K39.

**No :** REPAIR circuit 615 (GY/WH). GO to K39.

**K11 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR LOW RESISTANCE BETWEEN THE DRIVER AIR BAG MODULE AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Measure the resistance between driver air bag module electrical connector pin 1, circuit 614 (GY/OG) and pin 2, circuit 615 (GY/WH), harness side.



A0057063

**Fig. 74: Measuring Resistance Between Driver Air Bag Module Electrical Connector Pin 1 & 2**

Courtesy of FORD MOTOR CO.

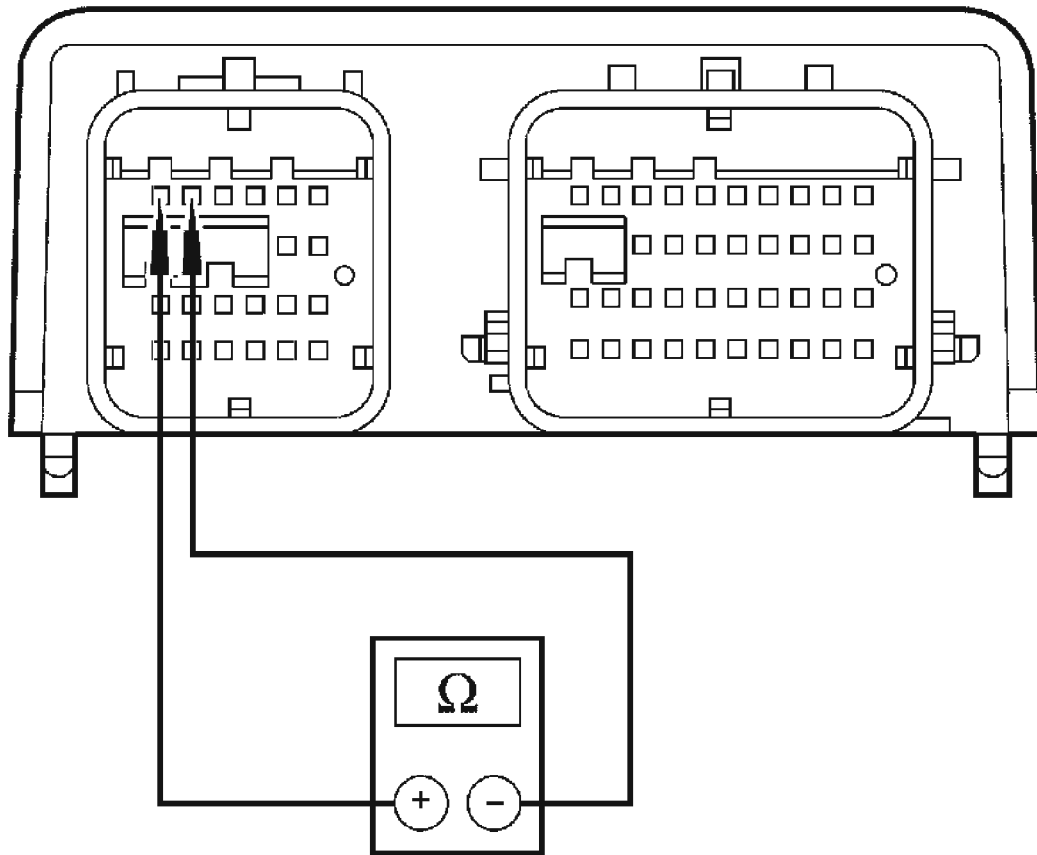
- Is the resistance greater than 10,000 ohms?

Yes : GO to K37.

No : GO to K12.

**K12 MEASURE THE RESISTANCE BETWEEN RCM CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH)**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 1, circuit 614 (GY/OG), and pin 2, circuit 615 (GY/WH), component side.



A0041266

**Fig. 75: Measuring Resistance Between RCM Connector Terminals**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

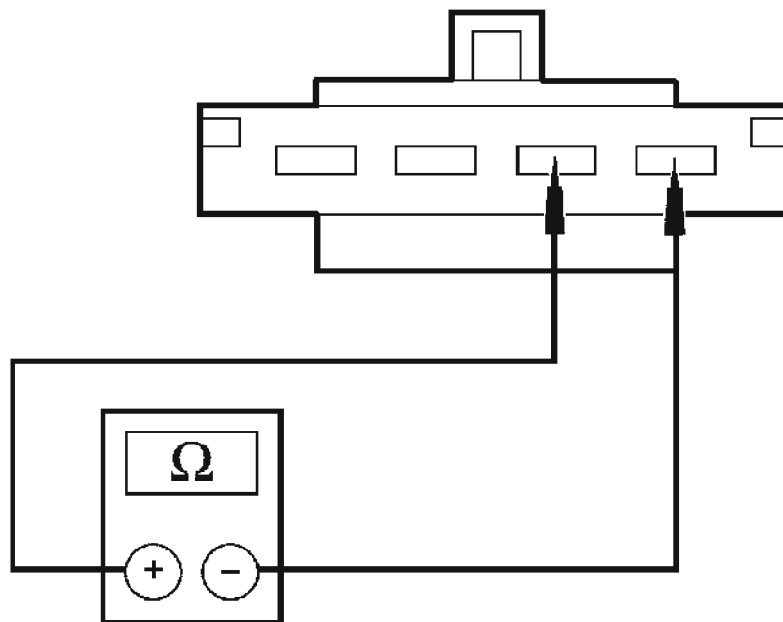
Yes : GO to K13.

No : GO to K37.

**K13 CHECK CIRCUIT 614 (GY/OG) AND CIRCUIT 615 (GY/WH) FOR LOW RESISTANCE BETWEEN THE CLOCKSPring AND THE RCM**

- Connect: RCM C2041a and C2041b.
- Disconnect: Clockspring C218b.
- Measure the resistance between clockspring C218b pin 1, circuit 614 (GY/OG)

and pin 2, circuit 615 (GY/WH), harness side.



A0015706

**Fig. 76: Measuring Resistance Between Clockspring And Pin**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

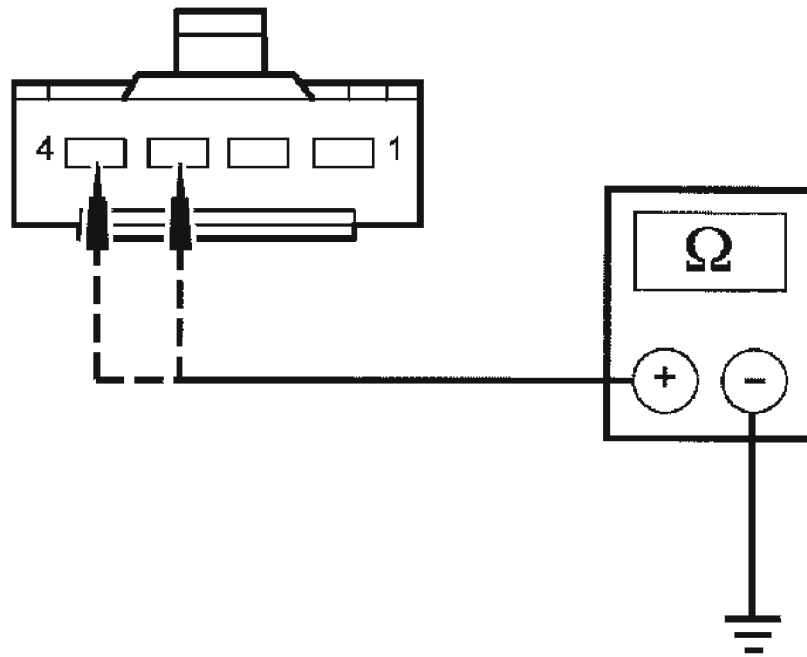
**Yes :** INSTALL a new clockspring. REFER to CLOCKSPRING. GO to K39.

**No :** REPAIR circuit 614 (GY/OG) and circuit 615 (GY/WH). GO to K39.

**K14 CHECK CIRCUIT 607 (LB/OG) AND CIRCUIT 616 (PK/BK) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- **For Escape/Mariner** , measure the resistance between passenger air bag module C256 pin 3, circuit 607 (LB/OG), harness side and ground; and between passenger air bag module C256 pin 4, circuit 616 (PK/BK), harness side and ground.

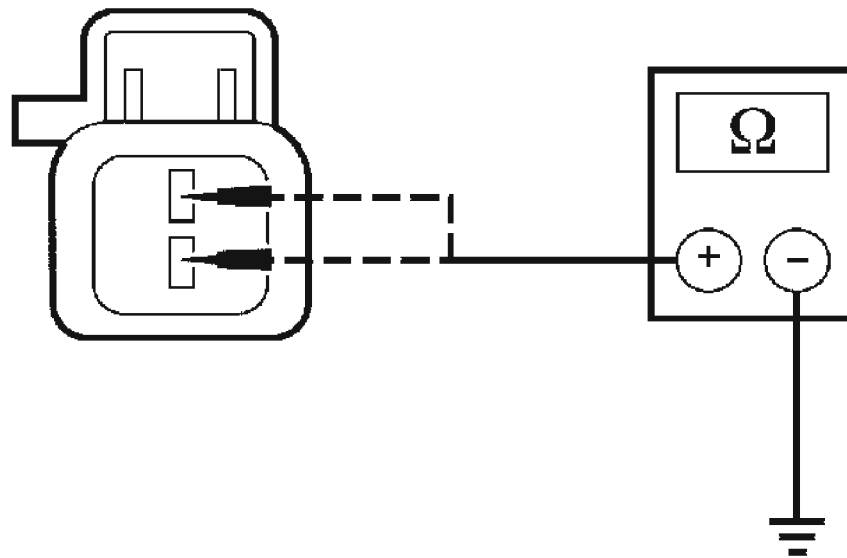




A0090688

**Fig. 77: Measuring Resistance Between Passenger Air Bag Module And Ground (Escape/Mariner)**  
Courtesy of FORD MOTOR CO.

- **For Escape Hybrid** , measure the resistance between passenger air bag module C256 pin 1, circuit 607 (LB/OG), harness side and ground; and between passenger air bag module C256 pin 2, circuit 616 (PK/BK), harness side and ground.



N0011314

**Fig. 78: Measuring Resistance Between Passenger Air Bag Module And Ground (Escape Hybrid)**

Courtesy of FORD MOTOR CO.

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

**Yes :** GO to K37.

**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar.

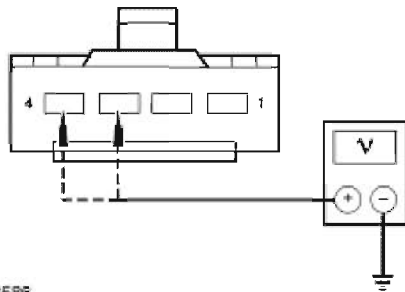
REPAIR circuit 607 (LB/OG) or circuit 616 (PK/BK). GO to K39.

### **K15 CHECK CIRCUIT 607 (LB/OG) AND CIRCUIT 616 (PK/BK) FOR A SHORT TO BATTERY BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND**

### REPOWERING.

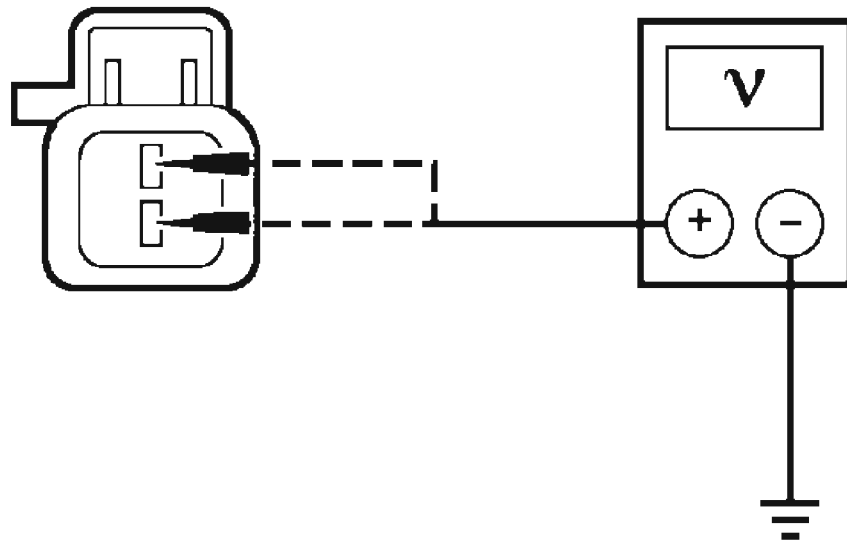
- Key in ON position.
- **For Escape/Mariner** , measure the voltage between passenger air bag module C256 pin 3, circuit 607 (LB/OG), harness side and ground; and between passenger air bag module C256 pin 4, circuit 616 (PK/BK), harness side and ground.



A0088585

**Fig. 79: Measuring Voltage Between connector Terminals And Ground**  
**Courtesy of FORD MOTOR CO.**

- **For Escape Hybrid vehicles** , measure the voltage between passenger air bag module C256 pin 1, circuit 607 (LB/OG), harness side and ground; and between passenger air bag module C256 pin 2, circuit 616 (PK/BK), harness side and ground.



A0088573

**Fig. 80: Measuring Voltage Between Connector Terminals And Ground  
(Escape Hybrid)**

Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

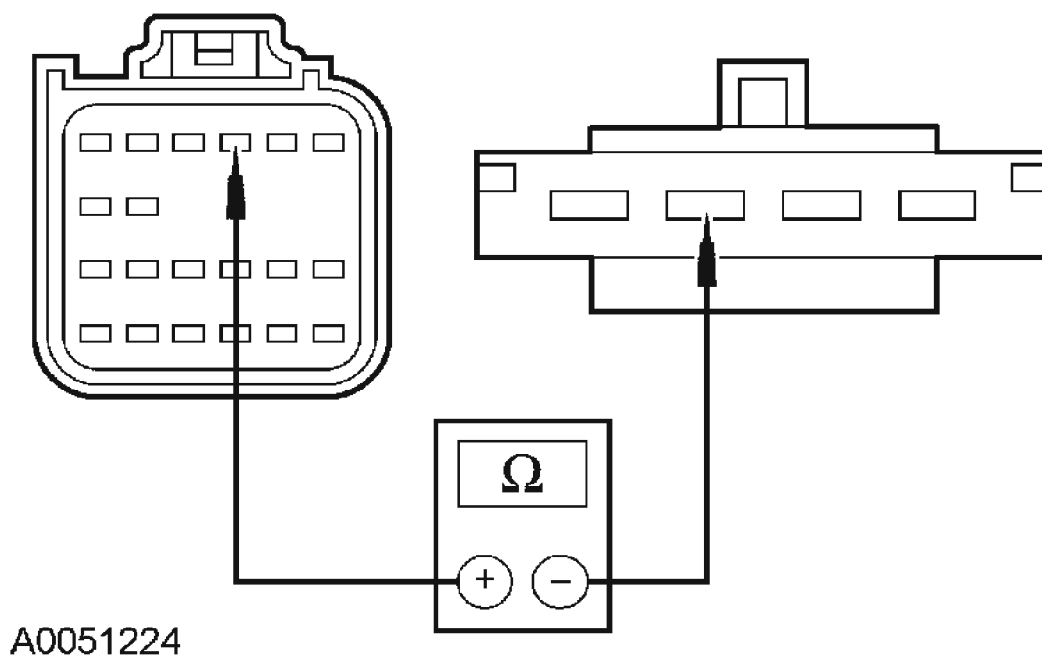
Yes : GO to K37.

No : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar.

REPAIR circuit 607 (LB/OG) or circuit 616 (PK/BK). GO to K39.

**K16 CHECK CIRCUIT 607 (LB/OG) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- **For Escape/Mariner** , measure the resistance between RCM C2041a pin 3, circuit 607 (LB/OG), harness side and passenger air bag module C256 pin 3, circuit 607 (LB/OG), harness side.

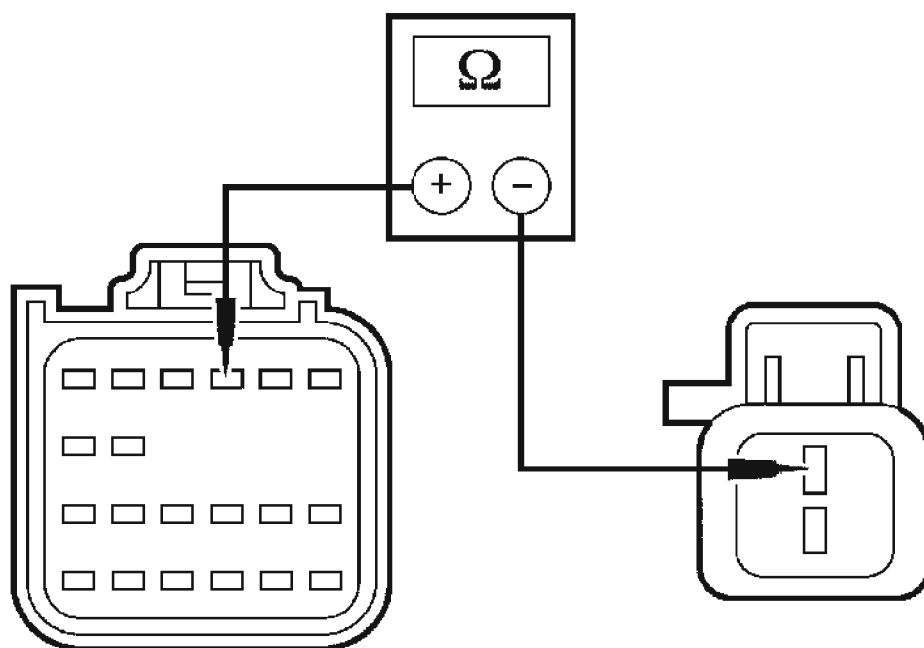


**Fig. 81: Measuring Resistance Between RCM And Passenger Air Bag**

**Module (Escape/Mariner)**

Courtesy of FORD MOTOR CO.

- **For Escape Hybrid** , measure the resistance between RCM C2041a pin 3, circuit 607 (LB/OG), harness side and passenger air bag module C256 pin 1, circuit 607 (LB/OG), harness side.



N0011313

**Fig. 82: Measuring Resistance Between RCM And Passenger Air Bag Module (Escape Hybrid)**

Courtesy of FORD MOTOR CO.

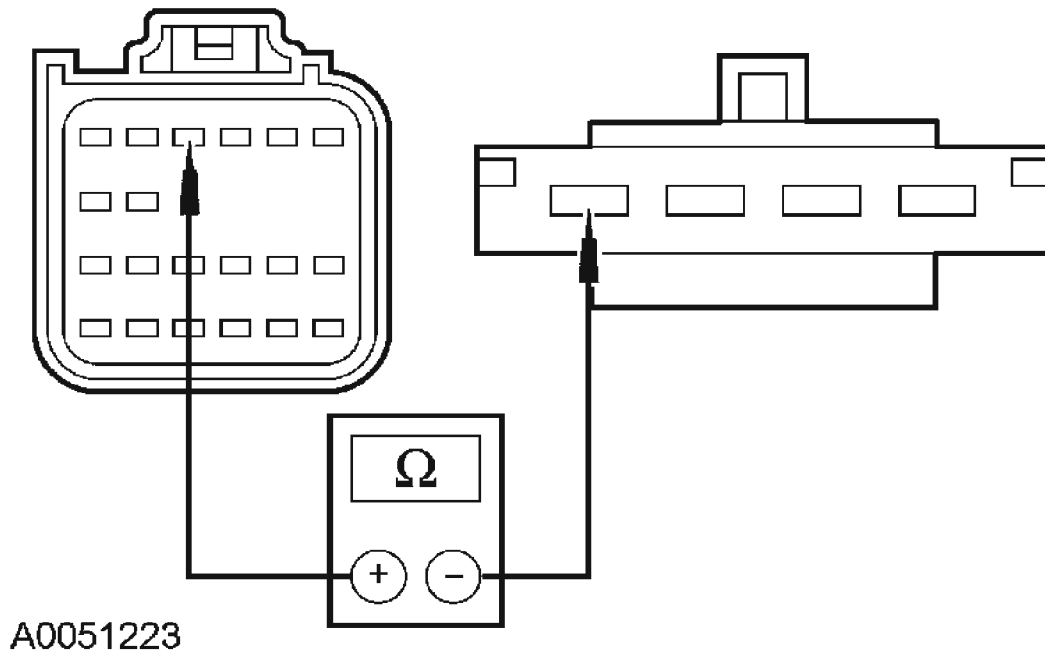
- **Is the resistance less than 0.5 ohm?**

Yes : GO to K17.

No : REPAIR circuit 607 (LB/OG). GO to K39.

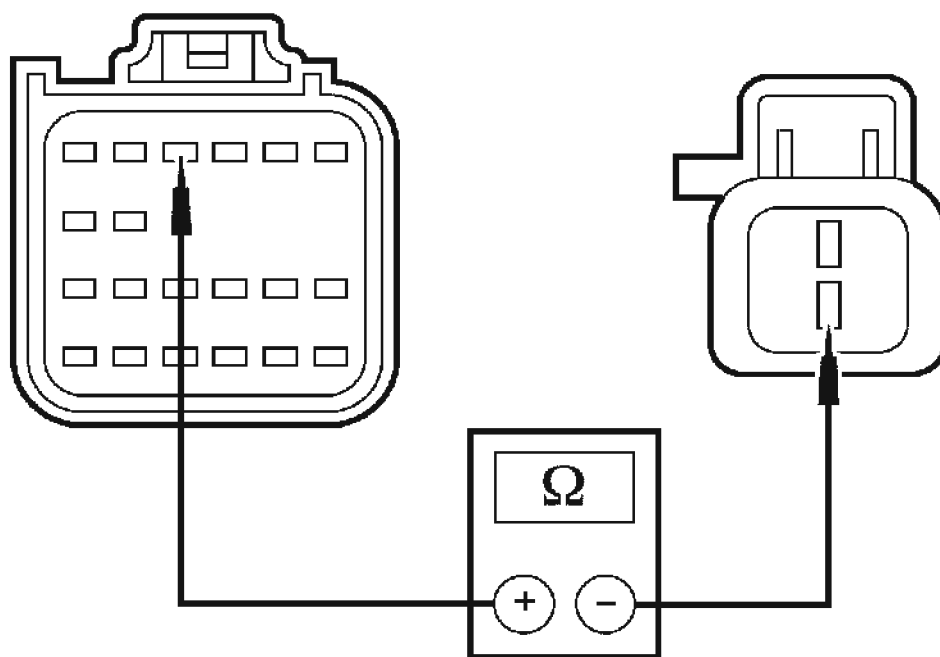
**K17 CHECK CIRCUIT 616 (PK/BK) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- **For Escape/Mariner** , measure the resistance between RCM C2041a pin 4, circuit 616 (PK/BK), harness side and passenger air bag module C256 pin 4, circuit 616 (PK/BK), harness side.



**Fig. 83: Measuring Resistance Between RCM And Passenger Air Bag Module (Escape/Mariner)**  
Courtesy of FORD MOTOR CO.

- **For Escape Hybrid** , measure the resistance between RCM C2041a pin 4, circuit 616 (PK/BK), harness side and passenger air bag module C256 pin 2, circuit 616 (PK/BK), harness side.



N0011312

**Fig. 84: Measuring Resistance Between RCM And Passenger Air Bag Module (Escape Hybrid)**

Courtesy of FORD MOTOR CO.

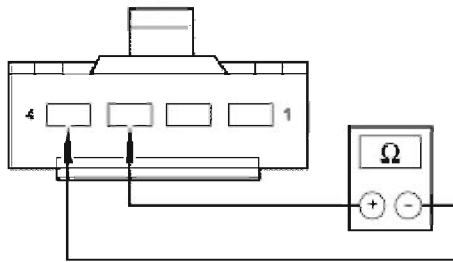
- Is the resistance less than 0.5 ohm?

Yes : GO to K37.

No : REPAIR circuit 616 (PK/BK). GO to K39.

**K18 CHECK CIRCUIT 607 (LB/OG) AND CIRCUIT 616 (PK/BK) FOR LOW RESISTANCE BETWEEN THE PASSENGER AIR BAG MODULE AND THE RCM**

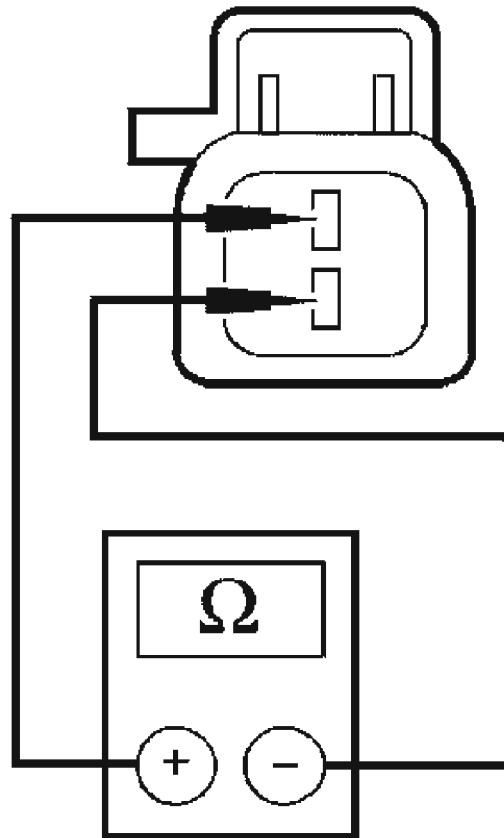
- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- **For Escape/Mariner** , measure the resistance between passenger air bag module C256 pin 3, circuit 607 (LB/OG), and pin 4, circuit 616 (PK/BK), harness side.



A0029872

**Fig. 85: Measuring Resistance Between Connector Terminals**  
**Courtesy of FORD MOTOR CO.**

- **For Escape Hybrid** , measure the resistance between passenger air bag module C256 pin 3, circuit 607 (LB/OG), and pin 4, circuit 616 (PK/BK), harness side.



A0029887

**Fig. 86: Measuring Resistance Between Air Bag Connector Terminals**  
**(Escape Hybrid)**



Courtesy of FORD MOTOR CO.

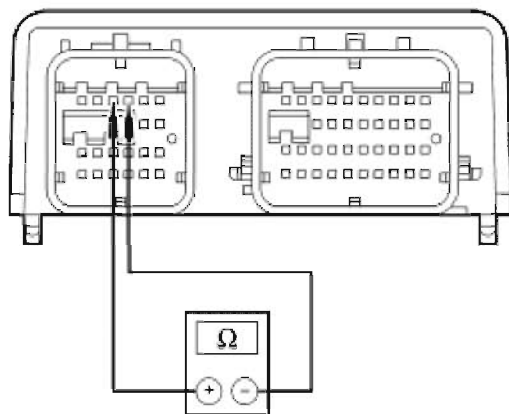
- Is the resistance greater than 10,000 ohms?

Yes : GO to K37.

No : GO to K19.

**K19 MEASURE THE RESISTANCE BETWEEN RCM CIRCUIT 607 (LB/OG) AND CIRCUIT 616 (PK/BK)**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 3, circuit 607 (LB/OG), and pin 4, circuit 616 (PK/BK), component side.



ACC41271

**Fig. 87: Measuring Resistance Between RCM Pins 3 And 4**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

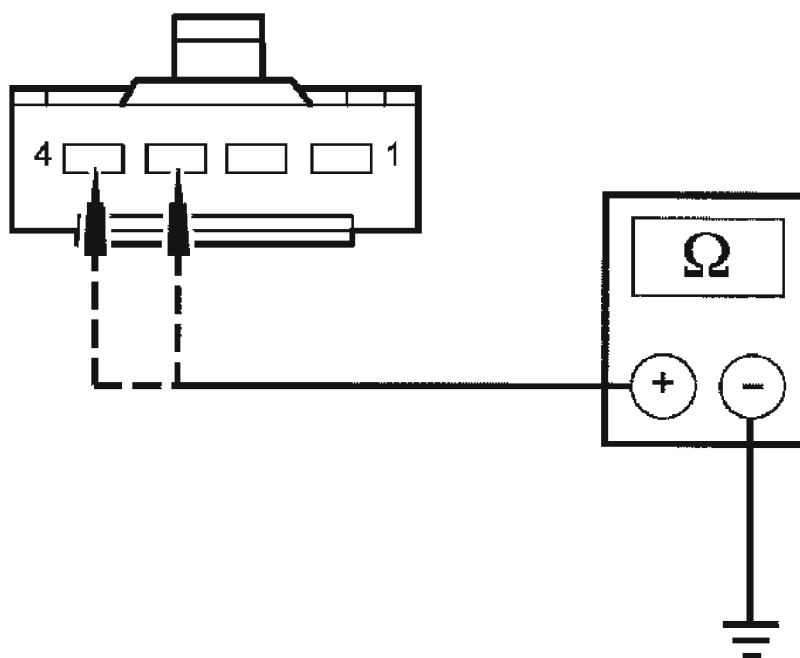
Yes : REPAIR circuit 607 (LB/OG) and circuit 616 (PK/BK). GO to K39.

No : GO to K37.

**K20 CHECK CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.

- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Measure the resistance between driver air bag module electrical connector pin 3, circuit 1516 (YE/WH), harness side and ground; and between driver air bag module electrical connector pin 4, circuit 1517 (RD/OG), harness side and ground.



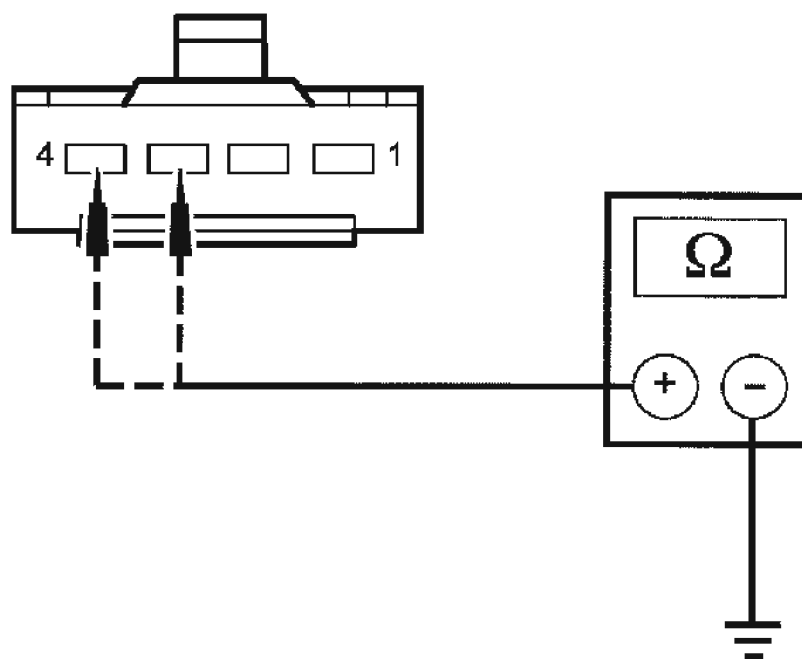
A0090688

**Fig. 88: Measuring Resistance Between Driver Air Bag Module Electrical Connector Pin And Ground**  
 Courtesy of FORD MOTOR CO.

- Are the resistances greater than 1,000,000 ohms?  
 Yes : GO to K37.  
 No : GO to K21.

**K21 CHECK CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE CLOCKSPrING**

- Disconnect: Clockspring C218b.
- Measure the resistance between clockspring C218b pin 3, circuit 1516 (YE/WH), harness side and ground; and between clockspring C218b pin 4, circuit 1517 (RD/OG), harness side and ground.



A0090688

**Fig. 89: Measuring Resistance Between Clockspring And Ground**  
 Courtesy of FORD MOTOR CO.

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

**Yes :** INSTALL a new clockspring. REFER to **CLOCKSPRING**. GO to K39.

**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar.

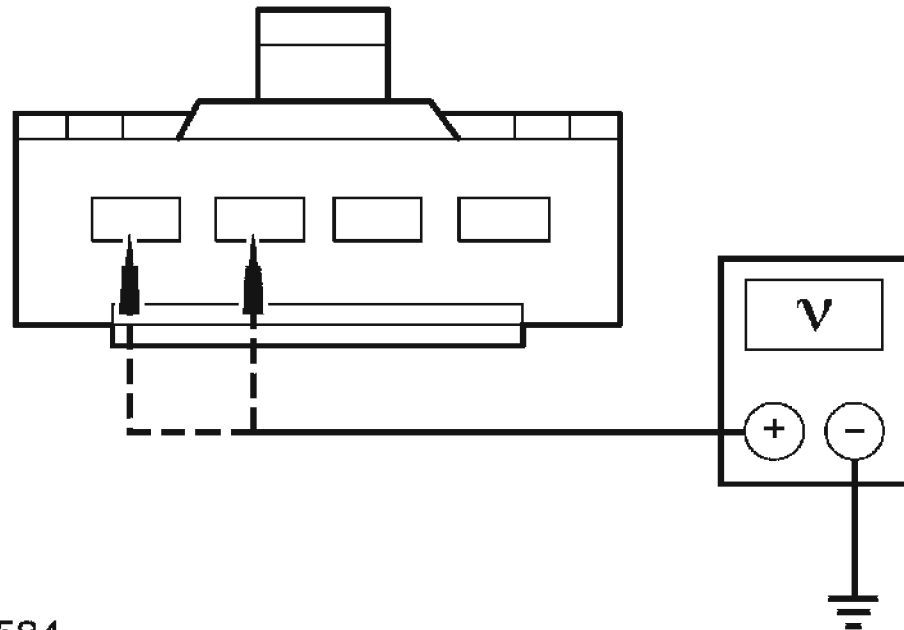
REPAIR circuit 1516 (YE/WH) or circuit 1517 (RD/OG). GO to K39.

## **K22 CHECK CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG) FOR A SHORT TO VOLTAGE BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND**

### **REPOWERING.**

- Key in ON position.
- Measure the voltage between driver air bag module electrical connector pin 3, circuit 1516 (YE/WH), harness side and ground; and between driver air bag module electrical connector pin 4, circuit 1517 (RD/OG), harness side and ground.



A0088584

**Fig. 90: Measuring Voltage Between Driver Air Bag Module Electrical Connector And Ground**

Courtesy of FORD MOTOR CO.

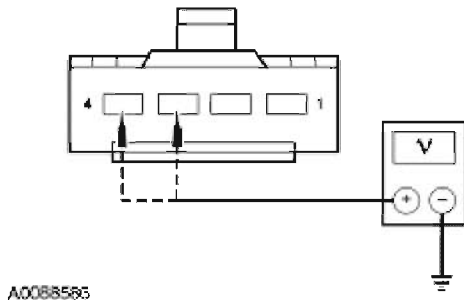
- Are the voltages less than 0.2 volt?

Yes : GO to K37.

No : GO to K23.

### **K23 CHECK CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG) FOR A SHORT TO VOLTAGE BETWEEN THE RCM AND THE CLOCKSPRING**

- Key in OFF position.
- Disconnect: Clockspring C218b.
- Key in ON position.
- Measure the voltage between clockspring C218b pin 3, circuit 1516 (YE/WH), harness side and ground; and between clockspring C218b pin 4, circuit 1517 (RD/OG), harness side and ground.



**Fig. 91: Measuring Voltage Between connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

- **Are the voltages less than 0.2 volt?**

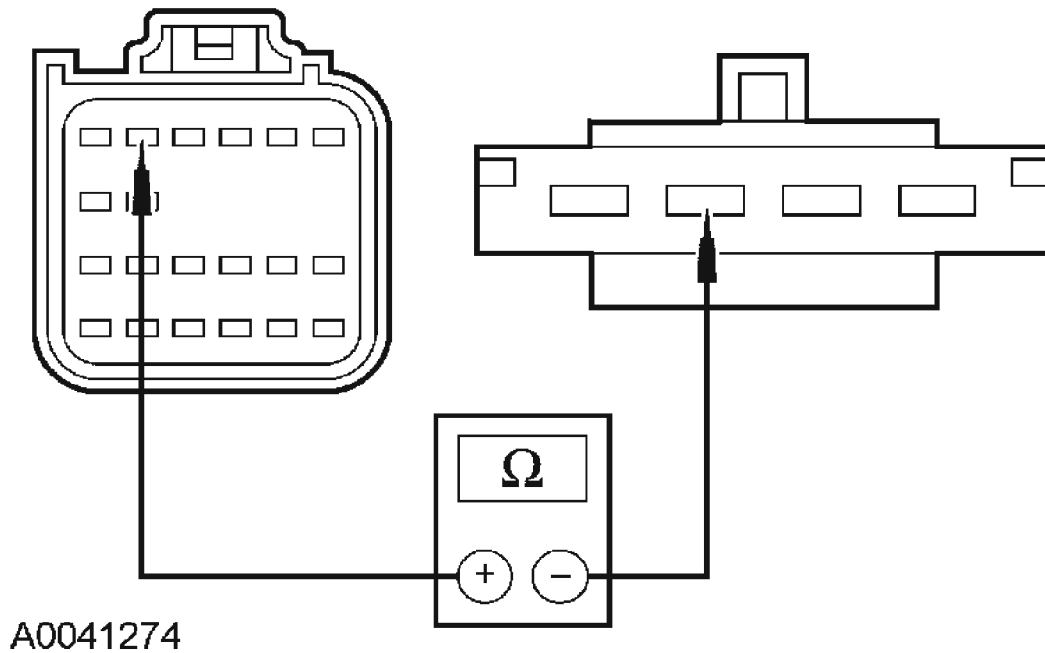
**Yes :** INSTALL a new clockspring. REFER to CLOCKSPRING. GO to K39.

**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar.

REPAIR circuit 1516 (YE/WH) or circuit 1517 (RD/OG). GO to K39.

**K24 CHECK CIRCUIT 1516 (YE/WH) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 5, circuit 1516 (YE/WH), harness side and the driver air bag module electrical connector pin 3, circuit 1516 (YE/WH), harness side.

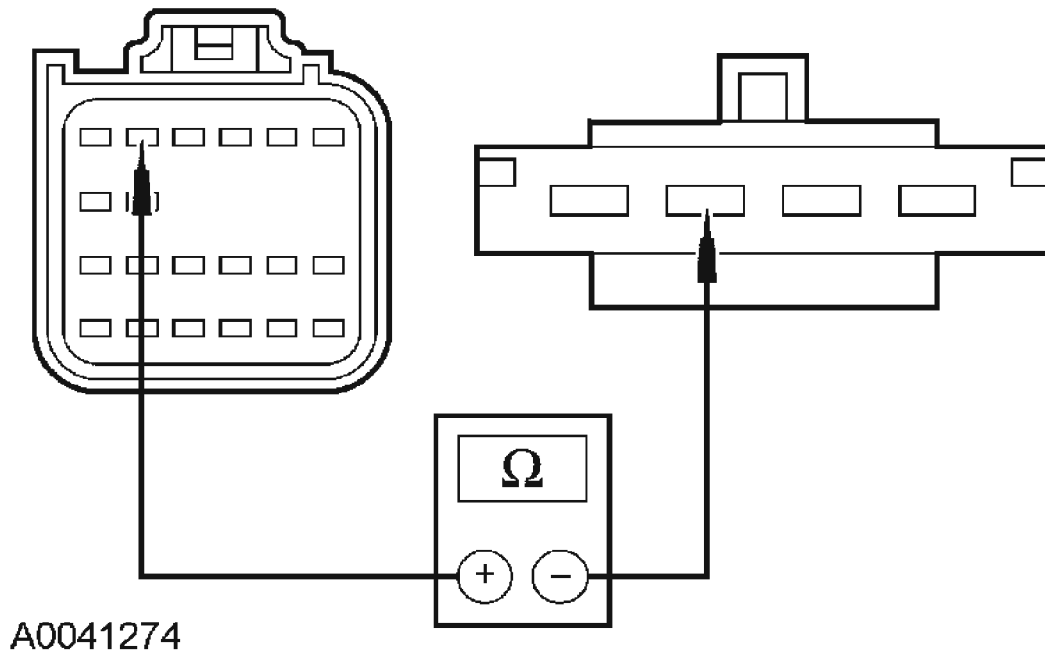


**Fig. 92: Measuring Resistance Between RCM And Driver Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?  
Yes : GO to K26.  
No : GO to K25.

**K25 CHECK CIRCUIT 1516 (YE/WH) FOR AN OPEN BETWEEN THE RCM AND THE CLOCKSPrING**

- Disconnect: Clockspring C218a.
- Measure the resistance between RCM C2041a pin 5, circuit 1516 (YE/WH), harness side and clockspring C218a pin 3, circuit 1516 (YE/WH), harness side.



**Fig. 93: Measuring Resistance Between RCM And Clockspring**  
 Courtesy of FORD MOTOR CO.

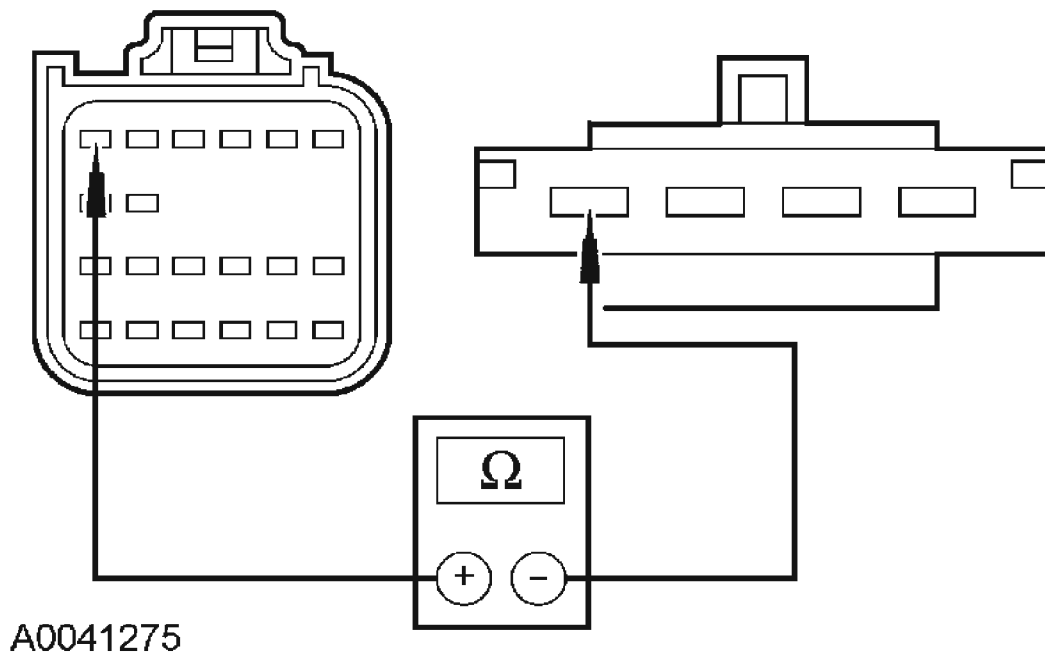
- Is the resistance less than 0.5 ohm?

Yes : INSTALL a new clockspring. REFER to **CLOCKSPRING**. GO to K39.

No : REPAIR circuit 1516 (YE/WH). GO to K39.

**K26 CHECK CIRCUIT 1517 (RD/OG) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Measure the resistance between RCM C2041a pin 6, circuit 1517 (RD/OG), harness side and driver air bag module electrical connector pin 4, circuit 1517 (RD/OG), harness side.



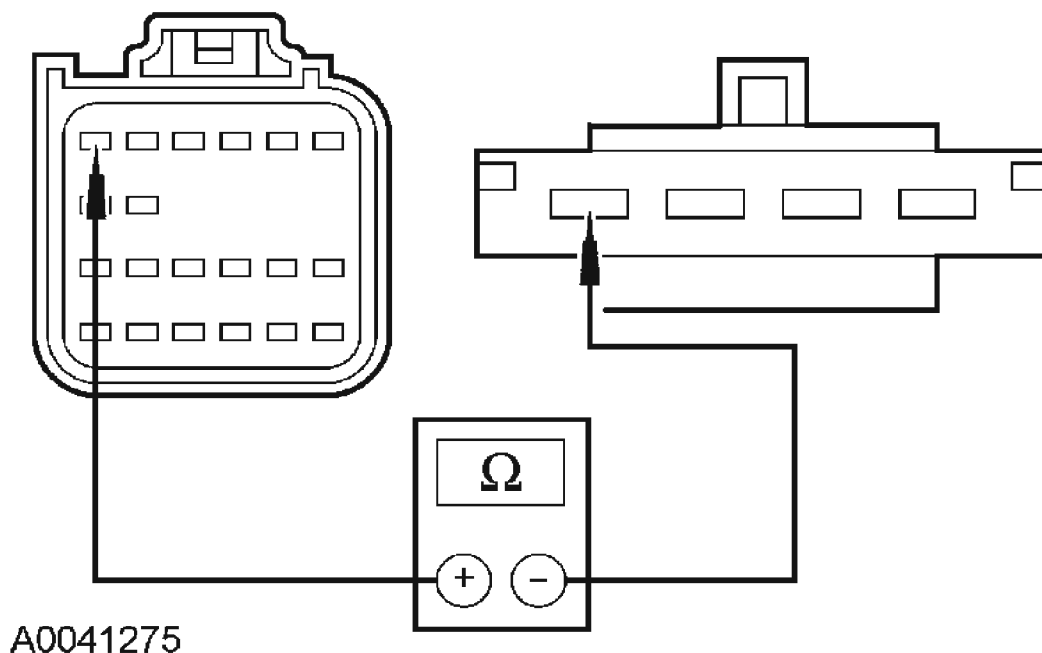
**Fig. 94: Measuring Resistance Between RCM And Driver Air Bag Module Electrical Connector**  
 Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?  
 Yes : GO to K37.  
 No : GO to K27.

**K27 CHECK CIRCUIT 1517 (RD/OG) FOR AN OPEN BETWEEN THE RCM AND THE CLOCKSPrING**

- Disconnect: Clockspring C218b.
- Measure the resistance between RCM C2041a pin 6, circuit 1517 (RD/OG), harness side and clockspring C218b pin 4, circuit 1517 (RD/OG), harness side.





**Fig. 95: Measuring Resistance Between RCM And Clockspring**  
 Courtesy of FORD MOTOR CO.

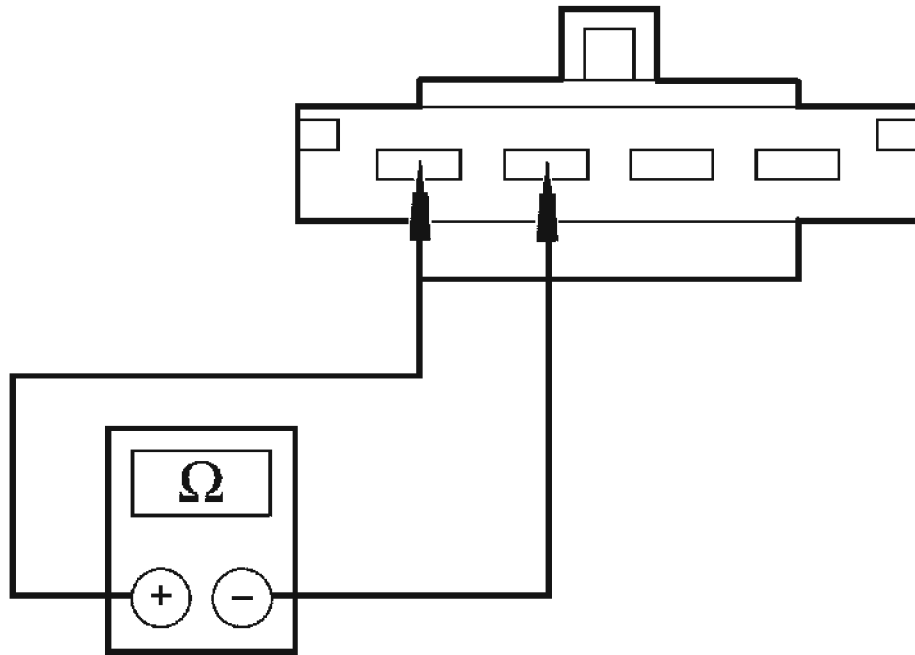
- Is the resistance less than 0.5 ohm?

Yes : INSTALL a new clockspring. REFER to **CLOCKSPRING**. GO to K39.

No : REPAIR circuit 1517 (RD/OG). GO to K39.

**K28 CHECK FOR LOW RESISTANCE ON CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG) BETWEEN THE RCM AND THE DRIVER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Air Bag Module Restraint System Diagnostic Tool.
- Measure the resistance between driver air bag module electrical connector pin 3, circuit 1516 (YE/WH), harness side and pin 4, circuit 1517 (RD/OG), harness side.



A0015535

**Fig. 96: Measuring Resistance Of Driver Air Bag Module Electrical Connector**

Courtesy of FORD MOTOR CO.

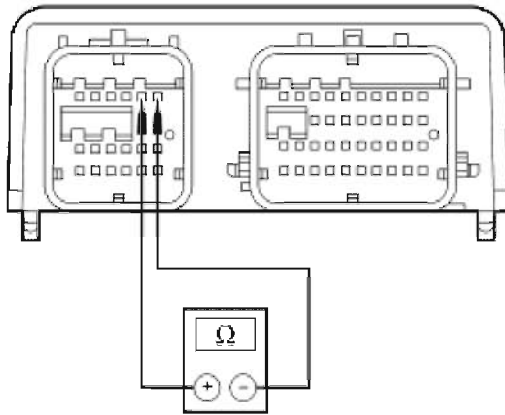
- Is the resistance greater than 10,000 ohms?

Yes : GO to K37.

No : GO to K29.

**K29 MEASURE THE RESISTANCE BETWEEN RCM CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG)**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 5, circuit 1516 (YE/WH), component side and pin 6, circuit 1517 (RD/OG), component side.



A0041276

**Fig. 97: Measuring Resistance Between RCM Connector Terminals**  
Courtesy of FORD MOTOR CO.

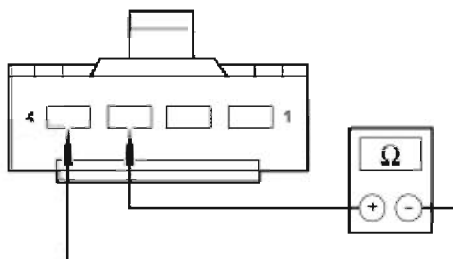
- Is the resistance greater than 10,000 ohms?

Yes : GO to K30.

No : GO to K37.

**K30 CHECK FOR LOW RESISTANCE ON CIRCUIT 1516 (YE/WH) AND CIRCUIT 1517 (RD/OG) BETWEEN THE DRIVER AIR BAG MODULE AND THE CLOCKSPrING**

- Connect: RCM C2041a and C2041b.
- Disconnect: Clockspring C218b.
- Measure the resistance between clockspring C218b pin 3, circuit 1516 (YE/WH), harness side and pin 4, circuit 1517 (RD/OG), harness side.



A0029872

**Fig. 98: Measuring Resistance Between Connector Terminals**  
Courtesy of FORD MOTOR CO.

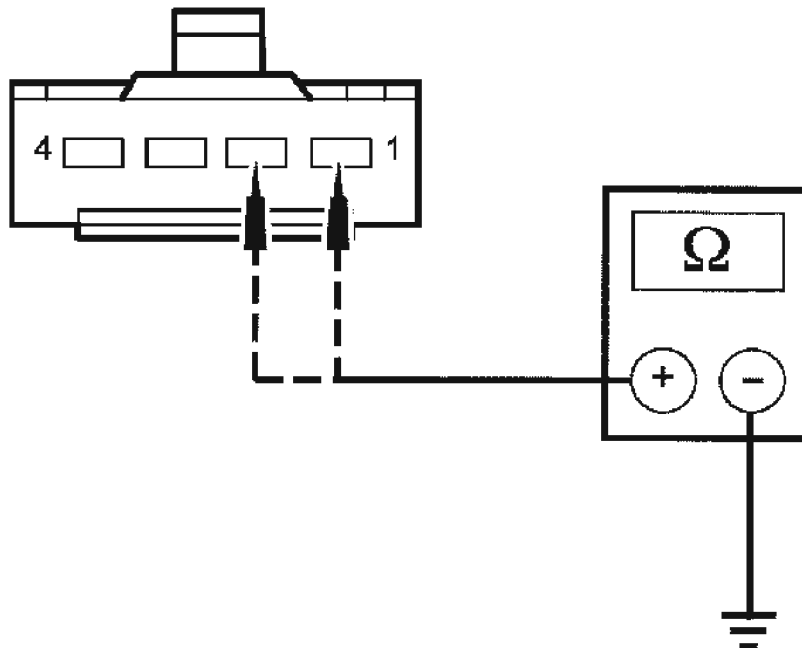
- Is the resistance greater than 10,000 ohms?

**Yes** : INSTALL a new clockspring. REFER to **CLOCKSPRING**. GO to K39.

**No** : REPAIR circuit 1516 (YE/WH) and circuit 1517 (RD/OG). GO to K39.

**K31 CHECK CIRCUIT 1518 (BK/WH) AND CIRCUIT 1519 (LG/RD) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between passenger air bag module C256 pin 1, circuit 1518 (BK/WH), harness side and ground; and between passenger air bag module C256 pin 2, circuit 1519 (LG/RD), harness side and ground.



A0090687

**Fig. 99: Measuring Resistance Between Passenger Air Bag Module And Ground**

Courtesy of FORD MOTOR CO.

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

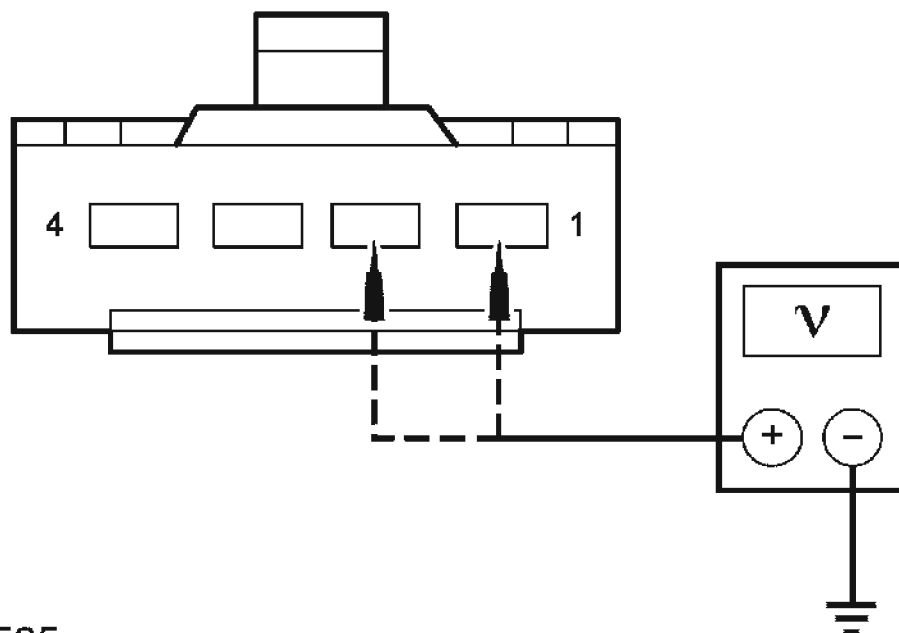
**Yes** : GO to K37.

**No** : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit.

REPAIR circuit 1518 (BK/WH) or circuit 1519 (LG/RD). GO to K39.

**K32 CHECK CIRCUIT 1518 (BK/WH) AND CIRCUIT 1519 (LG/RD) FOR A SHORT TO VOLTAGE BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between passenger air bag module C256 pin 1, circuit 1518 (BK/WH), harness side and ground; and between passenger air bag module C256 pin 2, circuit 1519 (LG/RD), harness side and ground.



**Fig. 100: Measuring Voltage Between Passenger Air Bag Module And Ground****Courtesy of FORD MOTOR CO.**

- Are the voltages less than 0.2 volt?

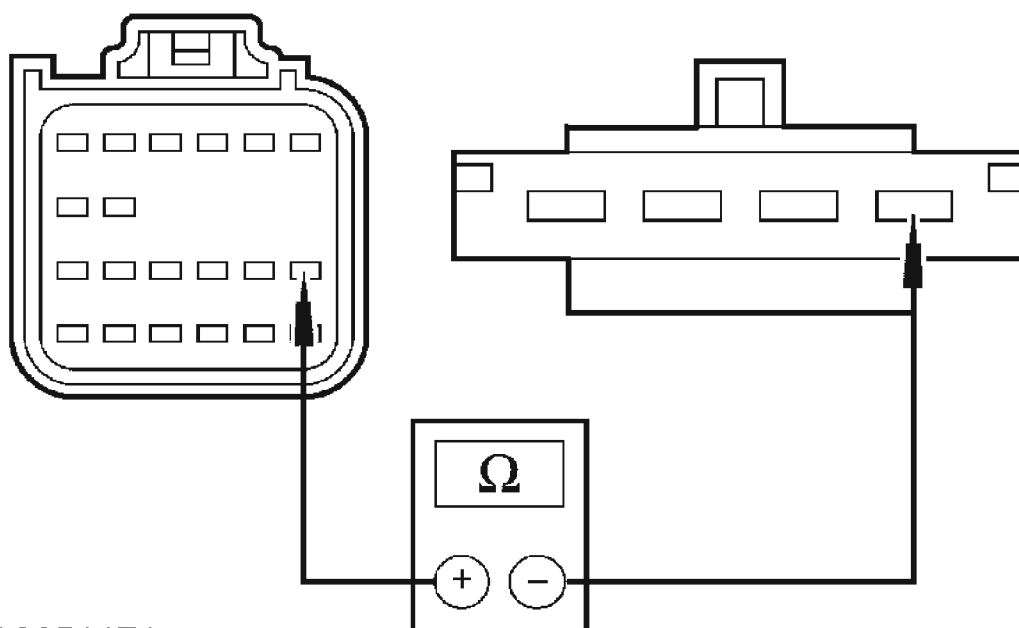
Yes : GO to K37.

No : Due to the shorting bar feature in the RCM electrical connector, the fault can exist in either circuit.

REPAIR circuit 1518 (BK/WH) or circuit 1519 (LG/RD). GO to K39.

**K33 CHECK CIRCUIT 1518 (BK/WH) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 13, circuit 1518 (BK/WH), harness side and passenger air bag module C256 pin 1, circuit 1518 (BK/WH), harness side.



A0051171

**Fig. 101: Measuring Resistance Between RCM And Passenger Air Bag**

**Module****Courtesy of FORD MOTOR CO.**

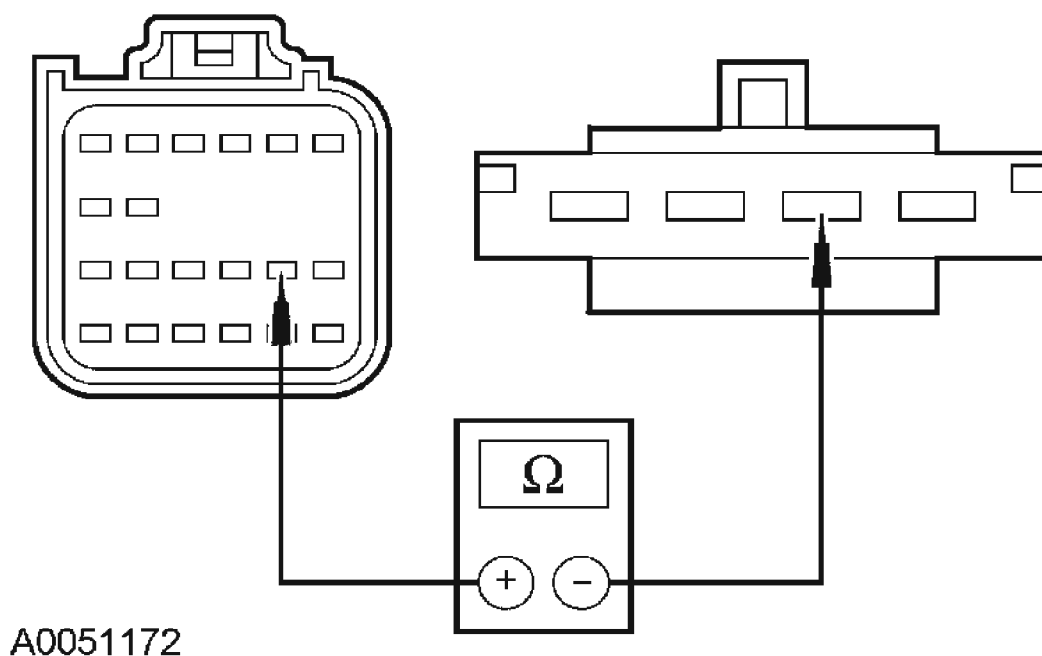
- Is the resistance less than 0.5 ohm?

Yes : GO to K34.

No : REPAIR circuit 1518 (BK/WH). GO to K39.

**K34 CHECK CIRCUIT 1519 (LG/RD) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Measure the resistance between RCM C2041a pin 14, circuit 1519 (LG/RD), harness side and passenger air bag module C256 pin 2, circuit 1519 (LG/RD), harness side.



**Fig. 102: Measuring Resistance Between RCM And Passenger Air Bag Module**

**Courtesy of FORD MOTOR CO.**

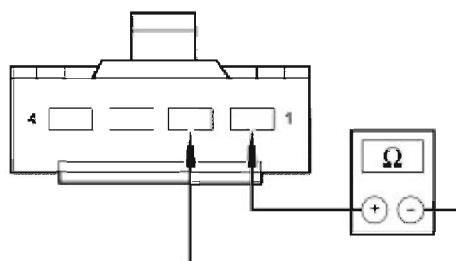
- Is the resistance less than 0.5 ohm?

Yes : GO to K37.

No : REPAIR circuit 1519 (LG/RD). GO to K39.

**K35 CHECK FOR LOW RESISTANCE ON CIRCUIT 1518 (BK/WH) AND CIRCUIT 1519 (LG/RD) BETWEEN THE RCM AND THE PASSENGER AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Air Bag Module Restraint System Diagnostic Tool.
- Measure the resistance between passenger air bag module C256 pin 1, circuit 1518 (BK/WH), harness side and pin 2, circuit 1519 (LG/RD), harness side.



A0029882

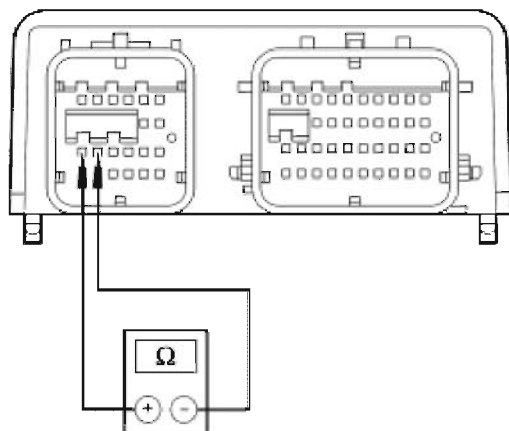
**Fig. 103: Measuring Resistance Between Connector Terminals**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?  
Yes : GO to K37.  
No : GO to K36.

**K36 MEASURE THE RESISTANCE BETWEEN RCM CIRCUIT 1518 (BK/WH) AND CIRCUIT 1519 (LG/RD)**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 13, circuit 1518 (BK/WH), component side and pin 14, circuit 1519 (LG/RD), component side.





A0041281

**Fig. 104: Measuring Resistance Between RCM Connector Terminals**  
Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

Yes : REPAIR circuit 1518 (BK/WH) and circuit 1519 (LG/RD). GO to K39.

No : GO to K37.

### K37 CONFIRM THE RCM FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self-test. If not, erroneous DTCs will be recorded

- Key in OFF position.
  - Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
  - Connect: Restraint System Diagnostic Tools.
  - Connect: RCM C2041a and C2041b.
  - Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
  - Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
  - Was DTC B2293 retrieved during the on-demand self test?
- Yes : If a "?" was flagged by the diagnostic tool. CARRY OUT the entire pinpoint

test.

INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to K39.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to K39.

### **K38 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- If the flagged fault was reported for the driver air bag module:
  - Remove the steering wheel access door to access the driver air bag module electrical connector.
  - Disconnect the driver air bag module electrical connector.
  - Connect restraint system diagnostic tool 418-F403 to the driver air bag module squib connector.
- If the flagged fault was reported for the passenger air bag module:
  - Disconnect the passenger air bag module C256. Refer to **PASSENGER AIR BAG MODULE**.
  - For Escape/Mariner, connect restraint system diagnostic tool 418-F403 to passenger air bag module C256.
  - For Escape Hybrid, connect restraint system diagnostic tool 418-133 to passenger air bag module C256.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2293/Record All Flagged Faults.
- **Was the DTC B2293 retrieved during the on-demand self test?**

**Yes** : This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

CHECK for causes of the intermittent fault at or near the affected air bag module connector. REPAIR any intermittent concerns found.

If an intermittent concern **was** found and repaired, GO to K39.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

If an intermittent concern **was not** found and repaired, USE the flagged faults recorded and GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For driver air bag module squib 1 (D\_ABAG) with a short to ground (STG) fault, GO to K3.

For driver air bag module squib 1 (D\_ABAG) with a short to battery (STB) fault, GO to K5.

For driver air bag module squib 1 (D\_ABAG) with an open circuit (O\_CIR) fault, GO to K7.

For driver air bag module squib 1 (D\_ABAG) with a low resistance (LOWRES) fault, GO to K11.

For passenger air bag module squib 1 (P\_ABAG) with a short to ground (STG) fault, GO to K14.

For passenger air bag module squib 1 (P\_ABAG) with a short to battery (STB) fault, GO to K15.

For passenger air bag module squib 1 (P\_ABAG) with an open circuit (O\_CIR) fault, GO to K16.

For passenger air bag module squib 1 (P\_ABAG) with a low resistance (LOWRES) fault, GO to K18.

For driver air bag module squib 2 (D\_ABAG2) with a short to ground (STG) fault, GO to K20.

For driver air bag module squib 2 (D\_ABAG2) with a short to battery (STB) fault, GO to K22.

For driver air bag module squib 2 (D\_ABAG2) with an open circuit (O\_CIR) fault, GO to K24.

For driver air bag module squib 2 (D\_ABAG2) with a low resistance (LOWRES) fault, GO to K28.

For passenger air bag module squib 2 (P\_ABAG2) with a short to ground (STG) fault, GO to K31.

For passenger air bag module squib 2 (P\_ABAG2) with a short to battery (STB) fault, GO to K32.

For passenger air bag module squib 2 (P\_ABAG2) with an open circuit (O\_CIR) fault, GO to K33.

For passenger air bag module squib 2 (P\_ABAG2) with a low resistance (LOWRES) fault, GO to K35.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to K39.

### **K39 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step K1.
- **Were any continuous DTCs retrieved during Step K1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Pinpoint Test L: LFC 24 and 25/DTC B2294 - Restraint System Safety Canopy Module Status**

#### **Normal Operation**

The restraints control module (RCM) checks all safety canopy module circuits for faults. If the RCM detects one of the following faults on any of the safety canopy module circuits, it will store diagnostic trouble code (DTC) B2294 in memory and flash, depending on the fault, either lamp fault code (LFC) 24 or 25 (or higher priority code if one exists) on the air bag indicator.

#### **Fault Conditions**

The RCM monitors for the following fault conditions:

- Low resistance
- Circuit open
- Circuit short to voltage
- Circuit short to ground

**Possible Causes**

A safety canopy module status fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty safety canopy module.
- RCM is faulted.

**PINPOINT TEST L: LFC 24 AND 25/DTC B2294 - RESTRAINT SYSTEM SAFETY CANOPY MODULE STATUS**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**L1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag

equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag B2294/Record All Flagged Faults.
- Enter the following diagnostic mode on the scan tool: Retrieve/Flag/Record Continuous DTCs.
- **Was DTC B2294 retrieved during the on-demand self test?**

**Yes :** For vehicles with safety canopy modules:

This is a hard fault, the fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to L3.

**For vehicles without safety canopy modules:**

This is a hard fault, the fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to L2.

**No** : This is an intermittent fault. The fault condition is not present at this time.  
GO to L17.

## L2 CHECK THE SAFETY CANOPY MODULE BRIDGE RESISTOR

**NOTE:** Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: LH Safety Canopy Bridge Resistor.
- Install a known good safety canopy bridge resistor.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2294.
- **Was DTC B2294 retrieved during the on-demand self test?**

**Yes** : Using the flagged faults recorded in Step L1, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded in Step L1, multiple faults exist and the entire pinpoint test must be carried out.

For driver safety canopy module (DFCURTN) with a short to battery (STB) fault, GO to L4.

For driver safety canopy module (DFCURTN) with a short to ground (STG) fault, GO to L5.

For driver safety canopy module (DFCURTN) with an open circuit (O\_CIR) fault, GO to L6.

For driver safety canopy module (DFCURTN) with a low resistance (LOWRES) fault, GO to L8.

**No** : Fault corrected. GO to L18.

## L3 CHECK THE DRIVER AND PASSENGER SAFETY CANOPY MODULES

- Key in OFF position.

- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- If the flagged fault was reported for the driver safety canopy module:
  - Disconnect the driver safety canopy module C3055. Refer to **SAFETY CANOPY MODULE**.
  - Connect restraint system diagnostic tool 418-133 to the driver safety canopy module C3055.
- If the flagged fault was reported for the passenger safety canopy module:
  - Disconnect the passenger safety canopy module C3056. Refer to **SAFETY CANOPY MODULE**.
  - Connect restraint system diagnostic tool 418-133 to passenger safety canopy module C3056.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2294.
- **Was DTC B2294 retrieved during the on-demand self test?**  
**Yes** : Using the flagged faults recorded in Step L1, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded in Step L1, multiple faults exist and the entire pinpoint test must be carried out.

For driver safety canopy module (DFCURTN) with a short to battery (STB) fault, GO to L4.

For driver safety canopy module (DFCURTN) with a short to ground (STG) fault, GO to L5.

For driver safety canopy module (DFCURTN) with an open circuit (O\_CIR) fault, GO to L6.

For driver safety canopy module (DFCURTN) with a low resistance (LOWRES) fault, GO to L8.

For passenger safety canopy module (PFCURTN) with a short to battery (STB) fault, GO to L10.

For passenger safety canopy module (PFCURTN) with a short to ground (STG) fault, GO to L11.



For passenger safety canopy module (PFCURTN) with an open circuit (O\_CIR) fault, GO to L12.

For passenger safety canopy module (PFCURTN) with a low resistance (LOWRES) fault, GO to L14.

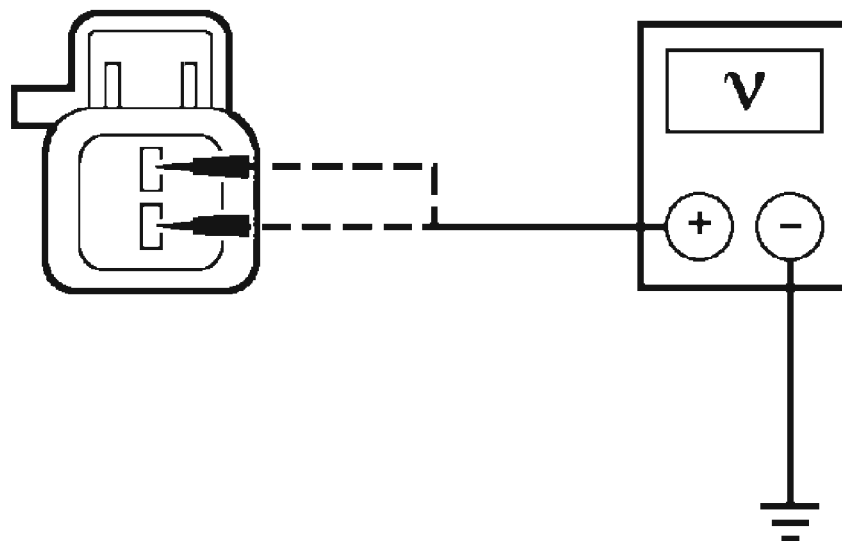
**No** : If a flagged fault of "?" was recorded in Step L1, multiple faults exist and the entire pinpoint test must be carried out.

If a fault was flagged against driver safety canopy module in Step L1, INSTALL a new driver safety canopy module. REFER to **SAFETY CANOPY MODULE**. GO to L18.

If a fault was flagged against passenger safety canopy module in Step L1, INSTALL a new passenger safety canopy module. REFER to **SAFETY CANOPY MODULE**. GO to L18.

#### **L4 CHECK CIRCUIT 1633 (BK/OG) AND CIRCUIT 1634 (RD/PK) FOR A SHORT TO BATTERY BETWEEN THE RCM AND THE DRIVER SAFETY CANOPY MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Side Safety Canopy Module Restraint System Diagnostic Tool (with Safety Canopy).
- Disconnect: LH Side Safety Canopy Bridge Resistor (without Safety Canopy).
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between driver side safety canopy module C3055 pin 1, circuit 1633 (BK/OG), harness side and ground; and between driver side safety canopy module C3055 pin 2, circuit 1634 (RD/PK), harness side and ground.



A0088573

**Fig. 105: Measuring Voltage Between Safety Canopy Module Connector Terminals And Ground**

Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

Yes : GO to L16.

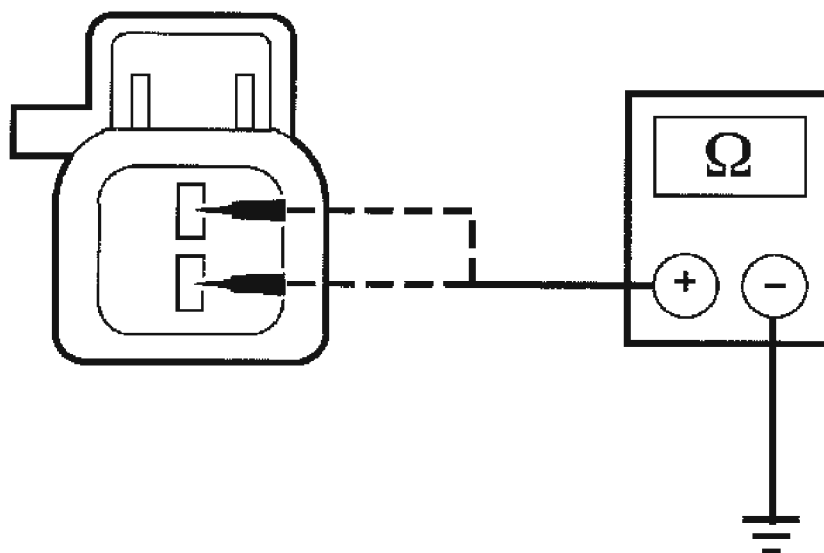
No : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit.

REPAIR circuit 1633 (BK/OG) or circuit 1634 (RD/PK). GO to L18.

**L5 CHECK CIRCUIT 1633 (BK/OG) AND CIRCUIT 1634 (RD/PK) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE DRIVER SAFETY CANOPY MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Canopy Module Restraint System Diagnostic Tool (with Safety Canopy).
- Disconnect: LH Side Safety Canopy Bridge Resistor (without Safety Canopy).
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between driver safety canopy module C3055 pin 1, circuit

1633 (BK/OG), harness side and ground; and between driver safety canopy module C3055 pin 2, circuit 1634 (RD/PK), harness side and ground.



A0090503

**Fig. 106: Measuring Resistance Between Driver Safety Canopy Module And Ground**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to L16.

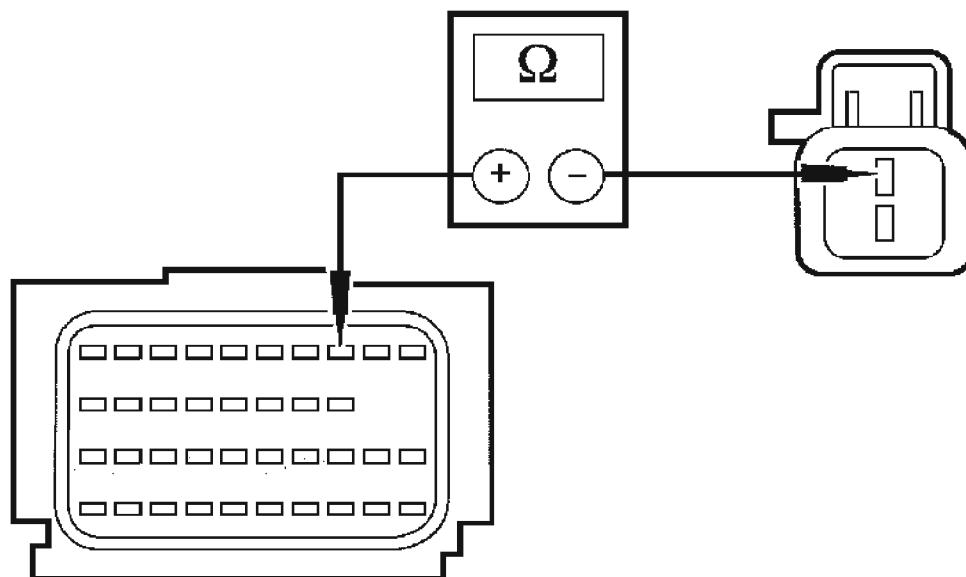
No : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit.

REPAIR circuit 1633 (BK/OG) or circuit 1634 (RD/PK). GO to L18.

#### **L6 CHECK CIRCUIT 1633 (BK/OG) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER SAFETY CANOPY MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Canopy Module Restraint System Diagnostic Tool (with Safety Canopy).
- Disconnect: LH Safety Canopy Module Bridge Resistor (without Safety Canopy).

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 3, circuit 1633 (BK/OG), harness side and driver safety canopy module C3055 pin 1, circuit 1633 (BK/OG), harness side.



A0088576

**Fig. 107: Measuring Resistance Between RCM And Driver Safety Canopy Module**

Courtesy of FORD MOTOR CO.

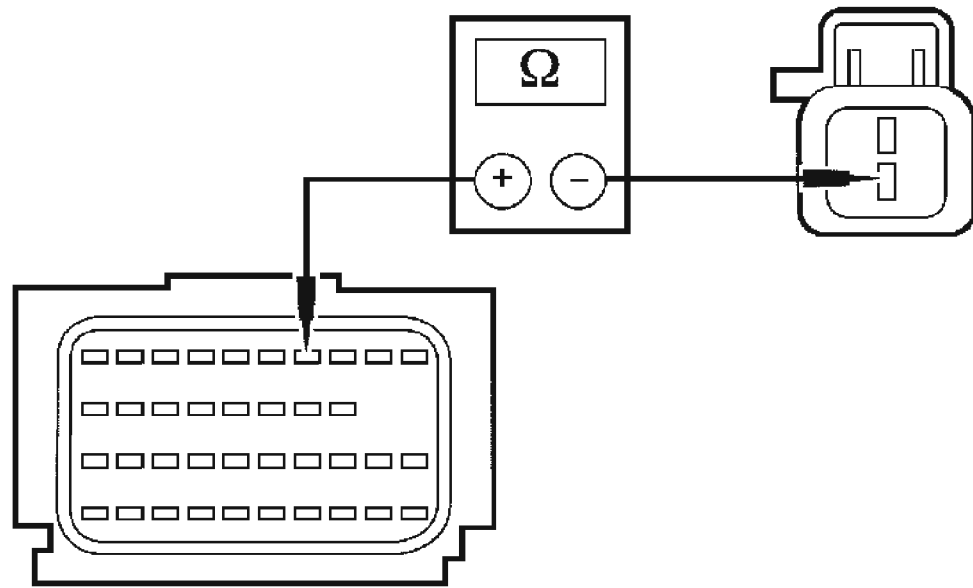
- **Is the resistance less than 0.5 ohm?**

**Yes :** GO to L7.

**No :** REPAIR circuit 1633 (BK/OG). GO to L18.

**L7 CHECK CIRCUIT 1634 (RD/PK) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER SAFETY CANOPY MODULE**

- Measure the resistance between RCM C2041b pin 4, circuit 1634 (RD/PK), harness side and driver safety canopy module C3055 pin 2, circuit 1634 (RD/PK), harness side.



A0088575

**Fig. 108: Measuring Resistance Between RCM And Driver Safety Canopy Module**

Courtesy of FORD MOTOR CO.

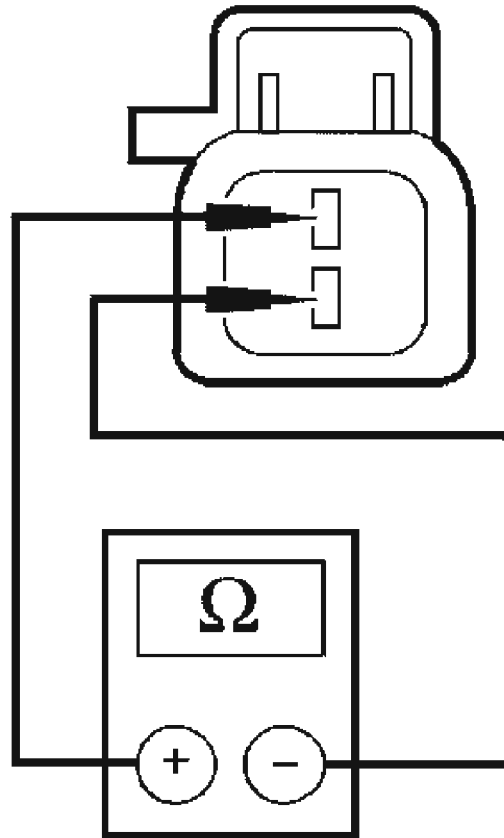
- Is the resistance less than 0.5 ohm?

Yes : GO to L16.

No : REPAIR circuit 1634 (RD/PK). GO to L18.

**L8 CHECK FOR LOW RESISTANCE ON CIRCUIT 1633 (BK/OG) AND CIRCUIT 1634 (RD/PK) BETWEEN THE DRIVER SAFETY CANOPY MODULE AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Canopy Module Restraint System Diagnostic Tool (with Safety Canopy).
- Disconnect: LH Side Safety Canopy Bridge Resistor (without Safety Canopy).
- Measure the resistance between driver side air curtain module C3055 circuit 1633 (BK/OG) and 1634 (RD/PK), harness side.



A0029887

**Fig. 109: Measuring Resistance Between Driver Side Air Curtain Module Connector Terminals**  
Courtesy of FORD MOTOR CO.

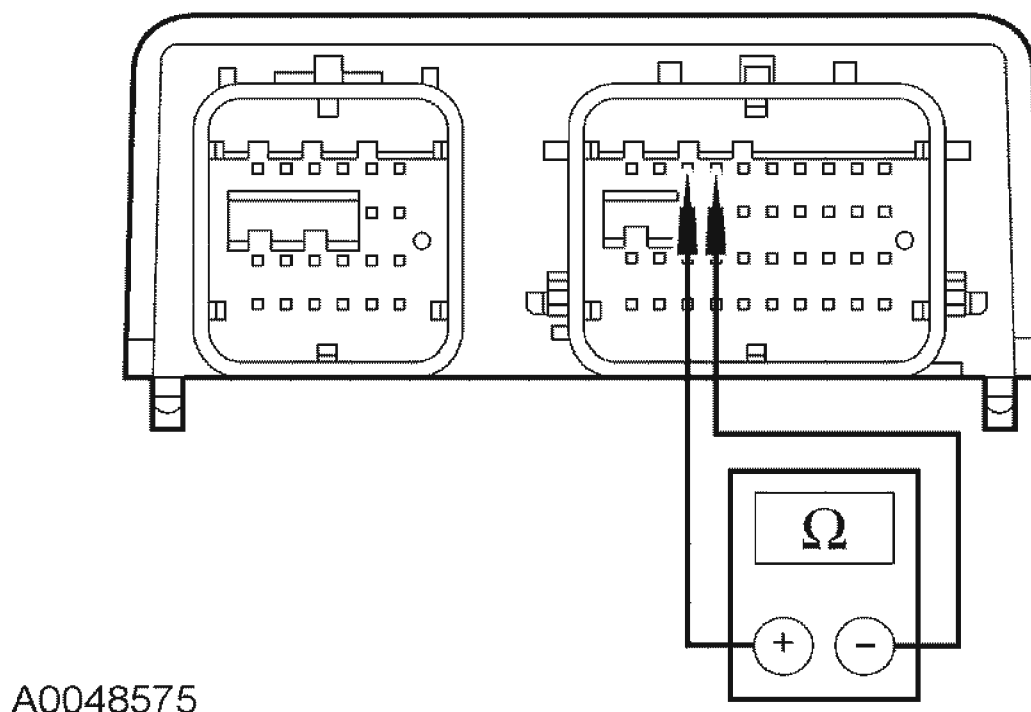
- Is the resistance greater than 10, 000 ohms?

Yes : GO to L16.

No : GO to L9.

**L9 MEASURE THE RESISTANCE BETWEEN RCM CIRCUIT 1633 (BK/OG)  
AND CIRCUIT 1634 (RD/PK)**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 3, circuit 1633 (BK/OG), and pin 4, circuit 1634 (RD/PK), component side.



**Fig. 110: Measuring Resistance Between RCM Connector Terminals**  
 Courtesy of FORD MOTOR CO.

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

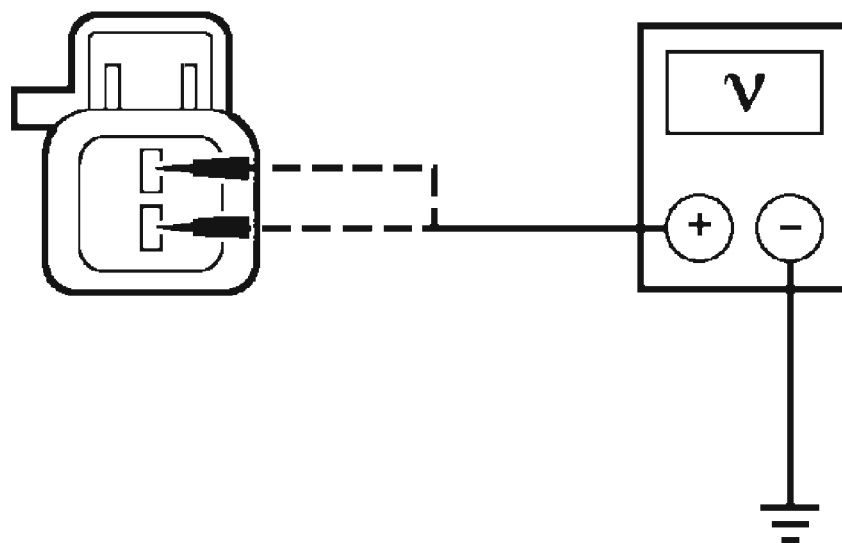
**Yes :** REPAIR circuit 1633 (BK/OG) and circuit 1634 (RD/PK). GO to L18.

**No :** GO to L16.

**L10 CHECK CIRCUIT 1635 (OG/LG) AND CIRCUIT 1636 (YE/BK) FOR A SHORT TO BATTERY BETWEEN THE RCM AND THE PASSENGER SAFETY CANOPY MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Canopy Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between passenger safety canopy module C3056 pin 1, circuit 1635 (OG/LG), harness side and ground; and between passenger safety

canopy module C3056 pin 2, circuit 1636 (YE/BK), harness side and ground.



A0088573

**Fig. 111: Measuring Voltage Between Passenger Safety Canopy Module Connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

Yes : GO to L16.

No : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit.

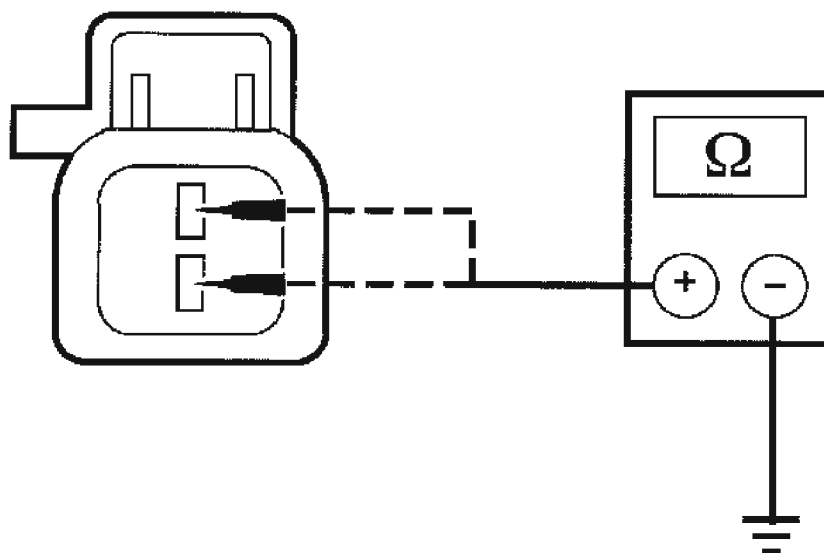
REPAIR circuit 1635 (OG/LG) or circuit 1636 (YE/BK). GO to L18.

### **L11 CHECK CIRCUIT 1635 (OG/LG) AND CIRCUIT 1636 (YE/BK) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE PASSENGER SAFETY CANOPY MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Canopy Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between passenger safety canopy module C3056 pin 1, circuit 1635 (OG/LG), harness side and ground; and between passenger safety



canopy module C3056 pin 2, circuit 1636 (YE/BK), harness side and ground.



A0090503

**Fig. 112: Measuring Resistance Between Passenger Safety Canopy Module And Ground**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

**Yes :** GO to L16.

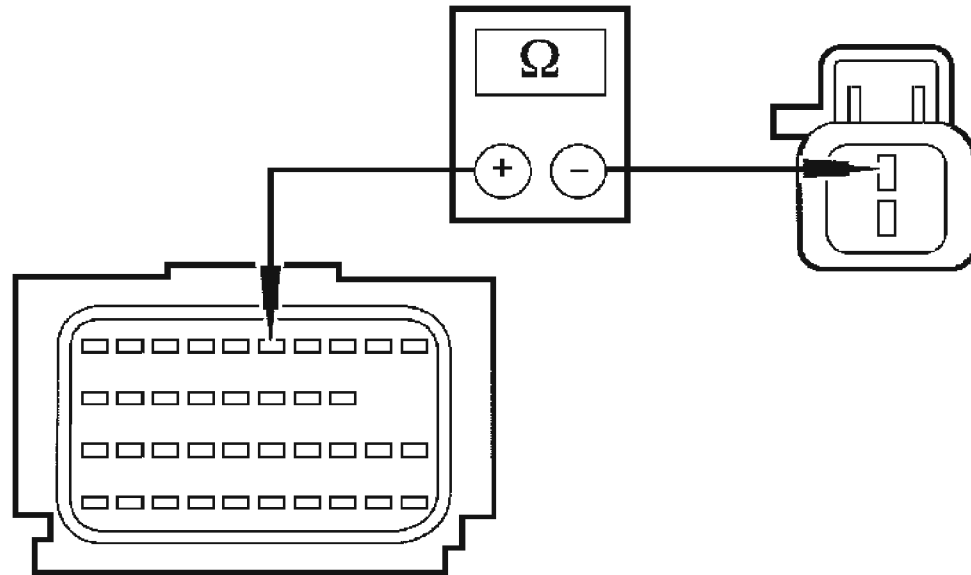
**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit.

REPAIR circuit 1635 (OG/LG) or circuit 1636 (YE/BK). GO to L18.

## **L12 CHECK CIRCUIT 1635 (OG/LG) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER SAFETY CANOPY MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Canopy Module Restraint System Diagnostic Tool.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 5, circuit 1635 (OG/LG), harness side and passenger safety canopy module C3056 pin 1, circuit 1635

(OG/LG), harness side.



A0088588

**Fig. 113: Measuring Resistance Between RCM And Passenger Safety Canopy Module**

Courtesy of FORD MOTOR CO.

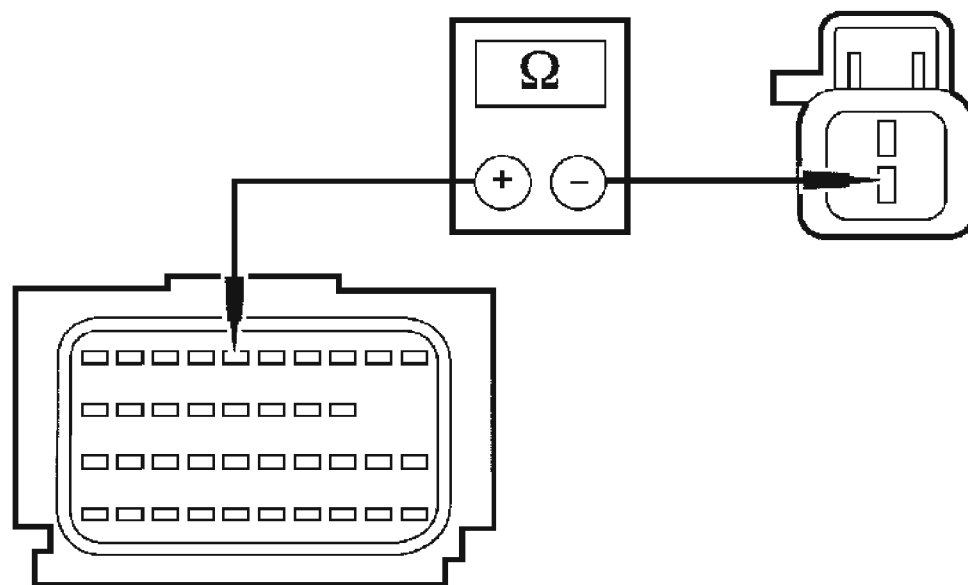
- Is the resistance less than 0.5 ohm?

Yes : GO to L13.

No : REPAIR circuit 1635 (OG/LG). GO to L18.

**L13 CHECK CIRCUIT 1636 (YE/BK) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER SAFETY CANOPY MODULE**

- Measure the resistance between RCM C2041b pin 6, circuit 1636 (YE/BK), harness side and passenger safety canopy module C3056 pin 2, circuit 1636 (YE/BK), harness side.



A0088589

**Fig. 114: Measuring Resistance Between RCM And Passenger Safety Canopy Module**

Courtesy of FORD MOTOR CO.

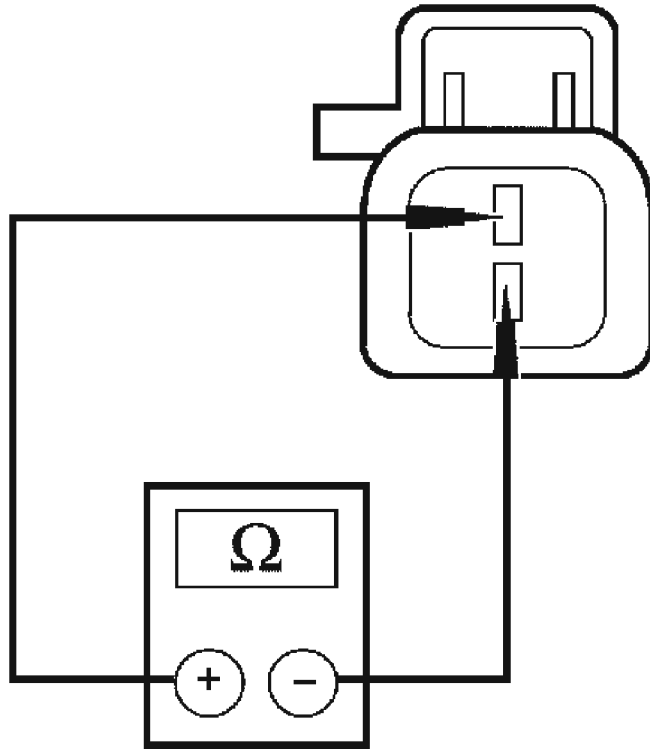
- Is the resistance less than 0.5 ohm?

Yes : GO to L16.

No : REPAIR circuit 1636 (YE/BK). GO to L18.

**L14 CHECK FOR LOW RESISTANCE ON CIRCUIT 1635 (OG/LG) AND CIRCUIT 1636 (YE/BK) BETWEEN THE PASSENGER SAFETY CANOPY MODULE AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Safety Canopy Module Restraint System Diagnostic Tool.
- Measure the resistance between passenger safety canopy module C3056 pin 1, circuit 1635 (OG/LG), and pin 2, circuit 1636 (YE/BK), harness side.



A0015714

**Fig. 115: Measuring Resistance Between Passenger Safety Canopy Module Pins 1 & 2**

Courtesy of FORD MOTOR CO.

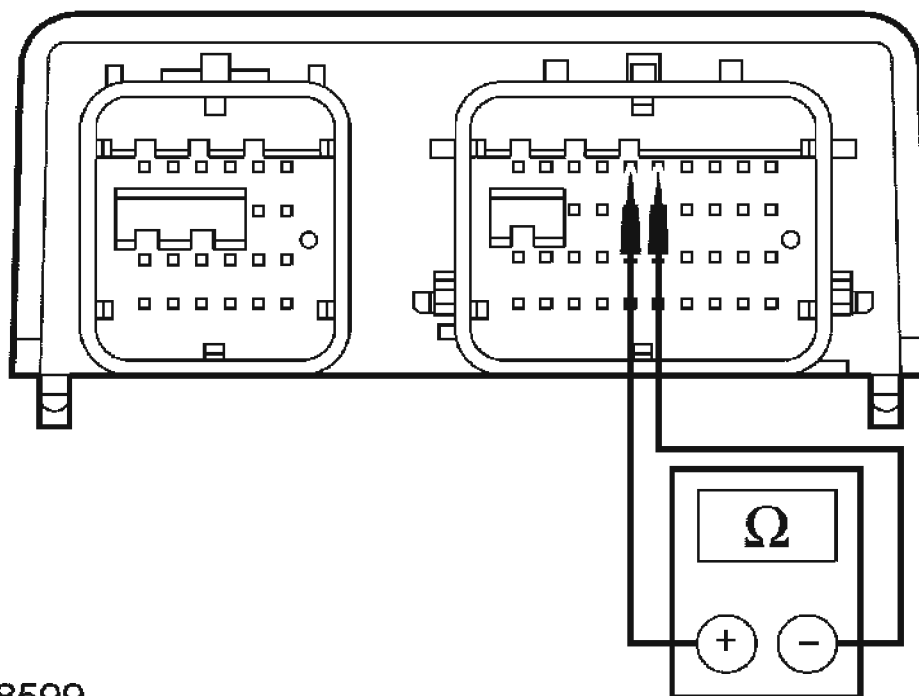
- Is the resistance greater than 10,000 ohms?

Yes : GO to L16.

No : GO to L15.

**L15 MEASURE THE RESISTANCE BETWEEN RCM CIRCUIT 1635 (OG/LG) AND CIRCUIT 1636 (YE/BK)**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 5, circuit 1635 (OG/LG), and pin 6, circuit 1636 (YE/BK), component side.



A0048599

**Fig. 116: Measuring Resistance Between RCM Connector Terminals 5 & 6**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

Yes : REPAIR circuit 1635 (OG/LG) and circuit 1636 (YE/BK). GO to L18.

No : GO to L16.

#### L16 CONFIRM THE RCM FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: Restraint System Diagnostic Tools (with Safety Canopy).
- Connect: LH Side Safety Canopy Bridge Resistor (without Safety Canopy).
- Connect: RCM C2041a and C2041b.
- Repower the system. **Do not** prove out the system at this time. Refer to

**SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2294 retrieved during the on-demand self test?**  
**Yes :** If a "?" was flagged by the diagnostic tool, CARRY OUT the entire pinpoint test.

INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to L18.

**No :** CHECK for causes of the intermittent fault at or near the affected side air curtain module connector. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to L18.

**L17 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- If the flagged fault was reported for the driver safety canopy module:
  - Disconnect the driver safety canopy module C3055. Refer to **SAFETY CANOPY MODULE.**
  - Connect restraint system diagnostic tool 418-133 to the driver safety canopy module C3055.
- If the flagged fault was reported for the passenger safety canopy module:
  - Disconnect the passenger safety canopy module C3056. Refer to **SAFETY CANOPY MODULE.**
  - Connect restraint system diagnostic tool 418-133 to passenger safety canopy module C3056.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2294/Record All Flagged Faults.
- **Was DTC B2294 retrieved during the on-demand self test?**  
**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

CHECK for causes of the intermittent fault at or near the affected side air curtain

module connector. REPAIR any intermittent concerns found.

If an intermittent concern **was** found and repaired, GO to L18.

If an intermittent concern **was not** found and repaired, USE the flagged faults recorded and GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For driver safety canopy module (DFCURTN) with a short to battery (STB) fault, GO to L4.

For driver safety canopy module (DFCURTN) with a short to ground (STG) fault, GO to L5.

For driver safety canopy module (DFCURTN) with an open circuit (O\_CIR) fault, GO to L6.

For driver safety canopy module (DFCURTN) with a low resistance (LOWRES) fault, GO to L8.

For passenger safety canopy module (PFCURTN) with a short to battery (STB) fault, GO to L10.

For passenger safety canopy module (PFCURTN) with a short to ground (STG) fault, GO to L11.

For passenger safety canopy module (PFCURTN) with an open circuit (O\_CIR) fault, GO to L12.

For passenger safety canopy module (PFCURTN) with a low resistance (LOWRES) fault, GO to L14.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to L18.

## **L18 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step L1.
- **Were any continuous DTCs retrieved during Step L1 ?**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system,

REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test M: LFC 22 or 23/ DTC B2295 - Restraint System - Side Air Bag Fault**

#### Normal Operation

**NOTE:** Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.

A seat side air bag module provides protection of the thorax area (between the neck and abdomen) of the body, working in conjunction with the head protection provided by a safety canopy module. Only late build vehicles equipped with safety canopy modules are equipped with seat side air bag modules. Refer to **AIR BAG AND SAFETY BELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**.

The restraints control module (RCM) checks all of the seat side air bag circuits for faults. If the RCM detects one of the following faults on any of the seat side air bag circuits, it will store diagnostic trouble code (DTC) B2295 in memory and, depending on the fault, flash a lamp fault code (LFC) 22 or 23 on the air bag indicator.

#### Fault Conditions

The RCM monitors for the following fault conditions:

- Low resistance
- High resistance or circuit open
- Circuit short to battery
- Circuit short to ground

#### Possible Causes

A seat side air bag status fault can be caused by:

- wiring, terminals or connectors.
- a faulted seat side air bag bridge resistor.
- a faulted seat side air bag module.
- a faulted RCM.

**PINPOINT TEST M: DTC B2295 - RESTRAINT SYSTEM - SIDE AIR BAG FAULT**



**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

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

#### M1 CHECK FOR ON-DEMAND AND CONTINUOUS DTCs

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: DTC B2295/Record All Flagged Faults.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record/Flag Continuous DTCs.
- **Was DTC B2295 retrieved during the on-demand self test?**

**Yes :** Vehicles with seat side air bag modules

This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to M3.

### **Vehicles without seat side air bag modules**

This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to M2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to M17.

## **M2 CHECK THE SEAT SIDE AIR BAG MODULE BRIDGE RESISTORS**

**NOTE:** Depending on the vehicle build date, some vehicles that are not equipped with the side impact protection safety package (safety canopies and side air bags) option may or may not be equipped with bridge resistor(s) and the associated wiring.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver and Passenger Seat Side Air Bag Bridge Resistors.
- Transfer the driver seat side air bag bridge resistor to the passenger side and the

passenger seat side air bag bridge resistor to the driver side.

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2294/Record All Flagged Faults.
- **Did the flagged fault transfer between the driver side (DFSIDE) and the passenger side (PFSIDE)?**

**Yes** : INSTALL a new seat side air bag bridge resistor. GO to M18.

**No** : Using the flagged faults recorded in Step M1, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded in Step M1, multiple faults exist and the entire pinpoint test must be carried out.

For driver seat side air bag module (DFSIDE) with a short to battery (STB) fault, GO to M4.

For driver seat side air bag module (DFSIDE) with a short to ground (STG) fault, GO to M5.

For driver seat side air bag module (DFSIDE) with an open circuit (O\_CIR) fault, GO to M6.

For driver seat side air bag module (DFSIDE) with a low resistance (LOWRES) fault, GO to M8.

For passenger seat side air bag module (PFSIDE) with a short to battery (STB) fault, GO to M10.

For passenger seat side air bag module (PFSIDE) with a short to ground (STG) fault, GO to M11.

For passenger seat side air bag module (PFSIDE) with an open circuit (O\_CIR) fault, GO to M12.

For passenger seat side air bag module (PFSIDE) with a low resistance (LOWRES) fault, GO to M14.

### **M3 CHECK THE DRIVER AND PASSENGER SEAT SIDE AIR BAG MODULES**

- Key in OFF position.

- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- If the flagged fault was reported for the driver seat side air bag module:
  - Disconnect the driver seat side air bag module C367.
  - Connect restraint system diagnostic tool 418-133 to driver seat side air bag module C367.
- If the flagged fault was flagged for the passenger seat side air bag module:
  - Disconnect the passenger seat side air bag module C337.
  - Connect restraint system diagnostic tool 418-133 to passenger seat side air bag module C337.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2295/Record All Flagged Faults.
- **Was DTC B2295 retrieved during the on-demand self test?**  
**Yes :** Using the flagged faults recorded in Step M1, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded in Step M1, multiple faults exist and the entire pinpoint test must be carried out.

For driver seat side air bag module (DFSIDE) with a short to battery (STB) fault, GO to M4.

For driver seat side air bag module (DFSIDE) with a short to ground (STG) fault, GO to M5.

For driver seat side air bag module (DFSIDE) with an open circuit (O\_CIR) fault, GO to M6.

For driver seat side air bag module (DFSIDE) with a low resistance (LOWRES) fault, GO to M8.

For passenger seat side air bag module (PFSIDE) with a short to battery (STB) fault, GO to M10.

For passenger seat side air bag module (PFSIDE) with a short to ground (STG) fault, GO to M11.

For passenger seat side air bag module (PFSIDE) with an open circuit (O\_CIR)

fault, GO to M12.

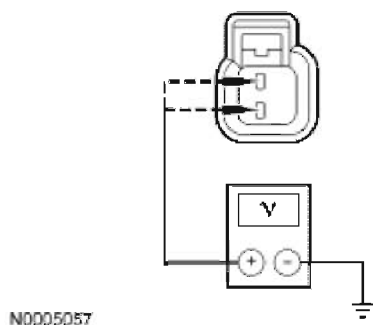
For passenger seat side air bag module (PFSIDE) with a low resistance (LOWRES) fault, GO to M14.

**No** : If a fault was flagged against the driver seat side air bag module in Step M1, INSTALL a new driver seat side air bag module. REFER to **SIDE AIR BAG MODULE**. GO to M18.

If a fault was flagged against the passenger seat side air bag module in Step M1, INSTALL a new passenger seat side air bag module. REFER to **SIDE AIR BAG MODULE**. GO to M18.

#### **M4 CHECK CIRCUITS 1257 (WH/LB) AND 1258 (RD) FOR A SHORT TO BATTERY BETWEEN THE RCM AND THE DRIVER SEAT SIDE AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).
- Disconnect: Driver Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Disconnect: RCM C2041a and C2041b.
- Key in ON position.
- Measure the voltage between driver side air bag module C367 pin 1, circuit 1257 (WH/LB), harness side and ground; and between driver side air bag module C367 pin 2, circuit 1258 (RD), harness side and ground.



**Fig. 117: Measuring Voltage Between Connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

- **Are the voltages less than 0.2 volt?**

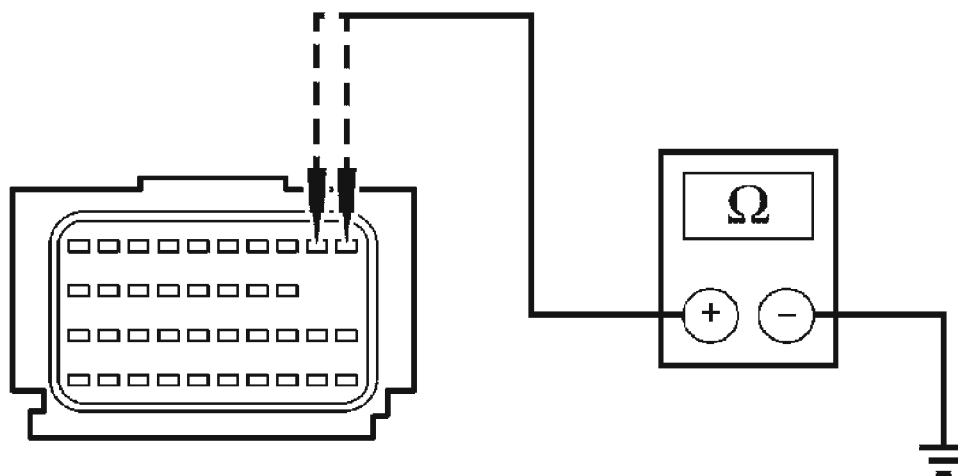
**Yes** : GO to M16.

**No** : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bars.

REPAIR circuit 1257 (WH/LB) or 1258 (RD). GO to M18.

### **M5 CHECK CIRCUITS 1257 (WH/LB) AND 1258 (RD) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE DRIVER SEAT SIDE AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).
- Disconnect: Driver Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 1, circuit 1257 (WH/LB), harness side and ground; and between RCM C2041b pin 2, circuit 1258 (RD), harness side and ground.



A0041283

**Fig. 118: Measuring Resistance Between RCM And Ground**  
Courtesy of FORD MOTOR CO.

- Are the resistances greater than 10,000 ohms?

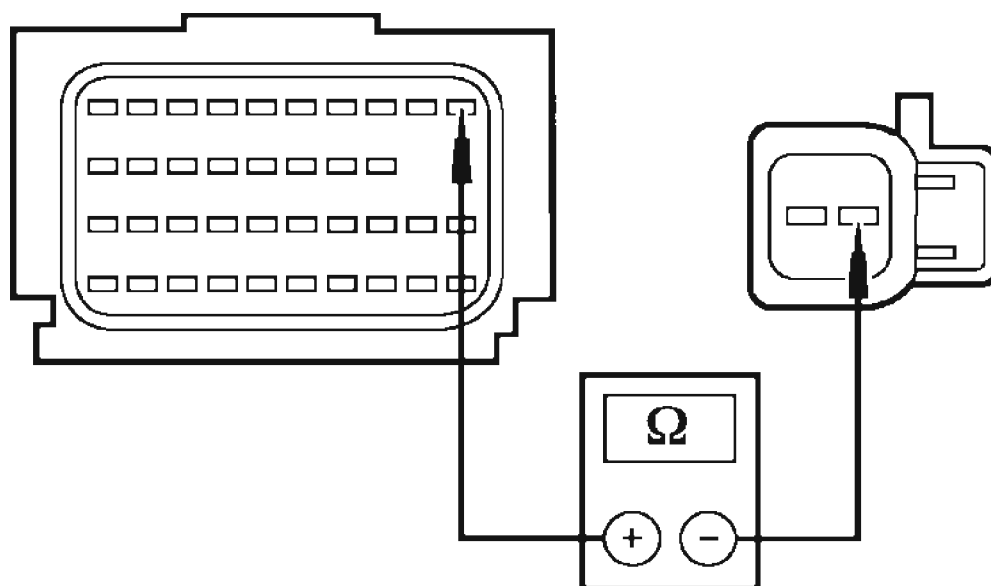
**Yes** : GO to M16.

**No** : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bars.

REPAIR circuit 1257 (WH/LB) or 1258 (RD). GO to M18.

#### **M6 CHECK CIRCUIT 1257 (WH/LB) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER SEAT SIDE AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).
- Disconnect: Driver Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 1, circuit 1257 (WH/LB), harness side and driver seat side air bag module C367 pin 1, circuit 1257 (WH/LB), harness side.



A0075116

**Fig. 119: Measuring Resistance Between RCM And Driver Seat Side Air Bag Module**

Courtesy of FORD MOTOR CO.

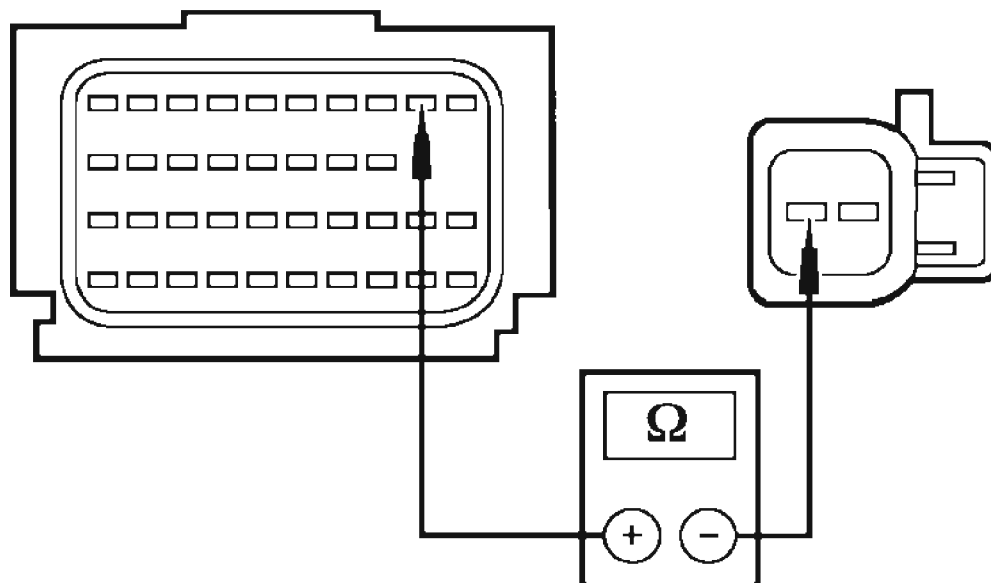
- Is the resistance less than 0.5 ohm?

Yes : GO to M7.

No : REPAIR circuit 1257 (WH/LB). GO to M18.

#### **M7 CHECK CIRCUIT 1258 (RD) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER SEAT SIDE AIR BAG MODULE**

- Measure the resistance between RCM C2041b pin 2, circuit 1258 (RD), harness side and driver seat side air bag module C367 pin 2, circuit 1258 (RD), harness side.



A0075117

**Fig. 120: Measuring Resistance Between RCM And Driver Seat Side Air Bag Module**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

Yes : GO to M16.

No : REPAIR circuit 1258 (RD). GO to M18.

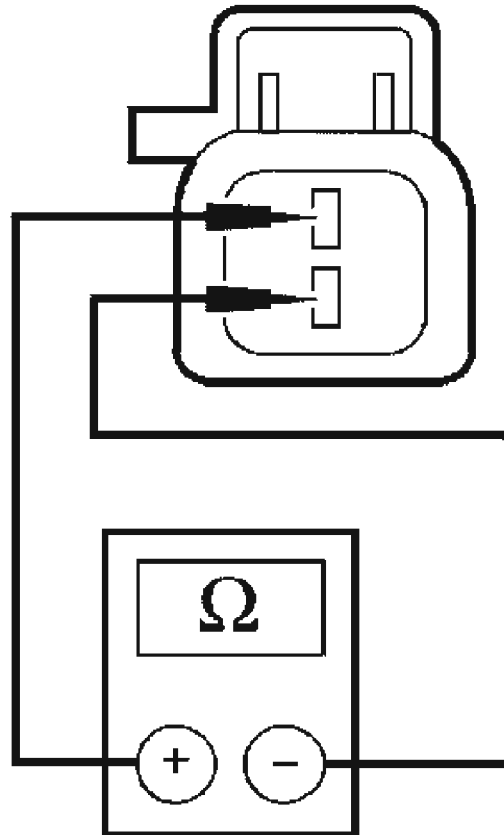
#### **M8 CHECK FOR LOW RESISTANCE ON CIRCUITS 1257 (WH/LB) AND 1258 (RD) BETWEEN THE DRIVER SEAT SIDE AIR BAG MODULE AND RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Seat Side Air Bag Module Restraint System Diagnostic Tool



(Vehicles With Seat Side Air Bags).

- Disconnect: Driver Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Measure the resistance between driver seat side air bag module C367 pin 1, circuit 1257 (WH/LB), harness side and pin 2, circuit 1258 (RD), harness side.



A0029887

**Fig. 121: Measuring Resistance Between Air Bag Connector Terminals**  
Courtesy of FORD MOTOR CO.

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

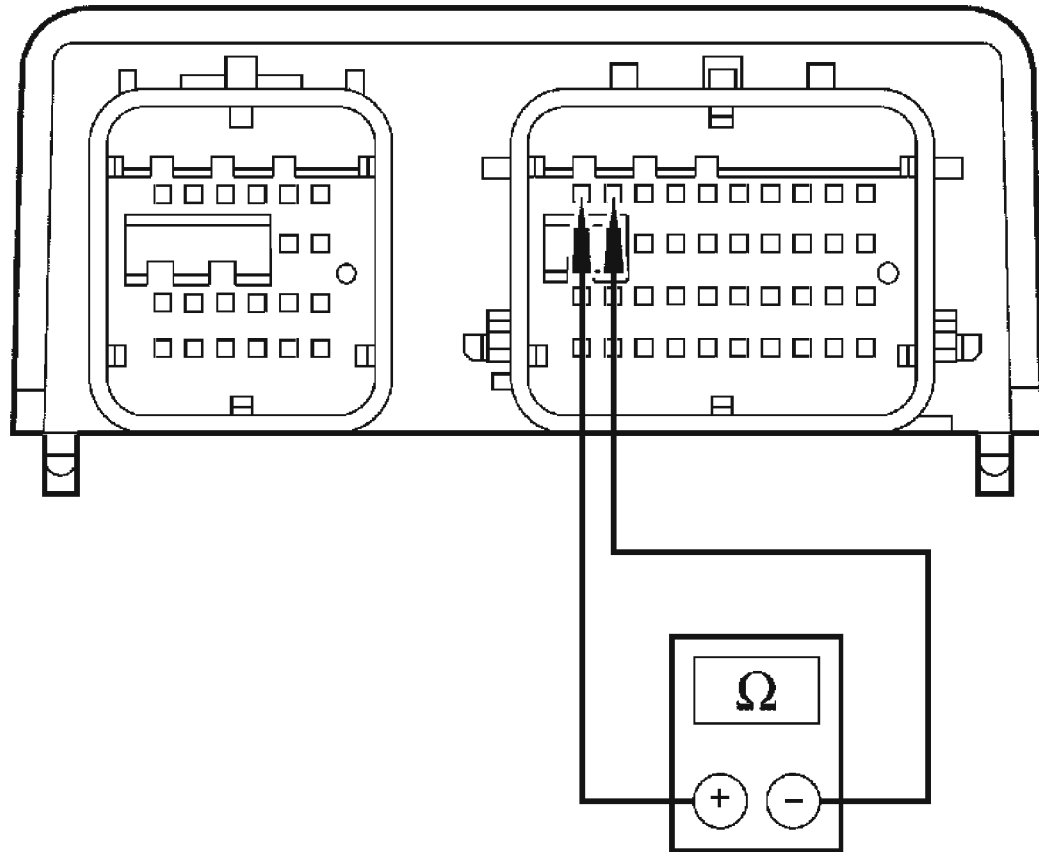
**Yes :** GO to M16.

**No :** GO to M9.

**M9 CHECK FOR LOW RESISTANCE BETWEEN RCM PINS 1 AND 2**

- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 1, component side and pin 2,

component side.



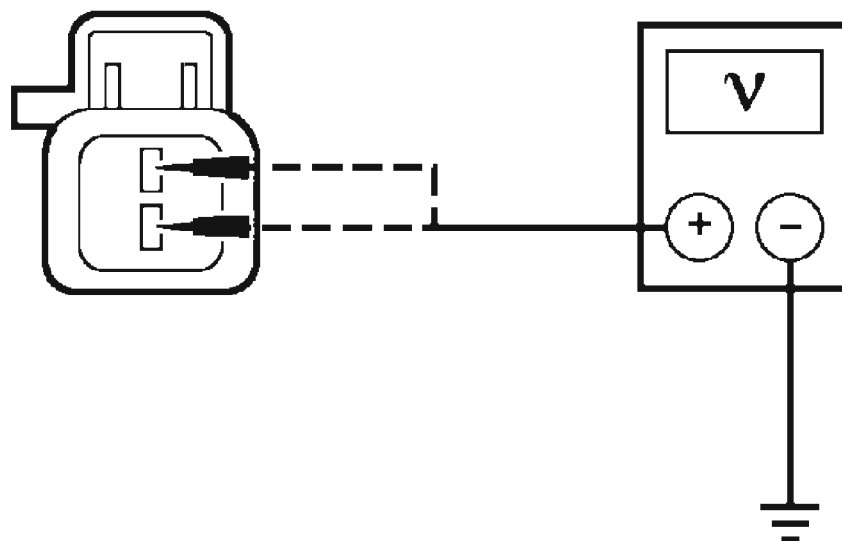
A0041286

**Fig. 122: Measuring Resistance Of RCM**  
Courtesy of FORD MOTOR CO.

- **Is the resistance greater than 10,000 ohms?**  
Yes : REPAIR circuit 1257 (WH/LB) and circuit 1258 (RD). GO to M18.  
No : GO to M16.

**M10 CHECK CIRCUITS 1259 (WH/YE) AND 1260 (BN/YE) FOR A SHORT TO BATTERY BETWEEN THE RCM AND THE PASSENGER SEAT SIDE AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).
- Disconnect: Passenger Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Disconnect: RCM C2041a and C2041b.
- Key in ON position.
- Measure the voltage between passenger side air bag module C337 pin 1, circuit 1259 (WH/YE), harness side and ground; and between passenger side air bag module C337 pin 2, circuit 1260 (BN/YE), harness side and ground.



A0088573

**Fig. 123: Measuring Voltage Between Connector Passenger Side Air Bag Module Terminals And Ground**  
 Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

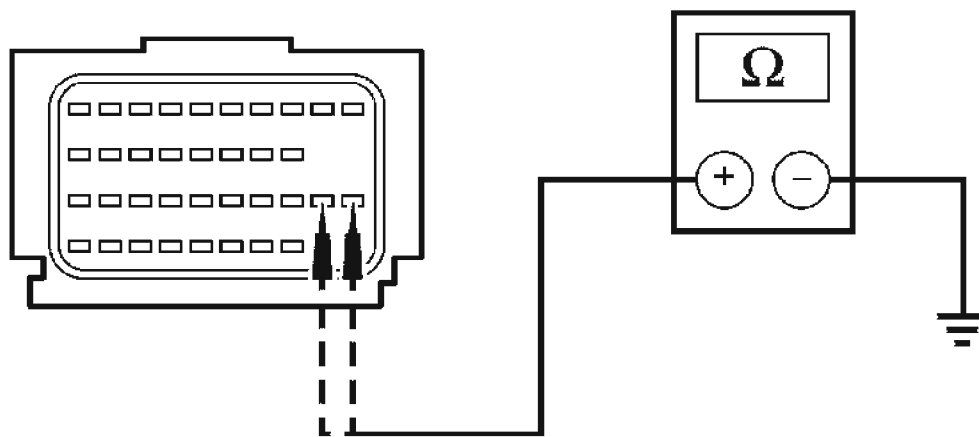
Yes : GO to M16.

No : Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bars.

REPAIR circuit 1259 (WH/YE) or circuit 1260 (BN/YE). GO to M18.

**M11 CHECK CIRCUITS 1259 (WH/YE) AND 1260 (BN/YE) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE PASSENGER SEAT SIDE AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).
- Disconnect: Passenger Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 21, circuit 1259 (WH/YE), harness side and ground; and between RCM C2041b pin 22, circuit 1260 (BN/YE), harness side and ground.



A0041288

**Fig. 124: Measuring Resistance Between RCM And Ground**  
Courtesy of FORD MOTOR CO.

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

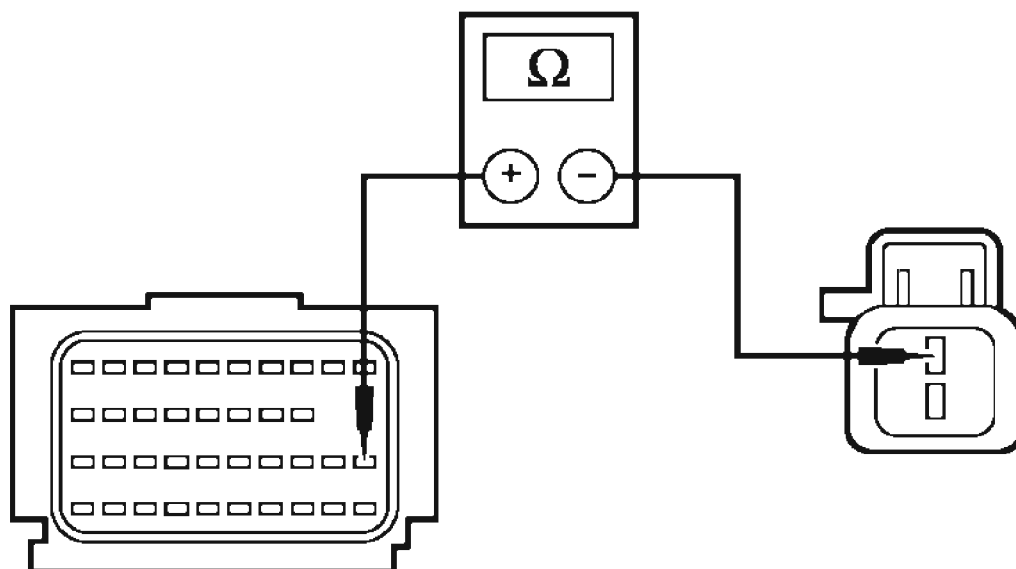
**Yes :** GO to M16.

**No :** Due to the shorting bar feature in the electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bars.

REPAIR circuit 1259 (WH/YE) or circuit 1260 (BN/YE). GO to M18.

**M12 CHECK CIRCUIT 1259 (WH/YE) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER SEAT SIDE AIR BAG MODULE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).
- Disconnect: Passenger Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041b pin 21, circuit 1259 (WH/YE), harness side and passenger seat side air bag module C337 pin 1, circuit 1259 (WH/YE), harness side.



N0003201

**Fig. 125: Measuring Resistance Between RCM And Passenger Seat Side Air Bag Module**

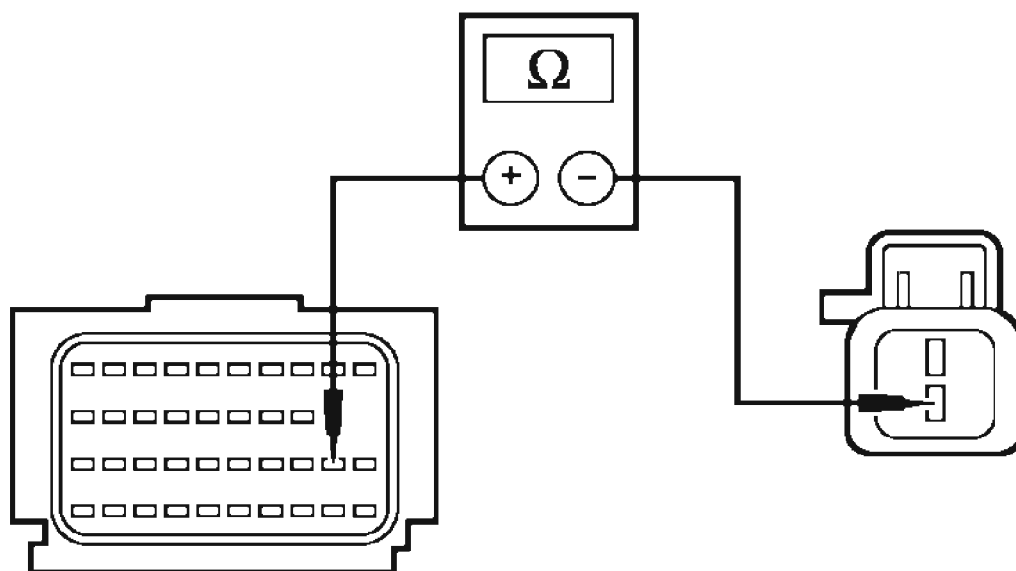
Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?  
Yes : GO to M13.

No : REPAIR circuit 1259 (WH/YE). GO to M18.

**M13 CHECK CIRCUIT 1260 (BN/YE) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER SEAT SIDE AIR BAG MODULE**

- Measure the resistance between RCM C2041b pin 22, circuit 1260 (BN/YE), harness side and passenger seat side air bag module C337 pin 2, circuit 1260 (BN/YE), harness side.



N0003202

**Fig. 126: Measuring Resistance Between RCM And Passenger Seat Side Air Bag Module**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

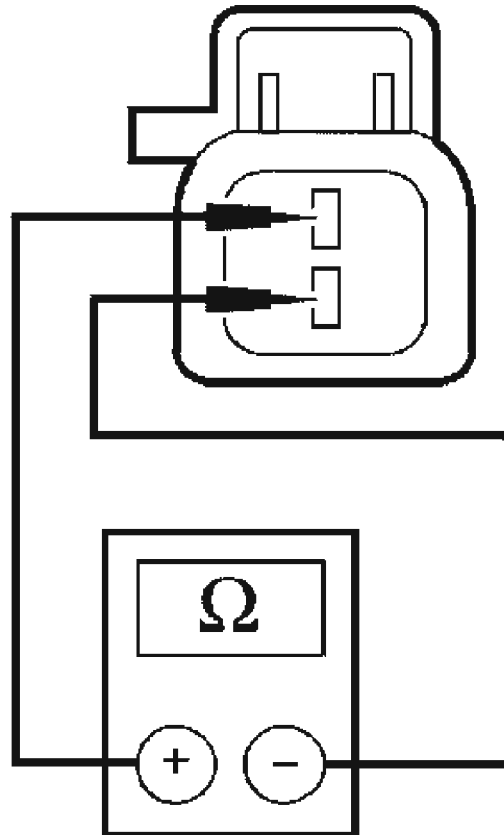
Yes : GO to M16.

No : REPAIR circuit 1260 (BN/YE). GO to M18.

**M14 CHECK FOR LOW RESISTANCE ON CIRCUITS 1259 (WH/YE) AND 1260 (BN/YE) BETWEEN THE PASSENGER SEAT SIDE AIR BAG MODULE AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Passenger Seat Side Air Bag Module Restraint System Diagnostic Tool (Vehicles With Seat Side Air Bags).

- Disconnect: Passenger Seat Side Air Bag Bridge Resistor (Vehicles Without Seat Side Air Bags).
- Measure the resistance between passenger seat side air bag module C337 pin 1, circuit 1259 (WH/YE), harness side and pin 2, circuit 1260 (BN/YE), harness side.

**A0029887**

**Fig. 127: Measuring Resistance Between Air Bag Connector Terminals**  
Courtesy of FORD MOTOR CO.

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

**Yes :** GO to M16.

**No :** GO to M15.

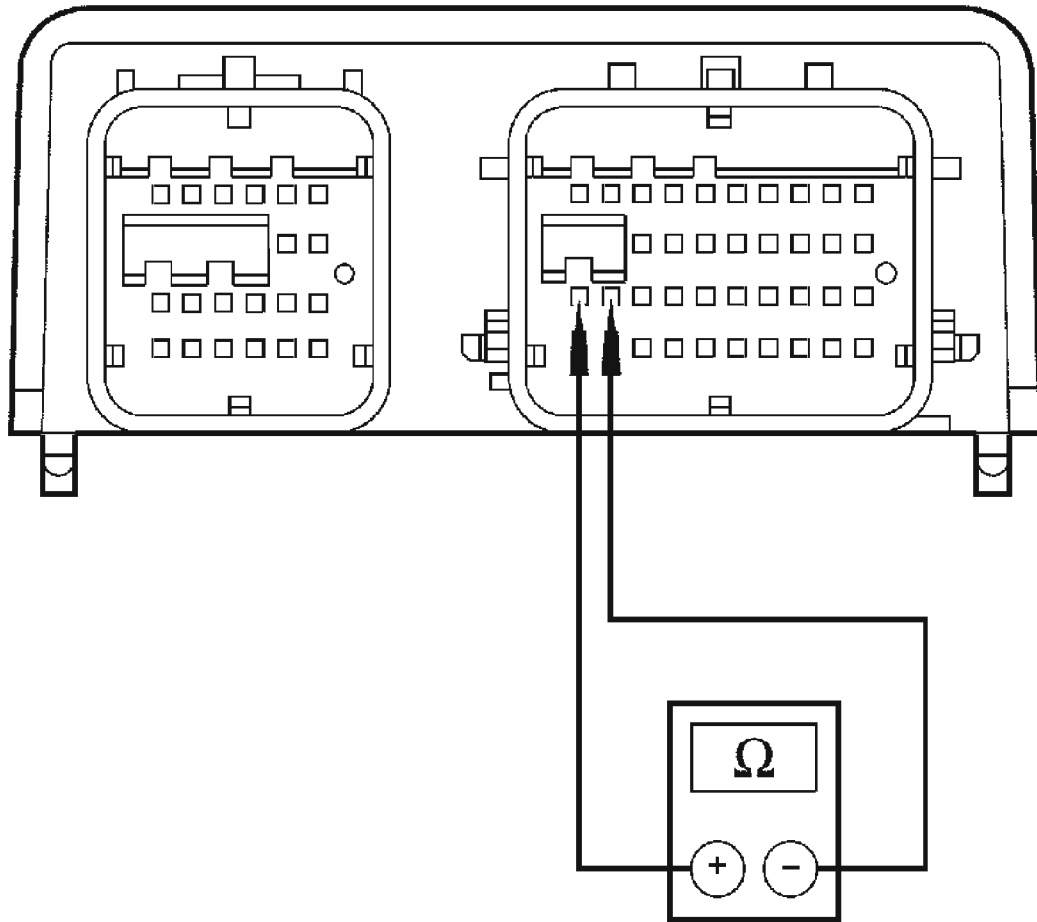
**M15 CHECK FOR LOW RESISTANCE BETWEEN RCM CIRCUITS 1259 (WH/YE) AND 1260 (BN/YE)**

- Disconnect: RCM C2041a and C2041b.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

- Measure the resistance between RCM C2041b pin 21, circuit 1259 (WH/YE), component side and pin 22, circuit 1260 (BN/YE), component side.



A0041291

**Fig. 128: Measuring Resistance Of Passenger Seat Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

- **Is the resistance greater than 10,000 ohms?**  
**Yes :** REPAIR circuit 1259 (WH/YE) and circuit 1260 (BN/YE). GO to M18.  
**No :** GO to M16.

**M16 CONFIRM THE RCM FAULT**



**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connectors are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: Restraint System Diagnostic Tools (Vehicles With Seat Side Air Bags).
- Connect: Seat Side Air Bag Bridge Resistors (Vehicles Without Seat Side Air Bags).
- Connect: RCM C2041a and C2041b.
- Repower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2295/Record All Flagged Faults.
- **Was DTC B2295 retrieved during the on-demand self test?**  
**Yes :** If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to M18.

**No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to M18.

#### **M17 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- If the flagged fault was reported for the driver seat side air bag module:
  - Disconnect the driver seat side air bag module C367.
  - Connect restraint system diagnostic tool 418-133 to driver seat side air bag module C367.
- If the flagged fault was flagged for the passenger seat side air bag module:
  - Disconnect the passenger seat side air bag module C337.
  - Connect restraint system diagnostic tool 418-133 to passenger seat side air bag module C337.

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2295/Record All Flagged Faults.
- **Was DTC B2295 retrieved during the on-demand self test?**  
**Yes** : This is a hard fault. The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. CHECK for causes of the intermittent fault at or near the affected seat side air bag module connector. REPAIR any intermittent concerns found.

If an intermittent concern **was** found and repaired, GO to M18.

If an intermittent concern **was not** found and repaired, USE the flagged faults recorded and GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For driver seat side air bag module (DFSIDE) with a short to battery (STB) fault, GO to M4.

For driver seat side air bag module (DFSIDE) with a short to ground (STG) fault, GO to M5.

For driver seat side air bag module (DFSIDE) with an open circuit (O\_CIR) fault, GO to M6.

For driver seat side air bag module (DFSIDE) with a low resistance (LOWRES) fault, GO to M8.

For passenger seat side air bag module (PFSIDE) with a short to battery (STB) fault, GO to M10.

For passenger seat side air bag module (PFSIDE) with a short to ground (STG) fault, GO to M11.

For passenger seat side air bag module (PFSIDE) with an open circuit (O\_CIR) fault, GO to M12.

For passenger seat side air bag module (PFSIDE) with a low resistance (LOWRES) fault, GO to M14.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently.

ACTIVATE others systems in the same wire harness. REPAIR any intermittent concerns found. GO to M18.

### **M18 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step M1.
- **Were any continuous DTCs retrieved during Step M1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) PRIORITY TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Pinpoint Test N: LFC 42, 43, 44, 45 and 46/DTC B2296 - Restraint System Impact Sensor Status**

#### **Normal Operation**

The restraints control module (RCM) checks all of the impact sensor circuits for faults. If the RCM detects one of the following faults on any of the impact sensor circuits, it will store diagnostic trouble code (DTC) B2296 in memory and flash, depending on the fault, either lamp fault code (LFC) 42, 43, 44, 45 or 46 (or higher priority code if one exists) on the air bag indicator.

#### **Fault Conditions**

The RCM monitors for the following fault conditions:

- Low resistance
- Circuit open
- Circuit short to voltage
- Circuit short to ground

#### **Possible Causes**

A impact sensor status fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty impact sensor.
- incorrect sensor mounting.

- RCM is faulted.

**PINPOINT TEST N: LFC 42, 43, 44, 45 AND 46/DTC B2296 - RESTRAINT SYSTEM IMPACT SENSOR STATUS**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### **N1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296/Record All Flagged Faults.
- Enter the following diagnostic mode on the scan tool: Retrieve/Flag /Record Continuous DTCs.
- **Was DTC B2296 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For first row driver side impact (F\_D\_SEN) sensor with a mounting/communications (COMM) fault, GO to N2.

For first row driver side impact sensor (F\_D\_SEN) with an internal (INT) fault, INSTALL a new first row driver side impact sensor. REFER to **SIDE IMPACT SENSOR - FIRST ROW, B-PILLAR**. GO to N54.

For first row passenger side impact sensor (F\_P\_SEN) with a mounting/communications (COMM) fault, GO to N12.

For first row passenger side impact sensor (F\_P\_SEN) with an internal (INT) fault, INSTALL a new first row passenger side impact sensor. REFER to **SIDE IMPACT SENSOR - FIRST ROW, B-PILLAR**. GO to N54.

For second row driver side impact sensor (D\_2\_SEN) with a mounting/communication (COMM) fault, GO to N22.

For second row driver side impact sensor (D\_2\_SEN) with an internal (INT) fault, INSTALL a new second row driver side impact sensor. REFER to **SIDE IMPACT SENSOR - SECOND ROW, C-PILLAR**. GO to N54.

For second row passenger side impact sensor (P\_2\_SEN) with a mounting/communications (COMM) fault, GO to N32.

For second row passenger side impact sensor (P\_2\_SEN) with an internal (INT) fault, INSTALL a new second row passenger side impact sensor. REFER to **SIDE IMPACT SENSOR - SECOND ROW, C-PILLAR**. GO to N54.

For front impact severity sensor (FNT\_SEN) with a mounting/communications (COMM) fault, GO to N42.

For front impact severity sensor (FNT\_SEN) with an internal fault (INT) fault, INSTALL a new front impact severity sensor. REFER to **FRONT IMPACT SEVERITY SENSOR**. GO to N54.

**No** : This is an intermittent fault. The fault condition is not present at this time. GO to N53.

## **N2 INSPECT THE FIRST ROW DRIVER SIDE IMPACT SENSOR MOUNTING SURFACE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Inspect the first row driver side impact sensor mounting and make sure that the retaining bolt is fully seated and tightened correctly.
- Remove the first row driver side impact sensor.
- Visually inspect the first row driver side impact sensor and mounting surface for damage, corrosion or dirt.
- **Was a significant amount of corrosion or dirt found, the first row driver side impact sensor attached to the mounting surface incorrectly or was the impact sensor bolt not fully seated and tightened correctly?**

**Yes** : CLEAN and TIGHTEN the bolt or REPAIR the mounting surface as necessary. REINSTALL the first row driver side impact sensor. GO to N54.

**No** : GO to N3.

## **N3 INSTALL THE FIRST ROW DRIVER SIDE IMPACT SENSOR AND CARRY OUT THE ON-DEMAND SELF TEST**

- Clean and repair the mounting surface as necessary.
- Clean the first row driver side impact sensor mounting bolt.
- Install the first row driver side impact sensor.

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**  
Yes : GO to N4.  
No : Fault corrected. GO to N54.

**N4 CHECK THE FIRST ROW DRIVER SIDE IMPACT SENSOR GROUND CIRCUIT 1262 (BN/LG) FOR HIGH RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: First Row Driver Side Impact Sensor C3209.
- Measure the resistance between first row driver side impact sensor C3209 pin 1, circuit 1262 (BN/LG), harness side and the first row driver side impact sensor case ground.
- **Is the resistance less than 10 ohms?**  
Yes : GO to N6.  
No : GO to N5.

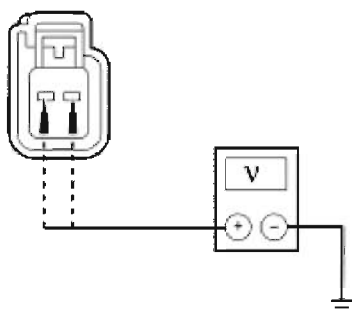
**N5 CLEAN THE FIRST ROW DRIVER SIDE IMPACT SENSOR MOUNTING SURFACE AND CARRY OUT THE ON-DEMAND SELF TEST**

- Remove the first row driver side impact sensor.
- Clean and repair the mounting surface as necessary.
- Clean the first row driver side impact sensor mounting bolt.
- Install the first row driver side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**  
Yes : GO to N6.  
No : Fault corrected. GO to N54.

**N6 CHECK CIRCUIT 1261 (WH/LG) AND CIRCUIT 1262 (BN/LG) FOR A SHORT TO VOLTAGE BETWEEN THE FIRST ROW DRIVER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position

- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Disconnect: First Row Driver Side Impact Sensor C3209.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between first row driver side impact sensor C3209 pin 1, circuit 1262 (BN/LG), harness side and ground; and between pin 2, circuit 1261 (WH/LG), harness side and ground.



A0058374

**Fig. 129: Measuring Voltage Between Connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

- **Are the voltages less than 0.2 volt?**

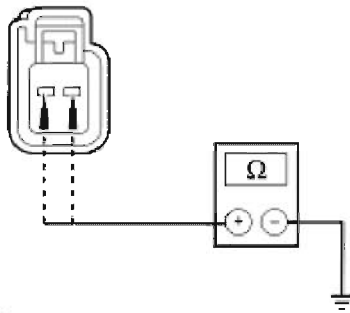
**Yes :** GO to N7.

**No :** REPAIR circuit 1261 (WH/LG) or circuit 1262 (BN/LG). GO to N54.

**N7 CHECK CIRCUIT 1261 (WH/LG) AND CIRCUIT 1262 (BN/LG) FOR A SHORT TO GROUND BETWEEN THE FIRST ROW DRIVER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Measure the resistance between first row driver side impact sensor C3209 pin 1, circuit 1262 (BN/LG), harness side and ground; and between pin 2, circuit 1261 (WH/LG), harness side and ground.





A0058373

**Fig. 130: Measuring Resistance Between connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

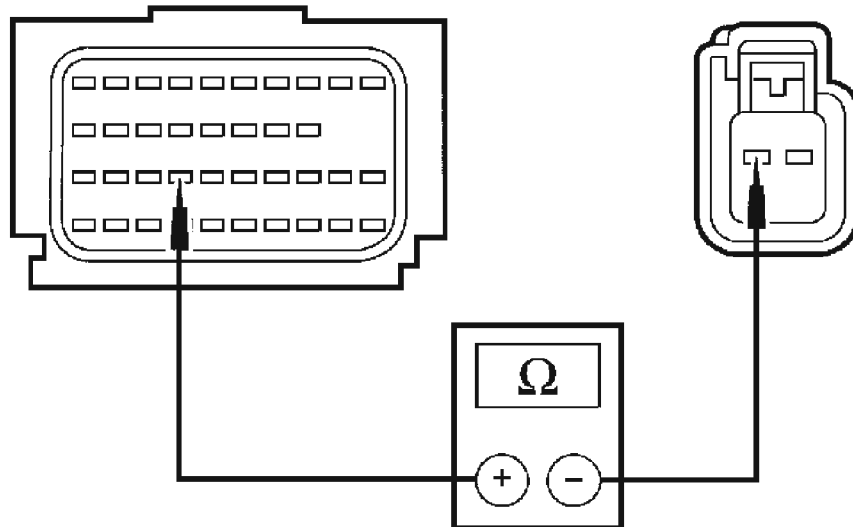
- Are the resistances greater than 1,000,000 ohms?

Yes : GO to N8.

No : REPAIR circuit 1261 (WH/LG) or circuit 1262 (BN/LG). GO to N54.

**N8 CHECK CIRCUIT 1261 (WH/LG) FOR AN OPEN BETWEEN THE RCM AND THE FIRST ROW DRIVER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 27, circuit 1261 (WH/LG), harness side and first row driver side impact sensor C3209 pin 2, circuit 1261 (WH/LG), harness side.



A0060503

**Fig. 131: Measuring Resistance Between RCM And First Row Driver Side Impact Sensor**  
Courtesy of FORD MOTOR CO.

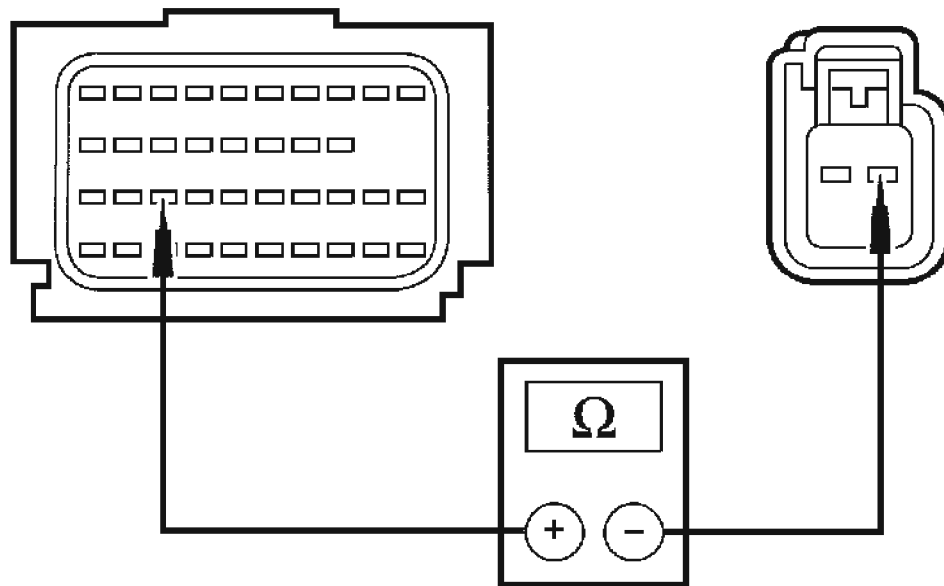
- **Is the resistance less than 0.5 ohm?**

**Yes :** GO to N9.

**No :** REPAIR circuit 1261 (WH/LG). GO to N54.

**N9 CHECK CIRCUIT 1262 (BN/LG) FOR AN OPEN BETWEEN THE RCM AND THE FIRST ROW DRIVER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 28, circuit 1262 (BN/LG), harness side and first row driver side impact sensor C3209 pin 1, circuit 1262 (BN/LG), harness side.



A0060504

**Fig. 132: Measuring Resistance Between RCM And First Row Driver Side Impact Sensor**

Courtesy of FORD MOTOR CO.

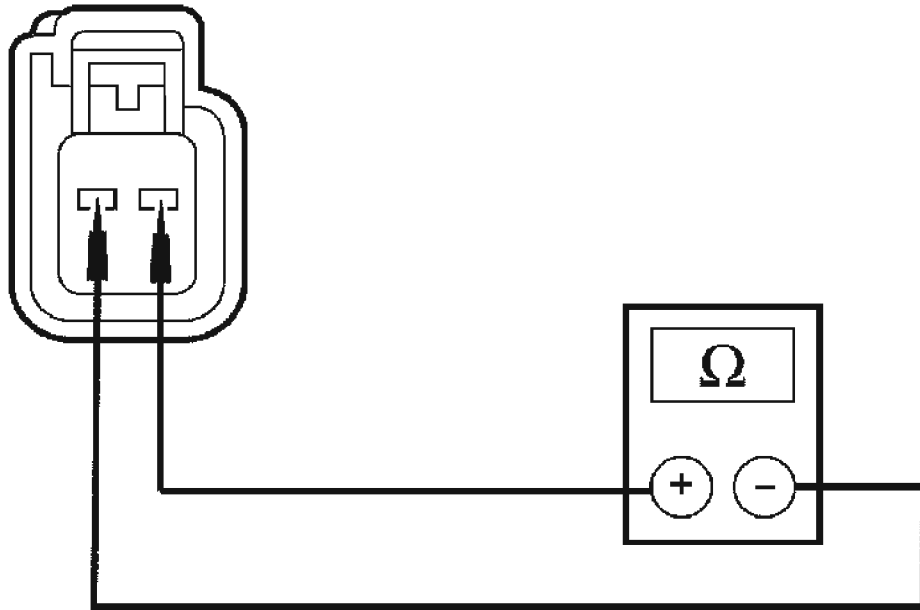
- **Is the resistance less than 0.5 ohm?**

**Yes :** GO to N10.

**No :** REPAIR circuit 1262 (BN/LG). GO to N54.

**N10 CHECK CIRCUIT 1261 (WH/LG) FOR A SHORT TO CIRCUIT 1262 (BN/LG) BETWEEN THE RCM AND THE FIRST ROW DRIVER SIDE IMPACT SENSOR**

- Measure the resistance between first row driver side impact sensor C3209 pin 2, circuit 1261 (WH/LG), harness side and pin 1, circuit 1262 (BN/LG), harness side.



A0058377

**Fig. 133: Measuring Resistance Between Connector Terminals**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to N11.

No : REPAIR circuit 1261 (WH/LG) and circuit 1262 (BN/LG). GO to N54.

#### **N11 CHECK THE FIRST ROW DRIVER SIDE IMPACT SENSOR**

- Connect: RCM C2041a and C2041b.
- Install a known good first row driver side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- Were any faults flagged against the first row driver side impact sensor?

Yes : GO to N52.

No : Fault corrected. GO to N54.

#### **N12 INSPECT THE FIRST ROW PASSENGER SIDE IMPACT SENSOR MOUNTING SURFACE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Inspect the first row passenger side impact sensor mounting and make sure that the retaining bolt is fully seated and tightened correctly.
- Remove the first row passenger side impact sensor.
- Visually inspect the first row passenger side impact sensor and mounting surface for damage, corrosion or dirt.
- **Was a significant amount of corrosion or dirt found, the first row passenger side impact sensor attached to the mounting surface incorrectly or was the impact sensor bolt not fully seated and tightened correctly?**  
 Yes : CLEAN and TIGHTEN the bolt or REPAIR the mounting surface as necessary. REINSTALL the first row passenger side impact sensor. GO to N54.  
 No : GO to N13.

#### **N13 INSTALL THE FIRST ROW PASSENGER SIDE IMPACT SENSOR AND CARRY OUT THE ON-DEMAND SELF TEST**

- Clean and repair the mounting surface as necessary.
- Clean the first row passenger side impact sensor mounting bolt.
- Install the first row passenger side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**  
 Yes : GO to N14.  
 No : Fault corrected. GO to N54.

#### **N14 CHECK THE FIRST ROW PASSENGER SIDE IMPACT SENSOR GROUND CIRCUIT 1264 (BN) FOR HIGH RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: First Row Passenger Side Impact Sensor C3211.
- Measure the resistance between the first row passenger side impact sensor C3211 pin 1, circuit 1264 (BN), harness side and the first row passenger side impact sensor case ground.
- **Is the resistance less than 10 ohms?**  
 Yes : GO to N16.

No : GO to N15.

### **N15 CLEAN THE FIRST ROW PASSENGER SIDE IMPACT SENSOR MOUNTING SURFACE AND CARRY OUT THE ON-DEMAND SELF TEST**

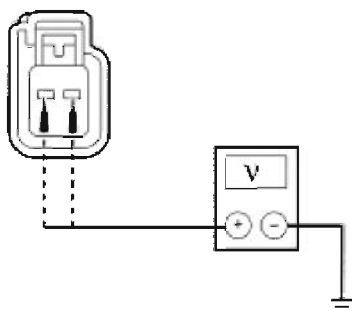
- Remove the first row passenger side impact sensor.
- Clean and repair the mounting surface as necessary.
- Clean the first row passenger side impact sensor mounting bolt.
- Install the first row passenger side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**

Yes : GO to N16.

No : Fault corrected. GO to N54.

### **N16 CHECK CIRCUIT 1263 (WH) AND CIRCUIT 1264 (BN) FOR A SHORT TO BATTERY BETWEEN THE FIRST ROW PASSENGER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Disconnect: First Row Passenger Side Impact Sensor C3211.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between first row passenger side impact sensor C3211 pin 2, circuit 1263 (WH), harness side and ground; and between pin 1, circuit 1264 (BN), harness side and ground.



**Fig. 134: Measuring Voltage Between Connector Terminals And Ground**  
 Courtesy of FORD MOTOR CO.

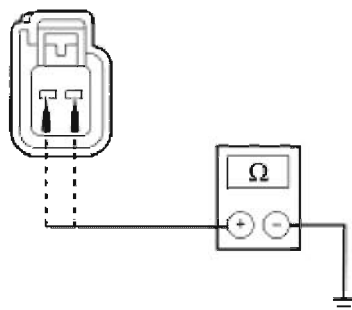
- Are the voltages less than 0.2 volt?

Yes : GO to N17.

No : REPAIR circuit 1263 (WH) or circuit 1264 (BN). GO to N54.

**N17 CHECK CIRCUIT 1263 (WH) AND CIRCUIT 1264 (BN) FOR A SHORT TO GROUND BETWEEN THE FIRST ROW PASSENGER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Measure the resistance between first row passenger side impact sensor C3211 pin 2, circuit 1263 (WH), harness side and ground; and between pin 1, circuit 1264 (BN), harness side and ground.



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**Fig. 135: Measuring Resistance Between connector Terminals And Ground**  
 Courtesy of FORD MOTOR CO.

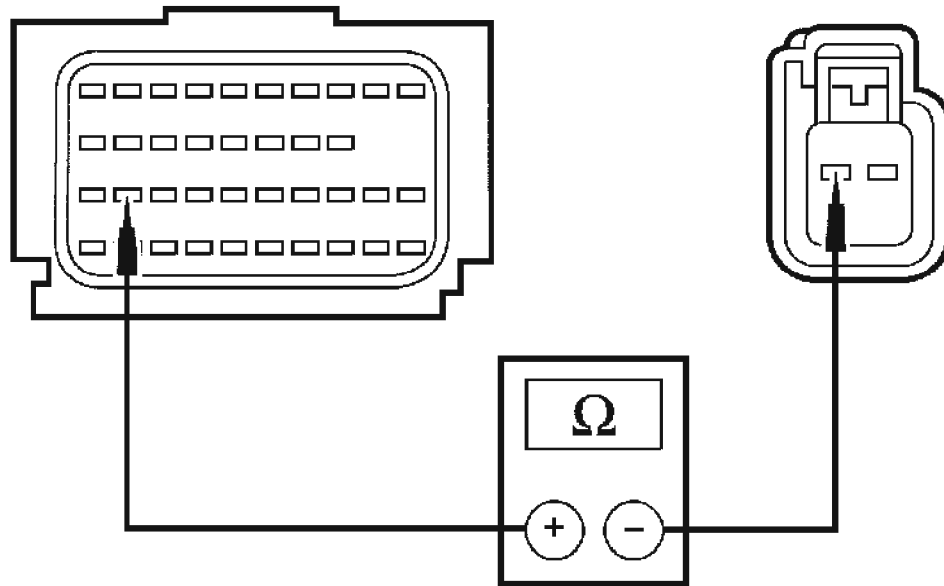
- Are the resistances greater than 1,000,000 ohms?

Yes : GO to N18.

No : REPAIR circuit 1263 (WH) or circuit 1264 (BN). GO to N54.

**N18 CHECK CIRCUIT 1263 (WH) FOR AN OPEN BETWEEN THE RCM AND THE FIRST ROW PASSENGER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 29, circuit 1263 (WH), harness side and first row passenger side impact sensor C3211 pin 2, circuit 1263 (WH), harness side.



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**Fig. 136: Measuring Resistance Between RCM And First Row Passenger Side Impact Sensor**

Courtesy of FORD MOTOR CO.

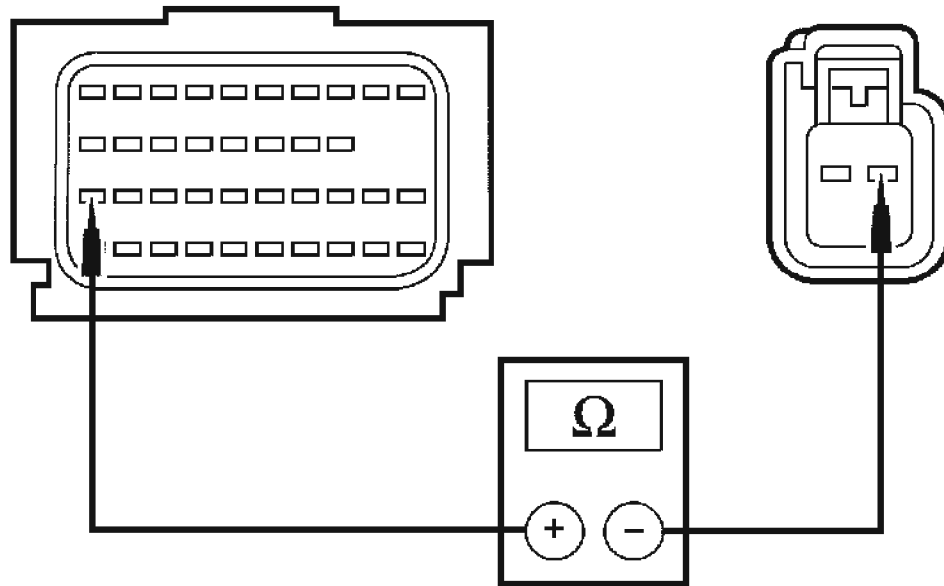
- Is the resistance less than 0.5 ohm?

Yes : GO to N19.

No : REPAIR circuit 1263 (WH). GO to N54.

**N19 CHECK CIRCUIT 1264 (BN) FOR AN OPEN BETWEEN THE RCM AND THE FIRST ROW PASSENGER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 30, circuit 1264 (BN), harness side and first row passenger side impact sensor C3211 pin 1, circuit 1264 (BN), harness side.



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**Fig. 137: Measuring Resistance Between RCM And First Row Passenger Side Impact Sensor**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

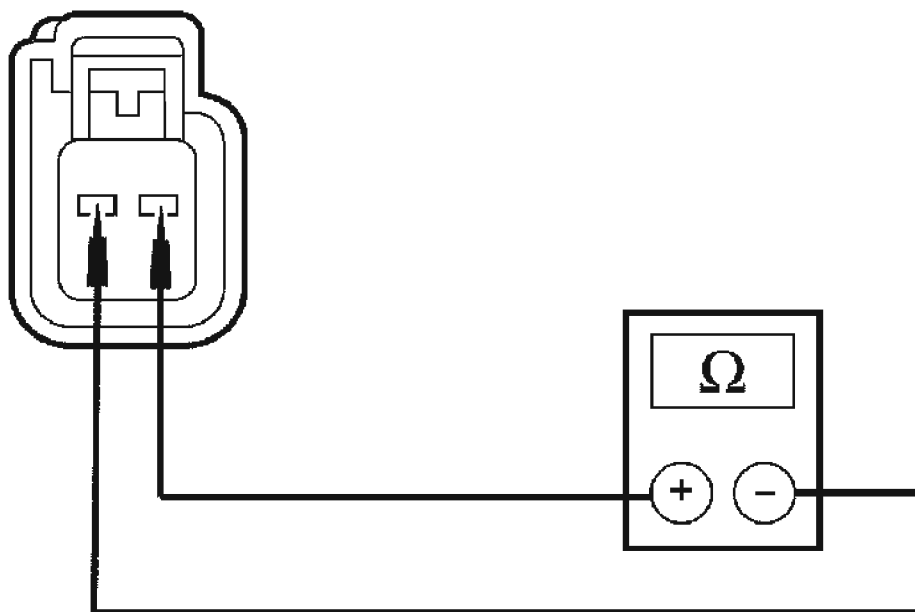
Yes : GO to N20.

No : REPAIR circuit 1264 (BN). GO to N54.

**N20 CHECK CIRCUIT 1263 (WH) FOR A SHORT TO CIRCUIT 1264 (BN) BETWEEN THE RCM AND THE FIRST ROW PASSENGER SIDE IMPACT SENSOR**

- Measure the resistance between first row passenger side impact sensor C3211 pin 2, circuit 1263 (WH), harness side and pin 1, circuit 1264 (BN), harness side.





A0058377

**Fig. 138: Measuring Resistance Between Connector Terminals**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

**Yes :** GO to N21.

**No :** REPAIR short between circuit 1263 (WH) and circuit 1264 (BN). GO to N54.

#### **N21 CHECK THE FIRST ROW PASSENGER SIDE IMPACT SENSOR**

- Connect: RCM C2041a and C2041b.
- Install a known good first row passenger side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Were any faults flagged against the first row passenger side impact sensor?**  
**Yes :** GO to N52.

**No :** Fault corrected. GO to N54.

#### **N22 INSPECT THE SECOND ROW DRIVER SIDE IMPACT SENSOR**

## MOUNTING SURFACE

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Inspect the second row driver side impact sensor mounting and make sure that the retaining bolt is fully seated and tightened correctly.
- Remove the second row driver side impact sensor.
- Visually inspect the second row driver side impact sensor mounting surface for damage, corrosion or dirt.
- **Was a significant amount of corrosion or dirt found, the second row driver side impact sensor attached to the mounting surface incorrectly or was the impact sensor bolt not fully seated and tightened correctly?**

**Yes** : CLEAN and TIGHTEN the bolt or REPAIR the mounting surface as necessary. REINSTALL the second row driver side impact sensor. GO to N54.

**No** : GO to N23.

## N23 INSTALL THE SECOND ROW DRIVER SIDE IMPACT SENSOR AND CARRY OUT THE ON-DEMAND SELF TEST

- Clean and repair the mounting surface as necessary.
- Clean the second row driver side impact sensor mounting bolt.
- Install the second row driver side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**

**Yes** : GO to N24.

**No** : Fault corrected. GO to N54.

## N24 CHECK THE SECOND ROW DRIVER SIDE IMPACT SENSOR GROUND CIRCUIT 1642 (DG/WH) FOR HIGH RESISTANCE

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Second Row Driver Side Impact Sensor C3210.
- Measure the resistance between second row driver side impact sensor C3210 pin 1, circuit 1642 (DG/WH), harness side and the second row driver side impact sensor case ground.
- **Is the resistance less than 10 ohms?**

**Yes** : GO to N26.

**No** : GO to N25.

### **N25 CLEAN THE SECOND ROW DRIVER SIDE IMPACT SENSOR MOUNTING SURFACE AND CARRY OUT THE ON-DEMAND SELF TEST**

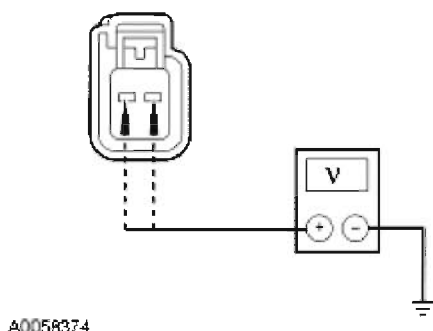
- Remove the second row driver side impact sensor.
- Clean and repair the mounting surface as necessary.
- Clean the second row driver side impact sensor mounting bolt.
- Install the second row driver side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**

**Yes** : GO to N26.

**No** : Fault corrected. GO to N54.

### **N26 CHECK CIRCUIT 1641 (VT) AND CIRCUIT 1642 (DG/WH) FOR A SHORT TO BATTERY BETWEEN THE SECOND ROW DRIVER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Second Row Driver Side Impact Sensor C3210.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Key in ON position.
- Measure the voltage between second row driver side impact sensor C3210 pin 2, circuit 1641 (VT), harness side and ground; and between pin 1, circuit 1642 (DG/WH), harness side and ground.



**Fig. 139: Measuring Voltage Between Connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

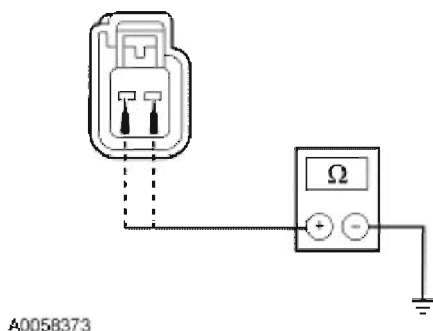
- Are the voltages less than 0.2 volt?

Yes : GO to N27.

No : REPAIR circuit 1641 (VT) or circuit 1642 (DG/WH). GO to N54.

**N27 CHECK CIRCUIT 1641 (VT) AND CIRCUIT 1642 (DG/WH) FOR A SHORT TO GROUND BETWEEN THE SECOND ROW DRIVER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Measure the resistance between second row driver side impact sensor C3210 pin 1, circuit 1641 (VT), harness side and ground; and between pin 2, circuit 1642 (DG/WH), harness side and ground.



**Fig. 140: Measuring Resistance Between connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

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

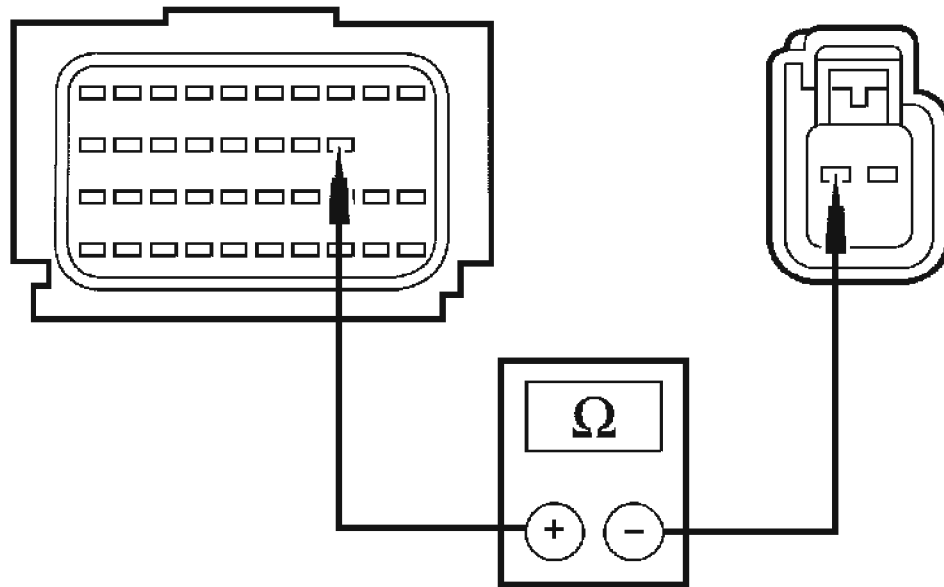
Yes : GO to N28.

No : REPAIR circuit 1641 (VT) or circuit 1642 (DG/WH). GO to N54.

**N28 CHECK CIRCUIT 1641 (VT) FOR AN OPEN BETWEEN THE RCM AND THE SECOND ROW DRIVER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 13, circuit 1641 (VT), harness

side and second row driver side impact sensor C3210 pin 2, circuit 1641 (VT), harness side.



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**Fig. 141: Measuring Resistance Between RCM C2041B Pin 13, Circuit 1641 (VT), Harness Side And Second Row Driver Side Impact Sensor C3210 Pin 2, Circuit 1641 (VT), Harness Side**  
 Courtesy of FORD MOTOR CO.

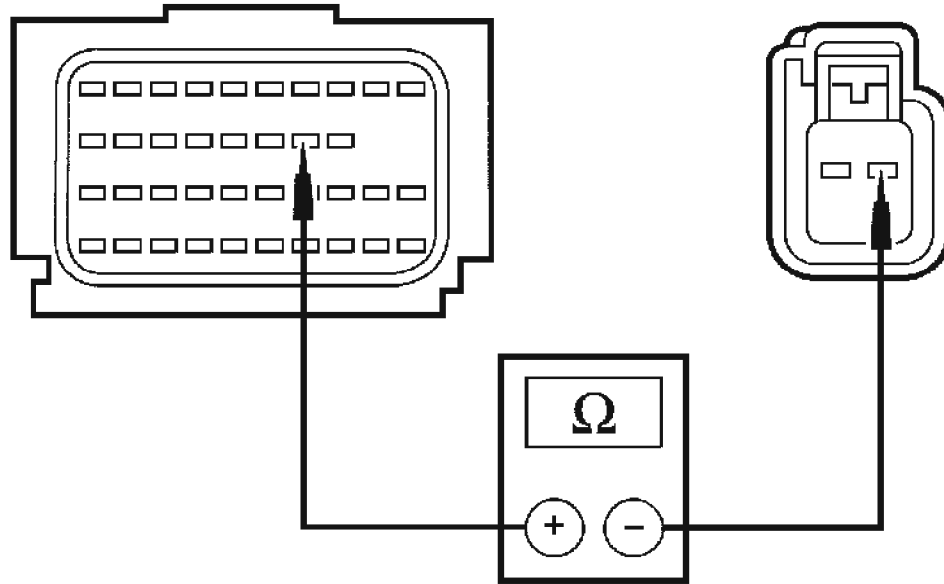
- Is the resistance less than 0.5 ohm?

Yes : GO to N29.

No : REPAIR circuit 1641 (VT). GO to N54.

#### **N29 CHECK CIRCUIT 1642 (DG/WH) FOR AN OPEN BETWEEN THE RCM AND THE SECOND ROW DRIVER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 14, circuit 1642 (DG/WH), harness side and second row driver side impact sensor C3210 pin 1, circuit 1642 (DG/WH), harness side.



A0060508

**Fig. 142: Checking Circuit 1642 (DG/WH) For An Open Between The RCM And The Second Row Driver Side Impact Sensor**  
Courtesy of FORD MOTOR CO.

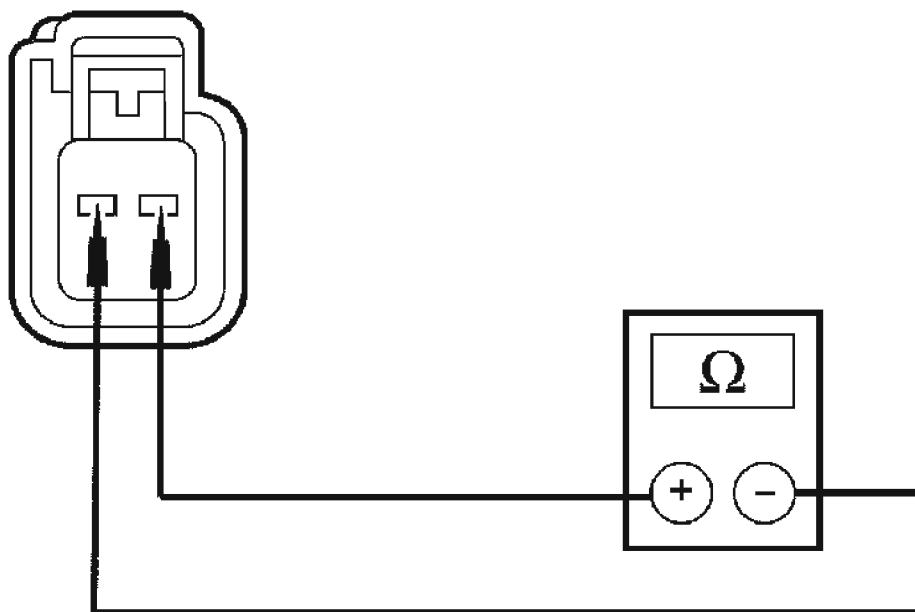
- Is the resistance less than 0.5 ohm?

Yes : GO to N30.

No : REPAIR circuit 1642 (DG/WH). GO to N54.

**N30 CHECK CIRCUIT 1641 (VT) FOR A SHORT TO CIRCUIT 1642 (DG/WH) BETWEEN THE RCM AND THE SECOND ROW DRIVER SIDE IMPACT SENSOR**

- Measure the resistance between second row driver side impact sensor C3210 pin 2, circuit 1641 (VT), harness side and pin 1, circuit 1642 (DG/WH), harness side.



A0058377

**Fig. 143: Measuring Resistance Between Connector Terminals**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to N31.

No : REPAIR circuit 1641 (VT) or circuit 1642 (DG/WH). GO to N54.

#### **N31 CHECK THE SECOND ROW DRIVER SIDE IMPACT SENSOR**

- Connect: RCM C2041a and C2041b.
  - Install a known good second row driver side impact sensor.
  - Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
  - Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
  - Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
  - **Were any faults flagged against the second row driver side impact sensor?**
- Yes : GO to N52.

No : Fault corrected. GO to N54.

#### **N32 INSPECT THE SECOND ROW PASSENGER SIDE IMPACT SENSOR MOUNTING SURFACE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Inspect the second row passenger side impact sensor mounting and make sure that the retaining bolt is fully seated and tightened correctly.
- Remove the second row passenger side impact sensor.
- Visually inspect the second row passenger side impact sensor and mounting surface for damage, corrosion or dirt.
- **Was a significant amount of corrosion or dirt found, the second row passenger side impact sensor attached to the mounting surface incorrectly or was the impact sensor bolt not fully seated and tightened correctly?**  
Yes : CLEAN and TIGHTEN the bolts or REPAIR the mounting surface as necessary. REINSTALL the second row passenger side impact sensor. GO to N54.  
No : GO to N33.

### **N33 INSTALL THE SECOND ROW PASSENGER SIDE IMPACT SENSOR AND CARRY OUT THE ON-DEMAND SELF TEST**

- Clean and repair the mounting surface as necessary.
- Clean the second row passenger side impact sensor mounting bolt.
- Install the second row passenger side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**  
Yes : GO to N34.  
No : Fault corrected. GO to N54.

### **N34 CHECK THE SECOND ROW PASSENGER SIDE IMPACT SENSOR GROUND CIRCUIT 1644 (LB/WH) FOR HIGH RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Second Row Passenger Side Impact Sensor C3212.
- Measure the resistance between second row passenger side impact sensor C3212 pin 1, circuit 1644 (LB/WH), harness side and the second row passenger side impact sensor case ground.
- **Is the resistance less than 10 ohms?**



**Yes** : GO to N36.

**No** : GO to N35.

### **N35 CLEAN THE SECOND ROW PASSENGER SIDE IMPACT SENSOR MOUNTING SURFACE AND CARRY OUT THE ON-DEMAND SELF TEST**

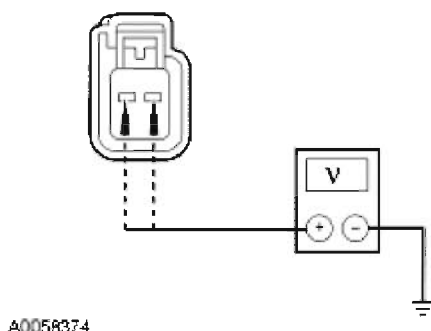
- Remove the second row passenger side impact sensor.
- Clean and repair the mounting surface as necessary.
- Clean the second row passenger side impact sensor mounting bolt.
- Install the second row passenger side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**

**Yes** : GO to N36.

**No** : Fault corrected. GO to N54.

### **N36 CHECK CIRCUIT 1643 (WH/RD) AND CIRCUIT 1644 (LB/WH) FOR A SHORT TO VOLTAGE BETWEEN THE SECOND ROW PASSENGER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Second Row Passenger Side Impact Sensor C3212.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Key in ON position.
- Measure the voltage between second row passenger side impact sensor C3212 pin 2, circuit 1643 (WH/RD), harness side and ground; and between pin 1, circuit 1644 (LB/WH), harness side and ground.



**Fig. 144: Measuring Voltage Between Connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

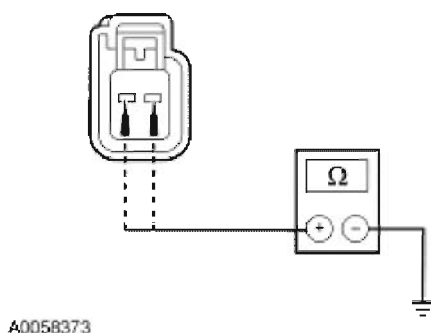
- Are the voltages less than 0.2 volt?

Yes : GO to N37.

No : REPAIR circuit 1643 (WH/RD) or circuit 1644 (LB/WH). GO to N54.

**N37 CHECK CIRCUIT 1643 (WH/RD) AND CIRCUIT 1644 (LB/WH) FOR A SHORT TO GROUND BETWEEN THE SECOND ROW PASSENGER SIDE IMPACT SENSOR AND THE RCM**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Measure the resistance between second row passenger side impact sensor 3212 pin 2, circuit 1643 (WH/RD), harness side and ground; and between pin 1, circuit 1644 (LB/WH), harness side and ground.



**Fig. 145: Measuring Resistance Between connector Terminals And Ground**  
Courtesy of FORD MOTOR CO.

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

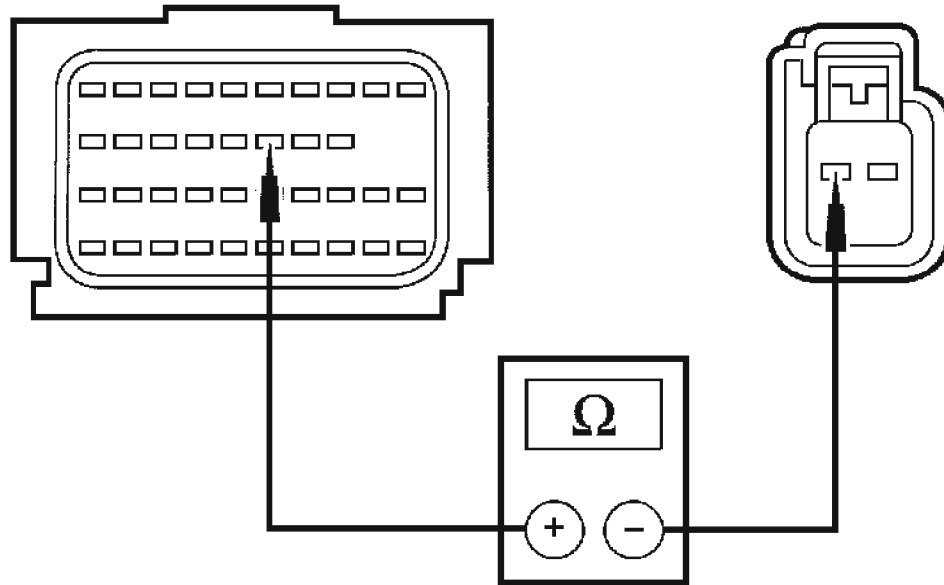
Yes : GO to N38.

No : REPAIR circuit 1643 (WH/RD) or 1644 (LB/WH). GO to N54.

**N38 CHECK CIRCUIT 1643 (WH/RD) FOR AN OPEN BETWEEN THE RCM AND THE SECOND ROW PASSENGER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 15, circuit 1643 (WH/RD),

harness side and second row passenger side impact sensor C3212 pin 2, circuit 1643 (WH/RD), harness side.



A0060509

**Fig. 146: Measuring Resistance Between RCM And Second Row Passenger Side Impact Sensor**  
Courtesy of FORD MOTOR CO.

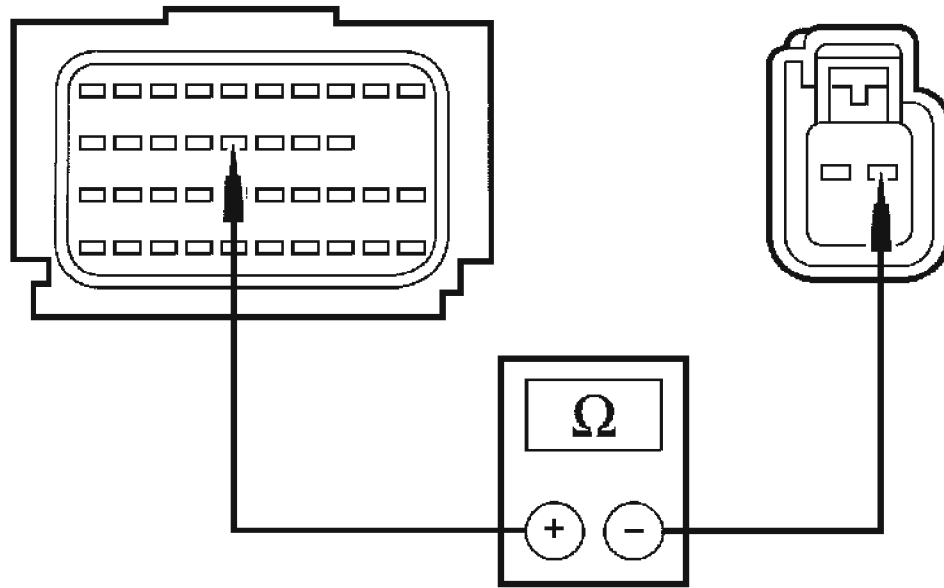
- Is the resistance less than 0.5 ohm?

Yes : GO to N39.

No : REPAIR circuit 1643 (WH/RD). GO to N54.

**N39 CHECK CIRCUIT 1644 (LB/WH) FOR AN OPEN BETWEEN THE RCM AND THE SECOND ROW PASSENGER SIDE IMPACT SENSOR**

- Measure the resistance between RCM C2041b pin 16, circuit 1644 (LB/WH), harness side and second row passenger side impact sensor C3212 pin 1, circuit 1644 (LB/WH), harness side.



A0060510

**Fig. 147: Measuring Resistance Between RCM And Second Row Passenger Side Impact Sensor**

Courtesy of FORD MOTOR CO.

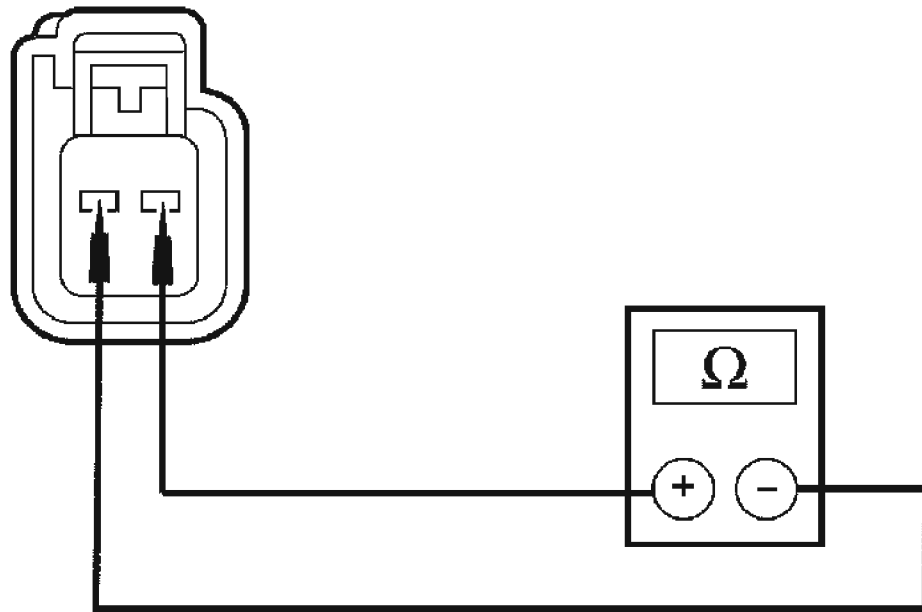
- Is the resistance less than 0.5 ohm?

Yes : GO to N40.

No : REPAIR circuit 1644 (LB/WH). GO to N54.

**N40 CHECK CIRCUIT 1643 (WH/RD) FOR A SHORT TO CIRCUIT 1644 (LB/WH) BETWEEN THE RCM AND THE SECOND ROW PASSENGER SIDE IMPACT SENSOR**

- Measure the resistance between second row passenger side impact sensor C3212 pin 2, circuit 1643 (WH/RD), harness side and pin 1, circuit 1644 (LB/WH), harness side.



A0058377

**Fig. 148: Measuring Resistance Between Connector Terminals**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to N41.

No : REPAIR circuit 1643 (WH/RD) and circuit 1644 (LB/WH). GO to N54.

#### **N41 CHECK THE SECOND ROW PASSENGER SIDE IMPACT SENSOR**

- Connect: RCM C2041a and C2041b.
- Install a known good second row passenger side impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Were any faults flagged against the second row passenger side impact sensor?**

Yes : GO to N52.

No : Fault corrected. GO to N54.

#### **N42 INSPECT THE FRONT IMPACT SEVERITY SENSOR MOUNTING**

**SURFACE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Inspect the front impact severity sensor mounting and make sure that the retaining bolt is fully seated and tightened correctly.
- Remove the front impact severity sensor. Refer to **FRONT IMPACT SEVERITY SENSOR**.
- Visually inspect the front impact severity sensor and mounting surface for damage, corrosion or dirt.
- **Was a significant amount of corrosion or dirt found, the front impact severity sensor attached to the mounting surface incorrectly or was the front impact severity sensor bolt not fully seated and tightened correctly?**  
**Yes** : CLEAN and TIGHTEN bolt or REPAIR the mounting surface as necessary. REINSTALL the front impact severity sensor. GO to N54.  
**No** : GO to N43.

**N43 INSTALL THE FRONT IMPACT SEVERITY SENSOR AND CARRY OUT THE ON-DEMAND SELF TEST**

- Clean and repair the mounting surface as necessary.
- Clean the front impact severity sensor mounting bolt.
- Install the front impact severity sensor. Refer to **FRONT IMPACT SEVERITY SENSOR**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**  
**Yes** : GO to N44.  
**No** : Fault corrected. GO to N54.

**N44 CHECK THE FRONT IMPACT SEVERITY SENSOR GROUND CIRCUIT 618 (VT/LG) FOR HIGH RESISTANCE**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Front Impact Severity Sensor C177.
- Measure the resistance between front impact severity sensor C177 pin 1, circuit 618 (VT/LG), harness side and the front impact severity sensor case ground.

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

**Yes** : GO to N46.

**No** : GO to N45.

#### **N45 CLEAN THE FRONT IMPACT SEVERITY SENSOR MOUNTING SURFACE AND CARRY OUT THE ON-DEMAND SELF-TEST**

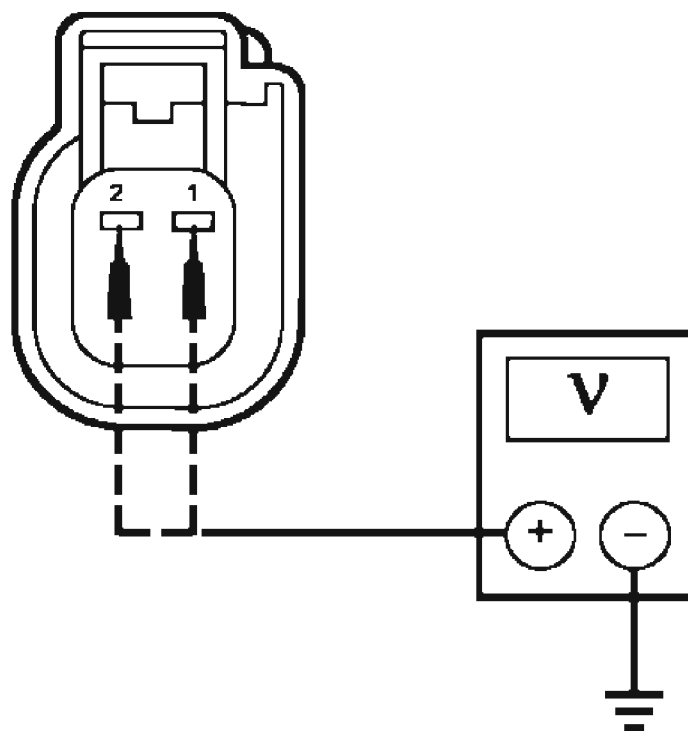
- Remove the front impact severity sensor. Refer to **FRONT IMPACT SEVERITY SENSOR**.
- Clean and repair the mounting surface as necessary.
- Clean the front impact severity sensor mounting bolt.
- Install the front impact severity sensor. Refer to **FRONT IMPACT SEVERITY SENSOR**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**

**Yes** : GO to N46.

**No** : Fault corrected. GO to N54.

#### **N46 CHECK CIRCUIT 617 (PK/OG) AND CIRCUIT 618 (VT/LG) FOR A SHORT TO VOLTAGE BETWEEN THE RCM AND THE FRONT IMPACT SEVERITY SENSOR**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Front Impact Severity Sensor C177.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between front impact severity sensor C177 pin 2, circuit 617 (PK/OG), harness side and ground; and between front impact severity sensor C177 pin 1, circuit 618 (VT/LG), harness side and ground.



A0030671

**Fig. 149: Measuring Voltage Between Front Impact Severity Sensor And Ground**

Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

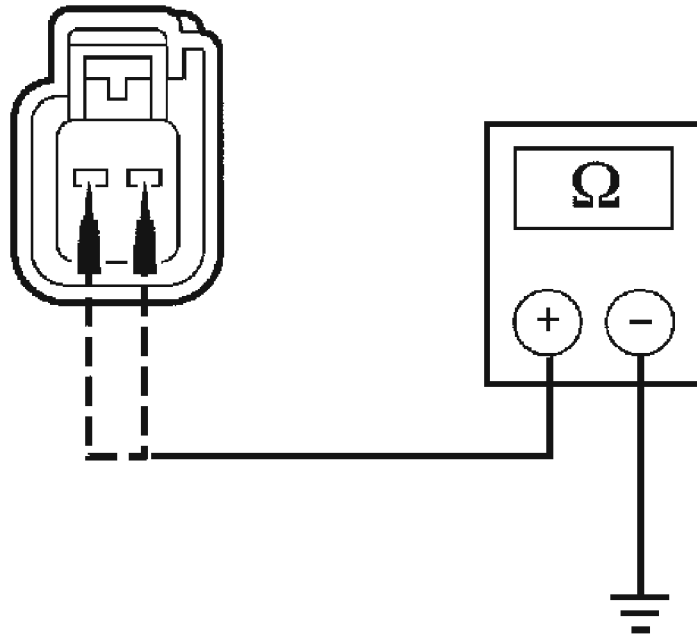
Yes : GO to N47.

No : REPAIR circuit 617 (PK/OG) or circuit 618 (VT/LG). GO to N54.

**N47 CHECK CIRCUIT 617 (PK/OG) AND CIRCUIT 618 (VT/LG) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE FRONT IMPACT SEVERITY SENSOR**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Measure the resistance between front impact severity sensor C177 pin 2, circuit 617 (PK/OG), harness side and ground; and between front impact severity sensor C177 pin 1, circuit 618 (VT/LG), harness side and ground.





A0088595

**Fig. 150: Measuring Resistance Between Front Impact Severity Sensor And Ground**

Courtesy of FORD MOTOR CO.

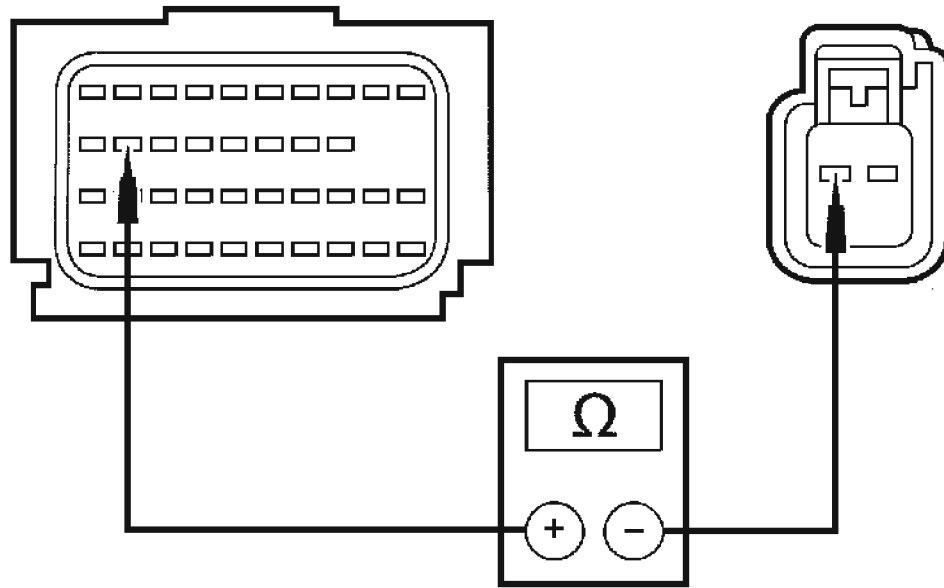
- **Are the resistances greater than 1,000,000 ohms?**

**Yes :** GO to N48.

**No :** REPAIR circuit 617 (PK/OG) or circuit 618 (VT/LG). GO to N54.

**N48 CHECK CIRCUIT 617 (PK/OG) FOR AN OPEN BETWEEN THE RCM AND THE FRONT IMPACT SEVERITY SENSOR**

- Measure the resistance between RCM C2041b pin 19, circuit 617 (PK/OG), harness side and front impact severity sensor C177 pin 2, circuit 617 (PK/OG), harness side.



A0060511

**Fig. 151: Measuring Resistance Between RCM And Front Impact Severity Sensor**

Courtesy of FORD MOTOR CO.

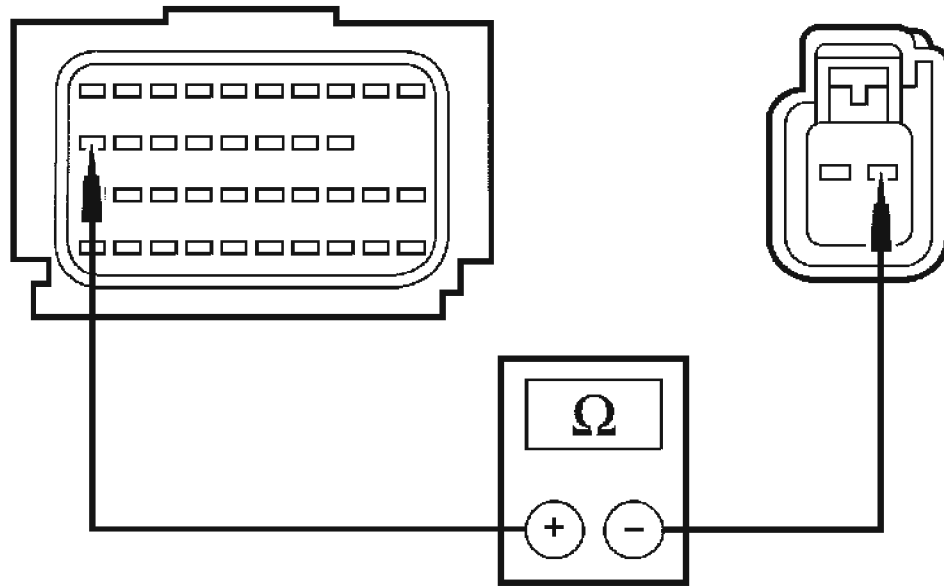
- Is the resistance less than 0.5 ohm?

Yes : GO to N49.

No : REPAIR circuit 617 (PK/OG). GO to N54.

**N49 CHECK CIRCUIT 618 (VT/LG) FOR AN OPEN BETWEEN THE RCM AND THE FRONT IMPACT SEVERITY SENSOR**

- Measure the resistance between RCM C2041b pin 20, circuit 618 (VT/LG), harness side and front impact severity sensor C177 pin 1, circuit 618 (VT/LG), harness side.



A0060512

**Fig. 152: Measuring Resistance Between RCM And Front Impact Severity Sensor**

Courtesy of FORD MOTOR CO.

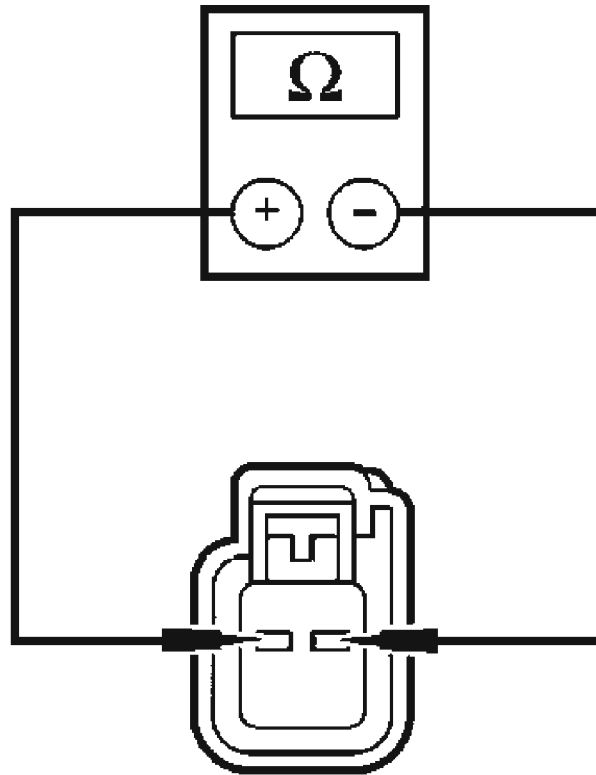
- Is the resistance less than 0.5 ohm?

Yes : GO to N50.

No : REPAIR circuit 618 (VT/LG). GO to N54.

**N50 CHECK CIRCUIT 617 (PK/OG) FOR A SHORT TO CIRCUIT 618 (VT/LG) BETWEEN THE RCM AND THE FRONT IMPACT SEVERITY SENSOR**

- Measure the resistance between front impact severity sensor C177 pin 2, circuit 617 (PK/OG), harness side and pin 1, circuit 618 (VT/LG), harness side.



A0060479

**Fig. 153: Measuring Resistance Between Front Impact Severity Sensor And Pin**

Courtesy of FORD MOTOR CO.

- **Is the resistance greater than 1,000,000 ohms?**

**Yes :** GO to N51.

**No :** REPAIR circuit 617 (PK/OG) and circuit 618 (VT/LG). GO to N54.

#### **N51 CHECK THE FRONT IMPACT SEVERITY SENSOR**

- Connect: RCM C2041a and C2041b.
- Install a known good front impact severity sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Were any faults flagged against the front impact severity sensor?**

**Yes** : GO to N52.

**No** : Fault corrected. GO to N54.

## **N52 CONFIRM THE RCM FAULT**

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Install the original impact sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296.
- **Was DTC B2296 retrieved during the on-demand self test?**  
**Yes** : If a "?" was flagged by the diagnostic tool, CARRY OUT the entire pinpoint test.

INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to N54.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to N54.

## **N53 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2296/Record All Flagged Faults.
- **Was DTC B2296 retrieved during the on-demand self test?**  
**Yes** : This is a hard fault. The fault condition is now present. The fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

For first row driver side impact (F\_D\_SEN) sensor with a mounting/communications (COMM) fault, GO to N2.

For first row driver side impact sensor (F\_S\_SEN) with an internal (INT) fault, INSTALL a new first row driver side impact sensor. REFER to **SIDE IMPACT SENSOR - FIRST ROW, B-PILLAR**. GO to N54.

For first row passenger side impact sensor (F\_P\_SEN) with a mounting/communications (COMM) fault, GO to N12.

For first row passenger side impact sensor (F\_P\_SEN) with an internal (INT) fault, INSTALL a new first row passenger side impact sensor. REFER to **SIDE IMPACT SENSOR - FIRST ROW, B-PILLAR**. GO to N54.

For second row driver side impact sensor (D\_2\_SEN) with a mounting/communication (COMM) fault, GO to N22.

For second row driver side impact sensor (D\_2\_SEN) with an internal (INT) fault, INSTALL a new second row driver side impact sensor. REFER to **SIDE IMPACT SENSOR - SECOND ROW, C-PILLAR**. GO to N54.

For second row passenger side impact sensor (P\_2\_SEN) with a mounting/communications (COMM) fault, GO to N32.

For second row passenger side impact sensor (P\_2\_SEN) with an internal (INT) fault, INSTALL a new second row passenger side impact sensor. REFER to **SIDE IMPACT SENSOR - SECOND ROW, C-PILLAR**. GO to N54.

For front impact severity sensor (FNT\_SEN) with a mounting/communications (COMM) fault, GO to N42.

For front impact severity sensor (FNT\_SEN) with an internal fault (INT) fault, INSTALL a new front impact severity sensor. REFER to **FRONT IMPACT SEVERITY SENSOR**. GO to N54.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to N54.

#### **N54 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step N1.
- **Were any continuous DTCs retrieved during Step N1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test O: LFC 51/DTC B2434 - Driver Safety Belt Buckle Switch Circuit Short to Ground****Normal Operation**

The restraints control module (RCM) checks the driver safety belt buckle switch circuits for faults. If the RCM detects a short to ground fault, it will store diagnostic trouble code (DTC) B2434 in memory and flash lamp fault code (LFC) 51 (or higher priority code if one exists) on the air bag indicator.

**Possible Causes**

A driver safety belt buckle switch circuit fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty driver safety belt buckle switch.
- a faulted RCM.

**PINPOINT TEST O: LFC 51/DTC B2434 - DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT SHORT TO GROUND**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**O1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was DTC B2434 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to O2.

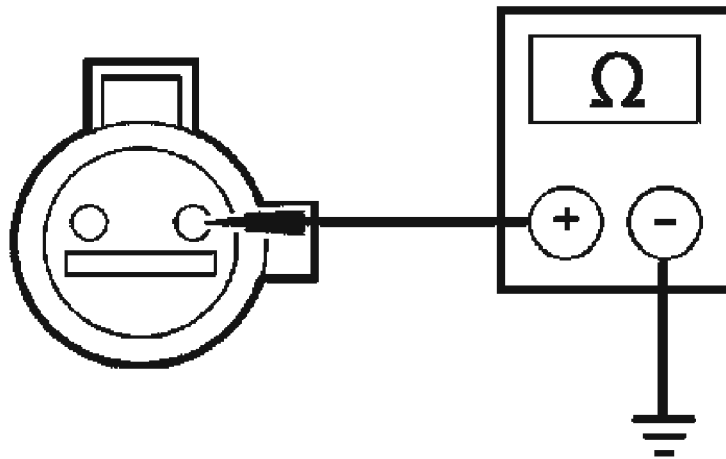
**No :** This is an intermittent fault. The fault condition is not present at this time.



GO to O5.

**O2 CHECK CIRCUIT 85 (BN/LB) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE DRIVER SAFETY BELT BUCKLE SWITCH**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Driver Safety Belt Buckle Switch C3065.
- Disconnect: RCM C2041b and C2041b.
- Measure the resistance between driver safety belt buckle switch C3065 pin 1, circuit 85 (BN/LB), harness side and ground.



**A0090711**

**Fig. 154: Measuring Resistance Between Driver Safety Belt Buckle Switch And Ground**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to O3.

No : REPAIR circuit 85 (BN/LB). GO to O6.

**O3 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH**

- Connect: RCM C2041a and C2041b.
- Install a known good driver safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Connect: Driver Safety Belt Buckle Switch C3065.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2434 retrieved during the on-demand self test?**  
Yes : GO to O4.  
No : Fault corrected. GO to O6.

**O4 CONFIRM THE RCM FAULT**

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Reinstall the original driver safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2434 retrieved during the on-demand self test?**  
Yes : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to O6.  
No : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to O6.

**O5 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2434 retrieved during the on-demand self test?**  
Yes : GO to O2.  
No : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard

fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to O6.

### **O6 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step O1.

- **Were any continuous DTCs retrieved during Step O1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test P: LFC 51/DTC B2435 - Driver Safety Belt Buckle Switch Resistance Out of Range**

#### **Normal Operation**

The restraints control module (RCM) checks the driver safety belt buckle switch circuits for faults. If the RCM detects a current out of range fault, it will store diagnostic trouble code (DTC) B2435 in memory and flash lamp fault code (LFC) 51 (or higher priority code if one exists) on the air bag indicator.

#### **Possible Causes**

A driver safety belt buckle switch current out of range fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty driver safety belt buckle and pretensioner assembly.
- RCM is faulted.

**PINPOINT TEST P: LFC 51/DTC B2435 - DRIVER SAFETY BELT BUCKLE SWITCH RESISTANCE OUT OF RANGE**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with

**the Pinpoint Test.**

## **P1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was DTC B2435 retrieved during the on-demand self test?**  
**Yes** : This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to P2.  
**No** : This is an intermittent fault. The fault condition is not present at this time. GO to P4.

## P2 CHECK THE SAFETY BELT BUCKLE SWITCH

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Install a known good driver safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2435 retrieved during the on-demand self test?**  
**Yes** : GO to P3.  
**No** : Fault corrected. GO to P5.

## P3 CONFIRM THE RCM FAULT

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Reinstall the original driver safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2435 retrieved during the on-demand self test?**

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to P4.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to P4.

#### **P4 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2435 retrieved during the on-demand self test?**

**Yes** : GO to P2.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to P4.

#### **P5 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step P1.
- **Were any continuous DTCs retrieved during Step P1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

#### **Pinpoint Test Q: LFC 52/DTC B2438 - Passenger Safety Belt Buckle Switch Circuit Short to Ground**

##### **Normal Operation**

The restraints control module (RCM) checks the passenger safety belt buckle switch circuits for faults. If the RCM detects a short to ground fault, it will store diagnostic trouble code (DTC) B2438 in memory and flash lamp fault code (LFC) 52 (or higher priority code if one exists) on the air bag indicator.

##### **Possible Causes**

A passenger safety belt buckle switch circuit fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty passenger safety belt buckle switch.
- RCM is faulted.

**PINPOINT TEST Q: LFC 52/DTC B2438 - PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT SHORT TO GROUND**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### **Q1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety

**canopy module. Doing so can result in safety canopy deployment.**

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

**• Was DTC B2438 retrieved during the on-demand self test?**

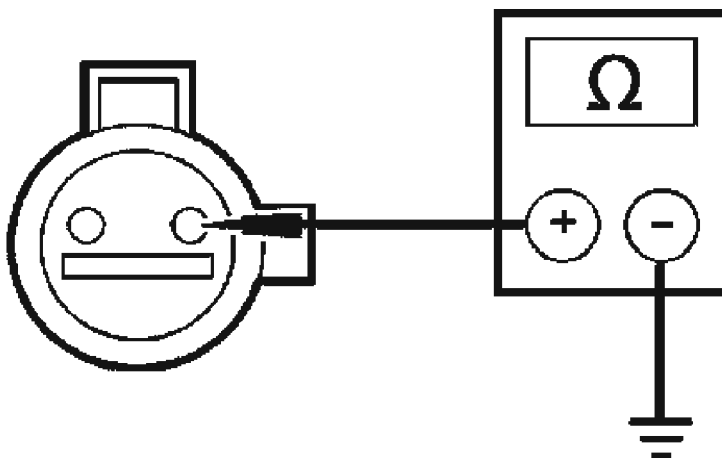
**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to Q2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to Q5.

**Q2 CHECK CIRCUIT 1514 (RD/BK) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE PASSENGER SAFETY BELT BUCKLE SWITCH**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: Passenger Safety Belt Buckle Switch C3066.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between passenger safety belt buckle switch C3066 pin 1, circuit 1514 (RD/BK), harness side and ground.





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**Fig. 155: Measuring Resistance Between Passenger Safety Belt Buckle Switch And Ground**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms?

Yes : GO to Q3.

No : REPAIR circuit 1514 (RD/BK). GO to Q6.

### **Q3 CHECK THE SAFETY BELT BUCKLE SWITCH**

- Connect: RCM C2041a and C2041b.
- Install a known good passenger safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Connect: Passenger Safety Belt Buckle Switch C3066.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Was DTC B2438 retrieved during the on-demand self test?

Yes : GO to Q4.

No : Fault corrected. GO to Q6.

## Q4 CONFIRM THE RCM FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Reinstall the original passenger safety belt buckle assembly. Refer to SAFETY BELT SYSTEM.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2438 retrieved during the on-demand self test?**  
**Yes :** INSTALL a new RCM. REFER to RESTRAINTS CONTROL MODULE (RCM). GO to Q6.  
**No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to Q6.

## Q5 CHECK FOR AN INTERMITTENT FAULT

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2438 retrieved during the on-demand self test?**  
**Yes :** GO to Q2.  
**No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to Q6.

## Q6 CHECK FOR ADDITIONAL DTCs

- Refer to the continuous DTCs recorded during Step Q1.
- **Were any continuous DTCs retrieved during Step Q1**  
**Yes :** Do not clear any DTCs until all DTCs have been resolved. GO to the RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE for pinpoint test direction.  
**No :** RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION. REPOWER the

system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test R: LFC 52/DTC B2439 - Passenger Safety Belt Buckle Switch Resistance Out of Range****Normal Operation**

The restraints control module (RCM) checks the passenger safety belt buckle switch circuits for faults. If the RCM detects a current out of range fault, it will store diagnostic trouble code (DTC) B2439 in memory and flash lamp fault code (LFC) 52 (or higher priority code if one exists) on the air bag indicator.

**Possible Causes**

A passenger safety belt buckle switch current out of range fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty passenger safety belt buckle switch.
- RCM is faulted.

**PINPOINT TEST R: LFC 52/DTC B2439 - PASSENGER SAFETY BELT BUCKLE SWITCH RESISTANCE OUT OF RANGE**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**R1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal

mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was DTC B2439 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to R2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to R4.

**R2 CHECK THE SAFETY BELT BUCKLE SWITCH**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Install a known good passenger safety belt buckle assembly. Refer to SAFETY BELT SYSTEM.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2438 retrieved during the on-demand self test?**

Yes : GO to R3.

No : Fault corrected. GO to R5.

**R3 CONFIRM THE RCM FAULT**

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Reinstall the original passenger safety belt buckle assembly. Refer to SAFETY BELT SYSTEM.
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2439 retrieved during the on-demand self test?**  
**Yes :** INSTALL a new RCM. REFER to RESTRAINTS CONTROL MODULE (RCM). GO to R5.  
**No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to R5.

**R4 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2439 retrieved during the on-demand self test?**

**Yes** : GO to R2.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to R5.

### **R5 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step R1.
- **Were any continuous DTCs retrieved during Step R1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

#### **Pinpoint Test S: LFC 51/DTC B2691 - Driver Safety Belt Buckle Switch Circuit Fault**

##### **Normal Operation**

The restraints control module (RCM) checks the safety belt buckle switch circuits for faults. If the RCM detects an open circuit or short to voltage fault, it will store diagnostic trouble code (DTC) B2691 in memory and flash lamp fault code (LFC) 51 (or higher priority code if one exists) on the air bag indicator.

##### **Possible Causes**

A driver safety belt buckle switch open circuit or short to voltage fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty driver safety belt buckle switch.
- a faulted RCM.

#### **PINPOINT TEST S: LFC 51/DTC B2691 - DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT FAULT**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

## S1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

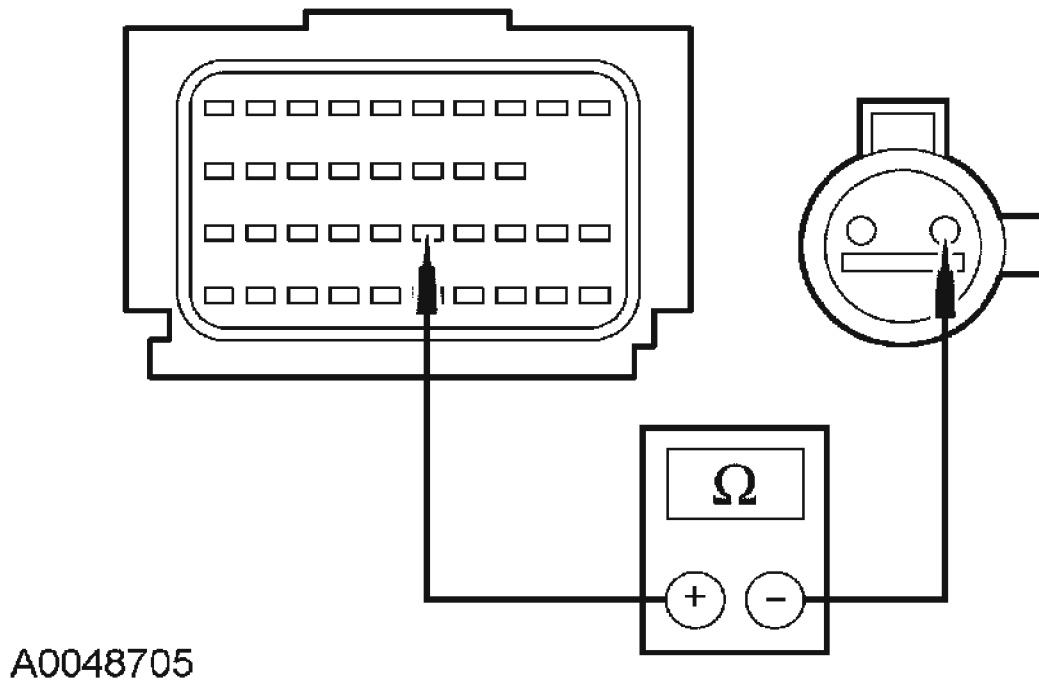
**NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was the DTC B2691 retrieved during the on-demand self test?**  
**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to S2.  
**No :** This is an intermittent fault. The fault condition is not present at this time. GO to S7.

**S2 CHECK CIRCUIT 85 (BN/LB) FOR AN OPEN BETWEEN THE RCM AND THE DRIVER SAFETY BELT BUCKLE SWITCH**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Driver Safety Belt Buckle Switch C3065.
- Measure the resistance between RCM C2041b pin 25, circuit 85 (BN/LB), harness side and driver safety belt buckle switch C3065 pin 2, circuit 85 (BN/LB), harness side.





**Fig. 156: Measuring Resistance Between RCM And Driver Safety Belt Buckle Switch**

Courtesy of FORD MOTOR CO.

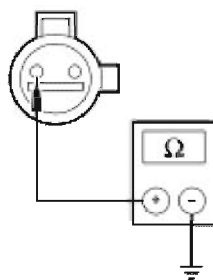
- Is the resistance less than 0.5 ohm?

Yes : GO to S3.

No : REPAIR circuit 85 (BN/LB). GO to S8.

**S3 CHECK CIRCUIT 1203 (BK/LB) FOR AN OPEN**

- Measure the resistance between driver safety belt buckle switch C3065 pin 2, circuit 1203 (BK/LB), harness side and ground.



**Fig. 157: Measuring Resistance Between Connector And Ground**

Courtesy of FORD MOTOR CO.

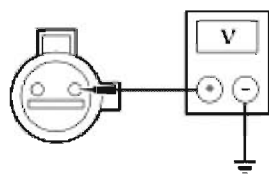
- Is the resistance less than 0.5 ohm?

Yes : GO to S4.

No : REPAIR circuit 1203 (BK/LB). GO to S8.

#### **S4 CHECK CIRCUIT 85 (BN/LB) FOR A SHORT TO VOLTAGE**

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between driver safety belt buckle switch C3065 pin 1, circuit 85 (BN/LB), harness side and ground.



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**Fig. 158: Measuring Voltage Between connector And Ground**  
Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?

Yes : GO to S5.

No : REPAIR circuit 85 (BN/LB). GO to S8.

#### **S5 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect: RCM C2041a and C2041b.
- Install a known good driver safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Connect: Driver Safety Belt Buckle Switch C3065.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Was DTC B2691 retrieved during the on-demand self test?  
Yes : GO to S6.

**No** : Fault corrected. GO to S8.

## **S6 CONFIRM THE RCM FAULT**

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Reinstall the original driver safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2691 retrieved during the on-demand self test?**  
**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to S8.  
**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to S8.

## **S7 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2691 retrieved during the on-demand self test?**  
**Yes** : GO to S2.  
**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to S8.

## **S8 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step S1.
- **Were any continuous DTCs retrieved during Step S1**  
**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.  
**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT**

**SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test T: LFC 52/DTC B2692 - Passenger Safety Belt Buckle Switch Circuit Fault**

**Normal Operation**

The restraints control module (RCM) checks the passenger safety belt buckle switch circuits for faults. If the RCM detects an open circuit or short to voltage fault, it will store diagnostic trouble code (DTC) B2692 in memory and flash lamp fault code (LFC) 52 (or higher priority code if one exists) on the air bag indicator.

**Possible Causes**

A passenger safety belt buckle switch open circuit or short to voltage fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty passenger safety belt buckle switch.
- RCM is faulted.

**PINPOINT TEST T: LFC 52/DTC B2692 - PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT FAULT**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**T1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal

mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

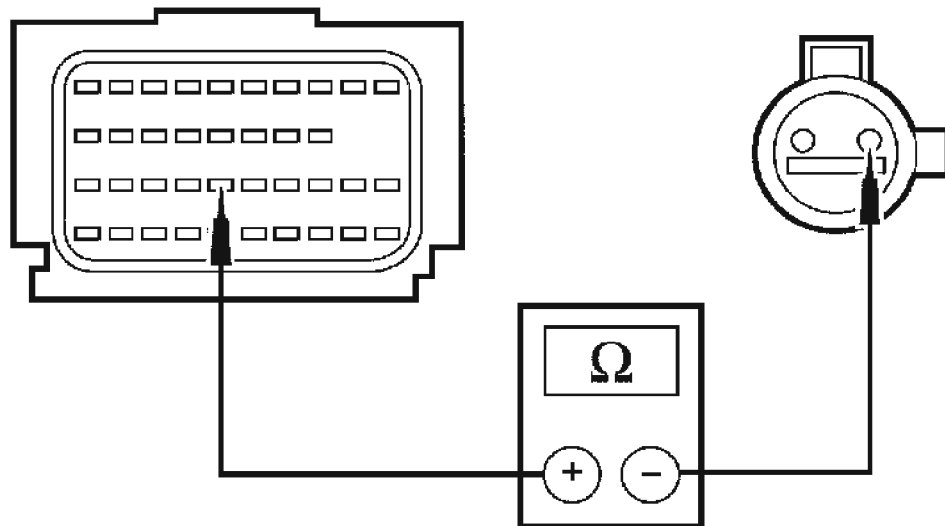
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- **Was the DTC B2692 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to T2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to T7.

## T2 CHECK CIRCUIT 1514 (RD/BK) FOR AN OPEN BETWEEN THE RCM AND THE PASSENGER SAFETY BELT BUCKLE SWITCH

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Passenger Safety Belt Buckle Switch C3066.
- Measure the resistance between RCM C2041b pin 26, circuit 1514 (RD/BK), harness side and the passenger safety belt buckle switch C3066 pin 1, circuit 1514 (RD/BK), harness side.



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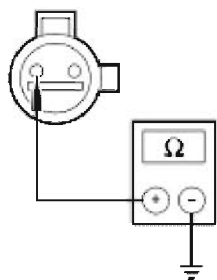
**Fig. 159: Measuring Resistance Between RCM And Passenger Safety Belt Buckle Switch**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?  
 Yes : GO to T3.  
 No : REPAIR circuit 1514 (RD/BK). GO to T8.

## T3 CHECK CIRCUIT 1203 (BK/LB) FOR AN OPEN

- Measure the resistance between passenger safety belt buckle switch C3066 pin 2, circuit 1203 (BK/LB), harness side and ground.



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**Fig. 160: Measuring Resistance Between Connector And Ground**  
 Courtesy of FORD MOTOR CO.

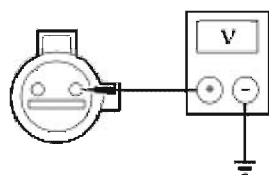
- Is the resistance less than 0.5 ohm?

Yes : GO to T4.

No : REPAIR circuit 1203 (BK/LB). GO to T8.

#### **T4 CHECK CIRCUIT 1514 (RD/BK) FOR A SHORT TO VOLTAGE**

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between passenger seat belt buckle switch C3066 pin 1, circuit 1514 (RD/BK), harness side and ground.



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**Fig. 161: Measuring Voltage Between connector And Ground**  
 Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?

Yes : GO to T5.

No : REPAIR circuit 1514 (RD/BK). GO to T8.

#### **T5 CHECK THE SAFETY BELT BUCKLE SWITCH**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

- Connect: RCM C2041a and C2041b.
- Install a known good passenger safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Connect: Passenger Safety Belt Buckle Switch C3066.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2692 retrieved during the on-demand self test?**  
Yes : GO to T6.  
No : Fault corrected. GO to T8.

**T6 CONFIRM THE RCM FAULT**

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Reinstall the original passenger safety belt buckle assembly. Refer to **SAFETY BELT SYSTEM**.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was the DTC B2692 retrieved during the on-demand self test?**  
Yes : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to T8.  
No : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to T8.

**T7 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC B2692 retrieved during the on-demand self test?**  
Yes : GO to T2.  
No : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard



fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to T8.

### **T8 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step T1.

- **Were any continuous DTCs retrieved during Step T1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test U: LFC 16/DTC B2909 - Belt Tension Sensor Fault**

**Normal Operation**

**NOTE:** LFC 16 is shared between DTC B2290 and DTC B2909.

**NOTE:** There was a change to the belt tension sensor (BTS) (part of the passenger safety belt retractor assembly) dependent on the vehicle build date. When installing a new passenger safety belt retractor assembly, always make sure the correct passenger safety belt retractor assembly is being installed. The passenger safety belt retractor assemblies are not interchangeable.

**NOTE:** There was a change to the OCS ECU dependent on the vehicle build date. The OCS ECU will have either a 10-pin connector (early build) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS service kit is being installed. The early build/late build OCS service kits are not interchangeable.

The belt tension sensor is part of the occupant classification sensor (OCS) system. The OCS system interprets a variable voltage signal provided by the safety belt tension sensor to identify the possible presence of a child safety seat in the front passenger seat. The voltage output of the belt tension sensor is proportional to the amount of tension applied to the sensor by the belt, no tension low voltage (approximately 0.95 volt), high tension high voltage (approximately 3.8 volts).

The occupant classification sensor (OCS) system checks the belt tension sensor circuits for

faults. If the OCS detects one of the following faults on any of the belt tension sensor circuits, it will report the failure to the RCM. The RCM will store diagnostic trouble code (DTC) B2909 in memory and flash either lamp fault code (LFC) 16 (or higher priority code if one exists) on the air bag indicator.

The occupant classification sensor (OCS) system components (seat cushion foam pad, bladder with pressure sensor and electronic control unit) are calibrated to each other and are serviced as an assembly. The OCS system components are not to be installed separately with the exception of the belt tension sensor. If a new OCS system, OCS system component or seat cushion foam pad are needed, a new OCS system service kit (seat cushion foam pad, bladder with pressure sensor and electronic control unit) must be installed as an assembly.

#### **Possible Causes**

A belt tension sensor circuit fault can be caused by one of the following:

- damaged wiring, terminals or connectors.
- a faulted belt tension sensor.
- a faulted OCS ECU.

#### **PINPOINT TEST U: LFC 16/DTC B2909 - BELT TENSION SENSOR FAULT**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### **U1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module

(RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2909/Record All Flagged Faults.
- Enter the following diagnostic mode on the scan tool: Retrieve/Flag/Record Continuous DTCs.
- **Was DTC B2909 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

Using the flagged faults recorded, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint test must be carried out.

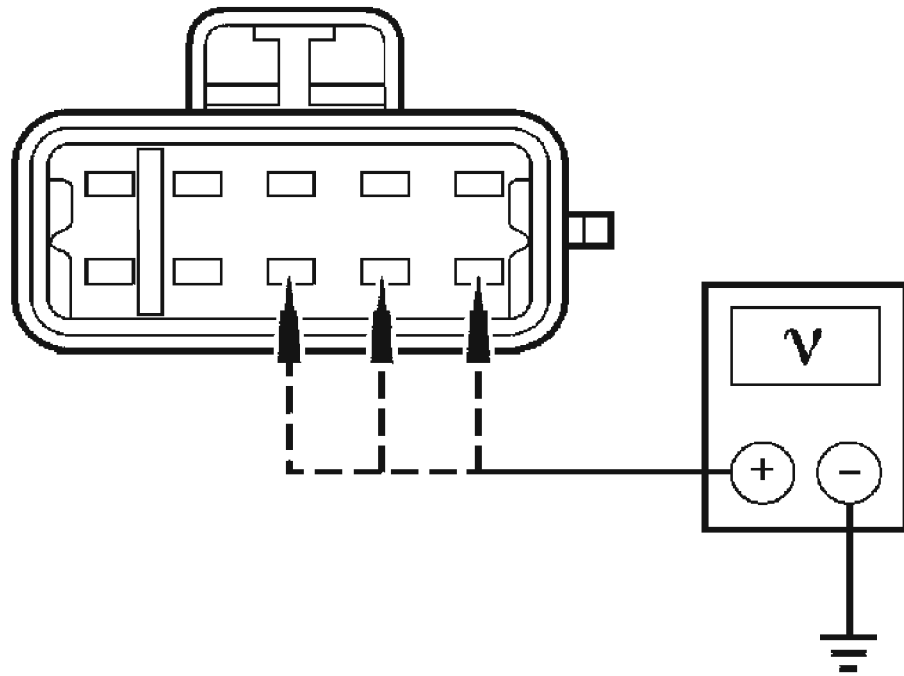
For belt tension sensor with a circuit fault (FPTS\_F), GO to U2.

For belt tension sensor with a short to ground fault (FPTS\_SG), GO to U4.

**No** : This is an intermittent fault. The fault condition is not present at this time. GO to U9.

## **U2 CHECK THE BELT TENSION SENSOR CIRCUITS FOR A SHORT TO VOLTAGE**

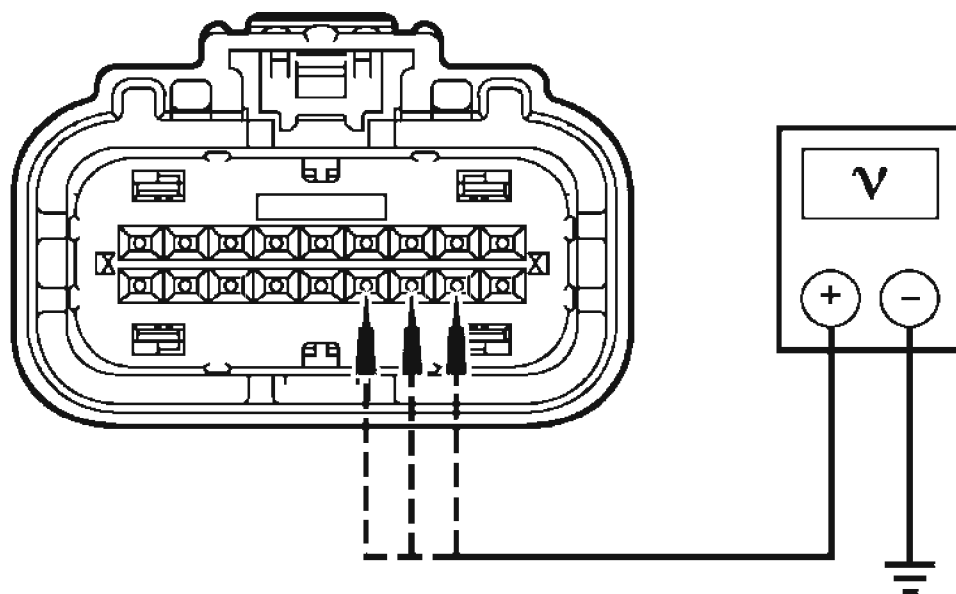
- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: Belt Tension Sensor C389 (Early build).
- Disconnect: Belt Tension Sensor C3282 (Late build).
- Disconnect: OCS ECU C3159 (Early build).
- Disconnect: OCS ECU C3285 (Late build).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- **Early build vehicles** , measure the voltage between the OCS ECU C3159 pin B, circuit 2088 (TN/RD), harness side and ground; pin C, circuit 1203 (BK/LB), harness side and ground; pin A, circuit 2089 (OG/BK), harness side and ground.



A0074134

**Fig. 162: Measuring Voltage Between OCS ECU C3159 Pin B, Circuit 2088 (TN/RD), Harness Side And Ground**  
Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the voltage between the OCS ECU C3285 pin 11, circuit 2088 (TN/RD), harness side and ground; pin 13, circuit 1203 (BK/LB), harness side and ground; pin 12, circuit 2089 (OG/BK), harness side and ground.



N0003715

**Fig. 163: Measuring Voltage Between OCS ECU And Ground**  
 Courtesy of FORD MOTOR CO.

- Are the voltages less than 0.2 volt?

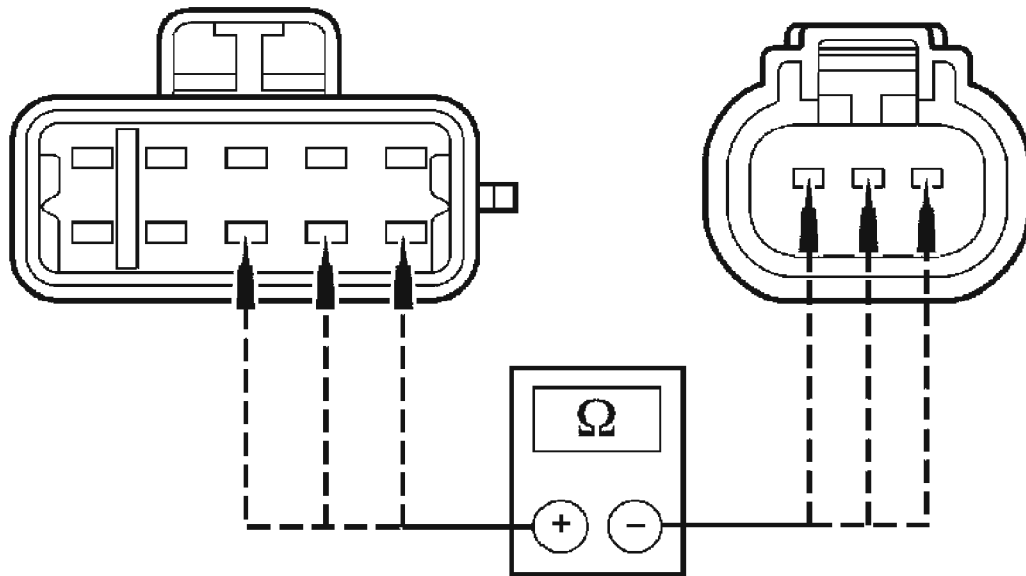
Yes : GO to U3.

No : REPAIR circuit 2088 (TN/RD), circuit 2089 (OG/BK) or circuit 1203 (BK/LB). GO to U10.

### U3 CHECK BELT TENSION SENSOR CIRCUITS FOR OPEN

**NOTE:** Early build BTS connector shown, late build similar.

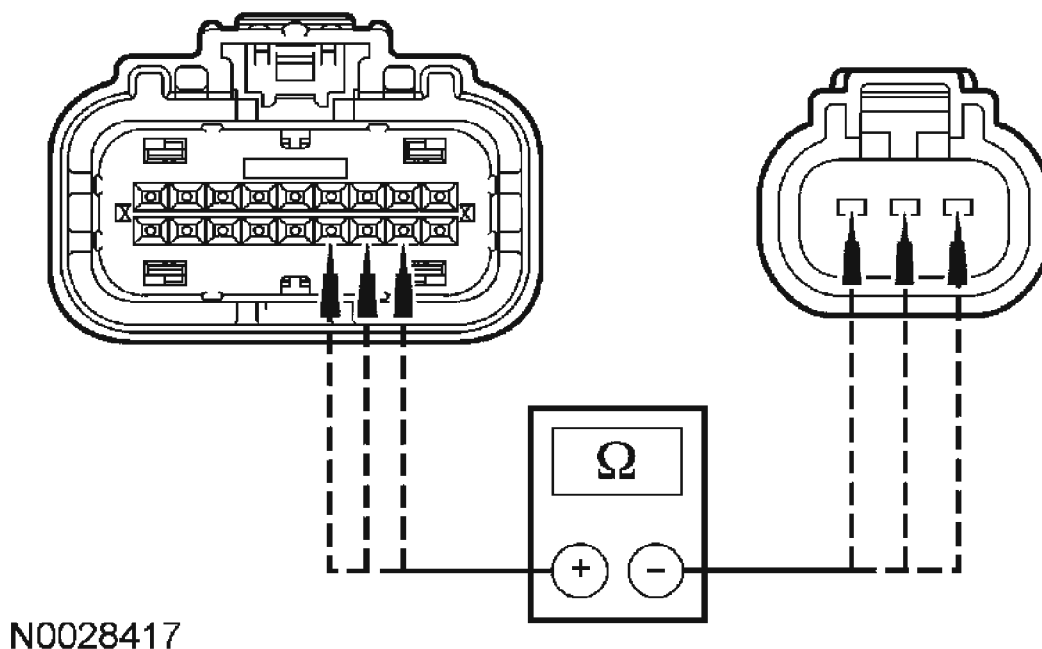
- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- **Early build vehicles** , measure the resistance between OCS C3159 pin B, circuit 2088 (TN/RD), harness side and the belt tension sensor C389 pin 1, circuit 2088 (TN/RD), harness side; and between OCS C3159 pin C, circuit 1203 (BK/LB), harness side and the belt tension sensor C389 pin 2, circuit 1203 (BK/LB), harness side; and between the OCS C3159 pin A, circuit 2089 (OG/BK), harness side and the belt tension sensor C389 pin 3, circuit 2089 (OG/BK), harness side.



A0075672

**Fig. 164: Measuring Resistance Between OCS And Belt Tension Sensor**  
Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS C3285 pin 11, circuit 2088 (TN/RD), harness side and the belt tension sensor C3282 pin 1, circuit 2088 (TN/RD), harness side; and between OCS C3285 pin 13, circuit 1203 (BK/LB), harness side and the belt tension sensor C3282 pin 2, circuit 1203 (BK/LB), harness side; and between the OCS C3285 pin 12, circuit 2089 (OG/BK), harness side and the belt tension sensor C3282 pin 3, circuit 2089 (OG/BK), harness side.



**Fig. 165: Measuring Resistance Between OCS C3285 Pin 11, Circuit 2088 (TN/RD), Harness Side And Belt Tension Sensor**  
 Courtesy of FORD MOTOR CO.

- Are the resistances less than 0.5 ohm?

Yes : GO to U5.

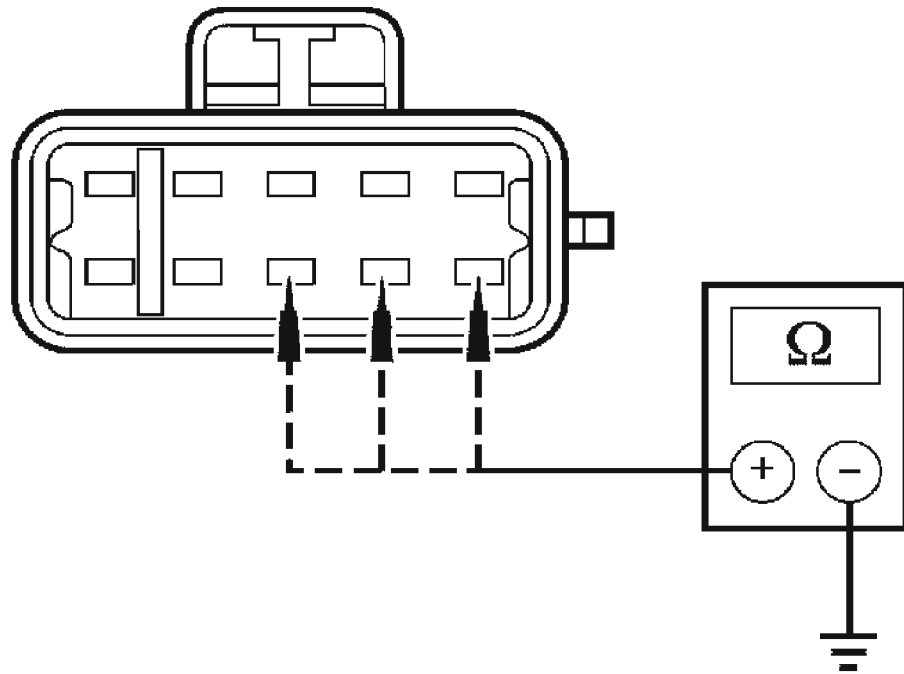
No : REPAIR circuit 2088 (TN/RD), circuit 2089 (OG/BK) or circuit 1203 (BK/LB).

GO to U10.

#### **U4 CHECK CIRCUITS 2088 (TN/RD), 2089 (OG/BK) and 1203 (BK/LB) FOR A SHORT TO GROUND**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- **Early build vehicles** , measure the resistance between OCS ECU C3159 pin B, circuit 2088 (TN/RD), harness side and ground; and between OCS ECU C3159 pin A, circuit 2089 (OG/BK) harness side and ground; and between OCS ECU C3159 pin C, circuit 1203 (BK/LB), harness side and ground.

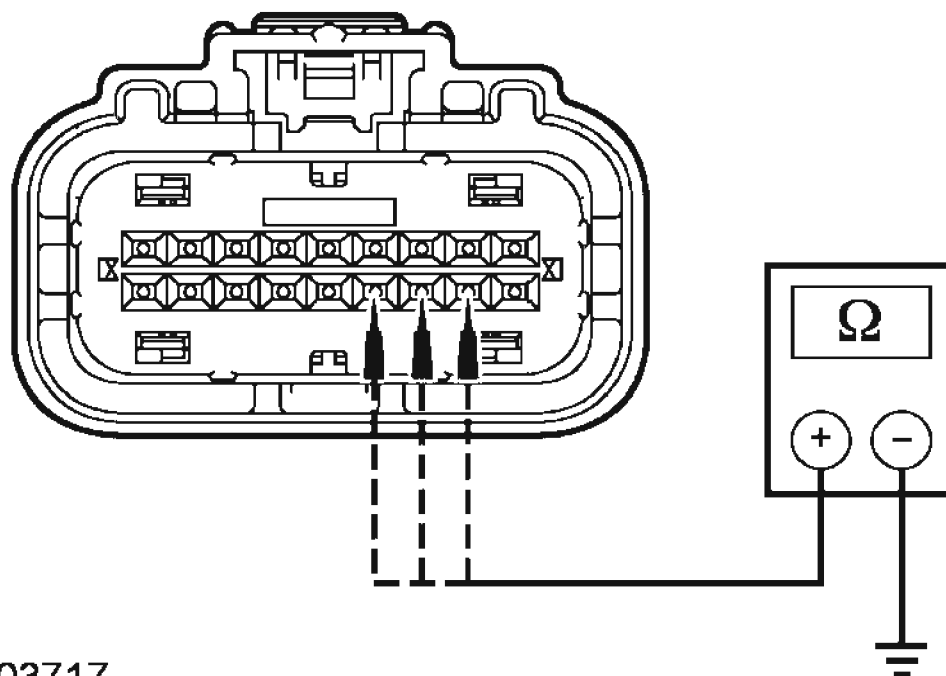




A0074130

**Fig. 166: Measuring Resistance Between OCS ECU C3159 Pin B, Circuit 2088 (TN/RD), Harness Side And Ground**  
Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285 pin 11, circuit 2088 (TN/RD), harness side and ground; and between OCS ECU C3285 pin 12, circuit 2089 (OG/BK) harness side and ground; and between OCS ECU C3285 pin 13, circuit 1203 (BK/LB), harness side and ground.



N0003717

**Fig. 167: Measuring Resistance Between OCS ECU C3285 Pin 11, Circuit 2088 (TN/RD), Harness Side And Ground**  
Courtesy of FORD MOTOR CO.

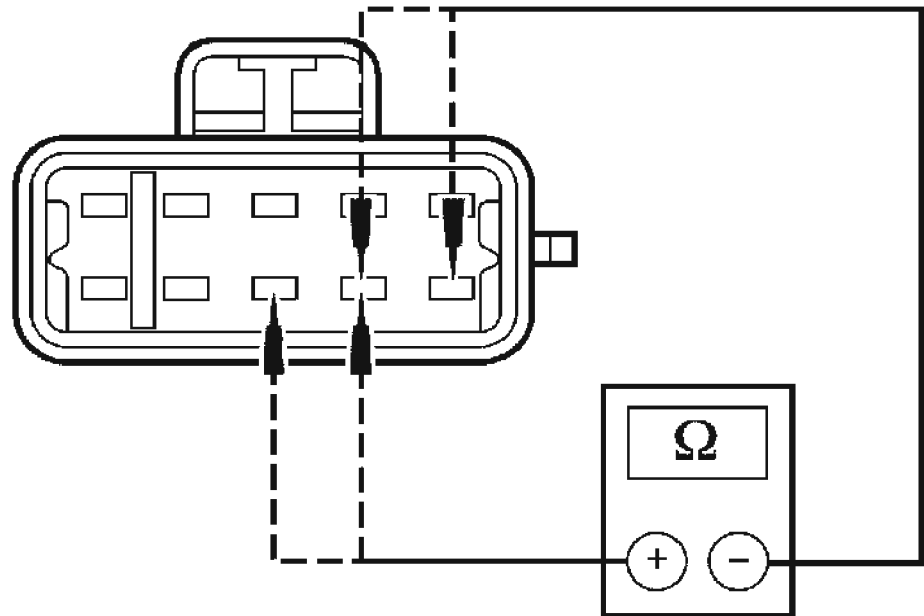
- **Are the resistances greater than 10,000 ohms?**

**Yes :** GO to U5.

**No :** REPAIR circuit 2088 (TN/RD), circuit 2089 (OG/BK) or circuit 1203 (BK/LB). GO to U10.

**U5 CHECK CIRCUITS 2088 (TN/RD), 2089 (OG/BK) AND 1203 (BK/LB) FOR A SHORT**

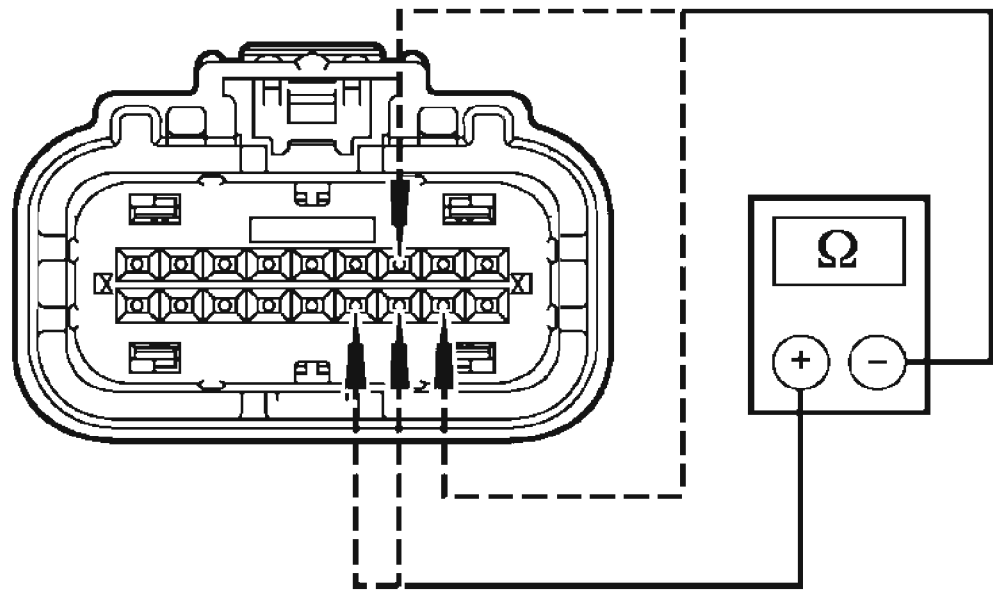
- **Early build vehicles** , measure the resistance between OCS ECU C3159:
  - pin B, circuit 2088 (TN/RD), harness side and pin A, circuit 2089 (OG/BK), harness side.
  - pin B, circuit 2088 (TN/RD), harness side and pin C, circuit 1203 (BK/LB), harness side.
  - pin A, circuit 2089 (OG/BK), harness side and pin C, circuit 1203 (BK/LB), harness side.



A0074129

**Fig. 168: Measuring Resistance Between OCS ECU C3159**  
Courtesy of FORD MOTOR CO.

- **Late build vehicles** , measure the resistance between OCS ECU C3285:
  - pin 11, circuit 2088 (TN/RD), harness side and pin 12, circuit 2089 (OG/BK), harness side.
  - pin 11, circuit 2088 (TN/RD), harness side and pin 13, circuit 1203 (BK/LB), harness side.
  - pin 12, circuit 2089 (OG/BK), harness side and pin 13, circuit 1203 (BK/LB), harness side.



N0003719

**Fig. 169: Measuring Resistance Between OCS ECU C3285**  
 Courtesy of FORD MOTOR CO.

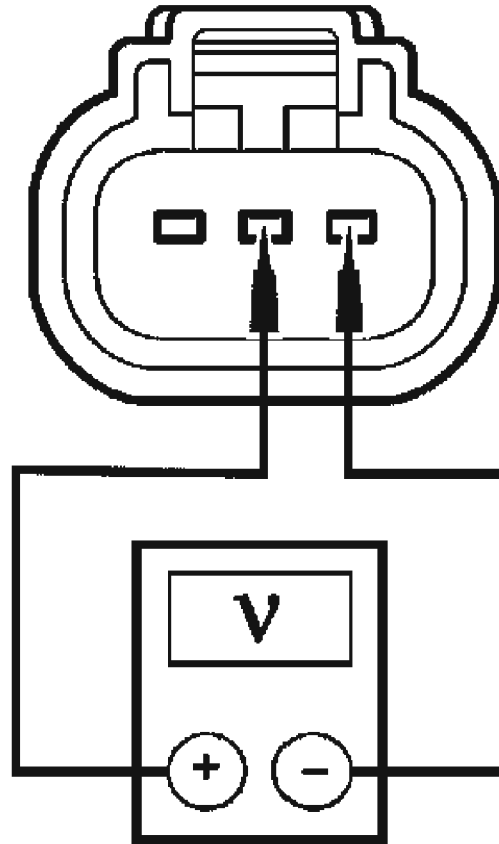
- Are the resistances greater than 10,000 ohms?

Yes : GO to U6.

No : REPAIR circuit 2088 (TN/RD), circuit 1203 (BK/LB) or circuit 2089 (OG/BK). GO to U10.

#### U6 CHECK OCS ECU OUTPUT

- Connect: OCS ECU C3159 (Early build).
- Connect: OCS ECU C3285 (Late build).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between belt tension sensor C389 (early build) or C3282 (late build) pin 1, circuit 2088 (TN/RD), harness side and pin 2, circuit 1203 (BK/LB), harness side.



A0074734

**Fig. 170: Measuring Voltage**  
Courtesy of FORD MOTOR CO.

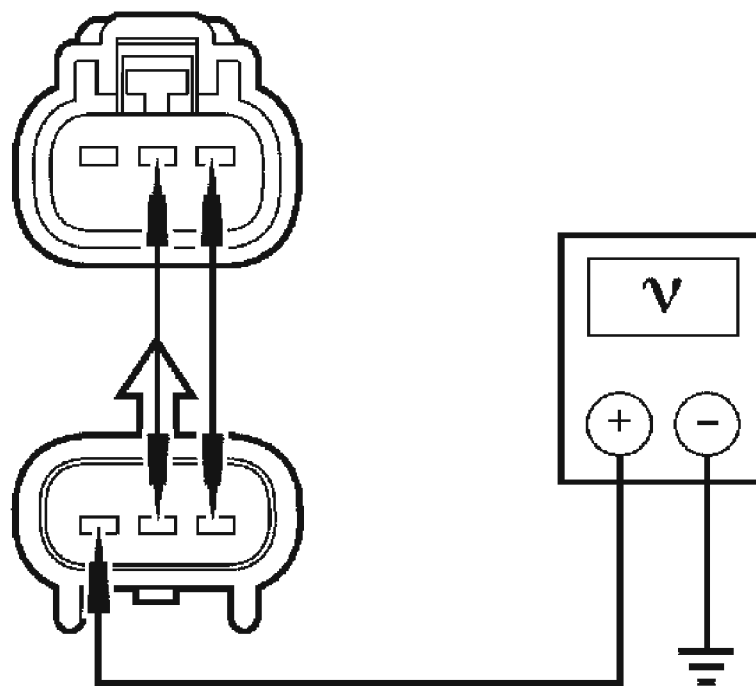
- Is the voltage approximately 5 volts?

Yes : GO to U7.

No : INSTALL a new OCS service kit. REFER to **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**. GO to U10.

#### **U7 CHECK BELT TENSION SENSOR VOLTAGE OUTPUT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Connect a fused jumper lead between the belt tension sensor C389 (early build) or C3282 (late build) pin 1, circuit 2088 (TN/RD), harness side and pin 1, circuit 2088 (TN/RD), component side.



A0074128

**Fig. 171: Connecting Fused Jumper Lead**  
 Courtesy of FORD MOTOR CO.

- Connect a fused jumper lead between the belt tension sensor C389 (early build) or C3282 (late build) pin 2, circuit 1203 (BK/LB), harness side and pin 2, circuit 1203 (BK/LB), component side.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between the belt tension sensor C389 (early build) or C3282 (late build) pin 3, circuit 2089 (OG/BK), component side and ground as you vary the tension of the belt tension sensor.
- **Does the voltage vary from approximately 0.95 volt with no tension applied to the sensor to approximately 3.8 volts with full tension applied to the sensor?**

**Yes** : GO to U8.

**No** : INSTALL a new belt tension sensor. REFER to **SAFETY BELT SYSTEM** . GO to U10.

## U8 CONFIRM THE BELT TENSION SENSOR FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Connect: OCS ECU C3159 (Early build).
- Connect: OCS ECU C3285 (Late build).
- Connect: Belt Tension Sensor C389 (Early build).
- Connect: Belt Tension Sensor C3282 (Late build).
- Repower the system. **Do not** prove out the system at this time. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: FLAG DTC B2909/Record All Flagged Faults.
- **Was DTC B2909 retrieved during the on-demand self test?**
  - Yes :** INSTALL a new OCS service kit. REFER to OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT. GO to U10.
  - No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to U10.

## U9 CHECK FOR AN INTERMITTENT FAULT

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Flag DTC B2909/Record All Flagged Faults.
- **Was DTC B2909 retrieved during the on-demand self test?**
  - Yes :** This is a hard fault. The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test.

Using the flagged faults recorded, GO to the appropriate PINPOINT TEST step.

If a flagged fault of "?" was recorded, multiple faults exist and the entire pinpoint

test must be carried out.

For belt tension sensor with a circuit fault (FPTS\_F), GO to U2.

For belt tension sensor with a short to ground fault (FPTS\_SG), GO to U4.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently.

ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to U10.

#### U10 CHECK FOR ADDITIONAL DTCs

- Refer to the continuous DTCs recorded during Step U1.
- **Were any continuous DTCs retrieved during Step U1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

#### Pinpoint Test V: LFC 15/DTC C1414 - Incorrect Vehicle ID

##### Normal Operation

**NOTE:** There are a number of possible occupant classification sensor (OCS) systems dependent on the vehicle build date and if equipped with heated seat option. The OCS ECU will have either a 10-pin connector (different calibrations based on vehicle build date) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS system service kit is being installed according to vehicle build date and heated seat option. The OCS system service kits are not interchangeable.

The restraints control module (RCM) monitors the communication condition and circuits of the OCS sensor for an embedded vehicle ID. If the RCM detects an unexpected condition or code from the OCS, it will store diagnostic trouble code (DTC) C1414 in memory and flash lamp fault code (LFC) 15 (or higher priority code if one exists) on the air bag indicator. For the Escape Hybrid vehicle, the RCM also monitors for a ground circuit on C2041a pin 21.

##### Possible Causes



An incorrect vehicle identification code can be caused by:

- damaged wiring, terminals or connectors.
- incorrect OCS system for vehicle.
- incorrect RCM for vehicle.

**PINPOINT TEST V: LFC 15/DTC C1414 - INCORRECT VEHICLE ID**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**V1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor

**pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.**

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

**• Was DTC C1414 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to V2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to V7.

## **V2 CHECK VEHICLE HISTORY**

- Key in OFF position.
- Check vehicle repair history.
- **Has a new RCM or OCS system been installed during this or a prior repair?**

**Yes :** If a new RCM has been installed or serviced, GO to V4.

If a new OCS system has been installed or serviced, GO to V3.

**No; For Escape Hybrid ,** GO to V5.

**For Escape/Mariner ,** GO to V6.

## **V3 CHECK OCS SYSTEM**

**NOTE:** There are a number of possible OCS systems dependent on the vehicle build date and if equipped with heated seat option. The OCS ECU will have either a 10-pin connector (different calibrations based on vehicle build date) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS system service kit is being installed according to vehicle build date and heated seat option. The OCS system service kits are not interchangeable.

- Key in OFF position.
- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Verify the correct OCS system has been installed for the vehicle's build date.
- **Is the correct OCS system installed?**  
**Yes :** For Escape Hybrid , GO to V5.

**For Escape/Mariner , GO to V6.**

**No :** INSTALL the correct OCS system service kit. REFER to OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT. GO to V8.

#### **V4 CHECK RCM**

- Key in OFF position.
- Verify the correct RCM has been installed for the vehicle's build date.
- **Is the correct RCM installed?**  
**Yes :** For Escape Hybrid , GO to V5.

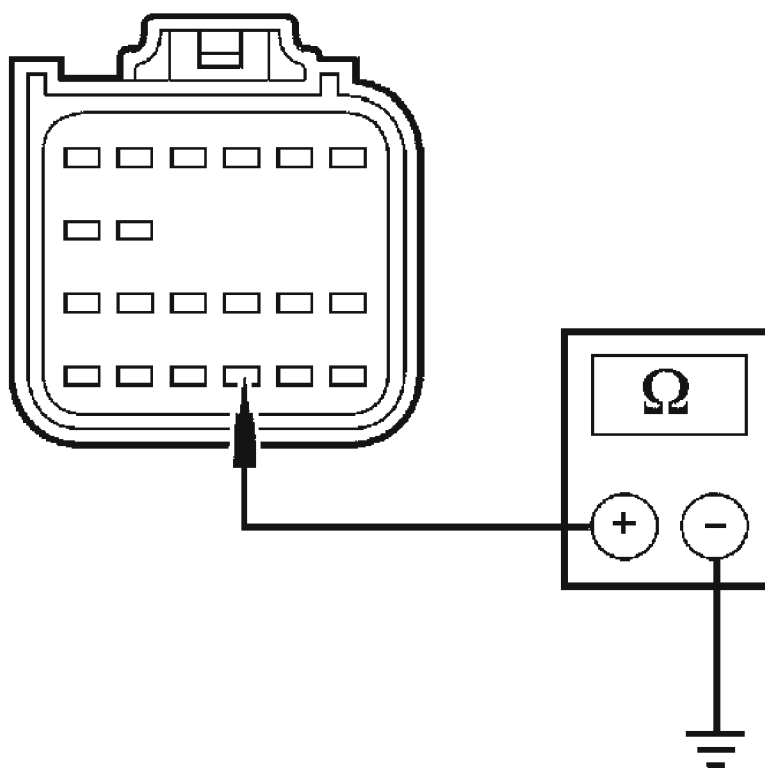
**For Escape/Mariner , GO to V6.**

**No :** INSTALL the correct RCM. REFER to RESTRAINTS CONTROL MODULE (RCM). GO to V8.

#### **V5 CHECK THE RCM I.D. GROUND CIRCUIT (ESCAPE HYBRID)**

**NOTE:** For this vehicle application, RCM C2041a pin 21 should be grounded to circuit 1203 (BK/LB).

- Depower the system. Refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.
- Disconnect: RCM C2041a and C2041b.
- Measure the resistance between RCM C2041a pin 21, circuit 1203 (BK/LB), harness side and ground.



A0074961

**Fig. 172: Measuring Resistance Between RCM C2041A Pin 21, Circuit 1203 (BK/LB), Harness Side And Ground**  
 Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

Yes : GO to V6.

No : REPAIR circuit 1203 (BK/LB). GO to V8.

#### V6 CONFIRM THE RCM FAULT

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Connect: RCM C2041a and C2041b (if disconnected in a previous step).
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.

- **Was the DTC C1414 retrieved during the on-demand self test?**

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to V8.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to V8.

## **V7 CHECK FOR INTERMITTENT FAULTS**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1414 retrieved during the on-demand self test?**

**Yes** : INSTALL new RCM. GO to V2.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. ACTIVATE other systems in the same wire harness. REPAIR any intermittent concerns found. GO to V8.

## **V8 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step V1.
- **Were any continuous DTCs retrieved during Step V1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Pinpoint Test W: LFC 49/DTC C1947 - Seat Track Position Sensor Circuit Short to Ground**

#### **Normal Operation**

The restraints control module (RCM) monitors the driver seat track position sensor circuits. If the RCM detects a short to ground, it will store diagnostic trouble code (DTC) C1947 in memory and flash lamp fault code (LFC) 49 (or higher priority code if one exists) on the air bag indicator.

#### **Possible Causes**

A driver seat track position sensor short to ground fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty driver seat track position sensor.
- RCM is faulted.

**PINPOINT TEST W: LFC 49/DTC C1947 - SEAT TRACK POSITION SENSOR CIRCUIT SHORT TO GROUND**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### **W1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical

**connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.**

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

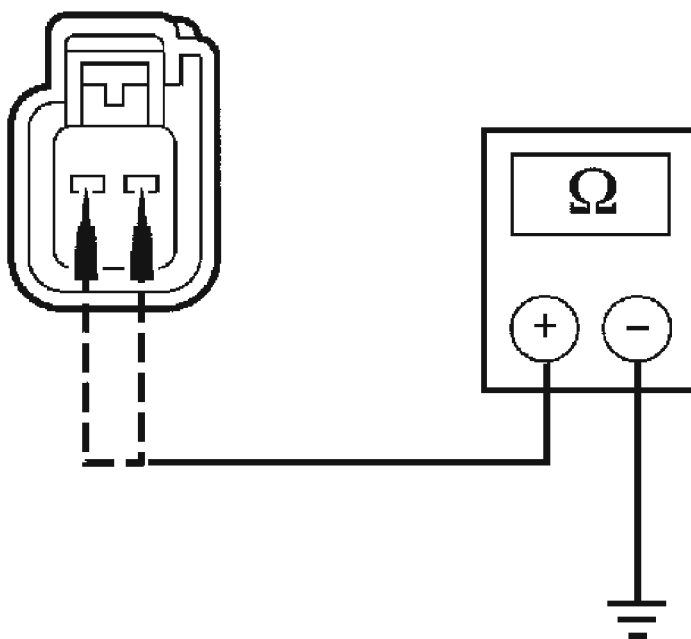
**• Was DTC C1947 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to W2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to W5.

**W2 CHECK CIRCUIT 1520 (LG) FOR A SHORT TO GROUND BETWEEN THE RCM AND THE DRIVER SEAT**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Seat Track Position Sensor C356.
- Measure the resistance between seat track position sensor C356 pin 2, circuit 1520 (LG), harness side and ground; and between seat track position sensor C356 pin 1, circuit 1203 (BK/LB) and ground.



A0088595

**Fig. 173: Measuring Resistance Between Seat Track Position Sensor C356 Pin 2, Circuit 1520 (LG), Harness Side And Ground**  
 Courtesy of FORD MOTOR CO.

- Is the resistance greater than 1,000,000 ohms for C356 pin 2, circuit 1520 (LG) and less than 5 ohms for C356 pin 1, circuit 1203 (BK/LB)?

Yes : GO to W3.

No : REPAIR circuit 1520 (LG) or circuit 1203 (BK/LB). GO to W6.

### **W3 CHECK THE SEAT TRACK POSITION SENSOR**

- Connect: RCM C2041a and C2041b.
- Install a known good seat track position sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1947 retrieved during the on-demand self test?**

Yes : GO to W4.

No : Fault corrected. GO to W6.



**W4 CONFIRM THE RCM FAULT**

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Reinstall the original seat track position sensor.
- Connect: Seat Track Position Sensor C356.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1947 retrieved during the on-demand self test?**
  - Yes :** INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to W6.
  - No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to W6.

**W5 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1947 retrieved during the on-demand self test?**
  - Yes :** GO to W2.
  - No :** CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to W6.

**W6 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step W1.
- **Were any continuous DTCs retrieved during Step W1 ?**
  - Yes :** Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.
  - No :** RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the

system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test X: LFC 49/DTC C1948 - Seat Track Position Sensor Circuit Resistance Out of Range**

**NOTE:** Due to the seat track position sensor being a Hall-effect type sensor, this pinpoint test will be diagnosing a current out of range fault instead of the current DTC definition for a resistance out of range fault.

#### **Normal Operation**

The restraints control module (RCM) monitors the driver seat track position sensor circuits. If the RCM detects a current out of range condition, it will store diagnostic trouble code (DTC) C1948 in memory and flash lamp fault code (LFC) 49 (or higher priority code if one exists) on the air bag indicator.

#### **Possible Causes**

A driver seat track position sensor circuit resistance out of range fault can be caused by:

- damaged wiring, terminals or connectors.
- a faulty driver seat track position sensor.
- RCM is faulted.

**PINPOINT TEST X: LFC 49/DTC C1948 - SEAT TRACK POSITION SENSOR CIRCUIT RESISTANCE OUT OF RANGE**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

#### **X1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle

over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.
- Was DTC C1948 retrieved during the on-demand self test?

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be

cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to X2.

**No** : This is an intermittent fault. The fault condition is not present at this time. GO to X4.

## **X2 CHECK THE SEAT TRACK POSITION SENSOR**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Install a known good seat track position sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1948 retrieved during the on-demand self test?**

**Yes** : GO to X3.

**No** : Fault corrected. GO to X5.

## **X3 CONFIRM THE RCM FAULT**

**NOTE:**      **Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Reinstall the original seat track position sensor.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1948 retrieved during the on-demand self test?**

**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to X5.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to X5.

## **X4 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1948 retrieved during the on-demand self test?**

**Yes** : GO to X2.

**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to X5.

### **X5 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step X1.
- **Were any continuous DTCs retrieved during Step X1**

**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.

**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Pinpoint Test Y: LFC 49/DTC C1981 - Seat Track Position Sensor Circuit Fault**

#### **Normal Operation**

The restraints control module (RCM) monitors the driver seat track position sensor circuits. If the RCM detects a open or short to battery, it will store diagnostic trouble code (DTC) C1981 in memory and flash lamp fault code (LFC) 49 (or higher priority code if one exists) on the air bag indicator.

#### **Possible Causes**

A driver seat track position sensor open circuit or short to battery fault can be caused by:

- damaged wiring, terminals or connectors.
- RCM is faulted.

### **PINPOINT TEST Y: LFC 49/DTC C1981 - SEAT TRACK POSITION SENSOR CIRCUIT FAULT**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM

and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

## Y1 CHECK FOR CONTINUOUS OR ON-DEMAND DTCs

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the

**vehicle over the road.**

**NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.**

- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- Enter the following diagnostic mode on the scan tool: Retrieve/Record Continuous DTCs.

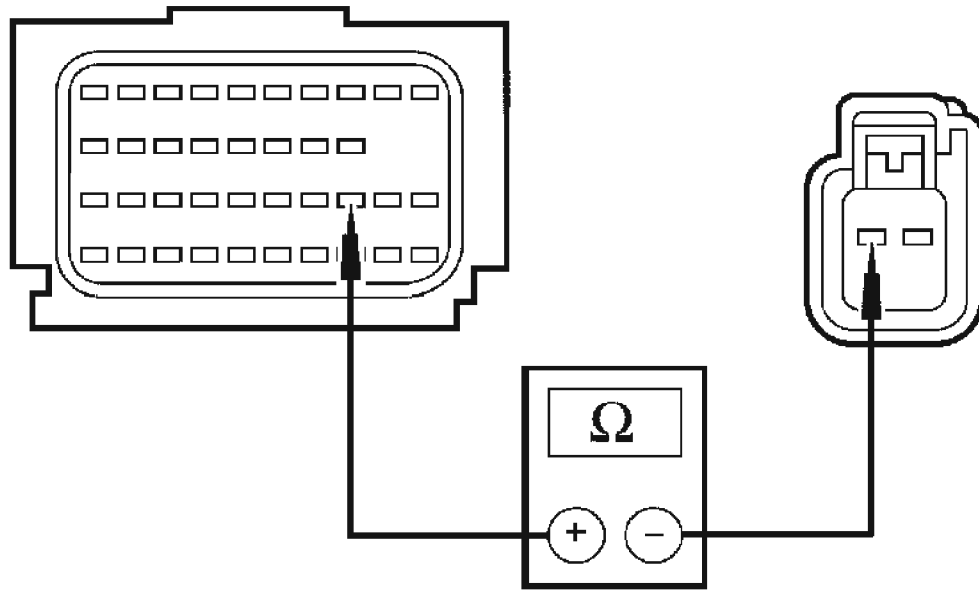
**• Was DTC C1981 retrieved during the on-demand self test?**

**Yes :** This is a hard fault. The fault condition is still present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. GO to Y2.

**No :** This is an intermittent fault. The fault condition is not present at this time. GO to Y6.

**Y2 CHECK CIRCUIT 1520 (LG) FOR AN OPEN**

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Disconnect: RCM C2041a and C2041b.
- Disconnect: Seat Track Position Sensor C356.
- Measure the resistance between RCM C2041b pin 23, circuit 1520 (LG), harness side and driver seat track position sensor C356 pin 2, circuit 1520 (LG), harness side.



A0048716

**Fig. 174: Measuring Resistance Between RCM Connector And Driver Seat Track Position Sensor Connector**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 0.5 ohm?

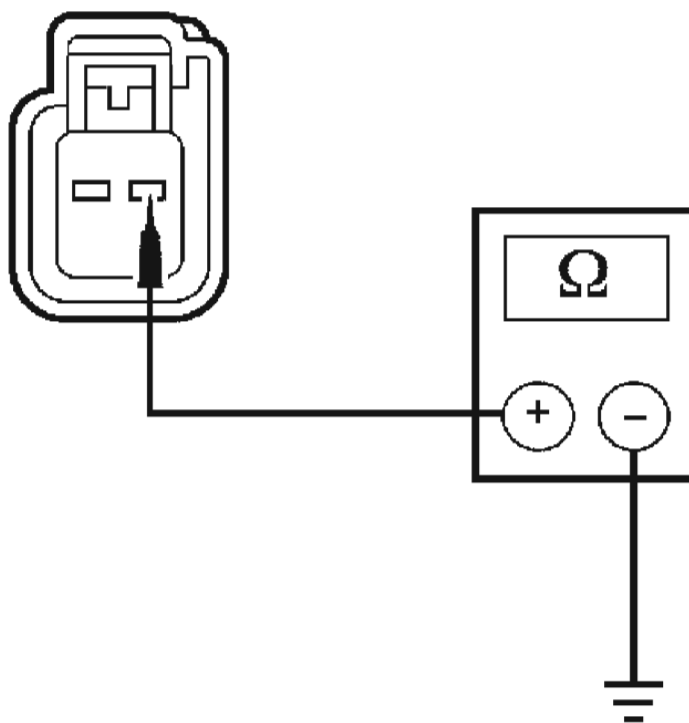
Yes : GO to Y3.

No : REPAIR circuit 1520 (LG). GO to Y7.

**Y3 CHECK CIRCUIT 1203 (BK/LB) FOR AN OPEN**

- Measure the resistance between driver seat track position sensor C356 pin 1, circuit 1203 (BK/LB), harness side and ground.





A0088601

**Fig. 175: Measuring Resistance Between Driver Seat Track Position Sensor And Ground**

Courtesy of FORD MOTOR CO.

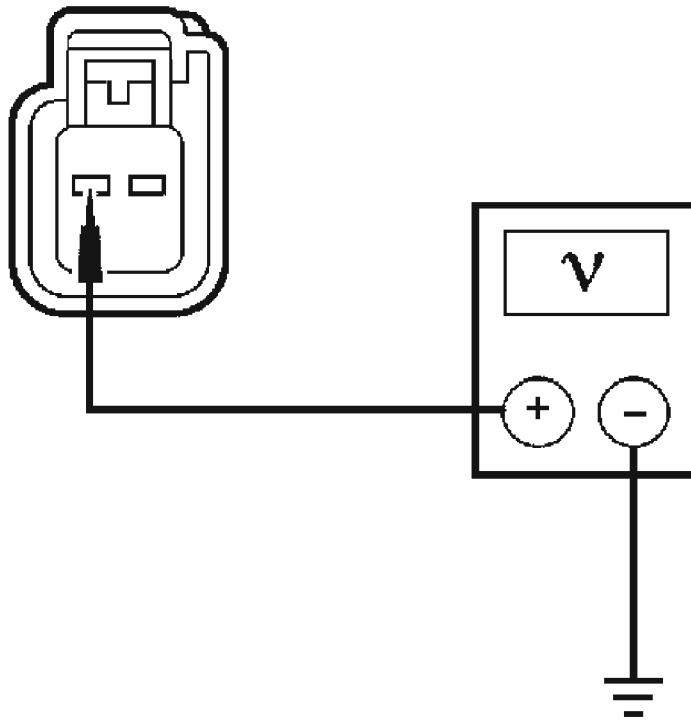
- Is the resistance less than 0.5 ohm?

Yes : GO to Y4.

No : REPAIR circuit 1203 (BK/LB). GO to Y7.

**Y4 CHECK CIRCUIT 1520 (LG) FOR A SHORT TO VOLTAGE**

- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Key in ON position.
- Measure the voltage between driver seat track position sensor C356 pin 2, circuit 1520 (LG), harness side and ground.



A0088603

**Fig. 176: Measuring Voltage Between Driver Seat Track Position Sensor And Ground**

Courtesy of FORD MOTOR CO.

- Is the voltage less than 0.2 volt?

Yes : GO to Y5.

No : REPAIR circuit 1520 (LG). GO to Y7.

**Y5 CONFIRM THE RCM FAULT**

**NOTE:** Make sure all restraint system diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.

- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.**
- Connect: RCM C2041a and C2041b.

- Connect: Seat Track Position Sensor C356.
- Repower the system. **Do not** prove out the system at this time. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1981 retrieved during the on-demand self test?**  
**Yes** : INSTALL a new RCM. REFER to **RESTRAINTS CONTROL MODULE (RCM)**. GO to Y7.  
**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to Y7.

**Y6 CHECK FOR AN INTERMITTENT FAULT**

- Key in OFF position.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Was DTC C1981 retrieved during the on-demand self test?**  
**Yes** : GO to Y2.  
**No** : CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition key frequently. REPAIR any intermittent concerns found. GO to Y7.

**Y7 CHECK FOR ADDITIONAL DTCs**

- Refer to the continuous DTCs recorded during Step Y1.
- **Were any continuous DTCs retrieved during Step Y1**  
**Yes** : Do not clear any DTCs until all DTCs have been resolved. GO to the **RESTRAINTS CONTROL MODULE (RCM) DIAGNOSTIC TROUBLE CODE (DTC) TABLE** for pinpoint test direction.  
**No** : RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

**Pinpoint Test Z: No Communication With The Restraints Control Module (RCM)****Normal Operation**

The diagnostic tool communicates with the restraints control module (RCM) through the data link connector (DLC) C251 pin 7, circuit 70 (LB/WH).

**Possible Causes**

A no communication fault with the RCM can be caused by:

- damaged wiring, terminals or connectors.
- a faulty data link connector (DLC).
- RCM is faulted.

**PINPOINT TEST Z: NO COMMUNICATION WITH THE RESTRAINTS CONTROL MODULE (RCM)**

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

**NOTE:** Most faults are due to connector and/or wiring concerns. Carry out a thorough Inspection and Verification before proceeding with the Pinpoint Test.

**Z1 CHECK THE RCM C2041a PIN 11 FOR DAMAGE**

**WARNING:** Restraint system diagnostic tools are for service only. Tools must be removed prior to operating the vehicle over the road. Failure to remove restraint system diagnostic tools could result in injury and possible violation of vehicle safety standards.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor

**pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.**

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

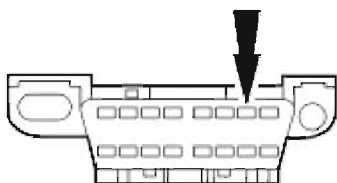
- Key in OFF position.
- Depower the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
- Disconnect: RCM C2041a and C2041b.
- Inspect RCM C2041a, harness side and RCM C2041a, component side, pin 11 for damage.
- **Are RCM C2041a and RCM C2041a pin 11 OK?**

**Yes :** GO to Z2.

**No :** REPAIR RCM C2041a or RCM C2041a pin 11 as necessary. RETEST the communication to the RCM. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

## **Z2 CHECK DLC C251 PIN 7 FOR DAMAGE**

- Inspect DLC C251 and DLC C251 pin 7 for damage.



A0030459

**Fig. 177: Locating DLC Pin 7**  
 Courtesy of FORD MOTOR CO.

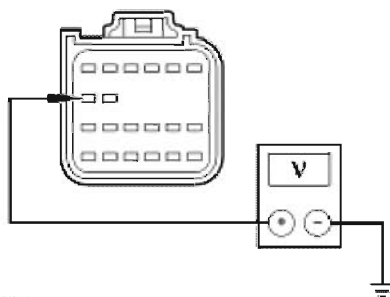
- Are DLC C251 and DLC C251 pin 7 OK?

**Yes :** GO to Z3.

**No :** REPAIR DLC C251 or DLC C251 pin 7 as necessary. RETEST the communication to the RCM. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### **Z3 CHECK THE IGNITION CIRCUIT 1654 (OG/YE) FOR AN OPEN**

- Key in OFF position.
- Deactivate the system. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**.
- Key in ON position.
- Measure the voltage between RCM C2041a pin 12, circuit 1654 (OG/YE), harness side and ground.



A0039638

**Fig. 178: Measuring Voltage Between RCM Connector And Ground**  
 Courtesy of FORD MOTOR CO.

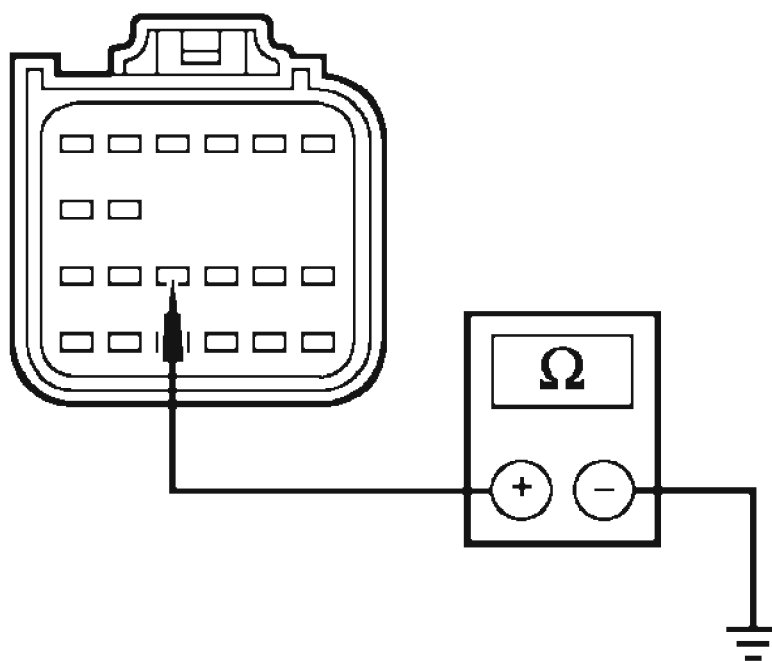
- Is the voltage greater than 10 volts?

**Yes :** GO to Z4.

**No** : REPAIR circuit 1654 (OG/YE). RETEST the communication to the RCM. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

#### **Z4 CHECK GROUND CIRCUIT 1203 (BK/LB) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between RCM C2041a pin 16, circuit 1203 (BK/LB), harness side and a sheet metal ground near the RCM.



A0039639

**Fig. 179: Measuring Resistance Between RCM connector And Ground**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

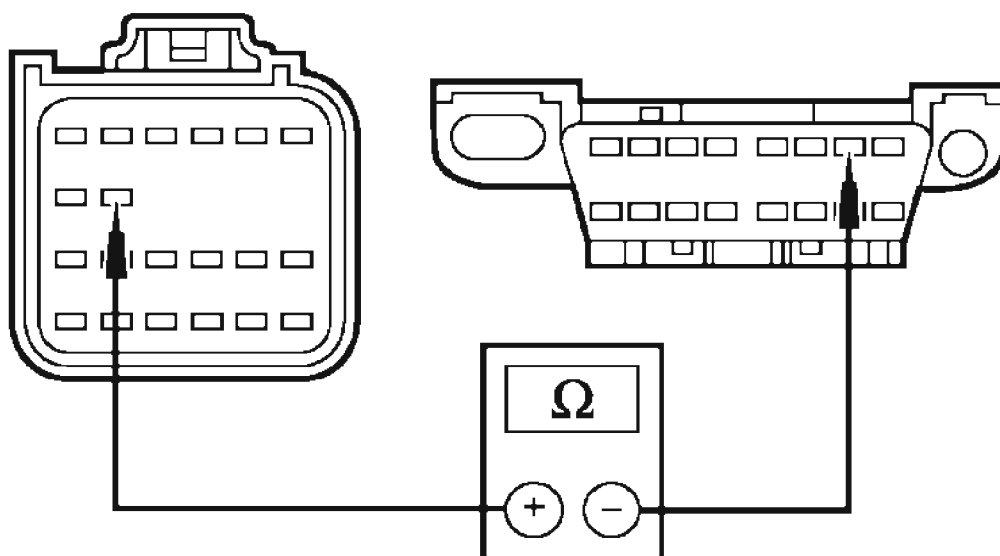
**Yes** : GO to Z5.

**No** : REPAIR circuit 1203 (BK/LB). RETEST the communication to the RCM. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the

system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### Z5 CHECK CIRCUIT 70 (LB/WH) FOR AN OPEN

- Measure the resistance between RCM C2041a pin 11, circuit 70 (LB/WH), harness side and DLC C251 pin 7, circuit 70 (LB/WH), harness side.



A0041599

**Fig. 180: Measuring Resistance Between RCM Connector And DLC Connector**

Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

Yes : GO to Z6.

No : REPAIR circuit 70 (LB/WH). RETEST the communication to the RCM. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION**. REPOWER the system. REFER to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**. PROVE OUT the system. CLEAR all DTCs.

### Z6 CONFIRM THE RCM FAULT

**NOTE:** Make sure the safety belt pretensioner restraint system



**diagnostic tools, sensor electrical connectors, and the RCM electrical connector are connected before carrying out the on-demand self test. If not, erroneous DTCs will be recorded.**

- Key in OFF position.
- Connect: RCM C2041a and C2041b.
- Enter the following diagnostic mode on the scan tool: On-Demand Self Test.
- **Did the diagnostic tool communicate with the RCM?**

**Yes** : Fault corrected. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION. REPOWER the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING. PROVE OUT the system. CLEAR all DTCs.

**No** : INSTALL a new RCM. REFER to RESTRAINTS CONTROL MODULE (RCM). RETEST the communication to the RCM. RECONNECT the system. If previously directed to deactivate the system, REACTIVATE the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION. REPOWER the system. REFER to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING. PROVE OUT the system. CLEAR all DTCs.

## GENERAL PROCEDURES

### SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING

#### Depowering Procedure

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**WARNING:** Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM)

**while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.**

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

1. Turn all vehicle accessories OFF.
2. Turn the ignition switch to OFF.
3. At the smart junction box (SJB), located at the RH side of the center console, remove the cover and the restraints control module (RCM) fuse F33 (15A) from the SJB. For additional information, refer to the **SUPPLEMENTAL RESTRAINTS** for Escape or **SUPPLEMENTAL RESTRAINTS** for Mariner.
4. Turn the ignition ON and visually monitor the air bag indicator for at least 30 seconds. The air bag indicator will remain lit continuously (no flashing) if the correct RCM fuse has been removed. If the air bag indicator does not remain lit continuously, remove the correct RCM fuse before proceeding.
5. Turn the ignition switch to OFF.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches. The front impact severity sensor is located on the radiator support bracket. The first row side impact sensors (if equipped) are

**located at or near the base of the B-pillars.  
The second row side impact sensors (if equipped) are located on the C-pillar.  
To deplete the backup power supply energy, disconnect the battery ground cable and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped).**

6. Disconnect the battery ground cable (14301) and wait at least one minute. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.

#### Repowering Procedure

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of vehicle safety standards.

1. Make sure all restraint system diagnostic tool(s) that may have been installed during the repair have been removed from the vehicle and all SRS components are connected.
2. Turn the ignition switch from OFF to ON.
3. Install RCM fuse F33 (15A) to the SJB and install the cover.

**WARNING:** Be sure that nobody is in the vehicle and that there is nothing blocking or set in front of any air bag module when the battery ground cable is connected.

4. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
5. Prove out the supplemental restraint system (SRS) as follows:

Turn the ignition key from ON to OFF. Wait 10 seconds, then turn the key back to ON and visually monitor the air bag indicator with the air bag modules installed. The air bag indicator will light continuously for approximately 6 seconds and then turn off. If an air bag supplemental restraint system (SRS) fault is present, the air bag indicator will:

- fail to light.
- remain lit continuously.
- flash.

The flashing might not occur until approximately 30 seconds after the ignition switch has been turned from the OFF to the ON position. This is the time required for the

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

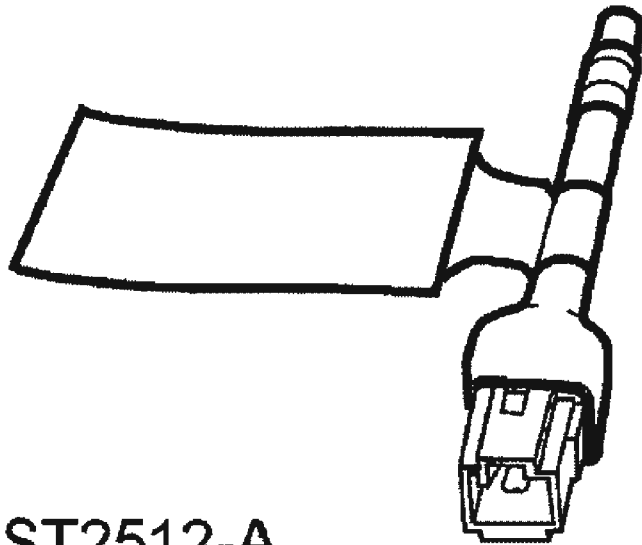
restraints control module (RCM) to complete the testing of the SRS. If the air bag indicator is inoperative and a SRS fault exists, a chime will sound in a pattern of 5 sets of 5 beeps. If this occurs, the air bag indicator and any SRS fault discovered must be diagnosed and repaired.

Clear all continuous DTCs from the restraints control module using a diagnostic tool.

#### SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEACTIVATION AND REACTIVATION

##### Special Tool(s)

##### SPECIAL TOOL SPECIFICATION



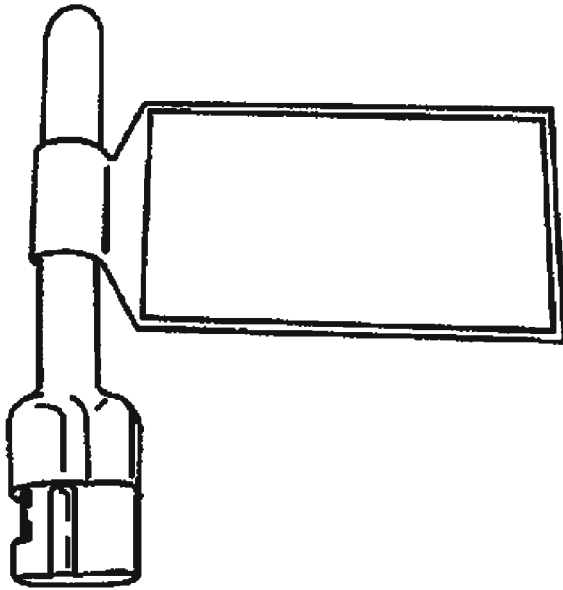
ST2512-A

Diagnostic Tool, Restraint System (2 required) 418-F403

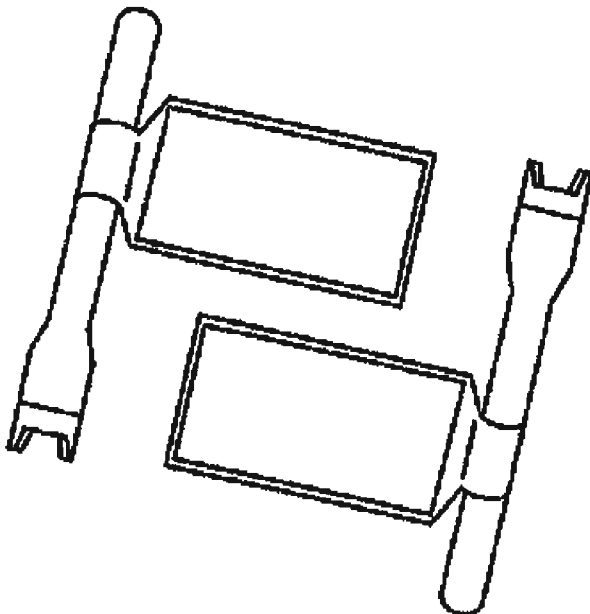
Diagnostic Tool, Restraint System (5 required)

## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



**ST2507-A**



**ST2621-A**

Diagnostic Tool, Restraint System (1 required) 418-F395

Deactivation

**WARNING:** Always wear safety glasses when repairing an air bag

supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** Never probe the connectors on the safety canopy module. Doing so can result in safety canopy deployment, which can result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

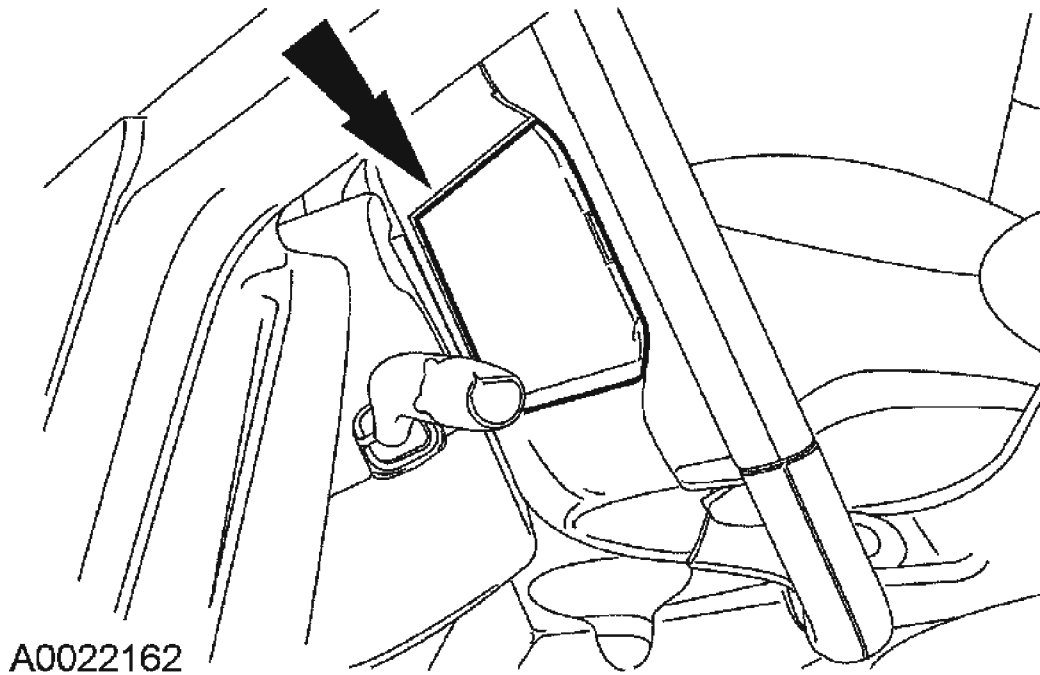
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**All vehicles**

1. Turn all vehicle accessories OFF.
2. Turn the ignition switch to OFF.
3. At the smart junction box (SJB), located at the RH side of the center console, remove the cover and the restraints control module (RCM) fuse F33 (15A) from the CJB. For additional information, refer to the **SUPPLEMENTAL RESTRAINTS** for Escape or **SUPPLEMENTAL RESTRAINTS** for Mariner.
4. Turn the ignition ON and visually monitor the air bag indicator for at least 30 seconds. The air bag indicator will remain lit continuously (no flashing) if the correct RCM fuse has been removed. If the air bag indicator does not remain lit continuously, remove the correct RCM fuse before proceeding.
5. Turn the ignition OFF.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches. The front impact severity sensor is located on the radiator support bracket. The first row side impact sensors (if equipped) are located at or near the base of the B-pillars. The second row side impact sensors (if equipped) are located on the C-pillar. To deplete the backup power supply energy, disconnect the battery ground cable and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped).

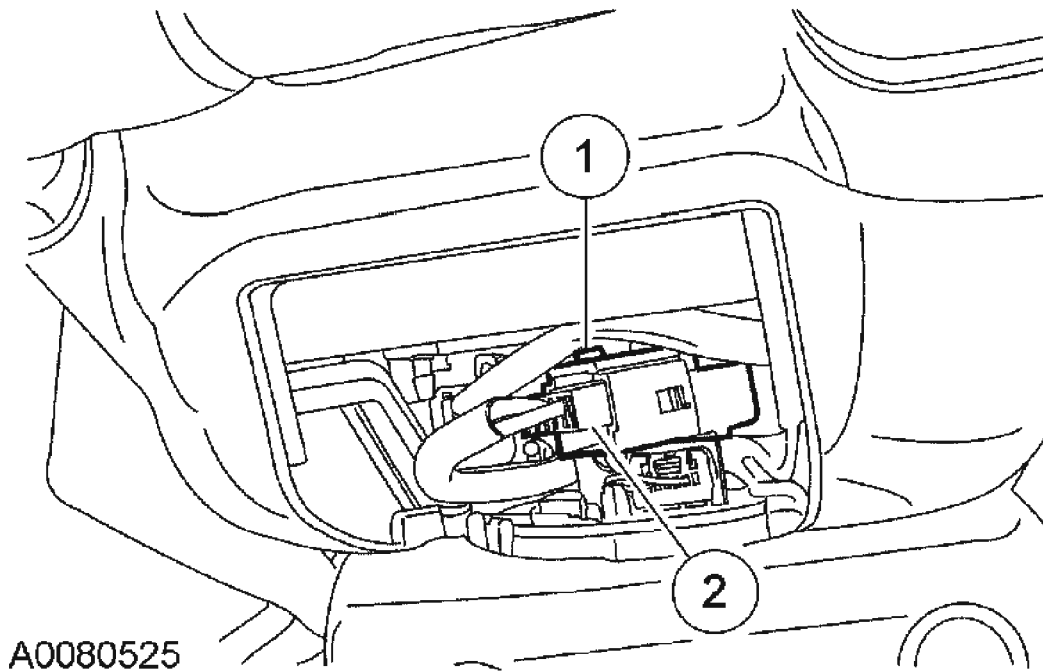
6. Disconnect the battery ground cable and wait at least one minute. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
7. Remove the steering wheel access cover.



**Fig. 181: Removing Steering Wheel Access Cover**  
**Courtesy of FORD MOTOR CO.**

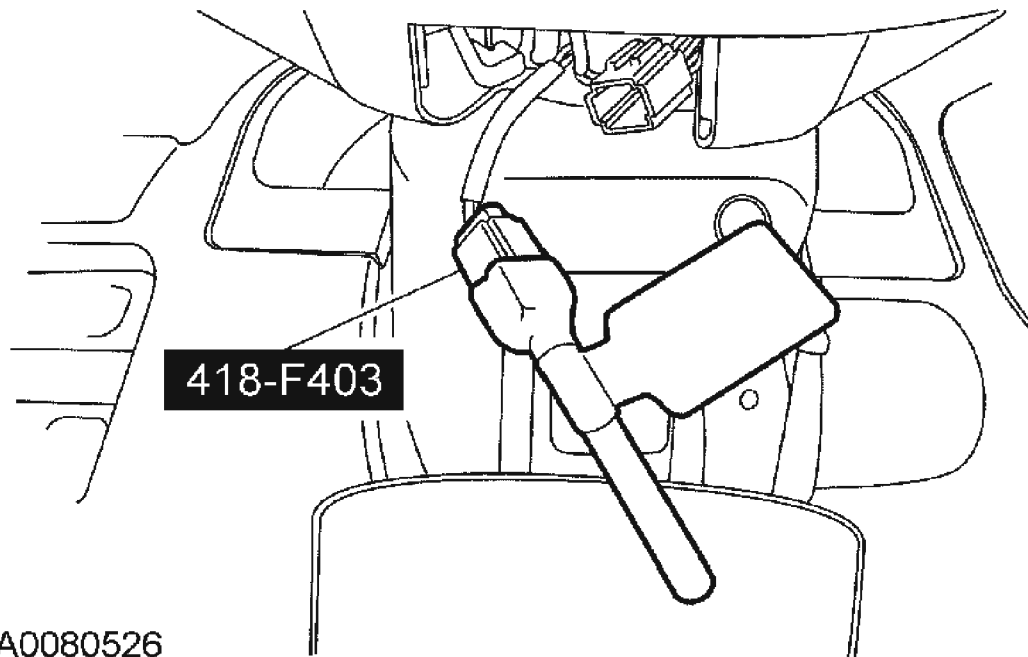
8. Disconnect the driver air bag module electrical connector.
  1. Through the steering wheel access cover opening, release the pin-type retainer and slide the driver air bag module electrical connector off of the pin-type retainer.
  2. Release the tab and disconnect the driver air bag module electrical connector.





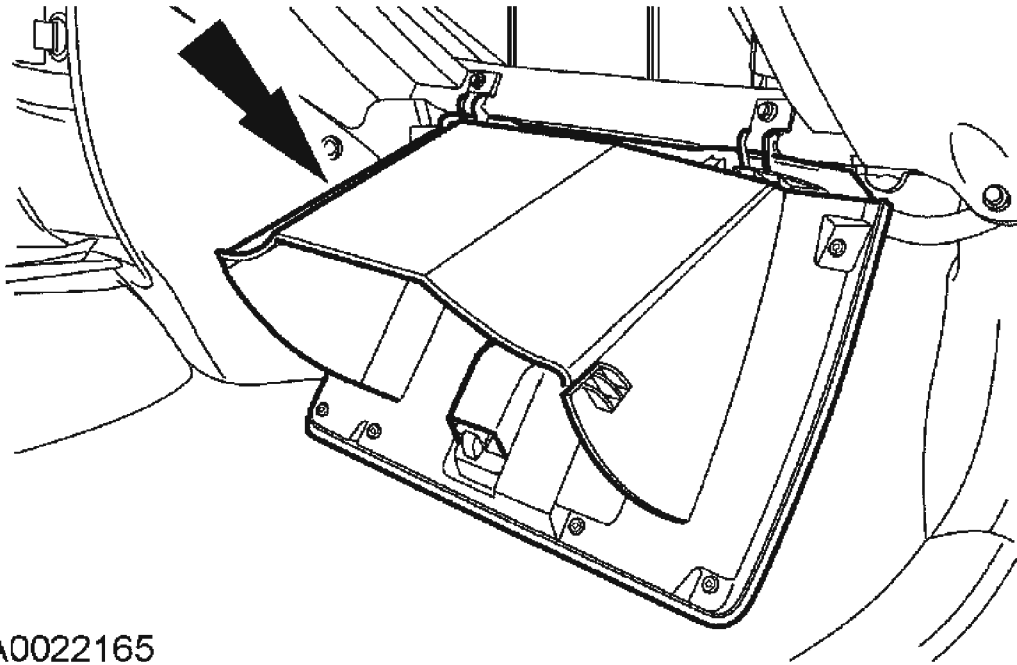
**Fig. 182: Disconnecting Driver Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

9. Attach the restraint system diagnostic tool to the clockspring electrical connector at the top of the steering column.



**Fig. 183: Attaching Restraint System Diagnostic Tool To Clockspring Electrical Connector At Top Of Steering Column**  
Courtesy of FORD MOTOR CO.

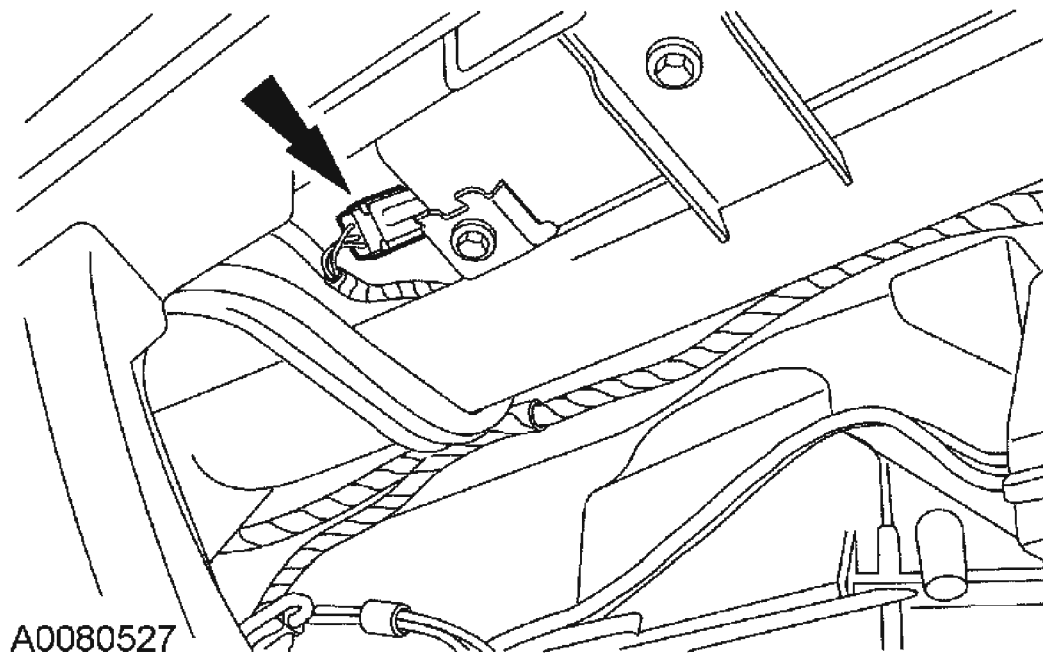
10. Open the glove compartment door past its stops.



A0022165

**Fig. 184: Opening Glove Compartment Door Past**  
**Courtesy of FORD MOTOR CO.**

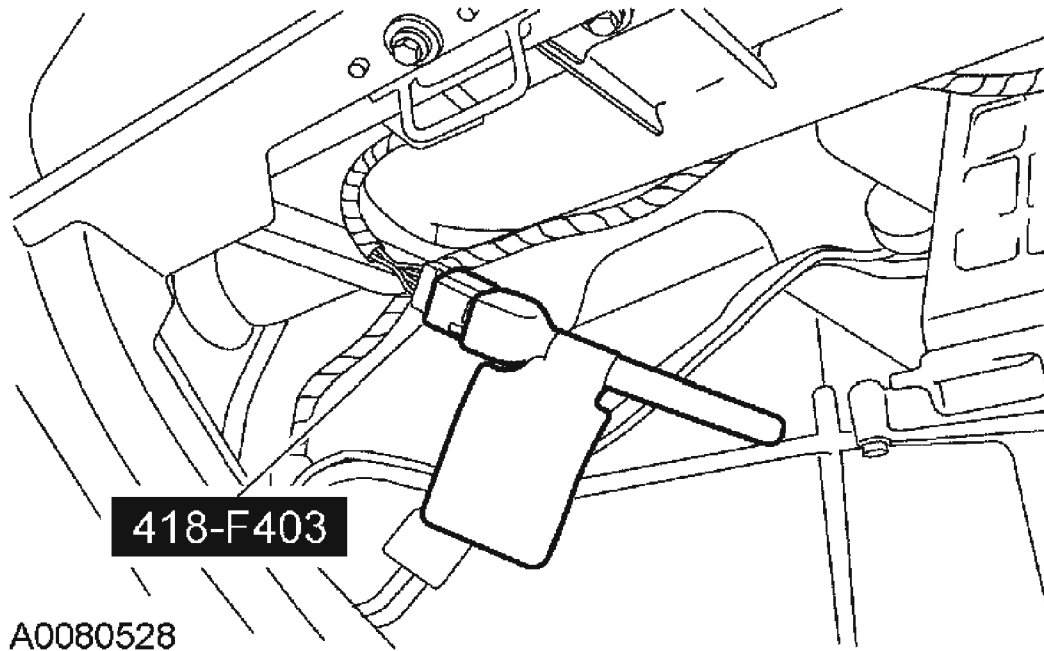
11. Through the glove compartment opening, disconnect the passenger air bag module electrical connector.



**Fig. 185: Disconnecting Passenger Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

**Escape and Mariner vehicles**

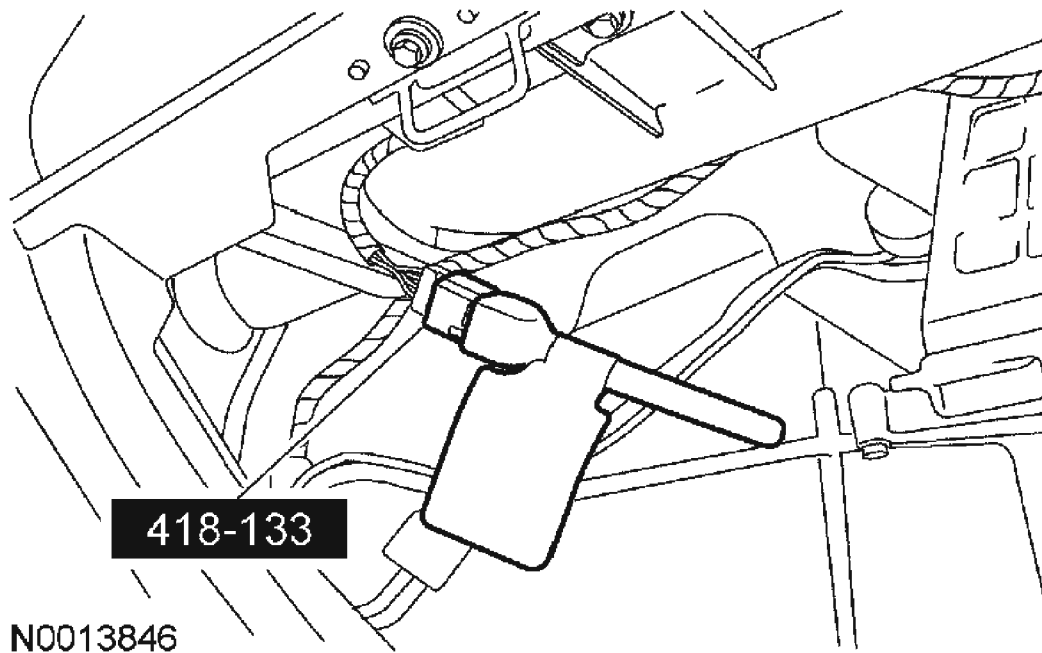
12. Attach the restraint system diagnostic tool to the vehicle harness side of the passenger air bag module electrical connector.



**Fig. 186: Attaching Restraint System Diagnostic Tool To Vehicle Harness Side Of Passenger Air Bag Module Electrical Connector (Escape and Mariner)**  
Courtesy of FORD MOTOR CO.

### Escape Hybrid vehicles

13. Attach the restraint system diagnostic tool to the vehicle harness side of the passenger air bag module electrical connector.

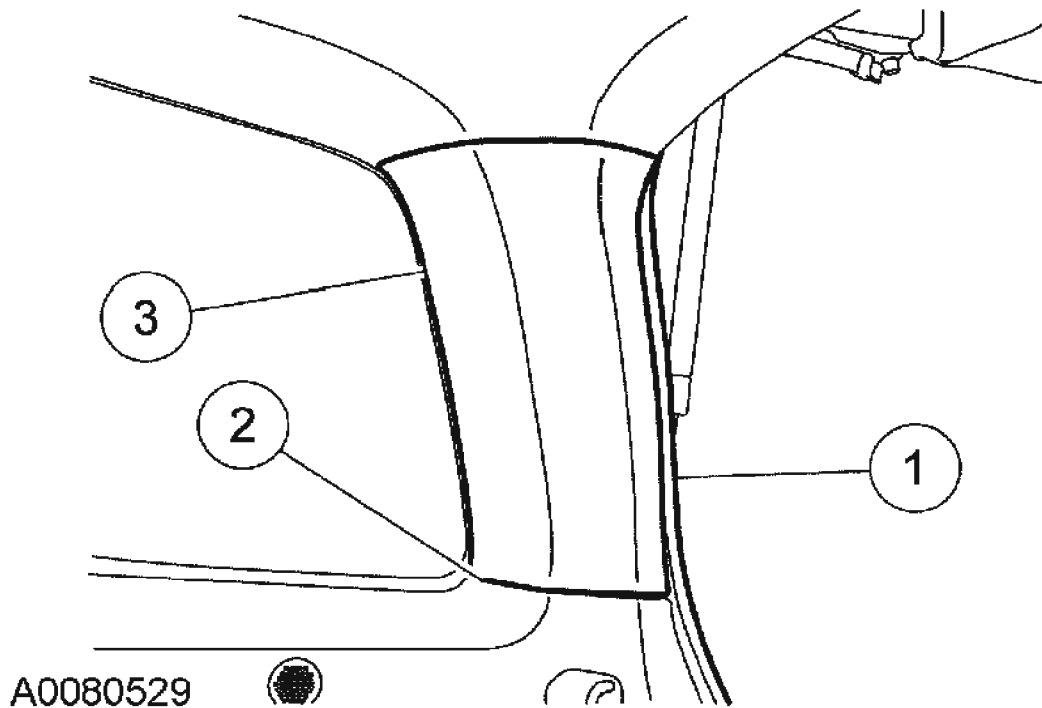


**Fig. 187: Attaching Restraint System Diagnostic Tool To Vehicle Harness Side Of Passenger Air Bag Module Electrical Connector (Escape Hybrid)**  
Courtesy of FORD MOTOR CO.

#### Vehicles with safety canopies

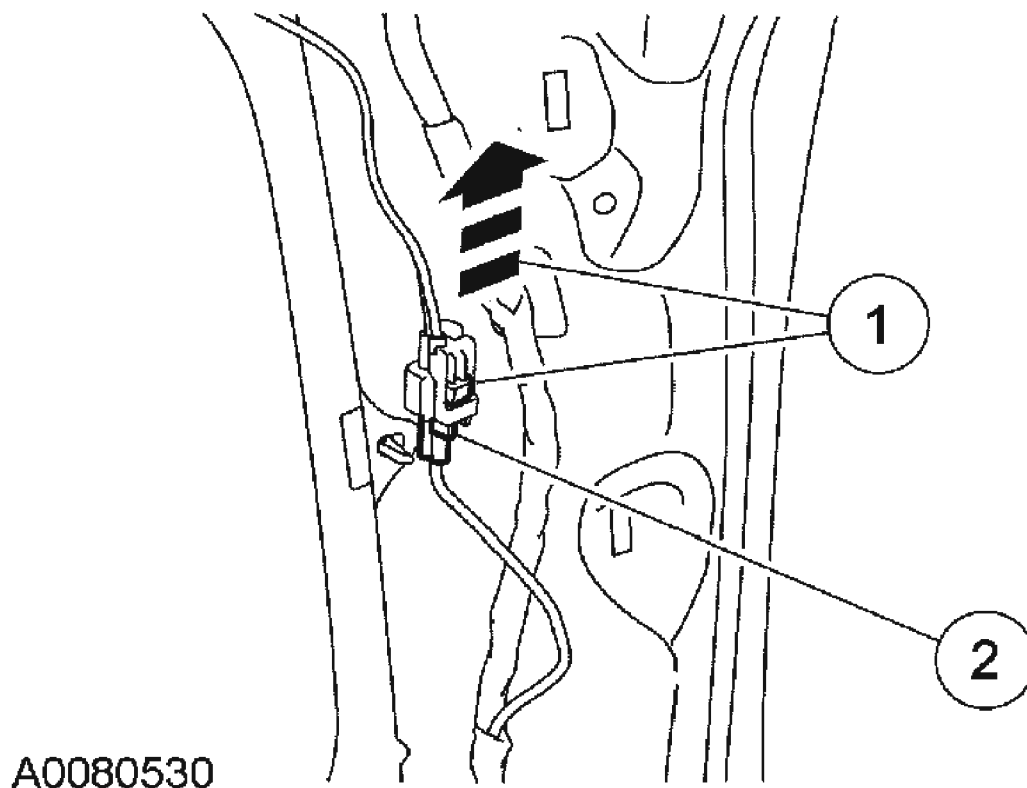
**NOTE:** If the headliner near each B-pillar has the word "AIRBAG" embossed on it, the vehicle is equipped with safety canopy modules.

14. Remove the passenger side D-pillar trim panel.
  1. Separate the weatherstrip.
  2. Pull out and separate the quarter trim panel at the D-pillar trim panel.
  3. Pull out to release the retainers and remove the D-pillar trim panel.



**Fig. 188: Separating Weatherstrip**  
Courtesy of FORD MOTOR CO.

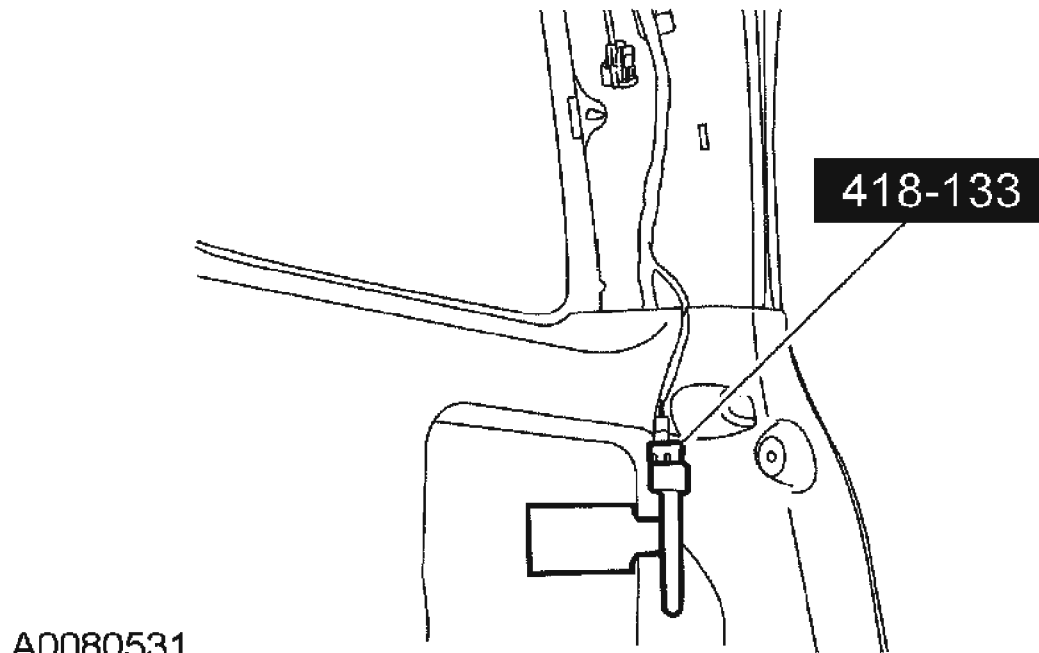
15. Disconnect the passenger side safety canopy module electrical connector.
  1. Slide and disengage the passenger side safety canopy module electrical connector locking clip.
  2. Push in to release the tab and disconnect the passenger side safety canopy module electrical connector.



**Fig. 189: Disconnecting Passenger Side Safety Canopy Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

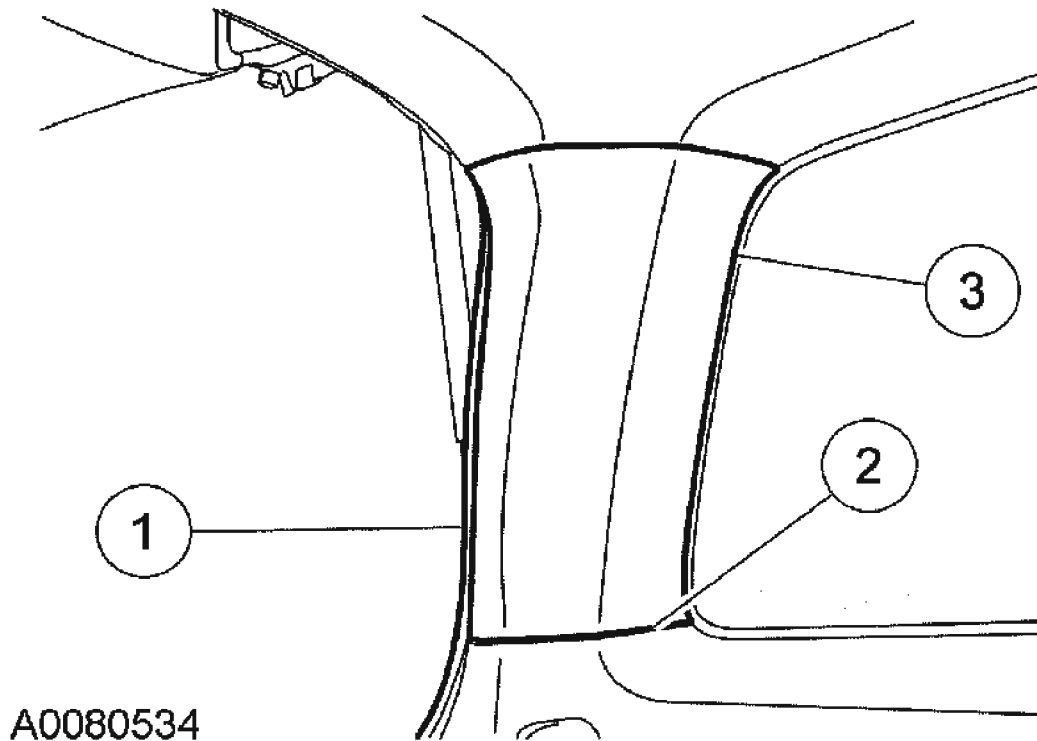
16. Attach the restraint system diagnostic tool to the vehicle harness side of the passenger side safety canopy module electrical connector.





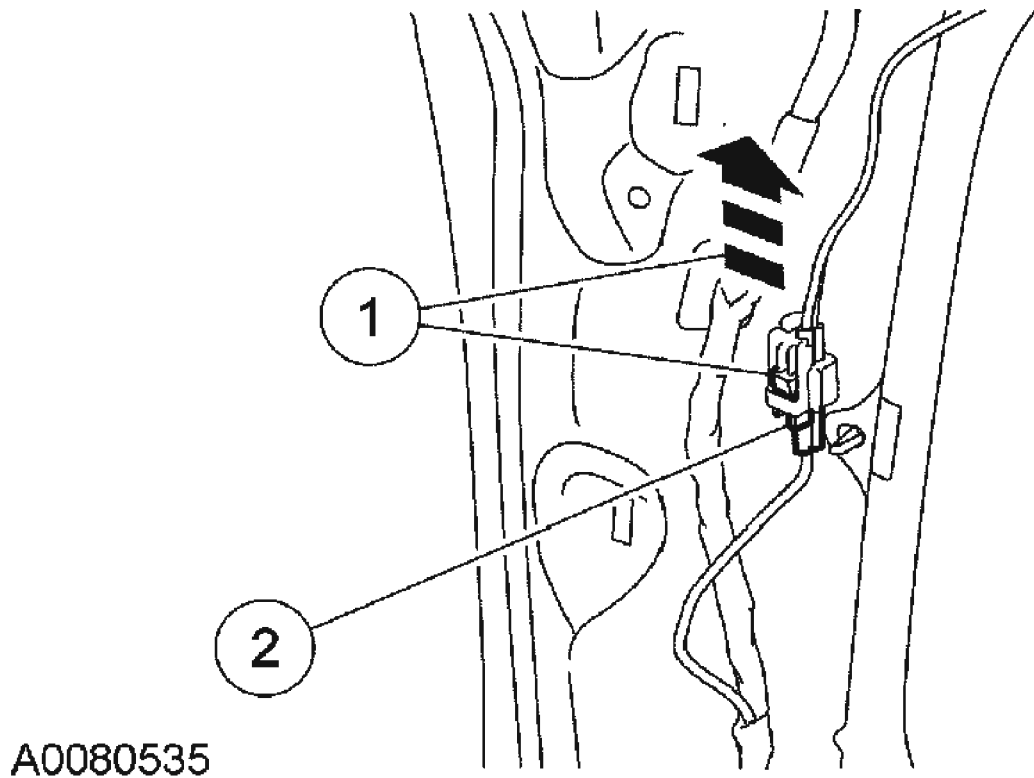
**Fig. 190: Attaching Restraint System Diagnostic Tool To Vehicle Harness Side Of Passenger Side Safety Canopy Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

17. Remove the driver side D-pillar trim panel.
  1. Separate the weatherstrip.
  2. Pull out and separate the quarter trim panel at the D-pillar trim panel.
  3. Pull out to release the retainers and remove the D-pillar trim panel.



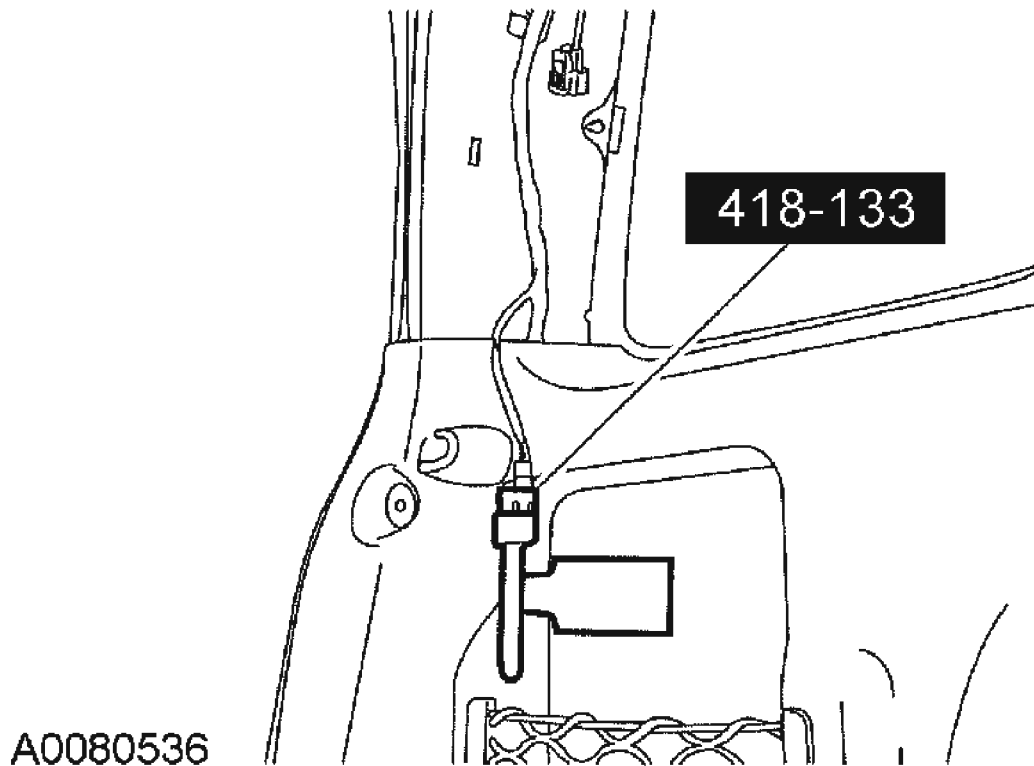
**Fig. 191: Separating Weatherstrip**  
Courtesy of FORD MOTOR CO.

18. Disconnect the driver side safety canopy module electrical connector.
  1. Slide and disengage the driver side safety canopy module electrical connector locking clip.
  2. Push in to release the tab and disconnect the driver side safety canopy module electrical connector.



**Fig. 192: Disconnecting Driver Side Safety Canopy Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

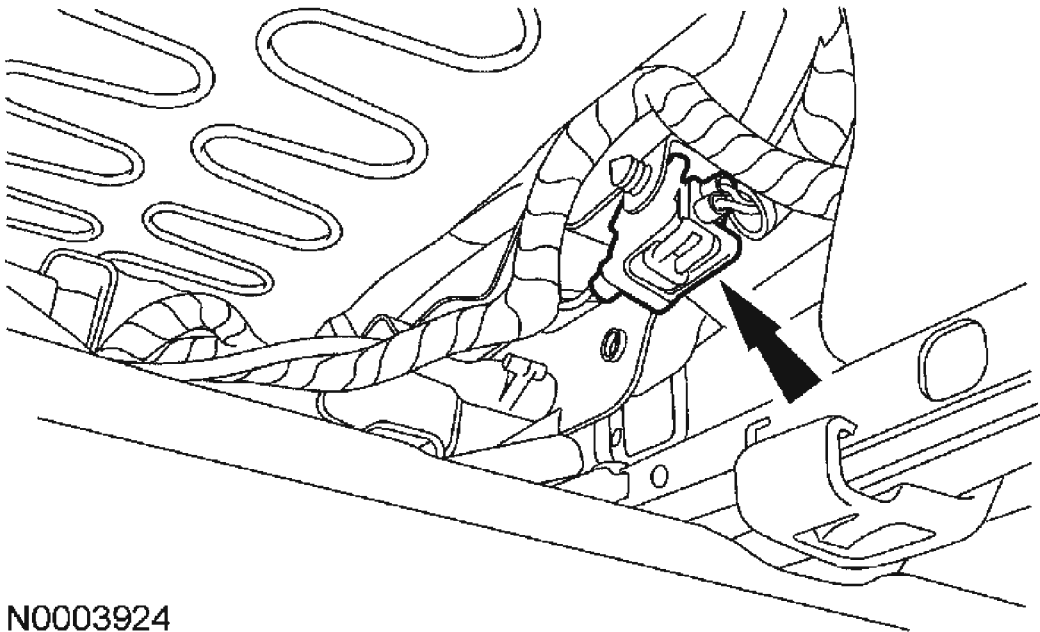
19. Attach the restraint system diagnostic tool to the vehicle harness side of the driver side safety canopy module electrical connector.



**Fig. 193: Attaching Restraint System Diagnostic Tool To Vehicle Harness Side Of Driver Side Safety Canopy Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

**Vehicles with seat side air bags**

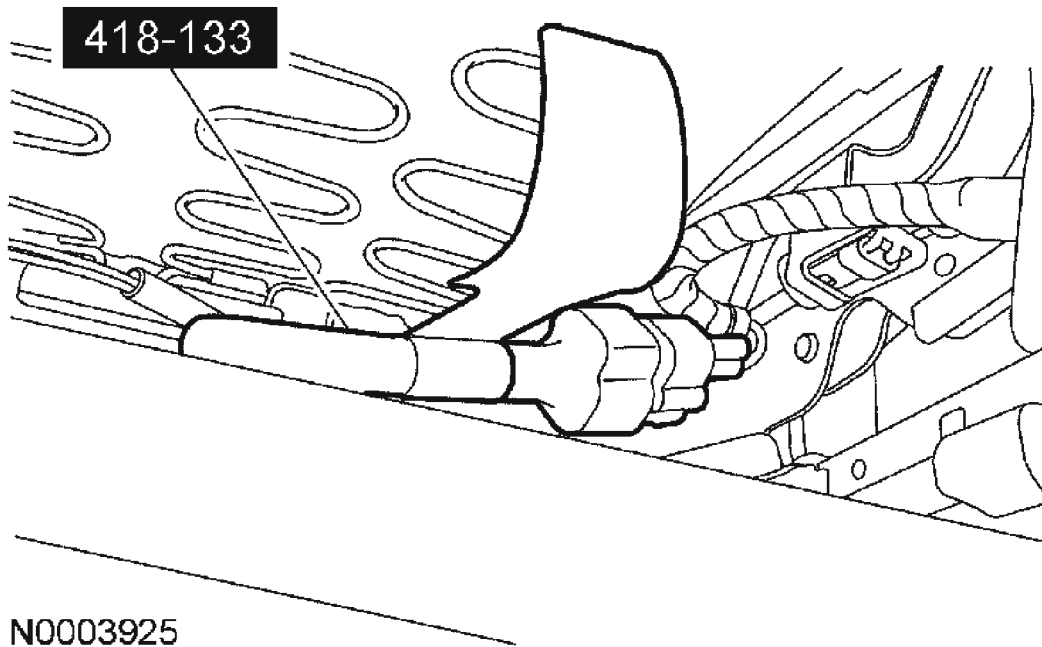
20. From under the rear of the passenger seat, slide and disengage the passenger seat side air bag module electrical connector locking clip, and then release the tab and disconnect the passenger seat side air bag module electrical connector.



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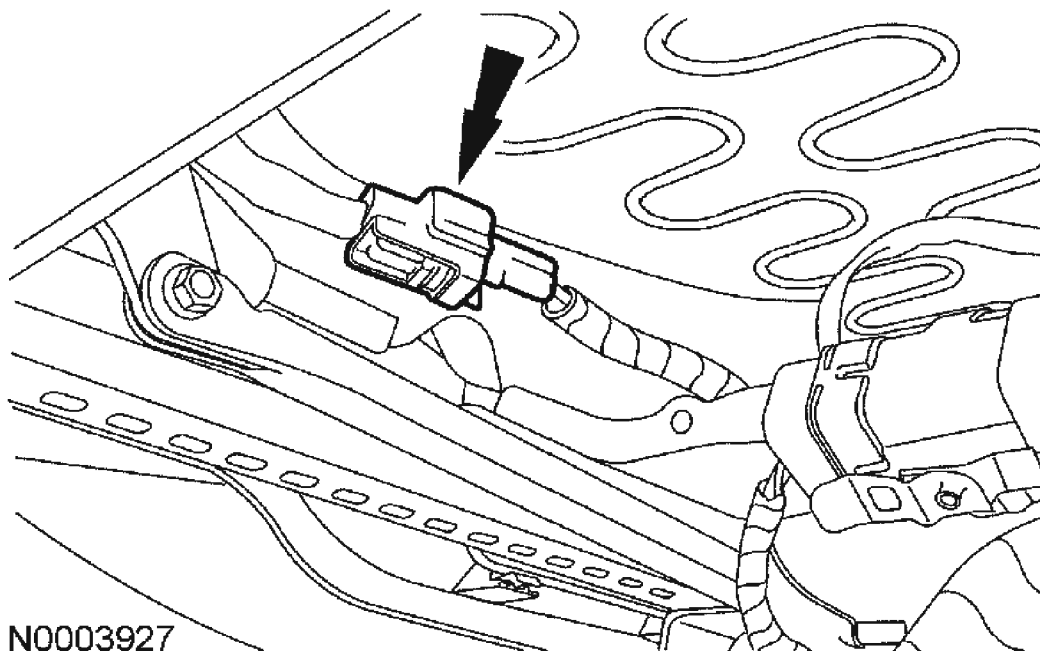
**Fig. 194: Disconnecting Passenger Seat Side Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

21. Attach the restraint system diagnostic tool to the vehicle harness side of the passenger seat side air bag module electrical connector.



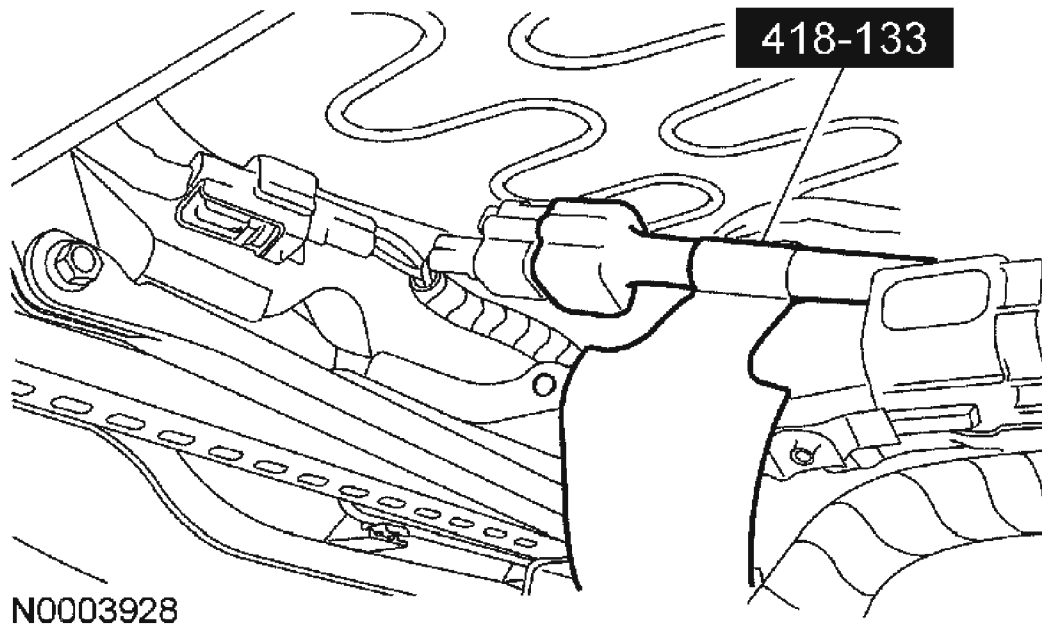
**Fig. 195: Attaching Restraint System Diagnostic Tool To Vehicle Harness Side Of Passenger Seat Side Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

22. From under the rear of the driver seat, slide and disengage the driver seat side air bag module electrical connector locking clip, and then release the tab and disconnect the driver seat side air bag module electrical connector.



**Fig. 196: Disconnecting Driver Seat Side Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

23. Attach the restraint system diagnostic tool to the vehicle harness side of the driver seat side air bag module electrical connector.



**Fig. 197: Attaching Restraint System Diagnostic Tool To Vehicle Harness Side Of Driver Seat Side Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

#### **All vehicles**

24. Install the RCM fuse F33 (15A) to the SJB.
25. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .

#### **Reactivation**

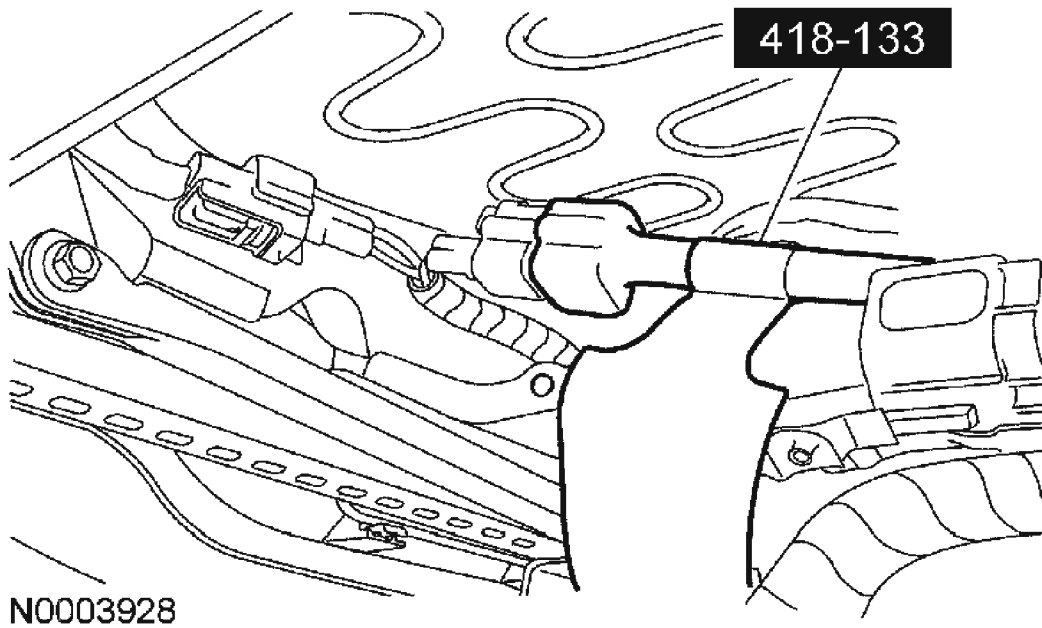
#### **All vehicles**

1. Remove the RCM fuse F33 (15A) from the SJB.
2. Disconnect the battery ground cable and wait at least one minute. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .

#### **Vehicles with seat side air bags**

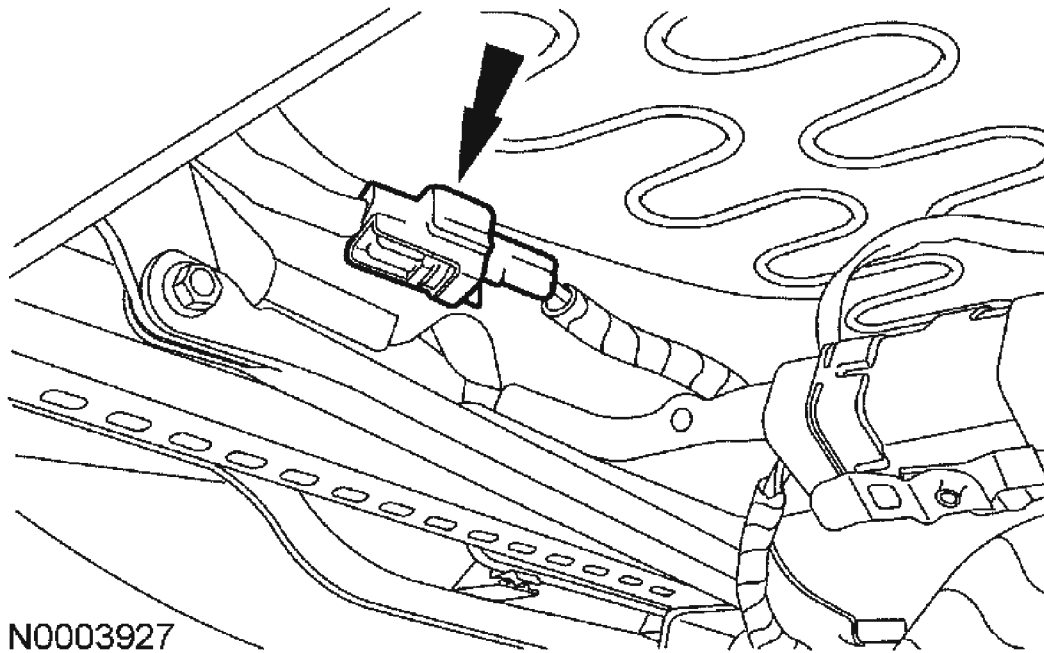
3. Remove the restraint system diagnostic tool from the vehicle harness side of the driver seat side air bag module electrical connector.





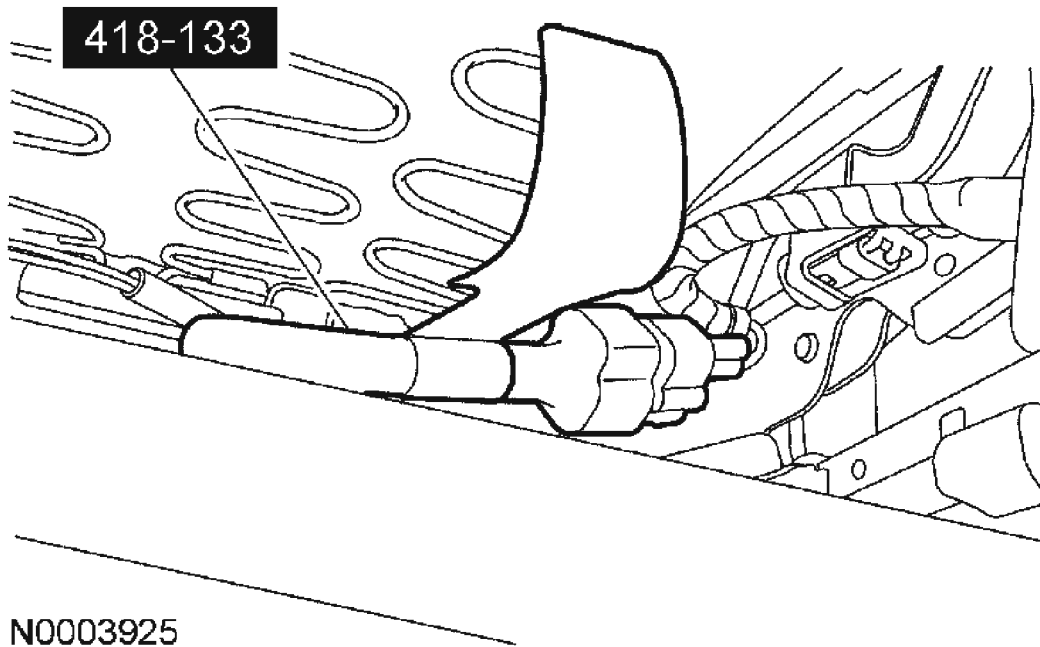
**Fig. 198: Removing Restraint System Diagnostic Tool**  
Courtesy of FORD MOTOR CO.

4. Connect the driver seat side air bag module electrical connector and then slide and engage the seat side air bag electrical connector locking clip.



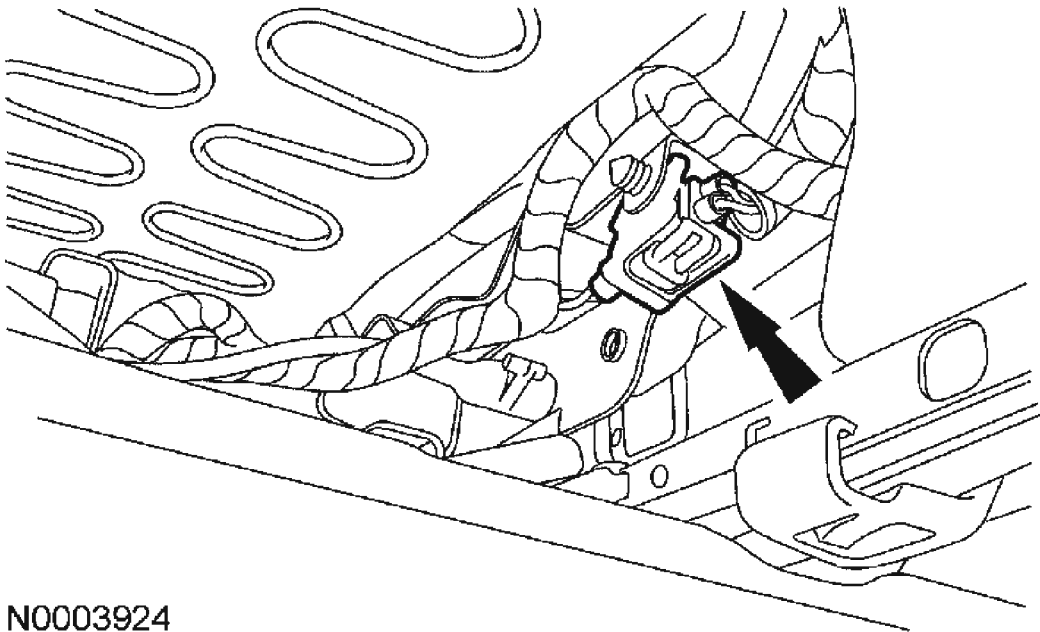
**Fig. 199: Connecting Driver Seat Side Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

5. Remove the restraint system diagnostic tool from the vehicle harness side of the passenger seat side air bag module electrical connector.



**Fig. 200: Removing Restraint System Diagnostic Tool**  
Courtesy of FORD MOTOR CO.

6. Connect the passenger seat side air bag module electrical connector and then slide and engage the seat side air bag electrical connector locking clip.

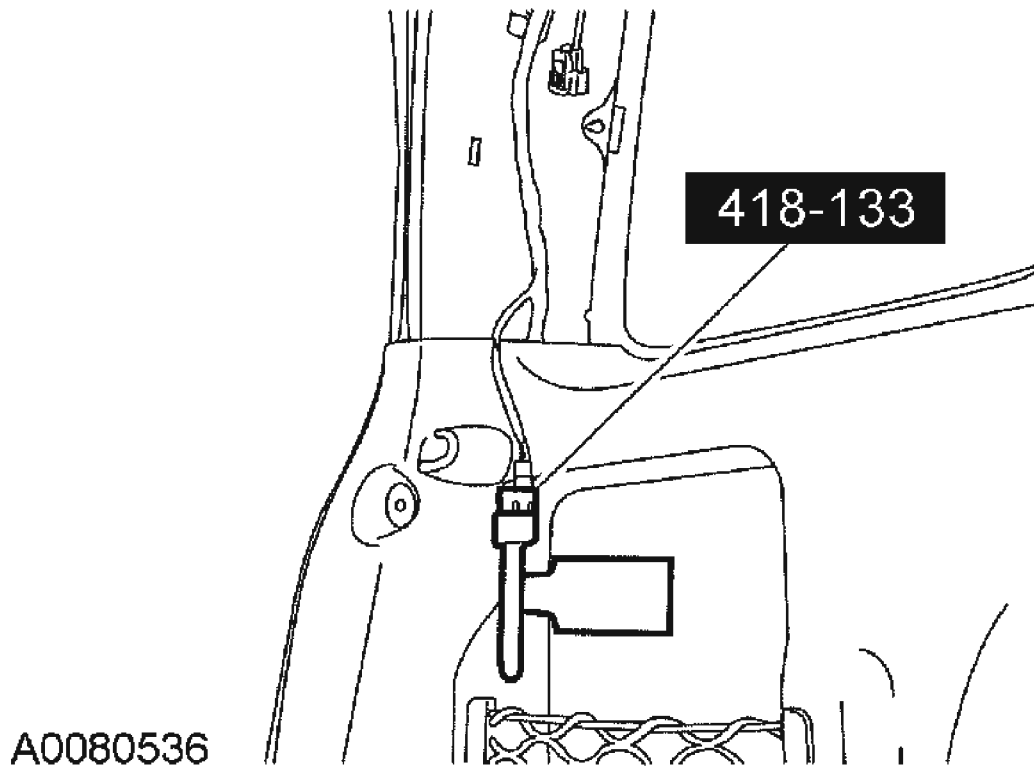


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**Fig. 201: Connecting Passenger Seat Side Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

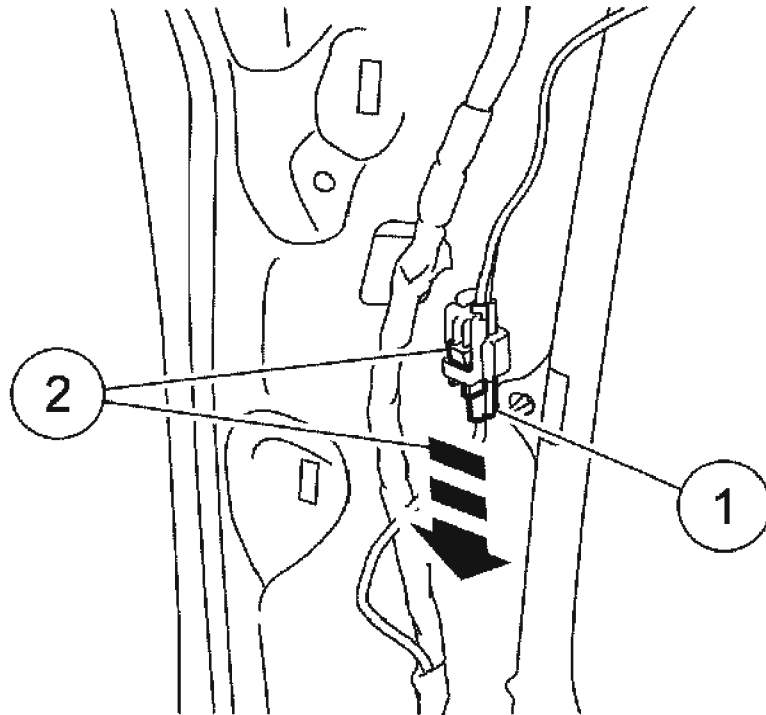
**Vehicles with safety canopies**

7. Remove the restraint system diagnostic tool from the vehicle harness side of the driver side safety canopy module electrical connector.



**Fig. 202: Removing Restraint System Diagnostic Tool From Vehicle Harness Side Of Driver Side Safety Canopy Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

8. Connect the driver side safety canopy module electrical connector.
  1. Connect the driver side safety canopy module electrical connector.
  2. Slide and engage the driver side safety canopy module electrical connector locking clip.

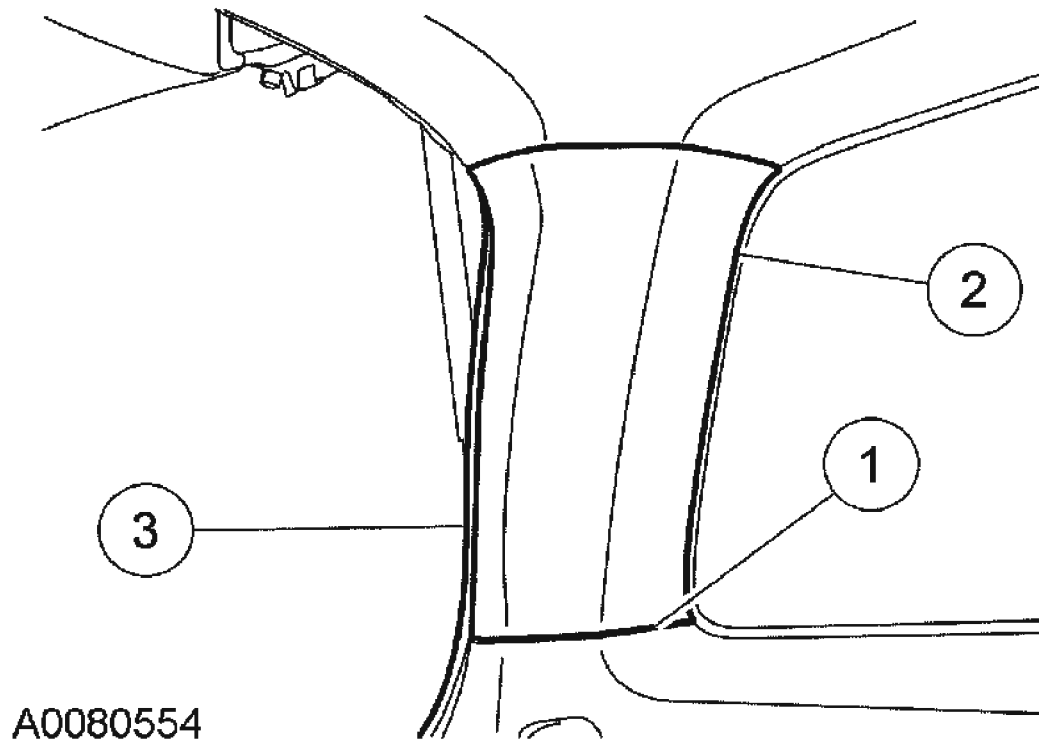


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**Fig. 203: Connecting Driver Side Safety Canopy Module Electrical Connector**

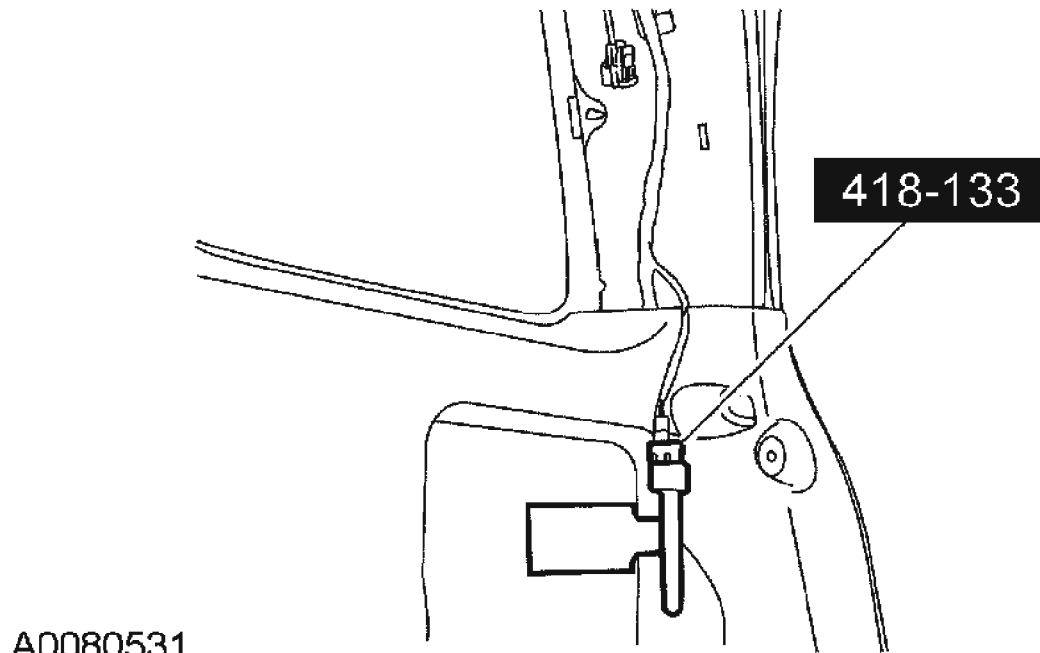
**Courtesy of FORD MOTOR CO.**

9. Install the driver side D-pillar trim panel.
  1. Engage the D-pillar trim panel to the quarter trim panel.
  2. Install the D-pillar trim panel.
  3. Install the weatherstrip.



**Fig. 204: Installing Weatherstrip**  
Courtesy of FORD MOTOR CO.

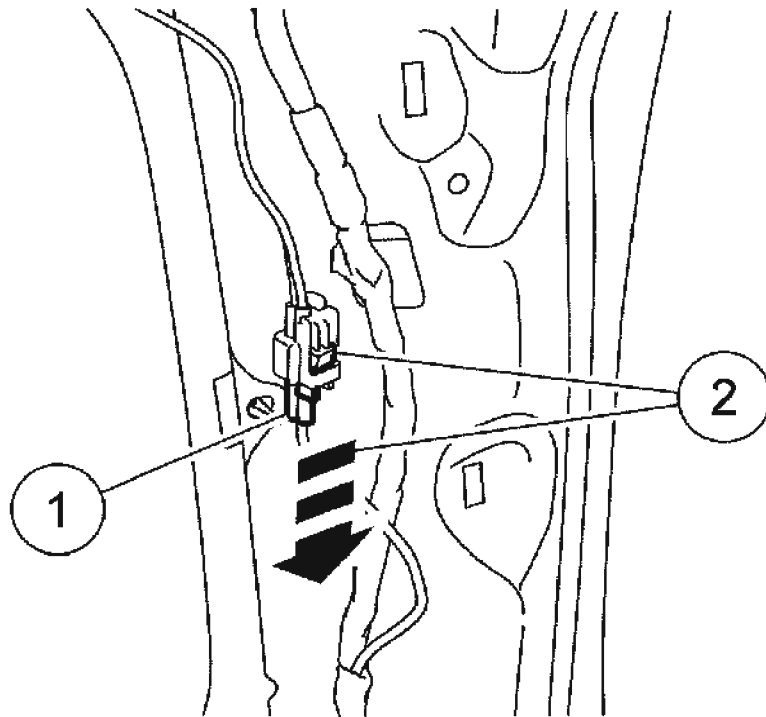
10. Remove the restraint system diagnostic tool from the vehicle harness side of the passenger side safety canopy module electrical connector.



**Fig. 205: Removing Restraint System Diagnostic Tool From Vehicle Harness Side Of Passenger Side Safety Canopy Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

11. Connect the passenger side safety canopy module electrical connector.
  1. Connect the passenger side safety canopy module electrical connector.
  2. Slide and engage the passenger side safety canopy module electrical connector locking clip.



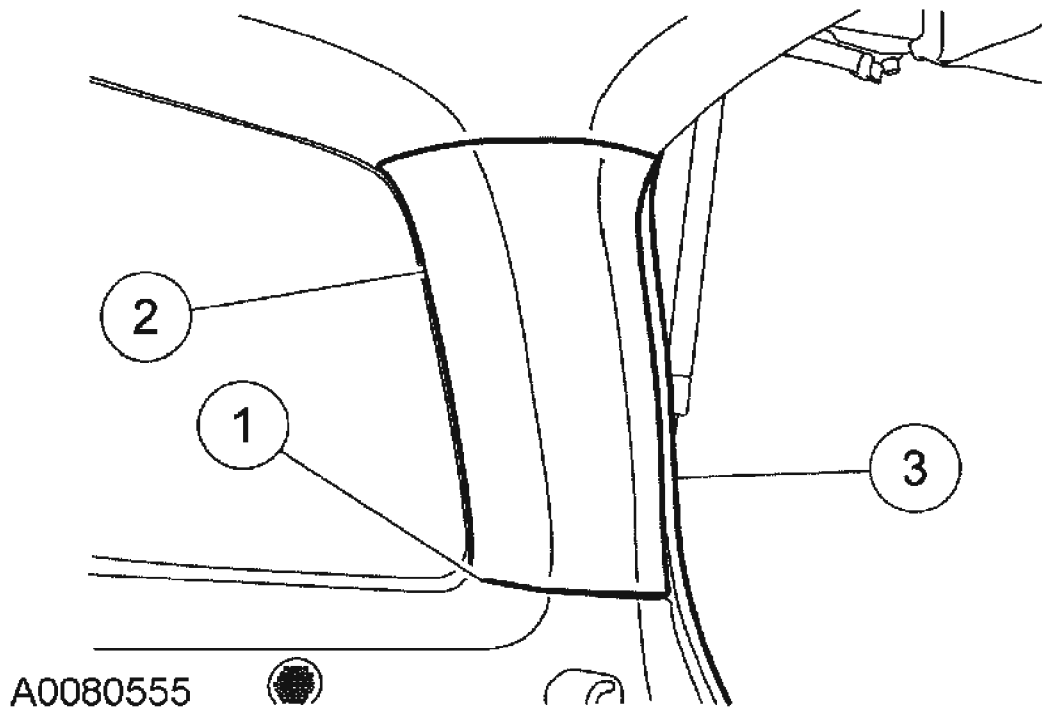


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**Fig. 206: Connecting Passenger Side Safety Canopy Module Electrical Connector**

**Courtesy of FORD MOTOR CO.**

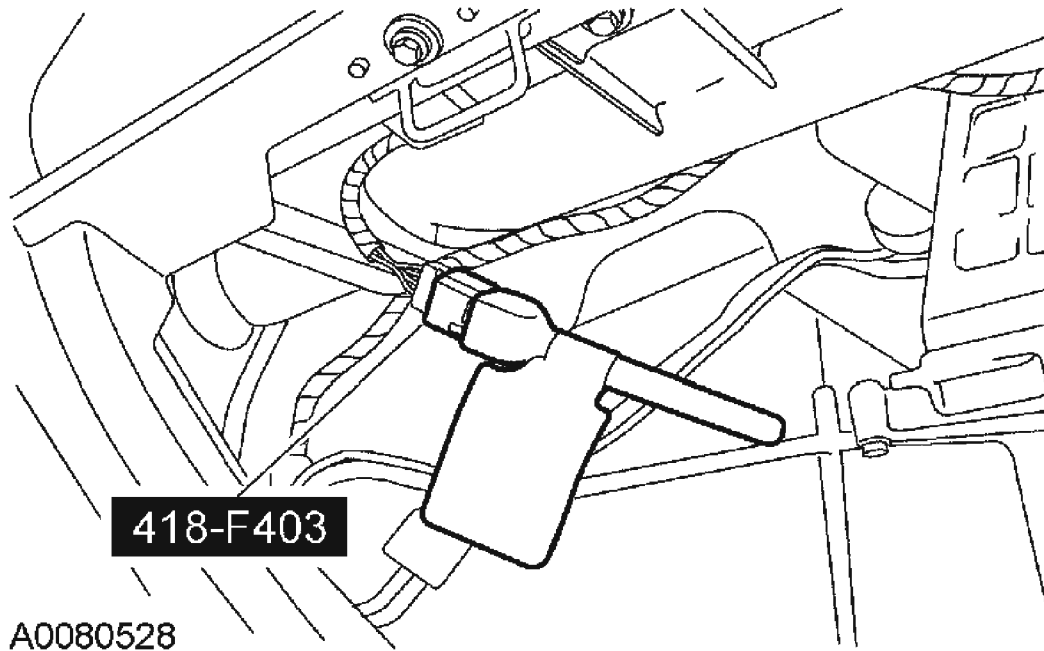
12. Install the passenger side D-pillar trim panel.
  1. Engage the D-pillar trim panel to the quarter trim panel.
  2. Install the D-pillar trim panel.
  3. Install the weatherstrip.



**Fig. 207: Installing Weatherstrip**  
Courtesy of FORD MOTOR CO.

**Escape and Mariner vehicles**

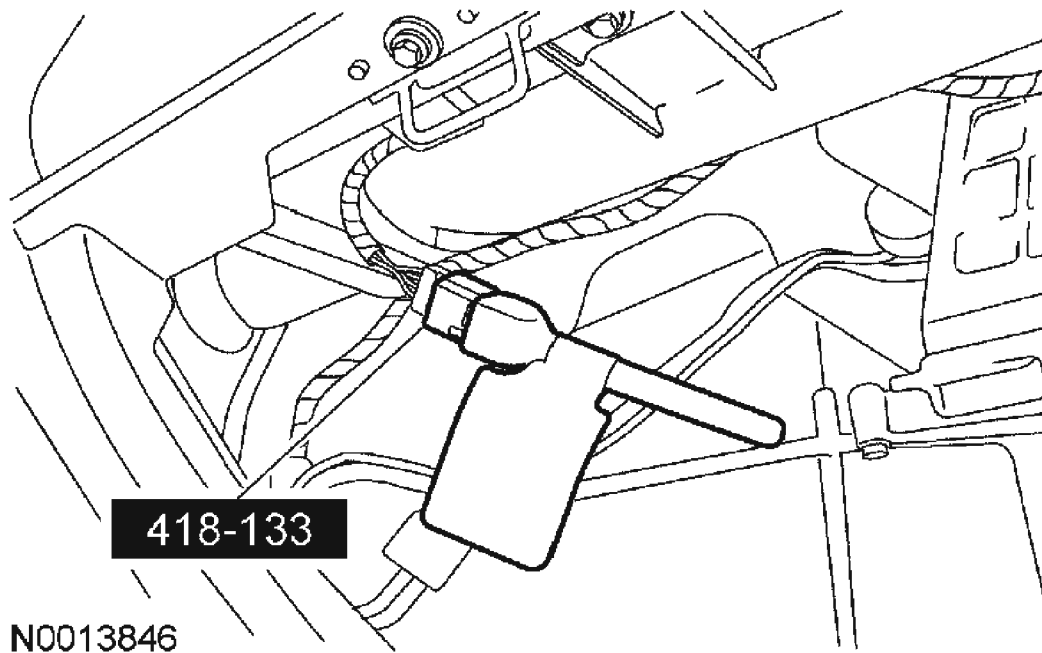
13. Remove the restraint system diagnostic tool from the vehicle harness side of the passenger air bag module electrical connector.



**Fig. 208: Removing Restraint System Diagnostic Tool From Vehicle Harness Side Of Passenger Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

### Escape Hybrid vehicles

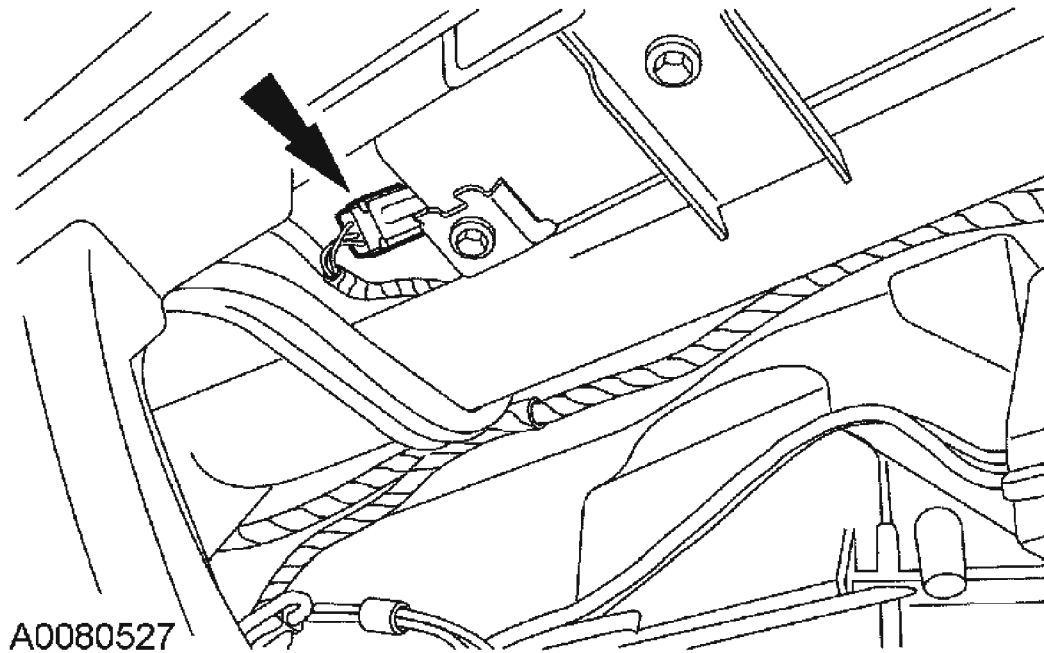
14. Remove the restraint system diagnostic tool from the vehicle harness side of the passenger air bag module electrical connector.



**Fig. 209: Removing Restraint System Diagnostic Tool From Vehicle Harness Side Of Passenger Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

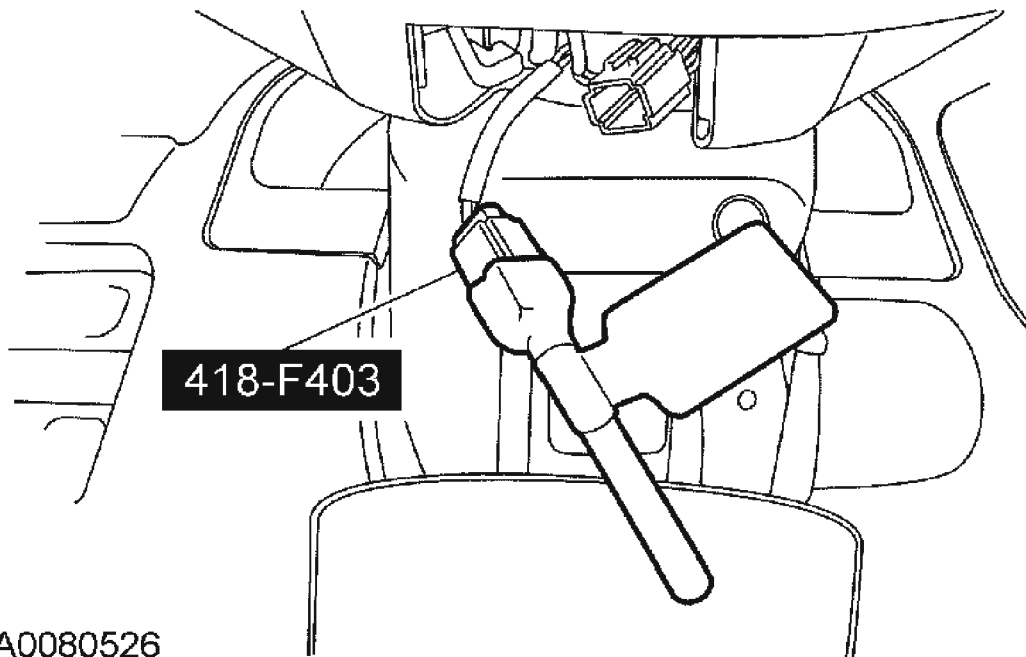
**All vehicles**

15. Through the glove compartment opening, connect the passenger air bag module electrical connector.



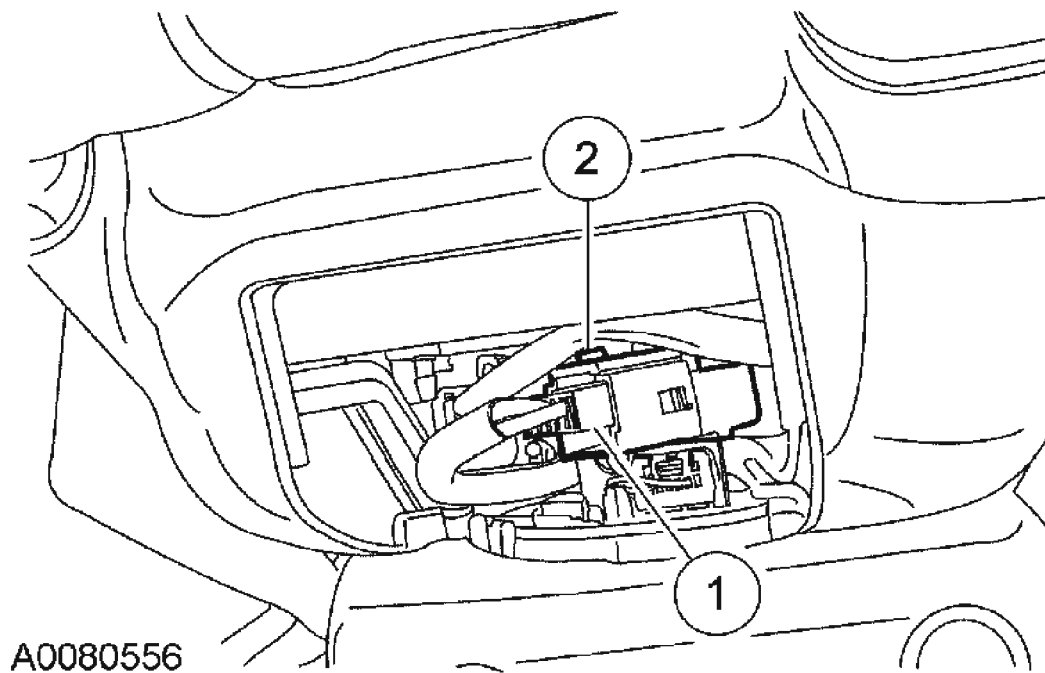
**Fig. 210: Connecting Passenger Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

16. Close the glove compartment.
17. Remove the restraint system diagnostic tool from the clockspring electrical connector at the top of the steering column.



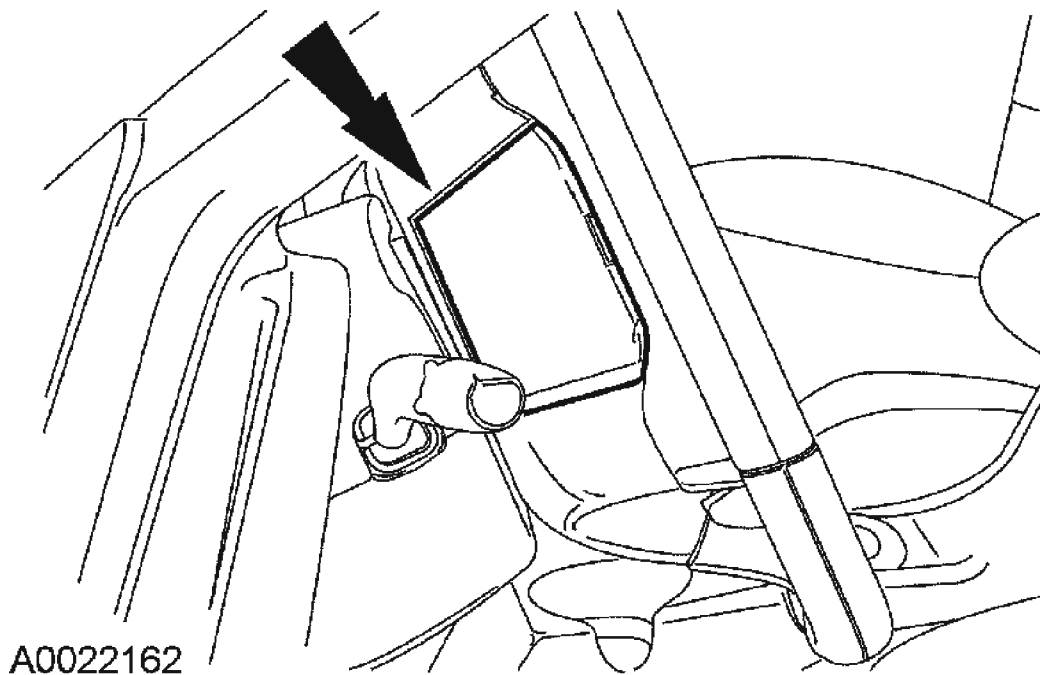
**Fig. 211: Removing Restraint System Diagnostic Tool From Clockspring Electrical Connector At Top Of Steering Column**  
Courtesy of FORD MOTOR CO.

18. Connect and install the driver air bag module electrical connector.
  1. Connect the driver air bag module electrical connector.
  2. Through the steering wheel access cover opening, slide the driver air bag module electrical connector onto the pin-type retainer.



**Fig. 212: Connecting Driver Air Bag Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

19. Install the steering wheel access cover.



**Fig. 213: Installing Steering Wheel Access Cover**  
Courtesy of FORD MOTOR CO.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of vehicle safety standards.

20. Make sure all restraint system diagnostic tool(s) that may have been installed during the repair have been removed from the vehicle and all SRS components are connected.
21. Turn the ignition switch from OFF to ON.
22. Install RCM fuse F33 (15A) to the SJB and install the cover.

**WARNING:** Be sure that nobody is in the vehicle and that there is nothing blocking or set in front of any air bag module when the battery ground cable is connected.

23. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
24. Prove out the supplemental restraint system (SRS) as follows:

Turn the ignition key from ON to OFF. Wait 10 seconds, then turn the key back to ON and visually monitor the air bag indicator with the air bag modules installed. The air



bag indicator will light continuously for approximately 6 seconds and then turn off. If an air bag supplemental restraint system (SRS) fault is present, the air bag indicator will:

- fail to light.
- remain lit continuously.
- flash.

The flashing might not occur until approximately 30 seconds after the ignition switch has been turned from the OFF to the ON position. This is the time required for the restraints control module (RCM) to complete the testing of the SRS. If the air bag indicator is inoperative and a SRS fault exists, a chime will sound in a pattern of 5 sets of 5 beeps. If this occurs, the air bag indicator and any SRS fault discovered must be diagnosed and repaired.

Clear all continuous DTCs from the restraints control module using a diagnostic tool.

#### **INSPECTION AND REPAIR AFTER A SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPLOYMENT**

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of vehicle safety standards.

- NOTE:** After diagnosing or repairing an SRS, the restraint system diagnostic tools must be removed before operating the vehicle over the road.
- NOTE:** After diagnosing or repairing a seat system, the restraint system diagnostic tools must be removed before operating the vehicle over the road.
- NOTE:** Deployable devices (such as air bag modules, pretensioners) may deploy alone or in various combinations depending on the impact event.
- NOTE:** Always refer to the appropriate workshop manual procedures prior to carrying out vehicle repairs affecting the supplemental restraint system (SRS) and safety belt system.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

1. When any deployable device or combination of devices are deployed and/or the restraints control module (RCM) has the diagnostic trouble code (DTC) B1231 (Crash Data Memory Full) in memory, the repair of the vehicle's SRS is to include the removal of all deployed devices and the installation of new deployable devices, the removal and installation of new impact sensors, and the removal and installation of a new RCM.
2. When any damage to the impact sensor mounting points or mounting hardware has occurred, repair or install new mounting points and mounting hardware as needed.
3. When the driver air bag module has deployed, a new clockspring must be installed.
4. Inspect the entire vehicle for damage, including the following components:
  - Steering column
  - Instrument panel knee bolsters and mounting points
  - Instrument panel braces and brackets
  - Instrument panel and mounting points
  - Seats and seat mounting points
  - Safety belts, safety belt buckles and safety belt retractors. For additional information, refer to **SAFETY BELT SYSTEM**
  - SRS wiring, wiring harnesses and connectors
5. After carrying out the review and inspection of the entire vehicle for damage, repair or install new components as needed.

## **RIVET NUT REPLACEMENT**

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**CAUTION:** If the safety canopy/side air curtain module has deployed, the tether cord rivet nut must be inspected and replaced if damaged before installing a new safety canopy.

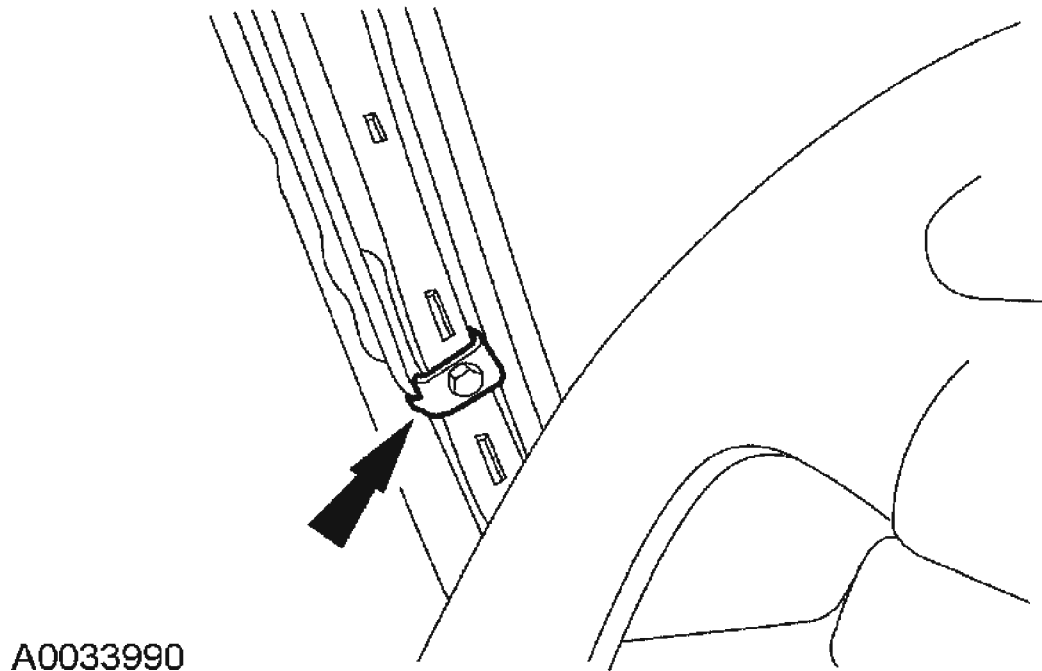
**NOTE:** A typical rivet nut replacement is shown that is similar for all vehicles.

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

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the necessary trim panel(s). For additional information, refer to **INTERIOR**

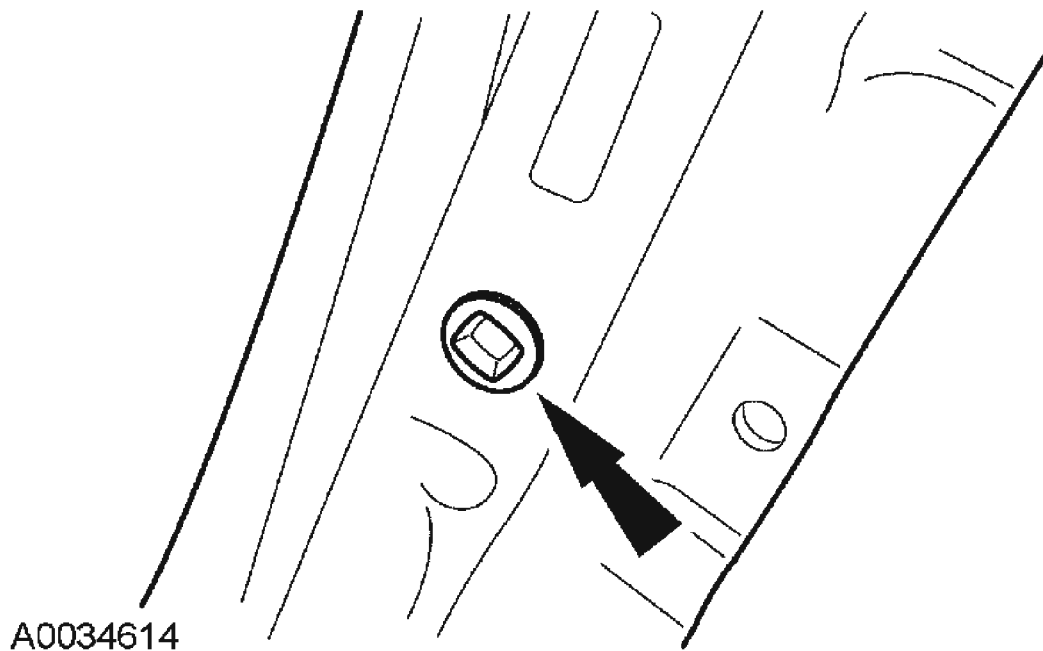
### **TRIM AND ORNAMENTATION .**

3. Remove the bolt and bracket for the tether cord (if present).



**Fig. 214: Removing Bolt And Bracket For Tether Cord**  
**Courtesy of FORD MOTOR CO.**

4. If needed, position and secure the safety canopy/side air curtain tether cord and bracket assembly out of the way.
5. Using the appropriate service tool, sand the rivet nut shoulder until the shoulder surface is removed.



**Fig. 215: Sanding Rivet Nut Shoulder**  
Courtesy of FORD MOTOR CO.

6. Punch the remaining portion of the rivet nut through the rivet nut hole.

**NOTE:** Use only Ford Motor Company factory-authorized replacement parts for rivet nut repair procedure.

7. Obtain the correct square shank rivet nut for the vehicle application from the Ford Master Parts Catalog, and insert it into the rivet nut hole.
8. Using a suitable rivet nut installing tool, install the rivet nut. For additional information, refer to the tool manufacturer's operating instructions.
9. If present, position the tether cord. Install the bolt. See the appropriate component removal and installation procedure or Specifications for the correct torque specification.

**NOTE:** The tether cord must be positioned correctly in place before installing the A-pillar trim panel.

10. Install the necessary trim panel(s). For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.

**Disposal of Deployable Devices and Pyrotechnic Devices That Are Undeployed/Inoperative**

**NOTE:** All inoperative air bag modules and safety belt pretensioners have been placed on the Mandatory Return List. All discolored or damaged air bag modules must be treated the same as any inoperative live air bag being returned.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the undeployed/inoperative device. For additional information, refer to the appropriate procedure in this article or **SAFETY BELT SYSTEM**.

**NOTE:** When installing a new air bag module, a prepaid return postcard is provided with the replacement air bag module. The serial number for the new part and the vehicle identification number (VIN) must be recorded and sent to Ford Motor Company.

3. If installing a new air bag module record the necessary information and return the inoperative air bag module to Ford Motor Company.

**Disposal of Deployable Devices and Pyrotechnic Devices That Are Deployed**

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the deployed device. For additional information, refer to the appropriate procedure in this article or **SAFETY BELT SYSTEM**.

**NOTE:** If a dual stage driver or passenger air bag module has deployed due to a crash event, the air bag module requires manual deployment to make sure both stages have deployed before scrapping the vehicle or disposing of the air bag module. To determine if a vehicle is equipped with dual stage driver or passenger air bag modules, refer to the **DESCRIPTION AND OPERATION**.

3. Dispose of the deployed device in the same manner as any other part to be scrapped.

**Disposal of Deployable Devices and Pyrotechnic Devices That Require Manual Deployment**

1. Safety and environmental concerns require consideration and treatment of restraints system deployable and pyrotechnic devices when disposing of vehicles, deployable devices or pyrotechnic devices. Deploying deployable and pyrotechnic devices before scrapping a vehicle or the device eliminates the potential for hazardous exposures or

reactions during processing. If special handling procedures are followed, deployable and pyrotechnic devices can be deployed safely and recycled with the vehicle, shipped separately to a recycling facility or disposed of safely.

**NOTE:** To determine the deployable devices a vehicle is equipped with, refer to the DESCRIPTION AND OPERATION.

A vehicle equipped with any of the following deployable devices requires manual deployment of the devices before scrapping the vehicle or component. For additional information, refer to the appropriate portion of this procedure.

- Driver air bag module
- Passenger air bag module
- Seat side air bag modules
- Safety canopy modules
- Side air curtain modules

**NOTE:** To determine the pyrotechnic devices a vehicle is equipped with, refer to the DESCRIPTION AND OPERATION.

2. A vehicle equipped with any of the following pyrotechnic devices requires manual deployment of the devices before scrapping the vehicle or component. For additional information, refer to the appropriate portion of this procedure.
  - Safety belt buckle pretensioners
  - Safety belt retractor pretensioners
  - Adaptive load limiting retractors
  - Deployable steering column

**NOTE:** To determine if a vehicle is equipped with dual stage driver or passenger air bag modules, refer to the DESCRIPTION AND OPERATION.

3. If a dual stage driver or passenger air bag module has deployed due to a crash event, the air bag module requires manual deployment to make sure both stages have deployed before scrapping the vehicle or disposing of the air bag module. For additional information, refer to DRIVER AIR BAG MODULE, PASSENGER AIR BAG MODULE AND SEAT SIDE AIR BAG MODULES - REMOTE DEPLOYMENT in this procedure.

Driver Air Bag Module, Passenger Air Bag Module and Seat Side Air Bag Modules - Remote Deployment

**WARNING:** Always wear safety glasses when repairing an air bag

supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** Carry a live air bag module with the air bag and trim cover pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Do not set a live air bag module down with the trim cover face down. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Carry a live seat side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Deployment is to be carried out outdoors with all personnel at least 9.14 meters (30 feet) away to make sure of personal safety. Due to the loud report which occurs when the air bag is deployed, hearing protection is required.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards.

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

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

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

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

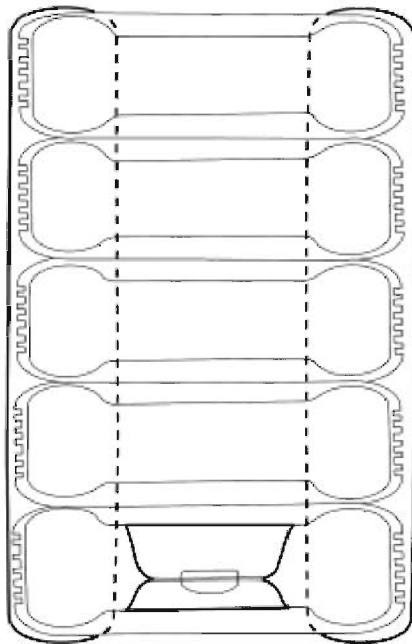
**vehicles.**

All driver, passenger and seat side air bag modules

1. Make a container to house the air bag module for deployment.

**NOTE:**      **The tires must be of sufficient size to accommodate the air bag module.**

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



N0033182

**Fig. 216: Making Container To House Air Bag Module For Deployment**  
Courtesy of FORD MOTOR CO.

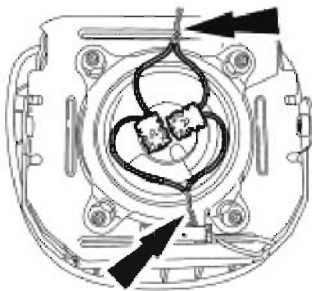
2. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
3. Remove the air bag module. For additional information, refer to the appropriate procedure in this article.

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



4. Cut each of the air bag module wires near the electrical connector that connects to the vehicle wire harness.
5. Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

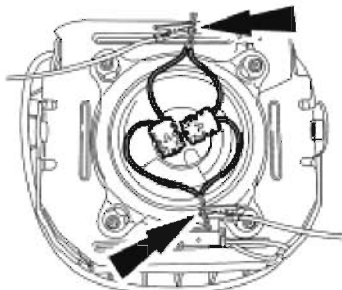
**NOTE:** Typical driver air bag module with 2 squibs shown, other air bag modules with multiple squibs similar.



A0043898

**Fig. 217: Locating Air Bag Module Wire Squibs**  
Courtesy of FORD MOTOR CO.

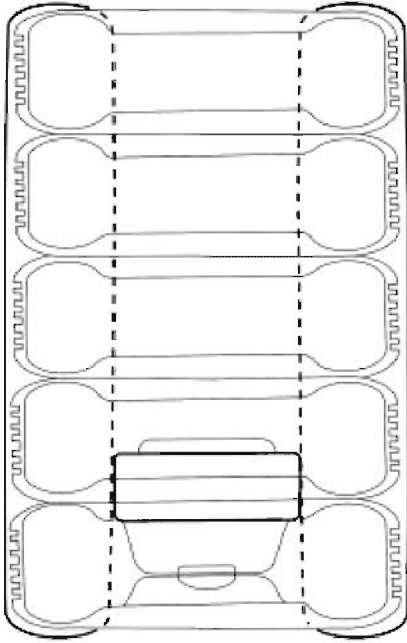
6. For air bag modules with multiple squibs, twist together a wire from each squib then repeat for the remaining wires from each squib.
7. Make a jumper harness to deploy the air bag module.
  - Obtain 2 wires (20 gauge minimum) at least 9.14 meters (30 feet) long and strip both ends of each wire.
  - At one end of the jumper harness, connect the wires together.
8. Using the end of the jumper harness that the wires are not connected together, attach each wire of the jumper harness to each wire of the air bag module or to the twisted-together wires if multiple squibs. Use tape or other insulating material to make sure that the leads do not make contact with each other.



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**Fig. 218: Connecting Jumper Wires To Squibs**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure to maintain the connections to the air bag module.



N0033193

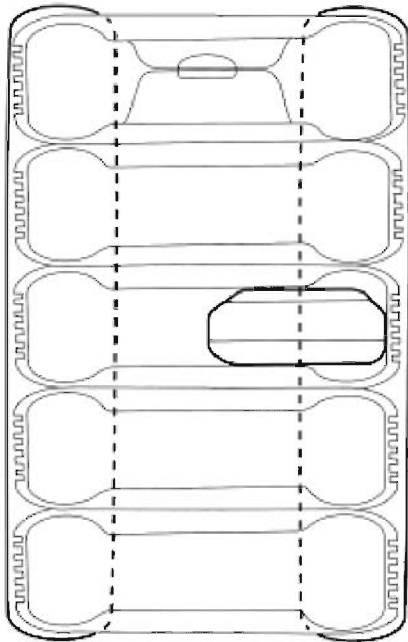
**Fig. 219: View Of Air Bag Modules Inside Tires For Deployment**  
Courtesy of FORD MOTOR CO.

9. With the stack of tires upright and the wheel on the bottom, carefully place the driver air bag module, with the trim cover facing up, on the wheel.

#### **Passenger and seat side air bag modules**

**NOTE:** Make sure to maintain the connections to the air bag module.

10. Tip the stack of tires on its side and place the air bag module inside the center tire, making sure that there are 2 tires beneath the tire containing the air bag module and 2 tires (including the tire and wheel assembly) above the tire containing the air bag module.
11. Place the tire stack upright, with the wheel on top.



N0033194

**Fig. 220: Identifying Passenger Or Seat Side Air Bag Modules Inside Center Tire**  
Courtesy of FORD MOTOR CO.

**All driver, passenger and seat side air bag modules**

12. Remain at least 9.14 meters (30 feet) away from the air bag module.
13. From the end of the jumper harness that is not connected to the air bag module, disconnect the 2 wires of the jumper harness from each other.
14. Deploy the air bag module by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.
15. To allow for cooling, wait at least 10 minutes before approaching the deployed air bag module.
16. Dispose of the deployed air bag module in the same manner as any other part to be scrapped.

Safety Belt Buckle Pretensioners, Safety Belt Retractor Pretensioners and Adaptive Load Limiting Safety Belt Retractors - Remote Deployment

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

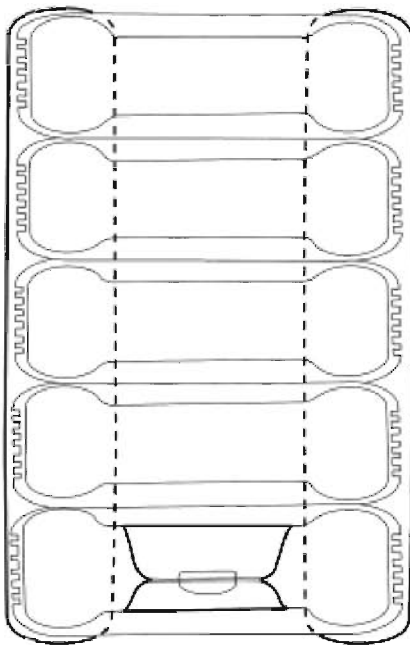
**WARNING:** Deployment is to be carried out outdoors with all personnel at least 9.14 meters (30 feet) away to make sure of personal safety. Due to the loud report which occurs when the pretensioner or adaptive load limiting retractor is deployed, hearing protection is required.

**NOTE:** A typical safety belt buckle and retractor disposal is shown that is similar for all vehicles.

1. Make a container to house the safety belt buckle or retractor for deployment.

**NOTE:** The tires must be of sufficient size to accommodate the safety belt buckle or retractor.

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



N0033182

**Fig. 221: Making Container To House Air Bag Module For Deployment**  
Courtesy of FORD MOTOR CO.

2. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
3. Remove the safety belt buckle or retractor. For additional information, refer to the

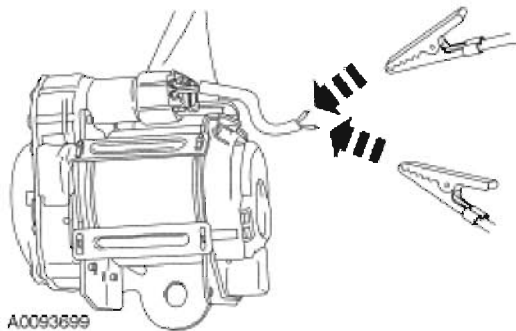
appropriate procedure in **SAFETY BELT SYSTEM** .

- When deploying a safety belt buckle pretensioner, install a nut and bolt of sufficient length and of the same diameter as was used to retain it to the seat.

**NOTE:** If the safety belt buckle or retractor does not have a hard-wired pigtail, it will be necessary to cut the wires and connector(s) from the vehicle wire harness and reconnect to the safety belt buckle or retractor.

4. Cut each of the safety belt buckle or retractor wires near the electrical connector that connects to the vehicle wire harness.
5. Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.
6. Make a jumper harness to deploy the safety belt buckle or retractor.
  - Obtain 2 wires (20 gauge minimum) at least 9.14 meters (30 feet) long and strip both ends of each wire.
  - At one end of the jumper harness, connect the wires together.

**NOTE:** Typical safety belt retractor pretensioner shown, other safety belt buckle pretensioners and load limiting retractors are similar.



**Fig. 222: Attaching Jumper Wires To Safety Belt Retractor Pretensioner**  
Courtesy of FORD MOTOR CO.

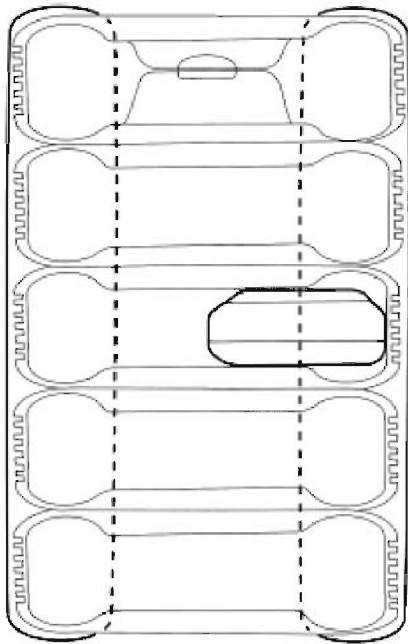
7. Using the end of the jumper harness that the wires are not connected together, attach each wire of the jumper harness to each wire of the safety belt buckle or retractor. Use tape or other insulating material to make sure that the leads do not make contact with each other.

**NOTE:** Make sure to maintain the connections to the safety belt buckle or retractor.

8. Tip the stack of tires on its side and place the safety belt buckle or retractor inside the

center tire, making sure that there are 2 tires beneath the tire containing the safety belt buckle or retractor and 2 tires (including the tire and wheel assembly) above the tire containing the safety belt buckle or retractor.

9. Place the tire stack upright, with the wheel on top.



N0033184

**Fig. 223: Identifying Passenger Or Seat Side Air Bag Modules Inside Center Tire**  
Courtesy of FORD MOTOR CO.

10. Remain at least 9.14 meters (30 feet) away from the safety belt buckle or retractor.
11. From the end of the jumper harness that is not connected to the safety belt buckle or retractor, disconnect the 2 wires of the jumper harness from each other.
12. Deploy the safety belt buckle or retractor by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.
13. To allow for cooling, wait at least 10 minutes before approaching the deployed safety belt buckle or retractor.
14. Dispose of the deployed safety belt buckle or retractor in the same manner as any other part to be scrapped.

Safety Belt Buckle Pretensioners, Safety Belt Retractor Pretensioners and Load Limiting Safety Belt Retractors - In-Vehicle Deployment

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never

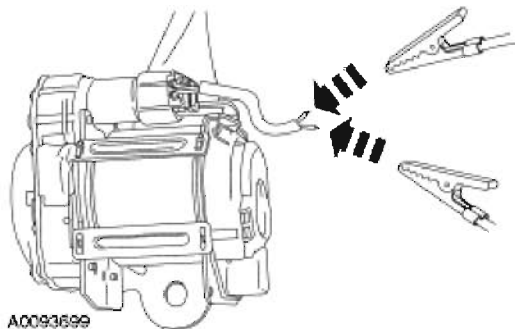
probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** Deployment is to be carried out outdoors with all personnel at least 9.14 meters (30 feet) away to make sure of personal safety. Due to the loud report which occurs when the pretensioner or adaptive load limiting retractor is deployed, hearing protection is required.

**NOTE:** A typical safety belt buckle and retractor disposal is shown that is similar for all vehicles.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Access the safety belt buckle or retractor electrical connectors. For additional information, refer to **SAFETY BELT SYSTEM**.
3. Cut each of the safety belt buckle or retractor wires, leaving at least 4 inches to work with.
4. Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.
5. Make a jumper harness to deploy the safety belt buckle or retractor.
  - Obtain 2 wires (20 gauge minimum) at least 9.14 meters (30 feet) long and strip both ends of each wire.
  - At one end of the jumper harness, connect the wires together.

**NOTE:** Typical safety belt retractor pretensioner shown, other safety belt buckle pretensioners and load limiting retractors are similar.



**Fig. 224: Attaching Jumper Wires To Safety Belt Retractor Pretensioner**  
Courtesy of FORD MOTOR CO.

6. Using the end of the jumper harness that the wires are not connected together, attach each wire of the jumper harness to each wire of the safety belt buckle or retractor. Use tape or other insulating material to make sure that the leads do not make contact with each other.
7. Remain at least 9.14 meters (30 feet) away from the safety belt buckle or retractor.
8. From the end of the jumper harness that is not connected to the safety belt buckle or retractor, disconnect the 2 wires of the jumper harness from each other.
9. Deploy the safety belt buckle or retractor by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.
10. To allow for cooling, wait at least 10 minutes before approaching the deployed safety belt buckle or retractor.
11. Dispose of the deployed safety belt buckle or retractor in the same manner as any other part to be scrapped.

**Safety Canopy Modules and Side Air Curtain Modules - In-Vehicle Deployment**

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards.

**WARNING:** Deployment is to be carried out outdoors with all personnel at least 9.14 meters (30 feet) away to make sure of personal safety. Due to the loud report which occurs when the safety canopy or side air curtain is deployed, hearing protection is required.

**NOTE:** The safety canopy module deployment for a scrapped vehicle will occur in its installed position in the vehicle.

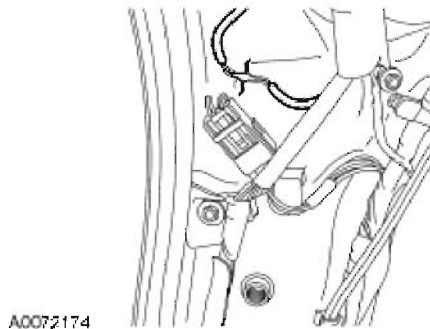
**NOTE:** A typical safety canopy module disposal is shown that is similar for all vehicles.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Access the safety canopy/side air curtain module electrical connectors. For additional information, refer to the appropriate procedure in this article.



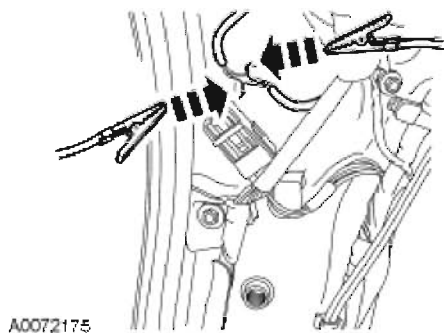
3. Cut each of the safety canopy/side air curtain module wires leaving at least 4 inches to work with.
4. Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

**NOTE:** Typical safety canopy/side air curtain module with 2 squibs shown, other safety canopy/side air curtain modules with 2 squibs are similar.



**Fig. 225: Identifying Safety Canopy/Side Air Curtain Module Wire Squibs**  
Courtesy of FORD MOTOR CO.

5. For safety canopy/side air curtain modules with multiple squibs, twist together a wire from each squib then repeat for the remaining wires from each squib.
6. Make a jumper harness to deploy the safety canopy/side air curtain module.
  - Obtain 2 wires (20 gauge minimum) at least 9.14 meters (30 feet) long and strip both ends of each wire.
  - At one end of the jumper harness, connect the wires together.
7. Using the end of the jumper harness that the wires are not connected together, attach each wire of the jumper harness to each wire of the safety canopy/side air curtain module or to the twisted-together wires if multiple squibs. Use tape or other insulating material to make sure that the leads do not make contact with each other.



**Fig. 226: Attaching Wire Of Jumper Harness To Wire Of Safety Canopy/Side Air Curtain Module**

**Courtesy of FORD MOTOR CO.**

8. From the end of the jumper harness that is not connected to the safety canopy/side air curtain module, disconnect the 2 wires of the jumper harness from each other.
9. Deploy the safety canopy/side air curtain module by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.
10. To allow for cooling, wait at least 10 minutes before approaching the deployed safety canopy/side air curtain module.
11. Dispose of the deployed safety canopy/side air curtain module in the same manner as any other part to be scrapped.

**Deployable Steering Column - In-Vehicle Deployment**

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Deployment is to be carried out outdoors with all personnel at least 9.14 meters (30 feet) away to make sure of personal safety. Due to the loud report which occurs when the deployable steering column is deployed, hearing protection is required.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

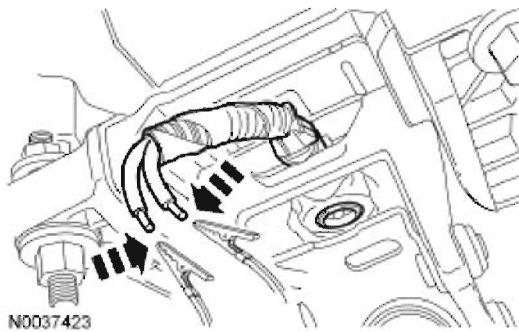
**NOTE:** It may be necessary to lower or remove the deployable steering column from the instrument panel to access the deployable steering column electrical connector.

2. Access the deployable steering column electrical connector.

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

3. Cut each of the deployable steering column wires, leaving at least 4 inches to work with.
4. Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.
5. Make a jumper harness to deploy the deployable steering column.

- Obtain 2 wires (20 gauge minimum) at least 9.14 meters (30 feet) long and strip both ends of each wire.
  - At one end of the jumper harness, connect the wires together.
6. Using the end of the jumper harness that the wires are not connected together, attach each wire of the jumper harness to each wire of the deployable steering column. Use tape or other insulating material to make sure that the leads do not make contact with each other.



**Fig. 227: Attaching Each Wire Of Jumper Harness To Each Wire Of Deployable Steering Column**

**Courtesy of FORD MOTOR CO.**

7. Remain at least 9.14 meters (30 feet) away from the deployable steering column.
8. From the end of the jumper harness that is not connected to the deployable steering column, disconnect the 2 wires of the jumper harness from each other.
9. Deploy the deployable steering column by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.
10. To allow for cooling, wait at least 10 minutes before approaching the deployed steering column.
11. Dispose of the deployed steering column in the same manner as any other part to be scrapped.

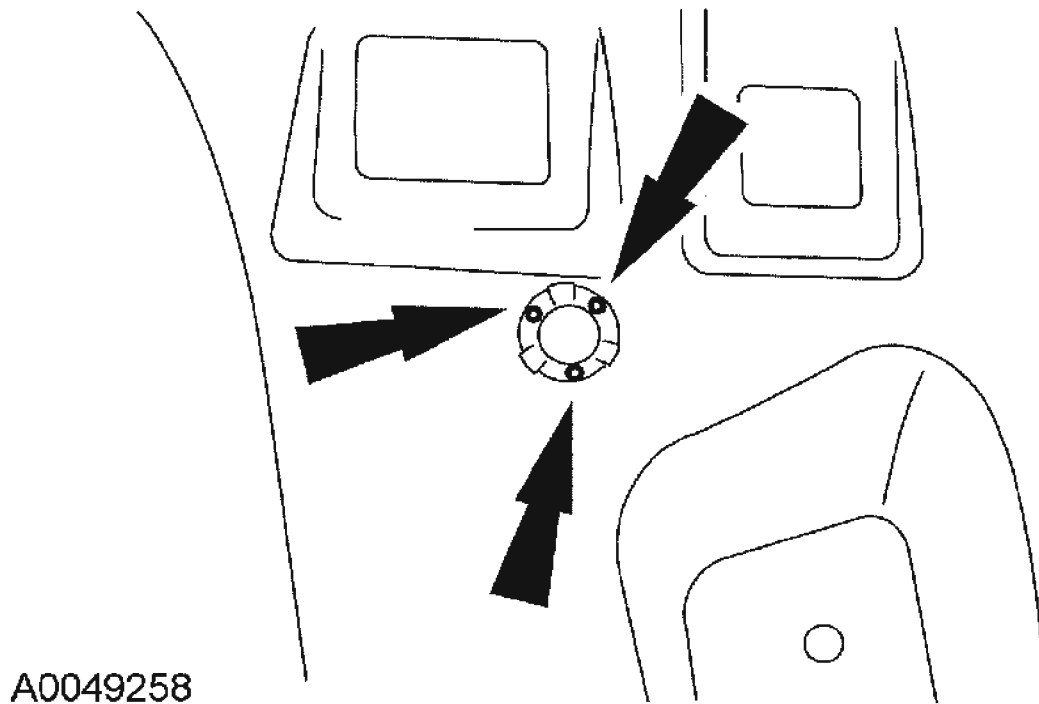
#### **WELD NUT REPAIR - MISSING WELD NUT**

**CAUTION:** Installing a J-nut in place of a weld nut is not a recommended repair.

**NOTE:** C-pillar repair shown, others similar.

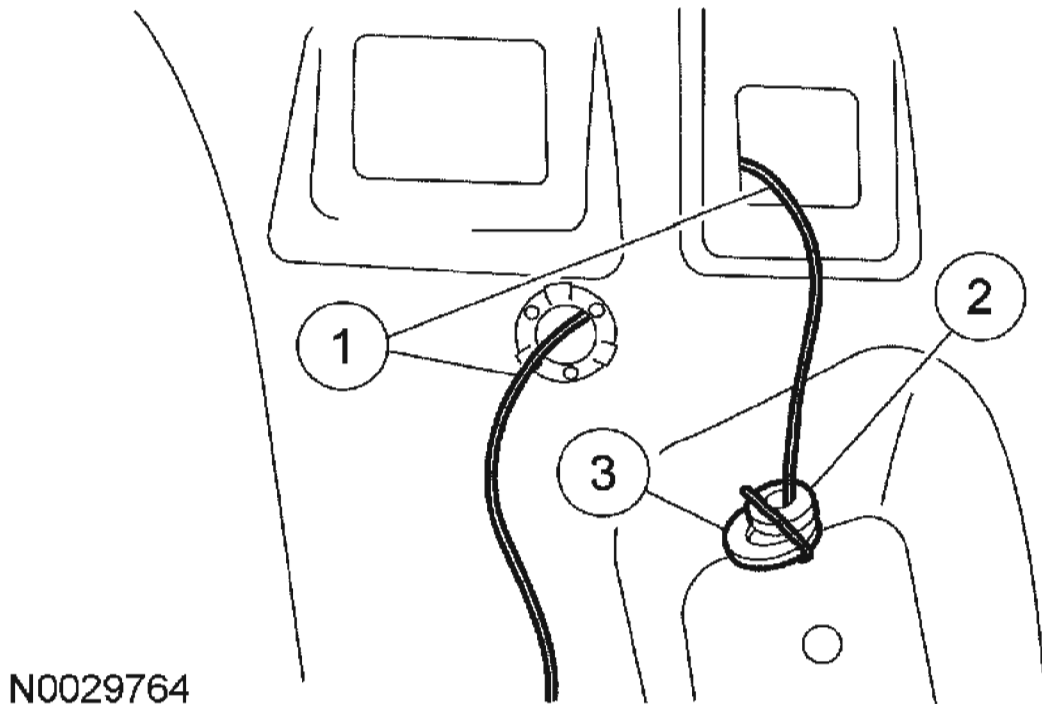
1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the component from where the weld nut is to be repaired. Refer to the appropriate **REMOVAL AND INSTALLATION PROCEDURE**.

3. Drill 3 equally spaced 1.75 mm (0.06 in) (5/64 in) holes in close proximity to where the weld nut face will be plug welded back to the sheet metal.



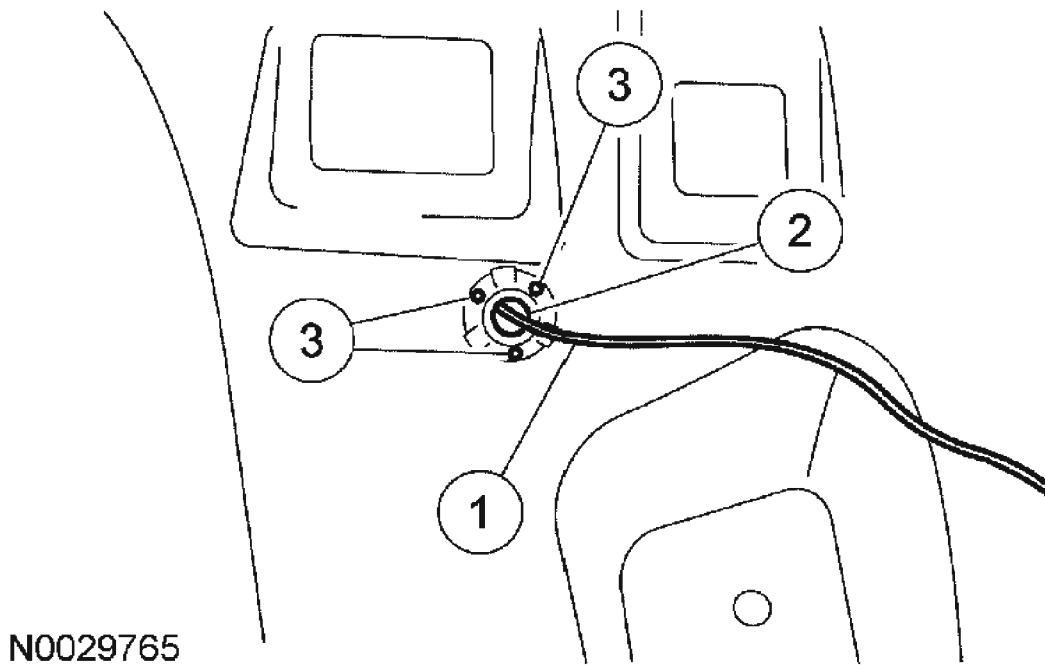
**Fig. 228: Locating Drilled Holes**  
Courtesy of FORD MOTOR CO.

4. Obtain the appropriate 6 mm (0.23 in) or 8 mm (0.32 in) weld nut.
5. Obtain the appropriate 6 mm (0.24 in) by 1.0 or 8 mm (0.32 in) by 1.25 grounding screw (self-tapping).
6. Set up for the positioning of the weld nut.
  1. Route a sufficient length of wire through the weld nut clearance hole and back out an adjacent access hole.
  2. Position a weld nut, shoulder end up, onto the wire.
  3. Position a flat washer onto the wire and secure it so it cannot be pulled off.



**Fig. 229: Positioning Weld Nut**  
Courtesy of FORD MOTOR CO.

7. Plug weld the weld nut into position.
  1. Pull the welding wire back through the clearance hole, allowing the weld nut and flat washer to follow the welding wire through and stop against the sheet metal.
  2. Make sure the weld nut shoulder is aligned through the clearance hole in the sheet metal.
  3. With the weld nut firmly held in position, plug weld the weld nut at the 3 holes drilled previously.



**Fig. 230: Pulling Welding Wire Back**  
Courtesy of FORD MOTOR CO.

8. Metal finish as required.
9. Verify the nut is securely in place.
10. Install the component with the previously obtained screw.
11. Tighten the attaching screws to specification. For additional information, refer to **SPECIFICATIONS**.

#### **WELD NUT REPAIR - STRIPPED WELD NUT**

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the component from where the weld nut is to be repaired. Refer to the appropriate removal and installation procedure in this article.
3. Inspect the weld nut and surrounding area for repair.
  - If there is not enough clearance for a larger bolt stud to go through or a larger bolt head to turn, then a threaded insert will have to be installed. Follow the instructions with the thread insert repair kit.
4. If a 6-mm weld nut is stripped, drill out the hole using a letter "H" or 0.26 in (6.5 mm) drill bit. Then tap, using an 8 mm by 1.25 bit.
  - Do not oversize a 6-mm weld nut by more than 8 mm.

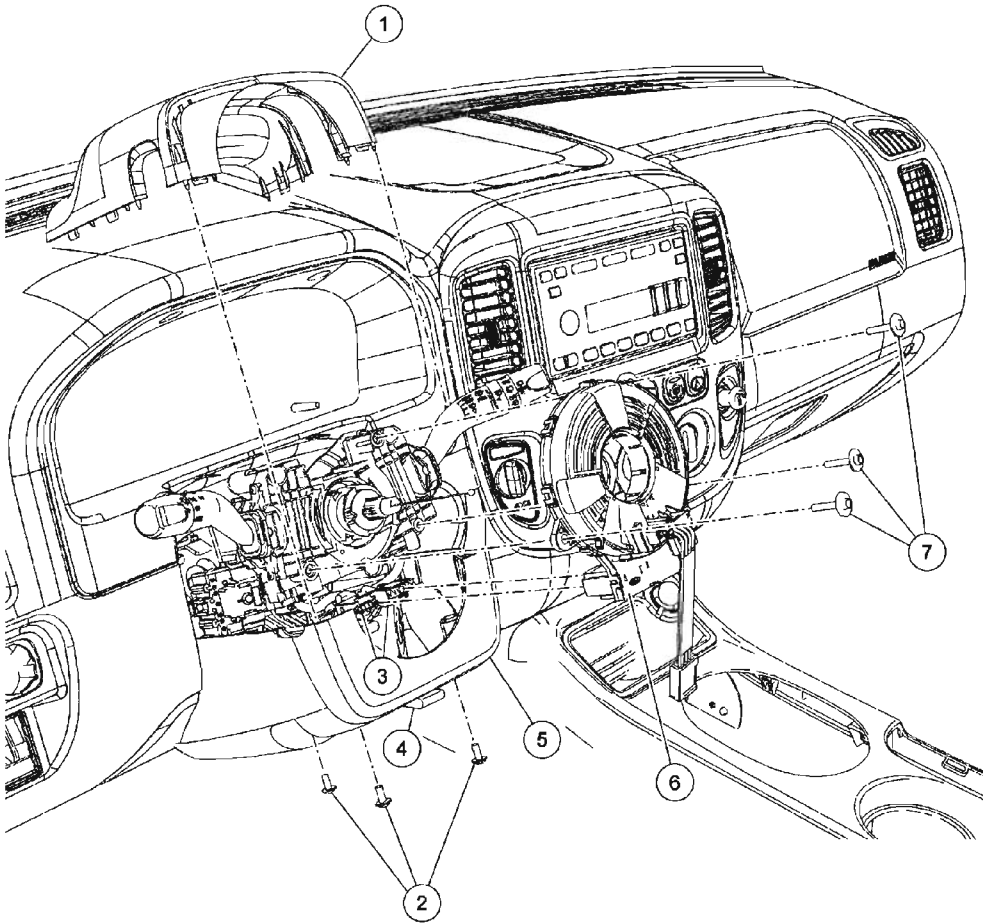
5. If an 8-mm weld nut is stripped, drill the hole using a letter "R" or 0.3990 in (9.9 mm) drill bit. Then tap, using a 10 mm by 1.50 bit.
  - Do not oversize an 8-mm weld nut by more than 10 mm.
6. Obtain the appropriate oversized screw.
7. Install the attaching screw(s) to the component.
8. Tighten the attaching screws to specification. For additional information, refer to **SPECIFICATIONS**.

## **REMOVAL AND INSTALLATION**

### **CLOCKSPRING**

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



A0001920

Item	Part Number	Description
1	3530	Upper steering column shroud
2	W504041	Lower steering column shroud screws
3	—	Clockspring electrical connectors (part of 14401)
4	—	Tilt column locking lever (if equipped)

Item	Part Number	Description
5	3K512	Lower steering column shroud
6	14A664	Clockspring
7	—	Clockspring screws

**Fig. 231: Identifying Clockspring Electrical Connector**  
Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

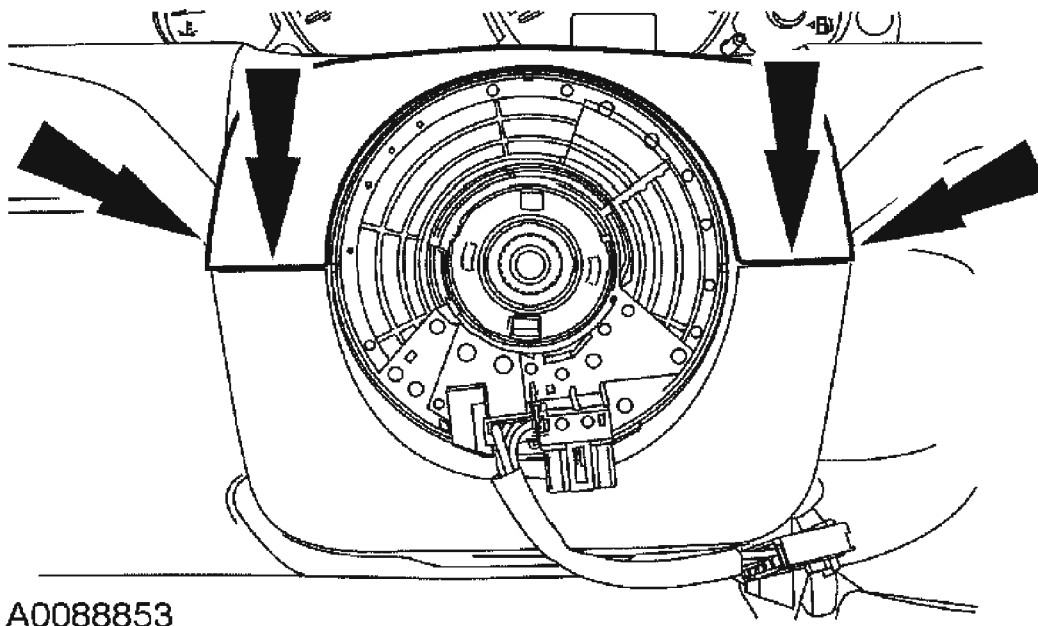


**NOTE:** The air bag warning lamp illuminates when the restraints control module (RCM) fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a SRS fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

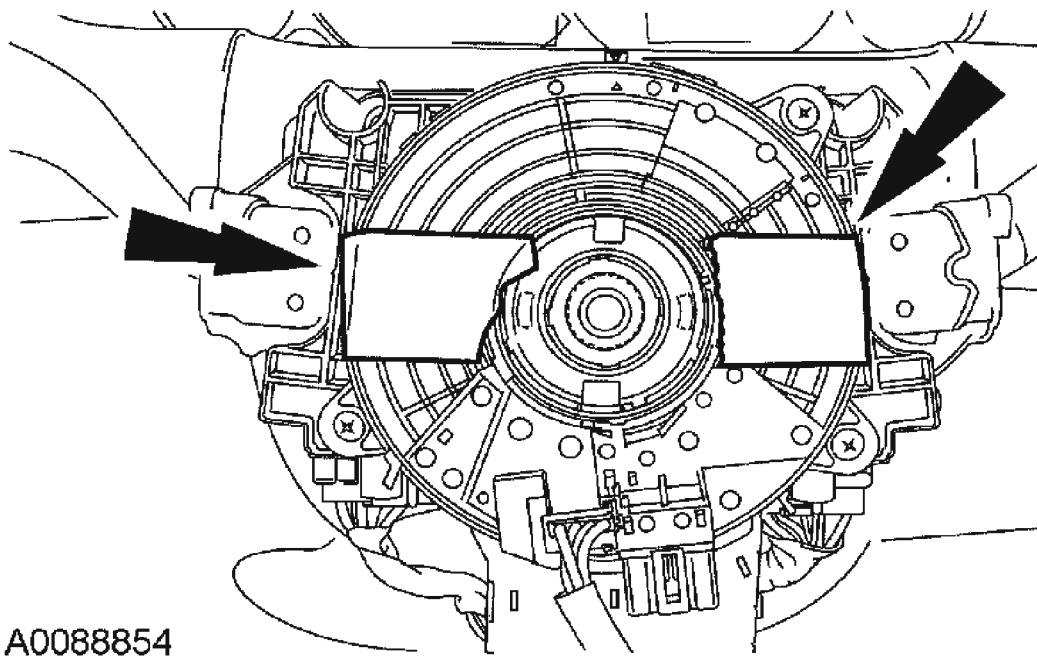
**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Make sure the road wheels are in the straight-ahead position.
3. Remove the steering wheel. For additional information, refer to **STEERING COLUMN**.
4. If equipped with tilt steering, position the steering column completely downward and lock in place.
5. Push in where indicated, releasing the retaining tabs, and remove the upper steering column shroud.



**Fig. 232: Removing Upper Steering Column Shroud**  
Courtesy of FORD MOTOR CO.

6. Release the tilt column locking lever, allowing the steering column to move upward. Do not lock the tilt column locking lever back in place.
7. Remove the 3 screws and position the lower steering column shroud aside.
8. If installing the same clockspring, apply 2 strips of masking tape across the clockspring to prevent accidental rotation when the clockspring is removed.



**Fig. 233: Identifying Clockspring**  
Courtesy of FORD MOTOR CO.

9. Remove the 3 clockspring screws.

**NOTE:** If the clockspring is to be reinstalled, do not allow the clockspring to turn from its removal position.

10. Partially remove the clockspring, then disconnect the 2 electrical connectors and remove the clockspring.

#### Installation

#### Vehicles needing clockspring recentering

**WARNING:** Incorrect centralization may result in premature component failure. If in doubt when centralizing the clockspring, repeat the centralizing procedure. Failure

**to follow this instruction may result in personal injury.**

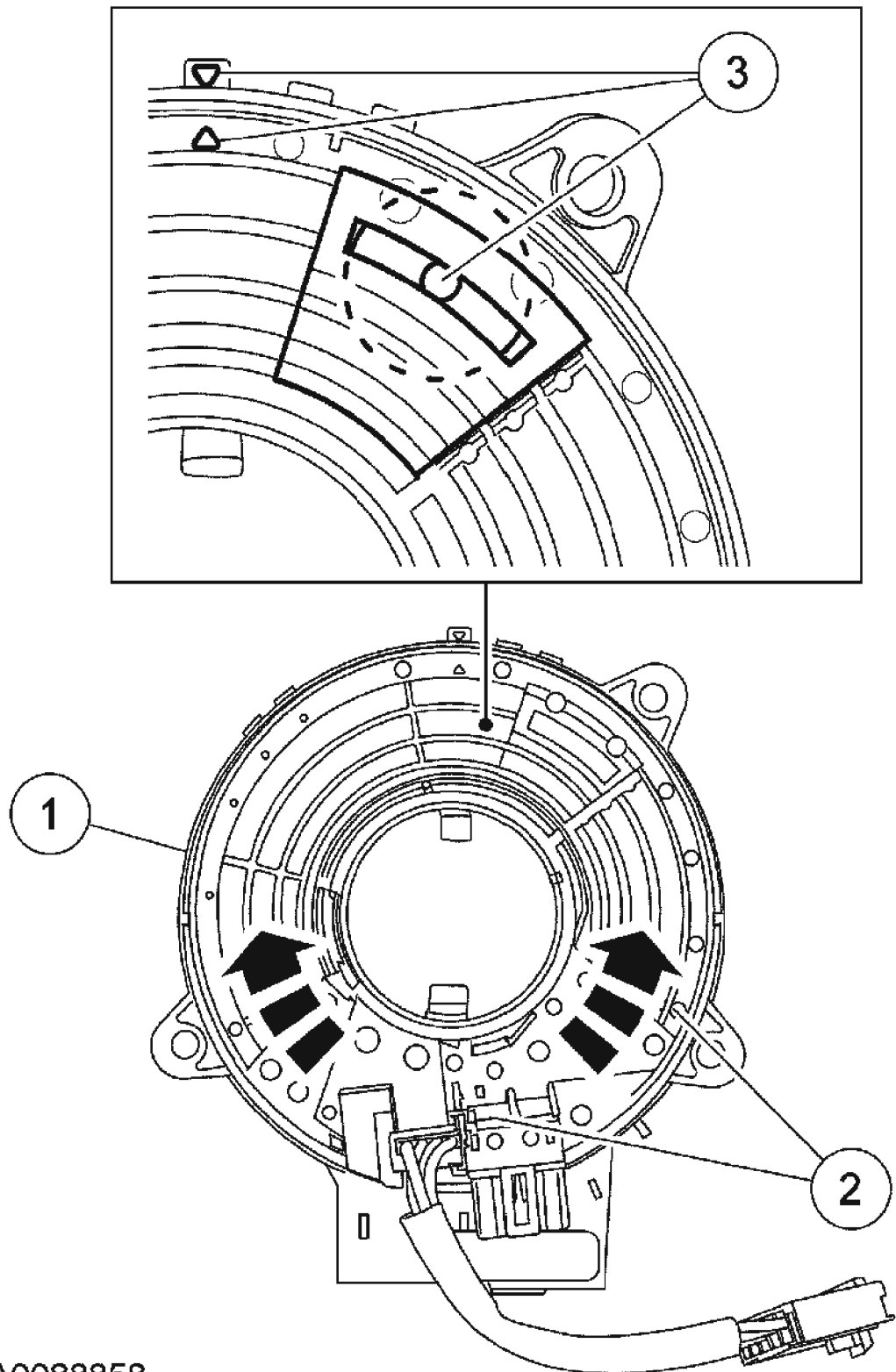
**CAUTION: Make sure the road wheels are in the straight-ahead position.**

1. If the vehicle's clockspring has rotated out of center, follow these steps to center the clockspring.

1. Hold the clockspring outer housing stationary.

**CAUTION: Overturning will destroy the clockspring. The internal ribbon wire acts as the stop and can be broken from its internal connection.**

2. While turning the rotor clockwise, carefully feel for the ribbon wire to run out of length and for a slight resistance. Stop turning at this point.
    3. Turn the clockspring counterclockwise until the yellow indicator shows anywhere in the window (window will be near the 1 o'clock position) and the arrow on the rotor lines up with the arrow on the top of the housing. The clockspring is now centered.
      - Do not allow the rotor to turn from this position.



A0088858

**Fig. 234: Turning Clockspring Counterclockwise**

**Courtesy of FORD MOTOR CO.**

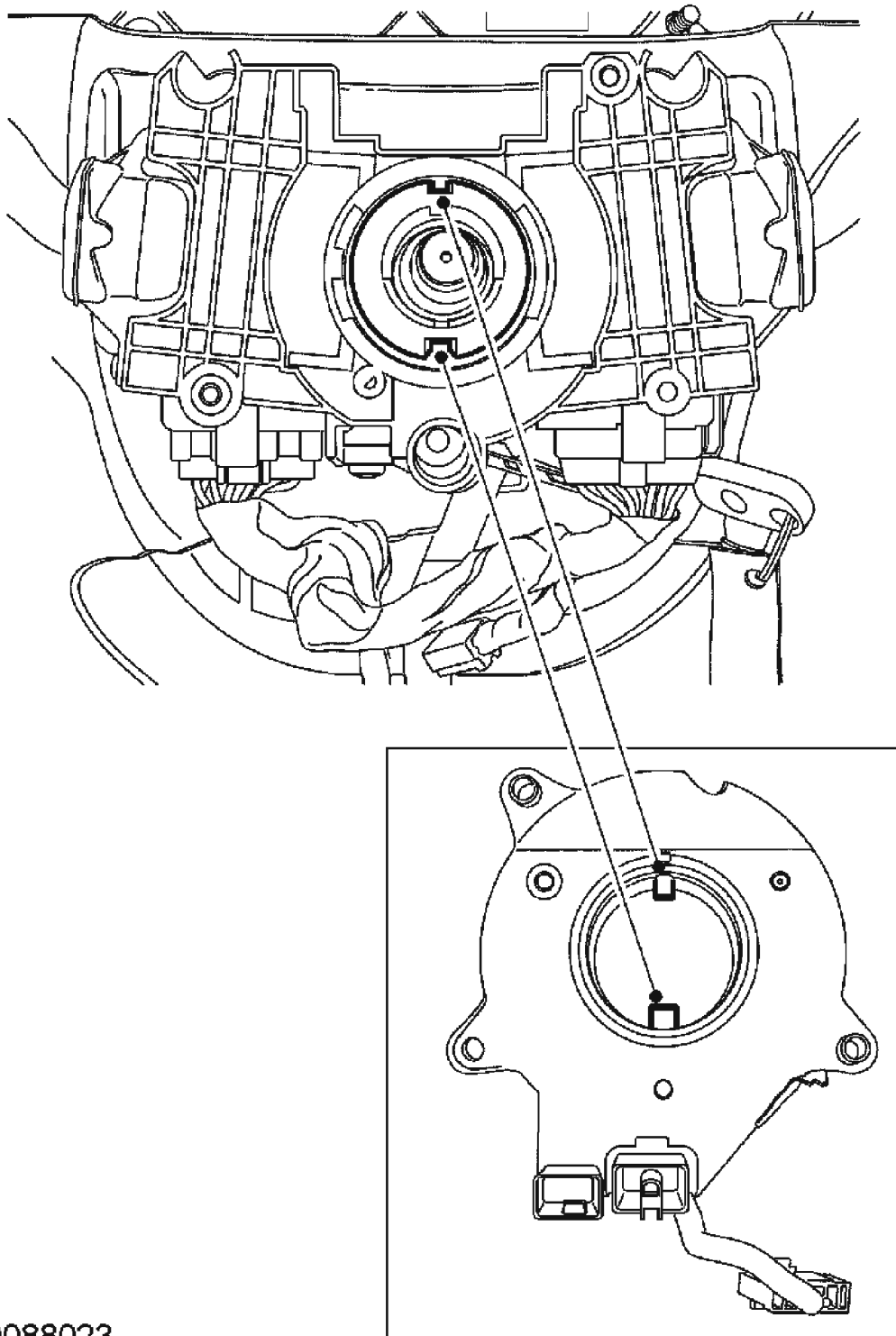
**All vehicles**

2. Connect the 2 clockspring electrical connectors to the clockspring.

**NOTE:**      **Slight turning of the clockspring rotor is allowable for alignment purposes to the steering column.**

**NOTE:**      **The clockspring is shown from the back for clarity.**

3. Align the clockspring for installation.
  - Align the large slot to the large tab in the clockspring.
  - Align the small slot to the small tab in the clockspring.



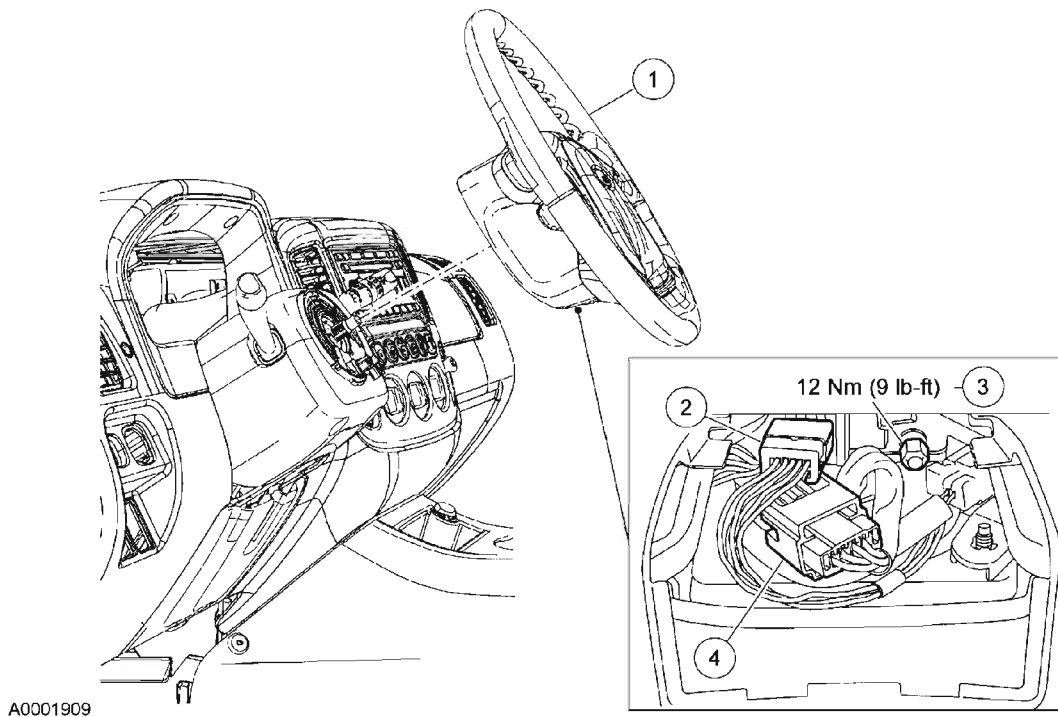
A0088023

**Fig. 235: Aligning Clockspring**  
Courtesy of FORD MOTOR CO.

4. Install the 3 clockspring screws.

5. For vehicles reusing a clockspring that was removed, remove the tape. For vehicles installing a new clockspring, remove the retaining pin.
6. Install the lower steering column shroud and the 3 screws.
7. Position the steering column completely downward and lock in place.
8. Install the upper steering column shroud and engage the retaining tabs.
9. Install the steering wheel. For additional information, refer to **STEERING COLUMN**.
10. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

## DRIVER AIR BAG MODULE



Item	Part Number	Description
1	043B13	Steering wheel and driver air bag module assembly
2	—	Clockspring electrical connector
3	—	Steering wheel mounting pinion shaft bolt
4	—	Driver air bag module electrical connector

**Fig. 236: Identifying Driver Air Bag Module Components And Torque Specification**  
Courtesy of FORD MOTOR CO.

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Carry a live air bag module with the air bag and trim cover pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Do not set a live air bag module down with the trim cover face down. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** The driver air bag (soft pack) and steering wheel can only be serviced as an assembly.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

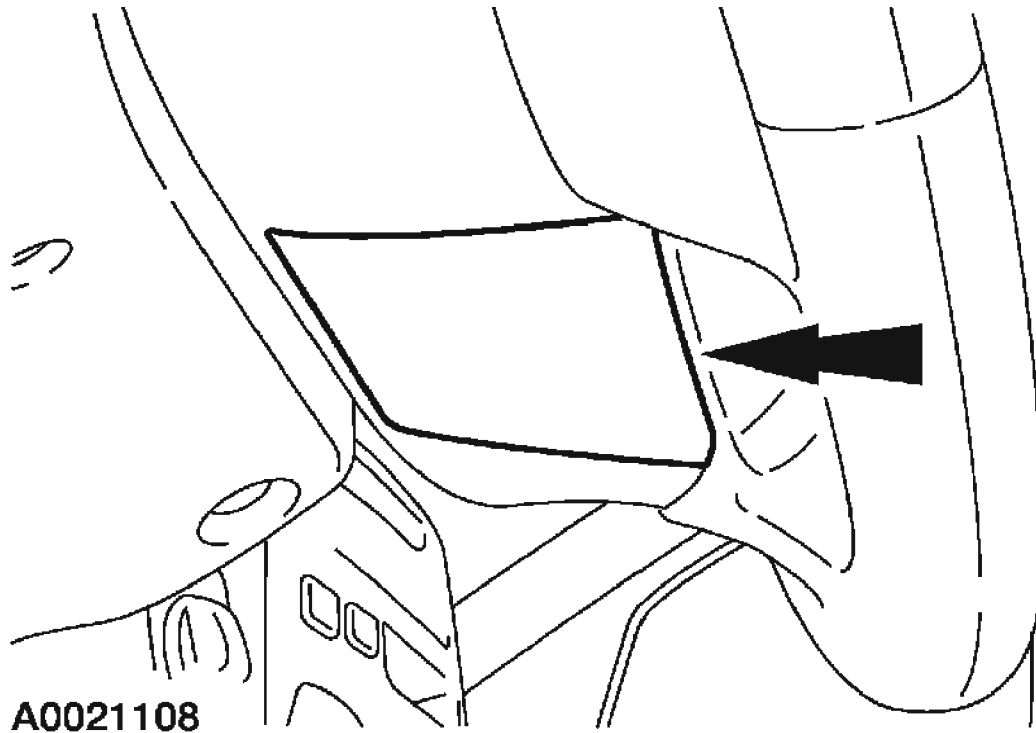
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.



2. Remove the steering wheel access cover.

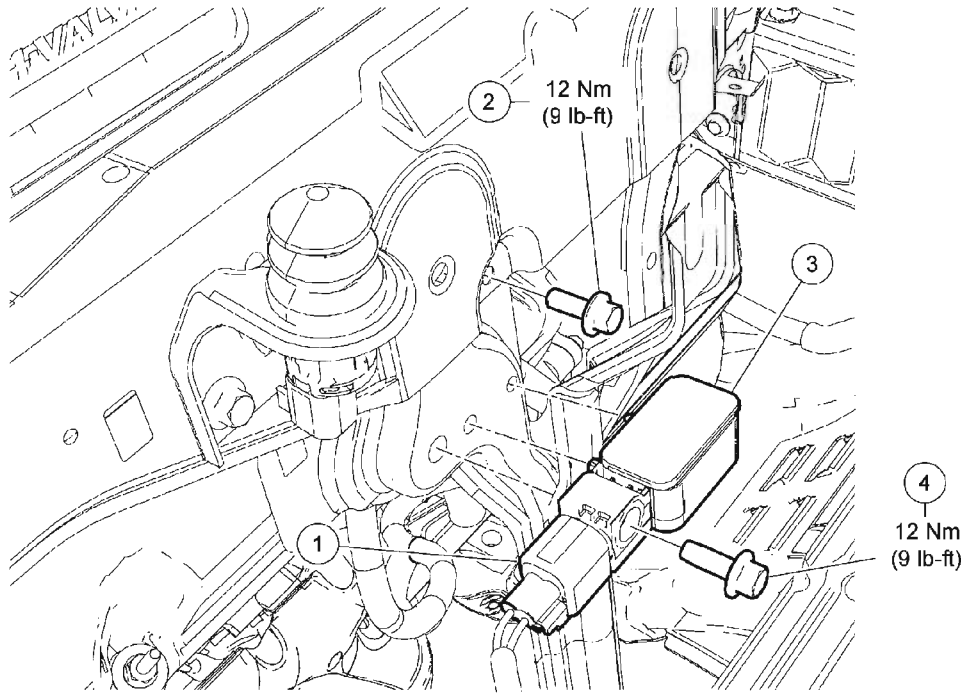


**Fig. 237: Removing Steering Wheel Access Cover**  
Courtesy of FORD MOTOR CO.

3. Disconnect the 2 electrical connectors to the clockspring.
4. Loosen the steering wheel mounting pinion shaft to release the steering wheel from the steering column shaft.
  - To install, tighten to 12 Nm (9 lb-ft).
5. Remove the driver air bag module and steering wheel assembly.
6. To install, reverse the removal procedure.
7. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

#### FRONT IMPACT SEVERITY SENSOR

**NOTE:** Radiator and radiator top shield are removed for clarity.



A0001769

Item	Part Number	Description
1	—	Front impact severity sensor connector (part of 14290)
2	—	Radiator support bracket bolt
3	14B006	Front impact severity sensor
4	W710361	Front impact severity sensor bolt

**Fig. 238: Identifying Front Impact Severity Sensor With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag SRS is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged SRS components whether or not the air bag is deployed.

**WARNING:** To reduce the risk of personal injury, do not use any

**memory saver devices.**

**NOTE:** The air bag warning lamp illuminates when the restraints control module (RCM) fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a SRS fault.

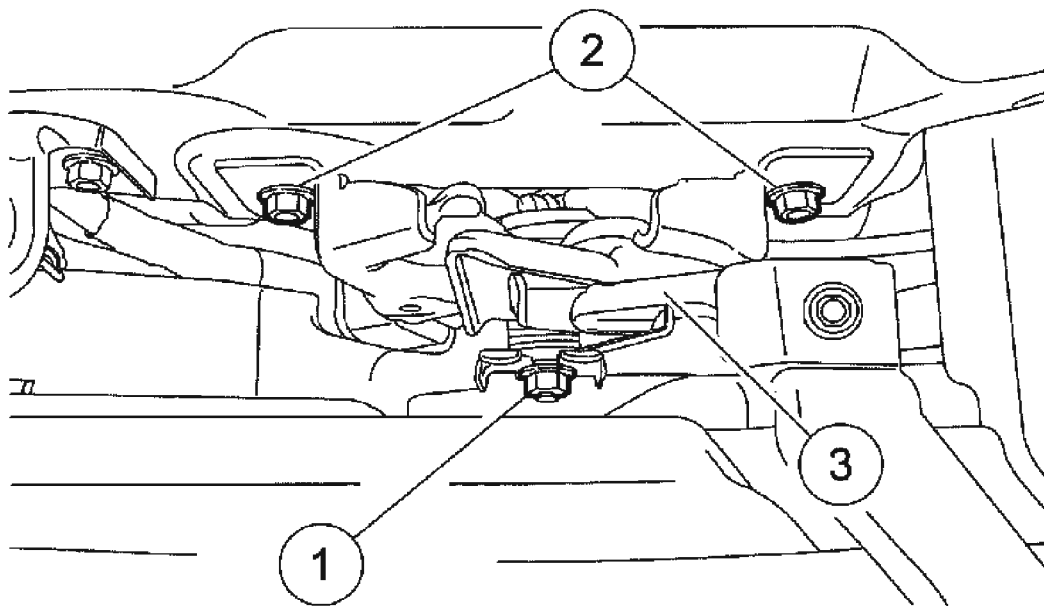
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

**NOTE:** Mark the hood latch position prior to removal of the bolts.

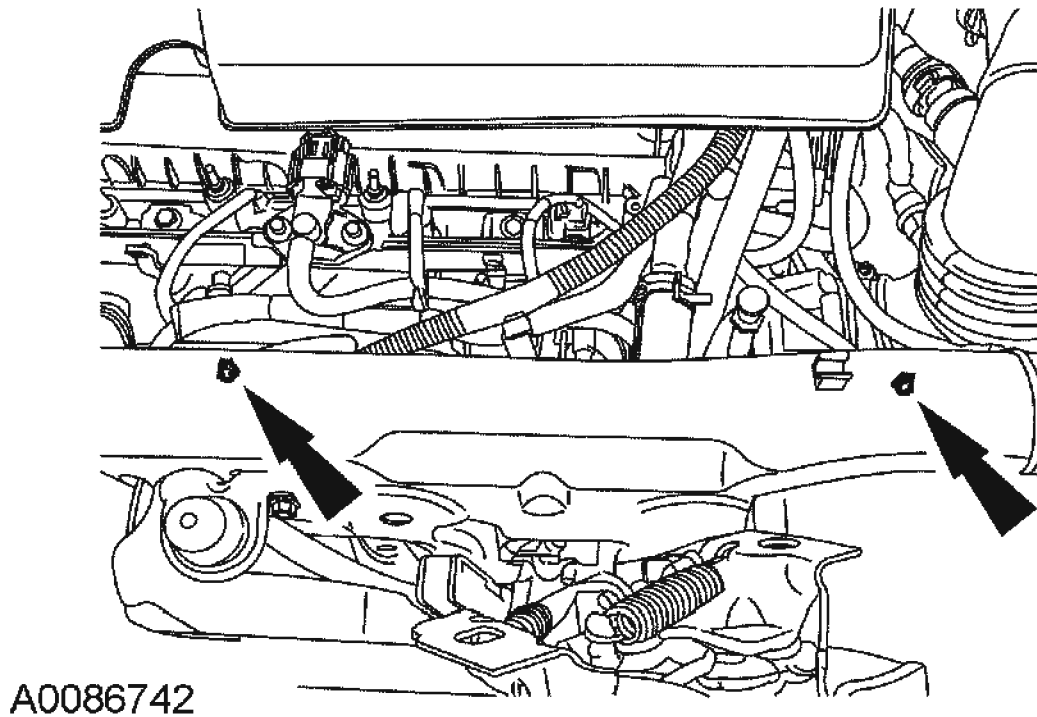
2. Position the hood latch assembly aside.
  1. Loosen the hood latch nut.
  2. Remove the hood latch bolts.
  3. Position the hood latch aside.



A0001611

**Fig. 239: Removing Hood Latch Bolts**  
Courtesy of FORD MOTOR CO.

3. Detach the wiring harness pin-type retainers.



**Fig. 240: Detaching Wiring Harness Pin-Type Retainers**  
Courtesy of FORD MOTOR CO.

4. Remove the radiator support bracket bolt.
5. Remove the front impact severity sensor bolt.
6. Disconnect the electrical connector and remove the front impact severity sensor.

#### Installation

1. Connect the electrical connector to the front impact severity sensor.

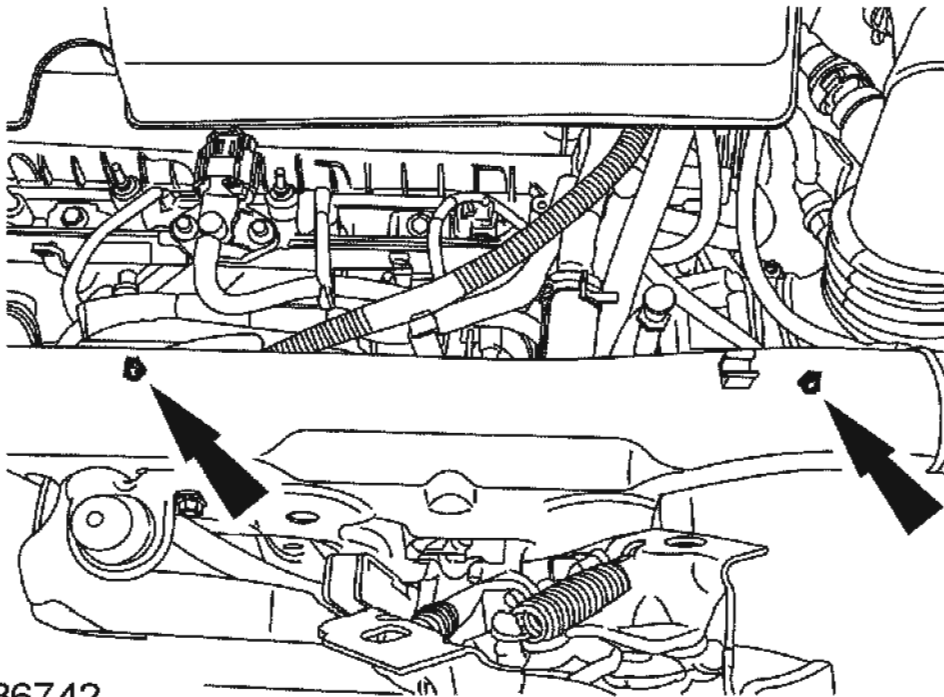
**NOTE:** Make sure the radiator support and front impact severity sensor mating surfaces are clean and free of foreign material.

2. Align the locator tabs of the front impact severity sensor to the openings in the radiator support bracket.

**WARNING:** The tightening torque of the air bag front impact severity sensor retaining bolt is critical for correct system operation.

3. Install the front impact severity sensor bolt.

- Tighten to 12 Nm (9 lb-ft).
- 4. Install the radiator support bracket bolt.
  - Tighten to 12 Nm (9 lb-ft).
- 5. Attach the wiring harness pin-type retainers.

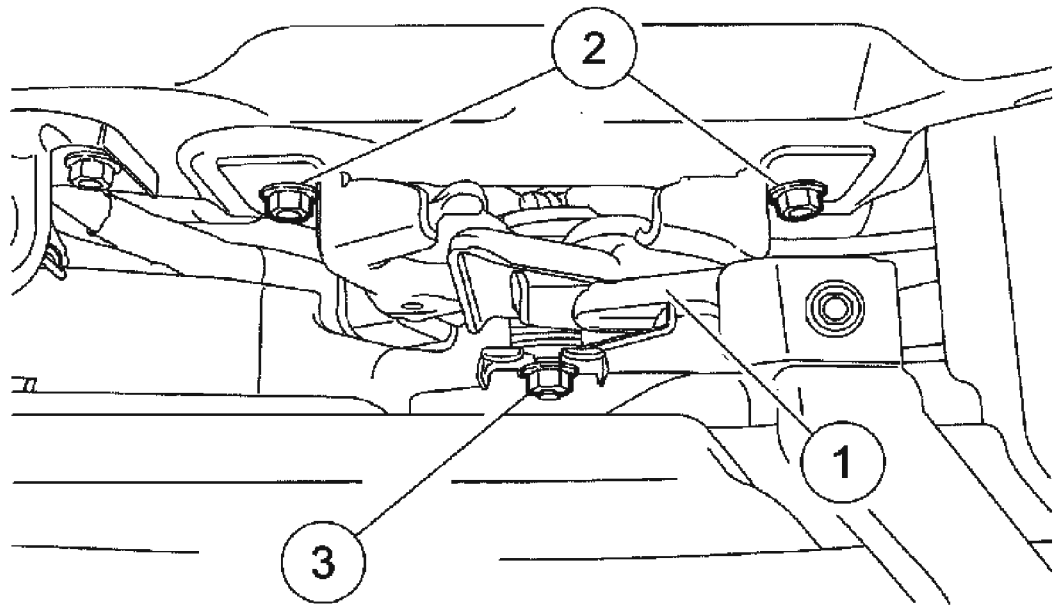


A0086742

**Fig. 241: Attaching Wiring Harness Pin-Type Retainers**  
Courtesy of FORD MOTOR CO.

**NOTE:** Align the hood latch position as previously marked during removal.

6. Install the hood latch assembly.
  1. Position the hood latch.
  2. Install the hood latch bolts.
    - Tighten to 9 Nm (80 lb-in).
  3. Tighten the hood latch nut.
    - Tighten to 9 Nm (80 lb-in).



A0002026

**Fig. 242: Tightening Hood Latch Nut**  
Courtesy of FORD MOTOR CO.

**CAUTION: Make sure the hood latch is fully engaged.**

7. Verify the hood latch striker is fully engaging the hood latch. For additional information, refer to **HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS**.
8. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

#### OCCUPANT CLASSIFICATION SENSOR - ORIGINAL EQUIPMENT

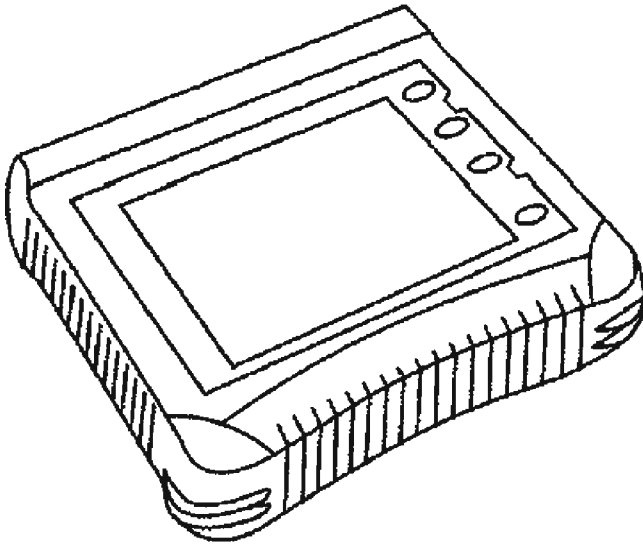
Special Tool(s)

#### SPECIAL TOOL SPECIFICATION

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## 2005 Ford Escape

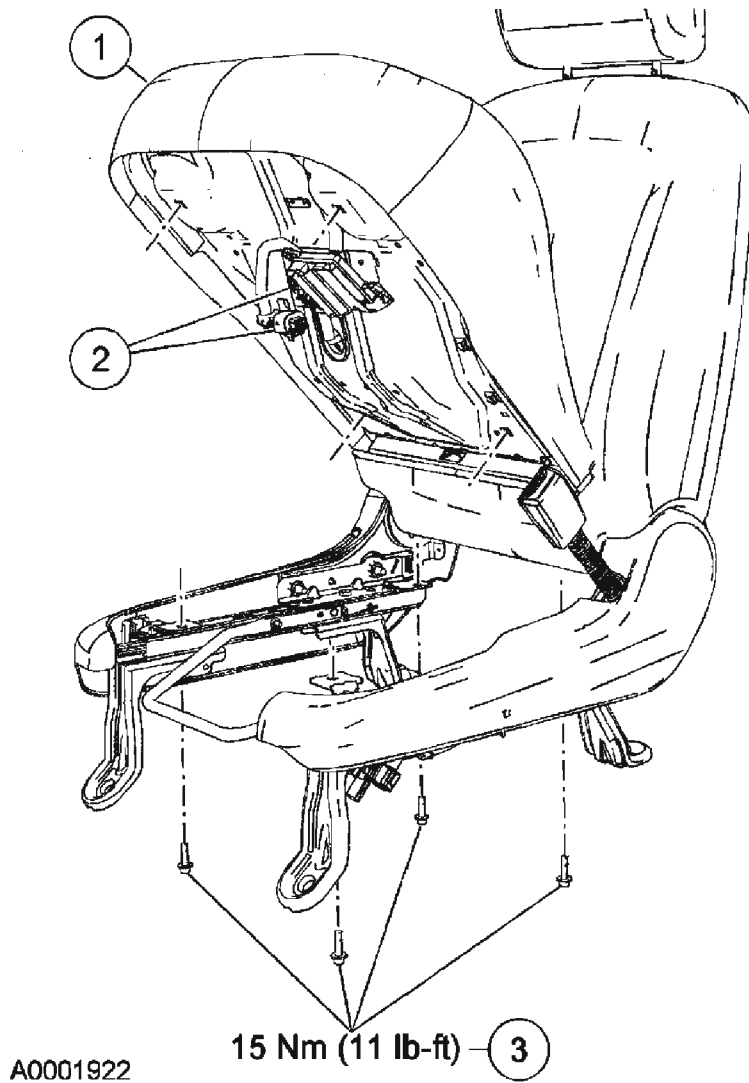
2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



ST2332-A

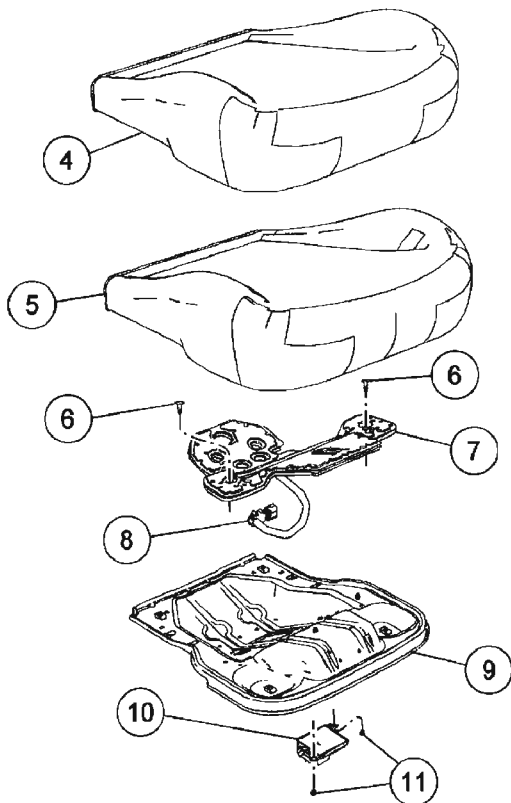
(WDS)  
Vehicle Communication Module  
(VCM) with appropriate adapters, or  
equivalent diagnostic tool





Item	Part Number	Description
1	—	Seat cushion assembly
2	—	Electrical connectors (part of 14A699)
3	—	Seat cushion bolts

**Fig. 243: Identifying Seat Cushion Assembly With Torque Specifications**  
 Courtesy of FORD MOTOR CO.



A0001923

Item	Part Number	Description
4	62900	Seat cushion trim cover
5	—	Seat cushion foam pad (part of 603B02)
6	—	Pin-type retainers (part of 603B02)
7	—	Occupant classification sensor (OCS) bladder (part of 603B02)
8	—	Pressure sensor (part of 603B02)
9	—	Seat cushion pan
10	—	OCS electronic control unit (ECU) (part of 603B02)
11	391950-S	OCS ECU rivets

**Fig. 244: Identifying Seat Cushion Trim Cover**  
 Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when

handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**WARNING:** not separate components.

**CAUTION:** There are 2 occupant classification sensor (OCS) system service kits available for this vehicle (base seat and heated seat). Always make sure the correct OCS service kit is installed.

**CAUTION:** It is necessary to rezero the OCS system when a front passenger seat cushion is disassembled, a new trim cover installed, or an OCS service kit is installed. A diagnostic tool is used to trigger the active command to carry out rezeroing of the OCS system.

**NOTE:** The heated seat element on the front passenger seat cushion is not serviceable separately. If a new heated seat element is needed on the front passenger seat cushion, a new occupant classification sensor (OCS) service kit equipped with a heated seat element must be installed.

**NOTE:** Occupant classification sensor (OCS) system components, seat cushion foam pad, bladder with pressure sensor and electronic control unit (ECU), are calibrated to each other and are serviced as an assembly. The OCS system components are not to be installed separately. If a new OCS system, OCS system component or seat cushion foam pad are needed, a new OCS system service kit (seat cushion foam pad, bladder with pressure sensor and ECU) must be installed as an assembly.

**NOTE:** There was a change to the OCS ECU dependent on the vehicle build date. The OCS ECU will have either a 10-pin connector (early build) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS service kit is being installed. The early build/late build OCS service kits are not interchangeable.

**NOTE:** To identify between a production OCS system and a service OCS system (OCS service kit), inspect the electronic control unit (ECU) electrical connector. A production OCS system allows the disconnect of the ECU electrical connector. A service OCS system (OCS service kit) has the ECU electrical connector glued to the ECU. It cannot and should not be disconnected or altered.

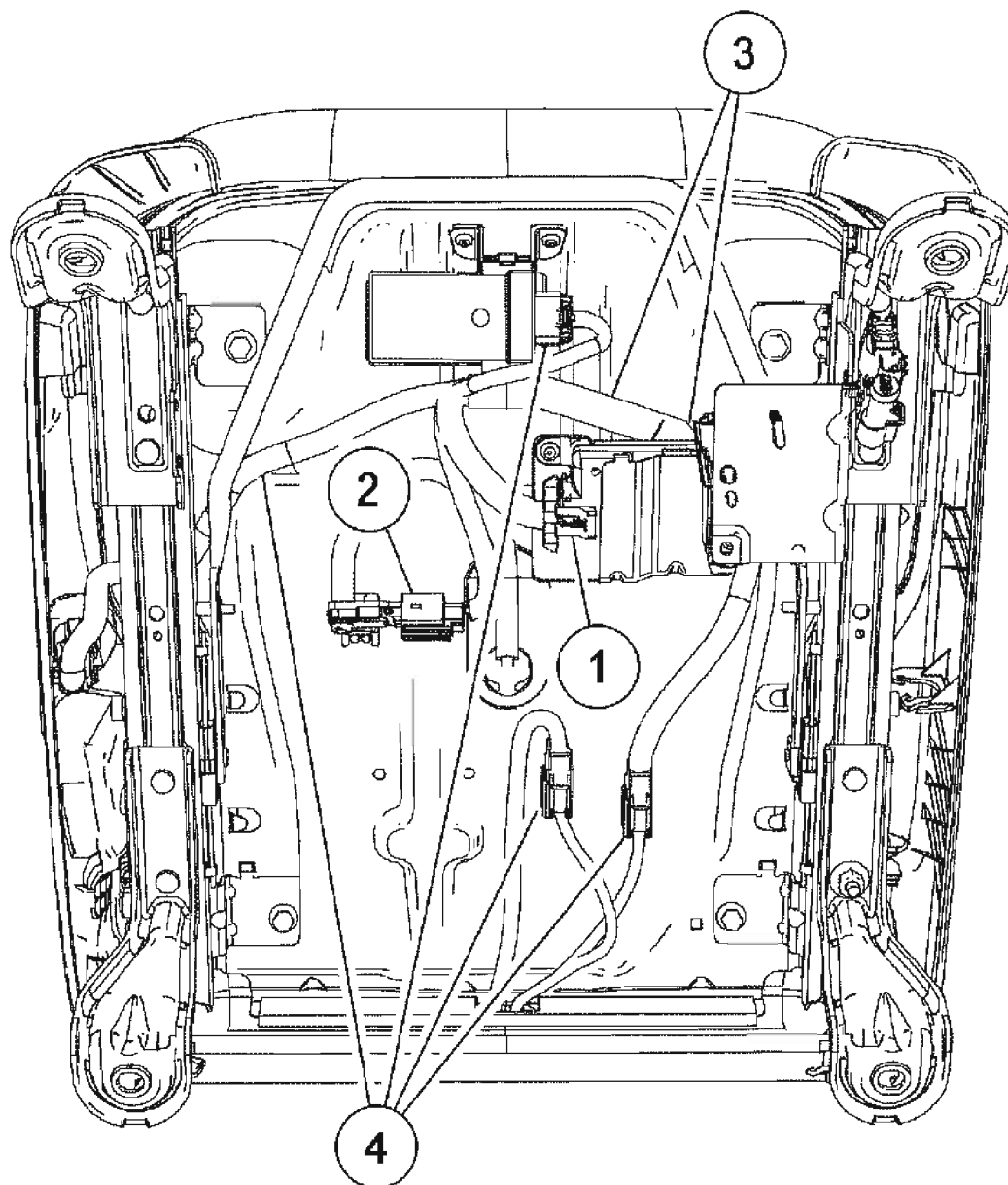
**NOTE:** If removing an OCS service kit, refer to the appropriate procedure in this article.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and perform the diagnostic procedure again.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the passenger seat. For additional information, refer to **SEATING**.
3. Disconnect the electrical connectors and wiring clips.
  1. Disconnect the OCS ECU electrical connector.
  2. Disconnect the pressure sensor electrical connector.
  3. Release the 2 wiring clips on the wiring harness from the cushion pan.
  4. If equipped with heated seats, disconnect the heated seat module electrical connector, release the wiring clip on the wiring harness from the cushion pan, and disconnect the 2 cushion element electrical connectors.



A0091776

**Fig. 245: Disconnecting Pressure Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

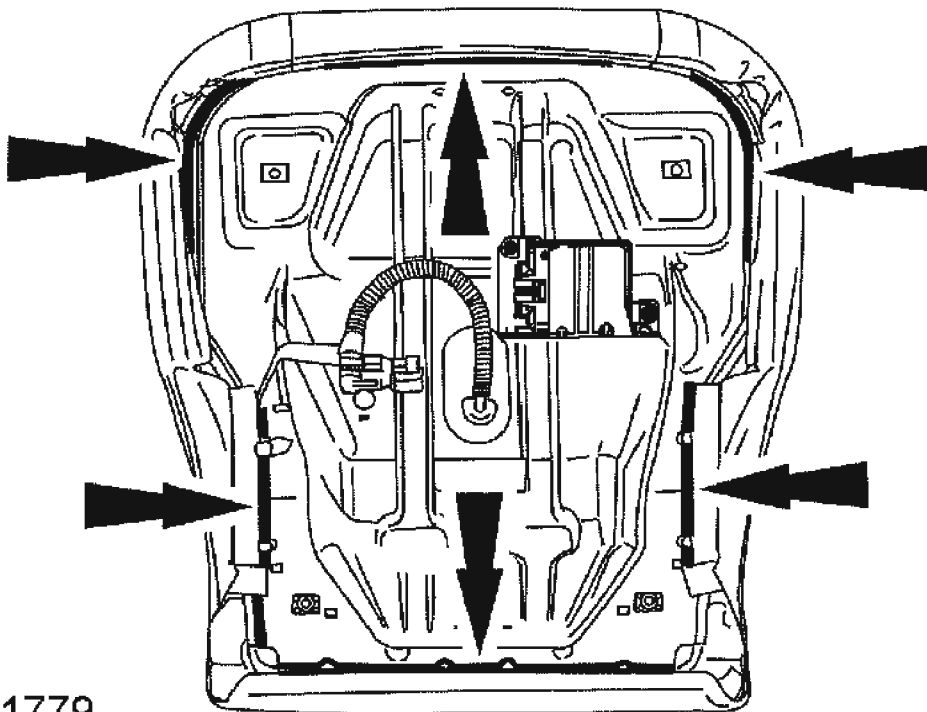
4. Remove the 4 seat cushion bolts retaining the seat cushion to the seat track.

**CAUTION:** While positioning the seat cushion pan and occupant classification sensor assembly, be careful not to

**damage any of the components. Failure to do so can result in component failure.**

5. Remove the seat cushion and pan assembly.
  - To aid in removal, recline the seat.

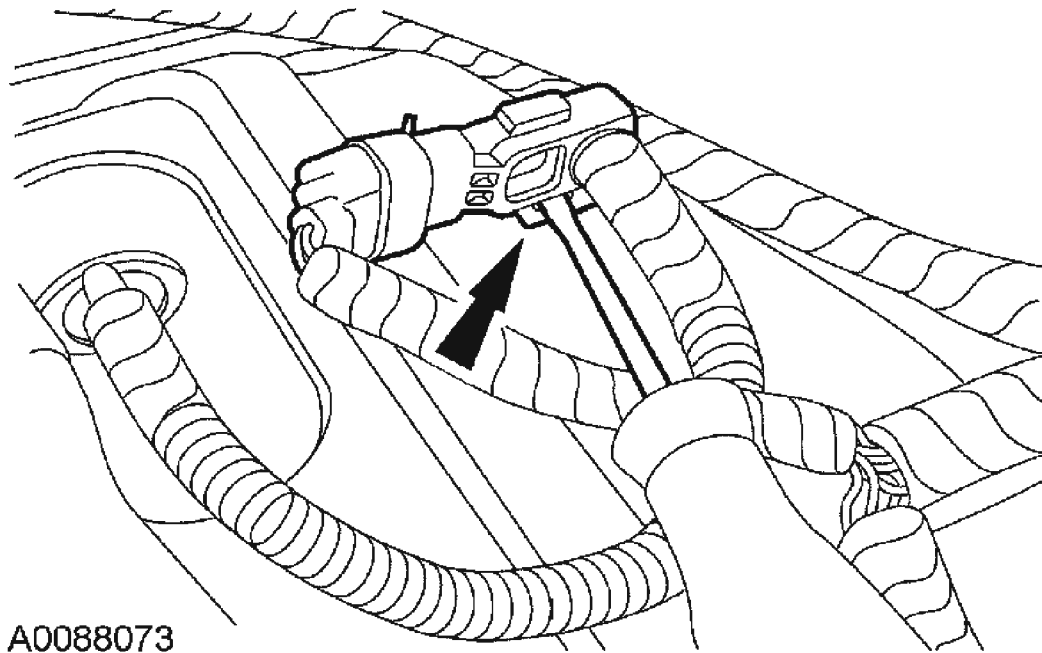
**CAUTION:** Use care when separating the seat upholstery from the hook-and-loop strip, or the hook-and-loop strip can be torn from the seat cushion foam pad.



A0091779

**Fig. 246: Detaching Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

6. Detach the seat cushion trim cover J-clips from the seat cushion pan and remove the seat cushion trim cover.
7. Remove the seat cushion foam pad.
8. Bend the retaining tab away from the pressure sensor, then slide the pressure sensor off the bracket.



**Fig. 247: Identifying Pressure Sensor**  
Courtesy of FORD MOTOR CO.

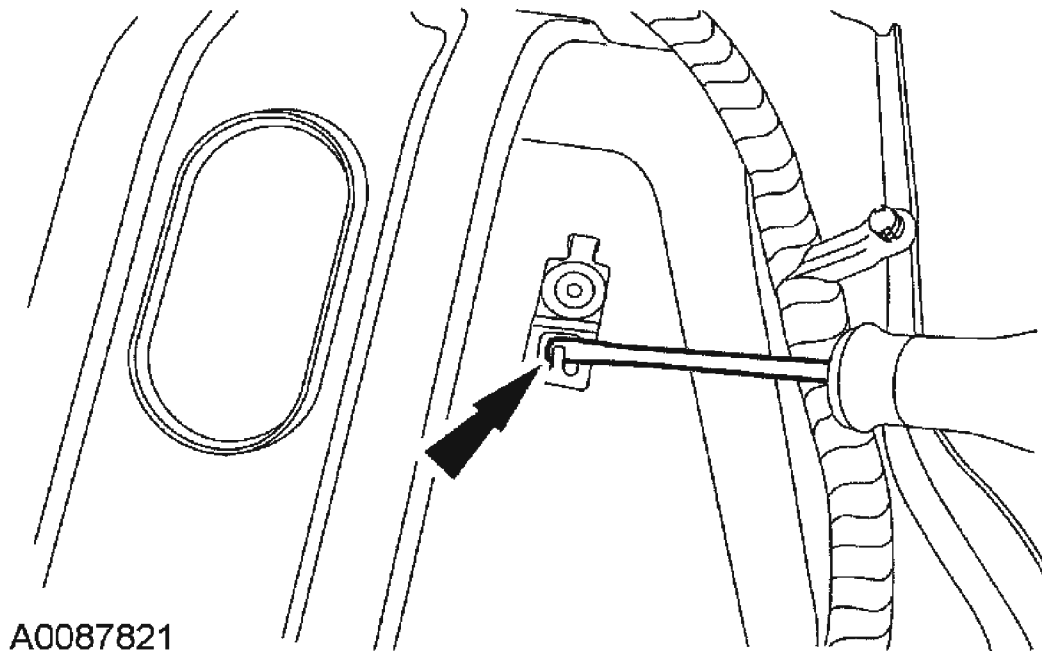
**CAUTION:** Care must be taken to prevent damage to the set cushion pan when removing the rivets.

9. Remove the 2 rivets and the OCS ECU.
10. Remove the 2 pin-type retainers from the OCS bladder and seat cushion pan.
11. Feed the OCS hose and pressure sensor through the seat cushion pan opening and remove as an assembly with the bladder.

#### Installation

**NOTE:** If installing an OCS service kit, refer to OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT.

1. Bend the retaining tab back on the pressure sensor component bracket.



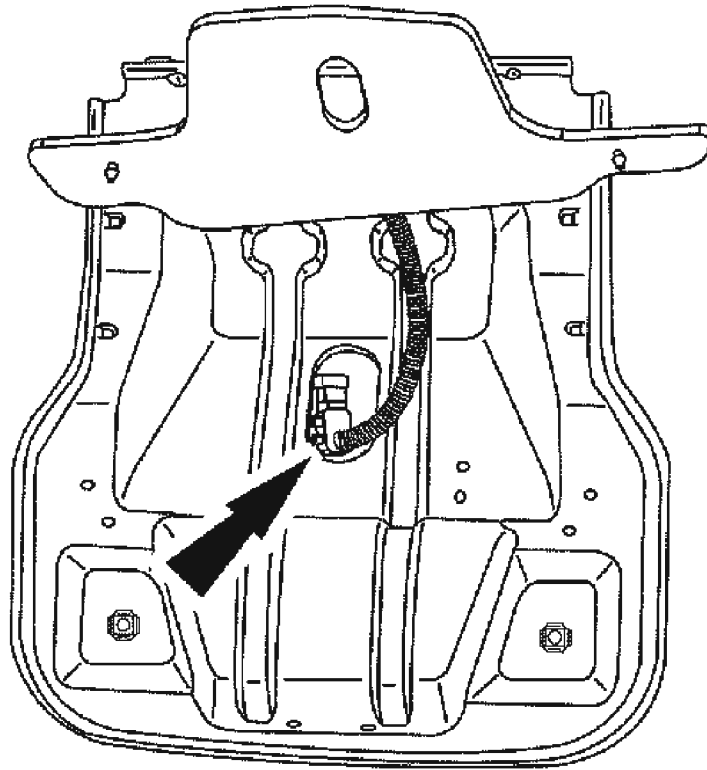
**Fig. 248: Bending Retaining Tab Back On Pressure Sensor Component Bracket**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Inspect the occupant classification sensor bladder, seat cushion pan and support assembly for any foreign objects, before installing the occupant classification sensor to the seat cushion pan. If any foreign objects are found, remove them. Failure to do so may result in personal injury, in the event of an air bag deployment.

**CAUTION:** Failure to route the seat occupant classification sensor components through the correct seat cushion support opening can cause component failure.

**CAUTION:** While positioning the seat cushion pan and occupant classification sensor assembly, be careful not to damage any of the components. Failure to do so can result in component failure.





A0087822

**Fig. 249: Feeding OCS Components**  
Courtesy of FORD MOTOR CO.

2. Feed the OCS components (pressure sensor and hose) through the seat cushion pan opening.
3. Align the OCS bladder to the seat cushion pan.
4. Install the 2 pin-type retainers to the OCS bladder and seat cushion pan.

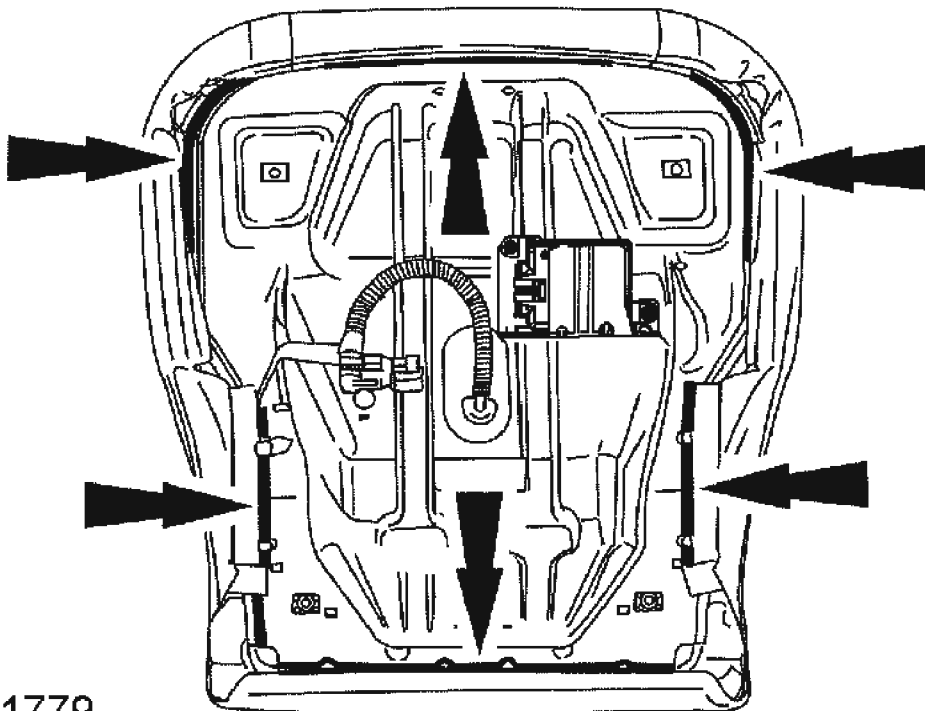
**NOTE:**      **Make sure the pressure sensor hose is not kinked during installation.**

5. Install the pressure sensor onto the seat cushion pan bracket, making sure the retaining tab is completely engaged.
  - When installed correctly, an audible click will be heard and the pressure sensor will not be able to be removed from its bracket without disengaging the retaining tab.
6. Slide the OCS ECU into the seat cushion pan bracket and install the rivets.
  - The OCS ECU must be correctly positioned and securely fastened in place. Failure to do so can set a diagnostic trouble code (DTC) in the restraints control

module (RCM).

7. Position the foam pad to the seat cushion pan.

**CAUTION:** Inspect the seat cushion pad and seat cushion trim cover for any foreign objects, before installing the seat cushion trim cover to the seat cushion pad. If any foreign objects are found, remove them. Failure to do so may result in personal injury, in the event of an air bag deployment.



A0091779

**Fig. 250: Installing Seat Cushion Trim Cover To Seat Cushion Foam Pad And Attaching J-Clips**  
Courtesy of FORD MOTOR CO.

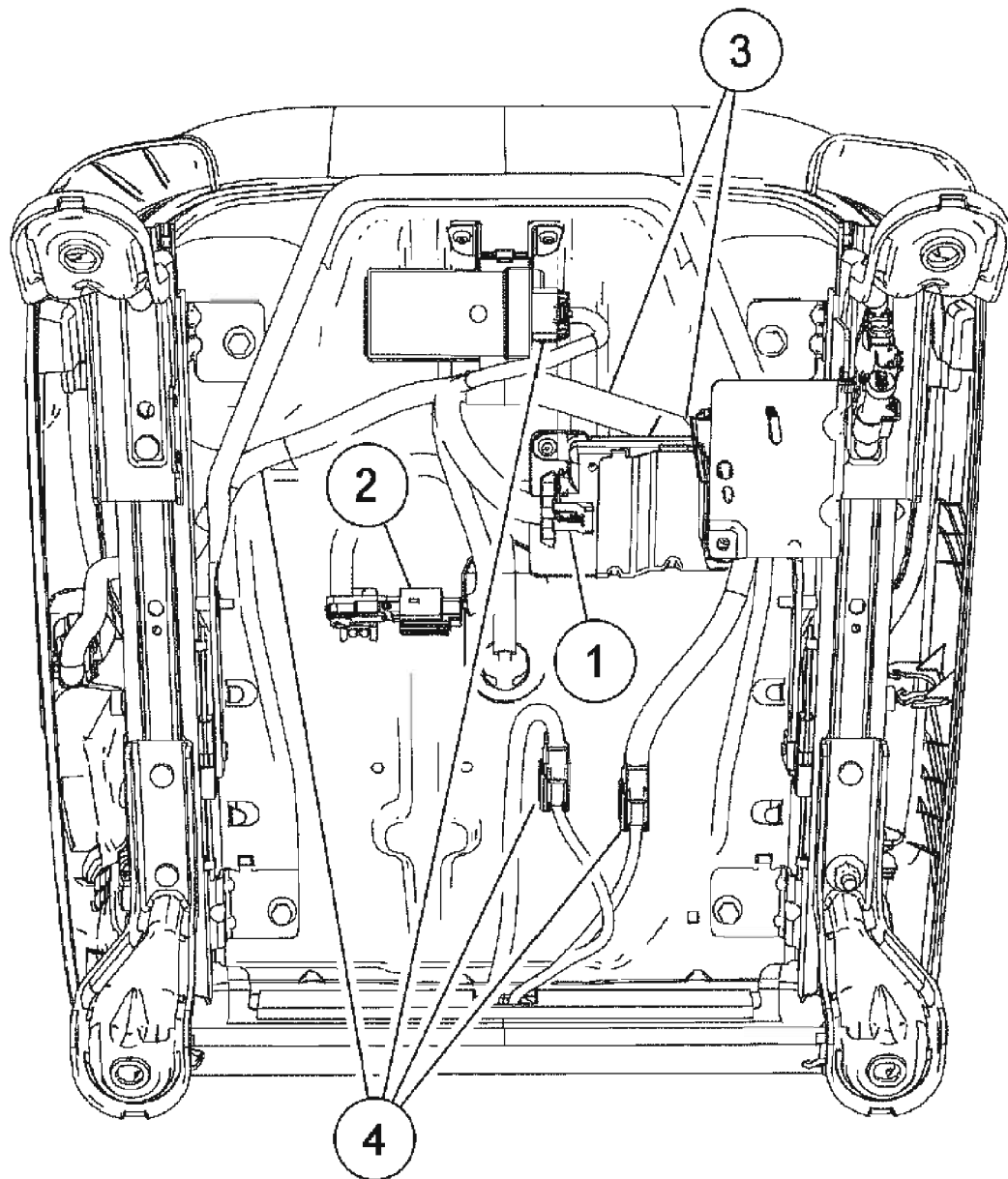
8. Install seat cushion trim cover to seat cushion foam pad and attach the J-clips.

**CAUTION:** While positioning the seat cushion pan and occupant classification sensor assembly, be careful not to damage any of the components. Failure to do so can result in component failure.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

9. Position the seat cushion and pan assembly to the seat track.
  - To aid in installation, recline the seat.
10. Install the 4 seat cushion bolts retaining the seat cushion to the seat track.
  - Tighten to 15 Nm (11 lb-ft).
11. Connect the electrical connectors and wiring clips.
  1. Connect the OCS ECU electrical connector.
  2. Connect the pressure sensor electrical connector.
  3. Install the 2 wiring clips on the wiring harness to the cushion pan.
  4. If equipped with heated seats, connect the heated seat module electrical connector, install the wiring clip on the wiring harness to the cushion pan, and connect the 2 cushion element electrical connectors.



A0091776

**Fig. 251: Connecting Pressure Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

12. Install the passenger seat into the vehicle. For additional information, refer to **SEATING**.
13. Repower the system. **Do not prove out the system at this time.** For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**

**DEPOWERING AND REPOWERING.**

**CAUTION:** Make sure the seat is completely assembled before rezeroing.

**CAUTION:** The following precautions must be taken before rezeroing the OCS system:

- Make sure the OCS system components are connected and no faults are present.
- Make sure the OCS system is not at a temperature below 0°C (32°F) or above 45°C (113°F) when initiating the rezeroing process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature within the limits, 0°C to 45°C (32°F to 113°F) for a minimum of 30 minutes.
- Make sure nothing is present on the passenger seat before rezeroing and nothing is placed on the seat during the rezeroing process.
- Make sure a minimum eight second time period has passed after cycling the ignition switch ON before the rezeroing process.

**NOTE:** For best results in rezeroing, the OCS system should be at or near room temperature, 10°C to 29°C (50°F to 85°F).

**NOTE:** When using an NGS+ (NGS with Vehicle Communication Module (VCM) and the latest software update) to rezero the OCS system:

- select "FUNCTION TEST"
- select "SYSTEM RESET"
- view the on-screen information, then press "TRIGGER"

**NOTE:** To rezero the OCS system using the Worldwide Diagnostic System (WDS):

- select the "Toolbox" icon
- select "Body" from the menu
- select "Restraints" from the menu

- **select "Seat Weight Sensor ReZero"**

**NOTE:** If the first attempt to rezero the OCS system is unsuccessful, a second attempt must be made.

**NOTE:** The ignition switch must be cycled after rezeroing the OCS system.

14. The NGS+ screen will then display "OCS RESET: REZERO." Press "DONE" (button 8) to rezero the OCS system. The NGS+ will display "TEST/FUNCTION SUCCESSFUL" once rezeroing of the OCS system is complete.

After selecting "Seat Weight Sensor ReZero", follow the on-screen prompts to carry out rezeroing of the OCS system.

Rezero the occupant classification sensor.

- With the front passenger seat empty, use a diagnostic tool to trigger the active command and rezero the occupant classification sensor.

15. Prove out the supplemental restraint system (SRS) as follows:

Turn the ignition key from ON to OFF. Wait 10 seconds, then turn the key back to ON and visually monitor the air bag indicator with the air bag modules installed. The air bag indicator will light continuously for approximately 6 seconds and then turn off. If an air bag supplemental restraint system (SRS) fault is present, the air bag indicator will:

- fail to light.
- remain lit continuously.
- flash.

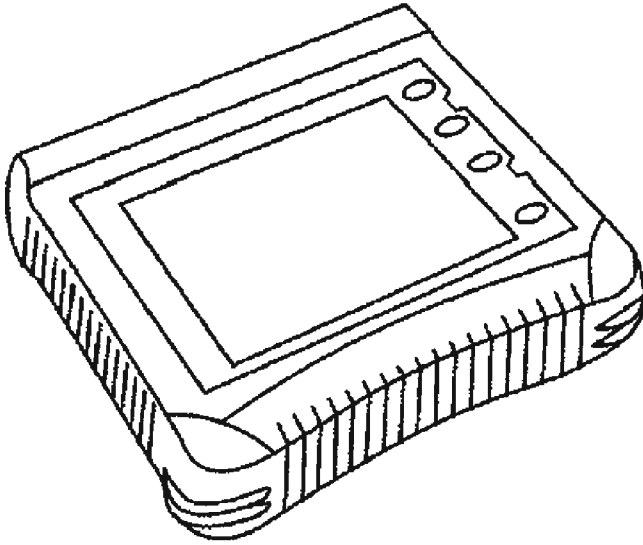
The flashing might not occur until approximately 30 seconds after the ignition switch has been turned from the OFF to the ON position. This is the time required for the restraints control module (RCM) to complete the testing of the SRS. If the air bag indicator is inoperative and a SRS fault exists, a chime will sound in a pattern of 5 sets of 5 beeps. If this occurs, the air bag indicator and any SRS fault discovered must be diagnosed and repaired.

Clear all continuous DTCs from the restraints control module using a diagnostic tool.

## **OCCUPANT CLASSIFICATION SENSOR - SERVICE KIT**

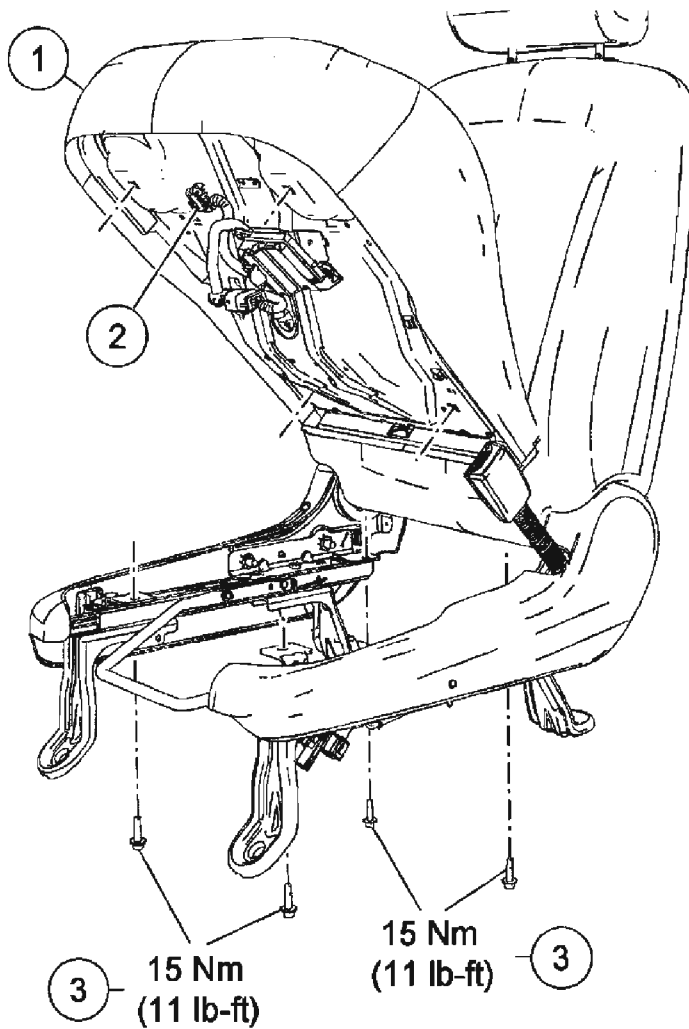
**Special Tool(s)**

## SPECIAL TOOL SPECIFICATION



**ST2332-A**

Worldwide Diagnostic System  
(WDS)  
Vehicle Communication Module  
(VCM) with appropriate adapters, or  
equivalent diagnostic tool

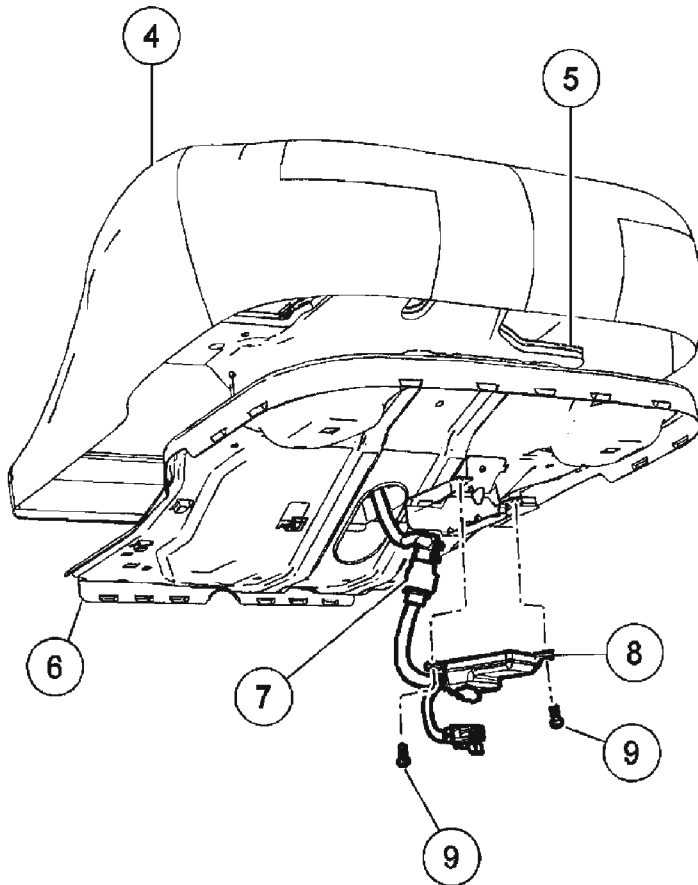


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Item	Part Number	Description
1	—	Seat cushion assembly
2	—	Electrical connectors (part of 603B02)
3	—	Seat cushion bolts

**Fig. 252: Identifying Seat Cushion Assembly With Torque Specifications**  
 Courtesy of FORD MOTOR CO.





A0001954

Item	Part Number	Description
4	62900	Seat cushion trim cover
5	603B02	OCS assembly
6	—	Seat cushion pan
7	—	Pressure sensor (part of 603B02)
8	—	OCS ECU (part of 603B02)
9	391950-S	OCS ECU rivets (part of 603B02)

**Fig. 253: Identifying Seat Cushion Trim Cover**  
Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when

handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**WARNING:** Do not separate components.

**CAUTION:** There are 2 occupant classification sensor (OCS) system service kits available for this vehicle (base seat and heated seat). Always make sure the correct OCS service kit is installed.

**CAUTION:** It is necessary to rezero the OCS system when a front passenger seat cushion is disassembled, a new trim cover installed, or an OCS service kit is installed. A diagnostic tool is used to trigger the active command to carry out rezeroing of the OCS system.

**NOTE:** The heated seat element on the front passenger seat cushion is not serviceable separately. If a new heated seat element is needed on the front passenger seat cushion, a new occupant classification sensor (OCS) service kit equipped with a heated seat element must be installed.

**NOTE:** Occupant classification sensor (OCS) system components (seat cushion foam pad, bladder with pressure sensor and electronic control unit) are calibrated to each other and are serviced as an assembly. The OCS system components are not to be installed separately. If a new OCS system, OCS system component or seat cushion foam pad are needed, a new OCS system service kit (seat cushion foam pad, bladder with pressure sensor and electronic control unit) must be installed as an assembly.

**NOTE:** There was a change to the OCS ECU dependent on the vehicle build date. The OCS ECU will have either a 10-pin connector (early build) or an 18-pin connector (late build). When installing a new OCS service kit, always make sure the correct OCS service kit is being installed. The early build/late build OCS service kits are not interchangeable.

**NOTE:** To identify between a production OCS system and a service OCS system (OCS service kit) inspect the electronic control unit (ECU) electrical connector. A production OCS system allows the disconnect of the ECU electrical connector. A service OCS system (OCS service kit) has the ECU electrical connector glued to the ECU. It cannot and should not be disconnected or altered.

**NOTE:** If removing an OEM OCS, refer to the appropriate procedure in this article.

**NOTE:** The seat wiring harness will be reused. The OCS service kit connector connects to the seat wiring harness ECU connector. The pressure sensor seat wiring harness connector will be left unplugged and secured by a tie strap.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

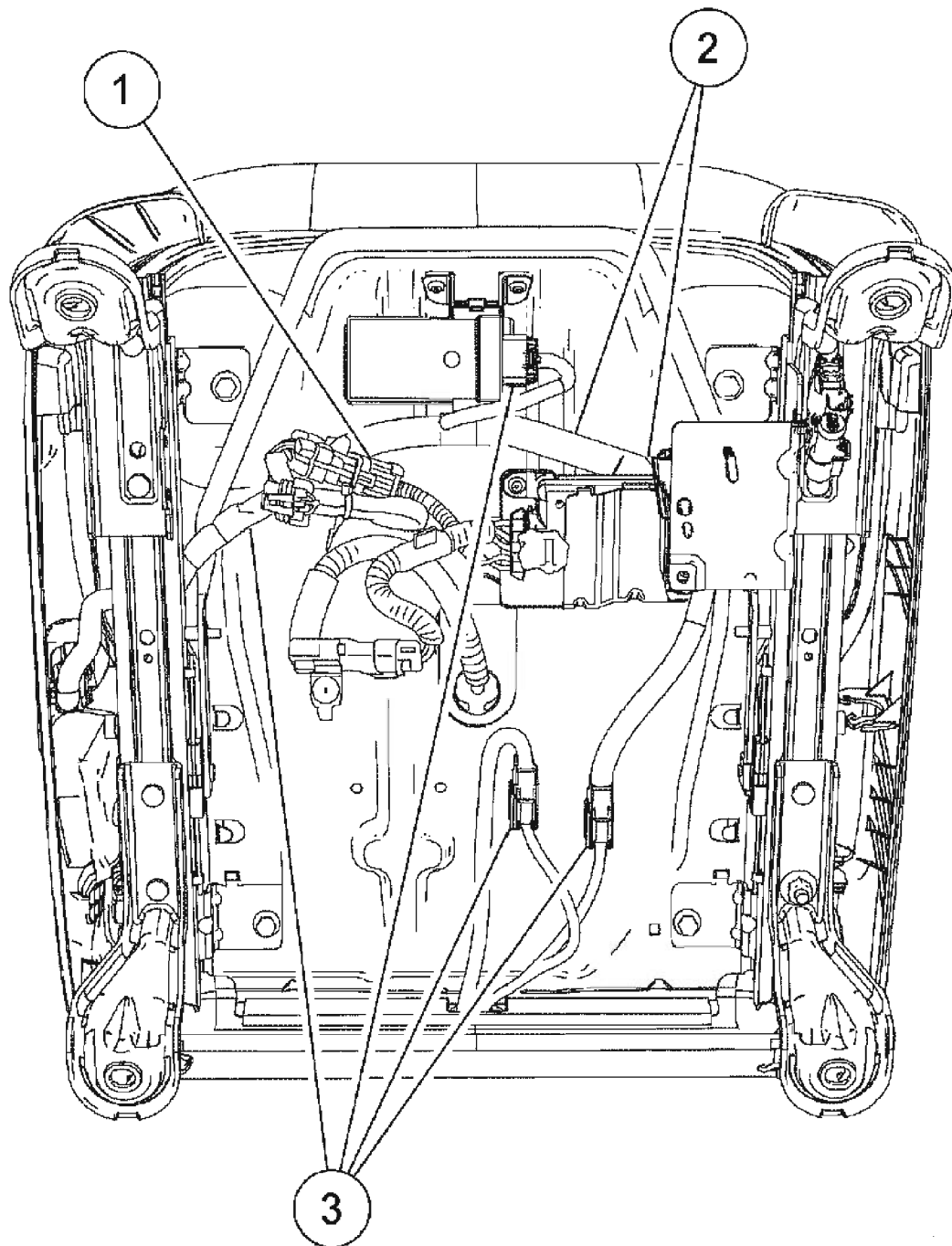
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and perform the diagnostic procedure again.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the passenger seat. For additional information, refer to **SEATING**.

**NOTE:** The seat wiring harness will be reused.

3. Disconnect the electrical connector(s) and wiring clips.
  1. Disconnect the seat wire harness OCS electrical connector from the service part OCS electrical connector.
  2. Release the 2 wiring clips on the wiring harness from the cushion pan.
  3. If equipped with heated seats, disconnect the heated seat module electrical connector, release the wiring clip on the wiring harness from the cushion pan, and disconnect the 2 cushion element electrical connectors.



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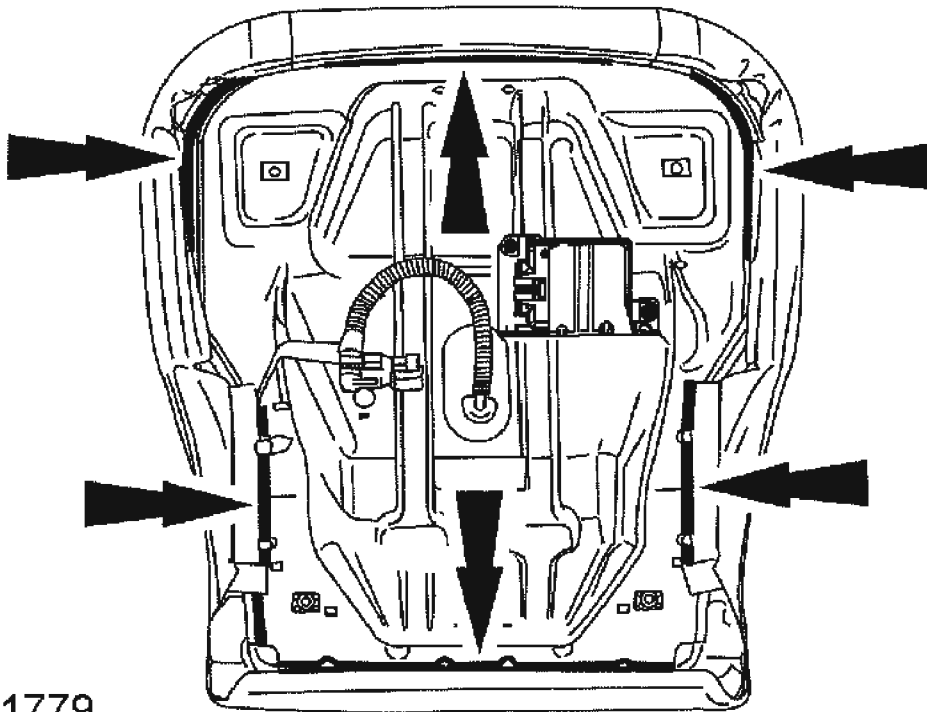
**Fig. 254: Releasing 2 Wiring Clips On Wiring Harness From Cushion Pan**  
Courtesy of FORD MOTOR CO.

4. Remove the 4 seat cushion bolts retaining the seat cushion to the seat track.

**CAUTION:** While positioning the seat cushion pan and occupant classification sensor assembly, be careful not to damage any of the components. Failure to do so can result in component failure.

5. Remove the seat cushion and pan assembly.
  - To aid in removal, recline the seat.

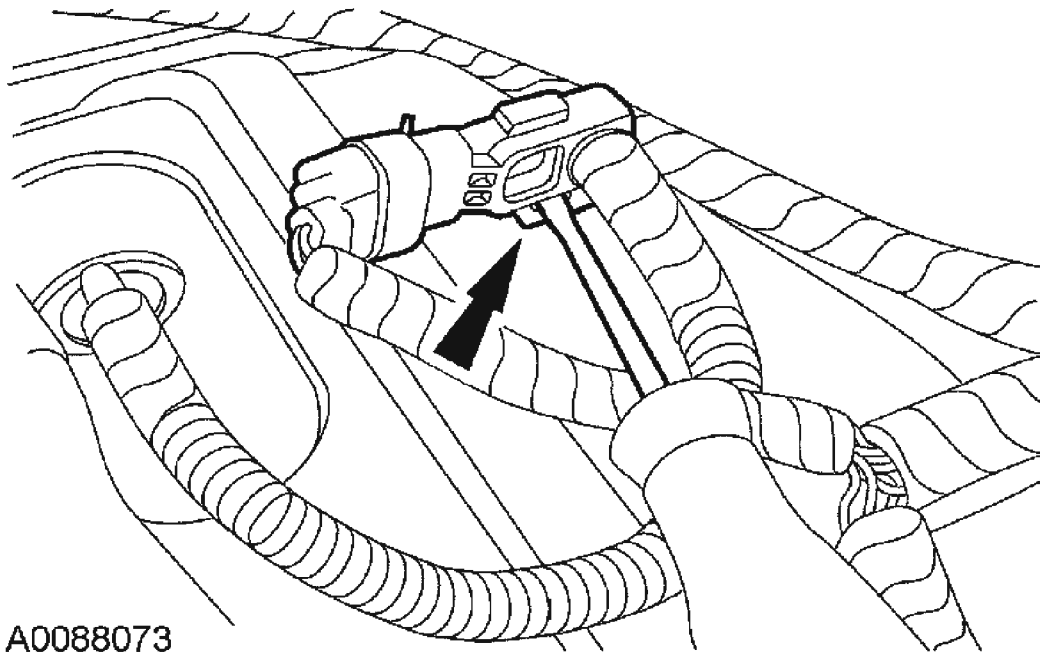
**CAUTION:** Use care when separating the seat upholstery from the hook-and-loop strip, or the hook-and-loop strip can be torn from the seat cushion foam pad.



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**Fig. 255: Detaching Seat Cushion Trim Cover J-Clips From Seat Cushion Pan**  
Courtesy of FORD MOTOR CO.

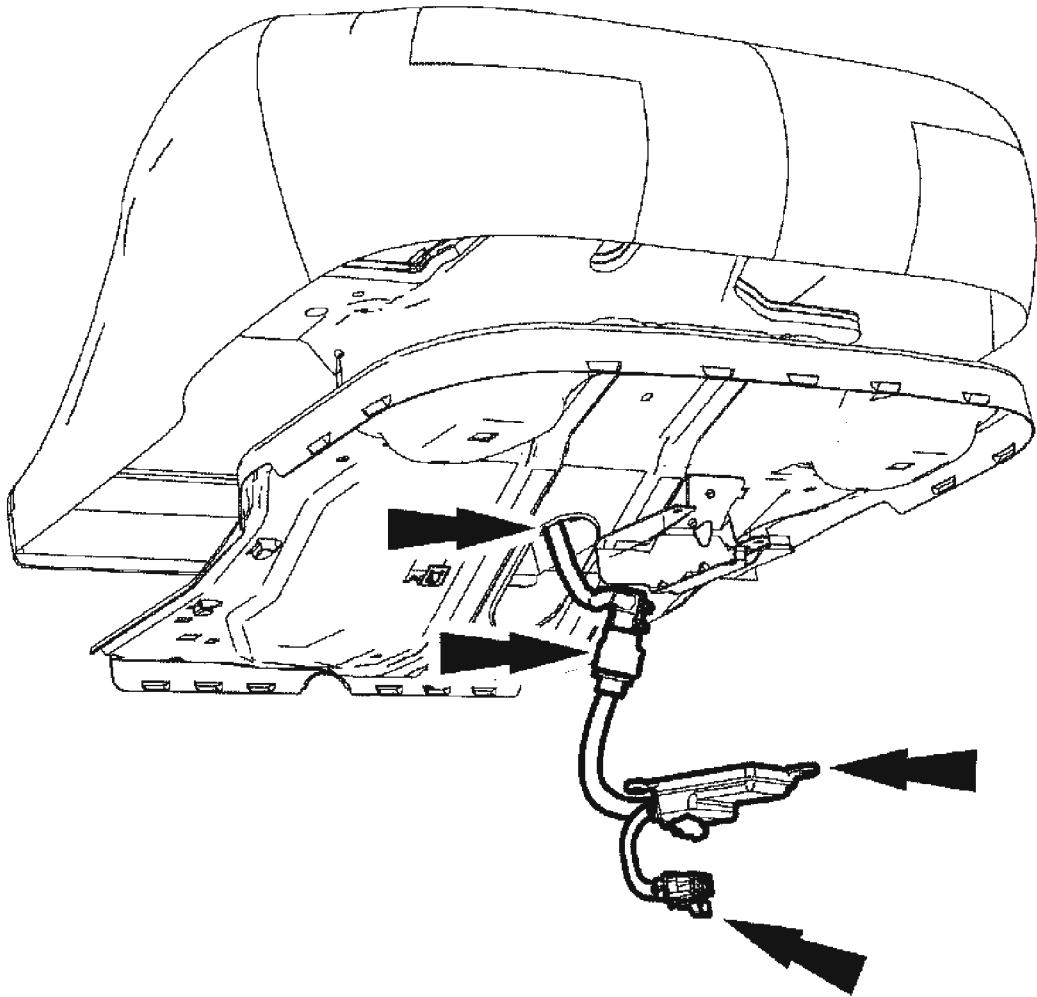
6. Detach the seat cushion trim cover J-clips from the seat cushion pan and remove the seat cushion trim cover.
7. Bend the retaining tab away from the pressure sensor, then slide the pressure sensor off the bracket.



**Fig. 256: Bending Retaining Tab Away From Pressure Sensor**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Care must be taken to prevent damage to the seat cushion pan when removing the rivets.

8. Remove the 2 rivets and detach OCS ECU from the seat cushion pan.
9. Remove the OCS.
  - Pull all the OCS components (hose, pressure sensor, wire harness, ECU and connectors) through the seat cushion pan opening.

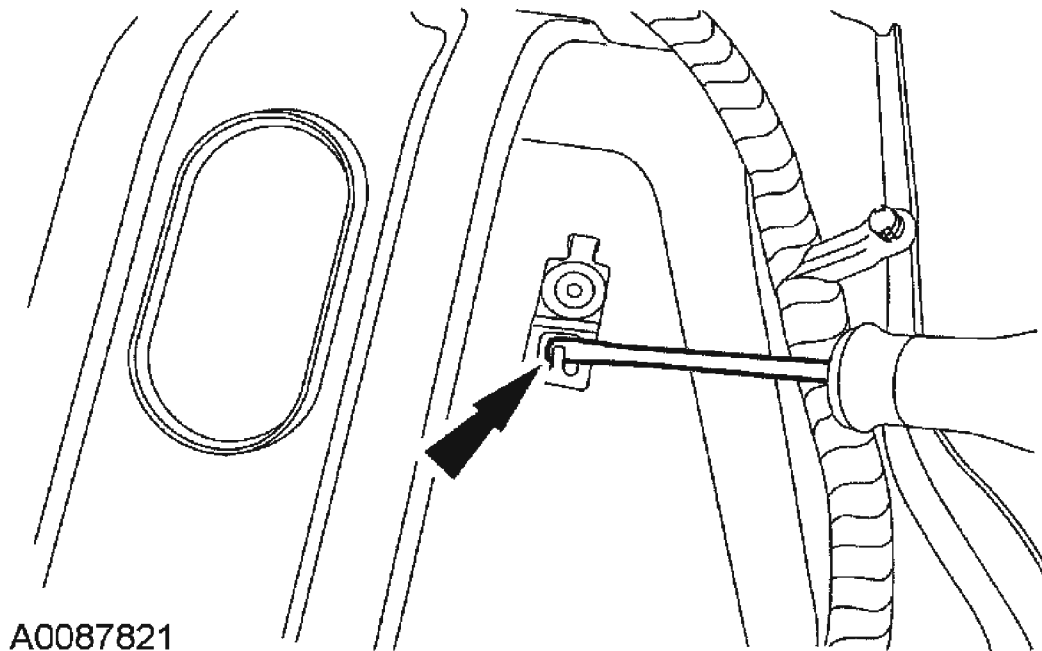


A0087836

**Fig. 257: Removing OCS**  
**Courtesy of FORD MOTOR CO.**

#### Installation

1. Bend the retaining tab back on the pressure sensor component bracket.



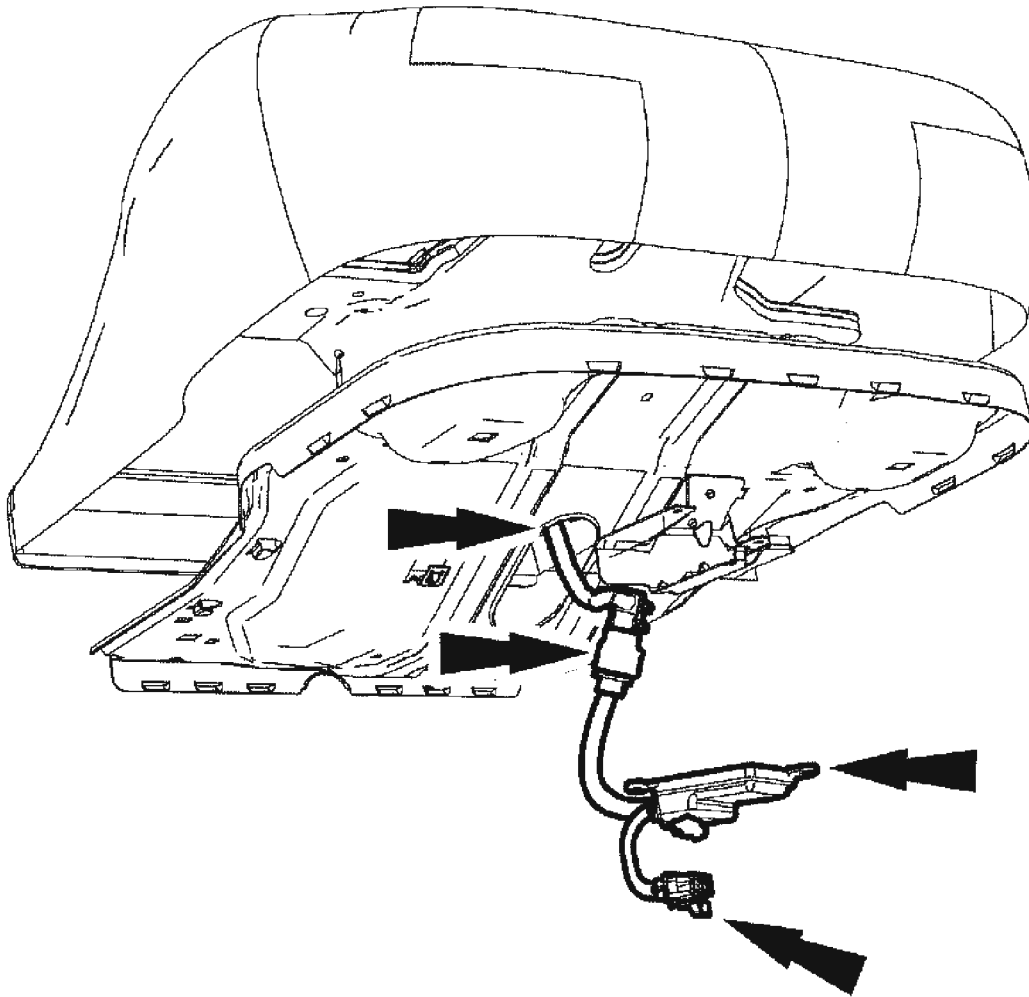
**Fig. 258: Bending Retaining Tab Back On Pressure Sensor Component Bracket**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Inspect the occupant classification sensor assembly, seat cushion pan and support assembly for any foreign objects before installing the occupant classification sensor assembly to the seat cushion pan. If any foreign objects are found, remove them. Failure to do so may result in personal injury, in the event of an air bag deployment.

**CAUTION:** Failure to route the seat occupant classification sensor components through the correct seat cushion support opening can cause component failure.

**CAUTION:** While positioning the seat cushion pan and occupant classification sensor assembly, be careful not to damage any of the components. Failure to do so can result in component failure.





A0087836

**Fig. 259: Feeding OCS Service Kit Components**  
Courtesy of FORD MOTOR CO.

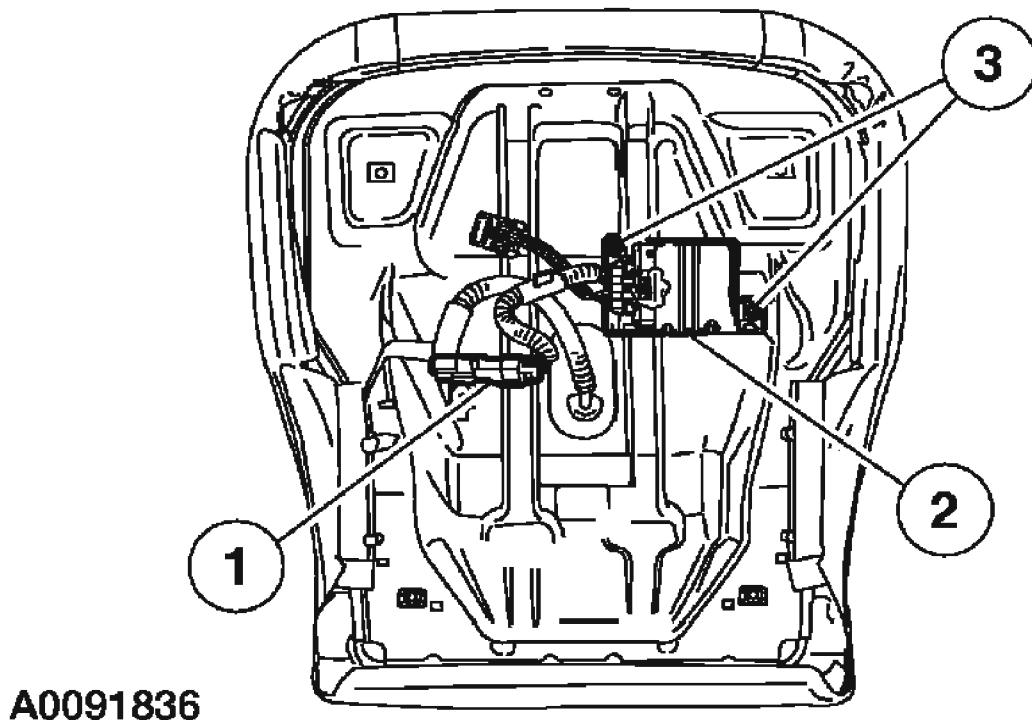
2. Feed the OCS service kit components (hose, pressure sensor, ECU, wire harness, and connectors) through the seat cushion pan opening.

**NOTE:** When installing a service part occupant classification sensor, the seat wire harness pressure sensor electrical connector is not used.

**NOTE:** Make sure the pressure sensor hose is not kinked during

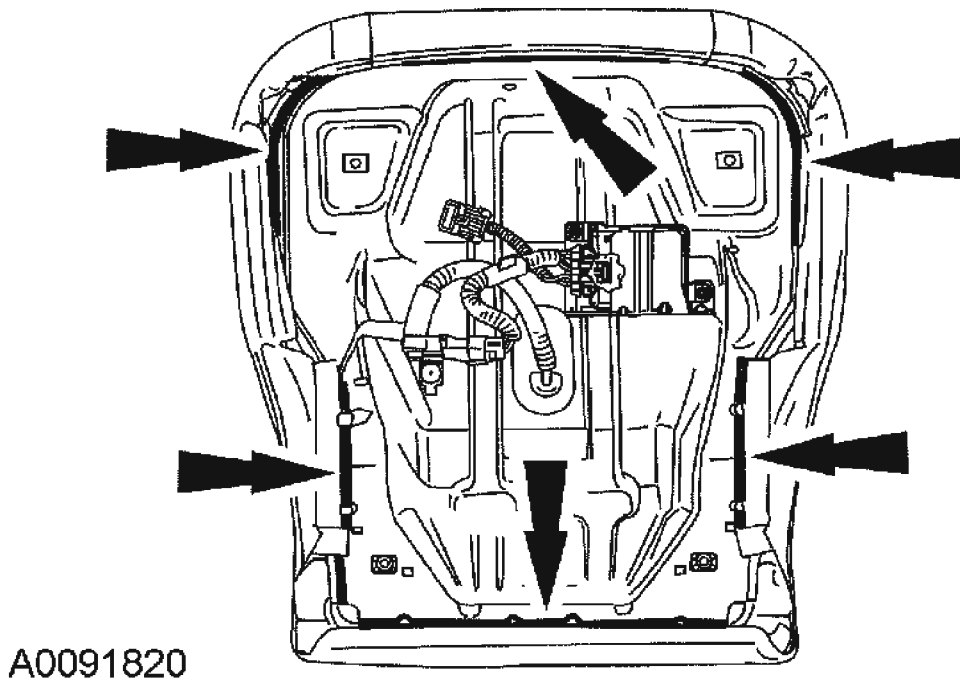
**installation.**

3. Install the OCS components to the seat cushion pan.
  1. Install the pressure sensor onto the seat cushion pan bracket, making sure the retaining tab is completely engaged.
    - When installed correctly, an audible click will be heard and the pressure sensor will not be able to be removed from its bracket without disengaging the retaining tab.
  2. Slide the electronic control unit (ECU) into the seat cushion pan bracket.
    - The ECU must be correctly positioned and securely fastened in place. Failure to do so can set a diagnostic trouble code (DTC) in the restraints control module (RCM).
  3. Install the rivets.



**Fig. 260: Installing Rivets**  
Courtesy of FORD MOTOR CO.

4. Attach the seat cushion trim cover J-clips to the seat cushion pan.



**Fig. 261: Attaching Seat Cushion Trim Cover J-Clips To Seat Cushion Pan**  
Courtesy of FORD MOTOR CO.

**CAUTION:** While positioning the seat cushion pan and occupant classification sensor assembly, be careful not to damage any of the components. Failure to do so can result in component failure.

5. Position the seat cushion and pan assembly to the seat track.
  - To aid in installation, recline the seat.
6. Install the 4 seat cushion bolts retaining the seat cushion to the seat track.
  - Tighten to 15 Nm (11 lb-ft).

**CAUTION:** Do not tie strap any wiring to the OCS bladder and pressure sensor hose.

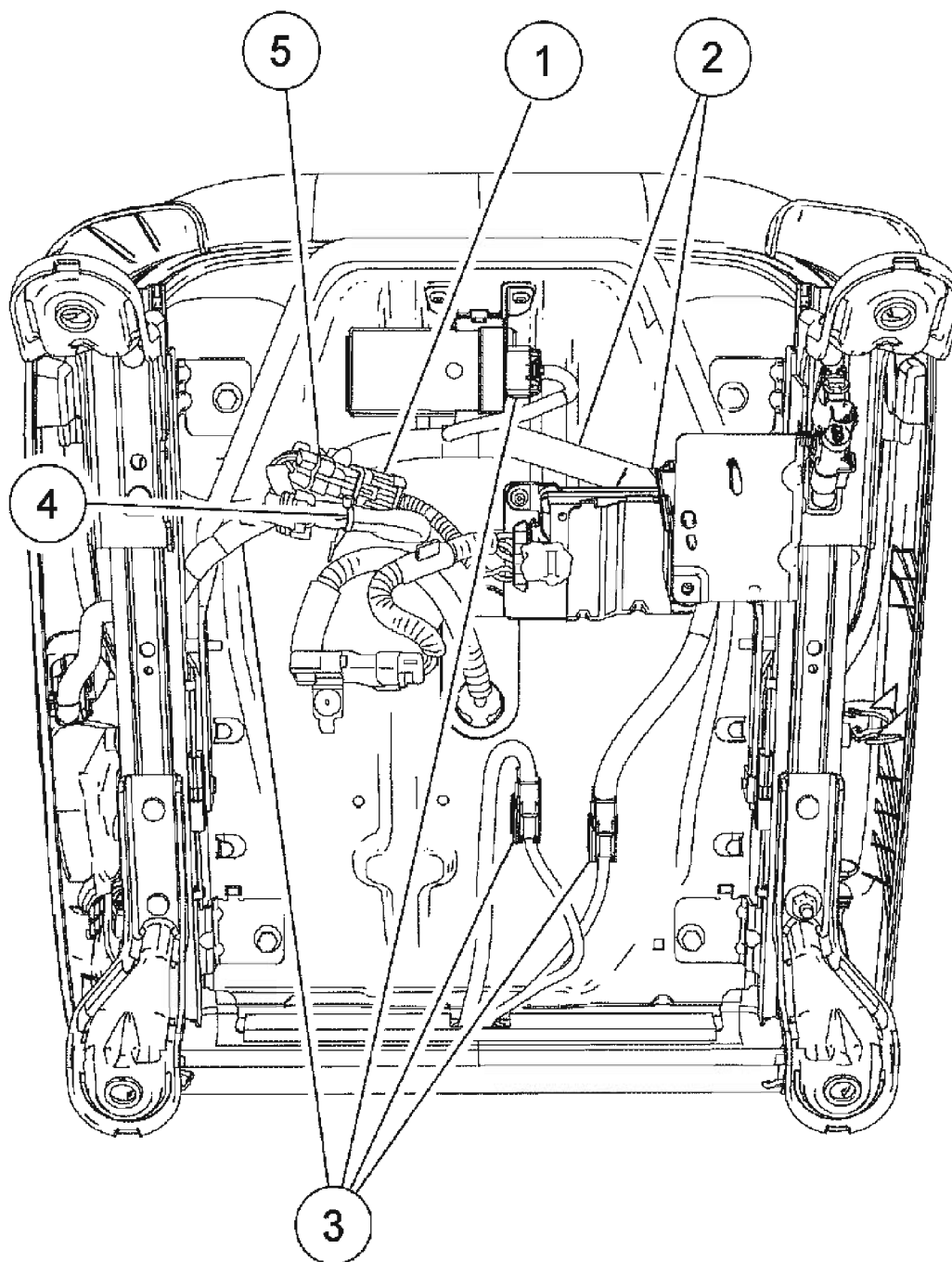
**NOTE:** The seat wiring harness will be reused.

7. Connect the electrical connector(s) and wiring clips.
  1. Connect the seat wire harness OCS electrical connector to the service part OCS electrical connector.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

2. Install the 2 wiring clips on the wiring harness to the cushion pan.
3. If equipped with heated seats, connect the heated seat module electrical connector, install the wiring clip on the wiring harness to the cushion pan, and connect the 2 cushion element electrical connectors.
4. Tie strap the unused seat wire harness pressure sensor electrical connector safely out of the way.
5. Tie strap all loose wire harnesses and electrical connectors safely out of the way.



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**Fig. 262: Connecting Seat Wire Harness OCS Electrical Connector To Service Part OCS Electrical Connector**  
Courtesy of FORD MOTOR CO.

8. Install the passenger seat into the vehicle. For additional information, refer to **SEATING**.

9. Repower the system. **Do not prove out the system at this time.** For additional information, refer to SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING.

**CAUTION:** Make sure the seat is completely assembled before rezeroing.

**CAUTION:** The following precautions must be taken before rezeroing the OCS system:

- Make sure the OCS system components are connected and no faults are present.
- Make sure the OCS system is not at a temperature below 0°C (32°F) or above 45°C (113°F) when initiating the rezeroing process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature within the limits, 0°C to 45°C (32°F to 113°F) for a minimum of 30 minutes.
- Make sure nothing is present on the passenger seat before rezeroing and nothing is placed on the seat during the rezeroing process.
- Make sure a minimum eight second time period has passed after cycling the ignition switch ON before the rezeroing process.

**NOTE:** For best results in rezeroing, the OCS system should be at or near room temperature, 10°C to 29°C (50°F to 85°F).

**NOTE:** When using an NGS+ (NGS with Vehicle Communication Module (VCM) and the latest software update) to rezero the OCS system:

- select "FUNCTION TEST"
- select "SYSTEM RESET"
- view the on-screen information, then press "TRIGGER"

**NOTE:** To rezero the OCS system using the Worldwide Diagnostic System (WDS):

- select the "Toolbox" icon

- **select "Body" from the menu**
- **select "Restraints" from the menu**
- **select "Seat Weight Sensor ReZero"**

**NOTE:** If the first attempt to rezero the OCS system is unsuccessful, a second attempt must be made.

**NOTE:** The ignition switch must be cycled after rezeroing the OCS system.

10. The NGS+ screen will then display "OCS RESET: REZERO." Press "DONE" (button 8) to rezero the OCS system. The NGS+ will display "TEST/FUNCTION SUCCESSFUL" once rezeroing of the OCS system is complete.

After selecting "Seat Weight Sensor ReZero", follow the on-screen prompts to carry out rezeroing of the OCS system.

Rezero the occupant classification sensor.

- With the front passenger seat empty, use a diagnostic tool to trigger the active command and rezero the occupant classification sensor.

11. Prove out the supplemental restraint system (SRS) as follows:

Turn the ignition key from ON to OFF. Wait 10 seconds, then turn the key back to ON and visually monitor the air bag indicator with the air bag modules installed. The air bag indicator will light continuously for approximately 6 seconds and then turn off. If an air bag supplemental restraint system (SRS) fault is present, the air bag indicator will:

- fail to light.
- remain lit continuously.
- flash.

The flashing might not occur until approximately 30 seconds after the ignition switch has been turned from the OFF to the ON position. This is the time required for the restraints control module (RCM) to complete the testing of the SRS. If the air bag indicator is inoperative and a SRS fault exists, a chime will sound in a pattern of 5 sets of 5 beeps. If this occurs, the air bag indicator and any SRS fault discovered must be diagnosed and repaired.

Clear all continuous DTCs from the restraints control module using a diagnostic tool.

**NOTE:** When installing a new occupant classification sensor, a prepaid return postcard is provided with the new occupant classification sensor. The serial number for the new part and the vehicle identification number (VIN) must be recorded and sent to Ford Motor Company.

12. Fill out the necessary information on the occupant classification sensor traceability card and return it along with the complete inoperative occupant classification sensor to Ford Motor Company.
  - When returning the inoperative occupant classification sensor, include the following: seat cushion foam pad, bladder, electronic control unit, pressure sensor (transducer), hose, electrical connectors and wire harness (service part occupant classification sensor only).


**SERVICE KIT ASSEMBLY - PASSENGER OCCUPANT CLASSIFICATION SENSOR VERIFICATION**

VERIFY KIT

This LT-42 module can be found (1) in your vehicle representative (2) on the data plate on the left side door to rear side of windshield.

PLEASE LOCATE AND IDENTIFY THE MODULE 4 WITH YOUR TIME DISCOUNT. (3) CONSULTATION SENSOR SERIAL NUMBER (SEE SAMPLE BELOW) AND (4) SENSOR IDENTIFICATION NUMBER (SEE SAMPLE BELOW) AND (5) SENSOR IDENTIFICATION NUMBER (SEE SAMPLE BELOW) AND (6) SENSOR IDENTIFICATION NUMBER (SEE SAMPLE BELOW).

PLEASE PRINT YOUR NAME, ADDRESS, PHONE NUMBER, E-MAIL ADDRESS, AND SIGNATURE IN THE SPACE PROVIDED BELOW.



DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

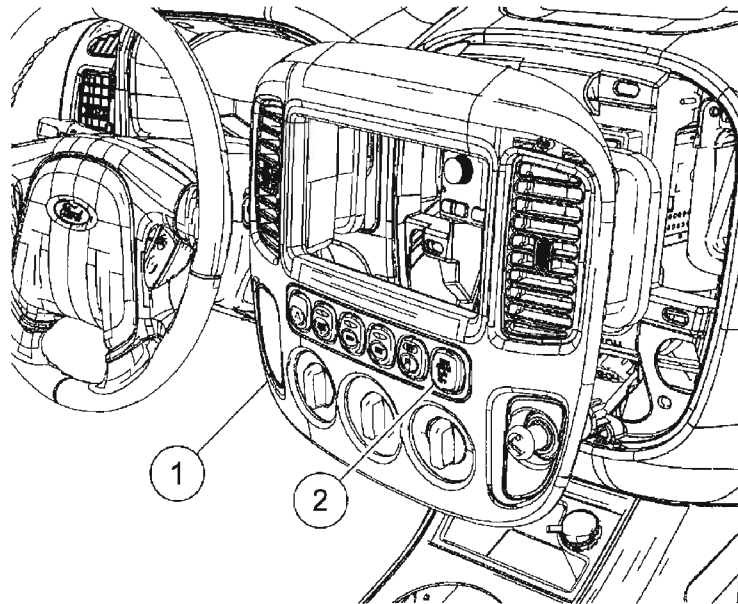
THE FTA - FEDERAL  
CIVILIAN VETERANS AFFAIRS MARKED VETERAN  
2001 AND FORWARD MODEL YEARS  
UNIFORMS 2001 AND FORWARD MODEL YEARS

A00033995

**Fig. 263: Occupant Classification Sensor Verification Form**  
**Courtesy of FORD MOTOR CO.**

## PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR





A0002037

Item	Part Number	Description
1	4302	Instrument panel center trim panel
2	—	Passenger air bag deactivation indicator

**Fig. 264: Identifying Passenger Air Bag Deactivation (PAD) Indicator**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

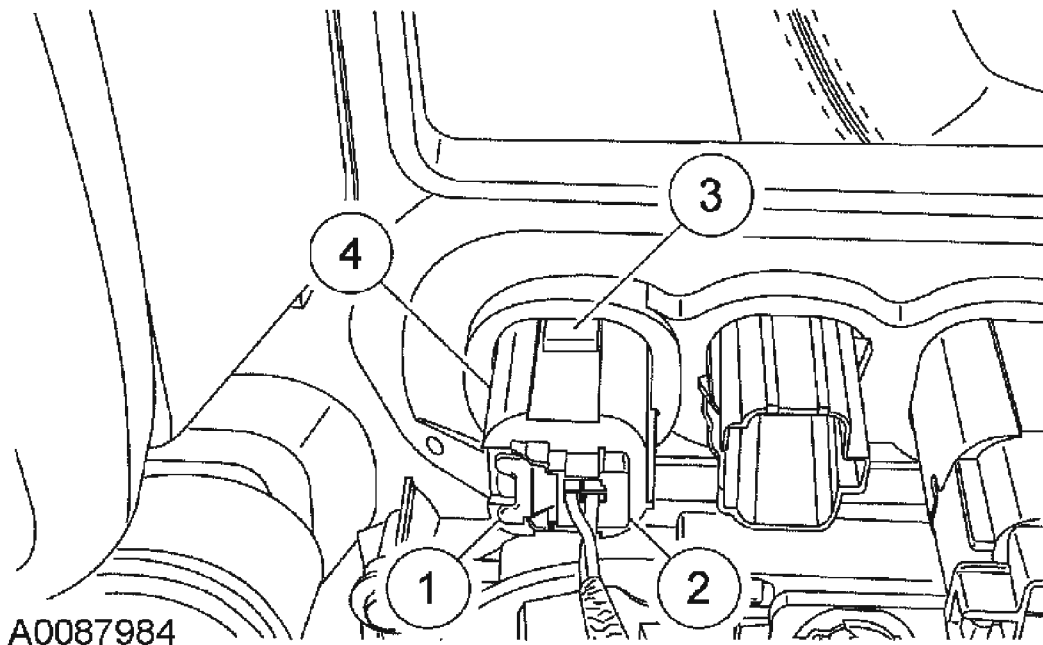
**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** Repair is made by installing a new part only. If the new part does

**not correct the condition, install the original part and carry out the diagnostic procedure again.**

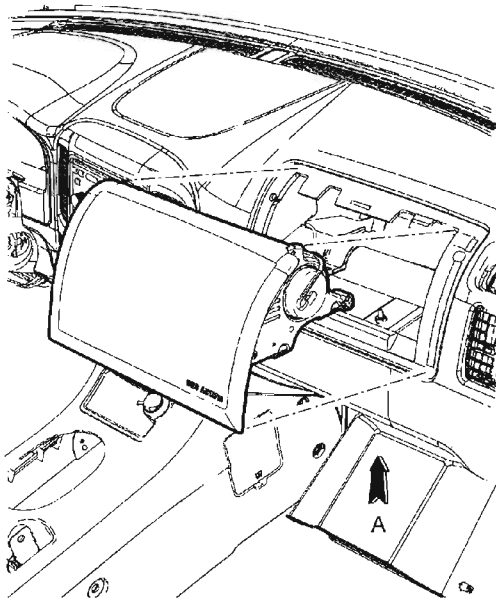
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Detach the retaining clips and partially remove the instrument panel center trim panel.
3. Remove the passenger air bag deactivation indicator.
  1. Release the red disconnect deterrent tab.
  2. Disconnect the connector.
  3. Release the 2 tabs (one shown).
  4. Remove the passenger air bag deactivation indicator.

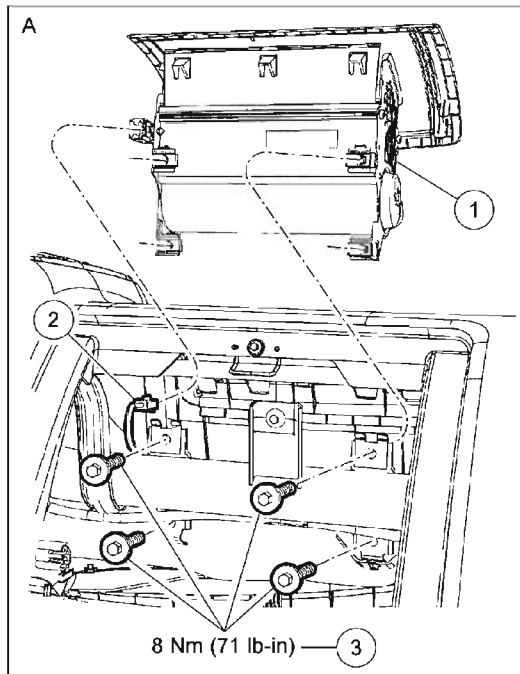


**Fig. 265: Removing Passenger Air Bag Deactivation Indicator**  
 Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.
5. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.



A0001919



Item	Part Number	Description
1	044A74	Passenger air bag module
2	—	Connector (part of 14401)
3	W706599	Passenger air bag module bolts (4 required)

**Fig. 266: Identifying Passenger Air Bag Module**  
 Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Carry a live air bag module with the air bag and deployment door pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Do not set a live air bag module down with the deployment door face down. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** After deployment, the air bag surface can contain deposits

of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** Air bag modules with discolored or damaged deployment doors must be replaced, not repainted.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

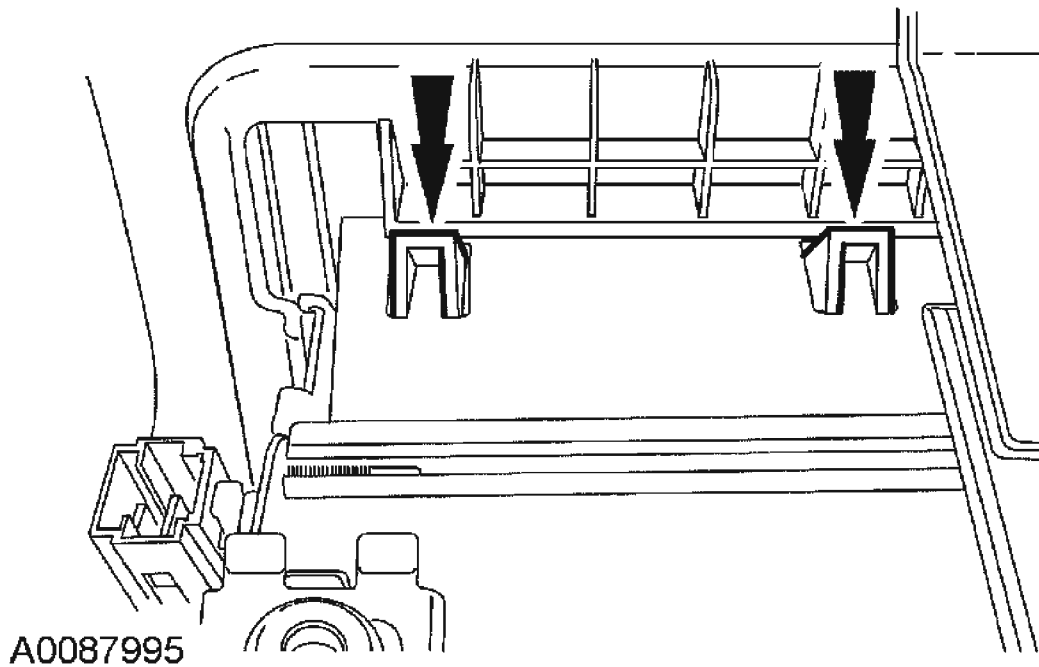
**NOTE:** The air bag warning lamp illuminates when the restraints control module (RCM) fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a SRS fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

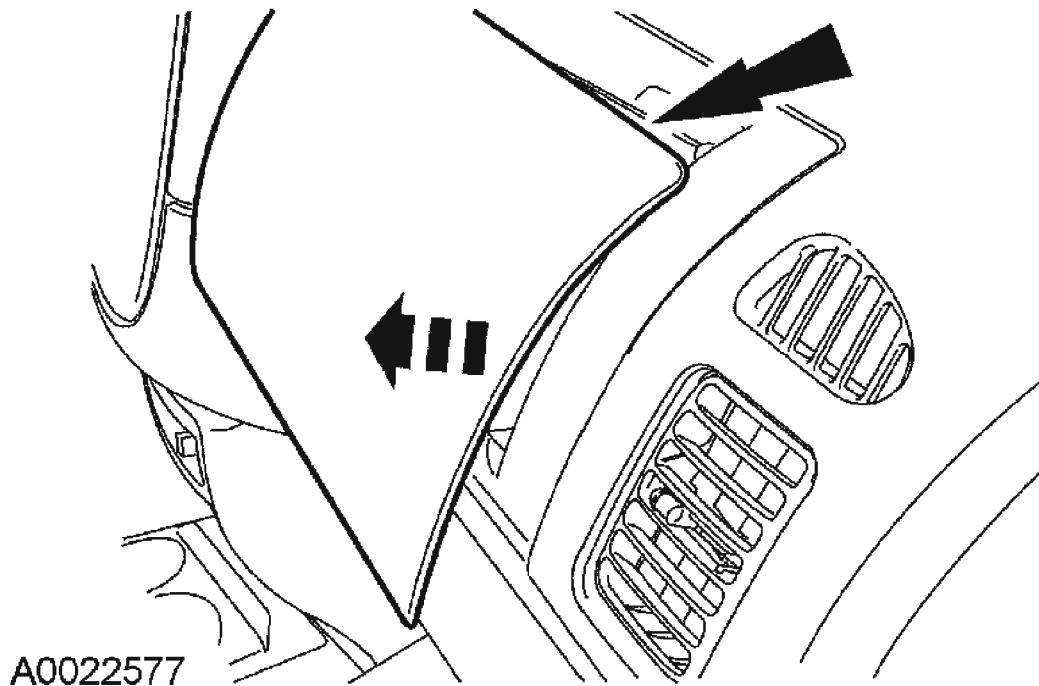
1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Open and lower the glove compartment door.
3. Disconnect the passenger air bag module electrical connector.
4. Remove the 4 passenger air bag module bolts.

**CAUTION:** Do not handle the passenger air bag module by grabbing the edges of the deployment door.



**Fig. 267: Identifying Glove Box**  
Courtesy of FORD MOTOR CO.

5. Through the glove box opening, push up to release the 3 lower deployment door clips (2 shown) from the instrument panel and push the lower end of the passenger air bag module out of the instrument panel, so the clips do not engage again.
6. Push down at the top of the deployment door, release the 3 clips and remove the passenger air bag module.

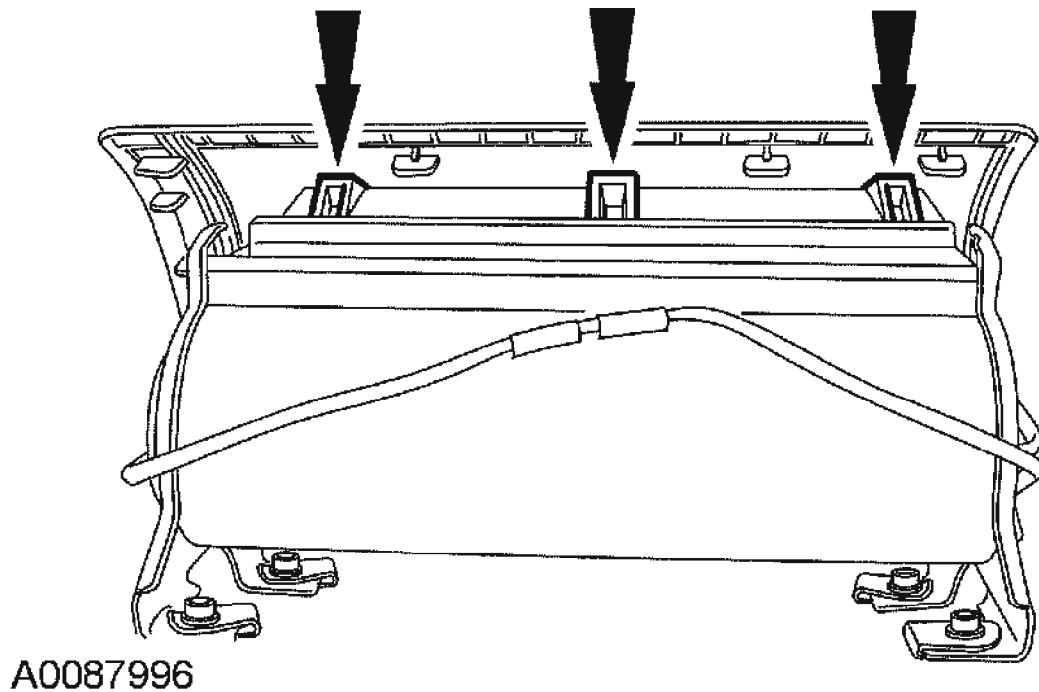


**Fig. 268: Pushing Down At Top Of Deployment Door**  
Courtesy of FORD MOTOR CO.

#### Installation

**NOTE:** Make sure the J-clips are in place before positioning the passenger air bag module to the instrument panel.

1. Install the passenger air bag module trim cover into the instrument panel.
  - With the alignment pins positioned to the instrument panel, push in, seating the top (shown) and bottom deployment door retainers.



**Fig. 269: Installing Passenger Air Bag Module Trim Cover Into Instrument Panel**

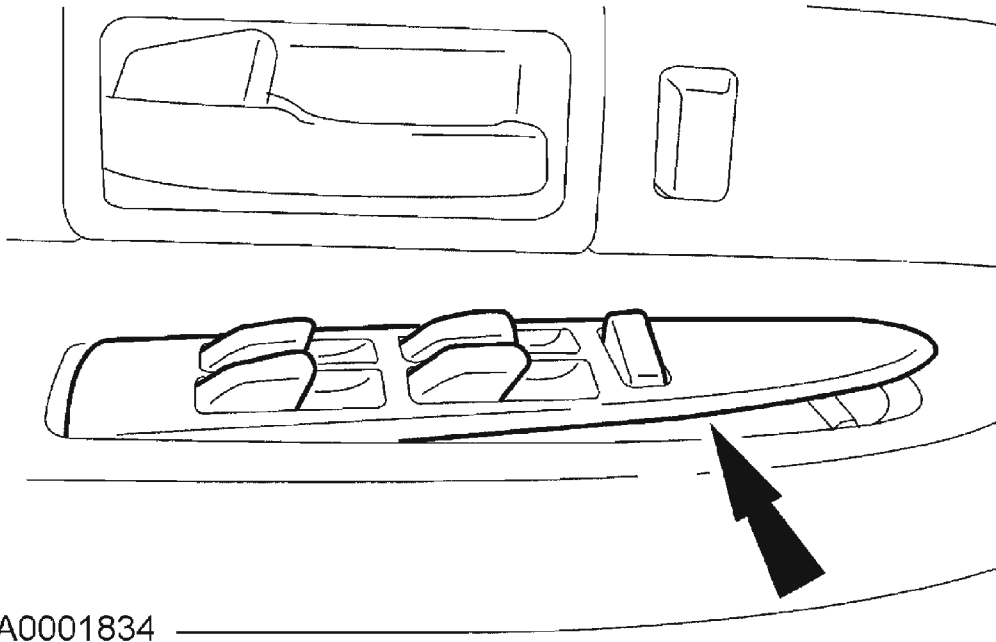
**Courtesy of FORD MOTOR CO.**

2. Install the 4 passenger air bag module bolts.
  - Tighten to 8 Nm (71 lb-in).
3. Connect the passenger air bag module electrical connector.
4. Close the glove compartment door.
5. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

**RESTRAINTS CONTROL MODULE (RCM)**

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



Item	Part Number	Description
1	—	Small RCM electrical wiring connector (part of 14401)
2	—	Large RCM electrical wiring connector (part of 14405)

Item	Part Number	Description
3	14B321	Restraints control module (RCM)
4	W709970-S900	Bolts

**Fig. 270: Identifying Restraints Control Module**  
Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** The restraints control module (RCM) orientation is critical for correct air bag supplemental restraint system (SRS) operation. If a vehicle equipped with an SRS system has been involved in a collision in which the center tunnel area has been damaged, inspect the mounting and bracket for deformation. If damaged, the RCM must be replaced whether or not the air bags have deployed. In addition, make sure the area of the RCM is restored to its original condition.

**WARNING:** Do not handle, move or change the original horizontal



mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow these instructions may result in the inadvertent deployment of the safety canopy and risk of personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**CAUTION:** Electronic modules are sensitive to static electrical charges. If exposed to these charges, damage can result.

**CAUTION:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. The RCM 40-pin connector has different keying configurations dependent on the vehicle build date and option content. Do not force the 40-pin connector onto the RCM. If the connector is forced onto the RCM, damage to the RCM and/or connector will occur.

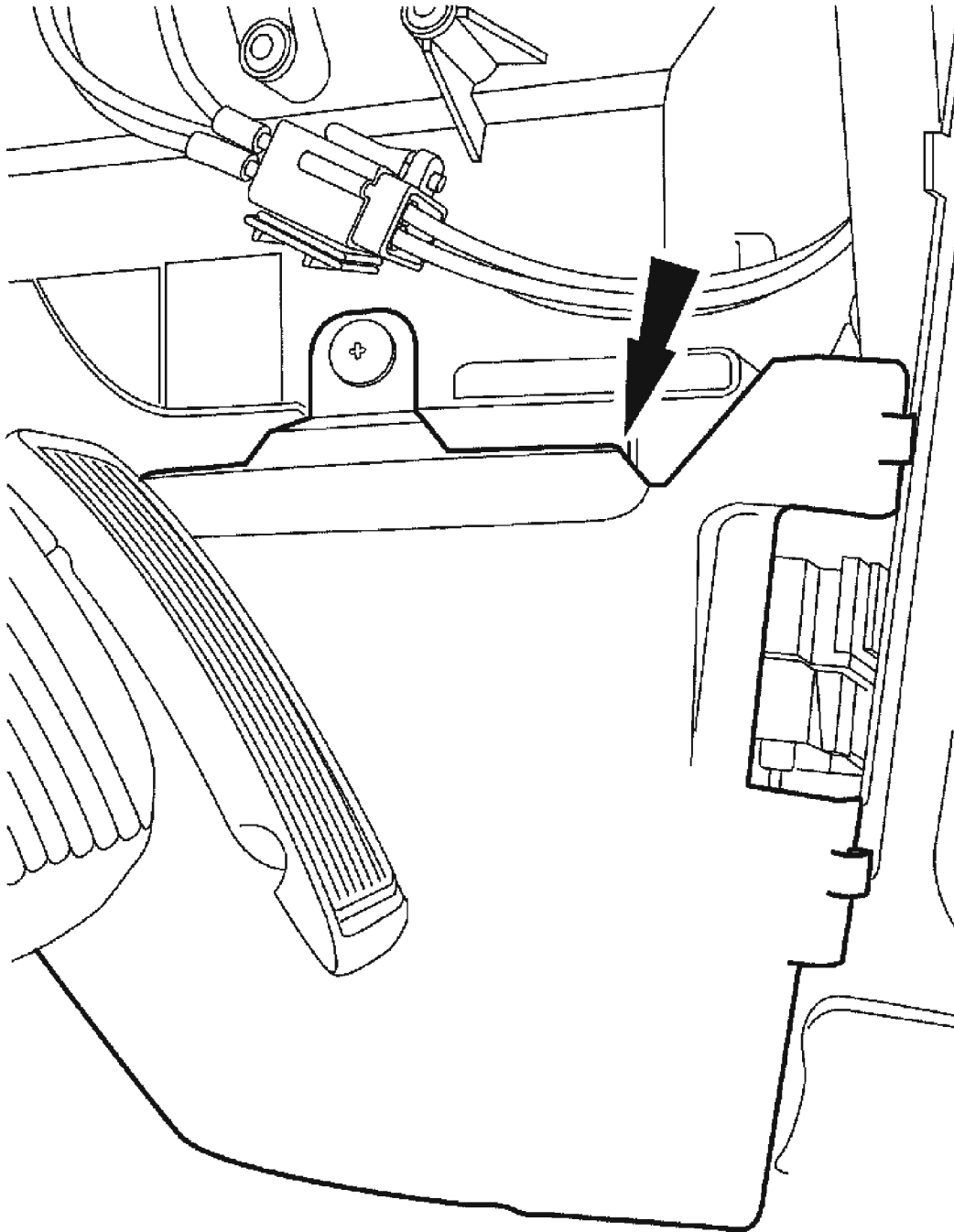
**NOTE:** When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. If an incorrect RCM is installed, erroneous DTCs will result.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the lower LH center instrument panel finish panel.



A0038990

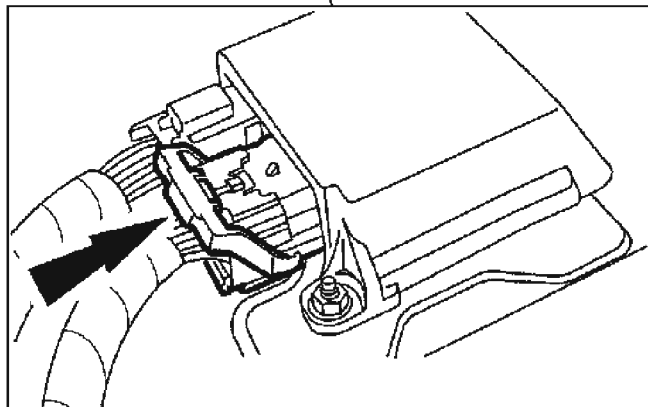
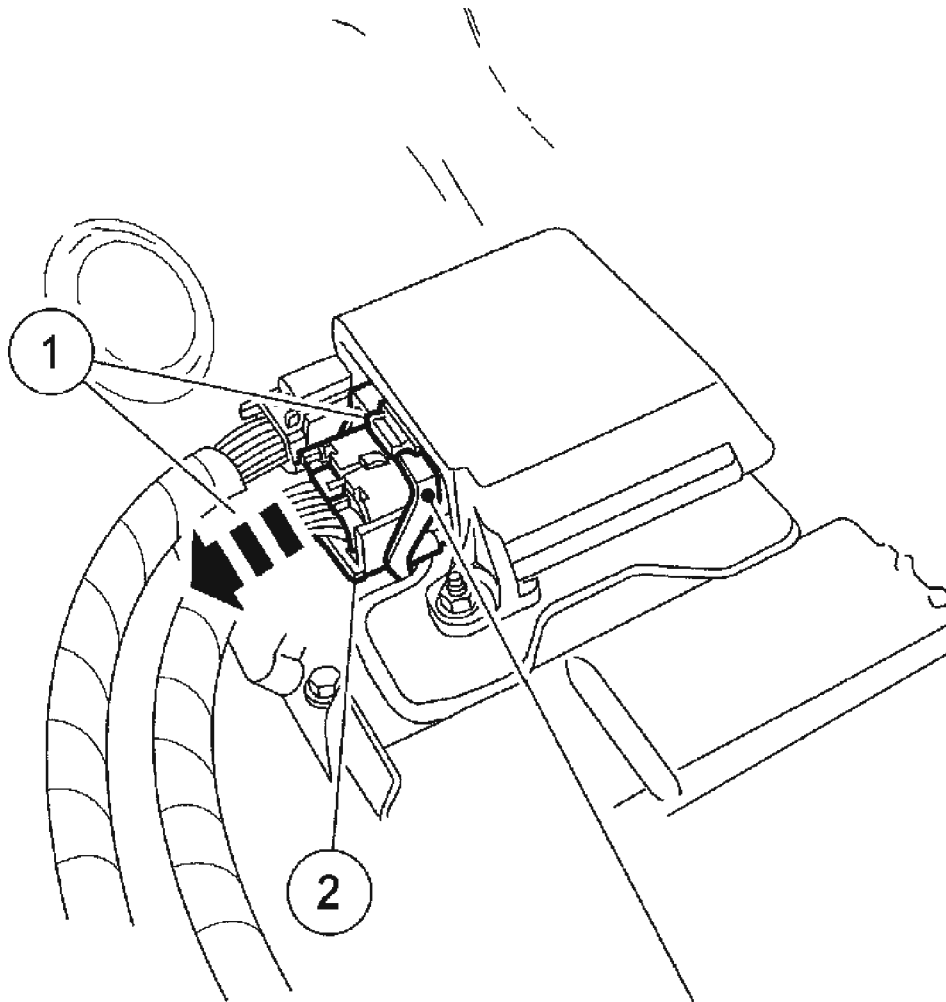
**Fig. 271: Removing Lower LH Center Instrument Panel Finish Panel**  
Courtesy of FORD MOTOR CO.

3. Position back the carpet on the LH and RH tunnel to access the RCM.
4. Disconnect the large RCM electrical connector.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

1. Pinch the thumb tab and pivot the connector position assurance lever all the way back until it stops.
2. Pull out and disconnect the large RCM electrical connector.



A0088899

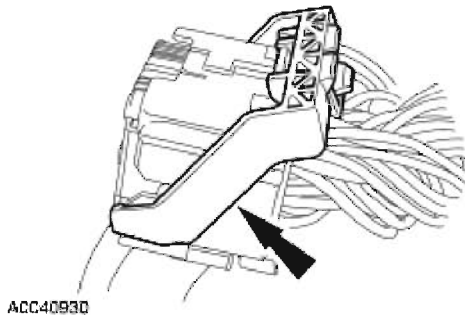
**Fig. 272: Disconnecting Large RCM Electrical Connector**  
Courtesy of FORD MOTOR CO.

5. Disconnect the small RCM electrical connector.
6. Remove the 3 bolts and the RCM.

**Installation**

**WARNING:** The tightening torque of the air bag RCM retaining bolts is critical for correct system operation.

1. Position the RCM and install the 3 bolts.
  - Tighten to 11 Nm (8 lb-ft).
2. Connect the small RCM electrical connector.
3. Make sure the connector position assurance lever is in the full release position before attempting to connect the large RCM electrical connector.



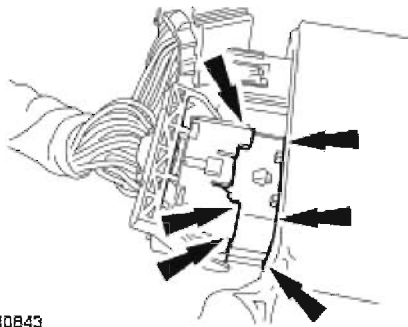
**Fig. 273: View Of Connector Position Assurance Lever**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Putting the large RCM electrical wiring connector into the RCM on an angle can cause bad electrical connections and damage components.

**NOTE:** The RCM has been removed for clarity.

4. Position the large RCM electrical wiring connector into the RCM.

**CAUTION:** Do not push the connector to where the lever pivots and seats itself. Light pressure is needed to get the connector into position on the RCM before using the lever to fully seat the connector.



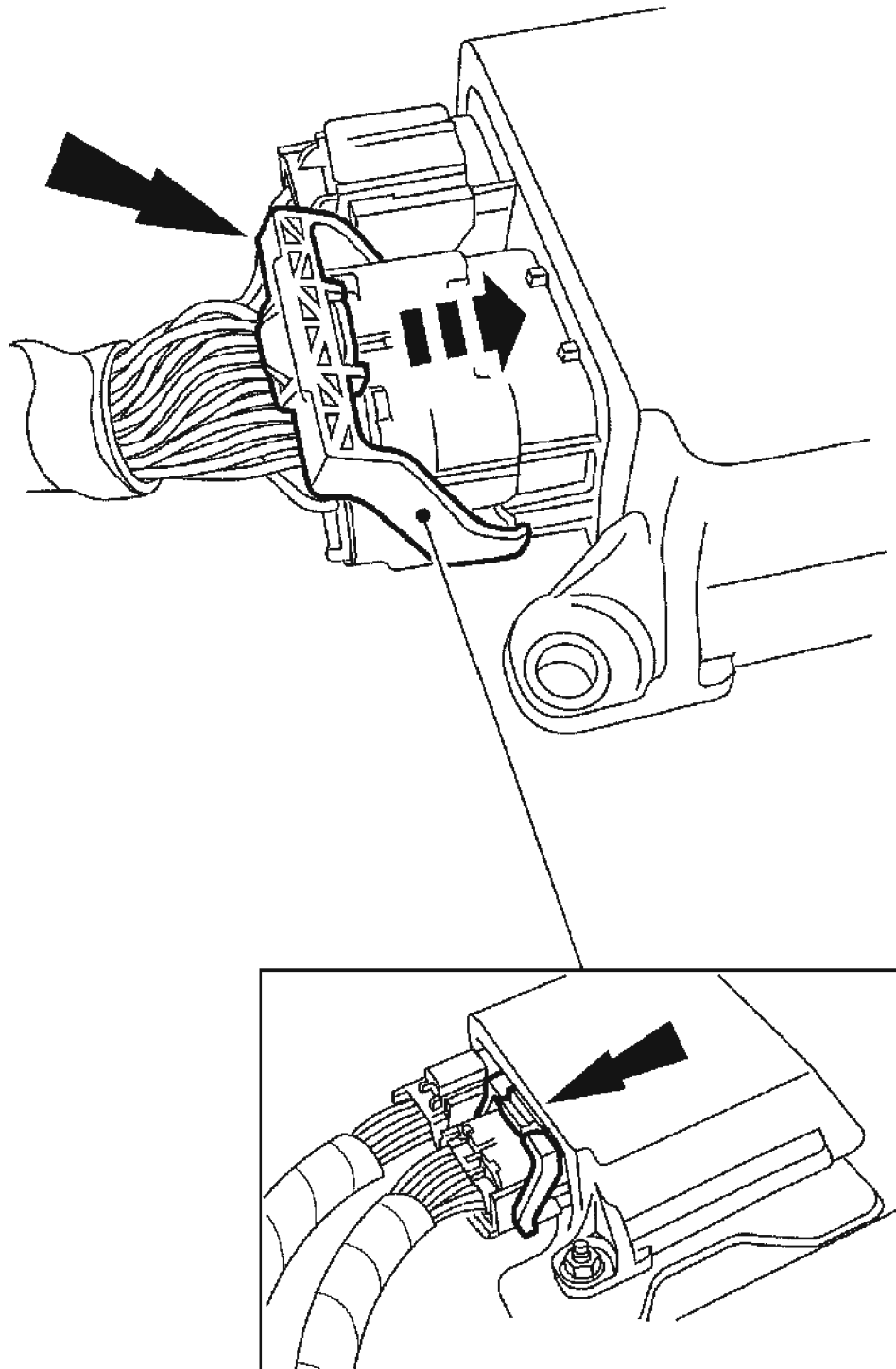
AC040843

**Fig. 274: Identifying Large RCM Electrical Wiring Connector**  
Courtesy of FORD MOTOR CO.

- With the large RCM electrical wiring connector uniformly aligned to the RCM, lightly push in until a subtle audible click is heard and a slight resistance is felt.

**NOTE:**      **The RCM has been removed for clarity.**

5. Connect the large RCM electrical wiring connector.
  - Using the connector position assurance lever, pivot it toward the RCM, drawing the connector into the RCM.
  - Make sure the thumb tab is engaged to the retainer on the RCM and locked in place.



A0088904

**Fig. 275: Identifying Connector**

## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner

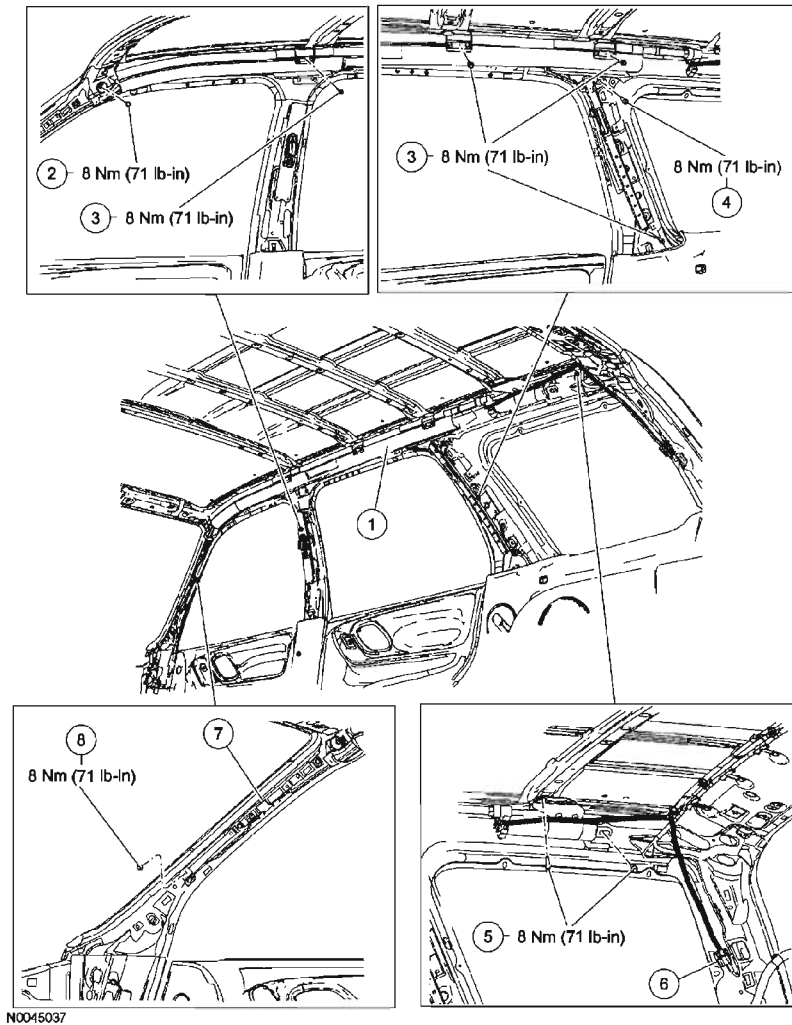
**Courtesy of FORD MOTOR CO.**

6. Position back the carpet on the LH and RH tunnel to its original position.
7. Install the lower LH center instrument panel finish panel.
8. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

**SAFETY CANOPY MODULE**

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



N0045037

Item	Part Number	Description
1	042D94	Safety canopy module
2	W709825	Safety canopy module top of A-Pillar bolt
3	W708798	Safety canopy bolts (4 required)
4	—	Safety canopy module tether bracket upper bolt (part of 042D95)
5	W500213	Safety canopy module bolts near the ignitor (2 required)
6	—	Safety canopy module electrical connector (part of 14A005)
7	—	A-Pillar tether pin-type retainer (part of 042D95)
8	—	A-Pillar tether bolt (part of 042D95)

**Fig. 276: Identifying Safety Canopy Module With Torque Specifications**  
Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when



handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** To reduce the risk of personal injury from an accidental deployment, always carry or place a live safety canopy module with the safety canopy and tear seam pointed away from your body. Failure to do so can result in personal injury in the event of a safety canopy module deployment.

**WARNING:** Anytime the safety canopy has deployed, the headliner, and all A-, B- and C-pillar upper trim panels and attaching hardware must be replaced along with any other damaged components and hardware. Failure to do so can result in personal injury in the event of a safety canopy deployment.

**WARNING:** Vehicles equipped with safety canopy modules require a specific headliner. When installing a new headliner on a vehicle equipped with safety canopy modules, make sure a headliner for safety canopy modules is being used. The word "AIRBAG" will appear on the headliner where it meets each B-pillar trim panel. Failure to do so can result in personal injury in the event of a safety canopy module deployment.

**WARNING:** Before installing a safety canopy module, inspect the roof line for any damage. If necessary, the sheet metal must be reworked to its original condition and structural integrity. All damaged fasteners must be replaced and any foreign objects removed. Failure to do so may result in personal injury in the event of a safety canopy deployment.

**WARNING:** Inspect the safety canopy before installation. If the safety canopy is damaged or the cover has separated and the canopy material has been exposed, a new safety canopy module must be installed. Do not attempt to repair the safety canopy module. Failure to follow these instructions can result in personal injury in the event of a safety canopy module deployment.

**WARNING:** To reduce the risk of injury, do not obstruct or place objects in the deployment path of the safety canopy module. Failure to follow these instructions can result in

**personal injury in the event of a safety canopy module deployment.**

**WARNING:** Never put any type of fastener or tie strap around any part of the safety canopy module or interior trim panel. This will prevent the safety canopy module from deploying correctly. Failure to do so can result in personal injury in the event of a safety canopy module deployment.

**WARNING:** Never probe the electrical connector on a safety canopy module. Doing so can result in safety canopy deployment.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**WARNING:** The safety canopy must be installed in the vehicle using new torque-prevailing type J-nuts (W520822, 5 per side). Use of this J-nut is mandatory so as to reduce the risk of loss of fastener effectiveness. Failure to follow these instructions may result in personal injury in the event of a safety canopy deployment.

**NOTE:** There are 2 different safety canopy modules, one for vehicles with a moonroof and one for vehicles without a moonroof. They are not interchangeable. If installing a new safety canopy module, the correct safety canopy module **MUST** be installed for the vehicle application.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

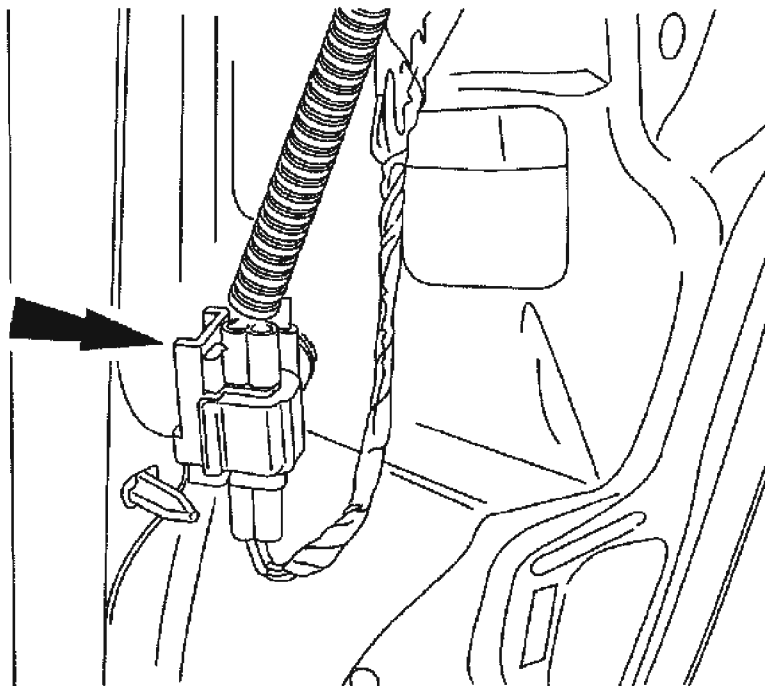
**NOTE:** RH side safety canopy module shown, LH side similar.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
3. Detach the A-pillar tether pin-type retainer from the A-pillar.

**NOTE:** If equipped with a moonroof and or rear window wiper assembly, note position and routing of the moonroof front drain hose and/or rear window washer solvent hose for installation purposes.

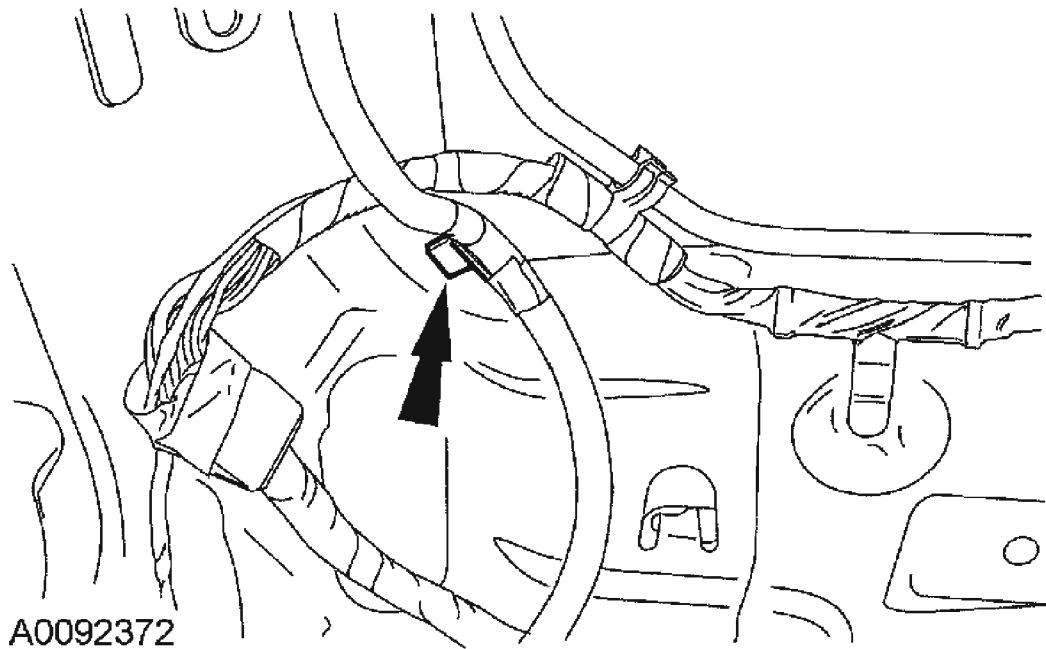
4. Remove the A-pillar tether bolt.
5. Remove the 2 safety canopy module bolts located near the top of the A- and B-pillars.
6. Disconnect the safety canopy module electrical connector and detach the connector from the D-pillar.

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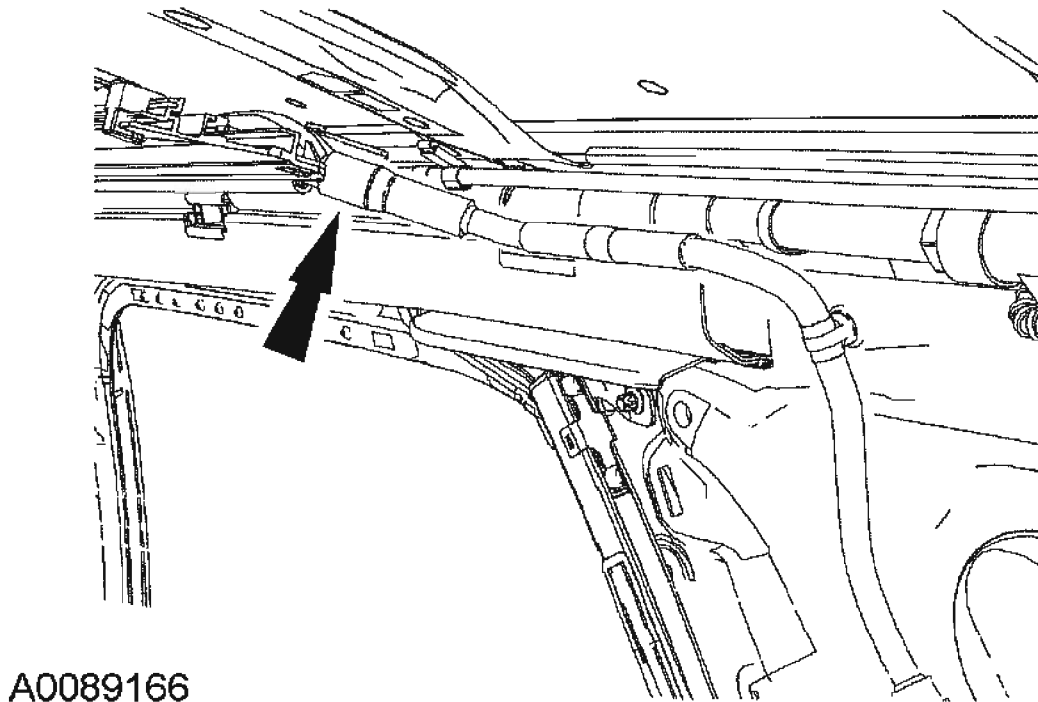
**Fig. 277: Detaching Connector From D-Pillar**  
Courtesy of FORD MOTOR CO.

7. Detach the safety canopy module wiring clip from the roof panel brace.



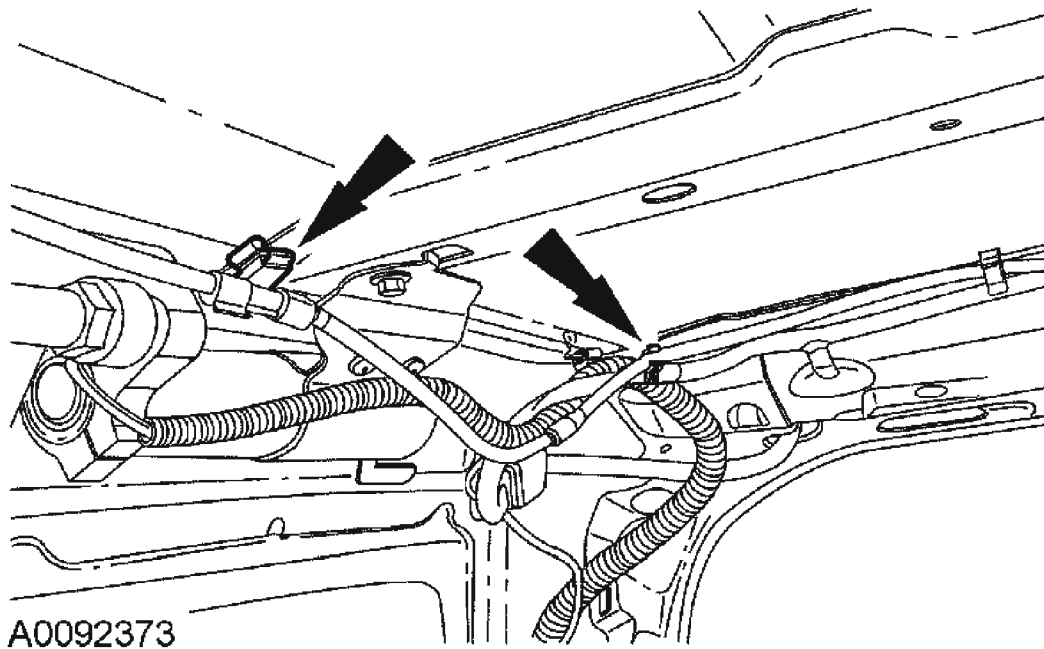
**Fig. 278: Detaching Safety Canopy Module Wiring Clip From Roof Panel Brace**  
Courtesy of FORD MOTOR CO.

8. Remove the 2 safety canopy module bolts near the ignitor (between the C- and D-pillars).
9. If the vehicle is equipped with a moonroof, disconnect the moonroof rear drain hose.



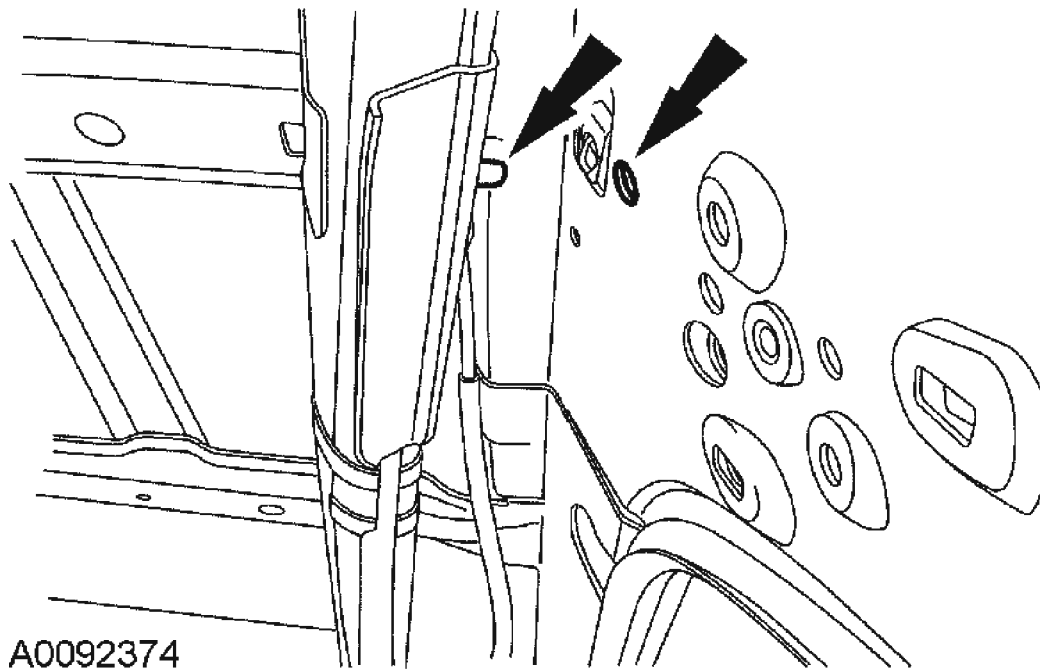
**Fig. 279: Disconnecting Moonroof Rear Drain Hose**  
Courtesy of FORD MOTOR CO.

10. If the vehicle is equipped with a rear window wiper assembly, detach the hose clips and position the hose aside.



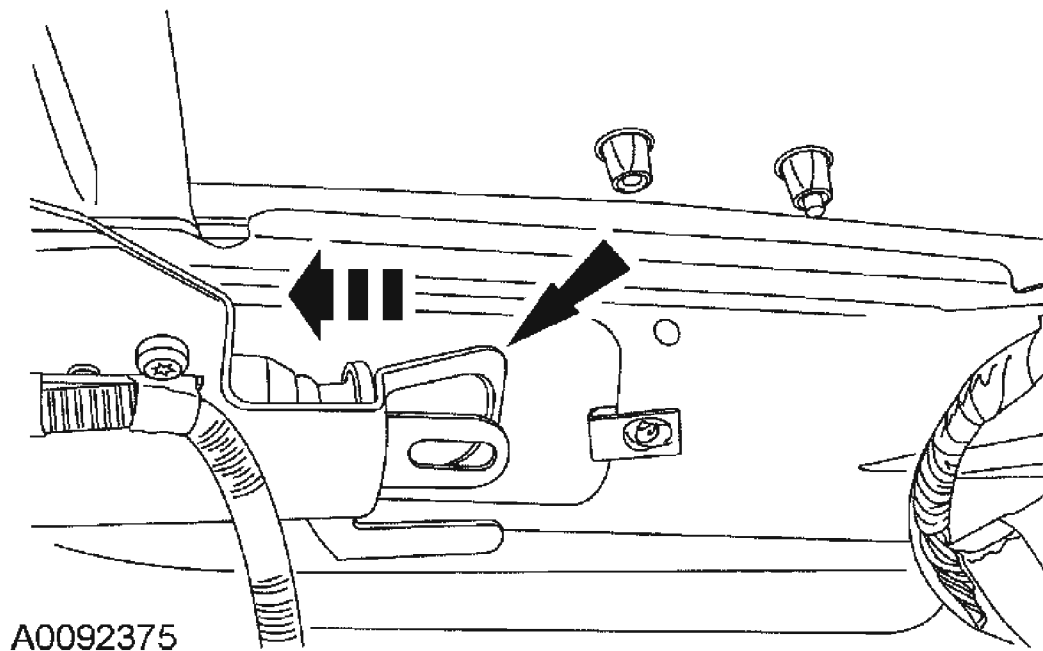
**Fig. 280: Detaching Hose Clips**  
**Courtesy of FORD MOTOR CO.**

11. Remove the 2 bolts from the safety canopy module tether bracket at the C-pillar.
12. Remove the remaining 2 safety canopy module bolts (1 near the top of the C-pillar, 1 between the B- and C-pillars).
13. Lift to unhook the safety canopy module from the C-pillar.



**Fig. 281: Lifting To Unhook Safety Canopy Module From C-Pillar**  
Courtesy of FORD MOTOR CO.

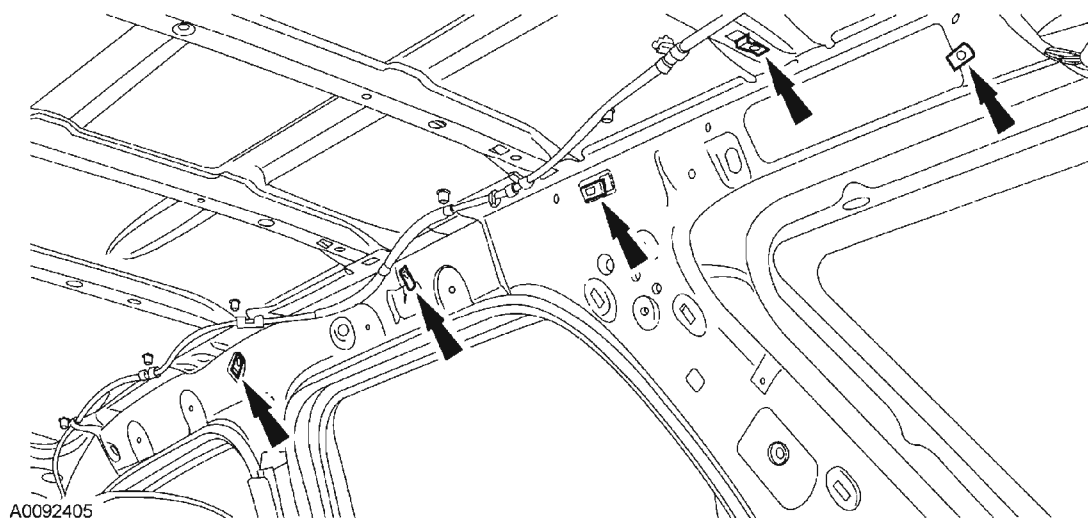
14. Move the safety canopy module forward and release the rear hook.



**Fig. 282: Moving Safety Canopy Module Forward And Release Rear Hook**  
Courtesy of FORD MOTOR CO.

#### Installation

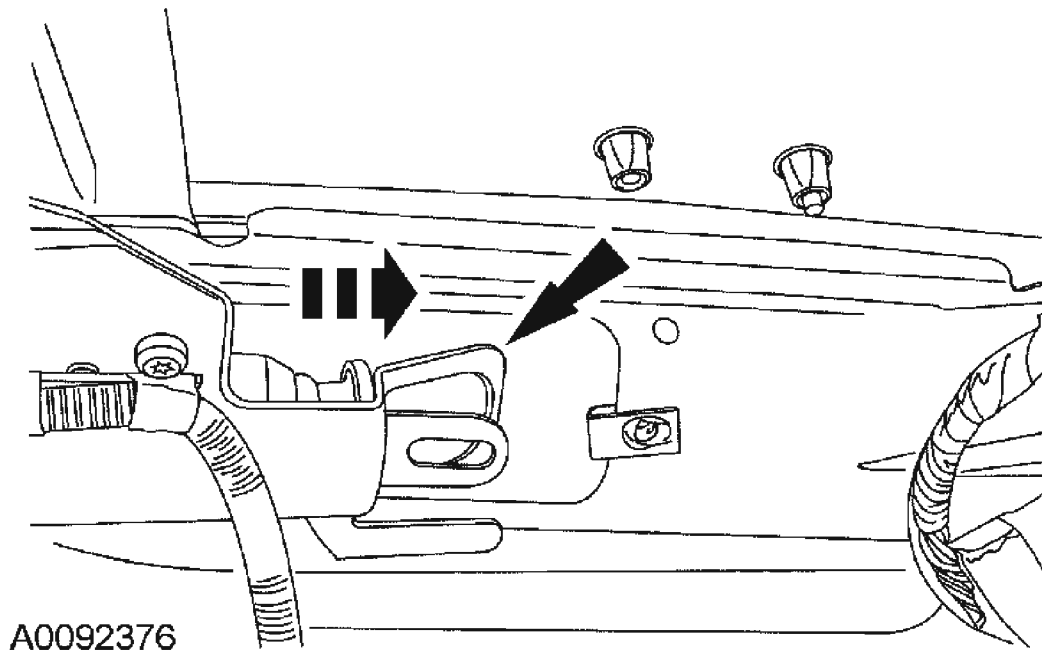
1. Install new safety canopy module J-nuts.



**Fig. 283: Installing New Safety Canopy Module J-Nuts**  
Courtesy of FORD MOTOR CO.

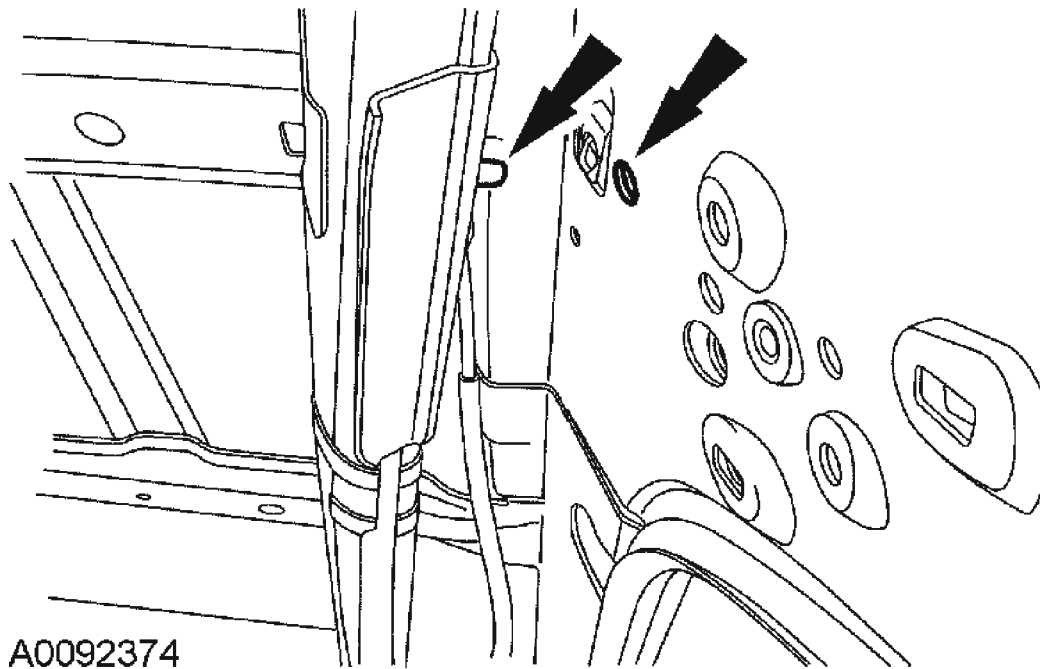


**NOTE:** If equipped with a moonroof and/or rear window wiper assembly, make sure of correct moonroof drain hose and/or rear window solvent hose routing.



**Fig. 284: Installing Safety Canopy Rear Hook**  
Courtesy of FORD MOTOR CO.

2. Install the safety canopy rear hook.
3. Hook the safety canopy module to the C-pillar.

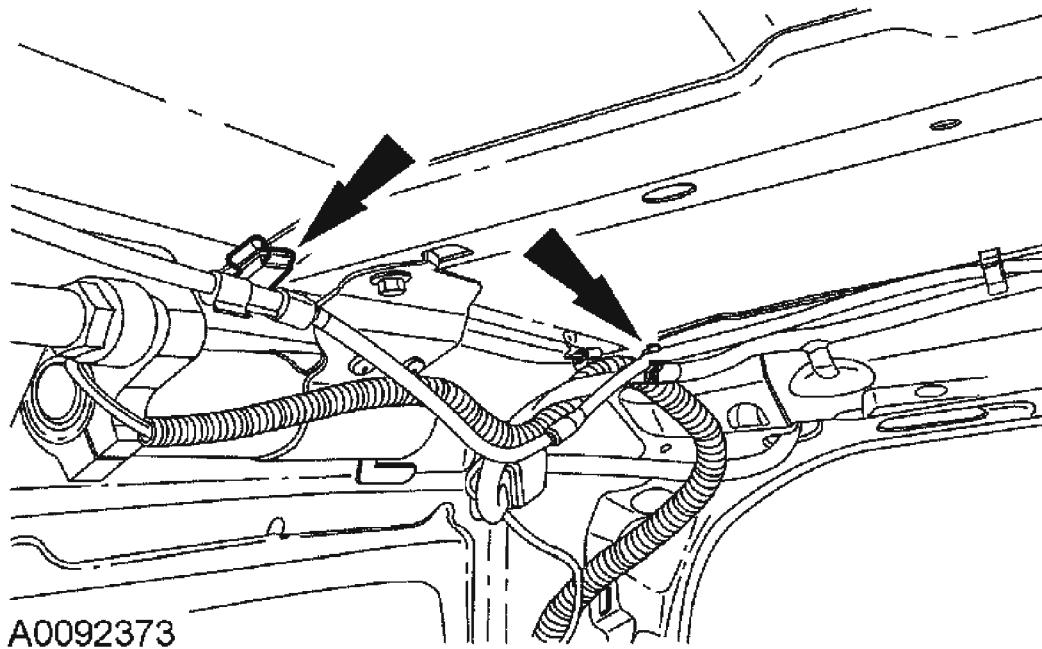


**Fig. 285: Hooking Safety Canopy Module To C-Pillar**  
 Courtesy of FORD MOTOR CO.

4. Install the 2 safety canopy module bolts located near the top of the A- and B-pillars.
  - Tighten to 8 Nm (71 lb-in).
5. Attach the A-pillar tether pin-type retainer to the A-pillar.

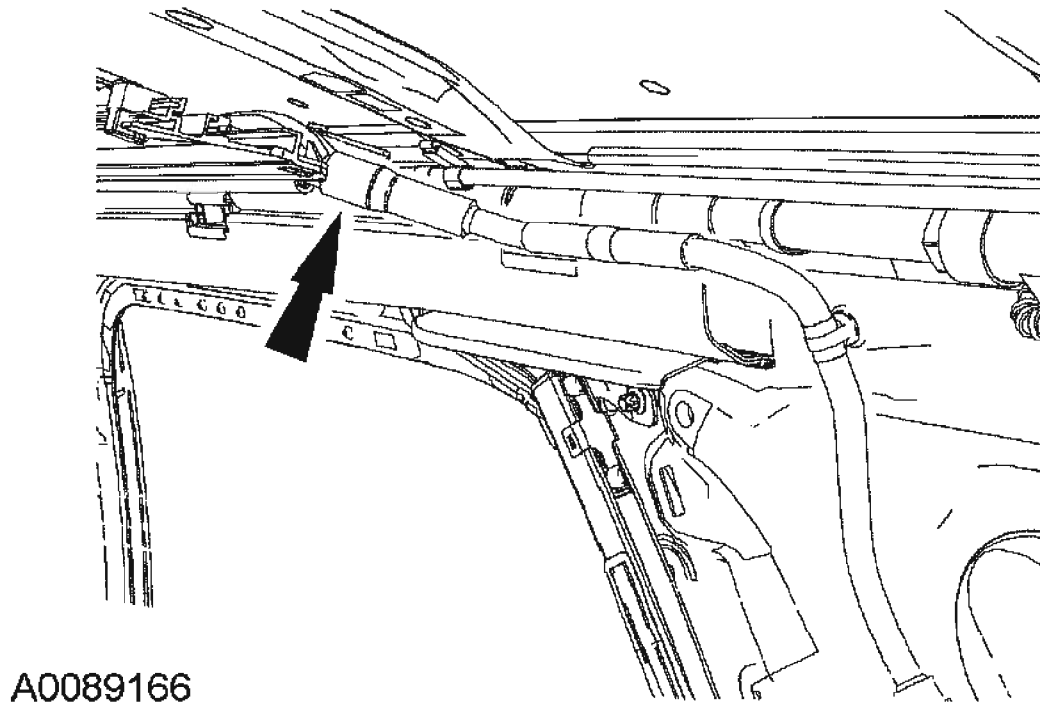
**NOTE:** If equipped with a moonroof and/or rear window wiper assembly, do not pinch the front moonroof drain hose and/or rear window washer solvent hose.

6. Install the A-pillar tether bolt.
  - Tighten to 8 Nm (71 lb-in).
7. Install the 2 safety canopy module bolts near the top of the C-pillar and between the B- and C-pillars.
  - Tighten to 8 Nm (71 lb-in).
8. Install the 2 bolts to the safety canopy module tether bracket at the C-pillar.
  - Tighten to 8 Nm (71 lb-in).
9. If the vehicle is equipped with a rear window wiper assembly, position the hose and attach the hose clips.



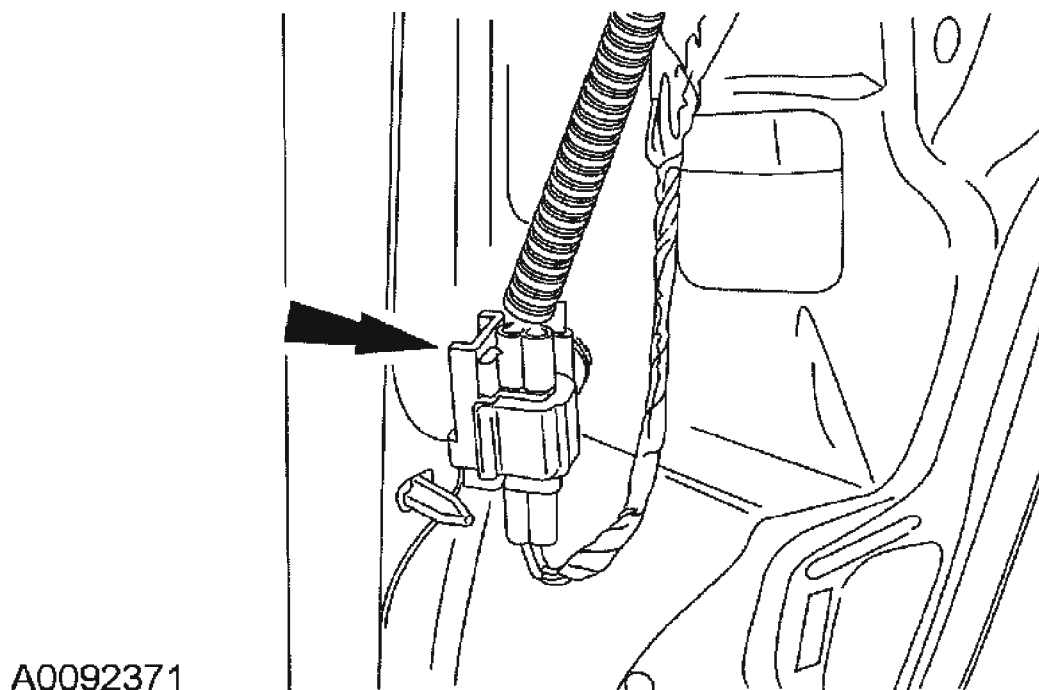
**Fig. 286: Attaching Hose Clips**  
**Courtesy of FORD MOTOR CO.**

10. If the vehicle is equipped with a moonroof, connect the moonroof rear drain hose.



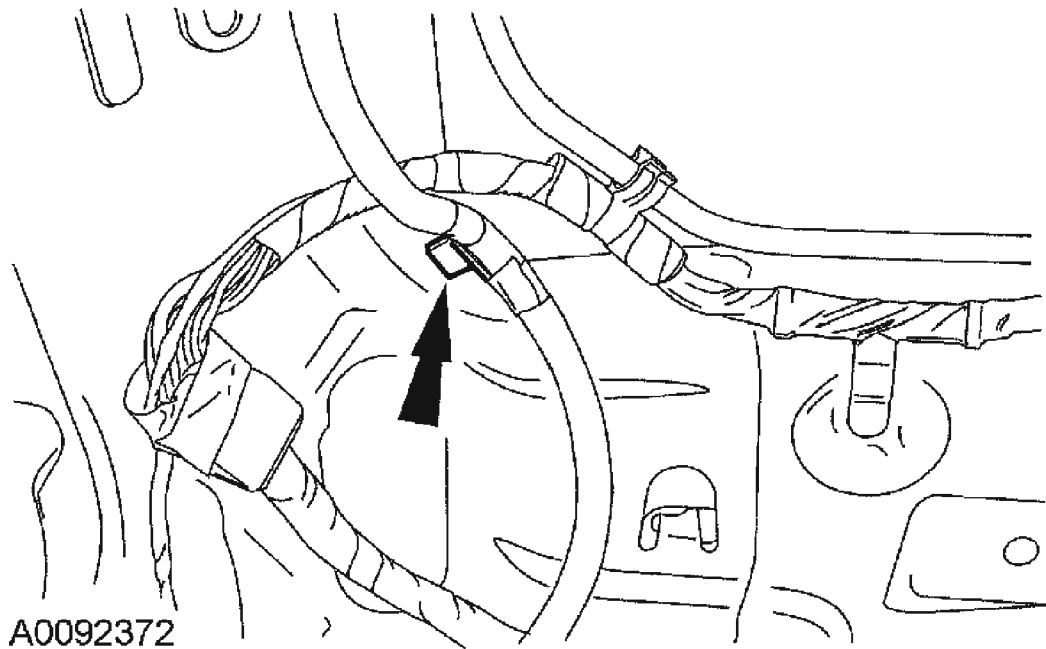
**Fig. 287: Connecting Moonroof Rear Drain Hose**  
Courtesy of FORD MOTOR CO.

11. Connect the safety canopy module electrical connector and attach the connector to the D-pillar.



**Fig. 288: Connecting Safety Canopy Module Electrical Connector And Attaching Connector To D-Pillar**  
Courtesy of FORD MOTOR CO.

12. Install the safety canopy module wiring clip to the roof panel brace.



**Fig. 289: Installing Safety Canopy Module Wiring Clip To Roof Panel Brace**  
Courtesy of FORD MOTOR CO.

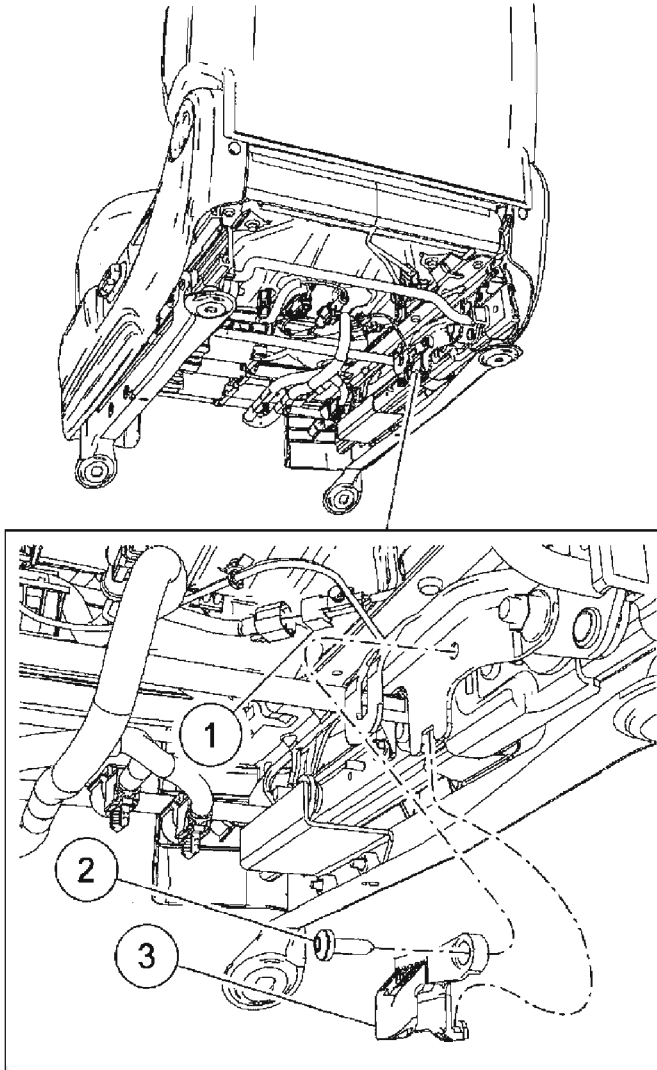
13. Install the remaining 2 safety canopy module bolts near the ignitor (between the C- and D-pillars).
  - Tighten to 8 Nm (71 lb-in).
14. Install the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
15. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

#### SEAT POSITION SENSOR

**NOTE:** Power seat track seat position sensor shown, manual seat track position sensor similar.

## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



A0087988

Item	Part Number	Description
1	—	Connector (part of 14C719)
2	—	Screw
3	14B416	Seat position sensor

**Fig. 290: Identifying Seat Position Sensor**  
Courtesy of FORD MOTOR CO.

#### Removal and Installation

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when

handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** The seat must be in rearward position.

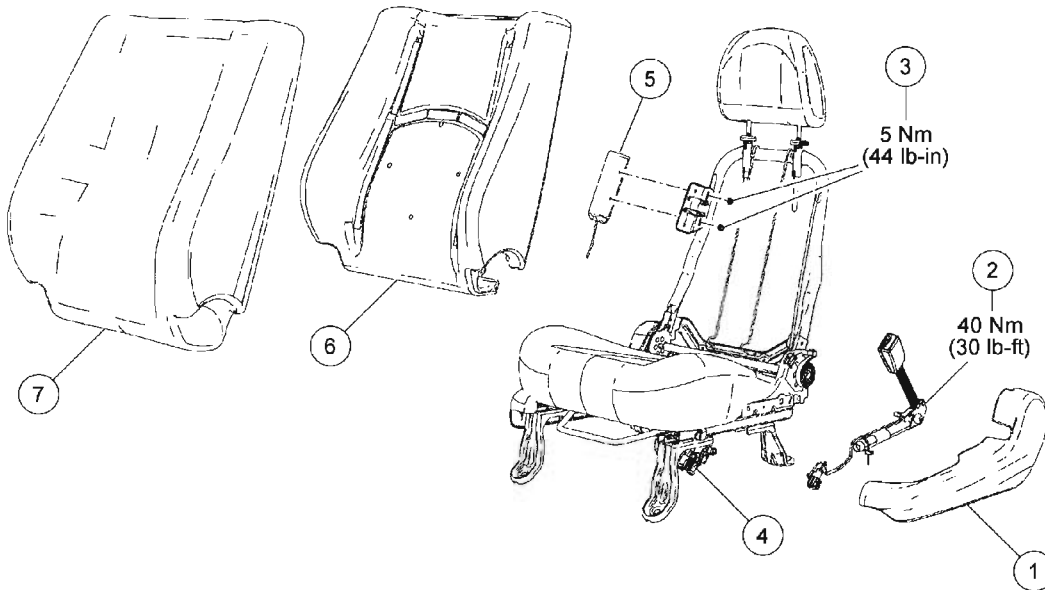
1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Disconnect the seat position sensor electrical connector.
3. Remove the screw and the seat position sensor.
4. To install, reverse the removal procedure.
5. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

## **SIDE AIR BAG MODULE**



## 2005 Ford Escape

### 2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



A0005244

Item	Part Number	Description
1	62187B	Inboard seat cushion side shield
2	—	Safety belt buckle pretensioner bolt (part of 61202B)
3	—	Side air bag module nuts
4	—	Side air bag module electrical connector
5	611D11/611D10	Side air bag module
6	64810	Seat back foam pad
7	64416	Seat back trim cover

**Fig. 291: Identifying Side Air Bag Module With Torque Specifications**  
Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of

an accidental deployment.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards.

**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

**WARNING:** Side air bag modules with damaged covers must be replaced.

**WARNING:** Front seat back trim covers installed on seats equipped with side air bags cannot be repaired, they are to be replaced. Cleaning is permissible.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a supplemental restraint system (SRS) component is being serviced, the SRS must be depowered.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** If a side air bag deployment took place a new seat back pad, trim cover, and side air bag module must be installed. The seat back frame should be replaced if necessary.

**NOTE:** When replacing the side air bag after deployment, refer to SEATING for additional information concerning the installation of a new side air bag.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

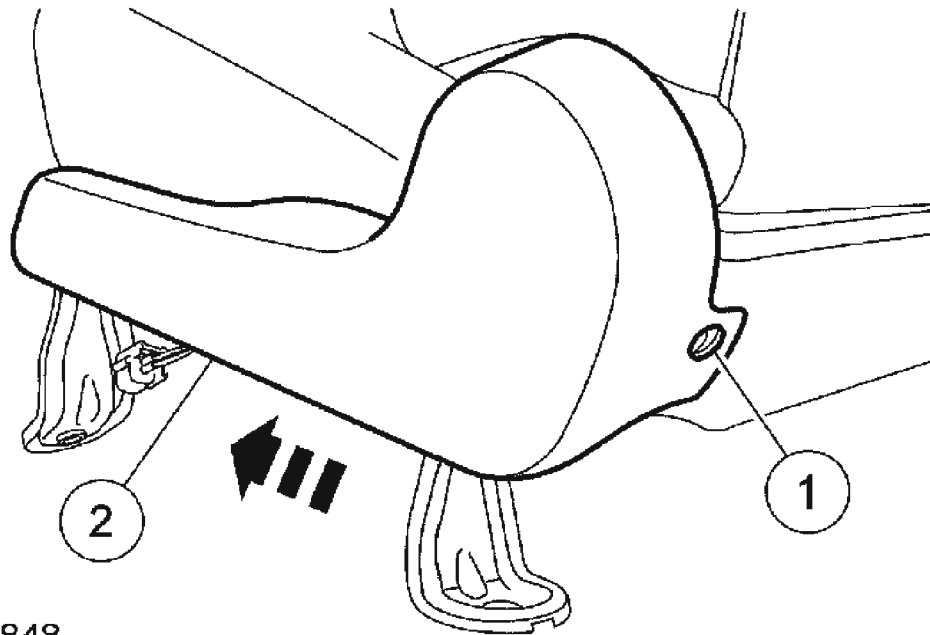
**NOTE:** Repair is made by installing a new part only. If the new part does

**not correct the condition, install the original part and carry out the diagnostic procedure again.**

**NOTE:** Passenger seat side air bag module shown, driver side similar.

**All seats**

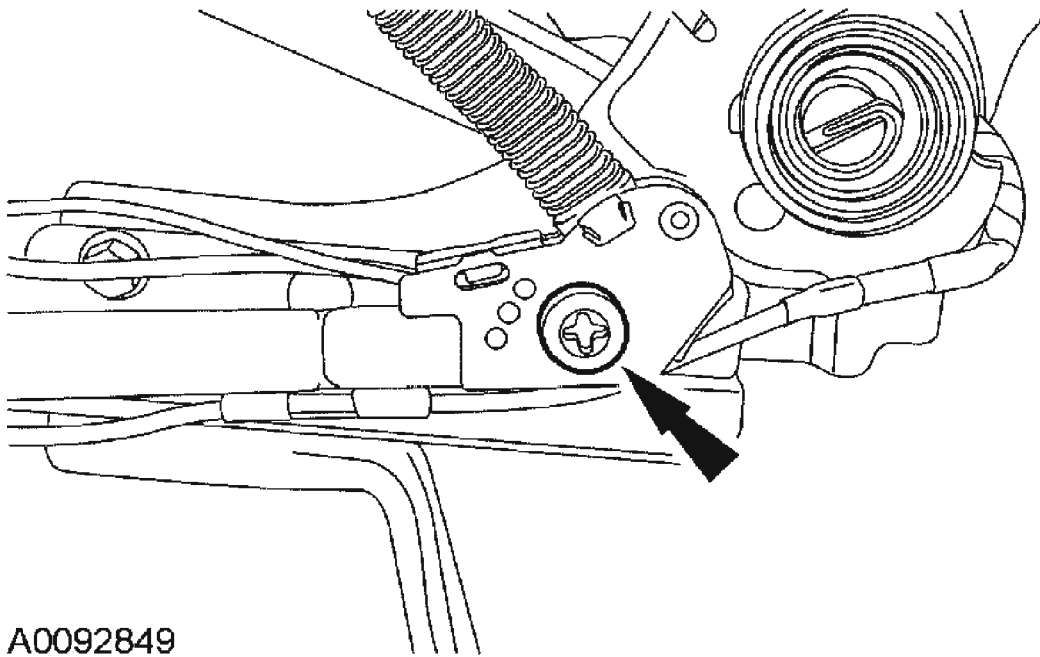
1. Remove the front seat and depower the system. For additional information, refer to **SEATING** .
2. Remove the inboard seat cushion side shield.
  1. Remove the rear screw.
  2. Push the inboard seat cushion side shield forward to release.



A0092848

**Fig. 292: Removing Rear Screw**  
**Courtesy of FORD MOTOR CO.**

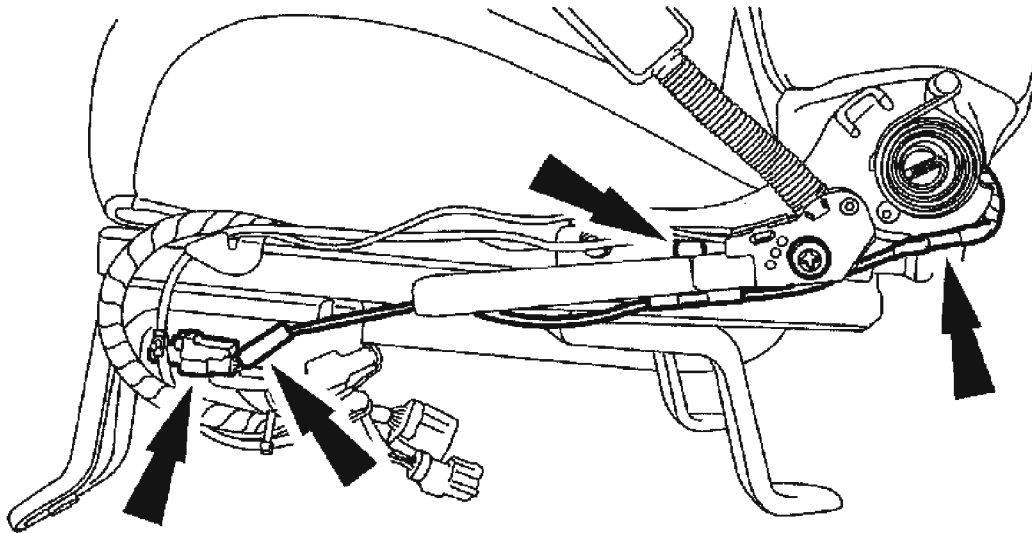
3. Loosen the safety belt buckle pretensioner bolt.



A0092849

**Fig. 293: Loosening Safety Belt Buckle Pretensioner Bolt**  
Courtesy of FORD MOTOR CO.

**WARNING:** Note the position of the wiring harness, to aid installation. An incorrectly routed wiring harness could become damaged when the seat is moved. Failure to follow this instruction may result in personal injury.



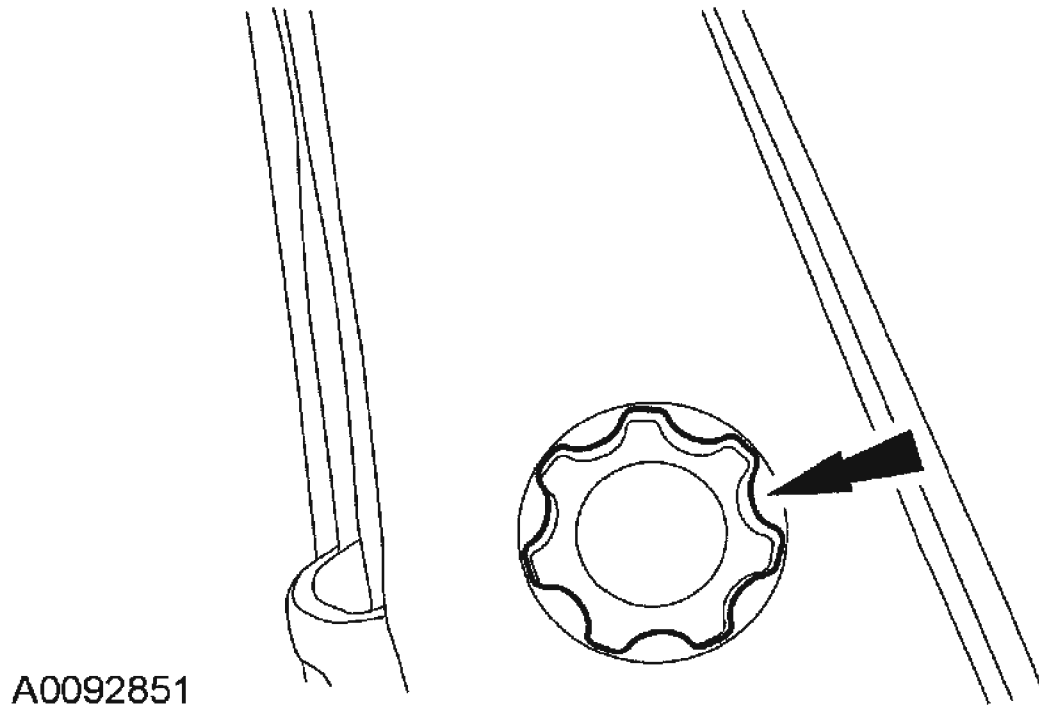
A0092850

**Fig. 294: Detaching Wiring Retainers**  
Courtesy of FORD MOTOR CO.

4. Disconnect the side air bag module electrical connector and detach the wiring retainers.

**Seats with manual lumbar adjust**

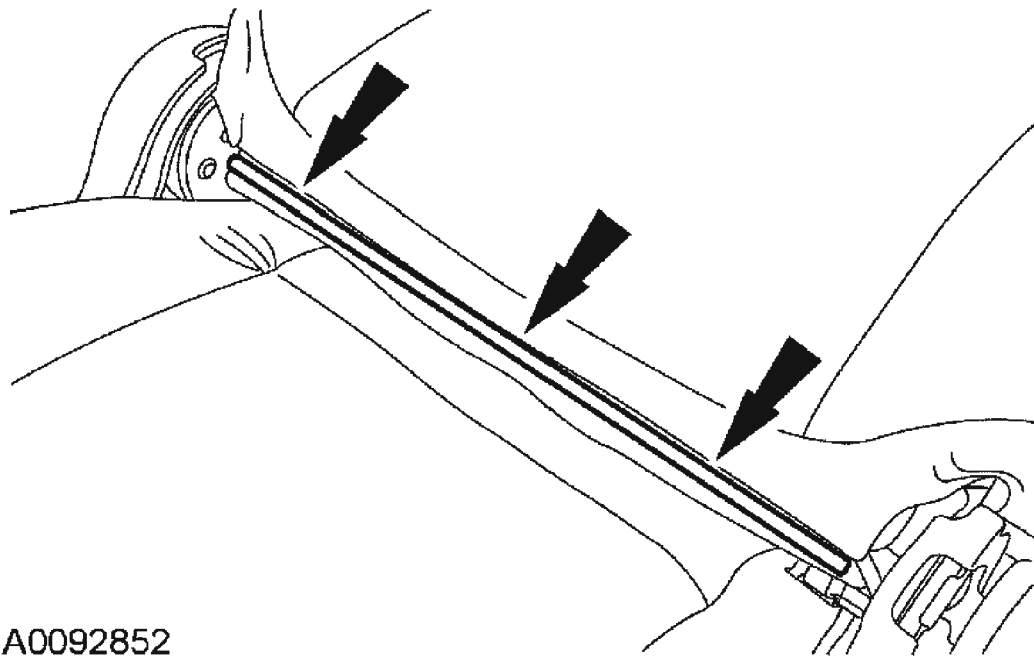
5. Turn the manual lumbar knob clockwise until it stops, releasing all tension on the manual lumbar support cable.
6. Pull and remove the manual lumbar knob.



**Fig. 295: Removing Manual Lumbar Knob**  
Courtesy of FORD MOTOR CO.

**All seats**

7. Fully recline the seat backrest.
8. Release the seat back trim cover J-clip.



**Fig. 296: Releasing Seat Back Trim Cover J-Clip**  
Courtesy of FORD MOTOR CO.

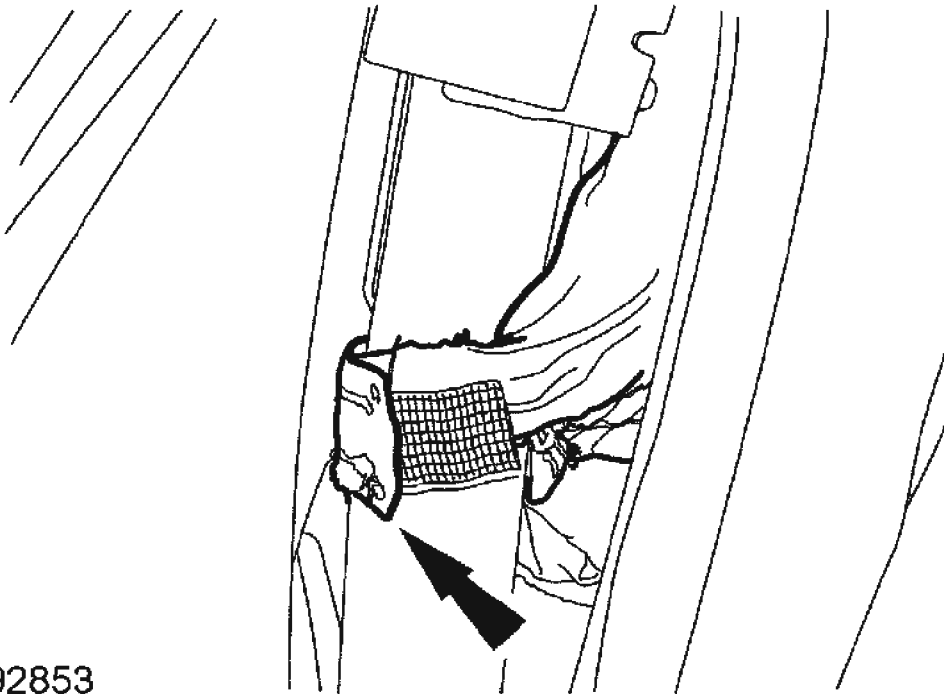
9. Move the seat backrest to the upright position.

**WARNING:** Front seat back trim covers installed on seats equipped with side air bags cannot be repaired; they are to be replaced (cleaning is permissible).

**CAUTION:** Use care when separating the seat cushion trim cover from the hook and loop strip. The hook and loop strip can be torn from the seat cushion foam.

10. Place a hand between the seat backrest trim cover and foam pad and carefully separate the hook and loop strips.
11. Carefully roll up the seat back trim cover in an inside out fashion to the side air bag module.
12. Release the hook and loop retainer from around seat backrest frame.

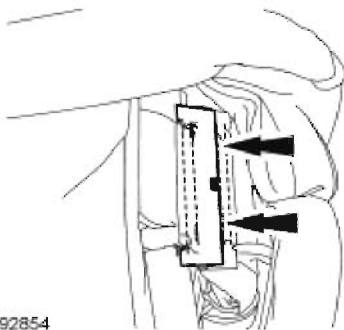
A0092853



**Fig. 297: Releasing Hook And Loop Retainer From Around Seat Backrest Frame**  
Courtesy of FORD MOTOR CO.

13. Release the side air bag module deployment chute J-clip from around the side air bag module.

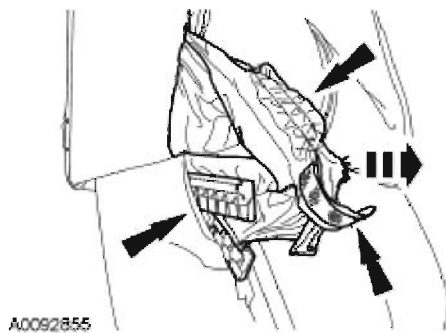
A0092854



**Fig. 298: Identifying Side Air Bag Module Backrest Trim Cover**  
Courtesy of FORD MOTOR CO.

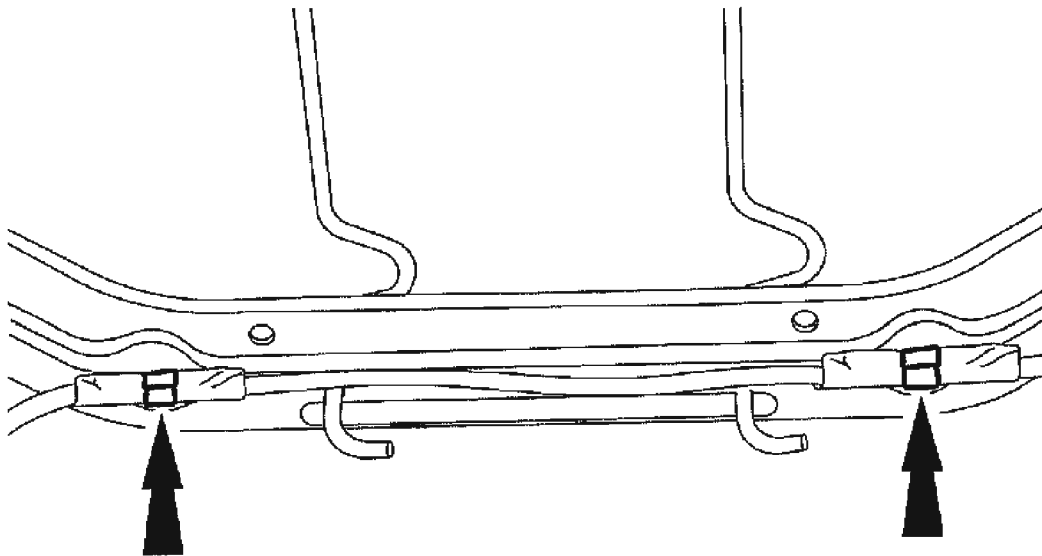
14. Feed the side air bag module deployment chute, J-clips, and hook and loop retainer out through the side air bag module seat back foam opening.





**Fig. 299: Identifying Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

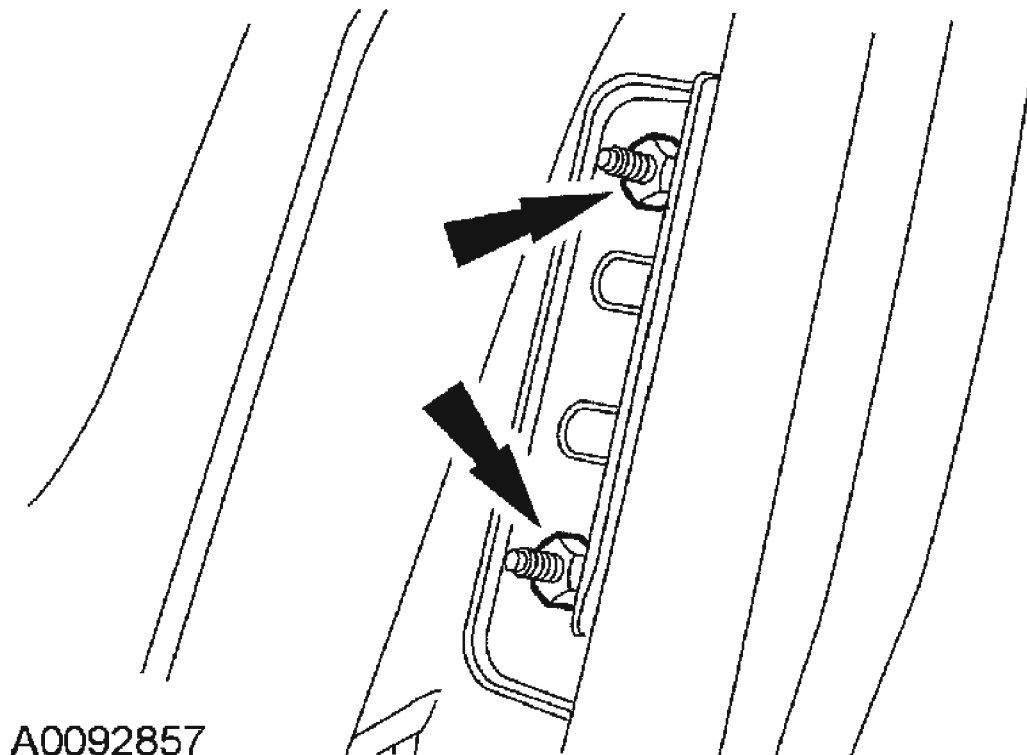
15. Continue to roll seat trim cover up to access the side air bag module.
16. Detach the 2 side air bag module wiring harness retainers from the seat backrest frame.



A0092856

**Fig. 300: Detaching 2 Side Air Bag Module Wiring Harness Retainers From Seat Backrest Frame**  
Courtesy of FORD MOTOR CO.

17. Remove the 2 side air bag module nuts and remove the side air bag module.



**Fig. 301: Removing Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

**Installation**

**WARNING:** Inspect the mounting surfaces of the side air bag module and the seat back frame mounting bracket for any foreign objects before installing the side air bag module. If any foreign objects are found, remove them. Failure to do so may result in personal injury, in the event of an air bag deployment.

**WARNING:** Inspect the seat side air bag deployment chute and the seat side air bag cavity in the seat back pad for any foreign objects. If any foreign objects are found remove them. Failure to do so may result in personal injury in the event of an air bag deployment.

**WARNING:** Before installing the side air bag module, check it for damage and foreign objects. If the air bag module is

**damaged, replace it. If any foreign objects are found, remove them. Failure to do so may result in personal injury, in the event of an air bag deployment.**

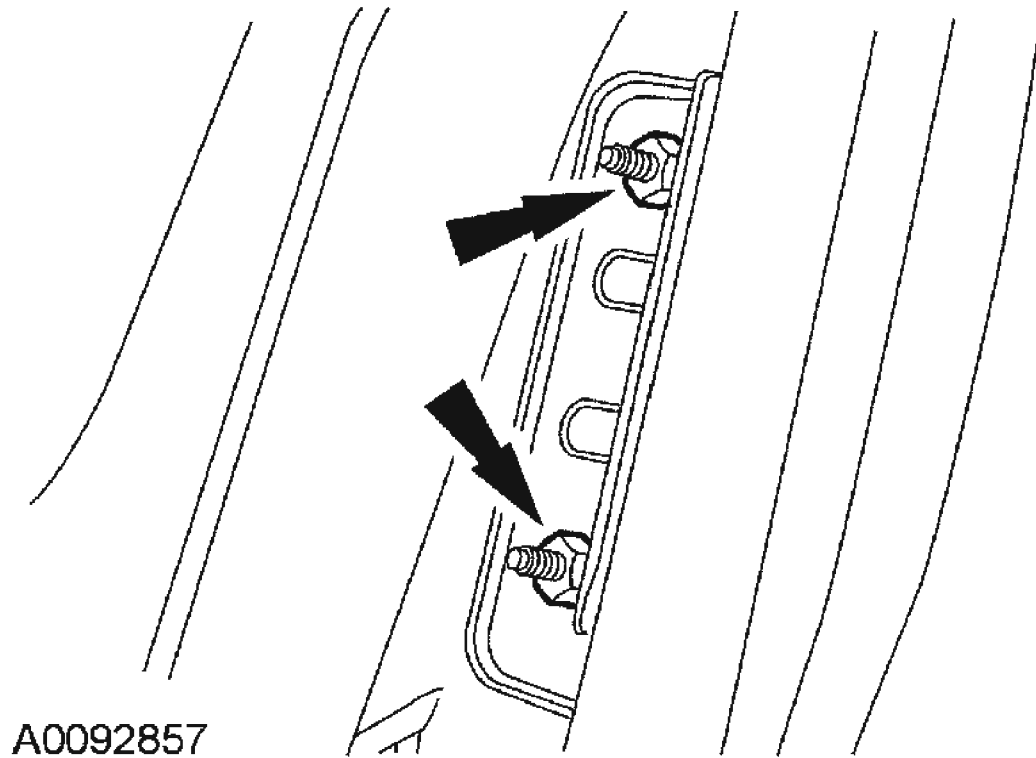
**WARNING:** If the air bag deployment chute is not properly positioned, the side air bag may not deploy properly.

**WARNING:** If the air bag cover has separated or the air bag material has been exposed, install a new side air bag module. Do not attempt to repair the air bag module. Failure to do so may result in personal injury in the event of an air bag deployment.

**CAUTION:** Make sure the side air bag module wiring harness is not pinched between the side air bag module and the mounting bracket.

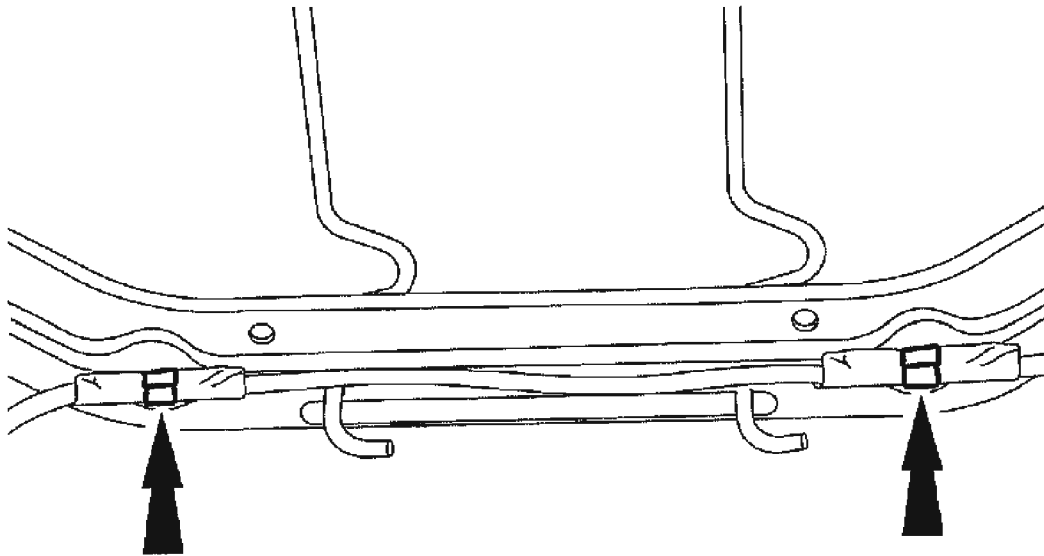
#### **All seats**

1. Install the side air bag module and nuts onto the seat backrest frame mounting bracket.
  - To install, tighten to 5 Nm (44 lb-in).



**Fig. 302: Installing Side Air Bag Module And Nuts Onto Seat Backrest Frame Mounting Bracket**  
Courtesy of FORD MOTOR CO.

2. Attach the 2 side air bag module wiring harness retainers to the seat backrest frame.



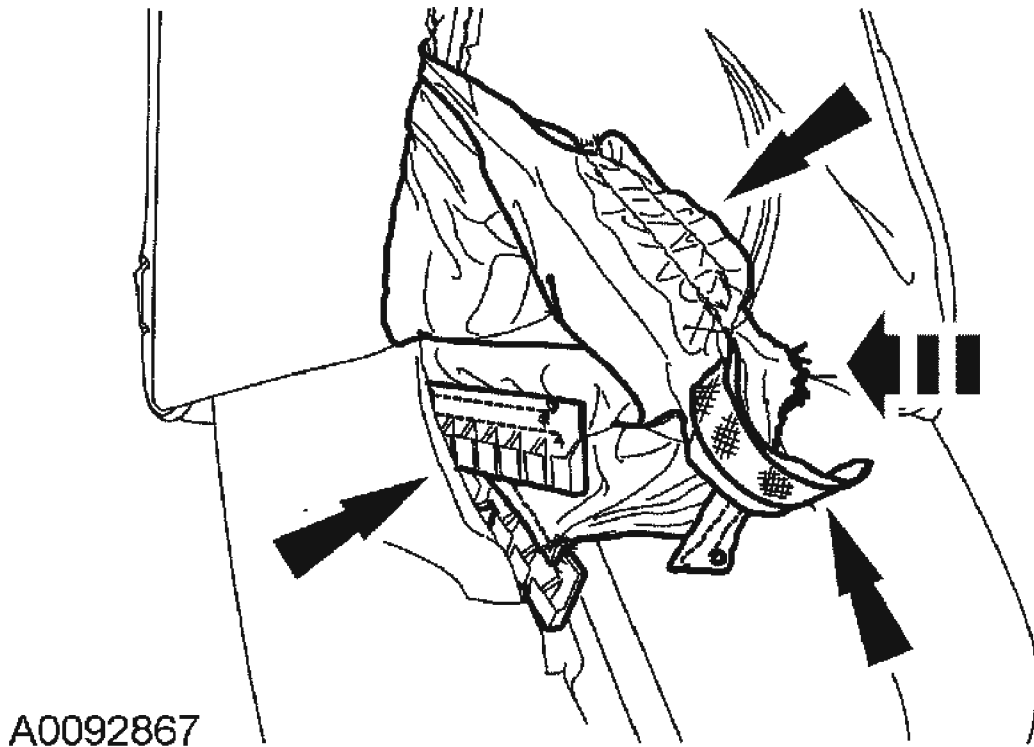
A0092856

**Fig. 303: Attaching 2 Side Air Bag Module Wiring Harness Retainers To Seat Backrest Frame**

**Courtesy of FORD MOTOR CO.**

3. Roll down the seat trim cover to the side air bag module.

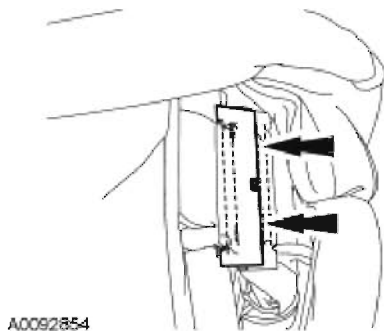
**WARNING:** Check the side air bag deployment chute for damage. The deployment chute must not be repaired. If there is any damage to the deployment chute, the seat back trim cover and deployment chute must be installed new as a unit.



**Fig. 304: Feeding Side Air Bag Module Deployment Chute, J-Clips, And Hook**  
Courtesy of FORD MOTOR CO.

4. Feed the side air bag module deployment chute, J-clips, and hook and loop retainer back through the side air bag module seat back foam opening.

**WARNING:** If the air bag deployment chute is not properly positioned, the side air bag may not deploy properly.

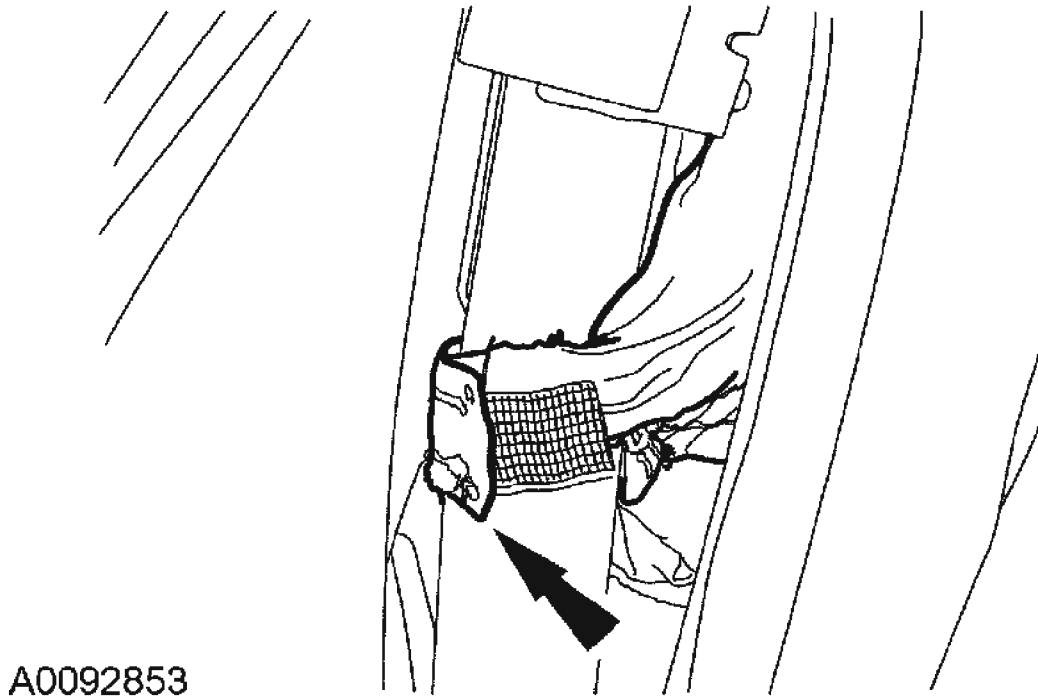


**Fig. 305: Identifying Side Air Bag Module Backrest Trim Cover**  
Courtesy of FORD MOTOR CO.

5. Install the side air bag module deployment chute and J-clips around the side air bag

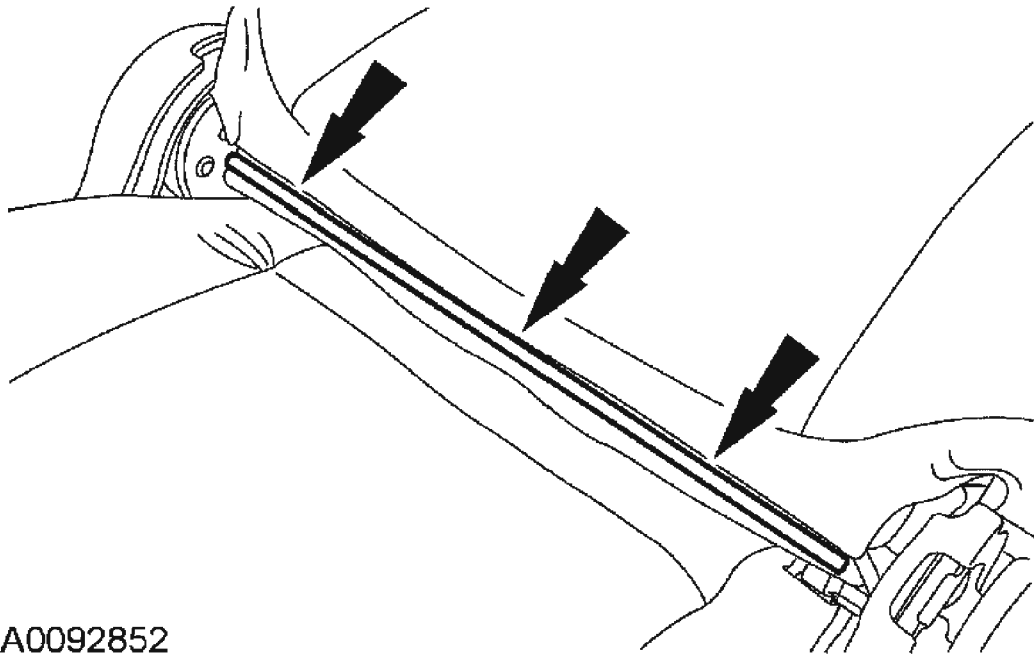
module and seat backrest frame.

6. Install the hook and loop fastener around the seat backrest frame.



**Fig. 306: Installing Hook And Loop Fastener Around Seat Backrest Frame**  
**Courtesy of FORD MOTOR CO.**

7. Roll the seat trim cover down in position and attach the hook and loop strips.
8. Feed the seat back trim cover rear J-clip through seat between the seat backrest and seat cushion.
9. Fully recline the seat backrest.
10. Attach the seat back trim cover J-clips.



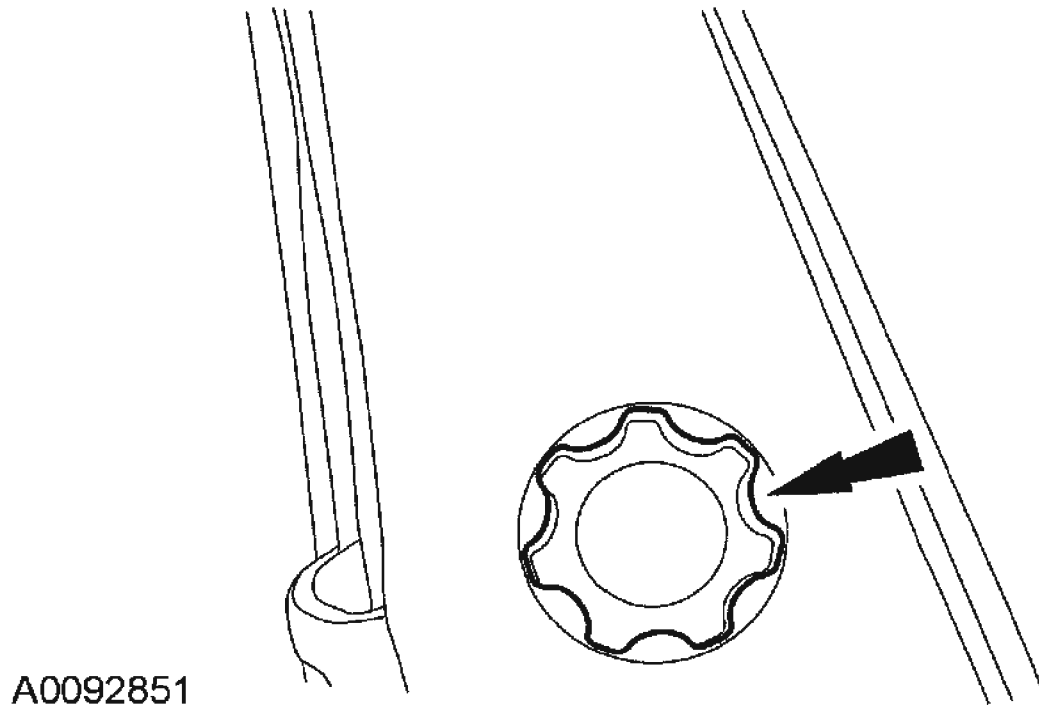
**Fig. 307: Attaching Seat Back Trim Cover J-Clips**  
**Courtesy of FORD MOTOR CO.**

11. Move seat backrest to the upright position.

**Seats with manual lumbar adjust**

12. Install the manual lumbar control knob.

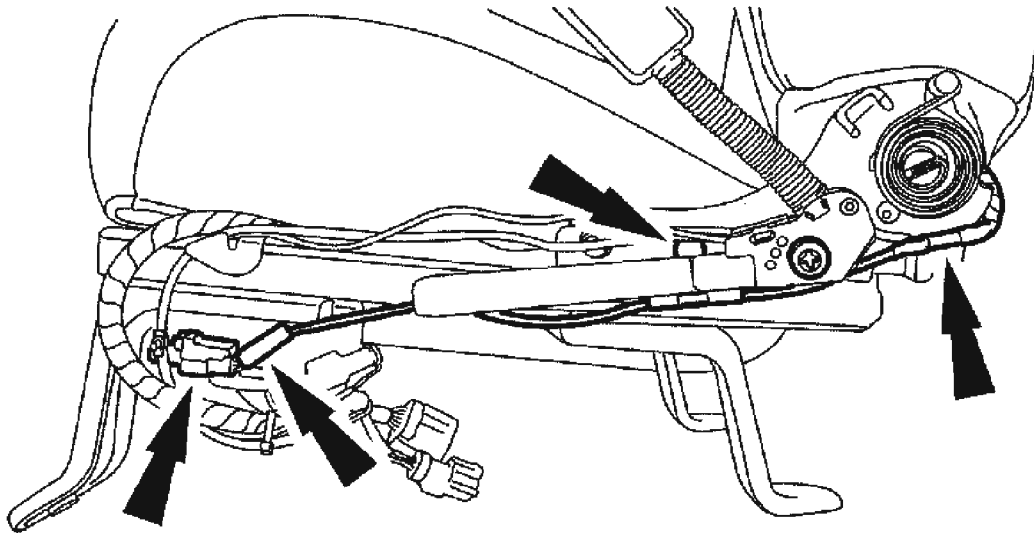




**Fig. 308: Installing Manual Lumbar Control Knob**  
Courtesy of FORD MOTOR CO.

**All seats**

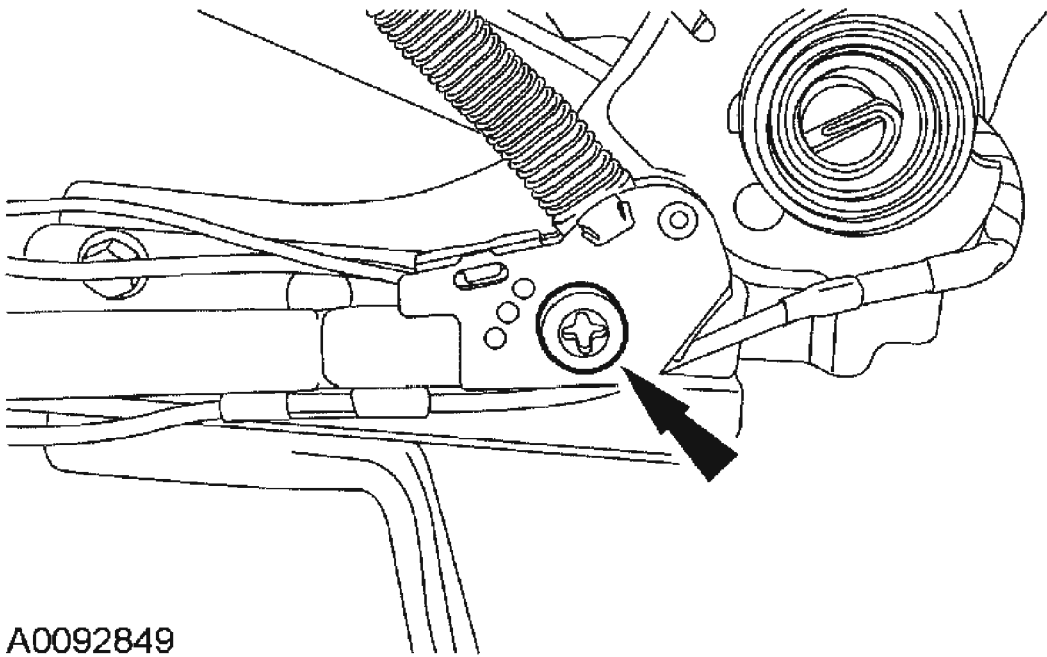
13. Connect the side air bag electrical connector and attach the wiring retainers.



A0092850

**Fig. 309: Attaching Wiring Retainers**  
Courtesy of FORD MOTOR CO.

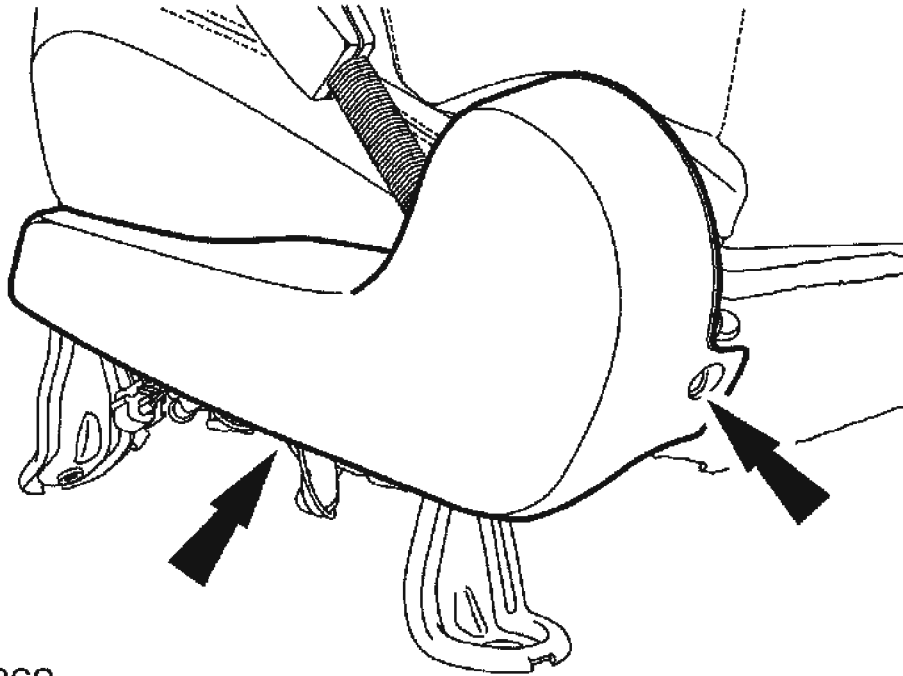
14. Tighten the safety belt buckle pretensioner bolt.
  - Tighten to 40 Nm (30 lb-ft).



A0092849

**Fig. 310: Tightening Safety Belt Buckle Pretensioner Bolt**  
Courtesy of FORD MOTOR CO.

15. Install the inboard seat cushion side shield and screw.



A0092868

**Fig. 311: Installing Inboard Seat Cushion Side Shield And Screw**  
Courtesy of FORD MOTOR CO.

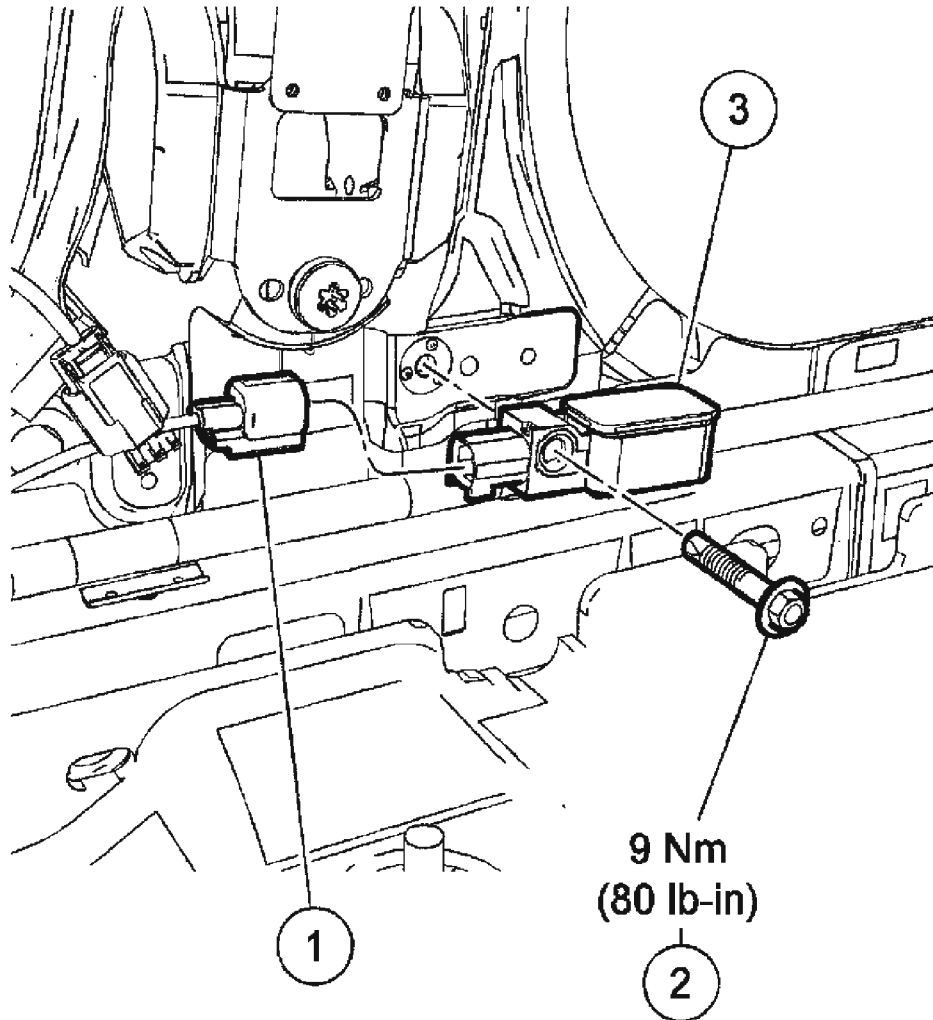
16. Install the front seat and repower the system. For additional information, refer to **SEATING** .

**SIDE IMPACT SENSOR - FIRST ROW, B-PILLAR**

**NOTE:** Front safety belt retractor anchor bolt and belt are removed for clarity.

## 2005 Ford Escape

2005 RESTRAINTS Supplemental Restraint System - Escape & Mariner



A0001830

Item	Part Number	Description
1	—	Side impact sensor connector (part of 14405)
2	710361	Side impact sensor bolt
3	14B345	Side impact sensor

**Fig. 312: Identifying Side Impact Sensor Connector With Torque Specifications**  
Courtesy of FORD MOTOR CO.

**Removal**

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag SRS is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged SRS components whether or not the air bag is deployed.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** The air bag warning lamp illuminates when the restraints control module (RCM) fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a SRS fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

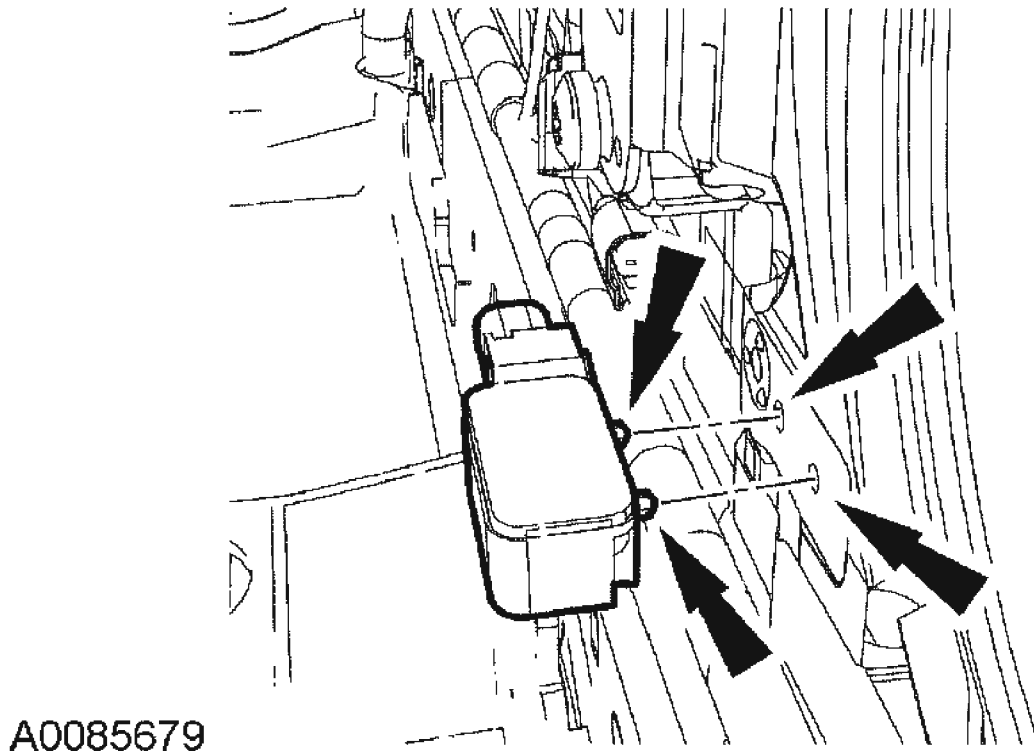
**NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

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

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the B-pillar trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
3. Disconnect the side impact sensor electrical connector.
4. Remove the bolt and the side impact sensor.

**Installation**

**NOTE:** Make sure the B-pillar and side impact severity sensor mating surfaces are clean and free of foreign material.



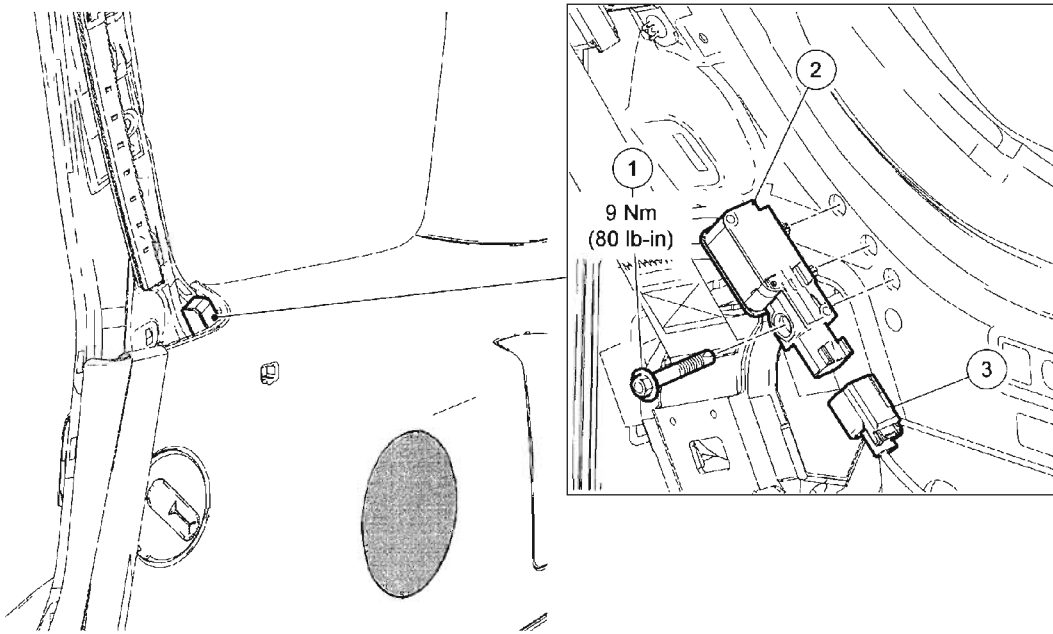
**Fig. 313: Aligning Side Impact Sensor Locator Tabs**  
Courtesy of FORD MOTOR CO.

1. Align the side impact sensor locator tabs to the openings in the B-pillar sheet metal.

**WARNING:** The tightening torque of the air bag side impact sensor retaining bolts is critical for correct system operation.

2. Install the side impact sensor bolt.
  - Tighten to 9 Nm (80 lb-in).
3. Connect the side impact sensor electrical connector.
4. Install the B-pillar trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
5. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

**SIDE IMPACT SENSOR - SECOND ROW, C-PILLAR**



N0031777

Item	Part Number	Description
1	710361	Side impact sensor bolt
2	14B345	Side impact sensor
3	—	Side impact sensor connector (part of 14405)

**Fig. 314: Identifying Side Impact Sensor Connector With Torque Specifications**  
 Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag SRS is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged SRS components whether or not the air bag is deployed.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.



- NOTE:** The air bag warning lamp illuminates when the restraints control module (RCM) fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a SRS fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** Repair is made by installing a new part only. If the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** RH side shown, LH side similar.

1. Depower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.
2. Remove the C-pillar trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
3. Remove the side impact sensor bolt.
4. Disconnect the electrical connector and remove the side impact sensor.

#### Installation

1. Connect the electrical connector to the side impact sensor.

**NOTE:** Make sure the C-pillar and side impact sensor mating surfaces are clean and free of foreign material.

2. Align the side impact sensor locator tabs to the openings in the C-pillar sheet metal.

**WARNING:** The tightening torque of the air bag side impact sensor retaining bolt is critical for correct system operation.

3. Install the side impact sensor bolt.
  - Tighten to 9 Nm (80 lb-in).
4. Install the C-pillar trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
5. Repower the system. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING AND REPOWERING**.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Instrument Panel and Console - Escape

## 2004 ACCESSORIES & EQUIPMENT

### Instrument Panel and Console - Escape

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Hood latch release handle bolts	6	-	53
Instrument panel cowl side bolts	9	-	80
Instrument panel cowl top bolt	6	-	53
Instrument panel nut	9	-	80
Floor console bolts	6	-	53
Floor console bracket bolts	6	-	53
Instrument cluster finish panel screws	3	-	27
Instrument panel center brace bolts	25	18	-
Steering column coupler nut	23	17	-

## DESCRIPTION AND OPERATION

### INSTRUMENT PANEL

The instrument panel consists of the following components:

- instrument panel center finish panel
- glove compartment
- instrument cluster
- instrument cluster finish panel
- instrument panel cowl top cover
- instrument panel finish end panels
- instrument panel steering column cover
- utility compartment
- passenger air bag module

### CONSOLE - OVERHEAD

The overhead console may consist of the following components:

- garage door opener compartment
- lamp switch

- roof opening panel control switch (with roof opening panel)
- sunglass compartment(s)
- center dome lamp/map lamps

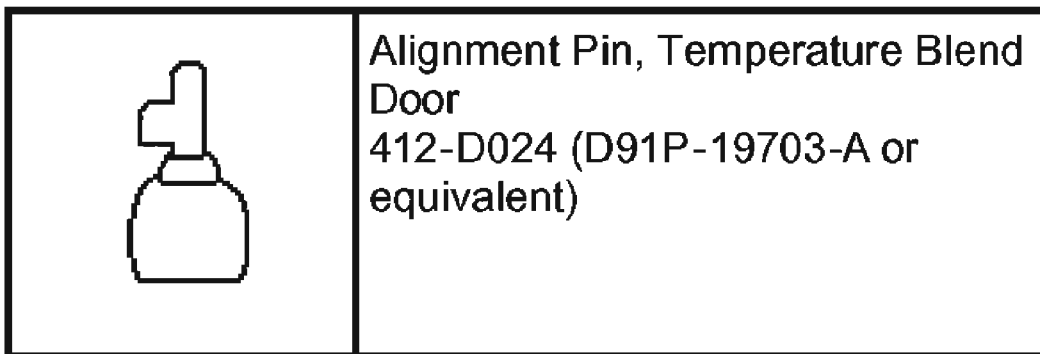
**CONSOLE - FLOOR**

The high series floor console consists of the following components:

- arm rest
- floor console finish panel
- rear cup holders
- storage compartment

The low series floor console consists of the following components:

- floor console front finish panel
- floor console rear finish panel

**REMOVAL AND INSTALLATION****INSTRUMENT PANEL**

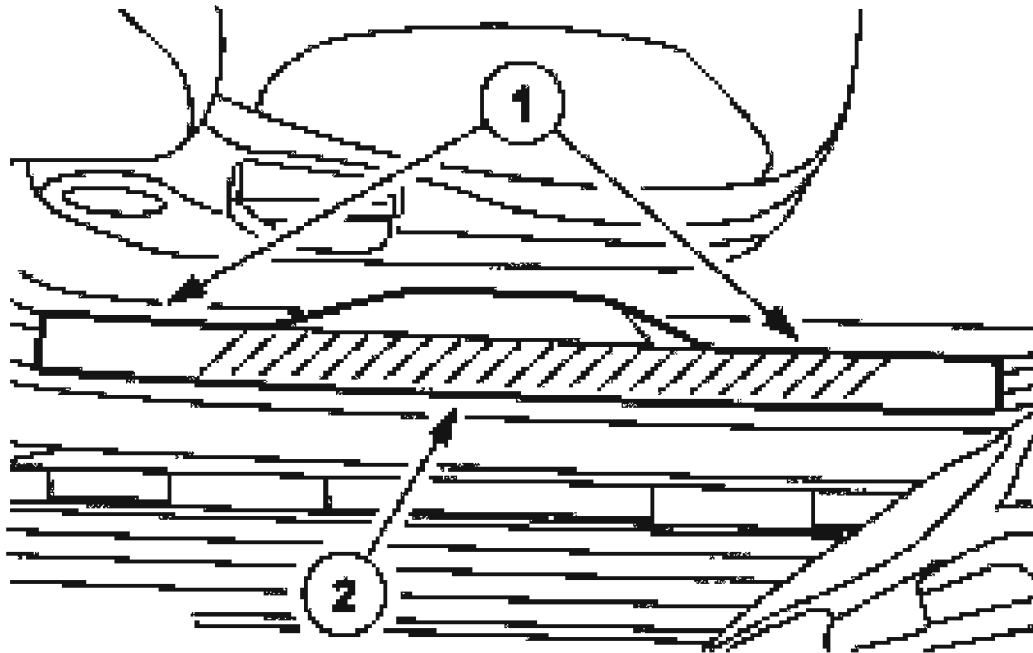
G02743264

**Fig. 1: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

**Removal and Installation**

**CAUTION:** Electronic modules are sensitive to static electrical charges. If exposed to these charges, damage may result.

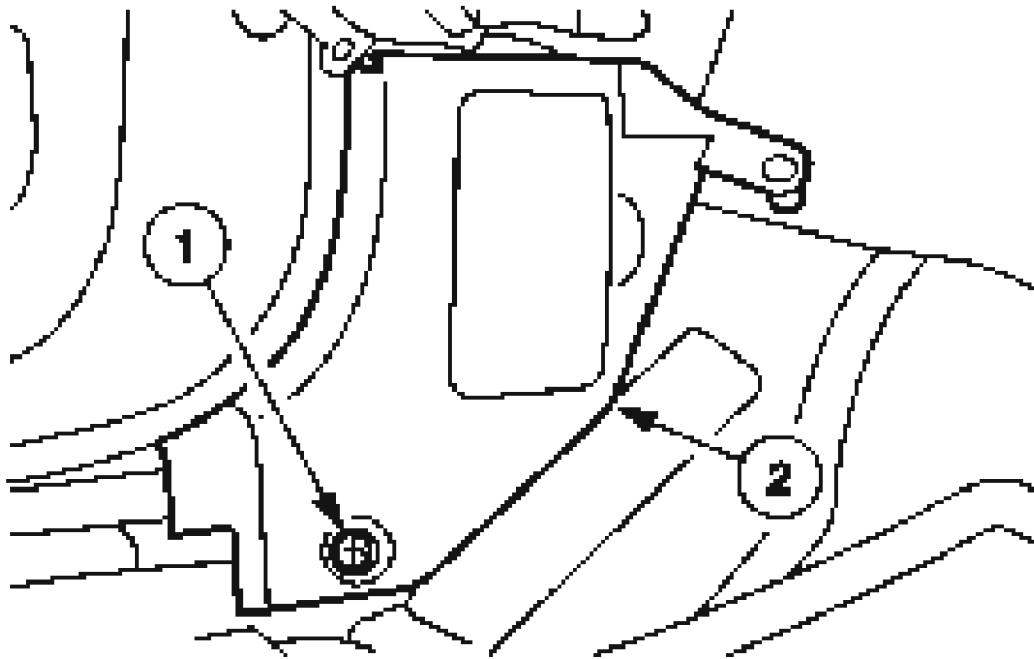
1. Depower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS** .
2. Remove the two front door scuff plates.
  1. Remove the four pin-type retainers.
  2. Remove the two front door scuff plates.



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**Fig. 2: Removing Front Door Scuff Plates**  
**Courtesy of FORD MOTOR CO.**

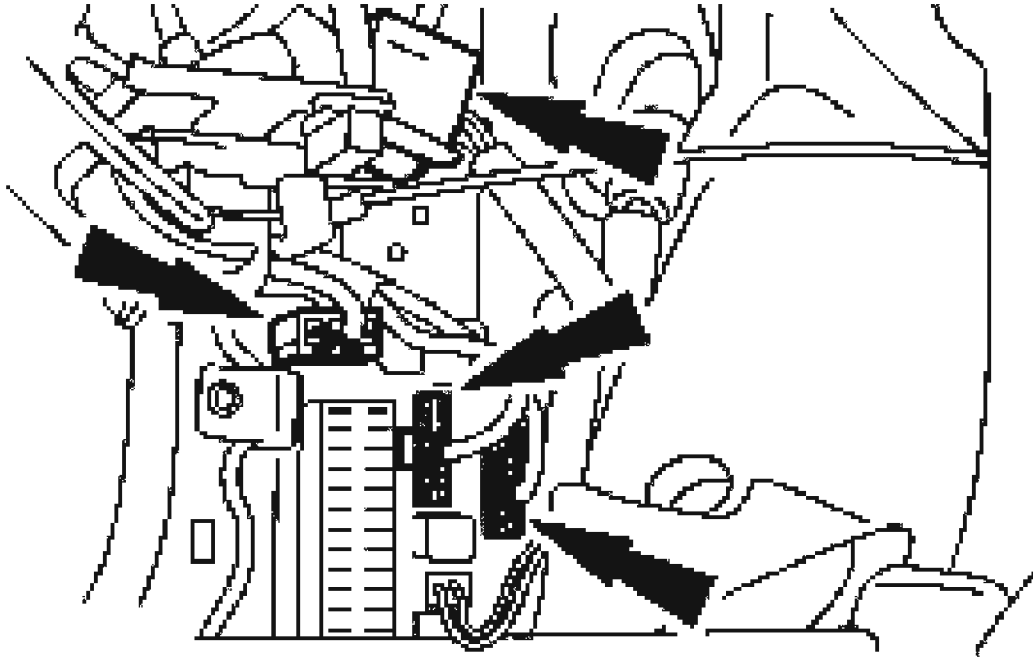
3. Remove the two A-pillar lower trim panels.
  1. Remove the two pin-type retainers.
  2. Remove the two A-pillar lower trim panels.



G02743266

**Fig. 3: Removing A-Pillar Lower Trim Panels**  
Courtesy of FORD MOTOR CO.

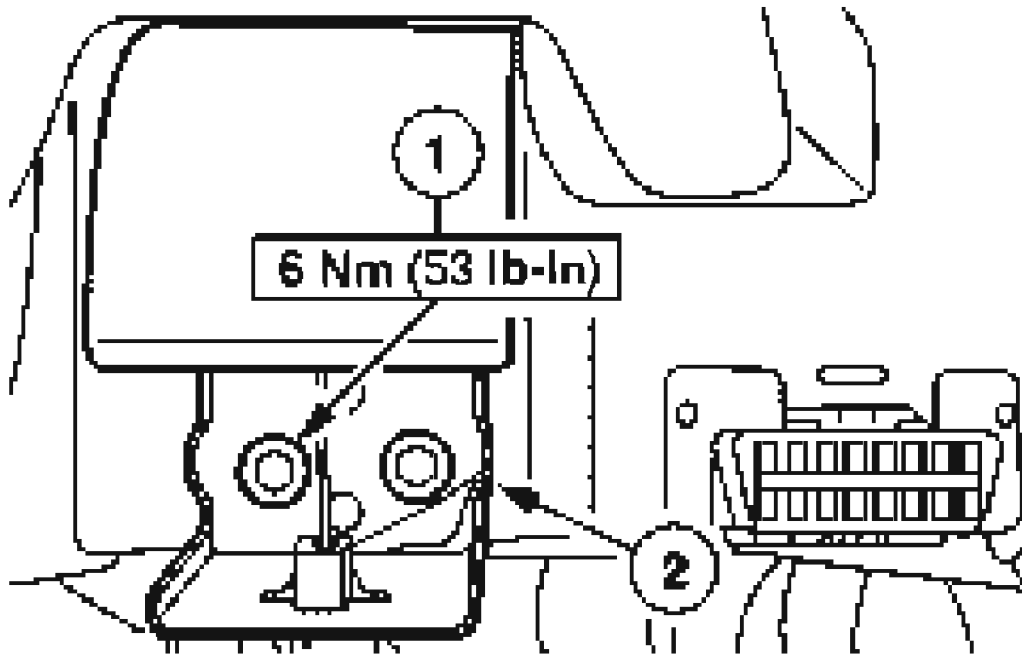
4. Disconnect the electrical connectors located by the LH cowl.



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**Fig. 4: Disconnecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

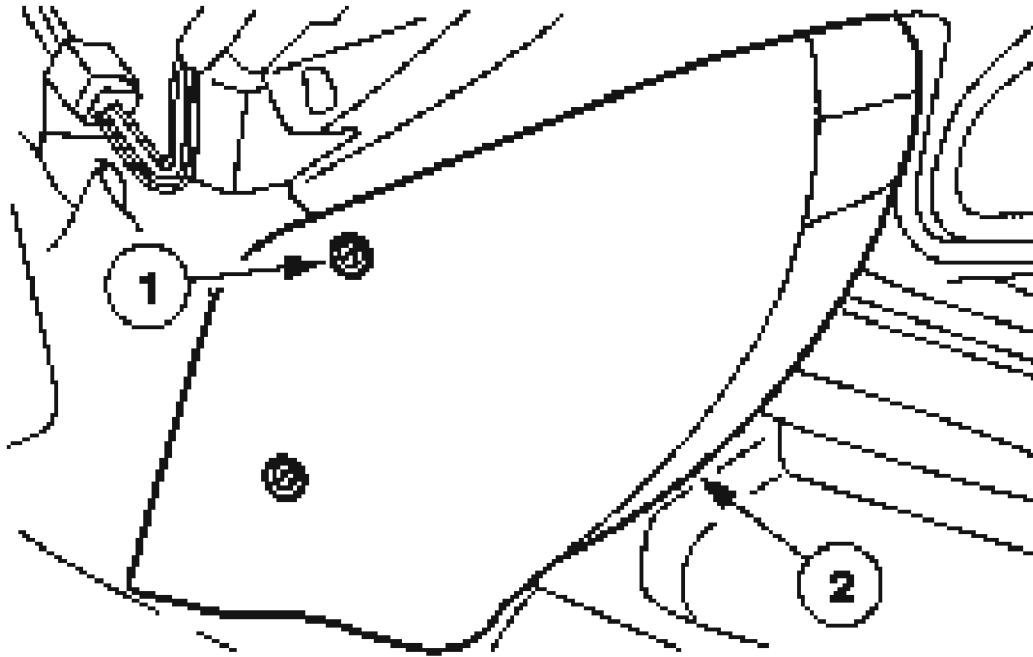
5. Position the hood latch release handle aside.
  1. Remove the bolts.
  2. Position the hood latch release handle aside.



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**Fig. 5: Positioning Hood Latch Release Handle Aside**  
Courtesy of FORD MOTOR CO.

6. Remove the utility compartment.
  1. Remove the four pin-type retainers.
  2. Remove the utility compartment.
    - Disconnect the electrical connector.

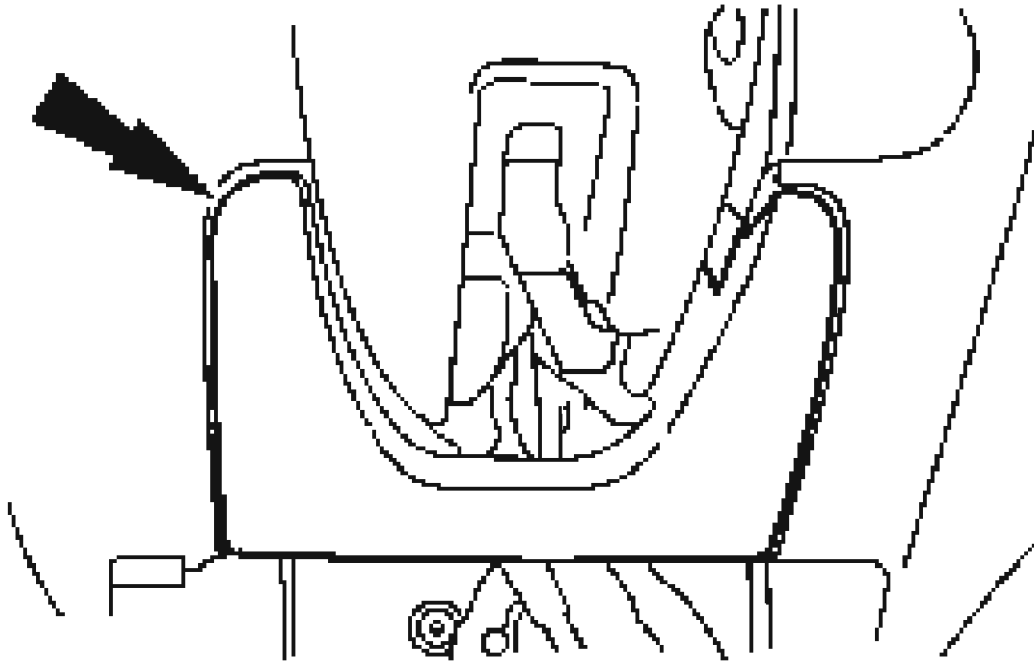


G02743269

**Fig. 6: Removing Utility Compartment**  
**Courtesy of FORD MOTOR CO.**

7. Remove the instrument panel steering column cover.
  - Release the upper clips and rotate the cover outward to release the lower pivot retainers.

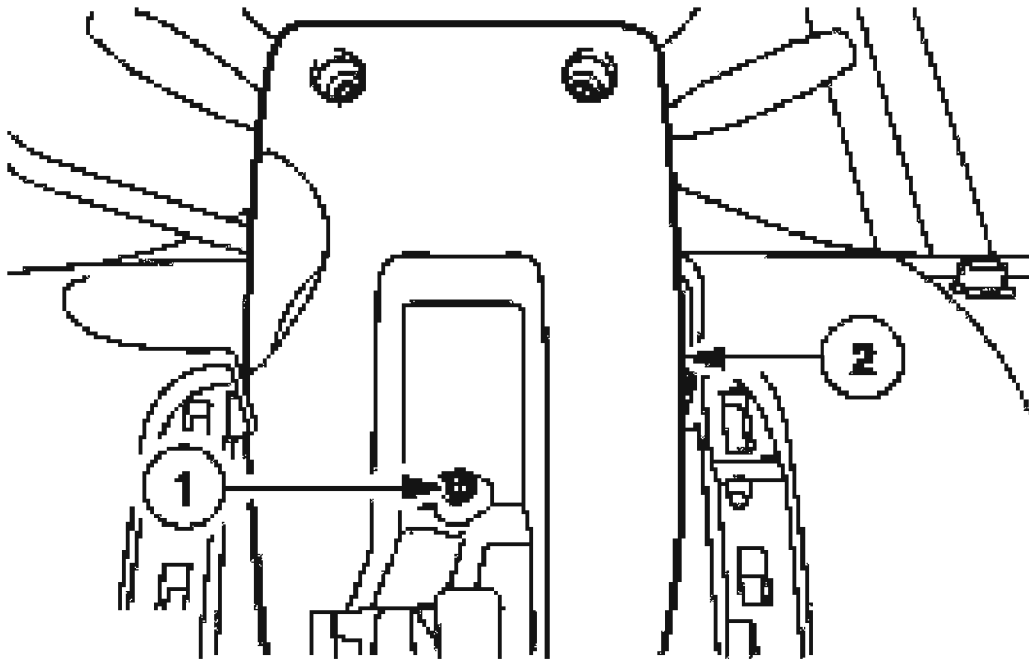




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**Fig. 7: Removing Instrument Panel Steering Column Cover**  
Courtesy of FORD MOTOR CO.

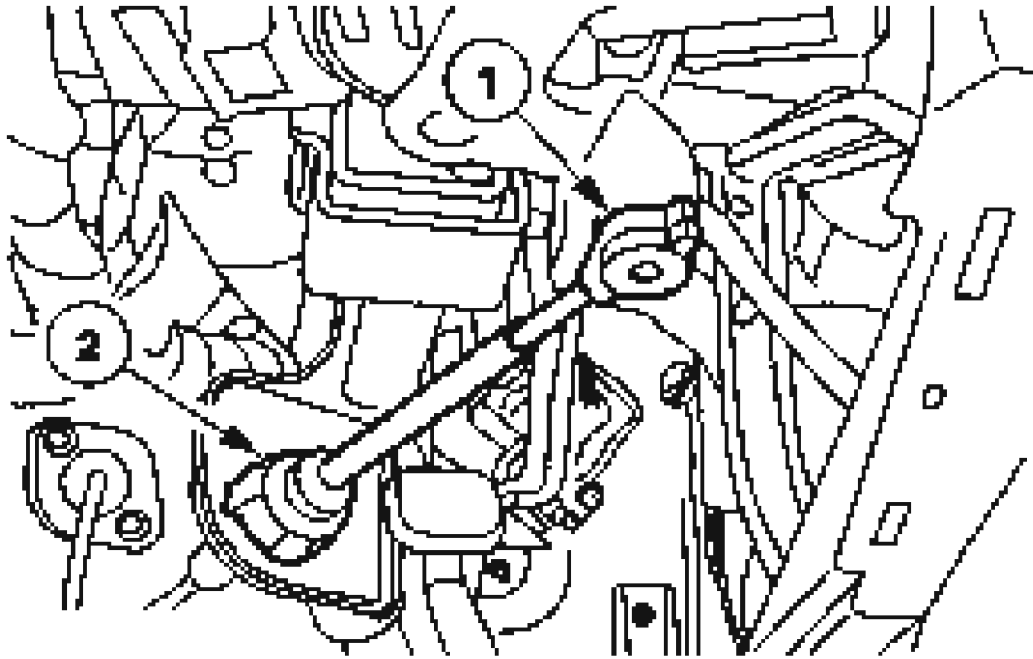
8. Remove the steering column lower cover.
  1. Remove the screws.
  2. Remove the steering column lower cover.



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**Fig. 8: Removing Steering Column Lower Cover**  
Courtesy of FORD MOTOR CO.

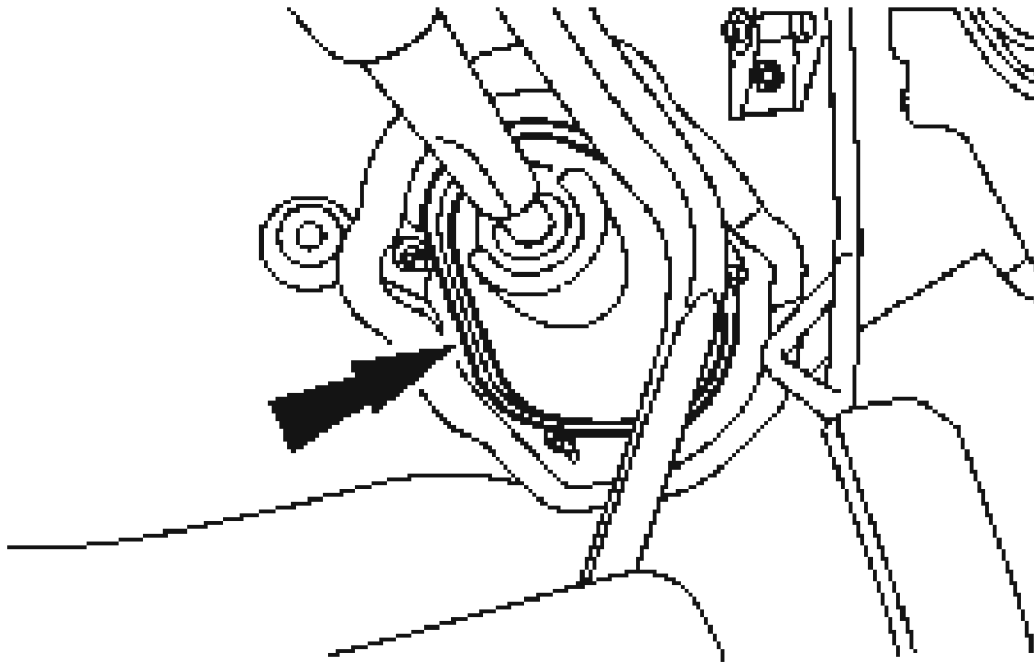
9. If equipped, disconnect the shift cable.
  1. Disconnect the shift cable.
  2. Disconnect the shift cable from the retaining bracket.



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**Fig. 9: Disconnecting Shift Cable**  
**Courtesy of FORD MOTOR CO.**

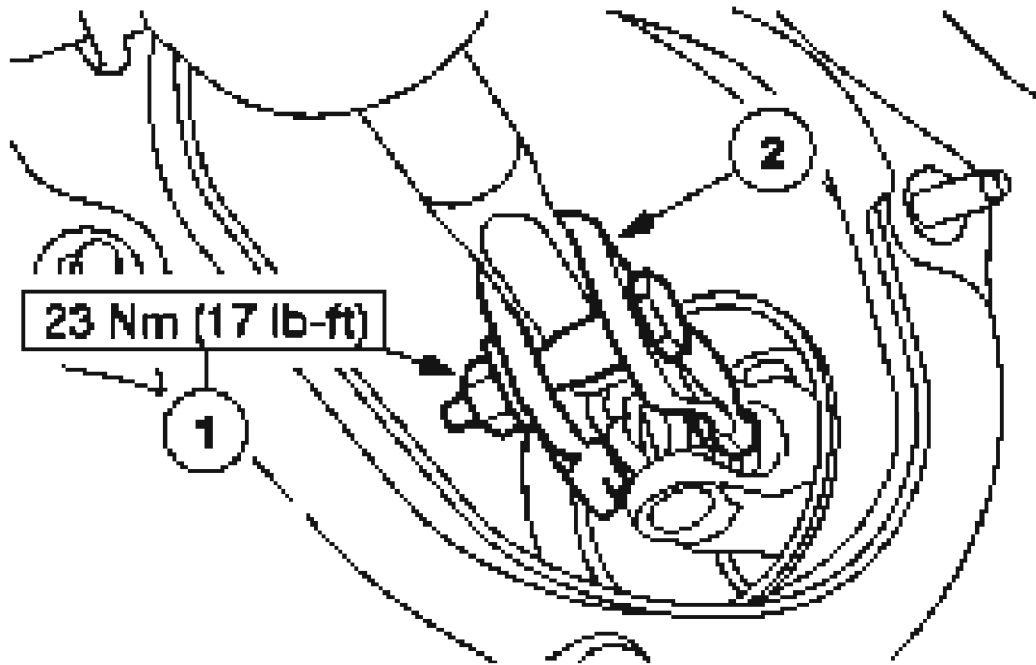
10. Remove the steering column coupler access cover.



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**Fig. 10: Removing Steering Column Coupler Access Cover**  
**Courtesy of FORD MOTOR CO.**

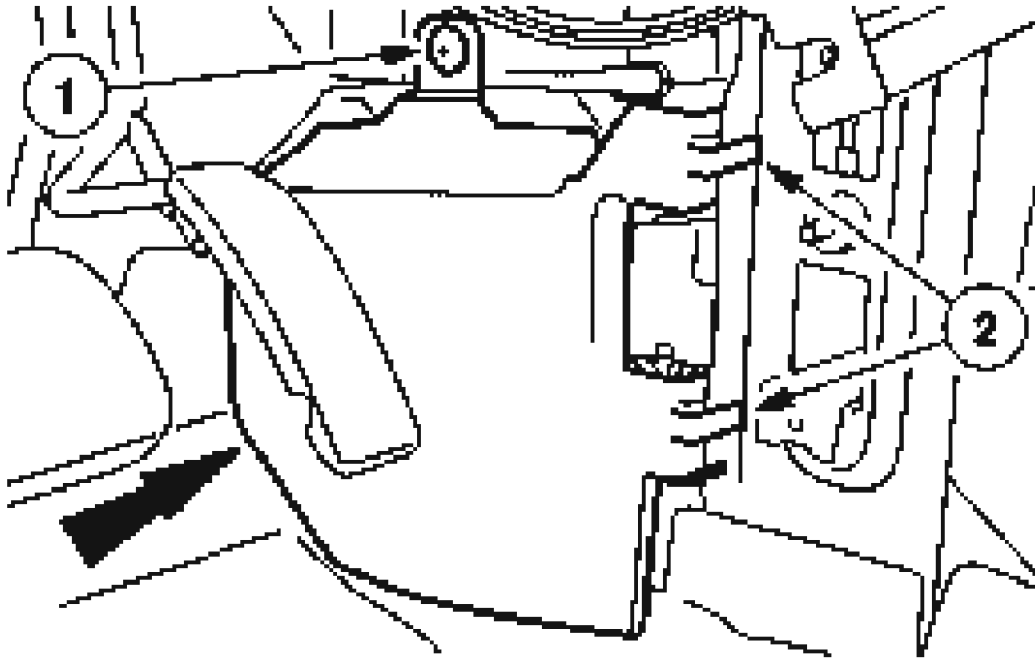
11. Disconnect the steering column coupler.
  1. Remove the steering column coupler bolt and nut.
  2. Disconnect the steering column coupler.



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**Fig. 11: Disconnecting Steering Column Coupler**  
**Courtesy of FORD MOTOR CO.**

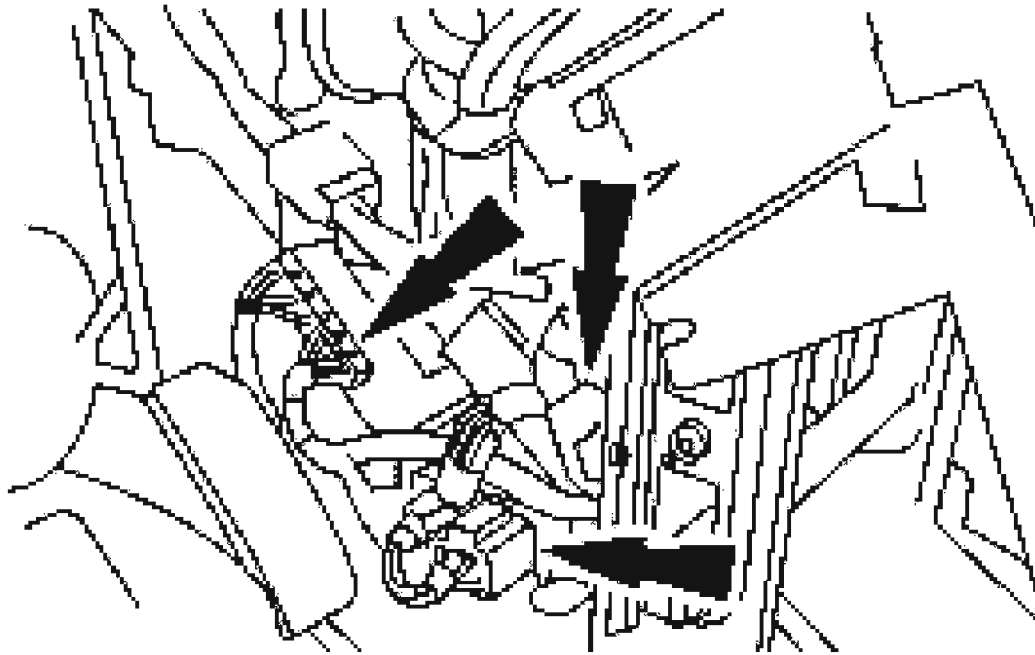
12. Remove the cover panel.
  1. Remove the pin-type retainer.
  2. Release the retaining clip.



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**Fig. 12: Removing Cover Panel**  
**Courtesy of FORD MOTOR CO.**

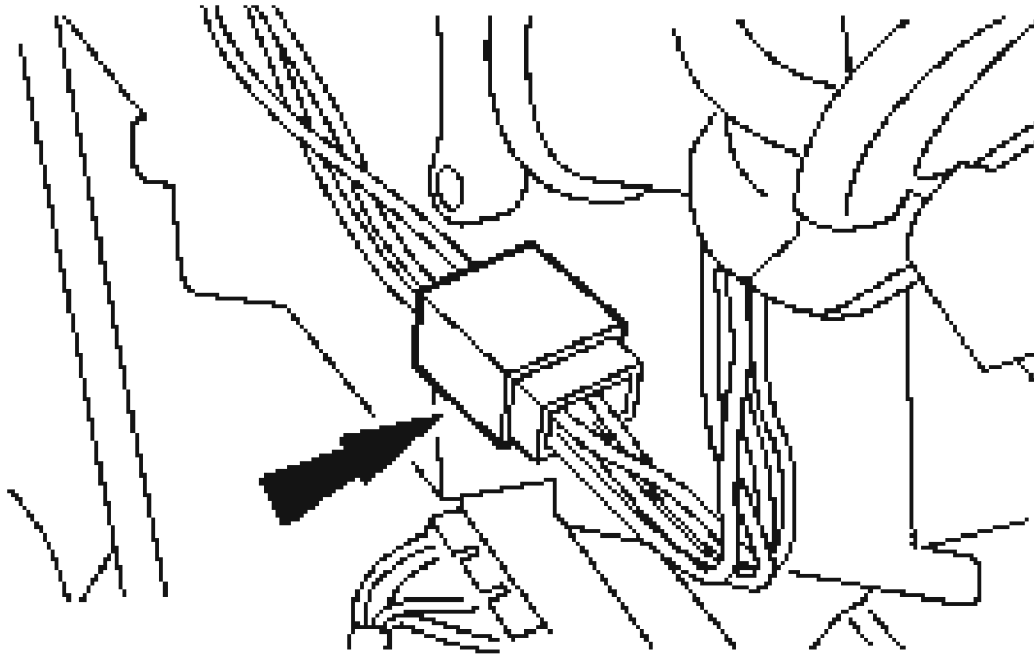
13. Disconnect the electrical connectors.



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**Fig. 13: Disconnecting Electrical Connectors**  
Courtesy of FORD MOTOR CO.

14. Disconnect the climate control vacuum harness connector.

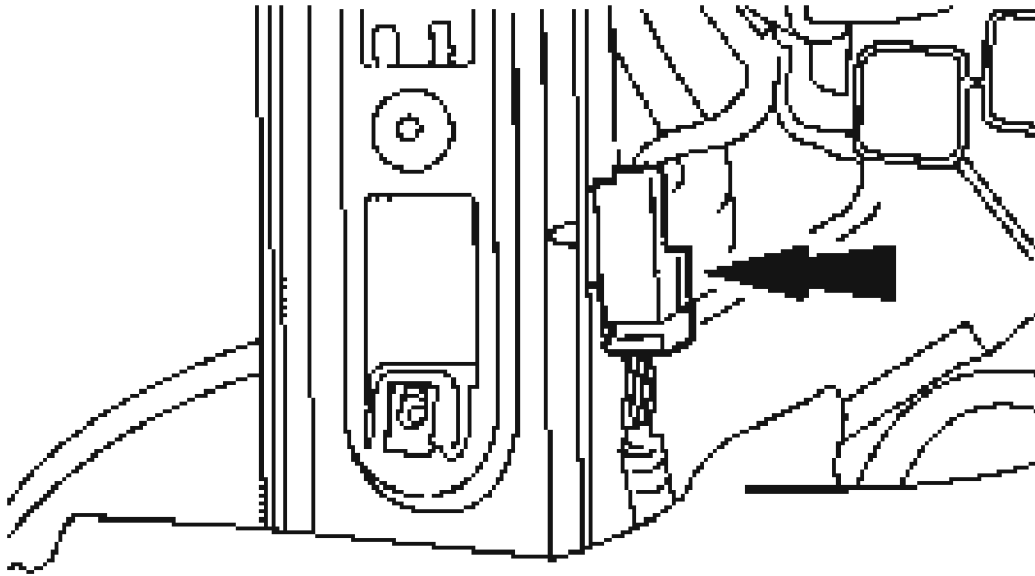


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**Fig. 14: Disconnecting Climate Control Vacuum Harness Connector**  
Courtesy of FORD MOTOR CO.

15. Disconnect the in-line electrical connector.

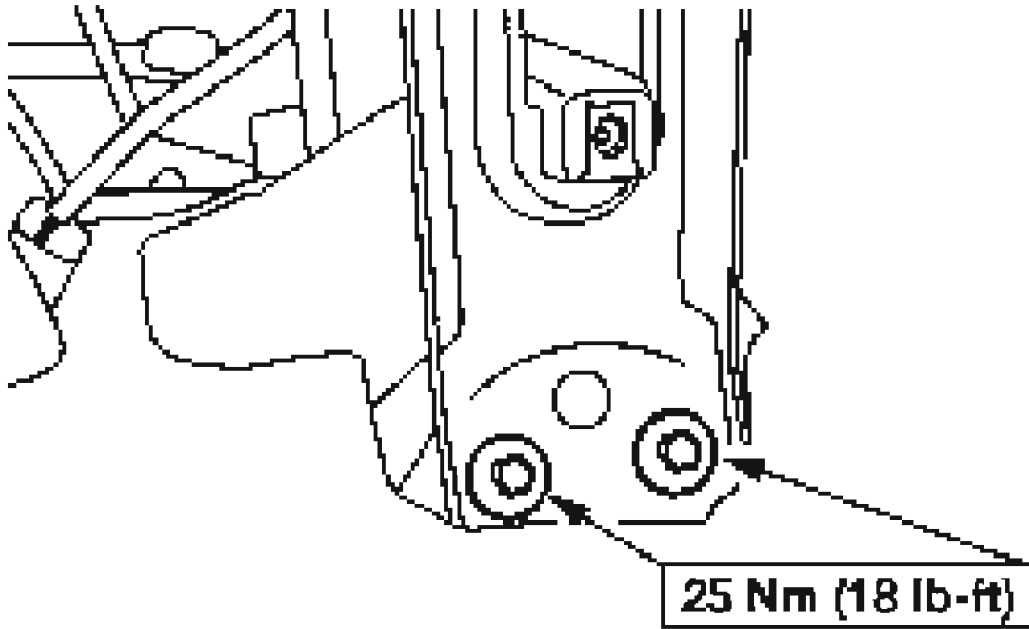




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**Fig. 15: Disconnecting In-Line Electrical Connector**  
Courtesy of FORD MOTOR CO.

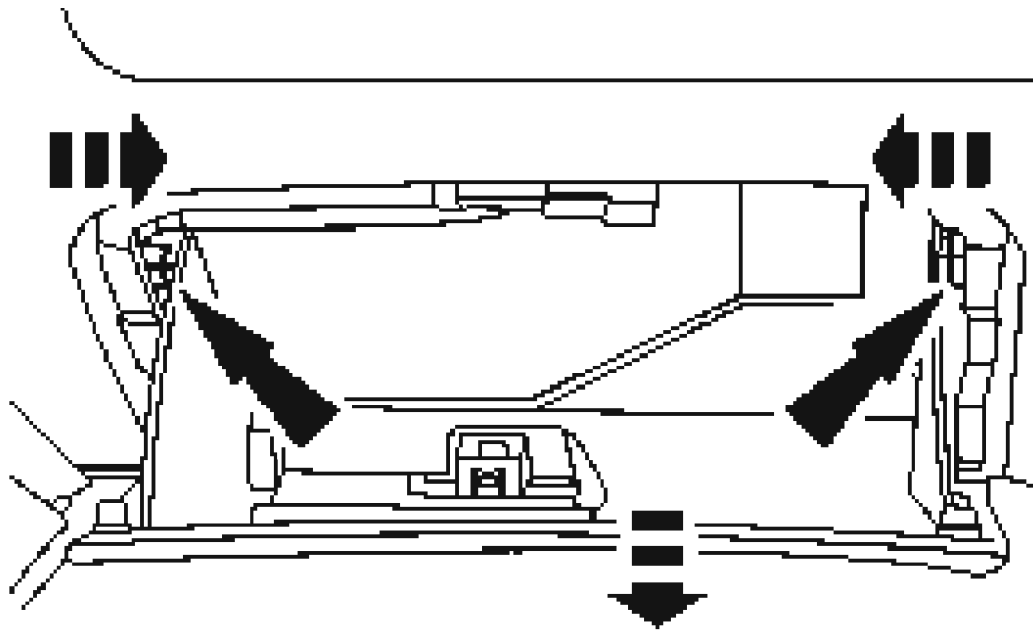
16. Remove the four instrument panel center brace bolts.



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**Fig. 16: Removing Instrument Panel Center Brace Bolts**  
Courtesy of FORD MOTOR CO.

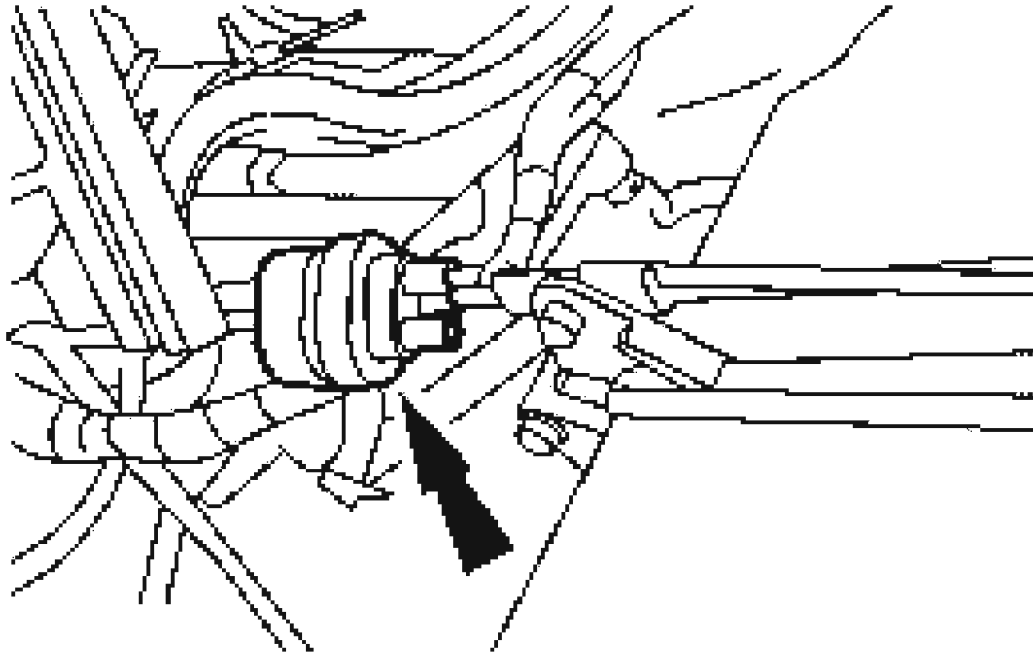
17. Open the glove compartment.
  - Press and release the tabs inward while lowering the glove compartment.



G02743280

**Fig. 17: Opening Glove Compartment**  
**Courtesy of FORD MOTOR CO.**

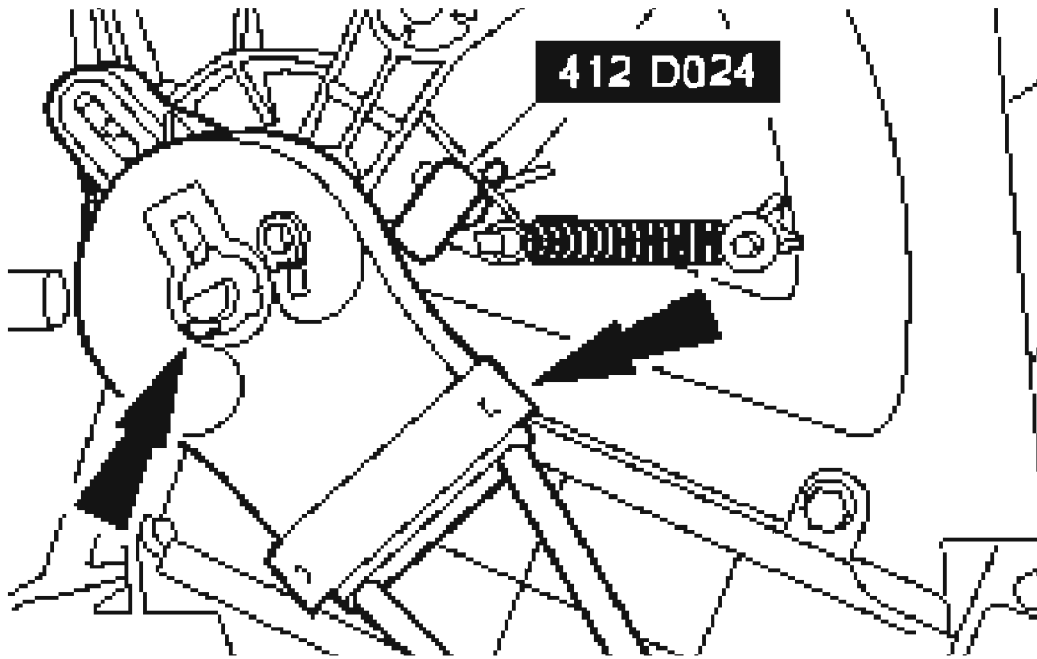
18. Disconnect the vacuum harness connector.



G02743281

**Fig. 18: Disconnecting Vacuum Harness Connector**  
Courtesy of FORD MOTOR CO.

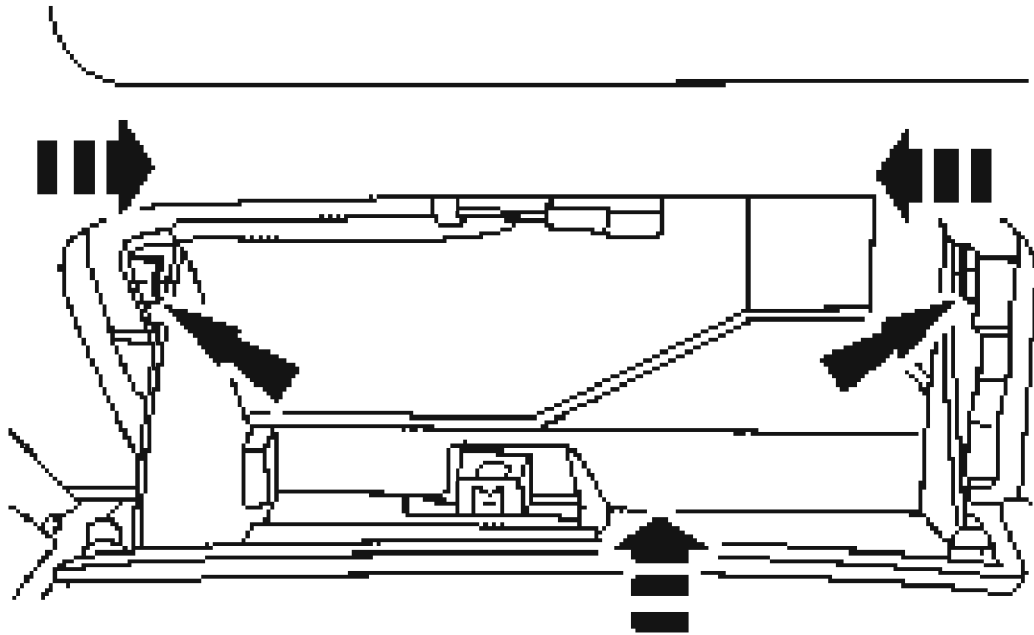
19. Disconnect the temperature control cable from the blend door shaft.
  - Using the special tool, align the locator holes.
  - Release the locking tab.
  - Disconnect the temperature control cable.



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**Fig. 19: Disconnecting Temperature Control Cable From Blend Door Shaft**  
Courtesy of FORD MOTOR CO.

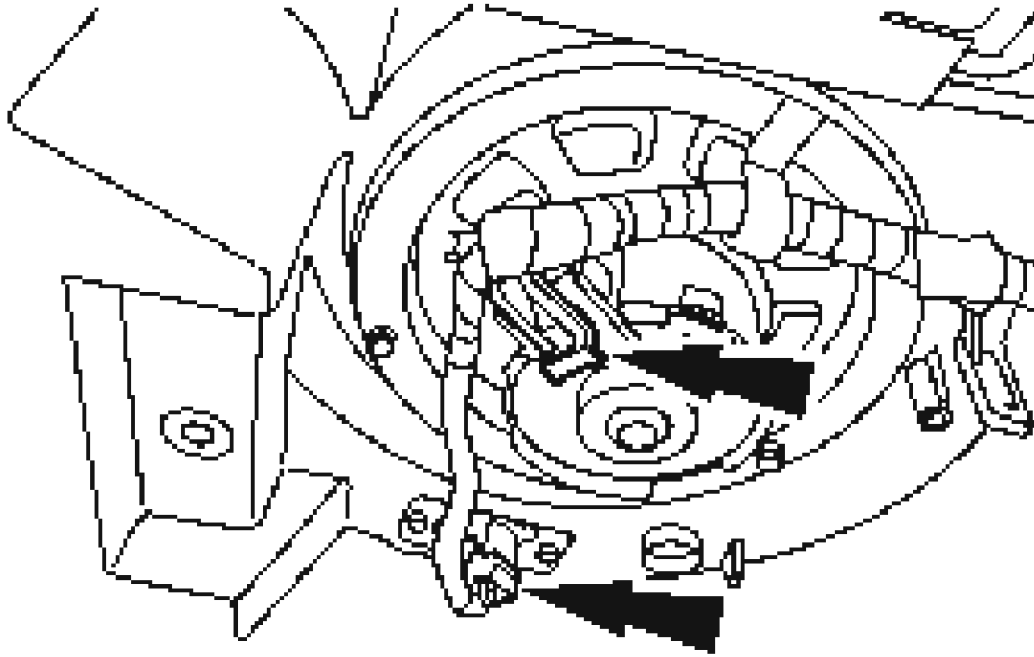
20. Close the glove compartment.
  - Press the release tabs inward while raising the glove compartment.



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**Fig. 20: Closing Glove Compartment**  
**Courtesy of FORD MOTOR CO.**

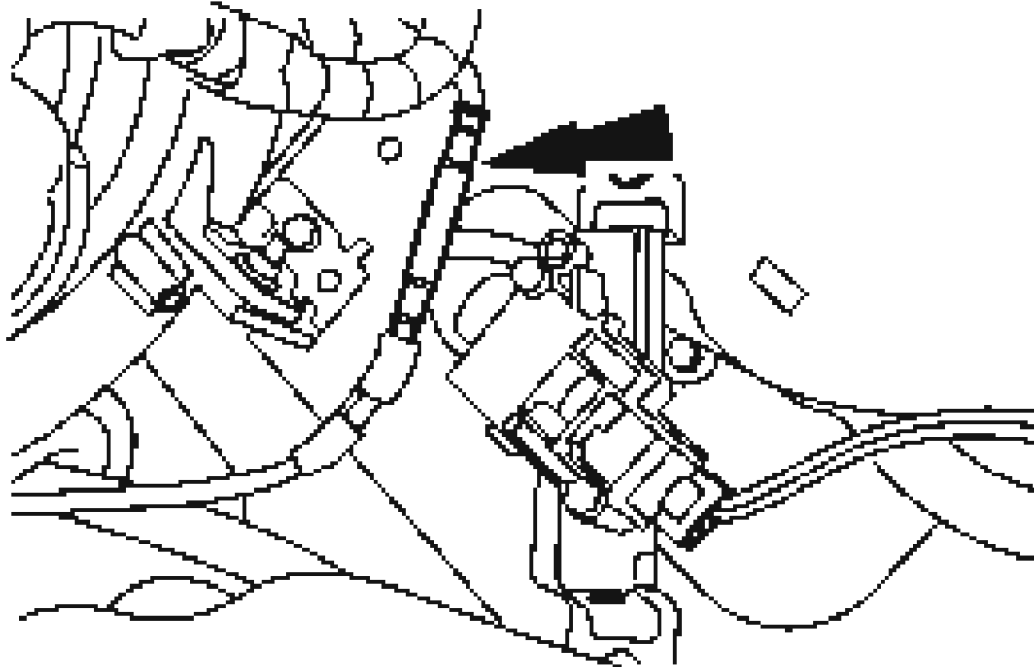
21. Disconnect the electrical connectors at the blower motor.



G02743284

**Fig. 21: Disconnecting Electrical Connectors At Blower Motor**  
**Courtesy of FORD MOTOR CO.**

22. Disconnect the antenna cable in-line connector.

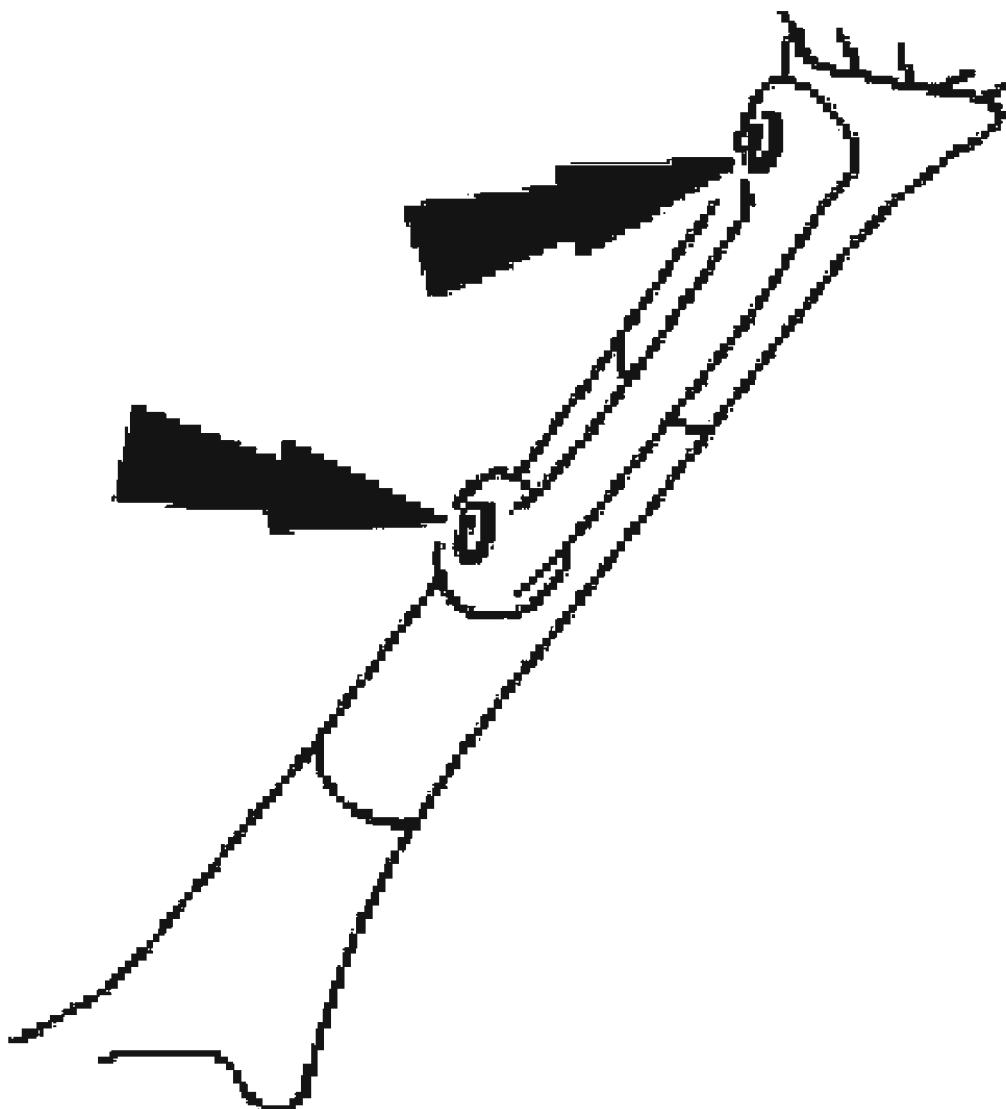


G02743285

**Fig. 22: Disconnecting Antenna Cable In-Line Connector**  
Courtesy of FORD MOTOR CO.

23. Open the four A-pillar passenger assist handle covers.

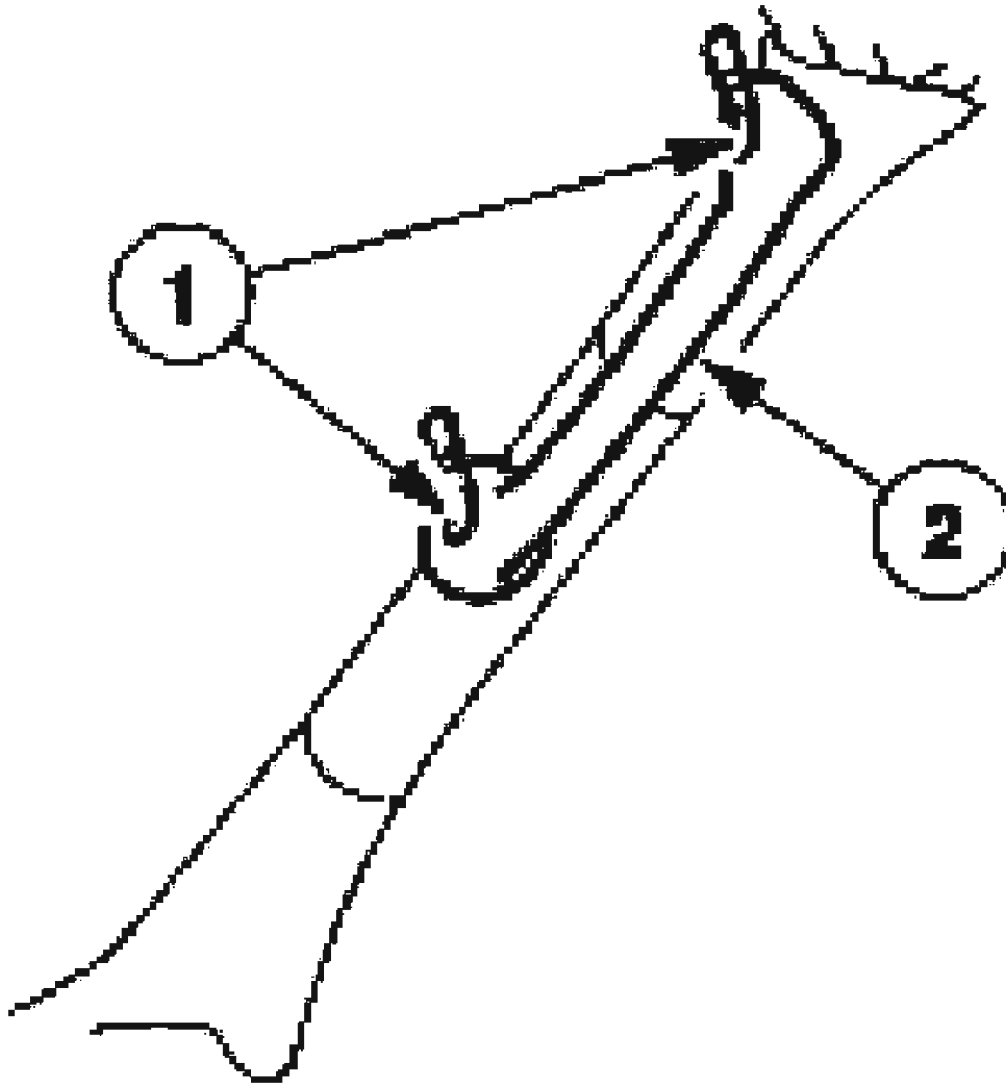




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**Fig. 23: Opening A-Pillar Passenger Assist Handle Covers**  
Courtesy of FORD MOTOR CO.

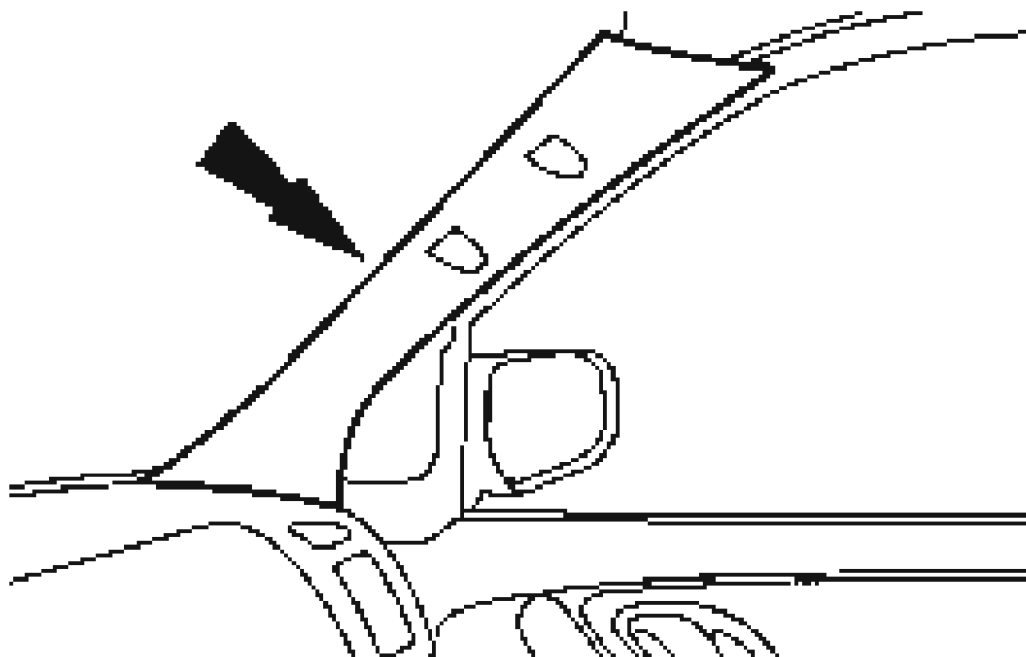
24. Remove the two A-pillar passenger assist handles.
  1. Remove the four bolts.
  2. Remove the two A-pillar passenger assist handles.



G02743287

**Fig. 24: Removing A-Pillar Passenger Assist Handles**  
Courtesy of FORD MOTOR CO.

25. Remove the two windshield side garnish mouldings.



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**Fig. 25: Removing Windshield Side Garnish Mouldings**  
Courtesy of FORD MOTOR CO.

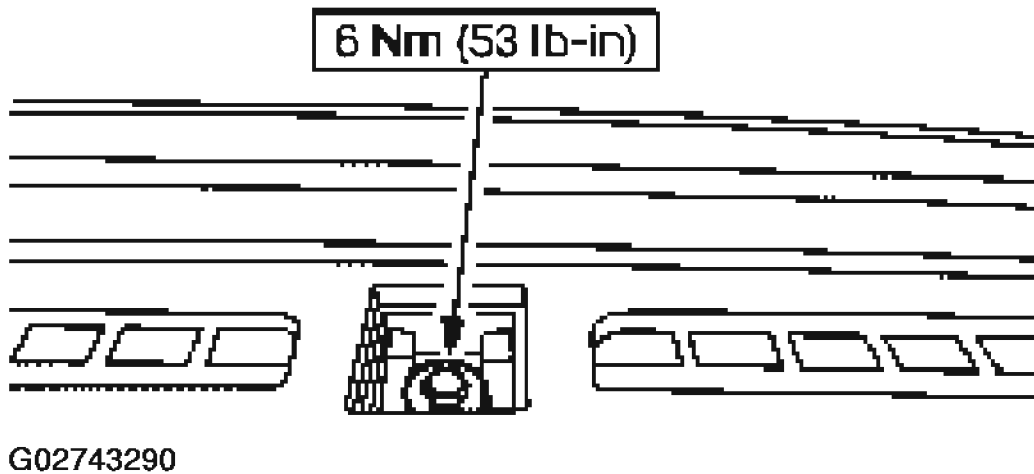
26. Remove the instrument panel cowl top cover.



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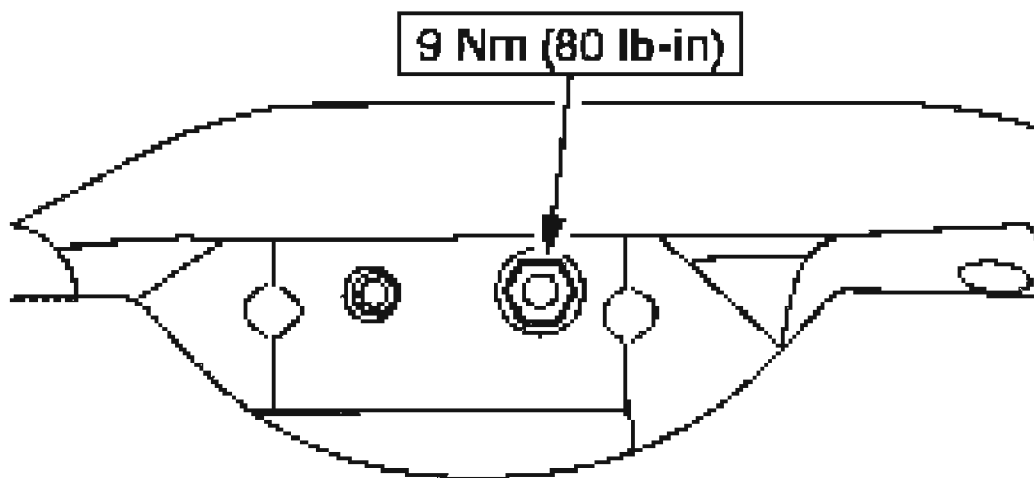
**Fig. 26: Removing Instrument Panel Cowl Top Cover**  
Courtesy of FORD MOTOR CO.

27. Remove the instrument panel cowl top bolt.



**Fig. 27: Removing Instrument Panel Cowl Top Bolt**  
Courtesy of FORD MOTOR CO.

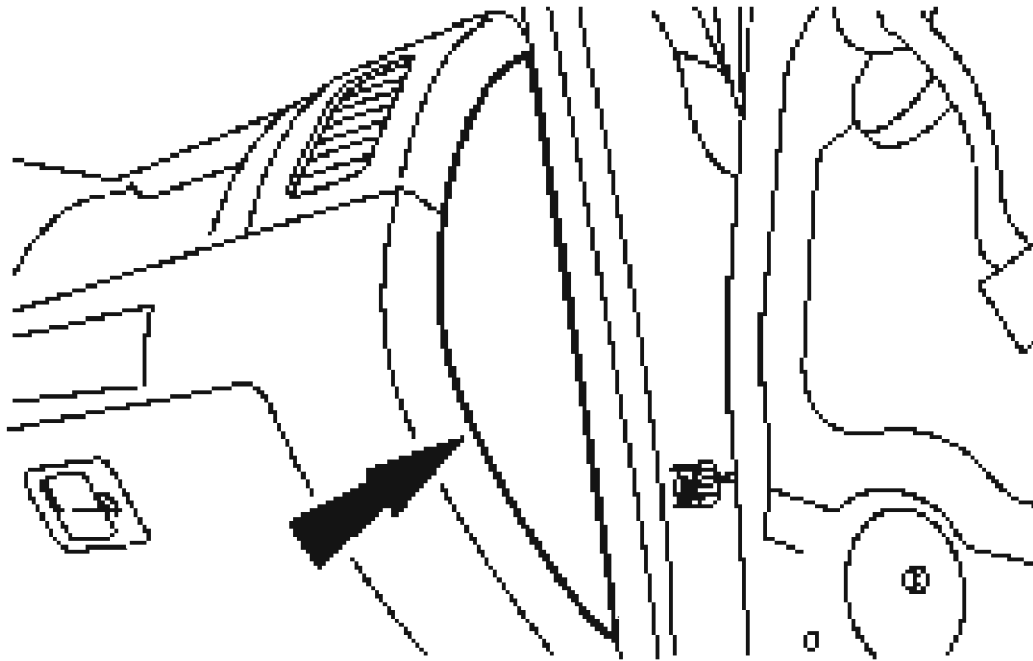
28. Remove the instrument cluster. For additional, information, refer to **INSTRUMENT CLUSTER** .
29. Through the instrument cluster opening, remove the instrument panel nut.



**Fig. 28: Removing Instrument Panel Nut**

Courtesy of FORD MOTOR CO.

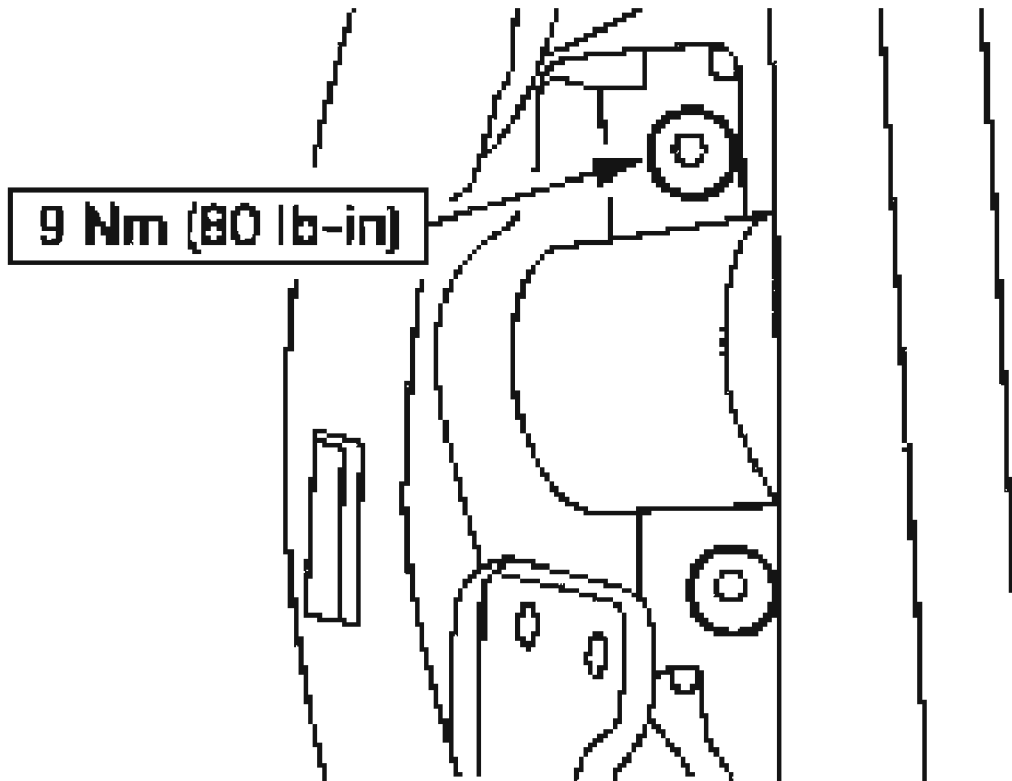
30. Remove the two instrument panel finish end panels.



G02743292

**Fig. 29: Removing Instrument Panel Finish End Panels**  
Courtesy of FORD MOTOR CO.

31. Remove the four instrument panel cowl side bolts.



G02743293

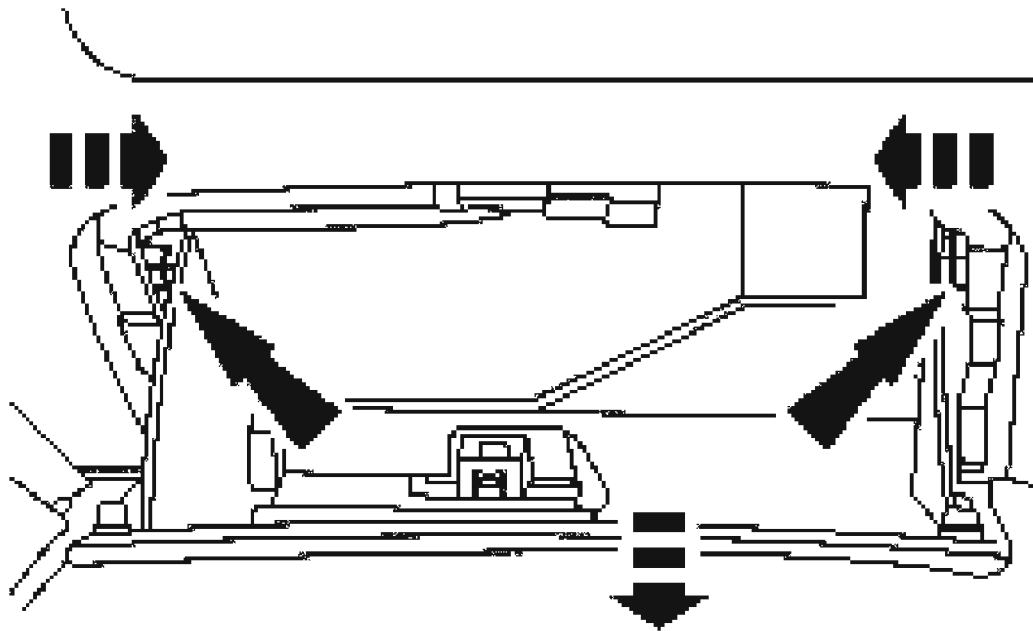
**Fig. 30: Removing Instrument Panel Cowl Side Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step requires an assistant.

32. Remove the instrument panel.
33. To install, reverse the removal procedure.
  - If necessary, transfer components.
  - If equipped with automatic transmission adjust linkage. For additional information, refer to **TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** .
  - Repower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS** .

**Removal and Installation**

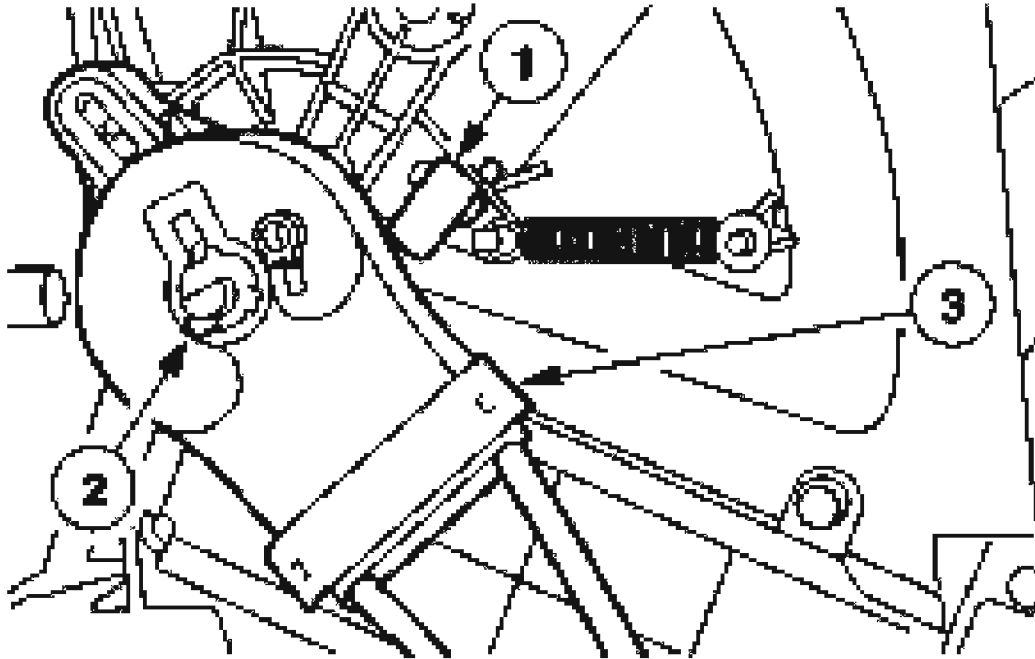
1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Lower the glove compartment.
  - Press the glove compartment release tabs inward while pulling downward on the glove compartment.



G02743294

**Fig. 31: Lowering Glove Compartment**  
Courtesy of FORD MOTOR CO.

3. Disconnect the temperature control cable.
  1. Position the locator pin.
  2. Release the locking tab.
  3. Remove the temperature control cable from the blend door shaft.

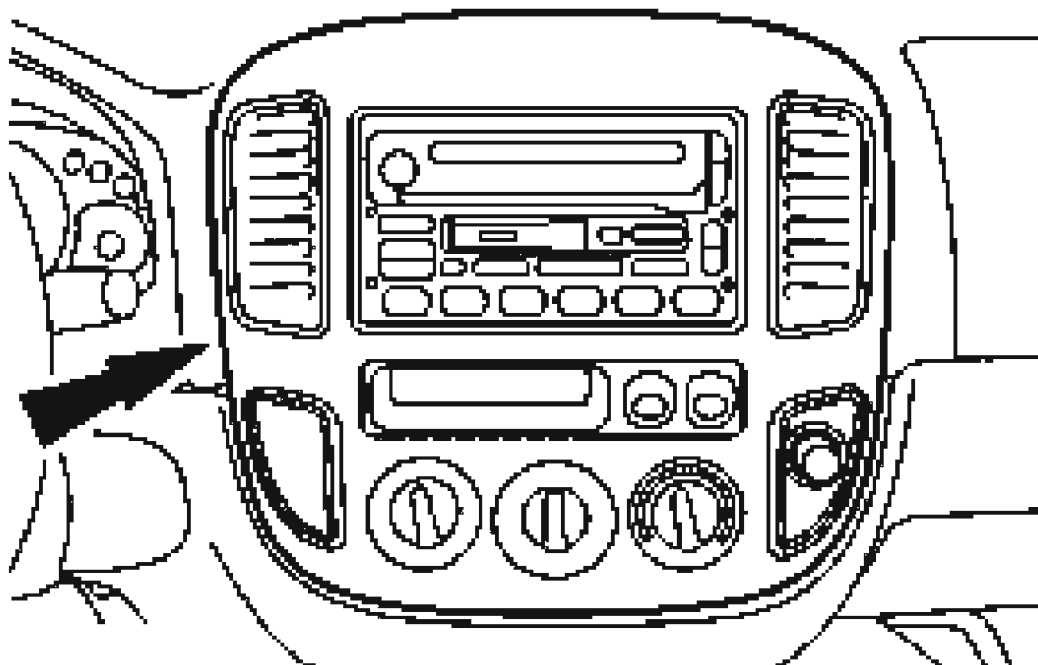


G02743295

**Fig. 32: Disconnecting Temperature Control Cable**  
Courtesy of FORD MOTOR CO.

4. Remove the instrument panel center finish panel.
  - Disconnect the electrical connectors.





G02743296

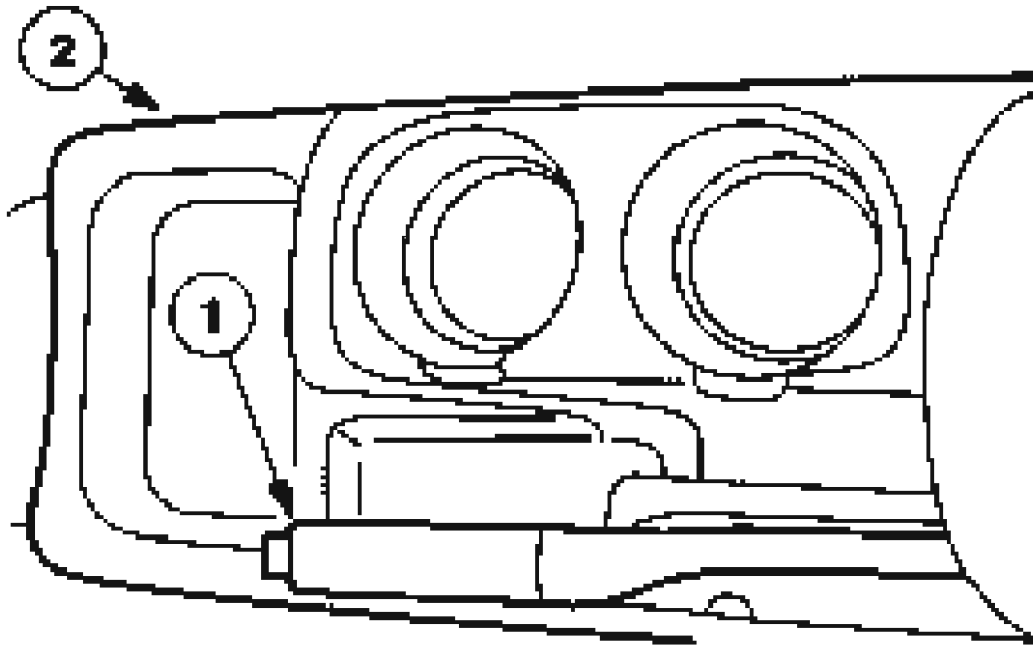
**Fig. 33: Removing Instrument Panel Center Finish Panel**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

#### **FLOOR CONSOLE - HIGH SERIES**

##### **Removal and Installation**

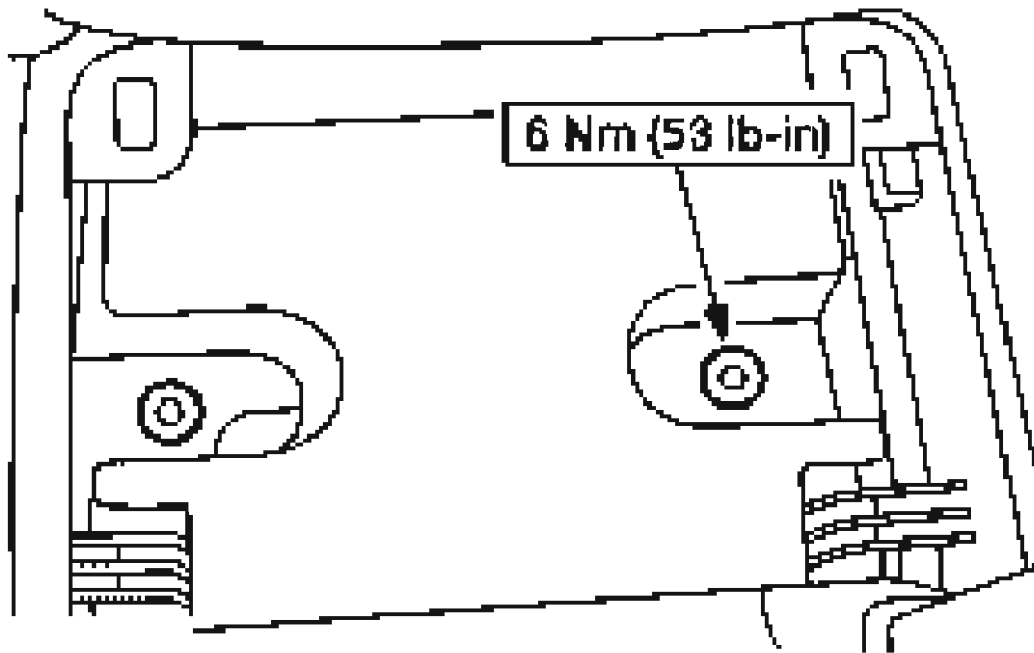
1. Remove the floor console finish panel.
  1. Apply the parking brake.
  2. Remove the floor console finish panel.



G02743297

**Fig. 34: Removing Floor Console Finish Panel**  
Courtesy of FORD MOTOR CO.

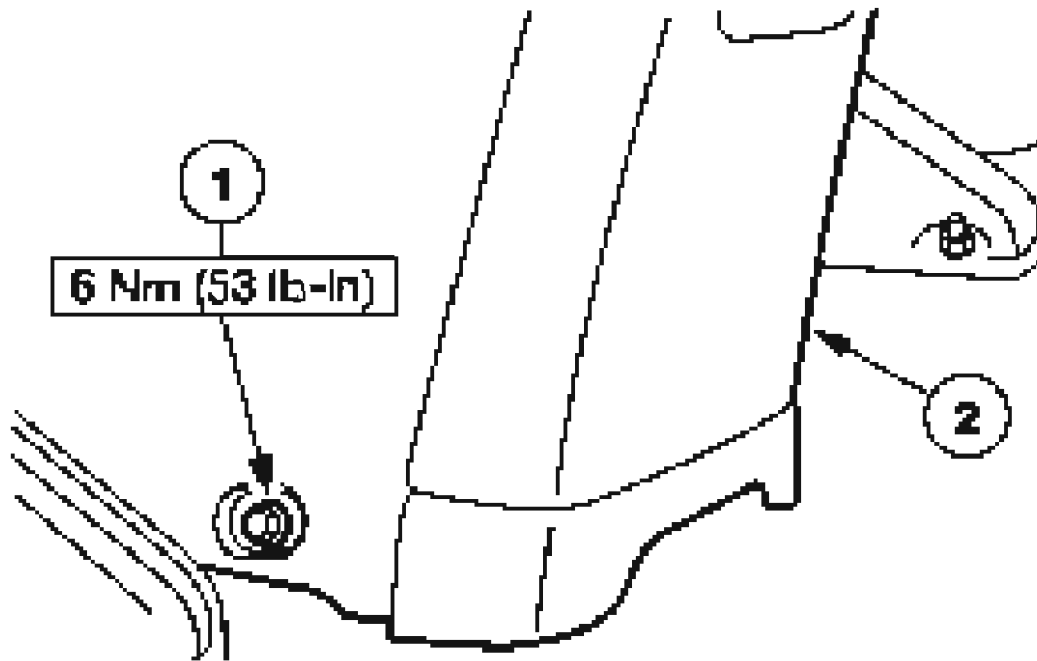
2. Remove the floor console front bolts.



G02743298

**Fig. 35: Removing Floor Console Front Bolts**  
Courtesy of FORD MOTOR CO.

3. Remove the floor console.
  1. Remove the two rear bolts.
  2. Remove the floor console.



G02743299

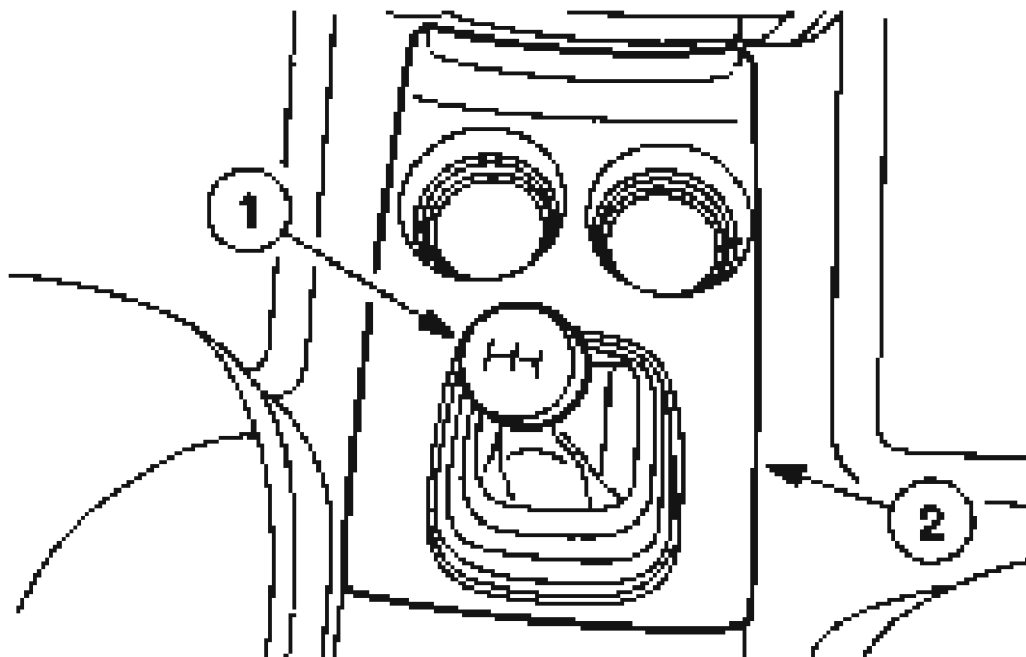
**Fig. 36: Removing Floor Console**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

#### **FLOOR CONSOLE - LOW SERIES**

##### **Removal and Installation**

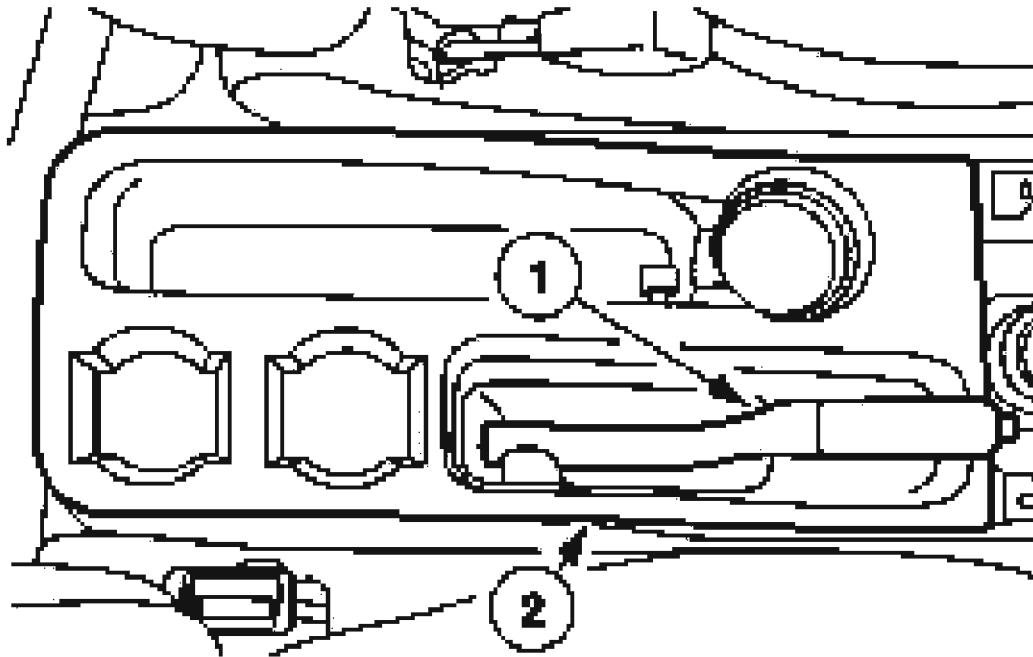
1. Remove the floor console front finish panel.
  1. Remove the manual transmission shifter knob by turning counterclockwise.
  2. Remove the floor console front finish panel.



G02743300

**Fig. 37: Removing Floor Console Front Finish Panel**  
Courtesy of FORD MOTOR CO.

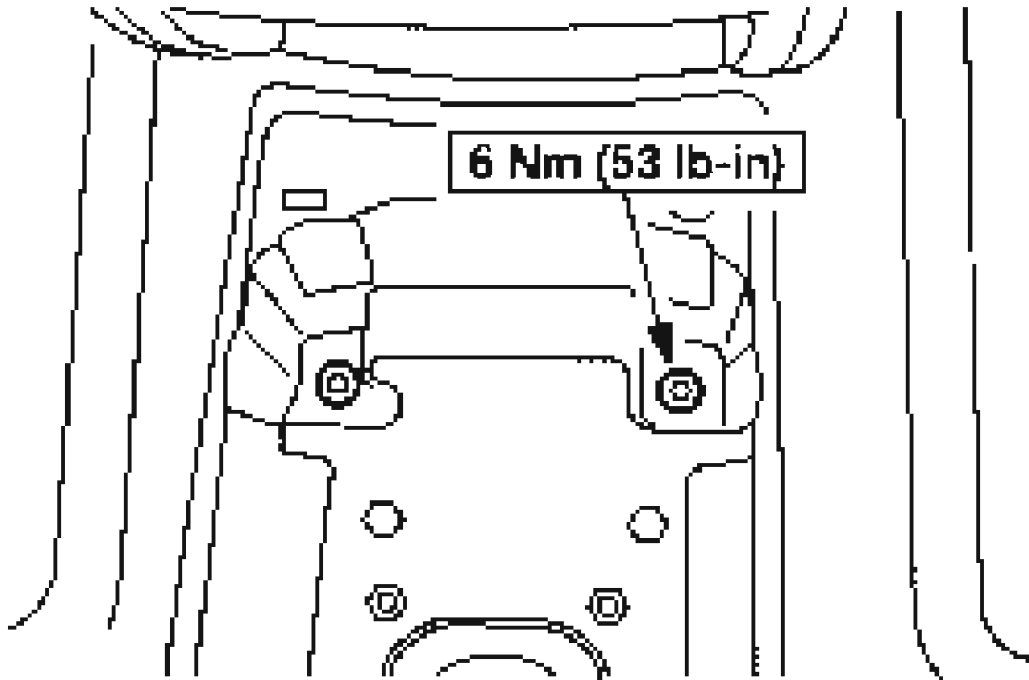
2. Remove the floor console rear finish panel.
  1. Apply the parking brake.
  2. Remove the floor console rear finish panel.



G02743301

**Fig. 38: Removing Floor Console Rear Finish Panel**  
Courtesy of FORD MOTOR CO.

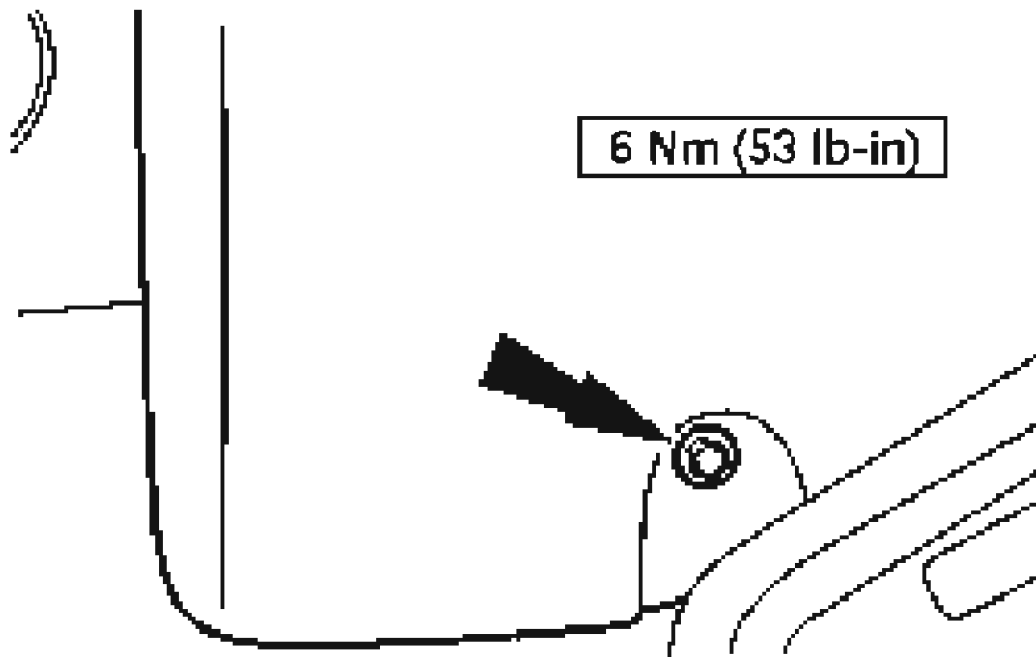
3. Remove the floor console front bolts.



G02743302

**Fig. 39: Removing Floor Console Front Bolts**  
Courtesy of FORD MOTOR CO.

4. Remove the floor console.
  - Remove the rear two bolts and the floor console.



G02743303

**Fig. 40: Removing Floor Console Rear Bolts**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.



## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Interior Trim and Ornamentation - Escape

## 2004 ACCESSORIES & EQUIPMENT

### Interior Trim and Ornamentation - Escape

## SPECIFICATION

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
A-pillar passenger assist handle bolts	4	-	35
Child seat tether anchor bolts	22	16	-
Door latch release handle bezel screws	4	-	35
Door handle cup screws	4	-	35
Front door trim panel screws	2	-	18
Interior lamp screws	3	-	27
Liftgate trim panel screws	1	-	9
Overhead console screws	3	-	27
Passenger assist handle bolts	8	-	71
Rear door trim panel screws	2	-	18
Safety belt D-ring bolts	55	41	-
Sun visor clip screws	3	-	27
Sun visor screws	3	-	27

## DESCRIPTION AND OPERATION

### INTERIOR TRIM

The interior trim consists of the following components:

- A-pillar lower trim panels
- B-pillar trim panels
- C-pillar trim panels
- D-pillar trim panels
- front door sail panels
- front door scuff plate trim panels
- front door trim panels
- headliner
- liftgate scuff plate trim panel
- liftgate trim panel
- rear door sail panels

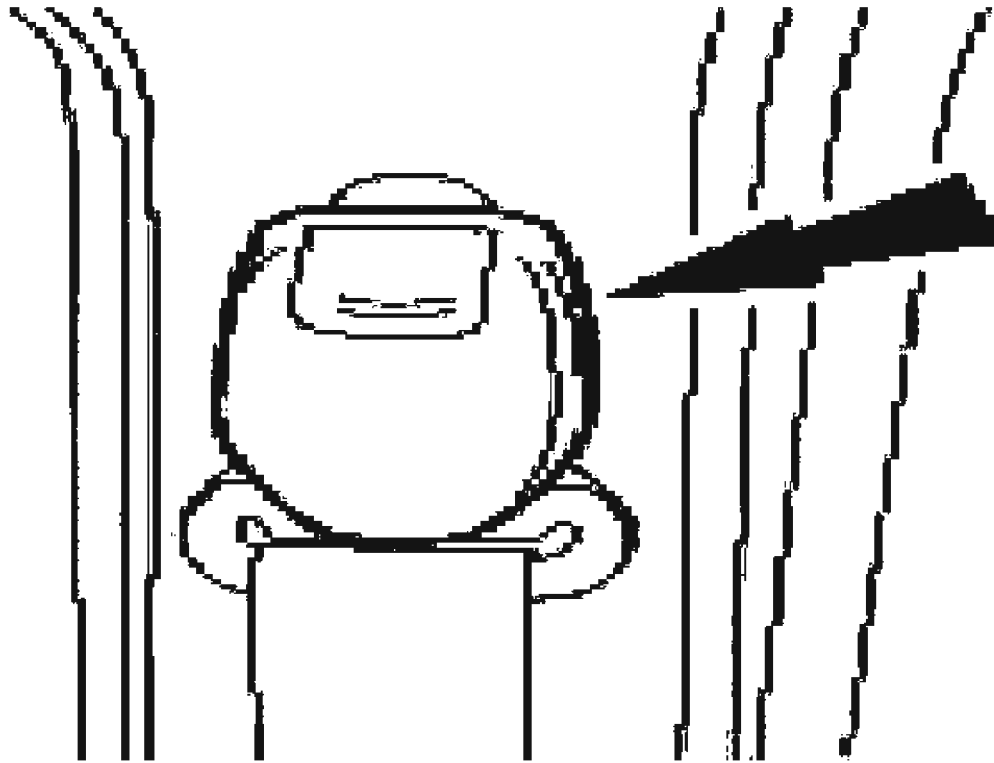
- rear door scuff plate trim panels
- rear door trim panels
- rear quarter trim panels
- retractable cargo cover
- sun visors
- window control switch panel cover
- windshield side garnish mouldings

## **REMOVAL AND INSTALLATION**

### **B-PILLAR TRIM PANEL**

#### **Removal and Installation**

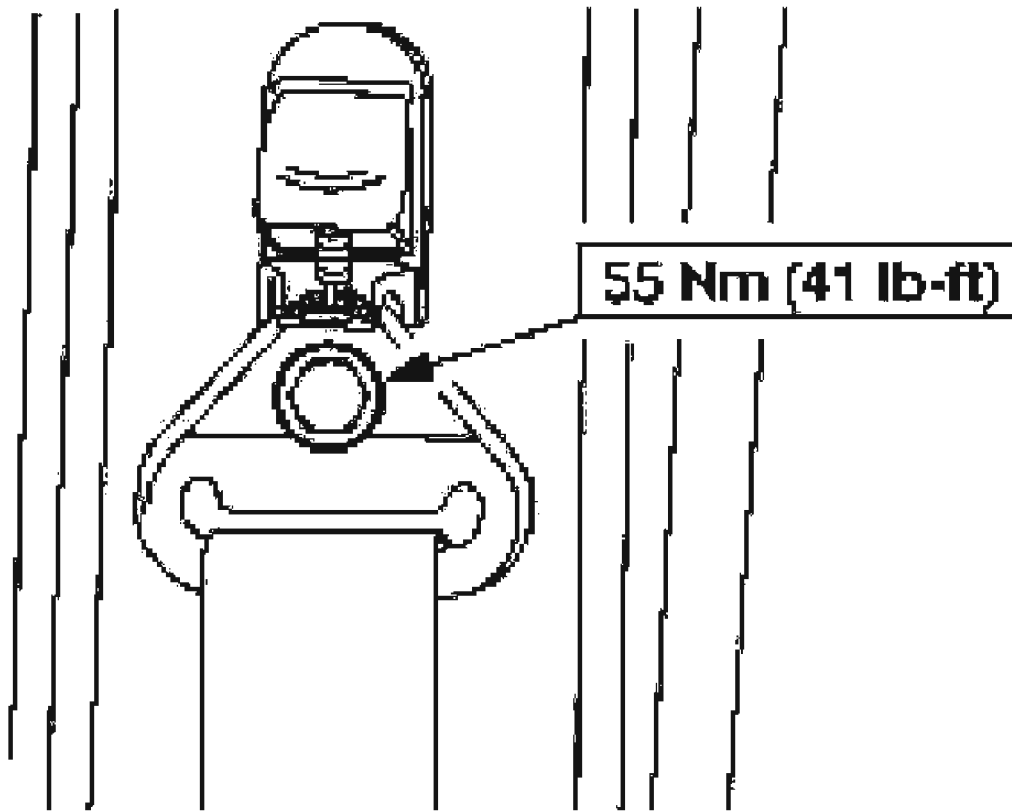
**NOTE:**      **Inspect the safety belt D-ring cover for damage. If the safety belt D-ring cover does not remain in place, install a new cover.**



G02742964

**Fig. 1: Removing Safety Belt D-Ring Cover**  
Courtesy of FORD MOTOR CO.

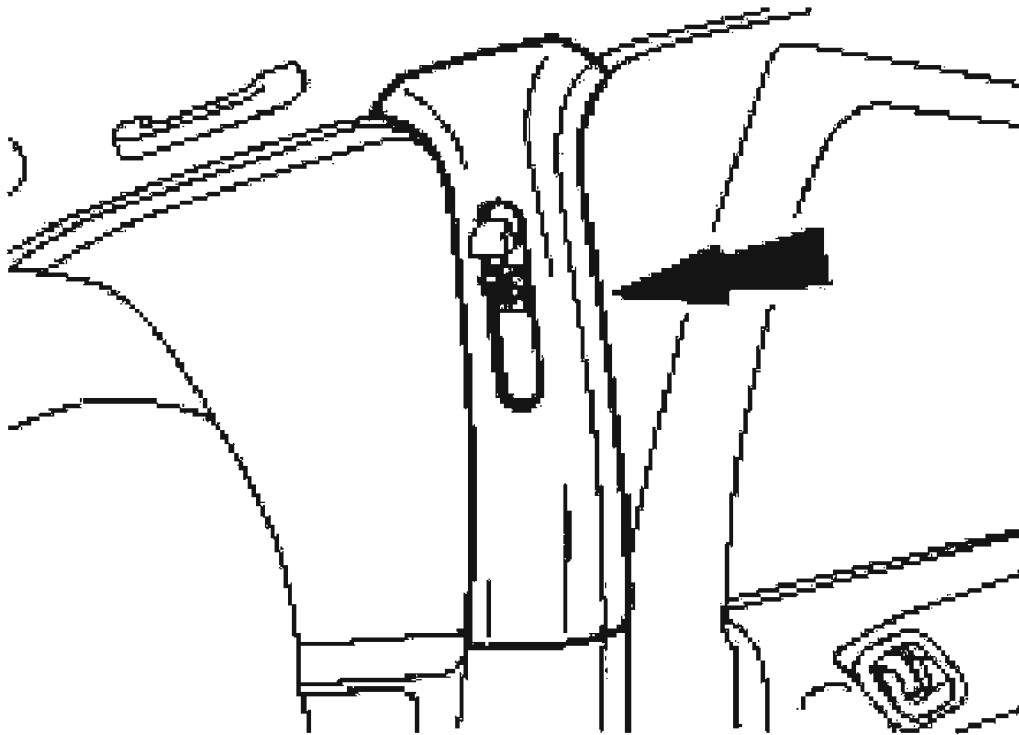
1. Remove the safety belt D-ring cover.
2. Remove the safety belt D-ring bolt.



G02742965

**Fig. 2: Removing Safety Belt D-Ring Bolt**  
Courtesy of FORD MOTOR CO.

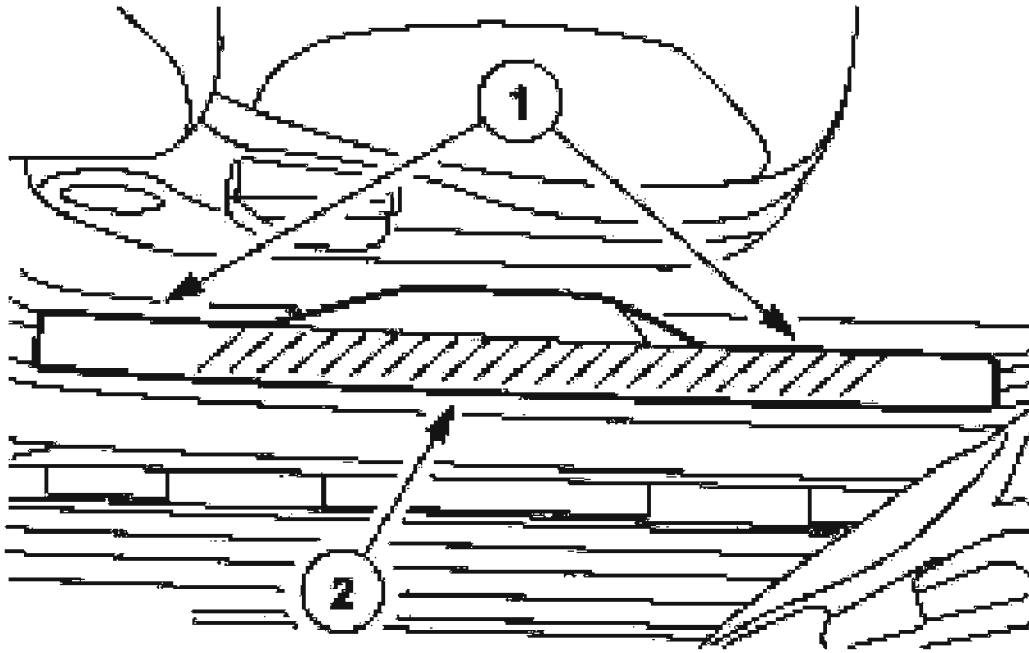
3. Position the front and rear door weatherstrips aside.
4. Remove the upper B-pillar trim panel.



G02742966

**Fig. 3: Removing Upper B-Pillar Trim Panel**  
Courtesy of FORD MOTOR CO.

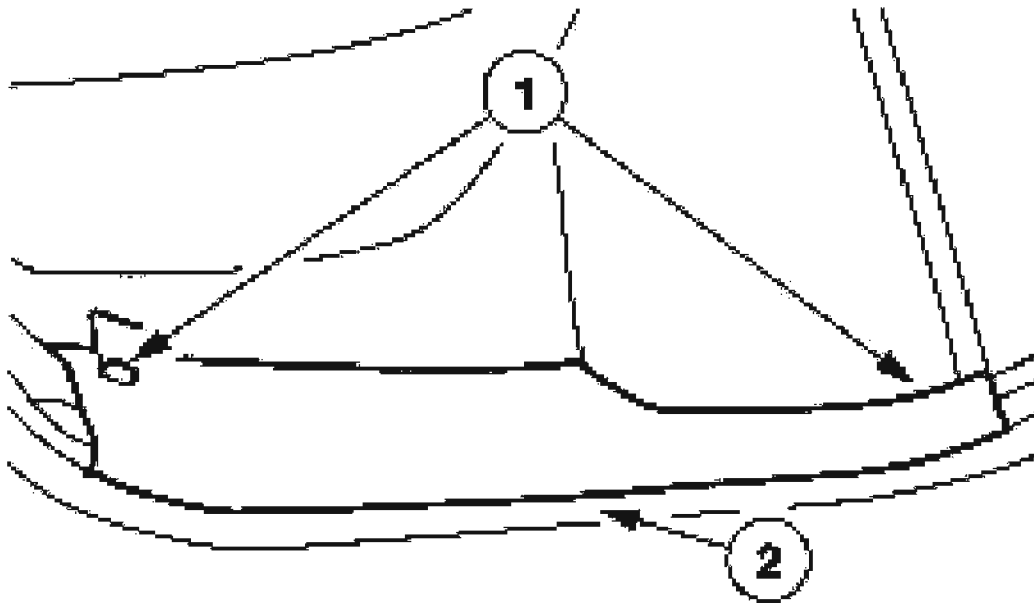
5. Remove the front door scuff plate trim panel.
  1. Remove the pin-type retainers.
  2. Remove the front door scuff plate trim panel.



G02742967

**Fig. 4: Removing Front Door Scuff Plate Trim Panel**  
Courtesy of FORD MOTOR CO.

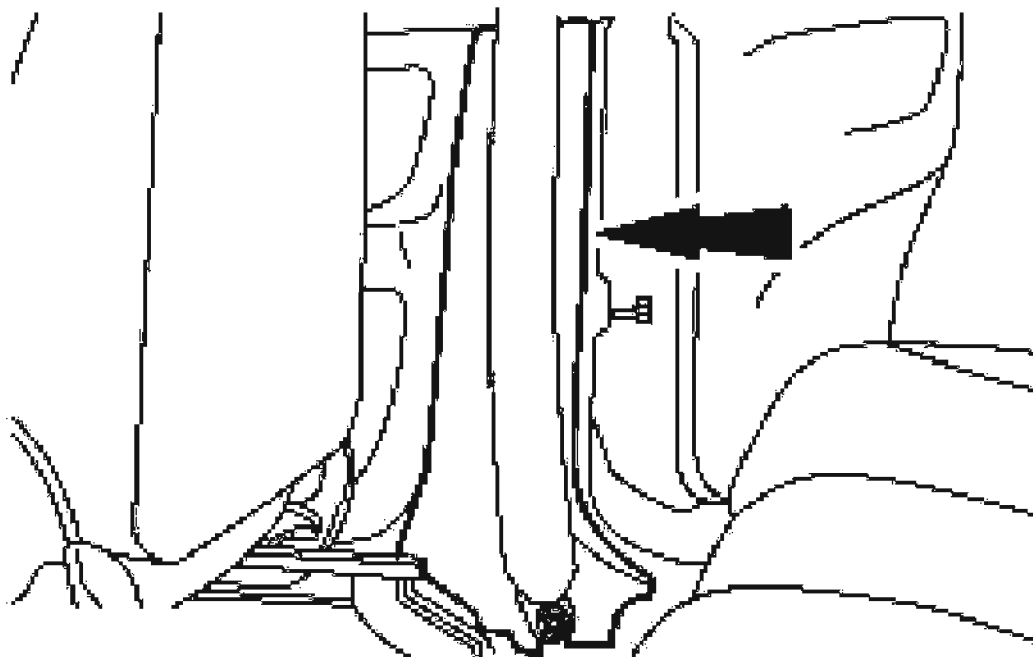
6. Remove the rear door scuff plate trim panel.
  1. Remove the pin-type retainers.
  2. Remove the rear door scuff plate trim panel.



G02742968

**Fig. 5: Removing Rear Door Scuff Plate Trim Panel**  
**Courtesy of FORD MOTOR CO.**

7. Remove the lower B-pillar trim panel.



G02742969

**Fig. 6: Removing Lower B-Pillar Trim Panel**  
Courtesy of FORD MOTOR CO.

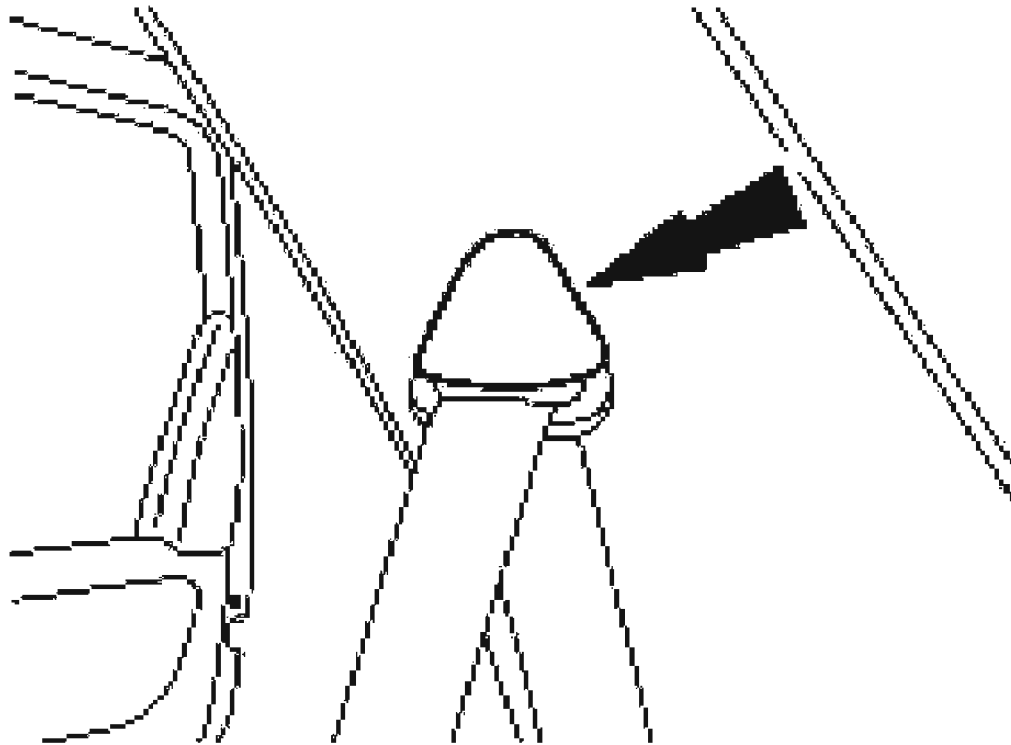
8. To install, reverse the removal procedure.

#### **C-PILLAR TRIM PANEL**

##### **Removal and Installation**

**NOTE:** Inspect the safety belt D-ring cover for damage. If the safety belt D-ring cover does not remain in place, install a new cover.

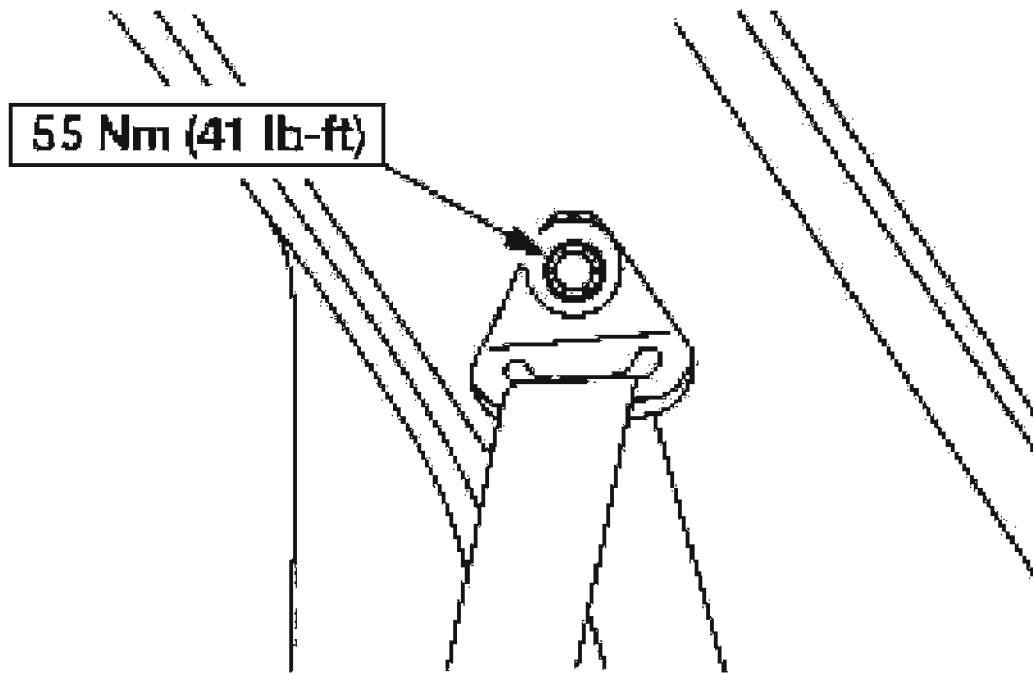




G02742970

**Fig. 7: Removing Safety Belt D-Ring Cover**  
Courtesy of FORD MOTOR CO.

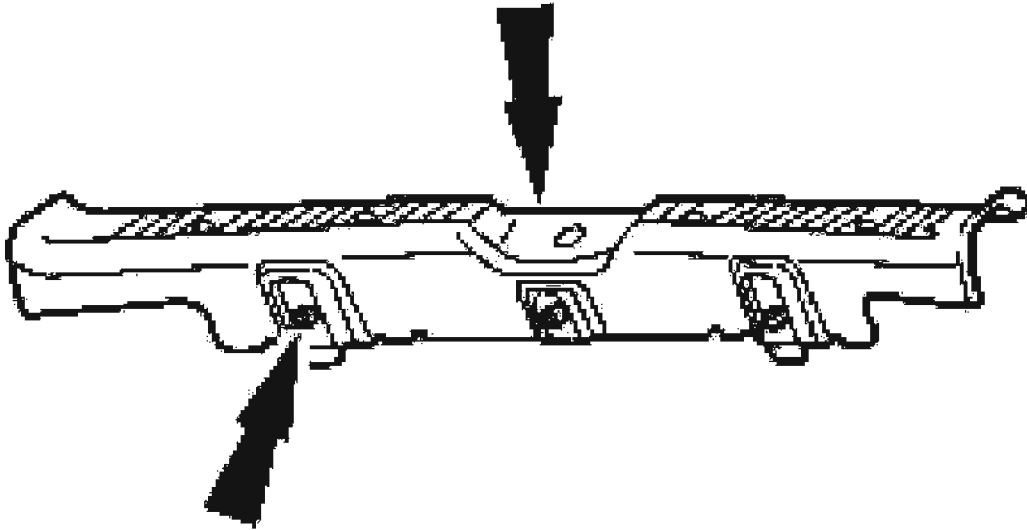
1. Remove the safety belt D-ring cover.
2. Remove the safety belt D-ring bolt.



G02742971

**Fig. 8: Removing Safety Belt D-Ring Bolt**  
Courtesy of FORD MOTOR CO.

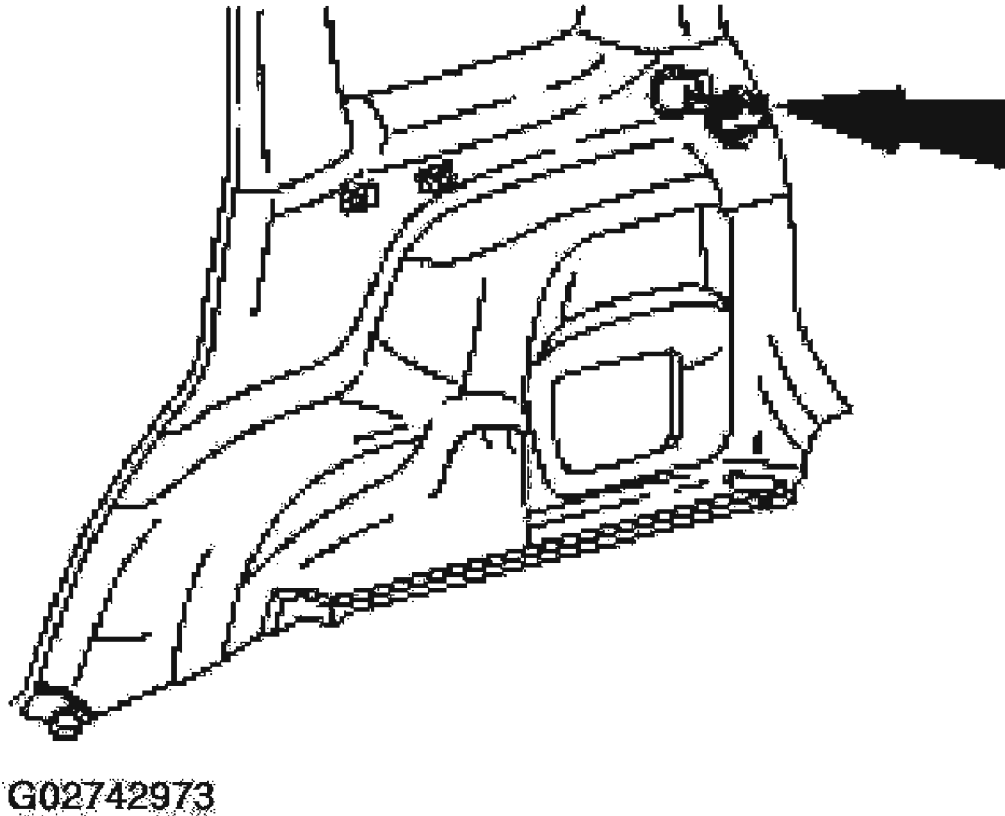
3. Remove the pin-type retainers and the liftgate scuff plate trim panel.



G02742972

**Fig. 9: Removing Pin-Type Retainers And Liftgate Scuff Plate Trim Panel**  
Courtesy of FORD MOTOR CO.

4. Position the liftgate weatherstrip aside.
5. If equipped, remove the cargo net hold-down.



**Fig. 10: Removing Cargo Net Hold-Down**  
Courtesy of FORD MOTOR CO.

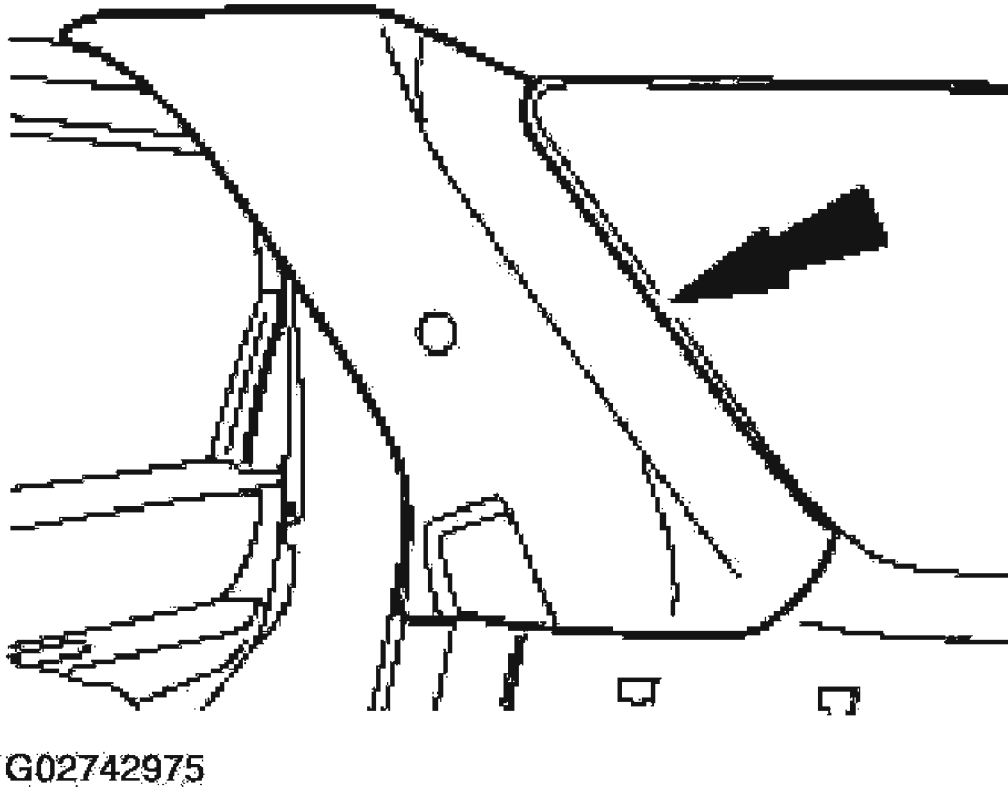
6. Remove the rear quarter trim panel.
  1. Insert a tape-wrapped screwdriver between the D-pillar trim panel and rear quarter trim panel.
  2. Push the screwdriver in the direction of the arrow and remove the rear quarter trim panel.



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**Fig. 11: Removing Rear Quarter Trim Panel**  
Courtesy of FORD MOTOR CO.

7. Remove the C-pillar trim panel.



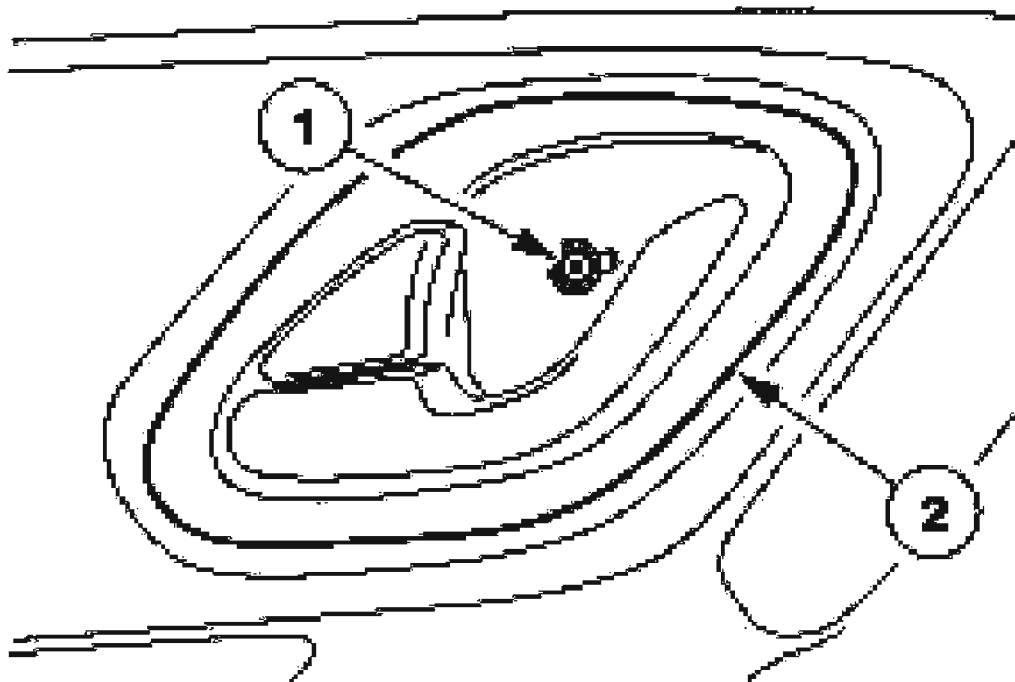
**Fig. 12: Removing C-Pillar Trim Panel**  
Courtesy of FORD MOTOR CO.

8. To install, reverse the removal procedure.

#### **FRONT DOOR TRIM PANEL**

##### **Removal and Installation**

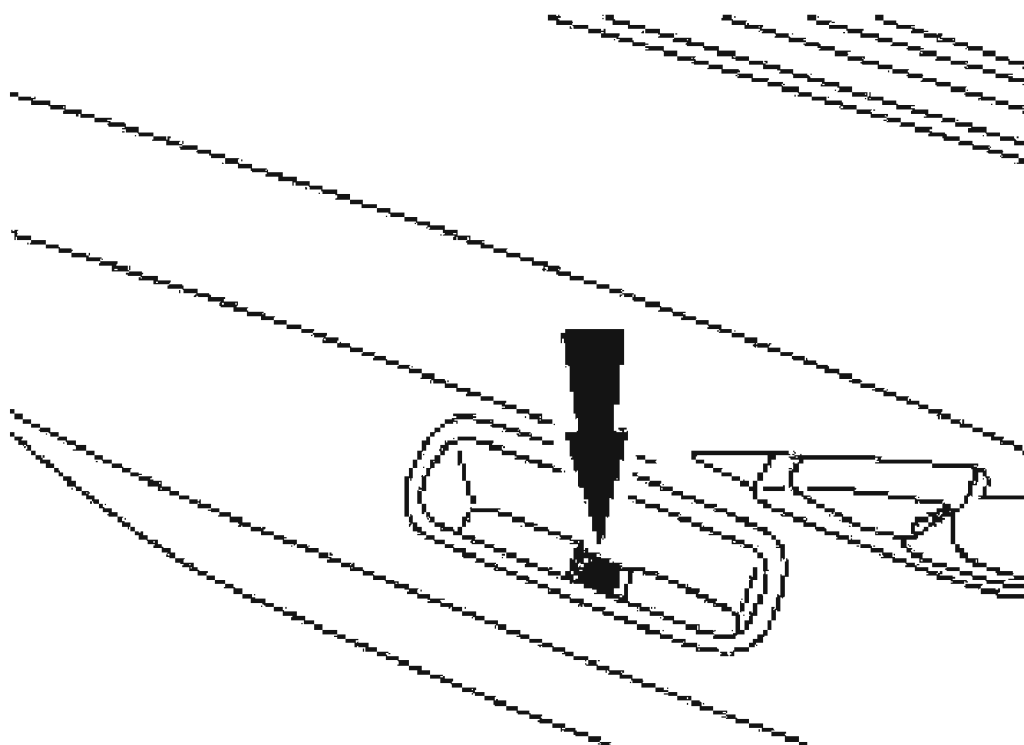
1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Remove the front door latch release handle bezel.
  1. Remove the screw.
  2. Remove the front door latch release handle bezel.



G02742976

**Fig. 13: Removing Front Door Latch Release Handle Bezel**  
Courtesy of FORD MOTOR CO.

3. Remove the door handle cup screw.

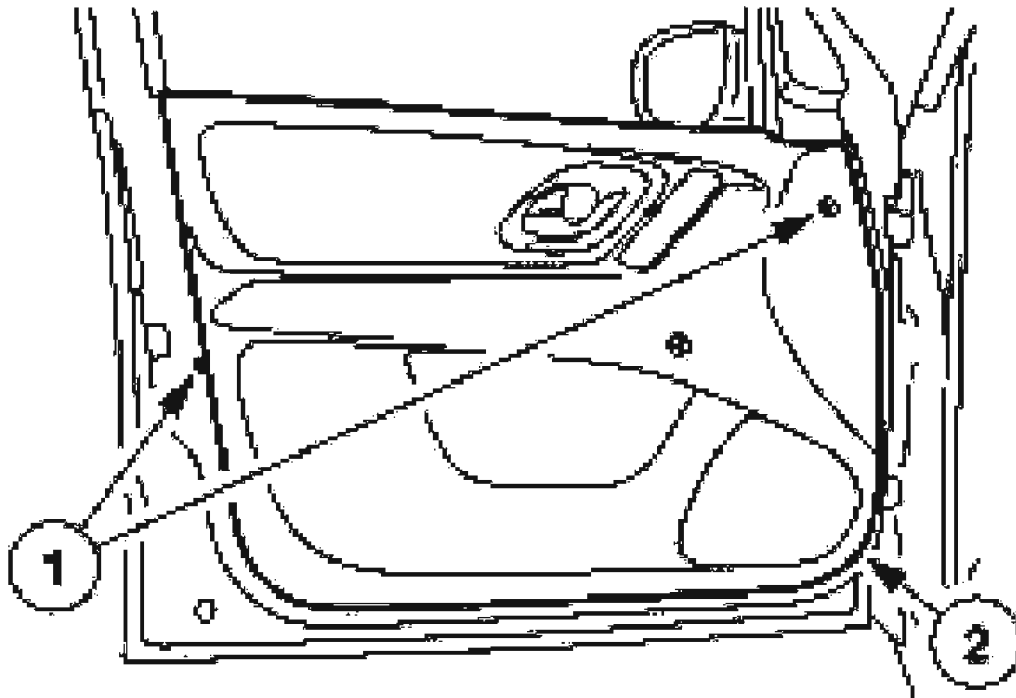


G02742977

**Fig. 14: Removing Door Handle Cup Screw**  
Courtesy of FORD MOTOR CO.

4. Remove the front door trim panel.
  1. Remove the screws.
  2. Remove the front door trim panel and disconnect the electrical connector.





G02742978

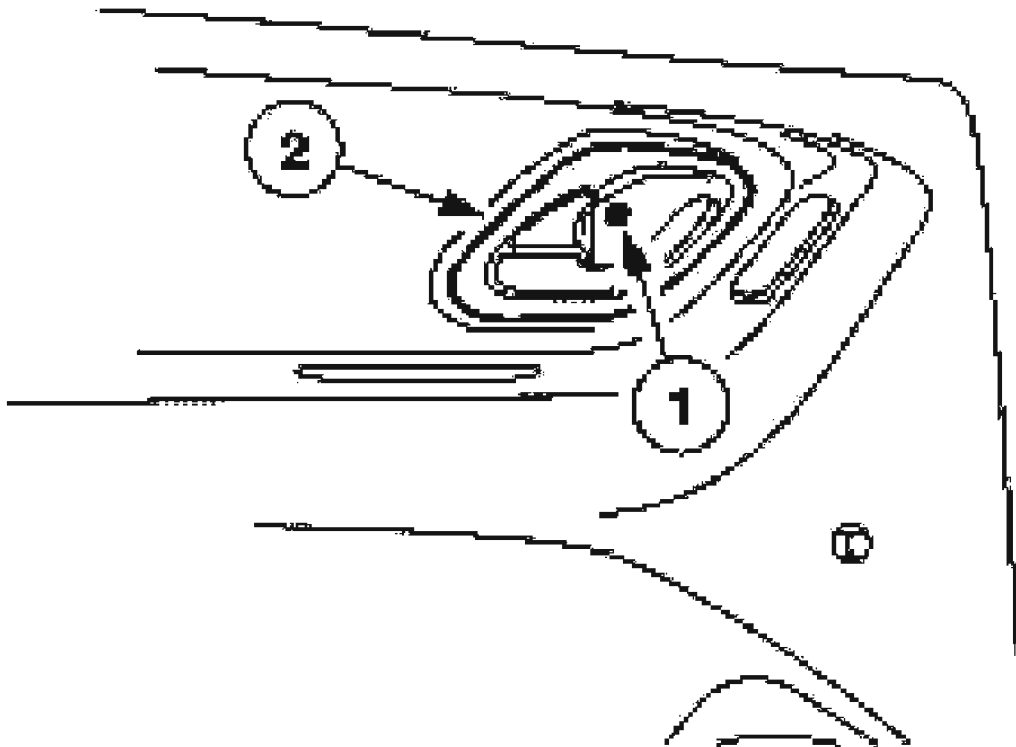
**Fig. 15: Removing Front Door Trim Panel**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

## REAR DOOR TRIM PANEL

### Removal and Installation

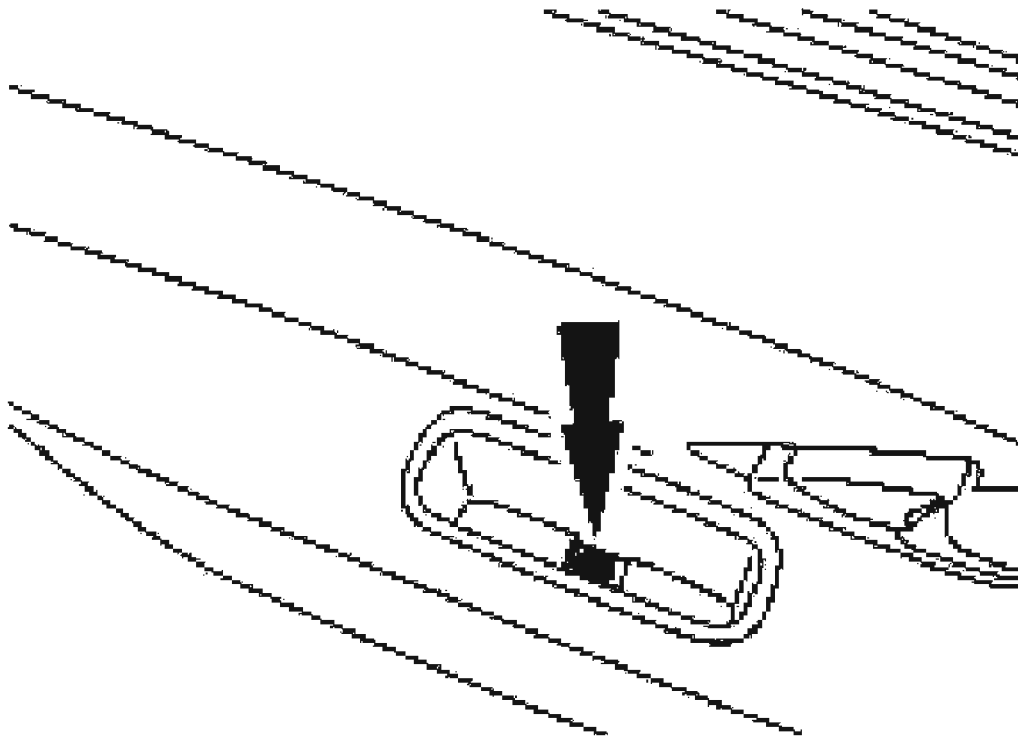
1. Remove the rear door latch release handle bezel.
  1. Remove the screw.
  2. Remove the rear door latch release handle bezel.



G02742979

**Fig. 16: Removing Rear Door Latch Release Handle Bezel**  
Courtesy of FORD MOTOR CO.

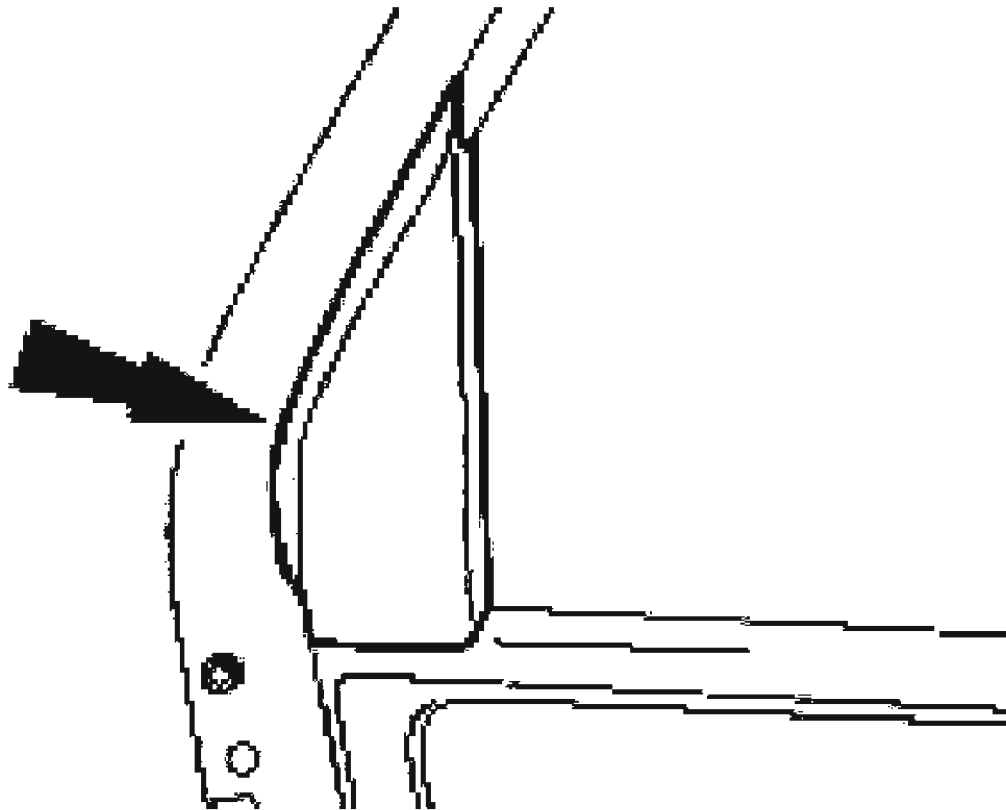
2. Remove the door handle cup screw.



G02742980

**Fig. 17: Removing Door Handle Cup Screw**  
Courtesy of FORD MOTOR CO.

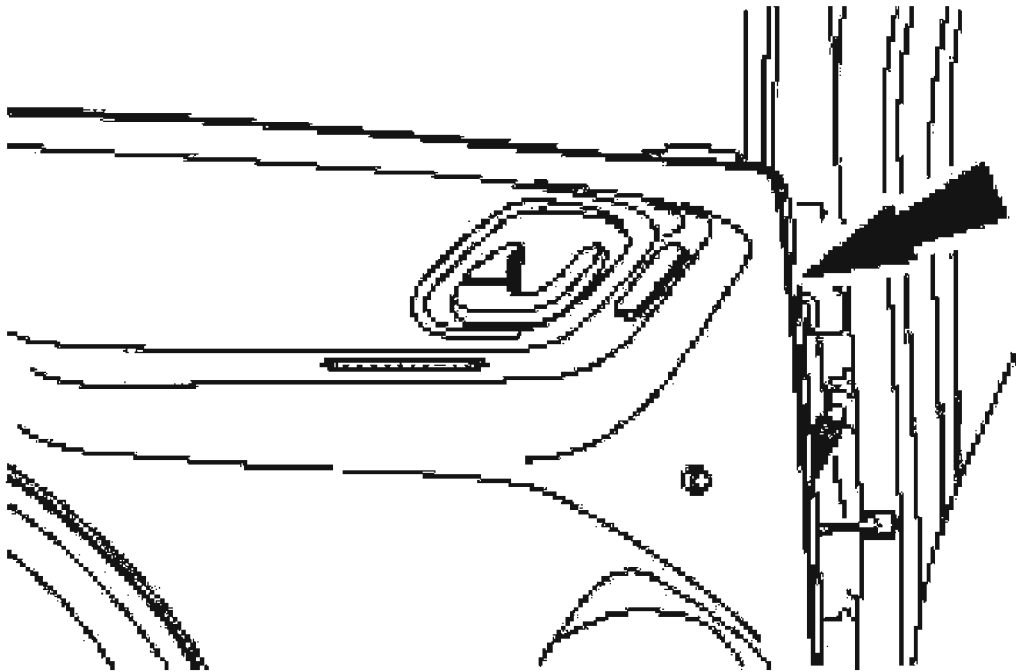
3. Remove the rear door sail panel.



G02742981

**Fig. 18: Removing Rear Door Sail Panel**  
Courtesy of FORD MOTOR CO.

4. Remove the rear door trim panel.
  - Disconnect the electrical connector.



G02742982

**Fig. 19: Removing Rear Door Trim Panel**  
Courtesy of FORD MOTOR CO.

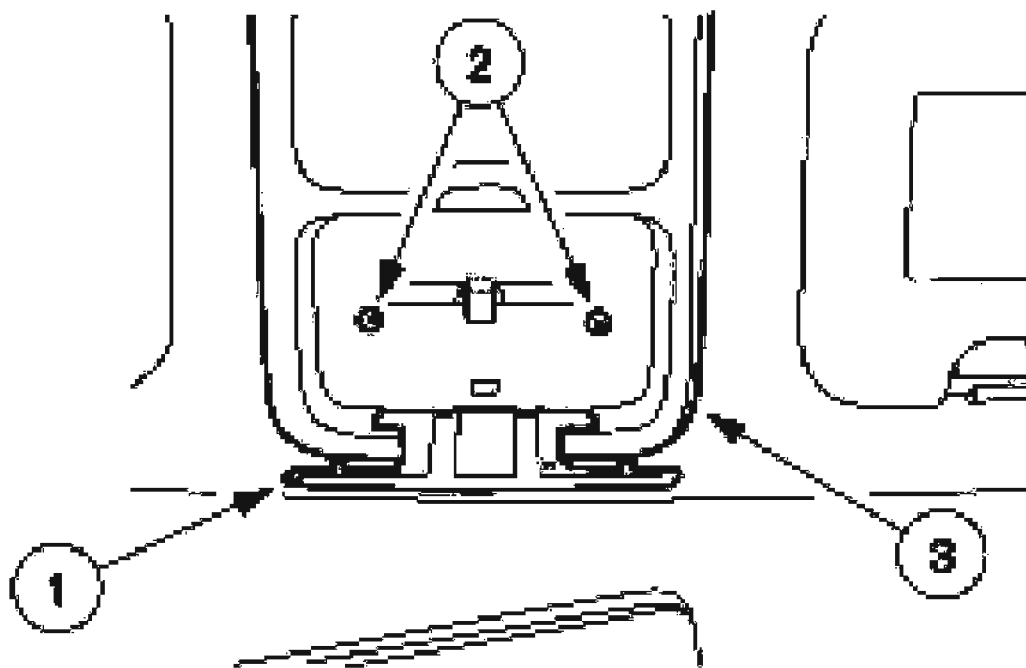
5. To install, reverse the removal procedure.

## HEADLINER

### Removal and Installation

#### Vehicles with overhead console

1. Remove the overhead console.
  1. Open the front console door.
  2. Remove the screws.
  3. Remove the overhead console.
    - If equipped, disconnect the electrical connector.

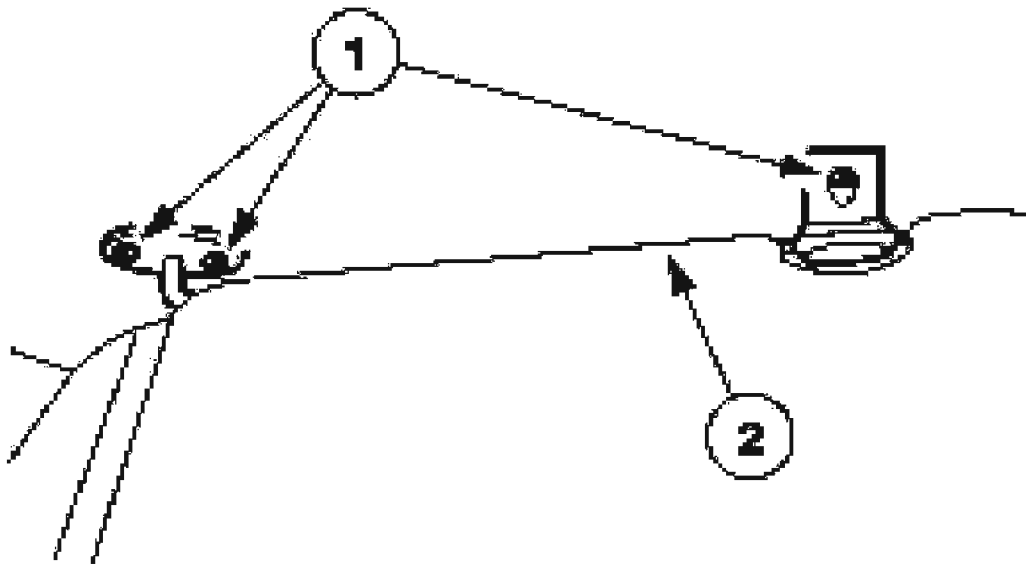


G02742983

**Fig. 20: Removing Overhead Console**  
Courtesy of FORD MOTOR CO.

**All vehicles**

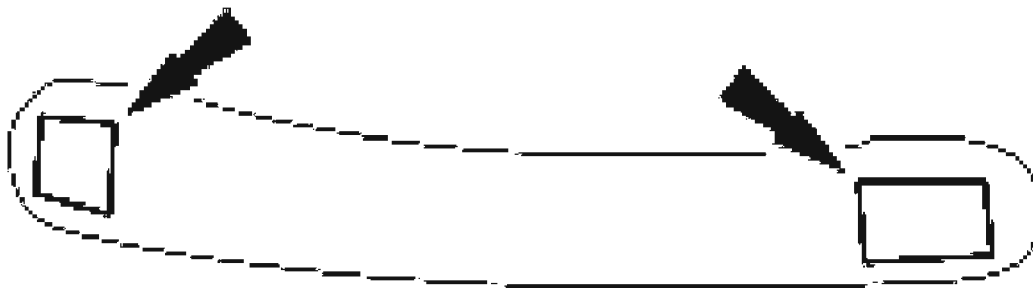
2. Remove the two sun visors and two clips.
  1. Remove the six screws.
  2. Remove the two sun visors and two clips.
    - If equipped, disconnect the electrical connector.



G02742984

**Fig. 21: Removing Sun Visors & Clips**  
Courtesy of FORD MOTOR CO.

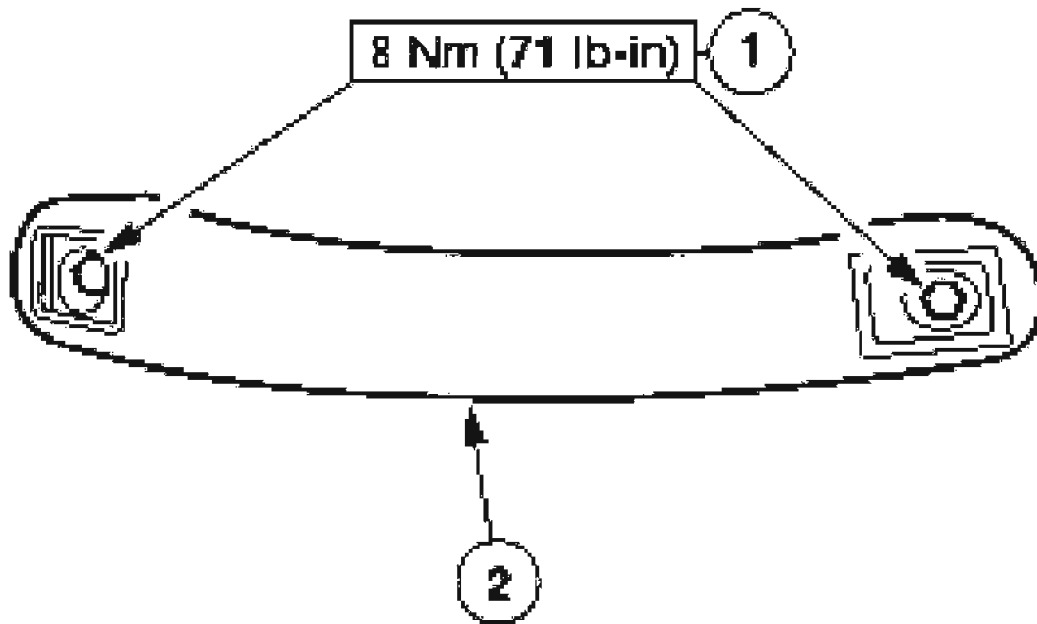
3. Remove the eight passenger assist handle covers.



G02742985

**Fig. 22: Removing Eight Passenger Assist Handle Covers**  
Courtesy of FORD MOTOR CO.

4. Remove the four passenger assist handles.
  1. Remove the eight bolts.
  2. Remove the four passenger assist handles.

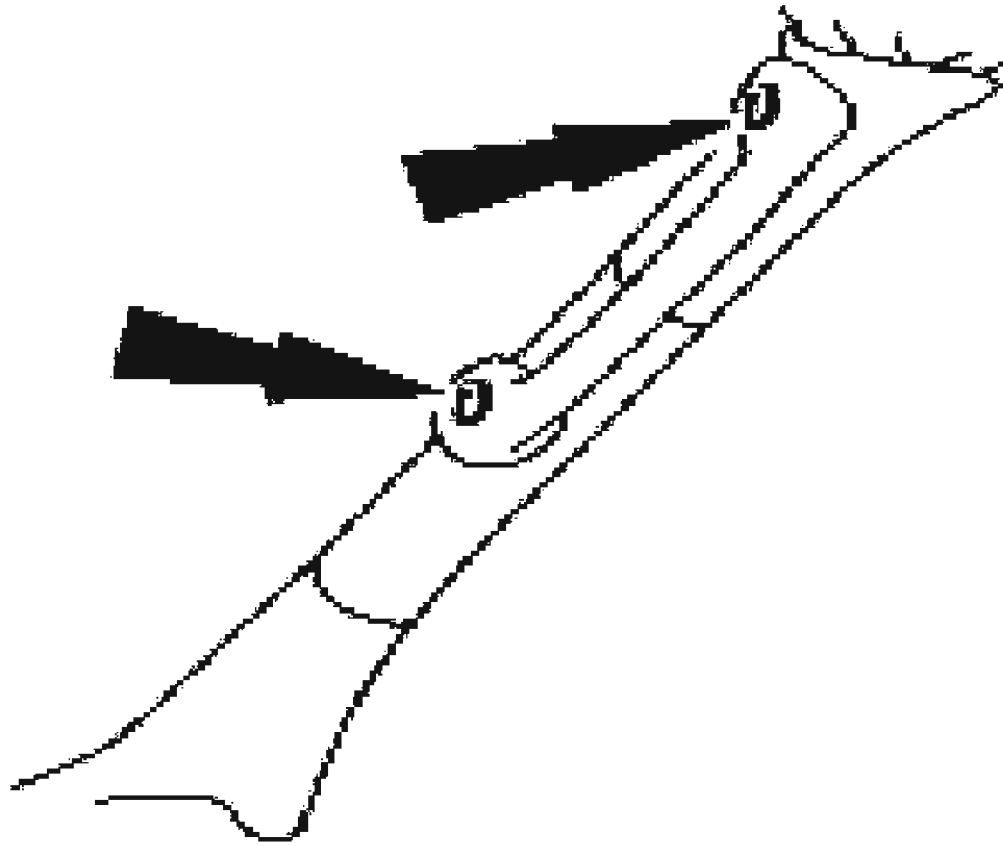


G02742986

**Fig. 23: Removing Four Passenger Assist Handles**  
Courtesy of FORD MOTOR CO.

5. Open the four A-pillar passenger assist handle covers.

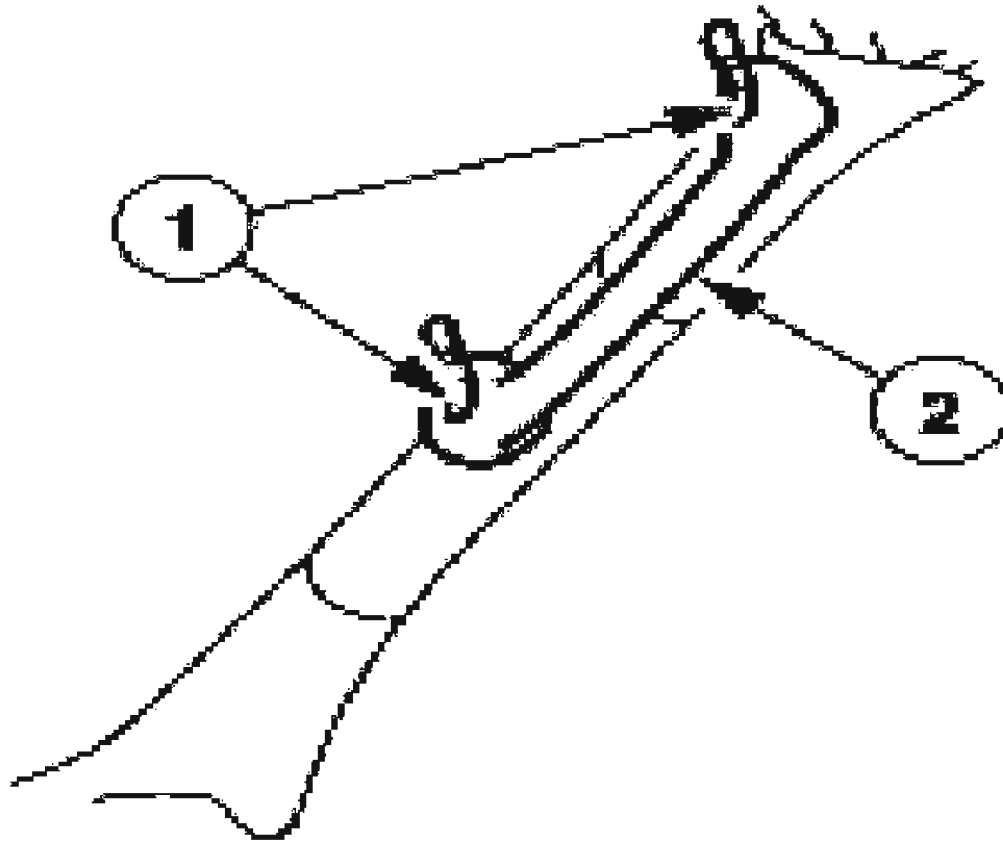




G02742987

**Fig. 24: Removing A-Pillar Passenger Assist Handle Covers**  
Courtesy of FORD MOTOR CO.

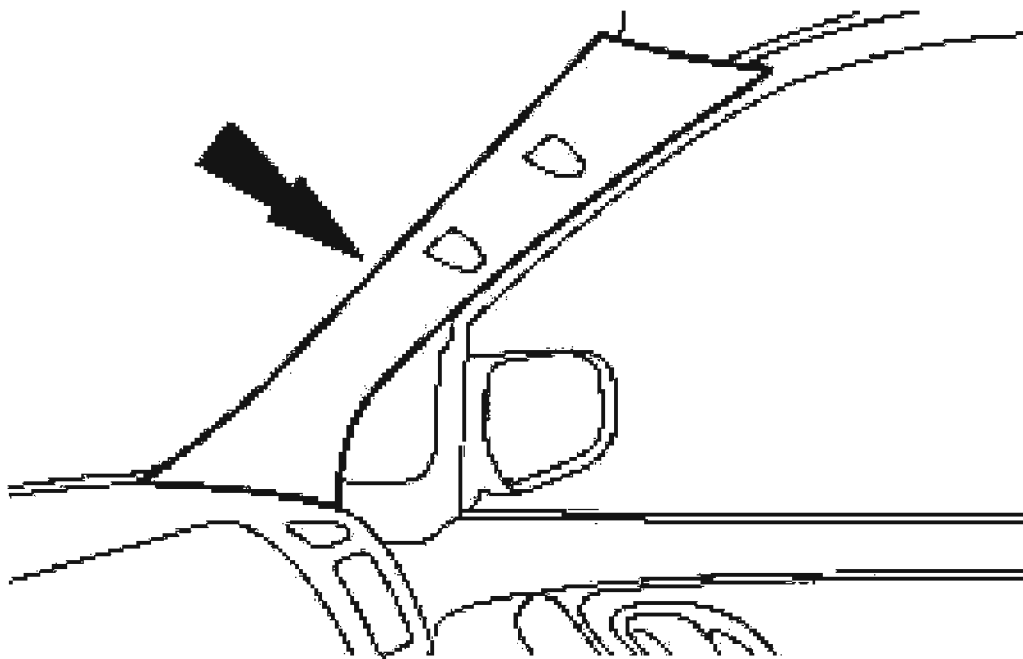
6. Remove the two A-pillar passenger assist handles.
  1. Remove the four bolts.
  2. Remove the two A-pillar passenger assist handles.



G02742988

**Fig. 25: Removing A-Pillar Passenger Assist Handles**  
Courtesy of FORD MOTOR CO.

7. Remove the two windshield side garnish mouldings.

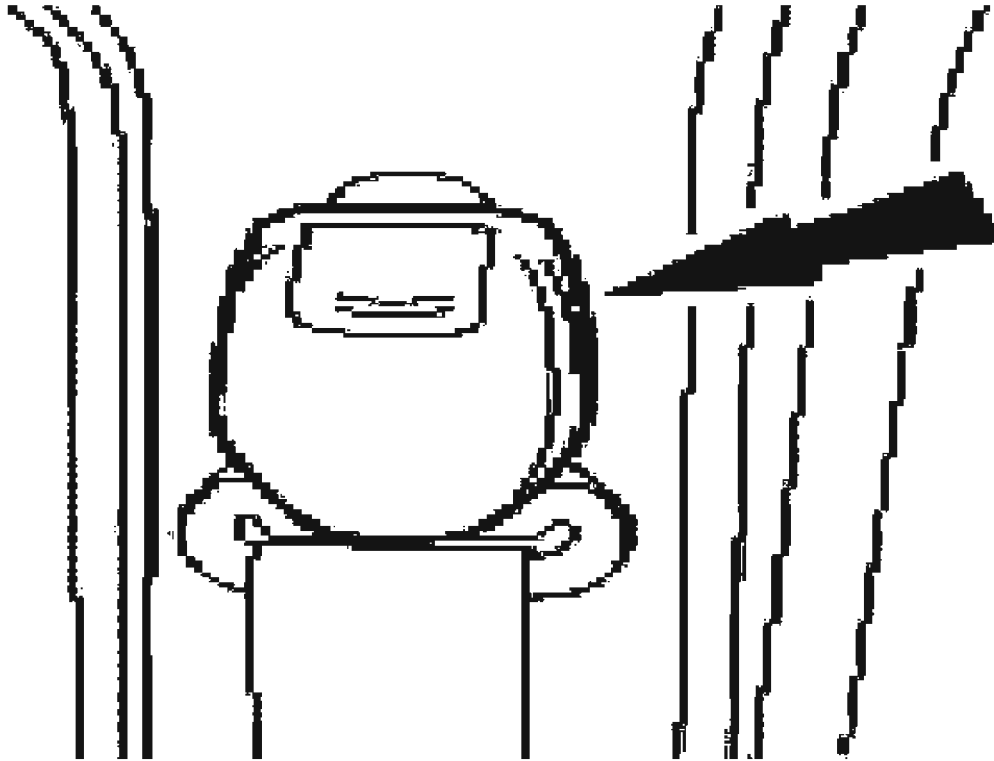


G02742989

**Fig. 26: Removing Two Windshield Side Garnish Mouldings**  
Courtesy of FORD MOTOR CO.

8. If equipped, remove the roof opening panel moulding.

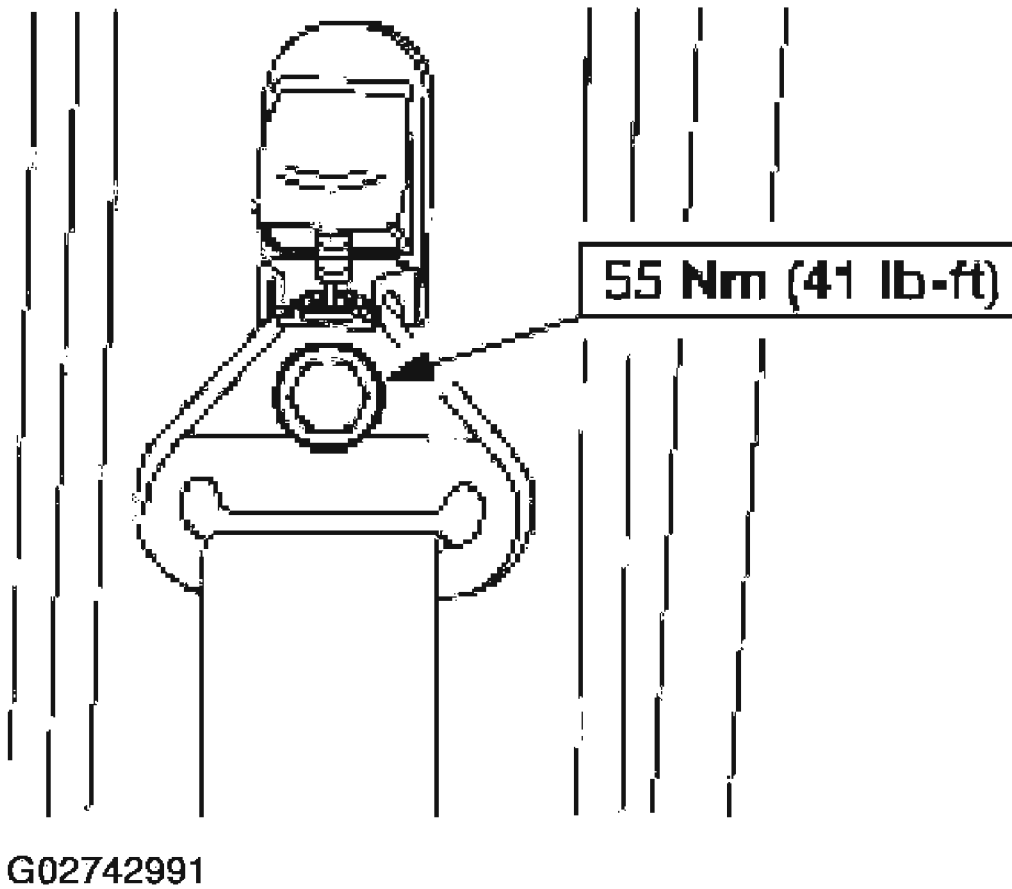
**NOTE:**      **Inspect the safety belt D-ring cover for damage. If the safety belt D-Ring cover does not remain in place, install a new cover.**



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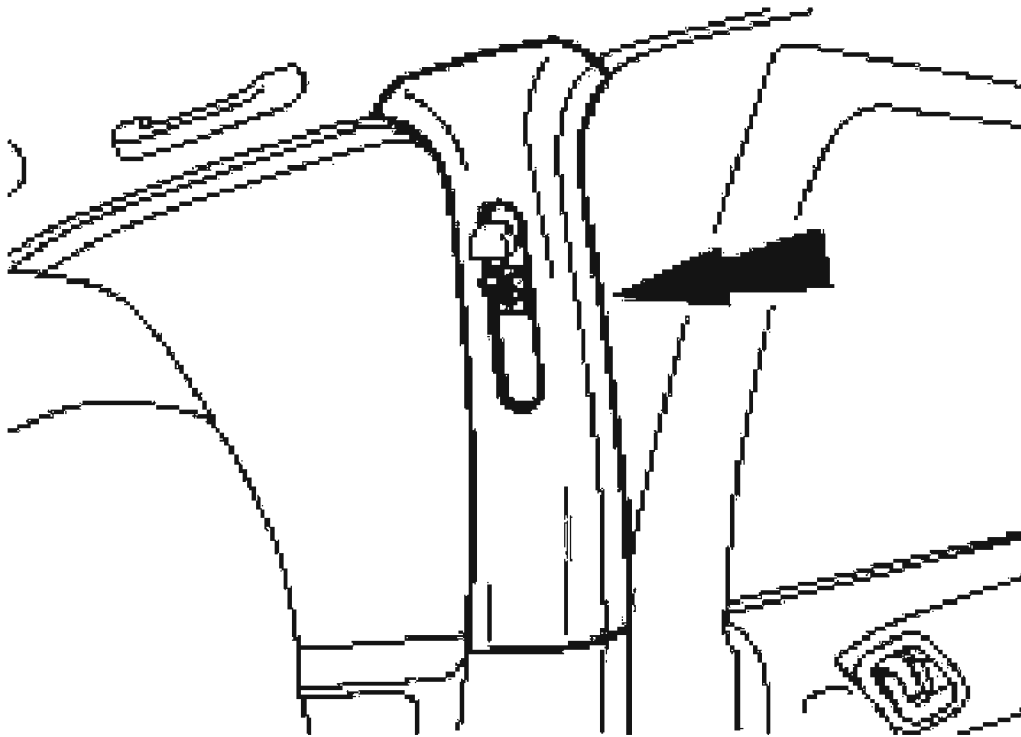
**Fig. 27: Removing Roof Opening Panel Moulding**  
Courtesy of FORD MOTOR CO.

9. Remove the two safety belt D-ring covers.
10. Remove the two safety belt D-ring bolts.



**Fig. 28: Removing Two Safety Belt D-Ring Bolts**  
Courtesy of FORD MOTOR CO.

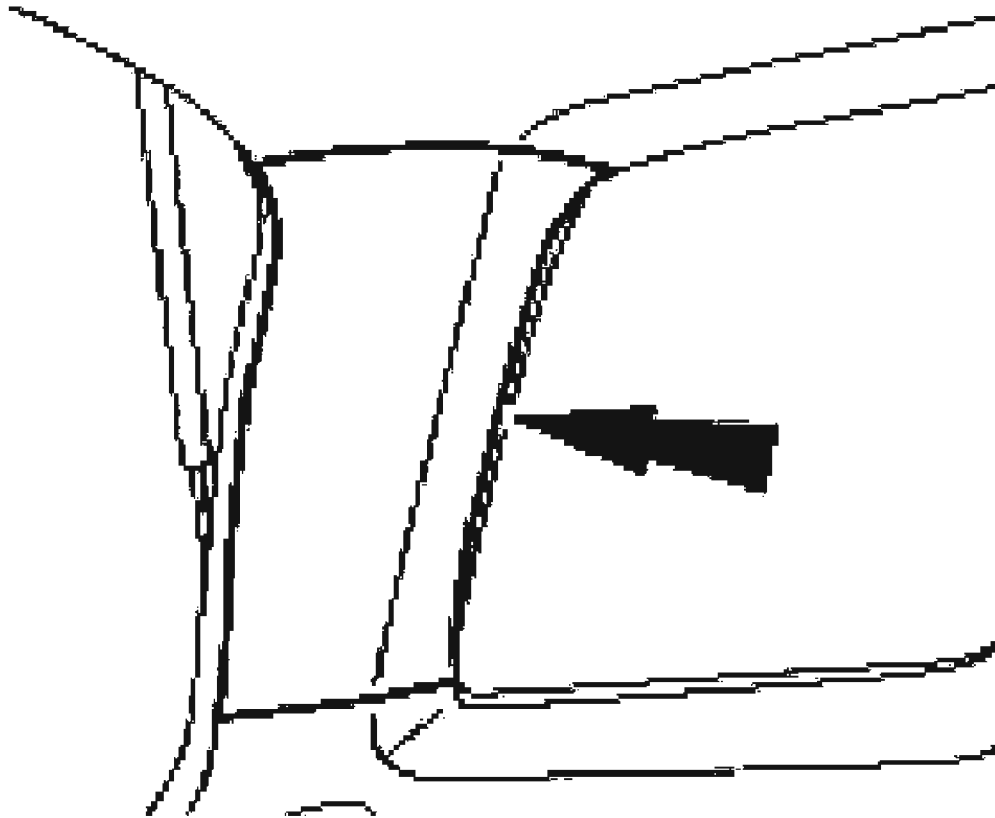
11. Position the front and rear door weatherstrips aside.
12. Remove the upper B-pillar trim panels.



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**Fig. 29: Removing Upper B-Pillar Trim Panels**  
Courtesy of FORD MOTOR CO.

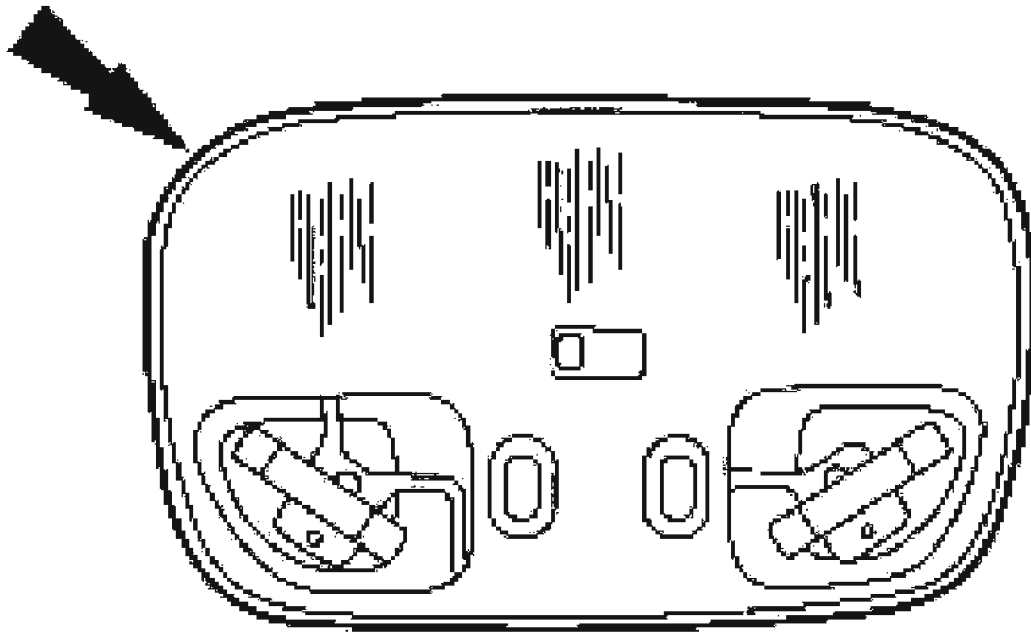
13. Remove the two C-pillar trim panels. For additional information, refer to **C-PILLAR TRIM PANEL**.
14. Remove the two D-pillar trim panels.



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**Fig. 30: Removing D-Pillar Trim Panels**  
Courtesy of FORD MOTOR CO.

15. Remove the front interior lamp lens.

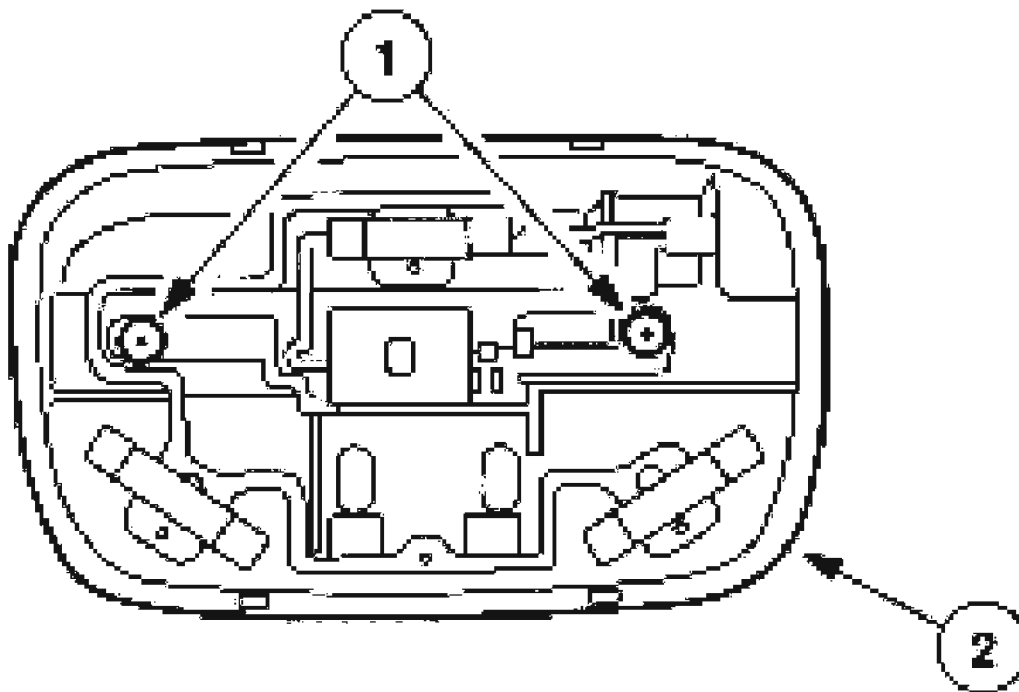


G02742994

**Fig. 31: Removing Front Interior Lamp Lens**  
Courtesy of FORD MOTOR CO.

16. Remove the front interior lamp.
  1. Remove the screws.
  2. Remove the front interior lamp.
    - Disconnect the electrical connector.





G02742995

**Fig. 32: Removing Front Interior Lamp**  
Courtesy of FORD MOTOR CO.

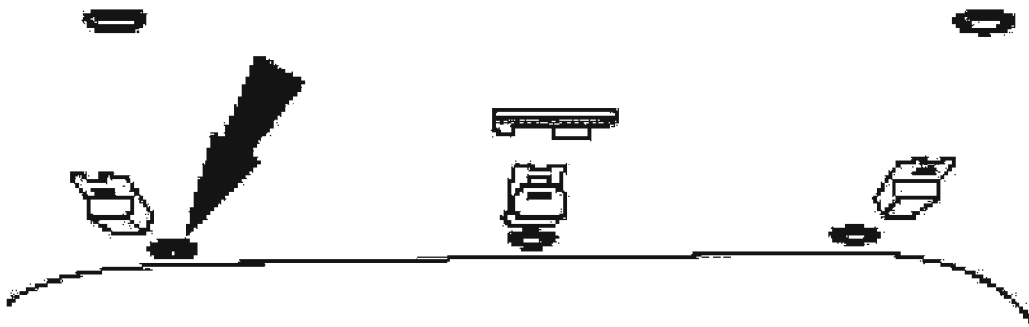
17. Remove the rear interior lamp.
  - Disconnect the electrical connector.



G02742996

**Fig. 33: Removing Rear Interior Lamp**  
Courtesy of FORD MOTOR CO.

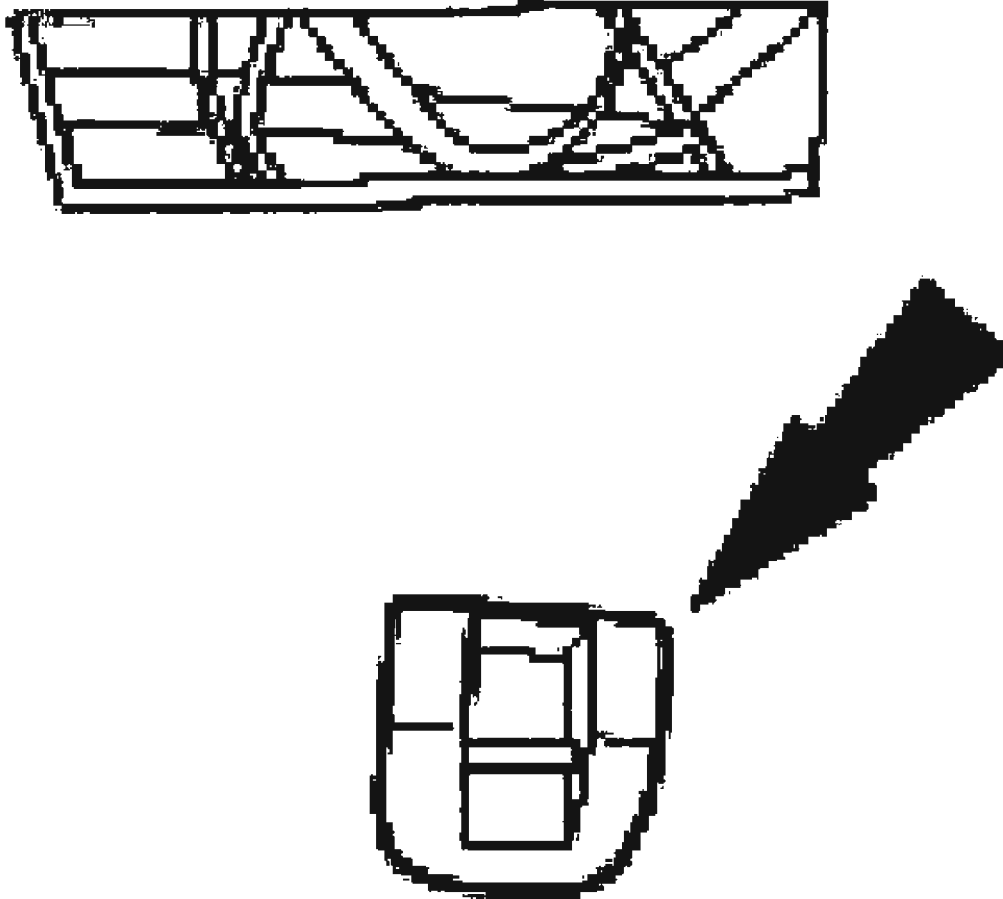
18. Remove the five pin-type retainers.



G02742997

**Fig. 34: Removing Five Pin-Type Retainers**  
Courtesy of FORD MOTOR CO.

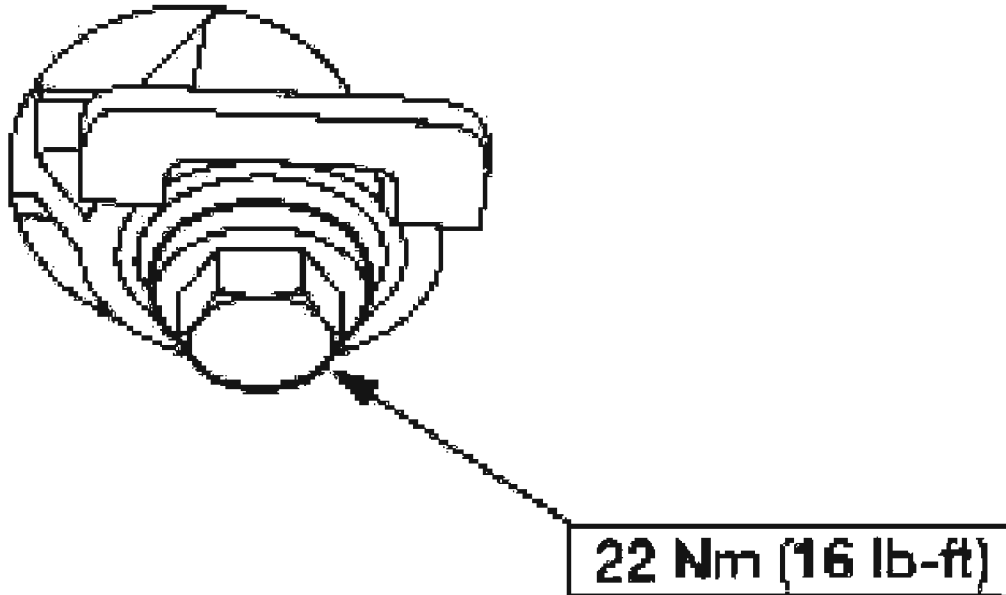
19. If equipped, remove the three child seat tether anchor covers.



G02742998

**Fig. 35: Removing Three Child Seat Tether Anchor Covers**  
Courtesy of FORD MOTOR CO.

20. If equipped, remove the three bolts and the child seat tether anchors.



G02742999

**Fig. 36: Removing Child Seat Tether Anchor Bolt**  
Courtesy of FORD MOTOR CO.

21. Remove the headliner.
22. To install, reverse the removal procedure.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Seating - Escape

## 2004 ACCESSORIES & EQUIPMENT

### Seating - Escape

## SPECIFICATIONS

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Front seat track to floor nuts and bolts	48	35	-
Front seat cushion pan bolts	15	11	-
Front seat backrest bolts	40	30	-
Front seat backrest pivot nut	40	30	-
Front seat cushion side cover screw	2	-	18
Rear seat backrest bolts and nuts	48	35	-
Rear seat cushion bolts	15	11	-
Rear seat cushion bracket bolts	48	35	-
Rear seat backrest latch bolt	40	30	-
Rear seat backrest latch nut	20	15	-
Safety belt pretensioner bolt	40	30	-

## DESCRIPTION AND OPERATION

### SEATS

The seats consist of the following components:

- seat track
- seat track with height adjuster (driver)
- power seat track (driver)
- seat control switch
- heated seat switch
- heated seat grids (in seat cushion and backrest)
- outboard seat cushion side shields
- inboard seat cushion side shields
- side air bags (if equipped)
- safety belt pretensioners
- front seat backrests
- front seat cushions

- 40% rear seat cushion
- 60% rear seat cushion
- 40% rear seat backrest
- 60% rear seat backrest
- bench rear seat backrest
- bench rear seat cushion
- rear seat backrest latches
- rear seat headrests
- headrest guide posts
- rear seat side trim panels
- front seat storage drawer

The seat options consist of:

- high back bucket (leather, driver power, dual map pockets, optional side air bag)
- high back bucket (high series cloth, dual map pockets, driver height adjuster, optional side air bags)
- high back bucket (low series cloth, optional side air bag)
- low back bucket (high series cloth, optional passenger seat trays, optional side air bag)
- bench rear seat (low series cloth, seatback dump latch)
- 60/40 rear seat (high series cloth, seatback dump latch)
- 60/40 rear seat (leather, seatback dump latch)
- heated seat, driver and passenger front only

#### **Side Air Bag**

Driver and passenger side air bags are attached to the seat backrest frame. For diagnostic information or if the side air bag has been deployed, refer to **AIR BAG RESTRAINT SYSTEMS** .


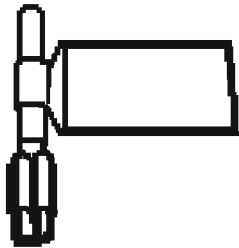
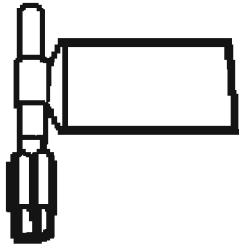
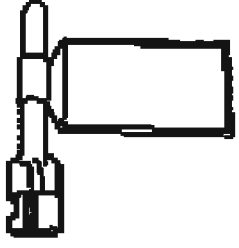
Front seat backrest trim covers installed on seats with side air bags cannot be repaired. The front seat backrest trim covers are to be installed new. Cleaning is permissible.

If a side air bag deployment took place, install a new seat back pad, trim cover and side air bag module. Install a new seat back frame if necessary.

## **DIAGNOSIS AND TESTING**

### **SEATS**

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

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
	Diagnostic Simulator, Restraint System 418-F470 or equivalent
	Diagnostic Simulator, Restraint System 418-F468 or equivalent
	Diagnostic Simulator, Restraint System 418-133

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**Fig. 1: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Seating - Escape

1. Verify the customer concern by operating the power and/or heated seat.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"><li>• Seat control switch</li><li>• Heated seat switch</li><li>• Seat tracks obstructed or damaged</li><li>• Backrest heated grid</li><li>• Seat cushion heated grid</li></ul>	<ul style="list-style-type: none"><li>• Battery junction box (BJB) fuses:<ul style="list-style-type: none"><li>▪ 21 (40A)</li><li>▪ Heated Seat Mini Fuse (30A)</li></ul></li><li>• Central junction box (CJB) fuses:<ul style="list-style-type: none"><li>▪ 26 (30A)</li><li>▪ 16 (10A)</li></ul></li><li>• Circuitry</li><li>• Motor(s)</li></ul>

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**Fig. 2: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

#### Symptom Chart

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>• The power seat is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Battery junction box (BJB) fuse 21 (40A).</li><li>• Central junction box (CJB) fuse 26 (30A).</li><li>• Circuitry.</li><li>• Seat control switch.</li><li>• Seat track.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test A.</u></li></ul>
<ul style="list-style-type: none"><li>• The power seat does not move horizontally/vertically</li></ul>	<ul style="list-style-type: none"><li>• Seat track.</li><li>• Circuitry.</li><li>• Seat control switch .</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test B.</u></li></ul>
<ul style="list-style-type: none"><li>• The heated seat is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Battery junction box (BJB) fuse 9 (30A).</li><li>• Central junction box (CJB) fuse 16 (10A)</li><li>• Heated seat switch.</li><li>• Circuitry.</li><li>• Backrest heated grid.</li><li>• Seat cushion heated grid.</li><li>• Heated seat module.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test C.</u></li></ul>

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**Fig. 3: Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests


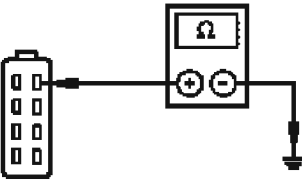
**WARNING:** Always wear safety glasses when repairing an air bag



**supplemental restraint system (SRS) vehicle and when handling an airbag module. This will reduce the risk of injury in the event of an accidental deployment.**


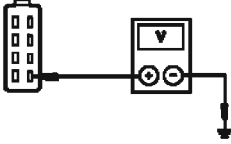
**WARNING:** Never probe the connectors on the air bag module. Doing so can result in air bag deployment, which can result in personal injury.

#### PINPOINT TEST A: THE POWER SEAT IS INOPERATIVE

Test Step	Result / Action to Take
<b>A1 CHECK GROUND CIRCUIT FOR OPEN</b>   <b>WARNING:</b> The restraint system diagnostic tool is for restraint system repair only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of vehicle safety standards. <b>NOTE:</b> If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered. <b>NOTE:</b> The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault. <b>NOTE:</b> The SRS must be fully operational and free of faults before releasing the vehicle to the customer. <ul style="list-style-type: none"> <li>Depower the SRS. For additional information, refer to AIR BAG RESTRAINT SYSTEMS.</li> <li>Disconnect: Seat Control Switch C360.</li> <li>Measure the resistance between the seat control switch C360 pin E, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to A2.</p> <p><b>No</b> REPAIR the circuit. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>

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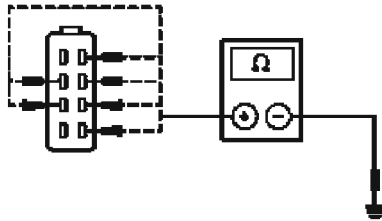
**Fig. 4: Pinpoint Test A: Power Seat Is Inoperative (Step A1)**  
Courtesy of FORD MOTOR CO.

A2 CHECK THE VOLTAGE TO THE SEAT CONTROL SWITCH	
<ul style="list-style-type: none"> <li>For vehicles equipped with seat side air bags, carry out the following: <ul style="list-style-type: none"> <li>Disconnect the driver seat side air bag C367.</li> <li>Connect restraint system diagnostic tool 418-F470 to the driver seat side air bag C367.</li> </ul> </li> <li>Disconnect the driver seat safety belt buckle pretensioner electrical connector at the pretensioner.</li> <li>Connect restraint system diagnostic tool 418-F468 or 418-133 (as applicable) to the driver seat safety belt buckle pretensioner electrical connector.</li> <li> <b>WARNING:</b> Make sure there is no one inside the vehicle and that there is nothing blocking or set in front of any air bag module when the battery is connected.</li> <li>Connect the battery.</li> <li>Measure the voltage between seat control switch C360 pin H, circuit 171 (BK/WH), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b>  <b>INSTALL</b> a new seat control switch. <b>REFER</b> to <b>Seat Control Switch</b>.</p> <p><b>TEST</b> the system for normal operation. For all vehicles, <b>DISCONNECT</b> the battery. <b>DISCONNECT</b> the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. <b>CONNECT</b> the driver seat safety belt buckle pretensioner electrical connector.</p> <p>For vehicles equipped with seat side air bags, <b>DISCONNECT</b> the restraint system diagnostic tool from driver seat side air bag module C367. <b>CONNECT</b> driver seat side air bag module C367.</p> <p>For all vehicles, <b>REPOWER</b> the supplemental restraint system (SRS). For additional information, <b>REFER</b> to <b>AIR BAG RESTRAINT SYSTEMS</b>.</p> <p><b>No</b>  <b>TEST</b> the system for normal operation. For all vehicles, <b>DISCONNECT</b> the battery. <b>DISCONNECT</b> the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. <b>CONNECT</b> the driver seat safety belt buckle pretensioner electrical connector.</p> <p>For vehicles equipped with seat side air bags, <b>DISCONNECT</b> the restraint system diagnostic tool from driver seat side air bag module C367. <b>CONNECT</b> driver seat side air bag module C367.</p> <p>For all vehicles, <b>REPOWER</b> the supplemental restraint system (SRS). For additional information, <b>REFER</b> to <b>AIR BAG RESTRAINT SYSTEMS</b>.</p>

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**Fig. 5: Pinpoint Test A: Power Seat Is Inoperative (Step A2)**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST B: THE POWER SEAT DOES NOT MOVE HORIZONTALLY/VERTICALLY**

Test Step	Result / Action to Take																					
<b>B1 CHECK THE SEAT MOTOR CIRCUITS FOR A SHORT TO GROUND</b>																						
<div><div></div><div><p><b>WARNING:</b> The restraint system diagnostic tool is for restraint system repair only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of vehicle safety standards. <b>NOTE:</b> If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, <b>the supplemental restraint system (SRS) must be depowered.</b> <b>NOTE:</b> The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault. <b>NOTE:</b> The SRS must be fully operational and free of faults before releasing the vehicle to the customer.</p><ul style="list-style-type: none"><li>Depower the SRS. For additional information, refer to AIR BAG RESTRAINT SYSTEMS.</li><li>Disconnect: Seat Control Switch C352.</li><li>Using the following table, measure the resistance between the seat control switch C352 pins, harness side and ground:</li></ul></div></div>	<div><div><p><b>Yes</b></p><p>GO to B2.</p></div><div><p><b>No</b></p><p>REPAIR the circuit in question. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p></div></div>																					
<table border="1"><thead><tr><th>Pin</th><th>Circuit</th><th>Inoperative Motor</th></tr></thead><tbody><tr><td>2</td><td>F</td><td>Forward</td></tr><tr><td>3</td><td>G</td><td>Reverse</td></tr><tr><td>7</td><td>B</td><td>Front Height Up</td></tr><tr><td>8</td><td>A</td><td>Front Height Down</td></tr><tr><td>5</td><td>D</td><td>Rear Height Up</td></tr><tr><td>6</td><td>C</td><td>Rear Height Down</td></tr></tbody></table> <div></div> <ul style="list-style-type: none"><li>Are the resistances greater than 10,000 ohms?</li></ul>	Pin	Circuit	Inoperative Motor	2	F	Forward	3	G	Reverse	7	B	Front Height Up	8	A	Front Height Down	5	D	Rear Height Up	6	C	Rear Height Down	
Pin	Circuit	Inoperative Motor																				
2	F	Forward																				
3	G	Reverse																				
7	B	Front Height Up																				
8	A	Front Height Down																				
5	D	Rear Height Up																				
6	C	Rear Height Down																				

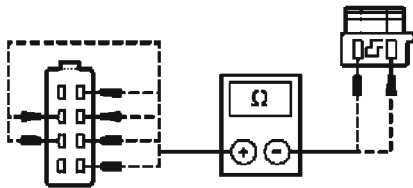
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**Fig. 6: Pinpoint Test B: Power Seat Does Not Move Horizontally/Vertically (Step B1)**  
 Courtesy of FORD MOTOR CO.

**B2 CHECK FOR AN OPEN CIRCUIT**

- Measure the resistance between the seat control switch C352 pins, harness side and the inoperative motor connector, harness side:

C352 Pin	Circuit	Seat Motor Connector
Forward/Reverse Motor		
3	G	Pin 1
2	F	Pin 2
Front Height Motor		
8	A	Pin 1
7	B	Pin 2
Rear Height Motor		
6	C	Pin 1
5	D	Pin 2



- Are all resistance readings less than 5 ohms?

**Yes**  
GO to B3.

**No**  
REPAIR the circuit in question. REPOWER the supplemental restraint system (SRS).

For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.

TEST the system for normal operation.

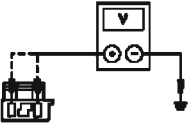
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**Fig. 7: Pinpoint Test B: Power Seat Does Not Move Horizontally/Vertically (Step B2)**  
Courtesy of FORD MOTOR CO.

**B3 CHECK THE SEAT MOTOR OPERATION**

- For vehicles equipped with seat side air bags, carry out the following:
  - Disconnect the driver seat side air bag C367.
  - Connect restraint system diagnostic tool 418-F470 to the driver seat side air bag C367.
- Disconnect the driver seat safety belt buckle pretensioner electrical connector at the pretensioner.
- Connect restraint system diagnostic tool 418-F468 or 418-133 (as applicable) to the driver seat safety belt buckle pretensioner electrical connector.
- ⚠ WARNING: Make sure there is no one inside the vehicle and that there is nothing blocking or set in front of any air bag module when the battery is connected.**
- Connect the battery.
- Disconnect: Seat Motor Connectors.
- Using the following table, measure the voltage between the seat motor connectors, harness side and ground, while moving the seat control switch in the indicated direction:

Seat Motor Connector	Pin	Circuit	Direction of Control Switch
Forward/ Reverse Motor	2	F	Forward
Forward/ Reverse Motor	1	G	Reverse
Front Height Motor	2	B	Up
Front Height Motor	1	A	Down
Rear Height Motor	2	D	Up
Rear Height Motor	1	C	Down



- Are the voltages greater than 10 volts in the operative directions?

**Yes**  
 INSTALL a new driver seat track. REFER to Seat Track — Driver Seat.

TEST the system for normal operation. For all vehicles, DISCONNECT the battery.  
 DISCONNECT the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. CONNECT the driver seat safety belt buckle pretensioner electrical connector.

For vehicles equipped with seat side air bags, DISCONNECT the restraint system diagnostic tool from driver seat side air bag module C367. CONNECT driver seat side air bag module C367.

For all vehicles, REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.

**No**  
 INSTALL a new seat control switch. REFER to Seat Control Switch.

TEST the system for normal operation. For all vehicles, DISCONNECT the battery.  
 DISCONNECT the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. CONNECT the driver seat safety belt buckle pretensioner electrical connector.

For vehicles equipped with seat side air bags, DISCONNECT the restraint system diagnostic tool from driver seat side air bag module C367. CONNECT driver seat side air bag module C367.

For all vehicles, REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.


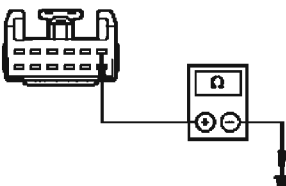
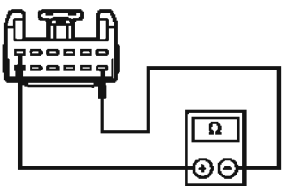
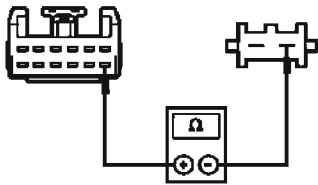
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**Fig. 8: Pinpoint Test B: Power Seat Does Not Move Horizontally/Vertically (Step B3)**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST C: THE HEATED SEAT IS INOPERATIVE**

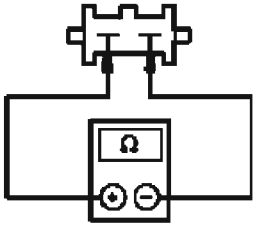
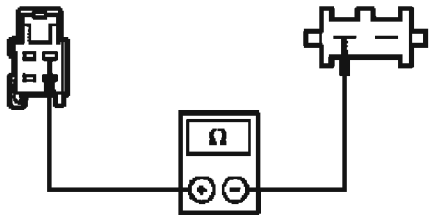
## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Seating - Escape

Test Step	Result / Action to Take
<b>C1 CHECK HEATED SEAT MODULE GROUND</b>   <b>WARNING:</b> The restraint system diagnostic tool is for restraint system repair only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of vehicle safety standards. <b>NOTE:</b> If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered. <b>NOTE:</b> The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault. <b>NOTE:</b> The SRS must be fully operational and free of faults before releasing the vehicle to the customer. <ul style="list-style-type: none"> <li>Depower the SRS. For additional information, refer to AIR BAG RESTRAINT SYSTEMS.</li> <li>Key in OFF position.</li> <li>Disconnect: Left/Right Inoperative Heated Seat Module C359/C329.</li> <li>Measure the resistance between the inoperative heated seat module C359/C329 pin 1, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C2</u>.</p> <p><b>No</b> REPAIR the circuit. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.</p> <p>TEST the system for normal operation.</p>
<b>C2 CHECK HEATER GRIDS FOR INTEGRITY</b>  <ul style="list-style-type: none"> <li>Measure the resistance between the inoperative heated seat module C359/C329 pin 6, circuit 1064 (YE/LB), harness side and inoperative heated seat module C359/C329 pin 7, circuit 1067 (VT/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance between 0.5 - 10 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C6</u>.</p> <p><b>No</b> GO to <u>C3</u>.</p>
<b>C3 CHECK CIRCUIT 1067 (VT/LB) FOR OPEN</b>  <ul style="list-style-type: none"> <li>Disconnect: Inoperative Backrest Heated Grid C365/C335.</li> <li>Measure the resistance between the inoperative heated seat module C359/C329 pin 7, circuit 1067 (VT/LB), harness side and the inoperative backrest heated grid C365/C335 pin 2, circuit 1067 (BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C4</u>.</p> <p><b>No</b> REPAIR circuit 1067 (VT/LB). REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>

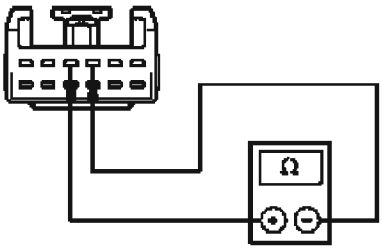
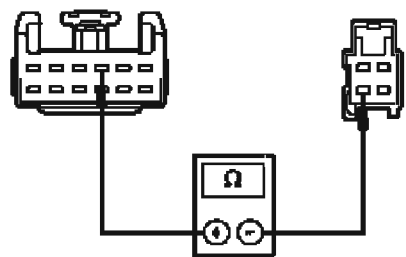
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**Fig. 9: Pinpoint Test C: Heated Seat Is Inoperative (Step C1-C3)**  
 Courtesy of FORD MOTOR CO.

<p><b>C4 CHECK BACKREST HEATED GRID</b></p> <ul style="list-style-type: none"> <li>Measure the resistance across the inoperative backrest heated grid C365/C335 pin 1 circuit 1067 (BK) and pin 2 circuit 1066 (BK), component side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance between 0.5 - 10 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C5</u>.</p> <p><b>No</b> INSTALL a new front seat backrest. REFER to <u>Front Seat Backrest — Driver Seat Front Seat Backrest — Passenger Seat</u>. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>
<p><b>C5 CHECK CIRCUIT 1064 (RD) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: Inoperative Seat Cushion Heated Grid C364/C334.</li> <li>Measure the resistance between the inoperative seat cushion heated grid C364/C334 pin 1, circuit 1064 (RD), harness side and the backrest heated grid C365/C335 pin 1, circuit 1066 (BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> REPAIR circuit 1064 (YE/LB) between the inoperative heated seat module C359/C329 and harness C364/C334. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new front seat cushion. REFER to <u>Front Seat Cushion — Driver Seat or Front Seat Cushion — Passenger Seat</u>. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>

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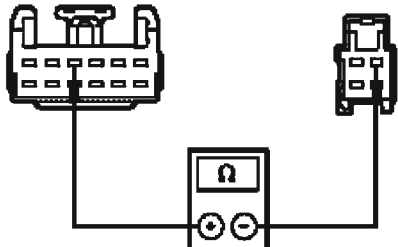
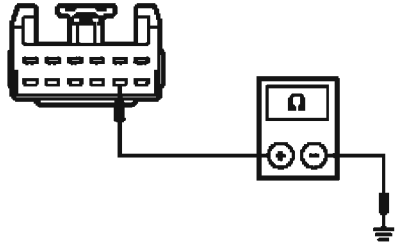
**Fig. 10: Pinpoint Test C: Heated Seat Is Inoperative (Step C4-C5)**  
Courtesy of FORD MOTOR CO.

<p><b>C6 CHECK HEATED SEAT SENSOR</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the inoperative heated seat module C359/C329 pin 4, circuit 1060 (BK/LB), harness side and heated seat module C359/C329 pin 3, circuit 1061 (BN/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance between 2 - 8 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C9</u>.</p> <p><b>No</b> GO to <u>C7</u>.</p>
<p><b>C7 CHECK CIRCUIT 1061 (BN/LB) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: Inoperative Seat Cushion Heated Grid C364/C334.</li> <li>Measure the resistance between the inoperative seat cushion heated grid C364/C334 pin 3, circuit 1061 (BN/LB), harness side and the heated seat module C359/C329 pin 3, circuit 1061 (BN/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C8</u>.</p> <p><b>No</b> REPAIR the circuit. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>

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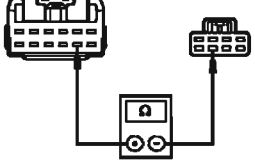
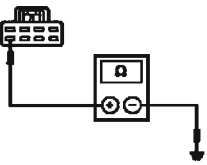
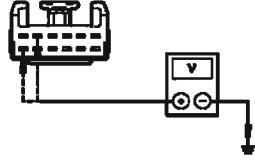
**Fig. 11: Pinpoint Test C: Heated Seat Is Inoperative (Step C6-C7)**  
 Courtesy of FORD MOTOR CO.



<p><b>C8 CHECK CIRCUIT 1060 (BK/LB) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the inoperative heated seat module C359/C329 pin 4, circuit 1060 (BK/LB), harness side and the seat cushion heated grid C364/C334 pin 2, circuit 1060 (BK/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b>  <b>INSTALL</b> a new front seat cushion. REFER to <u>Front Seat Cushion — Driver Seat or Front Seat Cushion — Passenger Seat</u>.  <b>REPOWER</b> the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p> <p><b>No</b>  <b>REPAIR</b> the circuit. <b>REPOWER</b> the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>
<p><b>C9 CHECK HEATED SEAT SWITCH</b></p> <ul style="list-style-type: none"> <li><b>NOTE:</b> An analog ohmmeter (or digital in analog mode) must be used in this step in order to observe the momentary grounding of circuit 1020 (DG/VT) when operating the heated seat switch.</li> <li>Measure the resistance between the inoperative heated seat module C359/C329 pin 11, circuit 1020 (DG/VT), harness side and ground. Observe the ohmmeter while operating the inoperative heated seat switch.</li> </ul>  <ul style="list-style-type: none"> <li>Does the resistance reading drop to less than 5 ohms momentarily?</li> </ul>	<p><b>Yes</b>  GO to <u>C12</u>.</p> <p><b>No</b>  GO to <u>C10</u>.</p>

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**Fig. 12: Pinpoint Test C: Heated Seat Is Inoperative (Step C8-C9)**  
 Courtesy of FORD MOTOR CO.

<b>C10 CHECK CIRCUIT 1020 (DG/VT) FOR OPEN</b> <ul style="list-style-type: none"> <li>Disconnect Inoperative Heated Seat Switch C320/C321.</li> <li>Measure the resistance between the inoperative heated seat switch C320/C321 pin 2, circuit 1020 (DG/VT), harness side and heated seat module C359/C329 pin 11, circuit 1020 (DG/VT), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to C11.</p> <p><b>No</b> REPAIR the circuit. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.</p> <p>TEST the system for normal operation.</p>
<b>C11 CHECK THE HEATED SEAT SWITCH GROUND CIRCUIT 57 (BK)</b> <ul style="list-style-type: none"> <li>Measure the resistance between the inoperative heated seat switch C320/C321 pin 1, circuit 57 (BK), harness side and ground</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new heated seat switch. REFER to Heated Seat Switch. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS. TEST the system for normal operation.</p>
<b>C12 CHECK POWER TO THE HEATED SEAT MODULE</b> <ul style="list-style-type: none"> <li>For vehicles equipped with seat side air bags, carry out the following:             <ul style="list-style-type: none"> <li>Disconnect the driver seat side air bag C367.</li> <li>Connect restraint system diagnostic tool 418-F470 to the driver seat side air bag C367.</li> </ul> </li> <li>Disconnect the driver seat safety belt buckle pretensioner electrical connector at the pretensioner.</li> <li>Connect restraint system diagnostic tool 418-F468 or 418-133 (as applicable) to the driver seat safety belt buckle pretensioner electrical connector.</li> <li><b>WARNING:</b> Make sure there is no one inside the vehicle and that there is nothing blocking or set in front of any air bag module when the battery is connected.</li> <li>Connect the battery.</li> <li>Key in ON position.</li> <li>Measure the voltage between the inoperative heated seat module C359/C329 pin 5, circuit 41 (BK/LB), harness side and ground; pin 12 circuit 1153 (RD/BK) harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to C13.</p> <p><b>No</b> REPAIR the circuit(s).</p> <p>TEST the system for normal operation. For all vehicles, DISCONNECT the battery. DISCONNECT the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. CONNECT the driver seat safety belt buckle pretensioner electrical connector.</p> <p>For vehicles equipped with seat side air bags, DISCONNECT the restraint system diagnostic tool from driver seat side air bag module C367. CONNECT driver seat side air bag module C367.</p> <p>For all vehicles, REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.</p>

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**Fig. 13: Pinpoint Test C: Heated Seat Is Inoperative (Step C10-C12)**  
**Courtesy of FORD MOTOR CO.**

C13 CHECK FOR CORRECT MODULE OPERATION	
<ul style="list-style-type: none"> <li>• Disconnect all the inoperative heated seat module connectors.</li> <li>• Check for:             <ul style="list-style-type: none"> <li>• corrosion</li> <li>• pushed-out pins</li> </ul> </li> <li>• Connect all heated seat module connectors and make sure they seat correctly.</li> <li>• Operate the system and verify the concern is still present.</li> <li>• <b>Is the concern still present?</b></li> </ul>	<p><b>Yes</b>            INSTALL a new heated seat module. REFER to <u>Heated Seat Module</u>.</p> <p>TEST the system for normal operation. For all vehicles, DISCONNECT the battery.</p> <p>DISCONNECT the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. CONNECT the driver seat safety belt buckle pretensioner electrical connector.</p> <p>For vehicles equipped with seat side air bags, DISCONNECT the restraint system diagnostic tool from driver seat side air bag module C367. CONNECT driver seat side air bag module C367.</p> <p>For all vehicles, REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.</p> <p><b>No</b>            The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector.</p> <p>TEST the system for normal operation. For all vehicles, DISCONNECT the battery.</p> <p>DISCONNECT the restraint system diagnostic tool from the driver seat safety belt buckle pretensioner electrical connector. CONNECT the driver seat safety belt buckle pretensioner electrical connector.</p> <p>For vehicles equipped with seat side air bags, DISCONNECT the restraint system diagnostic tool from driver seat side air bag module C367. CONNECT driver seat side air bag module C367.</p> <p>For all vehicles, REPOWER the supplemental restraint system (SRS). For additional information, REFER to AIR BAG RESTRAINT SYSTEMS.</p>

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**Fig. 14: Pinpoint Test C: Heated Seat Is Inoperative (Step C13)**  
 Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

### SEAT CONTROL SWITCH

## Removal and Installation

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and

before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

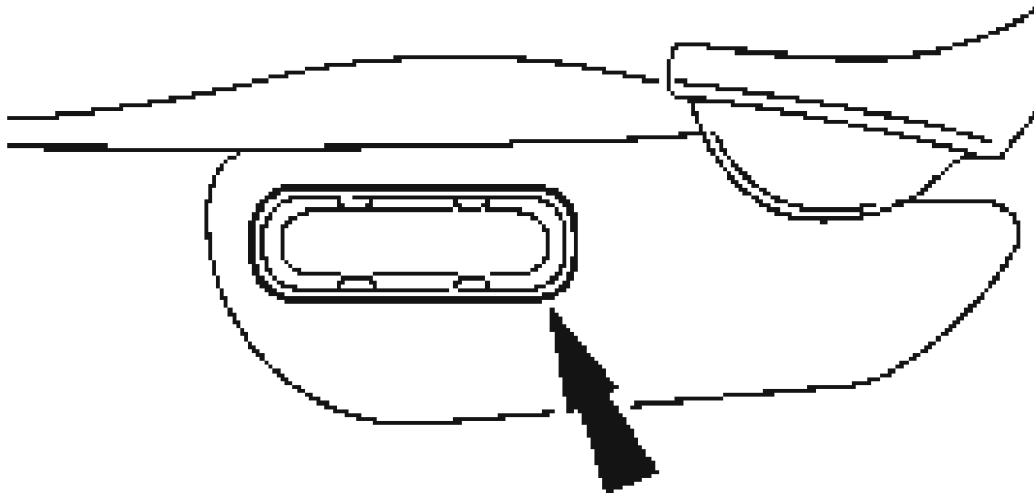
**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before

releasing the vehicle to the customer.

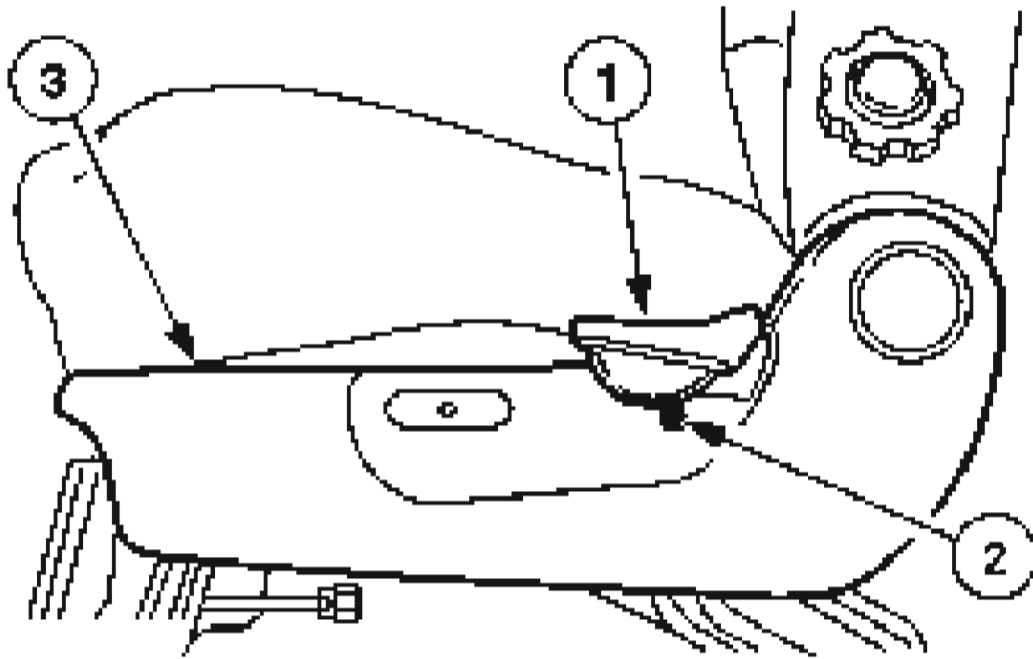
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.
1. Depower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS** .
  2. Remove the seat control switch knob.



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**Fig. 15: Removing Seat Control Switch Knob**  
Courtesy of FORD MOTOR CO.

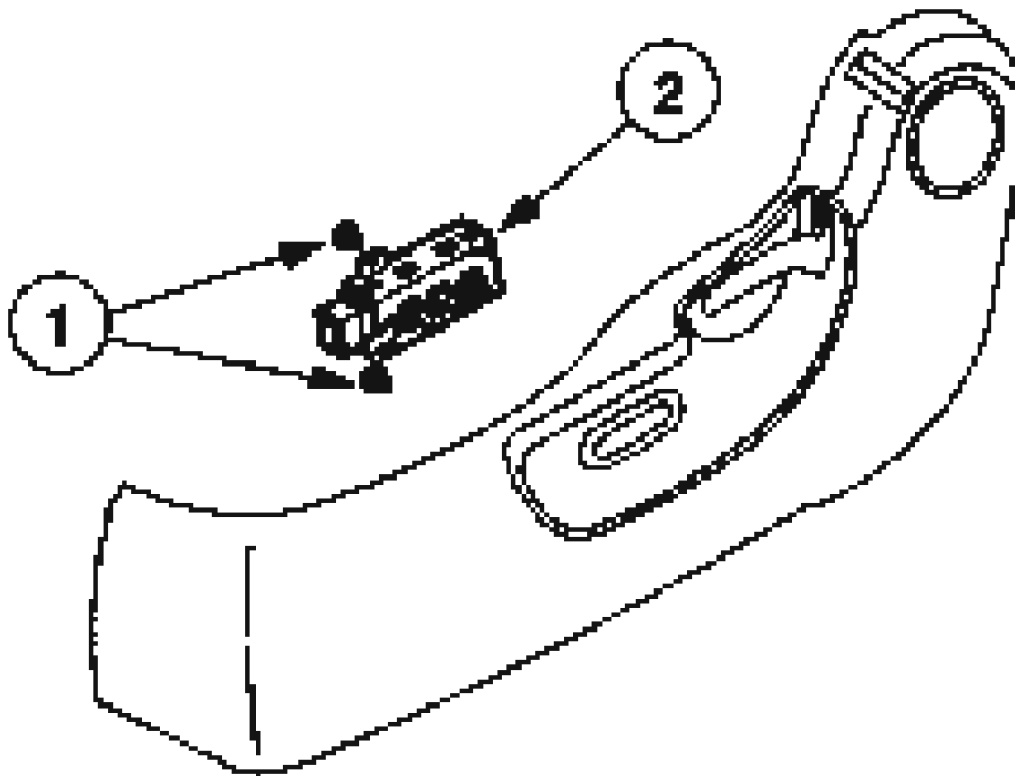
3. Remove the front seat cushion side shield.
  1. Remove the seat backrest handle.
  2. Remove the screw.
  3. Remove the shield.
    - Disconnect the electrical connector(s).



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**Fig. 16: Removing Front Seat Cushion Side Shield**  
**Courtesy of FORD MOTOR CO.**

4. Remove the seat control switch.
  1. Remove the screws.
  2. Remove the switch.



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**Fig. 17: Removing Seat Control Switch**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.
6. Repower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS** .

#### HEATED SEAT SWITCH

##### Removal and Installation

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear



seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of

the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

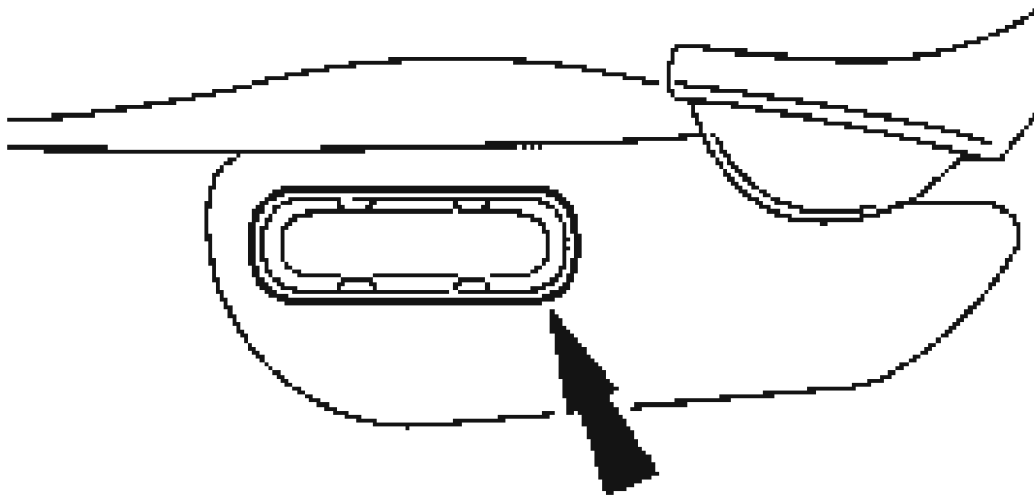
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

**NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback

**frame should be installed if necessary.**

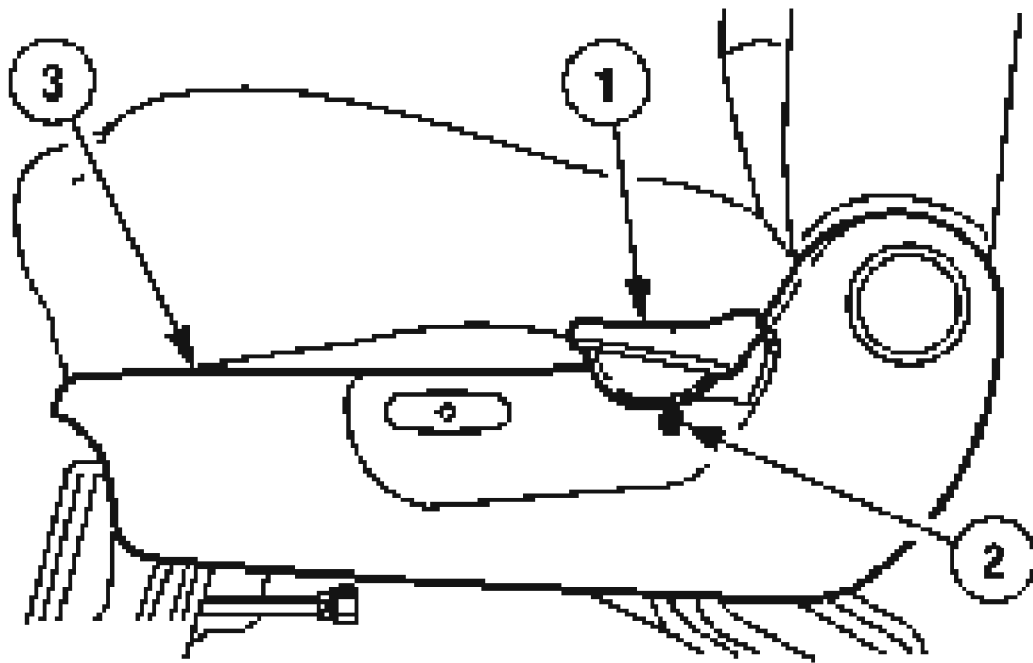
1. Depower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**.
2. Remove the seat control switch knob.



G02743049

**Fig. 18: Removing Seat Control Switch Knob**  
Courtesy of FORD MOTOR CO.

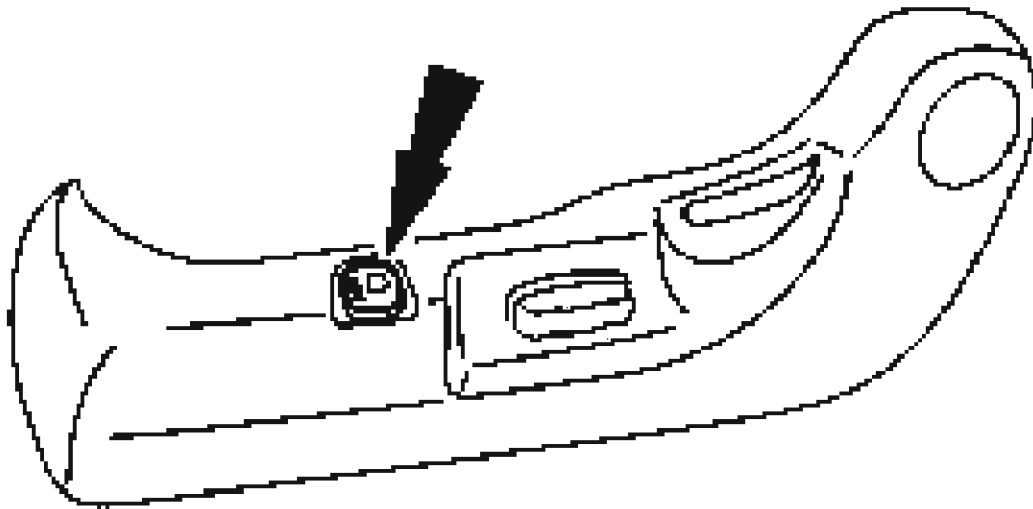
3. Remove the front seat cushion side shield.
  1. Remove the seat backrest handle.
  2. Remove the screw.
  3. Remove the shield.
    - Disconnect the electrical connectors.



G02743050

**Fig. 19: Removing Front Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

4. Release the locking tab and remove the heated seat switch.



G02743051

**Fig. 20: Releasing Locking Tab And Removing Heated Seat Switch**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.
6. Repower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS** .

#### **FRONT SEAT BACKREST - DRIVER SEAT**

##### **Removal**

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of

an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Install and correctly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

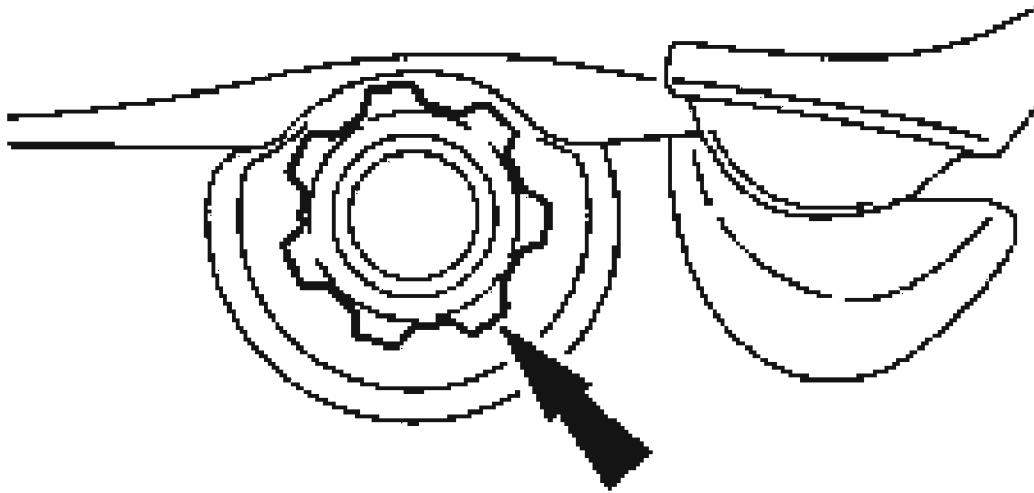
To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.
1. Remove the driver seat and depower the SRS. For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**.
  2. If equipped, remove the seat height adjustment control.

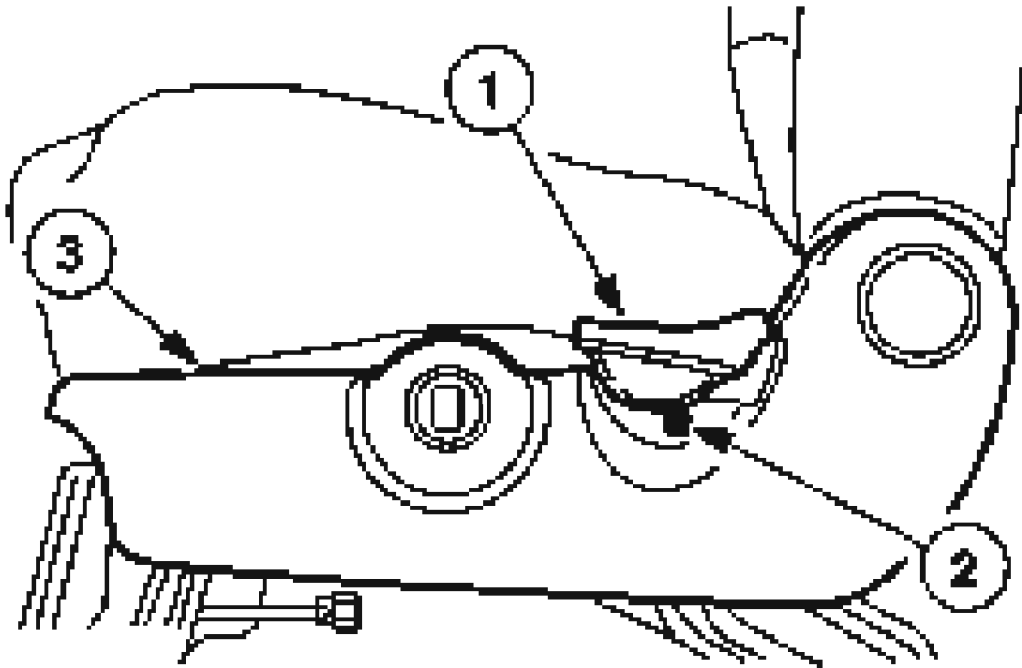


G02743052

**Fig. 21: Removing Seat Height Adjustment Control**  
**Courtesy of FORD MOTOR CO.**

3. Remove the outboard seat cushion side shield.
  1. Remove the seat backrest handle.
  2. Remove the screw.
  3. Remove the shield.
    - If equipped with a power/heated seat, disconnect the electrical connector(s).

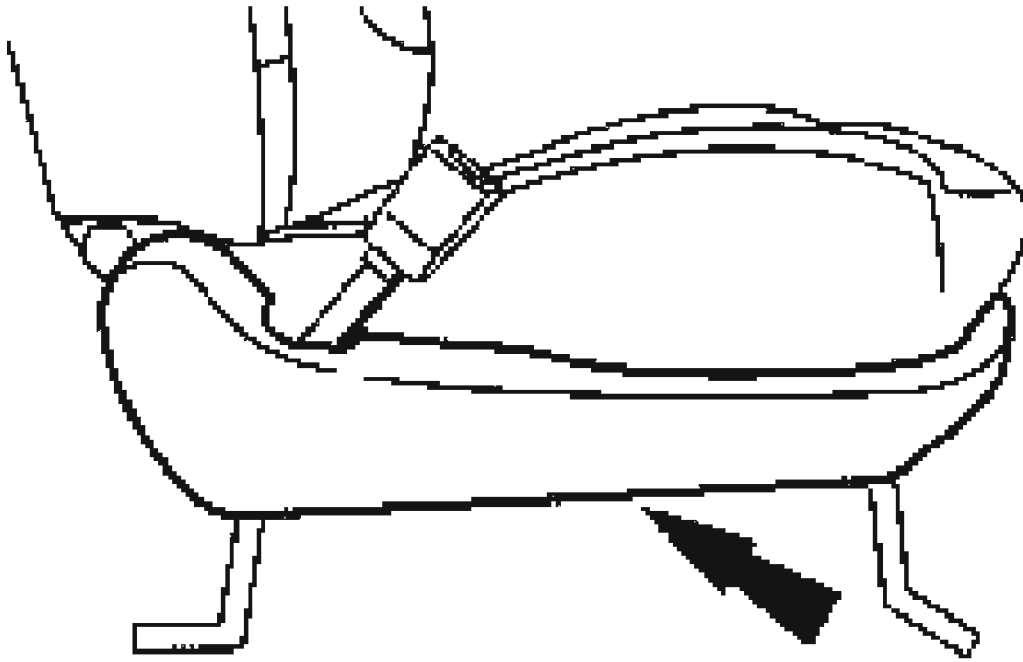




G02743053

**Fig. 22: Removing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

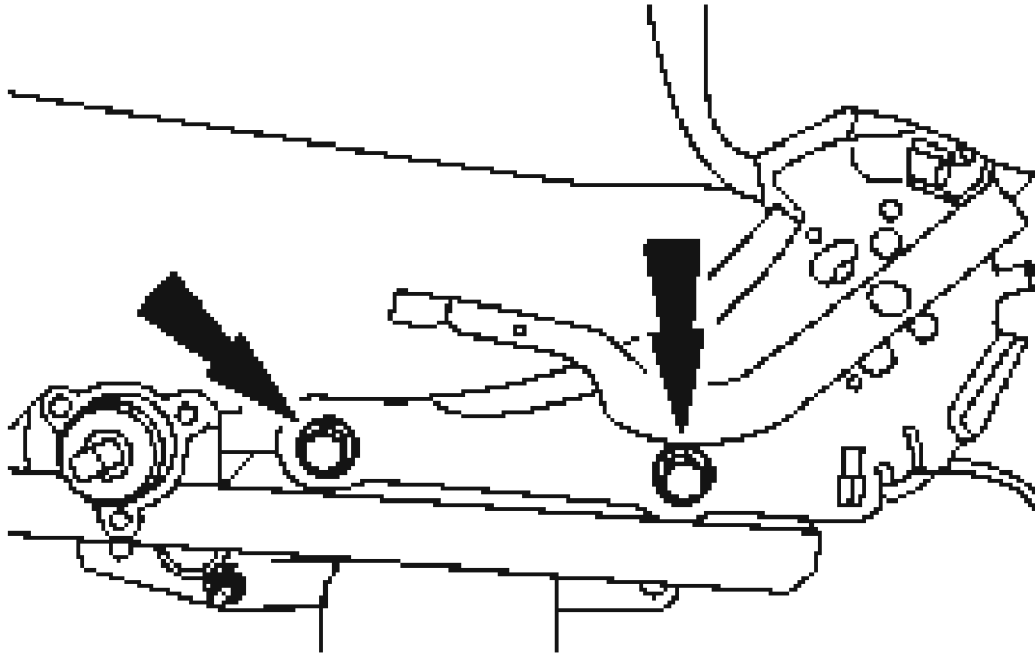
4. Remove the inboard seat cushion side shield.



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**Fig. 23: Removing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

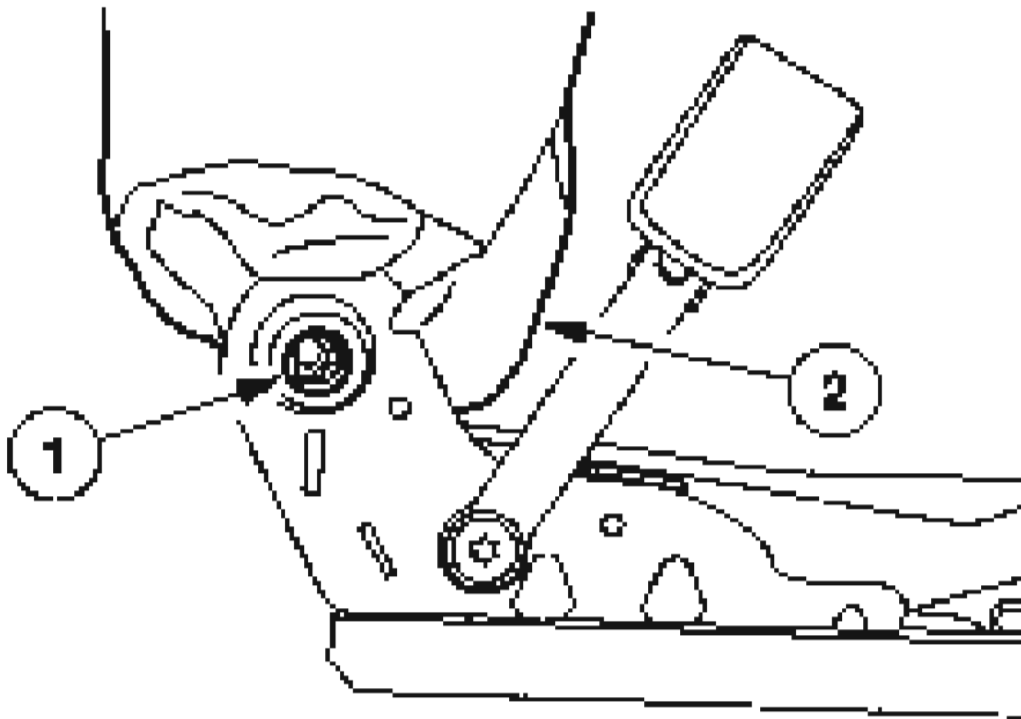
5. Remove the front seat backrest bolts.



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**Fig. 24: Removing Front Seat Backrest Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** If equipped with a side air bag module, note the routing of the wiring harness for installation.



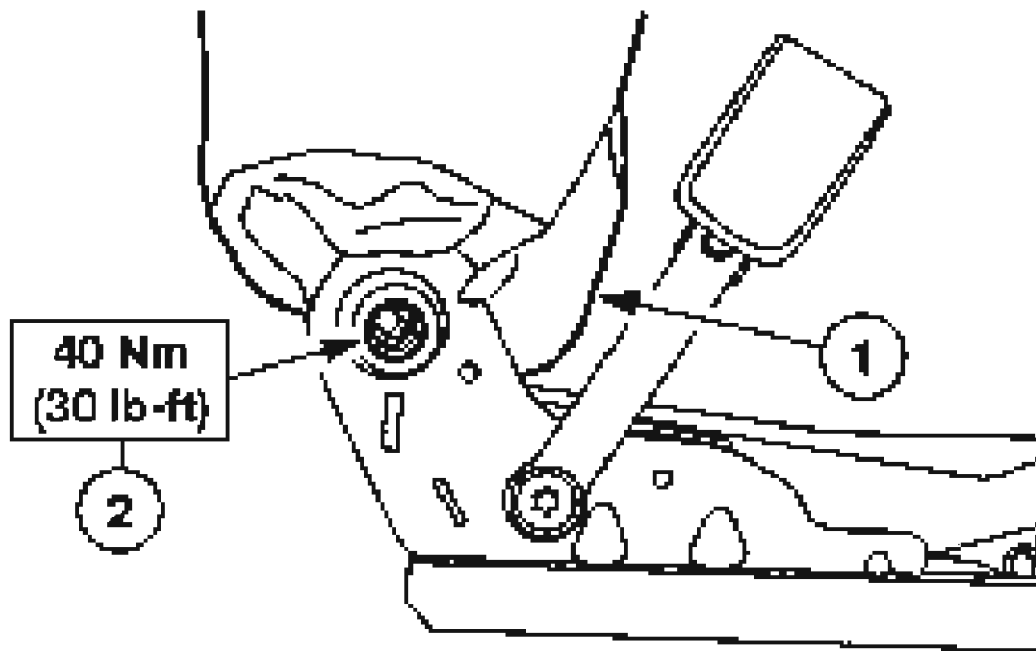
G02743056

**Fig. 25: Removing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

6. Remove the front seat backrest.
  1. Remove the pivot nut.
  2. Remove the backrest.
    - If equipped with heated seats, disconnect the backrest heated grid electrical connector.

#### Installation

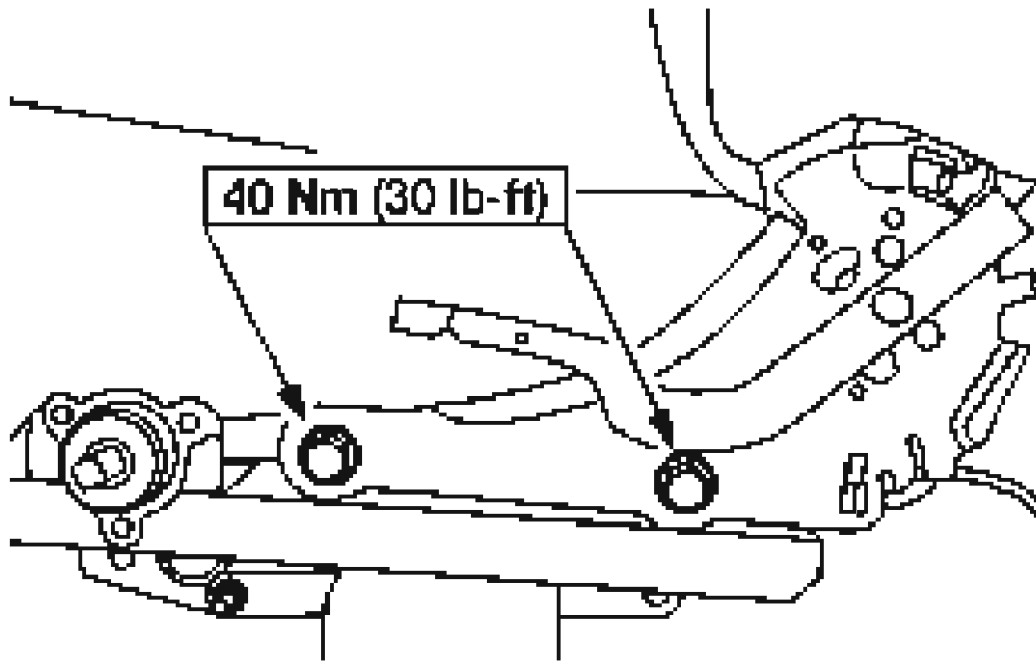
1. Install the front seat backrest.
  1. Install the backrest.
  2. Install the pivot nut.



G02743057

**Fig. 26: Installing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

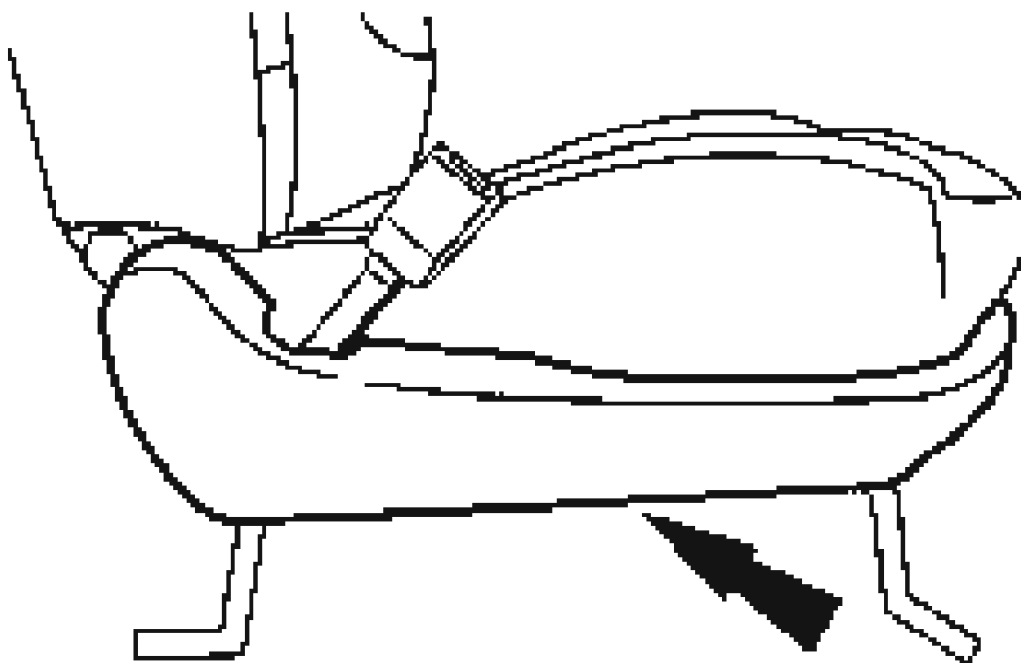
2. Install the front seat backrest bolts.
  - If equipped with heated seats, connect the backrest heated grid electrical connector.



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**Fig. 27: Identifying Front Seat Backrest Bolts Torque Specification**  
**Courtesy of FORD MOTOR CO.**

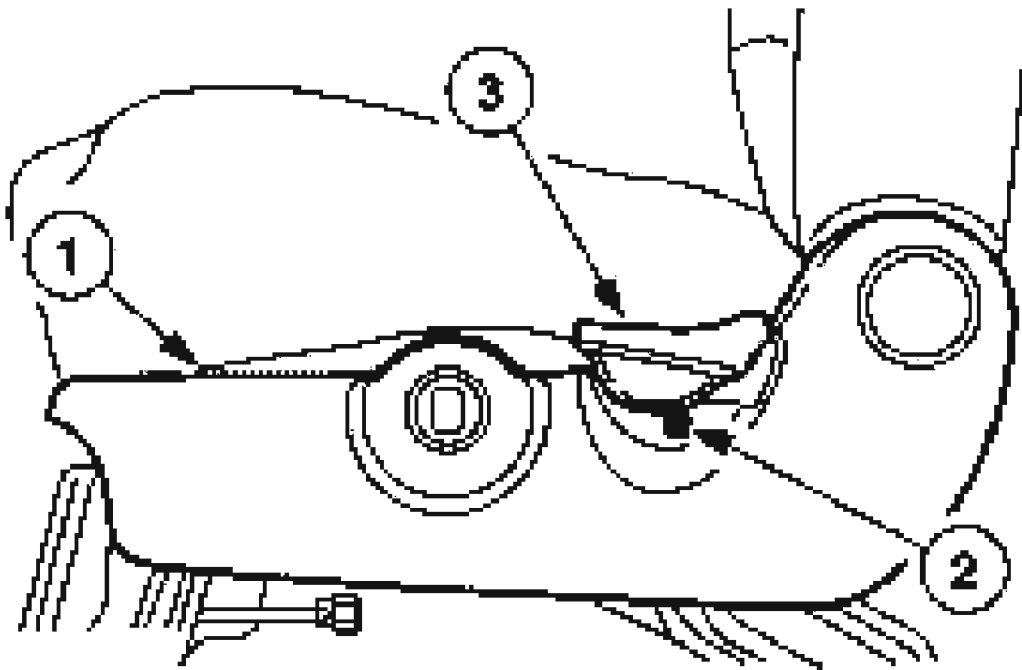
3. Install the inboard seat cushion side shield.



G02743059

**Fig. 28: Installing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

4. Install the outboard seat cushion side shield.
  - If equipped with a power/heated seat, connect the electrical connector(s).
2. Install the shield.
3. Install the screw.
4. Install the seat backrest handle.

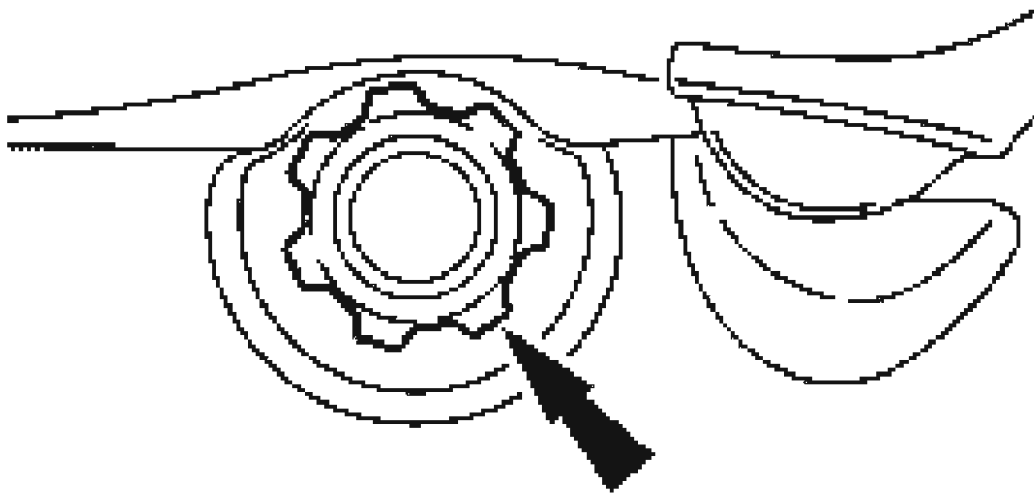


G02743060

**Fig. 29: Installing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

5. If equipped, install the seat height adjustment control.





G02743061

**Fig. 30: Installing Seat Height Adjustment Control**  
Courtesy of FORD MOTOR CO.

6. Install the driver seat and repower the SRS. For additional information, refer to **DRIVER SEAT**.
7. Check the restraint system for correct operation.

#### FRONT SEAT BACKREST - PASSENGER SEAT

##### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these

instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to **AIR BAG RESTRAINT SYSTEMS** to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

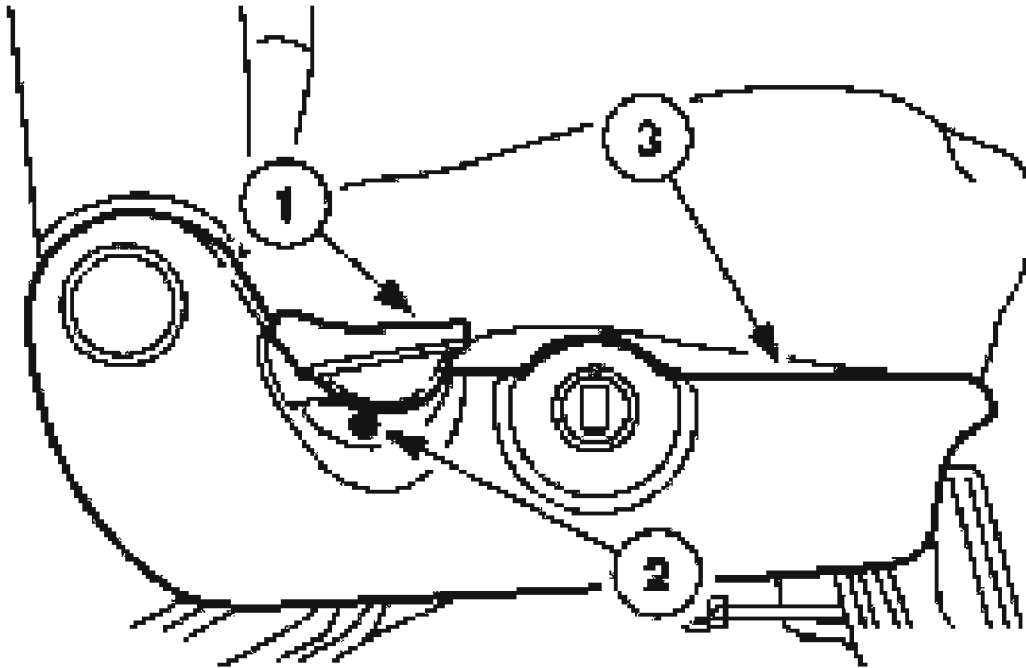
**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.
1. Remove passenger seat and depower the SRS. For additional information, refer to **PASSENGER SEAT**.
  2. Remove the outboard seat cushion side shield.
    1. Remove the seat backrest handle.
    2. Remove the screw.

3. Remove the shield.

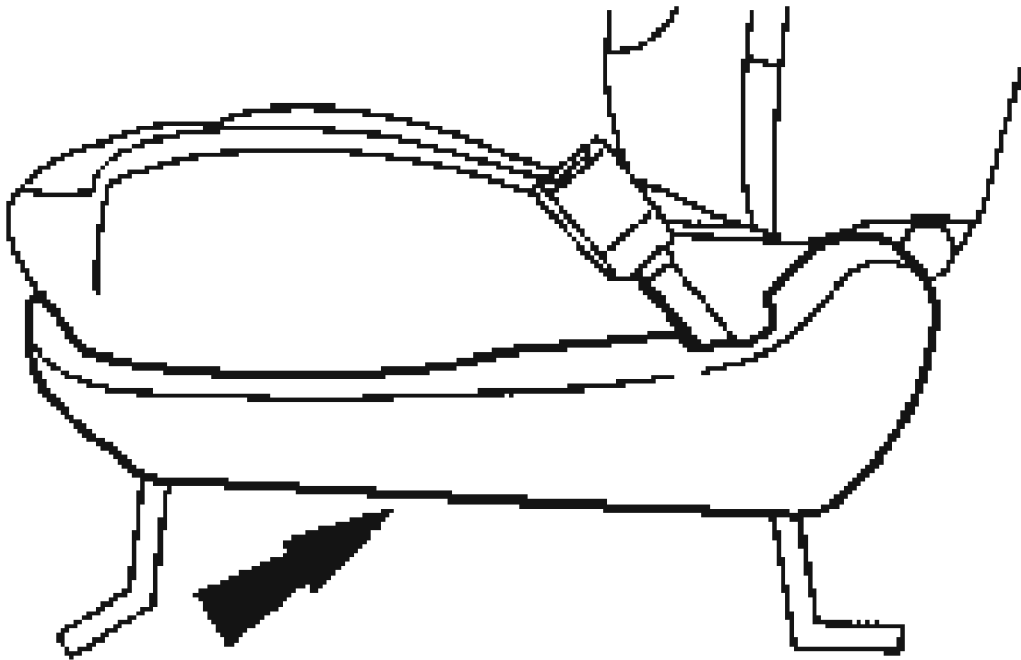
- If equipped with a heated seat, disconnect the electrical connector.



G02743062

**Fig. 31: Removing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

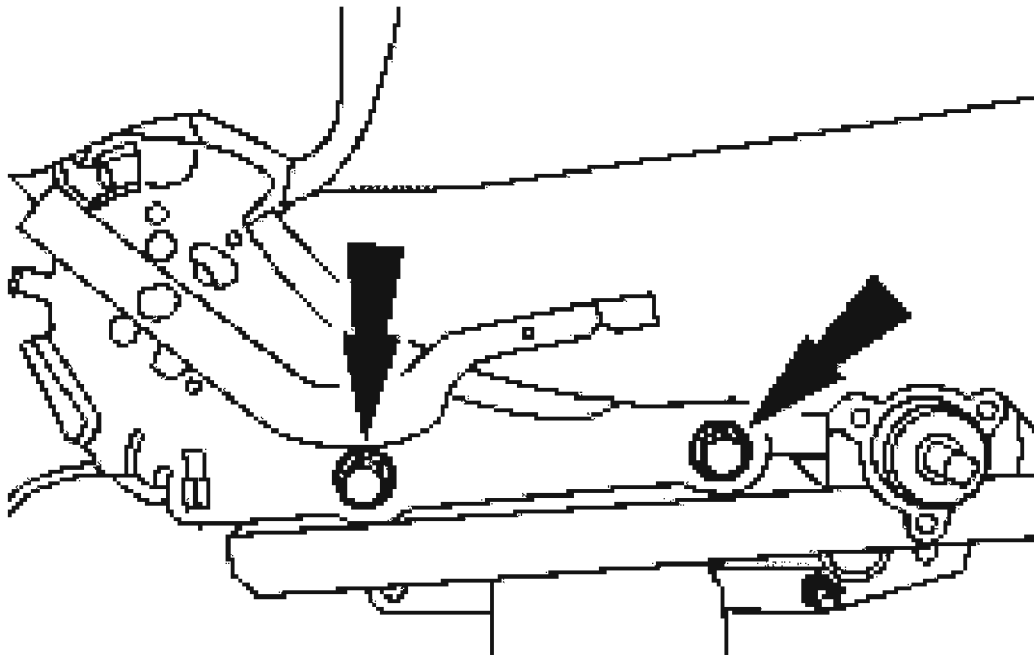
3. Remove the inboard seat cushion side shield.



G02743063

**Fig. 32: Removing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

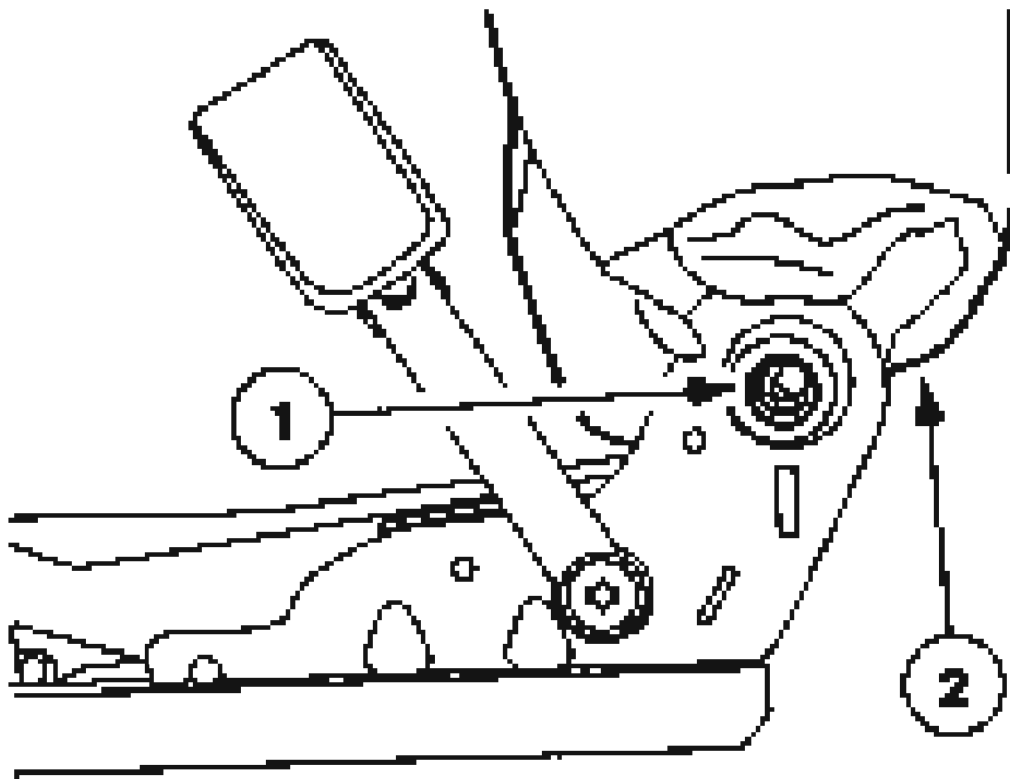
4. Remove the front seat backrest bolts.



G02743064

**Fig. 33: Removing Front Seat Backrest Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** If equipped with a side air bag module, note the routing of the wiring harness for installation.



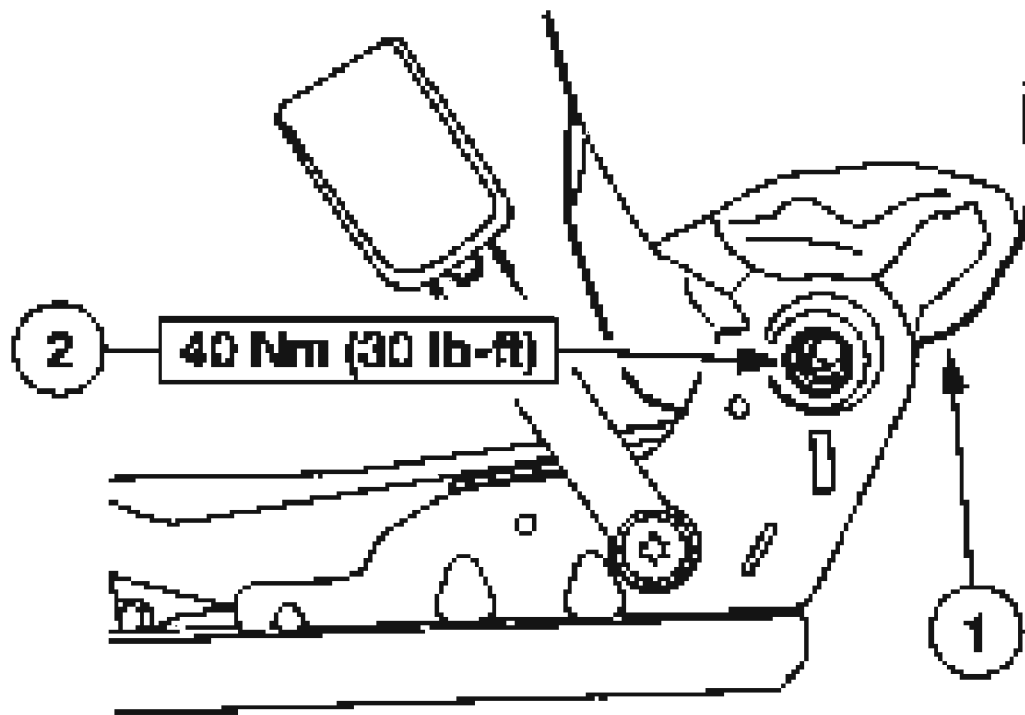
G02743065

**Fig. 34: Removing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

5. Remove the front seat backrest.
  1. Remove the pivot nut.
  2. Remove the backrest.
    - If equipped with heated seats, disconnect the backrest heated grid electrical connector.

#### Installation

1. Install the front seat backrest.
  1. Install the backrest.
  2. Install the pivot nut.

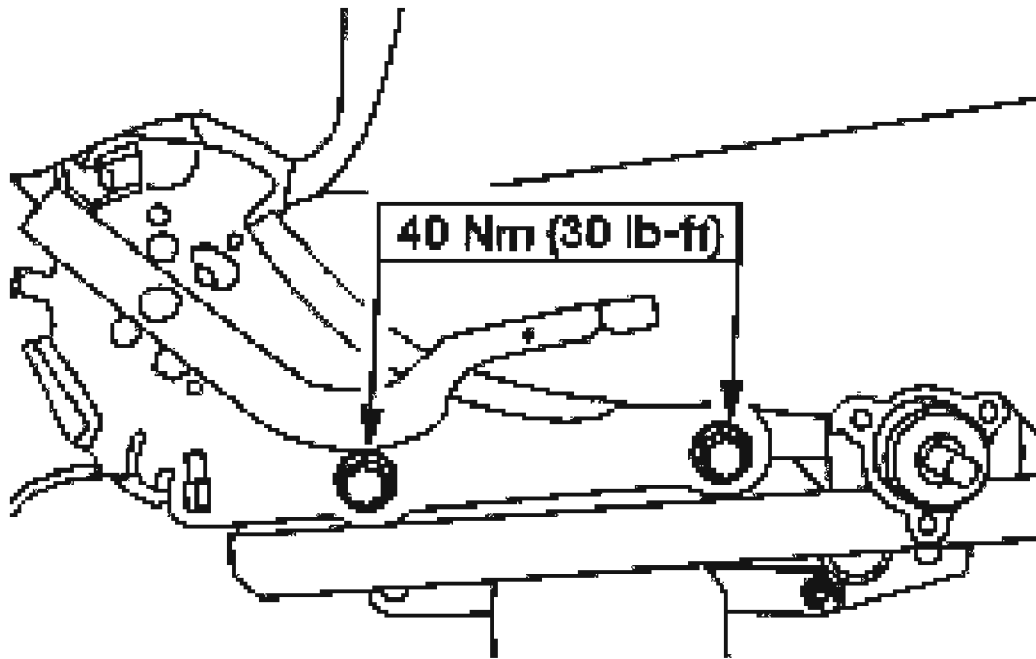


G02743066

**Fig. 35: Installing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

2. Install the front seat backrest bolts.
  - If equipped with heated seats, connect the backrest heated grid connector.

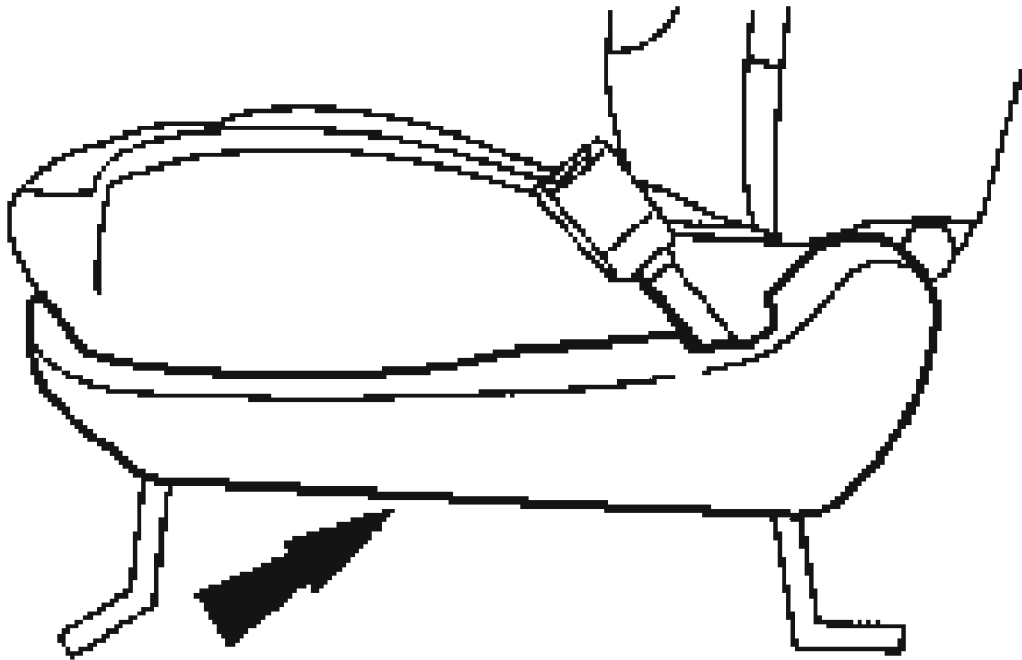




G02743067

**Fig. 36: Identifying Front Seat Backrest Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

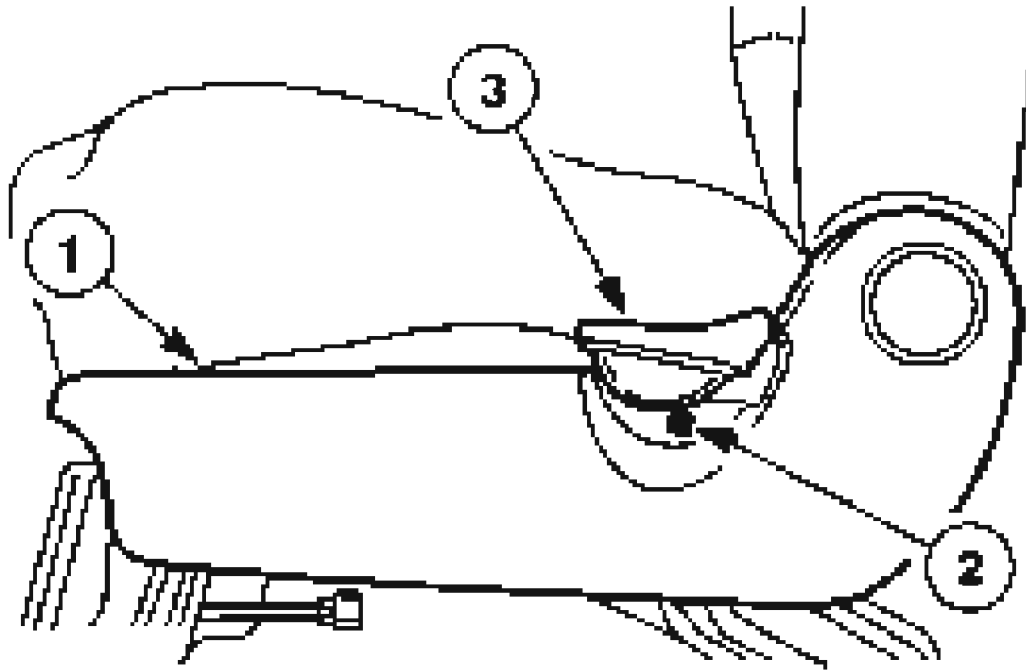
3. Install the inboard seat cushion side shield.



G02743068

**Fig. 37: Installing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

4. Install the outboard seat cushion side shield.
  - If equipped with a heated seat, connect the electrical connector.
2. Install the shield.
3. Install the screw.
4. Install the seat backrest handle.



G02743069

**Fig. 38: Installing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

5. Install the passenger seat and repower the SRS. For additional information, refer to **PASSENGER SEAT**.
6. Check the restraint system for correct operation.

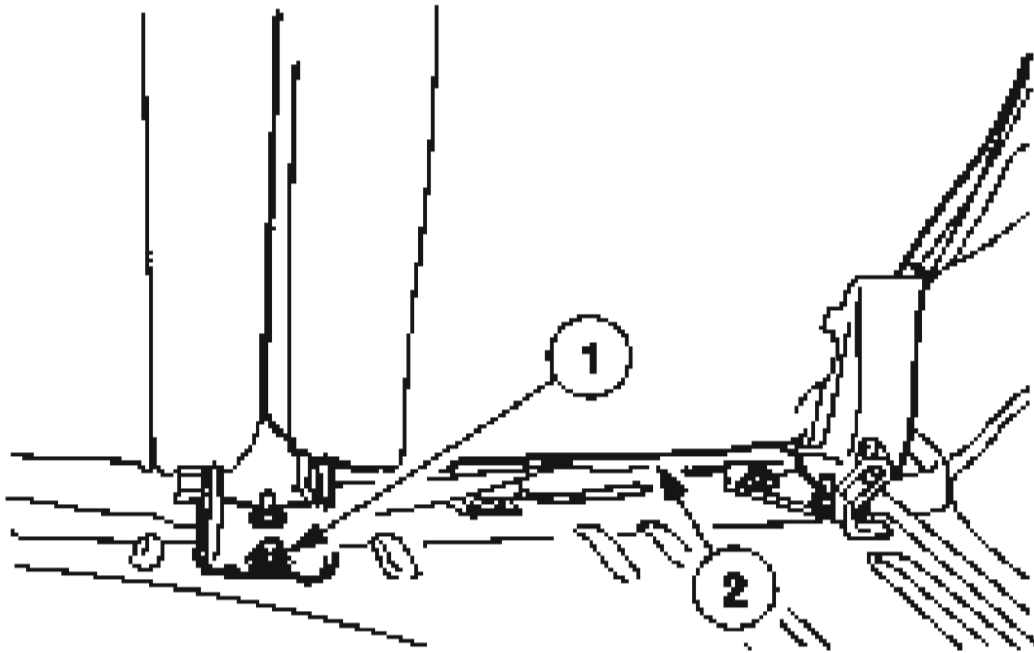
#### REAR SEAT BACKREST - SPLIT BENCH

##### Removal

**NOTE:** The 40% rear seat backrest must be removed before the 60% rear seat backrest.

##### 40% rear seat backrest

1. Remove the 40% rear seat backrest.
  1. Remove the nuts and bolts.
  2. Remove the backrest.

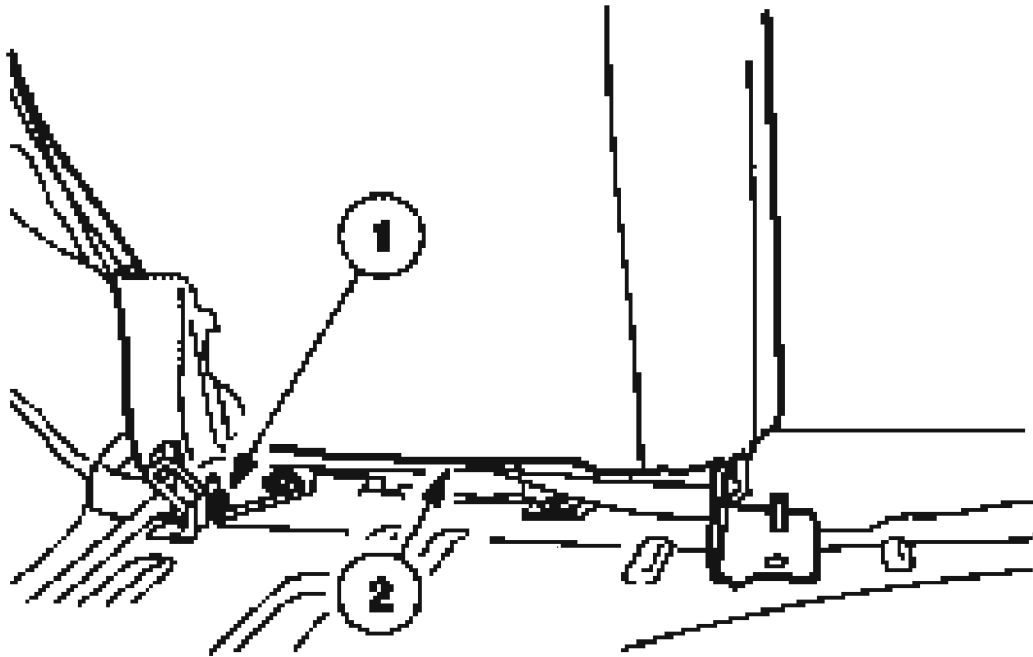


G02743070

**Fig. 39: Removing 40% Rear Seat Backrest**  
Courtesy of FORD MOTOR CO.

**60% rear seat backrest**

2. Remove the 60% rear seat backrest.
  1. Remove the nut and bolt.
  2. Remove the backrest.



G02743071

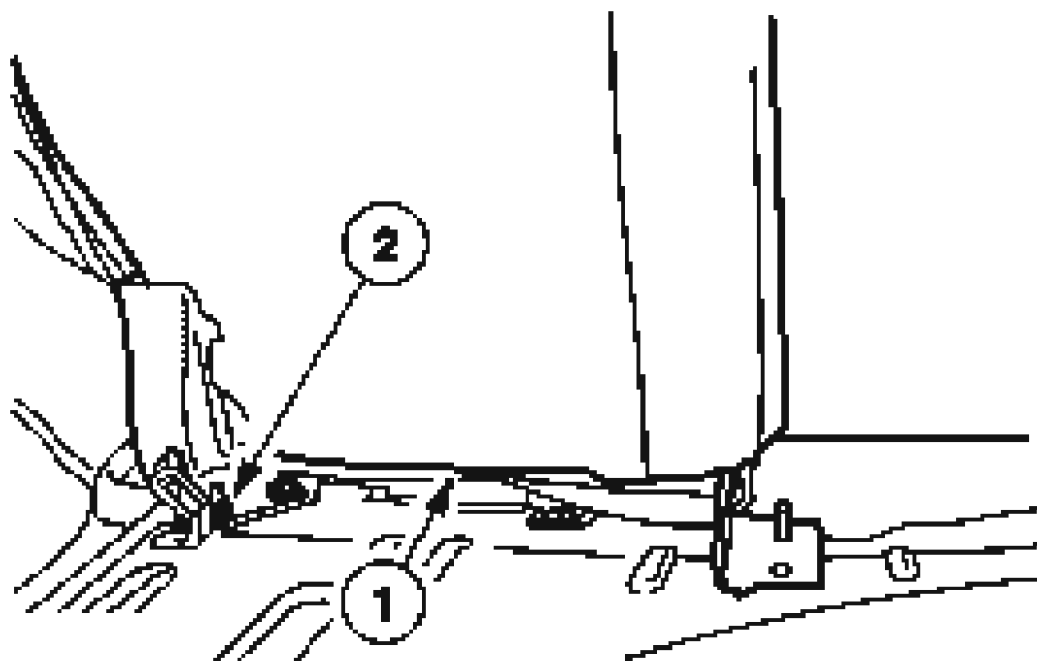
**Fig. 40: Removing 60% Rear Seat Backrest**  
Courtesy of FORD MOTOR CO.

#### Installation

**NOTE:** The 60% rear seat backrest must be installed before the 40% rear seat backrest.

60% rear seat backrest

**NOTE:** Do not tighten the nut and bolt at this time.



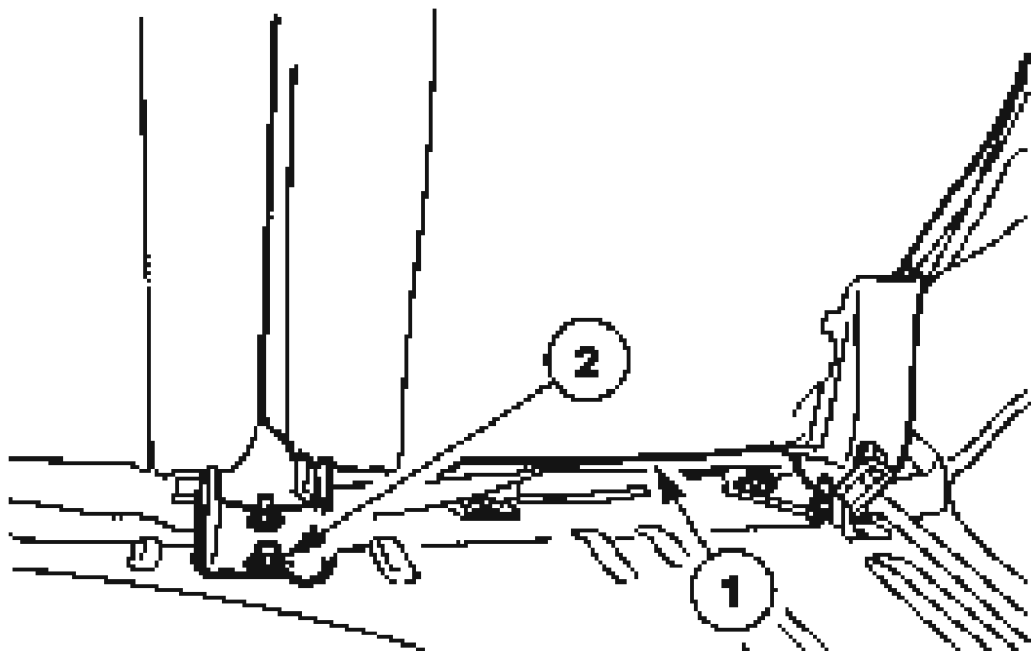
G02743072

**Fig. 41: Installing 60% Rear Seat Backrest**  
**Courtesy of FORD MOTOR CO.**

1. Install the 60% rear seat backrest.
  1. Install the rear seat backrest.
  2. Install the nut and bolt.

**40% rear seat backrest**

**NOTE:**      **Do not tighten the nuts and bolts at this time.**



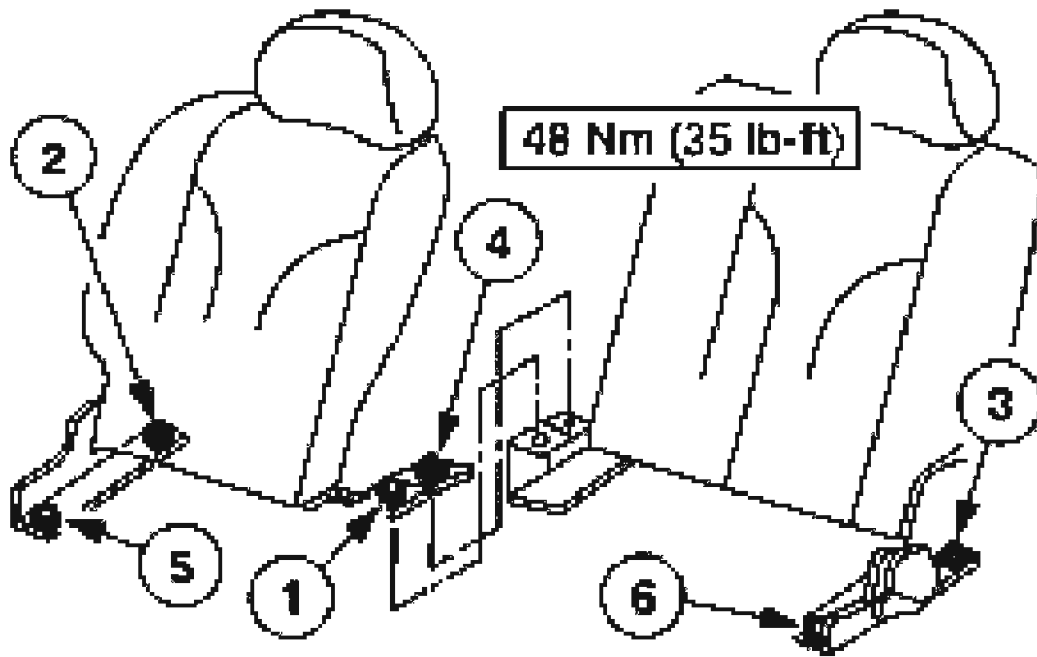
G02743073

**Fig. 42: Installing 40% Rear Seat Backrest**  
**Courtesy of FORD MOTOR CO.**

2. Install the 40% rear seat backrest.
  1. Install the rear seat backrest.
  2. Install the nuts and bolts.

**60/40% rear seat backrest**

3. Tighten the 60/40% rear seat backrest nuts and bolts in the sequence shown.



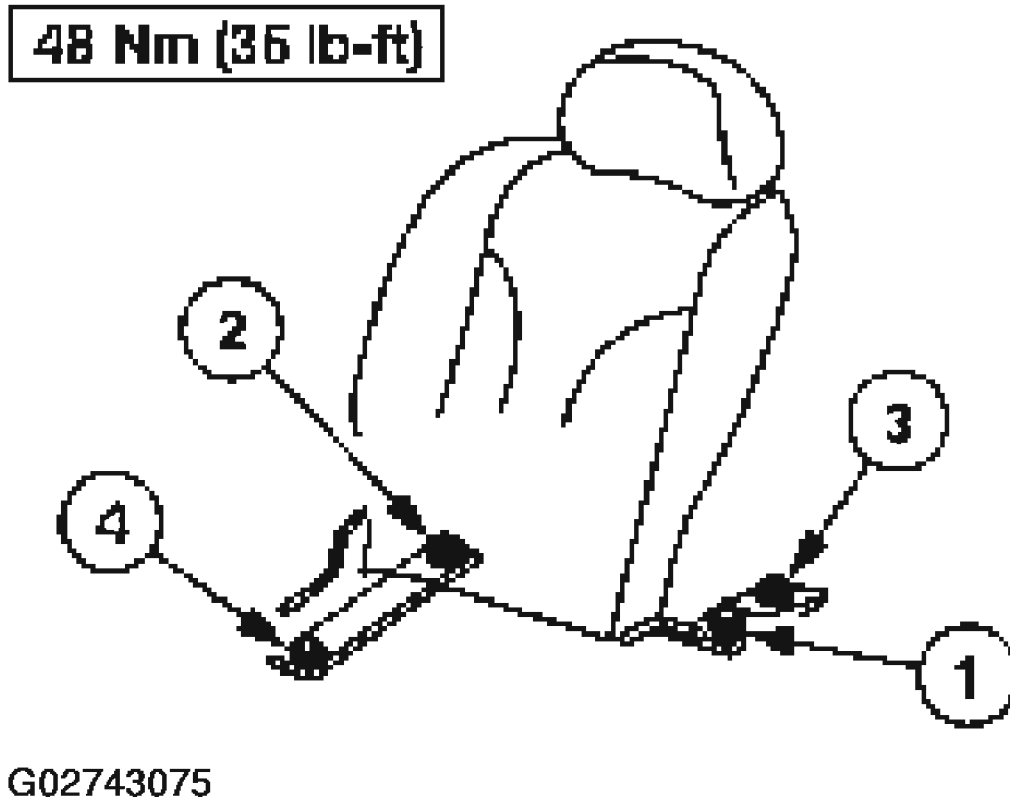
G02743074

**Fig. 43: Identifying Tightening Sequence & Torque Specification Of 60/40% Rear Seat Backrest Nuts And Bolts**  
Courtesy of FORD MOTOR CO.

#### **40% Rear Seat Backrest**

4. Tighten the 40% rear seat backrest nuts and bolts in the sequence shown.



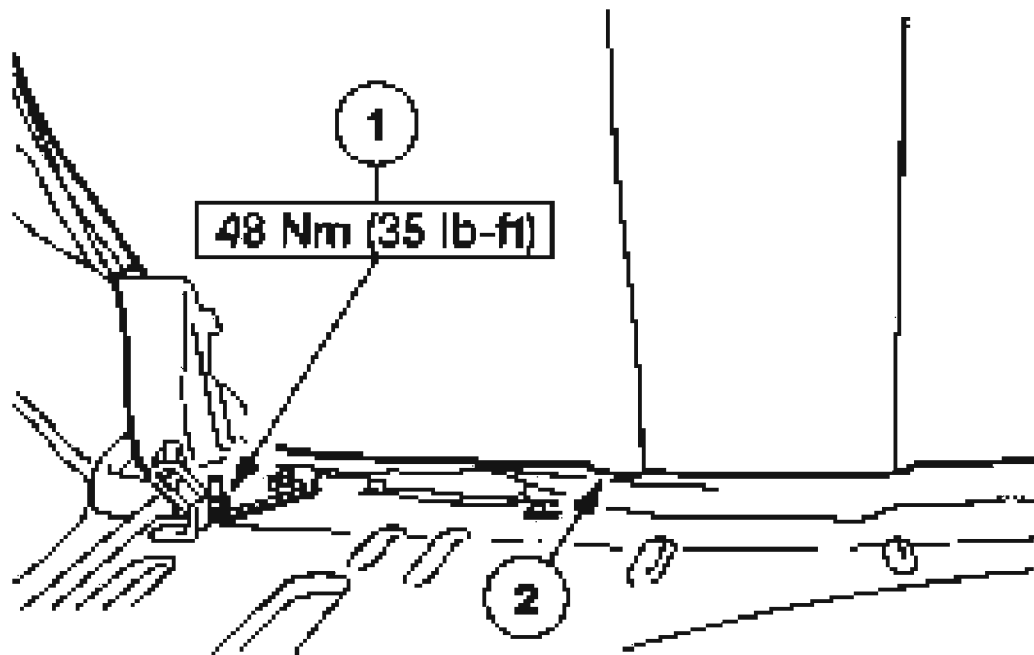


**Fig. 44: Identifying Tightening Sequence & Torque Specification Of 40% Rear Seat Backrest Nuts And Bolts**  
Courtesy of FORD MOTOR CO.

## REAR SEAT BACKREST - BENCH

### Removal and Installation

1. Remove the rear seat backrest.
  1. Remove the two nuts and two bolts.
  2. Remove the rear seat backrest.



G02743076

**Fig. 45: Removing Rear Seat Backrest**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.

#### SEAT TRACK - DRIVER SEAT

##### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover

tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result

in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

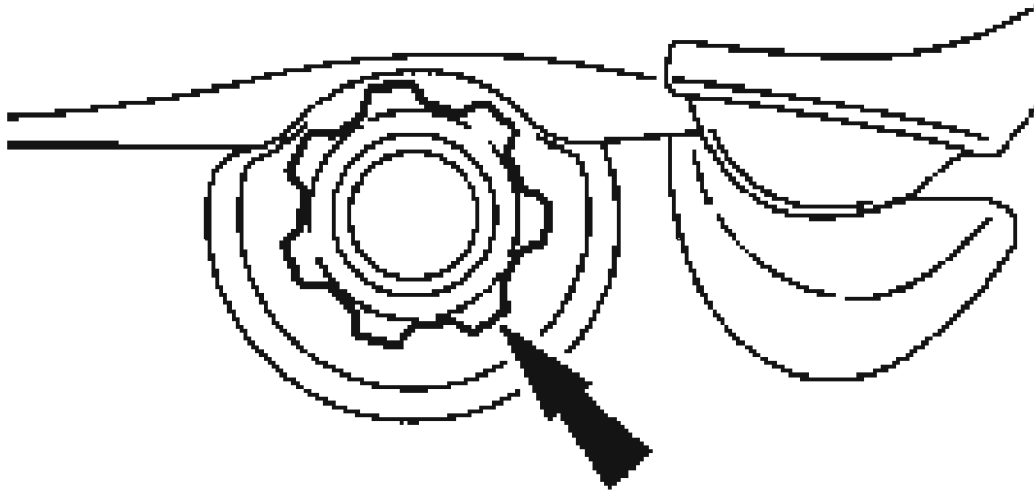
**NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

**NOTE:** Manual seat track shown, power seat track similar.

1. Remove the driver seat and depower the SRS. For additional information, refer to

**DRIVER SEAT .**

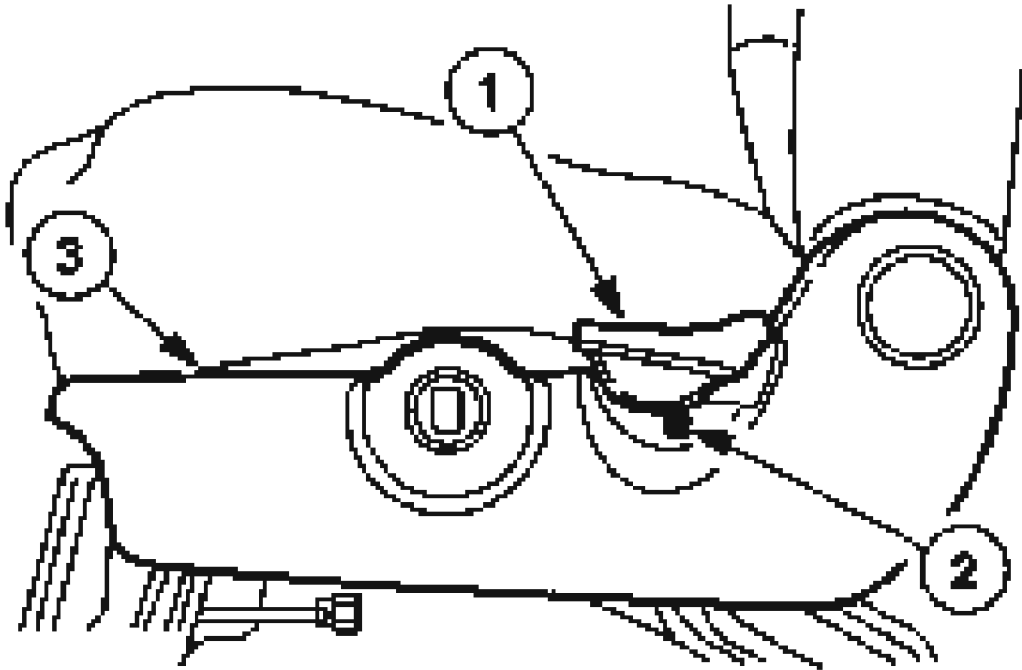
2. If equipped, remove the seat height adjustment control.



G02743077

**Fig. 46: Removing Seat Height Adjustment Control**  
Courtesy of FORD MOTOR CO.

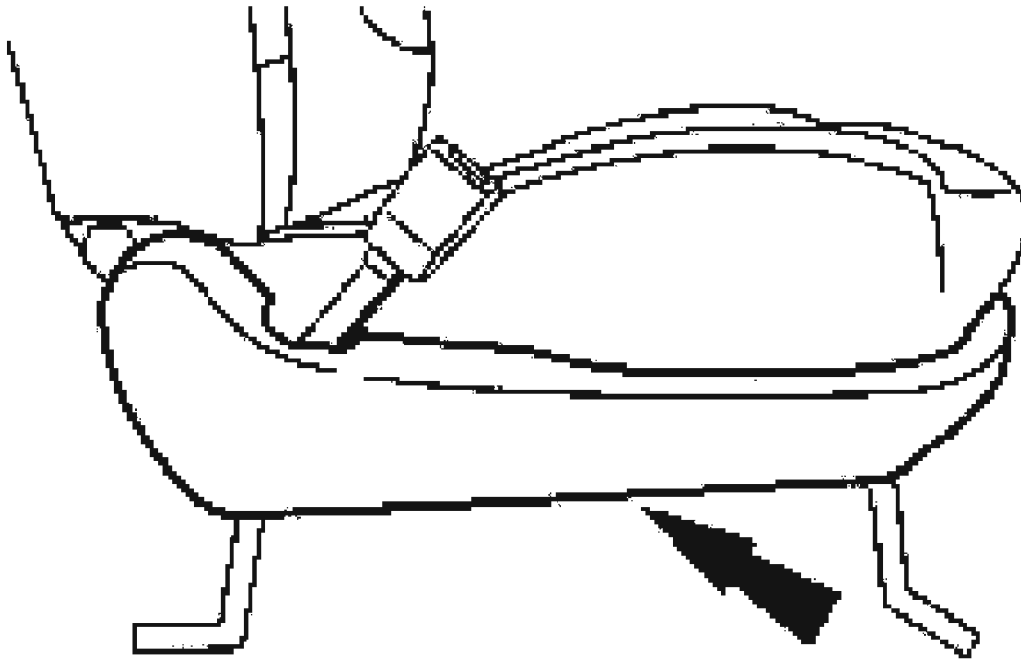
3. Remove the outboard seat cushion side shield.
  1. Remove the seat backrest handle.
  2. Remove the screw.
  3. Remove the shield.
    - If equipped with a power/heated seat, disconnect the electrical connector(s).



G02743078

**Fig. 47: Removing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

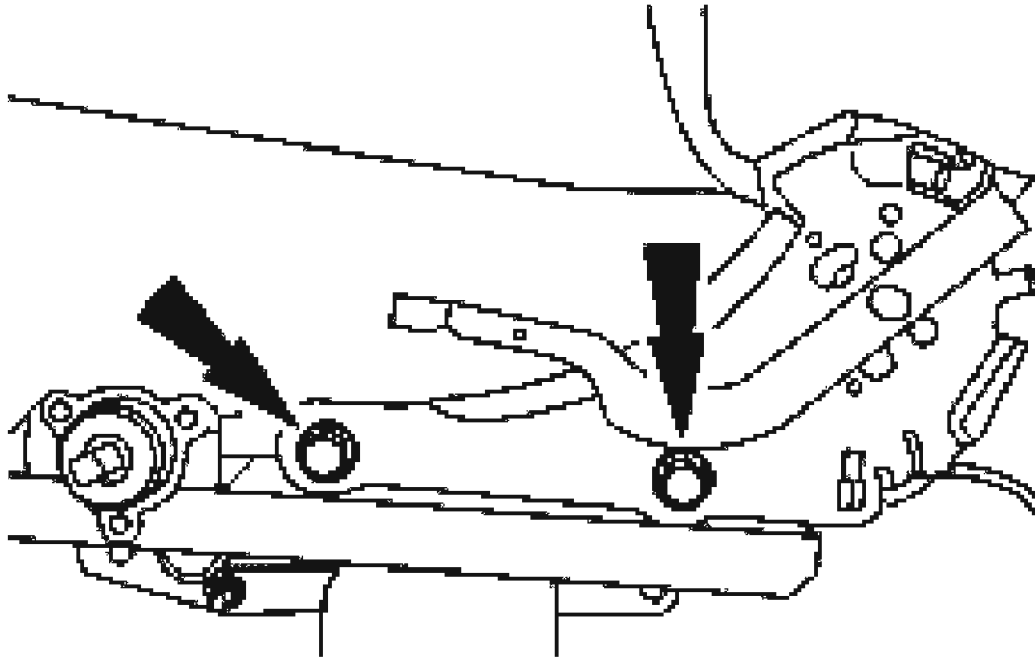
4. Remove the inboard seat cushion side shield.



G02743079

**Fig. 48: Removing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

5. Remove the front seat backrest bolts.

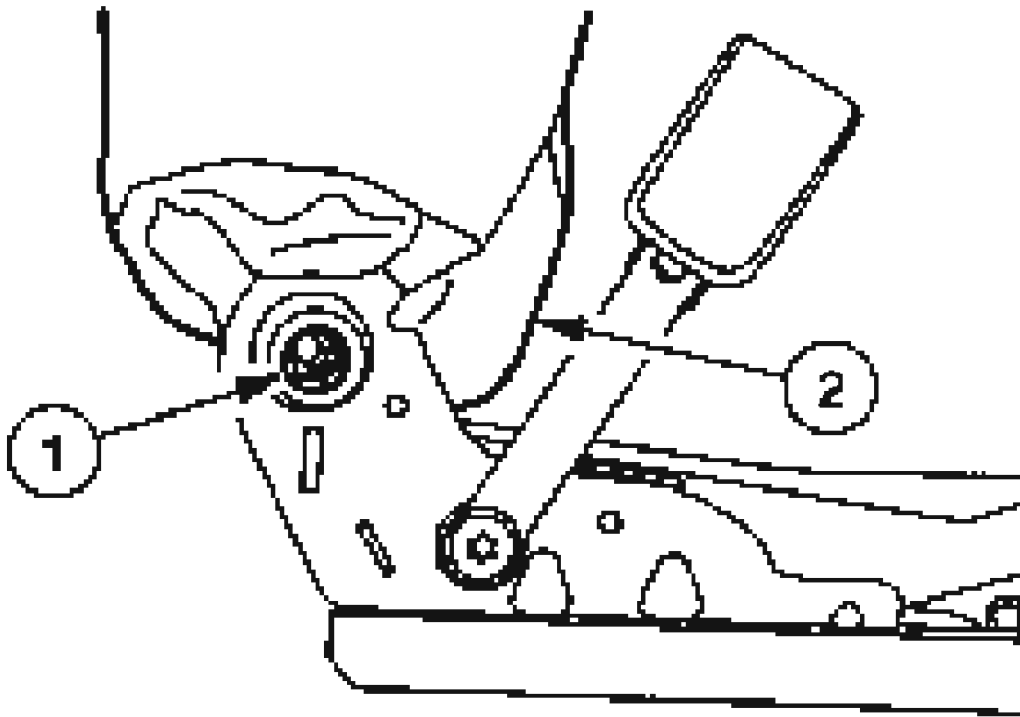


G02743080

**Fig. 49: Removing Front Seat Backrest Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** If equipped with a side air bag module, note the routing of the wiring harness for installation.

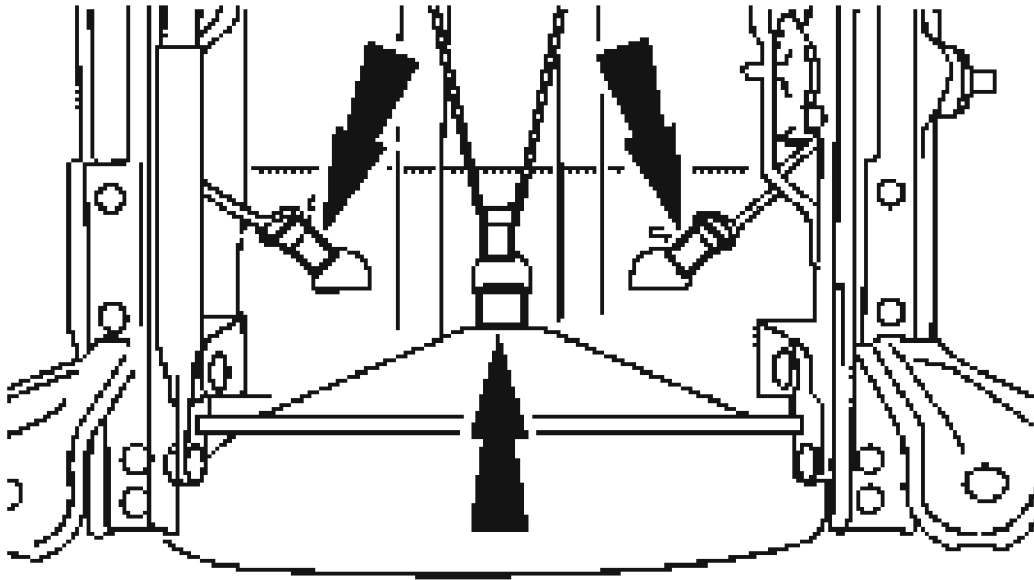




G02743081

**Fig. 50: Removing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

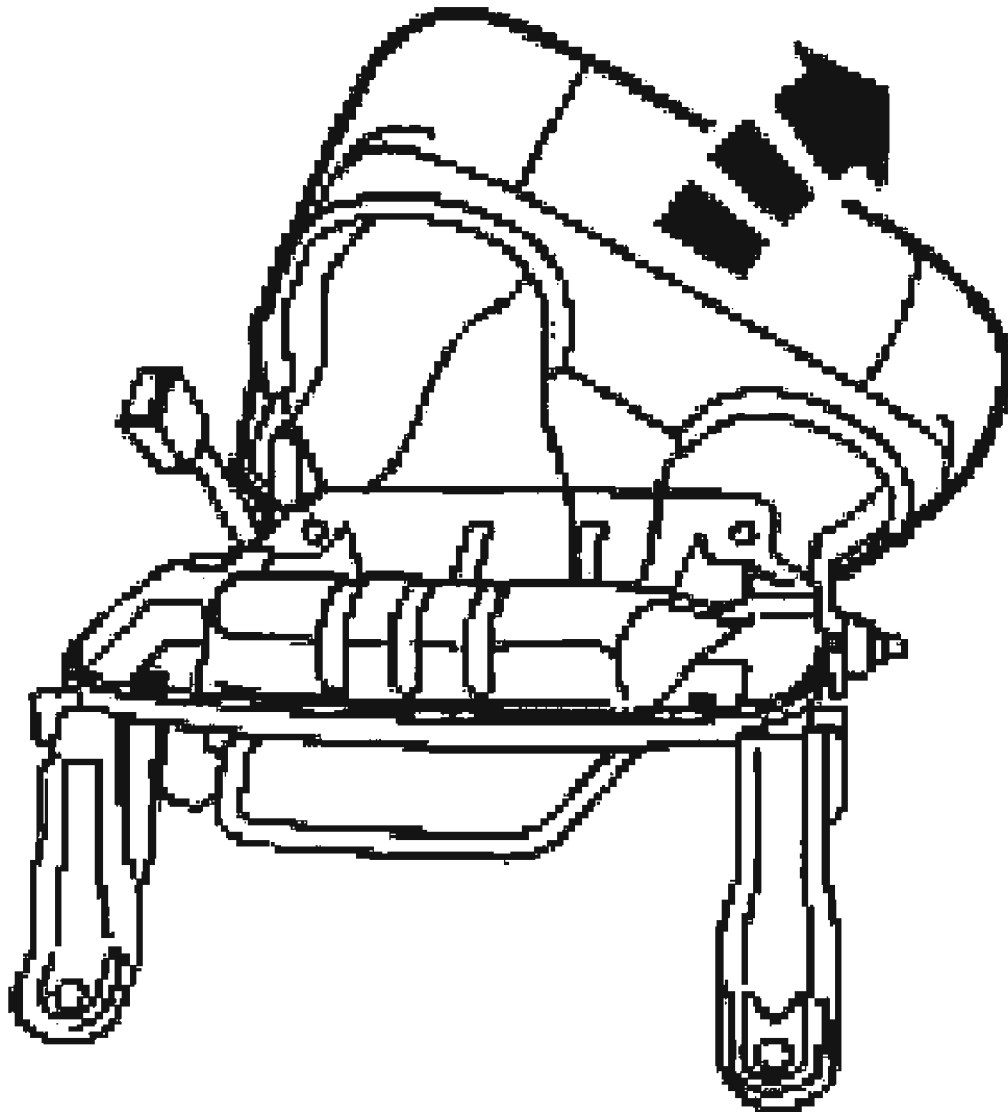
6. Remove the front seat backrest.
  1. Remove the pivot nut.
  2. Remove the backrest.
    - If equipped with heated seats, disconnect the backrest heated grid electrical connector.
7. Disconnect the seat cushion trim cover J-clips.



G02743082

**Fig. 51: Disconnecting Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

8. Remove the front seat cushion trim and pad from the front seat cushion frame.
  - If equipped with heated seats, disconnect the seat cushion heated grid electrical connector from the seat wiring harness.

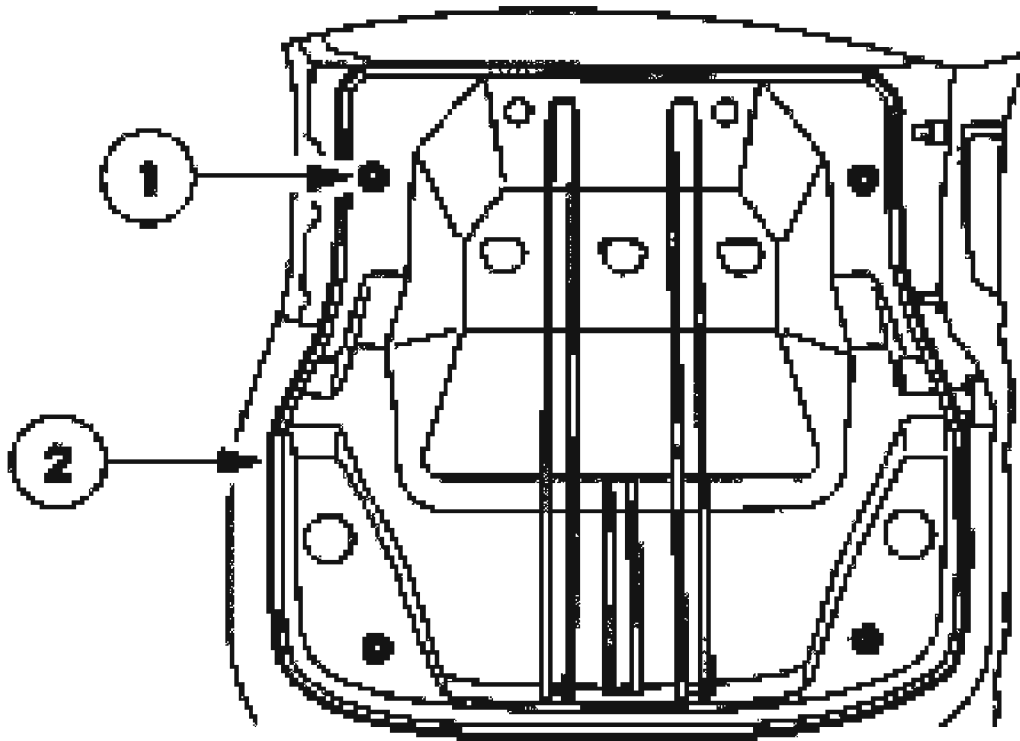


G02743083

**Fig. 52: Removing Front Seat Cushion Trim And Pad From Front Seat Cushion Frame**

**Courtesy of FORD MOTOR CO.**

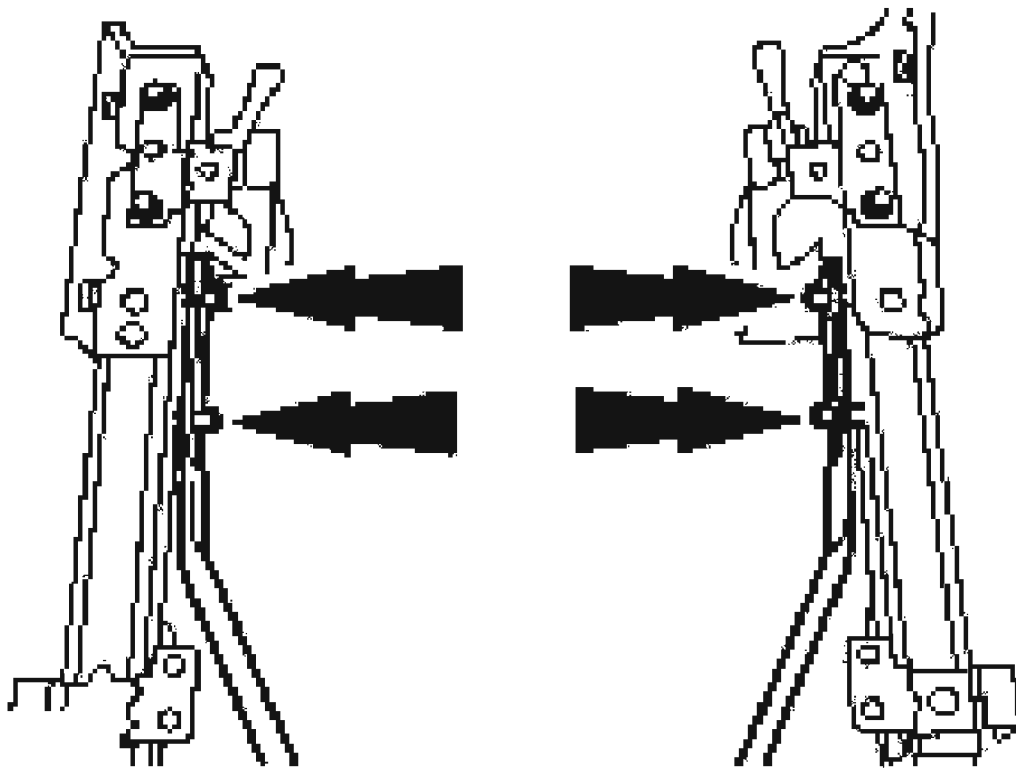
9. Remove the front seat cushion pan.
  1. Remove the bolts.
  2. Remove the front seat cushion pan.



G02743084

**Fig. 53: Removing Front Seat Cushion Pan**  
Courtesy of FORD MOTOR CO.

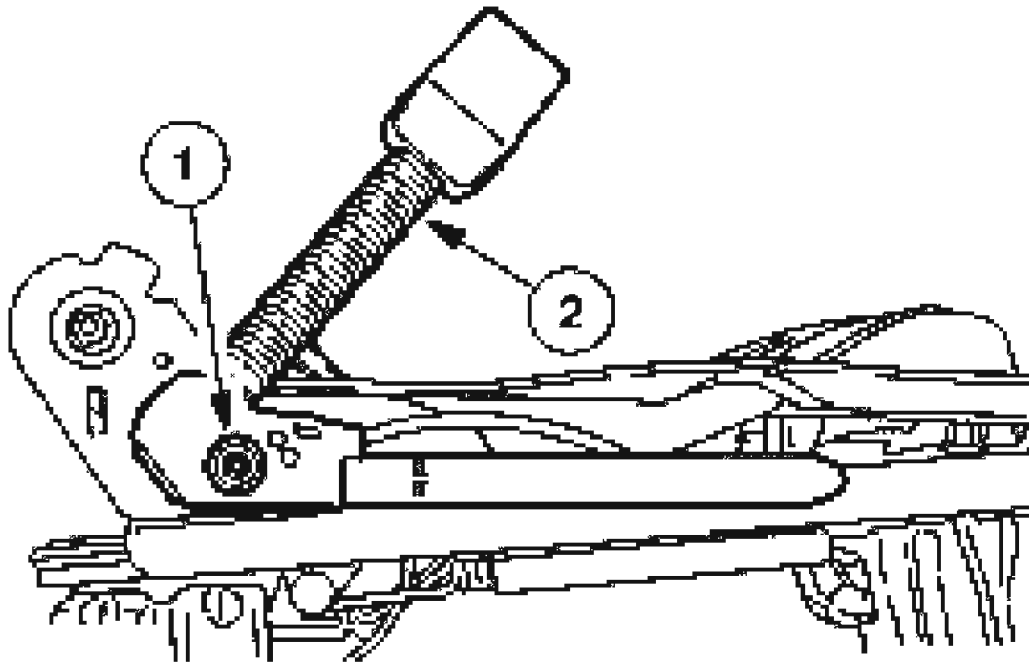
10. If equipped with manual seats, remove the seat adjuster.
  - Unclip the seat adjuster pins.



G02743085

**Fig. 54: Removing Seat Adjuster Pins**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the routing of the wiring harness for installation.



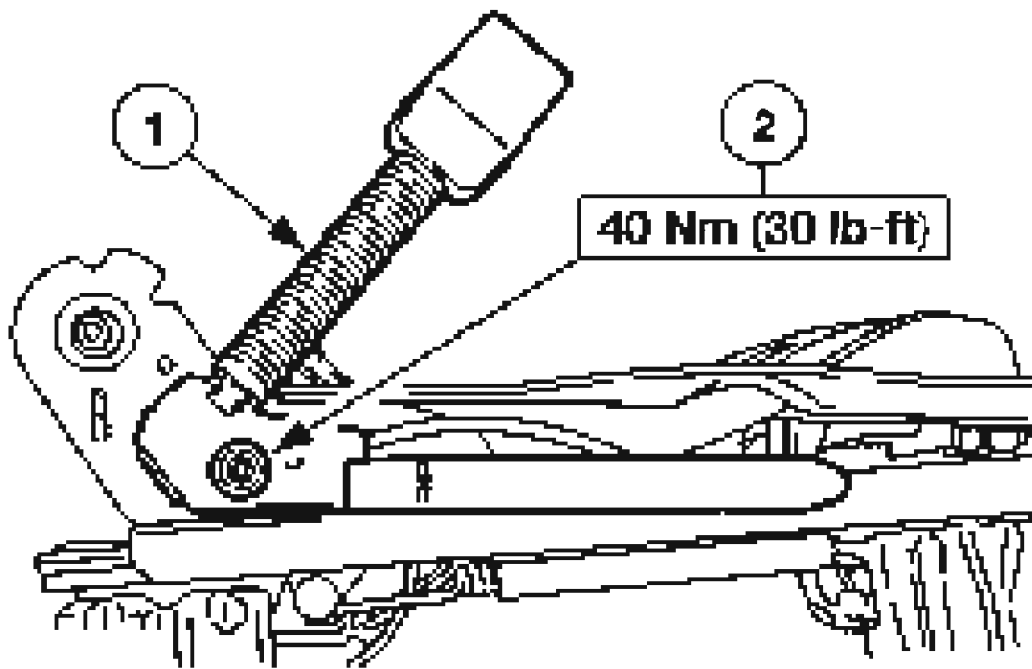
G02743086

**Fig. 55: Removing Safety Belt Pretensioner**  
Courtesy of FORD MOTOR CO.

11. Remove the safety belt pretensioner from the seat track.
  1. Remove the bolt.
  2. Remove the safety belt pretensioner.

**Installation**

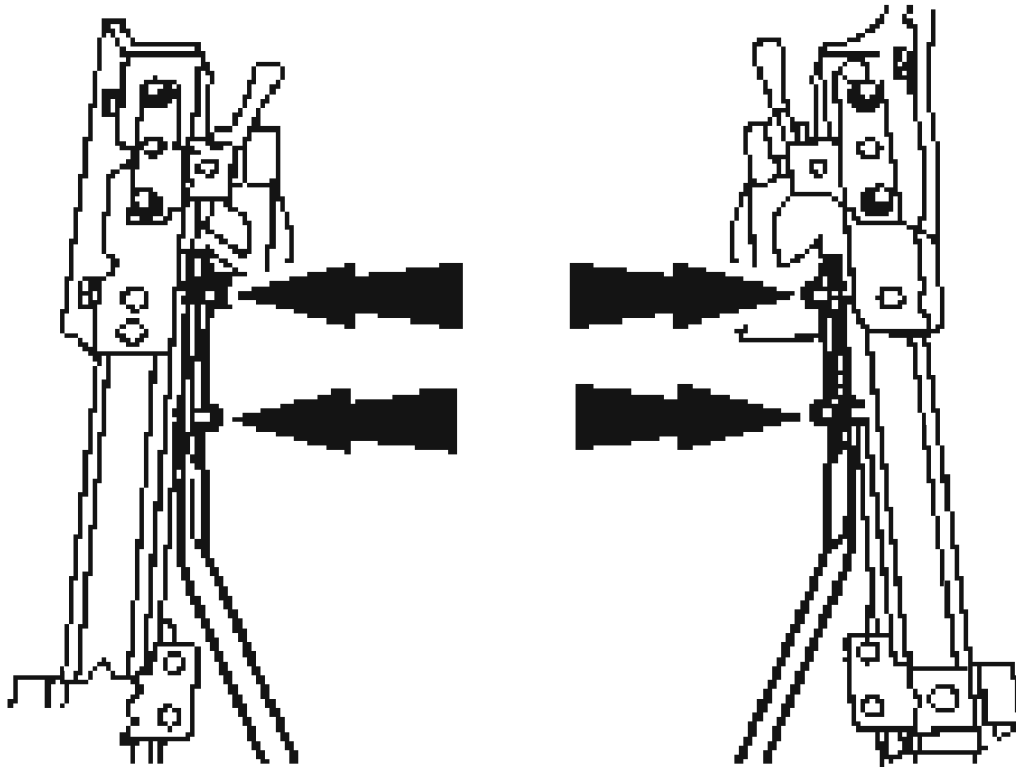
1. Install the safety belt pretensioner.
  1. Position the safety belt pretensioner.
  2. Install the bolt.



G02743087

**Fig. 56: Installing Safety Belt Pretensioner**  
Courtesy of FORD MOTOR CO.

2. If equipped with manual seats, install the seat adjuster.
  - Connect the seat adjuster pins.

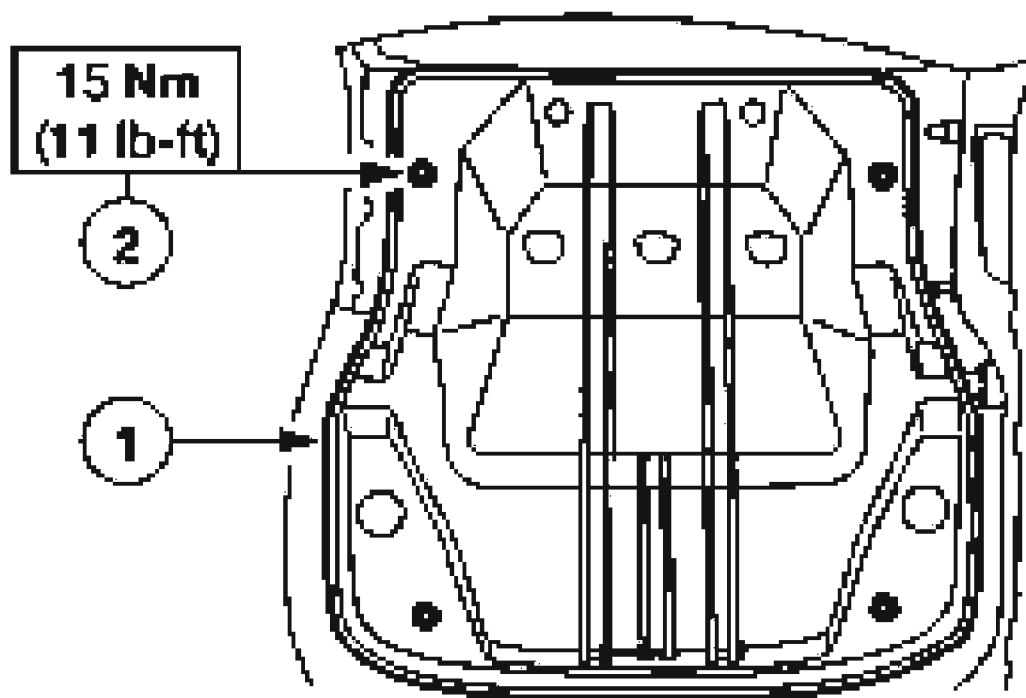


G02743088

**Fig. 57: Connecting Seat Adjuster Pins**  
**Courtesy of FORD MOTOR CO.**

3. Install the front seat cushion pan.
  1. Position the front seat cushion pan.
  2. Install the bolts.

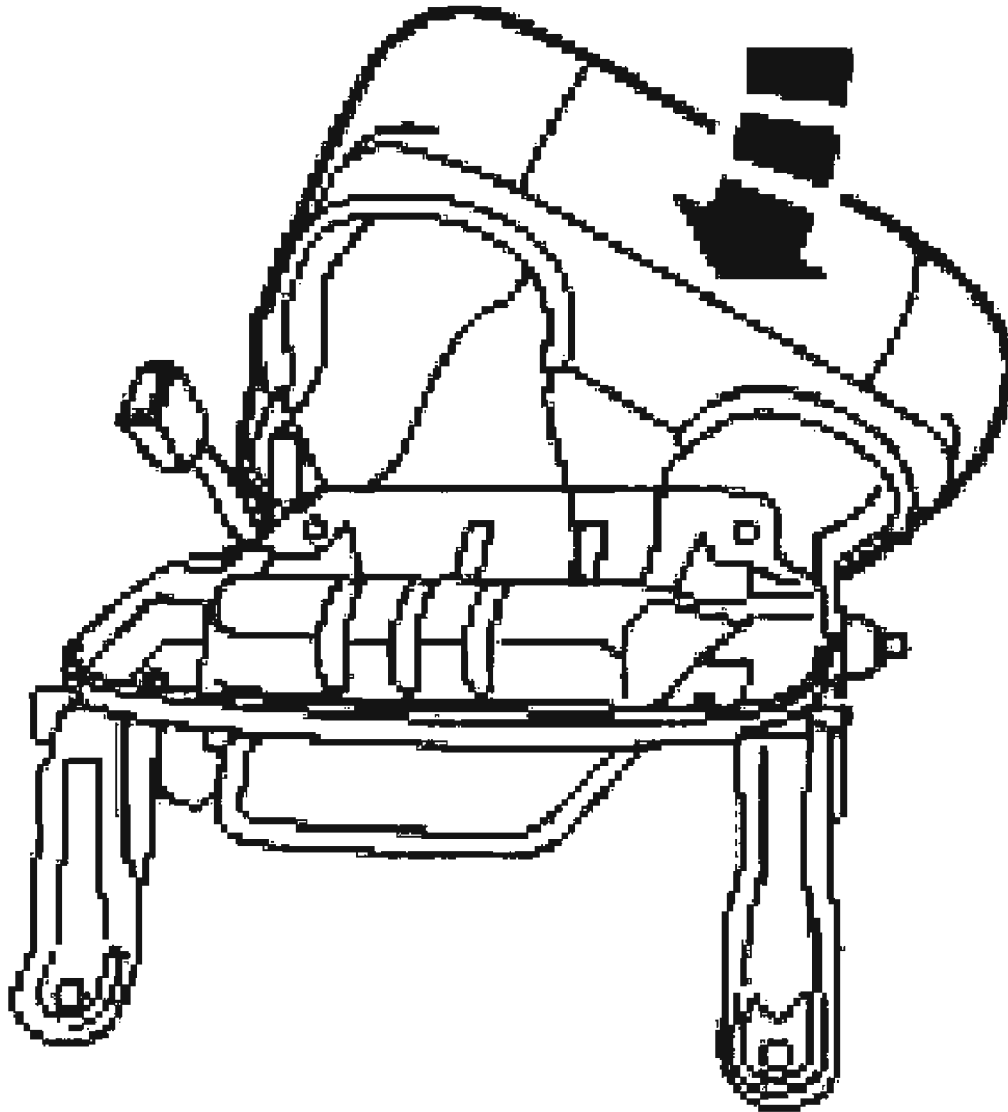




G02743089

**Fig. 58: Installing Front Seat Cushion Pan**  
**Courtesy of FORD MOTOR CO.**

4. Install the front seat cushion trim and pad to the front seat cushion frame.
  - If equipped with heated seats, connect the seat cushion heated grid electrical connector to the seat wiring harness.

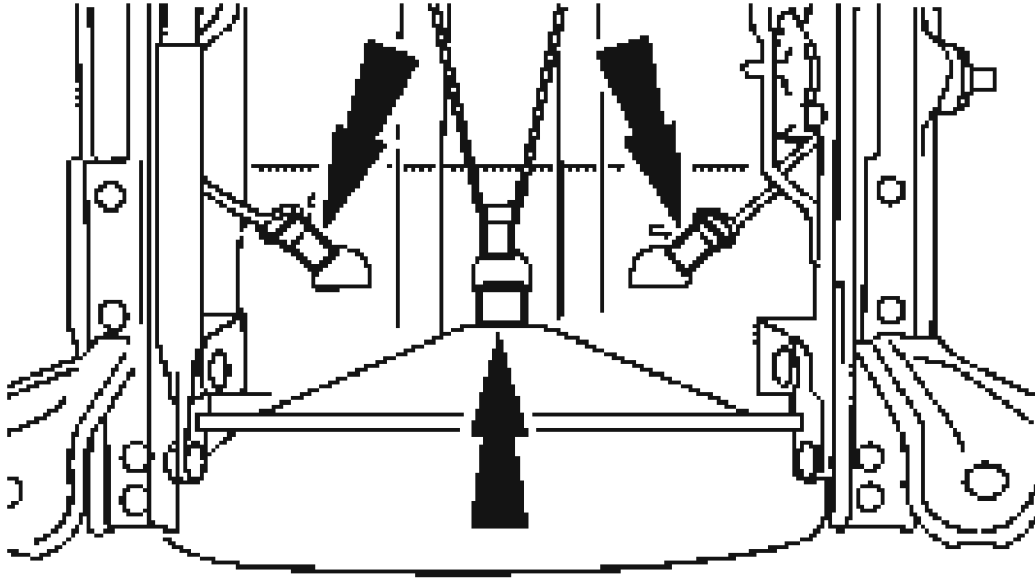


G02743090

**Fig. 59: Installing Front Seat Cushion Trim And Pad To Front Seat Cushion Frame**

**Courtesy of FORD MOTOR CO.**

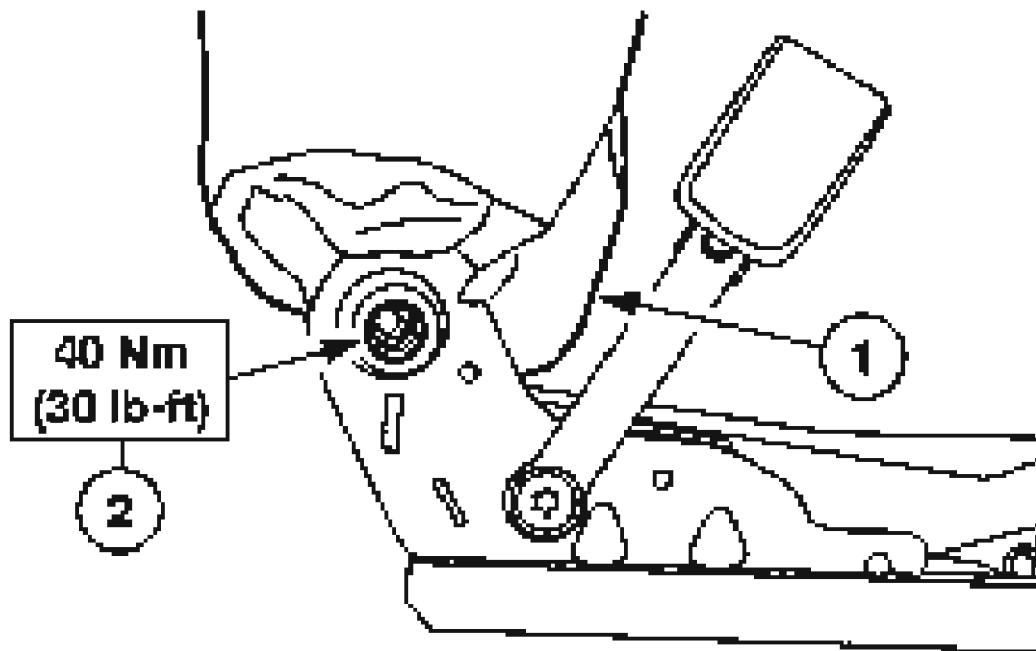
5. Connect the seat cushion trim cover J-clips.



G02743091

**Fig. 60: Connecting Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

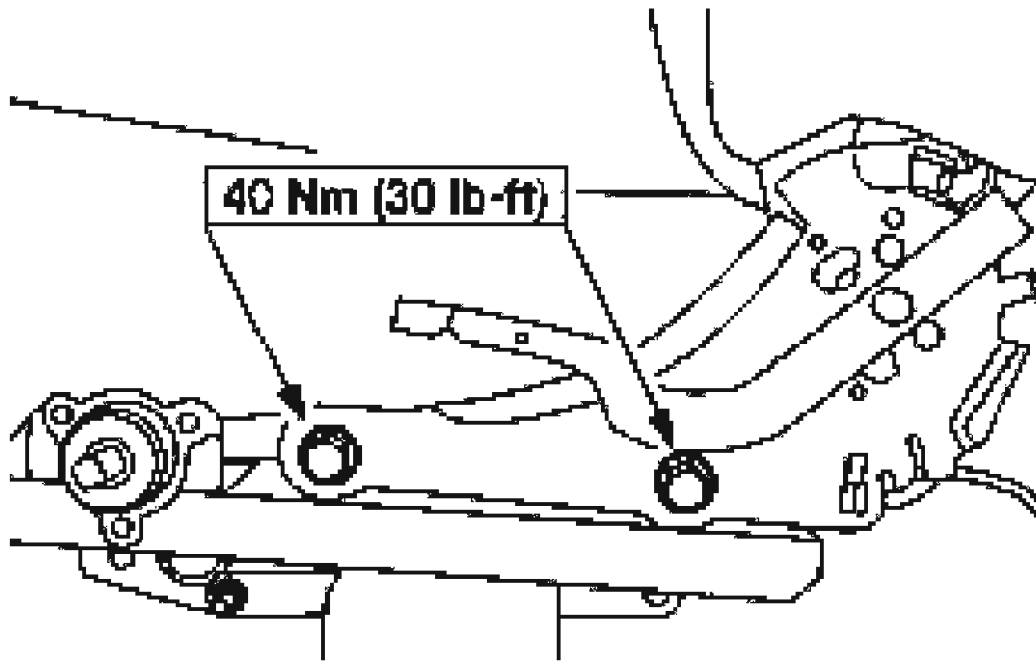
6. Install the front seat backrest.
  1. Install the backrest.
  2. Install the pivot nut.



G02743092

**Fig. 61: Installing Front Seat Backrest**  
**Courtesy of FORD MOTOR CO.**

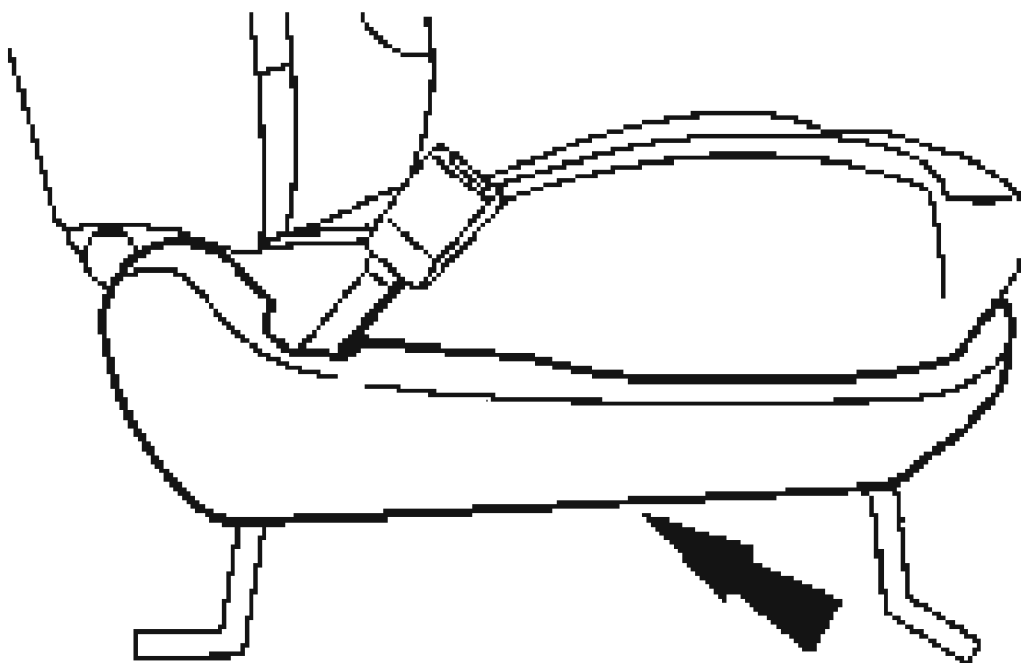
7. Install the front seat backrest bolts.
  - If equipped with heated seats, connect the backrest heated grid electrical connector.



G02743093

**Fig. 62: Identifying Front Seat Backrest Bolts Torque Specification**  
**Courtesy of FORD MOTOR CO.**

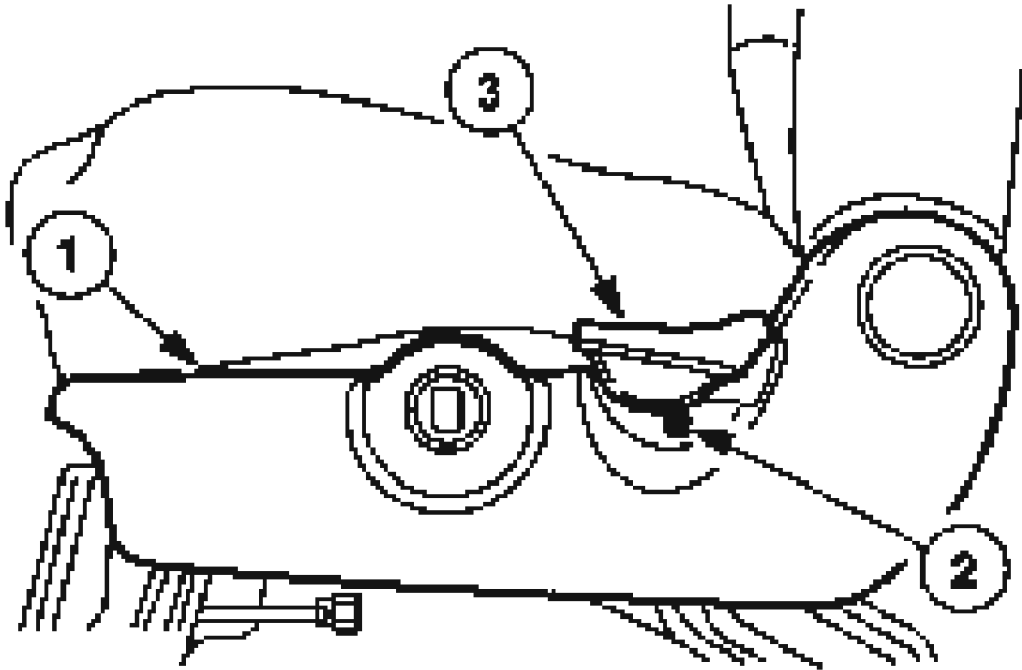
8. Install the inboard seat cushion side shield.



G02743094

**Fig. 63: Installing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

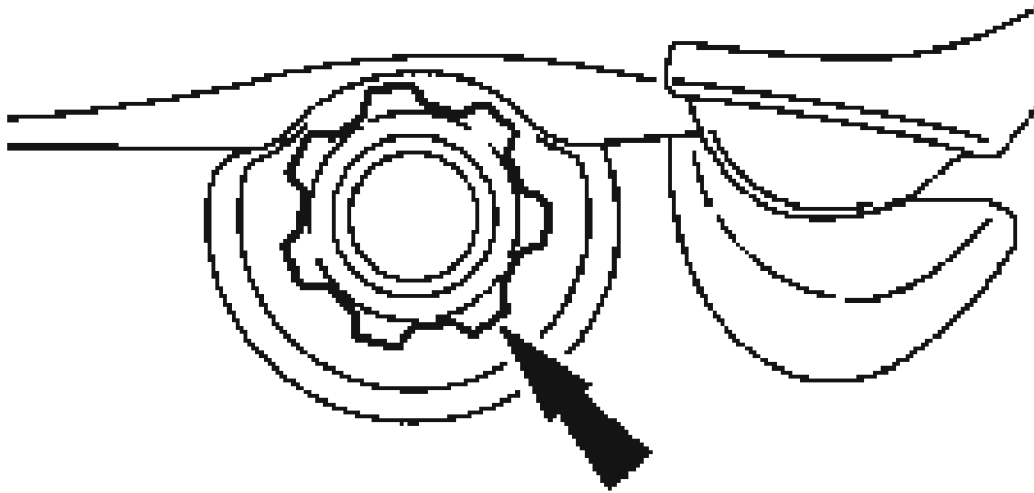
9. Install the outboard seat cushion side shield.
  - If equipped with a power/heated seat, connect the electrical connector.
2. Install the shield.
3. Install the screw.
4. Install the seat backrest handle.



G02743095

**Fig. 64: Installing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

10. If equipped, install the seat height adjustment control.



G02743096

**Fig. 65: Installing Seat Height Adjustment Control**  
Courtesy of FORD MOTOR CO.

11. Install the driver seat and repower the SRS. For additional information, refer to **DRIVER SEAT**.
12. Check the restraint system for correct operation.

#### SEAT TRACK - PASSENGER SEAT

##### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these



instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

refer to **AIR BAG RESTRAINT SYSTEMS** to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

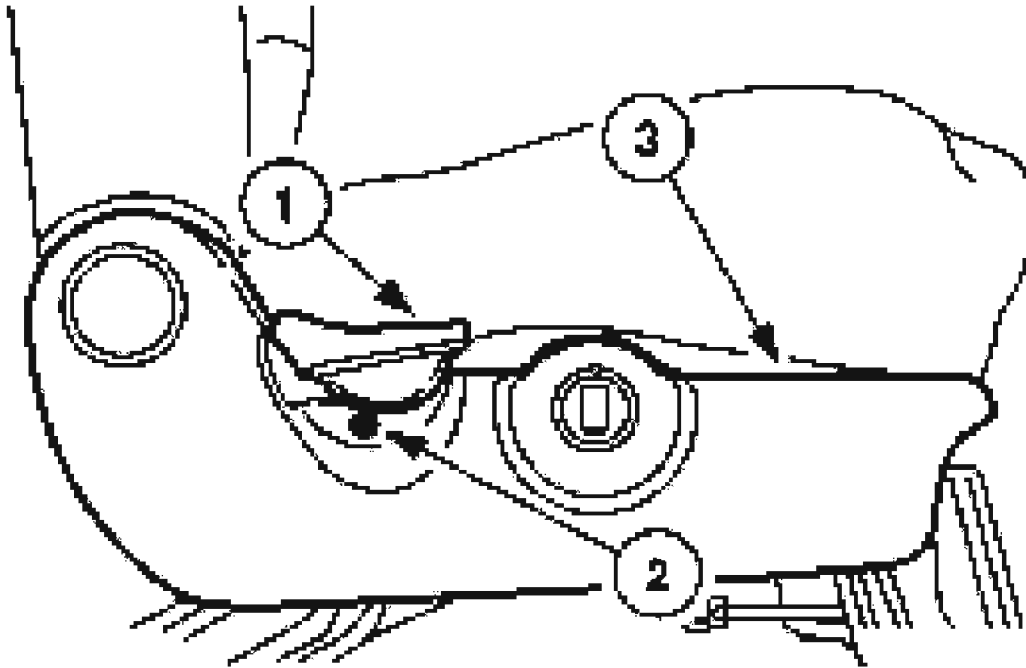
**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.
1. Remove the passenger seat and depower the SRS. For additional information, refer to **PASSENGER SEAT**.
  2. Remove the outboard seat cushion side shield.
    1. Remove the seat backrest handle.
    2. Remove the screw.

3. Remove the shield.

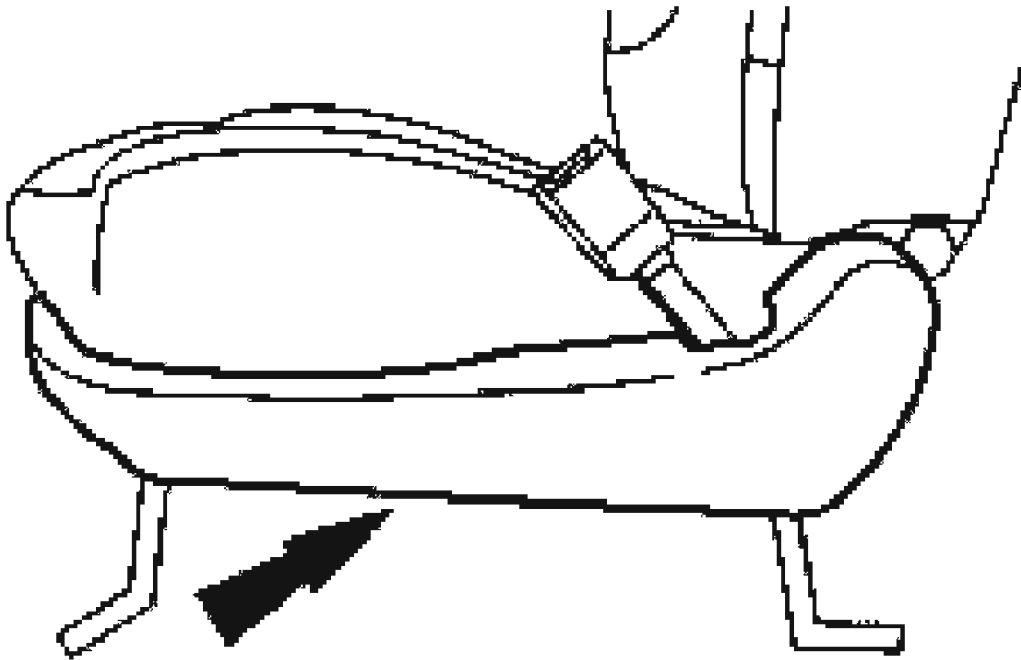
- If equipped with heated seats, disconnect the electrical connector.



G02743097

**Fig. 66: Removing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

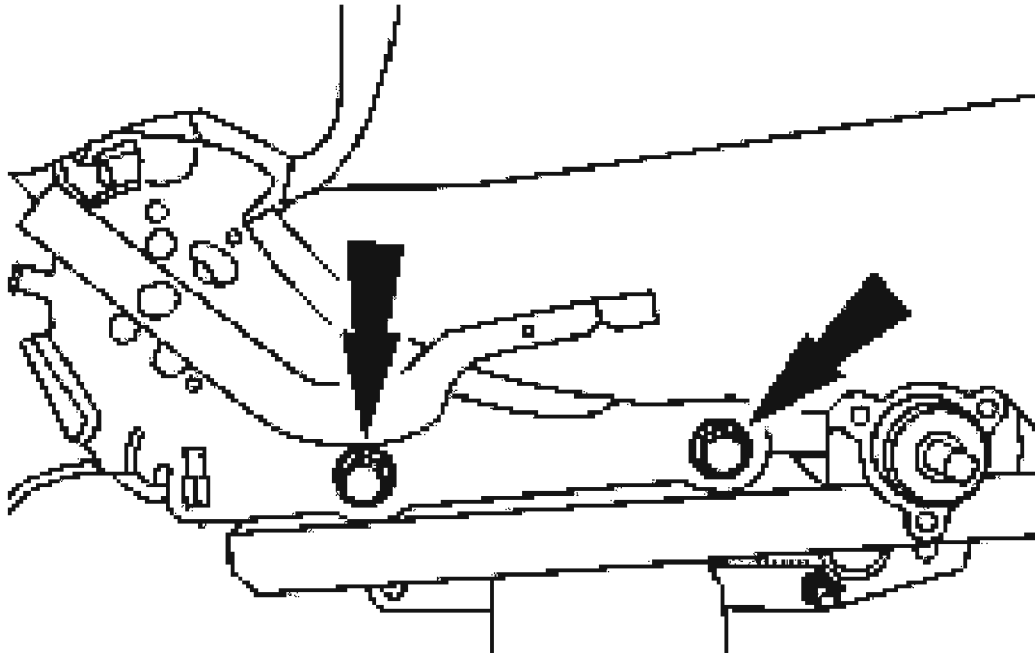
3. Remove the inboard seat cushion side shield.



G02743098

**Fig. 67: Removing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

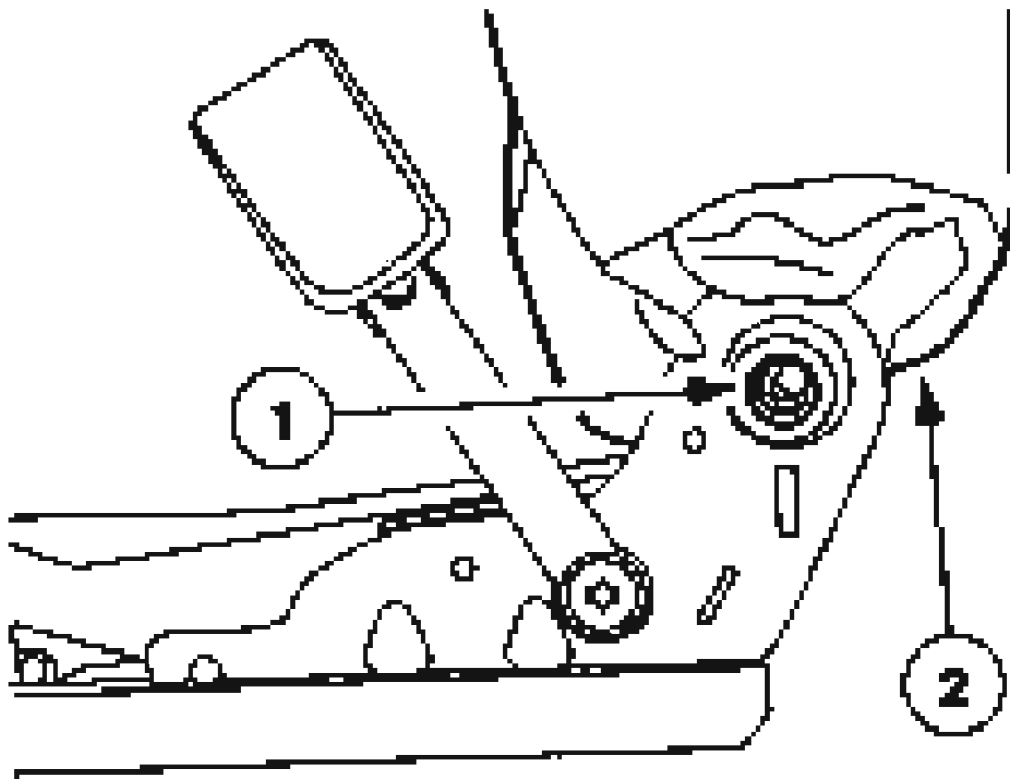
4. Remove the front seat backrest bolts.



G02743099

**Fig. 68: Removing Front Seat Backrest Bolts**  
Courtesy of FORD MOTOR CO.

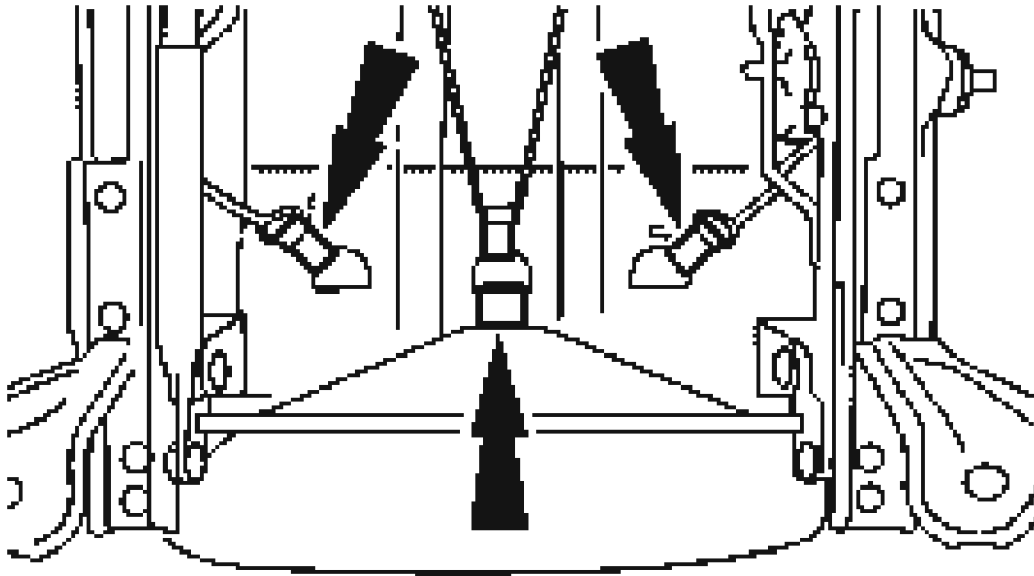
**NOTE:** If equipped with a side air bag module, note the routing of the wiring harness for installation.



G02743100

**Fig. 69: Removing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

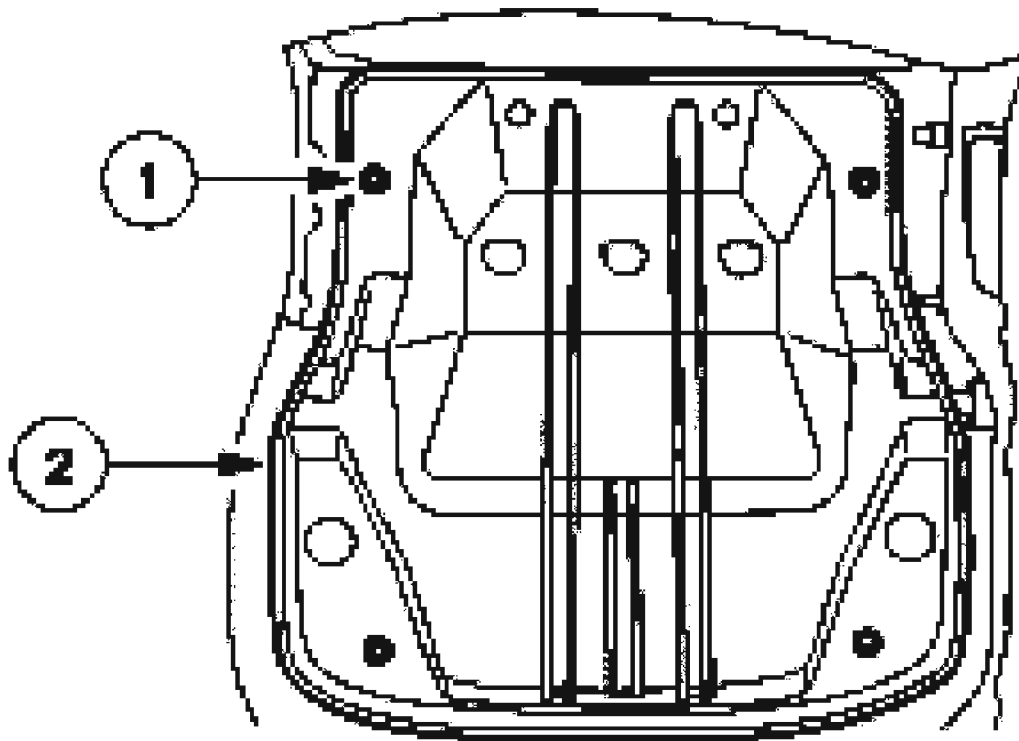
5. Remove the front seat backrest.
  1. Remove the pivot nut.
  2. Remove the backrest.
    - If equipped with heated seats, disconnect the backrest heated grid electrical connector.
6. If equipped, remove the under seat storage bin.
7. Disconnect the seat cushion trim cover J-clips.



G02743101

**Fig. 70: Disconnecting Seat Cushion Trim Cover J-Clips**  
**Courtesy of FORD MOTOR CO.**

8. Remove the front seat cushion trim and pad from the front seat cushion frame.
  - If equipped with heated seats, disconnect the seat cushion heated grid electrical connector.
9. Remove the front seat cushion pan.
  1. Remove the bolts.
  2. Remove the front seat cushion pan.

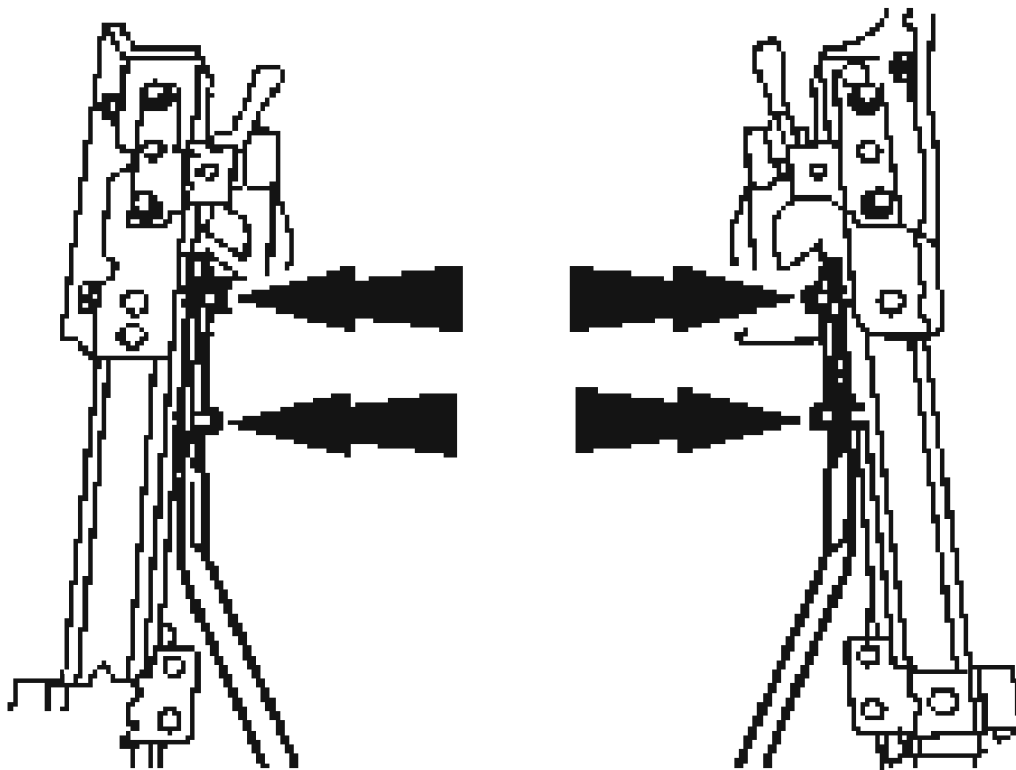


G02743102

**Fig. 71: Removing Front Seat Cushion Pan**  
Courtesy of FORD MOTOR CO.

10. Remove the seat adjuster.
  - Unclip the seat adjuster pins.

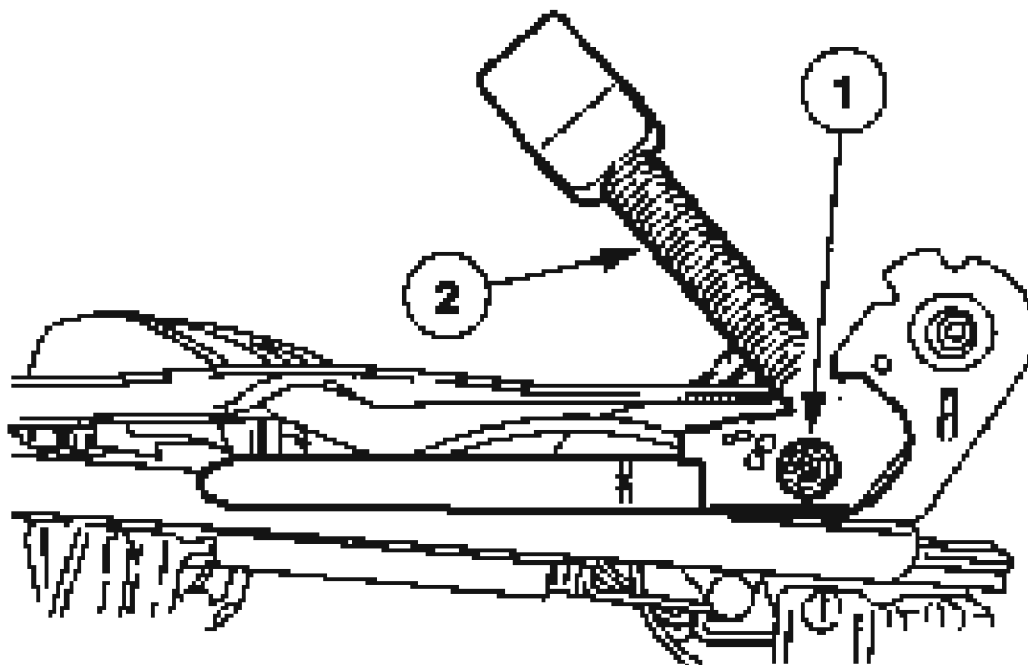




G02743103

**Fig. 72: Removing Seat Adjuster**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the routing of the wiring harness for installation.



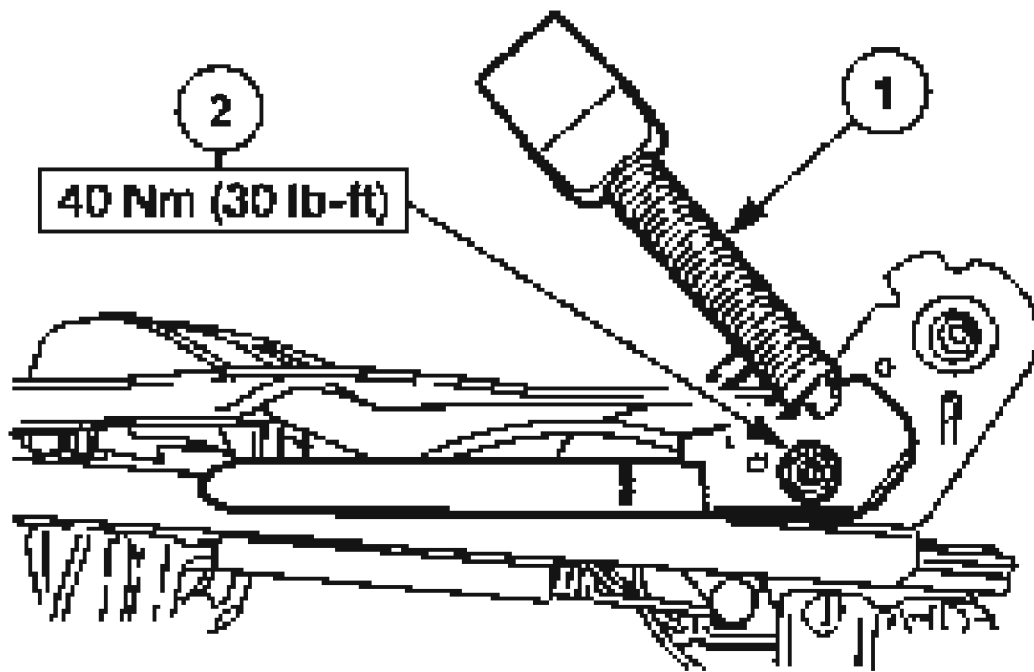
G02743104

**Fig. 73: Removing Safety Belt Pretensioner**  
Courtesy of FORD MOTOR CO.

11. Remove the safety belt pretensioner.
  1. Remove the bolt.
  2. Remove the safety belt pretensioner.

**Installation**

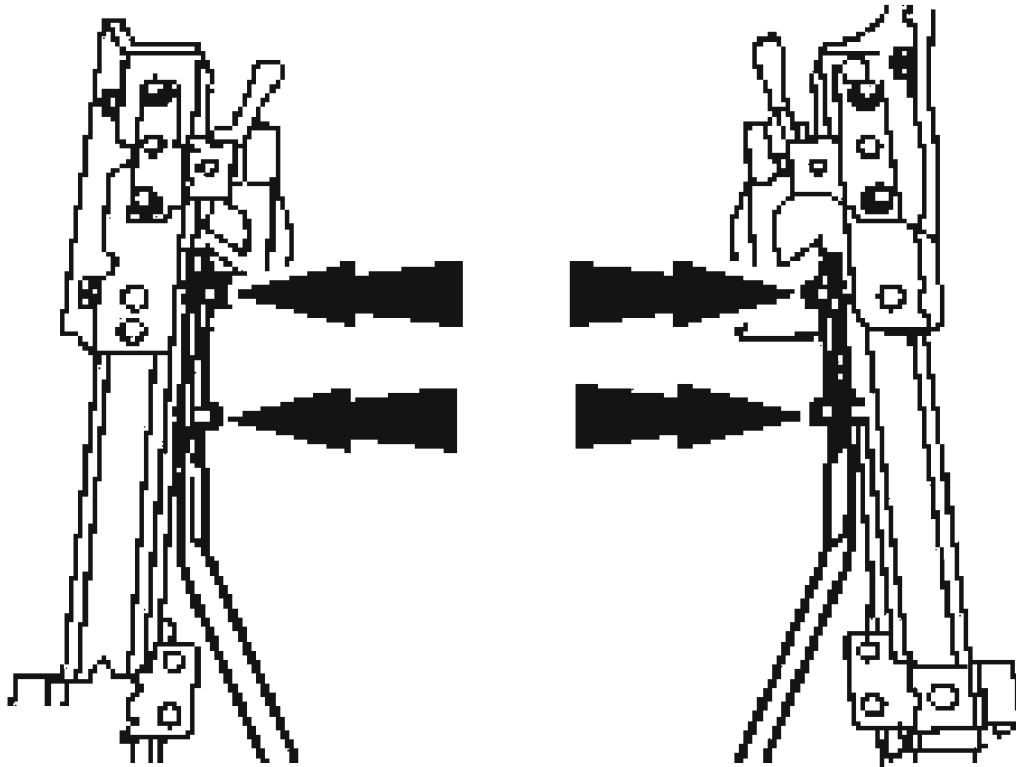
1. Install the safety belt pretensioner.
  1. Install the safety belt pretensioner.
  2. Install the bolt.



G02743105

**Fig. 74: Installing Safety Belt Pretensioner**  
Courtesy of FORD MOTOR CO.

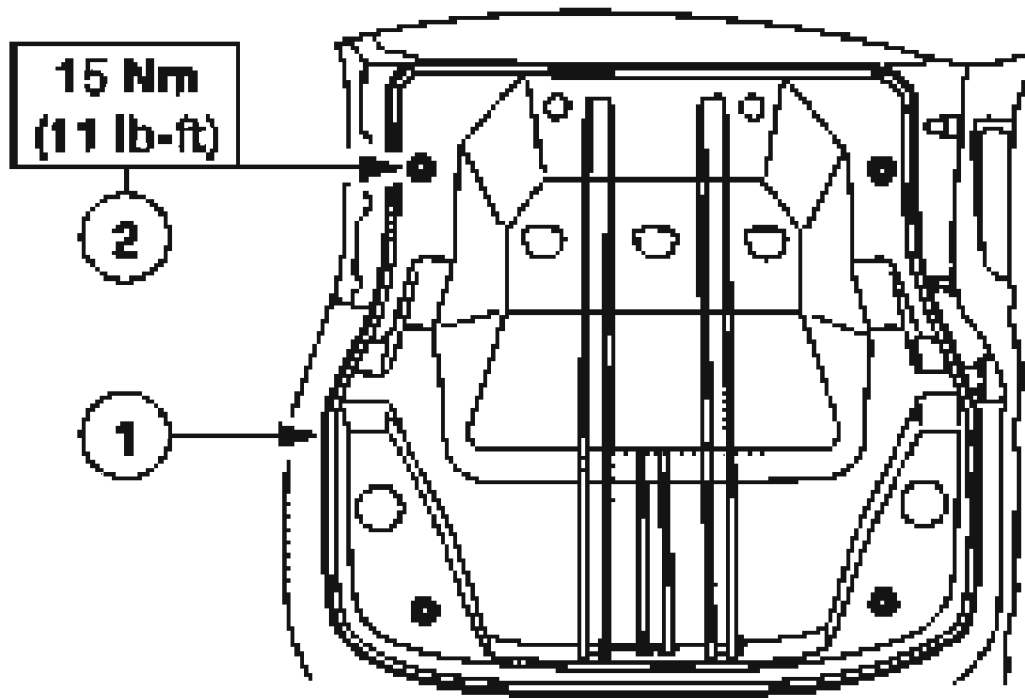
2. Install the seat adjuster.
  - Connect the seat adjuster pins.



G02743106

**Fig. 75: Connecting Seat Adjuster Pins**  
**Courtesy of FORD MOTOR CO.**

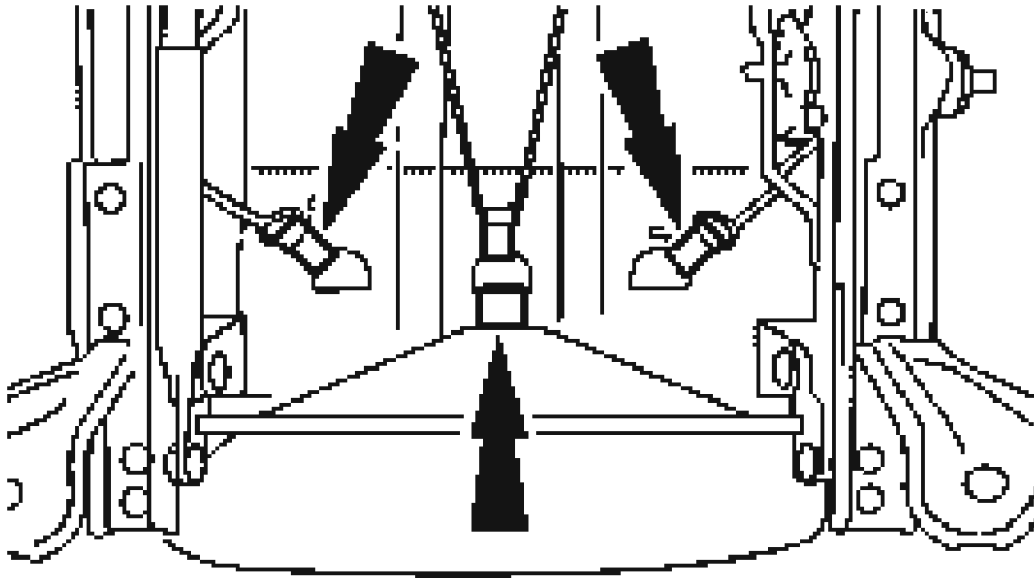
3. Install the front seat cushion pan.
  1. Position the front seat cushion pan.
  2. Install the bolts.



G02743107

**Fig. 76: Installing Front Seat Cushion Pan**  
Courtesy of FORD MOTOR CO.

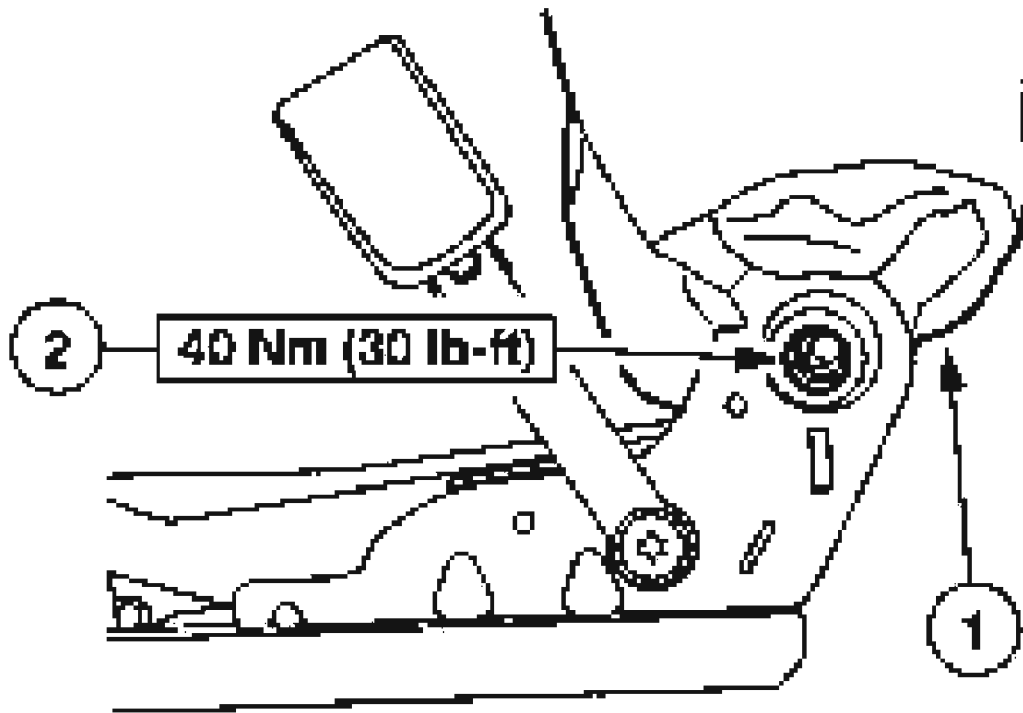
4. Install the front seat cushion and pad to the front seat cushion frame.
  - If equipped with heated seats, connect the seat cushion heated grid electrical connector.
5. Connect the seat cushion trim cover J-clips.



G02743108

**Fig. 77: Connecting Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

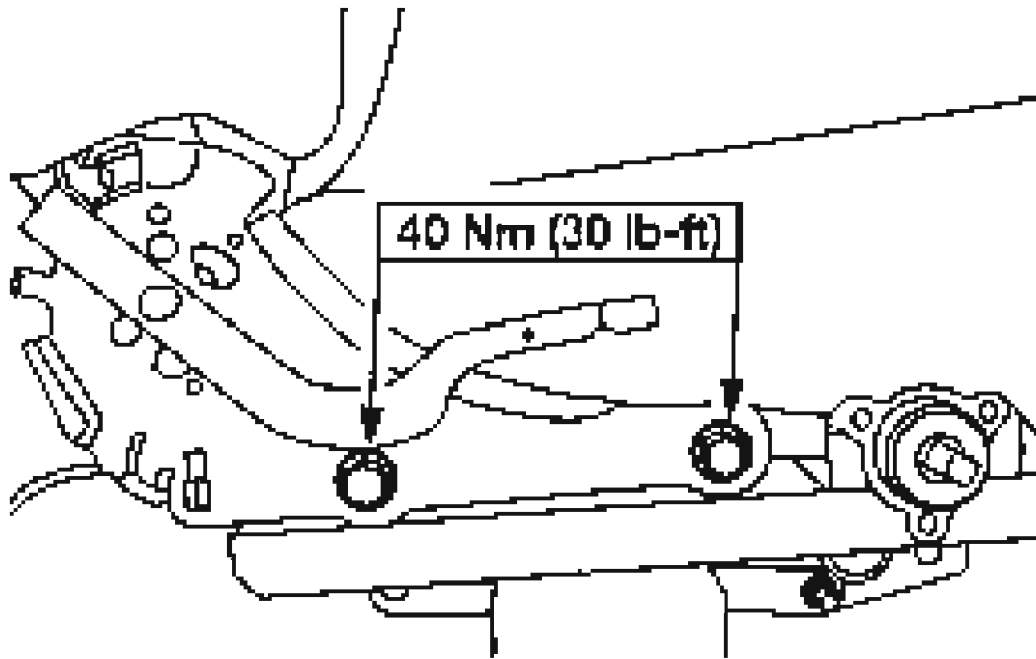
6. If equipped, install the under seat storage bin.
7. Install the front seat backrest.
  1. Install the backrest.
  2. Install the pivot nut.



G02743109

**Fig. 78: Installing Front Seat Backrest**  
Courtesy of FORD MOTOR CO.

8. Install the front seat backrest bolts.
  - If equipped with heated seats, connect the backrest heated grid electrical connectors.

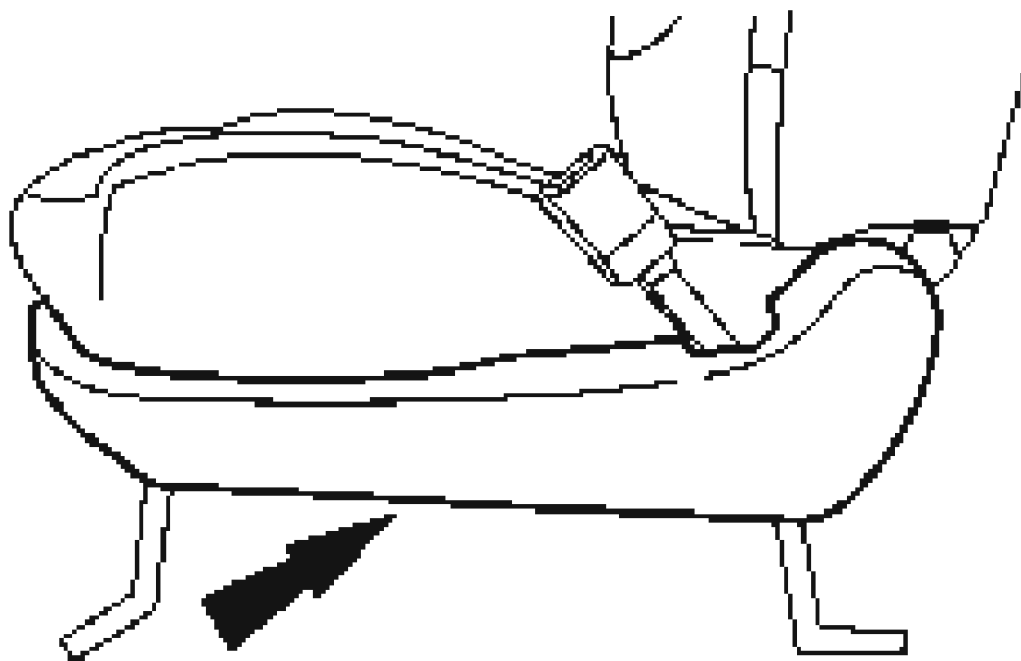


G02743110

**Fig. 79: Identifying Front Seat Backrest Bolts Torque Specification**  
Courtesy of FORD MOTOR CO.

9. Install the inboard seat cushion side shield.

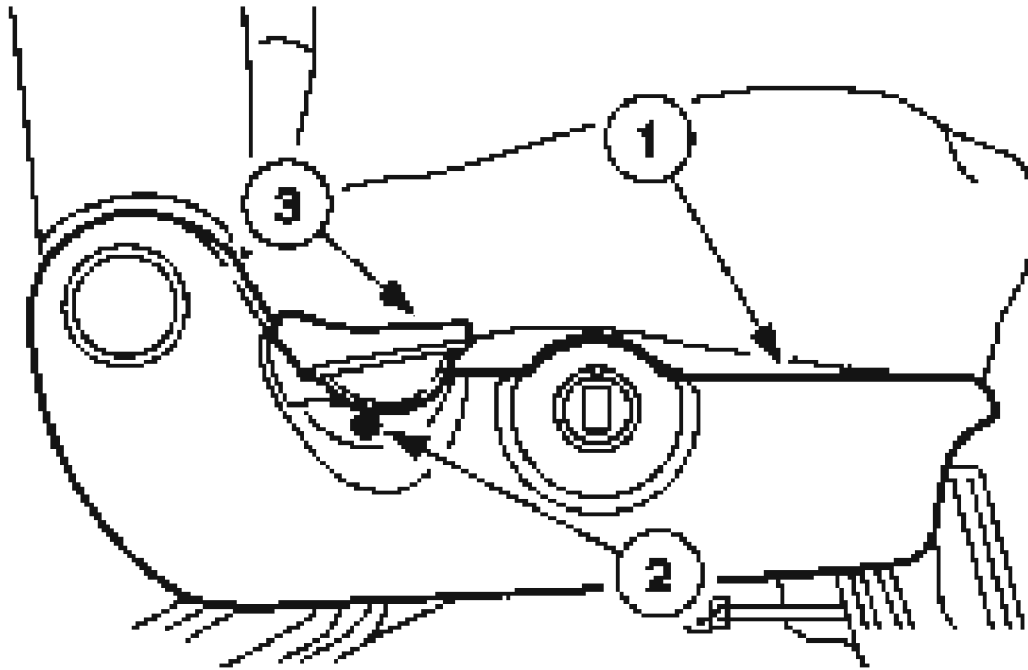




G02743111

**Fig. 80: Installing Inboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

10. Install the outboard seat cushion side shield.
  - If equipped with heated seats, connect the electrical connector.
1. Install the shield.
2. Install the screw.
3. Install the seat backrest handle.



G02743112

**Fig. 81: Installing Outboard Seat Cushion Side Shield**  
Courtesy of FORD MOTOR CO.

11. Install the passenger seat and repower the SRS. For additional information, refer to **PASSENGER SEAT**.
12. Check the restraint system for correct operation.

#### DRIVER SEAT

##### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal

injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment, which may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS .

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to

**disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.**

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.

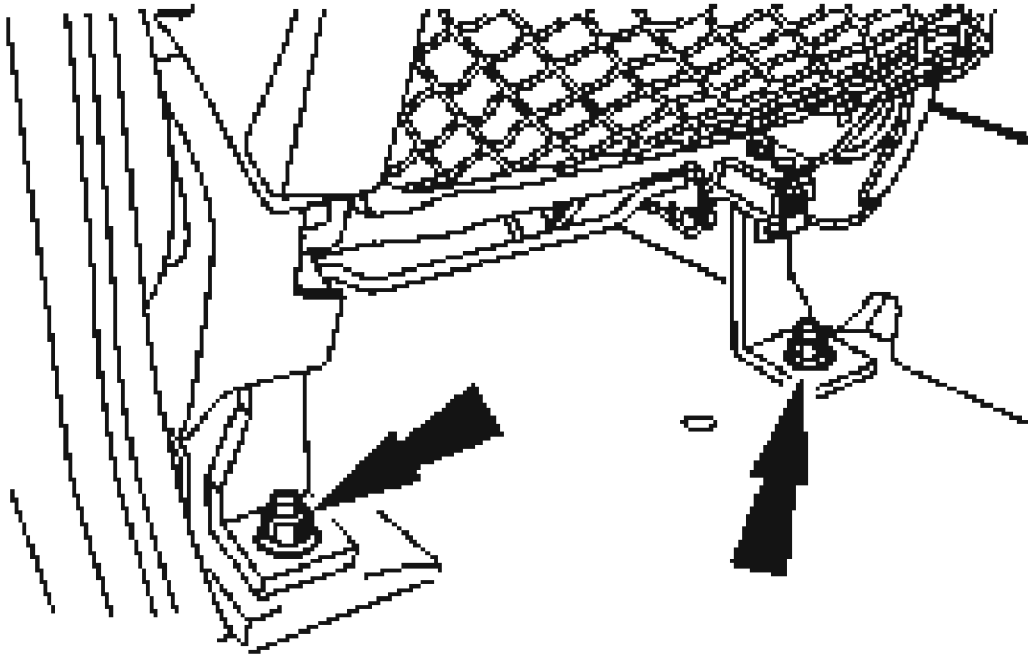
**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

**NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

1. Position the front seats forward.
2. Remove the seat track to floor nuts.

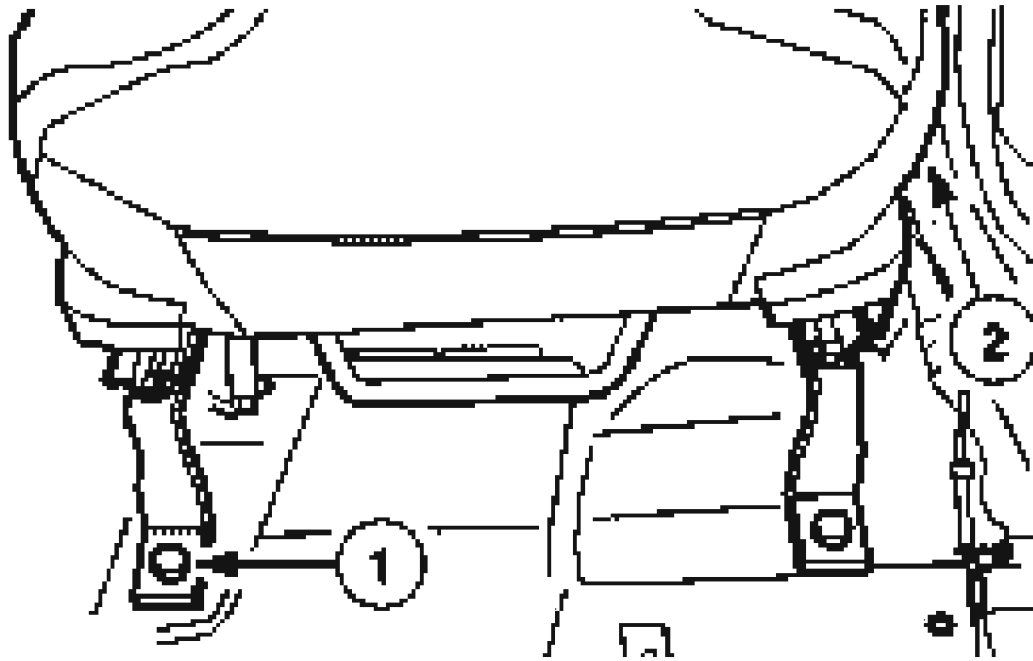


G02743113

**Fig. 82: Removing Seat Track To Floor Nuts**  
Courtesy of FORD MOTOR CO.

3. Position the driver seat rearward.
4. Depower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**.
5. If equipped, disconnect the seat side air bag module electrical connector.
6. Disconnect the safety belt pretensioner electrical connector.

**CAUTION:** Use care when handling the seat and track assembly.  
Dropping the assembly or sitting on a seat not secured  
in the vehicle may result in damaged components.



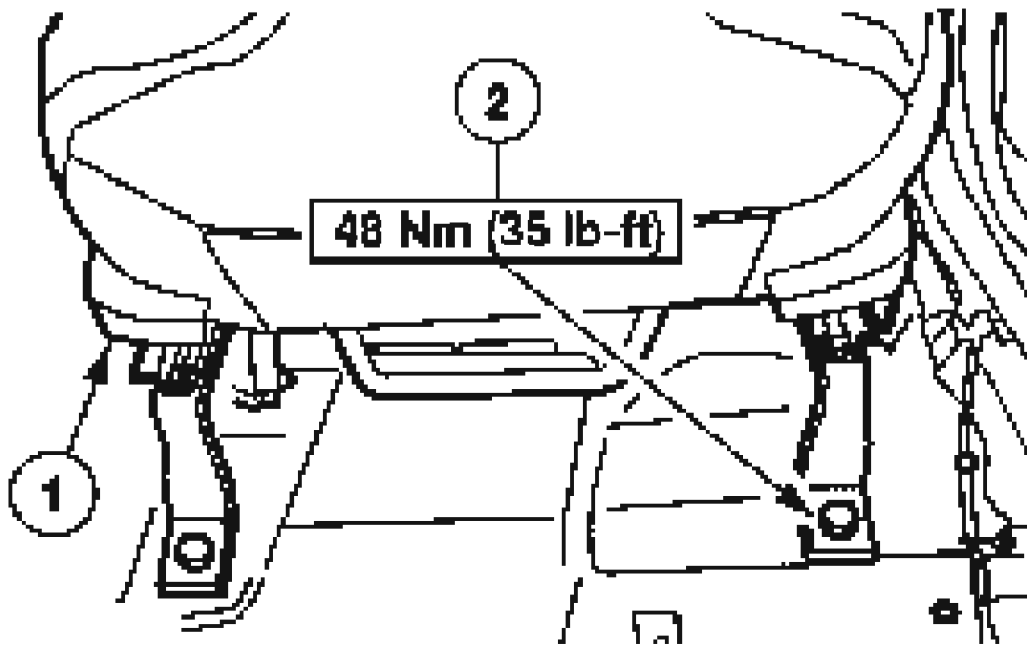
G02743114

**Fig. 83: Removing Driver Seat**  
Courtesy of FORD MOTOR CO.

7. Remove the driver seat.
  1. Remove the seat track to floor bolts.
  2. Remove the driver seat.
    - If equipped with a power seat, disconnect the electrical connector.

#### Installation

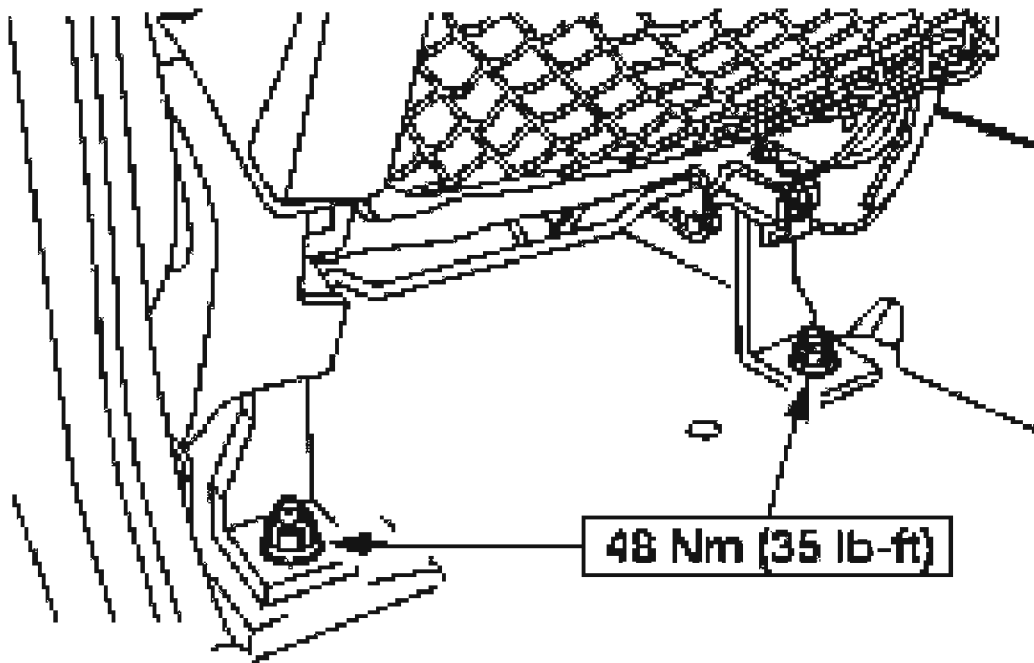
**CAUTION:** Use care when handling the seat and track assembly. Dropping the assembly or sitting on a seat not secured in the vehicle may result in damaged components.



G02743115

**Fig. 84: Installing Driver Seat**  
Courtesy of FORD MOTOR CO.

1. Install the driver seat.
  1. Position the driver seat.
  2. Install the seat track to floor bolts.
    - If equipped with a power seat, connect the electrical connector.
2. Connect the safety belt pretensioner electrical connector.
3. If equipped, connect the seat side air bag module electrical connector.
4. Repower the SRS. For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**
5. Position the driver seat forward.
6. Install the seat track to floor nuts.



G02743116

**Fig. 85: Identifying Seat Track To Floor Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

7. Check the restraint system for correct operation.

#### PASSENGER SEAT

##### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover



tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result

in personal injury.

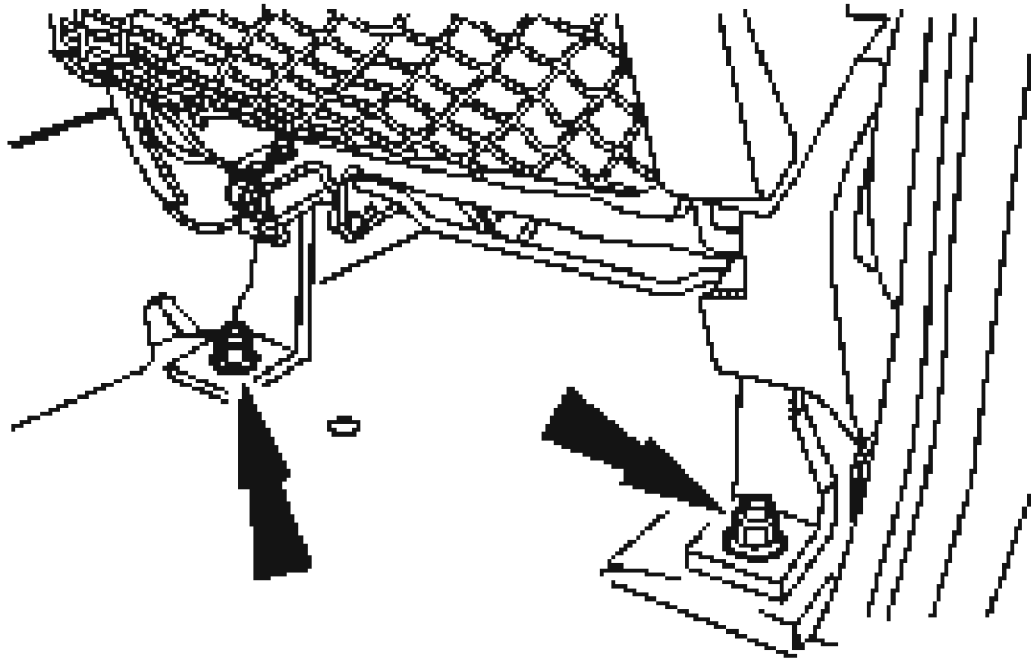
**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air-bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

1. Depower the supplemental restraint system (SRS). For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**.
2. Position the front seats forward.
3. Remove the seat track to floor nuts

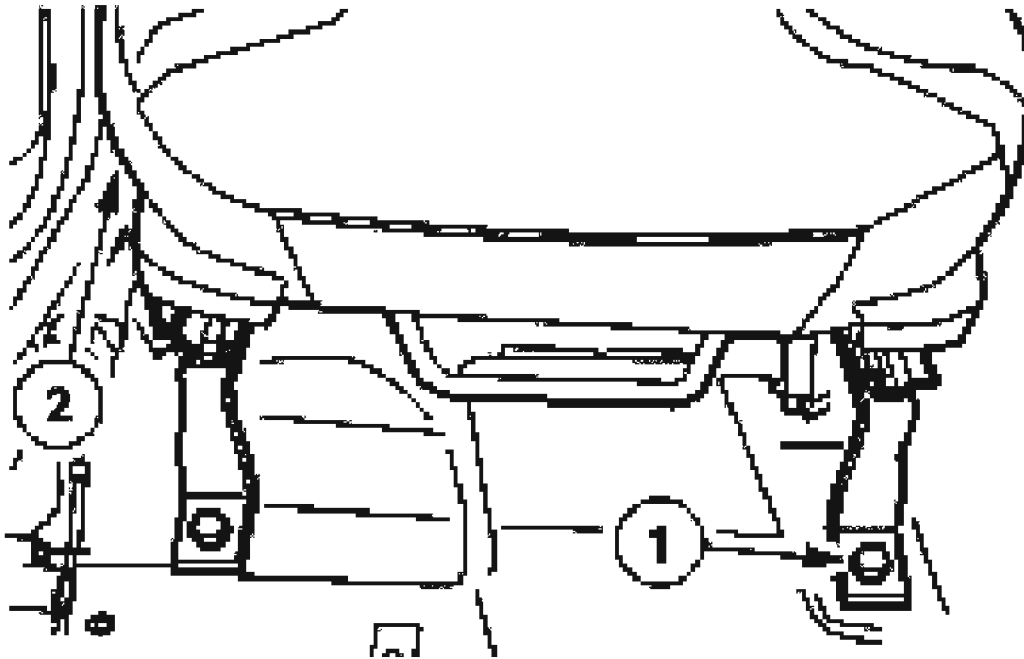


G02743117

**Fig. 86: Removing Seat Track To Floor Nuts**  
**Courtesy of FORD MOTOR CO.**

4. Position the passenger seat rearward.
5. Disconnect the safety belt pretensioner electrical connector.
6. If equipped, disconnect the seat air bag module electrical connector.

**CAUTION:** Use care when handling the seat and track assembly.  
Dropping the assembly or sitting on a seat not secured  
in the vehicle may result in damaged components.



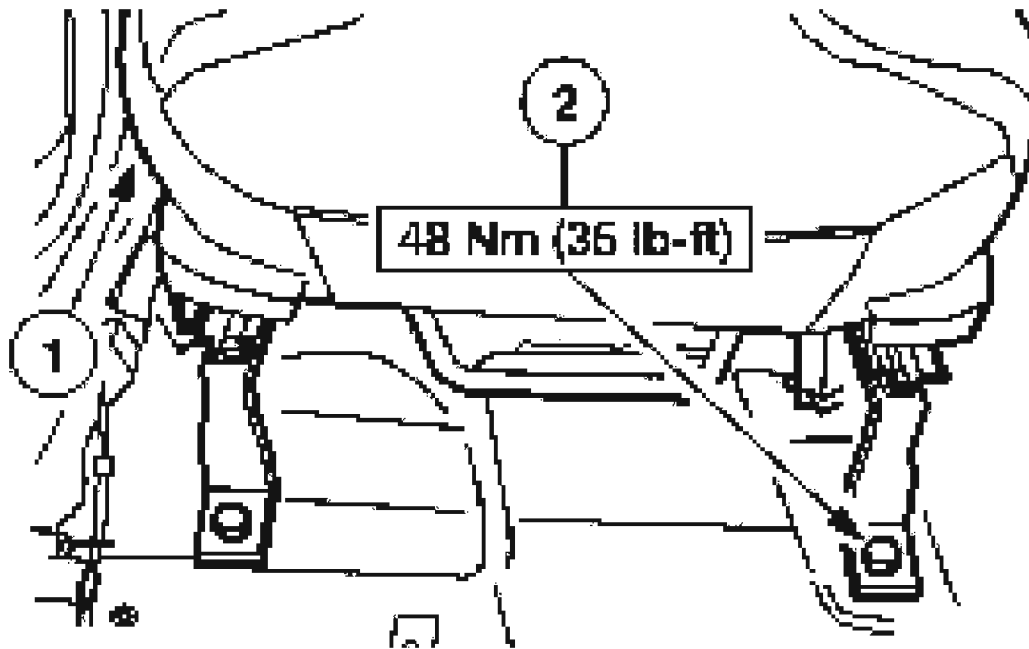
G02743118

**Fig. 87: Removing Passenger Seat**  
Courtesy of FORD MOTOR CO.

7. Remove the passenger seat.
  1. Remove the seat track to floor bolts.
  2. Remove the passenger seat.
    - If equipped with heated seats, disconnect the heated seat electrical connector.

#### Installation

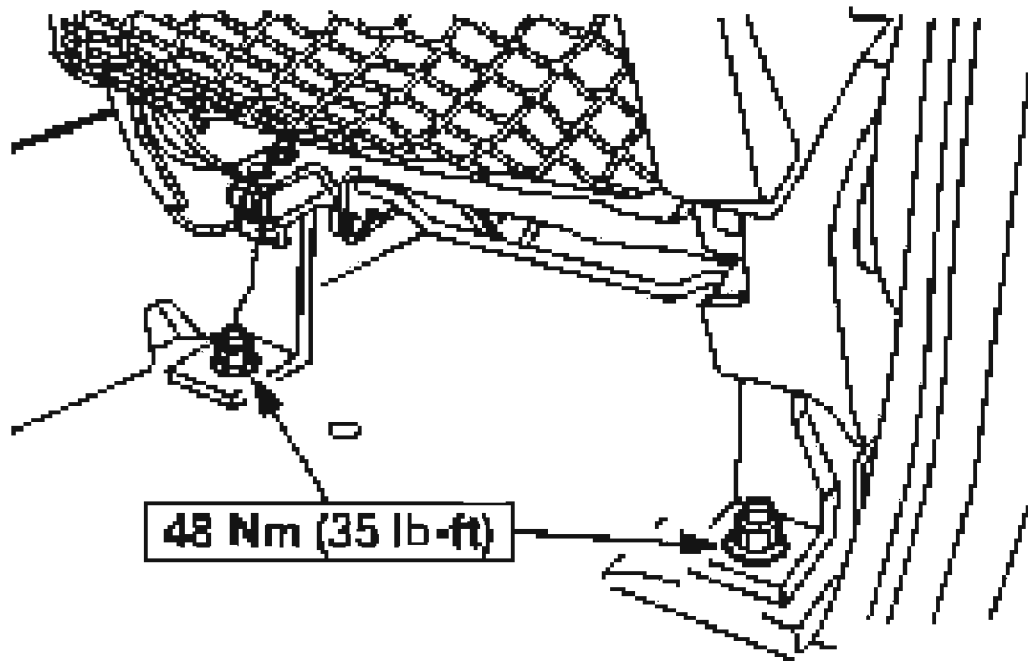
**CAUTION:** Use care when handling the seat and track assembly. Dropping the assembly or sitting on a seat not secured in the vehicle may result in damaged components.



G02743119

**Fig. 88: Installing Passenger Seat**  
Courtesy of FORD MOTOR CO.

1. Install the passenger seat.
  1. Position the passenger seat.
  2. Install the seat track to floor bolts.
    - If equipped with heated seats, connect the heated seat electrical connector.
2. Connect the safety belt pretensioner electrical connector.
3. If equipped, connect the seat side air bag module electrical connector.
4. Position the passenger seat forward.
5. Install the seat track to floor nuts.



G02743120

**Fig. 89: Identifying Seat Track To Floor Nuts Torque Specification**  
Courtesy of FORD MOTOR CO.

6. Repower the SRS. For additional information, refer to **AIR BAG RESTRAINT SYSTEMS**

## HEATED SEAT MODULE

### Removal

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if

equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and refer to possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

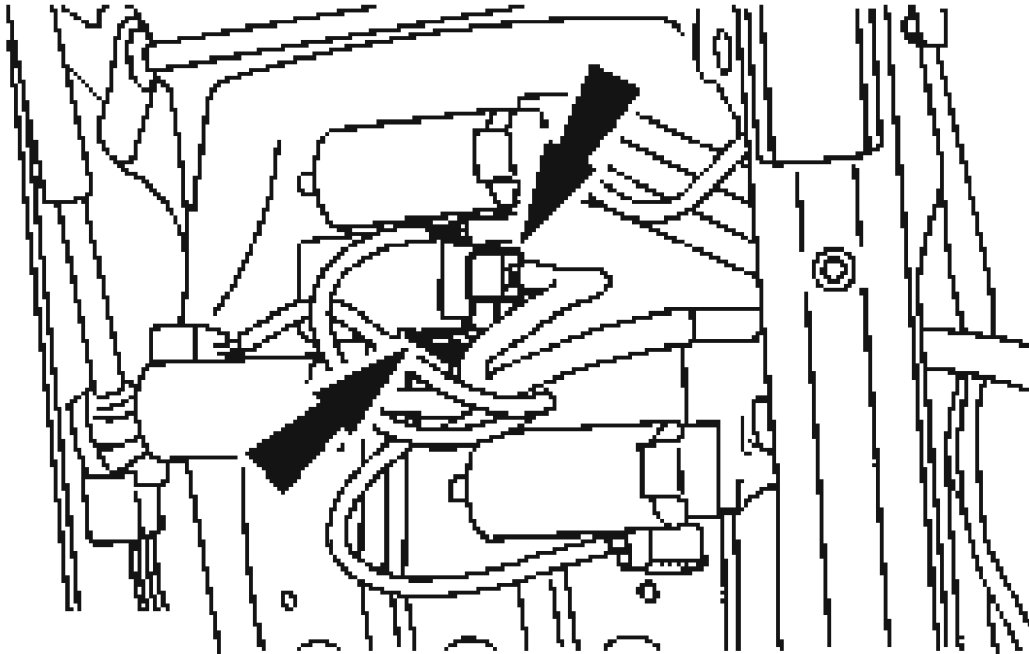
- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

1. Remove the front seat and depower the SRS. For additional information, refer to **DRIVER SEAT** or **PASSENGER SEAT**



2. Remove the heated seat module.

- Disconnect the electrical connector.
- Using a small flat-blade screwdriver, release the locking tab and slide the module off the bracket.



G02743121

**Fig. 90: Removing Heated Seat Module**  
Courtesy of FORD MOTOR CO.

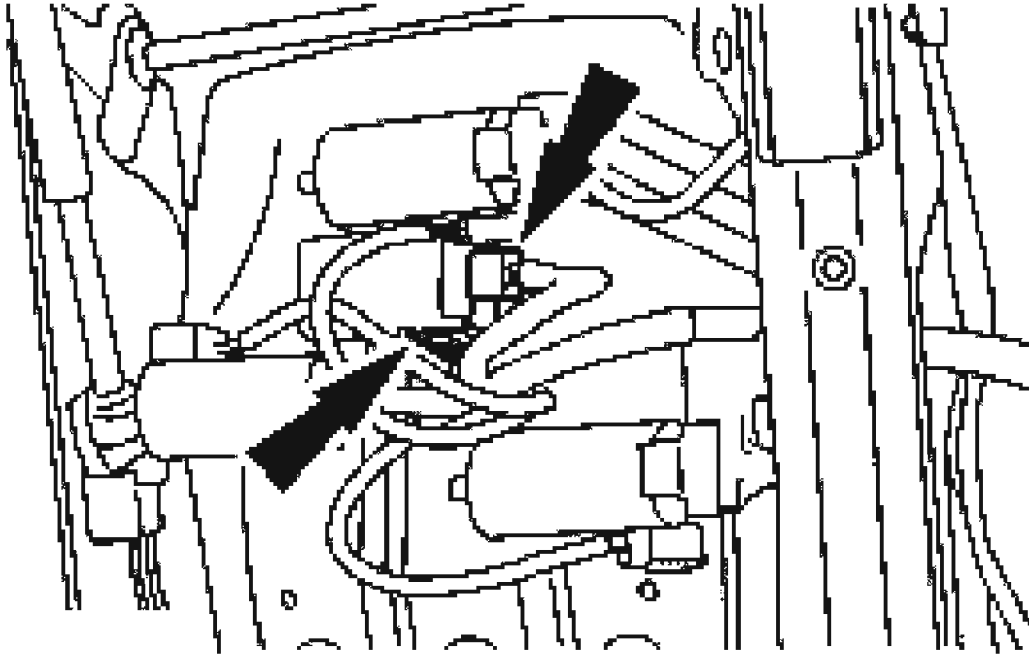
**Installation**

- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

1. Install the heated seat module.

- Slide the heated seat module down over the attachment bracket until the locking tab snaps into place

- Connect the electrical connector.



G02743122

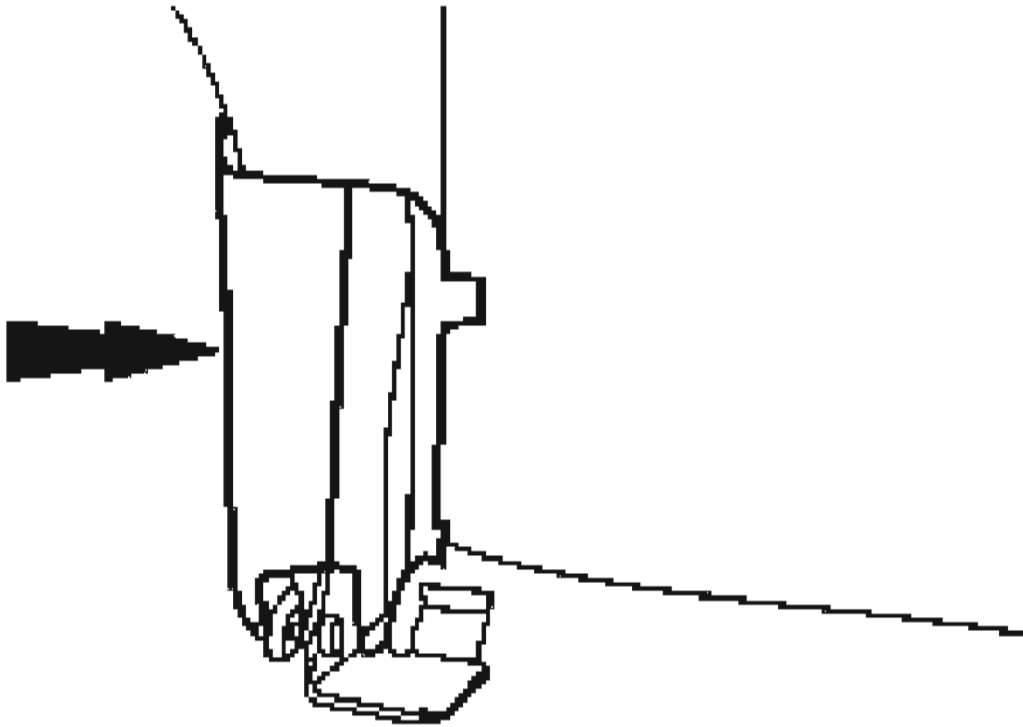
**Fig. 91: Installing Heated Seat Module**  
Courtesy of FORD MOTOR CO.

2. Install the front seat. For additional information, refer to **DRIVER SEAT** or **PASSENGER SEAT**

#### **REAR SEAT BACKREST LATCH**

##### **Removal and Installation**

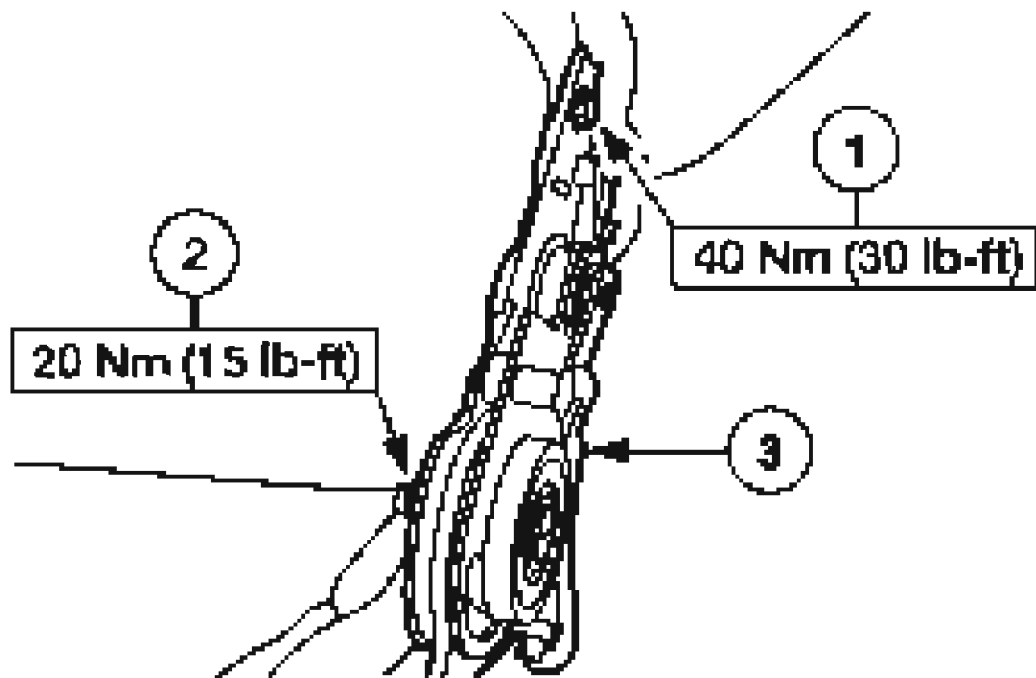
1. Remove the rear seat backrest. For additional information, refer to **REAR SEAT BACKREST - SPLIT BENCH** or **REAR SEAT BACKREST - BENCH** .
2. Remove the rear seat backrest side trim panel.



G02743123

**Fig. 92: Removing Rear Seat Backrest Side Trim Panel**  
Courtesy of FORD MOTOR CO.

3. Remove the rear seat backrest latch.
  1. Remove the bolt.
  2. Remove the nut.
  3. Remove the latch.



G02743124

**Fig. 93: Removing Rear Seat Backrest Latch**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## DISASSEMBLY AND ASSEMBLY

### FRONT SEAT CUSHION - DRIVER SEAT

#### Disassembly

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if

equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and refer to possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

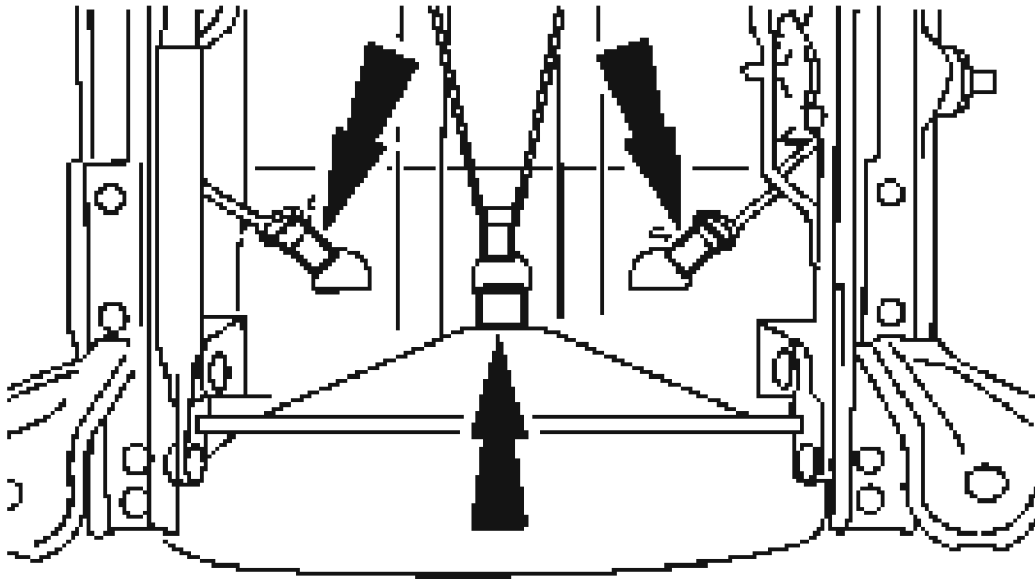
**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

**NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

1. Remove the driver seat and depower the SRS. For additional information, refer to **DRIVER SEAT**.

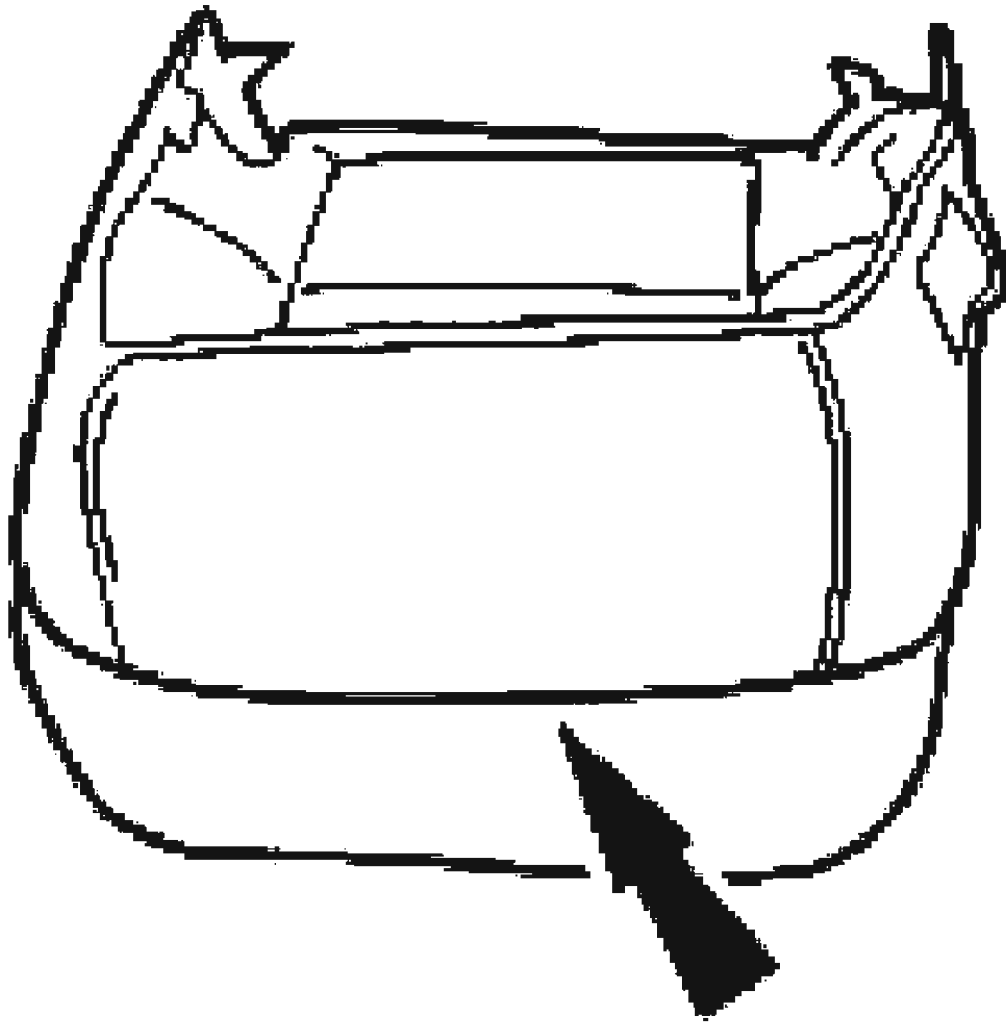
2. Disconnect the seat cushion trim cover J-clips.



G02743125

**Fig. 94: Disconnecting Seat Cushion Trim Cover J-Clips**  
**Courtesy of FORD MOTOR CO.**

3. Remove the front seat cushion trim and pad from the front seat cushion frame.
  - If equipped with heated seats, disconnect the backrest heated grid and the seat cushion heated grid electrical connectors.
4. Separate the front seat cushion trim from the front seat cushion pad.



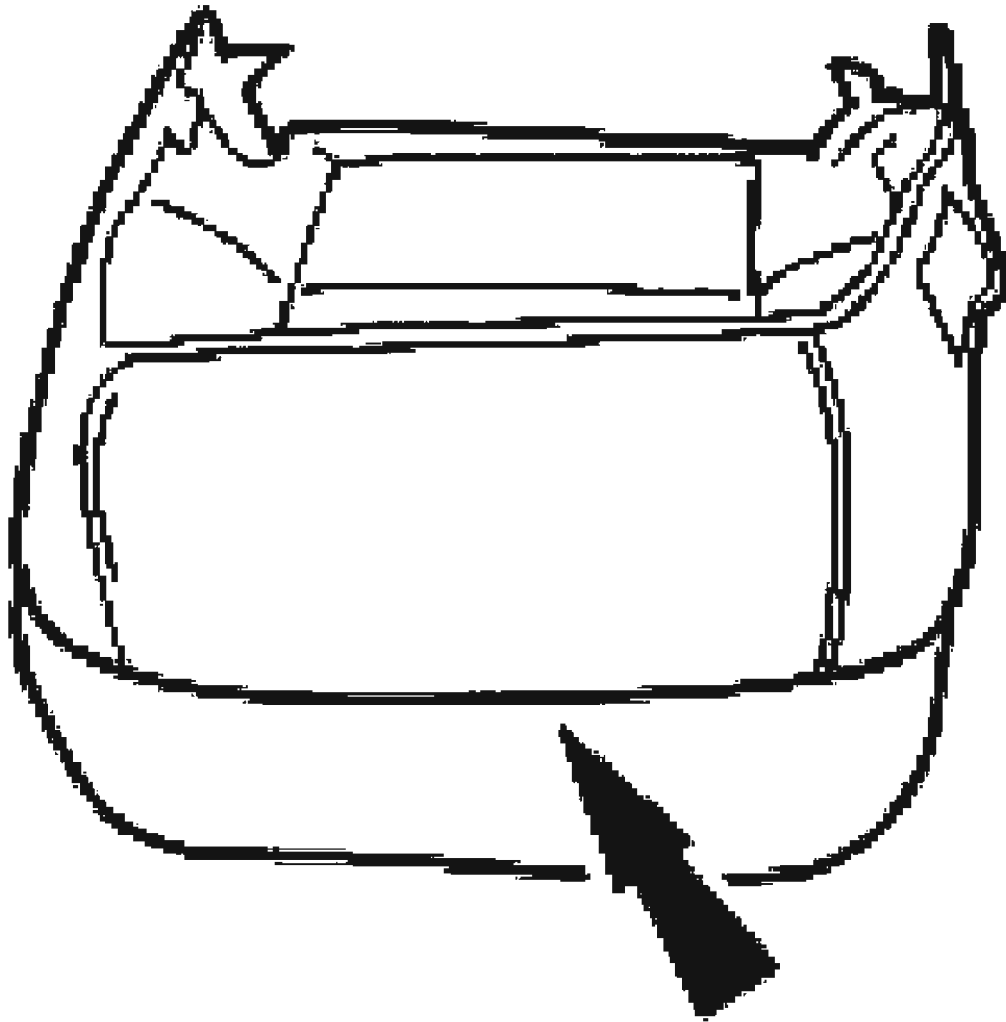
G02743126

**Fig. 95: Removing Front Seat Cushion Trim From Front Seat Cushion Pad**  
Courtesy of FORD MOTOR CO.

**Assembly**

1. Install the front seat cushion trim to the front seat cushion pad.

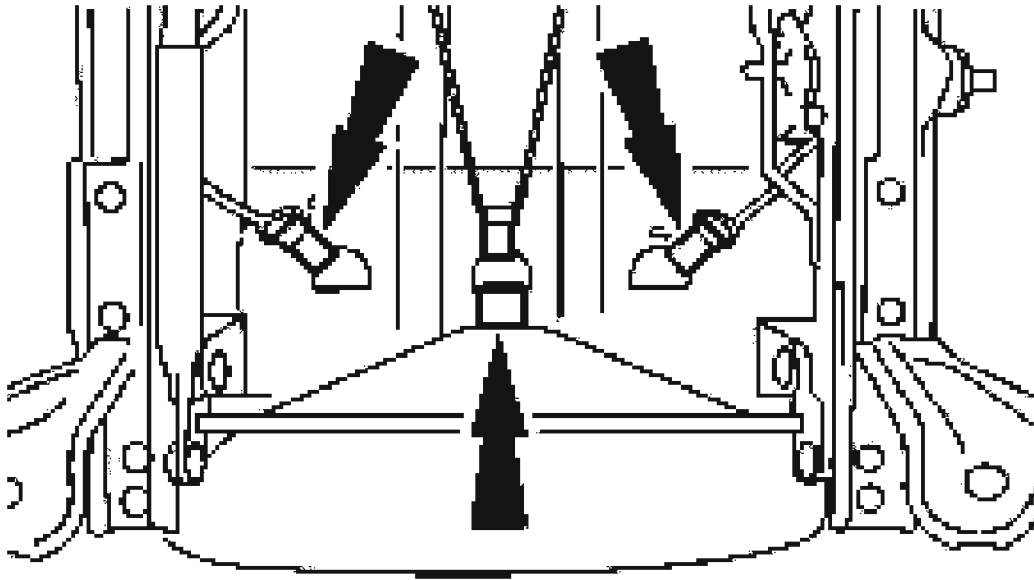




G02743127

**Fig. 96: Installing Front Seat Cushion Trim To Front Seat Cushion Pad**  
Courtesy of FORD MOTOR CO.

2. Install the front seat cushion trim and pad to the front seat cushion frame.
  - If equipped with heated seats, connect the backrest heated grid and the seat cushion heated grid electrical connectors.
3. Connect the seat cushion trim cover J-clips.



G02743128

**Fig. 97: Connecting Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

4. Install the driver seat and repower the SRS. For additional information, refer to **DRIVER SEAT**.
5. Check the restraint system for correct operation.

#### FRONT SEAT CUSHION - PASSENGER SEAT

##### Disassembly

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover

tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result

in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to remove could result in injury and possible violation of Vehicle safety standards. Failure to follow these instructions may result in personal injury.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.

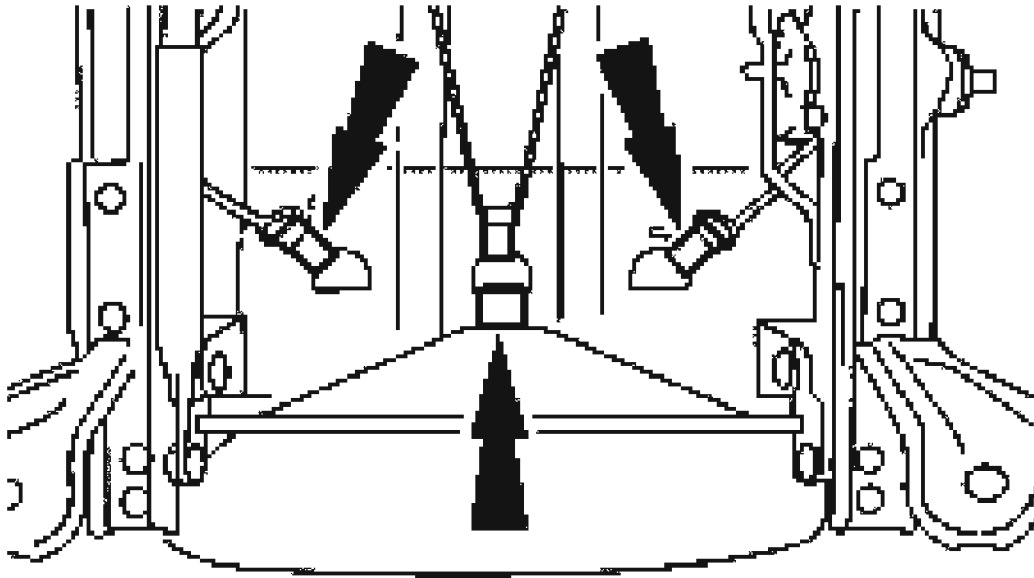
**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

**NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

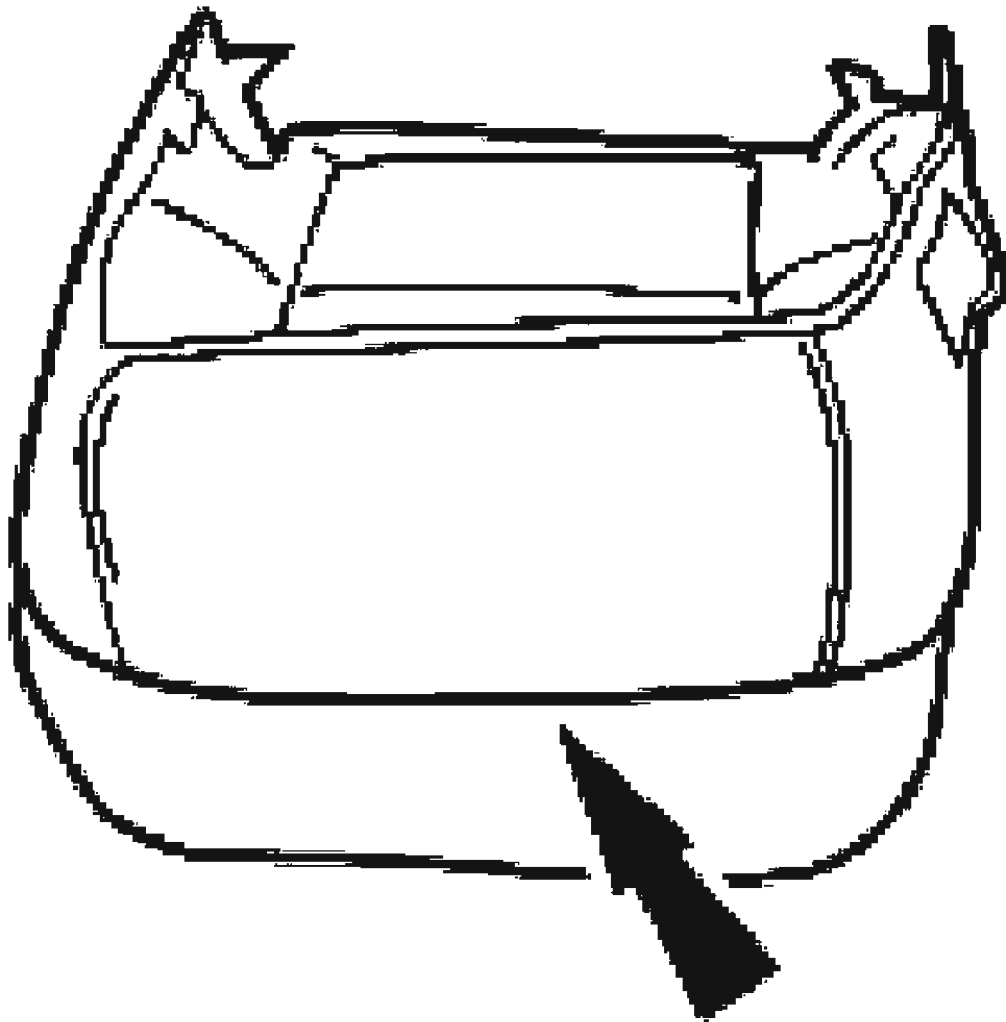
1. Remove the passenger seat and depower the SRS. For additional information, refer to **PASSENGER SEAT**.
2. Disconnect the seat cushion trim cover J-clips.



G02743129

**Fig. 98: Disconnecting Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

3. Remove the front seat cushion trim and pad from the front seat cushion frame.
  - If equipped with heated seats, disconnect the backrest heated grid connector and the seat cushion heated grid electrical connector from the seat wiring harness.
4. Separate the front seat cushion trim from the front seat cushion pad.

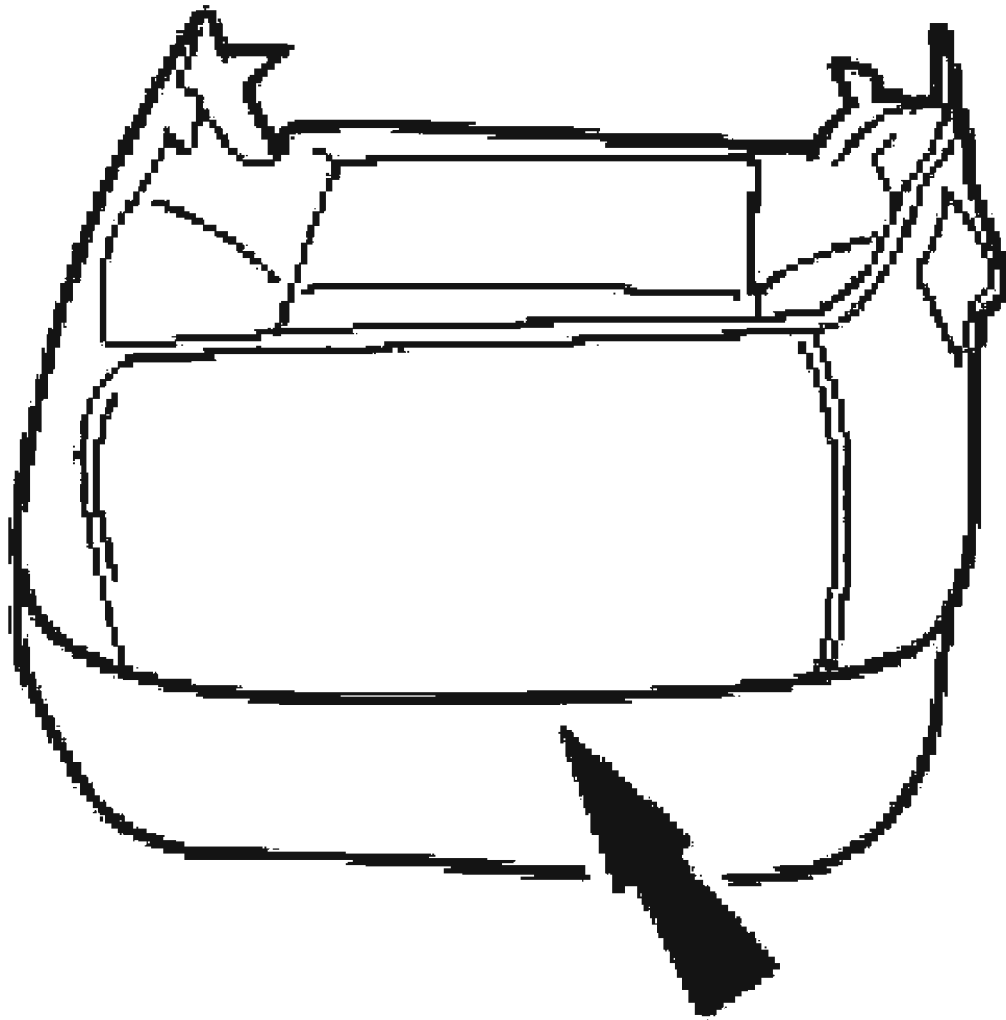


G02743130

**Fig. 99: Removing Front Seat Cushion Trim From Front Seat Cushion Pad**  
Courtesy of FORD MOTOR CO.

**Assembly**

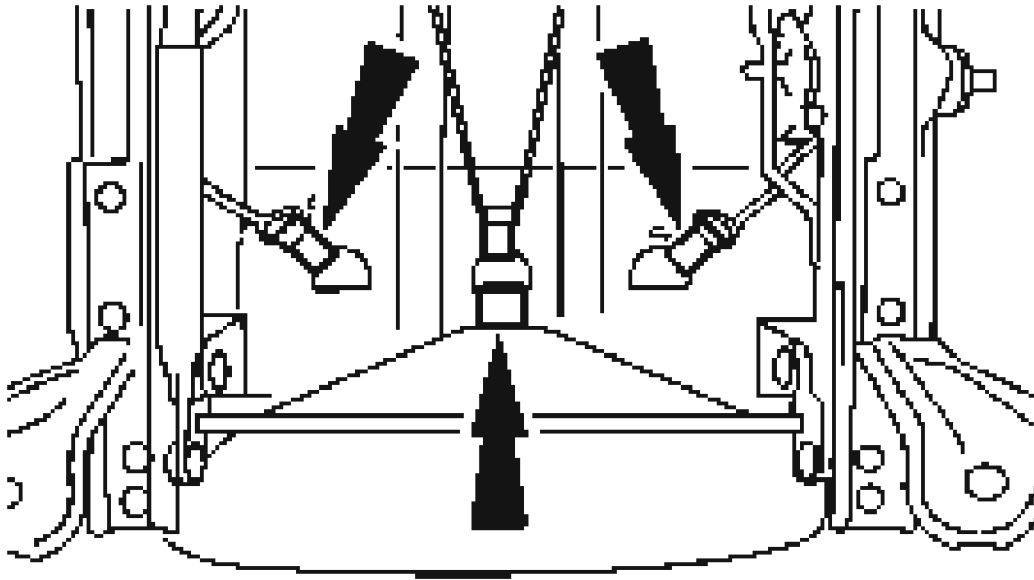
1. Install the front seat cushion trim to the front seat cushion pad.



G02743131

**Fig. 100: Installing Front Seat Cushion Trim To Front Seat Cushion Pad**  
Courtesy of FORD MOTOR CO.

2. Install the front seat cushion trim and pad to the front seat cushion frame.
  - If equipped with heated seats, connect the backrest heated grid connector and the seat cushion heated grid electrical connector to the seat wiring harness.
3. Connect the seat cushion trim cover J-clips.



G02743132

**Fig. 101: Connecting Seat Cushion Trim Cover J-Clips**  
Courtesy of FORD MOTOR CO.

4. Install the passenger seat and repower the SRS. For additional information, refer to **PASSENGER SEAT** .
5. Check the restraint system for correct operation.

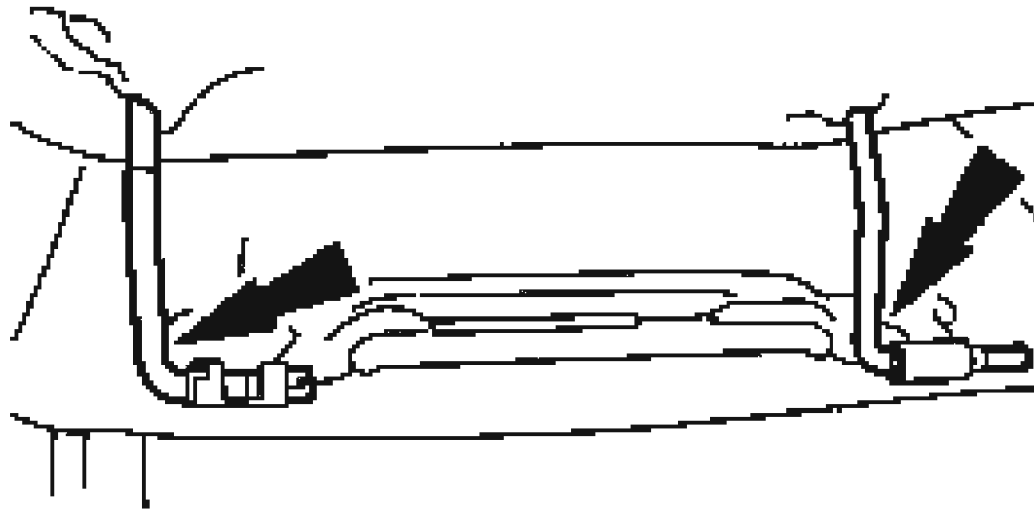
## REAR SEAT CUSHION

### Disassembly and Assembly

**NOTE:**      **60% split bench seat shown, 40% and bench seat similar.**

1. Lift up the rear seat cushion.
2. Remove the rear seat cushion.
  - Pull up on release lever and slide the seat out of the floor bracket.

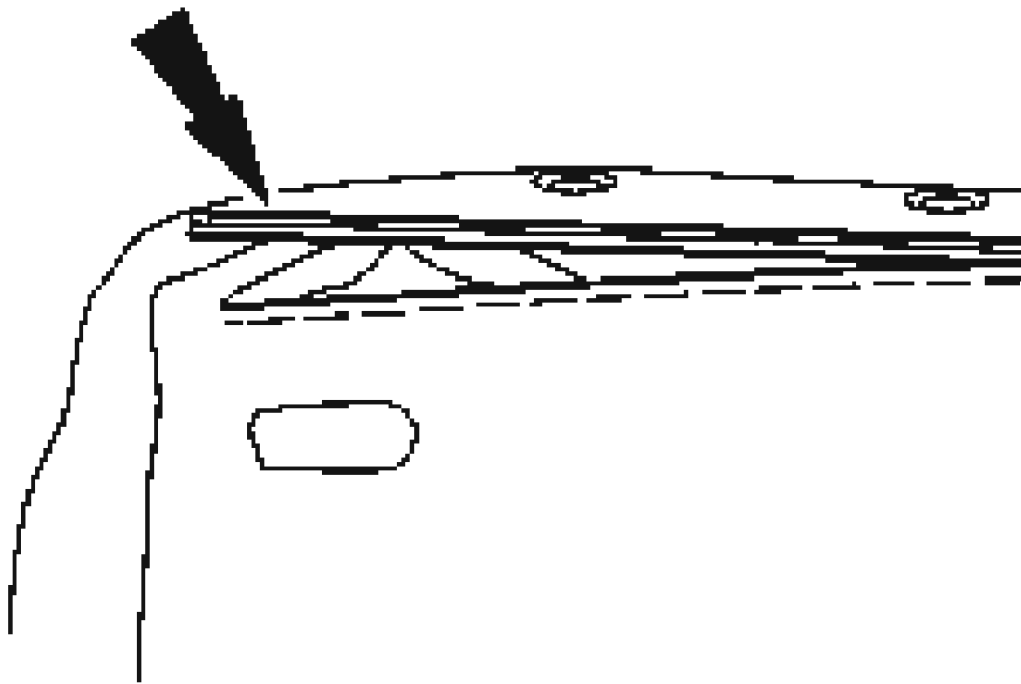




G02743133

**Fig. 102: Removing Rear Seat Cushion**  
**Courtesy of FORD MOTOR CO.**

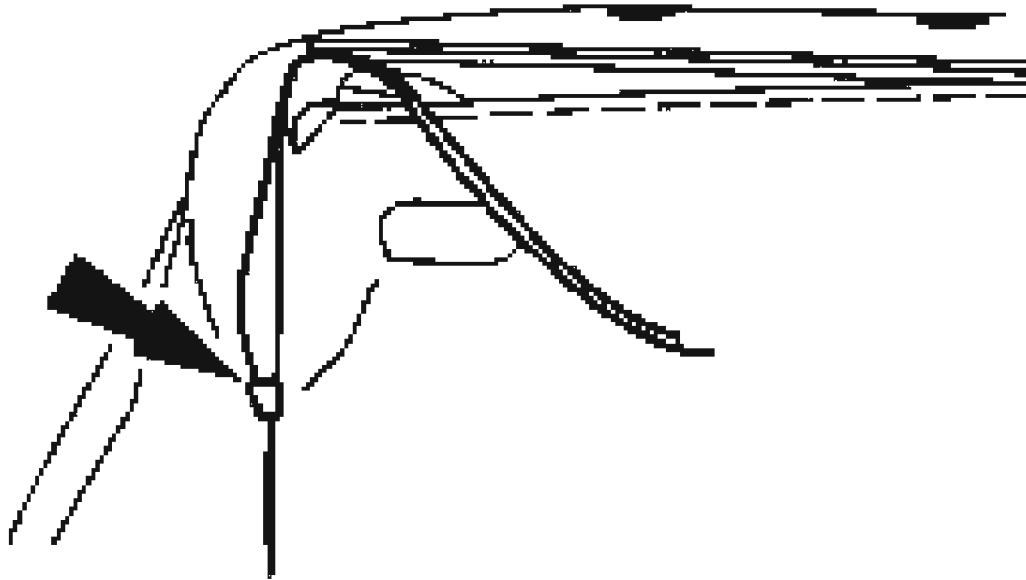
3. Release the J-retainer.



G02743134

**Fig. 103: Removing J-Retainer**  
**Courtesy of FORD MOTOR CO.**

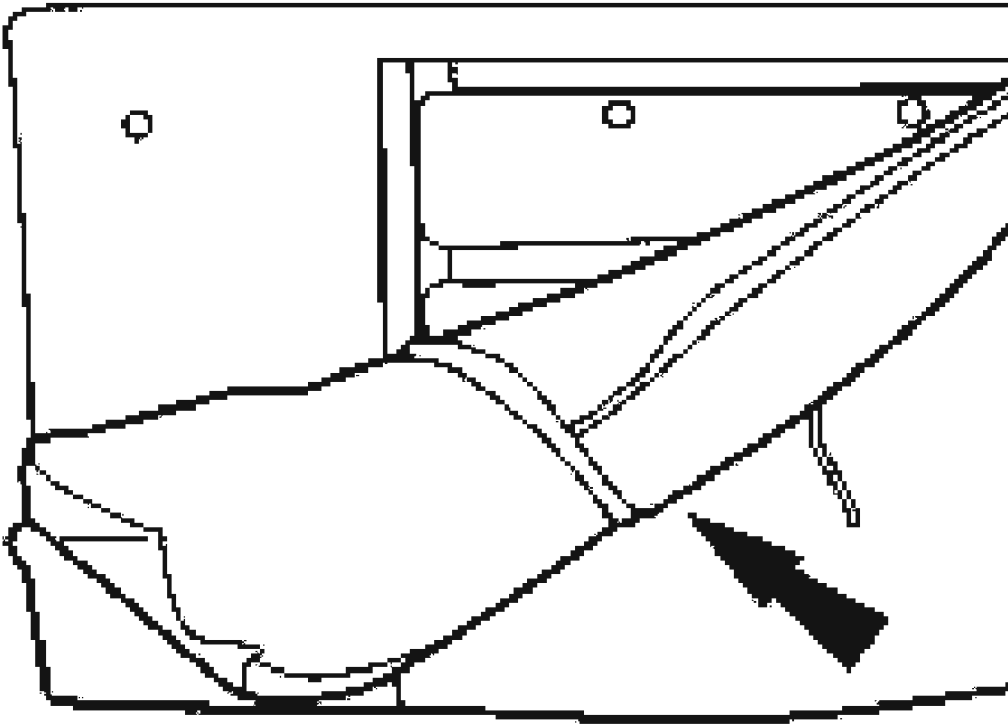
4. Unzip the rear seat cushion trim.



G02743135

**Fig. 104: Removing Rear Seat Cushion Trim**  
Courtesy of FORD MOTOR CO.

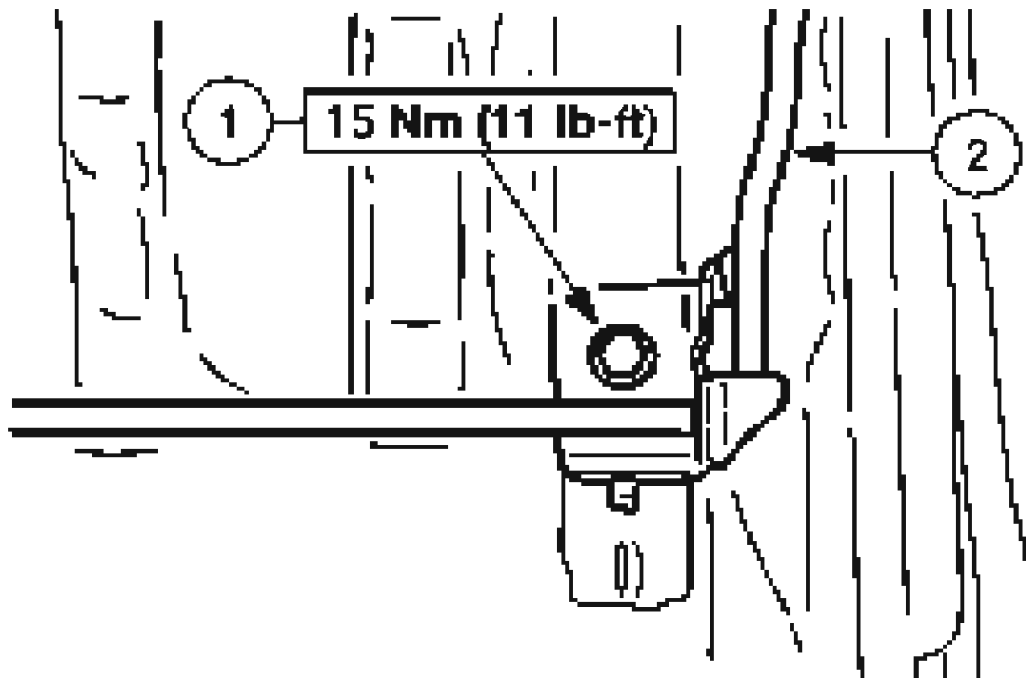
5. Remove the rear seat cushion trim from the rear seat cushion pad.



G02743136

**Fig. 105: Removing Rear Seat Cushion Trim From Rear Seat Cushion Pad**  
Courtesy of FORD MOTOR CO.

6. Remove the rear seat cushion bracket.
  1. Remove the two bolts.
  2. Remove the rear seat cushion bracket.



G02743137

**Fig. 106: Removing Rear Seat Cushion Bracket**  
Courtesy of FORD MOTOR CO.

7. To assemble, reverse the disassembly procedure.

#### FRONT SEAT BACKREST - DRIVER SEAT

##### Disassembly

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if

equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and refer to possible violation of vehicle safety standards.

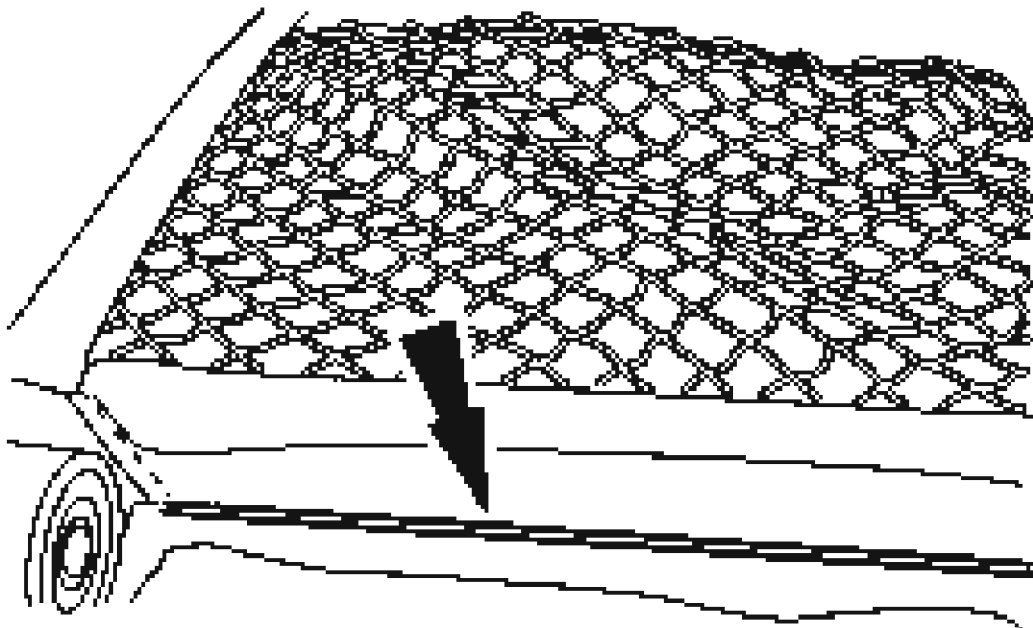
**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

- NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.
- NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.
- NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.
- NOTE:** Diagnostics or repairs are not to be carried out on a side air bag system or a safety belt pretensioner (if equipped) with the seat in the vehicle. Prior to attempting to diagnose/repair the side air bag system or a safety belt pretensioner (if equipped) the seat must be removed from the vehicle and the restraint system diagnostic tool must be installed in side air bag connector at the floor connector. The restraint system diagnostic tool must be removed prior to operating the vehicle.
- NOTE:** Diagnostics may be carried out on seat systems other than the

side air bag system or a safety belt pretensioner (if equipped) (climate controlled, heated, power seat track) with the seat installed in the vehicle as long as the restraint system diagnostic tool is installed under the seat in the side air bag to floor connector.

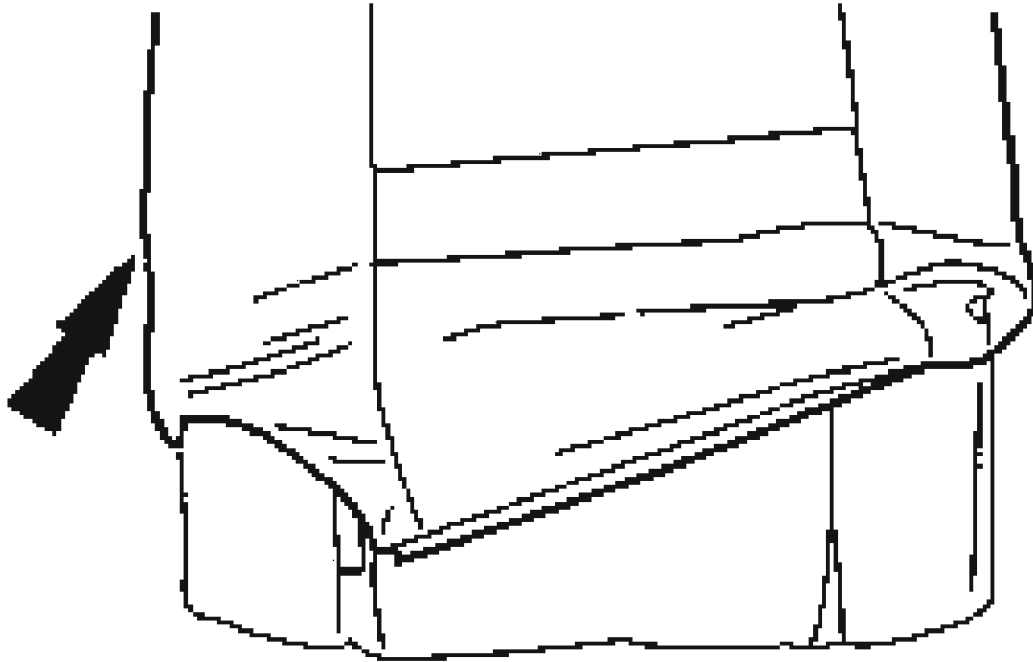
- NOTE:** After diagnosing/repairing a seat system the restraint system diagnostic tool must be removed before operating the vehicle.
- NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.
- NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.
1. Remove the driver seat backrest and depower the SRS. For additional information, refer to **FRONT SEAT BACKREST - DRIVER SEAT**.
  2. If equipped, remove the headrest and headrest guides.
  3. Release the front seat backrest J-retainer.





**Fig. 107: Removing Front Seat Backrest J-Retainer**  
Courtesy of FORD MOTOR CO.

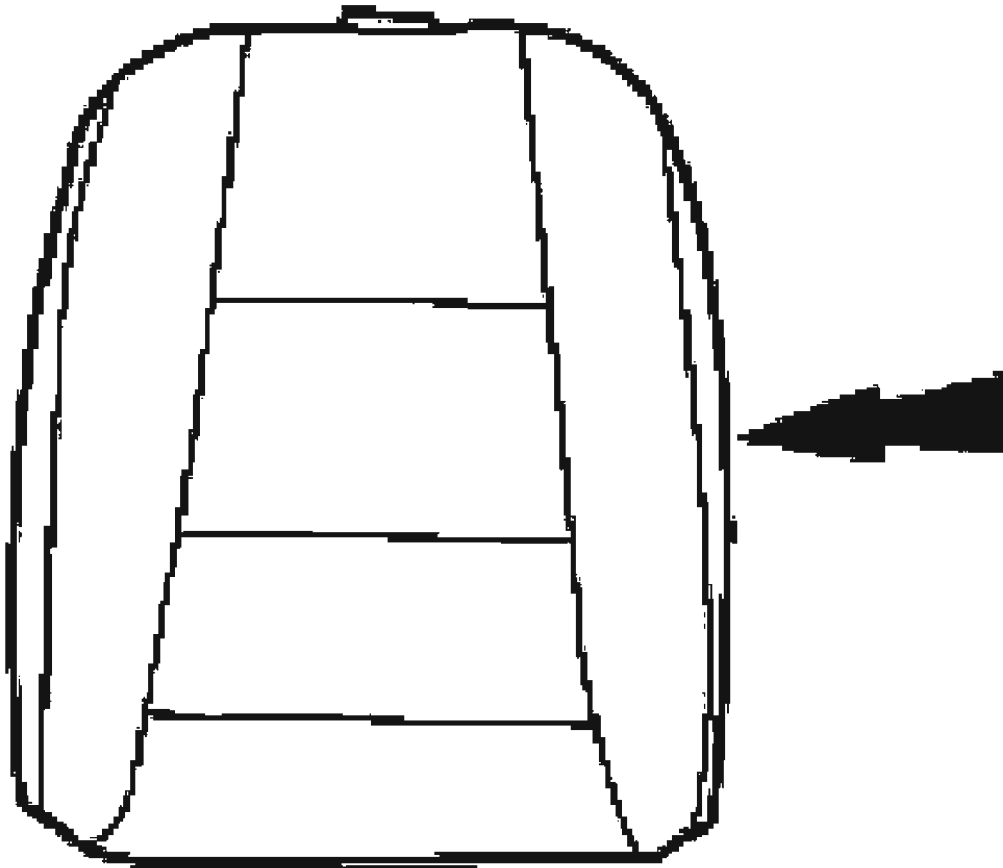
4. Remove the front seat backrest trim cover.



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**Fig. 108: Removing Front Seat Backrest Trim Cover**  
Courtesy of FORD MOTOR CO.

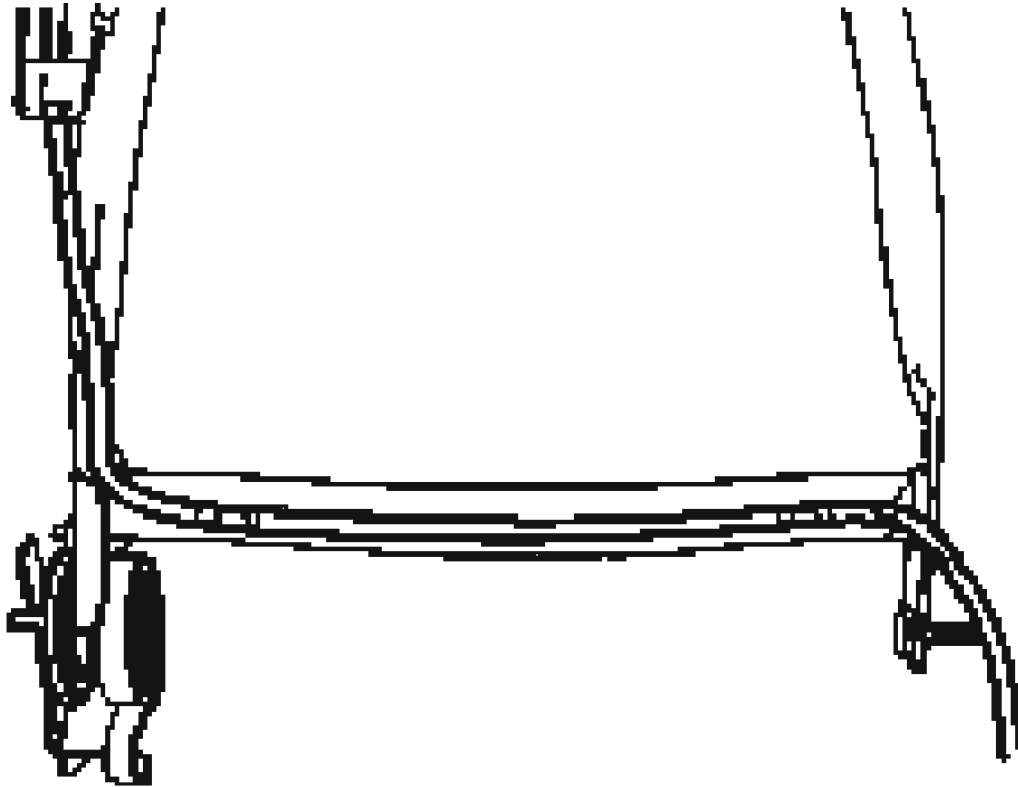
5. Separate the front backrest rest pad from the front backrest frame.



G02743140

**Fig. 109: Removing Front Backrest Rest Pad From Front Backrest Frame**  
Courtesy of FORD MOTOR CO.

6. Separate the side air bag module wiring harness locators from the seat back frame.

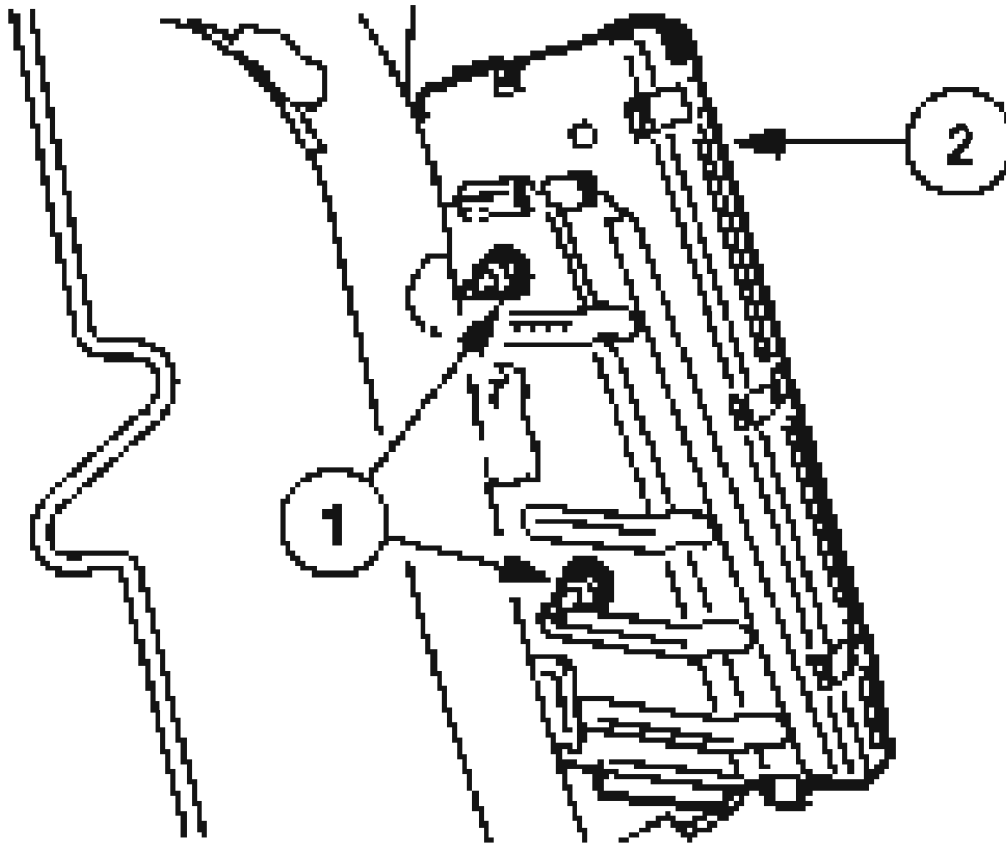


G02743141

**Fig. 110: Removing Side Air Bag Module Wiring Harness Locators From Seat Back Frame**

**Courtesy of FORD MOTOR CO.**

7. Remove the side air bag module.
  1. Remove the nuts.
  2. Remove the side air bag module.



G02743142

**Fig. 111: Removing Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

Assembly

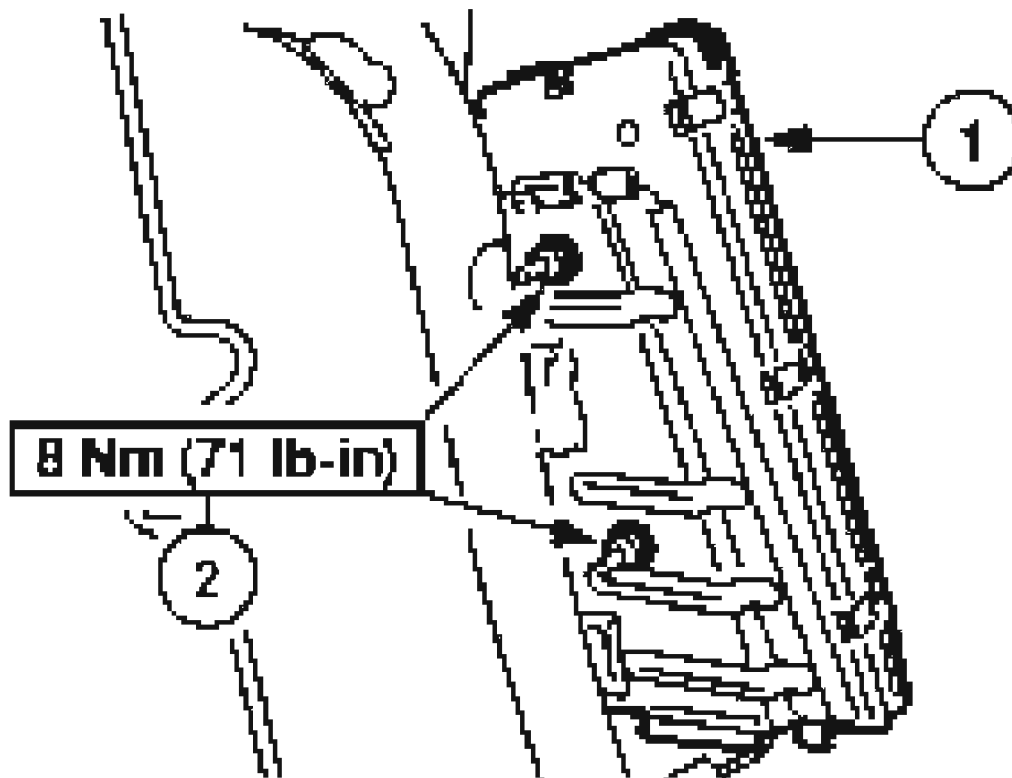
Vehicles with side air bag

**WARNING:** Inspect the mounting surfaces of the side air bag module and the seat back frame mounting for any foreign objects before installing the side air bag module. If any foreign objects are found, remove them. Failure to do so may result in personal injury in the event of an air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Inspect the side air bag cavity in the seat back pad for

any foreign objects. If any foreign objects are found, remove them. Failure to do so may result in personal injury in the event of an air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Before installing the side air bag module, check the air bag for damage and foreign objects. If any foreign objects are found, remove them. Failure to do so may result in personal injury in the event of an air bag deployment. Failure to follow these instructions may result in personal injury.

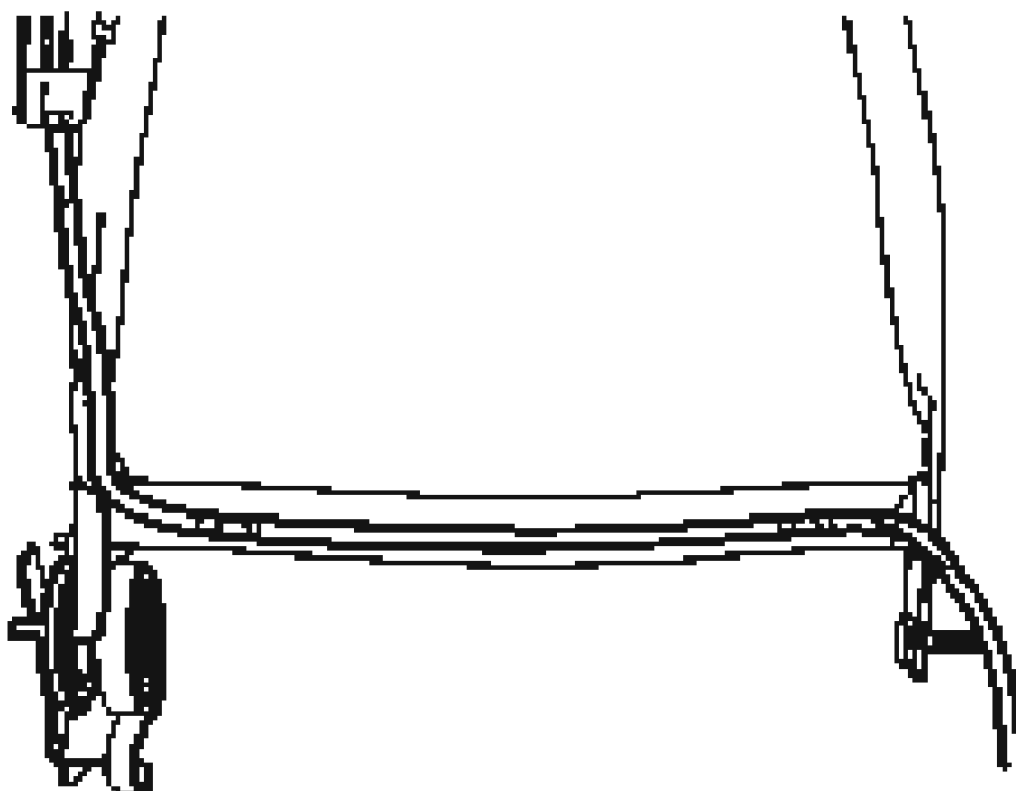


G02743143

**Fig. 112: Installing Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

1. Install the side air bag module.
1. Install the side air bag module.

2. Install the nuts.
2. Route the side air bag module wire harness. Install the locators to the seat backrest frame.

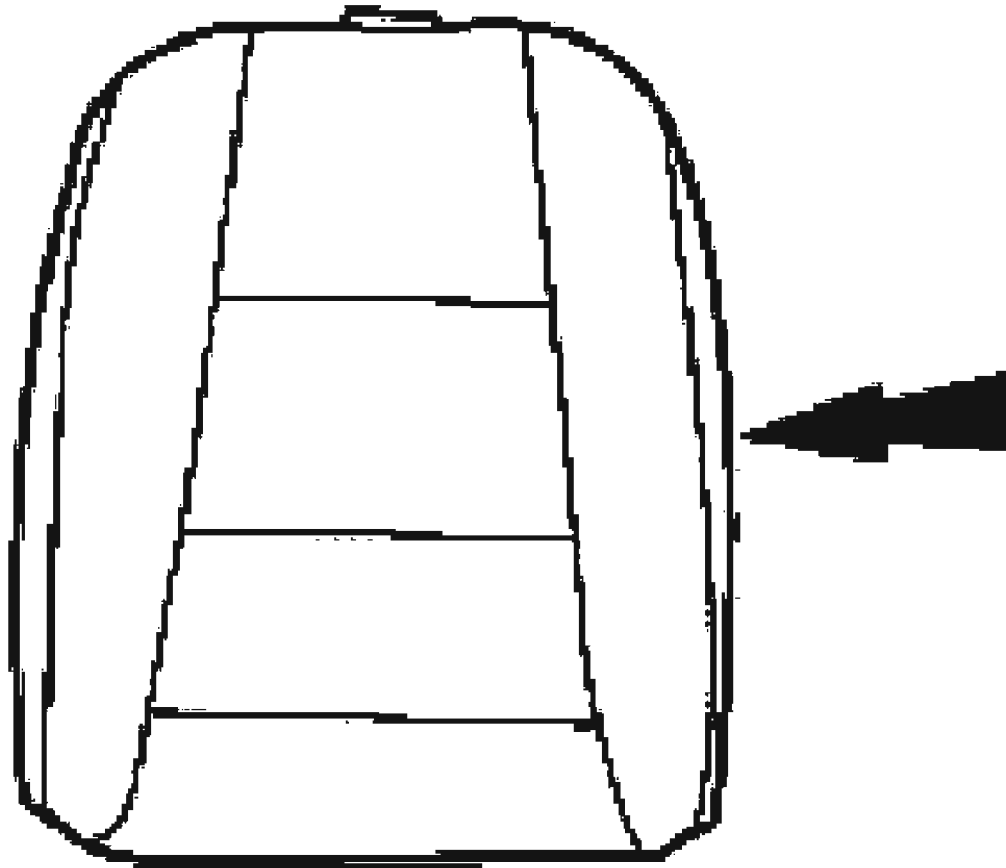


G02743144

**Fig. 113: Installing Locators To Seat Backrest Frame**  
Courtesy of FORD MOTOR CO.

**All vehicles**

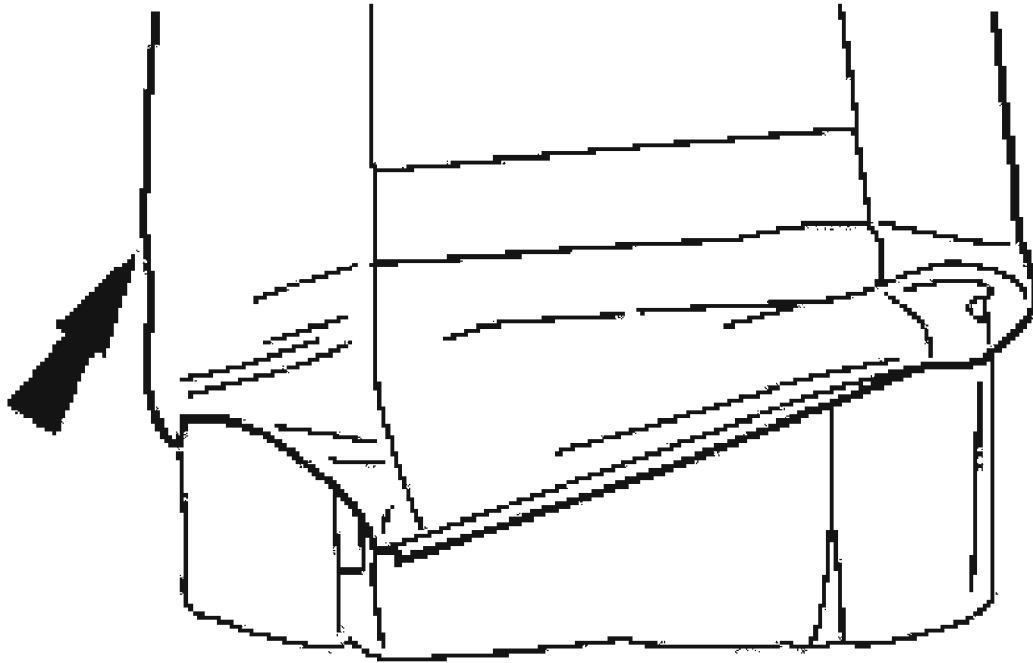
3. Install the front backrest pad to the front backrest frame.



G02743145

**Fig. 114: Installing Front Backrest Pad To Front Backrest Frame**  
Courtesy of FORD MOTOR CO.

4. Install the front seat backrest trim cover.

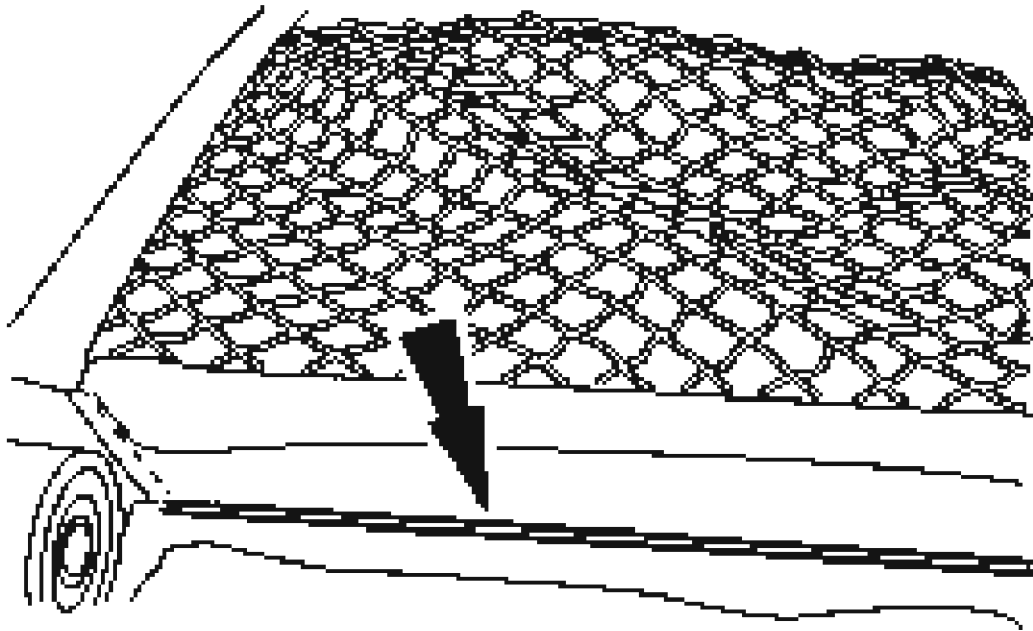


G02743146

**Fig. 115: Installing Front Seat Backrest Trim Cover**  
**Courtesy of FORD MOTOR CO.**

5. Connect the front seat backrest J-retainer.





G02743147

**Fig. 116: Connecting Front Seat Backrest J-Retainer**  
Courtesy of FORD MOTOR CO.

6. If equipped, install the headrest guide pins and headrest.
7. Install the front seat backrest and repower the SRS. For additional information, refer to **FRONT SEAT BACKREST - DRIVER SEAT**.

#### **FRONT SEAT BACKREST - PASSENGER SEAT**

##### **Disassembly**

**WARNING:** Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Carry a live side air bag module with the air bag and tear seam pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Do not set a live side air bag module down on the cover tear seam. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterward. Failure to follow these instructions may result in personal injury.

**WARNING:** Never probe the connectors on the air bag module. Doing so may result in air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Vehicle sensor orientation is critical for proper system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Replace and properly position the sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed. Failure to follow these instructions may result in personal injury.

**WARNING:** To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any front or side air bag supplemental restraint system (SRS) components and before servicing, replacing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches.

Refer to AIR BAG RESTRAINT SYSTEMS to determine location of the front air bag sensors.

The side air bag sensors are located at or near the base of the B-pillar.

To deplete the backup power supply energy, disconnect the battery and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if

equipped). Failure to follow these instructions may result in personal injury.

**WARNING:** The restraint system diagnostic tool is for restraint system service only. Remove from vehicle prior to road use. Failure to follow these instructions may result in personal injury and possible violation of vehicle safety standards.

**WARNING:** The safety belt pretensioner is a pyrotechnic device. Always wear safety glasses when repairing an air bag equipped vehicle and when handling a safety belt buckle pretensioner or safety belt retractor pretensioner. Never probe a pretensioner electrical connector. Doing so could result in pretensioner or air bag deployment and could result in personal injury.

**WARNING:** To reduce the risk of personal injury, do not use any memory saver devices.

**NOTE:** If a seat equipped with a seat-mounted side air bag and/or a safety belt pretensioner (if equipped) system is being serviced, the supplemental restraint system (SRS) must be depowered.

**NOTE:** The air bag warning lamp illuminates when the RCM fuse is removed and the ignition switch is ON. This is normal operation and does not indicate a supplemental restraint system (SRS) fault.

**NOTE:** The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

**NOTE:** A repair is made by installing a new part only. If a new part is installed and the new part does not correct the condition, install the original part and carry out the diagnostic procedure again.

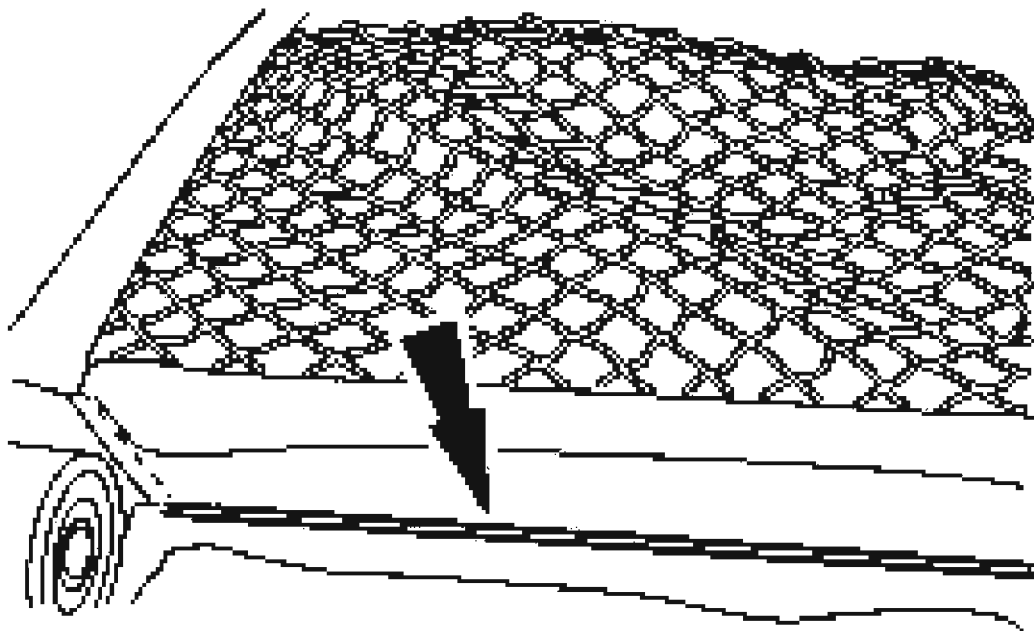
**NOTE:** If a side air bag deployment took place, a new seatback pad, trim cover, and side air bag module must be installed. A new seatback frame should be installed if necessary.

### **All vehicles**

1. Remove the passenger seat backrest and depower the SRS. For additional information,

refer to **FRONT SEAT BACKREST - PASSENGER SEAT** .

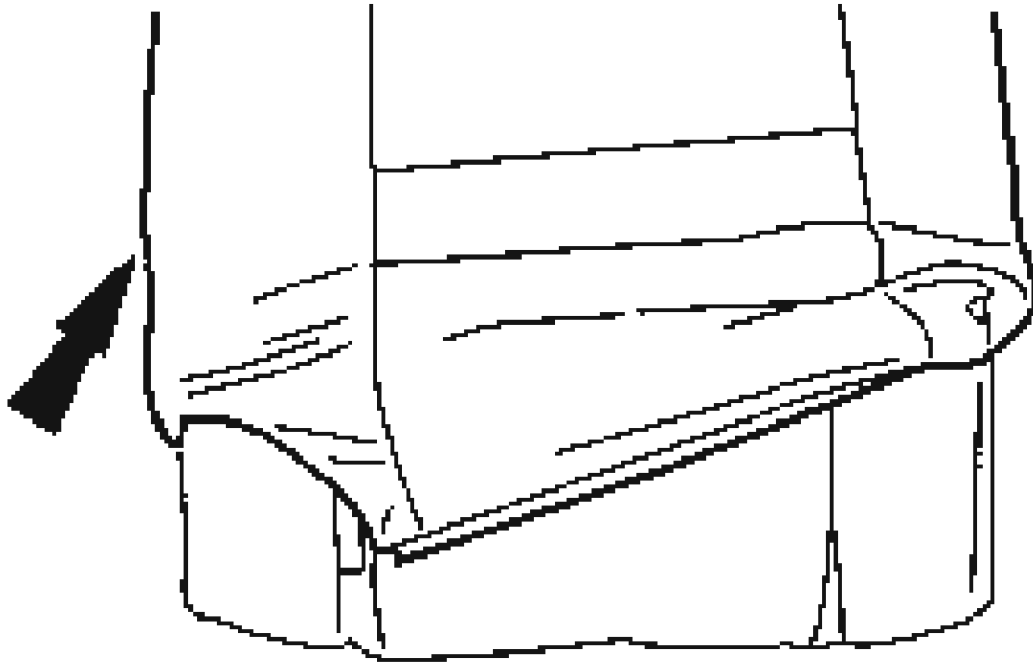
2. If equipped, remove the headrest and headrest guides.
3. Release the front seat backrest J-retainer.



G02743148

**Fig. 117: Removing Front Seat Backrest J-Retainer**  
Courtesy of FORD MOTOR CO.

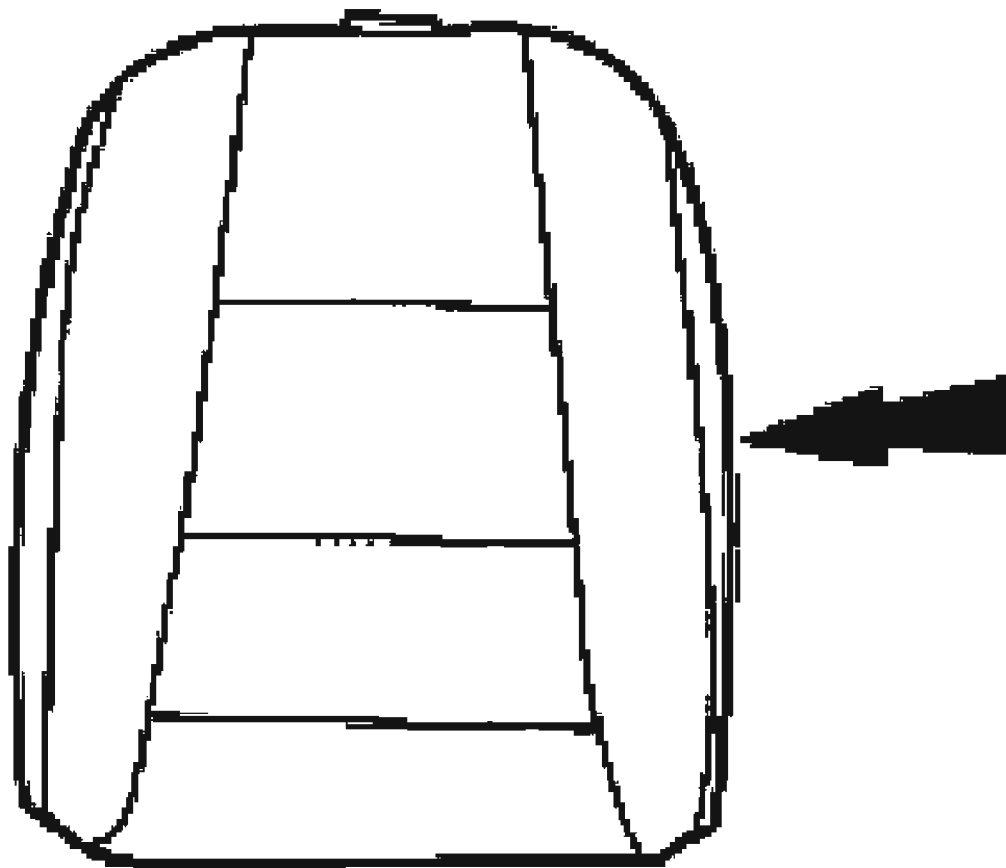
4. Remove the front seat backrest trim cover.



G02743149

**Fig. 118: Removing Front Seat Backrest Trim Cover**  
Courtesy of FORD MOTOR CO.

5. Separate the front backrest rest pad from the front backrest frame.

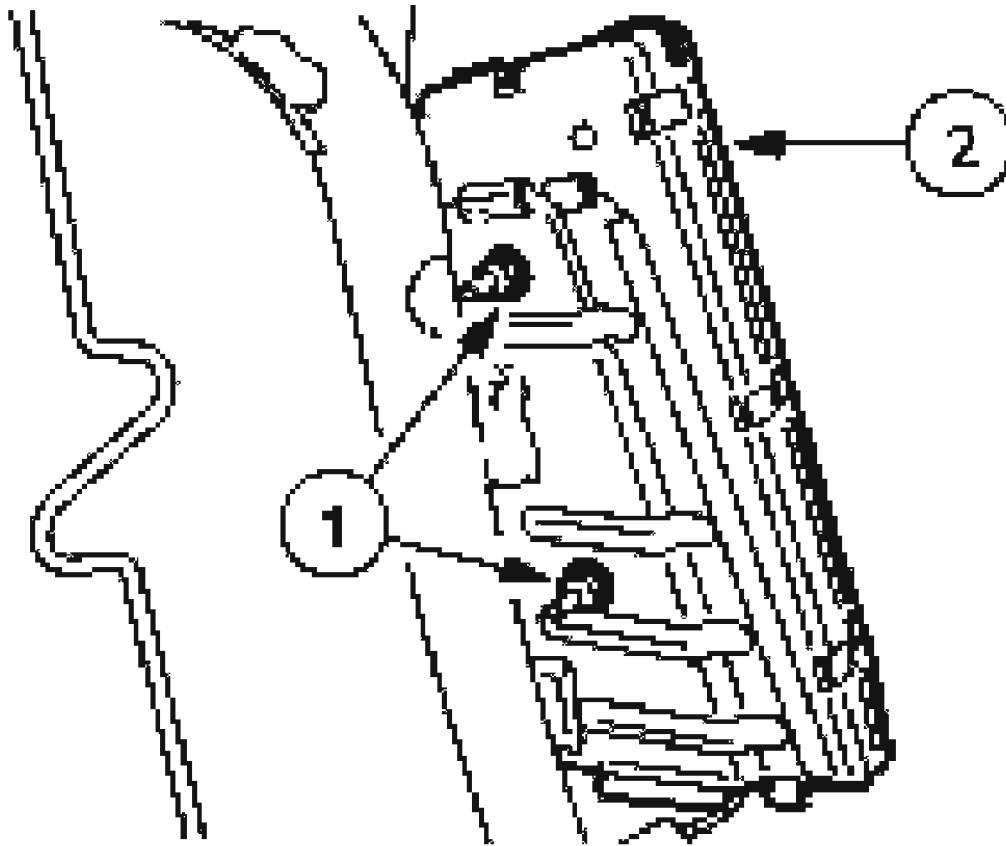


G02743150

**Fig. 119: Removing Front Backrest Rest Pad From Front Backrest Frame**  
Courtesy of FORD MOTOR CO.

**Vehicles with side air bag**

6. Remove the side air bag module.
  1. Remove the nuts.
  2. Remove the side air bag module.



G02743151

**Fig. 120: Removing Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

Assembly

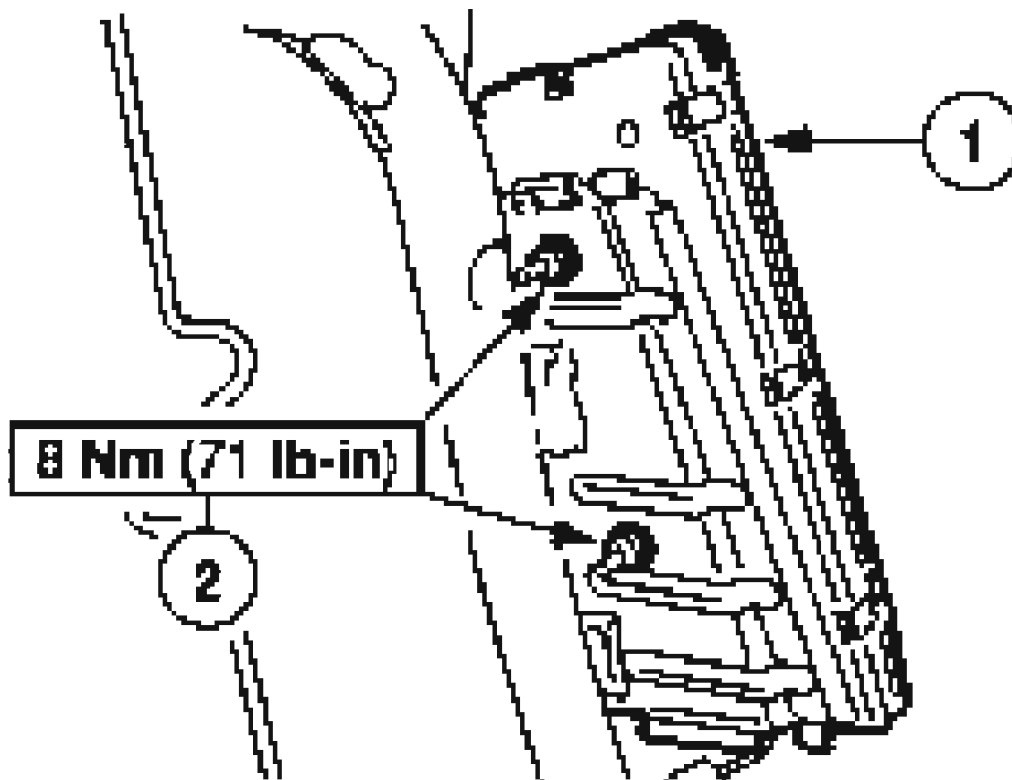
Vehicles with side air bag

**WARNING:** Inspect the mounting surfaces of the side air bag module and the seat back frame mounting for any foreign objects before installing the side air bag module. If any foreign objects are found, remove them. Failure to do so may result in personal injury in the event of an air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Inspect the side air bag cavity in the seat back pad for

any foreign objects. If any foreign objects are found, remove them. Failure to do so may result in personal injury in the event of an air bag deployment. Failure to follow these instructions may result in personal injury.

**WARNING:** Before installing the side air bag module, check the air bag for damage and foreign objects. If any foreign objects are found, remove them. Failure to do so may result in personal injury in the event of an air bag deployment. Failure to follow these instructions may result in personal injury.



G02743152

**Fig. 121: Installing Side Air Bag Module**  
Courtesy of FORD MOTOR CO.

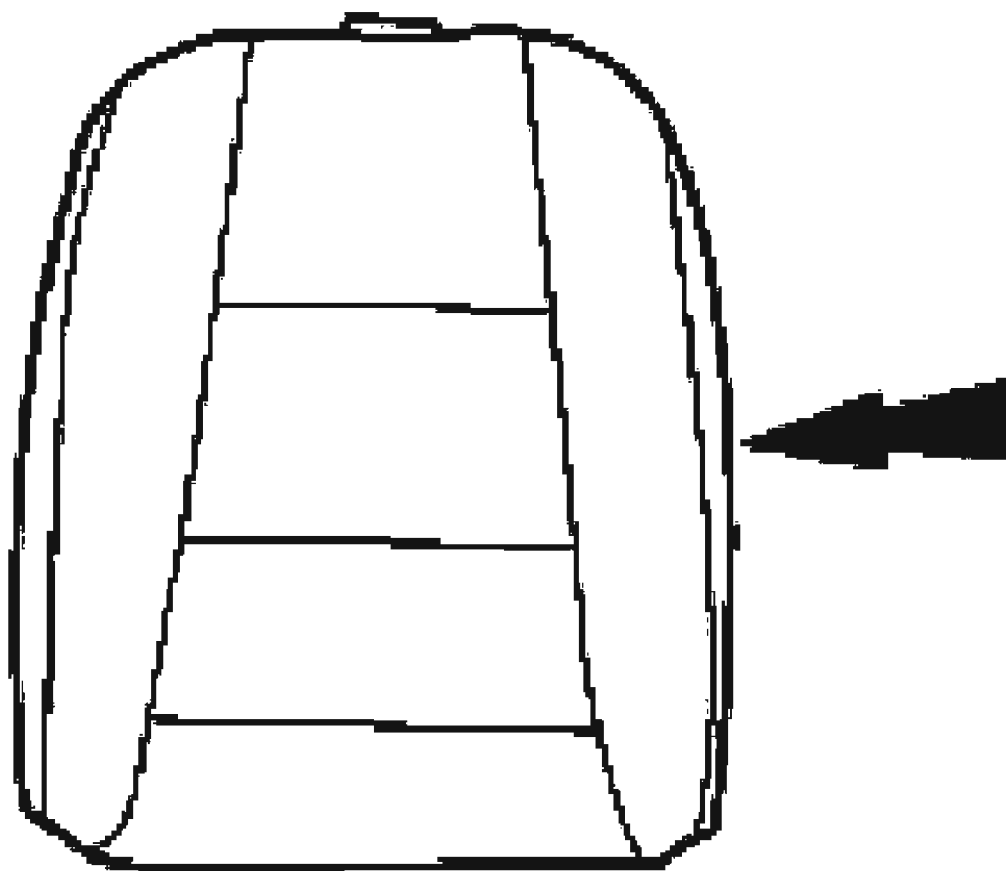
1. Install the side air bag module.
1. Install the side air bag module.



2. Install the nuts.

**All vehicles**

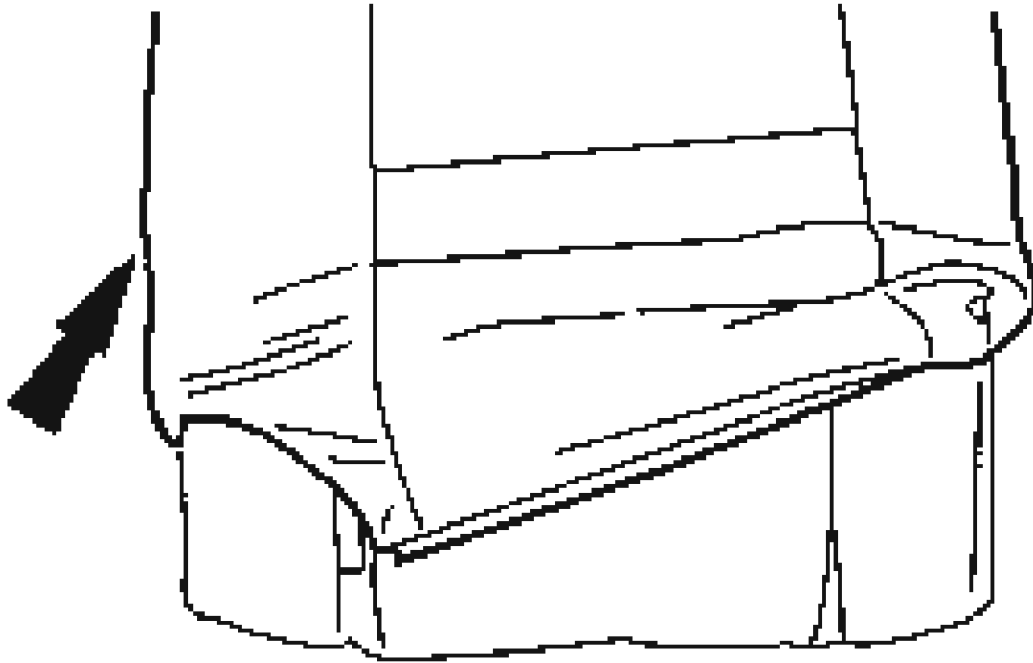
2. Install the front backrest rest pad to the front backrest frame.



G02743153

**Fig. 122: Installing Front Backrest Rest Pad To Front Backrest Frame**  
Courtesy of FORD MOTOR CO.

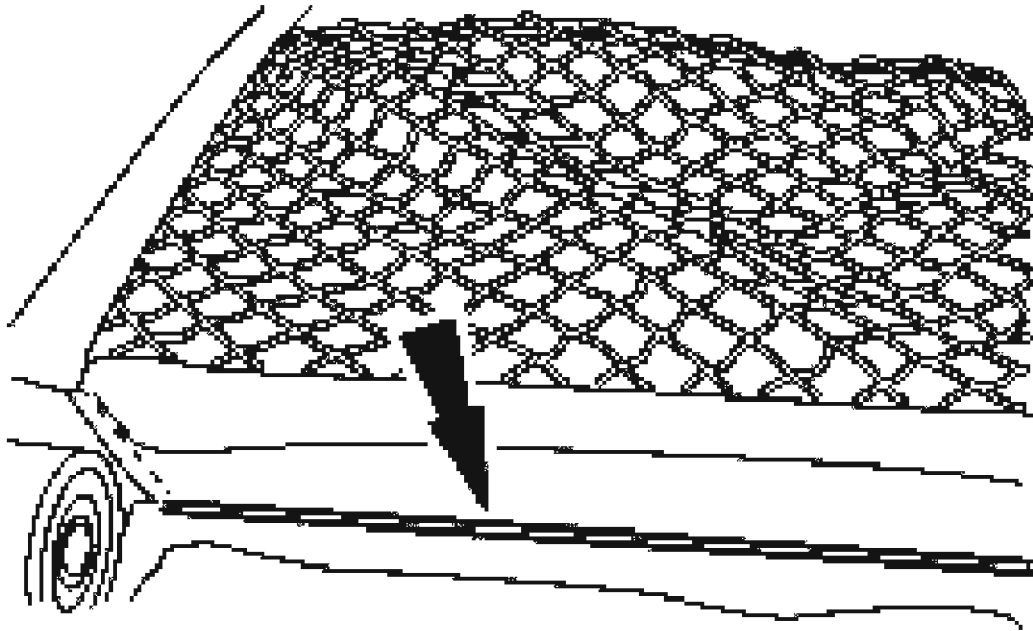
3. Install the front seat backrest trim cover.



G02743154

**Fig. 123: Installing Front Seat Backrest Trim Cover**  
**Courtesy of FORD MOTOR CO.**

4. Connect the front seat backrest J-retainer.



G02743155

**Fig. 124: Connecting Front Seat Backrest J-Retainer**  
**Courtesy of FORD MOTOR CO.**

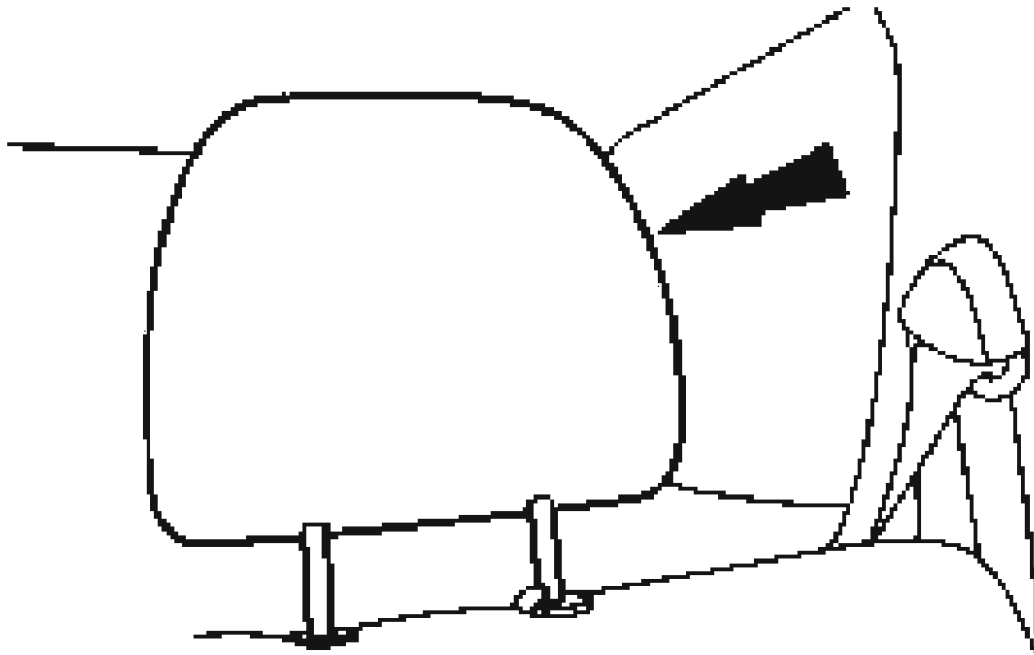
5. If equipped, install the headrest guides and headrest.
6. Install the front seat backrest and repower the SRS. For additional information, refer to **FRONT SEAT BACKREST - PASSENGER SEAT** .

## **REAR SEAT BACKREST**

### **Disassembly and Assembly**

**NOTE:**      **All rear seat backrests similar.**

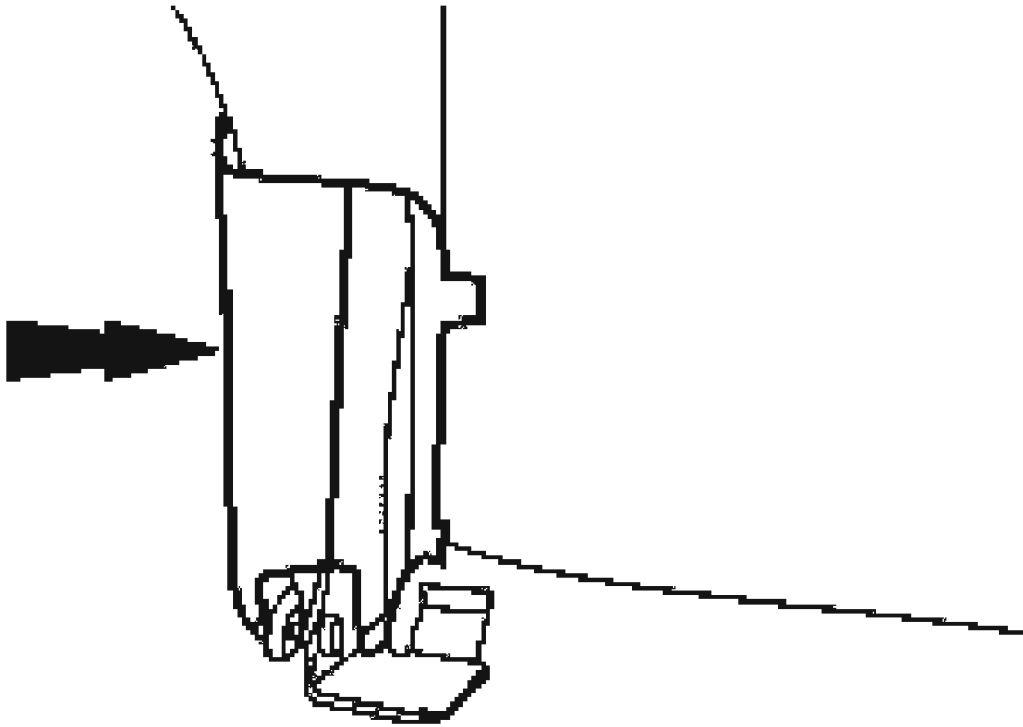
1. Remove the rear seat backrest. For additional information, refer to **REAR SEAT BACKREST - SPLIT BENCH** or **REAR SEAT BACKREST - BENCH** .
2. If equipped, remove the rear seat headrest(s).



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**Fig. 125: Removing Rear Seat Headrest**  
Courtesy of FORD MOTOR CO.

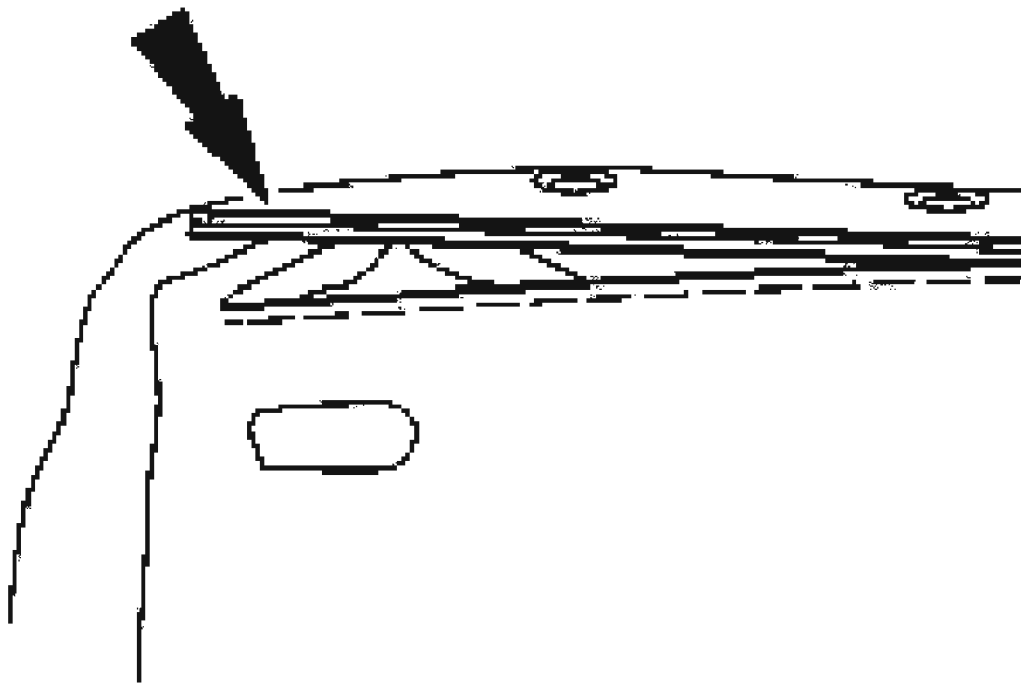
3. Remove the side trim panel(s).



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**Fig. 126: Removing Side Trim Panel**  
Courtesy of FORD MOTOR CO.

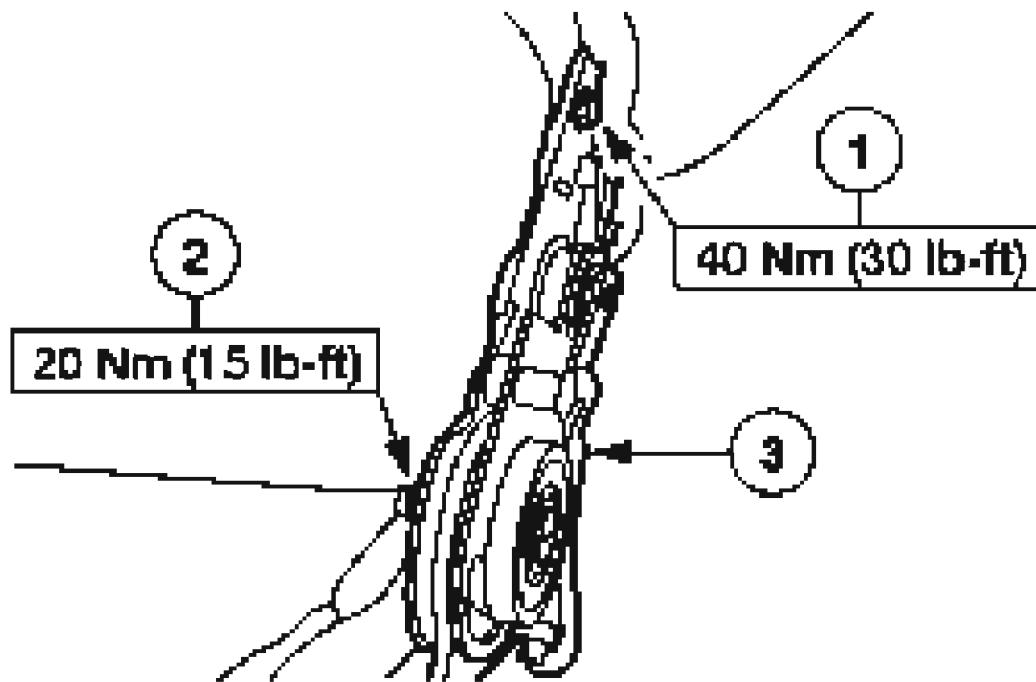
4. Unhook the seat backrest trim cover J-clip



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**Fig. 127: Removing Seat Backrest Trim Cover J-Clip**  
**Courtesy of FORD MOTOR CO.**

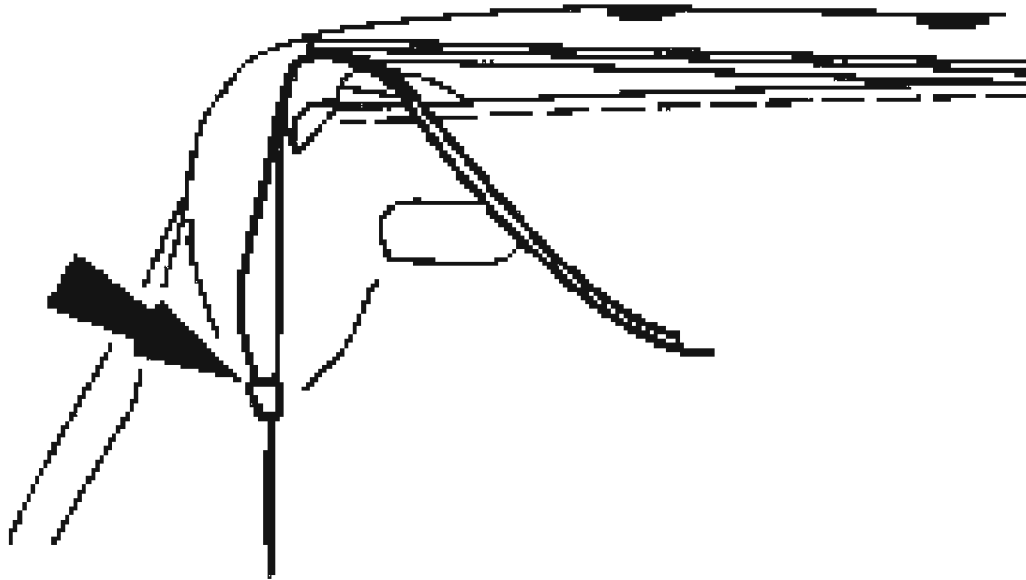
5. Remove the rear seat backrest latch(es).
  1. Remove the bolt(s).
  2. Remove the nut(s).
  3. Remove the rear seat backrest latch(es).



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**Fig. 128: Removing Rear Seat Backrest Latch**  
Courtesy of FORD MOTOR CO.

6. Unzip the rear seat backrest trim.

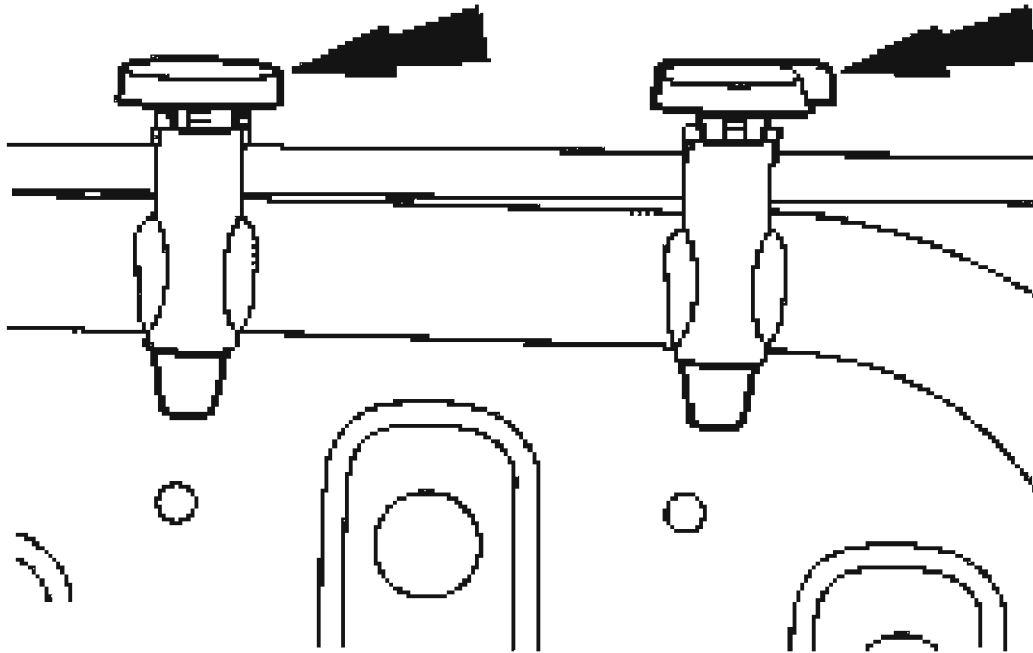


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**Fig. 129: Unzipping Rear Seat Backrest Trim**  
Courtesy of FORD MOTOR CO.

7. If equipped, remove the headrest guide posts.

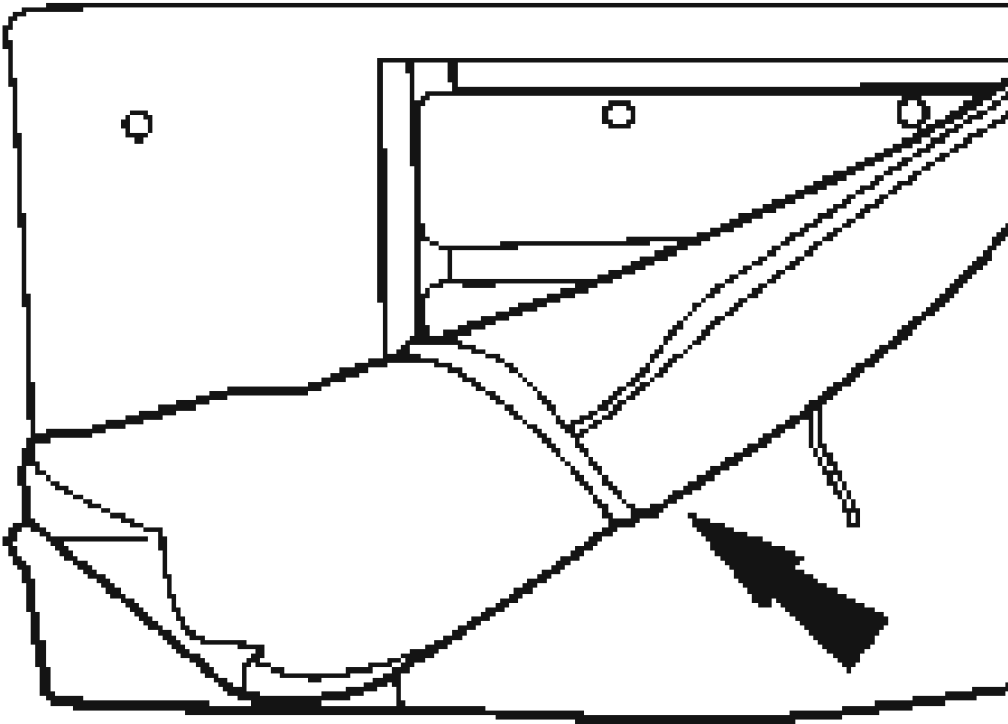




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**Fig. 130: Removing Headrest Guide Posts**  
**Courtesy of FORD MOTOR CO.**

8. Remove the seat backrest trim cover.



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**Fig. 131: Removing Seat Backrest Trim Cover**  
Courtesy of FORD MOTOR CO.

9. Remove the seat backrest frame from the seat backrest foam.
10. To assemble, reverse the disassembly procedure.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

## 2004 ACCESSORIES & EQUIPMENT

### Glass, Frames and Mechanisms - Escape

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Foam Dam	EBS-M3G137-A
Urethane Glass Prep Essex U-401	WSB-M5B280-C
Urethane Glass Primer Essex U-402	WSB-M2G314-B
Urethane Metal Primer Essex U -413	WSB-M2G234-C
Urethane Adhesive Essex 400-HV	WSB-M2G316-B
Rear Window Defroster Repair D8AZ-19562-AA or equivalent	WSB-M4J58-B
Dark Walnut Metallic Acrylic Lacquer Touch-Up Paint ALBZ-19500-5858A or equivalent	ESR-M2-P100-C

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Door window glass screws	2	-	18
Door window regulator bolts	6	-	53
Door window regulator nuts	6	-	53
Door glass top run bolts	6	-	53
Liftgate window glass hinge nuts	7	-	62
Liftgate window glass release handle nuts	4	-	35
Passenger assist handle bolts	11	8	-

## DESCRIPTION AND OPERATION

### GLASS, FRAMES AND MECHANISMS

The windshield consists of:

- standard plastic and glass laminate safety glass

- window opening flange bonded with urethane adhesive

The liftgate window consists of:

- standard plastic and glass laminate safety glass
- heated window grid wire
- two liftgate window glass hinges
- two liftgate lifting cylinder anchors
- window wiper motor and arm
- striker

The front door window consists of:

- standard plastic and glass laminate safety glass
- manual window regulator crank handle (if equipped)
- window control switch (if equipped)
- window regulator assembly which consists of:
  - manual window regulator
  - power window regulator and motor

The rear door window glass consists of:

- standard plastic and glass laminate safety glass
- manual window regulator crank handle (if equipped)
- window control switch (if equipped)
- window regulator assembly which consists of:
  - manual window regulator
  - power window regulator and motor

The rear quarter window consists of:

- standard plastic and glass laminate safety glass
- window opening flange bonded with urethane adhesive

The window control switch:

- is located on each door trim panel.
- may be used to raise or lower the passenger and driver side windows from the window control switch on the driver door.
- includes a window lock feature that is controlled through the window control


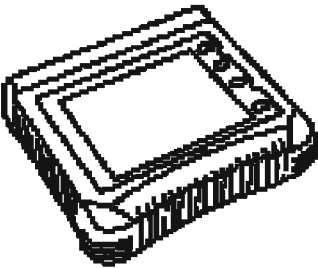
switch on the driver door.

- is illuminated. When the window lock feature is activated, illumination will be turned off on all of the passenger switches, leaving only the driver switch illuminated. For additional information, refer to **INSTRUMENT CLUSTER AND PANEL ILLUMINATION**.

## DIAGNOSIS AND TESTING

### GLASS, FRAMES AND MECHANISMS

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

	73III Automotive Meter 105-R0057 or equivalent
	Worldwide Diagnostic System (WDS) 418-F224,  New Generation STAR (NGS) Tester 418-F052, or equivalent diagnostic tool

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**Fig. 1: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Principles of Operation

The power operated windows are activated by switches on each passenger door or by a multiple switch on the driver door. The driver door window control switch is a two stage switch and incorporates the one-touch up/down feature.

Voltage to the power window system is supplied through the accessory delay relay and the central junction box (CJB) fuse 25 (30A). When the delayed accessory relay is energized, voltage is supplied to all window switches. When a window switch is activated power and ground paths are supplied to the appropriate side of the door window regulator to drive it in the desired direction.

The delayed accessory relay provides power for the operation of the power windows. The delayed accessory feature is active when the ignition switch is in the RUN or the ACC position, or when the ignition switch is changed from RUN or ACC to the OFF/LOCK position and the LF and RF doors are closed.

The generic electronic module (GEM) will deactivate the delayed accessory feature when:

- The LF door is ajar and the ignition switch is in the OFF/LOCK or KEY -OUT position.
- The RF door is ajar and the ignition switch is in the OFF/LOCK or KEY-OUT position.
- 10 minutes have elapsed since the ignition switch was changed from ACC or RUN to the OFF/LOCK position.

The heated rear window grid is activated by the rear window defrost switch located on the instrument panel.

When the rear window defrost switch is activated, a ground path is supplied to the GEM. The GEM then provides a ground path for the rear window defrost relay, located in the battery junction box (BJB). When the rear defrost relay coil is energized, voltage from the BJB is supplied to the rear window defrost grid the rear window defrost switch and if equipped the exterior mirrors. The GEM controls the operational cycle timing for the rear window defrost relay.

#### **Inspection and Verification**

1. Verify the customer concern by operating the power windows system or the rear window defroster system.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"> <li>Window regulator motor</li> <li>Window glass</li> <li>Heated rear window grid</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuses: <ul style="list-style-type: none"> <li>20 (40A)</li> <li>22 (30A)</li> </ul> </li> <li>BJB rear window defrost relay</li> <li>Central junction box (CJB) fuses: <ul style="list-style-type: none"> <li>11 (10A)</li> <li>16 (10A)</li> <li>25 (30A)</li> <li>27 (10A)</li> </ul> </li> <li>CJB ACC DELAY relay</li> <li>Circuitry</li> </ul>

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**Fig. 2: Mechanical And Electrical Damage Visual Inspection Chart**  
**Courtesy of FORD MOTOR CO.**

- If the concern remains after the inspection, connect the diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
  - check that the program card is correctly installed.
  - check the connections to the vehicle.
  - check the ignition switch position.
- If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool manual.
- Carry out the DATA LINK DIAGNOSTICS test. If the diagnostic tool responds with:
  - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to **MODULE COMMUNICATIONS NETWORK**.
  - NO RESP/NOT EQUIP for generic electronic module (GEM) module, refer to **MULTIFUNCTION ELECTRONIC MODULE**.
  - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the GEM.
- If the DTCs retrieved are related to the concern, go to the **GEM DIAGNOSTIC TROUBLE CODE (DTC) INDEX** to continue diagnostics.
- If no DTCs related to the concern are retrieved, proceed to the **SYMPTOM CHART** to continue diagnostics.

## 2004 Ford Escape

2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

**NOTE:** For a complete master list of the GEM diagnostic trouble code (DTC) index refer to MULTIFUNCTION ELECTRONIC MODULE .

### GEM DIAGNOSTIC TROUBLE CODE (DTC) INDEX

DTC	Description	Source	Action
B1302	Accessory Delay Relay Coil Circuit Failure	GEM	Go to <b><u>PINPOINT TEST A</u></b> .
B1304	Accessory Delay Relay Coil Circuit Open or Short to Battery	GEM	Go to <b><u>PINPOINT TEST A</u></b> .

Symptom Chart



## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>No communication with the generic electronic module (GEM)</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse 27 (10A).</li> <li>Circuitry.</li> <li>GEM.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to MULTIFUNCTION ELECTRONIC MODULES.</li> </ul>
<ul style="list-style-type: none"> <li>All power windows are inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse 25 (30A).</li> <li>CJB accessory delay relay.</li> <li>GEM.</li> <li>Driver window control switch.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test A.</u></li> </ul>
<ul style="list-style-type: none"> <li>Single power window is inoperative—driver</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Driver window control switch.</li> <li>Front door window regulator motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test B.</u></li> </ul>
<ul style="list-style-type: none"> <li>Single power window is inoperative—front passenger</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Driver window control switch.</li> <li>Passenger window control switch.</li> <li>Front door window regulator motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test C.</u></li> </ul>
<ul style="list-style-type: none"> <li>Single power window is inoperative—right rear</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Driver window control switch.</li> <li>Right rear window control switch.</li> <li>Rear door window regulator motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test D.</u></li> </ul>
<ul style="list-style-type: none"> <li>Single power window is inoperative—left rear</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Driver window control switch.</li> <li>Left rear window control switch.</li> <li>Rear door window regulator motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test E.</u></li> </ul>
<ul style="list-style-type: none"> <li>The defrost system is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuse 22 (30A).</li> <li>Central junction box (CJB) 16 (10A).</li> <li>Circuitry.</li> <li>Heated rear window relay.</li> <li>Heated rear window grid.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test F.</u></li> </ul>
<ul style="list-style-type: none"> <li>The one-touch up/down feature is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Driver window control switch.</li> </ul>	<ul style="list-style-type: none"> <li>INSTALL a new driver window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation</li> </ul>

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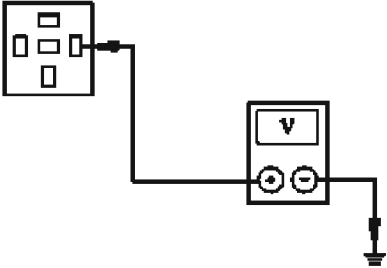
**Fig. 3: Trouble Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Test

#### PINPOINT TEST A: ALL POWER WINDOWS ARE INOPERATIVE

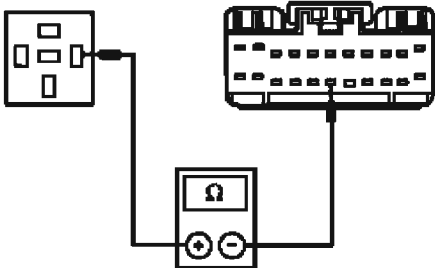
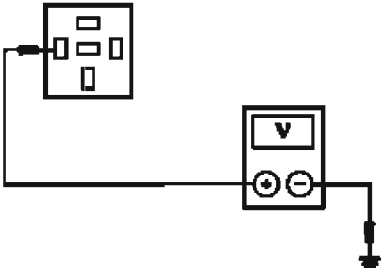
## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

Test Step	Result / Action to Take
<b>A1 CHECK THE GENERIC ELECTRONIC MODULE (GEM) DIAGNOSTIC TROUBLE CODES (DTCs)</b>	
<ul style="list-style-type: none"><li>Using the recorded results from the previous self-test:</li><li><b>Are any DTCs recorded?</b></li></ul>	<b>Yes</b> If GEM DTC B1302 or B1304, GO to <a href="#">A2</a> .  <b>No</b> GO to <a href="#">A4</a> .
<b>A2 CHECK CENTRAL JUNCTION BOX (CJB) ACCESSORY DELAY RELAY CIRCUIT 1004 (LB/RD) FOR SHORT TO VOLTAGE</b>	
<ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Accessory Delay Relay.</li><li>Disconnect: GEM C201a.</li><li>Key in ON position.</li><li>Measure the voltage between the CJB accessory delay relay connector C2075 pin 86, harness side and ground.</li></ul>  <ul style="list-style-type: none"><li><b>Is any voltage indicated?</b></li></ul>	<b>Yes</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.  <b>No</b> GO to <a href="#">A3</a> .

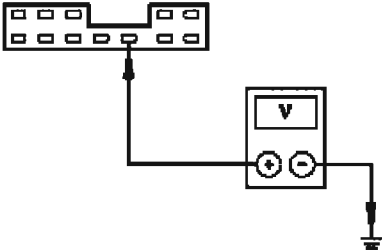
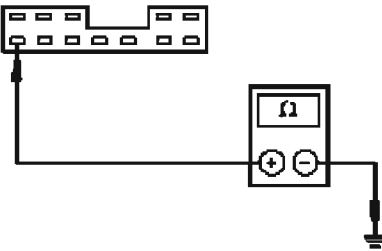
G02743166

**Fig. 4: Pinpoint Test A: All Power Windows Are Inoperative Step (A1 - A2)**  
Courtesy of FORD MOTOR CO.

<p><b>A3 CHECK CIRCUIT 1004 (LB/RD) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: GEM C201a.</li> <li>• Measure the resistance between the CJB accessory delay relay connector C2075 pin 86, harness side and the GEM C201a pin 17, circuit 1004 (LB/RD), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to A8.</p> <p><b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
<p><b>A4 CHECK THE CENTRAL JUNCTION BOX (CJB) ACCESSORY DELAY RELAY</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: Accessory Delay Relay.</li> <li>• Carry out the component test on the accessory delay relay.</li> </ul> <p>Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.</p> <ul style="list-style-type: none"> <li>• Is the relay OK?</li> </ul>	<p><b>Yes</b> GO to A5.</p> <p><b>No</b> INSTALL a new accessory delay relay. TEST the system for normal operation.</p>
<p><b>A5 CHECK THE VOLTAGE TO THE ACCESSORY DELAY RELAY COIL</b></p> <ul style="list-style-type: none"> <li>• Key in ON position.</li> <li>• Measure the voltage between CJB accessory delay relay connector C2075 pin 85, harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to A6.</p> <p><b>No</b> REPAIR the supply circuit as necessary. TEST the system for normal operation.</p>

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**Fig. 5: Pinpoint Test A: All Power Windows Are Inoperative Step (A3 - A5)**  
Courtesy of FORD MOTOR CO.

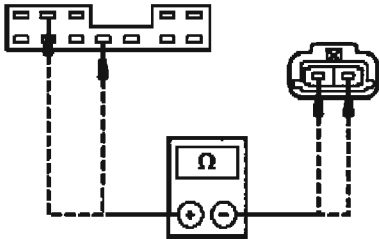
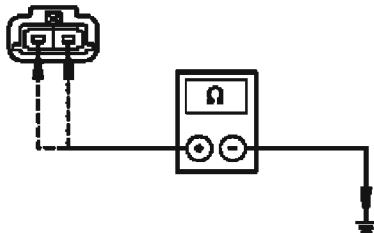
<b>A6 CHECK THE VOLTAGE TO THE DRIVER WINDOW CONTROL SWITCH — CIRCUIT 170 (RD/LB)</b>	<p><b>Yes</b> GO to <u>A7</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Connect: Accessory Delay Relay.</li> <li>• Disconnect: Driver Window Control Switch C508.</li> <li>• Key in ON position.</li> <li>• Measure the voltage between the driver window control switch C508 pin 8, circuit 170 (RD/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> INSTALL a new driver window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>A7 CHECK THE GROUND TO THE DRIVER WINDOW CONTROL SWITCH — CIRCUIT 57 (BK)</b>	<p><b>Yes</b> INSTALL a new driver window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Measure the resistance between driver window control switch C508 pin 12, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>
<b>A8 CHECK FOR CORRECT GEM OPERATION</b>	<p><b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>
<ul style="list-style-type: none"> <li>• Disconnect all GEM connectors.</li> <li>• Check for:             <ul style="list-style-type: none"> <li>• corrosion</li> <li>• pushed-out pins</li> </ul> </li> <li>• Connect all GEM connectors and make sure they seat correctly.</li> <li>• Operate the system and verify the concern is still present.</li> <li>• Is the concern still present?</li> </ul>	

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**Fig. 6: Pinpoint Test A: All Power Windows Are Inoperative Step (A6 - A8)**  
 Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

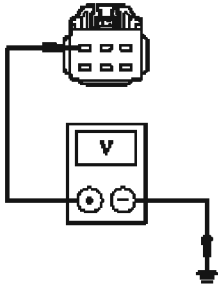
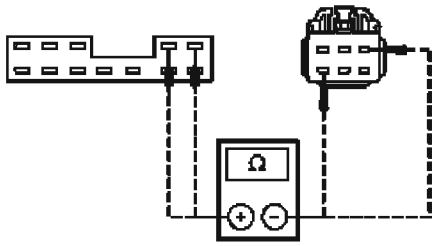
### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

Test Step	Result / Action to Take
<b>B1 CHECK THE POWER WINDOW DOWN OPERATION</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Driver Door Window Regulator C524.</li> <li>Key in ON position.</li> <li>While operating the driver window control switch, measure the voltage between the driver front door window regulator C524 pin B, circuit 992 (WH/BK), harness side and the driver front door window regulator C524 pin A, circuit 903 (RD), harness side.</li> <li><b>Is the voltage greater than 10 volts while operating the driver window control switch?</b></li> </ul>	<p><b>Yes</b>            INSTALL a new driver door window regulator motor. REFER to <a href="#">Front Door Window Regulator</a>. TEST the system for normal operation.</p> <p><b>No</b>            GO to <a href="#">B2</a>.</p>
<b>B2 CHECK CIRCUITS 992 (WH/BK) AND 903 (RD) FOR OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Driver Window Control Switch C508.</li> <li>Measure the resistance between the driver window control switch C508 pin 4, circuit 992 (WH/BK), harness side, and the driver front door window regulator C524 pin B, circuit 992 (WH/BK), harness side; and between the driver window control switch C508 pin 9, circuit 903 (RD), harness side, and the driver front door window regulator C524 pin A, circuit 903 (RD), harness side.</li> </ul>  <ul style="list-style-type: none"> <li><b>Is the resistance less than 5 ohms?</b></li> </ul>	<p><b>Yes</b>            GO to <a href="#">B3</a>.</p> <p><b>No</b>            REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<b>B3 CHECK CIRCUITS 992 (WH/BK) AND 903 (RD) FOR SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Measure the resistance between the driver front door window regulator C524 pin B, circuit 992 (WH/BK), harness side and ground; and between the driver front door window regulator C524 pin A, circuit 903 (RD), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Is the resistance greater than 10,000 ohms?</b></li> </ul>	<p><b>Yes</b>            INSTALL a new driver window control switch. REFER to <a href="#">Window Control Switch</a>. TEST the system for normal operation.</p> <p><b>No</b>            REPAIR the circuit(s) in question. TEST the system for normal operation.</p>

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**Fig. 7: Pinpoint Test B: A Single Power Window Is Inoperative - Driver Step (B1 - B3)**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST C: A SINGLE POWER WINDOW IS INOPERATIVE-FRONT PASSENGER**

Test Step	Result / Action to Take
<b>C1 CHECK CIRCUIT 170 (RD/LB) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Passenger Window Control Switch C604.</li> <li>Key in ON position.</li> <li>Measure the voltage between the passenger window control switch C604 pin 3, circuit 170 (RD/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>C2</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>C2 CHECK CIRCUITS 313 (WH/YE) AND 314 (TN/LB) FOR OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Driver Window Control Switch C508.</li> <li>Measure the resistance between the driver window control switch C508 pin 1, circuit 313 (WH/YE), harness side and the passenger window control switch C604 pin 1, circuit 313 (WH/YE) harness side; and between the driver window control switch C508 pin 2, circuit 314 (TN/LB), harness side and the passenger window control switch C604 pin 6, circuit 314 (TN/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C3</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>

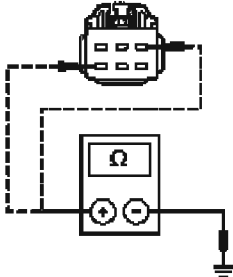
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**Fig. 8: Pinpoint Test C: A Single Power Window Is Inoperative - Front Passenger Step (C1 - C2)**

Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

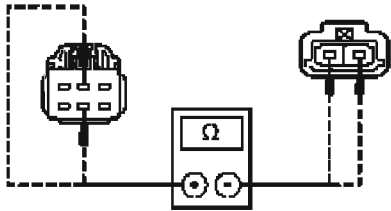
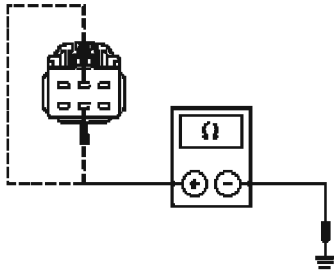
### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

<p><b>C3 CHECK CIRCUITS 313 (WH/YE) AND 314 (TN/LB) FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the passenger control window switch C604 pin 1, circuit 313 (WH/YE), harness side and ground; and between the passenger window switch C604 pin 6, circuit 314 (TN/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C4</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<p><b>C4 CHECK THE FRONT PASSENGER WINDOW CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the window control switch component test on the front passenger window control switch.</li> </ul> <p>Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the front passenger window control switch OK?</li> </ul>	<p><b>Yes</b> GO to <u>C5</u>.</p> <p><b>No</b> INSTALL a new front passenger window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation.</p>
<p><b>C5 CHECK THE DRIVER WINDOW CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the window control switch component test on the driver window control switch.</li> </ul> <p>Refer to Wiring Diagrams Cell <u>149</u> for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the driver window control switch OK?</li> </ul>	<p><b>Yes</b> GO to <u>C6</u>.</p> <p><b>No</b> INSTALL a new driver window control switch. REFER to <u>Window Control Switch</u>. TEST the system for</p>

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**Fig. 9: Pinpoint Test C: A Single Power Window Is Inoperative - Front Passenger Step (C3 - C5)**

Courtesy of FORD MOTOR CO.

	normal operation.
<p><b>C6 CHECK CIRCUITS 333 (YE/RD) AND 334 (RD/YE) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Front Door Window Regulator C608.</li> <li>• Measure the resistance between the front passenger window control switch C604 pin 5, circuit 333 (YE/RD), harness side and the front door window regulator C608 pin B, circuit 333 (YE/RD) harness side; and between the front passenger window control switch C604 pin 2, circuit 334 (RD/YE), harness side, and front door window regulator C608 pin A, circuit 334 (RD/YE), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>C7</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<p><b>C7 CHECK CIRCUITS 333 (YE/RD) AND 334 (RD/YE) FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>• Measure the resistance between the passenger window control switch C604 pin 5, circuit 333 (YE/RD), harness side and ground; and between the passenger window control switch C604 pin 2, circuit 334 (RD/YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new front door window regulator motor. REFER to <u>Front Door Window Regulator</u>. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>

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**Fig. 10: Pinpoint Test C: A Single Power Window Is Inoperative - Front Passenger Step (C6 - C7)**

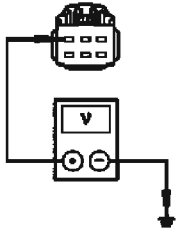
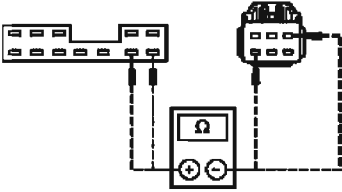
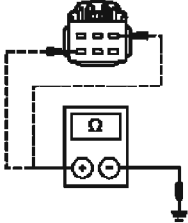
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**PINPOINT TEST D: A SINGLE POWER WINDOW IS INOPERATIVE-RIGHT REAR**



## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

Test Step	Result / Action to Take
<b>D1 CHECK CIRCUIT 170 (RD/LB) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Right Rear Window Control Switch C801.</li> <li>Key in ON position.</li> <li>Measure the voltage between the right rear window control switch C801 pin 3, circuit 170 (RD/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>D2</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>D2 CHECK CIRCUITS 317 (GY/OG) AND 316 (YE/LB) FOR OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Driver Window Control Switch C508.</li> <li>Measure the resistance between the driver window control switch C508 pin 6, circuit 316 (YE/LB), harness side and the right rear window control switch C801 pin 1, circuit 316 (YE/LB), harness side; and between the driver window control switch C508 pin 7, circuit 317 (GY/OG), harness side and the right rear window control switch C801 pin 6, circuit 317 (GY/OG), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>D3</u>.</p> <p><b>No</b> REPAIR the circuit (s) in question. TEST the system for normal operation.</p>
<b>D3 CHECK CIRCUITS 317 (GY/OG) AND 316 (YE/LB) FOR SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Measure the resistance between the right rear window control switch C801 pin 1, circuit 316 (YE/LB), harness side and ground; and between the right rear window control switch C801 pin 6, circuit 317 (GY/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>D4</u>.</p> <p><b>No</b> REPAIR the circuit (s) in question. TEST the system for normal operation.</p>

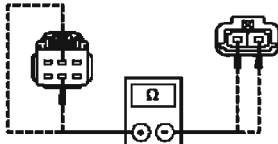
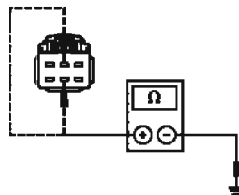
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**Fig. 11: Pinpoint Test D: A Single Power Window Is Inoperative - Right Rear Step (D1 - D3)**

Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

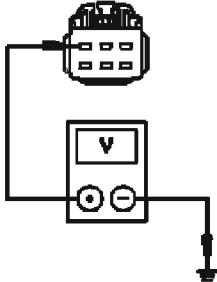
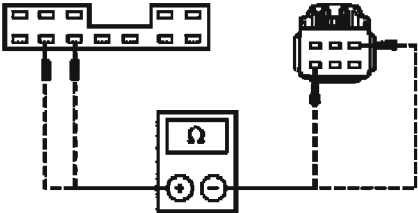
<p><b>D4 CHECK THE RIGHT REAR WINDOW CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the window control switch component test on the right rear window control switch.</li> </ul> <p>Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.</p> <p>Is the right rear window control switch OK?</p>	<p><b>Yes</b></p> <p>GO to D5.</p> <p><b>No</b></p> <p>INSTALL a new right rear window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation.</p>
<p><b>D5 CHECK THE DRIVER WINDOW CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the window control switch component test on the driver window control switch.</li> </ul> <p>Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.</p> <p>Is the driver window control switch OK?</p>	<p><b>Yes</b></p> <p>GO to D6.</p> <p><b>No</b></p> <p>INSTALL a new driver window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation.</p>
<p><b>D6 CHECK CIRCUITS 884 (YE/BK) AND 885 (YE/LB) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: Right Rear Window Regulator C803.</li> <li>Measure the resistance between the right rear window control switch C801 pin 5, circuit 885 (YE/LB), harness side and the right rear window regulator motor C803 pin B, circuit 885 (YE/LB), harness side; and between the right rear window control switch C801 pin 2, circuit 884 (YE/BK), harness side and the right rear window regulator motor C803 pin A, circuit 884 (YE/BK), harness side.</li> </ul>  <p>Is the resistance less than 5 ohms?</p>	<p><b>Yes</b></p> <p>GO to D7.</p> <p><b>No</b></p> <p>REPAIR the circuit (s) in question. TEST the system for normal operation.</p>
<p><b>D7 CHECK CIRCUITS 884 (YE/BK) AND 885 (YE/LB) FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between right rear window control switch C801 pin 5, circuit 885 (YE/LB), harness side and ground; and between right rear window control switch C801 pin 2, circuit 884 (YE/BK), harness side and ground.</li> </ul>  <p>Is the resistance greater than 10,000 ohms?</p>	<p><b>Yes</b></p> <p>INSTALL a new rear door window regulator motor. REFER to <u>Rear Door Window Regulator</u>. TEST the system for normal operation.</p> <p><b>No</b></p> <p>REPAIR the circuit (s) in question. TEST the system for normal operation.</p>

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**Fig. 12: Pinpoint Test D: A Single Power Window Is Inoperative - Right Rear Step (D4 - D7)**

Courtesy of FORD MOTOR CO.

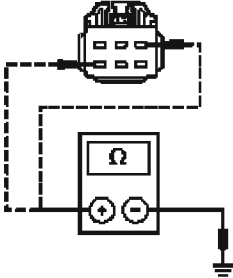
**PINPOINT TEST E: A SINGLE POWER WINDOW IS INOPERATIVE-LEFT REAR**

Test Step	Result / Action to Take
<p><b>E1 CHECK CIRCUIT 170 (RD/LB) FOR VOLTAGE</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Left Rear Window Control Switch C801.</li> <li>Key in ON position.</li> <li>Measure the voltage between the left rear window control switch C701 pin 3, circuit 170 (RD/LB), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to E2.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>E2 CHECK CIRCUITS 317 (GY/OG) AND 316 (YE/LB) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Driver Window Control Switch C508.</li> <li>Measure the resistance between the driver window control switch C508 pin 10, circuit 320 (RD/BK), harness side and the left rear window control switch C701 pin 1, circuit 316 (YE/LB), harness side; and between the driver window control switch C508 pin 11, circuit 319 (YE/BK), harness side and the left rear window control switch C701 pin 6, circuit 317 (GY/OG), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to E3.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>

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**Fig. 13: Pinpoint Test E: A Single Power Window Is Inoperative-Left Rear Step (E1 - E2)**

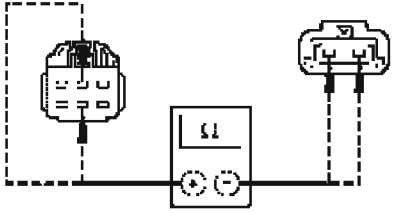
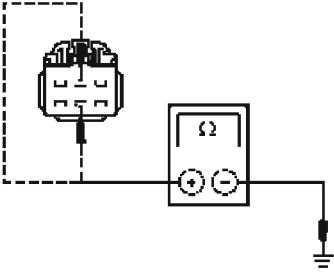
Courtesy of FORD MOTOR CO.

<p><b>E3 CHECK CIRCUITS 316 (YE/LB) AND 317 (GY/OG) FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between left rear window control switch C701 pin 1, circuit 316 (YE/LB), harness side and ground; and between left rear window control switch C701 pin 6, circuit 317 (GY/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>E4</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<p><b>E4 CHECK THE LEFT REAR WINDOW CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the window control switch component test on the left rear window control switch.</li> </ul> <p>Refer to SYSTEM WIRING DIGRAMS for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the left rear window control switch OK?</li> </ul>	<p><b>Yes</b> GO to <u>E5</u>.</p> <p><b>No</b> INSTALL a new left rear window control switch. REFER to <u>Window Control Switch</u>. TEST the system for normal operation.</p>
<p><b>E5 CHECK THE DRIVER WINDOW CONTROL SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the window control switch component test on the driver window control switch.</li> </ul> <p>Refer to SYSTEM WIRING DIGRAMS for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the driver window control switch OK?</li> </ul>	<p><b>Yes</b> GO to <u>E6</u>.</p> <p><b>No</b> INSTALL a new driver window control switch. TEST the system for normal operation.</p>

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**Fig. 14: Pinpoint Test E: A Single Power Window Is Inoperative-Left Rear Step (E3-E5)**

Courtesy of FORD MOTOR CO.

<p><b>E6 CHECK CIRCUITS 884 (YE/BK) AND 885 (YE/LB) FOR OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Left Rear Window Regulator C703.</li> <li>• Measure the resistance between the left rear window control switch C701 pin 5, circuit 885 (YE/LB), harness side and the left rear window regulator C703 pin B, circuit 885 (YE/LB), harness side; and between the left rear window control switch C701 pin 2, circuit 884 (YE/BK), harness side and the left rear window regulator C703 pin A, circuit 884 (YE/BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>EZ</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<p><b>E7 CHECK CIRCUITS 884 (YE/BK) AND 885 (YE/LB) FOR SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>• Measure the resistance between left rear window control switch C701 pin 5, circuit 885 (YE/LB), harness side and ground; and between the left rear window control switch C701 pin 2, circuit 884 (YE/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new left rear door window regulator motor. REFER to <u>Rear Door Window Regulator</u>. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>

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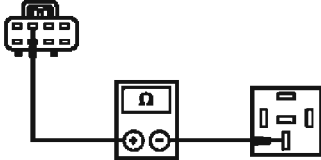
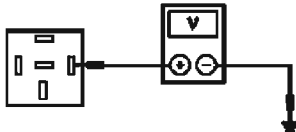
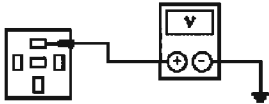
**Fig. 15: Pinpoint Test E: A Single Power Window Is Inoperative-Left Rear Step (E6-E7)**

Courtesy of FORD MOTOR CO.

PINPOINT TEST F: THE DEFROST SYSTEM IS INOPERATIVE

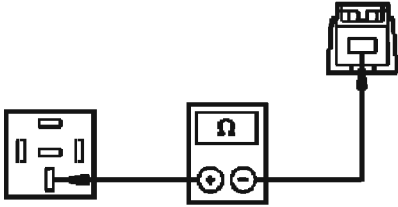
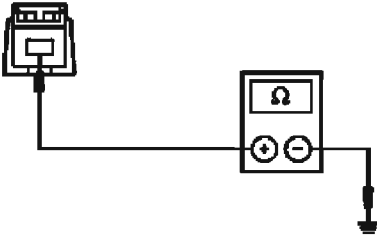
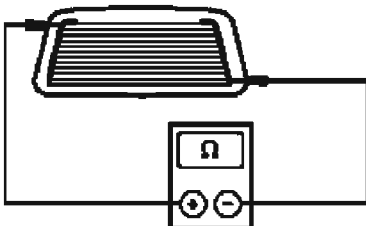
## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

Test Step	Result / Action to Take
<b>F1 CHECK CIRCUIT 186 (BN/LB) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Battery Junction Box (BJB) Rear Window Defrost Relay.</li> <li>Disconnect: Rear Window Defrost Switch C241.</li> <li>Measure the resistance between the BJB rear window defrost relay C1099 pin 30, circuit 186 (BN/LB), harness side and the rear window defrost switch C241 pin 6, circuit 186 (BN/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <b>F2</b>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>F2 CHECK THE BJB REAR WINDOW DEFROST RELAY</b> <ul style="list-style-type: none"> <li>Carry out the component test on the rear window defrost relay.</li> </ul> <p>Refer to Wiring Diagrams Cell 149 for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the rear window defrost relay OK?</li> </ul>	<p><b>Yes</b> GO to <b>F3</b>.</p> <p><b>No</b> INSTALL a new rear window defrost relay. TEST the system for normal operation.</p>
<b>F3 CHECK CIRCUIT 640 (RD/YE) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Measure the voltage between the BJB rear window defrost relay C1099 pin 86, circuit 640 (RD/YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <b>F4</b>.</p> <p><b>No</b> REPAIR the circuit or INSTALL a new BJB as necessary. TEST the system for normal operation.</p>
<b>F4 CHECK CIRCUIT 185 (BK) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Measure the voltage between the BJB rear window defrost relay C1099 pin 87, circuit 185 (BK) harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <b>F5</b>.</p> <p><b>No</b> REPAIR the circuit or INSTALL a new BJB as necessary. TEST the system for normal operation.</p>

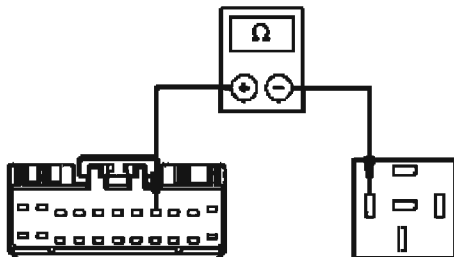
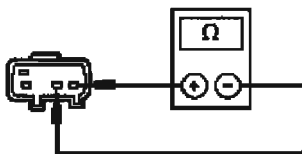
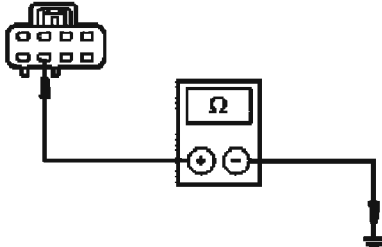
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**Fig. 16: Pinpoint Test F: Defrost System Is Inoperative Step (F1 - F4)**  
**Courtesy of FORD MOTOR CO.**

<p><b>F5 CHECK CIRCUIT 186 (BN/LB) FOR CONTINUITY</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: Rear Window Defrost C402a.</li> <li>• Measure the resistance between the rear window defrost relay C1099 pin 30 circuit 186 (BN/LB), harness side and the rear window defrost C402a pin 1, circuit 186 (BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>E6</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>F6 CHECK GRID GROUND FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Rear Window Defrost C402b.</li> <li>• Measure the resistance between the rear window defrost C402b pin 1, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>E7</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>F7 CHECK THE REAR WINDOW DEFROST GRID</b></p> <ul style="list-style-type: none"> <li>• Measure the resistance between the rear window defrost grid C402a pin 1, component side and the rear window defrost grid C402b, pin 1, component side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms&gt;</li> </ul>	<p><b>Yes</b> GO to <u>E8</u>.</p> <p><b>No</b> INSTALL a new liftgate window glass. REFER to <u>Liftgate Window Glass</u>. TEST the system for normal operation.</p>

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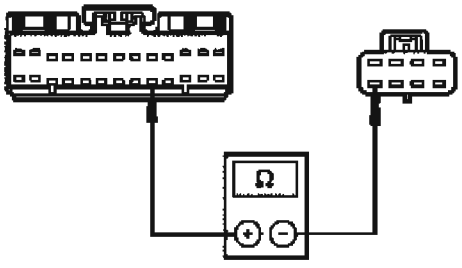
**Fig. 17: Pinpoint Test F: Defrost System Is Inoperative Step (F5 - F7)**  
Courtesy of FORD MOTOR CO.

<p><b>F8 CHECK CIRCUIT 1009 (OG/YE) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: GEM C201a.</li> <li>Measure the resistance between the GEM C201a, pin 8, circuit 1009 (OG/YE), harness side and the rear window defrost relay</li> </ul> <p>C1099 pin 85, circuit 1009 (OG/YE), harness side.</p>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>F9</u>.</p> <p><b>No</b> REPAIR the circuit or INSTALL a new BJB as necessary. TEST the system for normal operation.</p>
<p><b>F9 CHECK THE REAR WINDOW DEFROST SWITCH</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the rear window defrost switch C241 pins 1 and pin 2, component side, while pressing the switch on and off.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms with the switch ON and greater then 10,000 ohms with the switch OFF?</li> </ul>	<p><b>Yes</b> GO to <u>F10</u>.</p> <p><b>No</b> INSTALL a new rear window defrost switch. REFER to <u>Rear Window Defrost Switch</u>. TEST the system for normal operation.</p>
<p><b>F10 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the rear window defrost switch C241 pin 2, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>F11</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

G02743180

**Fig. 18: Pinpoint Test F: Defrost System Is Inoperative Step (F8 - F10)**  
Courtesy of FORD MOTOR CO.



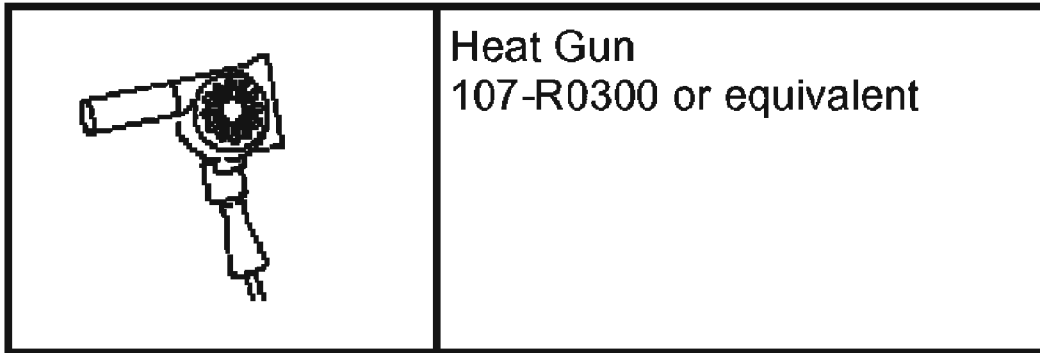
<b>F11 CHECK CIRCUIT 1010 (DB/OG) FOR AN OPEN</b> <ul style="list-style-type: none"><li>• Disconnect: GEM C201b.</li><li>• Measure the resistance between the GEM C201b pin 22, circuit 1010 (DB/OG), harness side and the rear window defrost switch C241 pin 1, circuit 1010 (DB/OG), harness side.</li></ul>  <ul style="list-style-type: none"><li>• Is the resistance less than 5 ohms?</li></ul>	<p><b>Yes</b> GO to <b>F12</b>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>F12 CHECK FOR CORRECT GEM OPERATION</b> <ul style="list-style-type: none"><li>• Disconnect all GEM connectors.</li><li>• Check for:<ul style="list-style-type: none"><li>• corrosion</li><li>• pushed-out pins</li></ul></li><li>• Connect all GEM connectors and make sure they seat correctly.</li><li>• Operate the system and verify the concern is still present.</li><li>• Is the concern still present?</li></ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES for the removal and installation procedure. TEST the system for normal operation.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. TEST the system for normal operation.</p>

G02743181

**Fig. 19: Pinpoint Test F: Defrost System Is Inoperative Step (F11 - F12)**  
Courtesy of FORD MOTOR CO.

## GENERAL PROCEDURES

### LEAD TERMINAL REPAIR



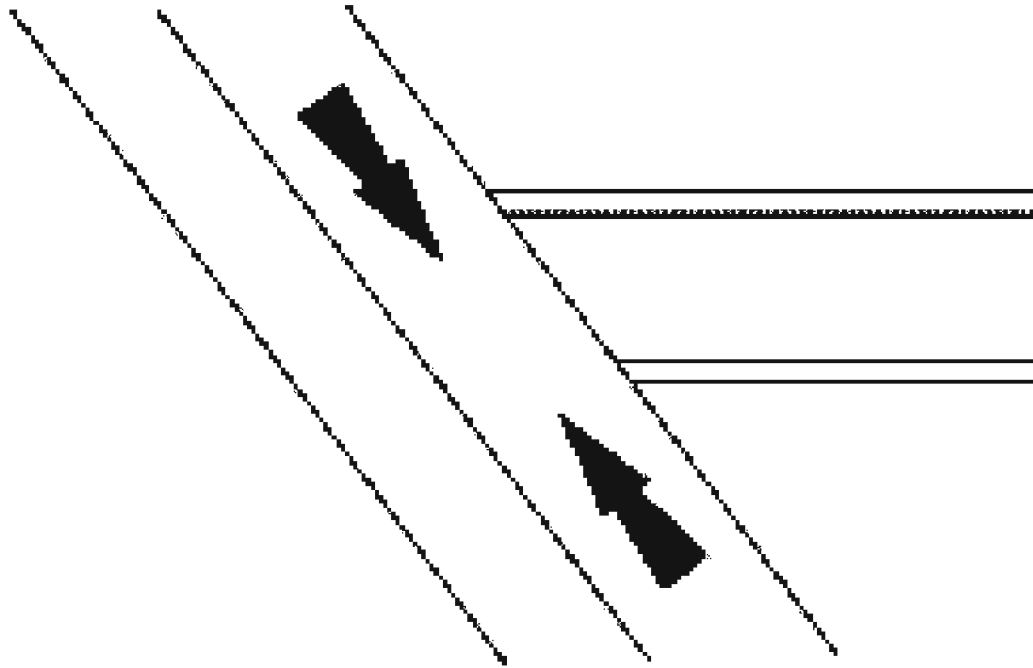
G02743182

**Fig. 20: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### MATERIAL SPECIFICATION

Item	Specification
Rear Window Defroster Repair PM-11 (CPM-11 in Canada) or equivalent	WSB-M4J58-B

**NOTE:** The rear window glass must be at room temperature at the time of the repair.

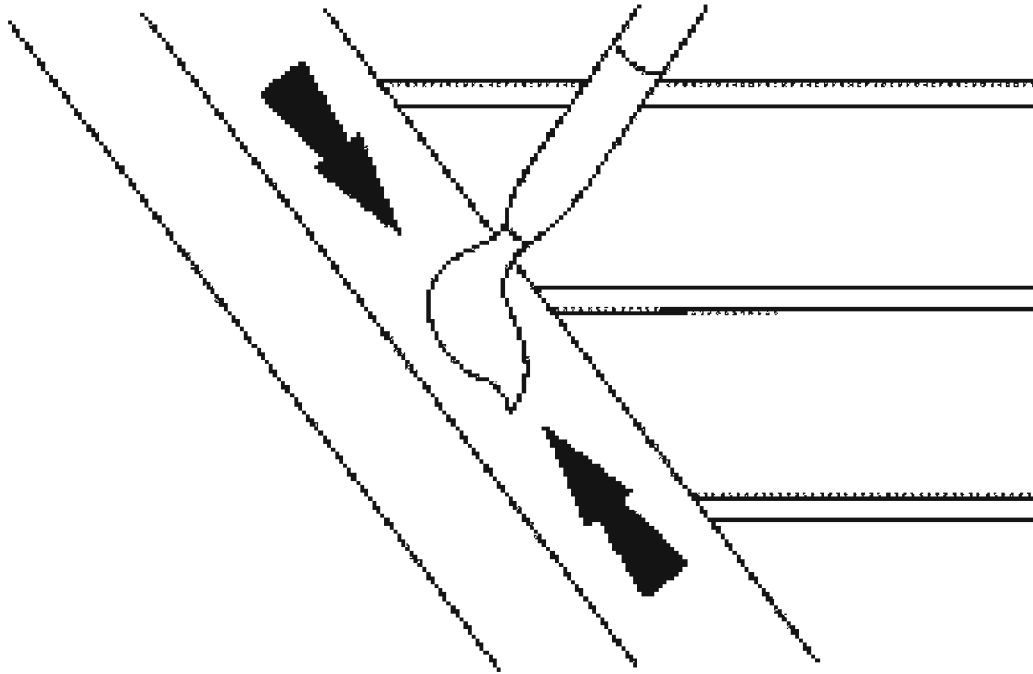


G02743183

**Fig. 21: Identifying Bus Bar Cleaning Area**  
Courtesy of FORD MOTOR CO.

1. Clean the bus bar in the area to be repaired with steel wool (3/0 to 4/0 grade).

**NOTE:** Allow 10 minutes of drying time between the coats.

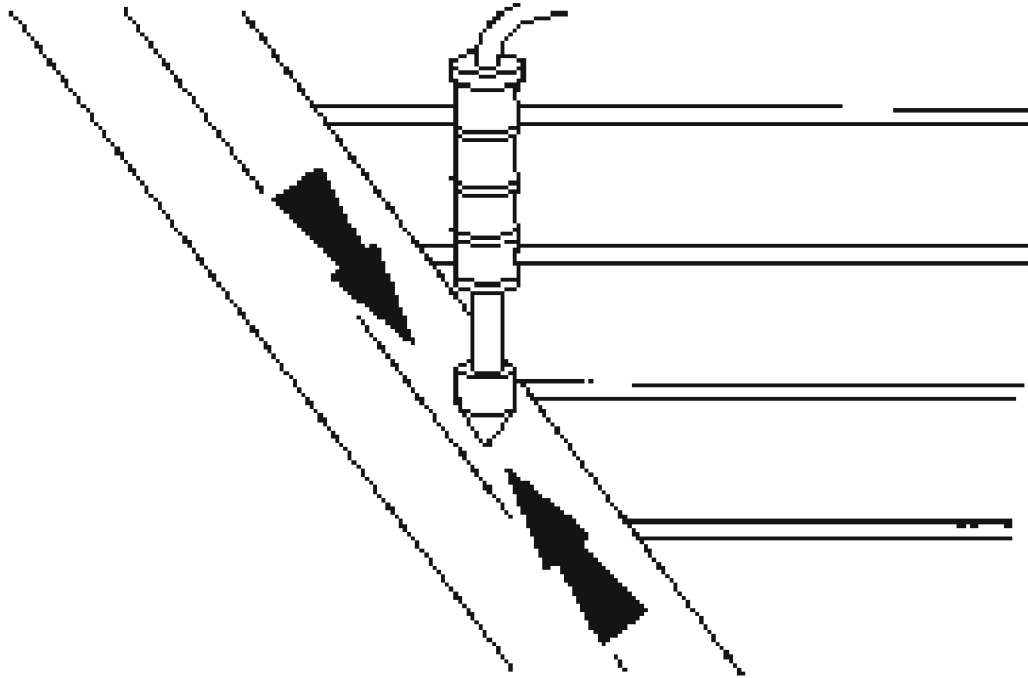


G02743184

**Fig. 22: Applying Coats Of Rear Window Defroster Repair To Surface**  
Courtesy of FORD MOTOR CO.

2. Apply 3 coats of rear window defroster repair to the surface.

**CAUTION:** Do not overheat the rear window glass or damage to the rear window glass may occur.

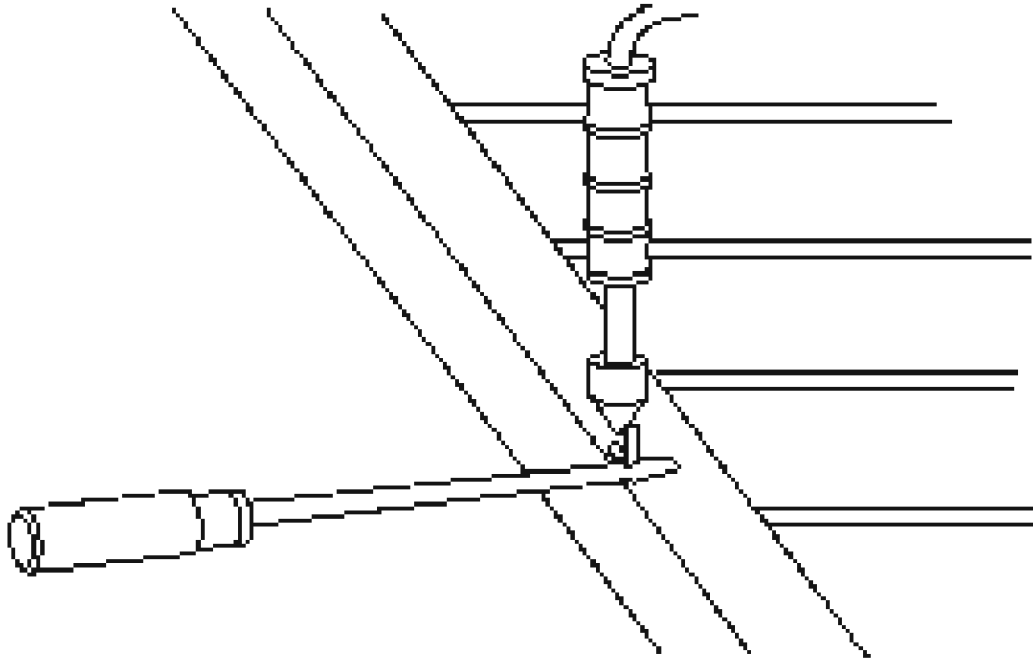


G02743185

**Fig. 23: Tinning Bus Bar Repair Area Using Solder**  
Courtesy of FORD MOTOR CO.

3. Tin the bus bar repair area with solder.

**CAUTION:** To prevent overheating the rear window glass, remove the soldering gun as soon as the solder flows.



G02743186

**Fig. 24: Preheating Rear Window Glass Repair Area Using Special Tool**  
Courtesy of FORD MOTOR CO.

4. Preheat the rear window glass in the area to be repaired using the special tool and solder the terminal to the bus bar.

**NOTE:** Turn the heated rear window switch on for 5 minutes prior to the final inspection of the repair.

5. Apply rear window defroster repair to the area as needed.

#### HEATED WINDOW GRID WIRE REPAIR

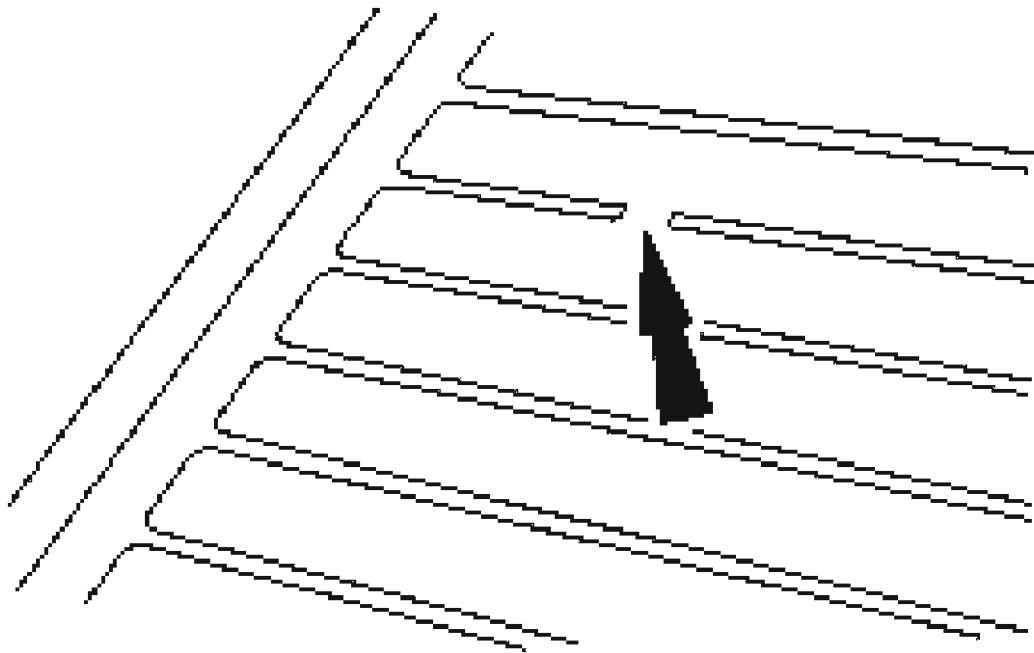
#### MATERIAL SPECIFICATION

Item	Specification
Acrylic Lacquer Touch-up Paint (Match color to exterior grid wire)	ESR-M2P100-C
Rear Window Defroster Repair PM-11 (CPM-11 in Canada) or equivalent	WSB-M4J58-B

**NOTE:** A single break or any breaks which exceed 25 mm (1 inch) in

one grid cannot be repaired. Install a new rear window glass.

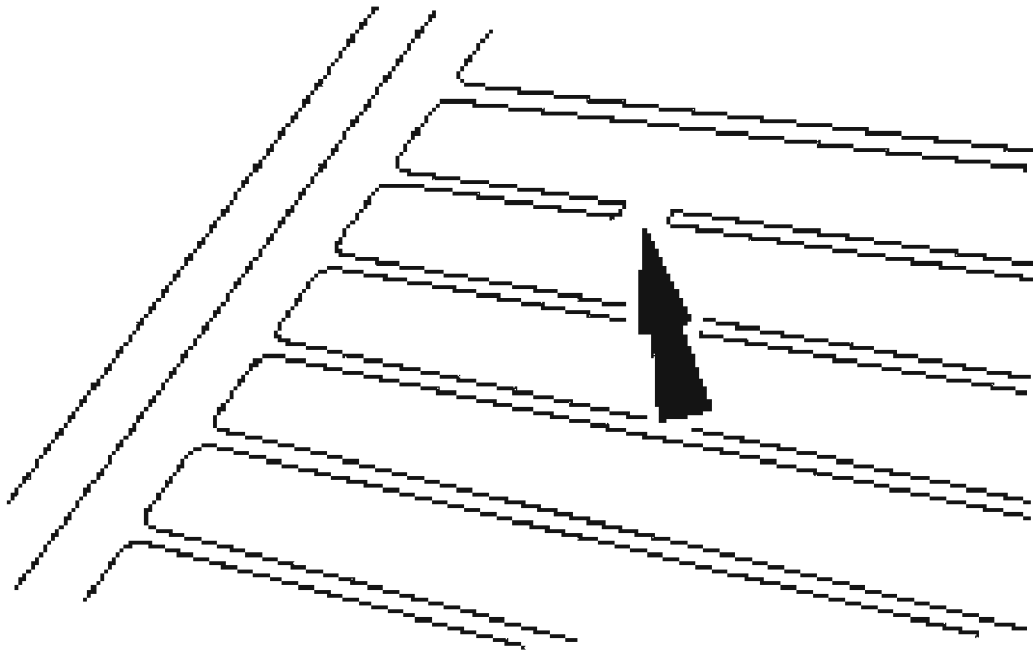
**NOTE:** If the first layer of the heated rear window grid (brown) is damaged or missing, it will be necessary to apply touch-up paint on the glass prior to applying the silver rear window defroster repair.



G02743187

**Fig. 25: Identifying Inoperative Grid Wires**  
Courtesy of FORD MOTOR CO.

1. Repair any inoperative grid wires using rear window defroster repair.
2. Bring the vehicle up to room temperature of at least 16° C (60° F) or above.
3. Clean the entire grid line repair area with a non-alcohol based window cleaner and 0000 steel wool.
4. Mark the location of the grid break on the exterior of the rear window glass.



G02743188

**Fig. 26: Locating Grid Break On Exterior Of Rear Window Glass**  
Courtesy of FORD MOTOR CO.

5. Using cellulose tape, mask the area directly above and below the grid break. The break area should be at the center of the mask.



G02743189

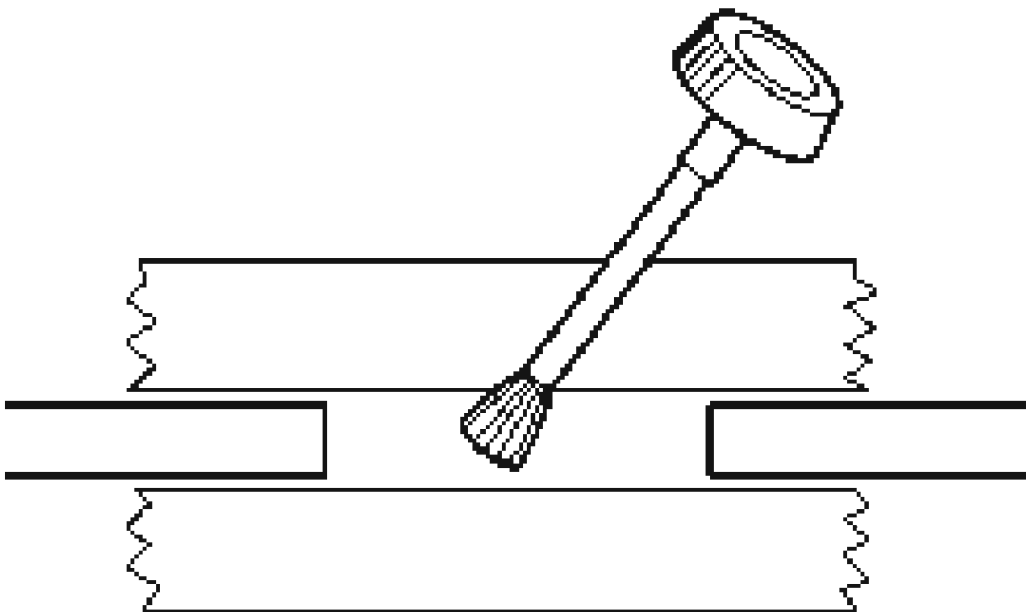
**Fig. 27: Masking Area Directly Above And Below Grid Break Using Cellulose**



Tape

Courtesy of FORD MOTOR CO.

- NOTE:** If the brown layer is not broken or missing, apply only the silver grid repair compound to the break.
- NOTE:** If both the brown and silver layers of the grid are broken or missing, apply a coating of the brown touch-up paint across the break in the grid line first. Do not overlap the silver grid line with the brown paint. Several applications may be necessary to achieve a color match.
- NOTE:** Extend the silver repair coating at least 6.35 mm (0.25 inch) on both sides of the break area.
- NOTE:** Allow at least 5 minutes of drying time between applications.



G02743190

**Fig. 28: Applying Repair Coating To Grid Break Area**  
Courtesy of FORD MOTOR CO.

6. Apply the repair coating to the grid break area in several smooth, continuous strokes.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Glass, Frames and Mechanisms - Escape

Apply 3 applications of the grid repair compound.

7. After 5 minutes, or after the repair area has dried completely, remove the mask.

**CAUTION: Be careful not to damage the grid line with the razor blade. If this occurs, additional repair may be necessary.**

8. Remove any excess repair compound above or below the grid line with a razor blade.

**NOTE: The repair coating will air-dry in approximately 1 minute and can be energized within 3 minutes.**

**NOTE: Optimum adhesion occurs after approximately 24 hours.**

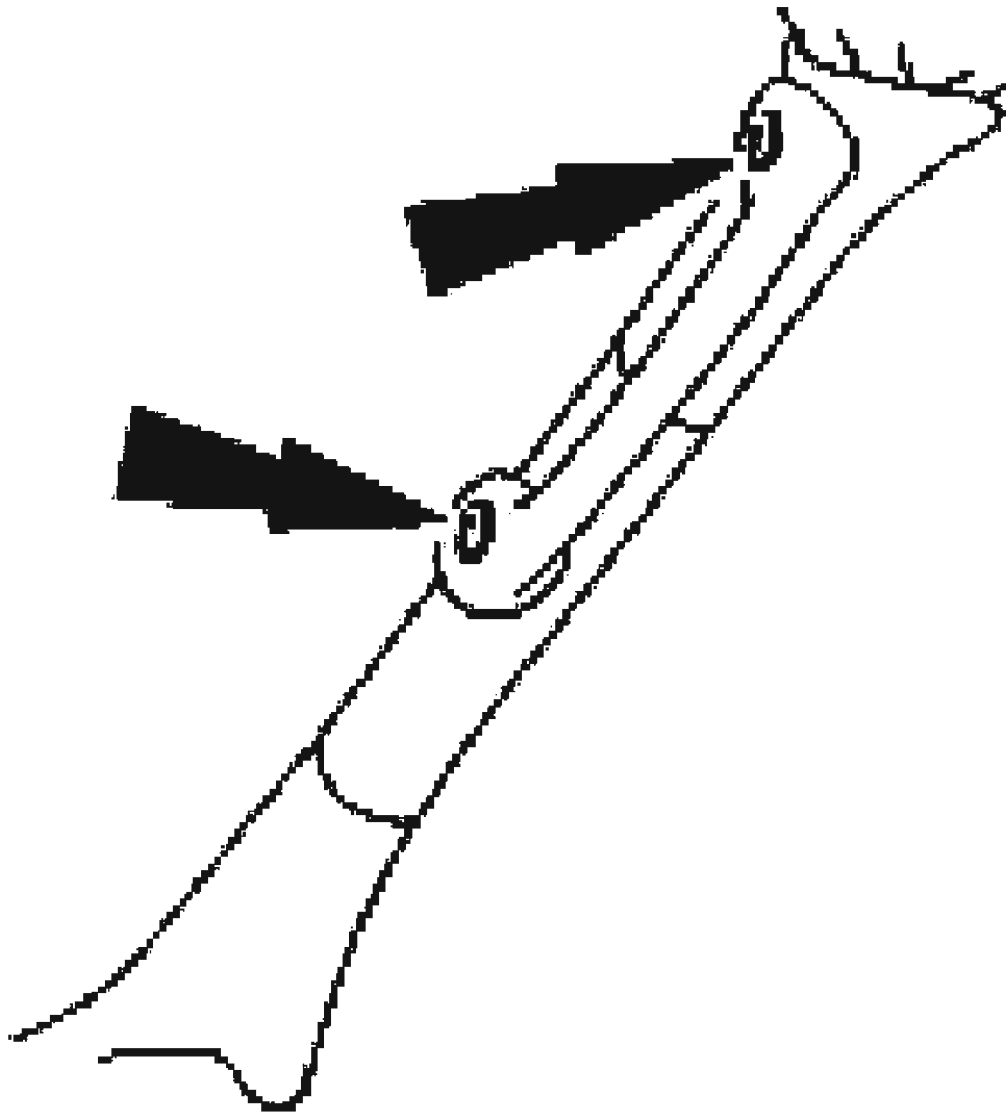
9. After optimum hardness is achieved, clean the repaired area with a non-alcohol based window cleaner.

#### WINDSHIELD RESEAL

#### MATERIAL SPECIFICATION

Item	Specification
Urethane Adhesive Essex 400-HV	WSB-M2G316-B

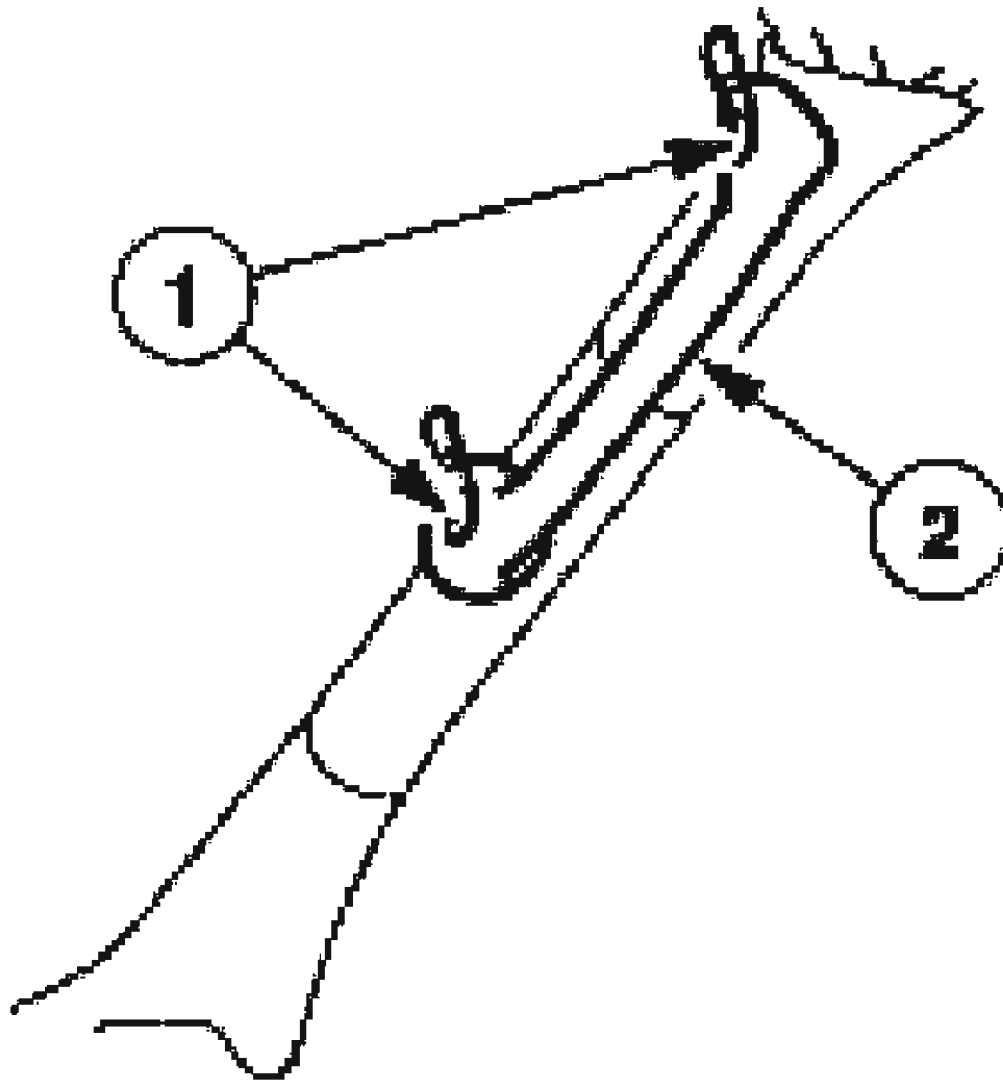
1. Open the four A-pillar assist handle covers.



G02743191

**Fig. 29: Opening A-Pillar Assist Handle Covers**  
Courtesy of FORD MOTOR CO.

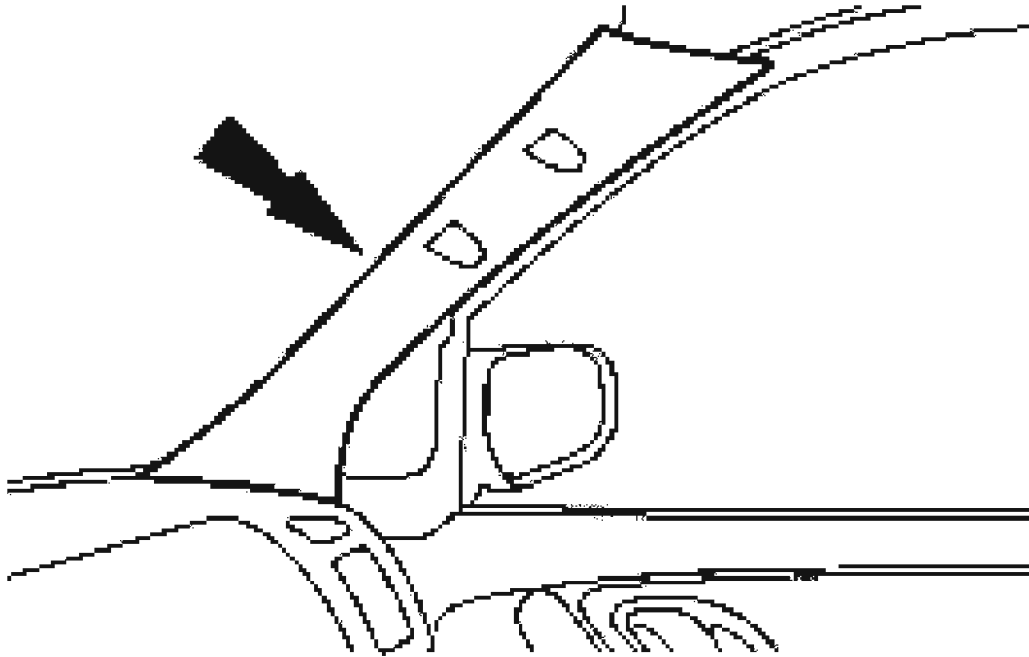
2. Remove the LH and RH A-pillar assist handles.
  1. Remove the four bolts.
  2. Remove the LH and RH A-pillar assist handles.



G02743192

**Fig. 30: Removing LH And RH A-Pillar Assist Handles**  
Courtesy of FORD MOTOR CO.

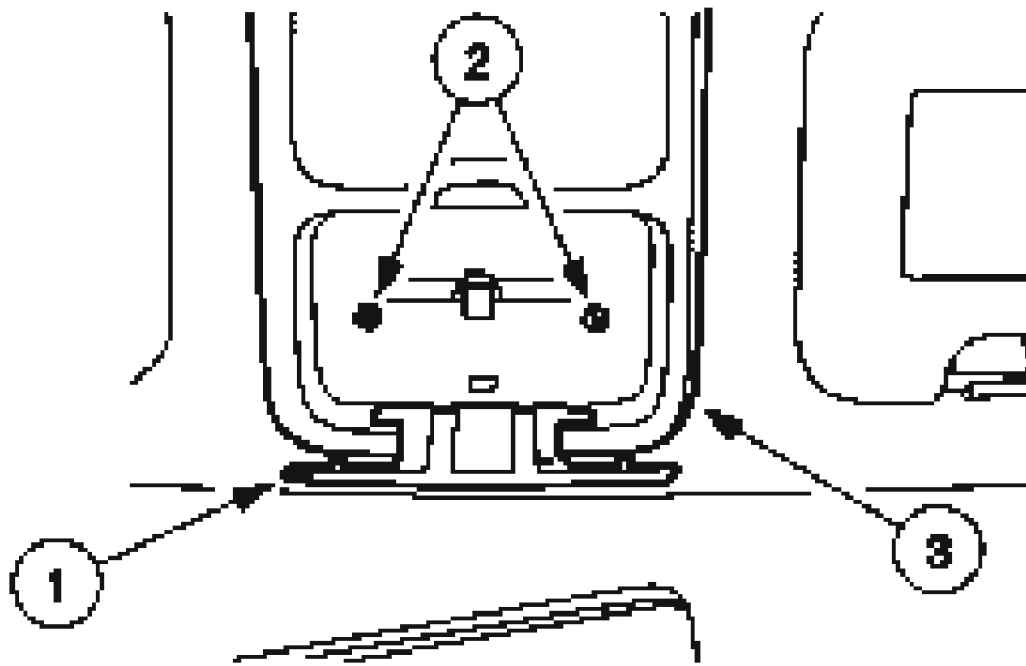
3. Remove the LH and RH windshield side garnish mouldings.



G02743193

**Fig. 31: Removing Windshield Side Garnish Mouldings**  
Courtesy of FORD MOTOR CO.

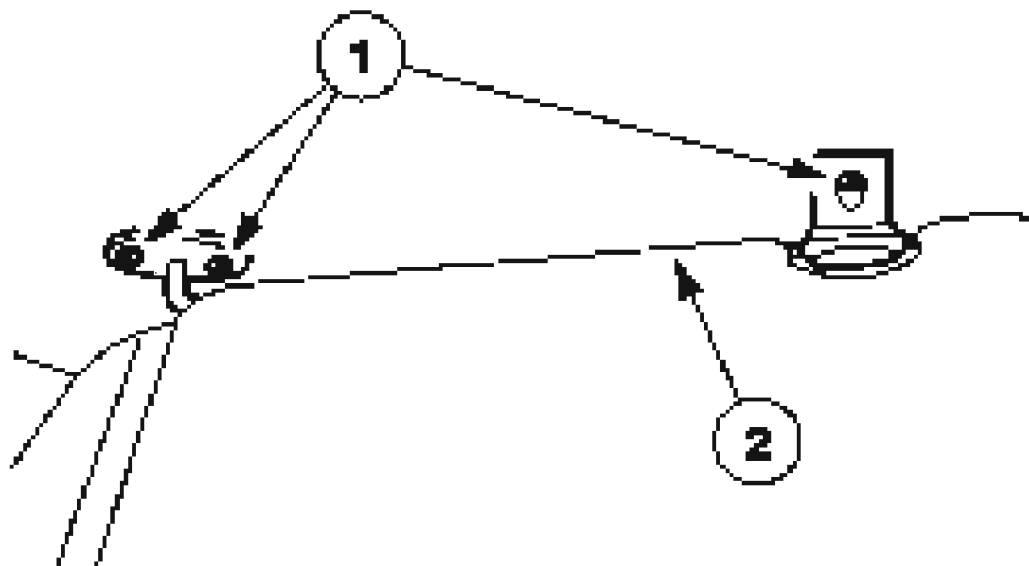
4. Remove the overhead console.
  1. Open the front console door.
  2. Remove the screws.
  3. Remove the overhead console.
    - If equipped, disconnect electrical connector.



G02743194

**Fig. 32: Removing Overhead Console**  
Courtesy of FORD MOTOR CO.

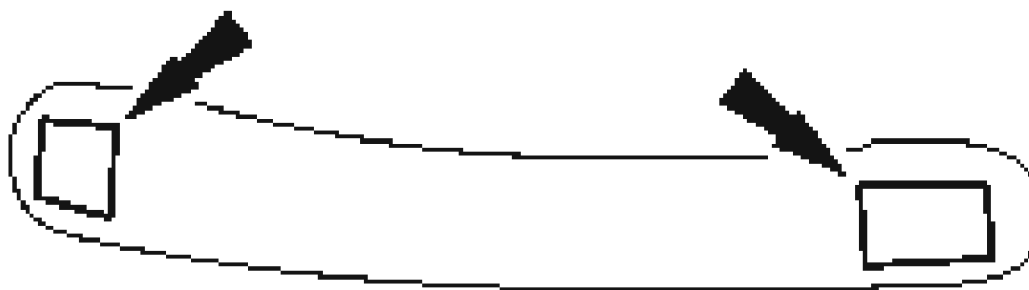
5. Remove the LH and RH sun visors and clips.
  1. Remove the six screws.
  2. Remove the sun visors and clips.



G02743195

**Fig. 33: Removing Sun Visors And Clips**  
Courtesy of FORD MOTOR CO.

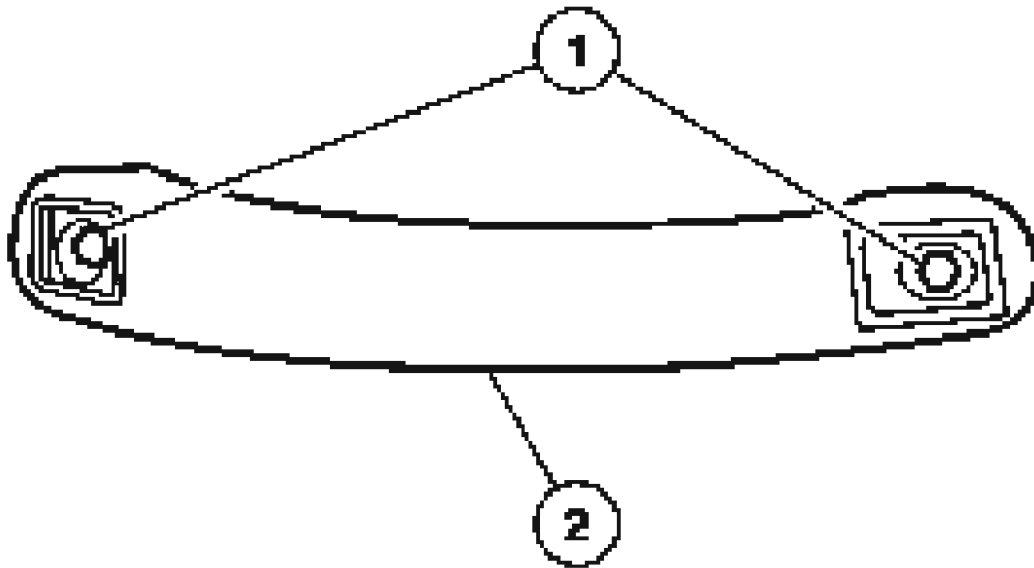
6. Remove the 4 front assist handle covers.



G02743196

**Fig. 34: Removing Front Assist Handle Covers**  
Courtesy of FORD MOTOR CO.

7. Remove the LH and RH front assist handles.
  1. Remove the bolts.
  2. Remove the front assist handles

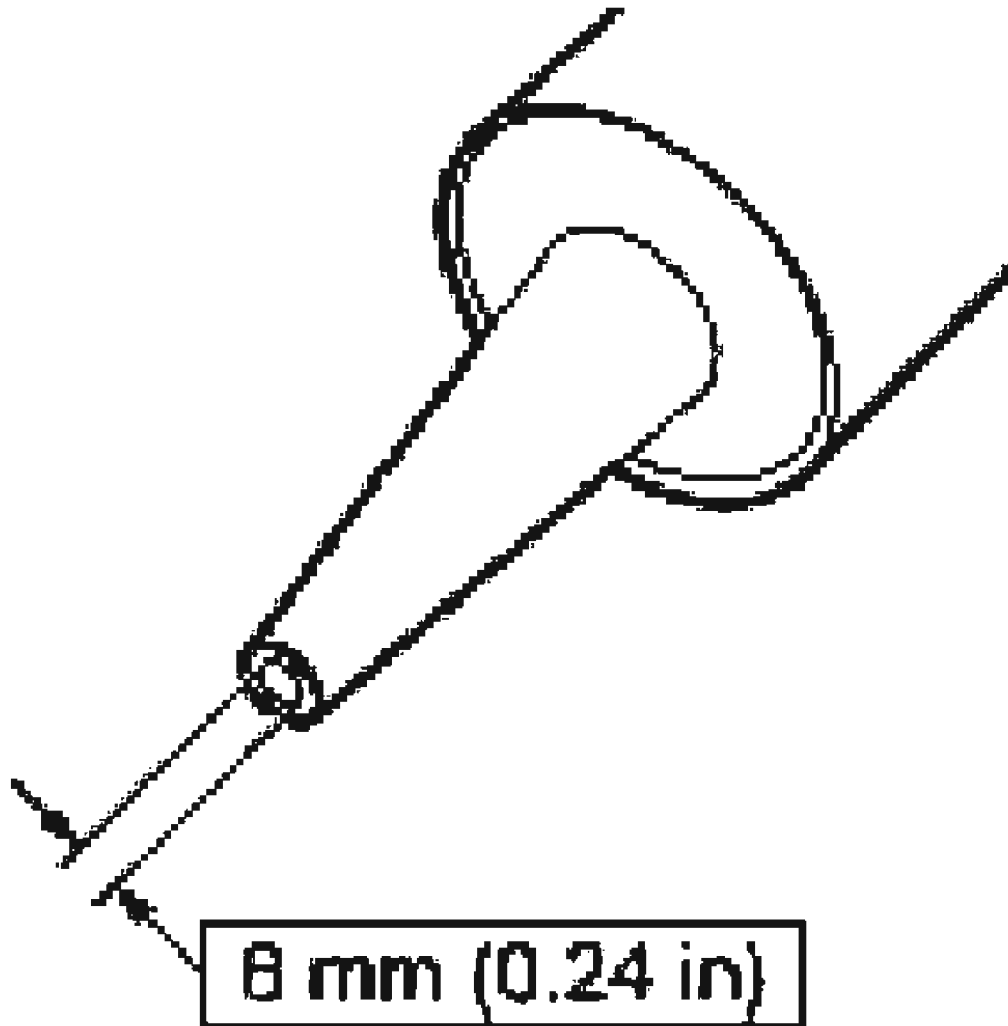


G02743197

**Fig. 35: Removing Front Assist Handles**  
Courtesy of FORD MOTOR CO.

8. Partially lower the front portion of the headliner and block with a suitable material.
9. Remove the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS**
10. Clean the interior and exterior of the windshield glass surface with non-alcohol based glass cleaner.
11. Cut the urethane adhesive applicator tip to specification.





G02743198

**Fig. 36: Identifying Urethane Adhesive Applicator Tip Cutting Specification**  
Courtesy of FORD MOTOR CO.

**NOTE:** Use either a high-ratio, electric or battery-operated caulk gun that will apply the urethane with less effort and continuous bead.

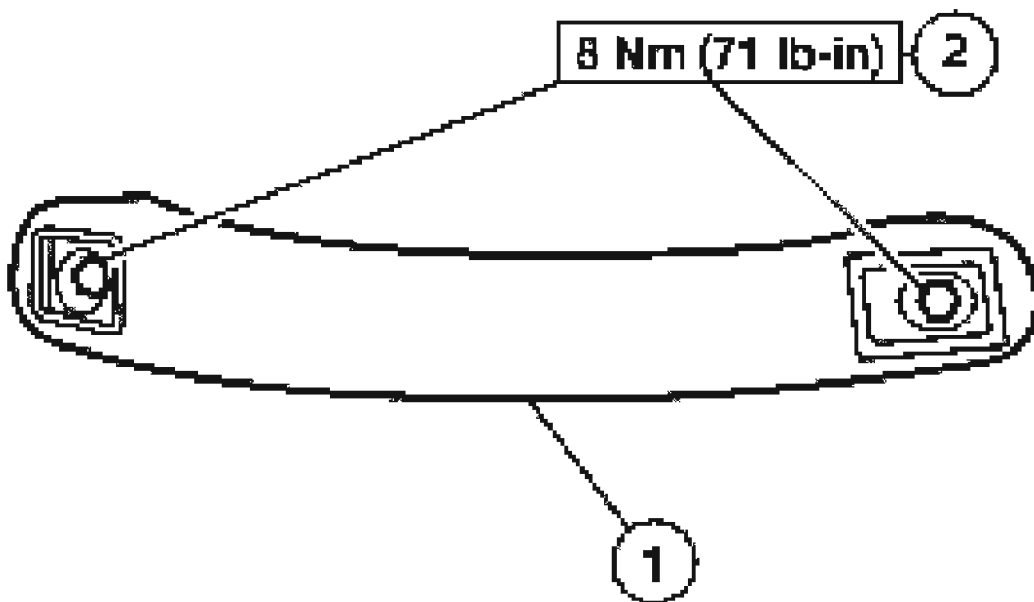
**NOTE:** Make sure that all gaps in the urethane adhesive are smoothed into one continuous bead.

12. Apply urethane adhesive over top of the existing urethane adhesive.

- Apply the urethane adhesive to the top and sides of the windshield from the interior of the vehicle.
- Apply the urethane adhesive to the bottom of the windshield from the exterior of the vehicle.

**NOTE:** The urethane adhesive must cure for a minimum of 1 hour before testing for air or water leaks.

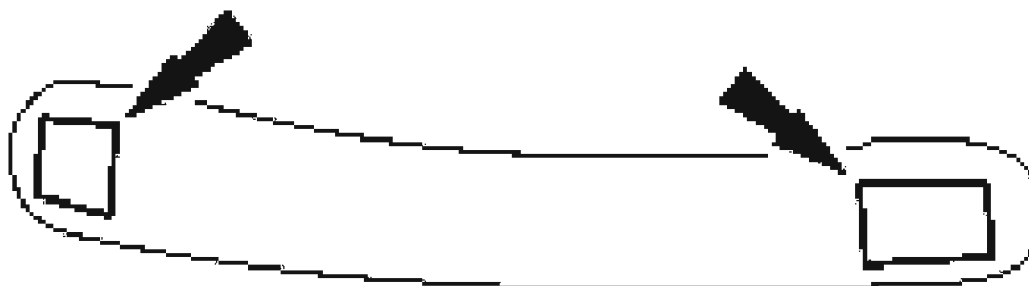
13. After the urethane has cured, check the windshield seal for air or water leaks through the urethane adhesive bead and add urethane adhesive as necessary.
14. Install the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS**
15. Position the front portion of the headliner.
16. Install the LH and RH front assist handles.
  1. Position the LH and RH assist handles.
  2. Install the bolts.



G02743199

**Fig. 37: Installing Front Assist Handles**  
Courtesy of FORD MOTOR CO.

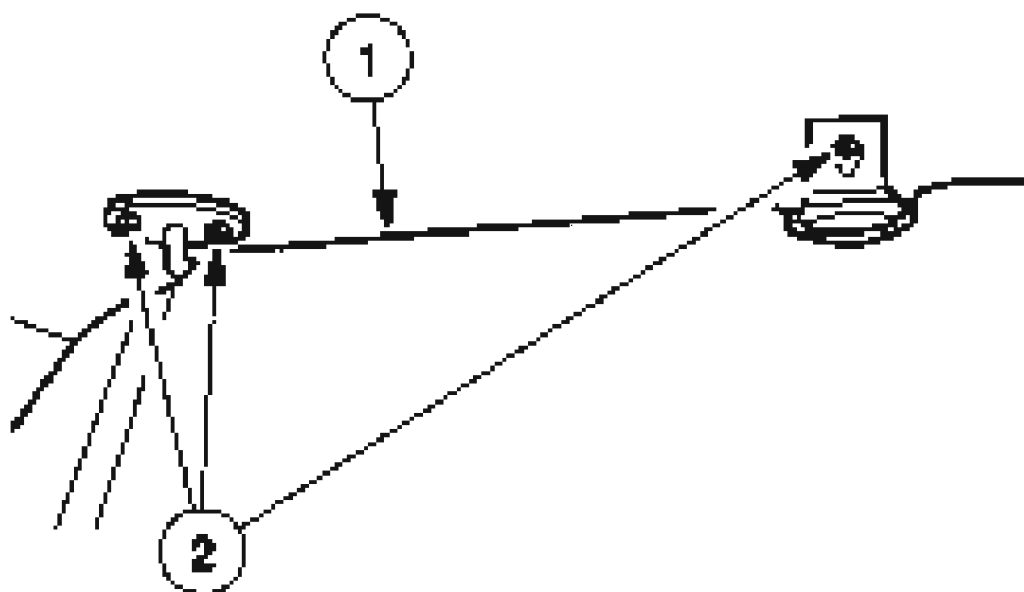
17. Install the 4 front assist handle covers.



G02743200

**Fig. 38: Install Front Assist Handle Covers**  
**Courtesy of FORD MOTOR CO.**

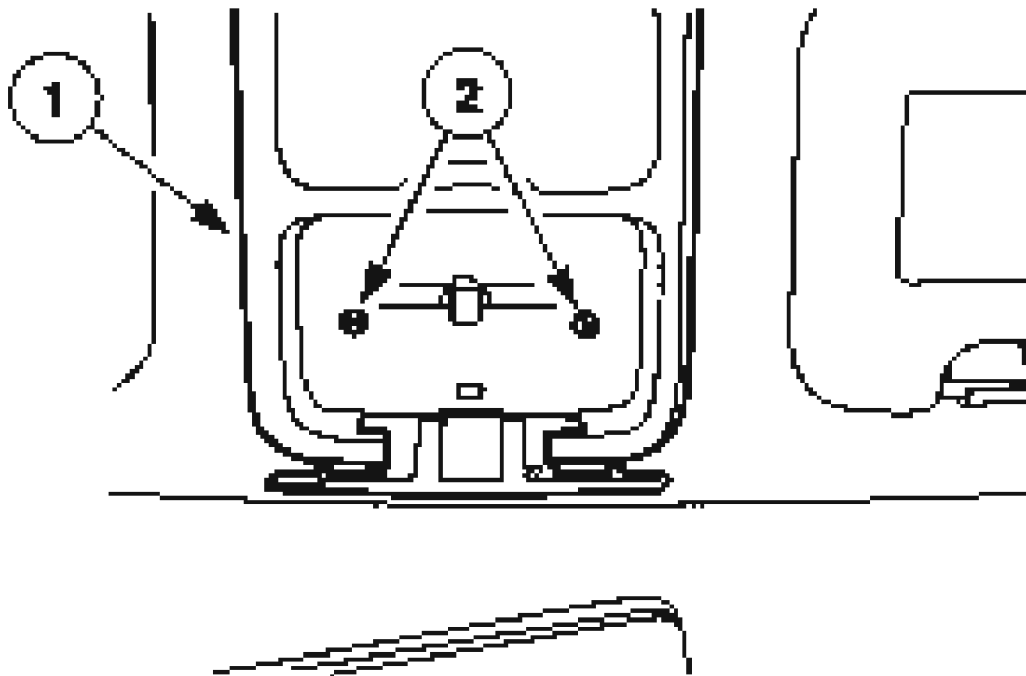
18. Install the LH and RH sun visors and clips.
  1. Position the sun visors and clips.
  2. Install the six screws.



G02743201

**Fig. 39: Installing Sun Visors And Clips**  
**Courtesy of FORD MOTOR CO.**

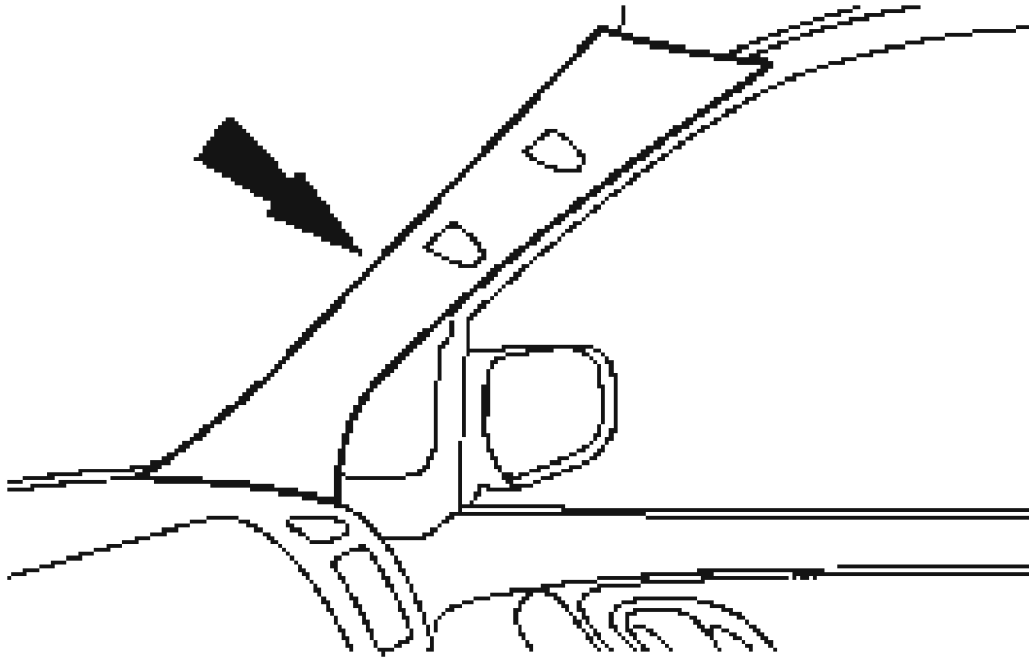
19. Install the overhead console.
  1. Position the overhead console.
    - If equipped, connect the electrical connector.
  2. Install the screws.



G02743202

**Fig. 40: Installing Overhead Console**  
**Courtesy of FORD MOTOR CO.**

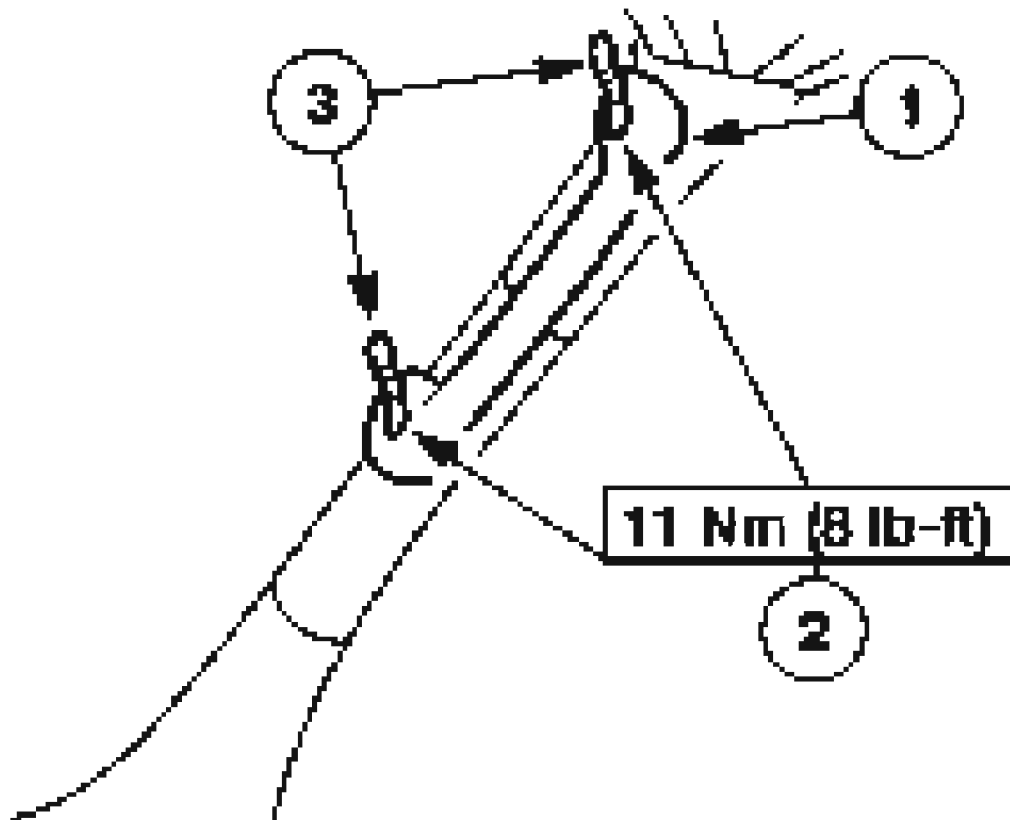
20. Install the LH and RH windshield side garnish mouldings.



G02743203

**Fig. 41: Installing Windshield Side Garnish Mouldings**  
**Courtesy of FORD MOTOR CO.**

21. Install the LH and RH A-pillar assist handles.
  1. Position the two assist handles.
  2. Install the four bolts.
  3. Close the four assist handle covers.



G02743204

**Fig. 42: Installing A-Pillar Assist Handles**

Courtesy of FORD MOTOR CO.

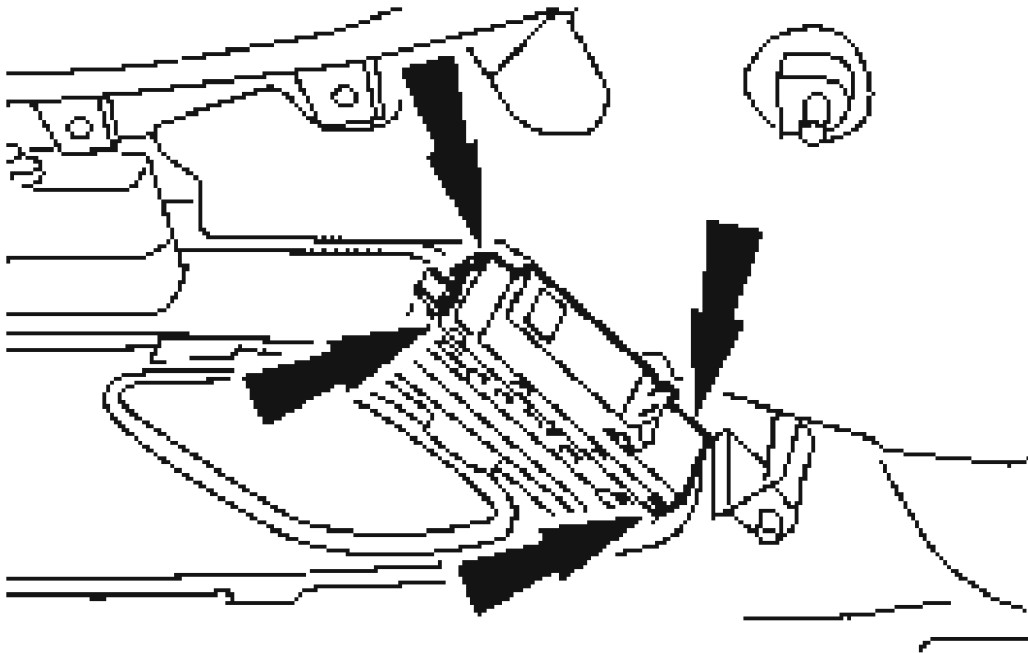
## REMOVAL AND INSTALLATION

### WINDOW CONTROL SWITCH

#### Removal and Installation

**NOTE:** The removal and installation procedures for all window control switches are similar.

1. Remove the front door trim panel or the rear door trim panel. For additional information, refer to INTERIOR TRIM AND ORNAMENTATION .
2. Release the locking clips and remove the window control switch.



G02743205

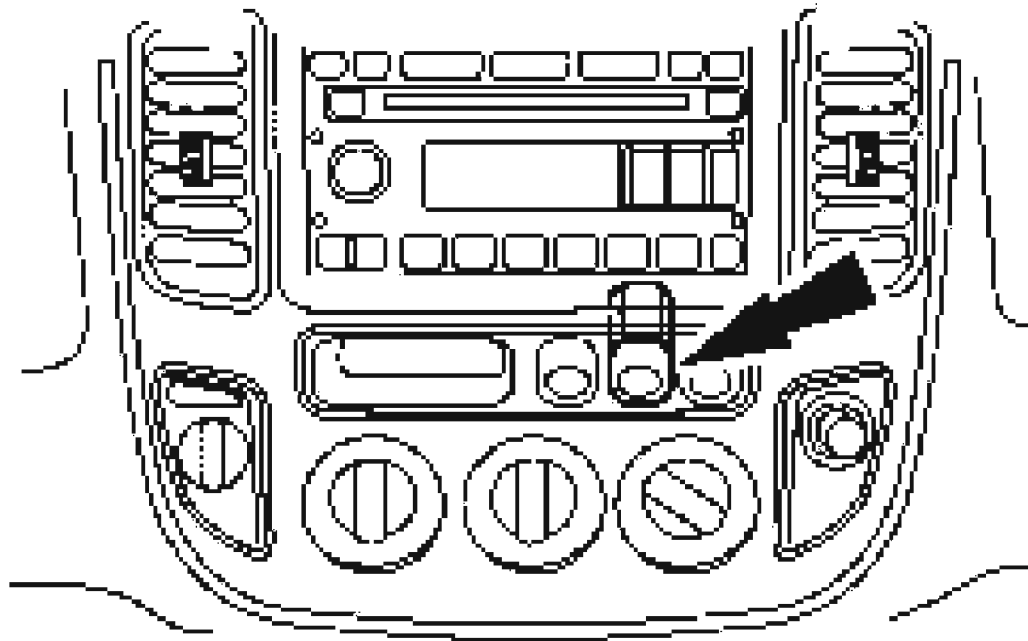
**Fig. 43: Removing Window Control Switch**  
**Courtesy of FORD MOTOR CO.**

3. To install, reverse the removal procedure.

## **REAR WINDOW DEFROST SWITCH**

### **Removal and Installation**

1. Remove the audio unit. For additional information, refer to **AUDIO UNIT**
2. Push outward on the rear window defrost switch to remove it from the instrument panel center finish panel.
  - Disconnect the electrical connector.



G02743206

**Fig. 44: Locating Rear Window Defrost Switch**  
Courtesy of FORD MOTOR CO.

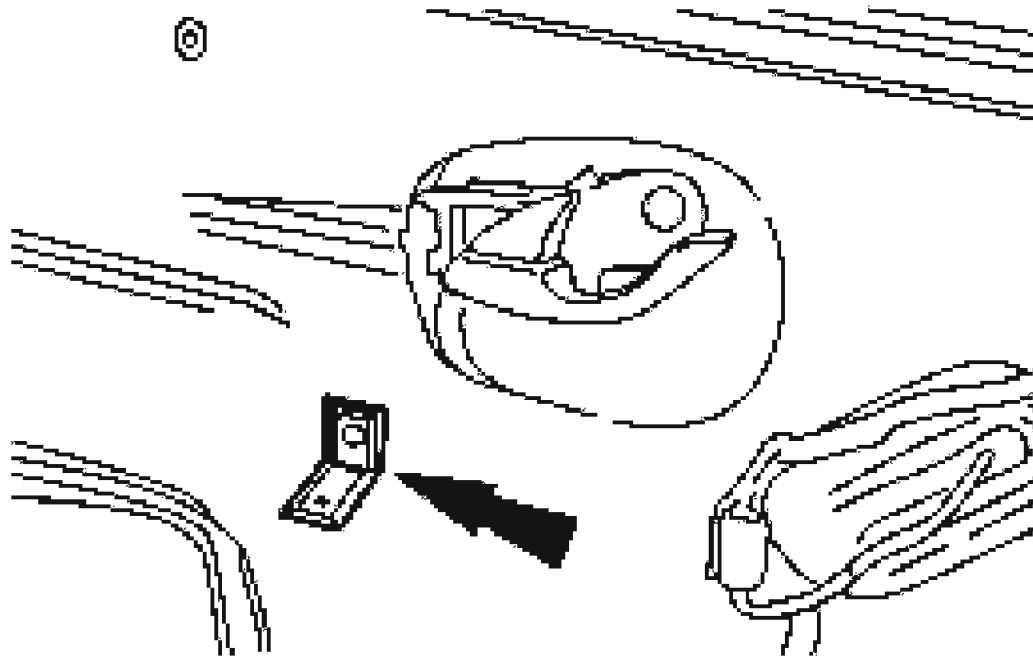
3. To install, reverse the removal procedure.

## **FRONT DOOR WINDOW GLASS**

### **Removal and Installation**

1. Remove the front door trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
2. Remove the screw and the door trim panel bracket.

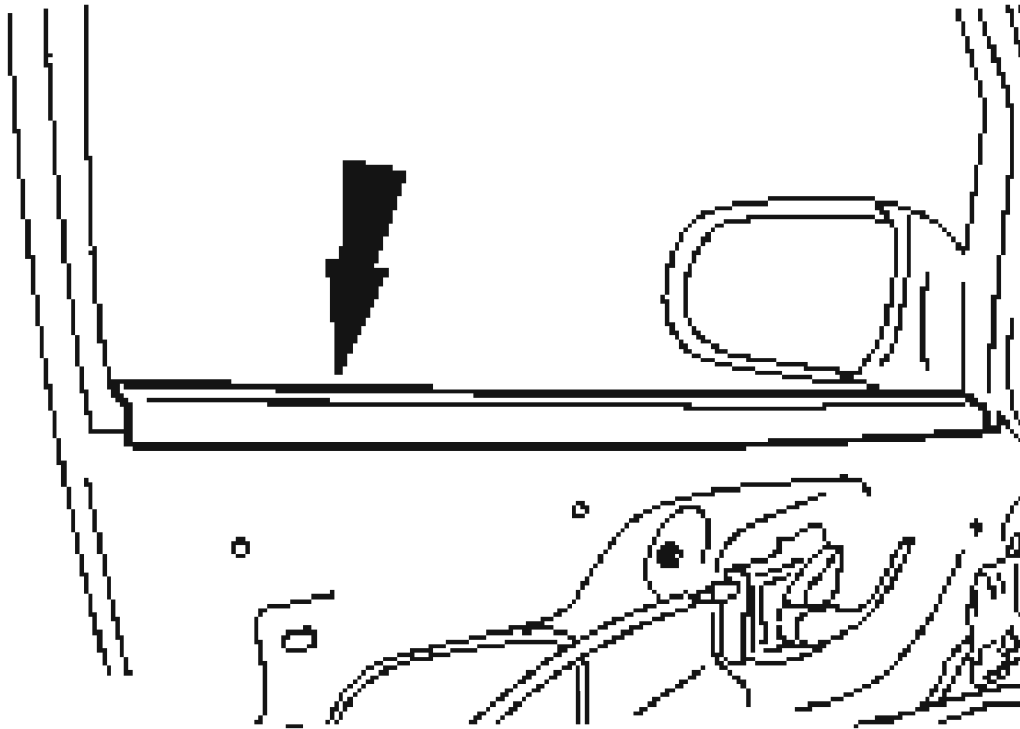




G02743207

**Fig. 45: Removing Door Trim Panel Bracket**  
Courtesy of FORD MOTOR CO.

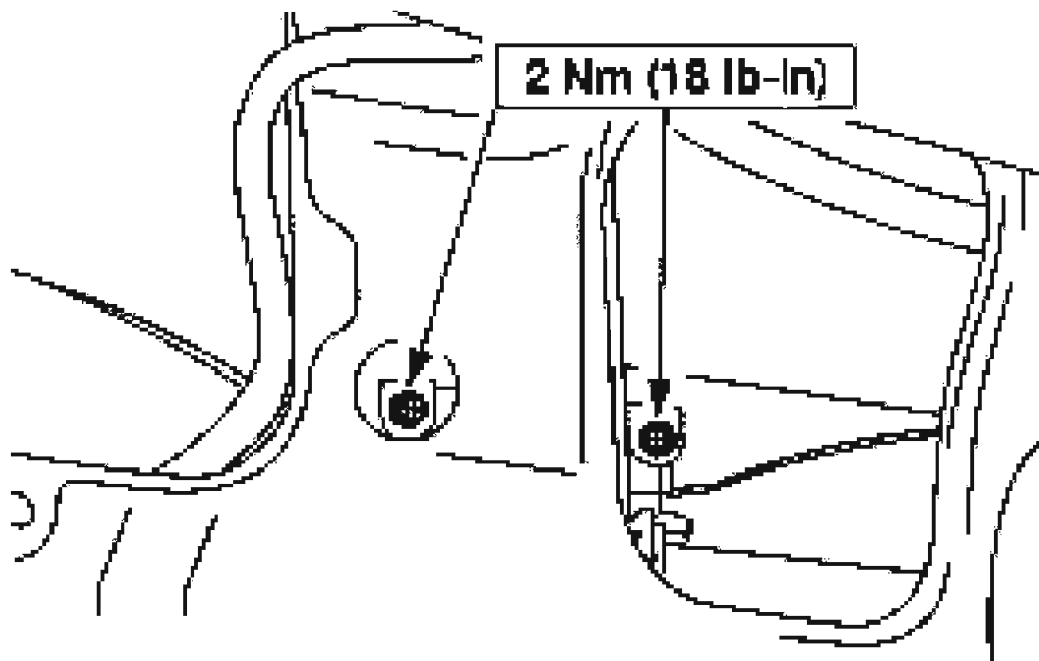
3. Position the water shield aside.
4. Remove the front door interior glass weatherstrip.



G02743208

**Fig. 46: Removing Front Door Interior Glass Weatherstrip**  
**Courtesy of FORD MOTOR CO.**

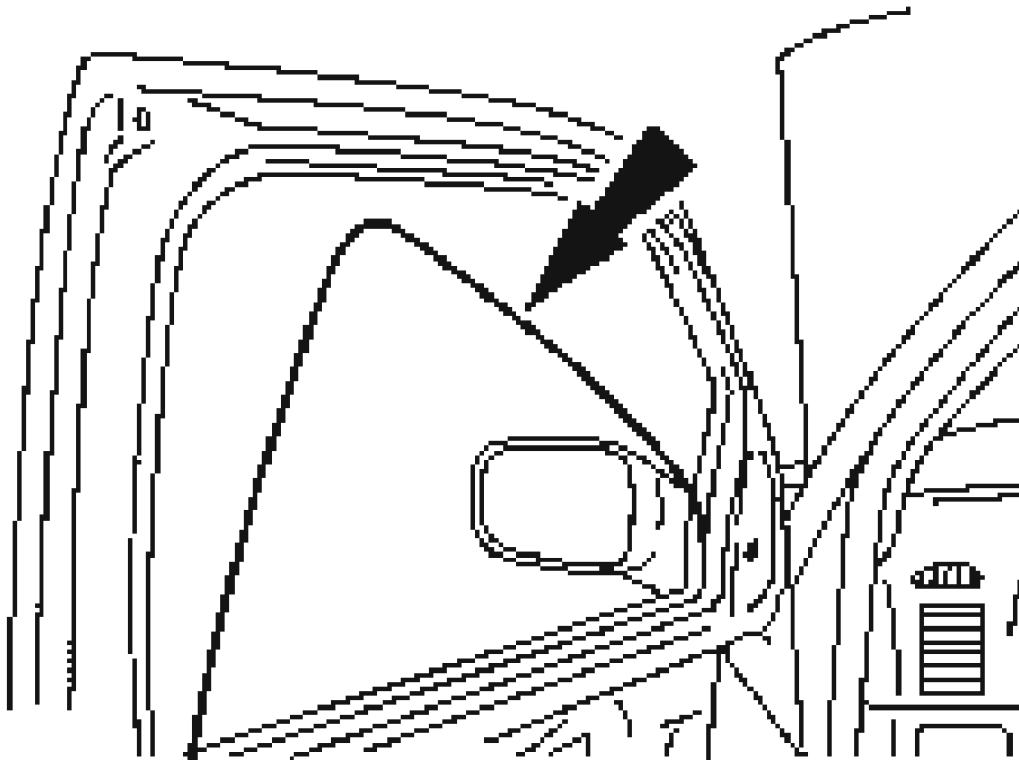
5. Connect the window control switch to the door harness.
6. Connect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
7. Lower the front door window glass to gain access to the screws.
8. Remove the front door window glass screws.



G02743209

**Fig. 47: Removing Front Door Window Glass Screws**  
Courtesy of FORD MOTOR CO.

9. Remove the front door window glass.



G02743210

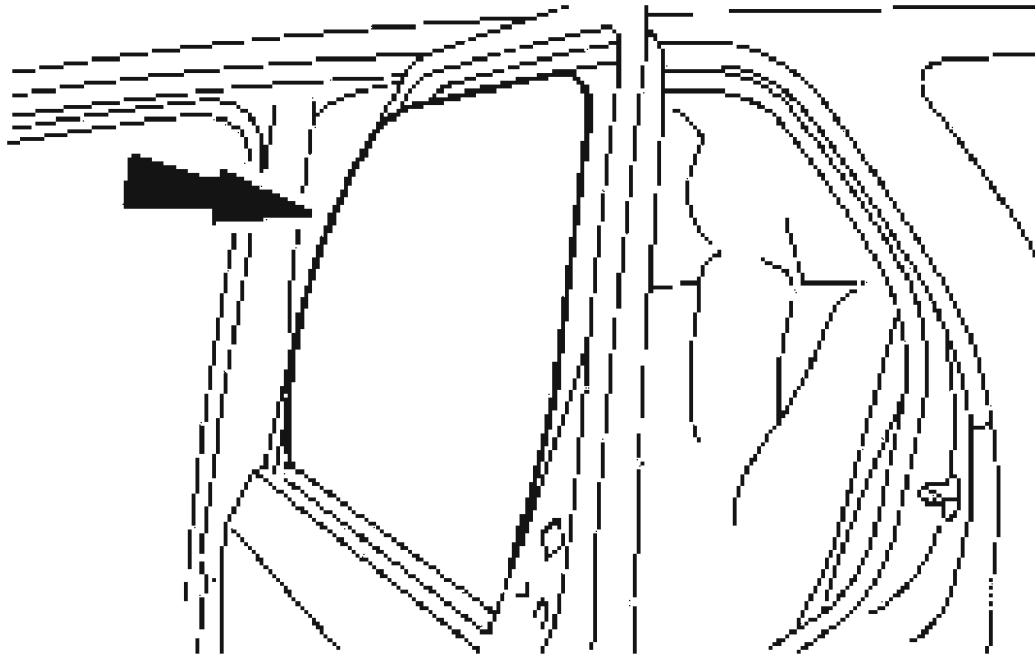
**Fig. 48: Removing Front Door Window Glass**  
Courtesy of FORD MOTOR CO.

10. To install, reverse the removal procedure.

## **REAR DOOR WINDOW GLASS**

### **Removal and Installation**

1. Remove the rear door glass top run. For additional information, refer to **REAR DOOR GLASS TOP RUN**.
2. Remove the rear door window glass.

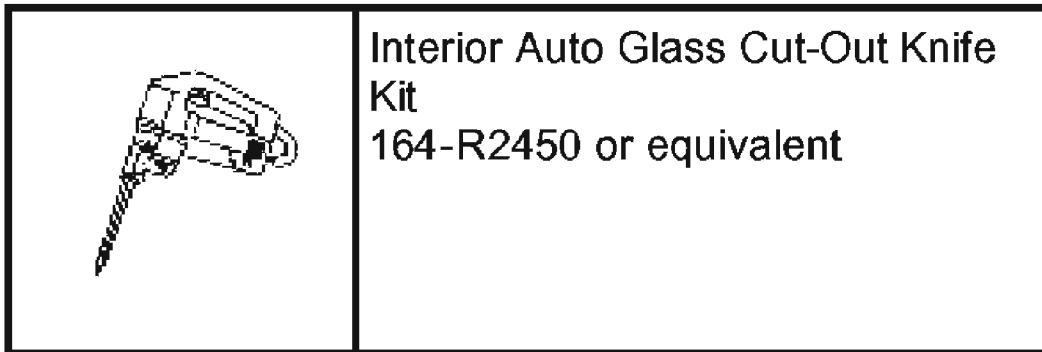


G02743211

**Fig. 49: Removing Rear Door Window Glass**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

#### REAR QUARTER WINDOW GLASS



G02743212

**Fig. 50: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

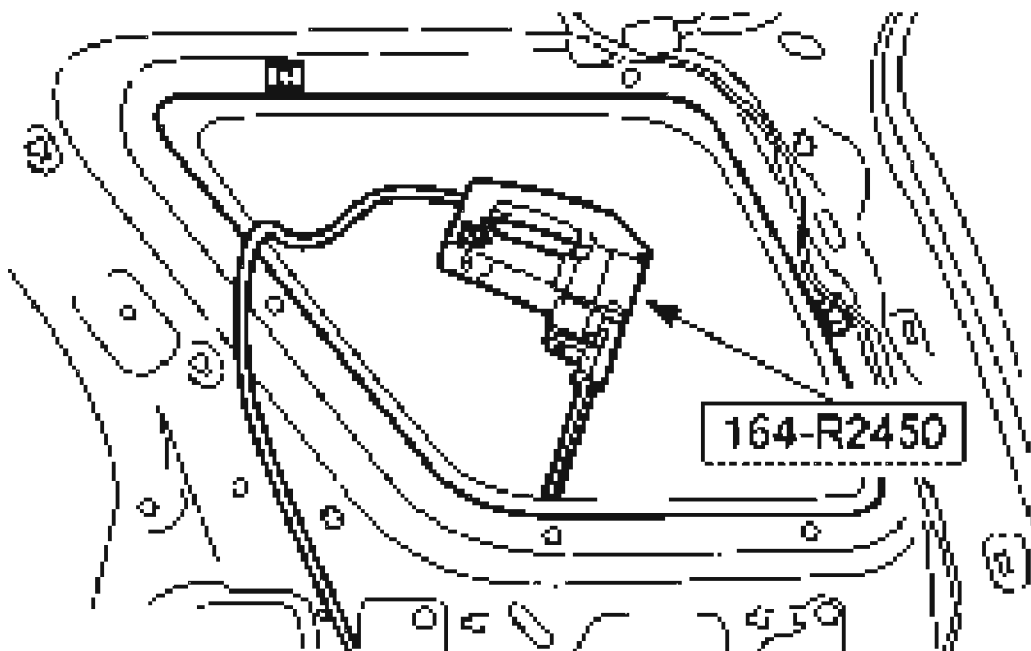
## Removal

**WARNING:** To prevent glass splinters from entering the eyes or cutting hands, wear safety glasses and heavy gloves when cutting the glass from the vehicle. Failure to follow these instructions may result in personal injury.

1. Remove the headliner. For additional information, refer to INTERIOR TRIM AND ORNAMENTATION

**NOTE:** Lubricate the urethane adhesive with water to aid the special tool when cutting.

**NOTE:** Locating tabs need to be cut through in order to remove the rear quarter window glass. The new quarter window glass will be equipped with new locating tabs.



G02743213

**Fig. 51: Cutting Urethane Adhesive From Quarter Window Glass**  
Courtesy of FORD MOTOR CO.

2. Using the special tool, cut the urethane adhesive from the quarter window glass starting at the top center and working toward the bottom corners and remove the rear quarter

window glass.

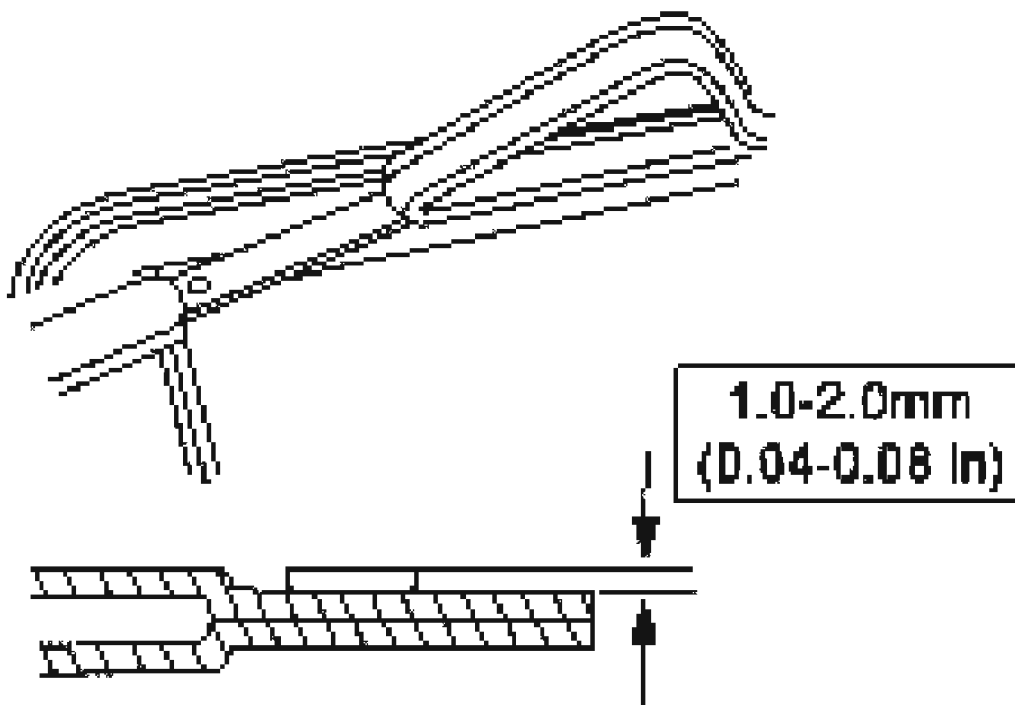
3. Using a soft brush or vacuum, remove any foreign material or dirt from the pinch weld.

#### Installation

**CAUTION:** After installing the urethane installed glass, the vehicle should not be driven until the urethane adhesive has cured. The curing time at temperatures above 13°C (55°F) and relative humidity above 50% is 12-24 hours. Inadequate curing of the urethane adhesive will adversely affect the strength of the urethane bond.

1. Dry fit the quarter window glass, making alignment marks with tape or non-staining grease pencil.

**CAUTION:** Do not scratch the pinch weld area.



G02743214

**Fig. 52: Identifying Urethane Adhesive Surface Specification**  
Courtesy of FORD MOTOR CO.

2. Trim the remaining urethane adhesive on the pinch weld to within the specification.
  - The existing urethane adhesive surface should be smooth and free of cuts and contamination.

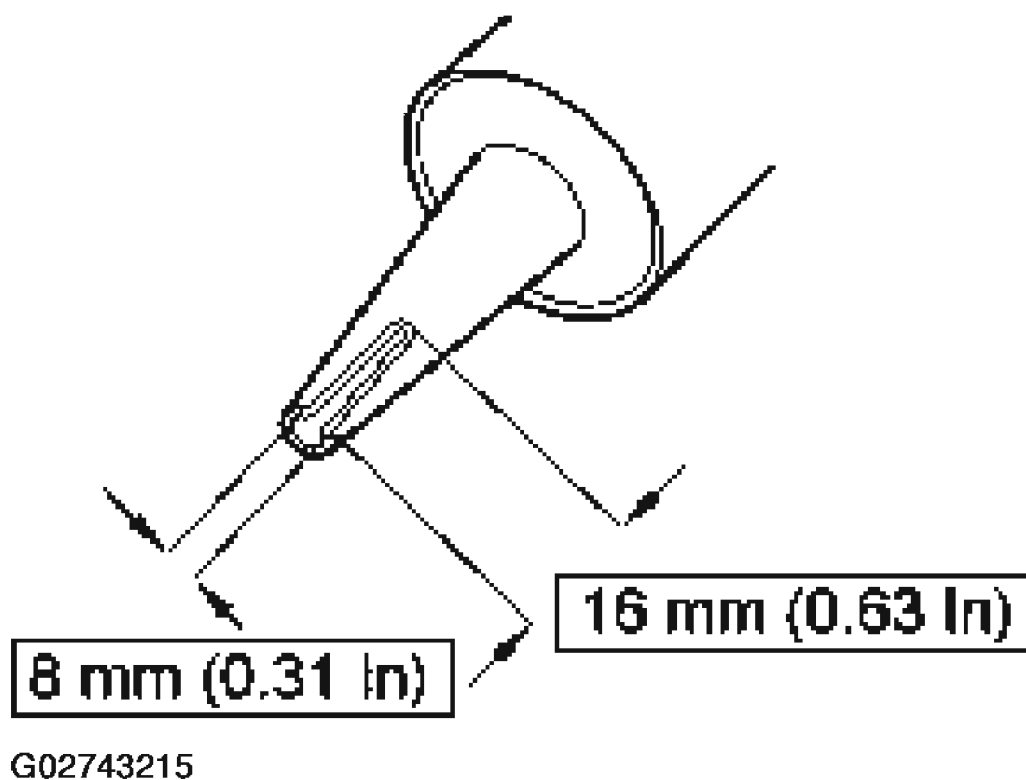
**CAUTION: Use caution when applying Urethane Metal Primer Essex U-413. Apply a light amount of primer. Too much primer will run and damage the painted surface.**

3. Use a wool applicator to apply Urethane Metal Primer Essex U-413 meeting Ford specification WSB-M2G234-C to any exposed metal on the pinch weld. Allow 6 to 10 minutes to dry.
4. Clean the inside of the quarter glass surface with alcohol-free cleaner, making sure the ceramic coated area is clean.

**NOTE: Wipe off the glass prep immediately after each application because it flash dries.**

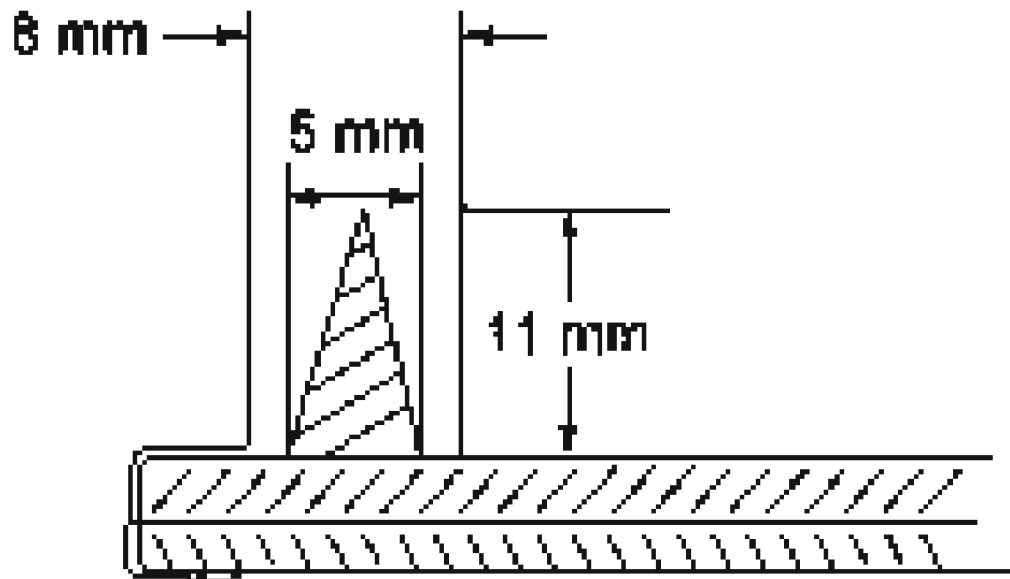
5. Apply Urethane Glass Prep Essex U-401 meeting Ford specification WSB-M5B280-C twice around the glass surface to urethane.
6. Apply Glass Primer Essex U-402 meeting Ford specification WSB-M2G314-B to the same area that was prepped in the previous step. Allow five minutes to dry.
7. Cut the urethane adhesive applicator tip to specification.





**Fig. 53: Identifying Urethane Adhesive Applicator Tip Cutting Specification**  
Courtesy of FORD MOTOR CO.

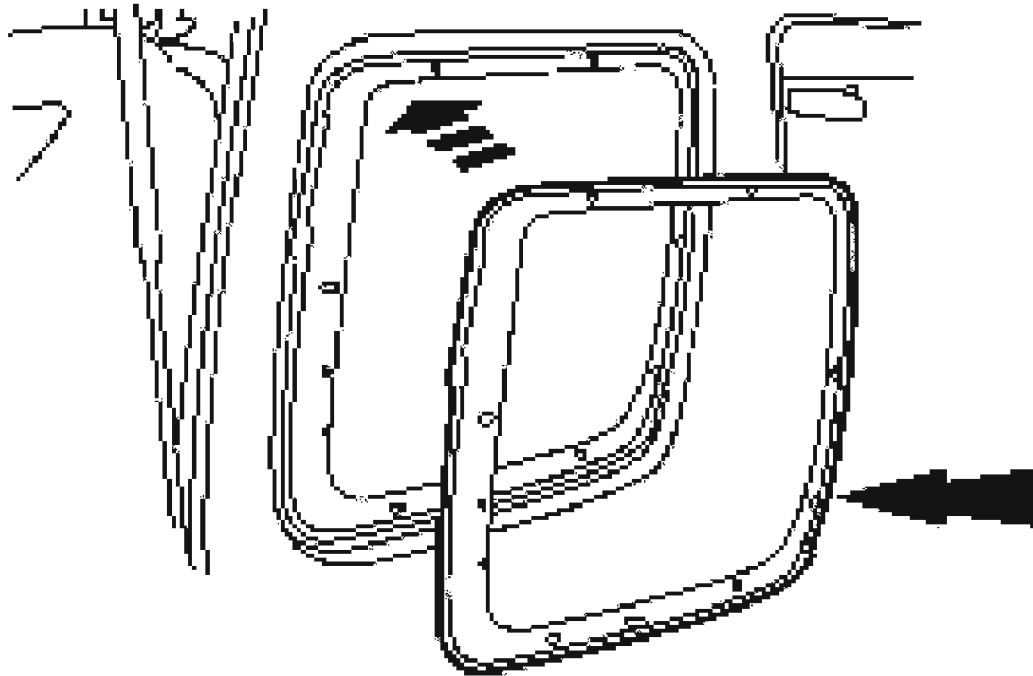
**NOTE:** Use caution when applying urethane adhesive. Apply to the outside edges of locating tabs on the glass surface.



G02743216

**Fig. 54: Identifying Urethane Adhesive Surface Specification**  
Courtesy of FORD MOTOR CO.

8. Apply a bead of Urethane Adhesive Essex 400-HV meeting Ford specification WSB-M2G316-B. Start at the bottom and work around to the sides of the quarter window glass.
9. Install the quarter window glass, aligning it to the marks previously made.



G02743217

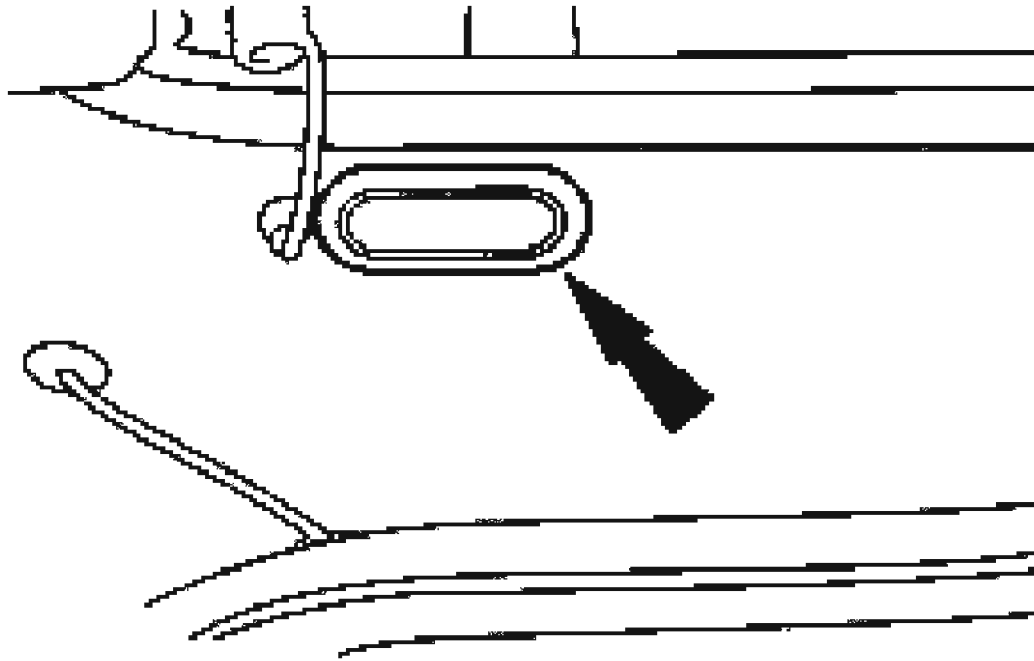
**Fig. 55: Installing Quarter Window Glass**  
Courtesy of FORD MOTOR CO.

10. After the quarter window glass is set, check for water leaks and add urethane adhesive where needed.
11. If necessary, remove excess urethane adhesive from the outside surface of the quarter window glass.
12. Install the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION** .

## LIFTGATE WINDOW GLASS

### Removal and Installation

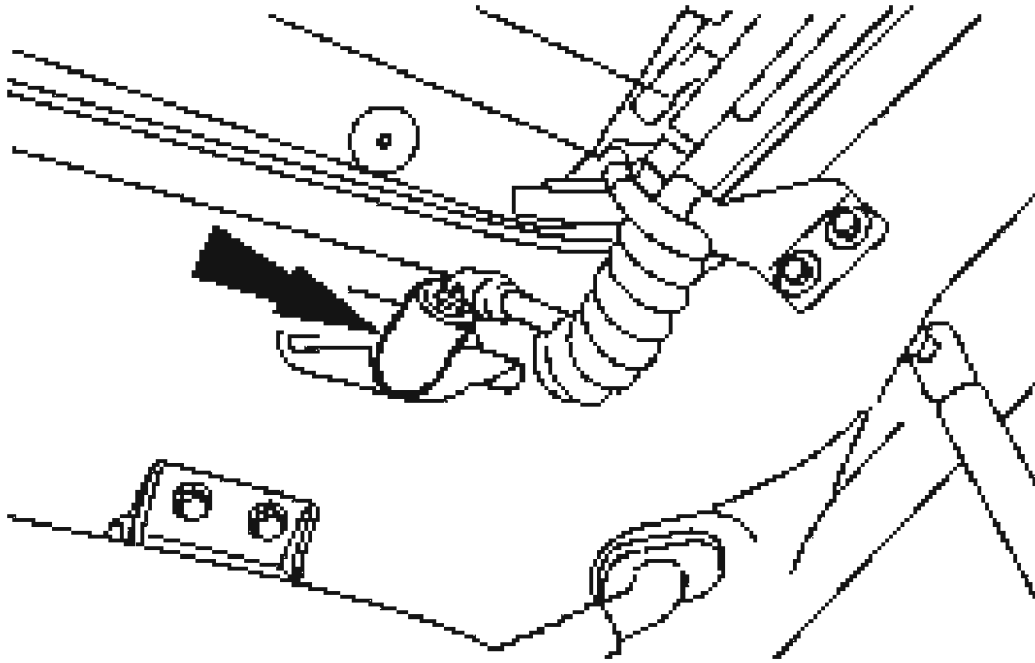
1. Open the liftgate glass.
2. Remove the two liftgate nut access covers (one on each side).



G02743218

**Fig. 56: Removing Liftgate Nut Access Cover**  
Courtesy of FORD MOTOR CO.

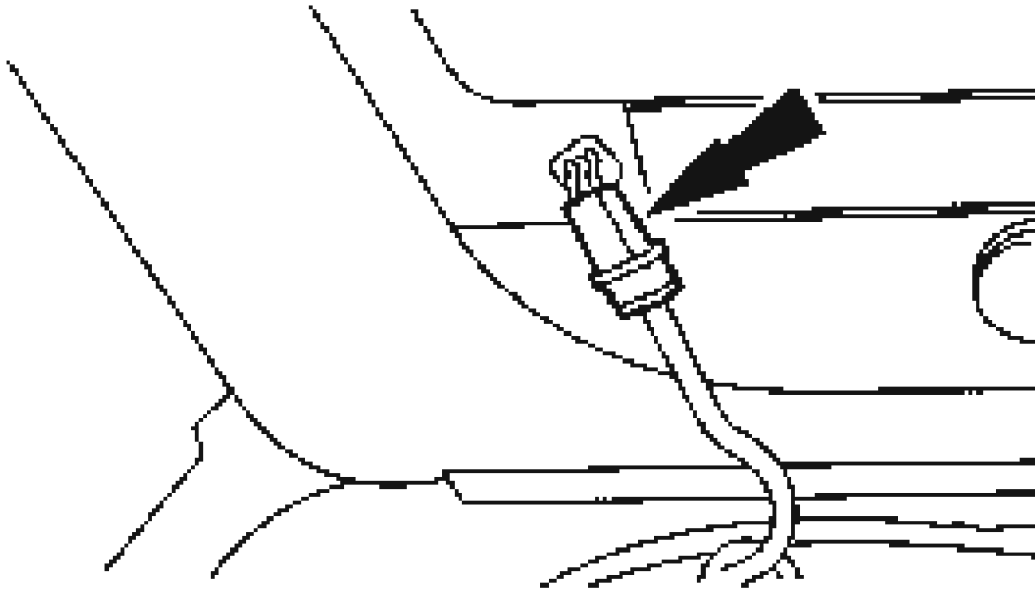
3. Disconnect the rear window glass electrical harness connector.



G02743219

**Fig. 57: Disconnecting Rear Window Glass Electrical Harness Connector**  
Courtesy of FORD MOTOR CO.

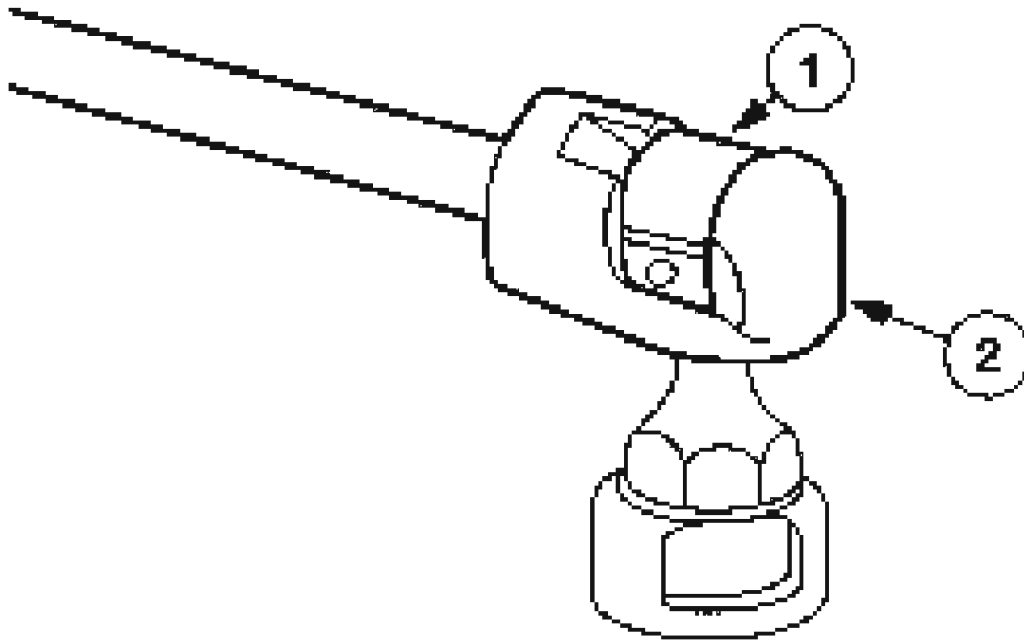
4. Disconnect the heated window grid wire electrical connector.



G02743220

**Fig. 58: Disconnecting Heated Window Grid Wire Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** An assistant may be needed to carry out this step.

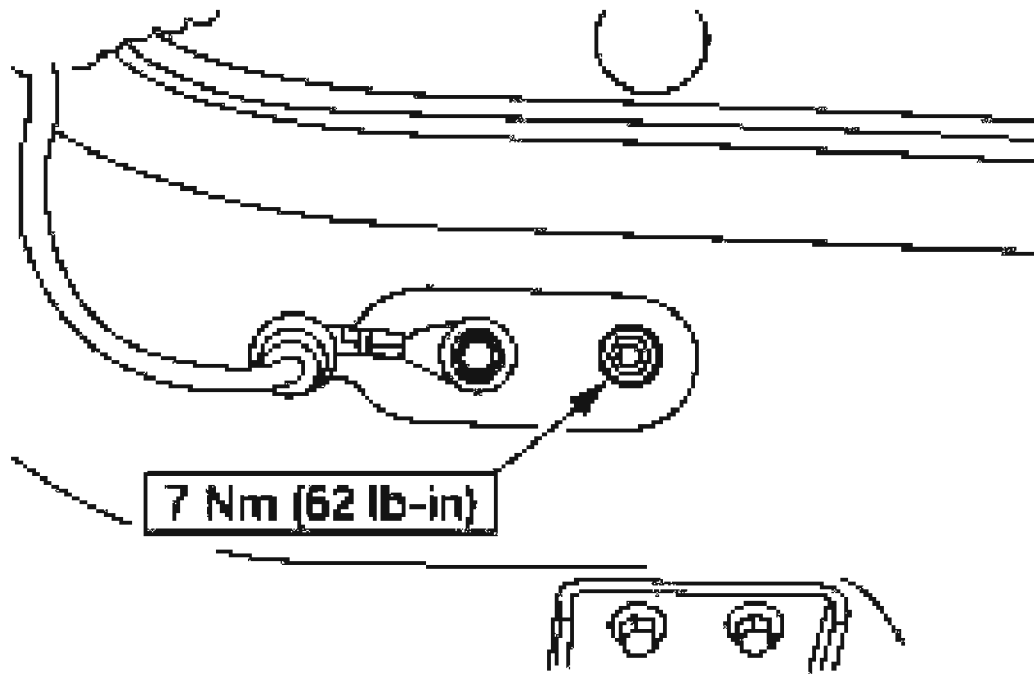


G02743221

**Fig. 59: Disconnecting Liftgate Window Glass Cylinders**  
Courtesy of FORD MOTOR CO.

5. Disconnect the two liftgate window glass cylinders.
  1. Slide the spring retainer to the end of the socket.
  2. Disconnect the socket from the ball stud.

**NOTE:** An assistant may be needed to carry out this step.



G02743222

**Fig. 60: Removing Liftgate Window Glass Hinge Nuts**  
Courtesy of FORD MOTOR CO.

6. Remove the two liftgate window glass hinge nuts.
7. To install, reverse the removal procedure.
  - Transfer components as necessary.

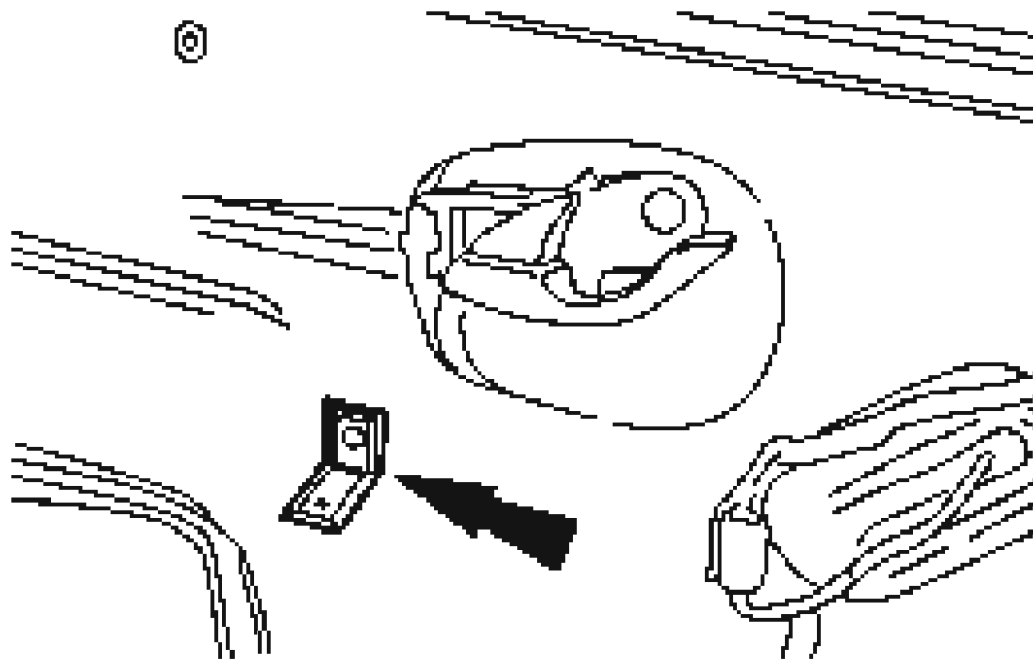
## FRONT DOOR WINDOW REGULATOR

### Removal and Installation

#### All vehicles

1. Remove the front door trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
2. Remove the screw and the front door trim panel bracket.





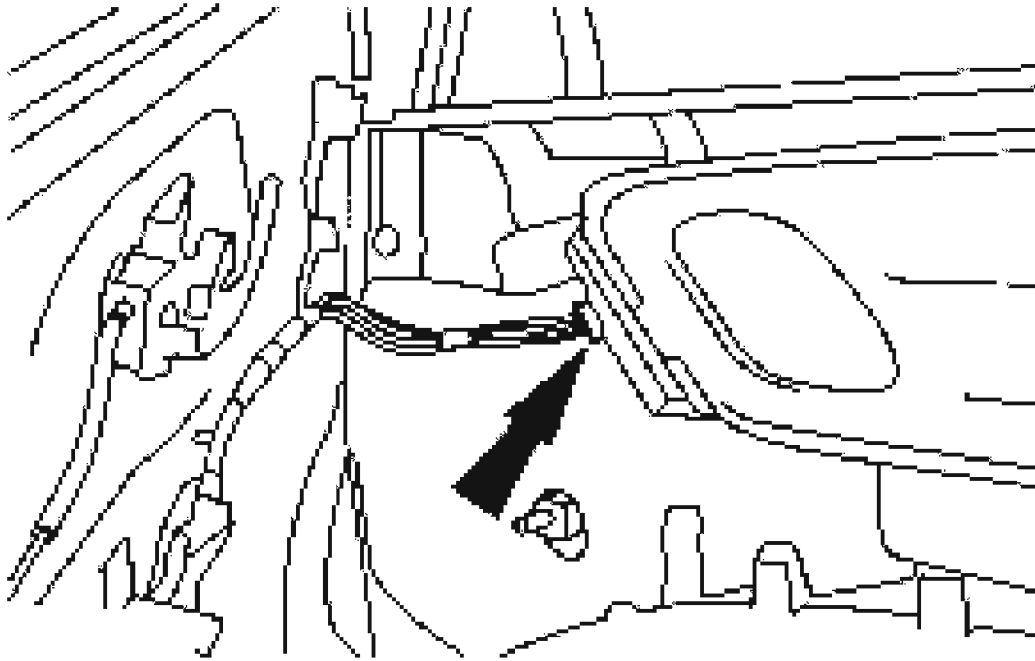
G02743223

**Fig. 61: Removing Front Door Trim Panel Bracket**  
Courtesy of FORD MOTOR CO.

3. Position the water shield aside.

**Vehicles with power windows**

4. Connect the window control switch electrical connector.



G02743224

**Fig. 62: Connecting Window Control Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

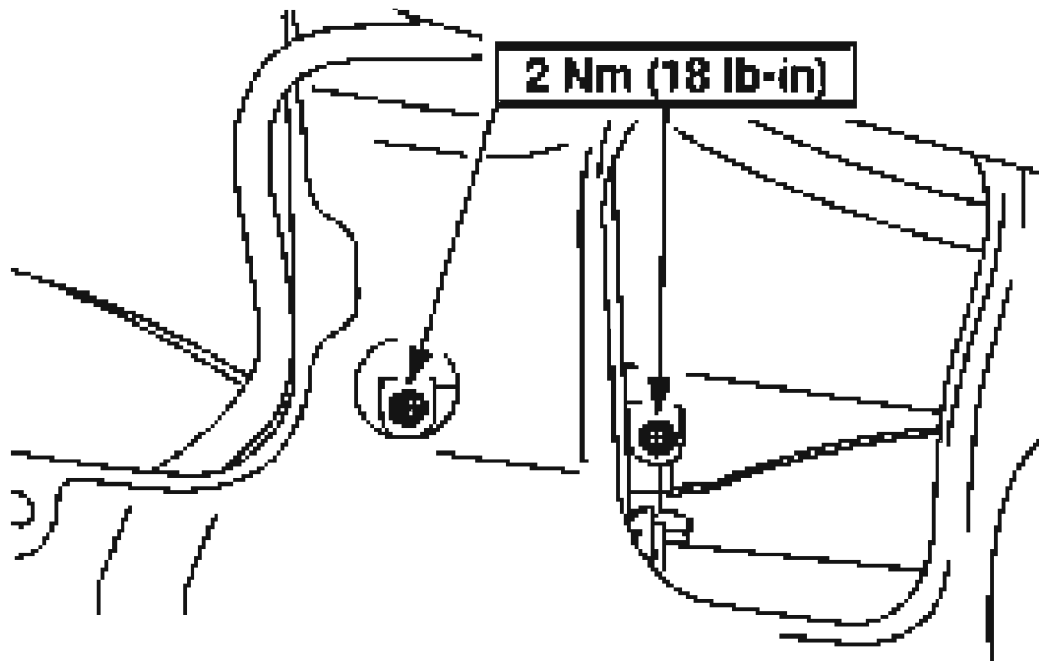
5. Connect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.

**All vehicles**

6. Lower the front door window glass to gain access to the screws.

**Vehicles with power windows**

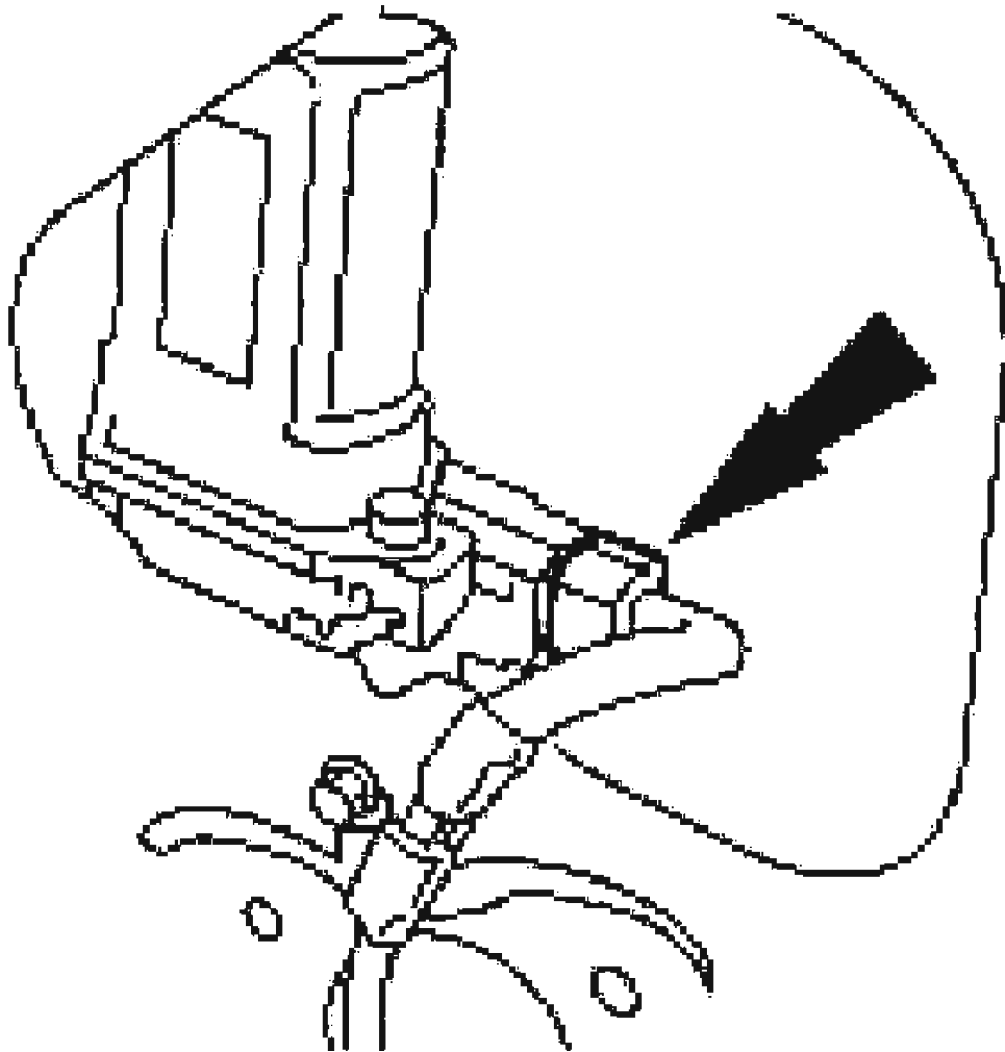
7. Disconnect the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
8. Disconnect the window control switch electrical connector.
9. Remove the front door window glass screws.



G02743225

**Fig. 63: Removing Front Door Window Glass Screws**  
**Courtesy of FORD MOTOR CO.**

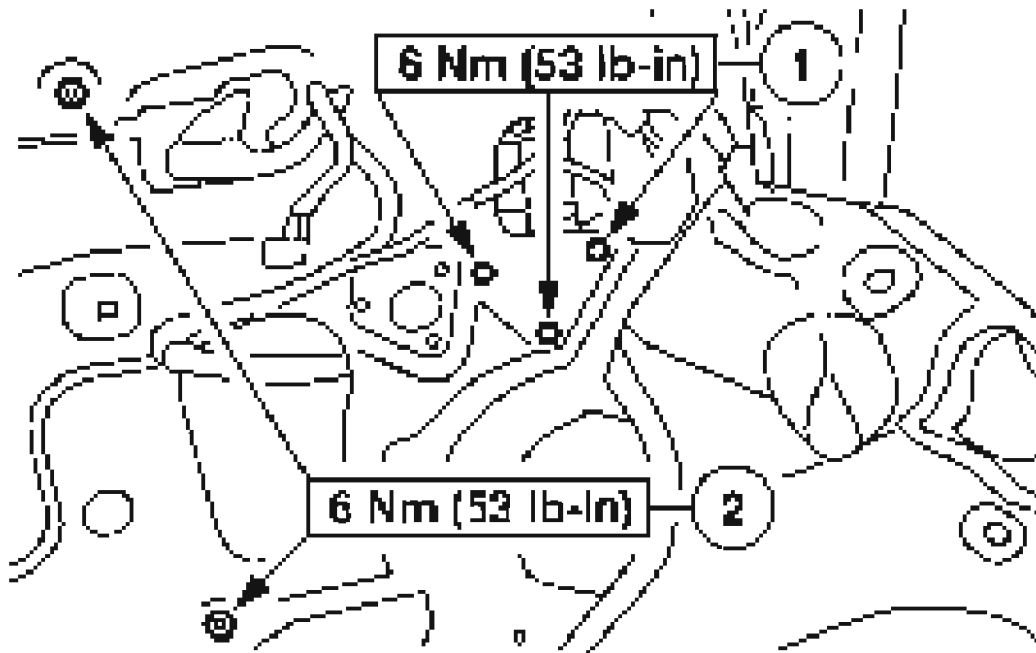
10. Support the front door window glass in the full up position.
11. Disconnect the front door power window regulator motor electrical connector.



G02743226

**Fig. 64: Disconnecting Front Door Power Window Regulator Motor Electrical Connector**  
Courtesy of FORD MOTOR CO.

12. Remove the front door power window regulator assembly.
  1. Remove the bolts.
  2. Remove the nuts.

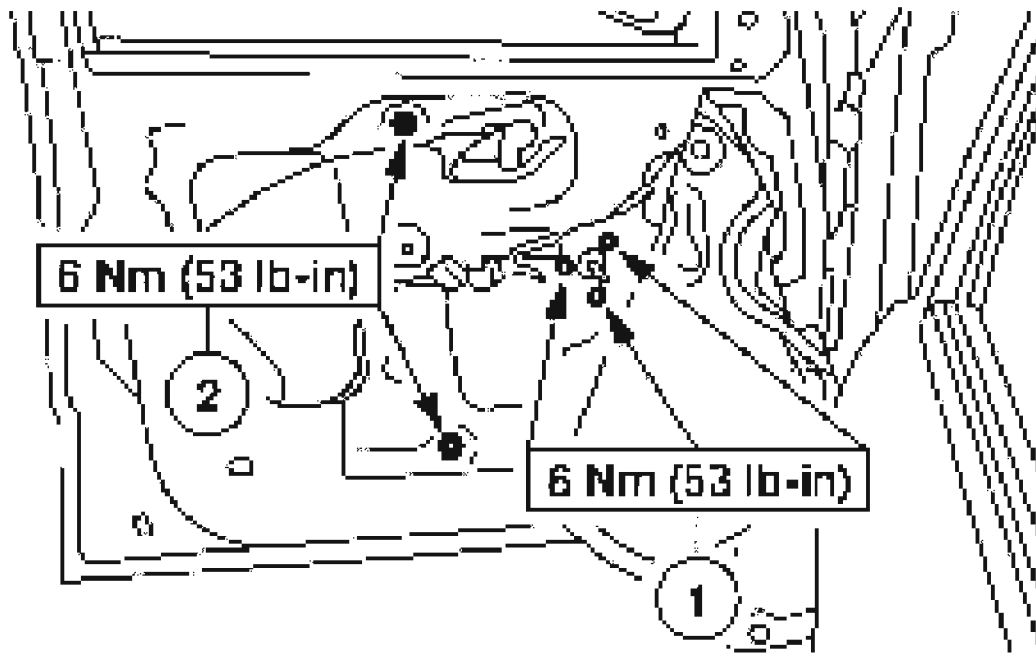


G02743227

**Fig. 65: Removing Front Door Power Window Regulator Assembly**  
Courtesy of FORD MOTOR CO.

**Vehicles with manual windows**

13. Remove the front door window regulator assembly.
  1. Remove the bolts
  2. Remove the nuts.



G02743228

**Fig. 66: Removing Front Door Window Regulator Assembly**  
Courtesy of FORD MOTOR CO.

#### All vehicles

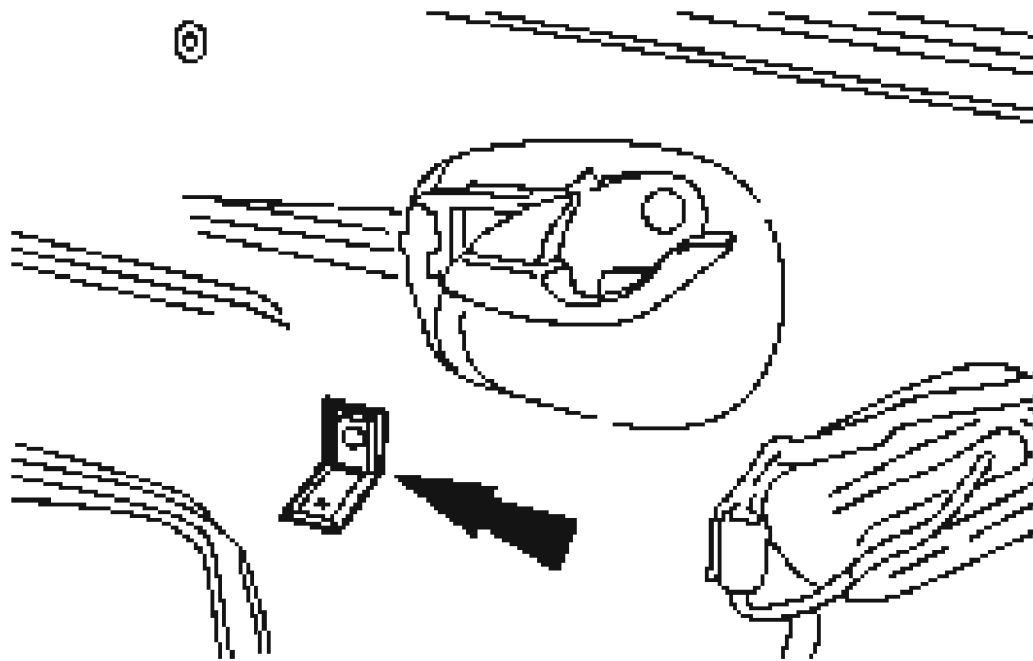
14. To install, reverse the removal procedure.
  - Cycle the door window glass to make sure of correct door window glass engagement.

### REAR DOOR WINDOW REGULATOR

#### Removal and Installation

#### All vehicles

1. Remove the rear door trim panel. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
2. Remove the screw and the rear door trim panel bracket.



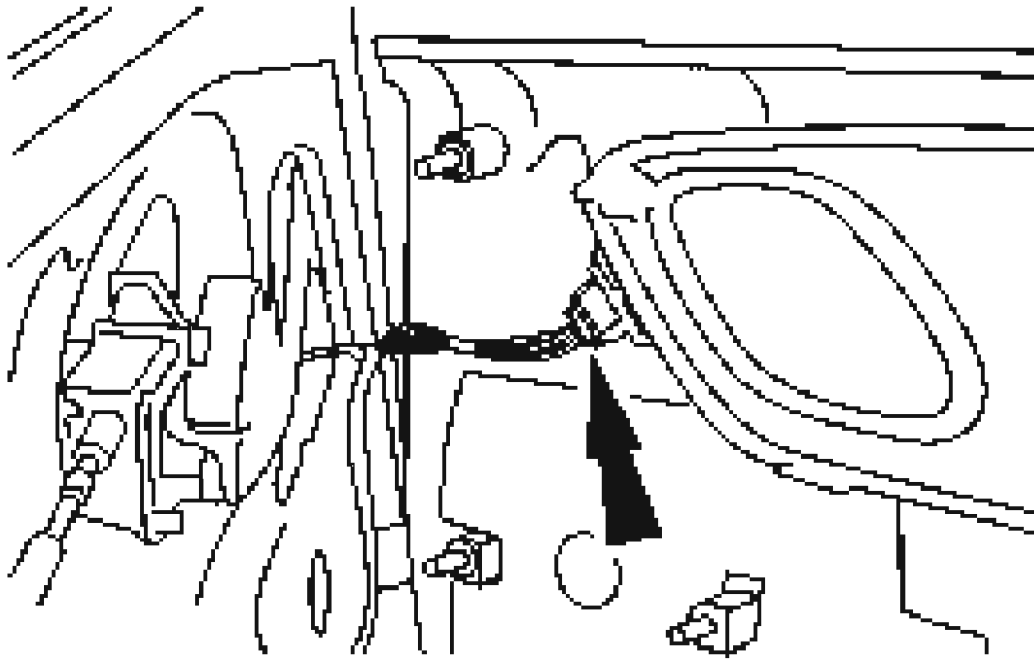
G02743229

**Fig. 67: Removing Rear Door Trim Panel Bracket**  
Courtesy of FORD MOTOR CO.

3. Position the water shield aside.

**Vehicles with power windows**

4. Connect the window control switch electrical connector.



G02743230

**Fig. 68: Connecting Window Control Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

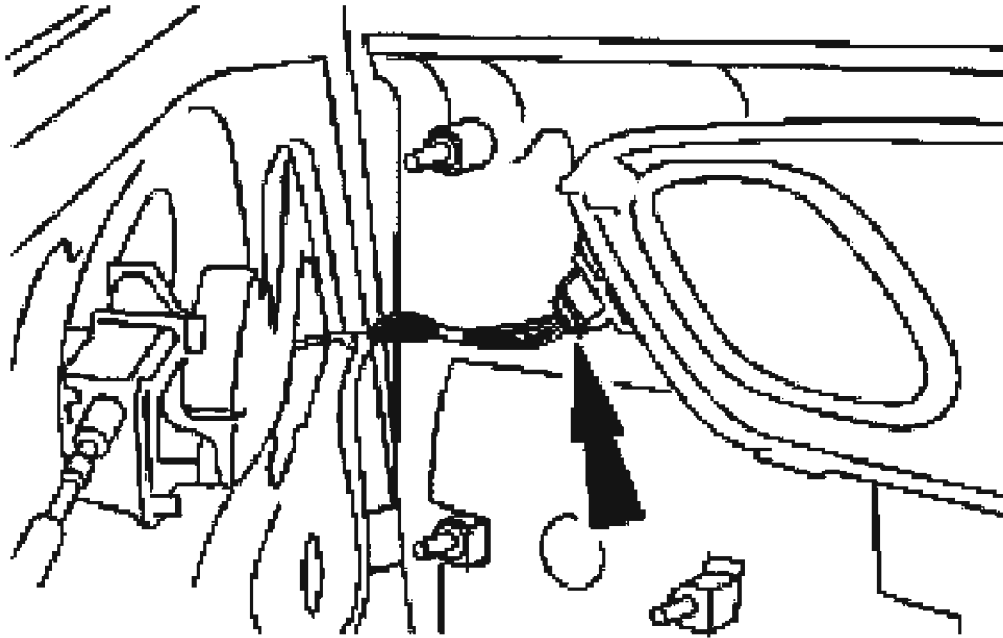
**All vehicles**

5. Lower the rear door window glass to gain access to the screws.

**Vehicles with power windows**

6. Disconnect the window control switch electrical connector.



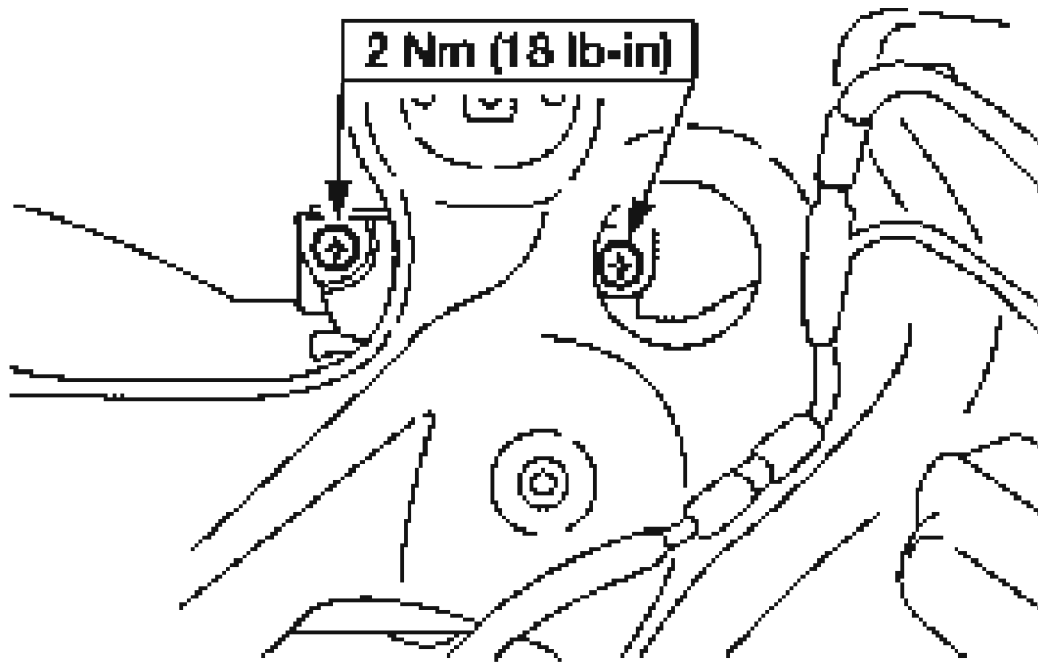


G02743231

**Fig. 69: Disconnecting Window Control Switch Electrical Connector**  
Courtesy of FORD MOTOR CO.

**All vehicles**

7. Remove the rear door window glass screws.



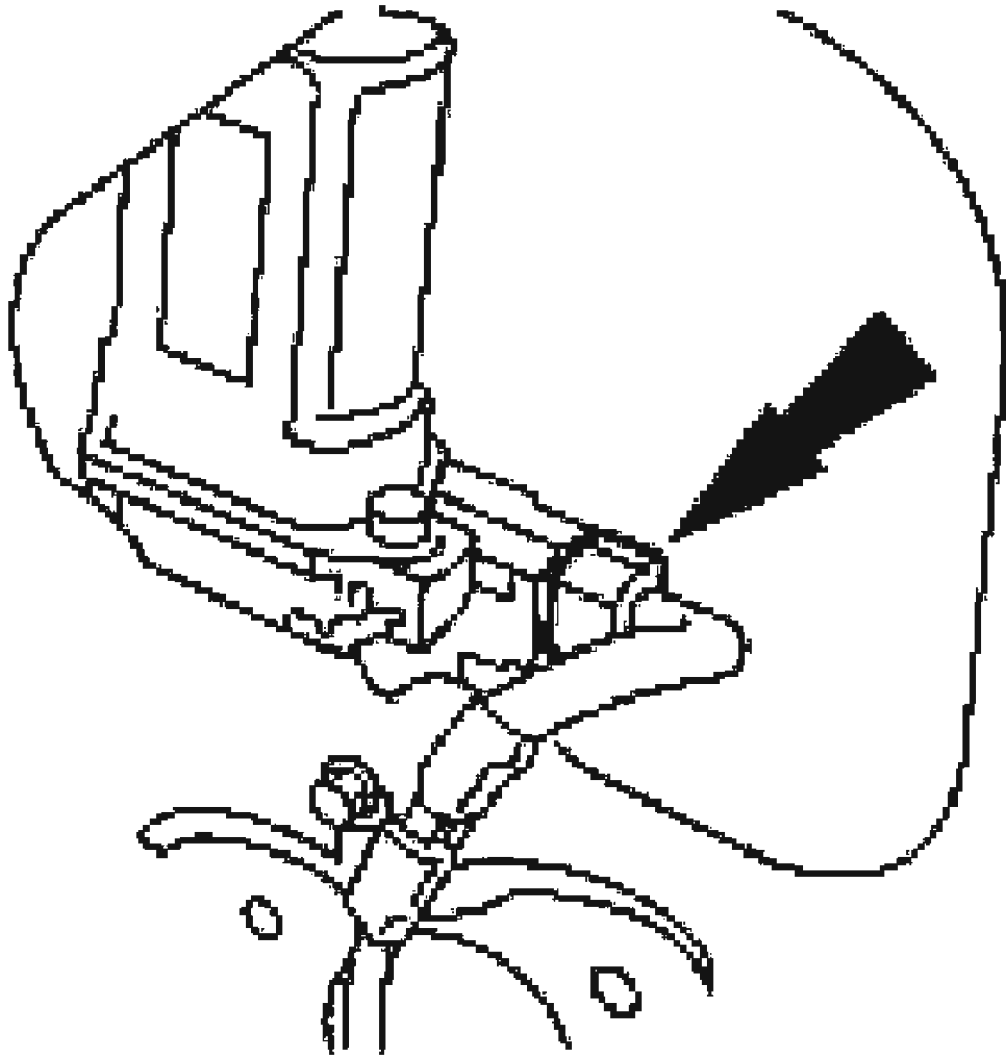
G02743232

**Fig. 70: Removing Rear Door Window Glass Screws**  
Courtesy of FORD MOTOR CO.

8. Support the rear door window glass in the full up position.

**Vehicles with power windows**

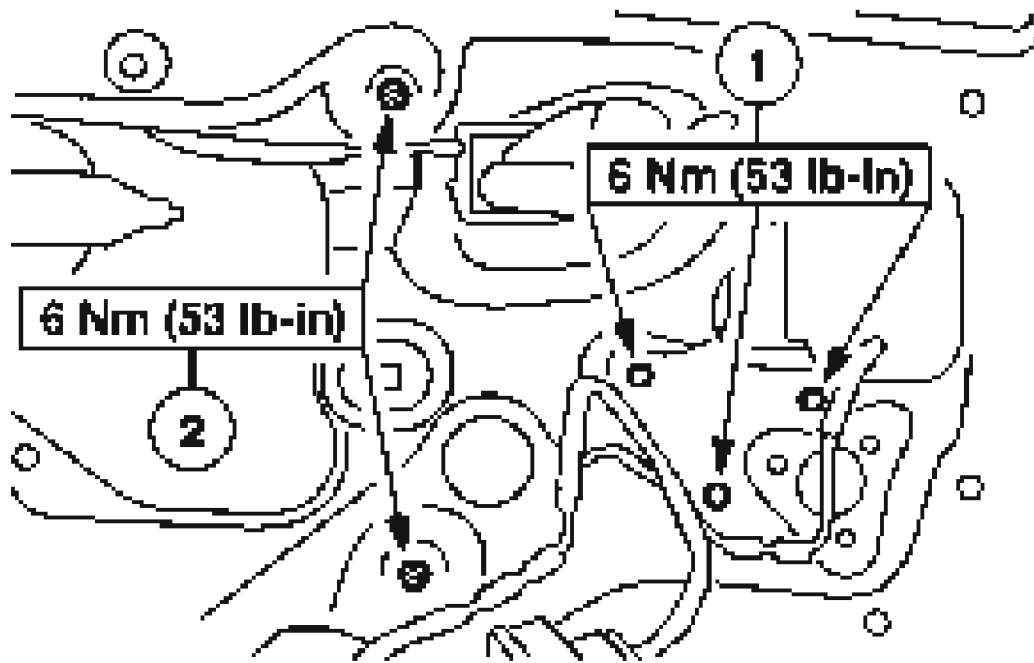
9. Disconnect the rear door power window regulator electrical connector.



G02743233

**Fig. 71: Disconnecting Rear Door Power Window Regulator Electrical Connector**  
Courtesy of FORD MOTOR CO.

10. Remove the rear door power window regulator assembly.
  1. Remove the bolts
  2. Remove the nuts.

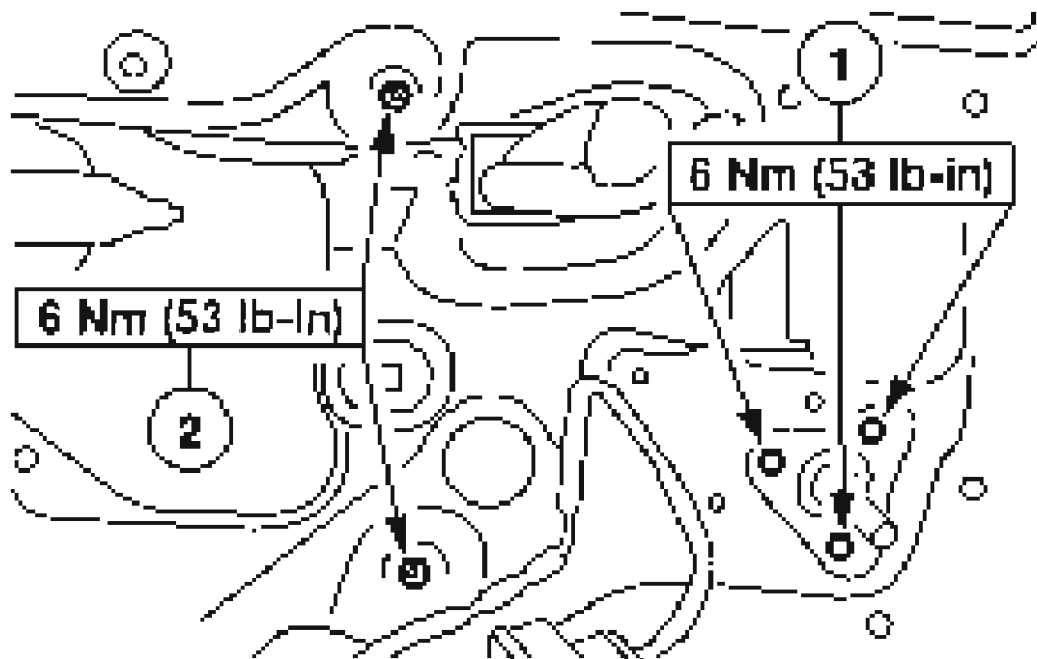


G02743234

**Fig. 72: Removing Rear Door Power Window Regulator Assembly**  
Courtesy of FORD MOTOR CO.

**Vehicles with manual windows**

11. Remove the rear door window regulator assembly.
  1. Remove the bolts.
  2. Remove the nuts.






G02743235

**Fig. 73: Removing Rear Door Window Regulator Assembly**  
Courtesy of FORD MOTOR CO.

#### All vehicles

12. To install, reverse the removal procedure.
  - Cycle the door glass to make sure of correct window glass engagement.

#### WINDSHIELD GLASS

	Interior Auto Glass Cut-Out Knife Kit 164-R2450 or equivalent
	Pneumatic Knife with Offset Blade 107-R1511 or equivalent
	The Pumper 164-R2459 or equivalent

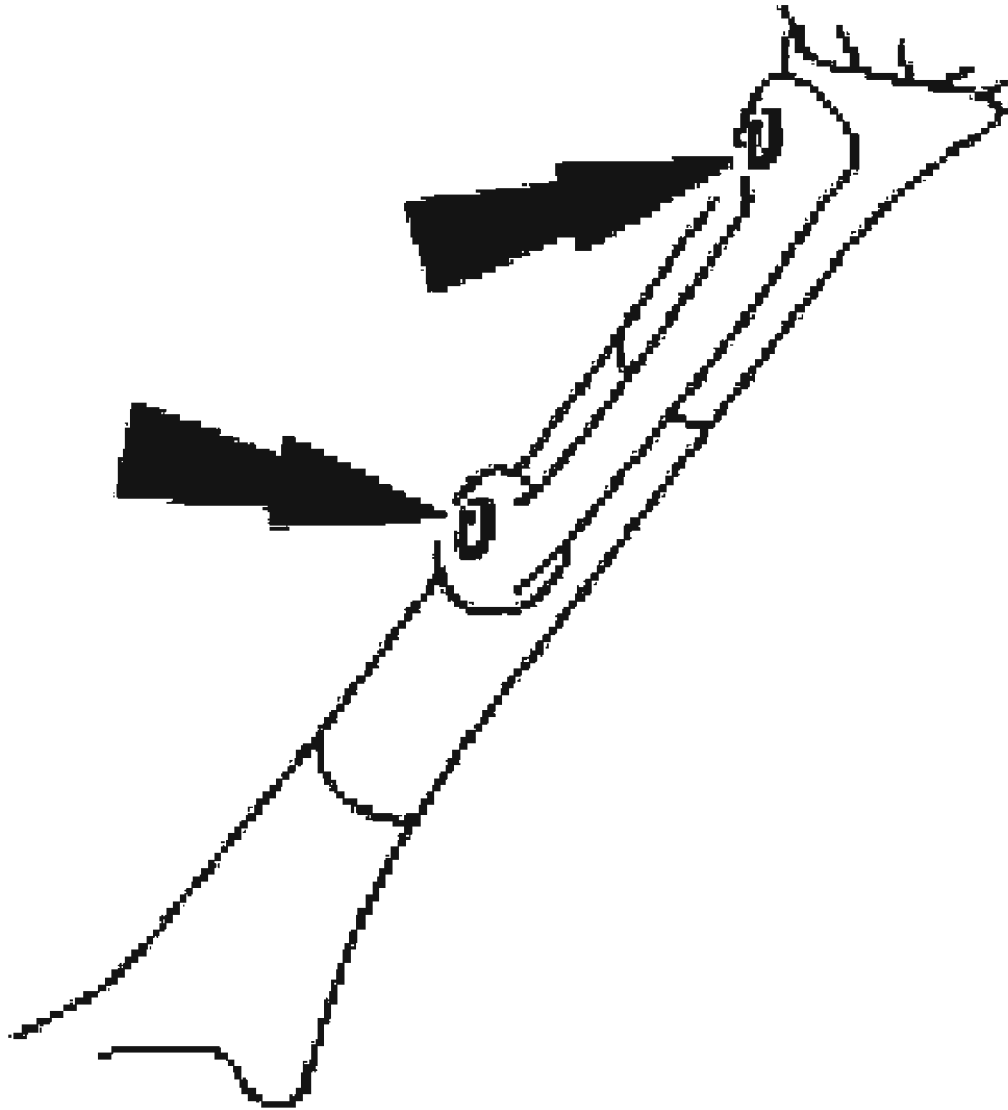
G02743236

**Fig. 74: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

#### Removal

**WARNING:** To prevent glass splinters from entering the eyes or cutting hands, wear safety glasses and heavy gloves when cutting the glass from the vehicle. Failure to follow these instructions may result in personal injury.

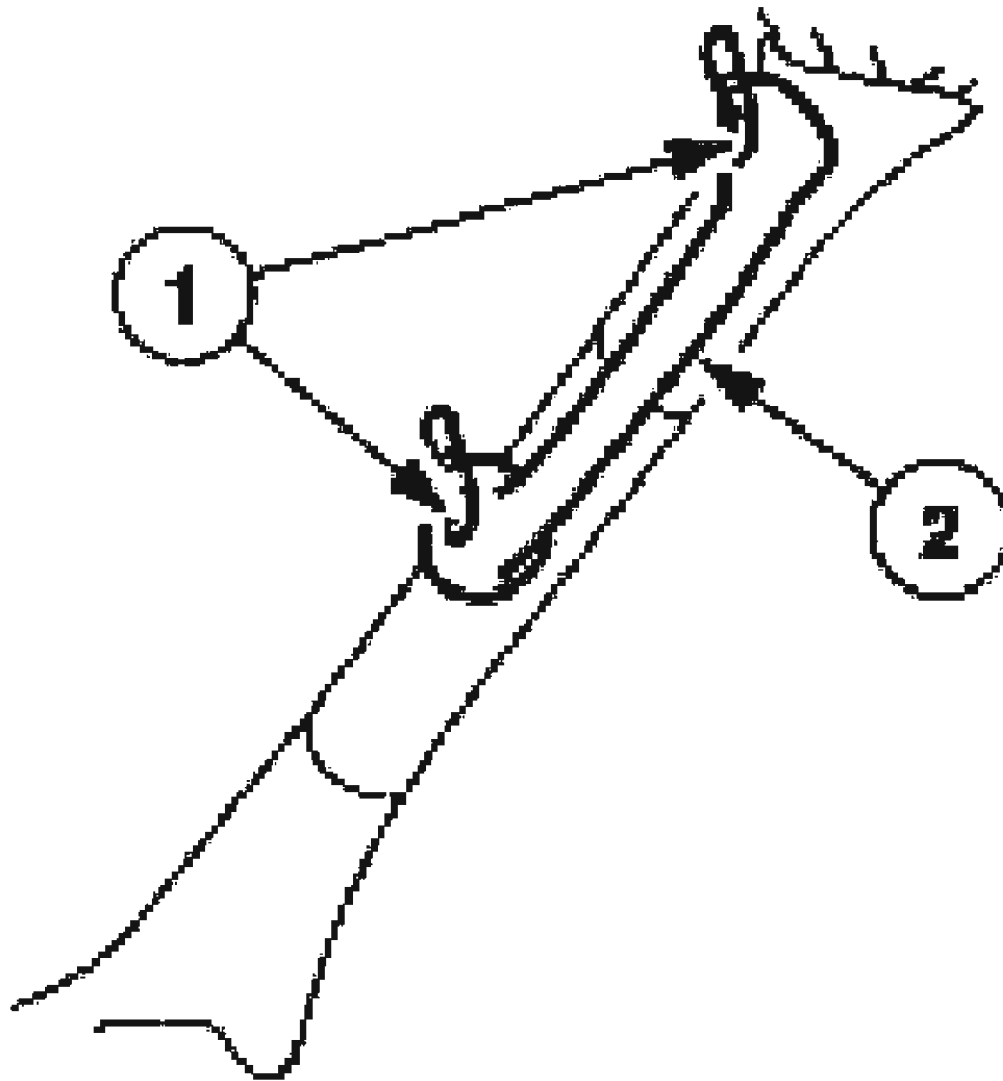
1. Open the four A-pillar passenger assist handle covers.



G02743237

**Fig. 75: Opening A-Pillar Passenger Assist Handle Covers**  
Courtesy of FORD MOTOR CO.

2. Remove the two A-pillar passenger assist handles.
  1. Remove the four bolts.
  2. Remove the two A-pillar passenger assist handles.

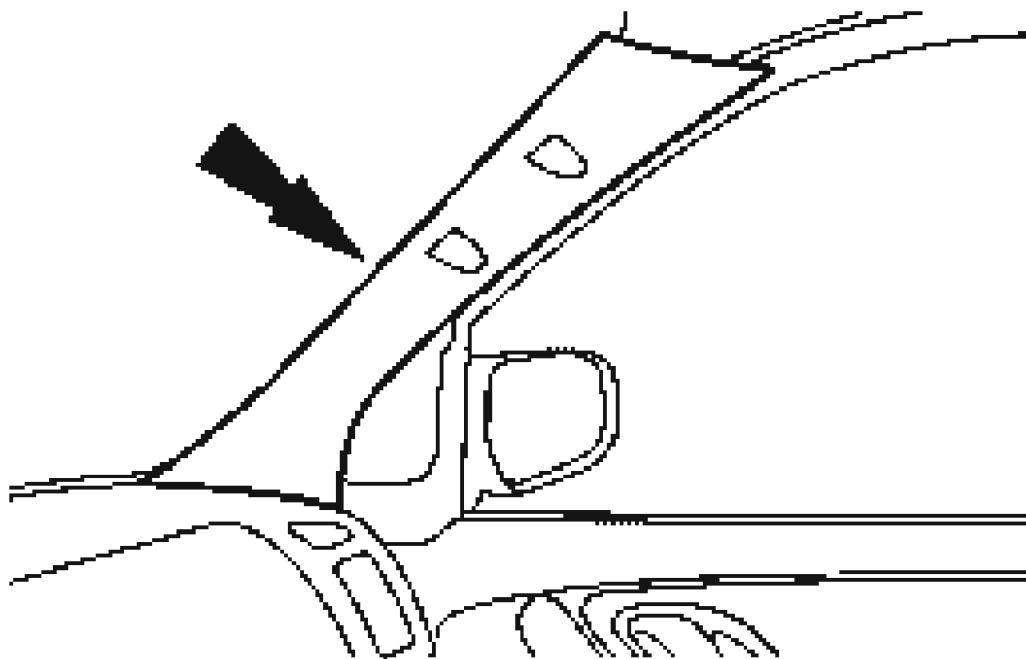


G02743238

**Fig. 76: Removing A-Pillar Passenger Assist Handles**  
Courtesy of FORD MOTOR CO.

3. Remove the two windshield side garnish mouldings.

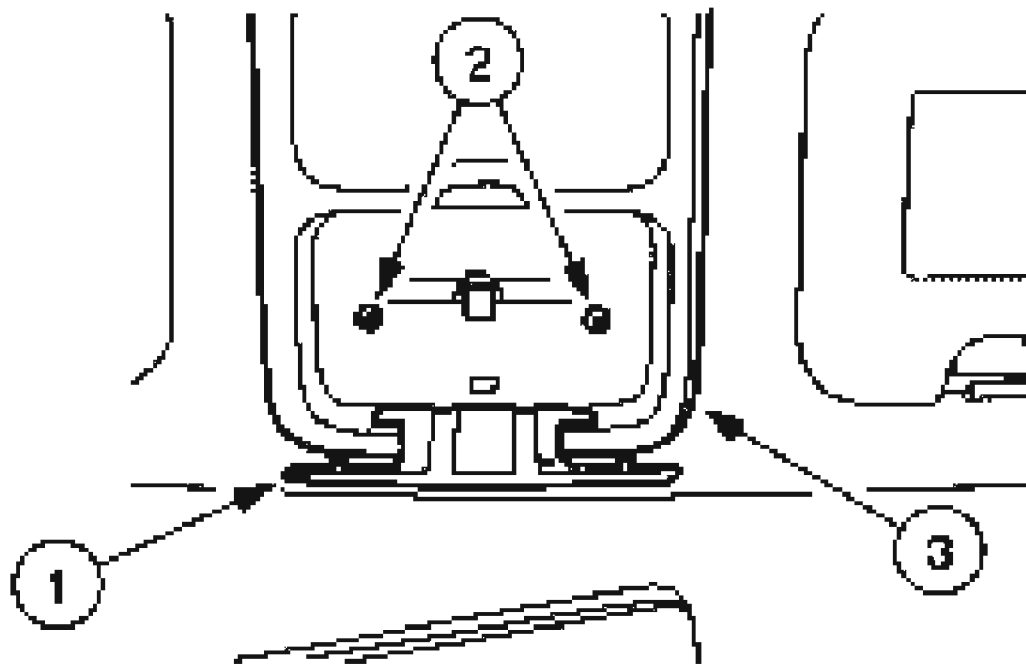




G02743239

**Fig. 77: Removing Windshield Side Garnish Mouldings**  
**Courtesy of FORD MOTOR CO.**

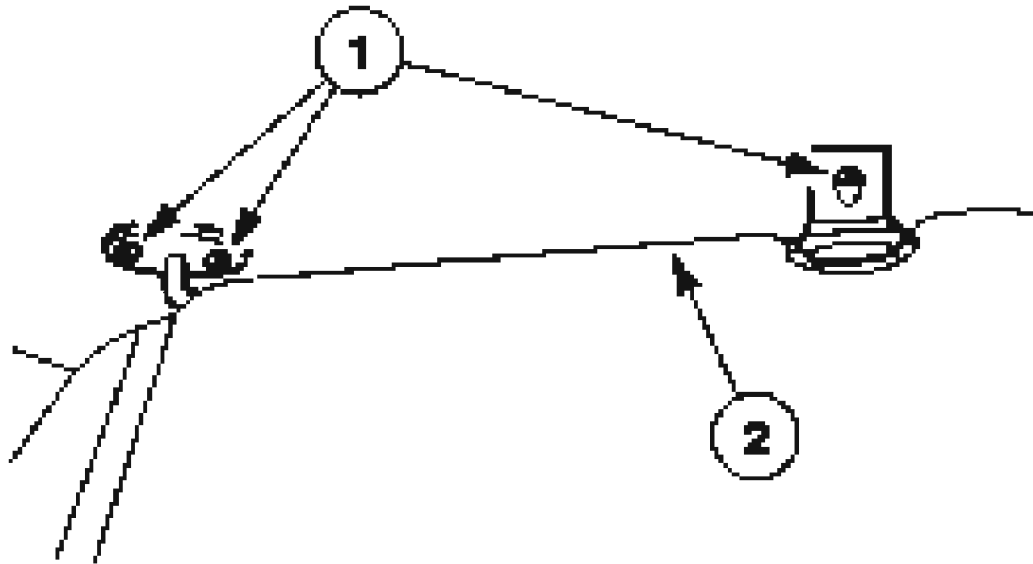
4. Remove the overhead console.
  1. Open the front console door.
  2. Remove the screws.
  3. Remove the overhead console.
    - If equipped, disconnect electrical connector.



G02743240

**Fig. 78: Removing Overhead Console**  
Courtesy of FORD MOTOR CO.

5. Remove the two sun visors and two clips.
  1. Remove the six screws.
  2. Remove the sun visors and clips.

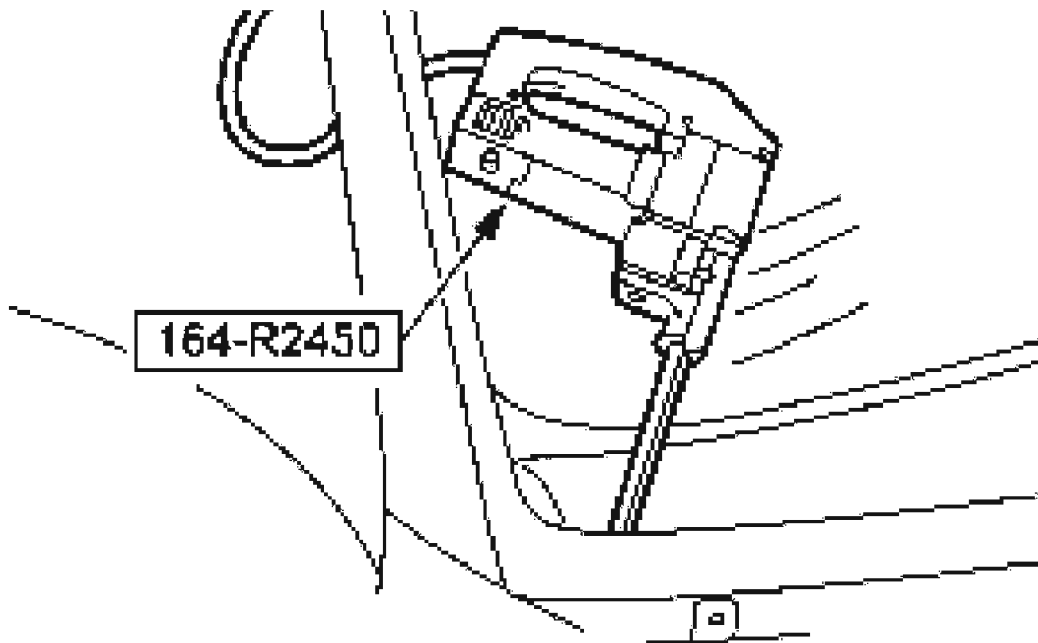


G02743241

**Fig. 79: Removing Sun Visors And Clips**  
Courtesy of FORD MOTOR CO.

6. Remove the driver and passenger assist handles.
7. Remove the interior rear view mirror.
8. Lower the front portion of the headliner.
9. Remove the cowl grille. For additional information, refer to **FRONT END BODY PANELS**.
10. Using a soft brush or vacuum, remove any dirt or foreign material from the pinch weld.

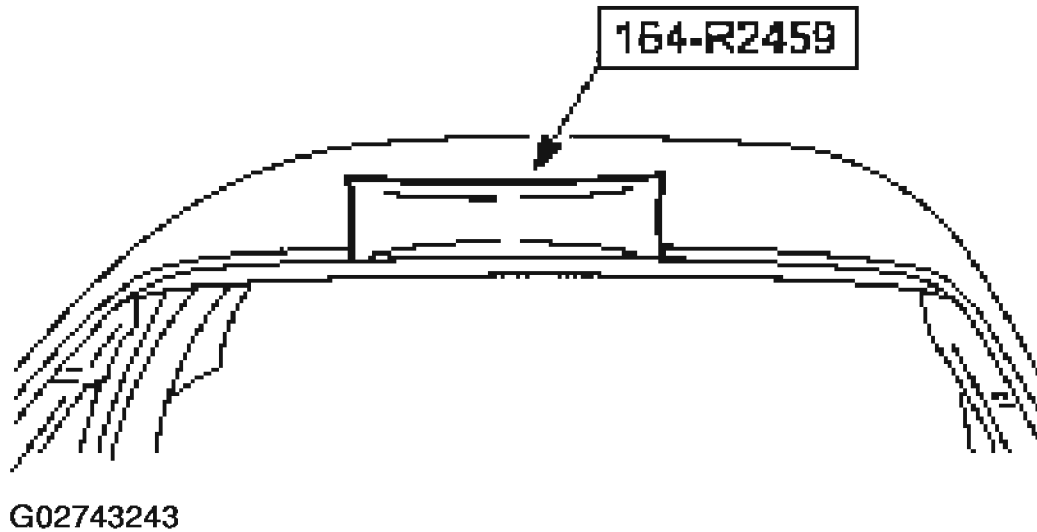
**NOTE:** Lubricate the urethane adhesive with water to aid the special tool when cutting.



G02743242

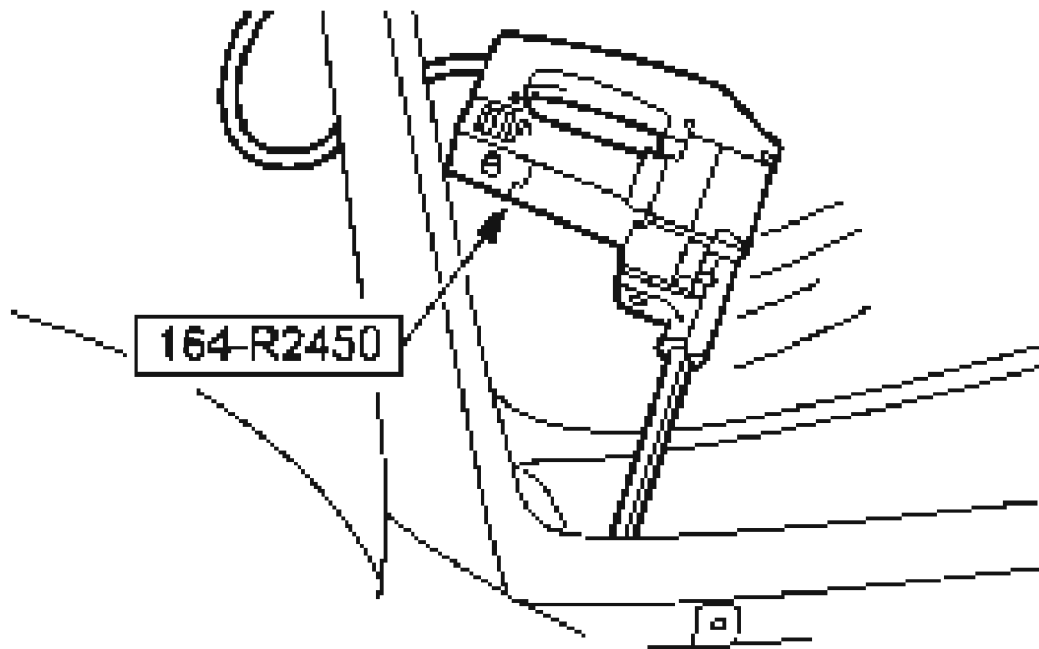
**Fig. 80: Cutting Urethane Adhesive From Windshield Glass**  
**Courtesy of FORD MOTOR CO.**

11. Using the special tool, cut the urethane adhesive from the windshield glass starting at the top center and work toward the bottom corners.
12. Using the special tool, distance the windshield glass from the body.



**Fig. 81: Distance Windshield Glass From Body Using Special Tool**  
**Courtesy of FORD MOTOR CO.**

13. Using the special tool, cut the remaining urethane adhesive and remove the windshield glass.



G02743244

**Fig. 82: Cutting Remaining Urethane Adhesive**  
Courtesy of FORD MOTOR CO.

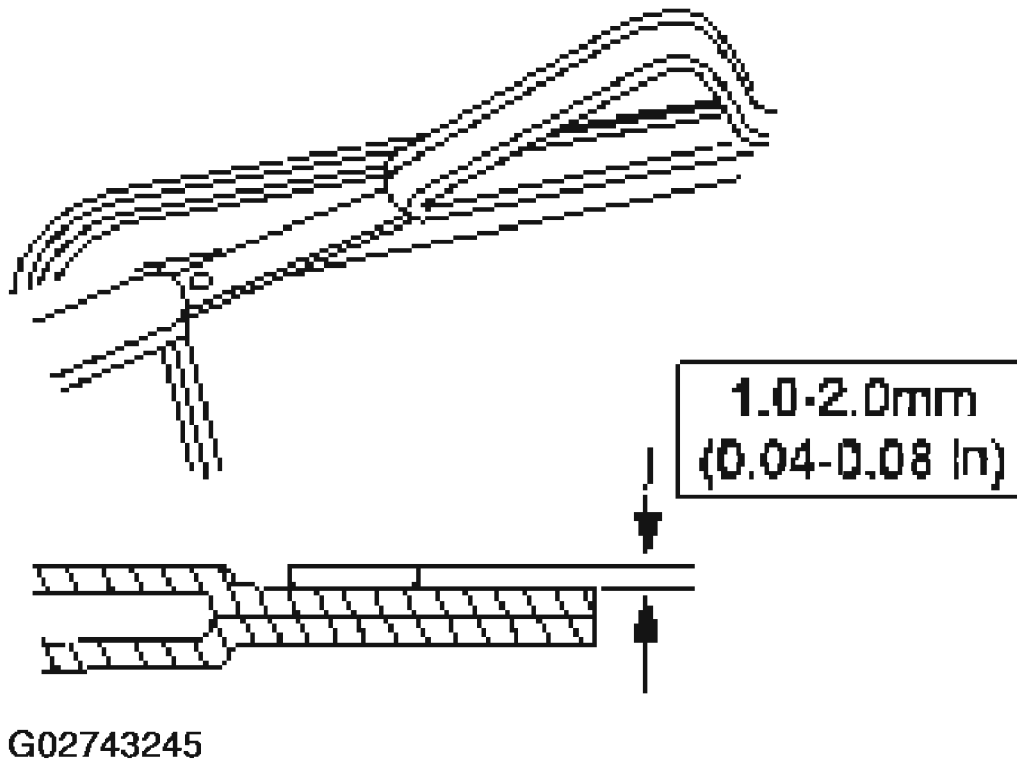
14. Using a soft brush or vacuum, remove any foreign material or dirt from the pinch weld.

#### Installation

**CAUTION:** After installing the urethane installed glass, the vehicle should not be driven until the urethane adhesive has cured. The curing times at temperatures above 13°C (55°F) and relative humidity above 50% is 12-24 hours. Inadequate curing of the urethane adhesive may adversely affect the strength of the urethane bond.

1. Dry fit the windshield glass, making alignment marks with tape or non-staining grease pencil.

**CAUTION:** Do not scratch the pinch weld area.



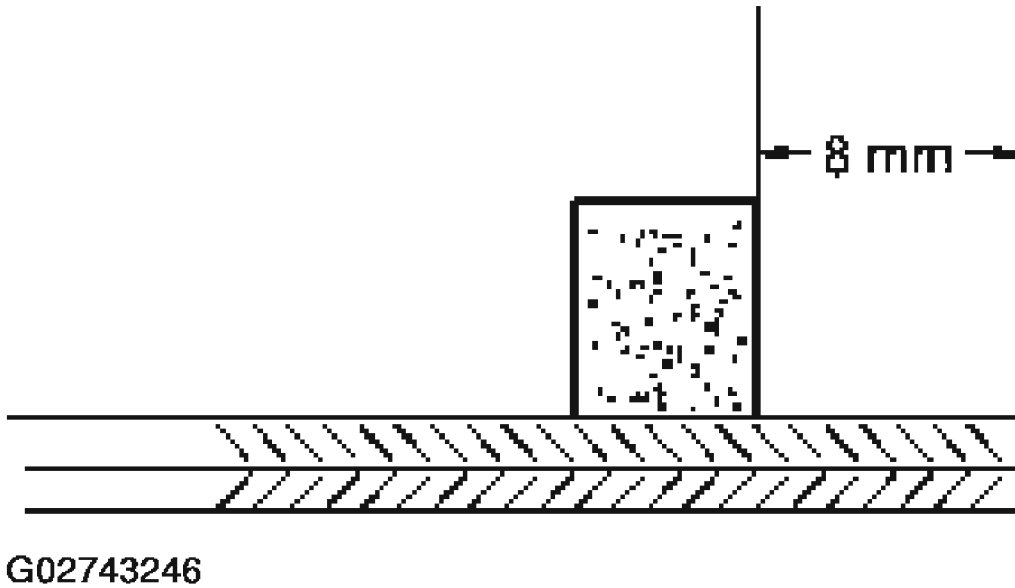
**Fig. 83: Identifying Urethane Adhesive Surface Specification**  
 Courtesy of FORD MOTOR CO.

2. Trim the remaining urethane adhesive on the pinch weld to within the specification.
  - The existing urethane adhesive surface should be smooth and free of cuts and contamination.
3. Use a wool applicator to apply Urethane Metal Primer Essex U-413 meeting Ford specification WSB-M2G234-C to any exposed metal on the pinch weld. Allow 6 to 10 minutes to dry.
4. If reinstalling the original windshield glass, remove the excess urethane adhesive and the windshield moulding.
5. Clean the inside of the windshield glass surface with an alcohol-free cleaner making sure the ceramic coated area is clean.

**NOTE:**      **Wipe off the glass prep immediately after each application because it flash dries.**

6. If installing a new windshield glass, apply Urethane Glass Prep Essex U-401 meeting Ford specification WSB-M5B280-C twice around the glass surface to be urethaned.

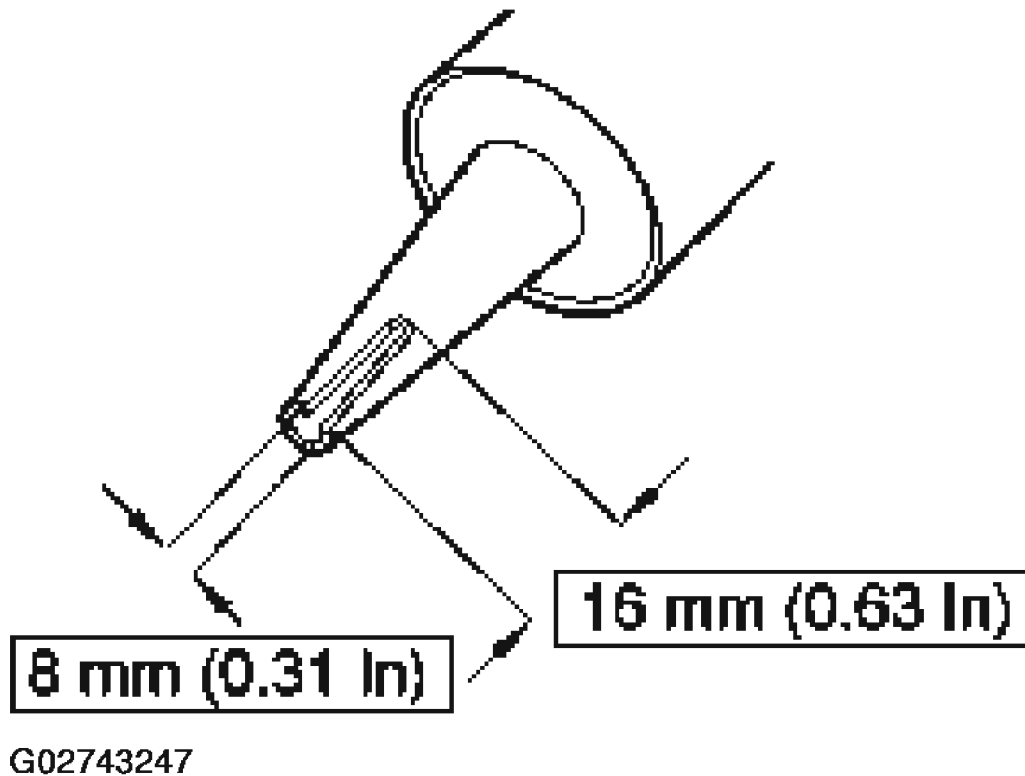
7. If installing a new windshield, apply Glass Primer Essex U-402 meeting Ford specification WSB-M2G314-B to the same area that was prepped in the pervious step. Allow five minutes to dry.
8. Apply foam dam meeting Ford specification EBS-M3G137-A to the bottom of the windshield glass.



**Fig. 84: Identifying Foam Dam Meeting Ford Specification Applying Area**  
Courtesy of FORD MOTOR CO.

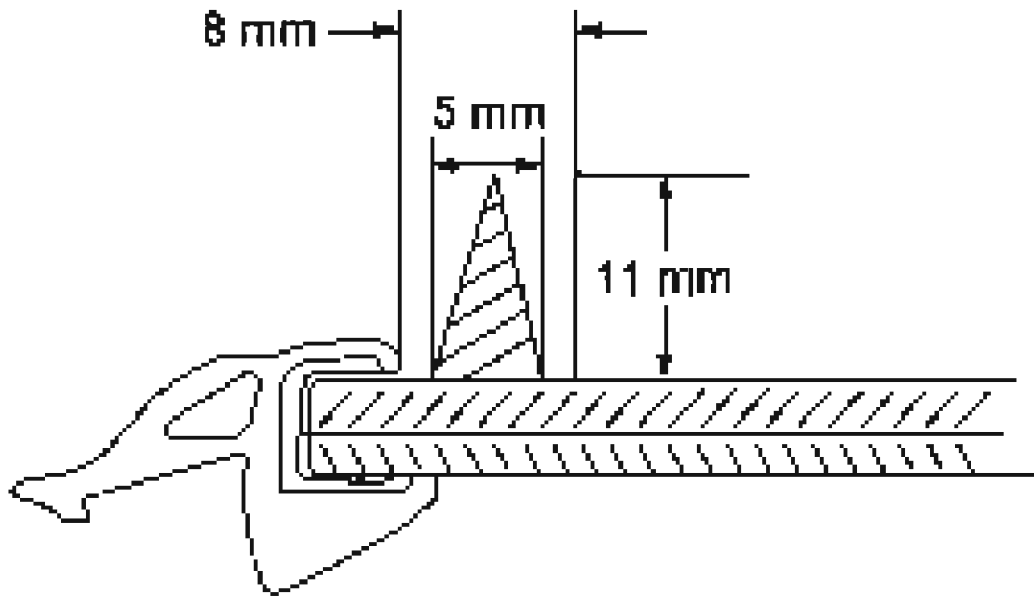
9. Cut the urethane adhesive applicator tip to specification.





**Fig. 85: Identifying Urethane Adhesive Applicator Tip Cutting Specification**  
Courtesy of FORD MOTOR CO.

10. Apply a bead of Urethane Adhesive Essex 400-HV meeting Ford specification WSB-M2G316-B to the sides and top of the windshield glass.

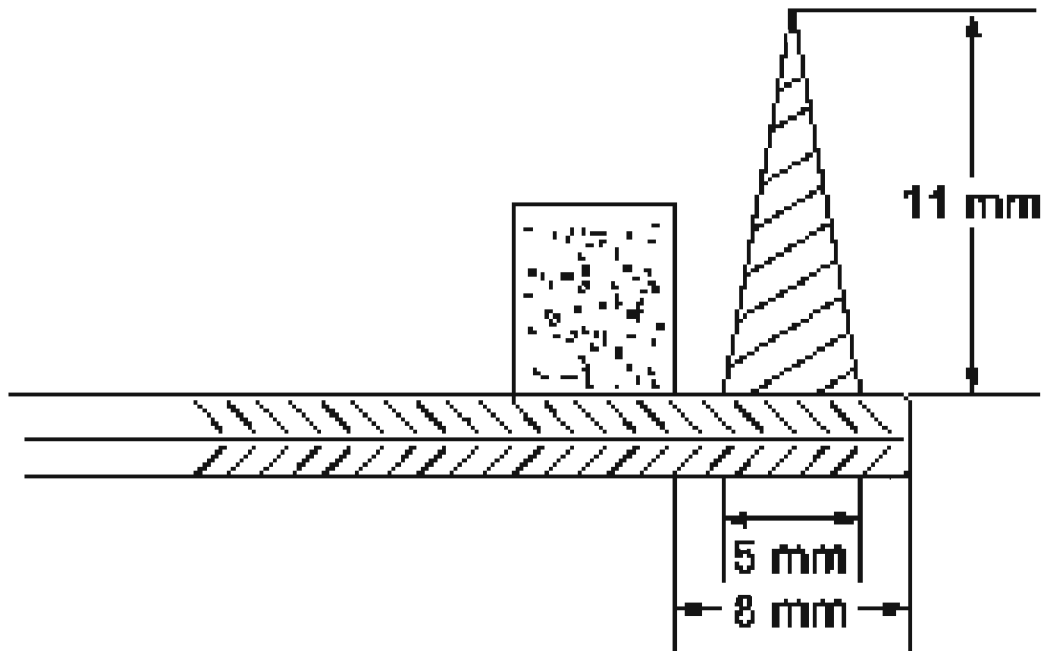


G02743248

**Fig. 86: Identifying Urethane Adhesive Specification To Sides And Top Of Windshield Glass**

Courtesy of FORD MOTOR CO.

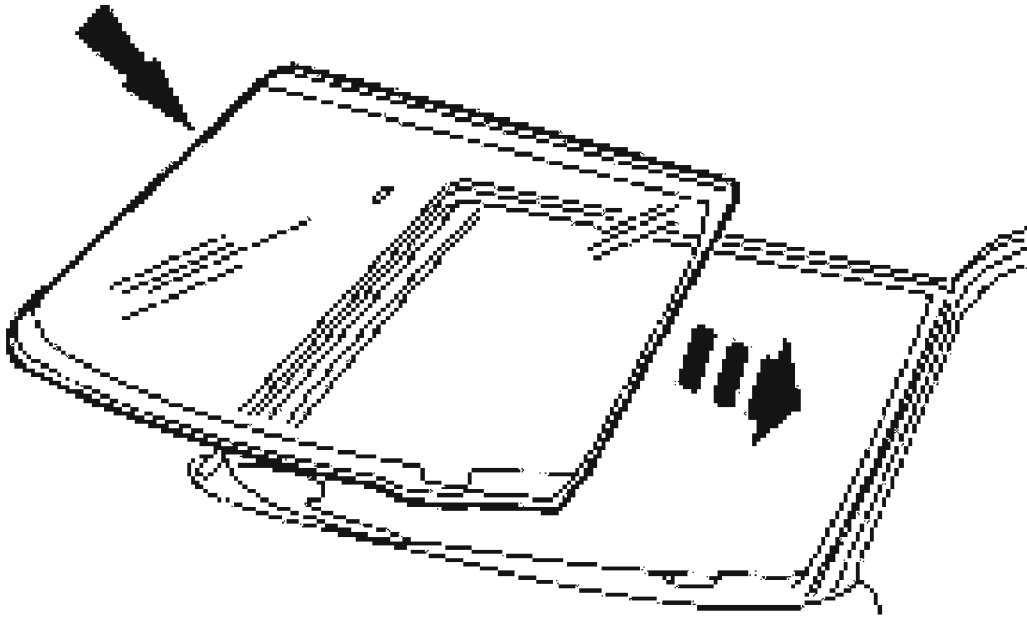
11. Apply a bead of Urethane Adhesive Essex 400-HV meeting Ford specification WSB-M2G316-B to the bottom of the windshield glass outside the foam dam.



G02743249

**Fig. 87: Identifying Urethane Adhesive Specification To Bottom Of Windshield Glass Outside Foam Dam**  
Courtesy of FORD MOTOR CO.

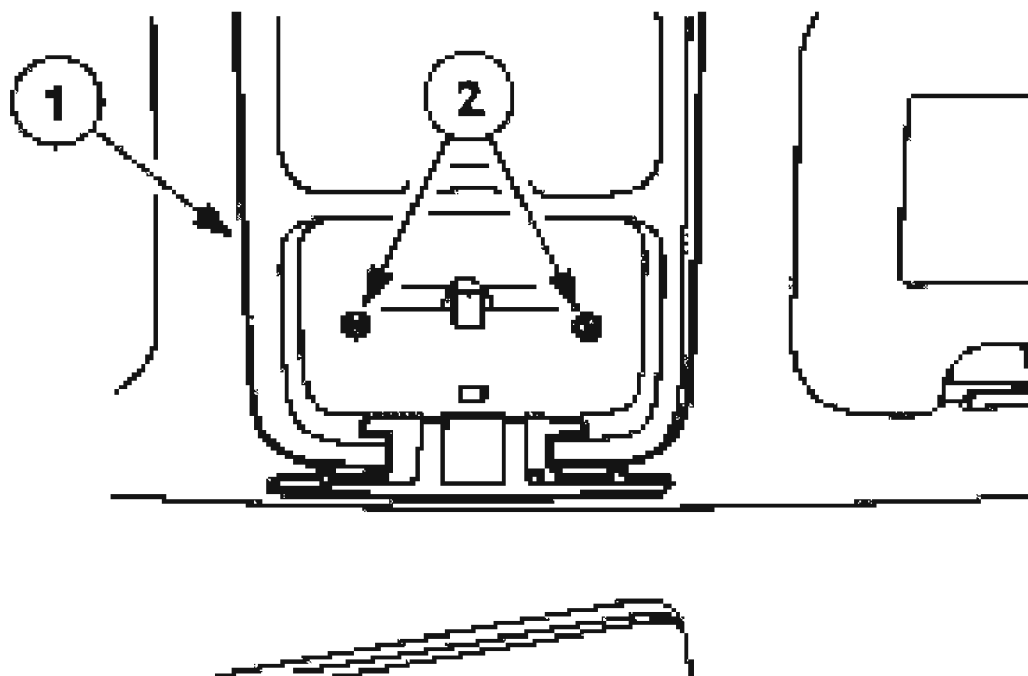
12. Install the windshield glass aligning it to the marks previously made.



G02743250

**Fig. 88: Installing Windshield Glass**  
**Courtesy of FORD MOTOR CO.**

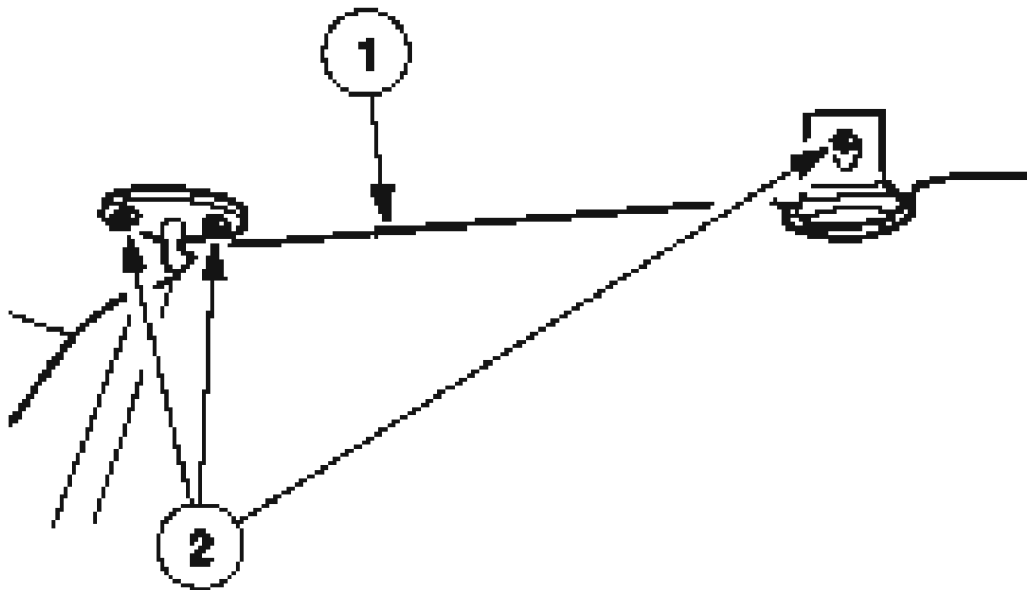
13. After the windshield glass is set, check for water leaks and add urethane adhesive where needed.
14. If necessary, remove excess urethane adhesive from the outside surface of the windshield glass.
15. Install the cowl grille. For additional information, refer to **FRONT END BODY PANELS**.
16. Reposition the front portion of the headliner.
17. Install the overhead console.
  1. Position the overhead console.
    - If equipped, connect the electrical connector.
  2. Install the screws.



G02743251

**Fig. 89: Installing Overhead Console**  
**Courtesy of FORD MOTOR CO.**

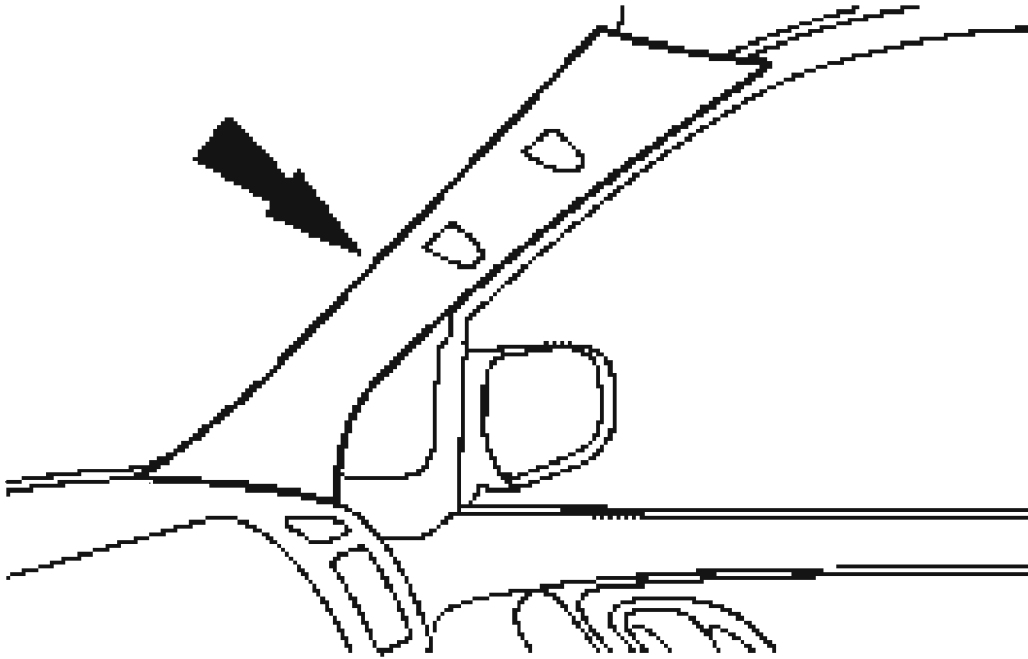
18. Install the two sun visors and two clips.
  1. Position the sun visors and clips.
  2. Install the six screws.



G02743252

**Fig. 90: Installing Sun Visors And Clips**  
**Courtesy of FORD MOTOR CO.**

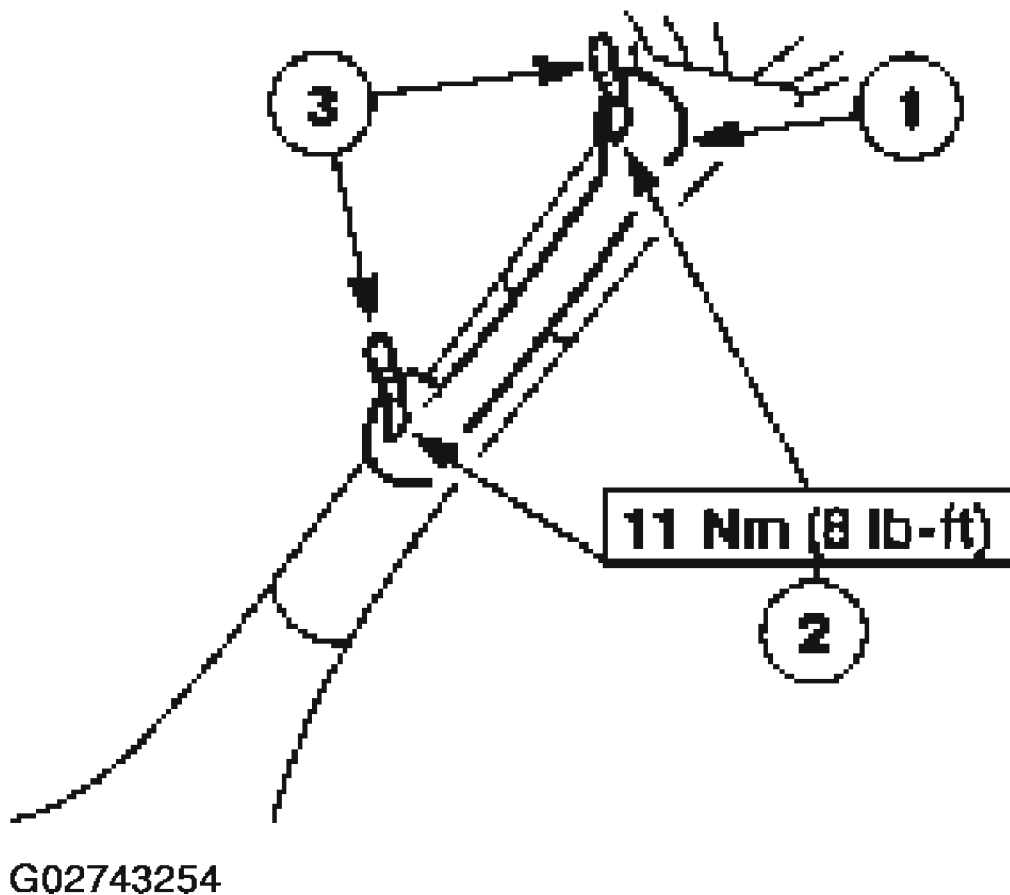
19. Install the interior rear view mirror.
20. Install the two windshield side garnish mouldings.



G02743253

**Fig. 91: Installing Windshield Side Garnish Mouldings**  
**Courtesy of FORD MOTOR CO.**

21. Install the two A-pillar passenger assist handles.
  1. Position the two assist handles.
  2. Install the four bolts.
  3. Close the four assist handle covers.



**Fig. 92: Installing A-Pillar Passenger Assist Handles**  
Courtesy of FORD MOTOR CO.

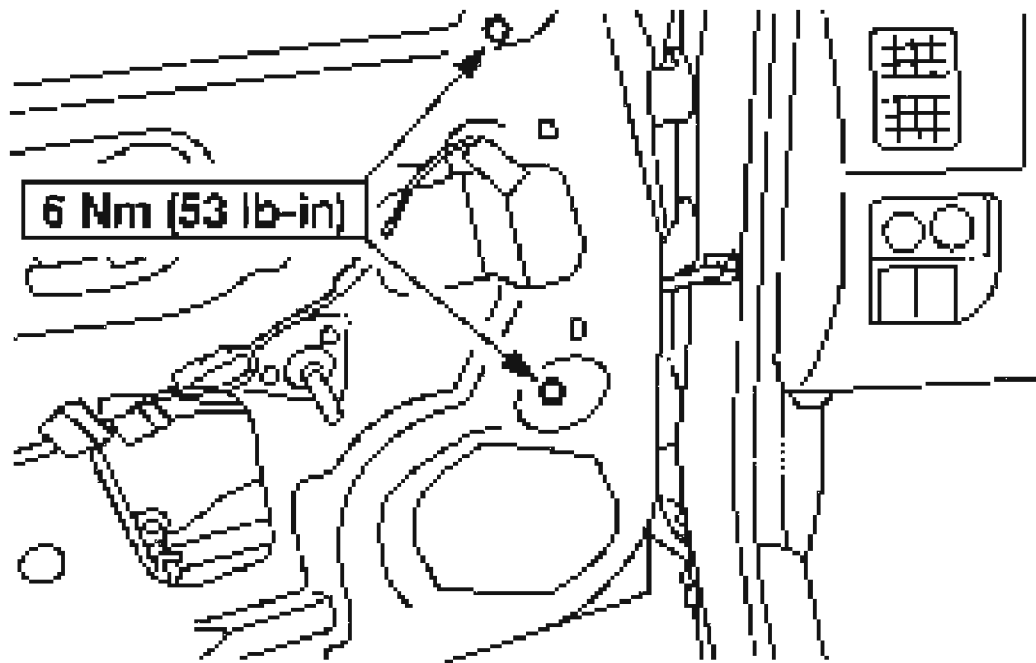
22. Install the driver and passenger assist handles.

#### FRONT DOOR GLASS TOP RUN

##### Removal and Installation

1. Remove the front door window glass. For additional information, refer to **FRONT DOOR WINDOW GLASS**.
2. Remove the front door interior sail panel.
  - If equipped, disconnect the speaker electrical connector.
3. Remove the door glass top run bolts.

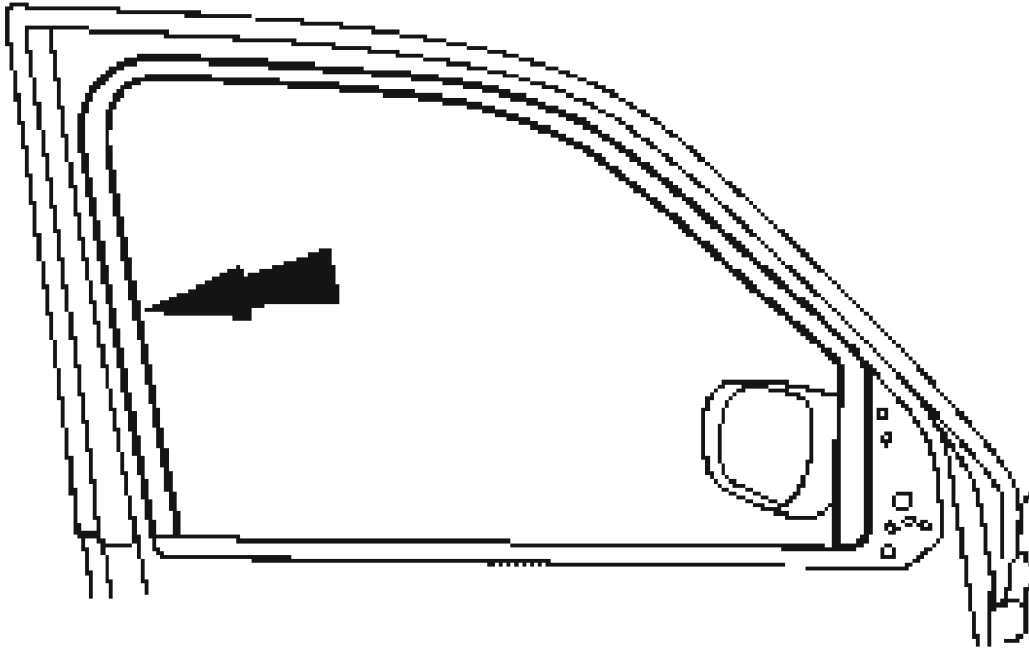




G02743255

**Fig. 93: Removing Door Glass Top Run Bolts**  
Courtesy of FORD MOTOR CO.

4. Remove the door glass top run.



G02743256

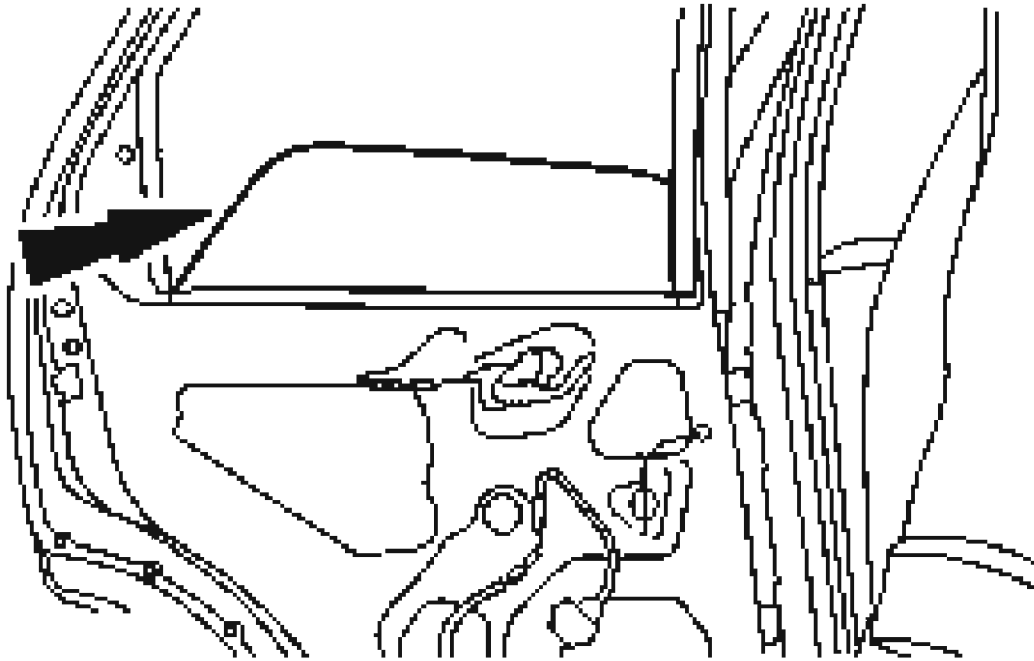
**Fig. 94: Removing Door Glass Top Run**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

#### **REAR DOOR GLASS TOP RUN**

##### **Removal**

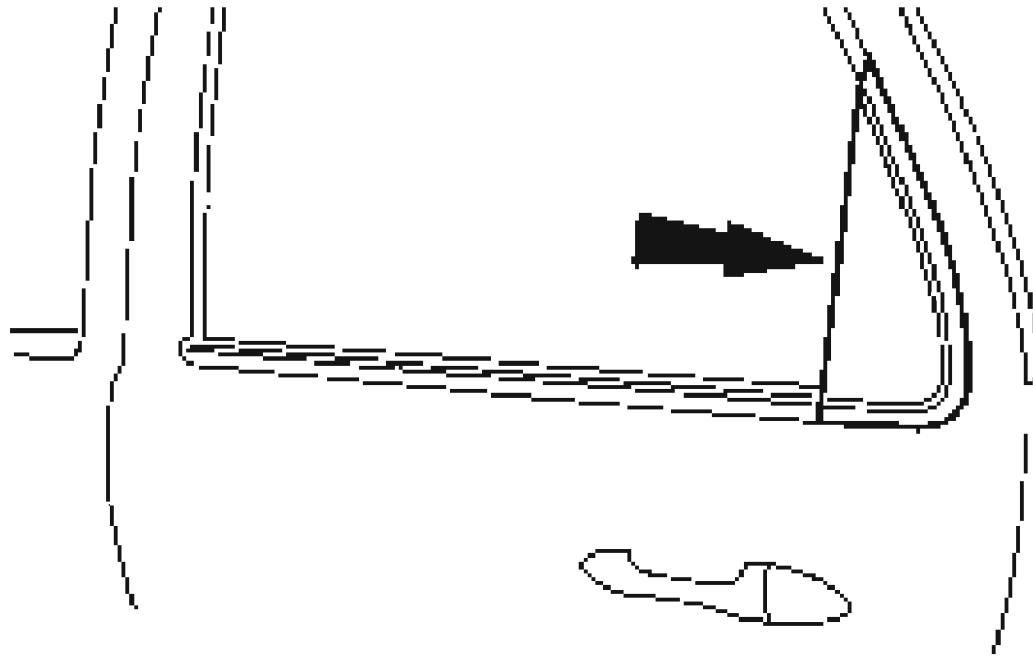
1. Remove the rear door window regulator. For additional information, refer to **REAR DOOR WINDOW REGULATOR** .
2. Position the rear door window glass to the full down position.



G02743257

**Fig. 95: Positioning Rear Door Window Glass**  
**Courtesy of FORD MOTOR CO.**

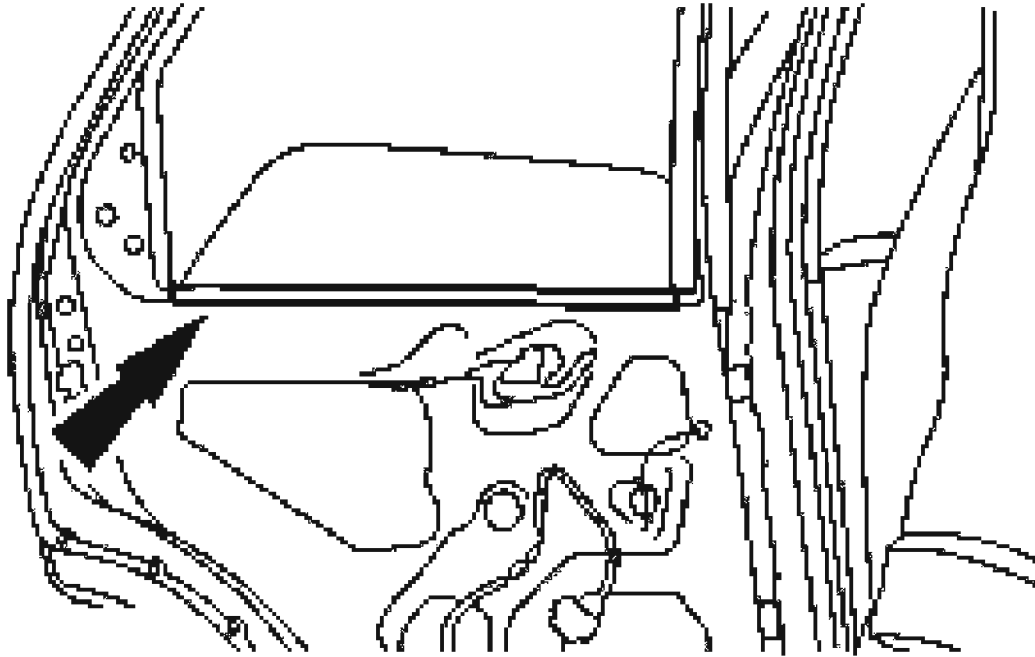
3. Remove the screws and the rear door exterior sail panel.



G02743258

**Fig. 96: Removing Rear Door Exterior Sail Panel**  
**Courtesy of FORD MOTOR CO.**

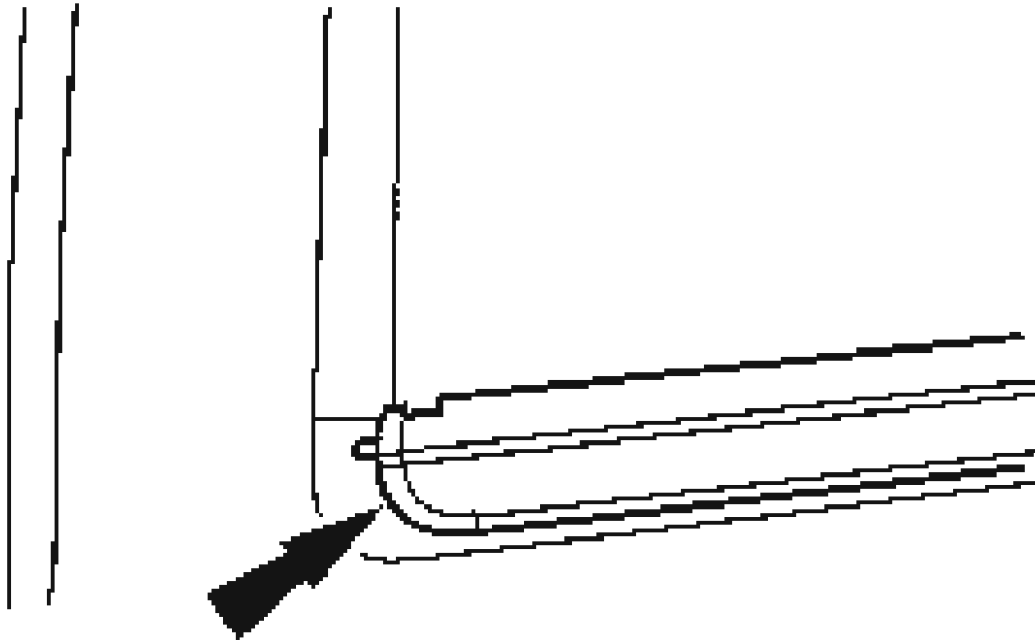
4. Remove the rear door interior glass weatherstrip.



G02743259

**Fig. 97: Removing Rear Door Interior Glass Weatherstrip**  
Courtesy of FORD MOTOR CO.

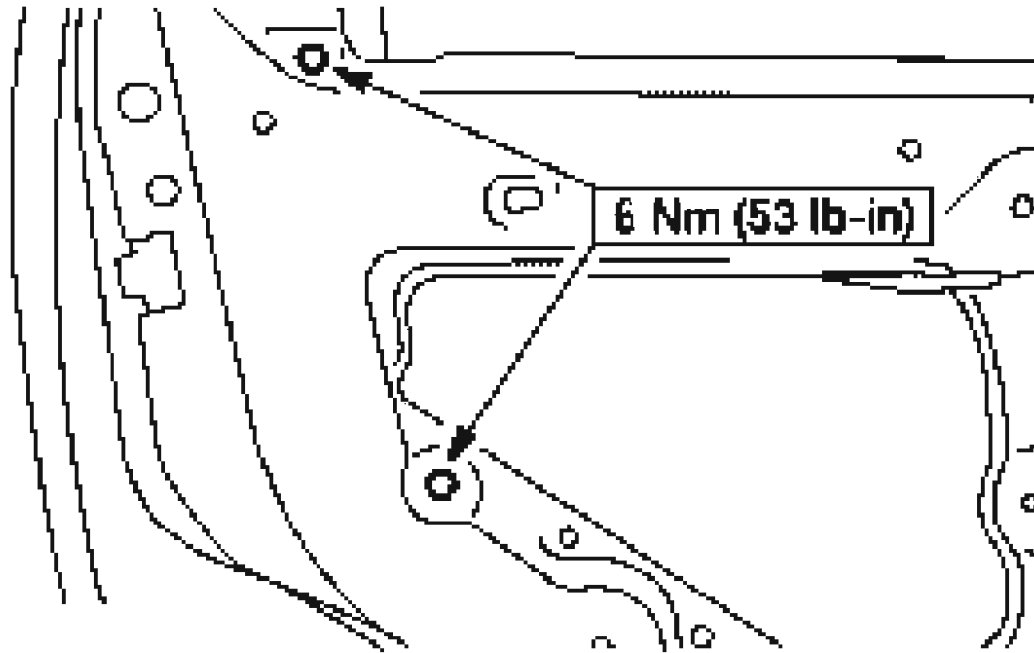
5. Remove the rear door exterior belt line moulding.



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**Fig. 98: Removing Rear Door Exterior Belt Line Moulding**  
Courtesy of FORD MOTOR CO.

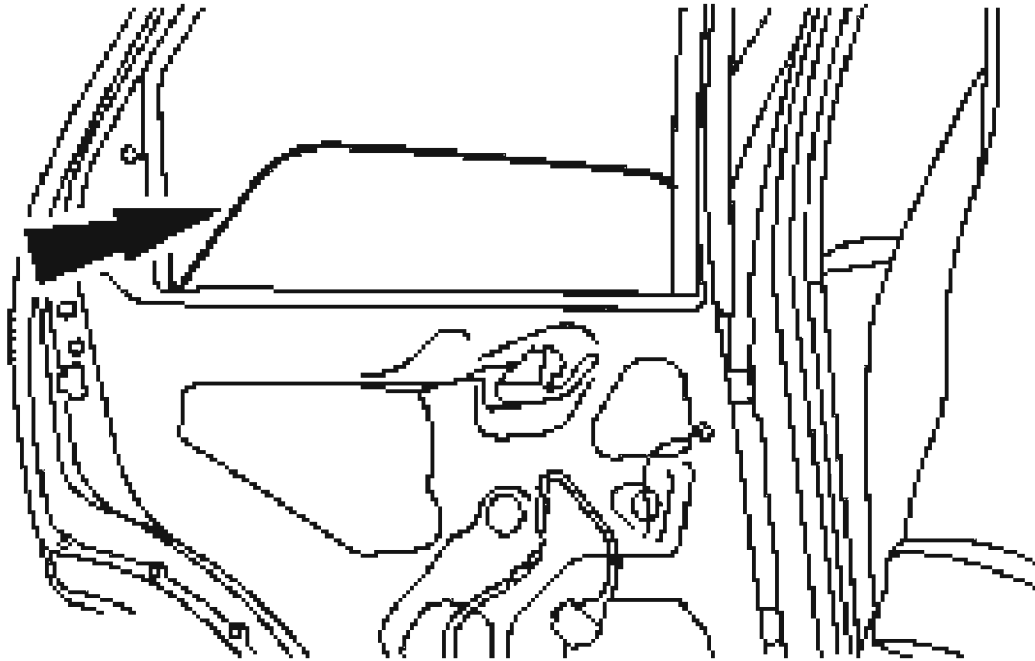
6. Remove the rear door glass top run bolts.



G02743261

**Fig. 99: Removing Rear Door Glass Top Run Bolts**  
**Courtesy of FORD MOTOR CO.**

7. Position the rear door window glass down and forward.

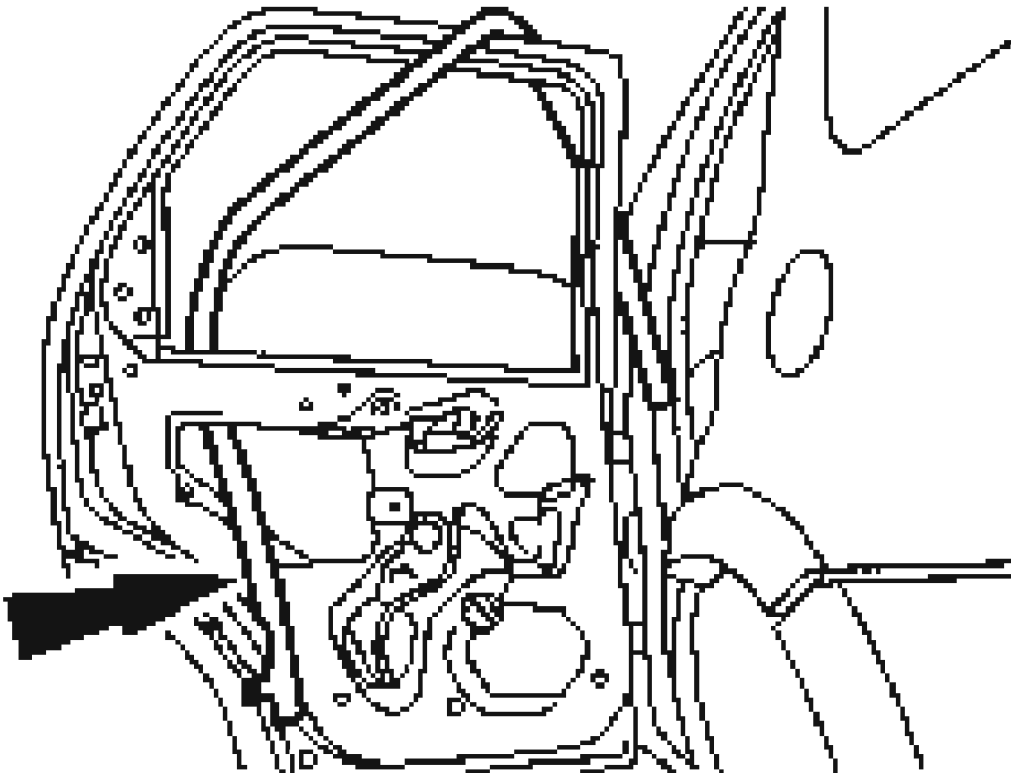


G02743262

**Fig. 100: Positioning Rear Door Window Glass**  
**Courtesy of FORD MOTOR CO.**

8. Remove the rear door glass top run.





G02743263

**Fig. 101: Removing Rear Door Glass Top Run**  
Courtesy of FORD MOTOR CO.

9. To install, reverse the removal procedure.

## 2006 Ford Escape

### 2006 ACCESSORIES & BODY, CAB Roof Opening Panel - Escape & Mariner

## 2006 ACCESSORIES & BODY, CAB

### Roof Opening Panel - Escape & Mariner

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Specification
Rear edge of roof panel to roof opening panel	0 to 1.5 mm (0 to 0.059 in)
Front edge of roof panel to roof opening panel	-1.5 to 0 mm (-0.059 to 0 in)

### TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Description	Nm	lb-in
Roof opening panel drain channel screws	2	17
Roof opening panel frame bolts	9	80
Roof opening panel glass screws	5	44
Roof opening panel motor screws	8	71

## DESCRIPTION AND OPERATION

### ROOF OPENING PANEL

The roof opening panel consists of the following:

- Air deflector
- Roof opening panel glass
- Roof opening panel motor
- Roof opening panel module
- Roof opening panel shield
- Roof opening panel switch (part of the overhead console)
- Roof opening panel drain hoses

The roof opening panel is an electronically operated panel that can be opened or closed by pressing a switch located on the overhead console. It also has a one-touch open feature.

The one-touch open feature is controlled by the roof opening panel module. When the switch is pressed and held for one second, the roof opening panel glass will open to the comfort position (approximately 100 mm [4 in] from the full open position). Pressing the switch a second time opens the roof opening panel glass to the full OPEN position.

The roof opening panel can be moved to the full CLOSED position by pushing the switch forward and holding it until the roof opening panel glass is fully closed. When the roof opening panel glass reaches the full CLOSED position, power is removed from the motor, which provides the soft stop feature.

When the roof opening panel glass is in the full CLOSED position, the rear portion can be raised to the VENT position to provide ventilation by pushing the switch forward. The roof opening panel glass can be closed by pushing the switch rearward.

## DIAGNOSIS AND TESTING

### ROOF OPENING PANEL

#### Special Tool(s)

#### SPECIAL TOOL(S) SPECIFICATIONS

**ST1137-A**

73III Automotive Meter  
105-R0057 or equivalent

#### Principles of Operation

#### Roof Opening Panel

Actuating the roof opening panel switch in the forward or rearward direction supplies a ground signal to the roof opening panel module. The roof opening panel module then

supplies power and ground to the roof opening panel motor. The vent and soft stop functions are controlled by the roof opening panel module and an internal roof opening panel position switch within the roof opening panel motor. These positions are obtained when an internal motor cam opens the roof opening panel position switch that removes ground to the roof opening panel module.

### Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical and electrical damage.

### VISUAL INSPECTION CHART

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Roof opening panel switch</li> <li>• Roof opening panel motor</li> <li>• Roof opening panel glass</li> <li>• Roof opening panel shield</li> <li>• Roof opening panel drain hoses</li> <li>• Air deflector</li> <li>• Lifting arm</li> <li>• Roof opening panel drain channel</li> </ul>	<ul style="list-style-type: none"> <li>• Battery junction box (BJB) fuse 19 (40A) for Escape</li> <li>• BJB fuse 22 (40A) for Hybrid Escape</li> <li>• Smart junction box (SJB) fuse(s):               <ul style="list-style-type: none"> <li>○ 4 (10A)</li> <li>○ 11 (15A)</li> </ul> </li> <li>• Accessory delay relay</li> <li>• Roof opening panel switch</li> <li>• Roof opening panel motor</li> <li>• Roof opening panel module</li> </ul>

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, GO to **SYMPTOM CHART**.

### Symptom Chart

### SYMPTOM CHART

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>• The roof opening panel has excessive wind noise</li> </ul>	<ul style="list-style-type: none"> <li>• Incorrect adjustment</li> <li>• Roof opening panel glass seals</li> </ul>	<ul style="list-style-type: none"> <li>• GO to <b><u>PINPOINT TEST A.</u></b></li> </ul>
<ul style="list-style-type: none"> <li>• The roof opening panel leaks</li> </ul>	<ul style="list-style-type: none"> <li>• Roof opening panel drain hose</li> <li>• Roof opening panel glass seals</li> </ul>	<ul style="list-style-type: none"> <li>• GO to <b><u>PINPOINT TEST B.</u></b></li> </ul>
	<ul style="list-style-type: none"> <li>• Roof opening panel</li> </ul>	

## 2006 Ford Escape

### 2006 ACCESSORIES & BODY, CAB Roof Opening Panel - Escape & Mariner

<ul style="list-style-type: none"><li>• The roof opening panel rattles</li></ul>	<ul style="list-style-type: none"><li>• glass adjustment</li><li>• Roof opening panel lifter assemblies</li><li>• Roof opening panel tracks</li><li>• Roof opening panel drain channels and guides</li><li>• Roof opening panel shield</li><li>• Roof opening panel air deflector</li><li>• Roof opening panel assembly</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST C.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The roof opening panel is noisy during operation</li></ul>	<ul style="list-style-type: none"><li>• Roof opening panel glass adjustment</li><li>• Roof opening panel tracks</li><li>• Roof opening panel shield</li><li>• Roof opening panel motor</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST D.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The roof opening panel does not open or close</li></ul>	<ul style="list-style-type: none"><li>• Fuse(s)</li><li>• Circuitry</li><li>• Roof opening panel switch</li><li>• Roof opening panel motor</li><li>• Roof opening panel module</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST E.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The roof opening panel does not stop in flush from any position</li></ul>	<ul style="list-style-type: none"><li>• Circuitry</li><li>• Roof opening panel motor</li><li>• Roof opening panel module</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST F.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The express open is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Circuitry</li><li>• Roof opening panel motor</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT</u></b></li></ul>

## 2006 Ford Escape

### 2006 ACCESSORIES & BODY, CAB Roof Opening Panel - Escape & Mariner

	<ul style="list-style-type: none"><li>• Roof opening panel module</li></ul>	<b><u>TEST F.</u></b>
<ul style="list-style-type: none"><li>• The roof opening panel does not have soft stop</li></ul>	<ul style="list-style-type: none"><li>• Circuitry</li><li>• Roof opening panel motor</li><li>• Roof opening panel module</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST F.</u></b></li></ul>

#### Pinpoint Tests

##### Pinpoint Test A: The Roof Opening Panel Has Excessive Wind Noise

#### Normal Operation

When the roof opening panel glass is completely closed, it is flush with the roof panel and correctly sealed.

#### Possible Causes

- Roof opening panel glass adjustment
- Roof opening panel glass seals

#### PINPOINT TEST A: THE ROOF OPENING PANEL HAS EXCESSIVE WIND NOISE

##### A1 CHECK THE ROOF OPENING PANEL GLASS SEALS

- Check the roof opening panel glass seals for:
  - looseness.
  - cracking.
  - pinching.
  - obstructions.
- **Are the seals OK?**

**Yes** : GO to A2.

**No** : REPAIR as necessary. TEST the system for normal operation.

##### A2 CHECK THE ROOF OPENING PANEL GLASS ADJUSTMENT

- Key in ON position.
- Open and close the roof opening panel glass.
- Check the alignment when the roof opening panel glass closes.
- **Is the alignment OK?**

**Yes** : If wind noise is still present, ADJUST the roof opening panel glass to closer

tolerance within specification. REFER to **ROOF OPENING PANEL ALIGNMENT** in this article. TEST the system for normal operation.

**No** : ADJUST the roof opening panel glass. REFER to **ROOF OPENING PANEL ALIGNMENT** in this article. TEST the system for normal operation.

#### **Pinpoint Test B: The Roof Opening Panel Leaks**

##### **Normal Operation**

When the roof opening panel glass is completely closed, it is flush with the roof panel and correctly sealed. The drain channel collects water and drains it through the front drain hose located in the A-pillar and the rear drain hose located in the C-pillar.

##### **Possible Causes**

- Roof opening panel glass adjustment
- Roof opening panel drain hoses
- Roof opening panel glass seals

#### **PINPOINT TEST B: THE ROOF OPENING PANEL LEAKS**

##### **B1 VERIFY CUSTOMER OPERATION OF THE ROOF OPENING PANEL WHEN PARKED**

- Make sure the customer is parking with the roof opening panel correctly in the closed position.
- **Is the customer parking with the roof opening panel in the closed position?**

**Yes** : GO to B2.

**No** : Instruct the customer to REFER to the owner's manual for correct operation of the roof opening panel.

##### **B2 CHECK THE ADJUSTMENT OF THE ROOF OPENING PANEL**

- Make sure the roof opening panel glass is centered and flush with the roof line.
- **Is the roof opening panel adjusted correctly?**

**Yes** : GO to B3.

**No** : ADJUST the roof opening panel. REFER to **ROOF OPENING PANEL ALIGNMENT** in this article. TEST the system for normal operation.

##### **B3 CHECK THE WEATHERSTRIP CONDITION**

**NOTE:** The seal has a bonded joint located on the passenger side or

**rear edge. This not a defect.**

- Make sure the roof opening panel seal is not cracked, torn or loose.
- Check the roof opening panel seal.
- **Is the roof opening panel seal in good condition and free from damage?**

**Yes :** GO to B4.

**No :** INSTALL a new roof opening panel seal. TEST the system for normal operation.

#### **B4 CHECK THE WATER TROUGH CONDITION**

- Check the water trough and guides for damage and/or correct attachment and function.
- **Is the water trough OK?**

**Yes :** GO to B5.

**No :** REPAIR the water trough or REPLACE as necessary. TEST the system for normal operation.

#### **B5 CHECK THE DRAIN HOSES**

**NOTE:** Drain hoses can be viewed with a flashlight by removing the headliner lace around the inside opening and gently pulling down on the headliner. (On some vehicles, new trim lace has been installed with Velcro style attachments.)

- Make sure the drain hoses are all connected and not cracked, slit, pinched or obstructed.
- **Are all the drain hoses present and attached correctly?**

**Yes :** GO to B6.

**No :** REPAIR or INSTALL a new drain hose(s). REFER to **ROOF OPENING PANEL FRONT DRAIN HOSE** or **ROOF OPENING PANEL REAR DRAIN HOSE** in this article. TEST the system for normal operation.

#### **B6 CHECK THE DRAIN HOSES FOR CORRECT FLOW**

**NOTE:** Drain hoses must flow downhill and cannot be pinched or restricted by headliner or any other trim components.

- With the panel open, slowly pour water into the water trough area and make sure



that the same amount of water exits the vehicle at the bottom of the A and C pillars.

- Check drain hoses for obstructions by blowing compressed air through the drain spouts in the water trough area, the retest with water.
- **Are the drain hoses operating correctly?**

**Yes :** INSPECT other areas of the vehicle that may cause water to enter the roof area such as the windshield or luggage rack, if equipped. If no problem is found, GO to B7.

**No :** Lower the headliner and INSPECT the drain hoses for correct routing. REPAIR or INSTALL a new drain hose(s). REFER to **ROOF OPENING PANEL FRONT DRAIN HOSE** or **ROOF OPENING PANEL REAR DRAIN HOSE** in this article. TEST the system for normal operation.

### **B7 CHECK THE CONDITION OF THE ROOF OPENING PANEL FRAME**

- Check the roof opening panel frame for damage that may cause the roof opening panel seal to seat incorrectly.
- **Is the roof opening panel frame OK?**

**Yes :** INSTALL a new roof opening panel. REFER to **ROOF OPENING PANEL MODULE** in this article. TEST the system for normal operation.

**No :** REPAIR the roof opening panel frame as necessary. TEST the system for normal operation.

### **Pinpoint Test C: The Roof Opening Panel Rattles**

#### **Normal Operation**

When the roof opening panel glass is completely closed, it is flush with the roof panel. All components should be secured correctly.

#### **Possible Causes**

- Roof opening panel glass adjustment
- Roof opening panel lifter assemblies
- Roof opening panel tracks
- Roof opening panel drain channels and guides
- Roof opening panel shield
- Roof opening panel air deflector
- Roof opening panel assembly

### **PINPOINT TEST C: THE ROOF OPENING PANEL RATTLES**

**C1 CHECK THE ROOF OPENING PANEL GLASS OPERATION**

- Check the roof opening panel glass during operation.
- **Is the roof opening panel glass loose?**

**Yes :** ADJUST the roof opening panel. REFER to **ROOF OPENING PANEL ALIGNMENT** in this article. VERIFY all bolts are tightened to specification. TEST the system for normal operation.

**No :** GO to C2.

**C2 CHECK THE ROOF OPENING PANEL TRACKS**

- Open the roof opening panel glass.
- Check the tracks for obstructions or signs of damage.
- **Are the tracks OK?**

**Yes :** GO to C3.

**No :** REMOVE any obstructions. REPAIR the roof opening panel tracks as necessary. TEST the system for normal operation.

**C3 CHECK THE DRAIN CHANNELS AND GUIDES**

- Check the drain channel and channel guides for any loose fasteners or obstructions.
- **Is the drain channel installed securely and free from foreign material?**

**Yes :** GO to C4.

**No :** REMOVE all foreign material from the drain channel and INSTALL securely. TEST the system for normal operation.

**C4 CHECK THE ROOF OPENING PANEL SHIELD**

- Check the roof opening panel shield for correct installation.
- **Is the roof opening panel shield installed correctly?**

**Yes :** GO to C5.

**No :** INSTALL the opening shield correctly. REFER to **ROOF OPENING PANEL SHIELD** in this article. TEST the system for normal operation.

**C5 CHECK THE AIR DEFLECTOR**

- Check the air deflector for obstructions and damage.
- **Is the air deflector OK?**

**Yes** : GO to C6.

**No** : REMOVE all obstructions and REPAIR or INSTALL a new air deflector. REFER to **AIR DEFLECTOR** in this article. TEST the system for normal operation.

### **C6 CHECK THE ROOF OPENING PANEL**

- Make sure the roof opening panel frame, drain tubes and wire harnesses are free from obstructions and damage, and are securely fastened.
- **Is the roof opening panel assembly OK?**

**Yes** : The system is operating normally.

**No** : REPAIR as necessary. TEST the system for normal operation.

#### **Pinpoint Test D: The Roof Opening Panel is Noisy During Operation**

##### **Normal Operation**

The roof opening panel operates smoothly while opening and closing.

##### **Possible Causes**

- Roof opening panel glass adjustment
- Roof opening panel tracks
- Roof opening panel shield
- Roof opening panel motor

#### **PINPOINT TEST D: THE ROOF OPENING PANEL IS NOISY DURING OPERATION**

### **D1 CHECK THE ROOF OPENING PANEL GLASS FOR OBSTRUCTIONS OR DAMAGE**

- Check the roof opening panel glass for any obstructions or damage from the following:
  - sand.
  - dirt.
  - leaves.
- **Are there any obstructions or damage?**

**Yes** : REMOVE all obstructions. REPAIR the roof opening panel as necessary. TEST the system for normal operation.

**No** : GO to D2.

### **D2 CHECK THE ROOF OPENING PANEL GLASS OPERATION**

- Check the roof opening panel glass during operation.
- **Is the roof opening panel glass loose or not correctly adjusted?**

**Yes :** ADJUST the roof opening panel. REFER to **ROOF OPENING PANEL ALIGNMENT** in this article. VERIFY all bolts are tightened to specification. TEST the system for normal operation.

**No :** GO to D3.

### **D3 CHECK THE ROOF OPENING PANEL TRACKS**

- Open the roof opening panel glass.
- Check the tracks for obstructions or signs of damage.
- **Are the tracks OK?**

**Yes :** GO to D4.

**No :** REMOVE all obstructions. REPAIR any damage as necessary. TEST the system for normal operation.

### **D4 CHECK THE ROOF OPENING PANEL SHIELD**

- Check the roof opening panel shield for correct movement.
- **Is the shield moving correctly?**

**Yes :** GO to D5.

**No :** REPAIR or INSTALL a new roof opening panel shield. REFER to **ROOF OPENING PANEL SHIELD** in this article. TEST the system for normal operation.

### **D5 CHECK THE ROOF OPENING PANEL MOTOR**

- Gain access to the roof opening panel motor.
- Open the roof opening panel.
- **Does the motor make excessive noise?**

**Yes :** INSTALL a new roof opening panel motor. REFER to **ROOF OPENING PANEL MOTOR** in this article. TEST the system for normal operation.

**No :** ADJUST the roof opening panel glass. REFER to **ROOF OPENING PANEL ALIGNMENT** in this article. TEST the system for normal operation.

#### **Pinpoint Test E: The Roof Opening Panel Does Not Open or Close**

For schematic and connector information refer to **POWER TOP/SUNROOF** for Escape models or **POWER TOP/SUNROOF** for Mariner models .

**Normal Operation**

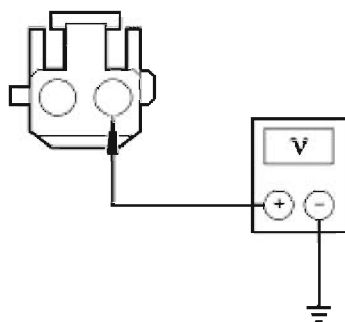
The roof opening panel module receives voltage on circuit 1173 (BN/OG) when the ignition switch is in the ACC or ON position. The roof opening panel module is grounded through circuit (BK). When the roof opening panel switch is pressed, circuit (BK) and circuit (WH) are connected for open/tilt down or circuit (BK) and circuit (VT) are connected for close/tilt up. The roof opening panel module controls the roof opening panel motor by directing power and ground on circuit (OG) and circuit (RD) to the motor.

**Possible Causes**

- Fuse(s)
- Circuit 1173 (BN/OG) open
- Circuit 57 (BK) open
- Circuit (DB) open
- Circuit (BK) open
- Circuit (WH) open
- Circuit (VT) open
- Circuit (OG) open or short to ground
- Circuit (RD) open or short to ground
- Roof opening panel switch
- Roof opening panel motor
- Roof opening panel module

**PINPOINT TEST E: THE ROOF OPENING PANEL DOES NOT OPEN OR CLOSE****E1 THE ROOF OPENING PANEL DOES NOT OPEN OR CLOSE**

- Key in OFF position.
- Disconnect: Roof Opening Panel Unit C919..
- Key in ON position.
- Measure the voltage between roof opening panel unit C919-1, circuit 1173 (BN/OG), harness side and ground.



**Fig. 1: Checking Roof Opening Panel Does Not Open Or Close**  
Courtesy of FORD MOTOR CO.

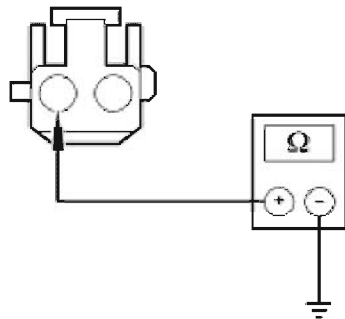
- Is the voltage greater than 10 volts?

**Yes :** GO to E2

**No :** VERIFY the smart junction box (SJB) fuse 11 (15A) is OK. If OK, REPAIR the circuit. TEST the system for normal operation.

**E2 CHECK CIRCUIT 57 (BK) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between roof opening panel unit C919-2, circuit 57 (BK), harness side and ground.



N0035558

**Fig. 2: Checking Circuit 57 (BK) For An Open**  
Courtesy of FORD MOTOR CO.

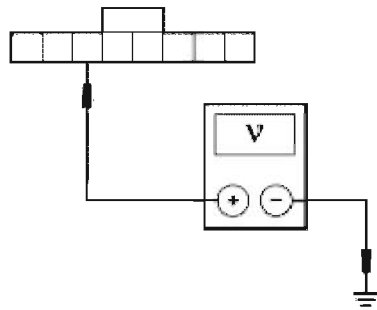
- Is the resistance less than 5 ohms?

**Yes :** GO to E3

**No :** REPAIR the circuit. TEST the system for normal operation.

**E3 CHECK CIRCUIT (DB) FOR POWER**

- Key in OFF position.
- Disconnect: Roof Opening Panel Module Connector.
- Key in ON position.
- Measure the voltage between the roof opening panel module connector, pin 6, circuit (DB), harness side and ground.



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**Fig. 3: Checking Circuit (DB) For Power**  
Courtesy of FORD MOTOR CO.

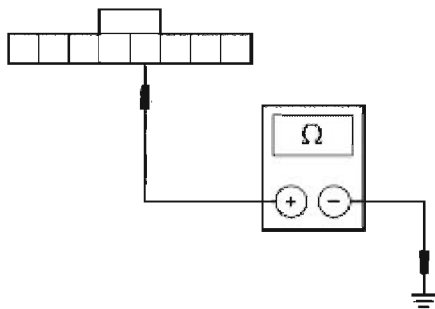
- Is the voltage greater than 10 volts?

**Yes :** GO to E4.

**No :** REPAIR the circuit. TEST the system for normal operation.

#### **E4 CHECK CIRCUIT (BK) FOR AN OPEN**

- Key in OFF position.
- Measure the resistance between the roof opening panel module connector, pin 4, circuit (BK), harness side and ground.



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**Fig. 4: Checking Circuit (BK) For An Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

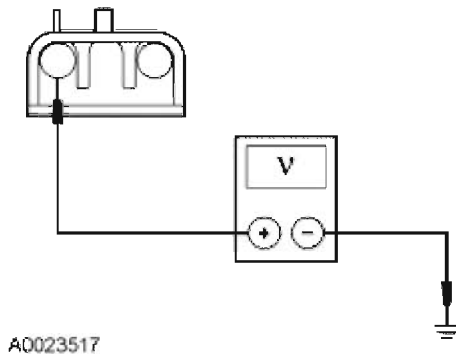
**Yes :** GO to E5.

**No :** REPAIR the circuit. TEST the system for normal operation.

#### **E5 CHECK POWER TO THE ROOF OPENING PANEL MOTOR CIRCUIT (OG)**

- Connect: Roof Opening Panel Module Connector.

- Disconnect: Roof Opening Panel Motor Connector.
- Key in ON position.
- While pressing the roof opening panel switch to the OPEN position, measure the voltage between the roof opening panel motor connector, pin 3, circuit (OG), harness side and ground.



**Fig. 5: Checking Power To Roof Opening Panel Motor Circuit (OG)**  
Courtesy of FORD MOTOR CO.

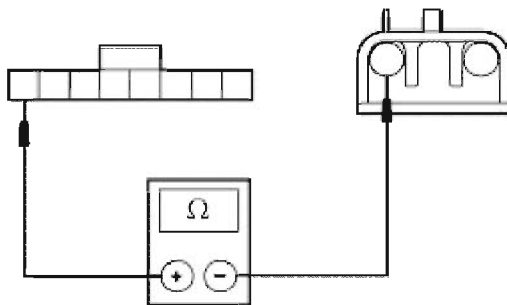
- Is the voltage greater than 10 volts?

**Yes** : GO to E8.

**No** : GO to E6.

#### **E6 CHECK CIRCUIT (OG) FOR AN OPEN**

- Key in OFF position.
- Disconnect: Roof Opening Panel Module Connector.
- Measure the resistance between the roof opening panel motor connector, pin 3, circuit (OG), harness side and the roof opening panel module connector, pin 8, circuit (OG), harness side.



**Fig. 6: Checking Circuit (OG) For An Open**  
Courtesy of FORD MOTOR CO.



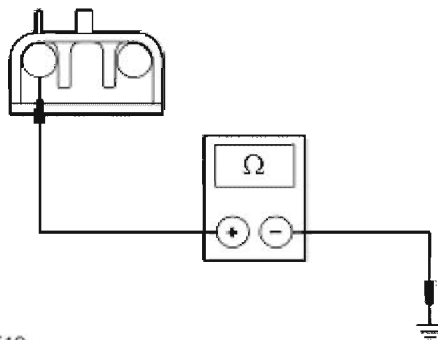
- **Is the resistance less than 5 ohms?**

**Yes :** GO to E7.

**No :** REPAIR the circuit. TEST the system for normal operation.

### **E7 CHECK CIRCUIT (OG) FOR A SHORT TO GROUND**

- Measure the resistance between the roof opening panel motor connector, pin 3, circuit (OG), harness side and ground.



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**Fig. 7: Checking Circuit (OG) For Short To Ground**  
Courtesy of FORD MOTOR CO.

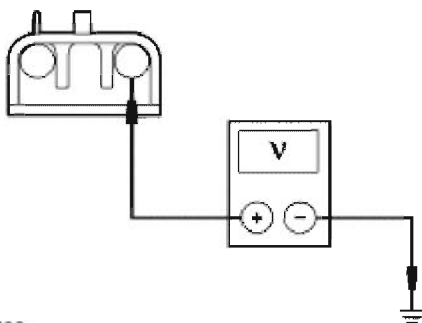
- **Is the resistance greater than 10,000 ohms?**

**Yes :** GO to E11.

**No :** REPAIR the circuit. TEST the system for normal operation.

### **E8 CHECK VOLTAGE TO THE ROOF OPENING PANEL MOTOR CIRCUIT (RD)**

- While pressing the roof opening panel switch to the CLOSED position, measure the voltage between the roof opening panel motor connector, pin 1, circuit (RD), harness side and ground.



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**Fig. 8: Checking Voltage To Roof Opening Panel Motor Circuit (RD)**

Courtesy of FORD MOTOR CO.

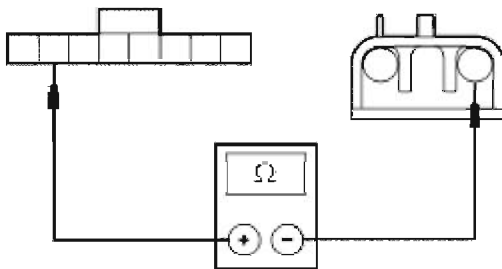
- Is the voltage greater than 10 volts?

**Yes :** INSTALL a new roof opening panel motor. REFER to **ROOF OPENING PANEL MOTOR** in this article. TEST the system for normal operation.

**No :** GO to E9.

### **E9 CHECK CIRCUIT (RD) FOR AN OPEN**

- Key in OFF position.
- Disconnect: Roof Opening Panel Module Connector.
- Measure the resistance between the roof opening panel module connector, pin 7, circuit (RD), harness side and the roof opening panel motor connector, pin 1, circuit (RD), harness side.



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**Fig. 9: Checking Circuit (RD) For An Open**  
Courtesy of FORD MOTOR CO.

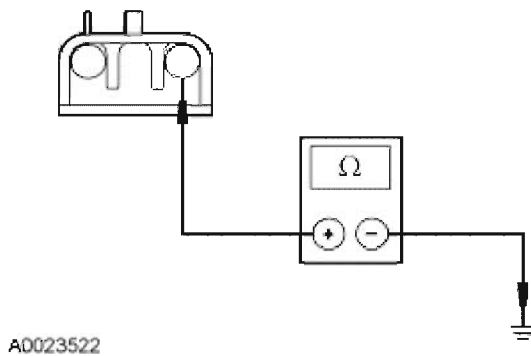
- Is the resistance less than 5 ohms?

**Yes :** GO to E10.

**No :** REPAIR the circuit. TEST the system for normal operation.

### **E10 CHECK CIRCUIT (RD) FOR A SHORT TO GROUND**

- Measure the resistance between the roof opening panel motor connector, pin 1, circuit (RD), harness side and ground.



**Fig. 10: Checking Circuit (RD) For Short To Ground**  
Courtesy of FORD MOTOR CO.

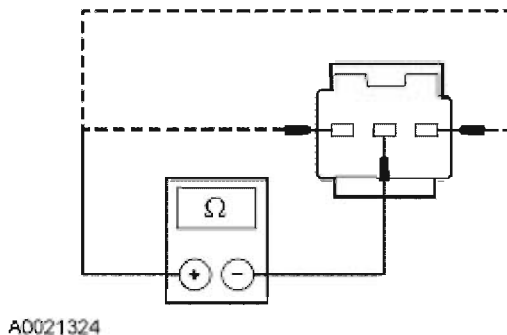
- Is the resistance greater than 10,000 ohms?

**Yes :** GO to E11.

**No :** REPAIR the circuit. TEST the system for normal operation.

### E11 CHECK THE ROOF OPENING PANEL SWITCH

- Disconnect: Roof Opening Panel Switch Connector.
- Measure the resistance between the roof opening panel switch pins 2 and 3, component side while pressing the roof opening panel switch to the CLOSED position; and between the roof opening panel switch pins 1 and 2, component side while pressing the roof opening panel switch to the OPEN position.



**Fig. 11: Checking Roof Opening Panel Switch**  
Courtesy of FORD MOTOR CO.

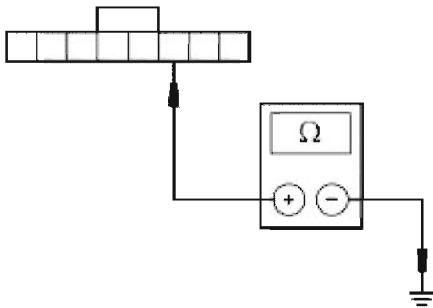
- Are the resistances less than 5 ohms?

**Yes :** GO to E12.

**No :** INSTALL a new roof opening panel switch. TEST the system for normal operation.

**E12 CHECK CIRCUIT (VT) FOR AN OPEN**

- Disconnect: Roof Opening Panel Module Connector.
- Connect: Roof Opening Panel Switch Connector.
- Measure the resistance between the roof opening panel module connector, pin 3, circuit (VT), harness side and ground while pressing the roof opening panel switch to the CLOSED position.



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**Fig. 12: Checking Circuit (VT) For An Open**  
Courtesy of FORD MOTOR CO.

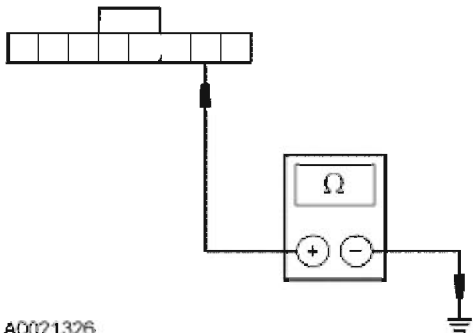
- Is the resistance less than 5 ohms?

**Yes :** GO to E13.

**No :** REPAIR the circuit. TEST the system for normal operation

**E13 CHECK CIRCUIT (WH) FOR AN OPEN**

- Measure the resistance between the roof opening panel module connector, pin 2, circuit (WH), harness side and ground while pressing the roof opening panel switch to the OPEN position.



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**Fig. 13: Checking Circuit (WH) For An Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

**Yes** : INSTALL a new roof opening panel module. REFER to **ROOF OPENING PANEL MODULE** in this article. TEST the system for normal operation.

**No** : REPAIR the circuit. TEST the system for normal operation.

**Pinpoint Test F: The Roof Opening Panel Does Not Have Soft Stop**

For schematic and connector information refer to **POWER TOP/SUNROOF** for Escape models or **POWER TOP/SUNROOF** for Mariner models .

**Normal Operation**

The roof opening panel position switch removes ground from circuit (OG/WH) when the roof opening panel reaches the CLOSED position and when the roof opening panel reaches the COMFORT position. In these positions the roof opening panel module will remove power from the roof opening panel motor.

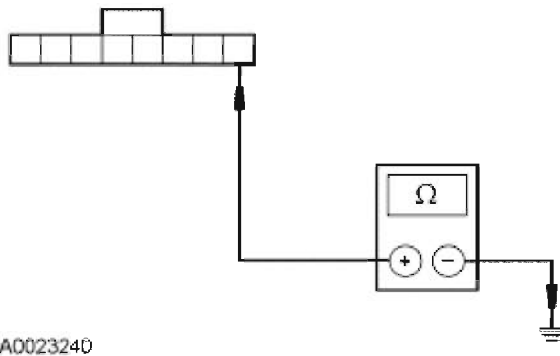
**Possible Causes**

- Circuit (OG/WH) open or short to ground
- Circuit (BK) open
- Roof opening panel motor
- Roof opening panel module

**PINPOINT TEST F: THE ROOF OPENING PANEL DOES NOT HAVE SOFT STOP**

**F1 CHECK THE ROOF OPENING PANEL POSITION SWITCH FOR A SHORT TO GROUND IN THE CLOSED POSITION**

- Key in ON position.
- Close the roof opening panel.
- Key in OFF position.
- Disconnect: Roof Opening Panel Module Connector.
- With the roof opening panel in the CLOSED position, measure the resistance between the roof opening panel module connector, pin 1, circuit (OG/WH), harness side and ground.



**Fig. 14: Checking Roof Opening Panel Position Switch For Short To Ground In Closed Position**

Courtesy of FORD MOTOR CO.

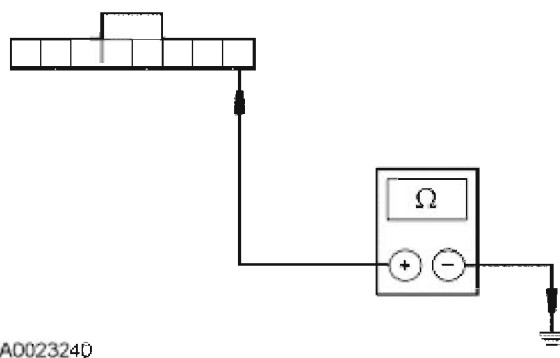
- Is the resistance greater than 10,000 ohms?

**Yes :** GO to F3.

**No :** GO to F2.

## F2 CHECK CIRCUIT (OG/WH) FOR A SHORT TO GROUND

- Disconnect: Roof Opening Panel Position Switch Connector.
- Measure the resistance between the roof opening panel module connector, pin 1, circuit (OG/WH), harness side and ground.



**Fig. 15: Checking Circuit (OG/WH) For Short To Ground**

Courtesy of FORD MOTOR CO.

- Is the resistance greater than 10,000 ohms?

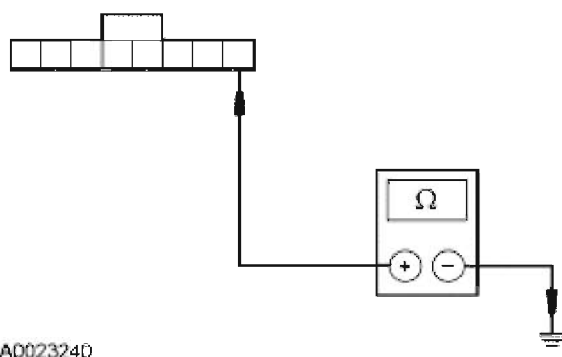
**Yes :** INSTALL a new roof opening panel motor. REFER to **ROOF OPENING PANEL MOTOR** in this article. TEST the system for normal operation.

**No :** REPAIR the circuit. TEST the system for normal operation.

## F3 CHECK THE ROOF OPENING PANEL POSITION SWITCH FOR A

**SHORT TO GROUND IN THE COMFORT POSITION**

- Key in OFF position.
- Connect: Roof Opening Panel Module Connector.
- Key in ON position.
- Open the roof opening panel to the COMFORT position.
- Key in OFF position.
- Disconnect: Roof Opening Panel Module Connector.
- With the roof opening panel in the COMFORT position, measure the resistance between the roof opening panel module connector, pin 1, circuit (OG/WH), harness side and ground.



**Fig. 16: Checking Roof Opening Panel Position Switch For Short To Ground In Comfort Position**

Courtesy of FORD MOTOR CO.

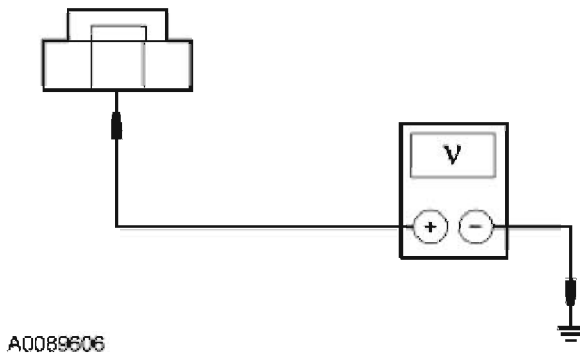
- Is the resistance greater than 10,000 ohms?

**Yes :** GO to F4.

**No :** INSTALL a new roof opening panel motor. REFER to **ROOF OPENING PANEL MOTOR** in this article. TEST the system for normal operation.

**F4 CHECK THE ROOF OPENING PANEL POSITION SWITCH SIGNAL**

- Disconnect: Roof Opening Panel Position Switch Connector.
- Measure the voltage between the roof opening panel position switch connector, pin 2, circuit (OG/WH), harness side and ground.



**Fig. 17: Checking Roof Opening Panel Position Switch Signal**  
Courtesy of FORD MOTOR CO.

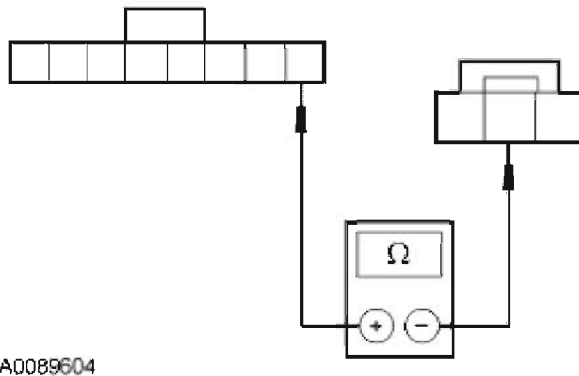
- Is the voltage greater than 10 volts?

**Yes :** GO to F6.

**No :** GO to F5.

#### **F5 CHECK CIRCUIT (OG/WH) FOR AN OPEN**

- Measure the resistance between the roof opening panel module connector, pin 1, circuit (OG/WH), harness side and the roof opening panel position switch connector, pin 2, circuit (OG/WH), harness side.



**Fig. 18: Checking Circuit (OG/WH) For An Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

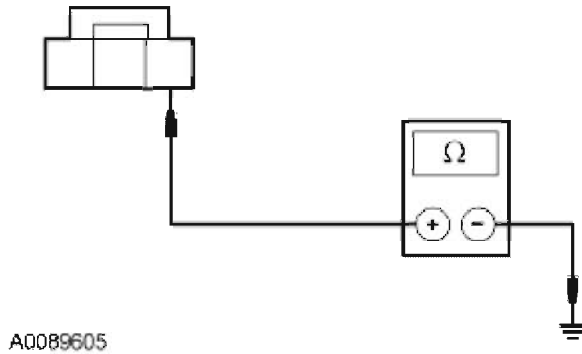
**Yes :** INSTALL a new roof opening panel module. REFER to **ROOF OPENING PANEL MODULE** in this article. TEST the system for normal operation.

**No :** REPAIR the circuit. TEST the system for normal operation.

#### **F6 CHECK CIRCUIT (BK) FOR AN OPEN**



- Measure the resistance between the roof opening panel position switch connector, pin 1, circuit (BK), harness side and ground.



**Fig. 19: Checking Circuit (BK) For An Open**  
Courtesy of FORD MOTOR CO.

- Is the resistance less than 5 ohms?

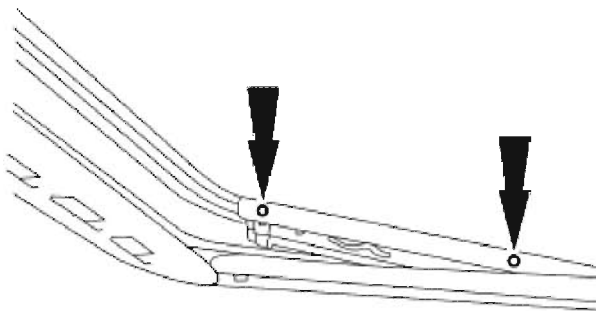
**Yes :** INSTALL a new roof opening panel motor. REFER to **ROOF OPENING PANEL MOTOR** in this article. TEST the system for normal operation.

**No :** REPAIR the circuit. TEST the system for normal operation.

## GENERAL PROCEDURES

### ROOF OPENING PANEL ALIGNMENT

1. Open the roof opening panel to the VENT position.
2. Loosen the 4 roof opening panel glass screws.



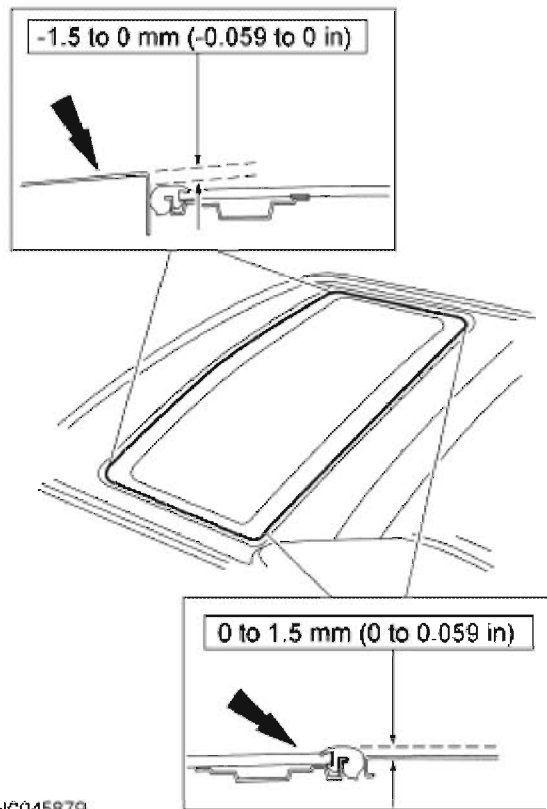
**Fig. 20: Locating Roof Opening Panel Glass Screws**  
Courtesy of FORD MOTOR CO.

3. Close the roof opening panel glass.

**NOTE:** The correct position of the roof opening panel glass to the

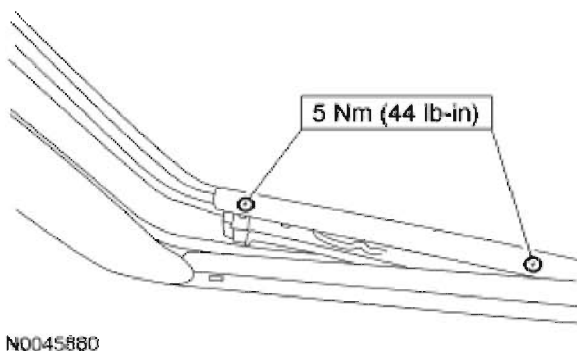
roof panel should be -1.5 mm to 0 mm (-0.059 to 0 in) at the front edge and 0 mm to 1.5 mm (0 to 0.059 in) at the rear edge of the roof panel.

Make sure the roof opening panel is centered in the roof opening.



**Fig. 21: Adjusting Roof Opening Panel Glass**  
Courtesy of FORD MOTOR CO.

4. Adjust the roof opening panel glass.
5. Open the roof opening panel to the VENT position and tighten the 4 roof opening panel glass screws.

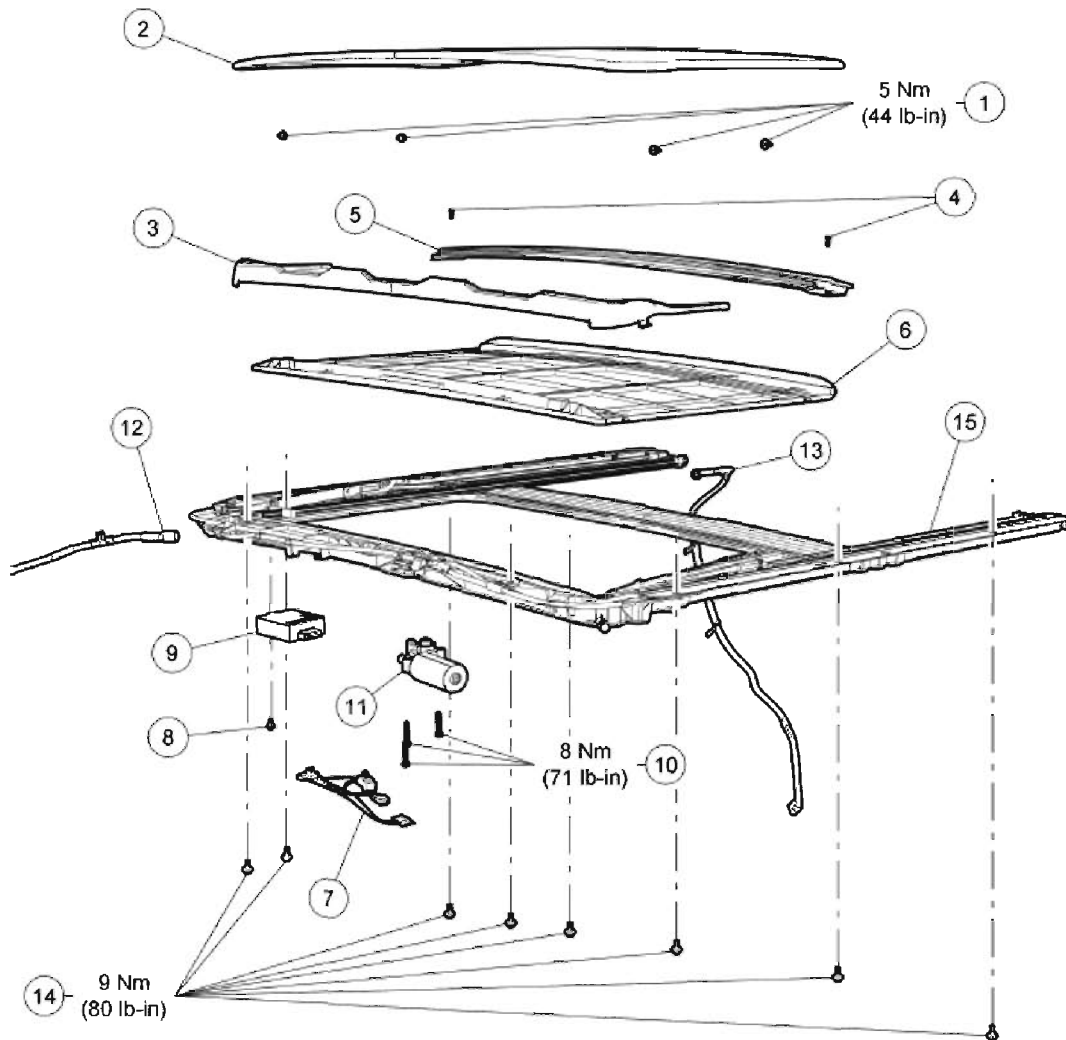


**Fig. 22: Tightening Roof Opening Panel Glass Screws With Torque Specifications**

Courtesy of FORD MOTOR CO.

## REMOVAL AND INSTALLATION

### ROOF OPENING PANEL - EXPLODED VIEW



A0095386

Item	Part Number	Description
1	78502B88	Roof opening panel glass screws (4 required)
2	7850054	Roof opening panel glass
3	78500A26	Roof opening panel air deflector
4	—	Roof opening panel drain channel screws (2 required)
5	7854022	Roof opening panel drain channel
6	78519A02	Roof opening panel shield
7	15B672	Roof opening panel switch harness

Item	Part Number	Description
8	—	Roof opening panel module pin-type retainer
9	14677	Roof opening panel module
10	15C668	Roof opening panel motor bolts (3 required)
11	15790	Roof opening panel motor
12	78502C52A/ 78502C53A	Front drain hose
13	78502C52B/ 78502C53	Rear drain hose
14	—	Roof opening panel frame bolts (8 required)
15	78502C22	Roof opening panel frame

**Fig. 23: Exploded View Of Roof Opening Panel With Torque Specifications**

**Courtesy of FORD MOTOR CO.**

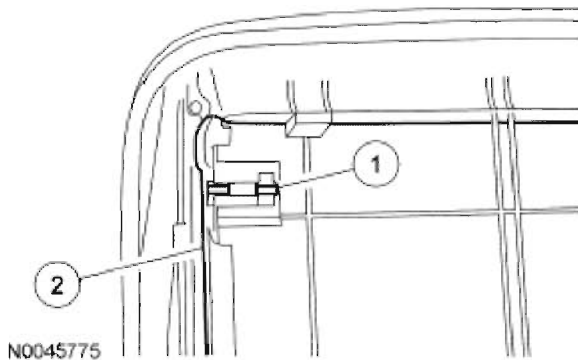
1. For additional information, refer to the individual procedures in this article.

**ROOF OPENING PANEL GLASS**

1. Open the roof opening panel to the VENT position.
2. Remove the 4 roof opening panel glass screws and the roof opening panel glass.
  - To install tighten to 5 Nm (44 lb-in).
3. To install, reverse the removal procedure.
  - Verify that the roof opening panel is centered and aligned before tightening the bolts. For additional information, refer to **ROOF OPENING PANEL ALIGNMENT** in this article.

**ROOF OPENING PANEL SHIELD****Removal and Installation**

1. Remove the roof opening panel glass. For additional information, refer to **ROOF OPENING PANEL GLASS** in this article.
2. Remove the 2 roof opening panel drain channel screws and the drain channel.
3. Remove the roof opening panel shield.
  1. Disengage the 4 spring-loaded slide locks.
  2. Slide the panel up and forward.



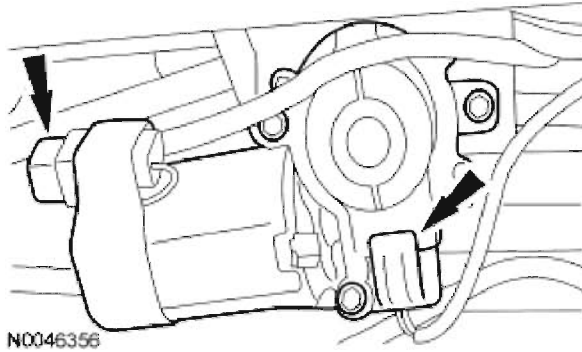
**Fig. 24: Removing Roof Opening Panel Shield**  
**Courtesy of FORD MOTOR CO.**

4. To install, reverse the removal procedure.

**ROOF OPENING PANEL MOTOR****Removal and Installation**

1. Close the roof opening panel glass.

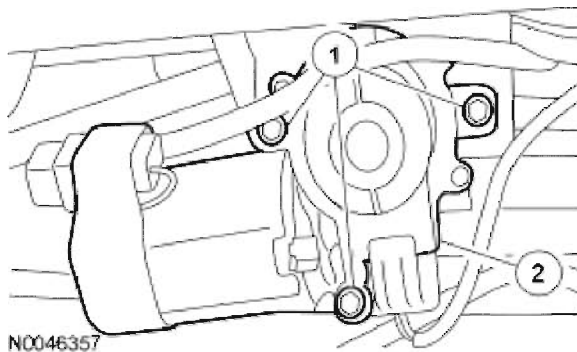
2. Remove the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION** .
3. Disconnect the electrical connectors.



**Fig. 25: Locating Electrical Connectors**  
Courtesy of FORD MOTOR CO.

**NOTE:** Anytime a roof opening panel motor is removed, the cables/mechanisms can experience free-play movement. It is important that the cables do not move. They are timed to be parallel with each other.

4. Remove the roof opening panel motor.
  1. Remove the 3 roof opening panel motor screws.
  2. Remove the roof opening panel motor.
    - To install, tighten to 8 Nm (71 lb-in).



**Fig. 26: Identifying Roof Opening Panel Motor Screws**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

## ROOF OPENING PANEL MODULE

### Removal and Installation

1. Remove the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION** .
2. Remove the roof opening panel module pin-type retainer and the roof opening panel module.
  - Disconnect the electrical connectors.
3. To install, reverse the removal procedure.

## **AIR DEFLECTOR**

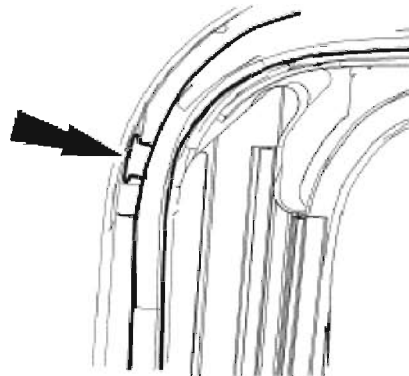
### **Removal and Installation**

#### **All vehicles**

1. Position the roof opening panel glass to the full OPEN position.

**CAUTION: Do not damage the air deflector retaining tabs when releasing the air deflector from the roof opening panel frame.**

2. Release the 2 air deflector retaining tabs from the roof opening panel frame.
  - Push the deflector down and towards the RH side to release the LH tab.
  - Shift the air deflector to the LH side to release the RH side.

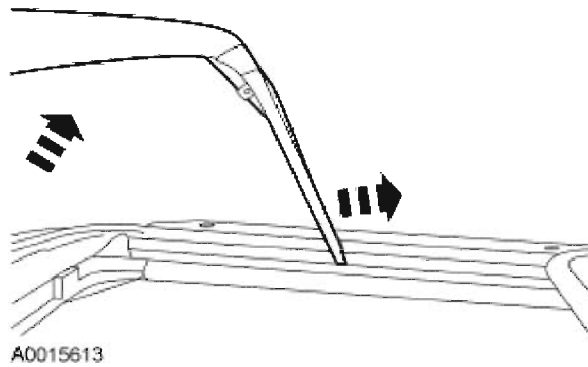


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**Fig. 27: Identifying Air Deflector Retaining Tabs**  
**Courtesy of FORD MOTOR CO.**

#### **Early build**

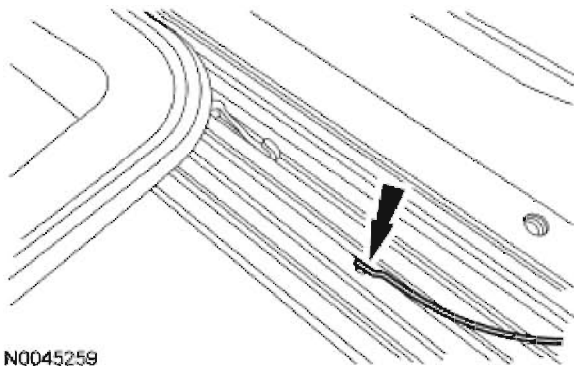
3. Pivot the air deflector and slide the air deflector from the locator to release the air deflector arms.



**Fig. 28: Identifying Air Deflector Arms**  
Courtesy of FORD MOTOR CO.

**Late build**

4. Lift the front of the air deflector upwards to release the air deflector wire retainer.



**Fig. 29: Identifying Air Deflector Wire Retainer**  
Courtesy of FORD MOTOR CO.

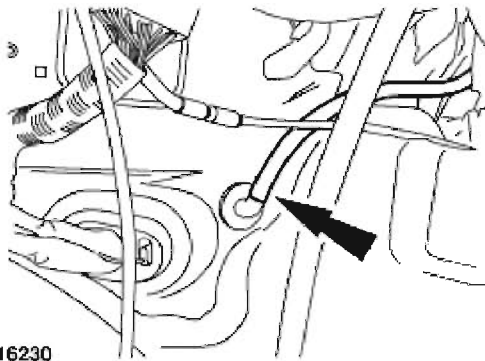
**All vehicles**

5. Remove the air deflector.
6. To install, reverse the removal procedure.

**ROOF OPENING PANEL FRONT DRAIN HOSE**

**Removal and Installation**

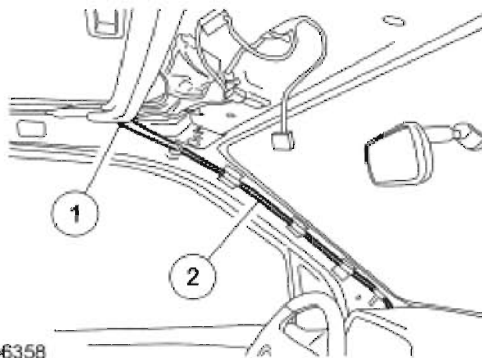
1. Remove the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION** .
2. Disconnect the roof opening panel front drain hose at the front body pillar.



**Fig. 30: Locating Roof Opening Panel Front Drain Hose**  
Courtesy of FORD MOTOR CO.

**NOTE:** The drain hose body attachment can be accessed from under the instrument panel.

3. Remove the roof opening panel front drain hose.
  1. Disconnect the hose from the roof opening panel frame.
  2. Remove the roof opening panel front drain hose.



**Fig. 31: Identifying Roof Opening Panel Front Drain Hose**  
Courtesy of FORD MOTOR CO.

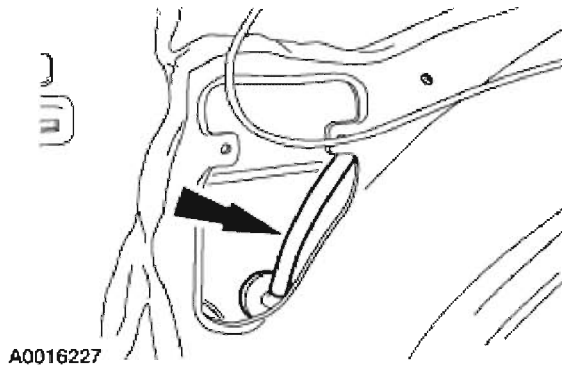
4. To install, reverse the removal procedure.

## ROOF OPENING PANEL REAR DRAIN HOSE

### Removal and Installation

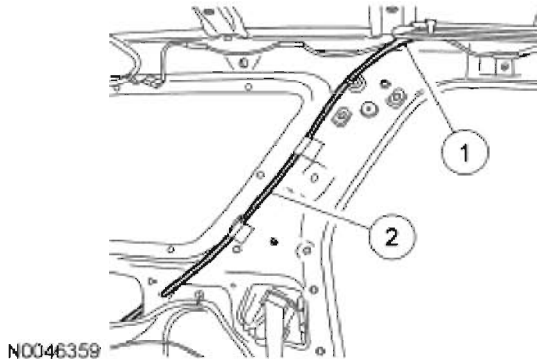
1. Remove the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
2. Disconnect the roof opening panel rear drain hose.





**Fig. 32: Locating Roof Opening Panel Rear Drain Hose**  
Courtesy of FORD MOTOR CO.

3. Remove the roof opening panel rear drain hose.
  1. Disconnect the roof opening panel rear drain hose from the roof opening panel frame.
  2. Remove the roof opening panel rear drain hose.



**Fig. 33: Identifying Roof Opening Panel Rear Drain Hose**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## ROOF OPENING PANEL FRAME

### Removal and Installation

1. Remove the headliner. For additional information, refer to **INTERIOR TRIM AND ORNAMENTATION**.
2. Disconnect the 4 roof opening panel drain hoses.
3. Release the wire harness locators.
4. Remove the 8 roof opening panel frame bolts and remove the roof opening panel frame.
  - To install tighten to 9 Nm (80 lb-in).
5. To install, reverse the removal procedure.

**2004 ACCESSORIES & EQUIPMENT****Wipers and Washers - Escape****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
Passenger windshield wiper blade	75 mm
Driver windshield wiper blade	65 mm

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

Description	Nm	lb-ft	lb-in
Windshield wiper pivot shaft nut	35	26	
Windshield wiper motor bolts	15	11	
Windshield wiper motor linkage bolt	17	13	
Windshield wiper/washer reservoir bolts	6		53
Windshield wiper mounting arm and pivot shaft bolts	12	-	107
Rear wiper motor bolt	5		44
Rear wiper motor nut	4	-	35
Rear wiper motor pivot shaft nut	7		62

**DESCRIPTION AND OPERATION****WIPERS AND WASHERS - FRONT**

The windshield wipers and washer system consists of the following:

- windshield wiper blade
- windshield wiper pivot arm
- windshield wiper mounting arm and pivot shaft (For additional information, refer to **WINDSHIELD WIPER MOTOR** .)
- windshield wiper motor
- windshield wiper/washer switch (part of the multifunction switch)
- windshield washer reservoir
- windshield washer pump
- windshield washer nozzle jet


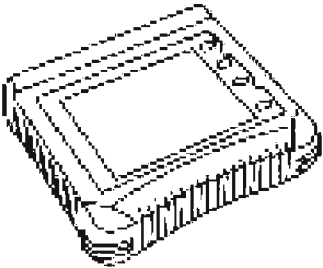

**WIPERS AND WASHERS - REAR**

The rear window wiper and washer system consists of the following:

- rear window wiper blade
- rear window wiper arm
- rear window wiper motor
- rear window wiper/washer switch
- generic electronic control module (GEM)
- windshield washer reservoir
- rear window washer pump
- rear window washer hose
- rear window washer hose check valve
- rear window washer nozzle jet

**DIAGNOSIS AND TESTING****WIPERS AND WASHERS**

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

	73III Automotive Meter 105-R0057 or equivalent
	Worldwide Diagnostic System (WDS) 418-F224,  New Generation STAR (NGS) Tester 418-F052, or equivalent diagnostic tool
	SABRE Electrical System Tester 010-00736 or equivalent

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**Fig. 1: Identifying Special Tools**  
**Courtesy of FORD MOTOR CO.**

#### Principles of Operation

The wiper system has four different operating modes: off mode, low-speed mode, high-speed mode, and interval mode.

In the off mode, there is no windshield wiper motor activity, and the windshield wiper motor is in the PARK position.

In the ON mode, the windshield wiper motor is set to a low-speed setting. The multifunction

switch provides voltage to the windshield wiper motor through the low-speed circuit. The windshield wiper motor provides ground through a dedicated ground circuit.

In the high-speed mode, the windshield wiper motor is set to a high-speed setting. The multifunction switch provides voltage to the windshield wiper motor through the high-speed circuit. The windshield wiper motor provides ground through a dedicated ground circuit.

In the interval mode, the windshield wiper motor is set to a low-speed setting. The windshield wiper interval relay is activated at the beginning of each wipe and deactivated when the windshield wiper motor park switch reaches the run position. The interval relay is part of the multifunction switch.

When the multifunction switch is in the interval (INT) position, the windshield wipers will make a single sweep followed by a pause.

If the washer button is pressed between 100 ms and 300 ms, with the mode switch in the off position, the wiper system will provide one low-speed wipe with no wash.

To engage the windshield washer, push the knob of the multifunction switch toward the steering column. When the multifunction switch is in the OFF or INT position, the windshield wipers will run as long as the knob is depressed (up to 10 seconds). When the knob is released, the washer will stop immediately, but the windshield wipers will continue to run for two to three sweeps, then return to their previous set operation. Washer engagement does not affect windshield wiper operation when the multifunction switch is in the LOW or HIGH position, but the washer will be deactivated if the knob is held for longer than 10 seconds.

#### **Rear Window Wiper Washer**

The generic electronic module (GEM) allows operation of the rear window wiper functions when the ignition switch is in the RUN or ACC position only. The GEM controls the cycling of the rear window wiper motor through a single relay (rear window wiper relay). The rear window wiper relay is internal to the central junction box (CJB).

There are four modes of operation: off mode, interval mode, on mode and wash mode.

**NOTE: The GEM does not control the rear window washer, only the rear window wiper.**

In the off mode, there is no liftgate wiper motor activity and the liftgate wiper motor will be in the PARK position.

When the multifunction switch is placed in the interval position, the GEM will activate the rear window wipe cycle of the rear window wiper motor. Once the wiper cycle has reached the LO position, after the initial wipe, the GEM will start a cyclical timing function.

In the ON mode, the GEM will cycle the rear window motor continuously at a set-speed setting. The GEM provides a ground to activate the rear window wiper relay.

The wash mode can only be activated when the rear wiper mode of the multifunction switch is in the OFF or ON positions. When the rear wiper switch is in the OFF position and wash mode is activated the rear window wiper will not cycle.

Fluid for the rear window washer is supplied by a washer pump located in the rear passenger compartment.

#### Inspection and Verification

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Wiper linkage</li> <li>• Washer nozzles</li> <li>• Washer pump hoses</li> </ul>	<ul style="list-style-type: none"> <li>• Battery junction box (BJB) fuse (40A)</li> <li>• Central junction box (CJB) fuse: <ul style="list-style-type: none"> <li>▪ 10 (20A)</li> <li>▪ 3 (10A)</li> </ul> </li> <li>• Multifunction switch</li> <li>• Ignition relay</li> <li>• Windshield wiper motor</li> <li>• Windshield washer pump</li> <li>• Rear window wiper relay</li> <li>• Rear window washer pump</li> <li>• Circuitry</li> <li>• Generic electronic module (GEM)</li> </ul>

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**Fig. 2: Visual Inspection Chart**  
**Courtesy of FORD MOTOR CO.**

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the diagnostic tool does not power up, refer to the diagnostic tool manual.
5. Carry out the diagnostic tool data link test. If the diagnostic tool responds with:
  - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to **MODULE COMMUNICATIONS NETWORK**.
  - NO RESP/NOT EQUIP for GEM, Refer to **MULTIFUNCTION ELECTRONIC MODULE**.
  - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Wipers and Washers - Escape

(DTCs), erase the continuous DTCs, and carry out the self-test diagnostics for the GEM.

6. If the DTCs retrieved are related to the concern, go to the **GENERIC ELECTRONIC MODULE (GEM) DIAGNOSTIC TROUBLE CODE (DTC) INDEX**.
7. If no DTCs related to the concern are retrieved, GO to **SYMPTOM CHART**.

#### Generic Electronic Module (GEM) Diagnostic Trouble Code (DTC) Index

#### GENERIC ELECTRONIC MODULE DIAGNOSTIC TROUBLE CODE

DTC	Description	Source	Action
B1244	Wiper Rear Motor Run Relay Circuit Failure	GEM	If the rear window wipers are inoperative, Go to <b><u>PINPOINT TEST G</u></b> . If the rear window wipers stay on continuously, GO to <b><u>PINPOINT TEST H</u></b> .
B1245	Wiper Rear Motor Run Relay Circuit Short to Battery	GEM	Go to <b><u>PINPOINT TEST G</u></b> .
B1342	GEM is Defective	GEM	CLEAR the DTC. REPEAT the GEM self-test. INSTALL a new GEM. REFER to <b><u>MULTIFUNCTION ELECTRONIC MODULE</u></b> .
B1611	Wiper Rear Mode Select Switch Circuit Failure	GEM	Go to <b><u>PINPOINT TEST H</u></b> .

#### Symptom Chart

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Wipers and Washers - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>No communication with the generic electronic module (GEM)</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse 27 (10A).</li> <li>Circuitry.</li> <li>GEM.</li> </ul>	<ul style="list-style-type: none"> <li>REFER to the MULTIFUNCTION ELECTRONIC MODULES article.</li> </ul>
<ul style="list-style-type: none"> <li>The wipers are inoperative</li> </ul>	<ul style="list-style-type: none"> <li>CJB fuse 10 (20A).</li> <li>Circuitry.</li> <li>Multifunction switch.</li> <li>Windshield wiper motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test A.</u></li> </ul>
<ul style="list-style-type: none"> <li>The wipers stay on continuously</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Multifunction switch.</li> <li>Windshield wiper motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test B.</u></li> </ul>
<ul style="list-style-type: none"> <li>The high-speed wipers do not operate correctly</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Multifunction switch.</li> <li>Windshield wiper motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test C.</u></li> </ul>
<ul style="list-style-type: none"> <li>The low-speed wipers do not operate correctly</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Multifunction switch.</li> <li>Windshield wiper motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test D.</u></li> </ul>
<ul style="list-style-type: none"> <li>The intermittent wiper mode does not operate correctly</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Multifunction switch.</li> <li>Windshield wiper motor.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test E.</u></li> </ul>
<ul style="list-style-type: none"> <li>The wash and wipe function does not operate correctly</li> </ul>	<ul style="list-style-type: none"> <li>Multifunction switch.</li> </ul>	<ul style="list-style-type: none"> <li>CHECK the operation of the low-speed wipers. If the low-speed wipers do not operate correctly, <u>Go To Pinpoint Test D.</u> If the low-speed wipers operate correctly, INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article.</li> </ul>
<ul style="list-style-type: none"> <li>The wipers do not operate correctly in the mist position</li> </ul>	<ul style="list-style-type: none"> <li>Multifunction switch.</li> </ul>	<ul style="list-style-type: none"> <li>CHECK the operation of the low-speed wipers. If the low-speed wipers do not operate correctly, <u>Go To Pinpoint Test D.</u> If the low-speed wipers operate correctly, INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article.</li> </ul>
<ul style="list-style-type: none"> <li>The windshield washer pump is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Multifunction switch.</li> <li>Washer pump.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test E.</u></li> </ul>

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**Fig. 3: Symptom Chart (1 Of 2)**  
**Courtesy of FORD MOTOR CO.**



## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Wipers and Washers - Escape

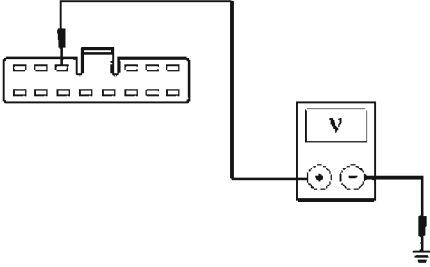
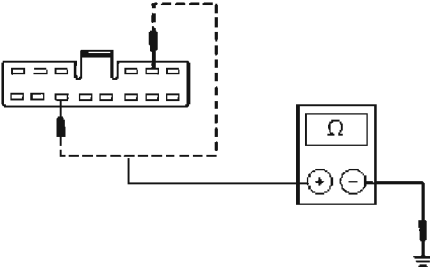
<ul style="list-style-type: none"><li>• The rear window wipers are inoperative</li></ul>	<ul style="list-style-type: none"><li>• Circuitry.</li><li>• Multifunction switch.</li><li>• Rear window wiper relay.</li><li>• Rear window wiper motor.</li><li>• CJB fuse 3 (10A).</li><li>• GEM.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test G.</u></li></ul>
<ul style="list-style-type: none"><li>• The rear window wipers stay on continuously</li></ul>	<ul style="list-style-type: none"><li>• Circuitry.</li><li>• Multifunction switch.</li><li>• Rear window wiper relay.</li><li>• Rear window wiper motor.</li><li>• GEM.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test H.</u></li></ul>
<ul style="list-style-type: none"><li>• The intermittent rear window wipers do not operate correctly</li></ul>	<ul style="list-style-type: none"><li>• Circuitry.</li><li>• Rear window multifunction motor.</li><li>• Multifunction switch.</li><li>• GEM.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test I.</u></li></ul>
<ul style="list-style-type: none"><li>• The rear window wipers do not park</li></ul>	<ul style="list-style-type: none"><li>• Circuitry.</li><li>• Rear window wiper motor.</li><li>• CJB.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test J.</u></li></ul>
<ul style="list-style-type: none"><li>• The rear window washer pump is inoperative</li></ul>	<ul style="list-style-type: none"><li>• Circuitry.</li><li>• CJB.</li><li>• Multifunction switch.</li><li>• Rear window washer pump.</li></ul>	<ul style="list-style-type: none"><li>• <u>Go To Pinpoint Test K.</u></li></ul>

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**Fig. 4: Symptom Chart (2 Of 2)**  
**Courtesy of FORD MOTOR CO.**

#### Pinpoint Tests

#### PINPOINT TEST A: THE WIPERS ARE INOPERATIVE

Test Step	Result / Action to Take
<b>A1 CHECK THE MULTIFUNCTION SWITCH CIRCUIT 950 (WH/BK) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Multifunction Switch C2081.</li> <li>Key in ON position.</li> <li>Measure the voltage between the multifunction switch C2081 pin 3, circuit 950 (WH/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to A2.</p> <p><b>No</b> REPAIR the supply circuit. TEST the system for normal operation.</p>
<b>A2 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between the multifunction switch C2081 pin 5, circuit 57 (BK), harness side and ground and between multifunction switch C2081 pin 9, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to A3.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<b>A3 CHECK THE MULTIFUNCTION SWITCH</b> <ul style="list-style-type: none"> <li>Carry out the multifunction switch component test.</li> </ul> <p>Refer to the COMPONENT TESTING article for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the multifunction switch OK?</li> </ul>	<p><b>Yes</b> GO to A4.</p> <p><b>No</b> INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article. TEST the system for normal operation.</p>

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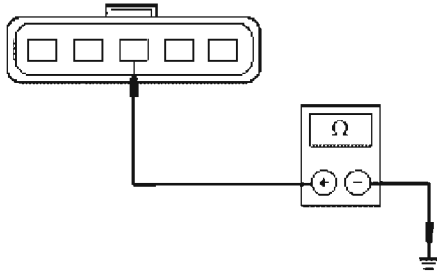
**Fig. 5: Pinpoint Test A: Wipers Are Inoperative (Step A1-A3)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Wipers and Washers - Escape

#### A4 CHECK CIRCUIT 571 (BK/OG) FOR AN OPEN

- Key in OFF position.
- Measure the resistance between the wiper motor C125 pin 3, circuit 571 (BK/OG), harness side and ground.



- Is the resistance less than 5 ohms?

#### Yes

CARRY OUT the windshield wiper motor component test. REFER to Windshield Wiper Motor component test.

#### No

REPAIR the circuit. TEST the system for normal operation.

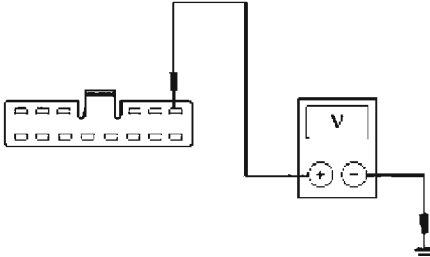
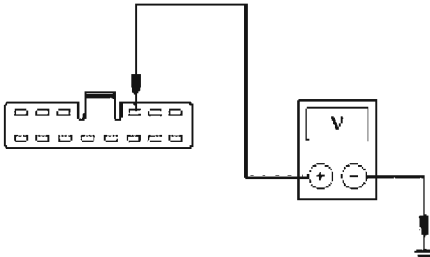
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**Fig. 6: Pinpoint Test A: Wipers Are Inoperative (Step A4)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST B: THE WIPERS STAY ON CONTINUOUSLY**

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Test Step	Result / Action to Take
<b>B1 CHECK THE MULTIFUNCTION SWITCH</b> <ul style="list-style-type: none"> <li>Disconnect: Multifunction Switch C2081.</li> <li>Key in ON position.</li> <li><b>Does the wiper motor continue to run?</b></li> </ul>	<p><b>Yes</b> GO to B2.</p> <p><b>No</b> INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article. TEST the system for normal operation.</p>
<b>B2 CHECK CIRCUIT 56 (DB/OG) FOR A SHORT TO VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Windshield Wiper Motor C125.</li> <li>Key in ON position.</li> <li>Measure the voltage between the multifunction switch C2081 pin 6, circuit 56 (DB/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is any voltage indicated?</li> </ul>	<p><b>Yes</b> REPAIR the circuit. TEST the system for normal operation.</p> <p><b>No</b> GO to B3.</p>
<b>B3 CHECK CIRCUIT 28 (BK/PK) FOR A SHORT TO VOLTAGE</b> <ul style="list-style-type: none"> <li>Measure the voltage between the multifunction switch C2081 pin 4, circuit 28 (BK/PK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is any voltage indicated?</li> </ul>	<p><b>Yes</b> REPAIR the circuit. TEST the system for normal operation.</p> <p><b>No</b> CARRY OUT the windshield wiper motor component test. REFER to <u>Windshield Wiper Motor</u> component test.</p>

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**Fig. 7: Pinpoint Test B: Wipers Stay On Continuously**  
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#### PINPOINT TEST C: THE HIGH-SPEED WIPERS DO NOT OPERATE CORRECTLY

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**Fig. 8: Pinpoint Test C: High-Speed Wipers Do Not Operate Correctly**  
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**PINPOINT TEST D: THE LOW-SPEED WIPERS DO NOT OPERATE CORRECTLY**

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**Fig. 9: Pinpoint Test D: Low-Speed Wipers Do Not Operate Correctly**  
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**PINPOINT TEST E: THE INTERMITTENT WIPER MODE DOES NOT OPERATE CORRECTLY**

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**Fig. 10: Pinpoint Test E: Intermittent Wiper Mode Does Not Operate Correctly**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST F: THE WINDSHIELD WASHER PUMP IS INOPERATIVE**

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**Fig. 11: Pinpoint Test F: Windshield Washer Pump Is Inoperative**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST G: THE REAR WINDOW WIPERS ARE INOPERATIVE**



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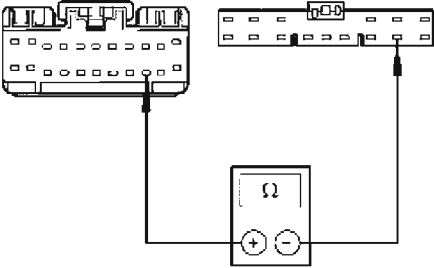
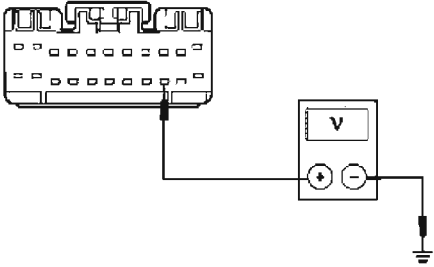
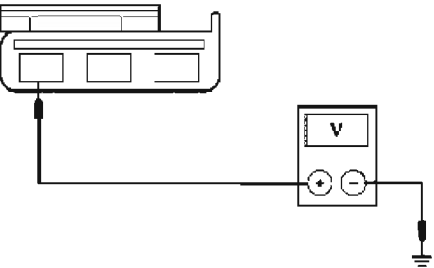
**Fig. 12: Pinpoint Test G: Rear Window Wipers Are Inoperative (Step G1-G3)**  
Courtesy of FORD MOTOR CO.

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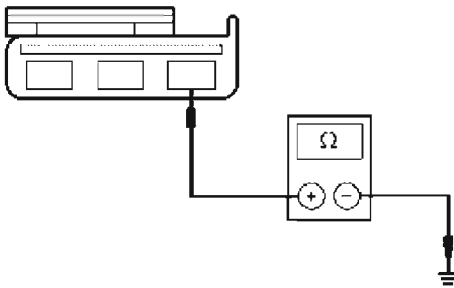
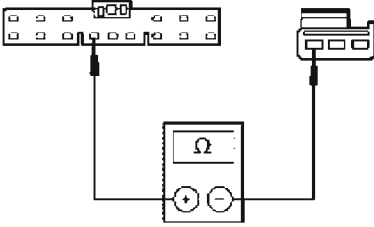
**Fig. 13: Pinpoint Test G: Rear Window Wipers Are Inoperative (Step G4-G6)**  
Courtesy of FORD MOTOR CO.

<p><b>G7 CHECK CIRCUIT 1359 (DG/VT) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the GEM C201a pin 20, circuit 1359 (DG/VT), harness side and CJB C270d pin 8, circuit 1359 (DG/VT), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> REPAIR/INSTALL a new CJB as necessary. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
<p><b>G8 CHECK CIRCUIT 1359 (DG/VT) FOR A SHORT TO VOLTAGE</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: C270d.</li> <li>Disconnect: GEM C201a.</li> <li>Key in ON position.</li> <li>Measure the voltage between the GEM C201a pin 20, circuit 1359 (DG/VT), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is any voltage indicated?</li> </ul>	<p><b>Yes</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to <u>G9</u>.</p>
<p><b>G9 CHECK CIRCUIT 411 (LB) FOR VOLTAGE</b></p> <ul style="list-style-type: none"> <li>Connect: GEM C201a.</li> <li>Disconnect: Rear Window Wiper Motor C476.</li> <li>Key in ON position.</li> <li>Using the GEM active command, command the rear window wiper relay ON.</li> <li>Measure the voltage between the rear window wiper motor C476 pin 3, circuit 411 (LB) harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>G10</u>.</p> <p><b>No</b> GO to <u>G11</u>.</p>

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**Fig. 14: Pinpoint Test G: Rear Window Wipers Are Inoperative (Step G7-G9)**

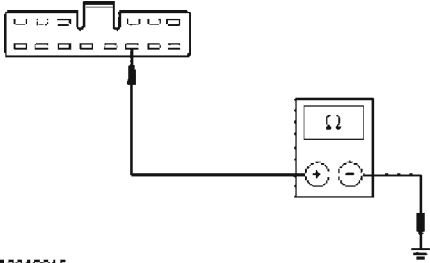
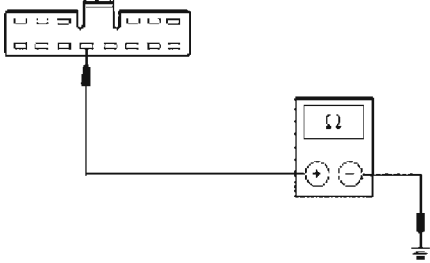
Courtesy of FORD MOTOR CO.

<p><b>G10 CHECK THE GROUND TO THE REAR WINDOW WIPER MOTOR 57 (BK)</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between the rear window wiper motor C476 pin 1, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new rear window wiper motor. REFER to <u>Rear Window Wiper Motor</u>. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
<p><b>G11 CHECK CIRCUIT 411 (LB) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: C270f.</li> <li>Measure the resistance between the rear window wiper motor C476 pin 3, circuit 411 (LB), harness side and CJB C270f pin 12, circuit 411 (BK/LB), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>G12</u>.</p> <p><b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
<p><b>G12 CHECK FOR CORRECT GEM OPERATION</b></p> <ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for:             <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li>Is the concern still present?</li> </ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to the MULTIFUNCTION ELECTRONIC MODULES article. CLEAR the DTCs. REPEAT the GEM self-test.</p> <p>If concern is still present after installation of a new GEM, INSTALL a new CJB. TEST the system for normal operation.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>

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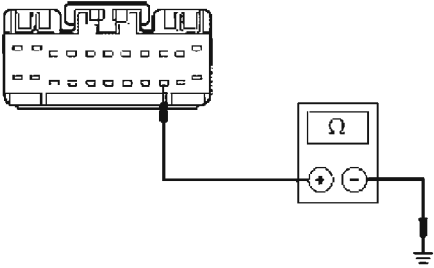
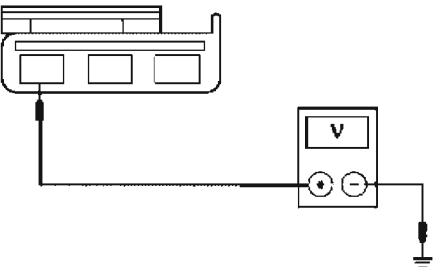
**Fig. 15: Pinpoint Test G: Rear Window Wipers Are Inoperative (Step G10-G12)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST H: THE REAR WINDOW WIPER STAYS ON CONTINUOUSLY**

Test Step	Result / Action to Take
<b>H1 CHECK THE GENERIC ELECTRONIC MODULE DIAGNOSTIC TROUBLE CODES (DTCS)</b> <ul style="list-style-type: none"> <li>Use the recorded results from the GEM continuous and on-demand self-test.</li> <li><b>Are any DTCs recorded?</b></li> </ul>	<b>Yes</b> If DTC B1611, GO to <u>H2</u> .  If DTC B1244, GO to <u>H4</u> .  <b>No</b> GO to <u>H6</u> .
<b>H2 CHECK THE MULTIFUNCTION SWITCH</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Multifunction Switch C2081.</li> <li>Key in ON position.</li> <li><b>Do the rear window wipers stop?</b></li> </ul>	<b>Yes</b> INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article. CLEAR the DTCs. REPEAT the self-test.  <b>No</b> GO to <u>H3</u> .
<b>H3 CHECK CIRCUITS 485 (PK/BK) AND 410 (WH/OG) FOR A SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: GEM C201a.</li> <li>Measure the resistance between the multifunction switch C2081 pin 12, circuit 485 (PK/BK), harness side and ground.</li> </ul>  <p>A0019815</p> <ul style="list-style-type: none"> <li>(Intermittent wipers) Measure the resistance between the multifunction switch C2081 pin 10 circuit 410 (WH/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Are the resistances greater than 10,000 ohms?</b></li> </ul>	<b>Yes</b> GO to <u>H6</u> .  <b>No</b> REPAIR the circuit (s) in question. CLEAR the DTCs. REPEAT the self-test.

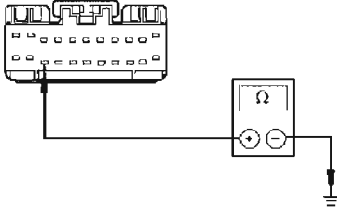
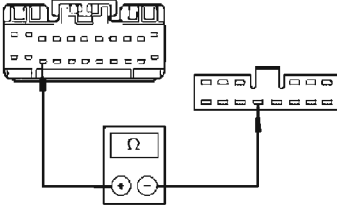
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**Fig. 16: Pinpoint Test H: Rear Window Wiper Stays On Continuously (Step H1-H3)**  
 Courtesy of FORD MOTOR CO.

<p><b>H4 CHECK CIRCUIT 1359 (DG/VT) FOR A SHORT TO GROUND</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: GEM C201a.</li> <li>• Disconnect: C270d.</li> <li>• Measure the resistance between GEM C201a pin 20, circuit 1359 (DG/VT), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to H5.</p> <p><b>No</b> REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
<p><b>H5 CHECK CIRCUIT 411 (LB) FOR A SHORT TO VOLTAGE</b></p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect: Rear Window Wiper Motor C476.</li> <li>• Disconnect: C270d.</li> <li>• Measure the voltage between the rear window wiper motor C476 pin 3, circuit 411 (LB) harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is any voltage indicated?</li> </ul>	<p><b>Yes</b> GO to H6.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>H6 CHECK FOR CORRECT GEM OPERATION</b></p> <ul style="list-style-type: none"> <li>• Disconnect all GEM connectors.</li> <li>• Check for: <ul style="list-style-type: none"> <li>• corrosion</li> <li>• pushed-out pins</li> </ul> </li> <li>• Connect all GEM connectors and make sure they seat correctly.</li> <li>• Operate the system and verify the concern is still present.</li> <li>• Is the concern still present?</li> </ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to the MULTIFUNCTION ELECTRONIC MODULES article. CLEAR the DTCs. REPEAT the GEM self-test.</p> <p>If concern is still present after installation of a new GEM, INSTALL a new CJB. TEST the system for normal operation.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>

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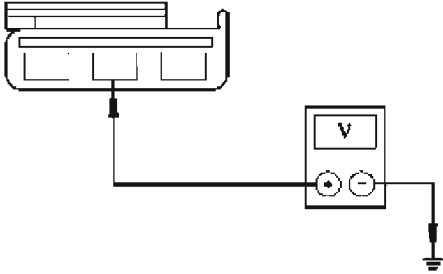
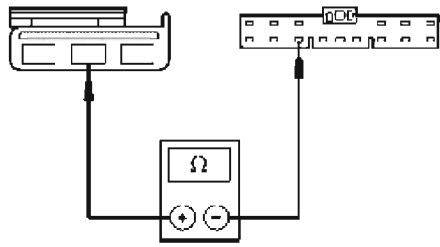
**PINPOINT TEST I: THE INTERMITTENT REAR WINDOW WIPERS DO NOT OPERATE CORRECTLY**

Test Step	Result / Action to Take
<b>I1 CHECK THE OPERATION OF THE REAR WINDOW WIPERS</b> <ul style="list-style-type: none"> <li>Check the operation of the rear window wipers in the ON mode.</li> <li>Do the rear window wipers operate correctly?</li> </ul>	<b>Yes</b> GO to I2. <b>No</b> Go To Pinpoint Test G..
<b>I2 CHECK THE MULTIFUNCTION SWITCH</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: GEM C201a.</li> <li>Place the multifunction switch in the INT position.</li> <li>Measure the resistance between the GEM C201a pin 14, circuit 410 (WH/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms or less?</li> </ul>	<b>Yes</b> GO to I4. <b>No</b> GO to I3.
<b>I3 CHECK CIRCUIT 410 (WH/OG) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Disconnect: Multifunction Switch C2081.</li> <li>Measure the resistance between the GEM C201a pin 14, circuit 410 (WH/OG), harness side and multifunction switch C2081 pin 10, circuit 410 (WH/OG), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<b>Yes</b> INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article. TEST the system for normal operation. <b>No</b> REPAIR the circuit. TEST the system for normal operation.
<b>I4 CHECK FOR CORRECT GEM OPERATION</b> <ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for:               <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li>Is the concern still present?</li> </ul>	<b>Yes</b> INSTALL a new GEM. REFER to the MULTIFUNCTION ELECTRONIC MODULES article. CLEAR the DTCs. REPEAT the GEM self-test. <b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

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**Fig. 18: Pinpoint Test I: Intermittent Rear Window Wipers Do Not Operate Correctly**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST J: THE REAR WINDOW WIPERS DO NOT PARK**

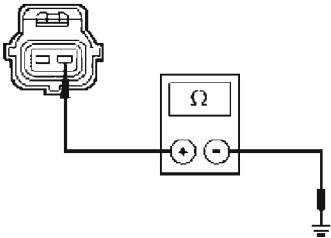
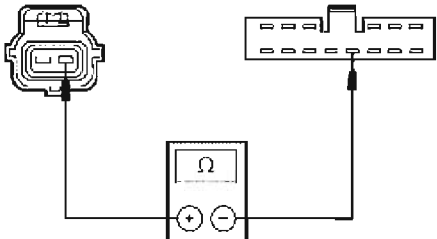
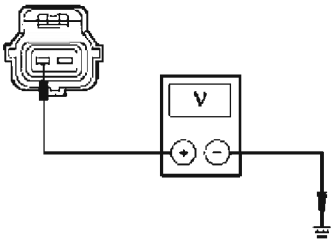
Test Step	Result / Action to Take
<b>J1 CHECK CIRCUIT 406 (BN) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Rear Window Wiper Motor C476.</li> <li>Key in ON position.</li> <li>Measure the voltage between the rear window wiper motor C476 pin 2, circuit 406 (BN), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> INSTALL a new rear window wiper motor. REFER to <u>Rear Window Wiper Motor</u>. TEST the system for normal operation.</p> <p><b>No</b> GO to <u>J2</u>.</p>
<b>J2 CHECK CENTRAL JUNCTION BOX (CJB) CIRCUIT 406 (BN/WH) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between the rear window wiper motor C476 pin 2, circuit 406 (BN), harness side and CJB C270f pin 13, circuit 406 (BN/WH), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> REPAIR the CJB as necessary. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 19: Pinpoint Test J: Rear Window Wipers Do Not Park**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST K: THE REAR WINDOW WASHER PUMP IS INOPERATIVE**



Test Step	Result / Action to Take
<b>K1 CHECK THE MULTIFUNCTION SWITCH GROUND</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Rear Window Washer Motor C476.</li> <li>Press the multifunction switch.</li> <li>Measure the resistance between the rear window washer motor C1097 pin 2, circuit 488 (DG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>K3</u>.</p> <p><b>No</b> GO to <u>K2</u>.</p>
<b>K2 CHECK CIRCUIT 488 (DG) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Disconnect: Multifunction Switch C2081.</li> <li>Measure the resistance between the rear window washer motor C1097 pin 2, circuit 488 (DG), harness side and multifunction switch C2081 pin 11, circuit 488 (DG), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new multifunction switch. REFER to the STEERING COLUMN SWITCHES article. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>K3 CHECK CIRCUIT 406 (BN/WH) FOR VOLTAGE</b> <ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Measure the voltage between the rear window washer motor C1097 pin 1, circuit 406 (BN/WH) harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> INSTALL a new rear window washer motor. REFER to <u>Rear Window Washer Pump</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the supply circuit. TEST the system for normal operation.</p>

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**Fig. 20: Pinpoint Test K: Rear Window Washer Pump Is Inoperative**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

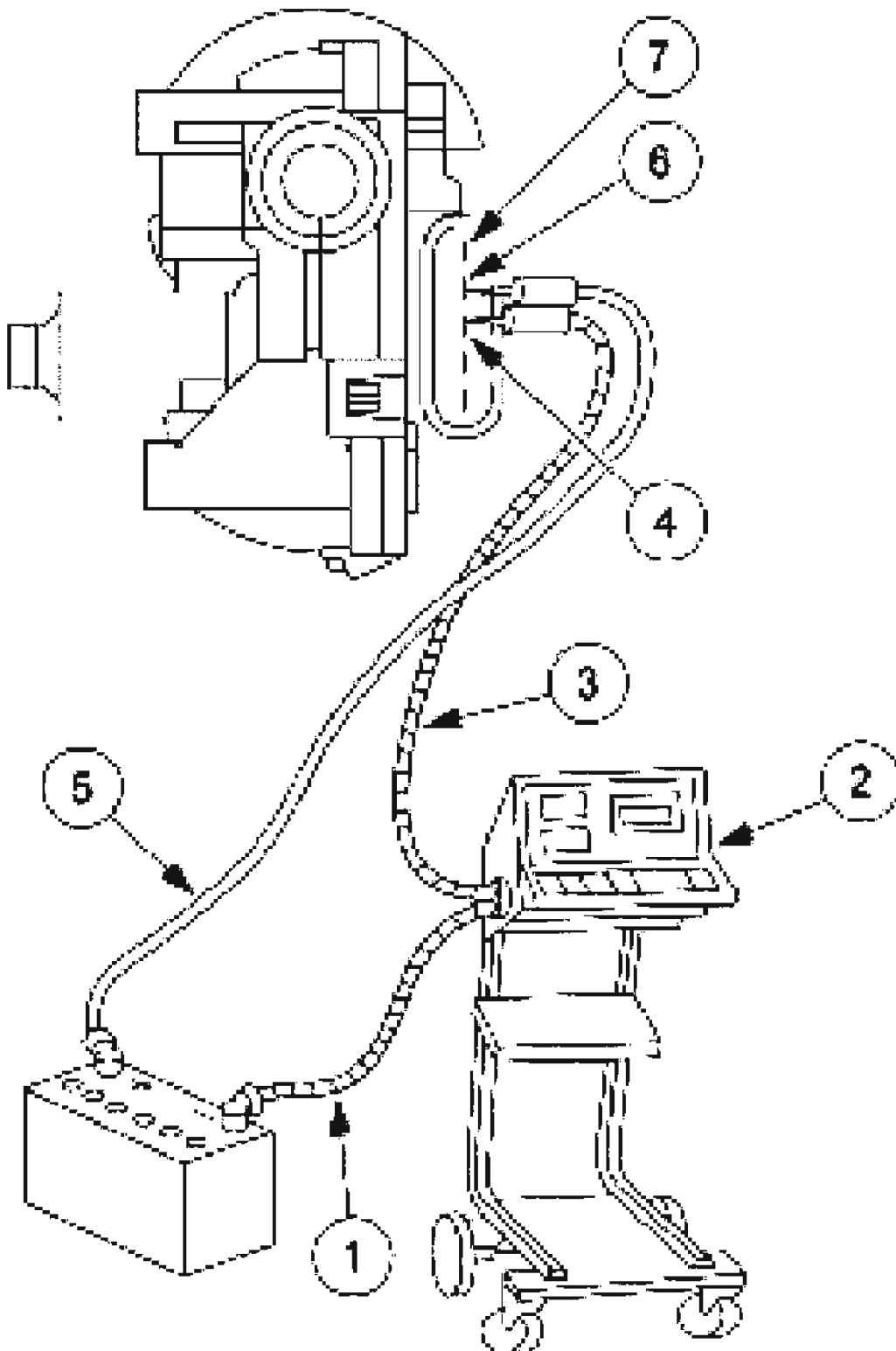
### 2004 ACCESSORIES & EQUIPMENT Wipers and Washers - Escape

#### Windshield Wiper Motor

Use an Alternator, Regulator, Battery and Starter Tester (ARBST) to test the wiper motor on the vehicle.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Wipers and Washers - Escape



**Fig. 21: Testing Wiper Motor On Vehicle**  
Courtesy of FORD MOTOR CO.

To test the wiper motor, disconnect the windshield wiper mounting arm and pivot shaft from the windshield wiper motor; refer to WIPER PIVOT ARM - FRONT or WIPER PIVOT ARM - REAR.

Disconnect the wiper motor. Connect the (1) green lead from (2) Alternator, Regulator, Battery and Starter Tester (ARBST) to the battery negative (-) post. Connect the (3) red lead from ARBST to the wiper motor (4) common brush terminal (terminal 3).

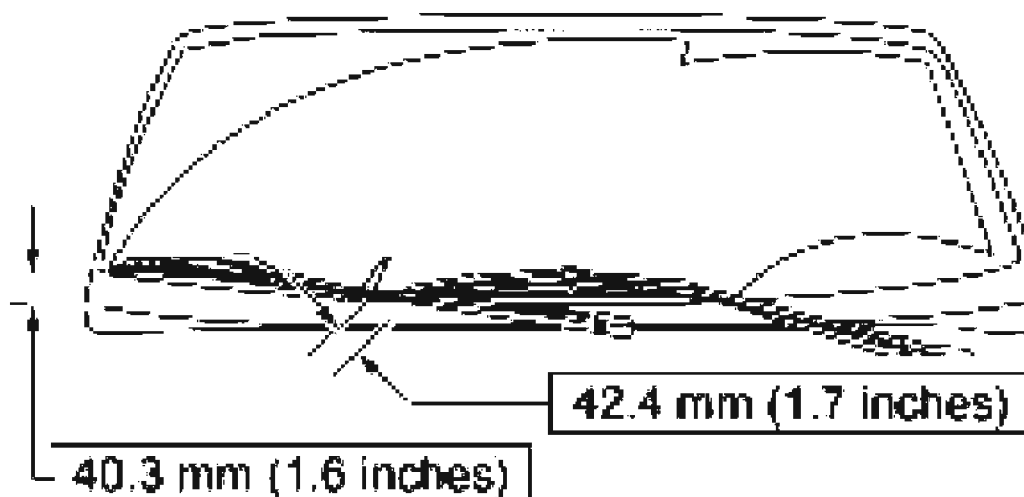
Test the low-speed mode by connecting a (5) cable from the battery positive (+) post to the (6) low-speed brush terminal (terminal 4) and measure the current draw. If the current draw is greater than 3.5 amperes, install a new windshield wiper motor.

Test the high-speed mode by connecting a cable from the battery positive (+) post to the (7) high-speed brush terminal (terminal 5) and measure the current draw. If the current draw is greater than 5.5 amperes, install a new wiper motor.

## GENERAL PROCEDURES

### WINDSHIELD WIPER BLADE AND PIVOT ARM ADJUSTMENT

1. Cycle and park the windshield wipers
2. Verify that the RH and LH wiper blades are located at the specified position.

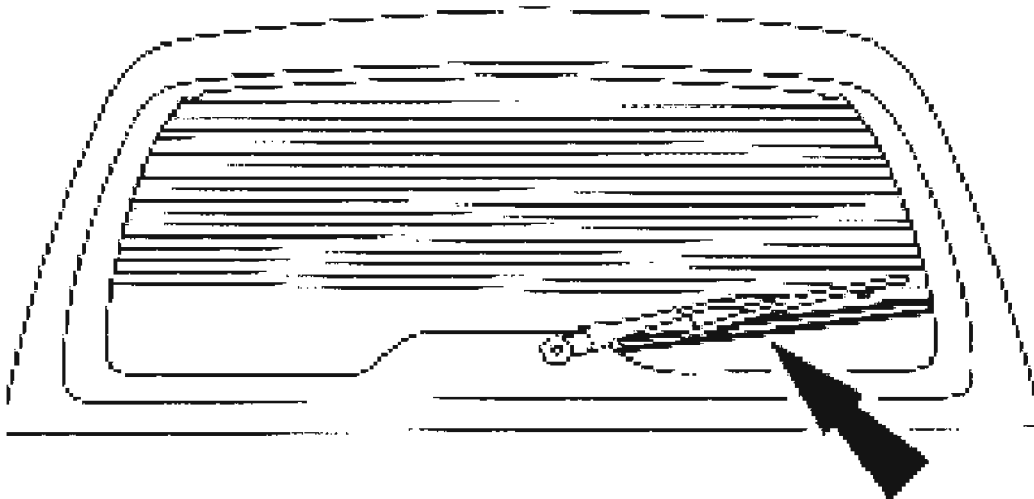


**Fig. 22: Identifying RH And LH Wiper Blades Are Located At Specified Position**  
Courtesy of FORD MOTOR CO.

3. If not within specification, remove the windshield wiper pivot arms and reposition to the correct locations; refer to **WIPER PIVOT ARM - FRONT** .

#### **REAR WINDOW WIPER BLADE AND PIVOT ARM ADJUSTMENT**

1. Cycle and park the rear window wiper.
2. Verify that the rear window wiper blade is located at the specified position.



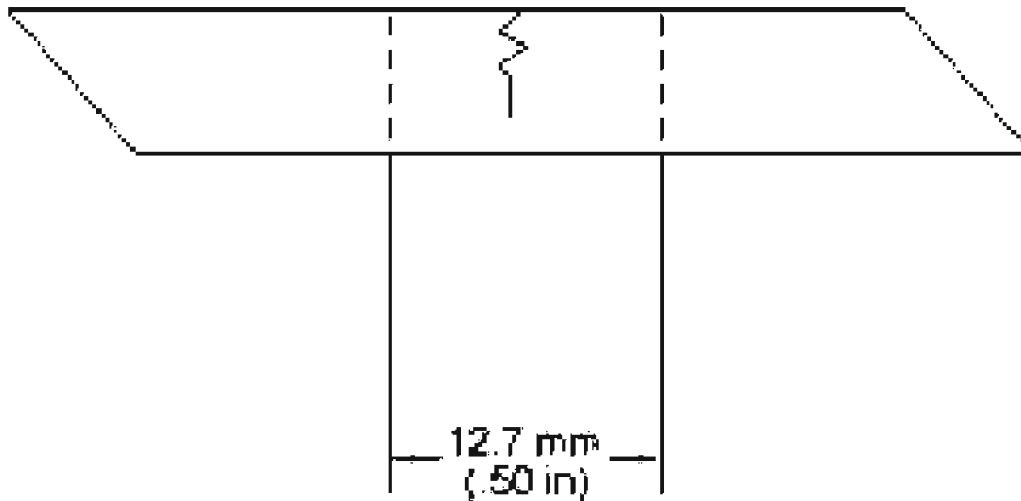
G02743399

**Fig. 23: Identifying Rear Window Wiper Blade Location**  
Courtesy of FORD MOTOR CO.

3. If not within specification, remove the rear window wiper pivot arm and reposition to the correct location; refer to **WIPER PIVOT ARM - REAR** .

#### **WASHER HOSE REPAIR**

1. Locate and verify the leaking washer hose.
2. Cut the hose cleanly and remove the damaged portion of the washer hose.



G02743400

**Fig. 24: Identifying Washer Hose Cut**  
Courtesy of FORD MOTOR CO.

3. Install a windshield washer hose adapter between the cut ends of the hose.

**NOTE:** In difficult cases, clamping may be required.

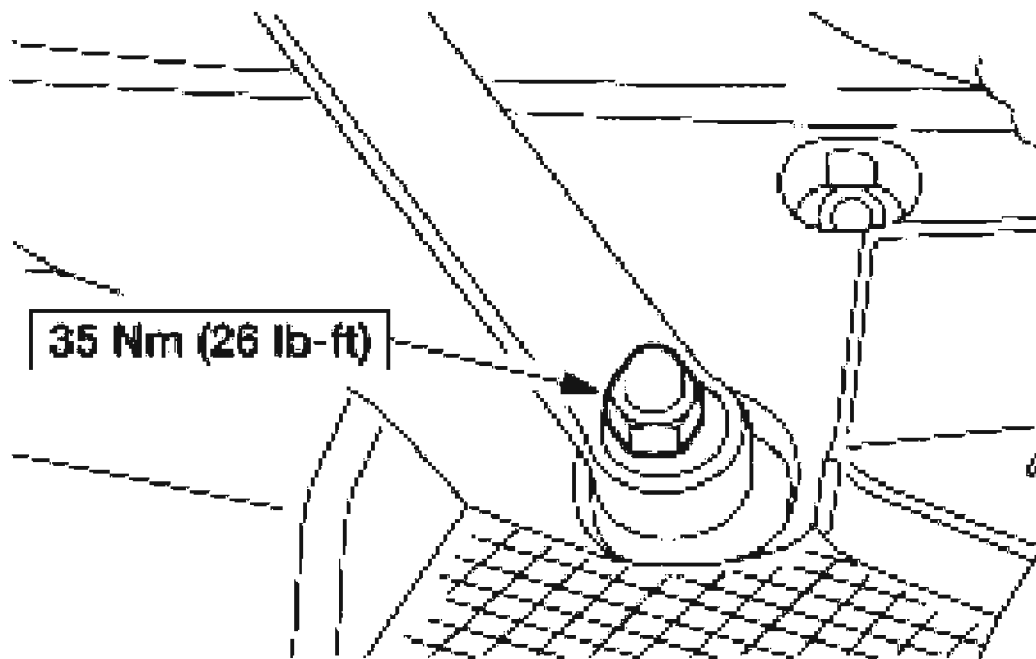
4. Install a segment of 6.4 mm (0.25 in) i.d. black rubber hose over the ends of the washer hose, and clamp both ends of the rubber hose using spring clamps.

## REMOVAL AND INSTALLATION

### WIPER PIVOT ARM - FRONT

#### Removal and Installation

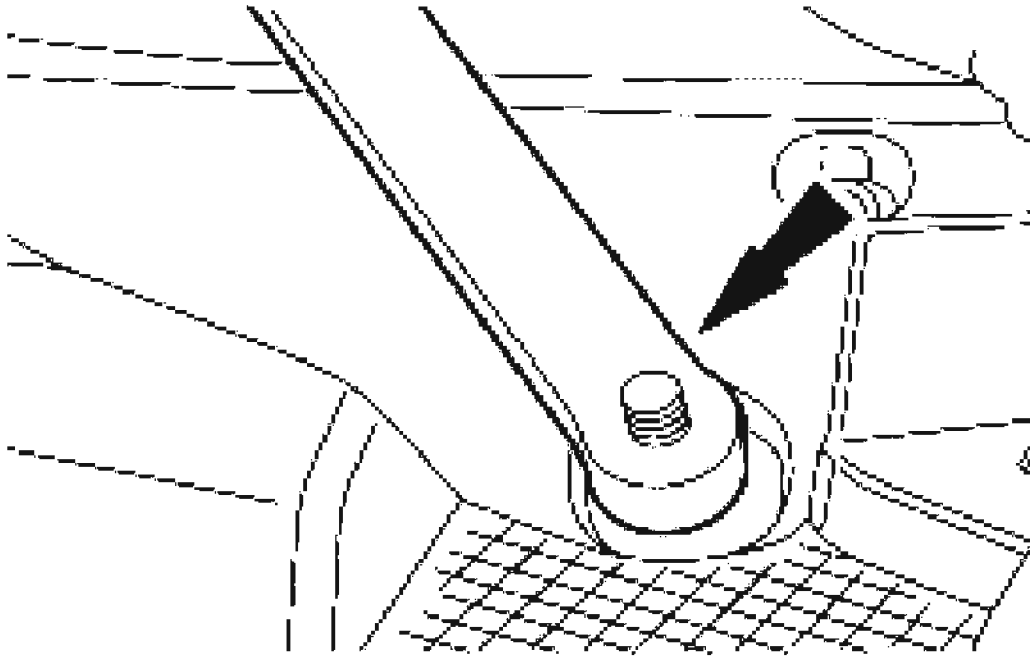
1. Remove the pivot arm nut.



G02743401

**Fig. 25: Removing Pivot Arm Nut**  
Courtesy of FORD MOTOR CO.

2. Remove the windshield wiper pivot arm.



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**Fig. 26: Removing Windshield Wiper Pivot Arm**  
Courtesy of FORD MOTOR CO.

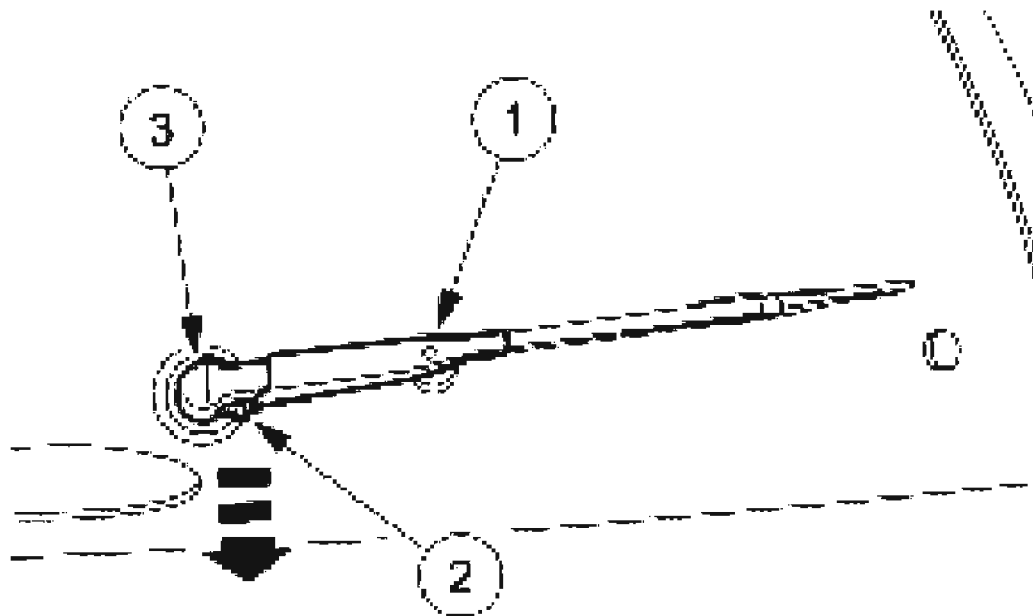
3. To install, reverse the removal procedure.
  - Adjust the windshield wiper pivot arms. For additional information, refer to **WINDSHIELD WIPER BLADE AND PIVOT ARM ADJUSTMENT**.

## **WIPER PIVOT ARM - REAR**

### **Removal and Installation**

1. Remove the pivot arm.
  1. Lift pivot arm to the upright position.
  2. Slide the locking tab out.
  3. Pull up and remove the pivot arm.





G02743403

**Fig. 27: Removing Pivot Arm**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.
  - Adjust the windshield wiper pivot arm. For additional information, refer to **REAR WINDOW WIPER BLADE AND PIVOT ARM ADJUSTMENT** .

## **WIPER MOUNTING ARM AND PIVOT SHAFT**

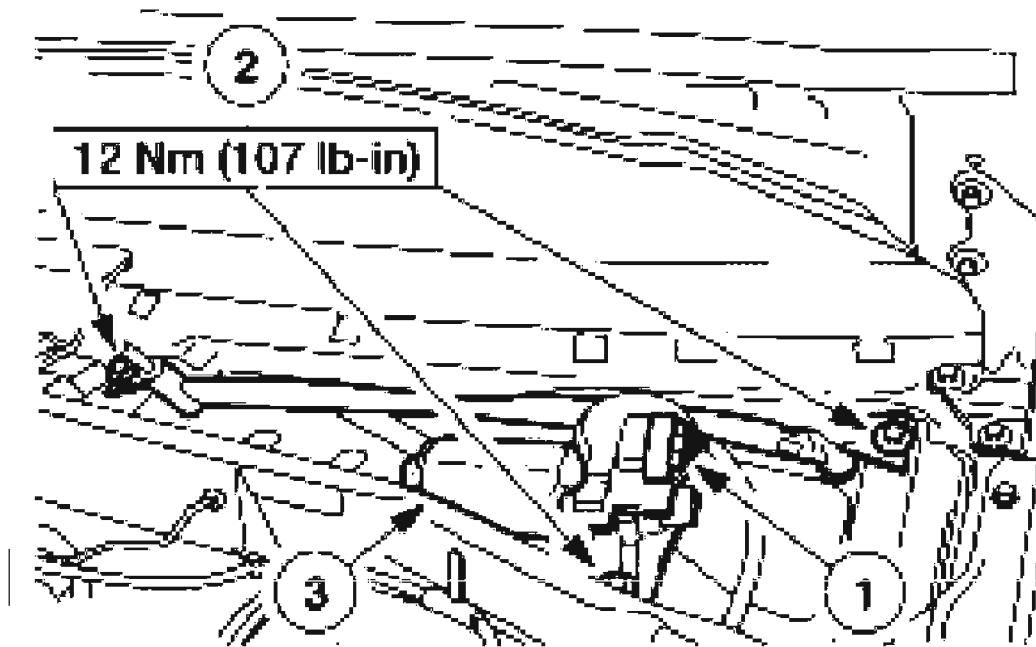
### **Removal and Installation**

1. refer to **WINDSHIELD WIPER MOTOR** .

## **WINDSHIELD WIPER MOTOR**

### **Removal and Installation**

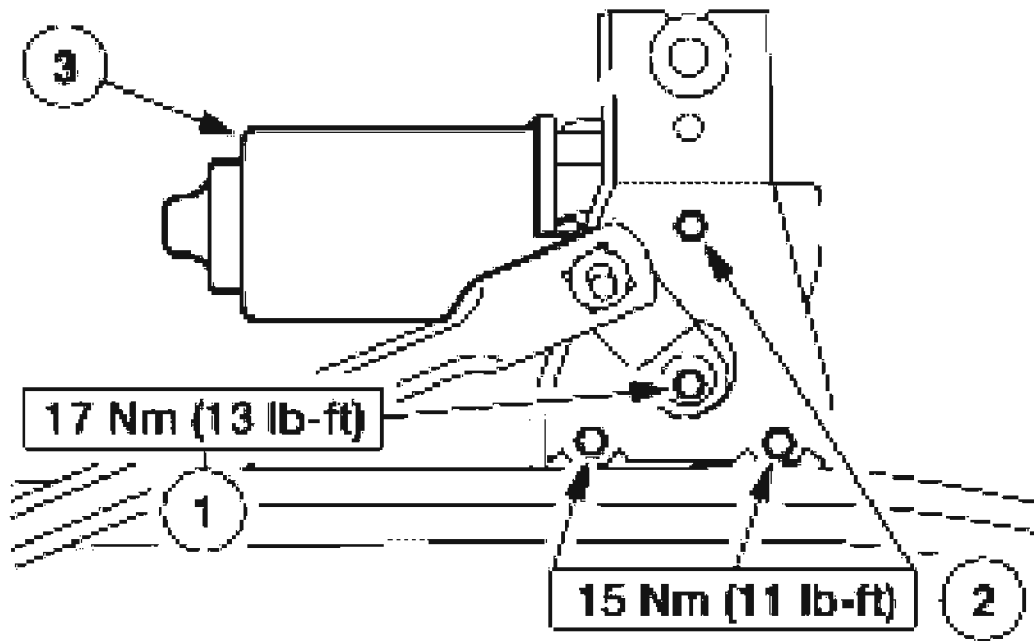
1. Remove the cowl top vent panels; refer to **FRONT END BODY PANELS** .
2. Remove the wiper mounting arm and pivot shaft.
  1. Disconnect the electrical connector.
  2. Remove the bolts.
  3. Remove the wiper mounting arm and pivot shaft.



G02743404

**Fig. 28: Removing Wiper Mounting Arm And Pivot Shaft**  
Courtesy of FORD MOTOR CO.

3. Remove the windshield wiper motor.
  1. Remove the bolt and windshield wiper motor linkage.
  2. Remove the windshield wiper motor mounting bolts.
  3. Remove the windshield wiper motor.



G02743405

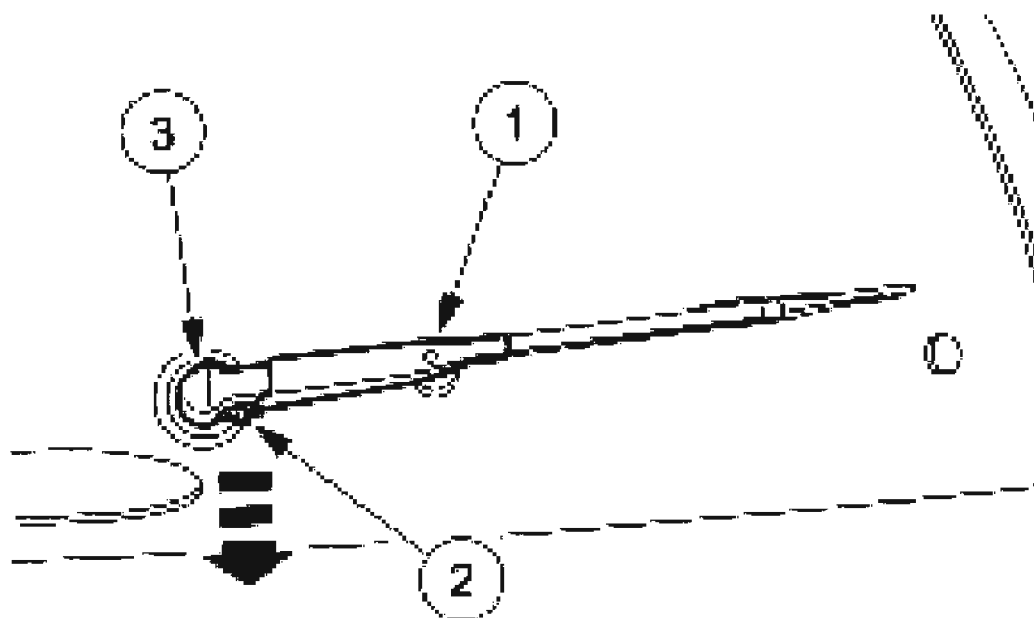
**Fig. 29: Removing Windshield Wiper Motor**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## REAR WINDOW WIPER MOTOR

### Removal and Installation

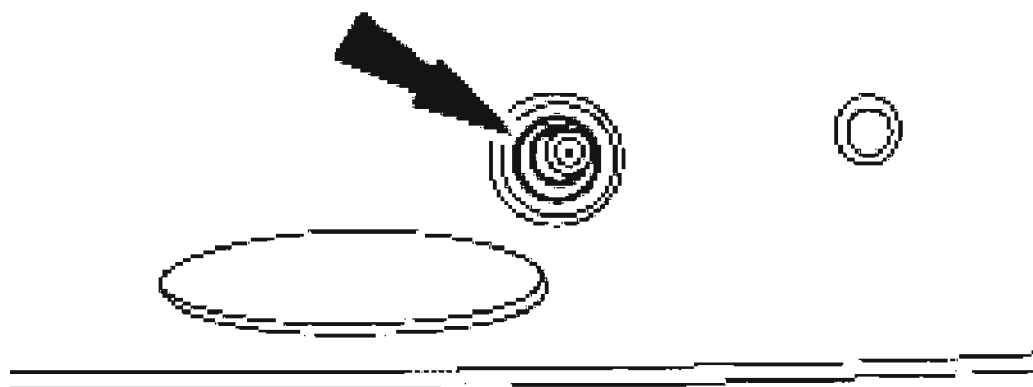
1. Remove the pivot arm.
  1. Lift pivot arm to the upright position.
  2. Slide the locking tab out.
  3. Pull up and remove the pivot arm.



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**Fig. 30: Removing Pivot Arm**  
Courtesy of FORD MOTOR CO.

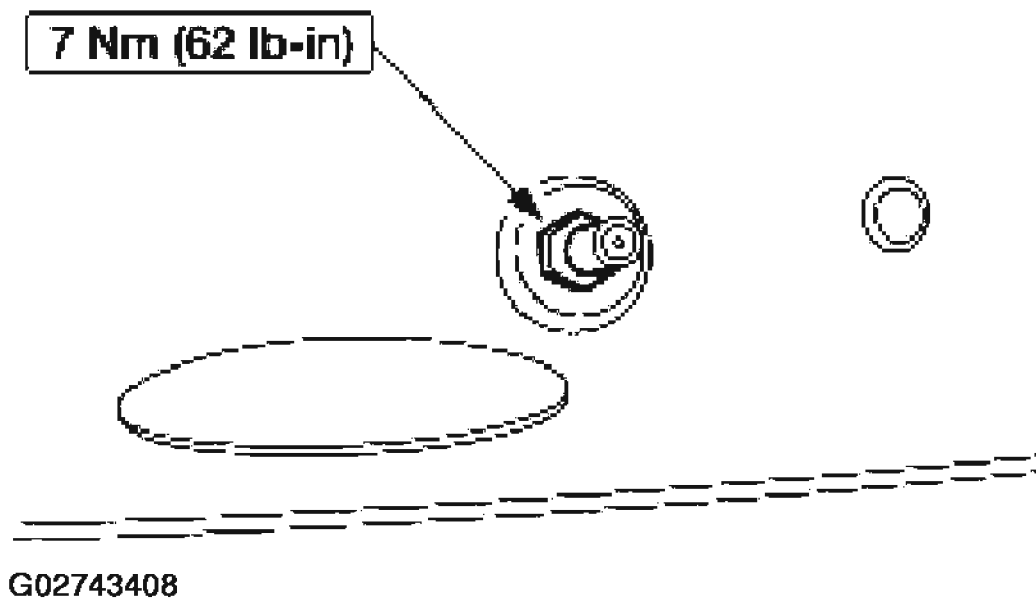
2. Remove the rear wiper motor shaft nut cover.



G02743407

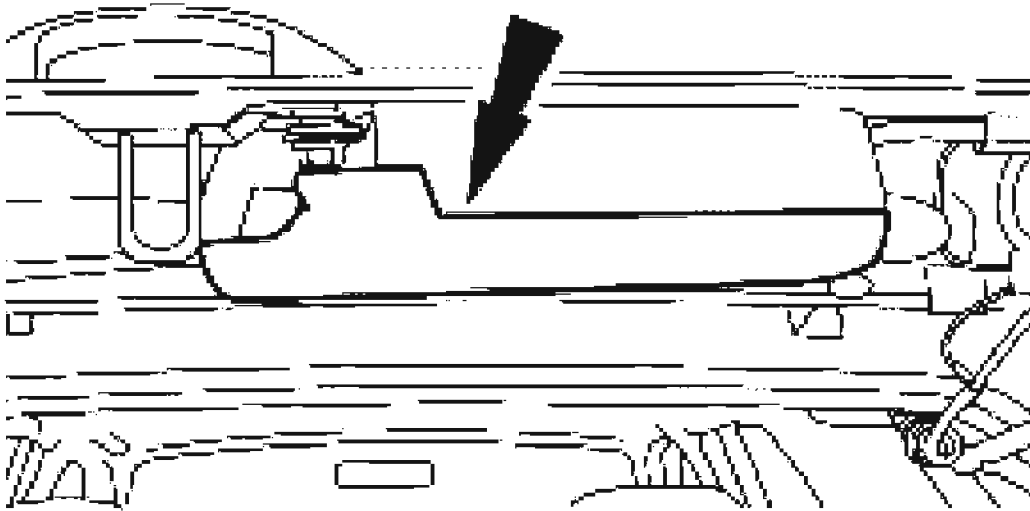
**Fig. 31: Removing Rear Wiper Motor Shaft Nut Cover**  
Courtesy of FORD MOTOR CO.

3. Remove the rear wiper motor shaft nut.



**Fig. 32: Removing Rear Wiper Motor Shaft Nut**  
Courtesy of FORD MOTOR CO.

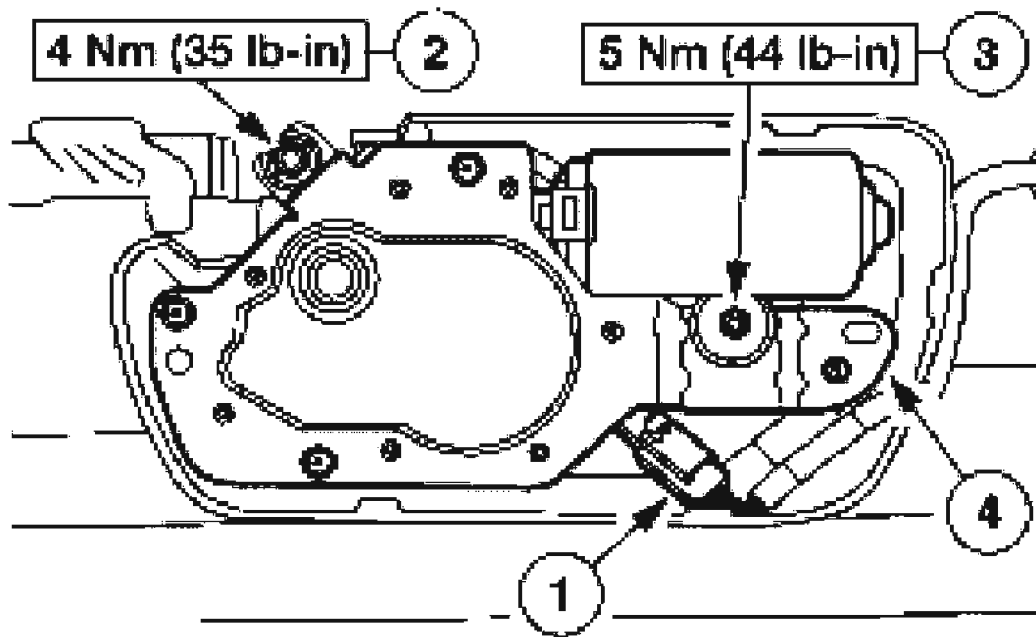
4. Open the liftgate.
5. Remove the rear wiper motor plastic cover.



G02743409

**Fig. 33: Removing Rear Wiper Motor Plastic Cover**  
Courtesy of FORD MOTOR CO.

6. Remove rear wiper motor.
  1. Disconnect the electrical connector.
  2. Remove the nut.
  3. Remove the bolt.
  4. Remove the rear wiper motor.



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**Fig. 34: Removing Rear Wiper Motor**  
Courtesy of FORD MOTOR CO.

7. To install, reverse the removal procedure.

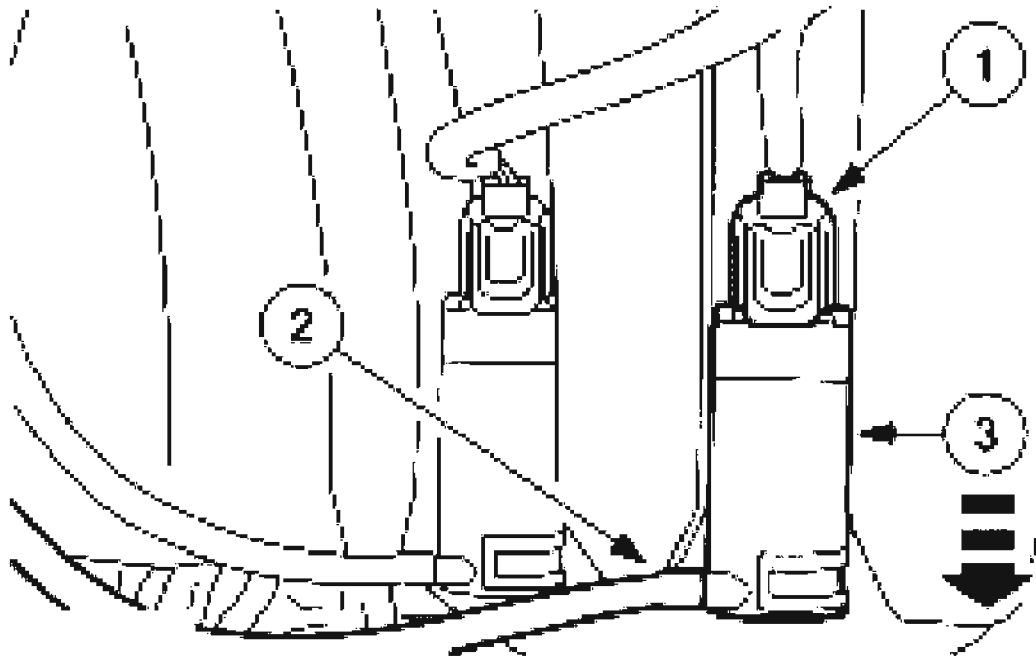
## WINDSHIELD WASHER PUMP

### Removal and Installation

1. Remove the RH front wheel and tire assembly.
2. Remove the RH front splash shield.

**WARNING:** Windshield washer solution contains methanol, which is poisonous. Observe all cautions and warnings indicated on the label of the washer solution container. Failure to follow these instructions may result in personal injury.

**NOTE:** To prevent spilling windshield washer fluid, drain the windshield washer reservoir before washer pump removal.



G02743411

**Fig. 35: Removing Windshield Washer Pump**  
Courtesy of FORD MOTOR CO.

3. Remove the windshield washer pump.
  1. Disconnect the electrical connector.
  2. Disconnect the hose.
  3. Remove the windshield washer pump.

**CAUTION:** Do not operate the windshield washer pump prior to filling the windshield washer reservoir to prevent component damage. Failure to follow these instructions may result in personal injury.

4. To install, reverse the removal procedure.

**WARNING:** Windshield washer solution contains methanol, which is poisonous. Observe all cautions and warnings indicated on the label of the washer solution container.

- Fill the windshield washer reservoir with Ultra-Clear Windshield Washer



Concentrate C9AZ-19550-AC or BC or equivalent meeting Ford specification ESR-M17P5-A.

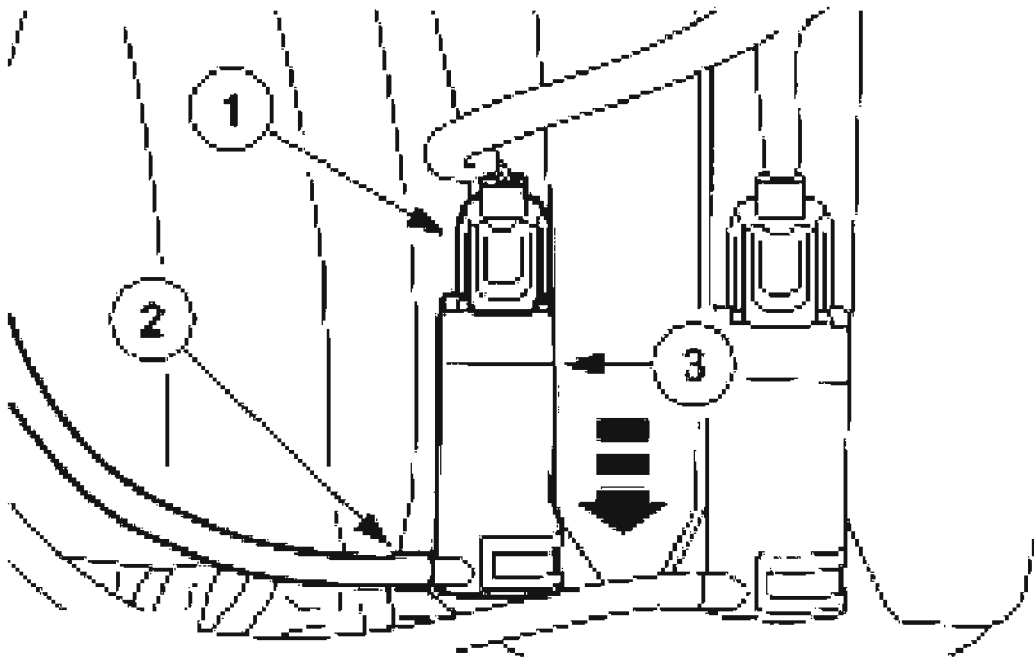
## REAR WINDOW WASHER PUMP

### Removal and Installation

1. Remove the RH front wheel and tire assembly.
2. Remove the RH front splash shield.

**WARNING:** Windshield washer solution contains methanol, which is poisonous. Observe all cautions and warnings indicated on the label of the washer solution container. Failure to follow these instructions may result in personal injury.

**NOTE:** To prevent spilling windshield washer fluid, drain the windshield washer reservoir before washer pump removal.



G02743412

**Fig. 36: Removing Windshield Washer Pump**  
Courtesy of FORD MOTOR CO.

3. Remove the windshield washer pump.
  1. Disconnect the electrical connector.
  2. Disconnect the hose.
  3. Remove the windshield washer pump.

**CAUTION:** Do not operate the windshield washer pump prior to filling the windshield washer reservoir.

4. To install, reverse the removal procedure.

**WARNING:** Windshield washer solution contains methanol, which is poisonous. Observe all cautions and warnings indicated on the label of the washer solution container. Failure to follow these instructions may result in personal injury.

- Fill the windshield washer reservoir with Ultra-Clear Windshield Washer Concentrate C9AZ-19550-AC or BC or equivalent meeting Ford specification ESR-M17P5-A.

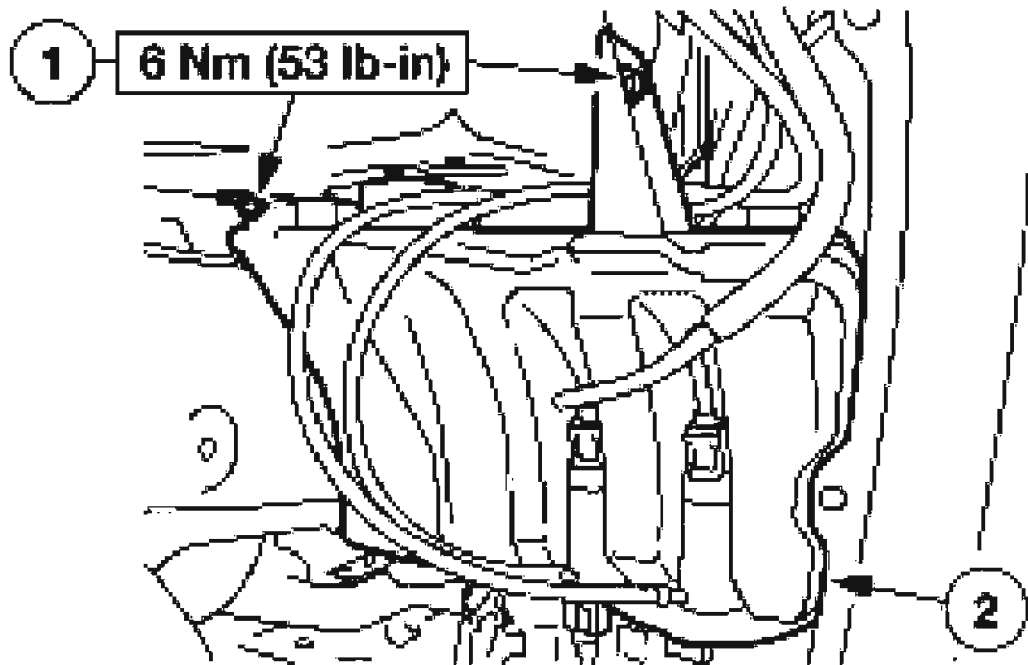
## WASHER PUMP AND RESERVOIR

### Removal and Installation

1. Remove the right front wheel and tire assembly.
2. Remove the right front splash shield.

**WARNING:** Windshield washer solution contains methanol, which is poisonous. Observe all cautions and warnings indicated on the label of the washer solution container. Failure to follow these instructions may result in personal injury.

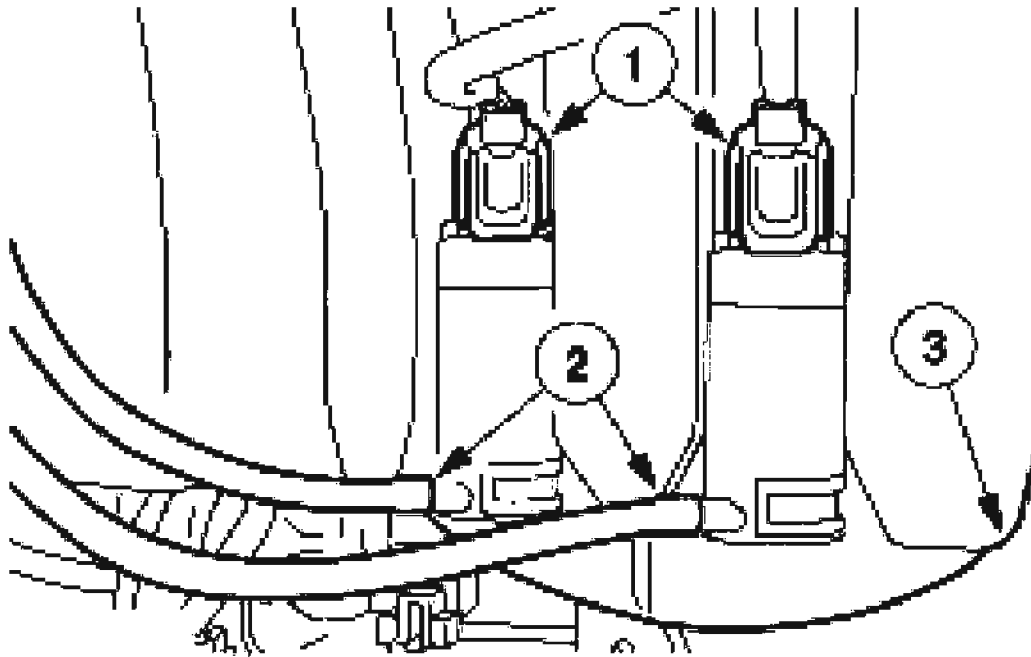
**NOTE:** To prevent spilling windshield washer fluid, drain the windshield washer reservoir before removal.



G02743413

**Fig. 37: Positioning Windshield Washer Reservoir**  
**Courtesy of FORD MOTOR CO.**

3. Position the windshield washer reservoir aside.
  1. Remove the bolts.
  2. Position the windshield washer reservoir aside.
4. Remove the windshield washer reservoir.
  1. Disconnect the electrical connectors.
  2. Disconnect the hoses.
  3. Remove the windshield washer reservoir.



G02743414

**Fig. 38: Removing Windshield Washer Reservoir**  
Courtesy of FORD MOTOR CO.

**CAUTION:** Do not operate the windshield washer pump prior to filling the windshield washer reservoir.

5. To install, reverse the removal procedure.

**WARNING:** Windshield washer solution contains methanol, which is poisonous. Observe all cautions and warnings indicated on the label of the washer solution container. Failure to follow these instructions may result in personal injury.

- Fill the windshield washer reservoir with Ultra-Clear Windshield Washer Concentrate C9AZ-19550-AC or BC or equivalent meeting Ford specification ESR-M17P5-A.

**2004 ACCESSORIES & EQUIPMENT****Exterior Lighting - Escape****SPECIFICATIONS****TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

Description	Nm	lb-in
Headlamp bolts and nut	5	44
Inner fender well bolts	8	71

**DESCRIPTION AND OPERATION****EXTERIOR LIGHTING**


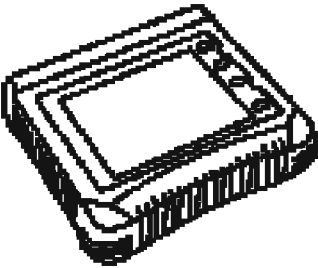
The exterior lighting consists of the following:

- headlamps
- side lamps/front turn signal lamps
- rear lamps
- high-mounted stoplamps
- fog lamps
- parking lamps
- license plate lamps
- reversing lamps
- side repeater lamps
- brake pedal position (BPP) switch
- fog lamp switch
- multifunction switch
- autolamp switch (integral to the interior rear view mirror)
- photocell sensor (integral to the interior rear view mirror)

The headlamp switch is integrated into the multifunction switch. For additional information, refer to **STEERING COLUMN SWITCHES**

**DIAGNOSIS AND TESTING****HEADLAMPS**

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

	73III Automotive Meter 105-R0057 or equivalent
	Worldwide Diagnostic System (WDS) 418-F224,  New Generation STAR (NGS) Tester 418-F052, or equivalent diagnostic tool

G02742734

**Fig. 1: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

**Inspection and Verification**

1. Verify the customer concern by operating the headlamps.
2. Visually inspect for obvious signs of mechanical and electrical damage; refer to the following chart:

Mechanical	Electrical
<ul style="list-style-type: none"> <li>Steering column multifunction switch</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuses:               <ul style="list-style-type: none"> <li>2 (15A)</li> <li>3 (15A)</li> <li>12 (15A)</li> <li>15 (15A)</li> </ul> </li> <li>Central junction box (CJB) fuse:               <ul style="list-style-type: none"> <li>16 (10A)</li> </ul> </li> <li>Circuitry</li> <li>Connectors</li> <li>Headlamp bulb</li> </ul>

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**Fig. 2: Visual Inspection Chart**  
**Courtesy of FORD MOTOR CO.**

- If the inspection reveals obvious concern(s) that can be readily identified, repair as necessary.
- If the cause of the fault is not visually evident, proceed to the diagnostic tool diagnostics.
- If the concern remains after the inspection, connect the diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
  - check that the program card is correctly installed.
  - check the connections to the vehicle.
  - check the ignition switch position.
- If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool manual.
- Carry out the DATA LINK DIAGNOSTIC TEST. If the diagnostic tool responds with:
  - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to **MODULE COMMUNICATIONS NETWORK**.
  - NO RESP/NOT EQUIP for hybrid electronic cluster (instrument cluster), refer to **INSTRUMENT CLUSTER**.
  - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the instrument cluster.
- If the DTCs retrieved are related to the concern, go to the **GEM DIAGNOSTIC TROUBLE CODE (DTC) INDEX** to continue diagnostics.
- If no DTCs related to the concern are retrieved, proceed to the **SYMPTOM CHART** to continue diagnostics.

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

#### GEM Diagnostic Trouble Code (DTC) Index

#### GEM DIAGNOSTIC TROUBLE CODE (DTC) INDEX

DTC	Description	Source	Action
B1342	ECU is Defective	GEM	CLEAR the DTCs. RETRIEVE the DTCs. If DTC B1342 is retrieved, INSTALL a new GEM. REFER to <b>MULTIFUNCTION ELECTRONIC MODULE</b> .
B1470	Lamp Headlamp Input Circuit Failure	GEM	Go to <b>PINPOINT TEST A</b> .
B2598	Headlamp Relay Circuit Failure	GEM	Go to <b>PINPOINT TEST A</b> .

#### Symptom Chart

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>Both headlamps are inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuses: <ul style="list-style-type: none"> <li>2 (15A).</li> <li>3 (15A).</li> </ul> </li> <li>Circuitry.</li> <li>Steering column multifunction switch.</li> <li>Headlamp relay.</li> <li>Headlamp bulbs.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test A.</u></li> </ul>
<ul style="list-style-type: none"> <li>The low beam headlamp is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Steering column multifunction switch.</li> <li>Headlamp bulbs.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test B.</u></li> </ul>
<ul style="list-style-type: none"> <li>The high beams are inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Steering column multifunction switch.</li> <li>Headlamp bulbs.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test C.</u></li> </ul>
<ul style="list-style-type: none"> <li>One low beam headlamp is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Headlamp bulb.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test D.</u></li> </ul>
<ul style="list-style-type: none"> <li>One high beam headlamp is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Headlamp bulb.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test E.</u></li> </ul>
<ul style="list-style-type: none"> <li>The headlamps are on continuously</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Steering column multifunction switch.</li> <li>Relay.</li> <li>GEM.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test F.</u></li> </ul>
<ul style="list-style-type: none"> <li>The flash-to-pass feature is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Steering column multifunction switch.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test G.</u></li> </ul>

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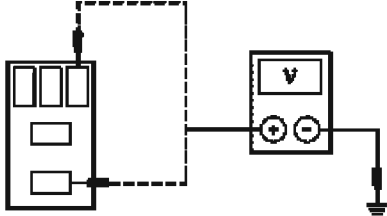
**Fig. 3: Problem Symptom Chart**



Courtesy of FORD MOTOR CO.

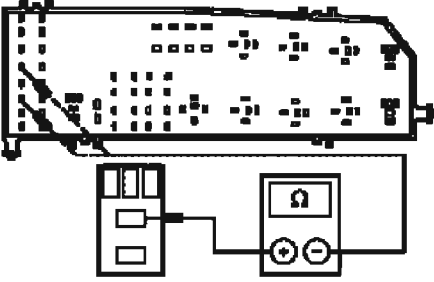
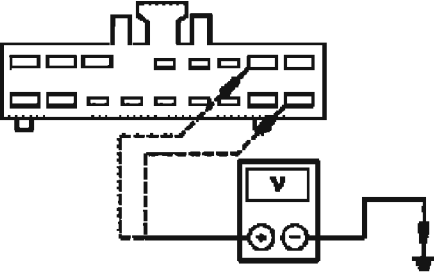
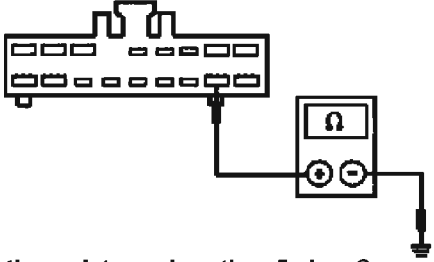
### Pinpoint Tests

#### PINPOINT TEST A: BOTH HEADLAMPS ARE INOPERATIVE

Test Step	Result / Action to Take
<b>A1 CHECK THE HEADLAMP RELAY OPERATION</b>	
<ul style="list-style-type: none"> <li>Key in ON position.</li> <li>Turn the steering column multifunction switch to the flash-to-pass position.</li> <li><b>Does the flash-to-pass operate correctly?</b></li> </ul>	<p><b>Yes</b> GO to <u>A7</u>.</p> <p><b>No</b> GO to <u>A2</u>.</p>
<b>A2 CHECK POWER TO THE HEADLAMP RELAY</b>	
<ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Headlamp Relay C1103.</li> <li>Measure the voltage between the headlamp relay C1103 pin 1, harness side and ground; and between the headlamp relay C1103 pin 3, harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Are the voltages greater than 10 volts?</b></li> </ul>	<p><b>Yes</b> GO to <u>A3</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
<b>A3 CHECK THE HEADLAMP RELAY</b>	
<ul style="list-style-type: none"> <li>Carry out the headlamp relay component test.</li> </ul> <p>Refer to Wiring Diagrams Cell <u>149</u> for schematic and connector information.</p> <p>Component test: Micro Relay Test.</p> <ul style="list-style-type: none"> <li><b>Is the relay OK?</b></li> </ul>	<p><b>Yes</b> GO to <u>A4</u>.</p> <p><b>No</b> INSTALL a new headlamp relay. TEST the system for normal operation.</p>

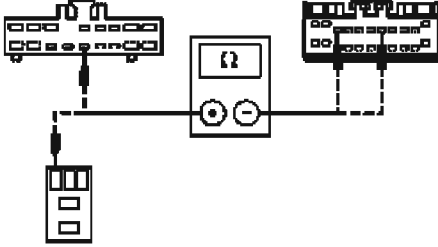
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**Fig. 4: Pinpoint Test A Chart - Both Headlamps Are Inoperative (A1-A3)**  
Courtesy of FORD MOTOR CO.

<p><b>A4 CHECK CIRCUIT 1335 (YE/WH) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: LH Headlamp Fuse 2 (15A).</li> <li>• Disconnect: RH Headlamp Fuse 3 (15A).</li> <li>• Measure the resistance between the headlamp relay C1103 pin 5, circuit 1335 (YE/WH), harness side and LH headlamp fuse F2 (15A), harness side; and between the headlamp relay C1103 pin 5, circuit 1335 (YE/WH), harness side and RH headlamp fuse F3 (15A), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> REINSTALL the headlamp fuses and headlamp relay. GO to <b>A5</b>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>A5 CHECK VOLTAGE TO MULTIFUNCTION SWITCH</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Steering Column Multifunction Switch C2080.</li> <li>• Measure the voltage between the steering column multifunction switch C2080 pin 17, circuit 12 (LG/BK), harness side and ground; and between the steering column multifunction switch pin 7, circuit 13 (RD/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <b>A6</b>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>A6 CHECK THE STEERING COLUMN MULTIFUNCTION SWITCH GROUND</b></p> <ul style="list-style-type: none"> <li>• Measure the resistance between the steering column multifunction switch C2080 pin 16, circuit 57 (BK), and ground.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 5: Pinpoint Test A Chart - Both Headlamps Are Inoperative (A4-A6)**  
 Courtesy of FORD MOTOR CO.

<p><b>A7 CHECK CIRCUIT 15 (RD/YE) AND 1402 (RD/WH) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: GEM C201a.</li> <li>Disconnect: Steering Column Multifunction Switch C2080.</li> <li>Disconnect: Headlamp Relay C1103.</li> <li>Measure the resistance between the steering column multifunction switch C2080 pin 13, circuit 1402 (RD/WH), harness side and the GEM C201a pin 3, circuit 1402 (RD/WH), harness side; and between the headlamp relay pin 2, circuit 15 (RD/YE), harness side and the GEM C201a pin 7, circuit 15 (RD/YE), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to A8.</p> <p><b>No</b> REPAIR the circuit(s). TEST the system for normal operation.</p>
<p><b>A8 CHECK FOR CORRECT GEM OPERATION</b></p> <ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for: <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li>Is the concern still present?</li> </ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to MULTI-FUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the GEM self-test.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>

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**Fig. 6: Pinpoint Test A Chart - Both Headlamps Are Inoperative (A7-A8)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST B: THE LOW BEAM HEADLAMPS ARE INOPERATIVE**

Test Step	Result / Action to Take
<p><b>B1 CHECK STEERING COLUMN MULTIFUNCTION SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the steering column multifunction switch component test.</li> </ul> <p>Refer to Component Testing article for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the steering column multifunction switch OK?</li> </ul>	<p><b>Yes</b> REPAIR circuit 12 (LG/BK). TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p>

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**Fig. 7: Pinpoint Test B Chart - Low Beam Headlamps Are Inoperative (B1)**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST C: THE HIGH BEAMS ARE INOPERATIVE**

Test Step	Result / Action to Take
<b>C1 CHECK STEERING COLUMN MULTIFUNCTION SWITCH</b>	
<ul style="list-style-type: none"> <li>Carry out the steering column multifunction switch component test.</li> </ul> <p>Refer to Component Testing article for schematic and connector information.</p> <p>Component test: Steering Column Multifunction Switch Test.</p> <ul style="list-style-type: none"> <li><b>Is the steering column multifunction switch OK?</b></li> </ul>	<p><b>Yes</b>            If vehicle is equipped with daytime running lamps (DRL), GO to <b>C2</b>. If not equipped with DRL, REPAIR circuit 13 (RD/BK). TEST the system for normal operation.</p> <p><b>No</b>            INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p>
<b>C2 CHECK THE DRL RELAY</b>	
<ul style="list-style-type: none"> <li>Carry out the DRL relay component test.</li> </ul> <p>Refer to Component Testing article for schematic and connector information.</p> <p>Component test: Micro Relay Test.</p> <ul style="list-style-type: none"> <li><b>Is the relay OK?</b></li> </ul>	<p><b>Yes</b>            REPAIR circuit 13 (RD/BK). TEST the system for normal operation.</p> <p><b>No</b>            INSTALL a new DRL relay. TEST the system for normal operation.</p>

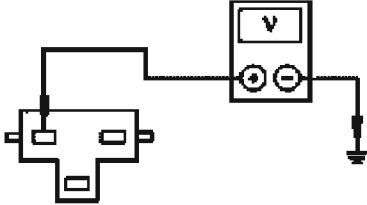
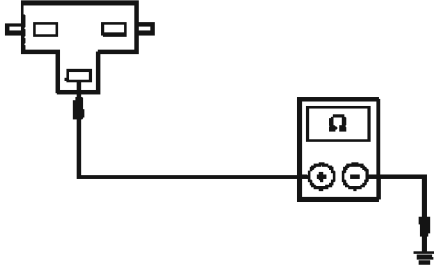
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**Fig. 8: Pinpoint Test C Chart - High Beams Are Inoperative (C1-C2)**  
**Courtesy of FORD MOTOR CO.**

**PINPOINT TEST D: ONE LOW BEAM HEADLAMP IS INOPERATIVE**

## 2004 Ford Escape

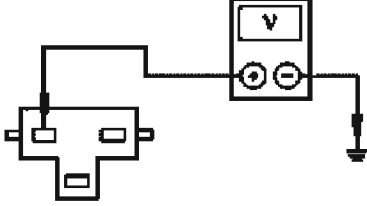
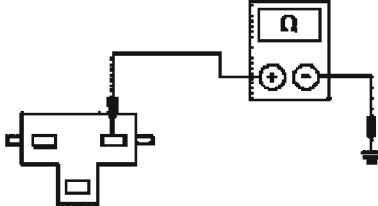
### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

Test Step	Result / Action to Take
<b>D1 CHECK POWER TO THE INOPERATIVE HEADLAMP</b> <ul style="list-style-type: none"> <li>Disconnect: LH Headlamp C1041.</li> <li>Disconnect: RH Headlamp C1021.</li> <li>Turn the steering column multifunction switch to the ON position.</li> <li>Measure the voltage between the LH headlamp C1021 pin 3, circuit 1055 (WH/LG), harness side and ground or between the RH headlamp C1041 pin 3, 1056 (WH/LG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Are the voltages greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>D2</u>.</p> <p><b>No</b> REPAIR circuit(s) in question. TEST the system for normal operation.</p>
<b>D2 CHECK THE HEADLAMP GROUND CIRCUIT</b> <ul style="list-style-type: none"> <li>Measure the resistance between the LH headlamp C1021 pin 1, circuit 12 (LG/BK), harness side and ground or between the RH headlamp C1041 pin 1, 12 (LG/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new headlamp bulb. REFER to <u>Headlamp Bulb</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit(s) in question. TEST the system for normal operation.</p>

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**Fig. 9: Pinpoint Test D Chart - One Low Beam Headlamp Is Inoperative (D1-D2)**  
Courtesy of FORD MOTOR CO.

#### PINPOINT TEST E: ONE HIGH BEAM HEADLAMP IS INOPERATIVE

Test Step	Result / Action to Take
<b>E1 CHECK POWER TO THE INOPERATIVE HEADLAMP</b> <ul style="list-style-type: none"> <li>Disconnect: LH Headlamp C1041.</li> <li>Disconnect: RH Headlamp C1021.</li> <li>Turn the steering column multifunction switch to the ON position.</li> <li>Measure the voltage between the LH headlamp C1021 pin 3, circuit 1055 (WH/LG), harness side and ground or between the RH headlamp C1041 pin 3, circuit 1056 (WH/LG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Are the voltages greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>E2</u>.</p> <p><b>No</b> REPAIR circuit(s) in question. TEST the system for normal operation.</p>
<b>E2 CHECK THE HEADLAMP GROUND CIRCUIT</b> <ul style="list-style-type: none"> <li>Move the steering column multifunction switch to the high beam position.</li> <li>Measure the resistance between the LH headlamp C1021 pin 2, circuit 13 (RD/BK), harness side and ground or between the RH headlamp C1041 pin 2, circuit 13 (RD/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new headlamp bulb. REFER to <u>Headlamp Bulb</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit(s) in question. TEST the system for normal operation.</p>

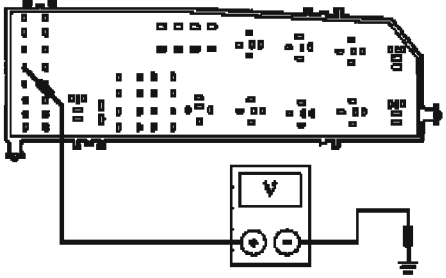
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**Fig. 10: Pinpoint Test E Chart - One High Beam Headlamp Is Inoperative (E1-E2)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST F: THE HEADLAMPS ARE ON CONTINUOUSLY**

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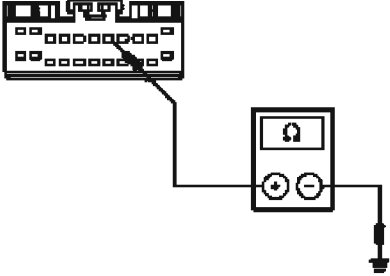
Test Step	Result / Action to Take
<b>F1 CHECK THE HEADLAMP RELAY</b> <ul style="list-style-type: none"> <li>Disconnect: Headlamp Relay C1103.</li> <li>Do the headlamps turn off?</li> </ul>	<b>Yes</b> GO to <u>F4</u> .  <b>No</b> GO to <u>E2</u> .
<b>F2 CHECK THE HEADLAMP RELAY NO. 2</b> <ul style="list-style-type: none"> <li>Carry out the headlamp relay test.</li> </ul> <p>Refer to Wiring Diagrams Cell <u>149</u> for schematic and connector information.</p> <ul style="list-style-type: none"> <li>Is the headlamp relay OK?</li> </ul>	<b>Yes</b> GO to <u>F3</u> .  <b>No</b> INSTALL a new headlamp relay. TEST the system for normal operation.
<b>F3 CHECK CIRCUIT 1335 (YE/WH) FOR A SHORT TO POWER</b> <ul style="list-style-type: none"> <li>Disconnect: RH headlamp 3 (15A).</li> <li>Measure the voltage between the RH headlamp fuse 3 (15A), circuit 1335 (YE/WH), harness side and ground.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<b>Yes</b> REPAIR the circuit. TEST the system for normal operation.  <b>No</b> REINSTALL the headlamp relay. GO to <u>F4</u> .

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**Fig. 11: Pinpoint Test F Chart - Headlamps Are On Continuously (F1-F3)**  
 Courtesy of FORD MOTOR CO.

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<b>F4 CHECK THE GEM</b> <ul style="list-style-type: none"> <li>Disconnect: GEM C201a.</li> <li>Do the headlamps turn off?</li> </ul>	<b>Yes</b> GO to <u>F6</u> .  <b>No</b> GO to <u>F5</u> .
<b>F5 CHECK CIRCUIT 15 (RD/YE) FOR A SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Measure the resistance between the GEM C201a pin 7, circuit 15 (RD/YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<b>Yes</b> INSTALL a new headlamp relay. TEST the system for normal operation.  <b>No</b> REPAIR the circuit. TEST the system for normal operation.
<b>F6 CHECK THE STEERING COLUMN MULTIFUNCTION SWITCH</b> <ul style="list-style-type: none"> <li>Connect: GEM C201a.</li> <li>Disconnect: Steering Column Multifunction Switch C2080.</li> <li>Do the headlamps turn off?</li> </ul>	<b>Yes</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.  <b>No</b> If equipped with autolamps, RECONNECT the GEM. GO to <u>F7</u> .  If not equipped with autolamps, RECONNECT the GEM. GO to <u>F8</u> .

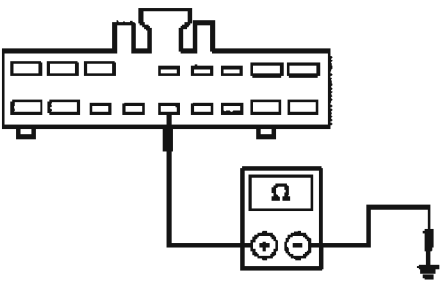
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**Fig. 12: Pinpoint Test F Chart - Headlamps Are On Continuously (F4-F6)**  
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<b>F7 CHECK THE REAR VIEW MIRROR</b> <ul style="list-style-type: none"> <li>Disconnect: Photocell Sensor C911.</li> <li><b>Do the headlamps turn off?</b></li> </ul>	<b>Yes</b> INSTALL a new interior rear view mirror. TEST the system for normal operation.  <b>No</b> GO to <u>E8</u> .
<b>F8 CHECK CIRCUIT 1402 (RD/WH) FOR A SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Measure the resistance between the steering column multifunction switch C2080 pin 13, circuit 1402 (RD/WH), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Is the resistance greater than 10,000 ohms?</b></li> </ul>	<b>Yes</b> GO to <u>E9</u> .  <b>No</b> REPAIR the circuit. TEST the system for normal operation.
<b>F9 CHECK FOR CORRECT GEM OPERATION</b> <ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for:               <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li><b>Is the concern still present?</b></li> </ul>	<b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the GEM self-test.  <b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

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**Fig. 13: Pinpoint Test F Chart - Headlamps Are On Continuously (F7-F9)**  
 Courtesy of FORD MOTOR CO.

#### PINPOINT TEST G: THE FLASH-TO-PASS FEATURE IS INOPERATIVE

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape


Test Step	Result / Action to Take
<b>G1 CHECK HIGH BEAM OPERATION</b>	
<ul style="list-style-type: none"><li>Turn the steering column multifunction switch to the ON position.</li><li>Move the steering column multifunction switch to the high beam position.</li><li><b>Do the high beams operate?</b></li></ul>	<b>Yes</b> GO to G2.  <b>No</b> GO to <u>Pinpoint Test C.</u>
<b>G2 CHECK THE STEERING COLUMN MULTIFUNCTION SWITCH</b>	
<ul style="list-style-type: none"><li>Carry out the steering column multifunction switch component test.</li></ul> <p>Refer to Component Testing article for schematic and connector information.</p> <p>Component test: Steering Column Multifunction Switch Test.</p> <ul style="list-style-type: none"><li><b>Is the steering column multifunction switch OK?</b></li></ul>	<b>Yes</b> REPAIR circuit 15 (RD/YE) for an open between GEM and steering column multifunction switch. TEST the system for normal operation.  <b>No</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.

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**Fig. 14: Pinpoint Test G Chart - Flash-To-Pass Feature Is Inoperative (G1-G2)**  
Courtesy of FORD MOTOR CO.

#### AUTOLAMPS

Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.

	<b>73III Automotive Meter 105-R0057 or equivalent</b>
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**Fig. 15: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### Principles of Operation

The autolamp system provides light-sensitive automatic on/off control of the headlamps and parking lamps controlled by the generic electronic module (GEM) when the autolamp switch is turned ON. When the ignition switch is turned to the RUN or START position with the autolamps feature already enabled and the ambient light level is dark, the GEM will request the headlamps and parking lamps be turned on. When the autolamps are disabled, the GEM will request the headlamps and parking lamps to be turned off, regardless of the ignition switch position.

When the autolamps have been enabled and the ignition switch is in the RUN/START position, the GEM will request that the exterior lamps be turned on or off based on ambient light level. If the vehicle enters darkness for at least 15 seconds, the GEM will request the exterior lamps on. If the vehicle enters light for at least 15 seconds, the GEM will request the exterior lamps off. By delaying turning on and off the exterior lamps during short periods of darkness and light, the vehicle security module prevents the exterior lamps from flashing on and off.

#### Inspection and Verification

**NOTE:** The autolamp switch, photocell sensor and time delay control are integral to the interior rear view mirror.

**NOTE:** The interior rear view mirror is referred to as the photocell sensor.

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

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Photocell sensor</li> </ul>	<ul style="list-style-type: none"> <li>• Central junction box (CJB) fuse(s):               <ul style="list-style-type: none"> <li>▪ 14 (10A)</li> <li>▪ 16 (10A)</li> </ul> </li> <li>• Circuitry</li> <li>• Photocell sensor</li> </ul>

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**Fig. 16: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. If the fault is not visually evident, determine the symptom and proceed to the **SYMPTOM CHART**.

## 2004 Ford Escape

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#### Symptom Chart

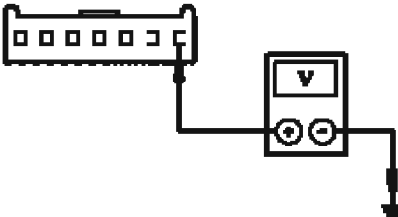
Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>The autolamps are inoperative</li></ul>	<ul style="list-style-type: none"><li>Circuitry.</li><li>Photocell sensor.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test H.</u></li></ul>
<ul style="list-style-type: none"><li>The autolamps are on continuously</li></ul>	<ul style="list-style-type: none"><li>Photocell sensor.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test I.</u></li></ul>
<ul style="list-style-type: none"><li>The autolamp time delay is inoperative</li></ul>	<ul style="list-style-type: none"><li>Photocell sensor.</li></ul>	<ul style="list-style-type: none"><li>INSTALL a new interior rear view mirror. TEST the system for normal operation.</li></ul>

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**Fig. 17: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

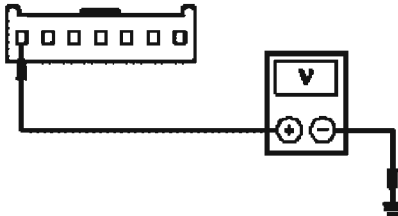
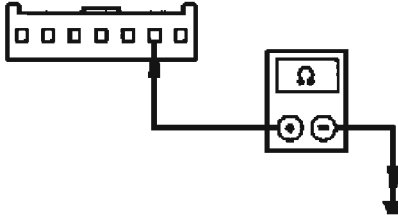
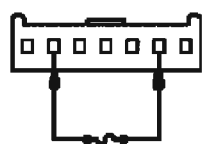
#### PINPOINT TEST H: THE AUTOLAMPS ARE INOPERATIVE

Test Step	Result / Action to Take
<b>H1 CHECK THE HEADLAMP OPERATION</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Turn the headlamp switch to the headlamps ON position.</li><li><b>Do the parking lamps and headlamps operate correctly?</b></li></ul>	<b>Yes</b> TURN the headlamp switch OFF. GO to <u>H2</u> .  <b>No</b> REFER to <u>Headlamps or Parking, Rear and License Lamps</u> in this section as necessary.
<b>H2 CHECK CIRCUIT 640 (RD/YE) FOR AN OPEN</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Photocell Sensor C911.</li><li>Key in ON position.</li><li>Measure the voltage between the photocell sensor C911 pin 1, circuit 640 (RD/YE), harness side and ground.</li></ul>  <ul style="list-style-type: none"><li><b>Is the voltage greater than 10 volts?</b></li></ul>	<b>Yes</b> GO to <u>H3</u> .  <b>No</b> REPAIR the circuit. TEST the system for normal operation.

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**Fig. 18: Pinpoint Test H Chart - Autolamps Are Inoperative (H1-H2)**

Courtesy of FORD MOTOR CO.

<p><b>H3 CHECK CIRCUIT 956 (OG/LG) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Measure the voltage between the photocell sensor C911 pin 7, circuit 956 (OG/LG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to H4.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>H4 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between the photocell sensor C911 pin 2, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to H5.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>H5 CHECK THE PHOTOCELL SENSOR</b></p> <ul style="list-style-type: none"> <li>Connect a fused (10A) jumper wire between the photocell sensor C911 pin 2, circuit 1402 (RD/WH), harness side and the photocell sensor C911 pin 2, circuit 57 (BK), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Do the exterior lamps illuminate?</li> </ul>	<p><b>Yes</b> INSTALL a new interior rear view mirror. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 1402 (RD/WH). TEST the system for normal operation.</p>

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**Fig. 19: Pinpoint Test H Chart - Autolamps Are Inoperative (H3-H5)**  
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#### PINPOINT TEST I: THE AUTOLAMPS ARE ON CONTINUOUSLY


Test Step	Result / Action to Take
<b>I1 CHECK THE HEADLAMP OPERATION</b>	
<ul style="list-style-type: none"><li>Key in OFF position.</li><li>Turn the headlamp switch OFF.</li><li><b>Do the headlamps continue to illuminate?</b></li></ul>	<p><b>Yes</b> If the headlamps are illuminated, <u>Go To Pinpoint Test E.</u></p> <p>If only the parking lamps are illuminated, <u>Go To Pinpoint Test U.</u></p> <p><b>No</b> INSTALL a new interior rear view mirror. TEST the system for normal operation.</p>

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**Fig. 20: Pinpoint Test I Chart - Autolamps Are On Continuously (I1)**  
Courtesy of FORD MOTOR CO.

#### STOPLAMPS

Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.

	<b>73III Automotive Meter</b> <b>105-R0057 or equivalent</b>
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**Fig. 21: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### Inspection and Verification

1. Verify the customer concern by operating the stoplamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

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Mechanical	Electrical
<ul style="list-style-type: none"><li>Brake pedal position (BPP) switch</li></ul>	<ul style="list-style-type: none"><li>Battery junction box (BJB) fuse 21 (40A)</li><li>Central junction box (CJB) fuse 24 (15A)</li><li>Wiring harness</li><li>Connectors</li><li>Stoplamp bulbs</li></ul>

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**Fig. 22: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

- If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- If the fault is not visually evident, verify the symptom and proceed to the **SYMPTOM CHART**.

#### Symptom Chart

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>The stoplamps are inoperative</li></ul>	<ul style="list-style-type: none"><li>Battery junction box (BJB) fuse 21 (40A).</li><li>Central junction box (CJB) fuse 24 (15A).</li><li>Brake pedal position (BPP) switch.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test J.</u></li></ul>
<ul style="list-style-type: none"><li>One or more stoplamps are inoperative</li></ul>	<ul style="list-style-type: none"><li>Stoplamp bulb.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test K.</u></li></ul>
<ul style="list-style-type: none"><li>The stoplamps are on continuously</li></ul>	<ul style="list-style-type: none"><li>BPP switch.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test L.</u></li></ul>

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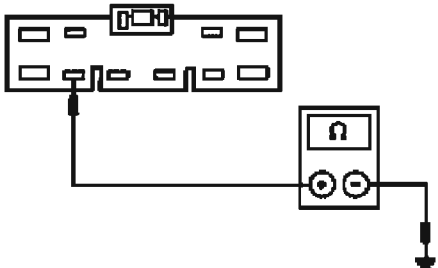
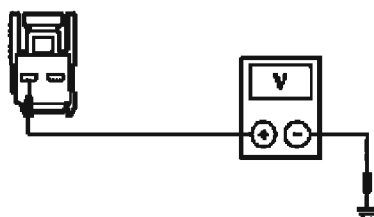
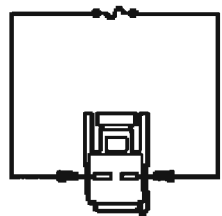
**Fig. 23: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

##### PINPOINT TEST J: THE STOPLAMPS ARE INOPERATIVE

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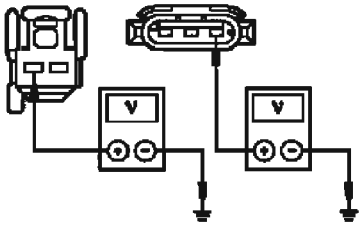
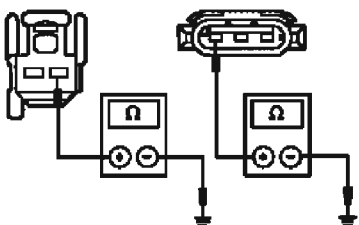
Test Step	Result / Action to Take
<b>J1 CHECK CIRCUIT 10 (LG/RD) FOR A SHORT TO GROUND</b> <ul style="list-style-type: none"> <li>Disconnect: Central Junction Box (CJB) C270e.</li> <li>Measure the resistance between CJB C270e pin 9, circuit 10 (LG/RD), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>J2</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>J2 CHECK VOLTAGE TO THE BPP SWITCH</b> <ul style="list-style-type: none"> <li>Connect: CJB C270e.</li> <li>Disconnect: Brake Pedal Position (BPP) Switch C278.</li> <li>Measure the voltage between BPP switch C278 pin 2, circuit 10 (LG/RD), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>J3</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>J3 CHECK BPP SWITCH</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Connect a fused (15A) jumper wire between the BPP C278 pin 1, circuit 511 (LG), harness side and the BPP C278 pin 2, circuit 10 (LG/RD), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Do the stoplamps operate?</li> </ul>	<p><b>Yes</b> INSTALL a new BPP switch. REFER to BRAKE SYSTEM-GENERAL INFORMATION. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 24: Pinpoint Test J Chart - Stoplamps Are Inoperative (J1-J3)**  
Courtesy of FORD MOTOR CO.

PINPOINT TEST K: ONE OR MORE STOPLAMPS ARE INOPERATIVE



Test Step	Result / Action to Take												
<b>K1 CHECK VOLTAGE TO INOPERATIVE STOPLAMP</b> <ul style="list-style-type: none"><li>Disconnect: Inoperative Stoplamp.</li><li>Apply the brake.</li></ul>  <ul style="list-style-type: none"><li>Use the following chart to measure the voltage between the inoperative stoplamp connector and ground.</li></ul> <table border="1"><thead><tr><th>Inoperative Stoplamp</th><th>Connector(s)</th><th>Circuit</th></tr></thead><tbody><tr><td>LH</td><td>C419 pin 3</td><td>511 (LG)</td></tr><tr><td>RH</td><td>C418 pin 3</td><td>511 (LG)</td></tr><tr><td>Hi-Mount</td><td>C475 pin 2</td><td>511 (LG)</td></tr></tbody></table>  <ul style="list-style-type: none"><li>Is the voltage greater than 10 volts?</li></ul>	Inoperative Stoplamp	Connector(s)	Circuit	LH	C419 pin 3	511 (LG)	RH	C418 pin 3	511 (LG)	Hi-Mount	C475 pin 2	511 (LG)	<p><b>Yes</b> GO to K2.</p> <p><b>No</b> REPAIR the circuit in question. TEST the system for normal operation.</p>
Inoperative Stoplamp	Connector(s)	Circuit											
LH	C419 pin 3	511 (LG)											
RH	C418 pin 3	511 (LG)											
Hi-Mount	C475 pin 2	511 (LG)											
<b>K2 CHECK INOPERATIVE STOPLAMP GROUND</b> <ul style="list-style-type: none"><li>Use the following chart to measure the resistance between the inoperative stoplamp connector and ground.</li></ul> <table border="1"><thead><tr><th>Inoperative Stoplamp</th><th>Connector(s)</th><th>Circuit</th></tr></thead><tbody><tr><td>LH</td><td>C419 pin 1</td><td>57 (BK)</td></tr><tr><td>RH</td><td>C418 pin 1</td><td>57 (BK)</td></tr><tr><td>Hi-Mount</td><td>C475 pin 1</td><td>57 (BK)</td></tr></tbody></table>  <ul style="list-style-type: none"><li>Is the resistance less than 5 ohms?</li></ul>	Inoperative Stoplamp	Connector(s)	Circuit	LH	C419 pin 1	57 (BK)	RH	C418 pin 1	57 (BK)	Hi-Mount	C475 pin 1	57 (BK)	<p><b>Yes</b> INSTALL a new stoplamp socket. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
Inoperative Stoplamp	Connector(s)	Circuit											
LH	C419 pin 1	57 (BK)											
RH	C418 pin 1	57 (BK)											
Hi-Mount	C475 pin 1	57 (BK)											

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**Fig. 25: Pinpoint Test K Chart - One Or More Stoplamps Are Inoperative (K1-K2)**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST L: THE STOPLAMPS ARE ON CONTINUOUSLY**

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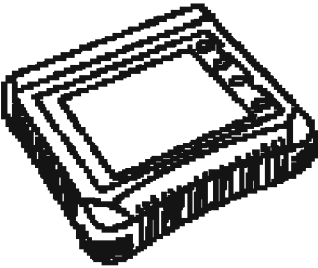
Test Step	Result / Action to Take
<b>L1 CHECK THE BRAKE PEDAL POSITION (BPP) SWITCH</b> <ul style="list-style-type: none"><li>• Disconnect: BPP Switch C278.</li><li>• Do the stoplamps turn off?</li></ul>	<b>Yes</b> INSTALL a new BPP switch. REFER to <u>Brake Pedal Position (BPP) Switch</u> in this section. TEST the system for normal operation.  <b>No</b> REPAIR circuit 511 (LG) for a short to power. TEST the system for normal operation.

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**Fig. 26: Pinpoint Test L Chart - Stoplamps Are On Continuously (L1)**  
Courtesy of FORD MOTOR CO.

#### TURN SIGNAL, CORNERING AND HAZARD LAMPS

Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.

	73III Automotive Meter 105-R0057 or equivalent
	Worldwide Diagnostic System (WDS) 418-F224,  New Generation STAR (NGS) Tester 418-F052 or equivalent diagnostic tool

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**Fig. 27: Identifying Special Tools**  
Courtesy of FORD MOTOR CO.

**Inspection and Verification**

1. Verify the customer concern by operating the turn signal/hazard lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Steering column multifunction switch</li> <li>• Hazard switch</li> </ul>	<ul style="list-style-type: none"> <li>• Battery junction box (BJB) fuse 20 (40A)</li> <li>• Central junction box (CJB) fuses: <ul style="list-style-type: none"> <li>▪ 20 (15A)</li> <li>▪ 6 (10A)</li> </ul> </li> <li>• Wiring harness</li> <li>• Connectors</li> <li>• Bulbs</li> </ul>

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**Fig. 28: Visual Inspection Chart**  
**Courtesy of FORD MOTOR CO.**

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause of the fault is not visually evident, proceed to the diagnostic tool diagnostics.
5. If the concern remains after the inspection, connect the diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
  - check that the program card is correctly installed.
  - check the connections to the vehicle.
  - check the ignition switch position.
6. If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool manual.
7. Carry out the DATA LINK DIAGNOSTIC TEST. If the diagnostic tool responds with:
  - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to **MODULE COMMUNICATIONS NETWORK**.
  - NO RESP/NOT EQUIP for hybrid electronic cluster (instrument cluster), refer to **INSTRUMENT CLUSTER**.
  - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the instrument cluster.
8. If the DTCs retrieved are related to the concern, go to **GEM DIAGNOSTIC TROUBLE CODE (DTC) INDEX** to continue diagnostics.
9. If no DTCs related to the concern are retrieved, proceed to the **SYMPTOM CHART**

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to continue diagnostics.

#### GEM Diagnostic Trouble Code (DTC) Index

DTC	Description	Source	Action
B1342	ECU is Defective	GEM	CLEAR the DTCs. RETRIEVE the DTCs. If DTC B1342 is retrieved, INSTALL a new GEM. REFER to <b>MULTIFUNCTION ELECTRONIC MODULE</b> .
B1499	Lamp Turn Signal Left Circuit Failure	GEM	Go to <b>PINPOINT TEST P</b> .
B1501	Lamp Turn Signal Left Circuit Short to Battery	GEM	Go to <b>PINPOINT TEST P</b> .

#### Symptom Chart

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>The turn signal lamps are never on</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuse 20 (40A).</li> <li>Central junction box (CJB) fuses: <ul style="list-style-type: none"> <li>8 (10A).</li> <li>6 (10A).</li> </ul> </li> <li>Circuitry.</li> <li>Steering column multifunction switch.</li> <li>Electronic flasher unit.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>M</b>.</li> </ul>
<ul style="list-style-type: none"> <li>The turn signal lamps are always on</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Multifunction switch.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>N</b>.</li> </ul>
<ul style="list-style-type: none"> <li>The hazard lamps are never on</li> </ul>	<ul style="list-style-type: none"> <li>BJB fuse 20 (40A).</li> <li>CJB fuse 20 (15A).</li> <li>Circuitry.</li> <li>Hazard flasher switch.</li> <li>Electronic flasher unit.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>O</b>.</li> </ul>
<ul style="list-style-type: none"> <li>The hazard lamps are always on</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Hazard flasher switch.</li> <li>Electronic flasher unit.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>P</b>.</li> </ul>
<ul style="list-style-type: none"> <li>One turn signal/hazard lamp is never on</li> </ul>	<ul style="list-style-type: none"> <li>Turn signal/hazard flasher bulb.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>Q</b>.</li> </ul>
<ul style="list-style-type: none"> <li>One turn signal/hazard lamp is always on</li> </ul>	<ul style="list-style-type: none"> <li>Steering column multifunction switch.</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li>Go To Pinpoint Test <b>R</b>.</li> </ul>

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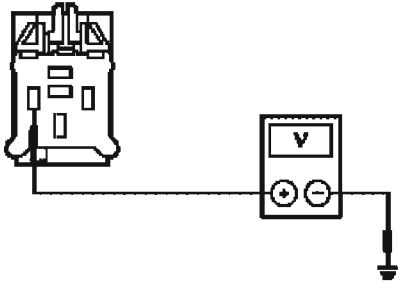
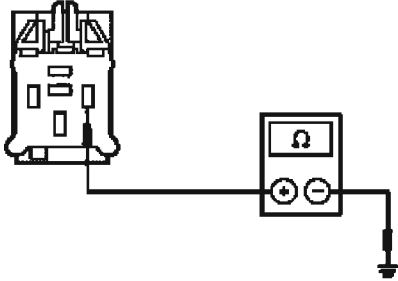
**Fig. 29: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

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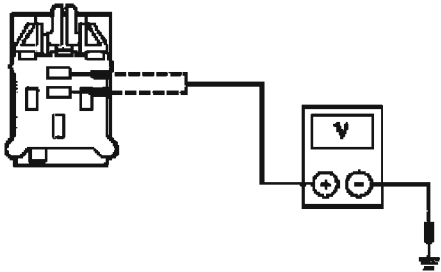
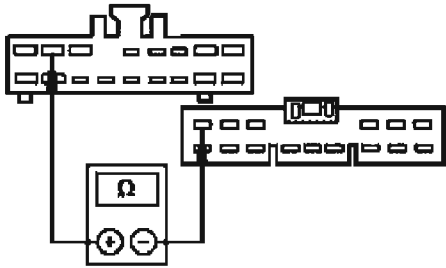
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#### PINPOINT TEST M: THE TURN SIGNAL LAMPS ARE NEVER ON

Test Step	Result / Action to Take
<b>M1 CHECK CIRCUIT 383 (RD/WH) FOR AN OPEN</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Disconnect: Electronic Flasher Unit C2027b.</li><li>Key in ON position.</li><li>Measure the voltage between the electronic flasher unit C2027b pin 1, circuit 383 (RD/WH), harness side and ground.</li></ul>  <ul style="list-style-type: none"><li>Is the voltage greater than 10 volts?</li></ul>	<b>Yes</b> GO to <b>M2</b> .  <b>No</b> REPAIR the circuit. TEST the system for normal operation.
<b>M2 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b> <ul style="list-style-type: none"><li>Key in OFF position.</li><li>Measure the resistance between the electronic flasher unit C2027b pin 3, circuit 57 (BK), harness side and ground.</li></ul>  <ul style="list-style-type: none"><li>Is the resistance less than 5 ohms?</li></ul>	<b>Yes</b> GO to <b>M3</b> .  <b>No</b> REPAIR the circuit. TEST the system for normal operation.

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**Fig. 30: Pinpoint Test M Chart - Turn Signal Lamps Are Never On (M1-M2)**  
Courtesy of FORD MOTOR CO.

<p><b>M3 CHECK SIGNAL TO THE ELECTRONIC FLASHER UNIT</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Electronic Flasher Unit C2027a.</li> <li>• Key in ON position.</li> <li>• Measure the voltage between the electronic flasher unit C2027a pin 7, circuit 1057 (OG/BK), harness side and ground, with the LH turn signal on and between the electronic flasher unit C2027a pin 11, circuit 1058 (BN/WH), harness side and ground, with the RH turn signal on.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> INSTALL a new electronic flasher unit. TEST the system for normal operation.</p> <p><b>No</b> GO to <b>M4</b>.</p>
<p><b>M4 CHECK CIRCUIT 8 (OG/YE) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Central Junction Box (CJB) C270f.</li> <li>• Disconnect: Steering Column Multifunction Switch C2080.</li> <li>• Measure the resistance between the steering column multifunction switch C2080 pin 2, circuit 8 (OG/YE), harness side and CJB C270f pin 1, circuit 8 (OG/YE), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <b>M5</b>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>M5 CHECK MULTIFUNCTION SWITCH</b></p> <ul style="list-style-type: none"> <li>• Carry out the steering column multifunction switch component test;</li> </ul> <p>Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.</p> <p>Component test: Multifunction Switch Test.</p> <ul style="list-style-type: none"> <li>• Is the steering column multifunction switch OK?</li> </ul>	<p><b>Yes</b> INSTALL a new electronic flasher unit. TEST the system for normal operation.</p> <p><b>No</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p>

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**Fig. 31: Pinpoint Test M Chart - Turn Signal Lamps Are Never On (M3-M5)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST N: THE TURN SIGNAL LAMPS ARE ALWAYS ON**

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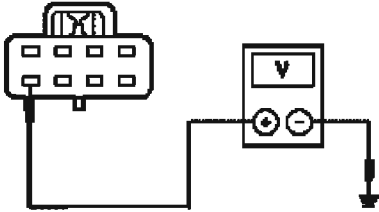
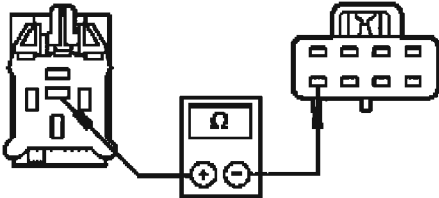
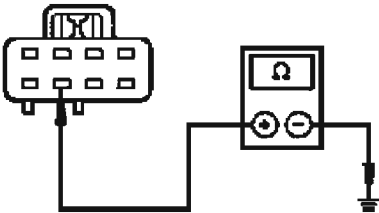
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Test Step	Result / Action to Take
<b>N1 CHECK SIGNAL TO THE ELECTRONIC FLASHER UNIT</b>	
<ul style="list-style-type: none"><li>Disconnect: Steering Column Multifunction Switch C2080.</li><li>Key in ON position.</li><li><b>Does the turn signal shut off?</b></li></ul>	<p><b>Yes</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 1057 (OG/BK) for LH turn signal for a short to power and circuit 1058 (BN/WH) for RH turn signal for a short to power. TEST the system for normal operation.</p>

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**Fig. 32: Pinpoint Test N Chart - Turn Signal Lamps Are Always On (N1)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST O: THE HAZARD LAMPS ARE NEVER ON**

Test Step	Result / Action to Take
<b>O1 CHECK POWER TO HAZARD FLASHER SWITCH</b> <ul style="list-style-type: none"> <li>Disconnect: Hazard Flasher Switch C2039.</li> <li>Measure the voltage between hazard flasher switch C2039 pin 1, circuit 385 (WH/RD), and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>Q3</u>.</p> <p><b>No</b> GO to <u>Q2</u>.</p>
<b>O2 CHECK CONTINUITY OF CIRCUIT 385 (WH/RD)</b> <ul style="list-style-type: none"> <li>Disconnect: Electronic Flasher Unit C2027b.</li> <li>Measure the resistance between electronic flasher unit C2027b pin 5, circuit 385 (WH/RD), and hazard flasher switch C2039 pin 1, circuit 385 (WH/RD), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new electronic flasher unit. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>O3 CHECK GROUND TO THE HAZARD FLASHER SWITCH</b> <ul style="list-style-type: none"> <li>Measure the resistance between hazard switch C2039 pin 2, circuit 57 (BK), and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new hazard flasher switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 33: Pinpoint Test O Chart - Hazard Lamps Are Never On (O1-O3)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST P: THE HAZARD FLASHER LAMPS ARE ALWAYS ON**



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### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

Test Step	Result / Action to Take
<b>P1 CHECK HAZARD FLASHER SWITCH</b>	<b>Yes</b> INSTALL a new hazard flasher switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.  <b>No</b> GO to <u>P2</u> .
<ul style="list-style-type: none"> <li>Disconnect: Hazard Flasher Switch C2039.</li> <li><b>Do the hazard lamps stop flashing?</b></li> </ul>	
<b>P2 CHECK CIRCUIT 385 (WH/RD) FOR A SHORT TO GROUND</b>	<b>Yes</b> GO to <u>P3</u> .  <b>No</b> REPAIR the circuit. TEST the system for normal operation.
<ul style="list-style-type: none"> <li>Disconnect: GEM C201a.</li> <li><b>Do the hazard lamps stop flashing?</b></li> </ul>	
<b>P3 CHECK FOR CORRECT GEM OPERATION</b>	<b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the GEM self-test.  <b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.
<ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for:               <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li><b>Is the concern still present?</b></li> </ul>	

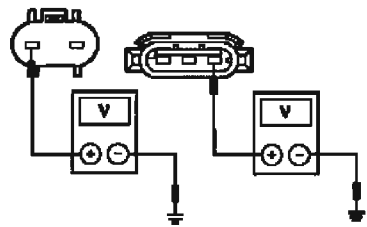
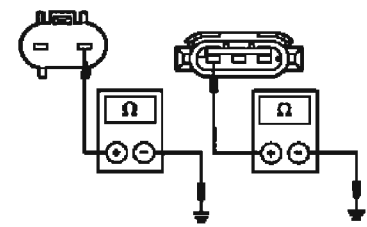
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**Fig. 34: Pinpoint Test P Chart - Hazard Flasher Lamps Are Always On (P1-P3)**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST Q: ONE TURN SIGNAL/HAZARD LAMP IS NEVER ON**

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

Test Step	Result / Action to Take																					
<b>Q1 CHECK VOLTAGE TO INOPERATIVE LAMP</b> <ul style="list-style-type: none"><li>• Key in OFF position.</li><li>• Disconnect: Inoperative Lamp.</li><li>• Turn the hazard flasher lamps on.</li><li>• Use the following chart to measure the voltage between the inoperative lamp connector and ground.</li></ul> <table border="1"><thead><tr><th>Inoperative Lamp</th><th>Connector(s)</th><th>Circuit</th></tr></thead><tbody><tr><td>LF</td><td>C1023 pin 3</td><td>3 (LG/WH)</td></tr><tr><td>RF</td><td>C1043 pin 3</td><td>2 (WH/LB)</td></tr><tr><td>LR</td><td>C413 pin 3</td><td>3 (LG/WH)</td></tr><tr><td>RR</td><td>C416 pin 3</td><td>2 (WH/LB)</td></tr><tr><td>LH Side Repeater</td><td>C1123 pin A</td><td>3 (LG/WH)</td></tr><tr><td>RH Side Repeater</td><td>C1122 pin A</td><td>2 (WH/LB)</td></tr></tbody></table>  <ul style="list-style-type: none"><li>• Is the voltage greater than 10 volts?</li></ul>	Inoperative Lamp	Connector(s)	Circuit	LF	C1023 pin 3	3 (LG/WH)	RF	C1043 pin 3	2 (WH/LB)	LR	C413 pin 3	3 (LG/WH)	RR	C416 pin 3	2 (WH/LB)	LH Side Repeater	C1123 pin A	3 (LG/WH)	RH Side Repeater	C1122 pin A	2 (WH/LB)	<p><b>Yes</b> GO to <u>Q2</u>.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>
Inoperative Lamp	Connector(s)	Circuit																				
LF	C1023 pin 3	3 (LG/WH)																				
RF	C1043 pin 3	2 (WH/LB)																				
LR	C413 pin 3	3 (LG/WH)																				
RR	C416 pin 3	2 (WH/LB)																				
LH Side Repeater	C1123 pin A	3 (LG/WH)																				
RH Side Repeater	C1122 pin A	2 (WH/LB)																				
<b>Q2 CHECK INOPERATIVE LAMP GROUND</b> <ul style="list-style-type: none"><li>• Use the following chart to measure the resistance between the inoperative lamp connector and ground.</li></ul> <table border="1"><thead><tr><th>Inoperative Lamp</th><th>Connector(s)</th><th>Circuit</th></tr></thead><tbody><tr><td>LF</td><td>C1023 pin 1</td><td>57 (BK)</td></tr><tr><td>RF</td><td>C1043 pin 1</td><td>57 (BK)</td></tr><tr><td>LR</td><td>C413 pin 1</td><td>57 (BK)</td></tr><tr><td>RR</td><td>C416 pin 1</td><td>57 (BK)</td></tr><tr><td>LH Side Repeater</td><td>C1123 pin B</td><td>57 (BK)</td></tr><tr><td>RH Side Repeater</td><td>C1122 pin B</td><td>571 (BK/OG)</td></tr></tbody></table>  <ul style="list-style-type: none"><li>• Is the resistance less than 5 ohms?</li></ul>	Inoperative Lamp	Connector(s)	Circuit	LF	C1023 pin 1	57 (BK)	RF	C1043 pin 1	57 (BK)	LR	C413 pin 1	57 (BK)	RR	C416 pin 1	57 (BK)	LH Side Repeater	C1123 pin B	57 (BK)	RH Side Repeater	C1122 pin B	571 (BK/OG)	<p><b>Yes</b> INSTALL a new turn signal/hazard lamp socket. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit in question. TEST the system for normal operation.</p>
Inoperative Lamp	Connector(s)	Circuit																				
LF	C1023 pin 1	57 (BK)																				
RF	C1043 pin 1	57 (BK)																				
LR	C413 pin 1	57 (BK)																				
RR	C416 pin 1	57 (BK)																				
LH Side Repeater	C1123 pin B	57 (BK)																				
RH Side Repeater	C1122 pin B	571 (BK/OG)																				

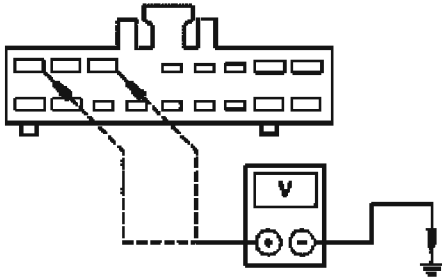
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**Fig. 35: Pinpoint Test Q Chart - One Turn Signal/Hazard Lamp Is Never On (Q1-Q2)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST R: ONE TURN SIGNAL/HAZARD LAMP IS ALWAYS ON**

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape


Test Step	Result / Action to Take
<b>R1 CHECK THE STEERING COLUMN MULTIFUNCTION SWITCH</b> <ul style="list-style-type: none"><li>Disconnect: Steering Column Multifunction Switch C2080.</li><li>Does the turn signal/hazard lamp stop flashing?</li></ul>	<b>Yes</b> INSTALL a new steering column multifunction switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.  <b>No</b> GO to <u>R2</u> .
<b>R2 CHECK CIRCUIT 1057 (OG/BK) OR CIRCUIT 1058 (BN/WH) FOR A SHORT TO POWER</b> <ul style="list-style-type: none"><li>Measure the voltage between the steering column multifunction switch C2080 pin 1, circuit 1057 (OG/BK), harness side and ground or between the steering column multifunction switch C2080 pin 3, circuit 1058 (BN/WH), harness side and ground.</li></ul>  <ul style="list-style-type: none"><li>Is any voltage present?</li></ul>	<b>Yes</b> REPAIR the circuit(s). TEST the system for normal operation.  <b>No</b> INSTALL a new electronic flasher unit. TEST the system for normal operation.

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**Fig. 36: Pinpoint Test R Chart - One Turn Signal/Hazard Lamp Is Always On (R1-R2)**  
Courtesy of FORD MOTOR CO.

#### PARKING, REAR AND LICENSE LAMPS

Refer to SYSTEM WIRING DIAGRAMS for schematic and connector information.

	<b>73III Automotive Meter</b> 105-R0057 or equivalent
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**Fig. 37: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### Inspection and Verification

1. Verify the customer concern by operating the parking, rear and license lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"> <li>Steering column multifunction switch</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuse 20 (40A)</li> <li>Central junction box (CJB) fuse 15 (15A)</li> <li>Wiring harness</li> <li>Connectors</li> <li>Damaged parking lamp relay</li> <li>Damaged parking, rear, or license lamp</li> </ul>

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**Fig. 38: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. If the fault is not visually evident, verify the symptom and proceed to the **SYMPTOM CHART**.

#### Symptom Chart

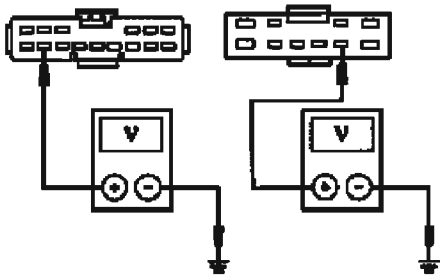
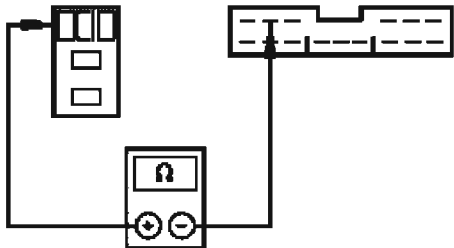
Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>The exterior lamp(s) are inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Battery junction box (BJB) fuse 20 (40A).</li> <li>Central junction box (CJB) fuse 15 (15A).</li> <li>Circuitry.</li> <li>Parking lamp relay.</li> <li>Steering column multifunction switch.</li> <li>GEM.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test S.</u></li> </ul>
<ul style="list-style-type: none"> <li>One or more parking, rear or license lamp is inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Lamp socket.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test T.</u></li> </ul>
<ul style="list-style-type: none"> <li>The parking, rear or license lamps are on continuously</li> </ul>	<ul style="list-style-type: none"> <li>Parking lamp relay.</li> <li>Steering column multifunction switch.</li> <li>GEM.</li> </ul>	<ul style="list-style-type: none"> <li><u>Go To Pinpoint Test U.</u></li> </ul>

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**Fig. 39: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

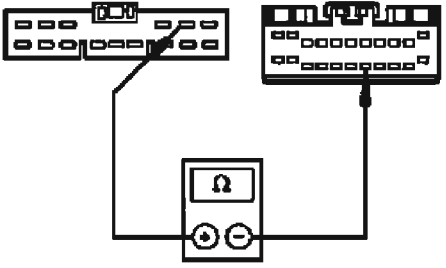
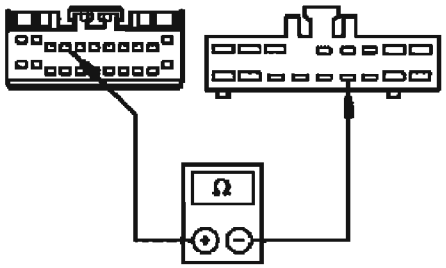
#### Pinpoint Tests

## PINPOINT TEST S: THE EXTERIOR LAMP(S) ARE INOPERATIVE

Test Step	Result / Action to Take
<b>S1 CHECK OPERATION OF PARKING LAMP RELAY</b> <ul style="list-style-type: none"> <li>Turn the steering column multifunction switch to park.</li> <li>Does the backlighting illuminate?</li> </ul>	<b>Yes</b> GO to <u>S2</u> .  <b>No</b> GO to <u>S3</u> .
<b>S2 CHECK CIRCUIT 14 FOR A SHORT TO POWER</b> <ul style="list-style-type: none"> <li>Disconnect: Central Junction Box (CJB) C270b.</li> <li>Disconnect: CJB C270f.</li> <li>Measure the voltage between the CJB C270b pin 6, circuit 14 (BN), component side and ground; and between the CJB C270f pin 14, circuit 14 (BN), component side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<b>Yes</b> REPAIR the circuit. TEST the system for normal operation.  <b>No</b> INSTALL a new CJB. TEST the system for normal operation.
<b>S3 CHECK PARKING LAMP RELAY</b> <ul style="list-style-type: none"> <li>Carry out the parking lamp relay component test.</li> </ul> <p>Refer to COMPONENT TESTING article for schematic and connector information.</p> <p>Component test: Micro Relay Test.</p> <ul style="list-style-type: none"> <li>Is the parking lamp relay OK?</li> </ul>	<b>Yes</b> GO to <u>S4</u> . <b>No</b> INSTALL a new parking lamp relay. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.
<b>S4 CHECK THE CENTRAL JUNCTION BOX (CJB) FOR AN OPEN</b> <ul style="list-style-type: none"> <li>Disconnect: Parking Lamp Relay C2059.</li> <li>Disconnect: Central Junction Box (CJB) C270d.</li> <li>Measure the resistance between the parking lamp relay C2059 pin 2, harness side and the CJB C270d pin 2, component side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<b>Yes</b> GO to <u>S5</u> .  <b>No</b> INSTALL a new CJB. TEST the system for normal operation.

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**Fig. 40: Pinpoint Test S Chart - Exterior Lamp(s) Are Inoperative (S1-S4)**  
 Courtesy of FORD MOTOR CO.

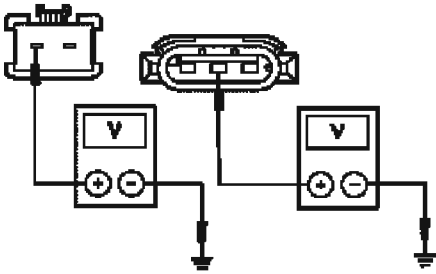
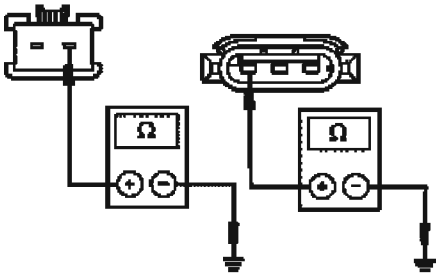
<p><b>S5 CHECK CIRCUIT 218 (WH/VT) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: GEM C201a.</li> <li>Measure the resistance between the CJB C270d pin 2, circuit 218 (WH/VT), harness side and the GEM C201a pin 18, circuit 218 (WH/VT), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>S6</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>S6 CHECK CIRCUIT 1401 (BK/LG) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Disconnect: Steering Column Multifunction Switch C2080.</li> <li>Measure the resistance between the GEM C201a pin 4, circuit 1401 (BK/LG), harness side and the steering column multifunction switch C2080 pin 14, circuit 1401 (BK/LG), harness side.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> GO to <u>S7</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>S7 CHECK THE HEADLAMP RELAY</b></p> <ul style="list-style-type: none"> <li>Carry out the headlamp relay component test.</li> </ul> <p>Refer to COMPONENT TESTING article for schematic and connector information.</p> <p>Component test: Micro Relay Switch Test.</p> <ul style="list-style-type: none"> <li>Is the headlamp relay switch OK?</li> </ul>	<p><b>Yes</b> GO to <u>S8</u>.</p> <p><b>No</b> INSTALL a new headlamp relay. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p>
<p><b>S8 CHECK FOR CORRECT GEM OPERATION</b></p> <ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for: <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li>Is the concern still present?</li> </ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the GEM self-test.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>

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Fig. 41: Pinpoint Test S Chart - Exterior Lamp(s) Are Inoperative (S5-S8)

Courtesy of FORD MOTOR CO.

**PINPOINT TEST T: ONE OR MORE PARKING, REAR OR LICENSE LAMP IS INOPERATIVE**

Test Step	Result / Action to Take
<b>T1 CHECK VOLTAGE TO INOPERATIVE LAMP</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Parking Lamp.</li> <li>Turn the parking lamps on.</li> <li>Measure the voltage between the inoperative lamp connector circuit 14 (BN), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to T2.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>T2 CHECK GROUND TO INOPERATIVE LAMP</b> <ul style="list-style-type: none"> <li>Measure the resistance between the inoperative lamp connector circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new lamp socket. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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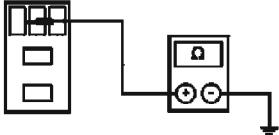
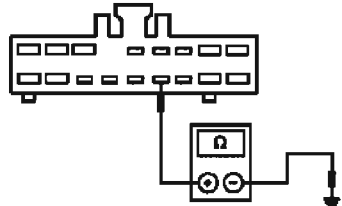
**Fig. 42: Pinpoint Test T Chart - One Or More Parking, Rear Or License Lamp Is Inoperative (T1-T2)**

Courtesy of FORD MOTOR CO.

**PINPOINT TEST U: THE PARKING, REAR OR LICENSE LAMPS ARE ON CONTINUOUSLY**

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

Test Step	Result / Action to Take
<b>U1 CHECK GEM FOR A SHORT TO GROUND</b>	
<ul style="list-style-type: none"> <li>Disconnect: GEM C201a.</li> <li>Do the lamps go off?</li> </ul>	<p><b>Yes</b> GO to U4.</p> <p><b>No</b> GO to U2.</p>
<b>U2 CHECK THE PARKING LAMP RELAY NO 2</b>	
<ul style="list-style-type: none"> <li>Disconnect: Parking Lamp Relay C2059.</li> <li>Carry out the parking lamp relay test.</li> </ul> <p>Refer to COMPONENT TESTING article for schematic and connector information.</p> <p>Component Testing.</p> <ul style="list-style-type: none"> <li>Is the parking lamp relay OK?</li> </ul>	<p><b>Yes</b> GO to U3</p> <p><b>No</b> INSTALL a new parking lamp relay. TEST the system for normal operation.</p>
<b>U3 CHECK CIRCUIT 218 (WH/VT) FOR A SHORT TO GROUND</b>	
<ul style="list-style-type: none"> <li>Measure the resistance between parking lamp relay C2059 pin 2, circuit 218 (WH/VT) harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> REPAIR circuit 14 (BN). TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit 218 (WH/VT). TEST the system for normal operation.</p>
<b>U4 CHECK CIRCUIT 1401 (BK/LG) FOR A SHORT TO GROUND</b>	
<ul style="list-style-type: none"> <li>Disconnect: Steering Column Multifunction Switch C2080.</li> <li>Measure the resistance between steering column multifunction switch C2080 pin 14, circuit 1401 (BK/LG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance greater than 10,000 ohms?</li> </ul>	<p><b>Yes</b> GO to U5.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>U5 CHECK FOR CORRECT GEM OPERATION</b>	
<ul style="list-style-type: none"> <li>Disconnect all GEM connectors.</li> <li>Check for: <ul style="list-style-type: none"> <li>corrosion</li> <li>pushed-out pins</li> </ul> </li> <li>Connect all GEM connectors and make sure they seat correctly.</li> <li>Operate the system and verify the concern is still present.</li> <li>Is the concern still present?</li> </ul>	<p><b>Yes</b> INSTALL a new GEM. REFER to MULTIFUNCTION ELECTRONIC MODULES. CLEAR the DTCs. REPEAT the GEM self-test.</p> <p><b>No</b> The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</p>

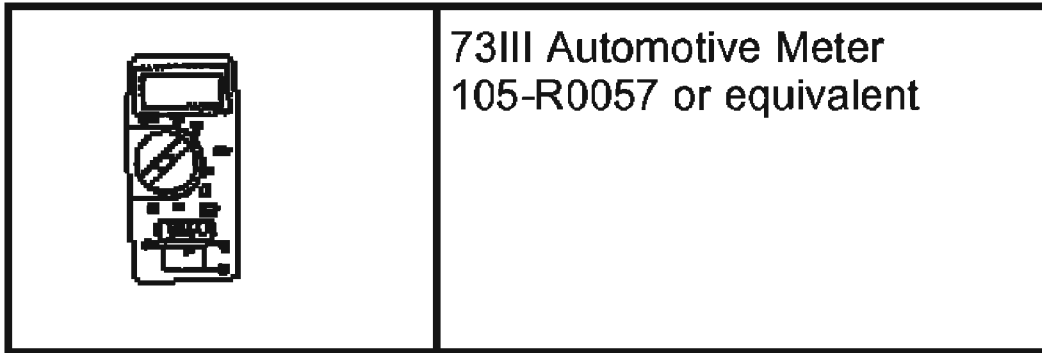
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**Fig. 43: Pinpoint Test U Chart - Parking, Rear Or License Lamps Are On Continuously (U1-U5)**  
Courtesy of FORD MOTOR CO.

#### FOG LAMPS

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





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**Fig. 44: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### Inspection and Verification

1. Verify the customer concern by operating the fog lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"><li>• Steering column multifunction switch</li></ul>	<ul style="list-style-type: none"><li>• Battery junction box (BJB) fuse 13 (20A)</li><li>• Wiring harness</li><li>• Circuitry</li><li>• Fog relay</li><li>• Fog lamp</li><li>• Fog lamp switch</li></ul>

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**Fig. 45: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

3. If the fault is not visually evident, verify the symptom and proceed to the **SYMPTOM CHART**.

#### Symptom Chart

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

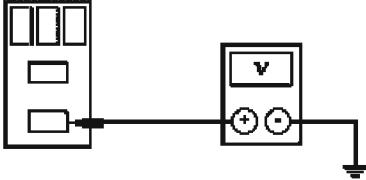
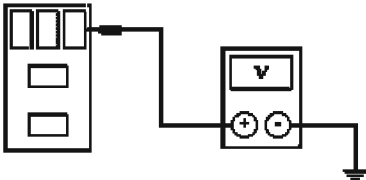
Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>The fog lamps are inoperative</li></ul>	<ul style="list-style-type: none"><li>Battery junction box (BJB) fuse 13 (20A).</li><li>Circuitry.</li><li>Steering column multifunction switch.</li><li>Fog relay.</li><li>Fog lamp switch.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test V.</u></li></ul>
<ul style="list-style-type: none"><li>The individual fog lamp is inoperative</li></ul>	<ul style="list-style-type: none"><li>Fog lamp bulb.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test W.</u></li></ul>
<ul style="list-style-type: none"><li>The fog lamps are on continuously</li></ul>	<ul style="list-style-type: none"><li>Circuitry.</li><li>Steering column multifunction switch.</li><li>Fog relay.</li><li>Fog lamp switch.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test X.</u></li></ul>

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**Fig. 46: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

#### PINPOINT TEST V: THE FOG LAMPS ARE INOPERATIVE

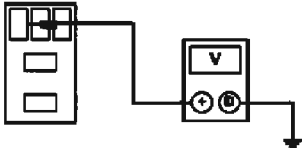
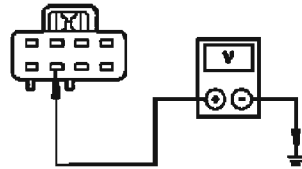
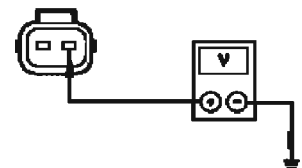
Test Step	Result / Action to Take
<b>V1 CHECK FOG LAMP RELAY CIRCUIT 54 (LG/YE) FOR POWER</b> <ul style="list-style-type: none"> <li>Disconnect: Fog Lamp Relay C1007.</li> <li>Measure the voltage between the fog relay C1007 pin 3, circuit 54 (LG/YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>V2</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>V2 CHECK VOLTAGE TO COIL SIDE OF FOG LAMP RELAY</b> <ul style="list-style-type: none"> <li>Turn the headlamps to the ON position.</li> <li>Verify the headlamps are in low beam.</li> <li>Turn the fog lamps on.</li> <li>Measure the voltage between the fog lamp relay C1007 pin 2, circuit 1347 (DB/WH), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>V3</u>.</p> <p><b>No</b> GO to <u>V4</u>.</p>

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**Fig. 47: Pinpoint Test V Chart - Fog Lamps Are Inoperative (V1-V2)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

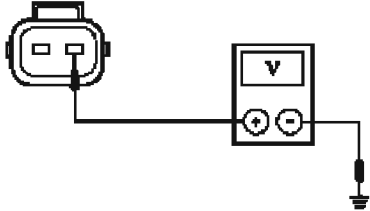
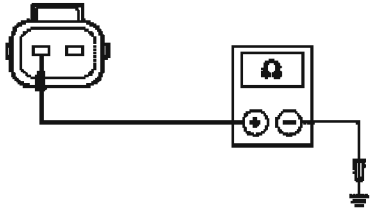
### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

<p><b>V3 CHECK CIRCUIT 57 (BK) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>Measure the resistance between the fog lamp C1007 relay pin 1, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new fog lamp relay. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>V4 CHECK VOLTAGE TO THE FOG LAMP SWITCH</b></p> <ul style="list-style-type: none"> <li>Disconnect: Fog Lamp Switch C242.</li> <li>Measure the voltage between fog lamp switch C242 pin 2, circuit 13 (RD/BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to V5.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<p><b>V5 CHECK FOG LAMP SWITCH</b></p> <ul style="list-style-type: none"> <li>Carry out the fog lamp switch component test.</li> </ul> <p>Refer to COMPONENT TESTING article for schematic and connector information.</p> <p>Component test: Fog Lamp Switch Test.</p> <ul style="list-style-type: none"> <li>Is the fog lamp switch OK?</li> </ul>	<p><b>Yes</b> GO to V6.</p> <p><b>No</b> INSTALL a new fog lamp switch. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.</p>
<p><b>V6 CHECK VOLTAGE TO CIRCUIT 478 (TN/OG)</b></p> <ul style="list-style-type: none"> <li>Disconnect: RH Fog Lamp C162.</li> <li>Disconnect: LH Fog Lamp C152.</li> <li>Measure the voltage between the fog lamp pin 1, circuit 478 (TN/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> REPAIR circuit 1347 (DB/WH). TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 478 (TN/OG). TEST the system for normal operation.</p>

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**Fig. 48: Pinpoint Test V Chart - Fog Lamps Are Inoperative (V3-V6)**  
Courtesy of FORD MOTOR CO.

**PINPOINT TEST W: THE INDIVIDUAL FOG LAMP IS INOPERATIVE**

Test Step	Result / Action to Take
<b>W1 CHECK VOLTAGE TO FOG LAMP</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Inoperative Fog Lamp.</li> <li>Turn the headlamps on.</li> <li>Verify the headlamps are in low beam.</li> <li>Turn the fog lamp switch on.</li> <li>Measure the voltage between the RH fog lamp C162 pin 1, circuit 478 (TN/OG), harness side and ground; or between the LH fog lamp C152 pin 1, circuit 478 (TN/OG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>W2</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>W2 CHECK GROUND CIRCUIT</b> <ul style="list-style-type: none"> <li>Measure the resistance between RH fog lamp C162 pin 2, circuit 57 (BK), harness side and ground; or between LH fog lamp C152 pin 2, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new fog lamp. REFER to <u>Fog Lamp</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 49: Pinpoint Test W Chart - Individual Fog Lamp Is Inoperative (W1-W2)**  
 Courtesy of FORD MOTOR CO.

**PINPOINT TEST X: THE FOG LAMPS ARE ON CONTINUOUSLY**

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

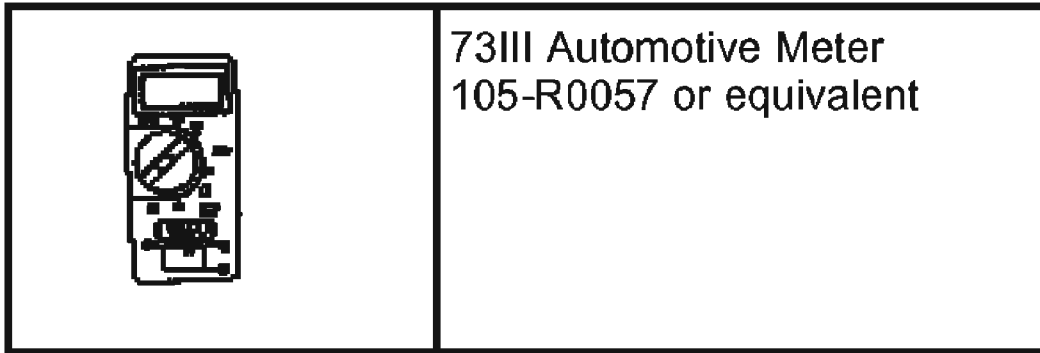
Test Step	Result / Action to Take
<b>X1 CHECK FOG LAMP SWITCH OPERATION</b>	
<ul style="list-style-type: none"> <li>Disconnect: Fog Lamp Switch C242.</li> <li>Did the fog lamps turn off?</li> </ul>	<b>Yes</b> GO to <u>X3</u> .  <b>No</b> GO to <u>X2</u> .
<b>X2 CHECK FOG LAMP RELAY OPERATION</b>	
<ul style="list-style-type: none"> <li>Disconnect: Fog Lamp Relay C1007.</li> <li>Did the fog lamps turn off?</li> </ul>	<b>Yes</b> GO to <u>X4</u> .  <b>No</b> REPAIR circuit 478 (TN/OG) for a short to power. TEST the system for normal operation.
<b>X3 CHECK VOLTAGE TO THE FOG LAMP SWITCH</b>	
<ul style="list-style-type: none"> <li>Measure the voltage between the fog lamp switch pin 2, circuit 13 (RD/BK), harness side and ground.</li> <li>Is voltage greater than 10 volts?</li> </ul>	<b>Yes</b> REPAIR the circuit. TEST the system for normal operation.  <b>No</b> INSTALL a new fog lamp switch. REFER to <u>Fog Lamp Switch</u> . TEST the system for normal operation.
<b>X4 CHECK THE FOG LAMP RELAY</b>	
<ul style="list-style-type: none"> <li>Carry out the fog lamp relay component test.</li> </ul> <p>Refer to COMPONENT TESTING article for schematic and connector information.</p> <p>Component test: Micro Relay Test.</p> <ul style="list-style-type: none"> <li>Is the fog lamp relay OK?</li> </ul>	<b>Yes</b> REPAIR circuit 1347 (DB/WH) for a short to power. TEST the system for normal operation. <b>No</b> INSTALL a new fog lamp relay. REFER to STEERING COLUMN SWITCHES. TEST the system for normal operation.

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**Fig. 50: Pinpoint Test X Chart - Fog Lamps Are On Continuously (X1-X4)**  
Courtesy of FORD MOTOR CO.

### REVERSING LAMPS

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



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**Fig. 51: Identifying Special Tool**  
 Courtesy of FORD MOTOR CO.

#### Inspection and Verification

1. Verify the customer concern by operating the reversing lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Reversing lamp switch (M/T)</li> <li>• Transmission range (TR) switch (A/T)</li> </ul>	<ul style="list-style-type: none"> <li>• Central junction box (CJB) fuse:               <ul style="list-style-type: none"> <li>▪ 6 (10A)</li> </ul> </li> <li>• Connectors</li> <li>• Bulbs</li> <li>• Transmission range (TR) switch (A/T) or reversing lamp switch (M/T)</li> </ul>

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**Fig. 52: Visual Inspection Chart**  
 Courtesy of FORD MOTOR CO.

3. If the fault is not visually evident, verify the symptom and proceed to the **SYMPTOM CHART**.

#### Symptom Chart

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

Condition	Possible Sources	Action
<ul style="list-style-type: none"><li>The reversing lamps are inoperative</li></ul>	<ul style="list-style-type: none"><li>Central junction box (CJB) fuse 6 (10A).</li><li>Circuitry.</li><li>Transmission range (TR) switch (A/T) or reversing lamp switch (M/T).</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test Y.</u></li></ul>
<ul style="list-style-type: none"><li>The individual reversing lamp is inoperative</li></ul>	<ul style="list-style-type: none"><li>Reversing lamp.</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test Z.</u></li></ul>
<ul style="list-style-type: none"><li>The reversing lamps are on continuously</li></ul>	<ul style="list-style-type: none"><li>TR switch (A/T) or reversing lamp switch (M/T).</li><li>Circuitry.</li></ul>	<ul style="list-style-type: none"><li><u>Go To Pinpoint Test AA.</u></li></ul>

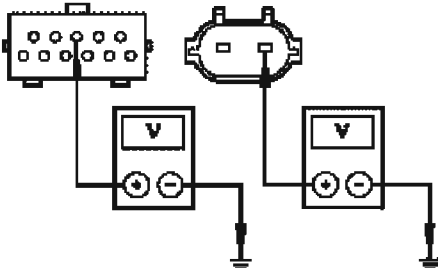
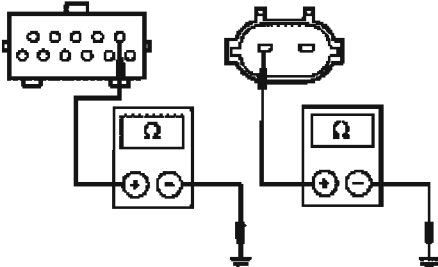
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**Fig. 53: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

#### PINPOINT TEST Y: THE REVERSING LAMPS ARE INOPERATIVE

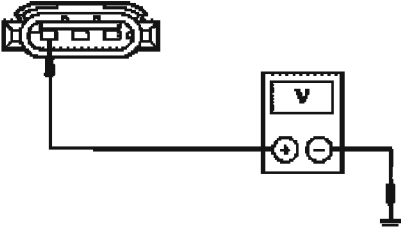


Test Step	Result / Action to Take
<b>Y1 CHECK VOLTAGE TO SWITCH</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Reversing Lamp Switch (M/T) C169.</li> <li>Disconnect: TR Switch (A/T) C167.</li> <li>Key in ON position.</li> <li>Measure the voltage between the A/T transmission range (TR) switch C167 pin 3, circuit 140 (BK/PK), harness side and ground; or between the M/T reversing lamp switch C169 pin A, circuit 140 (BK/PK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> GO to <u>Y2</u>.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>
<b>Y2 CHECK SWITCH GROUND</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Measure the resistance between the A/T transmission range (TR) switch C167 pin 1, circuit 57 (BK), harness side and ground; or between the M/T reversing lamp switch C169 pin B, circuit 57 (BK), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new reversing lamp switch or TR switch. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 54: Pinpoint Test Y Chart - Reversing Lamps Are Inoperative (Y1-Y2)**  
 Courtesy of FORD MOTOR CO.

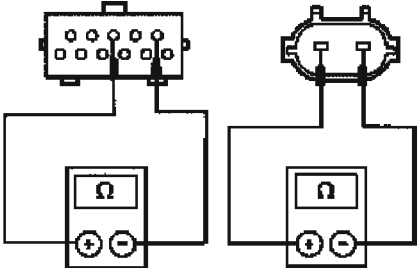
**PINPOINT TEST Z: THE INDIVIDUAL REVERSING LAMP IS INOPERATIVE**

Test Step	Result / Action to Take
<b>Z1 CHECK POWER TO INOPERATIVE REVERSING LAMP</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: Inoperative Reversing Lamp.</li> <li>Key in ON position.</li> <li>Measure the voltage between the RH reversing lamp C461 pin 1, circuit 8 (OG/YE), harness side and ground; or between the LH reversing lamp C451 pin 1, circuit 8 (OG/YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> REPAIR circuit 140 (BK/PK). TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 8 (OG/YE). TEST the system for normal operation.</p>

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**Fig. 55: Pinpoint Test Z Chart - Individual Reversing Lamp Is Inoperative (Z1)**  
Courtesy of FORD MOTOR CO.

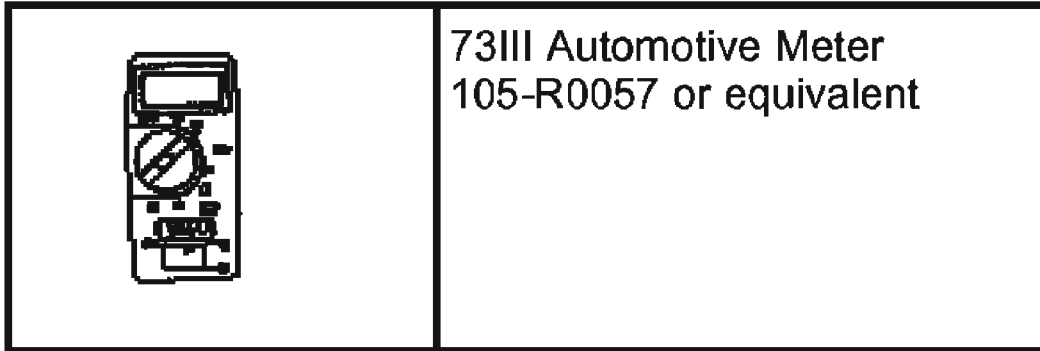
**PINPOINT TEST AA: THE REVERSING LAMPS ARE ON CONTINUOUSLY**

Test Step	Result / Action to Take
<b>AA1 CHECK SWITCH CONTINUITY</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>Disconnect: TR Switch (A/T) C167.</li> <li>Disconnect: Reversing Lamp Switch (M/T) C169.</li> <li>Key in ON position.</li> <li>Measure the resistance between the A/T transmission range (TR) switch C167 pin 1 and pin 3 component side; and between the M/T reversing lamp switch C169 pin B and pin A (component side).</li> </ul>  <ul style="list-style-type: none"> <li>Are the resistances less than 5 ohms?</li> </ul>	<p><b>Yes</b> INSTALL a new TR switch (A/T) or reversing lamp switch (M/T). TEST the system for normal operation.</p> <p><b>No</b> REPAIR circuit 140 (BK/PK). TEST the system for normal operation.</p>

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**Fig. 56: Pinpoint Test AA Chart - Reversing Lamps Are On Continuously (AA1)**  
Courtesy of FORD MOTOR CO.

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



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**Fig. 57: Identifying Special Tool**  
Courtesy of FORD MOTOR CO.

#### Inspection and Verification

1. Verify the customer concern by operating the trailer tow lights.
2. Verify the exterior lighting system of the vehicle is operating correctly. If not, Refer to the appropriate pinpoint test in this article.
3. Visually inspect for obvious signs of electrical damage.

Electrical
<ul style="list-style-type: none"><li>• Central junction box (CJB) fuse:<ul style="list-style-type: none"><li>▪ 21 (10A)</li><li>▪ 16 (10A)</li></ul></li><li>• Connections</li><li>• Circuitry</li><li>• Relays</li><li>• Bulb(s)</li></ul>

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**Fig. 58: Visual Inspection Chart**  
Courtesy of FORD MOTOR CO.

4. If the fault is not visually evident, determine the symptom and proceed to the **SYMPTOM CHART** .

Symptom Chart

## 2004 Ford Escape

### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

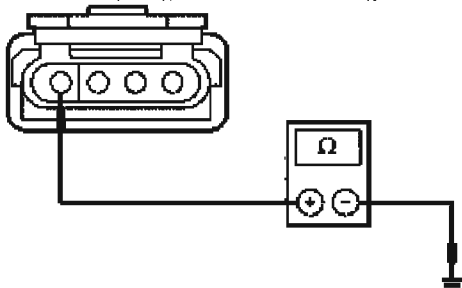
Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>The trailer lamps are inoperative</li> </ul>	<ul style="list-style-type: none"> <li>Central junction box (CJB) fuse 21 (10A).</li> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test AB.</a></li> </ul>
<ul style="list-style-type: none"> <li>The trailer lamps are inoperative—both trailer turn signals/stoplamps/hazard lamps</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test AC.</a></li> </ul>
<ul style="list-style-type: none"> <li>The individual trailer lamp is inoperative—RH trailer turn signals/stoplamps/hazard lamps</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test AD.</a></li> </ul>
<ul style="list-style-type: none"> <li>The individual trailer lamp is inoperative—LH trailer turn signals/stoplamps/hazard lamps</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test AE.</a></li> </ul>
<ul style="list-style-type: none"> <li>The individual trailer lamp is inoperative—parking lamps</li> </ul>	<ul style="list-style-type: none"> <li>Circuitry.</li> <li>Relay.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Go To Pinpoint Test AF.</a></li> </ul>

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**Fig. 59: Problem Symptom Chart**  
Courtesy of FORD MOTOR CO.

#### Pinpoint Tests

#### PINPOINT TEST AB: THE TRAILER LAMPS ARE INOPERATIVE

Test Step	Result / Action to Take
<b>AB1 CHECK TRAILER TOW GROUND</b> <ul style="list-style-type: none"> <li>Measure the resistance between trailer tow C439 pin 4, circuit 206 (WH), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	<p><b>Yes</b> The vehicle is operating correctly. HAVE the trailer repaired by an authorized camper/trailer repair center.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

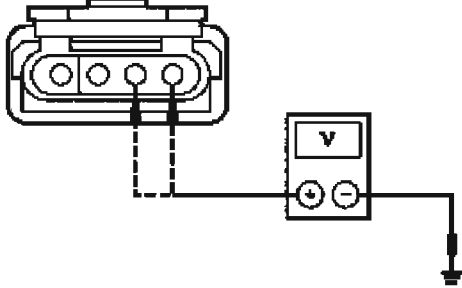
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**Fig. 60: Pinpoint Test AB Chart - Trailer Lamps Are Inoperative (AB1)**  
Courtesy of FORD MOTOR CO.

#### PINPOINT TEST AC: THE TRAILER LAMPS ARE INOPERATIVE-BOTH TRAILER TURN SIGNALS/STOPLAMPS/HAZARD LAMPS

## 2004 Ford Escape

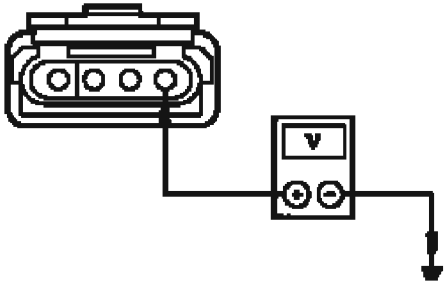
### 2004 ACCESSORIES & EQUIPMENT Exterior Lighting - Escape

Test Step	Result / Action to Take
<b>AC1 CHECK VEHICLE</b> <ul style="list-style-type: none"> <li>Disconnect: Trailer Tow C439.</li> <li>Operate vehicle turn signals, stop lamps, and hazard lamps.</li> <li><b>Do the lamps operate correctly?</b></li> </ul>	<p><b>Yes</b> GO to AC2.</p> <p><b>No</b> REFER to <u>Turn Signal, Cornering and Hazard Lamps or Stoplamps</u> in this section.</p>
<b>AC2 CHECK VOLTAGE TO THE TRAILER TOW CONNECTOR.</b> <ul style="list-style-type: none"> <li>Place the hazard lamp switch in the ON position.</li> <li>Check the voltage between the trailer tow C439 pin 1 circuit 64 (DG), harness side and ground; and between the trailer tow C439 pin 2 circuit 52 (YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li><b>Does the voltage alternate between 0 volts and greater than 10 volts on each circuit?</b></li> </ul>	<p><b>Yes</b> The vehicle is operating correctly. HAVE the trailer repaired by an authorized camper/trailer repair center.</p> <p><b>No</b> REPAIR the circuit(s) in question. TEST the system for normal operation.</p>

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**Fig. 61: Pinpoint Test AC Chart - Trailer Lamps Are Inoperative-Both Trailer Turn Signals/Stoplamps/Hazard Lamps (AC1)**  
**Courtesy of FORD MOTOR CO.**

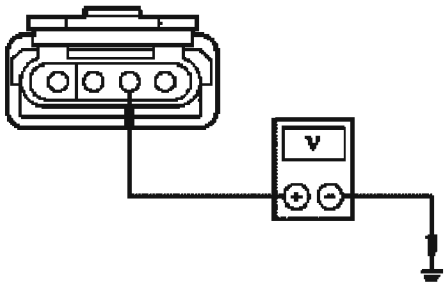
**PINPOINT TEST AD: THE INDIVIDUAL TRAILER LAMPS IS INOPERATIVE-RH TRAILER TURN SIGNALS/STOPLAMPS/HAZARD LAMPS**

Test Step	Result / Action to Take
<b>AD1 CHECK VOLTAGE TO RH TURN, STOP AND HAZARD TRAILER TOW CONNECTOR</b> <ul style="list-style-type: none"> <li>Disconnect: Trailer Tow C439.</li> <li>Place the hazard lamp switch in the ON position.</li> <li>Measure the voltage between trailer tow C439 pin 1, circuit 64 (DG), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Does the voltage alternate between 0 volts and greater than 10 volts?</li> </ul>	<p><b>Yes</b> The vehicle is operating correctly. HAVE the trailer repaired by an authorized camper/trailer repair center.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 62: Pinpoint Test AD Chart - Individual Trailer Lamps Is Inoperative-Rh Trailer Turn Signals/Stoplamps/Hazard Lamps (AD1)**  
Courtesy of FORD MOTOR CO.

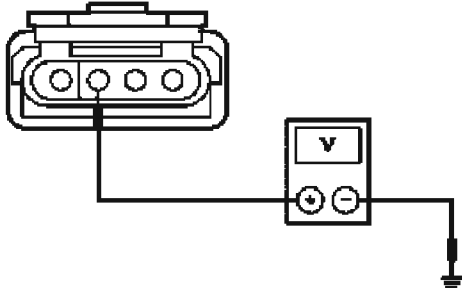
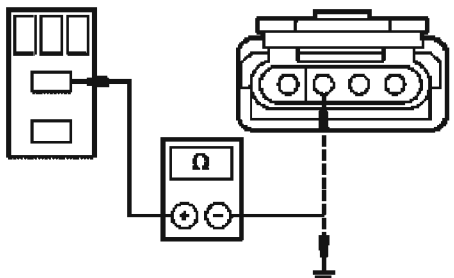
**PINPOINT TEST AE: THE INDIVIDUAL TRAILER LAMPS IS INOPERATIVE-LH TRAILER TURN SIGNALS/STOPLAMPS/HAZARD LAMPS**

Test Step	Result / Action to Take
<b>AE1 CHECK VOLTAGE TO LH TURN, STOP AND HAZARD TRAILER TOW CONNECTOR</b> <ul style="list-style-type: none"> <li>Place the hazard lamp switch in the ON position.</li> <li>Measure the voltage between trailer tow C439 pin 2, circuit 52 (YE), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Does the voltage alternate between 0 volts and greater than 10 volts?</li> </ul>	<p><b>Yes</b> The vehicle is operating correctly. HAVE the trailer repaired by an authorized camper/trailer repair center.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 63: Pinpoint Test AE Chart - Individual Trailer Lamps Is Inoperative-LH Trailer Turn Signals/Stoplamps/Hazard Lamps (AE1)**  
Courtesy of FORD MOTOR CO.

## PINPOINT TEST AF: THE INDIVIDUAL TRAILER LAMPS IS INOPERATIVE-PARKING LAMPS

Test Step	Result / Action to Take
<b>AF1 CHECK VOLTAGE TO PARKING LAMPS TRAILER TOW CONNECTOR</b> <ul style="list-style-type: none"> <li>Place the multifunction switch in the ON position.</li> <li>Measure the voltage between trailer tow C439 pin 3, circuit 962 (BN/WH), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 volts?</li> </ul>	<p><b>Yes</b> The vehicle is operating correctly. HAVE the trailer repaired by an authorized camper/trailer repair center.</p> <p><b>No</b> GO to AF2.</p>
<b>AF2 CHECK CIRCUIT 962 (BN/WH) FOR OPEN AND SHORT</b> <ul style="list-style-type: none"> <li>Turn the steering column multifunction switch to the OFF position.</li> <li>Disconnect: Parking Lamp Relay C2059.</li> <li>Measure the resistance between the parking lamp relay C2059 pin 5, circuit 962 (BN/WH), harness side and the trailer tow C439 pin 3, circuit 962 (BN/WH), harness side; and between the parking lamp relay C2059 pin 5, circuit 962 (BN/WH), harness side and ground.</li> </ul>  <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms between the parking lamp relay connector and the trailer tow connector and greater than 10,000 ohms between the parking lamp relay connector and chassis ground?</li> </ul>	<p><b>Yes</b> INSTALL a new parking lamp relay. REFER to <u>Parking, Rear and License Lamps</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> REPAIR the circuit. TEST the system for normal operation.</p>

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**Fig. 64: Pinpoint Test AF Chart - Individual Trailer Lamps Is Inoperative-Parking Lamps (AF1-AF2)**

Courtesy of FORD MOTOR CO.

## GENERAL PROCEDURES

### HEADLAMP ADJUSTMENT

#### Headlamp Aiming

- The headlamp aiming procedure depends on what type of beam pattern the headlamp is equipped with. To identify the headlamp beam pattern, look on the headlamp lens.



Molded in small letters on the headlamp lens is one of the following:

- SAE
  - VOL
  - VOR
2. Once the headlamp beam pattern is identified, aim the headlamps using one of the following methods as applicable.
- Photometric aimers can aim SAE, VOL and VOR type headlamps. This is the preferred method of headlamp aiming.
  - Visual or screen method aiming can be used to aim SAE, VOL and VOR type headlamps.
  - Mechanical aimers can only be used with SAE type headlamps. Lamps that can be aimed mechanically will have three nibs molded into the lens of the lamp.

#### **Photometric Aiming**

1. For the photometric aiming procedure, Refer to the appropriate photometric headlamp aimer instruction manual.

#### **Screen Method Aiming**

**NOTE:** Horizontal aim is not necessary for VOL or VOR headlamps.

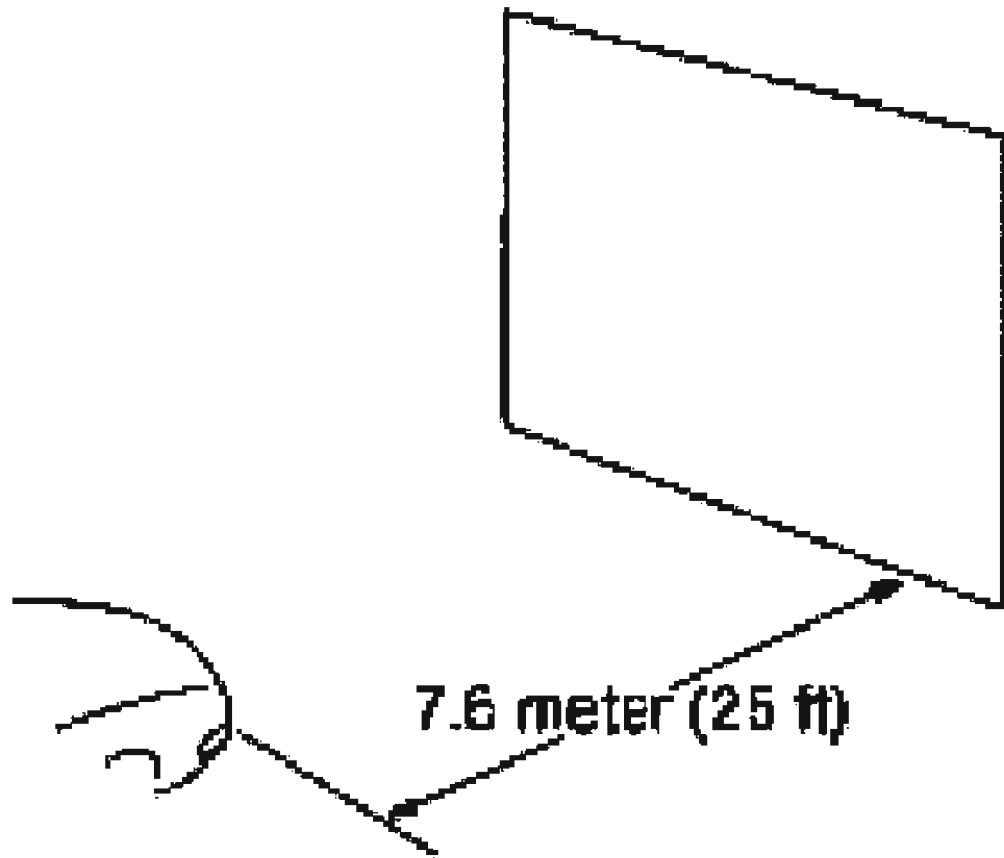
**NOTE:** Consult your state vehicle inspection manual for recommended tolerance ranges for visual aiming.

**NOTE:** The sight shield may need to be positioned or removed for access to the adjusters.

#### **All headlamp types**

1. Before starting headlamp adjustment:
  - Check the tire inflation.
  - Check that no other load is in the vehicle other than a half tank of fuel.
  - Check that the headlamps are clean.
  - Check for correct headlamp operation.
  - Check that the vehicle is on level ground.
  - If the vehicle is equipped with air suspension, make sure that the switch is on.

**NOTE:** The vertical wall or screen must be a minimum of 2.4 meters (8 feet) wide.



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**Fig. 65: Checking Distance Between Parked Vehicle And Vertical Wall**  
Courtesy of FORD MOTOR CO.

2. Park the vehicle on a level surface approximately 7.6 meters (25 feet) from the vertical wall or screen directly in front of it.

**NOTE:** The center of the lamp is marked by a 3 mm (0.12 in) circle on the headlamp lens.



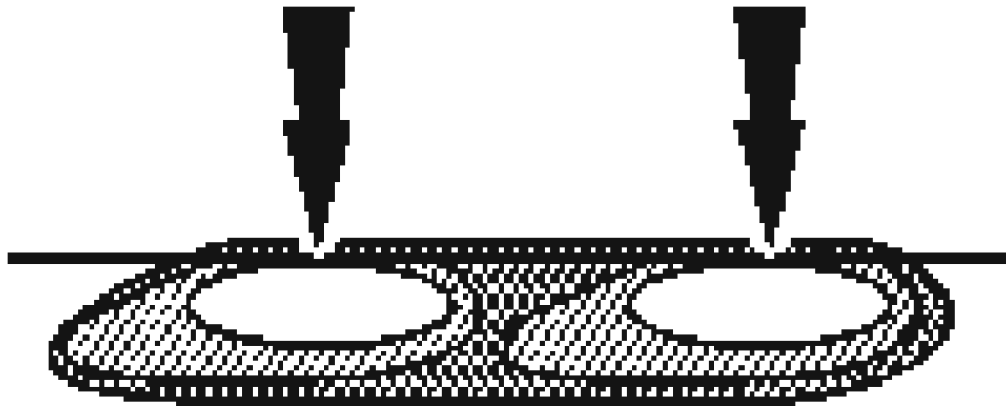
<http://vnx.su>

- NOTE:** This procedure should be done in a dark environment to effectively see the headlamp beam pattern.

- NOTE:** For SAE type headlamps, the appearance of the beam pattern may vary between vehicles.

- ## VOR type headlamps

**NOTE:** The appearance of the VOR beam pattern may vary between vehicles.



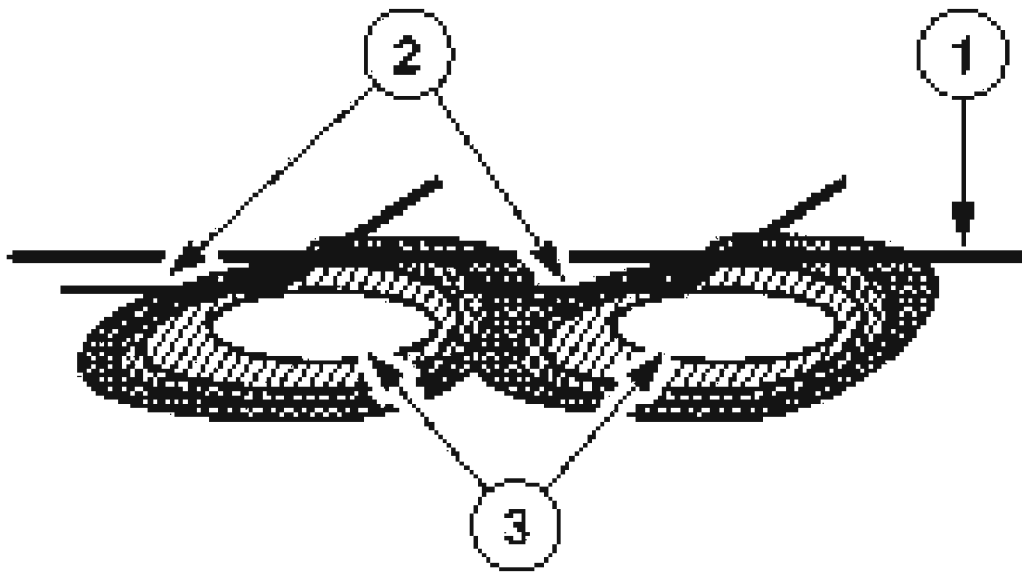
G02742800

**Fig. 67: Identifying High Intensity Area**  
Courtesy of FORD MOTOR CO.

6. Identify at the top edge of this high intensity area a distinct horizontal cutoff in the beam pattern. If the top edge of this cutoff is not even with the horizontal reference line, the headlamp beam will need to be adjusted.

#### **VOL type headlamps**

7. For VOL type headlamps, there will be a distinct cutoff in the left portion of the beam pattern. The edge of this cutoff should be positioned 50.2 mm (2 in) below the horizontal reference line.
  1. Horizontal reference line.
  2. Top edge of the beam pattern.
  3. High intensity zone.



G02742801

**Fig. 68: Identifying High Intensity Zone (VOL Type Headlamps)**  
Courtesy of FORD MOTOR CO.

#### Mechanical Aiming

1. For the mechanical aiming procedure, Refer to the appropriate mechanical headlamp aimer instruction manual.

## REMOVAL AND INSTALLATION

### HEADLAMP BULB

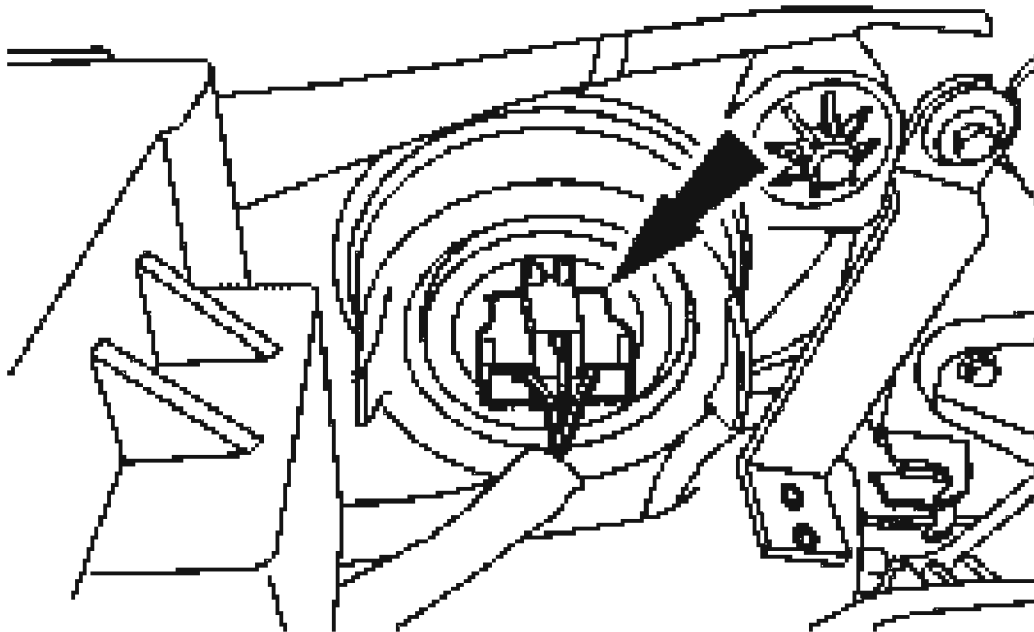
#### Removal and Installation

**WARNING:** The halogen headlamp bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb carefully. Grasp the bulb only by its base. Avoid touching the glass envelope. Failure to follow these instructions may result in personal injury.

**CAUTION:** The headlamp bulb should not be removed from the headlamp until just before a new bulb is installed. Removing the bulb for an extended period of time may

affect headlamp bulb performance. Contaminants may enter the headlamp where they can settle on the lens and reflector. Never turn on the headlamps with the bulb removed.

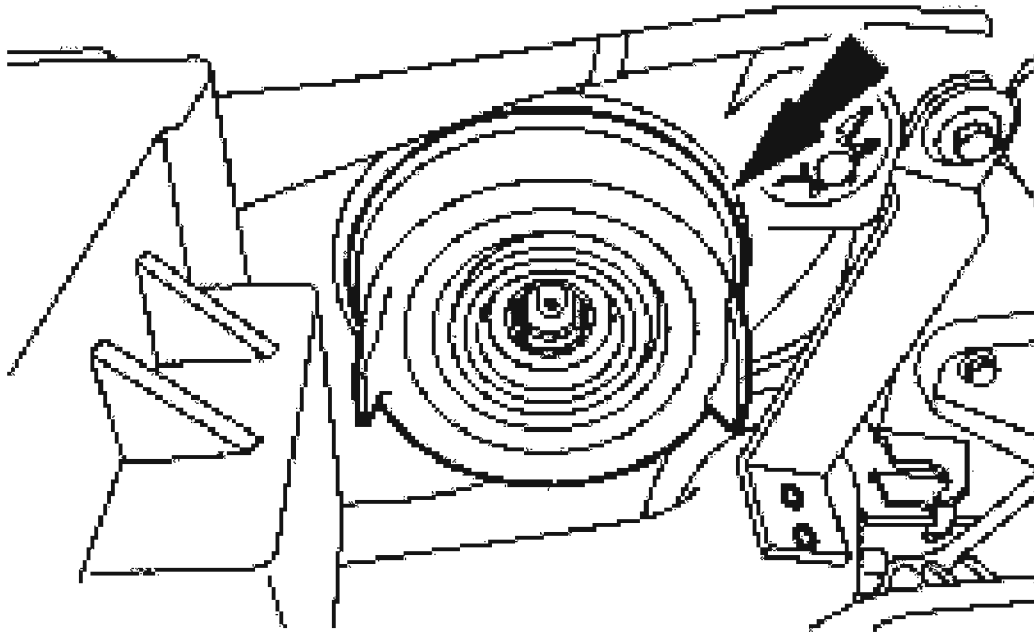
**NOTE:** Make sure that the headlamp switch and the ignition switch are in the OFF position.



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**Fig. 69: Disconnecting Headlamp Electrical Connector**  
Courtesy of FORD MOTOR CO.

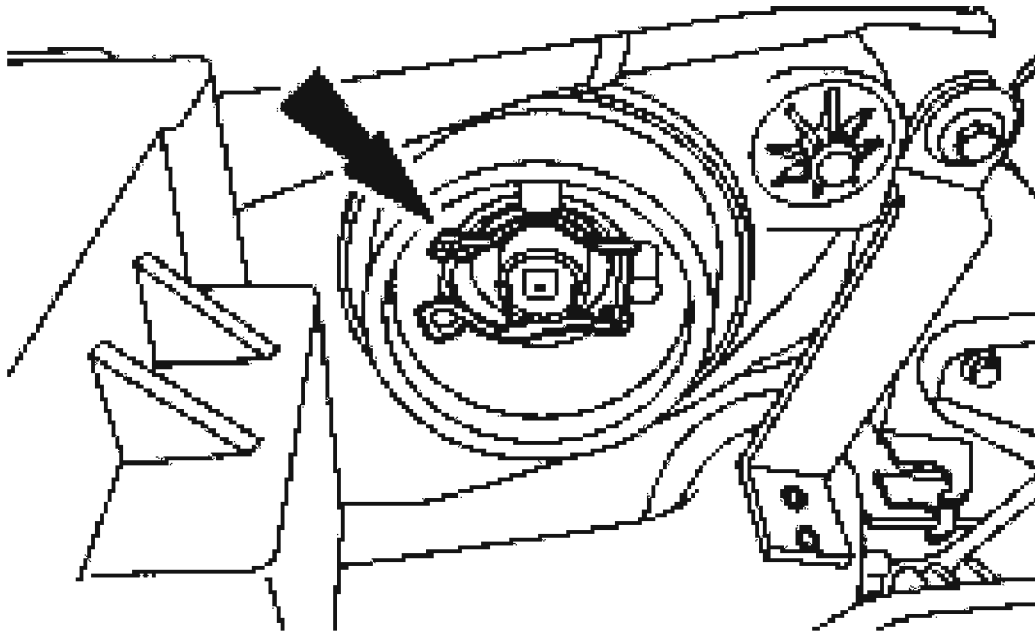
1. Disconnect the headlamp electrical connector.
2. Remove the rubber boot.



G02742803

**Fig. 70: Removing Rubber Boot**  
**Courtesy of FORD MOTOR CO.**

3. Depress the retainer clip and position aside.

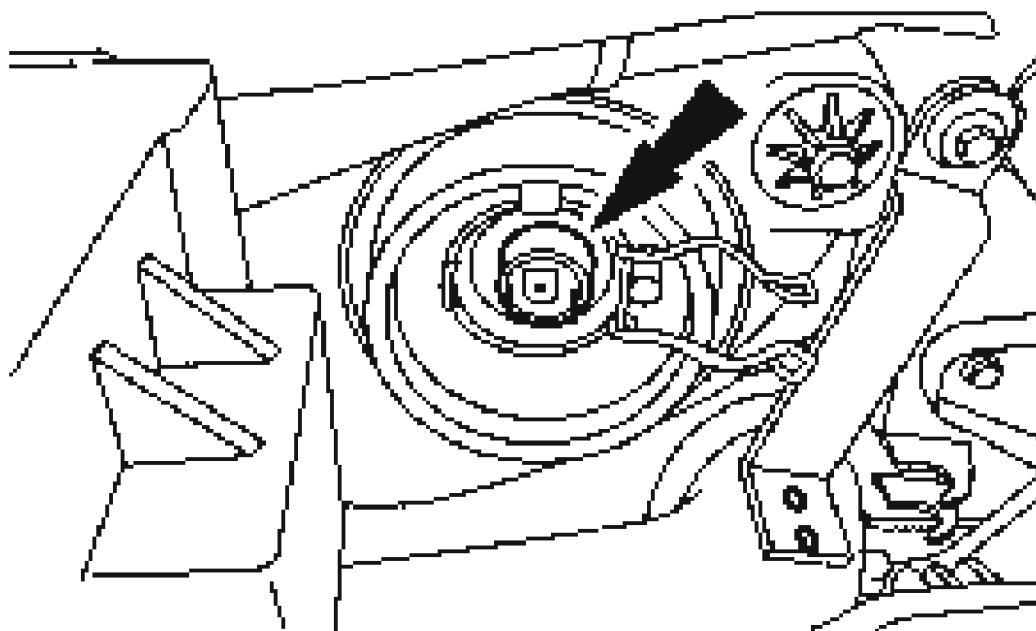


G02742804

**Fig. 71: Depressing Retainer Clip**  
**Courtesy of FORD MOTOR CO.**

4. Remove the bulb.





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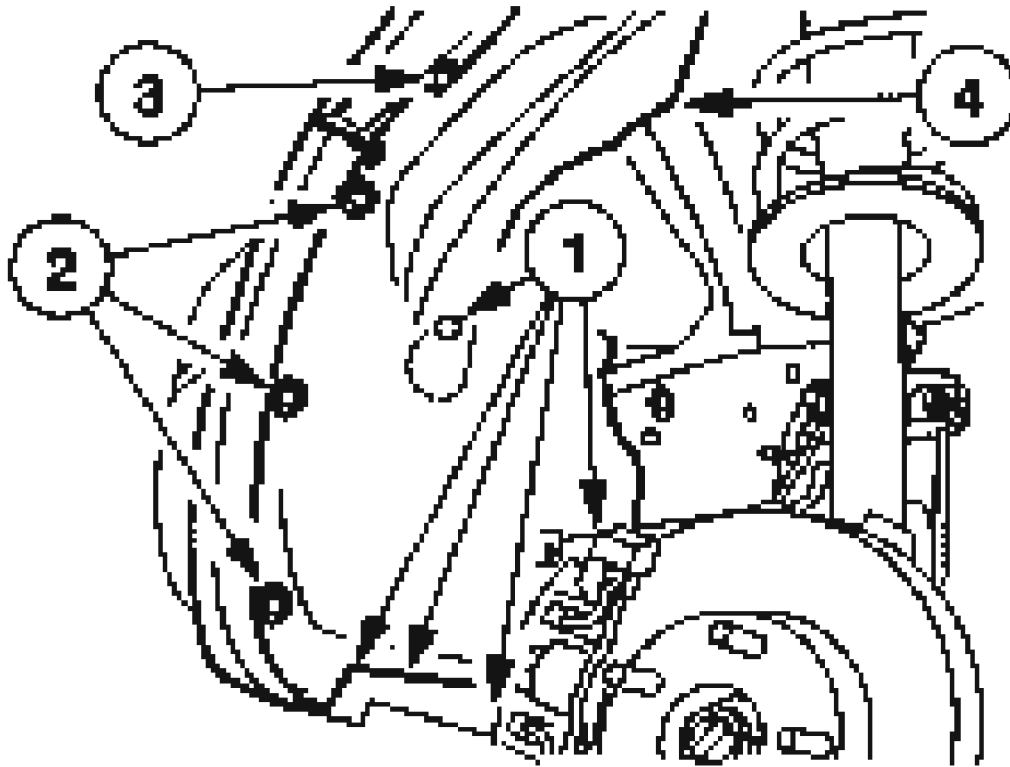
**Fig. 72: Removing Bulb**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

#### **SIDE LAMP/FRONT TURN SIGNAL LAMP BULB**

##### **Removal and Installation**

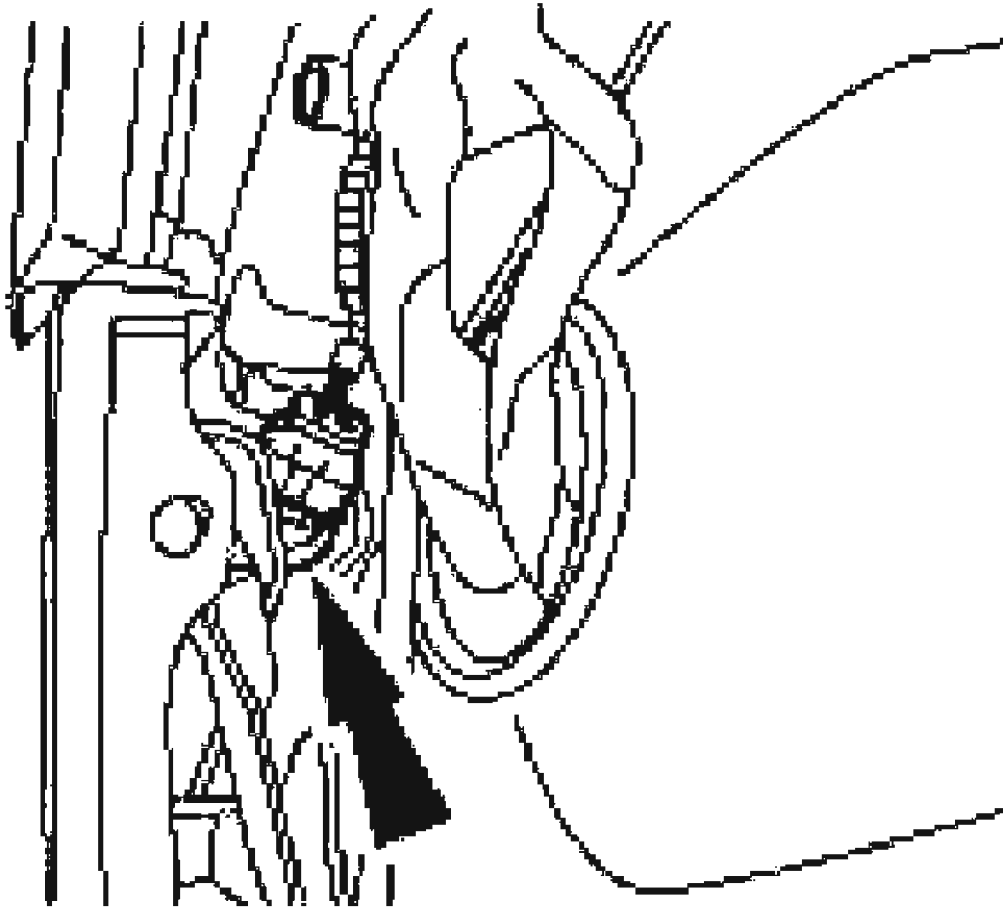
1. Remove the wheel and tire.
2. Position the inner fender well aside.
  1. Remove the bolts.
  2. Remove the pin-type retainers.
  3. Remove the screw.
  4. Position the inner fender well aside.



G02742806

**Fig. 73: Removing Inner Fender Well**  
Courtesy of FORD MOTOR CO.

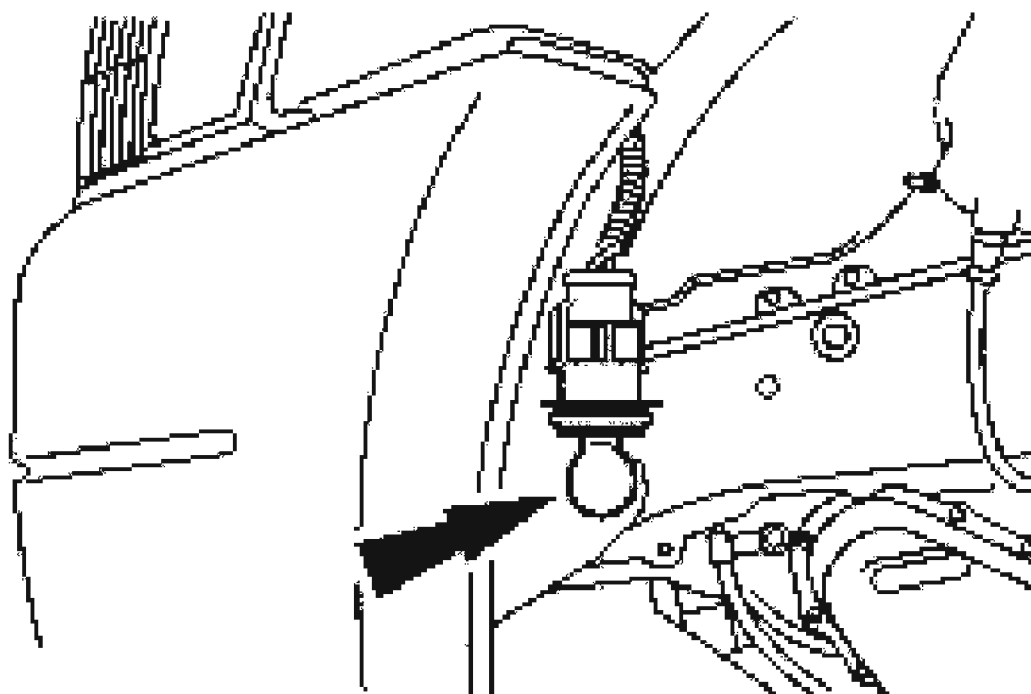
3. Remove the lamp socket from the lamp assembly.



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**Fig. 74: Removing Lamp Socket**  
Courtesy of FORD MOTOR CO.

4. Remove the bulb.



G02742808

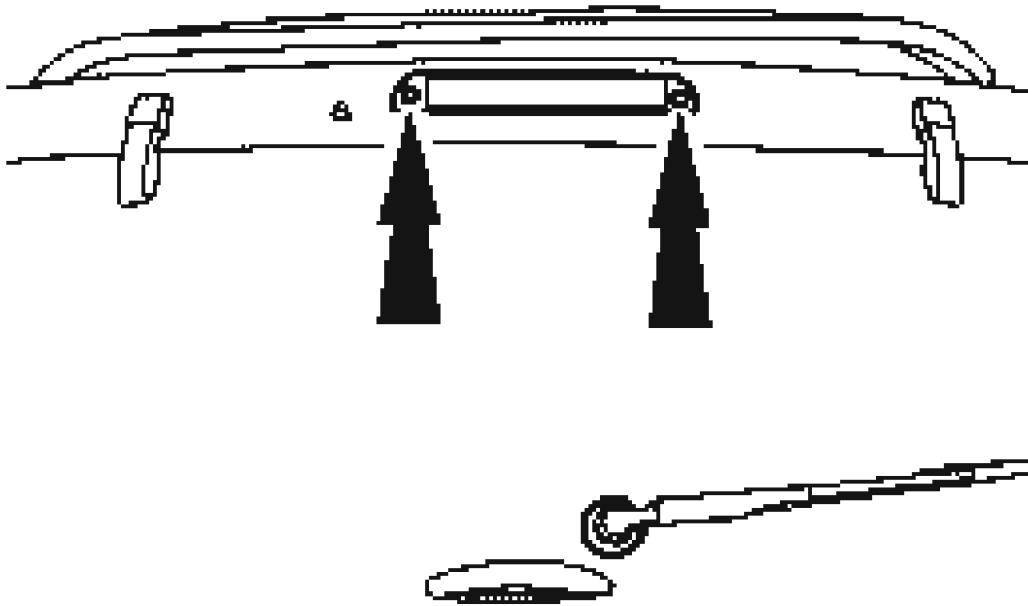
**Fig. 75: Removing Bulb**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

#### **HIGH MOUNTED STOPLAMP BULB**

##### **Removal and Installation**

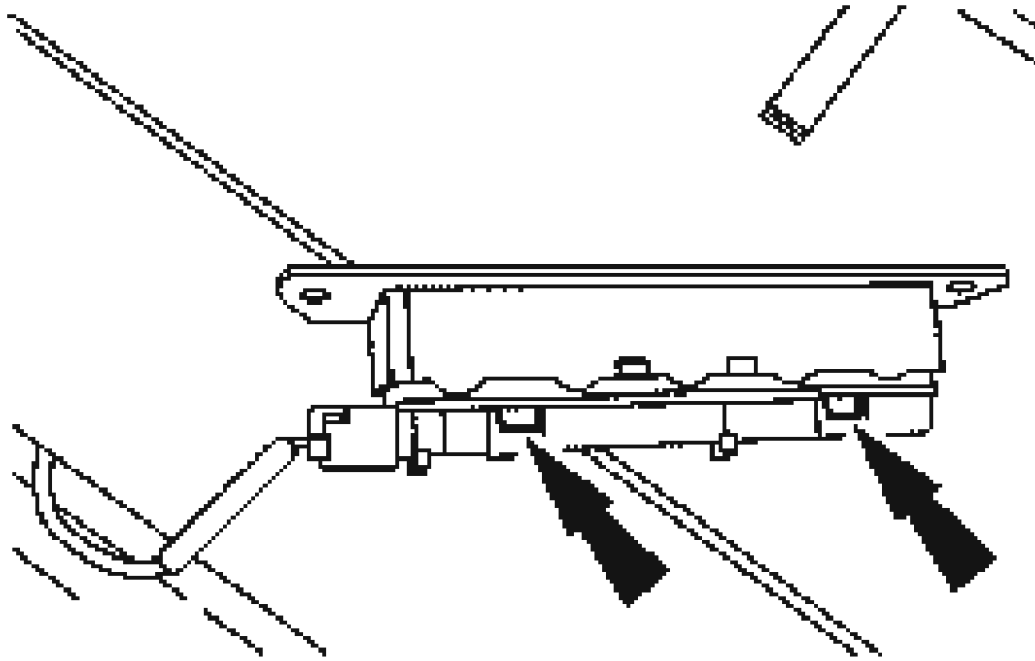
1. Remove the high-mounted stoplamp assembly.
  - Remove and discard the screws and washers.



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**Fig. 76: Removing High-Mounted Stoplamp Assembly**  
Courtesy of FORD MOTOR CO.

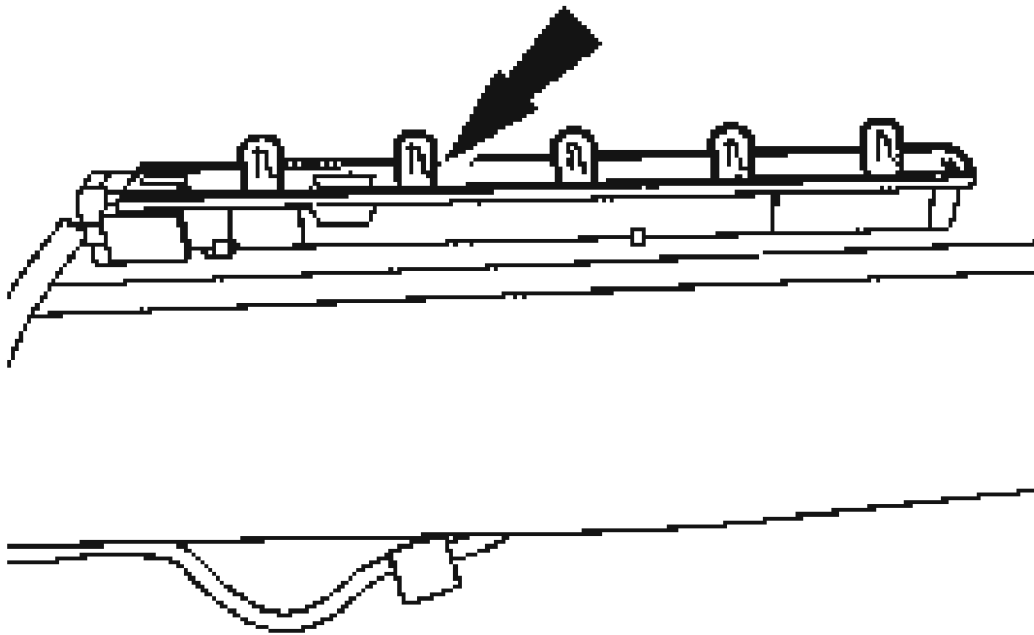
2. Remove the high-mounted stoplamp bulb holder from the lamp assembly by disengaging the snaps.



G02742810

**Fig. 77: Disengaging Snaps**  
Courtesy of FORD MOTOR CO.

3. Remove the bulb(s).



G02742811

**Fig. 78: Removing Bulbs**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

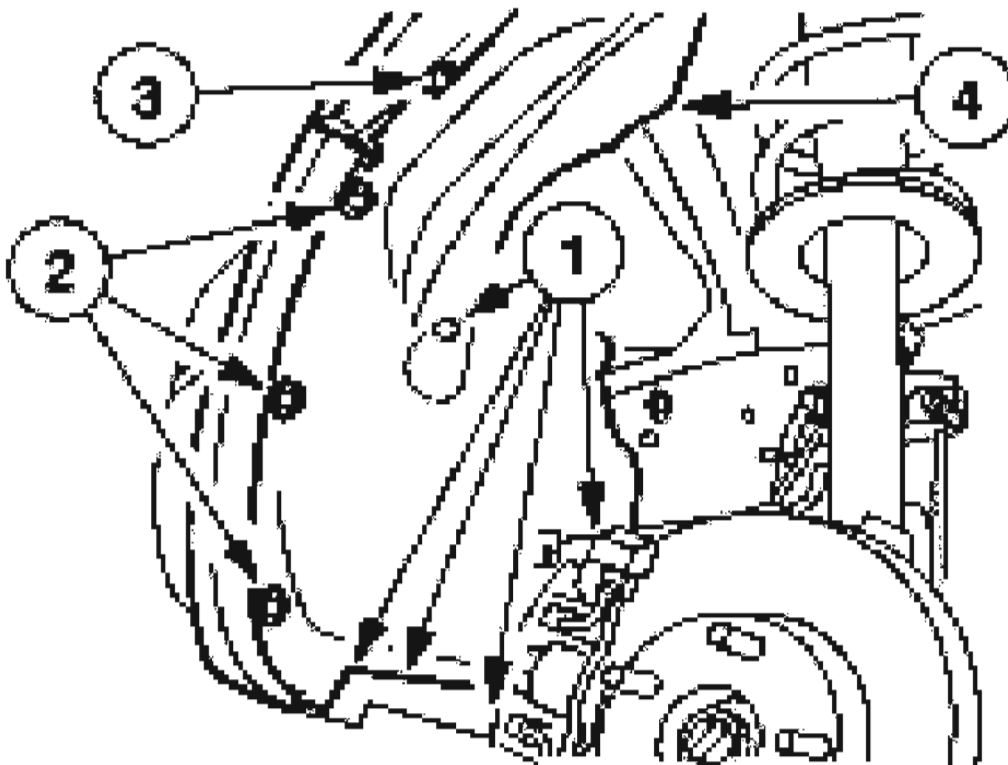
#### FOG LAMP BULB

##### Removal and Installation

**WARNING:** The halogen fog lamp bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb carefully. Grasp the bulb only by its base. Avoid touching the glass envelope. Failure to follow these instructions may result in personal injury.

**CAUTION:** The fog lamp bulb should not be removed from the fog lamp until just before a new bulb is installed. Removing the bulb for an extended period of time may affect fog lamp bulb performance. Contaminants may enter the fog lamp where they can settle on the lens and reflector. Never turn on the fog lamps with the bulb removed.

1. Remove the wheel and tire.
2. Position the inner fender well aside.
  1. Remove the bolts.
  2. Remove the pin-type retainers.
  3. Remove the screw.
  4. Position the inner fender well aside.

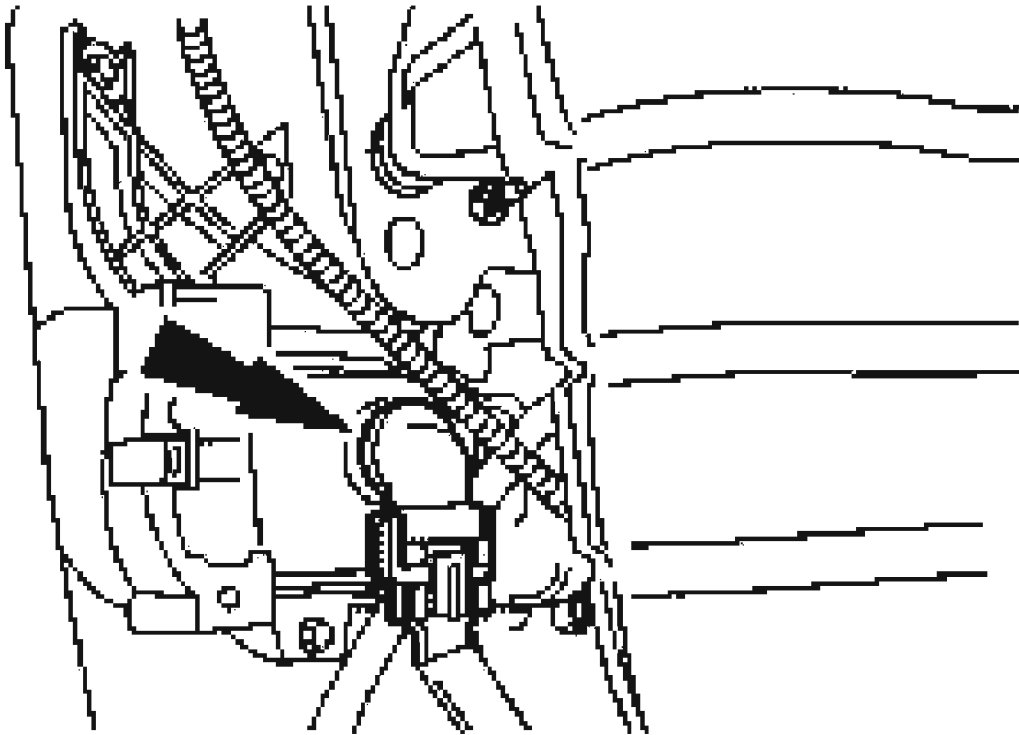


G02742812

**Fig. 79: Removing Inner Fender Well**  
Courtesy of FORD MOTOR CO.

3. Remove the lamp socket from the lamp assembly.
  - Disconnect the electrical connector.

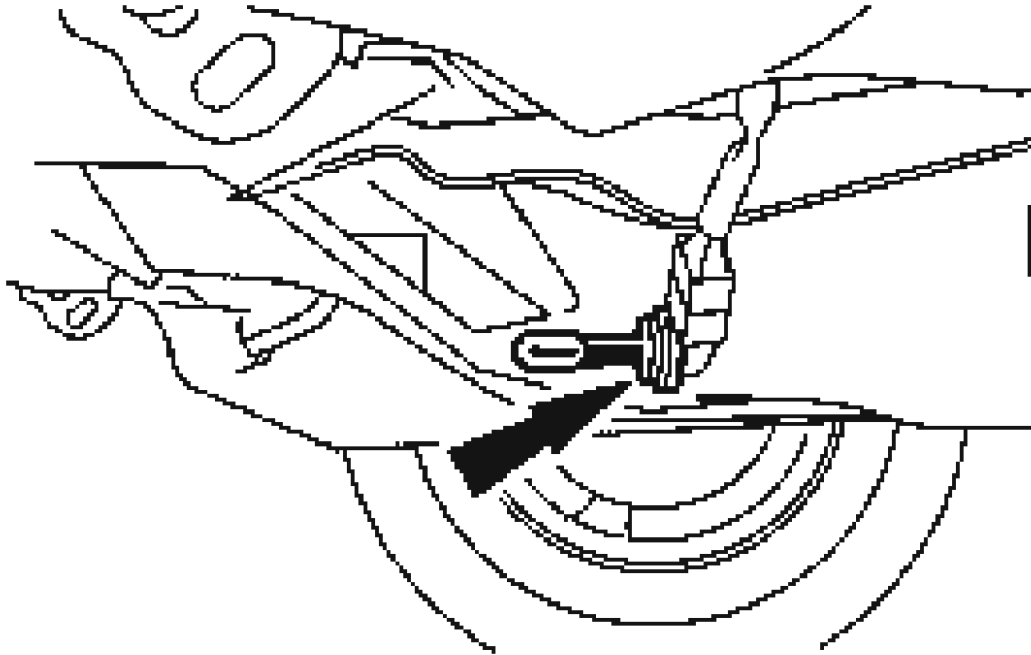




G02742813

**Fig. 80: Removing Lamp Socket**  
**Courtesy of FORD MOTOR CO.**

4. Disconnect the bulb from the electrical connector.



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**Fig. 81: Disconnecting Bulb**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.

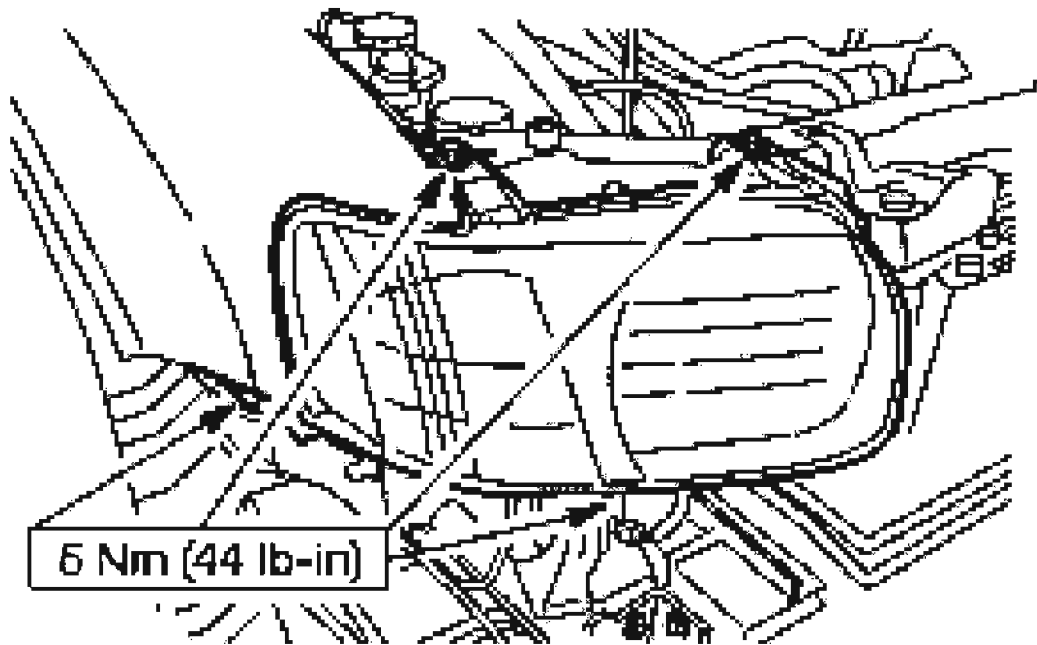
## HEADLAMP ASSEMBLY

### Removal and Installation

**NOTE:** Make sure that the headlamp switch and the ignition switch are in the OFF position.

1. Remove the front bumper cover. For additional information, refer to **BUMPERS**.

**NOTE:** Pull headlamp assembly forward to access electrical connectors.



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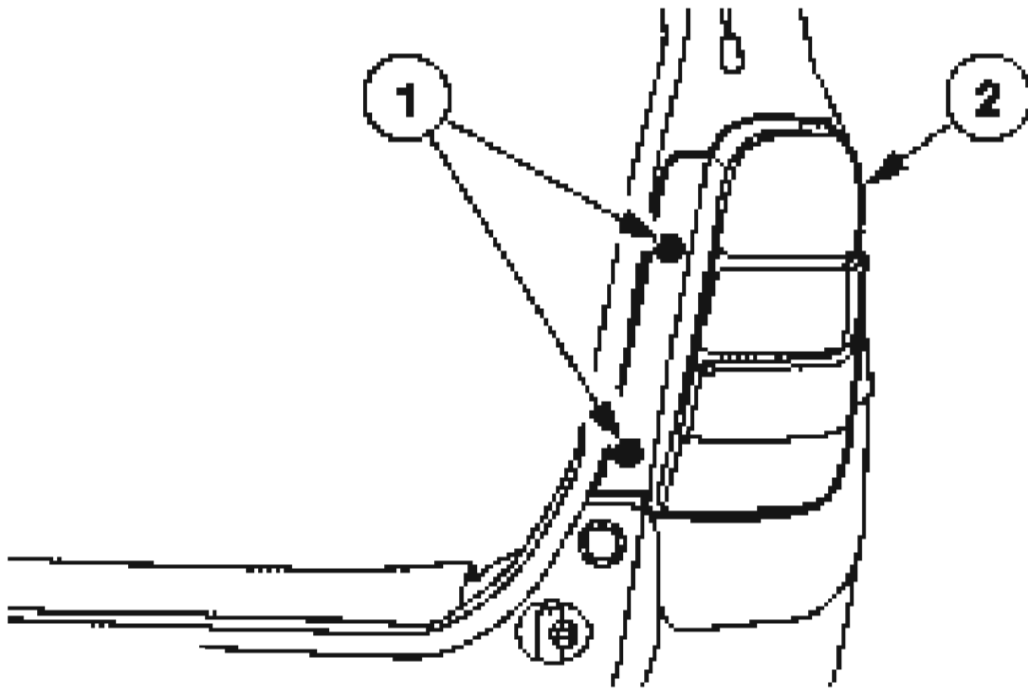
**Fig. 82: Removing Headlamp Assembly**  
Courtesy of FORD MOTOR CO.

2. Remove the headlamp assembly.
  1. Remove the three bolts.
  2. Loosen the nut.
    - Disconnect the electrical connectors.
3. To install, reverse the removal procedure.
  - If necessary, adjust the headlamps. For additional information, refer to **HEADLAMP ADJUSTMENT**.

## REAR LAMP ASSEMBLY

### Removal and Installation

1. Remove the rear lamp assembly.
  1. Remove the bolts.
  2. Pull straight back to remove the rear lamp assembly.
    - Disconnect the electrical connectors.



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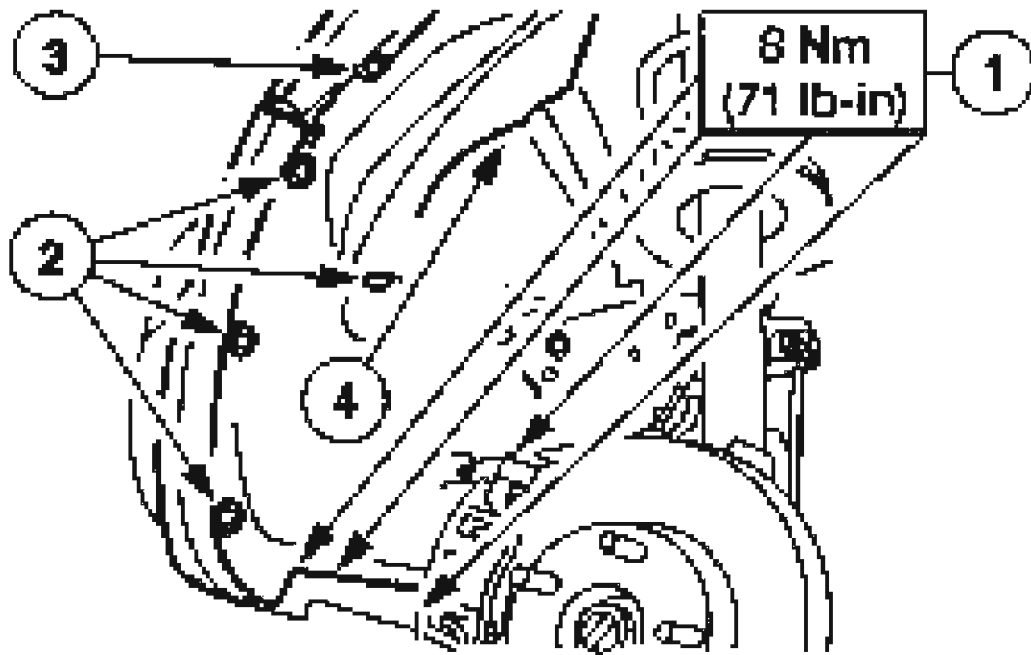
**Fig. 83: Removing Rear Lamp Assembly**  
Courtesy of FORD MOTOR CO.

2. To install, reverse the removal procedure.

## FOG LAMP

### Removal and Installation

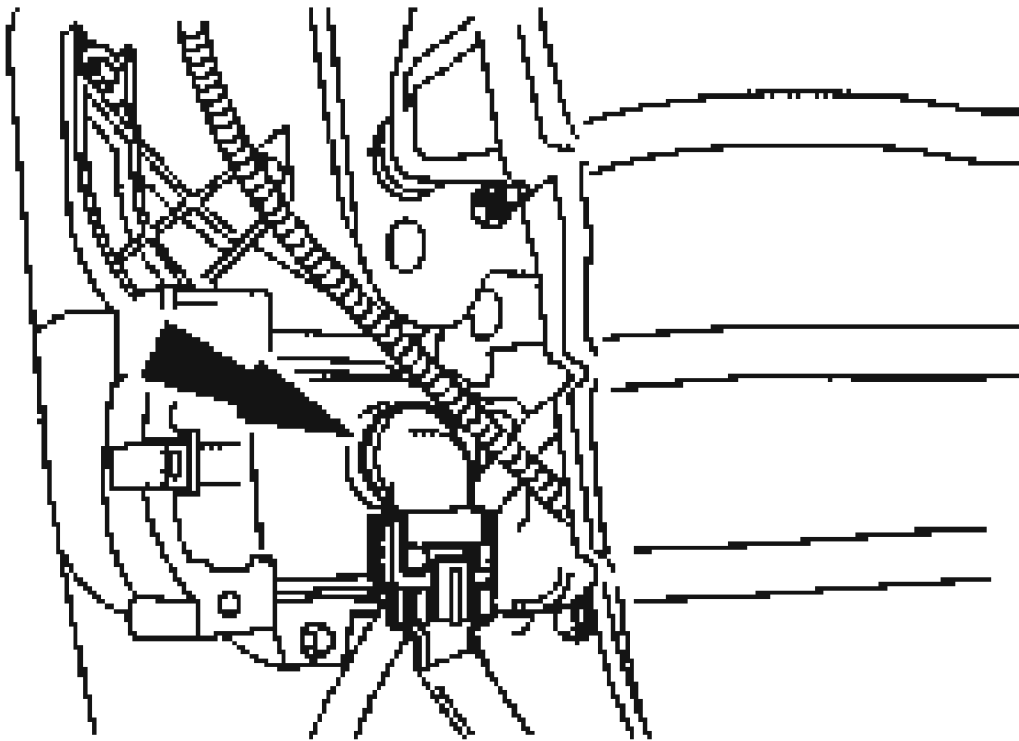
1. Remove the tire and wheel.
2. Position the inner fender well aside.
  1. Remove the bolts.
  2. Remove the pin -type retainers.
  3. Remove the screw.
  4. Position the inner fender well aside.



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**Fig. 84: Removing Inner Fender Well**  
Courtesy of FORD MOTOR CO.

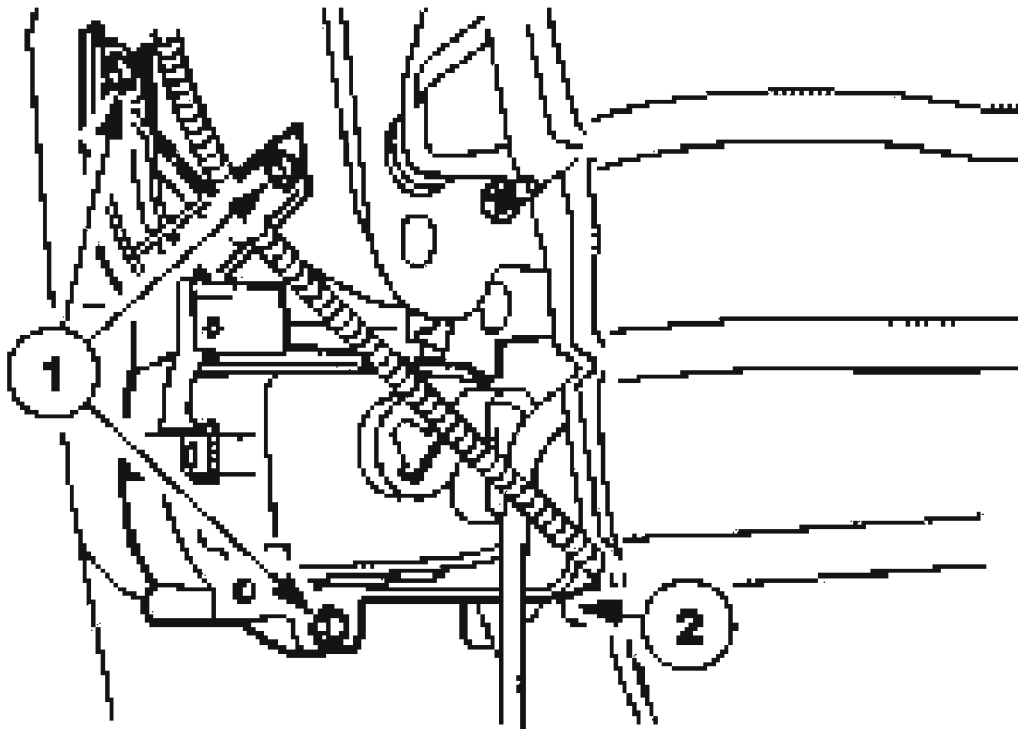
3. Disconnect the electrical bulb assembly and position aside.



G02742818

**Fig. 85: Disconnecting Electrical Bulb Assembly**  
Courtesy of FORD MOTOR CO.

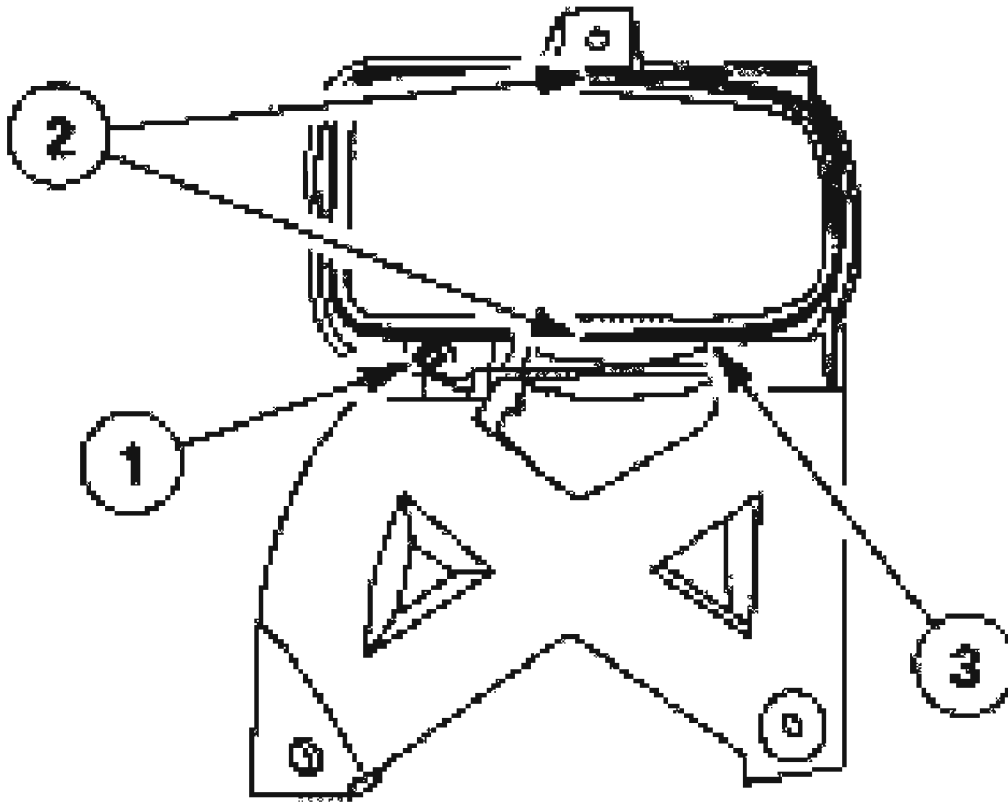
4. Remove the fog lamp assembly.
  1. Remove the bolts.
  2. Remove the fog lamp assembly.



G02742819

**Fig. 86: Removing Fog Lamp Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** This step may not be necessary if the fog lamp comes with bracket.



G02742820

**Fig. 87: Removing Fog Lamp**  
Courtesy of FORD MOTOR CO.

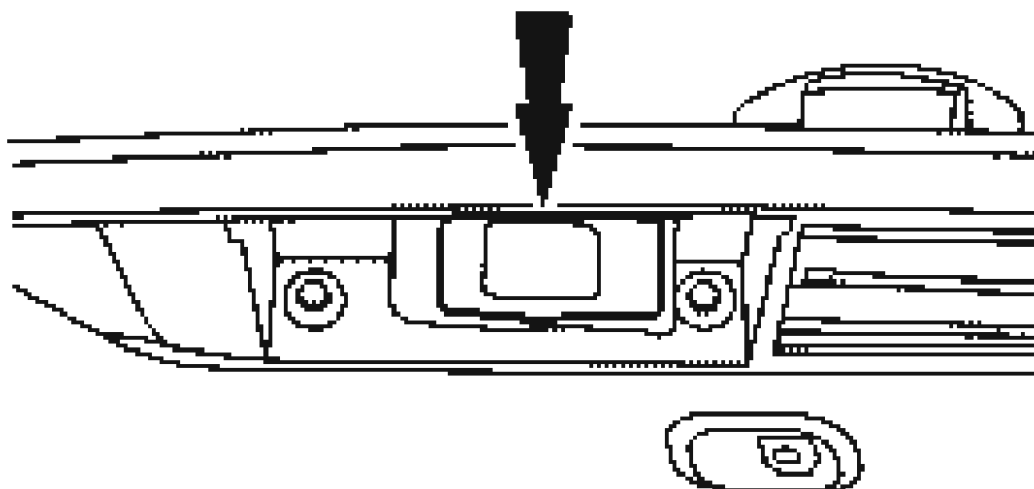
5. Remove the fog lamp from the fog lamp bracket.
  1. Remove the adjusting screw and spring.
  2. Squeeze the top and bottom of the fog lamp bracket.
  3. Remove the fog lamp from the fog lamp bracket.
6. To install, reverse the removal procedure.

## LICENSE PLATE LAMP

### Removal and Installation

1. Remove the license plate lamp assembly.
  - Push the license lamp to the right and pull out.

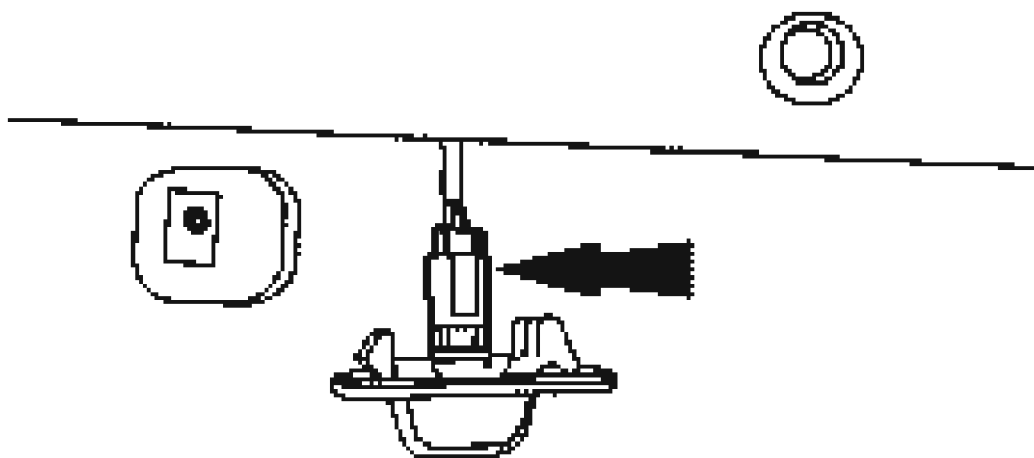




G02742821

**Fig. 88: Identifying License Plate Lamp Assembly**  
Courtesy of FORD MOTOR CO.

2. Disconnect the socket from the lens.
  - Remove the bulb.



G02742822

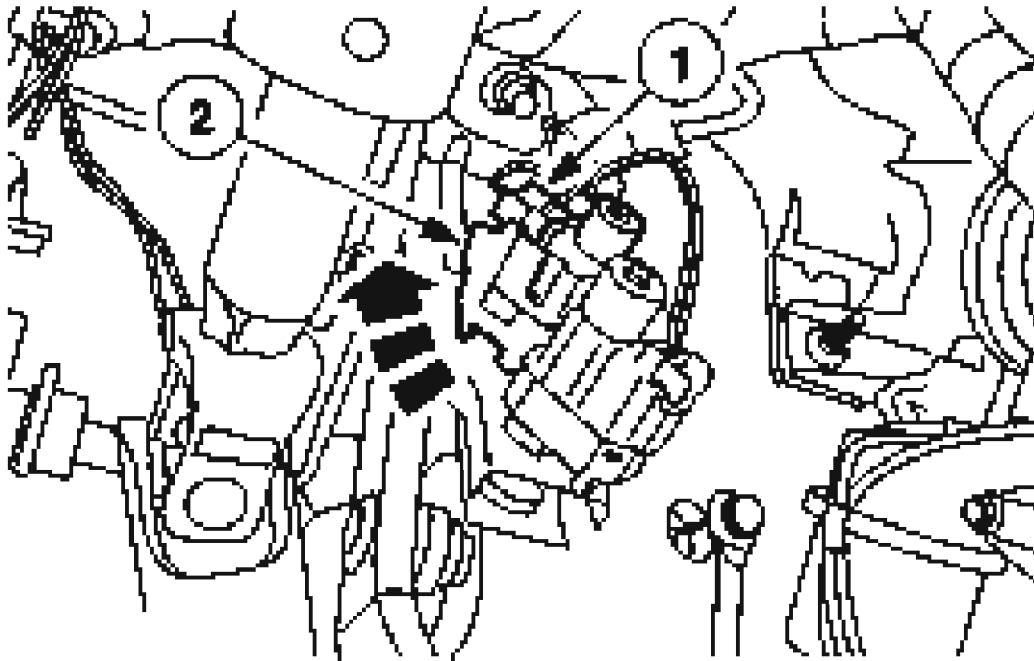
**Fig. 89: Disconnecting Socket From Lens**  
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

## BRAKE PEDAL POSITION (BPP) SWITCH

### Removal

1. Remove the brake pedal position (BPP) switch.
  1. Disconnect the electrical connector.
  2. Rotate clockwise and remove the BPP switch.



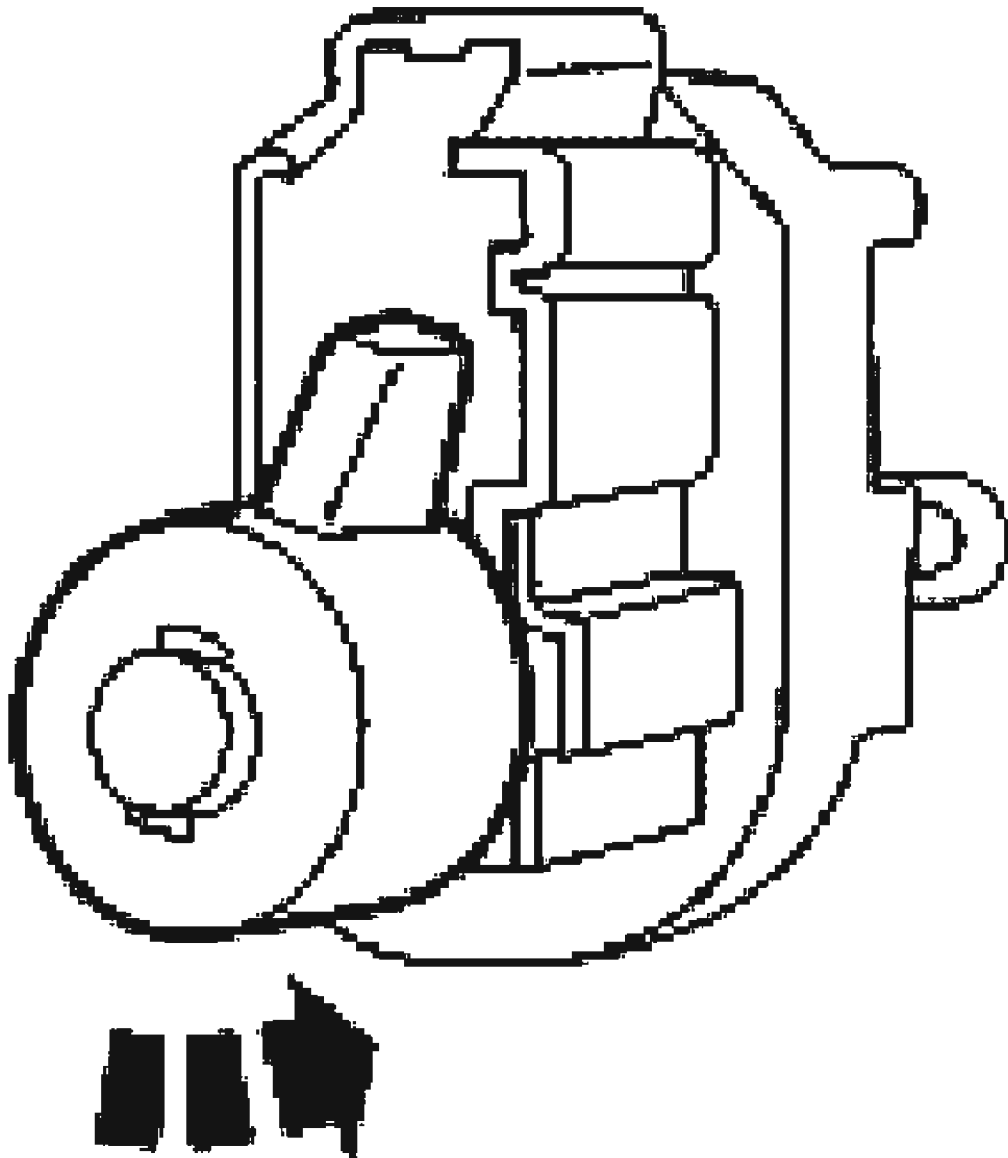
G02742823

**Fig. 90: Removing Brake Pedal Position (BPP) Switch**  
Courtesy of FORD MOTOR CO.

### Installation

**NOTE:** Initial installation of brake pedal position (BPP) switch allows for one adjustment. If additional adjustments are necessary, install a new switch.

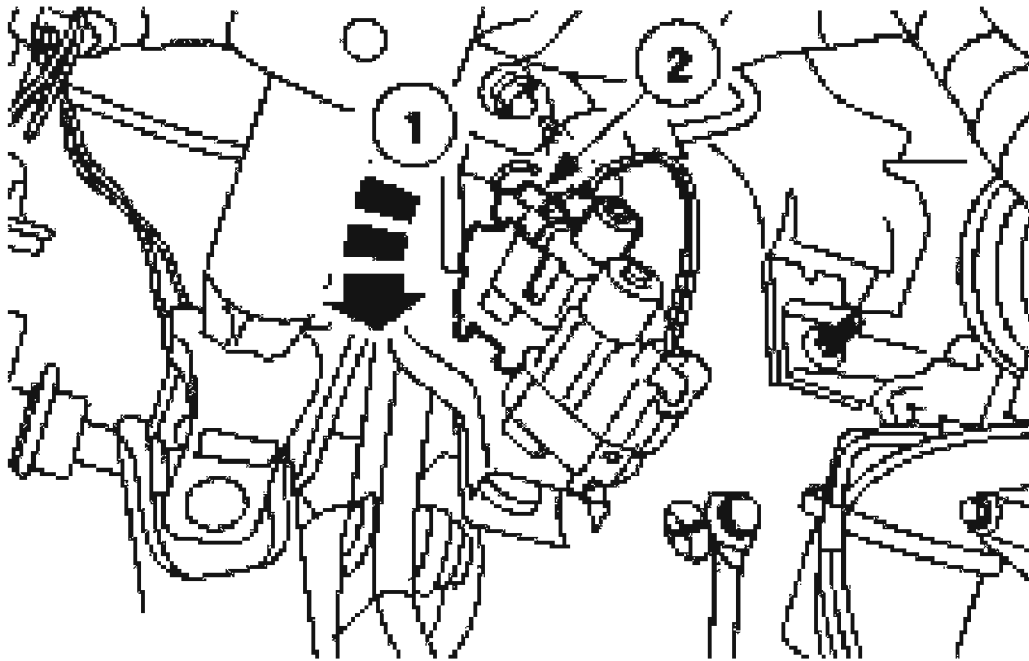
1. To unlock, rotate the lock knob counterclockwise to the stop.



G02742824

**Fig. 91: Rotating Lock Knob**  
Courtesy of FORD MOTOR CO.

2. With the engine running, fully depress and hold the brake pedal.
3. Install the brake pedal position (BPP) switch.
  1. Position the BPP switch in the bracket and rotate counterclockwise.
  2. Connect the electrical connector.



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**Fig. 92: Installing Brake Pedal Position (BPP) Switch**  
Courtesy of FORD MOTOR CO.

4. Slowly release the brake pedal.

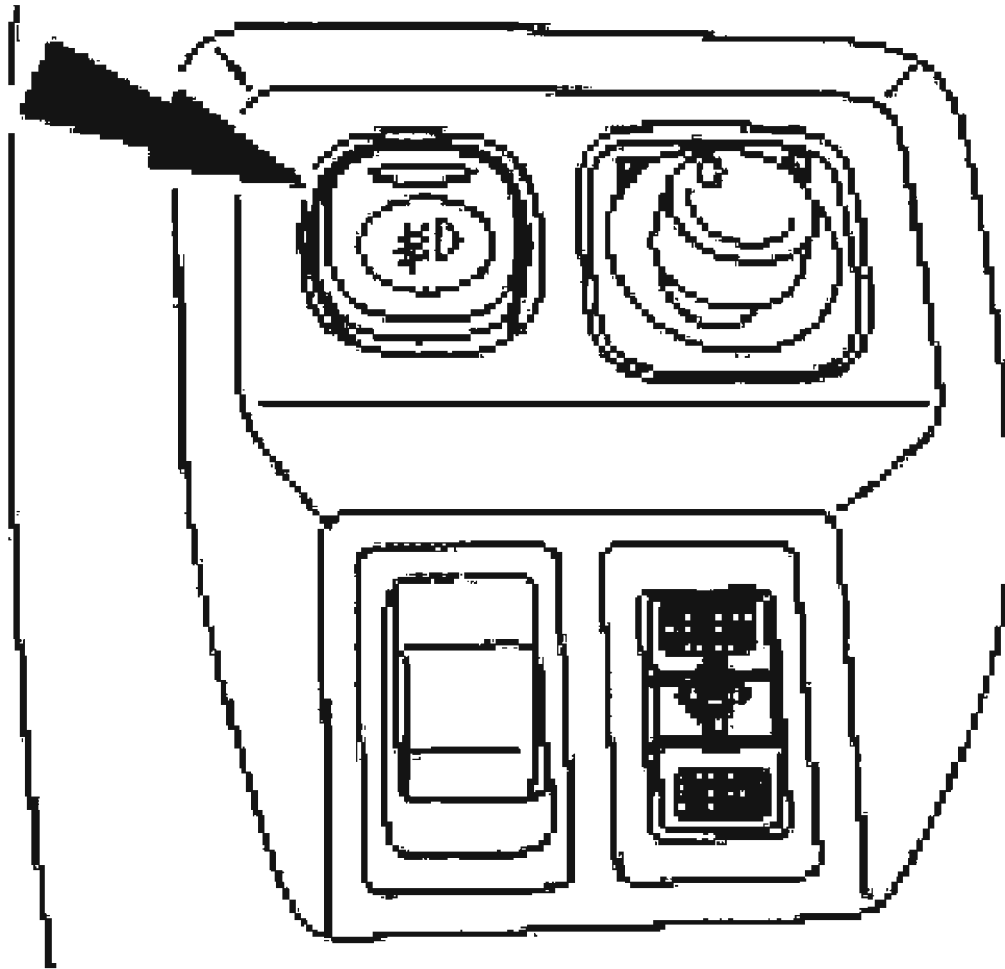
## FOG LAMP SWITCH

### Removal and Installation

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.

**CAUTION:** Do not use a screwdriver to remove fog lamp switch or damage to the finish panel may occur. Adding tape to the end of a thin tool will reduce marring to the finish panel.

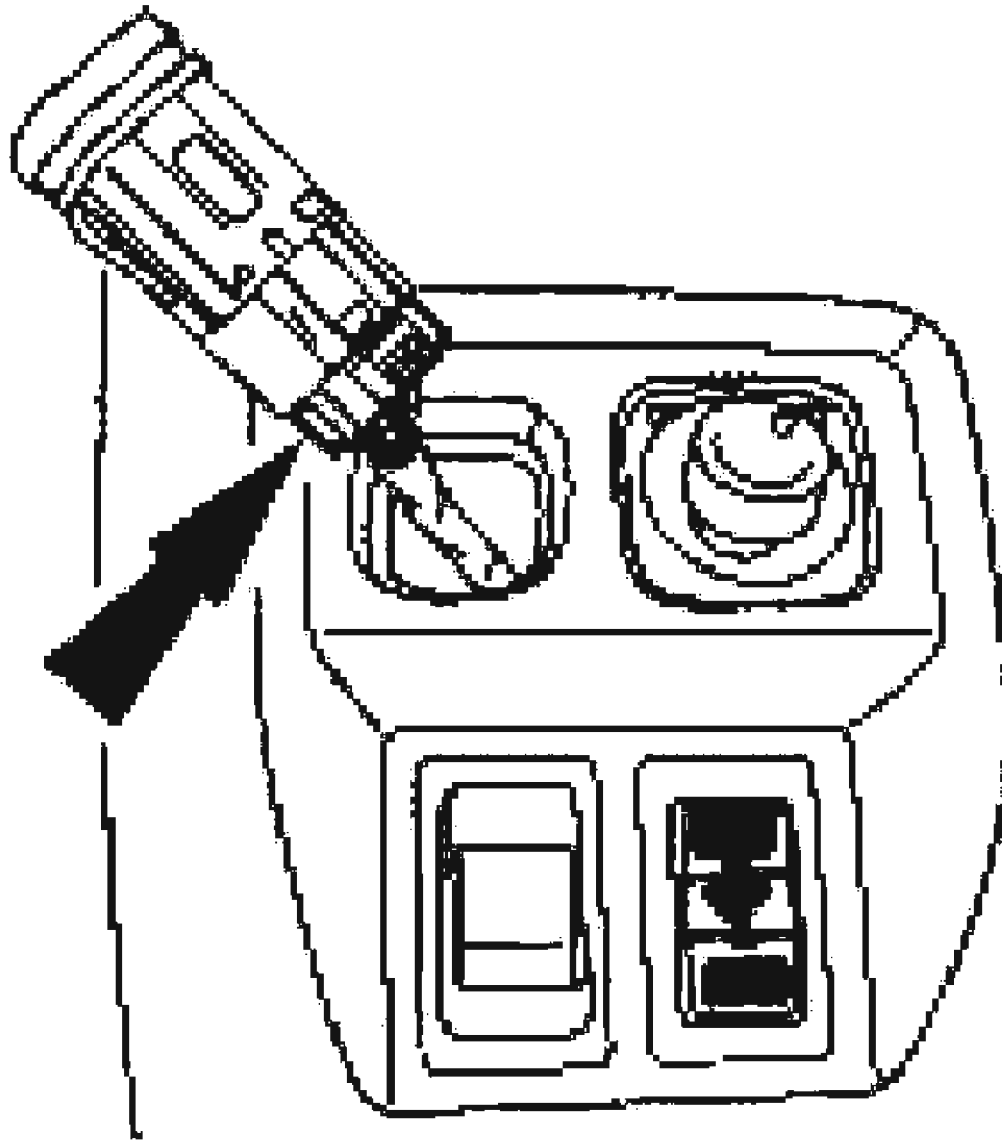
2. Use a thin tool to remove the fog lamp switch.



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**Fig. 93: Identifying Fog Lamp Switch**  
Courtesy of FORD MOTOR CO.

3. Disconnect the electrical connector.



G02742827

**Fig. 94: Disconnecting Electrical Connector**  
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

## 2006 Ford Escape

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## BUZZERS, RELAYS & TIMERS

### BUZZERS, RELAYS & TIMERS LOCATION

Component	Location
Accessory Delay Relay	In smart junction box. See <b>Fig. 2</b> .
A/C Clutch Relay	In battery junction box. See <b>Fig. 1</b> .
Blower Motor Relay	Behind lower left center of dash. See <b>Fig. 15</b> .
Cooling Fan Relay	In battery junction box. See <b>Fig. 1</b> .
Fog Lamp Relay	In battery junction box. See <b>Fig. 1</b> .
Fuel Pump Relay	In battery junction box. See <b>Fig. 1</b> .
Heated Seats Relay	Under driver's seat. See <b>Fig. 22</b> .
High Speed Fan Control Relay 1 (2.3L)	In battery junction box. See <b>Fig. 1</b> .
High Speed Fan Control Relay 2 (3.0L)	In battery junction box. See <b>Fig. 1</b> .
Low Speed Fan Control Relay (2.3L)	In battery junction box. See <b>Fig. 1</b> .
Low Speed Fan Control Relay (3.0L)	In battery junction box. See <b>Fig. 1</b> .
Park Lamp Relay	In smart junction box. See <b>Fig. 2</b> .
PCM Power Relay	In battery junction box. See <b>Fig. 1</b> .
Rear Defrost Relay	In smart junction box. See <b>Fig. 2</b> .
Run/Accessory Relay	In smart junction box. See <b>Fig. 2</b> .
Run/Start Relay	In smart junction box. See <b>Fig. 2</b> .
Starter Relay	In battery junction box. See <b>Fig. 1</b> .

## CIRCUIT PROTECTION DEVICES

### CIRCUIT PROTECTION DEVICES LOCATION

Component	Location
A/C Compressor Clutch Diode	In battery junction box. See <b>Fig. 1</b> .
Battery Junction Box (BJB) (2.3L)	Left front corner of engine compartment. See <b>Fig. 6</b> .
Battery Junction Box (BJB) (3.0L)	Left front corner of engine compartment. See <b>Fig. 4</b> .
Smart Junction Box (SJB) (2.3L)	Below center of dash. See <b>Fig. 5</b> .
Smart Junction Box (SJB) (3.0L)	Below center of dash. See <b>Fig. 3</b> .

## CONTROL UNITS

## 2006 Ford Escape

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### CONTROL UNITS LOCATION

Component	Location
ABS Control Module (2.3L)	On left rear of engine compartment. See <b>Fig. 5</b> .
ABS Control Module (3.0L)	Left rear of engine compartment. See <b>Fig. 3</b> .
Fuel Pump Driver Module.	Under center of vehicle. See <b>Fig. 17</b> .
Heated Seat Module (Driver Side Front)	Under driver's seat. See <b>Fig. 22</b> .
Heated Seat Module (Passenger Side Front)	Under passenger's seat. See <b>Fig. 23</b> .
Intelligent Torque Control Coupling (ITCC) Module	Under center console. See <b>Fig. 19</b> .
Parking Aid Module (PAM)	At right rear side of vehicle floor. See <b>Fig. 20</b> .
Passive Anti-Theft Transceiver	Behind lower left side of dash, near steering column. See <b>Fig. 15</b> .
Powertrain Control Module (PCM) (2.3L)	Rear center of firewall. See <b>Fig. 10</b> .
Powertrain Control Module (PCM) (3.0L)	In recess on upper center of firewall. See <b>Fig. 7</b> .
Restraints Control Module	Beneath lower center of dash, on transmission tunnel. See <b>Fig. 17</b> .

### MOTORS

#### MOTORS LOCATION

Component	Location
Door Lock Actuator (Left Rear)	In left rear door. See <b>Fig. 26</b> .
Door Lock Actuator (Right Rear)	In right rear door. See <b>Fig. 26</b> .
Door Lock Unit (Driver Side Front)	In left front door. See <b>Fig. 24</b> .
Door Lock Unit (Passenger Side Front)	In right front door. See <b>Fig. 25</b> .
EGR Stepper Motor (2.3L)	At rear of engine. See <b>Fig. 9</b> .
Engine Cooling Fan Motor 1 (2.3L)	Left front of engine compartment. See <b>Fig. 5</b> .
Engine Cooling Fan Motor 1 (3.0L)	Left front of engine compartment. See <b>Fig. 3</b> .
Engine Cooling Fan Motor 2 (2.3L)	Right front of engine compartment. See <b>Fig. 5</b> .
Engine Cooling Fan Motor 2 (3.0L)	Right front of engine compartment. See <b>Fig. 3</b> .
Front Blower Motor	Behind right side of dash. See <b>Fig. 14</b> .



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Fuel Tank Unit	Beneath left rear of vehicle, in fuel tank. See <b>Fig. 17</b> .
Liftgate Lock Actuator	In liftgate. See <b>Fig. 27</b> .
Power Seat Motor Assembly, Left	Under driver's seat. See <b>Fig. 22</b> .
Power Window Motor (Driver Side Front)	In left front door. See <b>Fig. 24</b> .
Power Window Motor (Left Rear)	In left rear door. See <b>Fig. 26</b> .
Power Window Motor (Passenger Side Front)	In right front door. See <b>Fig. 25</b> .
Power Window Motor (Right Rear)	In right rear door. See <b>Fig. 26</b> .
Rear Window Washer Pump Motor (2.3L)	Right front of engine compartment. See <b>Fig. 5</b> .
Rear Window Washer Pump Motor (3.0L)	Right front of engine compartment. See <b>Fig. 3</b> .
Rear Wiper Motor Assembly	On center of liftgate. See <b>Fig. 27</b> .
Roof Opening Panel Unit	At front center of roof, behind trim. See <b>Fig. 18</b> .
Speed Control Servo (2.3L)	On right side of engine compartment. See <b>Fig. 5</b> .
Speed Control Servo (3.0L)	On right side of engine compartment. See <b>Fig. 3</b> .
Starter Motor (2.3L)	Lower left side of engine. See <b>Fig. 6</b> .
Starter Motor (3.0L)	On rear of engine. See <b>Fig. 3</b> .
Windshield Washer Pump Motor (2.3L)	Right front of engine compartment. See <b>Fig. 5</b> .
Windshield Washer Pump Motor (3.0L)	Right front of engine compartment. See <b>Fig. 3</b> .
Windshield Wiper Motor (2.3L)	Left rear of engine compartment. See <b>Fig. 5</b> .
Windshield Wiper Motor (3.0L)	Left rear of engine compartment. See <b>Fig. 3</b> .

## SENDING UNITS & SENSORS

### SENDING UNITS & SENSORS LOCATION

Component	Location
Autolamp Sensor	Top left side of dash. See <b>Fig. 15</b> .
Camshaft Position Sensor (2.3L)	On rear of cylinder head. See <b>Fig. 9</b> .
Camshaft Position Sensor (3.0L)	On front of left cylinder head. See <b>Fig. 8</b> .
Crankshaft Position Sensor (2.3L)	On lower right front of engine. See <b>Fig. 10</b> .

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Crankshaft Position Sensor (3.0L)	On front of engine block. See <b>Fig. 8</b> .
Cylinder Head Temperature Sensor (2.3L)	On top of engine, on valve cover. See <b>Fig. 10</b> .
Differential Pressure Feedback EGR (DPFE) Sensor (3.0L)	On right rear of engine. See <b>Fig. 7</b> .
Engine Coolant Temperature (ECT) Sensor (3.0L)	On rear of engine in water outlet. See <b>Fig. 7</b> .
Forward Crash Sensor (2.3L)	Front of engine compartment. See <b>Fig. 5</b> .
Forward Crash Sensor (3.0L)	Front of engine compartment. See <b>Fig. 3</b> .
Fuel Rail Pressure/Temperature Sensor	On top of engine. See <b>Fig. 10</b> .
Fuel Tank Pressure Transducer Sensor	Beneath left rear of vehicle. See <b>Fig. 17</b> .
Fuel Tank Unit	Beneath left rear of vehicle, in fuel tank. See <b>Fig. 17</b> .
Heated Oxygen Sensor (HO2S) #11 (2.3L)	Rear center of engine compartment. See <b>Fig. 10</b> .
Heated Oxygen Sensor (HO2S) #11 (3.0L)	Near right rear of engine, in exhaust. See <b>Fig. 8</b> .
Heated Oxygen Sensor (HO2S) #12 (2.3L)	Near right front of engine, in exhaust. See <b>Fig. 10</b> .
Heated Oxygen Sensor (HO2S) #12 (3.0L)	Near right front of engine. See <b>Fig. 8</b> .
Heated Oxygen Sensor (HO2S) #21 (3.0L)	Rear left side of engine. See <b>Fig. 7</b> .
Heated Oxygen Sensor (HO2S) #22 (3.0L)	Rear left side of engine. See <b>Fig. 7</b> .
Injector Pressure Sensor (3.0L)	On top front of engine. See <b>Fig. 8</b> .
Knock Sensor (2.3L)	On front of engine, below cylinder head. See <b>Fig. 9</b> .
Manifold Absolute Pressure (MAP) Sensor (2.3L)	At left rear of engine, near intake manifold. See <b>Fig. 9</b> .
Manifold Absolute Pressure (MAP) Sensor (3.0L)	At rear of engine compartment, on firewall. See <b>Fig. 7</b> .
Mass Air Flow (MAF) Sensor (2.3L)	Near rear of cylinder head, in air intake duct. See <b>Fig. 9</b> .
Mass Air Flow (MAF) Sensor (3.0L)	On left side of engine compartment, in air intake duct. See <b>Fig. 7</b> .
Occupant Classification Sensor (OCS)	In passenger's seat. See <b>Fig. 23</b> .
Output Shaft Speed (OSS) Sensor (2.3L)	Left side of engine compartment. See <b>Fig. 12</b> .
Output Shaft Speed (OSS) Sensor (3.0L)	On left side of transmission, near left axle flange. See <b>Fig. 11</b> .
Parking Aid Sensor (Inner Left)	Behind left side of rear bumper. See <b>Fig. 17</b> .

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Parking Aid Sensor (Inner Right)	Behind right side of rear bumper. See <b>Fig. 19</b> .
Parking Aid Sensor (Outer Left)	Behind left side of rear bumper. See <b>Fig. 17</b> .
Parking Aid Sensor (Outer Right)	Behind right side of rear bumper. See <b>Fig. 19</b> .
Seat Belt Buckle Sensor, Driver's	In driver's seat. See <b>Fig. 22</b> .
Seat Belt Buckle Sensor, Passenger's	In passenger's seat. See <b>Fig. 23</b> .
Seat Position Sensor, Driver's	In driver's seat. See <b>Fig. 22</b> .
Seat Pressure Sensor	In passenger's seat. See <b>Fig. 23</b> .
Side Impact Sensor (Driver 1)	Left rocker panel, near "B" pillar. See <b>Fig. 18</b> .
Side Impact Sensor (Driver 2)	Left side of cargo area. See <b>Fig. 20</b> .
Side Impact Sensor (Passenger 1)	Right rocker panel, near "B" pillar. See <b>Fig. 19</b> .
Side Impact Sensor (Passenger 2)	Right side of cargo area. See <b>Fig. 20</b> .
Throttle Position Sensor (TPS) (2.3L)	On throttle body. See <b>Fig. 9</b> .
Throttle Position Sensor (TPS) (3.0L)	On throttle body. See <b>Fig. 7</b> .
Transmission Range (TR) Sensor (2.3L)	On top of transmission. See <b>Fig. 12</b> .
Transmission Range (TR) Sensor (3.0L)	On top of transmission. See <b>Fig. 11</b> .
Turbine Shaft Speed (TSS) Sensor (2.3L)	On right rear of transmission. See <b>Fig. 12</b> .
Turbine Shaft Speed (TSS) Sensor (3.0L)	On right rear of transmission. See <b>Fig. 11</b> .
Vehicle Speed Sensor (VSS)	On right side of transmission. See <b>Fig. 13</b> .
Wheel Speed Sensor (Left Front) (2.3L)	At left front wheel hub. See <b>Fig. 5</b> .
Wheel Speed Sensor (Left Front) (3.0L)	At left front wheel hub. See <b>Fig. 3</b> .
Wheel Speed Sensor (Left Rear)	On left rear wheel hub. See <b>Fig. 17</b> .
Wheel Speed Sensor (Right Front) (2.3L)	At right front wheel hub. See <b>Fig. 5</b> .
Wheel Speed Sensor (Right Front) (3.0L)	At right front wheel hub. See <b>Fig. 3</b> .
Wheel Speed Sensor (Right Rear)	On right rear wheel hub. See <b>Fig. 19</b> .

## SOLENOIDS & SOLENOID VALVES

### SOLENOIDS & SOLENOID VALVES LOCATION

Component	Location
A/C Clutch Solenoid (2.3L)	Right front corner of engine compartment. See <b>Fig. 6</b> .
A/C Clutch Solenoid (3.0L)	At right front side of engine compartment. See <b>Fig. 4</b> .
Differential Pressure EGR Vacuum Regulator (3.0L)	At rear of right valve cover. See <b>Fig. 8</b> .

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EVAP Canister Vent Control Solenoid	Beneath left rear of vehicle. See <b>Fig. 19</b> .
Fuel Injector 1 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Fuel Injector 1 (3.0L)	On top of engine. See <b>Fig. 8</b> .
Fuel Injector 2 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Fuel Injector 2 (3.0L)	On top of engine. See <b>Fig. 8</b> .
Fuel Injector 3 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Fuel Injector 3 (3.0L)	On top of engine. See <b>Fig. 8</b> .
Fuel Injector 4 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Fuel Injector 4 (3.0L)	On top of engine. See <b>Fig. 7</b> .
Fuel Injector 5	On top of engine. See <b>Fig. 7</b> .
Fuel Injector 6	On top of engine. See <b>Fig. 7</b> .
Idle Air Control (IAC) Valve (2.3L)	At top of engine, near throttle body. See <b>Fig. 9</b> .
Idle Air Control (IAC) Valve (3.0L)	Below throttle body, on center rear of engine. See <b>Fig. 8</b> .
Intelligent Torque Control Coupling (ITCC) Solenoid	Under center rear of vehicle. See <b>Fig. 17</b> .
Transmission Hardware Unit (2.3L)	On top of transmission. See <b>Fig. 12</b> .
Transmission Hardware Unit (3.0L)	On top of transmission. See <b>Fig. 11</b> .
Vapor Management Valve (2.3L)	At rear of engine compartment. See <b>Fig. 6</b> .
Vapor Management Valve (3.0L)	At rear of engine compartment. See <b>Fig. 3</b> .
Variable Camshaft Timing (VCV) Valve 1	Near top front of engine. See <b>Fig. 9</b> .

## SWITCHES

### SWITCHES LOCATION

Component	Location
A/C Clutch Cycling Pressure Switch (2.3L)	On right side of engine compartment, near strut tower. See <b>Fig. 5</b> .
A/C Clutch Cycling Pressure Switch (3.0L)	On right side of engine compartment, near strut tower. See <b>Fig. 3</b> .
Anti-Theft Hood Switch (2.3L)	Right front corner of engine compartment. See <b>Fig. 5</b> .
Anti-Theft Hood Switch (3.0L)	Right front corner of engine compartment. See <b>Fig. 3</b> .
Brake Fluid Level Switch (2.3L)	On brake fluid reservoir. See <b>Fig. 6</b> .
Brake Fluid Level Switch (3.0L)	On brake fluid reservoir. See <b>Fig. 4</b> .
	On bracket, above brake pedal. See <b>Fig.</b>

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Brake Pedal Position Switch	<b>16</b> .
Clutch Cutoff Switch	On bracket, above clutch pedal. See <b>Fig. 16</b> .
Clutch Switch	On bracket, above clutch pedal. See <b>Fig. 16</b> .
Deactivator Switch	On bracket, above brake pedal. See <b>Fig. 16</b> .
Dual Pressure Switch (2.3L)	Right front corner of engine compartment. See <b>Fig. 5</b> .
Dual Pressure Switch (3.0L)	Right front corner of engine compartment. See <b>Fig. 3</b> .
Inertia Fuel Shut-Off (IFS) Switch	At base of right door pillar, near kick panel. See <b>Fig. 19</b> .
Liftgate Ajar Switch	In bottom center of liftgate. See <b>Fig. 27</b> .
Liftgate Glass Ajar Switch	In center of liftgate. See <b>Fig. 27</b> .
Oil Pressure Switch (2.3L)	Left rear of engine block. See <b>Fig. 9</b> .
Oil Pressure Switch (3.0L)	On left side of engine. See <b>Fig. 7</b> .
Park Brake Switch	At base of park brake lever. See <b>Fig. 21</b> .
Power Steering Pressure Switch (2.3L)	On left front of engine. See <b>Fig. 9</b> .
Power Steering Pressure Switch (3.0L)	On left front of engine. See <b>Fig. 8</b> .
Reversing Lamps Switch	On top of transmission. See <b>Fig. 13</b> .

## MISCELLANEOUS

### MISCELLANEOUS LOCATION

Component	Location
ABS Test Connector (2.3L)	On left side of engine compartment, near strut tower. See <b>Fig. 5</b> .
ABS Test Connector (3.0L)	On left side of engine compartment, near strut tower. See <b>Fig. 3</b> .
Air Bag Sliding Contact	On steering column. See <b>Fig. 14</b> .
Battery (2.3L)	At left front corner of engine compartment. See <b>Fig. 5</b> .
Battery (3.0L)	At left front corner of engine compartment. See <b>Fig. 3</b> .
Coil On Plug (COP) 1 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Coil On Plug (COP) 1 (3.0L)	On top of engine. See <b>Fig. 8</b> .
Coil On Plug (COP) 2 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Coil On Plug (COP) 2 (3.0L)	On top of engine. See <b>Fig. 8</b> .
Coil On Plug (COP) 3 (2.3L)	On top of engine. See <b>Fig. 9</b> .

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Coil On Plug (COP) 3 (3.0L)	On top of engine. See <b>Fig. 8</b> .
Coil On Plug (COP) 4 (2.3L)	On top of engine. See <b>Fig. 9</b> .
Coil On Plug (COP) 4 (3.0L)	On top of engine. See <b>Fig. 7</b> .
Coil On Plug (COP) 5 (3.0L)	On top of engine. See <b>Fig. 7</b> .
Coil On Plug (COP) 6 (3.0L)	On top of engine. See <b>Fig. 7</b> .
Data Link Connector (DLC)	On lower left side of dash. See <b>Fig. 15</b> .
Front Blower Motor Resistor Assembly	Behind right side of dash. See <b>Fig. 14</b> .
Generator (2.3L)	On right front of engine. See <b>Fig. 6</b> .
Generator (3.0L)	On lower right side of engine. See <b>Fig. 8</b> .
Horn (Left) (2.3L)	Left front corner of engine compartment. See <b>Fig. 6</b> .
Horn (Left) (3.0L)	At left front corner of engine compartment. See <b>Fig. 4</b> .
Horn (Right) (2.3L)	Right front corner of engine compartment. See <b>Fig. 6</b> .
Horn (Right) (3.0L)	At right front side of engine compartment. See <b>Fig. 4</b> .
Ignition Transformer Capacitor 1 (2.3L)	On rear of cylinder head. See <b>Fig. 10</b> .
Ignition Transformer Capacitor 1 (3.0L)	On right front of engine. See <b>Fig. 8</b> .
Parking Aid Speaker	At right rear side of vehicle floor. See <b>Fig. 20</b> .
Passenger Air Bag Module	Behind right side of dash. See <b>Fig. 14</b> .
Safety Belt Retractor Pretensioner, Driver's	In driver's seat. See <b>Fig. 22</b> .
Safety Belt Retractor Pretensioner, Passenger's	In passenger's seat. See <b>Fig. 23</b> .
Seat Belt Tensioner (Passenger Seat)	Bottom of right "B" pillar. See <b>Fig. 17</b> .
Seat Cushion Heater (Left Front)	In driver's seat. See <b>Fig. 22</b> .
Seat Cushion Heater, (Left Front)	In driver's seat. See <b>Fig. 22</b> .
Seat Cushion Heater (Right Front)	In passenger's seat. See <b>Fig. 23</b> .
Side Air Bag Module, Left	Left side of driver's seat. See <b>Fig. 22</b> .
Side Air Bag Module (Right)	Right side of passenger's seat. See <b>Fig. 23</b> .
Side Air Curtain Module, Driver	Left "D" pillar. See <b>Fig. 19</b> .
Side Air Curtain Module, Passenger	Right "D" pillar. See <b>Fig. 18</b> .
Subwoofer Amplifier	On right side of cargo compartment, behind trim. See <b>Fig. 20</b> .
Trailer Tow Connector	At center rear of vehicle. See <b>Fig. 17</b> .

## CONNECTORS

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### CONNECTORS LOCATION

Component	Location
C110 (Black, 16 Pin)	Above right valve cover. See <b>Fig. 7</b> .
C133 (Gray, 16 Pin)	Above right valve cover. See <b>Fig. 7</b> .
C134 (2.3L) (Black, 42 Pin)	Left front of engine compartment. See <b>Fig. 5</b> .
C134 (3.0L) (Black, 42 Pin)	Left front of engine compartment. See <b>Fig. 3</b> .
C139 (2.3L) (White, 1 Pin)	Near battery junction box. See <b>Fig. 5</b> .
C139 (3.0L) (White, 1 Pin)	Near battery junction box. See <b>Fig. 3</b> .
C210 (24 Pin)	Behind center of dash. See <b>Fig. 15</b> .
C211 (Gray, 22 Pin)	Under center console. See <b>Fig. 18</b> .
C212 (12 Pin)	Behind left side of dash. See <b>Fig. 15</b> .
C213 (Black, 16 Pin)	Behind left side of dash. See <b>Fig. 20</b> .
C213 (Black, 16 Pin)	Below center of dash. See <b>Fig. 20</b> .
C214 (14 Pin)	Behind center of dash. See <b>Fig. 15</b> .
C248 (Gray, 4 Pin)	Under lower left side of dash. See <b>Fig. 16</b> .
C260 (2.3L) (White, 57 Pin)	Behind left side of dash. See <b>Fig. 5</b> .
C260 (3.0L) (White, 57 Pin)	Behind left side of dash. See <b>Fig. 3</b> .
C263 (Gray, 24 Pin)	Behind left side of dash. See <b>Fig. 3</b> .
C311 (White, 14 Pin)	Right "B" pillar. See <b>Fig. 18</b> .
C312 (White, 28 Pin)	Right "B" pillar. See <b>Fig. 20</b> .
C313 (White, 14 Pin)	Right "B" pillar. See <b>Fig. 20</b> .
C314 (White, 28 Pin)	In left "A" pillar. See <b>Fig. 18</b> .
C315 (Natural, 4 Pin)	Under passenger's seat. See <b>Fig. 18</b> .
C316 (Natural, 4 Pin)	Under driver's seat. See <b>Fig. 18</b> .
C327 (Natural, 11 Pin)	Under passenger's seat. See <b>Fig. 18</b> .
C328 (Natural, 11 Pin)	Under driver's seat. See <b>Fig. 18</b> .
C405 (Natural, 4 Pin)	In right top of liftgate. See <b>Fig. 27</b> .
C406 (White, 14 Pin)	In right side of liftgate. See <b>Fig. 27</b> .
C408 (White, 14 Pin)	Right rear corner of roof. See <b>Fig. 20</b> .
C410 (Black, 10 Pin)	Behind left side of dash. See <b>Fig. 16</b> .
C411 (Black, 10 Pin)	Left rear of vehicle. See <b>Fig. 18</b> .
C422 (Natural, 4 Pin)	Left rear of vehicle. See <b>Fig. 18</b> .
C913 (4 Pin)	Front of roof. See <b>Fig. 19</b> .

### GROUND S

### GROUND S LOCATION

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Component	Location
G101 (2.3L)	Rear of engine compartment, on firewall. See <b>Fig. 10</b> .
G101 (3.0L)	Rear of engine compartment, on firewall. See <b>Fig. 7</b> .
G102 (2.3L)	Right front of engine compartment. See <b>Fig. 5</b> .
G102 (3.0L)	Right front of engine compartment. See <b>Fig. 3</b> .
G103 (2.3L)	Right front of engine compartment. See <b>Fig. 5</b> .
G103 (3.0L)	Right front of engine compartment. See <b>Fig. 3</b> .
G104 (2.3L)	Left front of engine compartment. See <b>Fig. 5</b> .
G104 (3.0L)	Left front of engine compartment. See <b>Fig. 3</b> .
G105 (2.3L)	Left front of engine compartment. See <b>Fig. 5</b> .
G105 (3.0L)	Left front of engine compartment. See <b>Fig. 3</b> .
G106 (2.3L)	Right front of engine compartment. See <b>Fig. 6</b> .
G106 (3.0L)	Right front of engine compartment. See <b>Fig. 4</b> .
G107 (2.3L)	On top front of engine. See <b>Fig. 6</b> .
G107 (3.0L)	On front of engine. See <b>Fig. 4</b> .
G108 (2.3L)	Left rear of engine, near transmission. See <b>Fig. 6</b> .
G108 (3.0L)	At rear of engine. See <b>Fig. 4</b> .
G109 (2.3L)	Rear of engine compartment, on firewall. See <b>Fig. 10</b> .
G109 (3.0L)	Rear of engine compartment, on firewall. See <b>Fig. 7</b> .
G110 (2.3L)	Left front of engine compartment. See <b>Fig. 6</b> .
G110 (3.0L)	Left front corner of engine compartment. See <b>Fig. 4</b> .
G202	Behind left side of dash. See <b>Fig. 15</b> .
G203	Behind left side of dash. See <b>Fig. 15</b> .



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G204	Below center of dash. See <b>Fig. 21</b> .
G206	Behind left side of dash. See <b>Fig. 15</b> .
G207	Behind left side of dash. See <b>Fig. 15</b> .
G300	Under driver's seat. See <b>Fig. 20</b> .
G301	Under driver's seat. See <b>Fig. 20</b> .
G400	In liftgate. See <b>Fig. 27</b> .
G401	In liftgate. See <b>Fig. 27</b> .
G402	Left rear end of vehicle. See <b>Fig. 17</b> .
G403	Left rear end of vehicle. See <b>Fig. 17</b> .
G404	Right side of cargo area. See <b>Fig. 20</b> .
G405	Under rear center of vehicle. See <b>Fig. 17</b> .

## SPLICES

### SPLICES LOCATION

Component	Location
S100	In engine control harness, at right side of engine. See <b>Fig. 8</b> .
S101 (2.3L)	Right front corner of engine compartment. See <b>Fig. 6</b> .
S101 (3.0L)	Right front corner of engine compartment. See <b>Fig. 4</b> .
S102 (2.3L)	Front center of engine compartment. See <b>Fig. 6</b> .
S102 (3.0L)	At front of engine compartment. See <b>Fig. 4</b> .
S103 (2.3L)	On top of engine. See <b>Fig. 9</b> .
S103 (3.0L)	In engine control harness, at right side of engine. See <b>Fig. 8</b> .
S104 (2.3L)	In engine control harness, near PCM. See <b>Fig. 9</b> .
S104 (3.0L)	In engine control harness, near breakout for differential pressure EGR vacuum regulator. See <b>Fig. 8</b> .
S105 (2.3L)	At rear top of engine. See <b>Fig. 9</b> .
S105 (3.0L)	In engine control harness, at rear right side of engine. See <b>Fig. 8</b> .
S106 (2.3L)	Left front corner of engine compartment. See <b>Fig. 6</b> .
S106 (3.0L)	At left front of engine compartment. See

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	<b>Fig. 4 .</b>
S107 (2.3L)	In engine control harness, at rear of engine. See <b>Fig. 9 .</b>
S107 (3.0L)	In engine control harness, at right side of engine. See <b>Fig. 8 .</b>
S108	In engine control harness, above transmission. See <b>Fig. 7 .</b>
S109 (2.3L)	At rear top of engine. See <b>Fig. 9 .</b>
S109 (3.0L)	In engine control harness, above transmission. See <b>Fig. 7 .</b>
S110	In engine control harness, near breakout for C134. See <b>Fig. 7 .</b>
S111 (2.3L)	At rear of engine. See <b>Fig. 9 .</b>
S111 (3.0L)	In engine control harness, above transmission. See <b>Fig. 7 .</b>
S113 (2.3L)	Near breakout to C260. See <b>Fig. 5 .</b>
S113 (3.0L)	Near breakout to C260. See <b>Fig. 3 .</b>
S114 (2.3L)	Right front corner of engine compartment. See <b>Fig. 6 .</b>
S114 (3.0L)	Right front of engine compartment. See <b>Fig. 4 .</b>
S115	Right front corner of engine compartment. See <b>Fig. 4 .</b>
S116 (2.3L)	Left front corner of engine compartment. See <b>Fig. 6 .</b>
S116 (3.0L)	Right front corner of engine compartment. See <b>Fig. 4 .</b>
S117 (2.3L)	Left front corner of engine compartment. See <b>Fig. 6 .</b>
S117 (3.0L)	Under battery junction box. See <b>Fig. 4 .</b>
S118 (2.3L)	Left front corner of engine compartment. See <b>Fig. 6 .</b>
S118 (3.0L)	Under battery junction box. See <b>Fig. 4 .</b>
S119 (2.3L)	Left front corner of engine compartment. See <b>Fig. 6 .</b>
S119 (3.0L)	Near battery junction box. See <b>Fig. 4 .</b>
S120 (2.3L)	Left front corner of engine compartment. See <b>Fig. 6 .</b>
S120 (3.0L)	Near battery junction box. See <b>Fig. 4 .</b>
S123 (2.3L)	Left rear of engine compartment. See <b>Fig.</b>

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	<b>6 .</b>
S123 (3.0L)	Left rear corner of engine compartment. See <b>Fig. 4 .</b>
S124 (2.3L)	Left rear corner of engine compartment. See <b>Fig. 6 .</b>
S124 (3.0L)	Left rear corner of engine compartment. See <b>Fig. 4 .</b>
S125 (2.3L)	Left rear corner of engine compartment. See <b>Fig. 6 .</b>
S125 (3.0L)	Left rear corner of engine compartment. See <b>Fig. 4 .</b>
S126 (2.3L)	Left rear corner of engine compartment. See <b>Fig. 6 .</b>
S126 (3.0L)	Left rear corner of engine compartment. See <b>Fig. 4 .</b>
S127	Under battery junction box. See <b>Fig. 5 .</b>
S128 (2.3L)	Under battery junction box. See <b>Fig. 6 .</b>
S128 (3.0L)	Under battery junction box. See <b>Fig. 4 .</b>
S129 (2.3L)	Under battery junction box. See <b>Fig. 6 .</b>
S129 (3.0L)	Under battery junction box. See <b>Fig. 4 .</b>
S130 (2.3L)	Under battery junction box. See <b>Fig. 6 .</b>
S130 (3.0L)	Under battery junction box. See <b>Fig. 4 .</b>
S131 (2.3L)	Under battery junction box. See <b>Fig. 6 .</b>
S131 (3.0L)	Right front corner of engine compartment. See <b>Fig. 4 .</b>
S132	Under battery junction box. See <b>Fig. 6 .</b>
S134	Under battery junction box. See <b>Fig. 4 .</b>
S136 (2.3L)	In engine compartment harness, at left fender. See <b>Fig. 5 .</b>
S136 (3.0L)	In engine compartment harness, at left fender. See <b>Fig. 4 .</b>
S137 (2.3L)	In engine compartment harness, at left fender. See <b>Fig. 5 .</b>
S137 (3.0L)	In engine compartment harness, at left fender. See <b>Fig. 4 .</b>
S139 (2.3L)	In engine compartment harness, at left fender. See <b>Fig. 6 .</b>
S139 (3.0L)	In engine compartment harness, at left fender. See <b>Fig. 4 .</b>
S143 (2.3L)	Right front corner of engine compartment.

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	See <b>Fig. 5</b> .
S143 (3.0L)	Right front corner of engine compartment. See <b>Fig. 3</b> .
S144	Under battery junction box. See <b>Fig. 5</b> .
S145	Under battery junction box. See <b>Fig. 4</b> .
S146 (2.3L)	Left rear of engine compartment. See <b>Fig. 6</b> .
S146 (3.0L)	Left rear corner of engine compartment. See <b>Fig. 4</b> .
S150	At rear of engine. See <b>Fig. 9</b> .
S151 (2.3L)	On top of engine. See <b>Fig. 9</b> .
S151 (3.0L)	On top of engine. See <b>Fig. 8</b> .
S152 (2.3L)	On top of engine. See <b>Fig. 9</b> .
S152 (3.0L)	At front right side of engine. See <b>Fig. 8</b> .
S153	Near breakout to throttle position sensor. See <b>Fig. 7</b> .
S154	On top of engine. See <b>Fig. 9</b> .
S155	On top of engine. See <b>Fig. 9</b> .
S156	Near breakout to coil on plug 4. See <b>Fig. 7</b> .
S157	Top right side of engine, above valve cover. See <b>Fig. 8</b> .
S158	Left rear of engine compartment. See <b>Fig. 6</b> .
S159	Left rear of engine compartment. See <b>Fig. 6</b> .
S196	Left front corner of engine compartment. See <b>Fig. 5</b> .
S197	Left front corner of engine compartment. See <b>Fig. 5</b> .
S198	Below battery junction box. See <b>Fig. 7</b> .
S199	Below battery junction box. See <b>Fig. 7</b> .
S200	In main harness, near breakout to front blower motor. See <b>Fig. 14</b> .
S201	In main harness, near breakout to front cigar lighter. See <b>Fig. 14</b> .
S202	In main harness, behind center of dash. See <b>Fig. 14</b> .
S203	In main harness, near breakout to front cigar lighter. See <b>Fig. 15</b> .

**2006 Ford Escape**

2006 FORD MOTOR CO. Escape &amp; Mariner - Except Hybrid

S204	Behind center of dash. See <b>Fig. 15</b> .
S205	In main harness, near center of dash. See <b>Fig. 15</b> .
S206	Below center of dash. See <b>Fig. 21</b> .
S207	Below center of dash. See <b>Fig. 21</b> .
S208	In main harness, near breakout to passive anti-theft transceiver. See <b>Fig. 15</b> .
S210	Below center console. See <b>Fig. 21</b> .
S211	Below center console. See <b>Fig. 21</b> .
S212	In main harness, near breakout to ignition switch. See <b>Fig. 15</b> .
S213	In main harness, near breakout to instrument cluster. See <b>Fig. 15</b> .
S214	In main harness, near breakout to ignition switch. See <b>Fig. 15</b> .
S215	In main harness, near breakout to ignition switch. See <b>Fig. 15</b> .
S216	In main harness, behind left side of dash. See <b>Fig. 15</b> .
S217	In main harness, behind left side of dash. See <b>Fig. 15</b> .
S218	Behind left side of dash. See <b>Fig. 15</b> .
S219	Below center of dash. See <b>Fig. 21</b> .
S224	Behind center of dash. See <b>Fig. 15</b> .
S230	In radio jumper harness, near breakout to C213. See <b>Fig. 15</b> .
S231	In radio jumper harness, near breakout to C210. See <b>Fig. 15</b> .
S232	In radio jumper harness, near breakout to C210. See <b>Fig. 15</b> .
S233	In radio jumper harness, near breakout to hazard flasher switch. See <b>Fig. 15</b> .
S234	In radio jumper harness, near breakout to audio unit. See <b>Fig. 14</b> .
S300	Under passenger's seat. See <b>Fig. 20</b> .
S301	Under passenger's seat. See <b>Fig. 20</b> .
S302	Front of right rocker panel. See <b>Fig. 20</b> .
S303	Below center of dash. See <b>Fig. 20</b> .
S304	Under driver's seat. See <b>Fig. 18</b> .
	Left rocker panel, next to rear seat. See

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

S305	<b>Fig. 18 .</b>
S308	Left rocker panel, near "B" pillar. See <b>Fig. 18 .</b>
S309	Left rocker panel, near "B" pillar. See <b>Fig. 18 .</b>
S310	Left rocker panel, near driver's seat. See <b>Fig. 18 .</b>
S312	Left front rocker panel. See <b>Fig. 16 .</b>
S313	Left front rocker panel. See <b>Fig. 16 .</b>
S318	In breakout to smart junction box. See <b>Fig. 19 .</b>
S320	Under driver's seat. See <b>Fig. 20 .</b>
S323	In driver's seat, near heated seats relay. See <b>Fig. 22 .</b>
S324	In driver's seat, near heated seats relay. See <b>Fig. 22 .</b>
S325	In passenger seat, near occupant classification sensor (OCS) module. See <b>Fig. 23 .</b>
S326	In driver's seat. See <b>Fig. 22 .</b>
S327	In driver's seat. See <b>Fig. 22 .</b>
S328	In passenger's seat. See <b>Fig. 23 .</b>
S329	In passenger's seat. See <b>Fig. 23 .</b>
S330	Left rocker panel, near driver's seat. See <b>Fig. 18 .</b>
S331	At left kick panel. See <b>Fig. 16 .</b>
S332	At left kick panel. See <b>Fig. 16 .</b>
S333	Under center of dash. See <b>Fig. 17 .</b>
S400	Right rear corner of roof. See <b>Fig. 26 .</b>
S401	In liftgate harness, near breakout to G401. See <b>Fig. 27 .</b>
S402	In liftgate harness, near breakout to left license plate lamp. See <b>Fig. 27 .</b>
S403	Rear of headliner. See <b>Fig. 20 .</b>
S404 (Early Production)	Rear of headliner. See <b>Fig. 20 .</b>
S404 (Late Production)	Left rocker panel, near "B" pillar. See <b>Fig. 18 .</b>
S405 (Early Production)	Left "D" pillar. See <b>Fig. 18 .</b>
S405 (Late Production)	Left rocker panel, near "B" pillar. See <b>Fig. 18 .</b>

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

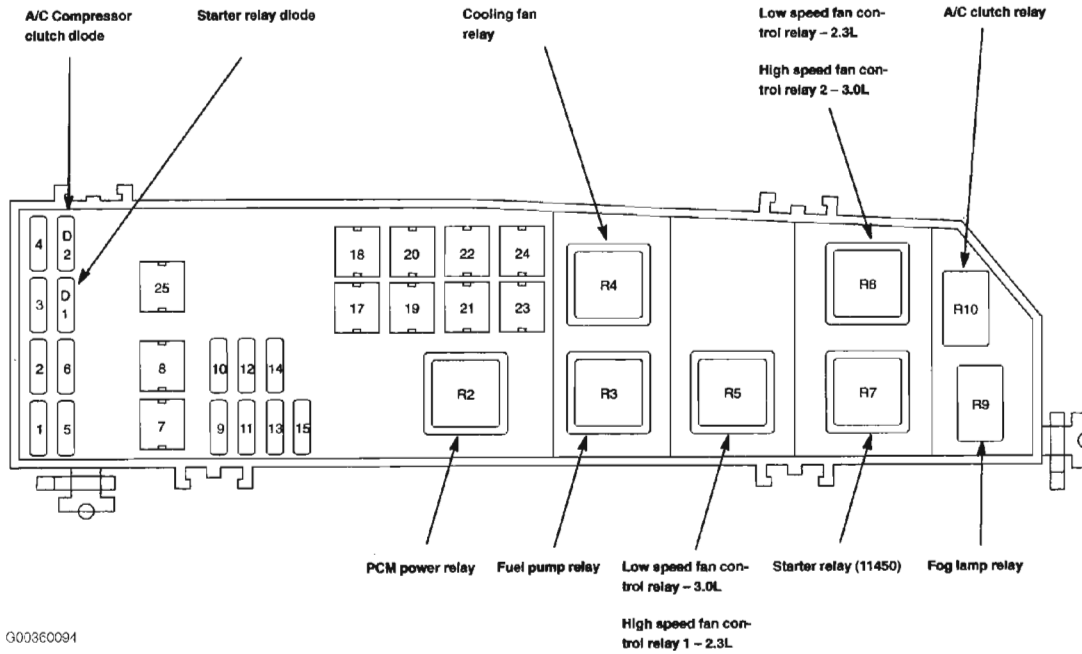
S406	Left "D" pillar. See <b>Fig. 20</b> .
S407	Left side of cargo area. See <b>Fig. 20</b> .
S408	Left side of cargo area. See <b>Fig. 20</b> .
S410	Under rear center of vehicle. See <b>Fig. 20</b> .
S412	Center of rear bumper. See <b>Fig. 18</b> .
S413	Center of rear bumper. See <b>Fig. 18</b> .
S414	Left "D" pillar. See <b>Fig. 20</b> .
S500	In left front door window regulator harness, near breakout to front driver side door lock unit. See <b>Fig. 24</b> .
S501	In left front door window regulator harness, near breakout to front driver side door lock unit. See <b>Fig. 24</b> .
S600	In right front door window regulator harness, near breakout to front passenger side door lock unit. See <b>Fig. 25</b> .
S601	In right front door window regulator harness, near breakout to front passenger side door lock unit. See <b>Fig. 25</b> .
S900	Left front corner of headliner. See <b>Fig. 20</b> .
S901	Left front corner of headliner. See <b>Fig. 20</b> .
S903	Left front corner of headliner. See <b>Fig. 20</b> .
S905	Front center of headliner. See <b>Fig. 19</b> .

## COMPONENT LOCATION GRAPHICS

**NOTE:** Figures may show multiple component locations. Refer to appropriate table for proper figure references.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



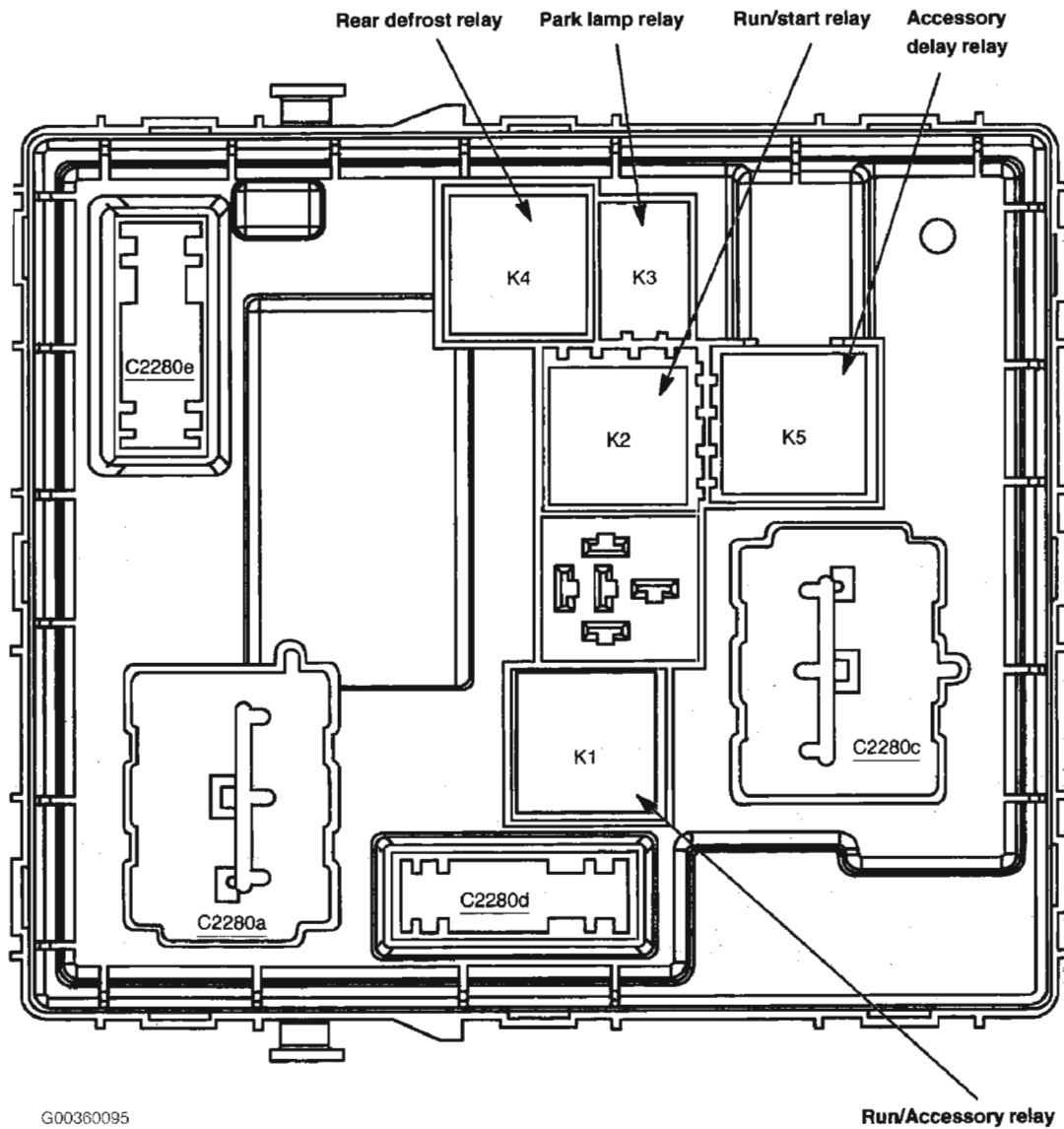
G00360094

**Fig. 1: Battery Junction Box (BJB)**  
Courtesy of FORD MOTOR CO.



## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

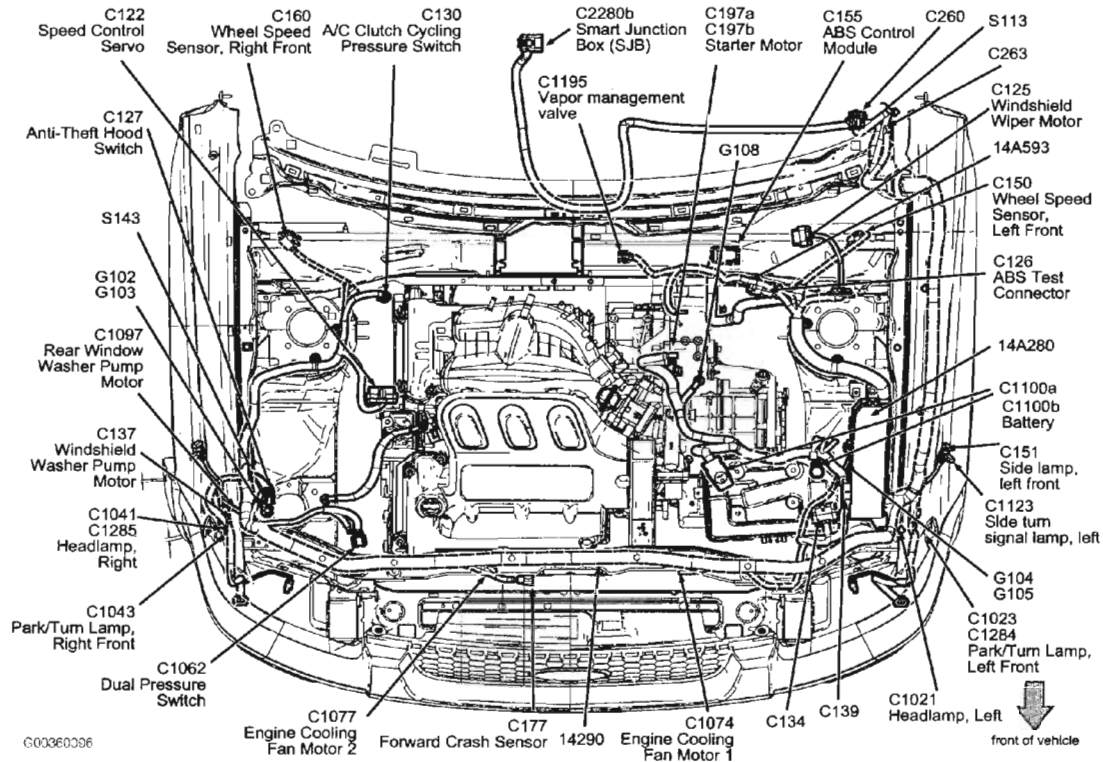


G00360095

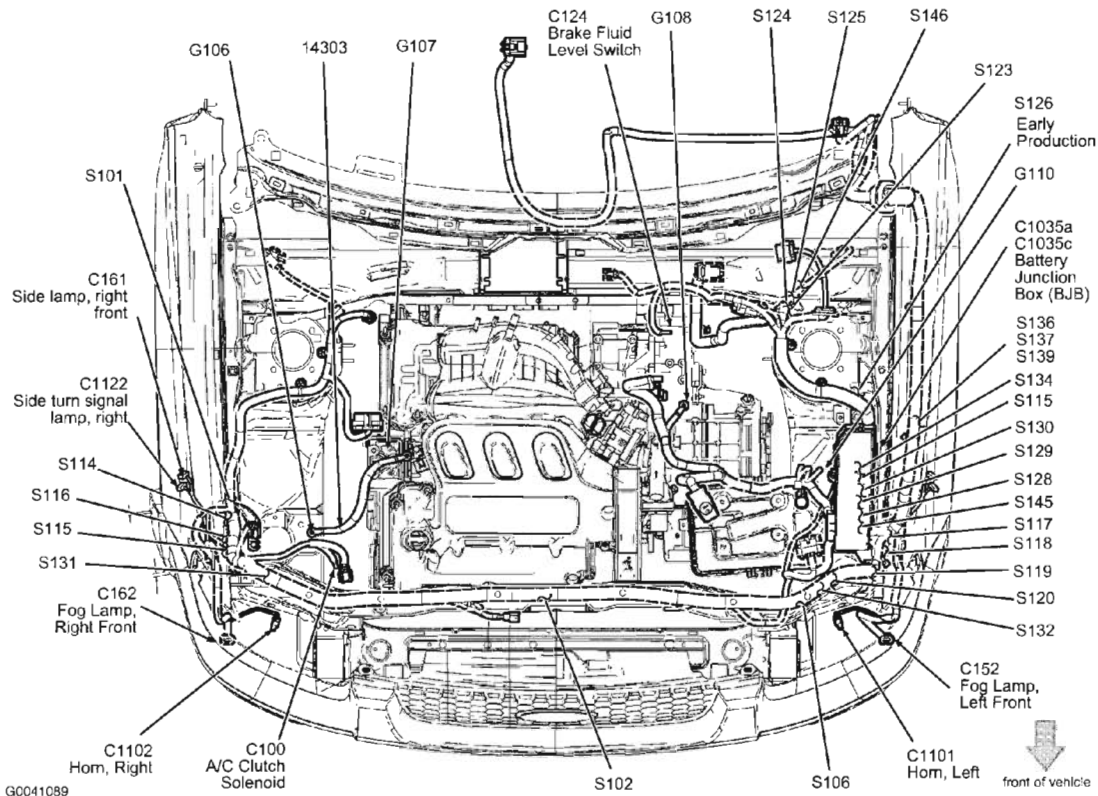
**Fig. 2: Smart Junction Box (SJB)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



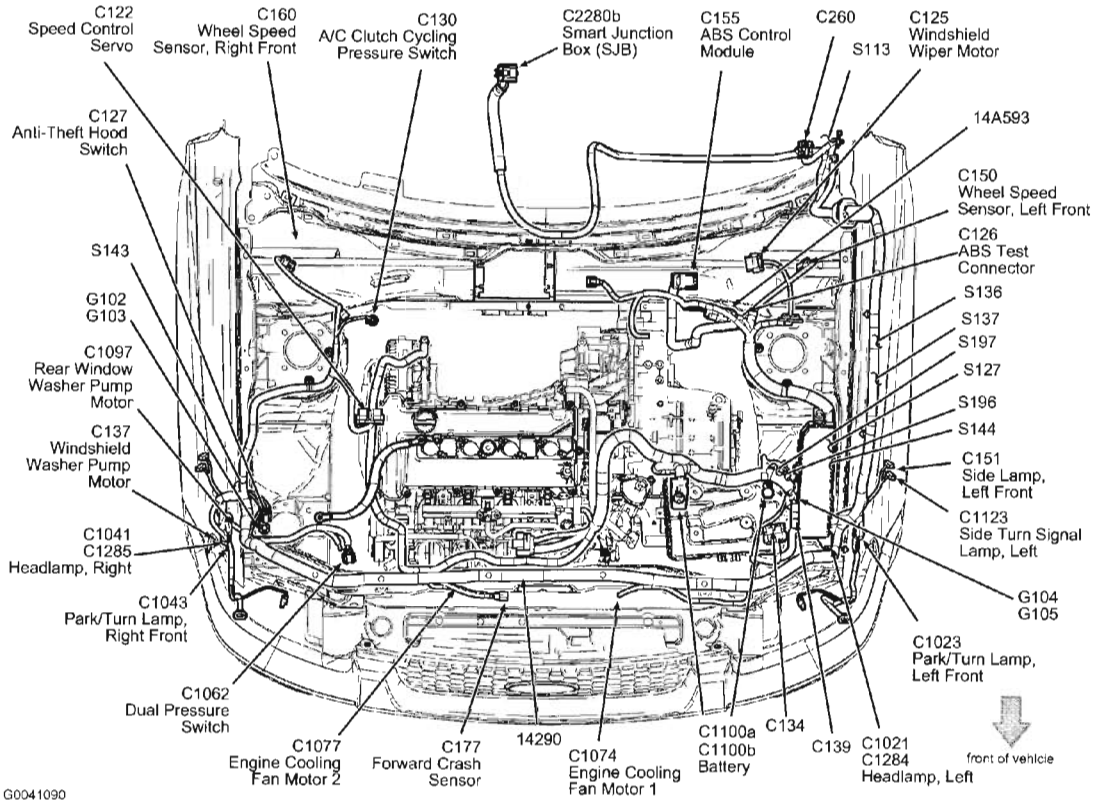
**Fig. 3: Engine Compartment (3.0L)**  
Courtesy of FORD MOTOR CO.



## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

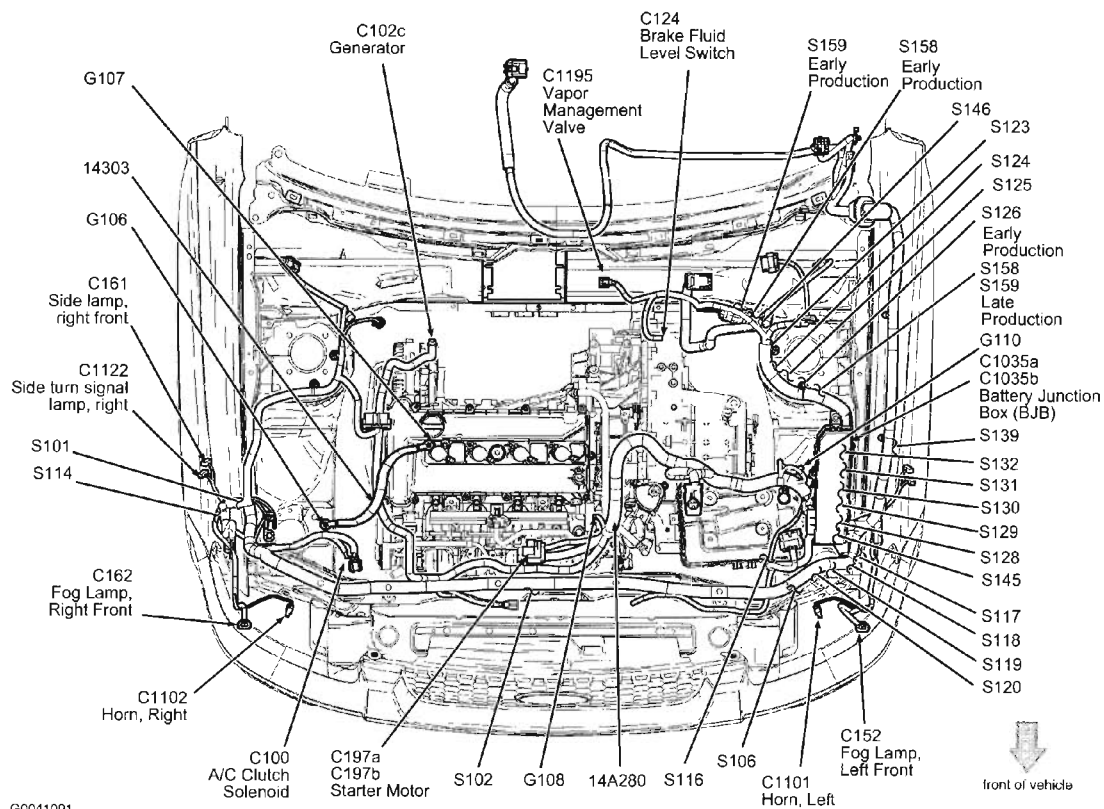
**Fig. 4: Engine Compartment (3.0L)**  
Courtesy of FORD MOTOR CO.



**Fig. 5: Engine Compartment (2.3L)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

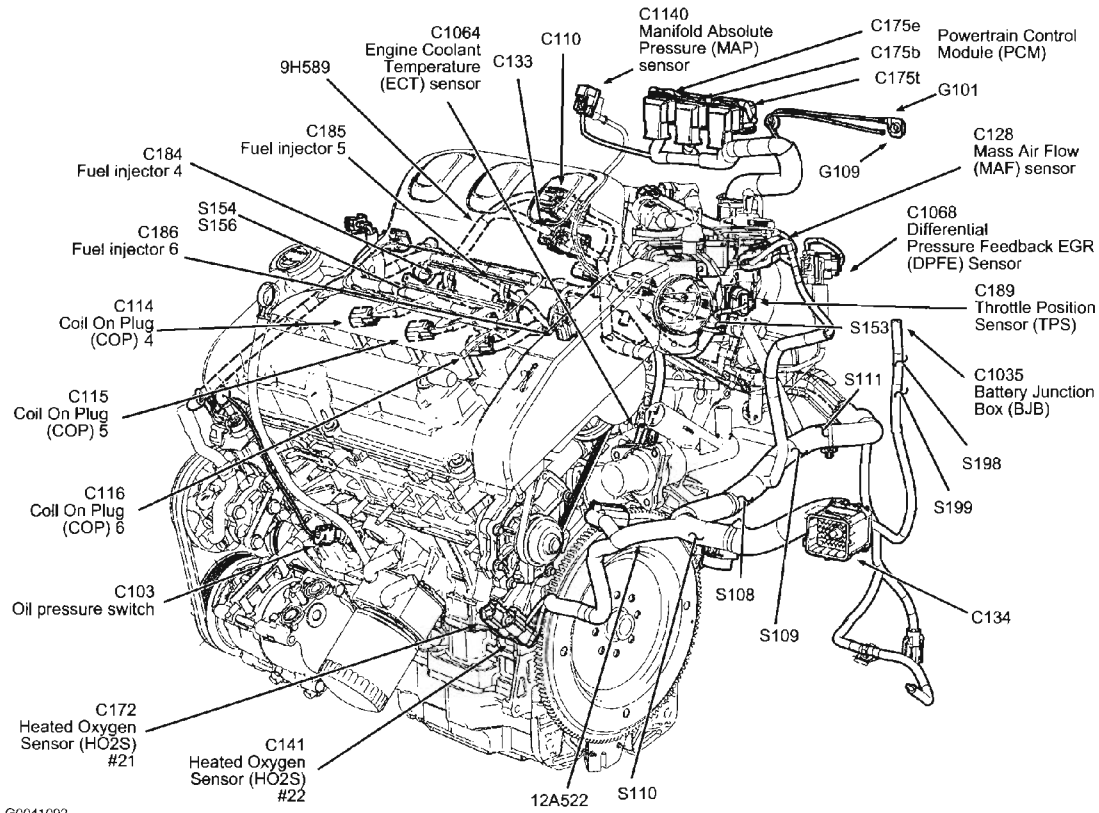
2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



**Fig. 6: Engine Compartment (2.3L)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

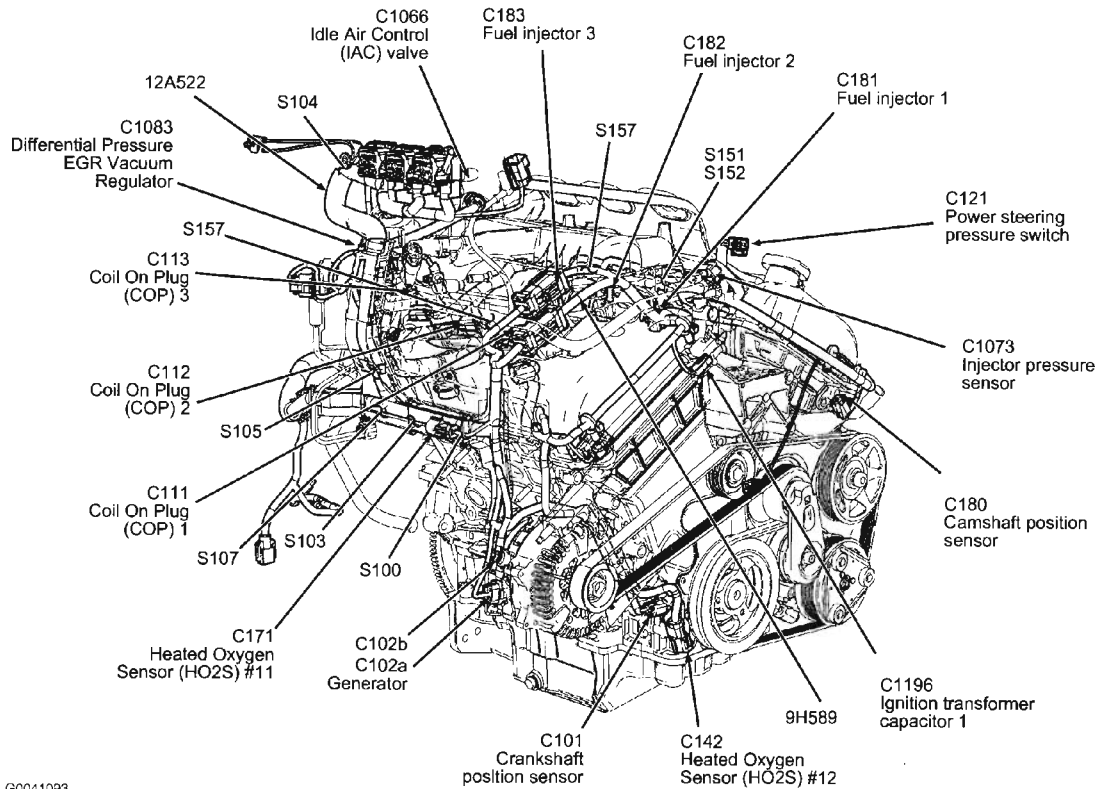
2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



**Fig. 7: Left Rear Of Engine (3.0L)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

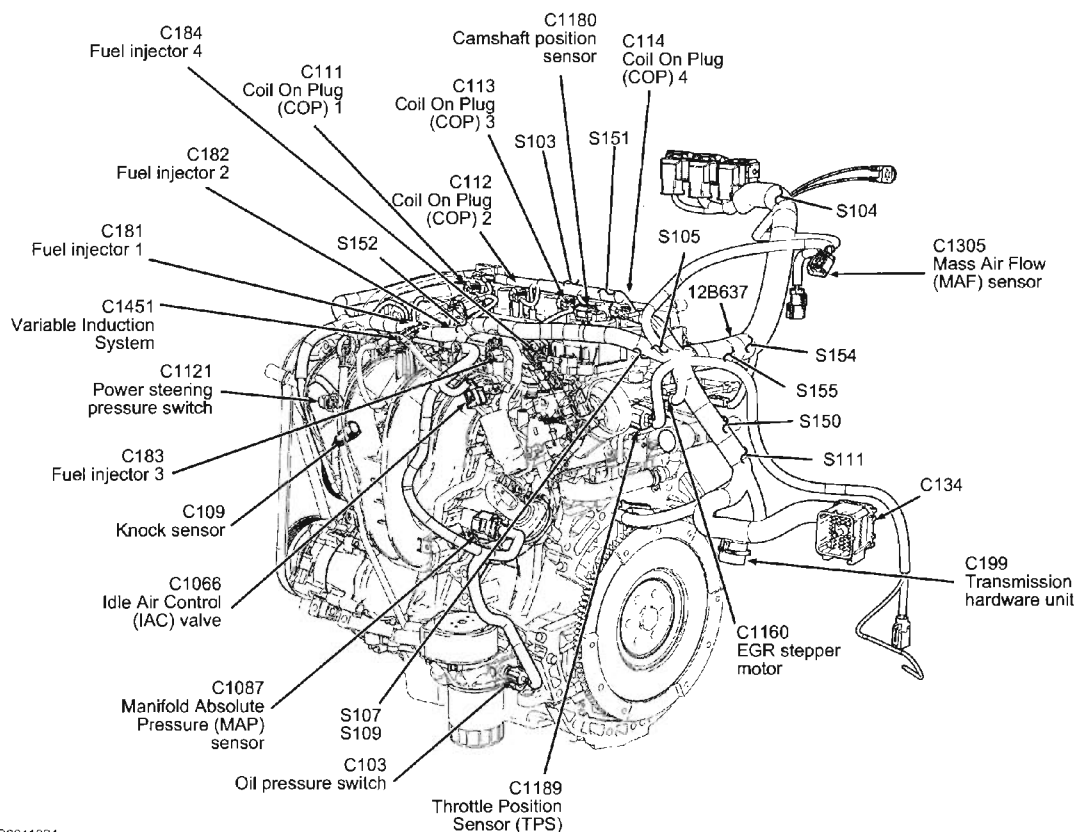


G0041093

**Fig. 8: Right Front Of Engine (3.0L)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

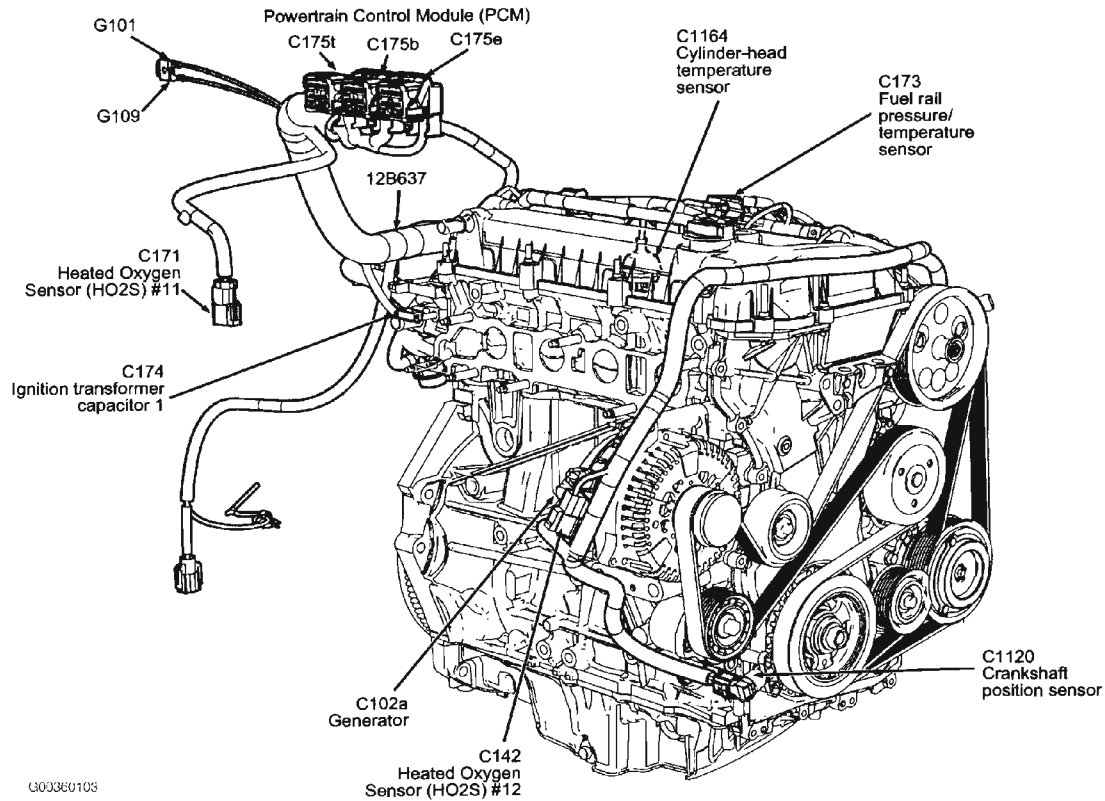


G0041094

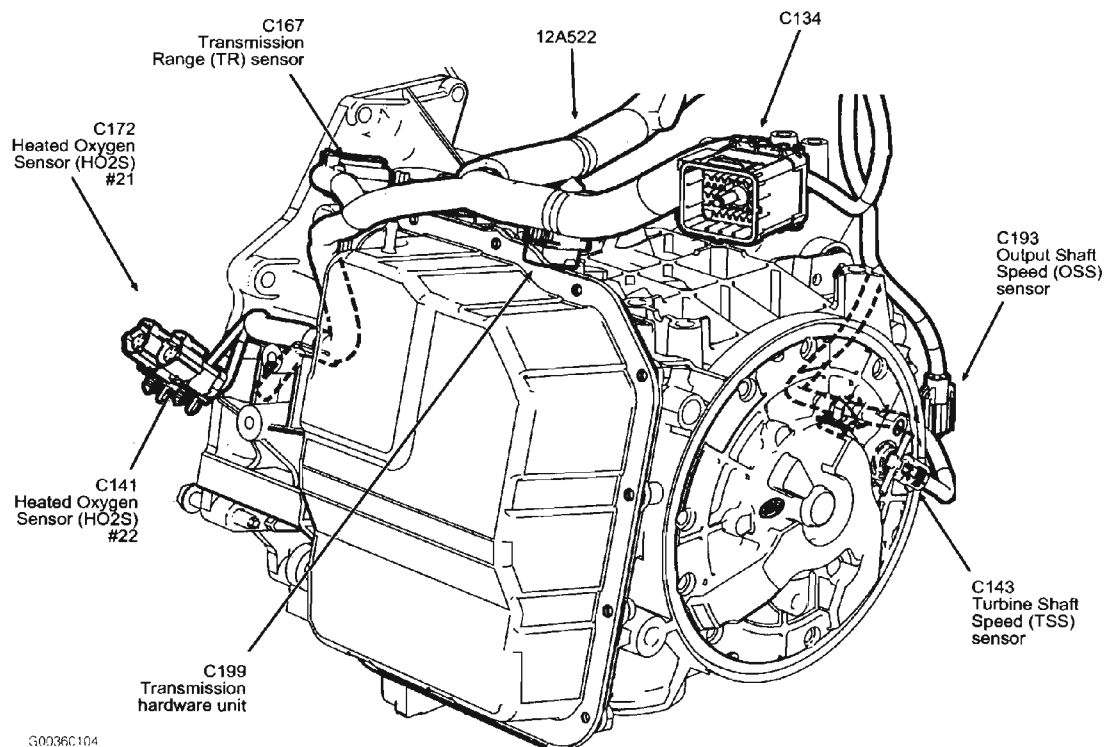
**Fig. 9: Left Rear Of Engine (2.3L)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

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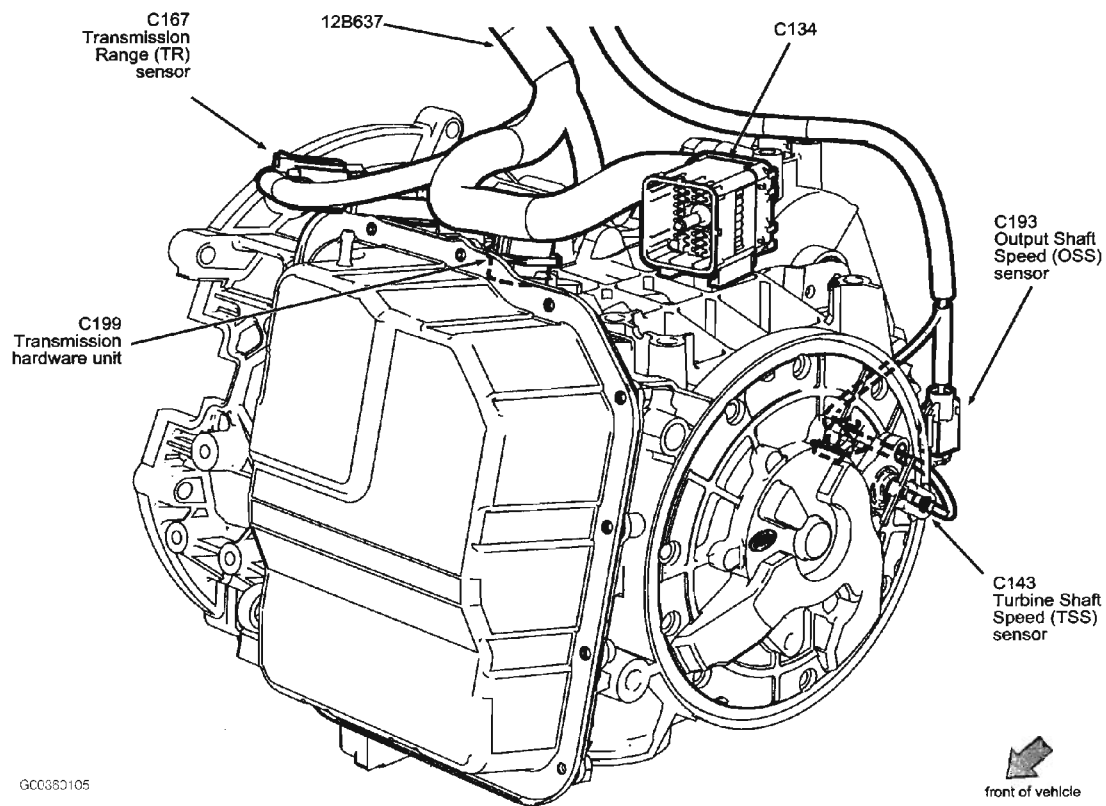


**Fig. 10: Right Front Of Engine (2.3L)**  
Courtesy of FORD MOTOR CO.





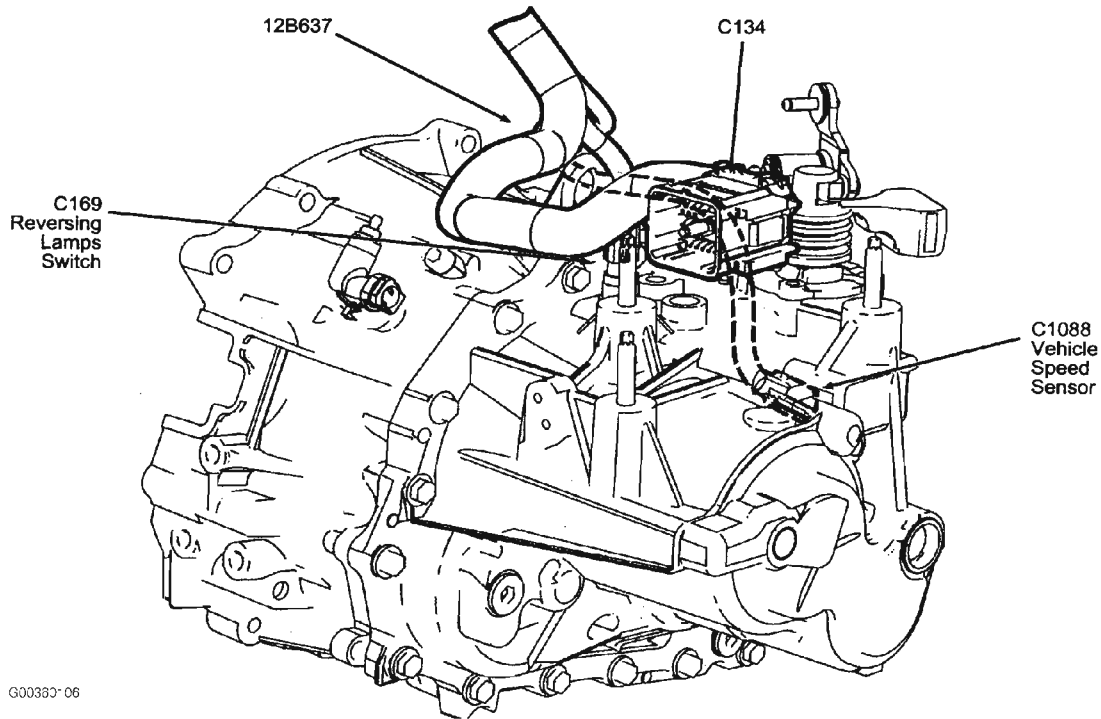
**Fig. 11: Automatic Transmission (3.0L)**  
Courtesy of FORD MOTOR CO.



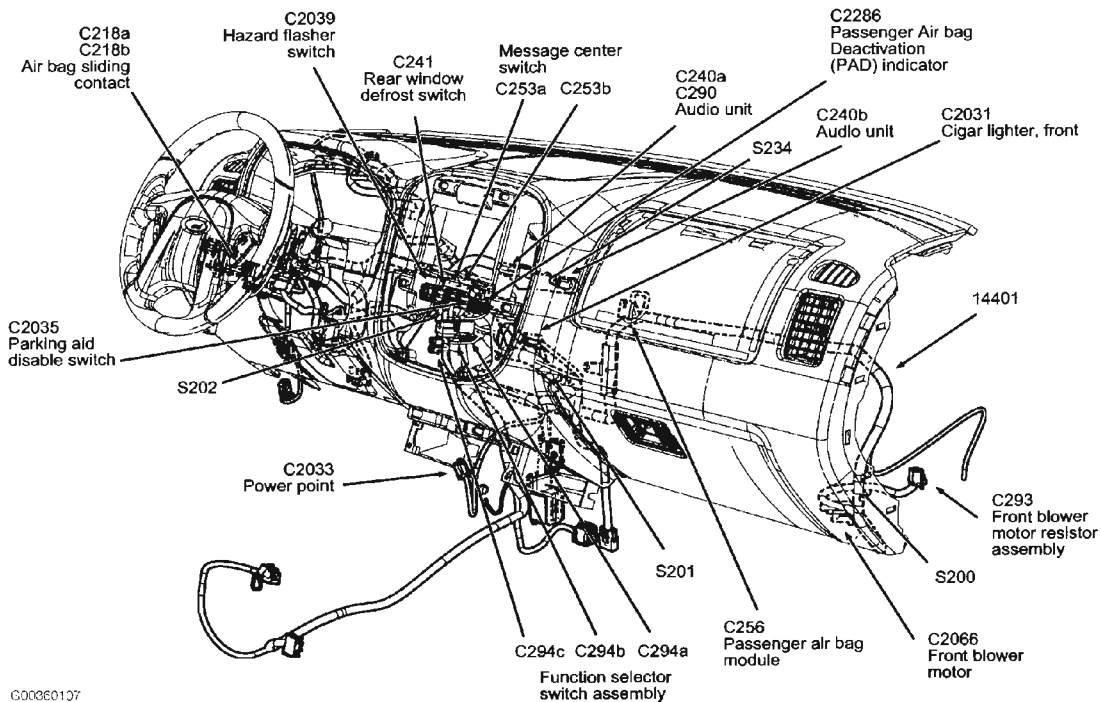
**Fig. 12: Automatic Transmission (2.3L)**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

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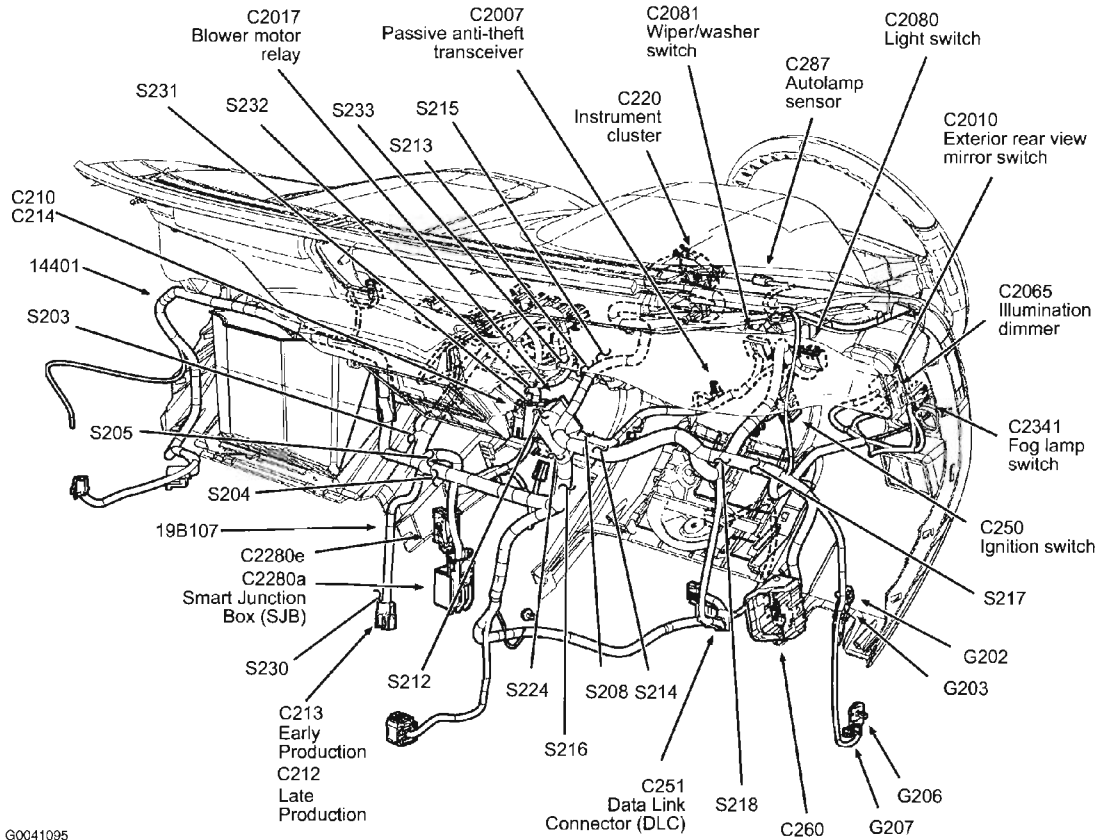
**Fig. 13: Manual Transmission**  
Courtesy of FORD MOTOR CO.



**Fig. 14: Dash Panel**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

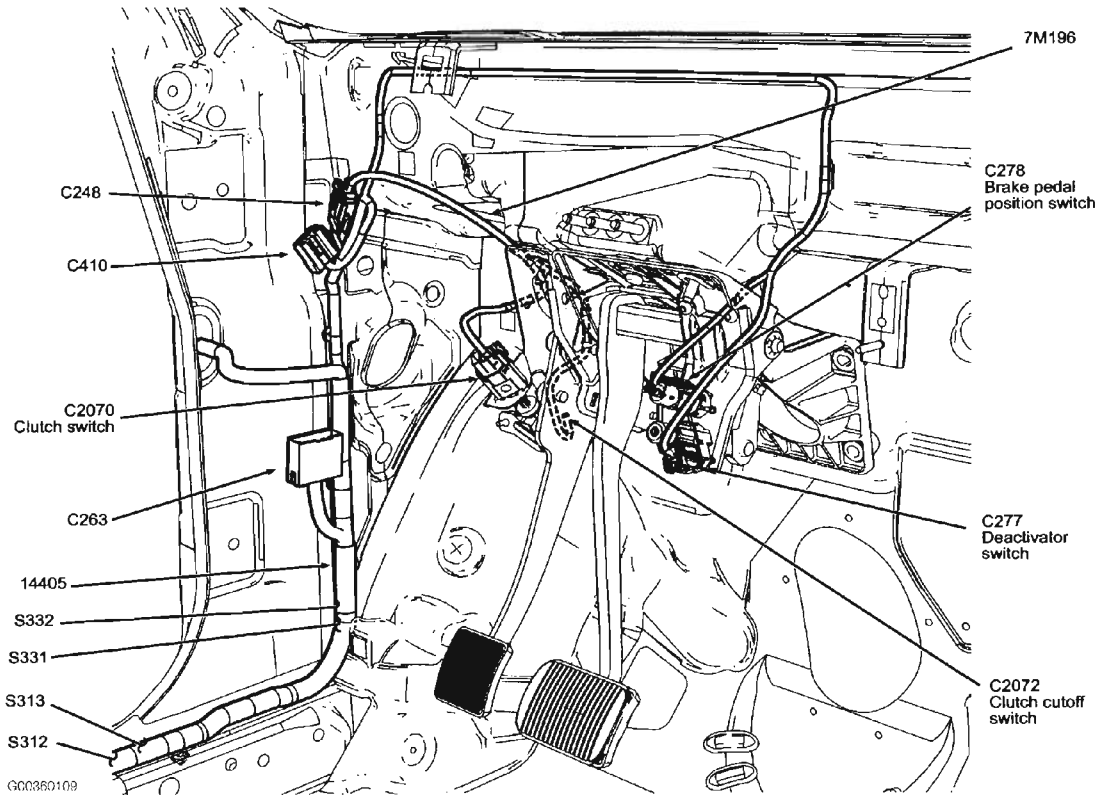


G0041095

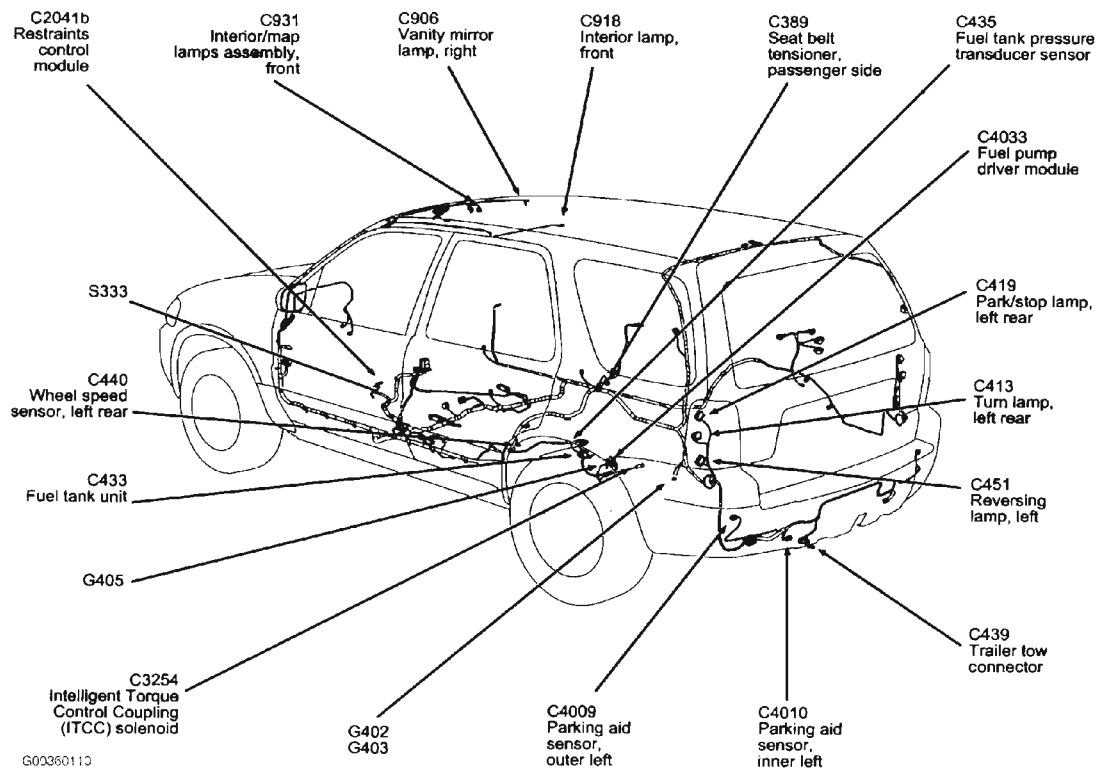
**Fig. 15: Behind Dash Panel**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



**Fig. 16: Under Left Side Of Dash**  
Courtesy of FORD MOTOR CO.

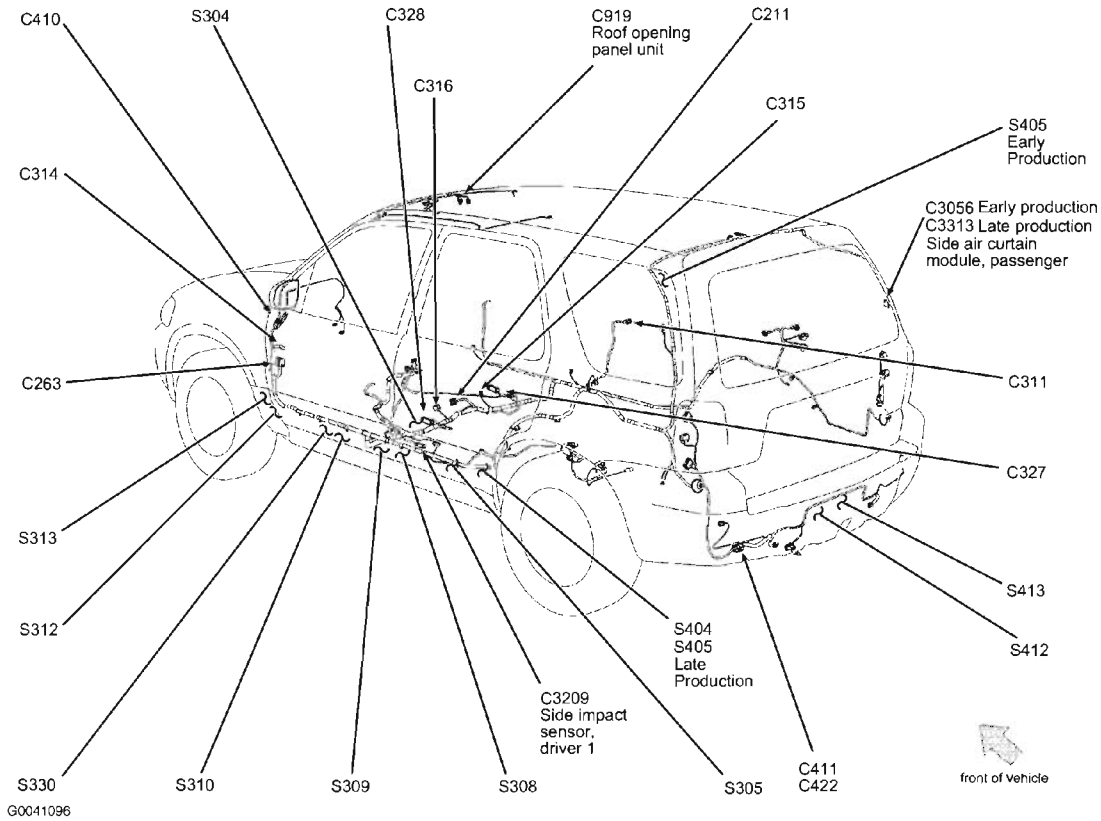


G00360113

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

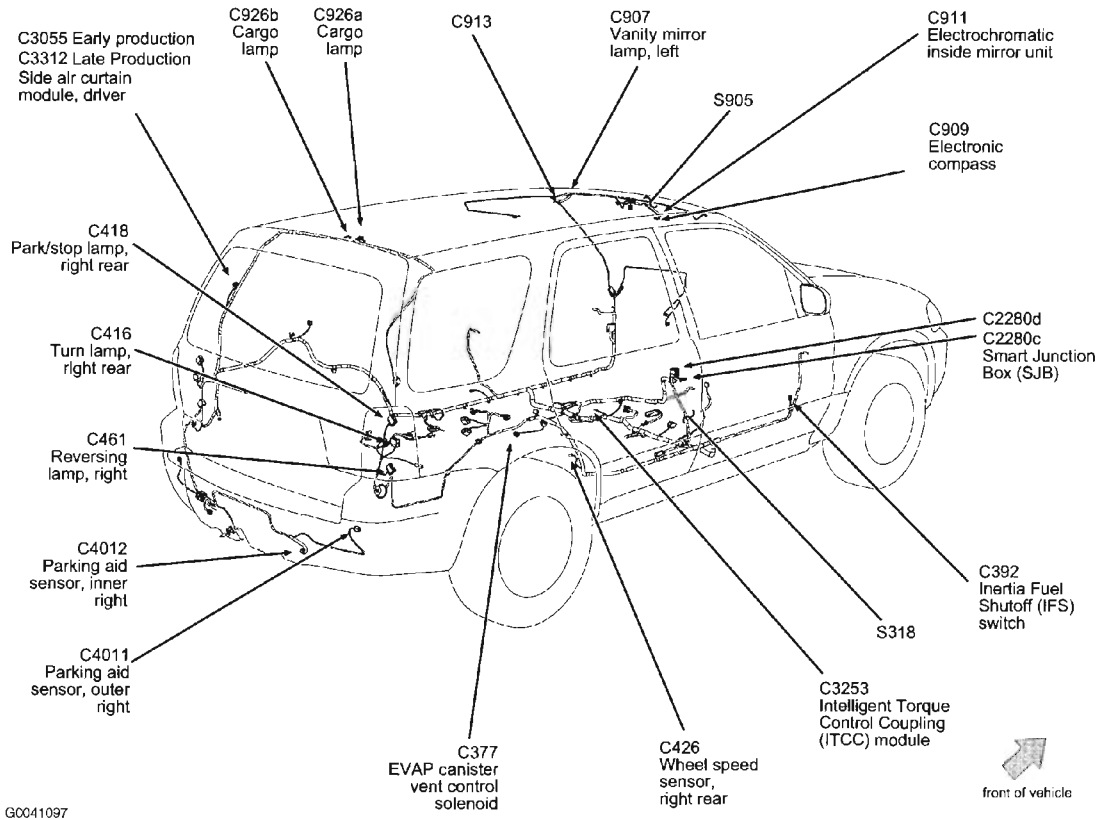
**Fig. 17: Left Side Of Vehicle**  
Courtesy of FORD MOTOR CO.



**Fig. 18: Left Side Of Vehicle**  
Courtesy of FORD MOTOR CO.

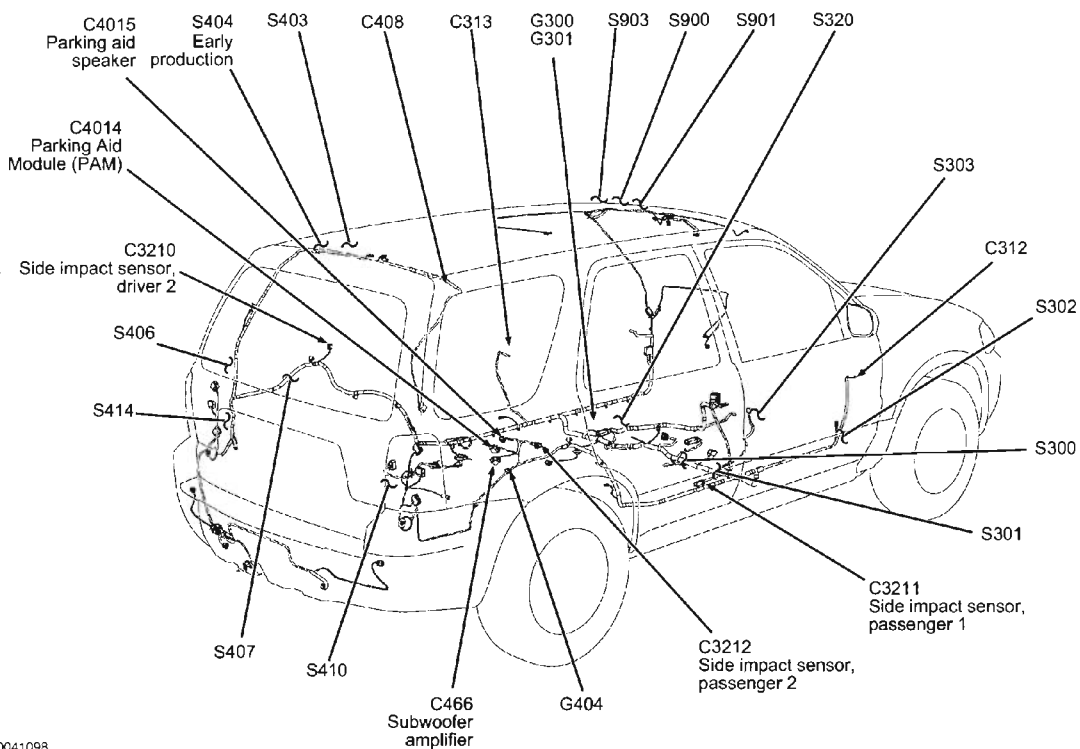
## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



G0041097

**Fig. 19: Right Side Of Vehicle**  
Courtesy of FORD MOTOR CO.

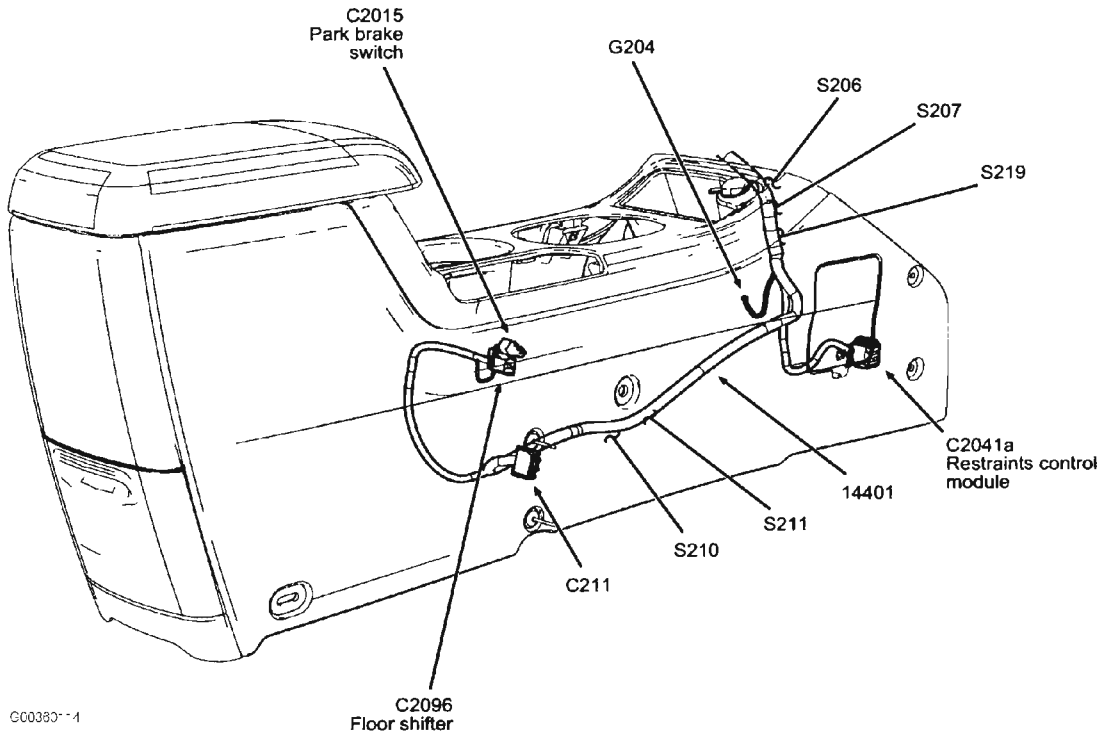


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## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

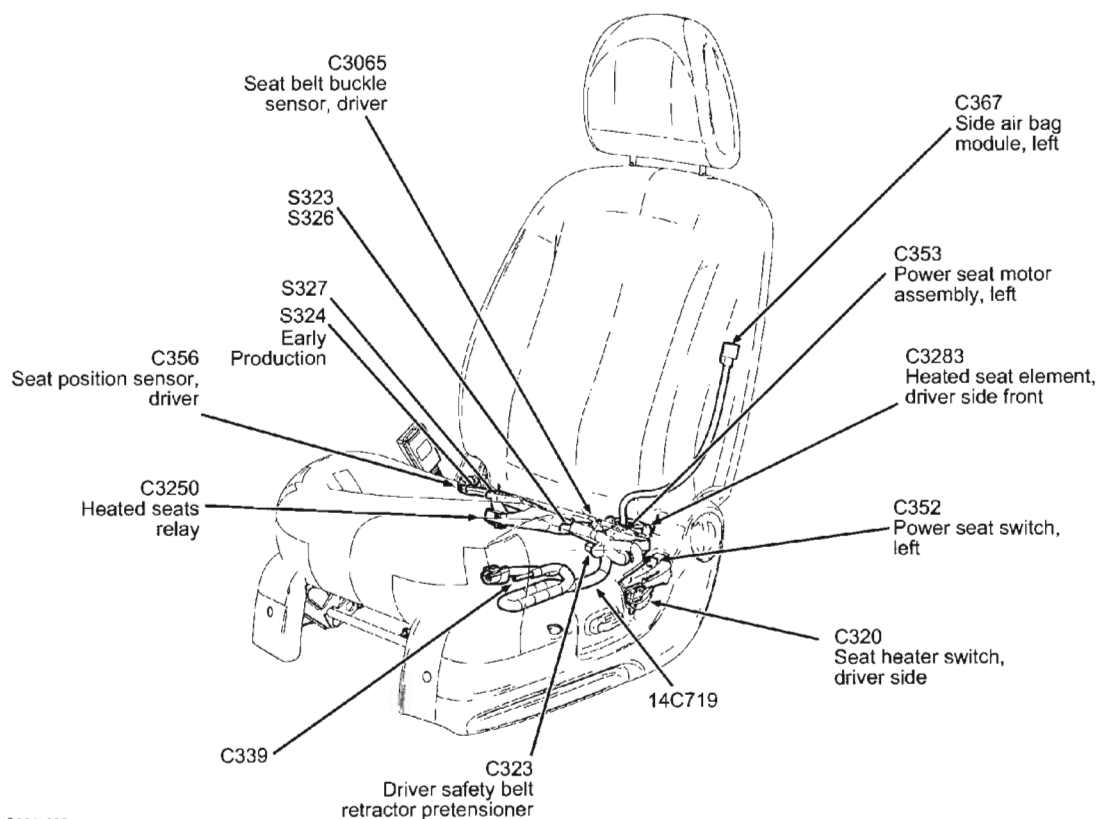
**Fig. 20: Right Side Of Vehicle**  
Courtesy of FORD MOTOR CO.



**Fig. 21: Center Console**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



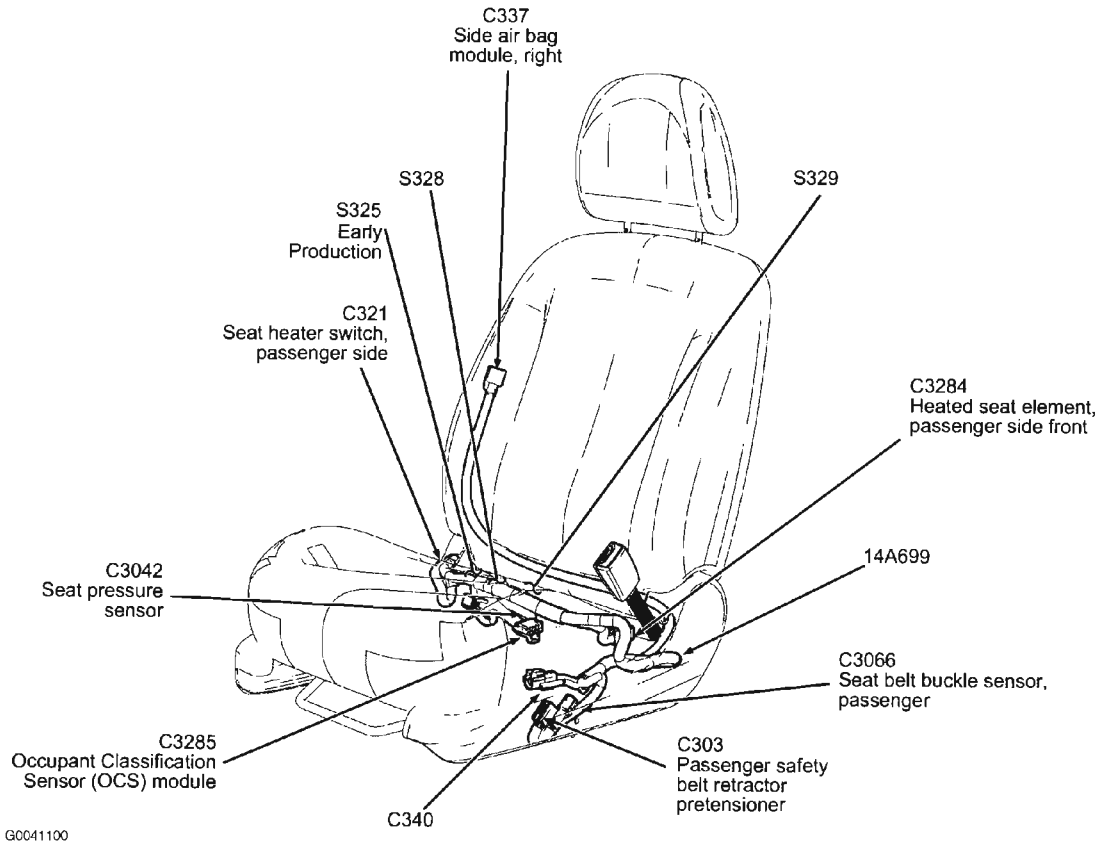
G0041099

**Fig. 22: Driver's Seat**  
Courtesy of FORD MOTOR CO.



## 2006 Ford Escape

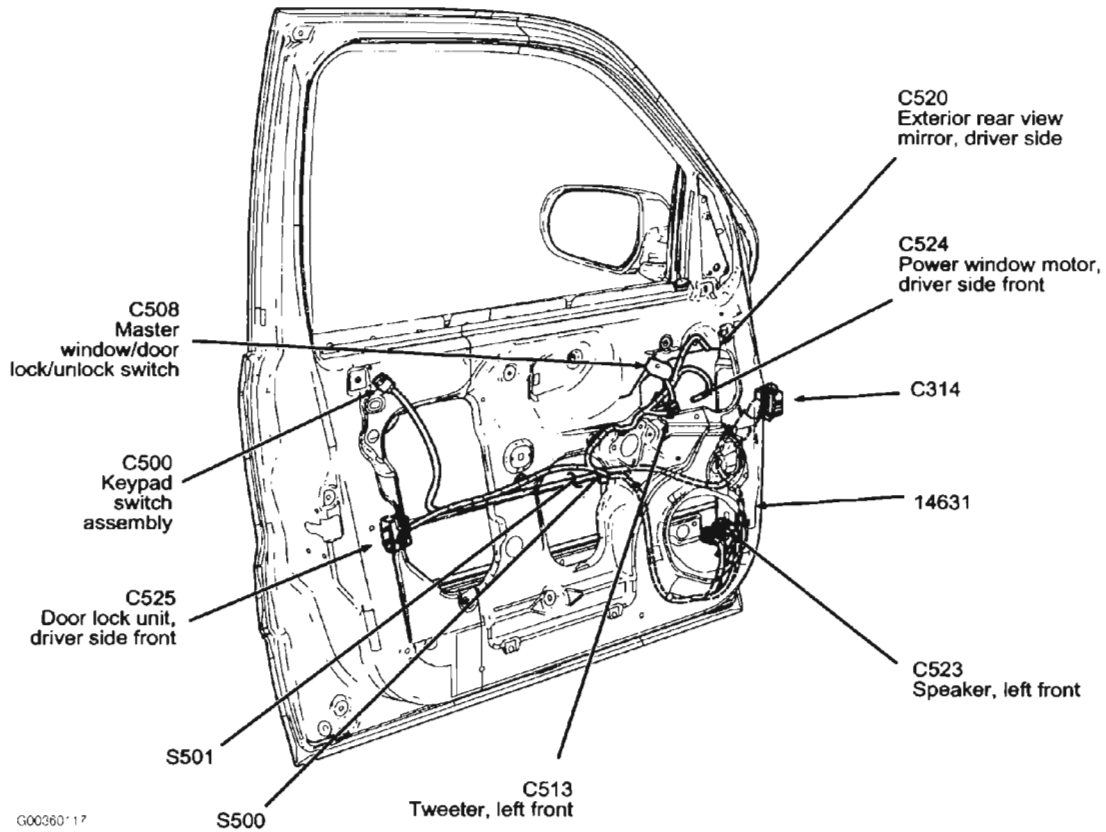
2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



**Fig. 23: Passenger's Seat**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

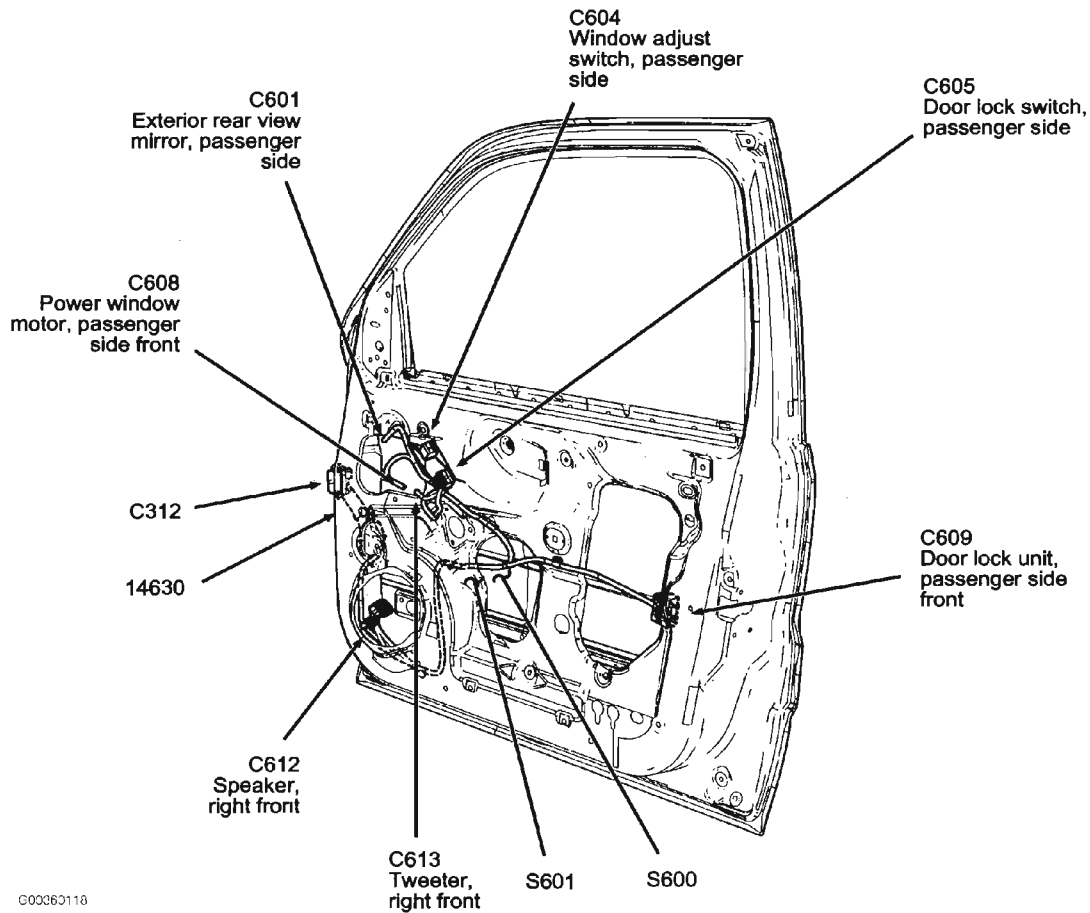
2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



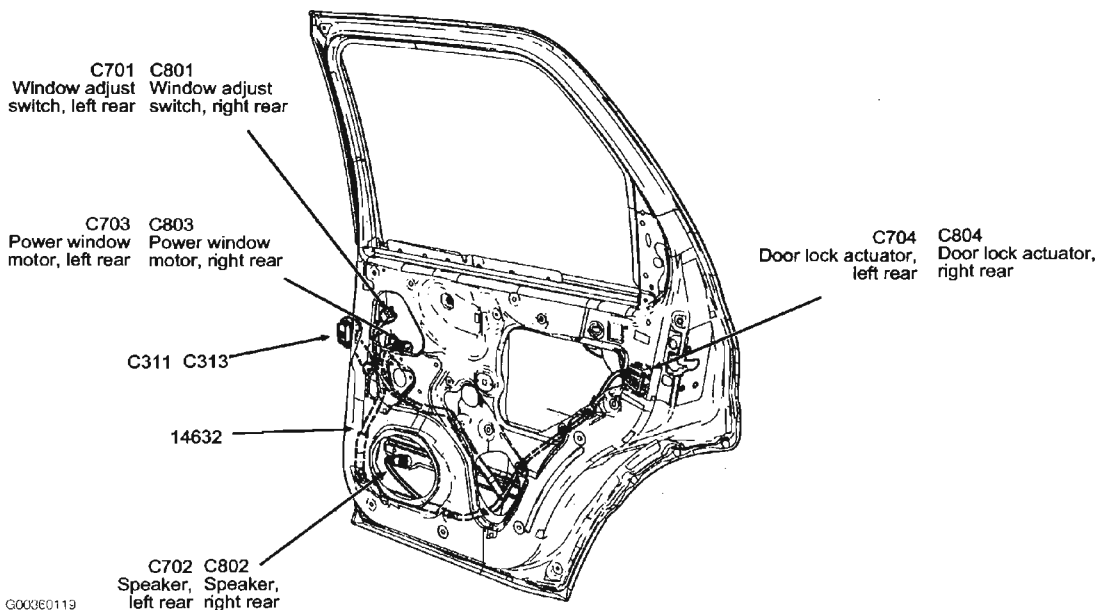
**Fig. 24: Left Front Door**  
Courtesy of FORD MOTOR CO.

## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid



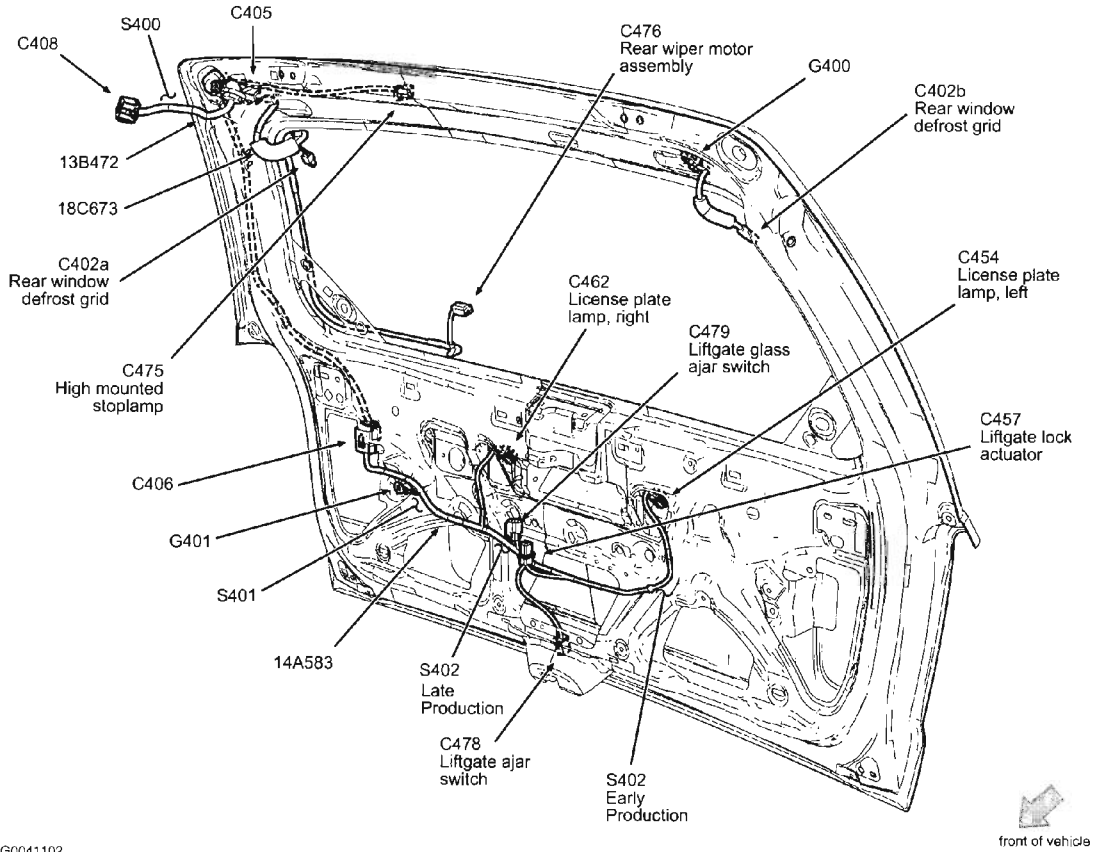
**Fig. 25: Right Front Door**  
Courtesy of FORD MOTOR CO.



## 2006 Ford Escape

2006 FORD MOTOR CO. Escape & Mariner - Except Hybrid

**Fig. 26: Right Rear Door (Left Similar)**  
Courtesy of FORD MOTOR CO.



G0041102

**Fig. 27: Liftgate**  
Courtesy of FORD MOTOR CO.

**2003-04 ELECTRICAL**

**Fuses & Circuit Breakers - Escape**

**IDENTIFICATION**

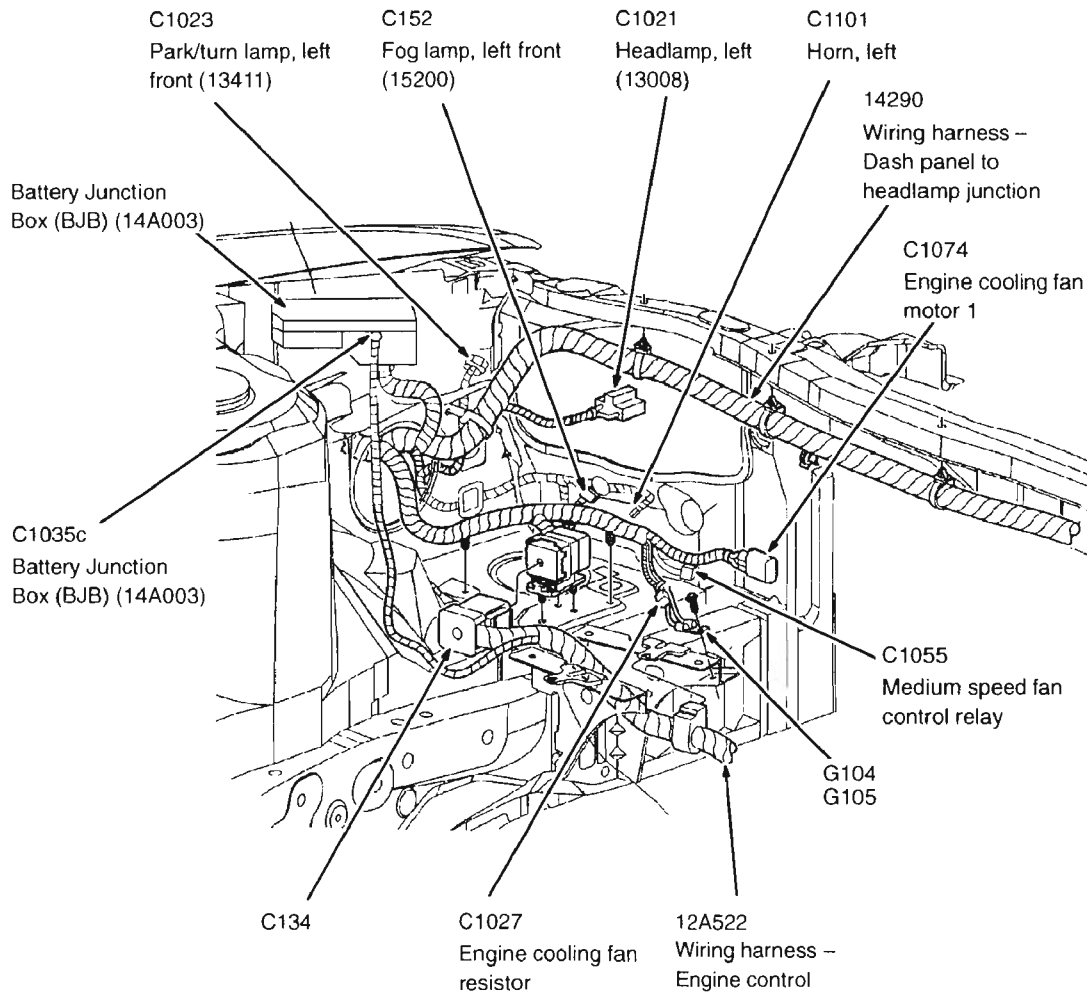
**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See appropriate **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

**BATTERY JUNCTION BOX**

- NOTE:** Battery junction box may also be referred to as power distribution box.
- NOTE:** Battery junction box is located on driver's front corner of engine compartment. See Fig. 1 .

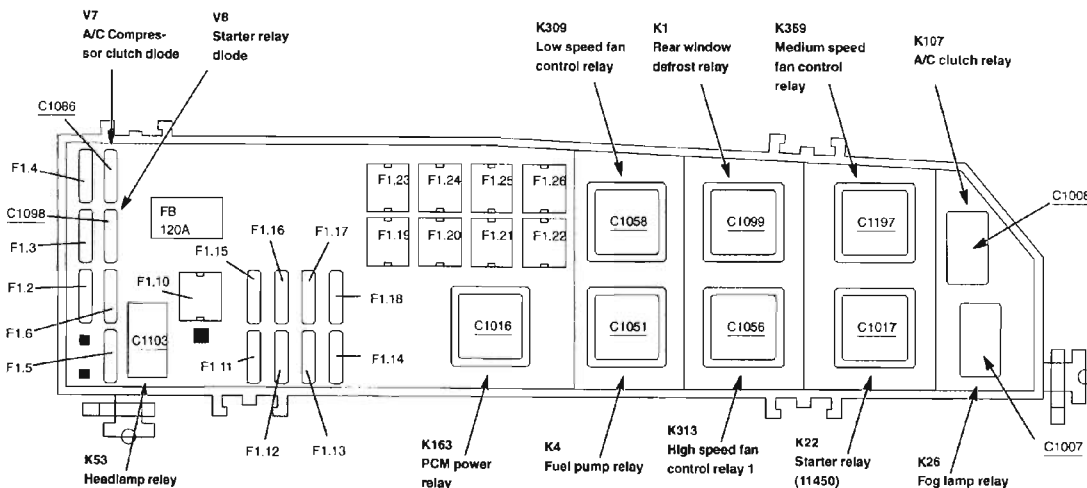
## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape



G00321680

**Fig. 1: Locating Engine Compartment Electrical Components**  
 Courtesy of FORD MOTOR CO.



G00321681

## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape

**Fig. 2: Identifying Battery Junction Box Components (2.0L)**  
Courtesy of FORD MOTOR CO.

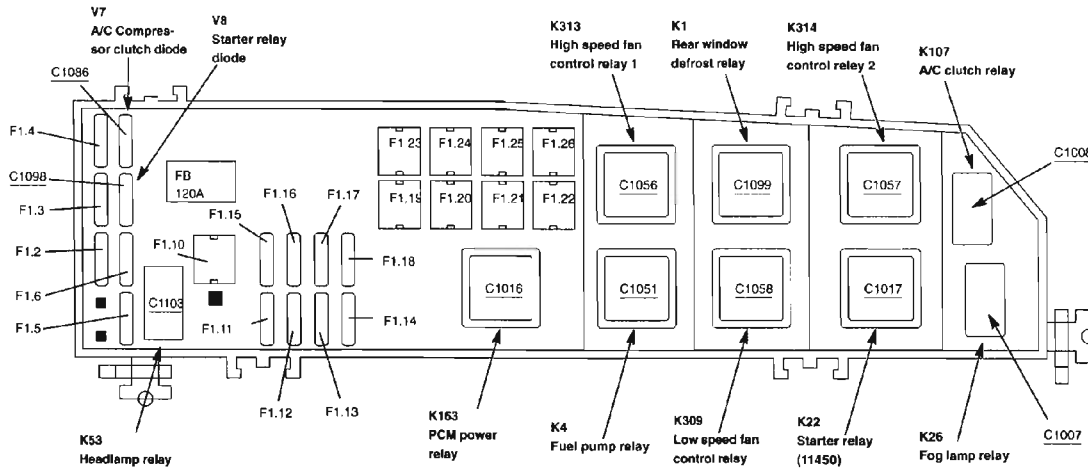
Fuse	Amps	Circuits protected
F1.2	15A	Headlamp, left (13008)
F1.3	15A	Headlamp, right (13008)
F1.4	5A	Powertrain Control Module (PCM) (12A650)
F1.5	15A	Heated Oxygen Sensor (HO2S) #11 (9F472), Heated Oxygen Sensor (HO2S) #12 (9G444), Vapor management valve
F1.6	20A	Fuel pump relay
F1.10	30A	PCM power relay, Powertrain Control Module (PCM) (12A650)
F1.11	15A	Generator
F1.12	15A	Daytime Running Lamps (DRL) module
F1.13	20A	Fog lamp relay
F1.14	25A	ABS control module (2C219), ABS test connector
F1.15	15A	Daytime Running Lamps (DRL) module, Daytime Running Lamps (DRL) relay
F1.16	15A	Power point (19N236)
F1.17	15A	A/C clutch relay
F1.18	15A	Power point, rear (19G247)
F1.19	40A	Starter relay (11450), Ignition relay, Central Junction Box (CJB) (14A068)
F1.20	40A	Accessory relay, Accessory delay relay, Central Junction Box (CJB) (14A068)
F1.21	40A	Central Junction Box (CJB) (14A068)
F1.22	30A	Rear window defrost relay
F1.23	40A	Blower motor relay
F1.24	60A	ABS control module (2C219), ABS test connector
F1.25	40A	Medium speed fan control relay, Low speed fan control relay
F1.26	40A	High speed fan control relay 1

G00322979

**Fig. 3: Battery Junction Box Legend (2.0L)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape



G00321683

**Fig. 4: Identifying Battery Junction Box Components (3.0L)**  
Courtesy of FORD MOTOR CO.



## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape

Fuse	Amps	Circuits protected
F1.2	15A	Headlamp, left (13008)
F1.3	15A	Headlamp, right (13008)
F1.4	5A	Powertrain Control Module (PCM) (12A650)
F1.5	15A	Heated Oxygen Sensor (HO2S) #11 (9F472), Heated Oxygen Sensor (HO2S) #12 (9G444), Vapor management valve, Heated Oxygen Sensor (HO2S) #21 (9F472), Heated Oxygen Sensor (HO2S) #22 (9G444)
F1.6	20A	Fuel pump relay
F1.9	30A	Heated seat module, passenger side front, Heated seat module, driver side front
F1.10	30A	PCM power relay, Powertrain Control Module (PCM) (12A650)
F1.11	15A	Generator
F1.12	15A	Daytime Running Lamps (DRL) module
F1.13	20A	Fog lamp relay
F1.14	25A	ABS control module (2C219), ABS test connector
F1.15	15A	Daytime Running Lamps (DRL) module, Daytime Running Lamps (DRL) relay
F1.16	15A	Power point (19N236)
F1.17	15A	A/C clutch relay
F1.18	15A	Power point, rear (19G247)
F1.19	40A	Starter relay (11450), Ignition relay, Central Junction Box (CJB) (14A068)
F1.20	40A	Accessory relay, Accessory delay relay, Central Junction Box (CJB) (14A068)
F1.21	40A	Central Junction Box (CJB) (14A068)
F1.22	30A	Rear window defrost relay
F1.23	40A	Blower motor relay
F1.24	60A	ABS control module (2C219), ABS test connector
F1.25	50A	High speed fan control relay 1
F1.26	50A	Low speed fan control relay

G00322980

**Fig. 5: Battery Junction Box Legend (3.0L)**  
Courtesy of FORD MOTOR CO.

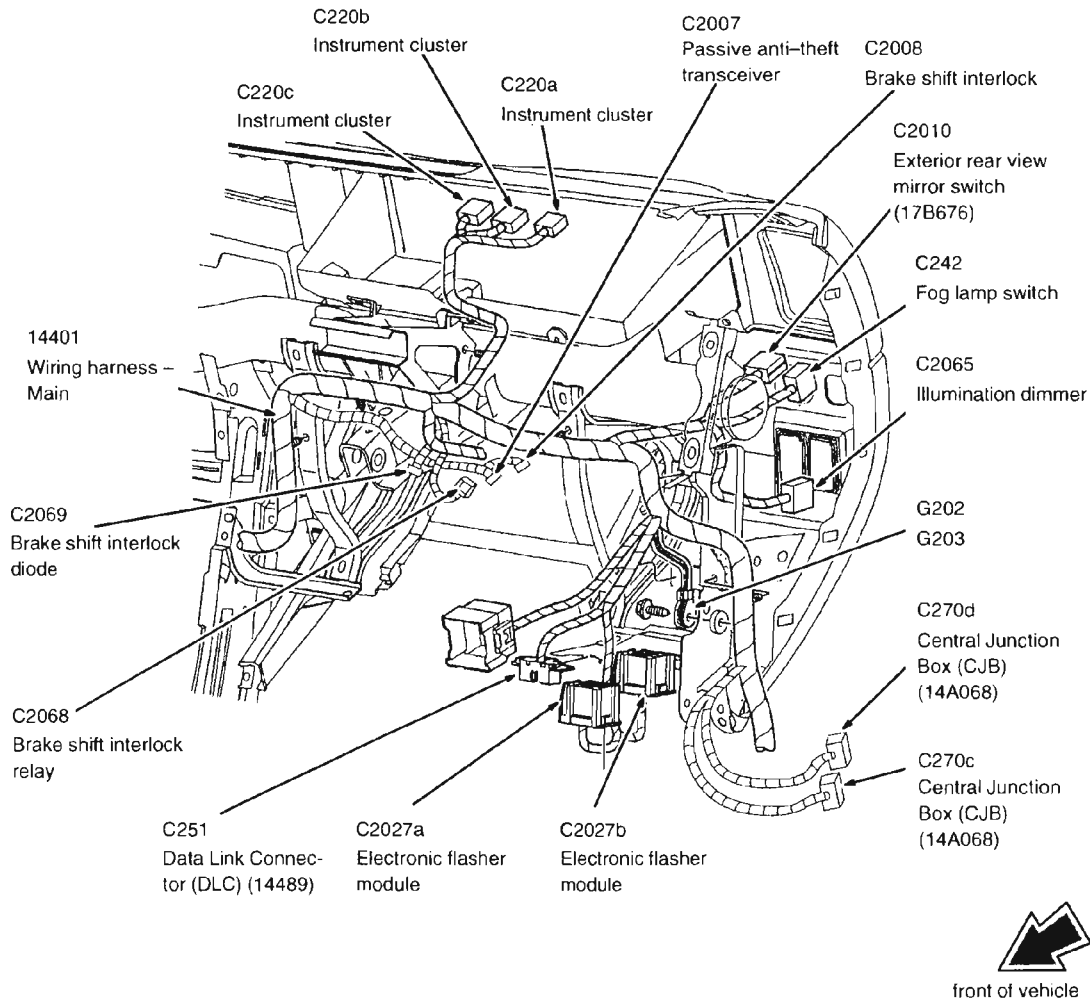
#### CENTRAL JUNCTION BOX

**NOTE:** Central junction box may also be referred to as a passenger compartment fuse panel.

**NOTE:** Central junction box is located under driver's side of instrument panel. See Fig. 6 .

## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape

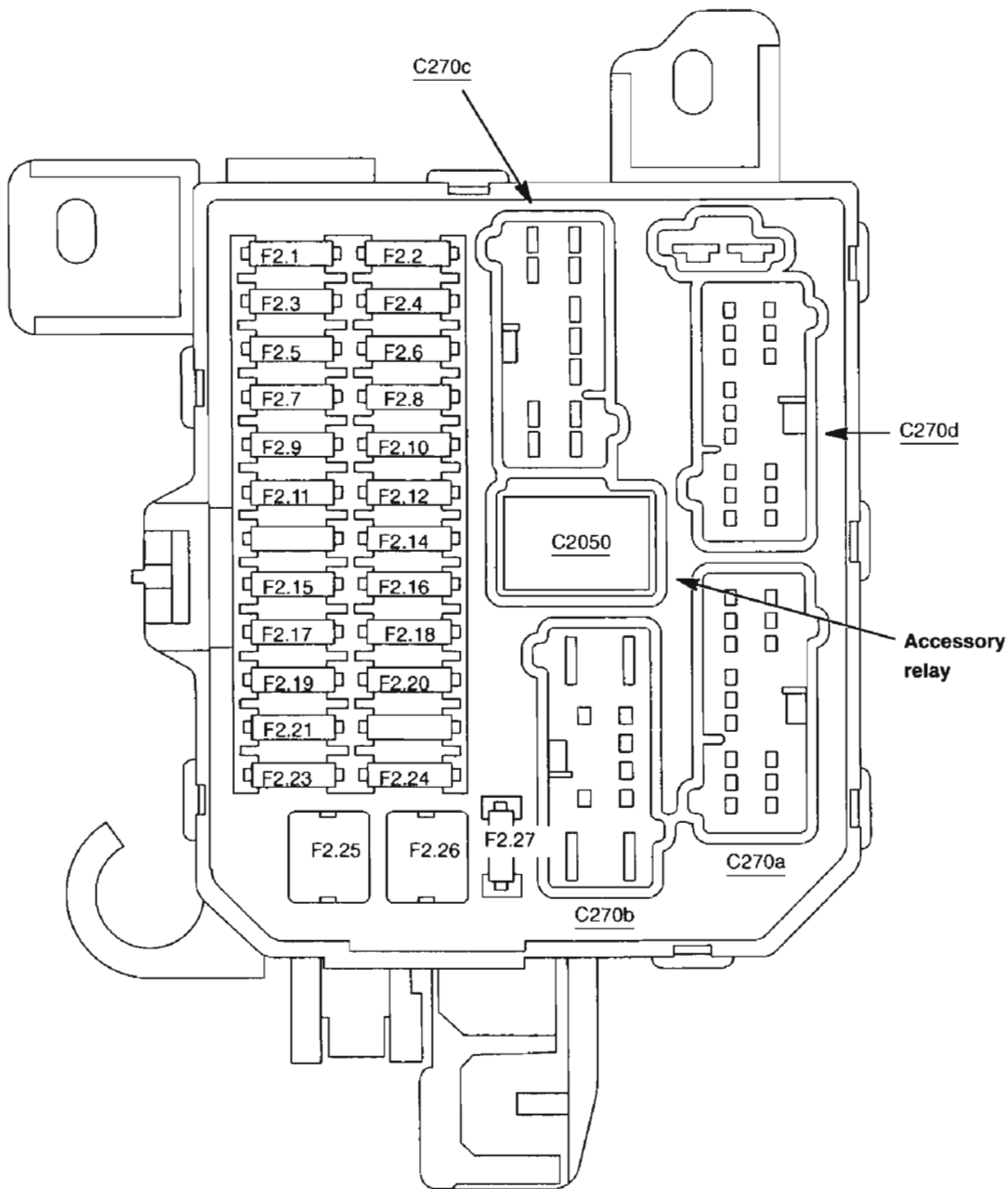


G00321685

**Fig. 6: Locating Instrument Panel Electrical Components**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape

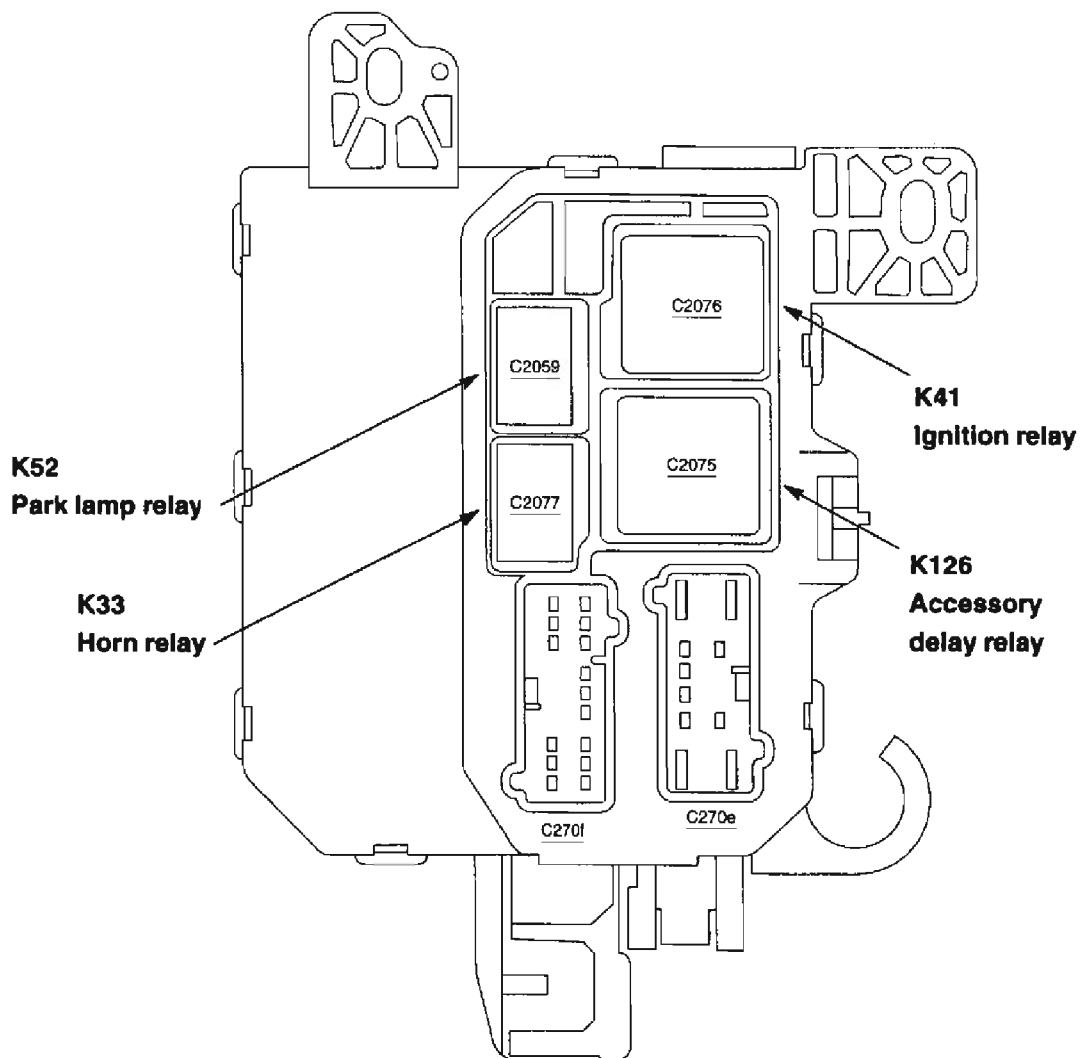


G00322981

**Fig. 7: Identifying Central Junction Box Components (1 Of 2)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape



G00322977

**Fig. 8: Identifying Central Junction Box Components (2 Of 2)**  
Courtesy of FORD MOTOR CO.

## 2004 Ford Escape

### 2003-04 ELECTRICAL Fuses & Circuit Breakers - Escape

Fuse	Amps	Circuits protected
F2.1	5A	EVAP canister vent control solenoid
F2.2	5A	Function selector switch assembly
F2.3	10A	Rear window washer pump motor, Rear wiper relay, Rear wiper motor assembly
F2.4	10A	Instrument cluster, Four-wheel drive switch
F2.5	5A	Restraints control module (14B321), Air bag sliding contact (14A664), Speed control servo (9C735), ABS test connector
F2.6	10A	Light switch, Reversing lamp, left (13411), Reversing lamp, right (13411), Parking Aid Module (PAM) (15K866)
F2.7	10A	Restraints control module (14B321), Passive anti-theft transceiver, PCM power diode, PCM power relay, Low speed fan control relay, A/C clutch relay, High speed fan control relay 1, High speed fan control relay 2, Medium speed fan control relay
F2.8	10A	Instrument cluster, Generic Electronic Module (GEM) (14B205), Exterior rear view mirror switch (17B676)
F2.9	3A	PCM power diode, PCM power relay, Low speed fan control relay, A/C clutch relay, High speed fan control relay 1, High speed fan control relay 2, Medium speed fan control relay
F2.10	20A	Windshield wiper motor (17508), Wiper/washer switch
F2.11	10A	Accessory delay relay, Ignition switch (11572)
F2.12	5A	Audio unit (18808)
F2.13	–	not used
F2.14	20A	Cigar lighter, front (15055)
F2.15	15A	Park lamp relay
F2.16	10A	Daytime Running Lamps (DRL) module, Instrument cluster, Generic Electronic Module (GEM) (14B205), Brake shift interlock, Brake shift interlock relay, Electrochromatic inside mirror unit (17700), Heated seat module, passenger side front, Heated seat module, driver side front, Rear window defrost relay
F2.17	15A	Roof opening panel module (502D70)
F2.18	5A	Instrument cluster
F2.19	10A	Subwoofer amplifier (18C804)
F2.20	15A	Electronic flasher module
F2.21	10A	Trailer tow connector (15A416)
F2.22	–	not used
F2.23	20A	Horn relay
F2.24	15A	Brake pedal position switch (13480), Deactivator switch
F2.25	30A	Master window/door lock/unlock switch, Window adjust switch, passenger side, Window adjust switch, left rear (14A412), Window adjust switch, right rear (14A412), Door lock switch, passenger side (14028)
F2.26	30A	Generic Electronic Module (GEM) (14B205), Power seat switch, left, Four-wheel drive relay
F2.27	10A	Generic Electronic Module (GEM) (14B205), Instrument cluster, Audio unit (18808), Data Link Connector (DLC) (14489)

G00322982

**Fig. 9: Central Junction Box Legend**  
**Courtesy of FORD MOTOR CO.**

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape

## 2001 ELECTRICAL

### Fuses & Circuit Breakers - Escape

## IDENTIFICATION

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

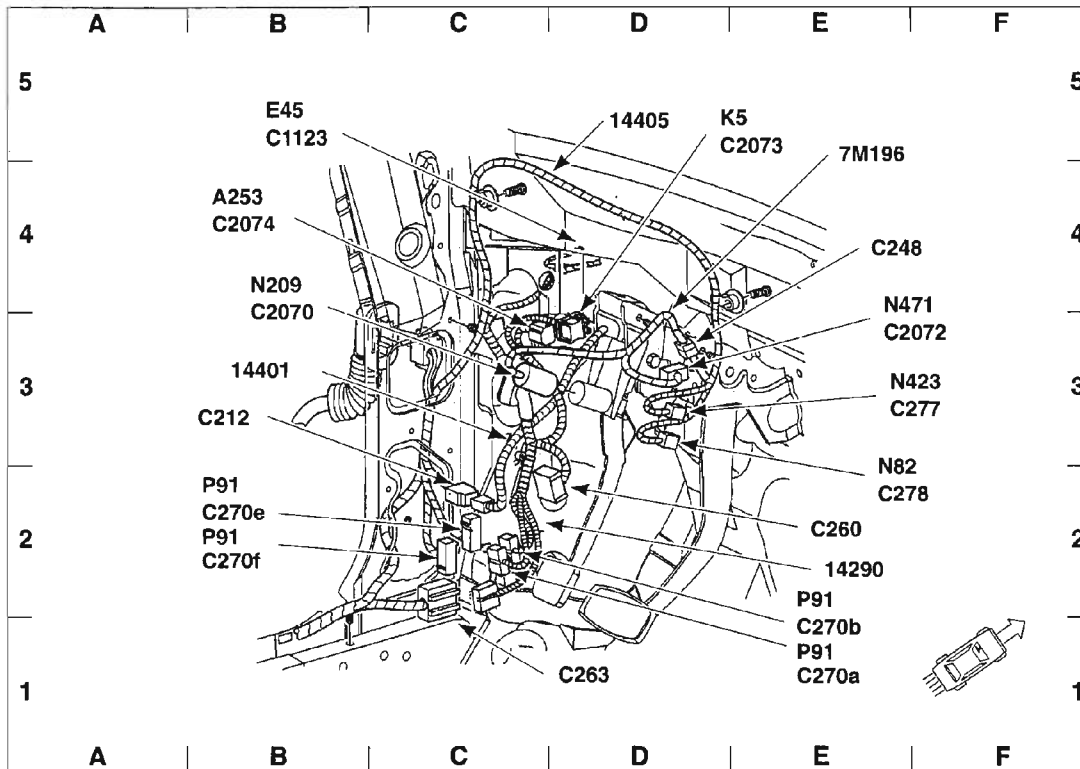
### CENTRAL JUNCTION BOX

**NOTE:** Central junction box may also be referred to as a passenger compartment fuse panel.

**NOTE:** Central junction box is located under driver's side of instrument panel. See Fig. 1 .

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape



#### LH rocker panel

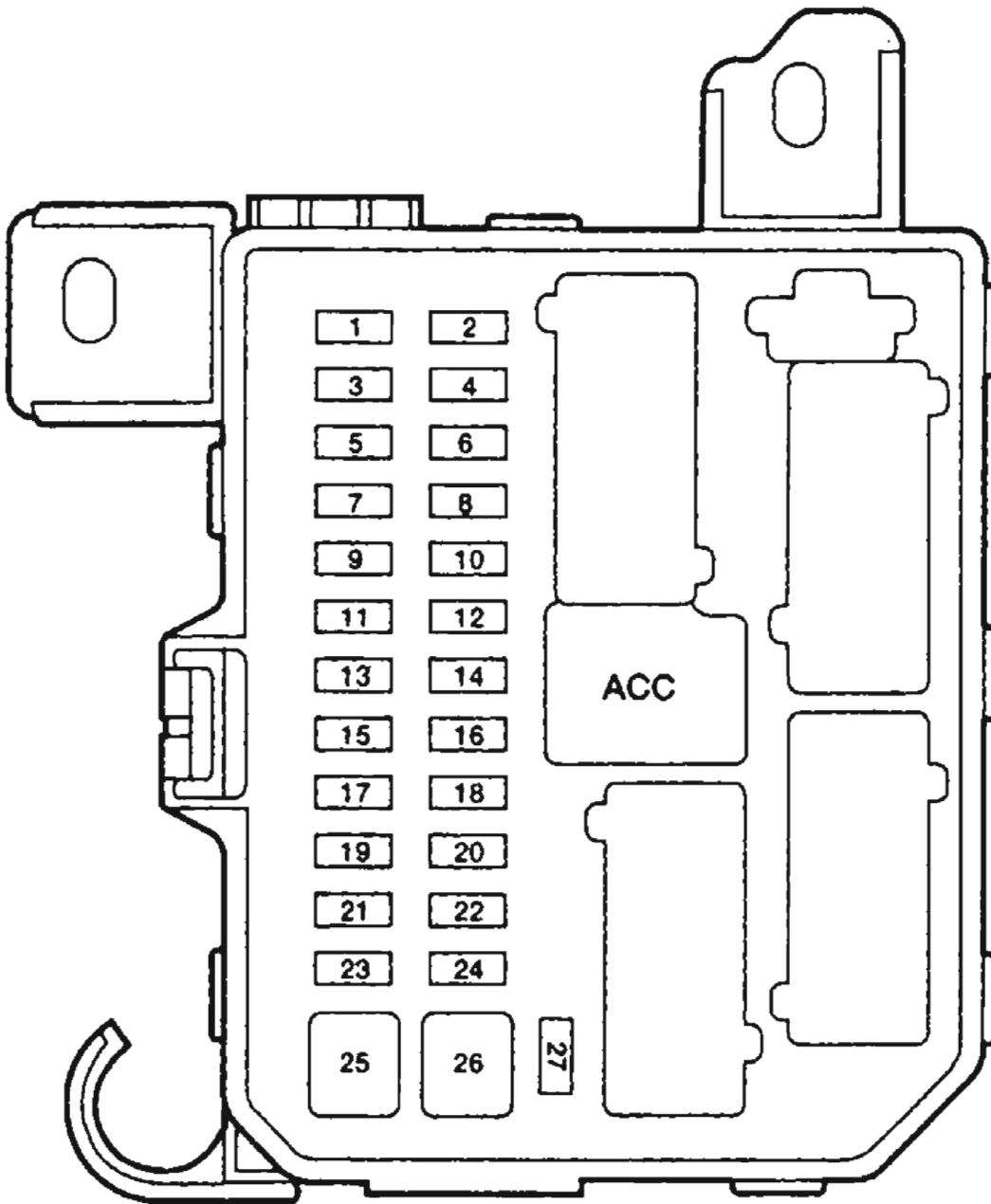
14290	E 2	C1123	B 5
14401	B 3	C2070	B 3
14405	D 5	C2072	E 3
7M196	E 5	C2073	E 5
A253 . Daytime Running Lamps (DRL) module	B 4	C2074	B 4
C212	B 3	E45 . Side turn signal lamp, left	B 5
C248	E 4	K5 . Daytime running lamps (DRL) relay	E 5
C260	E 2	N82 . Brake pedal position switch	E 2
C263	D 1	N209 . Clutch switch	B 4
C270a	E 1	N423 . Deactivator switch	E 3
C270b	E 1	N471 . Clutch cutoff switch	E 4
C270e	B 2	P91 . Central Junction Box (CJB)	B 2
C270f	B 2	P91 . Central Junction Box (CJB)	E 2
C277	F 3	P91 . Central Junction Box (CJB)	B 2
C278	E 2	P91 . Central Junction Box (CJB)	E 1

G00097871

**Fig. 1: Locating Instrument Panel Electrical Components**  
**Courtesy of FORD MOTOR CO.**

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape



G00097872

**Fig. 2: Identifying Central Junction Box Components**  
Courtesy of FORD MOTOR CO.



## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape

Fuse/Relay Location	Fuse Amp Rating	Passenger Compartment Fuse Panel Description
1	5A	Canister Vent Control Solenoid
2	5A	Blower Relay (coil), Rear Defrost Relay (coil), Pressure Switch to PCM
3	10A	Rear Wiper Motor, Rear Washer Motor, Rear Wiper Relay (coil)
4	10A	Four Wheel Drive Control Module, Cluster (Restraints Control Warning)
5	5A	ABS Unit (EVAC & FILL), ASC Unit, Restraints Control Module, ASC Main SW to ASC Unit
6	10A	Flasher Unit, Left reversing Lamp, Right Reversing Lamp

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**Fig. 3: Central Junction Box Legend (1 Of 3)**  
Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape

Fuse/Relay Location	Fuse Amp Rating	Passenger Compartment Fuse Panel Description
7	10A	Passive Anti-theft Transceiver (PATS), Restraints Control Module
8	10A	Cluster, Shift Lock Relay (coil), O/D signal to PCM
9	3A	PCM Relay (coil), Fan Relay 1, 2, 3 (coil), A/C Relay (coil)
10	20A	Front Wiper Motor, Front Washer Motor, INT Relay
11	10A	IGN Relay (coil), ACC Relay (coil), Starter Relay (coil), Key Interlock Solenoid, GEM
12	5A	Radio, Clock
13	—	Not Used
14	20A	Cigar Lighter
15	15A	Left Front Position Lamp, Right Front Position Lamp, Left License Lamp, Right License Lamp, Left Tail Lamp, Right Tail Lamp, Park Lamp Relay (coil), Trailer Fuse, Illumination Fuse
16	10A	Cluster, Power Mirror, GEM
17	15A	Sun Roof Motor
18	5A	Illumination for: Cluster, Heater Unit, Radio, Hazard Switch, Rear Defrost Switch, 4WD Switch, Front Fog Switch
19	10A	Subwoofer Amp
20	15A	Left/Right Turn Indicators, Left/Right Front Side Turn Lamps, Left/Right Front turn Lamps, Left/Right Rear Turn Lamps, Left/Right Trailer Turn, Flasher Unit
21	10A	Left /Right Trailer Position Lamps
22	15A	Not Used
23	15A	Left/Right Horn

G00099829

**Fig. 4: Central Junction Box Legend (2 Of 3)**  
**Courtesy of FORD MOTOR CO.**

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape

Fuse/Relay Location	Fuse Amp Rating	Passenger Compartment Fuse Panel Description
24	15A	Left/Right Stoplamps, Hight Mounted Stoplamp, Left/Right Trailer Stoplamp, ABS Unit, ASC Unit (Brake Pedal Position Switch), PCM, Shift Solenoid
25	30A	Power Window Motor - Right Front, Left Front, Right Rear, Left Rear
26	30A	Power Door Lock Motor - Right Front, Left Front, Right Rear, Left Rear, GEM (Door Lock Relay Coil), Power Seat
27	10A	Audio, Cluster, Interior Lamp, Map Lamp Cargo Lamp

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**Fig. 5: Central Junction Box Legend (3 Of 3)**  
Courtesy of FORD MOTOR CO.

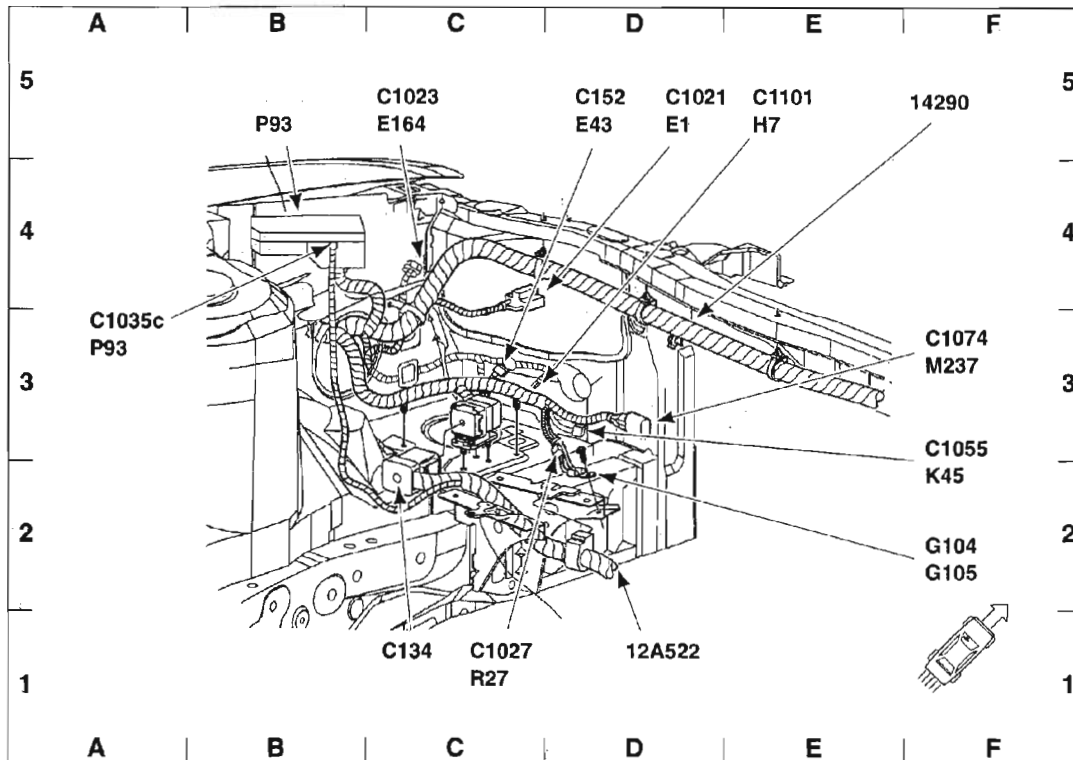
#### BATTERY JUNCTION BOX

**NOTE:** Battery junction box may also be referred to as power distribution box.

**NOTE:** Battery junction box is located on driver's front corner of engine compartment. See [Fig. 6](#) .

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape



#### engine compartment, LH side, front

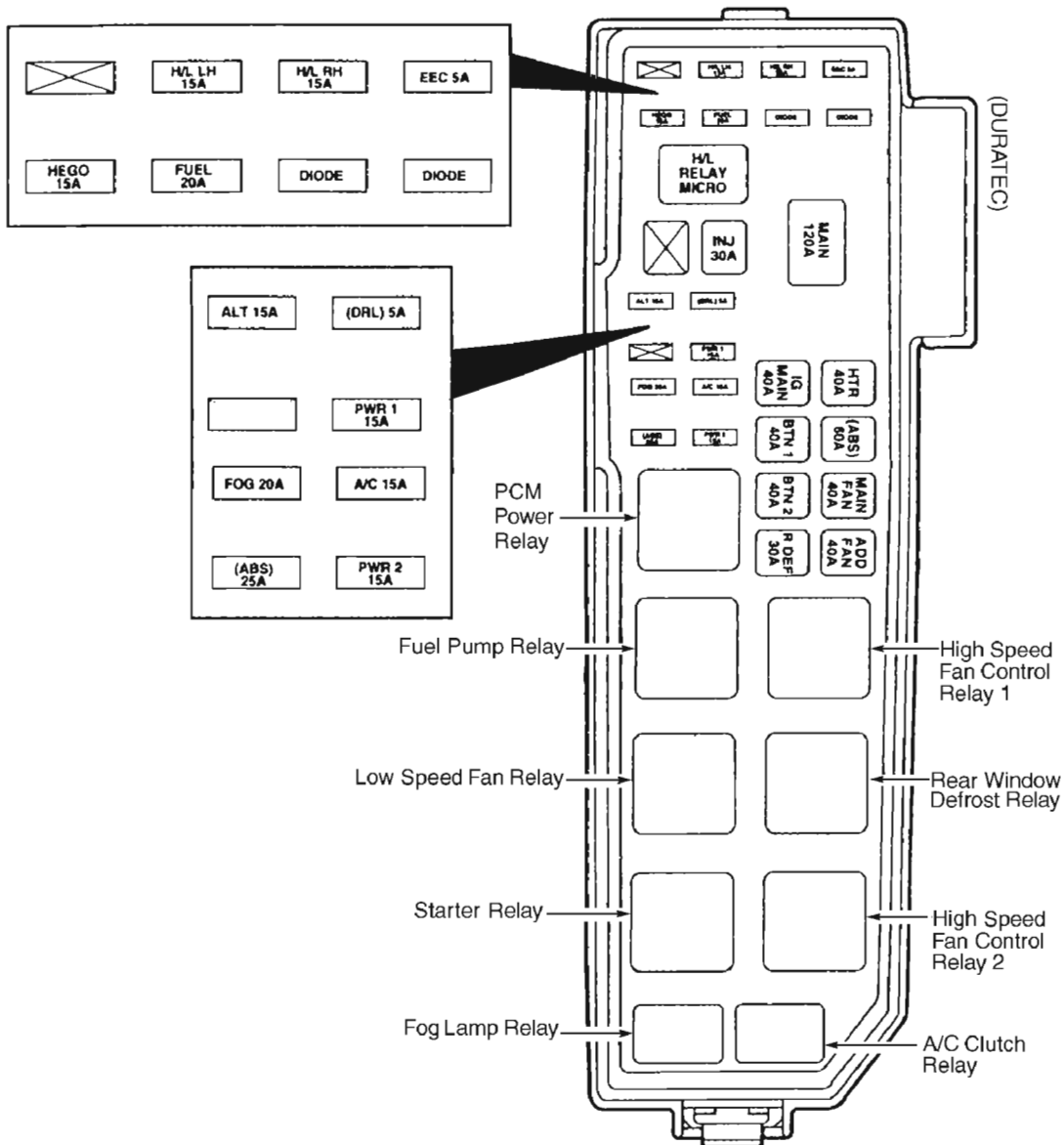
12A522	D 1	E1	Headlamp, left	D 5
14290	F 5	E43	Fog lamp, left front	D 5
C134	C 1	E164	Park/turn lamp, left front	C 5
C152	D 5	G104		F 2
C1021	D 5	G105		F 2
C1023	C 5	H7	Horn, left	E 5
C1027	C 1	K359	Engine cooling fan relay (Medium Speed)	F 2
C1035c	A 3	M237	Engine cooling fan motor 1	F 3
C1055	F 3	P93	Battery Junction Box (BJB)	A 3
C1074	F 3	P93	Battery Junction Box (BJB)	B 5
C1101	E 5	R27	Engine cooling fan resistor	C 1

G00097874

**Fig. 6: Locating Engine Compartment Electrical Components**  
**Courtesy of FORD MOTOR CO.**

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape

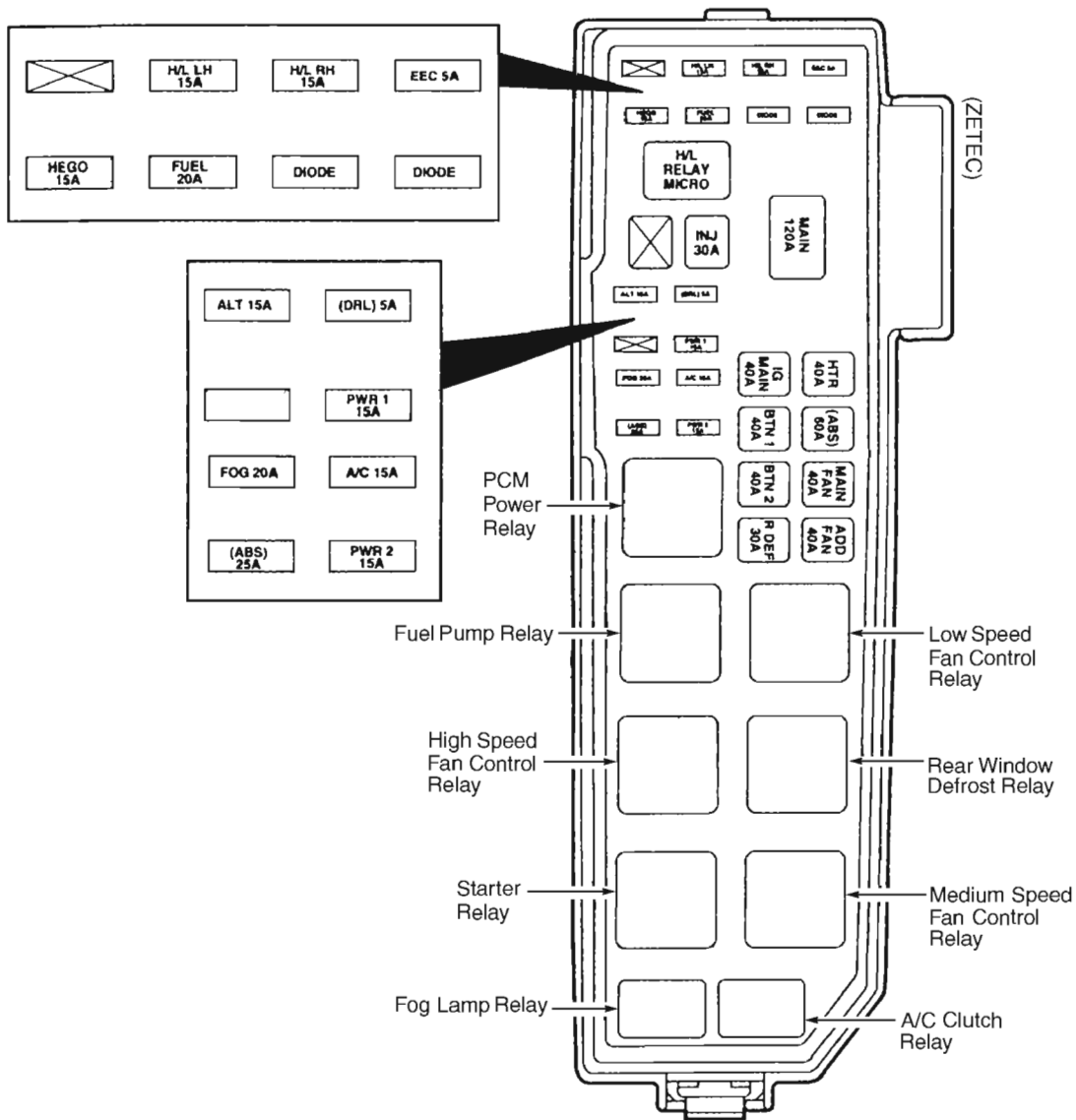


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**Fig. 7: Identifying Battery Junction Box Components (Duratec)**  
 Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape



G00099780

**Fig. 8: Identifying Battery Junction Box Components (Zetec)**  
 Courtesy of FORD MOTOR CO.

## 2001 Ford Escape

### 2001 ELECTRICAL Fuses & Circuit Breakers - Escape

Fuse/Relay Location	Fuse Amp Rating	Power Distribution Box Description
—	—	—
H/L LH	15A*	Headlamp (High/Low Left, High Beams)
H/L RH	15A*	Headlamp (High/Low Right,, High Beams)
EEC	5A*	EEC (KPWR)
HEGO	15A*	HEGO 1,2, CMS 1,2, VMV
FUEL	20A*	Fuel Pump, EEC (FPM)
DIODE	—	—
H/L RELAY MICRO	—	Headlamp (High/Low, Right/Left Relay)
—	—	—
INJ	30A**	EEC (VPWR), EVR, MAF, IAC, Bulkhead
MAIN	120A	Main
ALT	15A*	Alternator/ Regulator
(DRL)	15A*	DRL Unit (feed), DRL Relay
(DRL)	15A*	Daytime Running Lamps (DRL) Module
PWR 1	15A*	Auxiliary Power Point
FOG	20A*	Foglamps RH/LH, Foglamp Indicator
A/C	15A*	A/C Clutch
(ABS)	25A*	Anti-Lock Brake System SOL
PWR 2	15A*	Auxiliary Power Point
IG MAIN	40A**	Starter
HTR	40A**	Blower Motor, Blower Motor Relay
BTN 1	40A**	JB — Acc. Relay, Radio, Clock, Cigar Lighter, Cluster, Power Mirror, GEM
(ABS)	60A**	Anti-Lock Brake System Motor
BTN 2	40A**	JB — Radio, CD Changer, Cluster, Dome Lamps, Map Lamps, Cargo Lamps
MAIN FAN	40A**	Main Fan
R DEF	30A**	Rear Defroster
ADD FAN	40A**	Add Fan

\* Mini Fuses \*\*Maxi Fuses

G00099831

**Fig. 9: Battery Junction Box Legend (Duratec & Zetec)**  
 Courtesy of FORD MOTOR CO.

## **2001 Ford Escape**

2001 SYSTEM WIRING DIAGRAMS FORD Escape

### **2001 SYSTEM WIRING DIAGRAMS FORD**

**Escape**

## **AIR CONDITIONING**

**2.0L**



# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

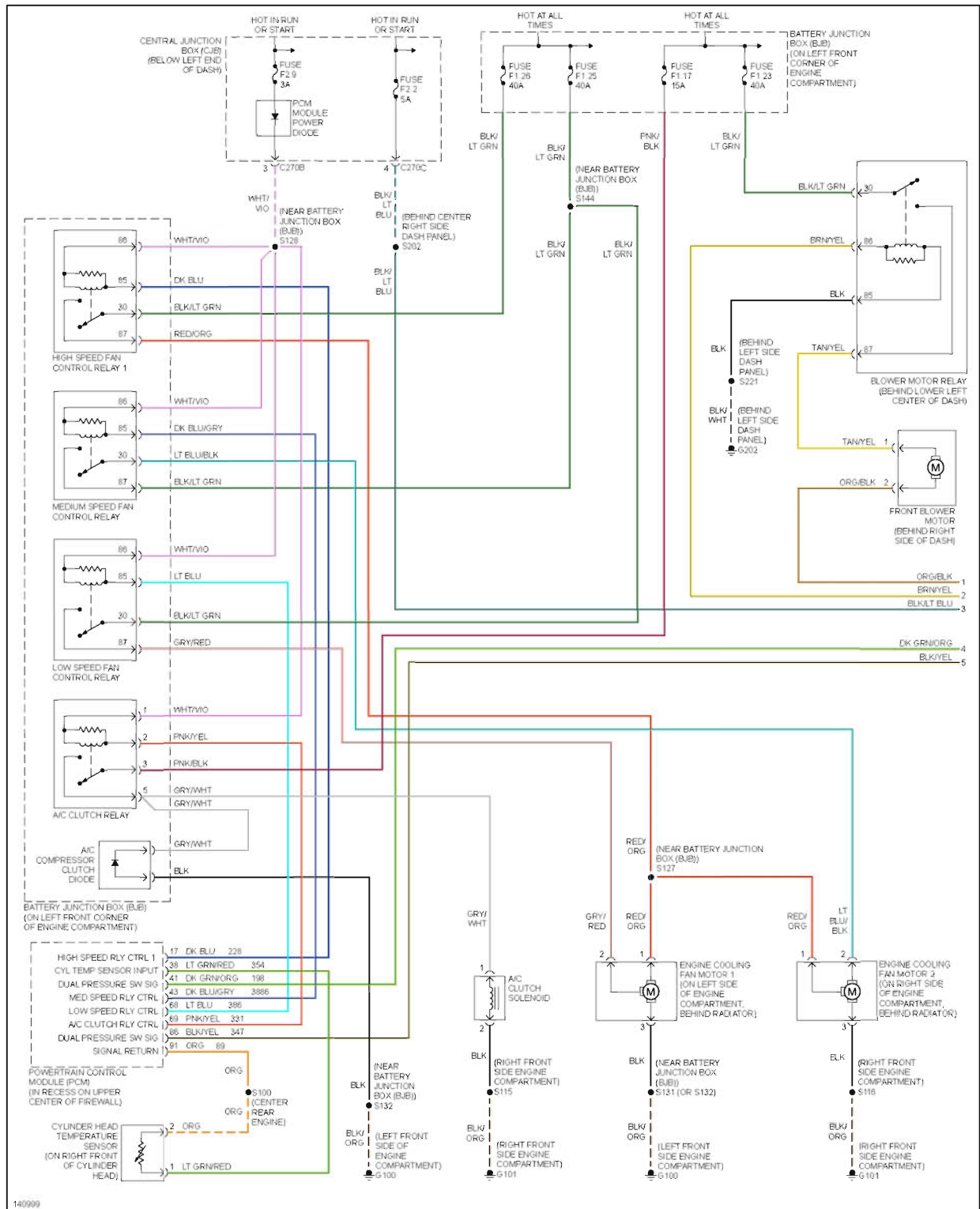
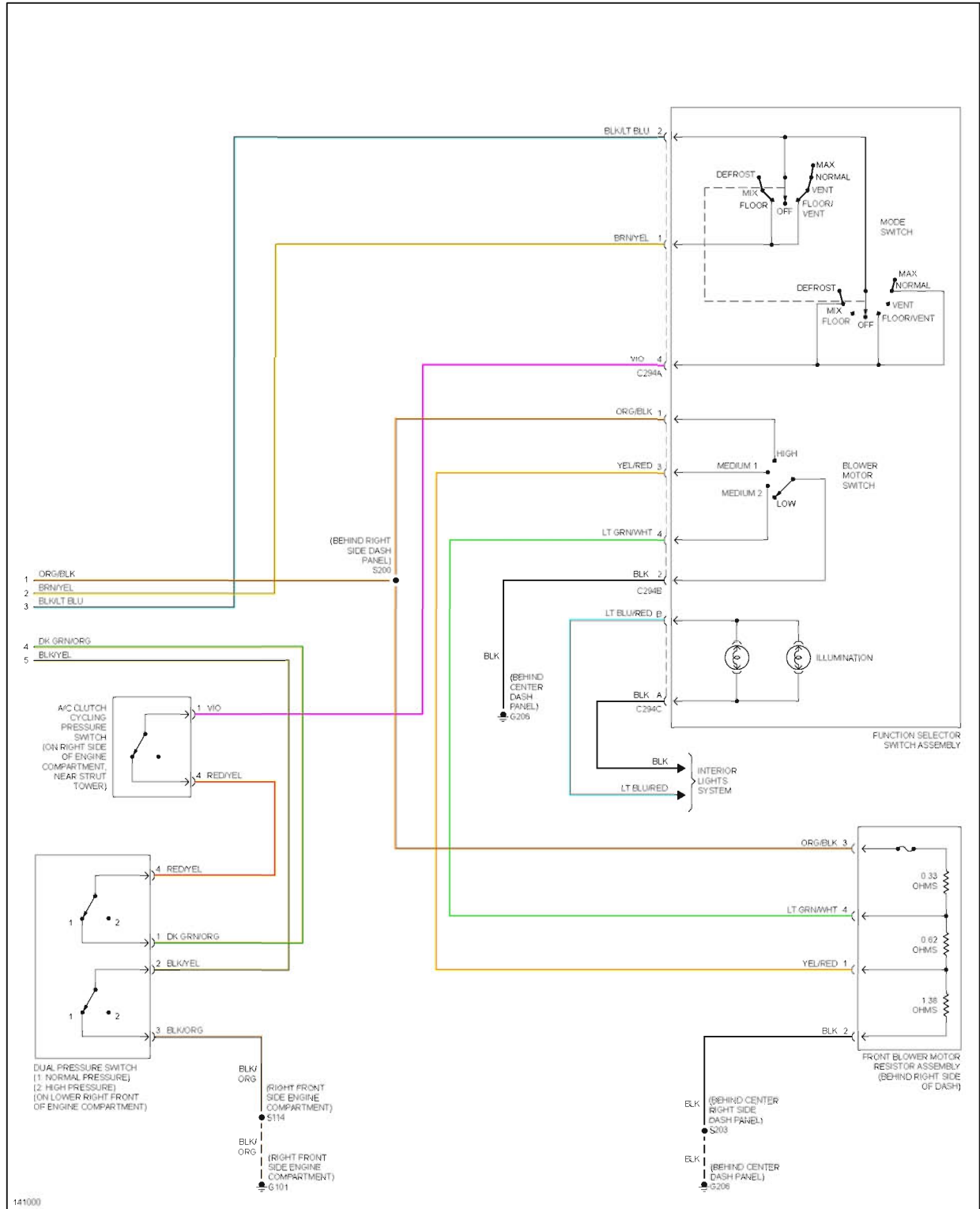


Fig. 1: 2.0L, Manual A/C Circuit (1 of 2)

# 2001 Ford Escape

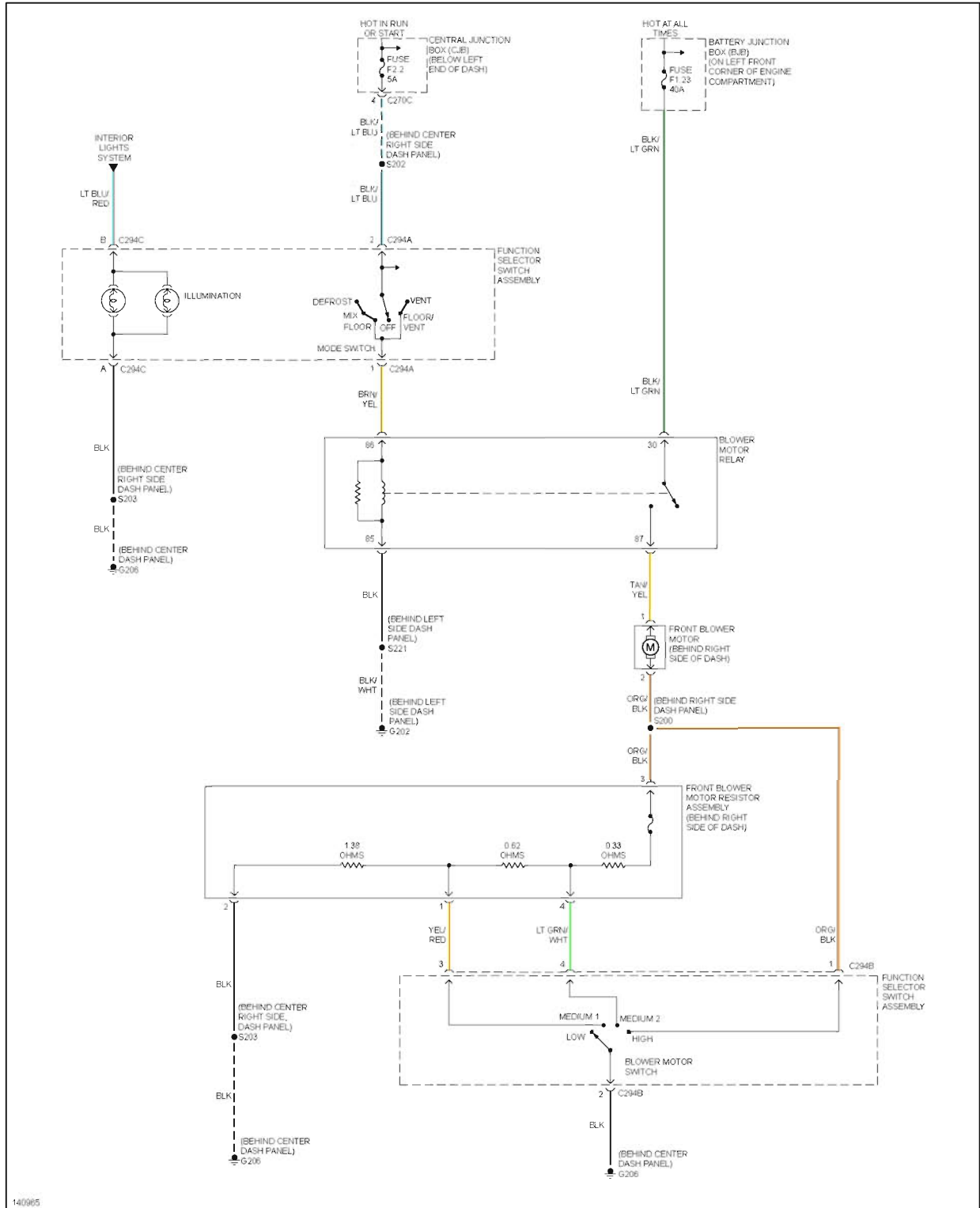
## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 2: 2.0L, Manual A/C Circuit (2 of 2)**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 3: Heater Circuit**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 4: 3.0L, Manual A/C Circuit (1 of 2)**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 5: 3.0L, Manual A/C Circuit (2 of 2)**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

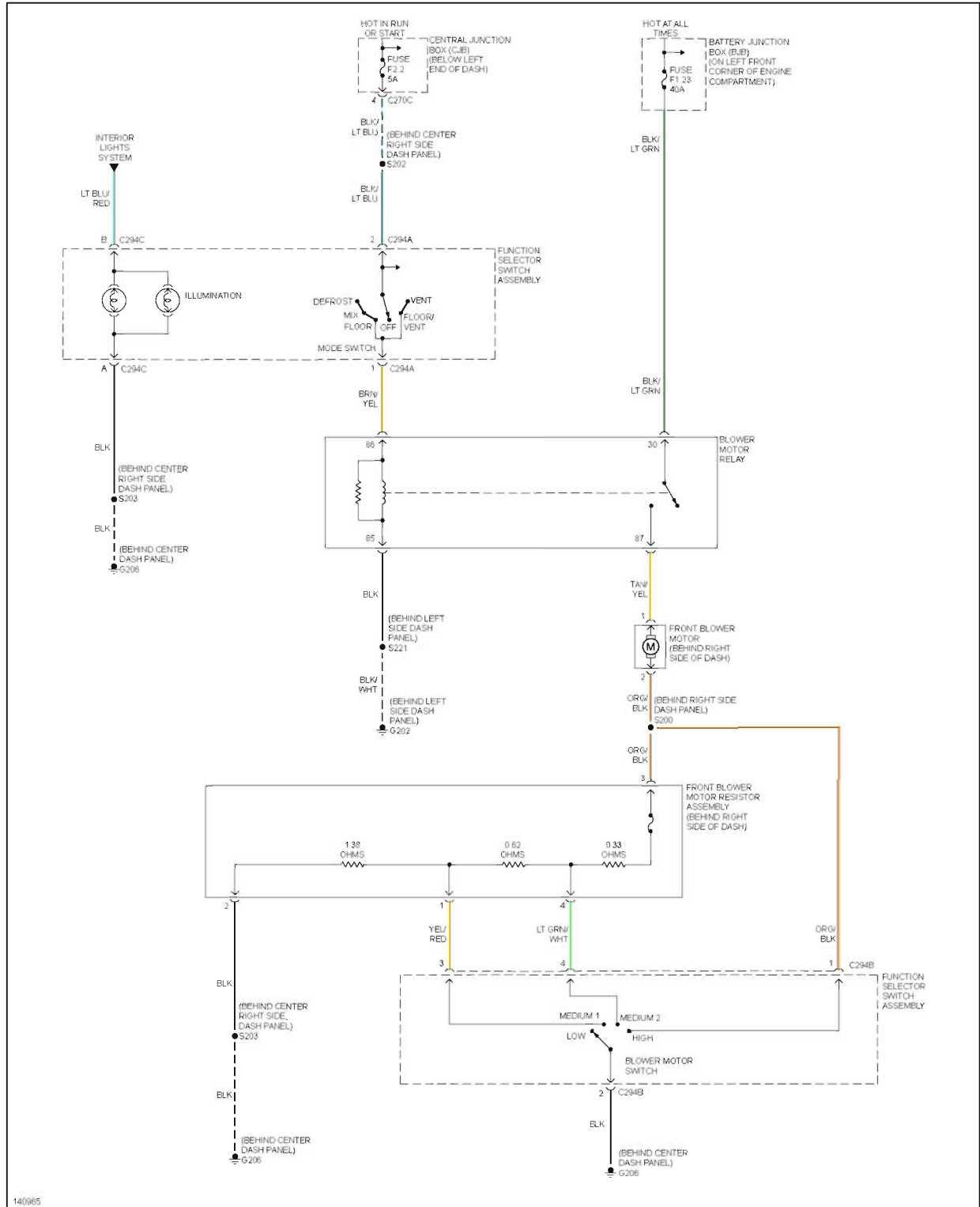


Fig. 6: Heater Circuit

ANTI-LOCK BRAKES

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

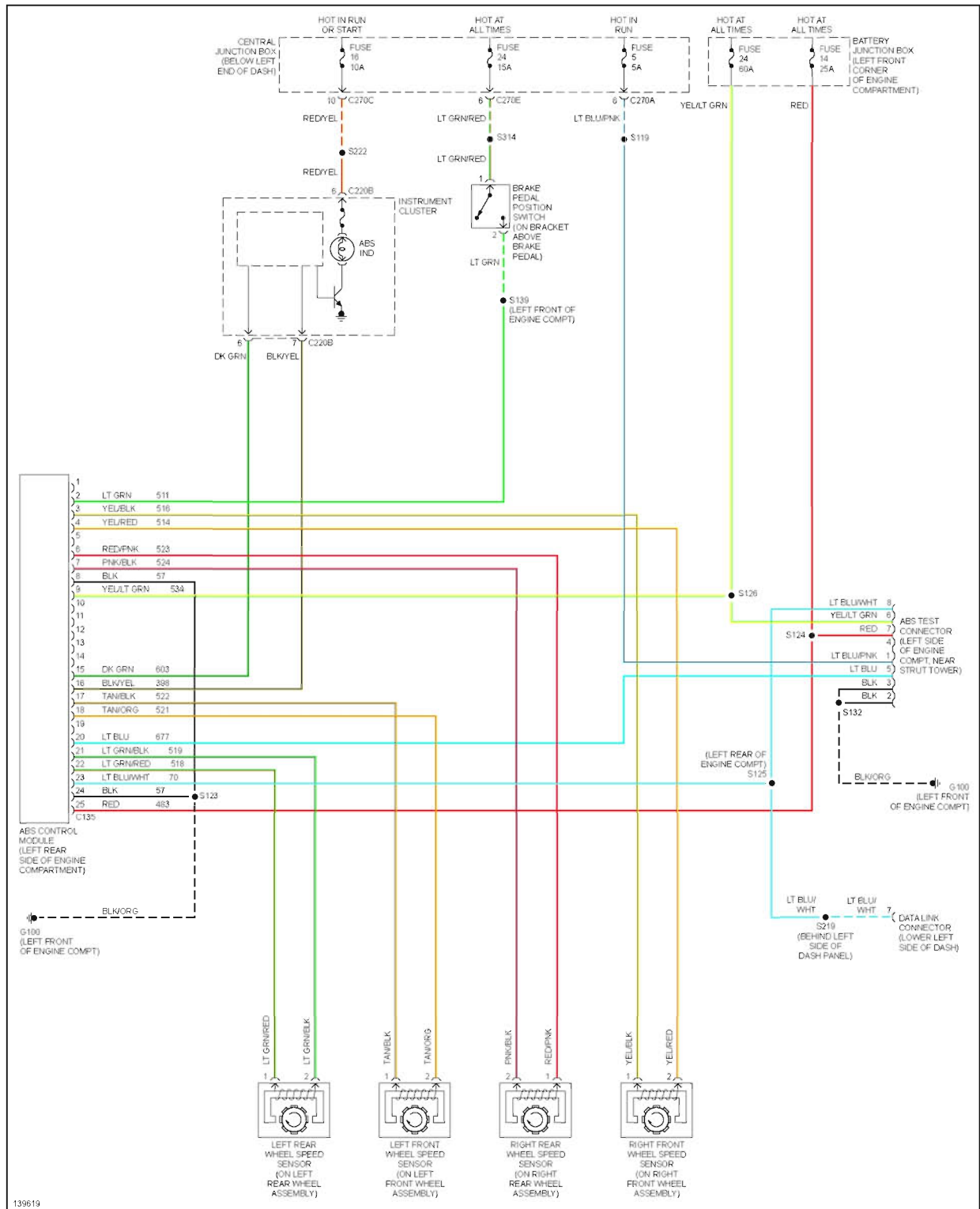


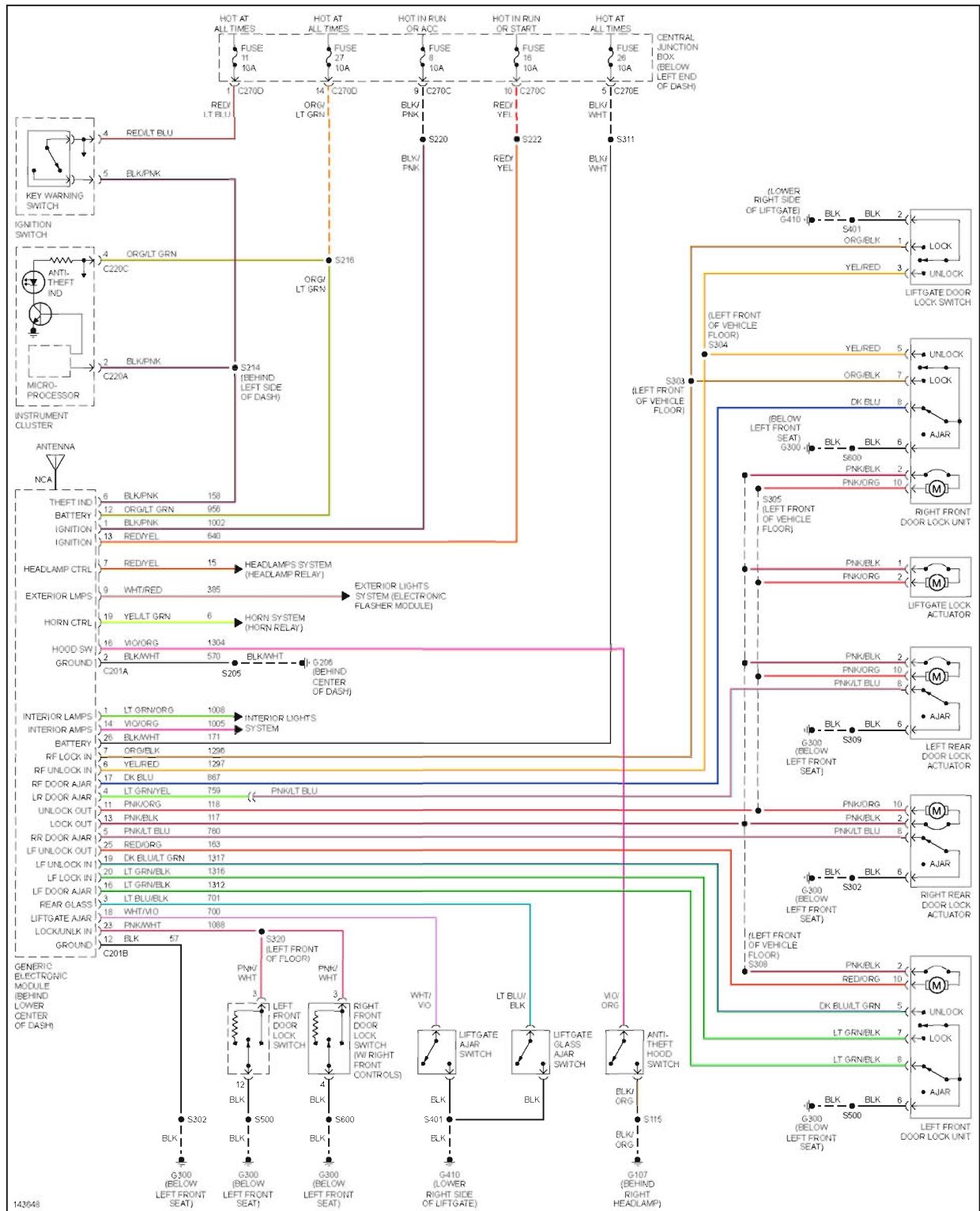
Fig. 7: Anti-lock Brake Circuits

## ANTI-THEFT



## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

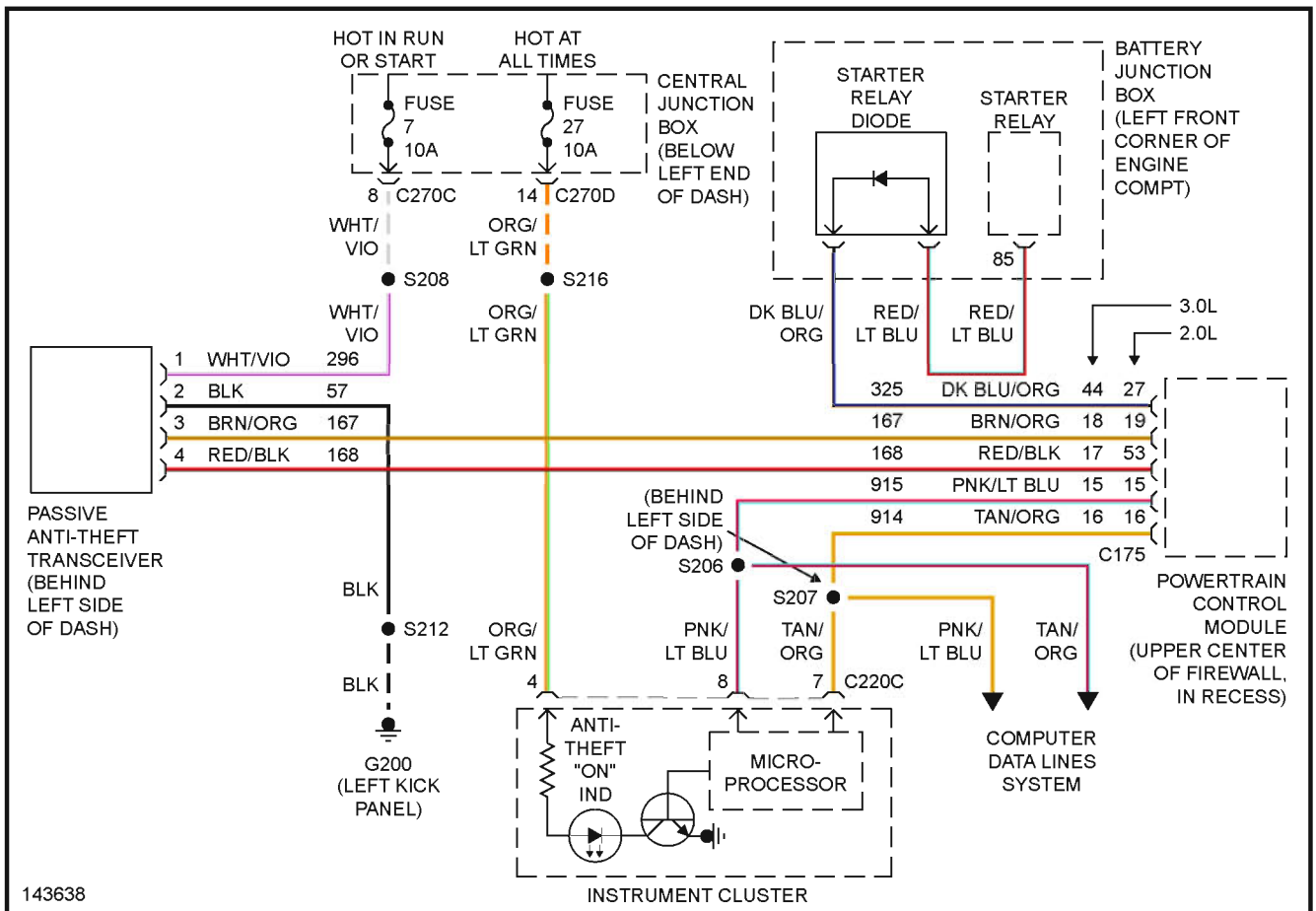


**Fig. 8: Forced Entry Circuit**



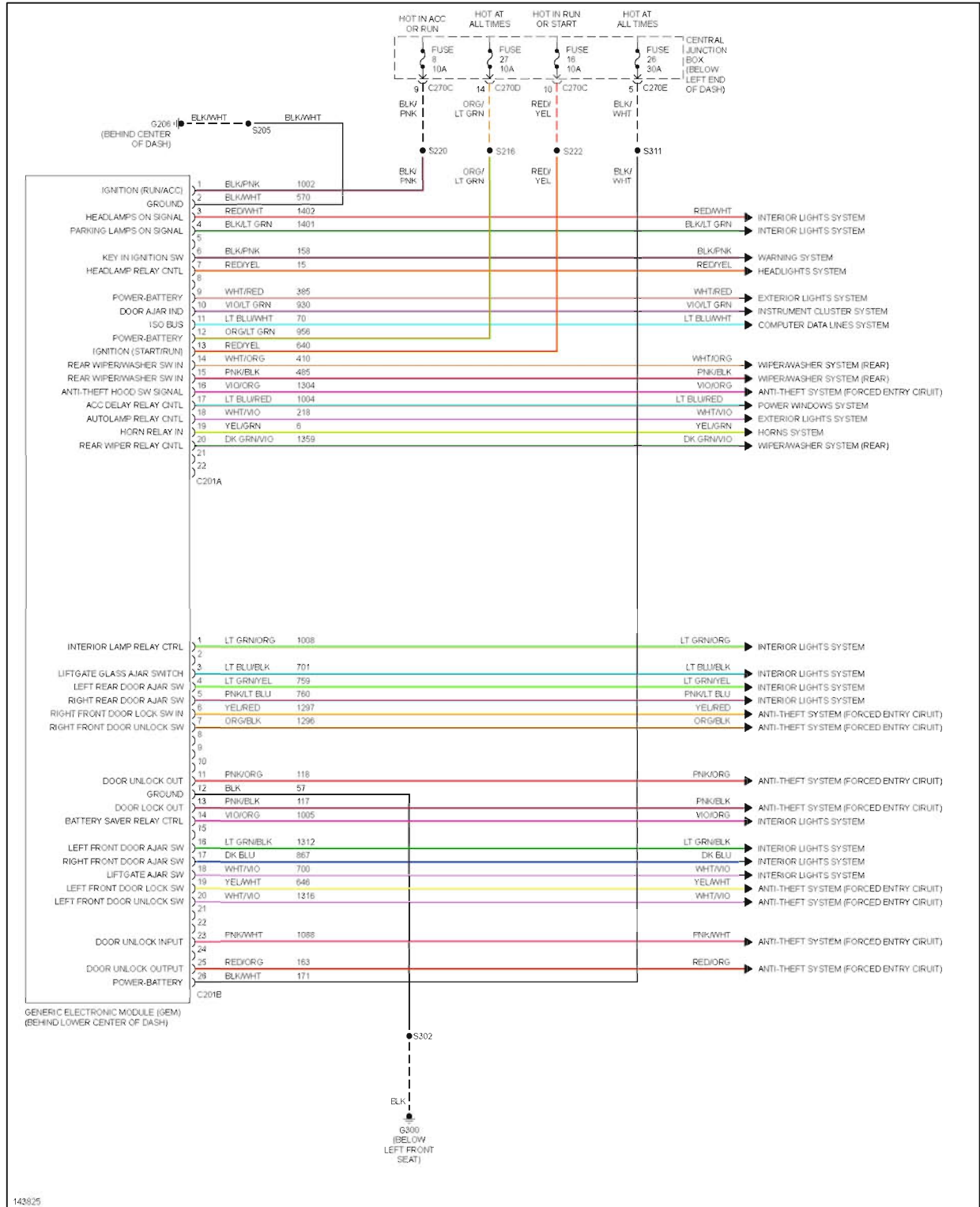
## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



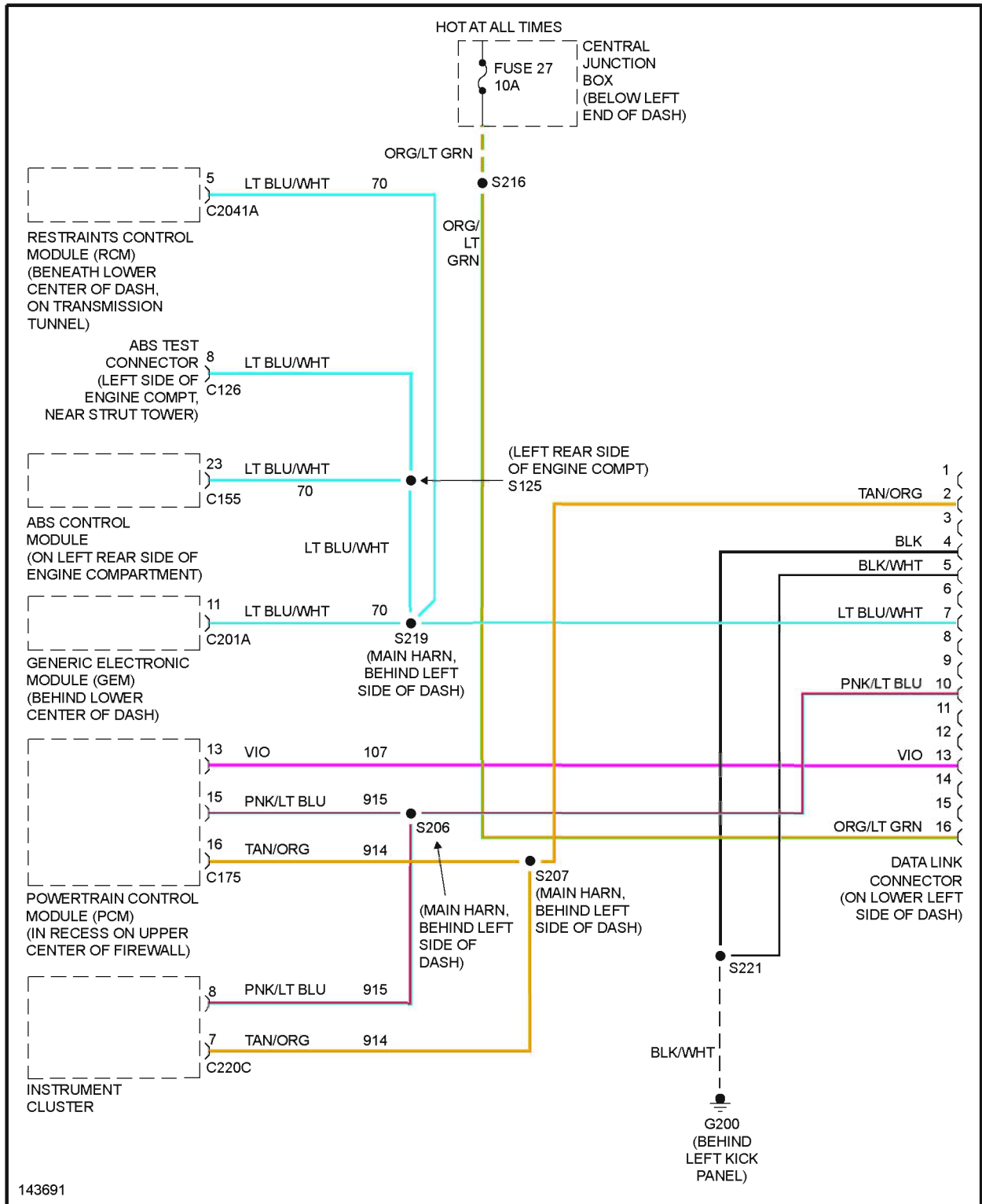
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Fig. 10: Body Computer Circuits

## COMPUTER DATA LINES

# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



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**Fig. 11: Computer Data Lines**

## COOLING FAN

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

2.0L

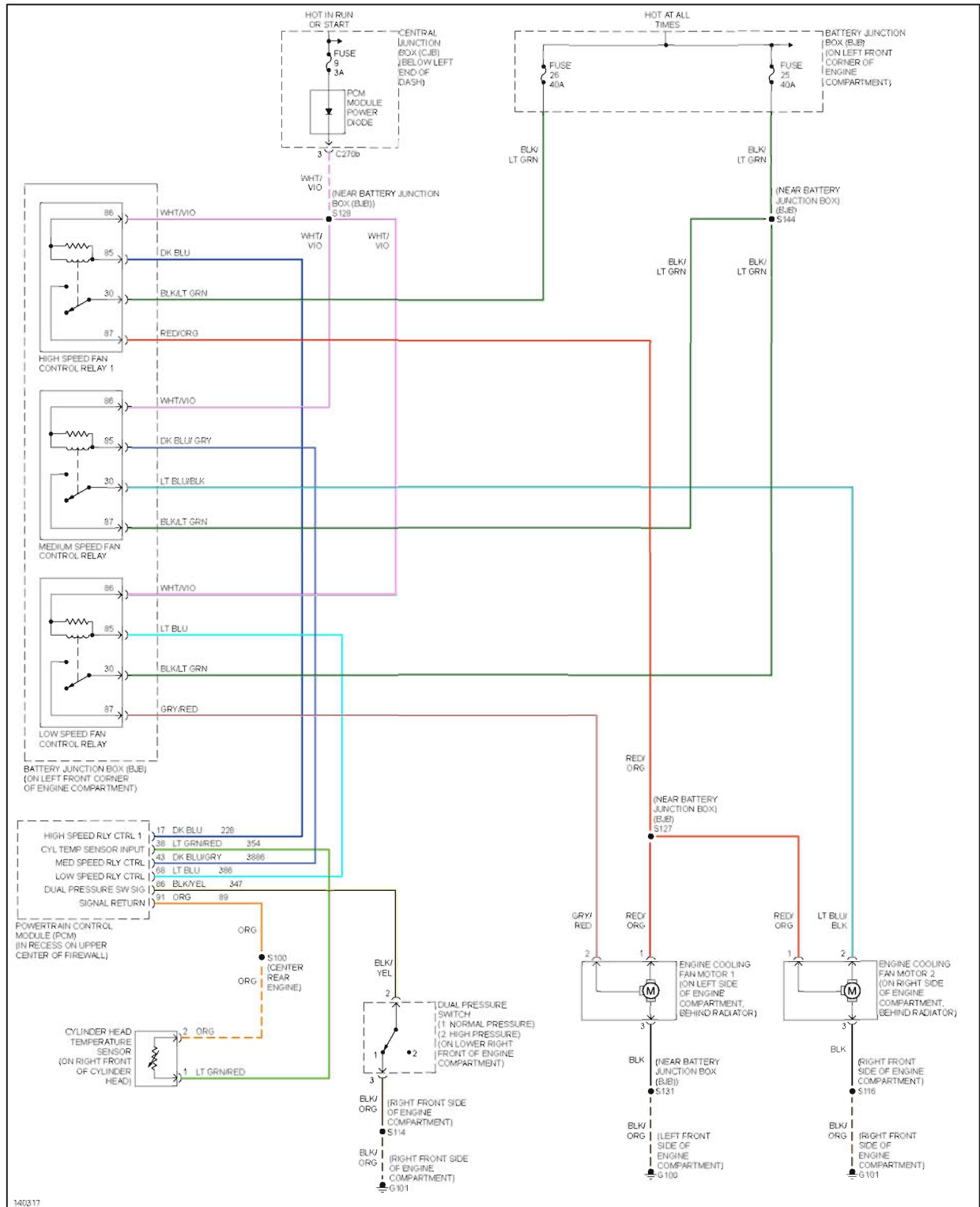
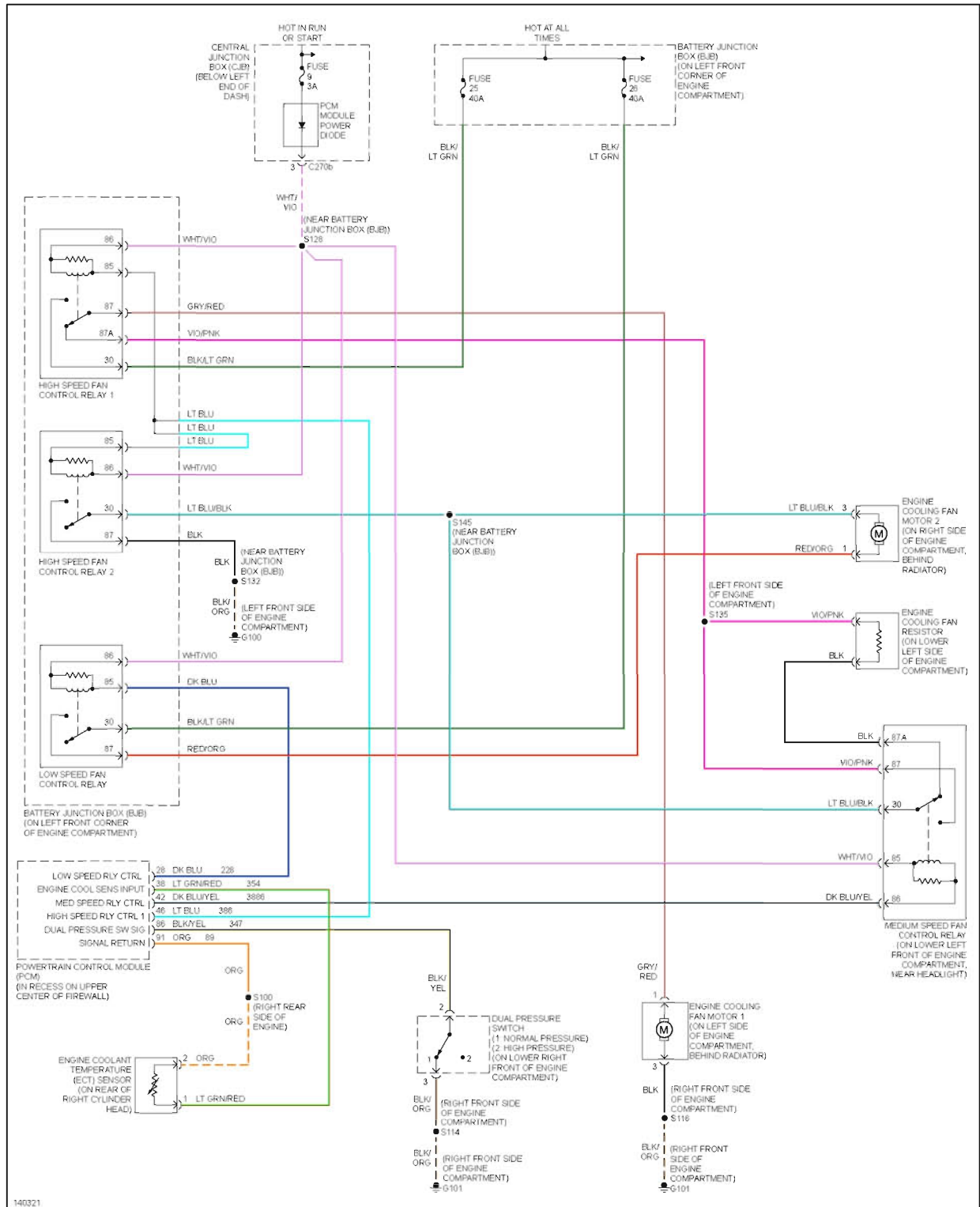


Fig. 12: 2.0L, Cooling Fan Circuit

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

#### 3.0L



**Fig. 13: 3.0L, Cooling Fan Circuit**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

[illegible]

### Fig. 14: Cruise Control Circuit

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# DEFOGGERS

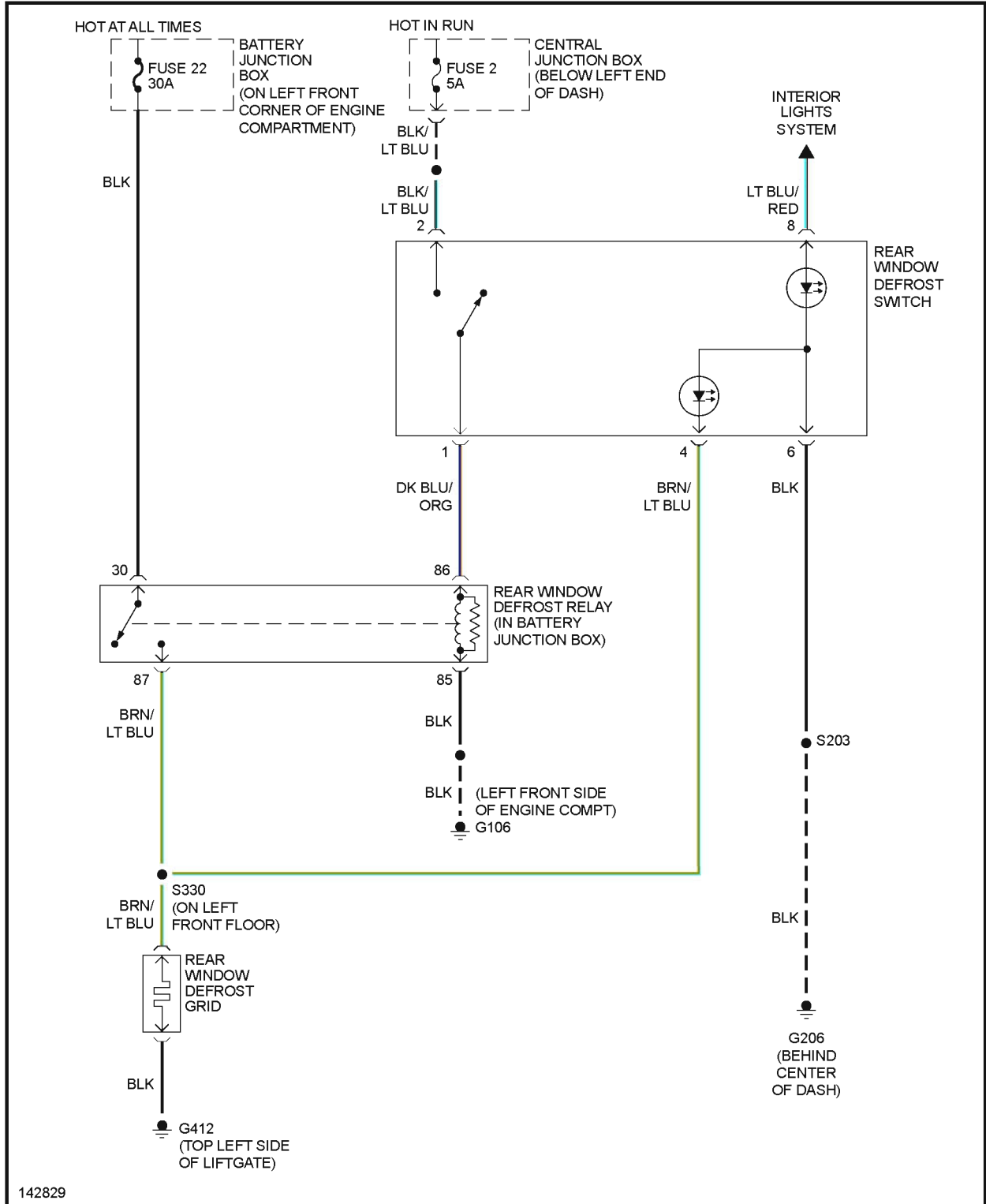
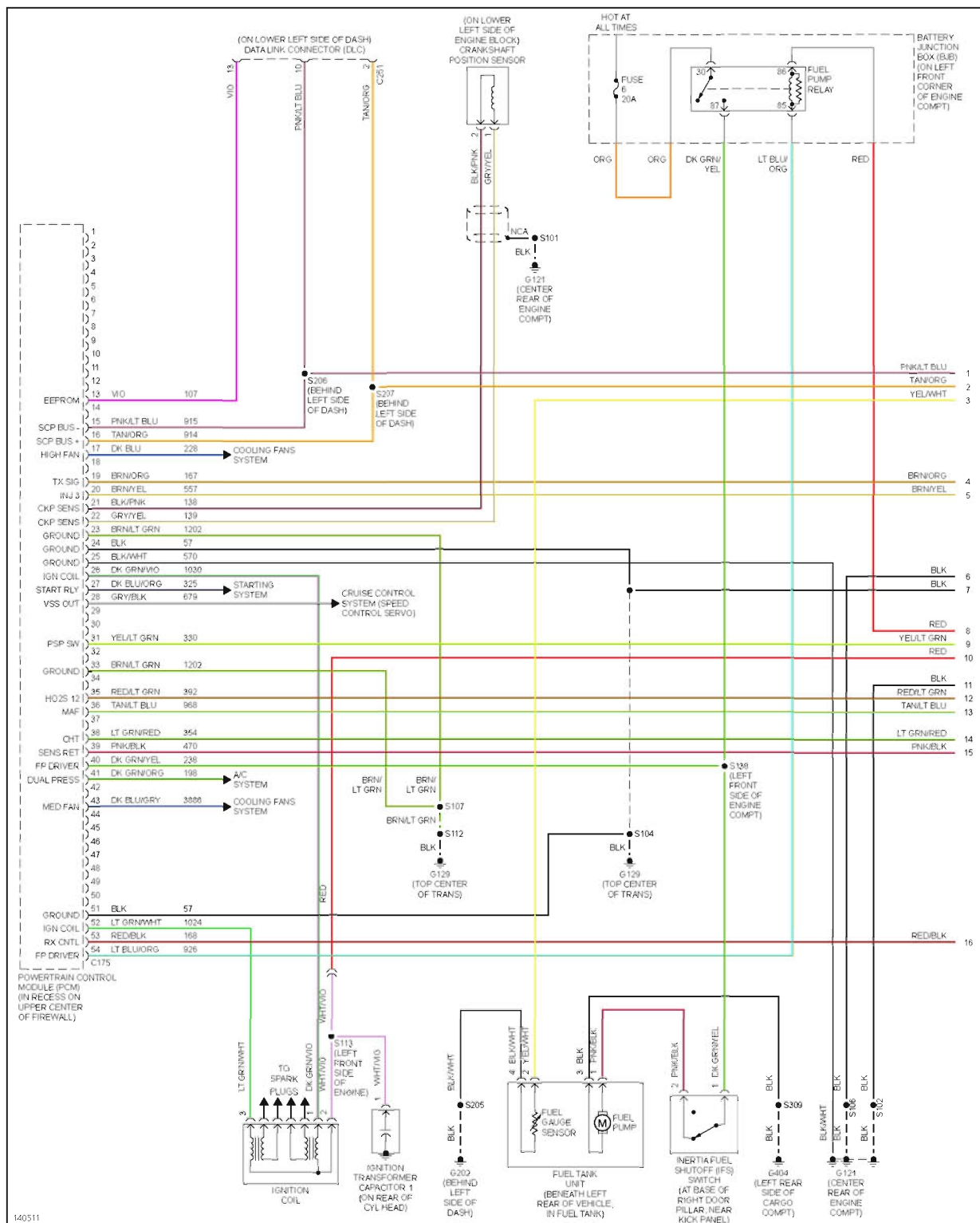


Fig. 15: Defogger Circuit

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

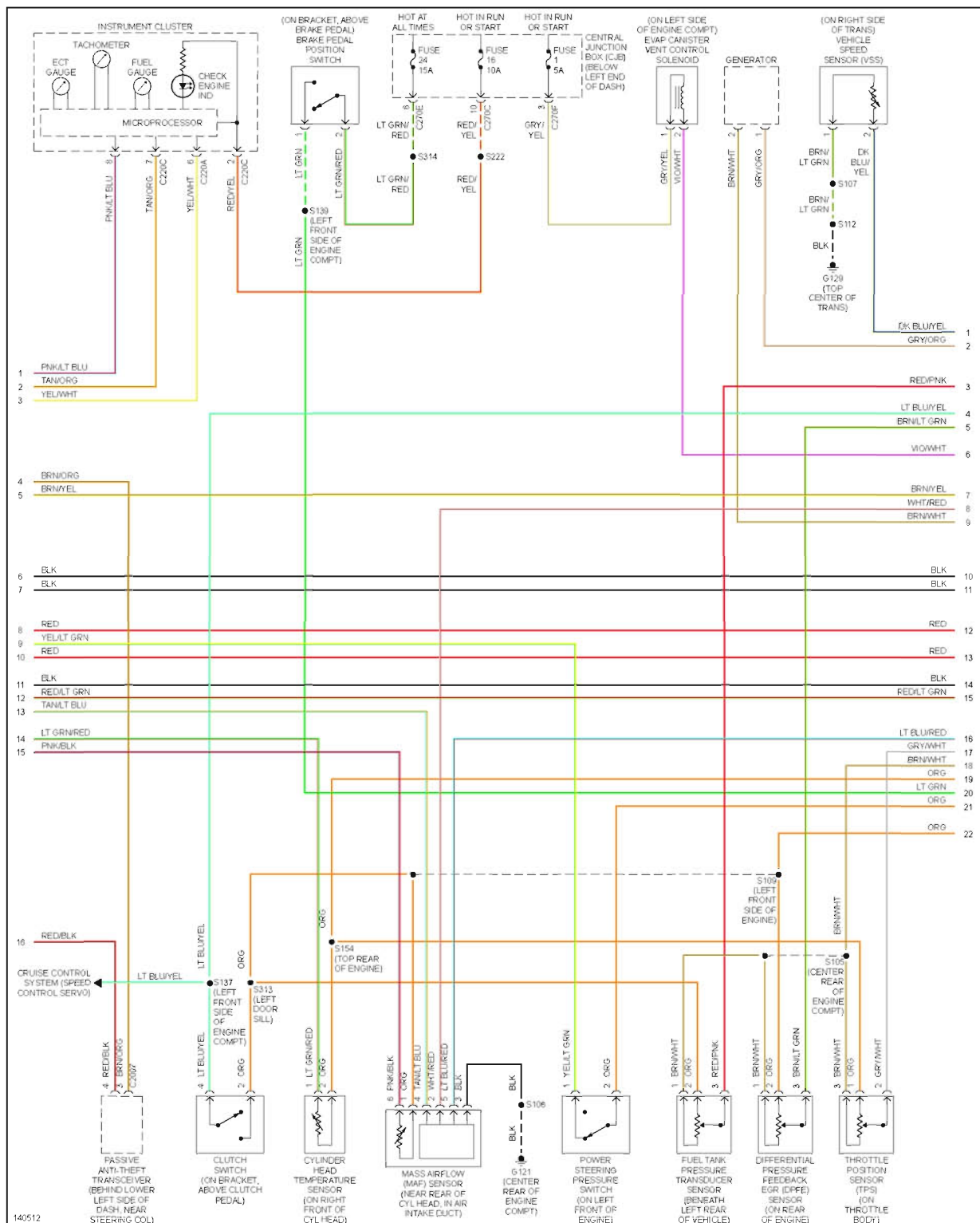
**2.0L**





## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

### **Fig. 17: 2.0L, Engine Performance Circuits (2 of 3)**



# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

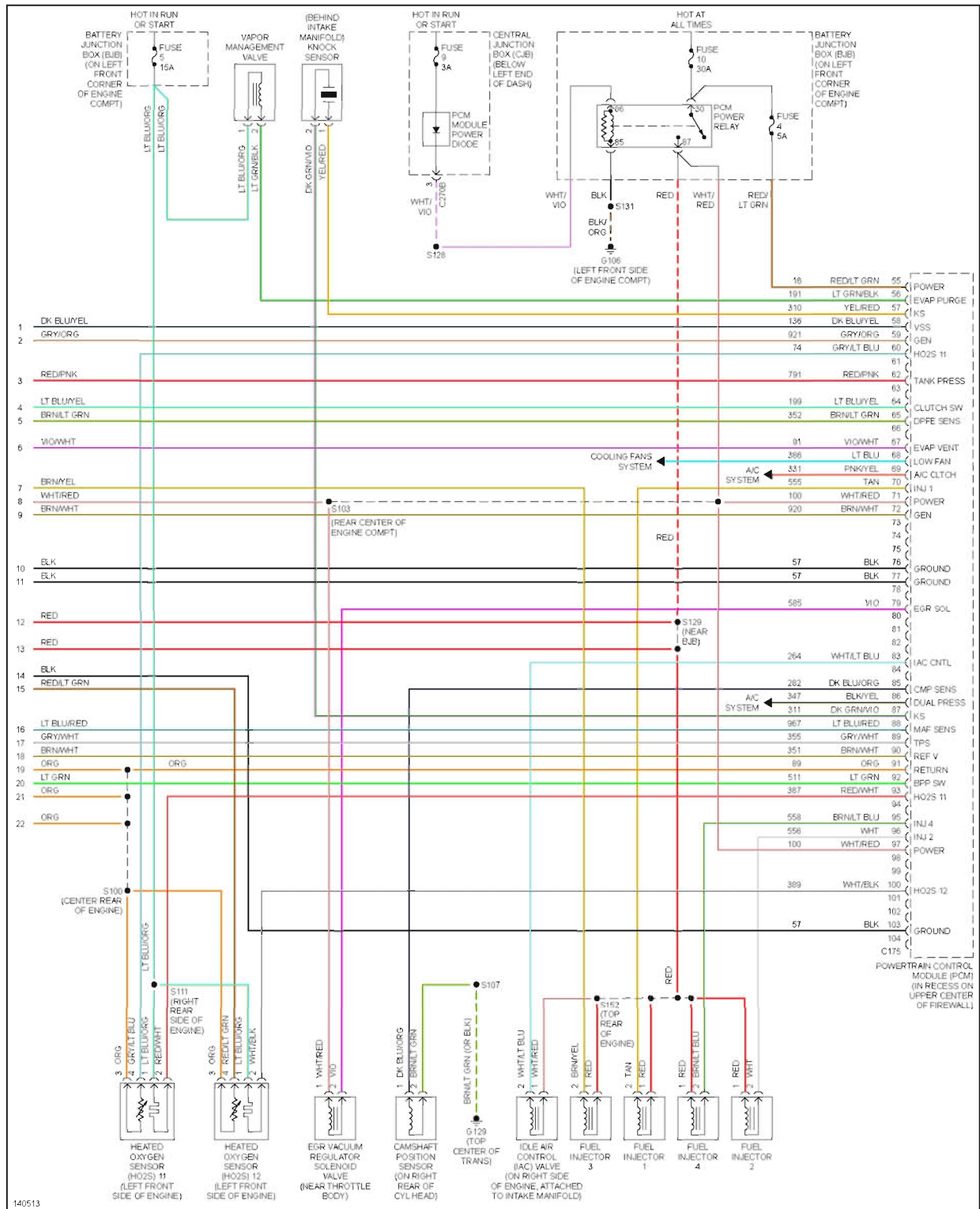


Fig. 18: 2.0L, Engine Performance Circuits (3 of 3)

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



### **Fig. 19: 3.0L, Engine Performance Circuits (1 of 4)**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



### **Fig. 20: 3.0L, Engine Performance Circuits (2 of 4)**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



### **Fig. 21: 3.0L, Engine Performance Circuits (3 of 4)**



# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

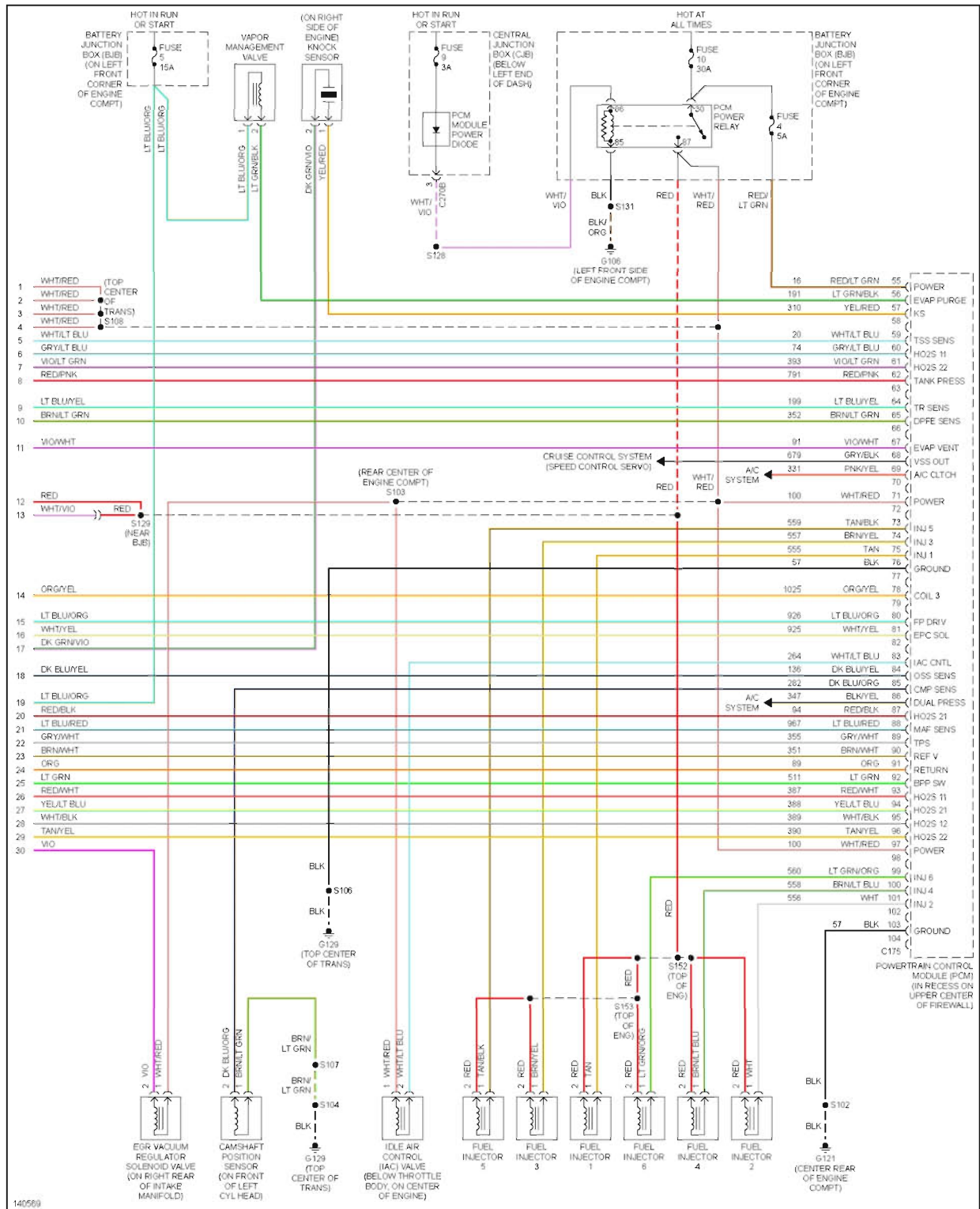
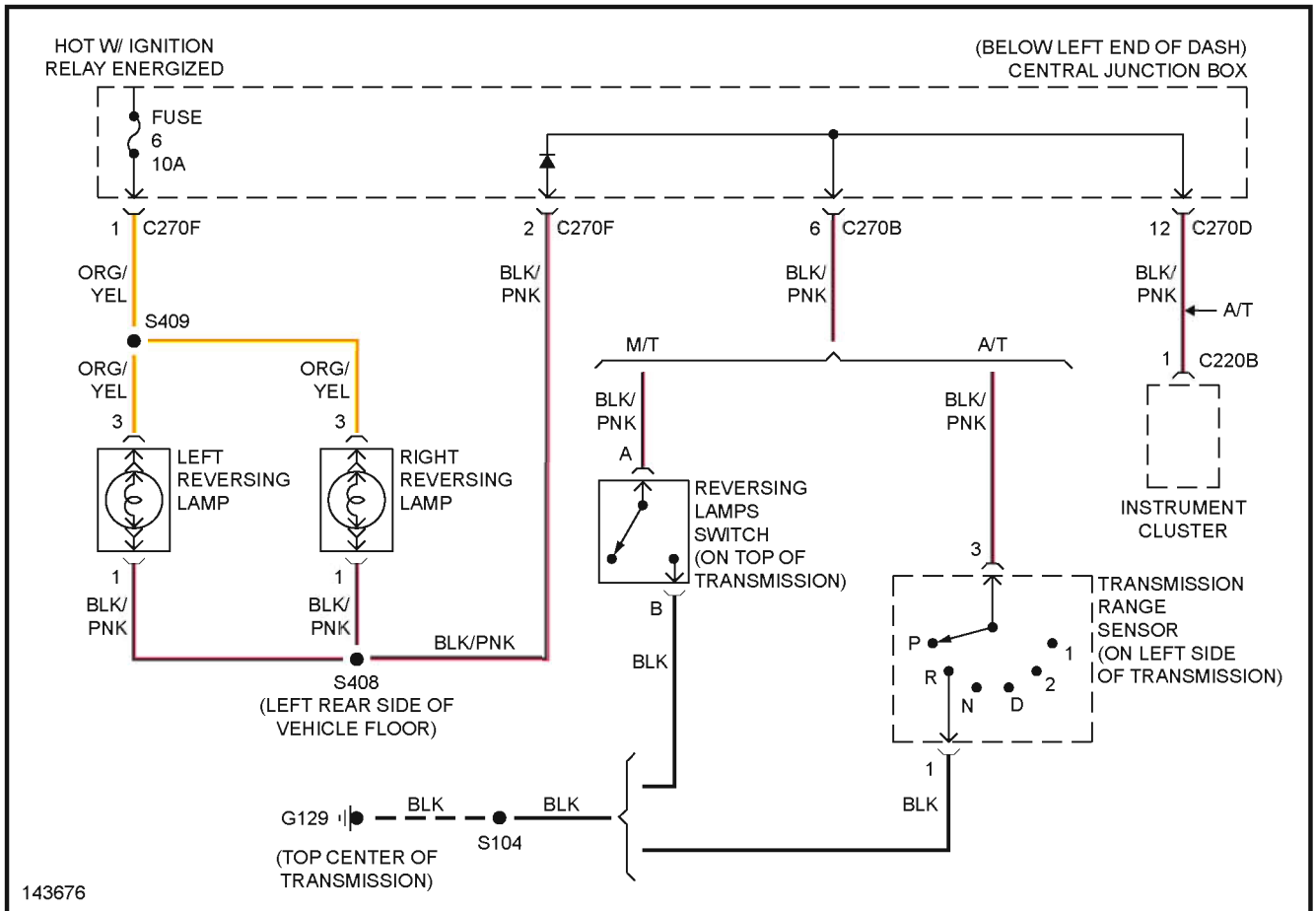


Fig. 22: 3.0L, Engine Performance Circuits (4 of 4)

## EXTERIOR LIGHTS

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 23: Back-up Lamps Circuit**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



## GROUND DISTRIBUTION



## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

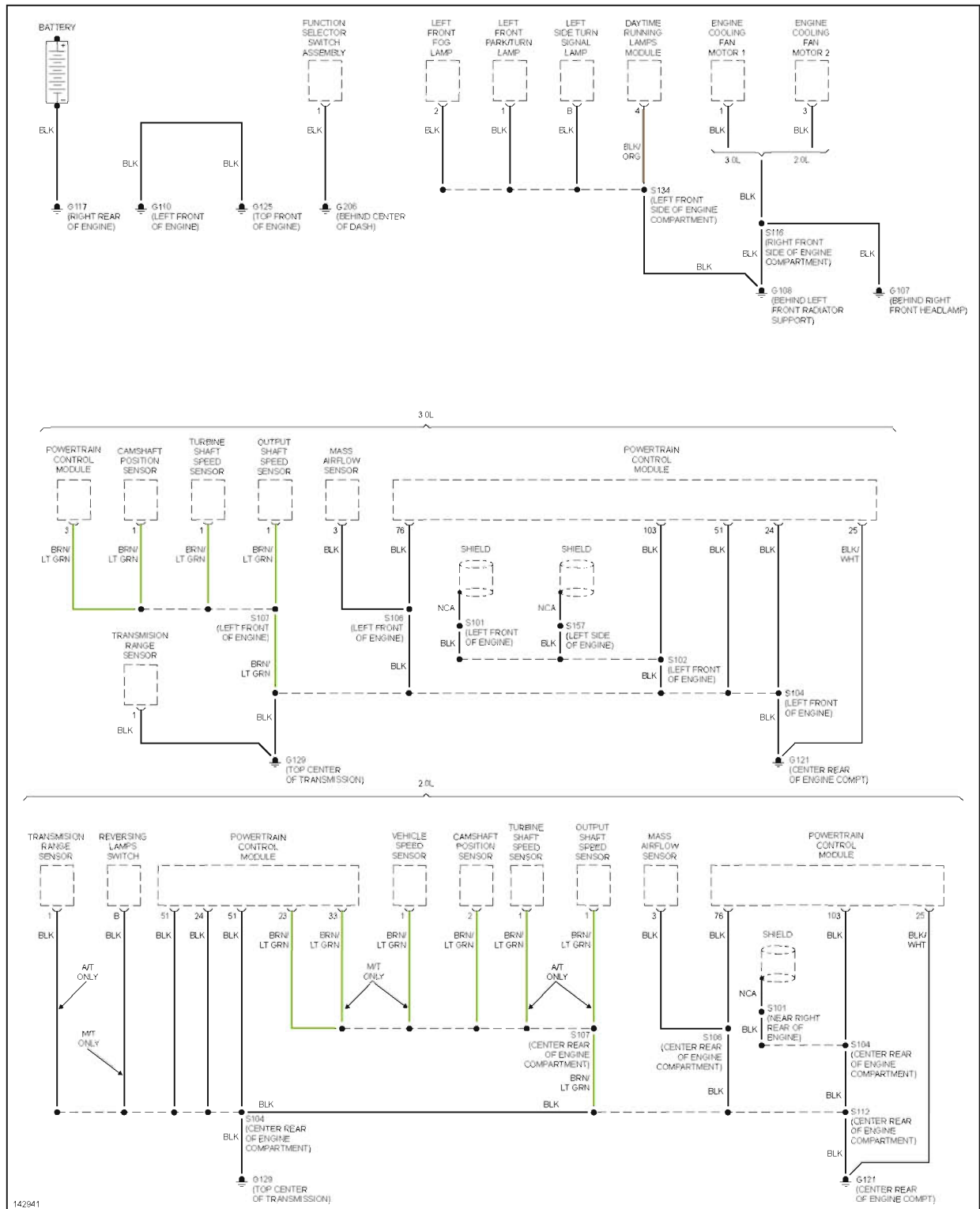
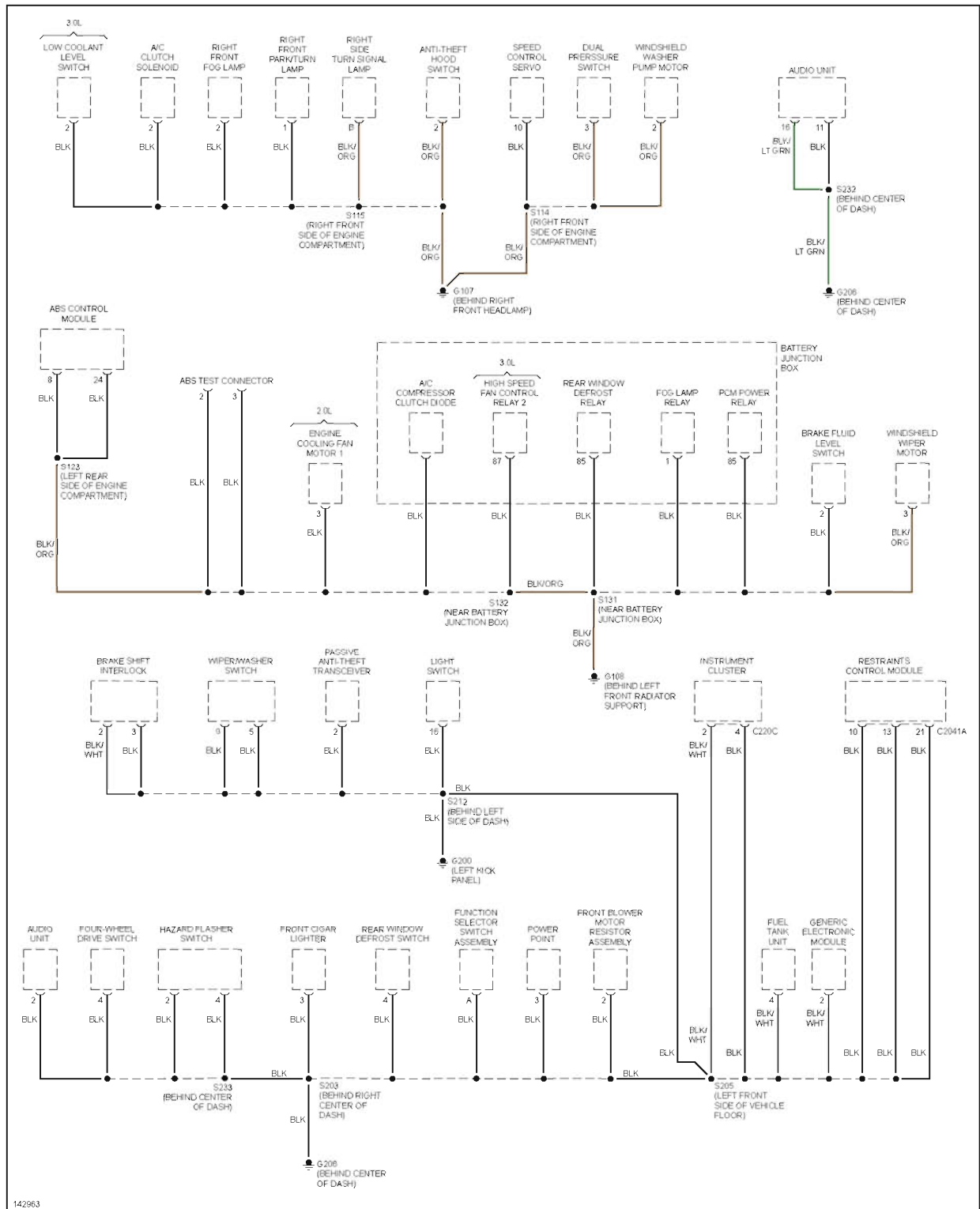


Fig. 25: Ground Distribution Circuit (1 of 3)

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 26: Ground Distribution Circuit (2 of 3)**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

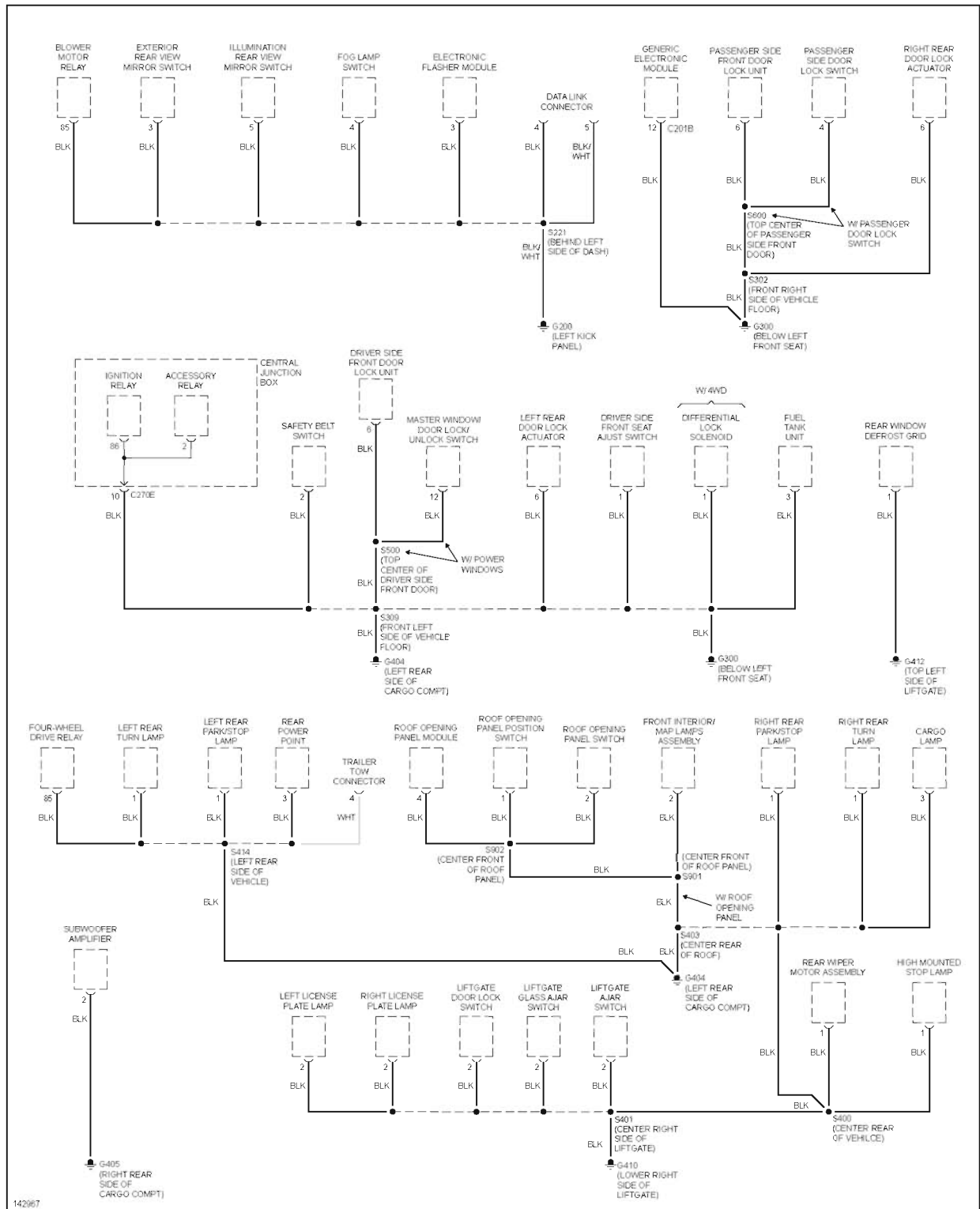
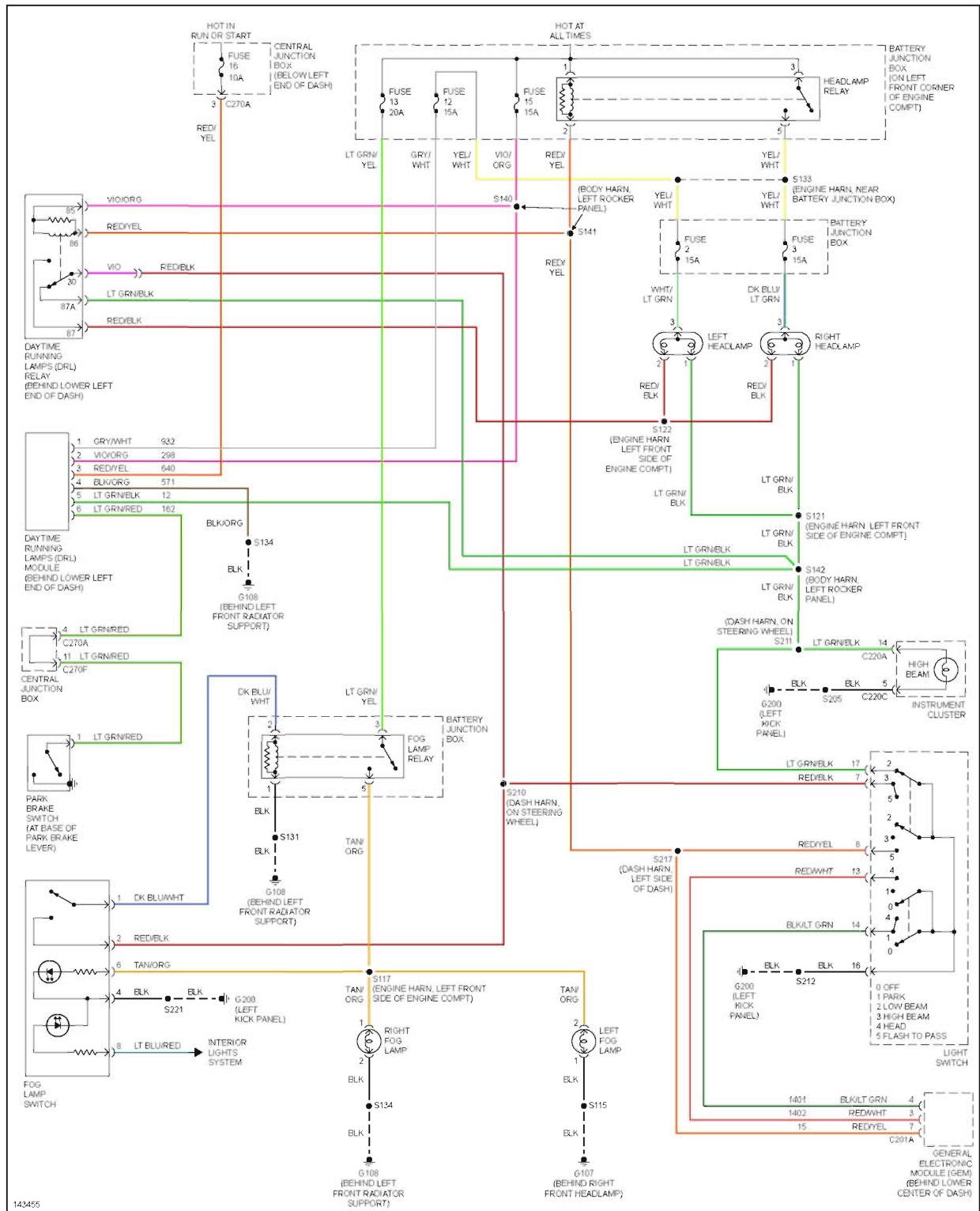


Fig. 27: Ground Distribution Circuit (3 of 3)

## HEADLIGHTS

# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 28: Headlight Circuit, W/ DRL**

# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

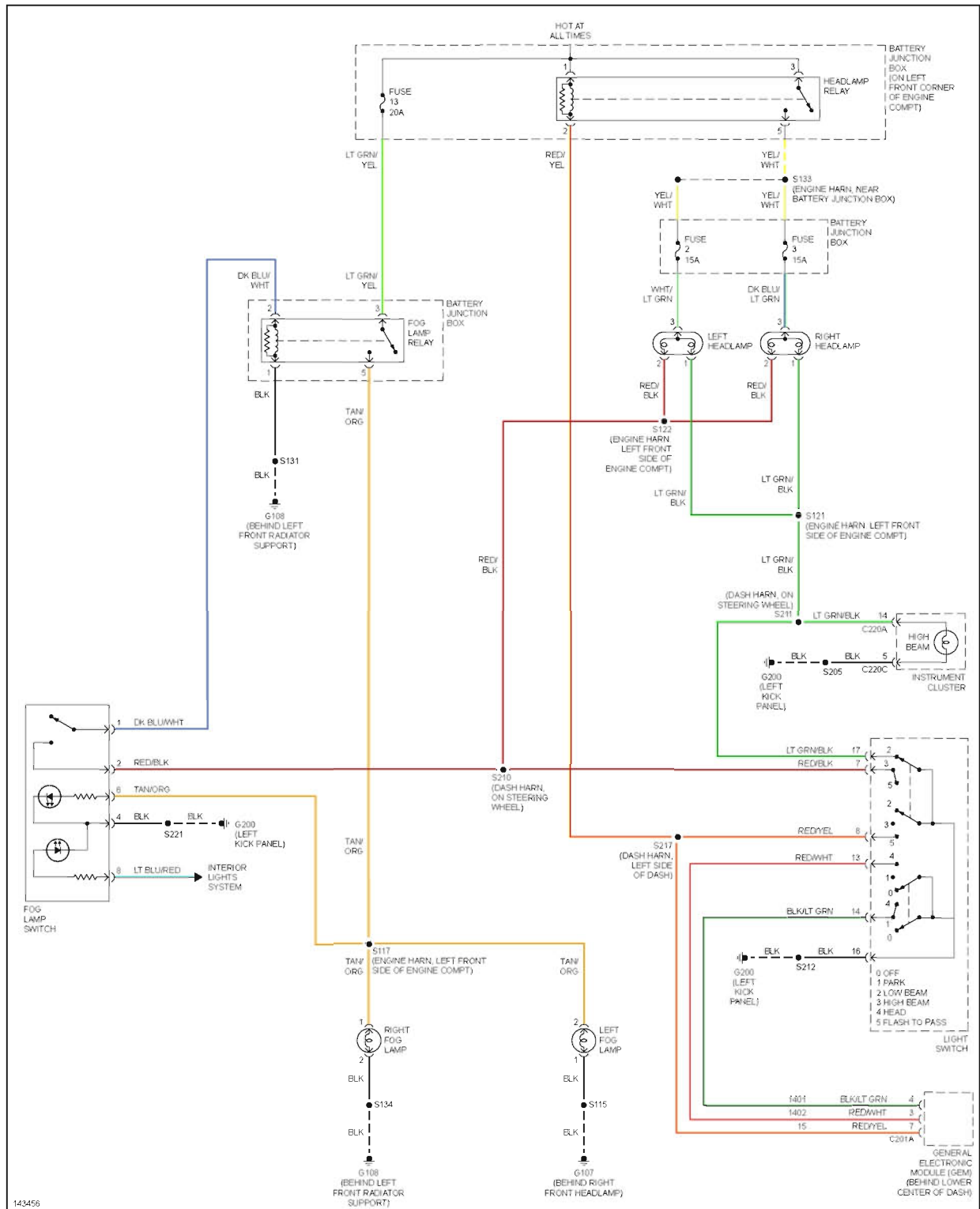


Fig. 29: Headlight Circuit, W/O DRL

HORN

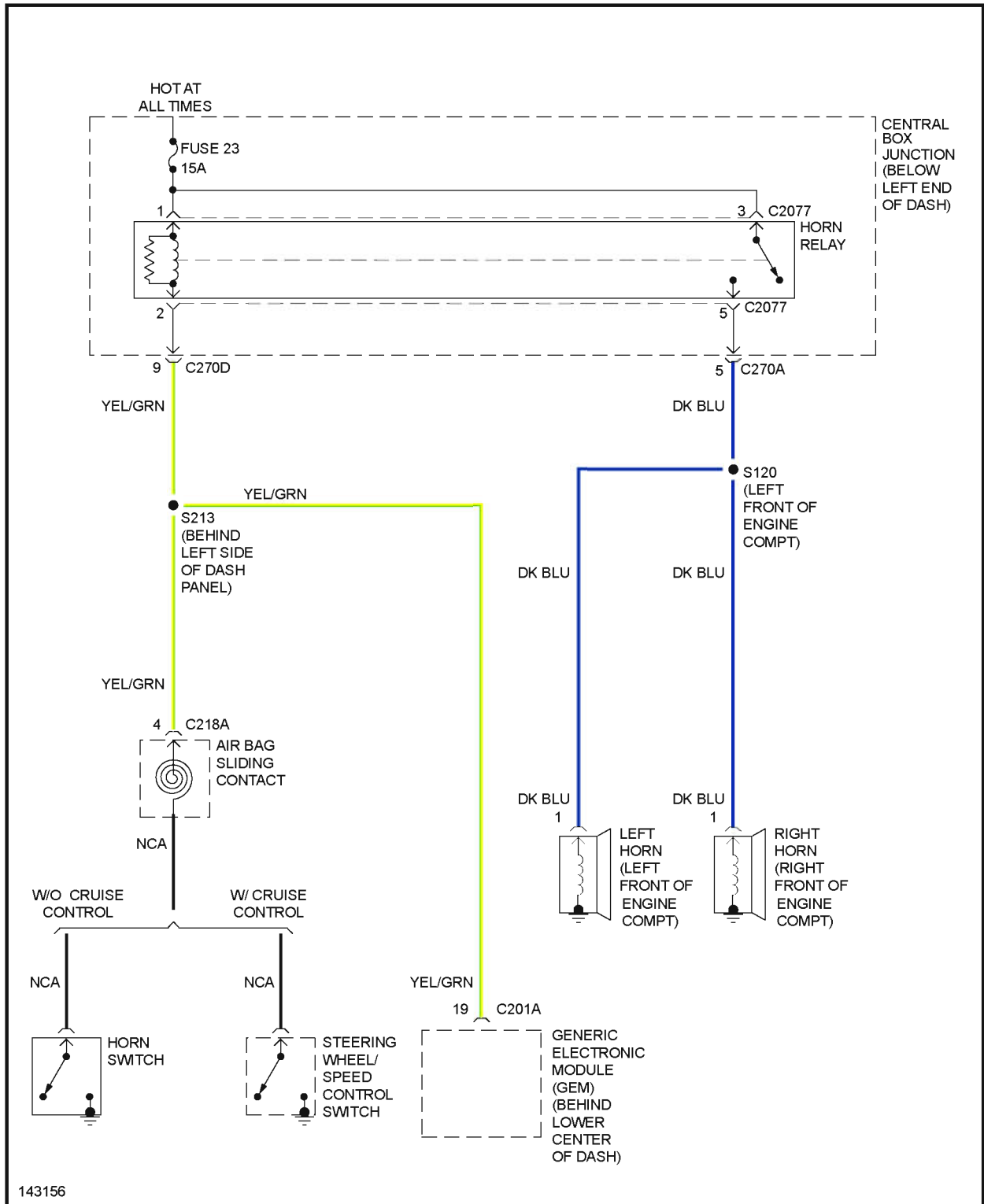


Fig. 30: Horn Circuit

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

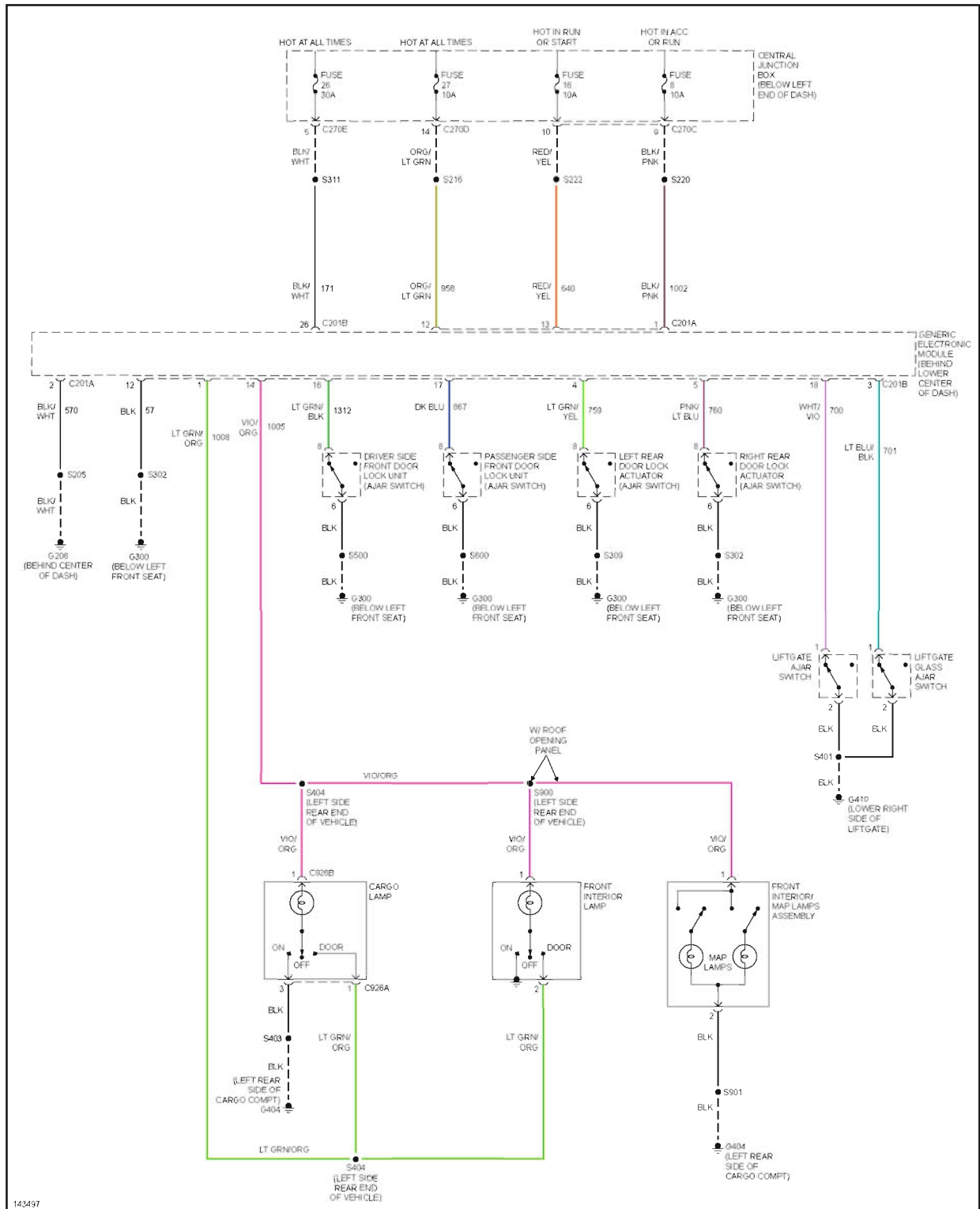


## INTERIOR LIGHTS



## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



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**Fig. 32: Courtesy Lamps Circuit**



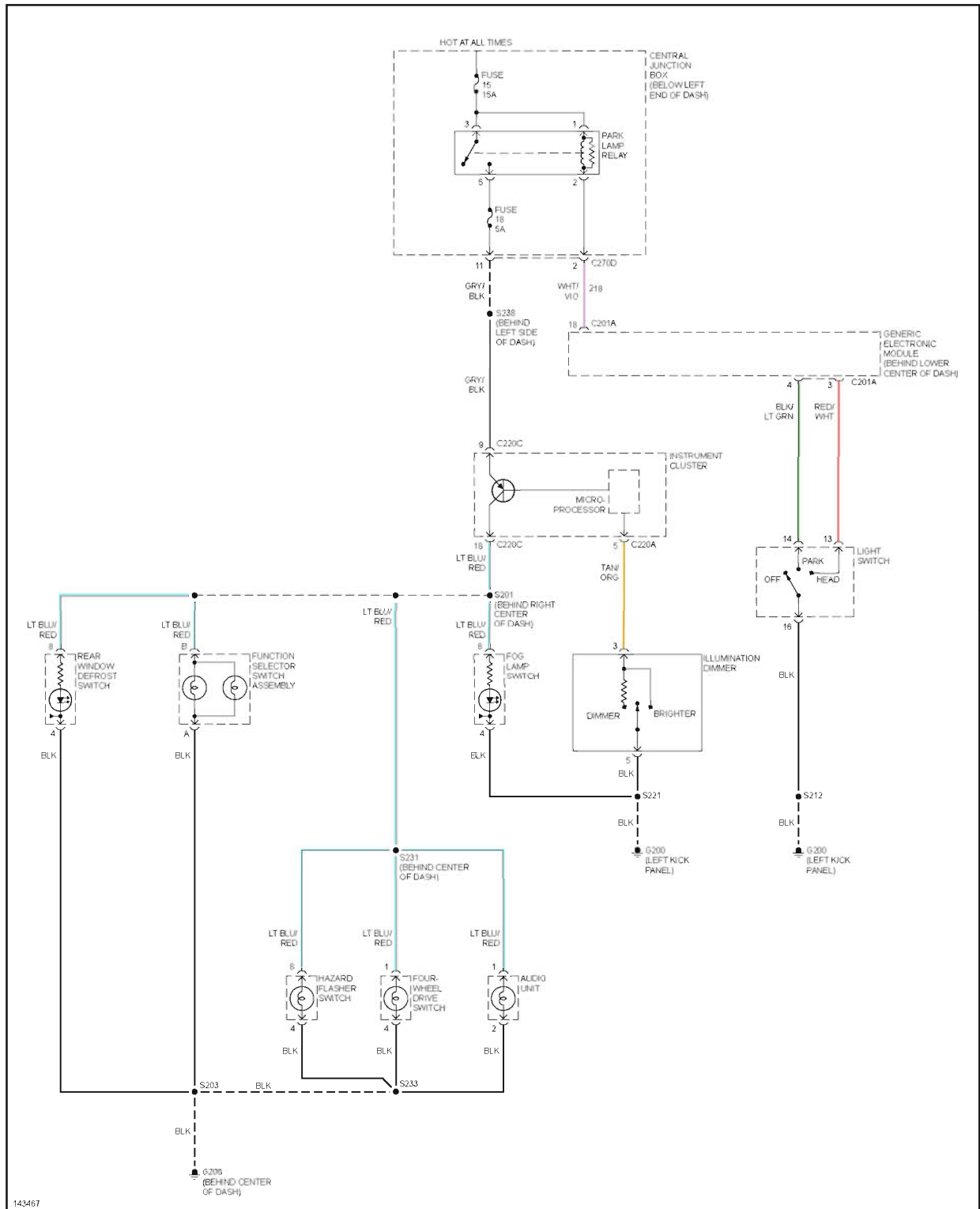


Fig. 33: Instrument Illumination Circuit

## POWER DISTRIBUTION

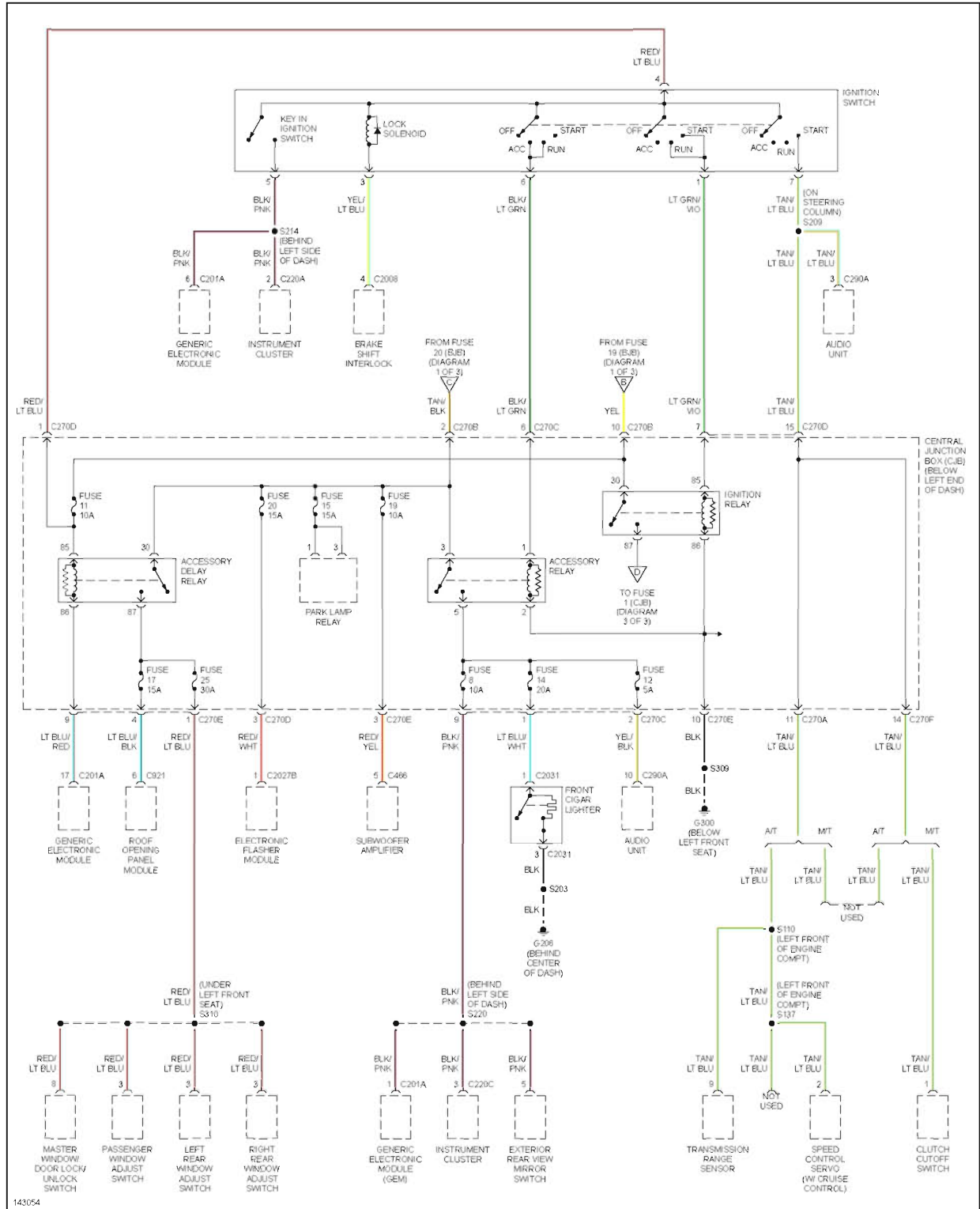
## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



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## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



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**Fig. 35: Power Distribution Circuit (2 of 3)**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

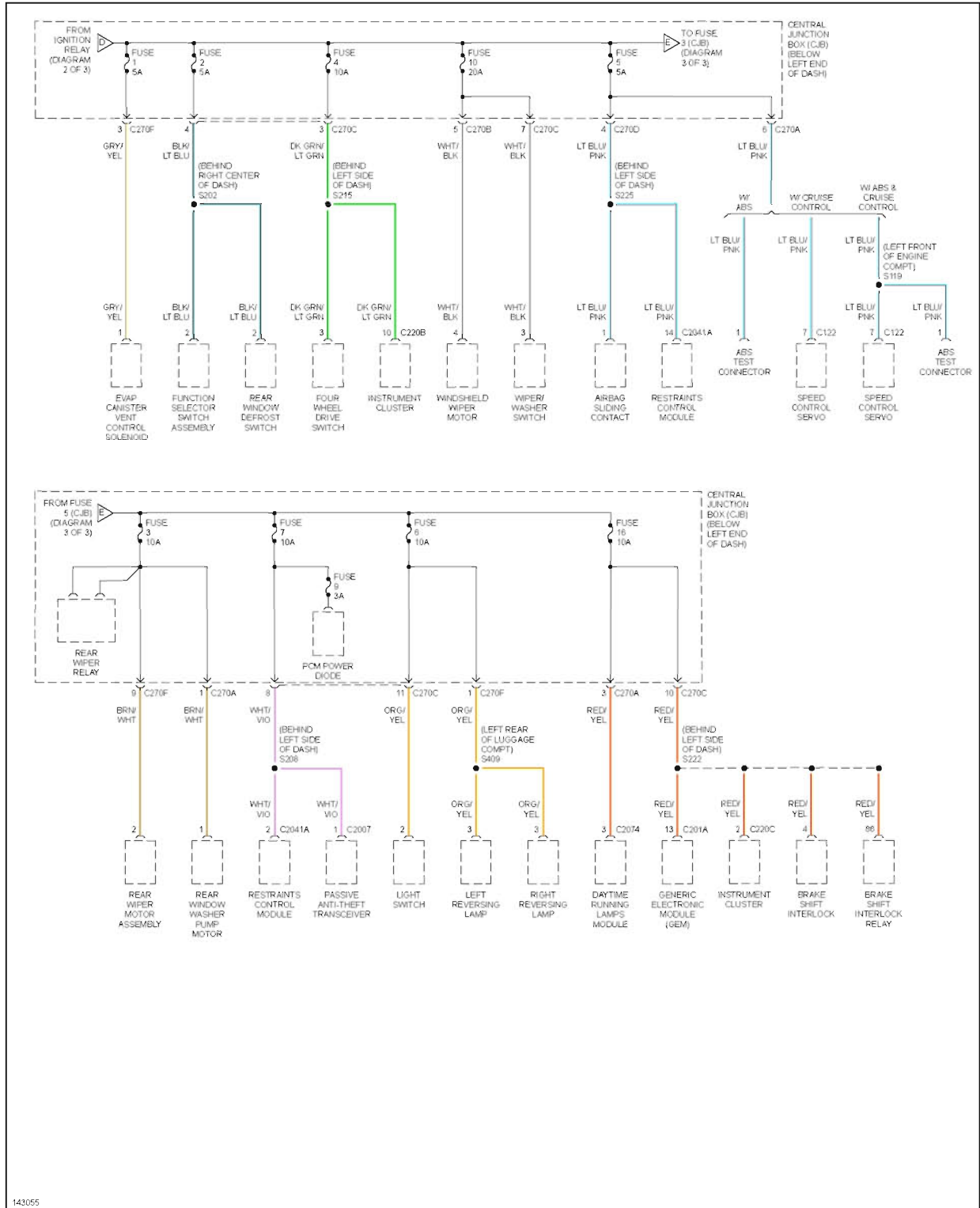


Fig. 36: Power Distribution Circuit (3 of 3)

## POWER DOOR LOCKS

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

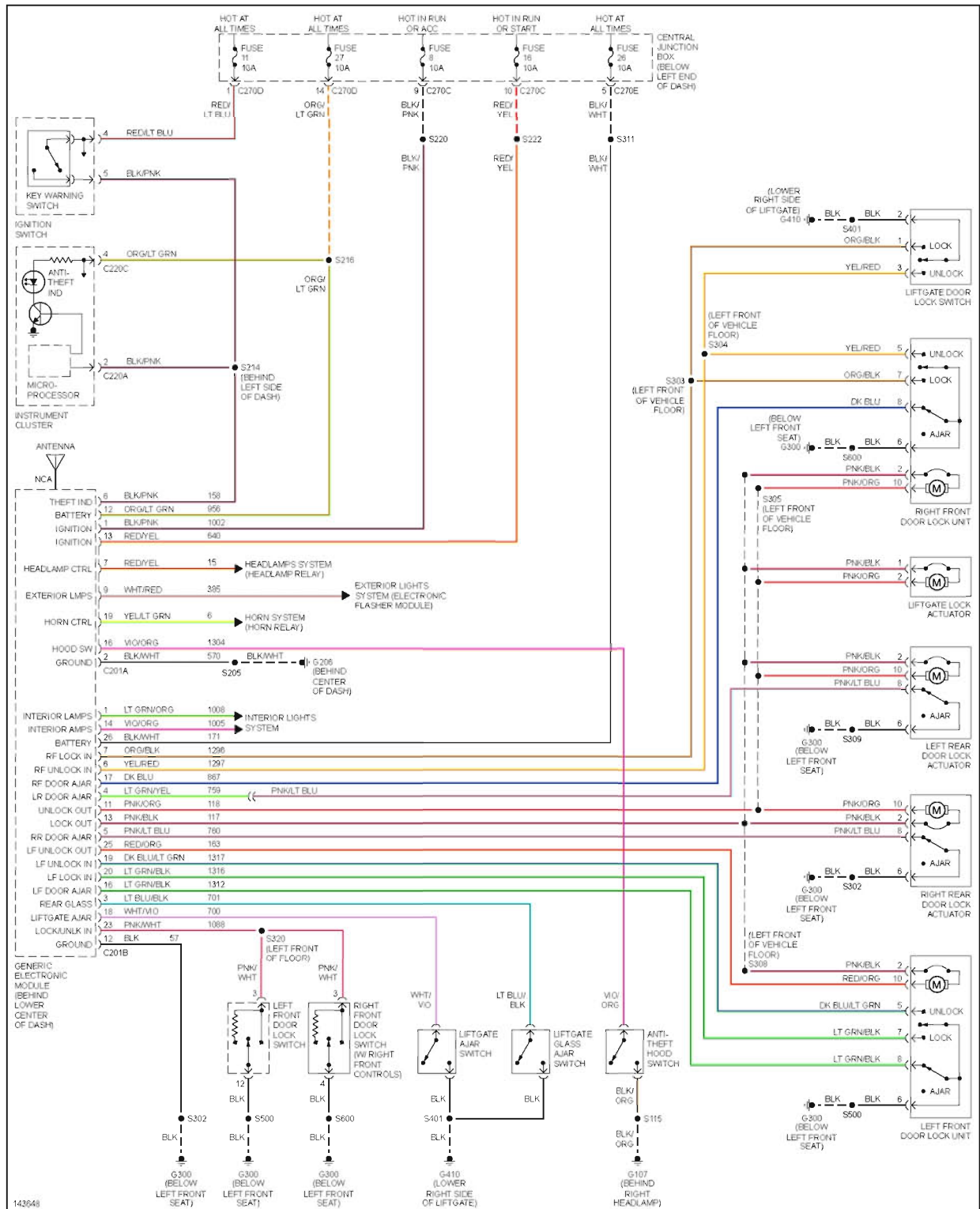


Fig. 37: Power Door Lock Circuit

## POWER MIRRORS

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

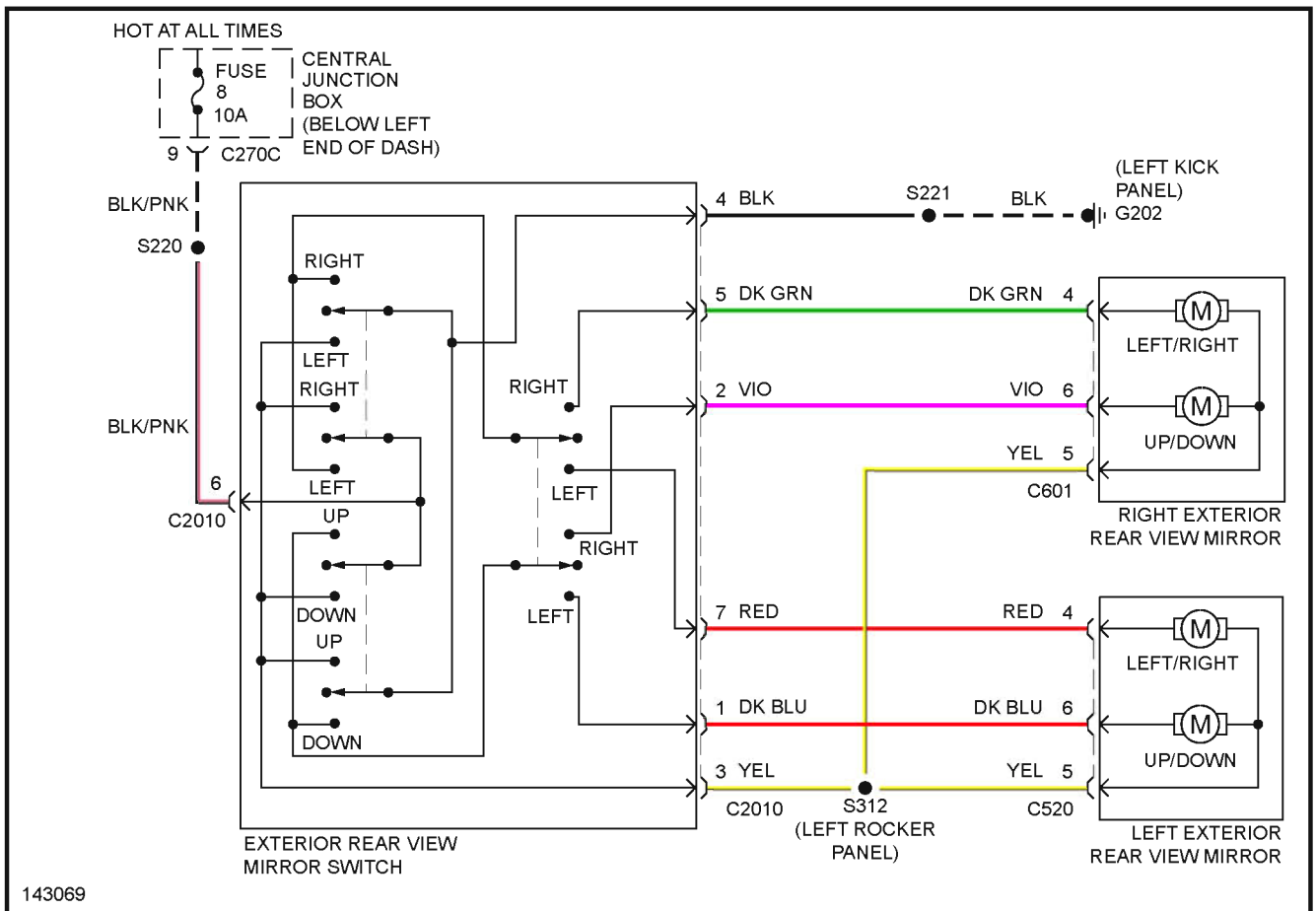
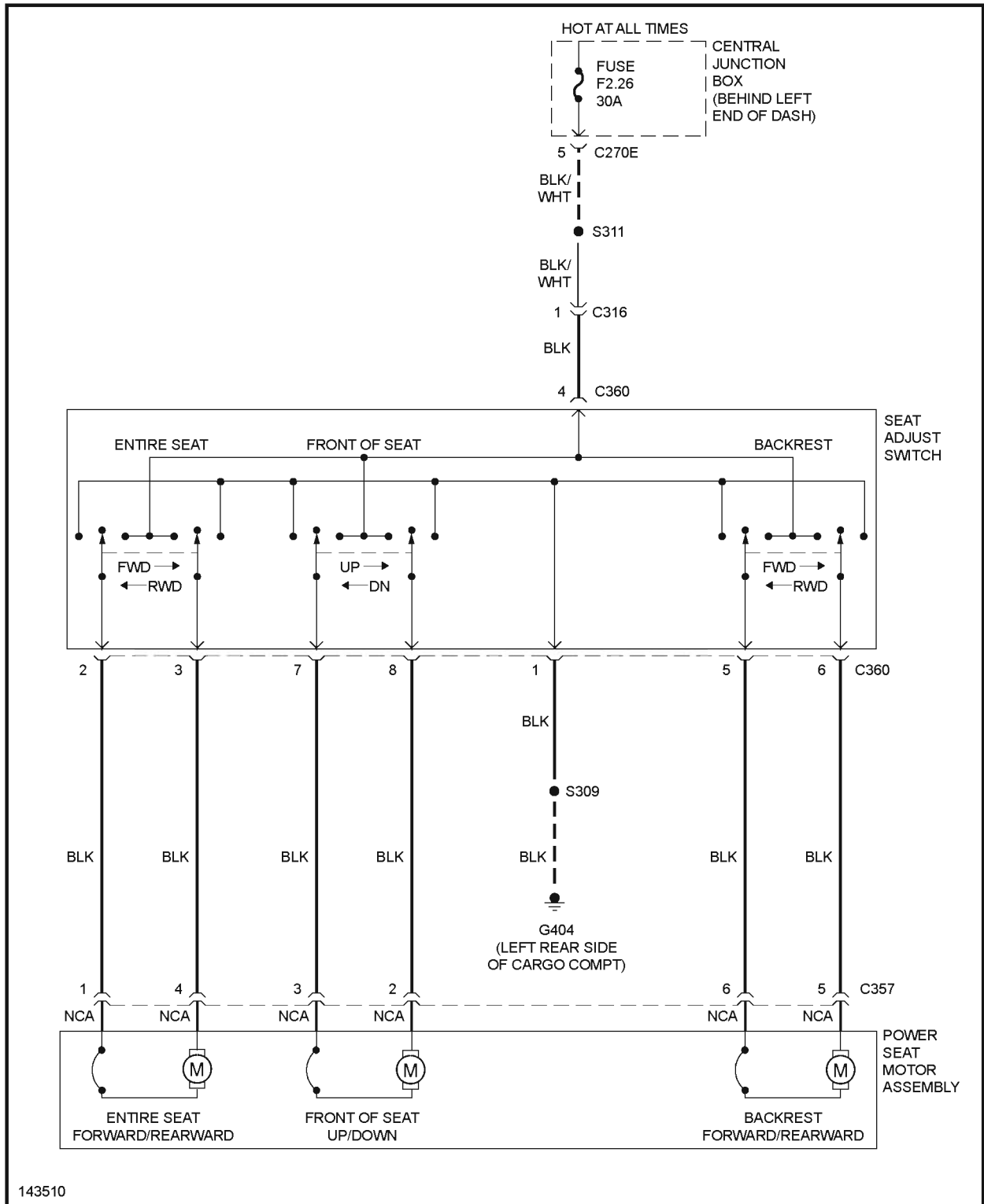


Fig. 38: Power Mirror Circuit

## POWER SEATS

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 39: 6-Way Power Seat Circuit**

**POWER TOP/SUNROOF**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

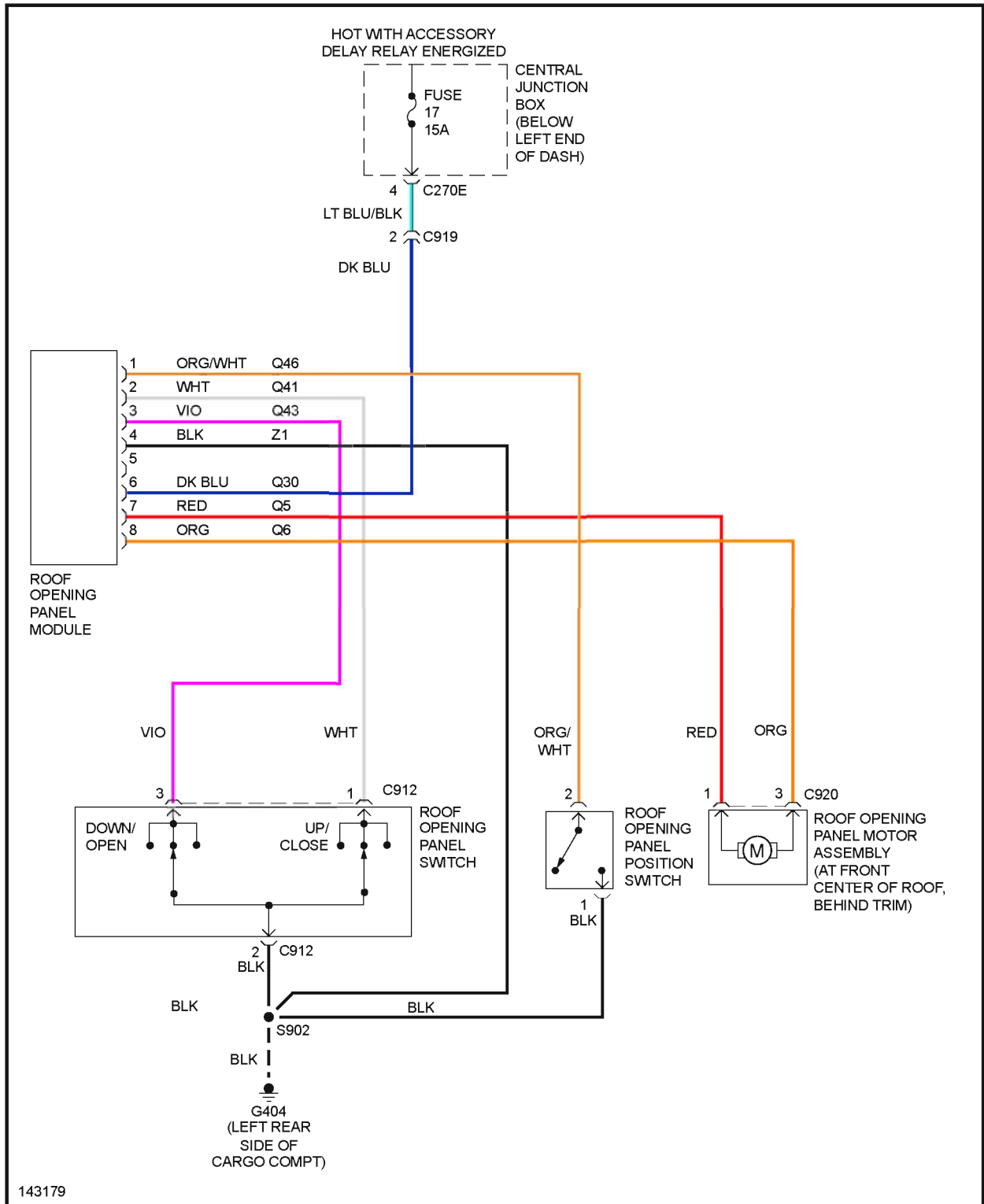


Fig. 40: Power Top/Sunroof Circuits

## POWER WINDOWS



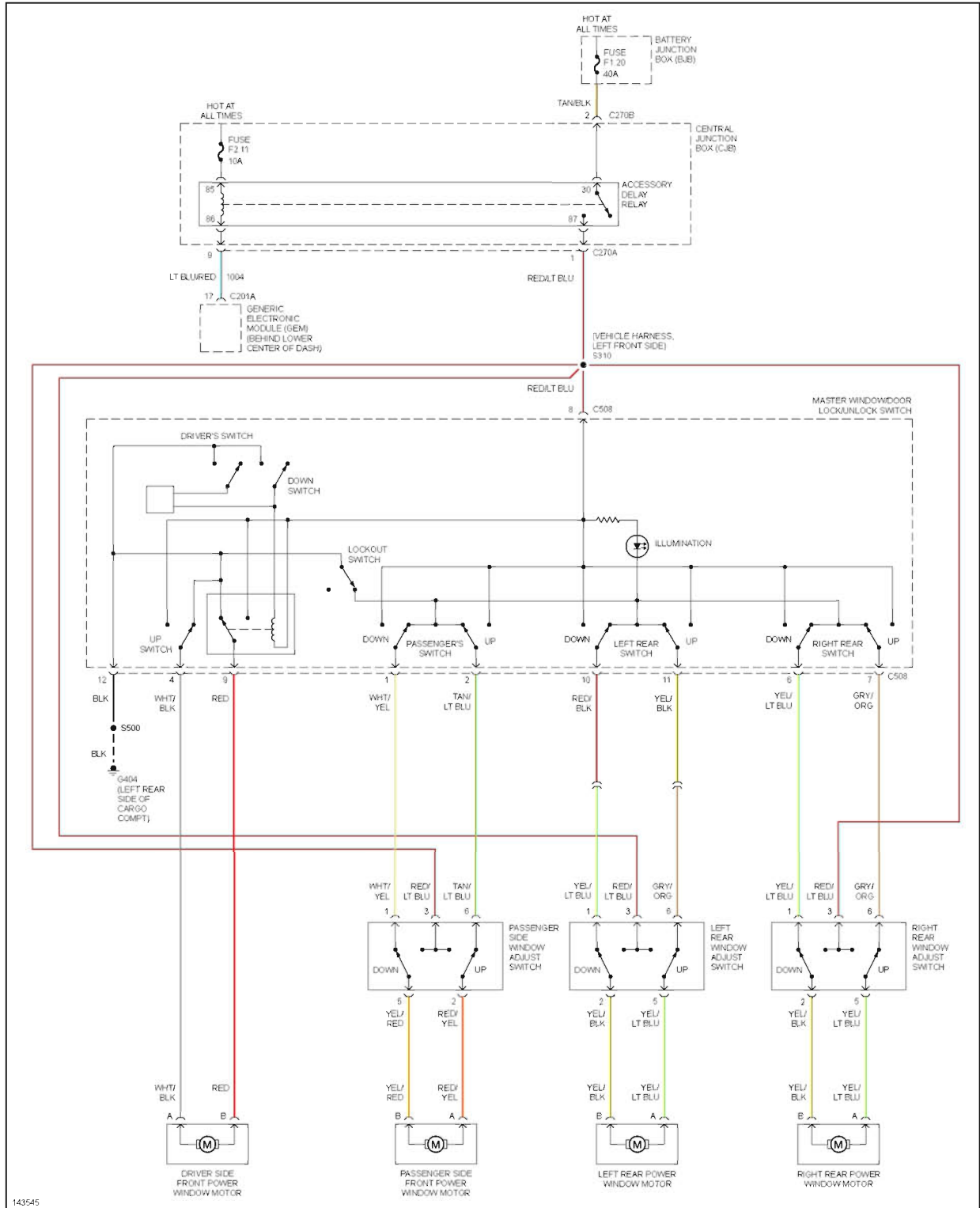
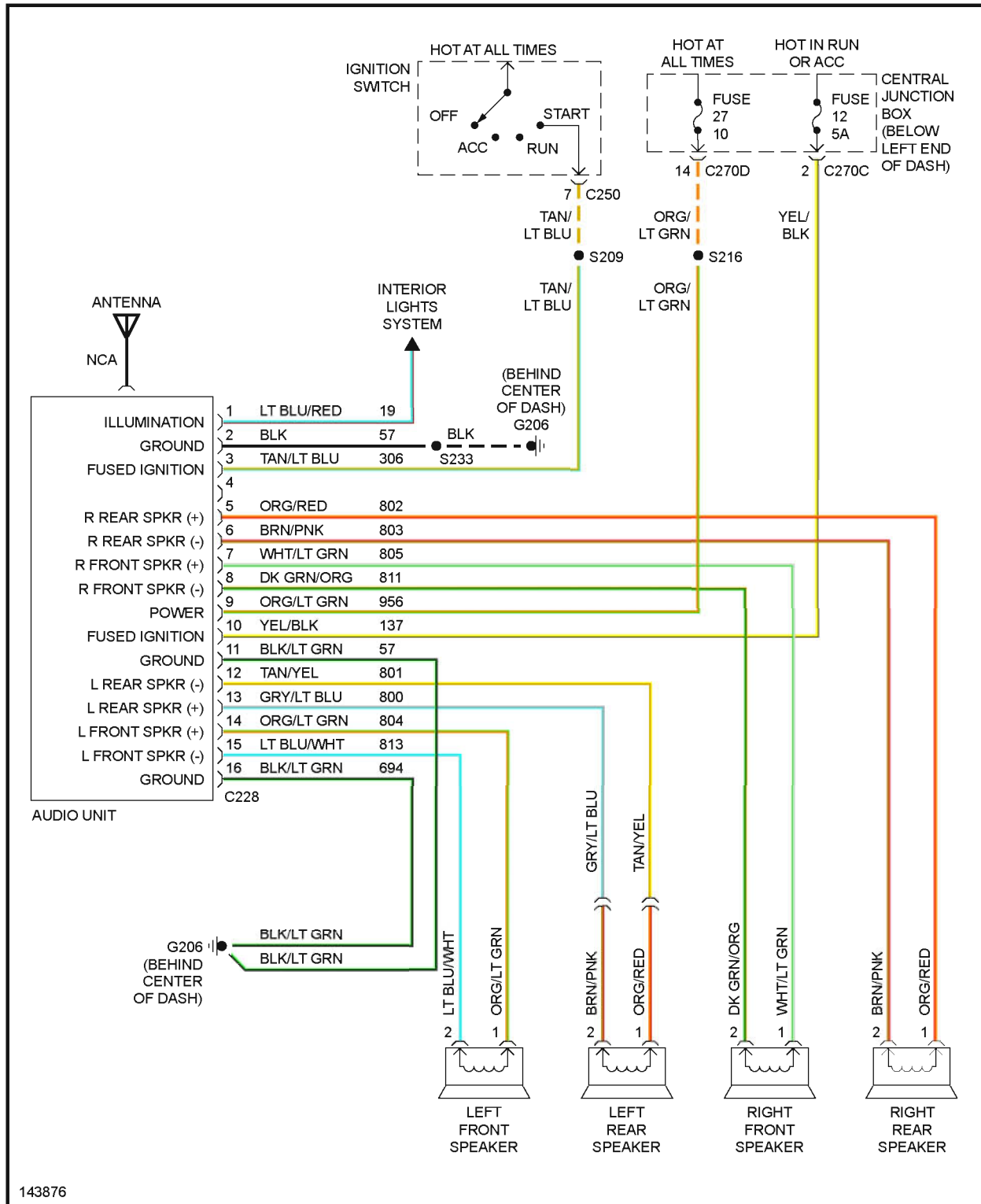


Fig. 41: Power Window Circuit

# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape

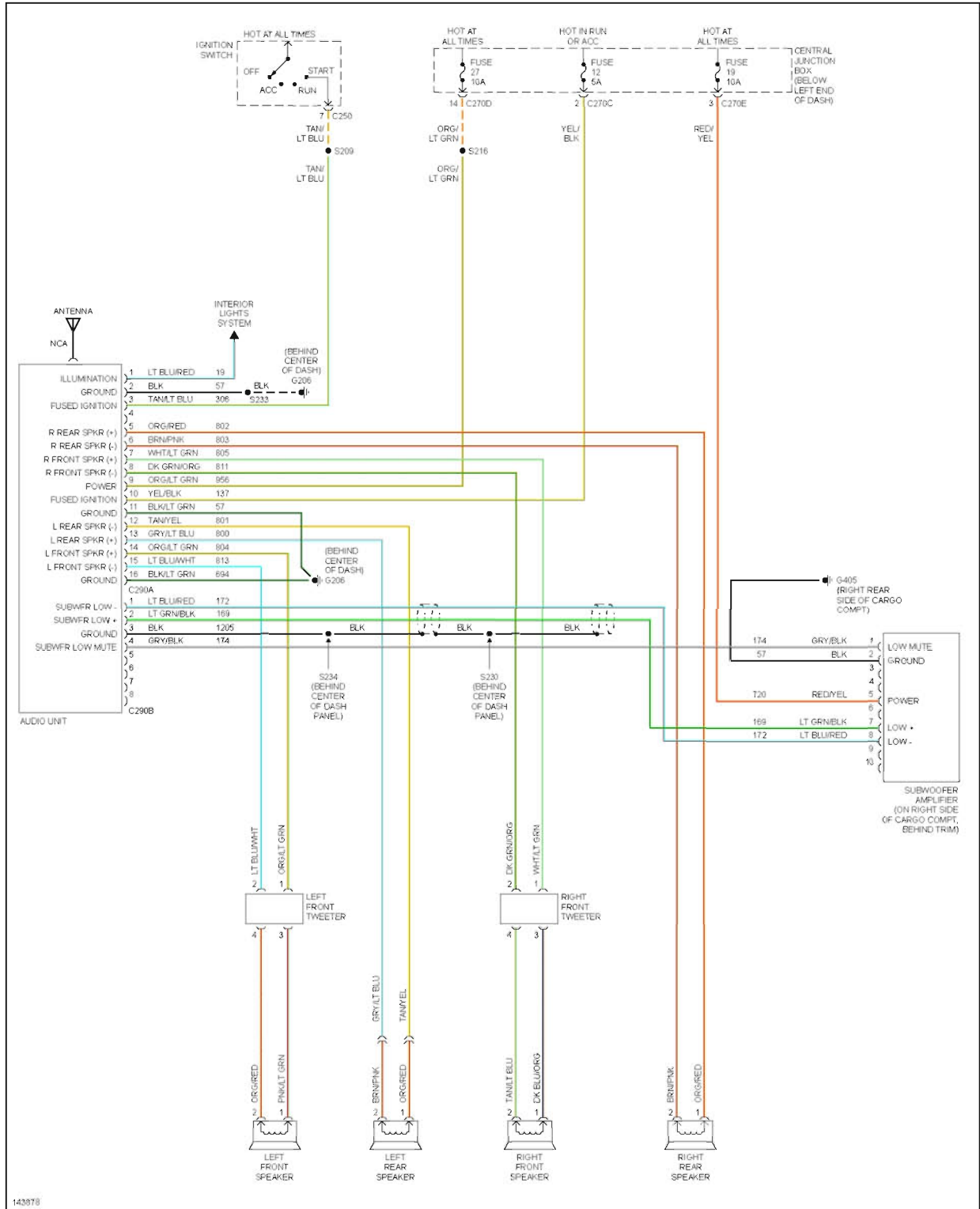


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Fig. 42: Radio Circuits, Base

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

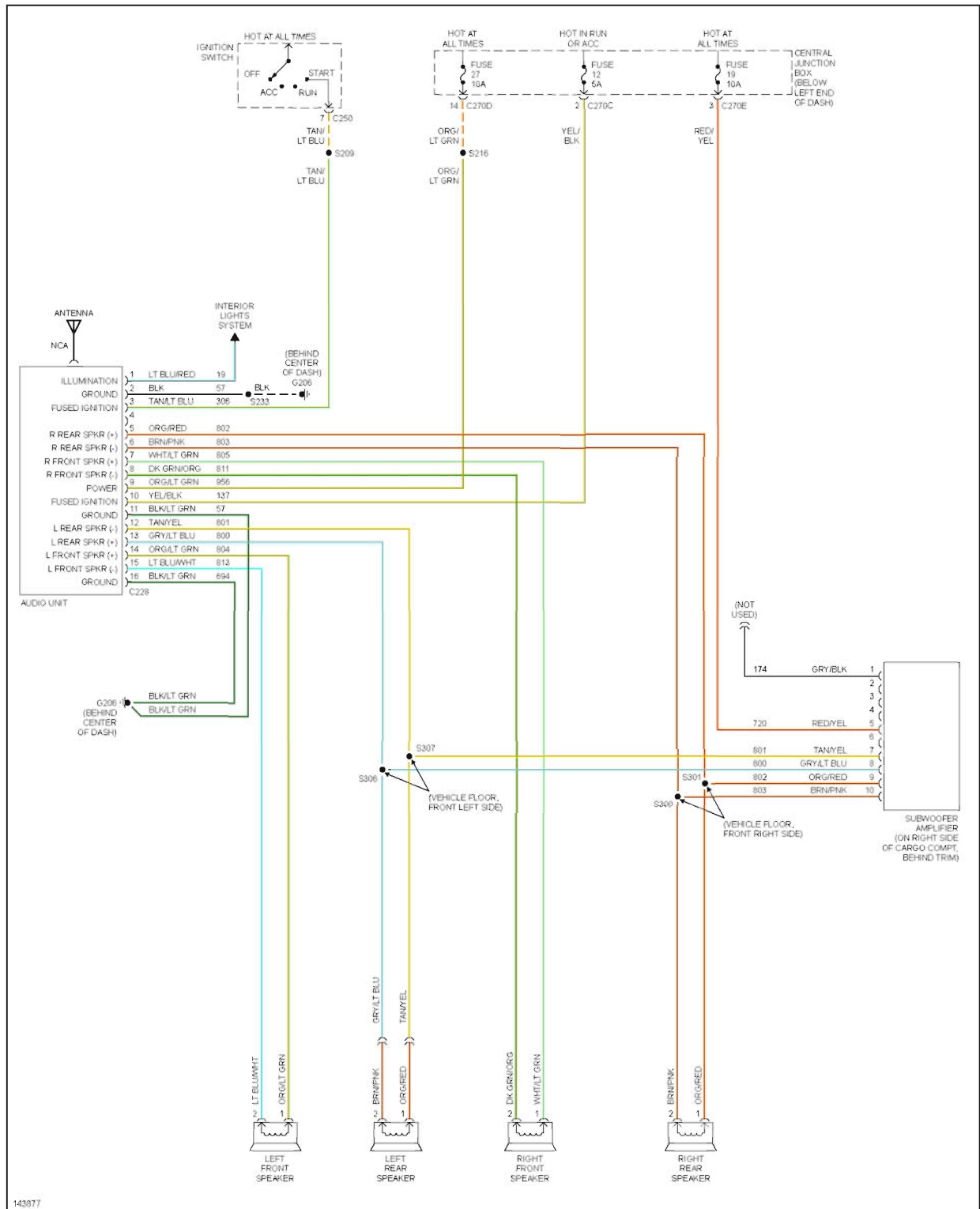


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Fig. 43: Radio Circuits, Highline

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



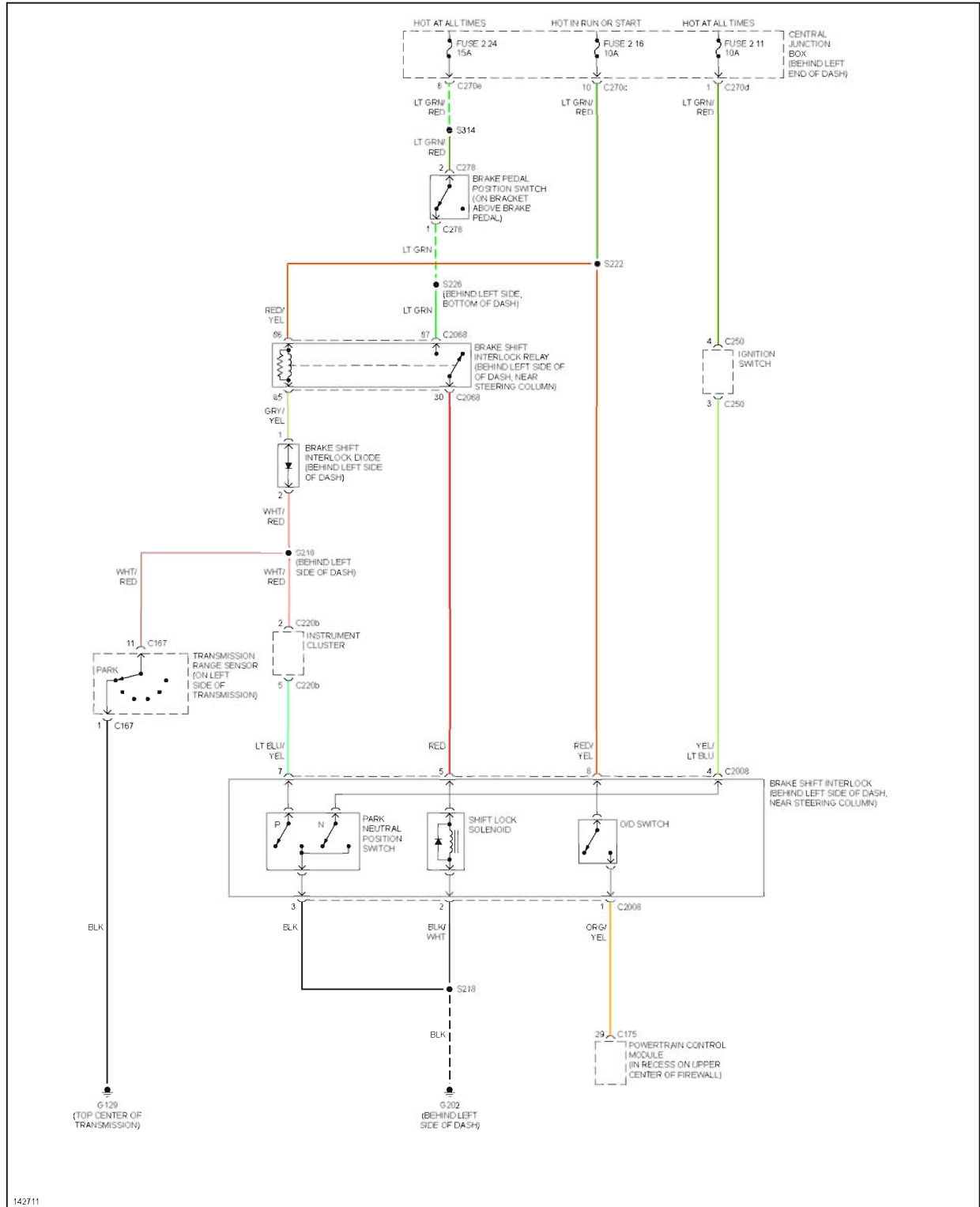
<http://vnx.su>

Fig. 44: Radio Circuits, Midline

## SHIFT INTERLOCKS

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



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**Fig. 45: Shift Interlock Circuit**

**STARTING/CHARGING**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

2.0L

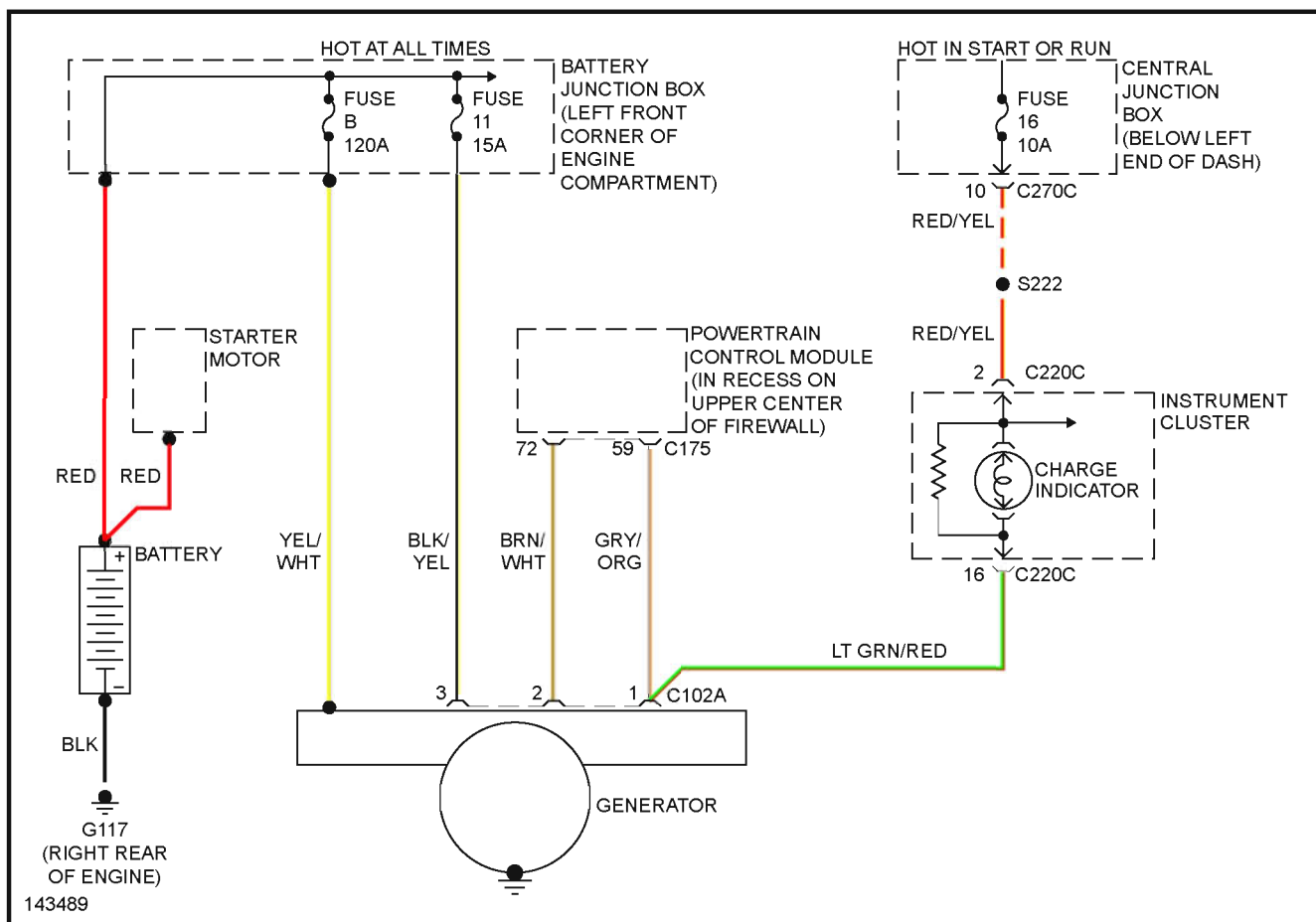


Fig. 46: 2.0L, Charging Circuit

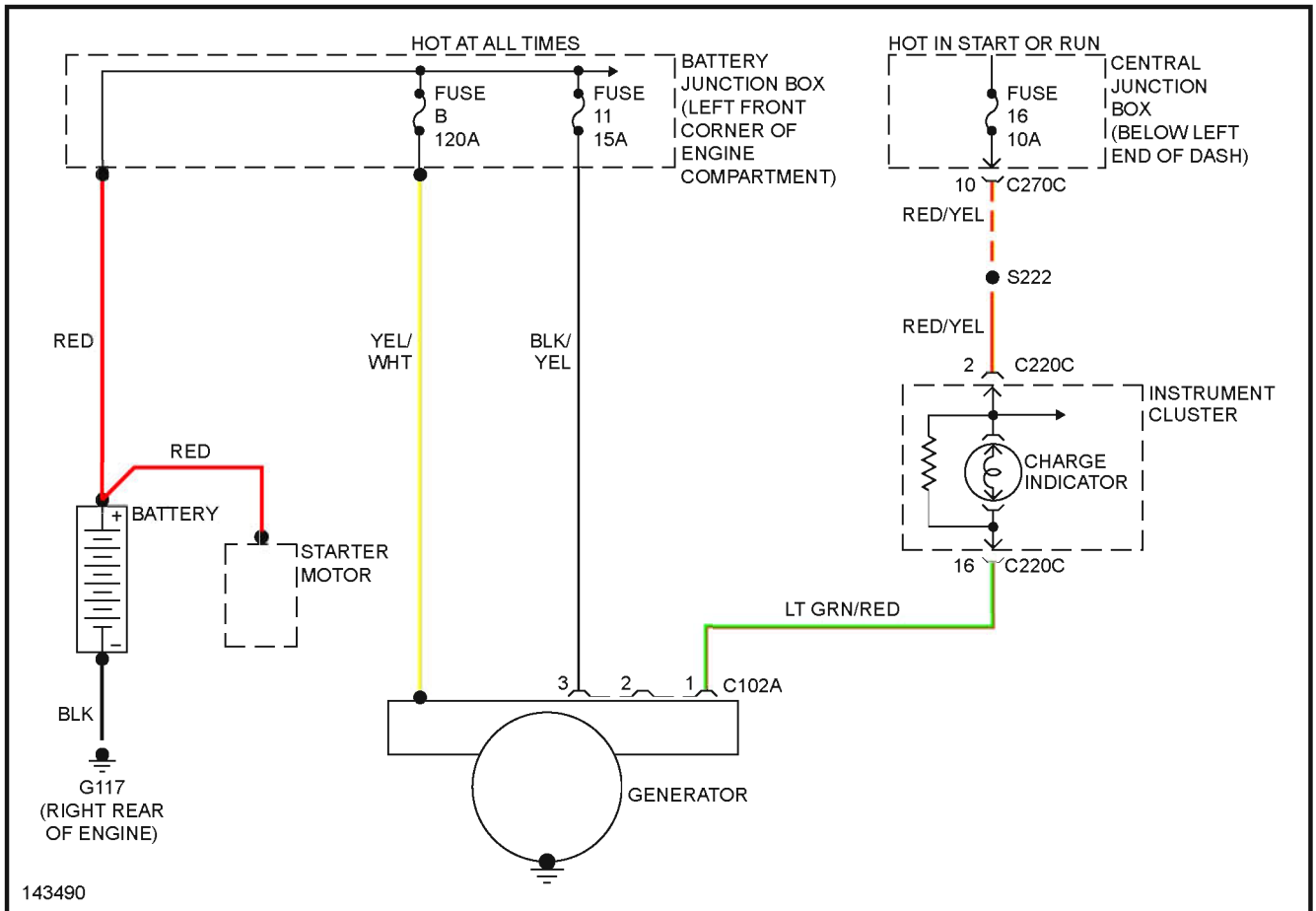
## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



### 3.0L

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 48: 3.0L, Charging Circuit**



## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

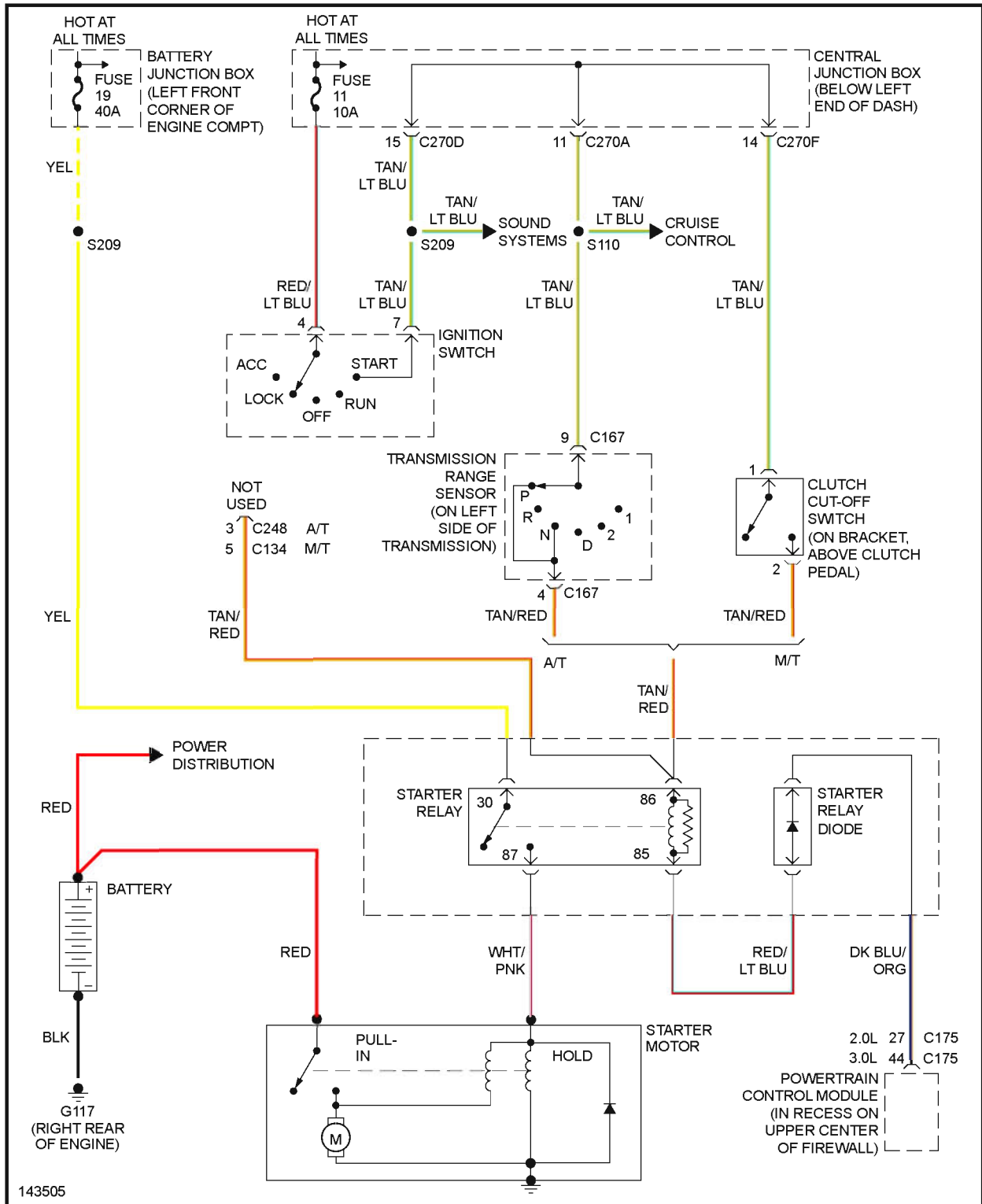
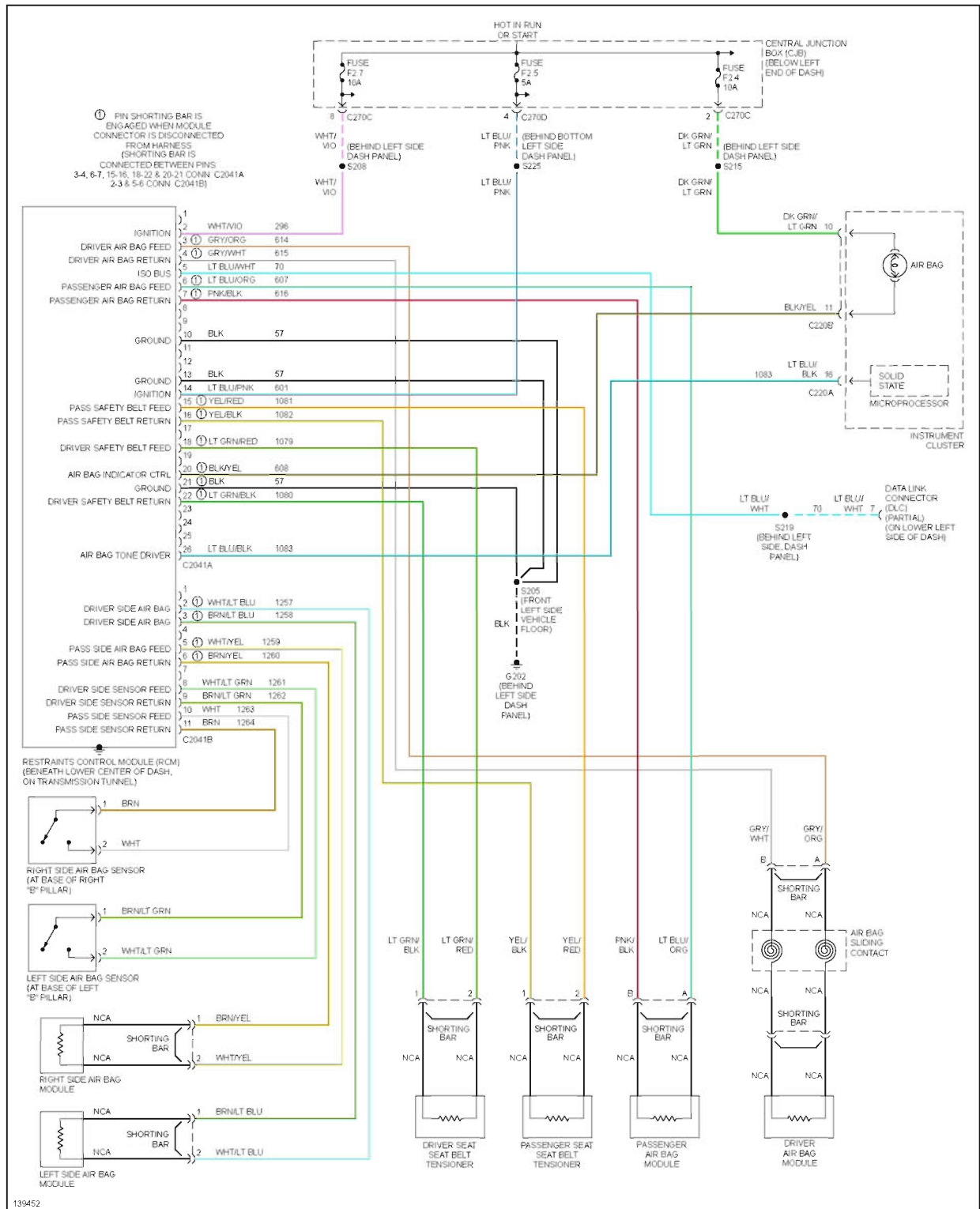


Fig. 49: Starting Circuit

## SUPPLEMENTAL RESTRAINTS

# 2001 Ford Escape

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



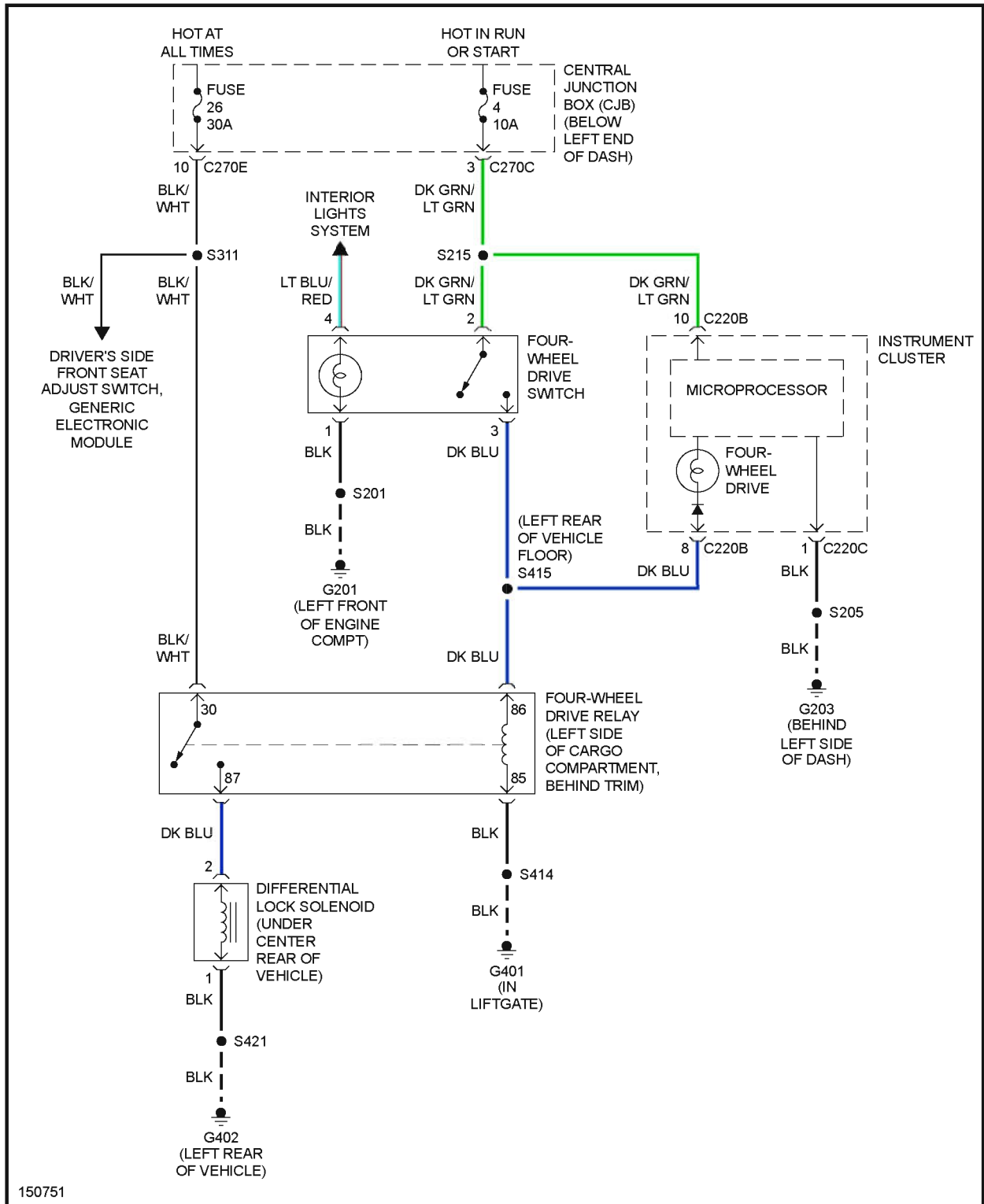
139452

Fig. 50: Supplemental Restraint Circuit

## TRANSMISSION

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 51: 4WD Circuit**

## 2001 SYSTEM WIRING DIAGRAMS FORD Escape



## WARNING SYSTEMS

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape

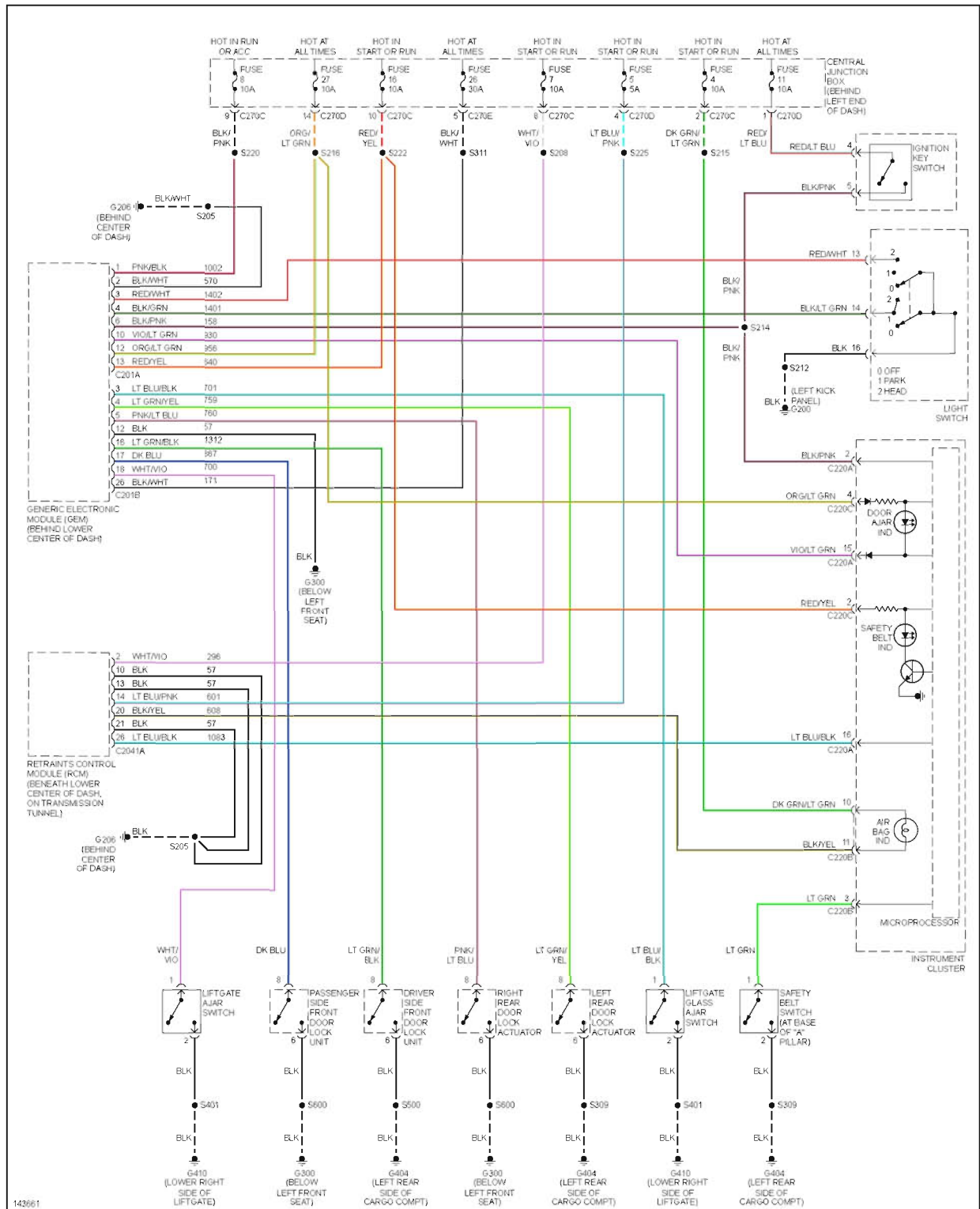
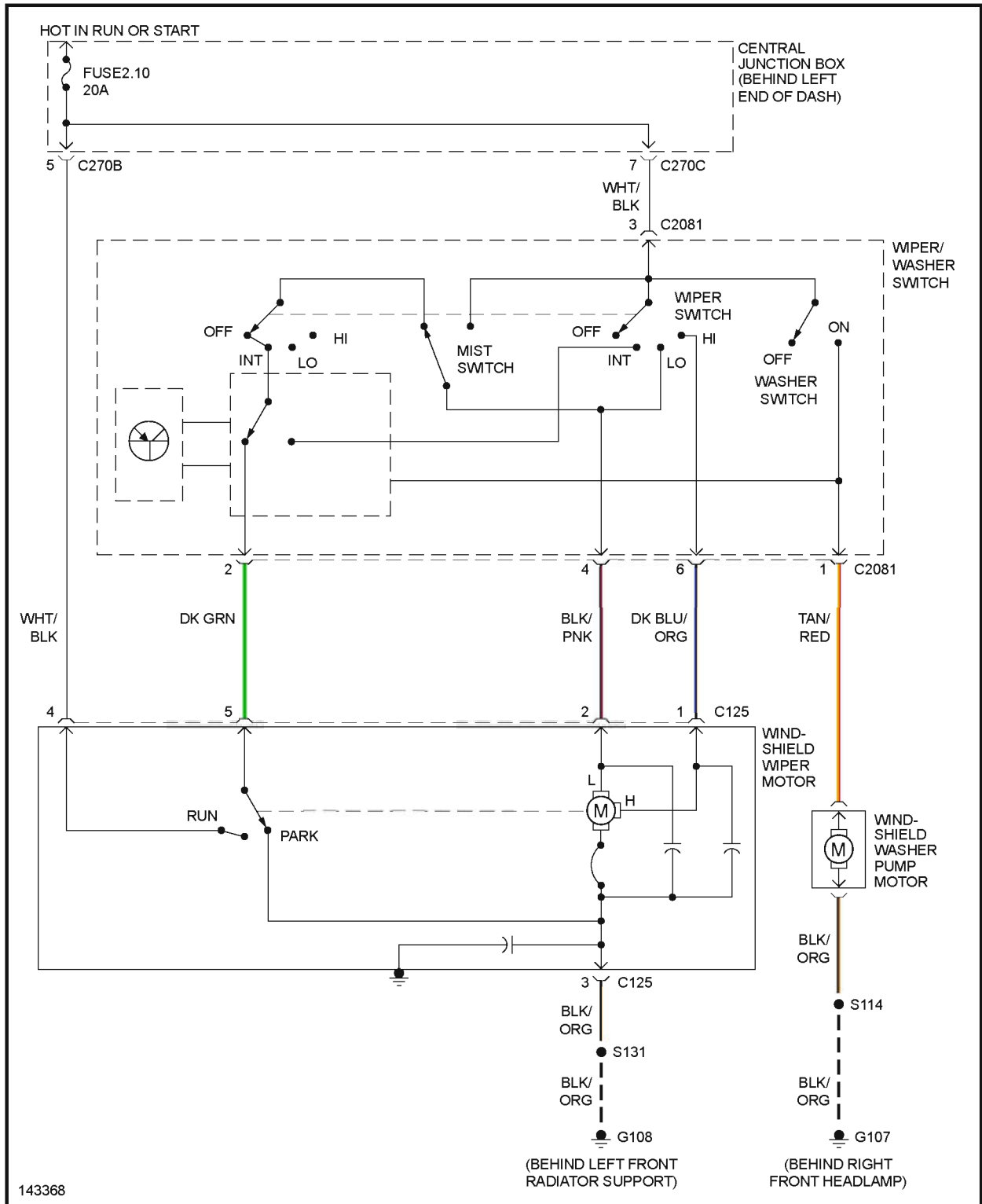


Fig. 53: Warning System Circuits

## WIPER/WASHER

## 2001 Ford Escape

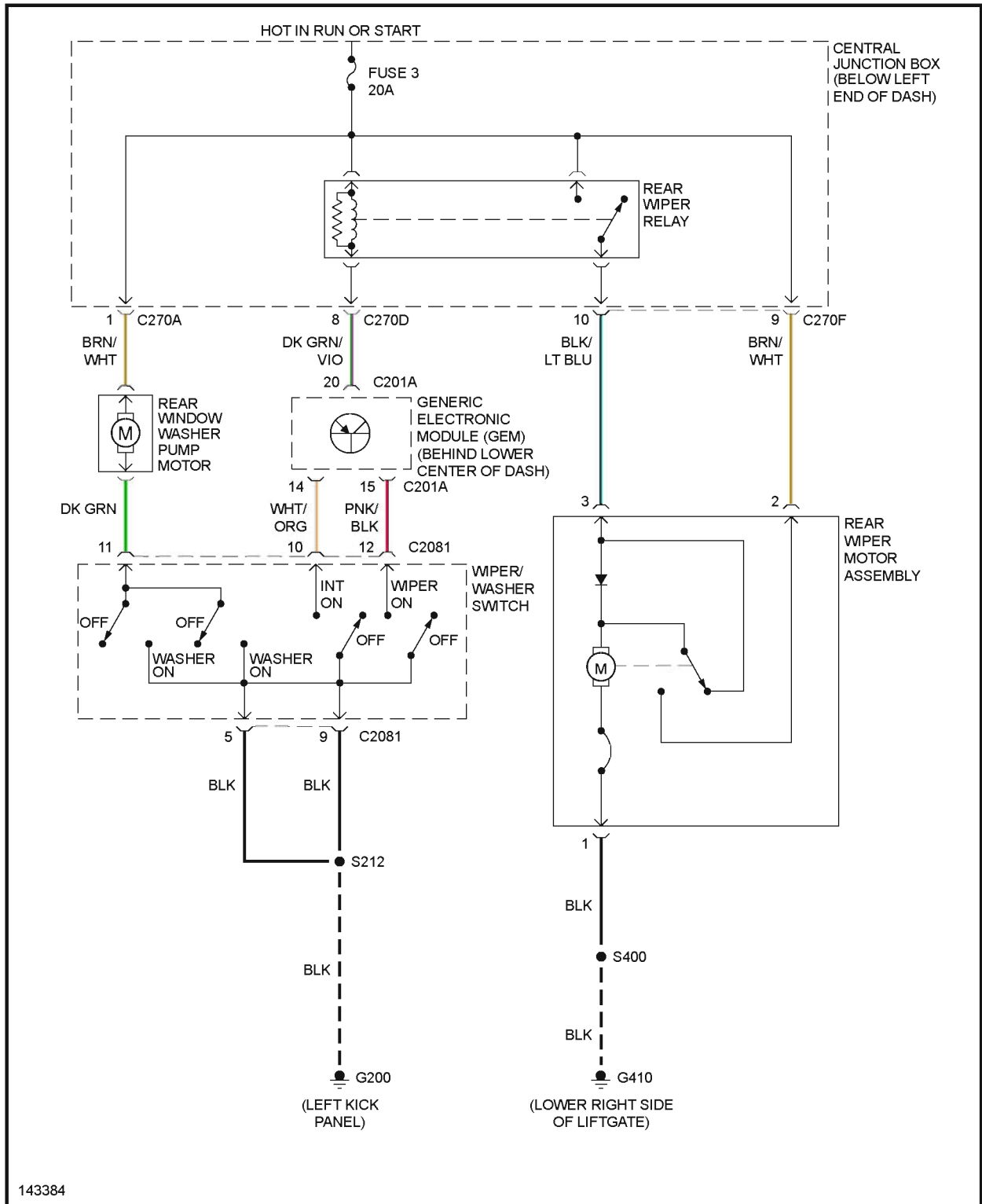
### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



**Fig. 54: Front Wiper/Washer Circuit**

## 2001 Ford Escape

### 2001 SYSTEM WIRING DIAGRAMS FORD Escape



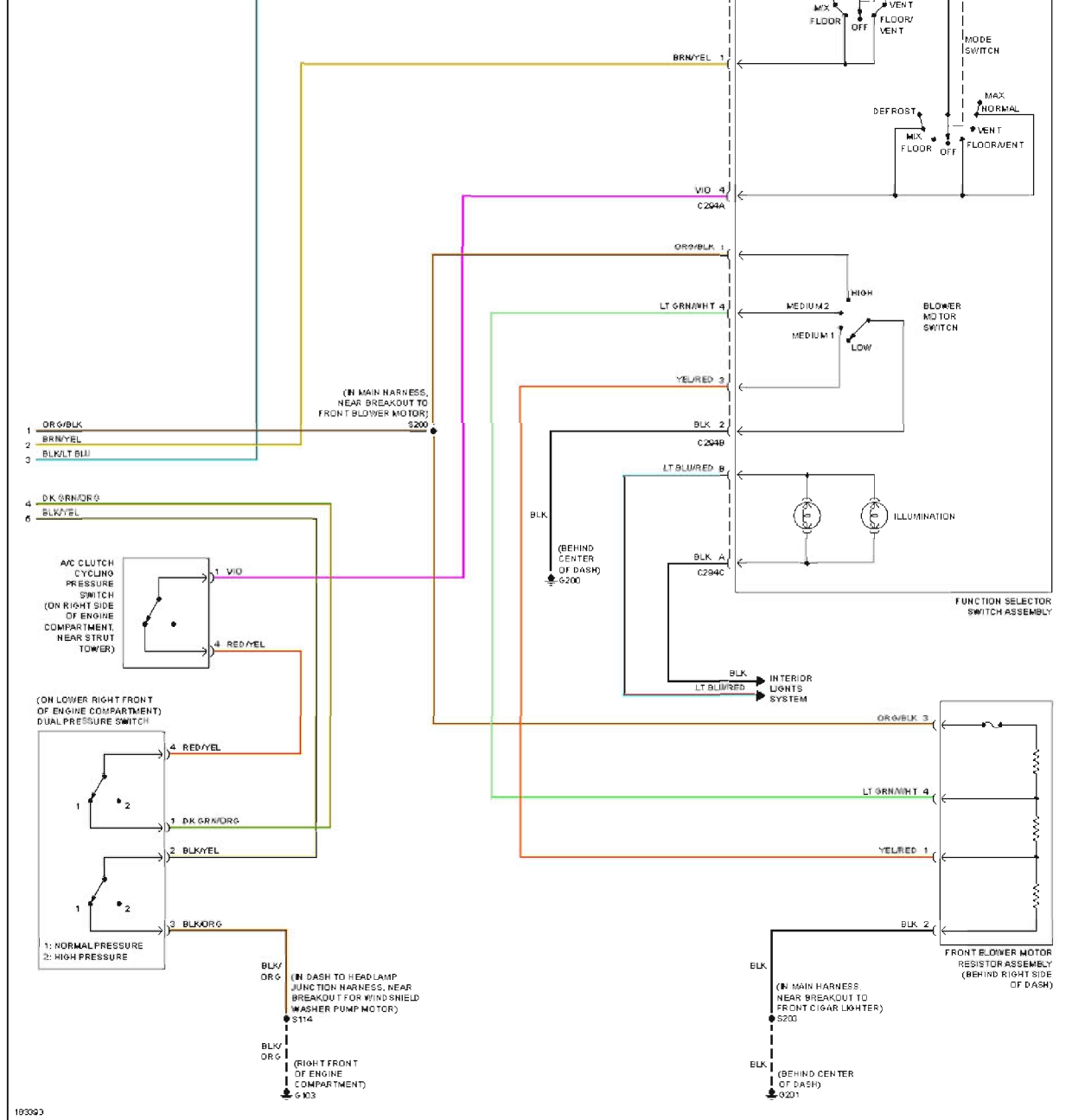
**Fig. 55: Rear Wiper/Washer Circuit**

# AIR CONDITIONING

2.0L



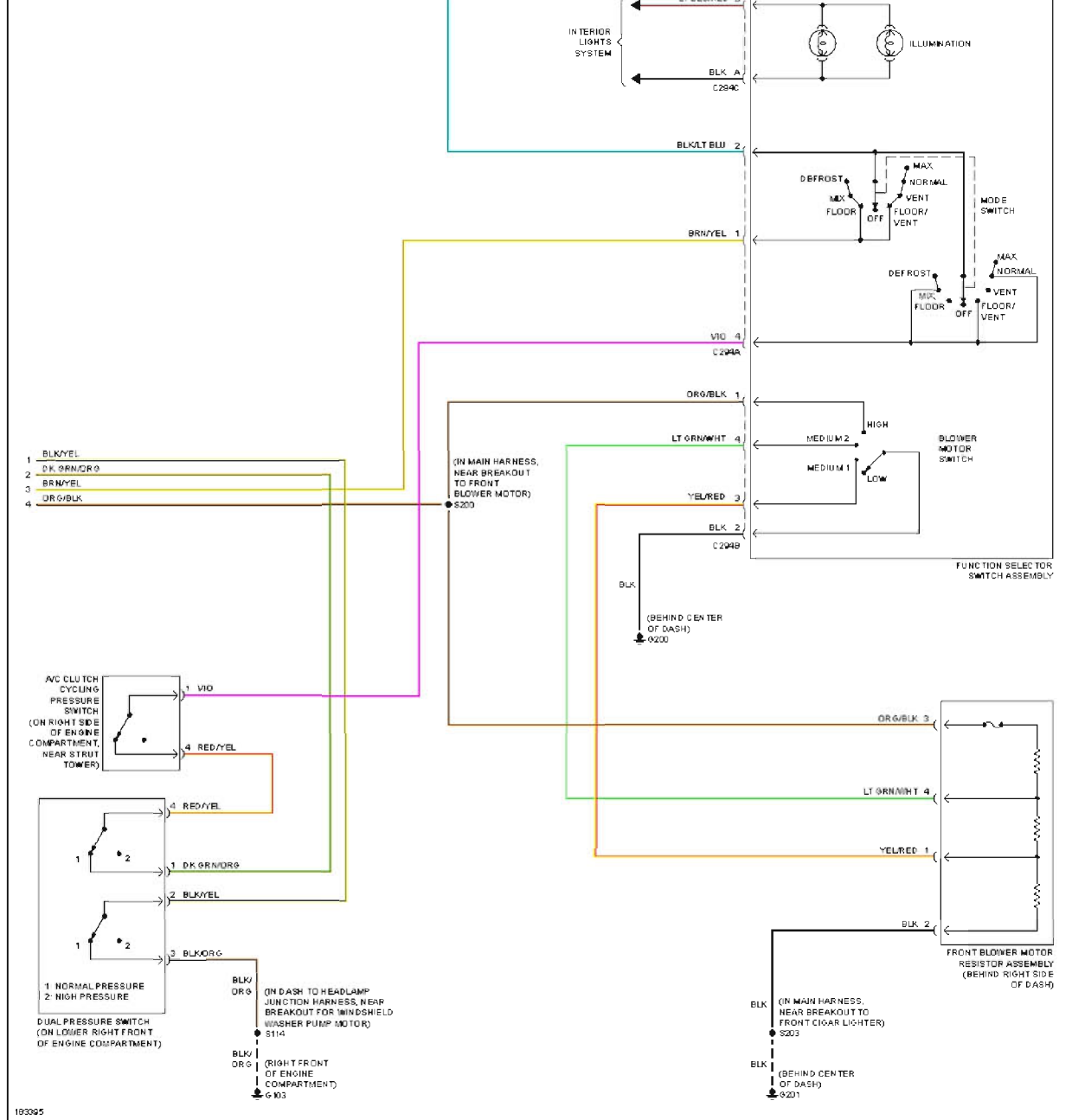
**Fig. 1: 2.0L, Manual A/C Circuit (1 of 2)**



**Fig. 2: 2.0L, Manual A/C Circuit (2 of 2)**

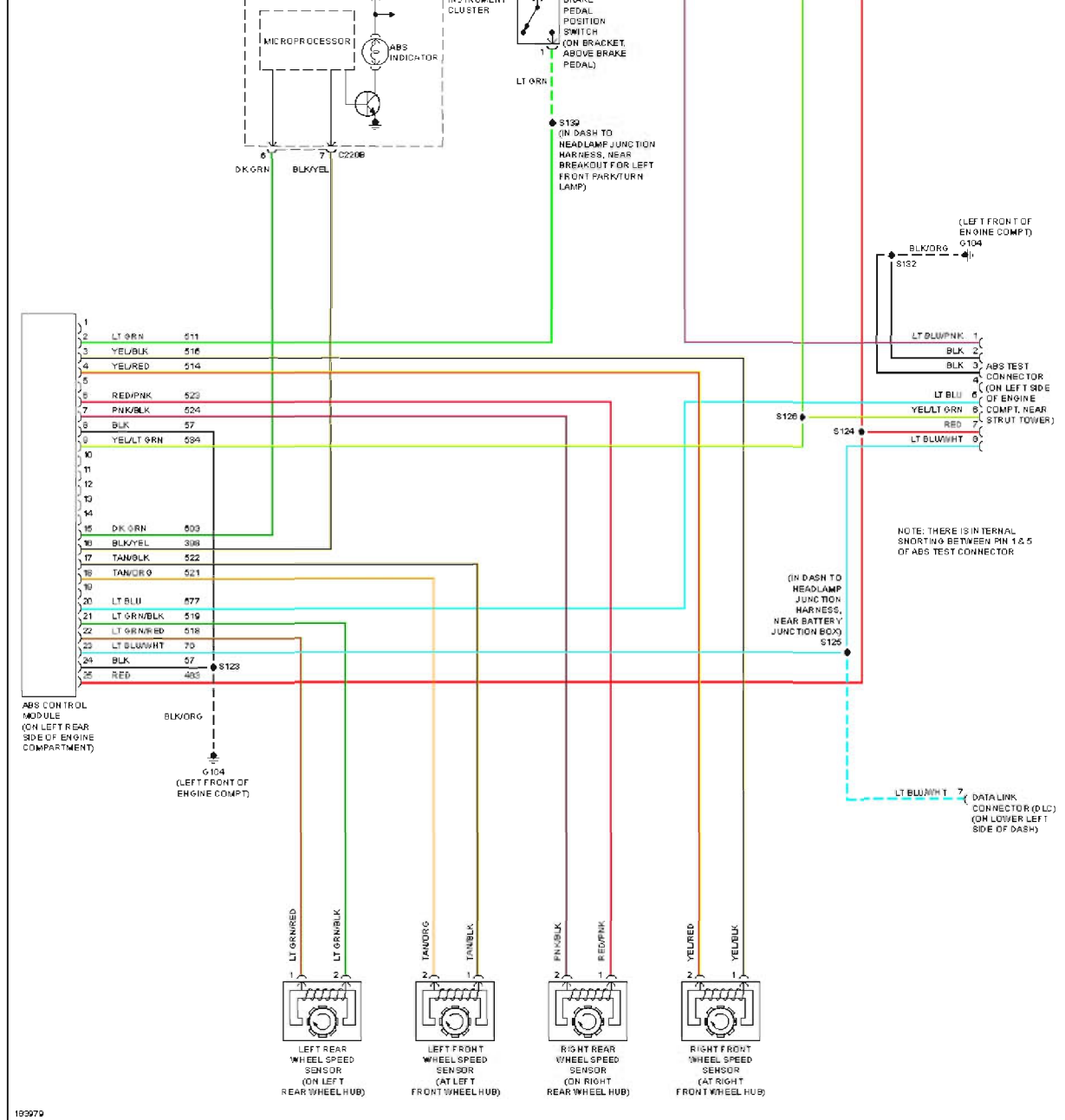
**3.0L**

**Fig. 3: 3.0L, Manual A/C Circuit (1 of 2)**



**Fig. 4: 3.0L, Manual A/C Circuit (2 of 2)**

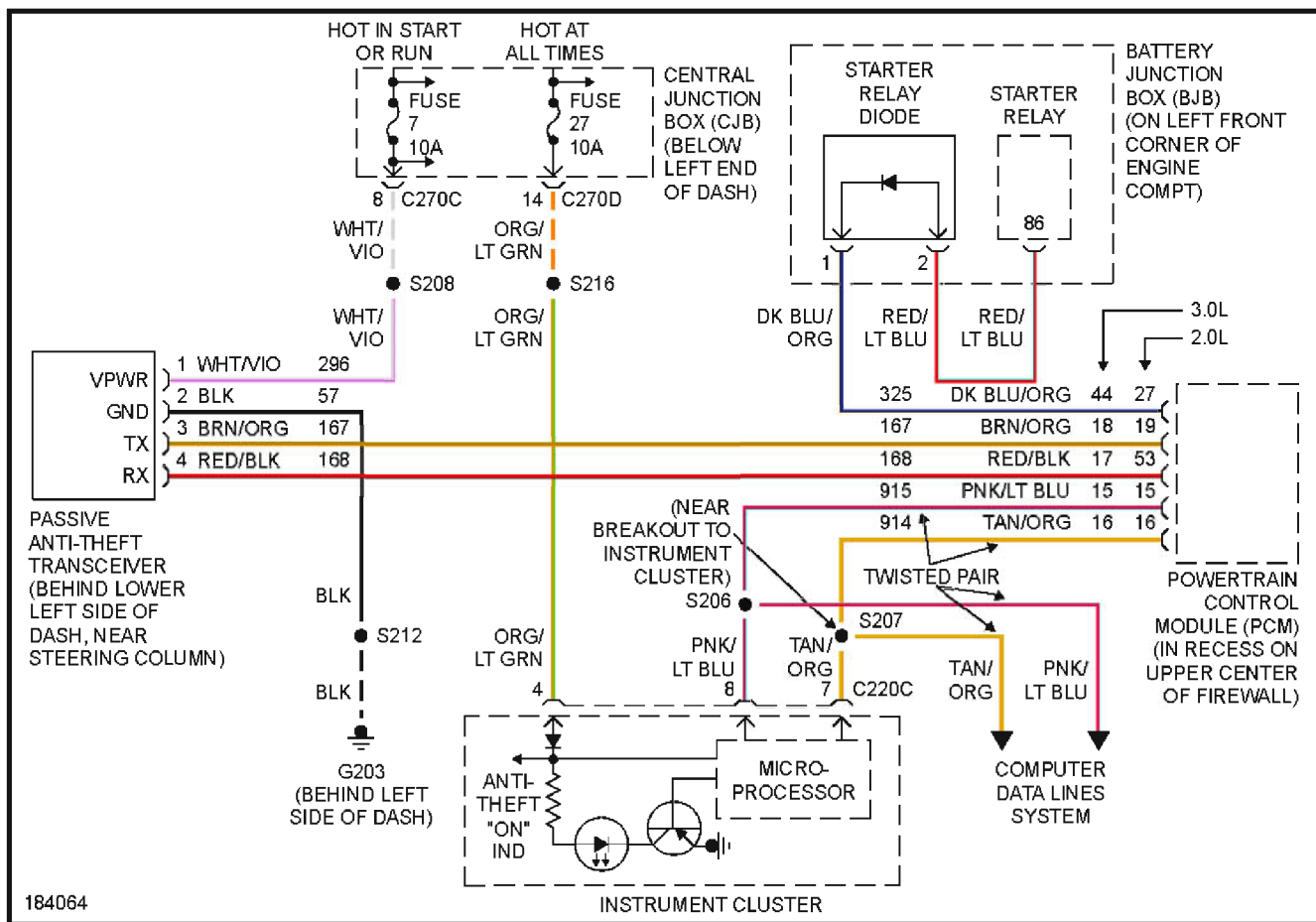
## ANTI-LOCK BRAKES



**Fig. 5: Anti-lock Brakes Circuit**

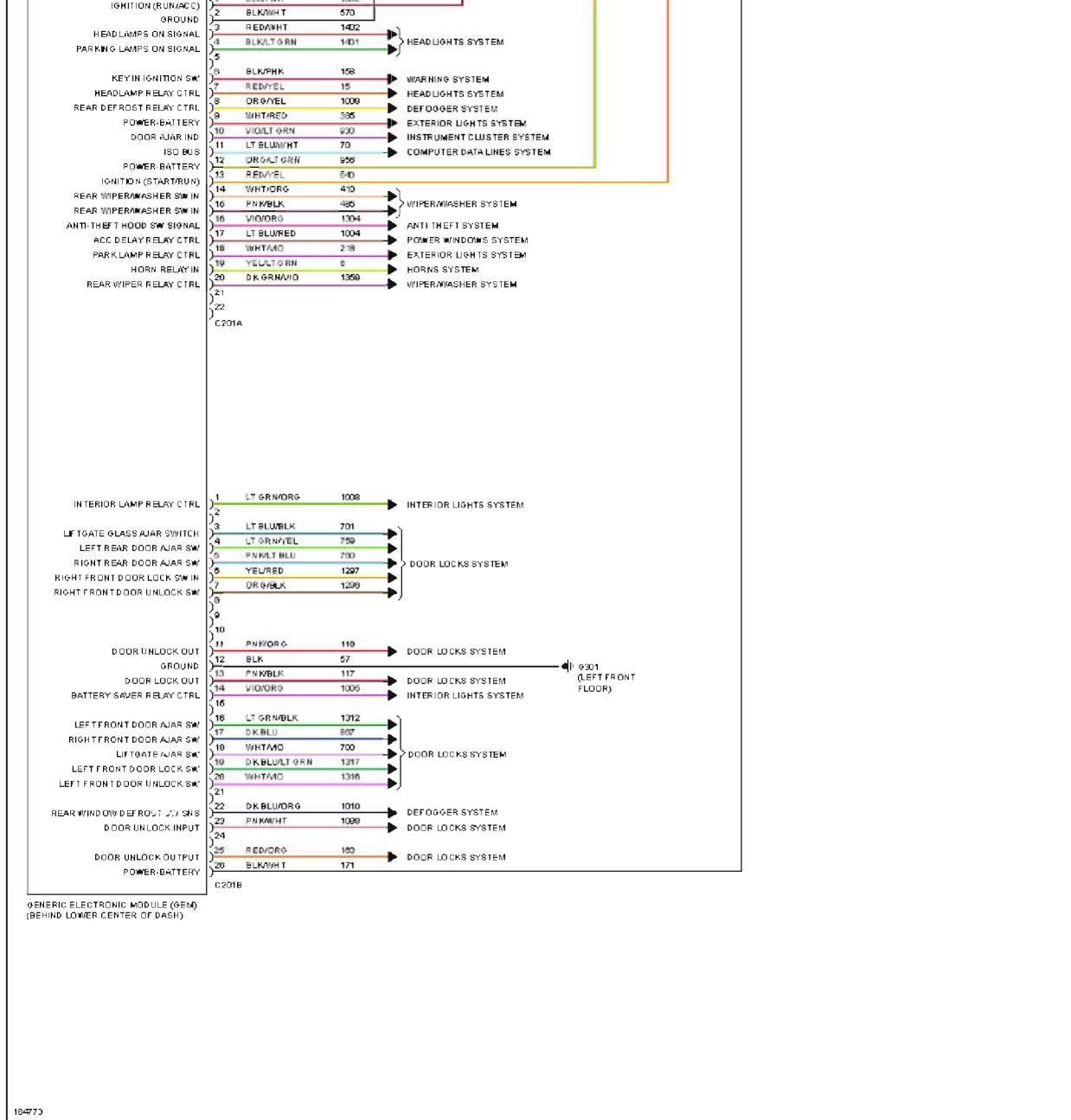
**ANTI-THEFT**

**Fig. 6: Forced Entry Circuit**



**Fig. 7: Passive Anti-theft Circuit**

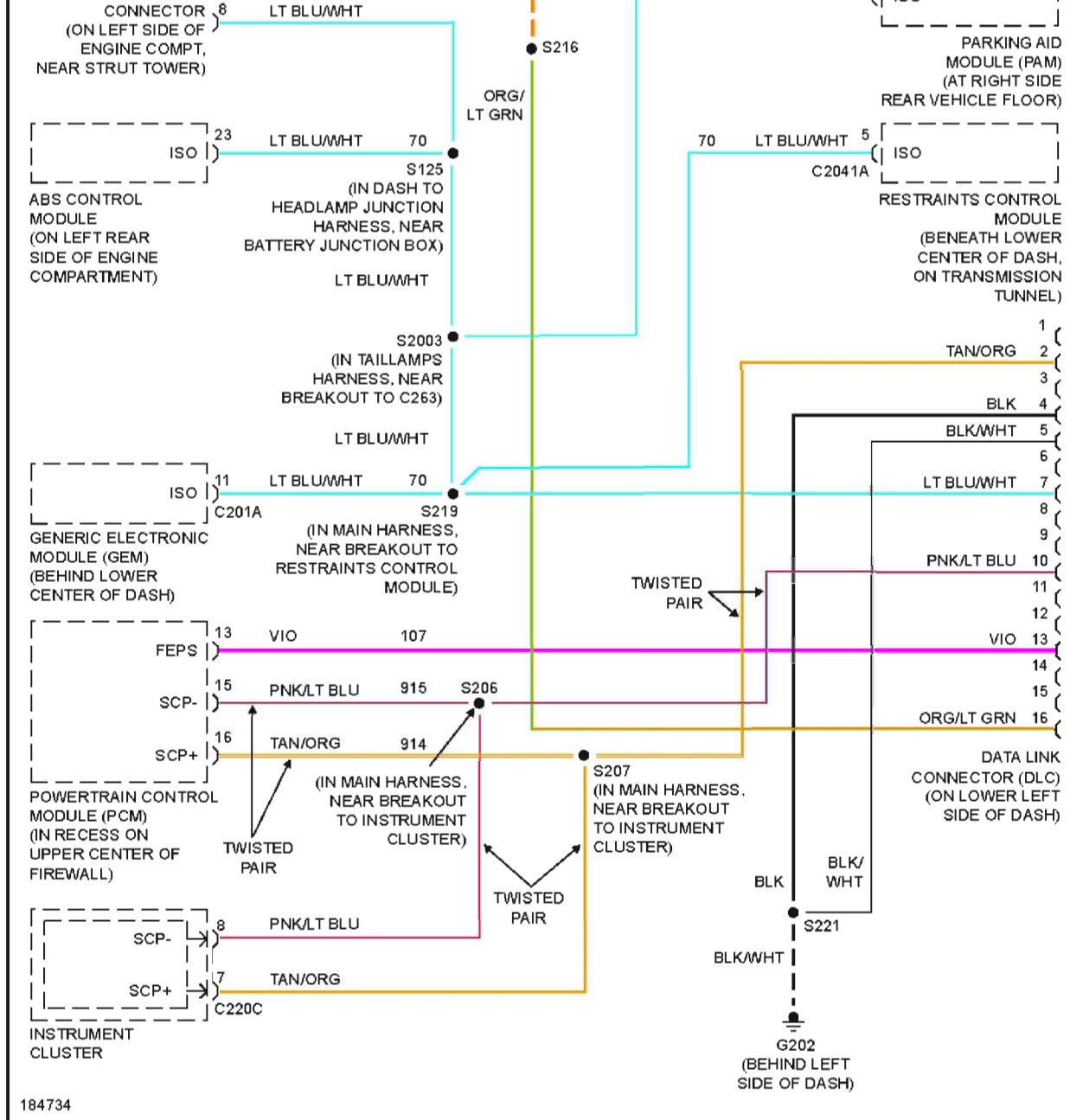
## BODY CONTROL MODULES



**Fig. 8: Body Control Modules Circuit**

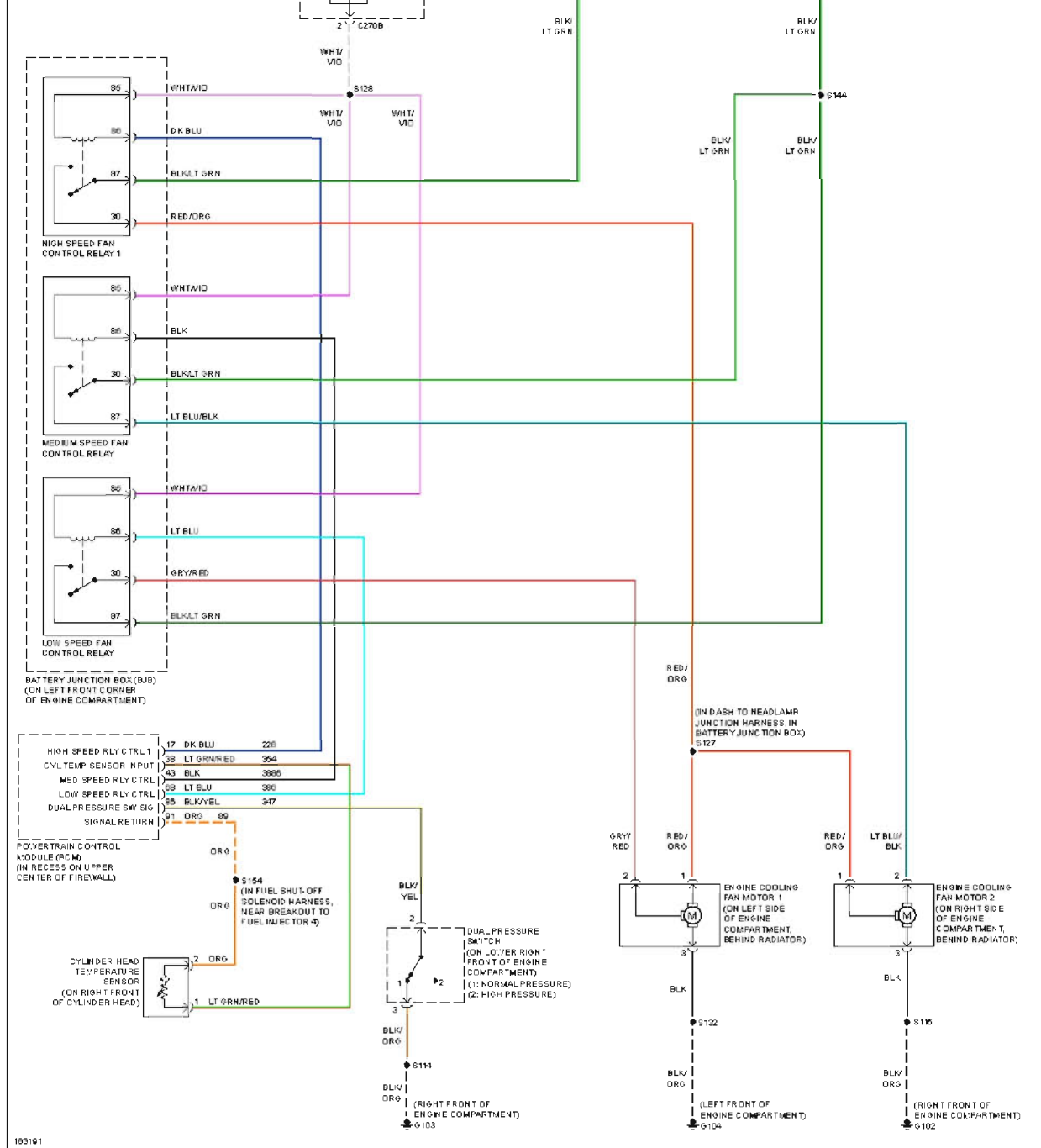
## COMPUTER DATA LINES



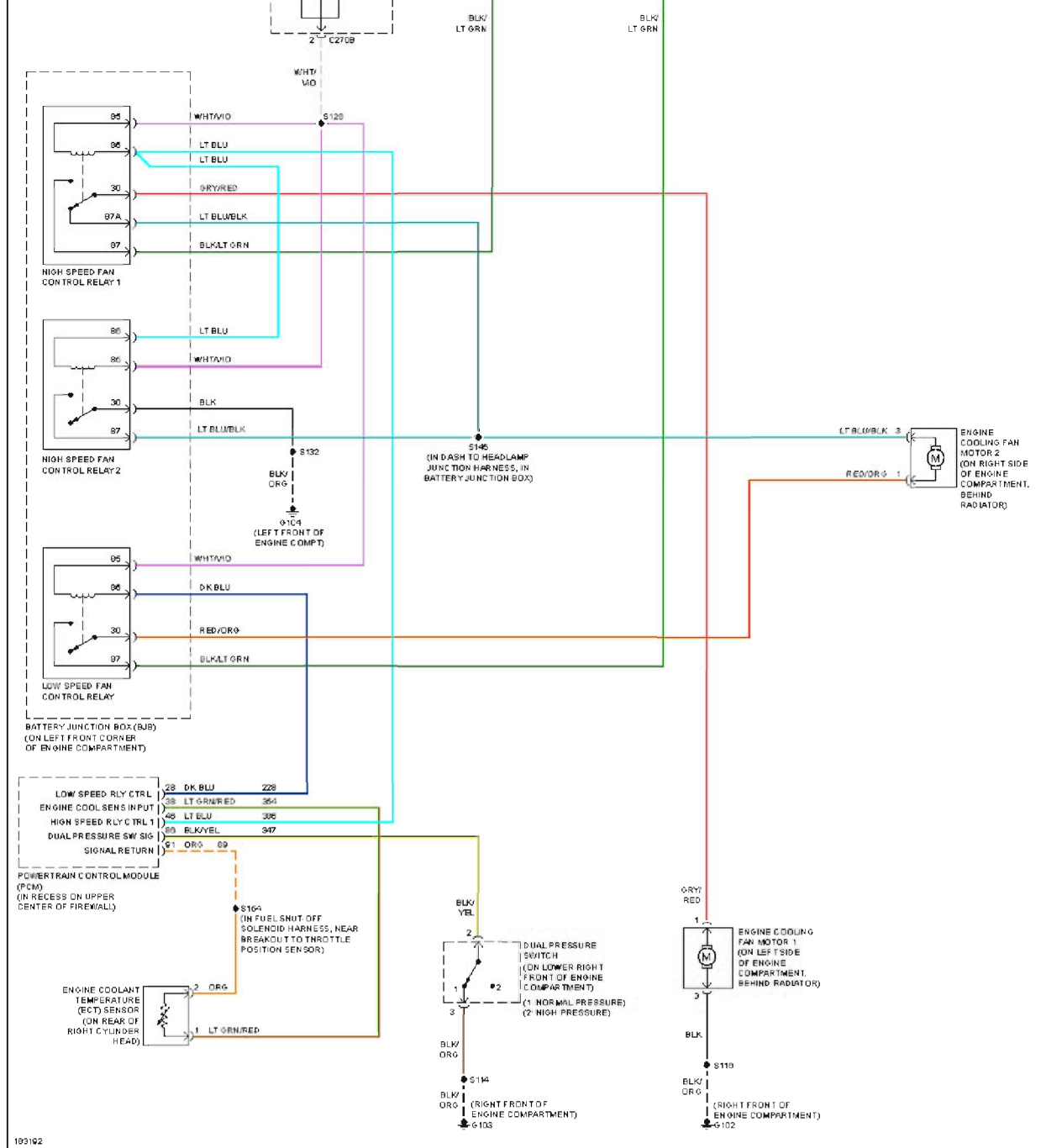


**Fig. 9: Computer Data Lines Circuit**

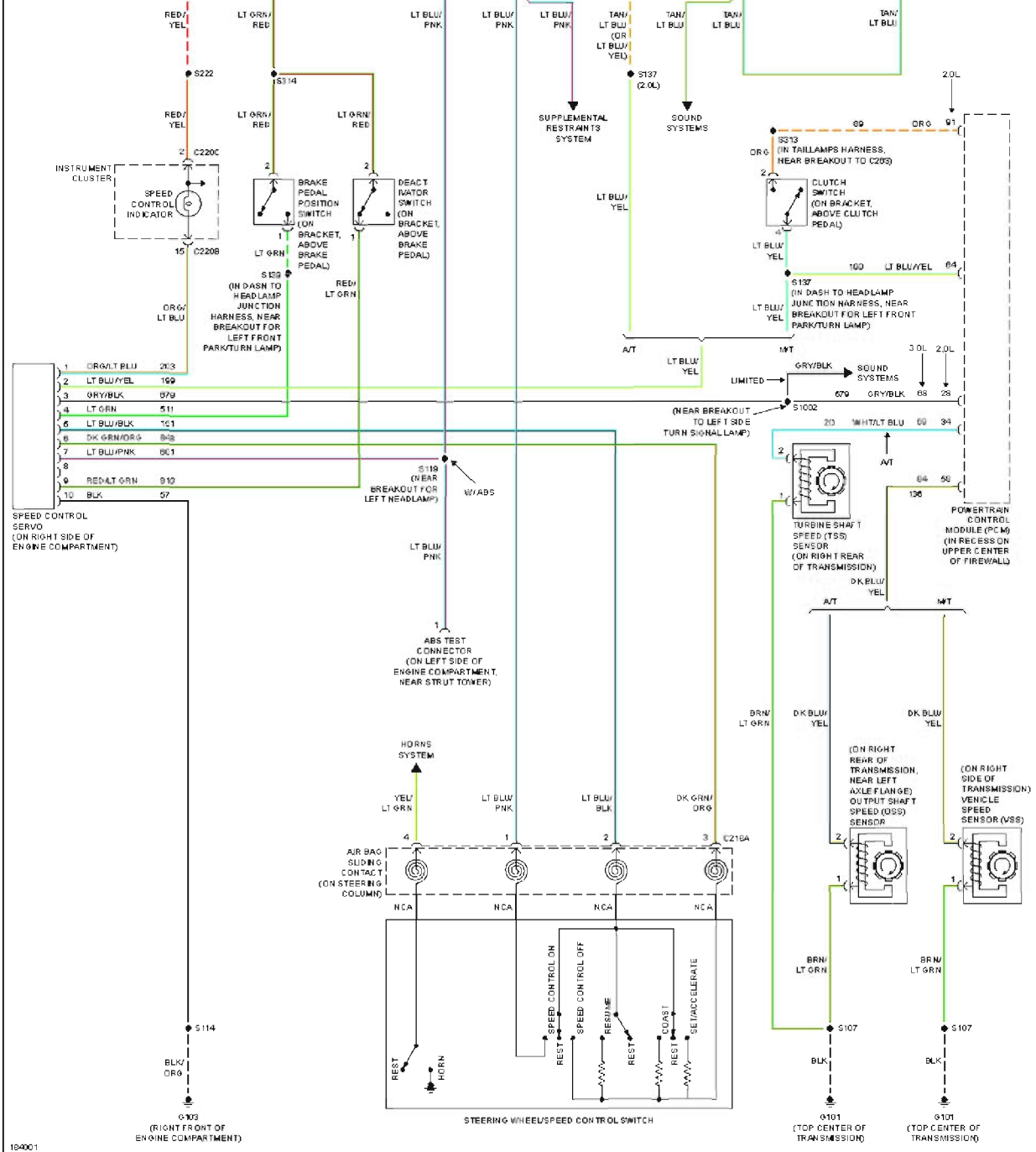
## COOLING FAN



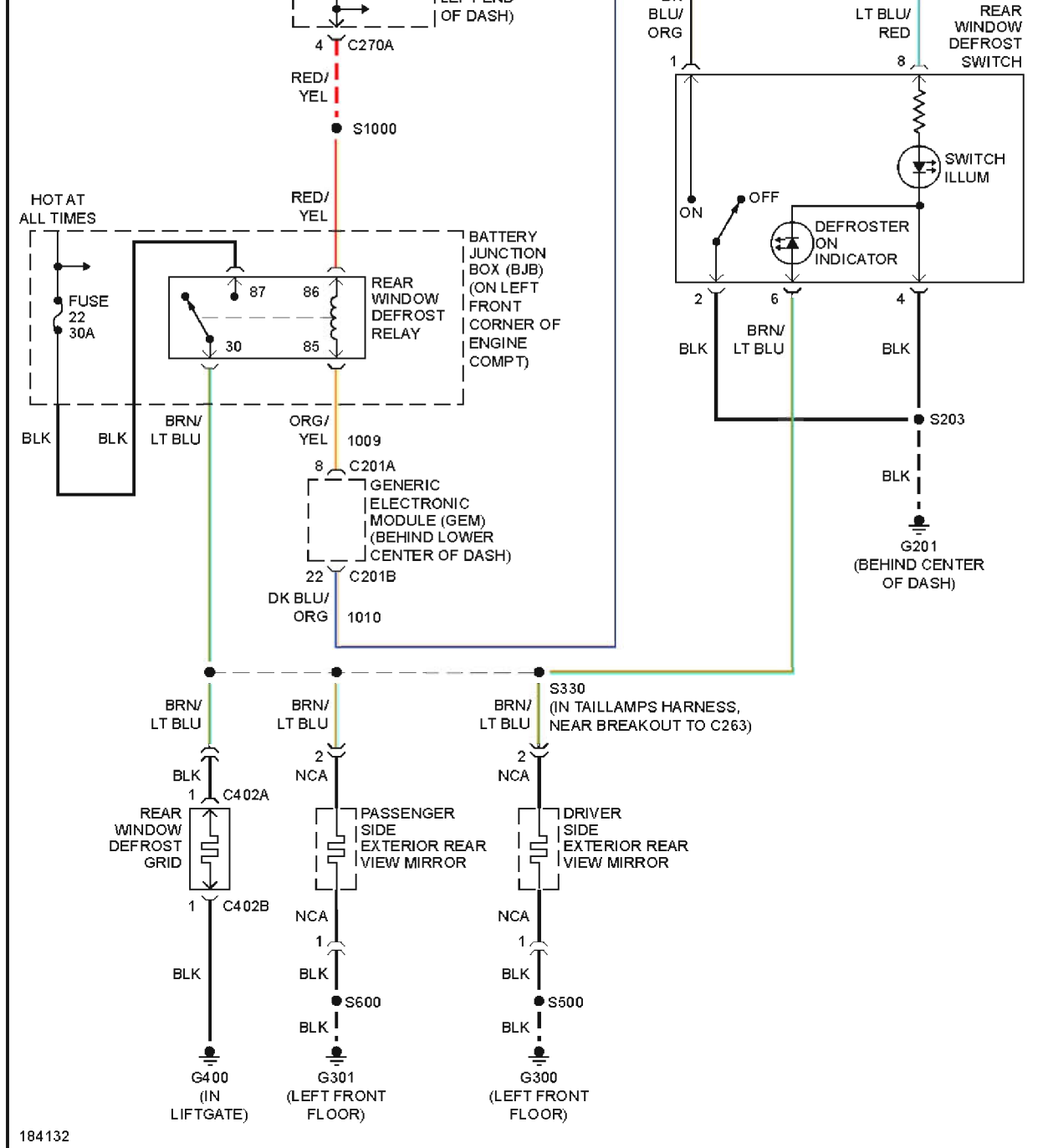
**Fig. 10: 2.0L, Cooling Fan Circuit**



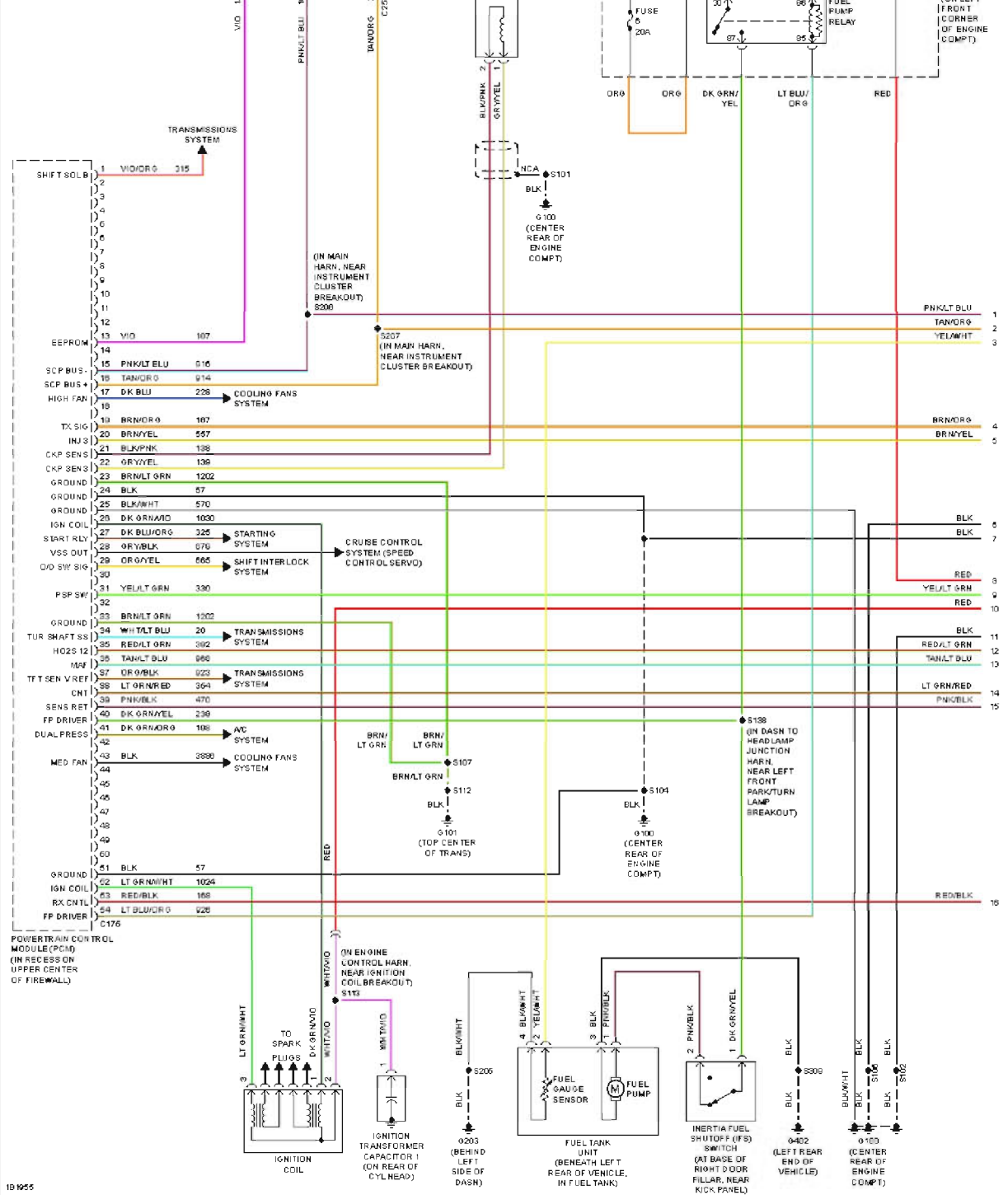
**Fig. 11: 3.0L, Cooling Fan Circuit**

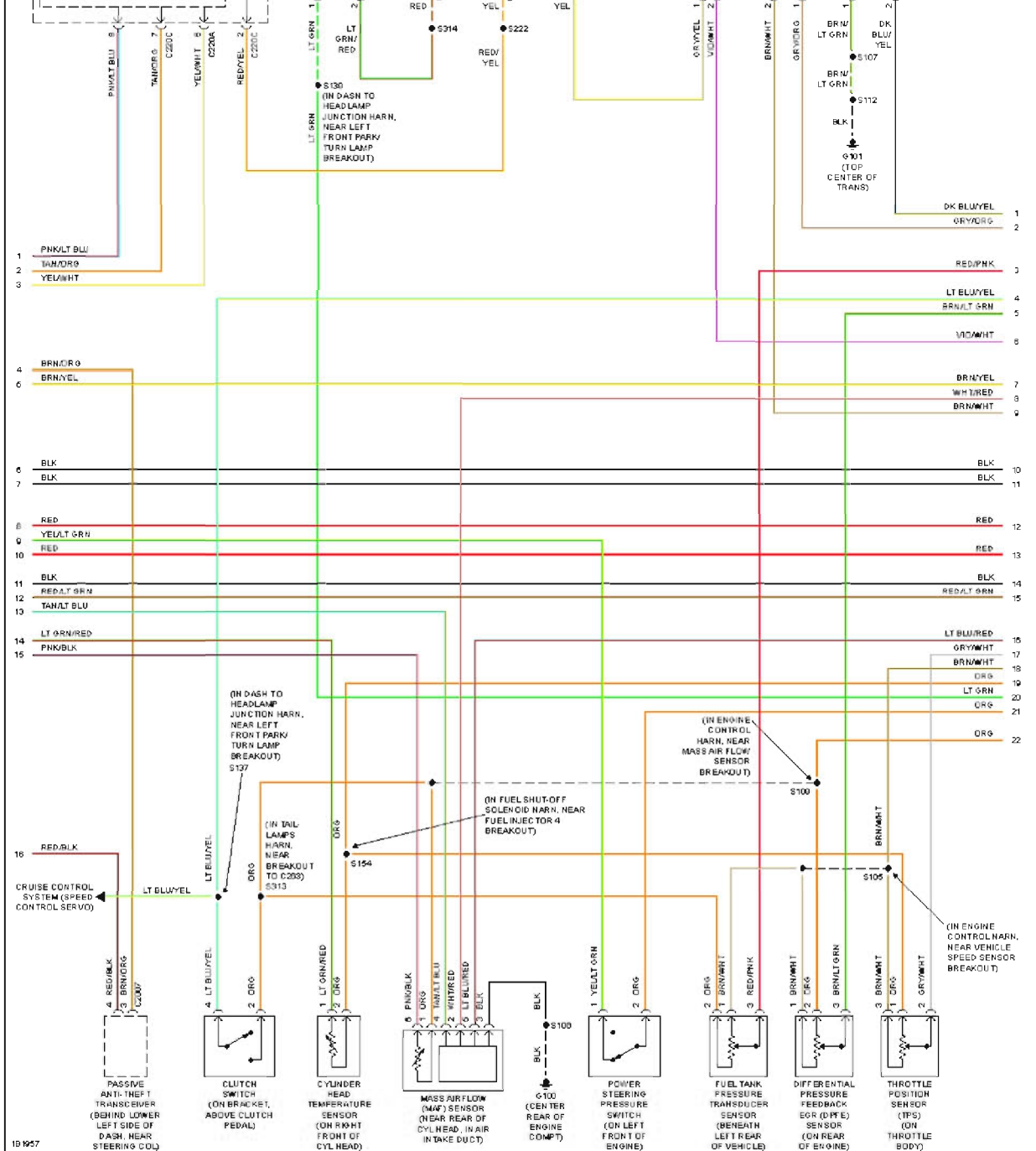


**Fig. 12: Cruise Control Circuit**



**Fig. 13: Defoggers Circuit**





**Fig. 15: 2.0L, Engine Performance Circuit (2 of 3)**

### 3.0L



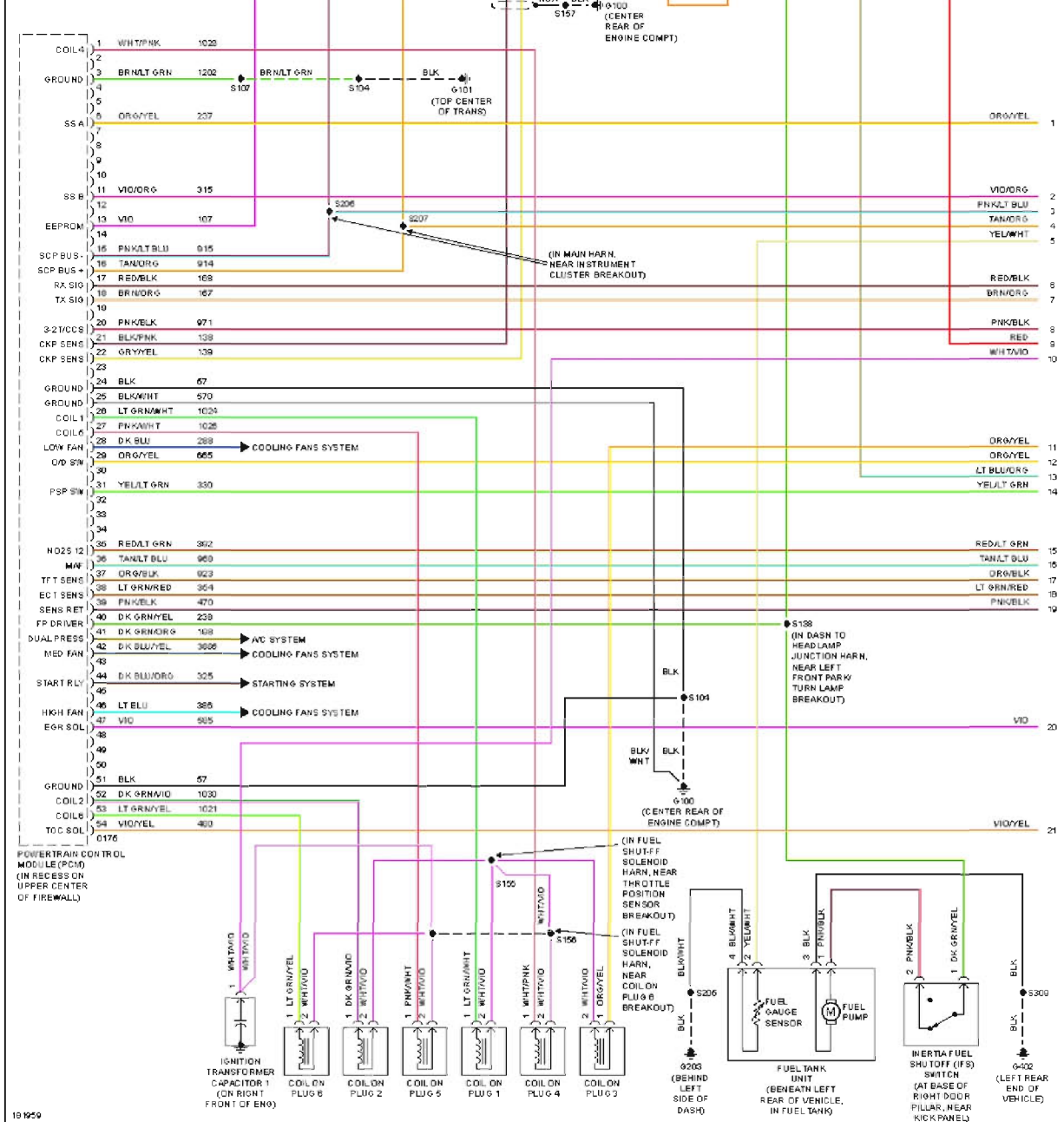


Fig. 17: 3.0L, Engine Performance Circuit (1 of 4)

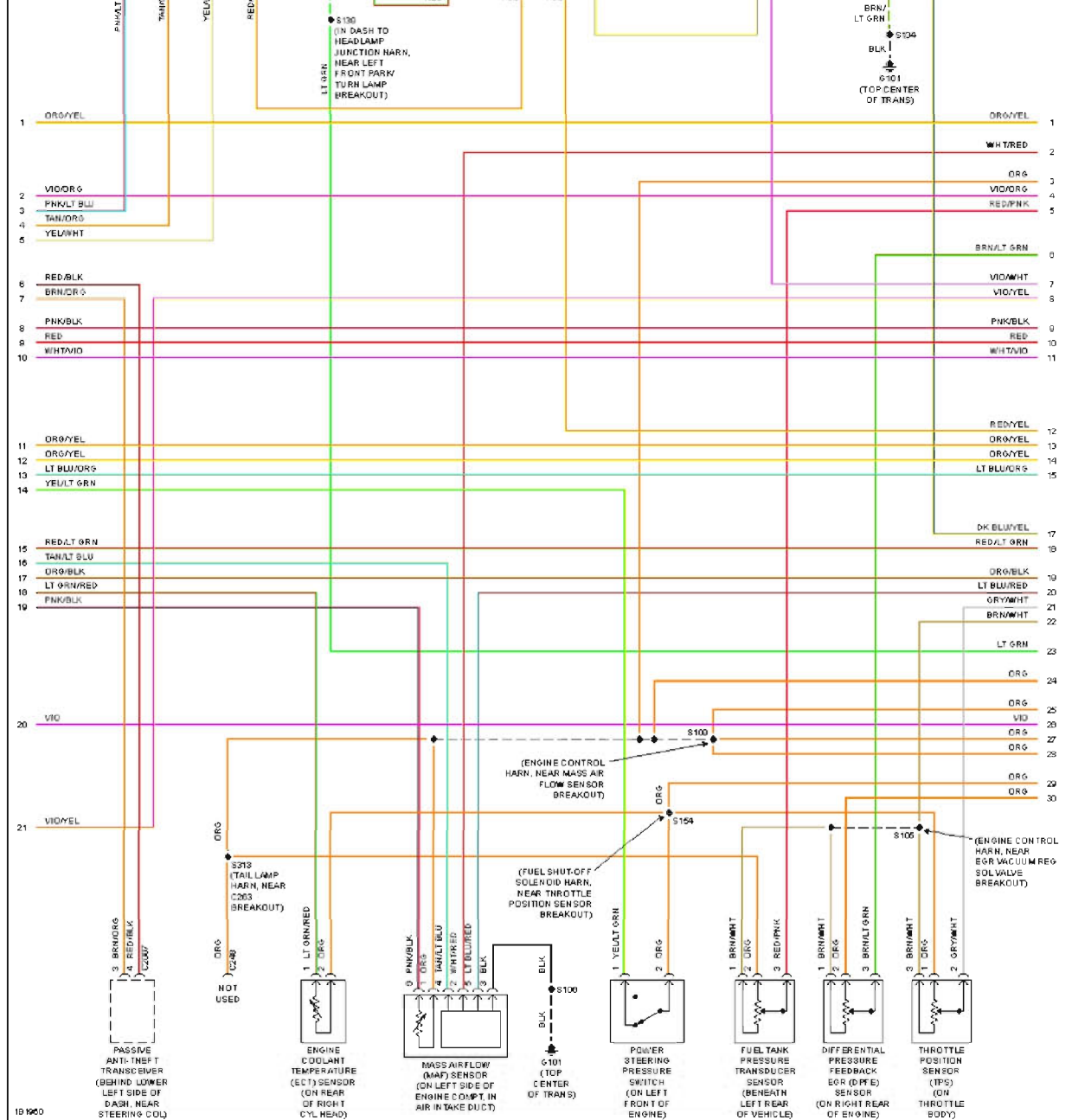


Fig. 18: 3.0L, Engine Performance Circuit (2 of 4)

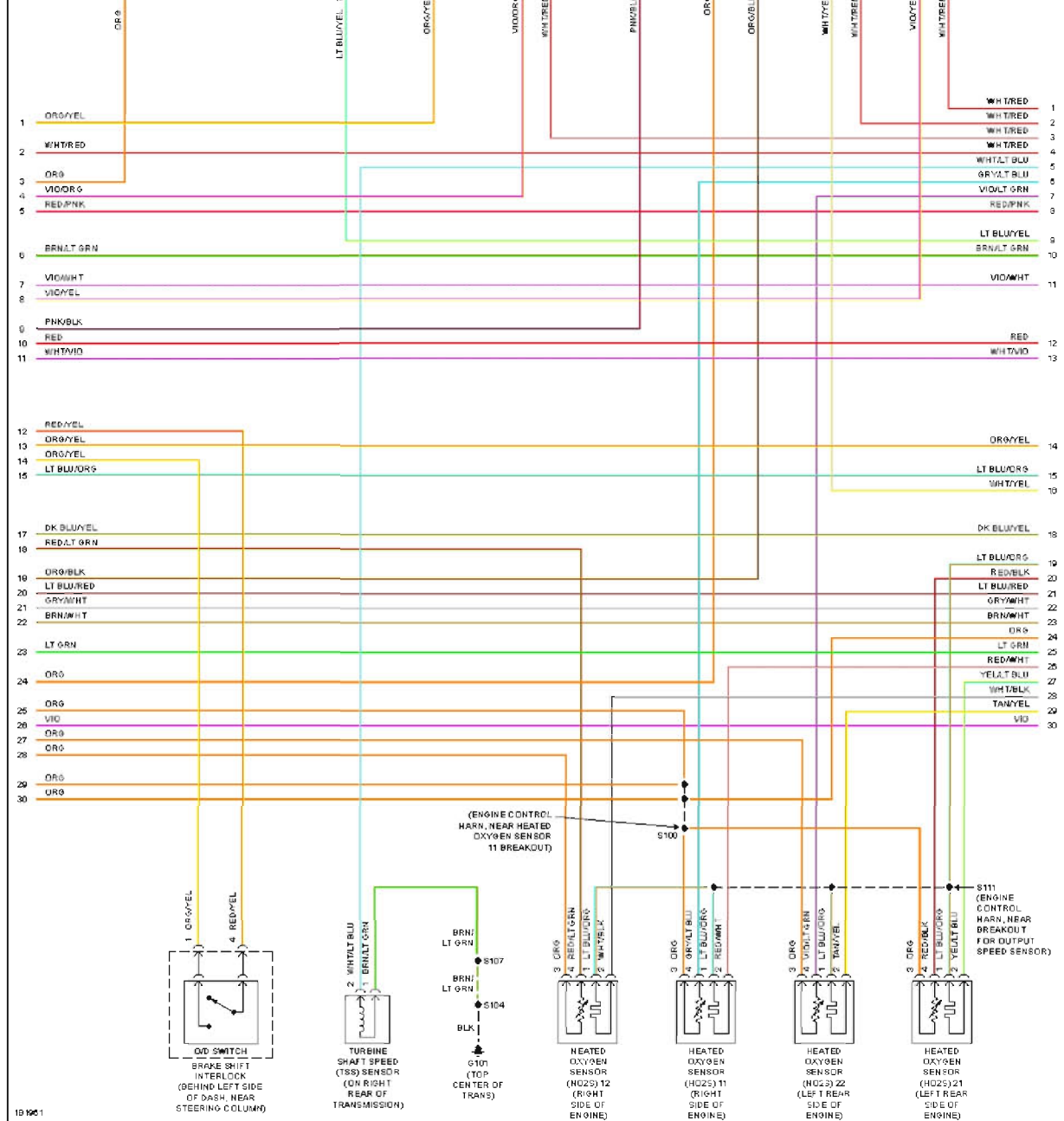


Fig. 19: 3.0L, Engine Performance Circuit (3 of 4)

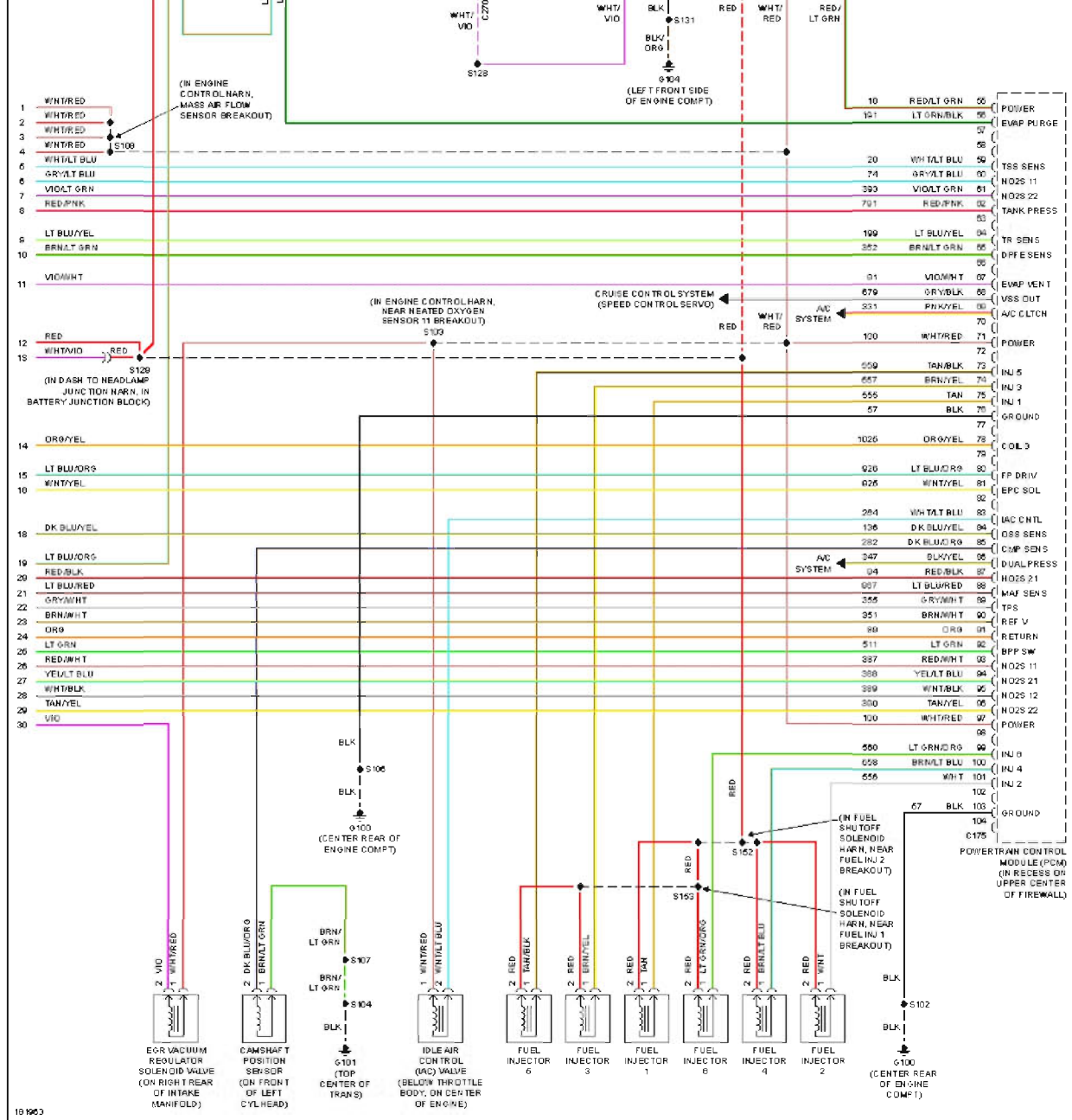
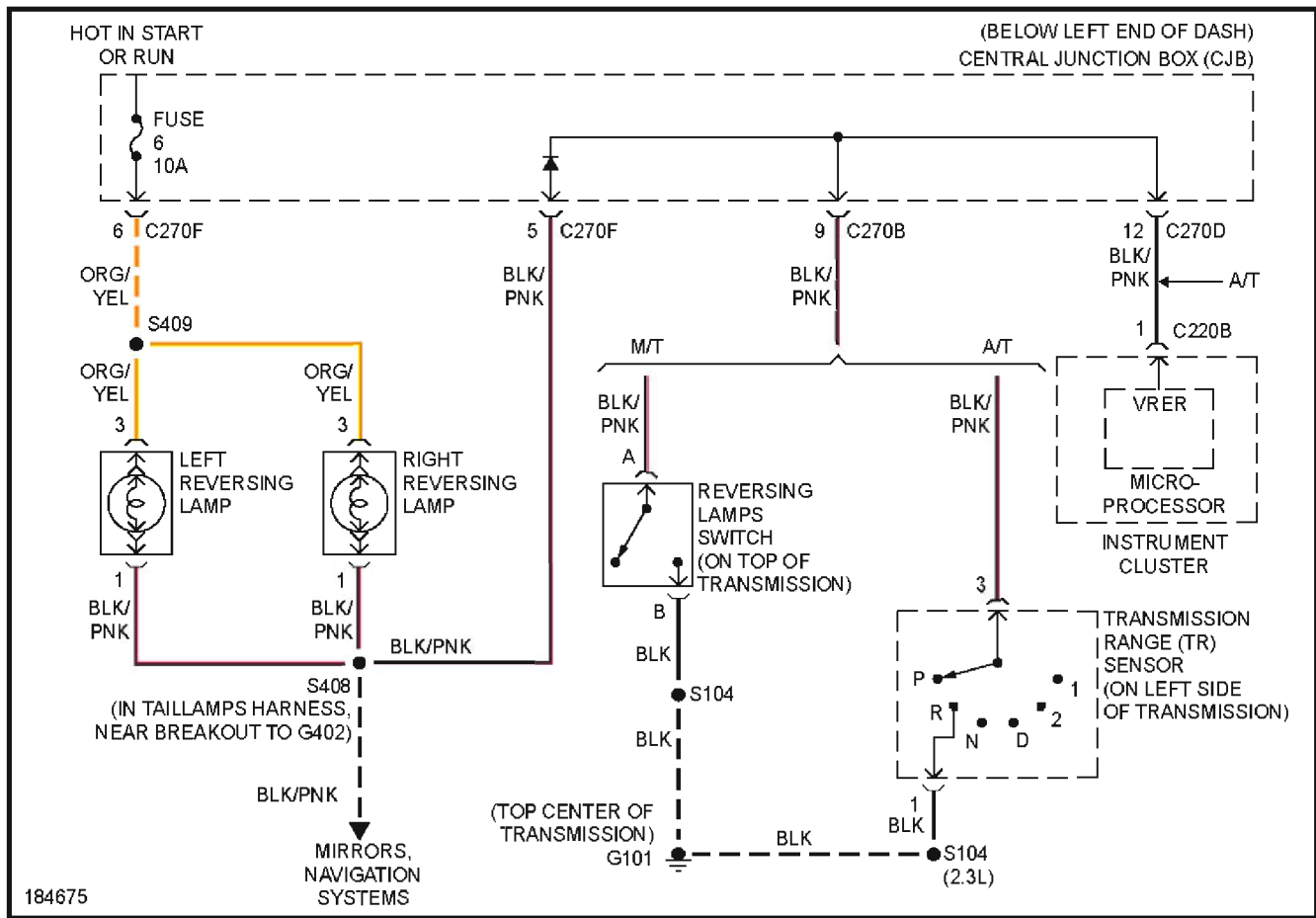
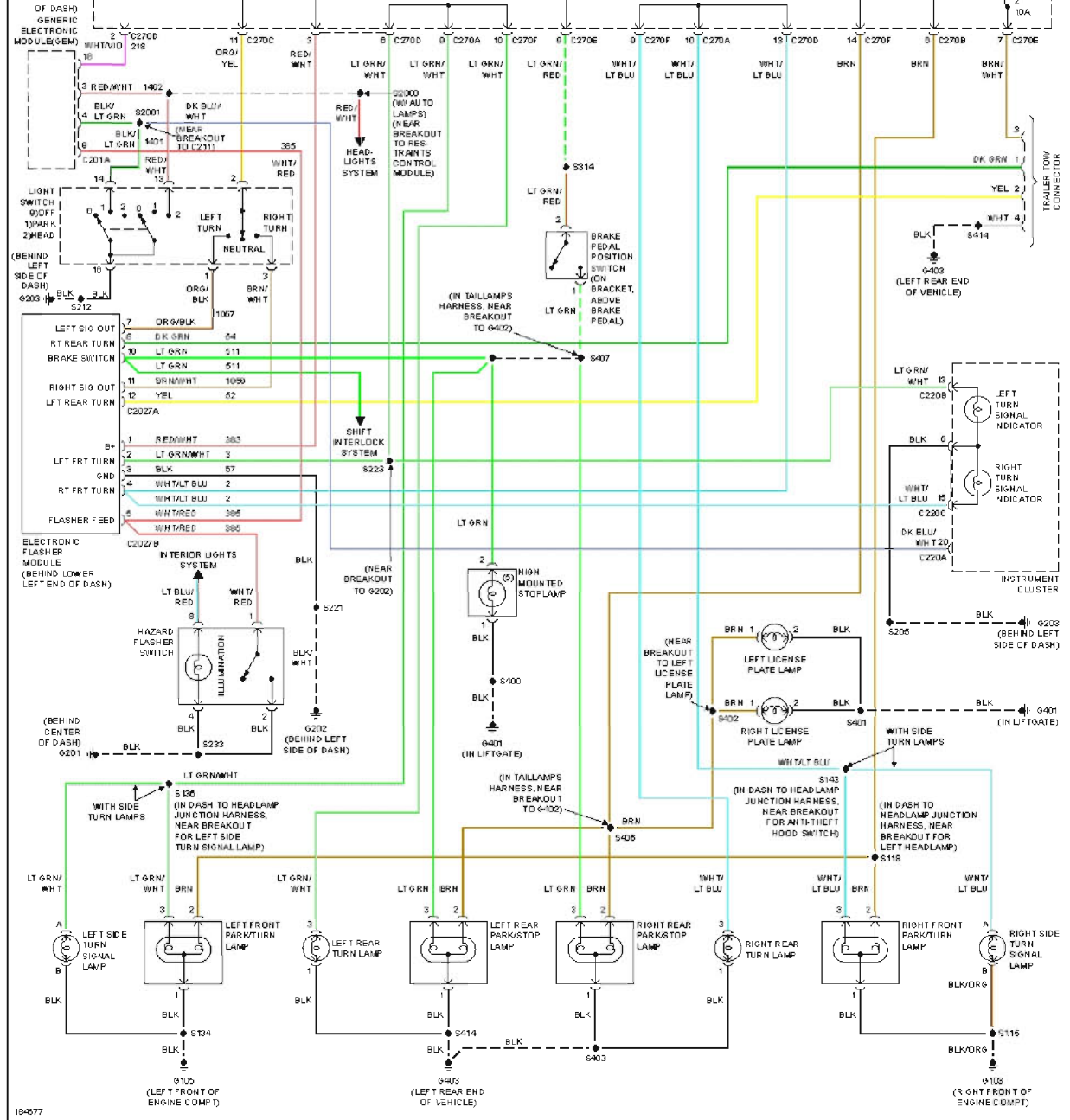


Fig. 20: 3.0L, Engine Performance Circuit (4 of 4)

## EXTERIOR LIGHTS



**Fig. 21: Back-up Lamps Circuit**



### Fig. 22: Exterior Lamps Circuit

## GROUND DISTRIBUTION

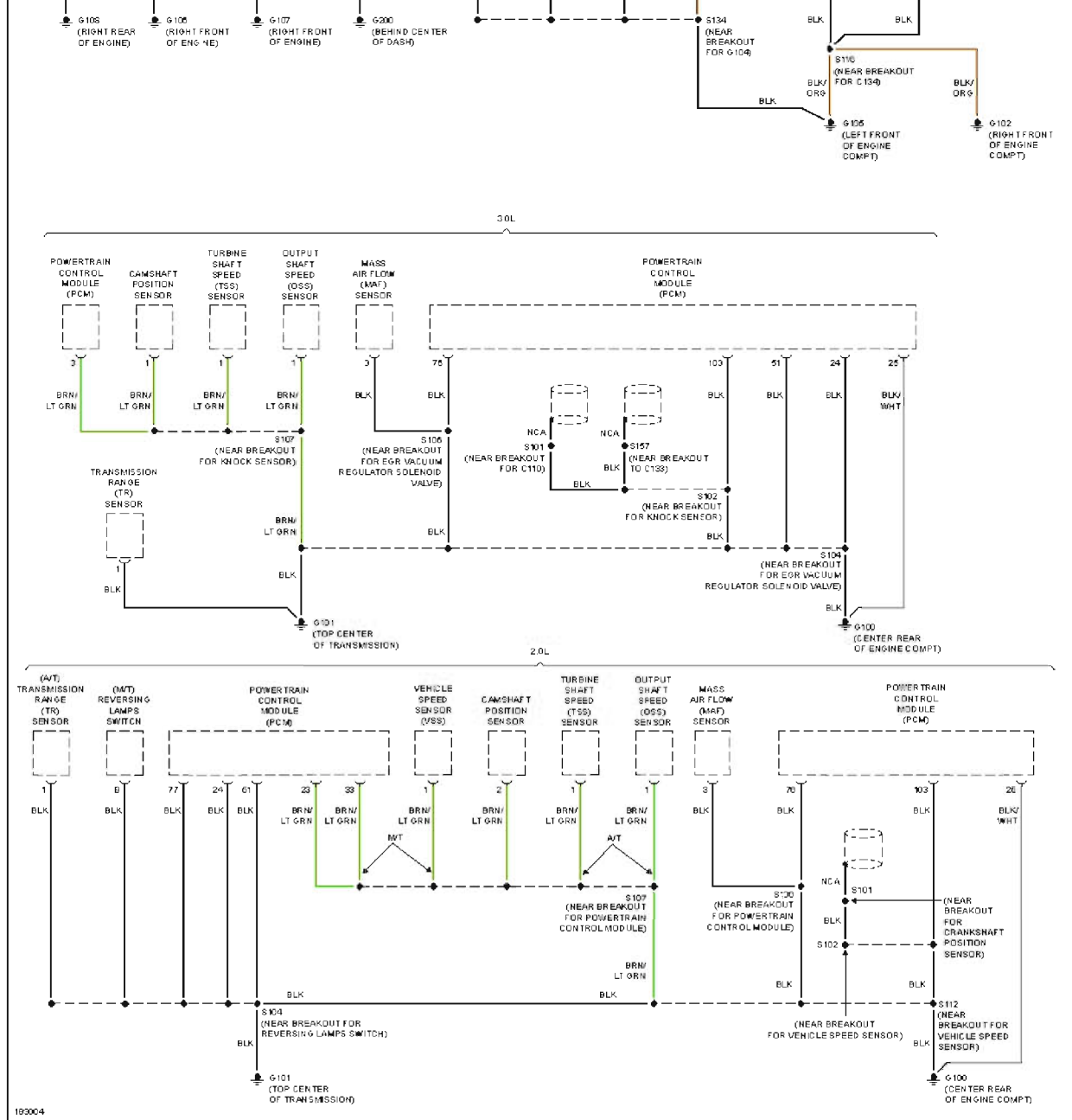


Fig. 23: Ground Distribution Circuit (1 of 3)

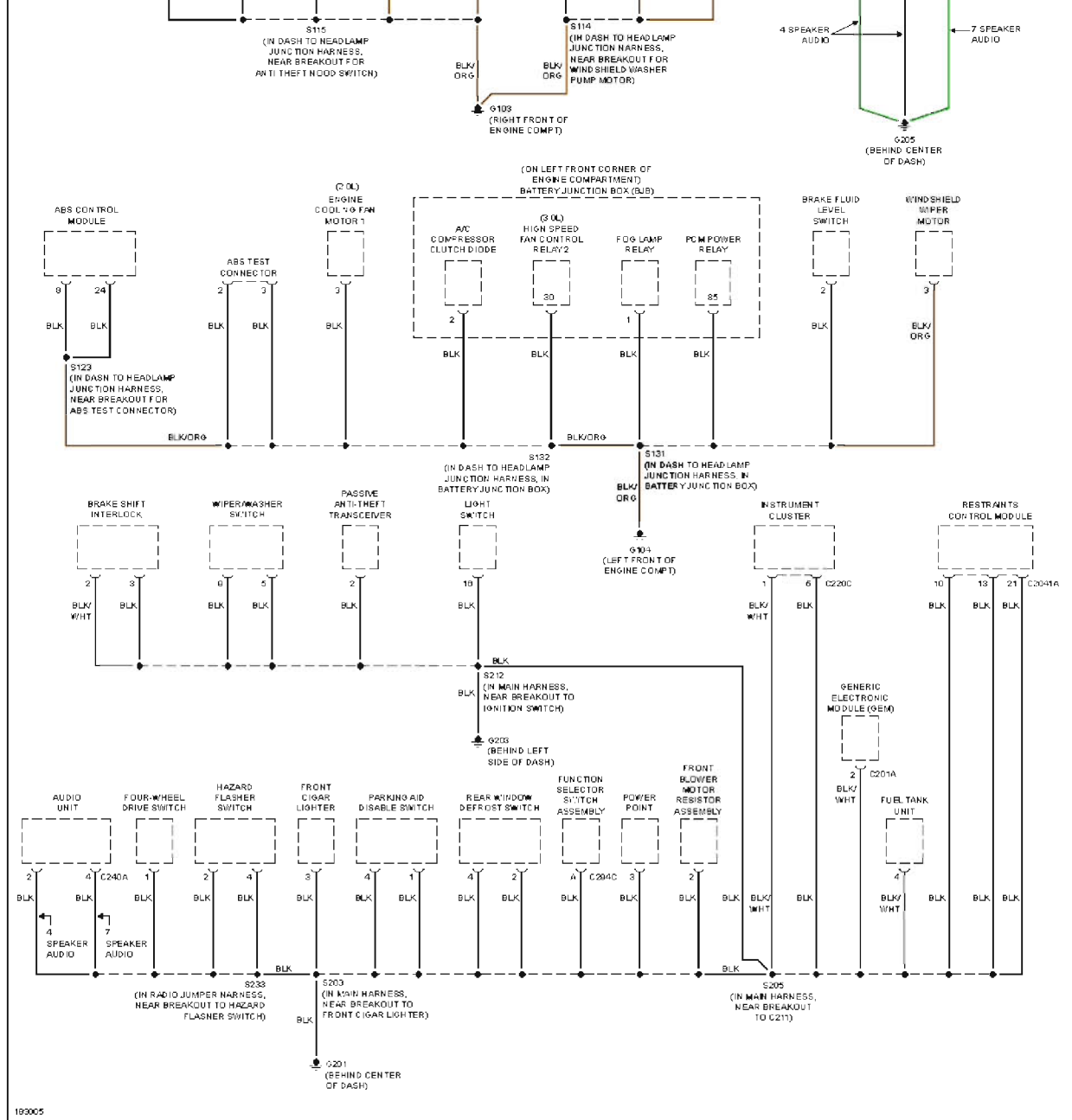


Fig. 24: Ground Distribution Circuit (2 of 3)



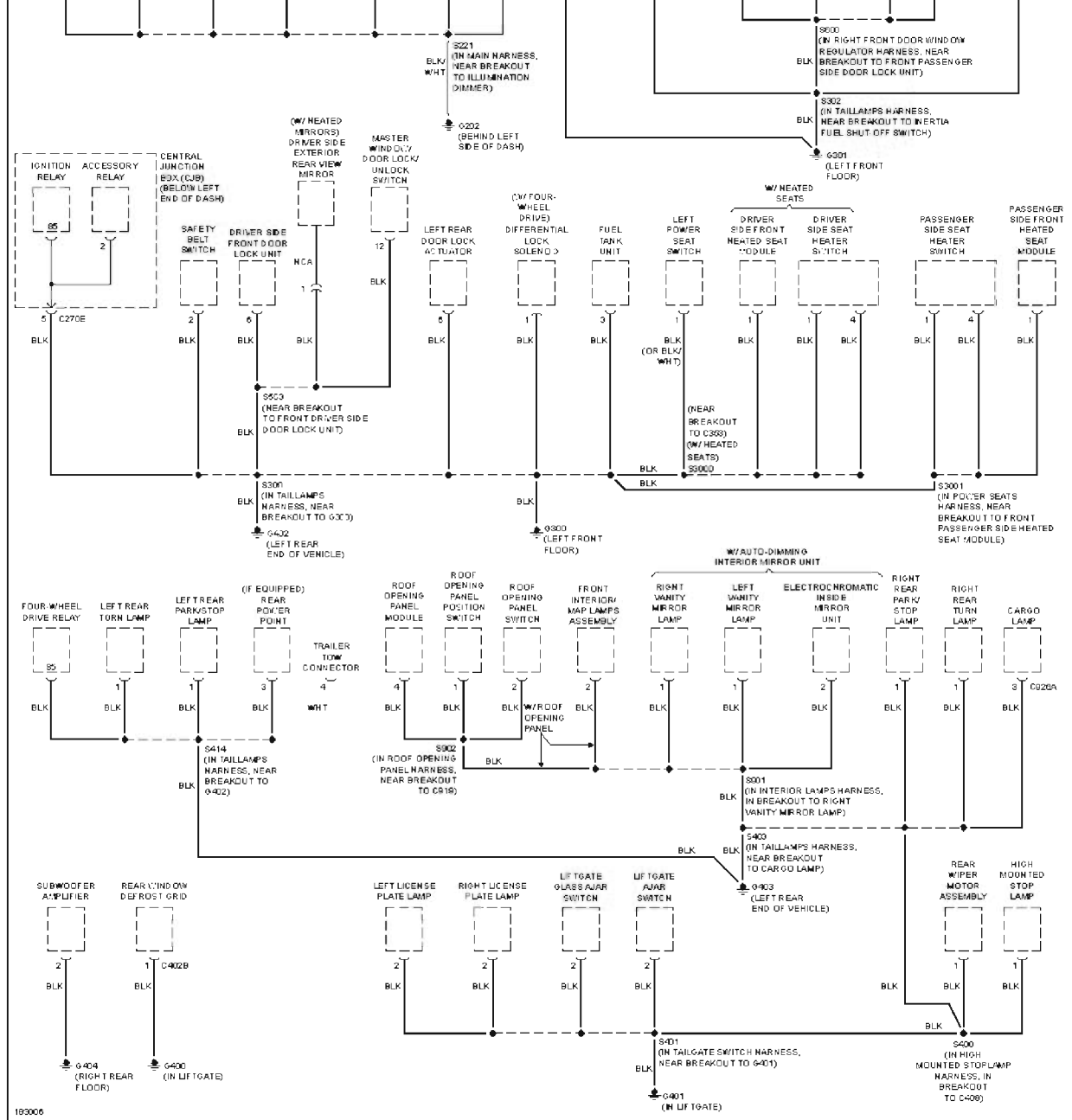
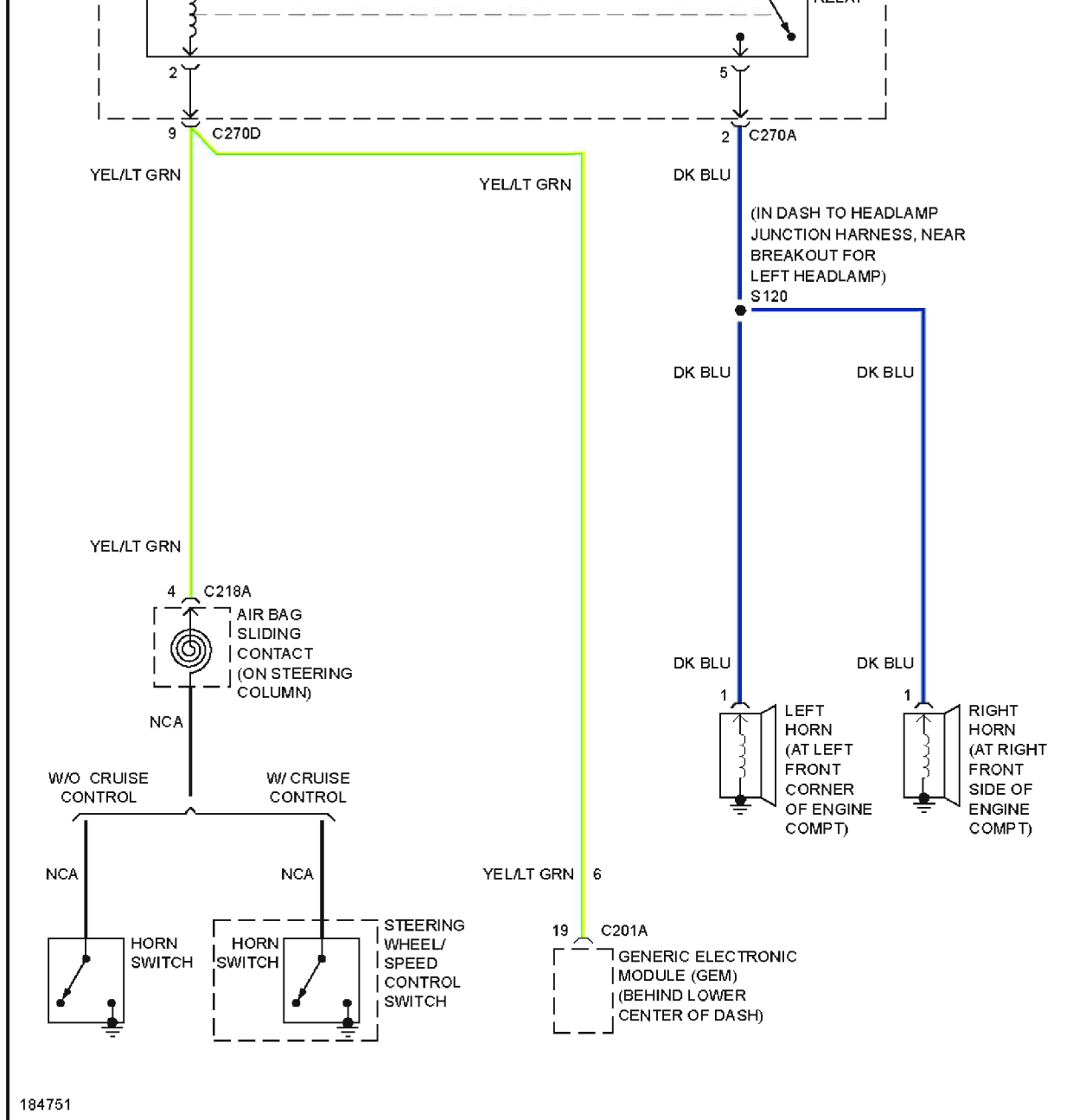


Fig. 25: Ground Distribution Circuit (3 of 3)

## HEADLIGHTS

**Fig. 26: Headlights Circuit, W/ DRL**

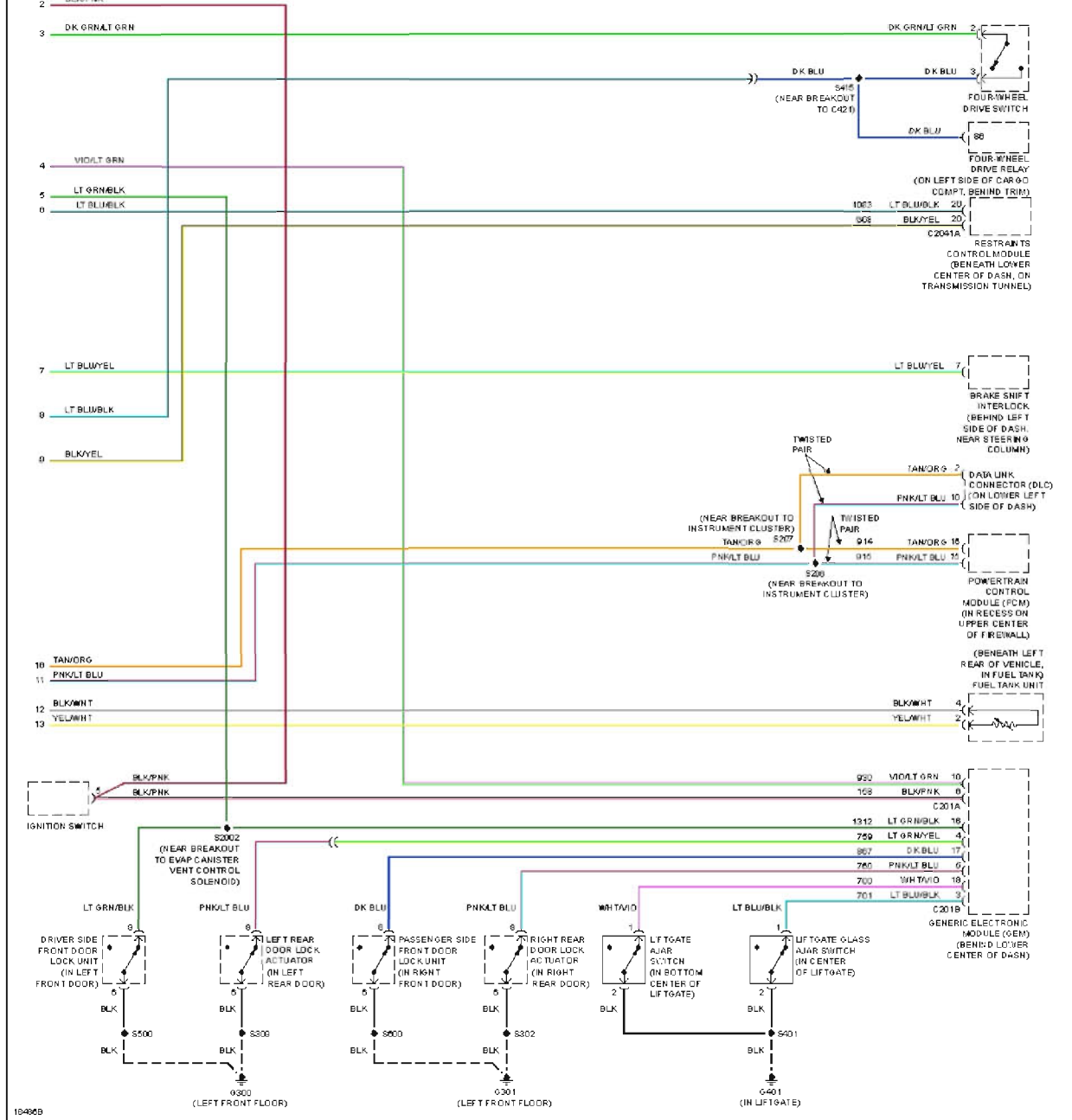
# HORN



**Fig. 28: Horn Circuit**

## INSTRUMENT CLUSTER





**Fig. 30: Instrument Cluster Circuit (2 of 2)**

## INTERIOR LIGHTS

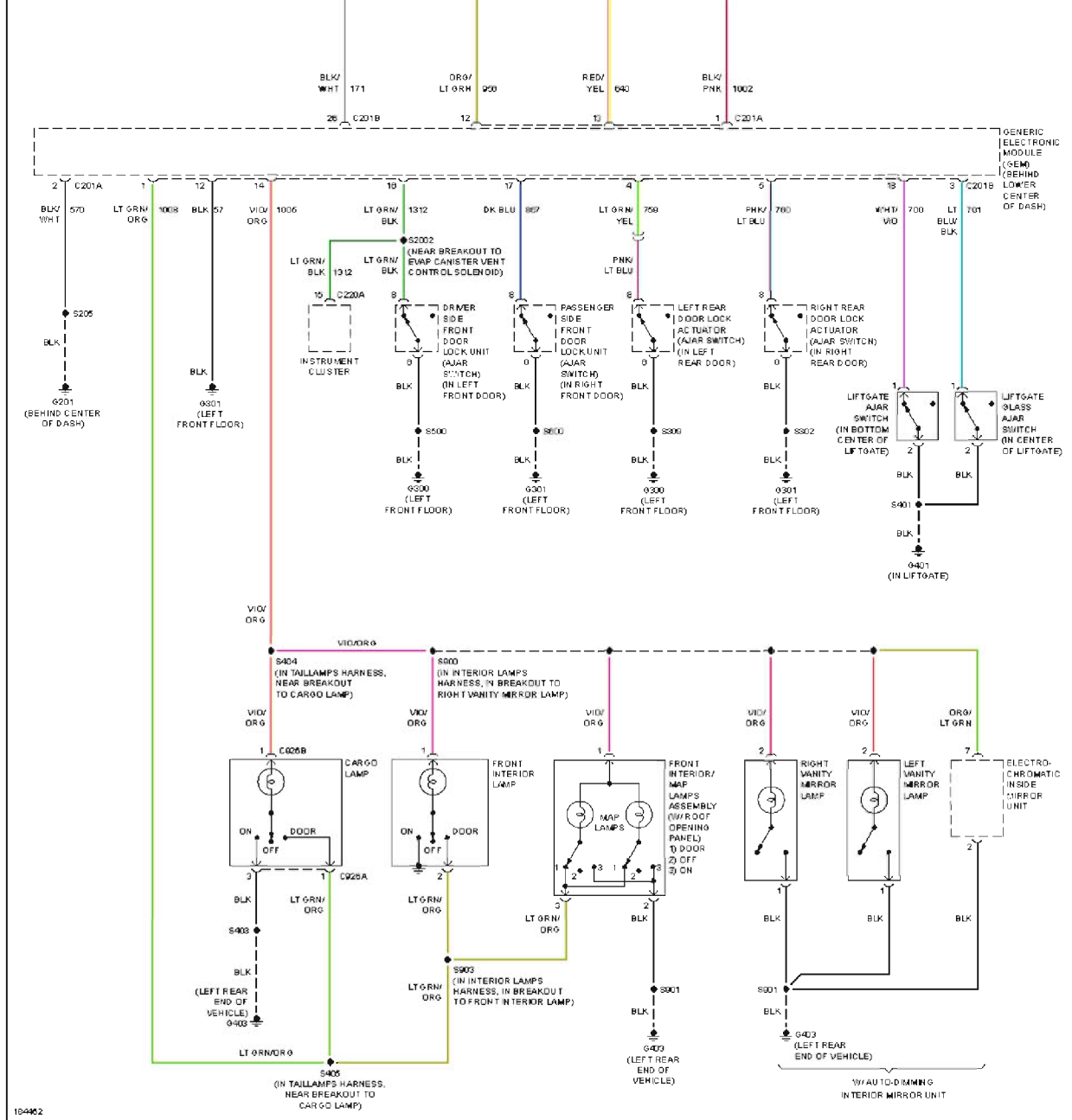
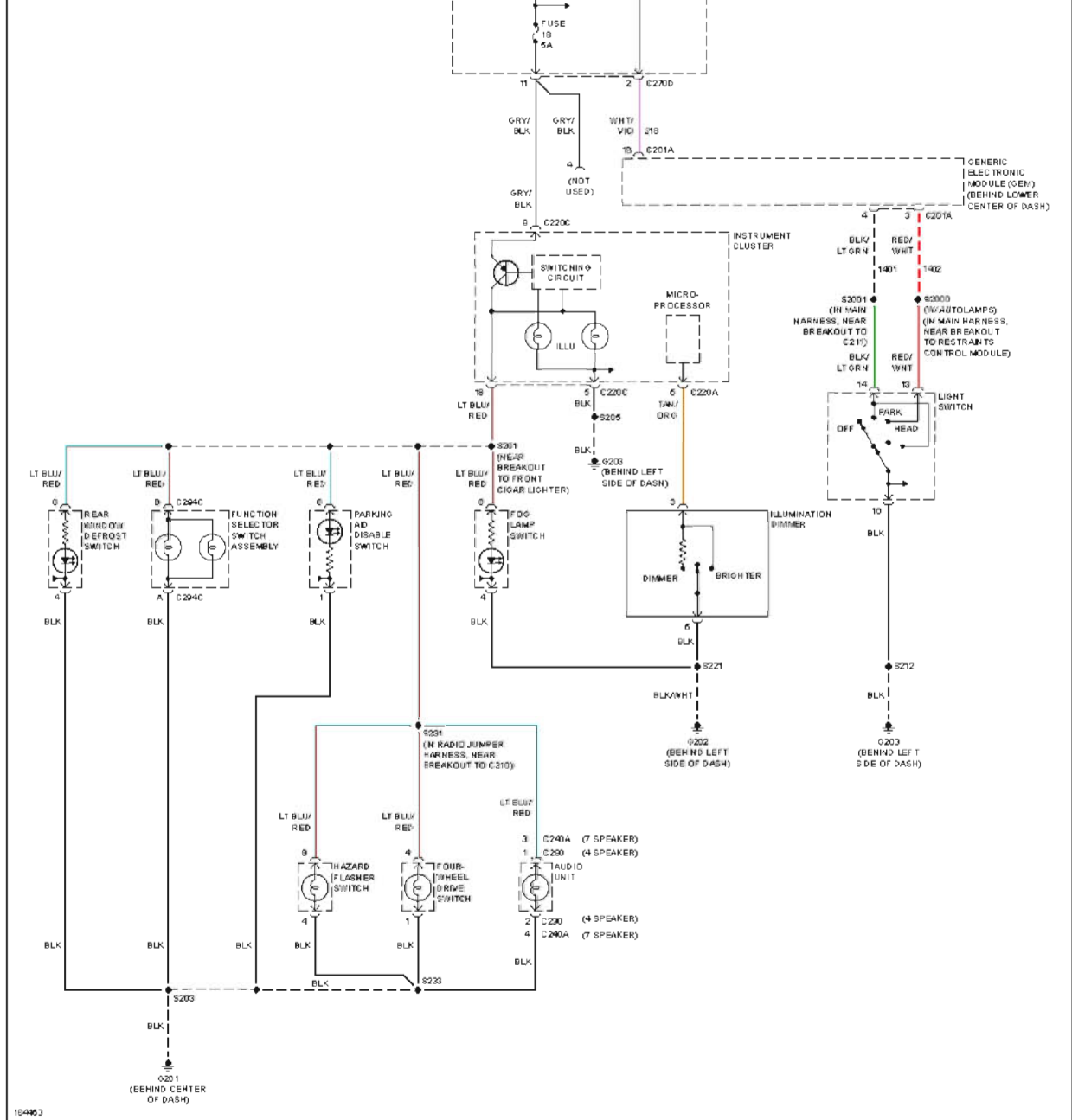
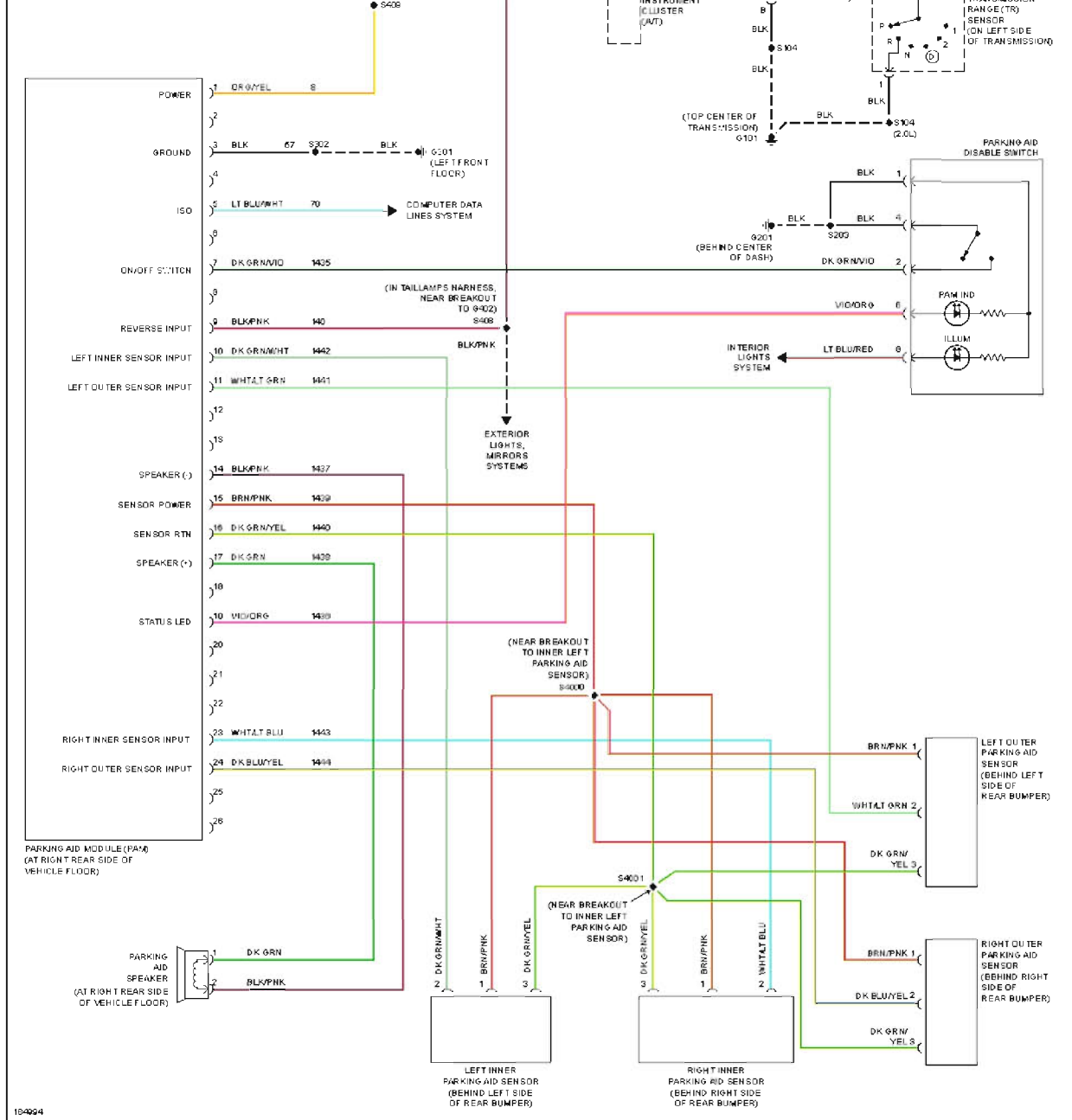


Fig. 31: Courtesy Lamps Circuit



**Fig. 32: Instrument Illumination Circuit**

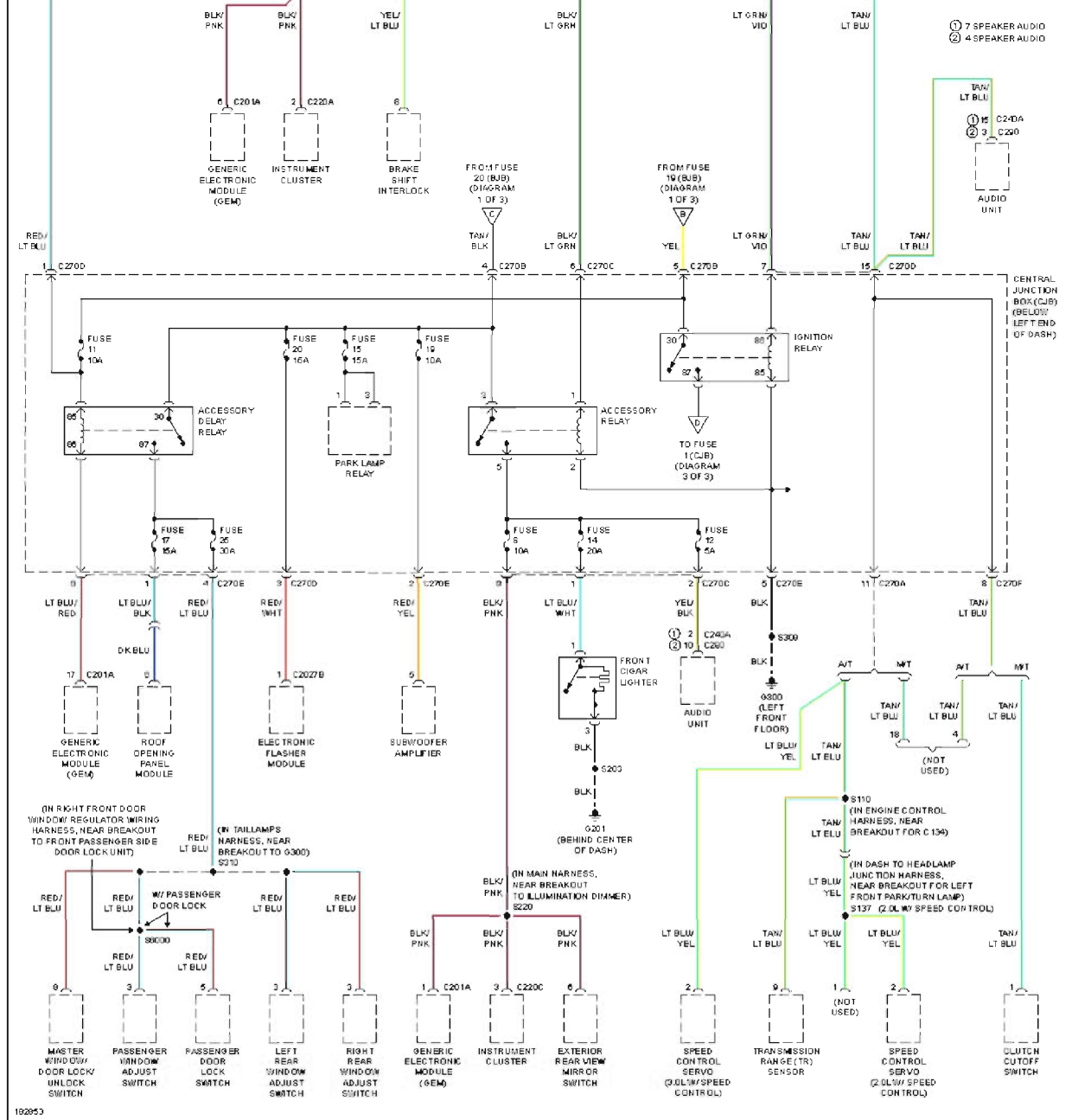




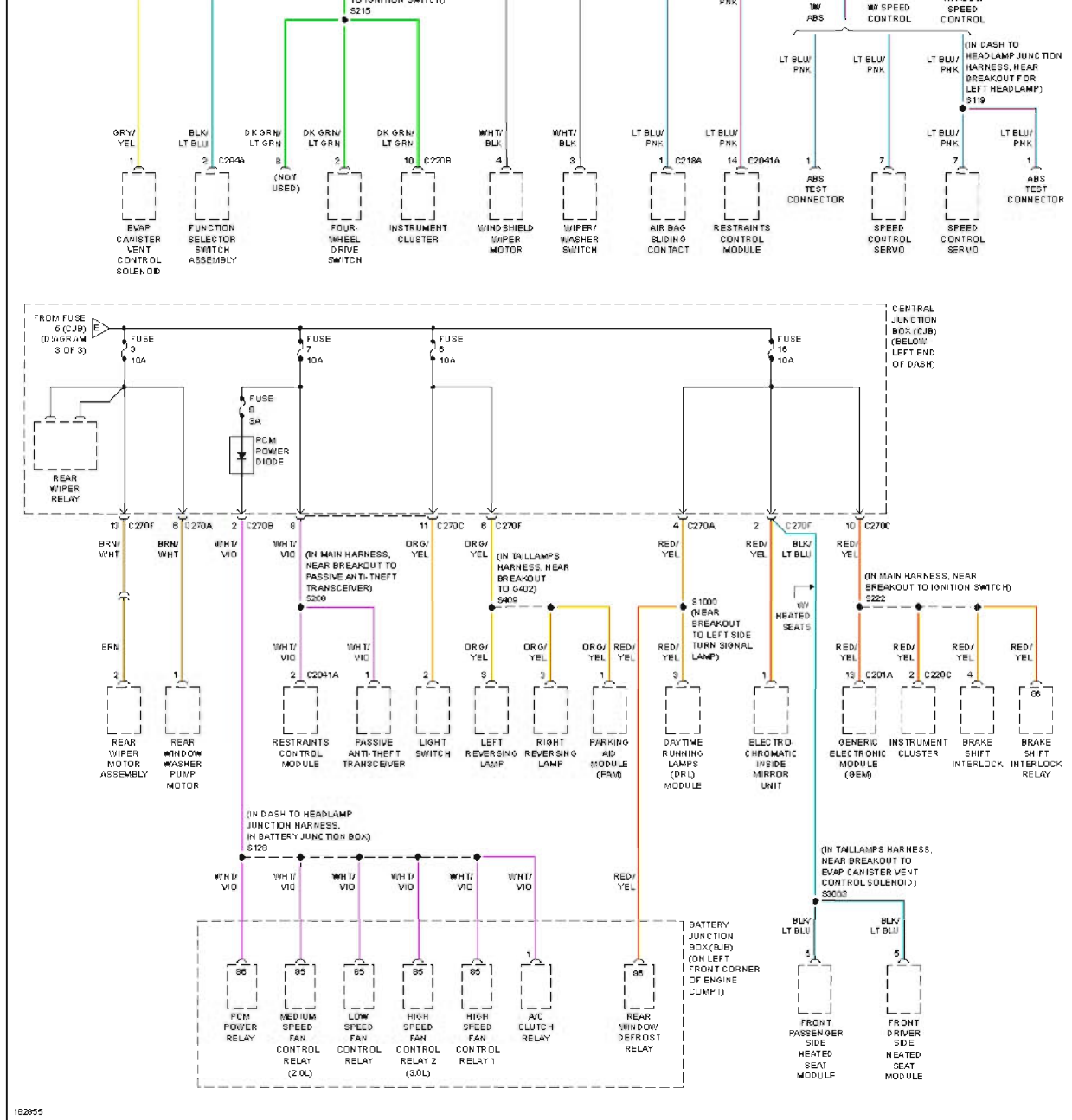
**Fig. 33: Parking Assistant Circuit**

## POWER DISTRIBUTION





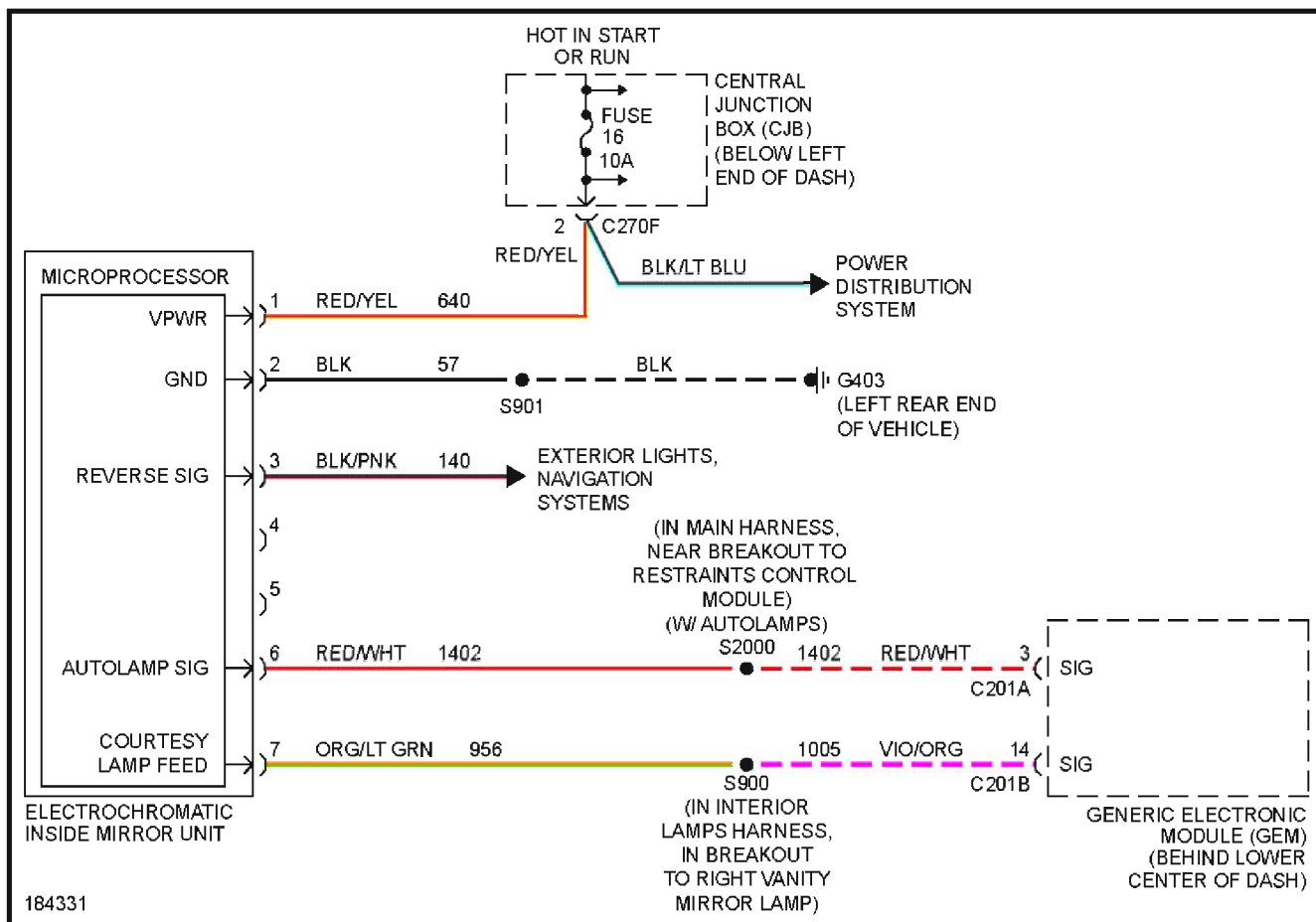
**Fig. 35: Power Distribution Circuit (2 of 3)**



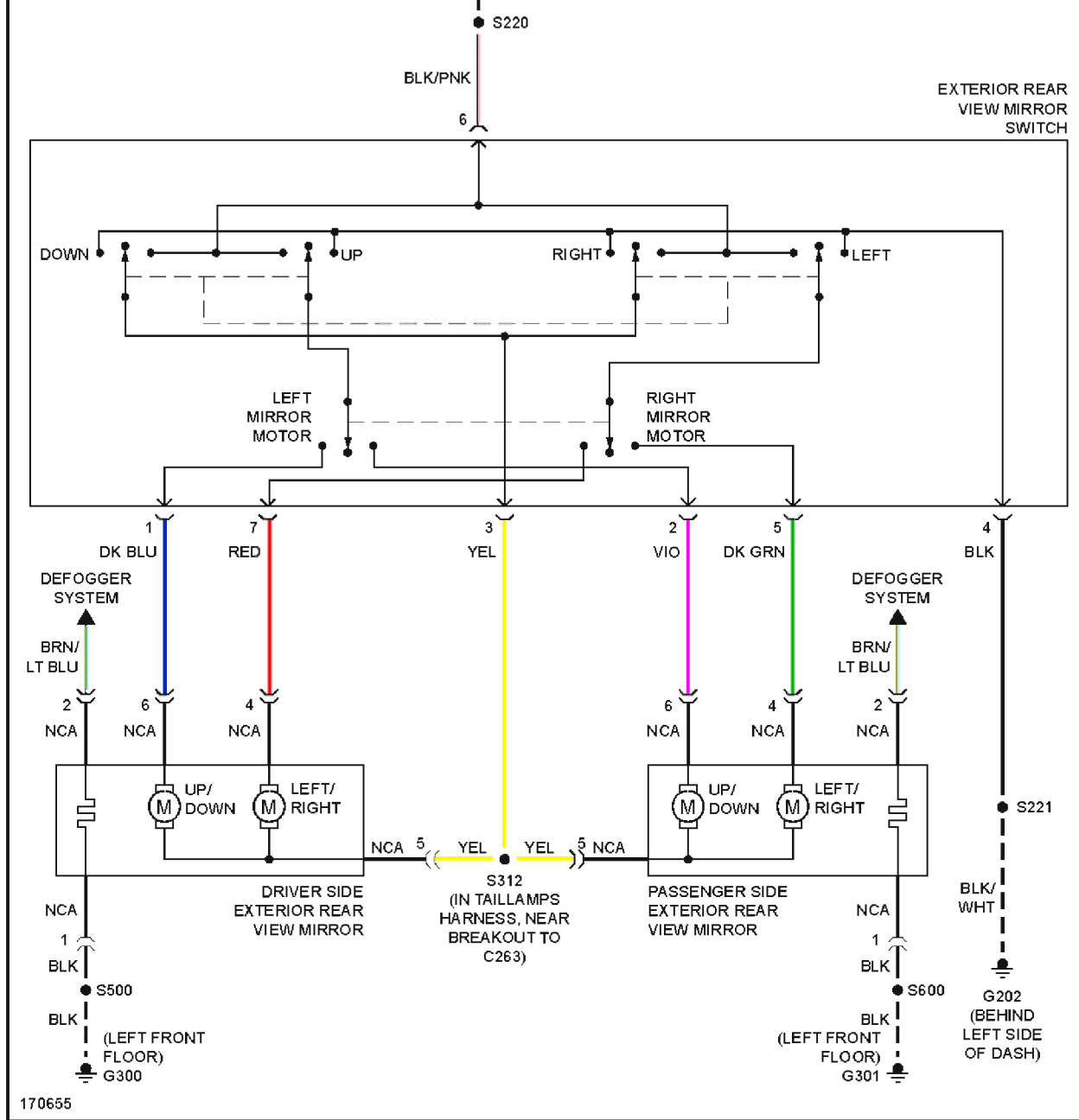
**Fig. 36: Power Distribution Circuit (3 of 3)**

## POWER DOOR LOCKS

## POWER MIRRORS

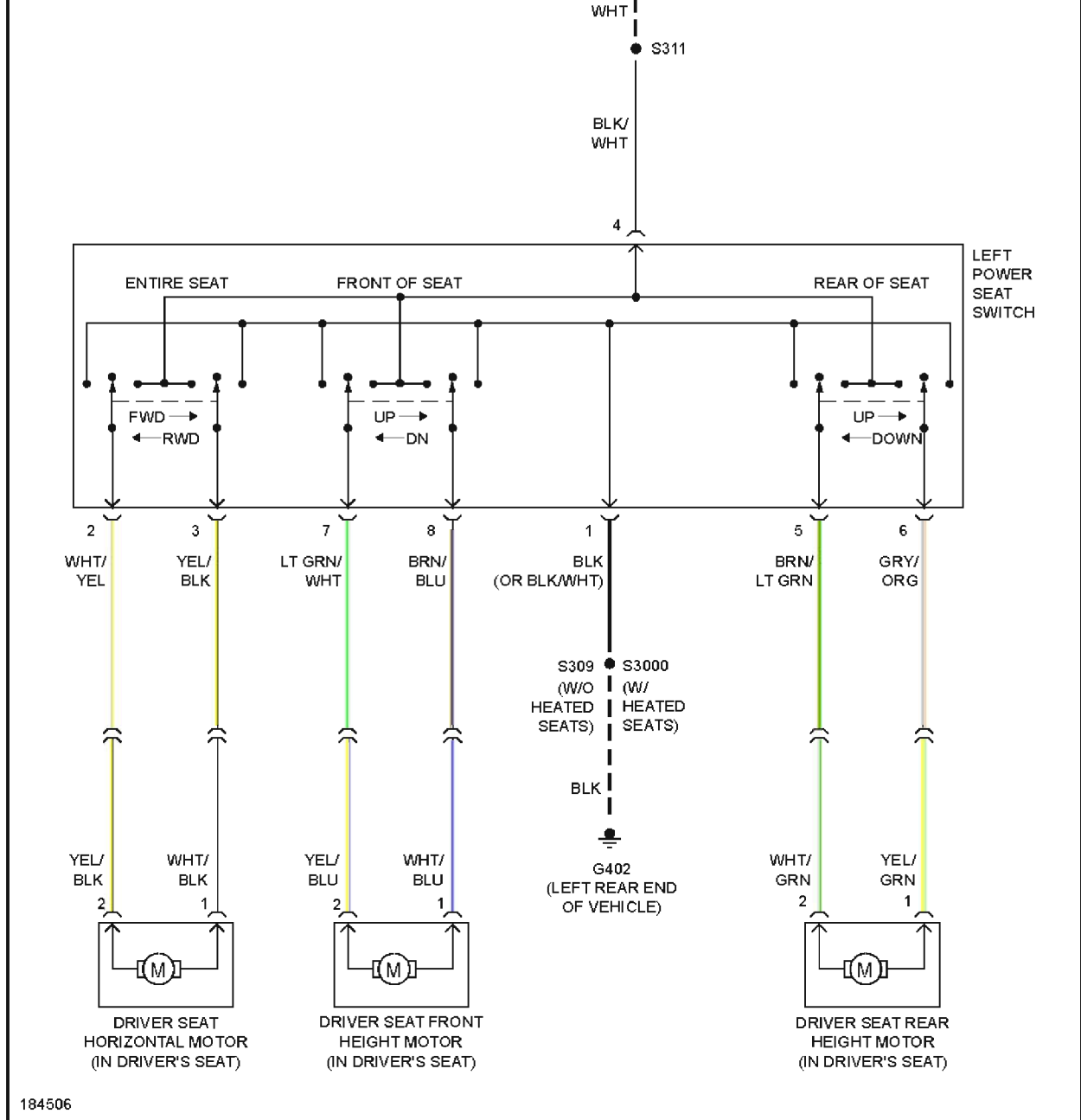


**Fig. 38: Electronic Day/Night Mirror Circuit**



**Fig. 39: Power Mirrors Circuit**

## POWER SEATS



184506

**Fig. 40: Driver Seat Circuit**



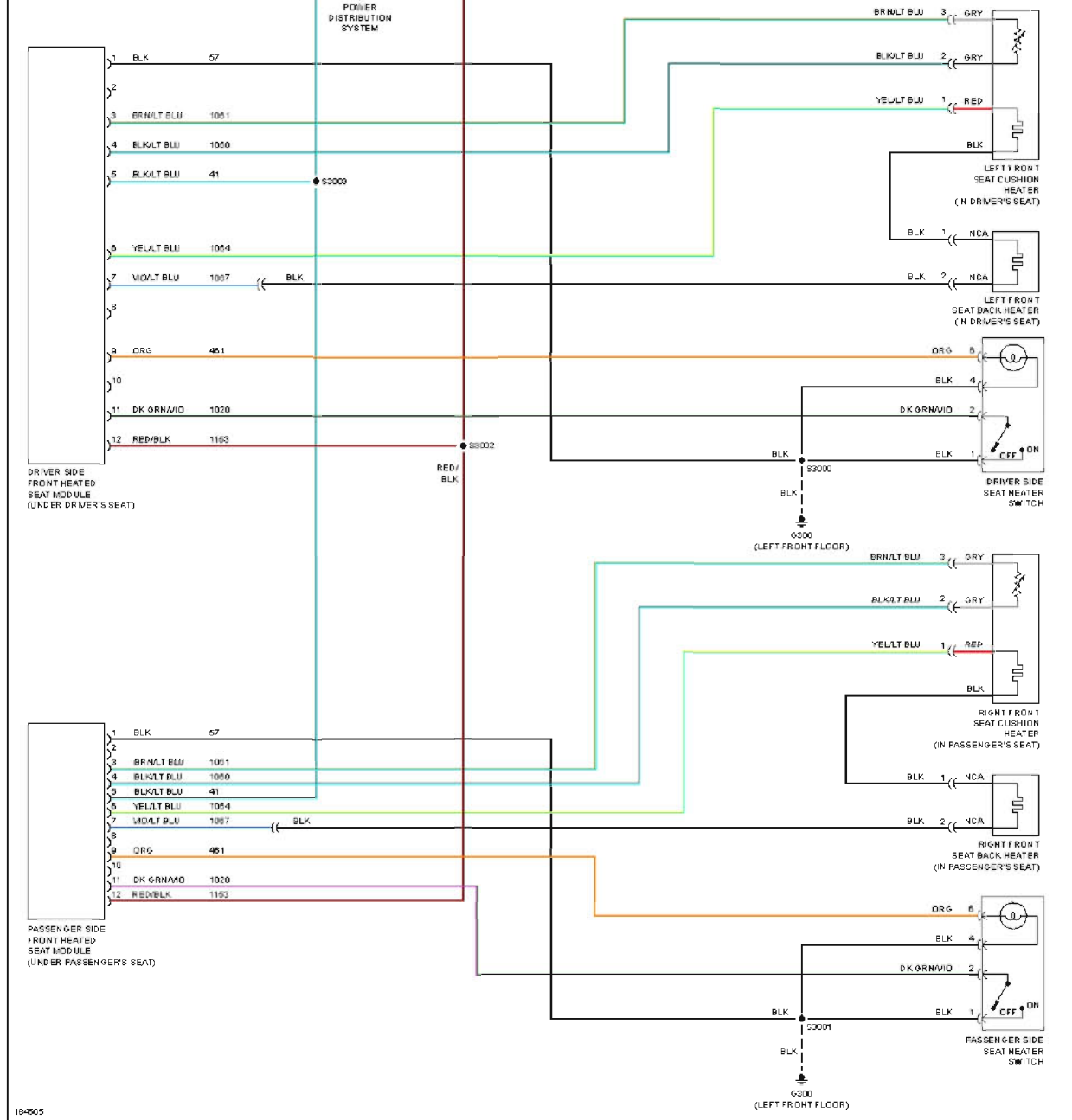
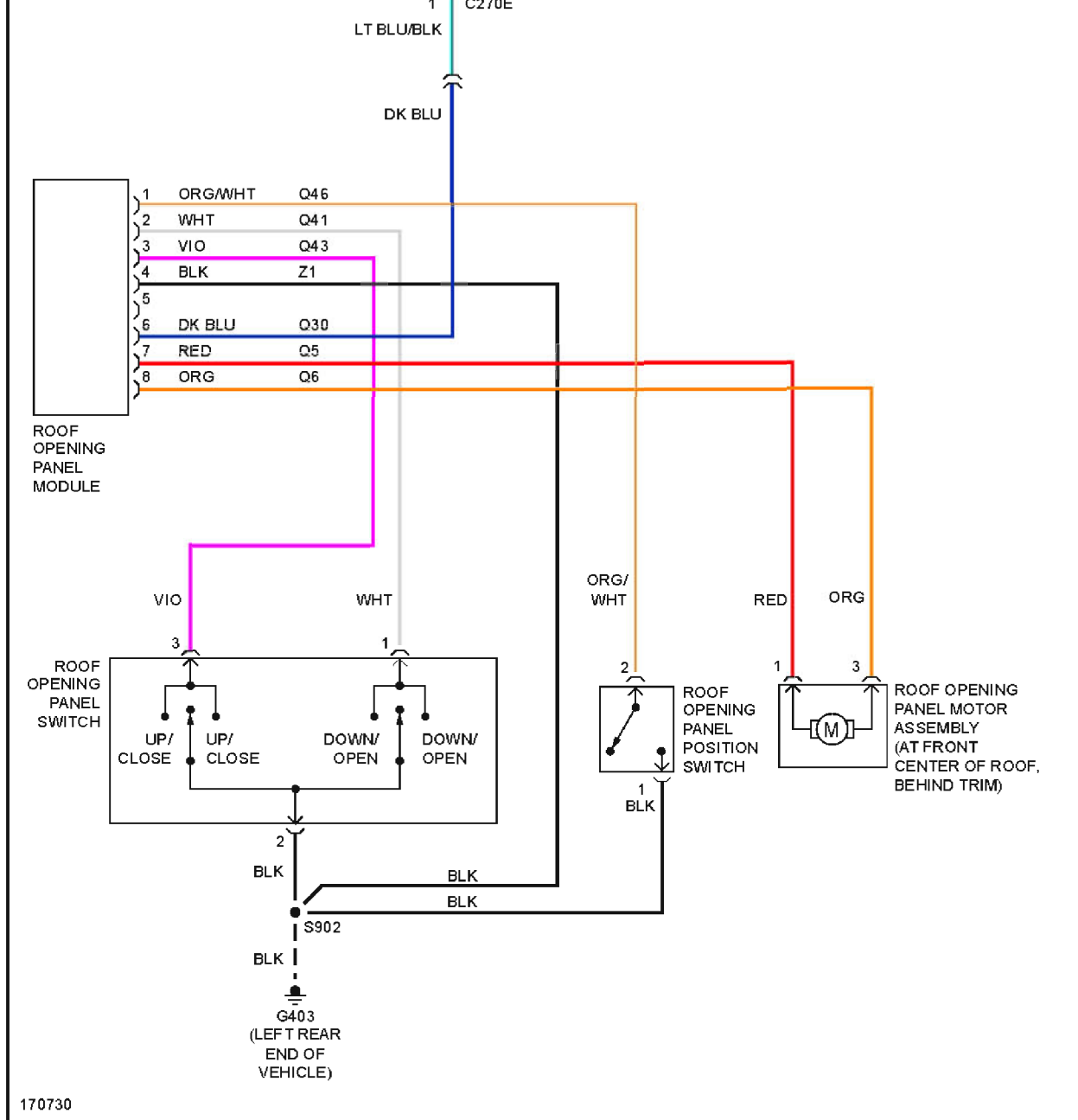


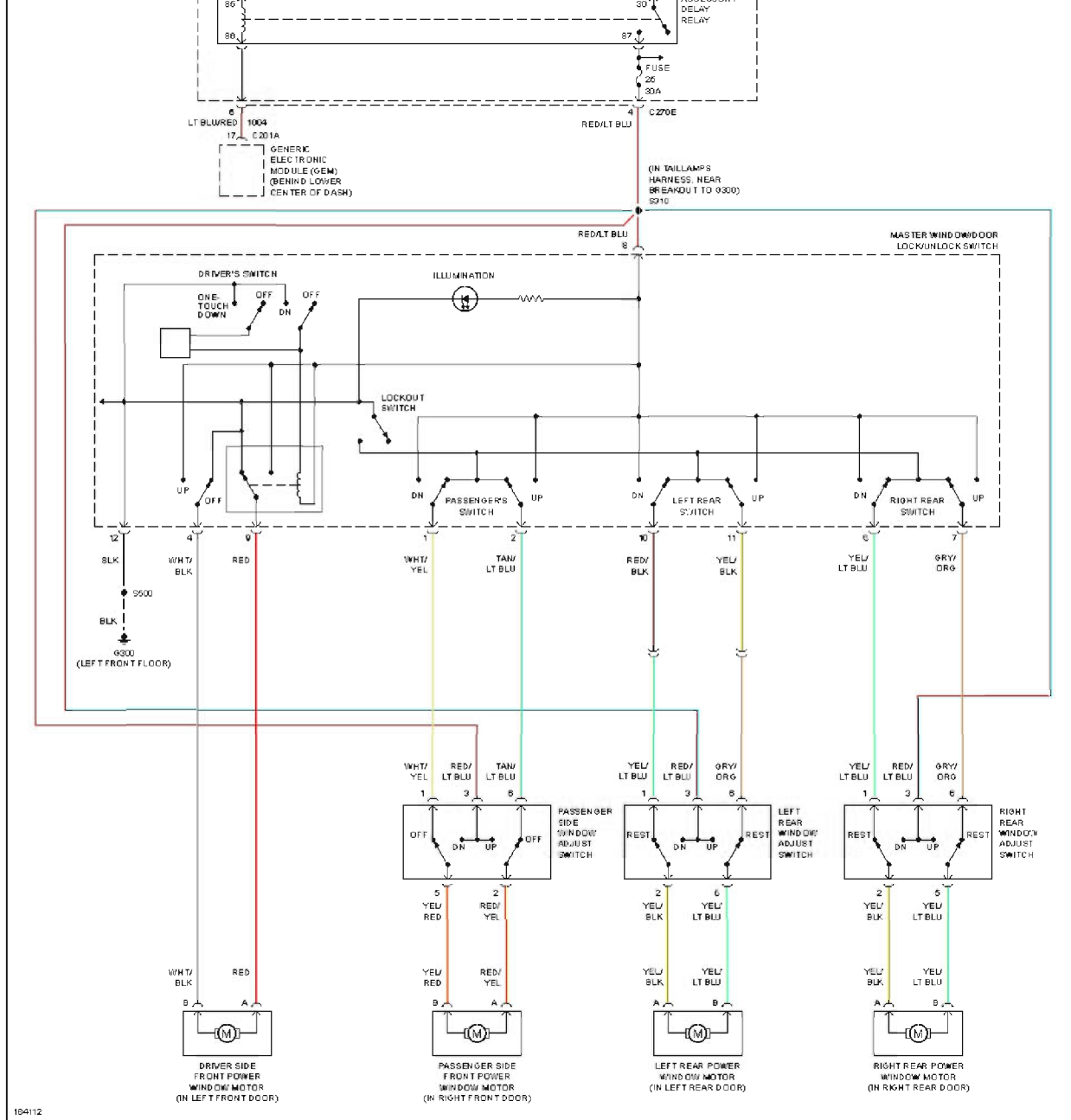
Fig. 41: Heated Seats Circuit

POWER TOP/SUNROOF



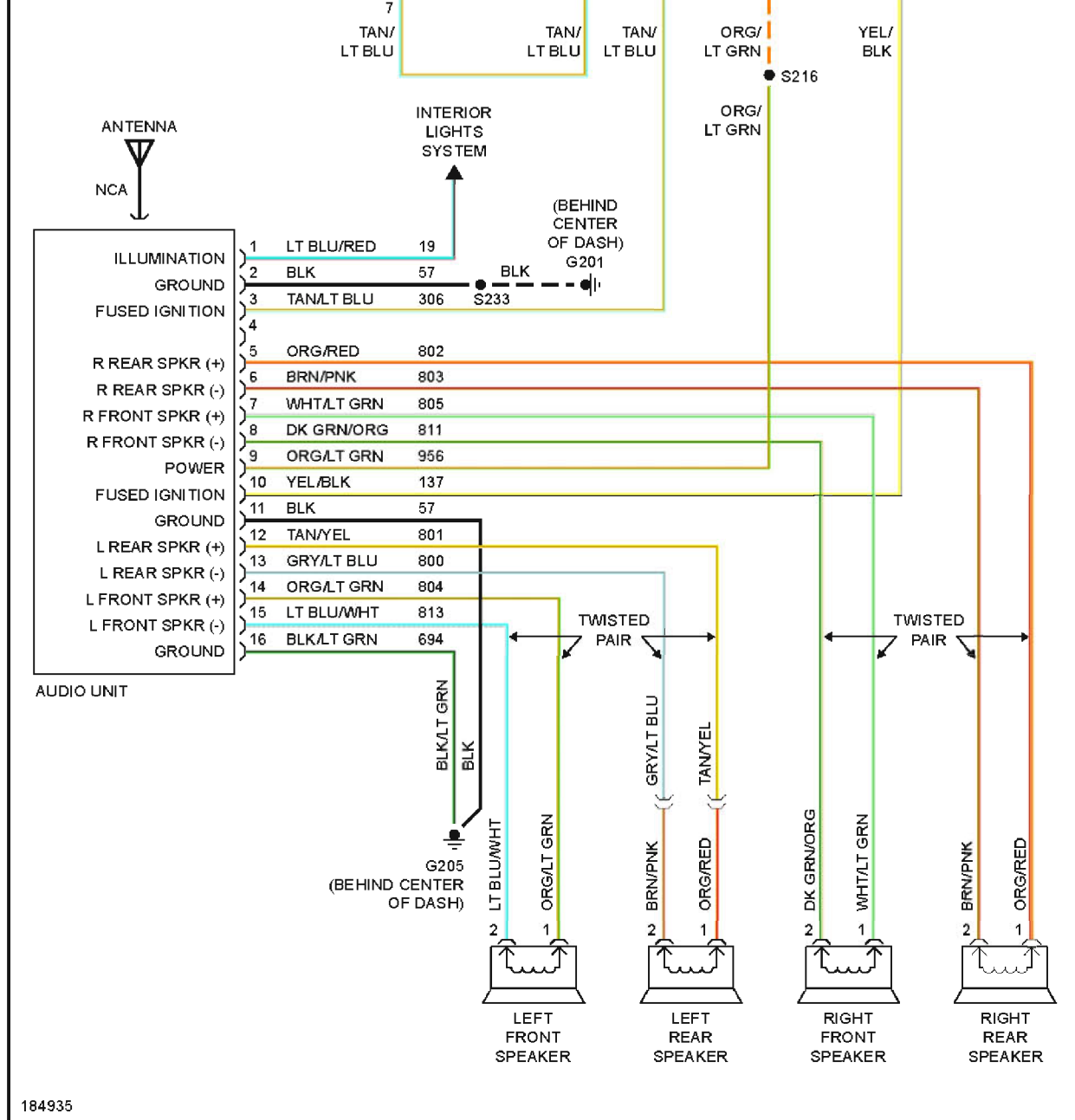
**Fig. 42: Power Top/Sunroof Circuit**

## POWER WINDOWS

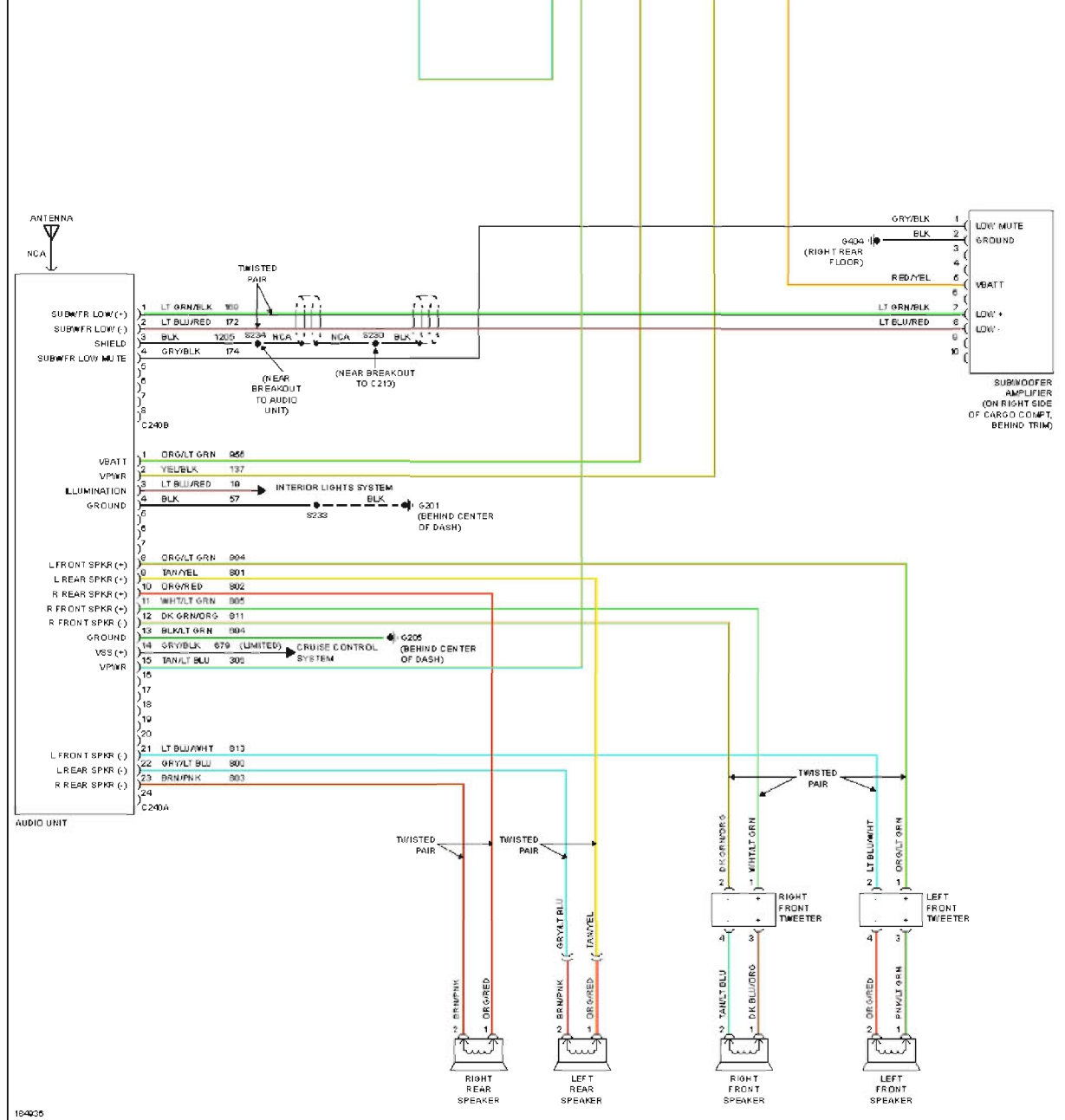


**Fig. 43: Power Windows Circuit**

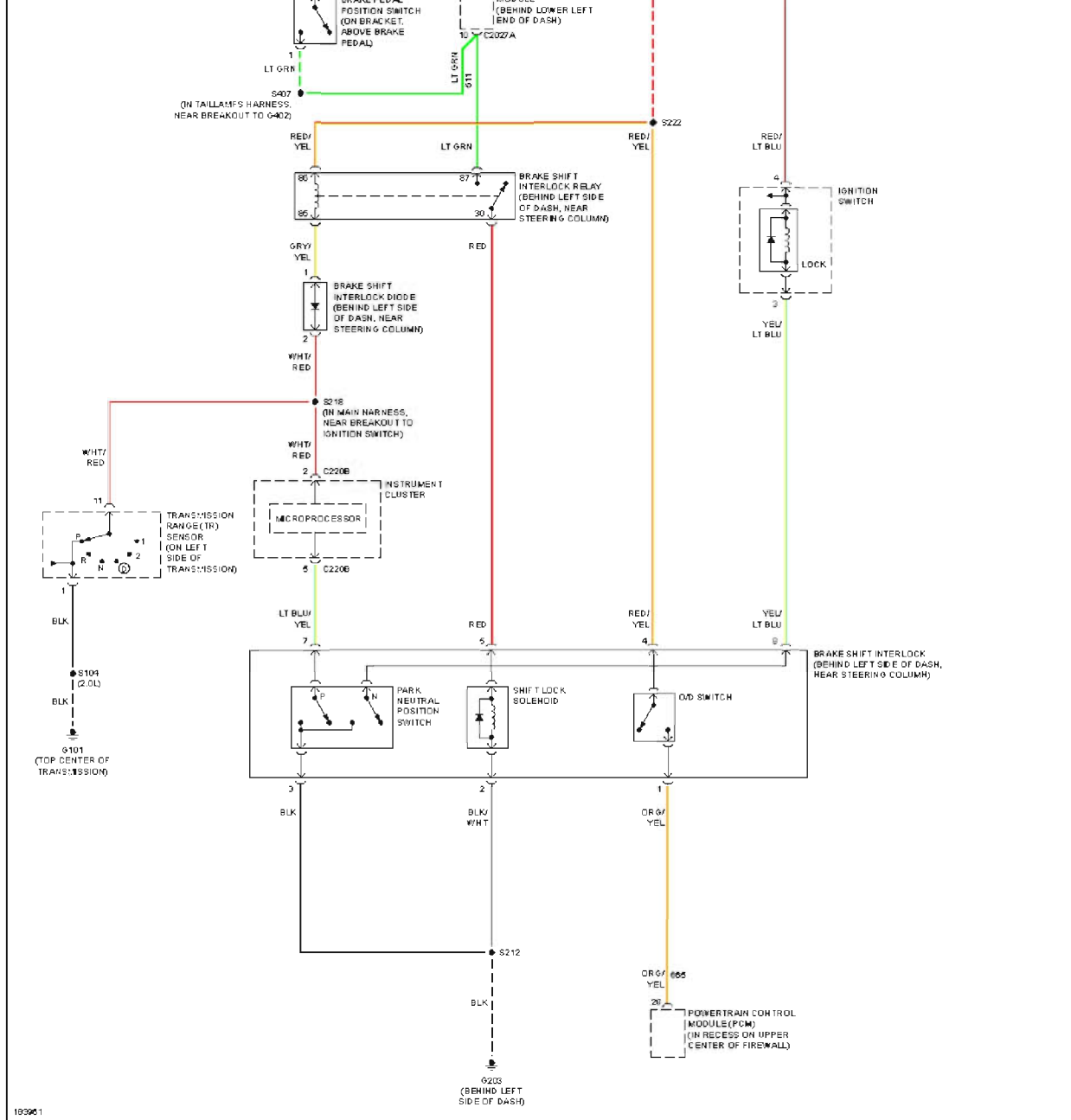
**RADIO**



**Fig. 44: Base Radio Circuit**

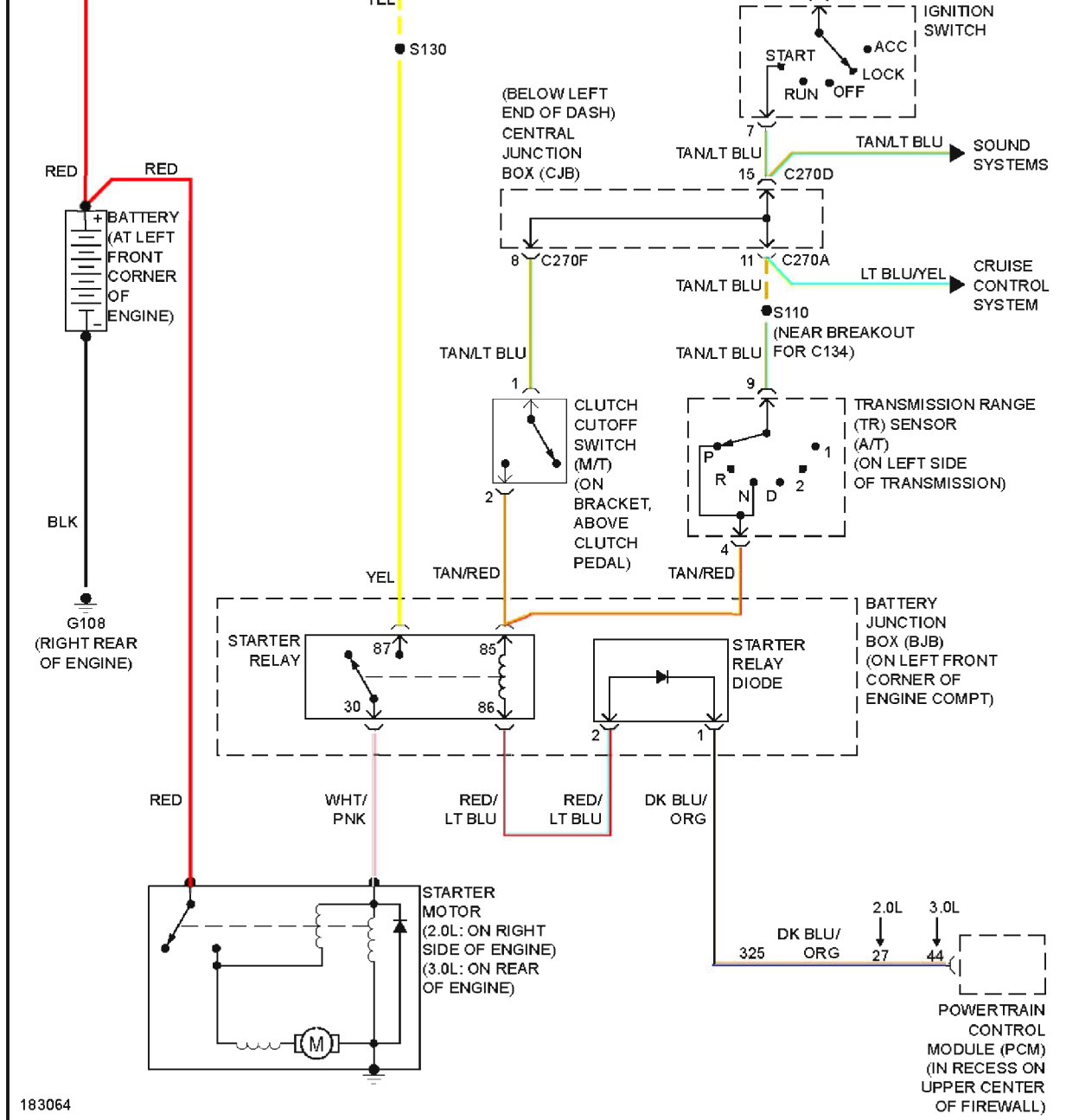


## SHIFT INTERLOCK

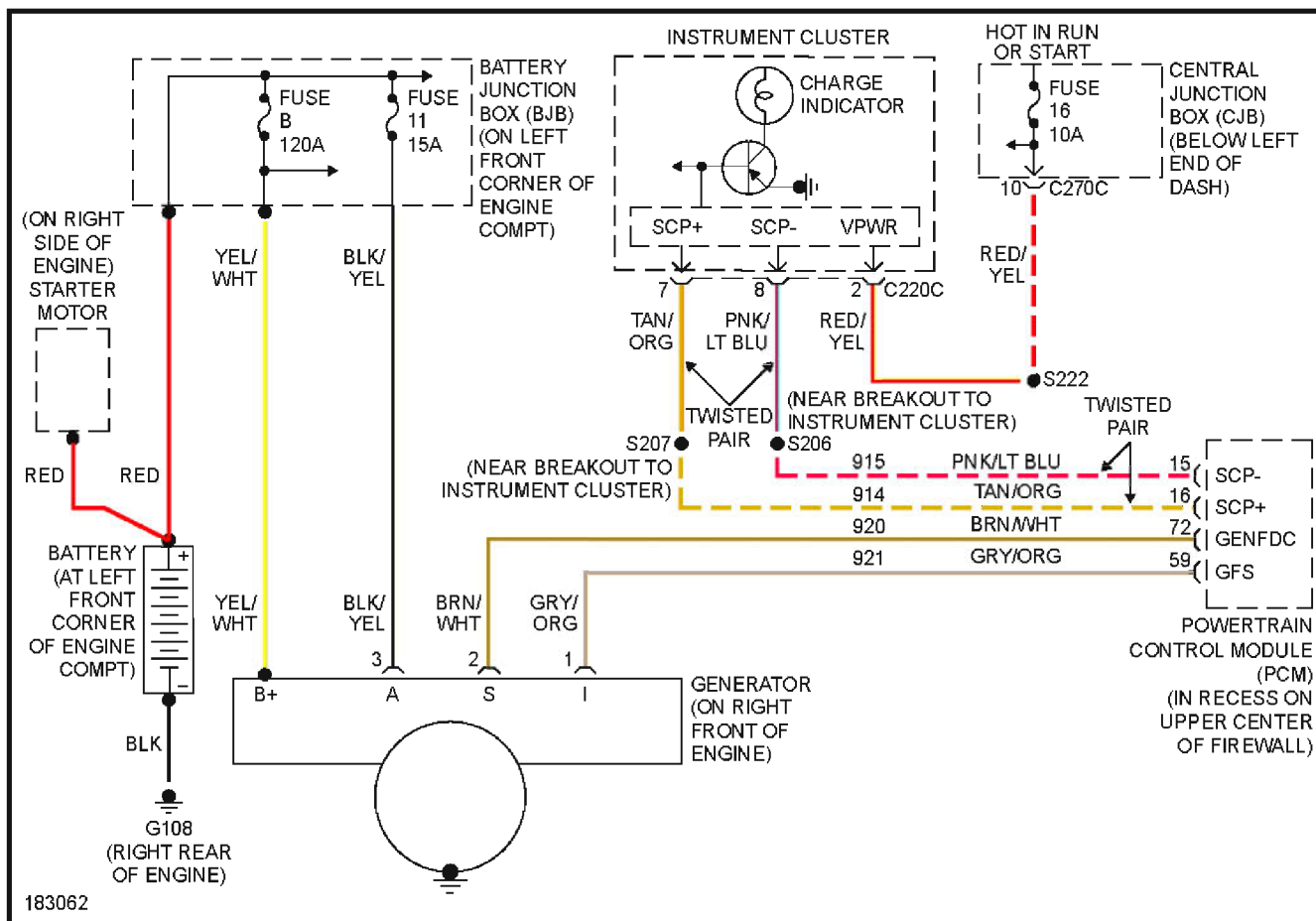


**Fig. 46: Shift Interlock Circuit**

**STARTING/CHARGING**



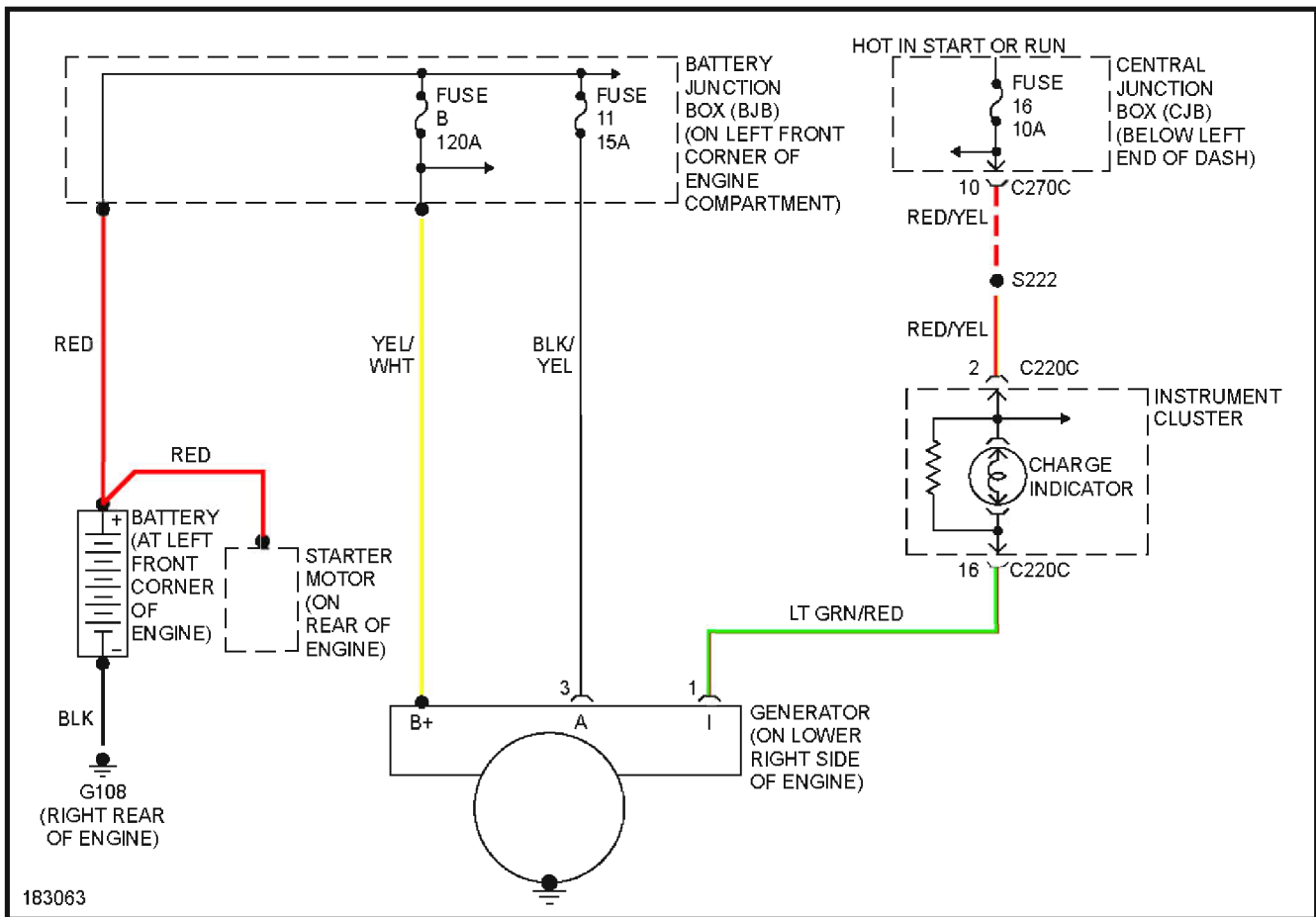
**Fig. 47: Starting Circuit**



**Fig. 48: 2.0L, Charging Circuit**

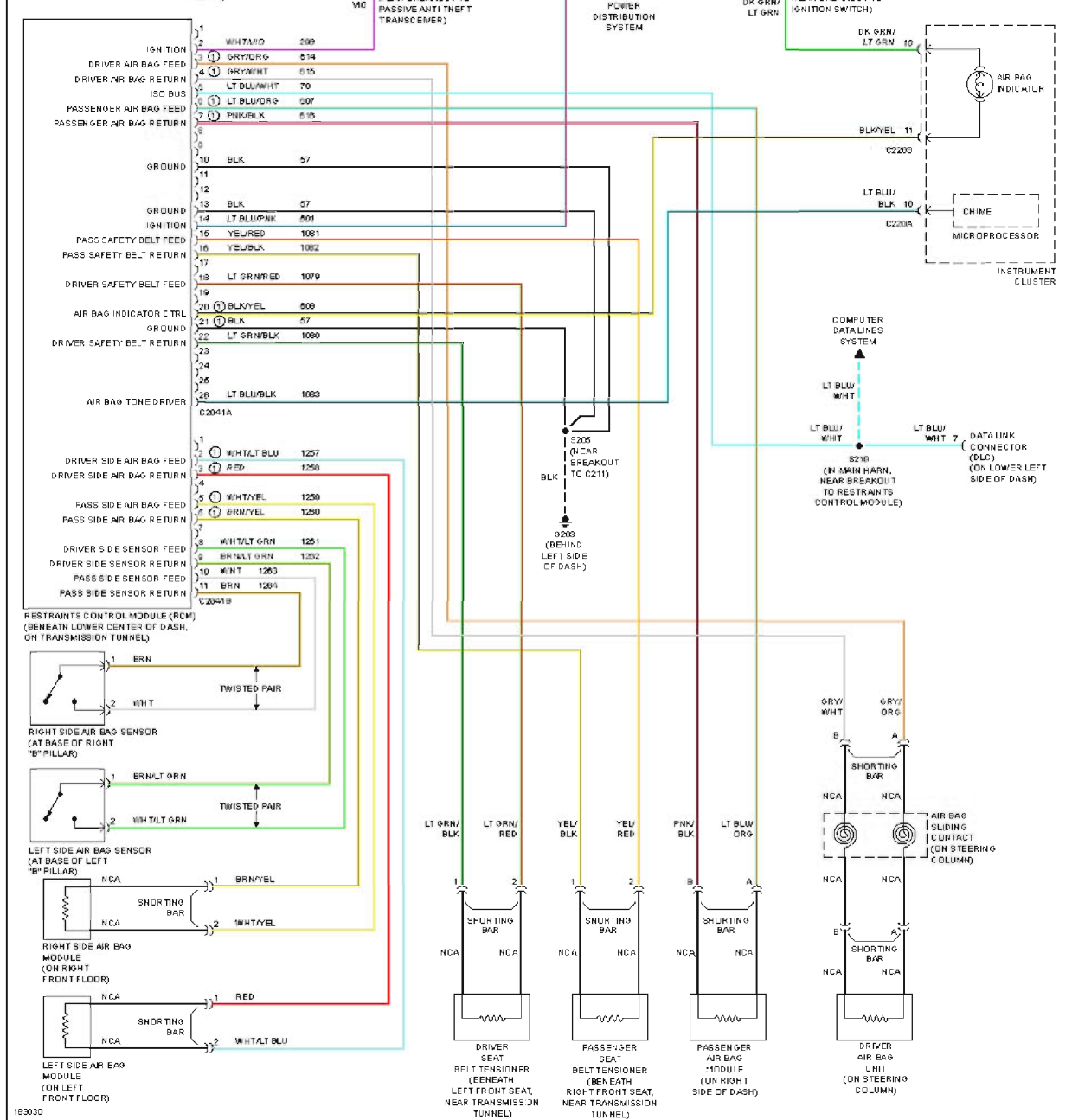
**3.0L**





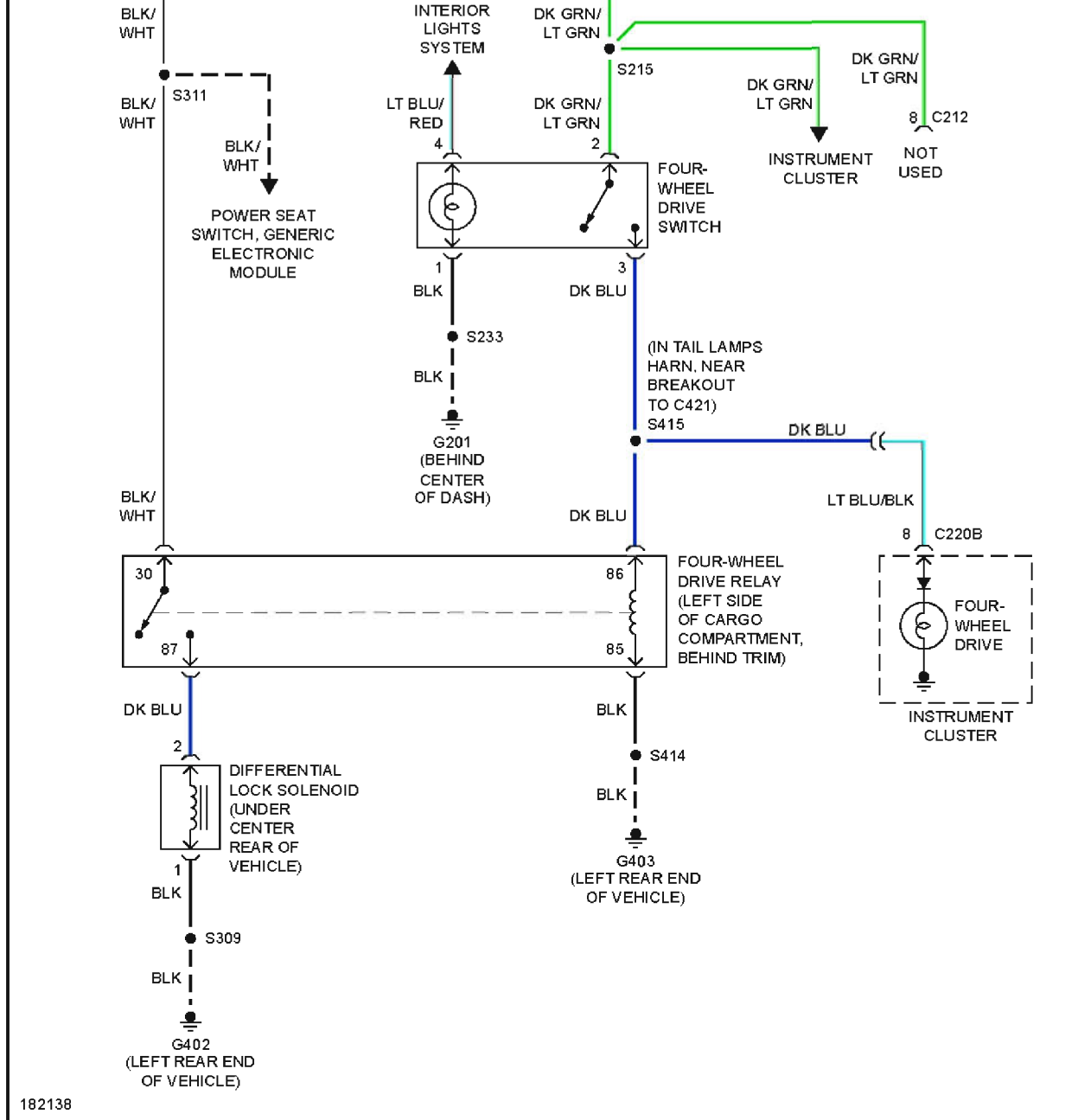
**Fig. 49: 3.0L, Charging Circuit**

## SUPPLEMENTAL RESTRAINTS

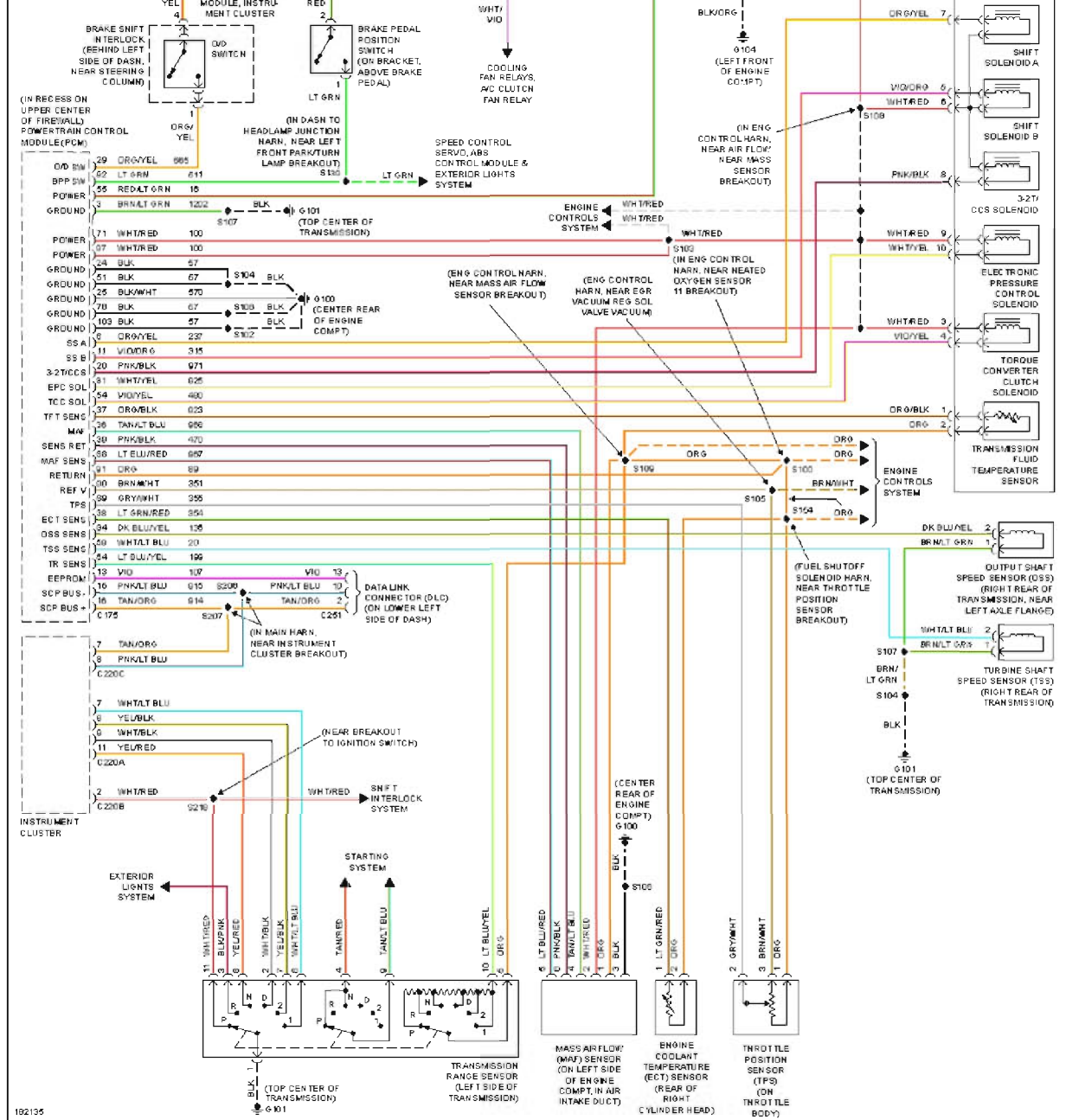


**Fig. 50: Supplemental Restraints Circuit**

**TRANSMISSION**

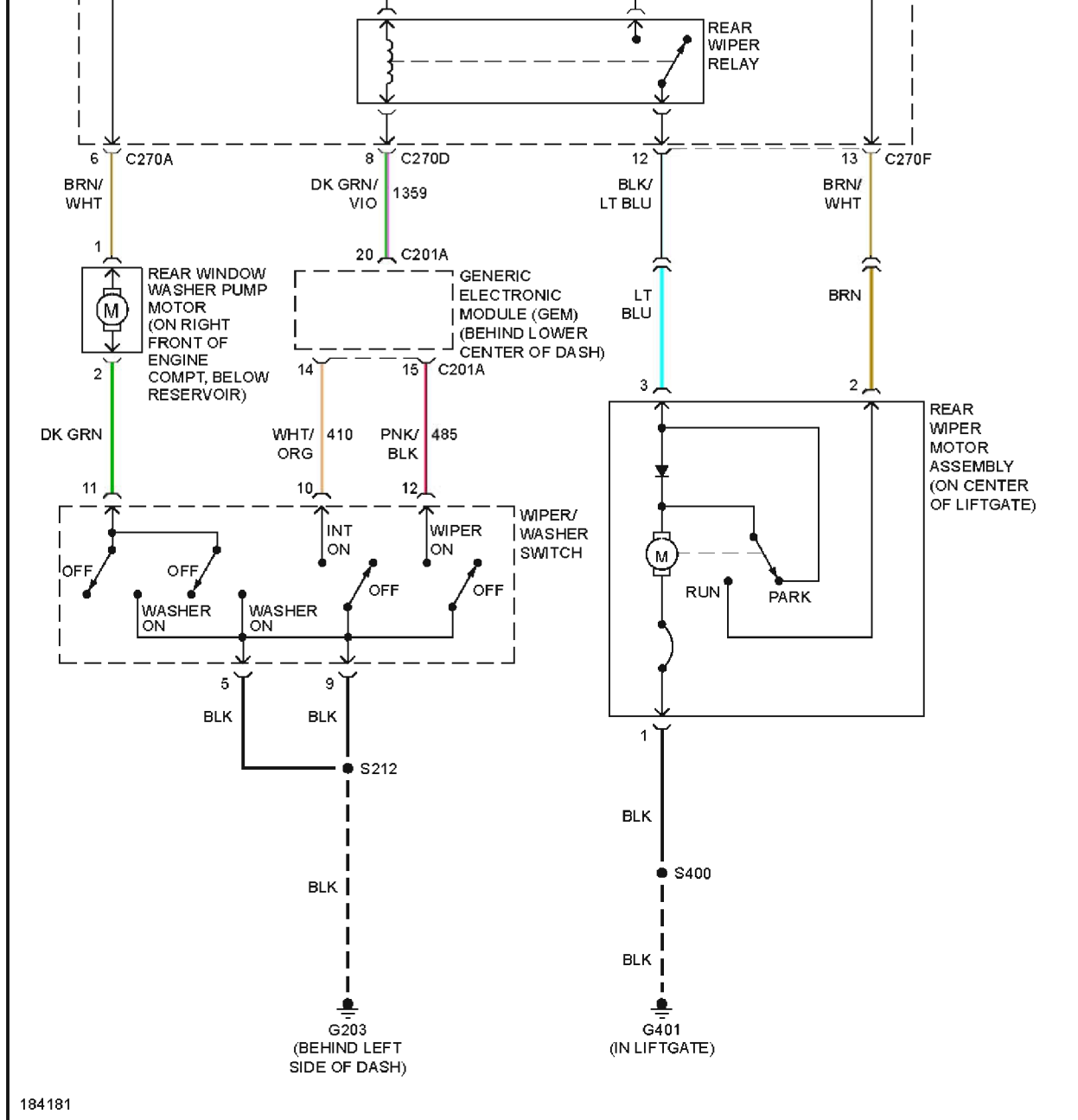


**Fig. 51: 4WD Circuit**









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**Fig. 55: Rear Wiper/Washer Circuit**

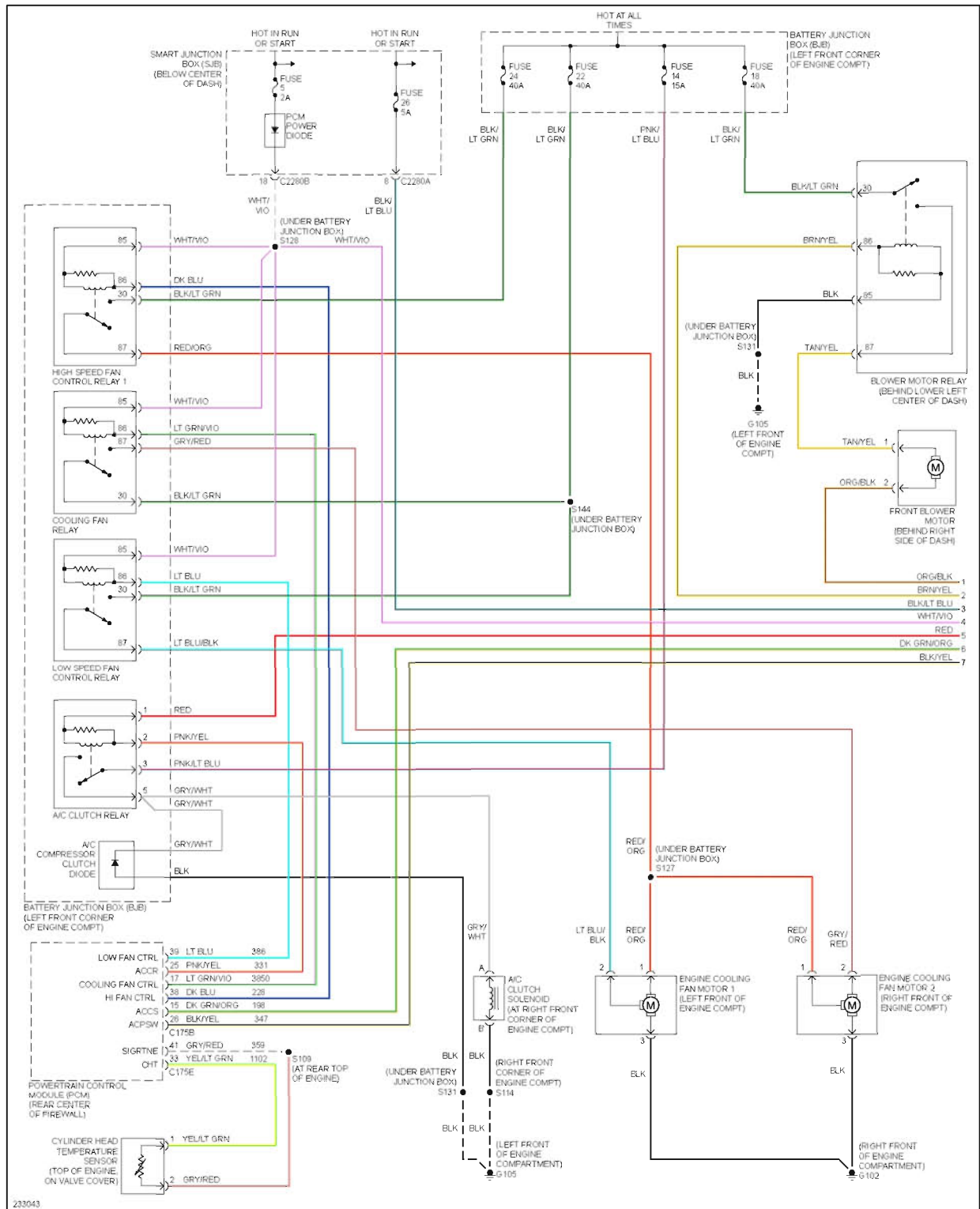
# AIR CONDITIONING

2.3L



# 2006 Ford Escape

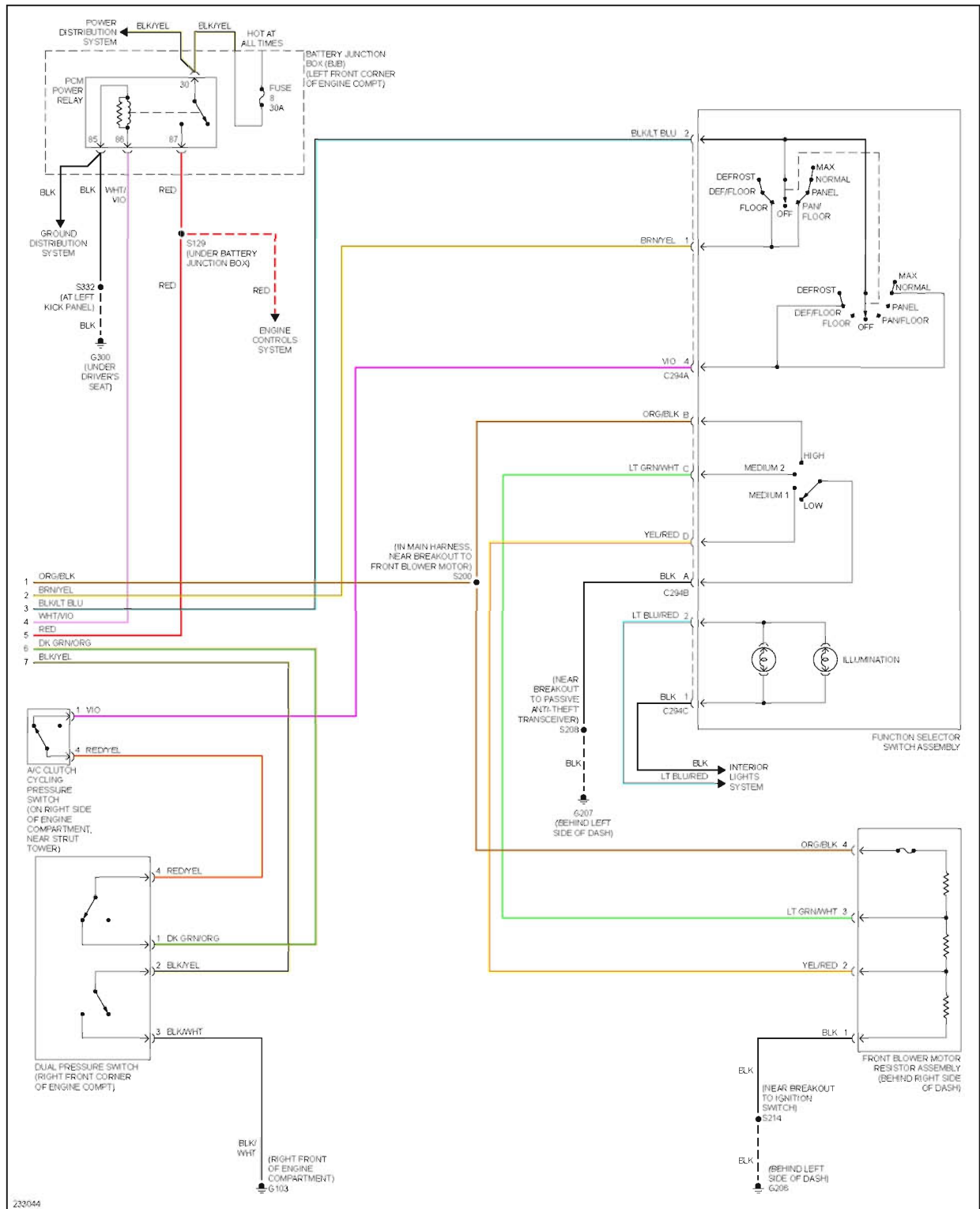
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 1: 2.3L, Manual A/C Circuit, Except Hybrid (1 of 2)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 2: 2.3L, Manual A/C Circuit, Except Hybrid (2 of 2)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

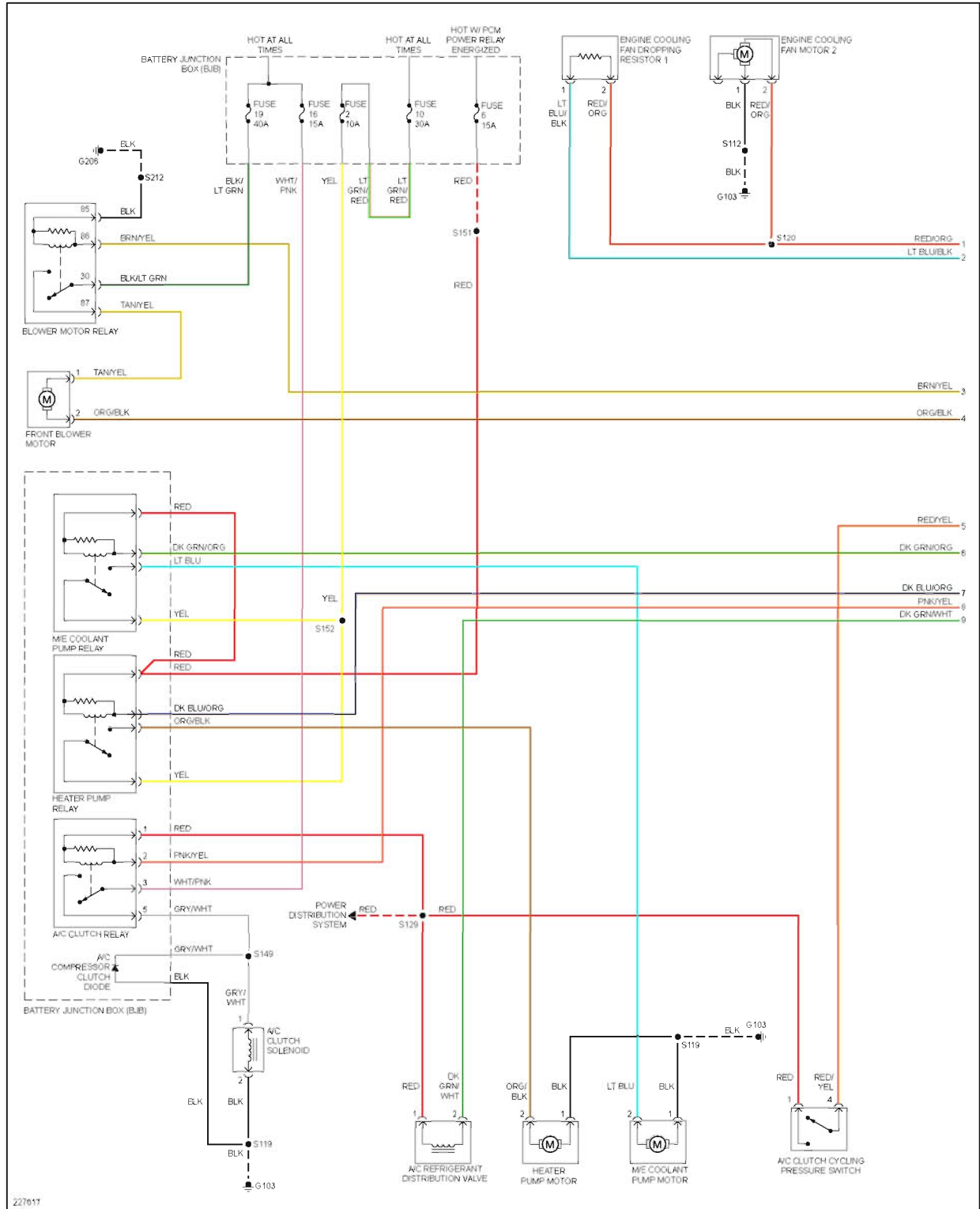


Fig. 3: 2.3L, Manual A/C Circuit, Hybrid (1 of 3)

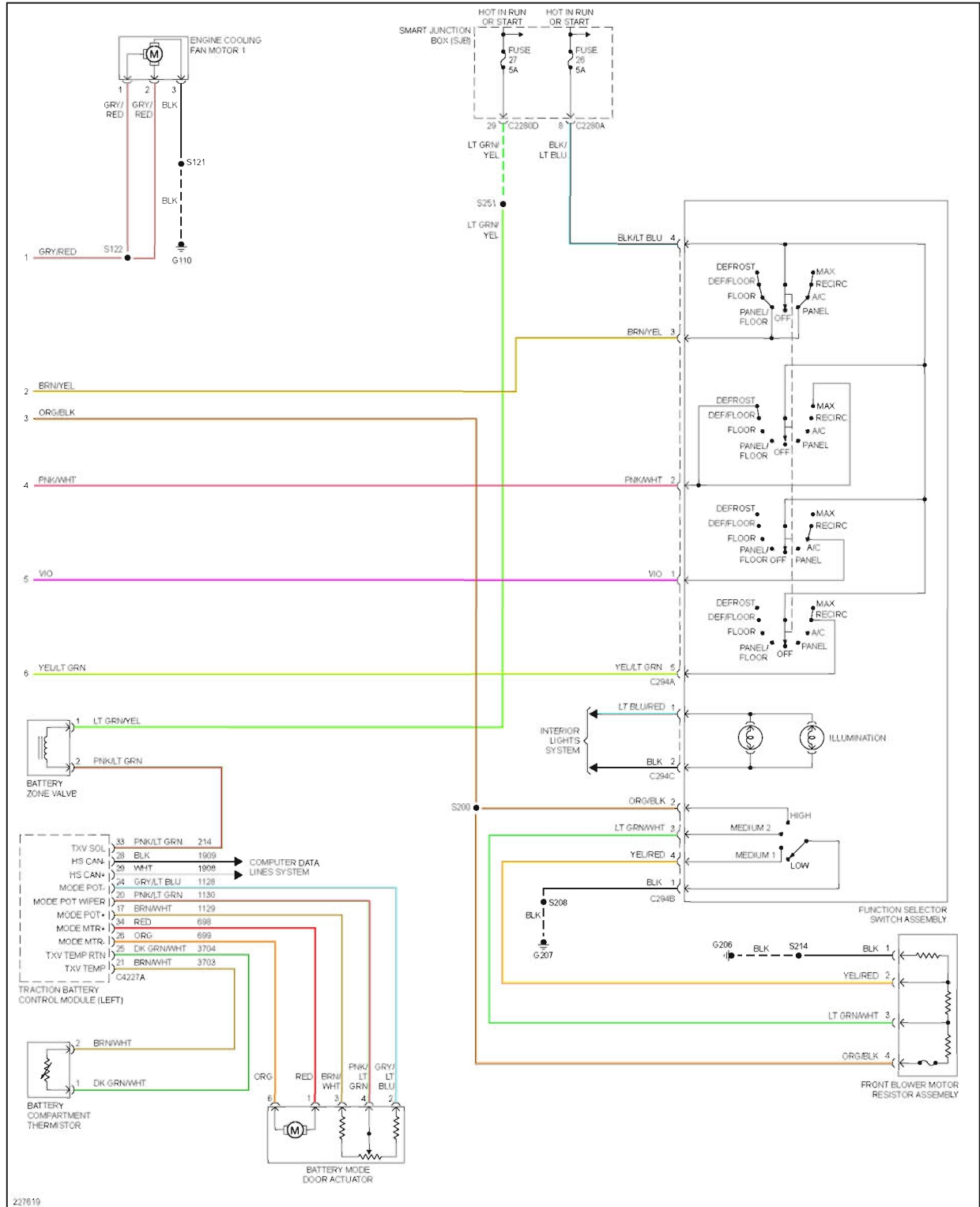
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 4: 2.3L, Manual A/C Circuit, Hybrid (2 of 3)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



http://vnx.su

Fig. 5: 2.3L, Manual A/C Circuit, Hybrid (3 of 3)

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

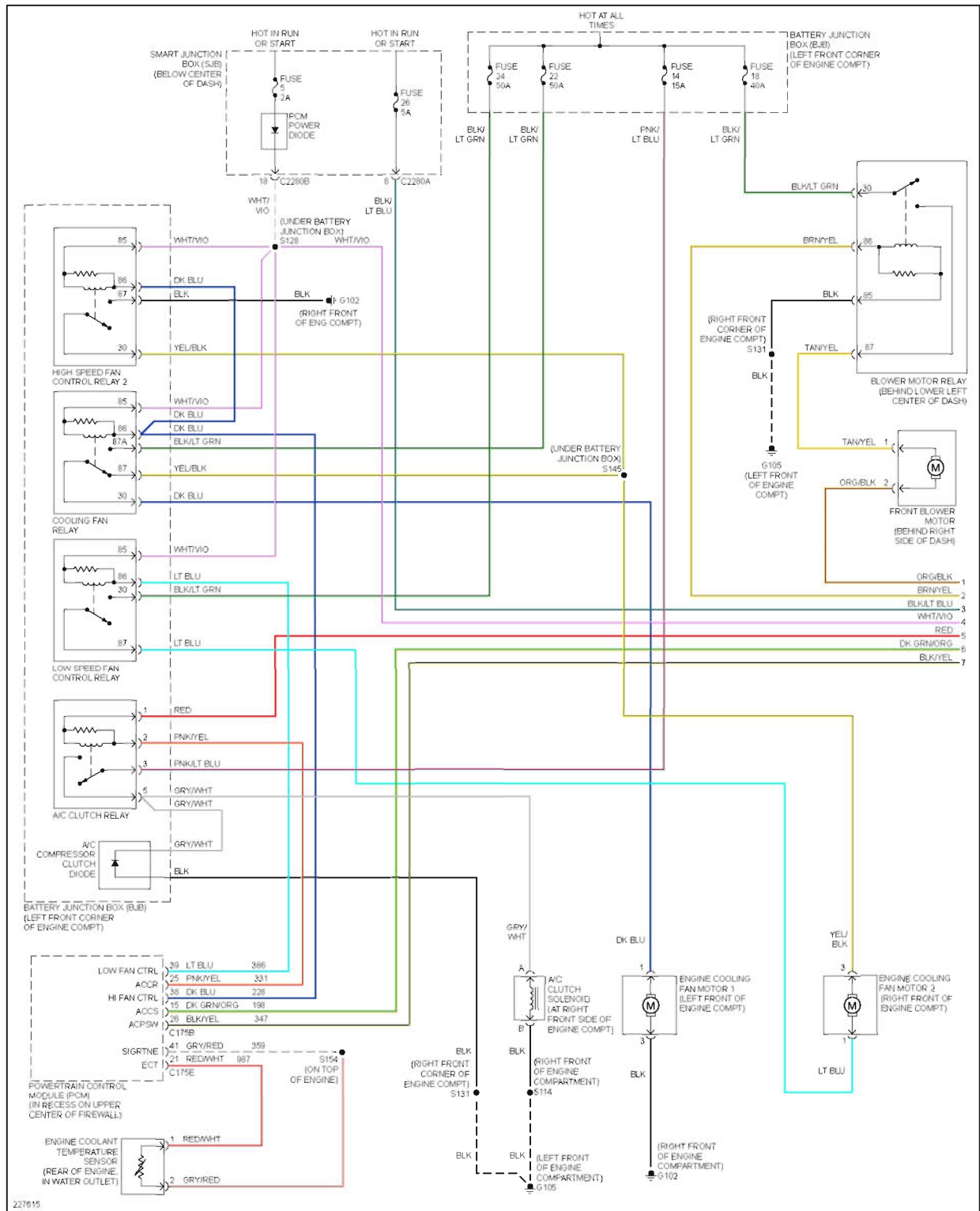


Fig. 6: 3.0L, Manual A/C Circuit, Except Hybrid (1 of 2)

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

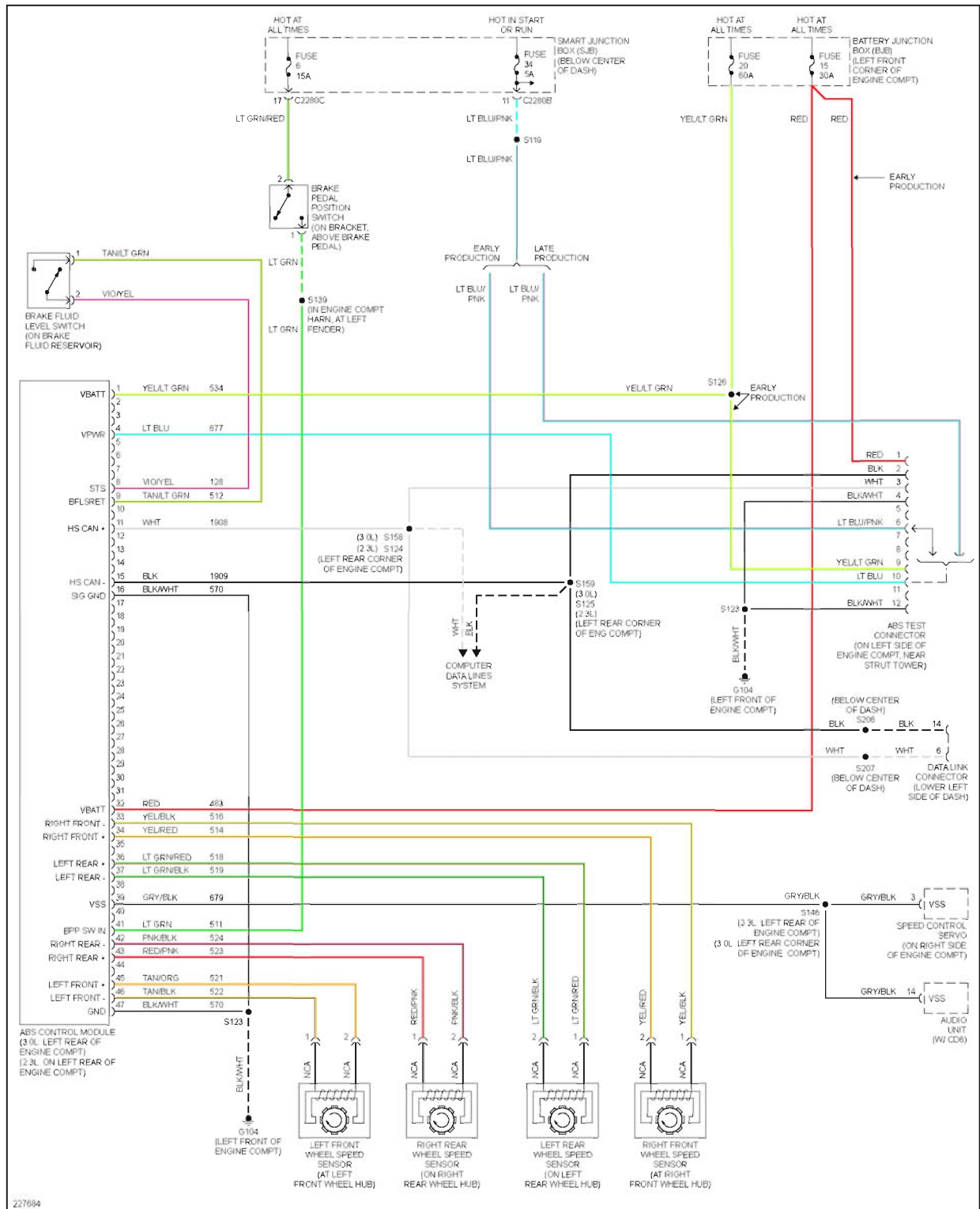


## ANTI-LOCK BRAKES



## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 8: Anti-lock Brakes Circuit, Except Hybrid**



## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

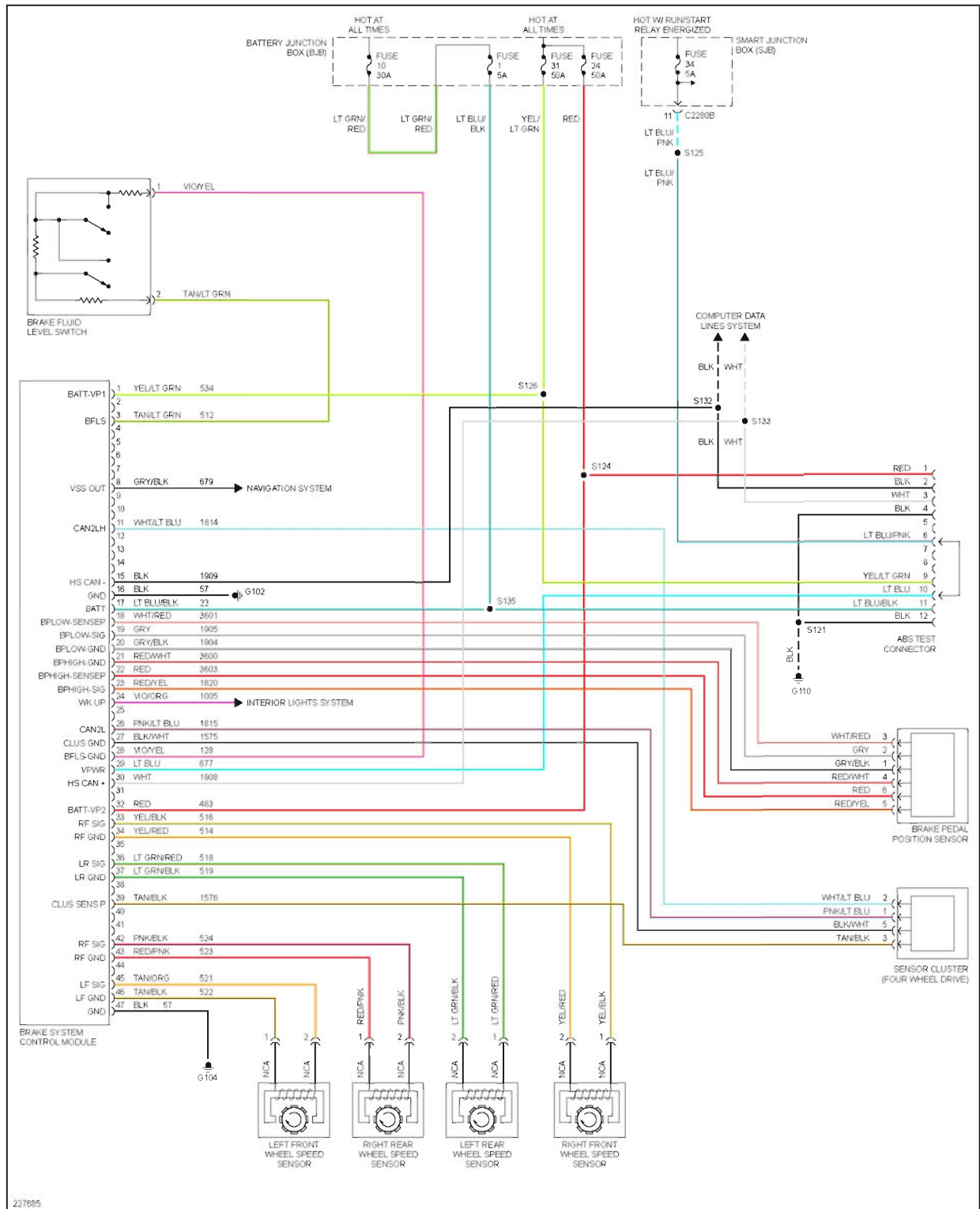
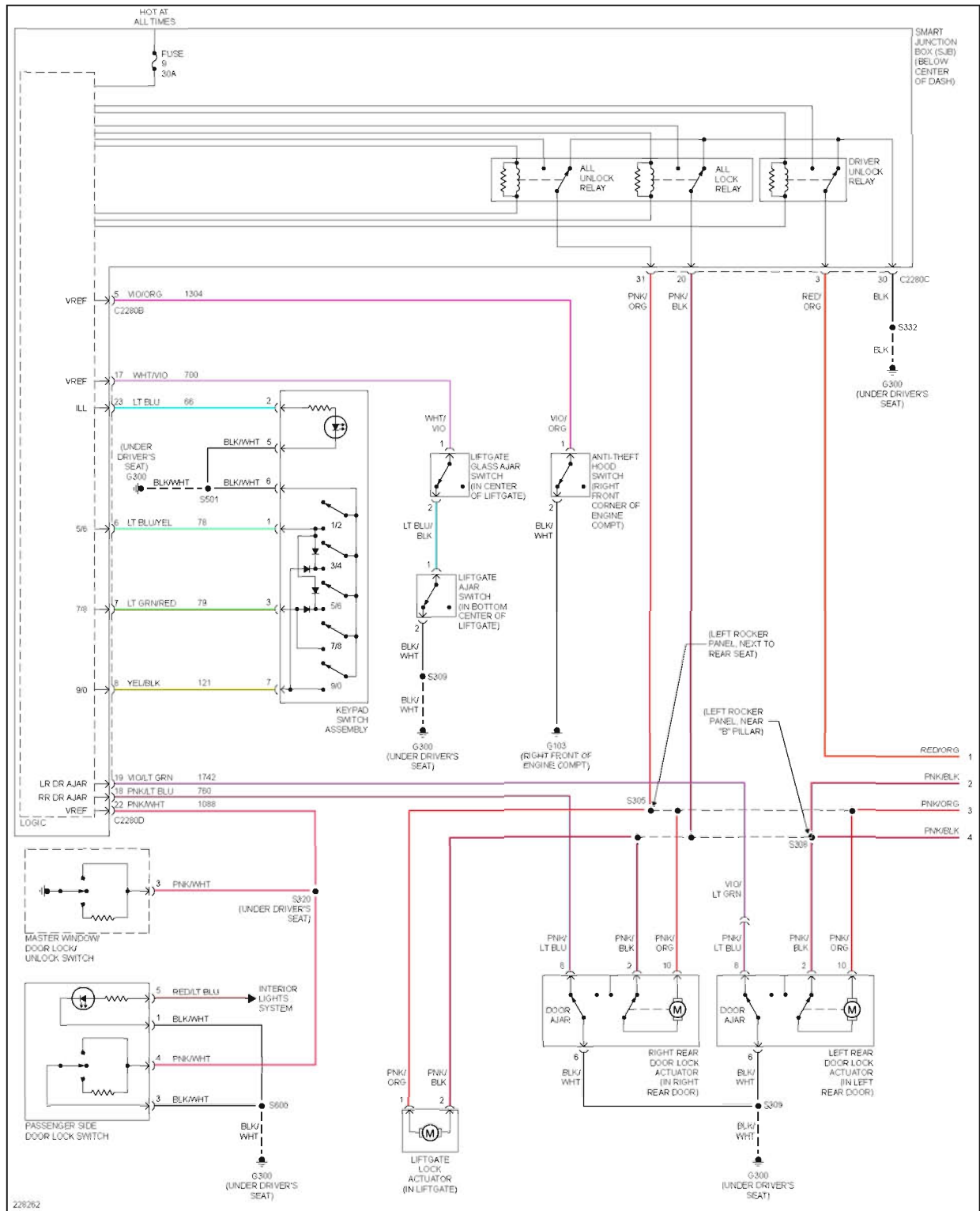


Fig. 9: Anti-lock Brakes Circuit, Hybrid

ANTI-THEFT

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



<http://vnx.su>

Fig. 10: Forced Entry Circuit, Except Hybrid (1 of 2)

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

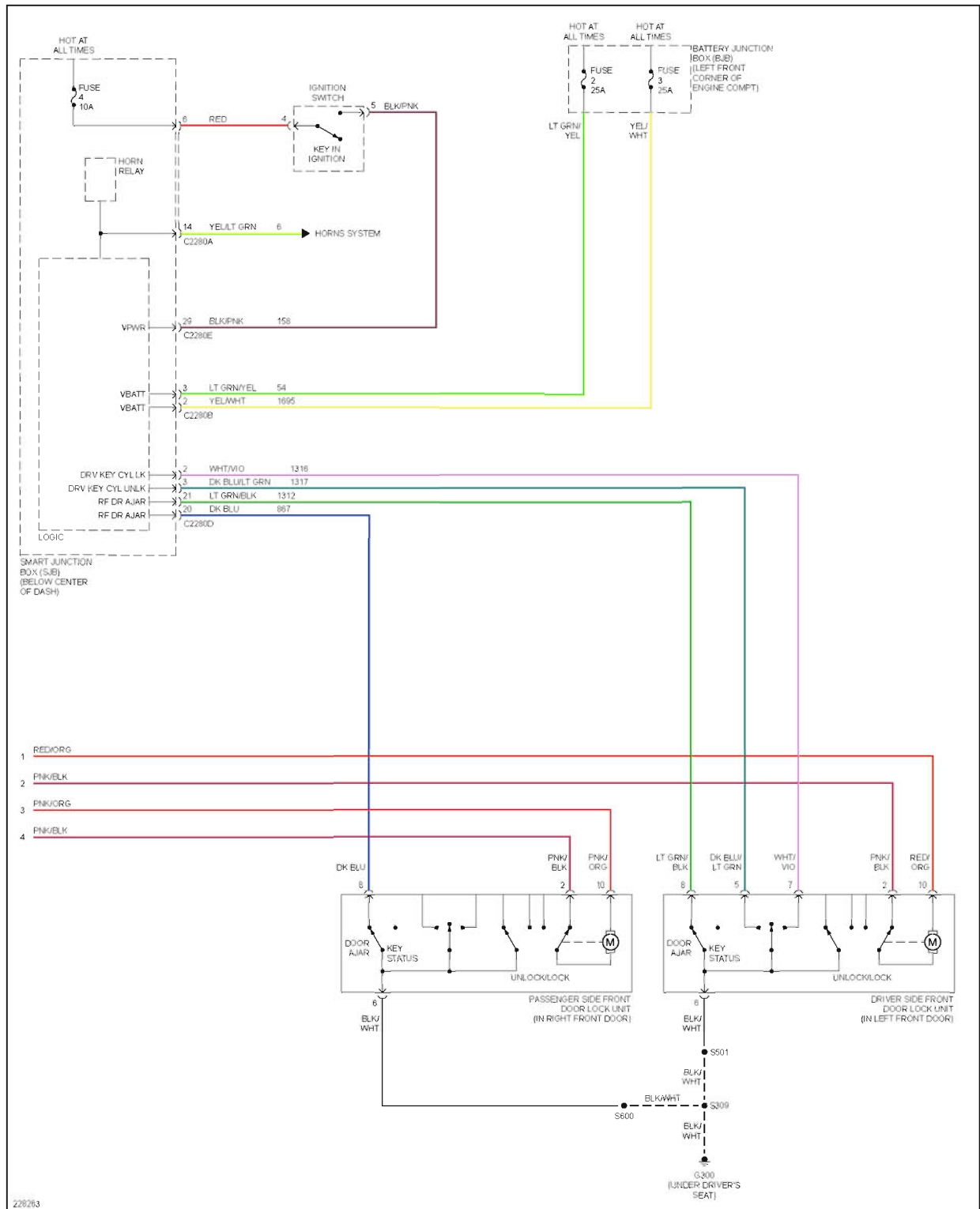


Fig. 11: Forced Entry Circuit, Except Hybrid (2 of 2)

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 12: Forced Entry Circuit, Hybrid (1 of 2)**

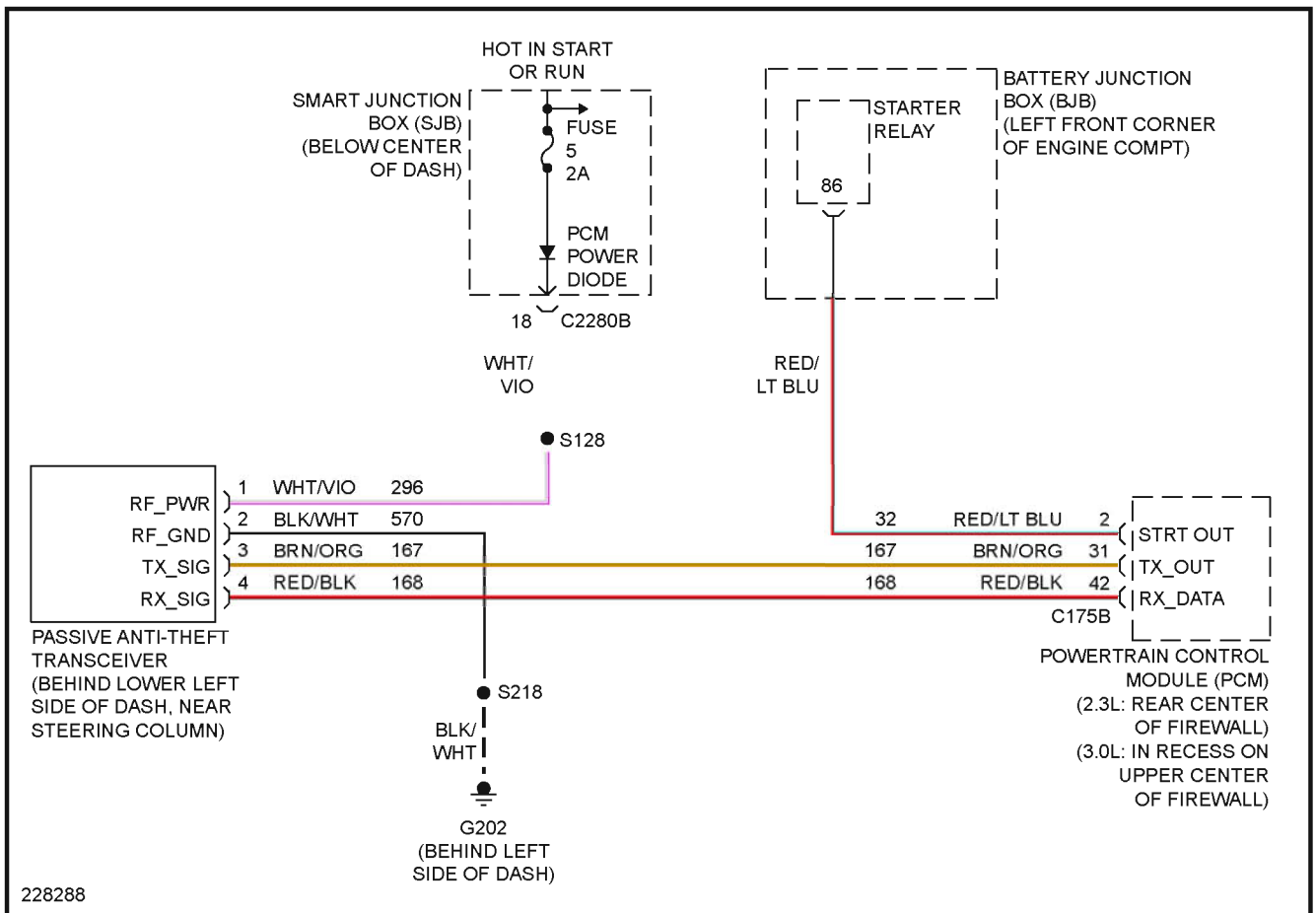
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 13: Forced Entry Circuit, Hybrid (2 of 2)**

## 2006 Ford Escape

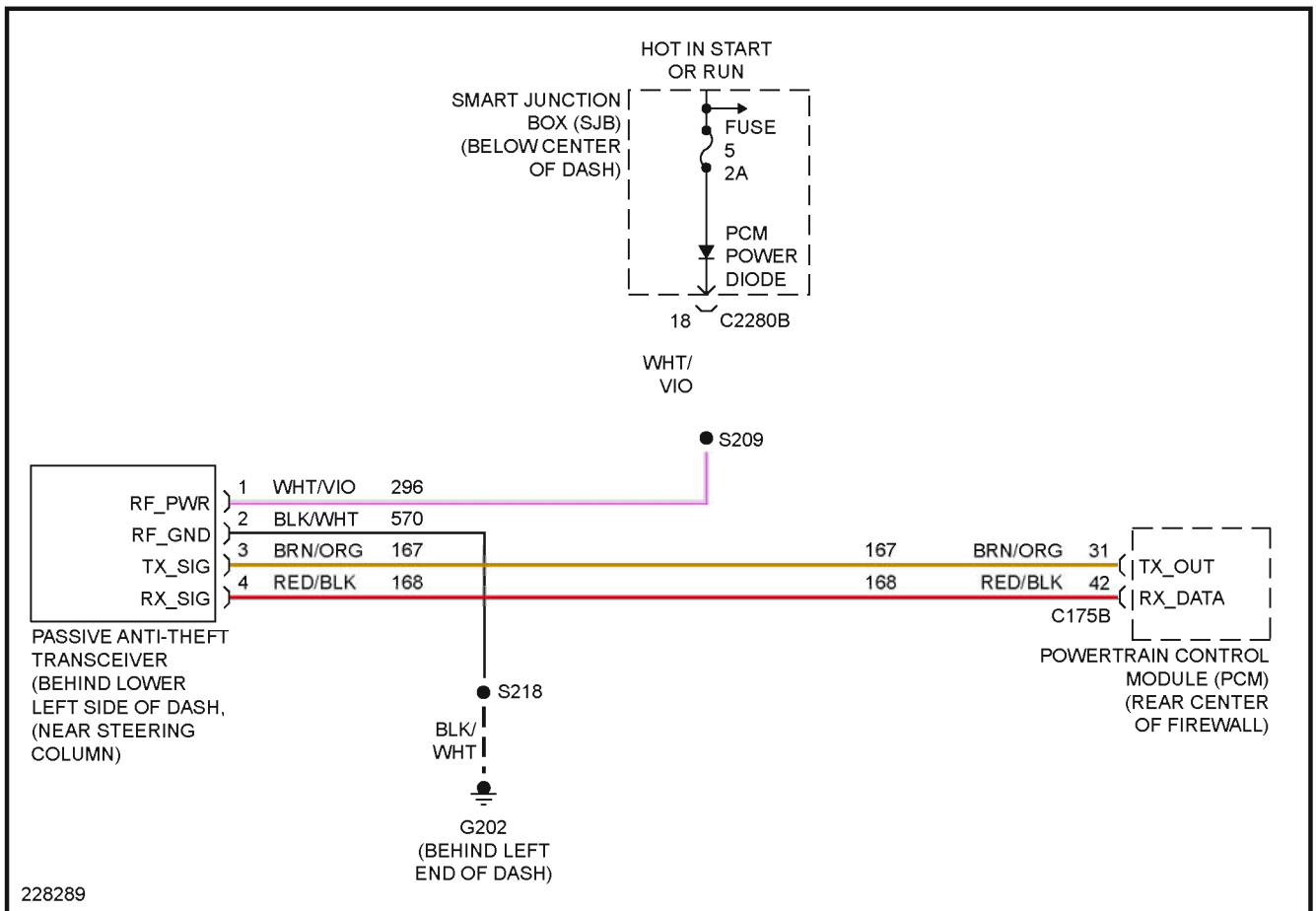
### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 14: Passive Anti-theft Circuit, Except Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

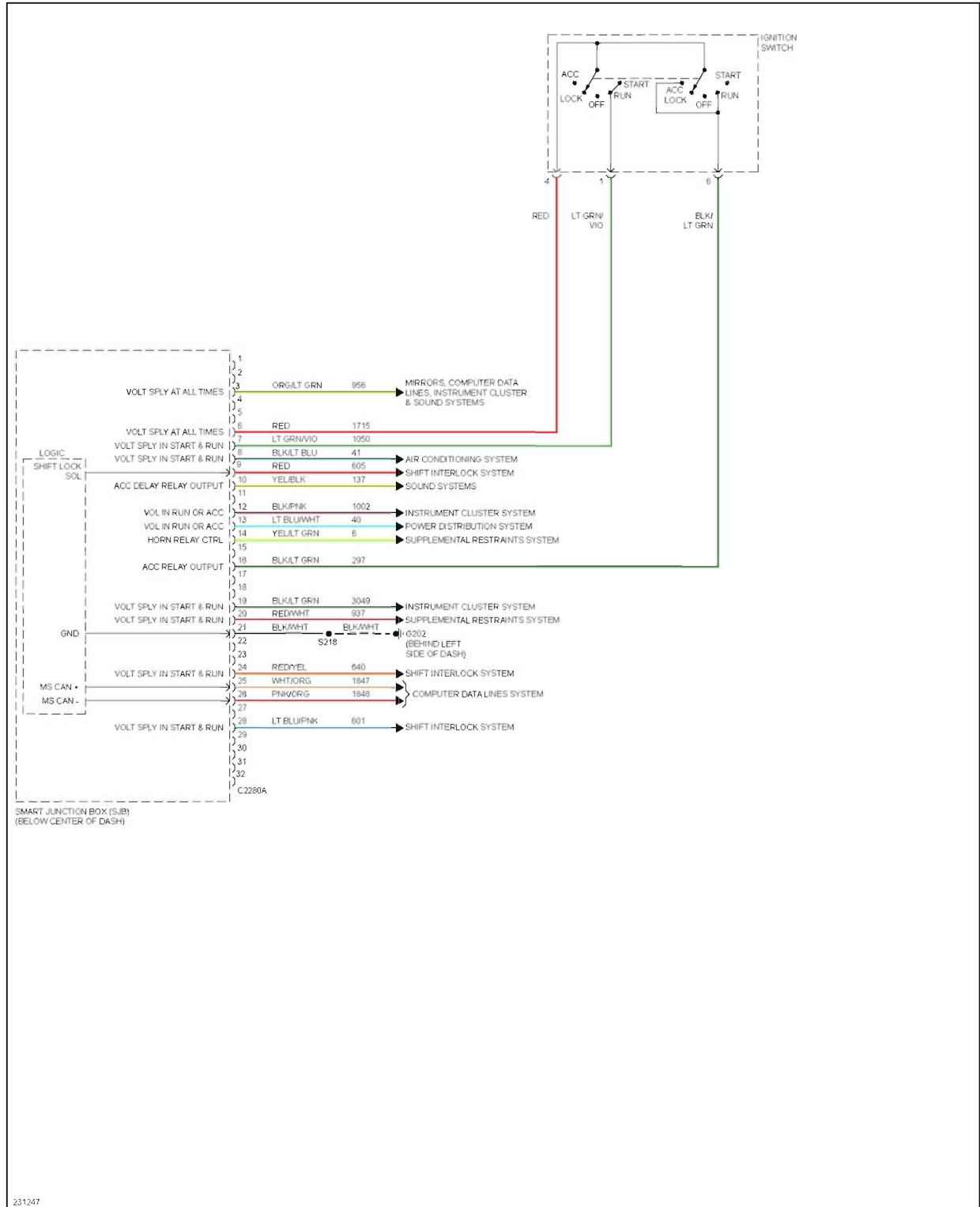


**Fig. 15: Passive Anti-theft Circuit, Hybrid**

## BODY CONTROL MODULES

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



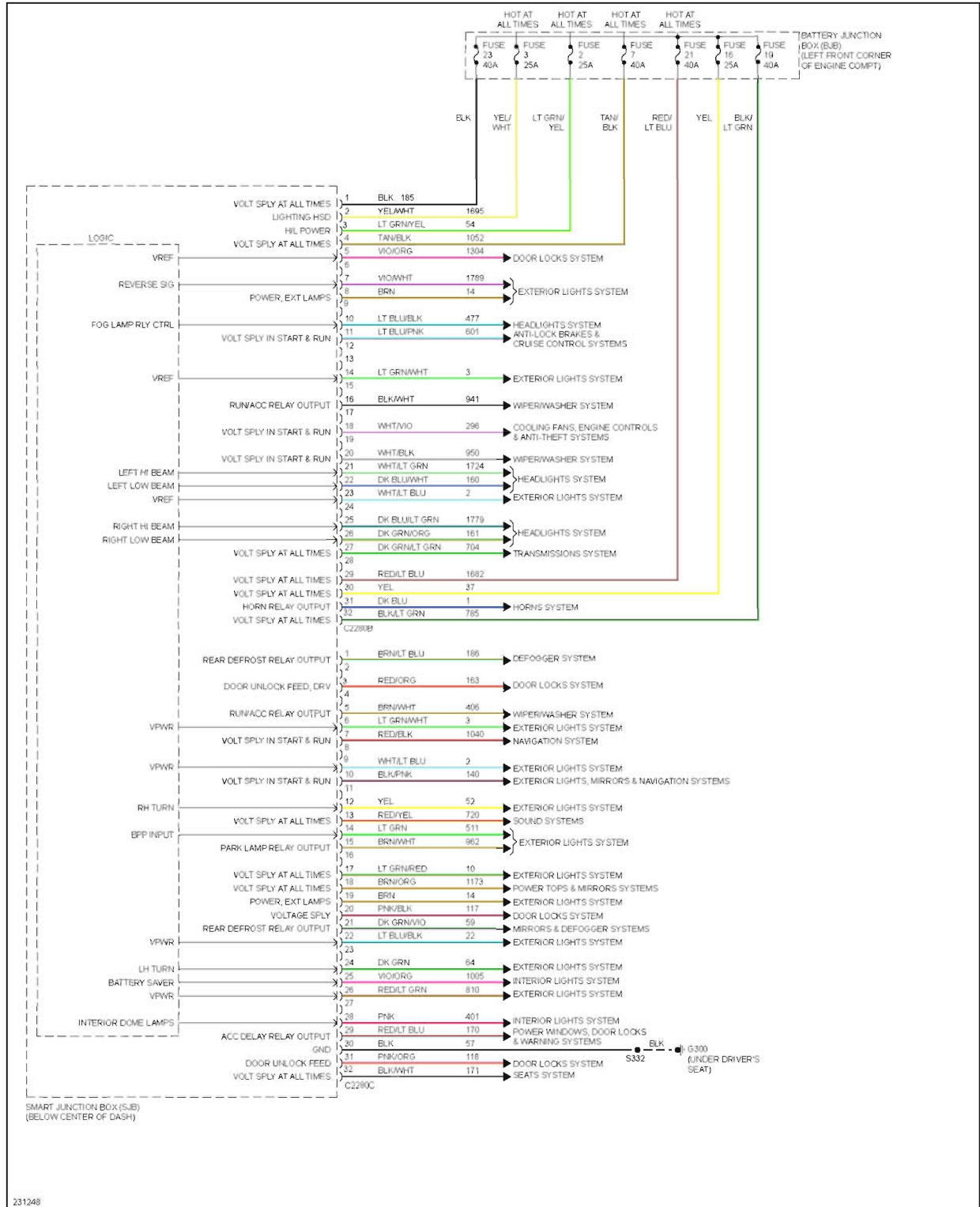
<http://vnx.su>

**Fig. 16: Body Control Modules Circuit, Except Hybrid (1 of 3)**



# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

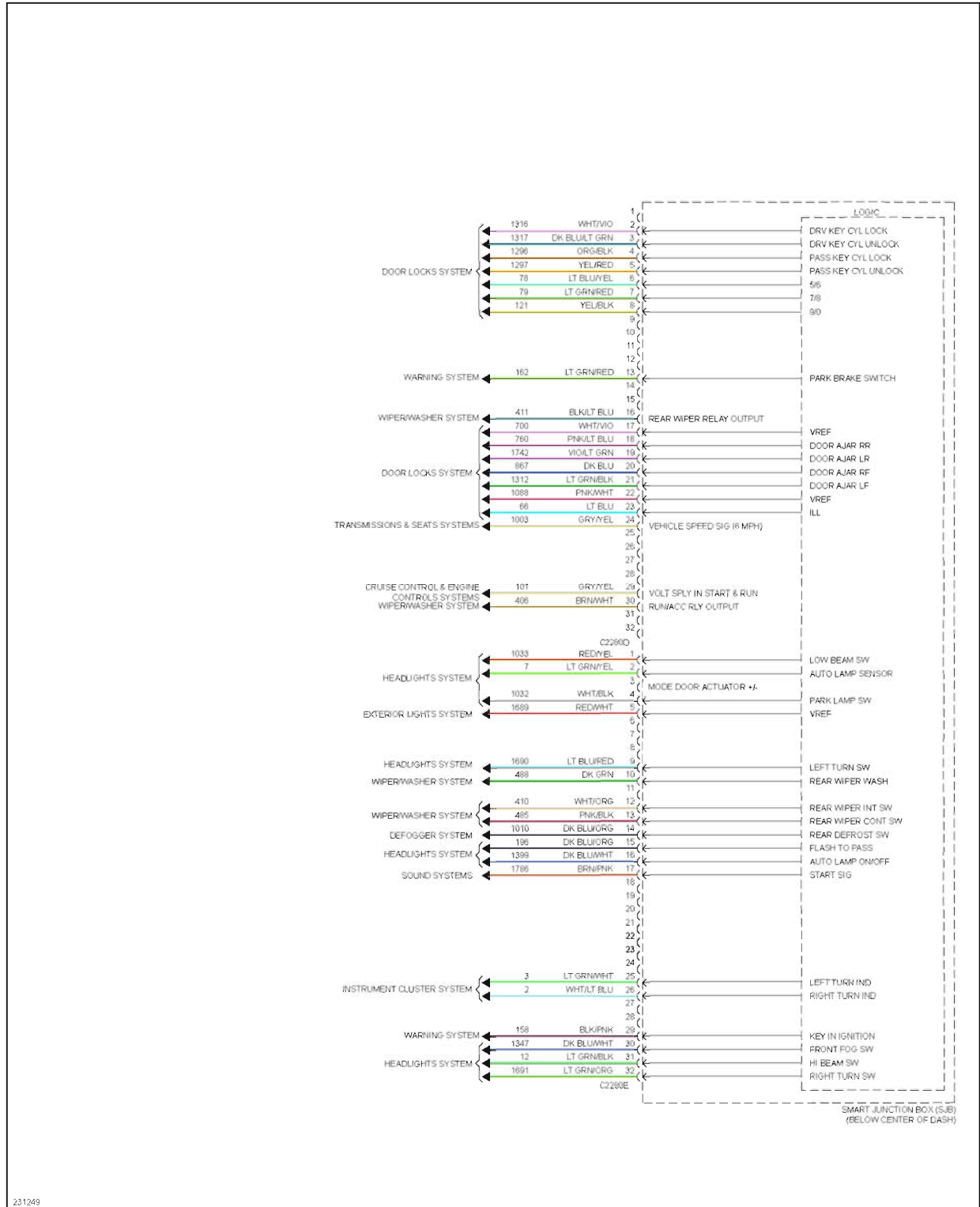


http://vnx.su

Fig. 17: Body Control Modules Circuit, Except Hybrid (2 of 3)

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

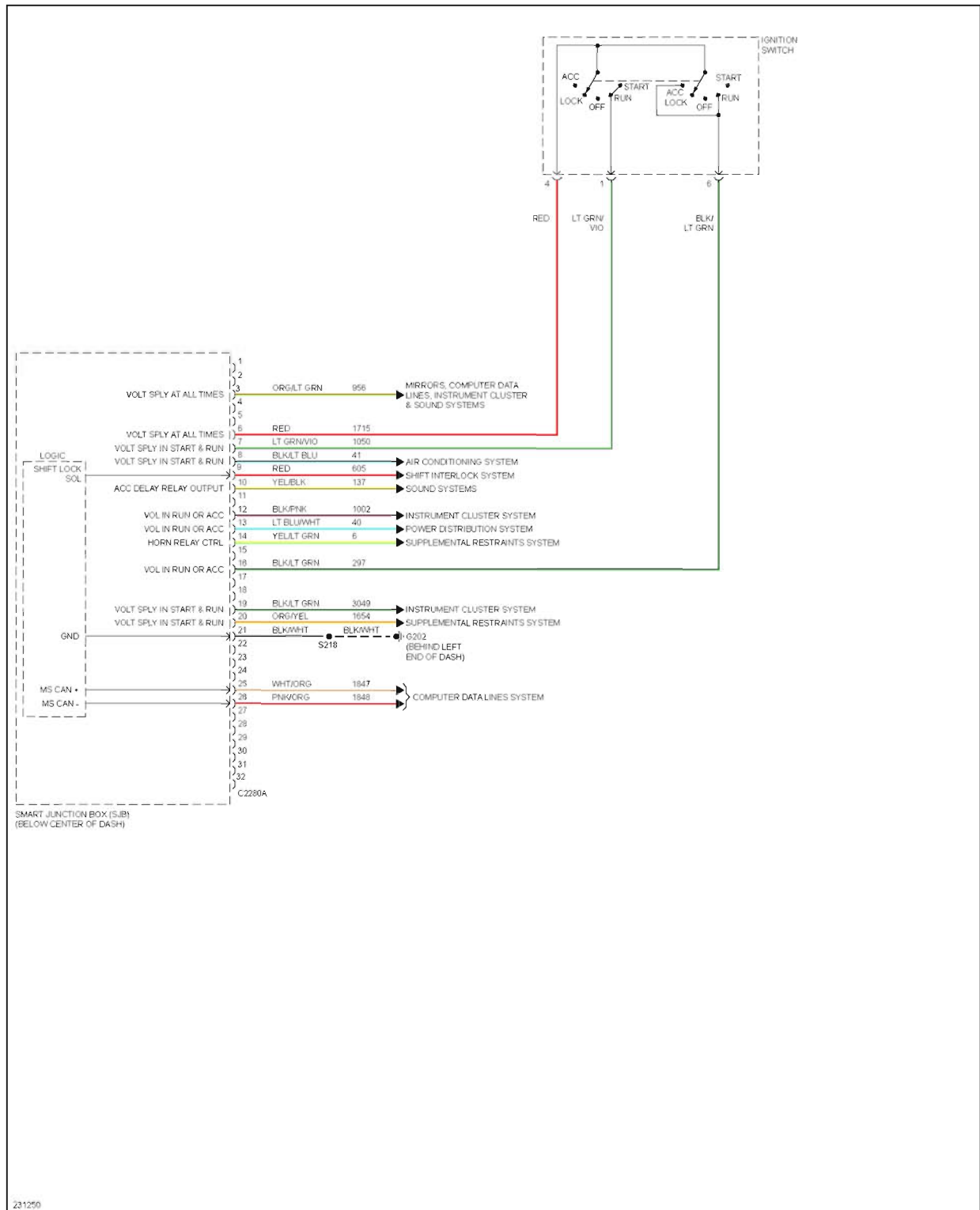


<http://2nx.su>

**Fig. 18: Body Control Modules Circuit, Except Hybrid (3 of 3)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 19: Body Control Modules Circuit, Hybrid (1 of 3)**

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 20: Body Control Modules Circuit, Hybrid (2 of 3)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

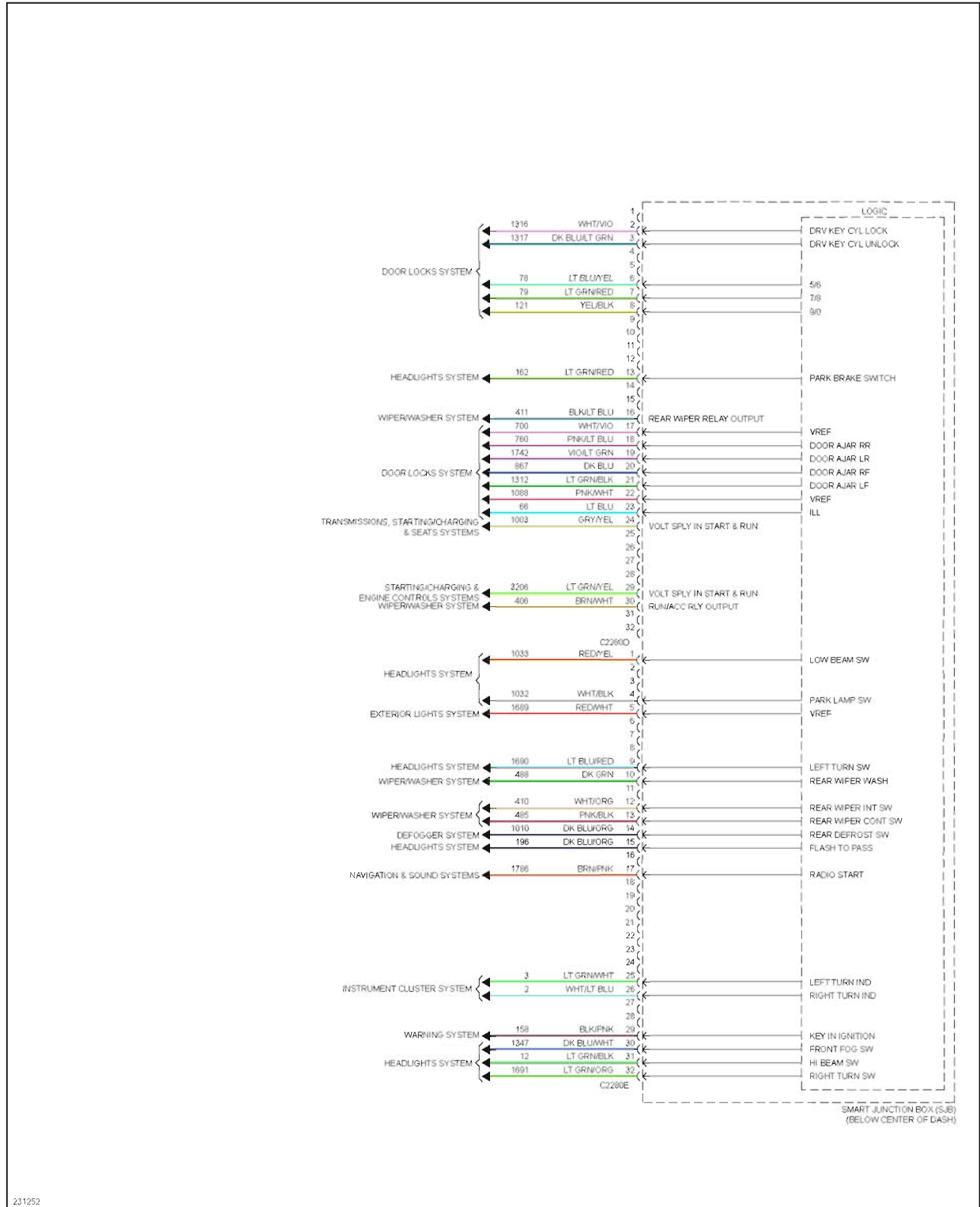
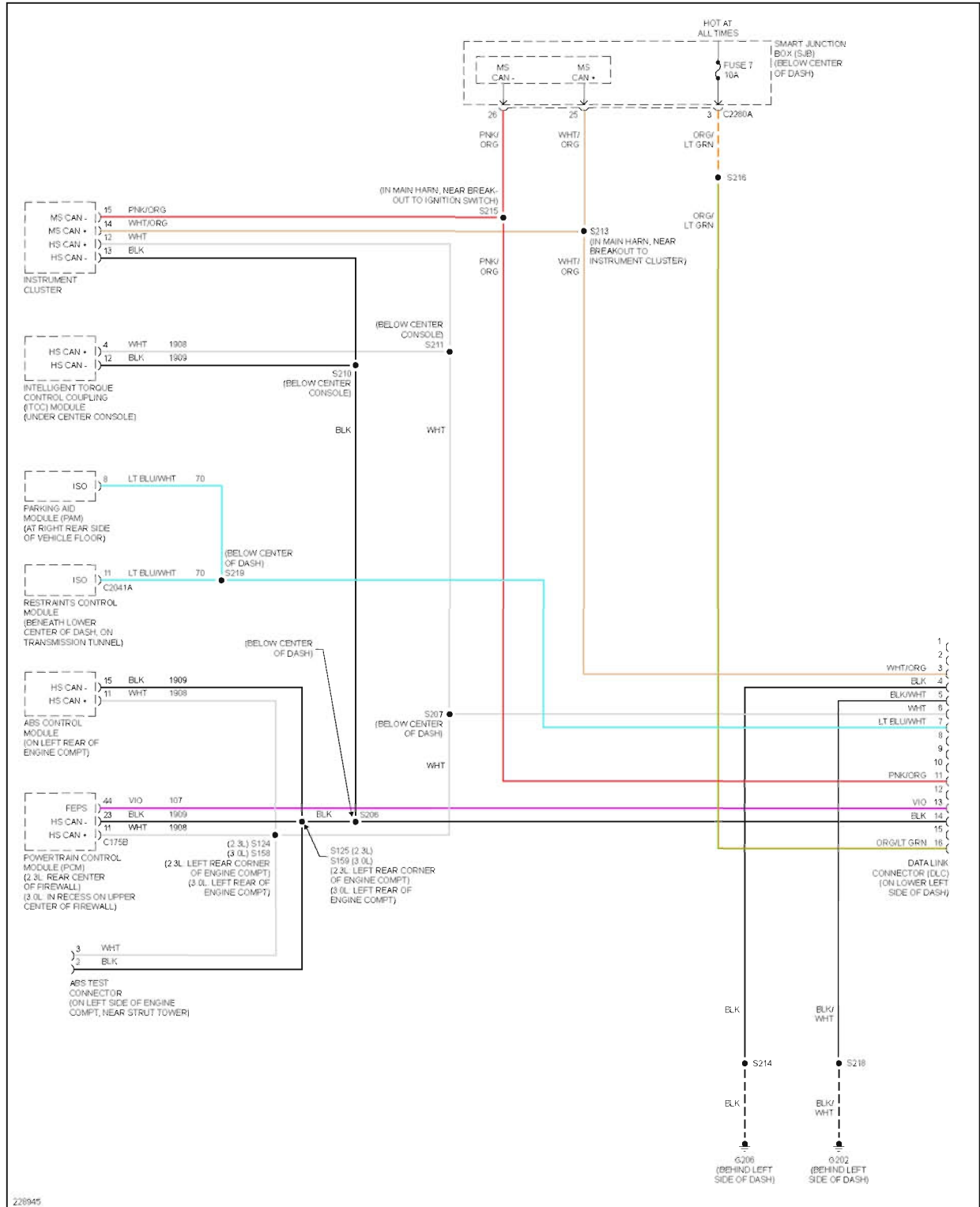


Fig. 21: Body Control Modules Circuit, Hybrid (3 of 3)

## COMPUTER DATA LINES

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 22: Computer Data Lines Circuit, Except Hybrid**

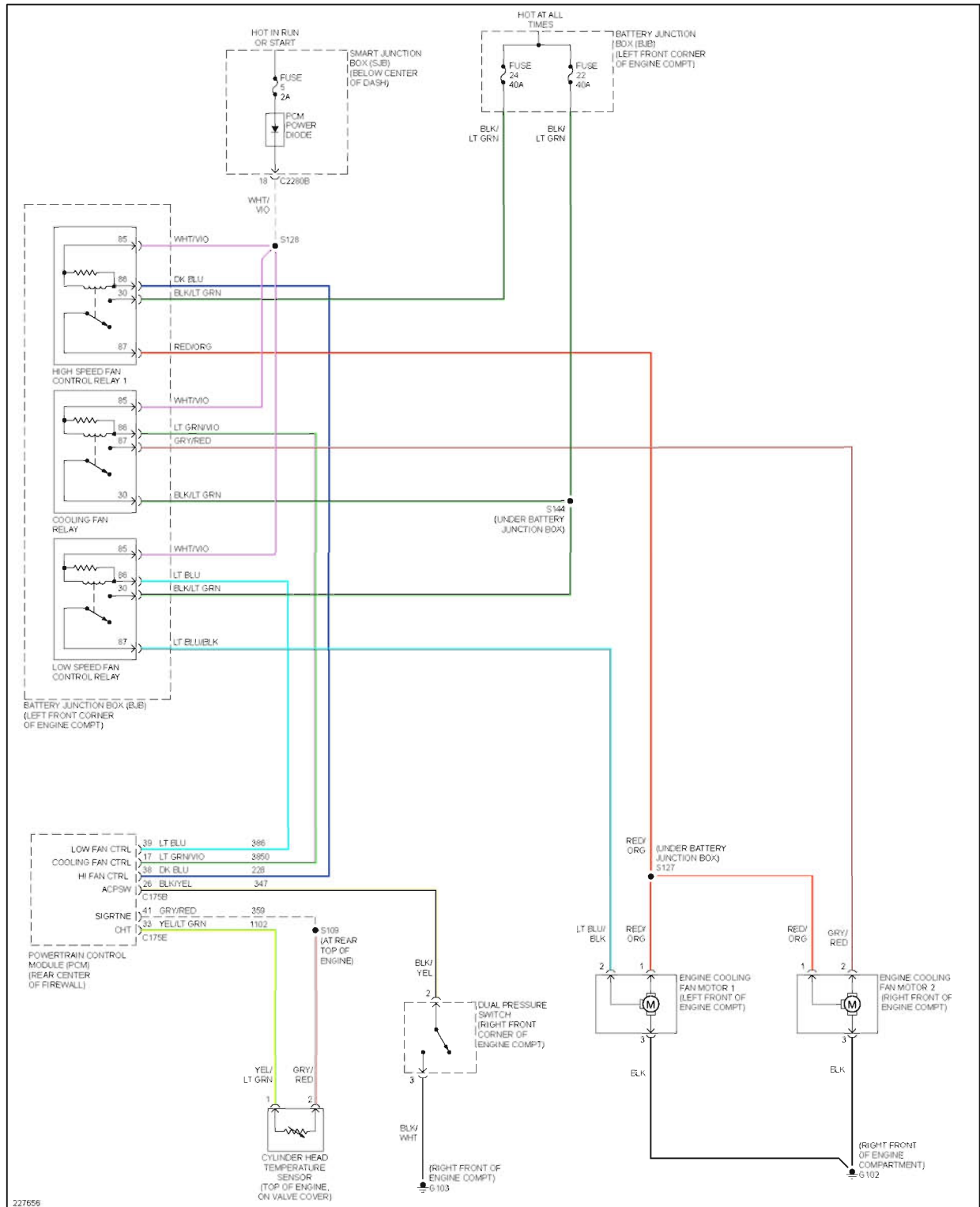
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



## COOLING FAN



### 2.3L

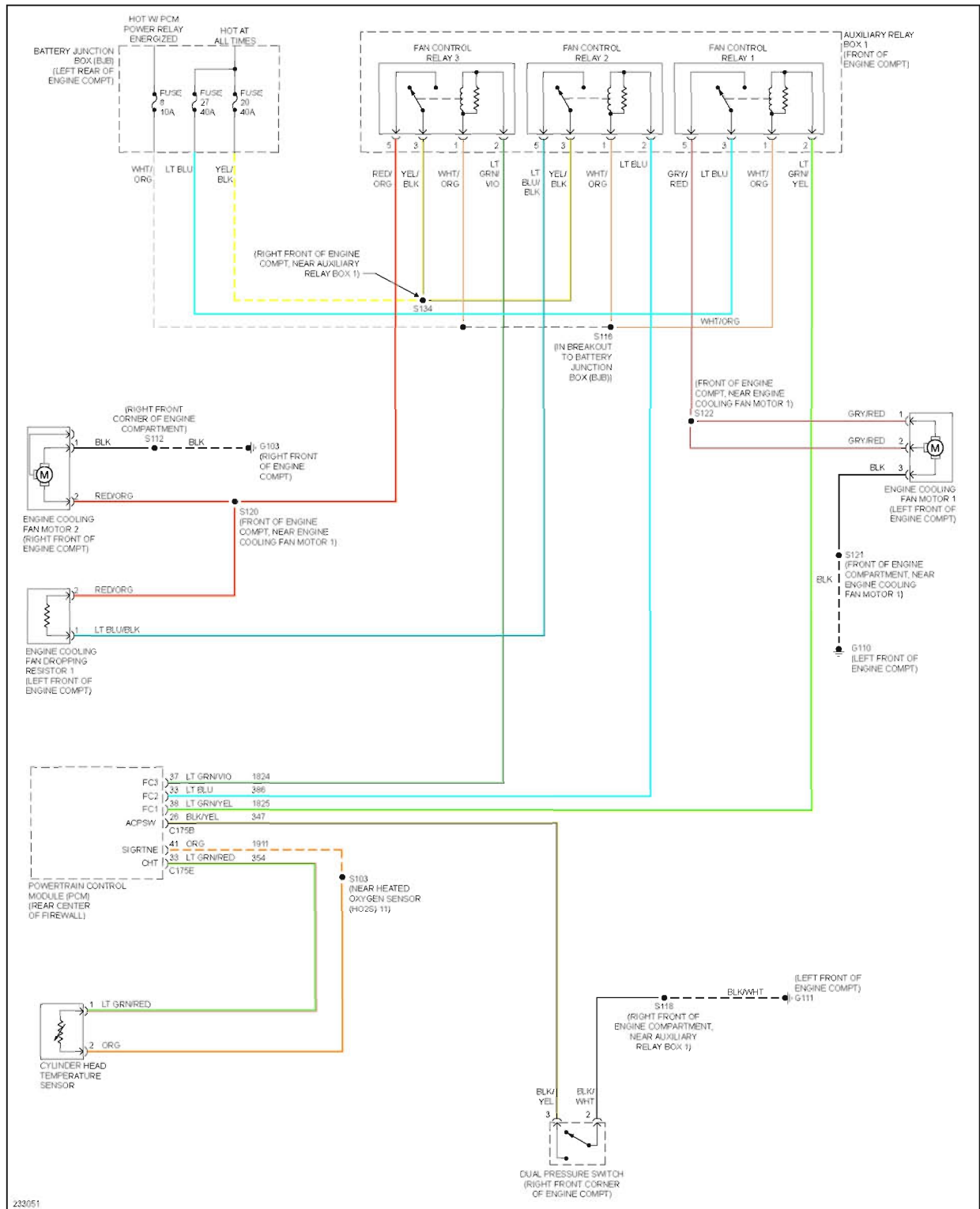


**Fig. 24: 2.3L, Cooling Fan Circuit, Except Hybrid**



## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 25: 2.3L, Cooling Fan Circuit, Hybrid**

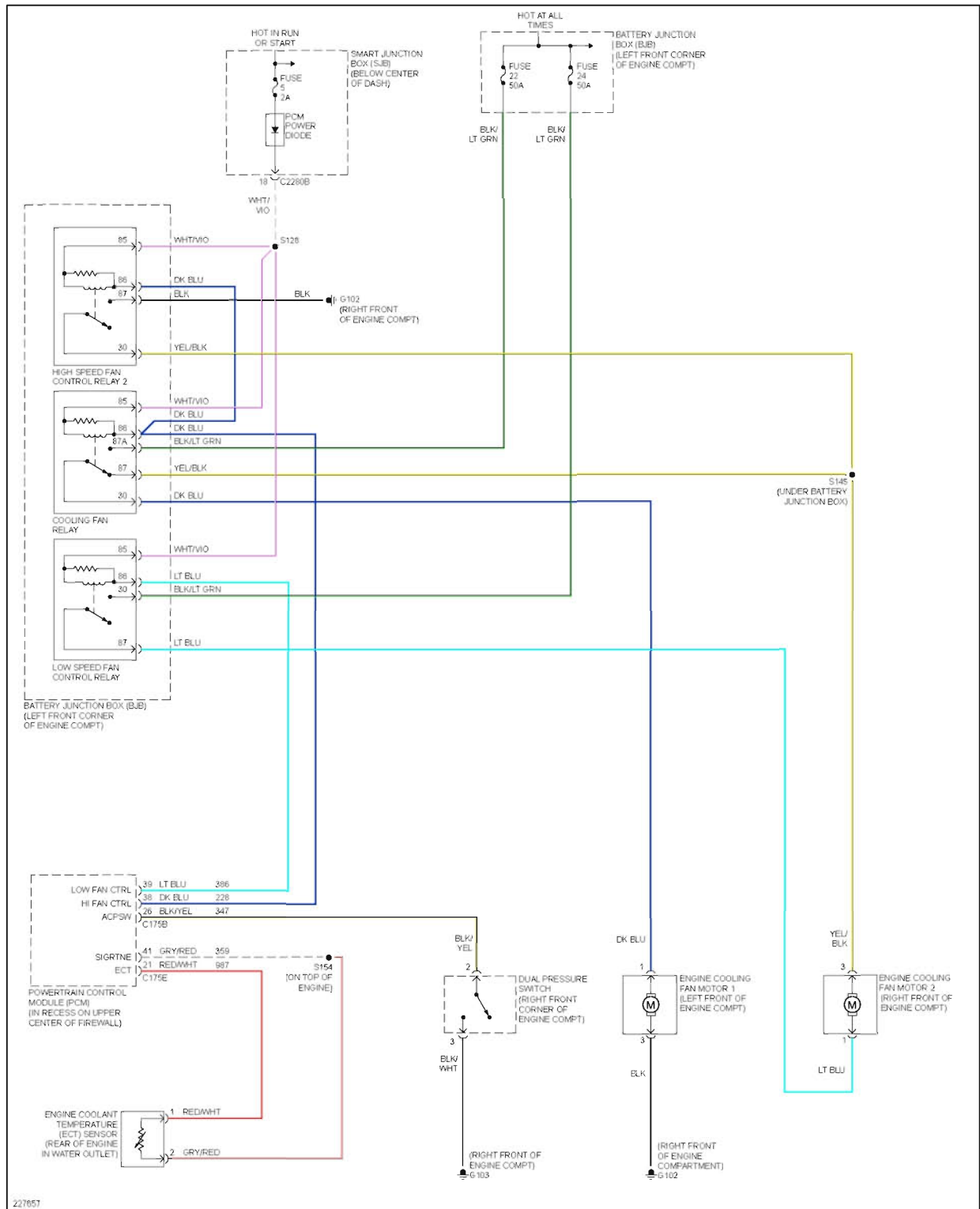


Fig. 26: 3.0L, Cooling Fan Circuit

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 27: Cruise Control Circuit, Except Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

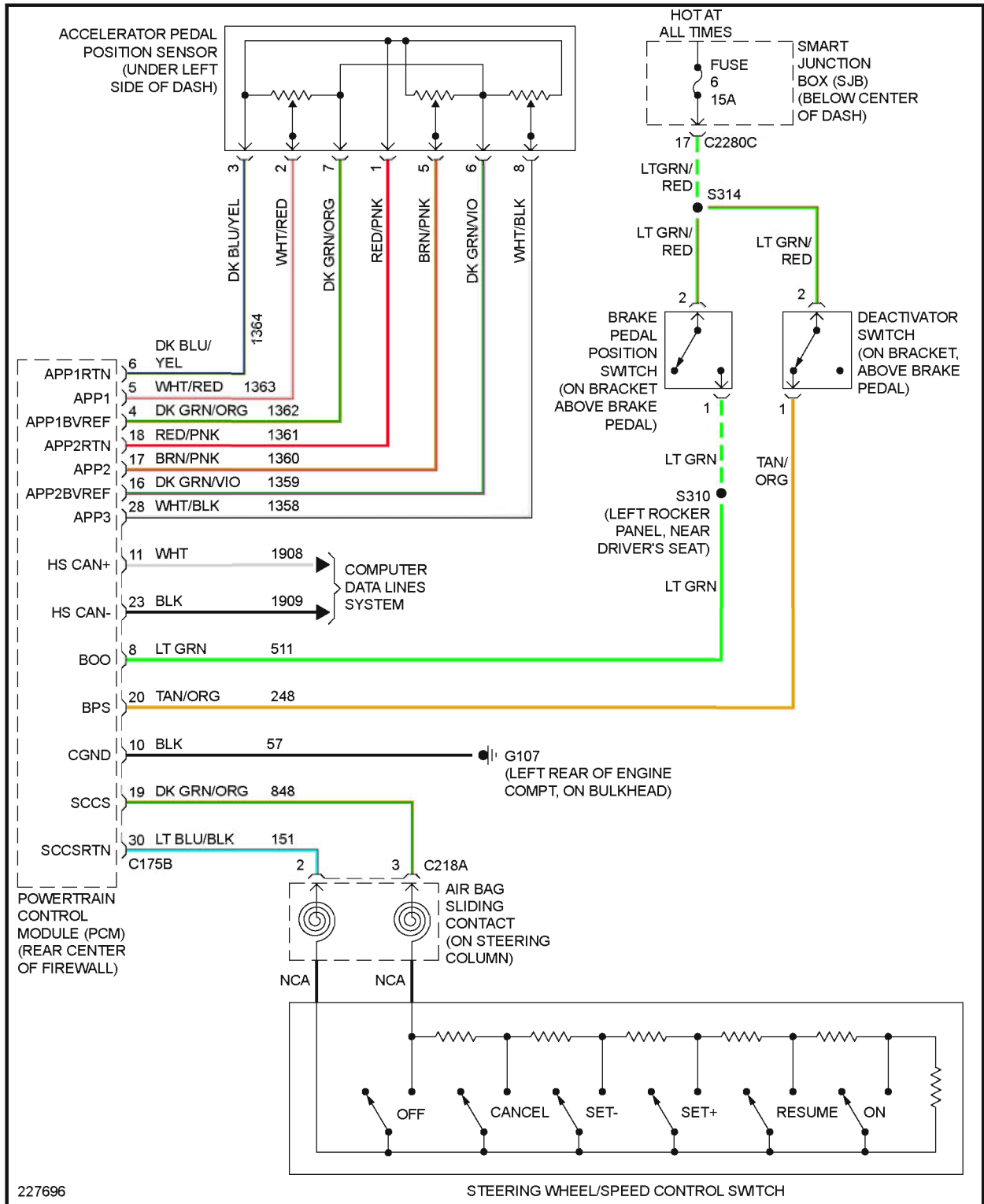
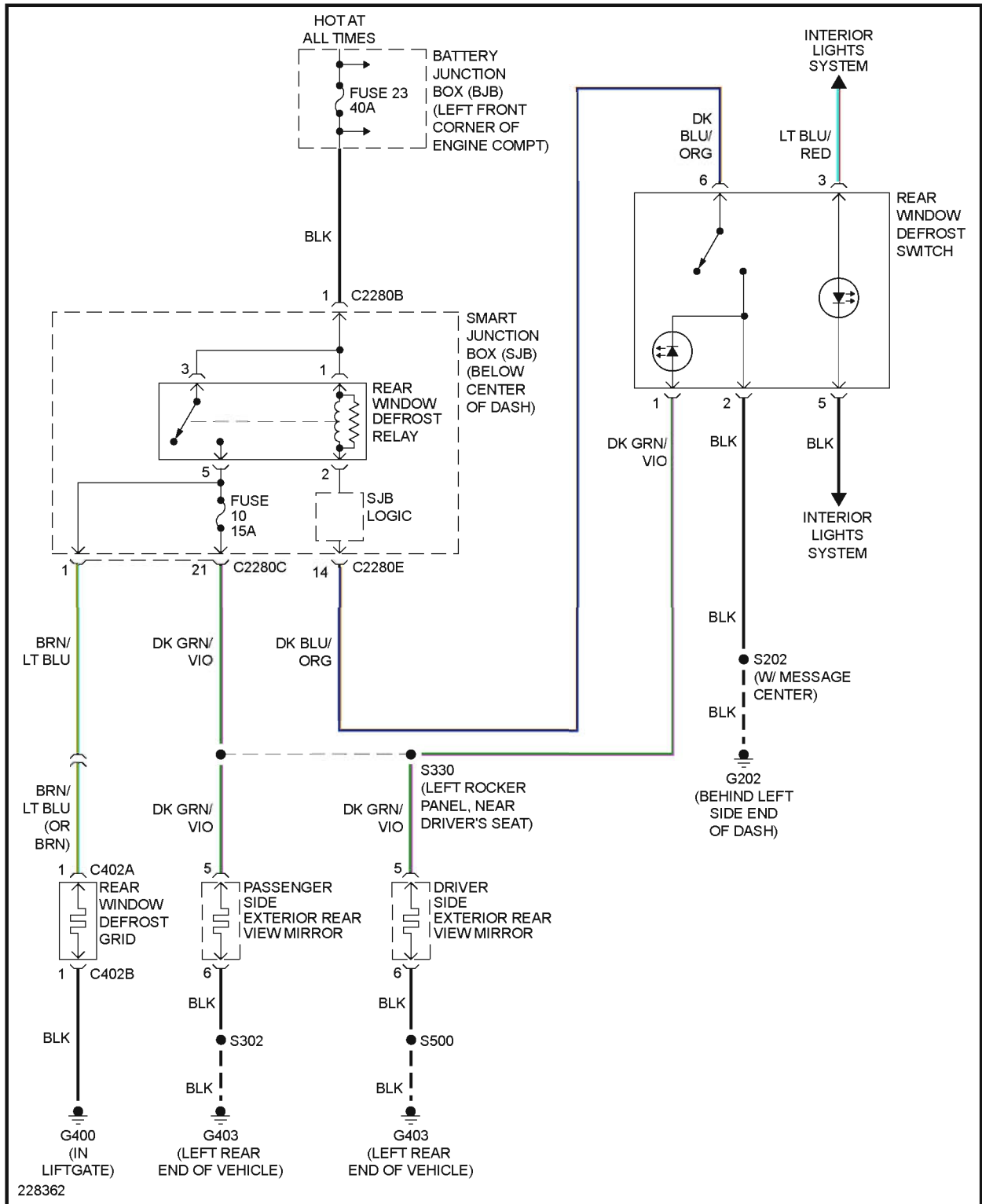


Fig. 28: Cruise Control Circuit, Hybrid

DEFOGGERS

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



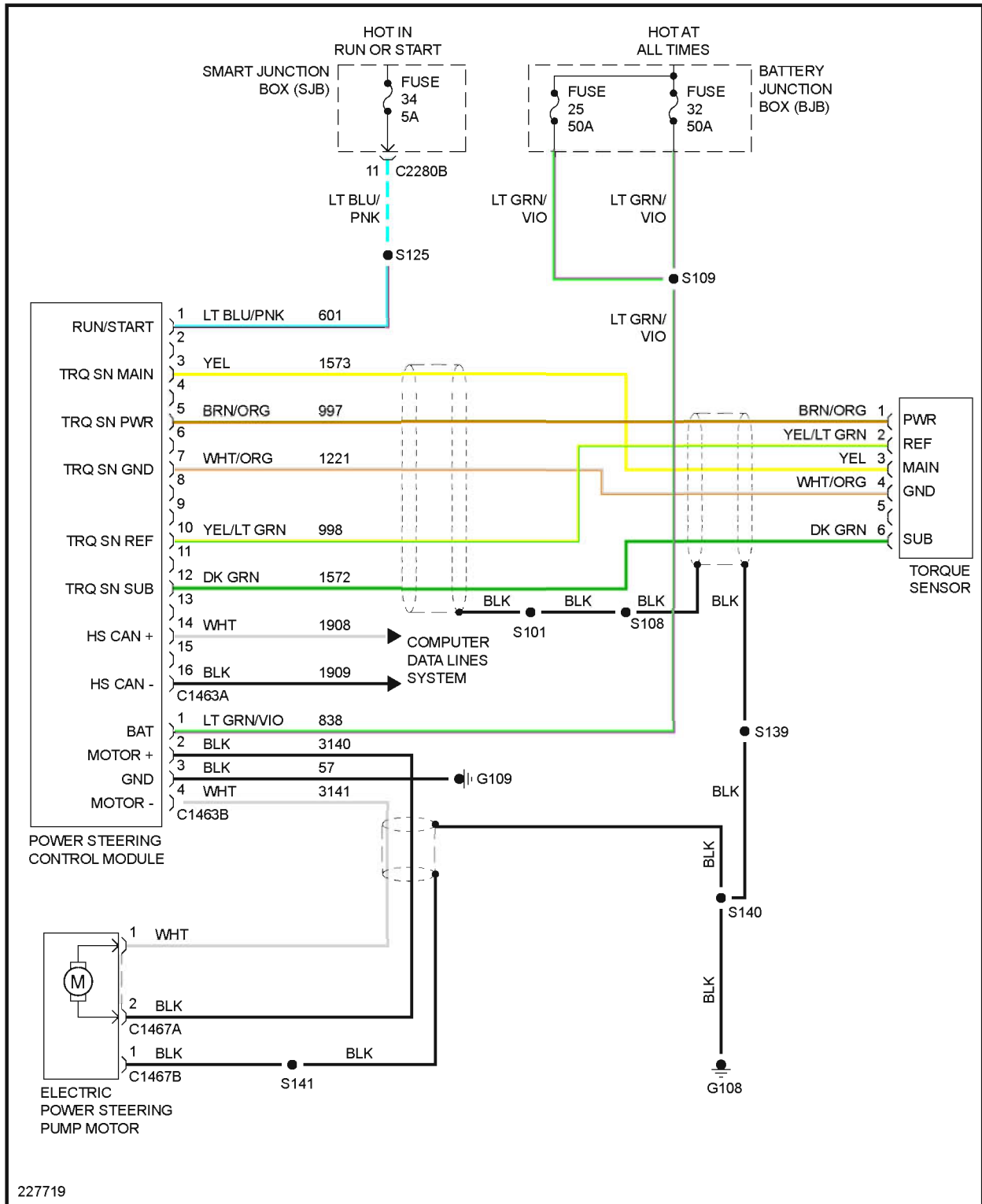
**Fig. 29: Defoggers Circuit, Except Hybrid**



## ELECTRONIC POWER STEERING

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 31: Electronic Power Steering Circuit, Hybrid**

**ENGINE PERFORMANCE**

2.3L

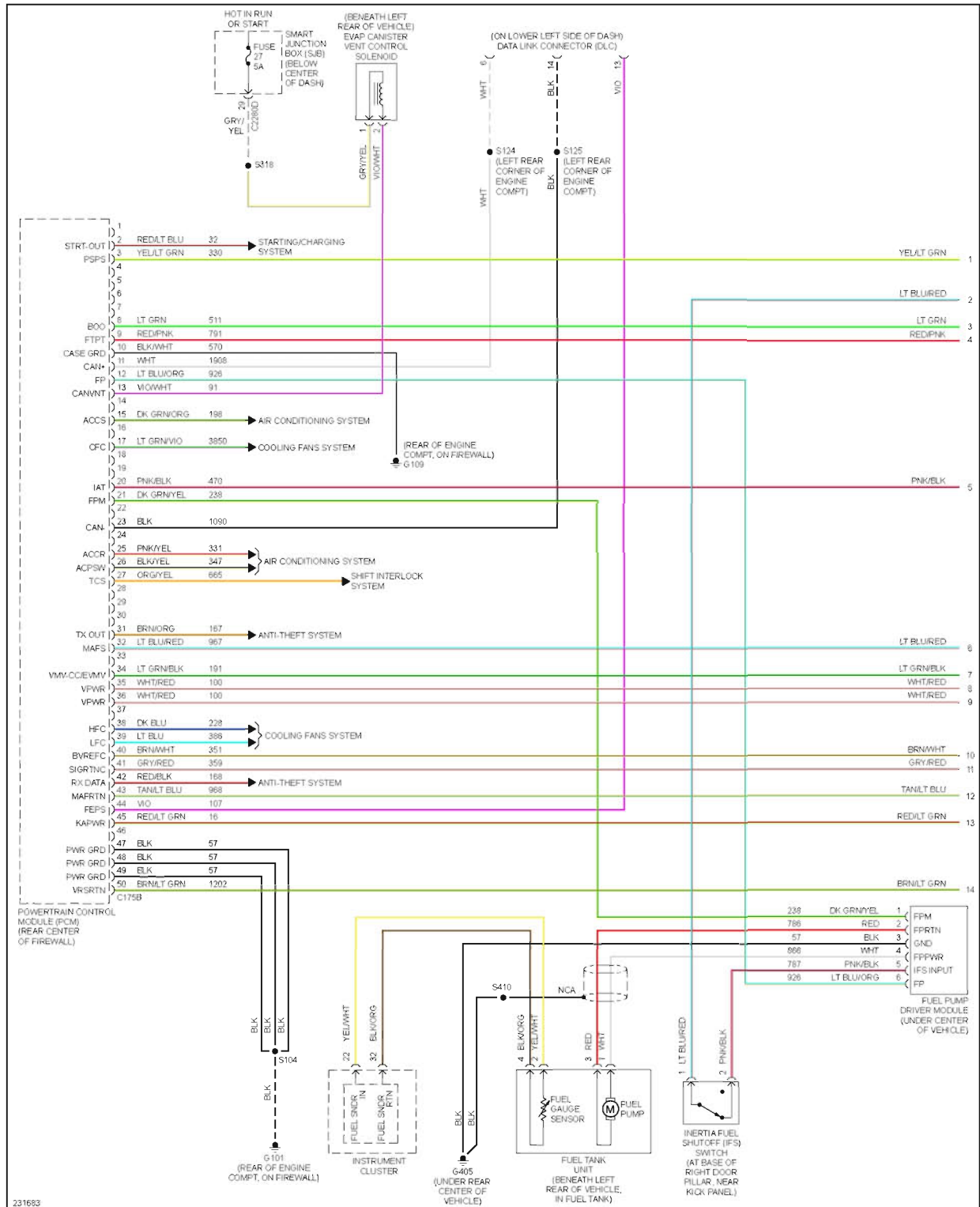
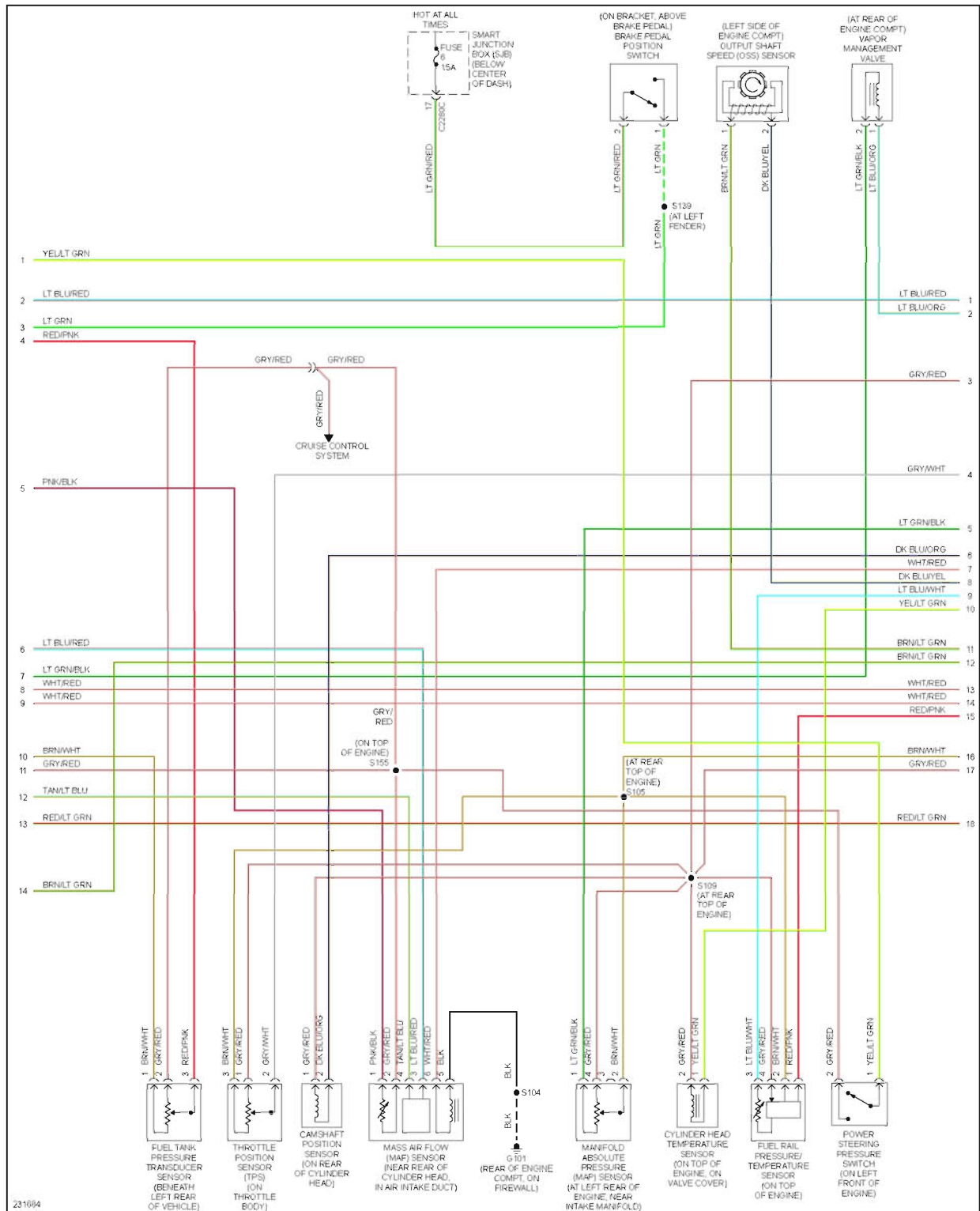


Fig. 32: 2.3L, Engine Performance Circuit, Except Hybrid (1 of 5)



## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 33: 2.3L, Engine Performance Circuit, Except Hybrid (2 of 5)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

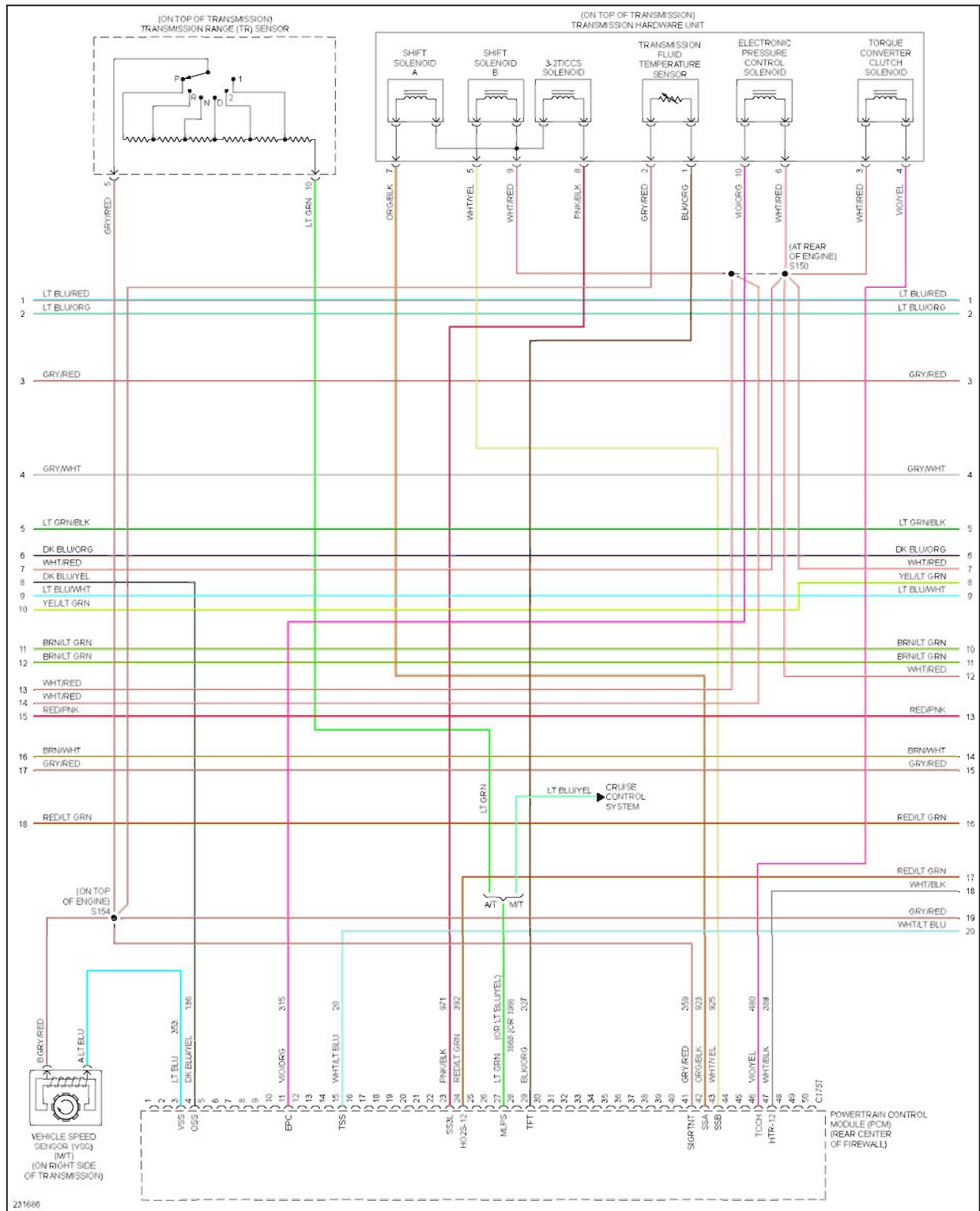


Fig. 34: 2.3L, Engine Performance Circuit, Except Hybrid (3 of 5)

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

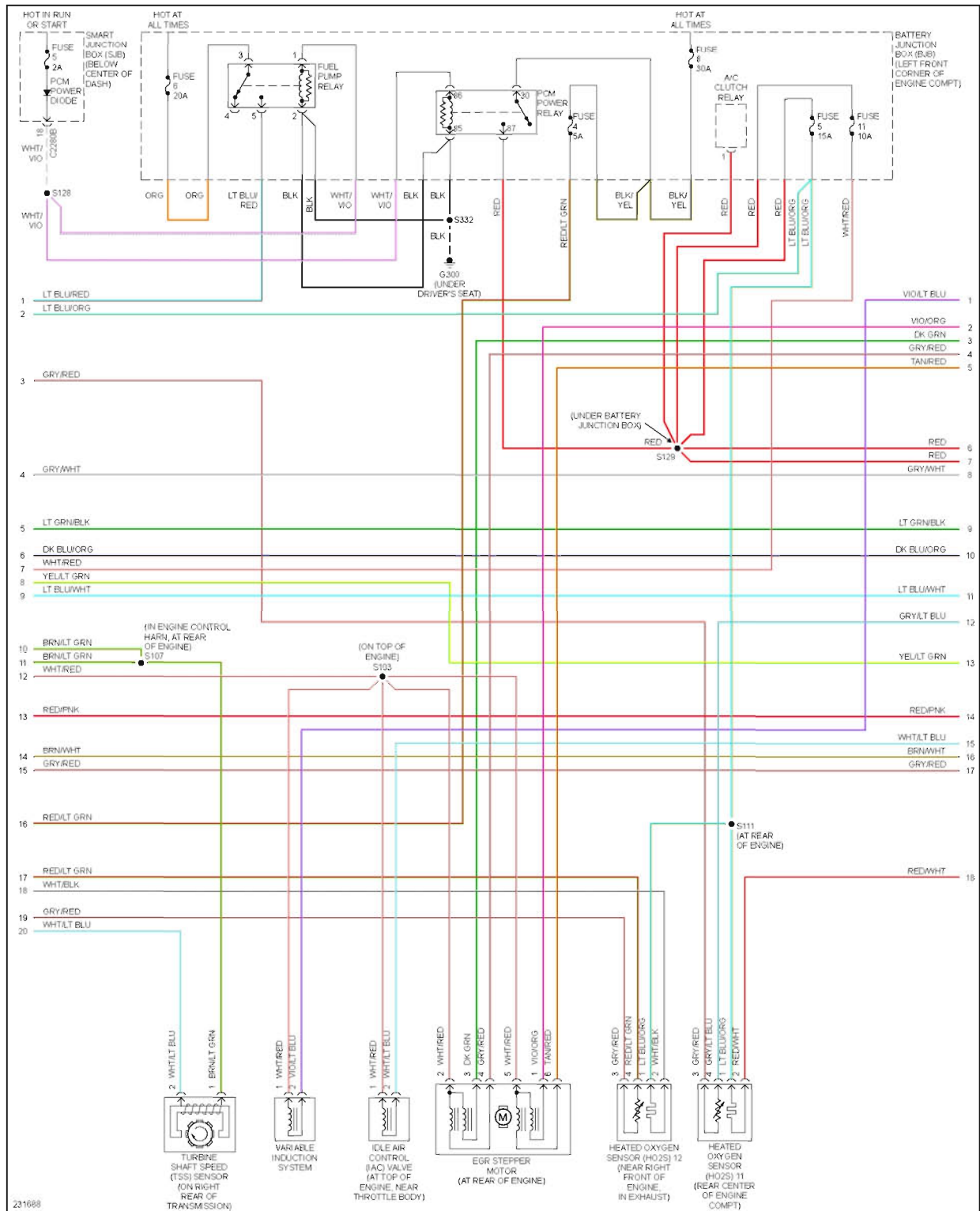


Fig. 35: 2.3L, Engine Performance Circuit, Except Hybrid (4 of 5)

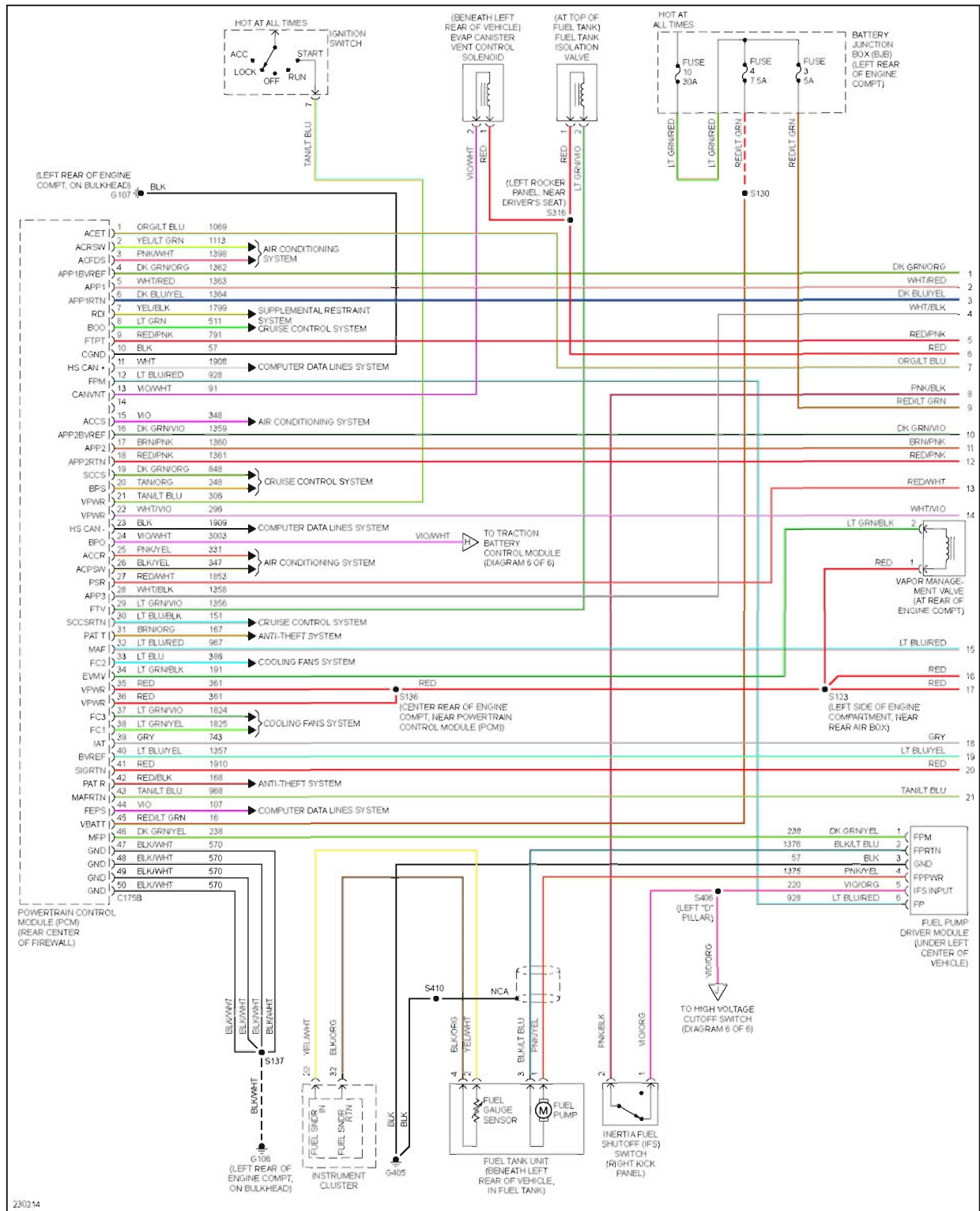
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 36: 2.3L, Engine Performance Circuit, Except Hybrid (5 of 5)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



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Fig. 37: 2.3L, Engine Performance Circuit, Hybrid (1 of 6)

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 38: 2.3L, Engine Performance Circuit, Hybrid (2 of 6)**



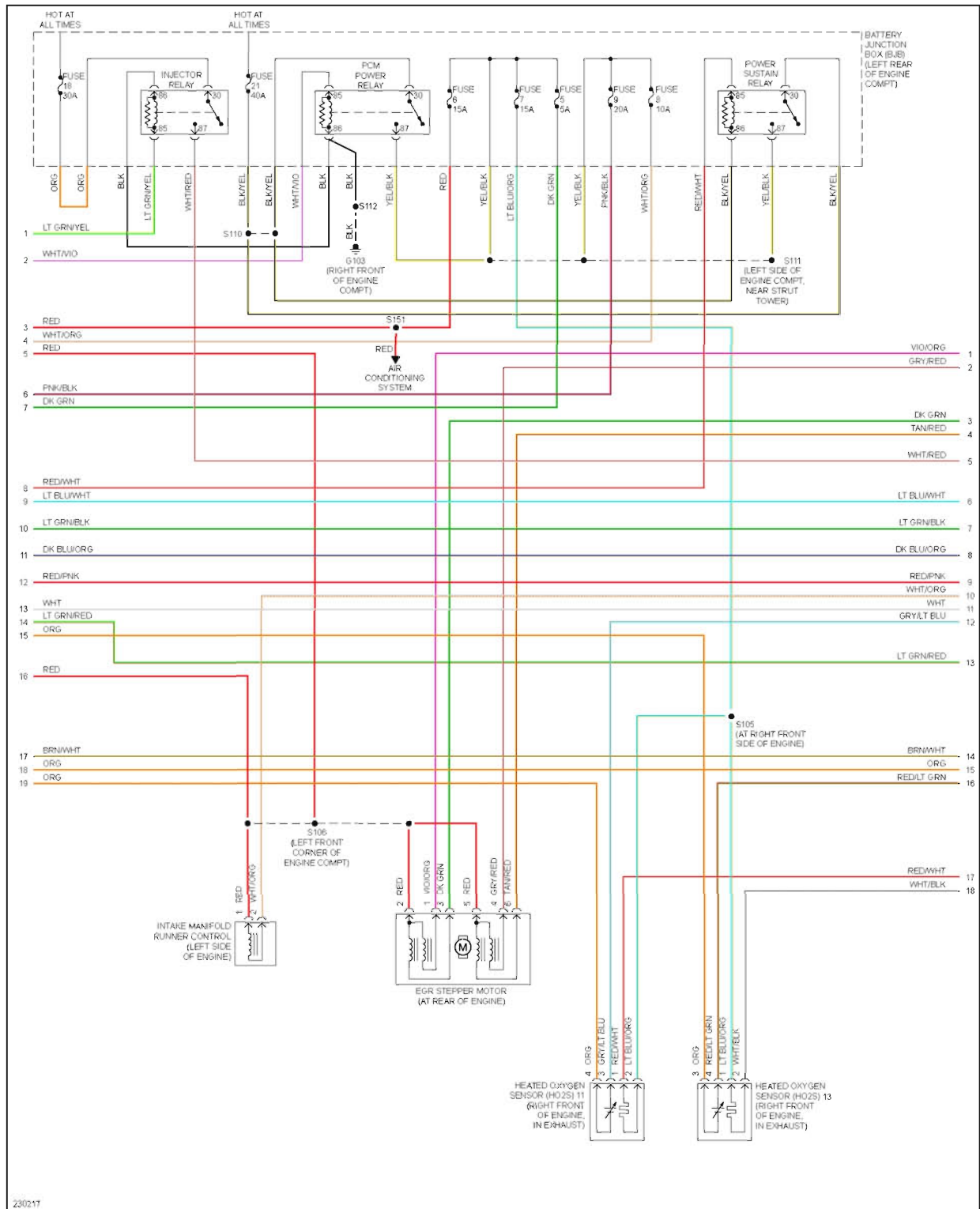
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 39: 2.3L, Engine Performance Circuit, Hybrid (3 of 6)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape





# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

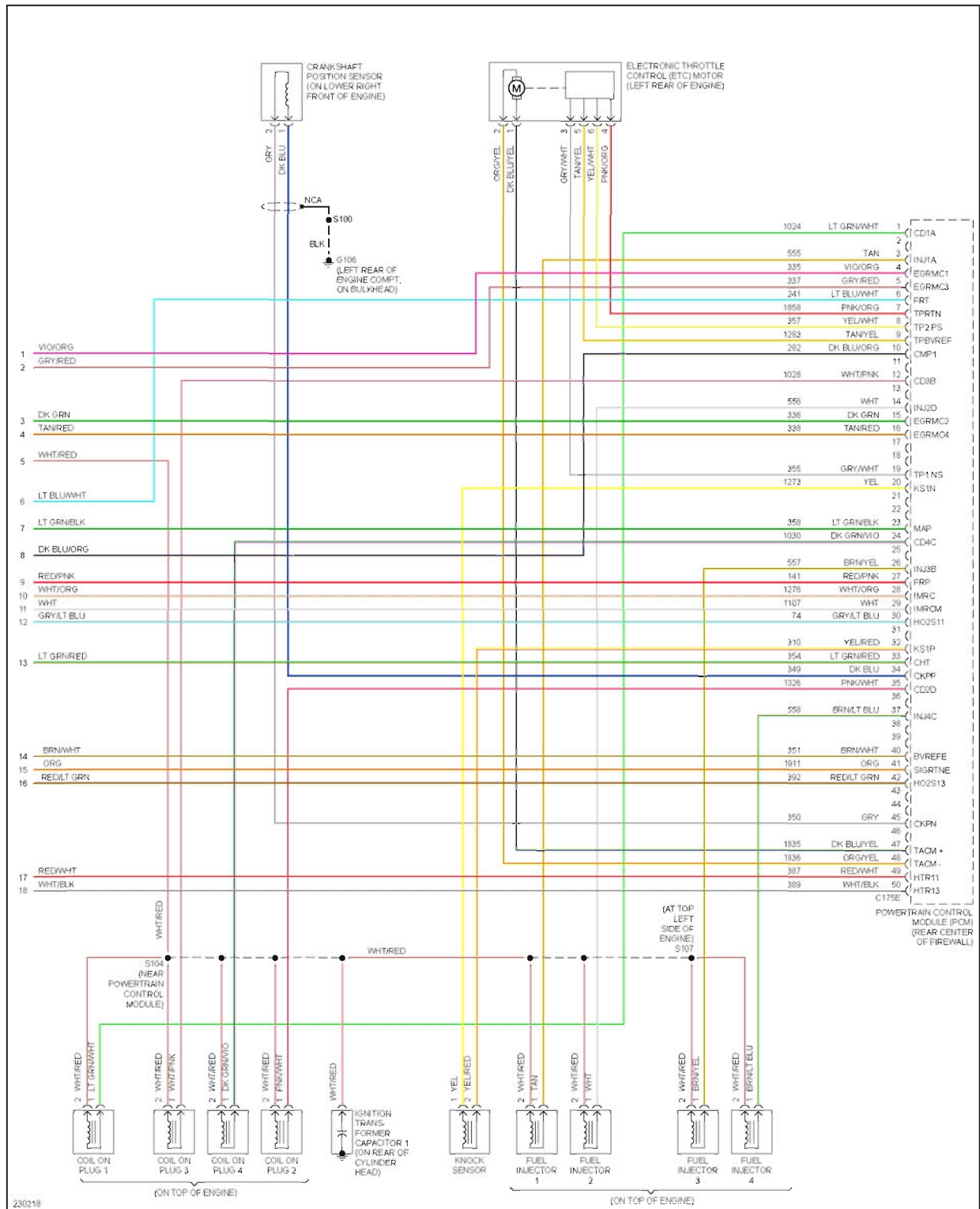
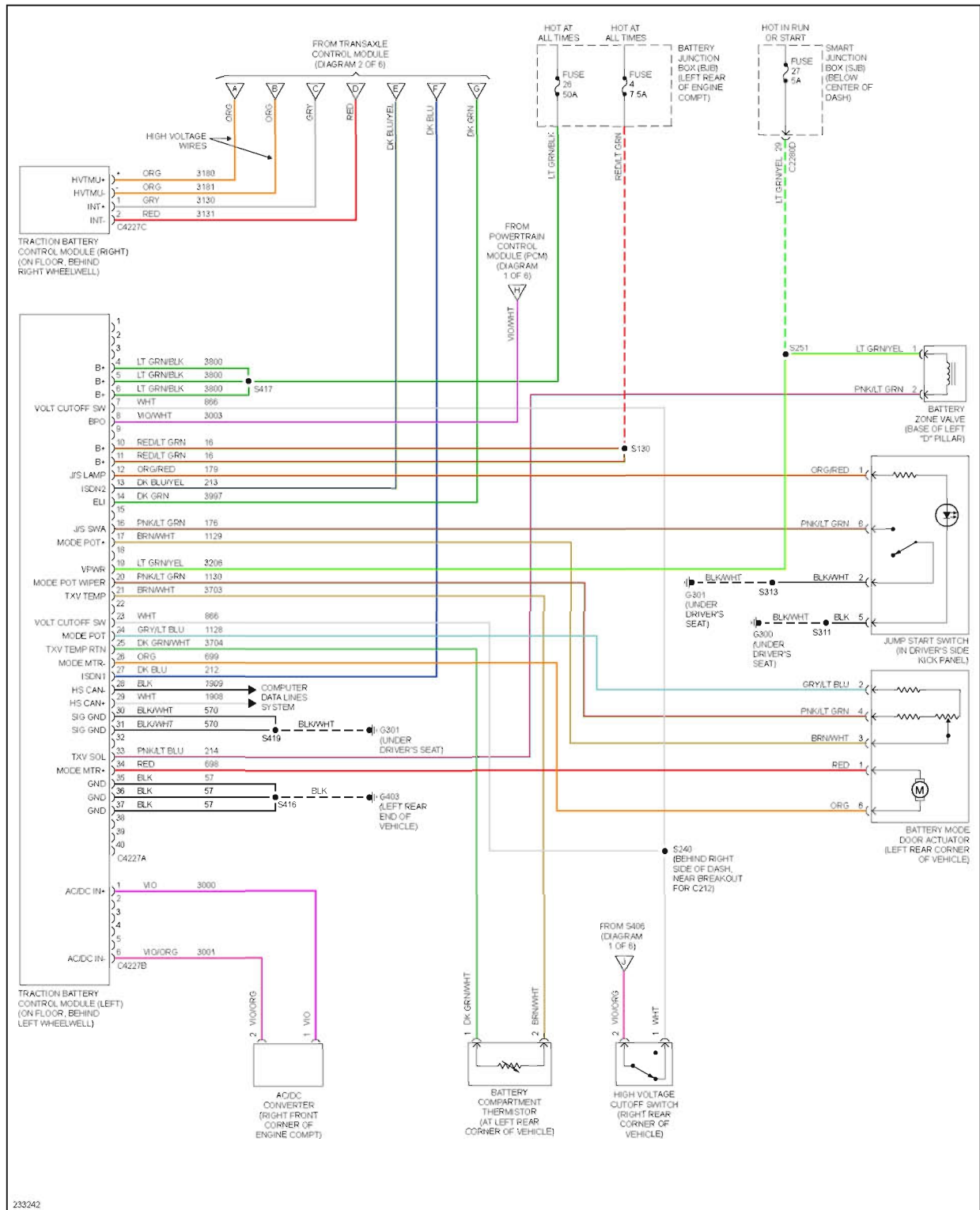


Fig. 41: 2.3L, Engine Performance Circuit, Hybrid (5 of 6)

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



http://vnx.su

Fig. 42: 2.3L, Engine Performance Circuit, Hybrid (6 of 6)

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

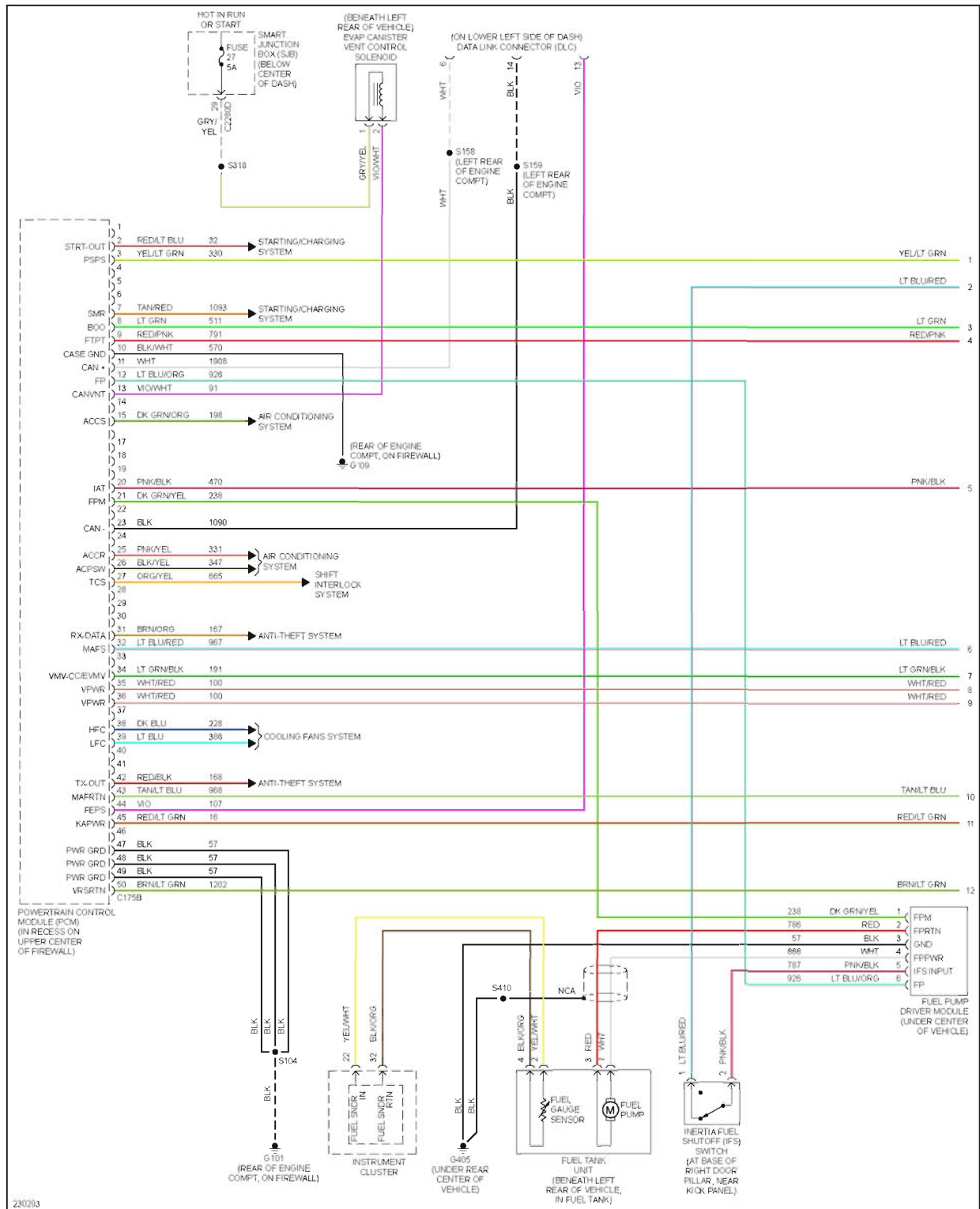


Fig. 43: 3.0L, Engine Performance Circuit (1 of 5)

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

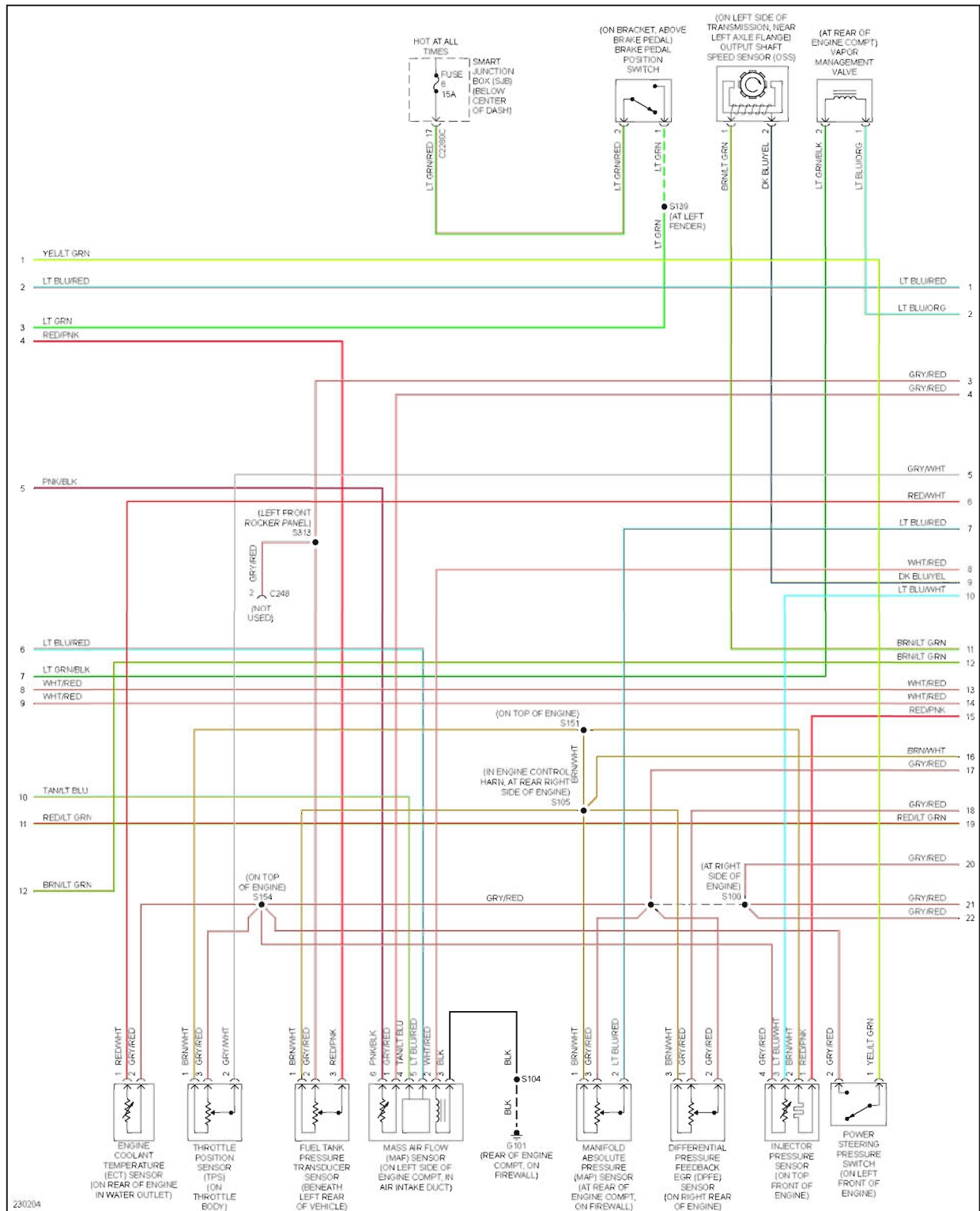


Fig. 44: 3.0L, Engine Performance Circuit (2 of 5)

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 45: 3.0L, Engine Performance Circuit (3 of 5)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

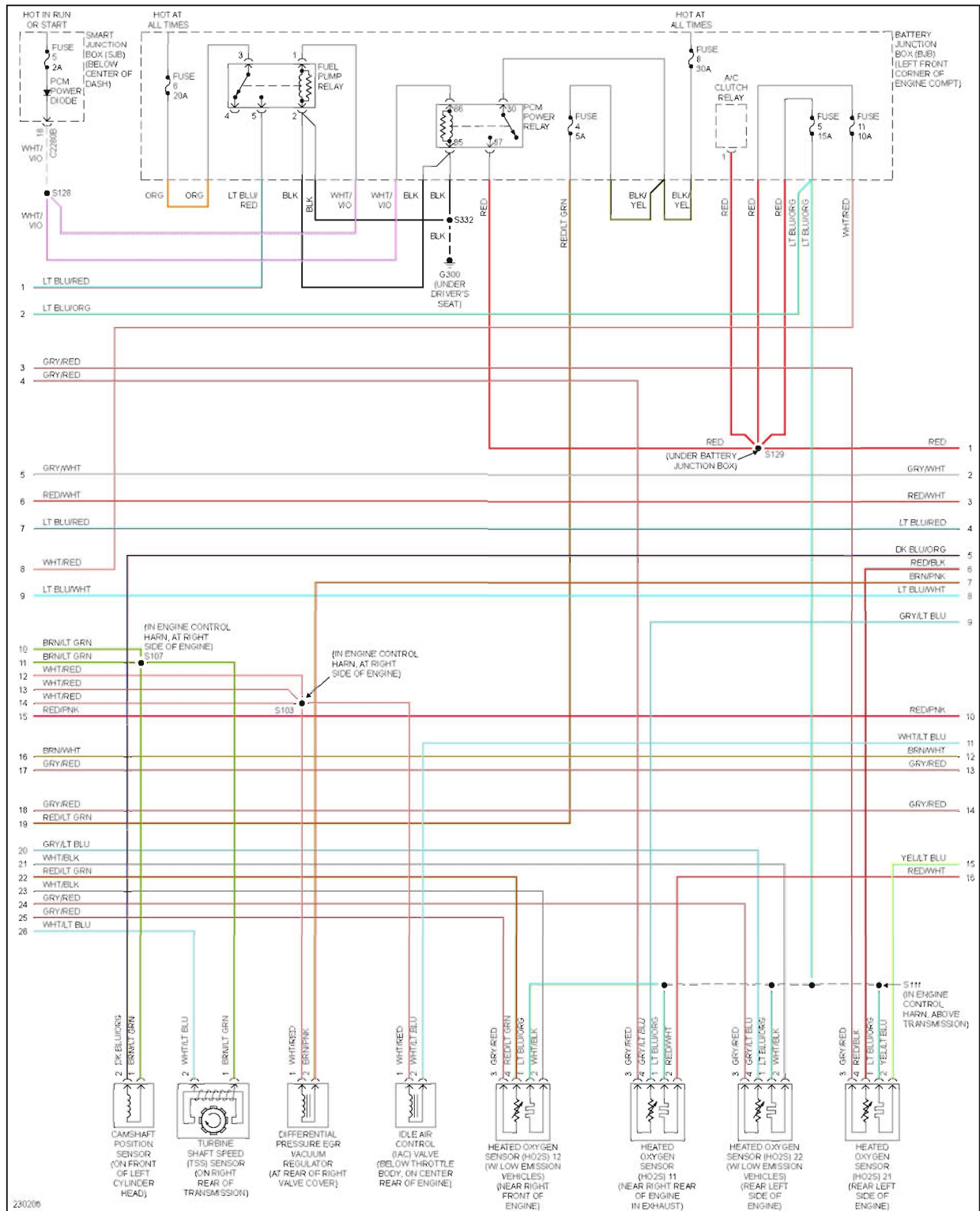


Fig. 46: 3.0L, Engine Performance Circuit (4 of 5)



# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

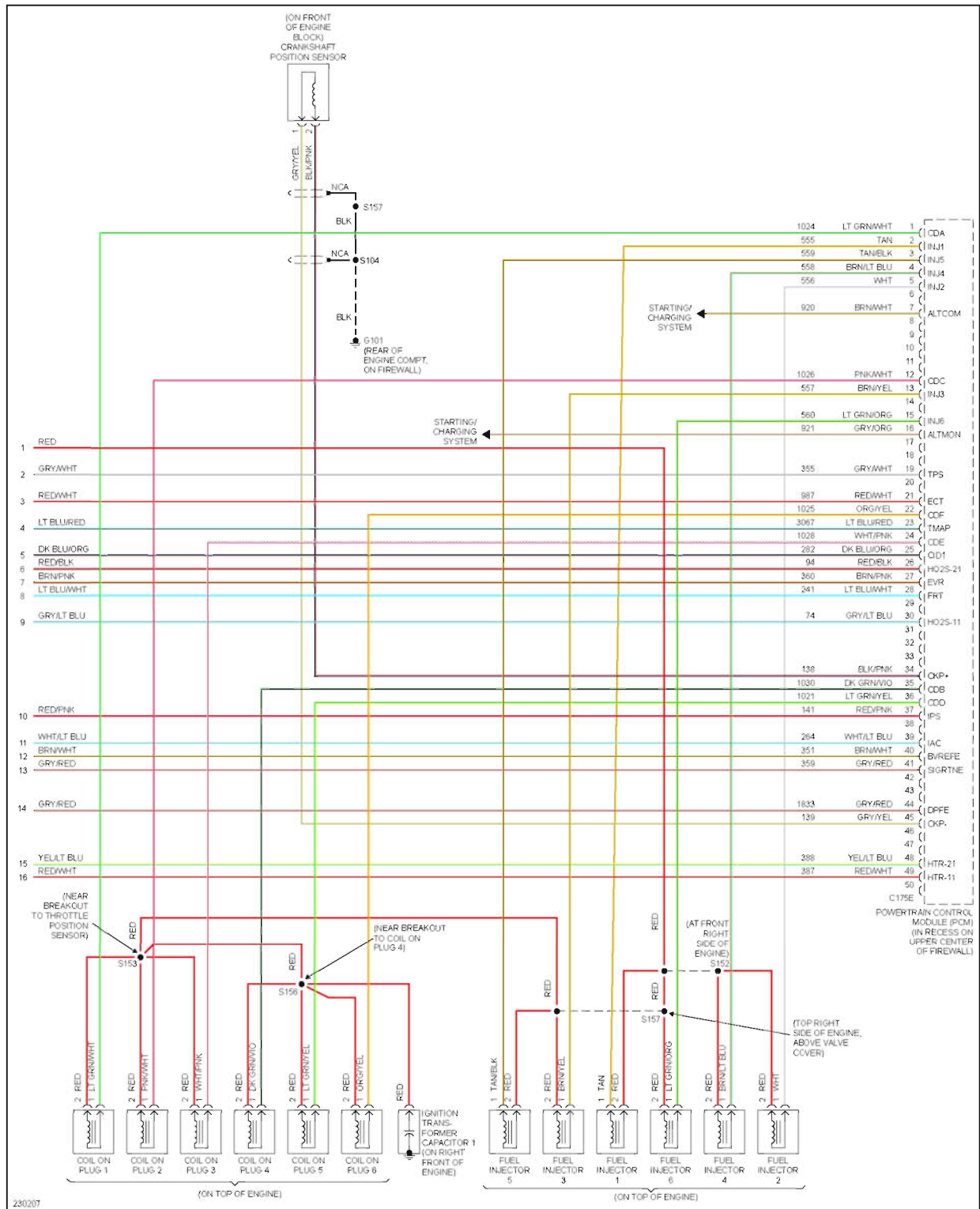
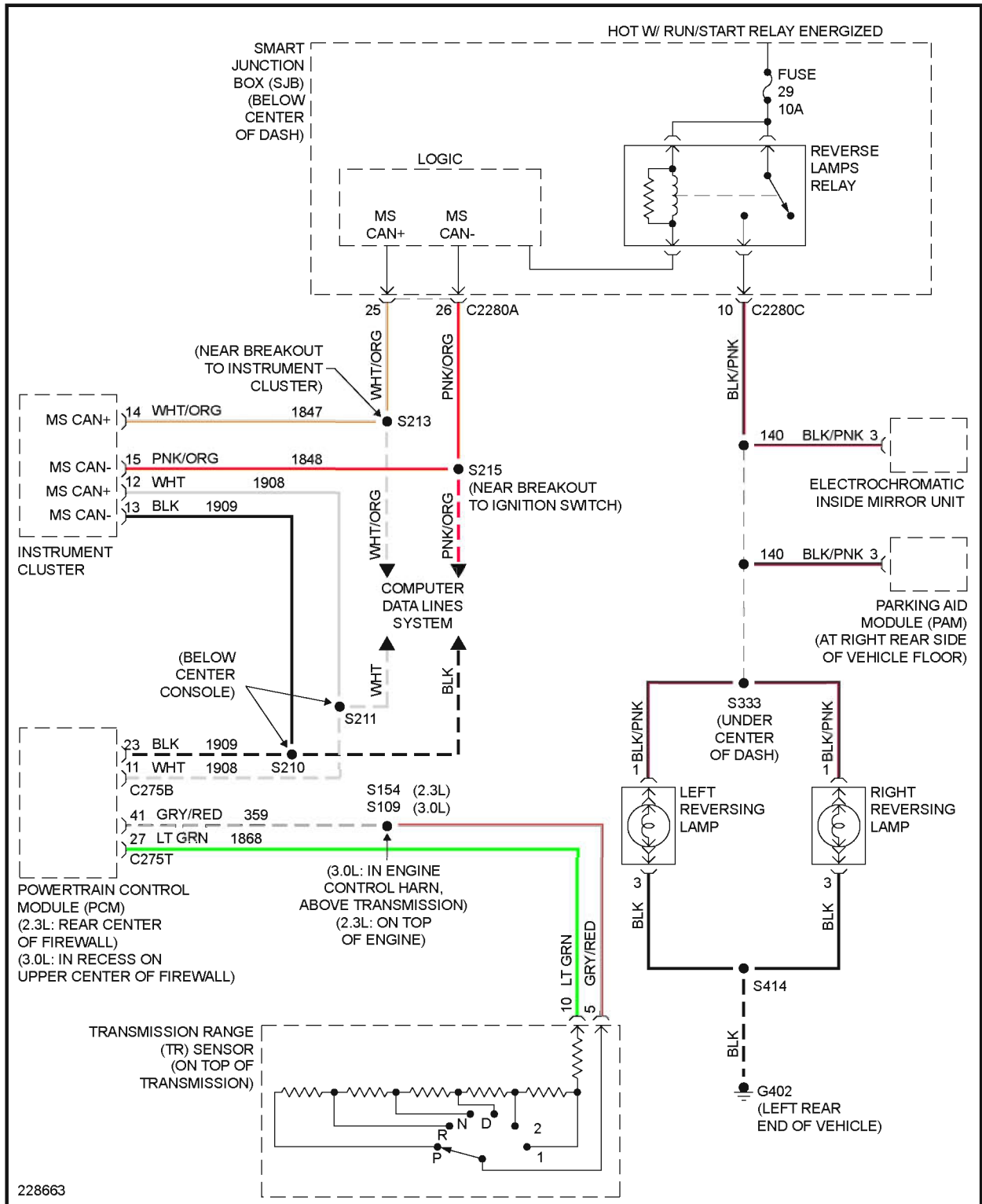


Fig. 47: 3.0L, Engine Performance Circuit (5 of 5)

## EXTERIOR LIGHTS

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

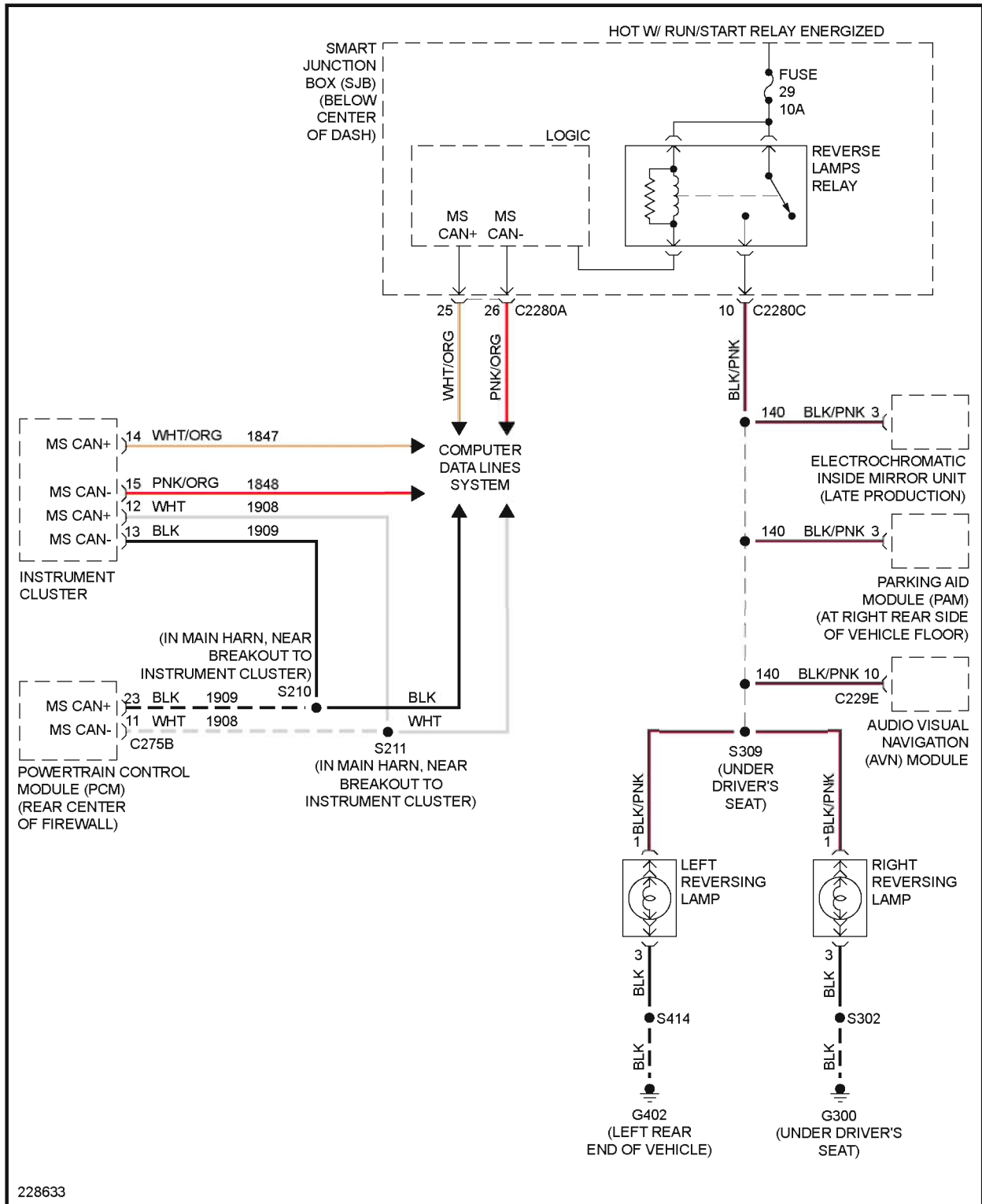


**Fig. 48: Back-up Lamps Circuit, A/T Except Hybrid**



## 2006 Ford Escape

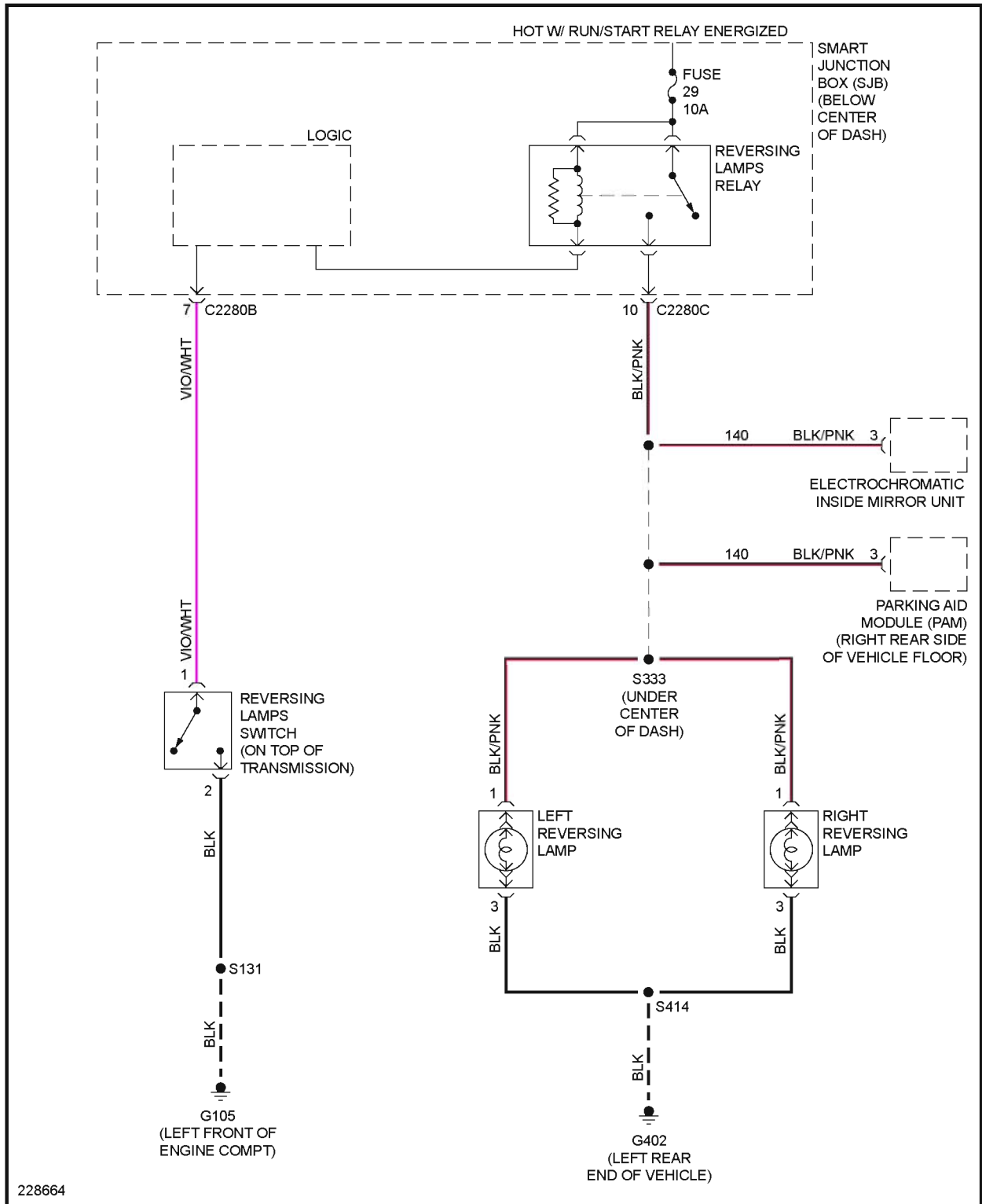
### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 49: Back-up Lamps Circuit, Hybrid**

## 2006 Ford Escape

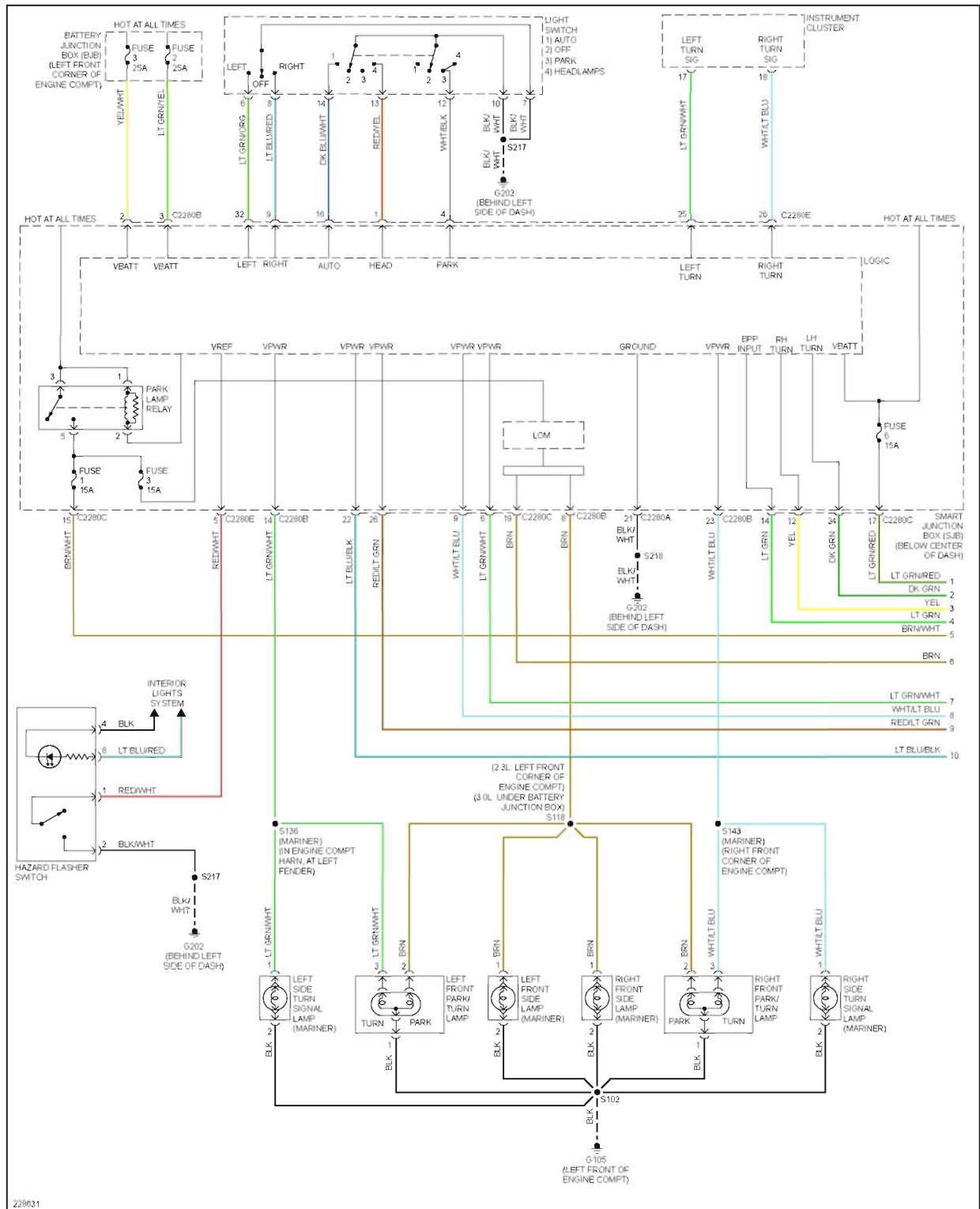
### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 50: Back-up Lamps Circuit, M/T Except Hybrid**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

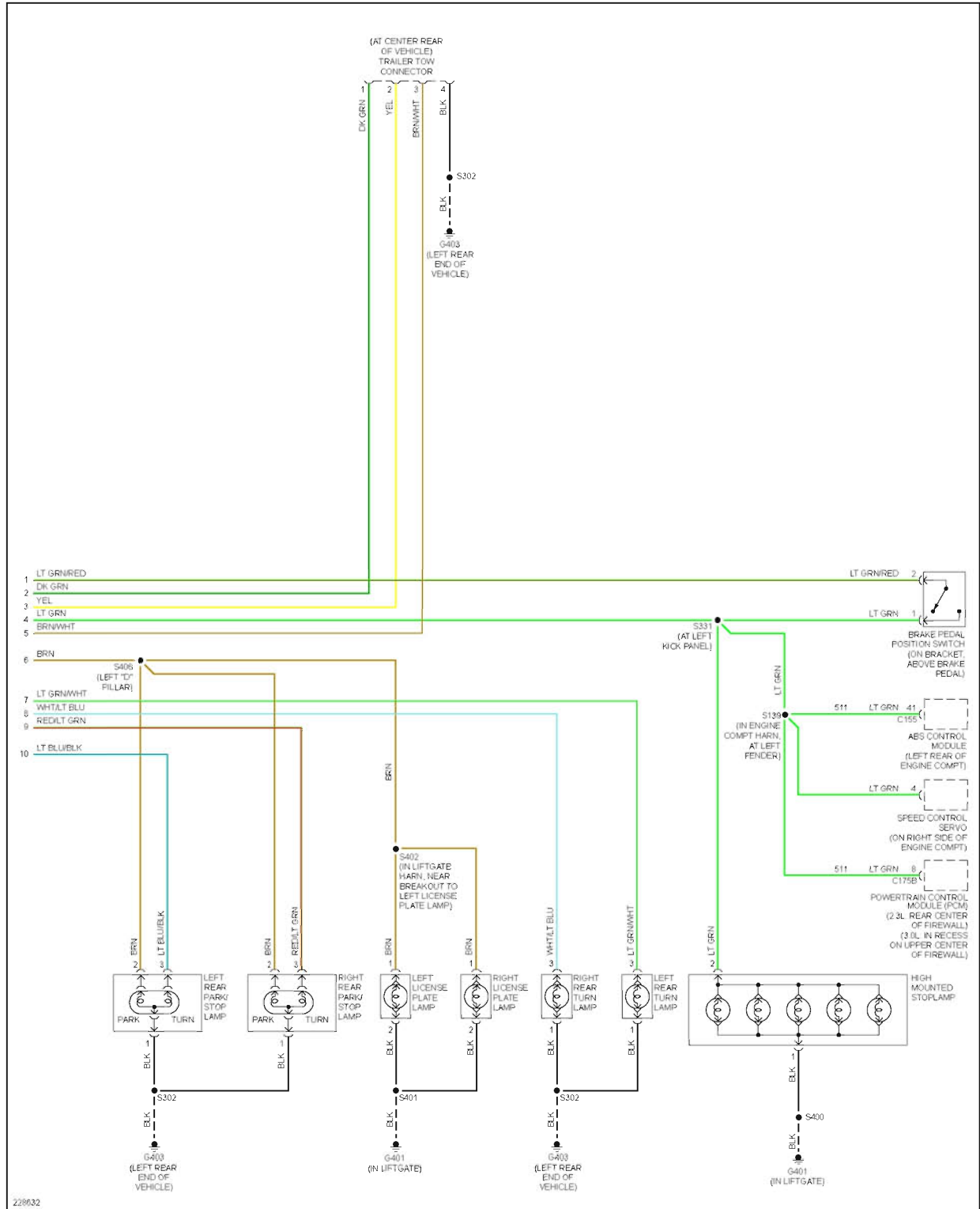


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Fig. 51: Exterior Lamps Circuit, Except Hybrid (1 of 2)

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 52: Exterior Lamps Circuit, Except Hybrid (2 of 2)**

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 53: Exterior Lamps Circuit, Hybrid (1 of 2)**

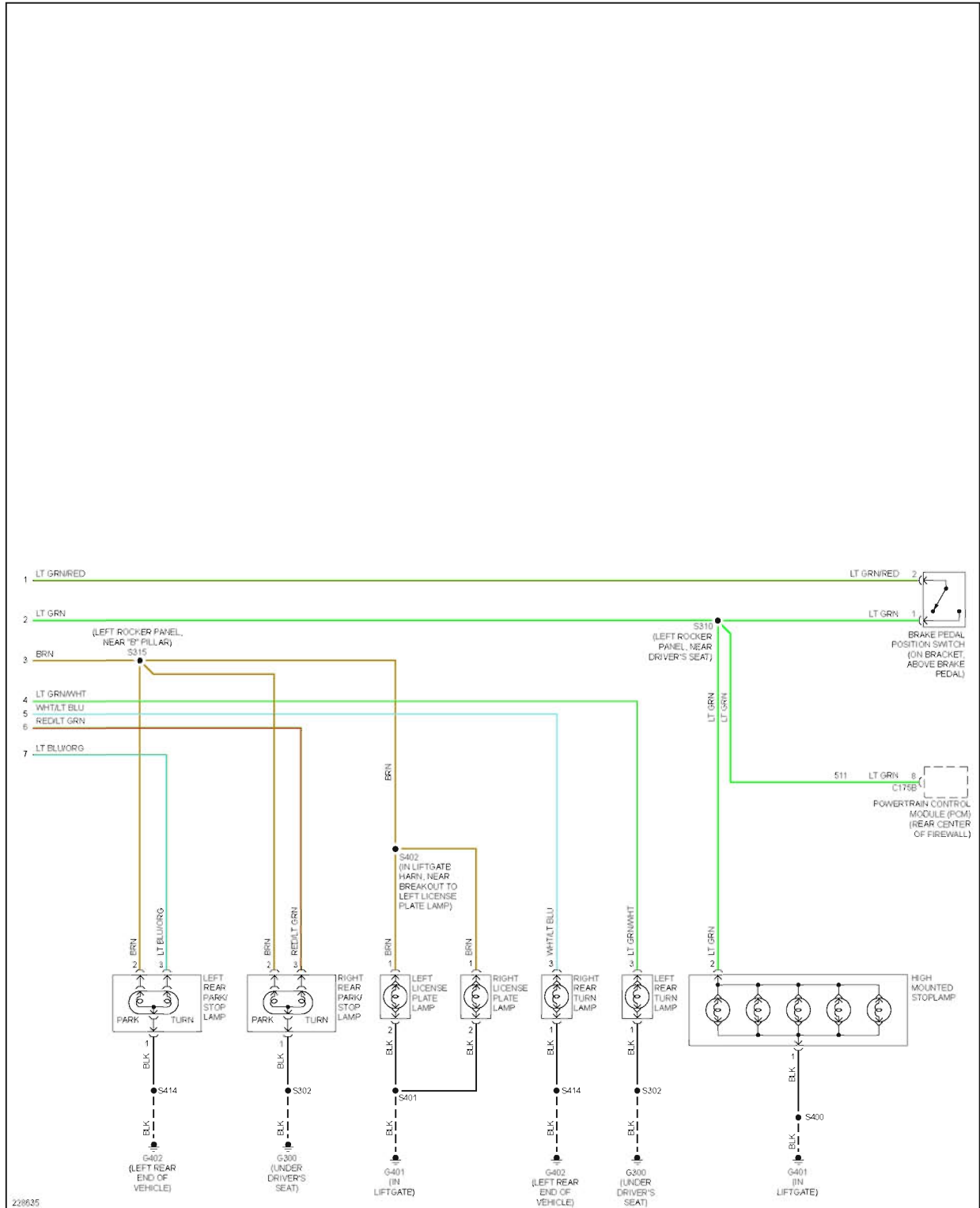


Fig. 54: Exterior Lamps Circuit, Hybrid (2 of 2)

## GROUND DISTRIBUTION

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 55: Ground Distribution Circuit, Except Hybrid (1 of 3)**

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 56: Ground Distribution Circuit, Except Hybrid (2 of 3)**



# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

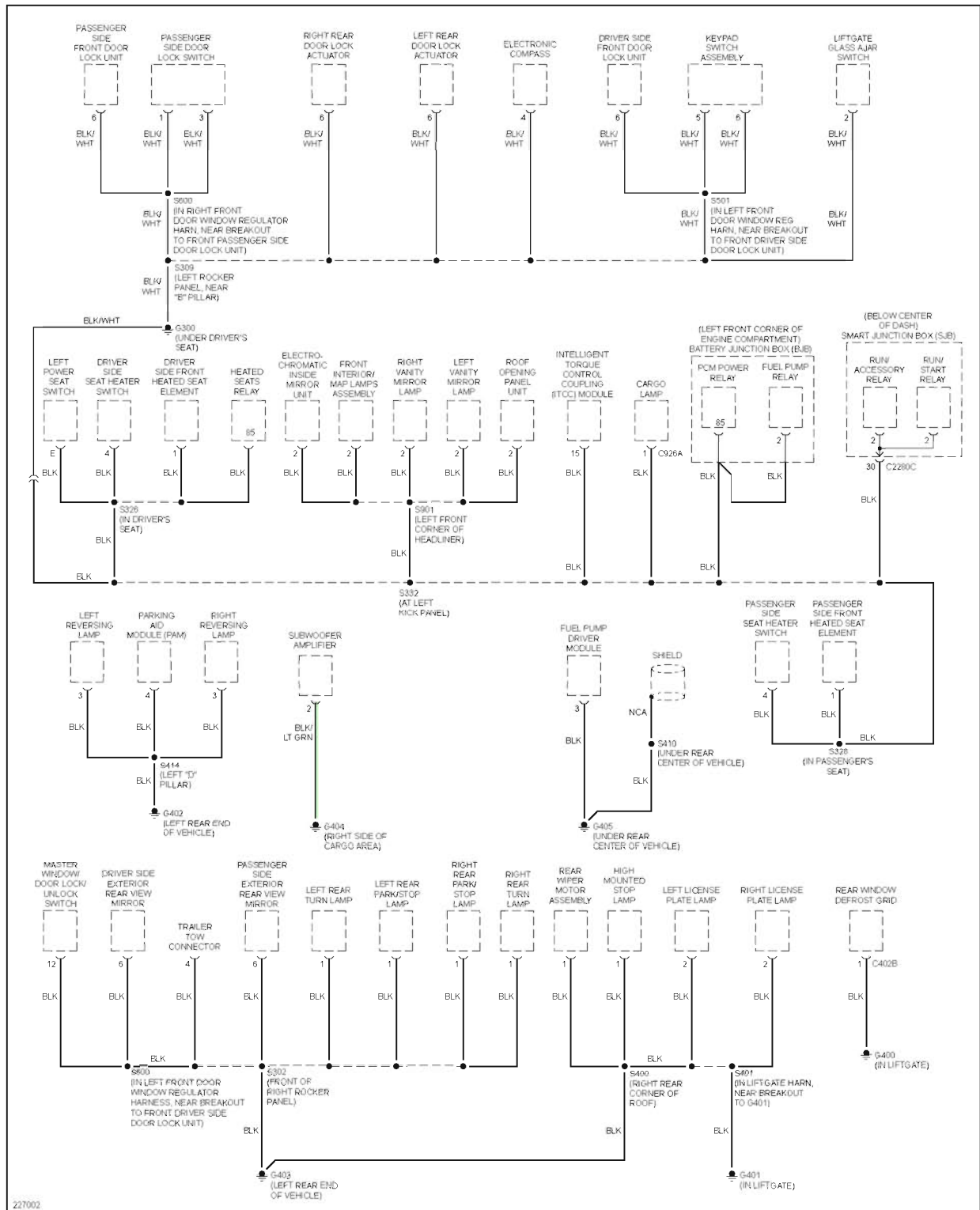


Fig. 57: Ground Distribution Circuit, Except Hybrid (3 of 3)

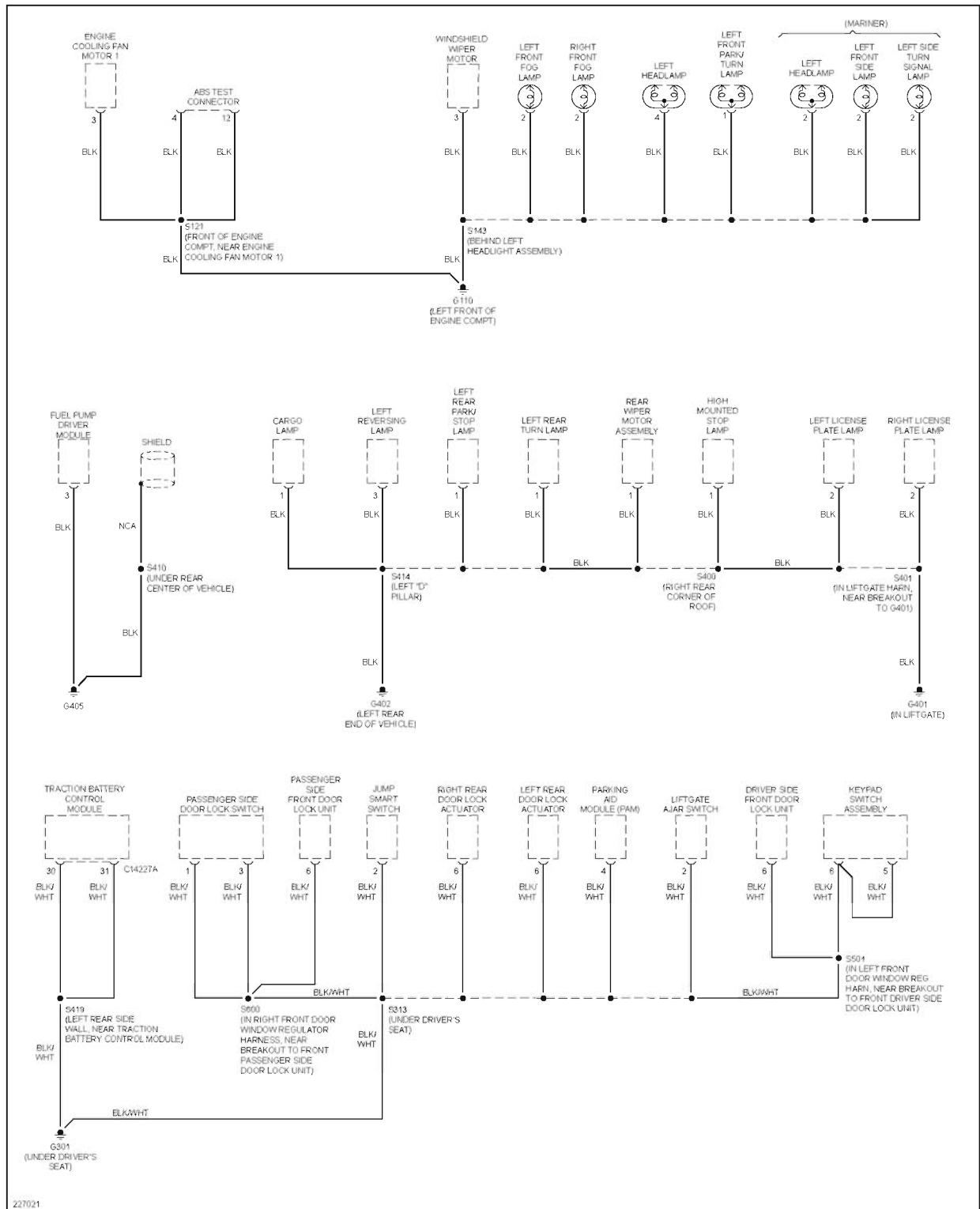
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 58: Ground Distribution Circuit, Hybrid (1 of 4)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 59: Ground Distribution Circuit, Hybrid (2 of 4)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

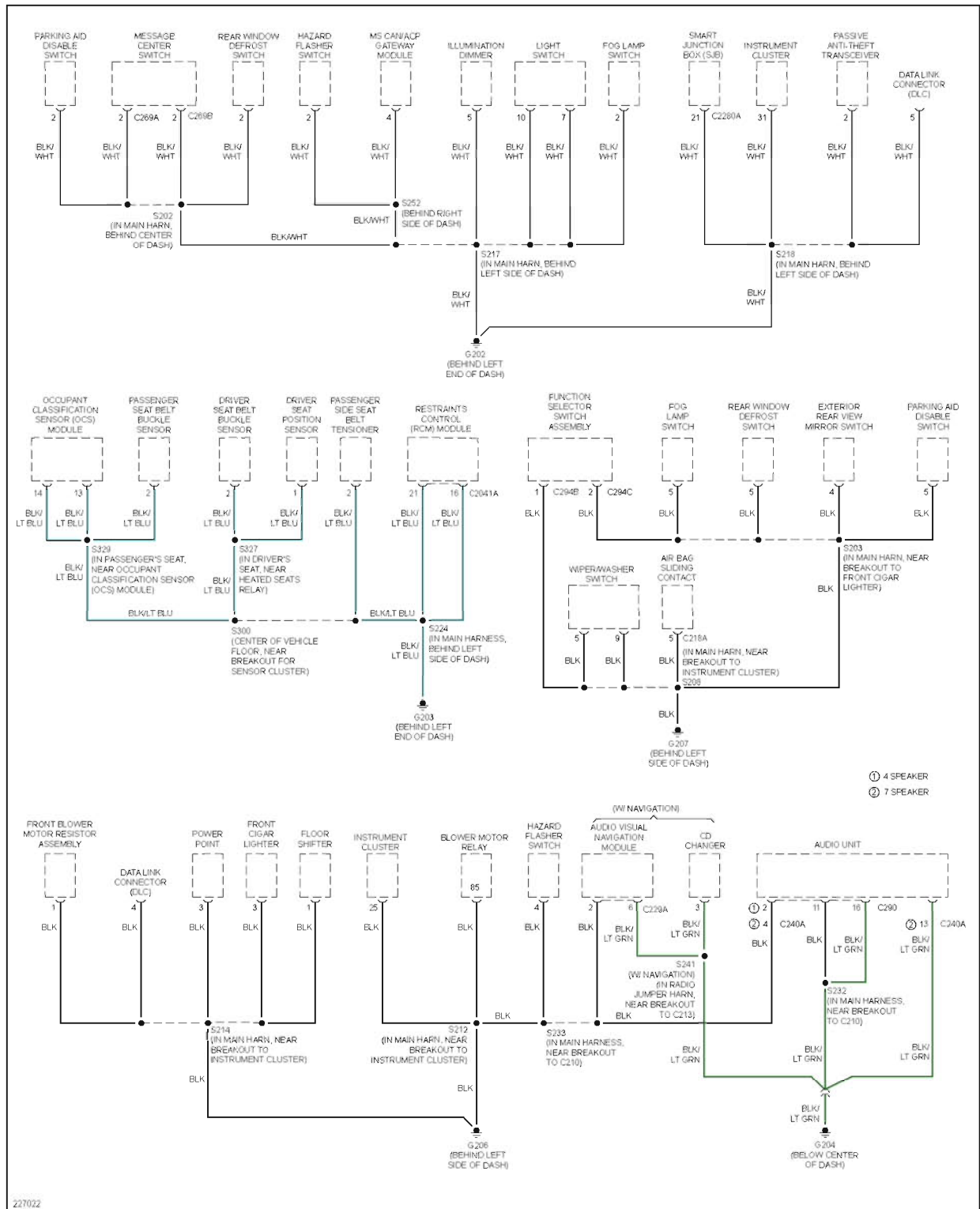
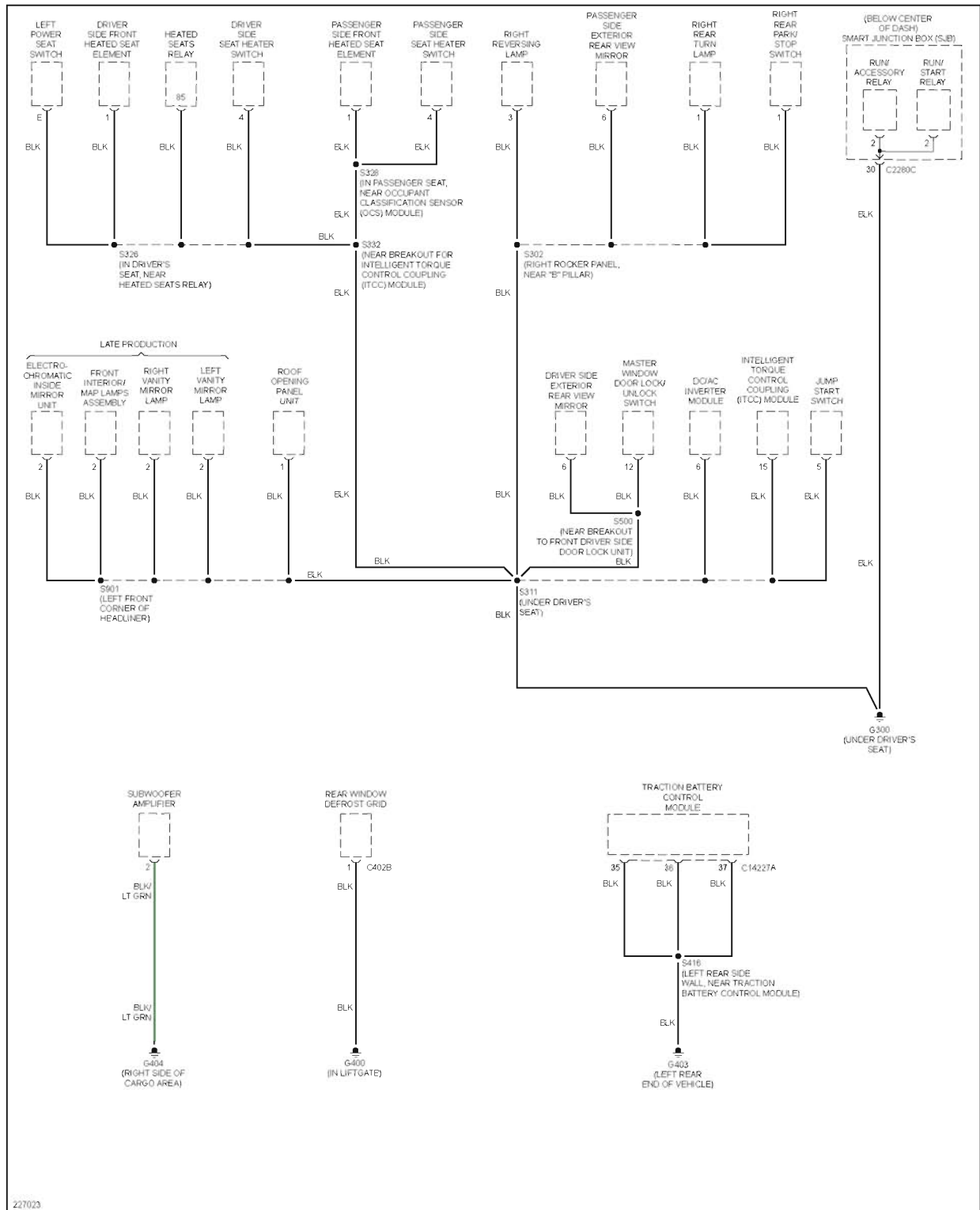


Fig. 60: Ground Distribution Circuit, Hybrid (3 of 4)

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



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**Fig. 61: Ground Distribution Circuit, Hybrid (4 of 4)**

## HEADLIGHTS

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 62: Headlights Circuit, Except Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

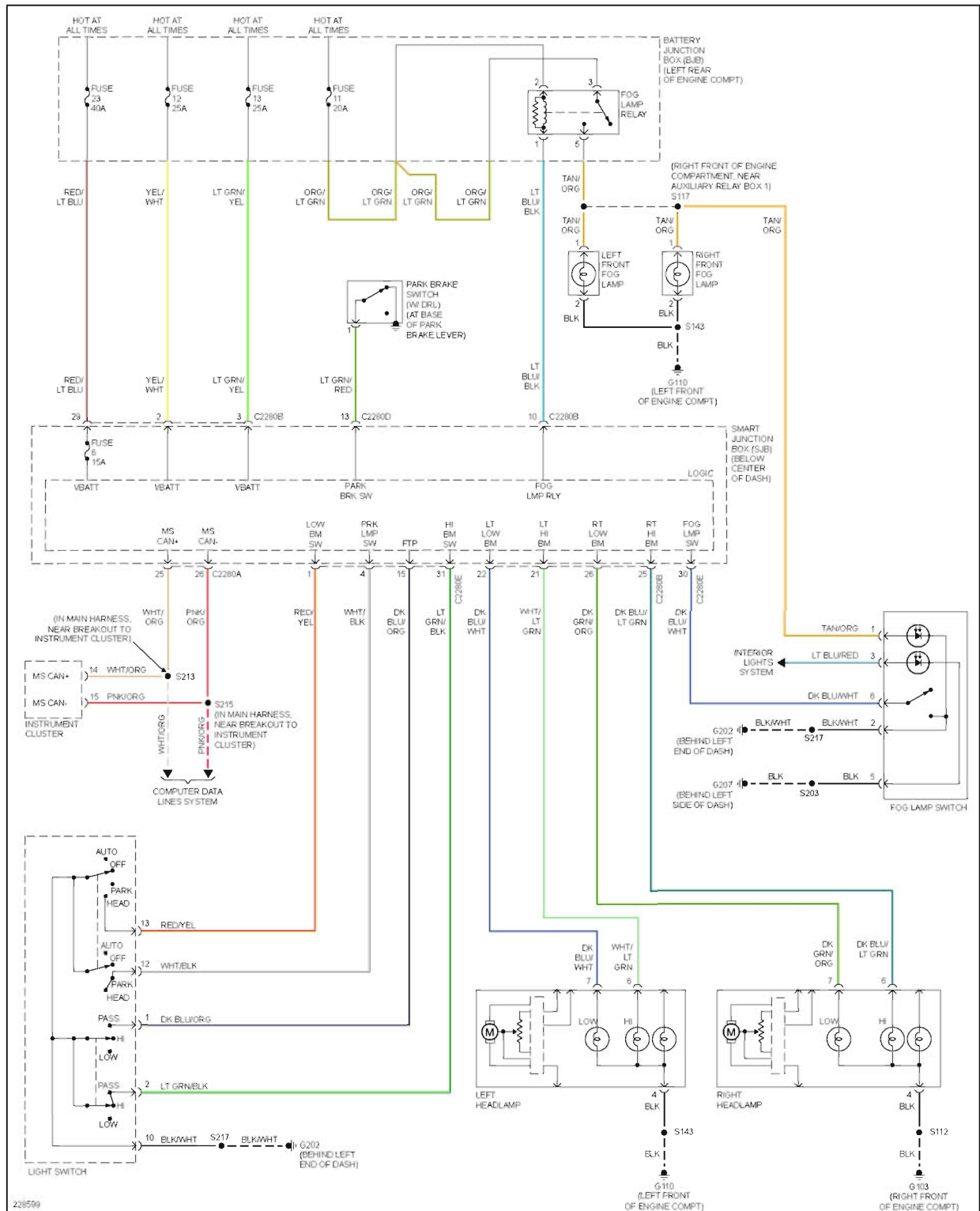


Fig. 63: Headlights Circuit, Hybrid

HORN

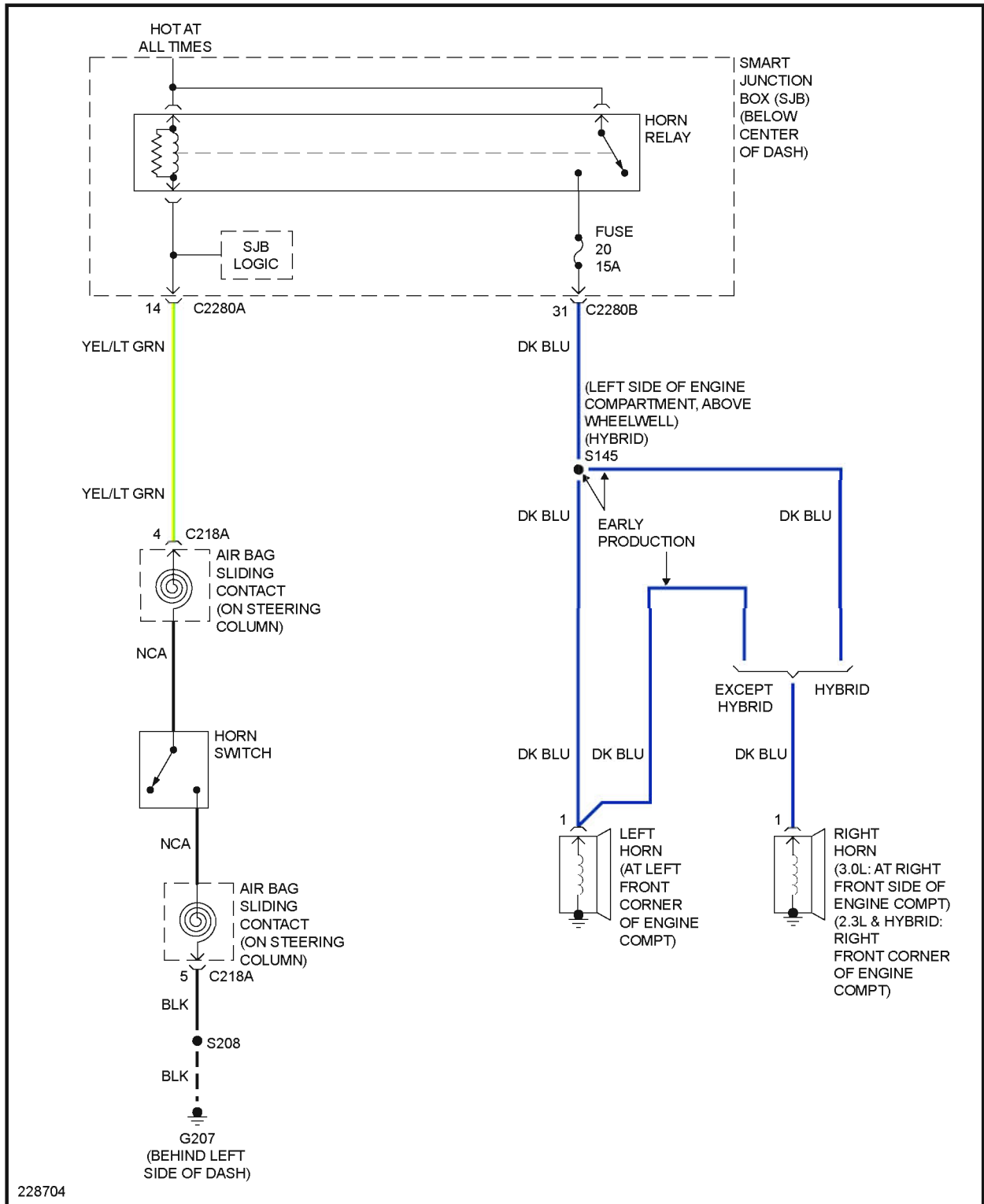


Fig. 64: Horn Circuit



# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

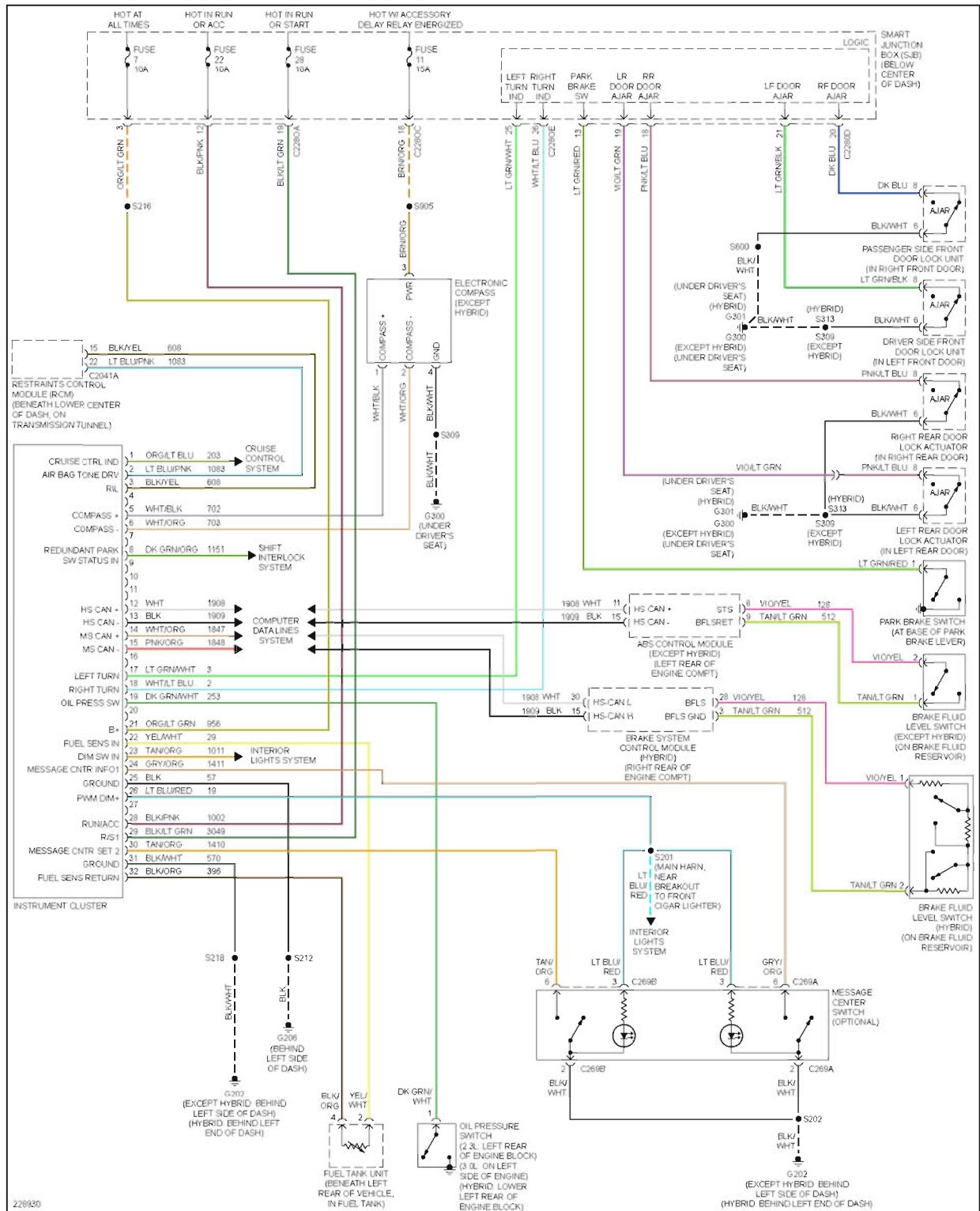


Fig. 65: Instrument Cluster Circuit

## INTERIOR LIGHTS

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

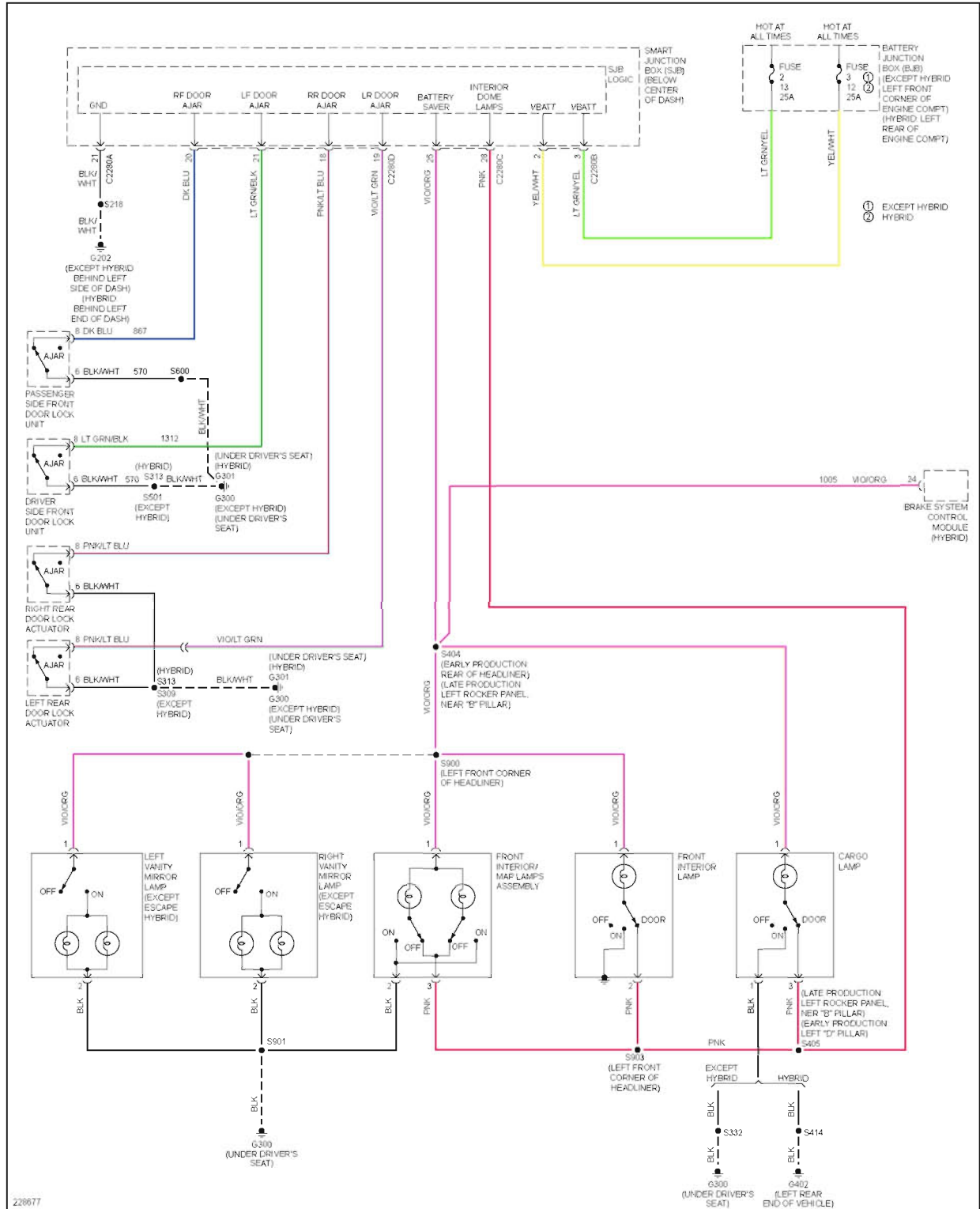


Fig. 66: Courtesy Lamps Circuit, W/ Roof Opening Panel

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

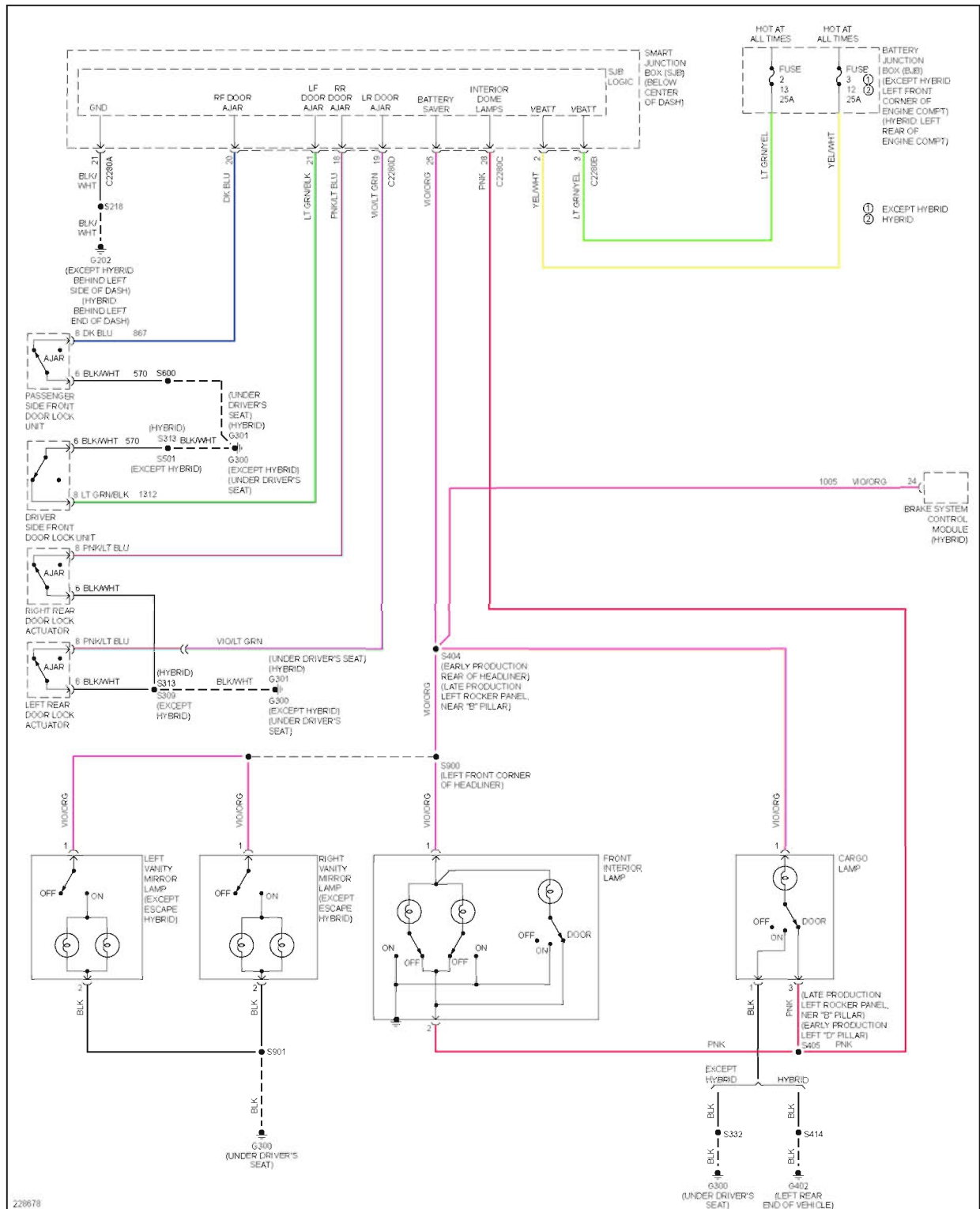


Fig. 67: Courtesy Lamps Circuit, W/O Roof Opening Panel

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

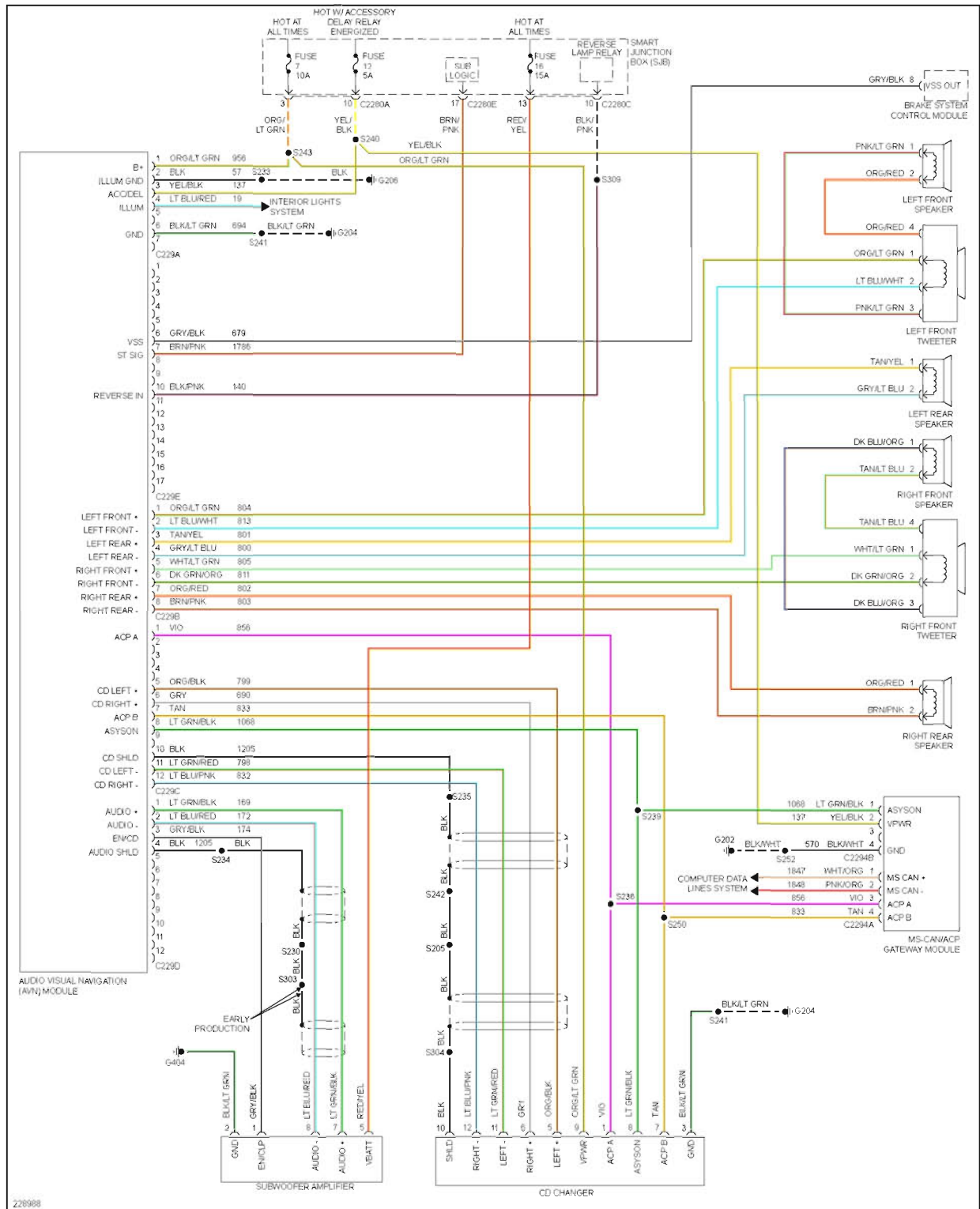


**Fig. 68: Instrument Illumination Circuit**

## NAVIGATION

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

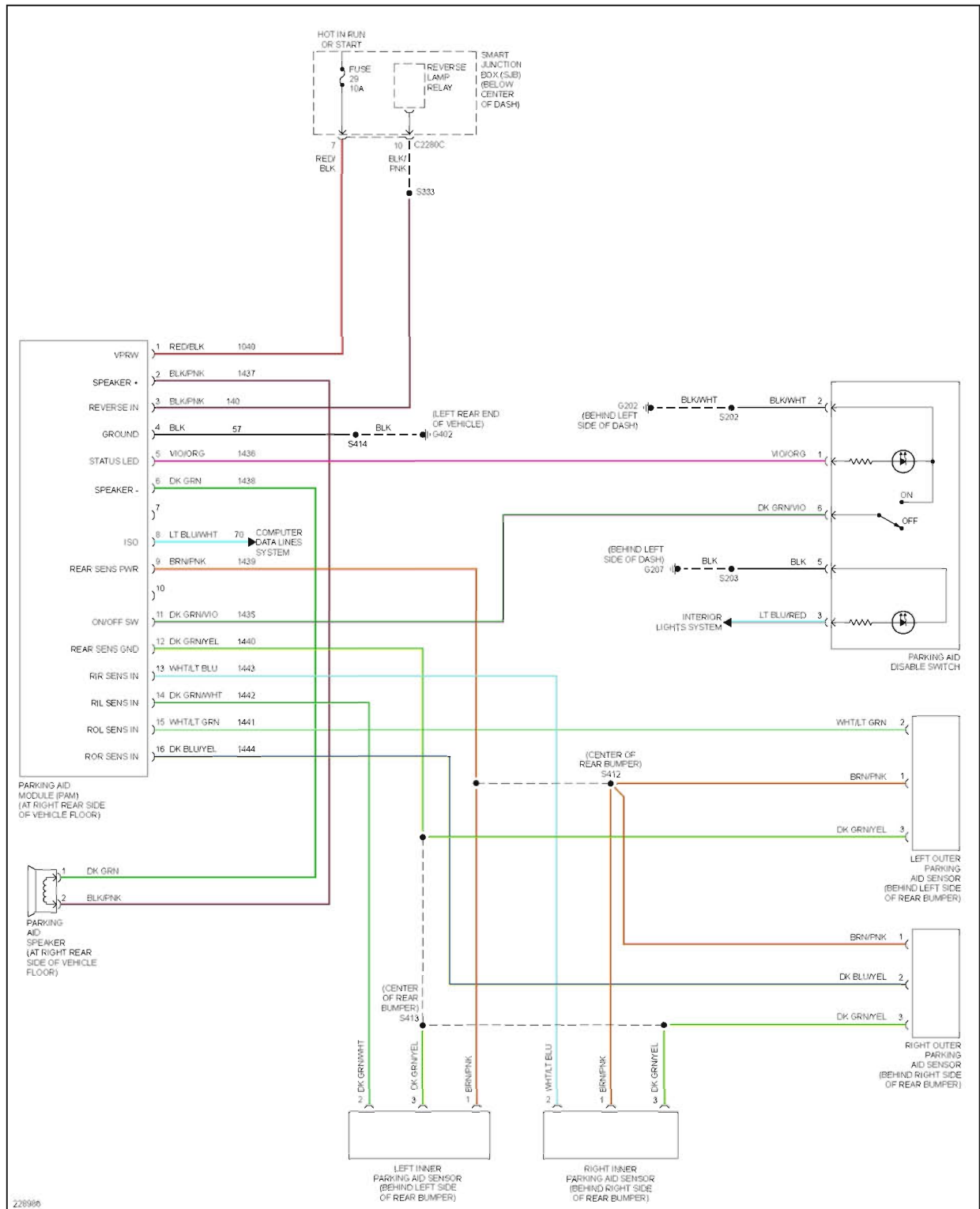


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Fig. 69: Navigation Circuit

## 2006 Ford Escape

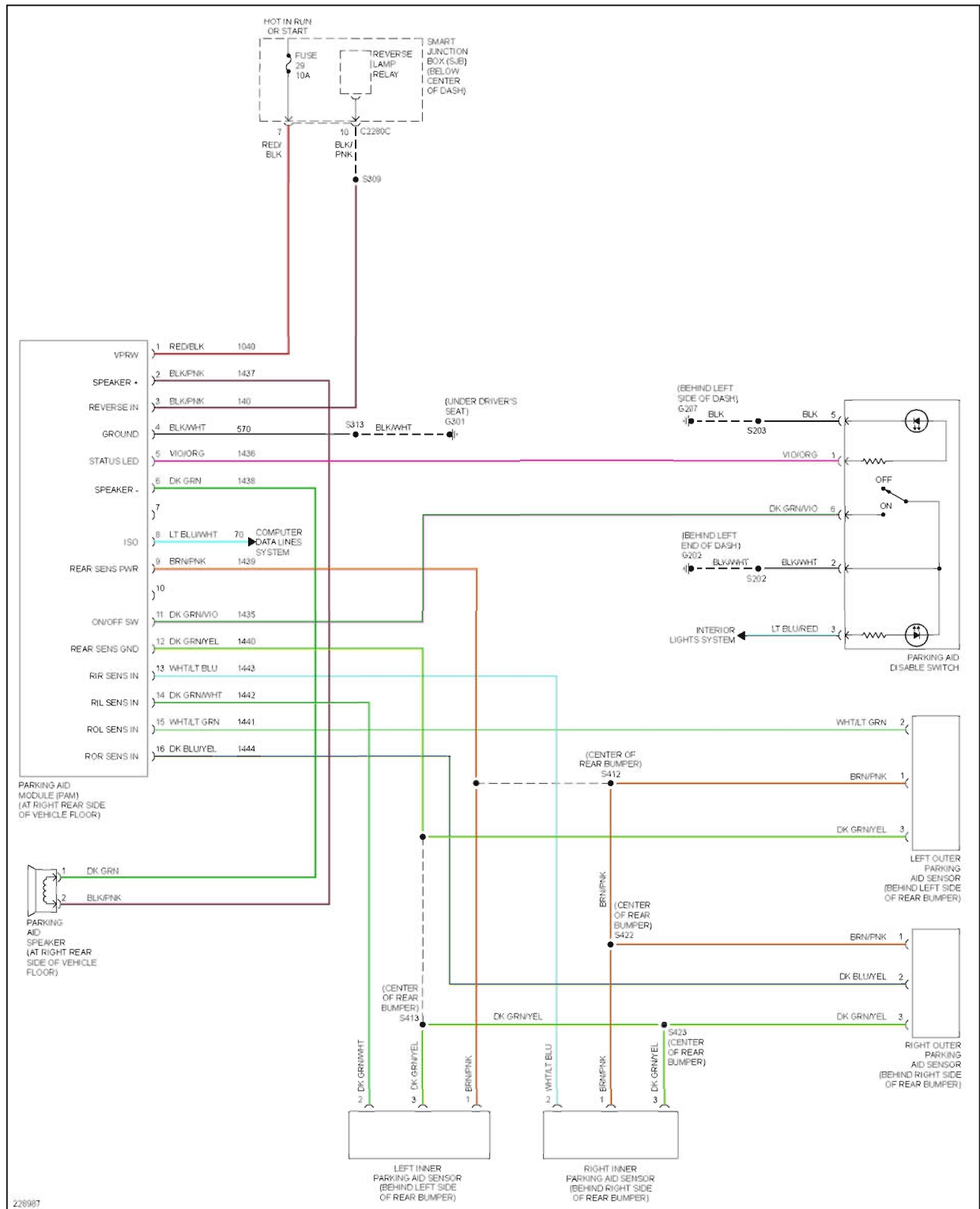
### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 70: Parking Assistant Circuit, Except Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 71: Parking Assistant Circuit, Hybrid**

## POWER DISTRIBUTION



## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 72: Power Distribution Circuit, Except Hybrid (1 of 4)**



## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 73: Power Distribution Circuit, Except Hybrid (2 of 4)**

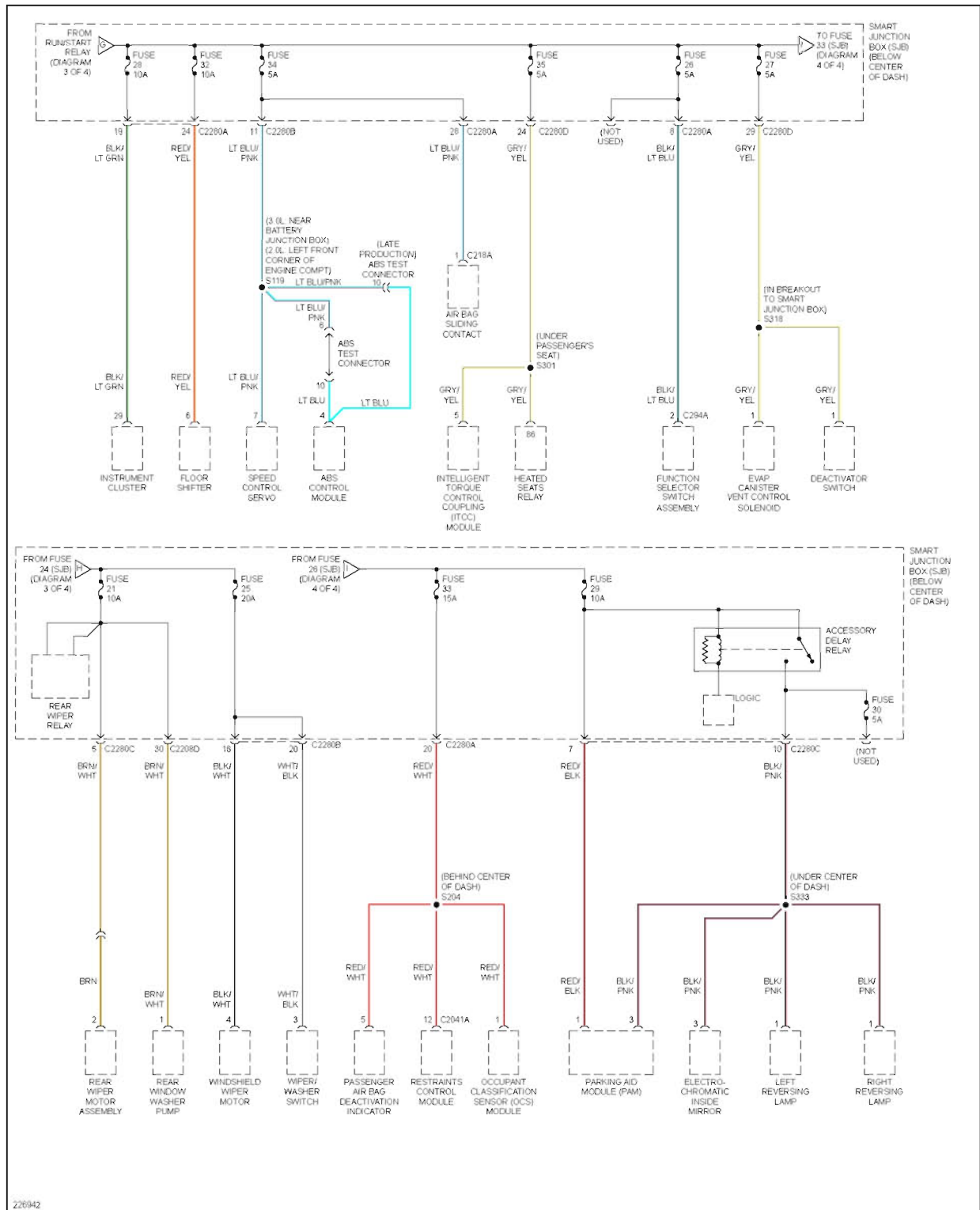
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 74: Power Distribution Circuit, Except Hybrid (3 of 4)**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 75: Power Distribution Circuit, Except Hybrid (4 of 4)**

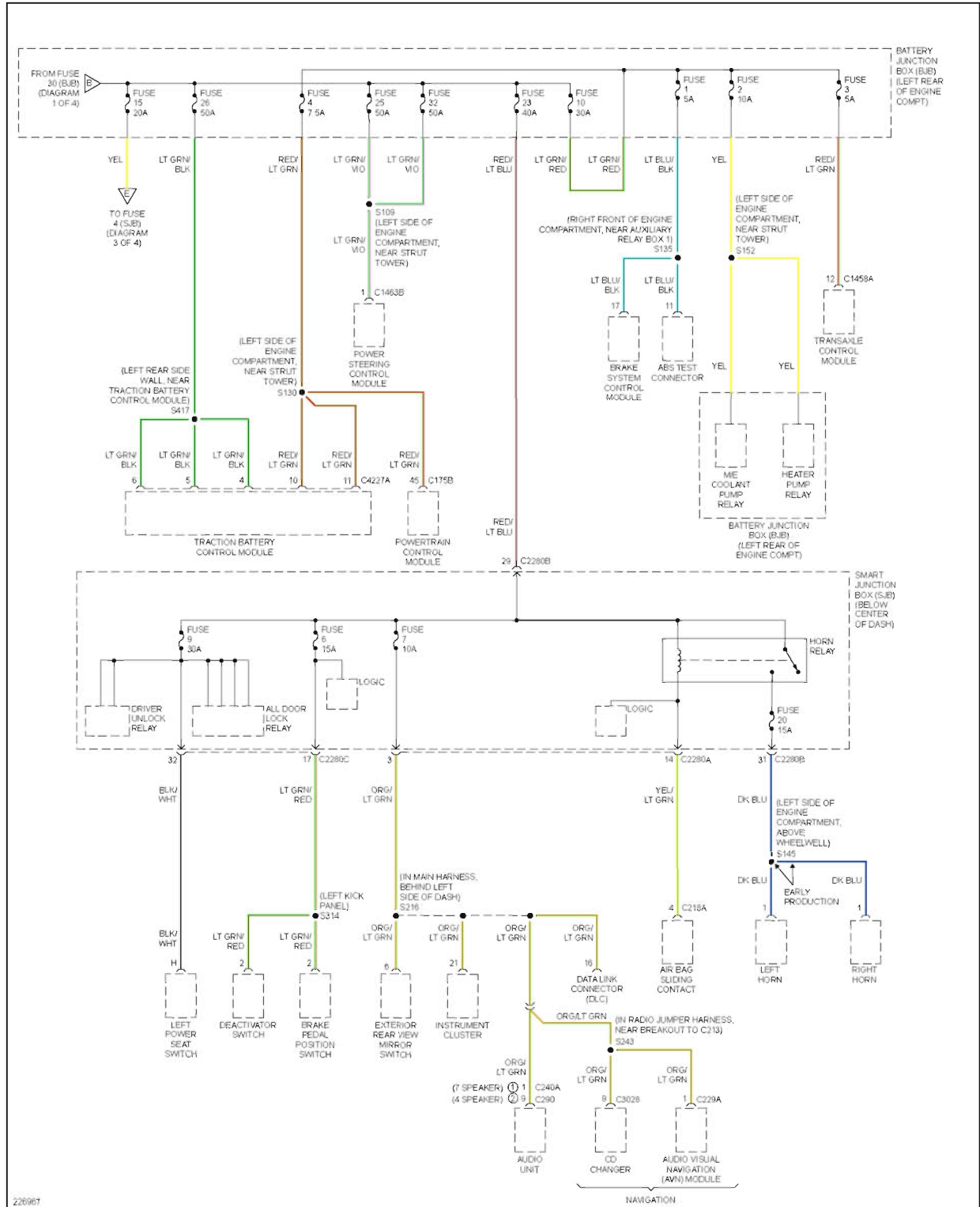
## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 76: Power Distribution Circuit, Hybrid (1 of 4)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

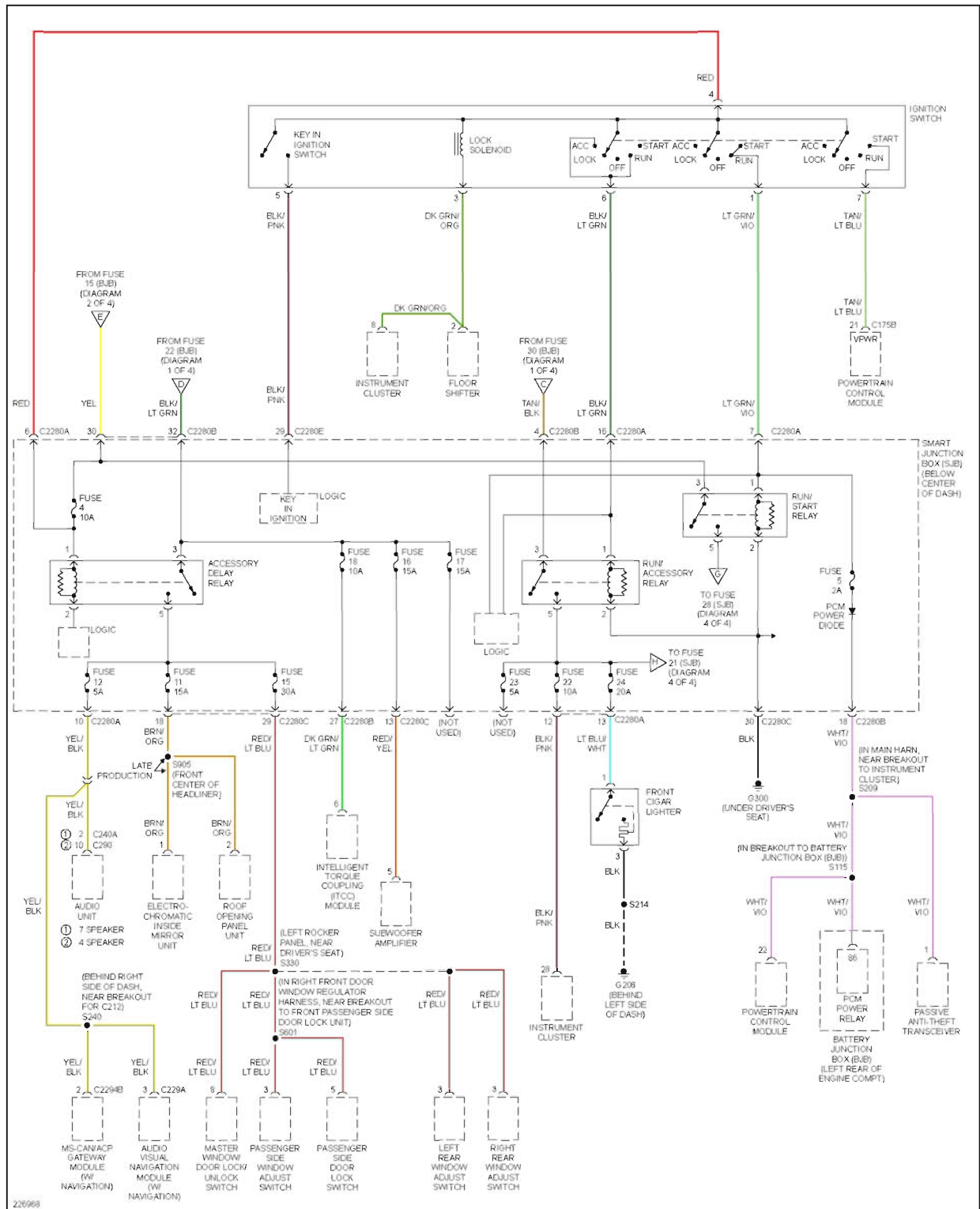


<http://vnx.su>

**Fig. 77: Power Distribution Circuit, Hybrid (2 of 4)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



<http://vnx.su>

Fig. 78: Power Distribution Circuit, Hybrid (3 of 4)



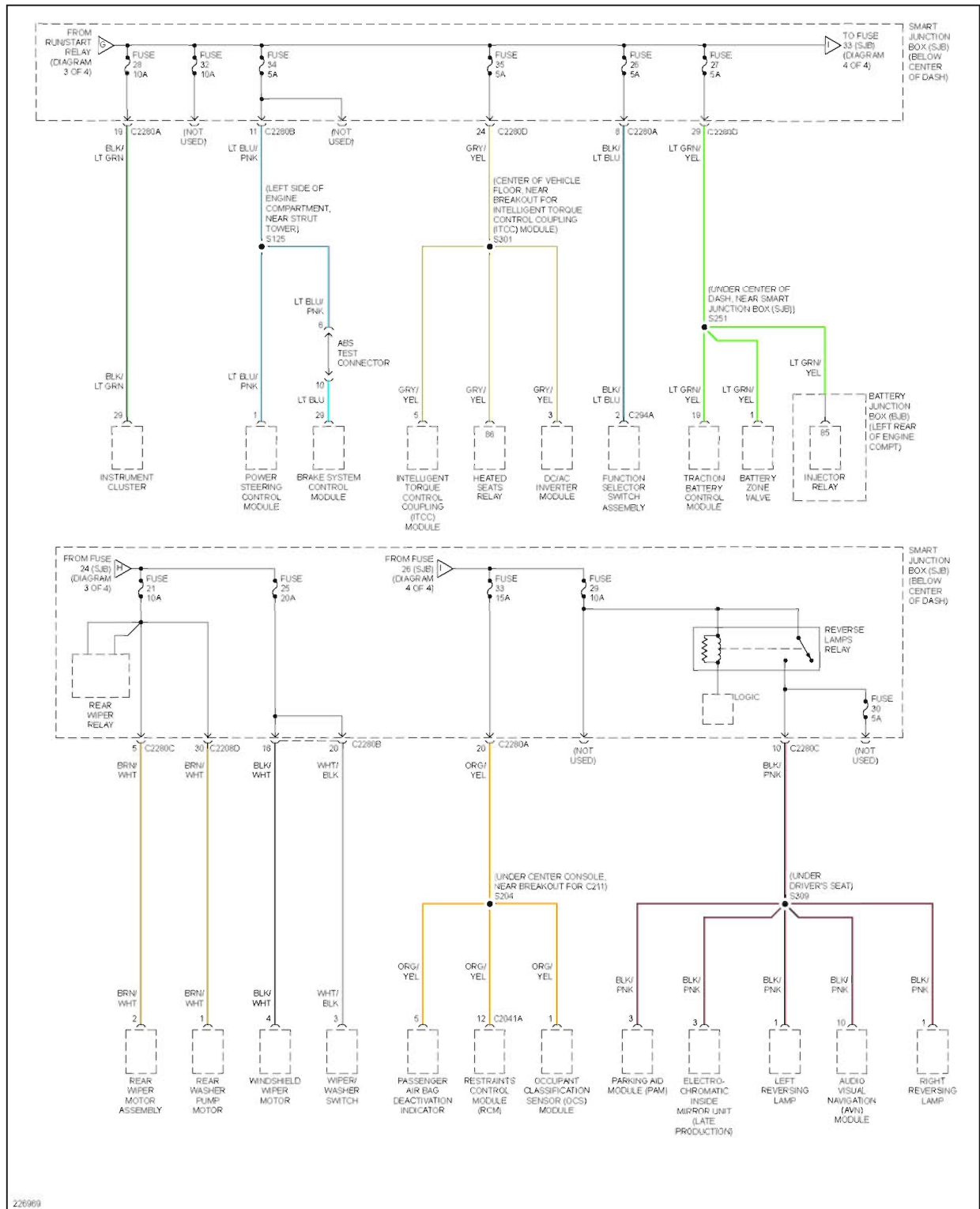
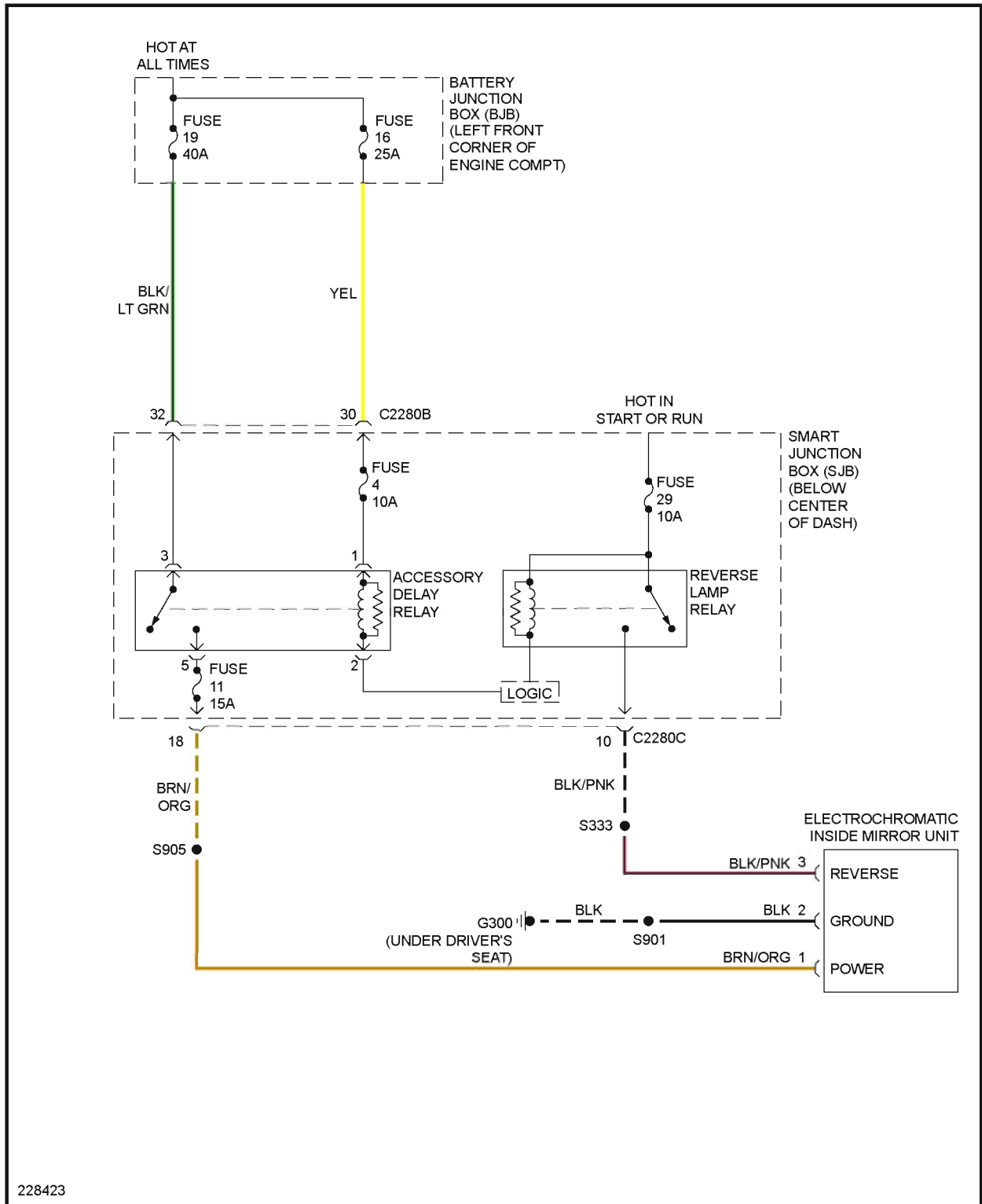


Fig. 79: Power Distribution Circuit, Hybrid (4 of 4)

## POWER MIRRORS

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 80: Electrochromic Mirror Circuit, Except Hybrid**



<p><b>2006 Ford Escape</b></p> <p>2006 SYSTEM WIRING DIAGRAMS Ford - Escape</p>
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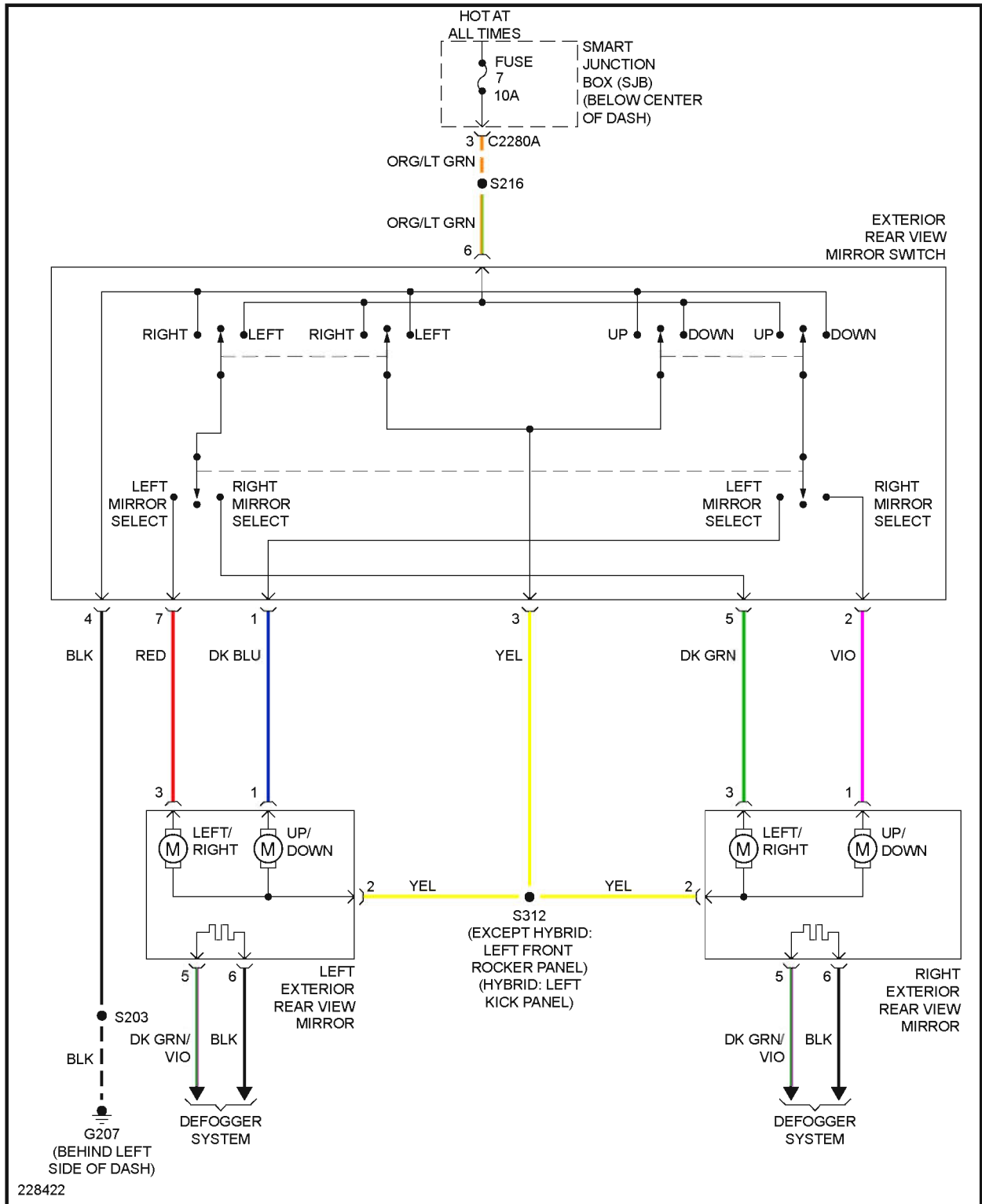
<p><b>2006 Ford Escape</b></p> <p>2006 SYSTEM WIRING DIAGRAMS Ford - Escape</p>
---



**Fig. 81: Electrochromic Mirror Circuit, Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



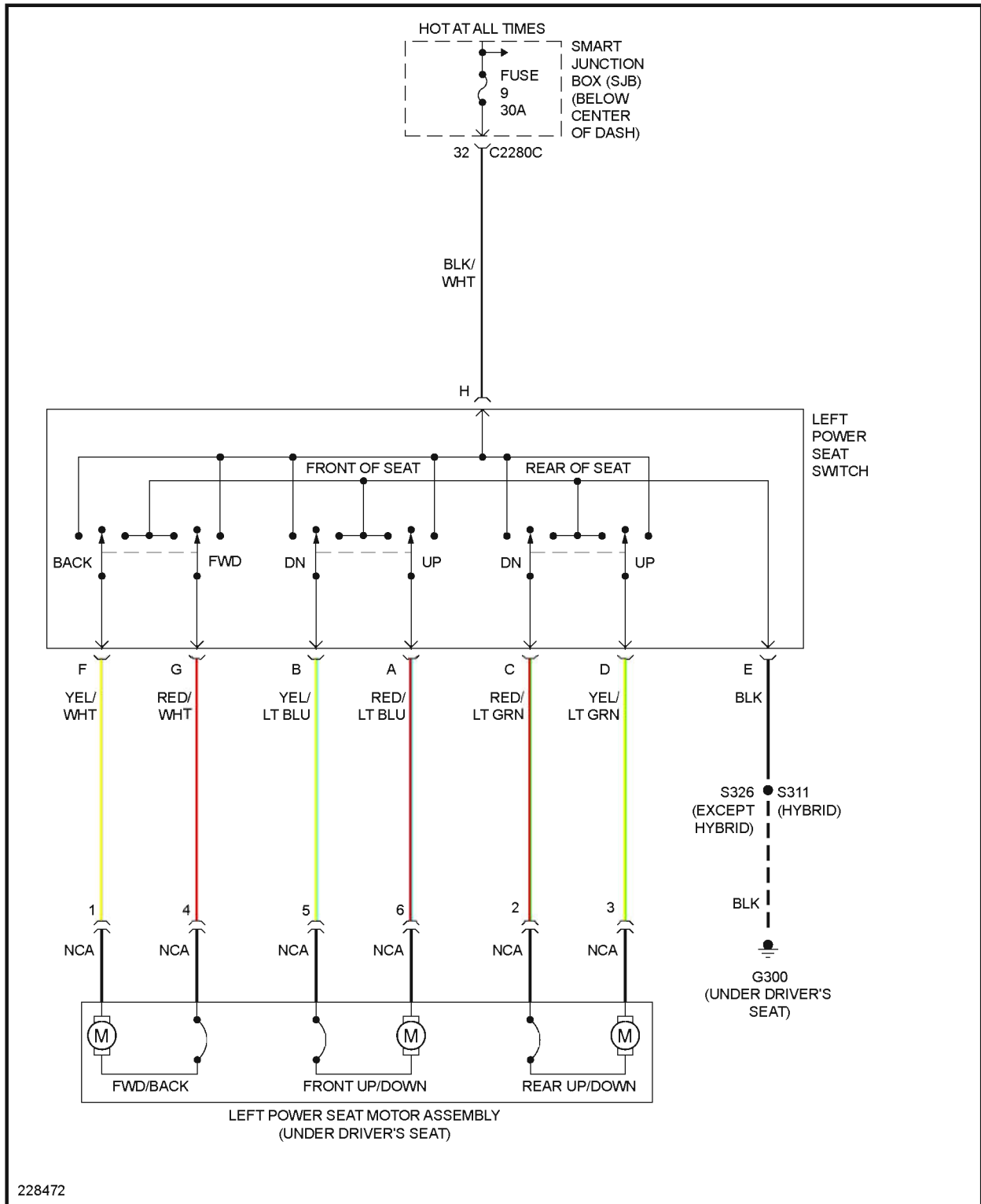
<http://vnx.su>

**Fig. 82: Power Mirrors Circuit**

## POWER SEATS

## 2006 Ford Escape

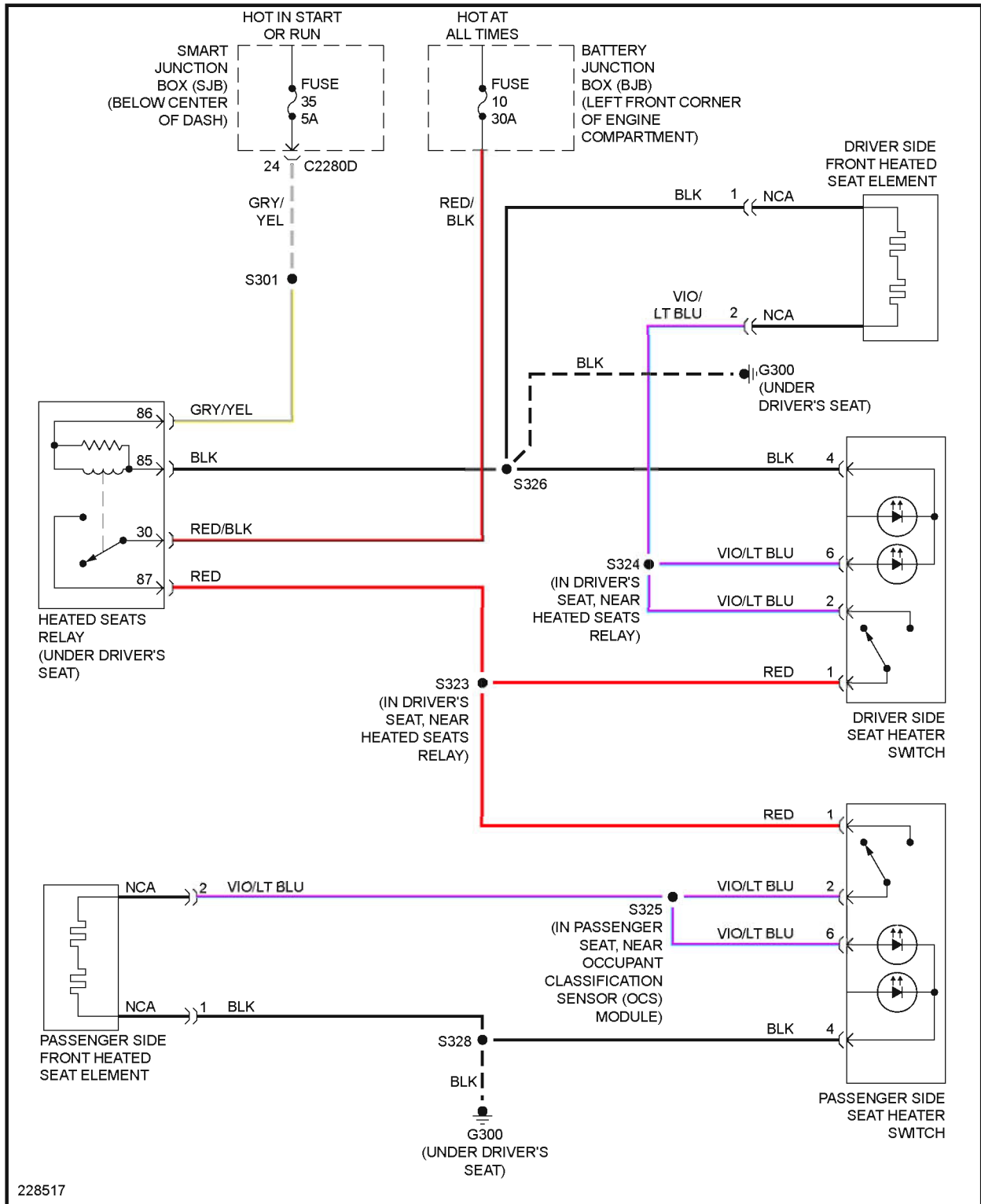
### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 83: Driver Power Seat Circuit**

## 2006 Ford Escape

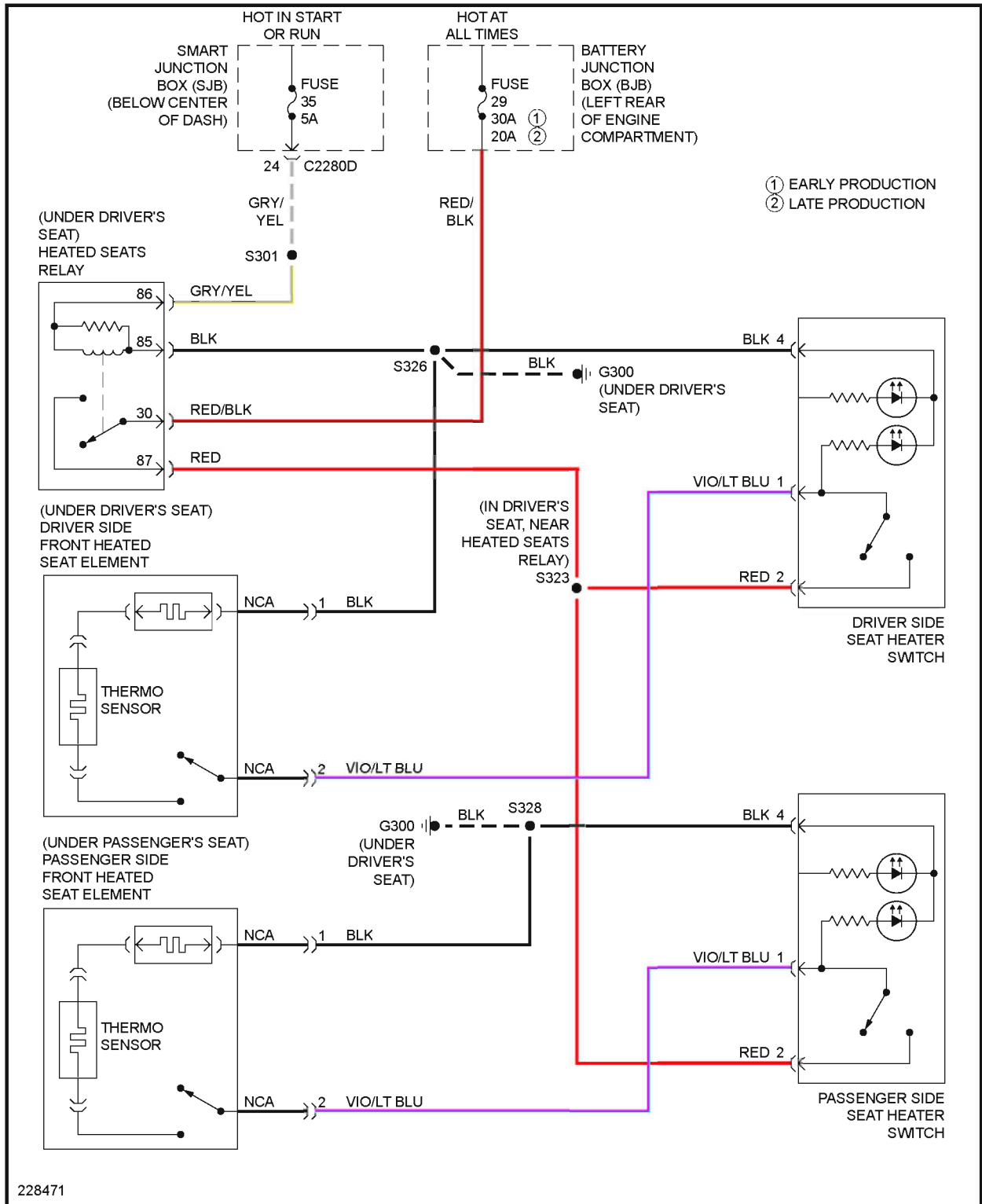
### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 84: Heated Seats Circuit, Early Production Except Hybrid**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 85: Heated Seats Circuit, Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

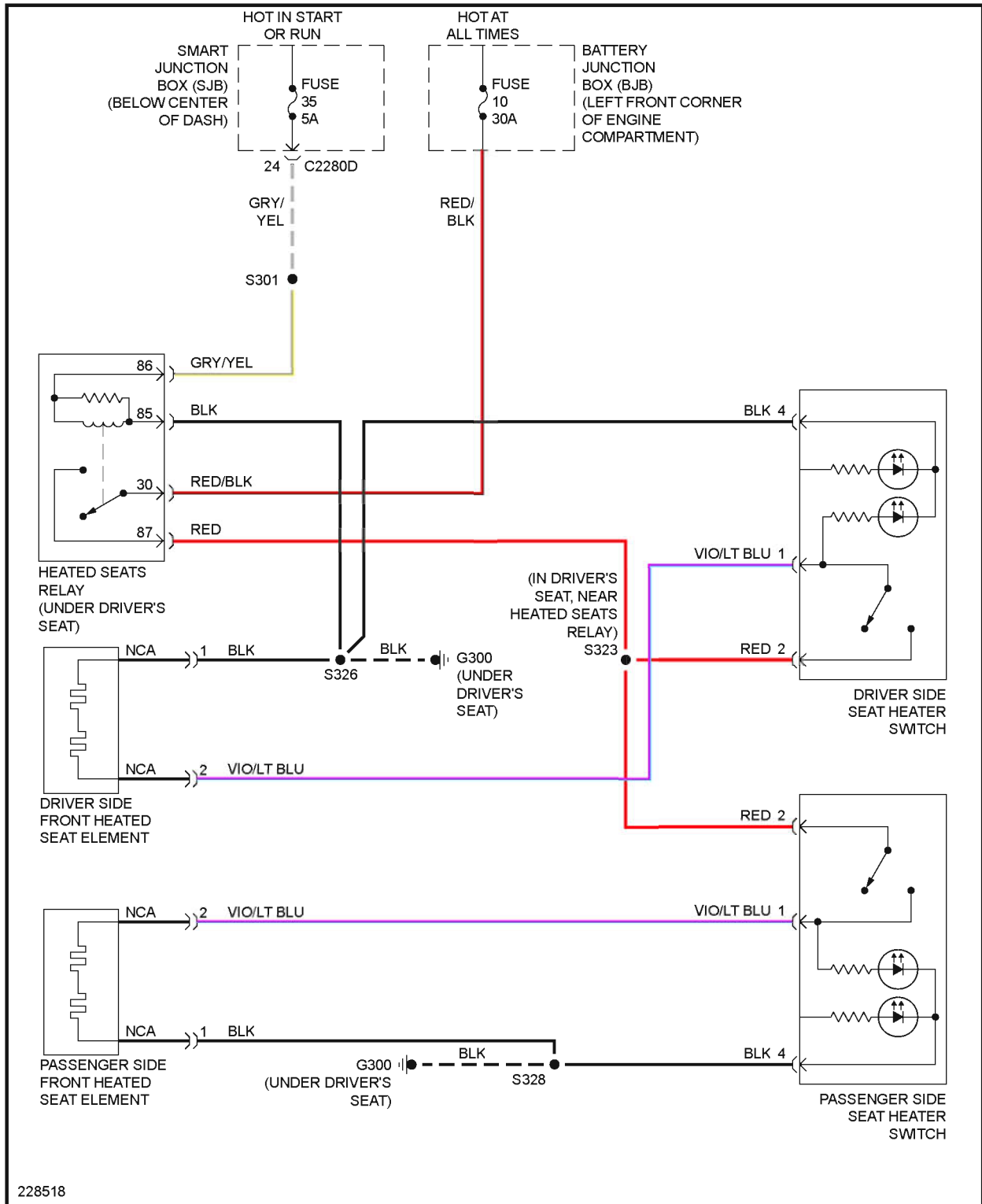
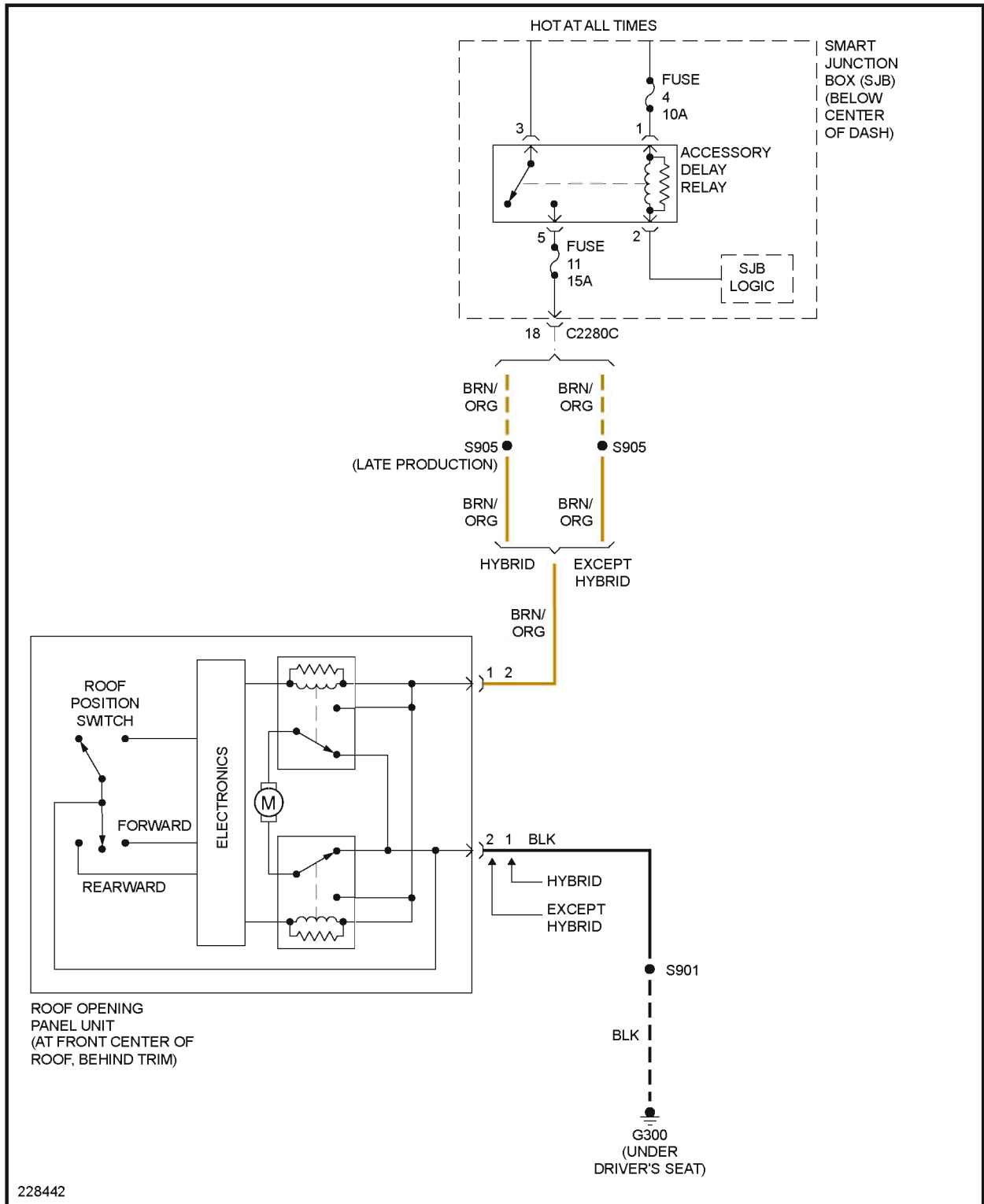


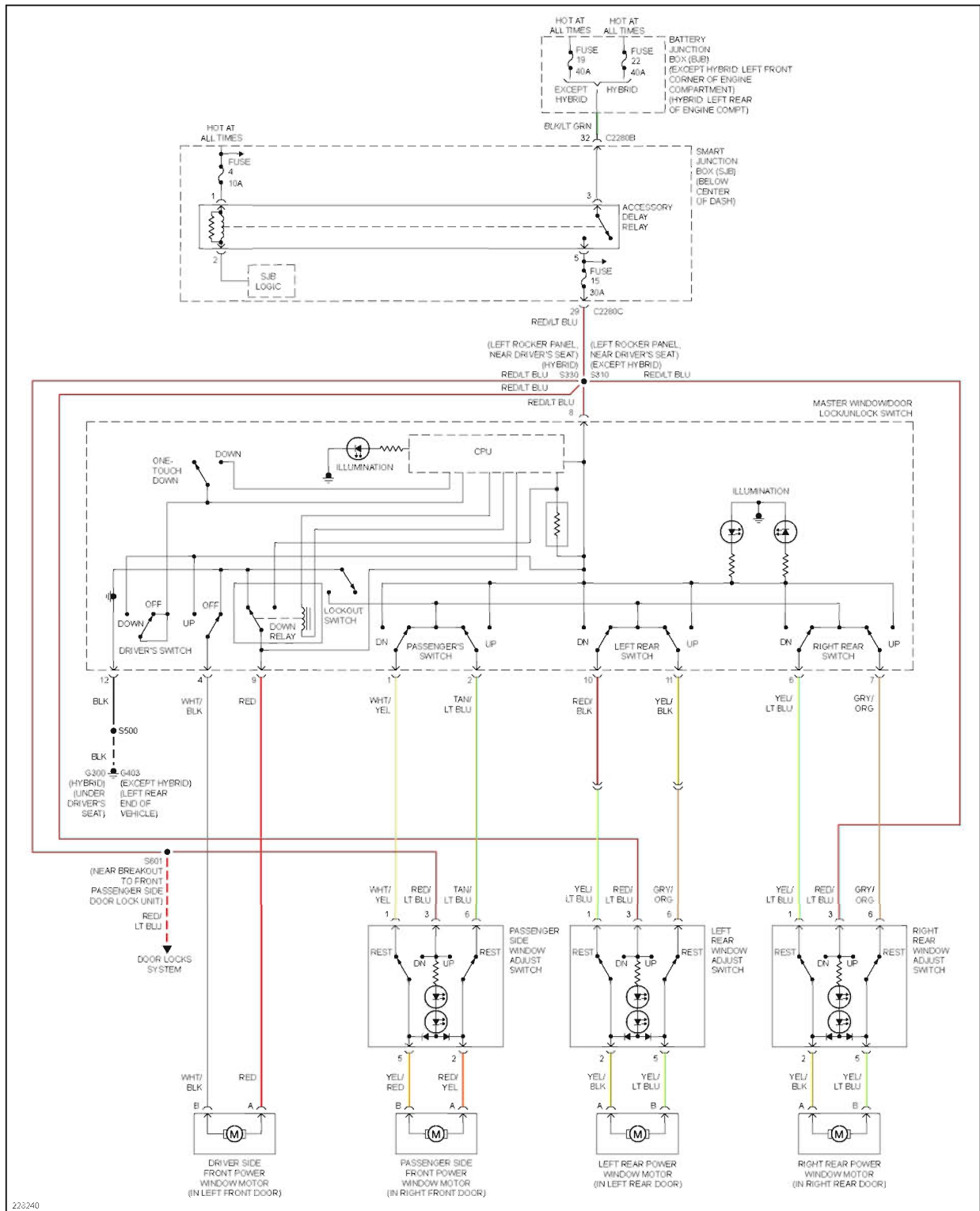
Fig. 86: Heated Seats Circuit, Late Production Except Hybrid

POWER TOP/SUNROOF



**Fig. 87: Power Top/Sunroof Circuit**

## POWER WINDOWS



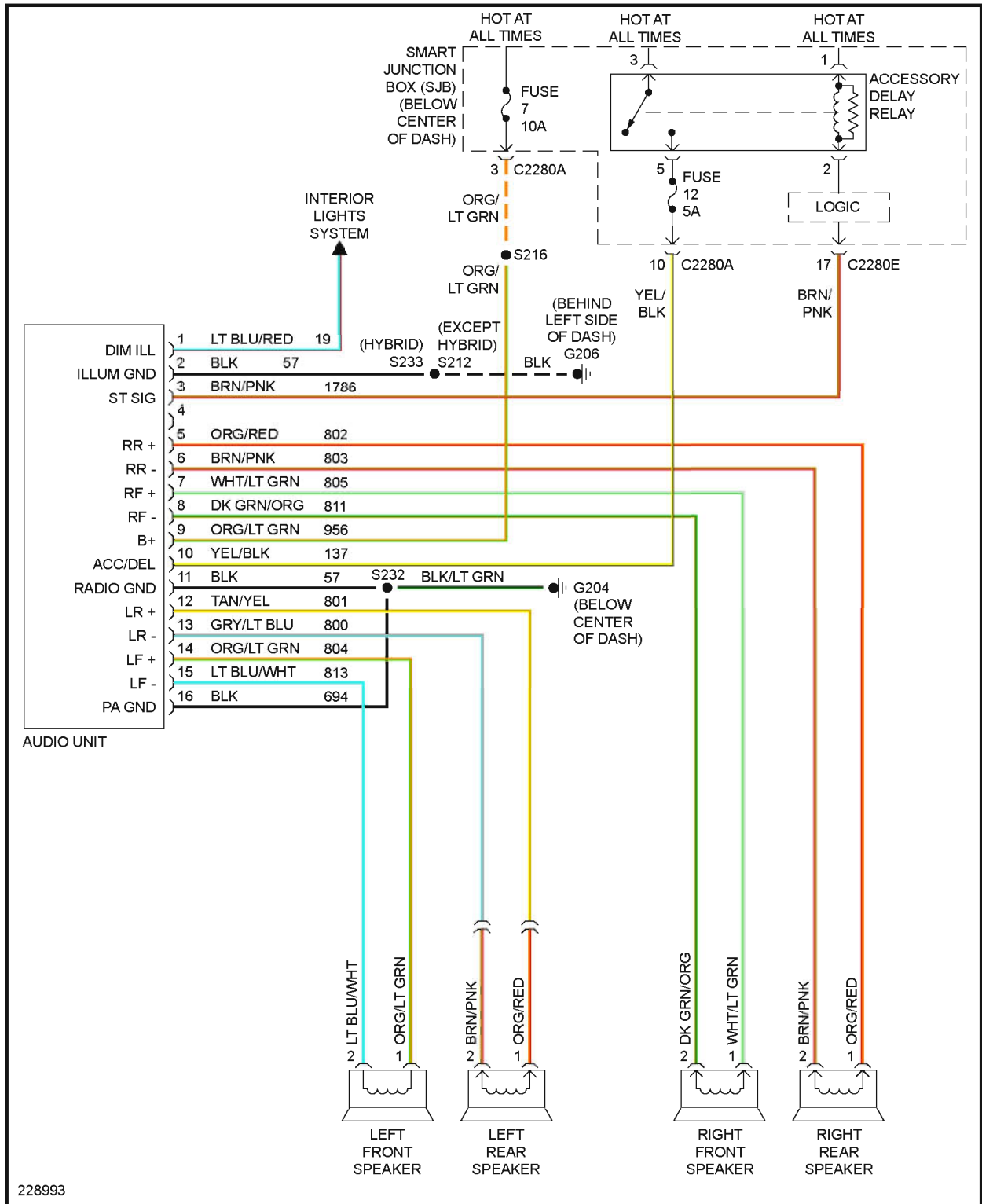
http://vnx.su

Fig. 88: Power Windows Circuit



## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 89: Base Radio Circuit**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

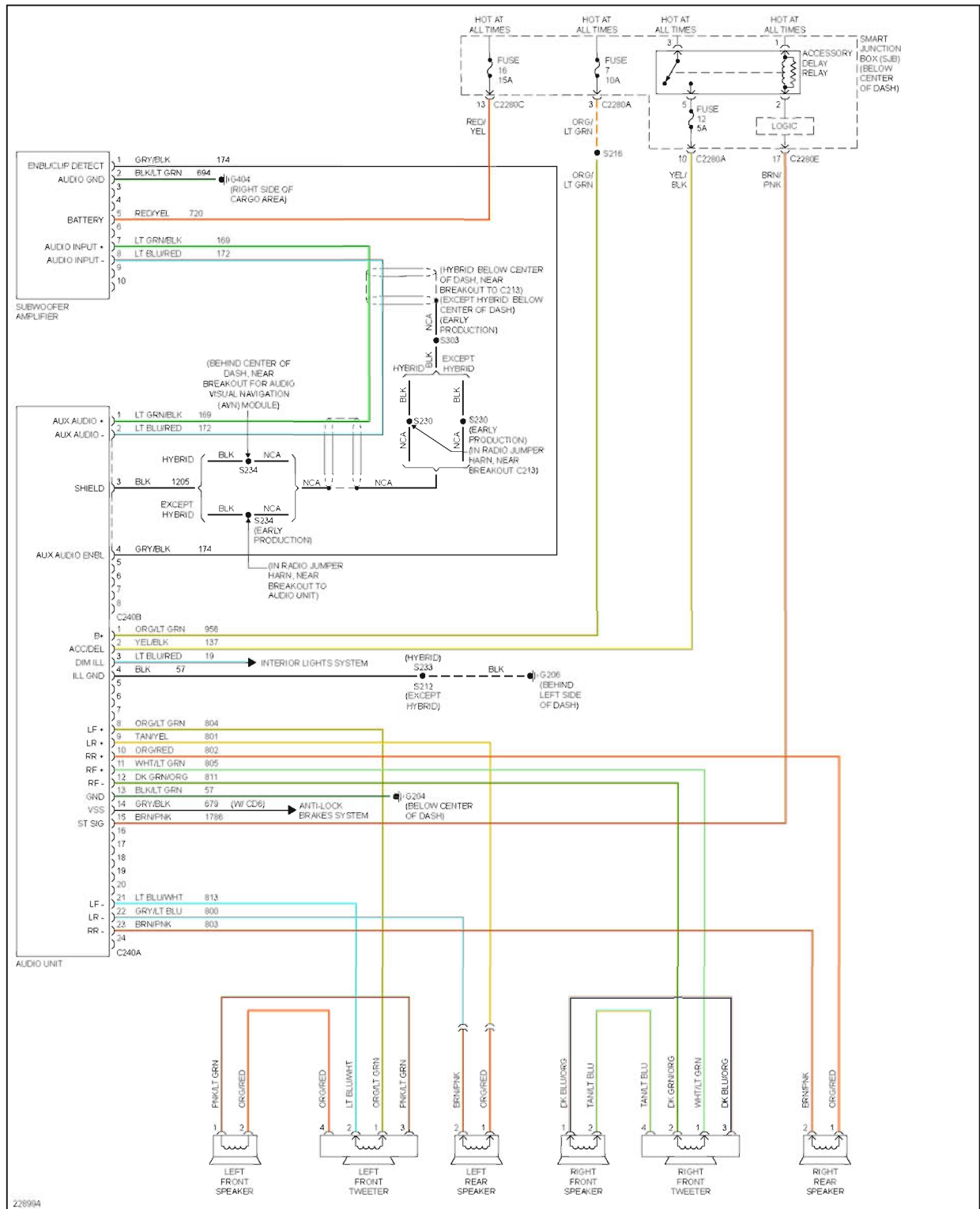


Fig. 90: Premium Radio Circuit

SHIFT INTERLOCK

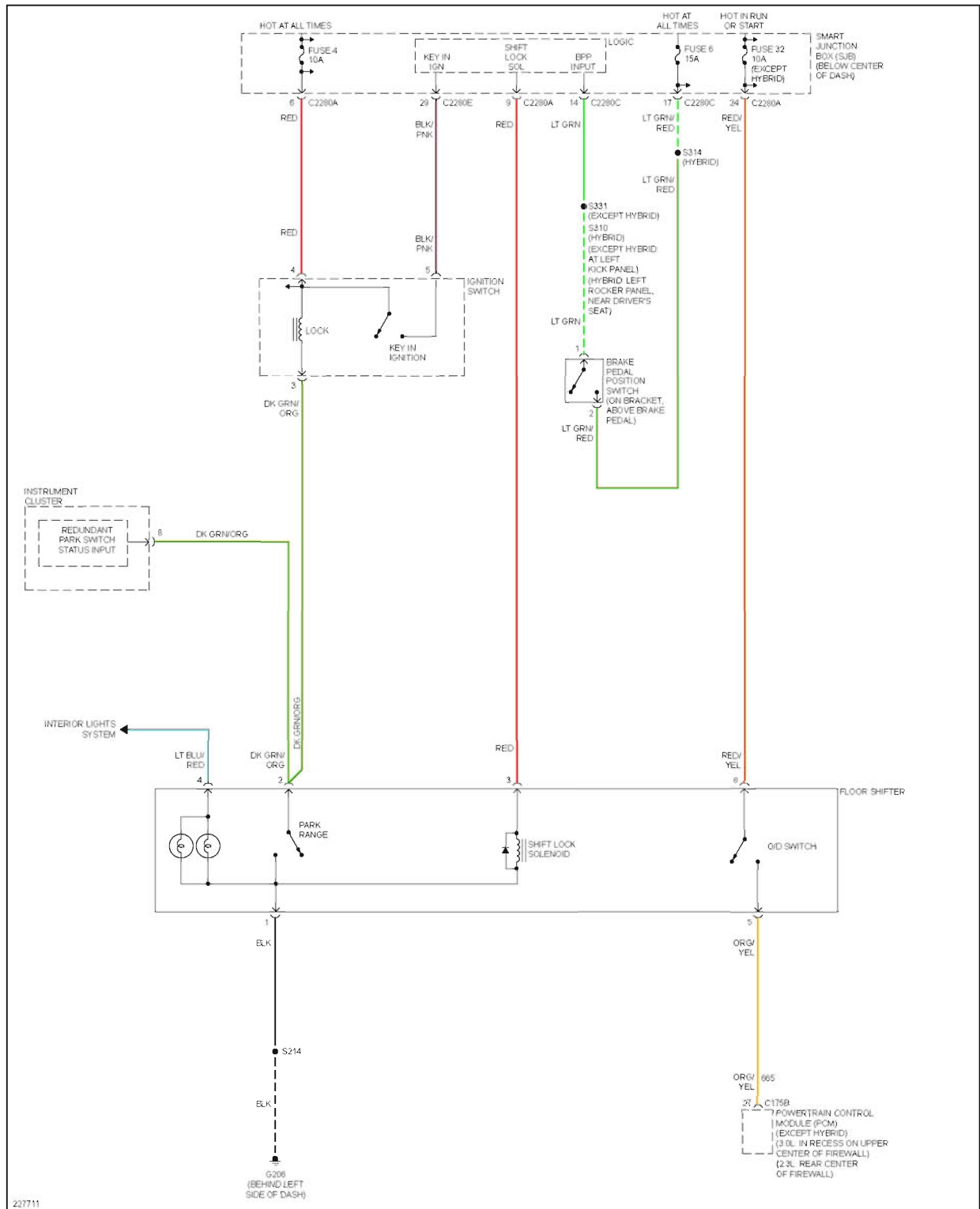
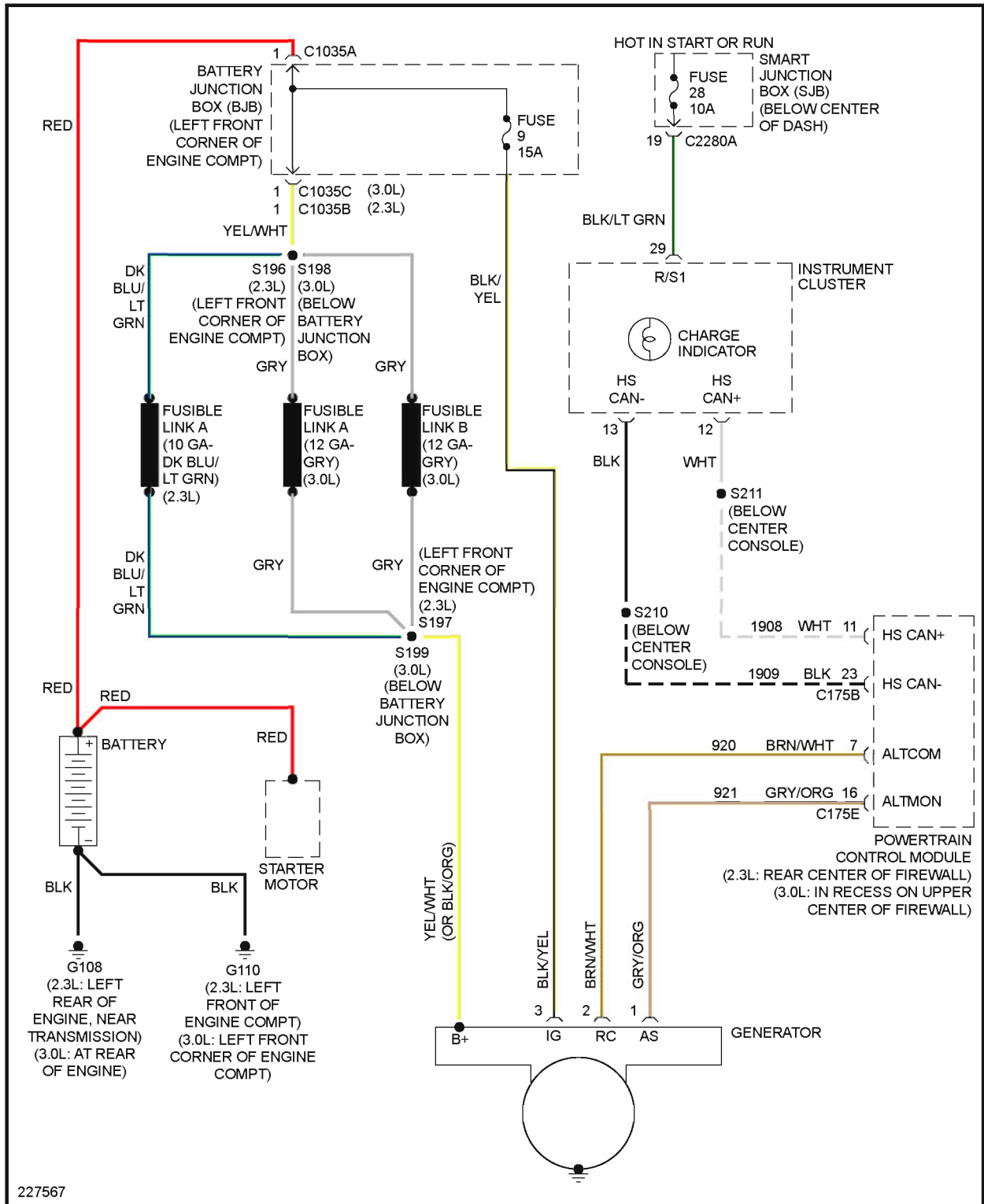


Fig. 91: Shift Interlock Circuit

STARTING/CHARGING

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 92: Charging Circuit, Except Hybrid**

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



### **Fig. 93: Starting Circuit, A/T Except Hybrid**

## 2006 Ford Escape

### 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

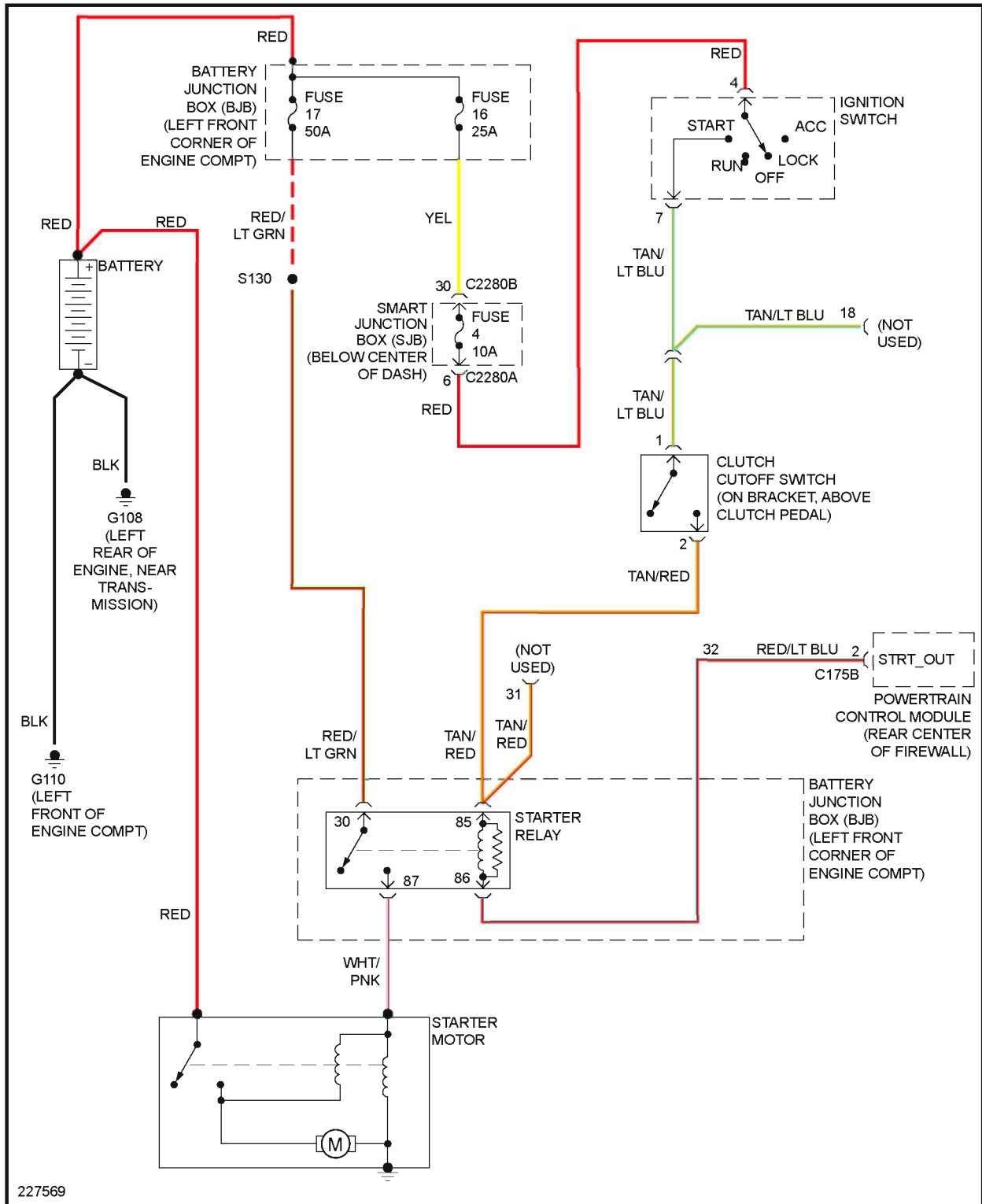


Fig. 94: Starting Circuit, M/T

## SUPPLEMENTAL RESTRAINTS

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 95: Supplemental Restraints Circuit (1 of 2)**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

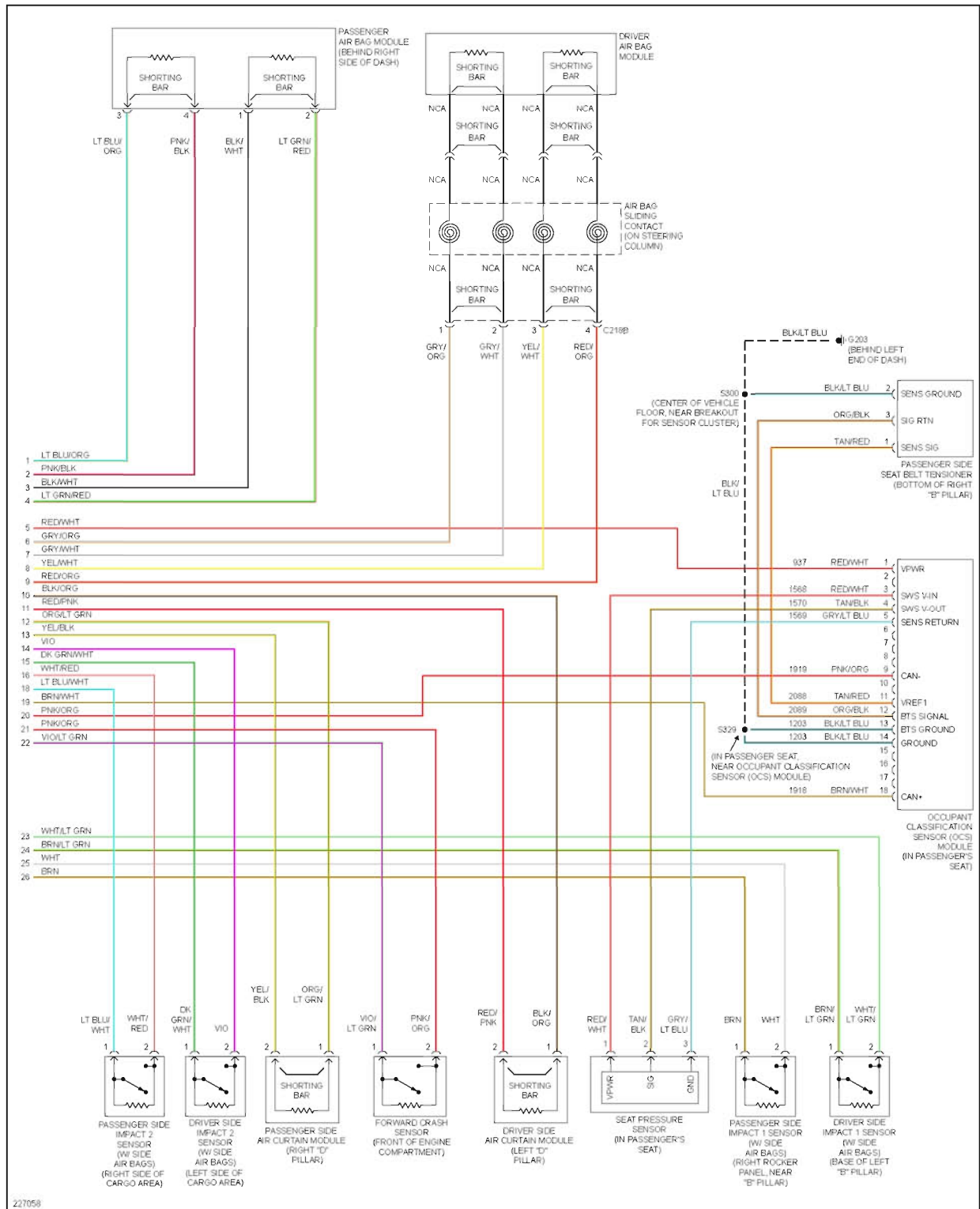


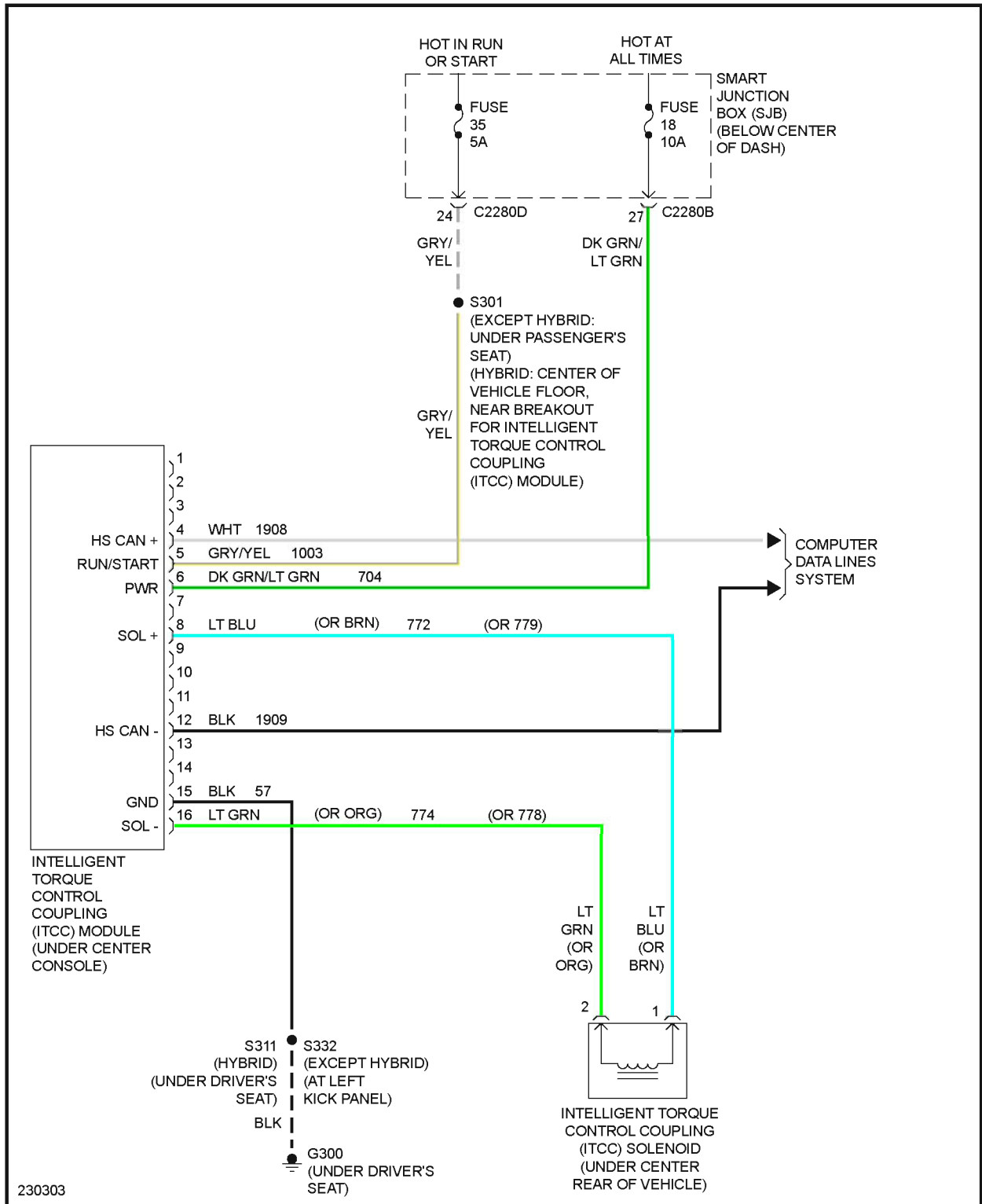
Fig. 96: Supplemental Restraints Circuit (2 of 2)

TRANSMISSION



# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



**Fig. 97: 4WD Circuit**

# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

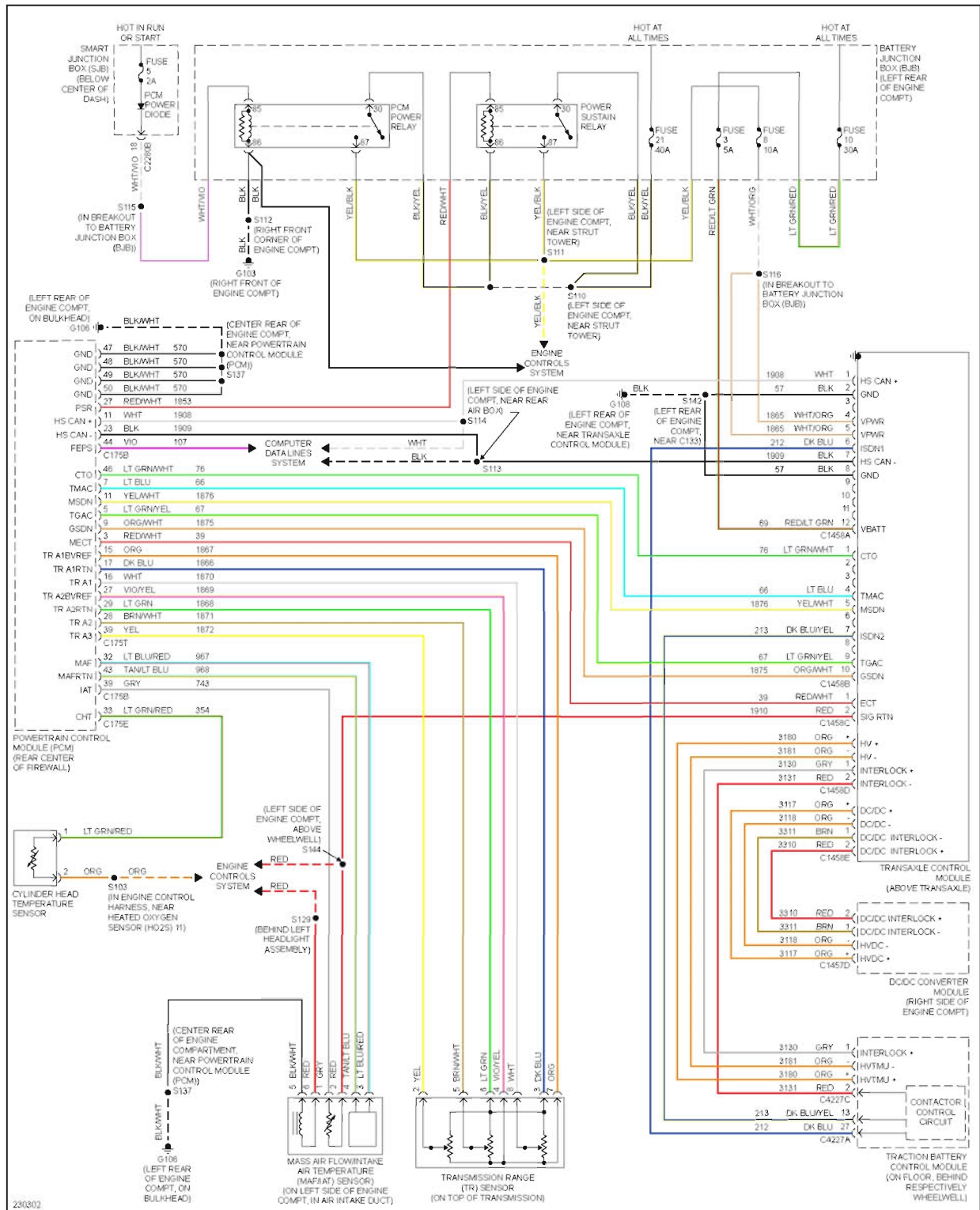


Fig. 98: A/T Circuit, Hybrid

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



### 3.0L

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



## WARNING SYSTEMS

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape

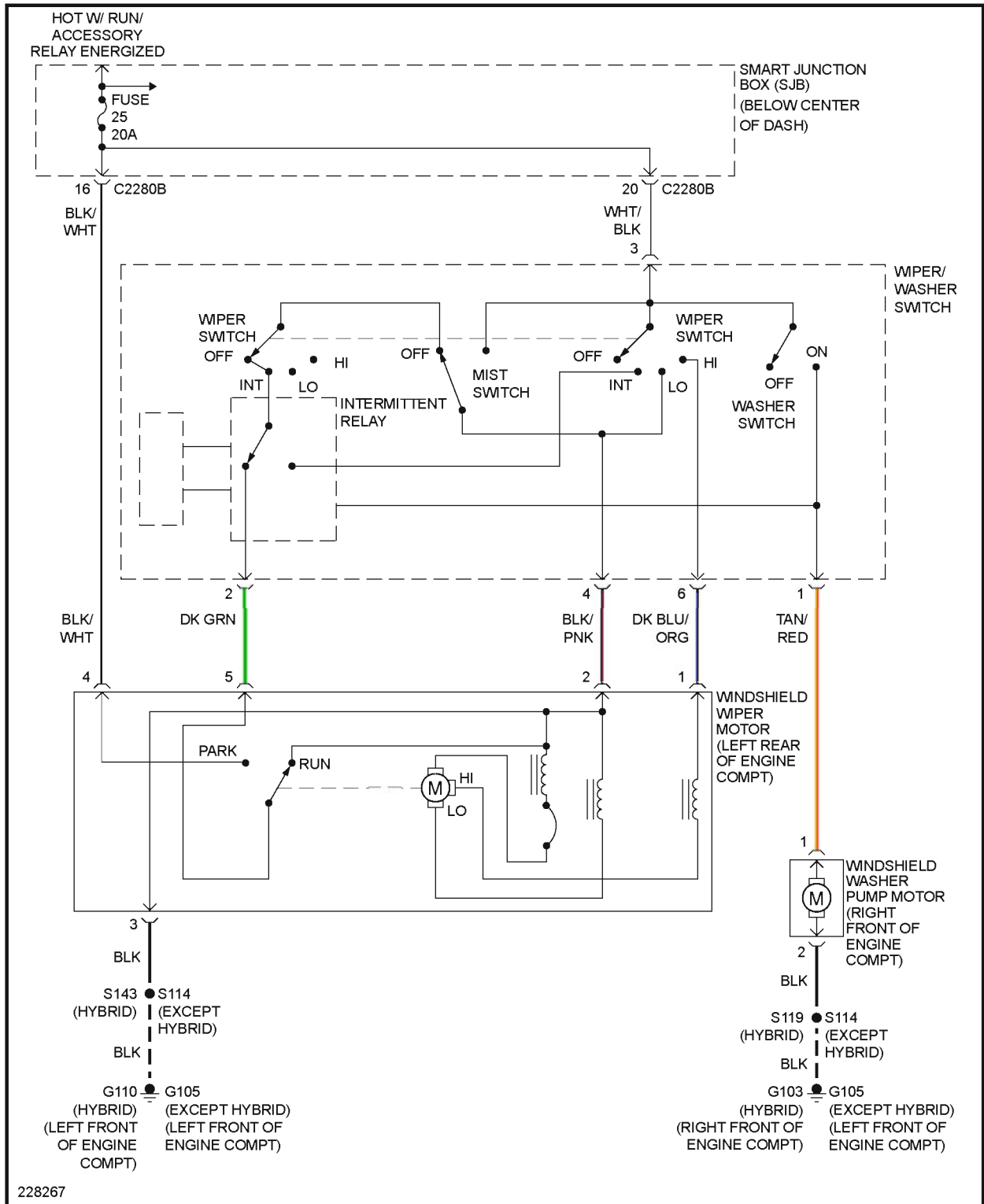


## WIPER/WASHER



# 2006 Ford Escape

## 2006 SYSTEM WIRING DIAGRAMS Ford - Escape



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**Fig. 102: Front Wiper/Washer Circuit**

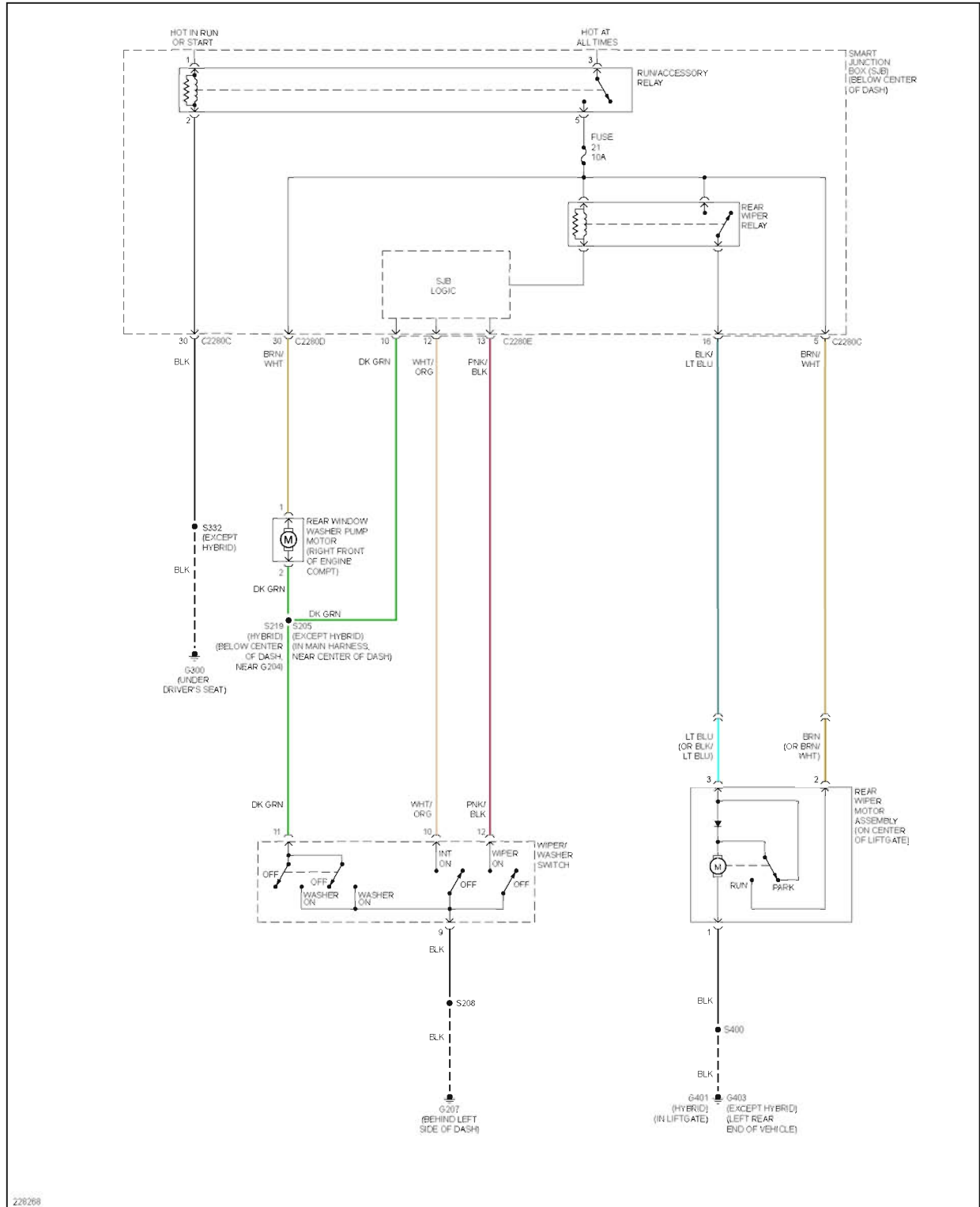


Fig. 103: Rear Wiper/Washer Circuit