

SECTION 303-00: Engine System — General Information  
SPECIFICATIONS

2000 Explorer/Mountaineer Workshop Manual

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**General Specifications**

Item	Specification
<b>Lubricants and Sealants</b>	
Devcon Aluminum Liquid F2	M3D35-A (E)
Threadlock® 262 E2FZ-19554-B	WSK-M2G351-A6
Super Premium SAE Motor Oil	Refer to owner literature
Diesel engine oil	Refer to owner literature
Gasoline Engine Oil Dye 164-R3705	ESE-M99C103-B1

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*SECTION 303-00: Engine System — General Information*  
*DESCRIPTION AND OPERATION*

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*2000 Explorer/Mountaineer Workshop Manual*

## Engine

**NOTE:** This section contains information, steps and procedures that may not be specific to your engine.

This section covers general procedures and diagnosis and testing of the engine system, except for exhaust emission control devices, which are covered in the Powertrain Control/Emissions Diagnosis Manual.

The engine incorporates the following features:

- a closed positive crankcase ventilation (PCV) system. For additional information, refer to [Section 303-08](#).
- an exhaust emission control system. For additional information, refer to [Section 303-08](#).
- an evaporative emission control system. For additional information, refer to [Section 303-13](#).

Some engines incorporate a fail-safe cooling system. Refer to the appropriate section in Group [303](#) for the procedure.

The engine, fuel system, ignition system, emissions system and exhaust system all affect exhaust emission levels and must be maintained according to the maintenance schedule. Refer to the scheduled Maintenance Guide.

Correct engine identification is required to order parts. Refer to the appropriate section in Group [303](#) for the procedure.

For complete vehicle and engine identification codes, refer to [Section 100-01](#).

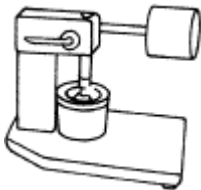


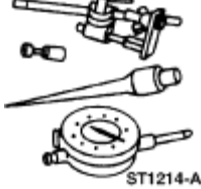



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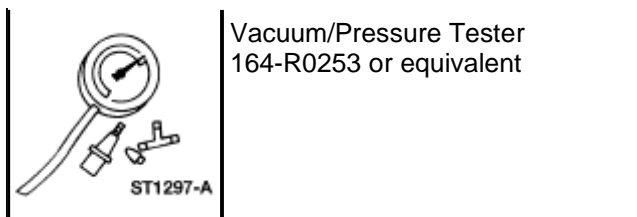
SECTION 303-00: Engine System — General Information  
DIAGNOSIS AND TESTING

2000 Explorer/Mountaineer Workshop Manual

## Engine

### Special Tool(s)

	<p>Commercially Available Leakdown Tester</p>
	<p>Quick Disconnect Compression Tester 134-R0212 or equivalent</p>
	<p>Cup Shaped Adapter 303-007 (TOOL-6565-AB) or equivalent</p>
	<p>Dial Indicator with Bracketry 100-002 (TOOL-4201-C) or equivalent</p>
	<p>Engine Cylinder Leak Detection/Air Pressurization Kit 014-00708 or equivalent</p>
	<p>Oil Pressure Tester 303-088 (T73L-6600-A)</p>
	<p>12 Volt Master UV Diagnostic Inspection Kit 164-R0756 or equivalent (Leak Detector)</p>



### Inspection and Verification

1. Verify the customer concern by operating the engine to duplicate the condition.
2. Visually inspect for obvious signs of mechanical damage. Refer to the following chart.

#### Visual Inspection Chart

Mechanical
<ul style="list-style-type: none"> <li>• Engine coolant leaks</li> <li>• Engine oil leaks</li> <li>• Fuel leaks</li> <li>• Damaged or severely worn parts</li> <li>• Loose mounting bolts, studs and nuts</li> </ul>

3. If the inspection reveals obvious concerns that can be readily identified, repair as necessary.
4. If the concerns remain after the inspection, determine the symptoms and go to the Symptom Chart.

### Symptom Chart

#### Symptom Chart

Condition	Possible Sources	Action
<ul style="list-style-type: none"> <li>• Difficult starting</li> </ul>	<ul style="list-style-type: none"> <li>• Damaged ignition system.</li> <li>• Damaged fuel system.</li> <li>• Damaged starting system.</li> <li>• Damaged charging system/battery.</li> <li>• Burnt valve.</li> <li>• Worn piston.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• REFER to <a href="#">Section 414-00</a>.</li> <li>• INSTALL a new valve.</li> <li>• INSTALL a new piston and piston</li> </ul>



	<ul style="list-style-type: none"> <li>• Worn piston rings.</li> <li>• Worn cylinder.</li> <li>• Damaged head gasket.</li> <li>• Damaged cooling system.</li> </ul>	<p>head.</p> <ul style="list-style-type: none"> <li>• INSTALL a new piston ring.</li> <li>• REPAIR or INSTALL a new cylinder block.</li> <li>• INSTALL a new head gasket.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> </ul>
<ul style="list-style-type: none"> <li>• Poor idling</li> </ul>	<ul style="list-style-type: none"> <li>• Vacuum leaks.</li> <li>• Malfunctioning or damaged ignition system.</li> <li>• Malfunctioning or damaged fuel system.</li> <li>• Damaged valve tappet or lash adjuster.</li> <li>• Damaged valve tappet guide or lash adjuster.</li> <li>• Improper valve-to-valve seat contact.</li> <li>• Damaged head gasket.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• INSTALL a new valve tappet or lash adjuster.</li> <li>• INSTALL a new valve tappet guide or valve tappet.</li> <li>• REPAIR or INSTALL a new valve or valve seat.</li> <li>• INSTALL a new head gasket.</li> </ul>
<ul style="list-style-type: none"> <li>• Abnormal combustion</li> </ul>	<ul style="list-style-type: none"> <li>• Malfunctioning or damaged fuel system.</li> <li>• Malfunctioning or damaged ignition system.</li> <li>• Damaged valve tappet or lash adjuster.</li> <li>• Damaged valve tappet guide or valve tappet.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• INSTALL a new valve tappet or lash adjuster.</li> <li>• INSTALL a new valve tappet guide or valve tappet.</li> </ul>

	<ul style="list-style-type: none"> <li>• Burnt or sticking valve.</li> <li>• Weak or broken valve spring.</li> <li>• Carbon accumulation in combustion chamber.</li> </ul>	<ul style="list-style-type: none"> <li>• REPAIR or INSTALL a new valve.</li> <li>• INSTALL a new valve spring.</li> <li>• ELIMINATE carbon buildup.</li> </ul>
<ul style="list-style-type: none"> <li>• Excessive oil consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Leaking oil.</li> <li>• Malfunctioning PCV system.</li> <li>• Worn valve stem seal.</li> <li>• Worn valve stem or valve guide.</li> <li>• Sticking piston rings.</li> <li>• Worn piston ring groove.</li> <li>• Worn piston or cylinder.</li> </ul>	<ul style="list-style-type: none"> <li>• REPAIR oil leakage.</li> <li>• REPAIR or INSTALL new necessary components.</li> <li>• INSTALL a new valve stem seal.</li> <li>• INSTALL a new valve stem and valve guide.</li> <li>• REPAIR or INSTALL new piston rings.</li> <li>• INSTALL a new piston and piston pin.</li> <li>• REPAIR or INSTALL a new piston or cylinder block.</li> </ul>
<ul style="list-style-type: none"> <li>• Engine noise</li> </ul>	<ul style="list-style-type: none"> <li>• Leaking exhaust system.</li> <li>• Incorrect drive belt tension.</li> <li>• Malfunctioning generator bearing.</li> <li>• Malfunctioning water pump bearing.</li> <li>• Malfunctioning or damaged cooling system.</li> <li>• Malfunctioning or damaged fuel system.</li> <li>• Loose timing chain/belt (6268).</li> <li>• Damaged timing chain tensioner (6L266).</li> <li>• Excessive main bearing clearance.</li> <li>• Seized or heat damaged crankshaft main bearing.</li> <li>• Excessive crankshaft end play.</li> </ul>	<ul style="list-style-type: none"> <li>• REPAIR exhaust leakage.</li> <li>• REFER to <a href="#">Section 303-05</a>.</li> <li>• Refer to the appropriate section in Group <a href="#">414</a> for the procedure.</li> <li>• REFER to <a href="#">Section 303-03</a>.</li> <li>• REFER to <a href="#">Section 303-03</a>.</li> <li>• Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>• ADJUST or INSTALL a new timing chain/belt.</li> <li>• INSTALL a new timing chain tensioner.</li> <li>• ADJUST clearance or INSTALL a new crankshaft main bearing (6333).</li> <li>• INSTALL a new crankshaft main bearing.</li> <li>• INSTALL a new thrust bearing or crankshaft (6303).</li> </ul>

	<ul style="list-style-type: none"> <li>Excessive connecting rod bearing clearance.</li> <li>Heat damaged connecting rod bearing (6211).</li> <li>Damaged connecting rod bushing (6207).</li> <li>Worn cylinder.</li> <li>Worn piston (6108) or piston pin (6135).</li> <li>Damaged piston rings.</li> <li>Bent connecting rod.</li> <li>Malfunctioning valve tappet (6500) or lash adjuster.</li> <li>Excessive valve tappet or lash adjuster clearance.</li> <li>Broken valve spring (6513).</li> <li>Excessive valve guide clearance.</li> </ul>	<ul style="list-style-type: none"> <li>INSTALL a new connecting rod bearing or connecting rod (6200).</li> <li>INSTALL a new connecting rod bearing.</li> <li>INSTALL a new connecting rod bushing.</li> <li>REPAIR or INSTALL a new cylinder block (6010).</li> <li>INSTALL a new piston or piston pin.</li> <li>INSTALL new piston rings.</li> <li>INSTALL a new connecting rod.</li> <li>INSTALL a new valve tappet or lash adjuster.</li> <li>ADJUST clearance or INSTALL a new valve tappet guide or valve tappet.</li> <li>INSTALL a new valve spring.</li> <li>ADJUST clearance or INSTALL a new valve guide (6510) and stem.</li> </ul>
<ul style="list-style-type: none"> <li>Insufficient power</li> </ul>	<ul style="list-style-type: none"> <li>Malfunctioning or damaged ignition system.</li> <li>Malfunctioning or damaged fuel system.</li> <li>Damaged or plugged exhaust system.</li> <li>Incorrect tire size.</li> <li>Dragging brakes.</li> <li>Slipping transmission.</li> <li>Malfunctioning valve tappet or lash adjuster.</li> <li>Damaged valve tappet guide or valve tappet.</li> <li>Compression leakage at valve</li> </ul>	<ul style="list-style-type: none"> <li>Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>Refer to the appropriate section in Group <a href="#">303</a> for the procedure. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.</li> <li>INSPECT exhaust system.</li> <li>REFER to <a href="#">Section 204-04</a>.</li> <li>REFER to <a href="#">Section 206-00</a>.</li> <li>Refer to the appropriate section in Group <a href="#">307</a> for the procedure.</li> <li>INSTALL a new valve tappet or lash adjuster.</li> <li>INSTALL a new valve tappet guide or valve tappet.</li> <li>REPAIR or INSTALL a new valve, valve seat or cylinder head (6049).</li> </ul>

	seat. • Seized valve stem. • Weak or broken valve spring. • Worn or damaged cam. • Damaged head gasket (6051). • Cracked or distorted cylinder head. • Damaged, worn or sticking piston ring(s). • Worn or damaged piston.	• INSTALL a new valve stem. • INSTALL a new valve spring.  • INSTALL a new camshaft.  • INSTALL a new head gasket. • INSTALL a new cylinder head.  • REPAIR or INSTALL a new piston ring(s).  • INSTALL a new piston and piston pin.
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## Component Tests

### Engine Oil Leaks

**NOTE:** When diagnosing engine oil leaks, the source and location of the leak must be positively identified prior to repair.

Prior to carrying out this procedure, clean the cylinder block, cylinder heads, valve covers, oil pan and flywheel with a suitable solvent to remove all traces of oil.

### Engine Oil Leaks—Fluorescent Oil Additive Method

Use the 12 Volt Master UV Diagnostic Inspection Kit to carry out the following procedure for oil leak diagnosis.

1. Clean the engine with a suitable solvent to remove all traces of oil.
2. Add Gasoline Engine Oil Dye 164-R3705 or equivalent meeting Ford specification ESE-M99C103-B1. Use a minimum 14.8 ml (0.5 ounce) to a maximum 29.6 ml (1 ounce) of fluorescent additive to all engines. If the oil is not premixed, fluorescent additive must first be added to crankcase.
3. Run the engine for 15 minutes. Stop the engine and inspect all seal and gasket areas for leaks using the 12 Volt Master UV Diagnostic Inspection Kit. A clear bright yellow or orange area will identify the leak. For extremely small leaks, several hours may be required for the leak to appear.

### Leakage Points—Underhood

Examine the following areas for oil leakage:

- valve cover gaskets
- intake manifold gaskets
- cylinder head gaskets
- oil bypass filter
- oil filter adapter
- engine front cover

- oil filter adapter and filter body
- oil level indicator tube connection
- oil pressure sensor

### **Leakage Points—Under Engine—With Vehicle on Hoist**

- oil pan gaskets (6710)
- oil pan sealer
- oil pan rear seal (6723)
- engine front cover gasket
- crankshaft front seal (6700)
- crankshaft rear oil seal (6701)
- crankshaft main bearing cap side bolts
- oil filter adapter and filter body
- oil cooler, if equipped

### **Leakage Points—With Transmission and Flywheel Removed**

- crankshaft rear oil seal
- rear main bearing cap parting line
- rear main bearing cap and seals
- flywheel mounting bolt holes (with flywheel [6375] installed)
- camshaft rear bearing covers (6266) or pipe plugs at the end of oil passages

Oil leaks at crimped seams in sheet metal parts and cracks in cast or stamped parts can be detected when using the dye method.

### **Compression Test—Compression Gauge Check**

1. Make sure the oil in the crankcase is of the correct viscosity and at the correct level and that the battery (10655) is correctly charged. Operate the vehicle until the engine is at normal operating temperature. Turn the ignition switch to the OFF position, then remove all the spark plugs (12405).
2. Set the throttle plates in the wide-open position.
3. Install a compression gauge such as the Compression Tester in the No. 1 cylinder.
4. Install an auxiliary starter switch in the starting circuit. With the ignition switch in the OFF position, and using the auxiliary starter switch, crank the engine a minimum of five compression strokes and record the highest reading. Note the approximate number of compression strokes required to obtain the highest reading.
5. Repeat the test on each cylinder, cranking the engine approximately the same number of compression strokes.

### **Compression Test—Test Results**

The indicated compression pressures are considered within specification if the lowest reading cylinder is within 75 percent of the highest reading. For additional information, refer to the Compression Pressure Limit Chart.

**Compression Pressure Limit Chart**

Maximum Pressure	Minimum Pressure	Maximum Pressure	Minimum Pressure	Maximum Pressure	Minimum Pressure	Maximum Pressure	Minimum Pressure
924 kPa (134 psi)	696 kPa (101 psi)	1131 kPa (164 psi)	848 kPa (123 psi)	1338 kPa (194 psi)	1000 kPa (146 psi)	1544 kPa (224 psi)	1158 kPa (168 psi)
938 kPa (136 psi)	703 kPa (102 psi)	1145 kPa (166 psi)	855 kPa (124 psi)	1351 kPa (196 psi)	1014 kPa (147 psi)	1558 kPa (226 psi)	1165 kPa (169 psi)
952 kPa (138 psi)	717 kPa (104 psi)	1158 kPa (168 psi)	869 kPa (126 psi)	1365 kPa (198 psi)	1020 kPa (148 psi)	1572 kPa (228 psi)	1179 kPa (171 psi)
965 kPa (140 psi)	724 kPa (106 psi)	1172 kPa (170 psi)	876 kPa (127 psi)	1379 kPa (200 psi)	1034 kPa (150 psi)	1586 kPa (230 psi)	1186 kPa (172 psi)
979 kPa (142 psi)	738 kPa (107 psi)	1186 kPa (172 psi)	889 kPa (129 psi)	1303 kPa (202 psi)	1041 kPa (151 psi)	1600 kPa (232 psi)	1200 kPa (174 psi)
933 kPa (144 psi)	745 kPa (109 psi)	1200 kPa (174 psi)	903 kPa (131 psi)	1407 kPa (204 psi)	1055 kPa (153 psi)	1055 kPa (153 psi)	1207 kPa (175 psi)
1007 kPa (146 psi)	758 kPa (110 psi)	1214 kPa (176 psi)	910 kPa (132 psi)	1420 kPa (206 psi)	1062 kPa (154 psi)	1627 kPa (154 psi)	1220 kPa (177 psi)
1020 kPa (148 psi)	765 kPa (111 psi)	1227 kPa (178 psi)	917 kPa (133 psi)	1434 kPa (208 psi)	1075 kPa (156 psi)	1641 kPa (238 psi)	1227 kPa (178 psi)
1034 kPa (150 psi)	779 kPa (113 psi)	1241 kPa (180 psi)	931 kPa (135 psi)	1448 kPa (210 psi)	1083 kPa (157 psi)	1655 kPa (240 psi)	1241 kPa (180 psi)
1048 kPa (152 psi)	786 kPa (114 psi)	1255 kPa (182 psi)	936 kPa (136 psi)	1462 kPa (212 psi)	1089 kPa (158 psi)	1669 kPa (242 psi)	1248 kPa (181 psi)
1062 kPa (154 psi)	793 kPa (115 psi)	1269 kPa (184 psi)	952 kPa (138 psi)	1476 kPa (214 psi)	1103 kPa (160 psi)	1682 kPa (244 psi)	1262 kPa (183 psi)
1076 kPa (156 psi)	807 kPa (117 psi)	1282 kPa (186 psi)	965 kPa (140 psi)	1489 kPa (216 psi)	1117 kPa (162 psi)	1696 kPa (246 psi)	1269 kPa (184 psi)
1089 kPa (158 psi)	814 kPa (118 psi)	1296 kPa (188 psi)	972 kPa (141 psi)	1503 kPa (218 psi)	1124 kPa (163 psi)	1710 kPa (248 psi)	1202 kPa (186 psi)
1103 kPa (160 psi)	827 kPa (120 psi)	1310 kPa (190 psi)	979 kPa (142 psi)	1517 kPa (220 psi)	1138 kPa (165 psi)	1724 kPa (250 psi)	1289 kPa (187 psi)
1110 kPa (161 psi)	834 kPa (121 psi)	1324 kPa (192 psi)	993 kPa (144 psi)	1631 kPa (222 psi)	1145 kPa (166 psi)	—	—

If one or more cylinders reads low, squirt approximately one tablespoon of Super Premium SAE 5W-30 Motor Oil, XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G on top of the pistons in the low-reading cylinders. Repeat the compression pressure check on these cylinders.

### Compression Test—Interpreting Compression Readings

1. If compression improves considerably, piston rings are faulty.
2. If compression does not improve, valves are sticking or seating incorrectly.
3. If two adjacent cylinders indicate low compression pressures and squirting oil on each piston does not increase compression, the head gasket may be leaking between cylinders. Engine oil or coolant in cylinders could result from this condition.

Use the Compression Pressure Limit Chart when checking cylinder compression so that the lowest reading is within 75 percent of the highest reading.

### Cylinder Leakage Detection

When a cylinder produces a low reading, use of the Engine Cylinder Leak Detection/Air Pressurization Kit will be helpful in pinpointing the exact cause.

The leakage detector is inserted in the spark plug hole, the piston is brought up to dead center on the compression stroke, and compressed air is admitted.

Once the combustion chamber is pressurized, a special gauge included in the kit will read the percentage of leakage. Leakage exceeding 20 percent is excessive.

While the air pressure is retained in the cylinder, listen for the hiss of escaping air. A leak at the intake valve (6507) will be heard in the throttle body (9E926). A leak at the exhaust valve (6505) can be heard at the tail pipe. Leakage past the piston rings will be audible at the positive crankcase ventilation (PCV) connection. If air is passing through a blown head gasket to an adjacent cylinder, the noise will be evident at the spark plug hole of the cylinder into which the air is leaking. Cracks in the cylinder block or gasket leakage into the cooling system may be detected by a stream of bubbles in the radiator (8005).

### Oil Consumption Test

The following diagnostic procedure is used to determine the source of excessive internal oil consumption.

1. **NOTE:** Oil use is normally greater during the first 16,100 km (10,000 miles) of service. As mileage increases, oil use generally decreases. Vehicles in normal service should get at least 1,450 km per liter (900 miles per quart) after 16,000 km (10,000 miles) of service. High speed driving, towing, high ambient temperature and other factors may result in greater oil use.

Define excessive oil consumption, such as the number of miles driven per liter (quart) of oil used. Also determine customer's driving habits, such as sustained high speed operation, towing, extended idle and other considerations.

2. Verify that the engine has no external oil leak as described under Engine Oil Leaks in the Diagnosis and Testing portion of this section.
3. Verify that the engine has the correct oil level dipstick (6750).
4. Verify that the engine is not being run in an overfilled condition. Check the oil level at least five minutes after a hot shutdown with the vehicle parked on a level surface. In no case should the level be above MAX or the letter F in FULL. If significantly overfilled, carry out Steps 6a through 6d.
5. Verify the spark plugs are not oil saturated. If the spark plugs are oil saturated and compression is good it can be assumed the valve seals or valve guides are at fault.
6. Carry out an oil consumption test:
  - a. Drain the engine oil, remove the oil bypass filter (6714) and refill with one liter (quart) less than the recommended amount.
  - b. Run the engine for three minutes (10 minutes if cold), and allow the oil to drain back for at least five

- minutes with the vehicle on a level surface.
- c. Remove oil level dipstick and wipe clean. (Do not wipe with anything contaminated with silicone compounds.) Reinstall the oil level dipstick, being sure to seat it firmly in the oil level indicator tube (6754). Remove the oil level dipstick and draw a mark on the back (unmarked) surface at the indicated oil level. This level should be about the same as the MIN or ADD mark on the face of the oil level dipstick.
  - d. Add one liter (quart) of oil. Restart the engine and allow to idle for at least two minutes. Shut off the engine and allow the oil to drain back for at least five minutes. Mark the oil level dipstick, using the procedure above.
  - e. Record the vehicle mileage.
  - f. Instruct the customer to drive the vehicle as usual and perform the following:
    - Check the oil level regularly at intervals of 160 to 240 km (100-150 miles).
    - Return to the service point when the oil level drops below the lower (MIN or ADD) mark on the oil level dipstick.
    - Add only full liters (quarts) of the same oil in an emergency. Note the mileage at which the oil is added.
  - g. Check the oil level under the same conditions and at the same location as in Steps 6c and 6d.
    - Measure the distance from the oil level to the UPPER mark on the oil level dipstick and record.
    - Measure the distance between the two scribe marks and record.
    - Divide the first measurement by the second.
    - Divide the distance driven during the oil test by the result. This quantity is the approximate oil consumption rate in kilometers per liter or in miles per quart.
  - h. If the oil consumption rate is unacceptable, go to Step 7.
7. Check the positive crankcase ventilation (PCV) system. Make sure the system is not plugged.
  8. Check for plugged oil drain-back holes in the cylinder heads and cylinder block.
  9. If the condition still exists after performing the above steps, go to Step 10.
  10. Perform a cylinder compression test or perform a cylinder leak detection test with Engine Cylinder Leak Detection/Air Pressurization Kit. This can help determine the source of oil consumption such as valves, piston rings or other areas.
  11. **NOTE:** After determining if new parts should be installed, make sure correct parts are used.

Check valve guides for excessive guide clearance. Install new all valve stem seals (6571) after verifying valve guide clearance.
  12. Worn or damaged internal engine components can cause excessive oil consumption. Small deposits of oil on the tips of spark plugs can be a clue to internal oil consumption. If internal oil consumption still persists, proceed as follows:
    - a. Remove the engine from the vehicle and place it on an engine work stand. Remove the intake manifolds (9424), cylinder heads, oil pan (6675) and oil pump (6600).
    - b. Check piston ring clearance, ring gap and ring orientation. Repair as necessary.
    - c. Check for excessive bearing clearance. Repair as necessary.
  13. Repeat the oil consumption test (Step 6) to confirm the oil consumption concern has been resolved.

### Intake Manifold Vacuum Test

Bring the engine to normal operating temperature. Connect the Vacuum/Pressure Tester to the intake



manifold. Run the engine at the specified idle speed.

The vacuum gauge should read between 51-74 kPa (15-22 in-Hg) depending upon the engine condition and the altitude at which the test is performed. Subtract 4.0193 kPa (1 in-Hg) from the specified reading for every 304.8 m (1,000 feet) of elevation above sea level.

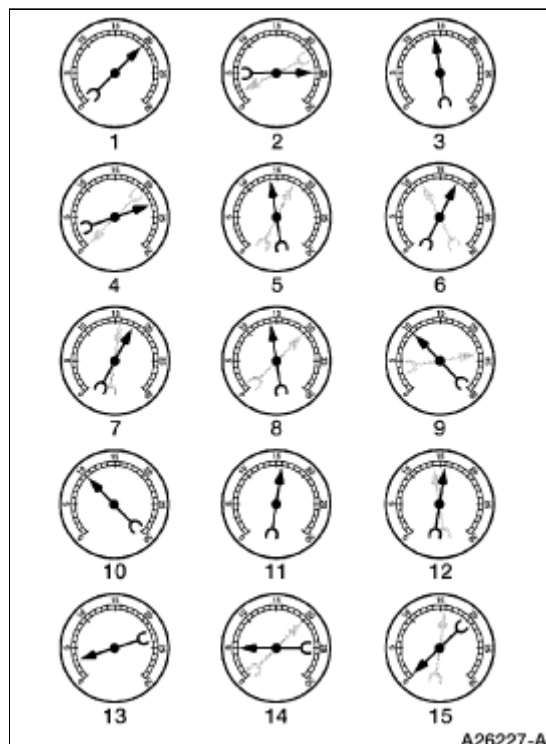
The reading should be steady. If necessary, adjust the gauge damper control (where used) if the needle is fluttering rapidly. Adjust the damper until the needle moves easily without excessive flutter.

### Intake Manifold Vacuum Test—Interpreting Vacuum Gauge Readings

A careful study of the vacuum gauge reading while the engine is idling will help pinpoint trouble areas. Always conduct other appropriate tests before arriving at a final diagnostic decision. Vacuum gauge readings, although helpful, must be interpreted carefully.

Most vacuum gauges have a normal band indicated on the gauge face.

The following are potential gauge readings. Some are normal; others should be investigated further.



1. **NORMAL READING:** Needle between 51-74 kPa (15-22 in-Hg) and holding steady.
2. **NORMAL READING DURING RAPID ACCELERATION AND DECELERATION:** When the engine is rapidly accelerated (dotted needle), the needle will drop to a low reading (not to zero). When the throttle is suddenly released, the needle will snap back up to a higher than normal figure.
3. **NORMAL FOR HIGH-LIFT CAMSHAFT WITH LARGE OVERLAP:** The needle will register as low as 51 kPa (15 in-Hg) but will be relatively steady. Some oscillation is normal.
4. **WORN RINGS OR DILUTED OIL:** When the engine is accelerated (dotted needle), the needle drops to 0 kPa (0 in-Hg). Upon deceleration, the needle runs slightly above 74 kPa (22 in-Hg).

5. **STICKING VALVES:** When the needle (dotted) remains steady at a normal vacuum but occasionally flicks (sharp, fast movement) down and back about 13 kPa (4 in-Hg), one or more valves may be sticking.
6. **BURNED OR WARPED VALVES:** A regular, evenly-spaced, downscale flicking of the needle indicates one or more burned or warped valves. Insufficient hydraulic lash adjuster or hydraulic lash adjuster (HLA) clearance will also cause this reaction.
7. **POOR VALVE SEATING:** A small but regular downscale flicking can mean one or more valves are not seating.
8. **WORN VALVE GUIDES:** When the needle oscillates over about a 13 kPa (4 in-Hg) range at idle speed, the valve guides could be worn. As engine speed increases, the needle will become steady if guides are responsible.
9. **WEAK VALVE SPRINGS:** When the needle oscillation becomes more violent as engine rpm is increased, weak valve springs are indicated. The reading at idle could be relatively steady.
10. **LATE VALVE TIMING:** A steady but low reading could be caused by late valve timing.
11. **IGNITION TIMING RETARDING:** Retarded ignition timing will produce a steady but somewhat low reading.
12. **INSUFFICIENT SPARK PLUG GAP:** When spark plugs are gapped too close, a regular, small pulsation of the needle can occur.
13. **INTAKE LEAK:** A low, steady reading can be caused by an intake manifold or throttle body gasket leak.
14. **BLOWN HEAD GASKET:** A regular drop of fair magnitude can be caused by a blown head gasket or warped cylinder head-to-cylinder block surface.
15. **RESTRICTED EXHAUST SYSTEM:** When the engine is first started and is idled, the reading may be normal, but as the engine rpm is increased, the back pressure caused by a clogged muffler (5230), kinked tail pipe or other concerns will cause the needle to slowly drop to 0 kPa (0 in-Hg). The needle then may slowly rise. Excessive exhaust clogging will cause the needle to drop to a low point even if the engine is only idling.
16. When vacuum leaks are indicated, search out and correct the cause. Excess air leaking into the system will upset the fuel mixture and cause concerns such as rough idle, missing on acceleration or burned valves. If the leak exists in an accessory unit such as the power brake booster (2005), the unit will not function correctly. Always fix vacuum leaks.

### **Excessive Engine Oil Consumption**

The amount of oil an engine uses will vary with the way the vehicle is driven in addition to normal engine-to-engine variation. This is especially true during the first 16,100 km (10,000 miles) when a new engine is being broken in or until certain internal engine components become conditioned. Vehicles used in heavy-duty operation may use more oil. The following are examples of heavy-duty operation:

- trailer towing applications
- severe loading applications
- sustained high speed operation

Engines need oil to lubricate the following internal components:

- cylinder block cylinder walls
- pistons and piston, pin and rings (6102)
- intake and exhaust valve stems
- intake and exhaust valve guides
- all internal engine components

When the pistons move downward, a thin film of oil is left on the cylinder walls. As the vehicle is operated, some oil is also drawn into the combustion chambers past the intake and exhaust valve stem seals and burned.

The following is a partial list of conditions that can affect oil consumption rates:

- engine duty cycle
- operator driving habits
- ambient temperature
- quality and viscosity of the oil

Operation under varying conditions can frequently be misleading. A vehicle that has been run for several thousand miles on short trips or in below-freezing ambient temperatures may have consumed a "normal" amount of oil. However, when checking the engine oil level, it may measure up to the FULL or MAX on the oil level dipstick due to dilution (condensation and fuel) in the engine crankcase. The vehicle might then be driven at high speeds on the highway where the condensation and fuel boil off. The next time the engine oil is checked, it may appear that a liter (quart) of oil was used in about 160 km (100 miles). This perceived 160 km (100 miles) per liter (quart) oil consumption rate causes customer concern even though the actual overall oil consumption rate is about 2,400 km (1,500 miles) per liter (quart).

Make sure the selected engine oil meets the current recommended API performance category with SAE viscosity grade as shown in the vehicle Owner's Guide. It is also important that the engine oil is changed at the intervals specified. For additional information, refer to the vehicle Owner's Guide.

### **Oil Pressure Test**

1. Disconnect and remove the oil pressure sensor (9278) from the engine.
2. Connect the Engine Oil Pressure Gauge to the oil pressure sender oil galley port.
3. Run the engine until normal operating temperature is reached.
4. Run the engine at the specified rpm and record the gauge reading.
5. The oil pressure should be within specifications; refer to the specification chart in the appropriate engine section.
6. If the pressure is not within specification, check the following possible sources:
  - insufficient oil
  - oil leakage
  - worn or damaged oil pump
  - oil pump screen cover and tube (6622)
  - excessive main bearing clearance
  - excessive connecting rod bearing clearance

**Valve Train Analysis—Engine Off—Valve Cover Removed**

Check for damaged or severely worn parts and correct assembly. Make sure correct parts are used with the static engine analysis as follows.

**Valve Train Analysis—Engine Off, Rocker Arm**

- Check for loose mounting bolts, studs and nuts.
- Check for plugged oil feed in the rocker arms (6564) or cylinder head.

**Valve Train Analysis—Engine Off, Camshaft Roller Followers and Hydraulic Lash Adjusters, Overhead Camshaft**

- Check for loose mounting bolts on camshaft carriers.
- Check for plugged oil feed in the camshaft roller followers, lash adjusters or cylinder heads.

**Valve Train Analysis—Engine Off, Camshaft—Engines**

- Check for broken or damaged parts.

**Valve Train Analysis—Engine Off, Push Rods**

- Check for bent push rods (6565) and restricted oil passage.

**Valve Train Analysis—Valve Springs**

- Check for broken or damaged parts.

**Valve Train Analysis—Engine Off, Valve Spring Retainer and Valve Spring Retainer Keys**

- Check for correct seating of the valve spring retainer key (6518) on the valve stem and in valve spring retainer (6514).
- Check for correct seating on the valve stem.

**Valve Train Analysis—Engine Off, Valves and Cylinder Head**

- Check for plugged oil drain back holes.
- Check for worn or damaged valve tips.
- Check for missing or damaged guide-mounted valve stem seal.
- Check collapsed valve tappet gap.
- Check installed valve spring height.
- Check for missing or worn valve spring seats.
- Check for plugged oil metering orifice in cylinder head oil reservoir (if equipped).

Static checks (engine off) are to be made on the engine prior to the dynamic procedure.

**Valve Train Analysis—Engine Running**

- Start the engine and, while idling, check for correct operation of all parts. Check the following:

### Valve Train Analysis—Engine Running, Positive Rotator and Valve Spring Retainer Keys

- Check for correct operation of positive rotator.

### Valve Train Analysis—Engine Running, Valves and Cylinder Head

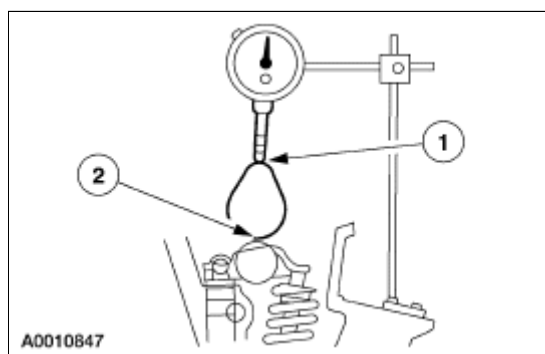
- Check for plugged oil drain back holes.
- Check for missing or damaged valve stem seals or guide mounted valve stem seals.
- Check for a plugged oil metering orifice in the cylinder head oil reservoir (4.6L engine only).

If insufficient oiling is suspected, check oil passages for blockage, then accelerate the engine to 1,200 rpm with the transmission in NEUTRAL and the engine at normal operating temperature. Oil should spurt from the rocker arm oil holes such that valve tips and camshaft roller followers are well oiled. With the valve covers (6582) off, some oil splash may overshoot camshaft roller followers.

### Valve Train Analysis—Engine Running, Camshaft Lobe Lift—OHC Engines

Check the lift of each camshaft lobe in consecutive order and make a note of the readings.

1. Remove the valve covers.
2. Remove the spark plugs.
3. Install the Dial Indicator with Bracketry so the rounded tip of indicator is on top of the camshaft lobe and on the same plane as the valve tappet.
4. Rotate the crankshaft using a breaker bar and socket attached to the crankshaft pulley retainer bolt. Rotate the crankshaft until the base circle of the camshaft lobe is reached.



5. Zero the dial indicator. Continue to rotate the crankshaft until the (1) high-lift point of the camshaft lobe is in the fully-raised position (highest indicator reading).
6. To check the accuracy of the original indicator reading, continue to rotate crankshaft until the (2) base circle is reached. The indicator reading should be zero. If zero reading is not obtained, repeat Steps 1 through 6.
7. **NOTE:** If the lift on any lobe is below specified service limits, the camshaft and camshaft roller followers operating on that camshaft (6250) must be replaced.

Remove the Dial Indicator with Bracketry.

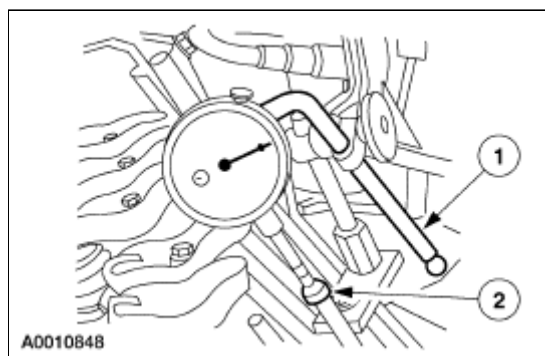
8. Install the spark plugs.
9. Install the valve covers.

### Valve Train Analysis—Engine Running, Camshaft Lobe Lift—Push Rod Engine

Check the lift of each lobe in consecutive order and make a note of the readings.


1. Remove the valve covers.
2. Remove the rocker arm seat bolts, rocker arm seat (6A528) and rocker arms.

### Typical Engine With Push Rods



3. Make sure the valve tappet is seated against camshaft (6250). Install (1) Dial Indicator with Bracketry so the ball socket adapter of the indicator is on top of the valve tappet or (2) Cup Shaped Adapter is on top of push rod and in same plane as valve tappet push rod movement.
4. Remove the spark plugs.
5. Connect an auxiliary starter switch in the starting circuit. Crank the engine with ignition switch in OFF position. Bump crankshaft over until valve tappet is on base circle of camshaft lobe. At this point, valve tappet will be in its lowest position. If checking during engine assembly, turn crankshaft using a socket or ratchet.
6. Zero the dial indicator. Continue to rotate crankshaft slowly until valve tappet is in fully-raised position (highest indicator reading).
7. **NOTE:** If lift on any lobe is below specified service limits, a new camshaft and valve tappet must be installed.

Compare total lift recorded on dial indicator with specifications.

8. To check the accuracy of the original dial indicator reading, continue to rotate the crankshaft until indicator reads zero.
9. Remove the dial indicator, adapter and auxiliary starter switch.
10.  **CAUTION:** After installing rocker arms, do not rotate crankshaft until valve tappets have

**had sufficient time to bleed down. To do otherwise may cause serious valve damage. Manually bleeding-down valve tappets will reduce waiting time.**

Install rocker arm seats, rocker arms and rocker arm seat bolts.

11. Install valve covers.

12. Install spark plugs.

### **Valve Train Analysis—Engine Running, Valve Tappet**

Valve tappet noise can be caused by any of the following:

- excessive valve tappet gap (collapsed)
- sticking valve tappet plunger
- valve tappet check valve not functioning correctly
- air in lubrication system
- leakdown rate too rapid
- excessive valve guide wear

Excessive collapsed valve tappet gap can be caused by loose rocker arm seat bolts/nuts, incorrect initial adjustment or wear of valve tappet face, or worn roller valve tappets, push rod (6565), rocker arm (6564), rocker arm seat or valve tip. With valve tappet collapsed, check gap between the valve tip and the rocker arm to determine if any other valve train parts are damaged, worn or out of adjustment.

A sticking valve tappet plunger can be caused by contaminants or varnish inside the valve tappet.

A valve tappet check valve that is not functioning can be caused by an obstruction such as dirt or chips that prevent it from closing when the camshaft lobe is lifting the valve tappet. It may also be caused by a broken check valve spring.

Air bubbles in the lubrication system will prevent the valve tappet from supporting the valve spring load. This can be caused by too high or too low an oil level in the oil pan or by air being drawn into the system through a hole, crack or leaking gasket on the oil pump screen cover and tube.

If the leakdown time is below the specified time for used valve tappets, noisy operation can result. If no other cause for noisy valve tappets can be found, the leakdown rate should be checked and new valve tappets installed for any valve tappets outside the specification.

Assembled valve tappets can be tested with Hydraulic Tappet Leakdown Tester to check the leakdown rate. The leakdown rate specification is the time in seconds for the plunger to move a specified distance while under a 22.7 kg (50 lb) load. Test the valve tappets as outlined in this section.


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## Sprockets

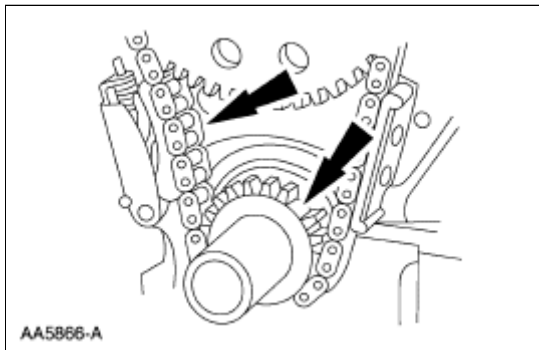
1.  **WARNING:** To avoid the possibility of personal injury or damage to the vehicle, do not operate the engine with the hood open until the fan blade has been examined for possible cracks and separation.

**NOTE:** Specifications show the expected minimum or maximum condition. Refer to the appropriate section in Group [303](#) for the procedure.

**NOTE:** If a component fails to meet the specifications, it is necessary to install a new component or refinish. If the component can be refinished, wear limits are provided as an aid to making a decision. A new component must be installed for any component that fails to meet specifications and cannot be refinished.

Inspect the timing chain/belt and the sprockets.

- Install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.





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## **Rocker Arms —Cleaning**

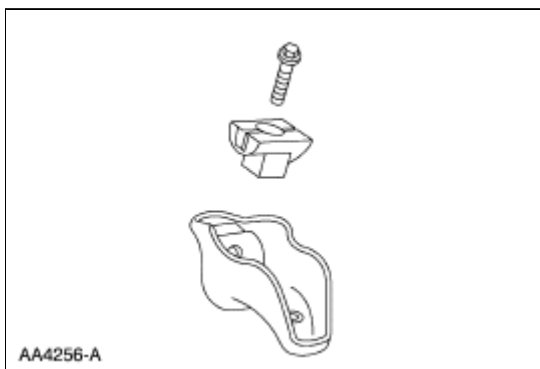
1. Clean all parts thoroughly. Make sure all oil passages are open.
  2. Make sure oil passage in the push rod/valve tappet end of the rocker arm (6564) is open.
-

## Rocker Arms —Inspection



**CAUTION:** Do not attempt to true surfaces by grinding. Check the rocker arm pad, side rails and seat for excessive wear, cracks, nicks or burrs. Check the rocker arm seat bolt for stripped or broken threads. Install new components as necessary or possible damage may occur.

1. Inspect the rocker arm push rod bore for nicks, scratches, scores or scuffs. Install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



2. Inspect the pad at the valve end of the rocker arm for indications of scuffing or abnormal wear. If the pad is grooved, install a new rocker arm. Refer to the appropriate section in Group [303](#) for the procedure.

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## **Push Rods —Cleaning**

1. Clean the push rods (6565) in a suitable solvent. Blow out the oil passage in the push rods with compressed air.
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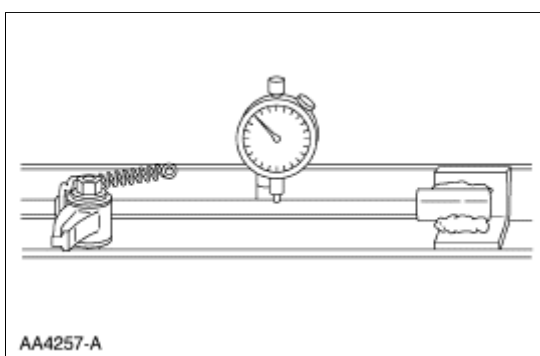
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## Push Rods —Inspection

1.  **CAUTION:** Do not attempt to straighten push rods.

Check the ends of the push rods for nicks, grooves, roughness or excessive wear. Install new push rods as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

- The push rods can be checked for straightness while they are installed in the engine by rotating them with the valve closed.
- They also can be checked using a Dial Indicator with Bracketry.



2. If the push rod is bent beyond specifications, install a new push rod. Refer to the appropriate section in Group [303](#) for the procedure.
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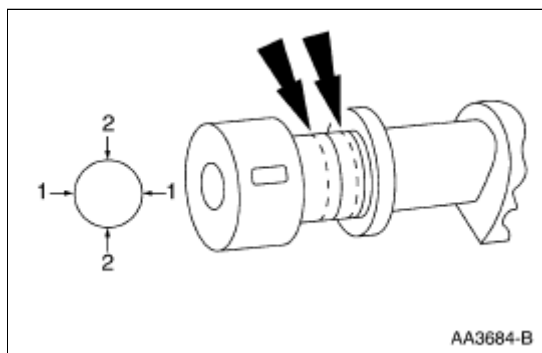
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### Camshaft Journal —Diameter

1. Measure each camshaft journal diameter in two directions.
  - If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



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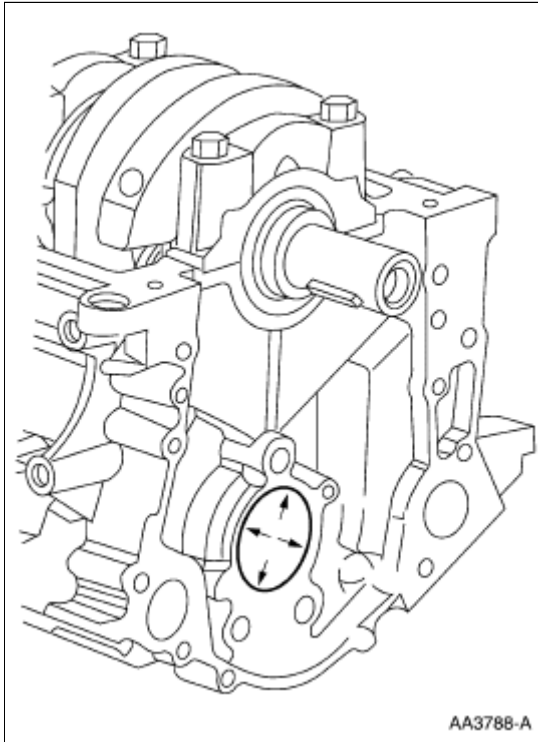
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### Camshaft Journal —Clearance, Push Rod Engine, Micrometer Method

1. **NOTE:** The camshaft journals must meet specifications before checking camshaft journal clearance.

Measure each camshaft bearing (6261) in two directions.

- Subtract the camshaft journal diameter from the camshaft bearing diameter.



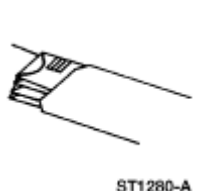




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## Camshaft Journal — Clearance, Plastigage Method

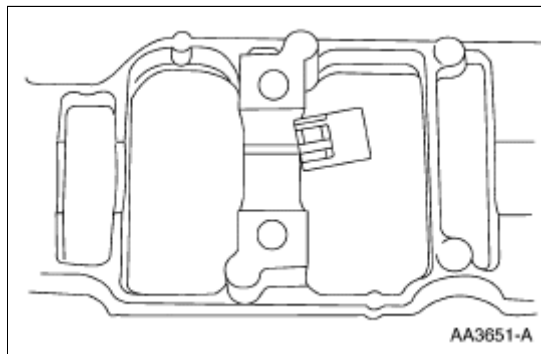
### Special Tool(s)

 ST1280-A	Plastigage 303-D031 (D81L-6002-B) or equivalent
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**NOTE:** The camshaft journals must meet specifications before checking camshaft journal clearance.

1. Remove the camshaft bearing cap and lay Plastigage across the surface. Refer to the appropriate section in Group [303](#) for the procedure.
2. **NOTE:** Do not turn the camshaft while carrying out this procedure.

Position the camshaft bearing cap and install the bolts. Refer to the appropriate section in Group [303](#) for the procedure.



3. Use Plastigage to verify the camshaft journal clearance.
    - If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.
-

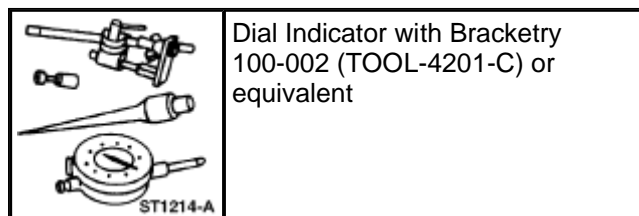


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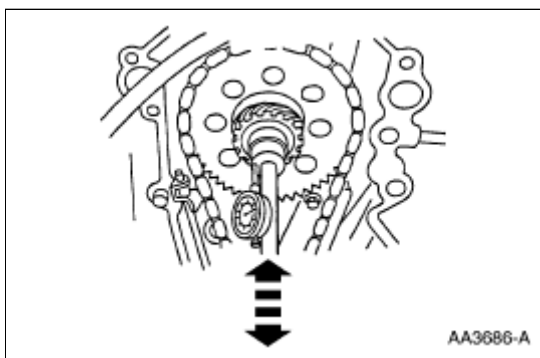
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## Camshaft —End Play, Push Rod Engines

### Special Tool(s)



1. Remove the valve tappets. Refer to the appropriate section in Group [303](#) for the procedure.
2. Use a Dial Indicator with Bracketry to measure camshaft end play.
3. Position the camshaft to the rear of the cylinder block.
4. Zero the indicator.
5. Move the camshaft to the front of the cylinder block. Note and record the camshaft end play.
  - If camshaft end play exceeds specifications, install a new camshaft thrust plate (6269).



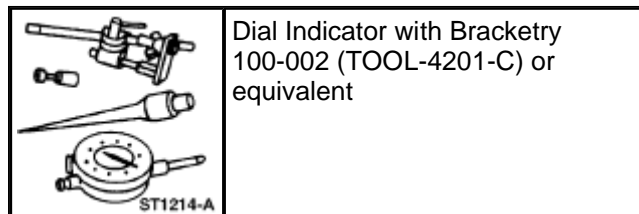


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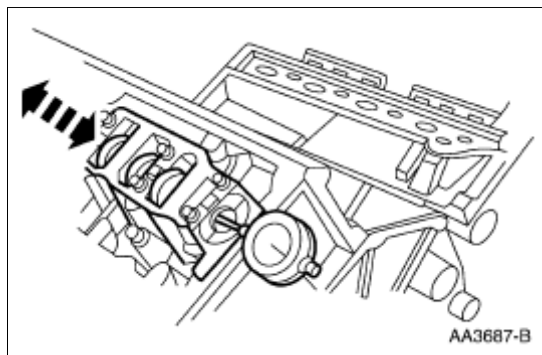
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## Camshaft —End Play, OHC Engines

### Special Tool(s)



1. Remove the roller followers. Refer to the appropriate section in Group [303](#) for the procedure.
2. Use a Dial Indicator with Bracketry to measure camshaft end play.
3. Position the camshaft to the rear of the cylinder head.
4. Zero the indicator.
5. Move the camshaft to the front of the cylinder head. Note and record the camshaft end play.
  - If camshaft end play exceeds specifications, install new camshaft and recheck end play. Refer to the appropriate section in Group [303](#) for the procedure.
  - If camshaft end play exceeds specification after camshaft installation, install a new cylinder head. Refer to the appropriate section in Group [303](#) for the procedure.





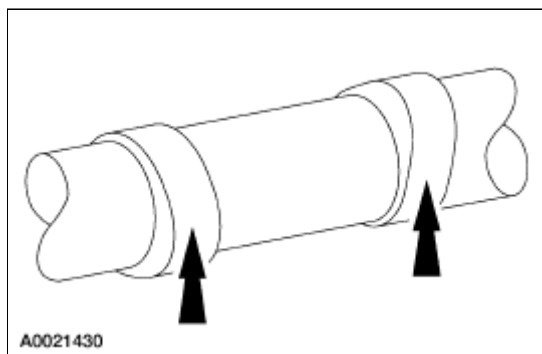
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### Camshaft —Lobe Surface

1. Inspect camshaft lobes for pitting or damage in the active area. Minor pitting is acceptable outside the active area.
  - If excessive pitting or damage is present, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



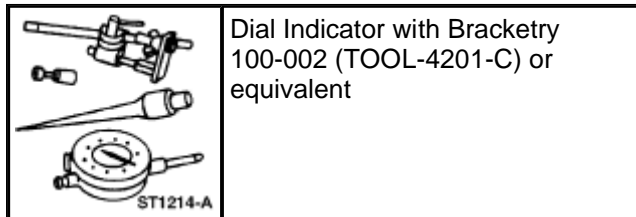


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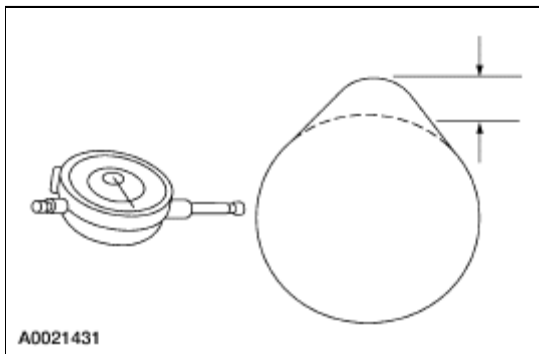
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## Camshaft —Lobe Lift

### Special Tool(s)



1. Use a Dial Indicator with Bracketry to measure camshaft intake/exhaust lobe lift.
  - Rotate the camshaft and subtract the lowest indicator reading from the highest indicator reading to figure the camshaft lobe lift.
  - For additional information, refer to Specifications in the appropriate section in Group 303.





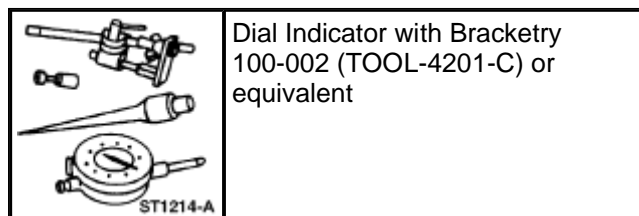
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## Camshaft —Runout

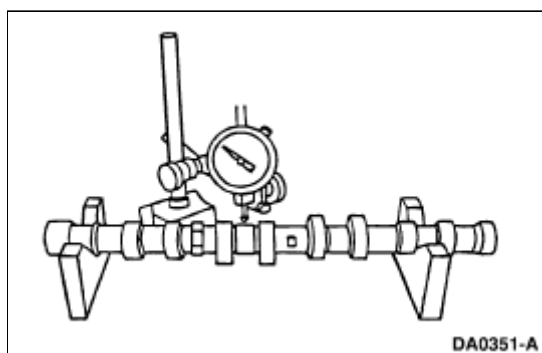
### Special Tool(s)



1. **NOTE:** Camshaft journals must be within specifications before checking runout.

Use a Dial Indicator with Bracketry to measure the camshaft runout.

- Rotate the camshaft and subtract the lowest indicator reading from the highest indicator reading.
- For additional information, refer to the specification chart in the appropriate engine section.
- If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.





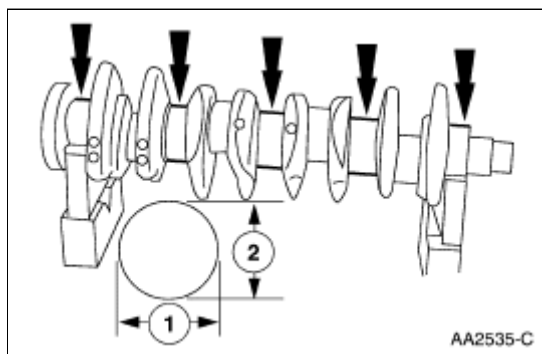
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## Crankshaft Main Bearing Journal —Diameter

1. Measure each of the crankshaft main bearing journal diameters in at least two directions.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



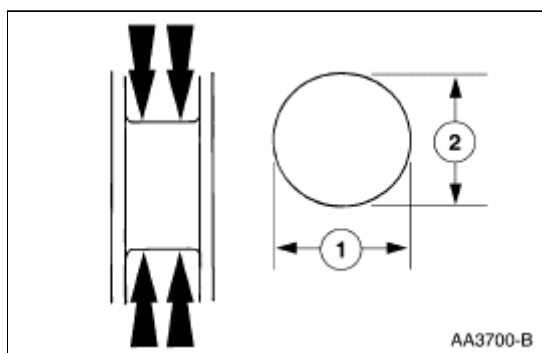
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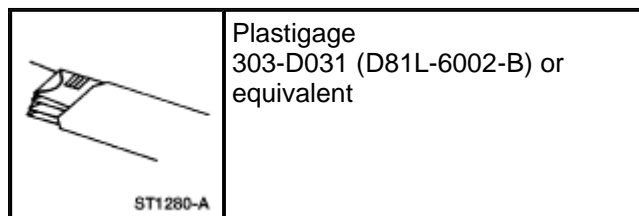
### Crankshaft Main Bearing Journal —Taper

1. Measure each of the crankshaft main bearing journal diameters in at least two directions at each end of the main bearing journal.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If it out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



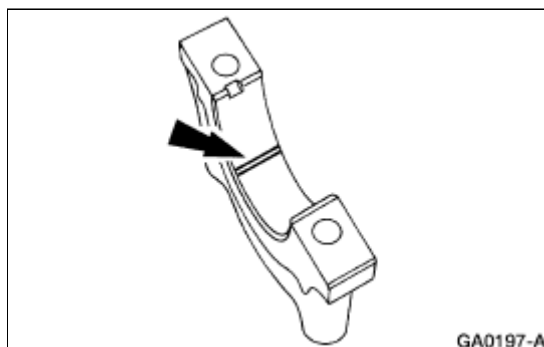
## Crankshaft Main Bearing Journal —Clearance

### Special Tool(s)



**NOTE:** Crankshaft main bearing journals must be within specifications before checking journal clearance.

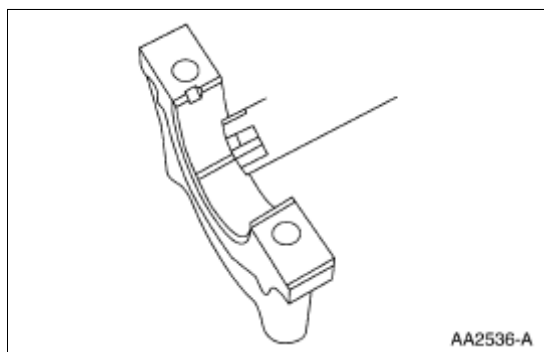
1. Remove the crankshaft main bearing caps and crankshaft main bearing.
2. Lay a piece of Plastigage across the face of each crankshaft main bearing surface.



3. **NOTE:** Do not turn the crankshaft while carrying out this procedure.

Install and remove the crankshaft main bearing cap.

4. Verify the crankshaft journal clearance.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.





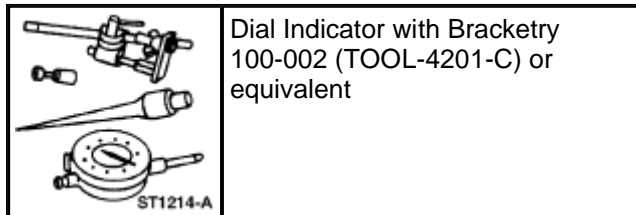


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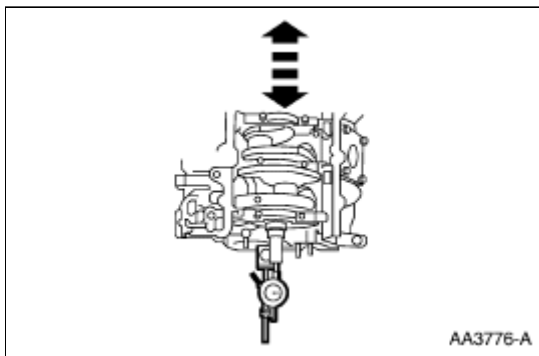
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## Crankshaft —End Play

### Special Tool(s)



1. Measure the crankshaft end play. Use a Dial Indicator with Bracketry to measure crankshaft end play.
2. Position the crankshaft to the rear of the cylinder block.
3. Zero the indicator.
4. Move the crankshaft to the front of the cylinder block. Note and record the crankshaft end play.
  - If crankshaft end play exceeds specifications, install a new crankshaft thrust washer (6334) or crankshaft thrust main bearing (6337). Refer to the appropriate section in Group [303](#) for the procedure.





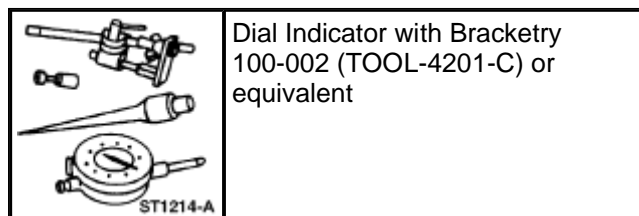
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## Crankshaft —Runout

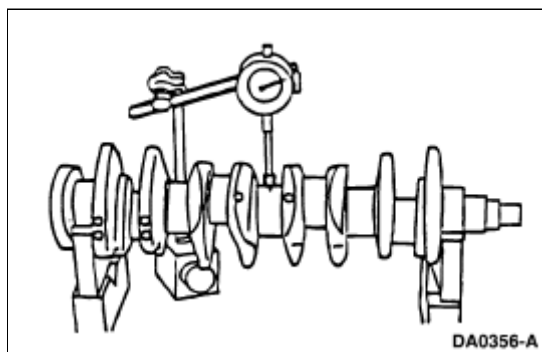
### Special Tool(s)



1. **NOTE:** Crankshaft main bearing journals must be within specifications before checking runout.

Use the Dial Indicator with Bracketry to measure the crankshaft runout.

- For additional information, refer to Specifications in the appropriate section in Group 303.
- Rotate the crankshaft and subtract the lowest dial indicator reading from the highest dial indicator reading to figure the crankshaft runout. If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

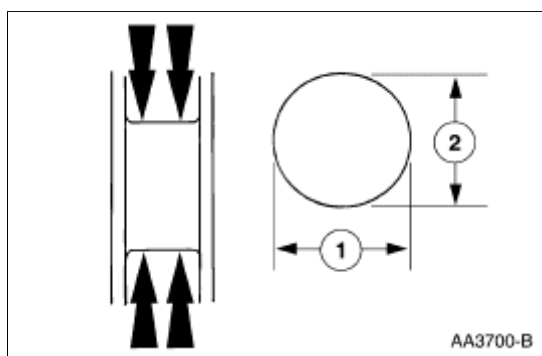




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**Crankshaft —Connecting Rod Journal Taper, Out of Round**

1. Measure the crankshaft connecting rod journal diameters in two directions perpendicular to one another at each end of the connecting rod journal. The difference in the measurements from one end to the other is the taper. Verify measurement is within the wear limit.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

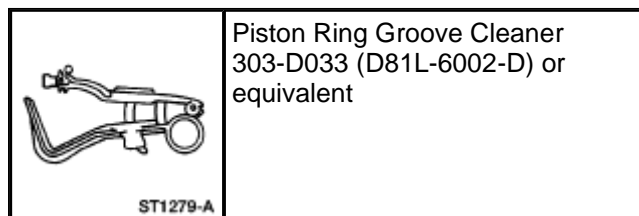


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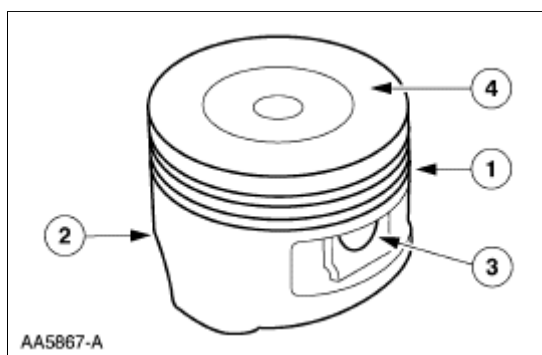
## Piston — Inspection

### Special Tool(s)

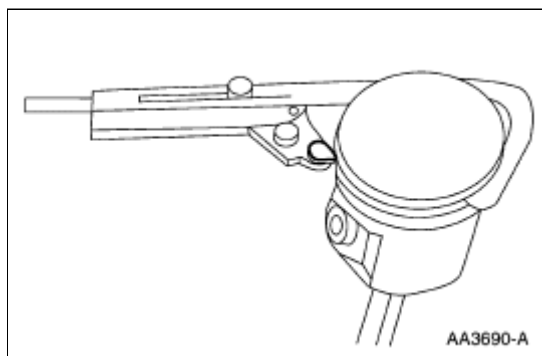


**CAUTION:** Do not use a caustic cleaning solution or a wire brush to clean the pistons or damage can occur.

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




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





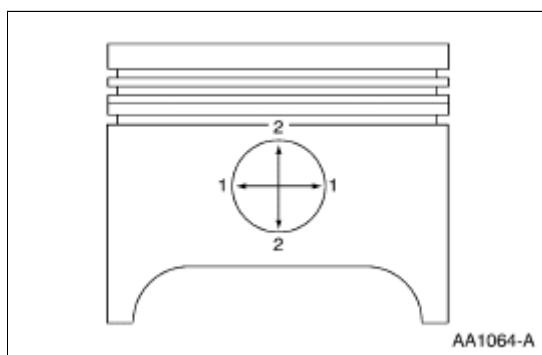
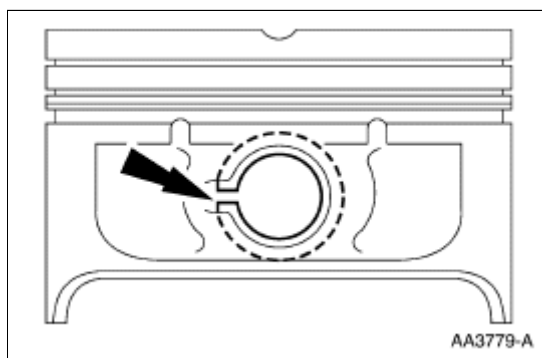
## Piston —Pin to Bore Diameter

1.  **WARNING:** Cover the end of the pin bore with a hand or shop rag when removing the retainer ring, since it has a tendency to spring out. Wear eye protection.

**NOTE:** Piston and piston pins are a matched set and should not be interchanged.

Measure the piston pin bore diameter in two directions on each side. Verify the diameter is within specification.

- If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.







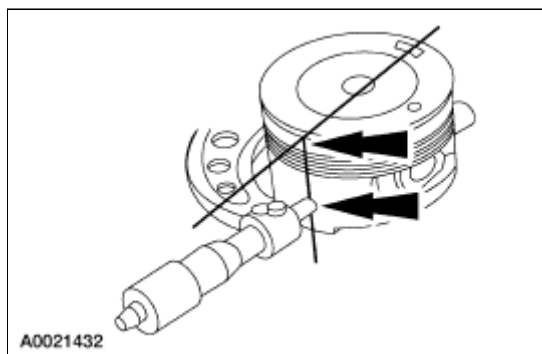
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## Piston —Diameter

1. Measure the piston dome and skirt diameter 90 degrees from the piston pin at the points indicated. For additional information, refer to Specifications in the appropriate section in Group 303.
  - If it is out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



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## **Piston —to Cylinder Bore Clearance**

1. Subtract the piston diameter from the cylinder bore diameter to find the piston-to-cylinder bore clearance.
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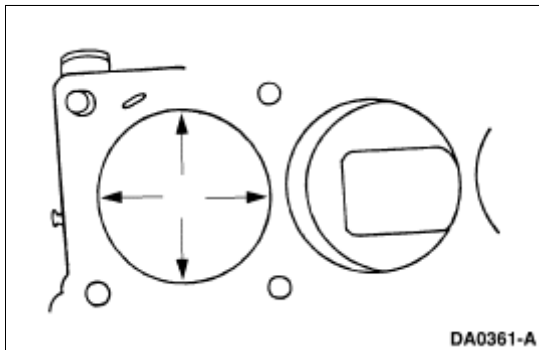
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## Piston — Selection

**NOTE:** The cylinder bore must be within the specifications for taper and out-of-round before fitting a piston.

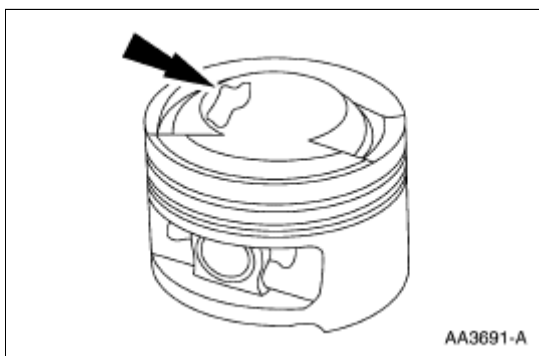
1. Select a piston size based on the cylinder bore.



2. **NOTE:** For precision fit, new pistons are divided into three categories within each size range based on their relative position within the range. A paint spot on the new pistons indicates the position within the size range.

Choose the piston with the correct paint color.

- For additional information, refer to the appropriate section in Group 303 for piston grading.



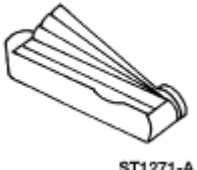


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## Piston —Ring End Gap

### Special Tool(s)

	Feeler Gauge Set 303-D027 (D81L-4201-A) or equivalent
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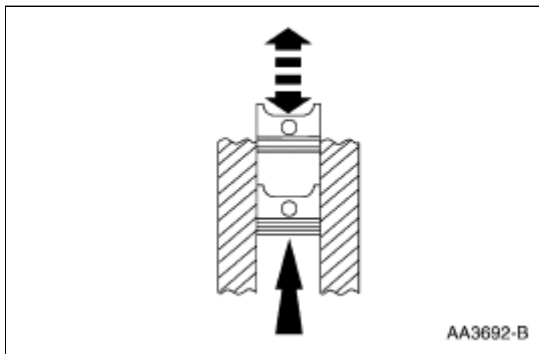
**CAUTION:** Use care when fitting piston rings to avoid possible damage to the piston ring or the cylinder bore.



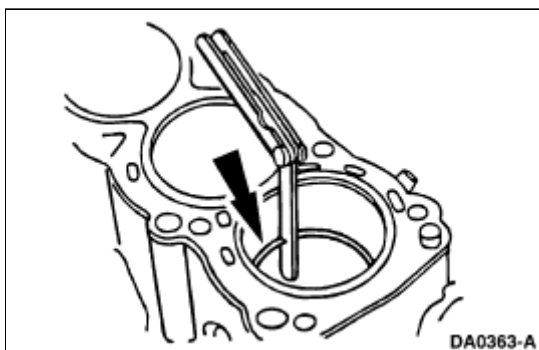
**CAUTION:** Piston rings should not be transferred from one piston to another.

**NOTE:** Cylinder bore must be within specification for taper and out-of-round.

1. Use a piston without rings to push a piston ring in a cylinder to the bottom of ring travel.



2. Use a feeler gauge to measure the top piston ring end gap and the second piston ring end gap.
  - For additional information, refer to Specifications in the appropriate section in Group 303.



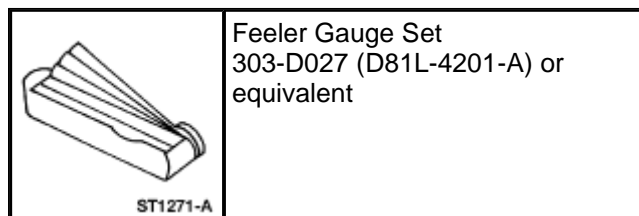


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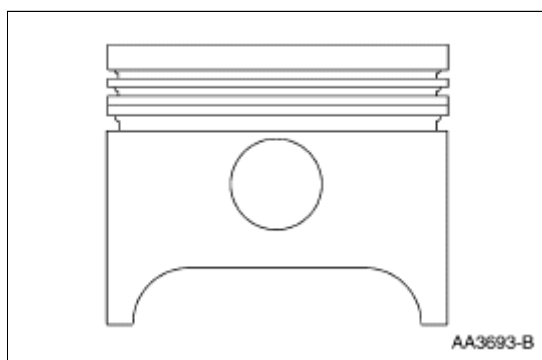
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## Piston — Ring-to-Groove Clearance

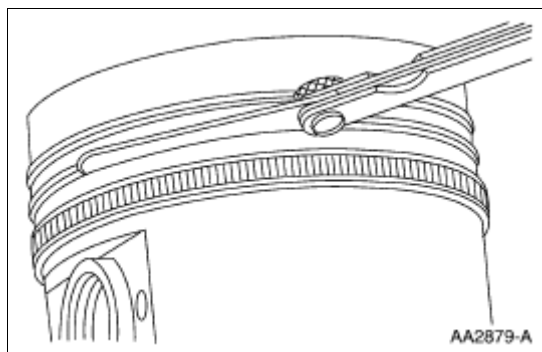
### Special Tool(s)



1. Inspect for a step in the grooves.



2. Measure the piston ring-to-groove clearance.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.







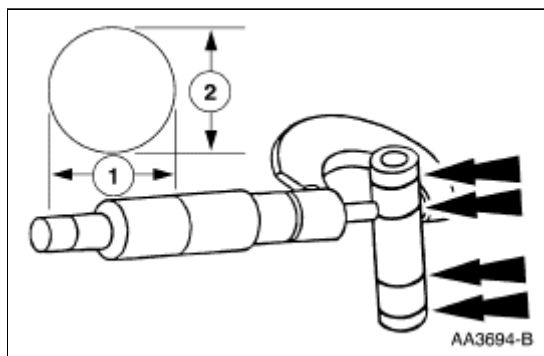
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## Piston —Pin Diameter

1. Measure the piston pin diameter in two directions at the points shown. Verify the diameter is within specification.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

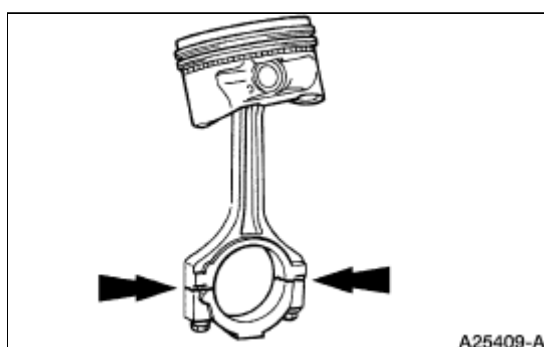


## Connecting Rod —Cleaning

1.  **CAUTION:** Do not use a caustic cleaning solution or damage to connecting rods can occur.

**NOTE:** If the connecting rod large end is mechanically split or cracked to produce a unique parting face, a locking joint is produced. Parts are not interchangeable.

Mark and separate the parts and clean with solvent. Clean the oil passages.



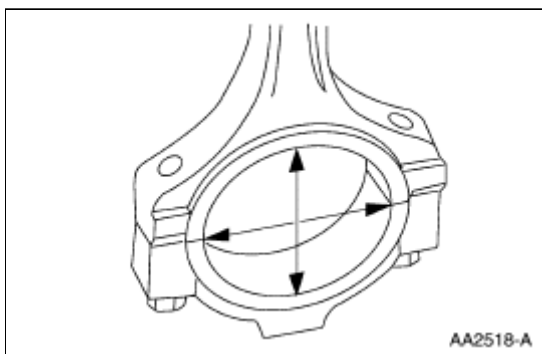
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## Connecting Rod —Large End Bore

1. Measure the bore in two directions. The difference is the connecting rod bore out-of-round. Verify the out-of-round is within specification.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



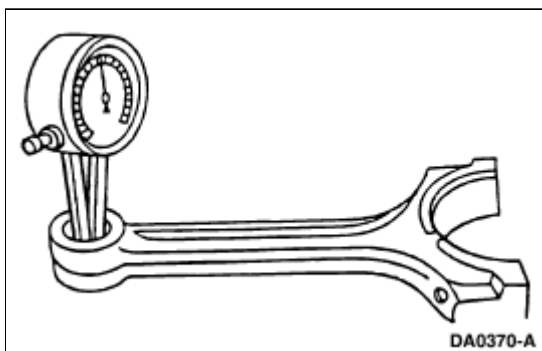
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## Connecting Rod —Bushing Diameter

1. Measure the inner diameter of the connecting rod bushing, if equipped. Verify the diameter is within specification.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



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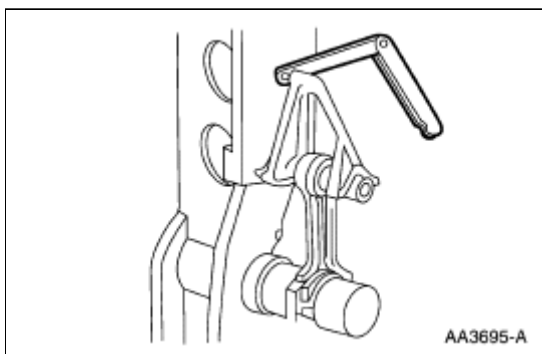
SECTION 303-00: Engine System — General Information  
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## Connecting Rod —Bend

1. Measure the connecting rod bend on a suitable alignment fixture. Follow the instructions of the fixture manufacturer. Verify the bend measurement is within specification.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



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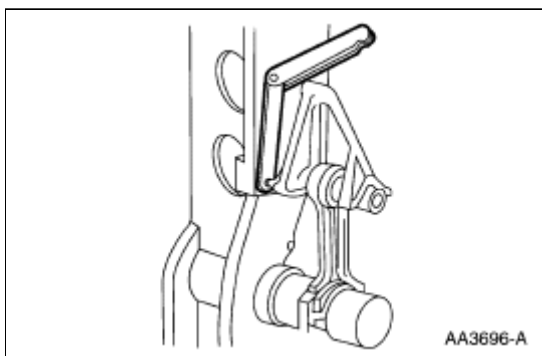
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## Connecting Rod —Twist

1. Measure the connecting rod twist on a suitable alignment fixture. Follow the instructions of the fixture manufacturer. Verify the measurement is within specification.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

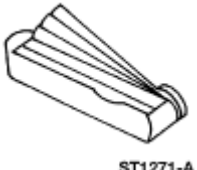


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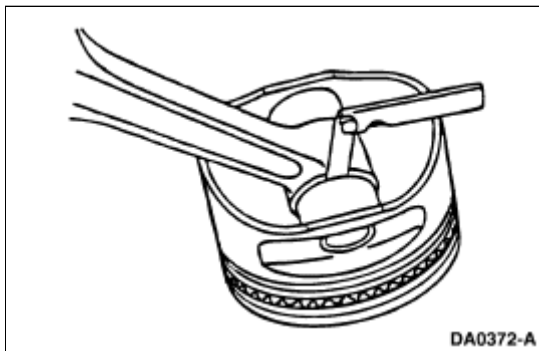
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## Connecting Rod —Piston Pin Side Clearance

### Special Tool(s)

	Feeler Gauge Set 303-D027 (D81L-4201-A) or equivalent
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1. Measure the clearance between the connecting rod and the piston. Verify the measurement is within specification.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

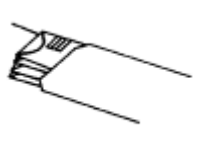






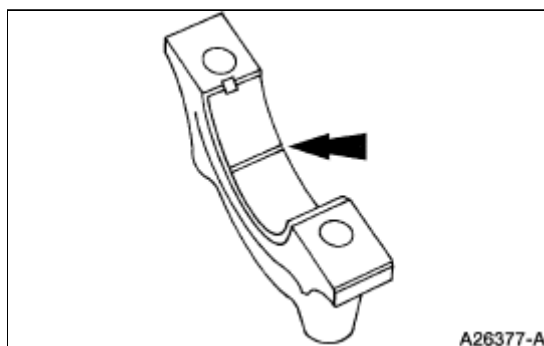
## Connecting Rod —Bearing Journal Clearance

### Special Tool(s)

 ST1280-A	Plastigage 303-D031 (D81L-6002-B) or equivalent
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**NOTE:** The crankshaft connecting rod journals must be within specifications to check the connecting rod bearing journal clearance.

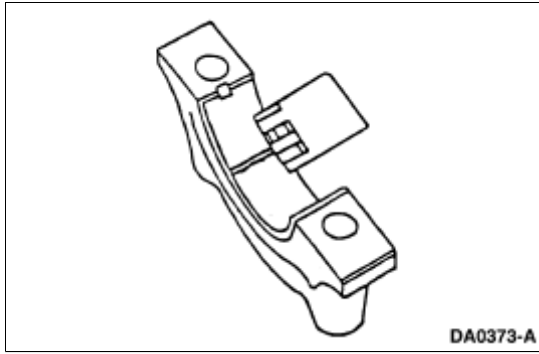
1. Remove the connecting rod bearing cap.
2. Position a piece of Plastigage across the bearing surface.



3. **NOTE:** Do not turn the crankshaft during this step.

Install and tighten to specifications, then remove the connecting rod bearing cap.

4. Measure the Plastigage to get the connecting rod bearing journal clearance. The Plastigage should be smooth and flat. A changing width indicates a tapered or damaged connecting rod or connecting rod bearing.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



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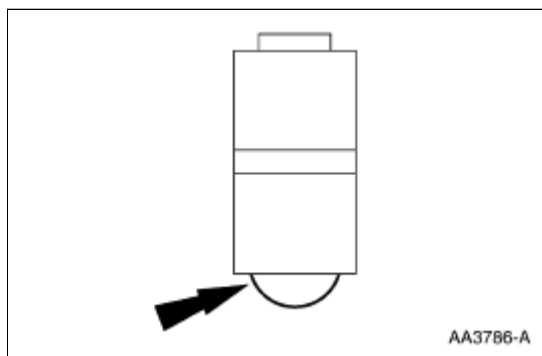
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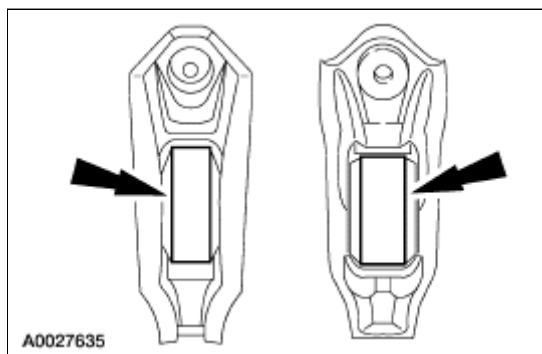
## Roller Follower — Inspection

### Push rod engines

1. Inspect the roller for flat spots or scoring. If any damage is found, inspect the camshaft lobes and valve tappet for damage.



### OHC engines





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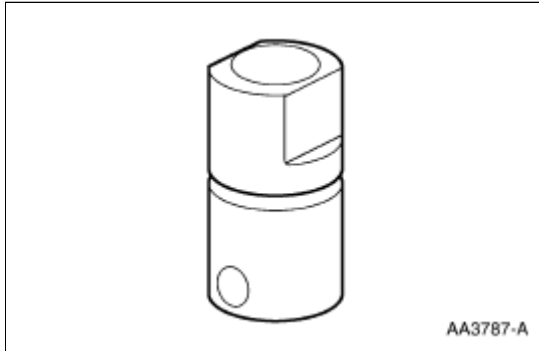
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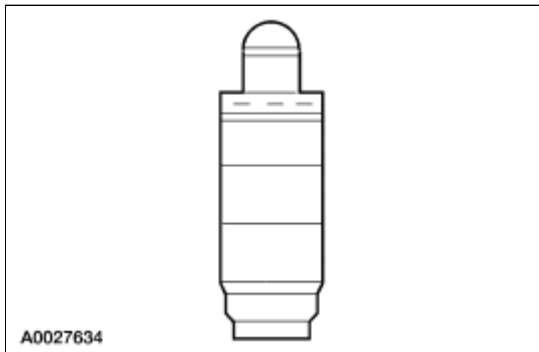
## Valve Tappet — Inspection

### Push rod engines

1. Inspect the hydraulic valve tappet and roller for damage. If any damage is found, inspect the camshaft lobes and valves for damage.



### OHC engines





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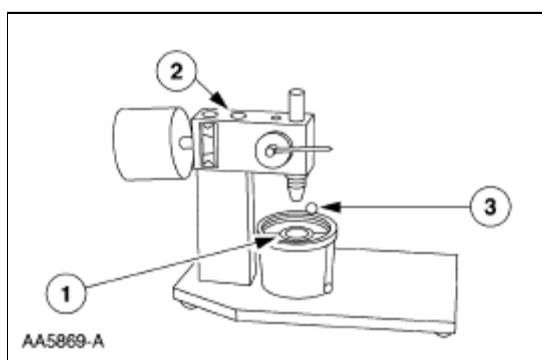
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## Valve Tappet —Leakdown Test, Hydraulic

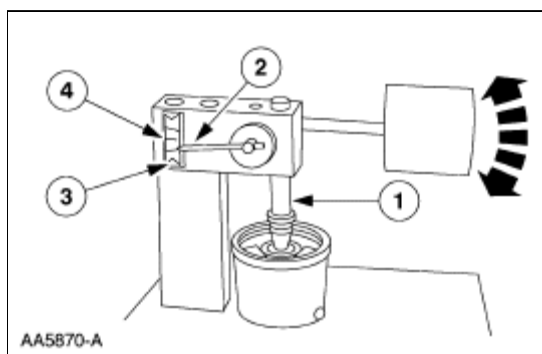
1. **NOTE:** The leakdown test will not be accurate if it is done with engine oil in the hydraulic valve tappet. Use testing fluid. New hydraulic valve tappets are already filled with testing fluid.

Compress the hydraulic valve tappet to remove the engine oil if necessary.

2. Place the (1) hydraulic valve tappet in a (2) commercially available hydraulic tappet leakdown tester. Position the (3) steel ball provided in the plunger cap. Add testing fluid to cover the hydraulic valve tappet and compress hydraulic tappet leakdown tester until the hydraulic valve tappet is filled with testing fluid.



3. Adjust the length of the (1) ram so the (2) pointer is just below the (3) Start Timing mark when the ram contacts the hydraulic valve tappet. Start timing as the pointer passes the (3) Start Timing mark and end timing as the pointer reaches the (4) center mark. For additional information, refer to the appropriate engine section in Group 303 for specifications on time parameters.







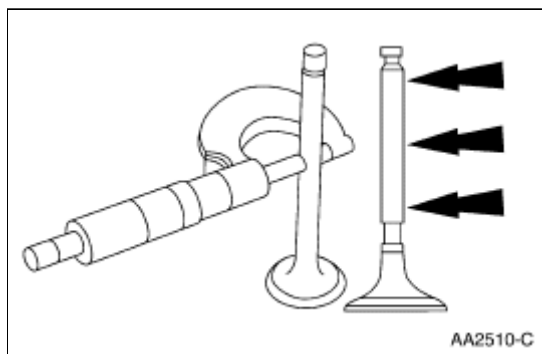
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## Valve — Stem Diameter

1. Measure the diameter of each intake and exhaust valve stem at the points shown. Verify the diameter is within specification.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.

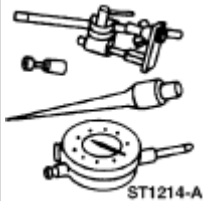
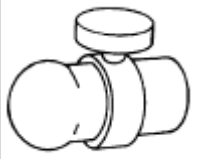


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## Valve — Stem to Valve Guide Clearance

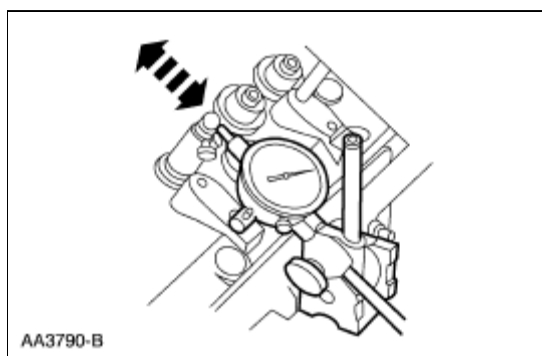
### Special Tool(s)

 ST1214-A	Dial Indicator with Bracketry 100-002 (TOOL-4201-C) or equivalent
 ST1251-A	Valve Stem Checking Tool 303-004 (TOOL-6505-E) or equivalent

**NOTE:** Valve stem diameter must be within specifications before checking valve stem to valve guide clearance.

1. **NOTE:** If necessary, use a magnetic base.

Install a Valve Stem Clearance Tool on the valve stem and install a Dial Indicator with Bracketry. Lower the valve until the Valve Stem Clearance Tool contacts the upper surface of the valve guide.



2. Move the Valve Stem Clearance Tool toward the indicator and zero the indicator. Move the Valve Stem Clearance Tool away from the indicator and note the reading. The reading will be **DOUBLE** the valve stem-to-valve guide clearance. Valves with oversize stems will need to be installed if out of specification.



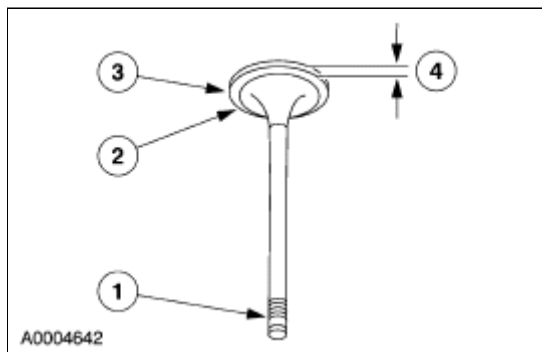
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## Valve — Inspection

1. Inspect the following valve areas:
  1. the end of the stem for grooves or scoring
  2. the valve face and the edge for pits, grooves or scores
  3. the valve head for signs of burning, erosion, warpage and cracking
  4. the valve margin for wear



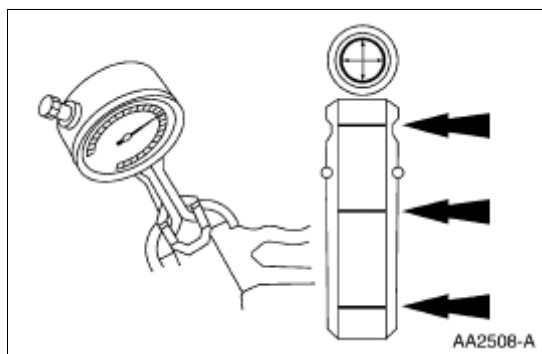
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### Valve —Guide Inner Diameter

1. Measure the inner diameter of the valve guides in two directions where indicated.
  - For additional information, refer to Specifications in the appropriate section in Group 303.



2. If the valve guide is not within specifications, ream the valve guide and install a valve with an oversize stem or remove the valve guide and install a new valve guide.
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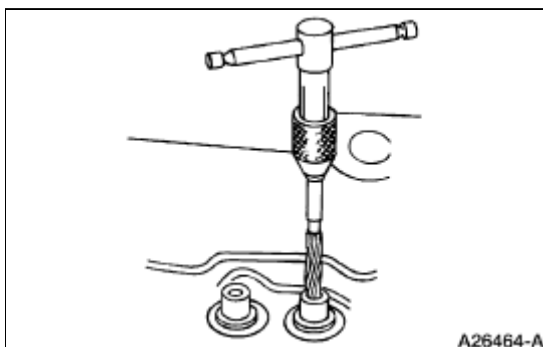
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### Valve —Guide Reaming

1. Use a hand-reaming kit to ream the valve guide.



2. Reface the valve seat.
  3. Clean the sharp edges left by reaming.
-

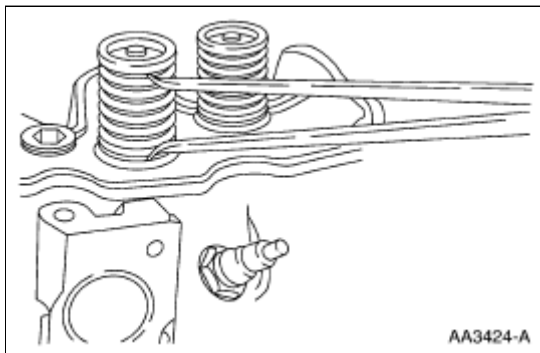
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## Valve —Spring Installed Length

1. Measure the installed length of each valve spring.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components. Refer to the appropriate section in Group [303](#) for the procedure.





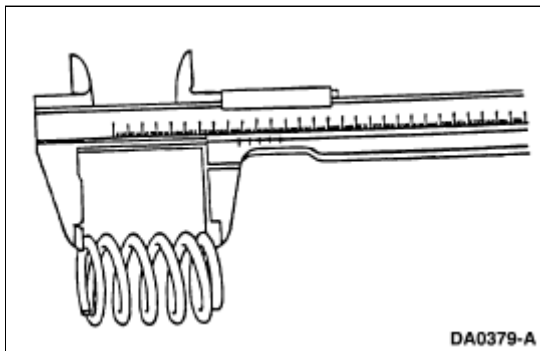
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## Valve —Spring Free Length

1. Measure the free length of each valve spring.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.



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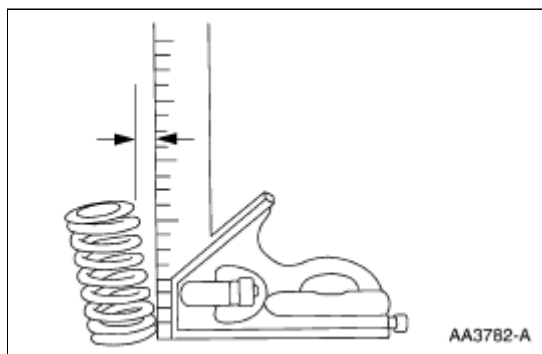
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## Valve —Spring Squareness

1. Measure the out-of-square on each valve spring.
  - Turn the valve spring and observe the space between the top of the valve spring and the square. Install a new valve spring if out of square. Refer to the appropriate section in Group [303](#) for the procedure.

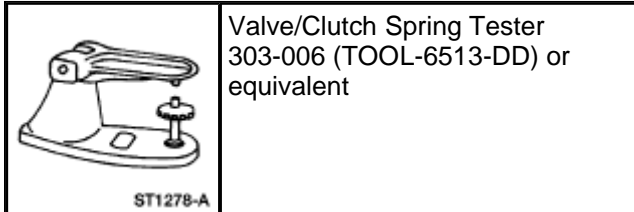


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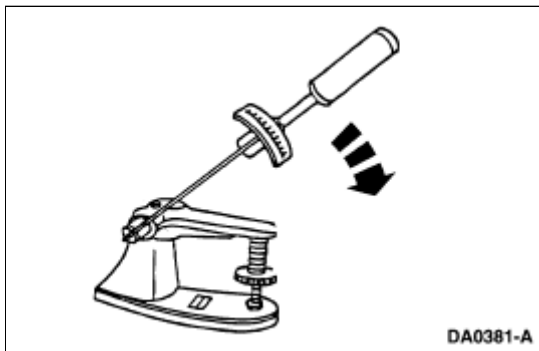
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## Valve —Spring Strength

### Special Tool(s)



1. Use a Valve/Clutch Spring Tester to check the valve spring for correct strength at the specified valve spring length.
  - For additional information, refer to Specifications in the appropriate section in Group 303.
  - If out of specification, install new components as necessary. Refer to the appropriate section in Group [303](#) for the procedure.





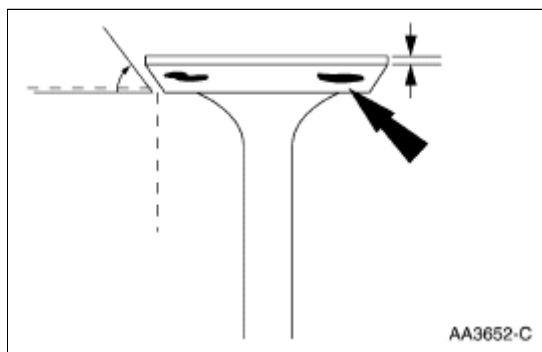
## Valve —Seat Inspection

### Valve and Seat Refacing Measurements



**CAUTION:** After grinding valves or valve seats, check valve clearance.

1. Check the valve head and seat.
  - Check valve angles.
  - Check margin width.
  - Refer to the appropriate section in Group [303](#) for the procedure.
  - Be sure margin width is within specification.



2. Inspect for abnormalities on the valve face and seat.

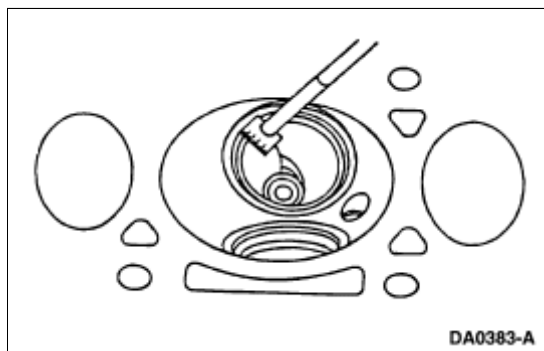
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## Valve —Seat Width

1. Measure the valve seat width. If necessary, grind the valve seat to specification.
  - Measure the intake valve seat width.
  - Measure the exhaust valve seat width.
  - Recheck the valve spring installed length after the seats have been ground, and shim the valve springs as necessary to achieve the correct installed spring length.
  - Refer to the appropriate section in Group [303](#) for the procedure.



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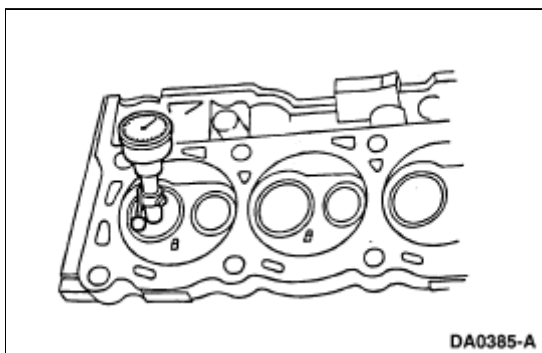
*SECTION 303-00: Engine System — General Information*  
**GENERAL PROCEDURES**

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*2000 Explorer/Mountaineer Workshop Manual*

## **Valve —Seat Runout**

1. Use the Valve Seat Runout Gauge to check valve seat runout.




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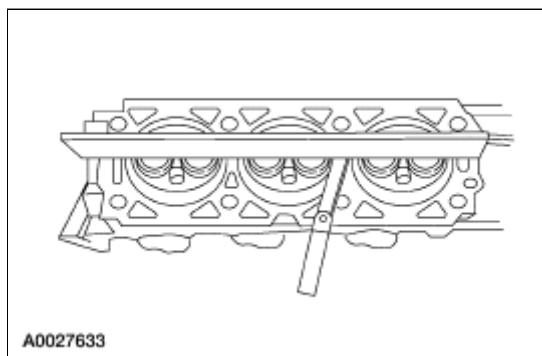
2000 Explorer/Mountaineer Workshop Manual

## Cylinder Head —Distortion

### Special Tool(s)

 ST1246-A	Straight Edge 303-D039 (D83L-4201-A) or equivalent
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1. Use a straight edge and a feeler gauge to inspect the cylinder head for flatness. If the cylinder head is distorted, install a new cylinder head.






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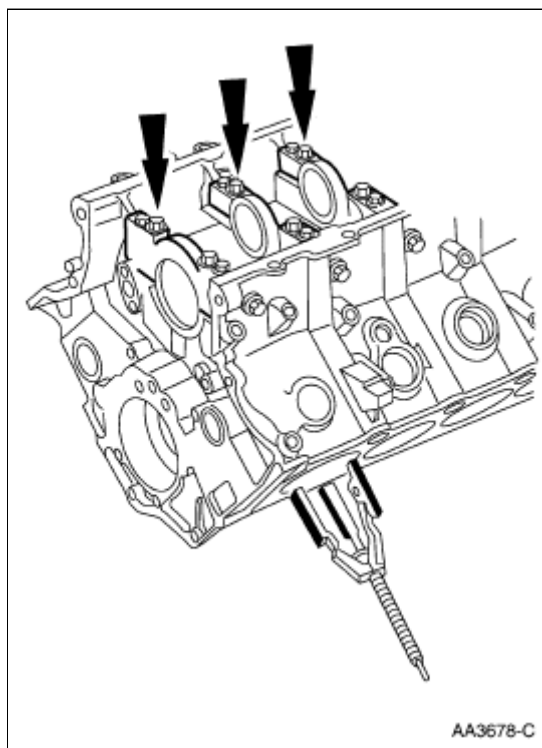
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## Cylinder Bore —Honing

### Special Tool(s)

	Engine Cylinder Hone Set 303-S084 (T73L-6011-A) or equivalent
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1. Install and tighten all main bearing caps to specification. For additional information, refer to Specifications in the appropriate section in Group 303.

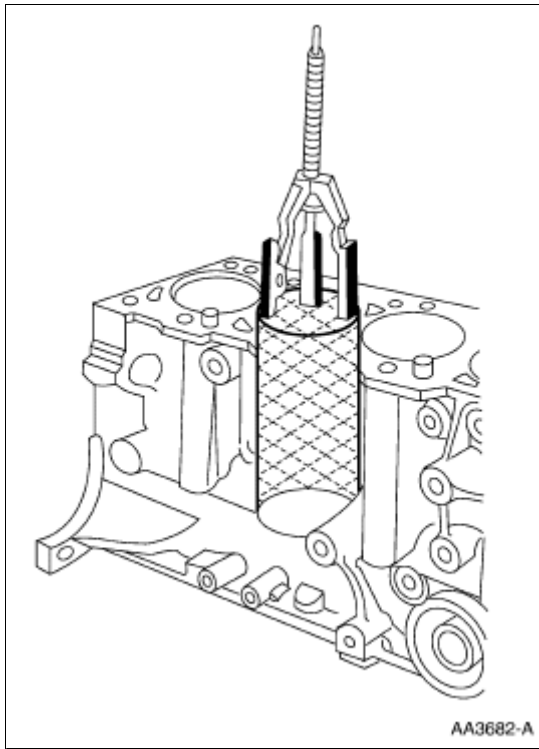


2. **NOTE:** To correct taper or out-of-round, bore the cylinder block.

**NOTE:** Honing should be done when fitting new piston rings and to remove glazed surface finish.

Hone with the Engine Cylinder Hone Set, at a speed of 300-500 rpm and a hone grit of 180-220 to provide the desired cylinder bore surface finish of 18-38AA.

- For additional information, refer to the appropriate section in Group 303 for base strokes per minute specification.



## Cylinder Bore —Cleaning

1.  **CAUTION:** If these procedures are not followed, rusting of the cylinder bores may occur.

Clean the cylinder bores with soap or detergent and water.

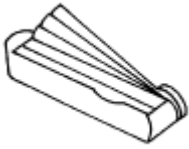

2. Thoroughly rinse with clean water and wipe dry with a clean, lint-free cloth.
  3. Use a clean, lint-free cloth and lubricate the cylinder bores.
    - Use Super Premium SAE Motor Oil meeting Ford specification.
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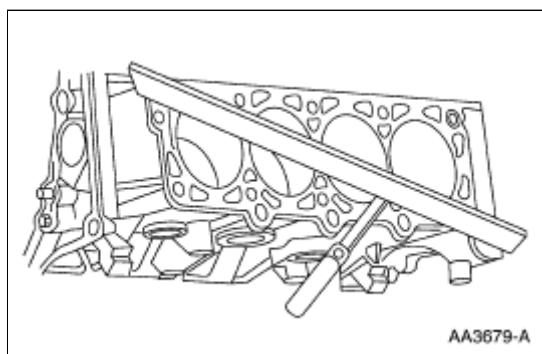
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## Cylinder Block —Distortion

### Special Tool(s)

 ST1271-A	Feeler Gauge Set 303-D027 (D81L-4201-A) or equivalent
 ST1246-A	Straightedge 303-D039 (D83L-4201-A) or equivalent

1. Use a straightedge and a feeler gauge to inspect the cylinder block for flatness. If the cylinder block is distorted, resurface the cylinder block within specification.






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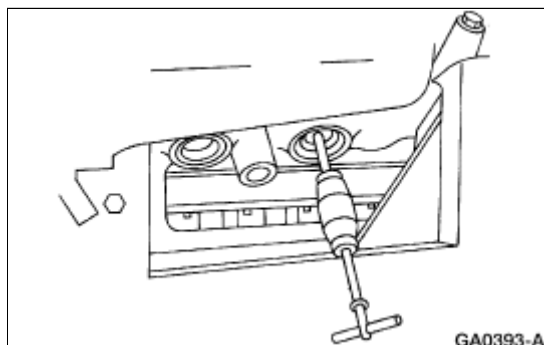
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## Cylinder Block —Core Plug Replacement

### Special Tool(s)

 ST1185-A	Impact Slide Hammer 100-001 (T50T-100-A)
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1. Use a slide hammer or tools suitable to remove the cylinder block core plug.



2. Inspect the cylinder block plug bore for any damage that would interfere with the correct sealing of the plug. If the cylinder block plug bore is damaged, bore for the next oversize plug.
3. **NOTE:** Oversize plugs are identified by the OS stamped in the flat located on the cup side of the plug.

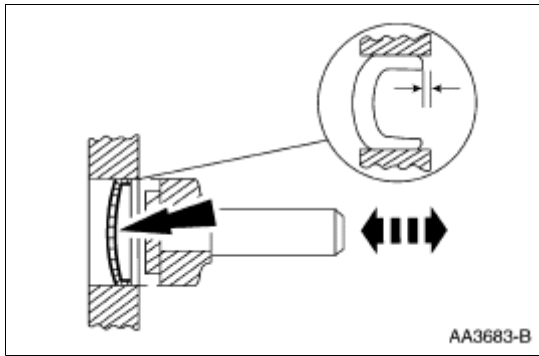
Coat the cylinder block core plug and bore lightly with Threadlock 262 E2FZ-19554-B or equivalent meeting Ford specification WSK-M2G351-A6 and install the cylinder block core plug.

### Cup-Type


4.  **CAUTION:** Use care during this procedure so as not to disturb or distort the cup sealing surface.

 **CAUTION:** When installed, the flanged edge must be below the chamfered edge of the bore to effectively seal the bore.

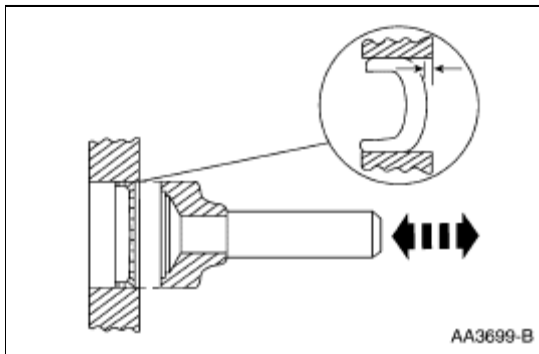
Use a tool suitable to seat the cup-type cylinder block core plug.



### Expansion-Type

1.  **CAUTION:** Do not contact the crown when installing an expansion-type cylinder block core plug. This could expand the plug before seating and result in leakage.

Use tool suitable to seat the expansion-type cylinder block core plug.


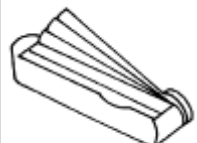



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## Spark Plug — Thread Repair

### Special Tool(s)

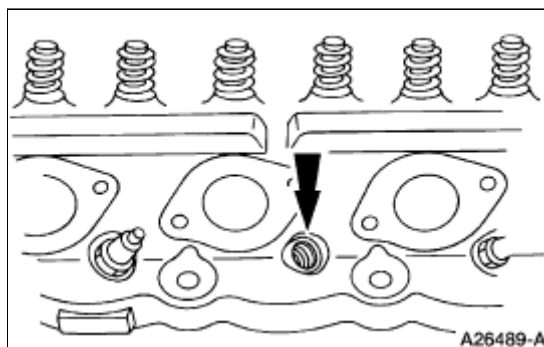
 ST1281-A	Sav-A-Thread Master Kit 107-R0921 or equivalent
 ST1271-A	Feeler Gauge Set 303-D027 (D81L-4201-A) or equivalent

 **CAUTION:** The cylinder head must be removed from the engine before installing a tapersert. If this procedure is done with the cylinder head on the engine, the cylinder walls can be damaged by metal chips produced by the thread cutting process.

 **CAUTION:** Do not use power or air-driven tools for installing taperserts.

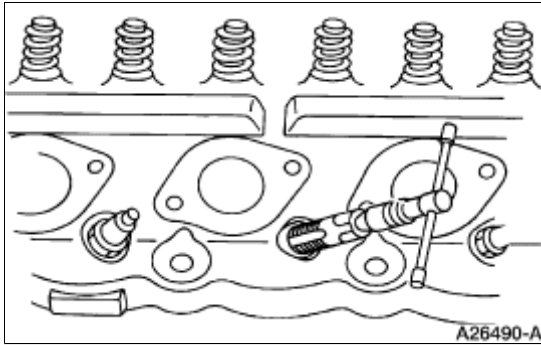
**NOTE:** This repair is permanent and will have no effect on cylinder head or spark plug life.

1. Clean the spark plug seat and threads.

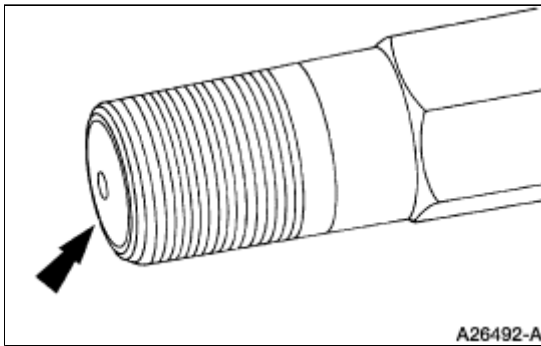


2. Start the tap into the spark plug hole, being careful to keep it correctly aligned. As the tap begins to cut new threads, apply aluminum cutting oil.



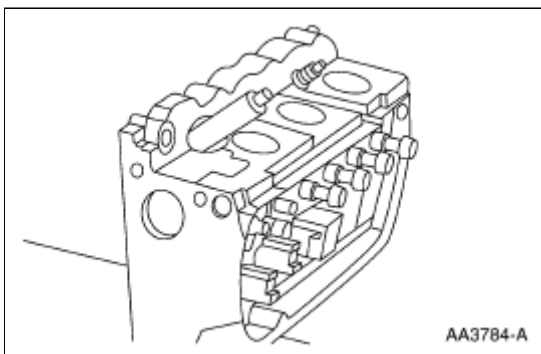


3. Continue cutting the threads and applying oil until the stop ring bottoms against the spark plug seat.
4. Remove the tap and metal chips.
5. Coat the threads of the mandrel with cutting oil.

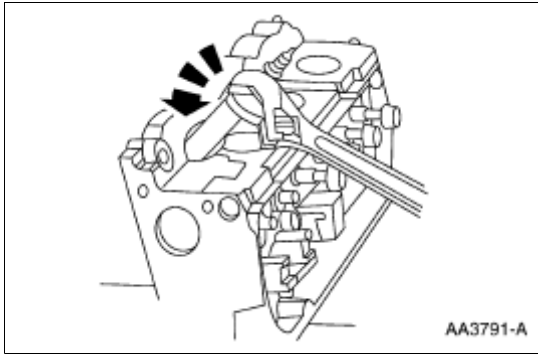


6. Thread the tapersert onto the mandrel until one thread of the mandrel extends beyond the tapersert.
7. **NOTE:** A correctly installed tapersert will be either flush with or 1.0 mm (0.039 inch) below the spark plug gasket seat.

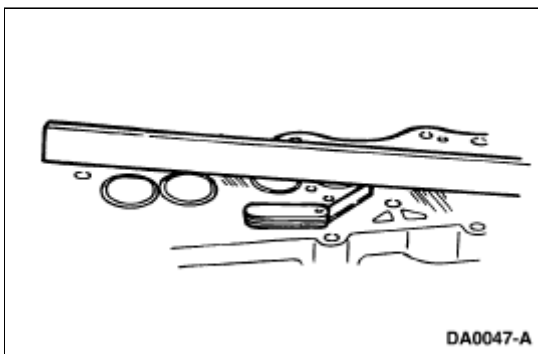
Tighten the tapersert into the spark plug hole.



8. Turn the mandrel body approximately one-half turn counterclockwise and remove.



9. Use the Feeler Gauge and a suitable straightedge to check for cylinder head flatness.
- Refer to the appropriate section in Group [303](#) for the procedure.



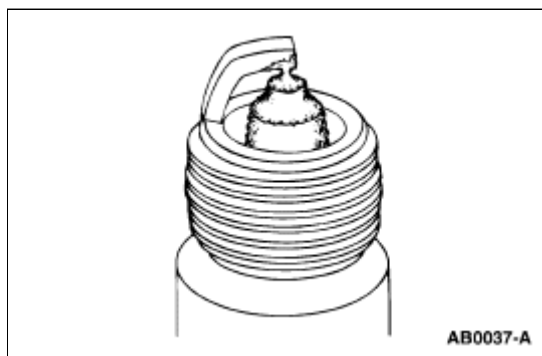
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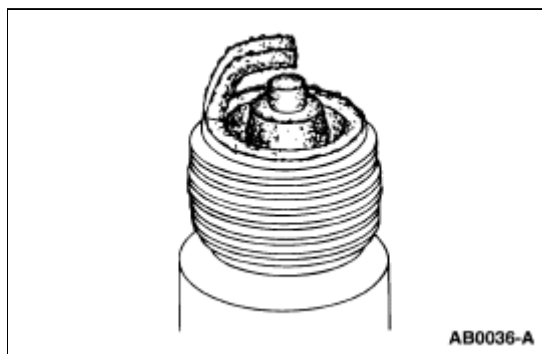
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## Spark Plug — Inspection

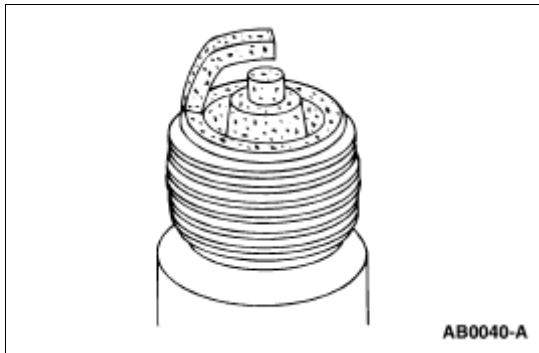
1. Inspect the spark plug for a bridged gap.
  - Check for deposit build-up closing the gap between the electrodes. Deposits are caused by oil or carbon fouling.
  - Clean the spark plug.



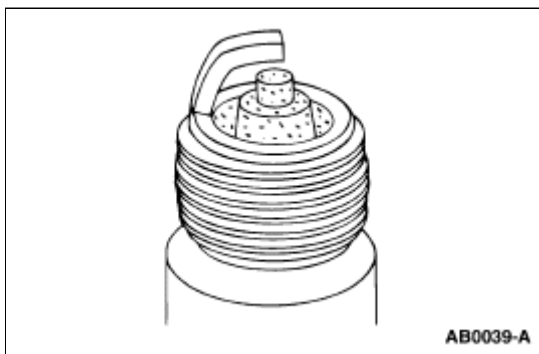
2. Check for oil fouling.
  - Check for wet, black deposits on the insulator shell bore electrodes, caused by excessive oil entering the combustion chamber through worn rings and pistons, excessive valve-to-guide clearance or worn or loose bearings.
  - Correct the oil leak concern.
  - Install a new spark plug.



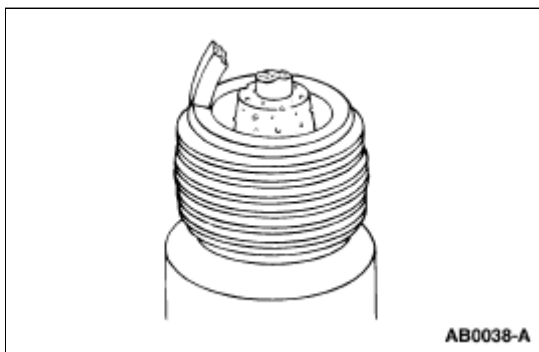
3. Inspect for carbon fouling. Look for black, dry, fluffy carbon deposits on the insulator tips, exposed shell surfaces and electrodes, caused by a spark plug with an incorrect heat range, dirty air cleaner, too rich a fuel mixture or excessive idling.
  - Clean the spark plug.



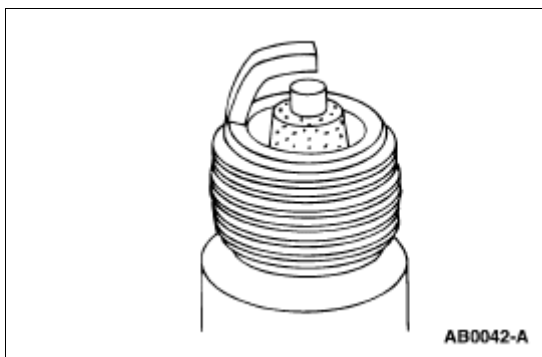
4. Inspect for normal burning.
  - Check for light tan or gray deposits on the firing tip.



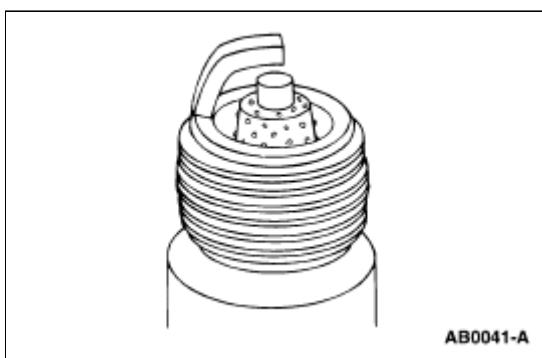
5. Inspect for pre-ignition, identified by melted electrodes and a possibly damaged insulator. Metallic deposits on the insulator indicate engine damage. This may be caused by incorrect ignition timing, wrong type of fuel or the installation of a heli-coil insert in place of the spark plug threads.
  - Install a new spark plug.



6. Inspect for overheating, identified by a white or light gray spots and with bluish-burnt appearance of electrodes. This is caused by engine overheating, wrong type of fuel, loose spark plugs, spark plugs with an incorrect heat range, low fuel pump pressure or incorrect ignition timing.
  - Install a new spark plug.



7. Inspect for fused deposits, identified by melted or spotty deposits resembling bubbles or blisters. These are caused by sudden acceleration.
- Clean the spark plug.




SECTION 303-00: Engine System — General Information  
GENERAL PROCEDURES

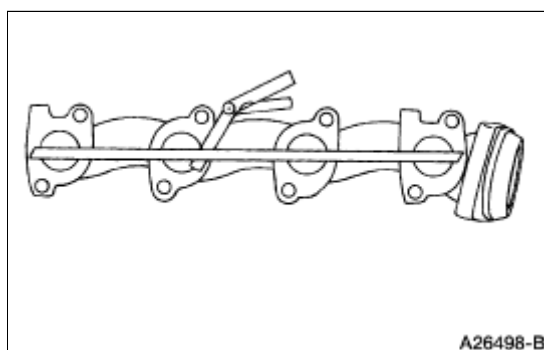
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## Exhaust Manifold — Inspection

### Special Tool(s)

 ST1246-A	Straight Edge 303-D039 (D83L-4201-A) or equivalent
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1. Place a Straight edge across the exhaust manifold flanges and check for warping with a feeler gauge.



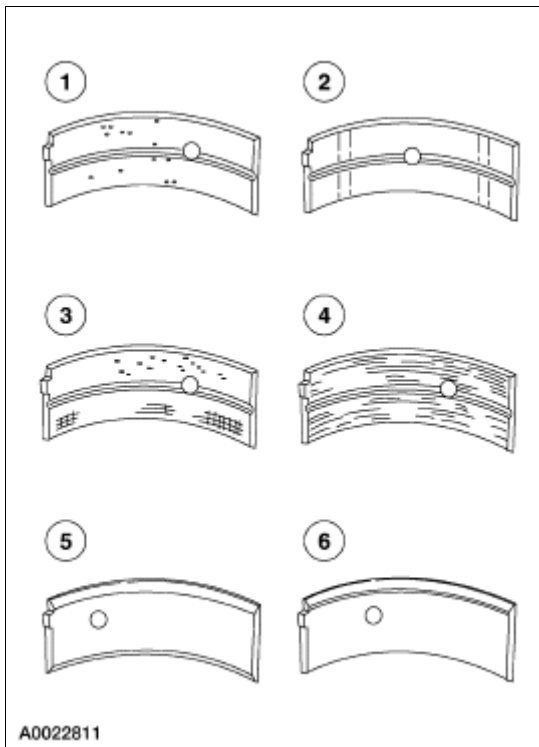
SECTION 303-00: Engine System — General Information  
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## Bearing — Inspection

1. Inspect bearings for the following defects. Possible causes are shown:
  1. cratering—fatigue failure
  2. spot glazing—improper seating
  3. scratching—dirty
  4. base exposed—poor lubrication
  5. both edges worn—journal damaged
  6. one edge worn—journal tapered or bearing not seated







SECTION 303-01A: Engine — 4.0L Push Rod  
SPECIFICATIONS

2000 Explorer/Mountaineer Workshop Manual

**General Specifications**

Item	Specification
<b>4.0L (push rod)</b>	
Displacement L (CID)	4.0L (244)
Number of cylinders	6
Bore mm (inch)	100.4 (3.9527)
Stroke mm (inch)	84.4 (3.31)
Firing order	1-4-2-5-3-6
Minimum oil pressure at 2,000 rpm (engine at normal operating temperature) kPa (psi)	103 (15)
<b>Cylinder Head and Valve Train</b>	
Combustion chamber volume (cc)	46.34-48.34
Valve guide bore diameter mm (inch)	8.062-8.087 (0.317-0.318)
Valve arrangement front to rear	LH=I-E-I-E-I-E RH=E-I-E-I-E-I
Head gasket surface flatness mm (inch)	a
Head gasket surface finish rms	60-150
<b>Valve Seat</b>	
Width mm (inch)	1.697-2.263 (0.067-0.089)
Angle degrees	45
Runout TIR maximum mm (inch)	0.038 (0.0014)
<b>Valves</b>	
Intake exhaust mm (inch)	8.025-8.043 (0.3159-0.3167) 7.999-8.017 (0.3149-0.3156)
Valve stem to guide clearance exhaust mm (inch)	0.021-0.064 (0.0008-0.0025)
Valve stem to guide clearance intake mm (inch)	0.046-0.089 (0.0018-0.0035)
Head diameter intake mm (in)	4.35 (1.71)
Head diameter exhaust mm (in)	34.5 (1.36)
Valve face angle degrees	44
Valve face runout limit mm (inch)	0.051 (0.002)
<b>Valve Rocker Arm Shaft, Push Rods and Tappets</b>	
Push rod runout TIR maximum mm (inch)	0.508 (0.020)

Tappet diameter mm (inch)	22.205-22.238 (0.8742-0.8755)
Tappet to bore clearance mm (inch)	0.013-0.056 (0.0005-0.0022)
Repair limit mm (inch)	0.127 (0.005)
Hydraulic lifter leakdown rate for 1/16 inch travel	10-50 seconds
<b>Valve Springs</b>	
Intake valve spring free length mm (inch)	48.514 (1.91)
Exhaust valve spring free length mm (inch)	48.514 (1.91)
Intake valve spring assembled height mm (inch)	40.08-40.87 (1.578-1.609)
Exhaust valve spring assembled height mm (inch)	40.08-40.87 (1.578-1.609)
Valve spring out of square mm (inch)	1.98 (0.078)
Intake valve spring compression pressure at specified height (lbs)	347-383 Nm 39.86-40.4 mm 256-282 lb-ft at 1.56-1.59 in
<b>Camshaft</b>	
Intake lobe lift mm (inch)	6.92 (0.272)
Exhaust lobe lift mm (inch)	6.92 (0.272)
Maximum allowable lobe lift loss mm (inch)	0.127 (0.005)
End play mm (inch)	0.065-0.165 (0.0025 - 0.0064)
Journal to bearing clearance mm (inch)	0.025-0.076 (0.001-0.003)
Repair limit mm (inch)	0.152 (0.006)
<b>Camshaft Drive</b>	
No. 1 journal diameter mm (inch)	49.57-49.59 (1.951-1.952)
No. 2 journal diameter mm (inch)	49.21-49.23 (1.937-1.938)
No. 3 journal diameter mm (inch)	48.83-48.84 (1.9224-1.9228)
No. 4 journal diameter mm (inch)	48.44- 48.46 (1.907-1.9078)
Maximum camshaft journal runout mm (inch)	0.127 (0.005)
No. 1 bearing inside diameter mm (inch)	49.635-49.655 (1.954-1.955)
No. 2 bearing inside diameter mm (inch)	49.225-49.275 (1.939-1.940)
No. 3 bearing inside diameter mm (inch)	48.750-48.768 (1.919-1.920)
No. 4 bearing inside diameter mm (inch)	48.875-48.895 (1.924-1.925)
Front bearing location depth <sup>b</sup> mm (inch)	0.51-0.89 (0.020-0.035)
<b>Cylinder Block</b>	

Cylinder bore diameter mm (inch)	100.38-100.43 (3.9527-3.9543)
Maximum cylinder out-of-round mm (inch)	0.025 (0.0009)
Maximum cylinder taper mm (inch)	0.025 (0.0009)
Main bearing bore diameter mm (inch)	60.62-60.64 (2.3866-2.3874)
Crankshaft to rear face of block runout TIR maximum mm (inch)	0.127 (0.005)
<b>Crankshaft and Flywheel</b>	
Main bearing journal diameter mm (inch)	56.980-57.0 (2.2433-2.2441)
Main bearing journal out-of-round mm (inch)	0.015 (0.0006)
Main bearing journal runout TIR maximum mm (inch)	0.0508 (0.002)
Main bearing journal runout limit mm (inch)	0.127 (0.005)
Main bearing thrust face runout TIR maximum mm (inch)	0.0254 (0.001)
Main bearing journal taper maximum per inch mm (inch)	0.008 (0.0003 per inch)
Thrust bearing journal length mm (inch)	26.39-26.44 (1.039-1.041)
Main and rod bearing journal finish rms maximum	12 and 8.8
Main bearing thrust face finish rms maximum	20
Connecting rod journal diameter mm (inch)	53.98-54.0 (2.1252-2.1260)
Connecting rod journal maximum out-of-round mm (inch)	0.008 (0.0003)
Connecting rod journal taper per inch maximum mm (inch)	0.008 (0.0003 per inch)
Crankshaft free end play mm (inch)	0.05-0.32 (0.002-0.01250)
<b>Connecting Rod Bearings</b>	
Clearance to crankshaft mm (inch)	0.020-0.053 (0.0008-0.0020)
Bearing wall thickness mm (inch)	1.399-1.406 (0.055-0.0554)
<b>Main Bearings</b>	
Clearance to crankshaft (inch)	0.013-0.056 (0.0005-0.0022)
Bearing wall thickness mm (inch)	1.799-1.806 (0.0708-0.0711)
<b>Connecting Rod, Piston and Rings</b>	
Piston pin bore or bushing i.d. mm (inch)	23.958-23.976 (0.943-0.944)
Rod bearing bore i.d. mm (inch)	56.82-56.84 (2.237-2.238)
Rod bearing bore out-of-round mm (inch)	0.01 (0.0004)
Rod length center to center mm (inch)	145.965-146.035 (5.746-5.749)
Alignment (bore-to-bore max. diff.) twist mm (inch)	0.038 (0.0015) per 25.4 mm (1.000)
Alignment (bore-to-bore max. diff.) bend mm (inch)	0.0125 (0.0049) per 25.4 mm (1.000)
Side clearance (assembled to crank) mm (inch)	0.092-0.268 (0.0032-0.0106)
<b>Piston Pin</b>	

Length mm (inch)	72.0-72.80 (2.835-2.866)
Red Blue	23.992-23.997 (0.9446-0.9448) 23.997-24 (0.9448-0.9449)
Pin to piston clearance mm (inch)	0.008-0.0152 (0.0003-0.0006)
Pin to connecting rod clearance mm (inch)	Interference Fit
<b>Piston</b>	
Diameter - mm (inch) °	100.380-100.400 (3.952-3.953)
Piston to bore clearance mm (inch)	0.021-0.048 (0.0008-0.0019)
Pin bore diameter mm (inch)	24.007-24.013 (0.9452-0.9453)
Top ring groove width mm (inch)	1.976-1.989 (0.0778-0.0783)
Bottom ring groove width mm (inch)	2.977-2.99 (0.1172-0.1177)
Diameter—coded blue mm (inch)	100.880-100.900 (3.972)
Diameter—coded yellow mm (inch)	101.350-101.370 (3.99)
<b>Piston Rings</b>	
Top compression ring gap mm (inch)	0.381-0.584 (0.015-0.023)
Bottom compression ring gap mm (inch)	0.381-1.397 (0.015-0.055)
Oil ring gap mm (inch)	0.381-1.397 (0.015-0.055)
Top compression ring width mm (inch)	1.578-1.59 (0.062)
Bottom compression ring width mm (inch)	1.728-1.74 (0.068-0.069)
Top compression side clearance mm (inch)	0.050-0.082 (0.001-0.003)
Bottom compression side clearance mm (inch)	0.050-0.082 (0.001-0.003)
<b>Lubrication System</b>	
Relief valve spring pressure lbs. at 35.3 lbs. (1.39 inch)	61.3-66.3 Nm (45.100-48.730 lb/ft)
Driveshaft to housing clearance mm (inch)	0.002-0.0031 (0.001)
Relief valve to housing clearance mm (inch)	0.0015-0.003 (0.0001)
Rotor assembly end clearance max. mm (inch)	0.0014-0.0044 (0.00015)
Outer race to end clearance mm (inch)	0.006-0.012 (0.0002-0.005)
Engine oil capacity liters (quarts) with oil filter	4.7 (5)
<b>Lubricant</b>	
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or DSP	WSS-M2C153-G
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A	ESE-M1C171-A
<b>Sealer</b>	

Threadlock 262 E2FZ-19554-B	WSK-M2G351-A6
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Pipe Sealant With Teflon® D8AZ-19554-A	WSK-M2G350-A2 and ESR-M18P7-A
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

<sup>a</sup> 0.079 mm (in) (0.003 inch) in any 6 inches—0.16 mm (in) (0.06 inch) overall

<sup>b</sup> distance in inches that the front edge of the bearing is installed below the front face of the cylinder block

<sup>c</sup> Measured 56 mm (2.205 inch) from the piston dome at 90 degrees to the pin

### Torque Specifications

Description	Nm	lb-ft	lb-in
Oil filter adapter bolt	57	42	—
Water pump to front cover bolts and studs	8.5-12	6-9	—
Engine front cover bolts and studs	17-21	13-15	—
Timing chain guide bolts	13	10	—
Timing chain tensioner bolts	10	—	89
Camshaft sprocket bolt	64	47	—
Rocker arm shaft bolts <sup>a</sup>	a	a	a
Valve cover bolts <sup>a</sup>	a	a	a
Ignition coil nuts	6	—	53
Oil filter	13	10	—
Upper intake manifold nuts	23	17	—
Wiring harness retainer nuts	15	11	—
EGR valve to exhaust manifold tube nut	40	30	—
EGR outlet tube bracket nut	47	35	—
EGR valve bolts	25	18	—
Camshaft thrust plate bolts	11	8	—
Oil pan bolts and nuts	8	—	71
Oil pump screen cover bolts	11	8	—
Oil pump bolts	18	13	—
Connecting rod bearing cap nuts <sup>a</sup>	a	a	a
Crankshaft main bearing cap bolts <sup>a</sup>	a	a	a
Crankshaft oil baffle nuts	19	15	—
Cylinder head bolts <sup>a</sup>	a	a	a
Lower intake manifold bolts <sup>a</sup>	a	a	a
Flywheel bolt <sup>a</sup>	a	a	a
Crankshaft pulley bolt <sup>a</sup>	a	a	a

Crankshaft position sensor	9-12	—	80-106
Exhaust manifold to cylinder head bolts	20-25	15-18	—
Water pump pulley bolts	22-28	17-20	—
Thermostat housing bolts	25	18	—
Generator mounting bracket bolts	40-55	30-40	—
A/C compressor mounting bracket brace bolts	47	35	—
A/C manifold tube bolt	20	15	—
Spark plugs	20	15	—
Transmission cooler line bracket bolts.	13-17	10-12	—
Engine insulator mount nuts (lower)	90	66	—
Fuel injection supply manifold studs	15	11	—
Oil level indicator tube nut	25	18	—
Engine wire harness bulkhead connector bolt	10-12	—	89-106
Bell housing bolts	40-55	30-40	—
Battery cable bracket bolt	15	11	—
Bulkhead connector bolt	6	—	53
Engine ground wire bolt	10	—	89
PCM connector bolt	6	—	53
Engine harness ground	10	—	89
Oil pressure sensor	20	15	—
Engine insulator mount nuts (upper)	88-132	65-97	—
Cylinder identification sensor screws	2.5-3.5	—	23-30
Exhaust manifold-to-exhaust inlet crossover pipe bolts	40	30	—
Oil pan drain plug	26	19	—
Oil filter adapter bolt	55-60	41-44	—
Torque converter mounting nuts	35	26	—
Front driveshaft CV joint bolts	30	22	—
Axle-to-frame bolts	70	52	—

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

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SECTION 303-01A: Engine — 4.0L Push Rod  
DESCRIPTION AND OPERATION

2000 Explorer/Mountaineer Workshop Manual

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## Engine

The compact Ford 60 degree 4.0L V-6 engine:

- is of lightweight, cast iron construction.
- has a precision-molded cast iron crankshaft.
- has replaceable aluminum/tin alloy crankshaft main bearing.
- has replaceable copper alloy camshaft bearing and connecting rod bearing.
- has forged-steel connecting rods.
- uses a distributorless ignition system.

### Engine Identification

For quick identification, refer to the vehicle control information decal mounted under the hood:

- The decal lists information needed for repairing. For additional information, refer to [Section 100-01](#).

An engine identification label is attached to the engine:

- It identifies each engine for determining parts usage.
- It identifies the engine displacement.
- It identifies the model year. For additional information, refer to [Section 100-01](#).

### Emission Calibration Label

**NOTE:** It is critical that the engine codes and the calibration number are known when ordering parts or making inquiries.

The emission calibration label is located on the radiator support:

- It identifies the engine calibration number.
- It identifies the engine code number and the revision level.

### Exhaust Emission Control System

Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

### Induction System

1. The air/fuel mixture needed by the engine is provided by the sequential electronic fuel injection system.
2. Fuel:
  - is supplied from the fuel tank by a fuel pump.
  - is filtered into the fuel injection supply manifold.
  - is delivered by the fuel injectors. A fuel damper is in place to prevent fluctuations in pressure caused by injector pulsation.



## Crankshaft

1. The crankshaft:
  - is supported on four steel-backed, aluminum crankshaft main bearings.
2. To provide smooth engine operation, the piston crankpins are positioned to provide a power impulse every 120 degrees of crankshaft rotation. This spacing provides quiet, smooth operation.
3. The crankshaft is connected to the camshaft by two sprockets and a timing chain, providing a 2:1 drive ratio.

## Camshaft

The camshaft:

- is supported by four camshaft bearings.
- thrust loads and end play are limited by the camshaft thrust plate.
- has a synchronizer drive gear located at the rear of the camshaft and part of the casting.

The camshaft synchronizer:

- drives the oil pump through the oil pump intermediate shaft.
- has a camshaft position (CMP) sensor is mounted on top of the camshaft synchronizer. For additional information, refer to [Section 303-14](#).

## Valve Train

The roller valve tappets:

- provide automatic lash adjustment.
- transfer up-and-down motion to the rocker arms through the push rods then the motion is delivered to the exhaust valves and the intake valves.

## Positive Crankcase Ventilation System

The engine is equipped with a positive closed type ventilation system recycling the crankcase vapors to the upper intake manifold. For additional information, refer to [Section 303-08](#).

## Engine Cooling System

The 4.0L engine is liquid cooled by:

- a centrifugal water pump driven by the crankshaft.
- a water thermostat which prevents coolant flow to the radiator until the engine is at normal operating temperature. For additional information, refer to [Section 303-03](#).

## Drive Belt System

Vehicles equipped with the 4.0L engine use a poly-v design drive belt with a self-adjusting drive belt tensioner. For additional information, refer to [Section 303-05](#).



*SECTION 303-01A: Engine — 4.0L Push Rod*  
*DIAGNOSIS AND TESTING*

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*2000 Explorer/Mountaineer Workshop Manual*

## **Engine**

Refer to [Section 303-00](#) for basic mechanical concerns or refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for driveability concerns.

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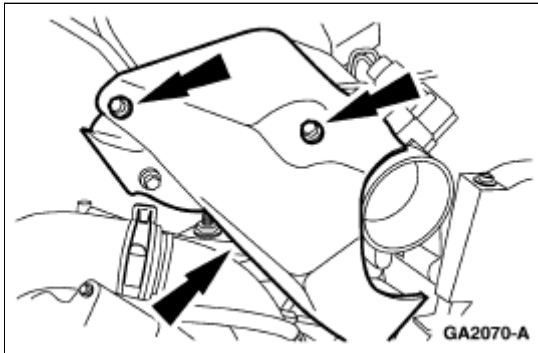
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

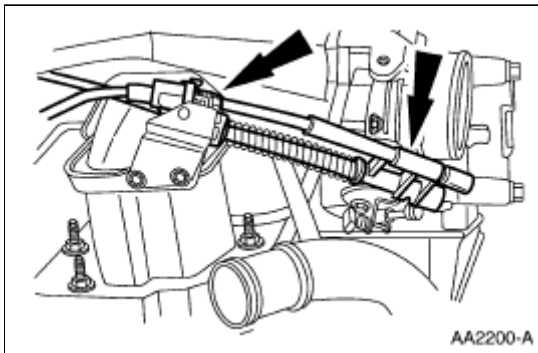
## Intake Manifold —Upper

### Removal

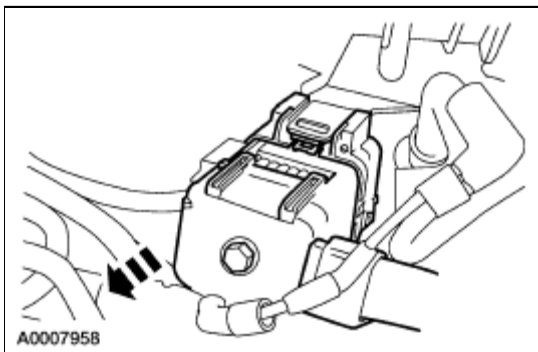
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
3. Remove the accelerator cable snow shield.



4. Disconnect the accelerator cable from the speed control actuator cable (if equipped) and position aside.

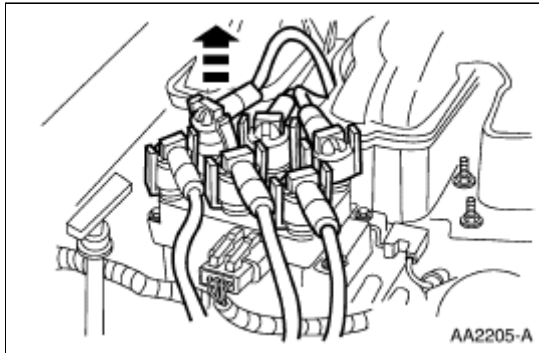


5. Loosen the bolt and slide the engine control wiring connector off the bracket.

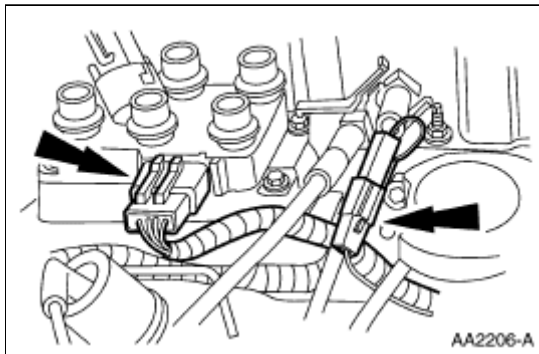


6. **NOTE:** Spark plug wires must be connected to the correct ignition coil terminal. Mark spark plug wires before removing them.

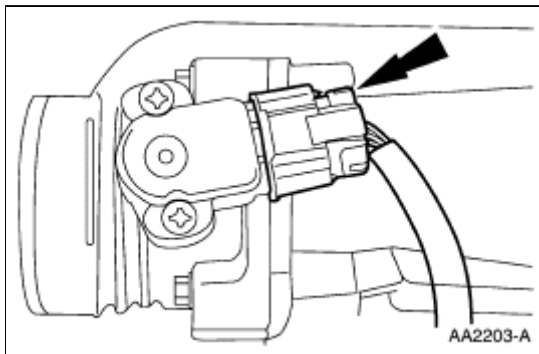
Disconnect the spark plug wires from the ignition coil.



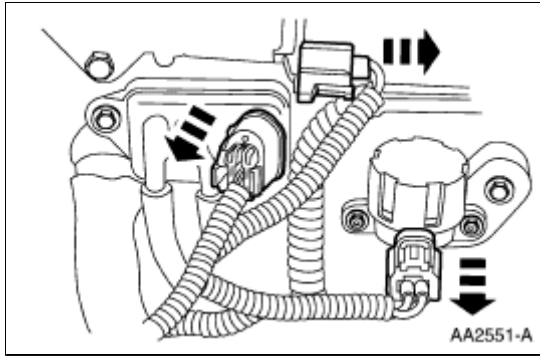
7. Disconnect the ignition coil and the radio ignition interference capacitor electrical connectors.



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

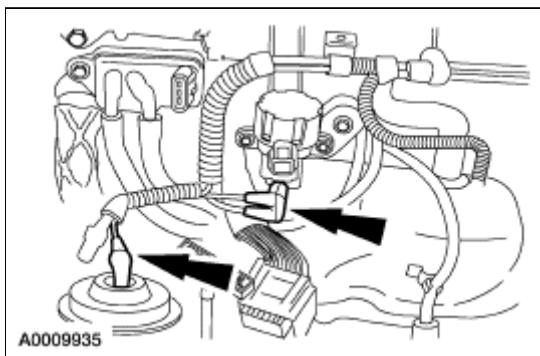


9. Disconnect the electrical connectors:
- idle air control (IAC) solenoid
  - EGR transducer
  - EGR solenoid

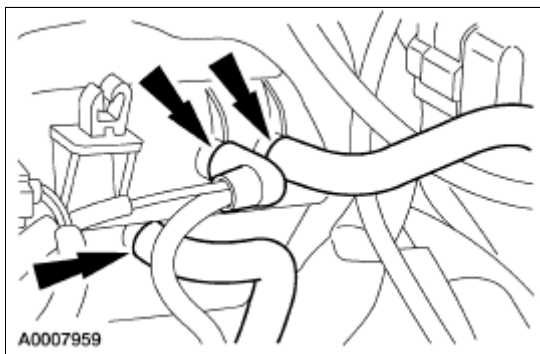


10. Disconnect the vacuum connections:

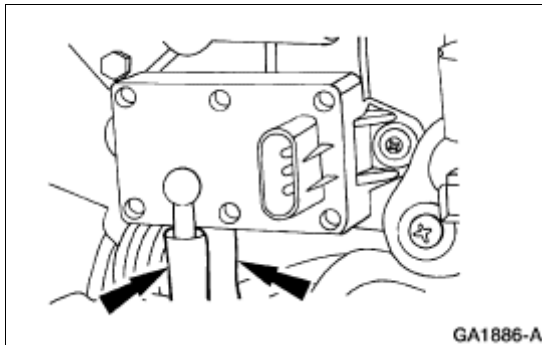
- EGR solenoid
- EGR valve



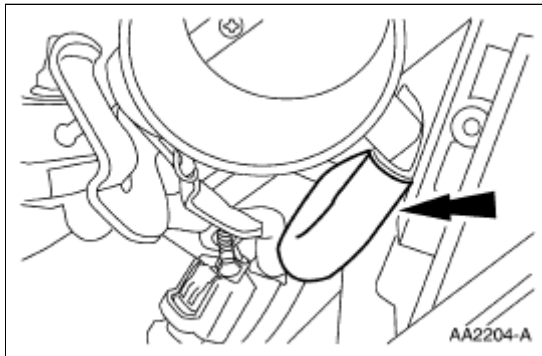
11. Disconnect the brake booster vacuum hose, the positive crankcase ventilation (PCV) hose, and the vacuum hose.



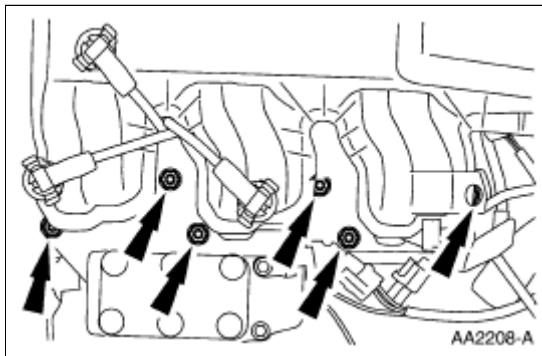
12. Disconnect the hoses from the EGR backpressure transducer.



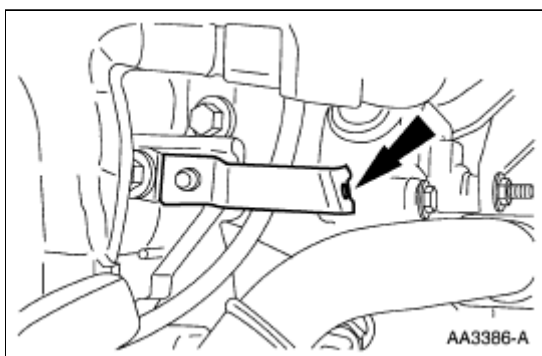
13. Disconnect the canister purge line from the throttle body.



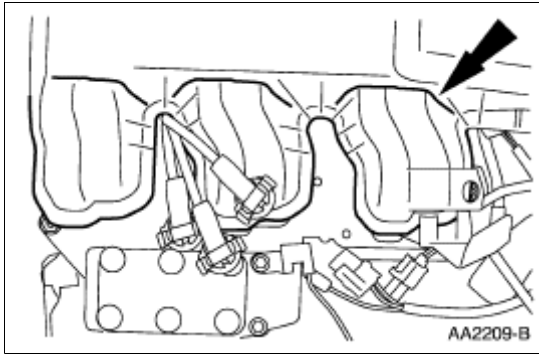
14. Remove the nuts.



15. Remove the fuel line bracket.



16. Remove the upper intake manifold and the gasket.

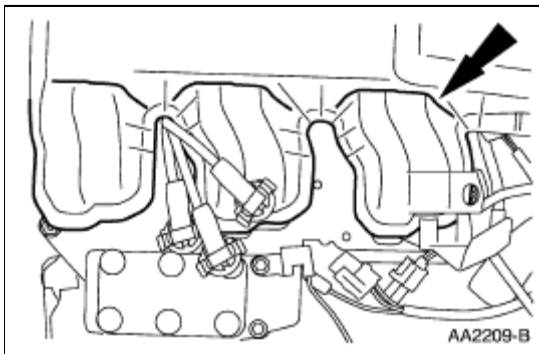


17. Inspect and install new gaskets, if necessary.

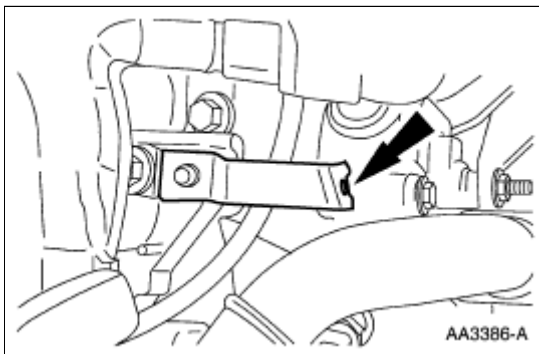
### Installation

1. **NOTE:** Before installing the upper intake manifold, the EGR port must be clean and free of obstruction. Remove carbon buildup from the EGR passages. Inspect and install new seals.

Position the upper intake manifold.

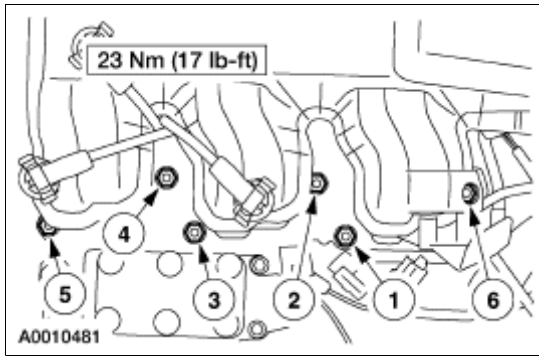


2. Position the fuel line bracket.

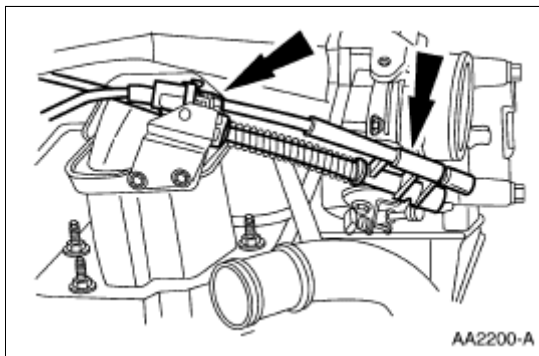


3. Install the nuts.
  - Tighten the nuts in the sequence shown.

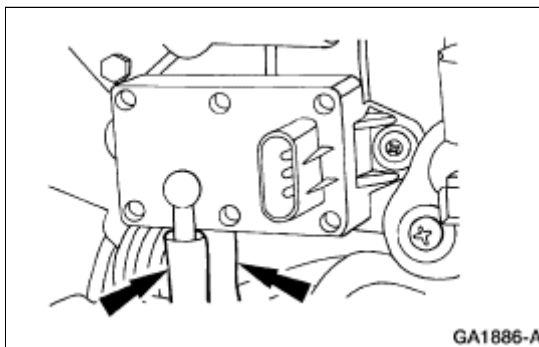




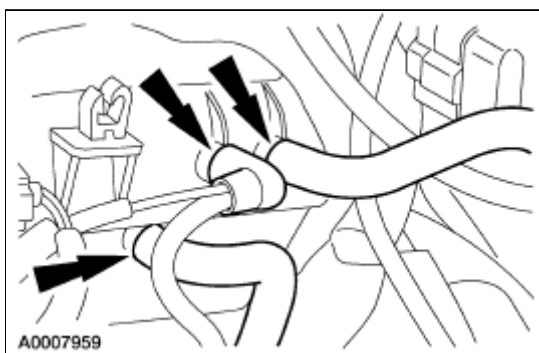
4. Connect the canister purge line from the throttle body.



5. Connect the hoses to the EGR backpressure transducer.

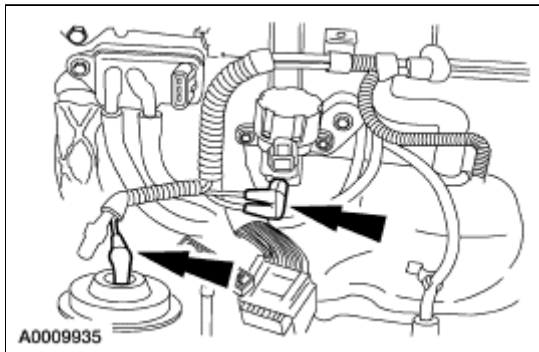


6. Connect the brake vacuum booster hose, the positive crankcase ventilation (PCV) hose and the vacuum hose.



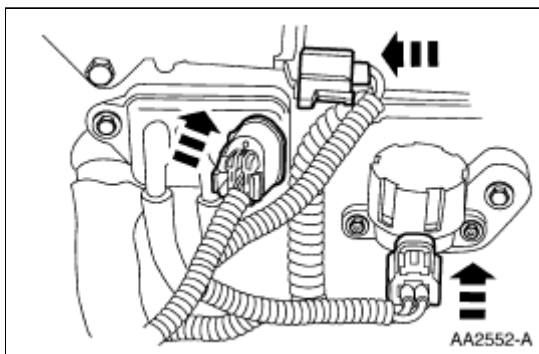
## 7. Connect the vacuum connections:

- EGR valve
- EGR solenoid

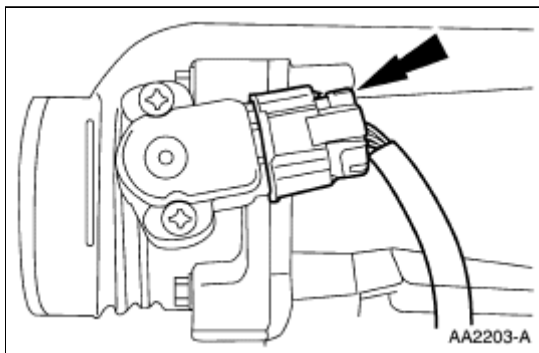


## 8. Connect the electrical connectors:

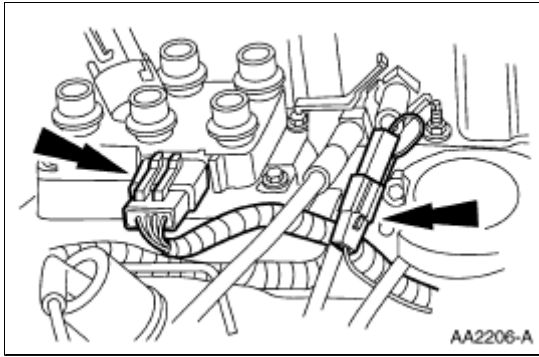
- EGR solenoid
- EGR transducer
- idle air control (IAC) solenoid



## 9. Connect the throttle position (TP) sensor electrical connector.



## 10. Connect the ignition coil and the radio ignition interference capacitor electrical connectors.

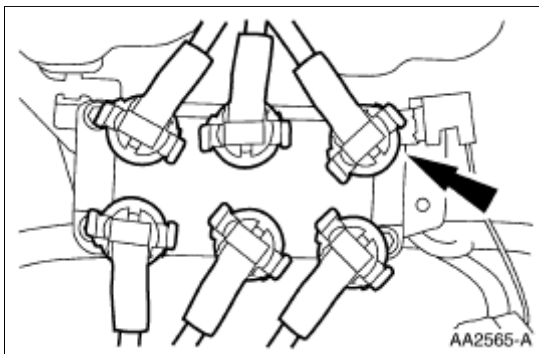


11.  **CAUTION:** Correct installation of the spark plug wires is critical to vehicle operation. If one spark plug wire is not correctly installed on the spark plug or ignition coil, both spark plugs connected to that segment of the ignition coil may not fire under load.

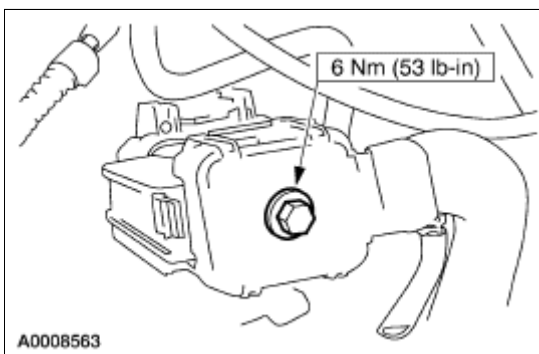
**NOTE:** Wipe the spark plug wires with a clean, damp cloth prior to inspection.

**NOTE:** When a spark plug wire is removed for any reason from a spark plug or ignition coil, or a new spark plug wire is installed, Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A or equivalent meeting Ford specification ESE-M1C171-A must be applied to the spark plug wire boot prior to installation.

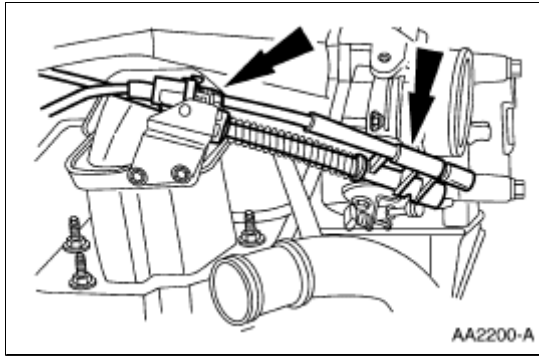
Connect the spark plug wires to the ignition coil.



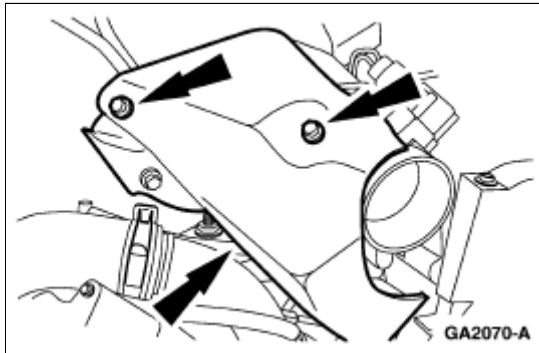
12. Slide the engine sensor control wiring connector on the bracket and tighten the bolt.



13. Connect the accelerator cable to the speed control actuator cable (if equipped).



14. Install the accelerator cable snow shield.



15. Install the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
  16. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
-

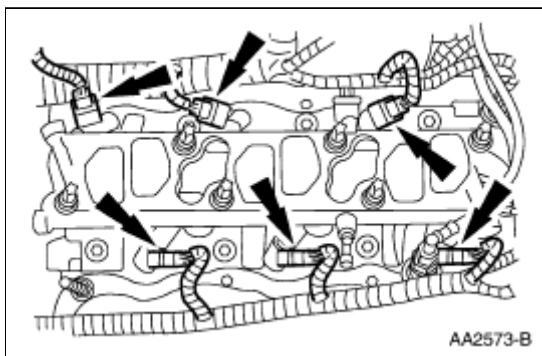
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

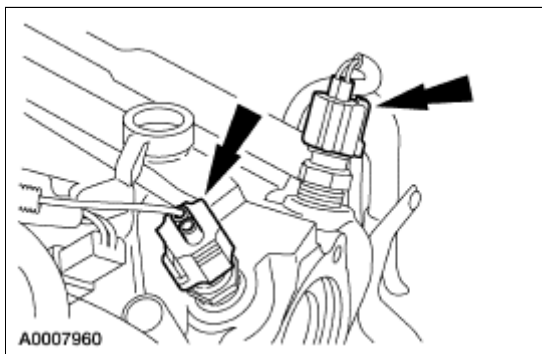
## Intake Manifold —Lower

### Removal

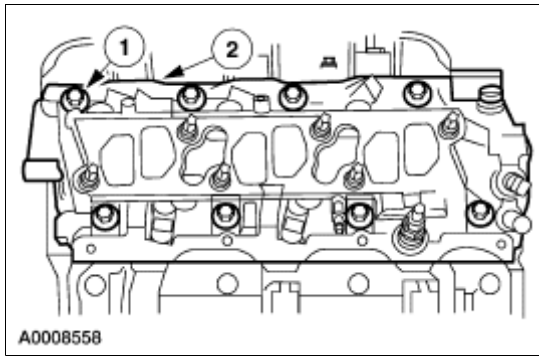
1. Remove the valve covers. For additional information, refer to [Valve Cover—RH](#) , [Valve Cover—LH](#) in this section.
2. Disconnect the fuel line. For additional information, refer to [Section 310-01](#) .
3. Remove the water thermostat. For additional information, refer to [Section 303-03](#) .
4. Disconnect the fuel injector electrical connectors.



5. Disconnect the engine coolant temperature (ECT) sensor, and the water temperature sender electrical connectors.

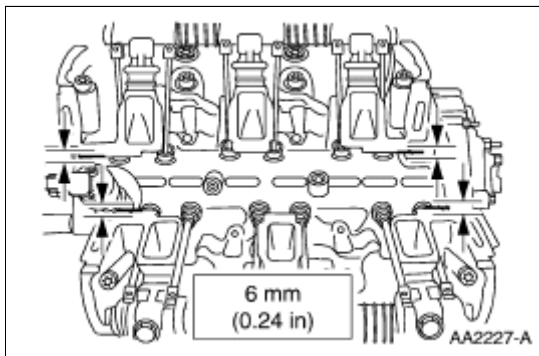


6. Remove the intake manifold.
  1. Remove the bolts.
  2. Remove the intake manifold and gasket.

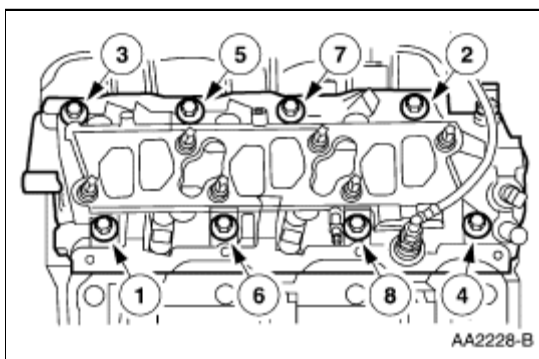


## Installation

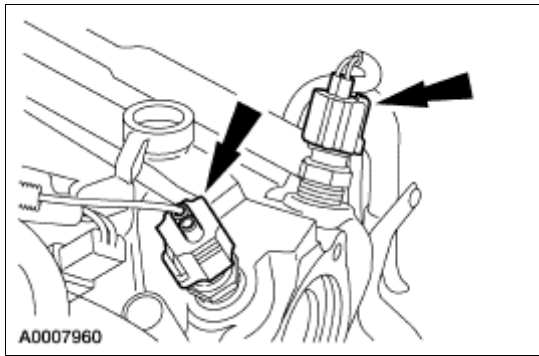
1. Clean and inspect the sealing surfaces.
2. Apply a bead of silicone rubber in four places.
  - Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



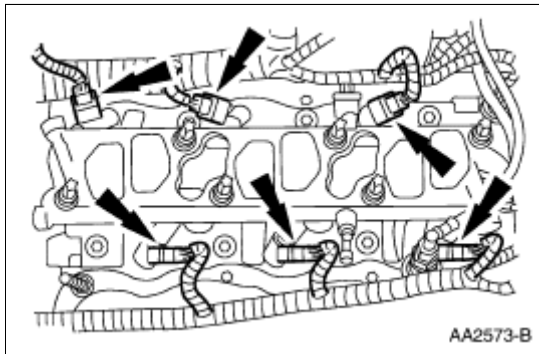
3. Install the gasket, the intake manifold and tighten the bolts in sequence in four steps:
  1. Tighten to 3 Nm (27 lb-in).
  2. Tighten to 10 Nm (89 lb-in).
  3. Tighten to 13 Nm (10 lb-ft).
  4. Tighten to 16 Nm (12 lb-ft).



4. Connect the engine coolant temperature (ECT) sensor, and the water temperature sender electrical connectors.



5. Connect the fuel injector electrical connectors.



6. Install the water thermostat. For additional information, refer to [Section 303-03](#).
  7. Connect the fuel line. For additional information, refer to [Section 310-01](#).
  8. Install the valve covers. For additional information, refer to [Valve Cover—RH](#) or [Valve Cover—LH](#) in this section.
-





SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

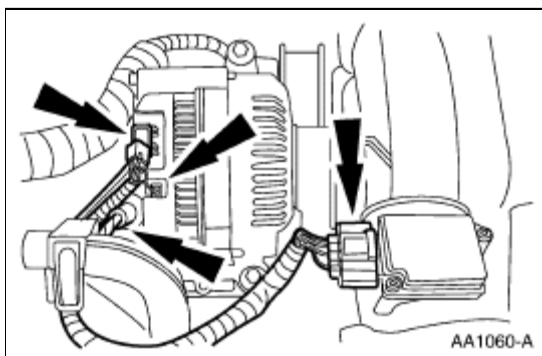
2000 Explorer/Mountaineer Workshop Manual

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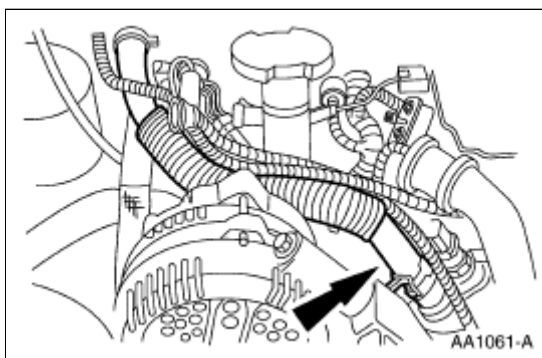
## Valve Cover —RH

### Removal

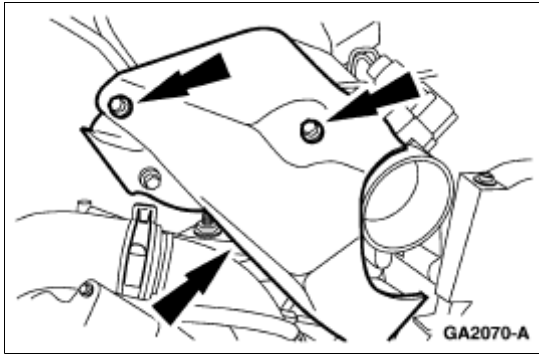
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Disconnect the spark plug wires. For additional information, refer to [Section 303-07A](#).
3. Drain the cooling system. For additional information, refer to [Section 303-03](#).
4. Disconnect the crankcase ventilation tube from the valve cover.
5. Disconnect the upper radiator hose from the intake manifold.
6. Disconnect the mass air flow (MAF) sensor and the generator electrical connectors.



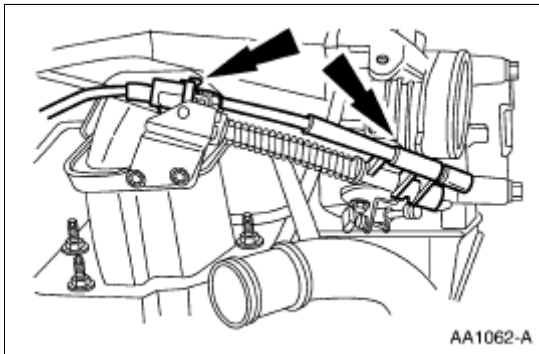
7. Disconnect the heater water hose.



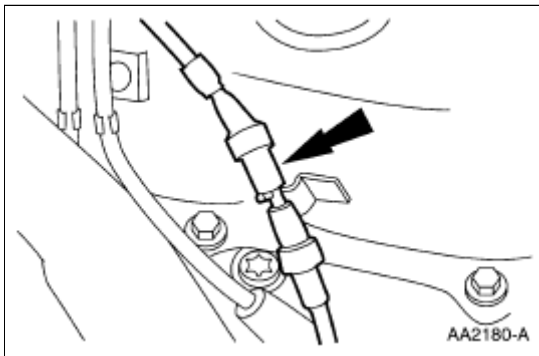
8. Remove the accelerator cable control snow shield.



9. Disconnect the speed control cable (if equipped) and position aside.



10. Disconnect the vacuum line.



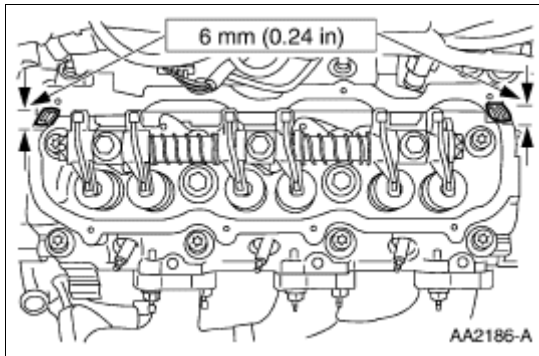
11. Remove the valve cover and the gasket.

## Installation

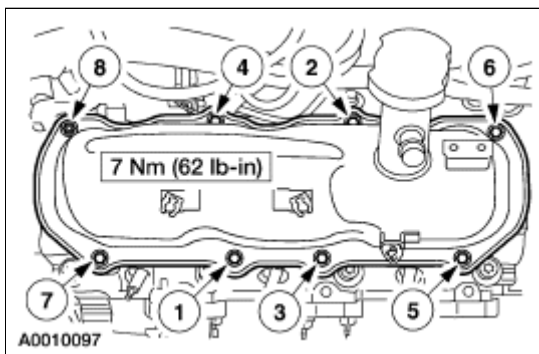
1. **NOTE:** Clean and inspect the sealing surfaces.

Apply a bead of silicone rubber in two places.

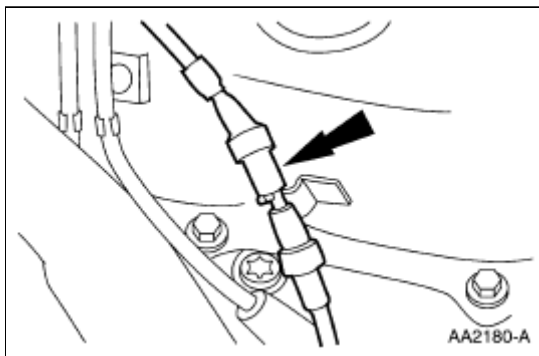
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



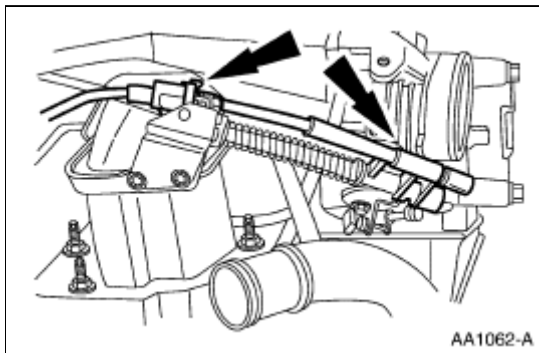
2. Install the valve cover gasket and the valve cover.
  - Tighten the bolts in the sequence shown.



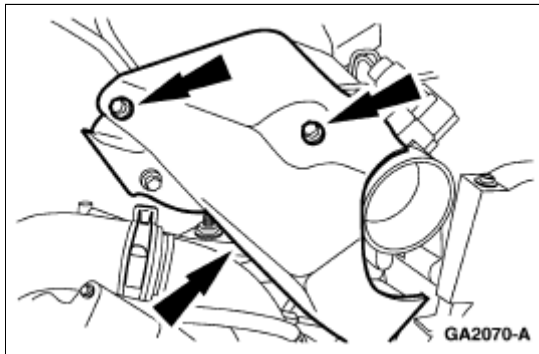
3. Connect the vacuum line.



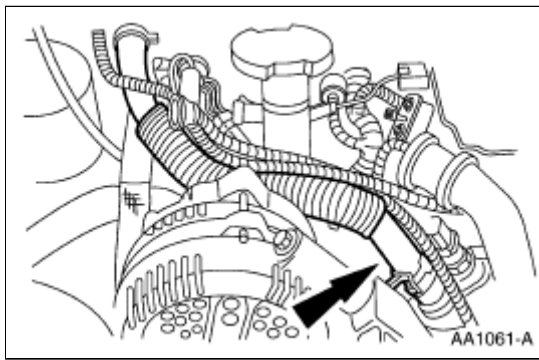
4. Connect the speed control cable (if equipped).



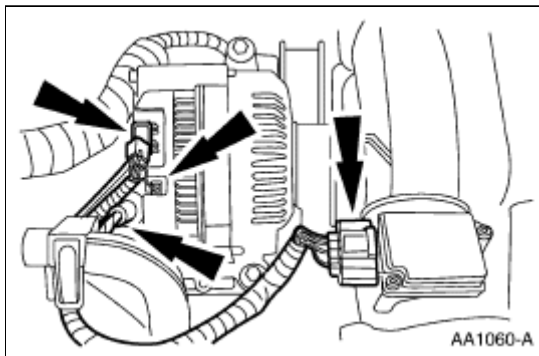
5. Install the accelerator cable snow shield.



6. Connect the heater water hose.



7. Connect the mass air flow (MAF) sensor and the generator electrical connectors.



8. Connect the upper radiator hose to the intake manifold.
  9. Connect the crankcase ventilation tube to the valve cover.
  10. Connect the spark plug wires. For additional information, refer to [Section 303-07A](#).
  11. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
  12. Fill and bleed the cooling system. For additional information, refer to [Section 303-03](#).
-



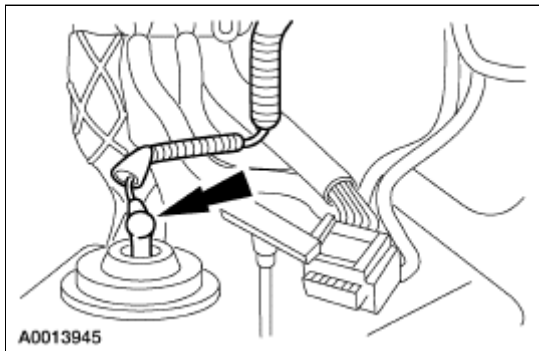
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

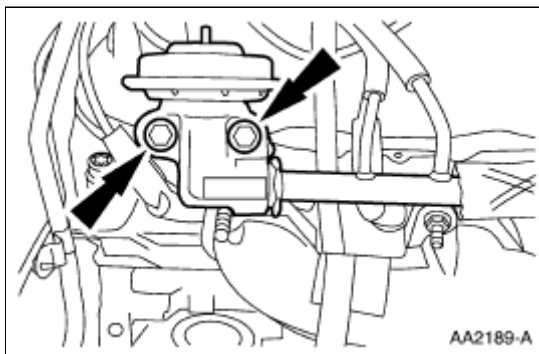
## Valve Cover —LH

### Removal

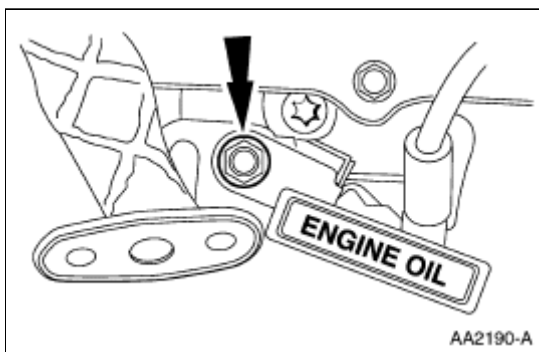
1. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
2. Disconnect the EGR valve vacuum line.



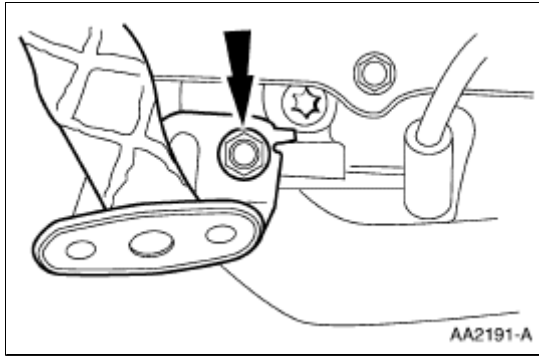
3. Remove the bolts.



4. Remove the oil level indicator tube.



5. Remove the EGR tube and the bracket.



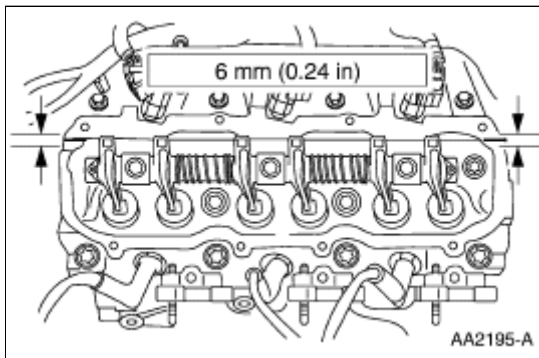
6. Remove the valve cover and the gasket.

### Installation

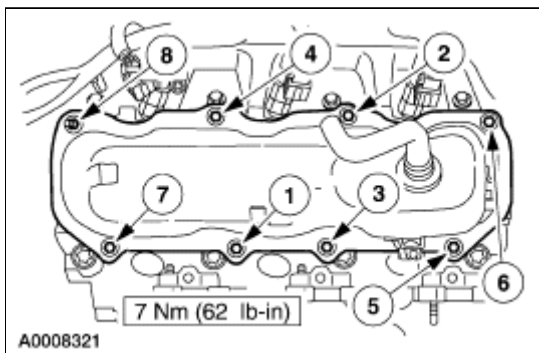
1. **NOTE:** Clean and inspect the sealing surfaces.

Apply a bead of silicone rubber in two places.

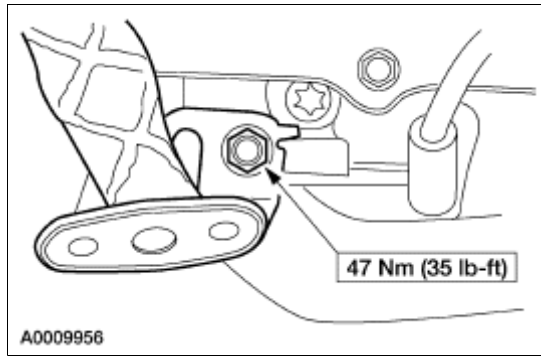
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



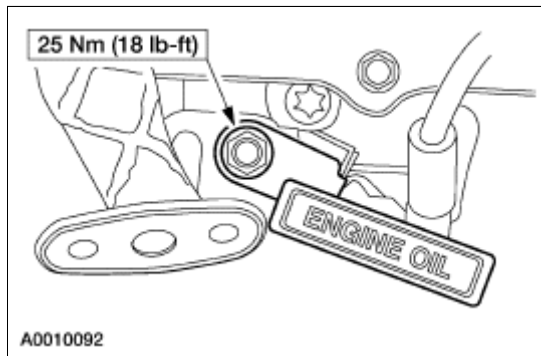
2. Install the valve cover gasket, valve cover and the bolts.
  - Tighten the bolts in the sequence shown.



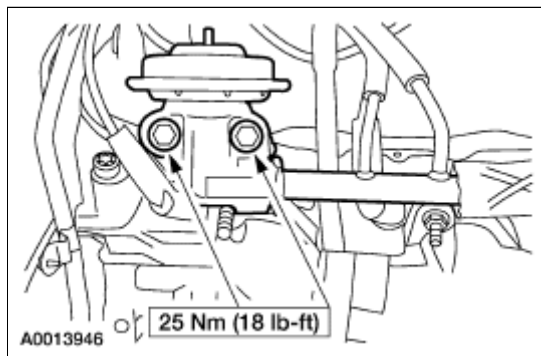
3. Install the EGR tube and the bracket.



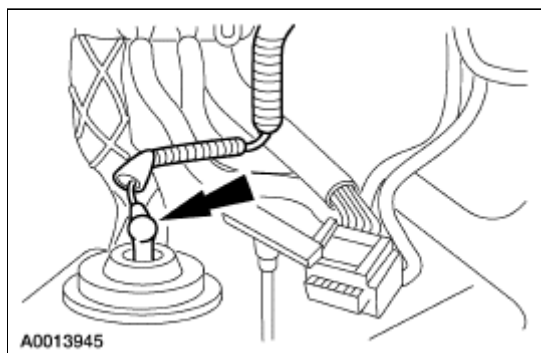
4. Install the oil level indicator tube.



5. Install a new gasket and the EGR valve.



6. Connect the EGR valve vacuum line.





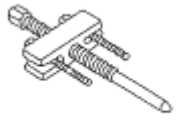
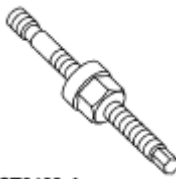
7. Install the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
-

SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

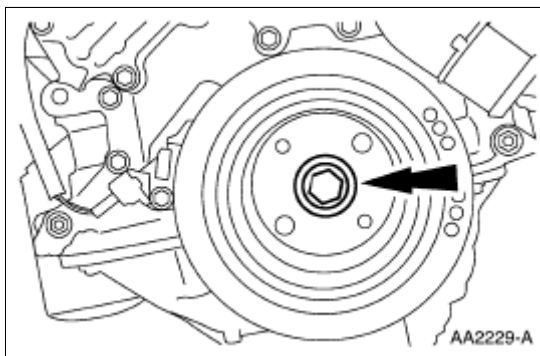
## Crankshaft Pulley

### Special Tool(s)

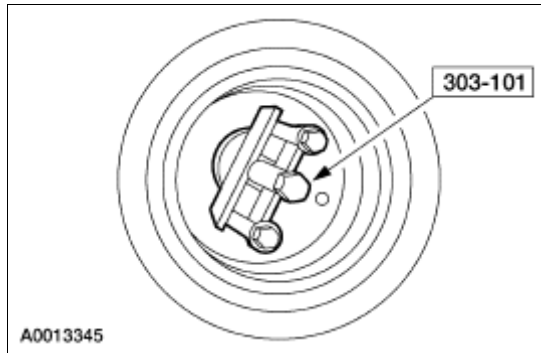
 ST1829-A	Crankshaft Damper Remover 303-101 (T74P-6316-A)
 ST2428-A	Crankshaft Damper Replacer 303-102 (T74P-6316-B)

### Removal

1. Remove the fan and fan shroud. For additional information, refer to [Section 303-03](#).
2. Remove the drive belt. For additional information, refer to [Section 303-05](#).
3. Remove the bolt.
  - Discard the bolt.



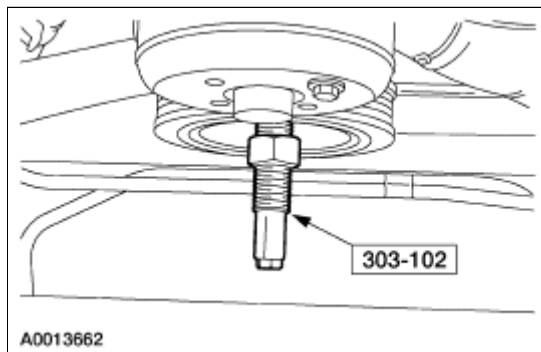
4. Using the special tool, remove the crankshaft pulley.



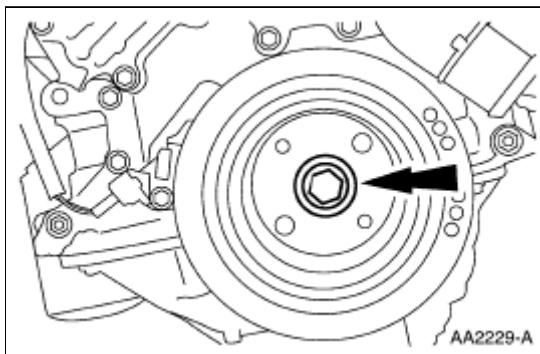
5. If necessary, remove the crankshaft key.

### Installation

1. If necessary, install the crankshaft key.
2. Using the special tool, install the crankshaft pulley.
  - Coat the sealing surfaces of the crankshaft damper with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M4G323-G.
  - Coat the crankshaft damper keyway with silicone rubber.
    - Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.
  - Install the crankshaft pulley.



3. Install a new bolt and tighten in two steps.
  1. Tighten to 45 Nm (33 lb-ft).
  2. Tighten an additional 90 degrees.






4. Install the drive belt. For additional information, refer to [Section 303-05](#).
  5. Install the fan and shroud. For additional information, refer to [Section 303-03](#).
-

SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

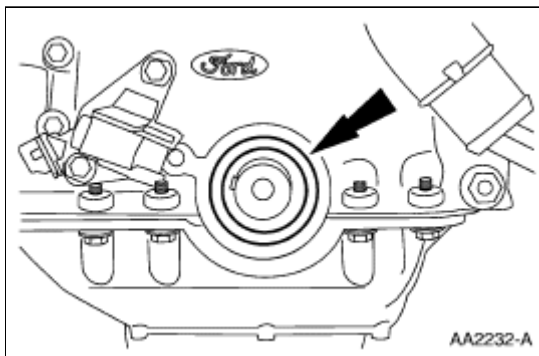
## Crankshaft Oil Seal —Front

### Special Tool(s)

 ST1288-A	Front Cover Seal Remover 303-107 (T74P-6700-A)
 ST2428-A	Crankshaft Damper Replacer 303-102 (T74P-6316-B)
 ST2439-A	Front Cover Aligner Replacer 303-093 (T74P-6019-A)

### Removal

1. Remove the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
2. Use the Front Cover Seal Remover to remove the seal.



### Installation

1. Install the front seal.
  - Lubricate the seal lip with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M4G323-G.
  - Using the Crankshaft Damper and Seal Replacer, install the front seal.

2. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
-

SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

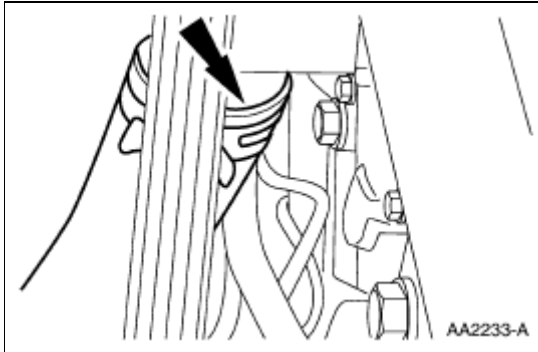
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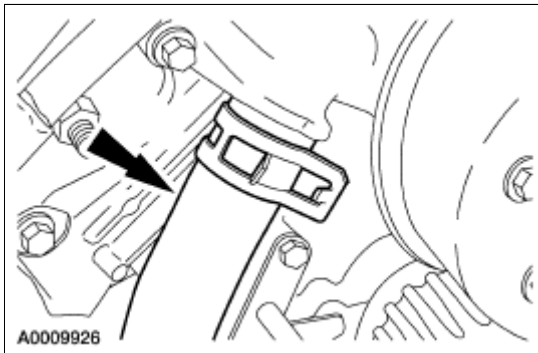
## Engine Front Cover

### Removal

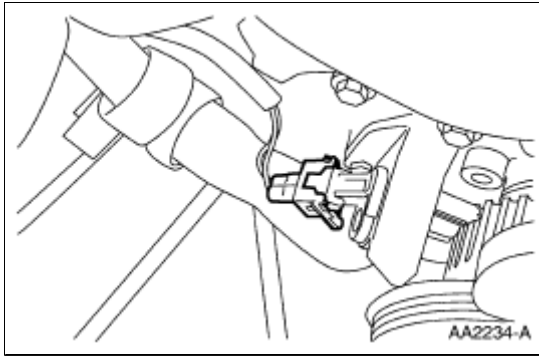
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Drain the engine coolant. For additional information, refer to [Section 303-03](#).
3. Remove the oil pan. For additional information, refer to [Oil Pan](#) in this section.
4. Remove the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
5. Disconnect the lower radiator hose.



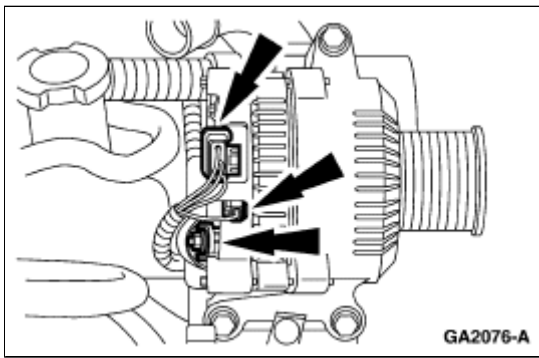
6. Disconnect the heater water hose from the water pump.



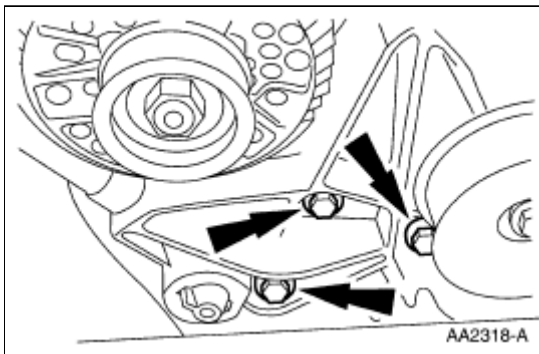
7. Disconnect the crankshaft position (CKP) sensor electrical connector.



8. Remove the drive belt tensioner. For additional information, refer to [Section 303-05](#).
9. Disconnect the generator electrical connectors.

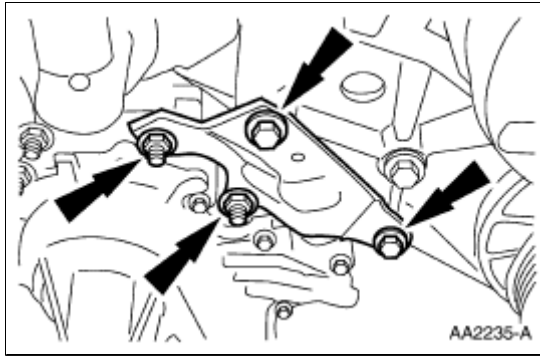


10. Remove the generator mounting bracket.

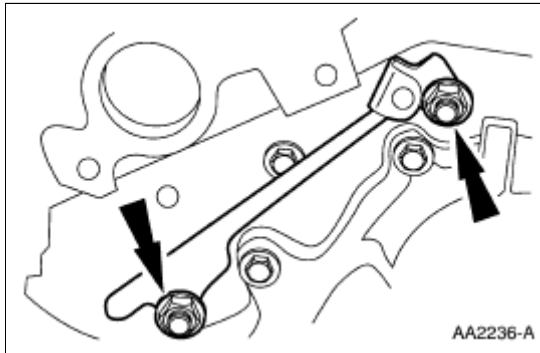


11. Remove the A/C bracket-to-water pump brace.

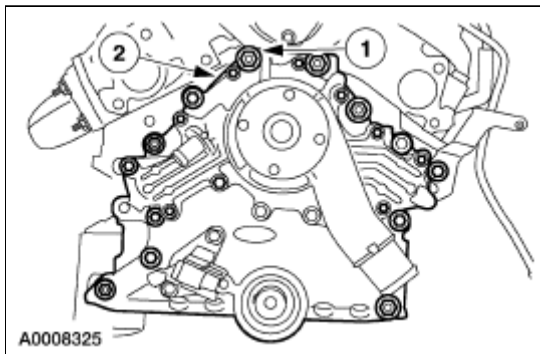




12. Remove the wire harness retainer.



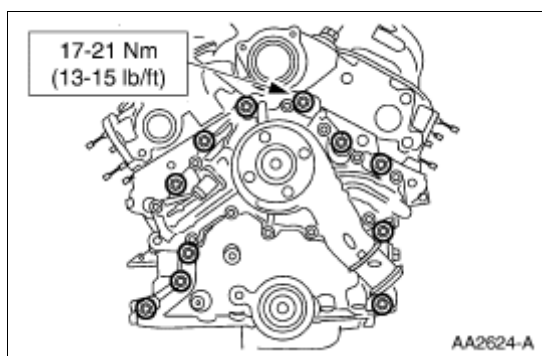
13. Remove the engine front cover.
  1. Remove the bolts and the nuts.
  2. Remove the front cover and the gasket.



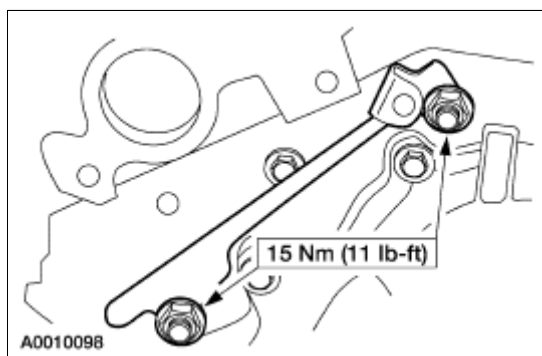
## Installation

1. Clean and inspect all the sealing surfaces.
2. **NOTE:** Use a straightedge to align the engine front cover and the cylinder block at the oil pan mating surface.

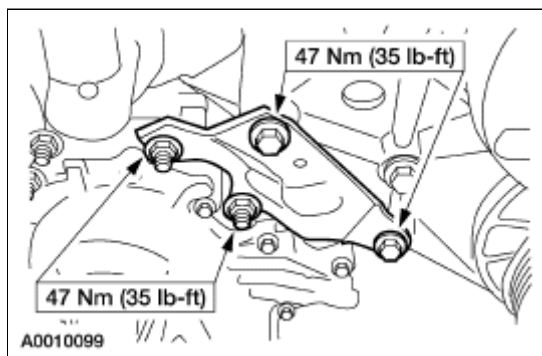
Install the engine front cover gasket and the front cover.



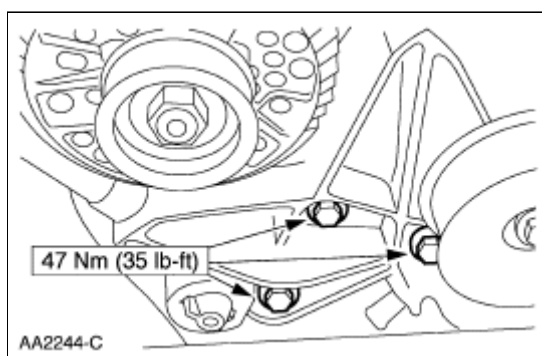
3. Install the wire harness retainer.



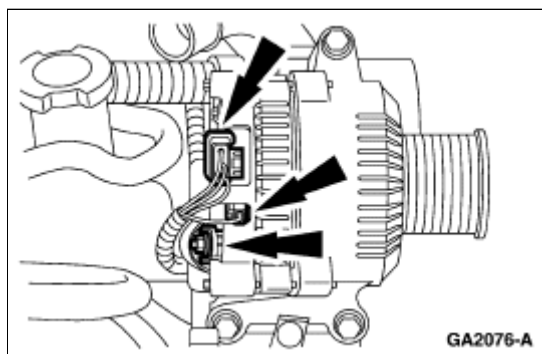
4. Install the A/C bracket-to-water pump brace.



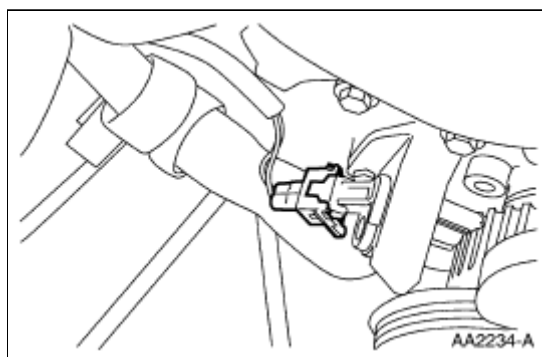
5. Install the generator mounting bracket.



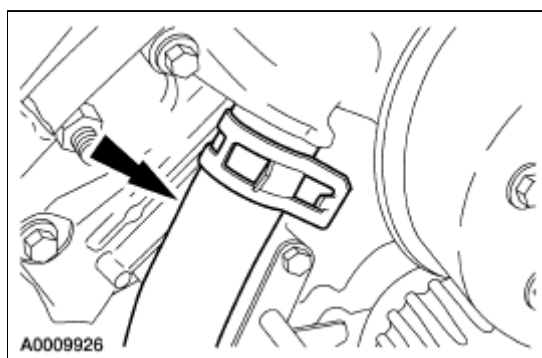
6. Install the drive belt tensioner. For additional information, refer to [Section 303-05](#).
7. Connect the generator electrical connectors.



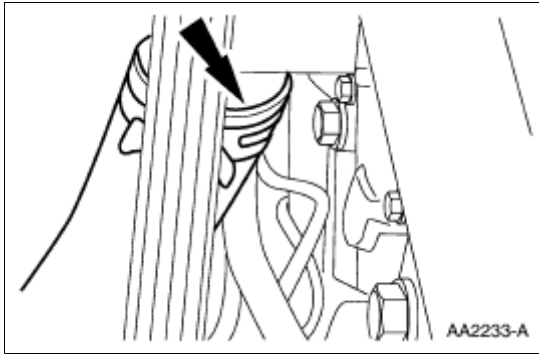
8. Connect the crankshaft position (CKP) sensor electrical connector.



9. Connect the heater water hose to the water pump.



10. Connect the lower radiator hose.



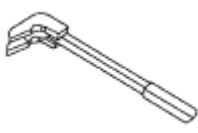

11. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
  12. Install the oil pan. For additional information, refer to [Oil Pan](#) in this section.
  13. Fill and bleed the cooling system. For additional information, refer to [Section 303-03](#).
  14. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
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SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR


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## Valve Spring

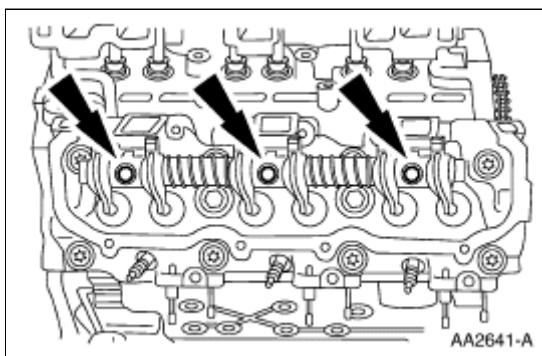
### Special Tool(s)


 ST1794-A	Valve Spring Compressor 303-104 (T74P-6565-A)
 ST1795-A	Valve Spring Compressor Bar 303-105 (T74P-6565-B)

### Removal

1. Remove the valve covers. For additional information, refer to [Intake Manifold—Upper](#) and [Intake Manifold—Lower](#) in this section.
2.  **CAUTION:** If the rocker arm shaft is not loosened gradually, the shaft may become bent during removal.

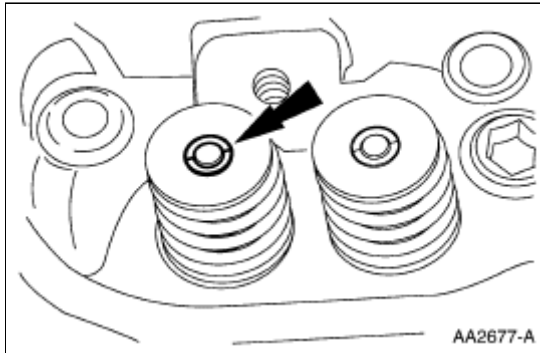
Remove the rocker arm shaft assembly.



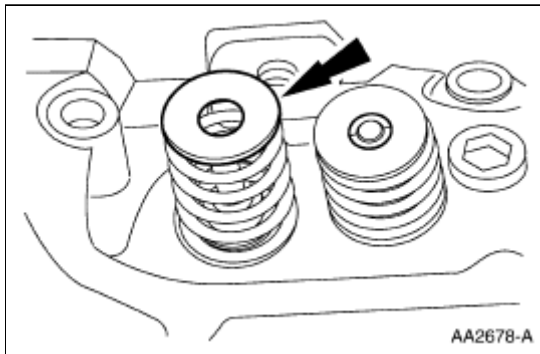
3. Remove the spark plugs. For additional information, refer to [Section 303-07A](#).
4. Position the piston at top dead center.
5.  **CAUTION:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve(s) to fall into the cylinder. A rubber band, tape or string wrapped around the end of the valve stem will prevent this from happening and still allow enough travel to check the valve for binds and excessive guide-to-valve stem clearance.

Use a suitable tool to apply air pressure to the cylinder.

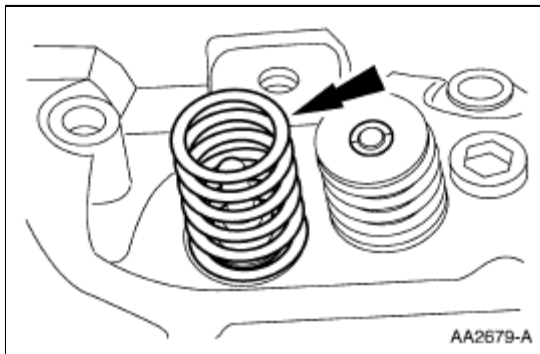
- Using the Valve Spring Compressor Bar and the Valve Spring Compressor, remove the valve spring retainer key.



- Remove the valve spring retainer.



- Remove the valve spring.



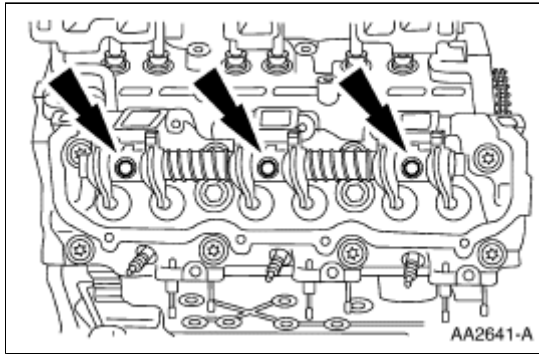
- Inspect the valve spring. For additional information, refer to [Section 303-00](#).

## Installation

- To install, reverse the removal procedure.
- NOTE:** If the rocker arm shaft is not tightened gradually, the shaft may become bent during installation.

Install the rocker arm shaft assembly and tighten in two steps:

1. Tighten to 32 Nm (24 lb-ft).
2. Tighten an additional 90 degrees.



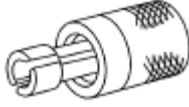


SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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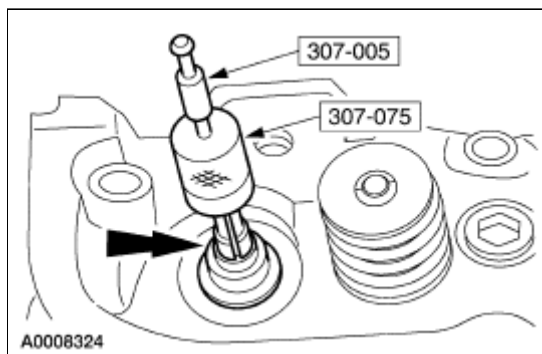
## Valve Seal

### Special Tool(s)

 ST1824-A	Valve Stem Seal Replacer 303-370 (T90T-6571-A)
 ST1187-A	Impact Hammer 307-005 (T59L-100-B)
 ST2114-A	Valve Seal Remover 303-075 (T72J-6571)

### Removal

1. Remove the valve spring. For additional information, refer to [Valve Spring](#) in this section.
2. Using the special tools, remove the valve stem seal.

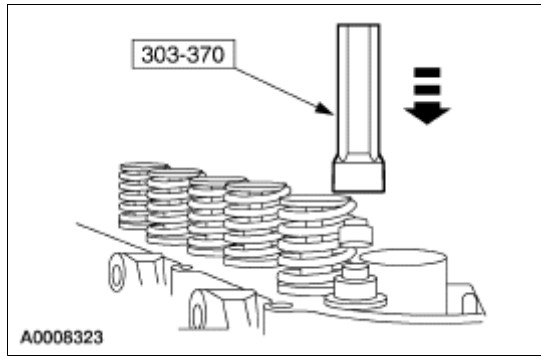


### Installation

1. **NOTE:** Lubricate the valve stem with Super Premium SAE 5W-30 Motor Oil X0-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

Use the special tool to install the valve stem seal.





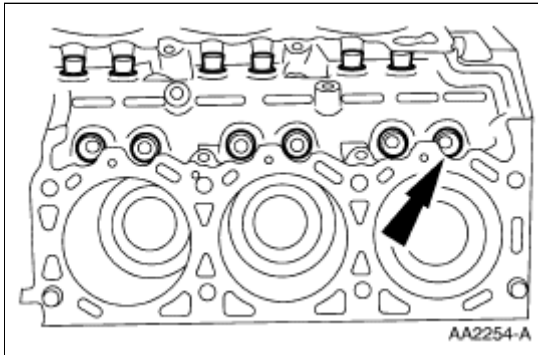
2. Install the valve spring. For additional information, refer to [Valve Spring](#) in this section.
-

## Valve Tappet

### Removal and Installation

1. Remove the cylinder heads. For additional information, refer to [Cylinder Head](#) in this section.
2. **NOTE:** Mark the valve tappets to make sure they are reinstalled in their original location.

Remove the valve tappets.



3. Inspect the valve tappets. For additional information, refer to [Section 303-00](#).
4. **NOTE:** Lubricate the valve tappets and bore with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

To install, reverse the removal procedure.



SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

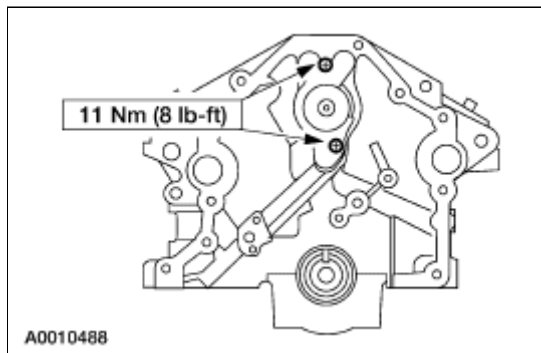
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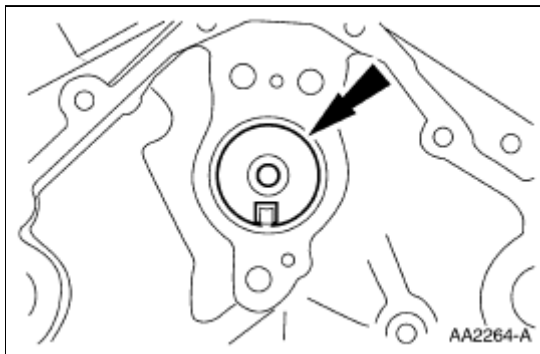
## Camshaft

### Removal and Installation

1. Remove the valve tappets. For additional information, refer to [Valve Tappet](#) in this section.
2. Remove the timing chain. For additional information, refer to [Timing Chain](#) in this section.
3. Remove the camshaft synchronizer. For additional information, refer to [Section 303-14](#).
4. Remove the camshaft thrust plate.



5. Remove the camshaft.



6. To install, reverse the removal procedure.
-



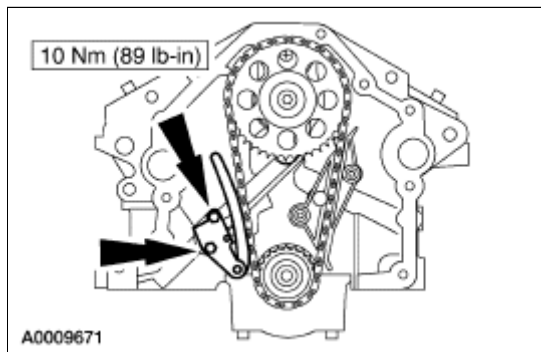
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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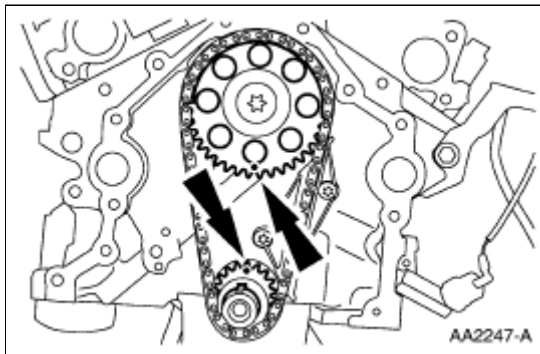
## Timing Chain

### Removal and Installation

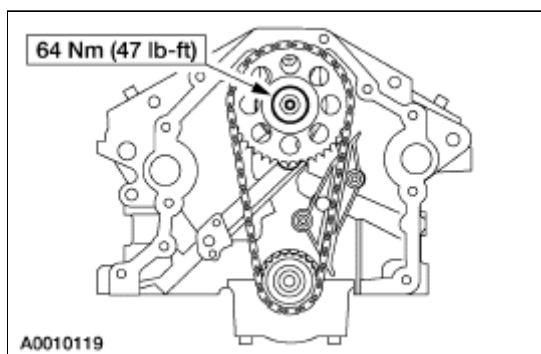
1. Remove the engine front cover. For additional information, refer to [Engine Front Cover](#) in this section.
2. Remove the timing chain tensioner.



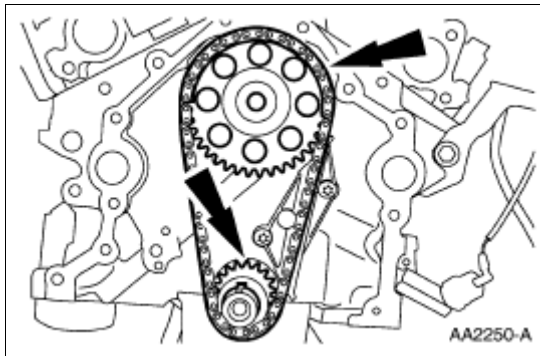
3. Align the timing marks.



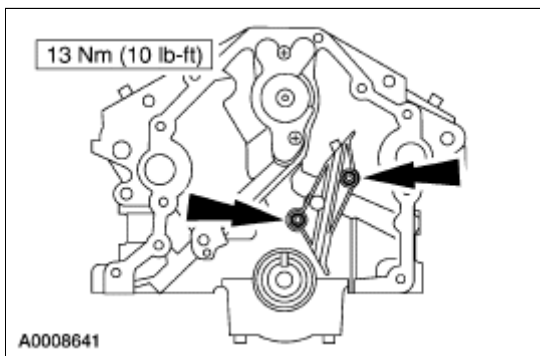
4. Remove the bolt.



5. Remove the timing chain and the timing gears as an assembly.



6. Remove the timing chain guide.



7. To install, reverse the removal procedure.
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SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

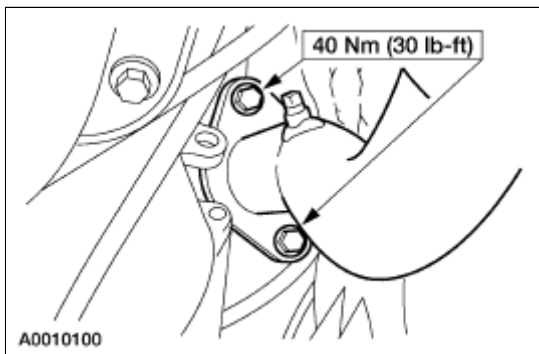
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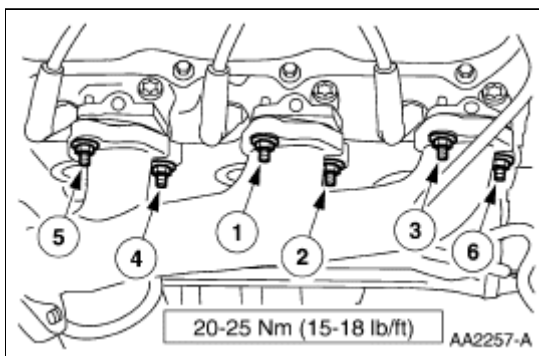
## Exhaust Manifold —RH

### Removal and Installation

1. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
2. Remove the bolts.



3. Lower the vehicle.
4. Remove the exhaust manifold and the gasket.



5. To install, reverse the removal procedure.
-





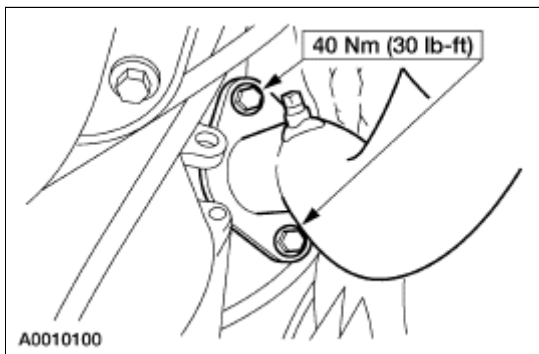
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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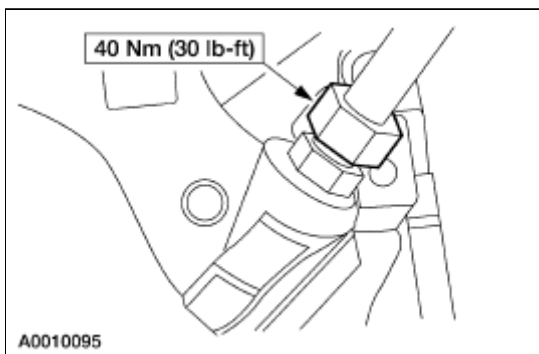
## Exhaust Manifold —LH

### Removal and Installation

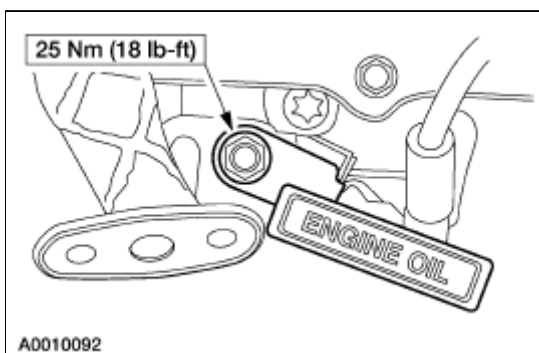
1. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
2. Remove the bolts.



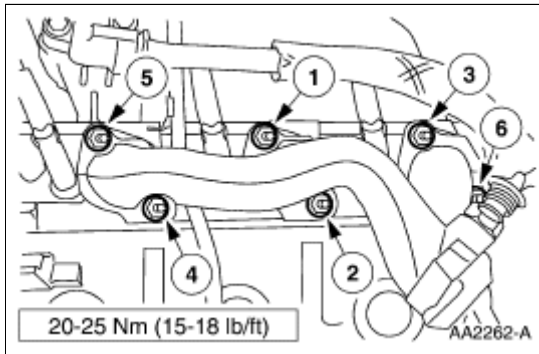
3. Lower the vehicle.
4. Disconnect the EGR valve to exhaust manifold tube.



5. Remove the oil level indicator tube.



6. Remove the exhaust manifold and the gasket.



7. To install, reverse the removal procedure.
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SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

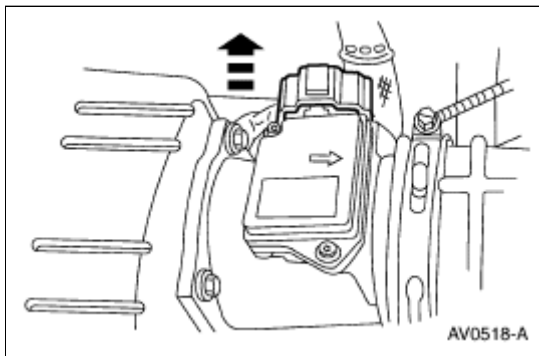
2000 Explorer/Mountaineer Workshop Manual

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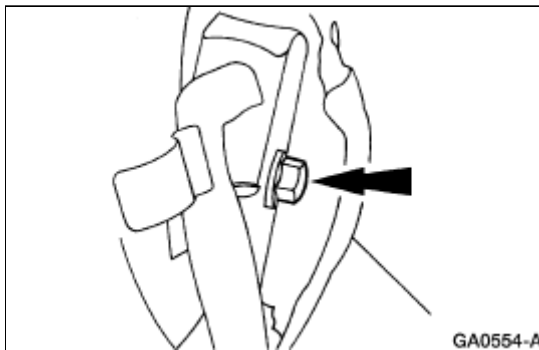
## Cylinder Head

### Removal

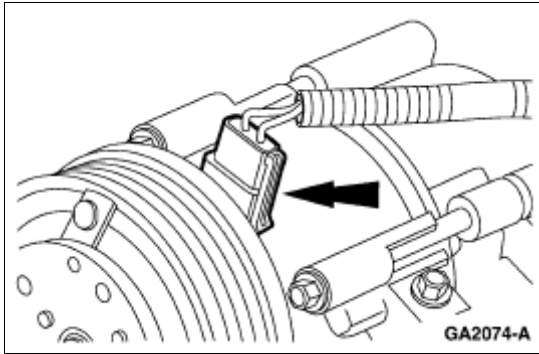
1. Remove the accelerator control splash shield.
2. Remove the drive belt tensioner. For additional information, refer to [Section 303-05](#).
3. Disconnect the mass air flow sensor electrical connector.



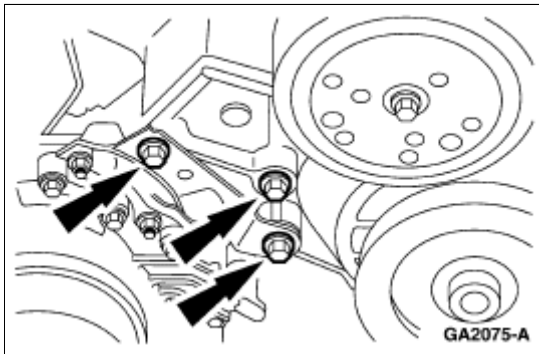
4. Recover the A/C system. For additional information, refer to [Section 412-03](#).
5. Loosen the bolt and separate the A/C manifold tube from the A/C compressor.



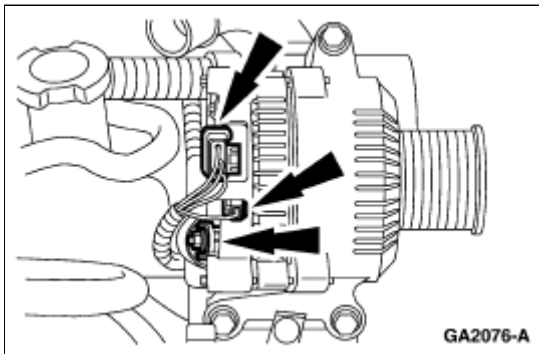
6. Disconnect the A/C compressor electrical connector.



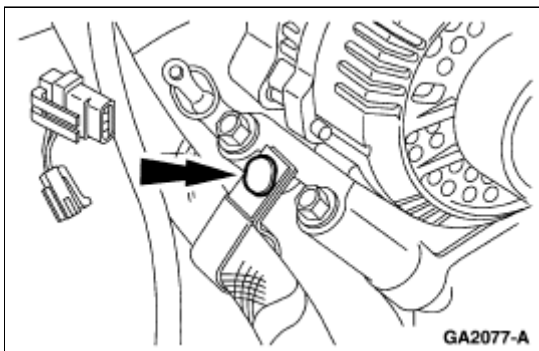
7. Position the A/C compressor mounting bracket aside.



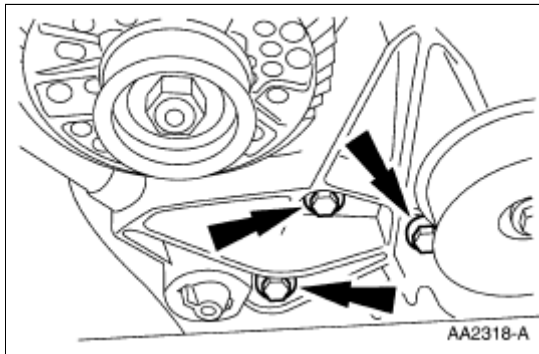
8. Disconnect the generator electrical connectors.




9. Disconnect the heater hose retaining clip and position the heater water hose aside.

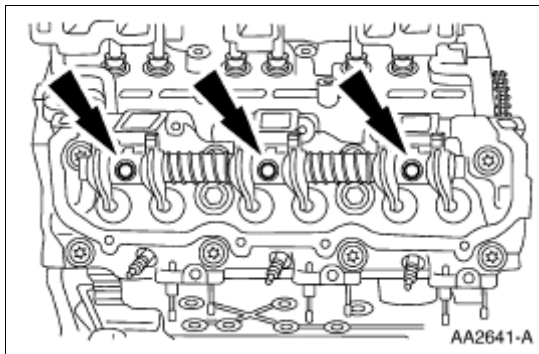


10. Remove the generator mounting bracket.



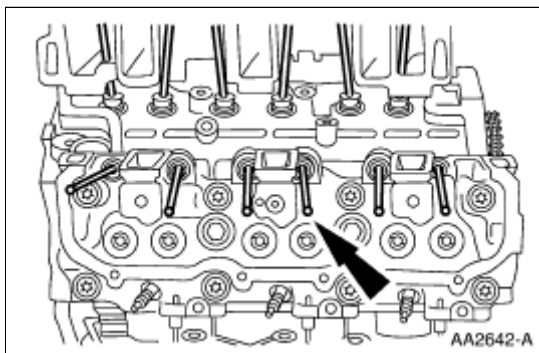
11. Remove the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
12. Remove the LH and RH exhaust manifolds. For additional information, refer to [Exhaust Manifold—LH](#) and [Exhaust Manifold—RH](#) in this section.
13. Remove the cylinder head-to-bulkhead ground strap.
14.  **CAUTION:** If the rocker arm shaft is not loosened gradually, the shaft may become bent during removal.

Remove the RH and LH rocker arm shafts.



15. **NOTE:** Mark the position of the push rods so they can be reinstalled in their original position.

Remove the push rods.



16. Remove the cylinder heads and the gaskets.

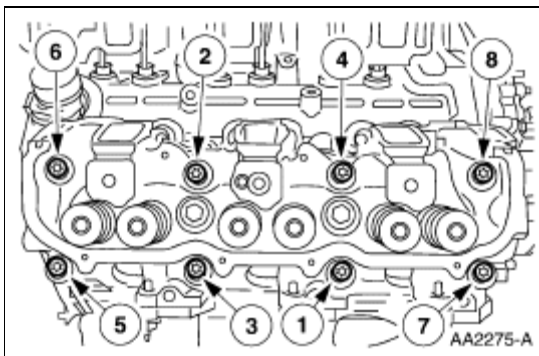
### Installation

1. Clean and inspect all sealing surfaces.
2. **NOTE:** New bolts must be used.

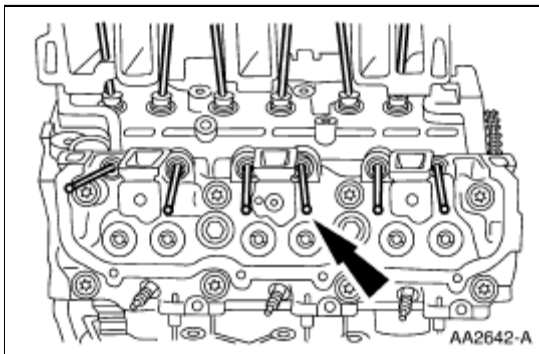
**NOTE:** The head gaskets are not interchangeable and are marked for either right or left side use.

Position the cylinder head and gasket and install the new bolts in three steps:

1. Tighten to 34 Nm (25 lb-ft).
2. Tighten to 72 Nm (53 lb-ft).
3. Tighten an additional 90 degrees.



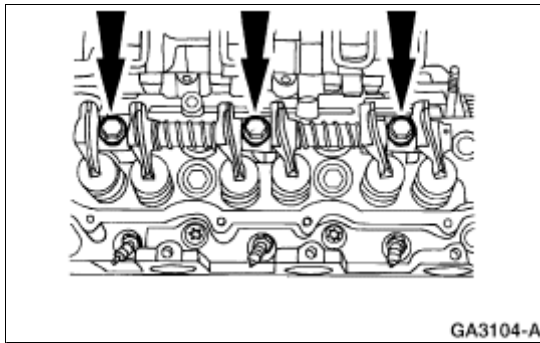
3. Install the push rods.



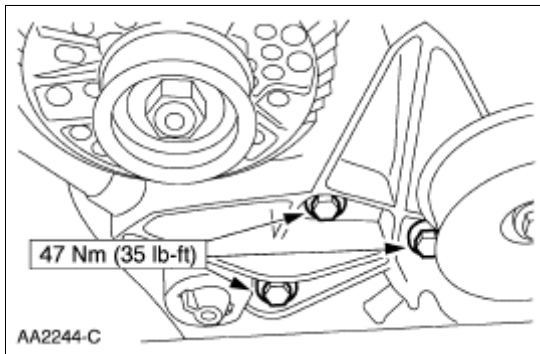
4.  **CAUTION:** Tighten the rocker arm shaft gradually or it may become bent during installation.

Install the rocker arm and shaft assembly and tighten the bolts in two steps:

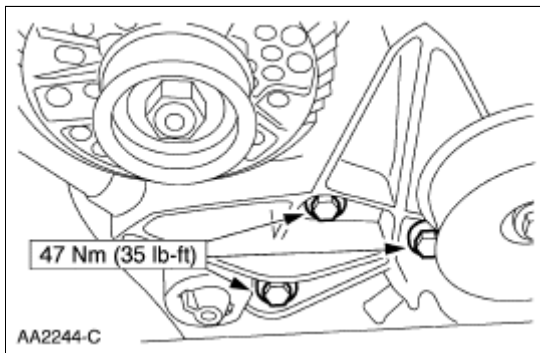
1. Tighten to 33 Nm (24 lb-ft).
2. Tighten an additional 90 degrees.



5. Install the cylinder head-to-bulkhead ground strap.
6. Install the LH and RH exhaust manifolds. For additional information, refer to [Exhaust Manifold—LH](#) and [Exhaust Manifold—RH](#) in this section.
7. Install the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.

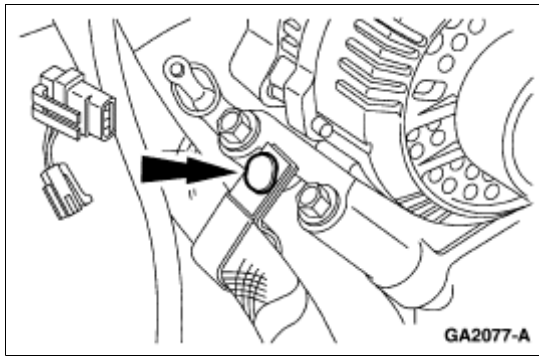


8. Install the generator mounting bracket.

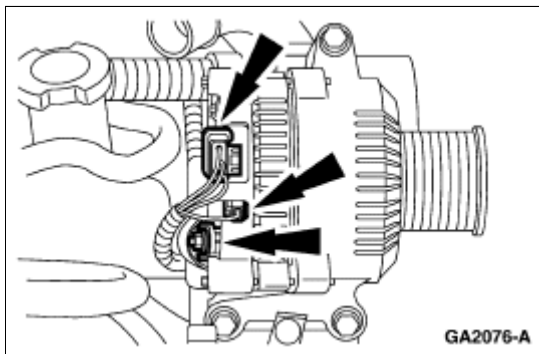


9. Connect the heater hose retaining clip.

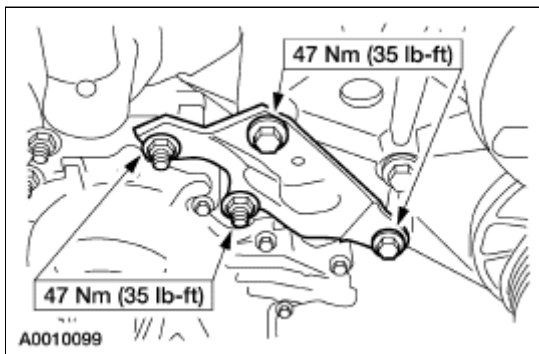




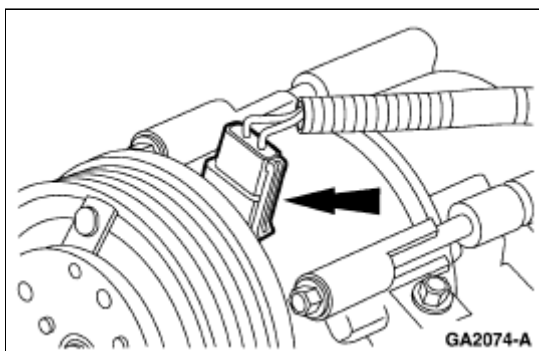
10. Connect the generator electrical connectors.



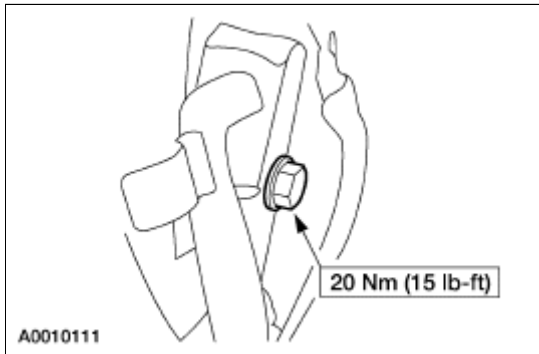
11. Install the A/C compressor mounting bracket.



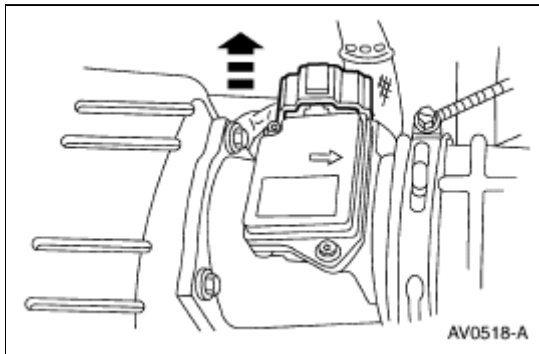
12. Connect the A/C compressor electrical connector.



13. Install the A/C manifold tube to the A/C compressor.



14. Recharge the A/C system. For additional information, refer to [Section 412-00](#).
15. Install the drive belt tensioner. For additional information, refer to [Section 303-05](#).
16. Connect the mass air flow sensor electrical connector.



17. Install the accelerator control splash shield.
-



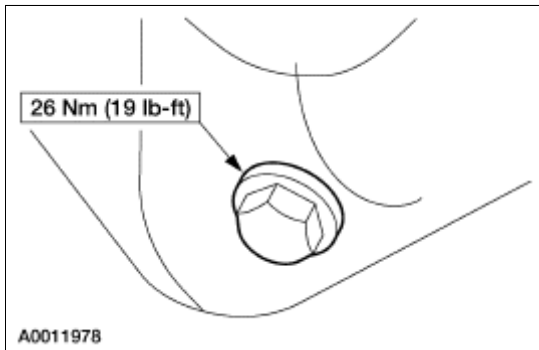
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

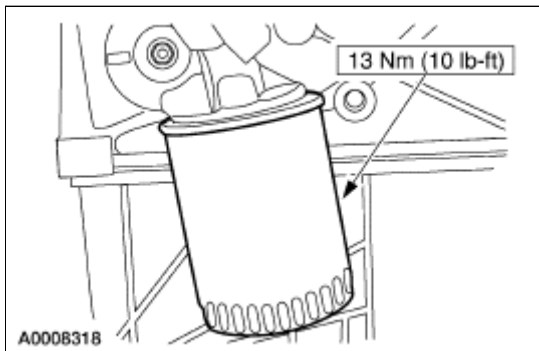
## Oil Filter Adapter

### Removal and Installation

1. Drain the engine oil.

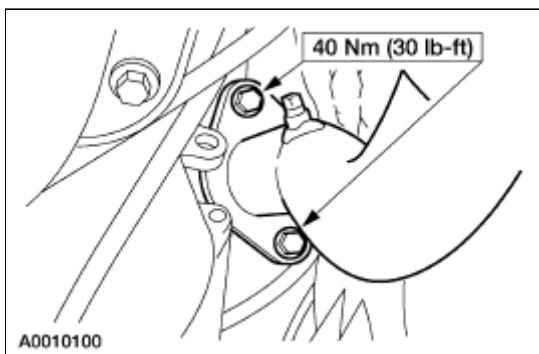


2. Remove the oil bypass filter.

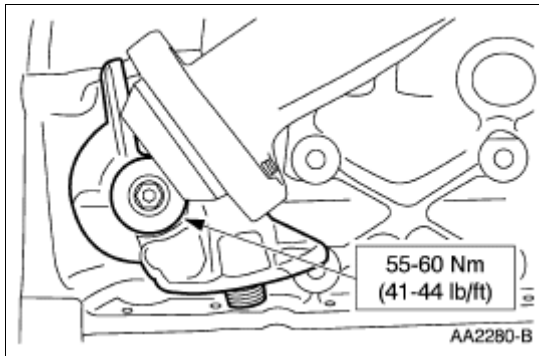


**NOTE:** RH side is shown, LH side is similar.

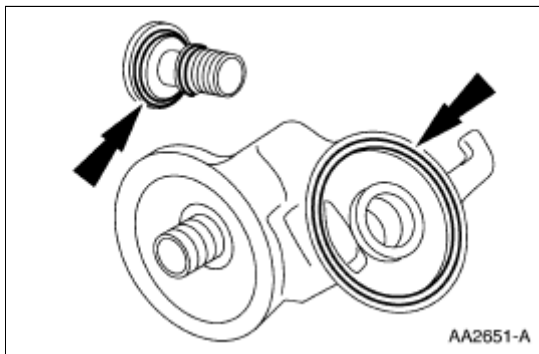
3. Disconnect the exhaust pipe from the exhaust manifolds.



4. Remove the oil filter adapter.



5. Inspect and install new O-ring seals if necessary.

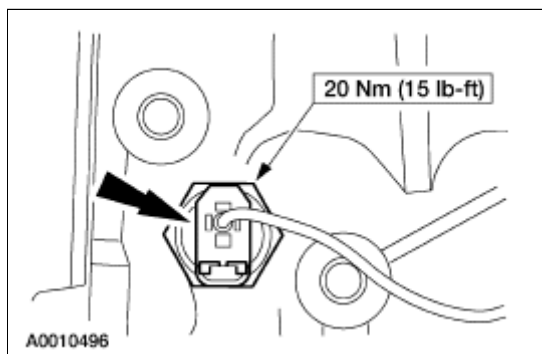


6. To install, reverse the removal procedure.
-

## Oil Pressure Switch

### Removal and Installation

1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Disconnect the oil pressure sensor electrical connector and remove the sensor.



3. **NOTE:** Coat the threads of the oil pressure sensor with Pipe Sealant with Teflon®D8AZ-19554-A or equivalent meeting Ford specifications WSK-M2G350-A2 and ESR-M18P7-A.

To install, reverse the removal procedure.

SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

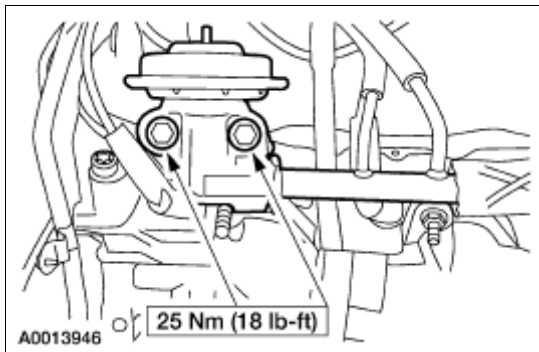
2000 Explorer/Mountaineer Workshop Manual

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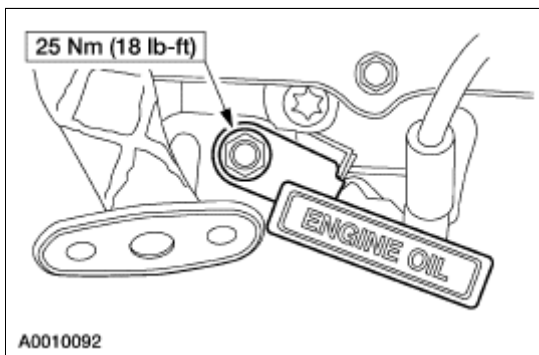
## Oil Level Indicator and Tube

### Removal and Installation

1. Remove the EGR valve.



2. Remove the oil level indicator tube.



3. To install, reverse the removal procedure.
-





SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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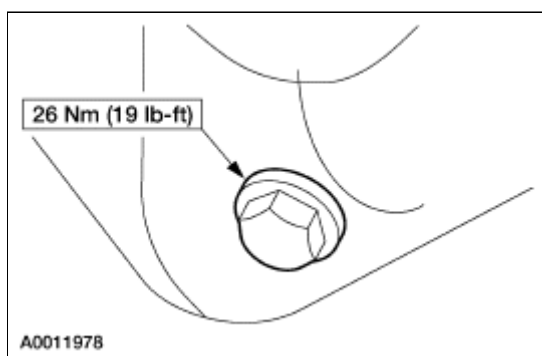
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## Oil Pan

### Removal

#### On All Vehicles

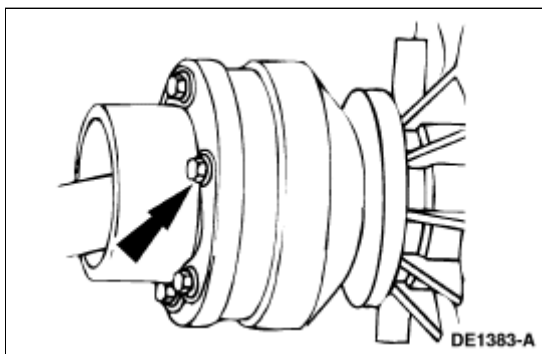
1. Check vehicle ride height. For additional information, refer to [Section 204-05](#).
2. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
3. Drain the engine oil and reinstall the drain plug.



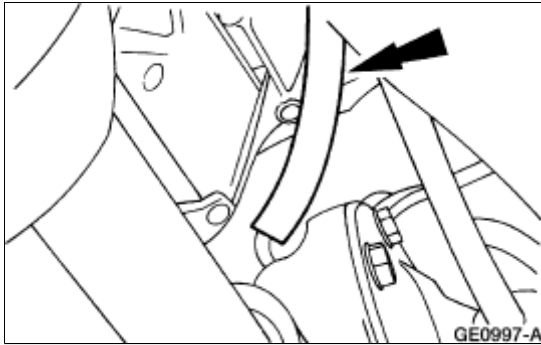
4. Remove both front torsion bars. For additional information, refer to [Section 204-01A](#) (Front Suspension—4x2) or [Section 204-01B](#) (Front Suspension—4x4).

#### For 4WD Vehicles

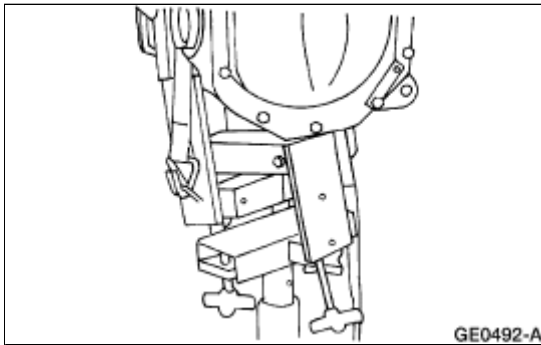
5. Disconnect the front driveshaft CV joint and position aside.



6. Disconnect the axle vent tube.

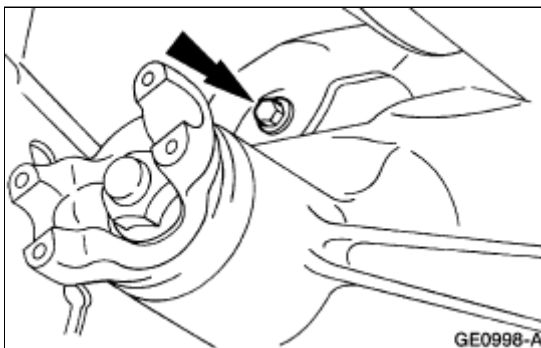


7. Support the axle with a suitable jack.



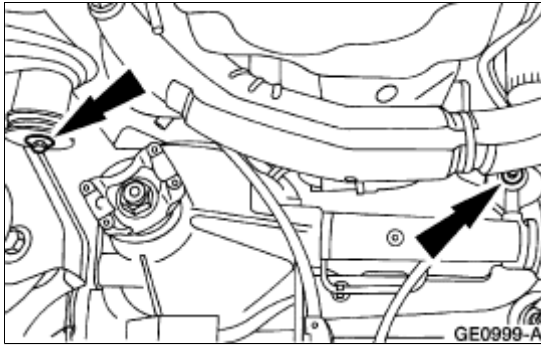
8. **NOTE:** Front driveshaft removed for clarity.

Remove the left front axle-to-frame bolt.

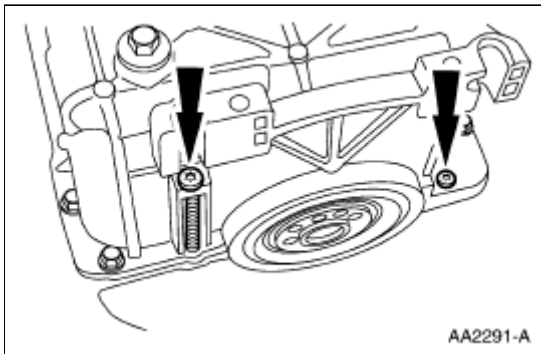


9. **NOTE:** Front driveshaft removed for clarity.

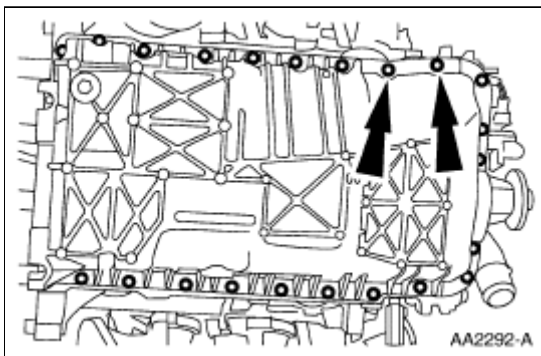
Remove the two axle-to-frame bolts. Lower the axle to just rest on the lower control arms.

**On All Vehicles**

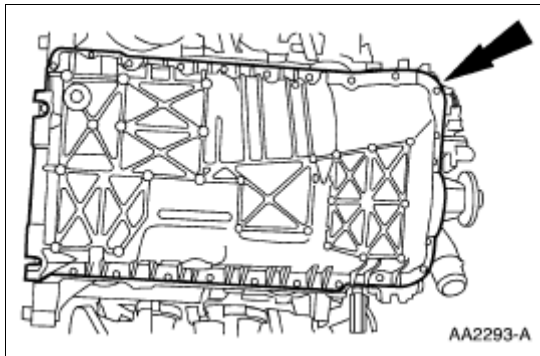
10. Remove the starter motor. For additional information, refer to [Section 303-06](#).
11. Remove the bolts.



12. Remove the bolts and the nuts.



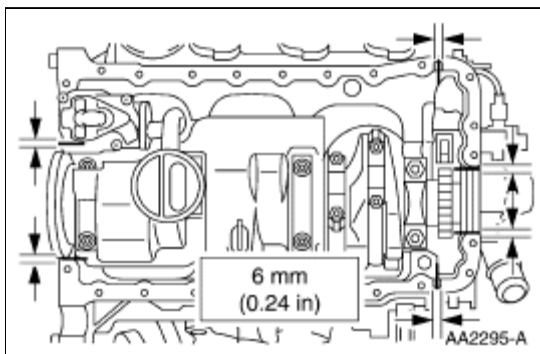
13. Remove the oil pan and the gasket.



## Installation

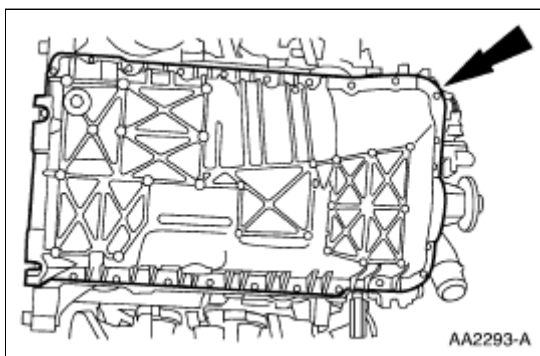
### On All Vehicles

1. Clean and inspect the sealing surfaces.
2. Apply a bead of silicone rubber in six places. Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.

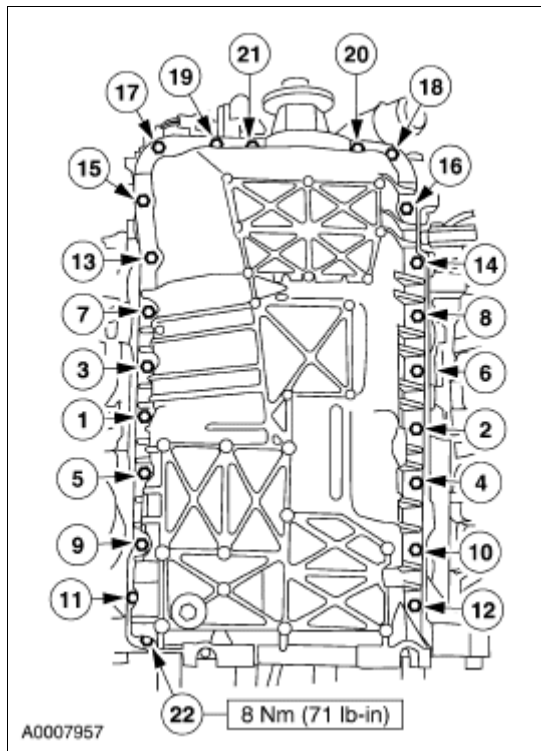


3. **NOTE:** Use a straightedge to maintain the rear oil pan edge-to-rear cylinder block edge alignment.

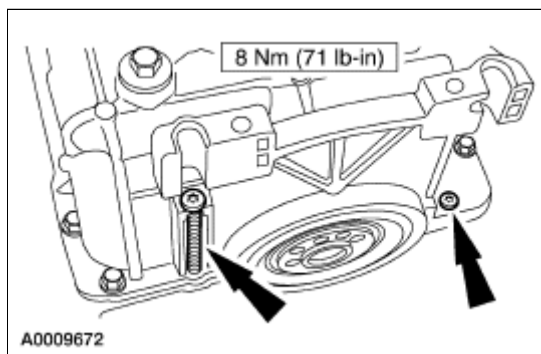
Position the gasket and the oil pan.



4. Install the bolts and nuts and tighten in the sequence shown.



5. Install the bolts.

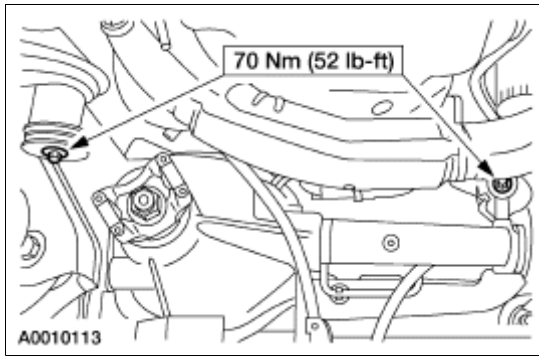


6. Install the starter motor. For additional information, refer to [Section 303-06](#).

#### For 4WD Vehicles

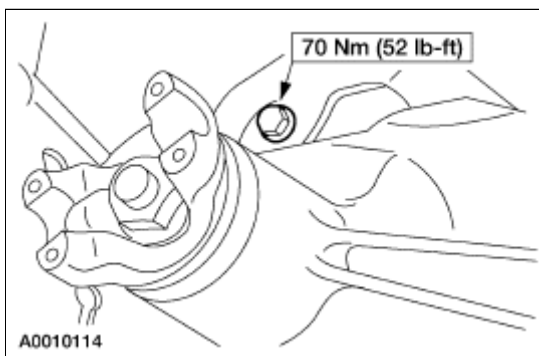
7. **NOTE:** Front driveshaft removed for clarity.

Raise the axle and install the two axle-to-frame bolts and nuts.

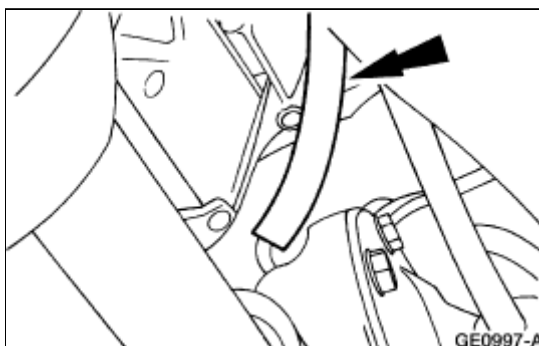


8. **NOTE:** Front driveshaft removed for clarity.

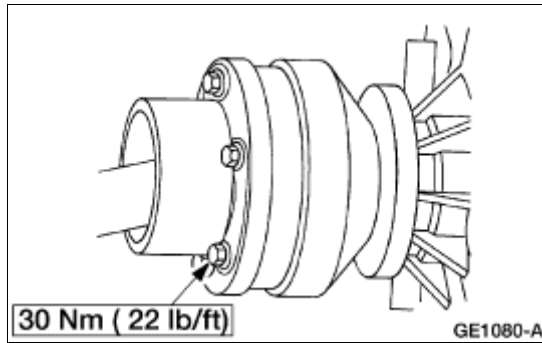
Install the left front axle-to-frame bolt and nut.



9. Remove the jack from the axle.
10. Connect the axle vent tube.



11. Connect the front driveshaft CV joint.

**On All Vehicles**

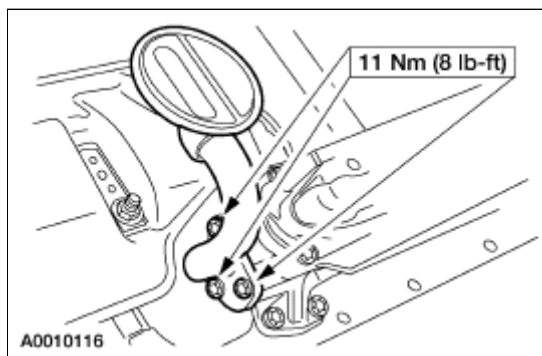
12. Install the front torsion bars. For additional information, refer to [Section 204-01A](#) (Front Suspension—4x2) or [Section 204-01B](#) (Front Suspension—4x4).
  13. Lower the vehicle.
  14. Fill the engine with Super Premium SAE 5W-30 Motor Oil X0-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
  15. Check vehicle ride height. For additional information, refer to [Section 204-05](#).
-

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## Oil Pump Screen and Pickup Tube

### Removal and Installation

1. Remove the oil pan. For additional information, refer to [Oil Pan](#) in this section.
2. Remove the oil pump screen cover and tube.
  - Discard the gasket.



3. Clean and inspect the sealing surfaces.
  4. To install, reverse the removal procedure.
-



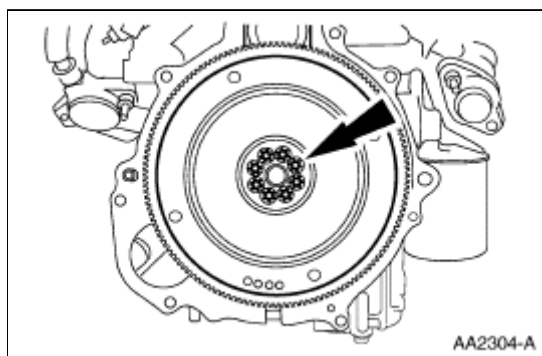
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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## Flywheel

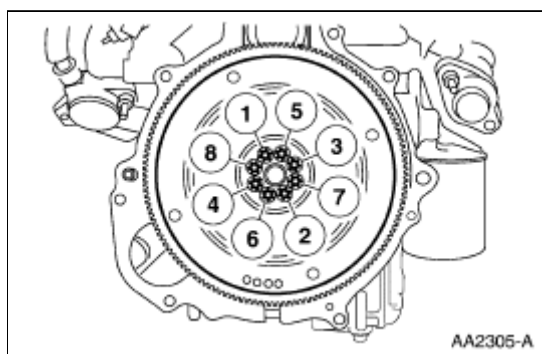
### Removal

1. Remove the transmission. For additional information, refer to [Section 307-01A](#) (5R55E) for automatic transmissions or [Section 308-03](#) for manual transmissions.
2. On manual transmission-equipped vehicles, remove the clutch. For additional information, refer to [Section 308-02](#).
3. Remove the flywheel.



### Installation

1. Inspect the flywheel. For additional information, refer to [Section 308-00](#).
2. Install the spacer, flywheel, and tighten the bolts in sequence in two steps:
  1. Tighten to 13 Nm (10 lb-ft).
  2. Tighten to 71 Nm (52 lb-ft).



3. On manual transmission-equipped vehicles, install the clutch. For additional information, refer to [Section 308-02](#).
4. Install the transmission. For additional information, refer to [Section 307-01A](#) (5R55E) for automatic transmissions or [Section 308-02](#) for manual transmissions.



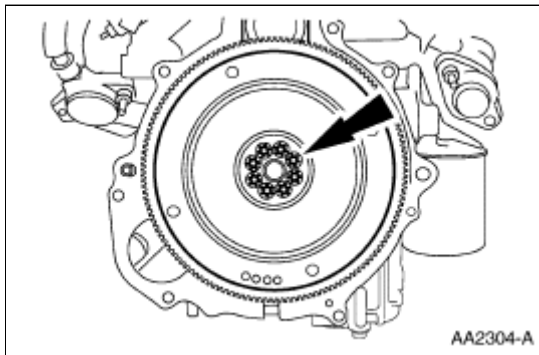
SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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## Flexplate

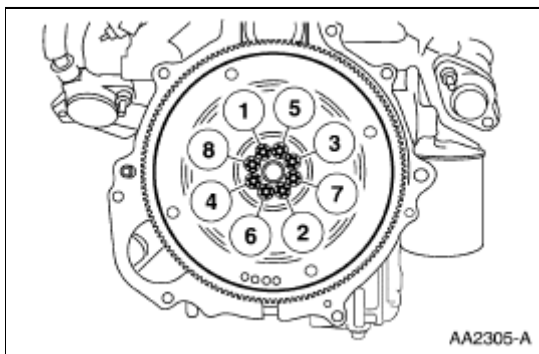
### Removal

1. Remove the transmission. For additional information, refer to [Section 307-01A](#) (4R44E) or [Section 307-01B](#) (5R55E).
2. Remove the bolts and the flexplate.



### Installation

1. Position the spacer and the flexplate and install the bolts. Tighten the bolts in the sequence shown in two stages.
  - Stage 1: Tighten to 13 Nm (10 lb-ft).
  - Stage 2: Tighten to 71 Nm (52 lb-ft).
2. Install the transmission. For additional information, refer to [Section 307-01A](#) (4R44E) or [Section 307-01B](#) (5R55E).







SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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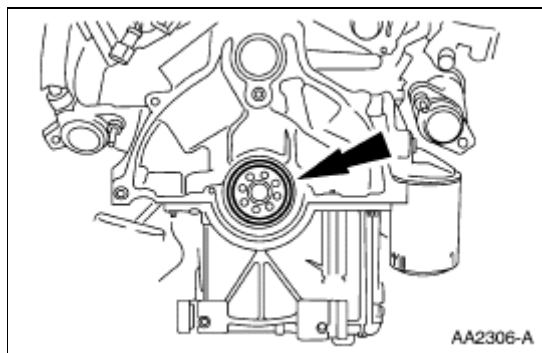
## Crankshaft Rear Oil Seal

### Special Tool(s)

 ST1785-A	Rear Oil Seal Replacer 303-S524 (T95T-6701-AR)
 ST2132-A	Rear Crank Seal Replacer 303-579 (T97T-6701-A)

### Removal

1. Remove the flexplate or flywheel. For additional information, refer to [Flexplate](#) or [Flywheel](#) in this section.
2. Remove the crankshaft rear oil seal using a punch and a jet plug remover.

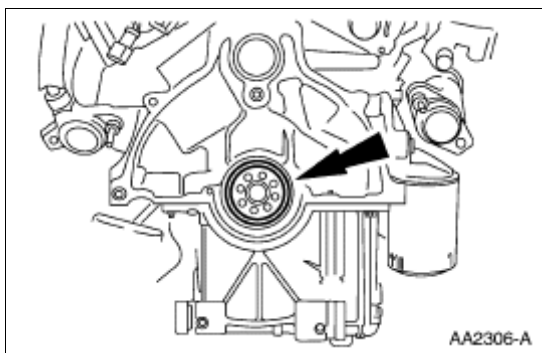


### Installation

1. **NOTE:** Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

Lubricate the inner seal lip on the crankshaft rear oil seal.

2. Install the crankshaft rear oil seal using the Rear Oil Seal Replacer.

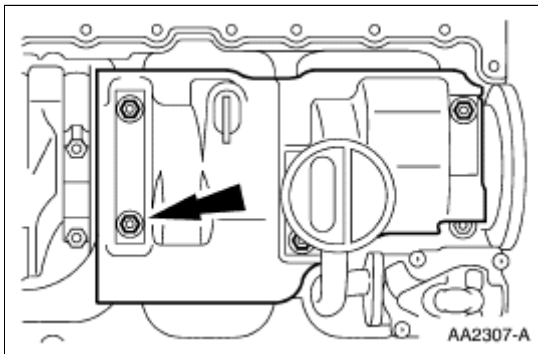



3. Install the flexplate or flywheel. For additional information, refer to [Flexplate](#) or [Flywheel](#) in this section.
-

## Crankshaft Main Bearing

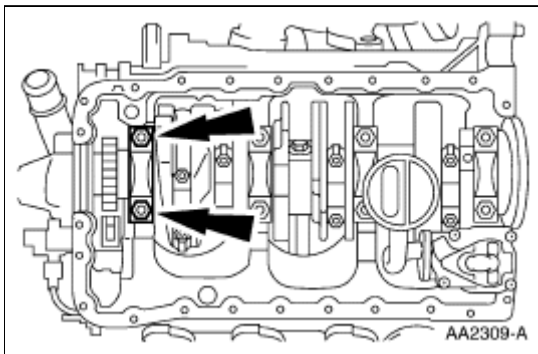
### Removal

1. Remove the oil pan. For additional information, refer to [Oil Pan](#) in this section.
2. Remove the oil pan baffle.

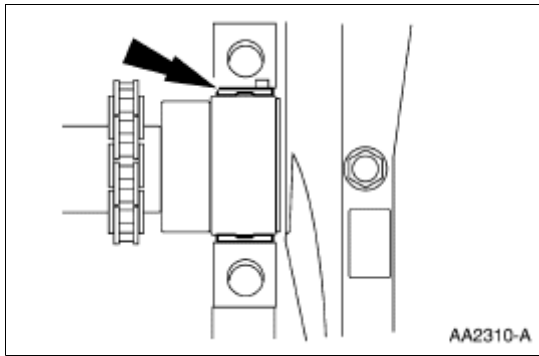


3.  **CAUTION:** The crankshaft main bearings must be inspected and new bearings installed one set at a time or damage to the engine may occur.

Remove one crankshaft main bearing cap.



4. Remove the crankshaft main bearing.

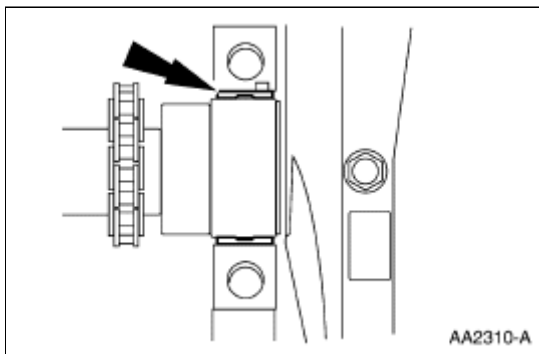


5. Repeat the procedure until all the crankshaft main bearings are removed.

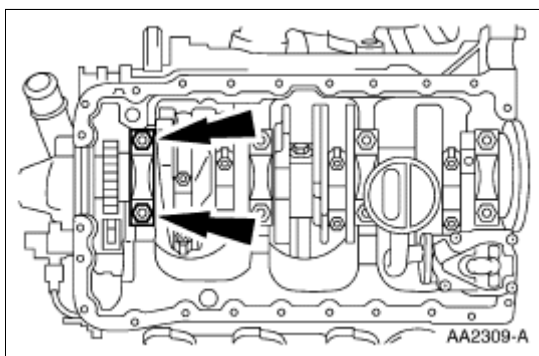
### Installation

1. The crankshaft main bearings are precision fit; refer to [Section 303-00](#) for checking clearances or bearing selection.
2. **NOTE:** Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

Install the crankshaft main bearing.



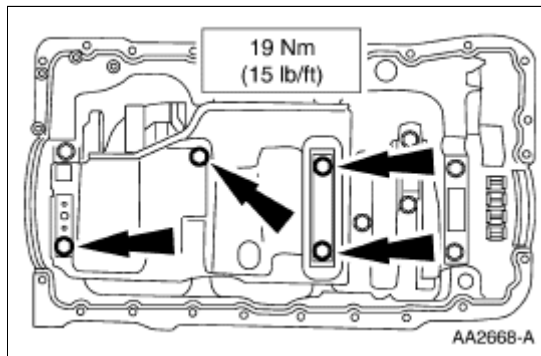
3. Install the crankshaft main bearing cap. Tighten the bolts in pairs in two steps:
  1. Tighten to 35 Nm (26 lb-ft).
  2. Tighten to 97 Nm (72 lb-ft).



4. Repeat the procedure until all the crankshaft main bearings are installed.



5. Install the oil pan baffle.

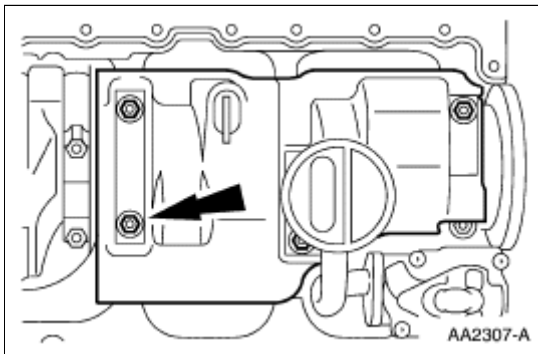



6. Install the oil pan. For additional information, refer to [Oil Pan](#) in this section.
-

## Connecting Rod Bearings

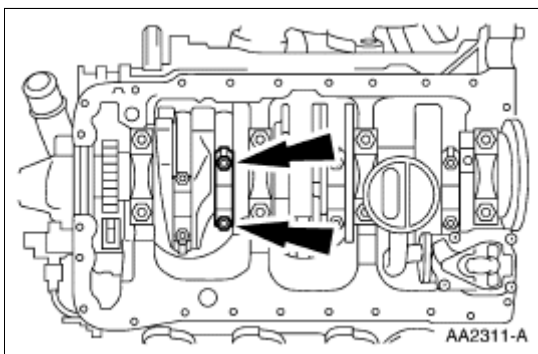
### Removal

1. Remove the oil pan. For additional information, refer to [Oil Pan](#) in this section.
2. Remove the oil pan baffle.

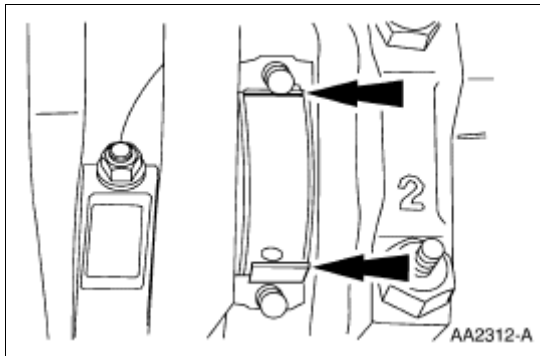


3.  **CAUTION:** The connecting rod bearing caps and the connecting rods are a matched set. Installing the incorrect connecting rod bearing cap on a connecting rod may result in engine damage.

Remove the connecting rod bearing cap.




4. Remove the connecting rod bearing.

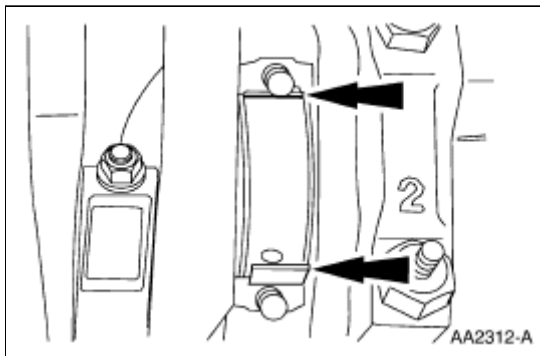


5. Repeat the procedure until all the crankshaft main bearings are removed.

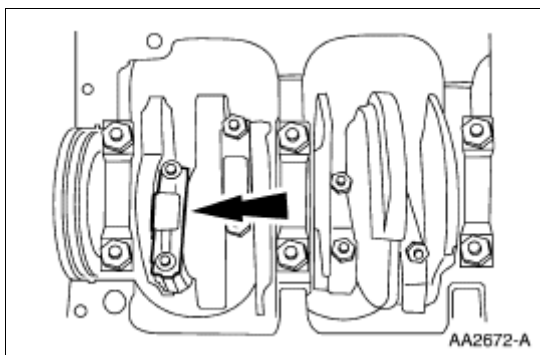
### Installation

1. The connecting rod bearings are precision fit. For additional information, refer to [Section 303-00](#) for checking clearances or bearing selection.
2.  **CAUTION:** The connecting rod bearings must be lubricated with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

Install the connecting rod bearing.

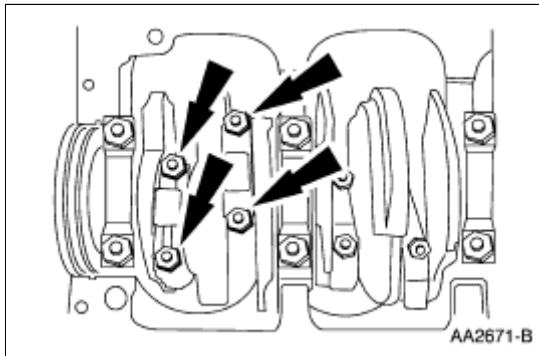


3. Install the connecting rod caps.
  - For connecting rod component tests, refer to [Section 303-00](#).

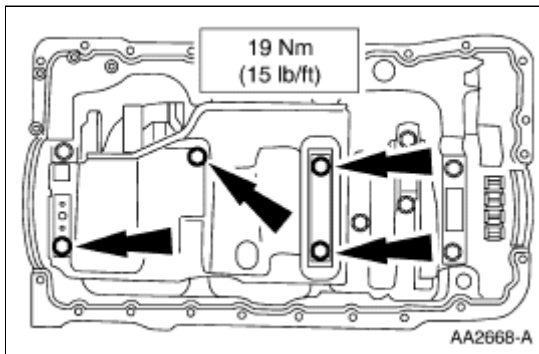


4. Install the nuts and tighten in two steps.
  1. Tighten to 20 Nm (15 lb-ft).

2. Tighten an additional 90 degrees.



5. Repeat the procedure until all the connecting rod bearings are installed.
6. Install the oil pan baffle.



7. Install the oil pan. For additional information, refer to [Oil Pan](#) in this section.
-


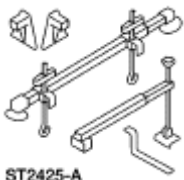


SECTION 303-01A: Engine — 4.0L Push Rod  
IN-VEHICLE REPAIR

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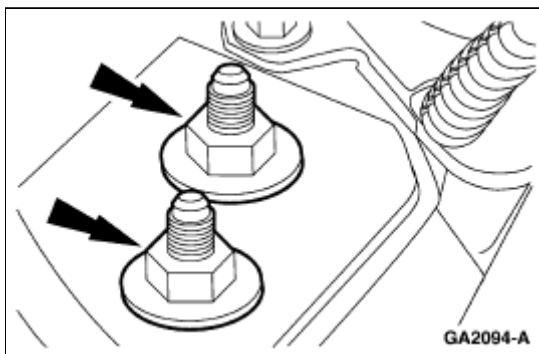
## Engine Support Insulators

### Special Tool(s)

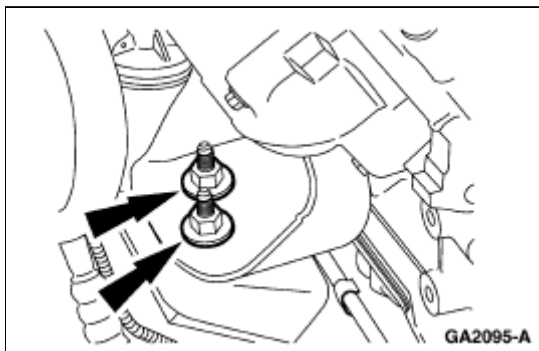
 ST1831-A	Lifting Eyes 303-D030 (D81L-6001-D)
 ST2425-A	3-Bar Engine Support Kit 303-F072

### Removal

1. Remove the engine cooling fan. For additional information, refer to [Section 303-03](#).
2. Remove the LH engine support insulator nuts.



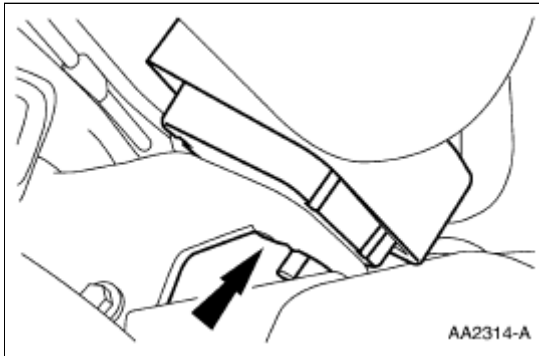
3. Remove the RH engine support insulator nuts.



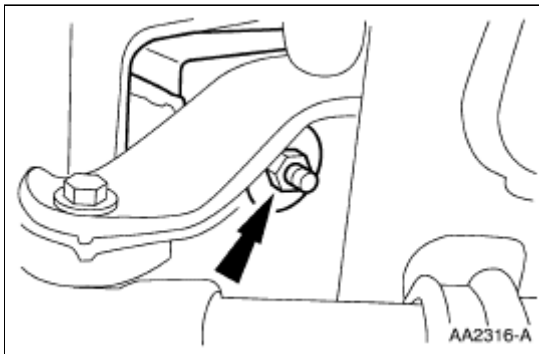
4. **NOTE:** The Lifting Eyes should be installed on the exhaust manifold studs for number one and number six cylinders.

Install the lifting eyes.

5. Raise the engine with the three bar engine support.
6. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
7. Remove the LH engine support insulator.

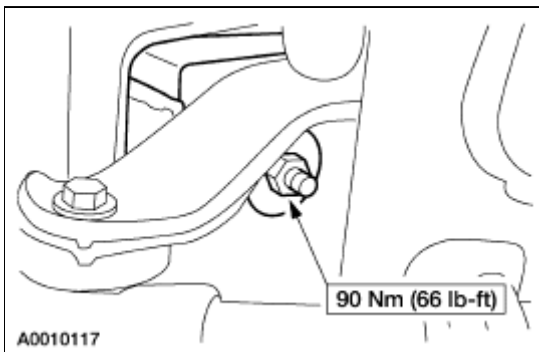


8. Remove the RH engine support insulator.

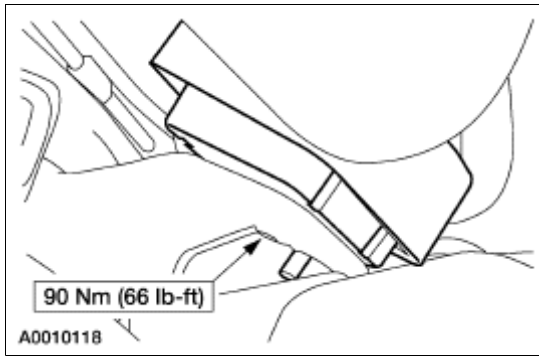


## Installation

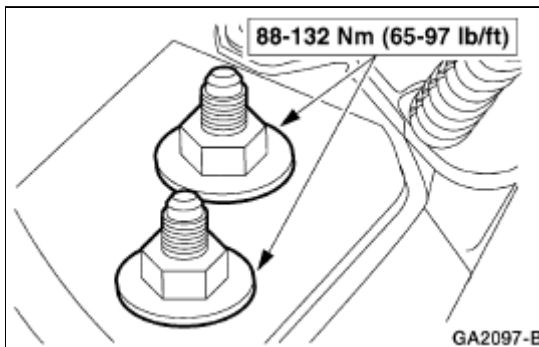
1. Install the RH engine support insulator.



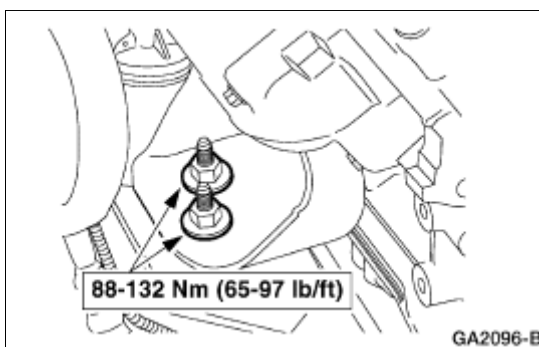
2. Install the LH engine support insulator.



3. Lower the vehicle.
4. Lower the engine and remove the three bar engine support.
5. Remove the lifting eyes from the exhaust manifold studs
6. Install the LH engine support insulator nuts.



7. Install the RH engine support insulator nuts.



8. Install the engine cooling fan. For additional information, refer to [Section 303-03](#).
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SECTION 303-01A: Engine — 4.0L Push Rod  
REMOVAL

2000 Explorer/Mountaineer Workshop Manual

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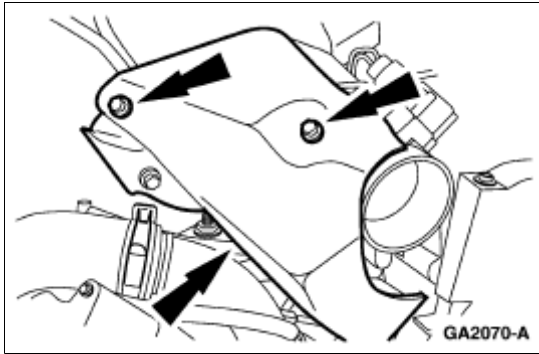
## Engine

### Special Tool(s)

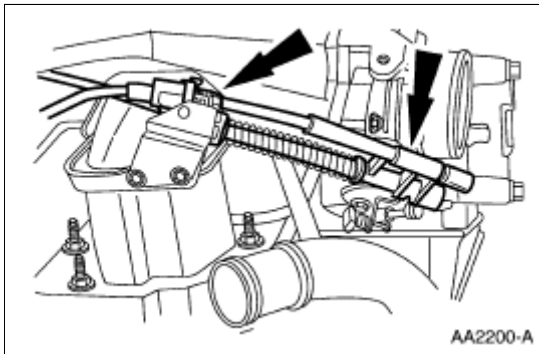
 ST1831-A	Lifting Eyes 303-D030 (D81L-6001-D) or equivalent
 ST1602-A	Spreader Bar 303-D089 (D93P-6001-A3) or equivalent

### Removal

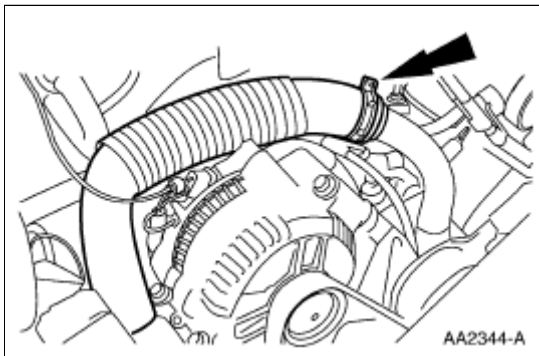
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Drain the engine cooling system. For additional information, refer to [Section 303-03](#).
3. Recover the A/C system. For additional information, refer to [Section 412-00](#).
4. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
5. Remove the radiator. For additional information, refer to [Section 303-03](#).
6. Remove the accessory drive belt. For additional information, refer to [Section 303-05](#).
7. Remove the hood.
8. Disconnect the power steering pressure hose.
9. Disconnect the power steering return hose.
10. Remove the accelerator cable snow shield.



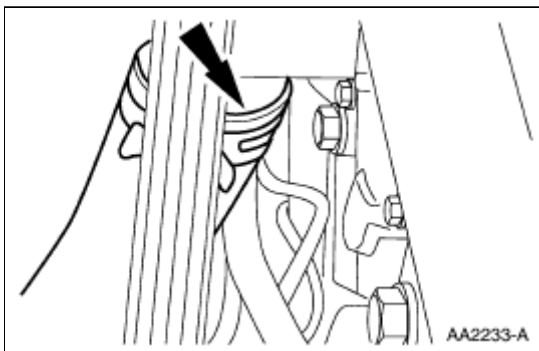
11. Disconnect the accelerator cable and the speed control cable (if equipped).



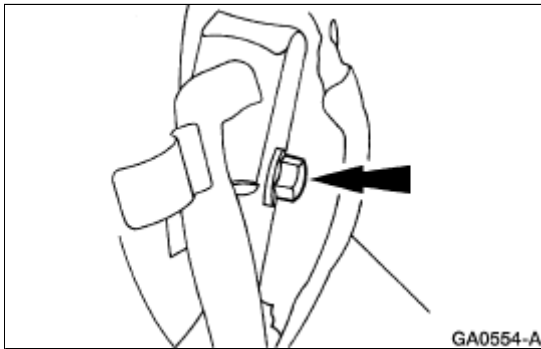
12. Remove the upper radiator hose.



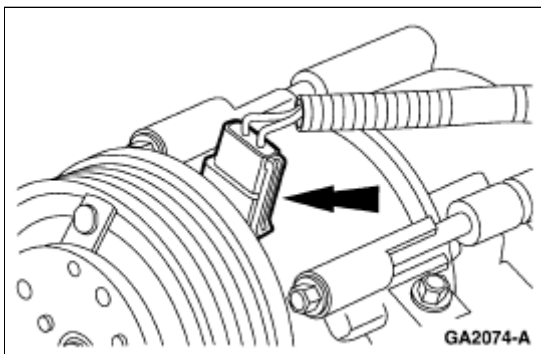
13. Remove the lower radiator hose.



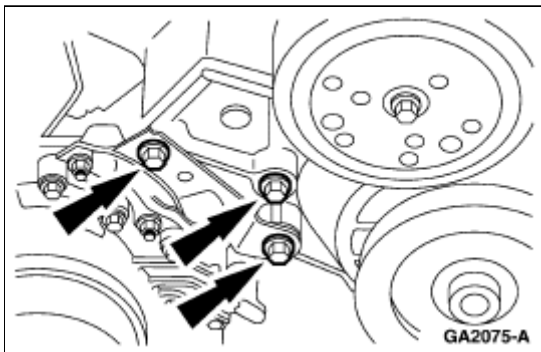
14. Loosen the bolt and remove the A/C manifold tube from the A/C compressor.



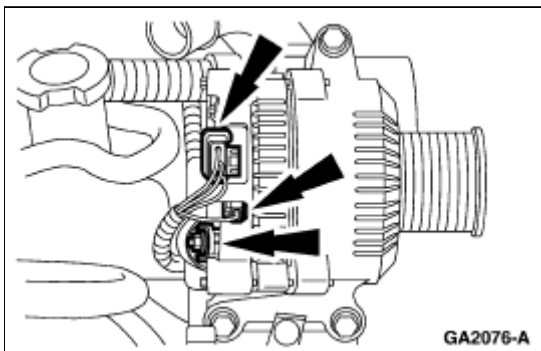
15. Disconnect the A/C compressor electrical connector.



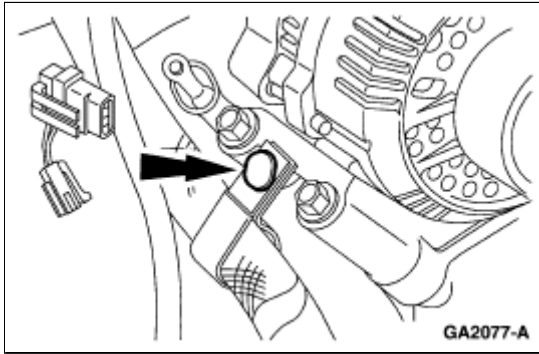
16. Remove the A/C compressor mounting bracket and position aside.



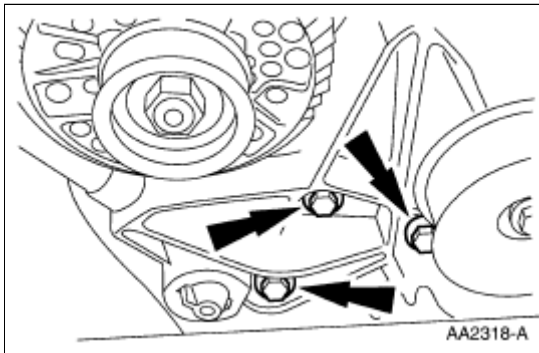
17. Disconnect the generator electrical connectors.



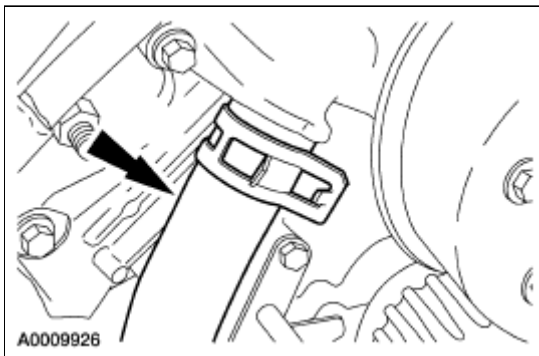
18. Disconnect the heater hose retaining clip.



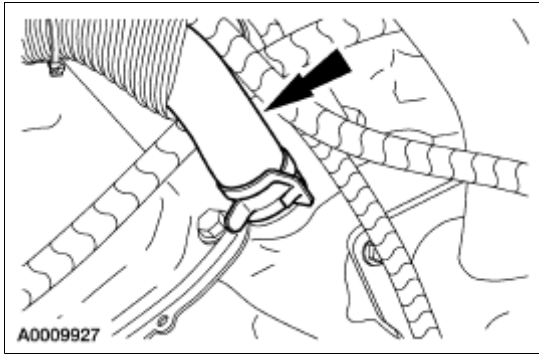
19. Remove the generator mounting bracket.



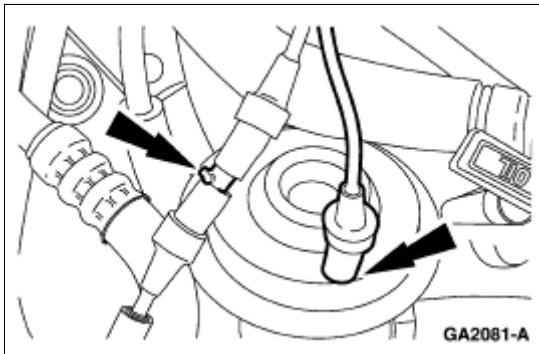
20. Disconnect the heater water hose from the water pump.



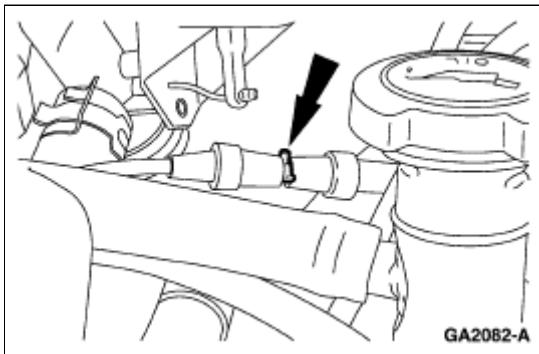
21. Disconnect the heater water hose from the lower intake manifold.



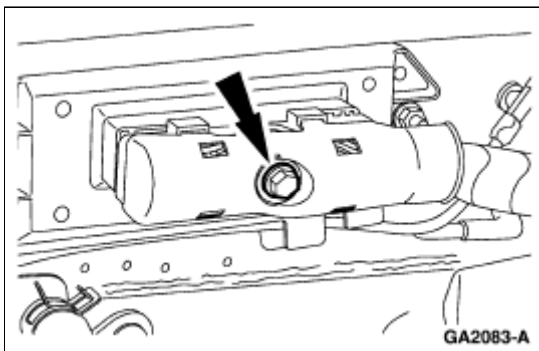
22. Disconnect the EGR valve vacuum connector and the LH vacuum connector.



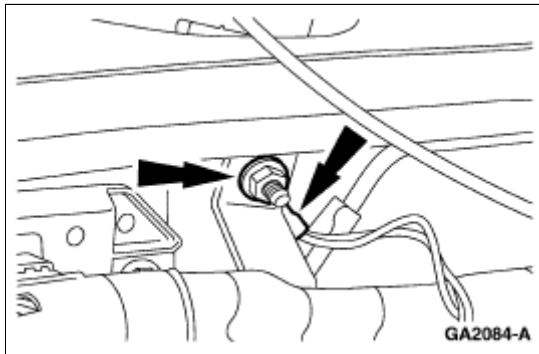
23. Disconnect the RH vacuum connector.



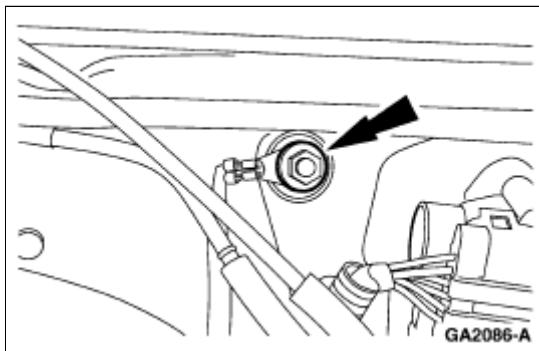
24. Disconnect the powertrain control module (PCM) electrical connector.



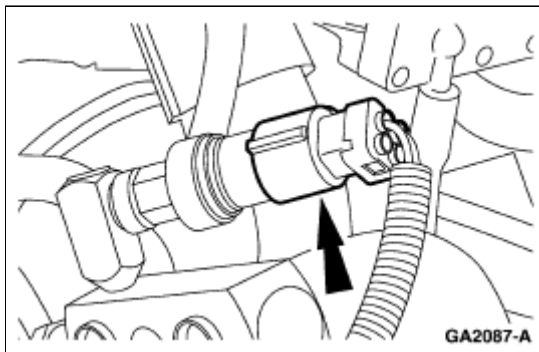
25. Remove the engine harness ground wire.



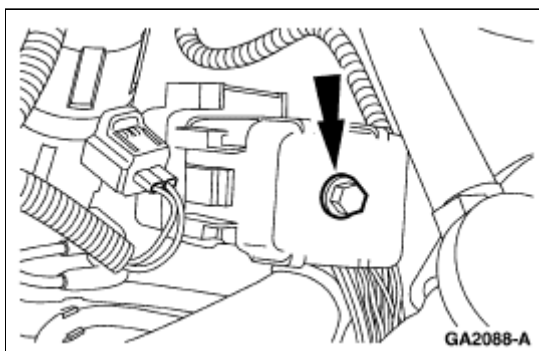
26. Remove the engine-to-body ground wire.



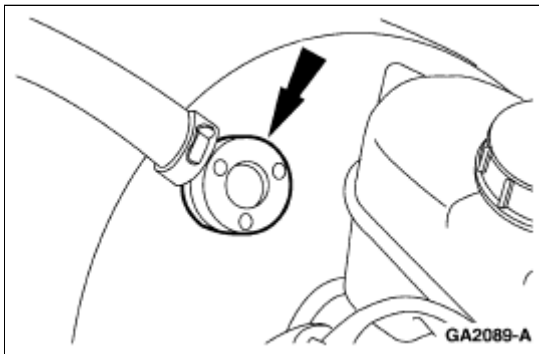
27. Disconnect the A/C high pressure switch electrical connector.



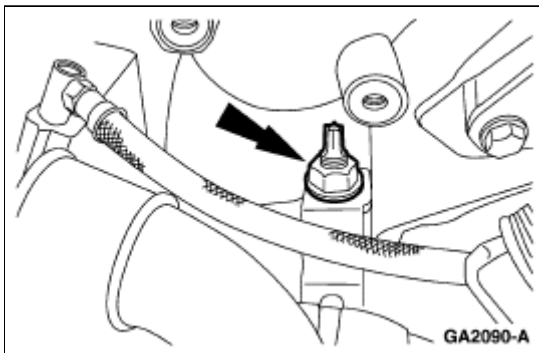
28. Disconnect the bulkhead connector.



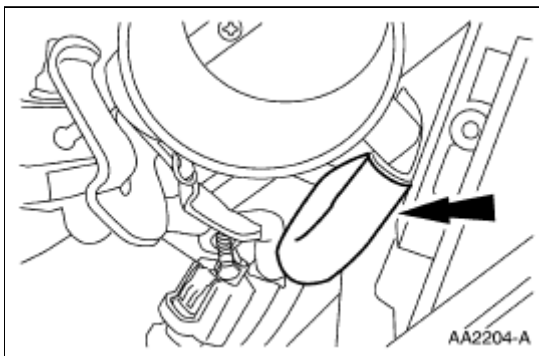
29. Disconnect the fuel line. For additional information, refer to [Section 310-00](#).
30. Disconnect the vacuum connector from the brake booster.



31. Disconnect the generator harness clip and position the harness aside.

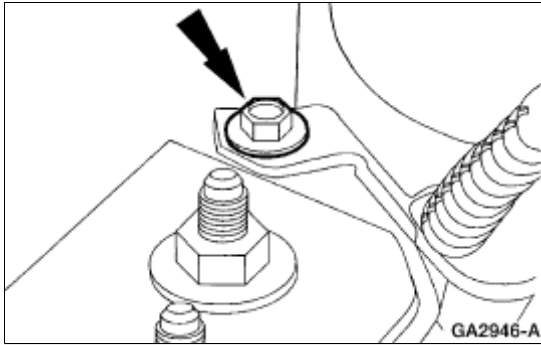


32. Disconnect the canister purge line.

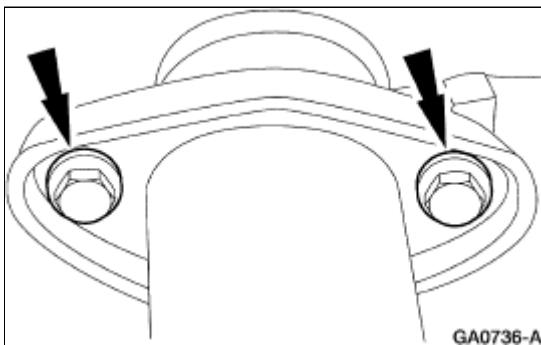


33. Position the battery cable bracket aside.

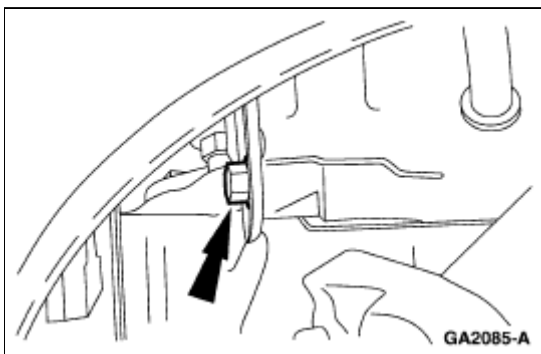




34. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
35. Remove the four RH and LH exhaust manifold bolts.

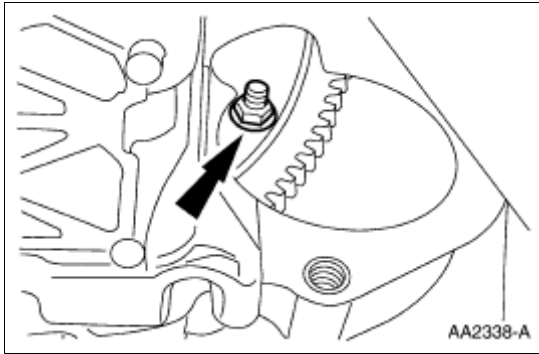


36. Disconnect the heated oxygen sensors.
37. Access the A/C manifold tube bracket through the RH wheel well and remove the bolt.



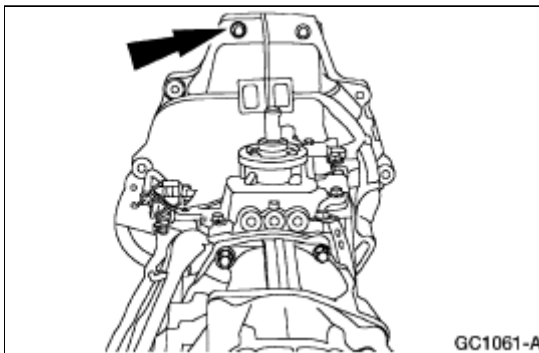
38. Remove the starter motor. For additional information, refer to [Section 303-06](#).
39. **NOTE:** For automatic transmission only.

Remove the four nuts.



40. Disconnect the transmission harness electrical connectors.
41. **NOTE:** Manual transmission is shown; automatic transmission is similar.

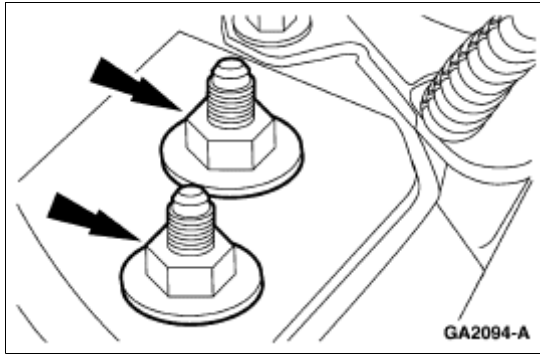
Remove the nine engine to transmission bolts.



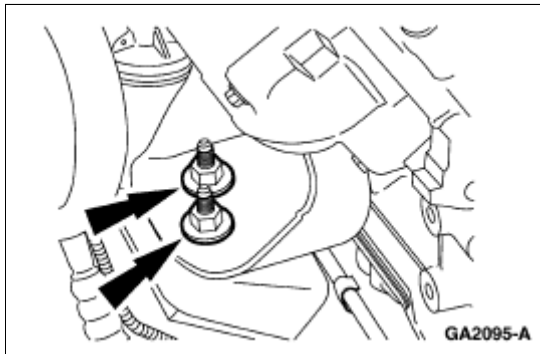
42. Drain the engine oil.
43. Lower the vehicle.
44. **NOTE:** The Lifting Eyes should be installed on the exhaust manifold studs for number one and number six cylinders.

Install the lifting eyes.

45. Support the engine with a floor crane.
46. Support the transmission with a suitable floor jack.
47. Remove the LH engine support insulator nuts.



48. Remove the RH engine support insulator nuts.



49. Remove the engine from the vehicle.
50. **NOTE:** For manual transmissions.

Remove the clutch. For additional information, refer to [Section 308-01](#).

51. **NOTE:** For automatic transmissions.

Remove the flywheel.

52. Remove the spacer plate.

53. Install the engine on a workstand.
-

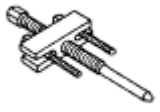
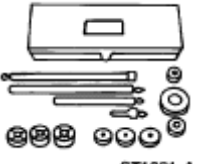


SECTION 303-01A: Engine — 4.0L Push Rod  
DISASSEMBLY

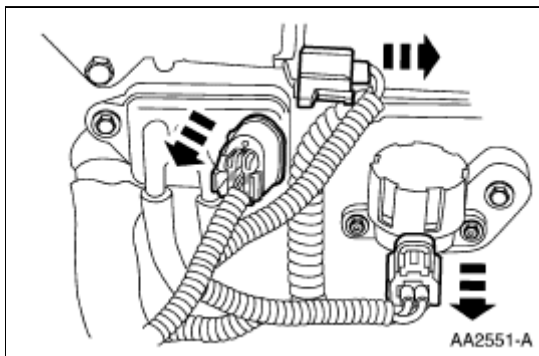
2000 Explorer/Mountaineer Workshop Manual

## Engine

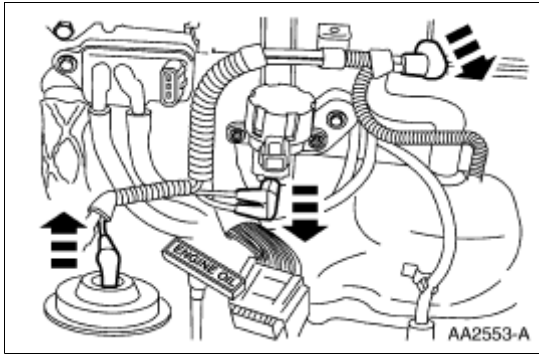
### Special Tool(s)

 ST1784-A	Crankshaft Damper Remover 303-101 (T74P-6316-A)
 ST1381-A	Camshaft Bearing Service Set 303-017 (T65L-6250-A)

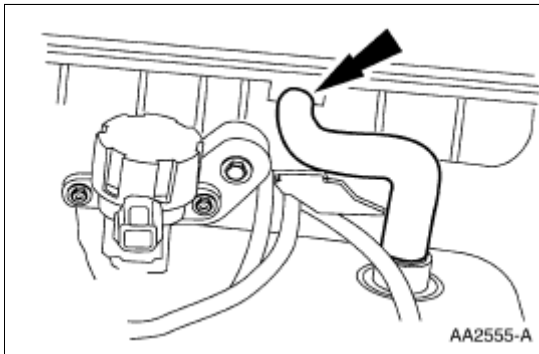
1. Disconnect the electrical connectors:
  - idle air control (IAC) valve
  - EGR transducer
  - EGR solenoid



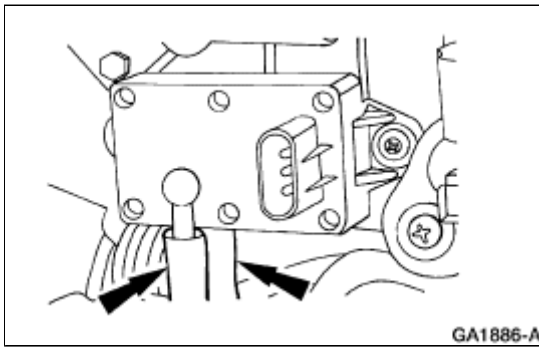
2. Disconnect the vacuum line connections:
  - EGR solenoid
  - upper intake manifold
  - EGR valve



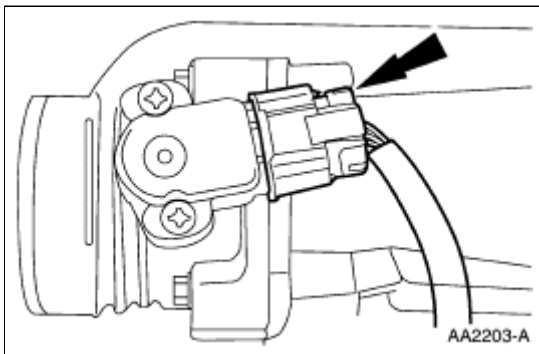
3. Disconnect the crankcase ventilation tube.



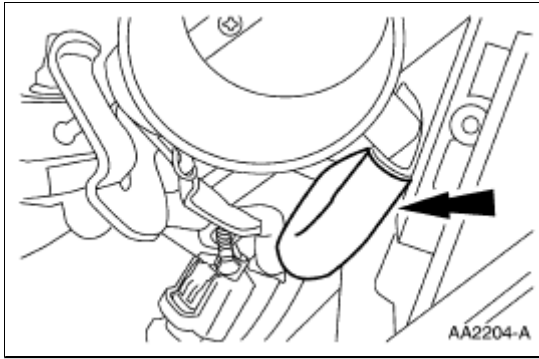
4. Disconnect the EGR sensor hoses.



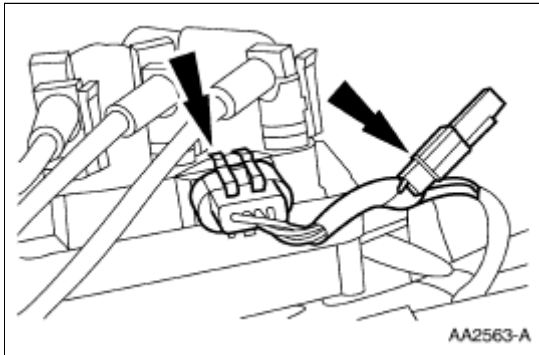
5. Disconnect the throttle position (TP) sensor electrical connector.



6. Disconnect the canister purge line from the throttle body.



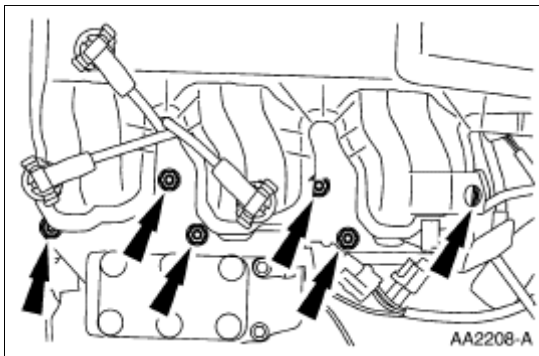
7. Disconnect the ignition coil and the radio ignition interference capacitor electrical connectors.



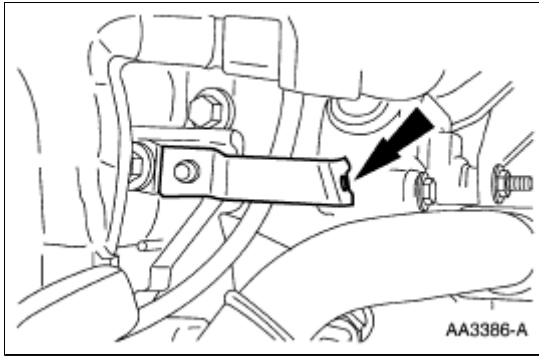
8. **NOTE:** Spark plug wires must be connected to the correct ignition coil terminals and spark plugs. Mark spark plug wires before removing them.

Disconnect the spark plug wires from the spark plugs and the ignition coils.

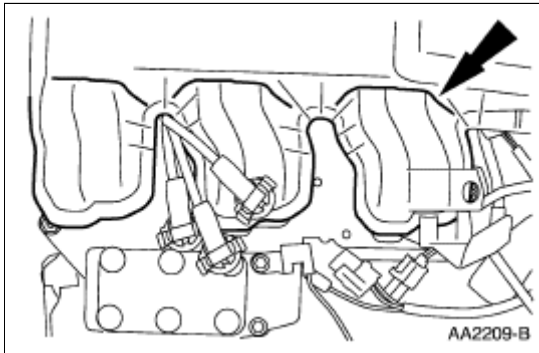
9. Remove the nuts.



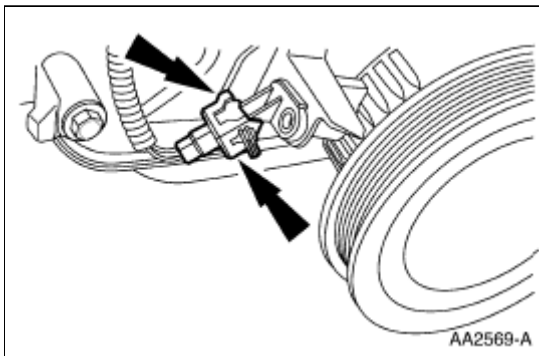
10. Detach the fuel line bracket.



11. Remove the upper intake manifold.

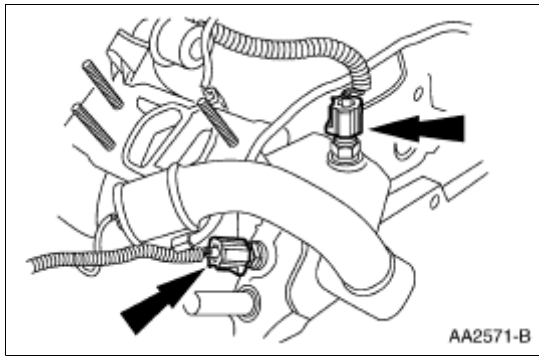


12. Inspect and install a new gasket if necessary.
13. Disconnect the crankshaft position (CKP) sensor electrical connector.

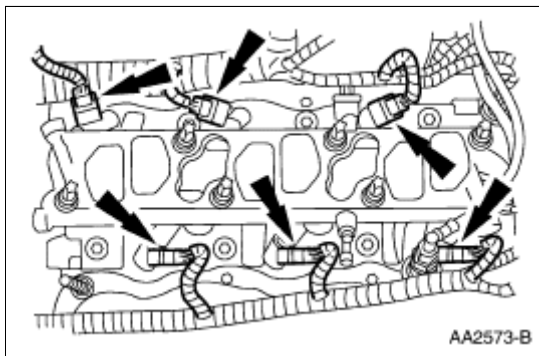


14. Disconnect the electrical connectors:
- engine coolant temperature (ECT) sensor
  - water temperature sender unit

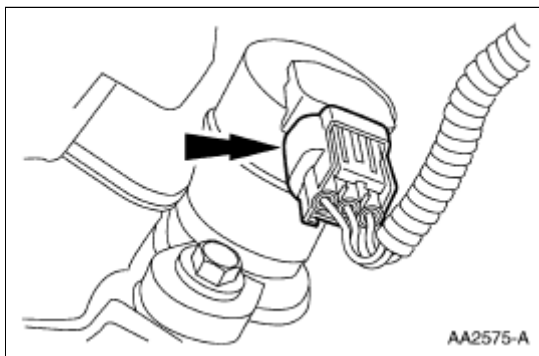




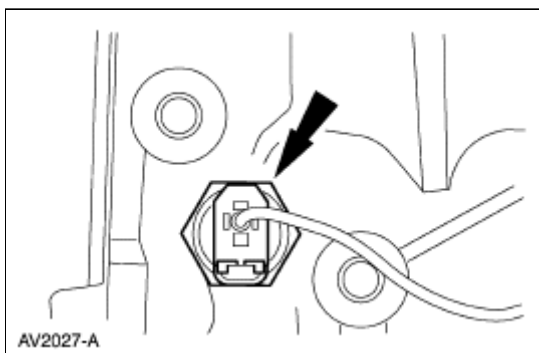
15. Disconnect the fuel injector electrical connectors.



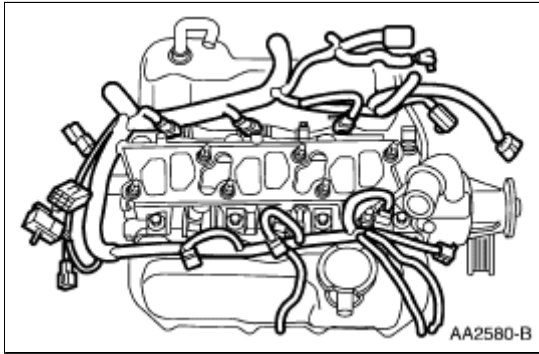
16. Disconnect the camshaft position (CMP) sensor electrical connector.



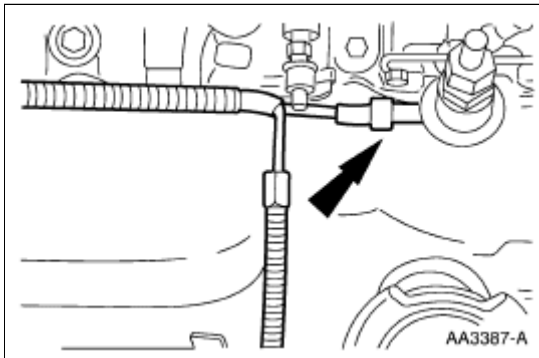
17. Disconnect the oil pressure sensor electrical connector and remove the sensor.



18. Remove the engine control sensor wiring.

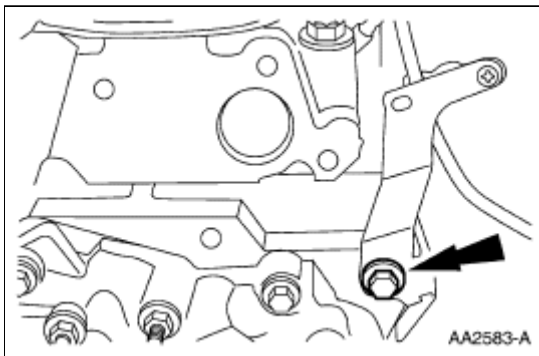


19. Disconnect the vacuum line and remove the vacuum line harness.

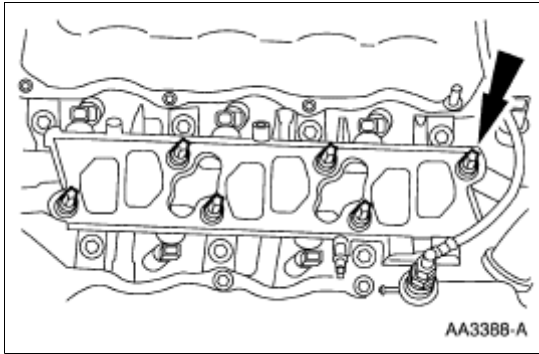


20. Remove the fan clutch and fan blade assembly. For additional information, refer to [Section 303-03](#).

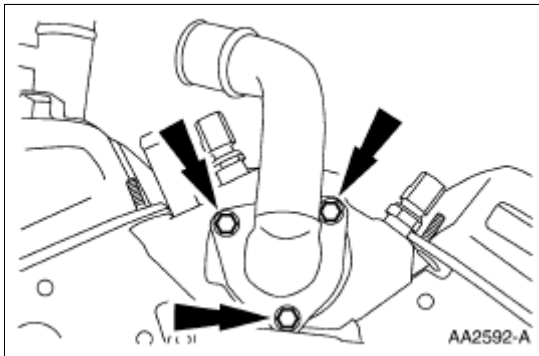
21. Remove the bolt.



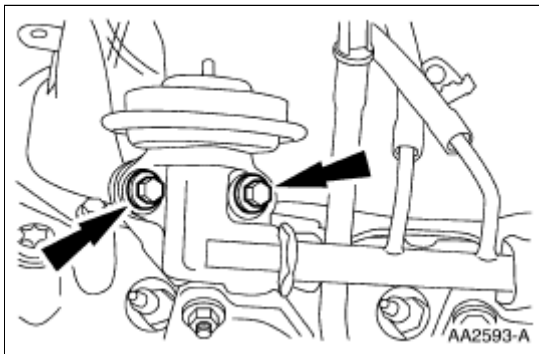
22. Remove the fuel injection supply manifold, the fuel injectors and discard the gasket.



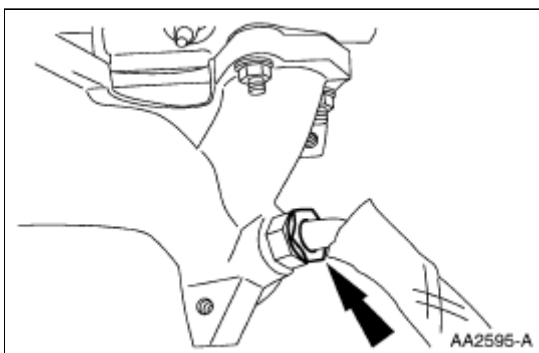
23. Remove the water hose connection and the water thermostat.



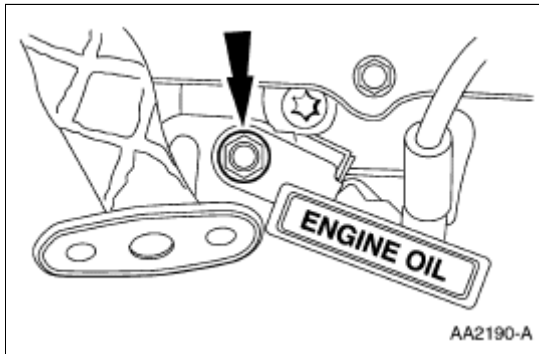
24. Remove the bolts.



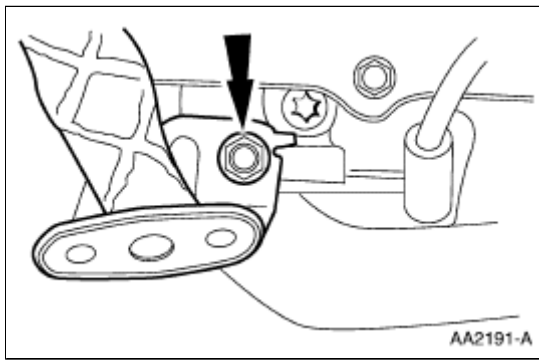
25. Disconnect the EGR valve to exhaust manifold tube.



26. Remove the oil level indicator tube.

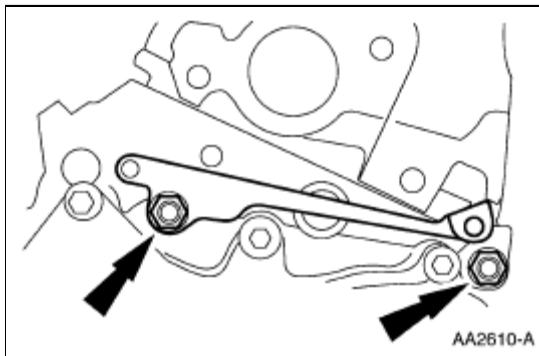


27. Remove the EGR outlet tube and the bracket.



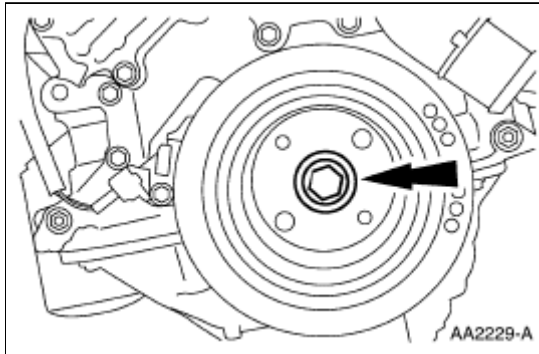
28. Remove the RH and LH exhaust manifolds and gaskets. For additional information, refer to [Exhaust Manifold—RH](#) and [Exhaust Manifold—LH](#) in this section.

29. Remove the wiring harness retainer bracket.

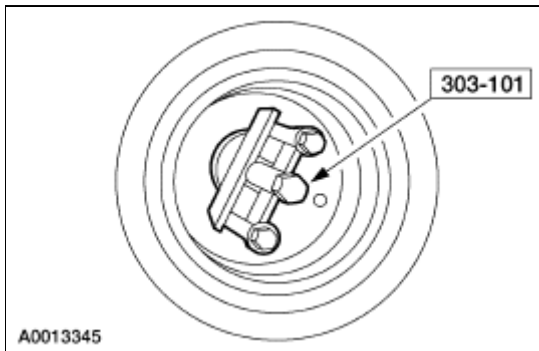


30. Remove the engine mount brackets. For additional information, refer to [Engine Support Insulators](#) in this section.
31. Remove the drive belt. For additional information, refer to [Section 303-05](#).
32. Remove the belt tensioner. For additional information, refer to [Section 303-05](#).
33. Remove the alternator and bracket. For additional information, refer to [Section 414-02](#).

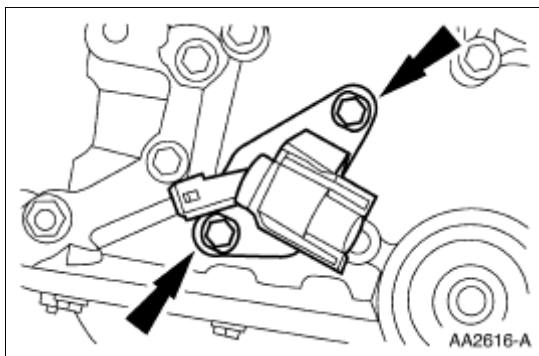
34. Remove the power steering and A/C bracket. For additional information, refer to [Section 211-02](#).
35. Remove the bolt.
  - Discard the bolt.



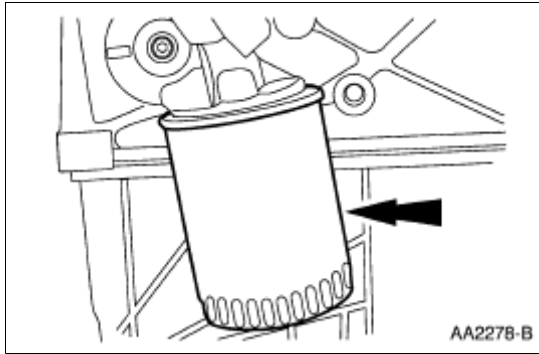
36. Using the special tool, remove the crankshaft pulley.



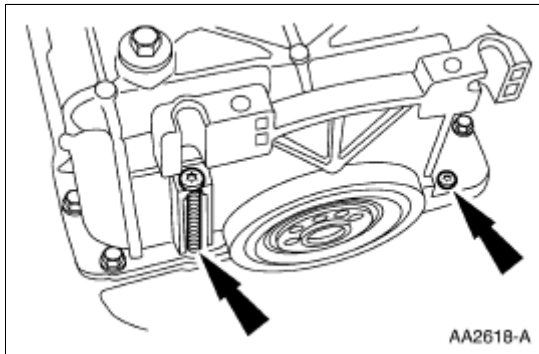
37. Remove the crankshaft position (CKP) sensor.



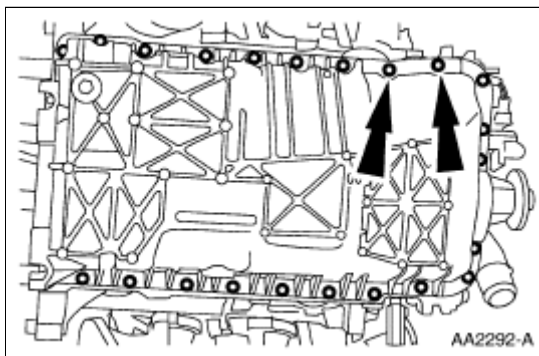
38. Remove the oil filter.



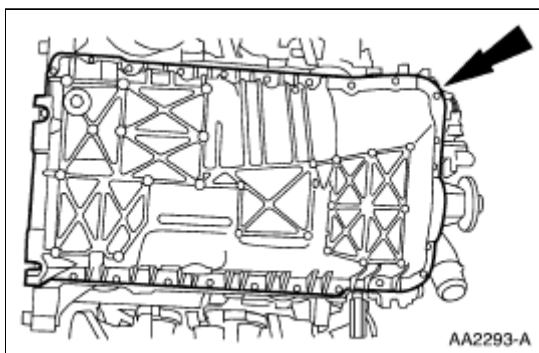
39. Remove the bolts.



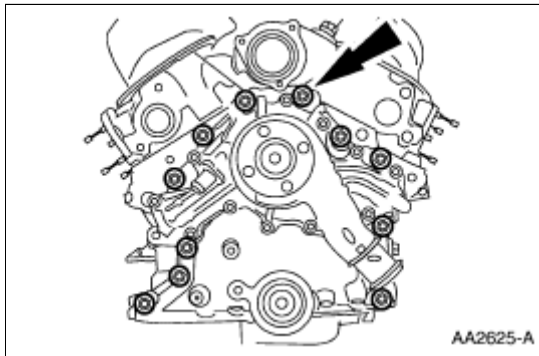
40. Remove the bolts and the nuts.



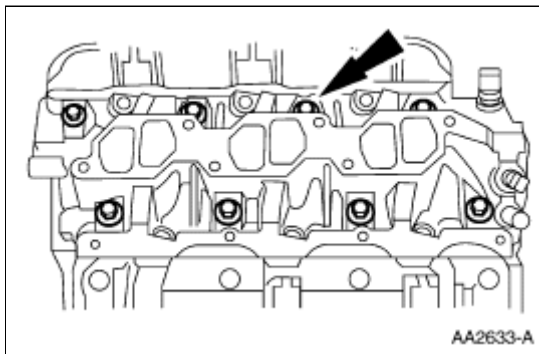
41. Remove the oil pan and the gasket.



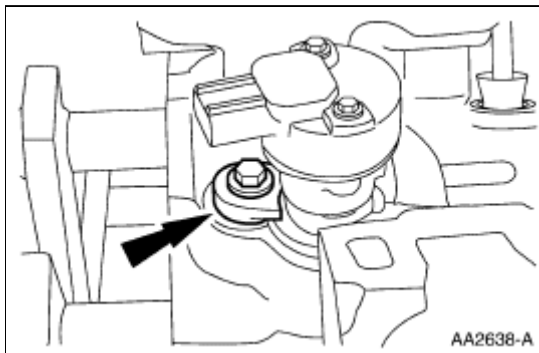
42. Remove the front cover and the gasket.




43. Remove the RH and the LH valve covers and the gaskets.
44. Remove the lower intake manifold and the gasket.

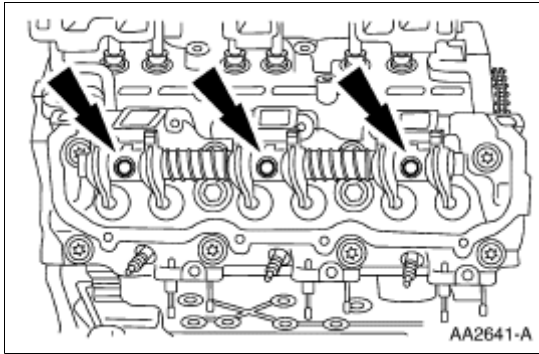


45. Remove the camshaft synchronizer.



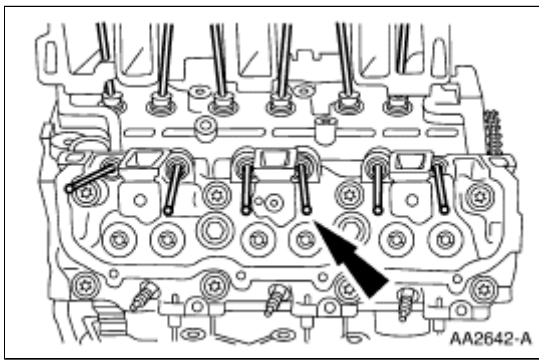
46.  **CAUTION:** If the rocker arm shaft is not loosened gradually, the shaft may become bent during removal.

Remove the RH and the LH rocker arm shafts.

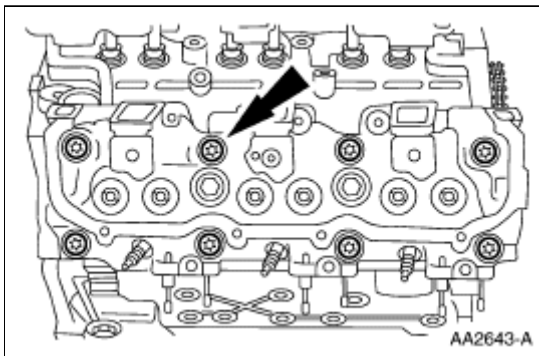


47. **NOTE:** Mark the push rods to make sure they are reinstalled in their correct location.

Remove the push rods.



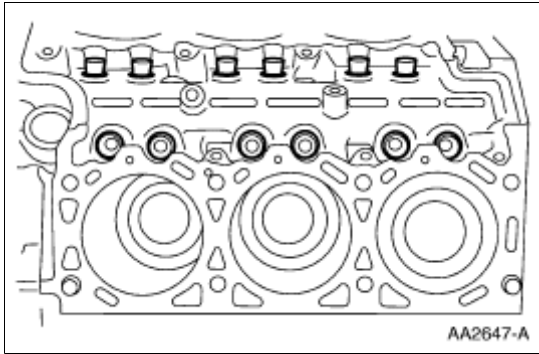
48. Remove the cylinder heads and the gaskets.



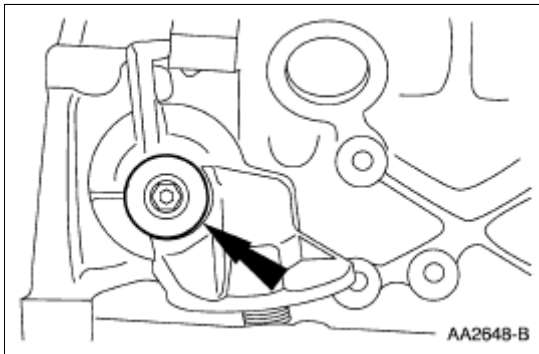
49. **NOTE:** Mark the valve tappets to make sure they are reinstalled in their original location.

Remove the valve tappets.

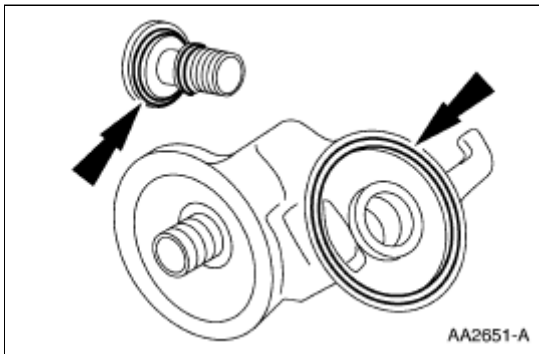




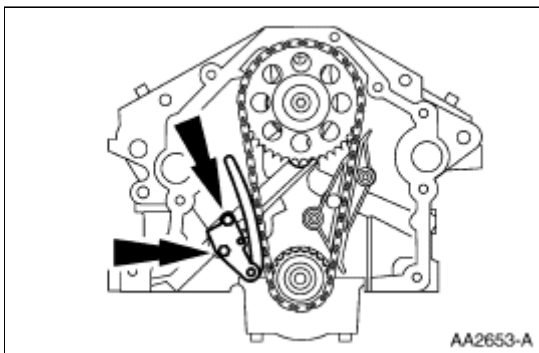
50. Remove the oil filter adapter.



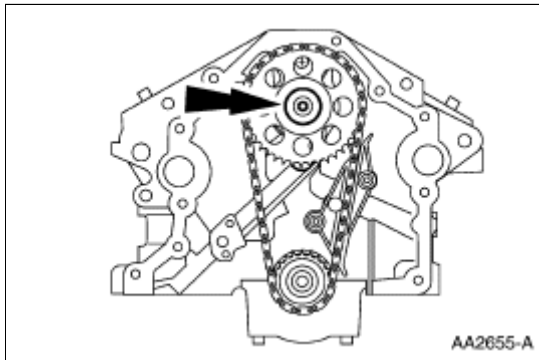
51. Inspect and install new O-ring seals if necessary.



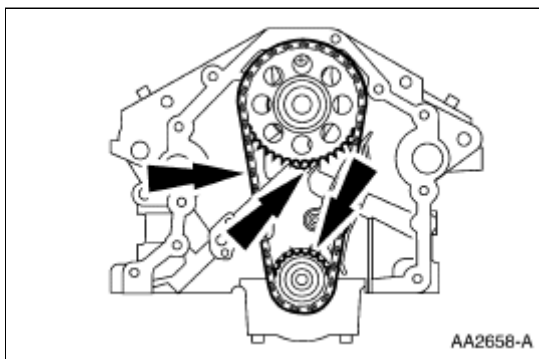
52. Remove the timing chain tensioner.



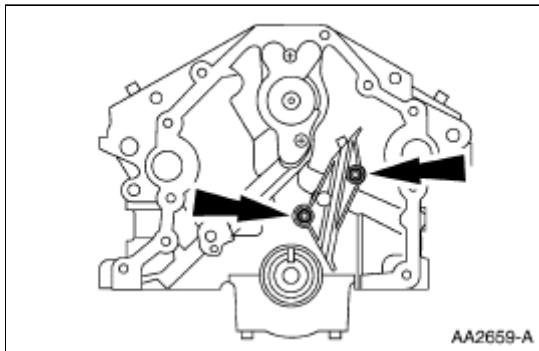
53. Remove the bolt.



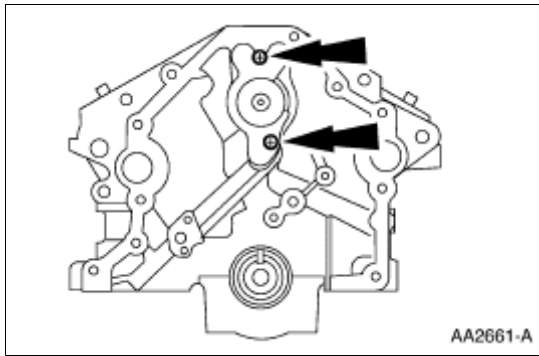
54. Remove the camshaft sprocket and the crankshaft sprocket with the timing chain.



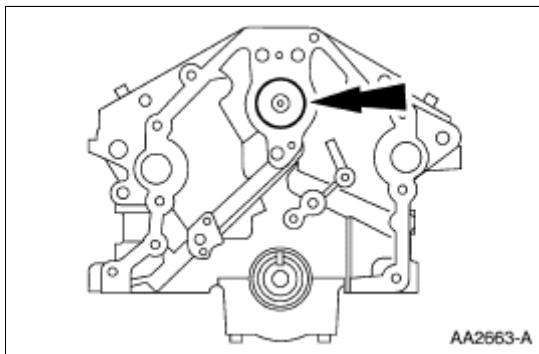
55. Remove the timing chain guide.



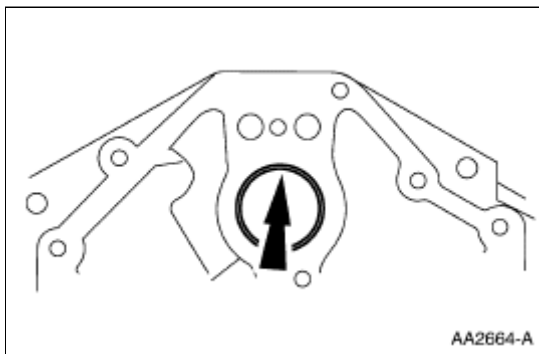
56. Remove the camshaft thrust plate.



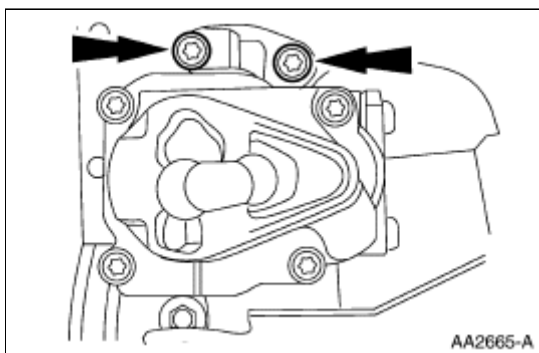
57. Remove the camshaft.



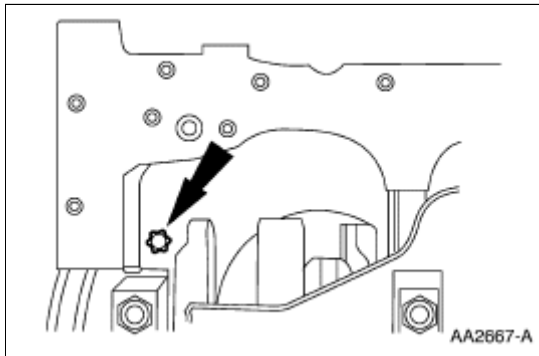
58. Use the Camshaft Bearing Remover to remove the camshaft bearings.



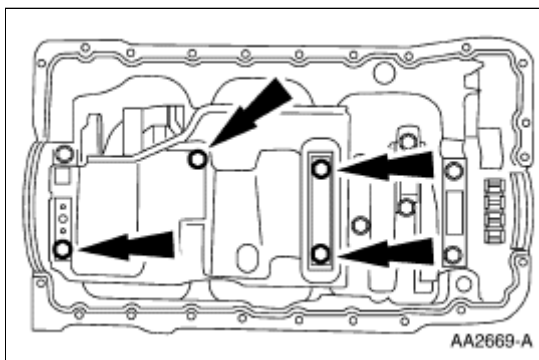
59. Remove the oil pump.



60. Remove the oil pump shaft.

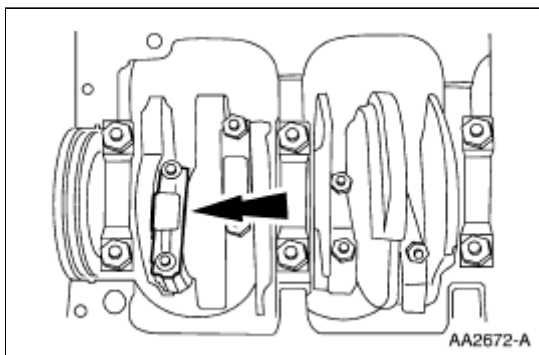


61. Remove the oil baffle assembly.

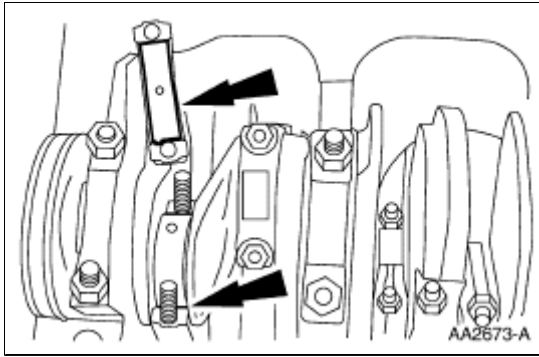


62. **NOTE:** Mark the connecting rod caps so they can be reinstalled in their original position.

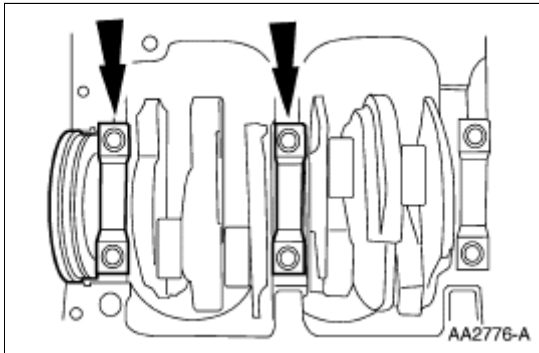
Remove the connecting rod caps.



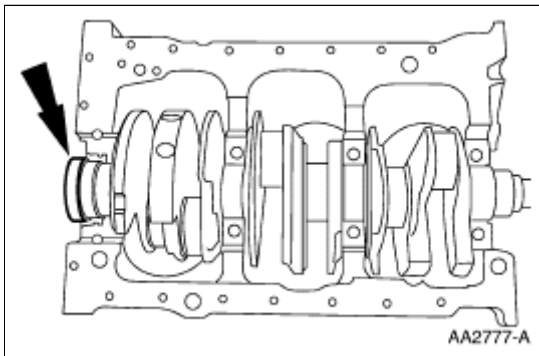
63. Remove the connecting rod bearings.



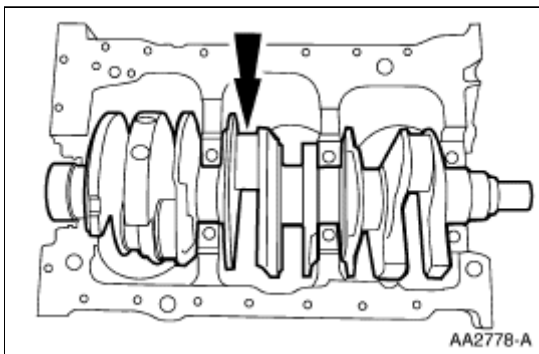
64. Remove the crankshaft main bearing caps.



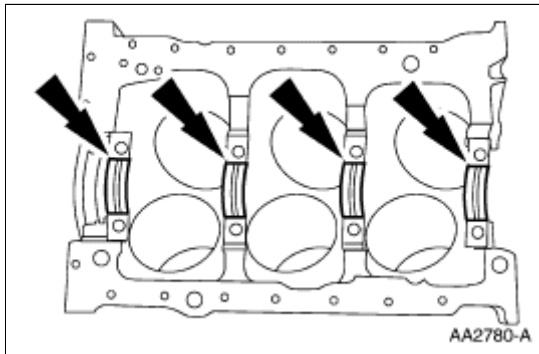
65. Remove the crankshaft rear oil seal.




66. Remove the crankshaft.

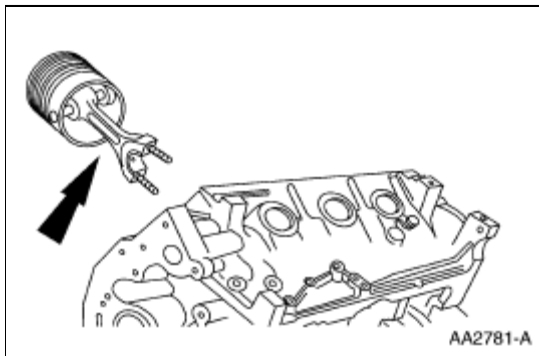


67. Remove the crankshaft main bearings and the crankshaft thrust main bearing.



68.  **CAUTION:** Place a rubber hose over the connecting rod studs to protect the crankshaft journals and the cylinder walls from being damaged.

Remove the piston connecting rod assembly.



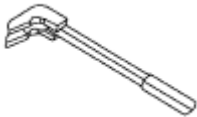

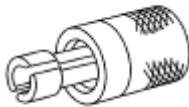


SECTION 303-01A: Engine — 4.0L Push Rod  
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

2000 Explorer/Mountaineer Workshop Manual

## Cylinder Head

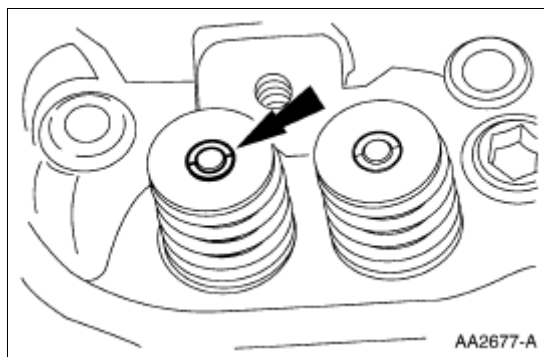
### Special Tool(s)

 ST1824-A	Valve Stem Seal Replacer 303-370 (T90T-6571-A)
 ST1795-A	Spring Compressor Bar 303-105 (T74P-6565-B)
 ST1794-A	Valve Spring Compressor 303-104 (T74P-6565-A)
 ST1187-A	Impact Hammer 307-005 (T59L-100-B)
 ST2114-A	Valve Seal Remover 303-075 (T72J-6571)

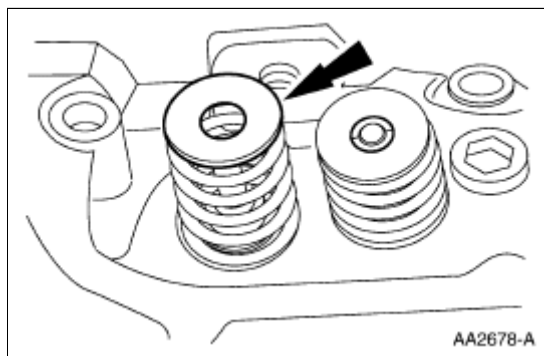
### Disassembly

**NOTE:** All of the valve components must be marked and reinstalled in their original location.

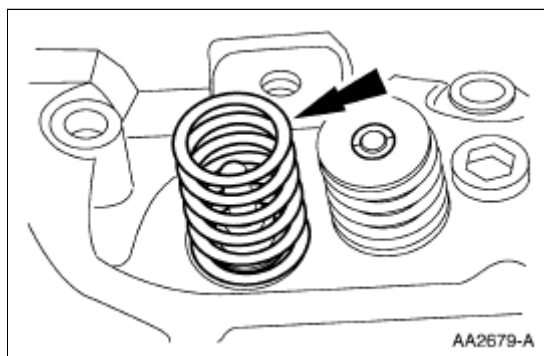
1. Using the Valve Spring Compressor Bar and the Valve Spring Compressor, remove the valve spring retainer key.



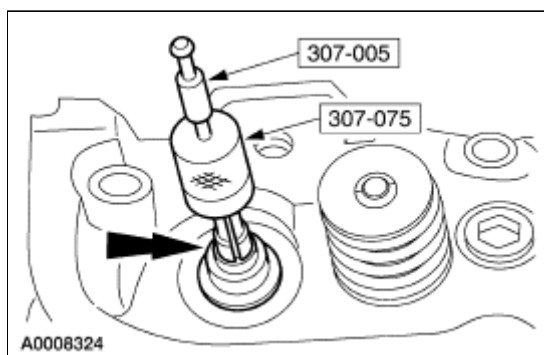
2. Remove the valve spring retainer.



3. Remove the valve spring.



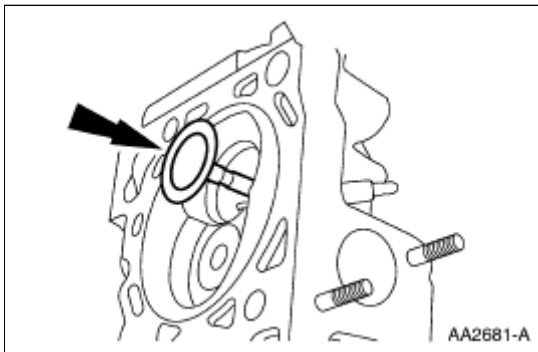
4. Using the special tools, remove the valve stem seal.





5. **NOTE:** Repeat the above procedure for each valve.

Remove the valve.

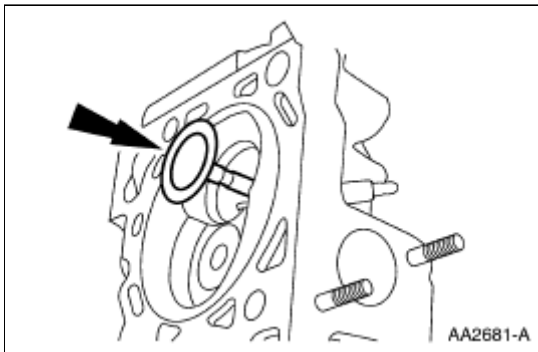


6. Inspect the valves and the valve spring; refer to [Section 303-00](#).
7. Inspect the valve guide and the valve seat; refer to [Section 303-00](#).

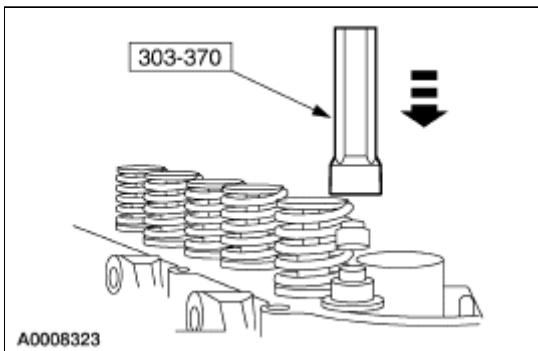
### Assembly

1. **NOTE:** The valve stem must be lubricated before installation. Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

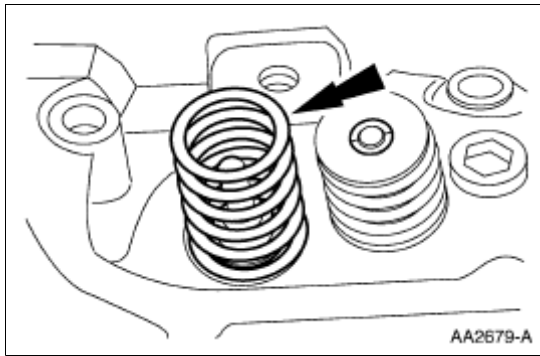
Install the valve.



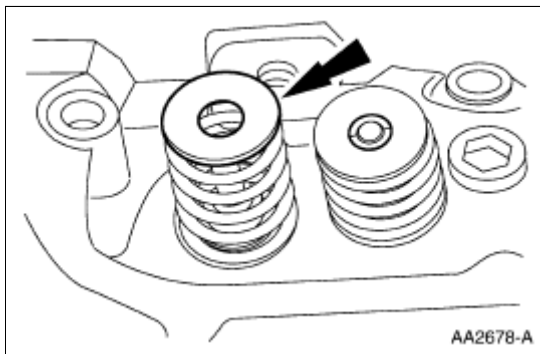
2. Using the special tool, install the valve stem seal.



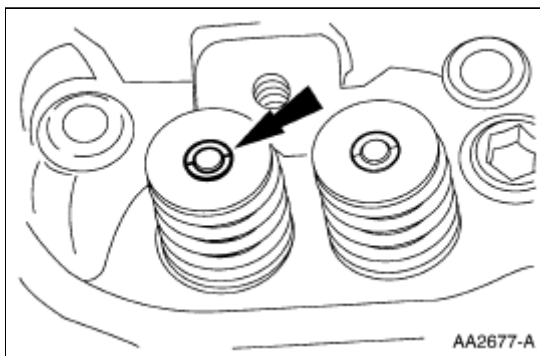
3. Install the valve spring.



4. Install the valve spring retainer.



5. Using the Valve Spring Compressor Bar and the Valve Spring Compressor, install the valve spring retainer key.



6. **NOTE:** Repeat the above procedure for each valve.

Inspect the valve spring installed length. For additional information, refer to [Section 303-00](#).

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SECTION 303-01A: Engine — 4.0L Push Rod  
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

2000 Explorer/Mountaineer Workshop Manual

## Piston —Piston Pin Connecting Rod, Press Fit

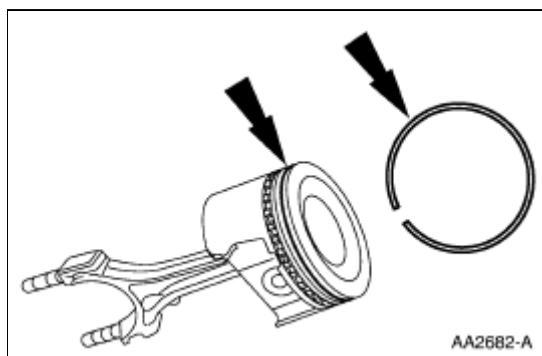
### Special Tool(s)

 ST1336-A	Pin Remover/Replacer 303-S024 (T68P-6135-A)
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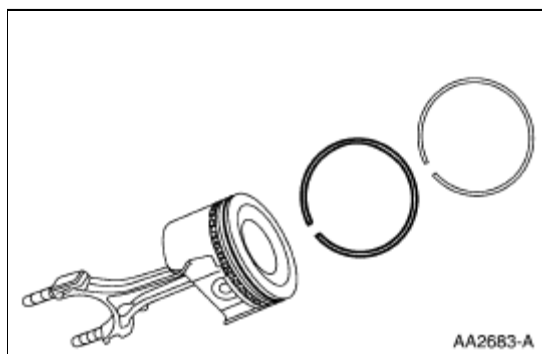
### Disassembly

1.  **CAUTION:** Use a suitable ring expander to remove piston rings to prevent damage.

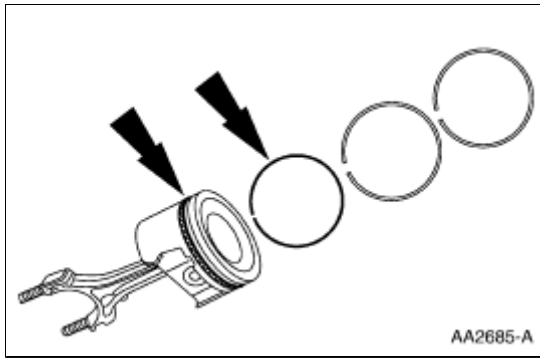
Remove the top compression ring.



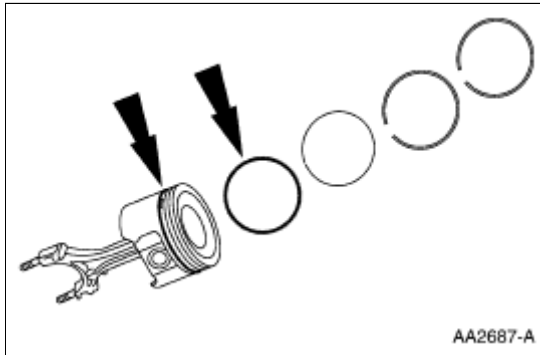
2. Remove the second compression ring.



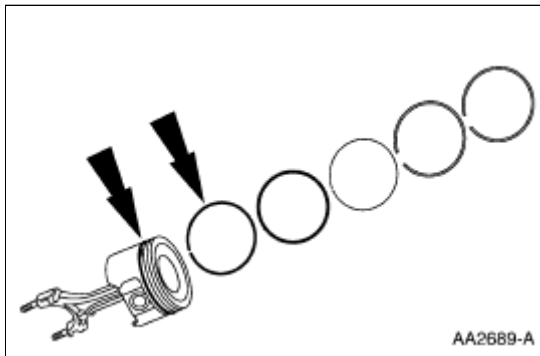
3. Remove the first oil control ring.



4. Remove the oil control spacer ring.



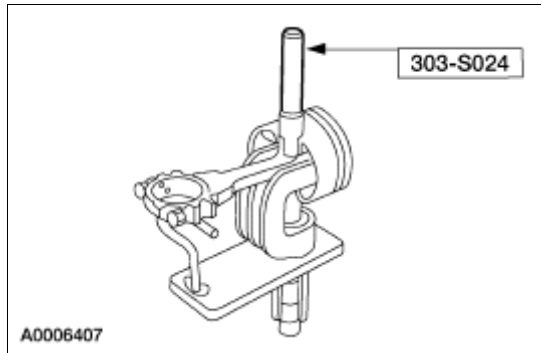
5. Remove the second oil control ring.



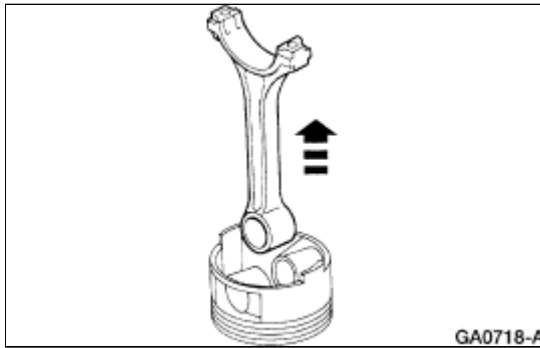
6.  **CAUTION: Do not re-use the piston or pin if removed or damage to the engine may occur.**

**NOTE:** Take note of piston connecting rod assembly and mark the connecting rod and piston to make sure of correct orientation during reassembly.

Using the special tool, press the piston pin out of the piston connecting rod assembly.



7. Remove the connecting rod from the piston.

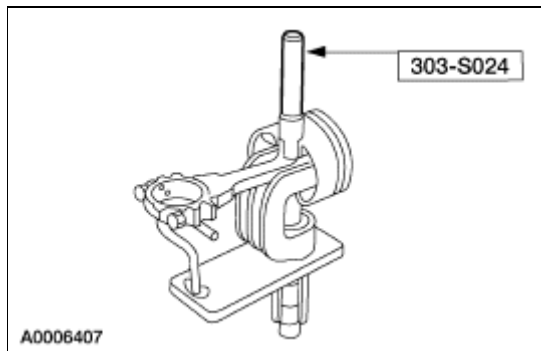


8. Clean and inspect the connecting rod. For additional information, refer to [Section 303-00](#).

### Assembly

1. Lubricate the new piston pin and new piston's pin bore.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
2. **NOTE:** During assembly the small end of the connecting rod must be heated to 232°-316°C (450°-600°F).

Using the special tool, press the piston pin into the piston and the connecting rod.

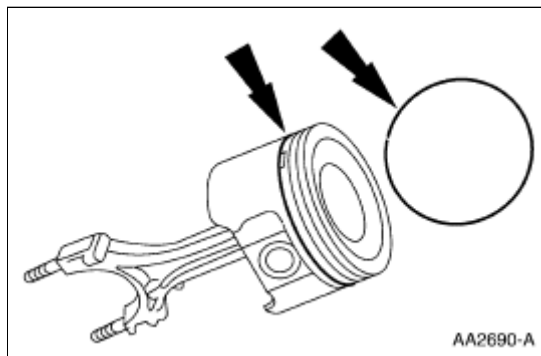


3. **NOTE:** Lubricate the piston and the piston rings with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

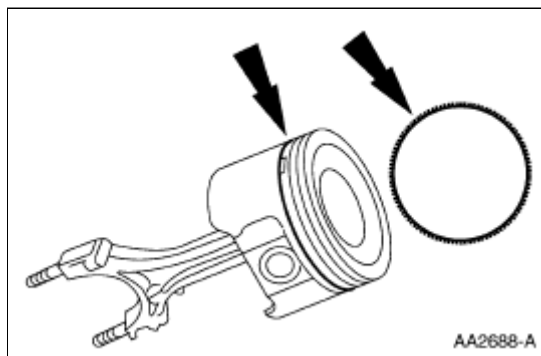
**NOTE:** Use a suitable ring expander to install the piston rings. Make sure ring end gaps are equally

spaced around the circumference of the piston for all piston rings.

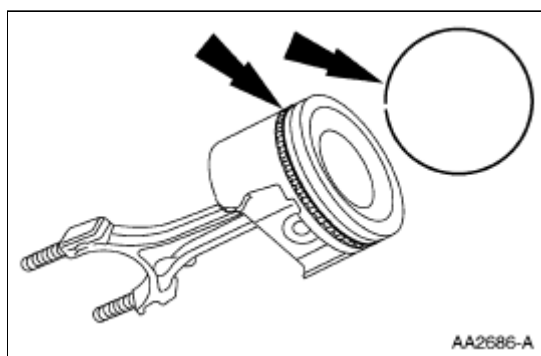
Install the second oil control ring.



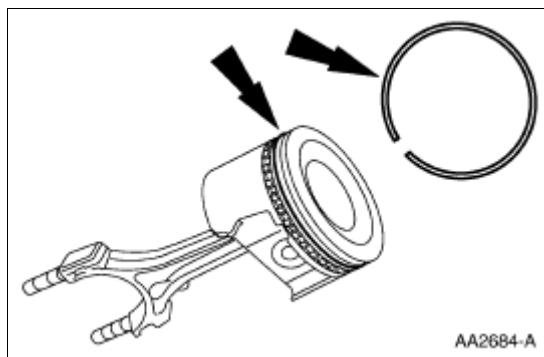
4. Install the oil control spacer ring.



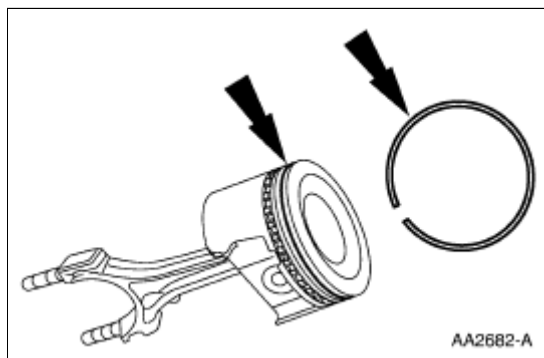
5. Install the first oil control ring.



6. Install the second compression ring.



7. Install the top compression ring.



8. Check piston ring end gap and ring-to-groove side clearance. For additional information, refer to [Section 303-00](#).
-

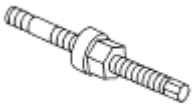
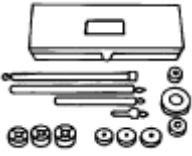


SECTION 303-01A: Engine — 4.0L Push Rod  
ASSEMBLY

2000 Explorer/Mountaineer Workshop Manual

## Engine

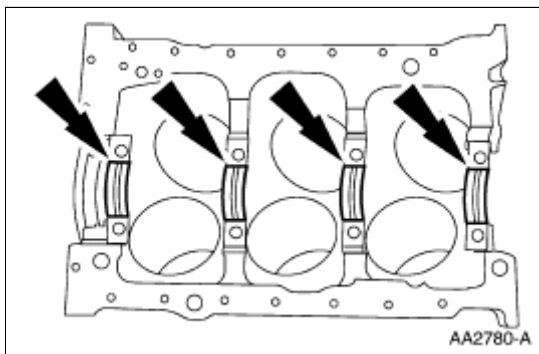
### Special Tool(s)

 <p>ST1287-A</p>	<p>Crankshaft Damper Replacer 303-102 (T74P-6316-B)</p>
 <p>ST1381-A</p>	<p>Camshaft Bearing Service Set 303-017 (T65L-6250-A)</p>

**NOTE:** Before engine assembly use Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A and a suitable plastic or wooden scraper to clean sealing surfaces. All sealing surfaces must be clean. Make sure coolant and oil passages are clear.

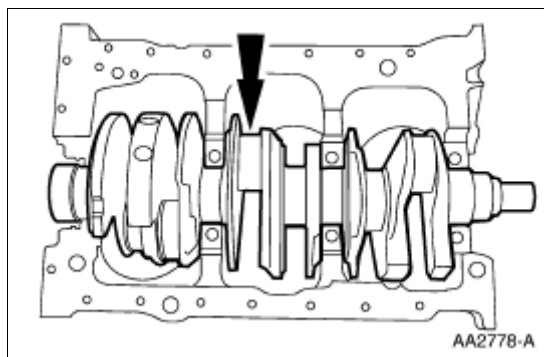
1. **NOTE:** All crankshaft components must be lubricated before installation.

Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G. Install the crankshaft main bearings and the crankshaft thrust main bearing.

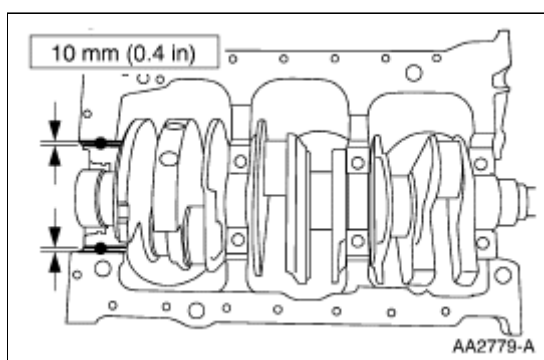


2. **NOTE:** The crankshaft main bearings are precise selective fit. Inspect bearing clearance. For additional information, refer to [Section 303-00](#).

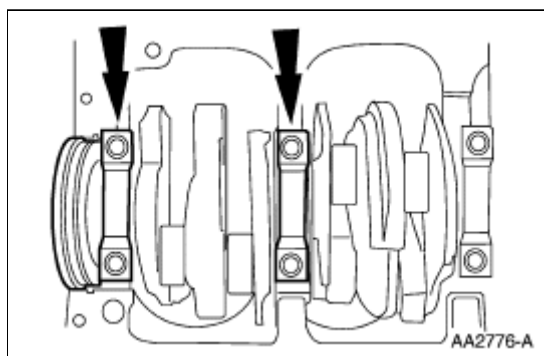
Install the crankshaft.



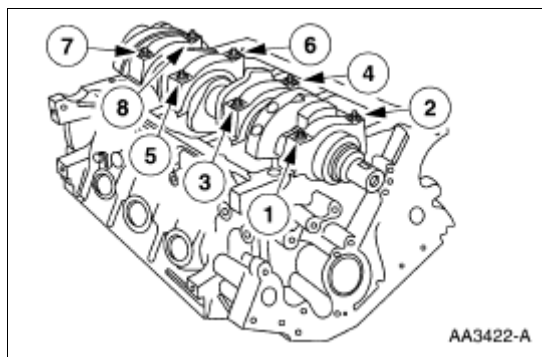
3. Apply silicone rubber in two places.
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.




4. Install the crankshaft main bearing caps.



5. Tighten the four bolts and the four studs in pairs in two steps:
1. Tighten to 35 Nm (25 lb-ft).
  2. Tighten to 97 Nm (72 lb-ft).

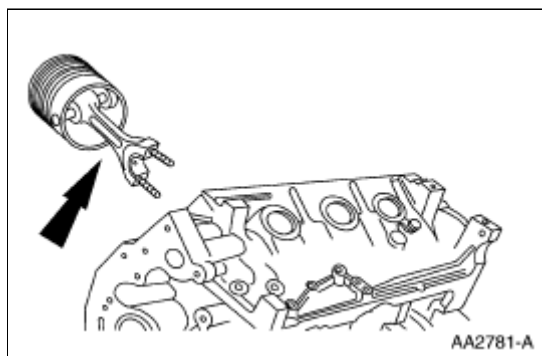


6.  **CAUTION:** Place a rubber hose over the connecting rod studs to protect the crankshaft journals and cylinder walls from being damaged.

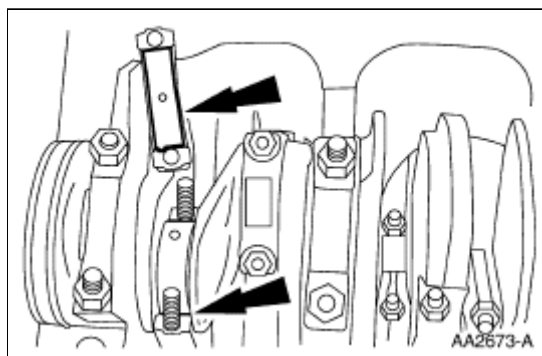
**NOTE:** Cylinder walls and piston must be lubricated. Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

**NOTE:** Position the piston with the notch in the piston head toward the front of the engine.

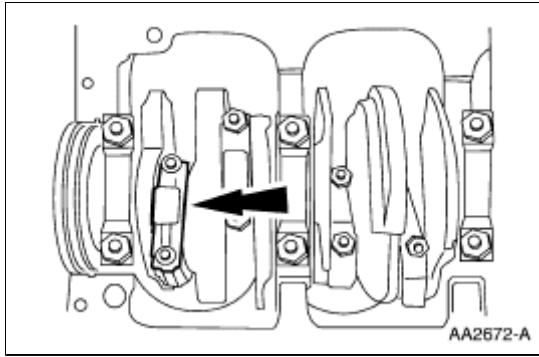
Install the piston connecting rod assembly using a suitable piston ring compressor.



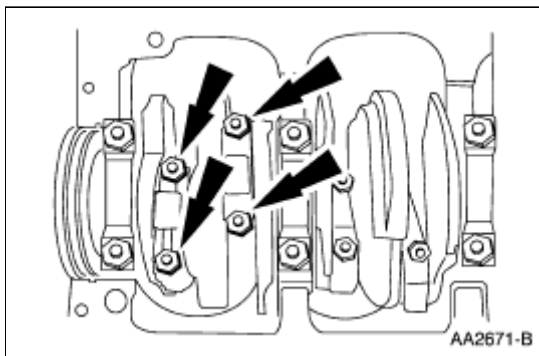
7. Install the connecting rod bearings.



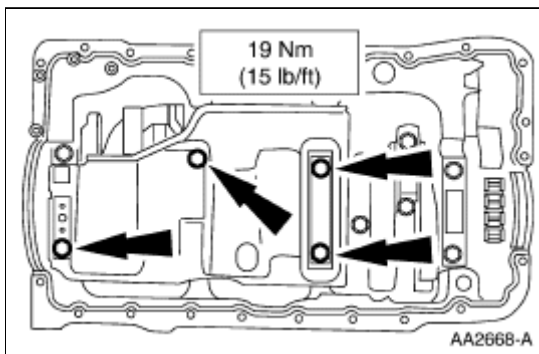
8. Install the connecting rod caps.
- For connecting rod component tests, refer to [Section 303-00](#).



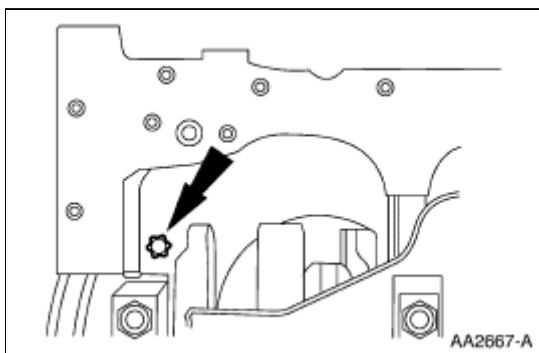
9. Install the nuts and tighten in two steps.
  1. Tighten to 20 Nm (15 lb-ft).
  2. Tighten an additional 90 degrees.



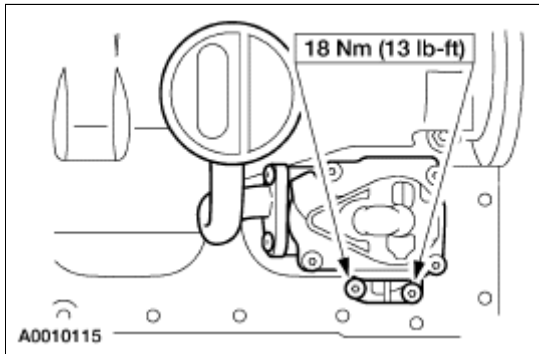
10. Install the oil baffle assembly.



11. Install the oil pump shaft.

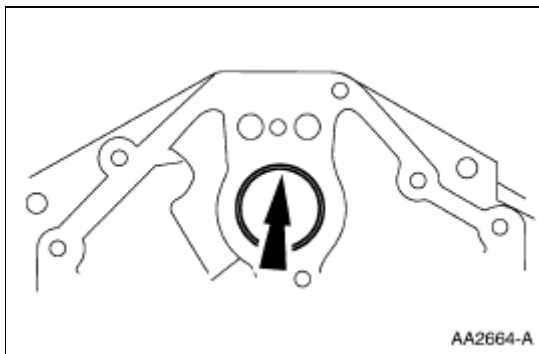


12. Install the oil pump.

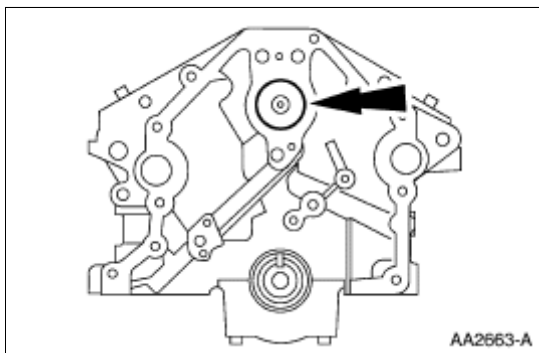


13. **NOTE:** All camshaft components must be lubricated before installation; use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

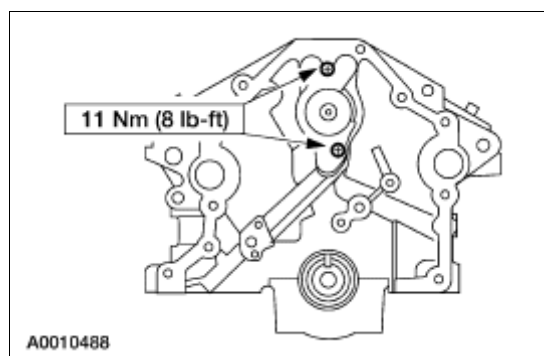
If removed, use the Camshaft Bearing Service Set and install the camshaft bearings.



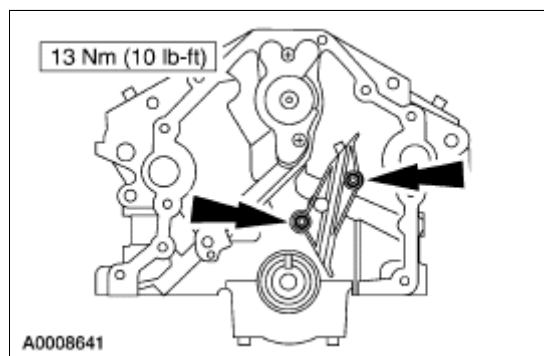
14. Install the camshaft.



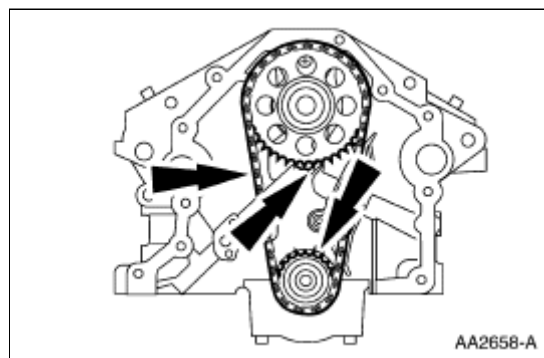
15. Install the camshaft thrust plate.



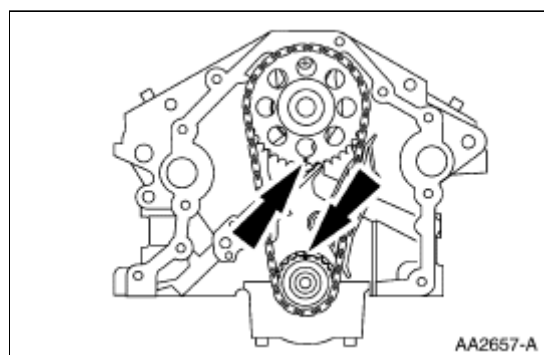
16. Install the timing chain guide.



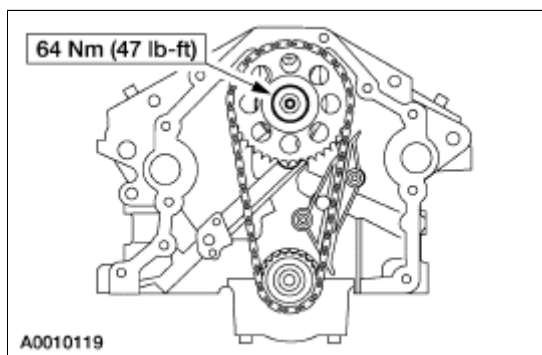
17. Install the camshaft sprocket and the crankshaft sprocket with the timing chain.



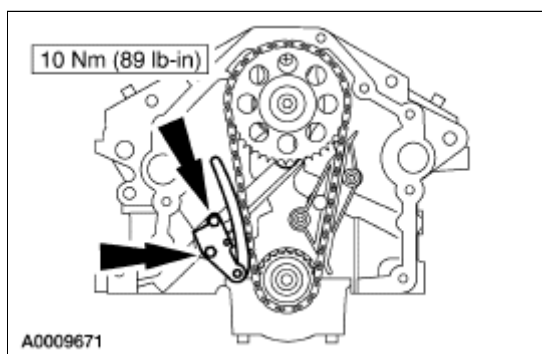
18. Verify the timing mark alignment.



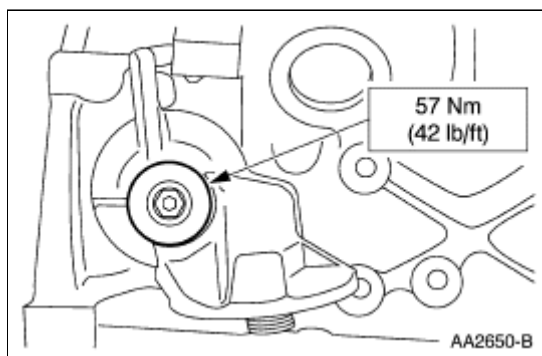
19. Install the bolt.



20. Install the timing chain tensioner.

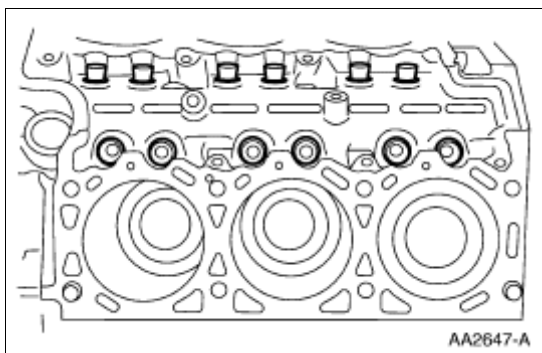


21. Install the oil filter adapter.



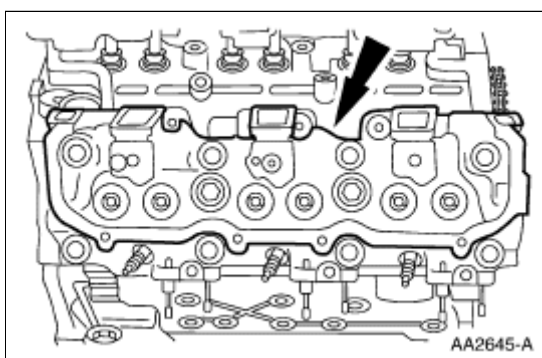
22. **NOTE:** Lubricate the valve tappets and bore with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

Install the valve tappets.



23. Install new cylinder head gaskets.

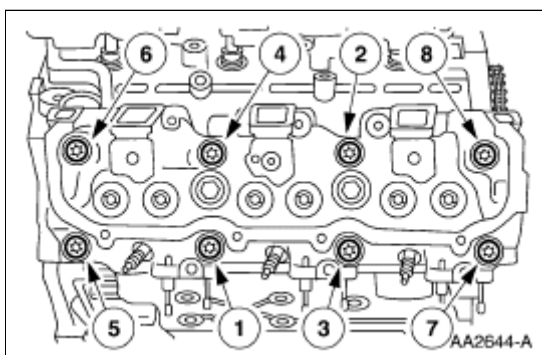
24. Install the cylinder heads.



25. **NOTE:** The RH side is shown; the LH side is similar.

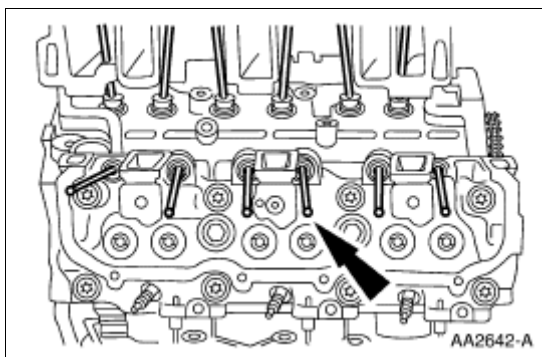
Install bolts and tighten in sequence shown in three steps:

1. Tighten to 32 Nm (24 lb-ft).
2. Tighten to 72 Nm (53 lb-ft).
3. Tighten an additional 90 degrees.



26. Install the push rods.

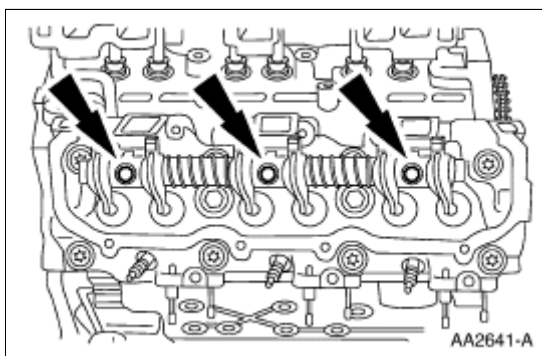




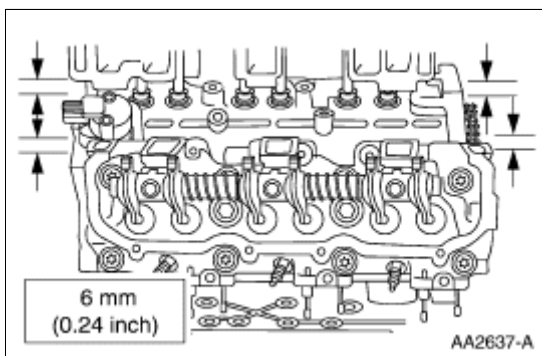
27.  **CAUTION:** If the rocker arm shaft is not tightened gradually, the shaft may become bent during installation.

Install the RH and LH rocker arm shaft assembly and tighten in two steps:

1. Tighten to 32 Nm (24 lb-ft).
2. Tighten an additional 90 degrees.

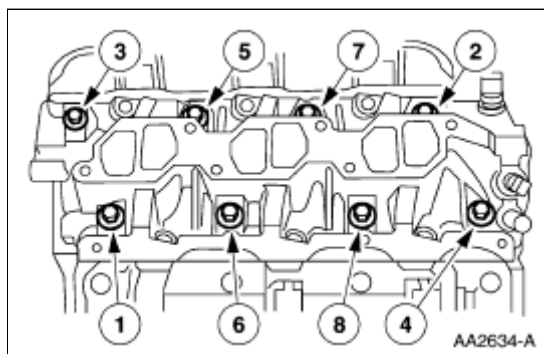


28. Install the camshaft synchronizer. For additional information, refer to [Section 303-14](#).
29. Apply silicone rubber in four places.
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



30. Install a new lower intake manifold gasket.
31. Install the lower intake manifold and tighten the bolts in sequence in four steps:
1. Tighten to 2 Nm (18 lb-in).
  2. Tighten to 10 Nm (89 lb-in).

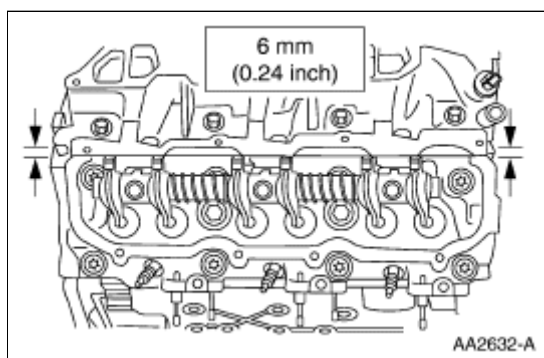
3. Tighten to 13 Nm (10 lb-ft).
4. Tighten to 12 Nm (12 lb-ft).



32. **NOTE:** The RH side is shown; the LH side is similar.

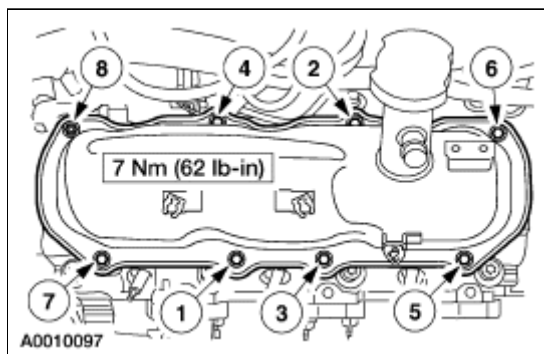
Apply sealer in two places.

- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.

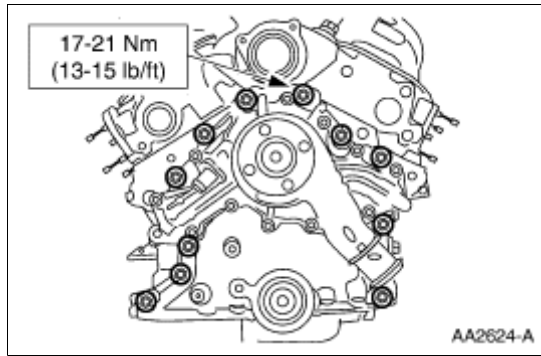


33. **NOTE:** The RH side is shown; the LH side is similar.

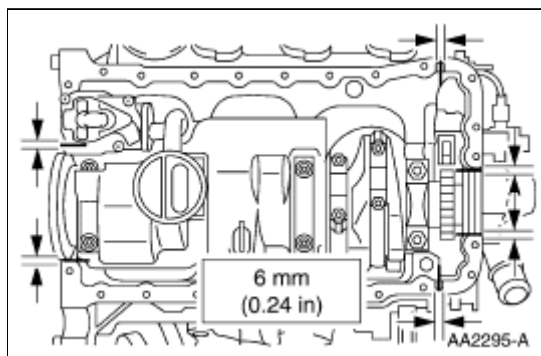
Install the RH and LH valve covers and new gaskets. Tighten the bolts in the sequence shown.



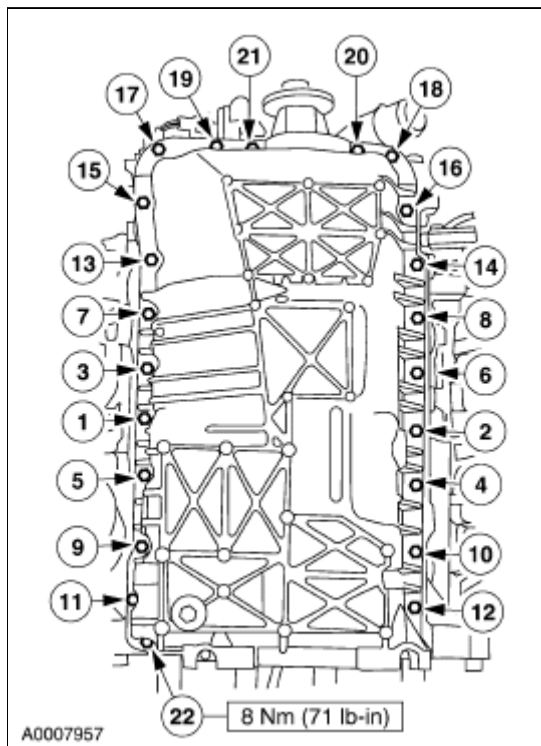
34. Install a new gasket and the front cover.



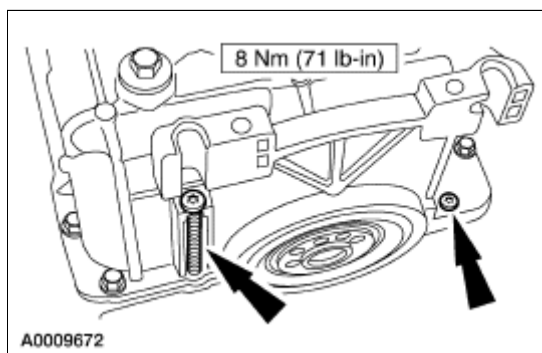
35. Apply silicone rubber in six places.
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



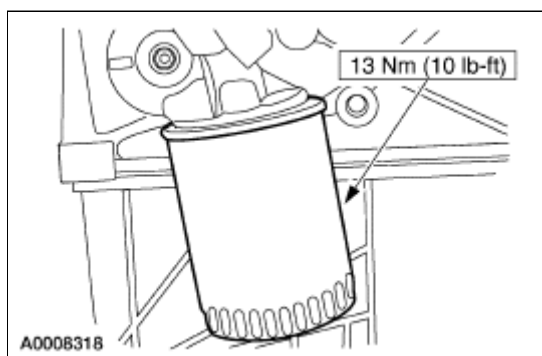
36. Install a new gasket, the oil pan and tighten the bolts and the nuts in the sequence shown.



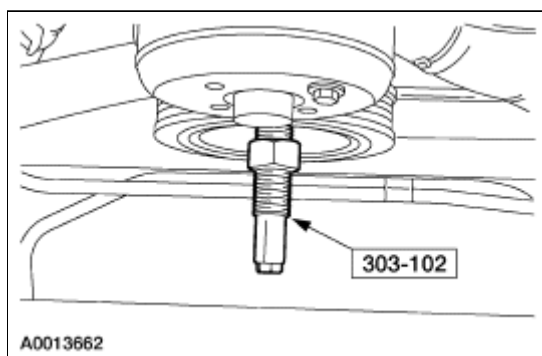
37. Install the bolts.



38. Install a new oil filter.



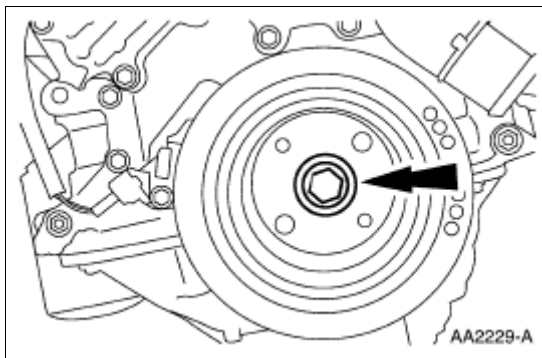
39. Install the crankshaft position (CKP) sensor. For additional information, refer to [Section 303-07A](#).
40. Using the special tool, install the crankshaft pulley.



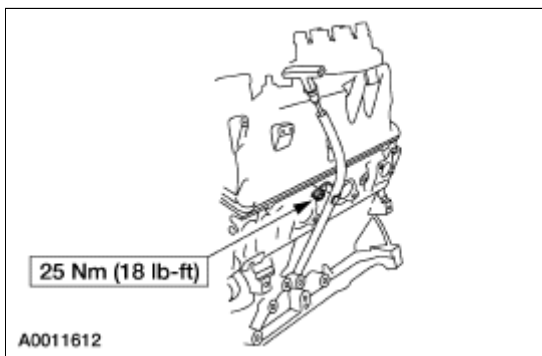
41. **NOTE:** This bolt is torque-to-yield and a new bolt must be installed.

Install a new bolt and tighten in two steps:

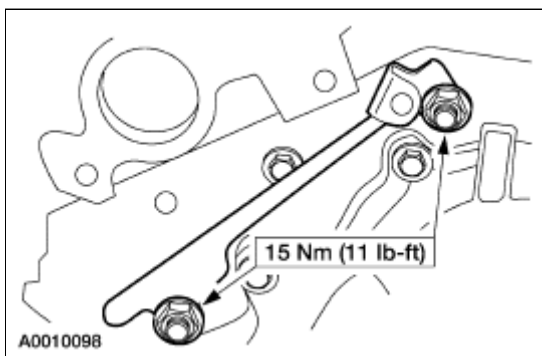
1. Tighten to 45 Nm (33 lb-ft).
2. Tighten an additional 90 degrees.



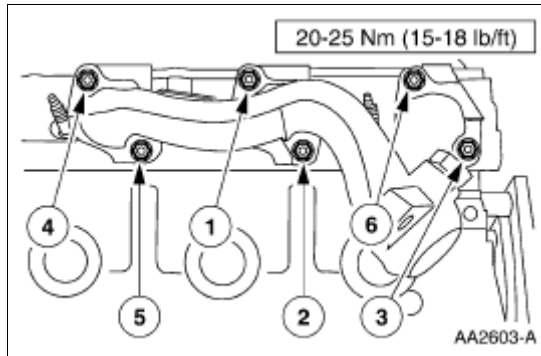
42. Install the oil level indicator tube.



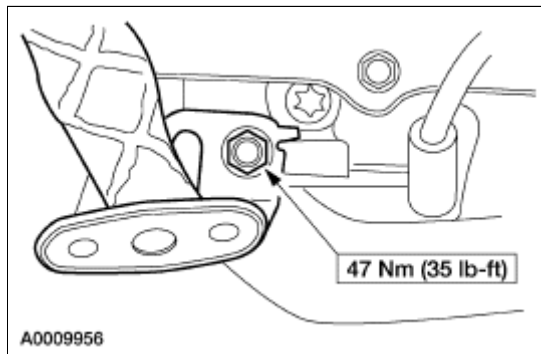
43. Install the power steering and A/C bracket. For additional information, refer to [Section 211-02](#).
44. Install the alternator and mounting bracket. For additional information, refer to [Section 414-02](#).
45. Install the accessory drive belt tensioner. For additional information, refer to [Section 303-05](#).
46. Install the engine mount brackets. For additional information, refer to [Engine Support Insulators](#) in this section.
47. Install the wiring harness retainer bracket.



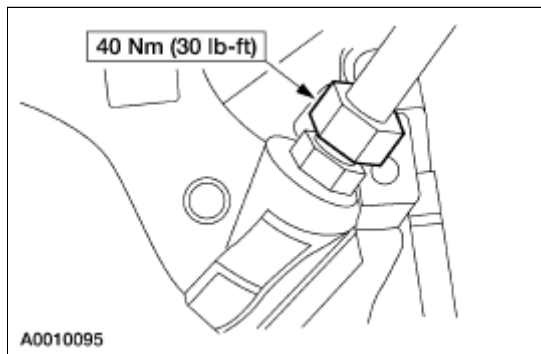
48. Install the RH and LH exhaust manifold gaskets, exhaust manifolds and tighten in the sequence shown.



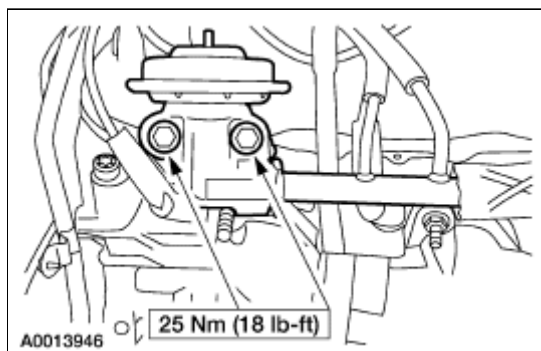
49. Install the EGR outlet tube and bracket.



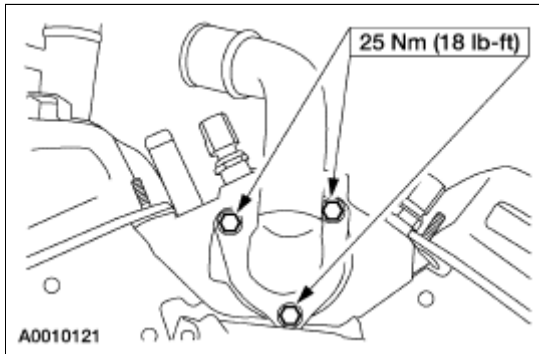
50. Connect the EGR valve tube to the exhaust manifold.



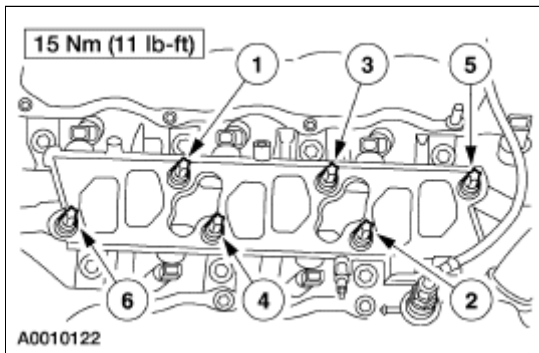
51. Install a new gasket and the EGR valve.



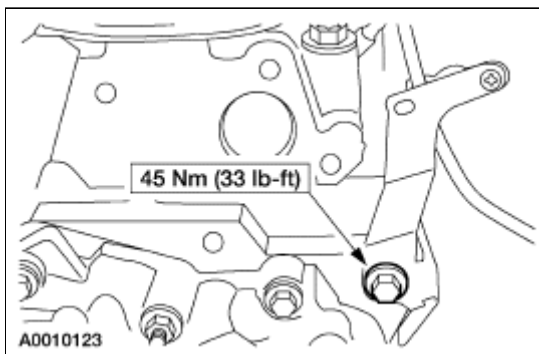
52. Install the water thermostat and the water hose connection.



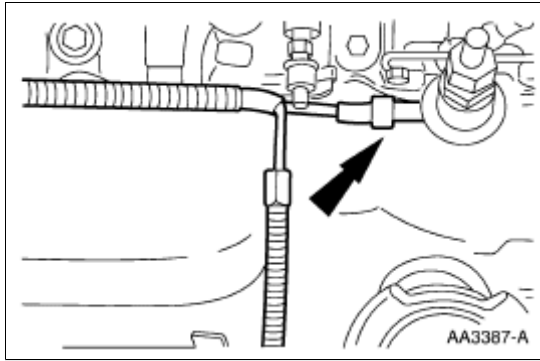
53. Install a new gasket, the fuel injection supply manifold and tighten the studs in the sequence shown.



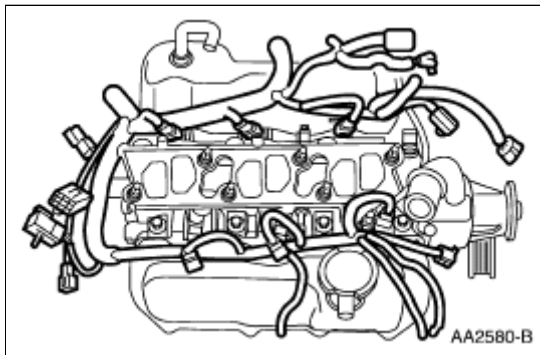
54. Install the bolt.



55. Install the fan blade clutch and fan blade assembly. For additional information, refer to [Section 303-03](#).
56. Position the vacuum harness and connect the line.

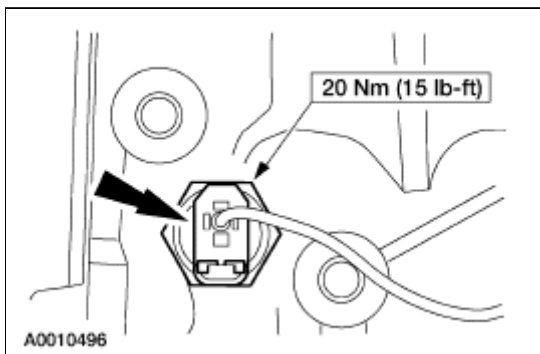


57. Position the engine control sensor wiring.



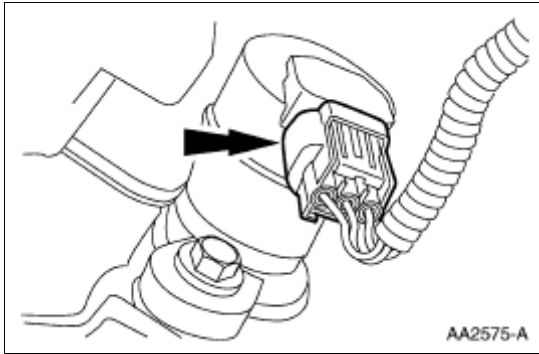
58. **NOTE:** Use Pipe Sealant with Teflon® D8AZ-19554-A or equivalent meeting Ford specifications WSK-M2G350-A2 and ESR-M18P7-A on the threads.

Install the oil pressure sensor and connect the electrical connector.

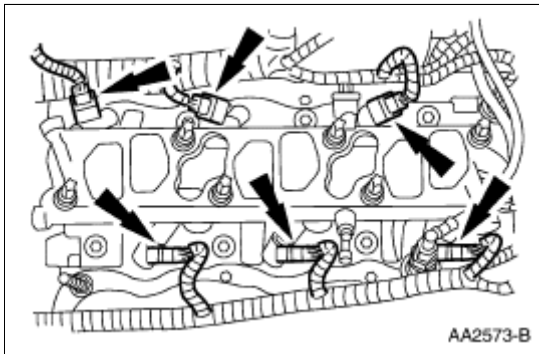


59. Connect the camshaft position (CMP) sensor electrical connector.



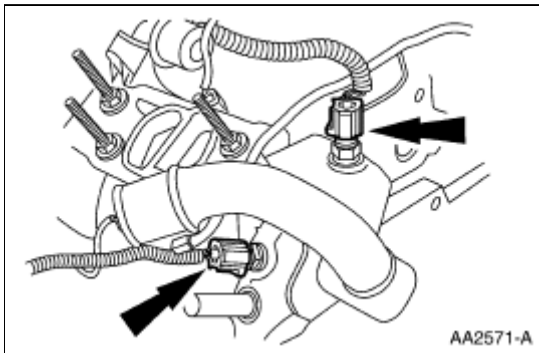


60. Connect the fuel injector electrical connectors.

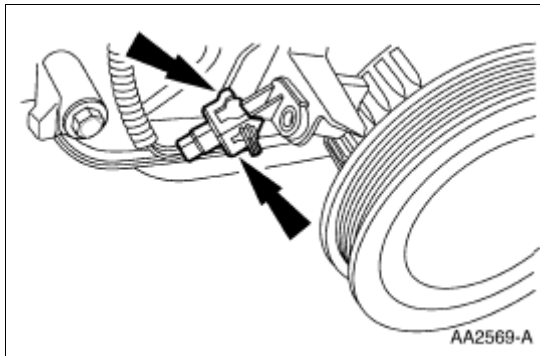


61. Connect the electrical connectors:

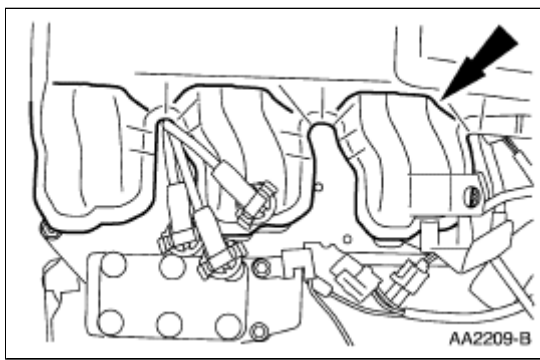
- engine coolant temperature (ECT) sensor
- water temperature indicator sender unit



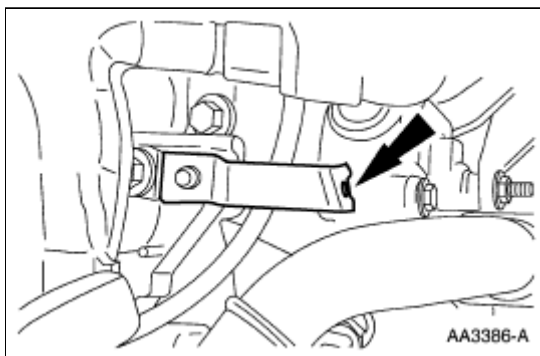
62. Connect the crankshaft position (CKP) sensor electrical connector.



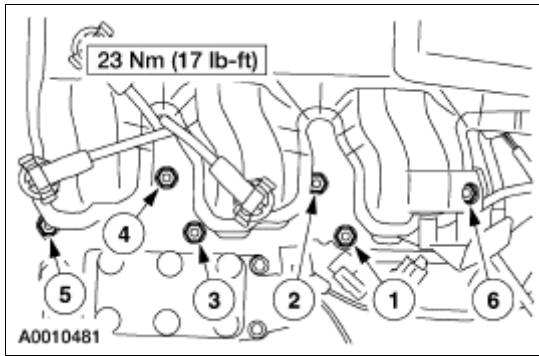
63. If removed, install a new intake manifold upper gasket.
64. Install the upper intake manifold.



65. Position the fuel line bracket.



66. Tighten the nuts in the sequence shown.



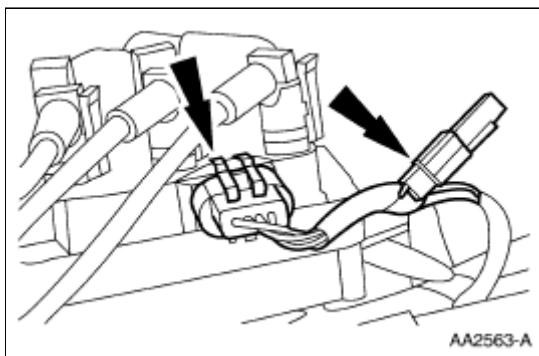
67. **CAUTION:** Correct installation of the spark plug wires is critical to vehicle operation. If one spark plug wire is not correctly installed on the spark plug or the ignition coil, both spark plugs connected to that segment of the ignition coil may not fire under load.

**NOTE:** Wipe the spark plug wires with a clean, damp cloth prior to inspection.

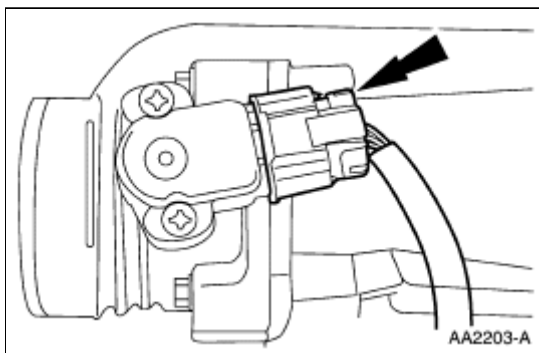
**NOTE:** When a spark plug wire is removed for any reason from a spark plug or ignition coil, or a new spark plug wire is installed, Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A or equivalent meeting Ford specification ESE -M1C171-A must be applied to the spark plug wire boot prior to installation.

Coat the entire interior surface of the boot and connect the spark plug wires to the ignition coil and to the spark plugs.

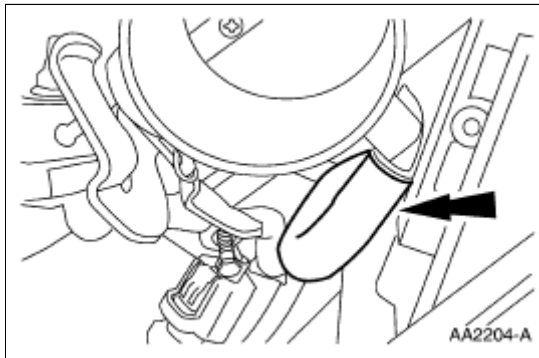
68. Connect the radio ignition interference capacitor and the ignition coil electrical connectors.



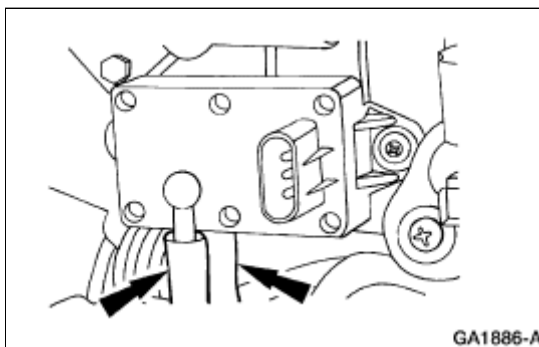
69. Connect the throttle position (TP) sensor electrical connector.



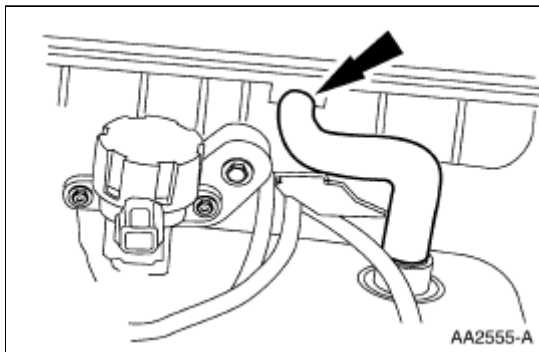
70. Connect the canister purge line from the throttle body.



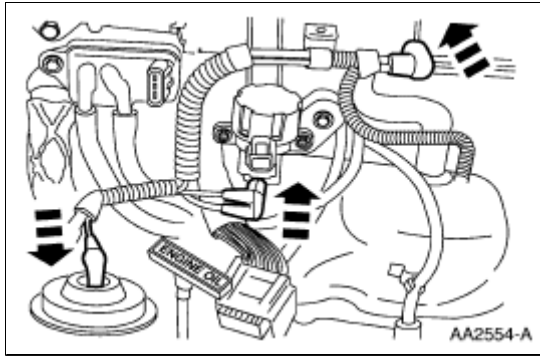
71. Connect the EGR transducer hoses.



72. Connect the crankcase ventilation tube.

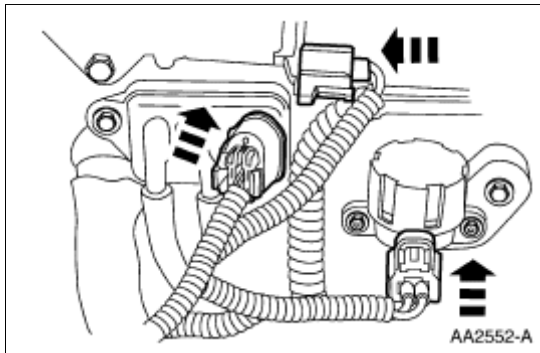


73. Connect the vacuum lines to the:
- EGR solenoid.
  - upper intake manifold.
  - EGR valve.



74. Connect the engine control sensor wiring to the:

- idle air control (IAC) valve.
- EGR transducer.
- EGR solenoid.





SECTION 303-01A: Engine — 4.0L Push Rod  
INSTALLATION

2000 Explorer/Mountaineer Workshop Manual

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## Engine

### Special Tool(s)

 ST1831-A	Lifting Eyes 303-D030 (D81L-6001-D) or equivalent
 ST1602-A	Spreader Bar 303-D089 (D93P-6001-A3) or equivalent

1. **NOTE:** The Lifting Eyes should be installed on the exhaust manifold studs for number one and number six cylinders.

Install the Lifting Eyes.

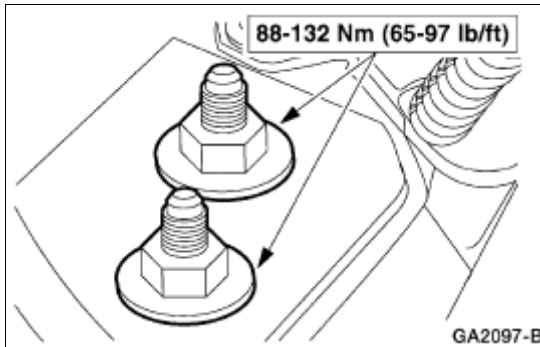
2. Install the Spreader Bar on the Lifting Eyes.
3. Position and attach a floor crane to the Spreader Bar.
4. Remove the engine from the workstand.
5. Install the spacer plate.
6. **NOTE:** For automatic transmissions.

Install the flywheel. For additional information, refer to [Flywheel](#) in this section.

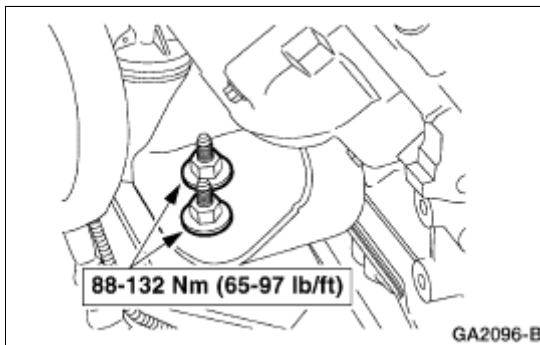
7. **NOTE:** For manual transmissions.

Install the clutch. For additional information, refer to [Section 308-01](#) .

8. Position the engine in the vehicle.
9. Install the LH engine support insulator nuts.

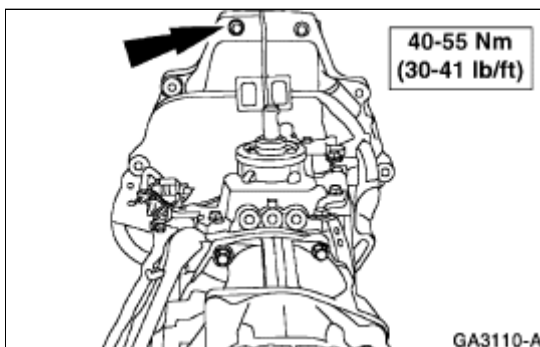


10. Install the RH engine support insulator nuts.

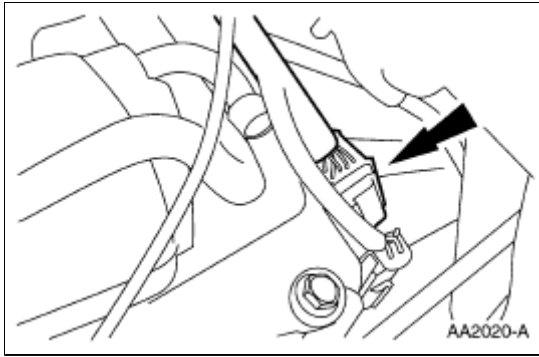


11. Remove the floor crane from the Lifting Eyes.
12. Remove the Lifting Eyes from the exhaust manifold studs.
13. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
14. **NOTE:** Manual transmission is shown; automatic transmission is similar.

Install the nine bolts.

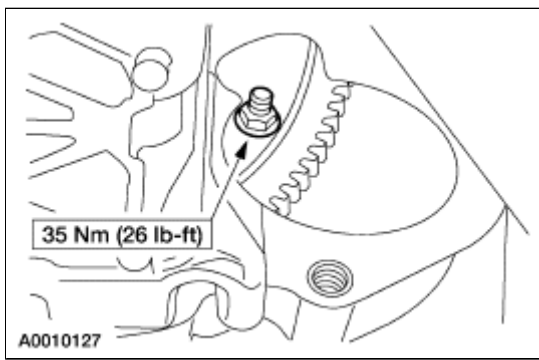


15. Connect the transmission wiring harness electrical connectors.

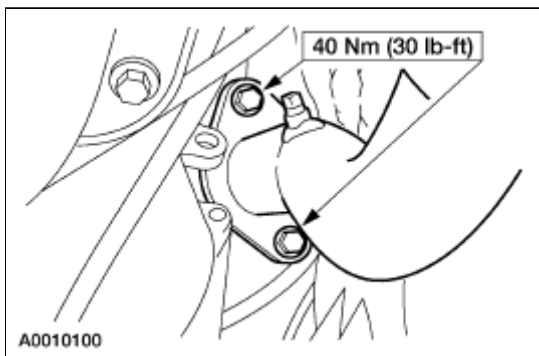


16. **NOTE:** For automatic transmission only.

Install the four nuts.

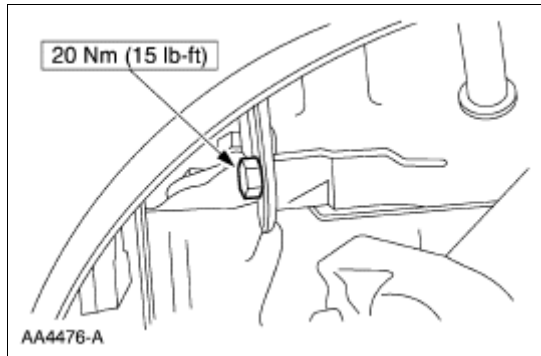


17. Install the four LH and RH exhaust manifold nuts.

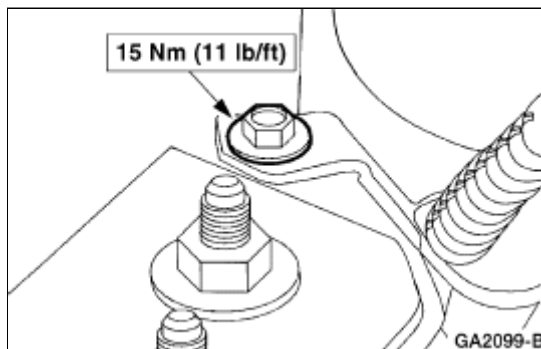


18. Connect the heated oxygen sensors.
19. Position the A/C manifold tube bracket through the RH wheel well and install the bolt.

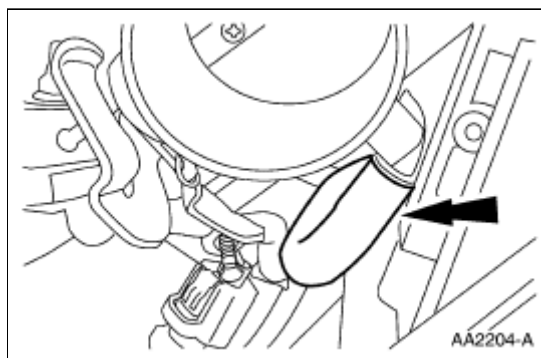




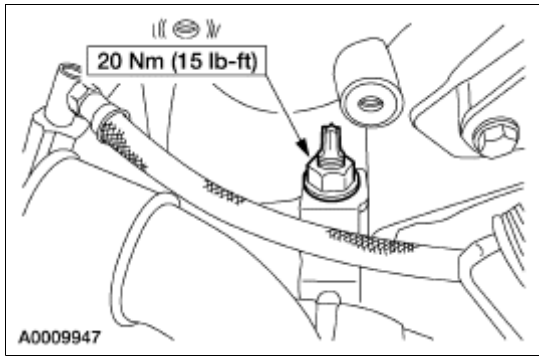
20. Install the starter motor. For additional information, refer to [Section 303-06](#).
21. Lower the vehicle.
22. Install the battery cable bracket.



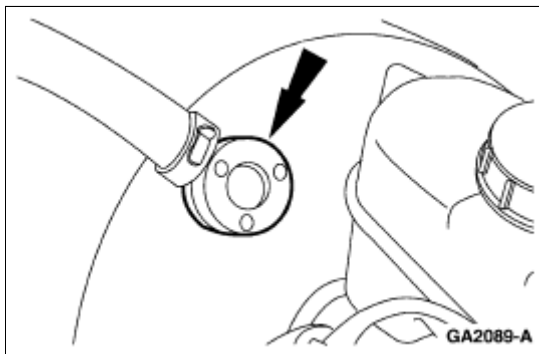
23. Connect the canister purge line.



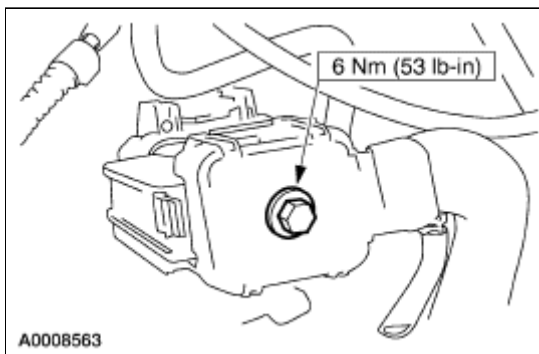
24. Install the generator harness and the retaining clip.



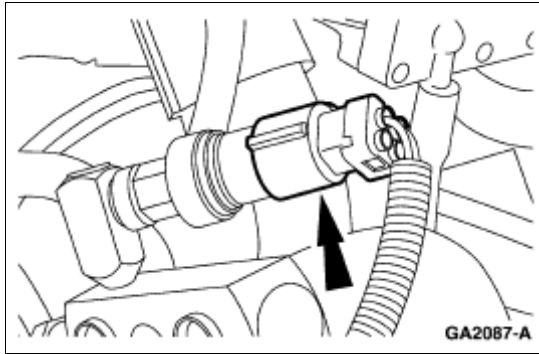
25. Connect the vacuum connector to the brake booster.



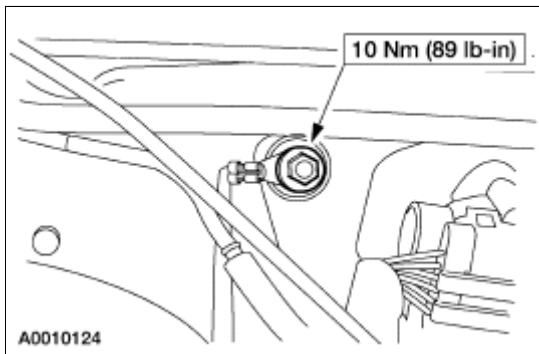
26. Connect the fuel lines. For additional information, refer to [Section 310-00](#).
27. Connect the bulkhead connector.



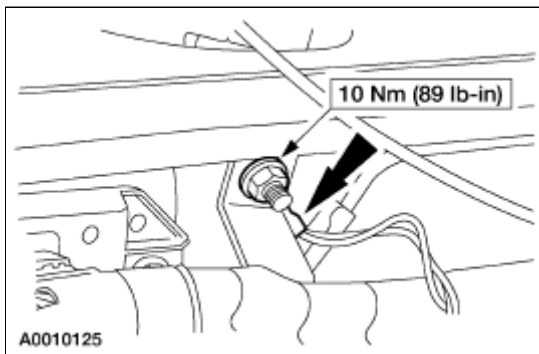
28. Connect the A/C high pressure switch electrical connector.



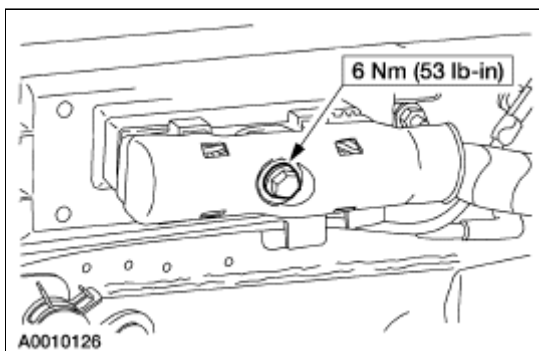
29. Install the engine-to-body ground wire.



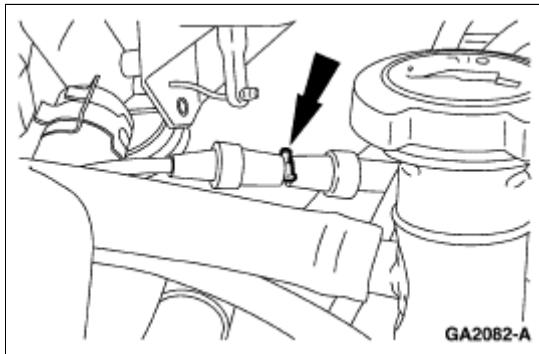
30. Install the engine harness ground wire.



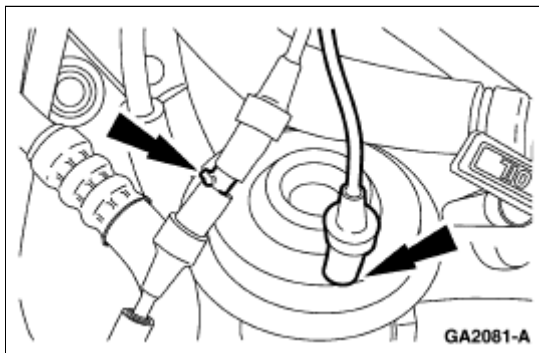
31. Install the powertrain control module (PCM) electrical connector.



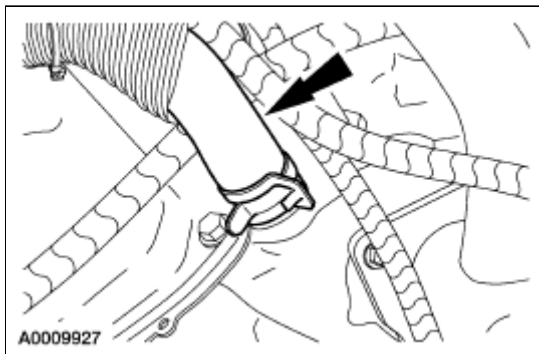
32. Connect the RH vacuum connector.



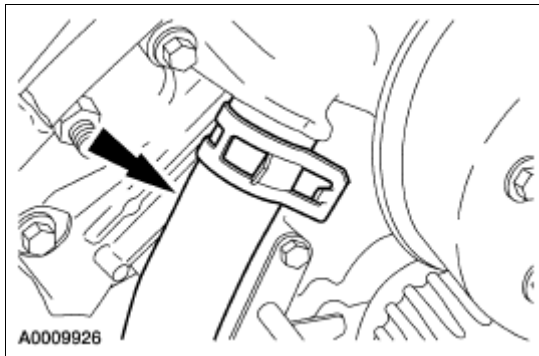
33. Connect the EGR vacuum connector and the LH vacuum connector.



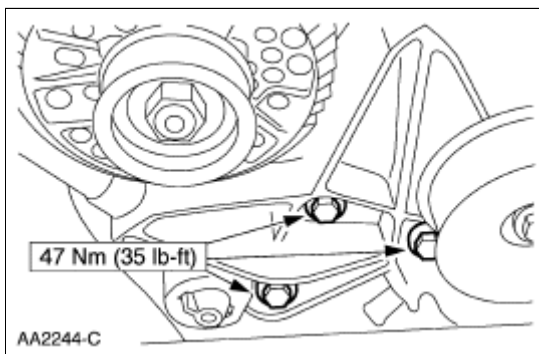
34. Connect the heater water hose to the lower intake manifold.



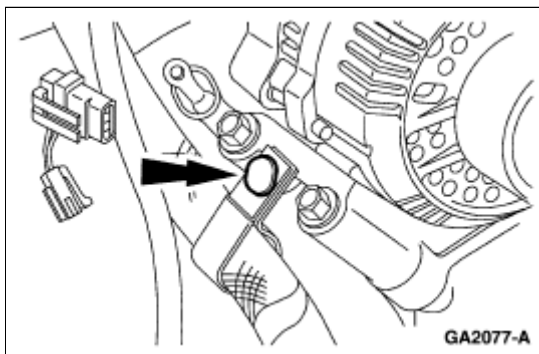
35. Connect the heater water hose to the water pump.



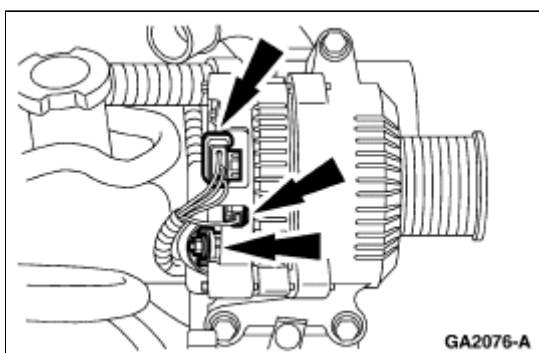
36. Install the generator mounting bracket.



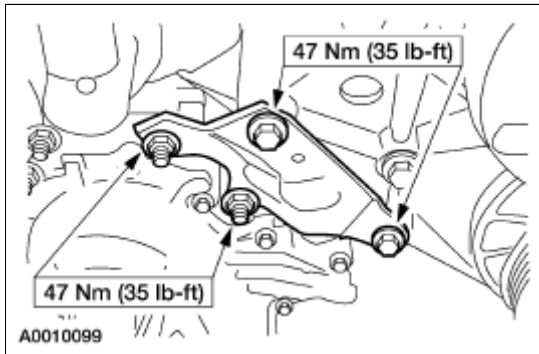
37. Connect the heater water hose retaining clip.



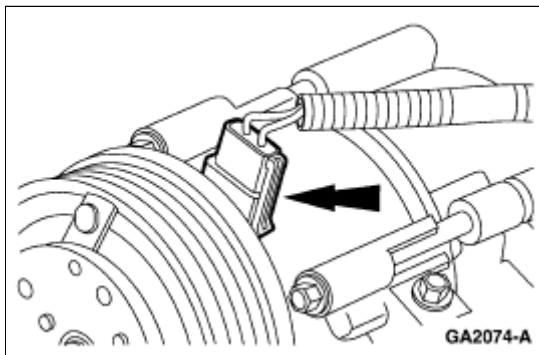
38. Connect the generator electrical connectors.



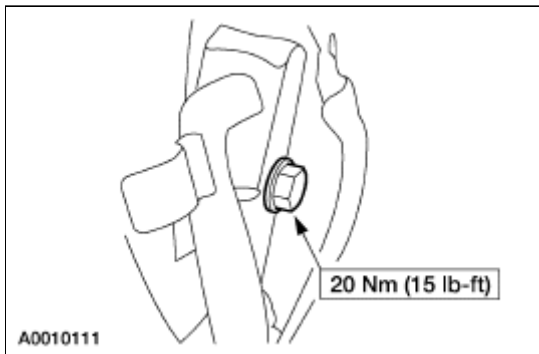
39. Install the A/C compressor mounting bracket.



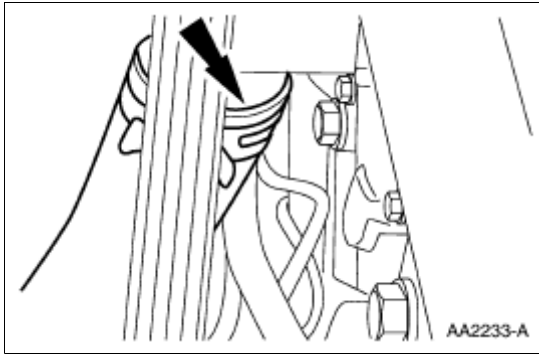
40. Connect the A/C compressor electrical connector.



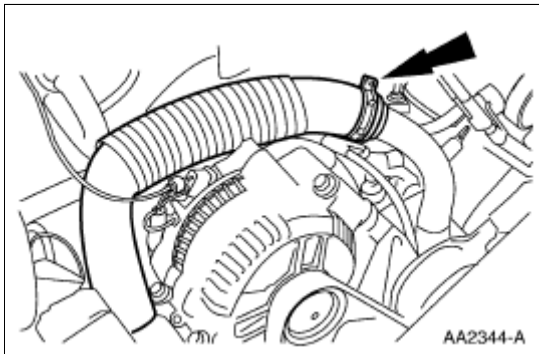
41. Install the A/C manifold tube on the A/C compressor.



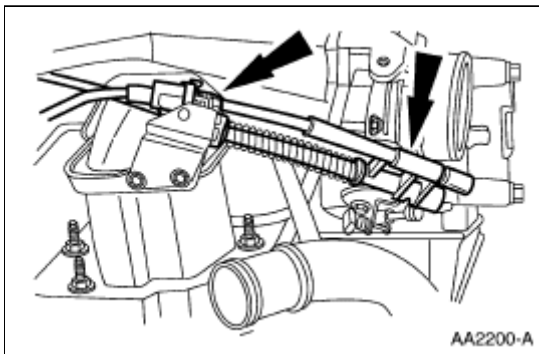
42. Install the radiator. For additional information, refer to [Section 303-03](#).
43. Install the lower radiator hose.



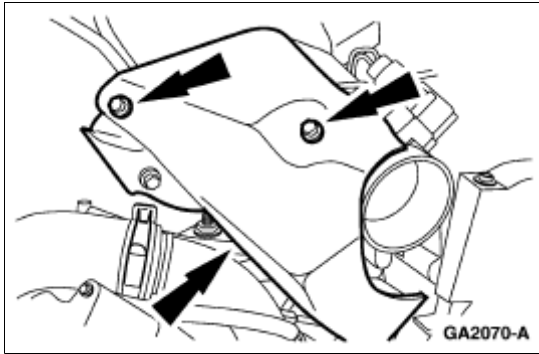
44. Install the upper radiator hose.



45. Connect the power steering pressure hose and the power steering return hose.
46. Connect the accelerator cable and the speed control cable (if equipped).



47. Install the accelerator cable control snow shield.



48. Install the accessory drive belt. For additional information, refer to [Section 303-05](#).
  49. Install the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
  50. Fill the engine with SAE 5W-30 Super Premium Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
  51. Recharge the A/C system. For additional information, refer to [Section 412-00](#).
  52. Fill the power steering system. For additional information, refer to [Section 211-00](#).
  53. Install the hood.
  54. Fill the cooling system. For additional information, refer to [Section 303-03](#).
  55. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
-



SECTION 303-01B: Engine — 4.0L SOHC  
SPECIFICATIONS

2000 Explorer/Mountaineer Workshop Manual

**General Specifications**

Item	Specification
<b>Sealers and Lubricants</b>	
Silicone Gasket and Sealant F7AZ-19554-EA	WSE-M4G323-A4
Pipe Sealant with Teflon® D8AZ-19554-A	WSK-M2G350-A2
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP	WSS-M2C153-G
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A	ESE-M1C171-A

**General Specifications**

Item	Specification
<b>4.0L SOHC</b>	
Displacement liters (cubic inch)	4.0L (244)
Number of cylinders	6
Bore mm (inch)	100.4 (3.953)
Stroke mm (inch)	84.4 (3.31)
Firing order	1-4-2-5-3-6
Minimum oil pressure at 2,000 rpm (engine at normal operating temperature) kPa (psi)	103 (15)
<b>Cylinder Head and Valve Train</b>	
Valve guide bore diameter mm (inch)	7.00-7.018 (0.276)
Combustion chamber volume (cc)	65.197 ± 2.068-2.018
Valve arrangement front to rear	LH=I-E-I-E-I-E RH=E-I-E-I-E-I
Gasket surface flatness mm (inch)	0.08 (0.003) Total
<b>Valve Seat</b>	
Width (exhaust and intake) mm (inch)	1.556-2.404 (0.06-0.094) 1.273-2.121 (0.05-0.083)
Angle degrees	45°
Runout TIR maximum mm (inch)	0.059 (0.002)
<b>Valves</b>	
Valve stem diameter intake mm (inch)	6.965-6.98 (0.274-0.275)
Valve stem diameter exhaust mm (inch)	6.95-6.965 (0.274)
Valve stem to guide clearance exhaust mm (inch)	0.035-0.068 (0.001-0.003)

Valve stem to guide clearance intake mm (inch)	0.020-0.053 (0.001-0.002)
Head diameter intake mm (inch)	45.9-46.1 (1.807-1.815)
Head diameter exhaust mm (inch)	38.9-39.1 (1.531-1.539)
Valve face angle degrees	45°
Valve face runout limit	0.03 (0.001)
<b>Valve Springs</b>	
Intake valve spring compression pressure at specified height (lbs)	275-305 Nm at 35.9-36.7 mm (202.84-224.968 lb/ft at 1.413-1.445 inch)
Exhaust valve spring compression pressure at specified height (lbs)	275-305 Nm at 35.9-36.7 mm (202.84-224.968 lb/ft at 1.413-1.445 inch)
Intake valve spring free length mm (inch)	43.1 (1.7)
Exhaust valve spring free length mm (inch)	43.1 (1.7)
Intake valve spring assembled height mm (inch)	39.86-40.86 (1.569-1.601)
Exhaust valve spring assembled height mm (inch)	39.86-40.68 (1.569-1.601)
<b>Camshaft</b>	
Intake lobe lift mm (inch)	6.584 (0.259)
End play mm (inch)	0.075-0.185 (0.0003-0.007)
Exhaust lobe lift mm (inch)	6.584 (0.259)
Maximum allowable lobe lift loss mm (inch)	0.127 (0.005)
Journal to bearing clearance mm (inch) <sup>a</sup>	0.04-0.095 (0.002-0.004)
<b>Journal to Bearing Clearance</b>	
Service limit mm (inch) <sub>a</sub>	0.152 (0.006)
<b>Camshaft Drive</b>	
Journal diameter mm (inch)	27.935-27.96 (1.100-1.104)
Bearing inside diameter mm (inch) all	28.0-28.03 (1.102-1.104)
Maximum camshaft journal runout mm (inch)	0.05 (0.002)
<b>Cylinder Block</b>	
Cylinder bore diameter mm (inch)	100.4 (3.953)
Maximum cylinder out-of-round mm (inch)	0.025 (0.001)
Maximum cylinder taper mm (inch)	0.025 (0.001)
Main bearing bore diameter mm (inch)	60.634-60.620 (2.387-2.387)
Crankshaft to rear face of block runout. TIR maximum mm (inch)	0.127 (0.005)
Distributor shaft bearing bore diameter mm (inch)	72.43-72.473 (2.852-2.853)
Head gasket surface flatness mm (inch)	0.1 (0.004) overall
Head gasket surface finish RMS	60-150
<b>Crankshaft and Flywheel</b>	
Main bearing journal diameter mm (inch)	56.980-57.0 (2.243-2.244)
Main bearing journal runout limit mm (inch)	0.05 (0.002)

Main bearing journal taper maximum per inch mm (inch)	0.008 (0.0003)
Connecting rod journal maximum out-of-round mm (inch)	0.008 (0.0003)
Crankshaft free end play mm (inch)	0.05-0.32 (0.002-0.0126)
Main bearing journal out-of-round mm (inch)	0.008 (0.0003)
Main bearing journal runout TIR maximum mm (inch)	0.05 (0.002)
Main bearing journal runout service limit mm (inch)	0.0127 (0.005)
Main bearing thrust face runout TIR maximum mm (inch)	0.0254 (0.010)
Thrust bearing journal length mm (inch)	26.39-26.44 (1.039-1.041)
Main and rod bearing journal finish RMS maximum	72 and 88
Main bearing thrust face finish RMS maximum	20
Connecting rod journal diameter mm (inch)	53.98-54.0 (2.125-2.126)
Connecting rod journal taper per inch maximum mm (inch)	0.008 (0.0003)
<b>Connecting Rod Bearings</b>	
Clearance to crankshaft desired mm (inch)	0.008-0.061 (0.0003-0.0024)
Clearance to crankshaft allowable mm (inch)	0.013-0.048 (0.0005-0.002)
Bearing wall thickness mm (inch)	1.4-1.408 (0.0551-0.0554)
<b>Main Bearings</b>	
Clearance to crankshaft mm (inch)	0.021-0.039 (0.0008-0.0015)
Clearance to crankshaft allowable mm (inch)	0.013-0.048 (0.0005-0.002)
Bearing wall thickness mm (inch)	1.8-1.806 (0.0709-0.0711)
<b>Connecting Rod, Piston and Rings</b>	
Side clearance (assembled to crankshaft) mm (inch)	0.092-0.268 (0.0036-0.0106)
Piston pin bore or bushing I.D. mm (inch)	23.958-23.976 (0.943-0.944)
Rod bearing bore I.D. mm (inch)	56.82-56.84 (2.237)
Rod bearing bore out-of-round mm (inch)	0.01 (0.0004)
Rod length center to center mm (inch)	145.965-146.035 (5.746-5.749)
Alignment (bore-to-bore max. diff.) twist mm (inch)	0.038 (0.0015) per 25.4 mm (1.000)
Alignment (bore-to-bore max. diff.) bend mm (inch)	0.0125 (0.00049) per 25.4 mm (1.000)
<b>Piston Pin</b>	
Length mm (inch)	72.0-72.8 (2.835-2.866)
Diameter (red) mm (inch)	23.994-23.997 (.9446-.9447)
Diameter (blue) mm (inch)	23.997-24.000 (0.9447-0.9449)
To piston pin bore clearance mm (inch)	0.01-0.016 (0.0004-0.0006)
To connecting rod bushing clearance mm (inch)	Press Fit -0.018 to -0.042 (-0.0007 to -0.0017)
<b>Piston</b>	
Bore clearance selective fit mm (inch)	0.030-0.060 (0.0012-0.002)
Diameter — coded STD mm (inch)	100.380-100.400 (3.952-3.9528)
Diameter — coded 0.5 mm (inch)	100.880-100.900 (3.972)

Diameter — coded 1.0 mm (inch)	101.350-101.370 (3.990-3.991)
Pin bore diameter (red) mm (inch)	24.007-24.010 (0.945)
Pin bore diameter (blue) mm (inch)	24.010-24.013 (0.945)
Top ring groove width mm (inch)	1.64-1.66 (0.0645-0.0654)
Bottom ring groove width mm (inch)	1.79-1.81 (0.0705-0.0713)
Oil ring groove width mm (inch)	3.5-3.53 (0.1378-0.1399)
<b>Piston Rings</b>	
Top compression ring width mm (inch)	1.578-1.598 (0.062-0.063)
Bottom compression ring width mm (inch)	1.728-1.74 (0.068-0.069)
Top compression side clearance mm (inch)	0.050-0.082 (0.002-.0003)
Bottom compression side clearance mm (inch)	0.050-0.082 (0.002-0.003)
Top compression ring gap mm (inch)	0.200-0.450 (0.008-0.018)
Bottom compression ring gap mm (inch)	0.450-0.700 (0.018-0.028)
<b>Lubrication System</b>	
Relief valve spring pressure lbs. At 35.3 mm (1.39 in)	61.3-66.3 Nm (45.100-48.730 lb/ft)
Driveshaft to housing clearance mm (inch)	0.02-0.031 (0.0007-0.0012)
Relief valve to housing clearance mm (inch)	0.015-0.03 (0.0007-0.0012)
Rotor assembly end clearance max. mm (inch)	0.014-0.044 (0.0006-0.0017)
Outer race to end clearance mm (inch)	0.06-0.12 (0.0002-0.0004)
Engine oil capacity liters (quarts)	3.8 (4) with filter

<sup>a</sup> Tighten camshaft bearing cap bolts to 15 Nm (11 lb-ft) when measuring journal clearance.

### Torque Specifications

Description	Nm	lb-ft	lb-in
A/C compressor manifold bolt	20	15	—
A/C line bracket nut	20	15	—
Accelerator control splash shield bolts	4	—	35
Balance shaft bolts	26-28	19-21	—
Balance shaft chain guide	9-11	—	80-97
Balance shaft tensioner bolts	28-30	21-22	—
Camshaft bearing cap bolts	(a)	—	—
Camshaft sprocket bolt	85	63	—
Cassette and sprocket to jackshaft bolt	(a)	—	—
Cassette bolt, LH	12	9	—
Cassette bolt, RH	10	—	89
Connecting rod bolts	(a)	—	—
Crankshaft pulley bolts	(a)	—	—
Cylinder head bolts	(a)	—	—

Accessory bracket bolts	42	31	—
Engine coolant temperature (ECT) sensor	10	—	89
Engine electrical connector	6	—	53
Engine front cover bolts	19	14	—
Engine lifting eye bolts	37	27	—
Electrical harness retainer bolt	10	—	89
Lower engine mount bracket nuts	80	59	—
Fuel line bracket bolt	10	—	89
Exhaust gas recirculation (EGR) tube bracket bolts	10	—	89
EGR valve tube fittings	40	30	—
Exhaust manifold nuts	22	16	—
Exhaust manifold to exhaust pipe bolts	40	30	—
Flywheel bolts	(a)	—	—
Front cassette bolt	19	14	—
Front cylinder head bolts	(a)	—	—
Fuel injection supply manifold bolts	24	18	—
Generator bracket bolts	42	31	—
Ground wire bolt	10	—	89
Heater hose bracket bolts	37	27	—
Hydraulic camshaft tensioner, RH	(a)	—	—
Hydraulic camshaft tensioner, LH	(a)	—	—
Jackshaft chain guide bolts	19	14	—
Jackshaft chain tensioner bolts	10	—	89
Jackshaft rear sprocket bolt	(a)	—	—
Jackshaft front sprocket bolt	(a)	—	—
Jackshaft thrust plate bolts	11	8	—
Knock sensor bolt	25	18	—
Ladder frame bolts and nuts (outside)	10	—	89
Ladder frame bolts (inside)	(a)	—	—
Ladder frame Torx® bolts	8	—	71
Ladder frame inserts	3	—	27
Lower intake manifold bolts	18	13	—
Main bearing cap bolts	97	72	—
Oil bypass filter	13	10	—
Oil filter adapter bolt	57	42	—
Oil level indicator tube bracket bolt	25	18	—
Oil pan bolts	9	—	80
Oil pan drain plug	26	19	—
Oil pressure sensor	11-16	9-11	—

Oil pump bolts	19	14	—
Oil pump drive assembly	19	14	—
Oil pump screen cover and tube bolts	11	8	—
Powertrain control module (PCM) bolt	6	—	53
Powertrain control module (PCM) ground wire nut	10	—	89
Power steering pressure line nut	18	13	—
Rear cassette bolt	18	13	—
Spark plug	20	15	—
Thermostat housing bolts	11	8	—
Transmission cooler line bracket bolt	47	35	—
Transmission to engine bolts	47	35	—
Torque converter to flywheel nuts	47	35	—
Upper engine mount bracket nuts	110	81	—
Lower engine mount bracket bolts	80	59	—
Upper intake manifold bolts	7	—	62
Valve cover bolts	9	—	80
Vapor management valve (VMV) hose bracket	15	11	—
Water pump bolts	10	—	89
Water temperature indicator sender unit	10	—	89
Wiring harness retainer nuts	15	11	—

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

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*SECTION 303-01B: Engine — 4.0L SOHC*  
*DESCRIPTION AND OPERATION*

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*2000 Explorer/Mountaineer Workshop Manual*

## **Engine**

The 4.0L SOHC engine consists of the following:

- single overhead camshafts
- sequential multiport fuel injection (SFI)
- distributorless ignition system
- aluminum cylinder heads
- cast iron, 60-degree V cylinder block
- composite two-piece intake manifold system
- balance shaft (4x4 vehicles)
- jackshaft
- unique engine timing configuration

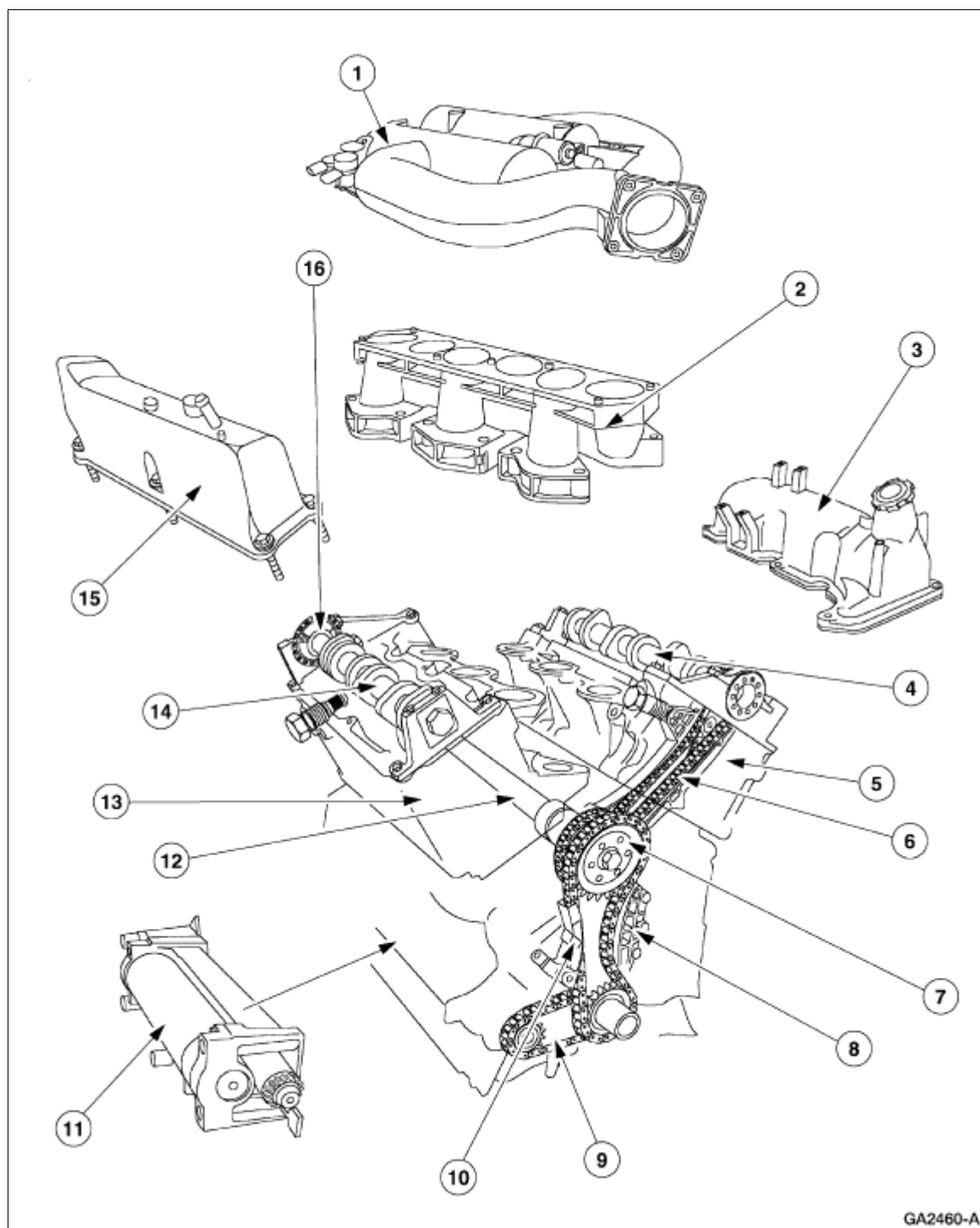
For quick identification, refer to the vehicle control information decal mounted under the hood.

- For additional information, refer to [Section 100-01](#).

An engine identification label is attached to the engine. The label:

- identifies the symbol code for determining parts usage. For additional information, refer to [Section 100-01](#).

### **Upper End—4.0L SOHC Engine**

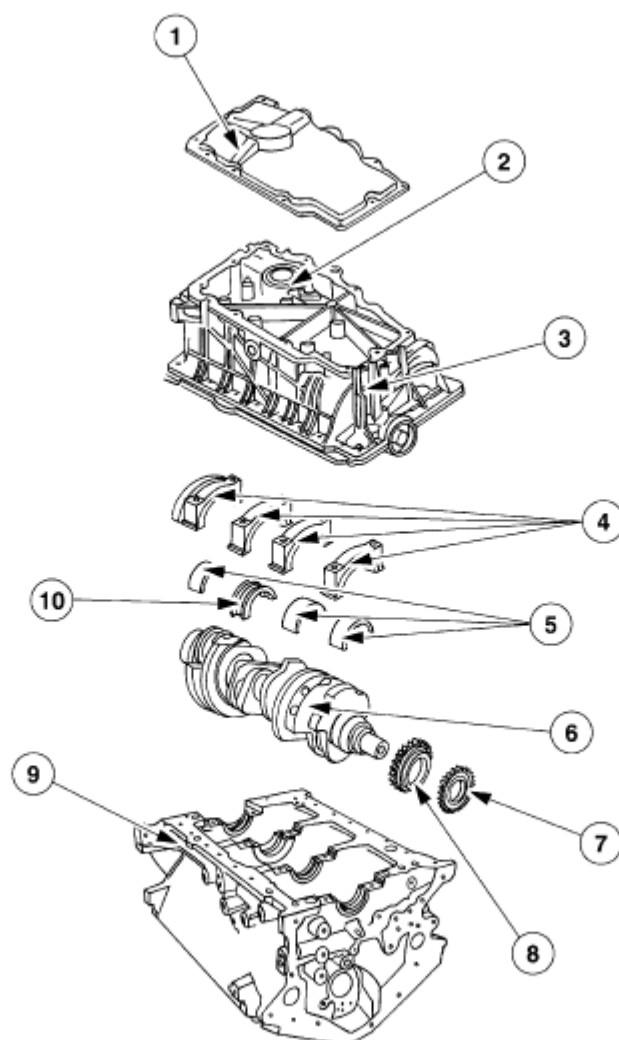


Item	Part Number	Description
1	9424	Intake manifold, upper
2	9424	Intake manifold, lower
3	6582	Valve cover, LH
4	6250	Camshaft
5	6049	Cylinder head
6	6M289	LH cassette



7	6M270	Jackshaft chain assembly
8	6K254	Jackshaft chain guide
9	6A364	Balance shaft chain (4x4 Only)
10	6M271	Jackshaft chain tensioner
11	6A311	Balance shaft (4x4 Only)
12	6M262	Jackshaft
13	6049	Cylinder head
14	6250	Camshaft
15	6582	Valve cover, RH
16	6M290	RH cassette

### Lower End—4.0L SOHC Engine



GA2462-A

Item	Part Number	Description
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1	6675	Oil pan
2	6617	Tube assembly oil pickup
3	6F092	Ladder frame
4	—	Main bearing caps
5	6333	Crankshaft main bearing
6	6303	Crankshaft
7	6306	Jackshaft sprocket
8	6K350	Balance shaft sprocket
9	6010	Cylinder block
10	6337	Crankshaft thrust main bearing

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*SECTION 303-01B: Engine — 4.0L SOHC*  
*DIAGNOSIS AND TESTING*

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*2000 Explorer/Mountaineer Workshop Manual*

## **Engine**

Refer to [Section 303-00](#).

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SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

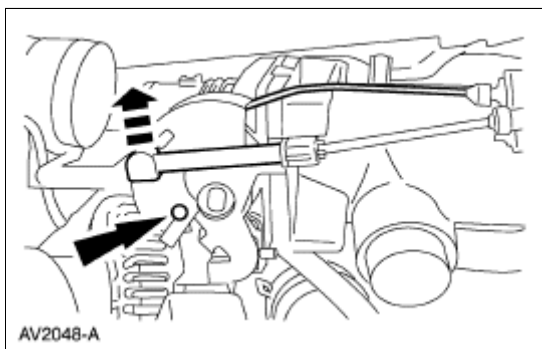
## Intake Manifold —Upper

### Removal and Installation

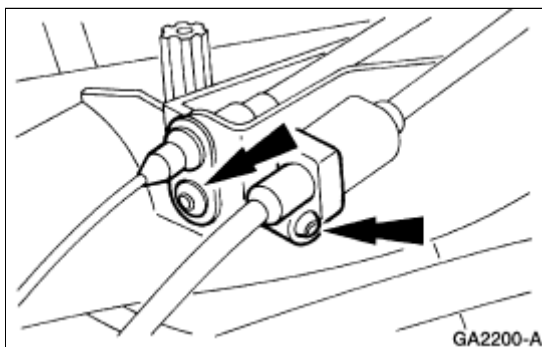


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

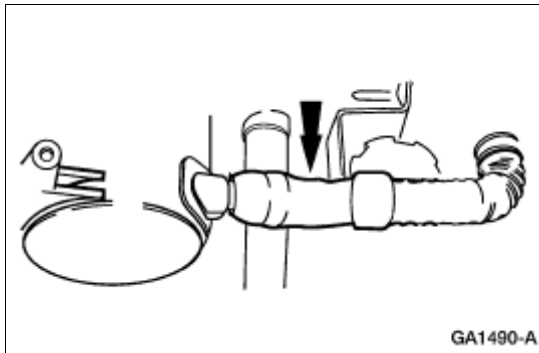
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
3. Disconnect the accelerator cable and the speed control cable (if equipped).



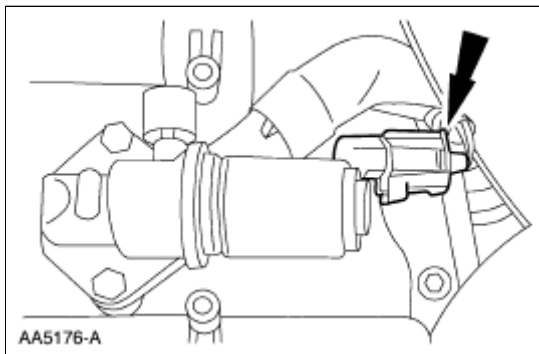
4. Remove and position the accelerator cable and speed control cable (if equipped) aside.



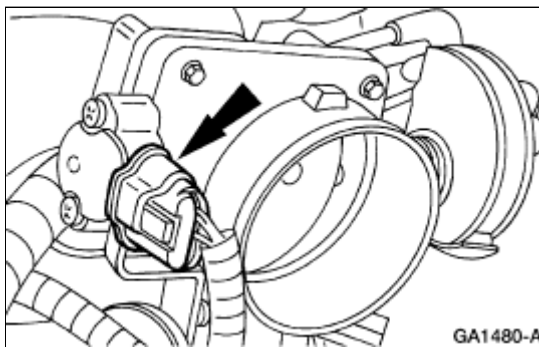
5. Disconnect the RH upper intake manifold vacuum connection.



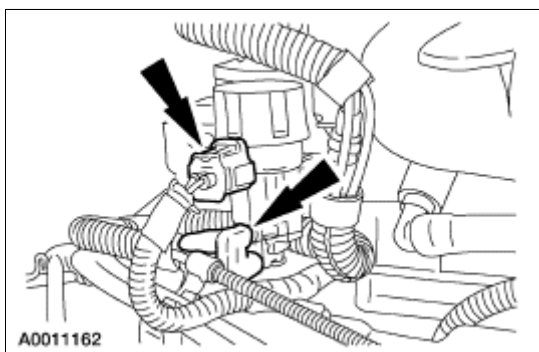
6. Disconnect the idle air control (IAC) valve electrical connector.



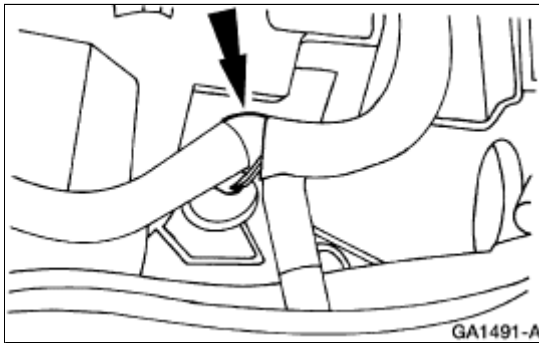
7. Disconnect the throttle position (TP) sensor electrical connector.



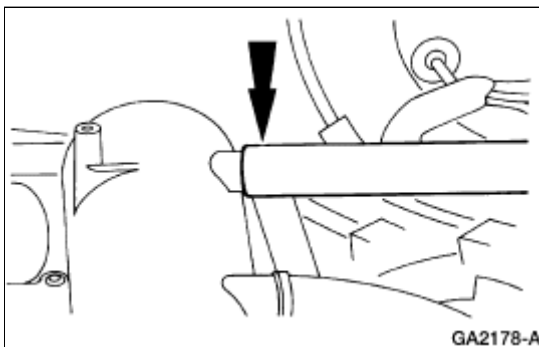
8. Disconnect the exhaust gas recirculation (EGR) vacuum regulator:
- electrical connector
  - vacuum connector



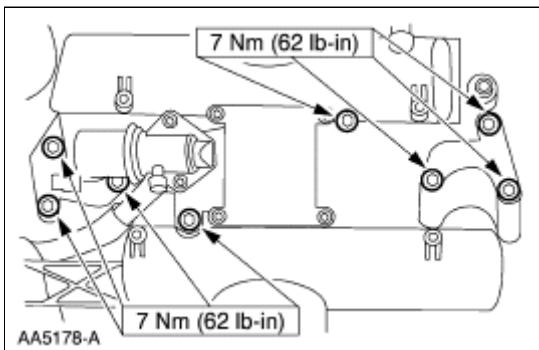
9. Disconnect the crankcase ventilation hose.



10. Disconnect the power brake booster vacuum hose.

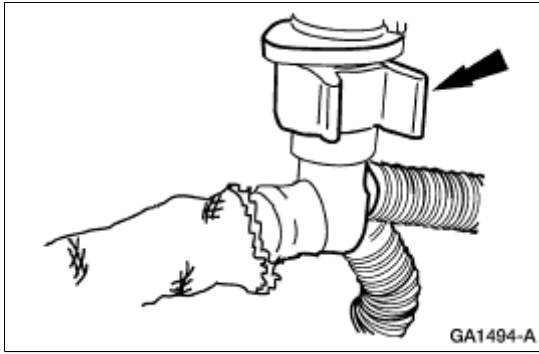


11. Remove the eight bolts.



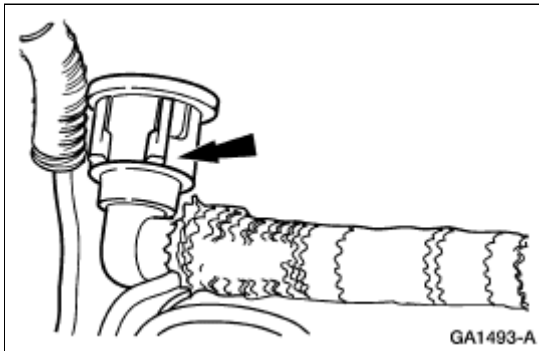
12. **NOTE:** Inspect and install new O-ring seals if necessary.

Disconnect the LH vapor management valve (VMV) hose.



13. **NOTE:** Inspect and install new O-ring seals if necessary.

Disconnect the RH VMV hose.



14. Remove the upper intake manifold.
- Inspect upper intake manifold gasket and install a new one if necessary.
15. To install, reverse the removal procedure.
-

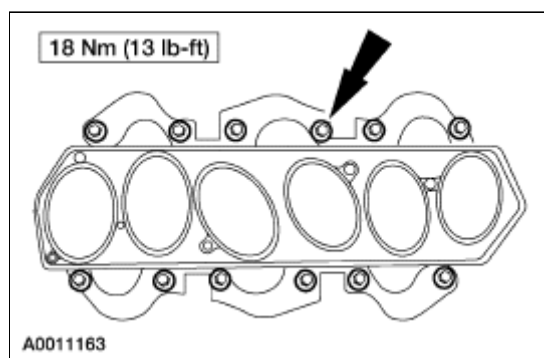




## Intake Manifold —Lower

### Removal and Installation

1. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
2. Remove the lower intake manifold.
  - Inspect the lower intake manifold gasket and install a new one if necessary.



3. To install, reverse the removal procedure.

SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

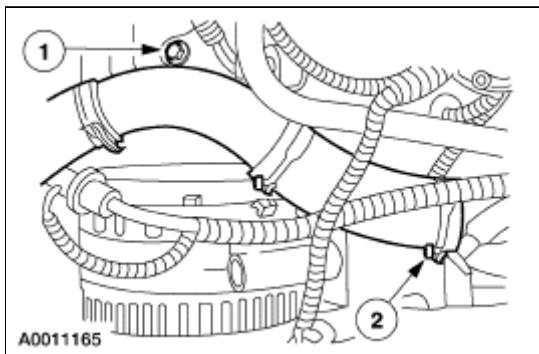
## Valve Cover —RH

### Removal and Installation

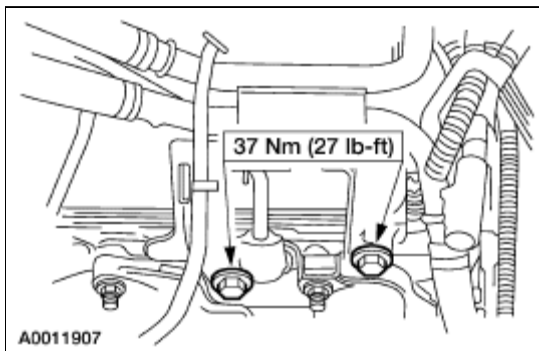


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

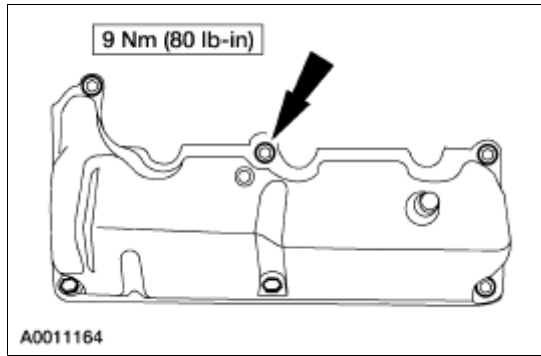
1. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
2. Drain the engine cooling system. For additional information, refer to [Section 303-03](#).
3. Disconnect the upper radiator hose and tube.
  1. Remove the bolt.
  2. Release the hose clamp and position hose and tube aside.



4. Remove the heater hose bracket and disconnect the transmission dipstick tube.



5. Disconnect the spark plug wires. For additional information, refer to [Section 303-07A](#), [Section 303-07B](#) or [Section 303-07C](#).
6. Remove the valve cover.
  - Discard the gasket.



7. To install, reverse the removal procedure.
-

SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

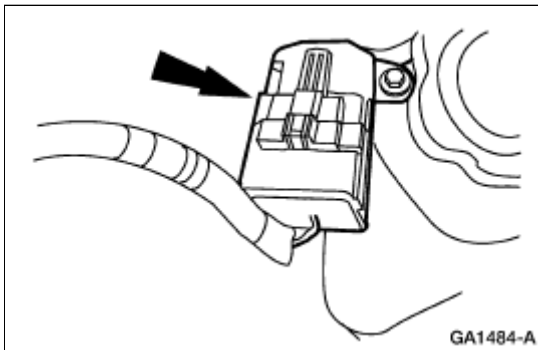
## Valve Cover —LH

### Removal

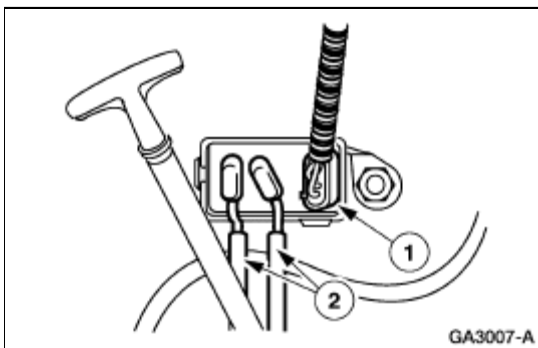


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

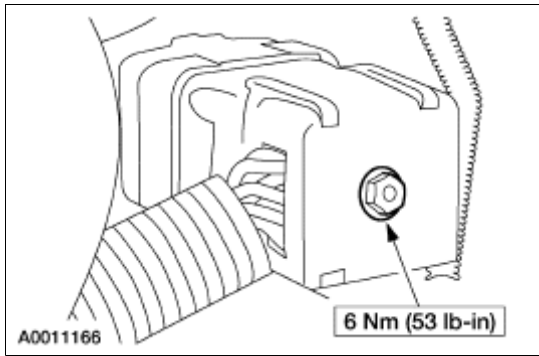
1. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
2. Disconnect the fuel line. For additional information, refer to [Section 310-00](#).
3. Disconnect the camshaft position (CMP) sensor electrical connector.



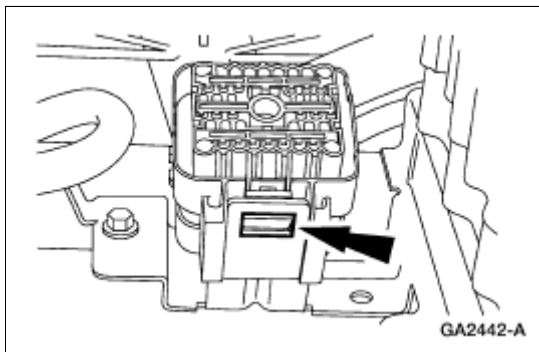
4. Disconnect the differential pressure feedback EGR transducer.
  1. Disconnect the electrical connector.
  2. Disconnect the vacuum hoses.



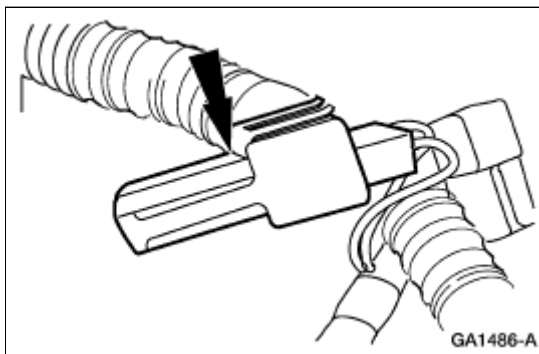
5. Disconnect the engine electrical connector.



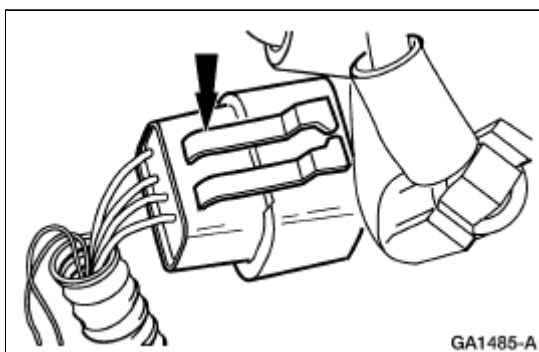
6. Disconnect the electrical connector from the valve cover.



7. Disconnect the radio ignition interference capacitor electrical connector.



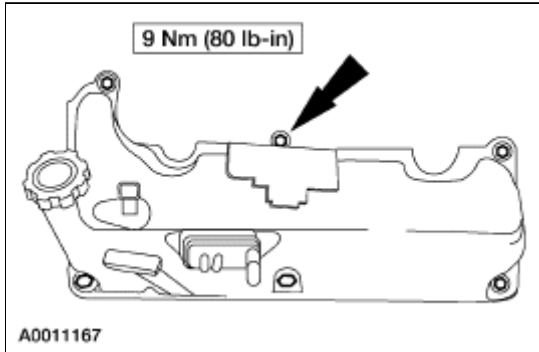
8. Disconnect the ignition coil electrical connector.



9. Disconnect the spark plug wires from the ignition coil. For additional information, refer to [Section 303-](#)

[07A](#), [Section 303-07B](#) or [Section 303-07C](#).

10. Remove the valve cover.
  - Discard the gasket.




11. To install, reverse the removal procedure.
-

## Crankshaft Pulley

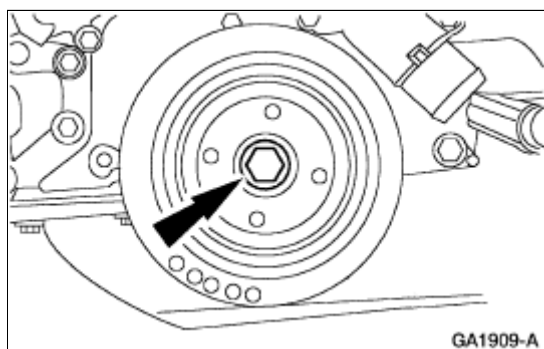
### Special Tool(s)

 ST1784-A	Crankshaft Damper Remover 303-101 (T74P-6316-A)
 ST1287-A	Crankshaft Damper Replacer 303-102 (T74P-6316-B)

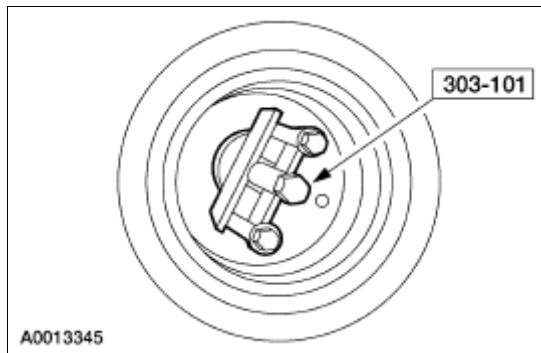
### Removal

1. Remove the fan shroud. For additional information, refer to [Section 303-03](#).
2. Remove the accessory drive belt. For additional information, refer to [Section 303-05](#).
3.  **CAUTION:** This bolt is torque to yield and cannot be reused.

Remove the damper bolt.

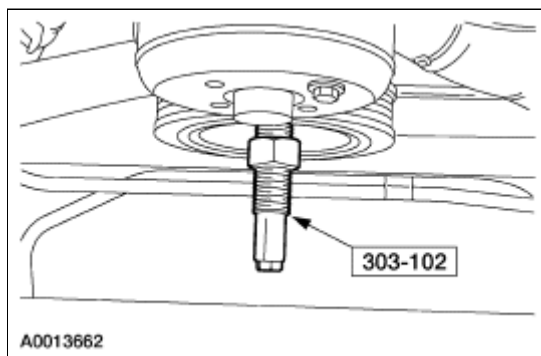


4. Using the special tool, remove the crankshaft pulley.

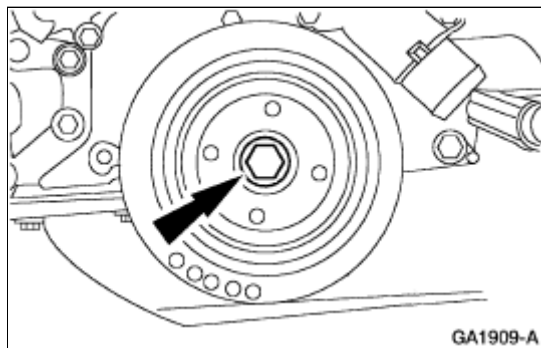


## Installation

1. Using the special tool, install the crankshaft pulley.



2. Install a new crankshaft pulley bolt.
  - Tighten the bolt in two stages:
  - Stage1: Tighten the bolt to 60 Nm (44 lb-ft).
  - Stage 2: Tighten the bolt an additional 90 degrees.



3. Install the accessory drive belt. For additional information, refer to [Section 303-05](#).
  4. Install the fan shroud. For additional information, refer to [Section 303-03](#).
-




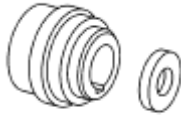



SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

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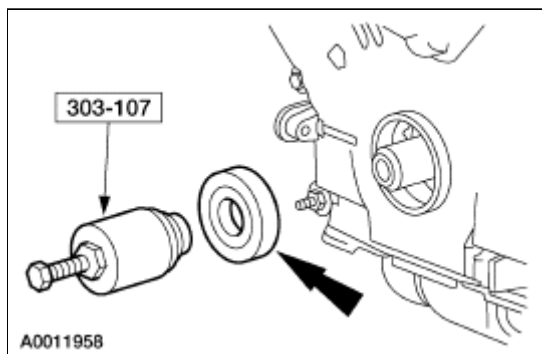
## Crankshaft Front Oil Seal

### Special Tool(s)

 ST1288-A	Front Cover Seal Remover 303-107 (T74P-6700-A)
 ST2439-A	Front Cover Aligner Replacer 303-093 (T74P-6019-A)
 ST2428-A	Crankshaft Damper Replacer 303-102 (T74P-6316-B)

### Removal

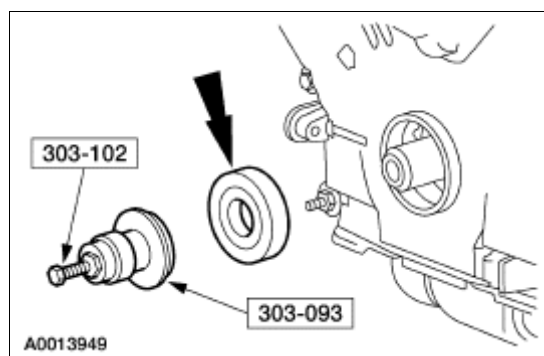
1. Remove the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
2. Using the special tool, remove the crankshaft front oil seal.



### Installation

1. **NOTE:** Lubricate the seal lip with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

Using the special tools and install the crankshaft front oil seal.



2. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
-

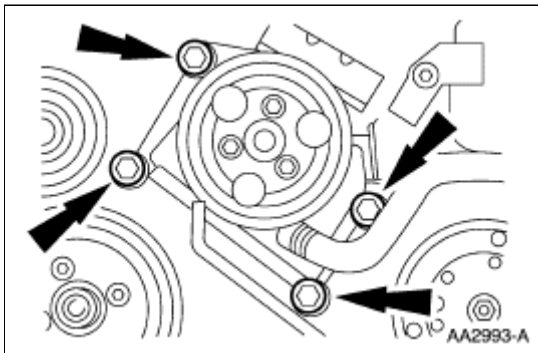
SECTION 303-01B: Engine — 4.0L SOHC  
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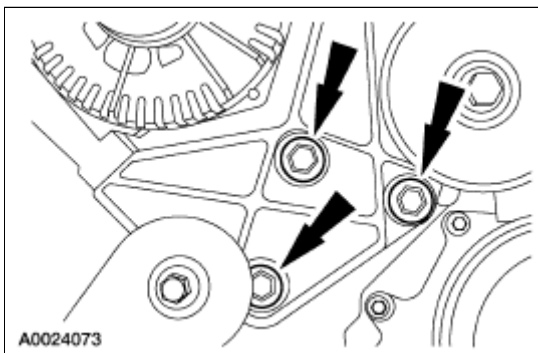
## Engine Front Cover

### Removal

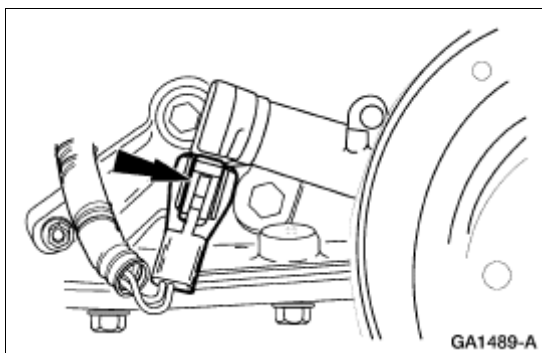
1. Disconnect the negative battery cable (14301). For additional information, refer to [Section 414-01](#).
2. Drain the engine coolant. For additional information, refer to [Section 303-03](#).
3. Remove the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
4. Remove the accessory bracket and position aside.



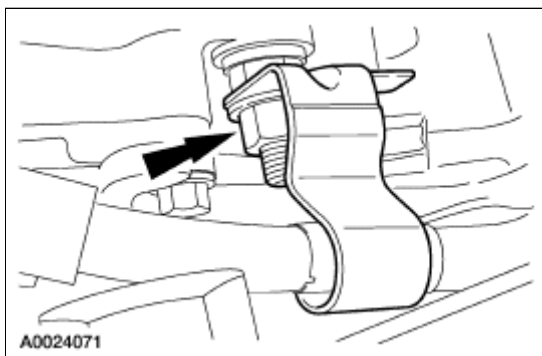
5. Disconnect the generator electrical connectors. For additional information, refer to [Section 414-02](#).
6. Remove the accessory drive belt tensioner. For additional information, refer to [Section 303-05](#).
7. Remove generator mounting bracket and position aside.



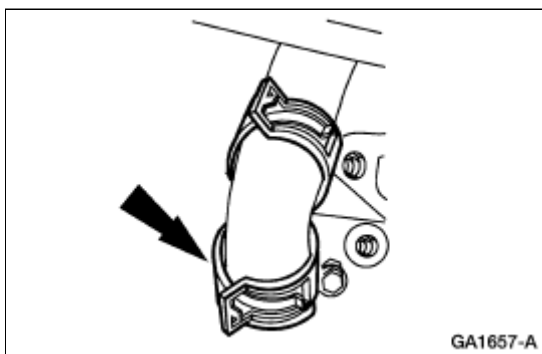
8. Disconnect the crankshaft position (CKP) sensor electrical connector.



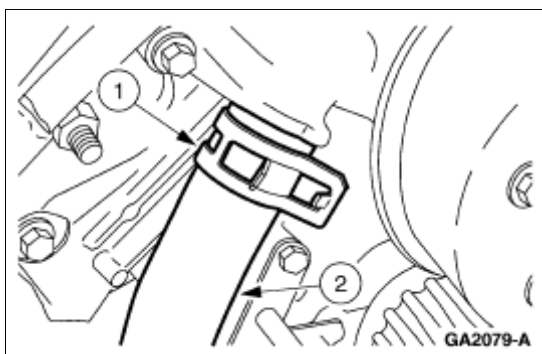
9. Remove the fuel vapor tube retaining nut and position aside.



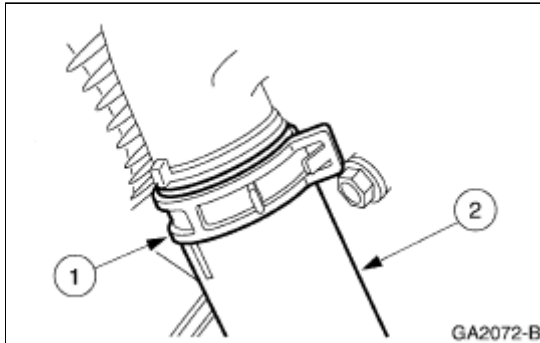
10. Remove the water bypass hose.



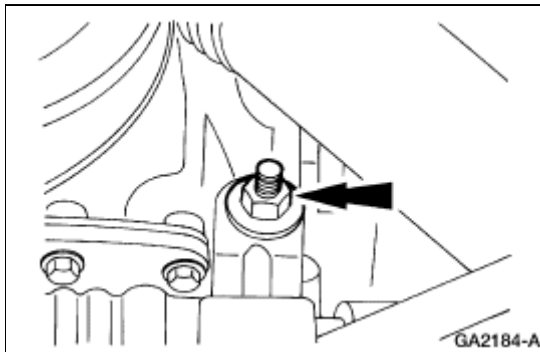
11. Remove the lower heater water hose.
1. Squeeze the hose clamp.
  2. Remove the hose.



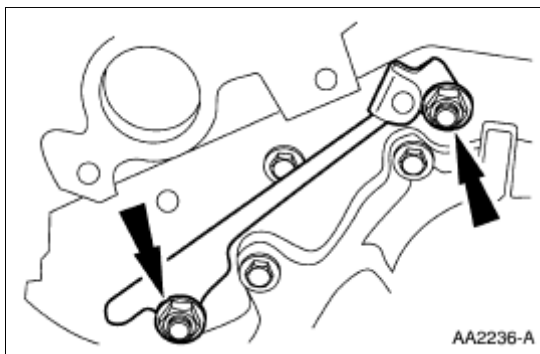
12. Disconnect the lower radiator hose.
  1. Squeeze the hose clamp.
  2. Disconnect the hose.



13. On A/C-equipped vehicles, remove the A/C line bracket and position aside.

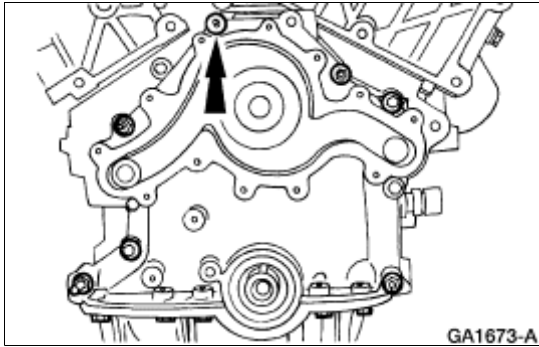


14. Remove the wiring harness retainer and position aside.



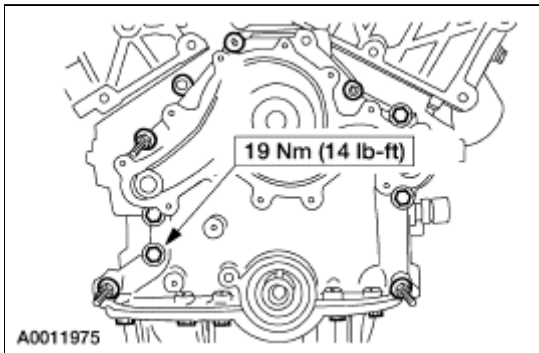
15. Remove the crankshaft front oil seal. For additional information, refer to [Crankshaft Front Oil Seal](#) in this section.
16. **NOTE:** The water pump is removed for clarity.

Remove the engine front cover.

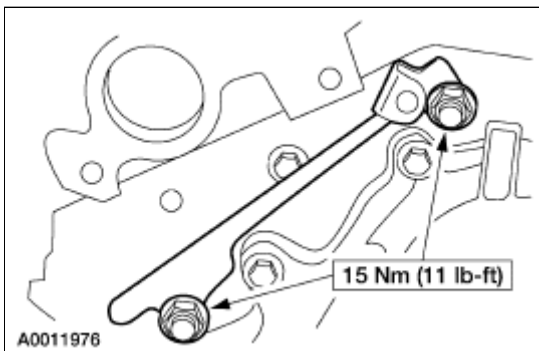


### Installation

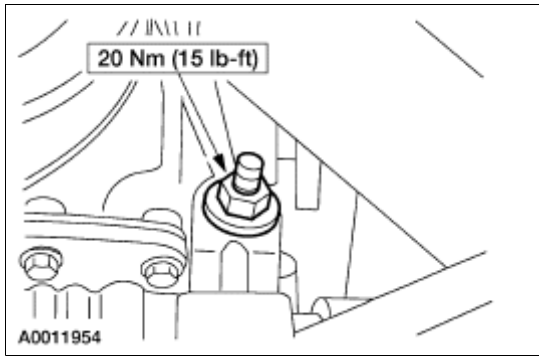
1. Clean and inspect the sealing surfaces.
2. Install the front cover gasket. For additional information, refer to [Engine](#) in this section.
3. Install the engine front cover.



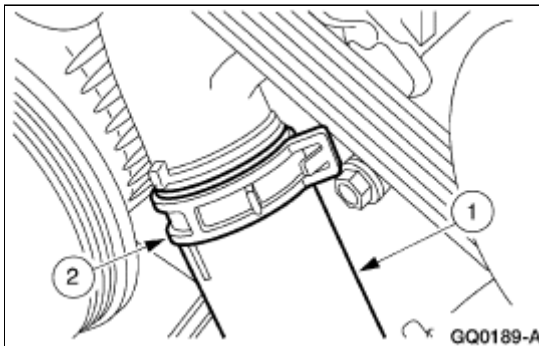
4. Install the crankshaft front oil seal. For additional information, refer to [Crankshaft Front Oil Seal](#) in this section.
5. Install the wiring harness retainer.



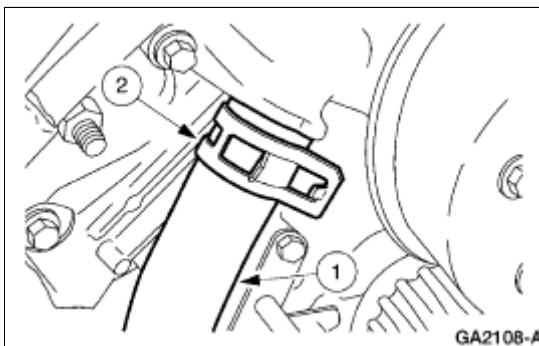
6. On A/C equipped vehicles, install the A/C line bracket nut.



7. Connect the lower radiator hose.
  1. Position the hose
  2. Install the clamp.

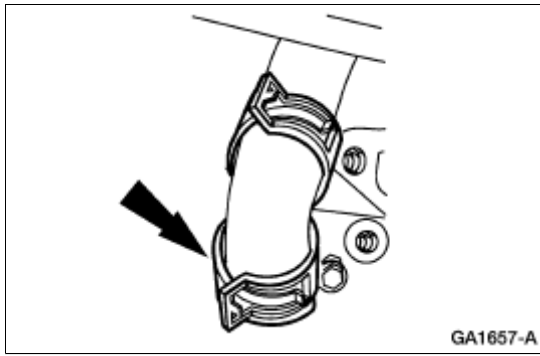


8. Connect the lower heater water hose.
  1. Position the hose.
  2. Install the hose clamp.

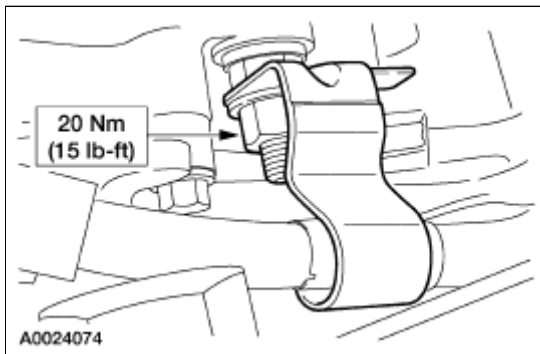


9. Install the water bypass hose.

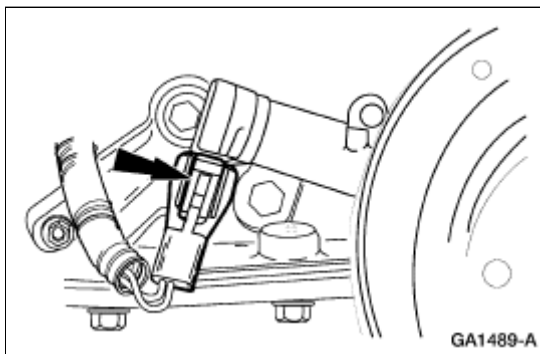




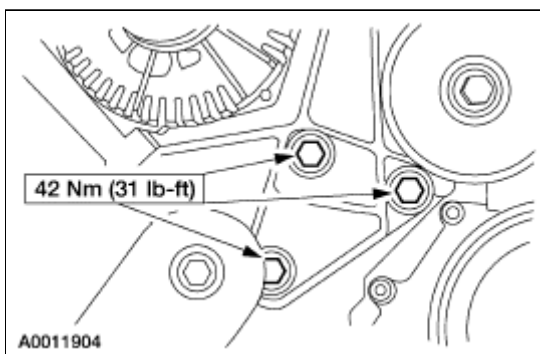
10. Position the fuel vapor tube and bracket, and install the nut.



11. Connect the crankshaft position (CKP) sensor electrical connector.

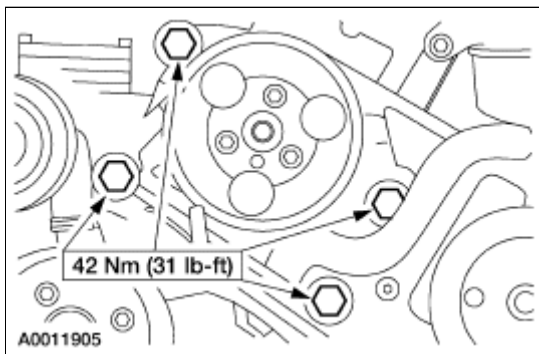


12. Install the generator mounting bracket.

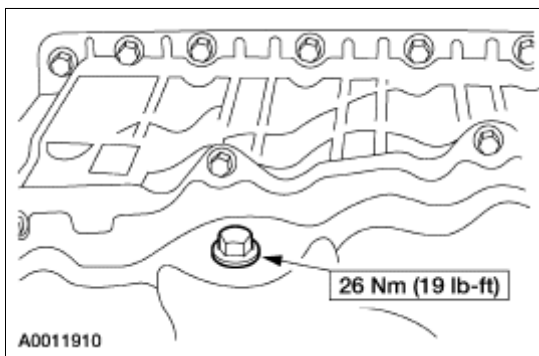


13. Install the accessory drive belt tensioner. For additional information, refer to [Section 303-05](#).

14. Connect the generator electrical connectors. For additional information, refer to [Section 414-02](#).
15. Install the accessory bracket.



16. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
17. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
18. Drain the engine oil.



19. Lower the vehicle.
  20. Fill the engine with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
  21. Fill the engine with coolant. For additional information, refer to [Section 303-03](#).
  22. Connect the negative battery cable. For additional information, refer to [Section 414-01](#).
-


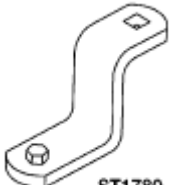

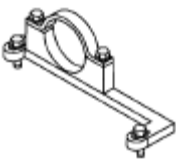

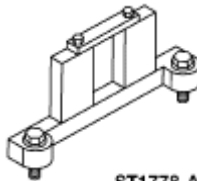
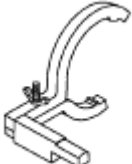


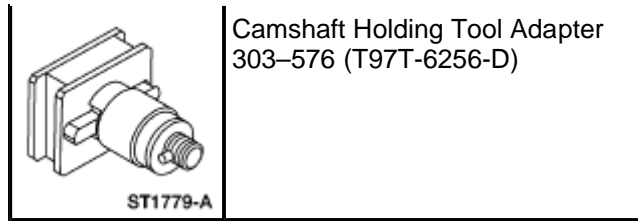
SECTION 303-01B: Engine — 4.0L SOHC  
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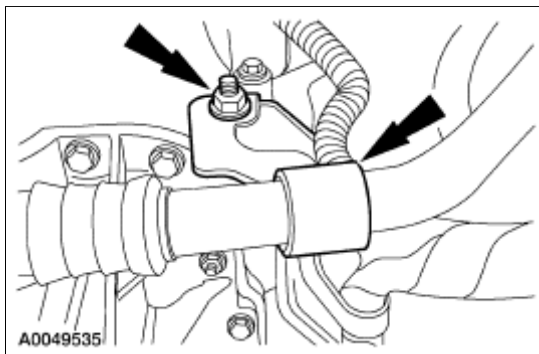
## Timing Drive Components —Camshaft Timing

### Special Tool(s)

 ST1774-A	Timing Chain Tensioner 303-571 (T97T-6K254-A)
 ST1780-A	Camshaft Gear Removal Tool 303-575 (T97T-6256-F)
 ST1781-A	Camshaft Gear Torque Adapter 303-565 (T97T-6256-G)
 ST1777-A	Camshaft Gear Holding Tool 303-564 (T97T-6256-B)
 ST1776-A	Camshaft Gear Holding Tool Adapter 303-578 (T97T-6256-A)
 ST1778-A	Camshaft Holding Tool 303-577 (T97T-6256-C)
 ST1775-A	Crankshaft Holding Tool 303-573 (T97T-6303-A)



1. Remove the valve covers. For additional information, refer to [Valve Cover—RH Valve Cover—LH](#) and in this section.
2. Remove the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
3. Remove the fuel supply manifold. For additional information, refer to [Section 303-04C](#).
4. Remove the accessory drive belt. For additional information, refer to [Section 303-05](#).
5. Remove the thermostat housing. For additional information, refer to [Section 303-03](#).
6. Remove the roller followers. For additional information, refer to [Roller Followers](#) in this section.
7. Remove the nut and position the A/C manifold and tube assembly bracket aside.

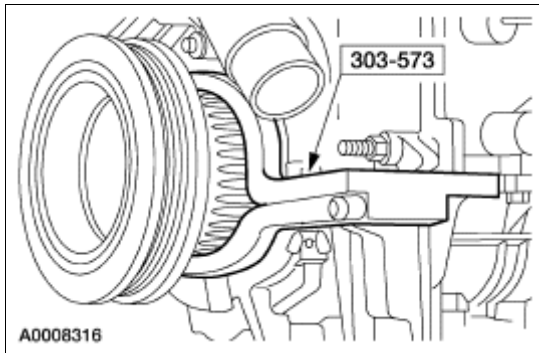


8. **NOTE:** You must re-time the LH and RH camshafts when either camshaft is disturbed.

Turn the crankshaft one revolution clockwise.

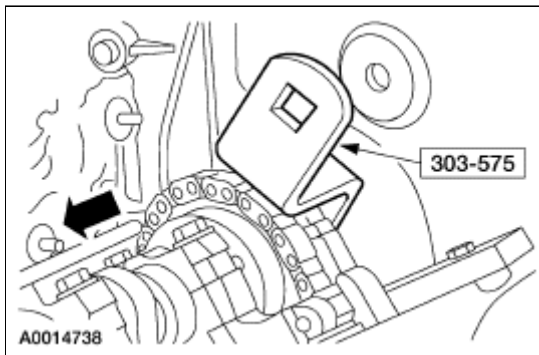
9. **NOTE:** The special tool must be installed on the damper and should contact the engine block, this positions the engine at top dead center (TDC).

Install the special tool.



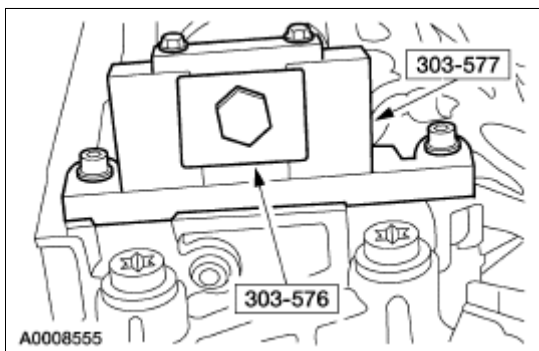
10.  **CAUTION:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.

Using the special tool, loosen the RH camshaft sprocket bolt.



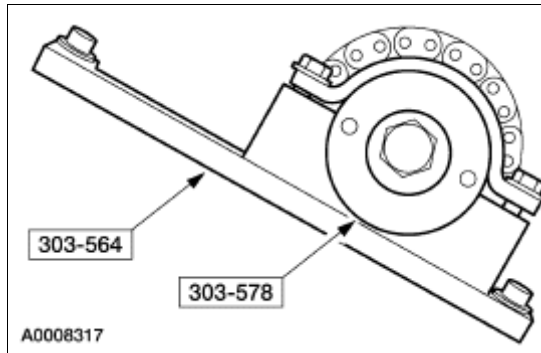
11. **NOTE:** The camshaft timing slots are off-center.

Position the camshaft timing slots below the centerline of the camshaft to correctly fit the special tools and install the special tools on the front of the RH cylinder head.

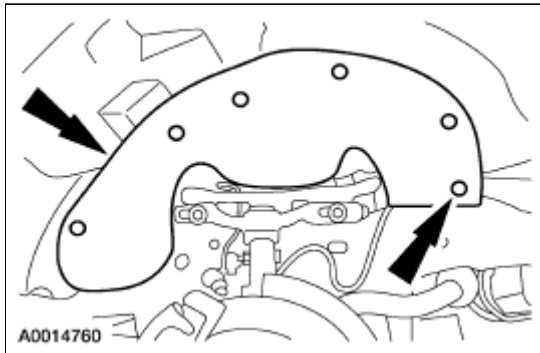


12. **NOTE:** Leave the top two special tool clamp bolts loose.

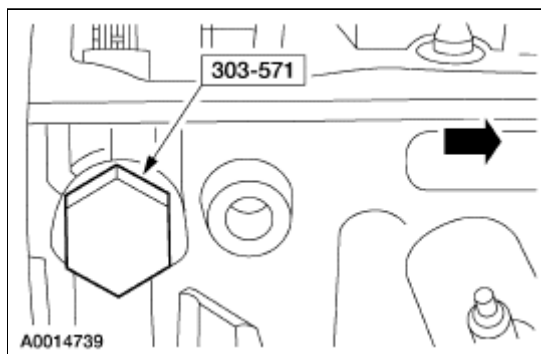
Install the special tools on the rear of the RH cylinder head.



13. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
14. Remove the RH wheel and tire. For additional information, refer to [Section 204-04](#).
15. Remove the RH lower splash splash.



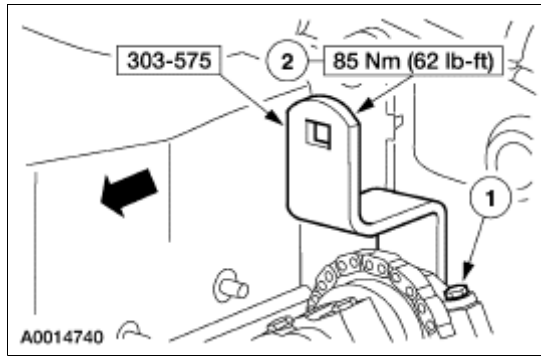
16. Remove the RH camshaft tensioner and install the special tool.



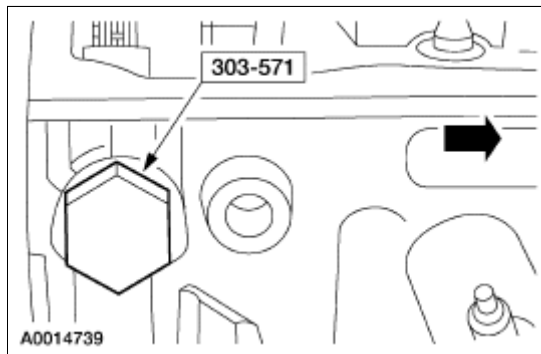
17. Lower the vehicle.
18.  **CAUTION:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.

Tighten the bolts.

1. Tighten the special tool top two clamp bolts to 10 Nm (89 lb-in).
2. Tighten the camshaft bolt.

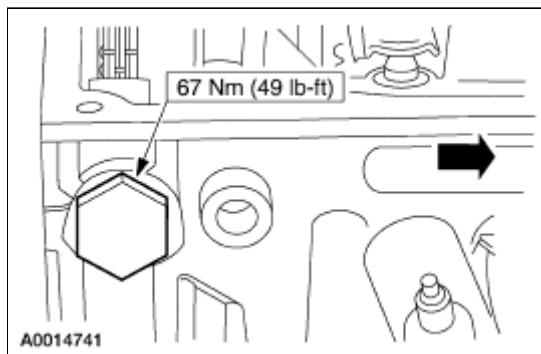


19. Remove the special tool.



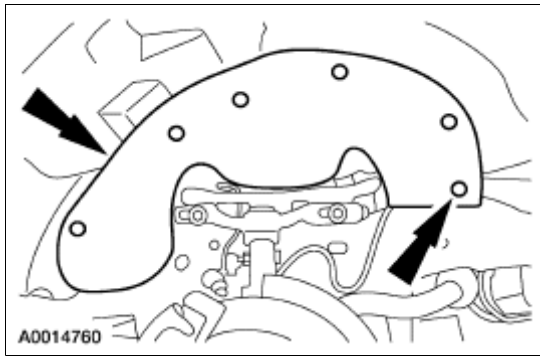
20. **NOTE:** When using a new washer the camshaft tensioner must be torqued to 44 Nm (32 lb-ft).

Install the RH camshaft tensioner.

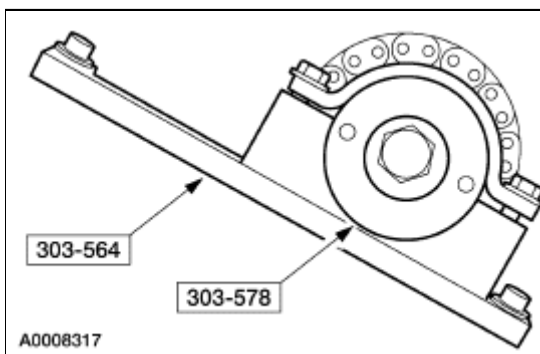


21. Raise the vehicle.
22. Install the RH lower splash shield.

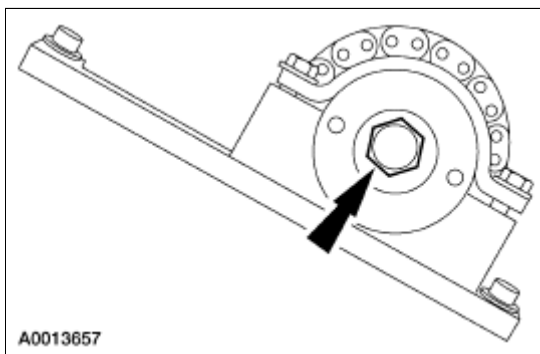




23. Install the RH wheel and tire. For additional information, refer to [Section 204-04](#).
24. Lower the vehicle.
25. Remove the special tools from the RH cylinder head.
26. Install the special tools on the front of the LH cylinder head and tighten the top two clamp bolts to 10 Nm (89 lb-in).

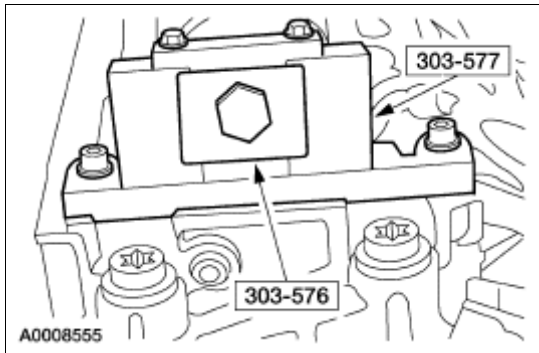


27. Loosen the LH camshaft sprocket bolt.

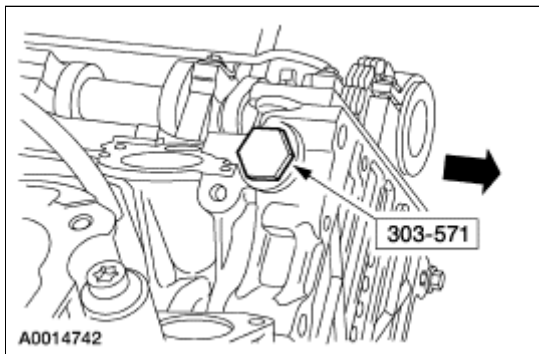


28. Loosen the top two clamp bolts on the special tool to allow the camshaft sprocket to rotate freely.
29. **NOTE:** The camshaft timing slots are off-center.

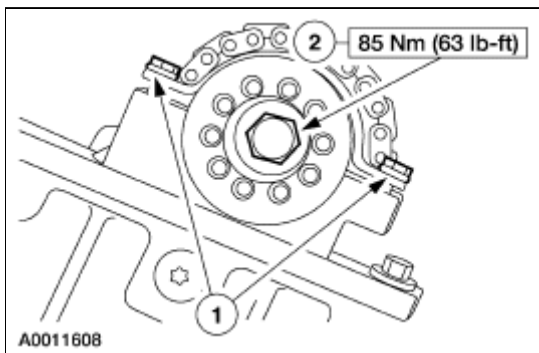
Position the camshaft timing slots below the centerline of the camshaft to correctly fit the special tools, and install the special tools on the rear of the LH cylinder head.



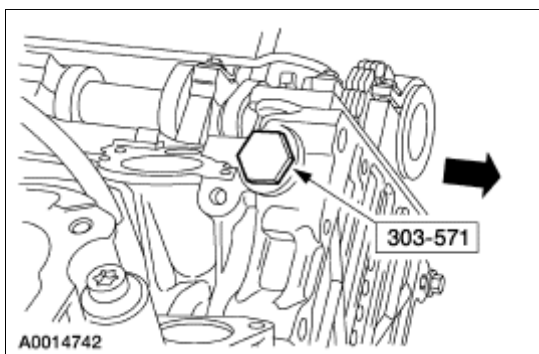
30. Remove the LH camshaft tensioner and install the special tool.



31. Tighten the bolts.
1. Tighten the special tool top two clamp bolts to 10 Nm (89 lb-in).
  2. Tighten the camshaft bolt.

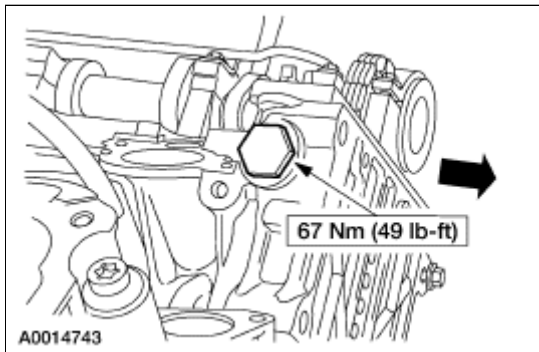


32. Remove the special tool.

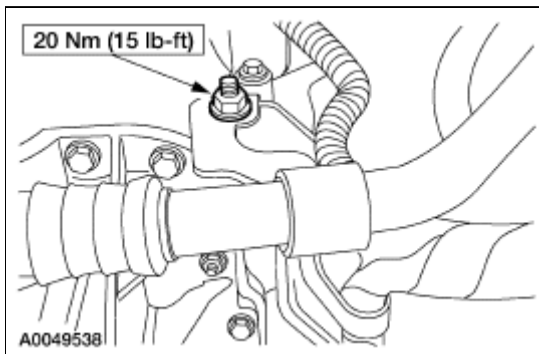


33. **NOTE:** When using a new washer the camshaft tensioner must be torqued to 44 Nm (32 lb-ft).

Install the LH camshaft tensioner.



34. Remove all of the special tools.
35. Install the A/C manifold and tube assembly bracket.



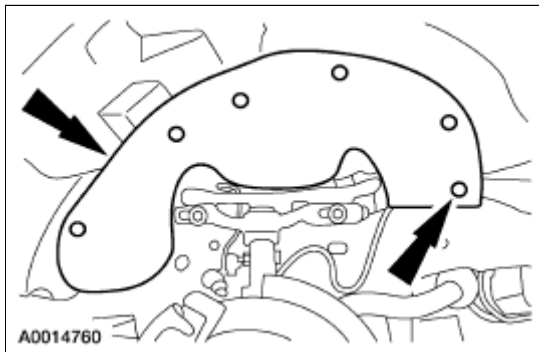
36. Install the roller followers. For additional information, refer to [Roller Followers](#) in this section.
37. Install the thermostat housing. For additional information, refer to [Section 303-03](#).
38. Install the accessory drive belt. For additional information, refer to [Section 303-05](#).
39. Install the fuel supply manifold. For additional information, refer to [Section 303-04C](#).
40. Install the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
41. Install the valve covers. For additional information, refer to [Valve Cover—LH](#) and [Valve Cover—RH](#) in this section.
-



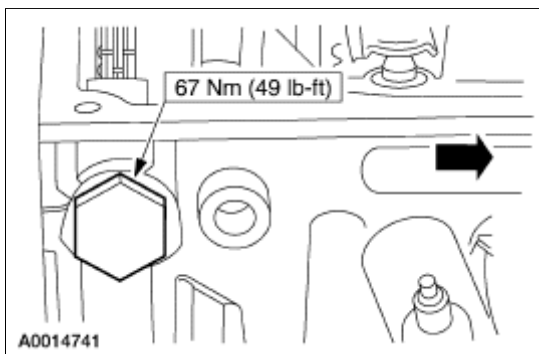
## Timing Drive Components —RH Hydraulic Chain Tensioner

### Removal and Installation

1. Remove the wheel and tire. For additional information, refer to [Section 204-04](#).
2. Remove the lower splash shield.



3. Remove the RH camshaft tensioner.
  - If using a new washer, tighten to 44 Nm (32 lb-ft).
  - If using the old washer, tighten to 67 Nm (49 lb-ft).



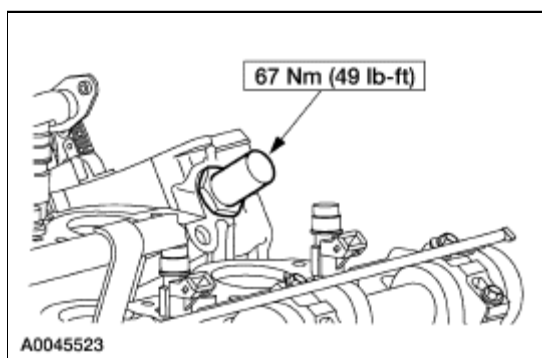
4. To install, reverse the removal procedure.



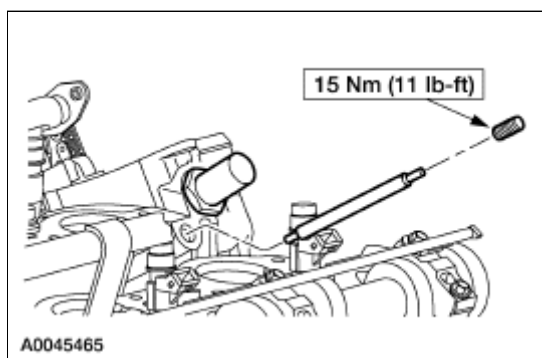
## Timing Drive Components —LH Hydraulic Chain Tensioner

### Removal and Installation

1. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
2. Remove the thermostat housing. For additional information, refer to [Section 303-03](#).
3. Remove the LH camshaft tensioner.
  - If using a new washer, tighten to 44 Nm (32 lb-ft).
  - If using the old washer, tighten to 67 Nm (49 lb-ft).



4. Remove the pipe plug, and the oil volume reduction plug.



5. **NOTE:** Be sure to install the new oil volume reduction plug supplied with the hydraulic chain tensioner.

To install, reverse the removal procedure.






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## Valve —Valve Spring

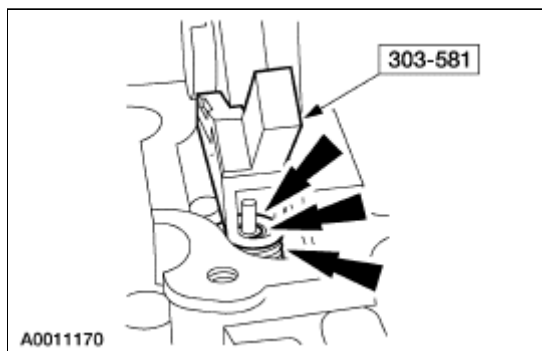
### Special Tool(s)

 ST1330-A	Valve Spring Compressor 303-581 (T97T-6565-A)
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### Removal and Installation

1. Remove the camshaft roller followers. For additional information, refer to [Roller Followers](#) in this section.
2. Position the piston at top dead center.
3. Hold the valve in the cylinder head.
  - Remove the spark plugs. For additional information, refer to [Section 303-07A](#), [Section 303-07B](#) or [Section 303-07C](#).
  - Use a suitable tool to apply air pressure to the cylinder.
4.  **CAUTION:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve to fall into the cylinder. If air pressure must be removed, support the valve prior to removal.

Using the special tool, remove the valve spring retainer keys, the valve spring and the retainer.



5. Inspect the components. For additional information, refer to [Section 303-00](#).
6. **NOTE:** Lubricate the parts with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G prior to installing.

To install, reverse the removal procedure.




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## Valve —Valve Seals

### Special Tool(s)

 ST1824-A	Valve Stem Seal Replacer 303-370 (T90T-6571-A)
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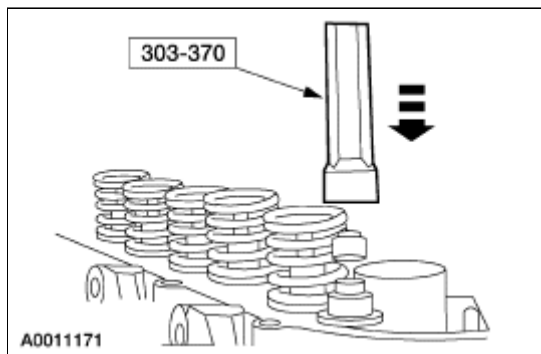
### Removal

1. Remove the valve springs. For additional information, refer to [Valve —Valve Spring](#) in this section.
2. Remove the valve stem seals.

### Installation

1. **NOTE:** Lubricate parts with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G prior to installing.

Using the special tool, install the valve stem seals.



2. Install the valve springs. For additional information, refer to [Valve —Valve Spring](#) in this section.
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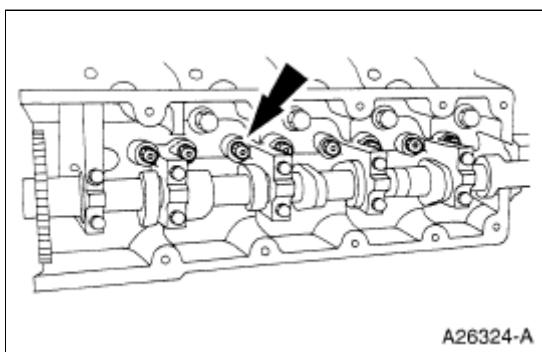


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## Hydraulic Lash Adjusters

### Removal and Installation

1. Remove the camshaft roller followers. For additional information, refer to [Roller Followers](#) in this section.
2. Remove the hydraulic lash adjusters.



3. **NOTE:** Lubricate the parts with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specifications WSS-M2C153-G prior to installing.

To install, reverse the removal procedure.

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## Roller Followers

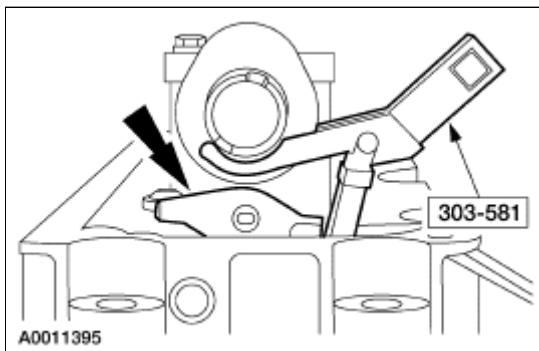
### Special Tool(s)

 ST1330-A	Valve Spring Compressor 303-581 (T97T-6565-A)
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### Removal

1. Remove the valve covers. For additional information, refer to [Valve Cover—LH](#) or [Valve Cover—RH](#) in this section.
2. Remove the fuel supply manifold. For additional information, refer to [Section 303-04B](#).
3. **NOTE:** Mark each camshaft roller follower to ensure its original position during reassembly.

Using the special tool, remove the camshaft roller followers.



4. **NOTE:** Lubricate the parts with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G prior to installing.

To install, reverse the removal procedure.

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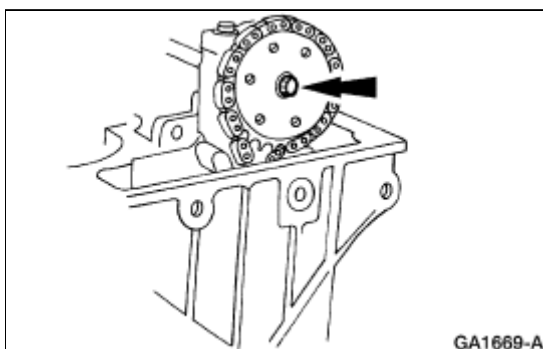
SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

## Camshaft —LH

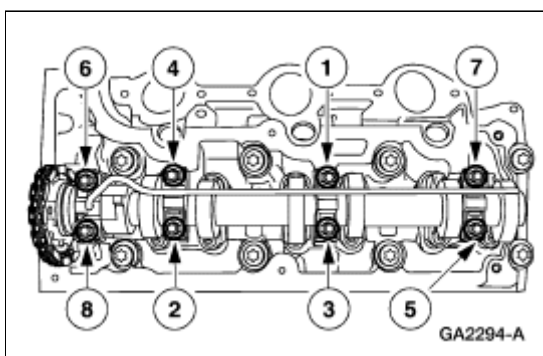
### Removal

1. Remove the camshaft roller followers. For additional information, refer to [Roller Followers](#) in this section.
2. Remove the LH hydraulic camshaft tensioner. For additional information, refer to Timing Drive Components—LH Hydraulic Chain Tensioner in this section.
3. Remove the bolt and the camshaft sprocket.



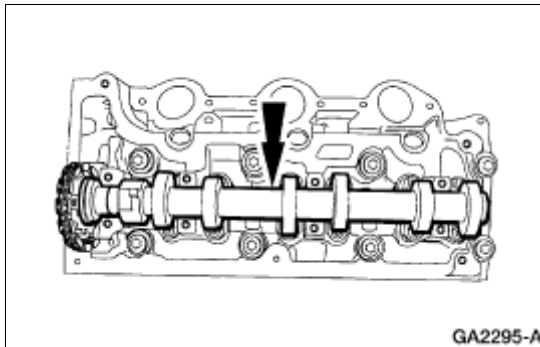
4. **NOTE:** Mark the position of the camshaft bearing caps so they can be installed in the original position.

Remove the bolts in the sequence shown and remove the camshaft bearing caps and the oil supply tube.



5. Remove the camshaft.

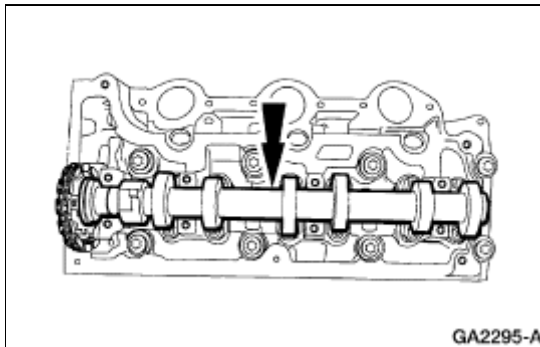




## Installation

1. **NOTE:** Lubricate the parts with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G before installing.

Install the camshaft.

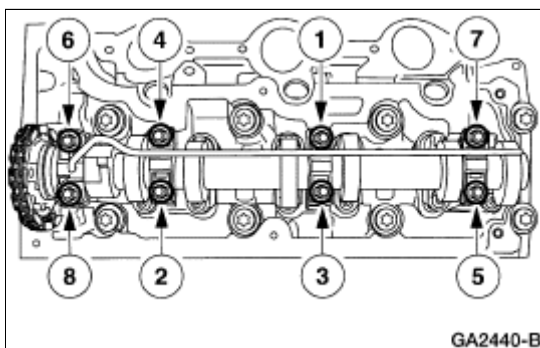


2. **NOTE:** The camshaft bearing caps must be installed in the original position.

**NOTE:** After installing the bolts, check the camshaft for free rotation.

Position the oil supply tube, the camshaft bearing caps, and the bolts.

- Tighten the bolts in the sequence shown in two stages.
- Stage 1: Tighten the bolts to 6 Nm (53 lb-in).
- Stage 2: Tighten the bolts to 16 Nm (12 lb-ft).



3. The camshaft must be re-timed. For additional information, refer to [Timing Drive Components—Camshaft Timing](#) in this section.

4. Install the camshaft roller followers. For additional information, refer to [Roller Followers](#) in this section.
-

SECTION 303-01B: Engine — 4.0L SOHC  
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## Camshaft —RH

### Special Tool(s)

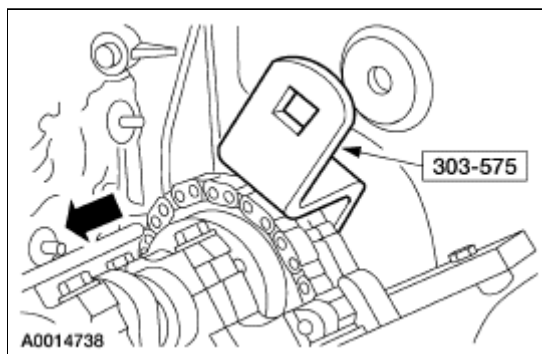
	Camshaft Gear Removal Tool 303-575 (T97T-6256-F)
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### Removal

1. Remove the camshaft roller followers. For additional information, refer to [Roller Followers](#) in this section.
2. Remove the RH hydraulic camshaft tensioner. For additional information, refer to Timing Drive Components in this section.

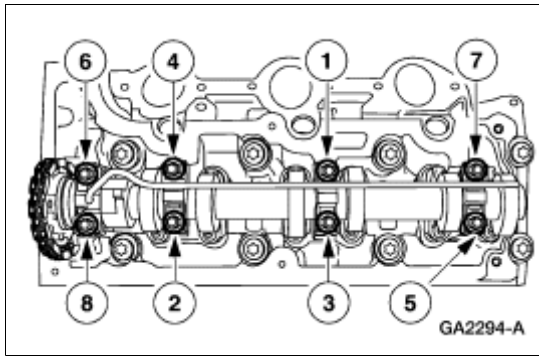
3.  **CAUTION:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.

Using the special tool, remove the bolt and the camshaft sprocket.

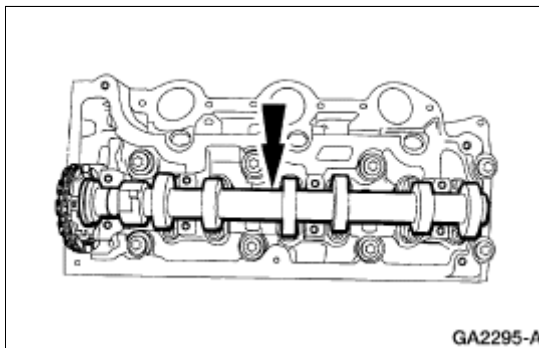


4. **NOTE:** Mark the position of the camshaft bearing caps so they can be installed in the original position.

Remove the bolts in the sequence shown and remove the camshaft bearing caps and the oil supply tube.



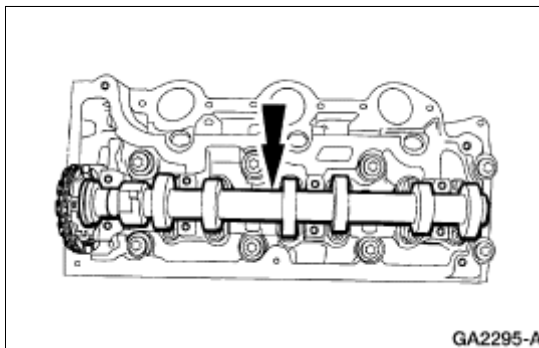
5. Remove the camshaft.



## Installation

1. **NOTE:** Lubricate the parts with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford Specification WSS-M2C153-G before installing.

Install the camshaft.

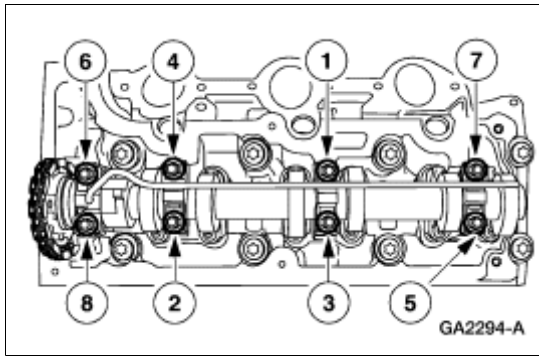


2. **NOTE:** The camshaft bearing caps must be installed in their original position.

**NOTE:** After installing the bolts, check the camshaft for free rotation.

Position the oil supply tube, the camshaft bearing caps, and the bolts.

- Tighten the bolts in the sequence shown in two stages:
- Stage 1: Tighten the bolts to 6 Nm (53 lb-in).
- Stage 2: Tighten the bolts to 16 Nm (12 lb-ft).



3. The camshaft must be re-timed. For additional information, refer to [Timing Drive Components—Camshaft Timing](#) in this section.
  4. Install the camshaft roller followers. For additional information, refer to [Roller Followers](#) in this section.
-

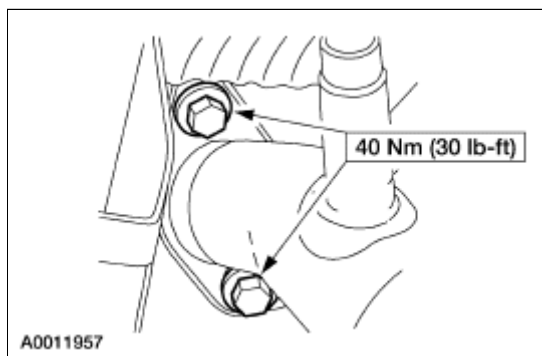
SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

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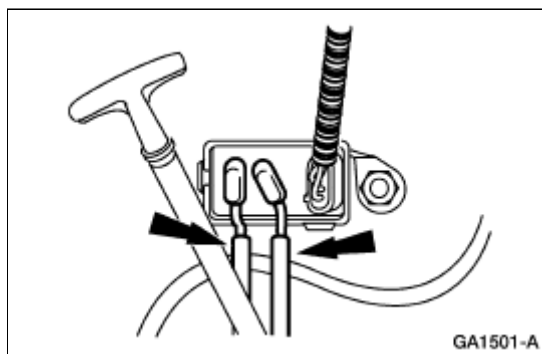
## Exhaust Manifold —LH

### Removal and Installation

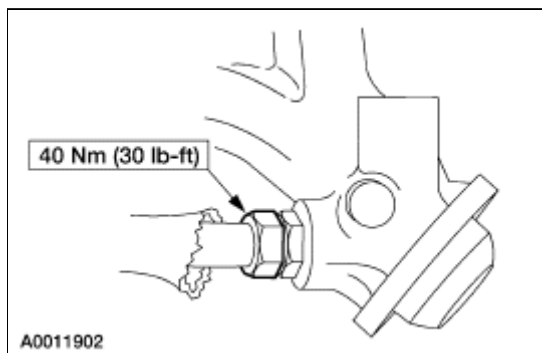
1. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
2. Remove the bolts.



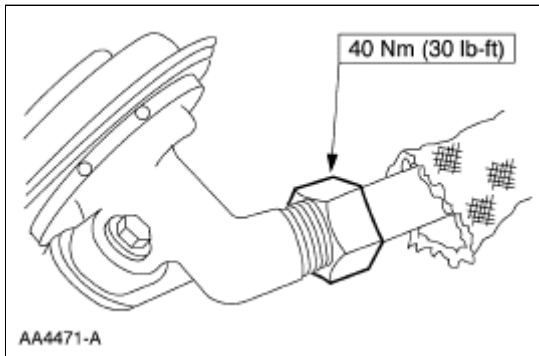
3. Lower the vehicle.
4. Disconnect the hoses from the differential pressure feedback (EGR) transducer.



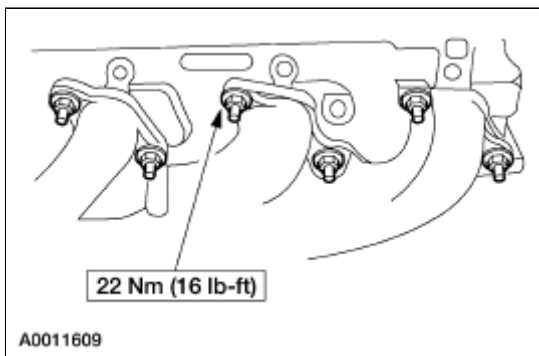
5. Disconnect the EGR valve to exhaust manifold tube from the exhaust manifold.



6. Disconnect the EGR valve to exhaust manifold tube from the EGR valve and remove the EGR valve to exhaust manifold tube.



7. Remove the LH exhaust manifold.



8. **NOTE:** Use new exhaust manifold gaskets and nuts.

To install, reverse the removal procedure.

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SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

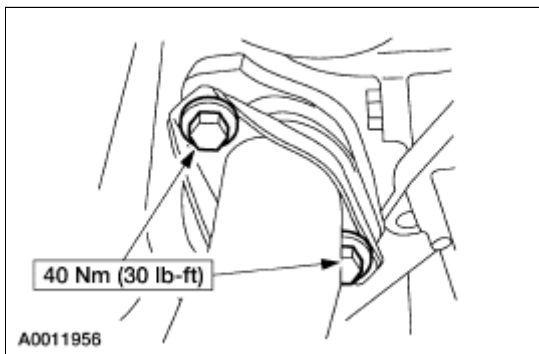
2000 Explorer/Mountaineer Workshop Manual

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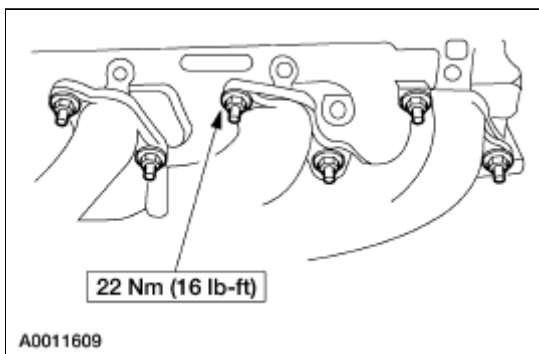
## Exhaust Manifold —RH

### Removal

1. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
2. Remove the bolts.



3. Lower the vehicle.
4. Remove the RH exhaust manifold.



5. **NOTE:** Use new exhaust manifold gaskets and nuts.

To install, reverse the removal procedure.

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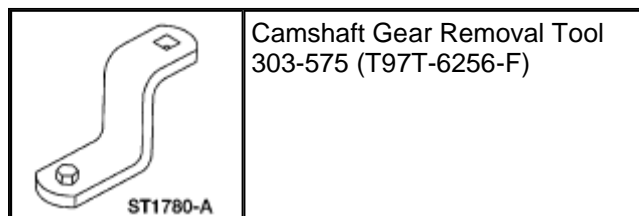


SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

## Cylinder Head

### Special Tool(s)

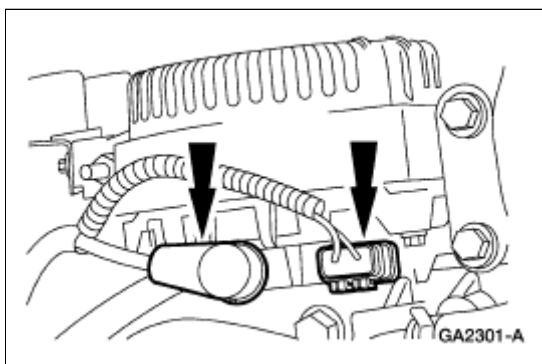


### Removal

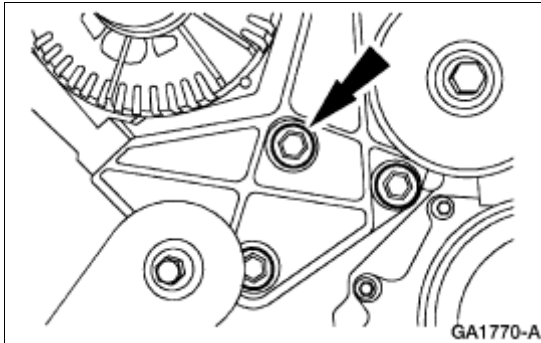


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

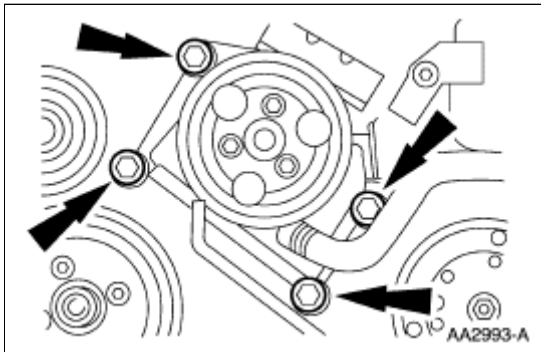
1. Remove the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
2. Remove the roller followers. For additional information, refer to [Roller Followers](#) in this section.
3. Remove the fan shroud. For additional information, refer to [Section 303-03](#).
4. Remove the belt tensioner. For additional information, refer to [Section 303-05](#).
5. Disconnect the generator electrical connectors.



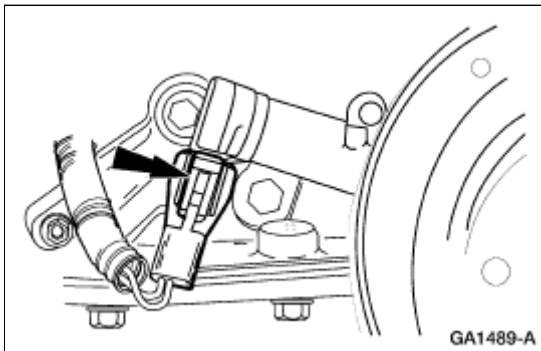
6. Remove the generator mounting bracket.



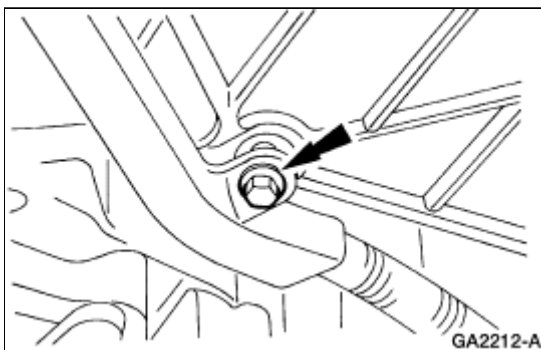
7. Remove the bolts and position the accessory bracket aside.



8. Disconnect the crankshaft position (CKP) sensor electrical connector.

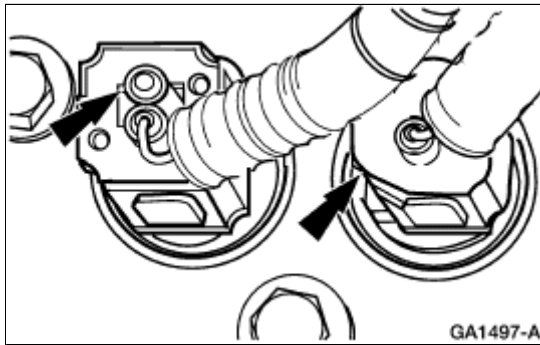


9. Remove the electrical harness retainer.

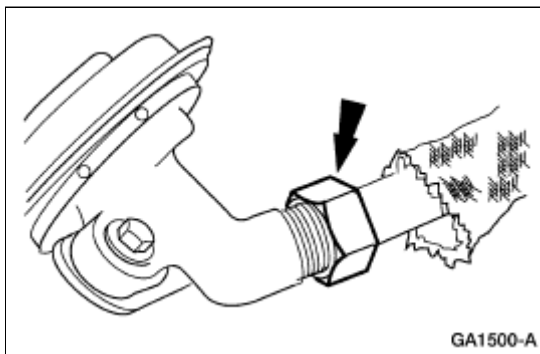


10. Disconnect the water temperature indicator sender unit and the engine coolant temperature (ECT)

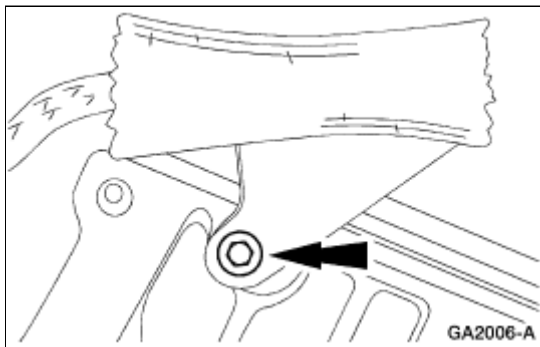
sensor electrical connectors.



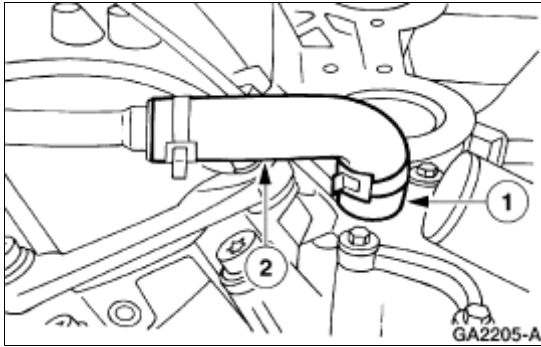
11. Disconnect the EGR tube nut.



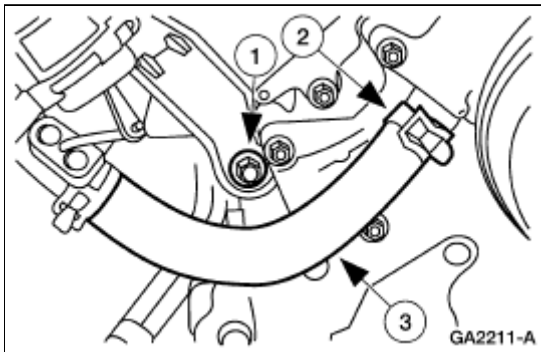
12. Position the EGR valve bracket aside.



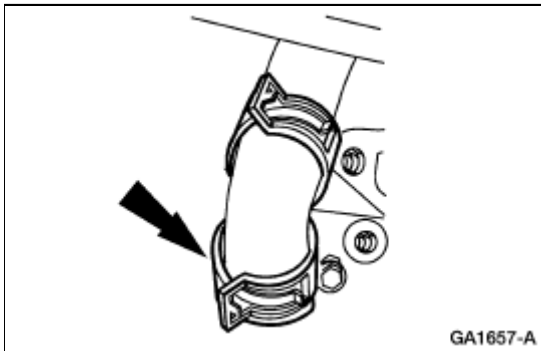
13. Remove the upper heater water hose.
  1. Squeeze the heater hose clamp.
  2. Remove the heater water hose.



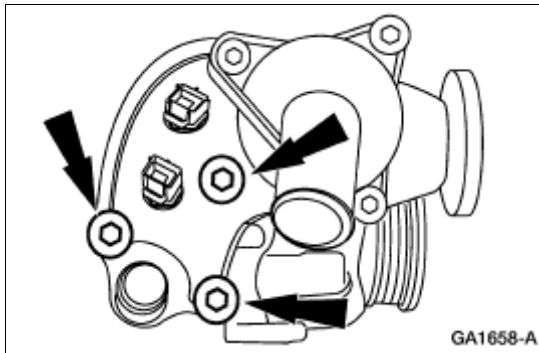
14. Remove the lower heater water hose and position aside.
1. Remove the bolt.
  2. Squeeze the hose clamp.
  3. Remove the heater water hose and position aside.



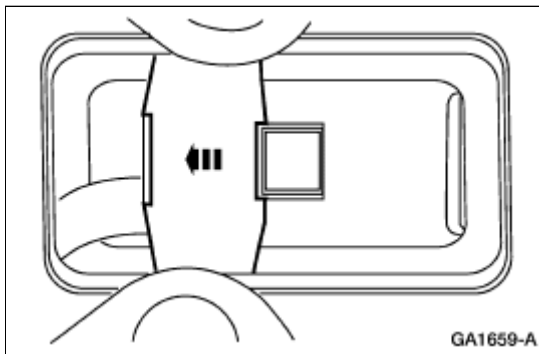
15. Disconnect the water bypass hose and position aside.



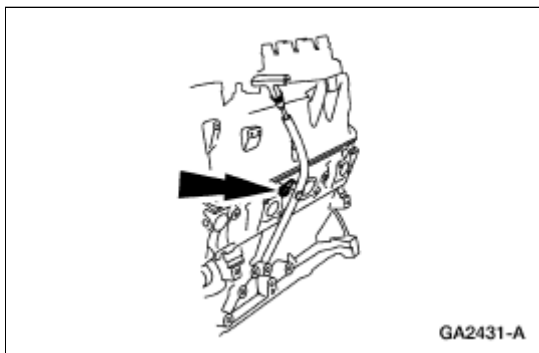
16. Remove the thermostat housing.



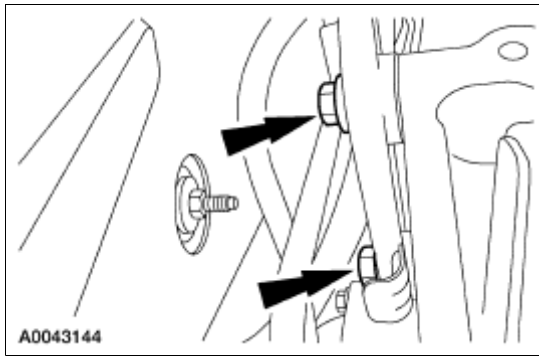
17. Remove the crankcase vent separator spring steel clip and remove the separator.



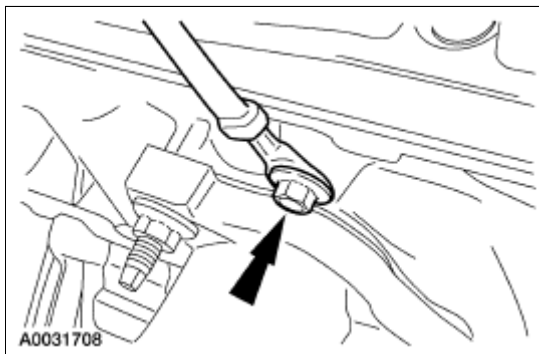
18. Remove the oil level indicator tube.



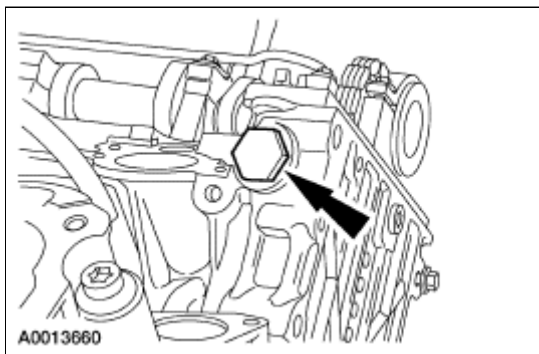
19. Remove the exhaust manifolds. For additional information, refer to [Exhaust Manifold—RH](#) and [Exhaust Manifold—LH](#) in this section.
20. Remove the engine wiring harness bolts and position the wiring harness aside.



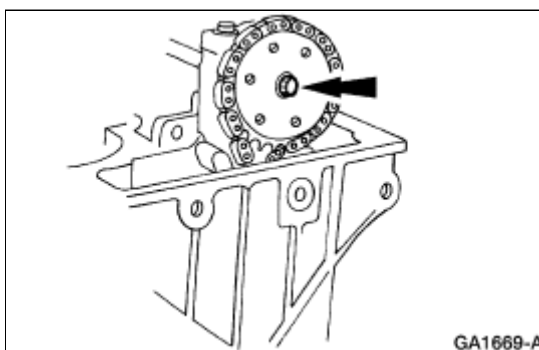
21. Remove the engine compartment ground strap.



22. Remove the LH hydraulic chain tensioner.

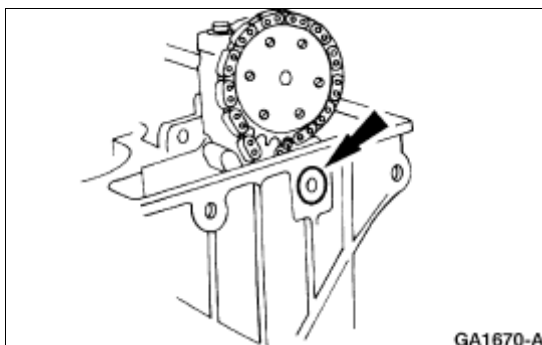



23. Remove the bolt.



24. Remove the bolt.

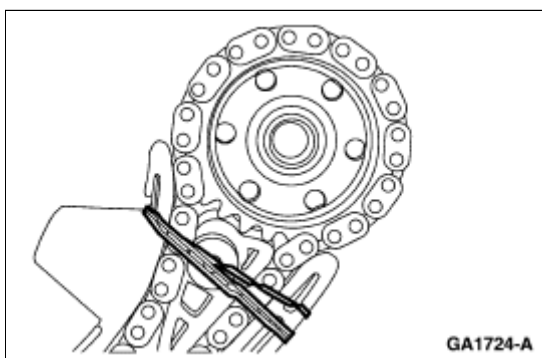




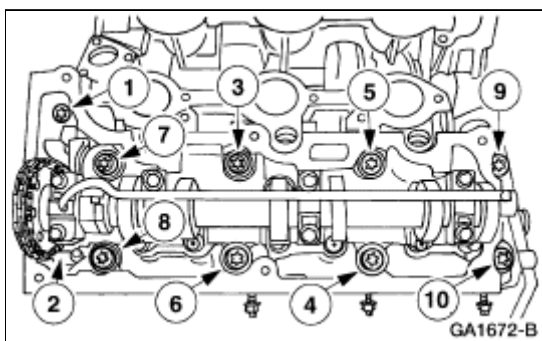
25.  **CAUTION:** To avoid breaking the cassette, remove the camshaft sprocket from the chain and cassette to gain clearance to remove cylinder the head.

**NOTE:** Hold the chain and cassette with a rubber band to aid in removal and prevent the chain from falling into the cylinder block.

Remove the LH camshaft sprocket from the cassette.



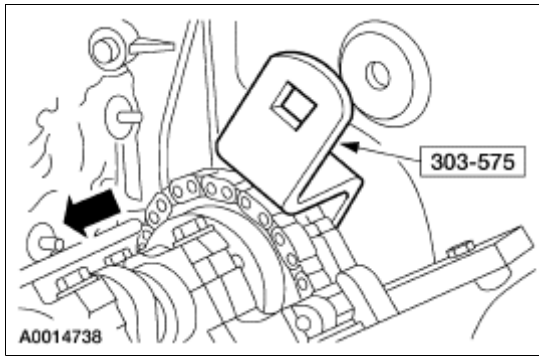
26. Remove the eight 12 mm bolts and two 8 mm bolts in the sequence shown and remove the LH cylinder head.
- Discard the head gasket.



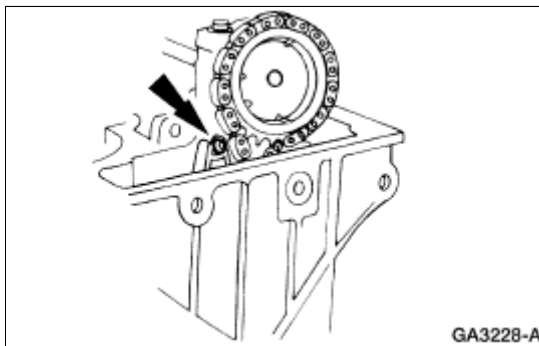
27. Remove the RH hydraulic chain tensioner. For additional information, refer to [Timing Drive Components—LH Hydraulic Chain Tensioner](#) in this section.


28.  **CAUTION:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.

Using the special tool, remove bolt and the camshaft sprocket.



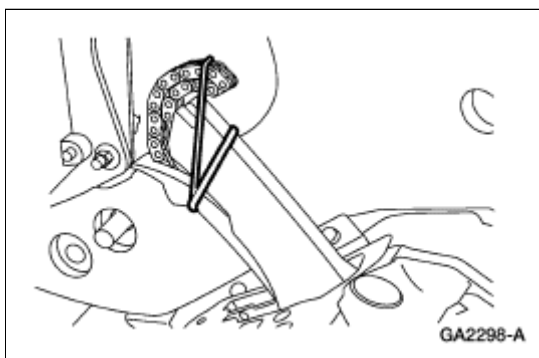
29. Remove the bolt.



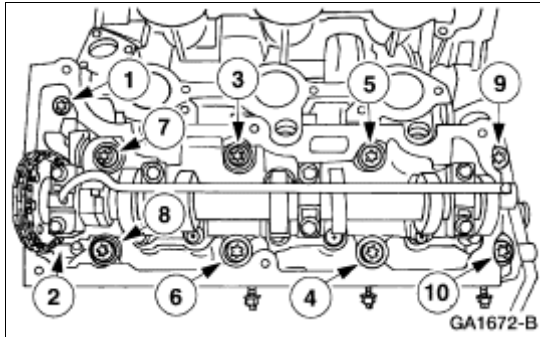
30.  **CAUTION:** To avoid breaking the cassette, remove the camshaft sprocket from the chain and cassette to gain clearance to remove cylinder the head.

**NOTE:** Hold the chain and cassette with a rubber band to aid in removal and prevent the chain from falling into the cylinder block.

Remove the RH camshaft sprocket from the cassette.



31. Remove the two 8 mm bolts and the eight 12 mm bolts in the sequence shown, and remove the RH cylinder head.
- Discard the head gasket.

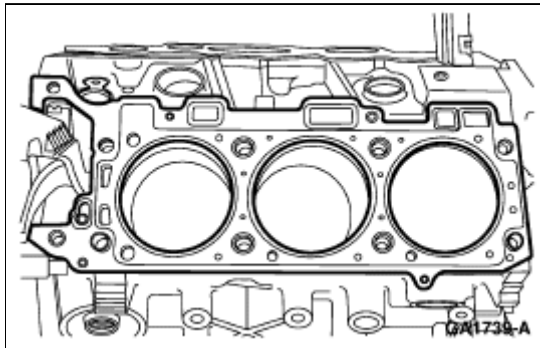


32. Inspect the cylinder head and block for flatness. For additional information, refer to [Section 303-00](#).

### Installation

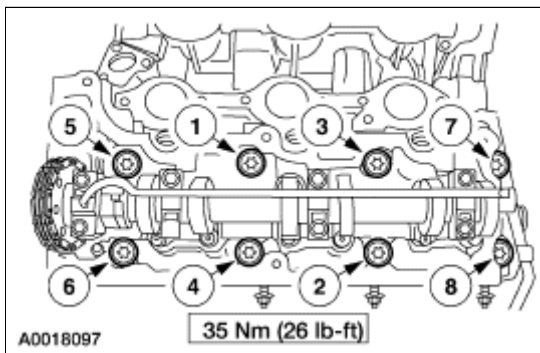
1. **NOTE:** The LH is shown, the RH is similar.

Position the cylinder head gasket and the cylinder head.



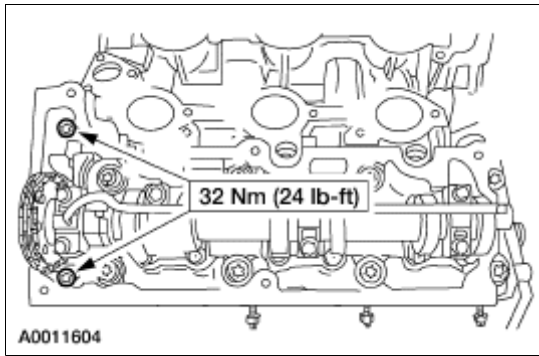
2. **NOTE:** LH shown, RH similar.

Install the 12 mm bolts and tighten in the sequence shown.



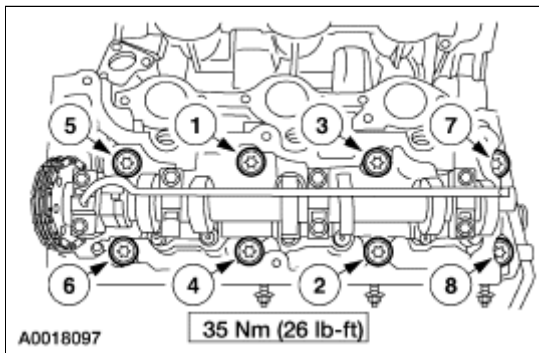
3. **NOTE:** LH shown, RH similar.

Install the two 8 mm bolts.



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

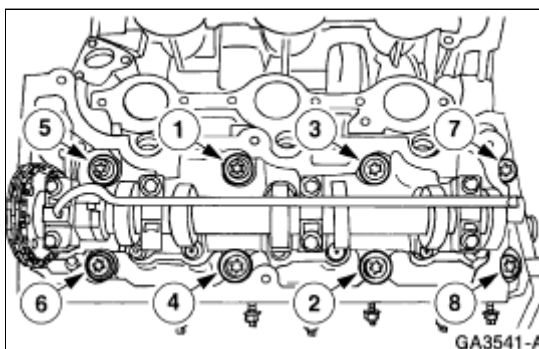
Tighten the 12mm bolts in the sequence shown.



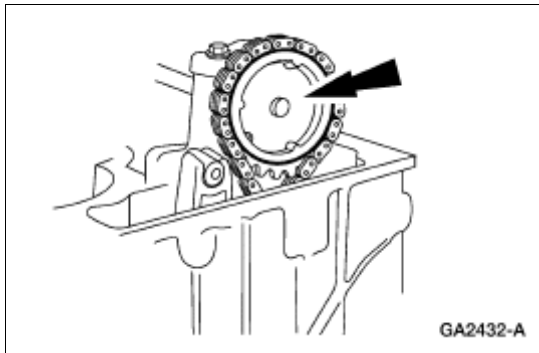
5. **NOTE:** LH shown, RH similar.

Tighten the eight 12 mm bolts in the sequence shown in two stages.

- Stage 1: Tighten the bolts 90 degrees.
- Stage 2: Tighten the bolts an additional 90 degrees.

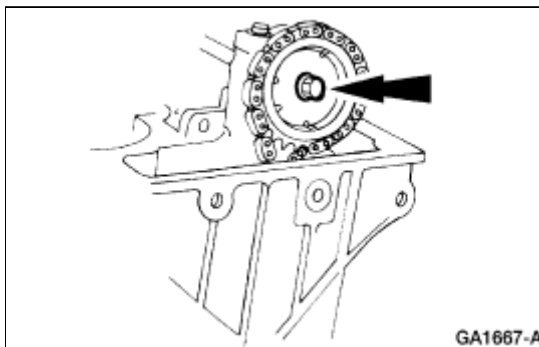


6. Install the RH rear camshaft sprocket in the cassette.

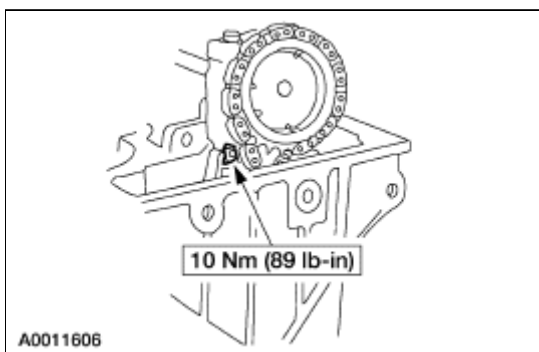


7.  **CAUTION:** The camshaft sprocket must turn freely on the camshaft. **DO NOT** tighten the bolt.

Install the RH rear camshaft bolt.

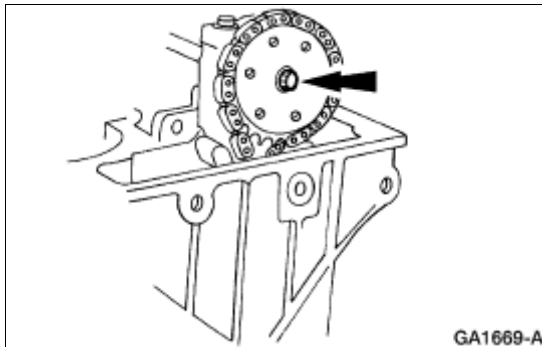


8. Install the bolt.

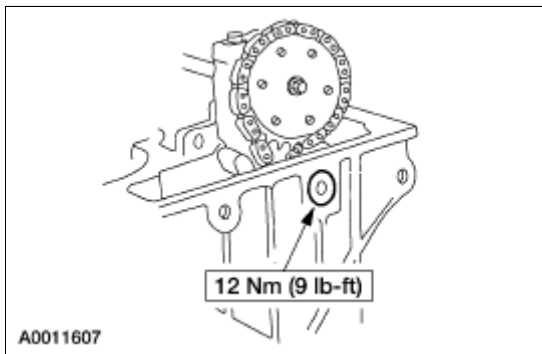


9.  **CAUTION:** The camshaft sprocket must turn freely on the camshaft. **DO NOT** tighten the bolt.

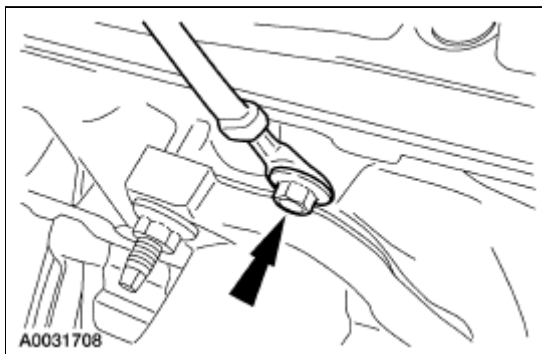
Install the LH front camshaft bolt.



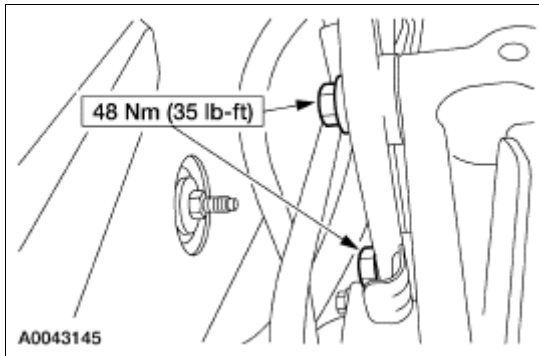
10. Install the LH bolt.



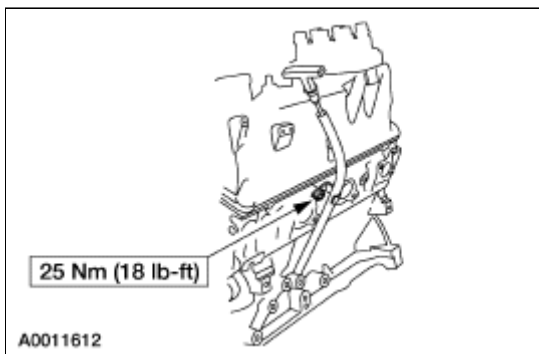
11. Carry out camshaft timing. For additional information, refer to [Timing Drive Components—Camshaft Timing](#) in this section.
12. Install the engine compartment ground strap.



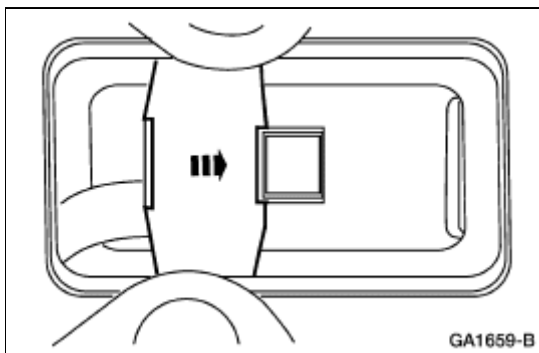
13. Install the wiring harness.



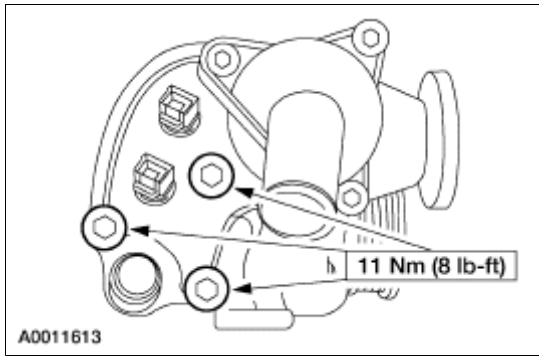
14. Install the exhaust manifolds. For additional information, refer to [Exhaust Manifold—LH](#) and [Exhaust Manifold—RH](#) in this section.
15. Install the oil level indicator tube.



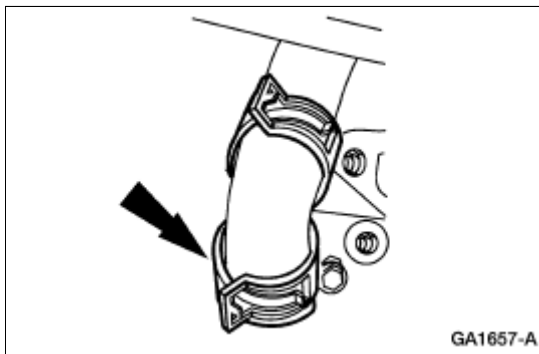
16. Install the crankcase vent separator and the spring steel clip.



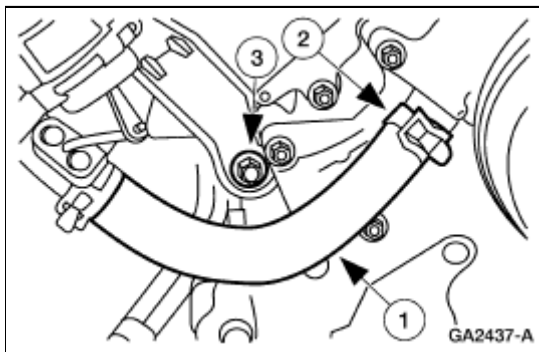
17. Install the thermostat housing.



18. Connect the water bypass hose.

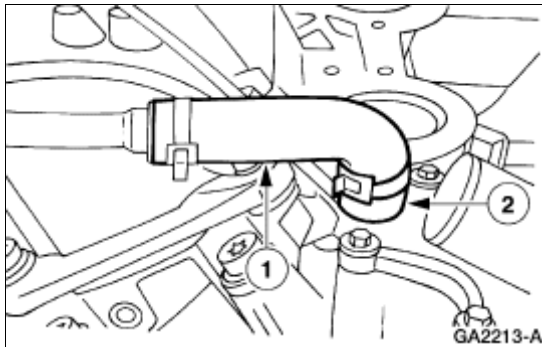


19. Install the lower heater water hose.
1. Position the heater water hose.
  2. Squeeze the heater hose clamp and position.
  3. Install the bolt.

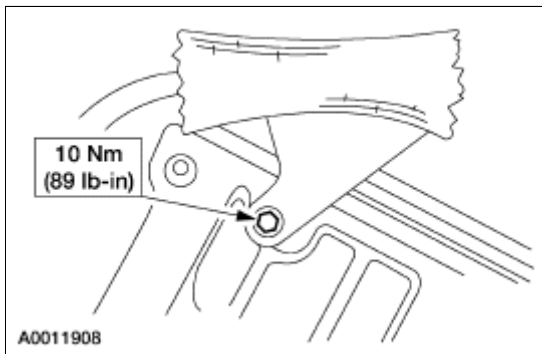


20. Install the upper heater water hose.
1. Position the heater water hose.
  2. Squeeze the hose clamp and position.

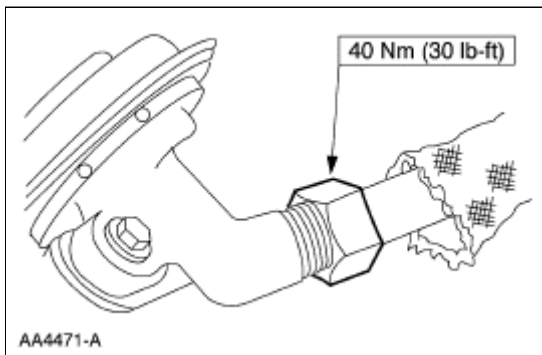




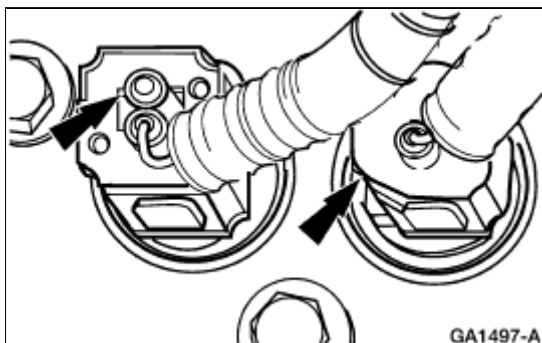
21. Install the EGR bracket.



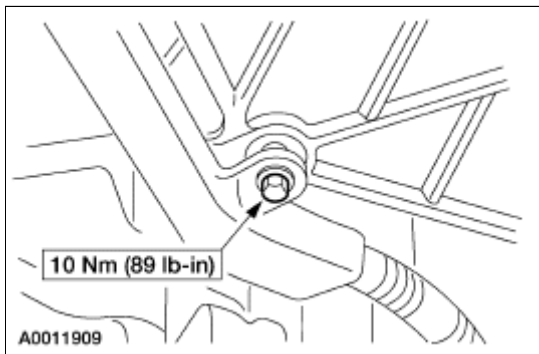
22. Connect the EGR tube nut.



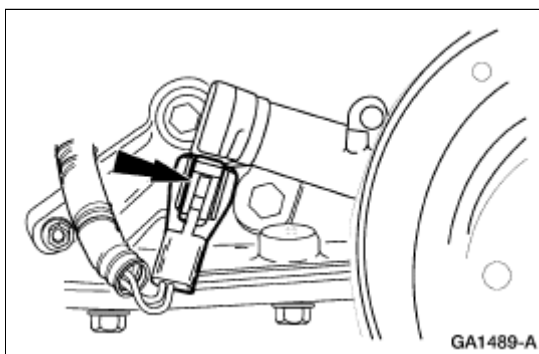
23. Connect the water temperature indicator sender unit and the engine coolant temperature (ECT) sensor electrical connectors.



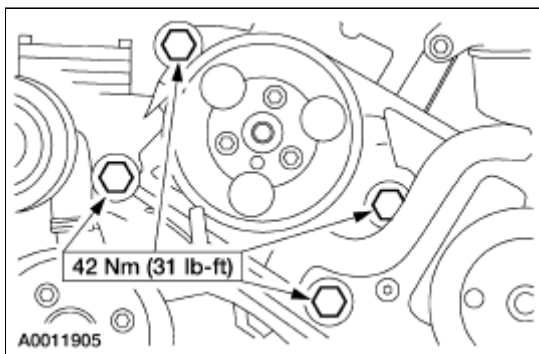
24. Install the electrical harness retainer.



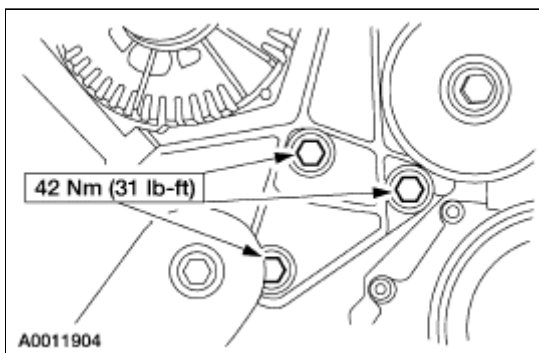
25. Connect the crankshaft position (CKP) sensor electrical connector.



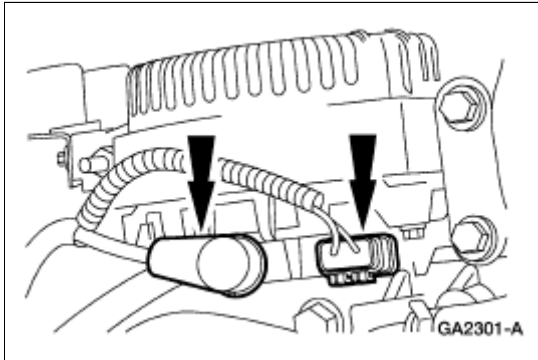
26. Install the accessory bracket.



27. Install the generator mounting bracket.



28. Connect the generator electrical connectors.



29. Install the belt tensioner. For additional information, refer to [Section 303-05](#).
30. Install the fan shroud. For additional information, refer to [Section 303-03](#).
31. Install the roller followers. For additional information, refer to [Roller Followers](#) in this section.
32. Install the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
-

SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

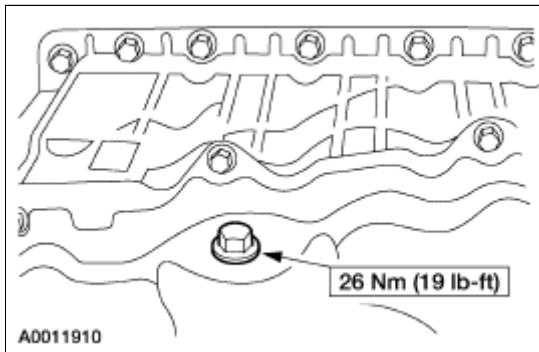
2000 Explorer/Mountaineer Workshop Manual

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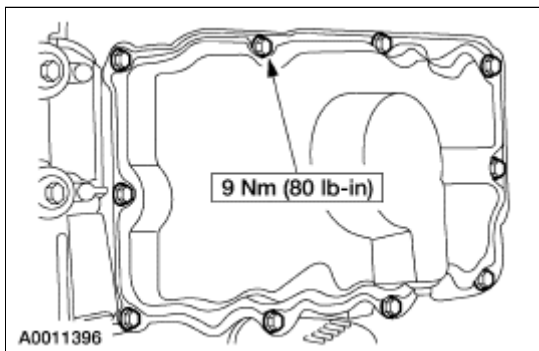
## Oil Pan

### Removal and Installation

1. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
2. Drain the engine oil.



3. Remove the bolts and the oil pan.



4. **NOTE:** All sealing surfaces must be cleaned prior to assembly. Use Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A to clean the sealing surfaces.

**NOTE:** Inspect integral oil pan gasket for cuts or damage that may cause leaks. Install a new gasket if necessary.

**NOTE:** Fill the engine with Super Premium SAE 5W-30 Motor Oil X0-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.

To install, reverse the removal procedure.

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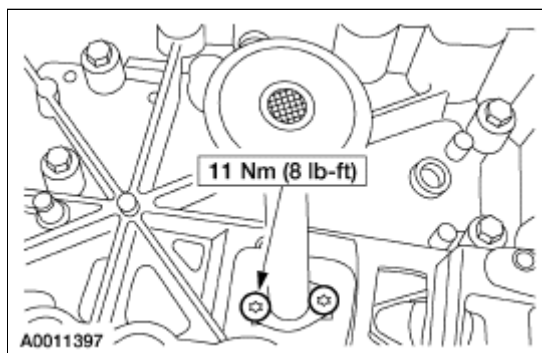
## Oil Pump Screen and Pickup Tube

### Material

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A

### Removal and Installation

1. Remove the oil pan. For additional information, refer to [Oil Pan](#) in this section.
2. Remove the oil pump screen and pickup tube and the gasket.



3. **NOTE:** Clean the gasket mating surfaces with metal surface cleaner.

To install, reverse the removal procedure.

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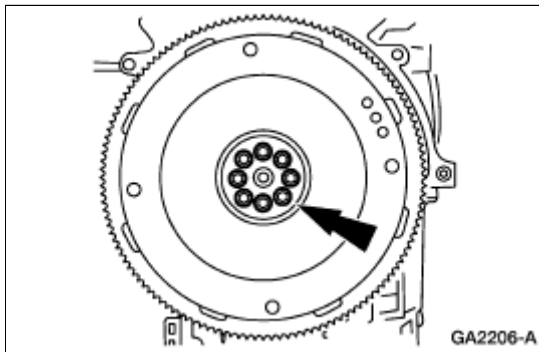
SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

## Flywheel

### Removal

1. Remove the transmission. For additional information, refer to [Section 307-01A](#) or [Section 307-01B](#).
2. Remove the flywheel.



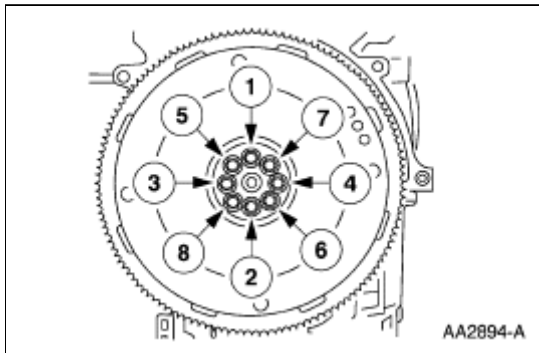
3. Clean and inspect the flywheel. For additional information, refer to [Section 303-00](#).

### Installation

1. **NOTE:** Special bolts are used for flywheel installation; do not use standard bolts.

Install the flywheel.

- Tighten the bolts in the sequence shown in two stages.
- Stage 1: Tighten the bolts to 13 Nm (10 lb-ft).
- Stage 2: Tighten the bolts to 71 Nm (52 lb-ft).



2. Install the transmission. For additional information, refer to [Section 307-01A](#) or [Section 307-01B](#).







SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

## Crankshaft Rear Oil Seal


### Special Tool(s)

 ST1385-A	Seal Remover 303-409 (T92C-6700-CH)
 ST1785-A	Rear Oil Seal Replacer 303-S524 (T95T-6701-AR)

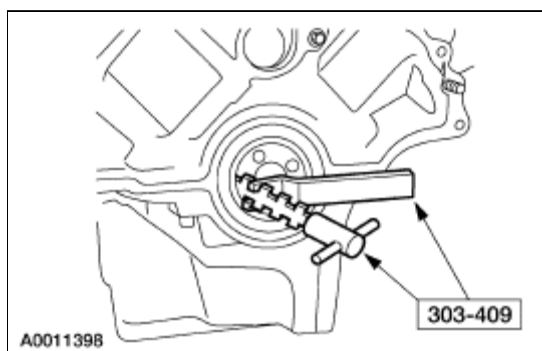
### Material

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent	WSS-M2C153-G

### Removal

1. Remove the flywheel. For additional information, refer to [Flywheel](#) in this section.
2.  **CAUTION:** Avoid scratching or damaging the oil crankshaft seal running surface during removal of the crankshaft rear oil seal.

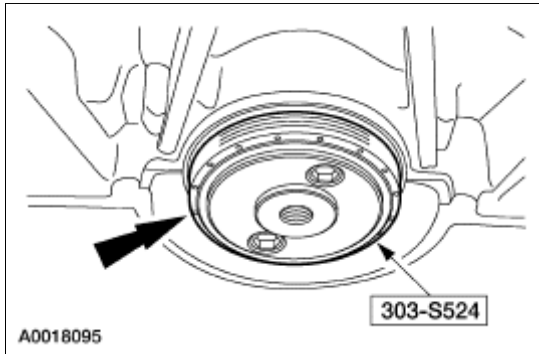
Using the special tool, remove the crankshaft rear oil seal.



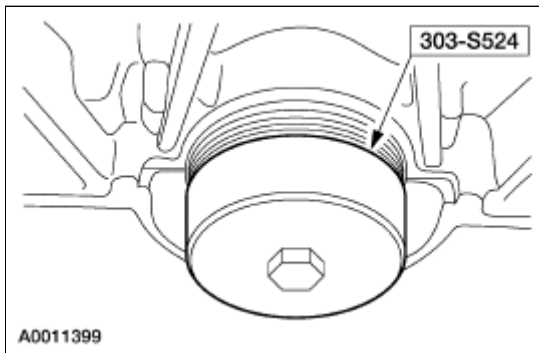
## Installation

1. **NOTE:** Be sure the crankshaft rear sealing surface is clean and free of any rust or corrosion. To clean the crankshaft rear sealing surface, use extra-fine emery cloth or extra-fine 0000 steel wool with metal surface cleaner.

Lubricate the crankshaft rear oil seal with clean engine oil and install on the special tool.



2. Using the special tool, install the crankshaft rear oil seal.



3. Install the flywheel. For additional information, refer to [Flywheel](#) in this section.
-


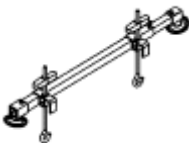


SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

## Cylinder Block Cradle

### Special Tool(s)

 ST1831-A	Lifting Eyes 303-D050 (D81L-6000-D) or equivalent
 ST2363-A	3 Bar Engine Support Kit 303-290A

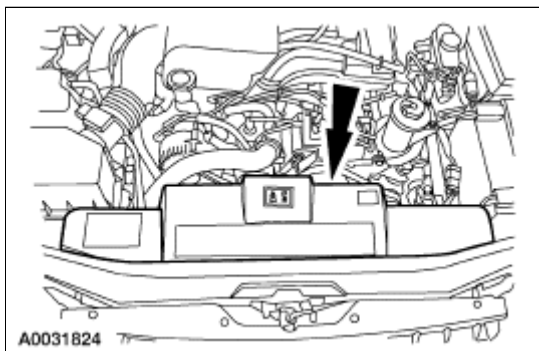
### Material

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA	WSE-M5B392-A
Silicone Gasket and Sealant F7AZ-19554-EA or equivalent	WSE-M5B392-A

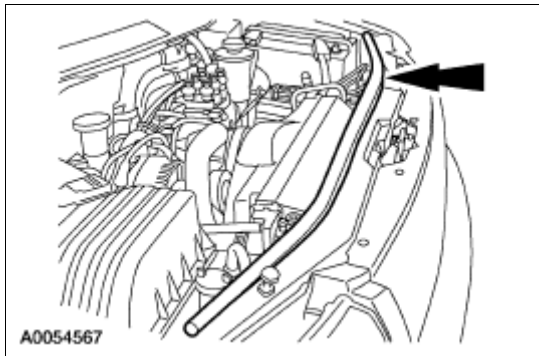
### Removal

#### All vehicles

1. Disconnect the negative battery cable. For additional information, refer to [Section 414-01](#).
2. Remove the upper air deflector.

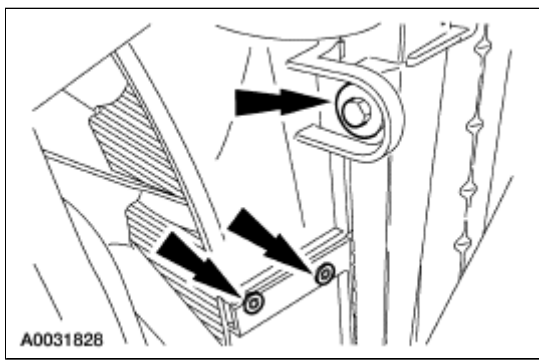


3. Remove the weatherstrip.

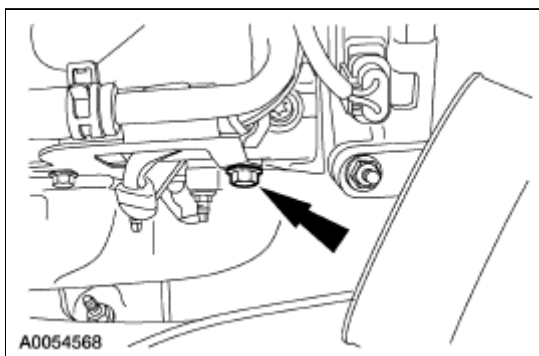


4. **NOTE:** Not all vehicles will have screws installed in the radiator fan shroud.

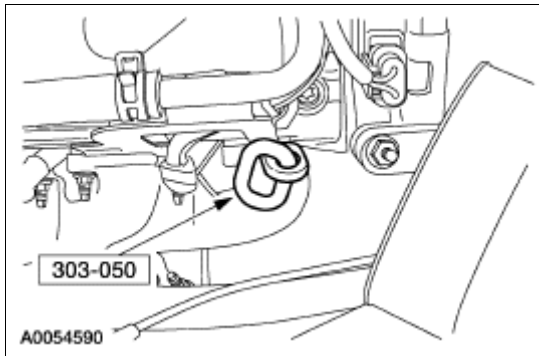
Remove and discard the screws. Remove the bolts and the fan shroud.



5. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
6. Remove the bolt.

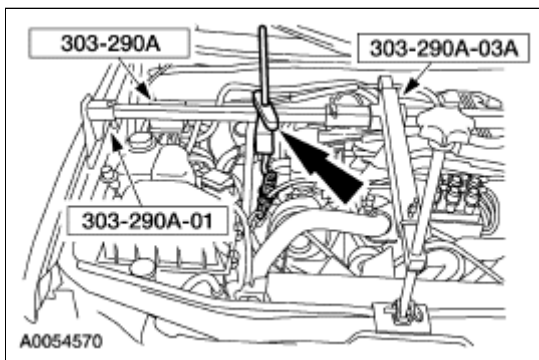


7. Install the RH lifting eye using the previously removed bolt.

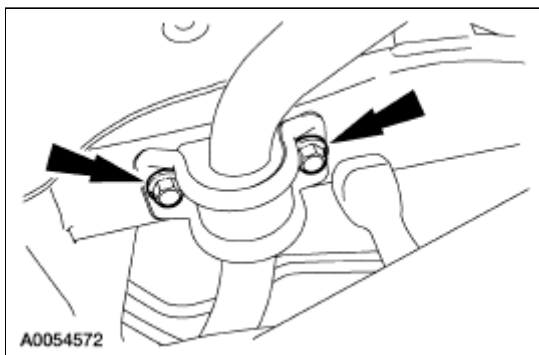


8. **NOTE:** This is not a typical setup. Only the right side of the motor will be raised.

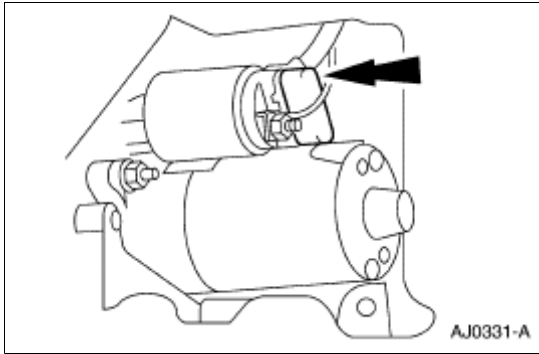
Install the special tools.



9. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
10. Remove the four bolts allowing the stabilizer bar to droop.

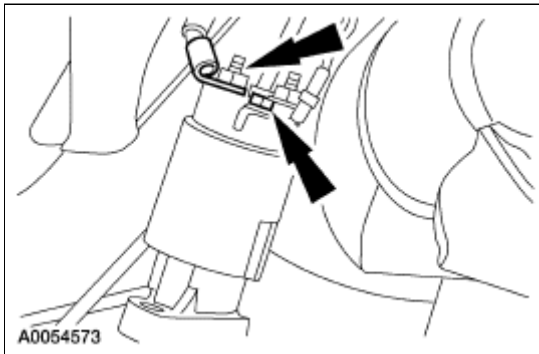


11. Remove the starter solenoid terminal cover.

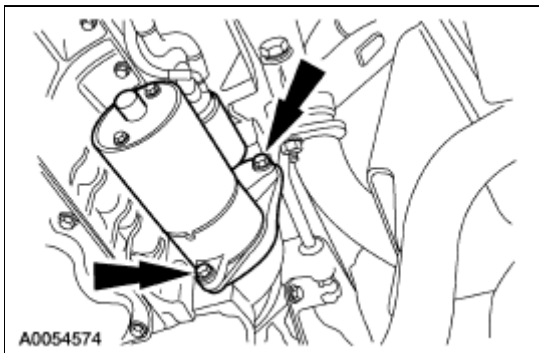


12. **NOTE:** The starter is shown removed for clarity. It is important to keep the starter motor from applying tension on the starter motor cables.

Disconnect the starter motor electrical connectors.

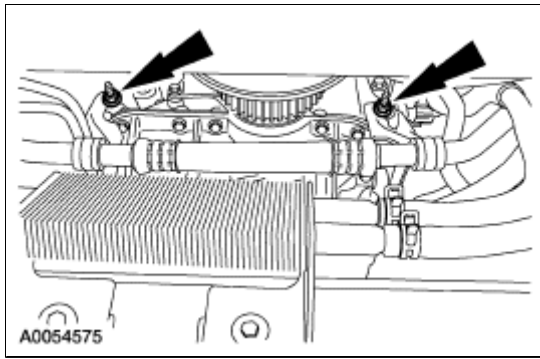


13. Remove the three starter motor bolts.



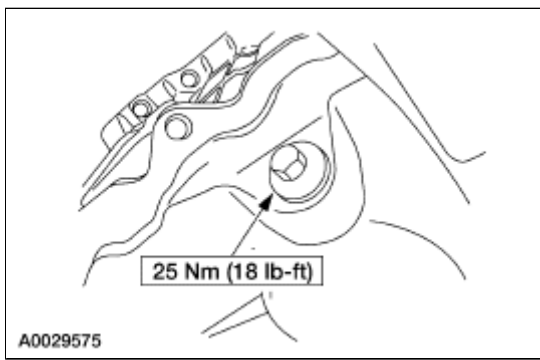
14. Remove the A/C line bracket nuts and position the brackets aside.





15. **NOTE:** Install the drain plug when finished draining.

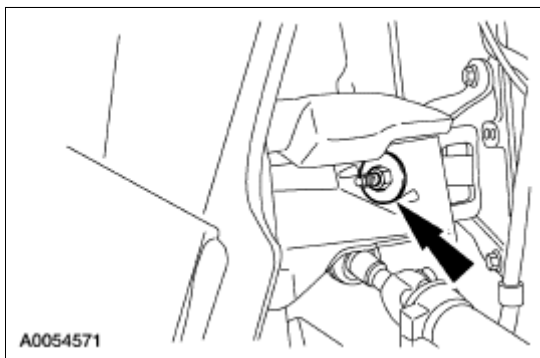
Drain the engine oil.



#### 4x2 vehicles

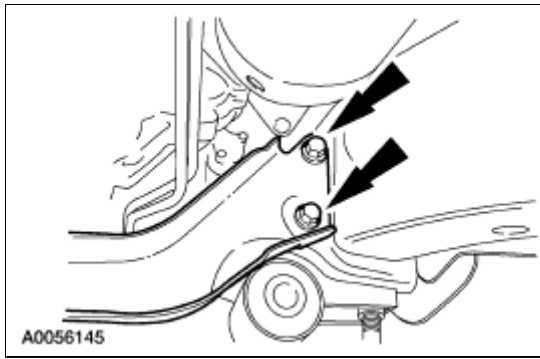
16. **NOTE:** LH side shown, RH side similar.

Remove the motor mount nuts.

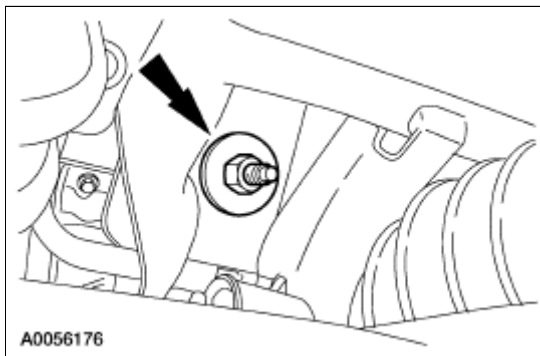


#### 4x4 vehicles

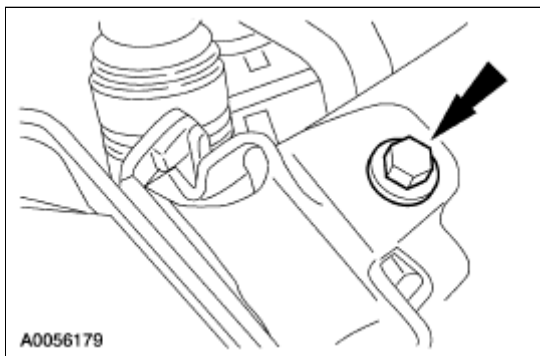
17. Remove the four bolts and the crossmember bolts.



18. Remove the RH motor mount nut.



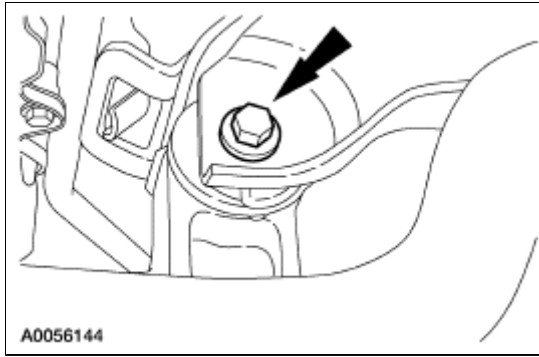
19. Remove the LH side through bolt and nut.



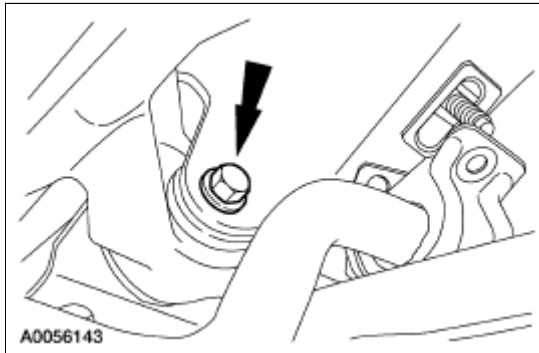
### All vehicles

20. Raise the engine.
21. **NOTE:** Use a floor jack to support the front axle assembly.

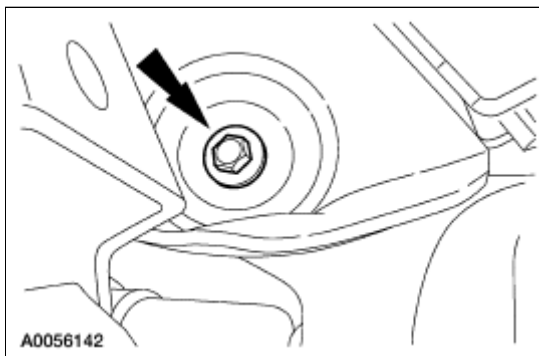
Remove the bolt from the right side of the axle housing. Discard the nut and bolt.



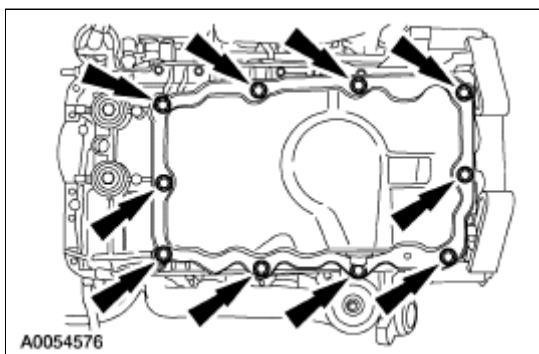
22. Remove the LH side lower axle housing bolt and nut. Discard the bolt and nut.



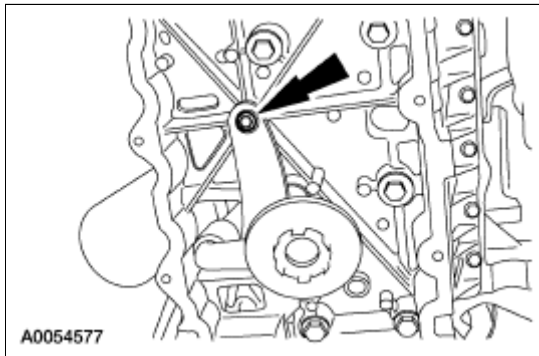
23. Remove the LH side upper axle housing axle bolt and nut. Discard the bolt and nut.



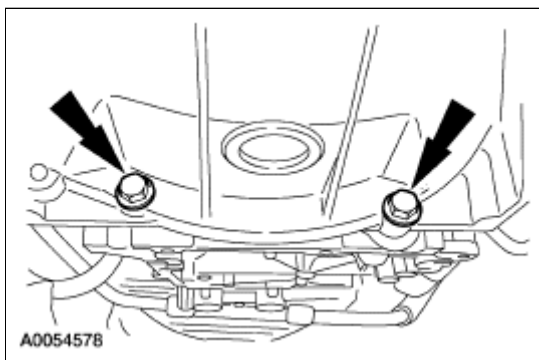
24. Remove the oil pan.



25. Remove the oil pump pickup tube.

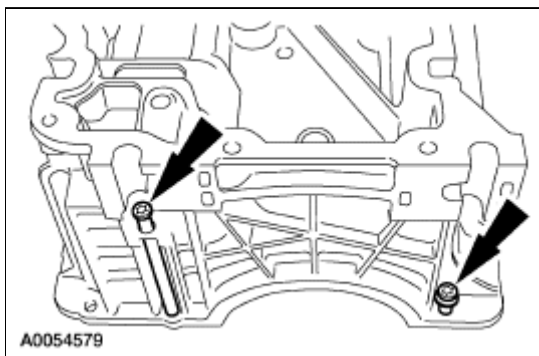


26. Remove the bolts.

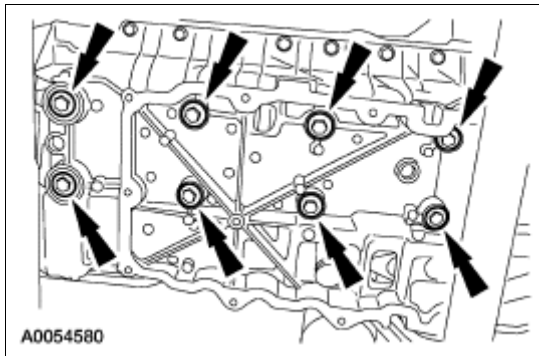


27. **NOTE:** The lower block cradle is shown removed for clarity. Note the location of the two torx bolts at the rear of the lower block cradle.

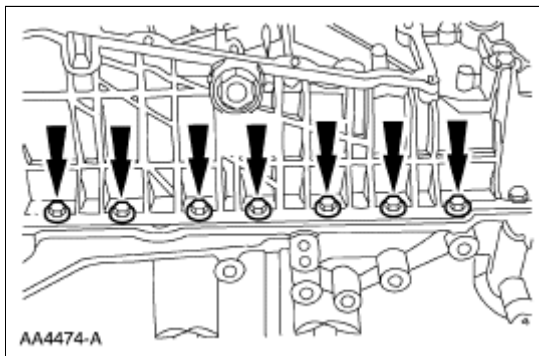
Remove the rear lower block cradle bolts.



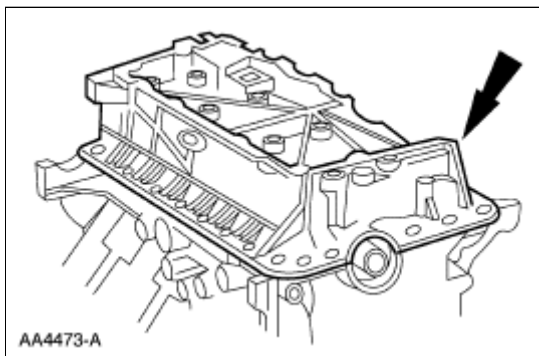
28. Remove the eight inner bolts. Discard the washer seals.



29. Remove the outer bolts and nuts.



30. Remove the ladder frame and the gasket.



## Installation

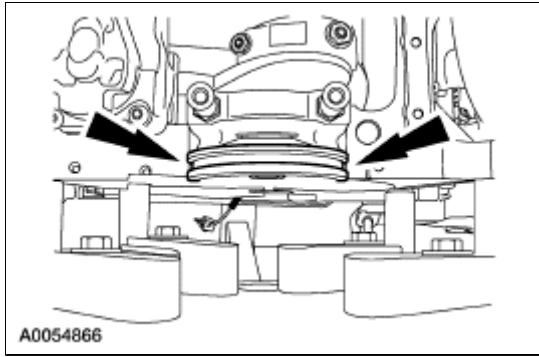
### All vehicles


1. **NOTE:** Inspect the integral oil pan gasket for cuts or damage that may cause leaks. Install a new gasket if necessary.

All sealing surfaces must be cleaned prior to assembly. Use metal surface cleaner to clean the sealing surfaces.

2. **NOTE:** Gasket material as well as silicone sealant may be present in the cavities in the main bearing cap. This material must be removed completely prior to assembly.

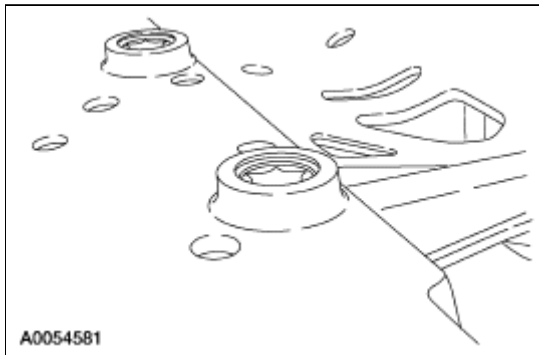
Clean the sealant from the cavities on the rear main bearing cap.



3.  **CAUTION:** Failure to back off the set screws can result in damage to the lower block cradle.

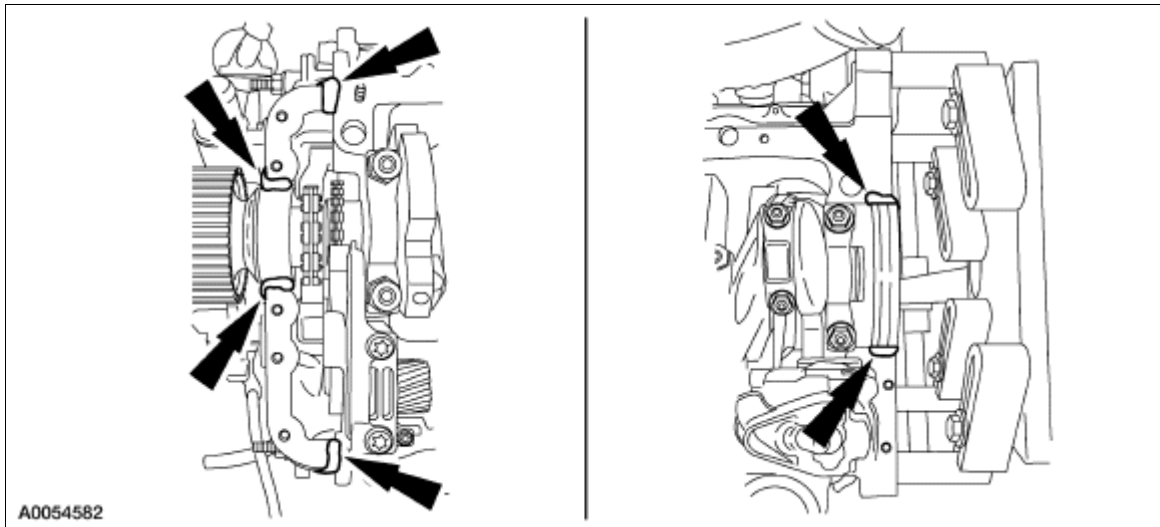
**NOTE:** The set screw is shown from the top (crankshaft) side of the lower block cradle.

Back the set screws off until they are below the lower block cradle boss.

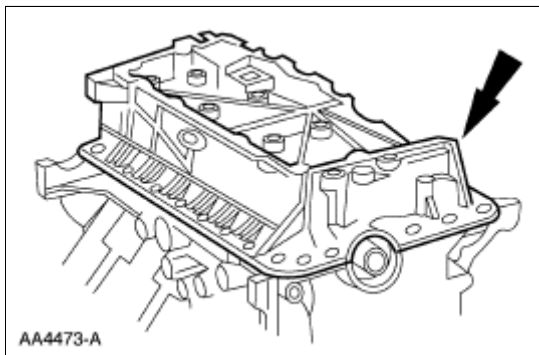


4. **NOTE:** If the block cradle gasket is not secured within four minutes of the sealant application, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Allow the metal surface cleaner to dry until there is no sign of wetness, or four minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

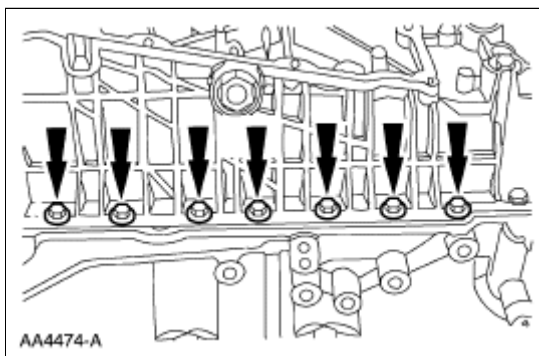
Apply silicone in the six places shown.



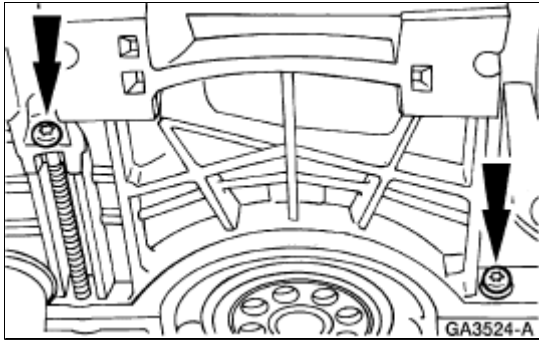
5. Position the lower block cradle and gasket assembly.



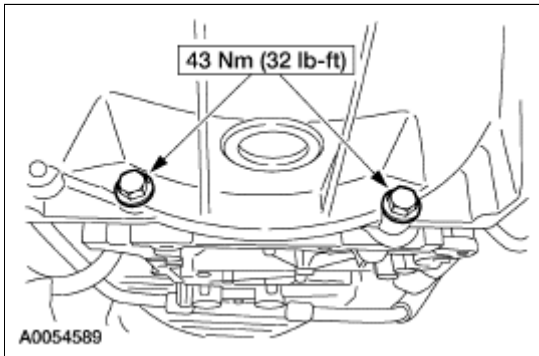
6. Install and hand-tighten the outer bolts and nuts.



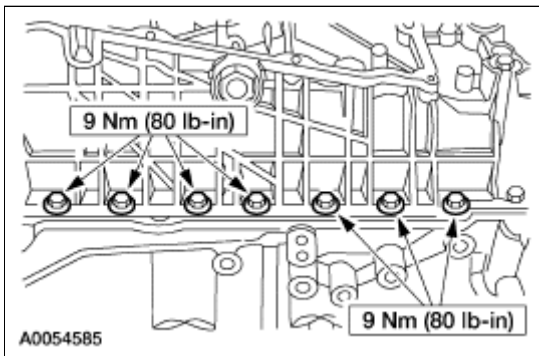
7. Install and hand-tighten the rear lower block cradle bolts.



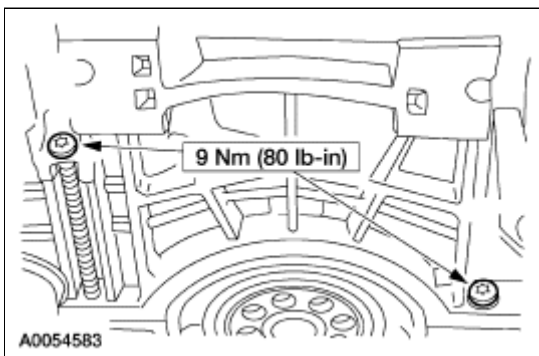
8. Install the two rear lower block cradle-to-bell housing bolts.



9. Tighten the outer bolts.

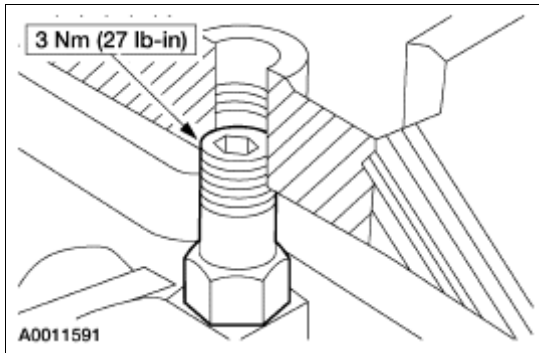


10. Tighten the rear lower block cradle bolts.

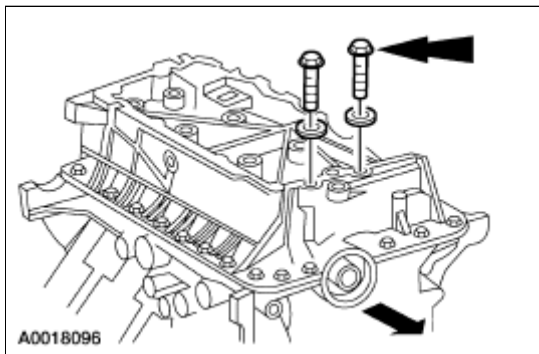


11. Tighten the eight inserts.

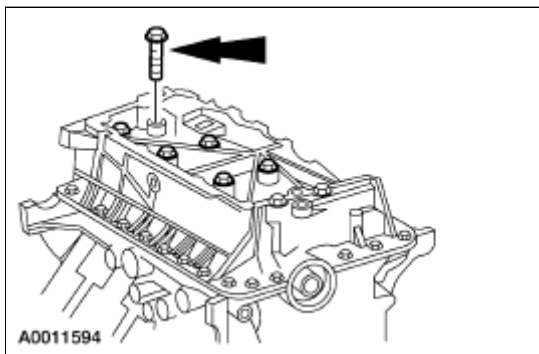




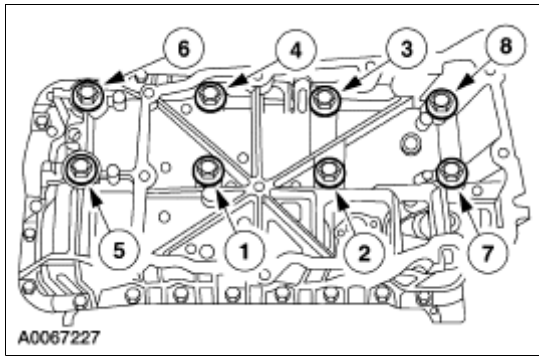
12. Install the two silver covered bolts and new washer seals. Hand-tighten them at this time.



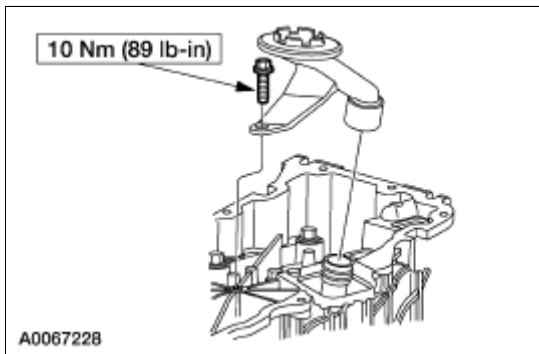
13. Install and hand-tighten the six remaining bolts.



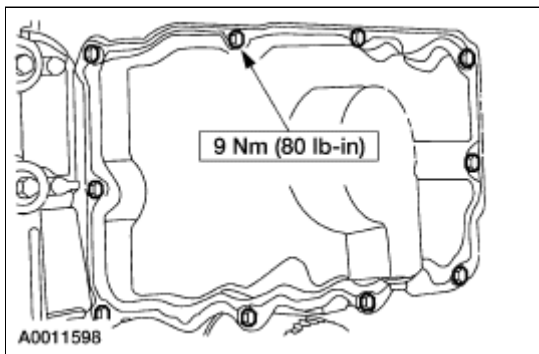
14. Tighten the lower block cradle bolts in two stages:
- Stage 1: Tighten to 15 Nm (11 lb-ft).
  - Stage 2: Tighten to 33 Nm (24 lb-ft).



15. Install the oil pump screen cover and tube.

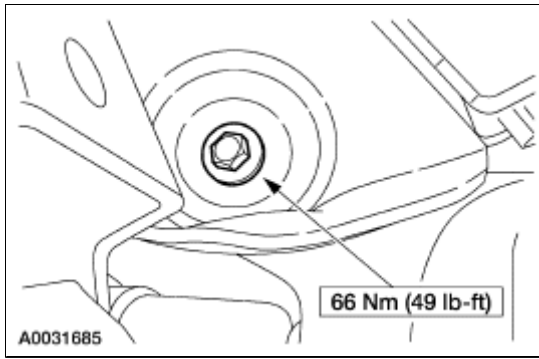


16. Install the oil pan and gasket.

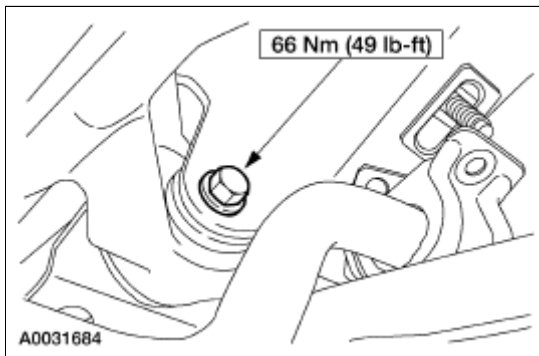


**NOTE:** Axle housing support bolts must be replaced each time they are removed. Do not reuse axle housing support bolts.

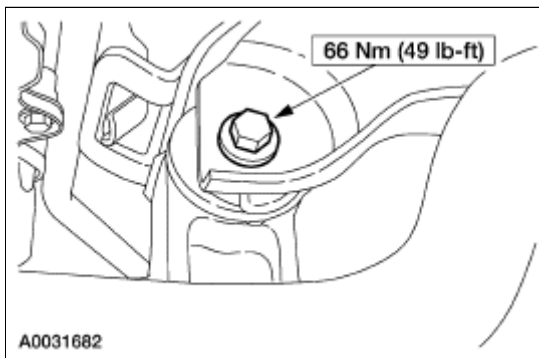
17. Install the new LH side upper axle housing axle bolt and nut.



18. Install the new LH side lower axle housing bolt and nut.



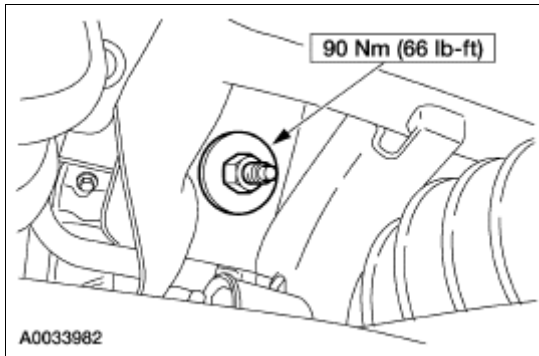
19. Install the new RH side axle housing bolt and nut.



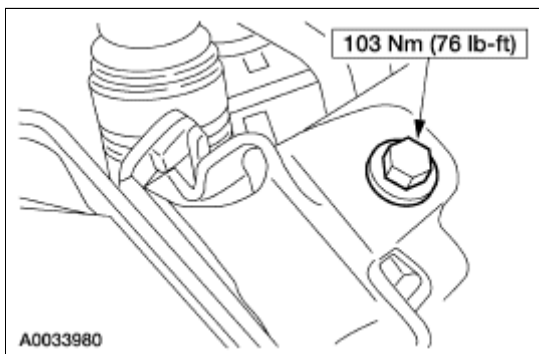
20. Remove the jack supporting the front axle assembly.  
21. Lower the engine.

#### 4x4 vehicles

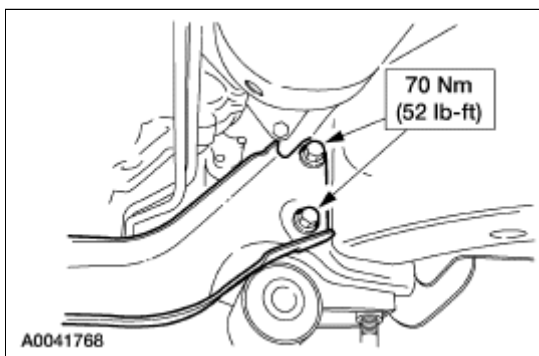
22. Install the RH motor mount nut.



23. Install the LH side through-bolt and nut.

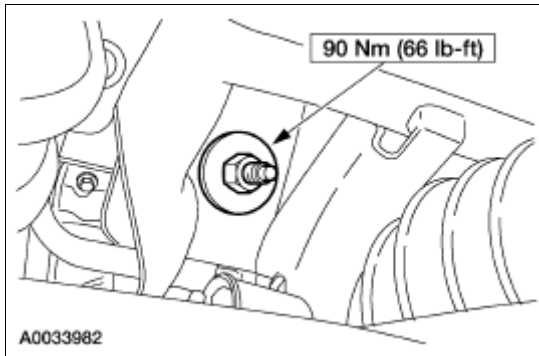


24. Install the crossmember.

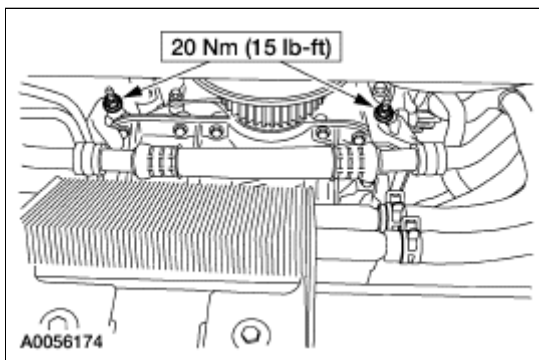


#### 4x2 vehicles

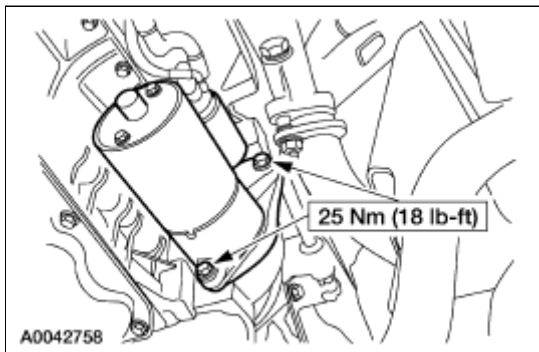
25. Install the motor mount nuts.

**All vehicles**

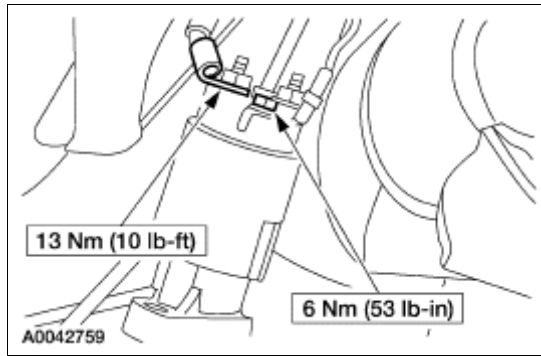
26. Position the A/C line and install the nuts.



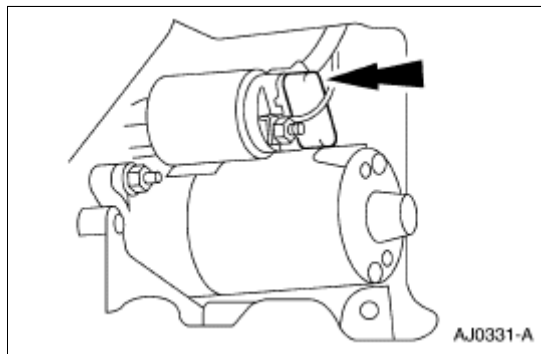
27. Install the starter motor.



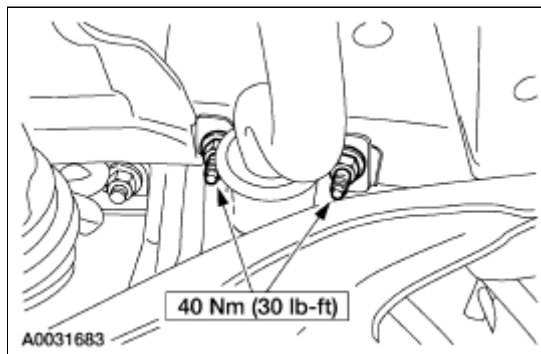
28. Connect the starter motor electrical connectors.



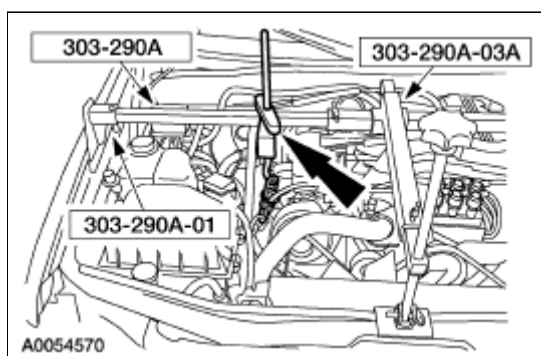
29. Install the starter motor solenoid terminal cover.



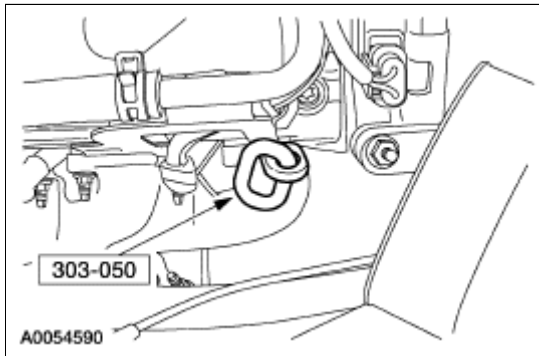
30. Position the stabilizer bar and install the sway bar bracket bolts.



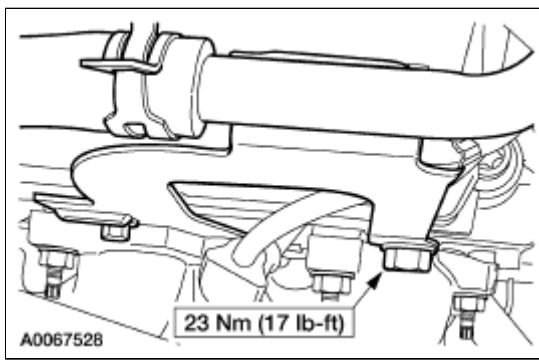
31. Remove the special tools.



32. Remove the RH lifting eye.

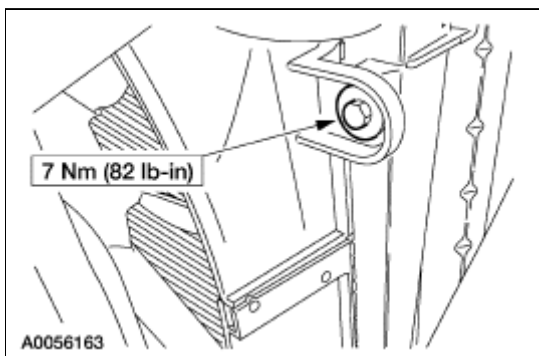


33. Install the bolt.

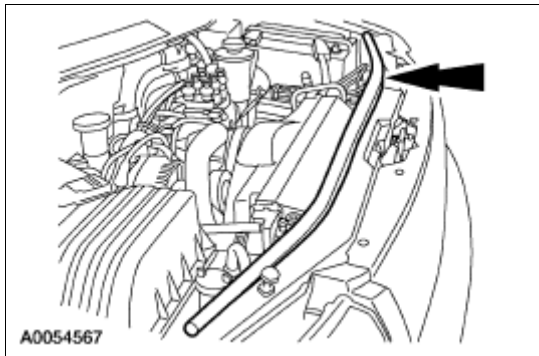


34. Install the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).

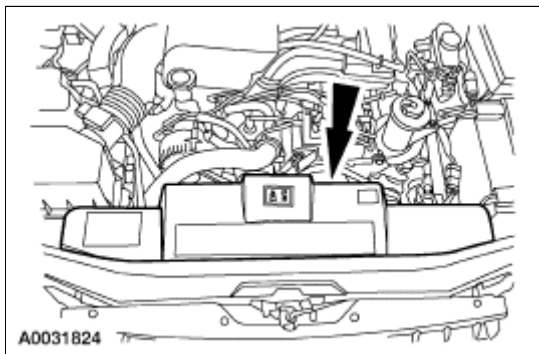
35. Install the upper fan shroud.



36. Install the weatherstrip.



37. Install the upper air deflector.



38. Connect the negative battery cable. For additional information, refer to [Section 414-01](#).
-


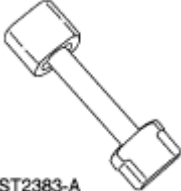

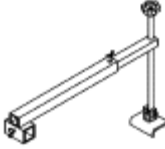


SECTION 303-01B: Engine — 4.0L SOHC  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

## Engine Support Insulators

### Special Tool(s)

 ST1831-A	Lifting Eyes 303-D030 (D81L-6001-D) or equivalent
 ST2383-A	Support Bar, Engine 303-290A
 ST2378-A	Adapters for 303-290 303-290A-01
 ST2379-A	Adapters for 303-290A (Support Leg) 303-290A-03A

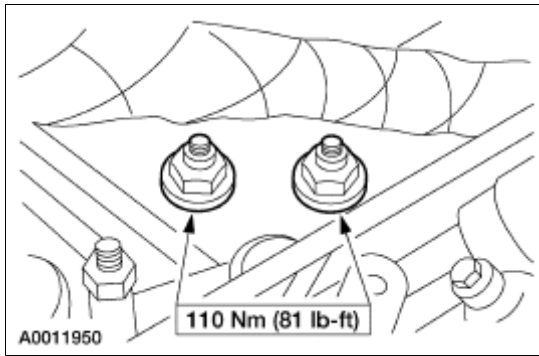
### Removal and Installation

#### All vehicles

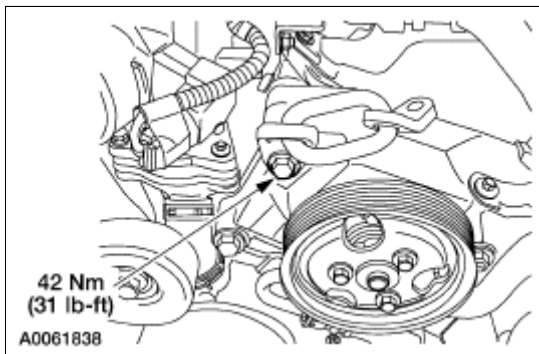
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Remove the fan shroud. For additional information, refer to [Section 303-03](#).

#### LH side

3. Remove the LH engine insulator nuts.

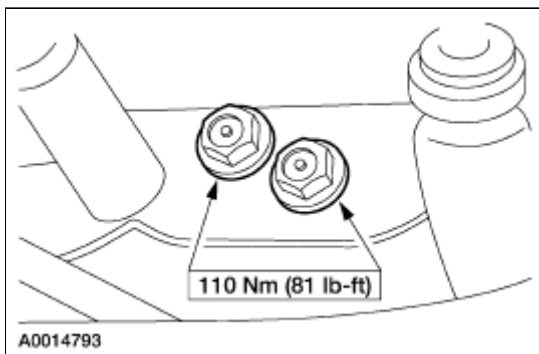


4. Remove the bolt and install the Lifting Eye.

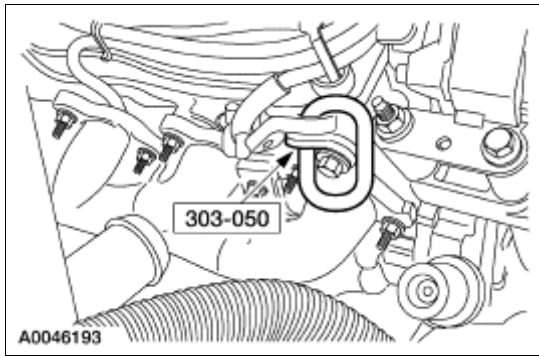


#### RH side

5. Remove the RH engine insulator nuts.

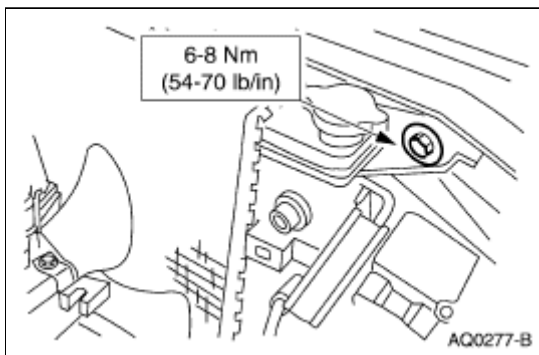


6. Remove the bolt and install the Lifting Eye.

**Both sides**

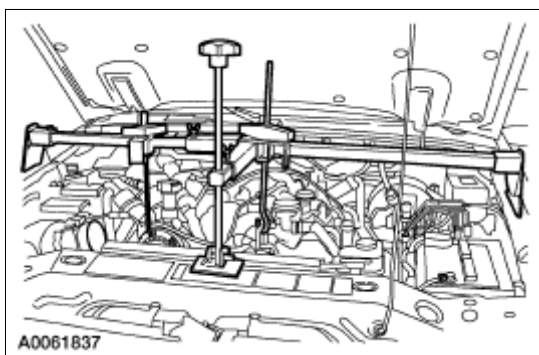
7. **NOTE:** Right side shown, left side similar.

Remove the radiator mounting bolts.



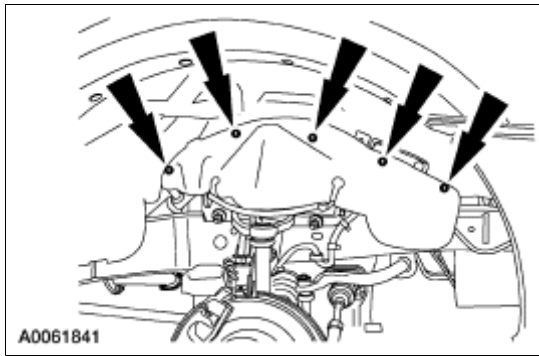
8. **NOTE:** The weight of the engine should be fully supported by the three bar support.

Install the three bar support equipment.



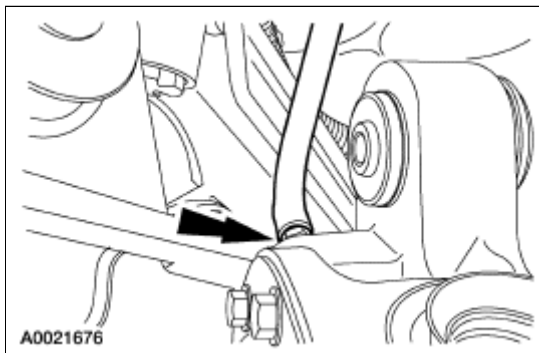
9. Remove the front wheel and tire assemblies. For additional information, refer to [Section 204-04](#).
10. **NOTE:** Right side shown, left side similar.


If equipped, remove the pin-type retainers and the corresponding inner fender well splash shield(s).



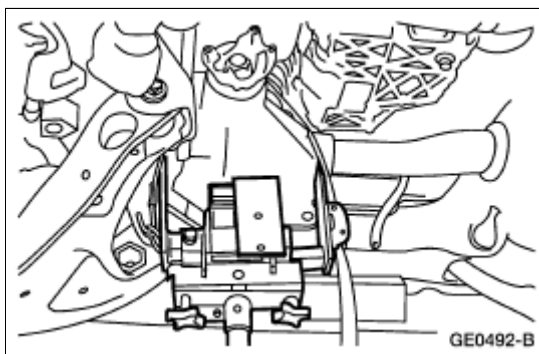
#### 4x4 vehicles

11. Disconnect the vent hose from the differential housing vent tube.



12.  **WARNING:** Secure the axle to the jack with a safety strap. Failure to follow these instructions can result in personal injury.

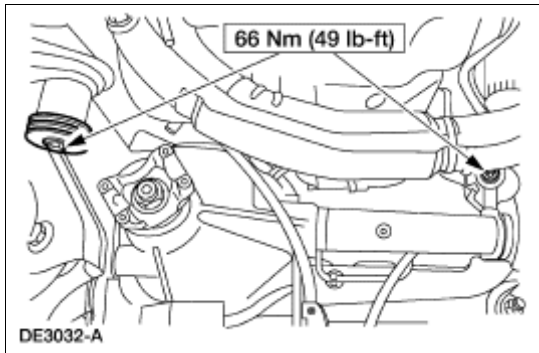
Secure the axle housing to a suitable lift.



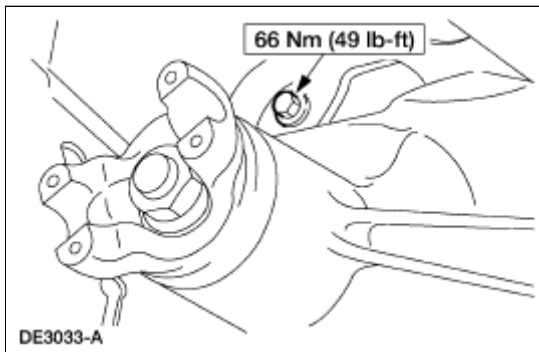
13.  **CAUTION:** Any time bolts, washers, spacers or nuts are loosened in the differential support for any reason, install new components to prevent damage.

**NOTE:** Driveshaft shown removed for clarity.

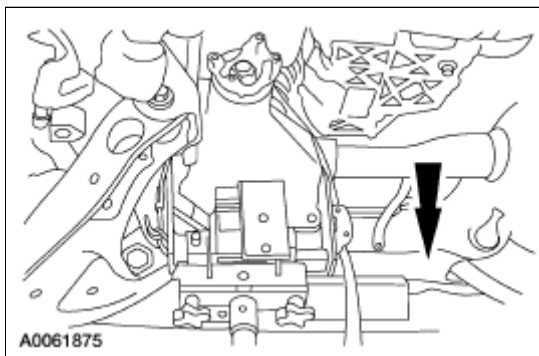
Remove and discard the bolts.



14. Remove and discard the bolt.

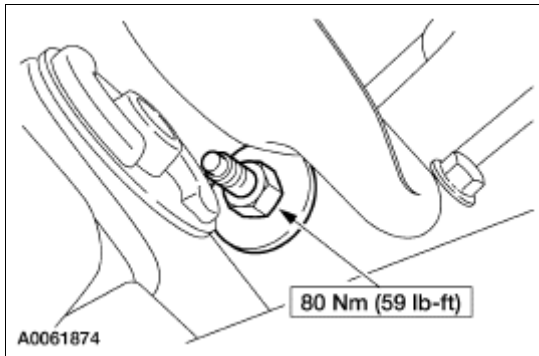


15. Lower the axle housing approximately 25 mm (1 in).

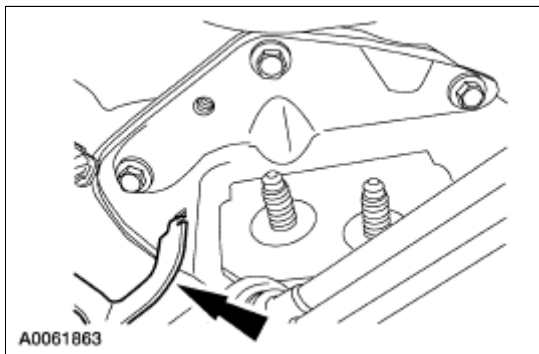


#### LH side

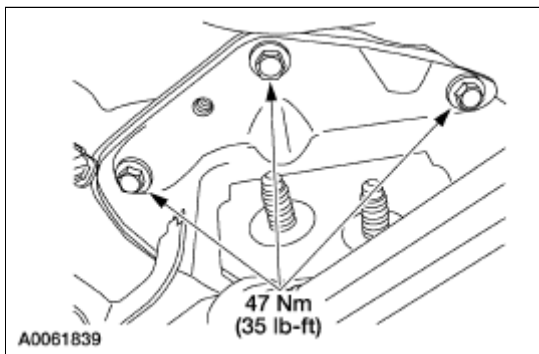
16. Remove the lower motor mount nut and washer.



17. If equipped, remove the wire harness bracket from the upper motor mount bracket.

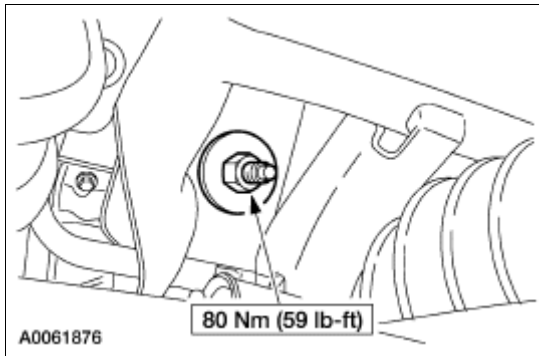


18. Remove the three bolts and the upper motor mount bracket and the motor mount.

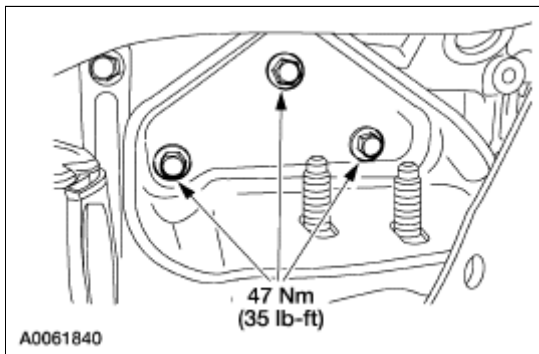


#### **RH side**

19. Remove the lower motor mount nut and washer.



20. Remove the bolts and upper motor mount bracket and the motor mount.



#### Both sides

21. **NOTE:** Remove the jack after the front differential retainers have been installed to provide clearance for torque access.

To install, reverse the removal procedure.

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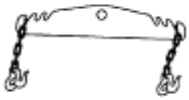
SECTION 303-01B: Engine — 4.0L SOHC  
REMOVAL

2000 Explorer/Mountaineer Workshop Manual

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## Engine

### Special Tool(s)

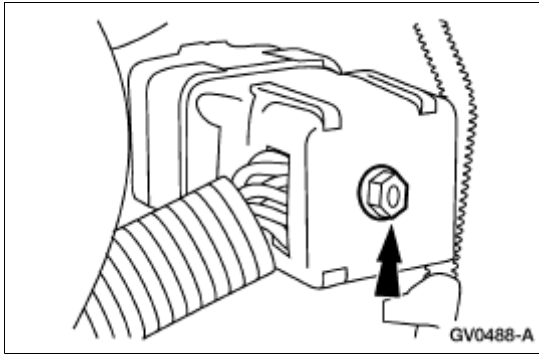
 ST1831-A	Lifting Eyes 303-D030 (D81L-6001-D) or equivalent
 ST1602-A	Spreader Bar 303-D089 (D93P-6001-A3) or equivalent

### Removal

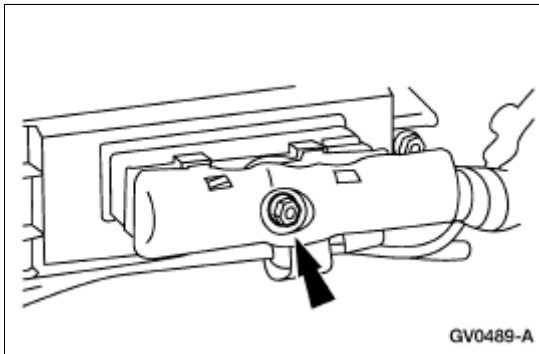


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

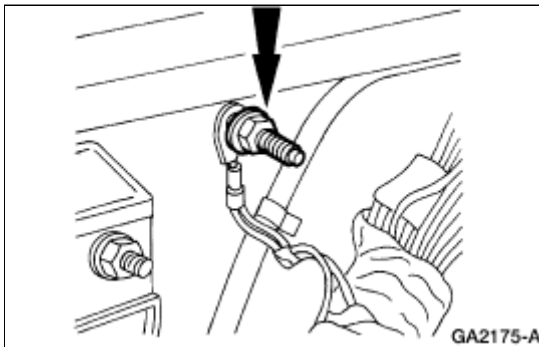
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Remove the hood.
3. Discharge and recover the A/C system. For additional information, refer to [Section 412-00](#).
4. Relieve the fuel pressure. For additional information, refer to [Section 310-00](#).
5. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
6. Disconnect the accelerator cable from the engine. For additional information, refer to [Section 310-02](#).
7. Disconnect the speed control cable from the engine. For additional information, refer to [Section 310-03](#).
8. Remove the radiator, the fan blade, and the fan shroud. For additional information, refer to [Section 303-03](#).
9. Disconnect the engine electrical connector.



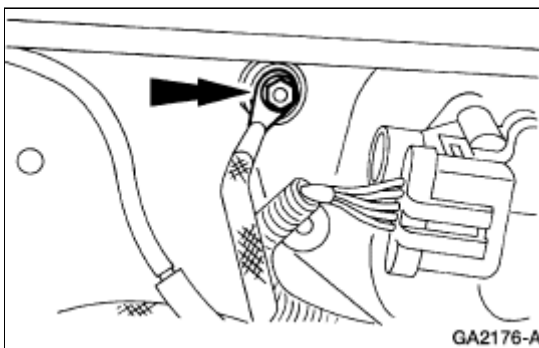
10. Disconnect the powertrain control module (PCM) electrical connector.



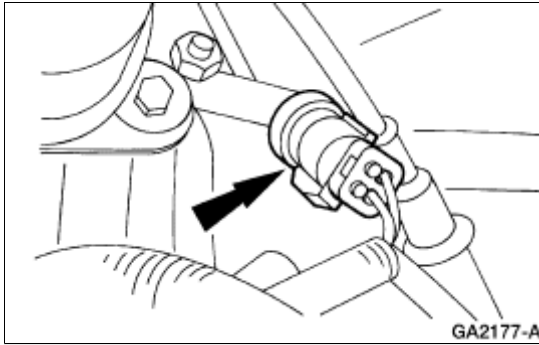
11. Disconnect the PCM electrical ground wire.



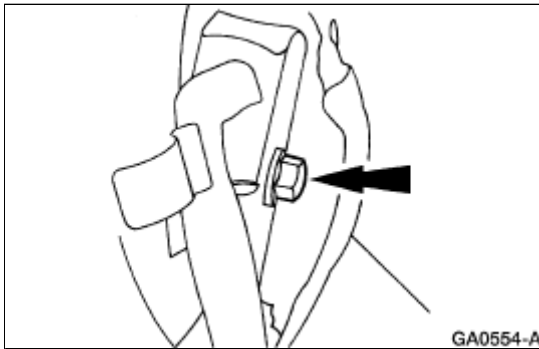
12. Disconnect the engine ground wire.



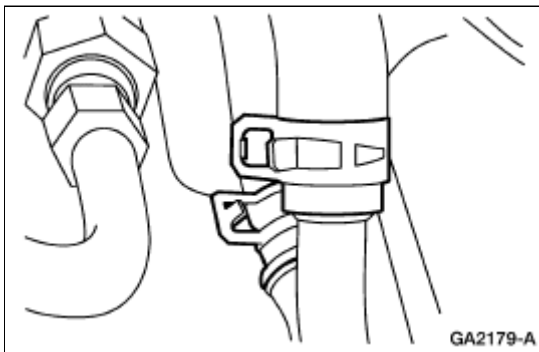
13. Disconnect the A/C high pressure switch electrical connector.



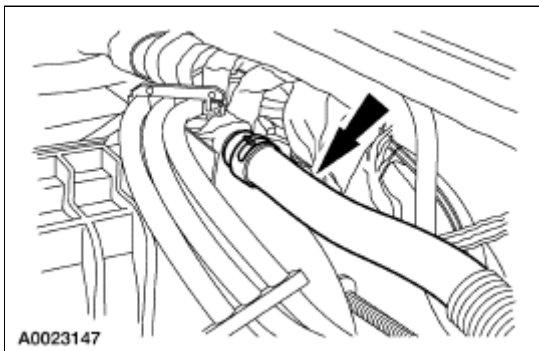
14. Remove the bolt and position the A/C lines aside.



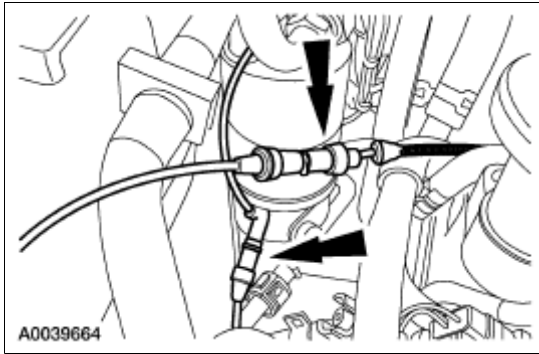
15. Disconnect the two heater water hoses.



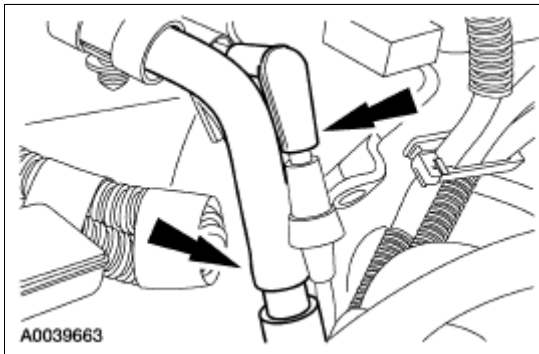
16. Disconnect the vacuum hose.



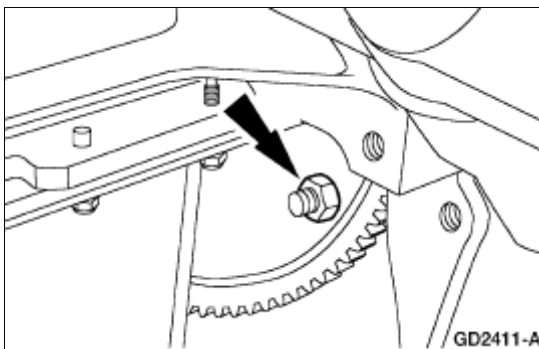
17. Disconnect the vacuum hoses.



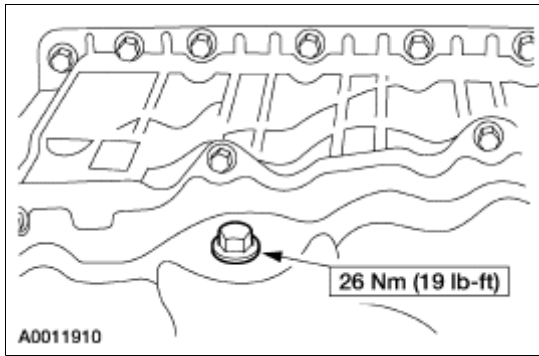
18. Disconnect the vacuum and evaporative emissions (EVAP) hoses.



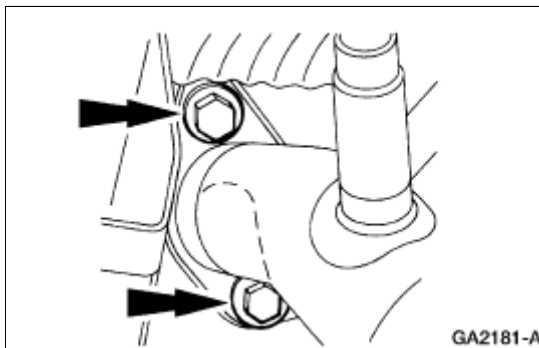
19. Disconnect the fuel line. For additional information, refer to [Section 310-00](#).
20. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
21. Remove the starter motor. For additional information, refer to [Section 303-06](#).
22. Remove the four nuts.



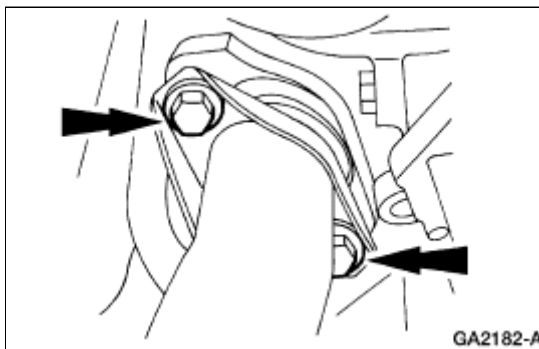
23. Drain the engine oil.
24. Install the oil drain plug.



25. Remove the bolts.



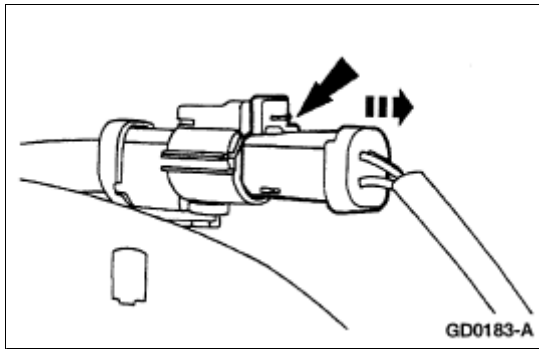
26. Remove the bolts.



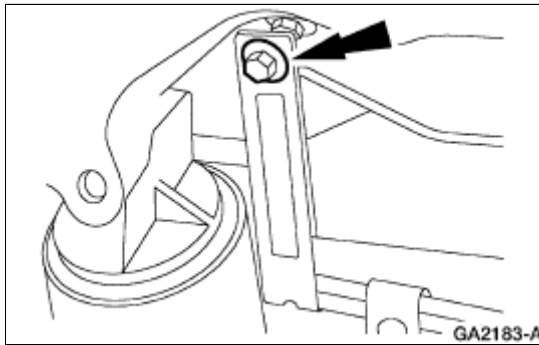
27. Disconnect the transmission electrical harness connector.



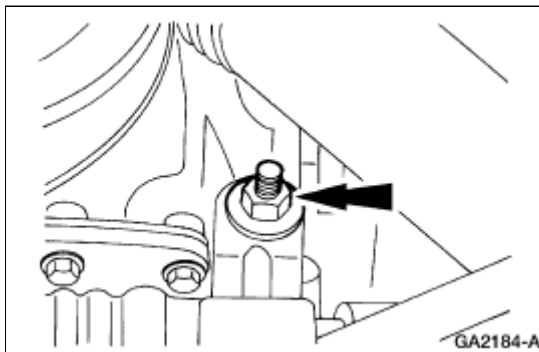
28. Disconnect the RH and LH heated oxygen (HO2S) sensor electrical connectors.



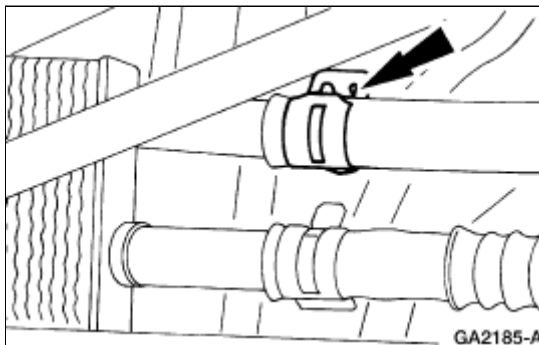
29. Remove the bolt and position the transmission cooling line bracket aside.



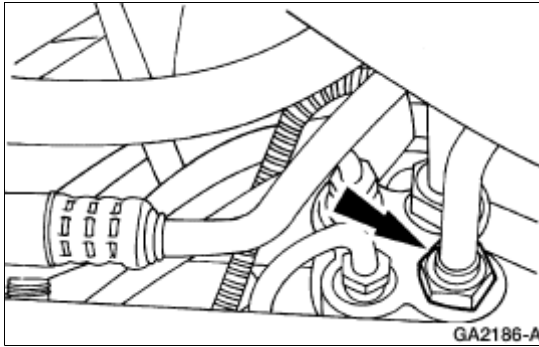
30. Remove the A/C line bracket nut and position it aside.



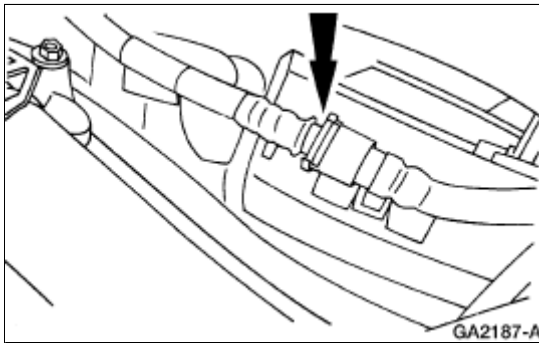
31. Disconnect the power steering return hose.



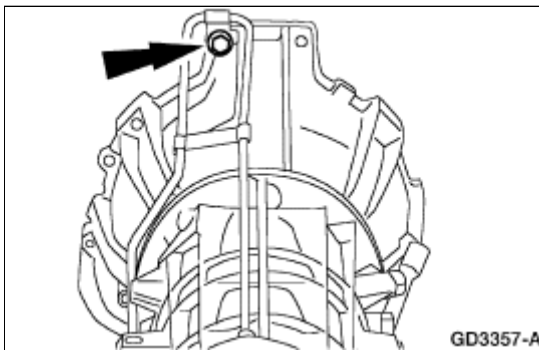
32. Disconnect the power steering pressure hose.



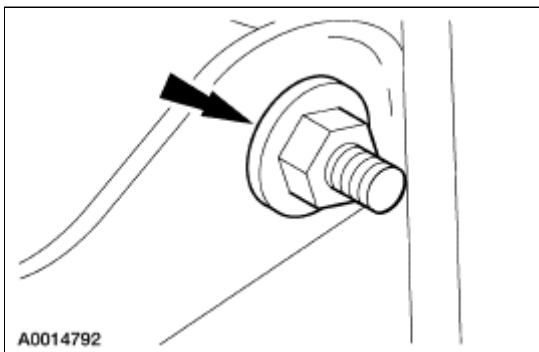
33. Disconnect the vapor management valve (VMV) hose connector.



34. Remove the eight bolts.

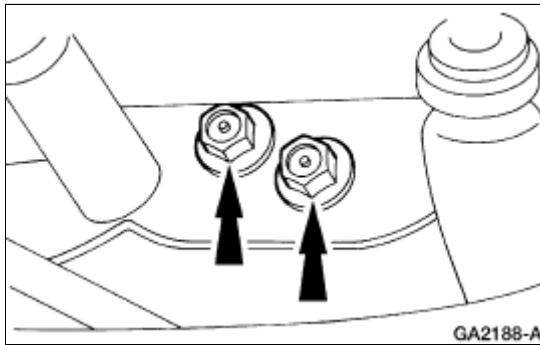


35. Remove the LH and the RH engine support insulator nuts.

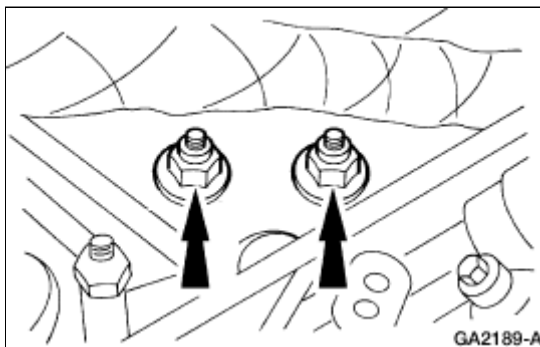


36. Lower the vehicle.

37. Remove the RH engine insulator nuts.



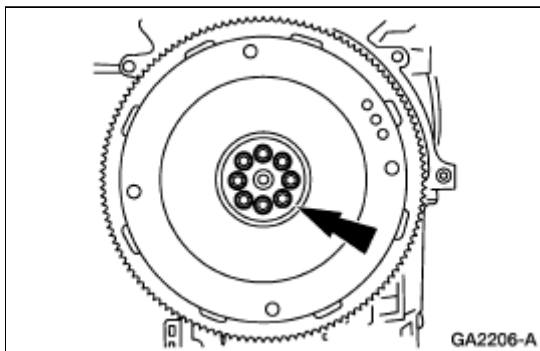
38. Remove the LH engine insulator nuts.



39. **NOTE:** The lifting eyes should be installed on the exhaust manifold studs for number three and number four cylinders.

Install the lifting eyes.

40. Install the spreader bar to the lifting eyes.
41. Attach a floor crane to the spreader bar and remove the engine.
42. Remove the flywheel.



43. Remove the spacer plate.
44. Install the engine on a suitable engine stand.

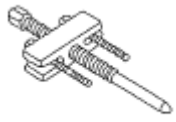
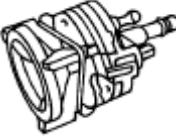







**SECTION 303-01B: Engine — 4.0L SOHC  
DISASSEMBLY**

2000 Explorer/Mountaineer Workshop Manual

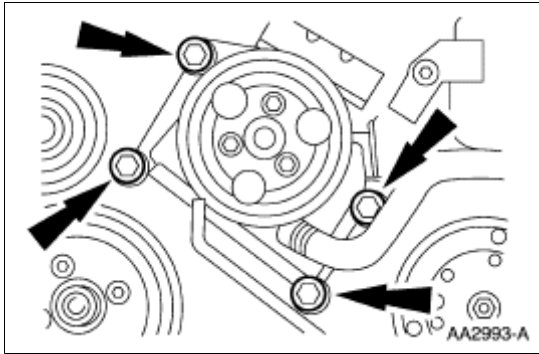
**Engine****Special Tool(s)**

 ST1829-A	Crankshaft Damper Remover 303-101 (T74P-6316-A)
 ST1276-A	Cylinder Ridge Reamer 303-016 (T64L-6011-EA)
 ST1330-A	Valve Spring Compressor 303-581 (T97T-6565-A)
 ST1394-A	Spark Plug Wire Remover 303-106 (T74P-6666-A)
 ST2191-A	Rear Jackshaft Socket 303-634

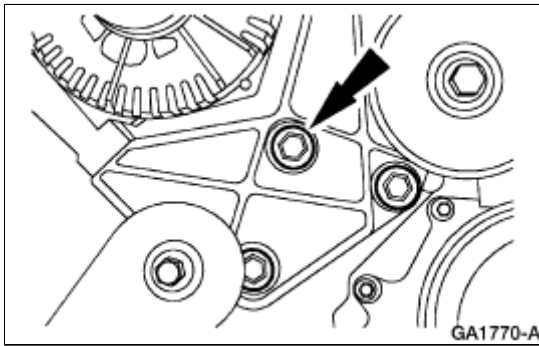


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

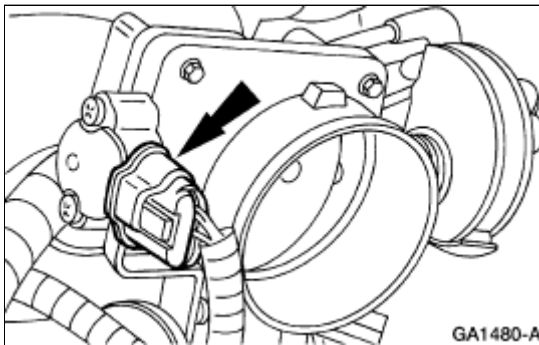
1. Rotate the drive belt tensioner counterclockwise and remove the drive belt.
2. Remove the bolts and position the accessory bracket aside.



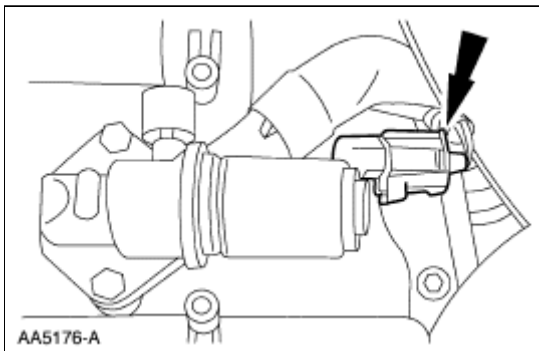
3. Remove the generator mounting bracket.



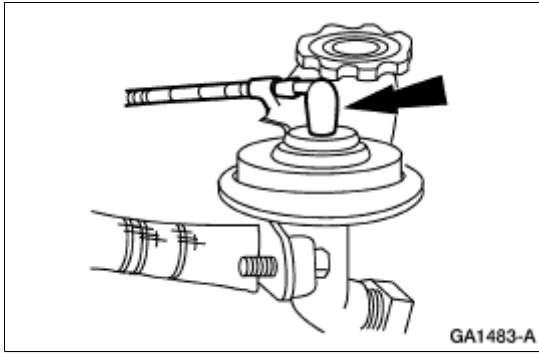
4. Disconnect the throttle position (TP) sensor electrical connector.



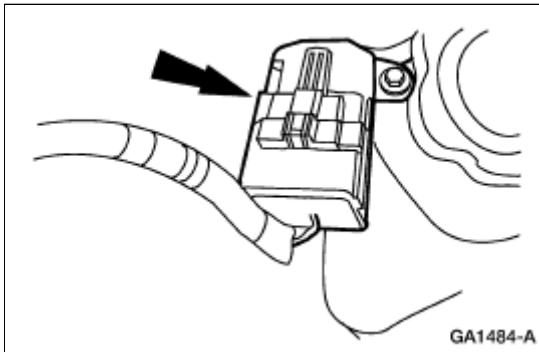
5. Disconnect the idle air control (IAC) valve electrical connector.



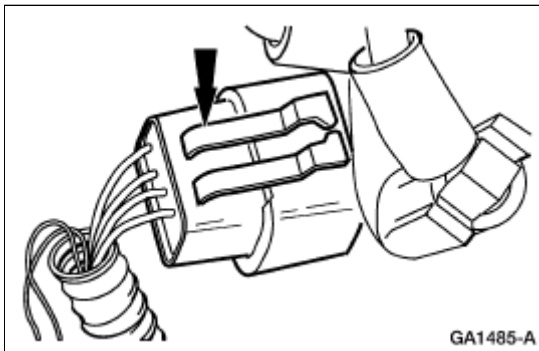
6. Disconnect the EGR valve vacuum hose.



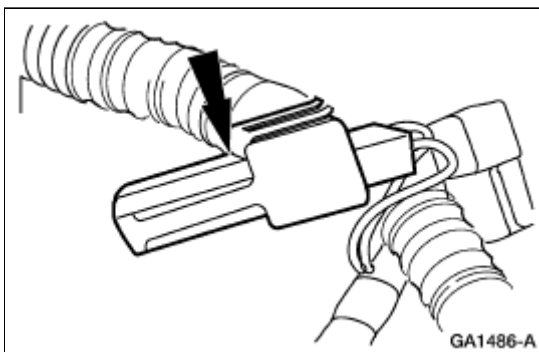
7. Disconnect the camshaft position (CMP) sensor electrical connector.



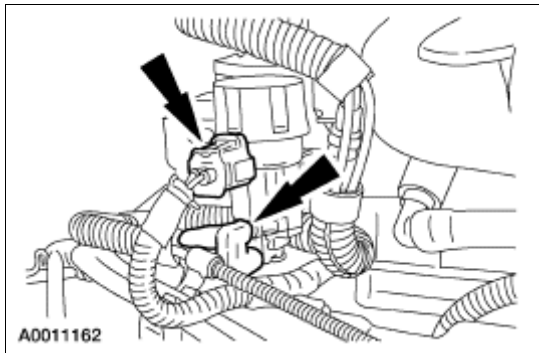
8. Disconnect the ignition coil electrical connector.



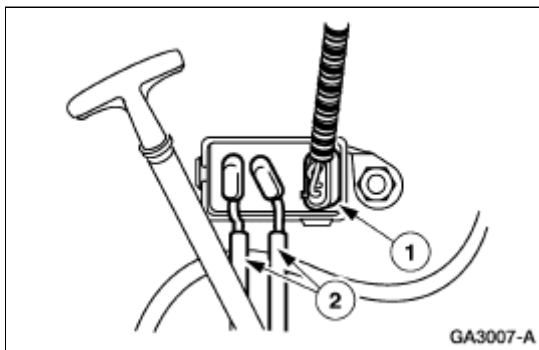
9. Disconnect the radio ignition interference capacitor electrical connector.



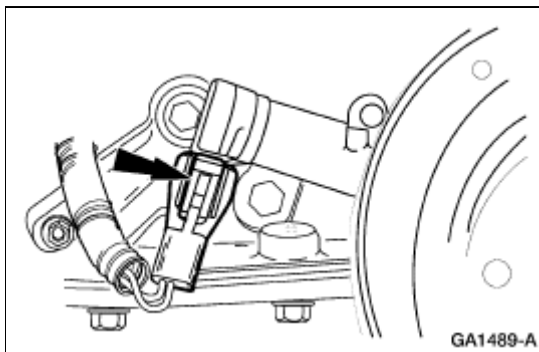
10. Disconnect the exhaust gas regulator (EGR) vacuum regulator.



11. Disconnect the differential pressure feedback EGR transducer.
  1. Disconnect the electrical connector.
  2. Disconnect the vacuum hoses.

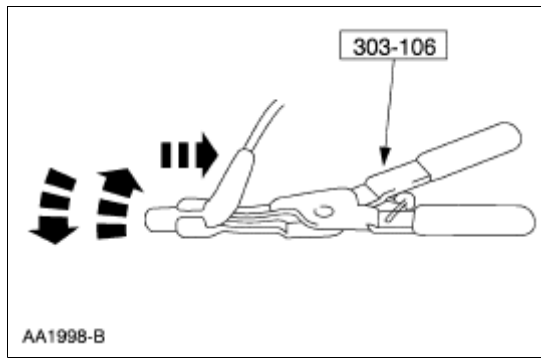


12. Disconnect the crankshaft position (CKP) sensor electrical connector.

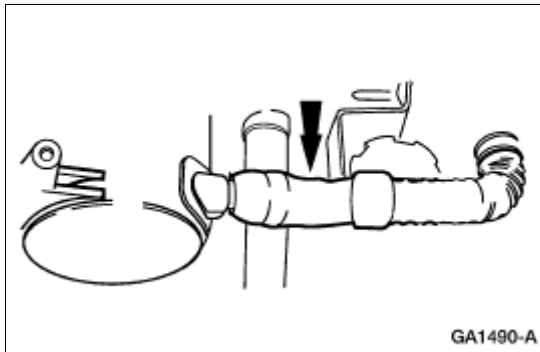


13.  **CAUTION: Spark plug wires must be connected correctly. Mark the spark plug wires before removing them.**

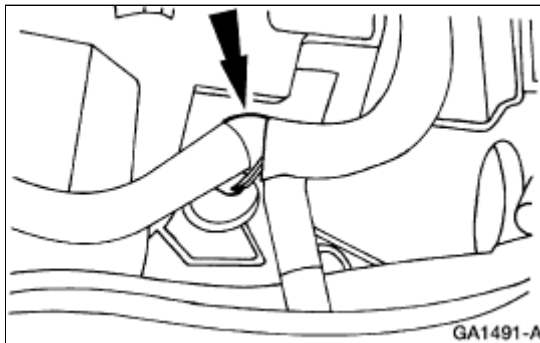
Using the special tool, remove the spark plug wires from the spark plug.



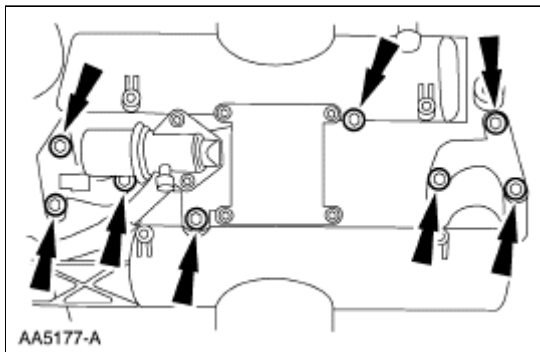
14. Disconnect the RH upper intake manifold vacuum hose.



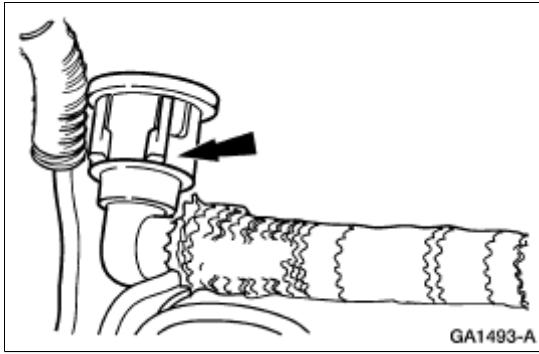
15. Disconnect the crankcase ventilation hose.



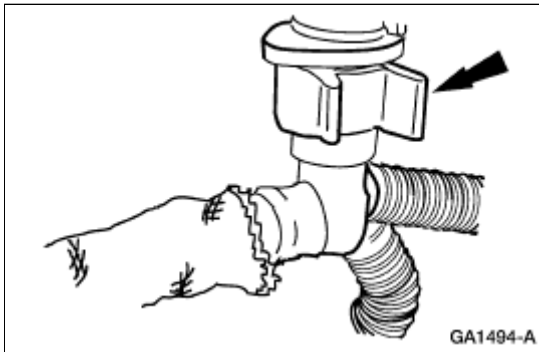
16. Remove the upper intake manifold.



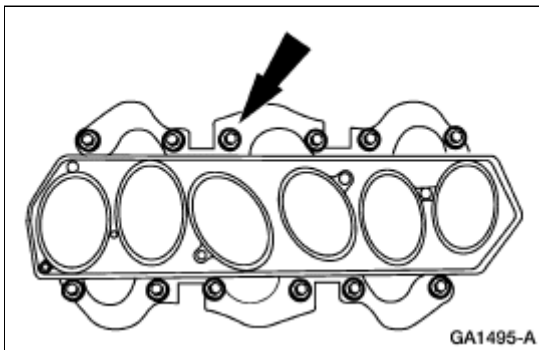
17. Disconnect the RH vapor management valve (VMV) hose.



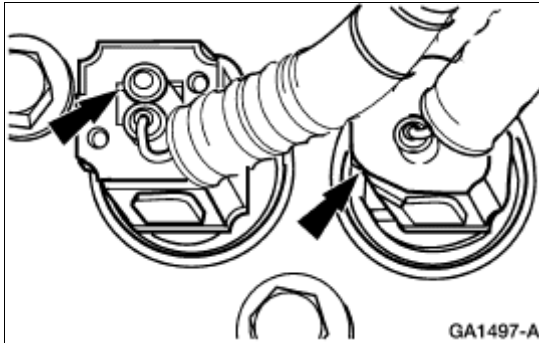
18. Disconnect the LH VMV hose.



19. Remove the upper intake manifold.
20. Remove the lower intake manifold.

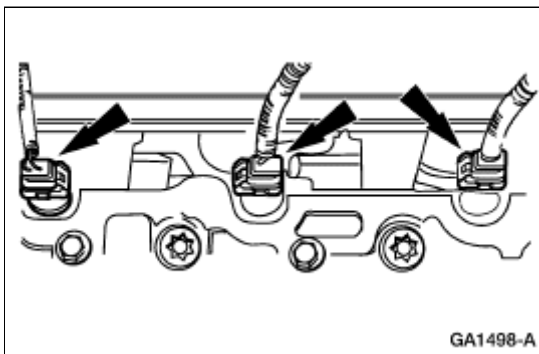


21. Disconnect the water temperature indicator sender unit and the engine coolant temperature (ECT) sensor electrical connectors.

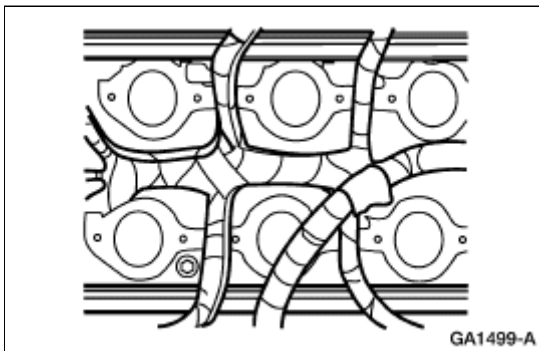


22. **NOTE:** The LH side is shown, the RH side is similar.

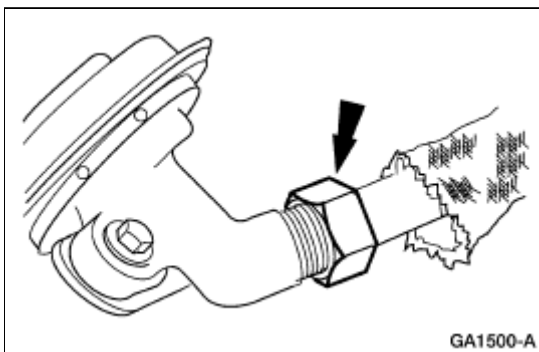
Disconnect the six fuel injector electrical connectors.



23. Remove the fuel charging wiring.

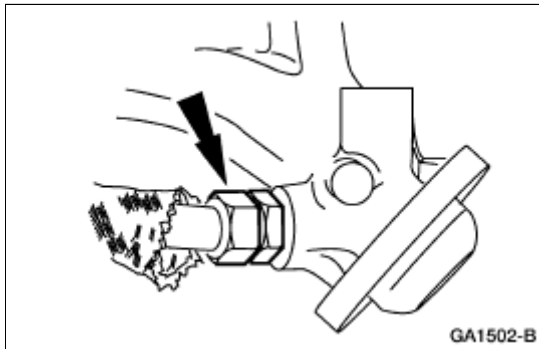


24. Disconnect the EGR valve to exhaust manifold tube from the EGR valve.

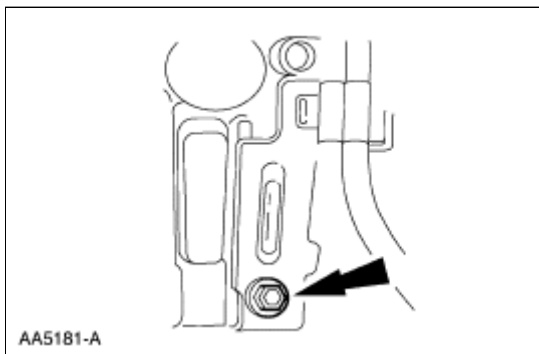




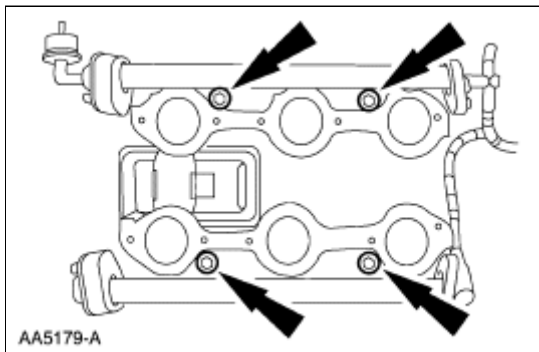
25. Disconnect the EGR valve to exhaust manifold tube from the exhaust manifold.



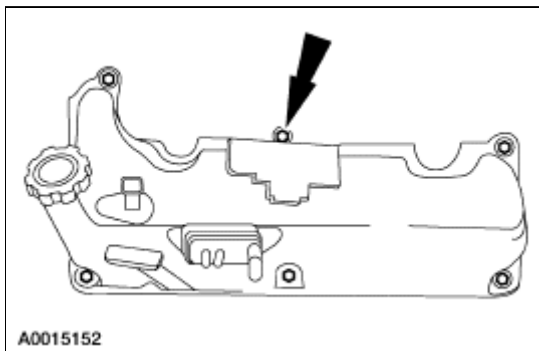
26. Remove the bolt and position the lower fuel line bracket aside.



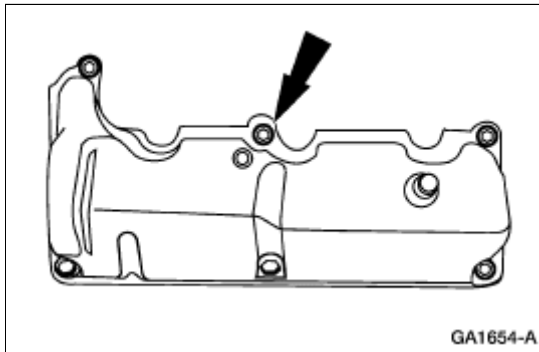
27. Remove the fuel injection supply manifold.



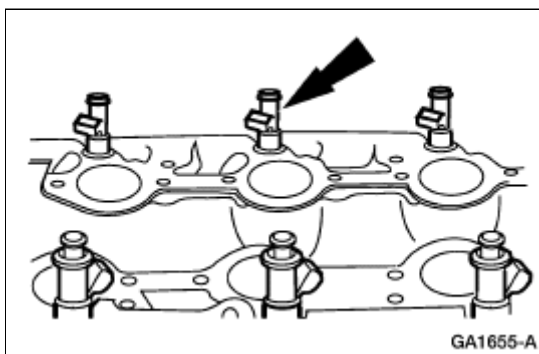
28. Remove the LH valve cover and the gasket.



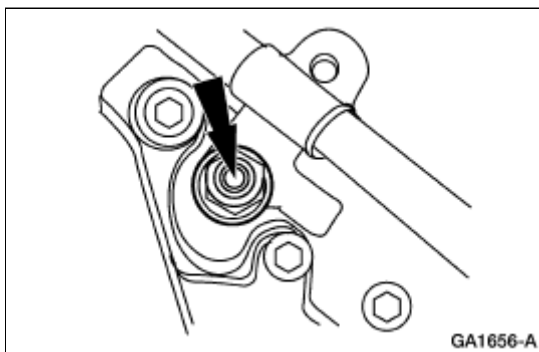
29. Remove the RH valve cover and the gasket.



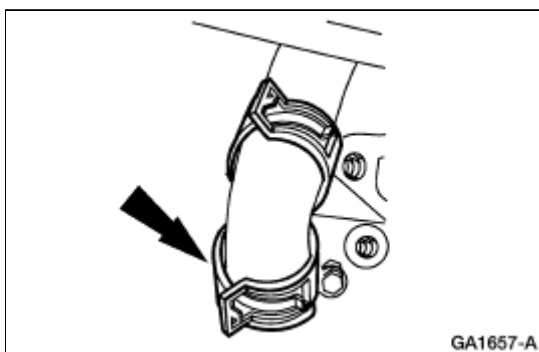
30. Remove the fuel injectors.



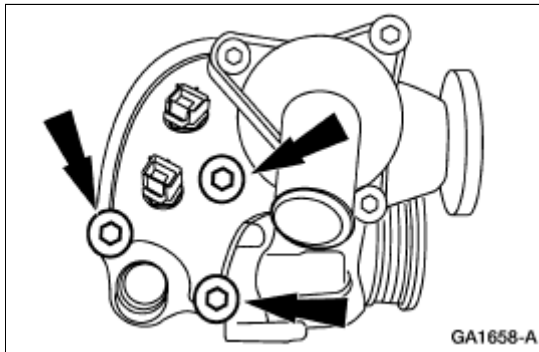
31. Remove the VMV hose bracket and position aside.



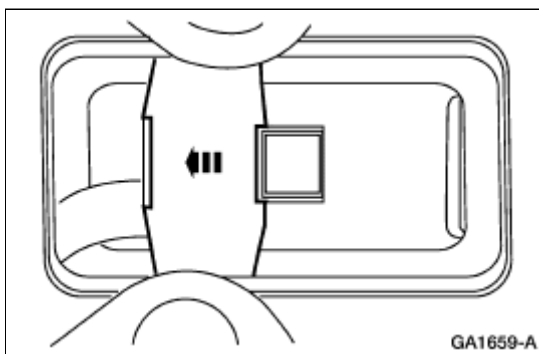
32. Disconnect the water bypass hose.



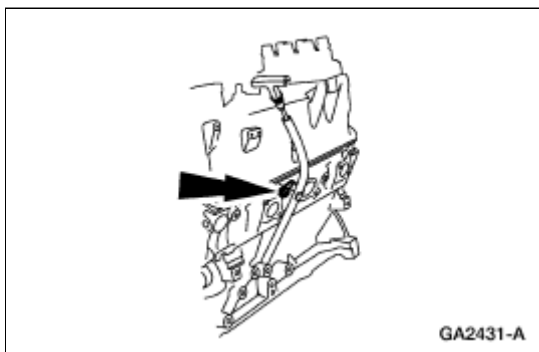
33. Remove the thermostat housing.



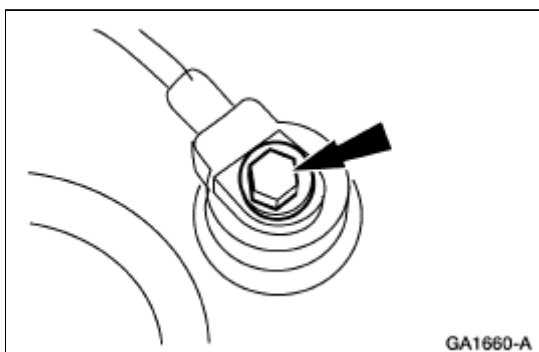
34. Remove the crankcase vent separator spring steel clip and remove the separator.



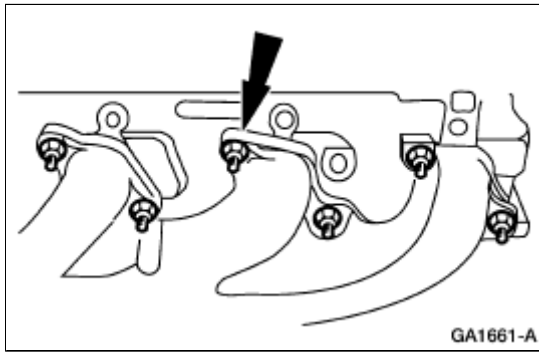
35. Remove the oil level indicator tube.



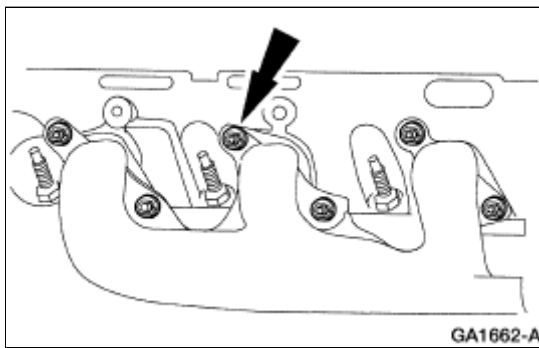
36. Remove the knock sensor.



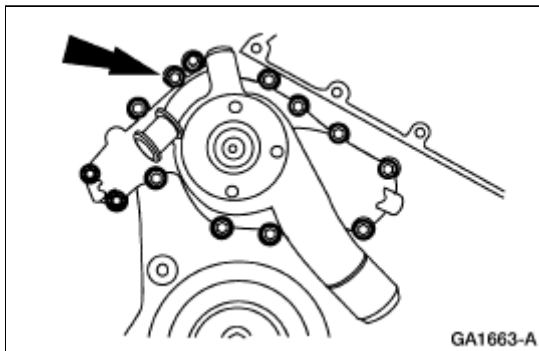
37. Remove the RH exhaust manifold and the gasket.



38. Remove the LH exhaust manifold and the gasket.

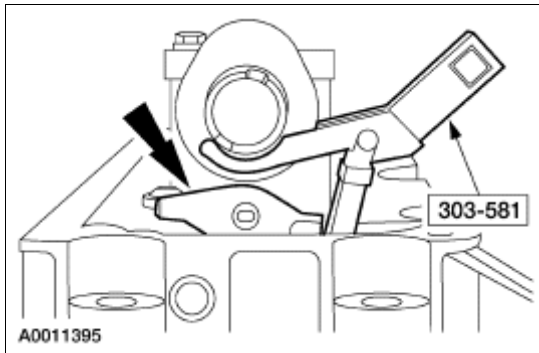


39. Remove the water pump.

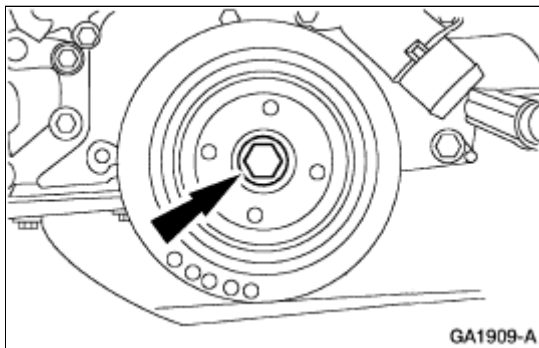


40. **NOTE:** Mark each camshaft roller follower to make sure of its original position during reassembly.

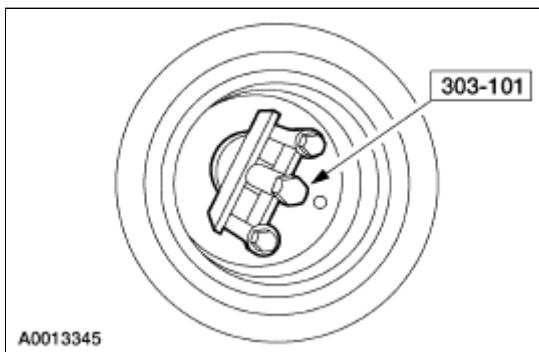
Using the special tool, remove the camshaft roller followers.



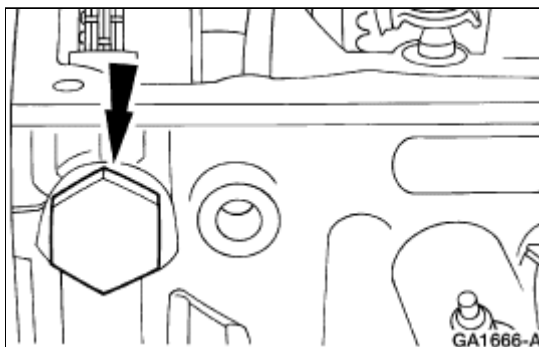
41. Remove the bolt.



42. Using the special tool, remove the crankshaft pulley.

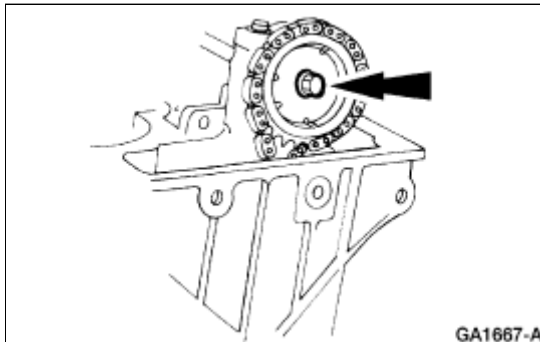


43. Remove the RH hydraulic chain tensioner.

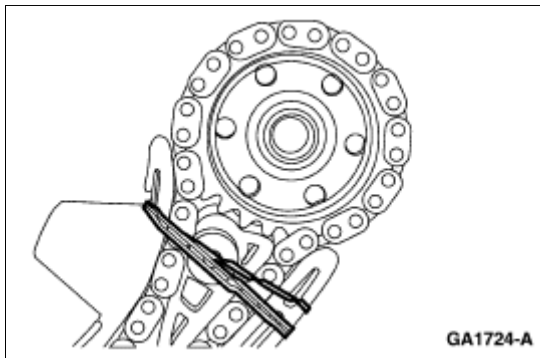


44.  **CAUTION:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.

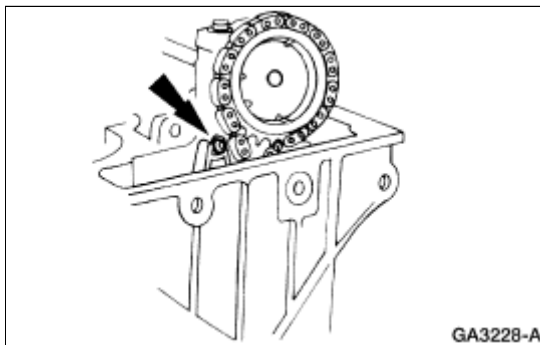
Remove the RH camshaft sprocket bolt.



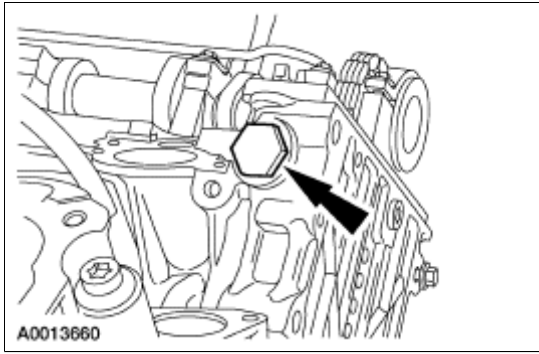
45. Remove the camshaft sprocket from the camshaft and install a rubber band on the cassette to hold the chain and camshaft sprocket in place.



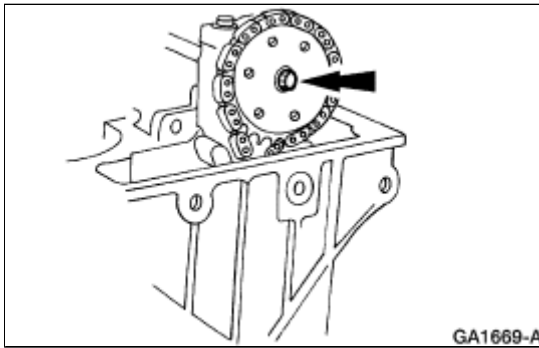
46. Remove the bolt.



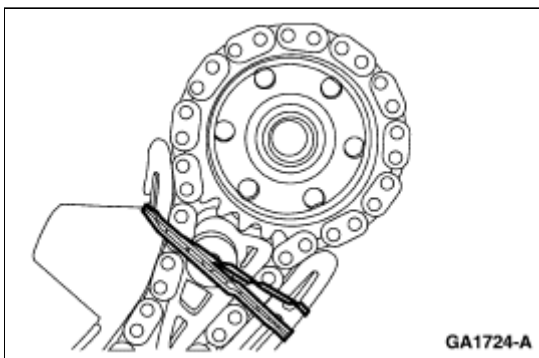
47. Remove the LH hydraulic chain tensioner.



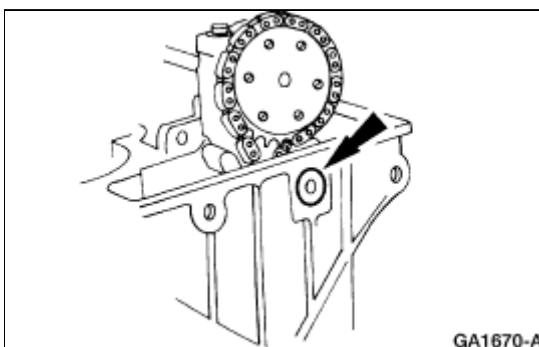
48. Remove the LH camshaft sprocket bolt.



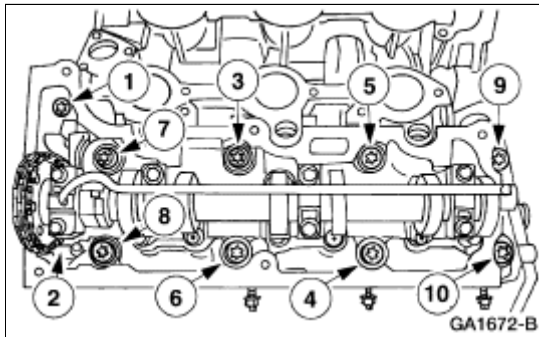
49. Remove the camshaft sprocket from the camshaft and install a rubber band on the cassette to hold the chain and camshaft sprocket in place.



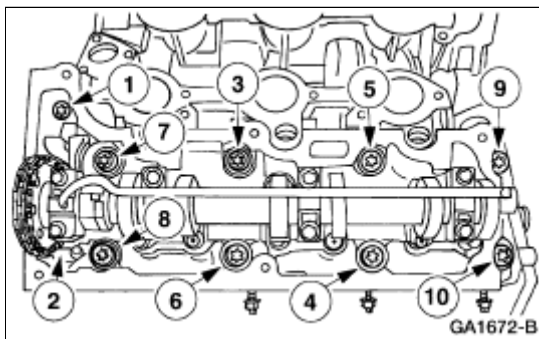
50. Remove the bolt.



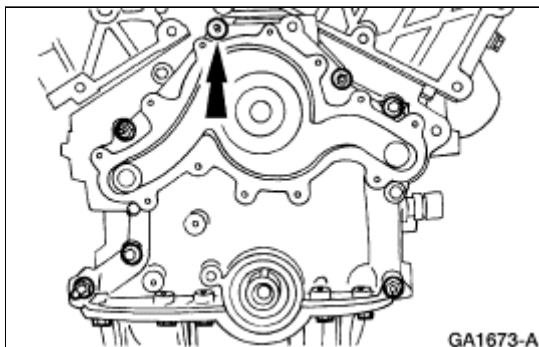
51. Remove the bolts in the sequence shown and remove the LH cylinder head.



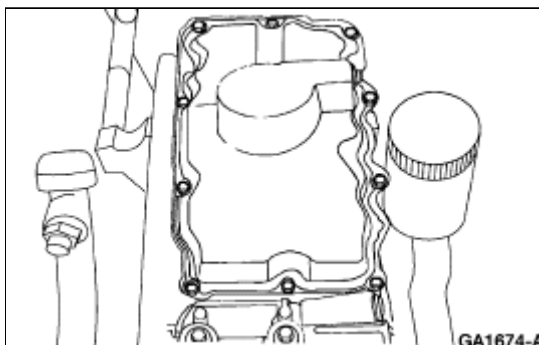
52. Remove the bolts in the sequence shown and remove the RH cylinder head.



53. Remove the engine front cover.

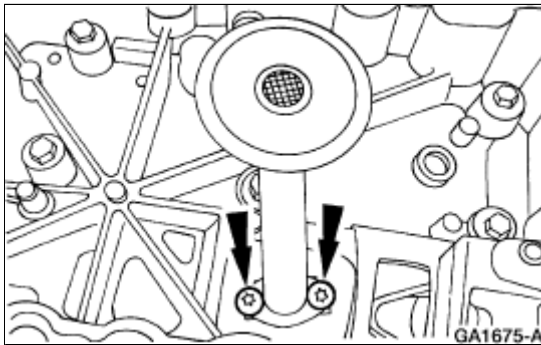


54. Remove the oil pan.

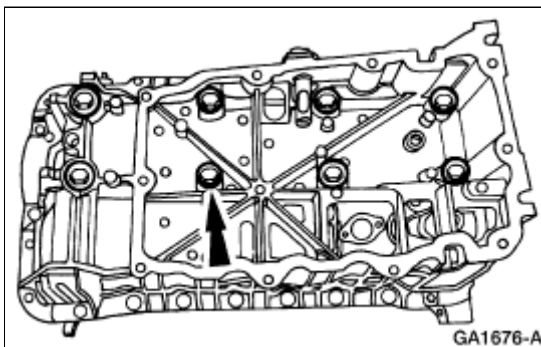




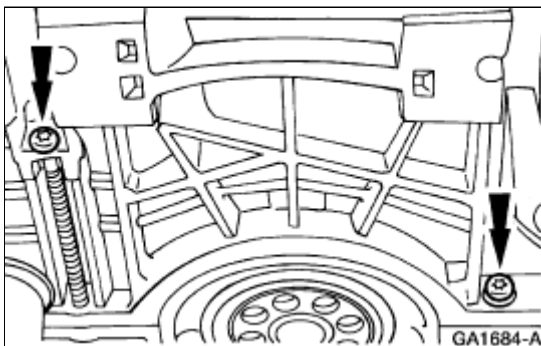
55. Remove the oil pump screen and pickup tube and the gasket.



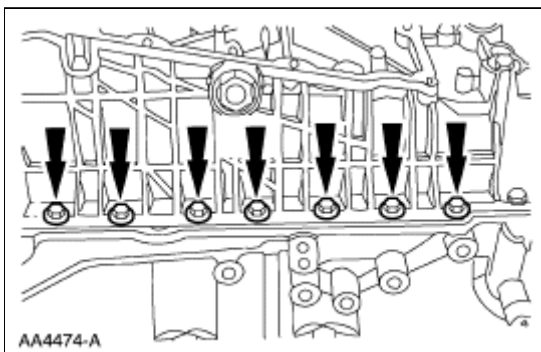
56. Remove the bolts.



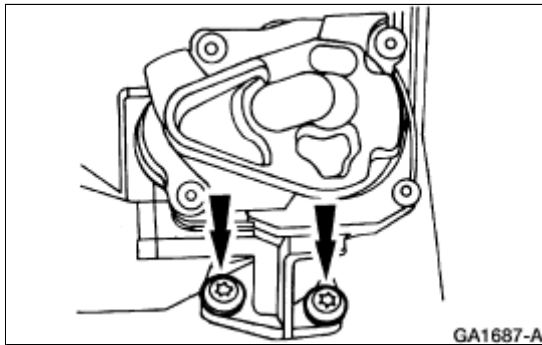
57. Remove the ladder frame bolts.



58. Remove the 15 bolts and the two nuts. Remove the ladder frame.

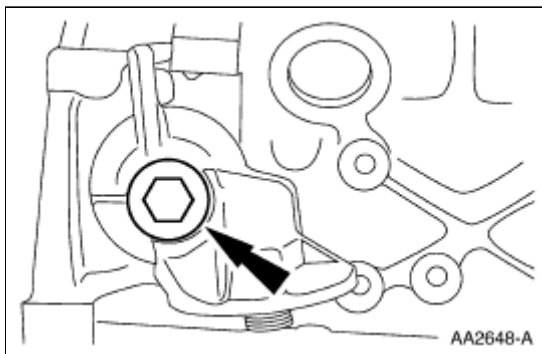


59. Remove the oil pump.

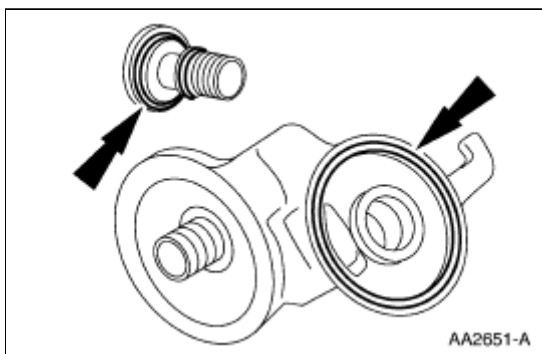


60. Remove the oil filter.

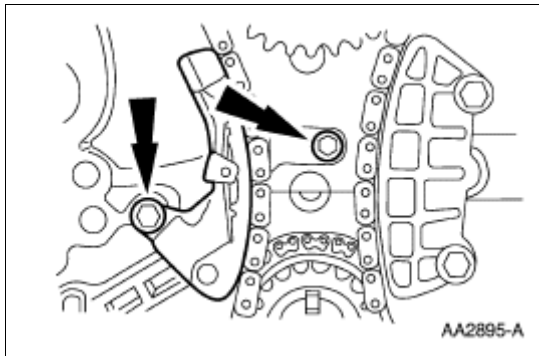
61. Remove the oil filter adapter.



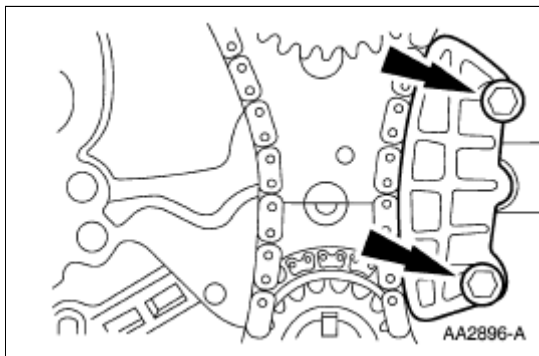
62. Inspect and install new O-ring seals if necessary.



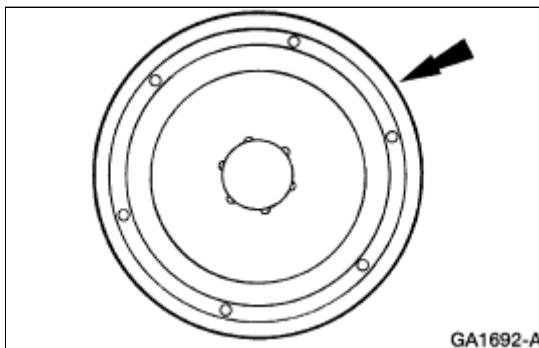
63. Remove the chain tensioner.



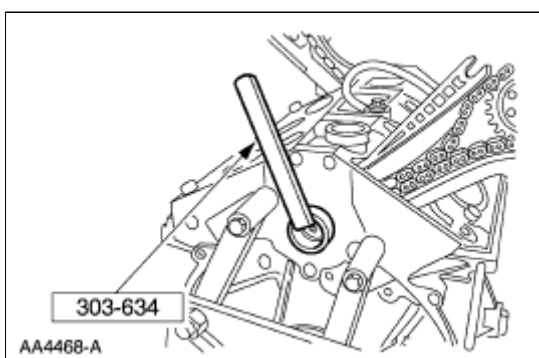
64. Remove the chain guide.



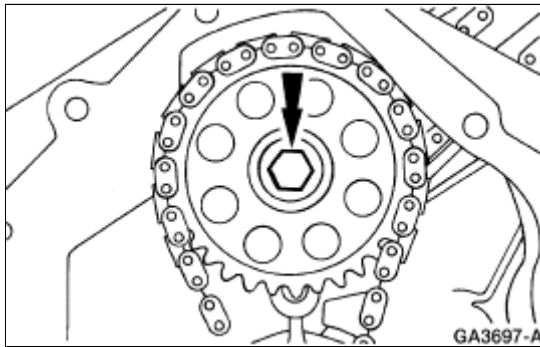
65. Remove the rear jackshaft plug.



66. Install the special tool at the rear of the jackshaft.



67. Loosen the front sprocket retaining bolt.

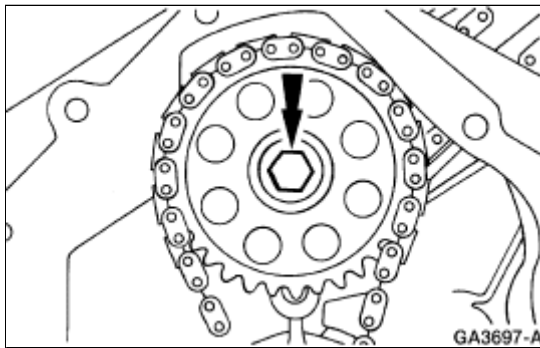


68. With special tool still in place, loosen the rear sprocket retaining bolt.

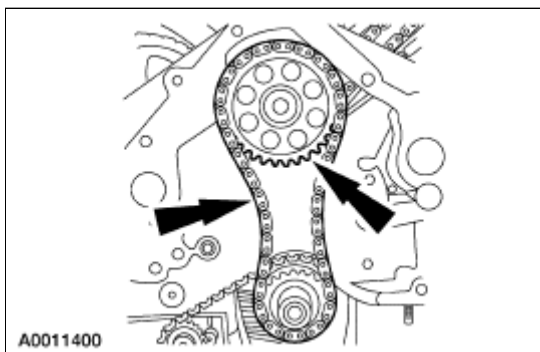
69. Remove the special tool.

70. **NOTE:** It may be required to hold the oil pump intermediate shaft, using an E-12 external TORX® socket, in order to remove the bolts if bolts do not turn out easily at this time.

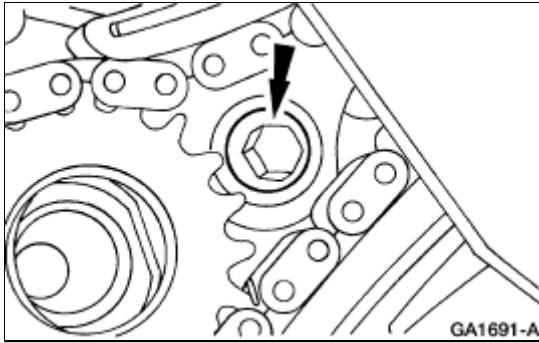
Remove the bolt.



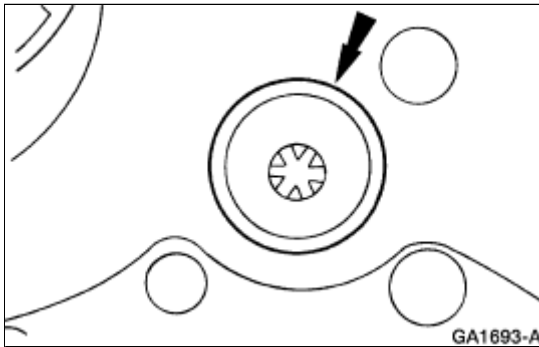
71. Remove the jackshaft sprocket and chain.



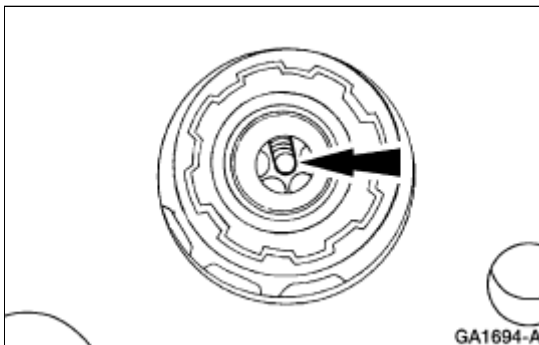
72. Remove the bolt and the front cassette.



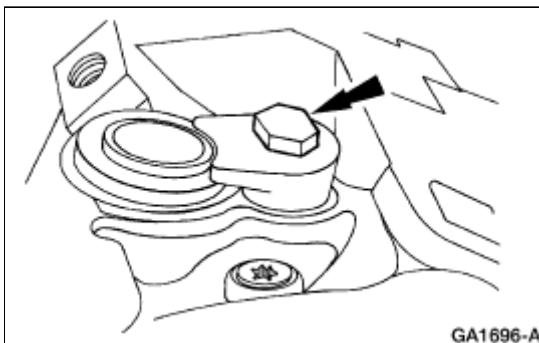
73. Remove the bolt and spacer.



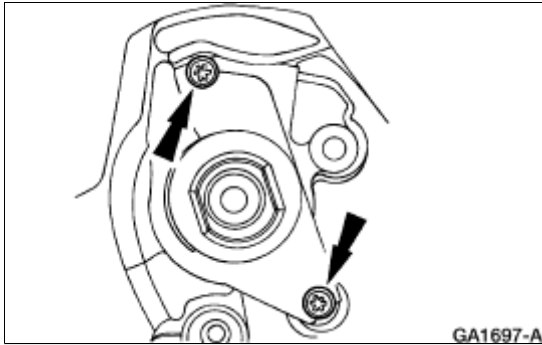
74. Remove the bolt and remove the cassette.



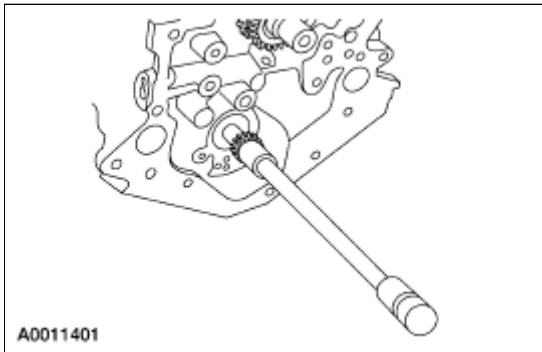
75. Remove the oil pump drive.



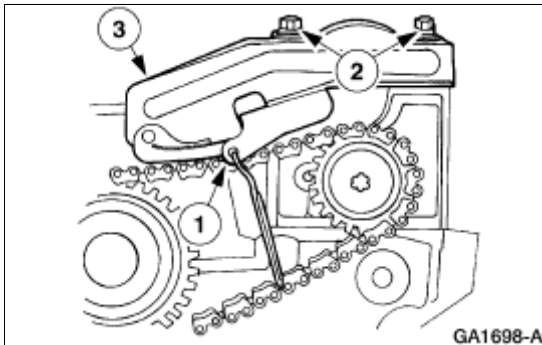
76. Remove the jackshaft thrust plate.



77. Remove the jackshaft.

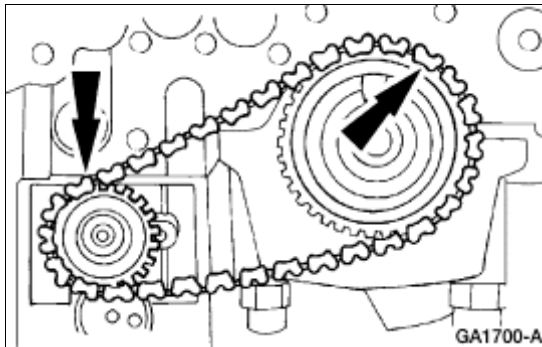


78. On 4 x 4 vehicles, remove the balance shaft tensioner.
1. Install a pin in the balance shaft tensioner.
  2. Remove the bolts.
  3. Remove the balance shaft tensioner.

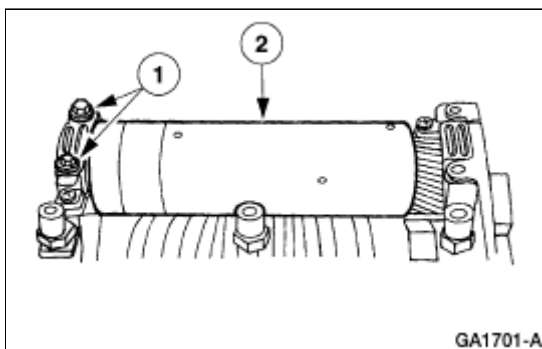


79. **NOTE:** DO NOT remove the balance shaft sprocket bolt.

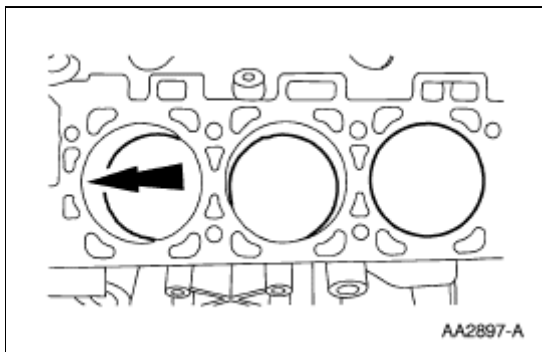
On 4 x 4 vehicles, remove the balance shaft chain and crankshaft sprocket.



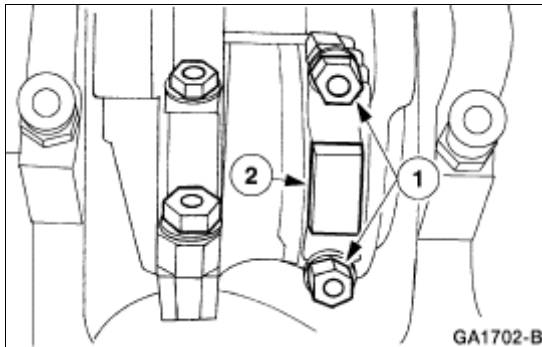
80. On 4 x 4 vehicles, remove the balance shaft.
1. Remove the bolts.
  2. Remove the balance shaft.



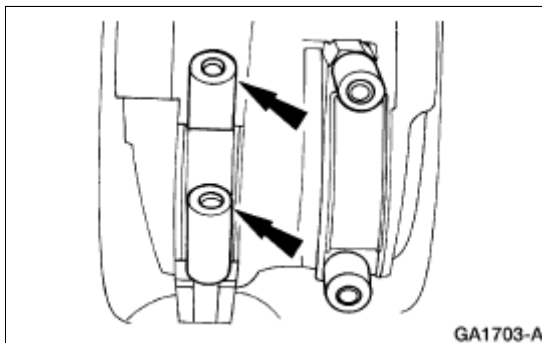
81. Using the cylinder ridge reamer, remove the ridge and carbon deposits from the top of each cylinder.



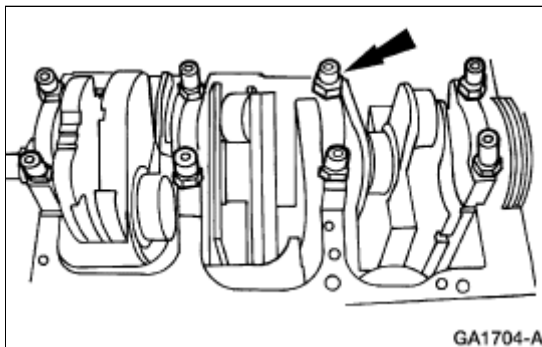
82. Remove the piston and connecting rod assemblies.
1. Remove the connecting rod nuts.
  2. Remove the connecting rod cap.



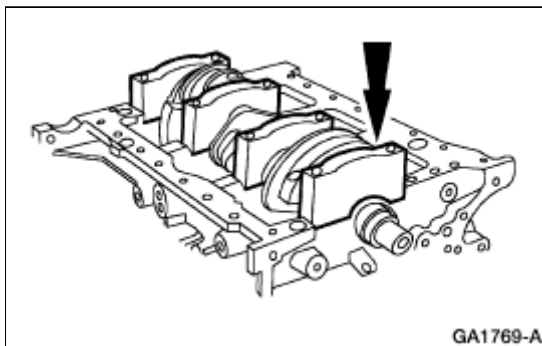
83. Install rubber hose pieces on the bolts to protect the crankshaft and remove the pistons.



84. Remove the bolts.

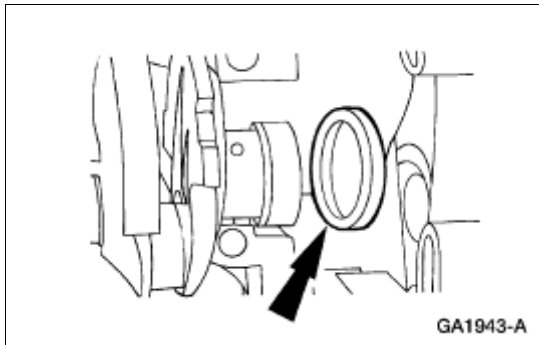


85. Remove the crankshaft main bearing caps.

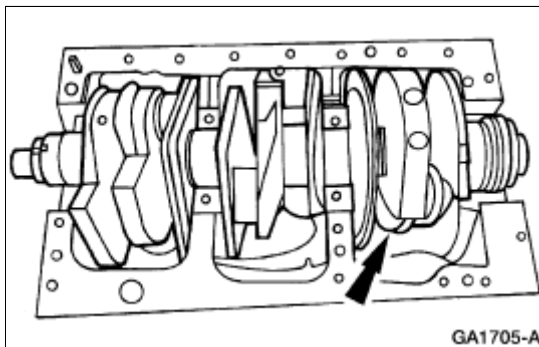


86. Remove the crankshaft rear oil seal from the crankshaft.





87. Remove the crankshaft.



88. Remove the crankshaft main bearings and the thrust bearing.

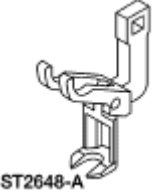
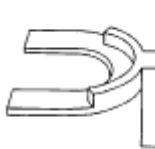
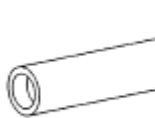
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SECTION 303-01B: Engine — 4.0L SOHC  
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

2000 Explorer/Mountaineer Workshop Manual

## Cylinder Head


### Special Tool(s)

 <p>ST2648-A</p>	Compressor, Valve Spring 303-567 (T97P-6565-A)
 <p>ST1331-A</p>	Spacer, Valve Spring Compressor 303-382 (T91P-6565-AH)
 <p>ST1332-A</p>	Installer, Valve Stem Oil Seal 303-383 (T91P-6571-A)

### Material

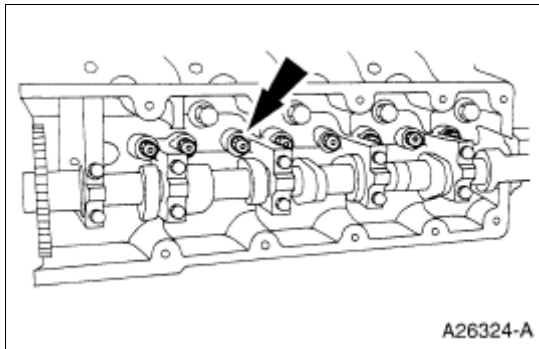
Item	Specification
Super Premium SAE 5W-20 Motor Oil XO-5W20-QSP or equivalent	WSS-M2C153-H
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A

### Disassembly

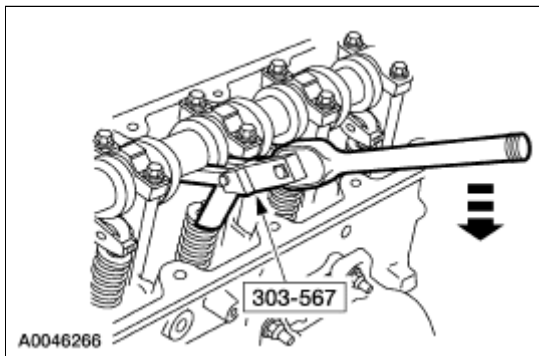
1.  **CAUTION:** Place the cylinder head on a cardboard or wood surface to prevent damage to the joint face.


**NOTE:** The hydraulic lash adjusters must be installed in their original locations. Record hydraulic lash adjuster locations.

Remove the hydraulic lash adjusters.



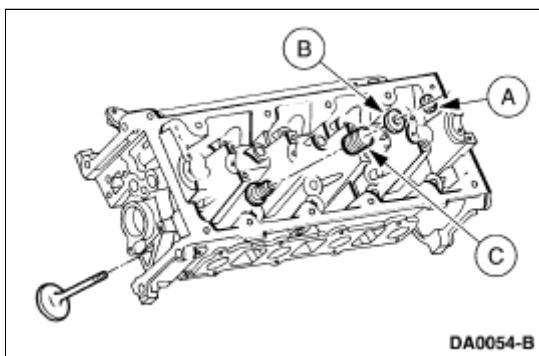
2. Use the special tool to compress the valve springs.



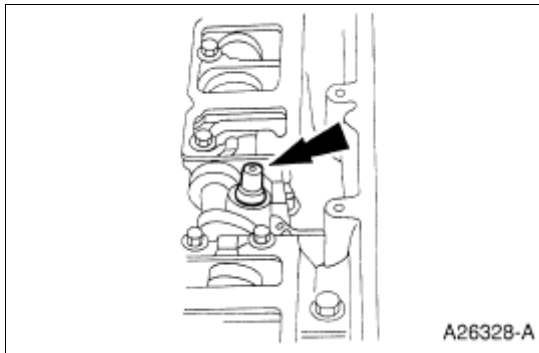
3.  **CAUTION:** Keep the valves and valve spring retainer keys (6518) in order so they can be installed in the same positions.

**NOTE:** Shown without camshaft for clarity.

Remove the (A) valve spring retainer keys, the (B) valve spring retainers (6514), the (C) valve springs, and the valves.

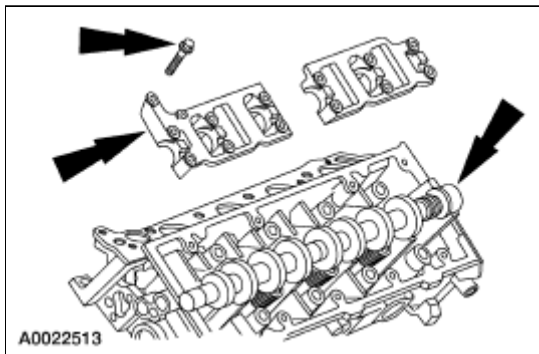


4. Remove the valve stem seals (6571).




5. **NOTE:** The camshaft bearing caps must be installed in their original location. Record camshaft bearing cap location.

Remove the bolts, the bearing caps and the camshaft.

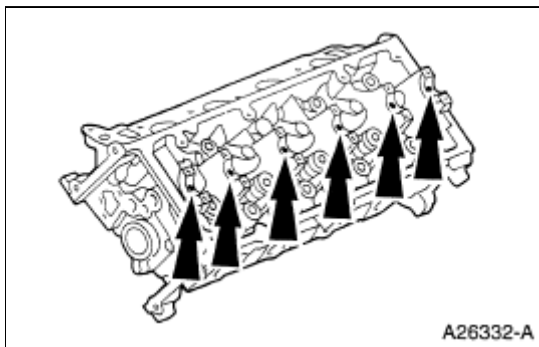


### Assembly

1.  **CAUTION:** Do not use metal scrapers or other tools to clean the cylinder head or damage to the head can occur.

Use a plastic scraper and metal surface cleaner to clean the cylinder head.

2. Lubricate the camshaft journals with clean engine oil.



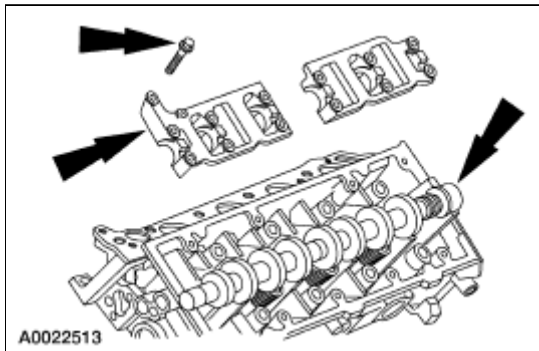
3. Lubricate the camshaft bearing caps with clean engine oil.

4.  **CAUTION:** Make sure the camshaft sprocket keyway is up and 90 degrees from the valve

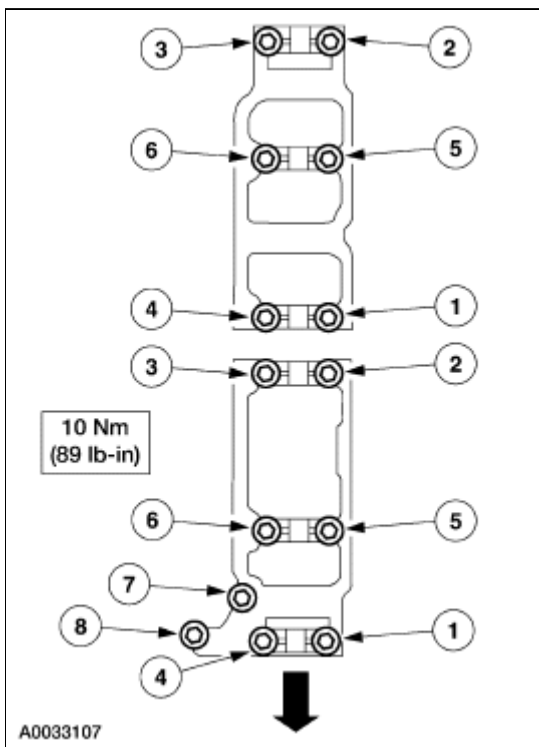
**cover mounting surface.**

Install the camshaft and the camshaft bearing caps in their original locations.

- Install the bolts loosely.

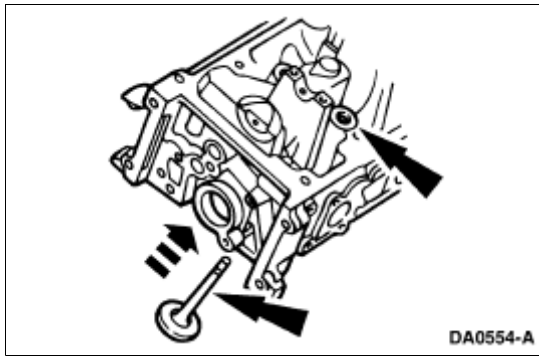


5. Tighten the bolts in the sequence shown.



6. **NOTE:** Lubricate the valve stems with clean engine oil.

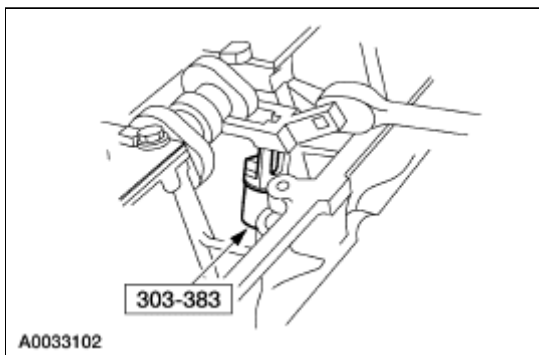
Install the valves in the valve guides located in the cylinder head.



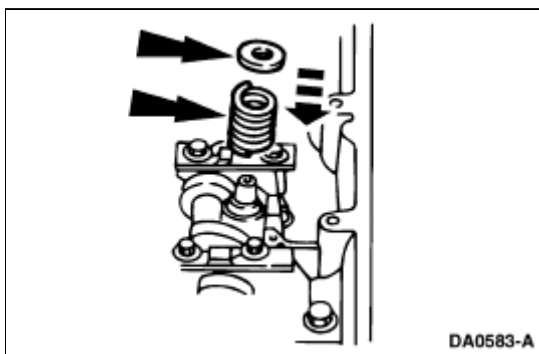
7. **NOTE:** The valve stem seal must be bottomed on the valve seat.

**NOTE:** Make sure that the garter spring is present in the valve stem seal.

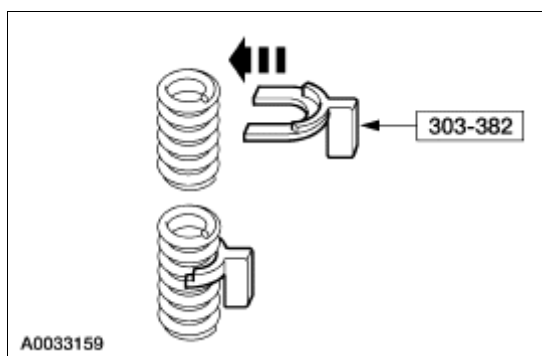
Use the special tool to install the valve stem seals.



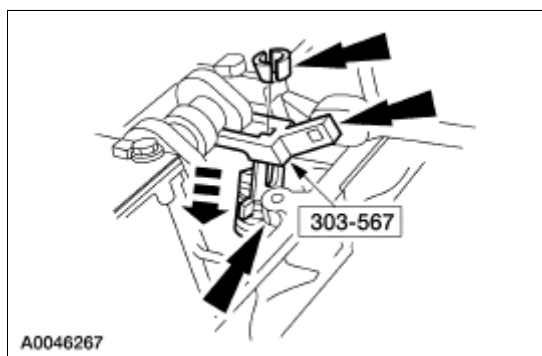
8. Install the valve springs and the valve spring retainers onto the valves.



9. Install the special tool between the valve spring coils to prevent valve stem seal damage.

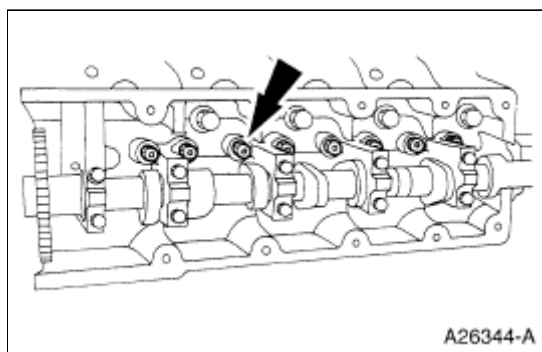


10. Use the special tool to compress the valve springs. Install the valve spring retainer keys.

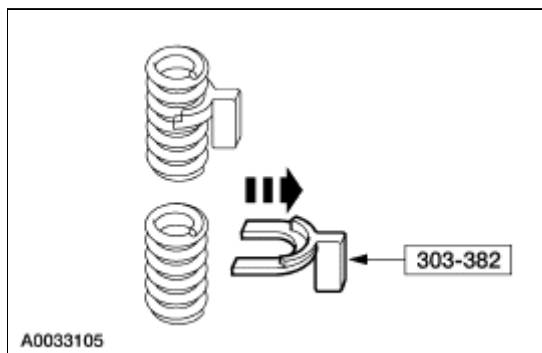


11. **NOTE:** Lubricate the hydraulic lash adjusters with clean engine oil.

Install the hydraulic lash adjusters in their original location.



12. Remove the special tool.








SECTION 303-01B: Engine — 4.0L SOHC  
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

2000 Explorer/Mountaineer Workshop Manual

## Piston

### Special Tool(s)

 ST1336-A	Pin Remover/Replacer 303-S024 (T68P-6135-A)
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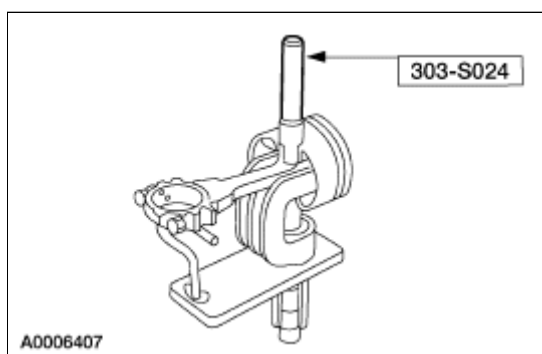
### Disassembly

1. **NOTE:** The connecting rod bolts and nuts cannot be reused.

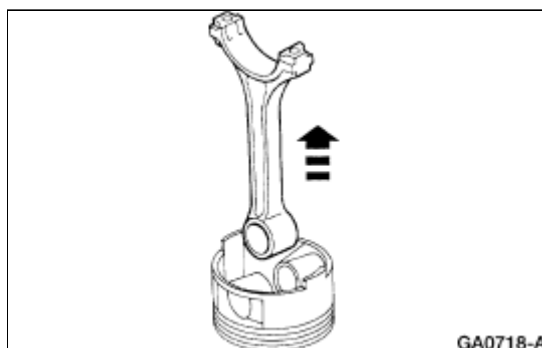
**NOTE:** Mark the position of the parts, so they can be installed in their original position.

Remove the connecting rod bearings from the connecting rod and caps.

2. Remove the piston rings. For additional information, refer to [Section 303-00](#).
3. Using the special tool, press the piston pin out of the connecting rod and piston assembly.



4. Remove the connecting rod from the piston.



5. Clean and inspect the connecting rod and piston. For additional information, refer to [Section 303-00](#).

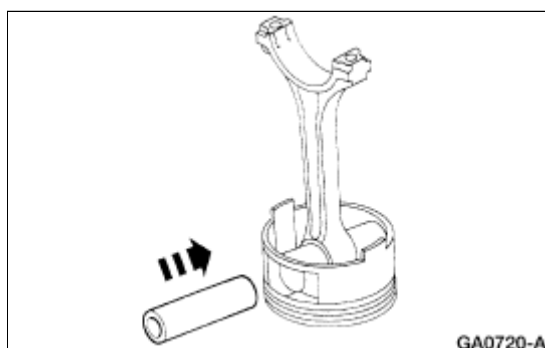
### Assembly

1. **NOTE:** Apply a light coat of Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G to all parts. Install the piston in the connecting rod with the cylinder number side of the rod and the indentation notch in the piston on the same side.

Install the large chamfered side of the connecting rod bearing bore facing toward the engine front on the RH bank connecting rod and facing toward the rear of the engine on LH bank connecting rod.

2. **NOTE:** The oil hole in connecting rod must face the RH side of the cylinder block and the arrow on the piston must face the front of the engine block.

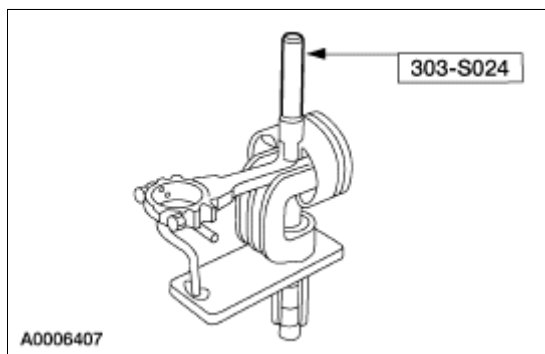
Position the piston pin in the bore aligned with the connecting rod bore.



3. **NOTE:** If the piston pin is removed from the piston, a new piston and pin assembly must be used. Do not reuse the piston or piston pin.

Gradually heat the pin bore side of the connecting rod to approximately 232°C-316°C (467°F-626°F) and immediately install the piston pin.

4. Using the special tool, press the piston pin into the piston and connecting rod assembly.



5. Install the piston rings. For additional information, refer to [Section 303-00](#).
-


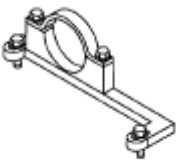

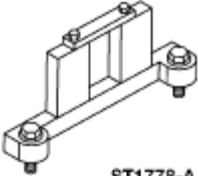
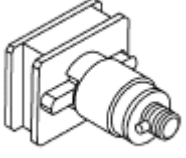
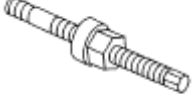
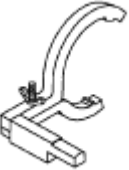


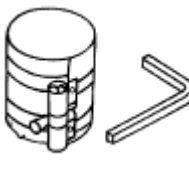


SECTION 303-01B: Engine — 4.0L SOHC  
ASSEMBLY

2000 Explorer/Mountaineer Workshop Manual

## Engine

### Special Tool(s)

 ST1774-A	Timing Chain Tensioner 303-571 (T97T-6K254-A)
 ST1777-A	Camshaft Gear Holding Tool 303-564 (T97T-6256-B)
 ST1776-A	Camshaft Gear Holding Tool Adapter 303-578 (T97T-6256-A)
 ST1778-A	Camshaft Holding Tool 303-577 (T97T-6256-C)
 ST1779-A	Camshaft Holding Tool Adapter 303-576 (T97T-6256-D)
 ST1287-A	Crankshaft Damper Replacer 303-102 (T74P-6316-B)
 ST1775-A	Crankshaft Holding Tool 303-573 (T97T-6303-A)

	Piston Ring Compressor 303-D032 (D81L-6002-C)
 ST1330-A	Valve Spring Compressor 303-581 (T97T-6565-A)
 ST2191-A	Rear Jackshaft Socket 303-634

### Material

Item	Specification
Metal Surface Cleaner F4AZ-219A536-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
Motorcraft Silicone Brake Caliper Grease and Dielectric Compound XG-3	ESE-M1C171-A

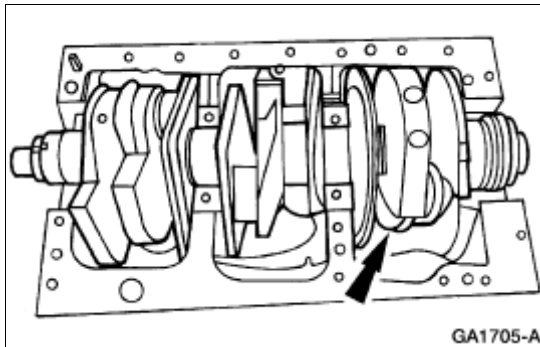


**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

**NOTE:** Before engine assembly, use metal surface cleaner and a suitable plastic or wooden scraper to clean the sealing surfaces. All sealing surfaces must be clean. Make sure coolant and oil passages are clear.

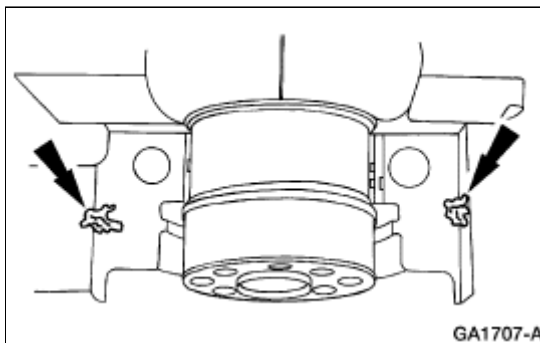
1. Install the crankshaft main bearings and the thrust bearing.
  - Lubricate the crankshaft main bearings with clean engine oil.
2. **NOTE:** The crankshaft main bearings are precision selective fit. Inspect the bearing clearance. For additional information, refer to [Section 303-00](#).

Install the crankshaft.

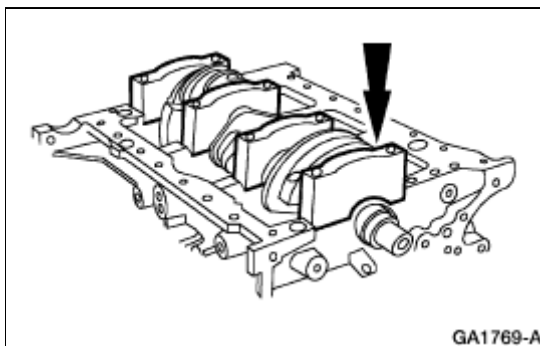


3. **NOTE:** The rear main bearing cap must be installed within four minutes after applying the silicone.

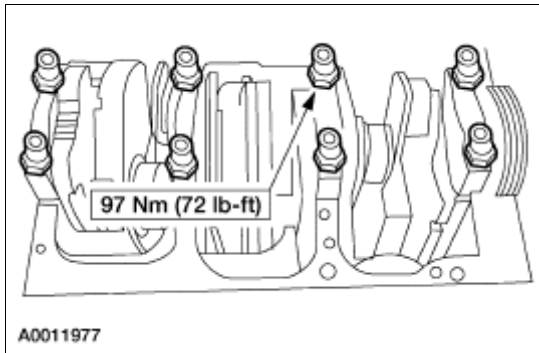
Apply silicone gasket and sealant to the rear main bearing cap to cylinder block parting line.



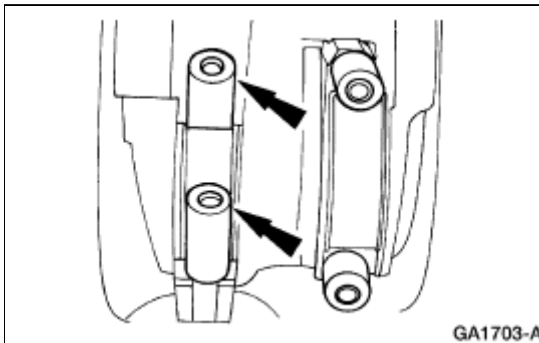
4. Install the crankshaft main bearings in the main bearing caps.
5. Install the main bearing caps.



6. Tighten the bolts.

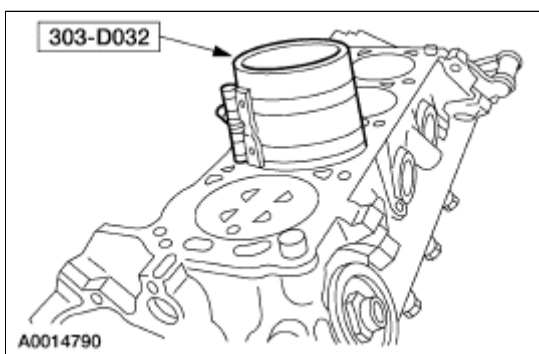


7. Lubricate the piston rings with clean engine oil.
8. Make sure that the piston rings are correctly spaced. For additional information, refer to [Section 303-00](#).
9. Install rubber hose pieces on the connecting rod bolts to protect the crankshaft.



10. **NOTE:** Position the piston with the indentation arrow toward the front of the cylinder block.

Using the special tool, install the pistons.



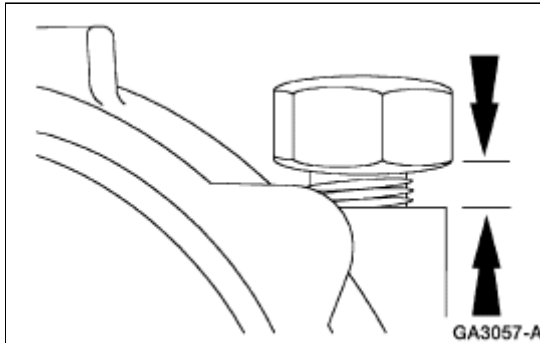
11. **NOTE:** The old nuts and bolts are used for checking clearances. New nuts and bolts must be used for reassembly.

Check the clearance of each connecting rod bearing. For additional information, refer to [Section 303-00](#).

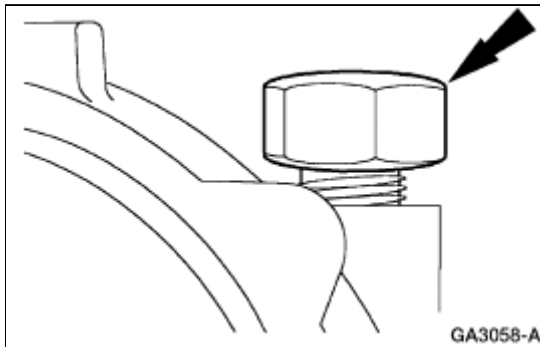
12. Rotate the crankshaft until the piston is at the bottom of its stroke.

13. **NOTE:** For cylinders 1, 2, and 3, remove the connecting rod nut at the oil split hole side first. For cylinders 4, 5, and 6, remove the opposite nut first.

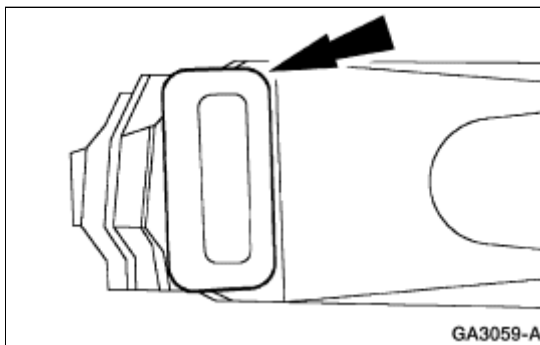
Loosen the first nut until the face is approximately 2 mm (0.08 in) over the end of the bolt.



14. Tap the bolt on the nut until it can be removed by hand.



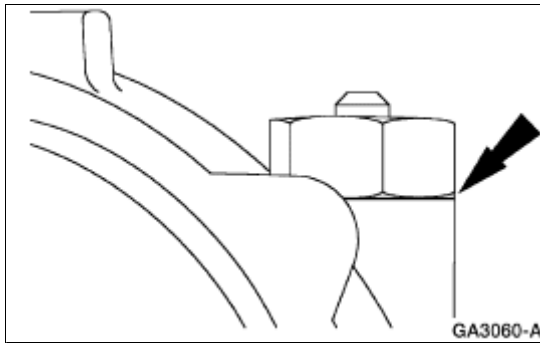
15. Repeat previous two steps for the opposite bolt.
16. Install the new bolts making certain that the bolt head is parallel to the sideward face of the connecting rod.



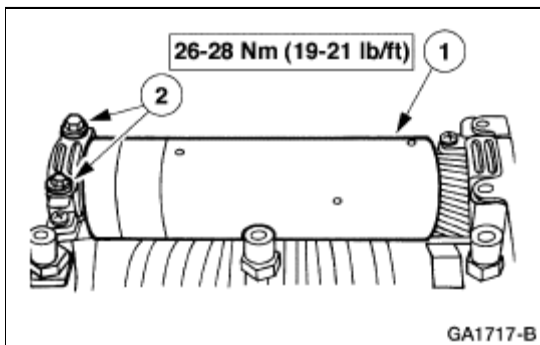
17. Install the connecting rod cap in the original position.
18. **NOTE:** Do not exceed 20 Nm (15 lb-ft) when tightening the connecting rod nuts.

Install and tighten the connecting rod nuts until they touch the connecting surface of the connecting rod cap.





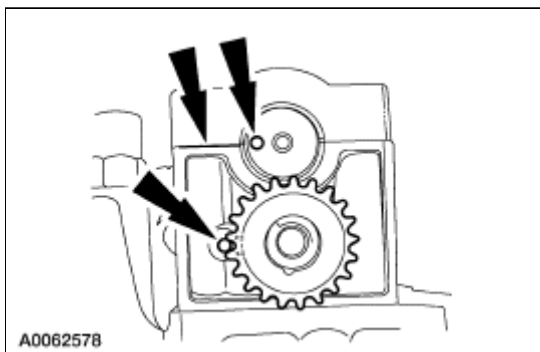
19. Tighten the connecting rod nuts simultaneously in two stages:
  - Stage 1: Tighten 20 Nm (15 lb-ft) .
  - Stage 2: Tighten 90 degrees.
20. Repeat previous four steps for the remaining connecting rods.
21. Rotate the crankshaft until the number one cylinder is at top dead center (TDC) of the compression stroke.
22. On 4 x 4 vehicles, install the balance shaft.
  1. Install the balance shaft assembly.
  2. Install the bolts.



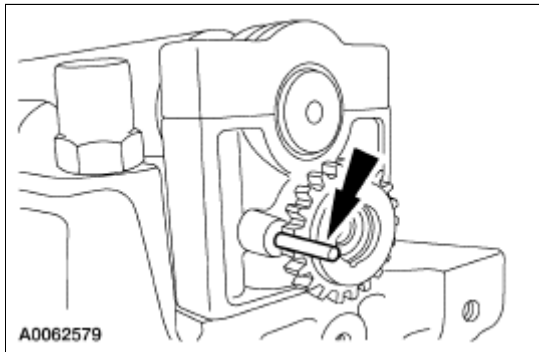
23. **NOTE:** Due to the gear ratio between the reversal shaft and the balance shaft, up to seven complete turns of the balance shaft may be required to find the correct position.

**NOTE:** The reverse shaft sprocket timing marks are located on the rear face of the sprocket.

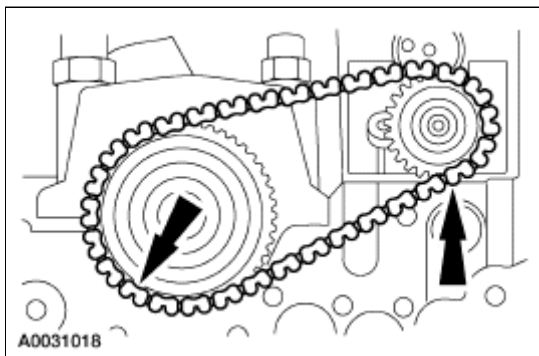
On 4 x 4 vehicles, align the timing marks.



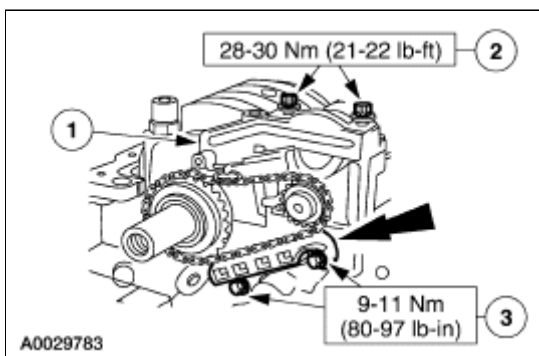
24. Install a 4 mm pin to hold the reverse shaft sprocket in place.



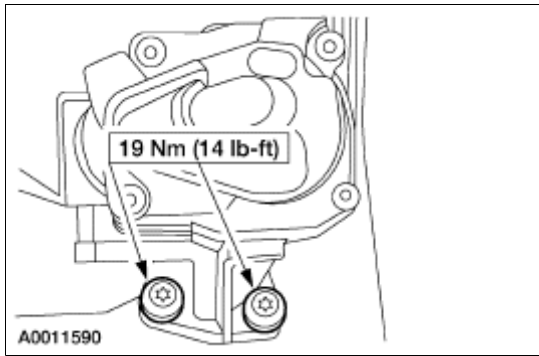
25. On 4 x 4 vehicles, install the balance shaft chain and crankshaft sprocket.



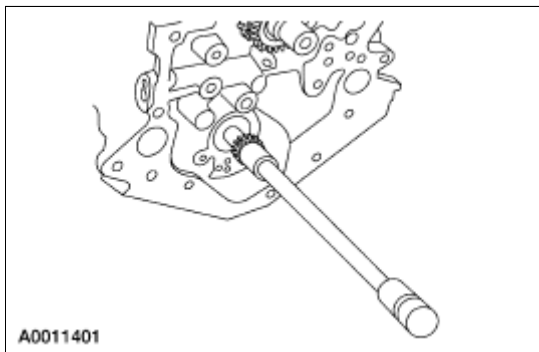
26. On 4 x 4 vehicles, install the balance shaft tensioner.
1. Install the balance shaft tensioner.
  2. Install the bolts.
  3. Position the balance shaft chain guide and install the two bolts.
    - Remove the pin from the tensioner.



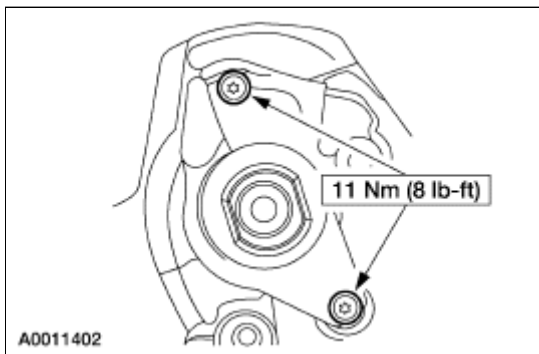
27. Install the oil pump.



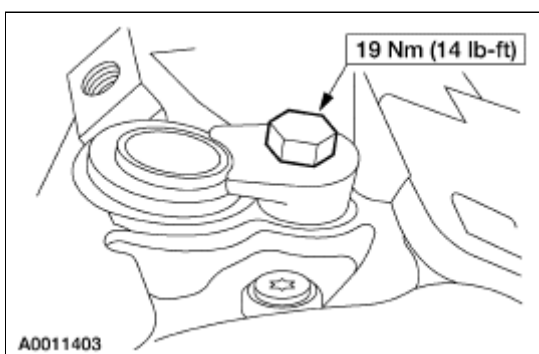
28. Install the jackshaft.



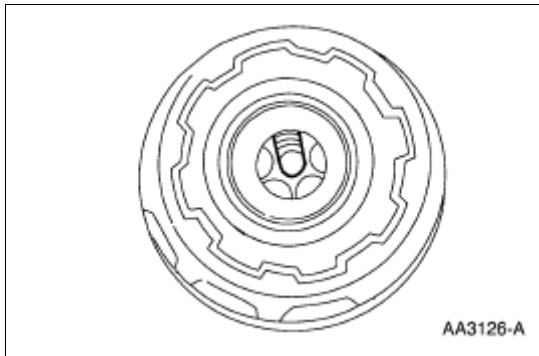
29. Install the jackshaft thrust plate and bolts.



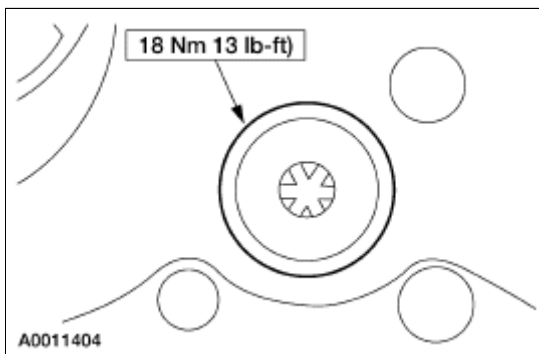
30. Install the oil pump drive.



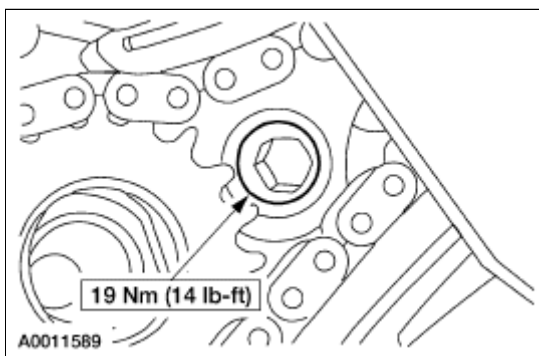
31. Attach the rear cassette and sprocket to the bolt. Do not tighten at this time.



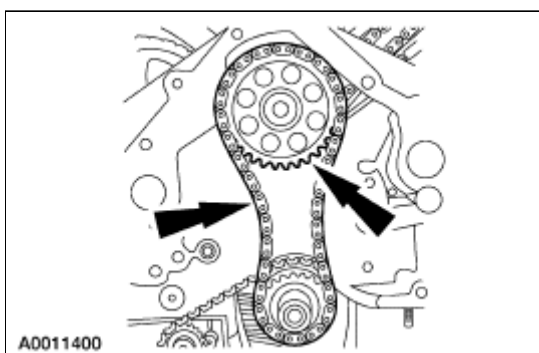
32. Install the rear cassette and bolt.



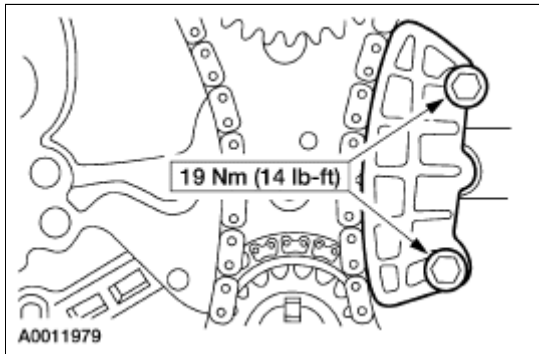
33. Install the front cassette and bolt.



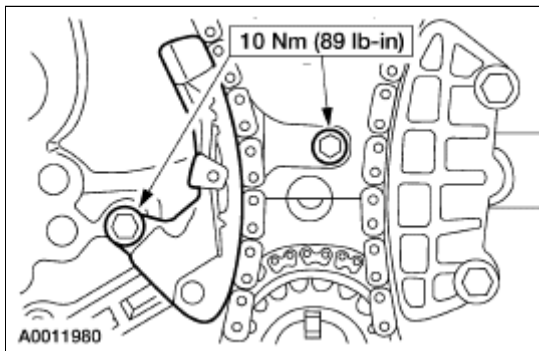
34. Position the jackshaft sprocket and chain.



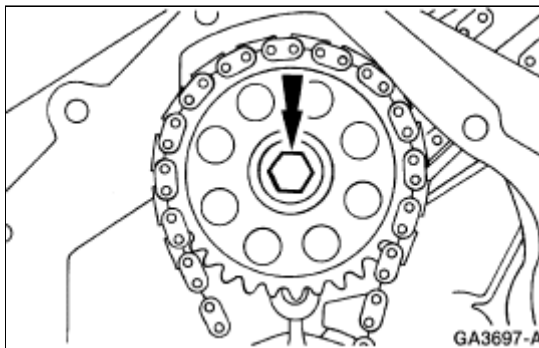
35. Install the chain guide.



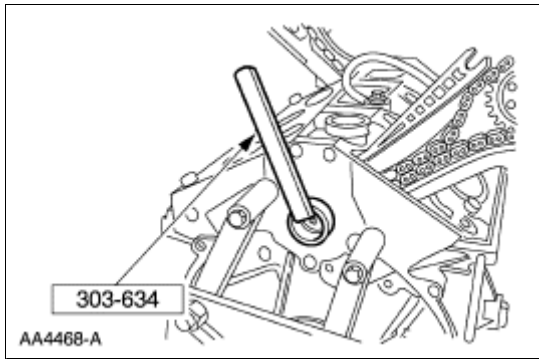
36. Install the chain tensioner.



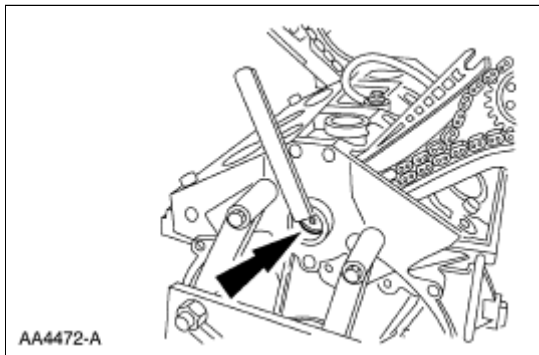
37. Install the bolt. Do not tighten at this time.



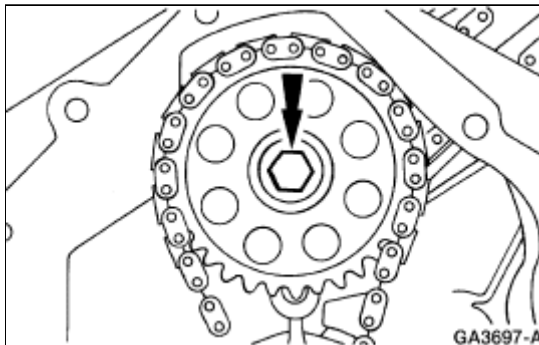
38. While holding the front jackshaft sprocket bolt secure, tighten the rear bolt to 20 Nm (15 lb-ft).
39. Install the special tool on the rear of the jackshaft.



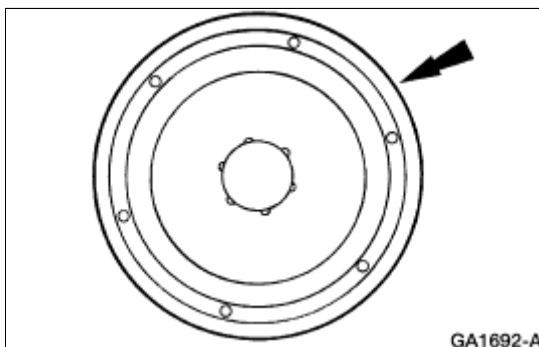
40. Tighten the rear bolt an additional 90 degrees.



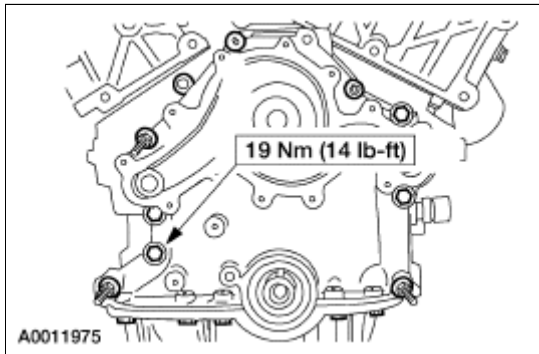
41. Tighten the front bolt in two stages.
- Stage 1: Tighten to 45 Nm (33 lb-ft).
  - Stage 2: Tighten 90 degrees.



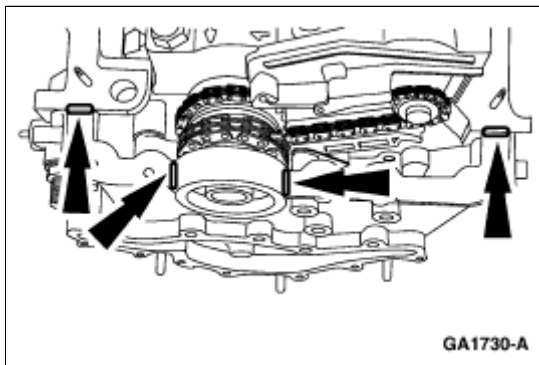
42. Remove the special tool and install the rear jackshaft plug.



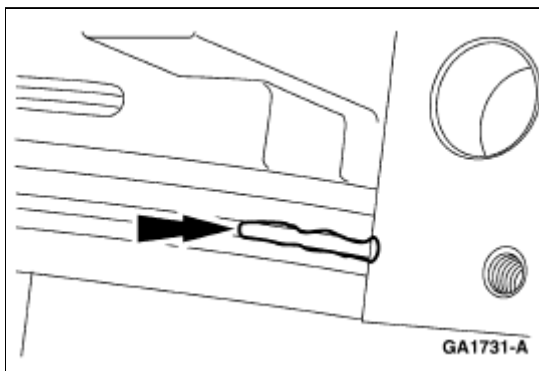
43. Position the front cover gasket and install the front cover.




44. Apply silicone gasket and sealant to the front cover in four places.

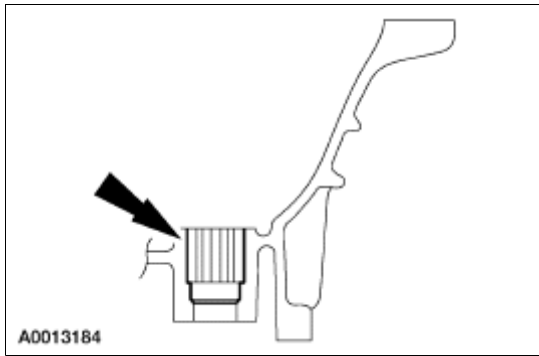


45. Apply silicone gasket and sealant to the rear main bearing cap as shown.
- Position the ladder frame gasket.

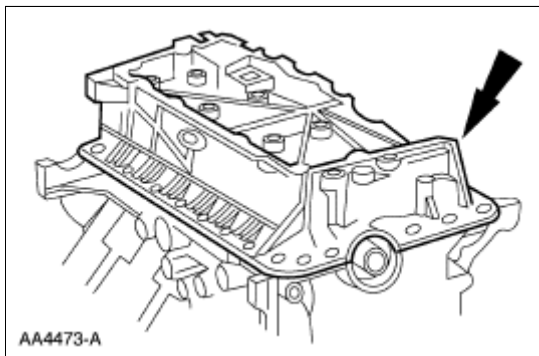


46.  **CAUTION:** The ladder frame inserts must be loosened completely or damage to the ladder frame and/or oil leaks may result.

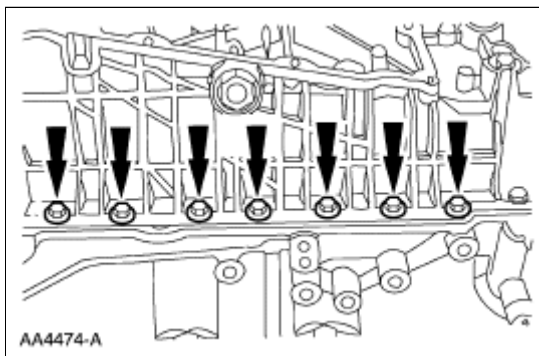
Loosen the ladder frame inserts.



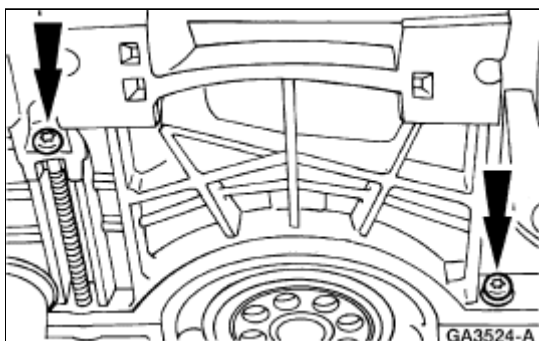
47. Position the ladder frame and gasket assembly.



48. Install and hand tighten the fifteen bolts and two nuts.



49. Install and hand tighten the bolts.

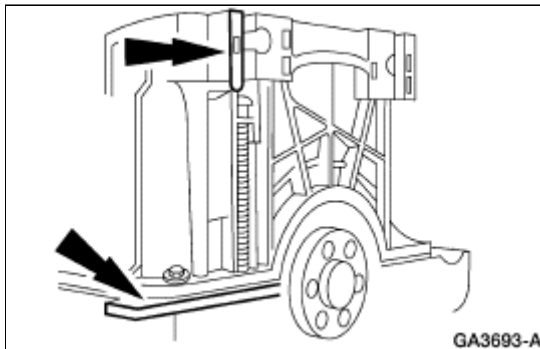


50. **NOTE:** The ladder frame to cylinder block alignment must be within a maximum mismatch of 0.25

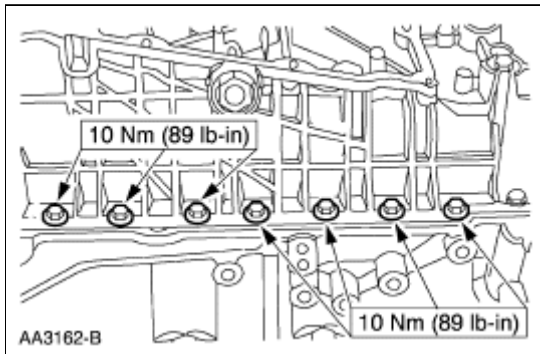


mm (0.01 in) ladder frame underflush or 0.05 mm ( 0.00196 in) ladder frame protrusion.

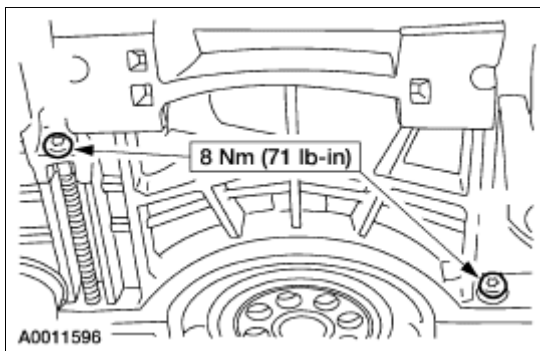
Using a straightedge, align the transmission face of the ladder frame with the rear face of the cylinder block.



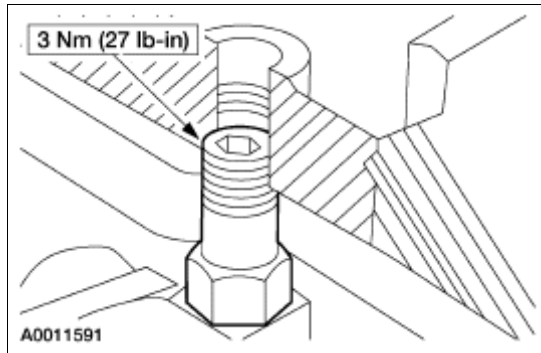
51. Tighten the fifteen bolts and two nuts.



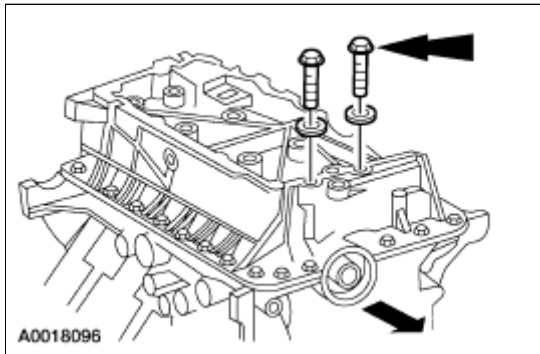
52. Tighten the bolts.



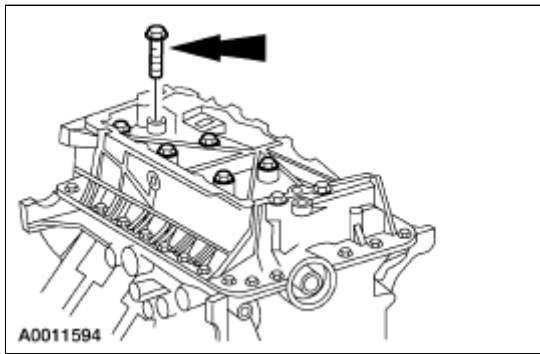
53. Tighten the inserts.



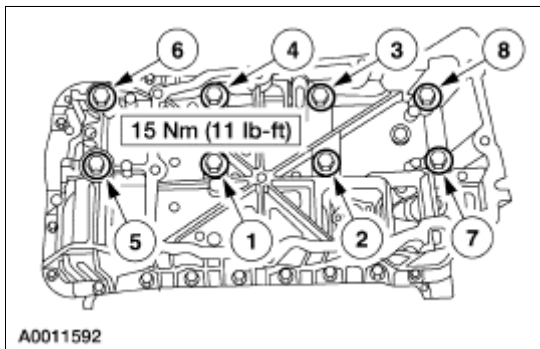
54. Install new seals on the two silver bolts and position them in the ladder frame.



55. Position the six remaining bolts.

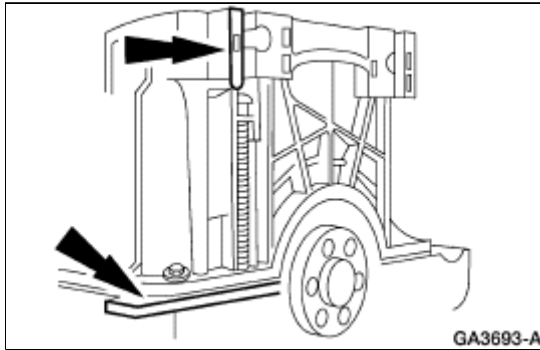


56. Tighten the ladder frame bolts in two stages.
- Stage 1: Tighten to 15 Nm (11 lb-ft).
  - Stage 2: Tighten to 33 Nm (24 lb-ft).

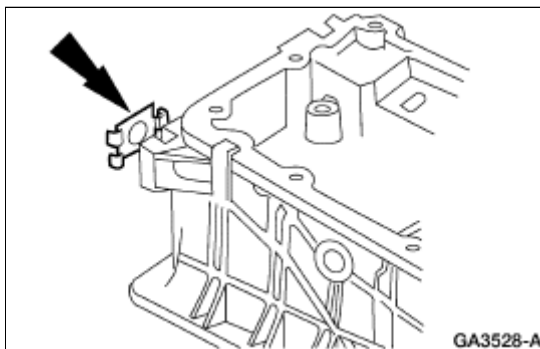


57. **NOTE:** Assemblies that measure out of specification must have the entire assembly procedure repeated.

Measure the step between the rear face of the cylinder block and the transmission face of the ladder frame.

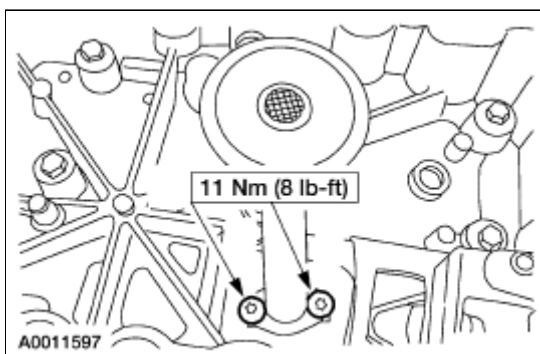


58. Repair all assemblies that exceed underflush specification by installing shims on one or both sides of the ladder frame.

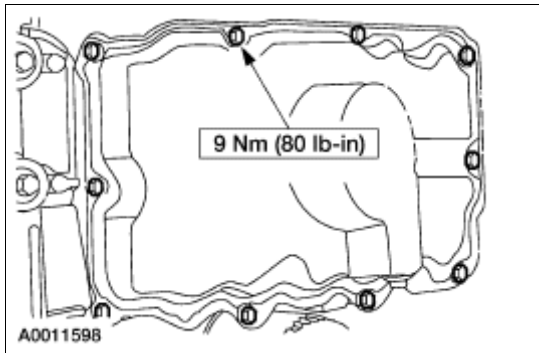


59. **NOTE:** Clean the gasket mating surfaces with metal surface cleaner.

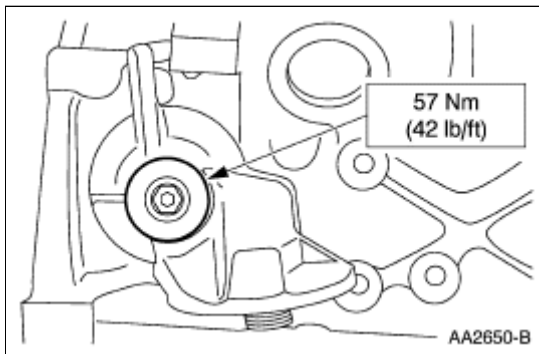
Install a new gasket and the oil pump screen and pickup tube.



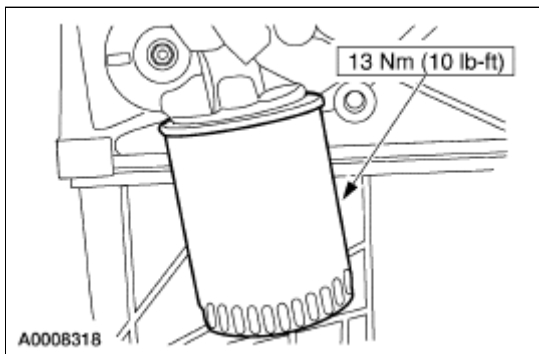
60. Install the gasket, and the oil pan.



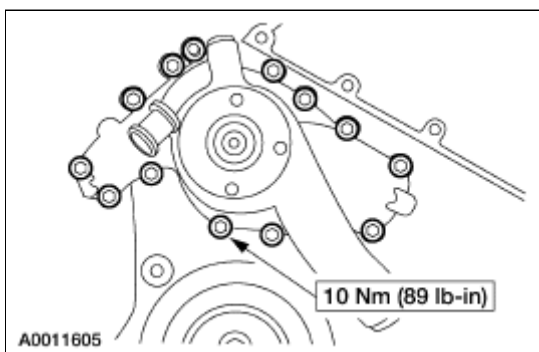
61. Install the oil filter adapter.



62. Install the oil filter.

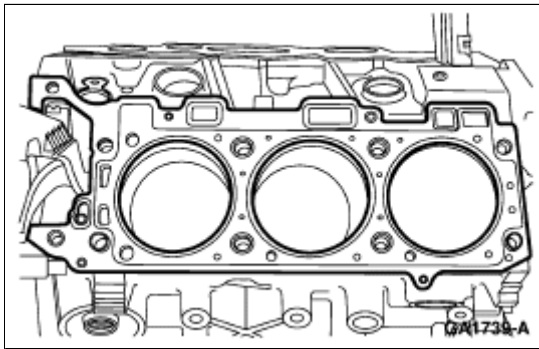


63. Install the water pump.



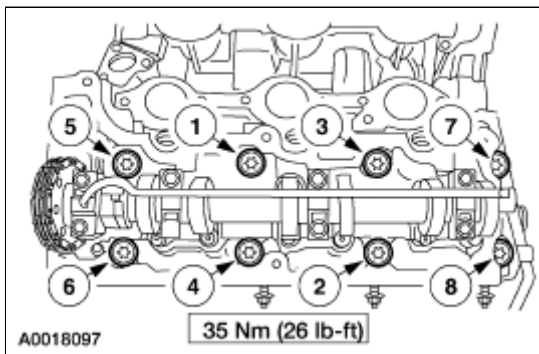
64. **NOTE:** LH shown, RH similar.

Install the cylinder head gasket.



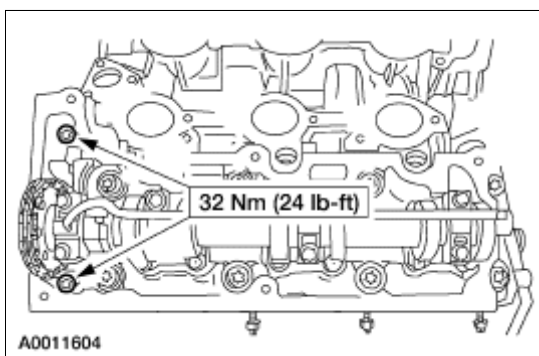
65. **NOTE:** LH shown, RH similar.

Install the cylinder head and tighten the bolts in the sequence shown.



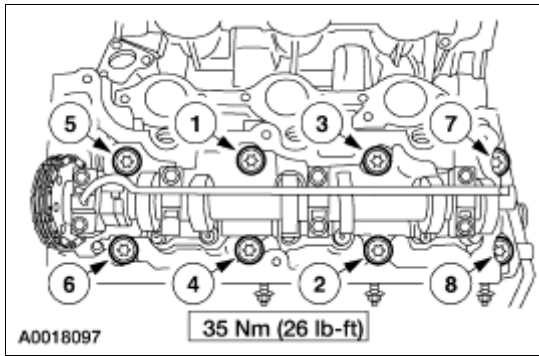
66. **NOTE:** LH shown, RH similar.

Install the two 8 mm bolts.



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

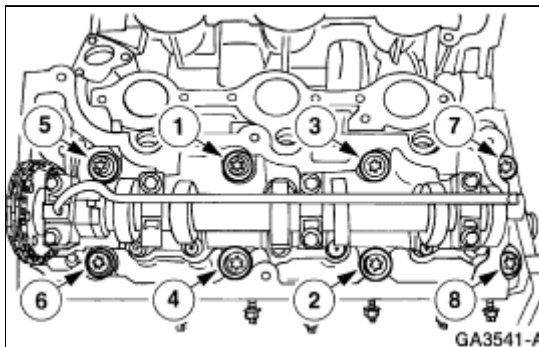
Tighten the 12mm bolts in the sequence shown.



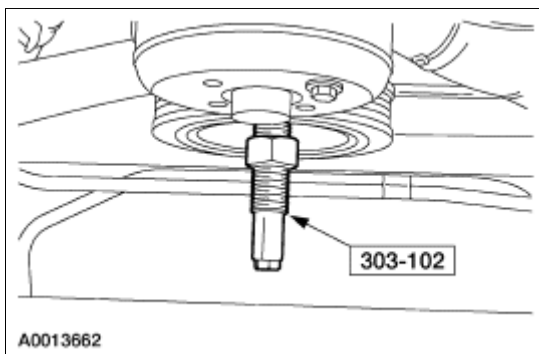
68. **NOTE:** LH shown, RH similar.

Tighten the bolts in the sequence shown in two stages.

- Stage 1: Rotate 90 degrees.
- Stage 2: Rotate an additional 90 degrees.



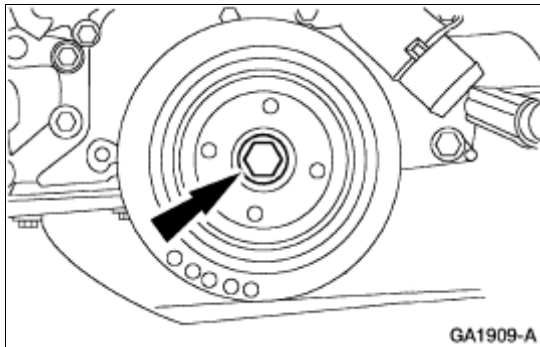
69. Using the special tool, install the crankshaft pulley.



70.  **CAUTION: A new bolt must be used each time it is removed.**

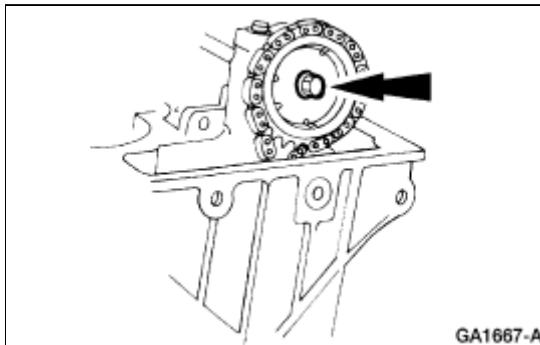
Tighten the bolt in two stages.

- Stage 1: Tighten to 45 Nm (33 lb-ft).
- Stage 2: Rotate an additional 90 degrees.

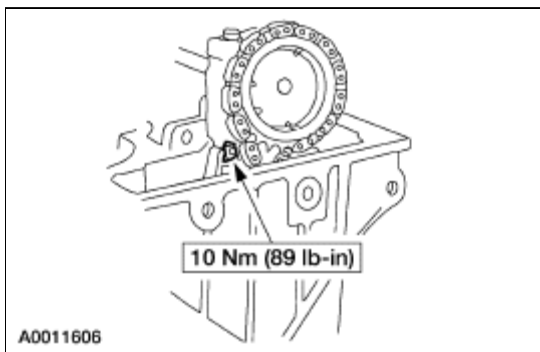



71.  **CAUTION:** The camshaft sprocket must turn freely on the camshaft. **DO NOT** tighten the bolt.

Install the RH rear camshaft bolt.

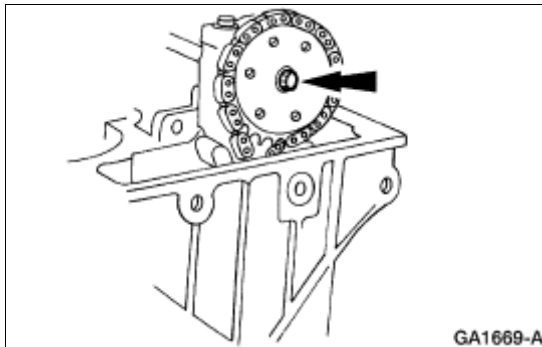


72. Install the bolt.

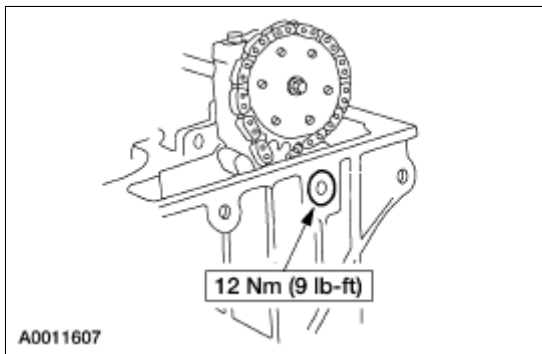


73.  **CAUTION:** The camshaft sprocket must turn freely on the camshaft. **DO NOT** tighten the bolt.

Install the LH front camshaft bolt.

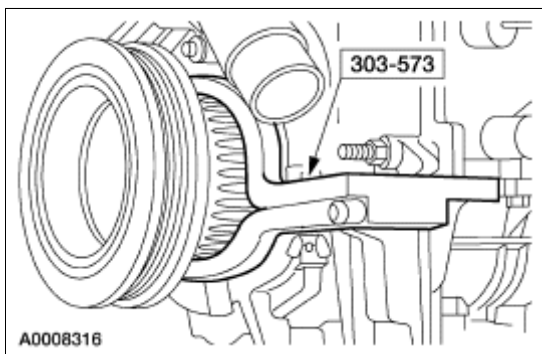


74. Install the bolt.



75. Turn the crankshaft one revolution clockwise.
76. **NOTE:** The special tool must be installed on the damper and should contact the engine block, this positions the engine at top dead center (TDC).

Install the special tool.

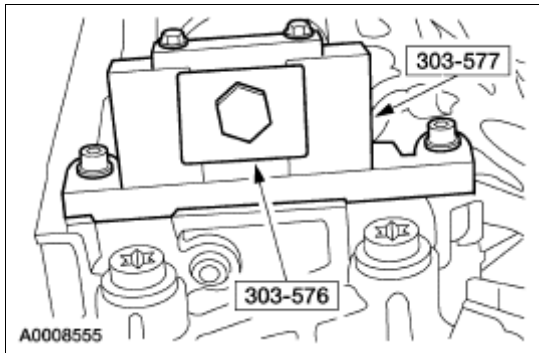


77. **NOTE:** Camshaft timing slots are off-center.

**NOTE:** Position the camshaft timing slots below centerline of camshaft to correctly fit the special tools.

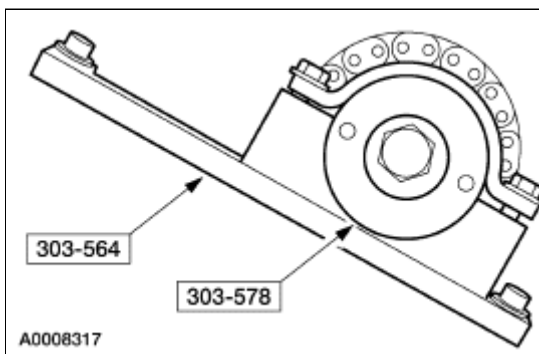
Install the special tools on the front of the RH cylinder head.



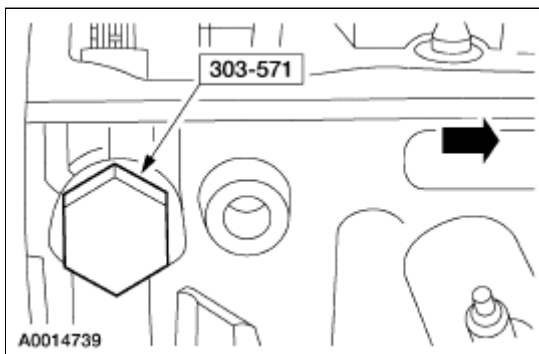


78. **NOTE:** Leave the top two special tool clamp bolts loose.

Install the special tools on the rear of the RH cylinder head.



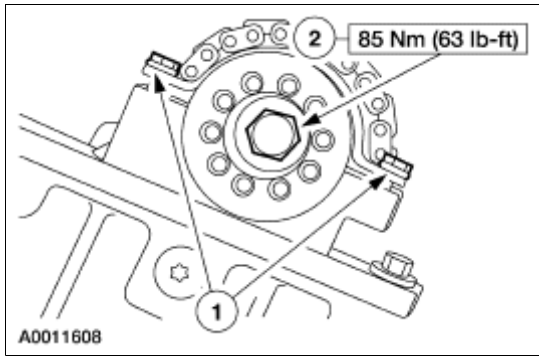
79. Install the special tool.



80.  **CAUTION:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.

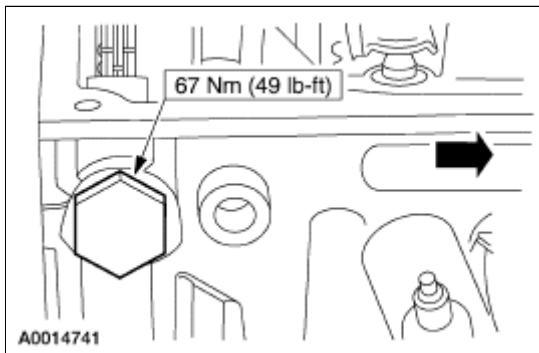
Tighten the bolts.

1. Tighten the special tool top two clamp bolts to 10 Nm (89 lb-in).
2. Tighten the camshaft bolt.



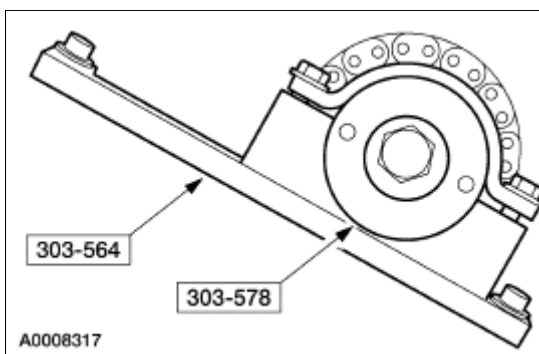
81. **NOTE:** When using a new washer the camshaft tensioner must be torqued to 44Nm (32lb-ft).

Remove the special tool and install the RH camshaft tensioner.



82. Remove the special tools from the RH cylinder head.
83. **NOTE:** Do not tighten the special tool top two clamp bolts. Camshaft sprocket must rotate freely.

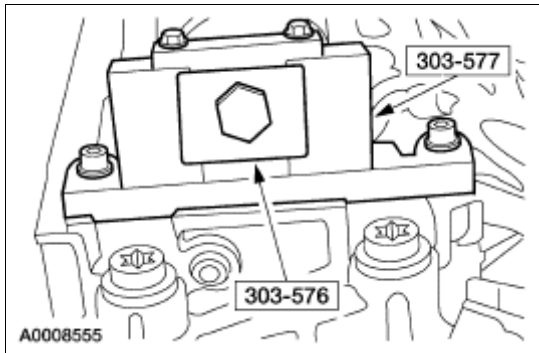
Install the special tools on the front of the LH cylinder head.



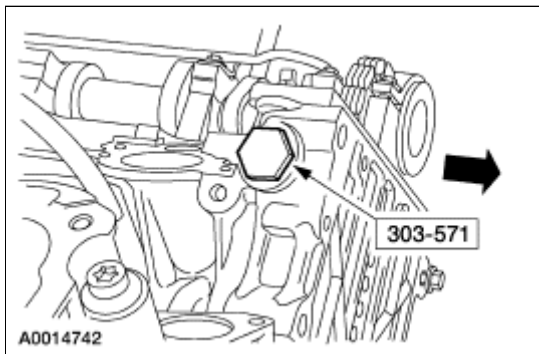
84. **NOTE:** Camshaft timing slots are off-center.

**NOTE:** Position the camshaft timing slots below centerline of camshaft to correctly fit the special tools.

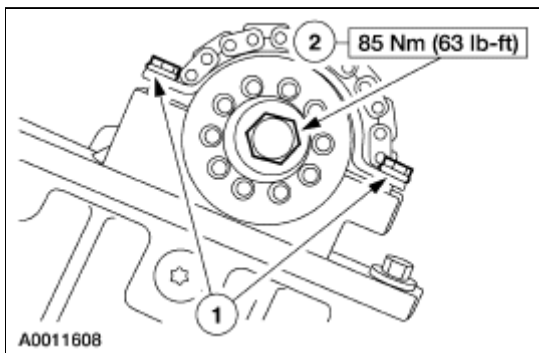
Install the special tools on the rear of the LH cylinder head.



85. Install the special tool.

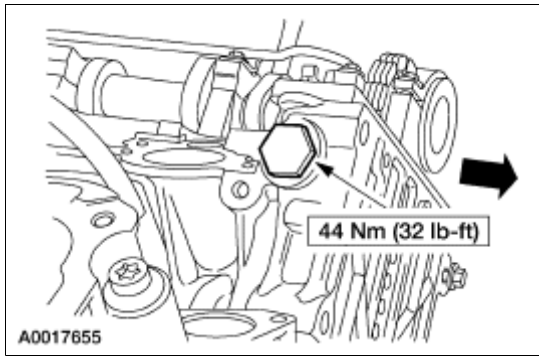


86. Tighten the bolts.
1. Tighten the special tool top two clamp bolts to 10 Nm (89 lb-in).
  2. Tighten the camshaft bolt.



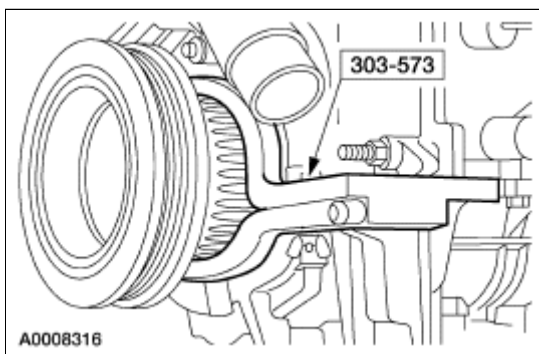
87. **NOTE:** When using a new washer the camshaft tensioner must be torqued to 44Nm (32lb-ft).

Remove the special tool and install the LH camshaft tensioner.



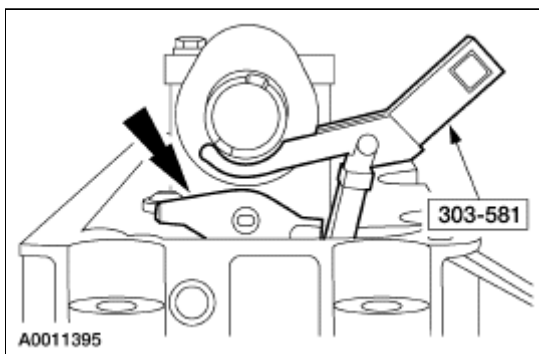
88. Remove the special tools from the LH cylinder head.

89. Remove the special tool.

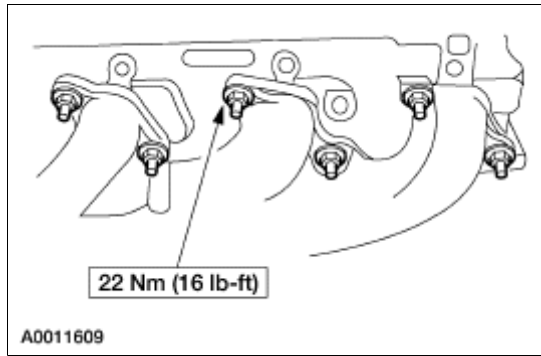


90. **NOTE:** Lubricate the parts with clean engine oil.

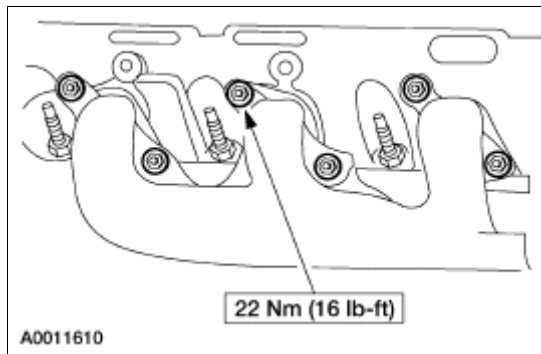
Using the special tool, install the roller followers in their original position.



91. Install the gasket and the LH exhaust manifold.

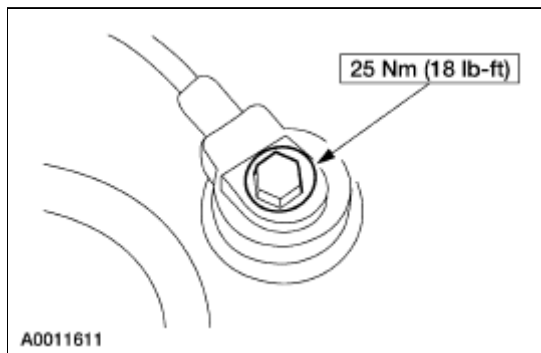


92. Install the gasket and the RH exhaust manifold.

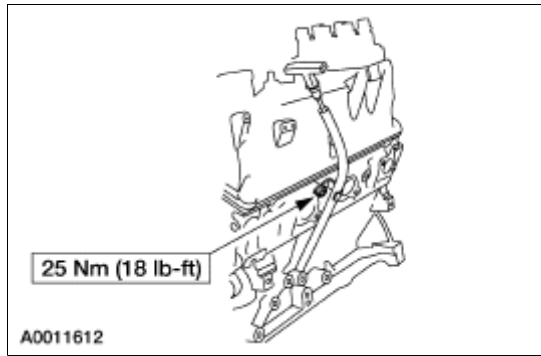


93. **NOTE:** Prior to installation, use Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A to clean mating surfaces.

Install the knock sensor.

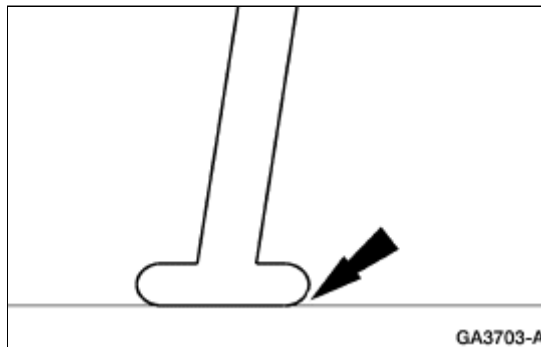


94. Install the oil level indicator tube.

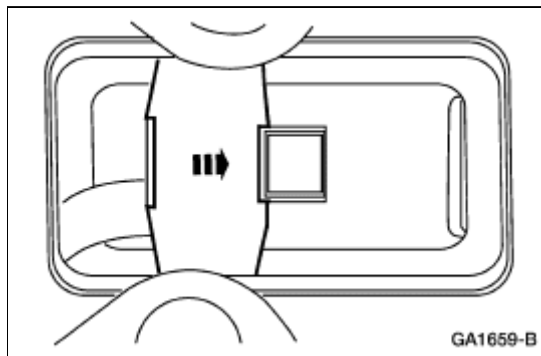


95. **NOTE:** If the oil level indicator tube is not installed flush with the cylinder block, false readings of the oil level may occur.

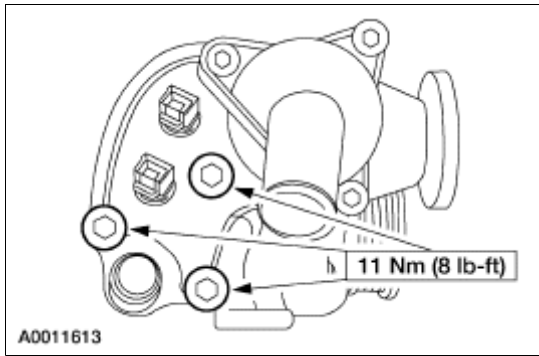
Make sure the oil level indicator tube is flush with the cylinder block.



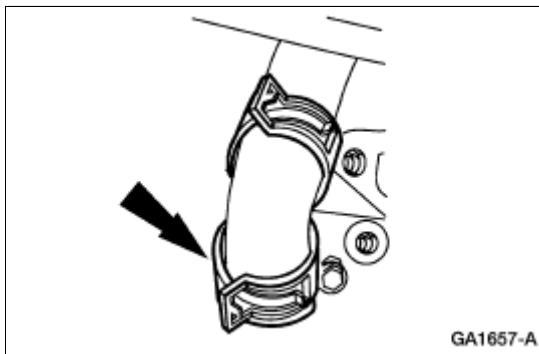
96. Install the crankcase vent separator.



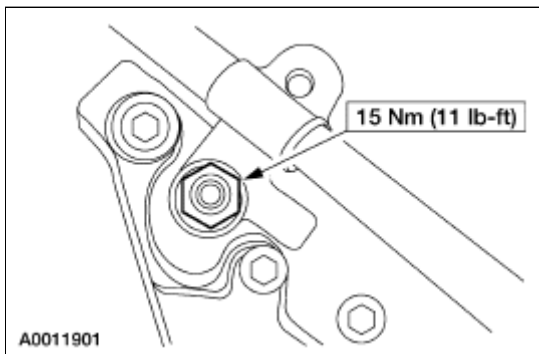
97. Install the thermostat housing.
- Inspect and install a new gasket if necessary.



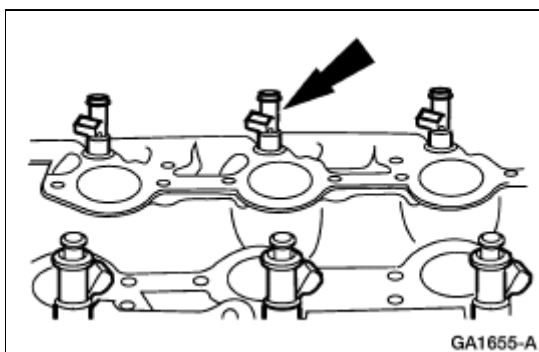
98. Connect the water bypass hose.



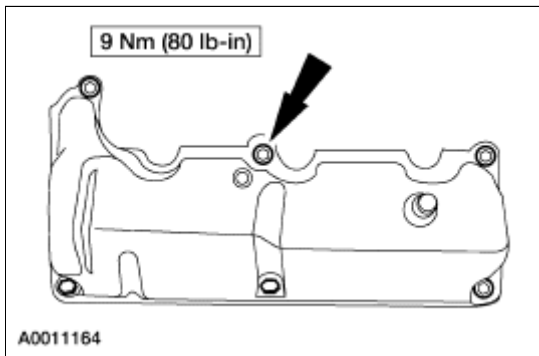
99. Install the vapor management valve (VMV) hose bracket.



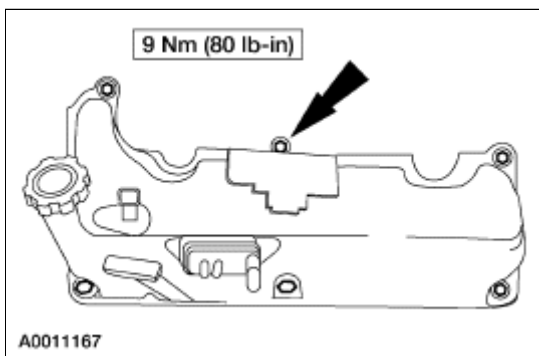
100. Install the fuel injectors.
- Lubricate the fuel injector O-ring seals with clean engine oil.



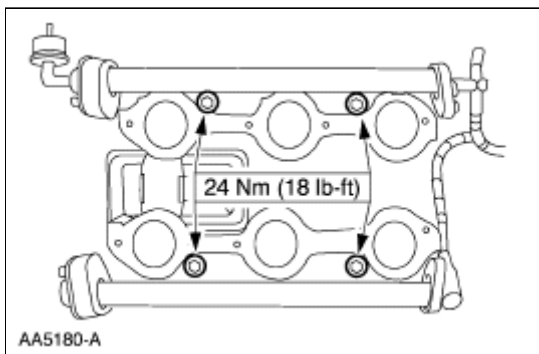
101. Install the gasket and the RH valve cover.



102. Install the gasket and the LH valve cover.

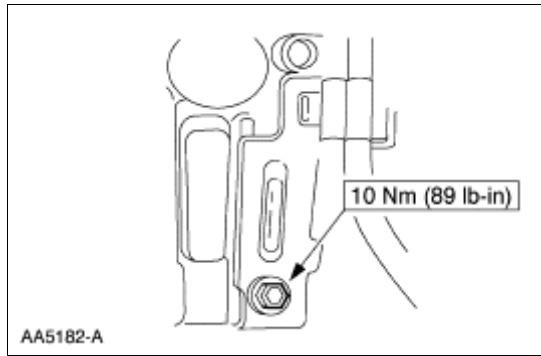


103. Install the fuel injection supply manifold.

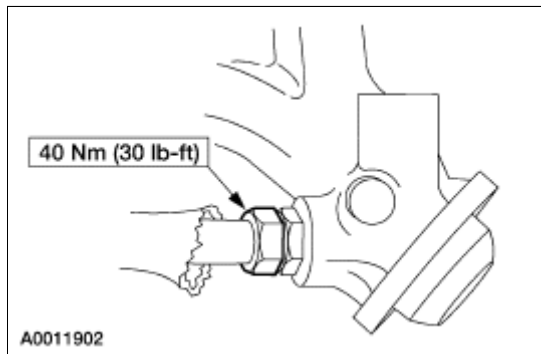


104. Install the lower fuel line bracket.

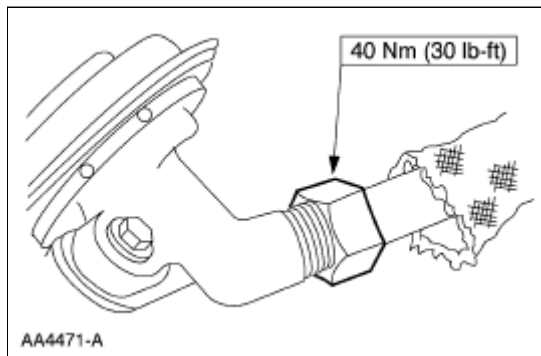




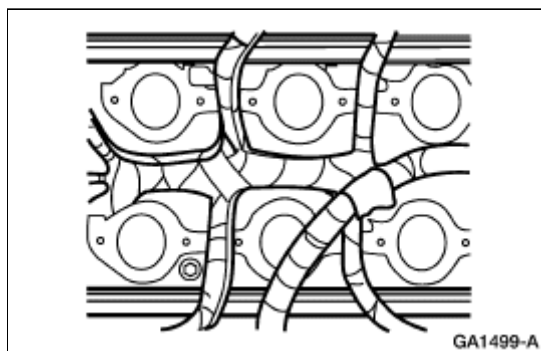
105. Connect the EGR valve to exhaust manifold tube to the exhaust manifold.



106. Connect the EGR valve to exhaust manifold tube to the EGR valve.

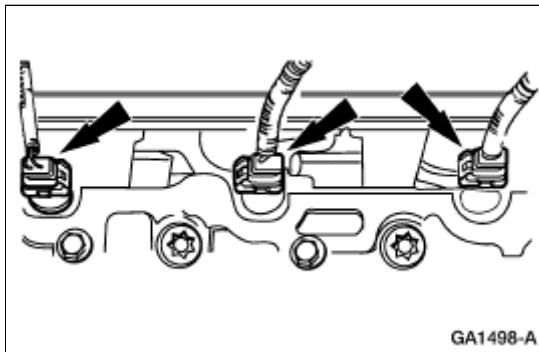


107. Install the fuel charging wiring.

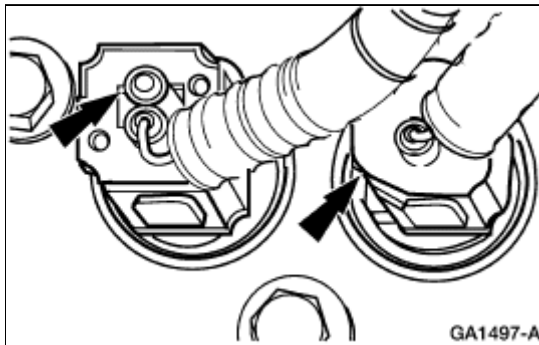


108. **NOTE:** LH shown, RH similar.

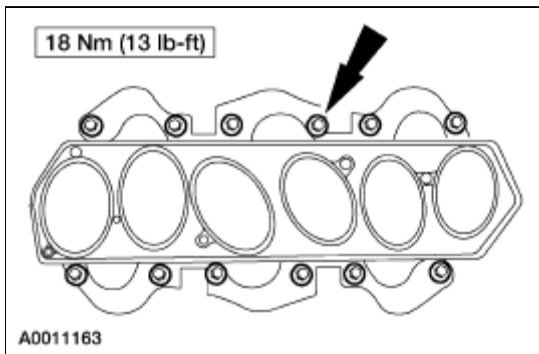
Connect the six fuel injector electrical connectors.



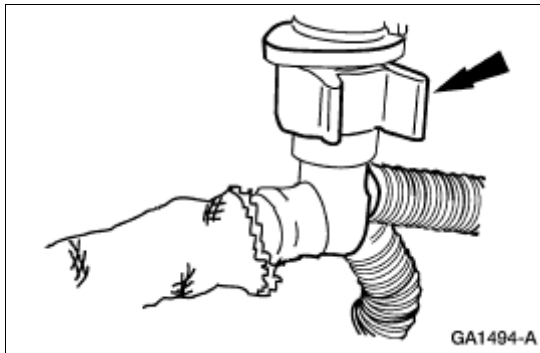
109. Connect the water temperature indicator sender unit and the engine coolant temperature (ECT) sensor electrical connectors.



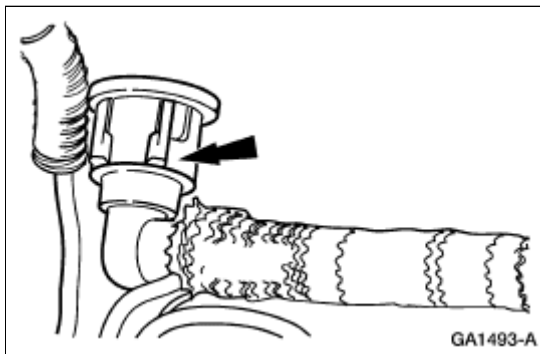
110. Install the lower intake manifold.



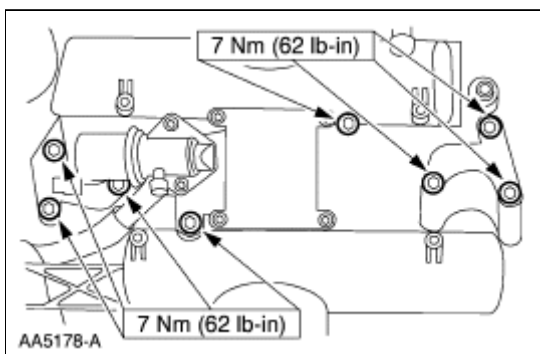
111. Connect the LH VMV hose.



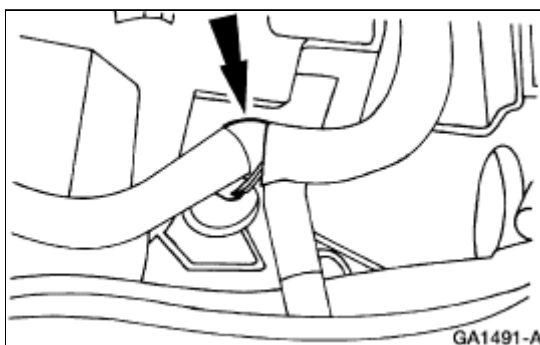
112. Connect the RH VMV hose.



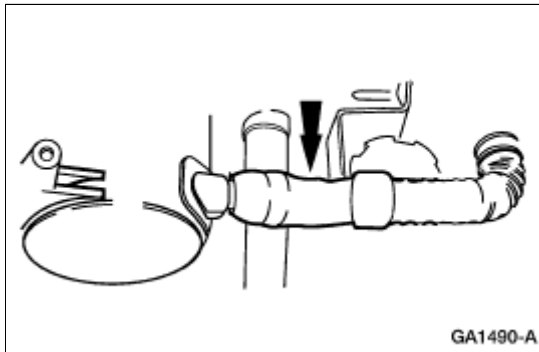
113. Install the upper intake manifold.
- Inspect and install a new gasket if necessary.



114. Connect the crankcase ventilation hose.



115. Connect the RH upper intake manifold vacuum hose.

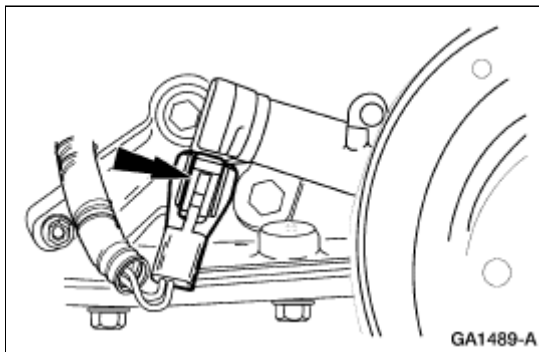


116.  **CAUTION:** Make sure to orient the spark plug boots so the spark plug wires do not contact the exhaust manifolds. Wire contact can send voltage spikes to other electronic modules.

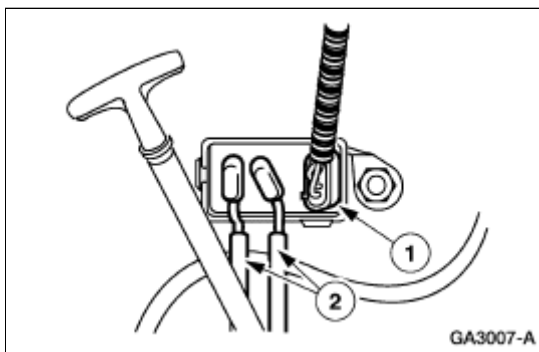
**NOTE:** Apply silicone brake caliper and dielectric compound to the inside of the spark plug boots.

Connect the spark plug wires to the spark plugs.

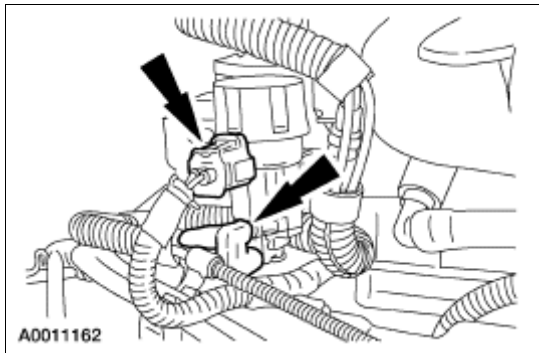
117. Connect the crankshaft position (CKP) sensor electrical connector.



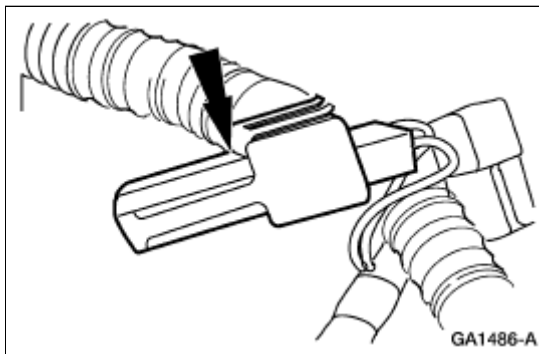
118. Connect the differential pressure feedback EGR transducer.
1. Connect electrical connector.
  2. Connect vacuum hoses.



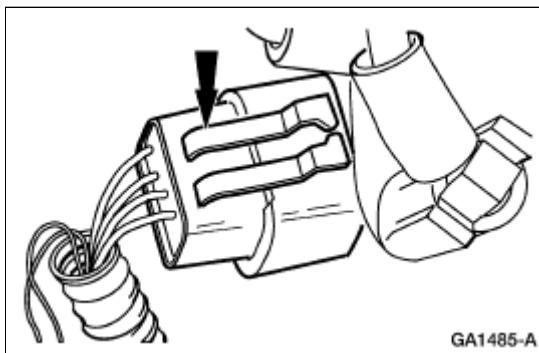
119. Connect the exhaust gas recirculation (EGR) vacuum regulator.



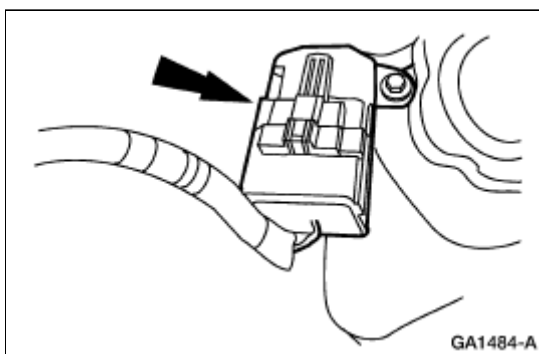
120. Connect the radio ignition interference capacitor electrical connector.



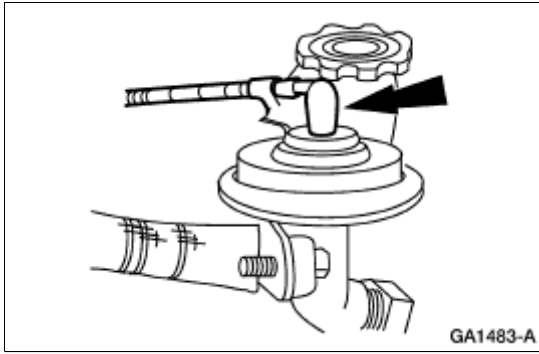
121. Connect the ignition coil electrical connector.



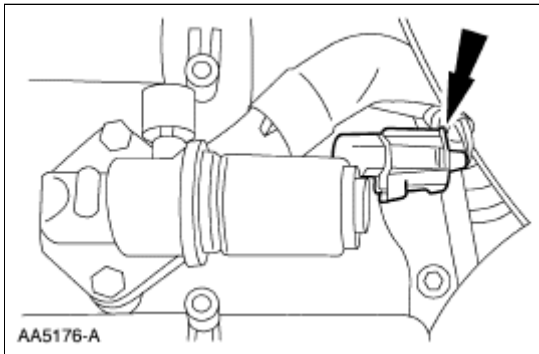
122. Connect the camshaft position (CMP) sensor electrical connector.



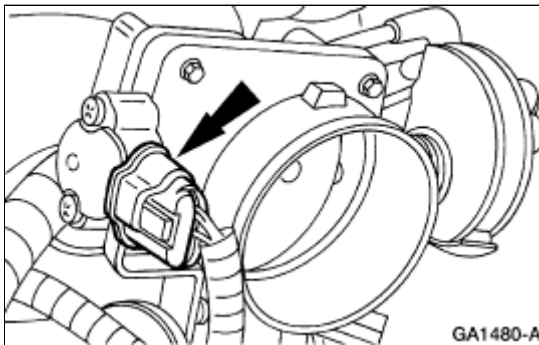
123. Connect the EGR valve vacuum hose.



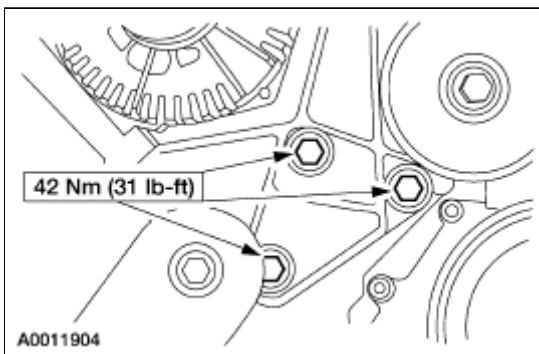
124. Connect the idle air control (IAC) valve electrical connector.



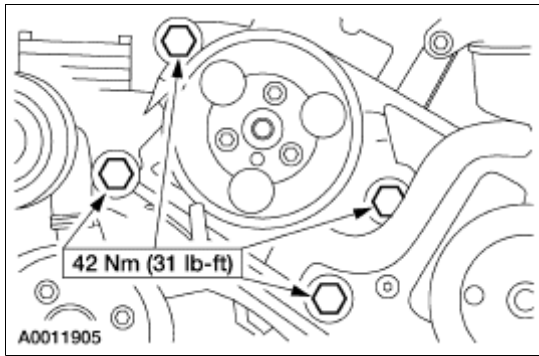
125. Connect the throttle position (TP) sensor electrical connector.



126. Install the generator mounting bracket.



127. Install the accessory bracket and tighten the bolts.



128. Rotate the drive belt tensioner counterclockwise and install the drive belt.
-



SECTION 303-01B: Engine — 4.0L SOHC  
INSTALLATION

2000 Explorer/Mountaineer Workshop Manual

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## Engine

### Special Tool(s)

 ST1831-A	Lifting Eyes 303-D030 (D81L-6001-D) or equivalent
 ST1602-A	Spreader Bar 303-D089 (D93P-6001-A3) or equivalent

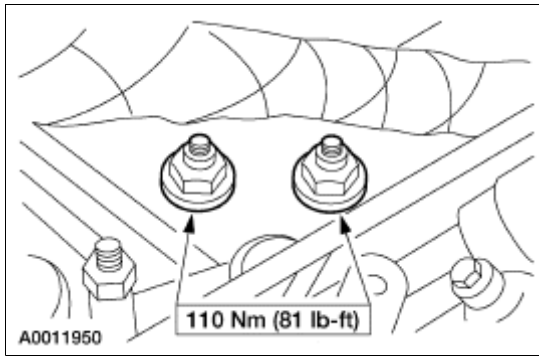
### Installation



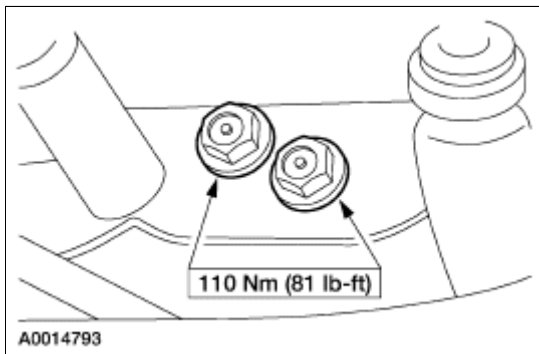
**CAUTION:** This vehicle is equipped with a composite material fuel supply manifold. If the supply manifold is used as a leverage device, damage may occur to the supply manifold. Care must be taken when working around the fuel supply manifold.

1. **NOTE:** The lifting eyes should be installed on the exhaust manifold studs for number three and number four cylinders.  
  
Install the lifting eyes.
2. Install the spreader bar on the lifting eyes.
3. Attach the floor crane to the spreader bar and remove the engine from the engine stand.
4. Install the rear crankshaft oil seal. For additional information, refer to [Crankshaft Rear Oil Seal](#) in this section.
5. Install the spacer plate.
6. Install the flywheel. For additional information, refer to [Flywheel](#) in this section.
7. Install the engine, remove the floor crane and the spreader bar.
8. Remove the lifting eyes.
9. Install the LH engine insulator nuts.

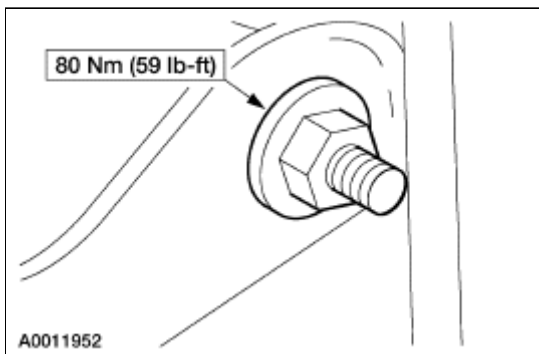




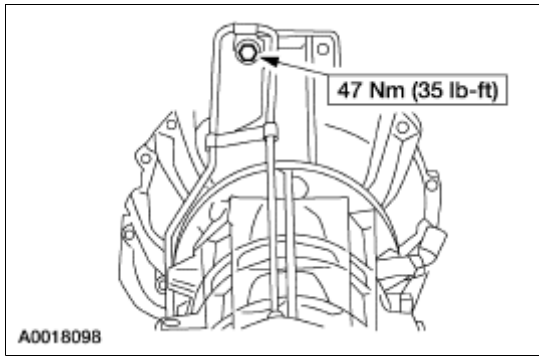
10. Install the RH engine insulator nuts.



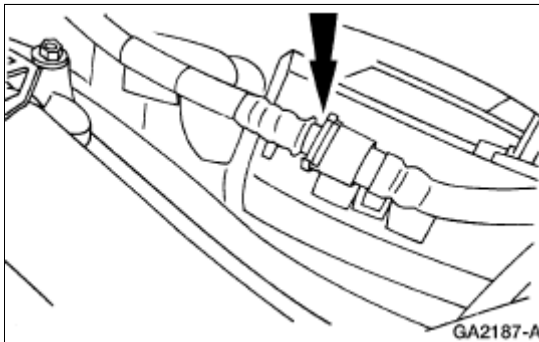
11. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
12. Install the LH and the RH engine support insulator nuts.



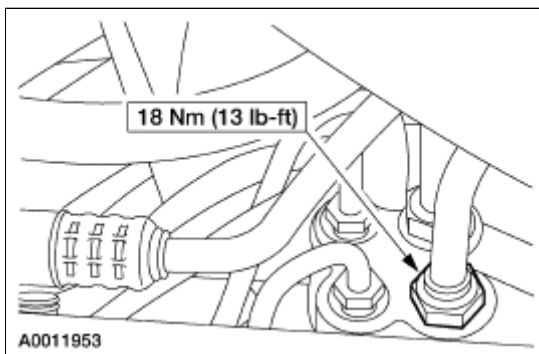
13. Install the eight bolts.



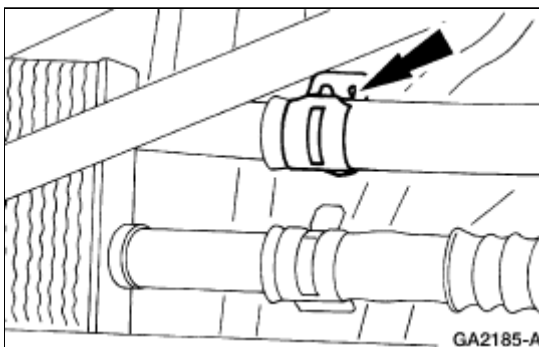
14. Connect the vapor management valve (VMV) hose connector.



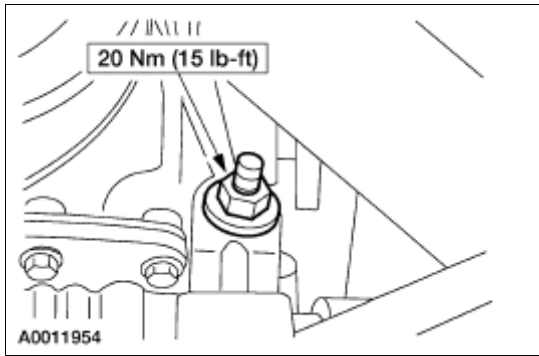
15. Connect the power steering pressure hose.



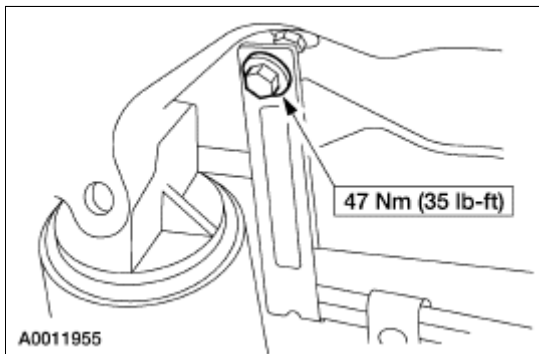
16. Connect the power steering return hose.



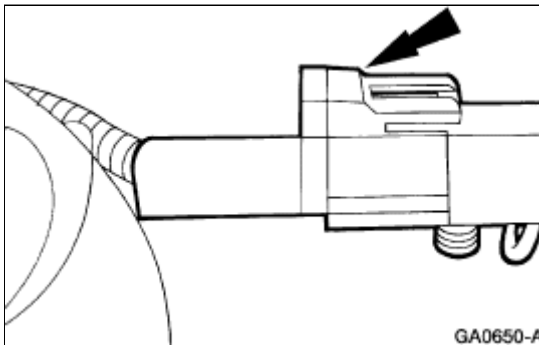
17. Position the A/C line bracket and install the nut.



18. Position the transmission cooling line bracket and install the bolt.



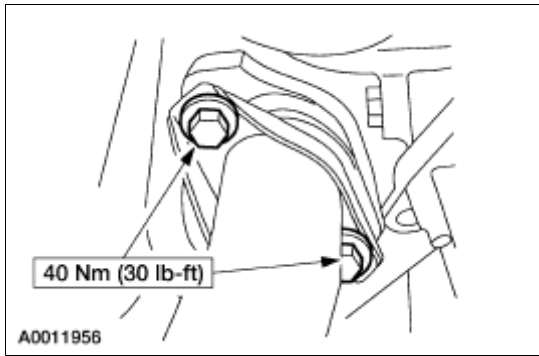
19. Connect the RH and LH heated oxygen sensor (HO2S) electrical connectors.



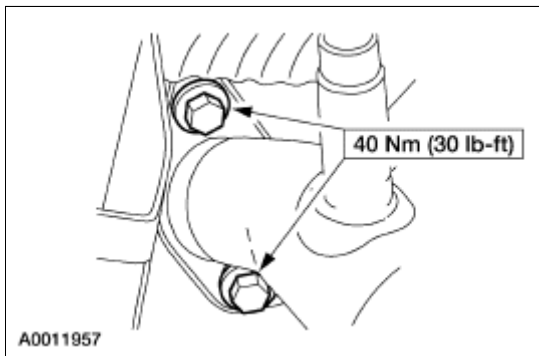
20. Connect the transmission harness electrical connector.



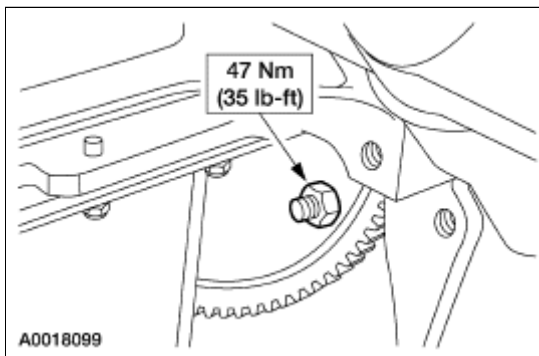
21. Install the bolts.



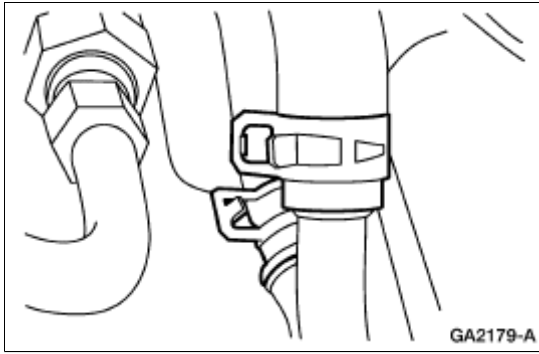
22. Install the bolts.



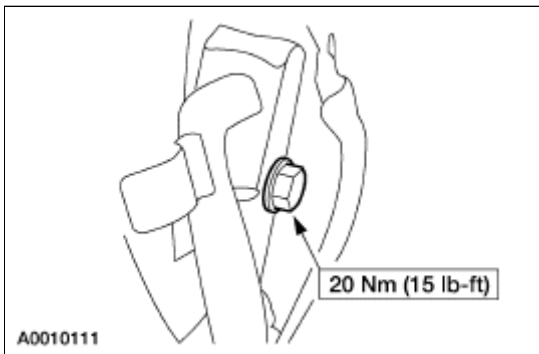
23. Install the four bolts.



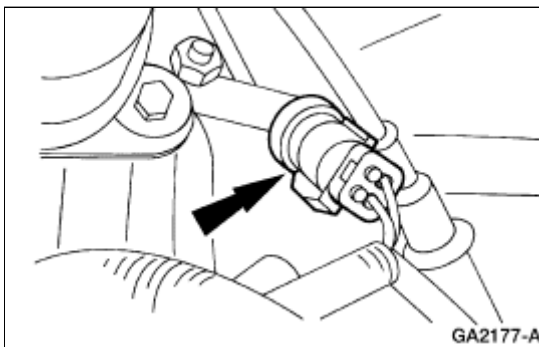
24. Install the starter. For additional information, refer to [Section 303-06](#).
25. Connect the fuel line. For additional information, refer to [Section 310-00](#).
26. Connect the two heater water hoses.



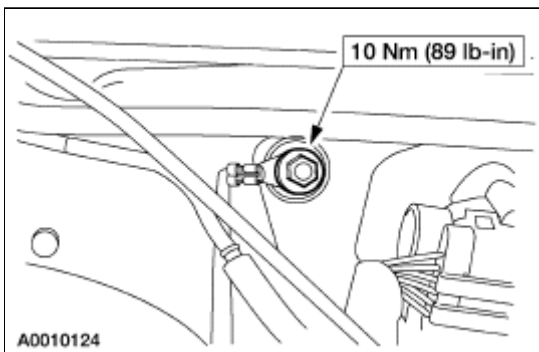
27. Position the A/C compressor manifold tube and install the bolt.



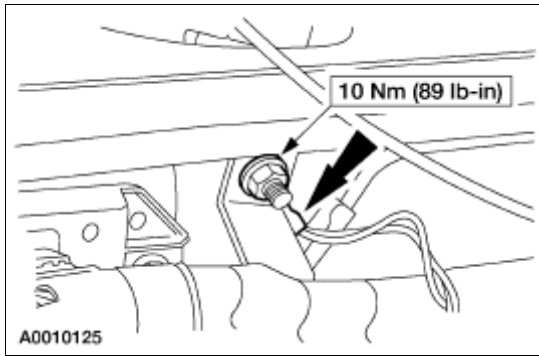
28. Connect the A/C high pressure switch electrical connector.



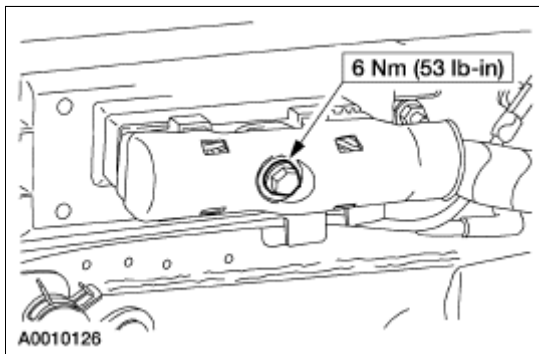
29. Connect the engine ground wire.



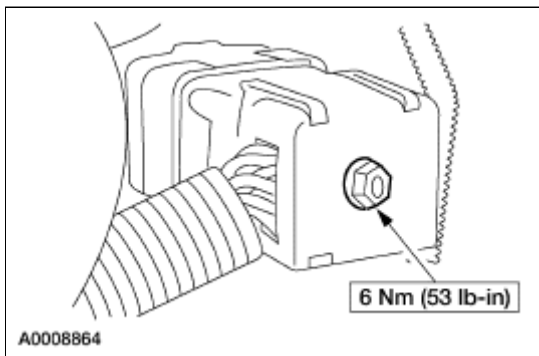
30. Connect the PCM electrical ground wire.



31. Connect the PCM electrical connector.



32. Connect the engine bulkhead electrical connector.



33. Install the radiator, the fan blade, and the fan shroud. For additional information, refer to [Section 303-03](#).
34. Install the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
35. Install the hood.
36. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
37. Fill the engine to the proper oil level with Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
38. Fill and bleed engine cooling system. For additional information, refer to [Section 303-03](#).

39. Recharge A/C system. For additional information, refer to [Section 412-00](#).
-

SECTION 303-01C: Engine — 5.0L  
SPECIFICATIONS

2000 Explorer/Mountaineer Workshop Manual

**General Specifications**

Item	Specification
<b>5.0L</b>	
Displacement liters (cubic inch)	5.0 (302)
Number of cylinders	8
Bore mm (inch)	101.6 (4.00)
Stroke mm (inch)	76.2 (3.00)
Firing order	1-3-7-2-6-5-4-8
Oil pressure at 2000 RPM Hot kPa (psi)	275-413 (40-60)
<b>Cylinder Head and Valve Train</b>	
Combustion chamber volume c.c.	58.3-61.3
Valve guide bore diameter mm (inch)	8.719-8.745 (0.343-0.344)
Valve arrangement front to rear	(RT)I-E-I-E-I-E-I-E (LT)E-I-E-I-E-I-E-I
Gasket surface flatness mm (inch)	0.076 (0.003) in 6 inches 0.152 (0.006) Overall
Gasket surface finish RMS	60-150
<b>Valve Seat</b>	
Width mm (inch)	1.524-2.032 (0.060-0.080)
Angle degrees	45°
Runout TIR maximum mm (inch)	0.050 (0.002)
<b>Valves</b>	
Valve stem diameter standard	
Intake	0.3415-0.3423
Exhaust	0.3410-0.3418
Valve stem diameter 0.015 oversize	
Intake	0.3565-0.3573
Exhaust	0.3561-0.3568
Valve stem diameter 0.030 oversize	
Intake	0.3715-0.3723
Exhaust	0.3711-0.3718
Valve stem to guide clearance intake mm (inch)	0.026-0.069 (0.0010-0.0027)
Valve stem to guide clearance exhaust mm (inch)	0.038-0.081 (0.0015-0.0032)
Service limit mm (inch)	0.14 (0.0055)
Head diameter intake mm (inch)	46.66-46.913 (1.837-1.847)
Head diameter exhaust mm (inch)	39.014-39.268 (1.536-1.546)



Valve face angle degrees	44°
Valve face runout limit mm (inch)	0.0510 (0.002)
<b>Valve Rocker Arm Shaft, Push Rods and Tappets</b>	
Maximum valve rocker arm lift ratio to 1 mm (inch)	1.59 (.062)
Push rod runout TIR maximum mm (inch)	0.15 (0.005)
Tappet diameter mm (inch)	22.2-22.212 (0.8740-0.8745)
Tappet to bore clearance mm (inch)	0.018-0.069 (0.0007-0.0027)
Service limit mm (inch)	0.127 (0.005)
Hydraulic lifter leakdown rate for 1/16 in travel	10-50 seconds
Collapsed tappet gap allowable mm (inch)	1.803-4.343 (0.071-0.171)
Collapsed tappet gap desired mm (inch)	2.311-3.385 (0.091-0.151)
<b>Valve Springs</b>	
Intake valve spring compression pressure at specified height (lbs)	190-210 at 1.20 74-82 at 1.78
Exhaust valve spring compression pressure at specified height (lbs)	190-210 at 1.20 76-84 at 1.60
Intake valve spring free length mm (inch)	52.324 (2.06)
Exhaust valve spring free length mm (inch)	47.452 (1.88)
Intake valve spring assembled height mm (inch)	44.45-45.974 (1.75-1.81)
Exhaust valve spring assembled height mm (inch)	40.132-41.656 (1.58-1.64)
Valve spring out of square mm (inch)	1.98 (0.078)
<b>Camshaft</b>	
Intake lobe lift mm (inch)	6.698 (0.2637)
Exhaust lobe lift mm (inch)	7.115 (0.2801)
Maximum allowable lobe lift loss mm (inch)	0.127 (0.005)
End play mm (inch)	0.025-0.178 (0.001-0.007)
End play wear limit mm (inch)	0.229 (0.009)
Journal to bearing clearance mm (inch)	0.025-.076 (0.001-0.003)
Service limit mm (inch)	0.152 (0.006)
<b>Camshaft drive</b>	
No. 1 journal diameter mm (inch)	52.857 (2.0815)
No. 2 Journal diameter mm (inch)	52.489 (2.0665)
No. 3 journal diameter mm (inch)	52.108 (2.0515)
No. 4 journal diameter mm (inch)	51.727 (2.0365)
No. 5 journal diameter mm (inch)	51.346 (2.0215)
Maximum camshaft journal runout mm (inch)	0.127 (0.005)
No. 1 bearing inside diameter mm (inch)	52.912 (2.0835)
No. 2 bearing inside diameter mm (inch)	52.565 (2.0685)
No. 3 bearing inside diameter mm (inch)	52.159 (2.0535)

No. 4 bearing inside diameter mm (inch)	51.778 (2.0385)
No. 5 bearing inside diameter mm (inch)	51.397 (2.0235)
Front bearing location depth mm (inch)	0.127-0.508 (0.005-0.020)
<b>Cylinder Block</b>	
Cylinder bore diameter mm (inch)	101.6-101.63 (4.0000-4.0012)
Maximum cylinder out-of-round mm (inch)	0.38 (.0015)
Service limit mm (inch)	0.127 (0.005)
Maximum cylinder taper mm (inch)	0.254 (0.010)
Main bearing bore diameter mm (inch)	62.006-62.026 (2.4412-2.4420)
Crankshaft to rear face of block runout. TIR maximum mm (inch)	0.127 (0.005)
Distributor shaft bearing bore diameter mm (inch)	11.492-11.534 (0.4525-0.4541)
Head gasket surface flatness mm (inch)	0.076 (0.003) in 6 inches 0.152 (0.006) overall
Head gasket surface finish root mean square (RMS)	60-150
<b>Crankshaft and Flywheel</b>	
Main bearing journal diameter mm (inch)	57.105-57.125 (2.2482-2.2490)
Main bearing journal out-of-round mm (inch)	0.015 (0.0006)
Main bearing journal runout TIR maximum mm (inch)	0.051 (0.002)
Main bearing journal runout service limit mm (inch)	0.127 (0.005)
Main bearing thrust face runout TIR maximum mm (inch)	0.025 (0.001)
Main bearing journal taper maximum per inch mm (inch)	0.013 (0.0005)
Thrust bearing journal length mm (inch)	28.88-28.931 (1.137-1.139)
Main and rod bearing journal finish RMS maximum	12
Main bearing thrust face finish RMS maximum	25 Front, 20 Rear
Connecting rod journal diameter mm (inch)	53.919-53.939 (2.1228-2.1236)
Connecting rod journal maximum out-of-round mm (inch)	0.015 (0.0006)
Connecting rod journal taper per inch maximum mm (inch)	0.015 (0.0006)
Crankshaft free end play mm (inch)	0.102-0.203 (0.004-0.008)
Crankshaft free end play service limit mm (inch)	0.127 (0.005)
<b>Connecting Rod Bearings</b>	
Clearance to crankshaft desired mm (inch)	0.02-0.039 (0.0008-0.0015)
Clearance to crankshaft allowable mm (inch)	0.018-0.061 (0.0007-0.0024)
Bearing wall thickness (STD) mm (inch)	1.453-1.466 (0.0572-0.0577)
<b>Main Bearings</b>	
Clearance to crankshaft desired mm (inch)	0.02-0.038 (0.0008-0.0015)
Clearance to Crankshaft Allowable mm (inch)	0.027-0.065 (0.0008-0.003)
Bearing wall thickness (STD) mm (inch)	2.431-2.438 (0.0957-0.0960)
<b>Connecting Rod, Piston and Rings</b>	
Piston pin bore or bushing I.D. mm (inch)	23.106-23.145 (0.909-0.911)

Rod bearing bore I.D. mm (inch)	56.871-56.879 (2.2390-2.2393)
Rod bearing bore out-of-round mm (inch)	0.01 (0.0004)
Rod length center to center mm (inch)	129.248-129.324 (5.0885-5.0915)
Alignment (bore-to-bore max. Diff.) twist mm (inch)	0.381 (0.015)
Service limit mm (inch)	0.584 (0.023)
Alignment (bore-to-bore max. Diff.) bend mm (inch)	0.305 (0.012)
Side clearance (assembled to crank) mm (inch)	0.254-0.508 (0.010-0.020)
<b>Piston Pin</b>	
Length mm (inch)	76.45-77.22 (3.010-3.040)
Diameter mm (inch)	23.1673-23.1698 (0.9121-0.9122)
To piston pin bore clearance mm (inch)	0.01016-0.01778 (0.0004-0.0007)
To connecting rod bushing clearance mm (inch)	Interference Fit
<b>Piston</b>	
Diameter — coded red mm (inch)	101.5670-101.5822 (3.9987-3.9993)
Diameter — coded blue mm (inch)	101.5746-101.6127 (3.9999-4.0005)
Diameter — coded yellow mm (inch)	101.6279-101.6432 (4.0011-4.0017)
Bore clearance selective fit mm (inch)	0.03-0.051 (0.0012-0.0020)
Pin bore diameter mm (inch)	23.180-23.185 (0.9126-0.9128)
Top ring groove width mm (inch)	1.524-1.5494 (0.060-0.061)
Bottom ring groove width mm (inch)	1.524-1.5494 (0.060-0.061)
Oil ring groove width mm (inch)	4.0310-4.06538 (0.1587-0.1597)
<b>Piston Rings</b>	
Top compression ring width mm (inch)	1.46558-1.49098 (0.0577-0.0587)
Bottom compression ring width mm (inch)	1.46558-1.49098 (0.0577-0.0587)
Top compression side clearance mm (inch)	0.033-0.084 (0.0013-0.0033)
Bottom compression side clearance mm (inch)	0.033-0.084 (0.0013-0.0033)
Oil ring side clearance mm (inch)	Snug
Top compression ring gap mm (inch)	0.254-0.508 (0.010-0.020)
Bottom compression ring gap mm (inch)	0.457-0.711 (0.018-0.028)
Oil ring gap mm (inch)	0.254-1.016 (0.010-0.040)
<b>Lubrication System</b>	
Relief valve spring pressure lbs. At 44.2 mm (1.74 inch)	14.4-16.6 Nm (10.6-12.2 lb/ft)
Driveshaft to housing clearance mm (inch)	0.038-0.076 (0.0015-0.0030)

Relief valve to housing clearance mm (inch)	0.038-0.076 (0.0015-0.0030)
Rotor assembly end clearance max. Mm (inch)	0.102 (0.004)
Outer race to end clearance mm (inch)	0.025-0.076 (0.001-0.003)
Engine oil capacity liters (quarts) <sup>a</sup>	4.7 (5)
<b>Lubricant</b>	
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP	WSS-M2C153-G
<b>Sealer</b>	
Devcon Aluminum Liquid F2	M3D354-A (E)
Silicone gasket and sealant F7AZ-19554-EA	WSE-M4G323-A4
Threadlock 262 E2FZ-19554-B	WSK-M2G351-A6
<b>Dye</b>	
Diesel engine oil dye 164-R3708	ESE-M99C103-B1
<b>Fluid Capacity</b>	
Premium Cooling System Fluid E2FZ-19549-AA or E2FZ-19549-B (in Oregon, F5FZ-19549-CC, in Canada CXC-10)	ESE-M97B44-A
<b>Cleaner</b>	
Metal surface cleaner F4AZ-19A536-RA	WSE-M5B392-A

<sup>a</sup> With filter change.

### Torque Specifications

Description	Nm	lb-ft	lb-in
A/C compressor bolts	21-28	16-21	—
Camshaft sprocket bolt	54-61	40-45	—
Camshaft thrust plate bolt	12.3-16.3	9-12	—
Connecting rod cap nuts	26-33	19-24	—
Cover plate screws	2.6-3.7	—	23-33
Crankshaft position (CKP) sensor bolts	8-12	—	71-106
Crankshaft main bearing cap bolts	82-93	61-68	—
Crankshaft vibration damper bolt	149-177	110-130	—
Cylinder head bolts <sup>a</sup>	a	a	a
Drive belt tensioner bolts	21-29	16-21	—
EGR spacer bolts	20	15	—
Engine front cover bolts	16-25	12-18	—
Engine mount nuts	148	109	—
Exhaust inlet pipe-to-exhaust manifold bolts	34-46	26-33	—
Exhaust manifold bolts	30	22	—
Exhaust manifold shield bolts	7	—	61

Flywheel bolts	102-115	75-85	—
Fuel injection supply manifold bolts	8-12	—	71-106
Generator bolts and nut	40-55	30-40	—
Idler pulley	40-55	30-40	—
Ignition coil bracket nuts	16-25	12-18	—
Lower intake manifold bolts <sup>a</sup>	a	a	a
Lower steering column shaft bolt	40-55	30-40	—
Oil cooler bolt	53	39	—
Oil bypass filter	12	9	—
Oil level indicator tube nut	25	18	—
Oil pan side bolts	15	11	—
Oil pan end bolts	20	15	—
Oil pressure sensor	16-25	12-18	—
Oil pump bolts	30-40	23-31	—
Oil pump screen cover and tube bolts	16-25	12-18	—
Oil pump screen cover and tube nut	30-43	23-31	—
Power steering pump bolts	21-29	16-21	—
Power steering reservoir bolts	8-12	—	67-106
Accelerator control snow shield bolts	8-12	—	67-106
Upper intake manifold bolts <sup>a</sup>	a	a	a
Valve cover bolts	16-21	12-15	—
Rocker arm bolts	24-34	18-25	—
Valve tappet guide plate retainer bolts	8-12	—	71-106
Water pump bolts	21-28	15-21	—
Wire harness nut	16-25	12-18	—
Water pump pulley bolts	16-25	12-18	—
Water heater tube nut fitting	16-25	12-18	—
Spark plug wire bracket nut	8-12	6-9	—
PCM connector bolt	5-7	—	45-61
PCM harness bracket bolt	10	—	89
Transmission bulkhead connector bolt	2-3	—	18-26
Engine bulkhead connector bolt	5-7	—	45-62
EGR valve to exhaust manifold tube nut	34-46	25-34	—
Accelerator bracket bolt	20	15	—
Accelerator bracket nuts	9	—	80
Generator bracket bolts <sup>a</sup>	a	a	a
Generator bracket bolt <sup>a</sup>	a	a	a
Transmission oil fill tube	25-34	18-25	—

A/C and power steering pump bolts	65	48	—
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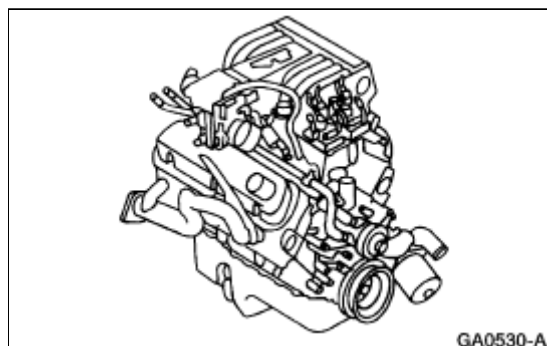
<sup>a</sup> Refer to text for tightening sequence.

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SECTION 303-01C: Engine — 5.0L  
DESCRIPTION AND OPERATION

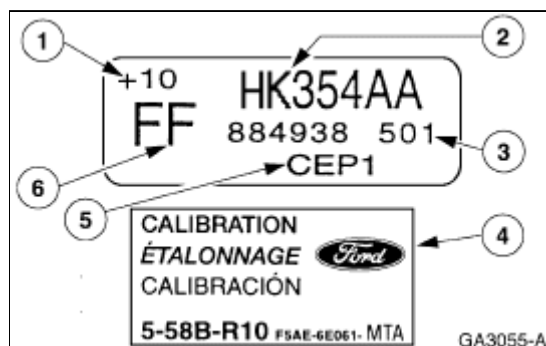
2000 Explorer/Mountaineer Workshop Manual

## Engine



The cylinder block is made of special high-grade cast iron, with thin-wall construction. The crankshaft (6303) has five crankshaft main bearings (6333) and is precision-cast iron. Piston, pin and rings (6102) are aluminum alloy, tin plated. Valve rocker arms (6564) are individually bolt-mounted. The valve tappets (6500) are hydraulic-roller design. These engines are also equipped with aluminum intake manifold systems.

### Engine Identification



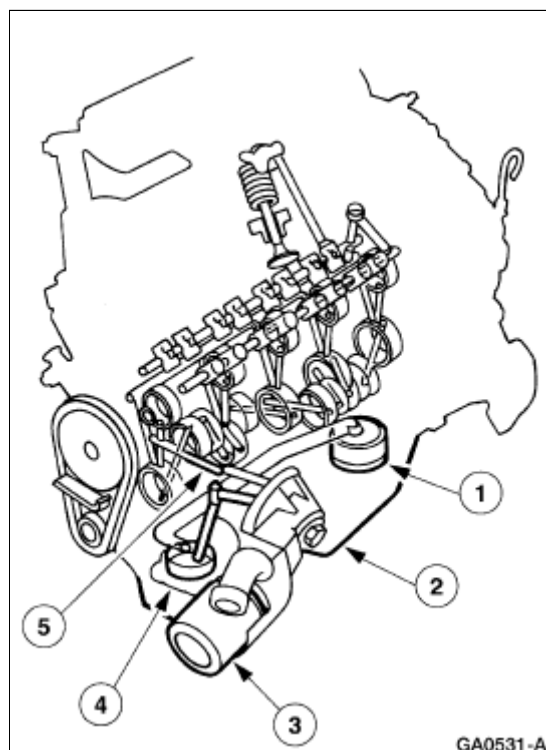
Item	Part Number	Description
1	—	Initial ignition timing
2	—	Engine code
3	—	Engine build date
4	—	Emission calibration label
5	—	Engine plant code
6	—	Shipping information

The engine code information label, located on the RH valve cover (6582), contains the engine build date, engine plant code, and engine code.

The emission calibration number label is located on the LH door or LH door post pillar. It identifies the engine calibration number, engine code number, and revision level.

It is critical that the engine codes and the calibration number be used when ordering parts or making inquiries about the engine.

## Engine Lubrication System



Item	Part Number	Description
1	6622	Oil pump screen cover and tube
2	6675	Oil pan
3	6714	Oil bypass filter
4	6600	Oil pump
5	—	Oil galley

The engine lubrication system is the force-feed type in which oil is supplied to these components:

- crankshaft
- connecting rod (6200)
- valve tappets
- camshaft bearings (6261)

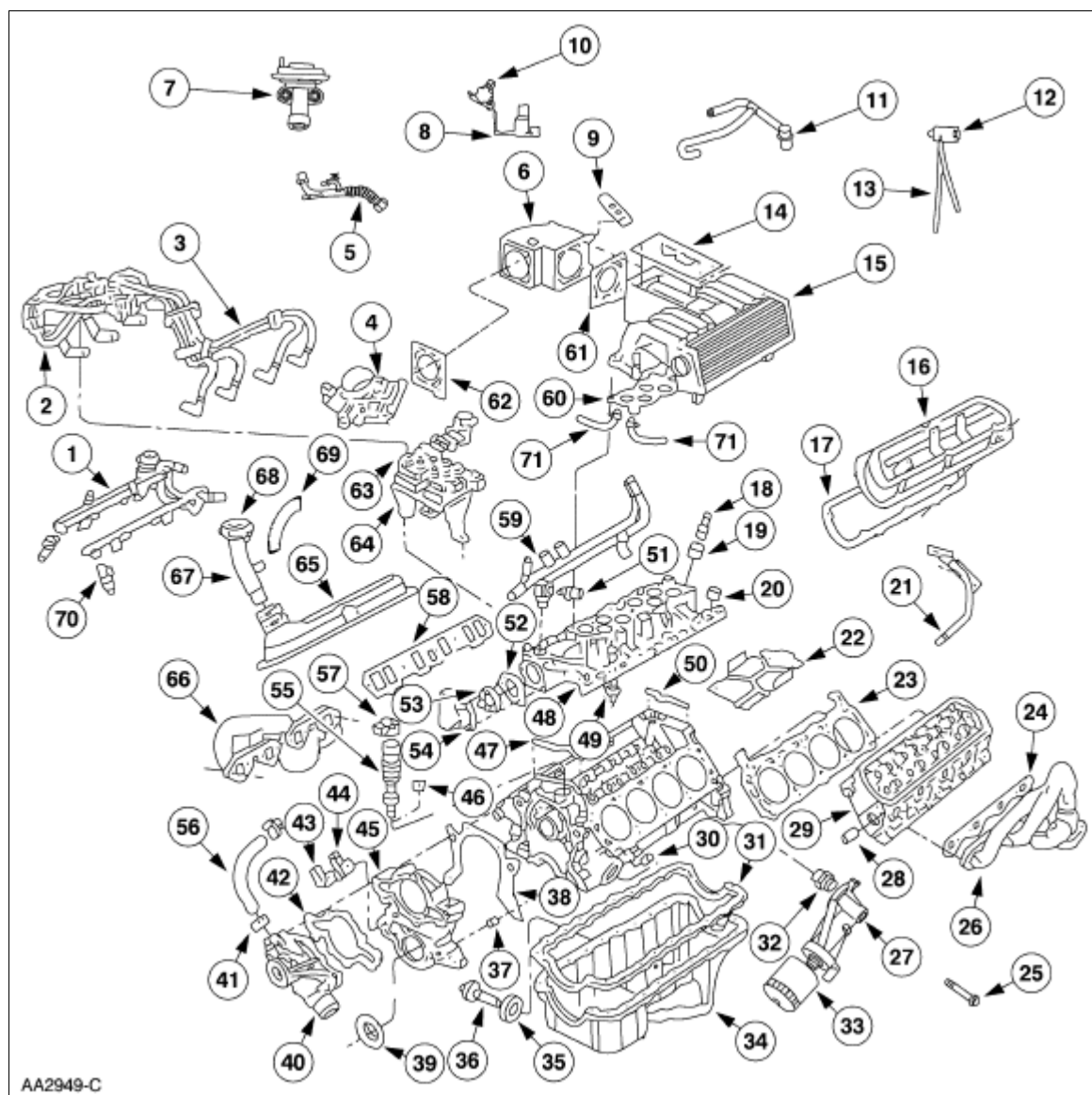
From the valve tappets, a controlled volume of oil is supplied to the rocker arms through hollow push rods (6565). All other moving parts are lubricated by gravity flow or splash.

The lubrication system consists of a full-pressure, cast-iron pump driven by the oil pump intermediate shaft from the camshaft synchronizer (12A362). The oil pressure is controlled by a relief valve.

The oil pan (6675) acts as a reservoir, holding the oil that is pumped through the engine by the oil pump (6600) after start-up.

## External Components





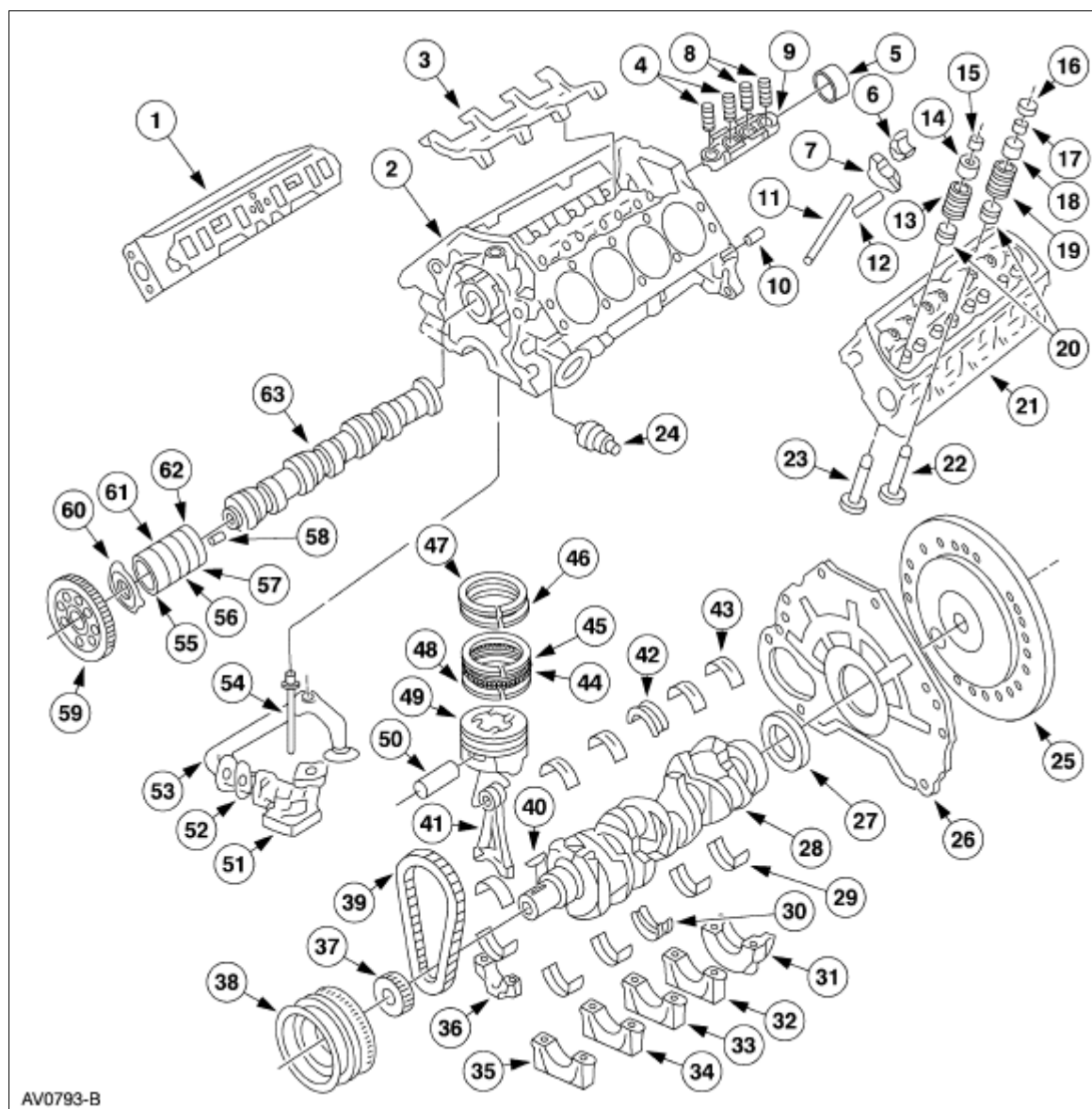
AA2949-C

Item	Part Number	Description
1	9F792	Fuel injection supply manifold
2	12280	Ignition wire and bracket (RH)
3	12281	Spark plug wire set (LH)
4	9E926	Throttle body
5	9D477	EGR valve to exhaust manifold tube
6	9E945	Throttle body spacer
7	9D475	EGR valve (late model)
8	9S430	EVR bracket
9	9D476	EGR valve gasket
10	9J459	EGR vacuum regulator
11	6758	PCV hose
12	9J433	EGR backpressure transducer

13	—	EGR backpressure transducer hoses
14	9E434	Intake manifold cover
15	9424	Intake manifold (upper)
16	6582 (6A505)	Valve cover (LH)
17	6584	Valve cover gasket
18	6A666	Positive crankcase ventilation valve
19	6K780	Crankcase ventilation grommet
20	87617	Port plug
21	6754	Oil level indicator tube
22	6L678	Intake manifold baffle
23	6051	Head gasket
24	9448	Exhaust manifold gasket
25	6895	Oil filter adapter bolt
26	9431	Exhaust manifold (LH)
27	6881	Adapter
28	351418	Cylinder head fitting
29	6049	Cylinder head
30	6A008	Cylinder head to block dowel
31	6710	Oil pan gasket
32	6890	Oil filter mounting insert
33	6714	Oil bypass filter
34	6675	Oil pan
35	—	Low oil level sensor washer
36	6C644	Low oil level sensor
37	—	Engine front cover dowels
38	6020	Engine front cover gasket
39	6700	Crankshaft front seal
40	8501	Water pump
41	—	Hose clamp
42	8507	Water pump housing gasket
43	6023	Timing pointer
44	6C315	Crankshaft position sensor
45	6059	Engine front cover
46	12270	Hold-down clamp
47	9A425	Intake manifold end gasket
48	9K461	Intake manifold (lower)
49	10884	Water temperature indicator sender unit
50	9A424	Intake manifold end seal
51	12A648	Engine coolant temperature sensor

52	8255	Water thermostat gasket
53	8575	Water thermostat
54	8592	Water hose connection
55	12A362	Camshaft synchronizer
56	8597	Water bypass tube
57	12A112	Camshaft position sensor
58	9439	Intake manifold gasket
59	9D424	Intake manifold heater inlet tube
60	9H486	Intake manifold upper gasket
61	9E933	EGR valve spacer gasket
62	9E933	Throttle body gasket
63	12029	Ignition coil
64	12A166	Ignition coil mounting bracket
65	6582	Valve cover (RH)
66	9430	Exhaust manifold (RH)
67	6763	Oil fill pipe
68	6766	Oil filler cap
69	6758	Closure hose
70	9F593	Fuel injector
71	18465	PCV heater hoses

**Internal Components**



Item	Part Number	Description
1	6049	Cylinder head
2	6010	Cylinder block
3	6C515	Valve tappet guide plate retainer
4	6500	Valve tappets
5	6266	Camshaft rear bearing cover
6	6A528	Rocker arm fulcrum
7	6564	Rocker arm
8	6500	Valve tappet
9	6K564	Tappet guide plate and retainer
10	6397	Bell housing location pin
11	6565	Push rod
12	6A588	Rocker arm fulcrum guide

13	6513	Valve spring
14	6A516	Valve spring rotator
15	6518	Valve spring retainer key
16	6518	Valve spring retainer key
17	6517	Valve spring retainer sleeve
18	6514	Valve spring retainer
19	6513	Valve spring
20	6A517	Valve stem seal
21	6049	Cylinder head
22	6507	Intake valve
23	6505	Exhaust valve
24	9278	Oil pressure sensor
25	6375	Flywheel
26	6A372	Engine rear plate
27	6701	Crankshaft rear oil seal
28	6303	Crankshaft
29	6A338	Crankshaft main bearing—lower (4 req'd)
30	6A339	Crankshaft thrust main bearing
31	6325	No. 5 main bearing cap
32	6327	No. 4 main bearing cap
33	6330	No. 3 main bearing cap
34	6334	No. 2 main bearing cap
35	6329	No. 1 main bearing cap
36	6210	Connecting rod cap
37	6306	Crankshaft sprocket
38	6316	Crankshaft damper assembly
39	6268	Timing chain/belt
40	388907	Crankshaft key
41	6200	Connecting rod
42	6337	Crankshaft thrust main bearing—upper
43	6333	Crankshaft main bearing—upper (4 req'd)
44	6161	Oil control spacer
45	6159	Oil control ring
46	6152	Compression ring
47	6150	Compression ring
48	6159	Oil control ring
49	6110	Piston
50	6135	Piston pin
51	6600	Oil pump

52	6625	Oil pump inlet tube gasket
53	6622	Oil pump screen cover and tube
54	6A618	Oil pump intermediate shaft
55	6261	No. 1 camshaft bearing
56	6262	No. 3 camshaft bearing
57	6270	No. 4 camshaft bearing
58	391269	Camshaft pin
59	6256	Camshaft sprocket
60	6269	Camshaft thrust plate
61	6267	No. 2 camshaft bearing
62	6263	No. 5 camshaft bearing
63	6250	Camshaft

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*SECTION 303-01C: Engine — 5.0L*  
*DIAGNOSIS AND TESTING*

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*2000 Explorer/Mountaineer Workshop Manual*

## **Engine**

For mechanical concerns; for additional information, refer to [Section 303-00](#).

For driveability concerns; for additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

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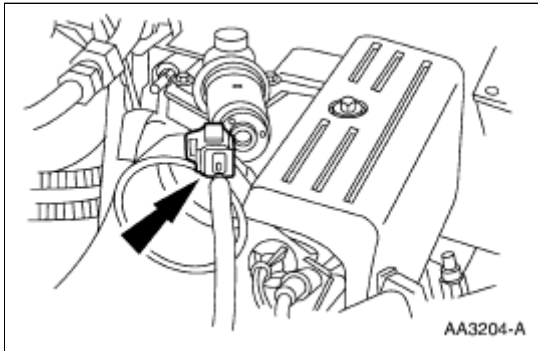
SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

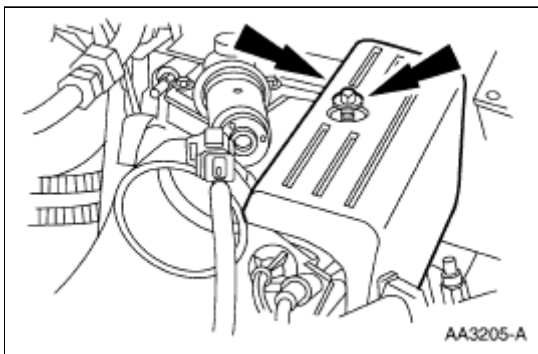
## Valve Cover —RH

### Removal

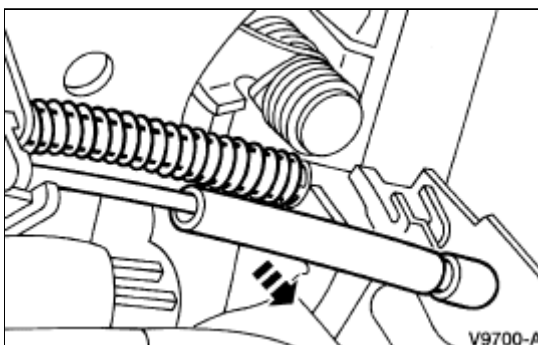
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
3. Disconnect the idle air control (IAC) valve electrical connector.



4. Remove the bolt and the accelerator control snow shield.

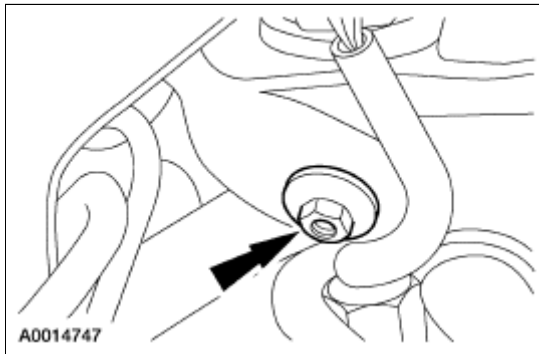


5. Disconnect the accelerator and speed control (if equipped) cables from the throttle linkage.

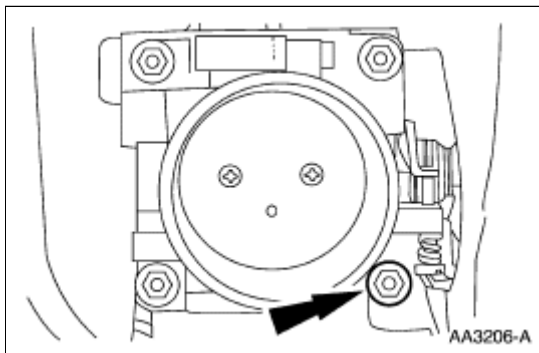




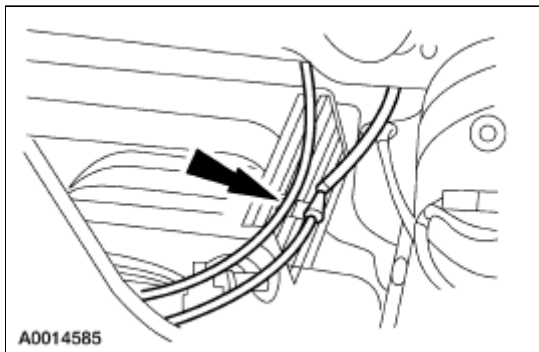
6. Remove the accelerator cable bracket nut.



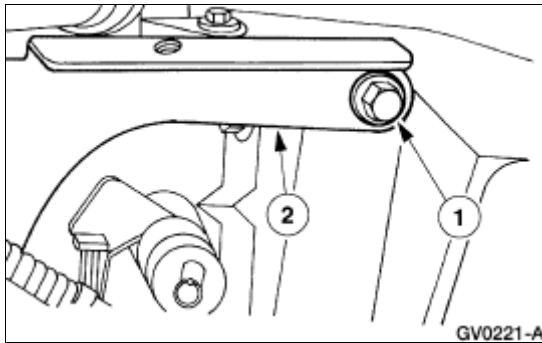
7. Remove the accelerator cable bracket lower nut.



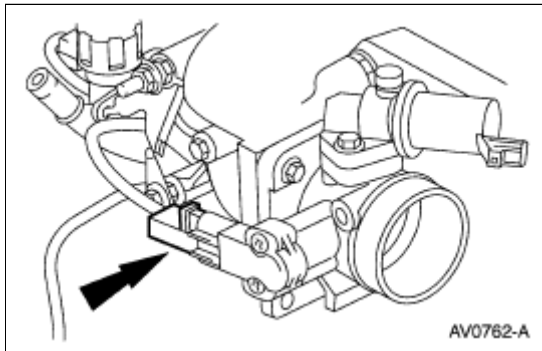
8. Remove the accelerator and speed control (if equipped) cables from the clip.



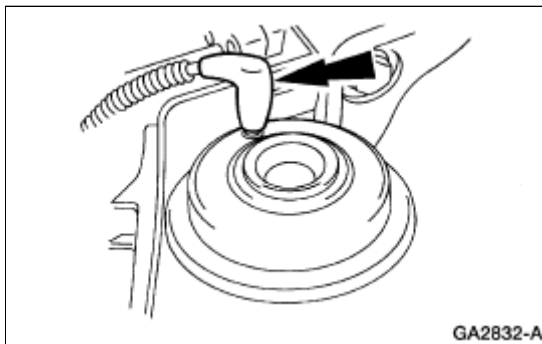
9. Remove the accelerator cable bracket.
  1. Remove the nut.
  2. Remove the accelerator cable bracket.



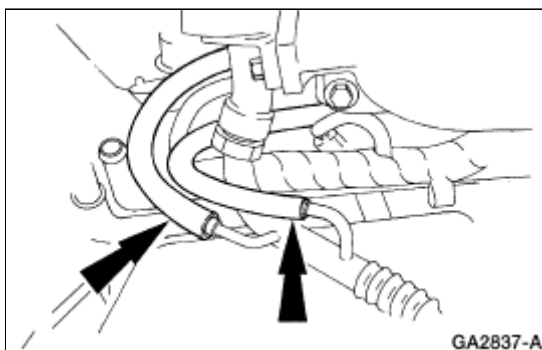
10. Disconnect the throttle position (TP) sensor electrical connector.



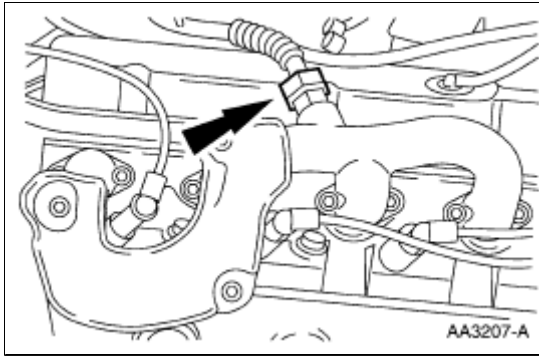
11. Remove the EGR vacuum connector.



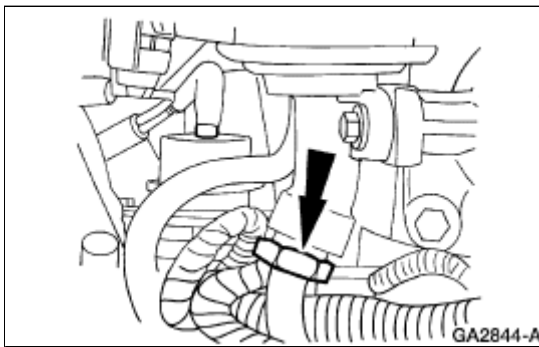
12. Disconnect the two pressure transducer hoses.



13. Disconnect the lower EGR valve-to-exhaust manifold tube fitting.

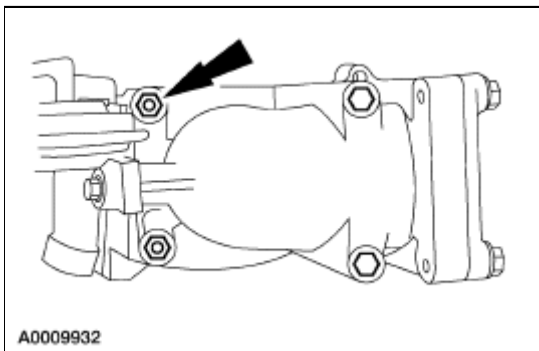


14. Disconnect the upper EGR valve-to-exhaust manifold tube fitting and remove the EGR valve to exhaust manifold tube.

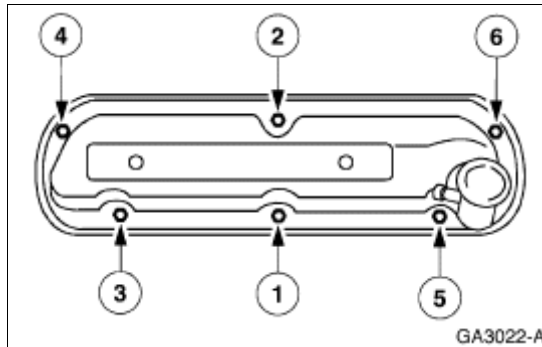


15. **NOTE:** Rear EGR spacer studs must be removed prior to EGR spacer removal. Use two nuts tightened against one another to remove the studs.

Remove the EGR spacer bolts, nuts and the EGR spacer.



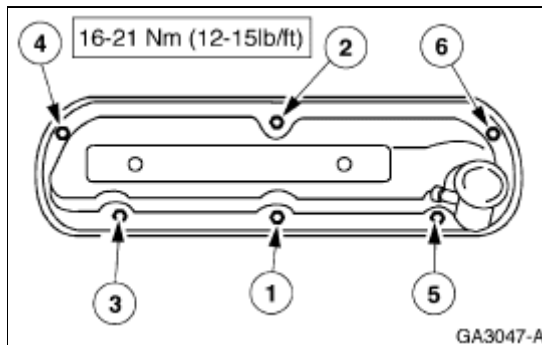
16. Disconnect the RH number 4 spark plug wire.
17. Remove the bolts and the RH valve cover.



### Installation

1. **NOTE:** Make sure stamping and chamfered edges of the steel carrier in the new RH valve cover gasket are facing up.

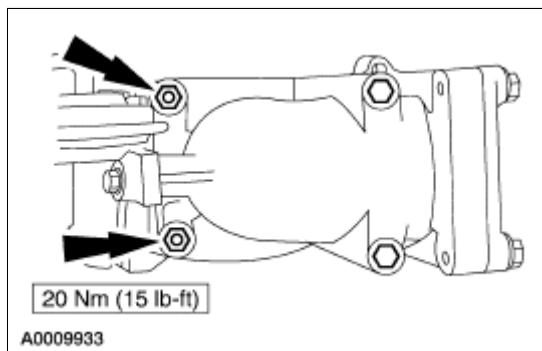
Install RH valve cover.



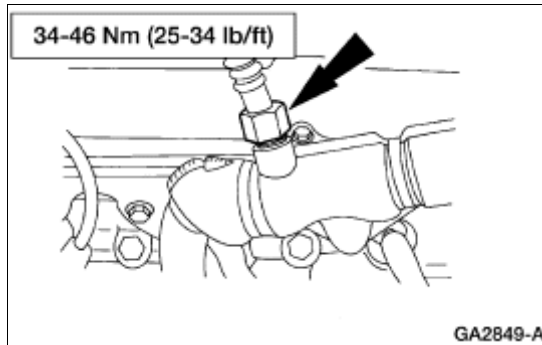
2. **CAUTION:** Clean the EGR spacer and throttle body gasket surfaces with Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A and a Teflon® or hardwood scraper. Avoid the use of metal scraper or abrasive materials when removing old gasket material, or possible vacuum and EGR passage leaks may result.

On early models, install the EGR spacer gasket.

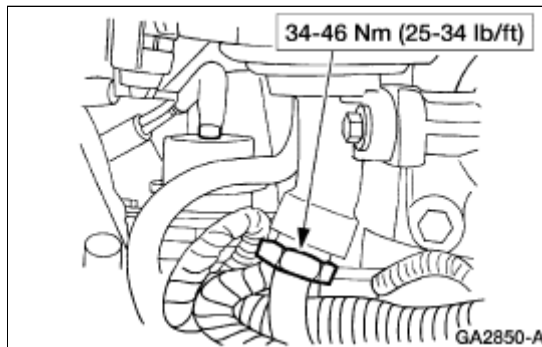
3. Install the EGR spacer, bolts, and the nuts.



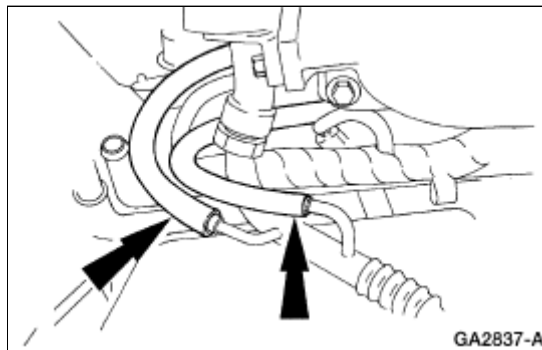
4. Connect the lower EGR valve-to-exhaust manifold tube nut.



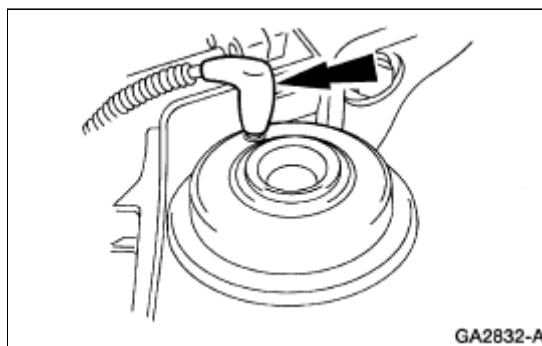
5. Connect the upper EGR valve-to-exhaust manifold tube nut.



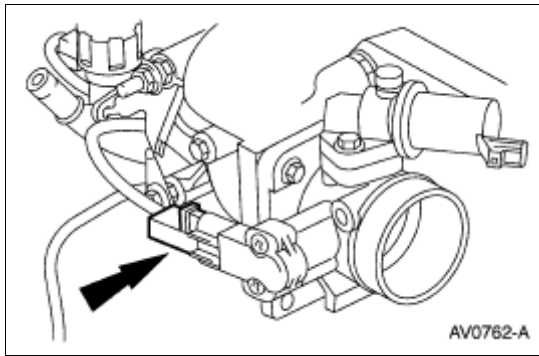
6. Connect the two EGR pressure transducer hoses.



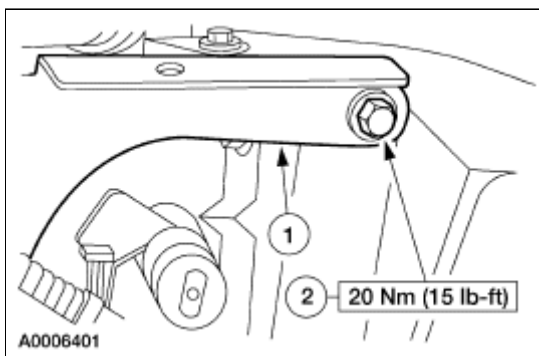
7. Connect the EGR valve vacuum connector.



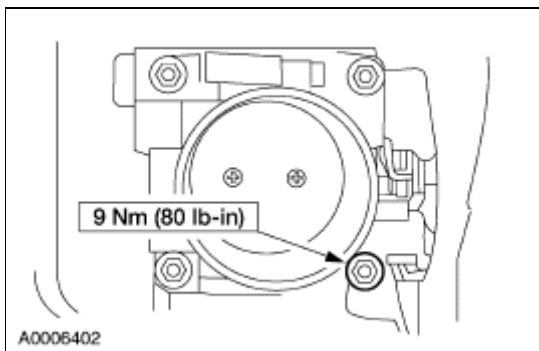
8. Connect the throttle position (TP) sensor electrical connector.



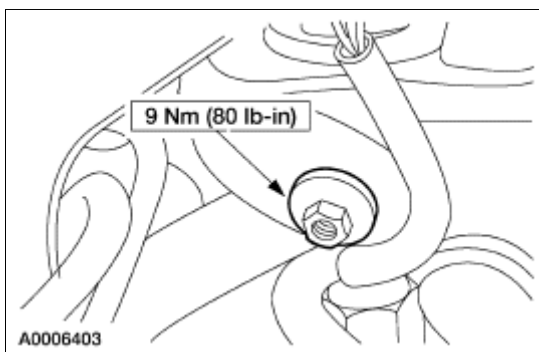
9. Install the accelerator cable bracket.
  1. Position the accelerator cable bracket.
  2. Install the bolt.



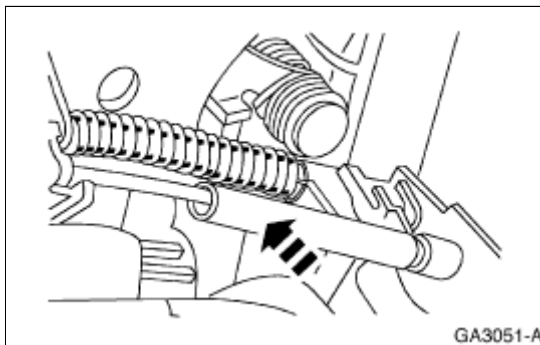
10. Install the accelerator cable bracket lower nut.



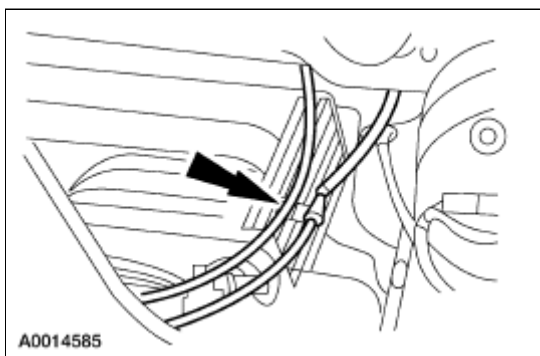
11. Install the accelerator cable bracket nut.



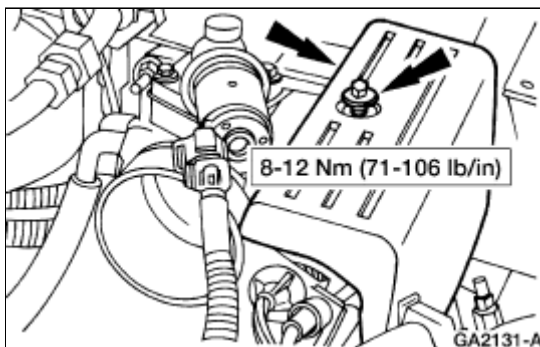
12. Connect the accelerator and speed control (if equipped) cables to the throttle linkage.



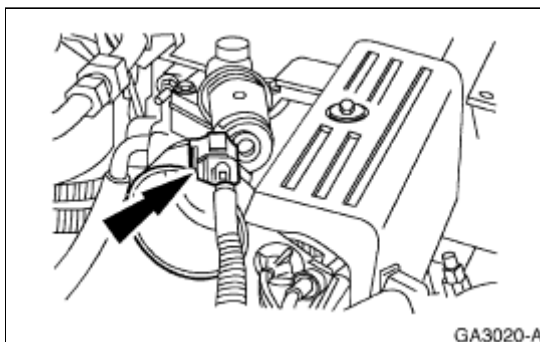
13. Position the accelerator and speed control (if equipped) cables into the clip.



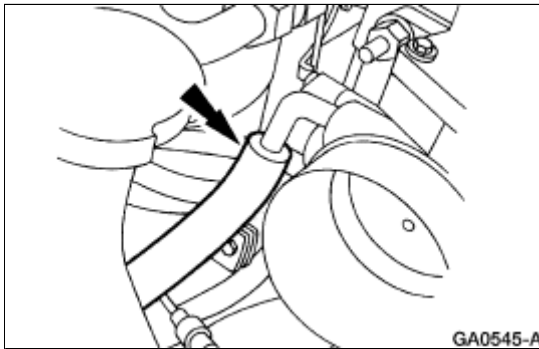
14. Install the accelerator control splash shield.



15. Connect the idle air control (IAC) valve electrical connector.



16. Connect the PCV hose to the throttle body.



17. Install the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
  18. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
-



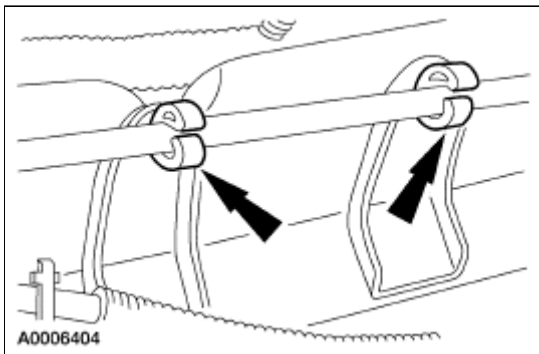
SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR

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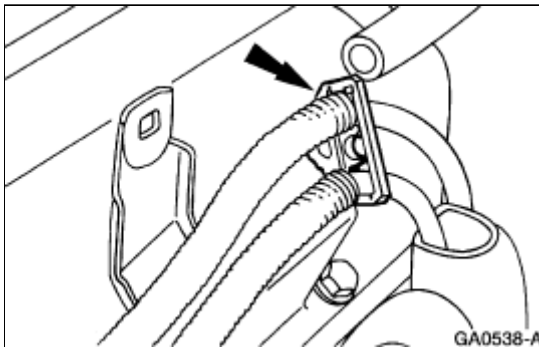
## Valve Cover —LH

### Removal

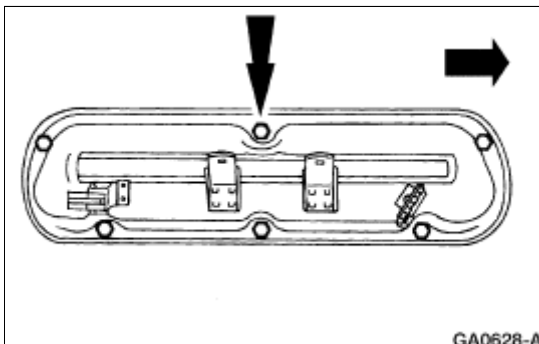
1. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
2. Disconnect the fuel line. For additional information, refer to [Section 310-00](#).
3. Disconnect the fuel line from the LH valve cover and position aside.



4. Disconnect the spark plug wires from the LH valve cover.



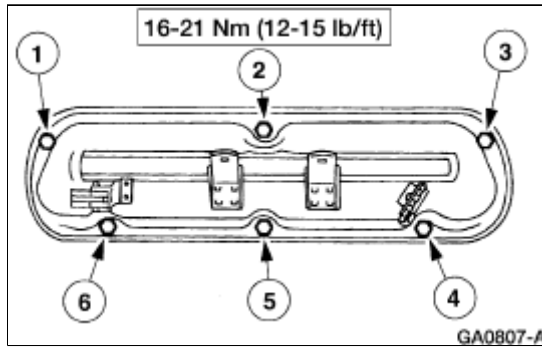
5. Remove the bolts and LH valve cover.



## Installation

1. **NOTE:** Make sure the stamping and chamfered edges of the steel carrier in the new LH valve cover gasket are facing up.

To install, reverse the removal procedure.



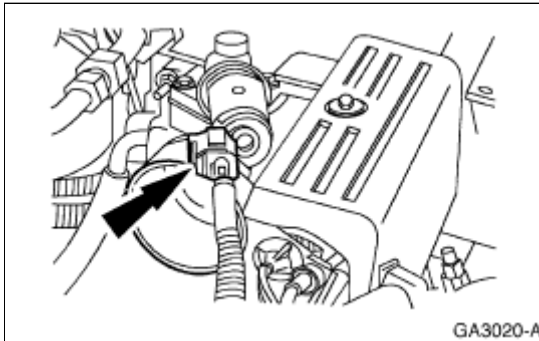
SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR

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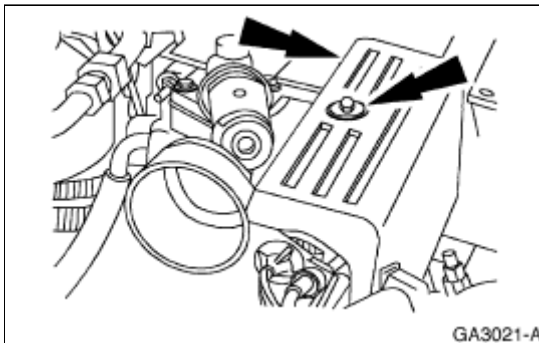
## Intake Manifold —Upper

### Removal

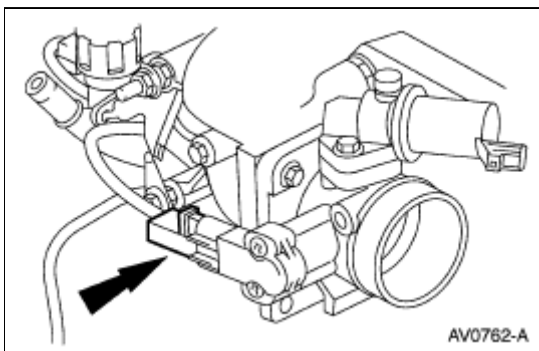
1. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
2. Remove the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
3. Disconnect the idle air control (IAC) electrical connector.



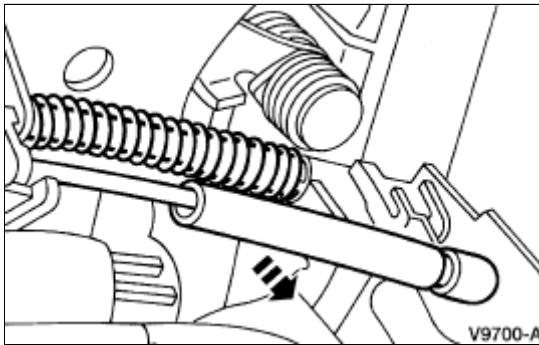
4. Remove the bolt and the accelerator control splash shield.



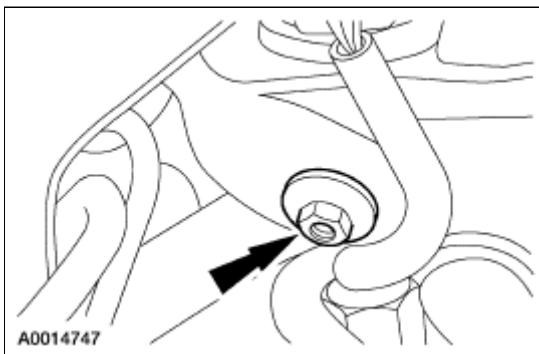
5. Disconnect the throttle position (TP) sensor electrical connector.



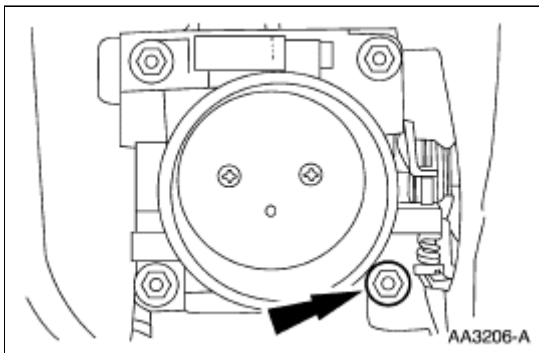
6. Disconnect the accelerator and speed control (if equipped) cables from the throttle linkage.



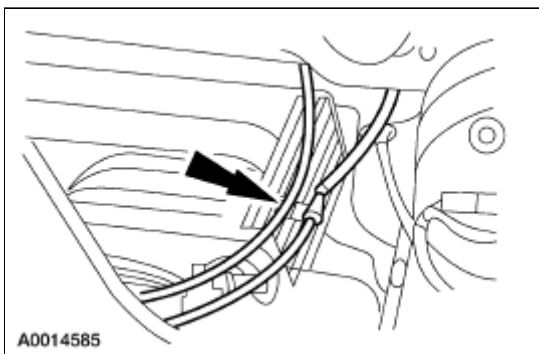
7. Remove the accelerator cable bracket nut.



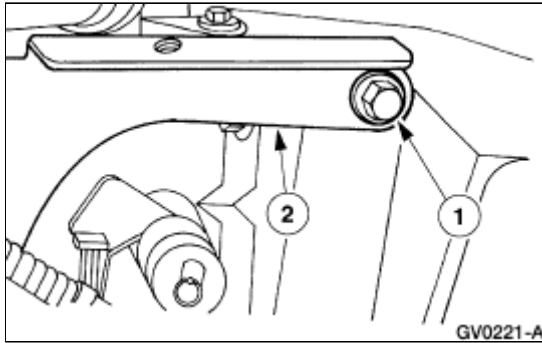
8. Remove the lower accelerator cable bracket nut.



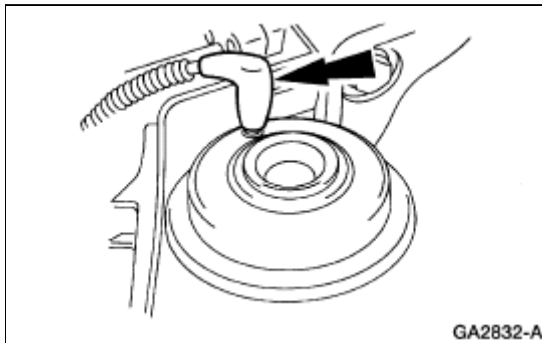
9. Remove the accelerator and speed control (if equipped) cables from the clip.



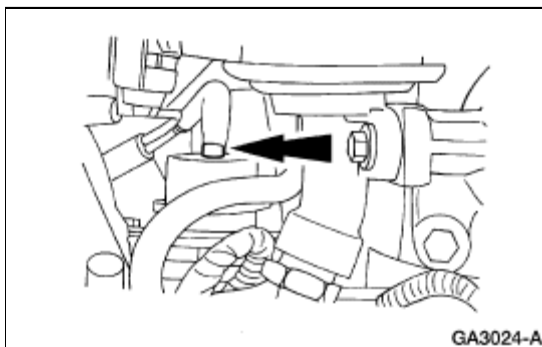
10. Remove the accelerator cable bracket.
  1. Remove the nut.
  2. Remove the accelerator cable bracket.



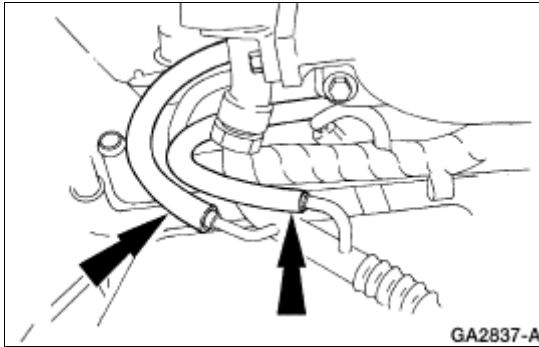
11. Disconnect the EGR valve vacuum connector.



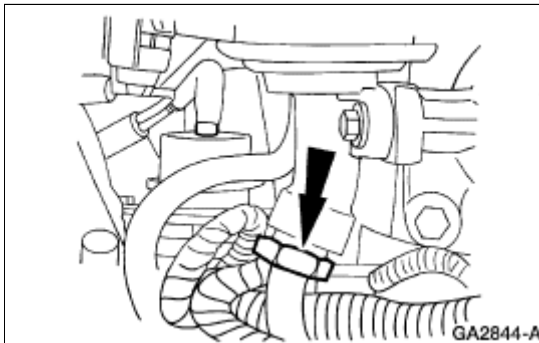
12. Disconnect the fuel pressure regulator vacuum connection.



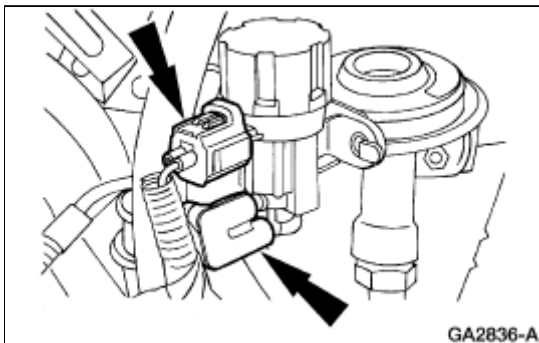
13. Disconnect the two pressure transducer hoses.



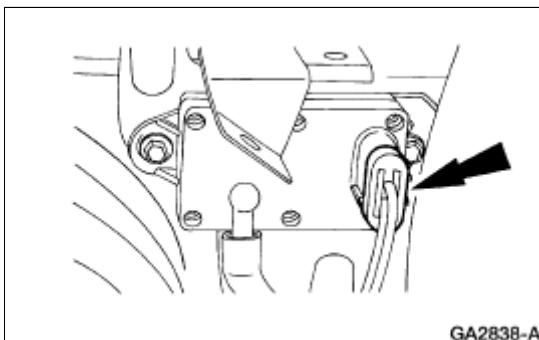
14. Disconnect the upper EGR valve-to-exhaust manifold tube fitting.



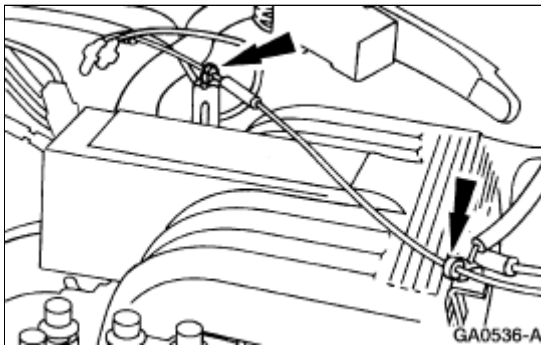
15. Disconnect the following connections:
- Engine vacuum regulator (EVR) electrical connector
  - EVR vacuum connector



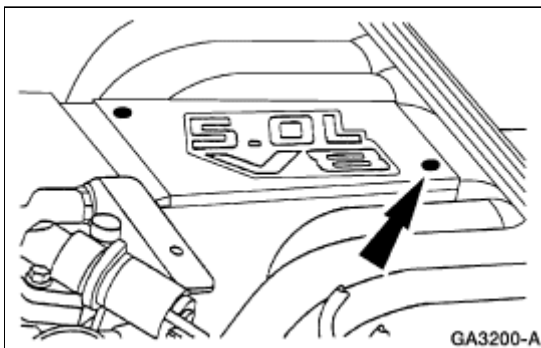
16. Disconnect the EGR backpressure transducer electrical connector.



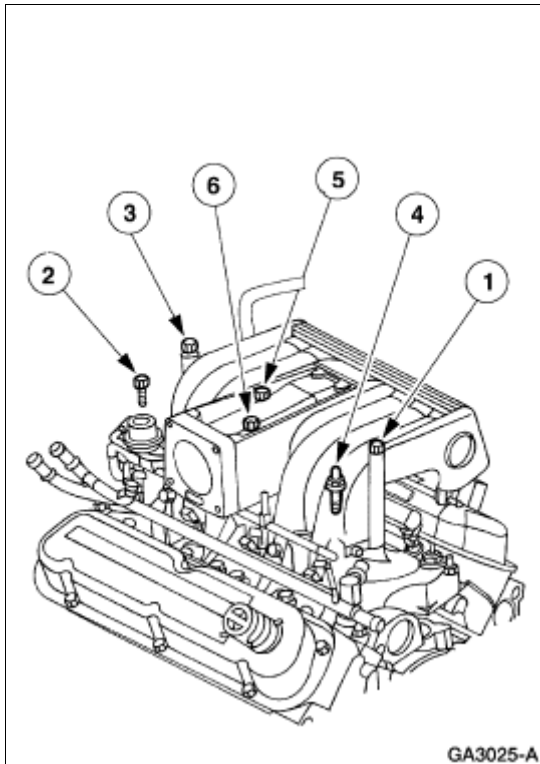
17. Remove the ignition coil bracket. For additional information, refer to [Section 303-07C](#).
18. Disconnect the accelerator cable from the upper intake manifold clips.



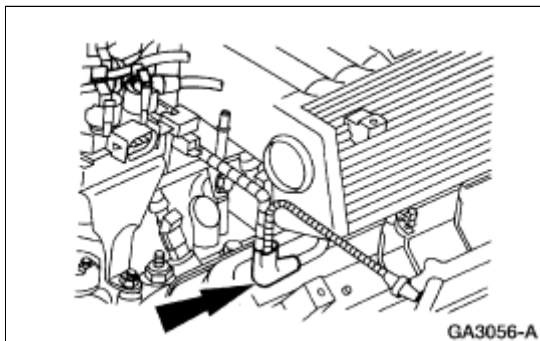
19. Remove the screws and the intake cover plate.



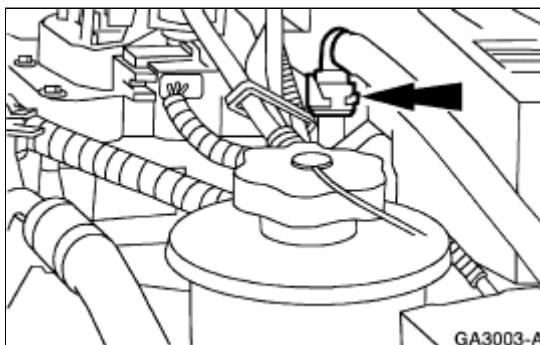
20. Remove the bolts in the sequence shown.



21. Disconnect the two vacuum connections from the front of the intake manifold.



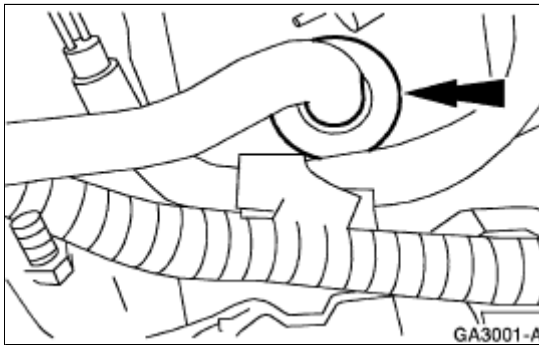
22. Disconnect the vapor management valve (VMV) purge line.



23. Disconnect the brake booster vacuum supply line at the LH rear upper intake connection.



24. Disconnect the positive crankcase ventilation (PCV) hose, and the two PCV heater hoses.



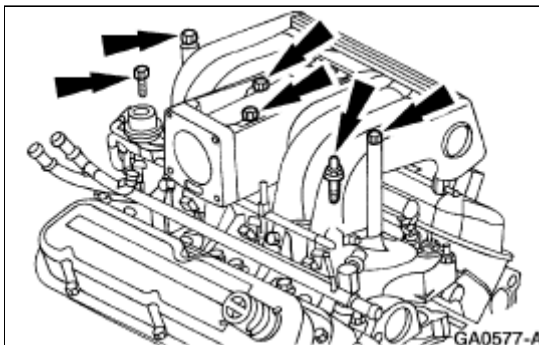
25. Remove the upper intake manifold and discard the old gasket.

### Installation

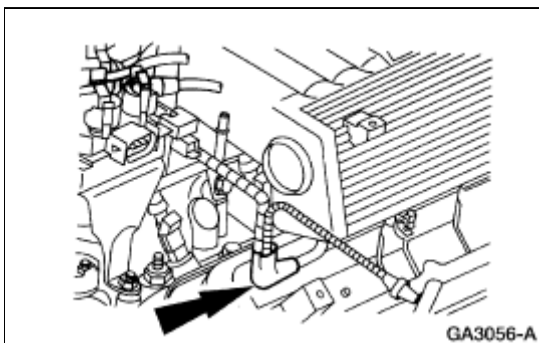
1. **NOTE:** Use Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A and a suitable plastic or wooden scraper to clean the upper and lower intake manifold gasket surfaces.

Clean and inspect all surfaces, install new seals and gaskets.

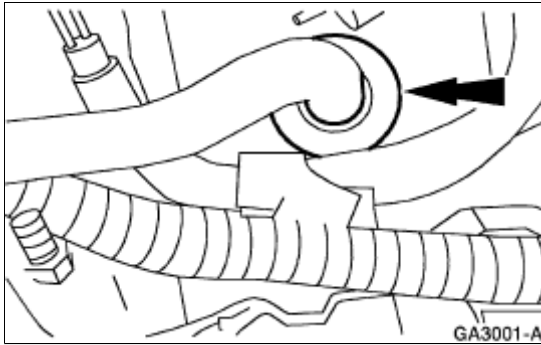
2. Position the upper intake manifold and gasket and start the bolts.



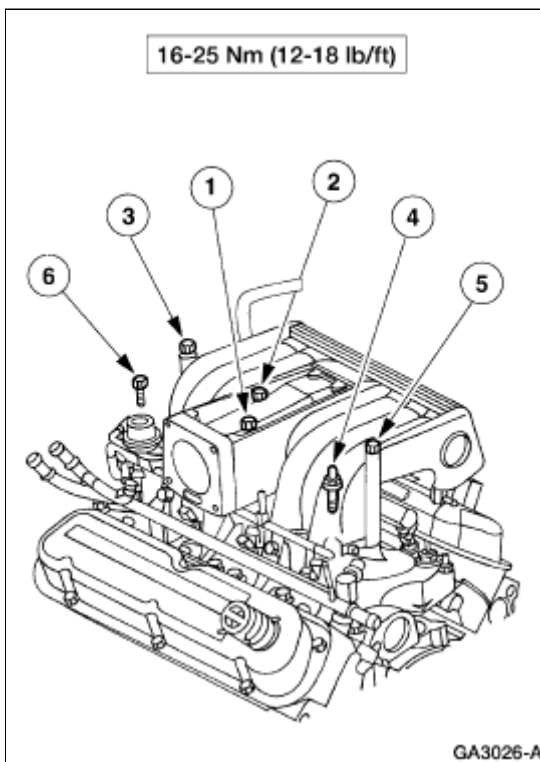
3. Connect the two upper intake vacuum connections.



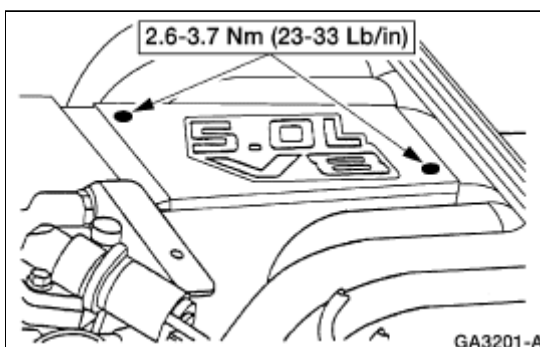
4. Connect the positive crankcase ventilation (PCV) tube, and the two PCV heater hoses.



5. Connect the vacuum supply line to the brake booster at the LH rear upper intake connection.
6. Tighten the bolts in the sequence shown.

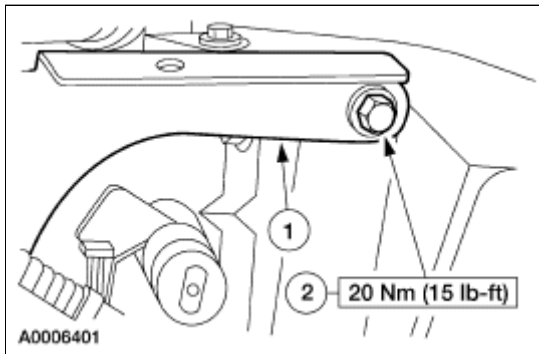


7. Install the upper intake manifold cover plate and tighten the screws.

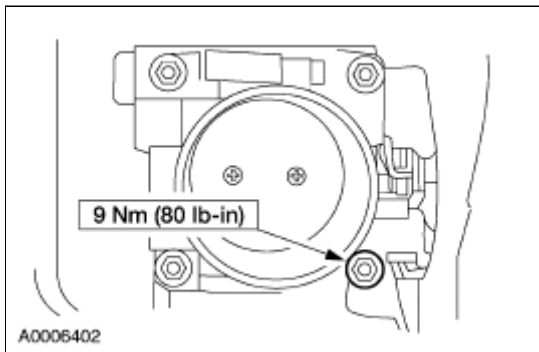


8. Install the accelerator cable bracket.

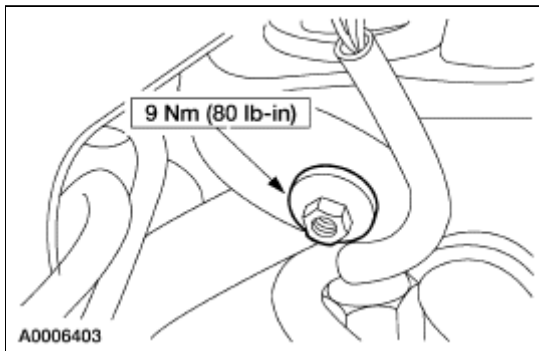
1. Position the accelerator cable bracket.
2. Install the bolt.



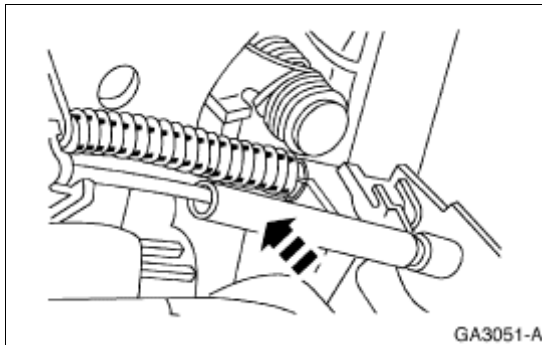
9. Install the lower accelerator cable bracket nut.



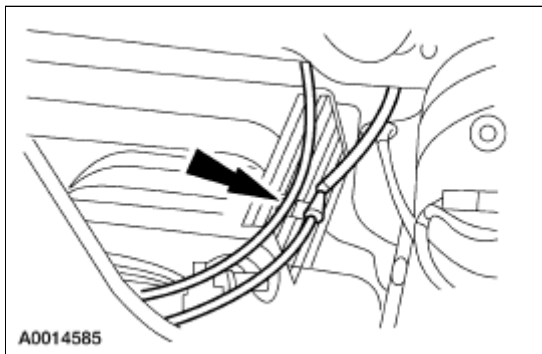
10. Install the accelerator cable bracket nut.



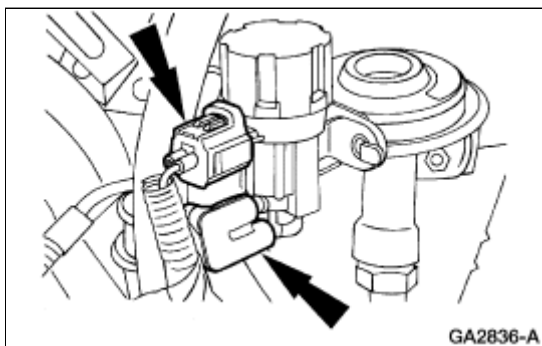
11. Connect the accelerator and speed control (if equipped) cables to the throttle linkage.



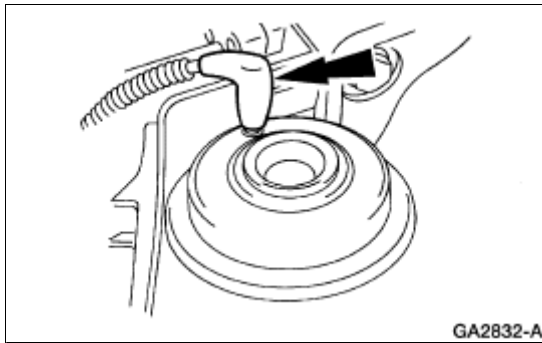
12. Position the accelerator and speed control (if equipped) cables into the clip.



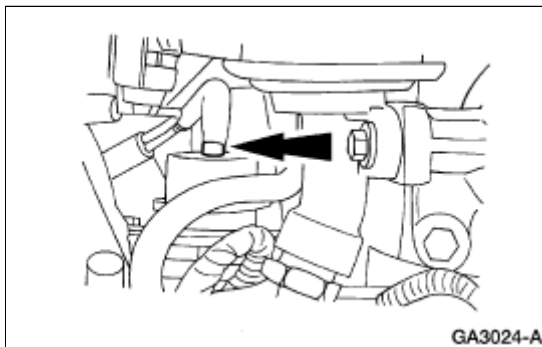
13. Install the ignition coils and the ignition coil bracket. For additional information, refer to [Section 303-07C](#).
14. Connect the following connections:
- Engine vacuum regulator (EVR) electrical connector
  - EVR vacuum connector



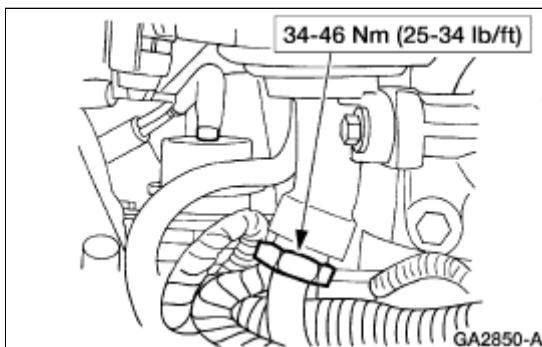
15. Connect the EGR valve vacuum connector.



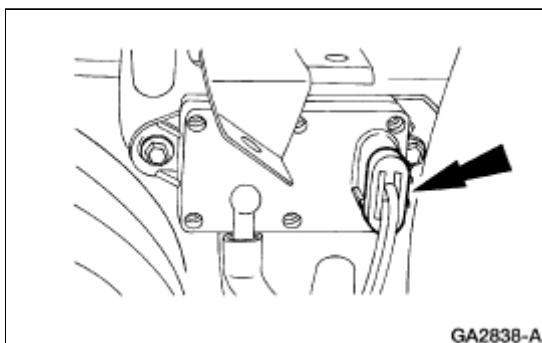
16. Connect the fuel pressure regulator vacuum connector.



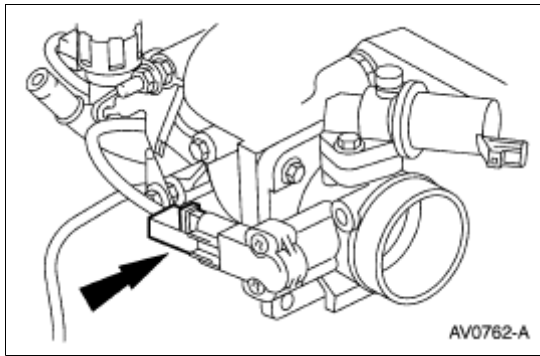
17. Connect the upper EGR valve-to-exhaust manifold tube connection.



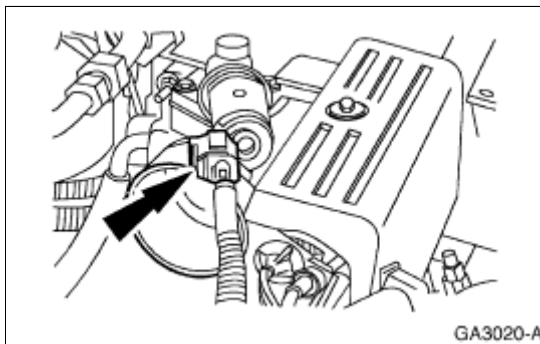
18. Connect the EGR backpressure transducer electrical connection.



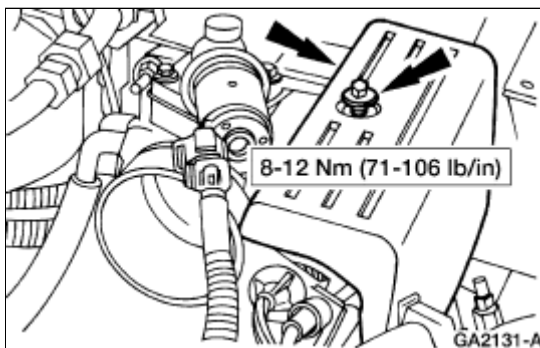
19. Connect the TP sensor electrical connector.



20. Connect the IAC electrical connector.



21. Install the accelerator control splash shield.



22. Install the air cleaner outlet tube. For additional information, refer to [Section 303-12](#).
23. Connect the battery ground cable. For additional information, refer to [Section 414-01](#).
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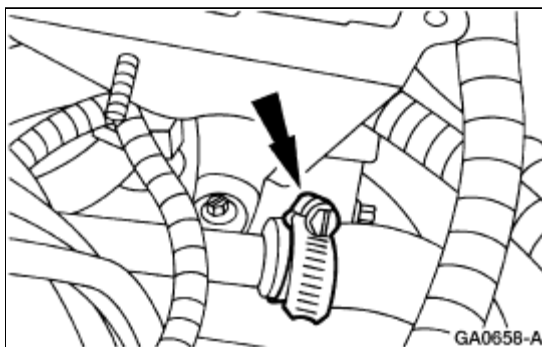
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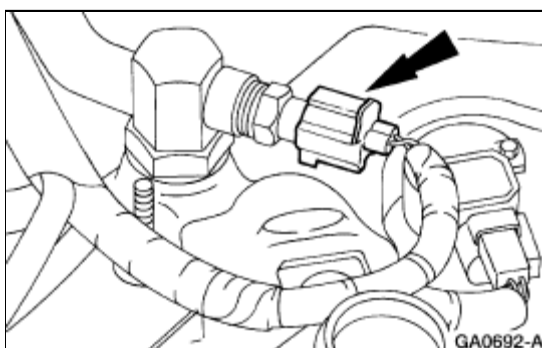
## Intake Manifold —Lower

### Removal

1. Drain the engine cooling system. For additional information, refer to [Section 303-03](#).
2. Disconnect the radiator overflow hose and position aside.
3. Remove the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
4. Disconnect the water bypass hose from the water heater tube.

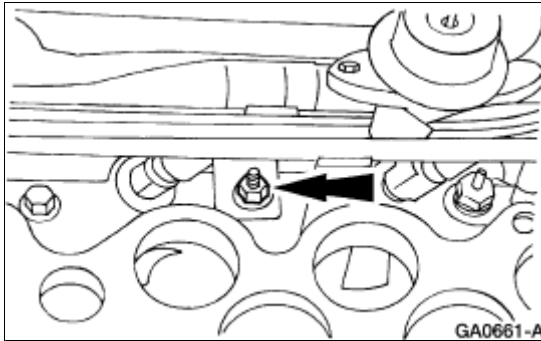


5. Disconnect the engine coolant temperature (ECT) electrical connector.

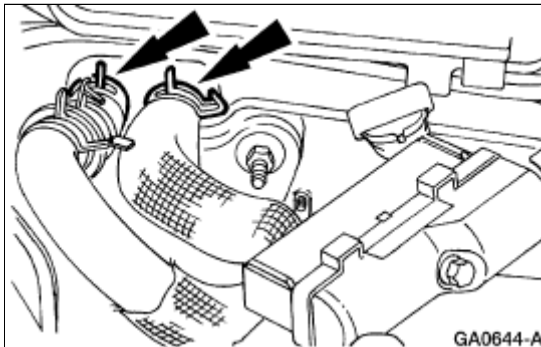


6. Remove the wire harness retainer nut.

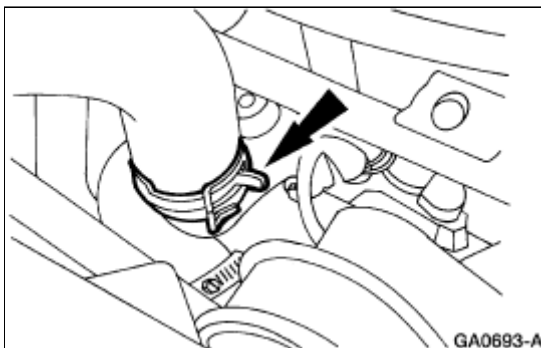




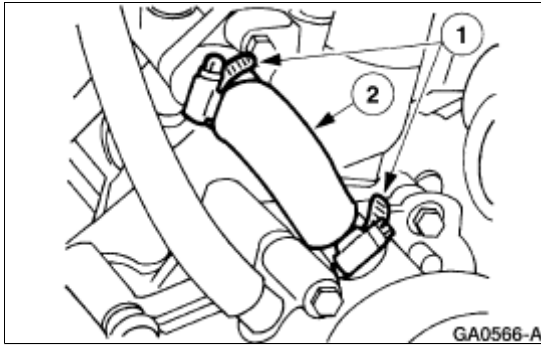
7. Disconnect the heater water hoses.



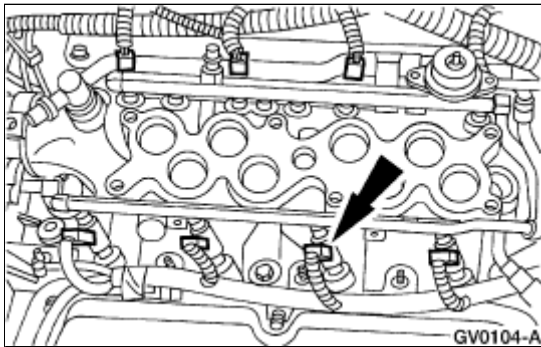
8. Disconnect the two PCV heater hoses from the water heater tube
9. Disconnect the upper radiator hose.



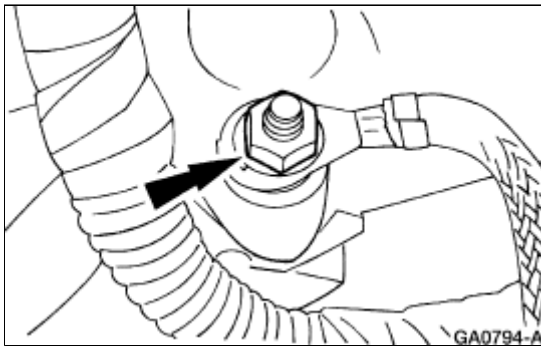
10. Remove the water bypass hose.
  1. Loosen the water bypass hose clamps.
  2. Remove the water bypass hose.



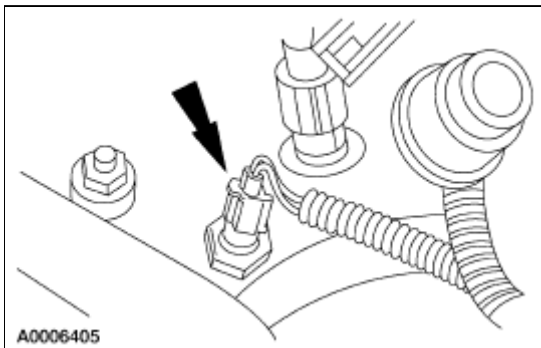
11. Disconnect the eight fuel injector electrical connectors.



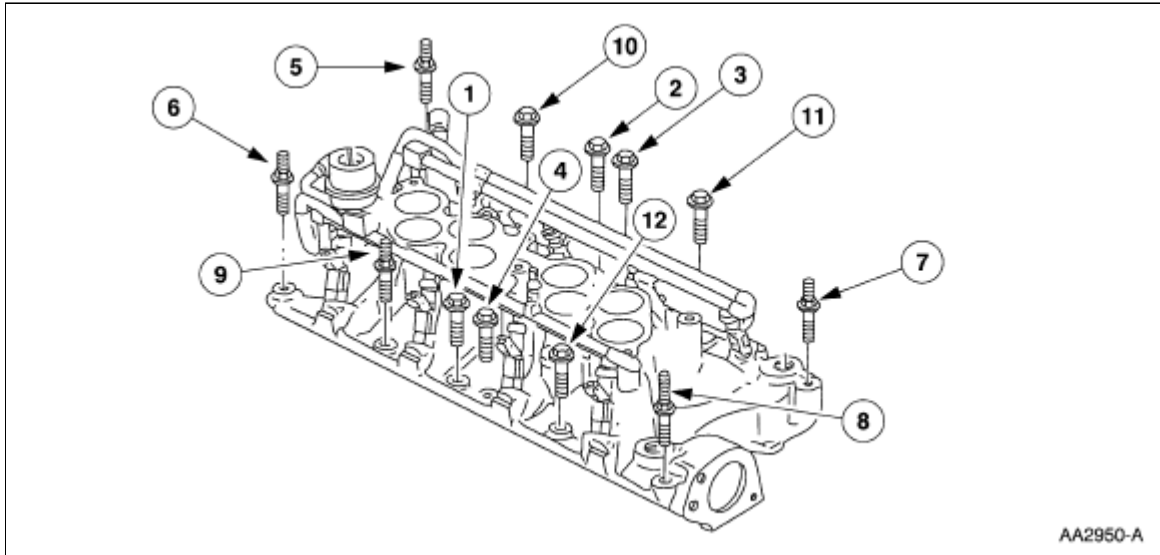
12. Disconnect the fuel line. For additional information, refer to [Section 310-00](#).
13. Disconnect the ground strap at the rear of the lower intake manifold.



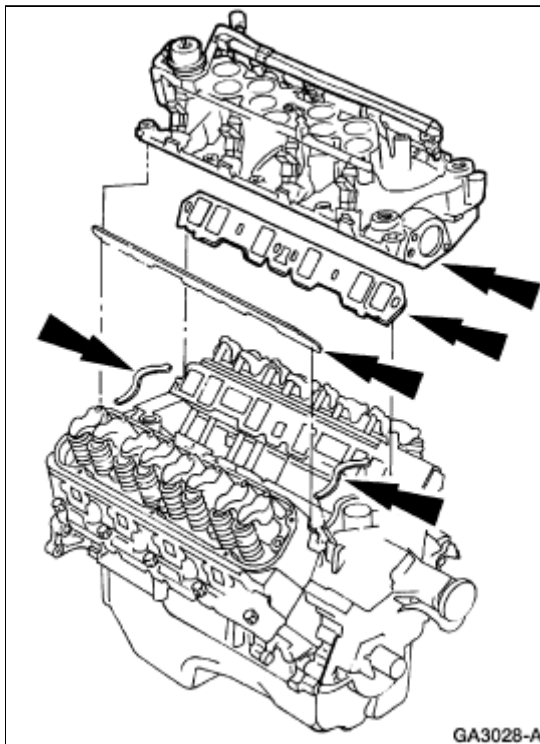
14. Disconnect the water temperature indicator sender electrical connector.



15. Remove the camshaft position (CMP) sensor and the camshaft synchronizer. For additional information, refer to [Section 303-14](#).
16. Remove the bolts.



17. Remove the lower intake manifold and discard the lower gasket.

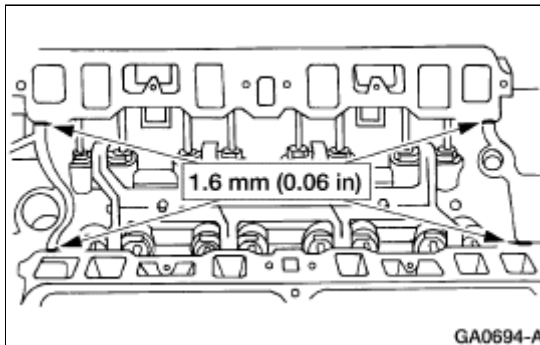


## Installation

1. **NOTE:** Use Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A to clean the gasket surfaces of the lower intake manifold, cylinder heads, and the cylinder block.

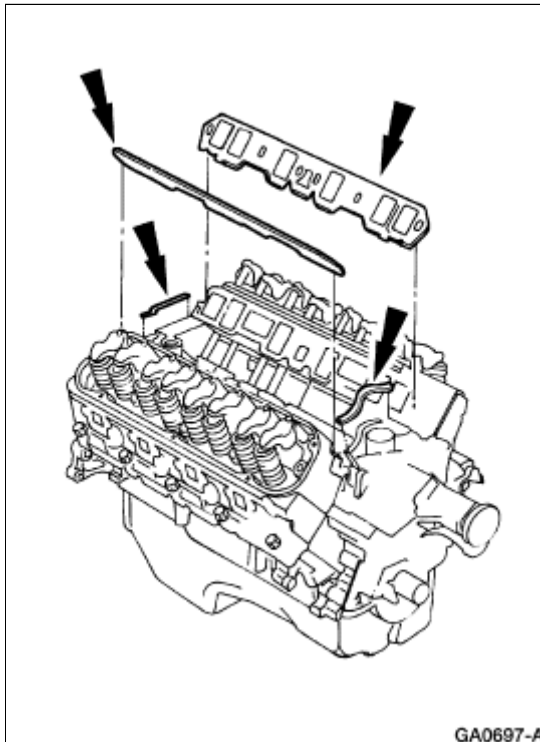
Apply a 1.6mm (0.06) bead of sealer in the corners where the cylinder head and cylinder block meet.

- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.

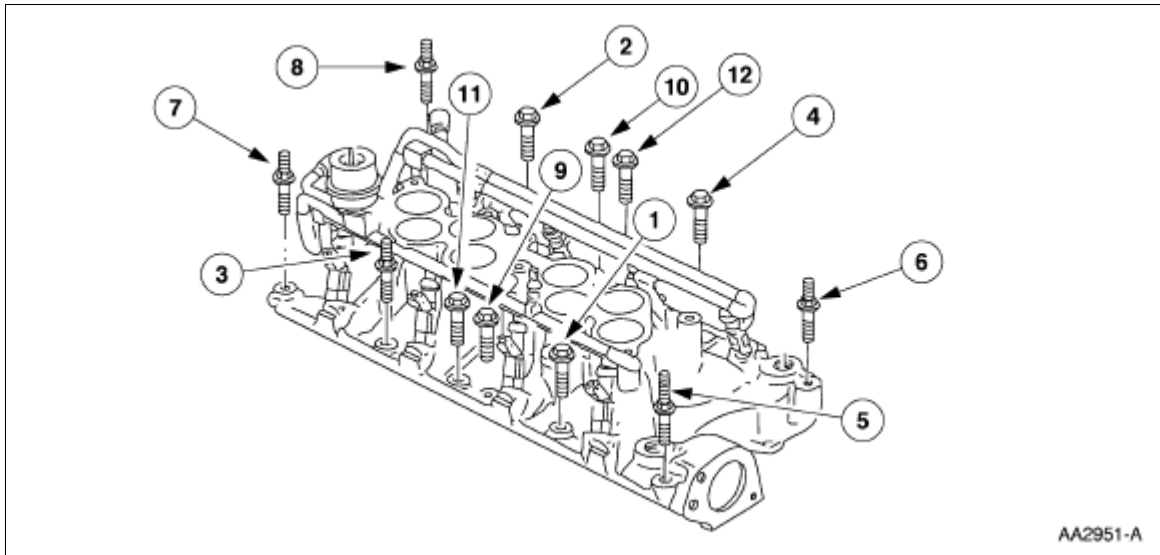


2. Position the four lower gaskets.

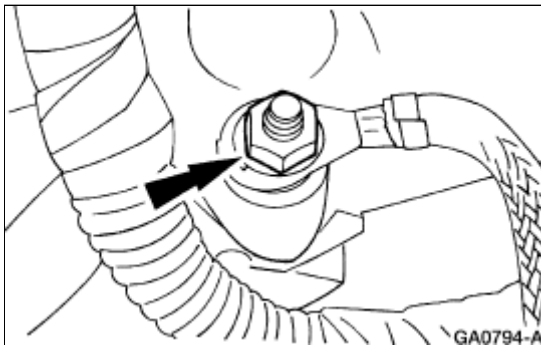
- Install the intake manifold seal tabs to notch in the lower intake manifold gaskets.
- Press firmly along the entire length of the intake manifold seal until silicone sealant is visible.



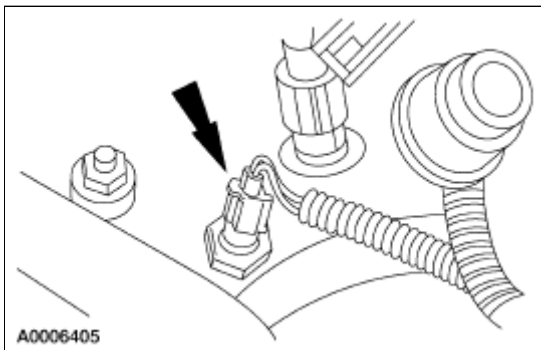
3. Position the lower intake manifold and start the bolts.



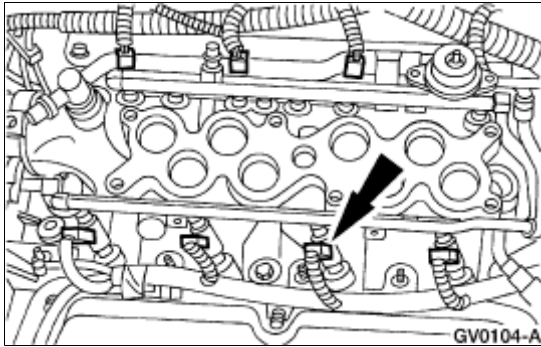
4. Tighten the lower intake manifold in two steps.
  - Step 1: Tighten to 10 Nm (89 lb-in).
  - Step 2: Tighten to 32 Nm (24 lb-ft).
5. Install the camshaft position (CMP) sensor and the camshaft synchronizer. For additional information, refer to [Section 303-14](#).
6. Connect the rear ground strap to the rear of the lower intake manifold.



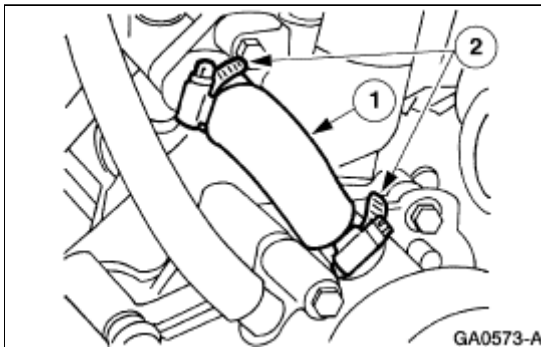
7. Connect the water temperature indicator sender electrical connector.



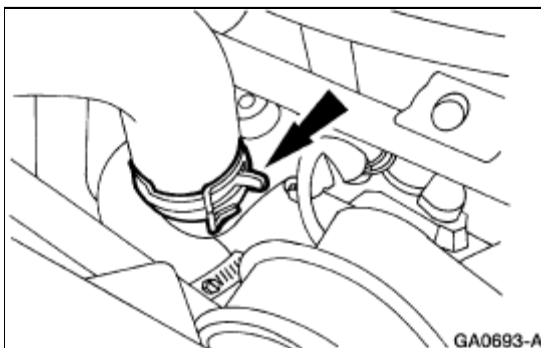
8. Connect the eight fuel injector electrical connectors.



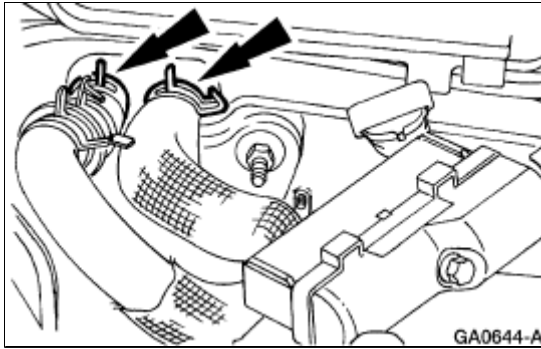
9. Reconnect the fuel line. For additional information, refer to [Section 303-00](#).
10. Install the water bypass hose.
  1. Position the water bypass hose.
  2. Install the two clamps.



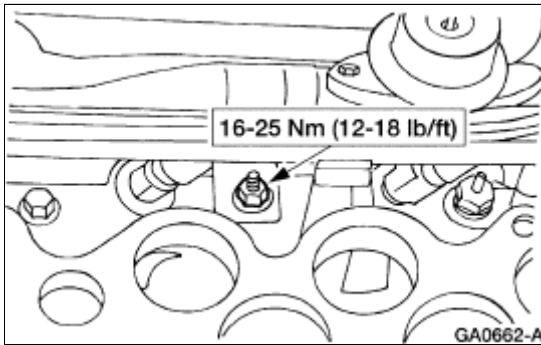
11. Connect the upper radiator hose.



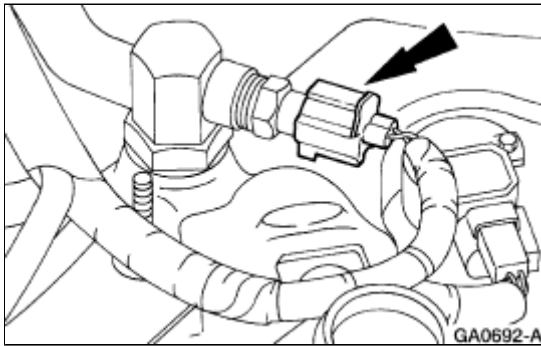
12. Connect the heater water hoses.



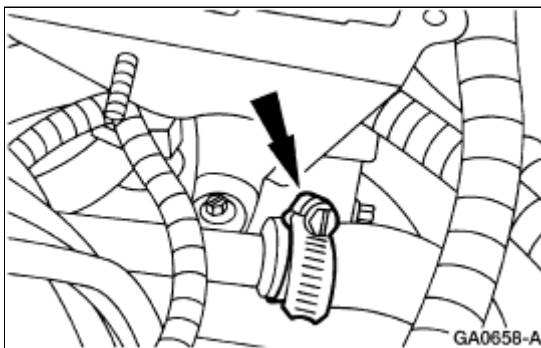
13. Install the wire harness retainer nut.



14. Connect the engine coolant temperature (ECT) electrical connector.



15. Connect the water heater bypass hose to the heater tube.



16. Connect the two PCV heater hoses to the heater tube.

17. Install the upper intake manifold. For additional information, refer to [Intake Manifold—Upper](#) in this section.
  18. Connect the radiator overflow hose.
  19. Fill the engine cooling system. For additional information, refer to [Section 303-03](#).
-

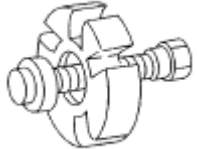
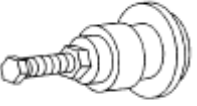
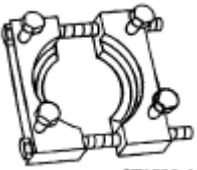



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IN-VEHICLE REPAIR

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## Crankshaft Pulley

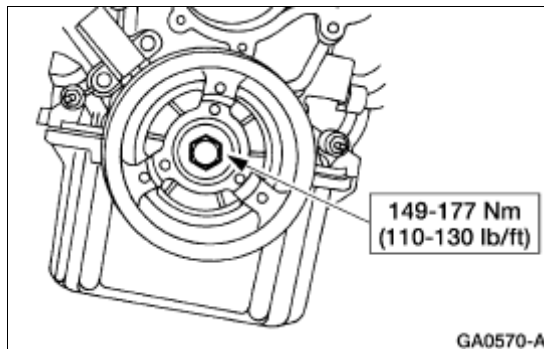
### Special Tool(s)

 ST1286-A	Crankshaft Damper Remover 303-009 (T58P-6316-D)
 ST1328-A	Crankshaft Seal Installer/Aligner 303-335 (T88T-6701-A)
 ST1582-A	Seal Remover 303-053 (T70P-6B070-B)
 ST1378-A	Damper Puller Adapter 303-176 (T82L-6316-B)

### Removal and Installation

1. Remove the fan shroud. For additional information, refer to [Section 303-03](#).
2. Remove the accessory drive belt. For additional information, refer to [Section 303-05](#).
3. **NOTE:** Use a suitable strap wrench to hold the crankshaft pulley (6312).

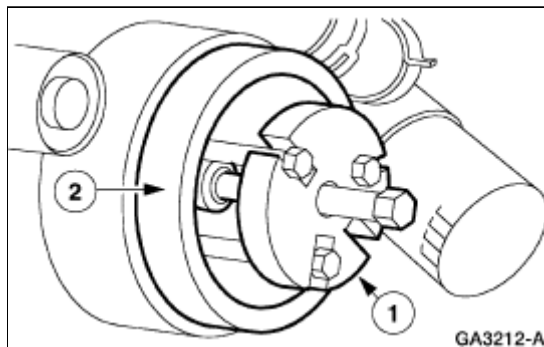
Remove the bolt.



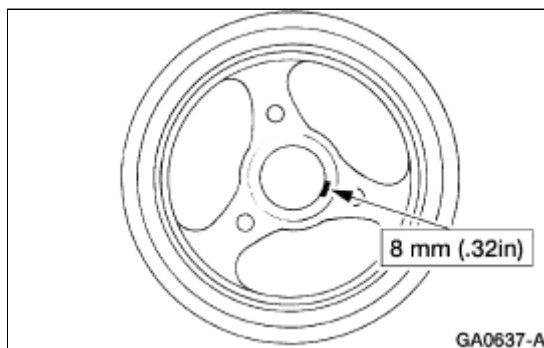
4. **NOTE:** The jackscrew from Damper Puller Adapter must be used with Crankshaft Damper Remover.

Use Crankshaft Damper Remover to remove the crankshaft pulley.

1. Install the Crankshaft Damper Remover.
2. Remove the crankshaft pulley.



5. Apply silicone sealant to the woodruff key slot on the crankshaft pulley.
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.

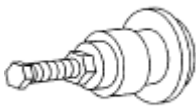
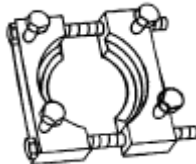


6. To install, reverse the removal procedure.
-



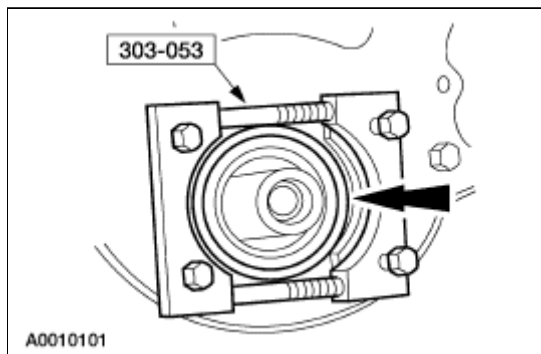
## Crankshaft Front Oil Seal

### Special Tool(s)

 ST1328-A	Crankshaft Seal Installer 303-335 (T88T-6701-A)
 ST1592-A	Seal Remover 303-053 (T70P-6B070-B)

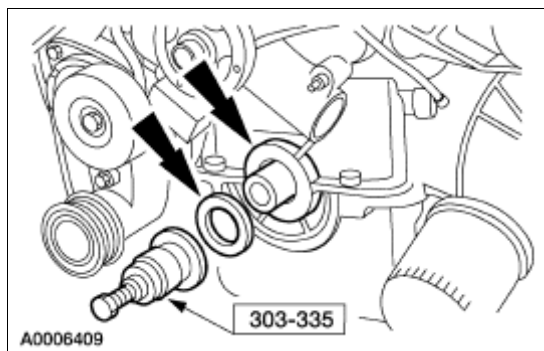
### Removal

1. Remove the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
2. Use the special tool to remove the crankshaft front seal.



### Installation

1. Install the crankshaft front seal using the special tool.




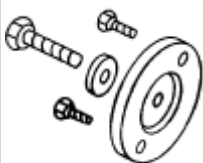
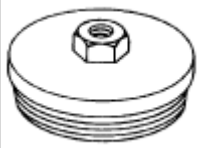
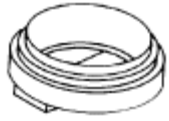

2. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#) in this section.
-

SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR


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## Crankshaft Rear Oil Seal

### Special Tool(s)

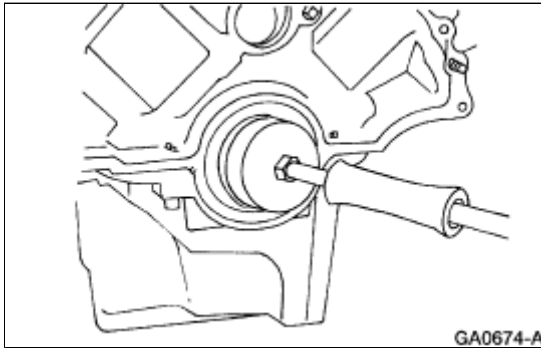
 ST1185-A	Impact Slide Hammer 100-001 (T50T-100-A)
 ST1593-A	Rear Crank Shaft Adapter 303-S560 (T96T-6701-A)
 ST1382-A	Rear Crank Seal Remover 303-519 (T95P-6701-EH)
 ST1479-A	Rear Crank Seal Replacer 303-516 (T95P-6701-BH)
 ST1594-A	Rear Crank Seal Replacer Spacer 303-561 (T96T-6701-B)

### Removal

1. Remove the flywheel. For additional information, refer to [Flywheel](#) in this section.
2.  **CAUTION:** Avoid scratching or damaging the oil seal surfaces during removal of the crankshaft rear oil seal (6701).

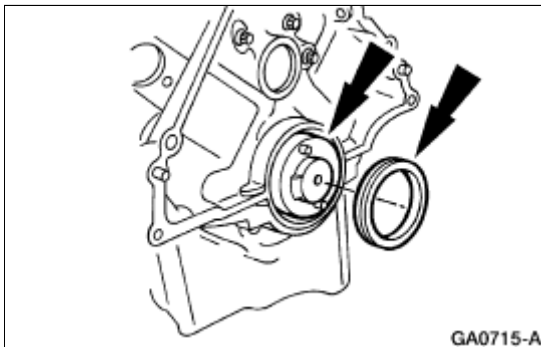
**NOTE:** Be sure the crankshaft rear sealing surface is clean and free of any rust or corrosion. To clean the crankshaft rear sealing surface, use extra-fine emery cloth or extra-fine 0000 steel wool with Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A.

Use Rear Crankshaft Seal Remover and Impact Slide Hammer to remove the crankshaft rear main seal.

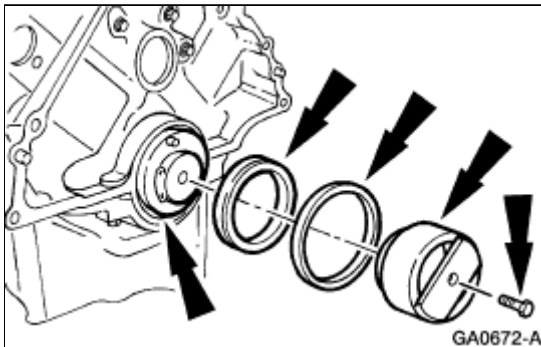


### Installation

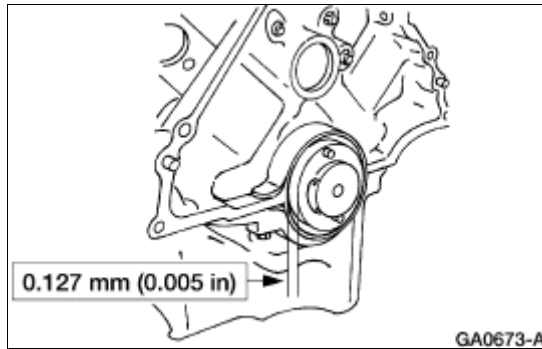
1. Lubricate the and crankshaft sealing surface.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.



2. Position Rear Crank Adapter and use Rear Crank Seal Replacer Spacer and Rear Crank Seal Replacer to install the crankshaft rear oil seal.



3. Check that the crankshaft rear oil seal is within specification.



4. Install the flywheel. For additional information, refer to [Flywheel](#) in this section.
-



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IN-VEHICLE REPAIR

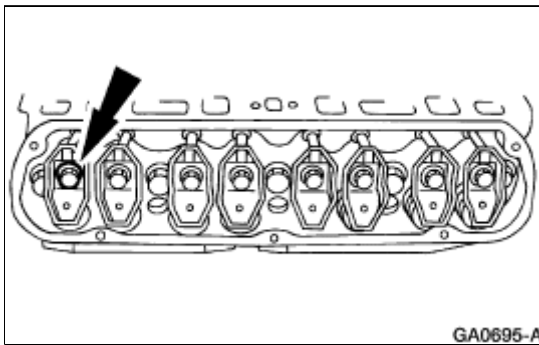
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## Valve Tappet

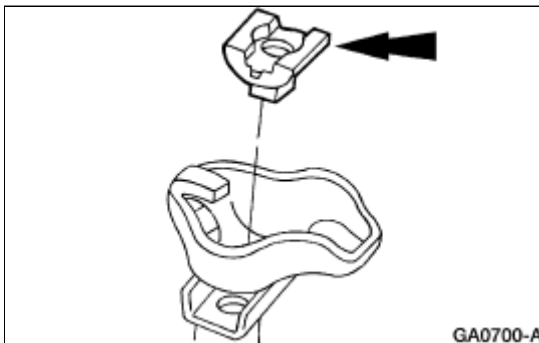
### Removal

1. Remove the lower intake manifold (9424). For additional information, refer to [Intake Manifold—Lower](#) in this section.
2. Remove the valve covers (6582). For additional information, refer to [Valve Cover—LH](#) or [Valve Cover—RH](#) in this section.
3. Remove the bolts.

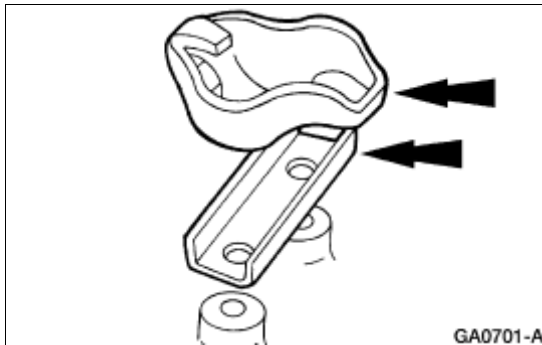


**NOTE:** Make sure to mark the rocker arms and the push rods so they will be installed in their original positions.

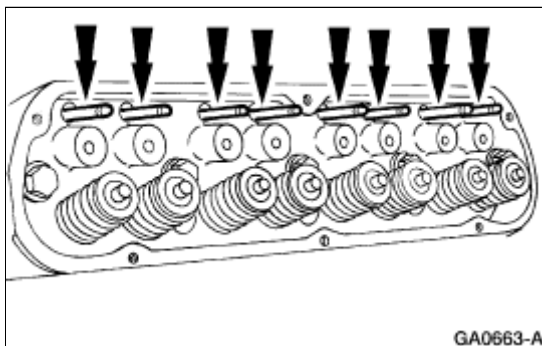
4. Remove the eight rocker arm seats (6A528).



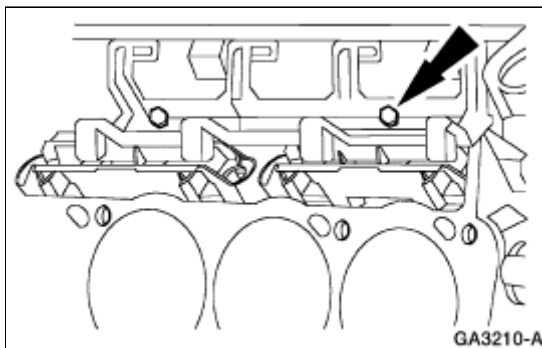
5. Remove the eight rocker arms (6564) and rocker arm fulcrum guides (6A588).



6. Remove the eight push rods (6565) and mark them so they can be reinstalled in their original positions.

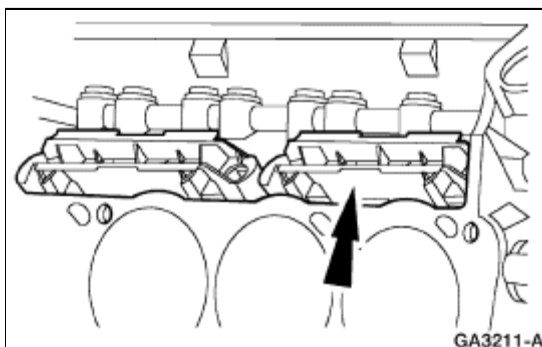


7. Remove the bolts and remove the valve tappet guide plate retainer.



8. **NOTE:** Mark the valve tappets so they can be reinstalled in their original positions.

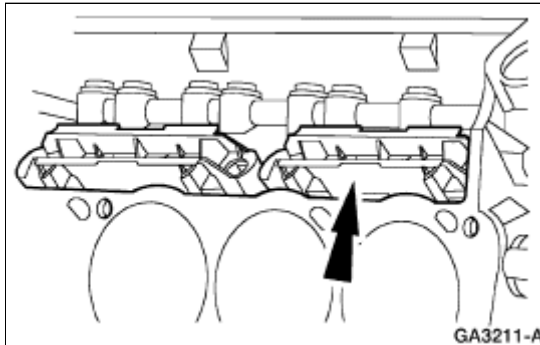
Remove the four valve tappet guides and the valve tappets using a valve tappet puller.



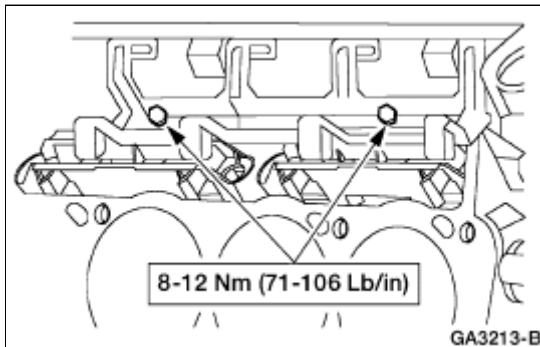
9. Inspect the valve tappets (6500). For additional information, refer to [Section 303-00](#).

## Installation

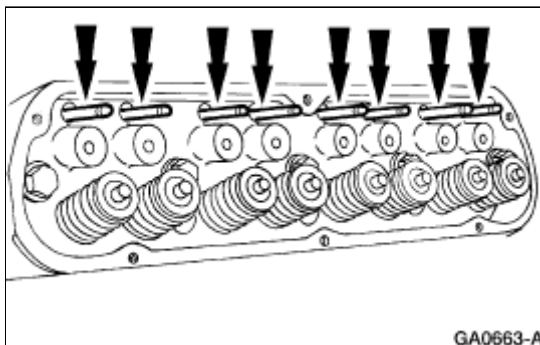
1. Lubricate the valve tappet bores before installing the valve tappets.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
2. Install the valve tappets and the valve tappet guide plates in their original positions.



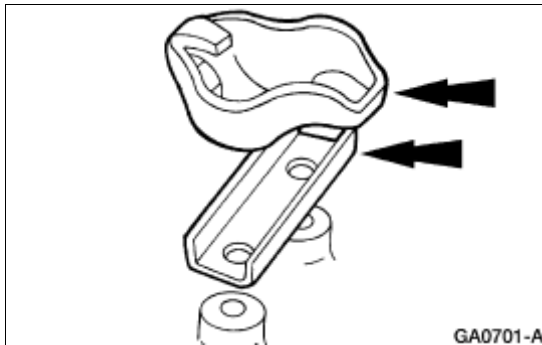
3. Position the valve tappet guide plate retainer and install the bolts.



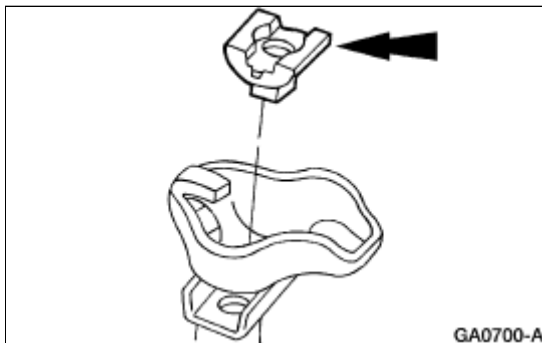
4. Install the push rods in the original location.



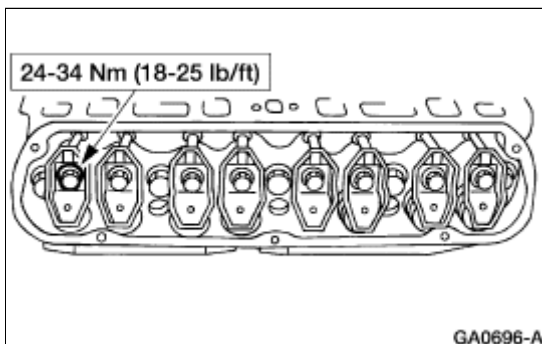
5. Apply engine oil to the top of the valve stem, rocker arm seats, and rocker arms.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
6. Install the eight rocker arms and rocker arm fulcrum guides.



7. Install the eight rocker arm seats.



8. Install the bolts.



9. Check the valve clearance. For additional information, refer to [Section 303-00](#).
  10. Install the valve cover on the side that is being repaired. For additional information, refer to [Valve Cover—RH](#) and [Valve Cover—LH](#) in this section.
  11. Install the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
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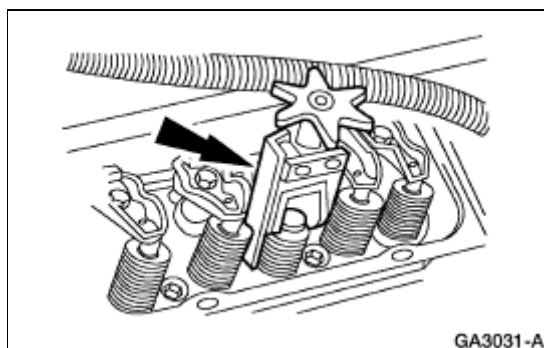
## Valve Spring

### Removal

1. Remove the rocker arm of the valve to be repaired. For additional information, refer to [Valve Tappet](#) in this section.
2. Position the piston at top dead center (TDC).
3. Remove the spark plugs. For additional information, refer to [Section 303-07C](#).
4.  **CAUTION:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve to fall into the cylinder. If air pressure must be removed, support the valve prior to removal.

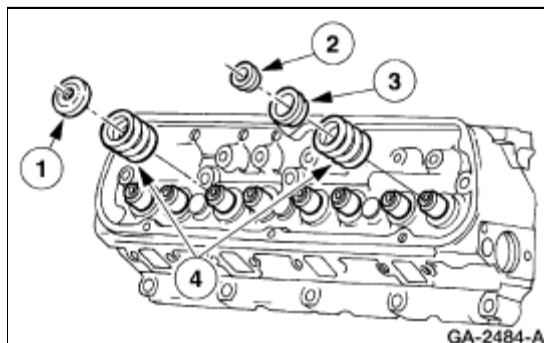
Install compressed air in the cylinder to hold both valves in position.

5. Use a suitable valve spring compressor, remove the valve spring retainer key.



**NOTE:** Mark the location of the parts so they can be installed in their original positions.

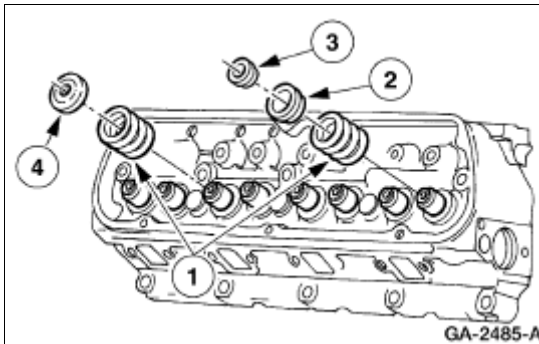
6. Remove the valve springs.
  1. Remove the valve spring rotator (exhaust).
  2. Remove the valve spring retainer sleeve (intake).
  3. Remove the valve spring retainer (intake).
  4. Remove the valve springs.



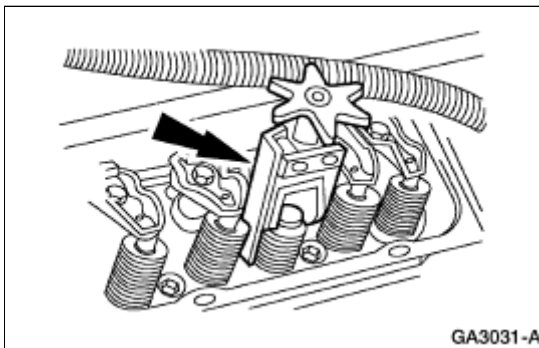
7. Check the valves and valve springs. For additional information, refer to [Section 303-00](#).

## Installation

1. Lubricate the valve stem.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
2. Install the valve springs.
  1. Install the valve springs.
  2. Install the valve spring retainer (intake).
  3. Install the valve spring retainer sleeve (intake).
  4. Install the valve spring rotator (exhaust).



3. Use a suitable valve spring compressor install the valve spring retainer keys.



4. Remove the compressed air line.
  5. Install the spark plugs. For additional information, refer to [Section 303-07C](#).
  6. Install the rocker arm. For additional information, refer to [Valve Tappet](#) in this section.
-



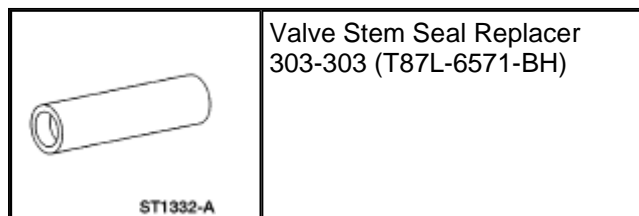


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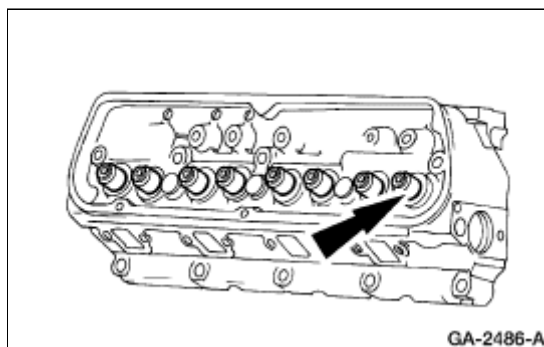
## Valve Seal

### Special Tool(s)



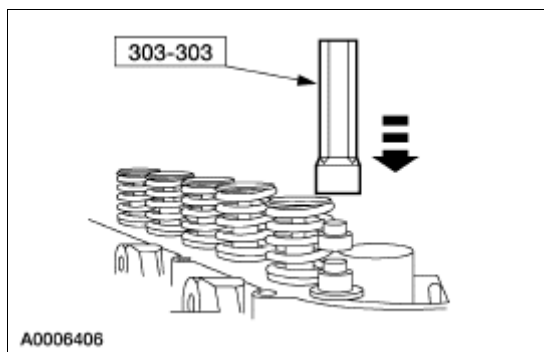
### Removal

1. Remove the valve springs. For additional information, refer to [Valve Spring](#) in this section.
2. Remove the valve stem seals.



### Installation

1. Use the special tool to install the valve stem seals.



2. Install the valve springs.



SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR

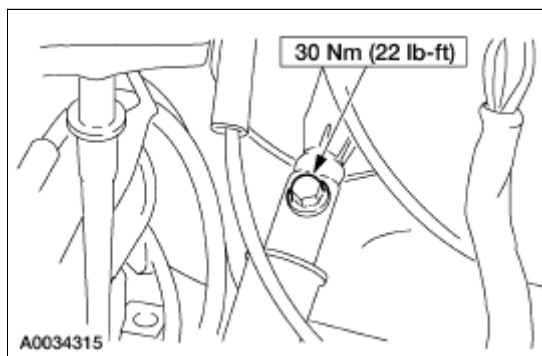
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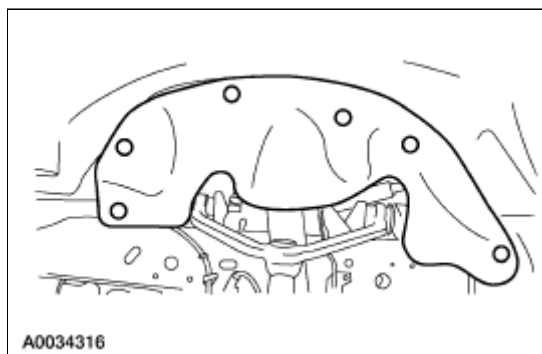
## Exhaust Manifold —LH

### Removal and Installation

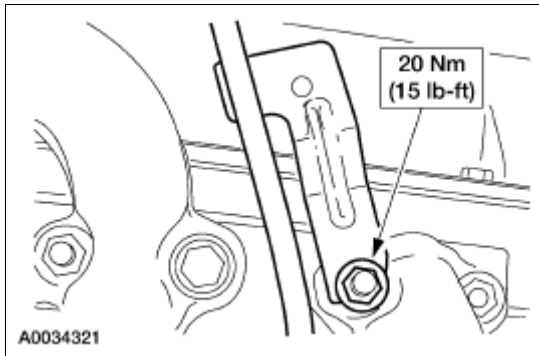
1. Position the front wheels in the straight-ahead position. Make sure the steering wheel is locked.
2. Remove the steering column intermediate shaft bolt.



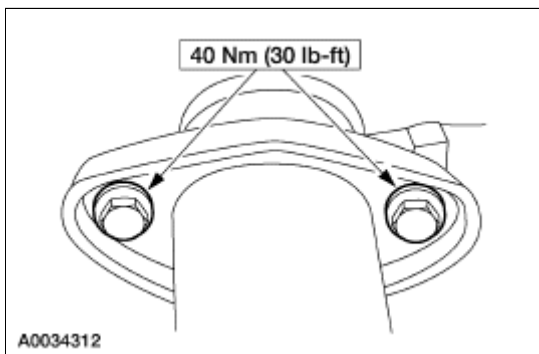
3. Remove the left front tire. For additional information, refer to [Section 204-04](#).
4. Remove the wheel well splash shield.



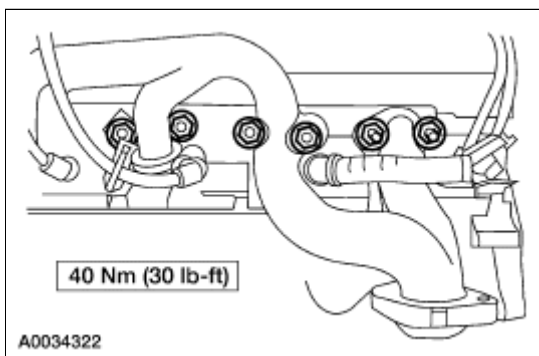
5. Remove the spark plug wires from left side spark plugs. For additional information, refer to [Section 303-07C](#).
6. Remove the engine oil level indicator tube.



7. Remove the bolts.



8. Remove the bolts.



9. Remove the exhaust manifold and the gasket.



10. To install, reverse the removal procedure.
    - Install a new gasket.
-

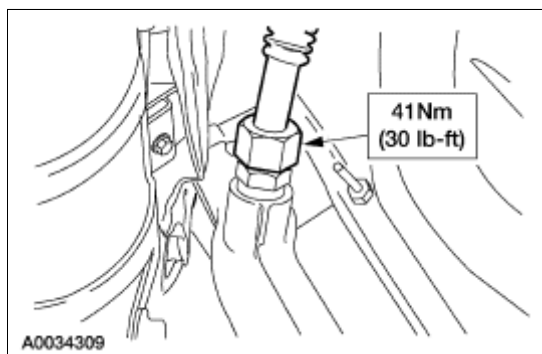
SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR

2000 Explorer/Mountaineer Workshop Manual

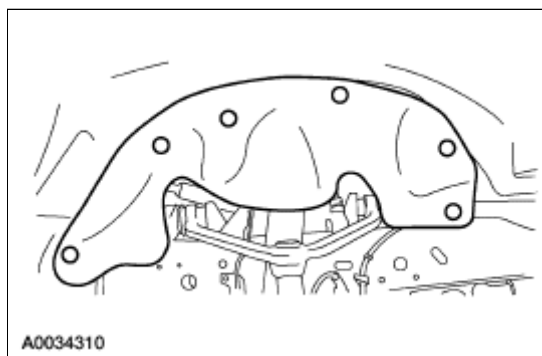
## Exhaust Manifold —RH

### Removal and Installation

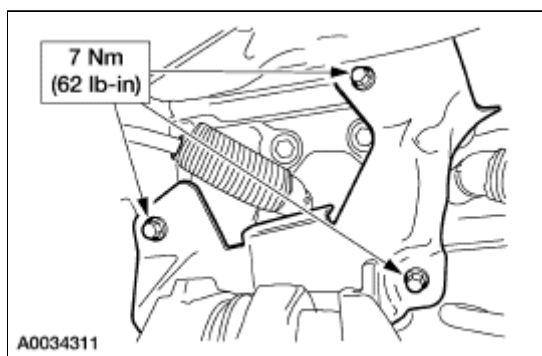
1. Disconnect the exhaust gas recirculation tube from the exhaust manifold.



2. Remove the right front tire. For additional information, refer to [Section 204-04](#).
3. Remove the wheel well splash shield.

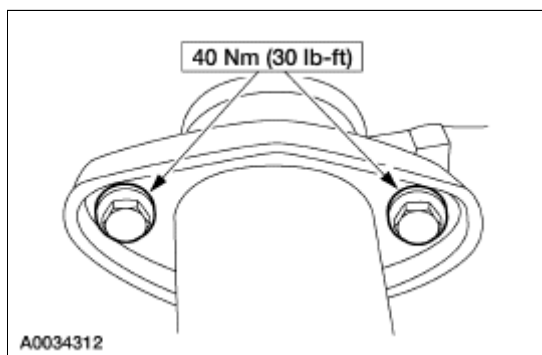


4. Remove the exhaust manifold heat shield.

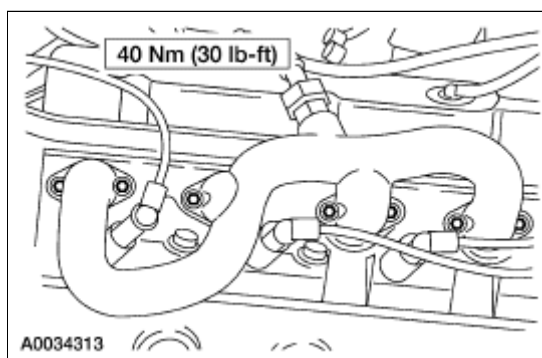


5. Remove the spark plug wires from the right side spark plugs. For additional information, refer to [Section 303-07C](#).

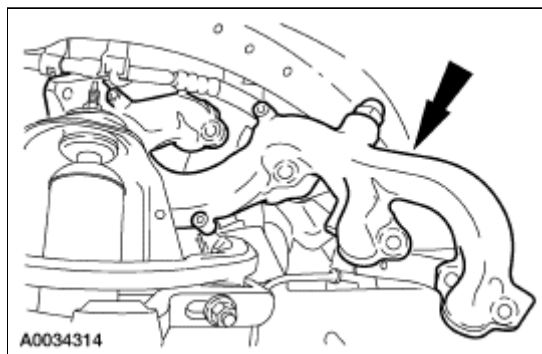
6. Remove the bolts.



7. Remove the bolts.



8. Remove the exhaust manifold and the gasket.



9. To install, reverse the removal procedure.
- Install a new gasket.
-





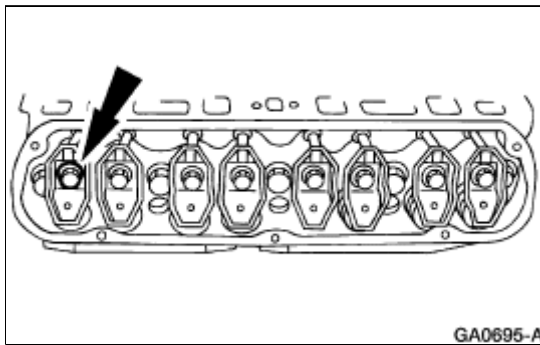
SECTION 303-01C: Engine — 5.0L  
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## Cylinder Head

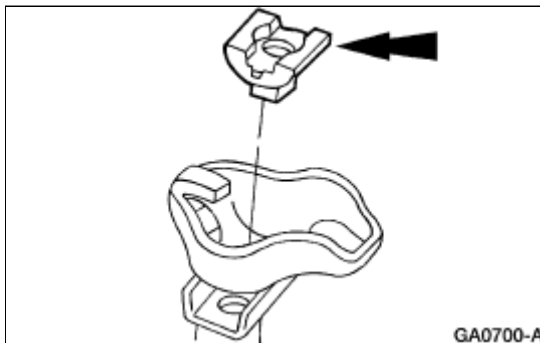
### Removal

1. Remove the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
2. Remove the valve covers. For additional information, refer to [Valve Cover—LH](#) or [Valve Cover—RH](#) in this section.
3. Remove the bolts.

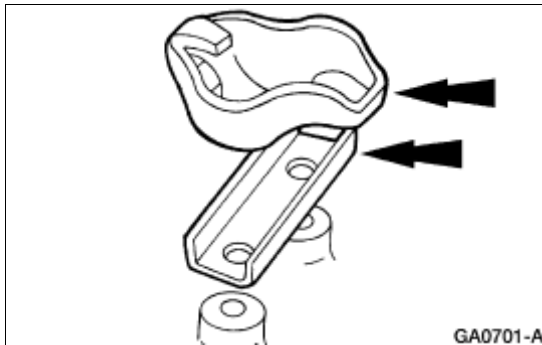


**NOTE:** Make sure to mark the rocker arms and the push rods so they will be installed in their original positions.

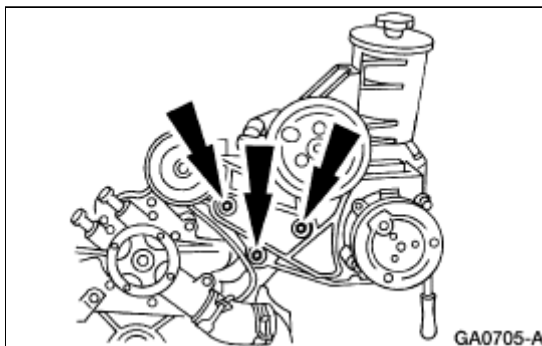
4. Remove the eight rocker arm fulcrums.



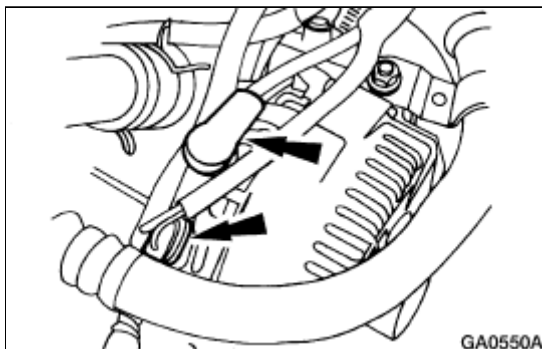
5. Remove the eight rocker arms and rocker arm fulcrum guides.



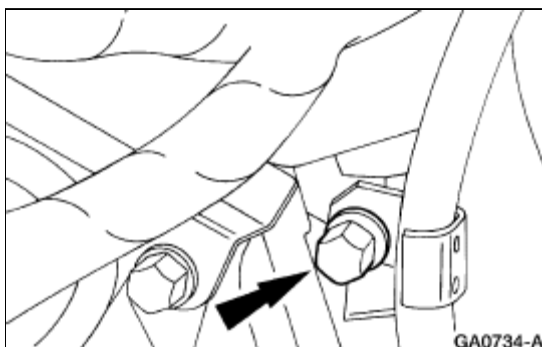
6. Remove the exhaust manifolds. For additional information, refer to [Exhaust Manifold—LH](#) or [Exhaust Manifold—RH](#) in this section.
7. Remove the bolts and remove the bracket (RH only).



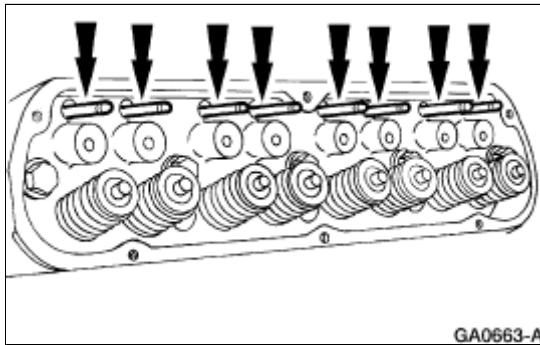
8. Disconnect the generator electrical connectors (RH only).



9. Remove the bolt retaining the transmission oil fill tube from the back of the RH cylinder head.



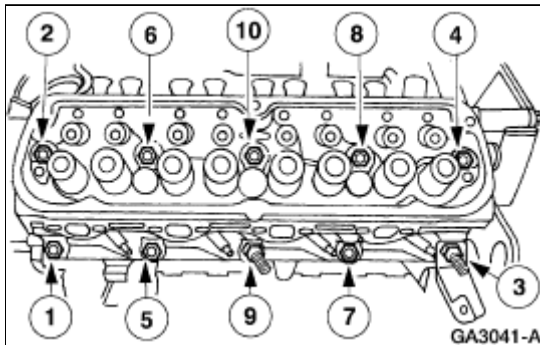
10. Remove the push rods and mark them so they can be installed in their original locations.



11. **NOTE:** Only the LH cylinder head is equipped with spark plug wire brackets.

Remove the bolts in the indicated sequence and remove the cylinder head.

- Discard the old bolts.



12. Clean and inspect the cylinder head surface. For additional information, refer to [Section 303-00](#).

### Installation

1. **NOTE:** A specially treated composition gasket is used. Do not apply a sealer to a composition gasket.

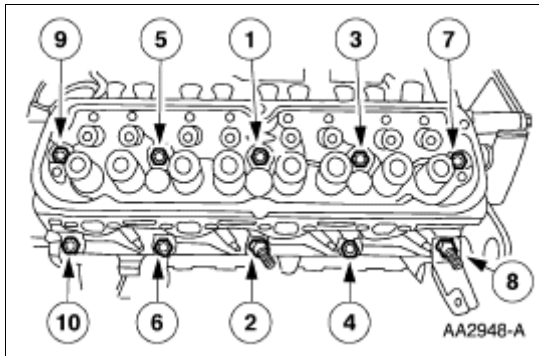
Use Metal Surface Cleaner F4AZ-19A536-RA or equivalent meeting Ford specification WSE-M5B392-A to clean the cylinder head, intake manifold, valve cover and head gasket surfaces.

2. Install the head gaskets.

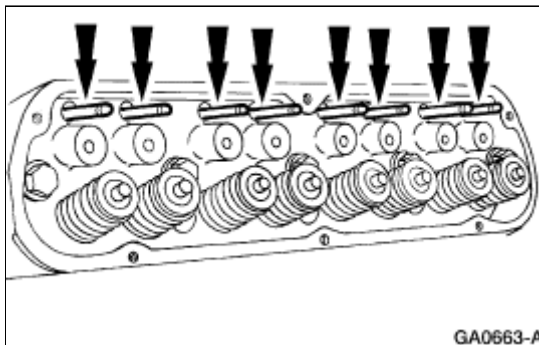
3. **NOTE:** Only the LH cylinder head is equipped with spark plug wire brackets.

Install the cylinder head on the head gasket and loosely install the new bolts.

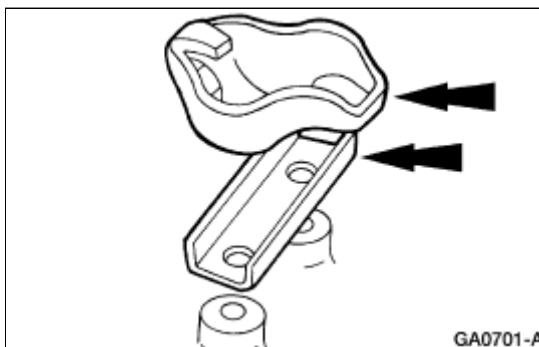
4. Tighten the bolts in three steps.
- Step 1: Tighten to 40 Nm (30 lb-ft).
  - Step 2: Tighten to 68 Nm (50 lb-ft).
  - Step 3: Tighten an additional 90 degrees.



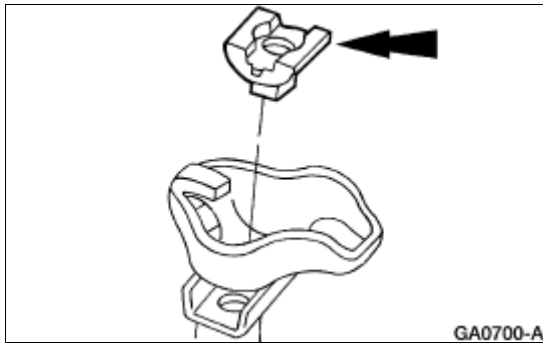
5. Lubricate and install the push rods in their original locations.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.



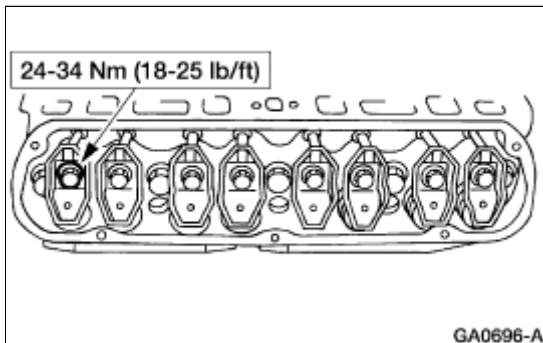
6. Apply engine oil to the top of the valve stem, rocker arm seats, and rocker arms.
  - Use Super Premium SAE 5W-30 Motor Oil XO5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
7. Install the eight rocker arms and rocker arm fulcrum guides.



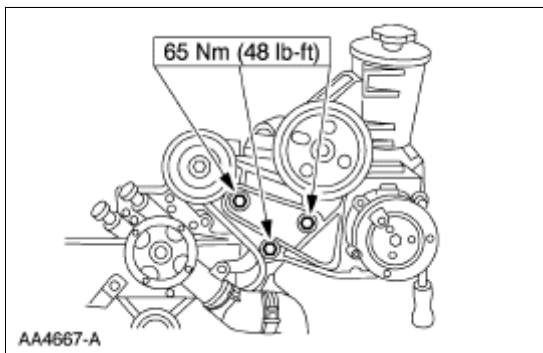
8. Install the eight rocker arm fulcrums.



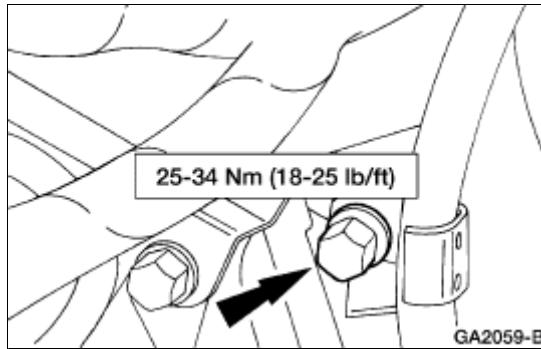
9. Install the bolts.



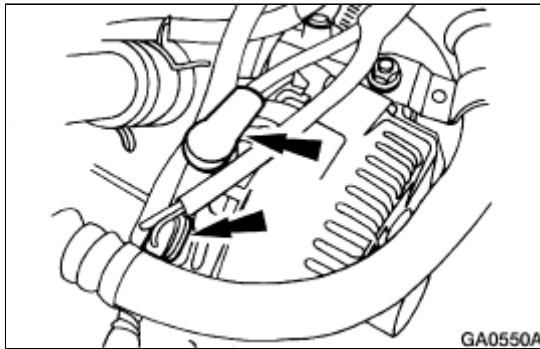
10. Check the valve clearance. For additional information, refer to [Section 303-00](#).
11. Install the valve cover on the side that is being repaired. For additional information, refer to [Valve Cover—LH](#) or [Valve Cover—RH](#) in this section.
12. Install the bracket and the bolts.



13. Install the bolt on the RH cylinder head.



14. Install the exhaust manifolds. For additional information, refer to [Exhaust Manifold—LH](#) or [Exhaust Manifold—RH](#) in this section.
15. Connect the generator electrical connectors (RH only).

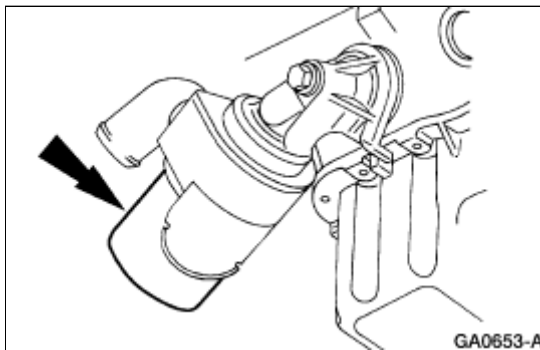


16. Install the lower intake manifold. For additional information, refer to [Intake Manifold—Lower](#) in this section.
-

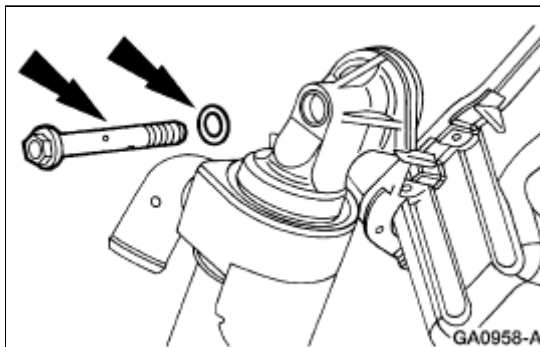
## Oil Cooler

### Removal

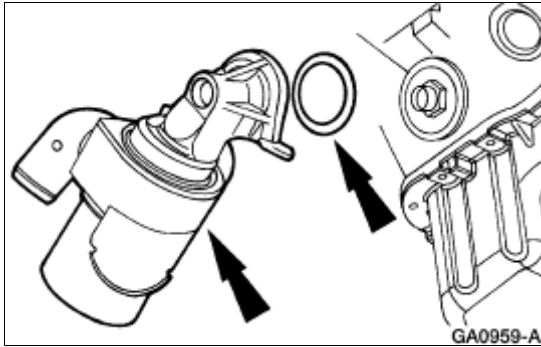
1. Remove the fan shroud. For additional information, refer to [Section 303-03](#).
2. Drain the engine cooling system. For additional information, refer to [Section 303-03](#).
3. Remove the oil filter (6731).



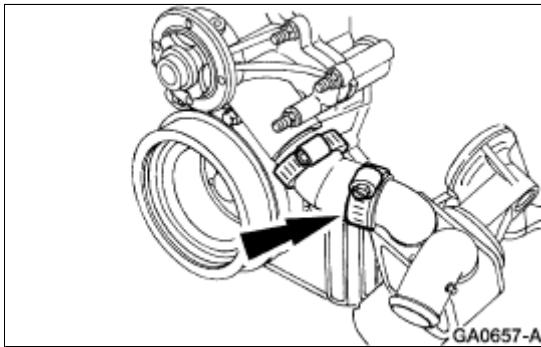
4. Disconnect the lower radiator hose from the oil cooler (6A642).
5. Remove the bolt and the O-ring.



6. Remove the oil cooler and the O-ring.



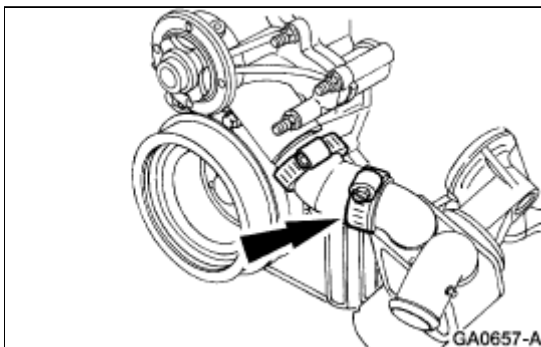
7. Disconnect the oil cooler from the water inlet hose.



8. Clean and inspect the surfaces of the cylinder block (6010) and the oil cooler.

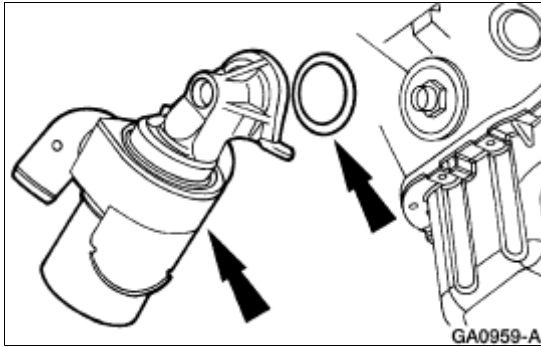
## Installation


1. Connect the oil cooler to the water inlet hose.



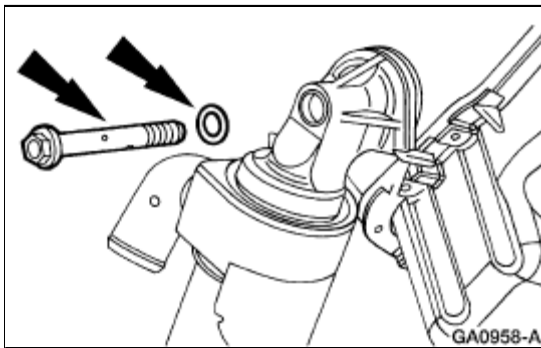
2. Position the oil cooler O-ring and install the oil cooler.



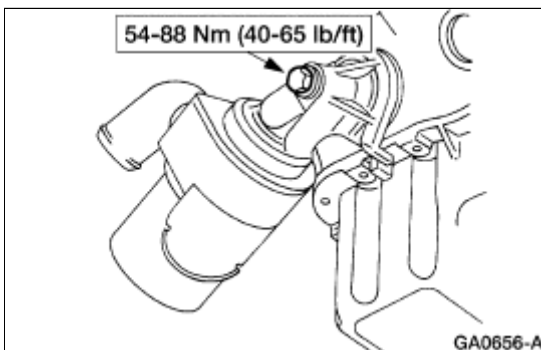


3.  **CAUTION:** Be sure to position the O-ring into the groove on the oil cooler. Failure to properly position the O-ring may crush the O-ring and cause an engine oil leak. Coat the O-ring with petroleum jelly to hold the O-ring in place during oil cooler bolt installation.

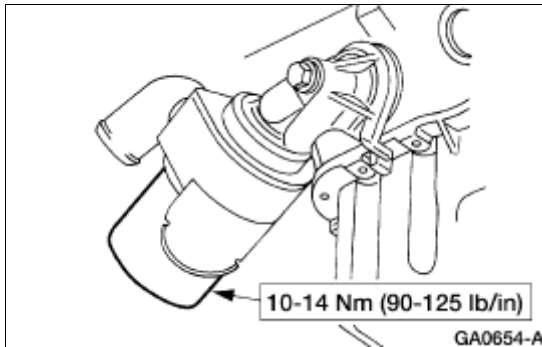
Install the bolt and O-ring.



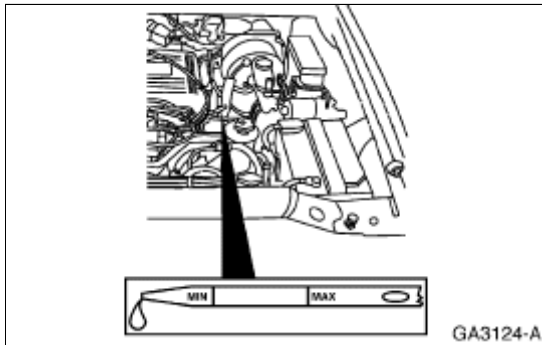
4. Tighten the bolt.



5. Connect the lower radiator hose (8286) to the oil cooler.
6. Install the oil bypass filter (6714).
- Coat oil filter gasket with Motorcraft Super Premium 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specifications WSS-M2C153-G and API Certification Mark.



7. Fill the engine cooling system. For additional information, refer to [Section 303-03](#).
8. Install the fan shroud. For additional information, refer to [Section 303-03](#).
9. Start the engine and run for two minutes. Stop the engine and allow the oil to drain back into the pan. Check the oil level and add as required. The oil level should read between the MIN and MAX lines.
  - Use clean engine oil meeting Ford specifications WSS-M2C153-G.





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IN-VEHICLE REPAIR

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## Oil Pan

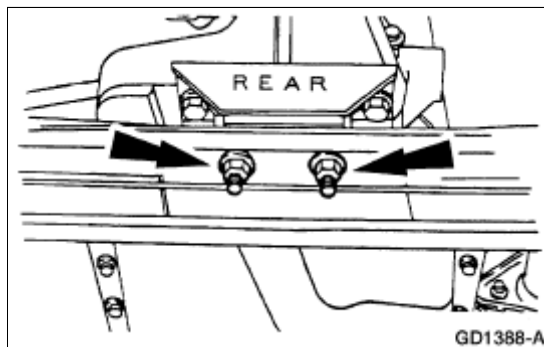
### Special Tool(s)

 ST2453-A	Axle Service Plugs Set 205-S358 (T95T-4850-A)
 ST1130-A	High-Lift Transmission Jack 014-00942

### Removal

#### All vehicles

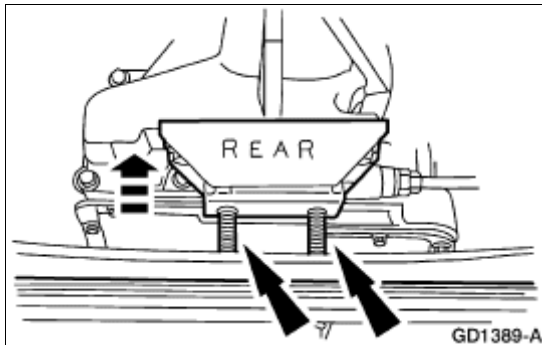
1. Disconnect battery ground cable. For additional information, refer to [Section 414-01](#).
2. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
3. Remove the nuts.



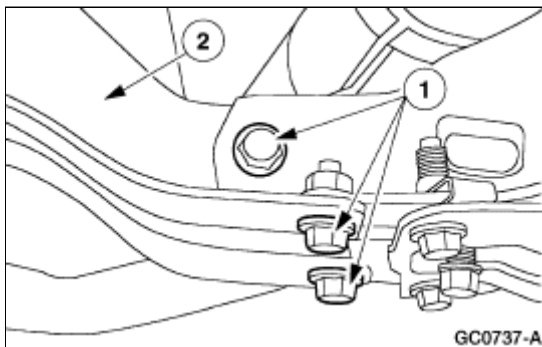
4.  **CAUTION:** Do not allow the transmission to hang freely.

Position the High-Lift Transmission Jack under the transmission.

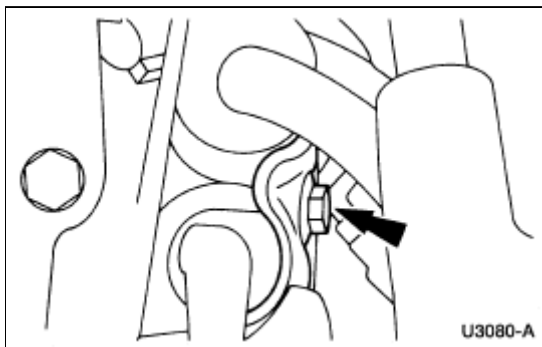
- Lift the transmission.



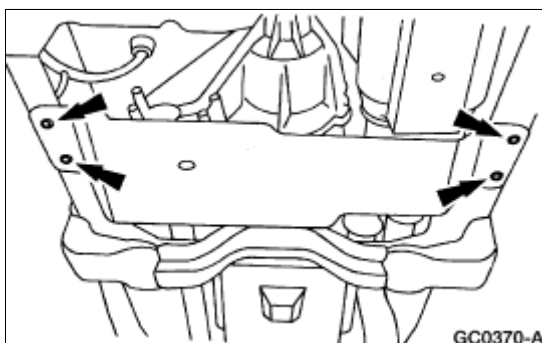
5. Remove the crossmember.
  1. Remove the six bolts.
  2. Remove the crossmember.



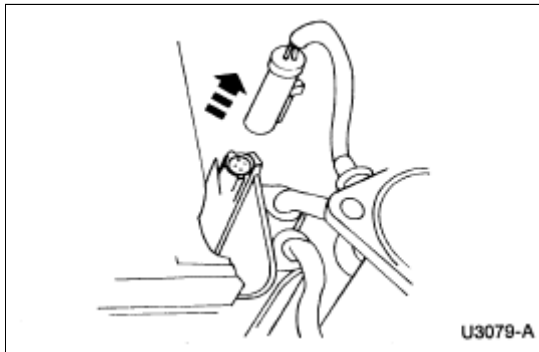
6. Remove the support insulator bracket.



7. Remove the transfer case skid plate, if equipped.

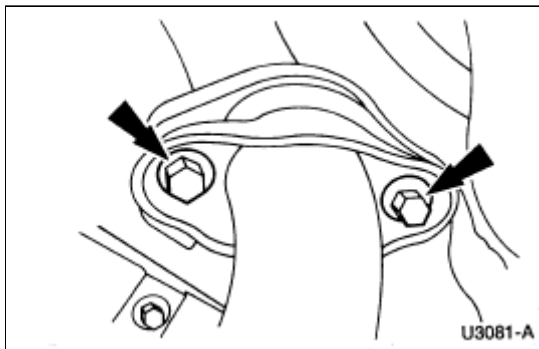


8. Disconnect the heated oxygen sensors (HO2S).

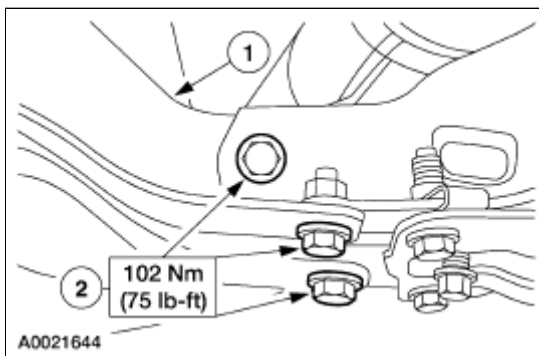


9. **NOTE:** The RH side is shown; the LH side is similar.

Remove the three-way catalytic converters (TWC).

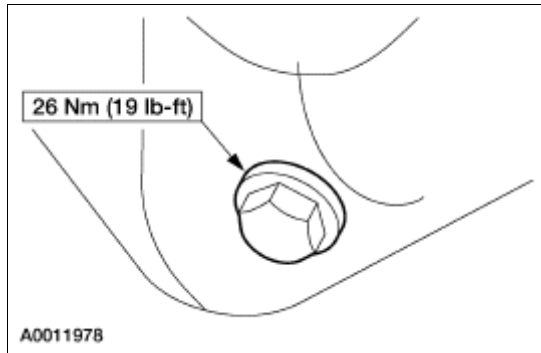


10. Install the crossmember.
1. Position the crossmember.
  2. Install the six bolts.

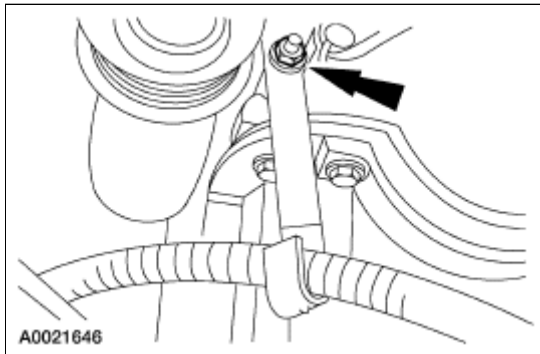


11. Lower the transmission onto the crossmember and position the High-Lift Transmission Jack aside.
12. **NOTE:** Place a suitable container under the oil pan.

Drain the engine oil and reinstall the drain plug.



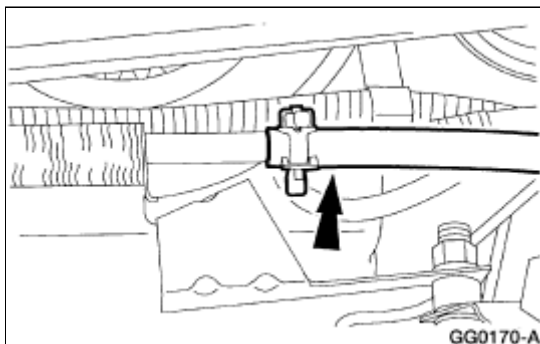
13. Remove the nut and position the bracket aside.



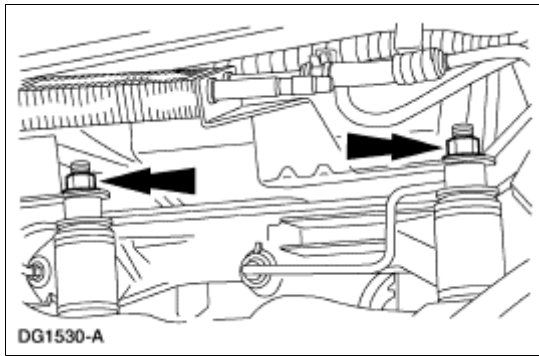
14. Lower the vehicle.
15. **NOTE:** Steering column must remain in the unlocked position.

Place the front wheels in the straight-ahead position.

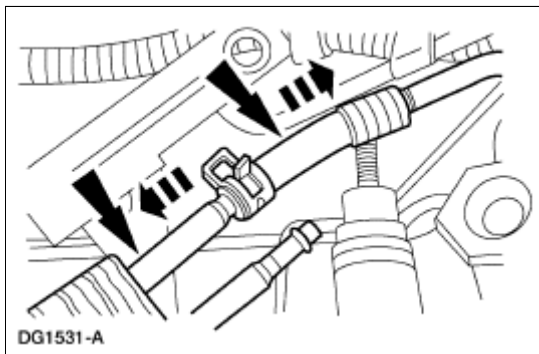
16. Raise and support the vehicle.
17. Disconnect the power steering return hose at the power steering fluid cooler.
- Allow the system to drain.



18. Remove the power steering fluid cooler-to-crossmember nuts.



19. Disconnect the power steering return hose. Remove the power steering fluid cooler.

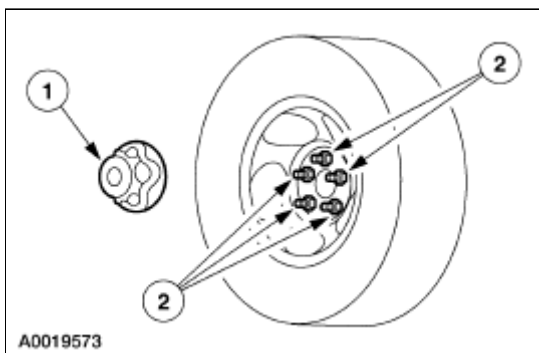


20.  **CAUTION:** Do not use heat to loosen a seized wheel nut. Heat can damage the wheel and wheel bearings.

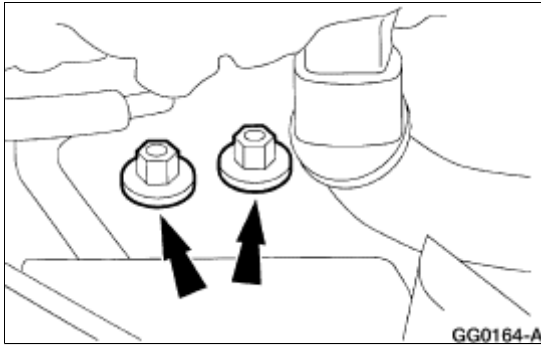
**NOTE:** To avoid damage or scratching to the center cap, place face up when removed.

Remove the front wheel and tire assemblies.

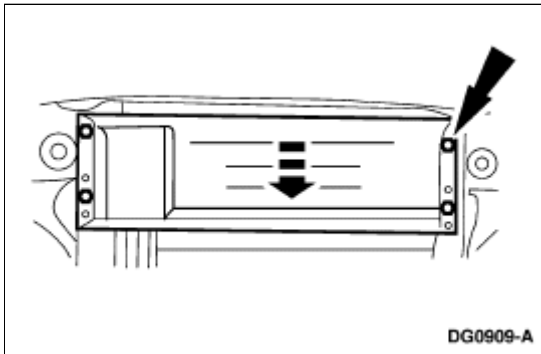
1. If necessary, remove the center cap.
2. Remove the nuts, and the wheel and tire assemblies.



21. Remove the inner fender splash shields.
22. Remove the top motor mount nuts.

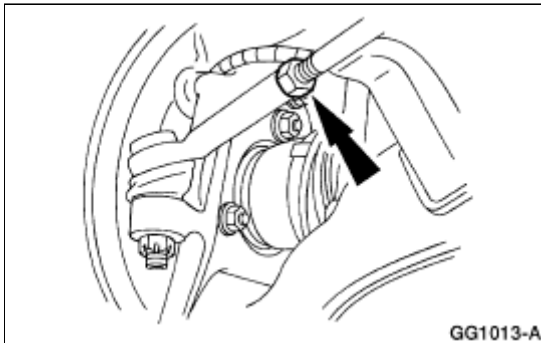


23. Remove the bolts and the radiator air deflector.



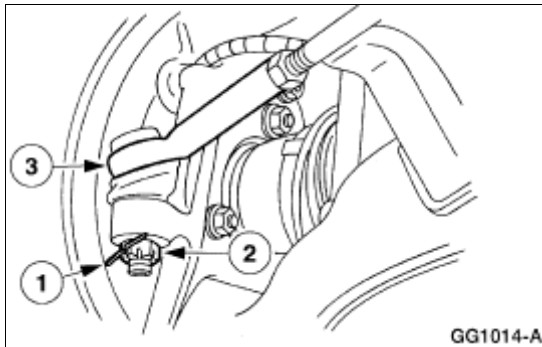
24. **NOTE:** LH tie-rod end shown, RH similar.

Loosen the tie-rod end jam nuts.



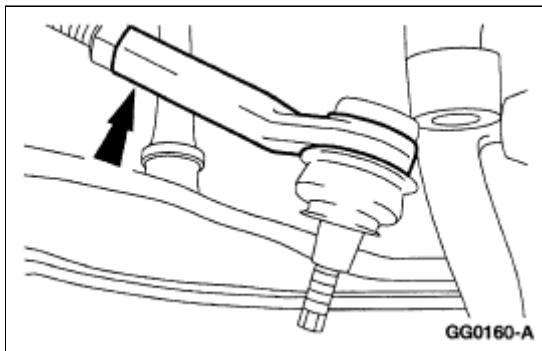
25. Disconnect the tie-rod ends.
1. Remove and discard the cotter pins.
  2. Remove the castellated nuts.
  3. Separate the tie-rod ends from the steering knuckles. Do not damage the tie-rod end seals.





26. Remove the LH tie-rod end.

- Count and record the number of turns required to remove the LH tie-rod end.

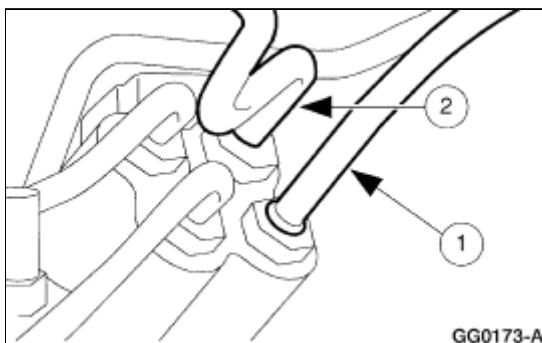


27. Remove the front stabilizer bar. For additional information, refer to [Section 204-01A](#) or [Section 204-01B](#).

- Mark the driver side end of the stabilizer bar for correct installation.

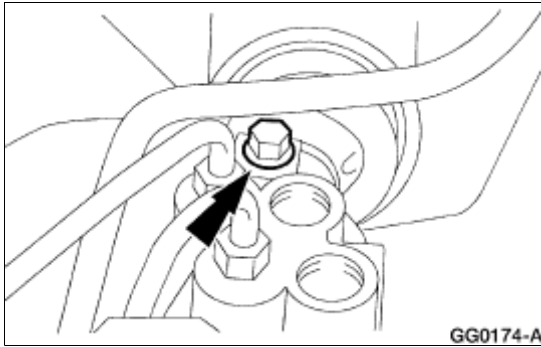
28. Disconnect the steering gear hoses.


1. Disconnect the power steering pressure hose.
2. Disconnect the power steering return hose.



29. Plug the ends of all fluid hoses removed and ports in the steering gear to prevent damage and entry of dirt.

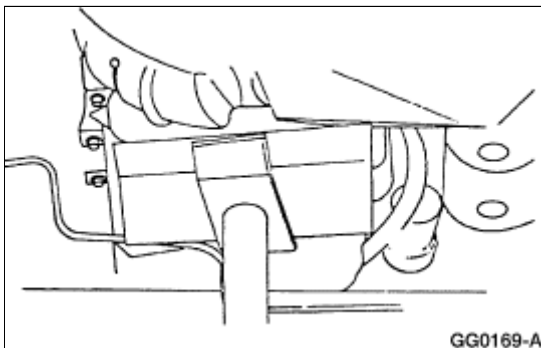
30. Rotate the steering column shaft to access the intermediate shaft pinch bolt. Remove the pinch bolt.



31. Lower the vehicle.
32. Turn the steering wheel back to the straight-ahead position. Turn the ignition key to the locked position.
33. Raise and support the vehicle.
34.  **CAUTION:** Do not rotate the steering wheel when the lower steering column shaft is disconnected, or damage to the air bag sliding contact will result.

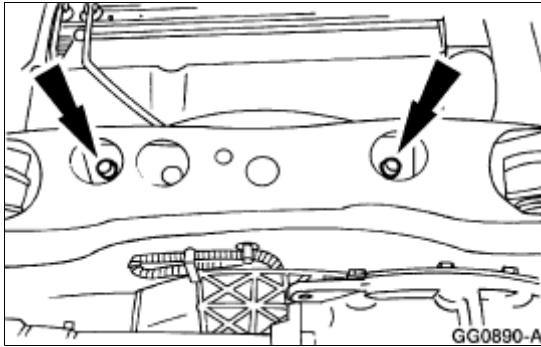
Disconnect the intermediate shaft from the steering gear input shaft.

35. Raise the engine.
  - Position a block of wood between a screw jack and the bottom of the oil pan to avoid damaging the oil pan while raising the engine.

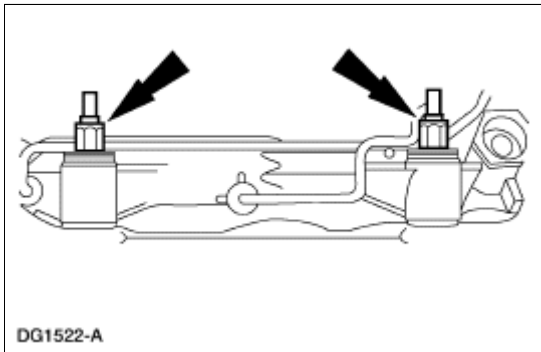


36.  **CAUTION:** Hold the tops of the steering gear-to-crossmember stud bolts to avoid damaging the steering gear fluid transfer tubes.

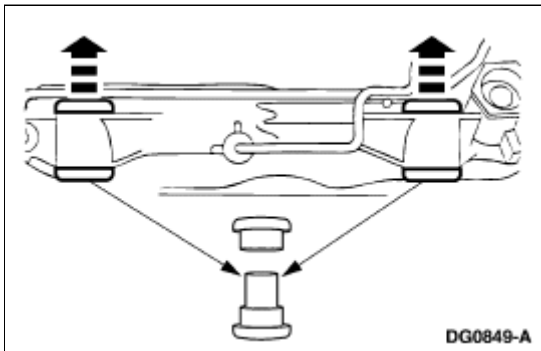
Remove the nuts.



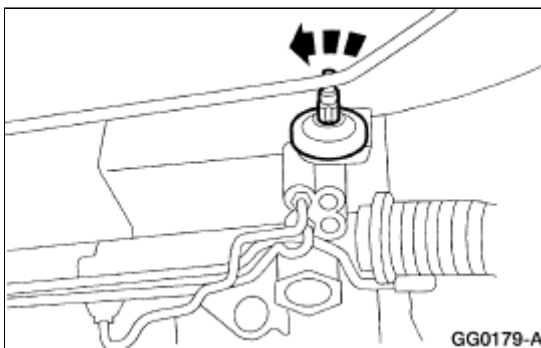
37. Remove the stud bolts and washers.



38. Remove the steering gear-to-crossmember insulator bushings.

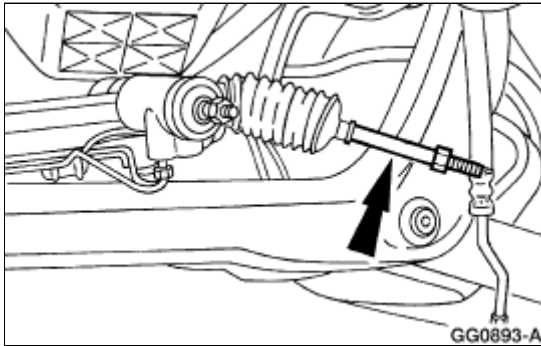


39. Turn the steering gear input shaft to the right until the stop is reached.

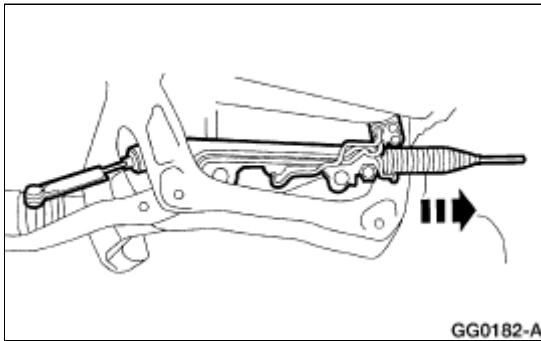


40. Move the steering gear as far to the RH side of the vehicle as possible.


41. Move the LH front wheel spindle tie-rod forward to clear the crossmember. Turn the steering gear input shaft to the left until the stop is reached.



42. Remove the steering gear from the vehicle.



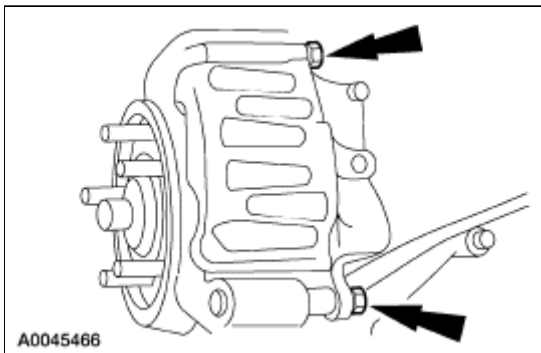
#### 4x4 vehicles

43.  **CAUTION:** Do not allow the calipers to hang by the hoses.

**NOTE:** Remove or tape the brake pads, to prevent them from falling out of the caliper guides.

**NOTE:** Install a wheel nut to secure each brake disc in place.

Remove the bolts and position both calipers aside.



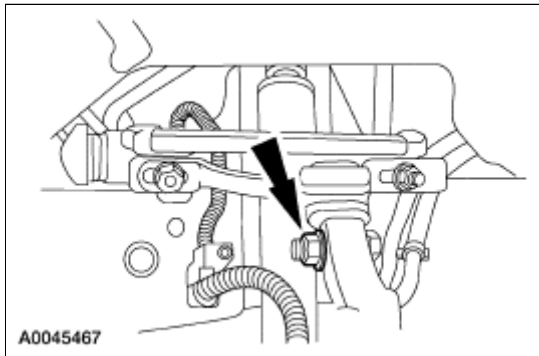
44. Unclip the left and right wheel anti-lock sensor wiring harnesses from the locators on the vehicle chassis, located above the stabilizer bar brackets.

45.  **CAUTION:** Do not allow the halfshafts to hang freely. It is possible to overextend and internally separate the inner CV joint.

 **CAUTION:** Take necessary precautions to protect the machined sealing surfaces on each axle.

Remove both pinch bolts and disconnect the upper ball joints.

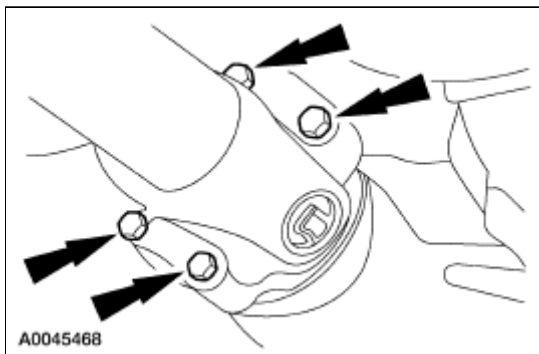
- Pull the RH halfshaft, with the wheel knuckle, away from the front axle until the halfshaft is out of the front axle.
- Pull the LH halfshaft, with the wheel knuckle, away from the front axle. The LH halfshaft cannot be removed from the front axle at this time.



46. **NOTE:** Tape the U-joint bearing caps to prevent them from falling off the U-joint.

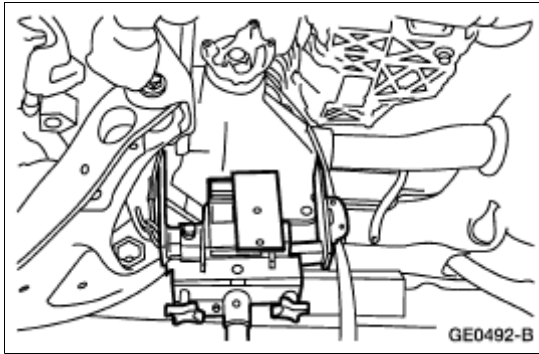
**NOTE:** Index-mark the front axle pinion flange to the front driveshaft.

Remove and discard the bolts and straps. Secure the driveshaft out of the way.

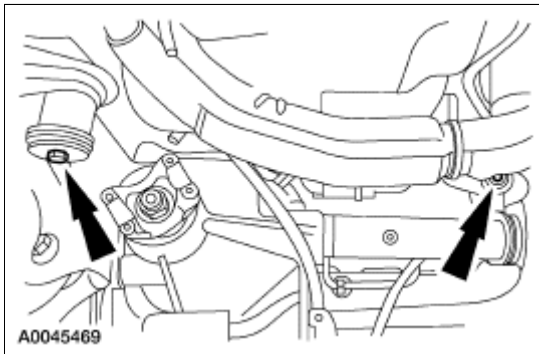


47. **NOTE:** Use the Axle Service Plugs Set T95T-4850-A to plug the axle openings.

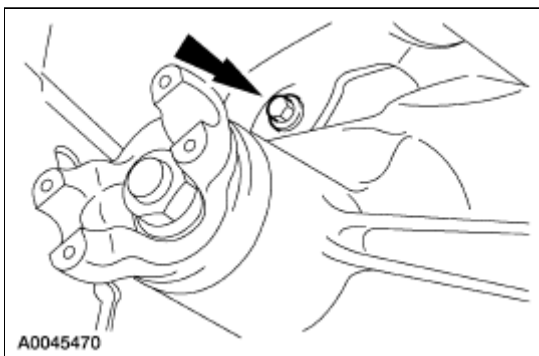
Secure the axle housing to a suitable lift.



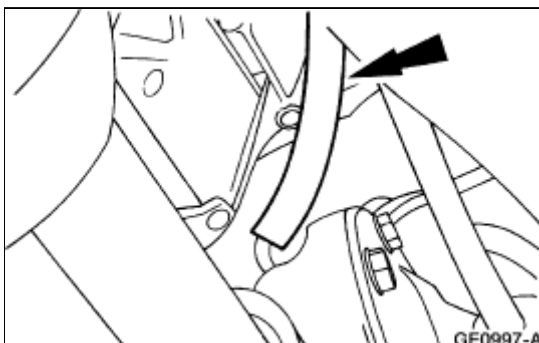
48. Remove and discard the bolts.



49. Remove the top front axle housing bolt, then lower the axle 25 mm (1 in) and move to the right 19 mm (0.75 in), guiding the LH axle halfshaft out of the axle.



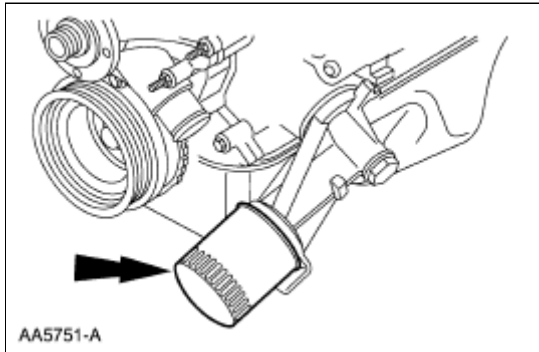
50. Disconnect the vent hose from the front axle housing.



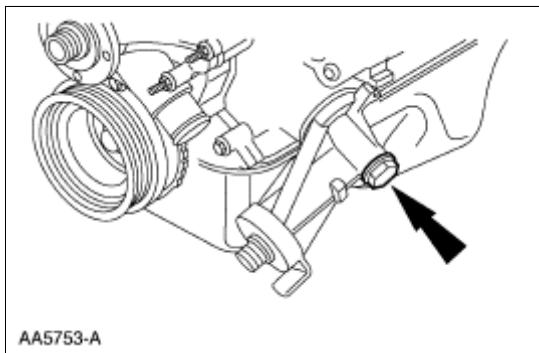
51. Lower the axle from the vehicle.

### All vehicles

52. Remove the oil filter assembly.

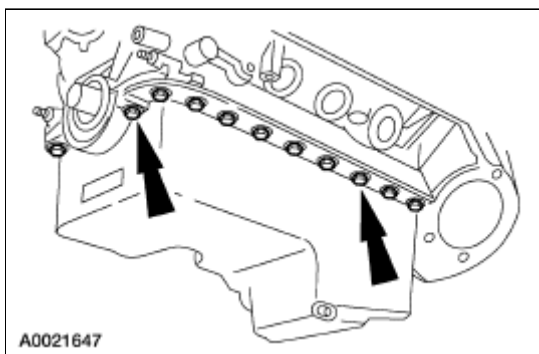


53. Position aside the oil bypass assembly.
- Remove the bolt and the O-ring seal.

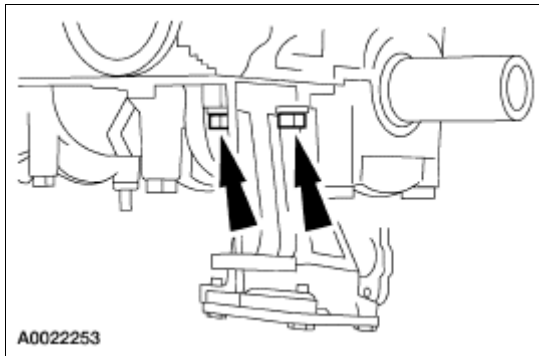


54. **NOTE:** Remove the oil pump and the oil pan as an assembly.

Remove the bolts and lower the oil pan.



55. Remove the bolts, lower the oil pump into the oil pan, and remove the oil pan.



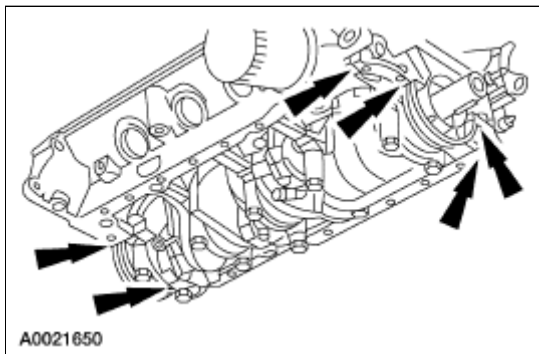
## Installation

### All vehicles

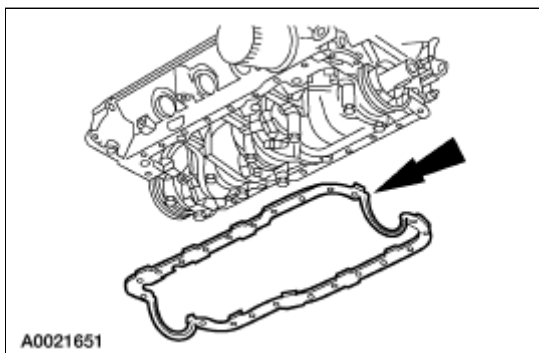
1. **NOTE:** The oil pan gasket must be installed within four minutes after applying the silicone.

Apply sealant in the six positions shown.

- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



2. Install the oil pan gasket.

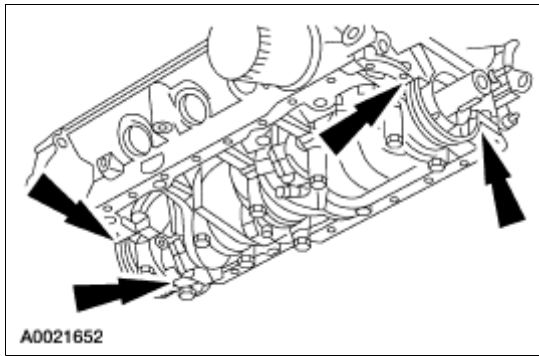


3. **NOTE:** The oil pan must be installed within four minutes after applying the silicone.

Apply sealant in the four positions shown:

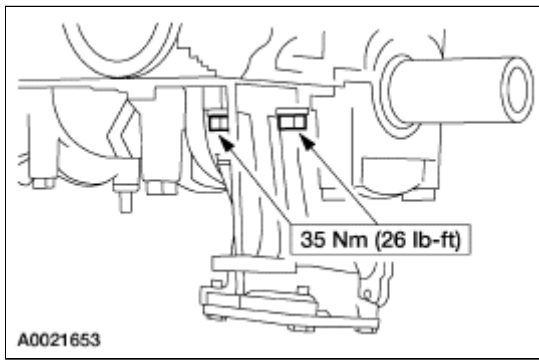
- Use Silicone Gasket and Sealant F7AZ-19554-EA or equivalent meeting Ford specification WSE-M4G323-A4.



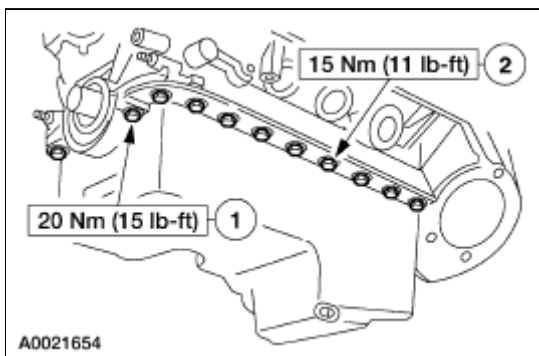


4. **NOTE:** The oil pan and the oil pump must be installed as an assembly.

Install the oil pump.



5. Install the oil pan and the reinforcement rails.
1. Tighten the four end bolts.
  2. Tighten the remaining 18 bolts.

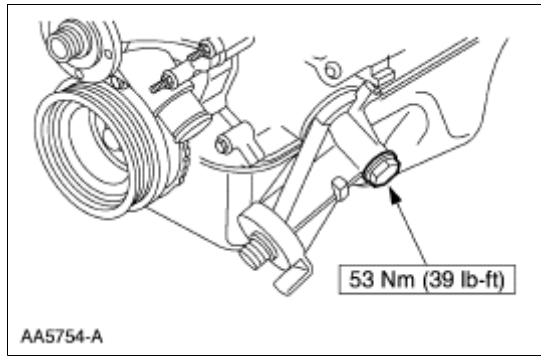


6.  **CAUTION:** Failure to properly position the O-ring seal can cause an engine oil leak.

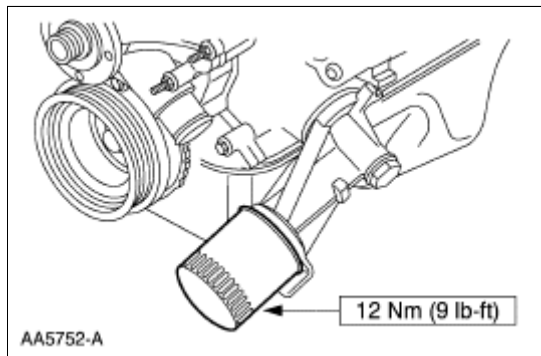
**NOTE:** Coat the O-ring seal with petroleum jelly to hold the O-ring in place during installation.

Install the oil bypass assembly.

- Position the O-ring seal into the groove on the adapter.
- Install the bolt.



7. Install the oil filter assembly.

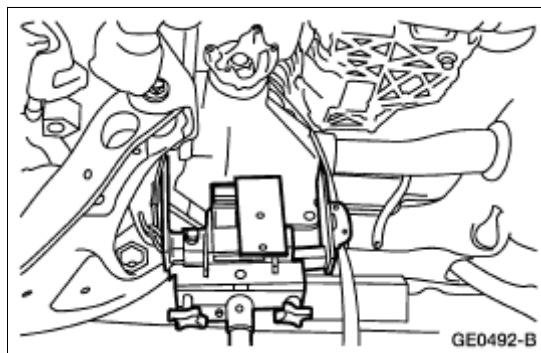


#### 4x4 vehicles

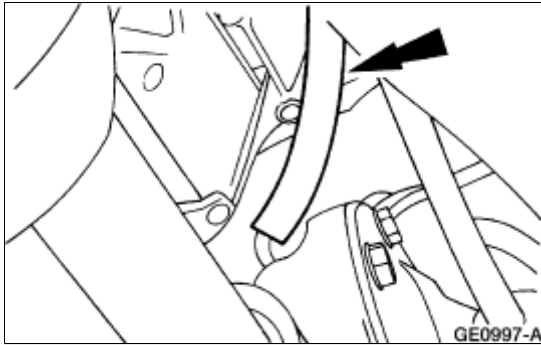
8. **NOTE:** Remove the plug set used to plug the axle openings.

Secure the front axle housing to a suitable lift.

9. Position the front axle close to the installed position.



10. Connect the vent hose to the front axle.




11.  **CAUTION: A new circlip must be installed on the end of the halfshaft.**

**NOTE:** LH halfshaft will not fully seat into the front axle at this time.

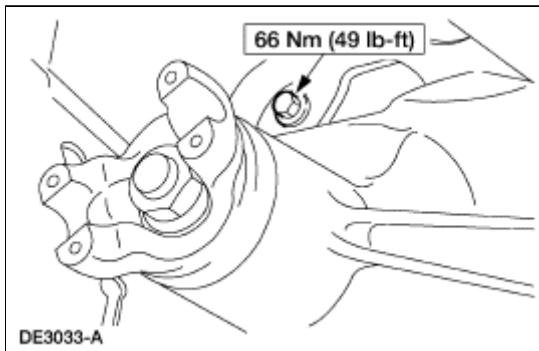
Guide the LH halfshaft into the front axle.

12. Raise the front axle to the fully installed position.

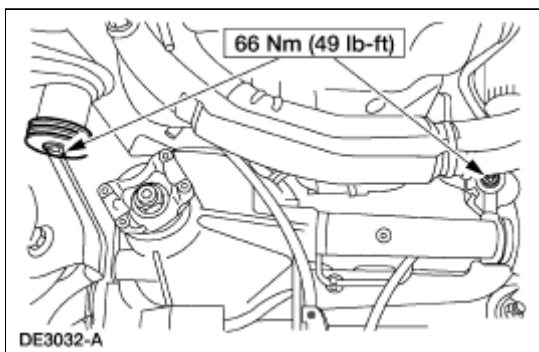
13.  **CAUTION: Make sure the halfshaft circlip fully seats.**

Completely install the LH halfshaft.


14. Install the front axle housing top bolt.



15. Using new bolts, install the remaining front axle housing bolts.

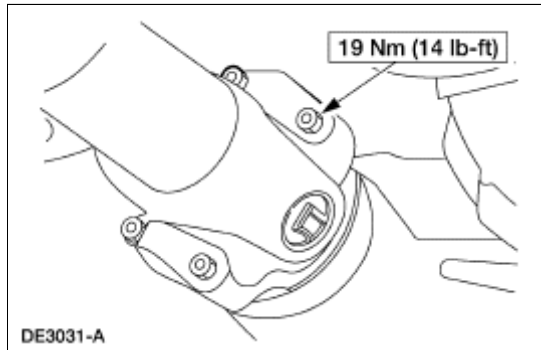


16.  **CAUTION:** A new circlip must be installed on the end of the halfshaft.

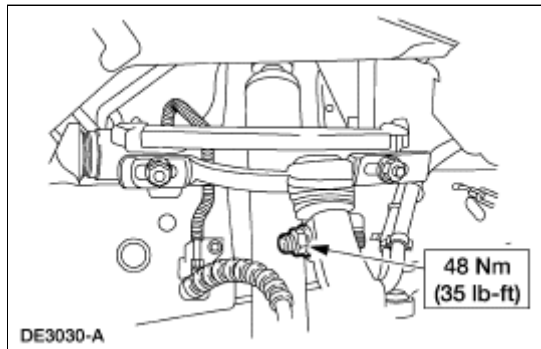
 **CAUTION:** Make sure the halfshaft circlip fully seats.

Install the RH halfshaft.

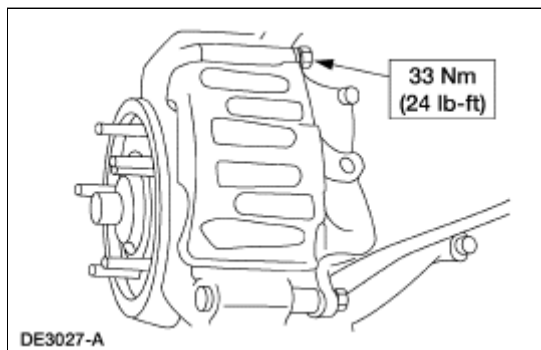
17. Using new bolts, install the front driveshaft.



18. Connect the upper ball joints and install the pinch bolts.

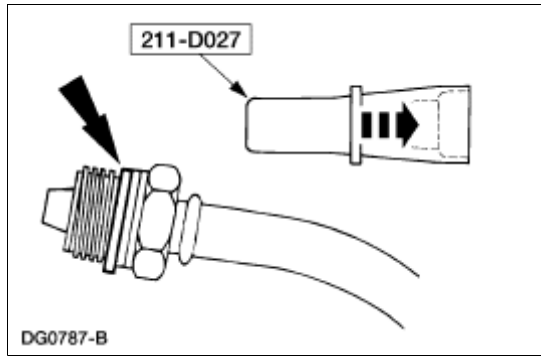


19. Install both front calipers.



### All vehicles

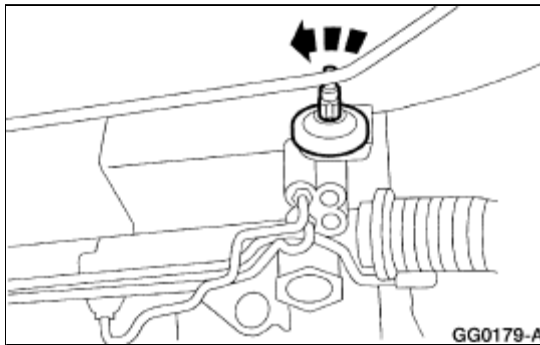
20. Using the special tool, install new seals on the power steering return hose and the power steering pressure hose.



21. **NOTE:** Make sure the steering gear input shaft is turned to the left until the stop is reached.

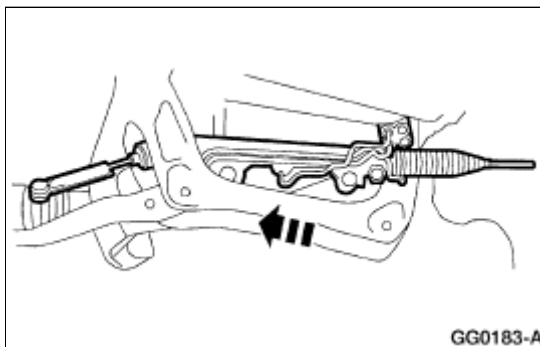
**NOTE:** Handle the steering gear with caution to avoid damage to fluid transfer tubes and to avoid dimples in the tie-rod boots.

Turn the steering gear input shaft to the right until the stop is reached. Note the number of turns required.

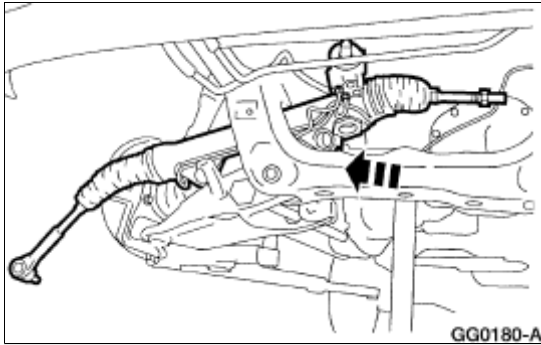


22. **NOTE:** Make sure the steering gear control valve housing is turned toward the front of the vehicle.

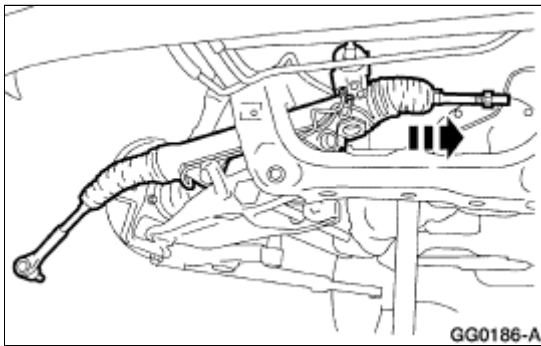
Install the steering gear into the RH opening of the crossmember.



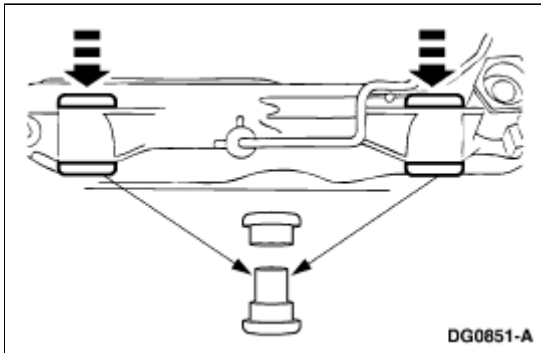
23. Move the steering gear as far to the RH side of the vehicle as possible.



24. Move the LH front wheel spindle tie-rod into the opening in the crossmember and move the steering gear into position.

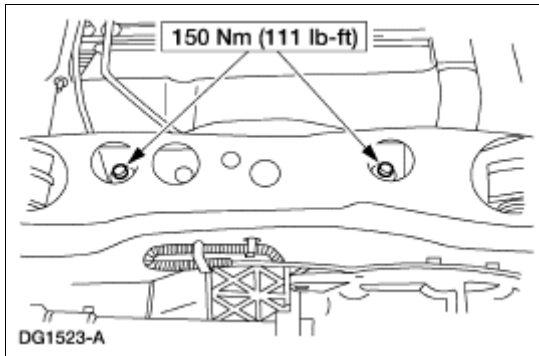


25. To place the steering gear in the straight ahead position, turn the steering gear input shaft to the left by half the number of turns recorded previously.
26. Install the steering gear-to-crossmember insulator bushings as shown.
- The large end of the metal sleeve must be positioned downward.
  - Check that the mounting surfaces on the crossmember are clean and free of debris.



27. Install the steering gear-to-crossmember washers and stud bolts.
- For additional information on correct mounting hardware orientation, refer to [Section 211-02](#).
28. **CAUTION:** Hold the tops of the steering gear-to-crossmember stud bolts to avoid damaging the steering gear fluid transfer tubes.

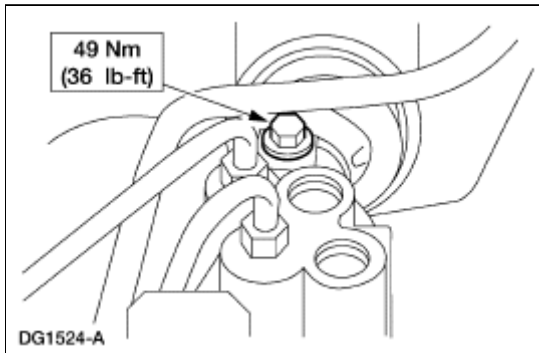
Install the nuts.



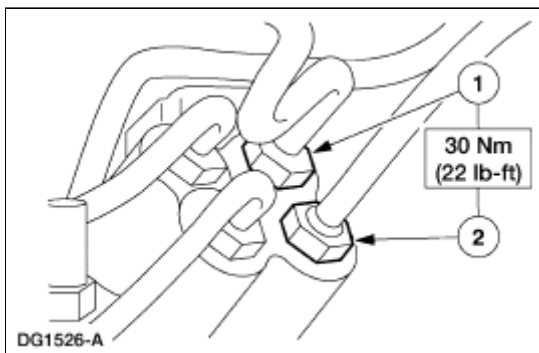
29. Lower the engine.

30.  **CAUTION:** Do not rotate the steering wheel when the lower steering column shaft is disconnected, or damage to the clockspring will result.

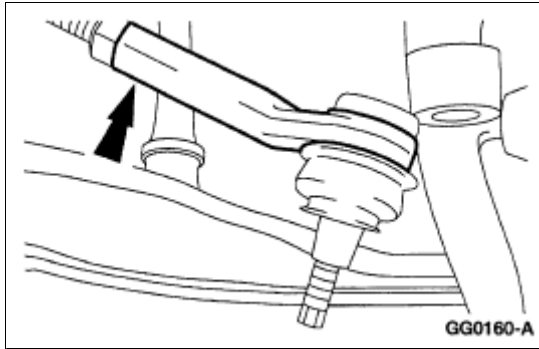
Connect the intermediate shaft to the steering gear input shaft. Install the pinch bolt.



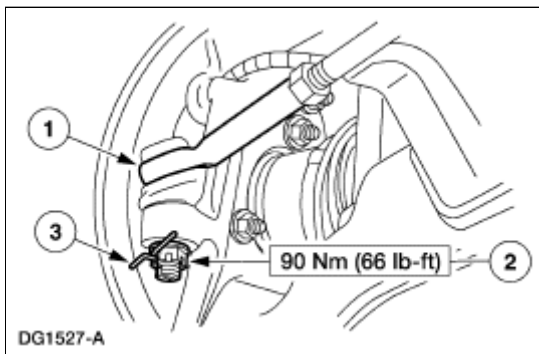
31. Connect the steering gear hoses.
- Connect the power steering return hose.
  - Connect the power steering pressure hose.



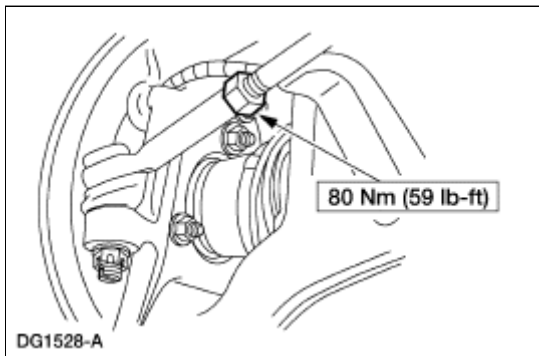
32. Install the front stabilizer bar. For additional information, refer to [Section 204-01A](#) or [Section 204-01B](#).
- Position the front stabilizer bar as noted during removal.
33. Install the tie-rod end.
- Rotate the tie-rod end the number of turns recorded during removal.



34. Connect the tie-rod ends to the steering knuckles.
1. Position the tie-rod ends to the steering knuckles.
  2. Install the castellated nuts.
  3. Install the new cotter pins.
    - Check that the brake dust shields are not bent and are not in contact with the outer tie-rod boot seals.

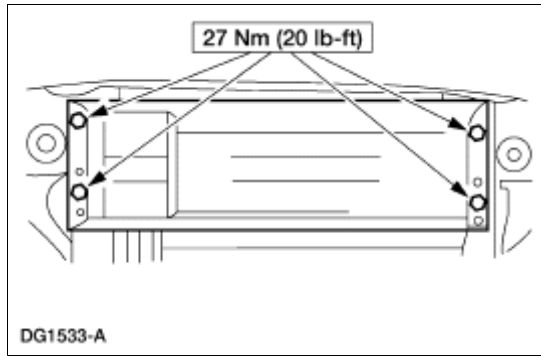


35. Tighten the LH tie-rod end jam nut.

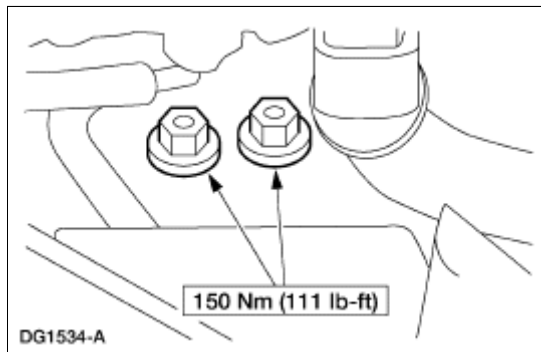


36. Install the radiator air deflector.

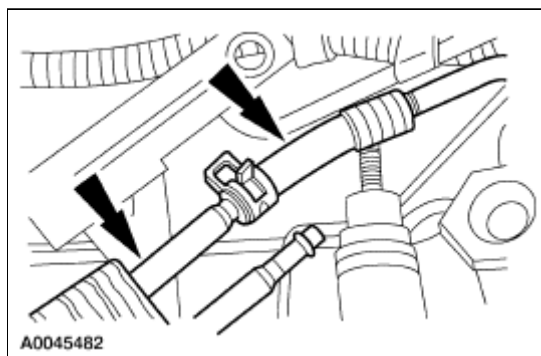




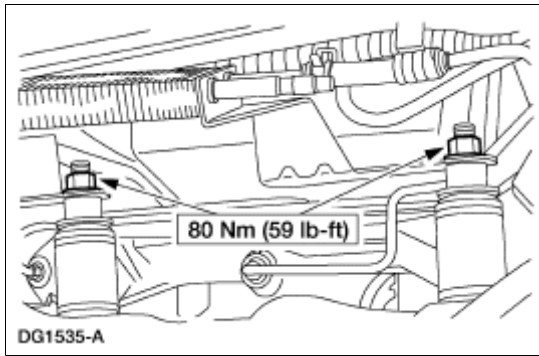
37. Install the top engine mount nuts.



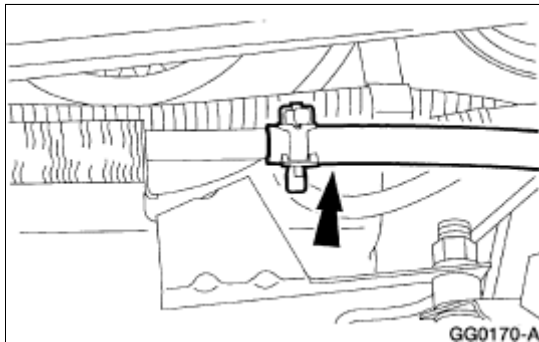
38. Install the inner fender splash shields.
39. Install the front wheel and tire assemblies. For additional information, refer to [Section 204-04](#).
40. Install the power steering fluid cooler and connect the power steering return hose.



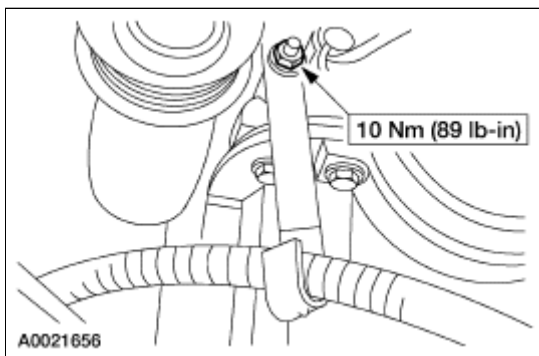
41. Install the power steering fluid cooler crossmember nuts.



42. Connect the power steering return hose.



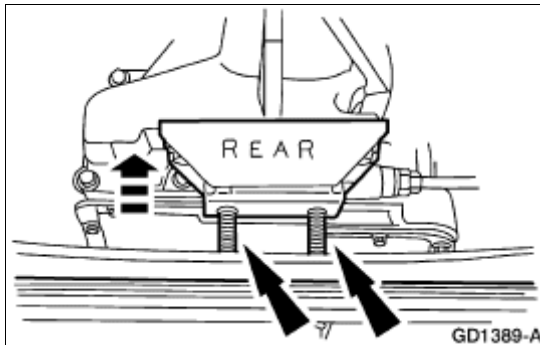
43. Install the wire harness and bracket.



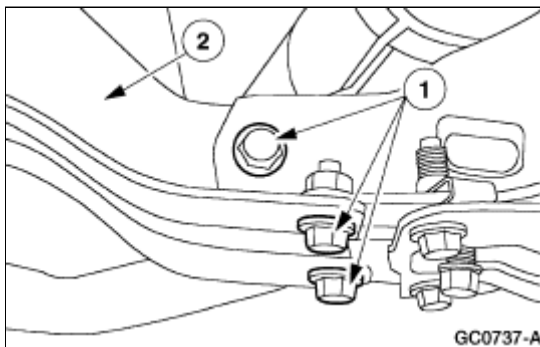
44.  **CAUTION: Do not allow the transmission to hang freely.**

Position the High-Lift Transmission Jack under the transmission.

- Lift the transmission.

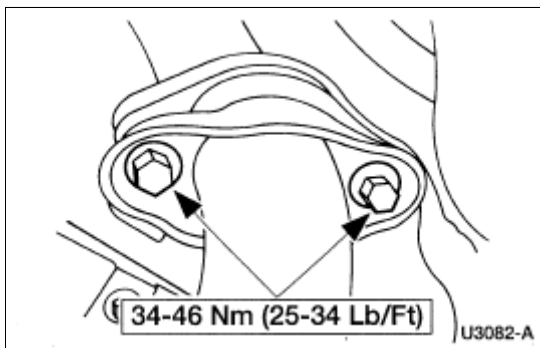


45. Remove the crossmember.
1. Remove the six bolts.
  2. Remove the crossmember.

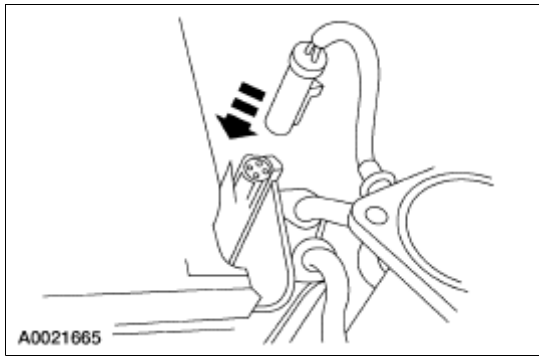


46. **NOTE:** The RH side is shown; the LH side is similar.

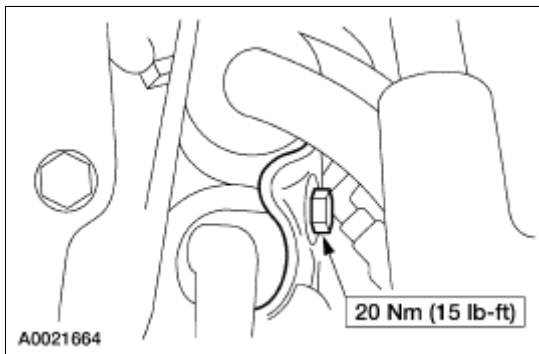
Install the three-way catalytic converter (TWC).



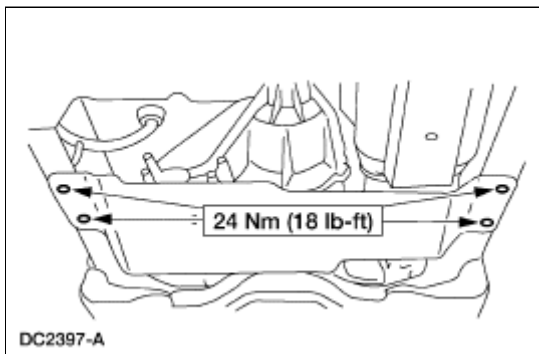
47. Connect the heated oxygen sensors (HO2S).



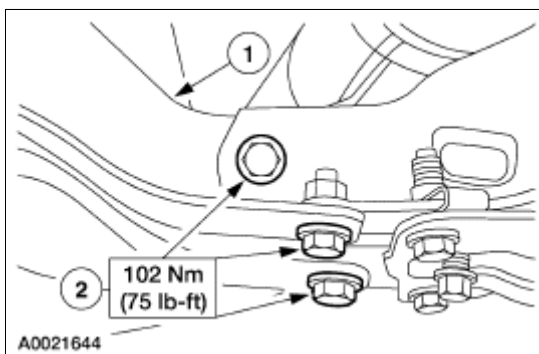
48. Install the support insulator bracket.



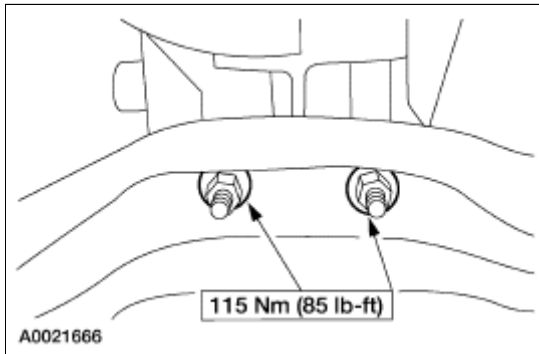
49. Install the transfer case skid plate, if equipped.



50. Install the crossmember.
1. Position the crossmember.
  2. Install the six bolts.



51. Lower the transmission onto the crossmember and install the nuts.



52. Position the High-Lift Transmission Jack aside.
53. Lower the vehicle.
54. Fill the engine crankcase with clean oil meeting Ford specification WSS-M2C153-G.
55. Fill and leak check the power steering system. For additional information, refer to [Section 211-00](#).
56. Connect the battery ground cable.
-

SECTION 303-01C: Engine — 5.0L  
IN-VEHICLE REPAIR

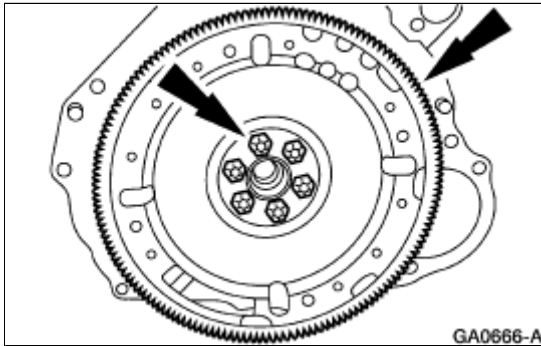
2000 Explorer/Mountaineer Workshop Manual

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## Flywheel

### Removal

1. Remove the transmission. For additional information, refer to [Section 307-01B](#).
2. Remove and discard the bolts. Remove the flywheel.

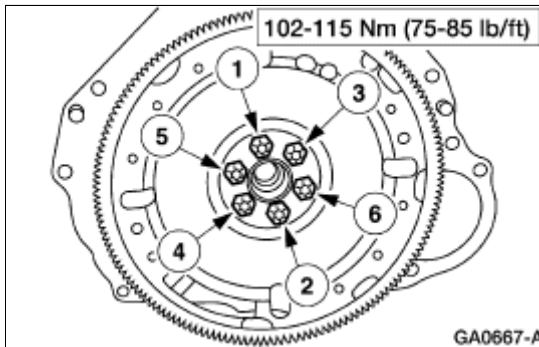


3. Clean and inspect the flywheel. For additional information, refer to [Section 303-00](#).

### Installation

1. **NOTE:** Sealant must be removed from the bolt holes prior to reassembly.

Position the flywheel and install new bolts.



2. Install the transmission. For additional information, refer to [Section 307-01B](#).
-

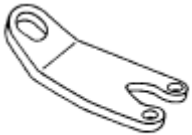

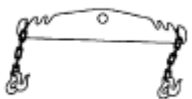


SECTION 303-01C: Engine — 5.0L  
REMOVAL

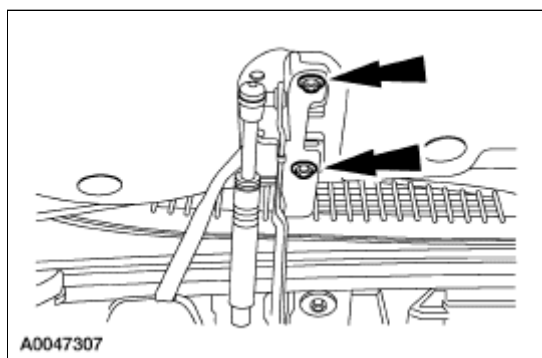
2000 Explorer/Mountaineer Workshop Manual

## Engine

### Special Tool(s)

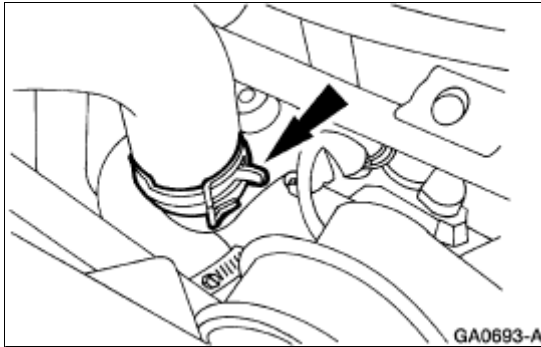
 ST1621-A	5.0L Lifting Bracket 303-D096 (D94P-6001-B) or equivalent
 ST2352-A	Spring Lock Coupling Disconnect Tool Set 412-039 (T84L-19623-B)
 ST1602-A	Spreader Bar 303-D089 (D93P-6001-A3) or equivalent

1. Remove the hood.

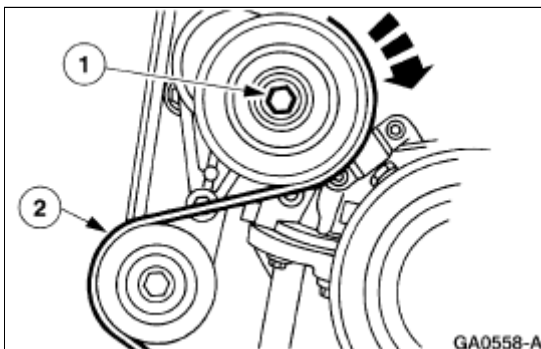


2. Remove the battery. For additional information, refer to [Section 414-01](#).
3. Drain the engine cooling system. For additional information, refer to [Section 303-03](#).
4. Disconnect the upper radiator hose.

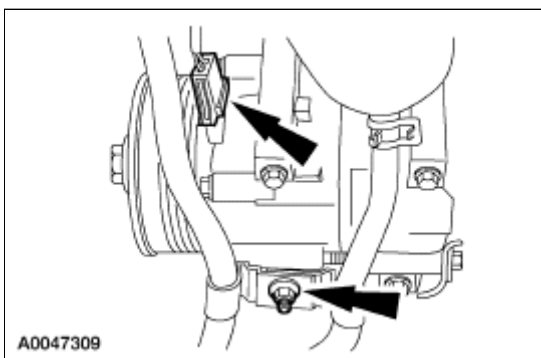




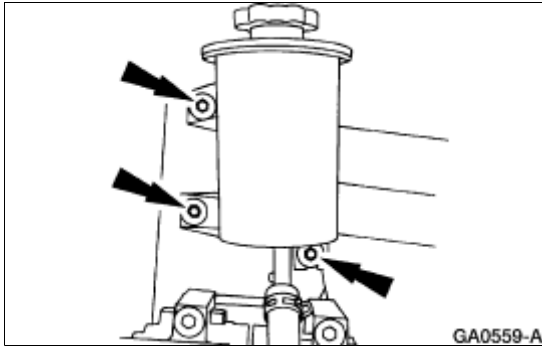
5. Remove the fan shroud. For additional information, refer to [Section 303-03](#).
6. Discharge and recover the air conditioning system. For additional information, refer to [Section 412-00](#).
7. Remove the drive belt.
  1. Rotate the drive belt tensioner clockwise.
  2. Remove the drive belt.



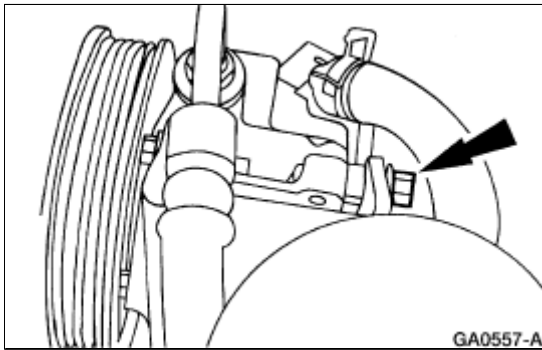
8. Disconnect the A/C clutch electrical connector and remove the power steering hose clamp.



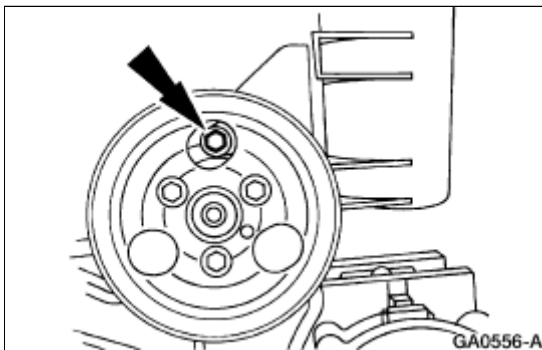
9. Remove the bolts and position the power steering reservoir aside.



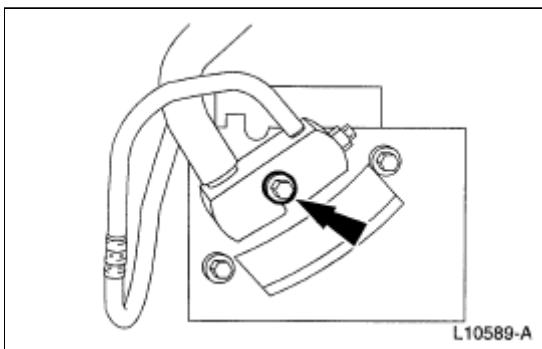
10. Remove the rear power steering pump bolt.



11. Remove the three bolts and position the power steering pump aside.

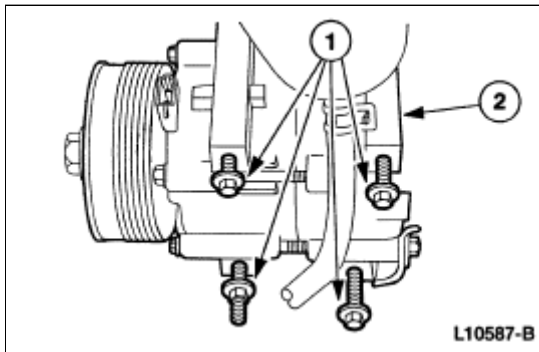


12. Remove the A/C manifold from the A/C compressor.

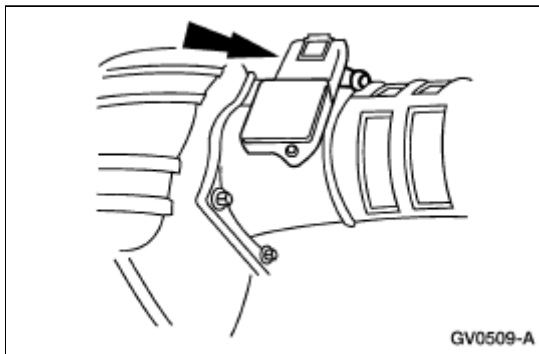


13. Remove the A/C compressor.

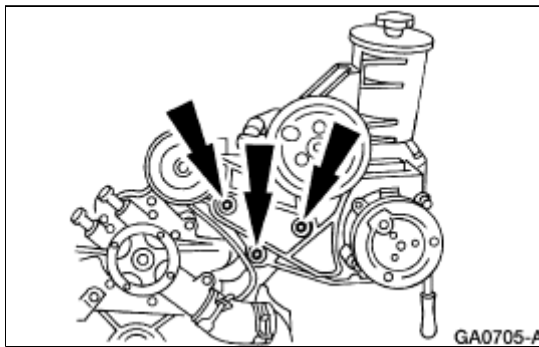
1. Remove the bolts.
2. Lift out the A/C compressor.



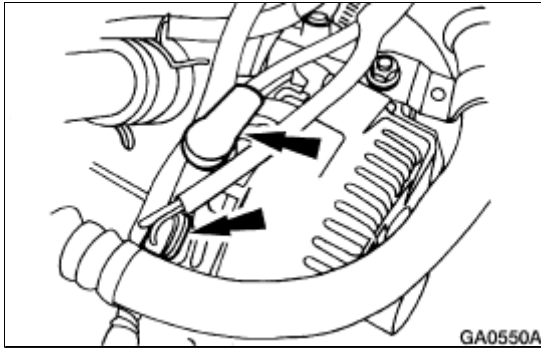
14. Disconnect the mass airflow (MAF) sensor electrical connector.



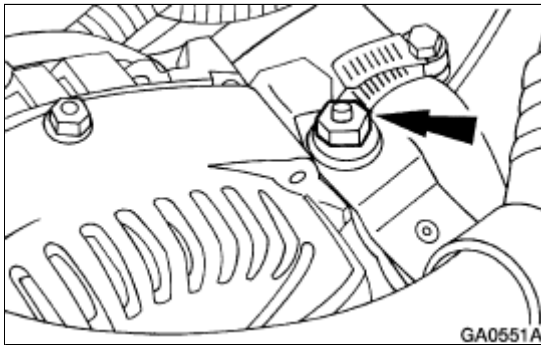
15. Remove the bolts and remove the bracket.



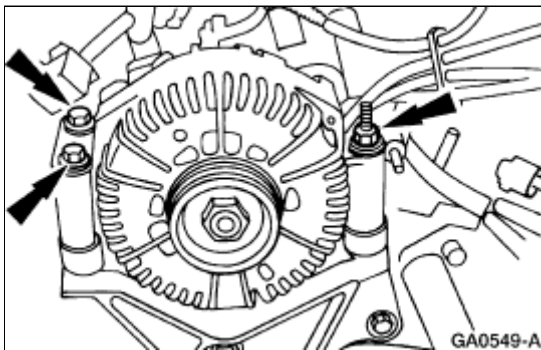
16. Disconnect the generator electrical connections.



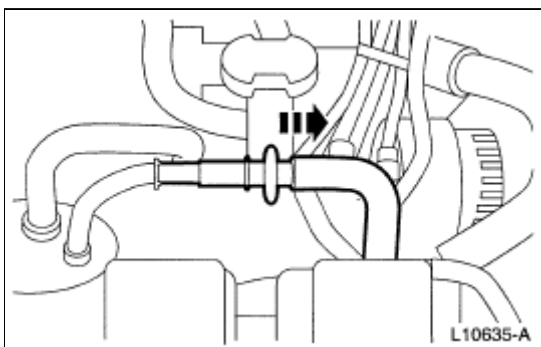
17. Remove the nut on the generator stud.



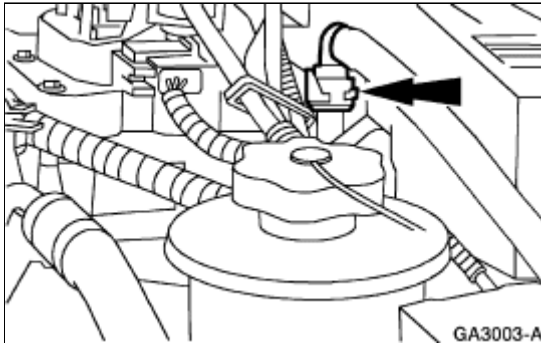
18. Remove the bolts and remove the generator.



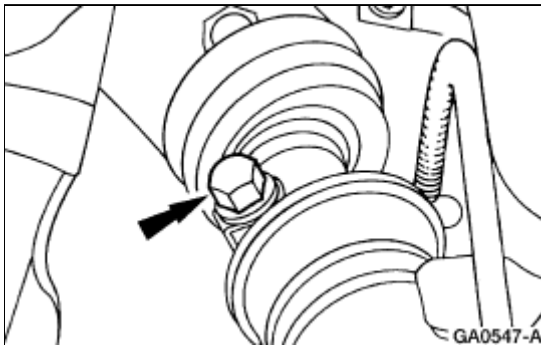
19. Using special tool 412-039, disconnect the A/C manifold and tube spring lock coupling from the suction accumulator/drier.



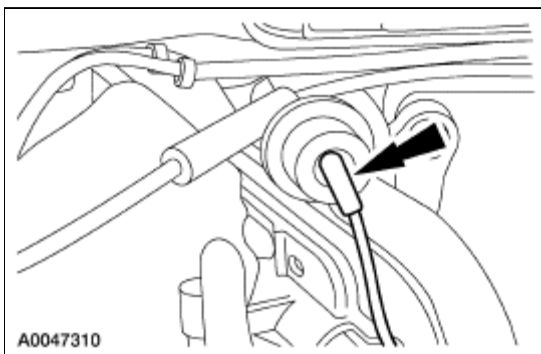
20. Disconnect the fuel lines at the spring lock couplings. For additional information, refer to [Section 310-00](#).
21. Disconnect the evaporative emissions (EVAP) canister purge solenoid hose.



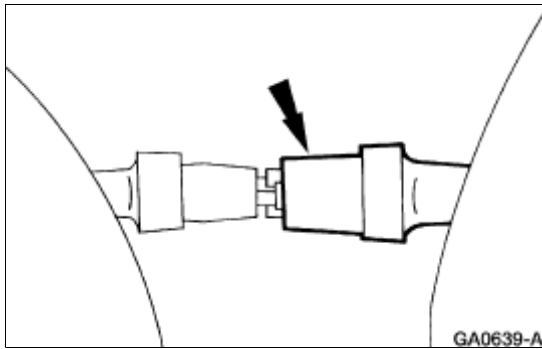
22. Remove the bolt and position the lower steering column shaft aside.



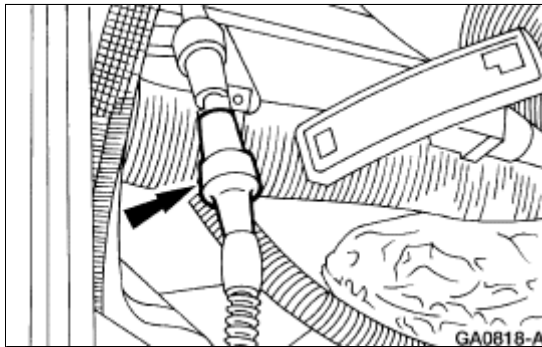
23. Disconnect the heater control valve vacuum hose.



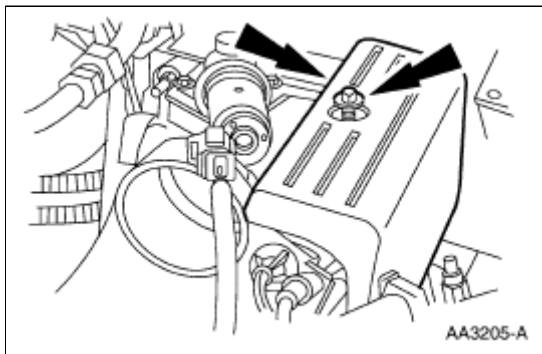
24. Disconnect the RH vacuum connection.



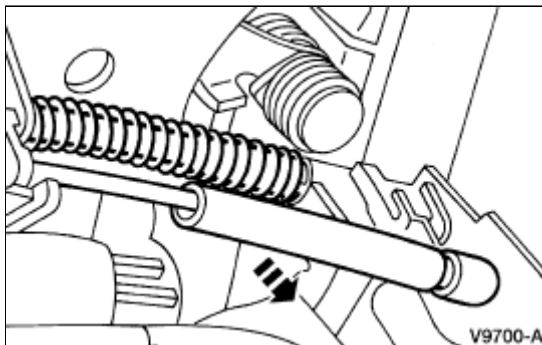
25. Disconnect the LH vacuum connection.



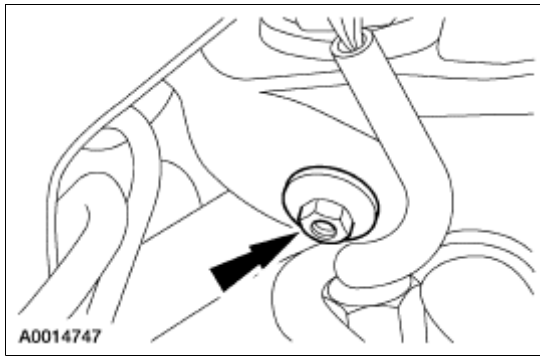
26. Remove the accelerator control snow shield.



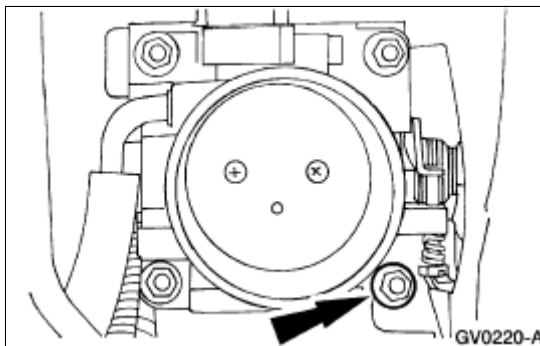
27. Disconnect the accelerator and the speed control cables from the throttle linkage.



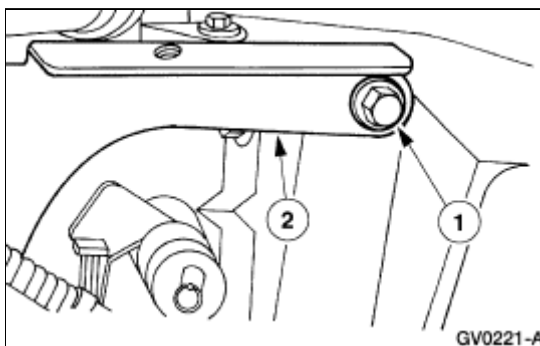
28. Remove the accelerator cable bracket nut.



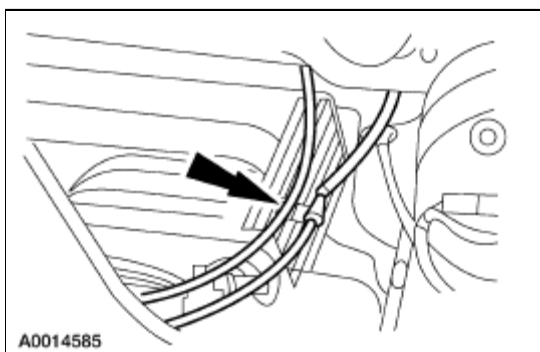
29. Remove the lower accelerator cable bracket nut.



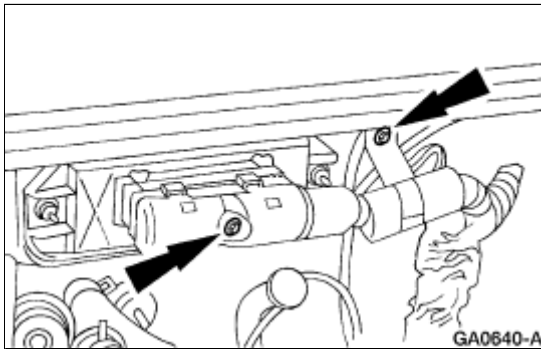
30. Remove the accelerator cable bracket.  
1. Remove the nut.  
2. Remove the accelerator cable bracket.



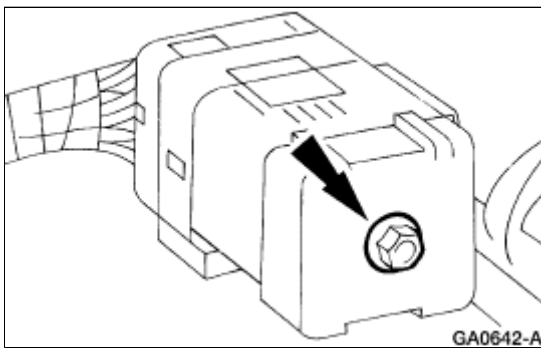
31. Remove the accelerator and the speed control cables from the clip.



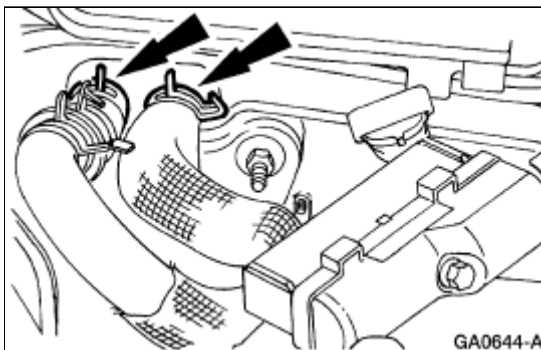
32. Disconnect the powertrain control module (PCM) connector and the body ground connector.



33. Disconnect the engine bulkhead connector.

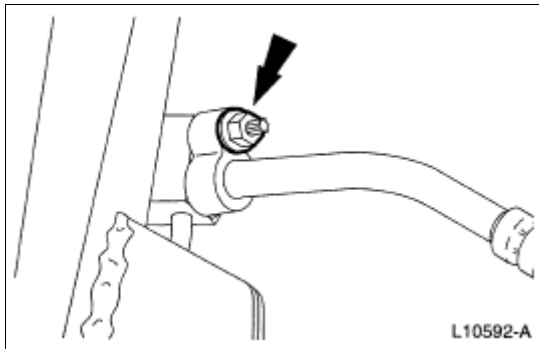


34. Disconnect the heater water hoses.

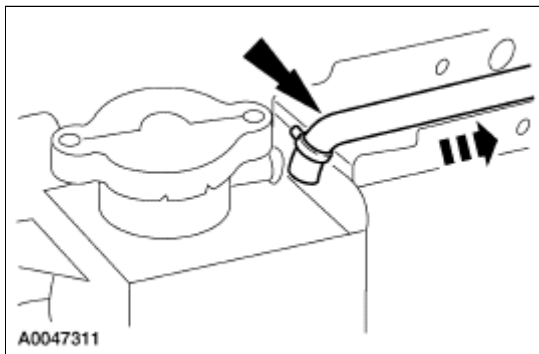


35. Disconnect the A/C manifold and tube, and the condenser to the evaporator tube, from the A/C condenser.

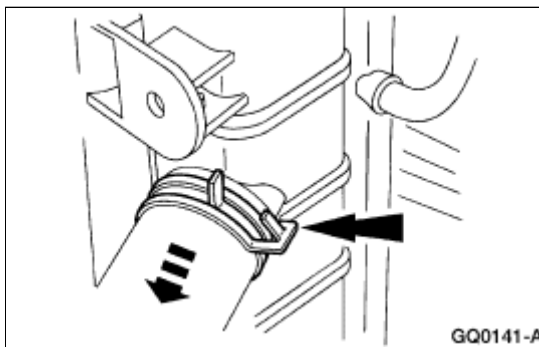




36. Disconnect the radiator overflow hose from the radiator filler neck.

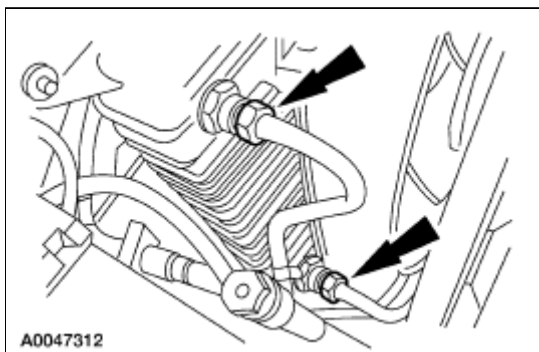


37. Disconnect the upper radiator hose from the radiator.

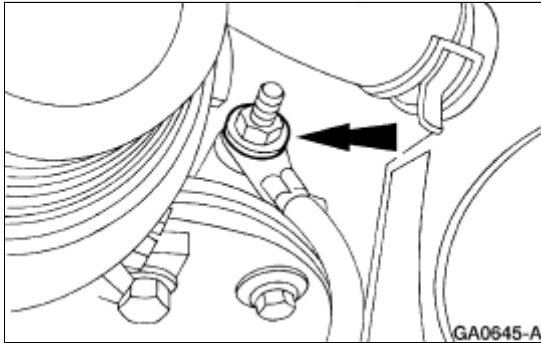


38. **NOTE:** To avoid disturbing the transmission oil cooler fittings, use a backup wrench.

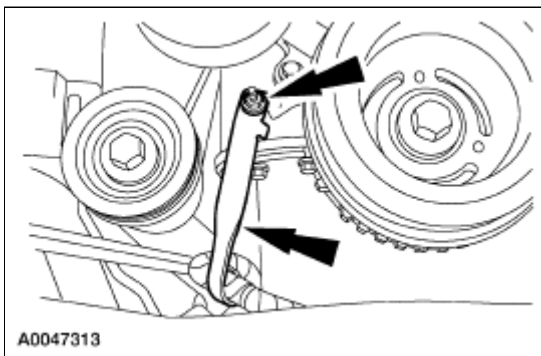
Disconnect the transmission cooling tubes.



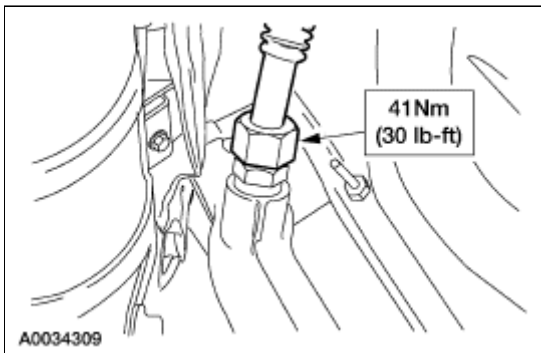
39. Disconnect the ground cable from the engine front cover.



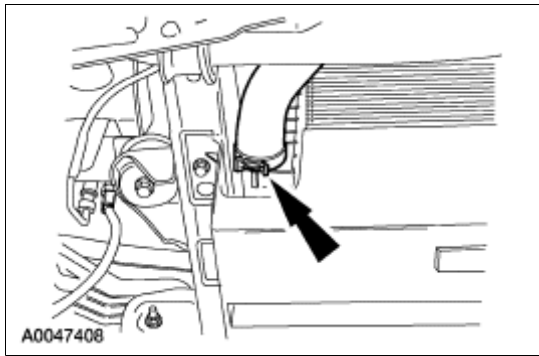
40. Remove the wiring brace from the engine front cover.



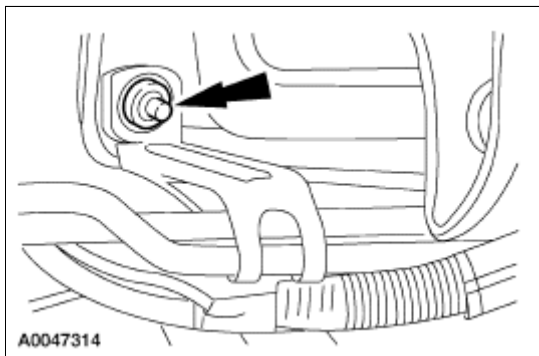
41. Disconnect the exhaust gas recirculation (EGR) tube from the exhaust manifold.



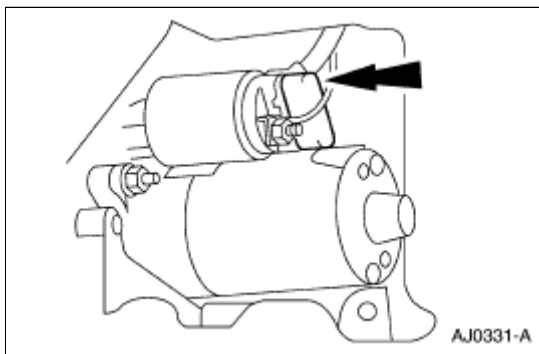
42. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
43. Disconnect the lower radiator hose from the radiator.



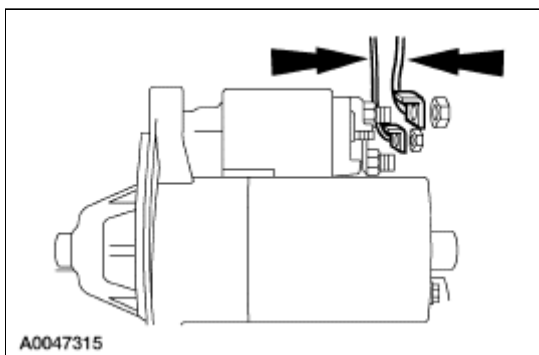
44. Remove the transmission cooler tubes brace from the RH engine mount.



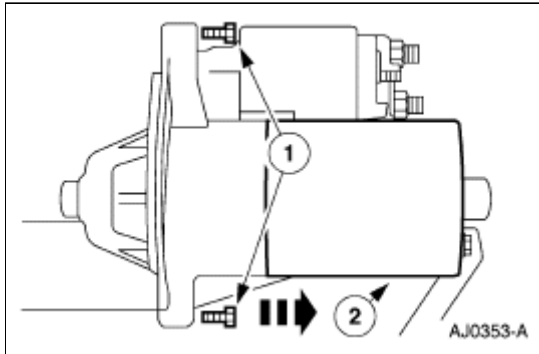
45. Remove the starter motor solenoid terminal cover.



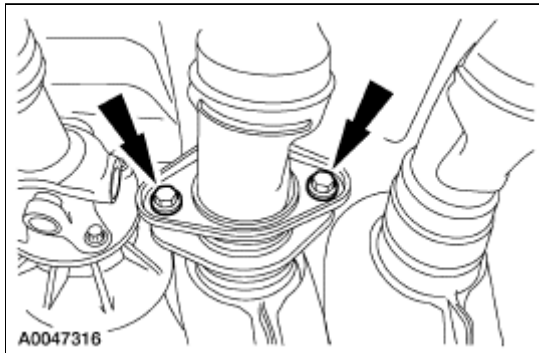
46. Disconnect the wiring from the starter motor solenoid.



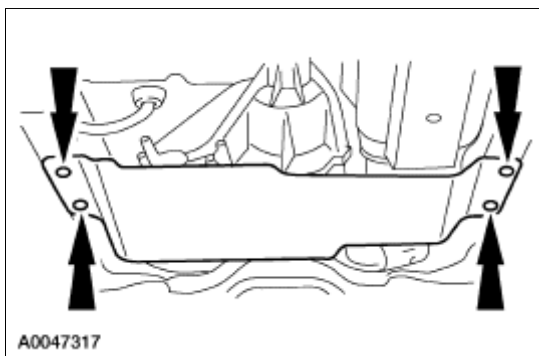
47. Remove the starter motor.
1. Remove the bolts.
  2. Remove the starter motor.



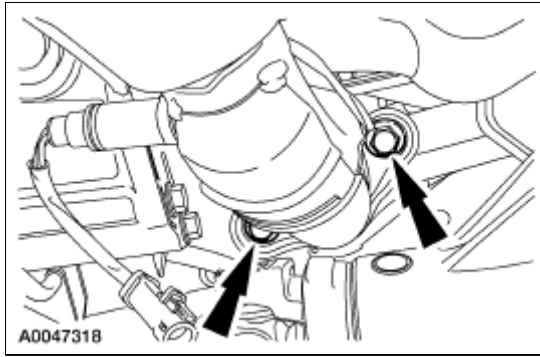
48. Remove the bolts from the muffler to the catalytic converter.



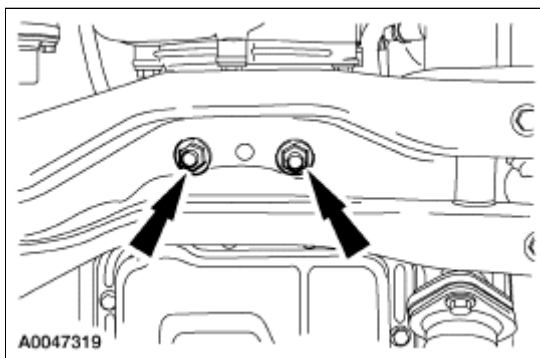
49. If equipped, remove the bolts and the skid plate.



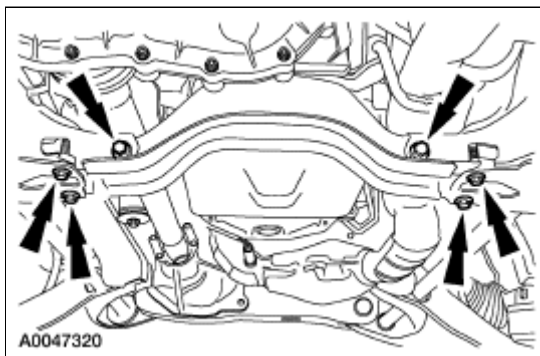
50. Remove the bolts.



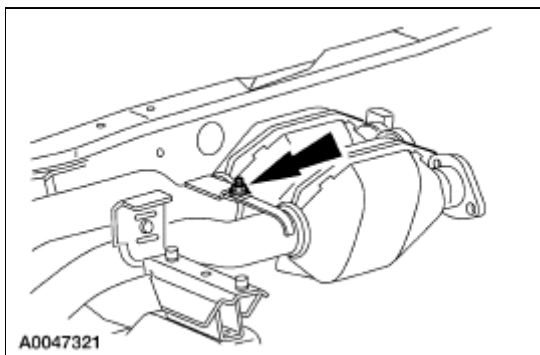
51. Remove the nuts.
- Position a suitable transmission jack under the transmission.



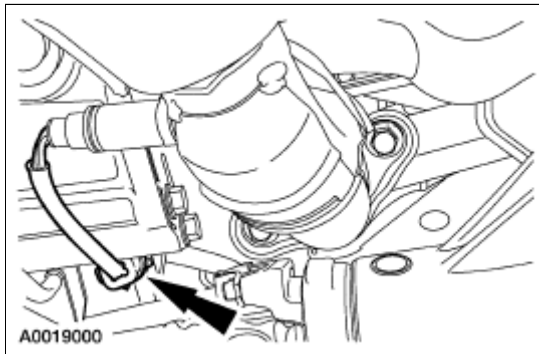
52. Remove the bolts and the transmission crossmember.




53. Remove the nut.

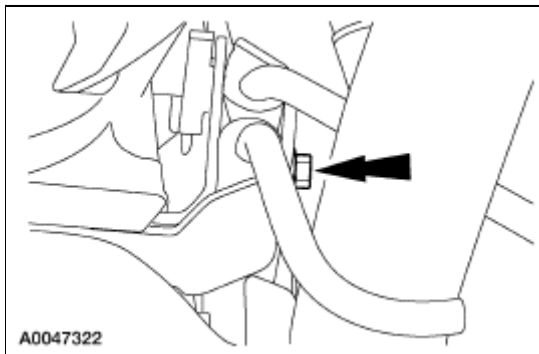


54. Disconnect the LH heated oxygen sensor and the catalyst monitor sensor.

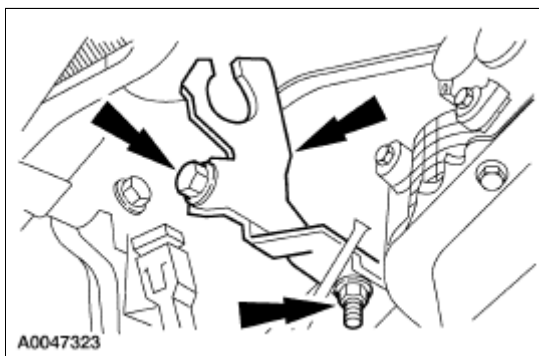


55.  **CAUTION:** Disconnect the RH oxygen sensor while lowering the three-way catalytic converter.

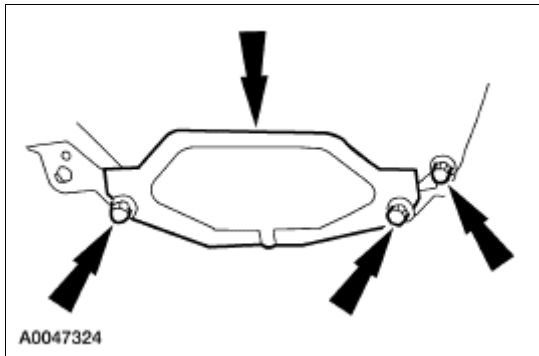
Remove the bolt and the three-way catalytic converter (TWC).



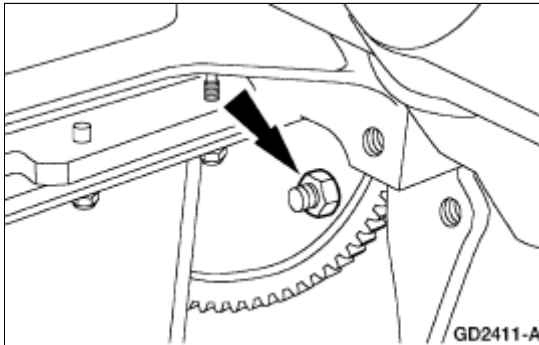
56. Remove the retainers and position the transmission cable and bracket aside.



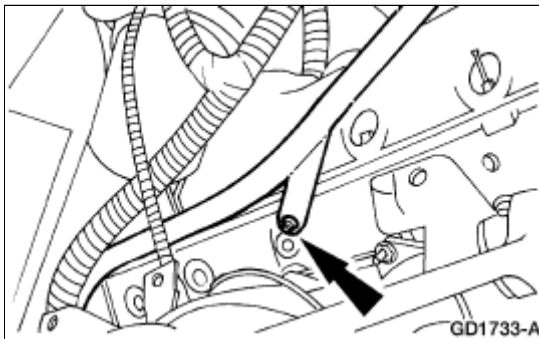
57. Remove the transmission inspection cover.



58. Remove the torque converter retaining nuts.

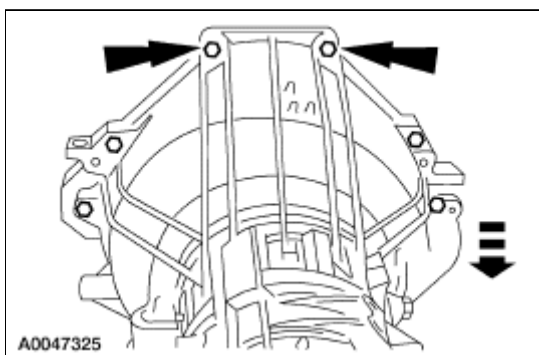


59. Remove the transmission fluid level indicator tube retaining bolt and position the indicator tube aside.

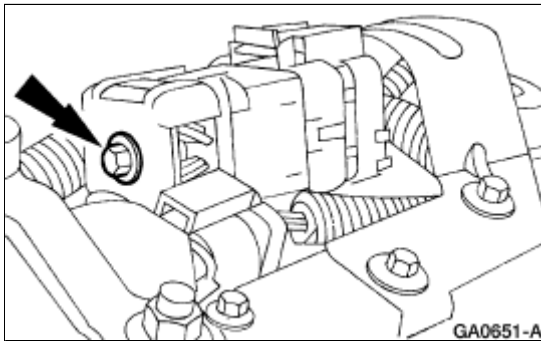


60. **NOTE:** Lower the transmission to access the upper bolts.

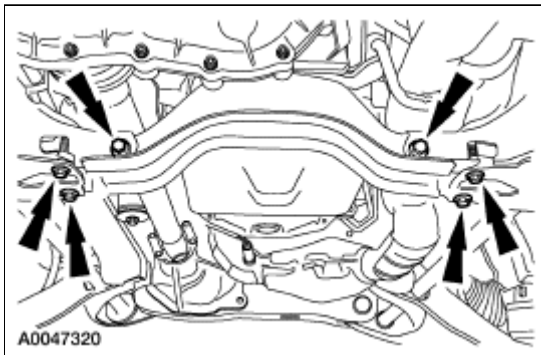
Remove the transmission-to-engine upper bolts.



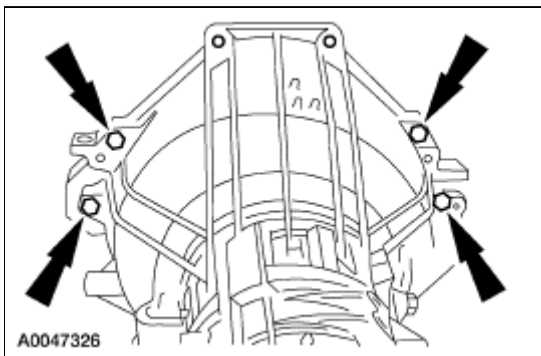
61. Disconnect the transmission bulkhead connector.



62. If equipped, disconnect the low oil level sensor electrical connector .
63. Raise the transmission and install the crossmember. Install the retaining nuts on the transmission mount. Tighten all retainers securely.

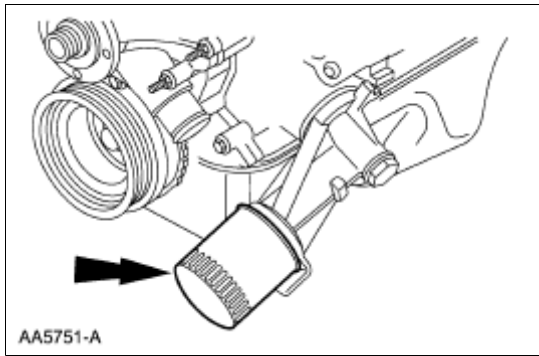


64. Remove the remaining transmission-to-engine bolts. Remove the transmission jack.

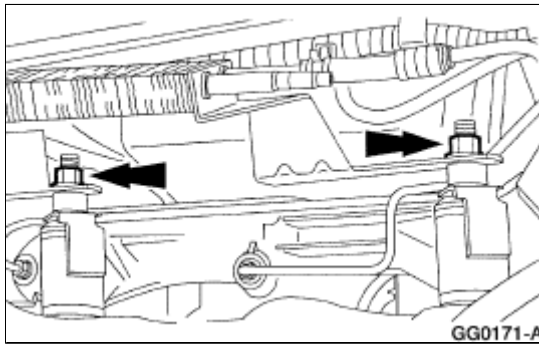


65. Remove the oil bypass filter.

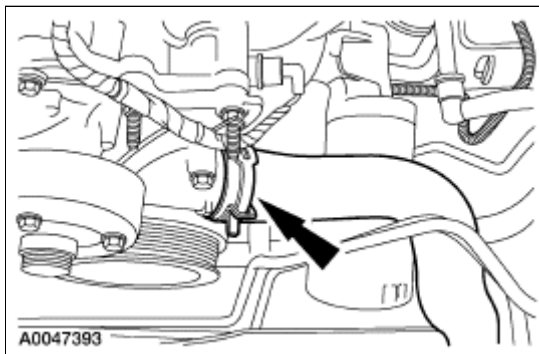




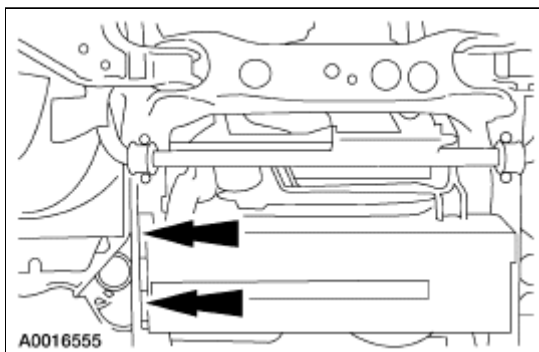
66. Remove the nuts and position the power steering cooler aside.



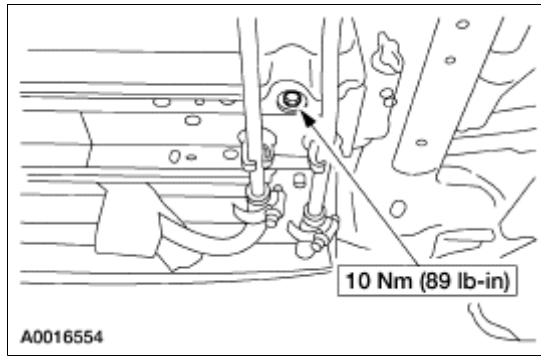
67. Remove the lower radiator hose from the water pump.



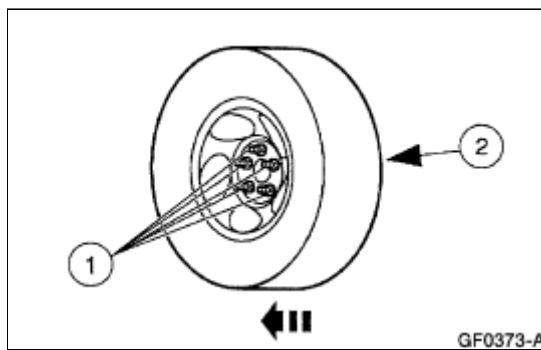
68. Remove the air deflector.



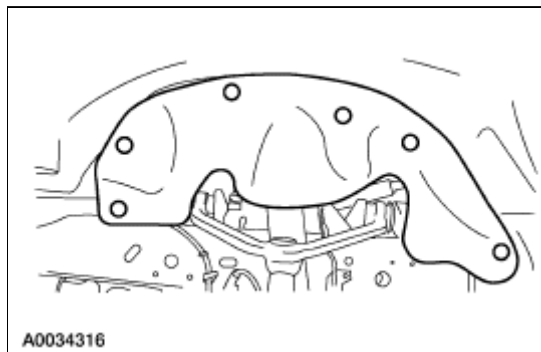
69. Remove the bolt.



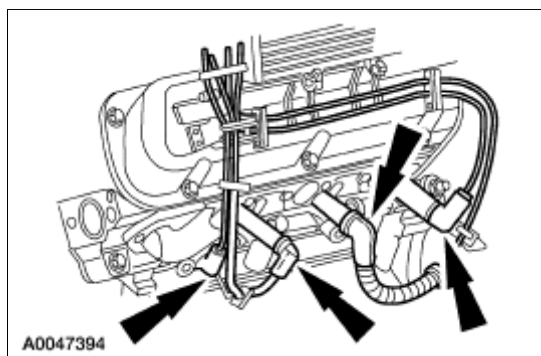
70. Remove the left front wheel and tire assembly.
1. Remove the wheel nuts.
  2. Remove the wheel and tire assembly, using a side-to-side rocking motion.



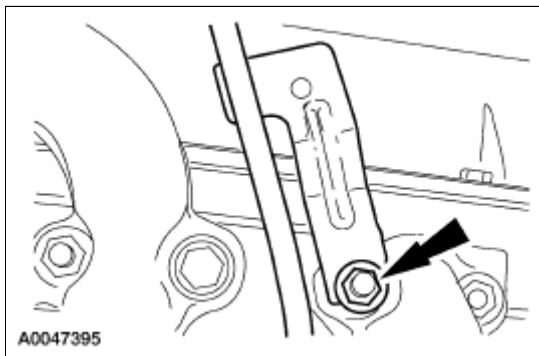
71. Remove the left front wheel well splash shield.



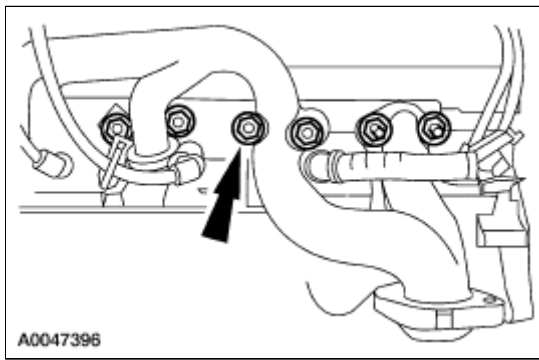
72. Disconnect the spark plug wires from the LH spark plugs.



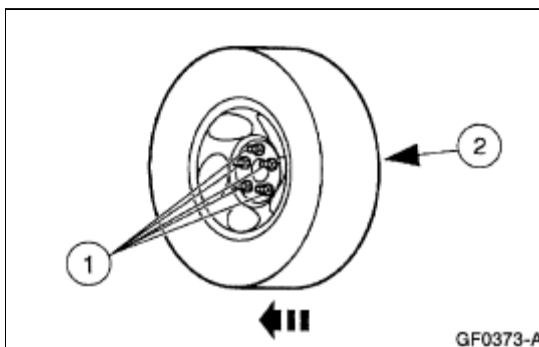
73. Remove the engine oil fluid level indicator tube.



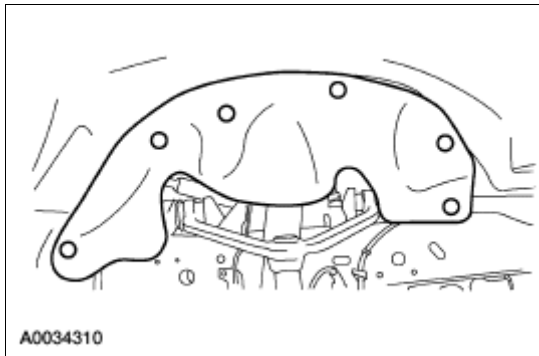
74. Remove all the LH exhaust manifold retainers.



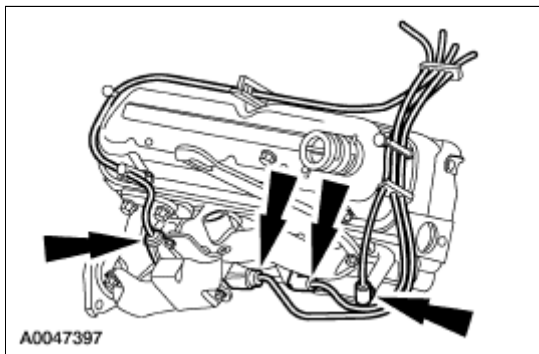
75. Remove the right front wheel and tire assembly.
1. Remove the wheel nuts.
  2. Remove the wheel and tire assembly, using a side-to-side rocking motion.



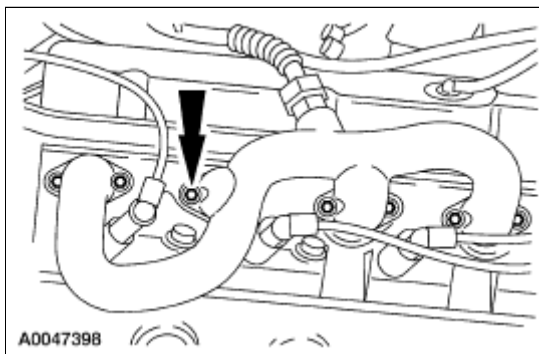
76. Remove the right side wheel well splash shield.



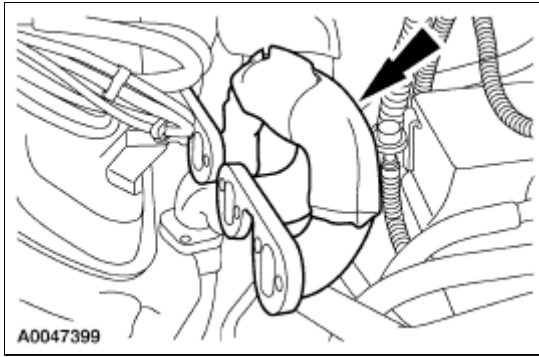
77. Disconnect the spark plug wires from the RH spark plugs.



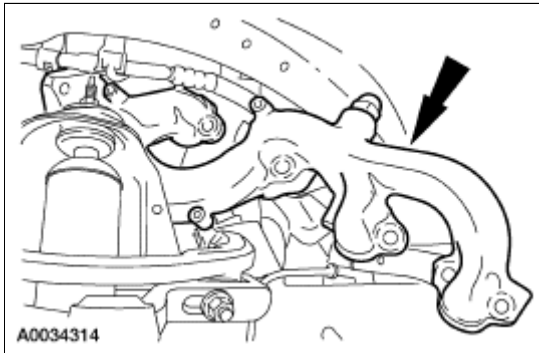
78. Remove all the RH exhaust manifold retainers.



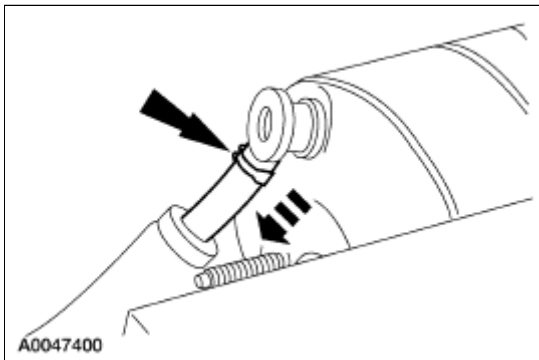
79. Lower the vehicle.
80. Remove the left side exhaust manifold and gasket.



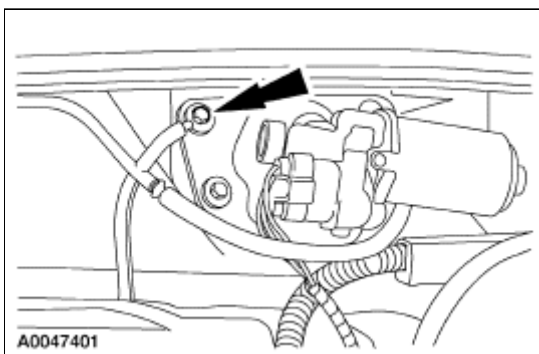
81. Remove the right side exhaust manifold and gasket.



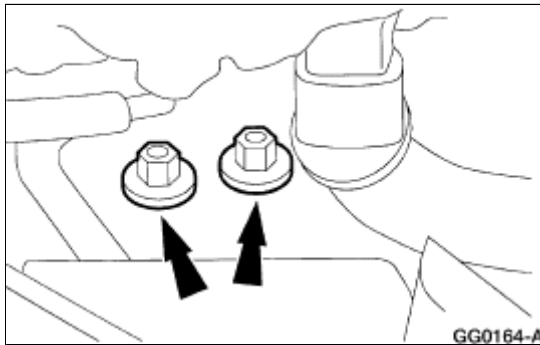
82. Disconnect the vacuum hose at the brake booster.



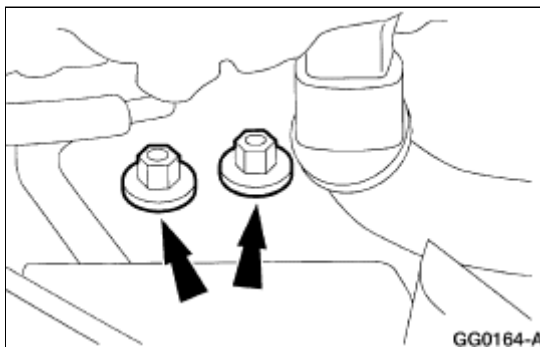
83. Remove the engine ground strap from the bulkhead.



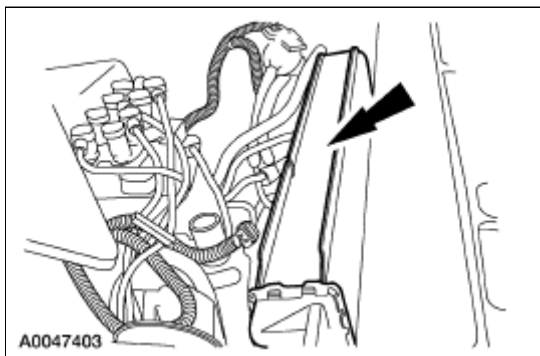
84. Remove the LH motor mount nuts.



85. Remove the RH motor mount nuts.

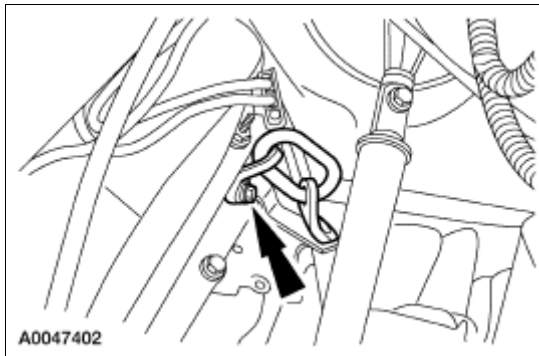


86. Remove the radiator and condenser assembly.

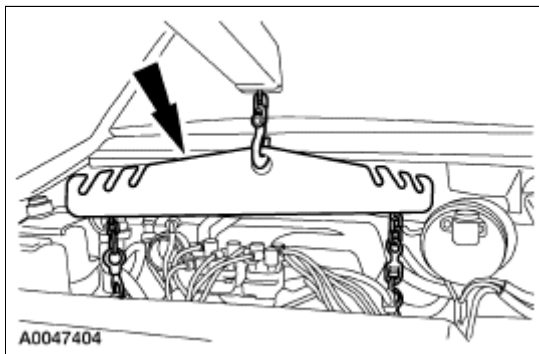


87. **NOTE:** The lifting brackets should be installed on the exhaust manifold stud bolts for the No. 1 and No. 8 cylinders.

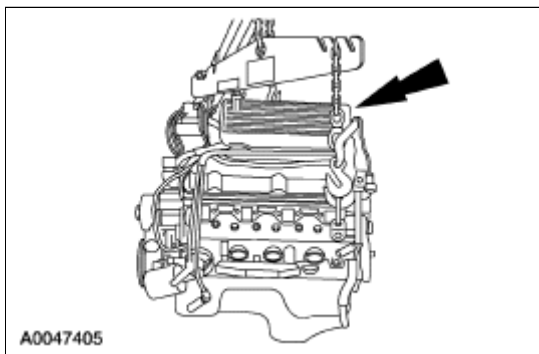
Install the lifting brackets.



88. Install the spreader bar on the lifting brackets.



89. Remove the engine.







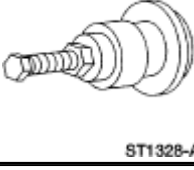

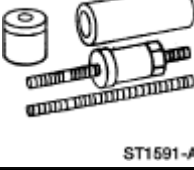
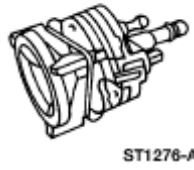




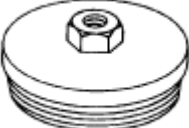

SECTION 303-01C: Engine — 5.0L  
DISASSEMBLY

2000 Explorer/Mountaineer Workshop Manual

## Engine

### Special Tool(s)

 ST1381-A	Camshaft Bearing Service Set 303-017 (T65L-6250-A)
 ST1286-A	Crankshaft Damper Remover 303-009 (T58P-6316-D)
 ST1328-A	Crankshaft Seal Installer/Aligner 303-335 (T88T-6701-A)
 ST2435-A	Syncro Positioning Tool 303-630
 ST1591-A	Damper Replacer 303-008 (T52L-6306-AEE)
 ST1276-A	Cylinder Ridge Reamer 303-016 (T64L-6011-EA)
 ST1592-A	Seal Remover 303-053 (T70P-6B070-B)

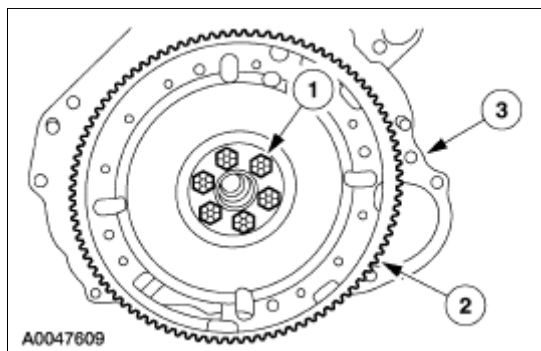
 ST1187-A	Impact Hammer 307-005 (T59L-100-B)
 ST1382-A	Rear Crank Seal Remover 303-519 (T95P-6701-EH)
 ST1378-A	Damper Puller Adapter 303-176 (T82L-6316-B)

### Material

Item	Specification
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent	WSS-M2C153-G
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A
Pipe Sealant with Teflon XW7Z-19554-AA or equivalent	WSK-M2G350-A2

### Disassembly

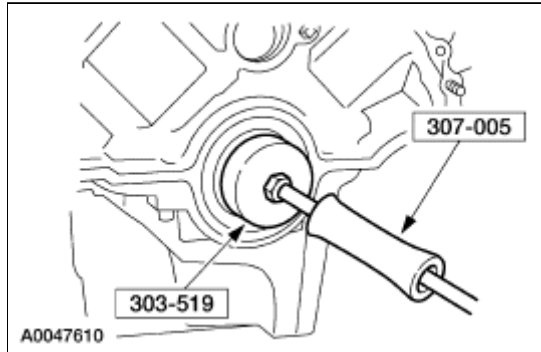
1. Remove the flywheel and the spacer plate.
  1. Remove and discard the flywheel bolts.
  2. Remove the flywheel.
  3. Remove the spacer plate.



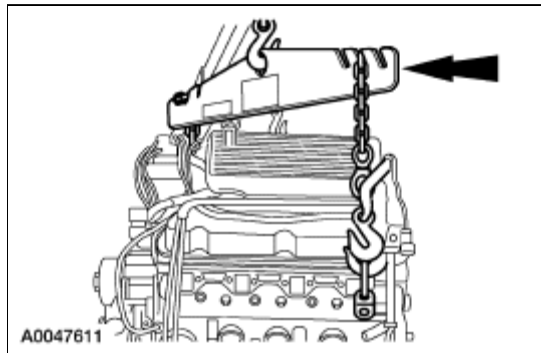
2.  **CAUTION:** Avoid scratching or damaging the oil seal surfaces during removal of the crankshaft rear oil seal.

**NOTE:** Be sure the crankshaft rear sealing surface is clean and free of any rust or corrosion. To clean the crankshaft rear sealing surface, use extra-fine emery cloth or extra-fine 0000 steel wool with metal surface cleaner.

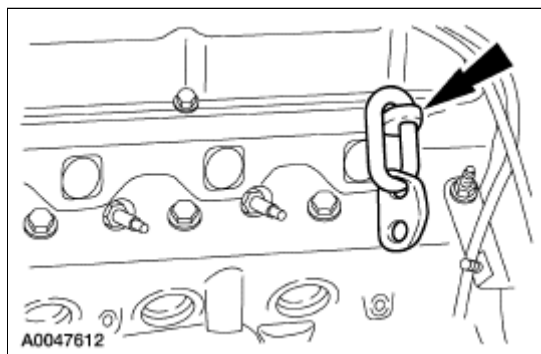
Using the special tools, remove the crankshaft rear main seal.



3. Mount the engine on a suitable engine stand and remove the spreader bar.

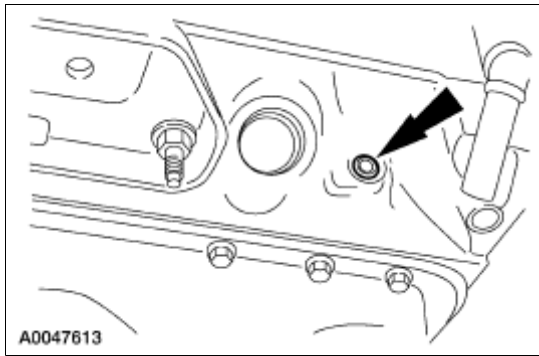


4. Remove the engine lifting brackets.

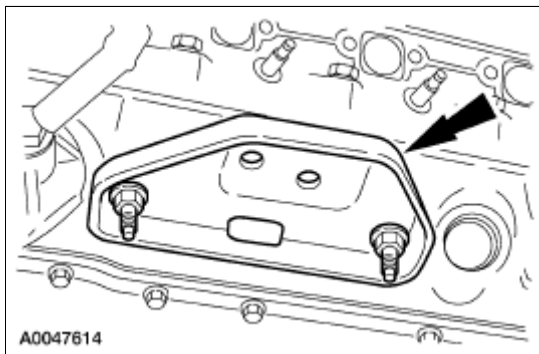


5. **NOTE:** If the cylinder block is to be reused, use thread sealer when installing the cylinder block coolant drain plugs.

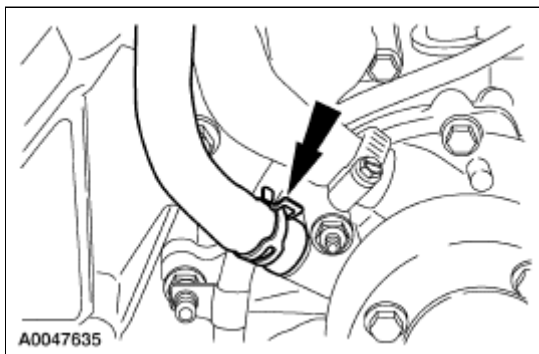
Remove both the RH and the LH cylinder block coolant drain plugs.



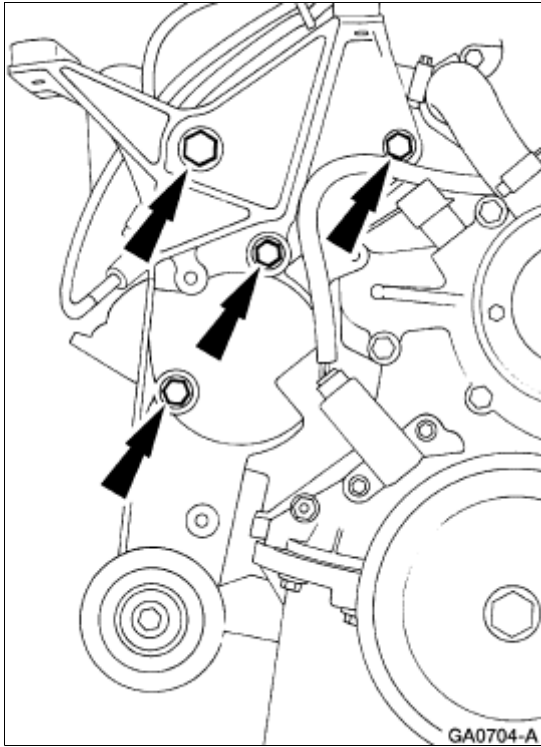
6. Remove both the RH and the LH engine mount brackets.



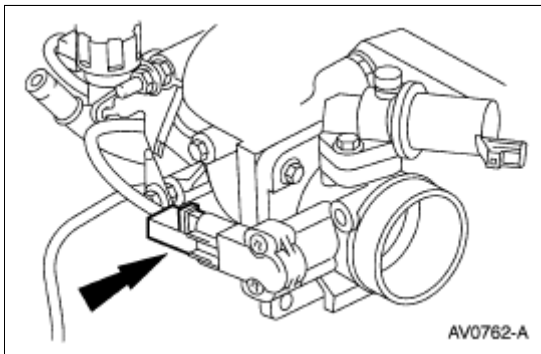
7. Disconnect the heater hose from the water pump.



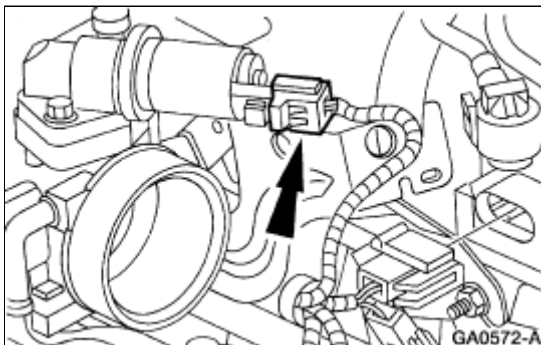
8. Remove the bolts and remove the generator mounting bracket.



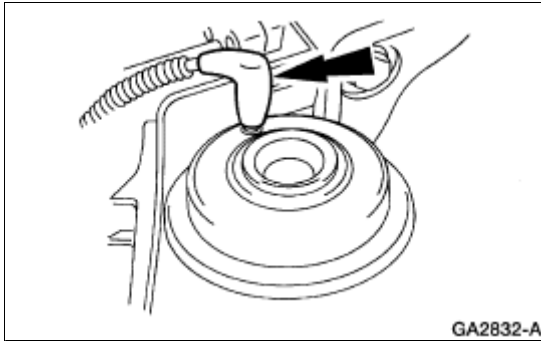
9. Disconnect the throttle position (TP) sensor electrical connector.



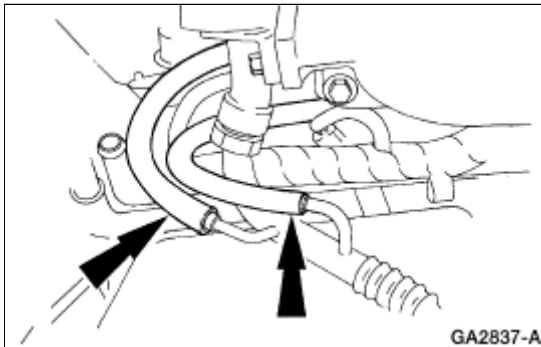
10. Disconnect the idle air control (IAC) solenoid electrical connector.



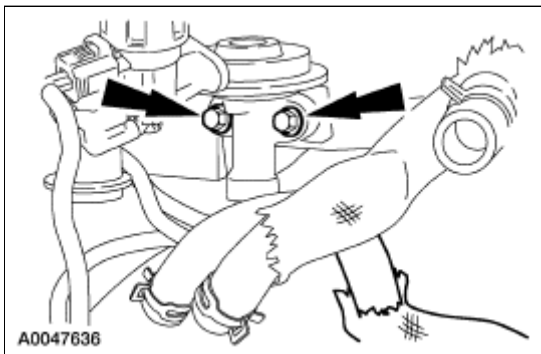
11. Remove the exhaust gas recirculation (EGR) valve vacuum hose.



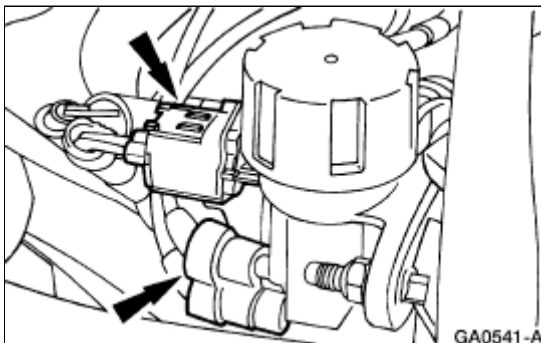
12. Disconnect the EGR backpressure transducer hoses.



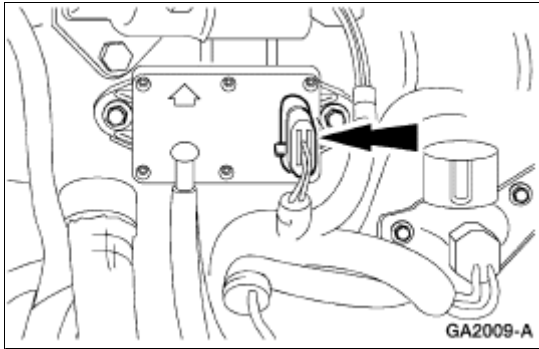
13. Remove the EGR valve and the EGR tube as an assembly.



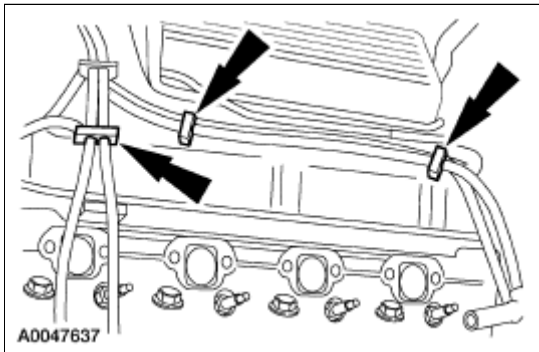
14. Disconnect the EGR vacuum regulator solenoid vacuum and electrical connections.



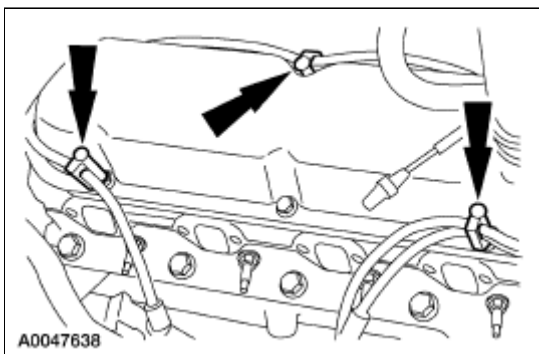
15. Disconnect the EGR backpressure transducer electrical connector.



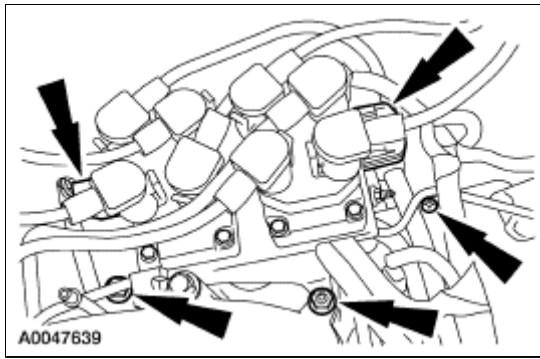
16. Disconnect the LH spark plug wire retainers from the valve cover. Position the spark plug wires aside.



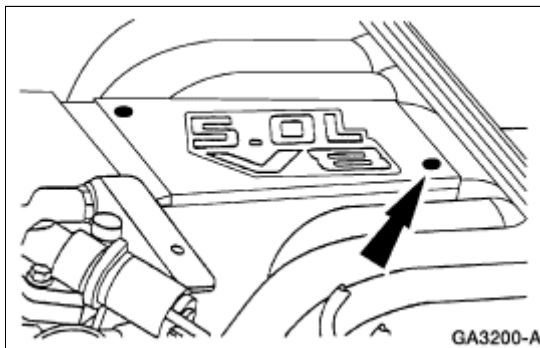
17. Disconnect the RH spark plug wire retainers from the valve cover. Position the spark plug wires aside.



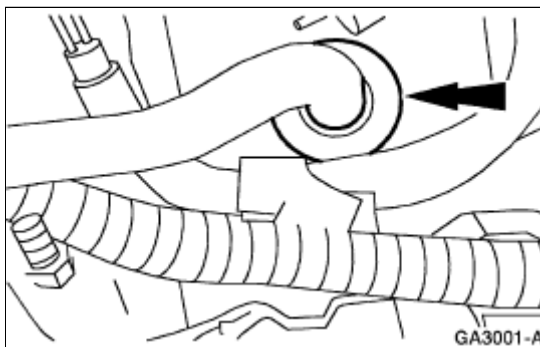
18. Remove the ignition coils and the mounting bracket as an assembly.
- Disconnect the coils.
  - Remove the mounting bracket retainers.



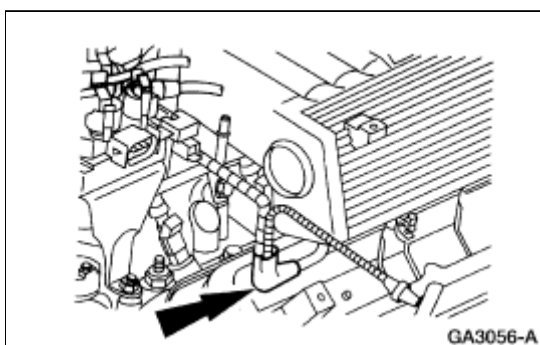
19. Remove the screws and the intake cover plate.



20. Disconnect the positive crankcase ventilation (PCV) hose.

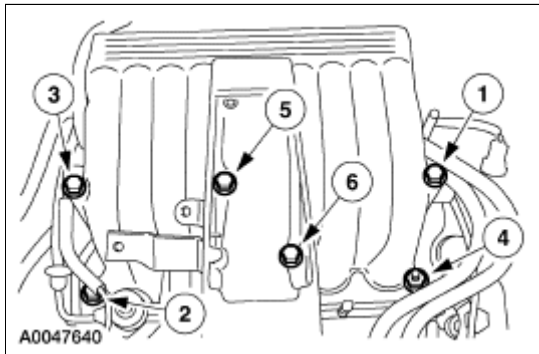


21. Disconnect the two evaporative emissions (EVAP) canister purge solenoid connections and the two PCV heater hoses.

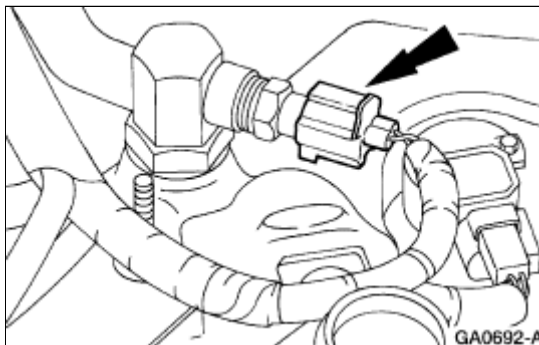




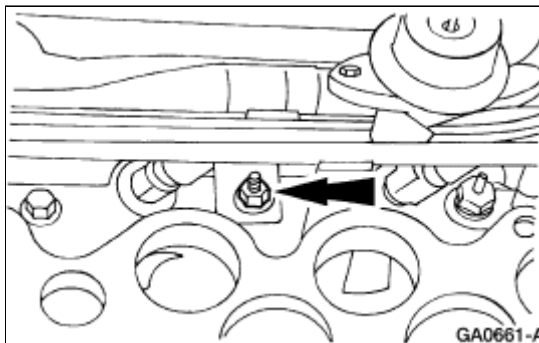
22. Remove the bolts in the sequence shown. Remove the upper intake manifold and gasket.



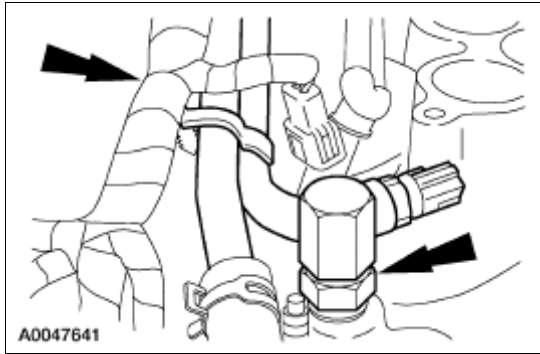
23. Disconnect the engine coolant temperature (ECT) sensor electrical connector.



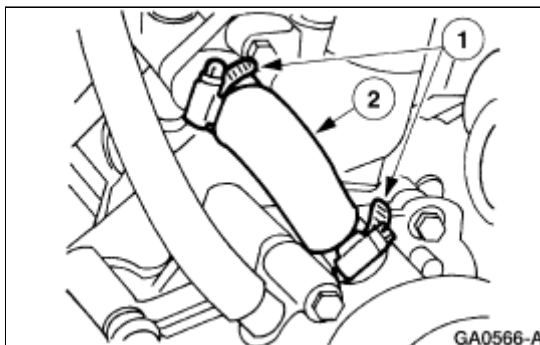
24. Remove the water heater tube retaining nut.



25. Remove the water heater tube from the lower intake manifold.
- Release the retaining nut from the intake manifold.
  - Position the wiring harness aside.



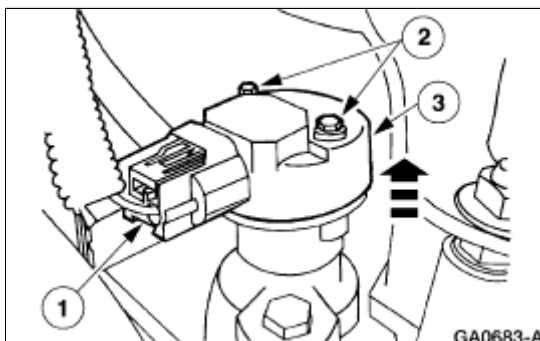
26. Remove the water bypass hose.
1. Loosen the hose clamps.
  2. Remove the water bypass hose.



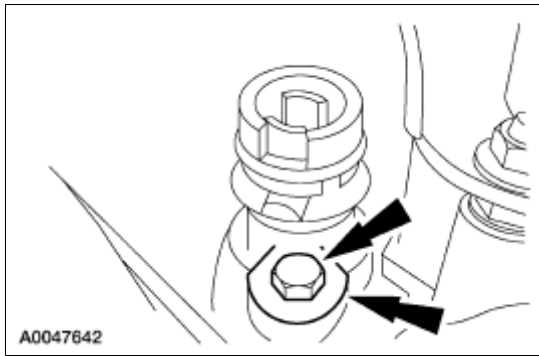
27. **NOTE:** Prior to the removal of the camshaft position (CMP) sensor, set the No. 1 cylinder to top dead center (TDC) of the compression stroke. Then note the position of the CMP sensor electrical connector. Installation procedures require that the electrical connector be located in the same position.

Remove the CMP sensor.

1. Disconnect the CMP electrical connector.
2. Remove the screws.
3. Remove the CMP sensor.

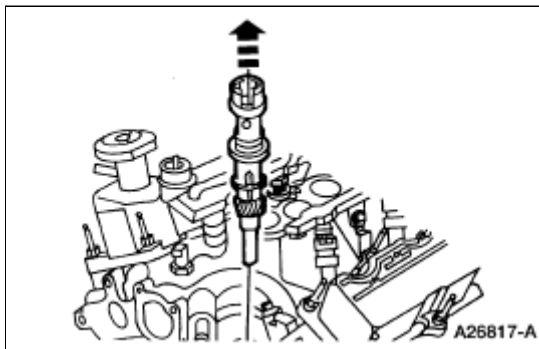


28. Remove the camshaft synchronizer hold-down bolt and clamp.

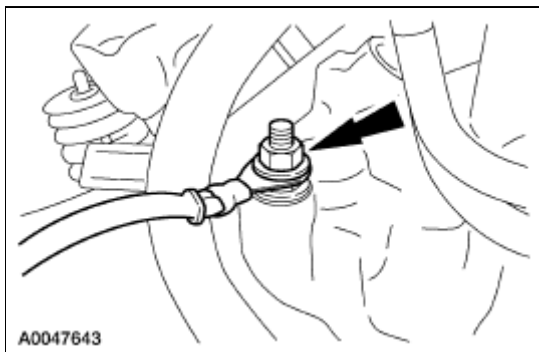


29. **NOTE:** The oil pump driveshaft might come out with the camshaft synchronizer. If so, retrieve the oil pump driveshaft before proceeding.

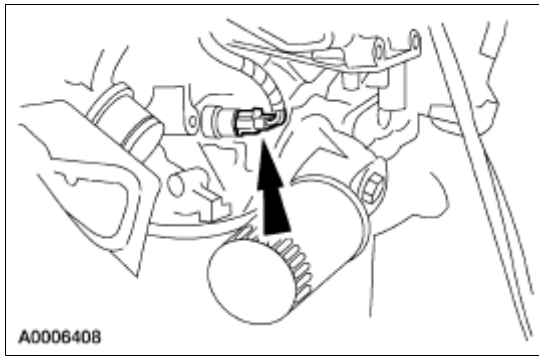
Remove the camshaft synchronizer.



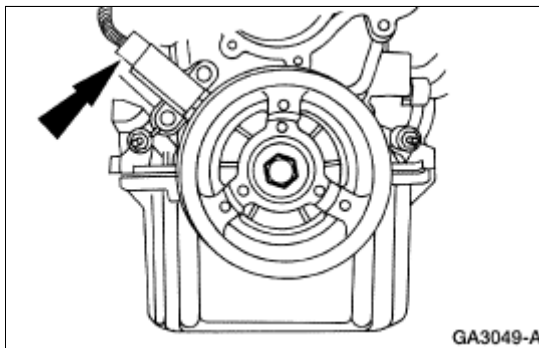
30. Remove the engine ground strap from the lower intake manifold.



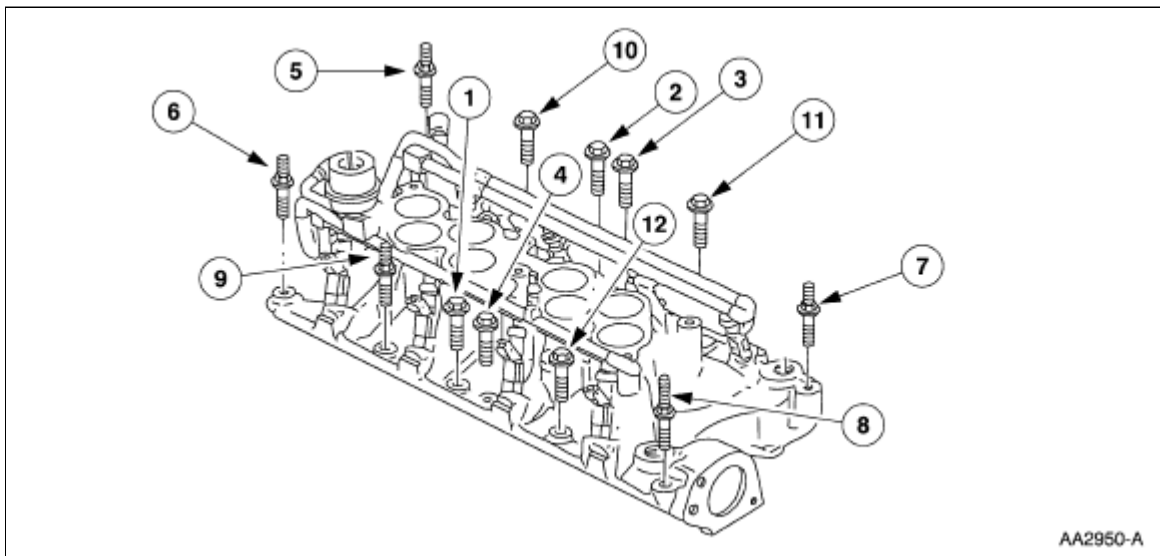
31. Disconnect the oil pressure sensor electrical connector.



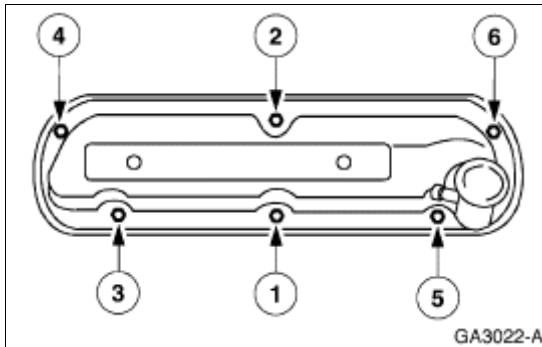
32. Disconnect the crankshaft position (CKP) sensor electrical connector.



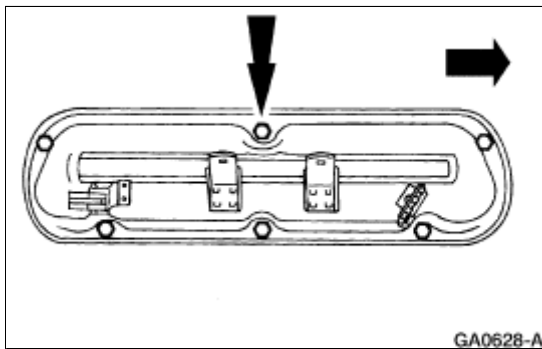
33. Remove the bolts in the sequence shown.



34. Remove the lower intake manifold and discard the gasket.
35. Remove the bolts and the RH valve cover.



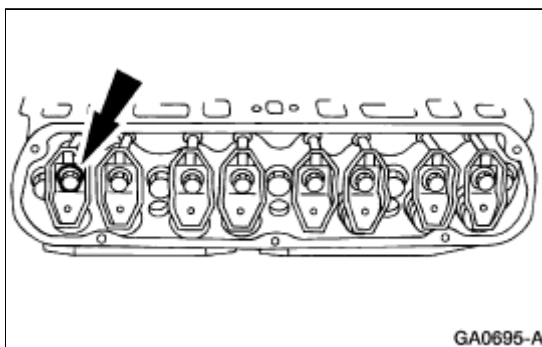
36. Remove the bolts and the LH valve cover.



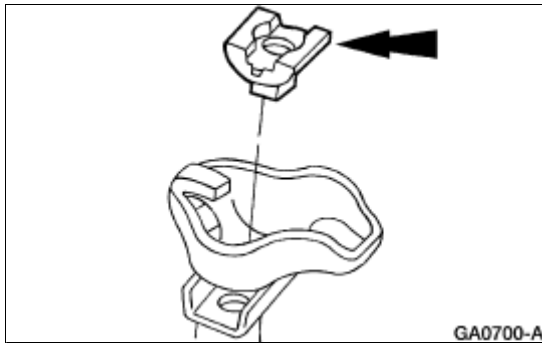
37. **NOTE:** Mark the rocker arms to make sure that they will be reinstalled in their original positions.

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

Remove the bolts from each side.

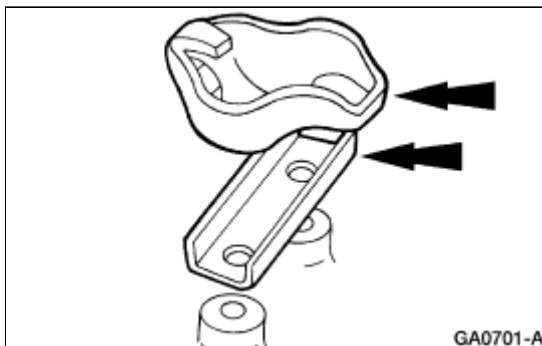


38. Remove the eight rocker arm fulcrums from each side.



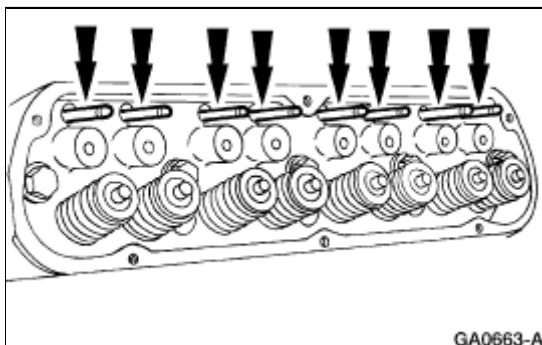
39. **NOTE:** If reusing the rocker arms, clean and inspect all of the components. For additional information, refer to [Section 303-00](#).

Remove the rocker arms and the rocker arm fulcrum guides from each side.

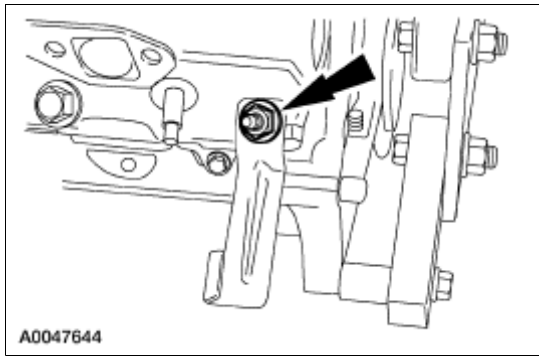


40. **NOTE:** Mark all push rods to make sure that they will be installed in their original positions.

Remove all of the push rods.



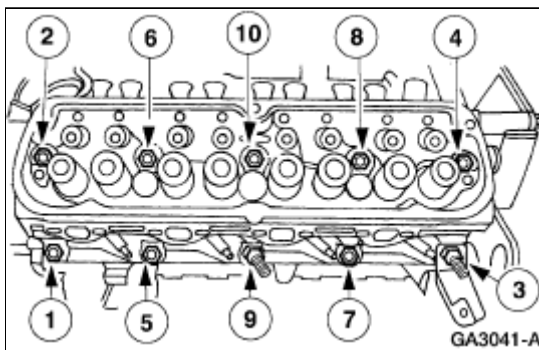
41. Remove the spark plug wire retaining bracket from the LH cylinder head.



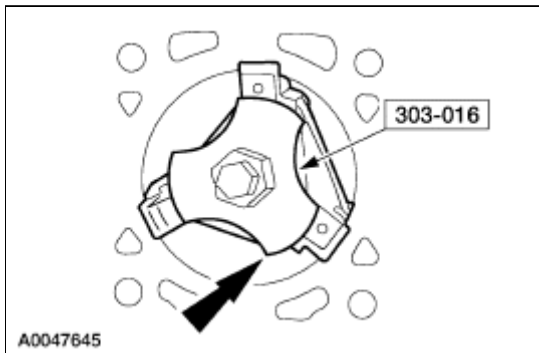
42. **NOTE:** If reusing the cylinder heads, refer to [Section 303-00](#).

Remove the bolts in the indicated sequence and remove the cylinder head from each side.

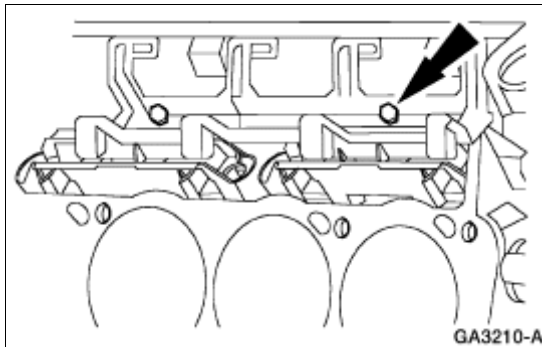
- Discard the old bolts.



43. Using the special tool, remove the ridge off the top of the eight cylinder bores.



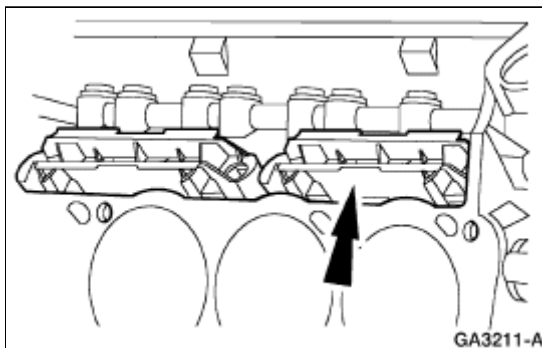
44. Remove the bolts and remove the valve tappet guide plate retainer.



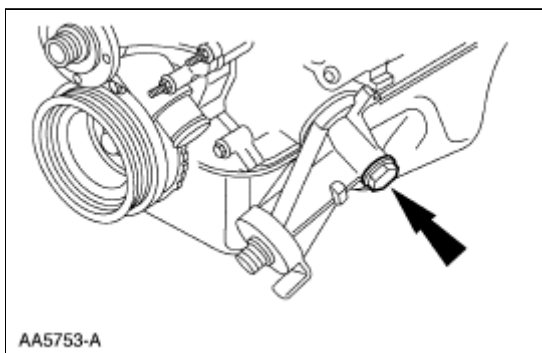
45. **NOTE:** If reusing the valve tappets, refer to [Section 303-00](#).

**NOTE:** Mark the valve tappets so they can be reinstalled in their original positions.

Remove the four valve tappet guide plates and the valve tappets using a valve tappet puller.

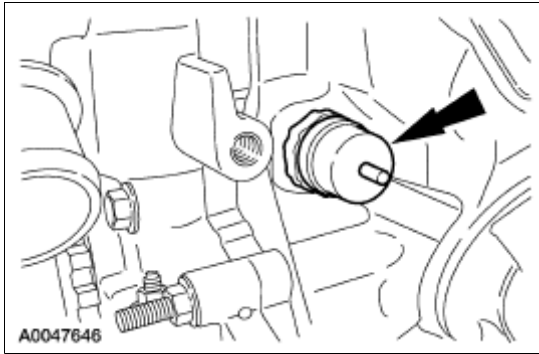


46. Remove the oil filter adapter bolt and the O-ring seal.

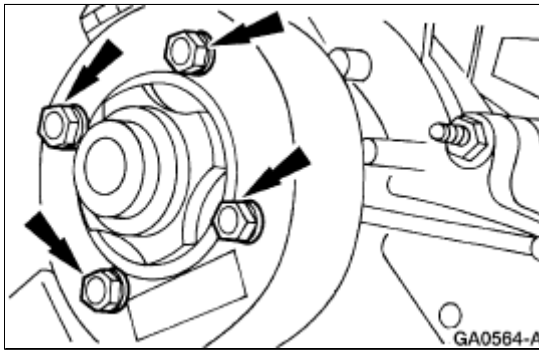


47. Remove the oil pressure sending unit.

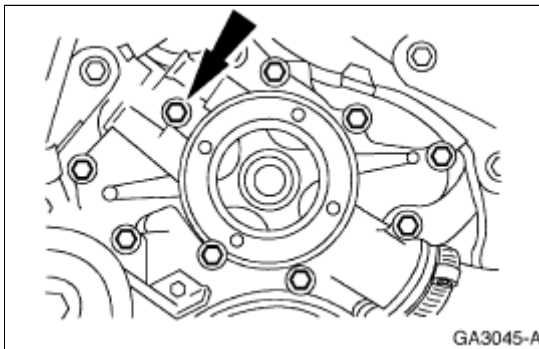




48. Remove the water pump pulley.

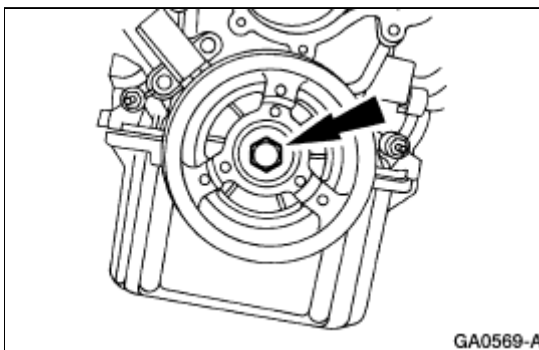


49. Remove the water pump.



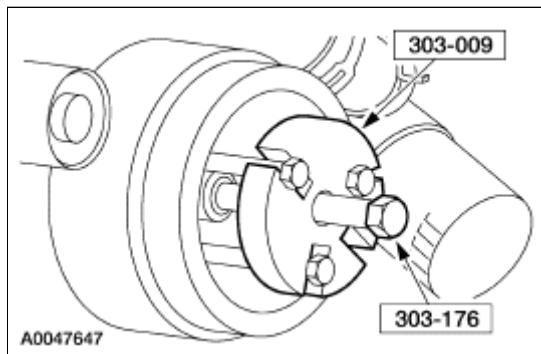
50. **NOTE:** Use a suitable strap wrench to hold the crankshaft pulley.

Remove the bolt.

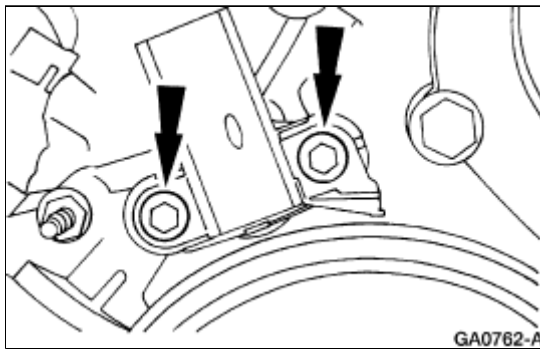


51. **NOTE:** The jackscrew from special tool 303-176 must be added to special tool 303-009.

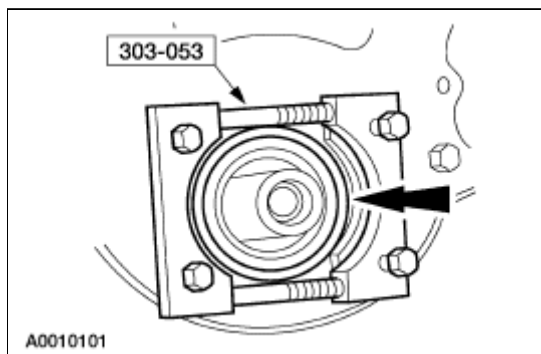
Using the special tools, remove the crankshaft pulley.



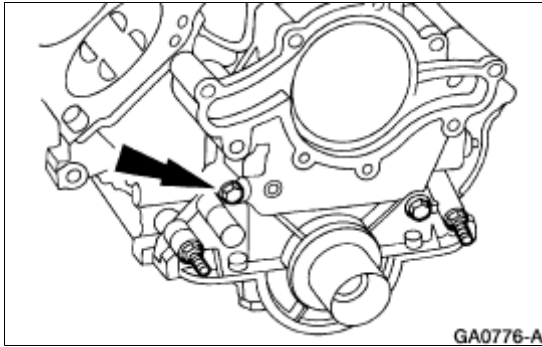
52. Remove the CKP sensor and timing pointer.



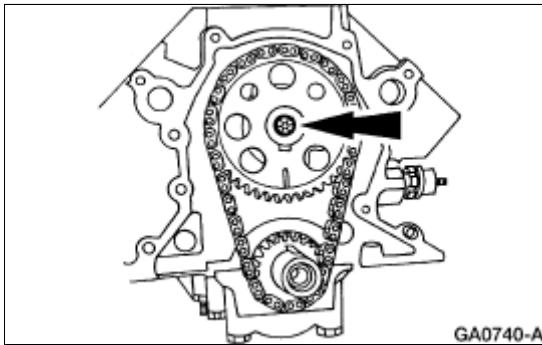
53. Using the special tool, remove the crankshaft front seal.



54. Remove the bolts and studs and the engine front cover.
- Discard the old engine front cover gasket.

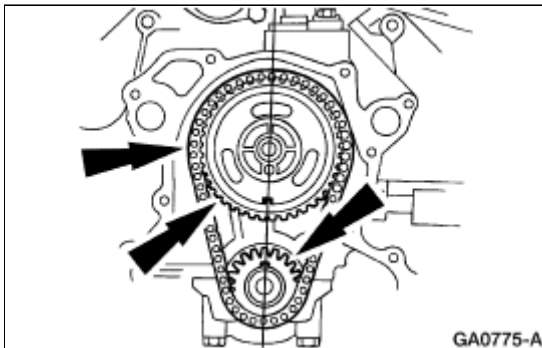


55. Remove the bolt.

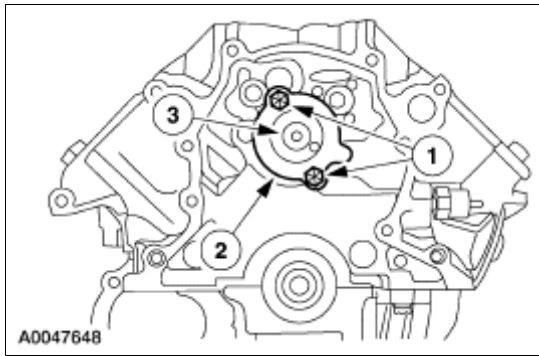


56. **NOTE:** If reusing timing drive components, refer to [Section 303-00](#).

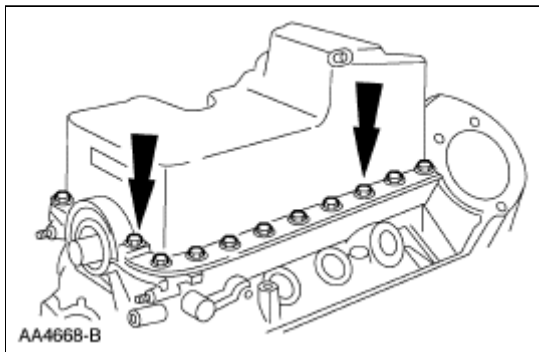
Remove the camshaft sprocket, crankshaft sprocket and the timing chain at the same time.



57. Remove the camshaft.
1. Remove the bolts.
  2. Remove the end plate.
  3. Remove the camshaft.



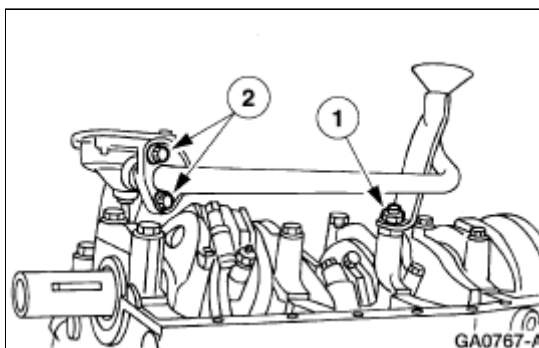
58. Rotate the engine on the engine stand.
59. Remove the 22 bolts, reinforcements rails and the oil pan.
  - Discard the old oil pan gasket.



60. **NOTE:** Use metal surface cleaner and a suitable plastic or wooden scraper to clean sealing surfaces. All sealing surfaces must be clean.

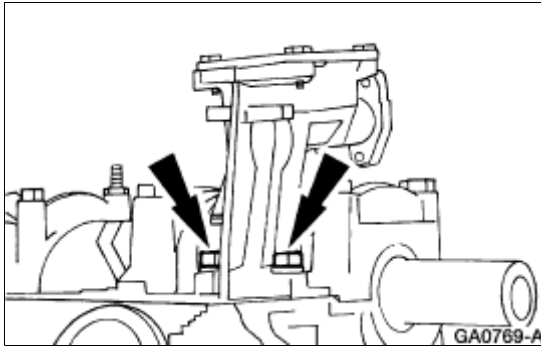
Remove the oil pump screen cover and tube.

1. Remove the nut.
2. Remove the bolts.

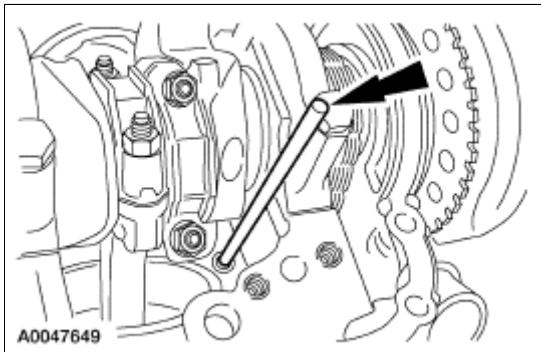


61. **NOTE:** If reusing the oil pump, refer to [Section 303-00](#).

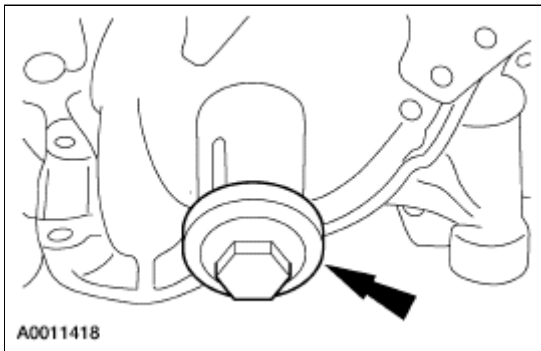
Remove the bolts and the oil pump.



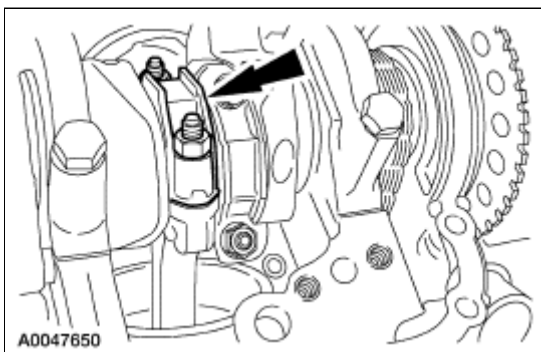
62. Remove the oil pump drive.



63. Install the crankshaft pulley bolt.



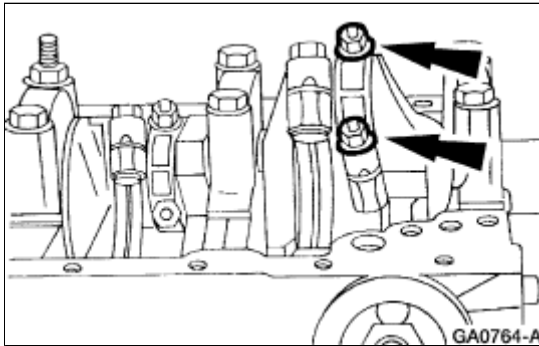
64. Turn the crankshaft until the connecting rod cap being removed is in the downward position.




65. **NOTE:** If reusing the connecting rods, refer to [Section 303-00](#).

**NOTE:** Mark the connecting rod caps so they can be reinstalled in their original positions.

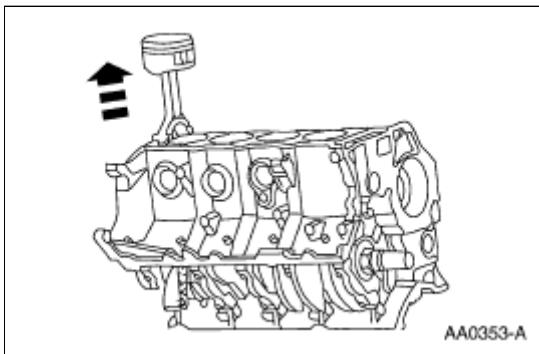
Remove the 16 nuts and the eight connecting rod caps.



66.  **CAUTION:** Place rubber hoses over the connecting rod studs to protect the crankshaft journals and the cylinder walls from being damaged.

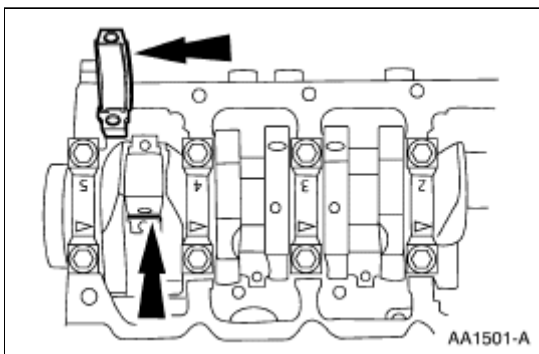
**NOTE:** If reusing the piston and the connecting rod assembly, refer to [Section 303-00](#).

Push the piston and connecting rod assembly out of the top of the cylinder.



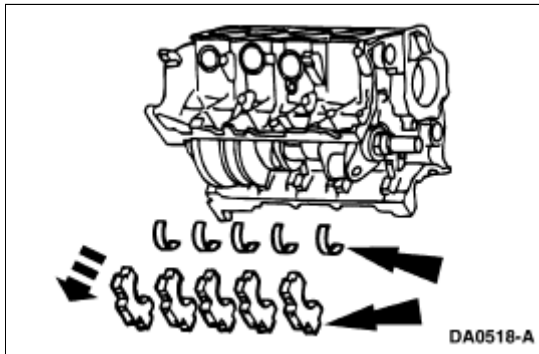
67. **NOTE:** If reusing the connecting rod bearings, refer to [Section 303-00](#).

Remove the connecting rod bearings from the connecting rod caps and from the connecting rods.



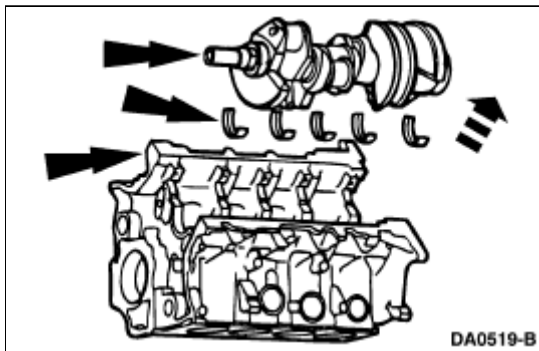
68. **NOTE:** If reusing the crankshaft main bearing caps, refer to [Section 303-00](#).

Remove the five main bearing caps and the lower crankshaft main bearings.

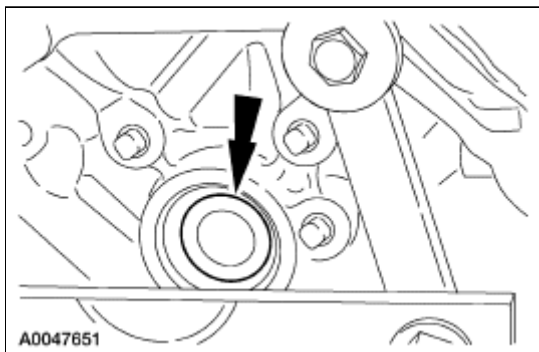


69. **NOTE:** If reusing the crankshaft, refer to [Section 303-00](#).

Remove the crankshaft and the upper crankshaft main bearings from the cylinder block.

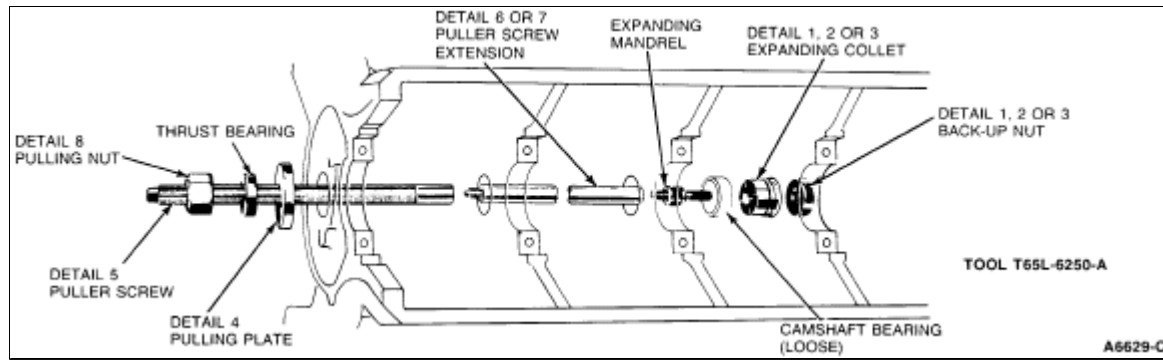


70. Remove the camshaft rear plug.



71. **NOTE:** If reusing the camshaft bearings, refer to [Section 303-00](#).

Using special tool, remove the camshaft bearings.



72. If reusing the engine block, refer to [Section 303-00](#).
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SECTION 303-01C: Engine — 5.0L  
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

2000 Explorer/Mountaineer Workshop Manual

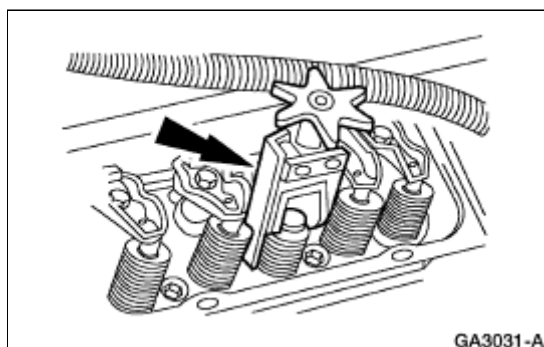
## Cylinder Head

### Special Tool(s)

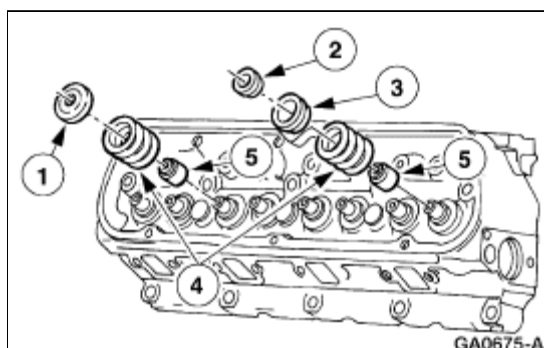
 <p>ST2131-A</p>	<p>Valve Stem Seal Replacer 303-303 (T87L-6571-BH)</p>
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### Disassembly

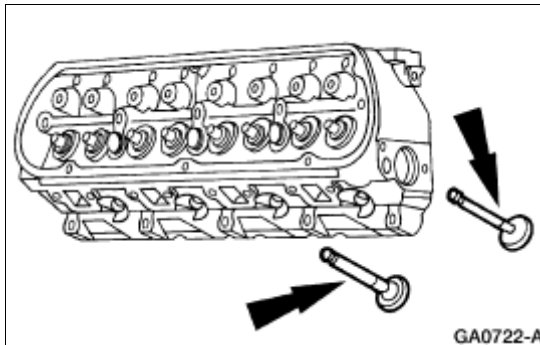
1. Use a suitable valve spring compressor on the valve spring to be removed. Compress the valve spring and remove the valve spring retainer key.



2. Remove the valve springs and valve stem seals.
  1. Remove the valve spring rotator (exhaust).
  2. Remove the valve spring retainer sleeve (intake).
  3. Remove the valve spring retainer (intake).
  4. Remove the valve springs.
  5. Remove the valve stem seals.



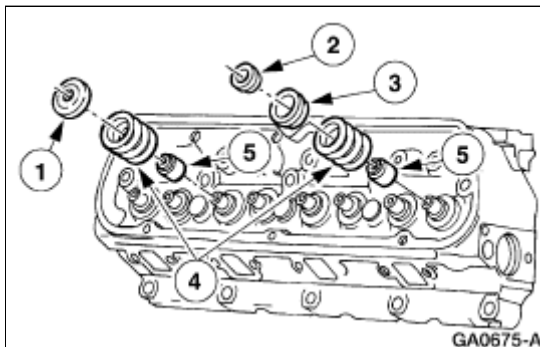
3. Remove the valve from the cylinder head.



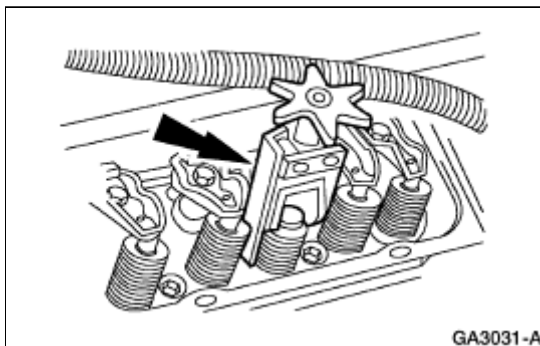
4. Inspect the valves and valve springs. For additional information, refer to [Section 303-00](#).

### Assembly

1. Lubricate and install the valve in the location from which it was removed.
  - Use Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent meeting Ford specification WSS-M2C153-G.
2. Install the valve springs and valve stem seals.
  1. Install the valve stem seals.
  2. Install the valve springs.
  3. Install the valve spring retainers (intake).
  4. Install the valve spring retainer sleeve (intake).
  5. Install the valve spring rotator (exhaust).



3. Use a suitable valve spring compressor on the valve spring to be installed. Compress the valve spring and install the valve spring retainer keys.



4. Inspect the valve springs. For additional information, refer to [Section 303-00](#).




SECTION 303-01C: Engine — 5.0L  
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

2000 Explorer/Mountaineer Workshop Manual

## Piston

### Special Tool(s)

 ST1400-A	Pin Remover/Replacer 303-S024 (T68P-6135-A)
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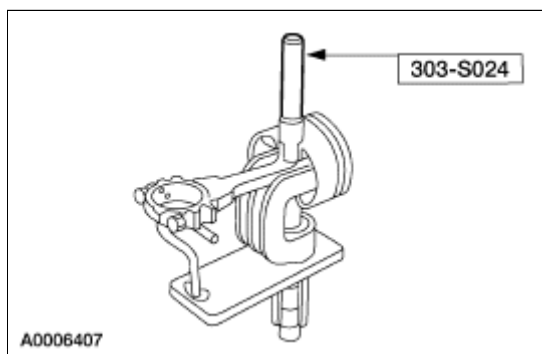
### Material

Item	Specification
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent	WSS-M2C153-G

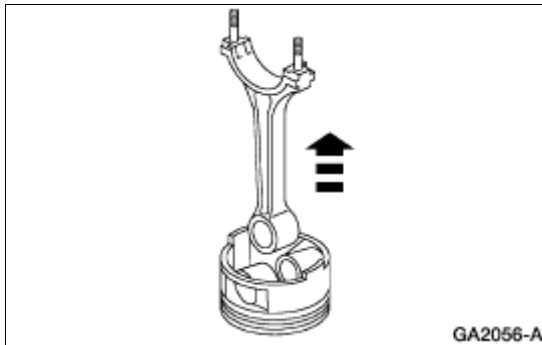
### Disassembly

1. **NOTE:** The piston pin bore of a connecting rod and the diameter of the pin must be within specification. Refer to the general specifications in this section.

Use the special tool to press the piston pin out of the connecting rod and piston assembly.



2. Remove the connecting rod from the piston.



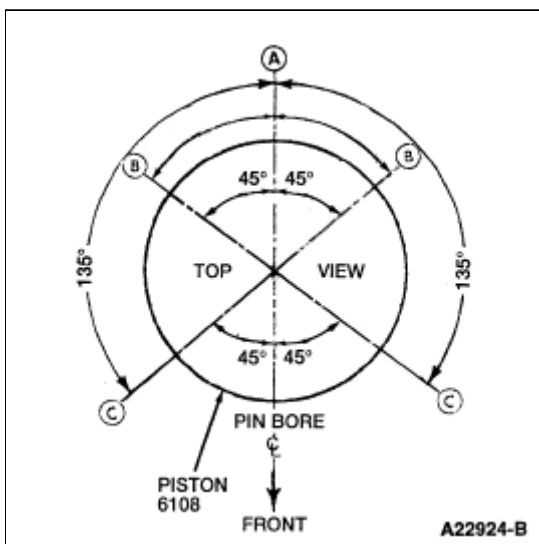
3. Remove the piston rings from the pistons.
4. Clean and inspect the connecting rod and the piston. For additional information, refer to [Section 303-00](#).

### Assembly

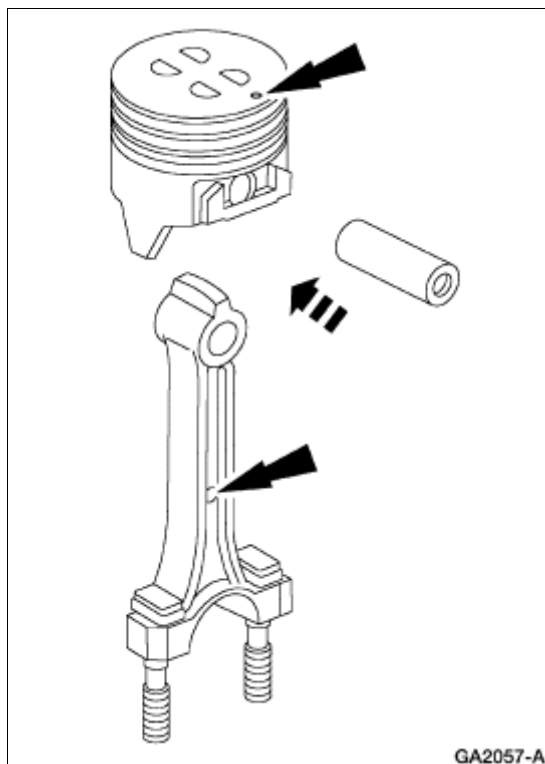
**NOTE:** For RH piston assemblies, the identification notch on the piston and the connecting rod must face in the same direction. For LH assemblies, they must face in the opposite direction.

If installing new connecting rods, use the large chamfered side of the connecting rod bearing bore for direction identification.

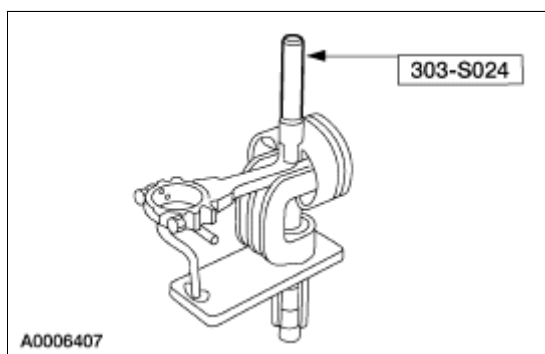
1. Install piston rings using a piston ring installation tool of the correct size.
2. Oil the piston rings and pistons with clean engine oil.
3. Make sure the ring gaps (oil spacer-A, oil ring-B, and compression ring-C are properly spaced around the circumference of the piston.



4. Lubricate the piston pin and piston pin bore with clean engine oil, and position the piston pin in the piston pin bore.



5. Use the special tool to press the piston pin into the piston and connecting rod.



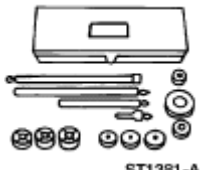
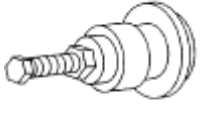
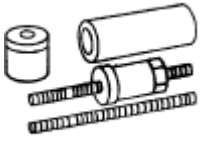

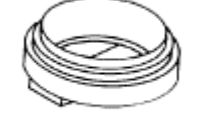

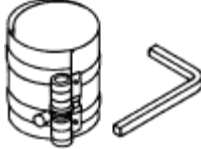


SECTION 303-01C: Engine — 5.0L  
ASSEMBLY

2000 Explorer/Mountaineer Workshop Manual

## Engine

### Special Tool(s)

 <p>ST1381-A</p>	<p>Camshaft Bearing Service Set 303-017 (T65L-6250-A)</p>
 <p>ST1328-A</p>	<p>Crankshaft Seal Installer/Aligner 303-335 (T88T-6701-A)</p>
 <p>ST1591-A</p>	<p>Damper Replacer 303-008 (T52L-6306-AEE)</p>
 <p>ST1593-A</p>	<p>Rear Crankshaft Adapter 303-S560 (T96T-6701-A)</p>
 <p>ST1479-A</p>	<p>Rear Crank Seal Replacer 303-516 (T95P-6701-BH)</p>
 <p>ST1594-A</p>	<p>Rear Crank Seal Replacer Spacer 303-561 (T96T-6701-B)</p>
	<p>Piston Ring Compressor 303-D032 (D81L-6002-C)</p>



**Material**

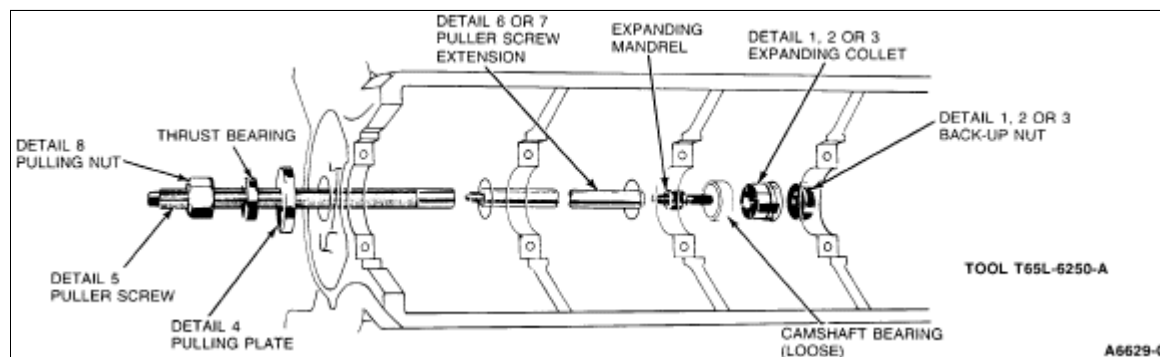
Item	Specification
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent	WSS-M2C153-G
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A
Silicone Gasket and Sealant F7AZ-19554-EA or equivalent	WSE-M4G323-A4
Pipe Sealant with Teflon XW7Z-19554-AA or equivalent	WSK-M2G350-A2

**NOTE:** If reusing the cylinder block, inspect all the core plugs. For additional information, refer to [Section 303-00](#).

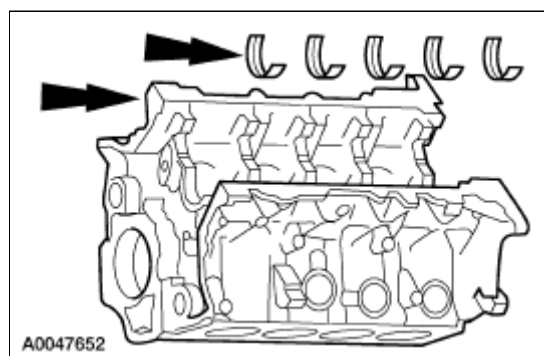
**NOTE:** Before engine assembly, use metal surface cleaner and a suitable plastic or wooden scraper to clean the sealing surfaces. All of the sealing surfaces must be clean. Make sure the coolant and the oil passages are clear.

- NOTE:** Make sure the oil hole in the camshaft bearing is in line with the oil port in the block.

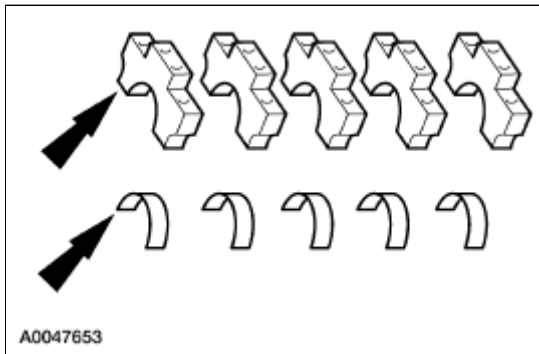
Lubricate the camshaft bearings with clean engine oil. Use special tool to install the camshaft bearings.



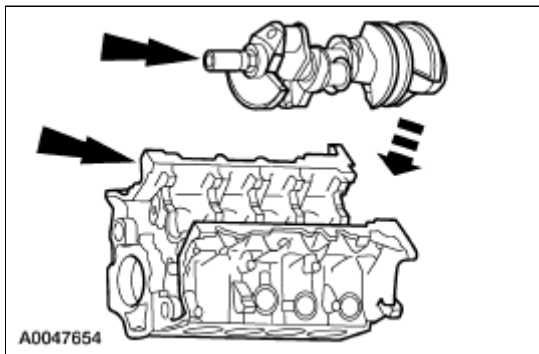
- Lubricate the crankshaft upper main bearings with clean engine oil and install the upper main bearings in the cylinder block.



3. Lubricate the crankshaft lower main bearings with clean engine oil and install the lower main bearings in the crankshaft main bearing caps.

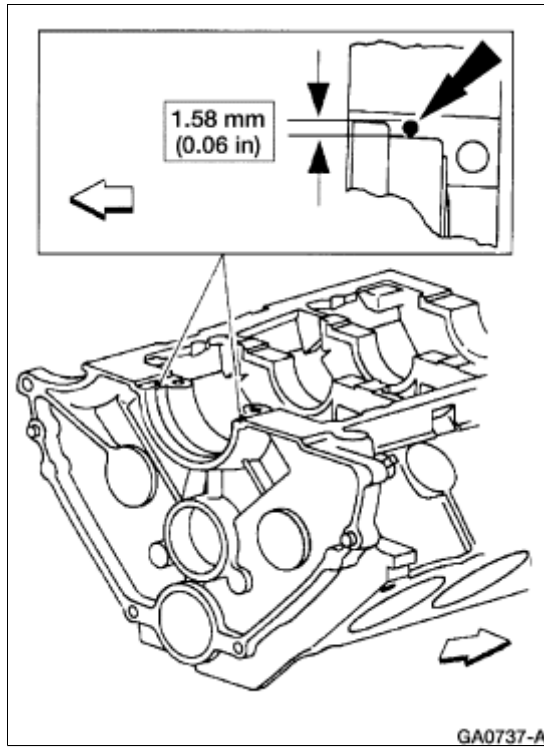


4. Install the crankshaft.



5. The crankshaft main bearings are precision selective fit. Inspect the bearing clearance. For additional information, refer to [Section 303-00](#).
6. **NOTE:** If the rear main bearing cap is not installed within four minutes, remove the sealant and reapply.

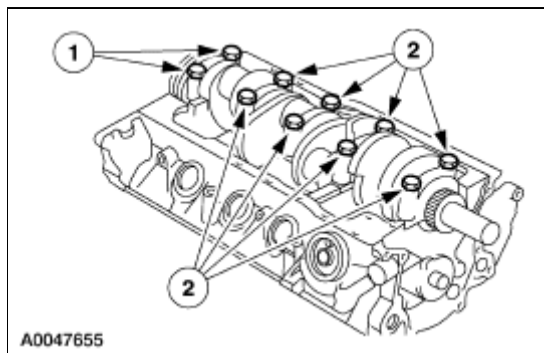
Using metal surface cleaner, clean the rear main bearing cap sealing area thoroughly and apply silicone gasket and sealant to the rear main bearing cap and to the cylinder block prating line.



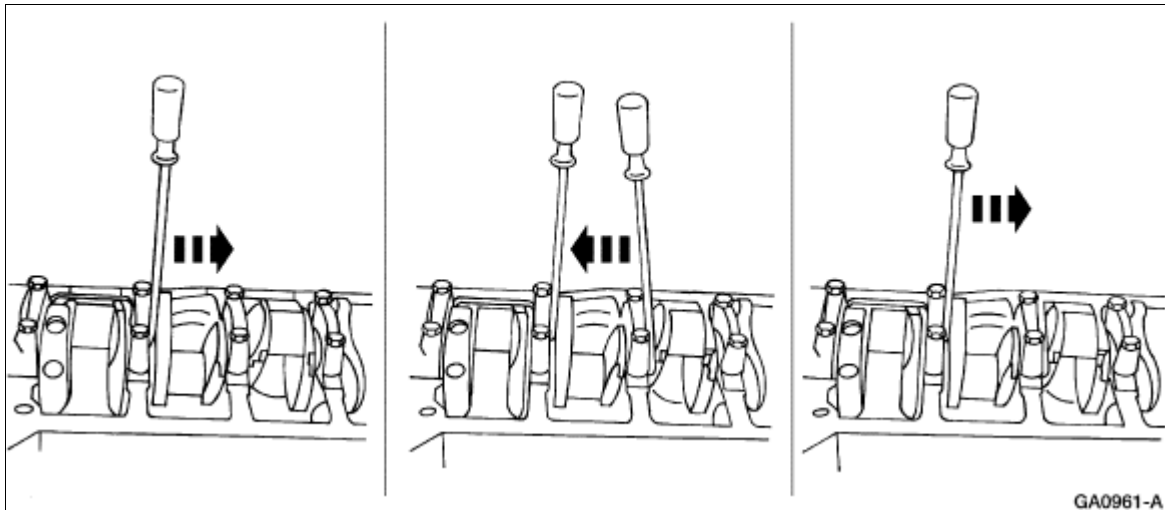
7. **NOTE:** Prior to installing the main bearing caps, lubricate the bearing surface with clean engine oil.

Install the main bearing caps and start the bolts.

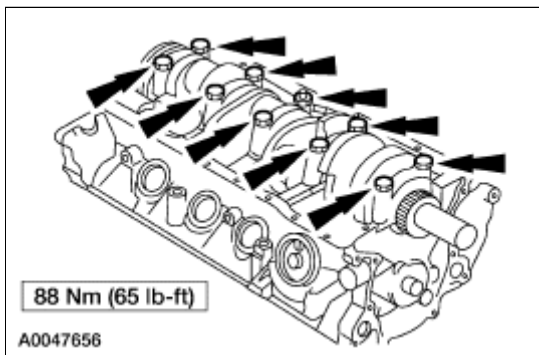
1. Install the rear main bearing cap.
2. Install the remaining main bearing caps.



8. Seat the thrust bearing while tightening the main bearing caps.



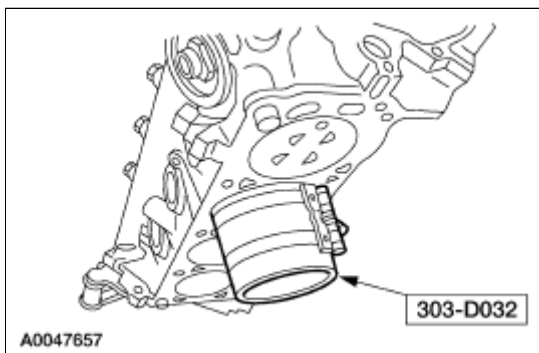
9. Tighten the bolts.



10. Make sure the piston rings are properly spaced. For additional information, refer to [Piston](#) in this section.
11. **NOTE:** Prior to piston installation, lubricate the cylinder bores with clean engine oil.

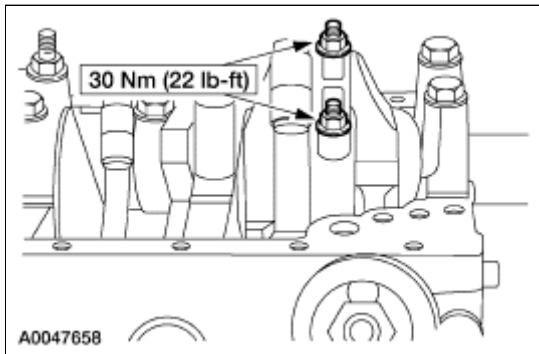
**NOTE:** Position the piston with the identification notch in the piston head toward the front of the cylinder block.

Using the special tool, install the pistons.

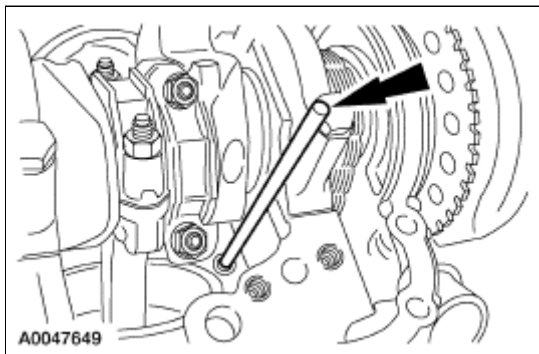


12. Check the clearance of each connecting rod bearing. For additional information, refer to [Section 303-00](#).

13. Lubricate the connecting rod bearings with clean engine oil and install the connecting rod caps and the nuts.

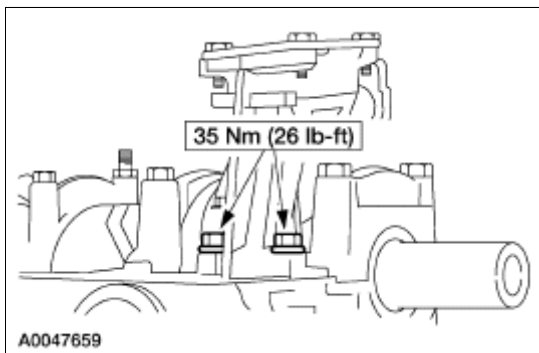


14. Install the oil pump driveshaft.

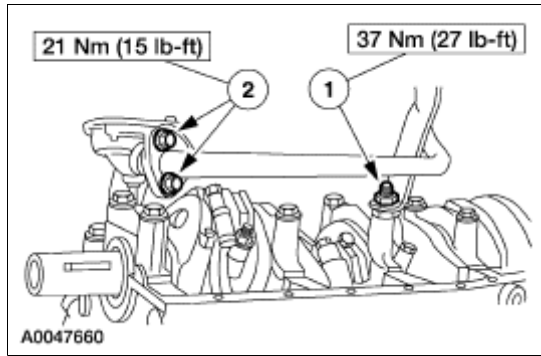


15. **NOTE:** Prime the oil pump prior to installation.

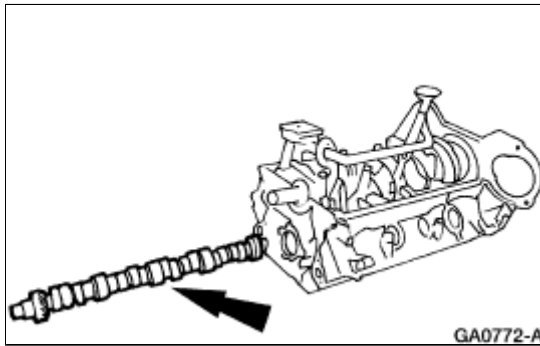
Position the oil pump and install the bolts.



16. Install the oil pump screen cover and tube.
1. Install the nut.
  2. Position the gasket and install the bolts.

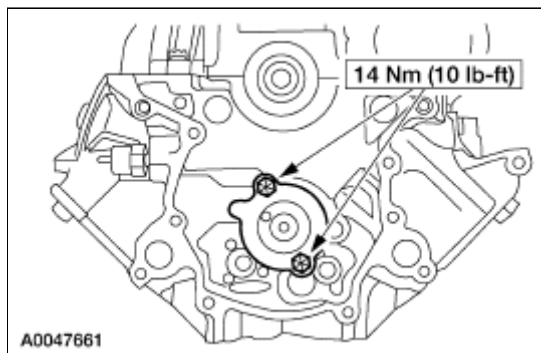


17. Lubricate the camshaft with clean engine oil and install the camshaft into the cylinder block.

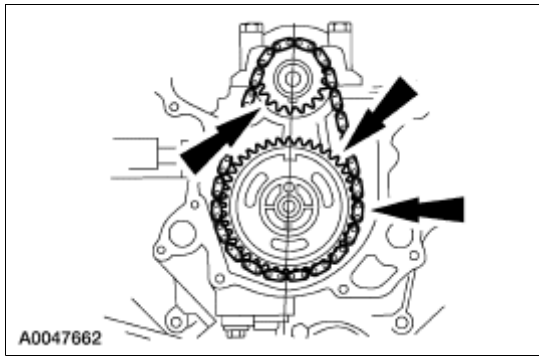


18. **NOTE:** The oil groove must face the rear of the engine.

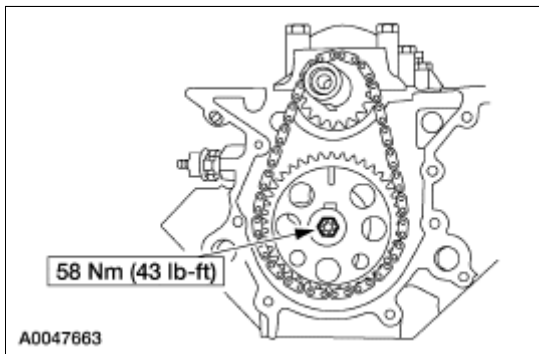
Lubricate the camshaft thrust plate with clean engine oil. Install the camshaft thrust plate.



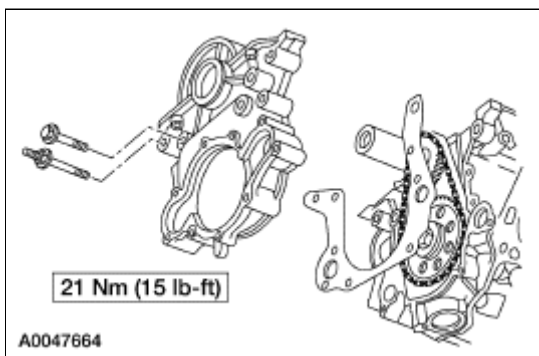
19. Position the crankshaft sprocket, the camshaft sprocket, and the timing chain while aligning the timing marks.



20. Lubricate the timing chain and sprockets with clean engine oil. Install the bolt.

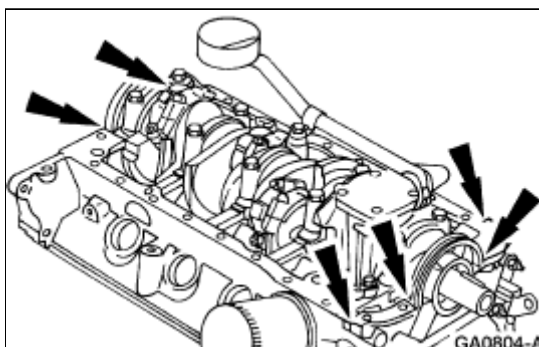


21. Position the lower engine front cover and the engine front cover gasket, and install the four bolts.

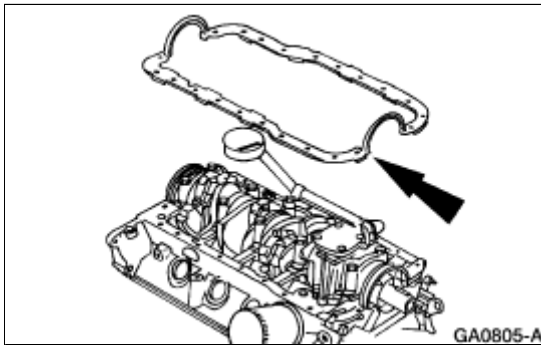


22. **NOTE:** The oil pan gasket must be installed within four minutes after applying the silicone.

Apply silicone gasket and sealant in six positions.

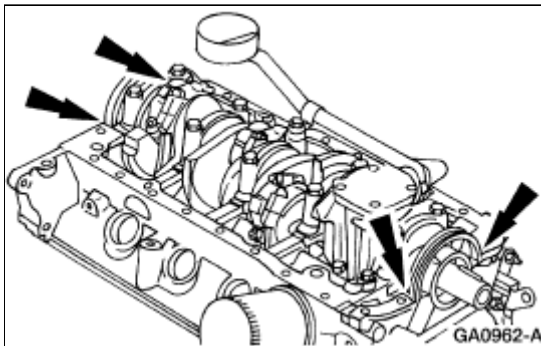


23. Install the oil pan gasket.

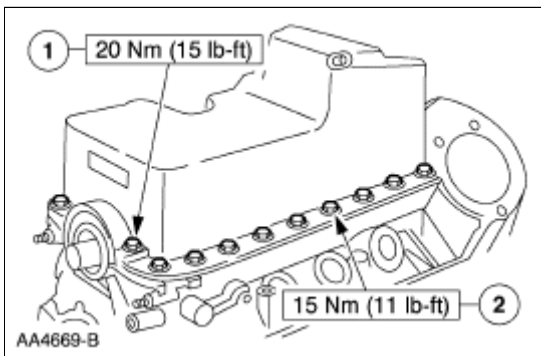


24. **NOTE:** The oil pan must be installed within four minutes after applying the silicone.

Apply silicone gasket and sealant in four positions.

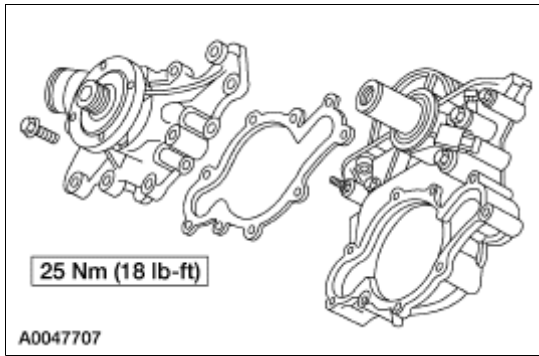


25. Position the oil pan, the reinforcement rails and install the 22 bolts.
1. Tighten the four end bolts.
  2. Tighten the remaining 18 bolts.



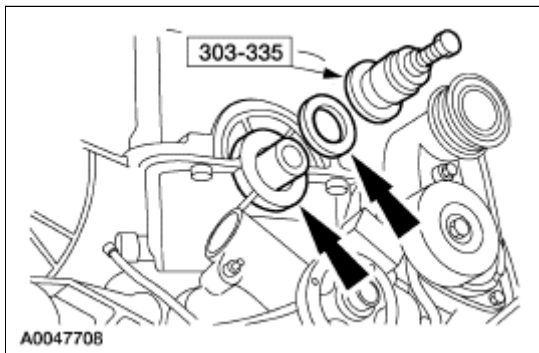
26. Install a new water pump housing gasket and the water pump.



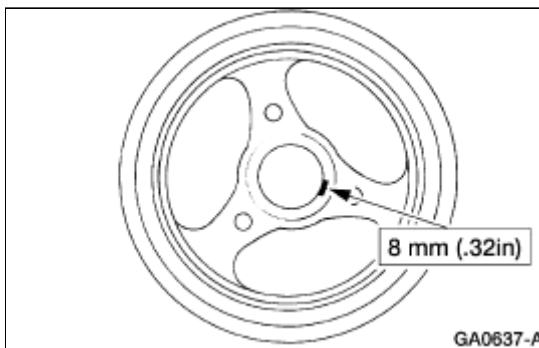


27. **NOTE:** Lubricate the engine front cover and the front oil seal inner lip with clean engine oil.

Using the special tool, install the crankshaft front oil seal.

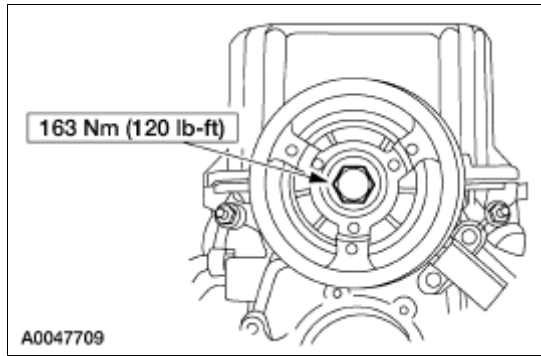



28. Apply silicone gasket and sealant to the woodruff key slot on the crankshaft pulley.



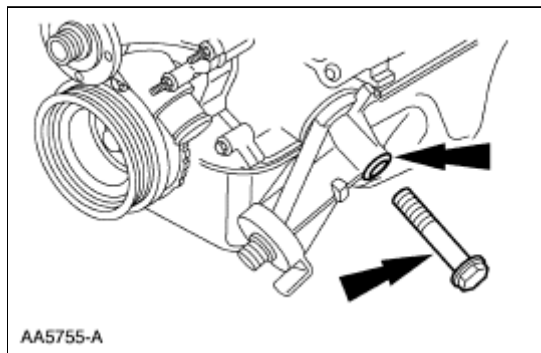
29. **NOTE:** Use a suitable strap wrench to hold the crankshaft pulley.

Position the crankshaft pulley and install the bolt.

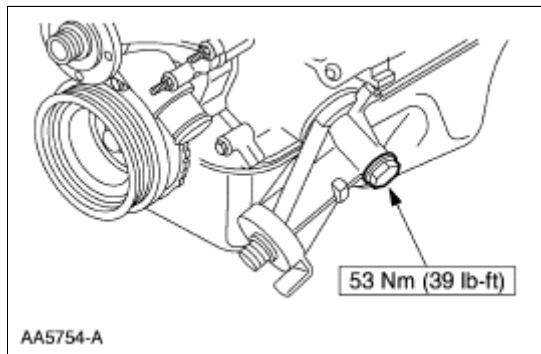


30.  **CAUTION:** Be sure to position the O-ring seal into the groove on the adapter. Failure to properly position the O-ring seal may cause an engine oil leak. Coat the O-ring seal with petroleum jelly to hold the O-ring seal in place during bolt installation.

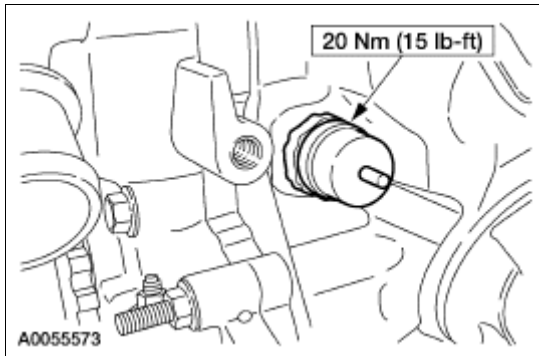
Install the bolt and O-ring seal.



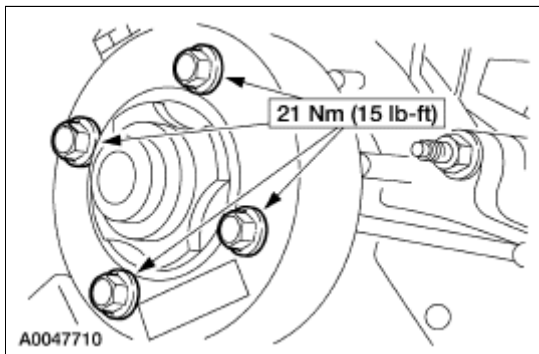
31. Tighten the bolt.



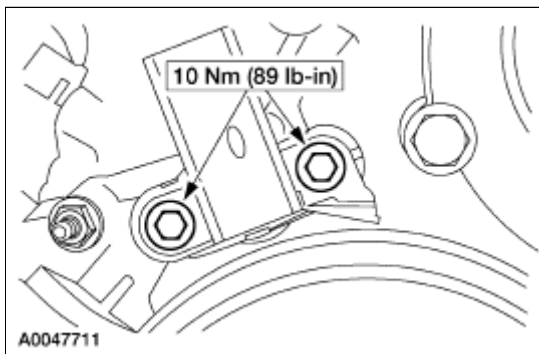
32. Install the oil pressure switch.



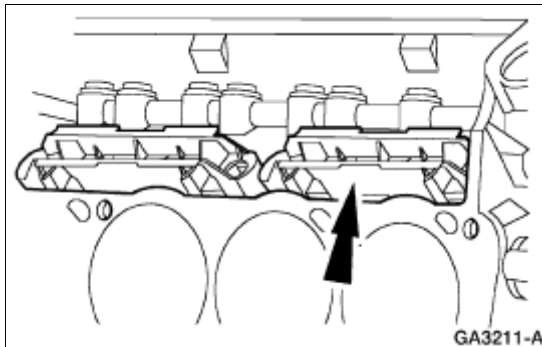
33. Position the water pump pulley and install the bolts.



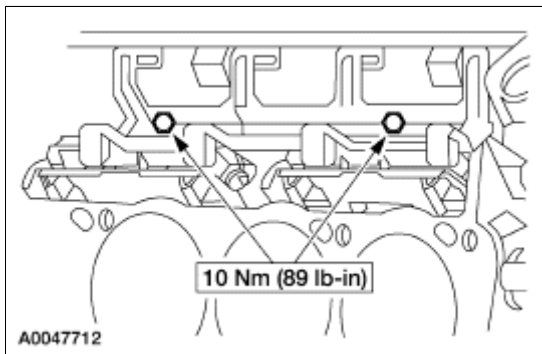
34. Position the crankshaft position sensor (CKP), timing pointer, and install the bolts.



35. Rotate the engine on the engine stand.
36. Lubricate the valve tappet bores with clean engine oil. Install the valve tappets and the valve tappet guide plates in their original positions.



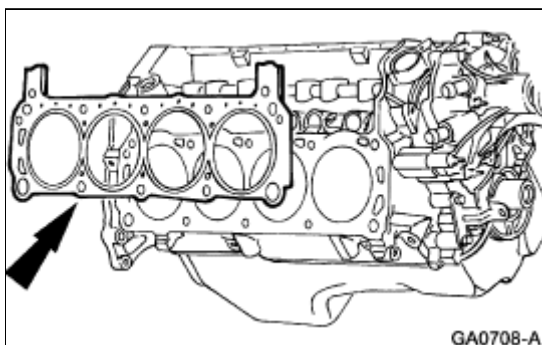
37. Position the valve tappet guide plate retainer and install the bolts.



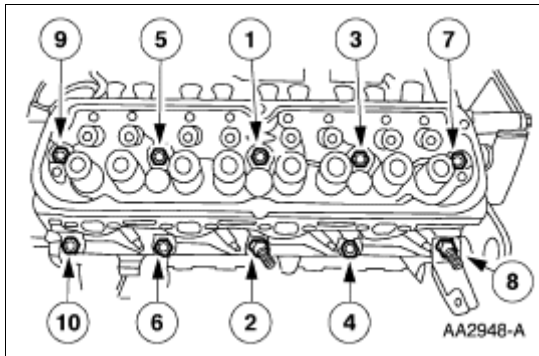
38. **NOTE:** The RH is shown; the LH is similar.

**NOTE:** A specially treated composition gasket is used. Do not apply sealer to a composition gasket.

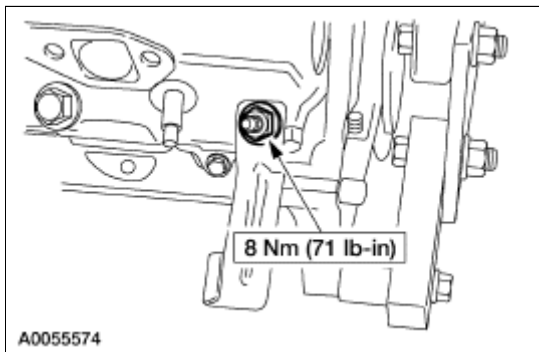
Position the head gasket over the two dowel pins.



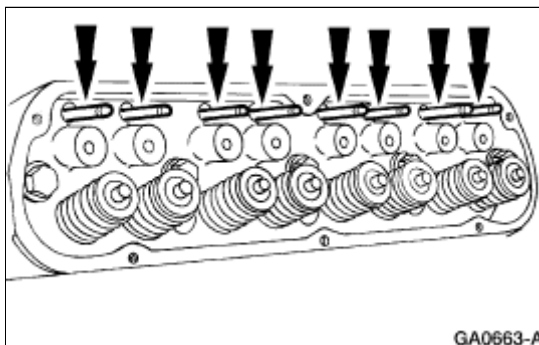
39. Install the cylinder head and install the ten new bolts in three steps.
- Step 1: Tighten to 40 Nm (30 lb-ft).
  - Step 2: Tighten to 68 Nm (50 lb-ft).
  - Step 3: Rotate an additional 90 degrees.



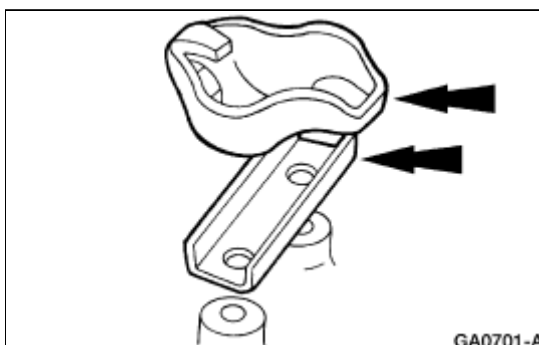
40. Install the spark plug wire bracket on the left cylinder head.



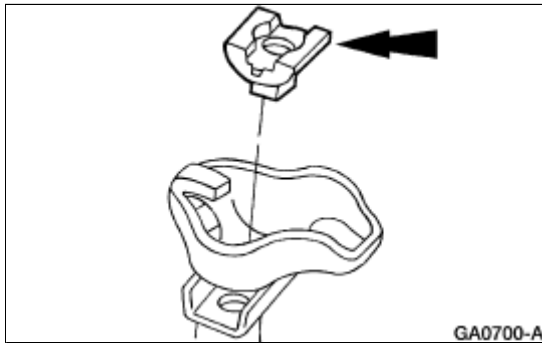
41. Install the push rods in their original positions.



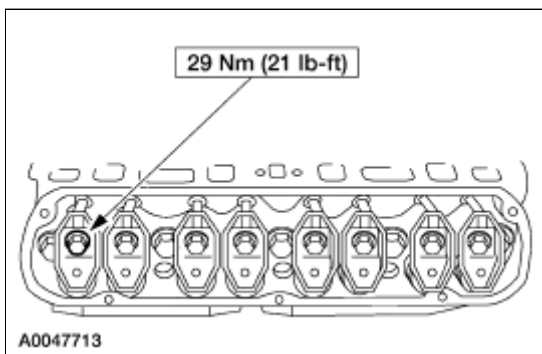
42. Lubricate the rocker arms and the fulcrum guides with clean engine oil. Install the rocker arms and the rocker arm fulcrum guides.



43. Install the eight rocker arm fulcrums.



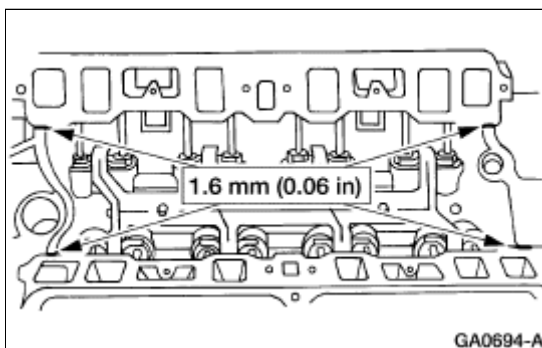
44. Install the bolts.



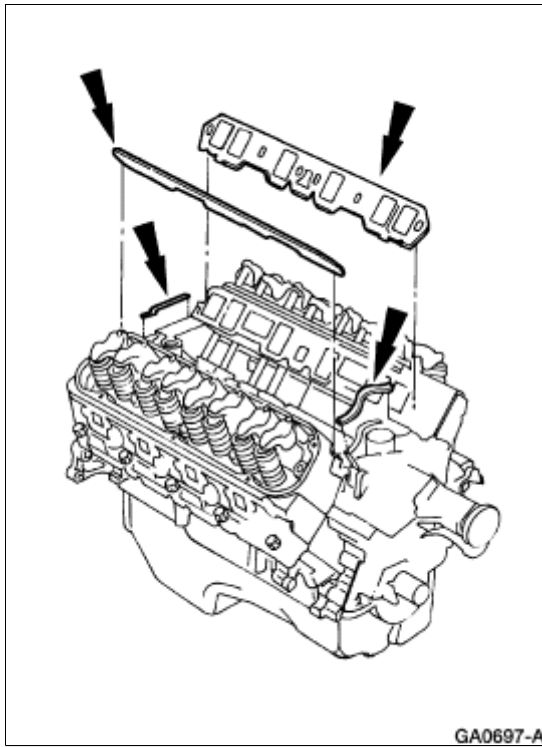
45. **NOTE:** Use metal surface cleaner to clean the gasket surfaces of the lower intake manifold, cylinder heads and cylinder block.

**NOTE:** The lower intake manifold must be installed within four minutes after applying the silicone.

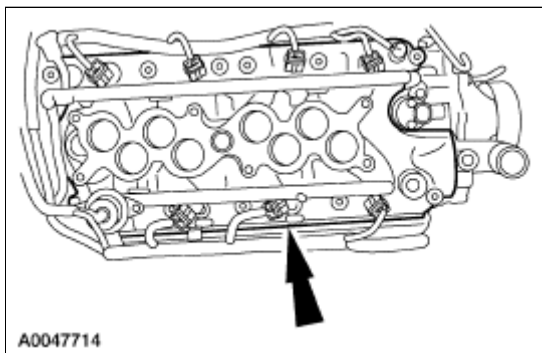
Apply silicone gasket and sealant in the corners where the cylinder head and the cylinder block meet.



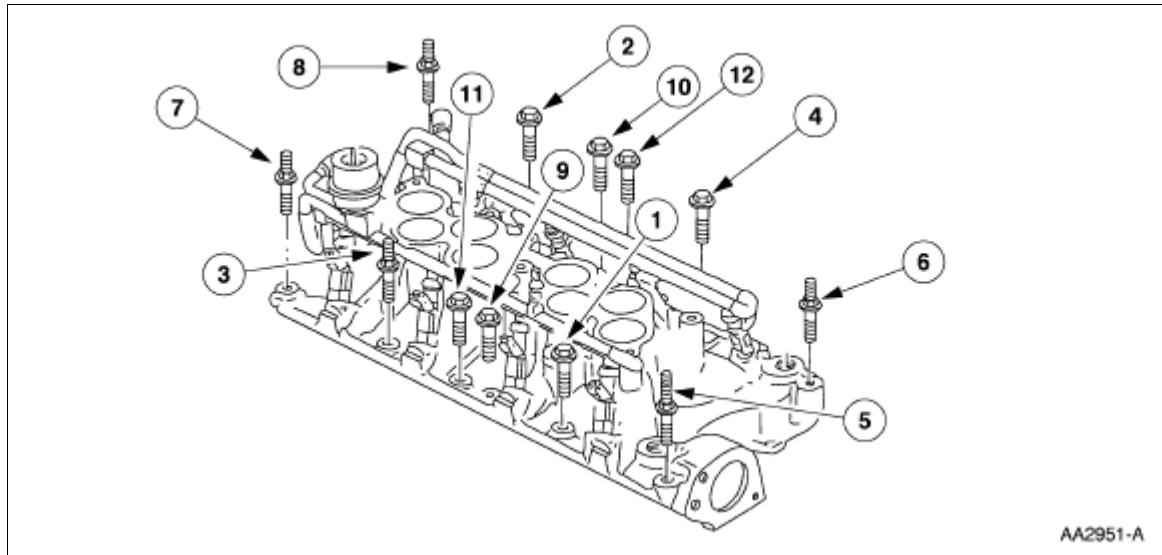
46. Position the four lower intake manifold gaskets.
- Install the intake manifold seal tabs into the notch in the lower intake manifold gaskets.
  - Press firmly along the entire length of the intake manifold seal until the silicone sealant is visible.



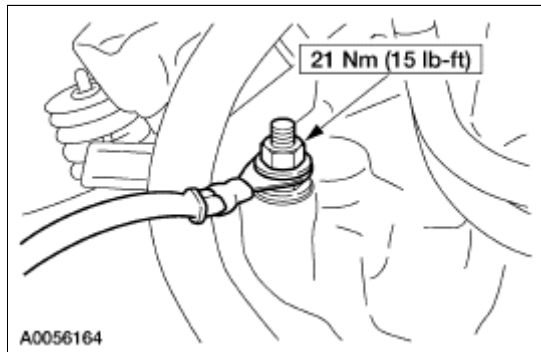
47. Install the lower intake manifold.



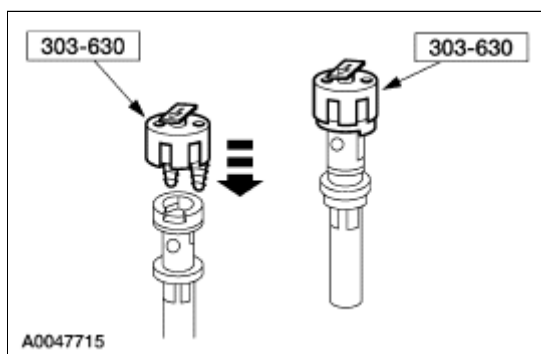
48. Tighten the twelve bolts in two steps.
- Step 1: Tighten to 10 Nm (89 lb-in).
  - Step 2: Tighten to 32 Nm (24 lb-ft).



49. Install the ground strap on the intake manifold.



50. Install the special tool, aligning the tabs and the notches with those on the camshaft synchronizer.

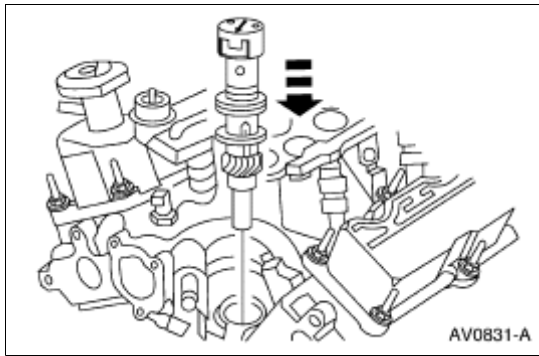


51. **NOTE:** When installing the camshaft synchronizer into the cylinder block, make sure that the arrow on the special tool is pointing toward the front of the vehicle, on a line that is parallel to the center line of the crankshaft.

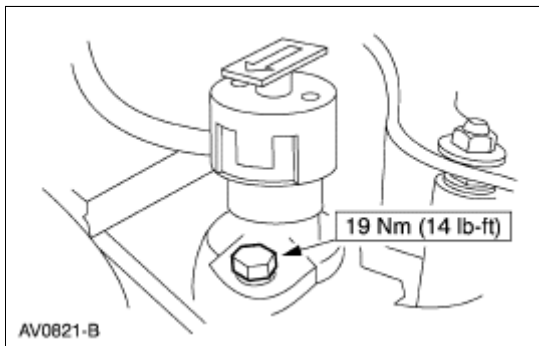
**NOTE:** The synchronizer will rotate slightly as the synchronizer gear engages the camshaft gear. When the synchronizer is fully installed, the arrow on the special tool should point to the position of the electrical connector.

Install the camshaft synchronizer.

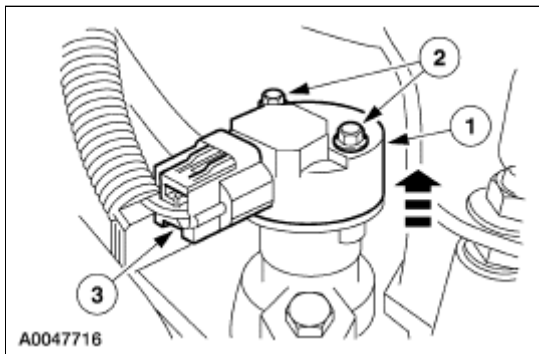




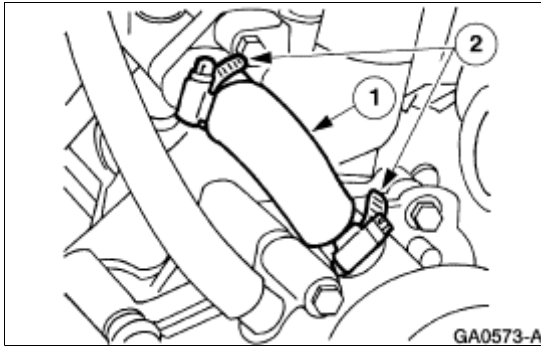
52. Position the clamp and install the bolt.



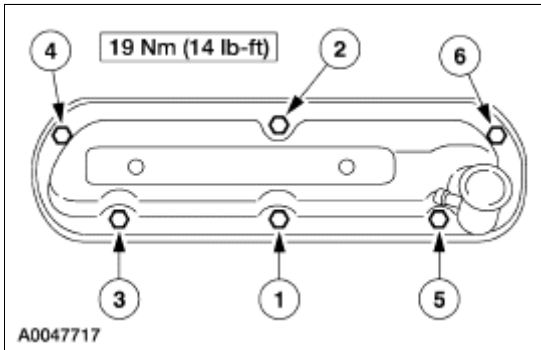
53. Remove the special tool.
54. Install the camshaft position (CMP) sensor.
1. Install the CMP sensor.
  2. Install the screws.
  3. Connect the CMP electrical connector.



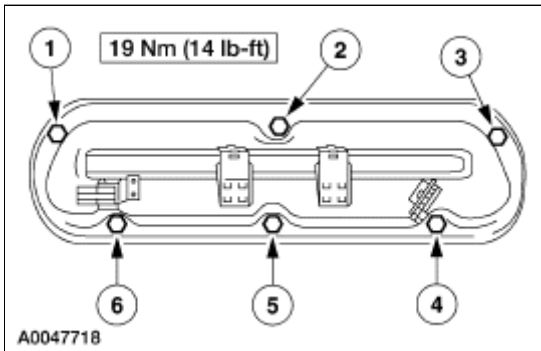
55. Install the water bypass tube.
1. Position the water bypass tube.
  2. Install the clamps.



56. Position the RH valve cover and gasket and install the bolts.



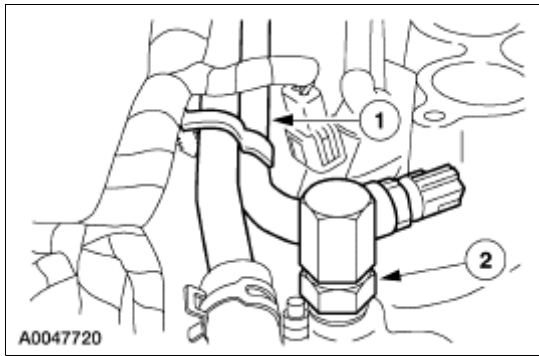
57. Position the LH valve cover and gasket, and install the bolts.



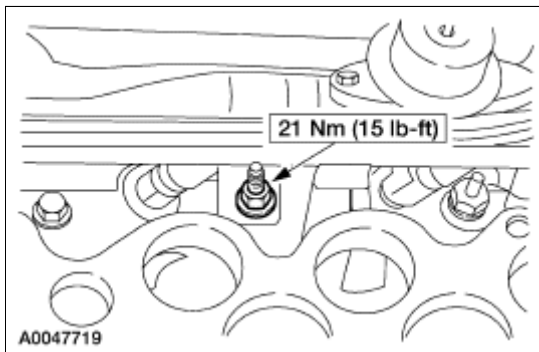
58. **NOTE:** Apply pipe sealant to pipe threads prior to installation.

Install the water heater tube on the lower intake manifold.

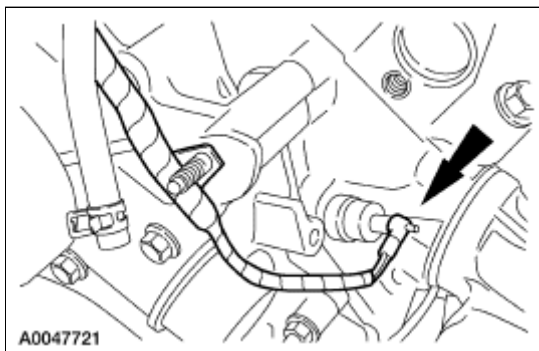
1. Install the water pipe and position the wiring harness.
2. Tighten the nut on the water pipe.



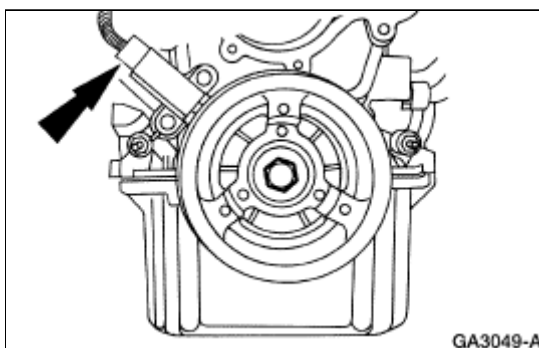
59. Install the heater tube retaining nut.



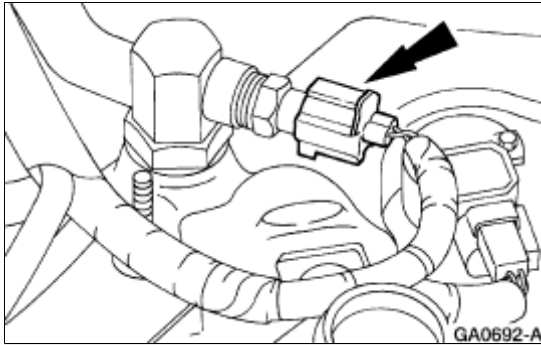
60. Position the engine sensor control wiring and connect the oil pressure sensor electrical connector.



61. Connect the crankshaft position sensor electrical connector.

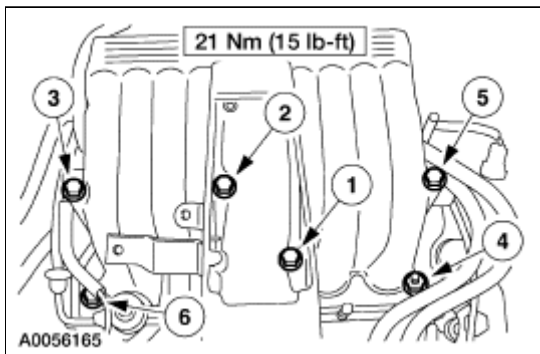


62. Connect the engine coolant temperature (ECT) electrical connector.

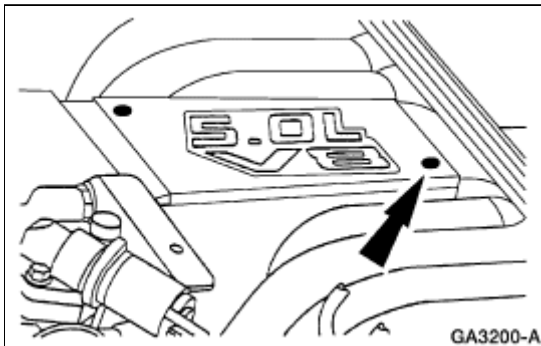


63. **NOTE:** Clean and inspect all the surfaces.

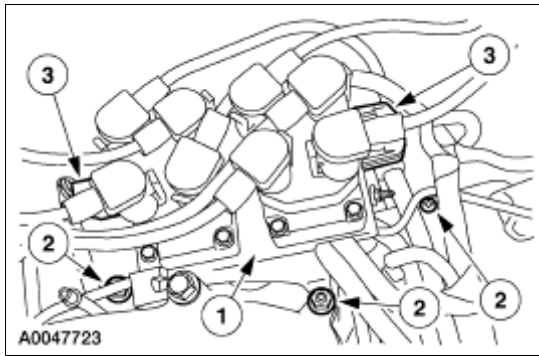
Install new seals and gaskets. Position the upper intake manifold and install the bolts in the sequence shown.



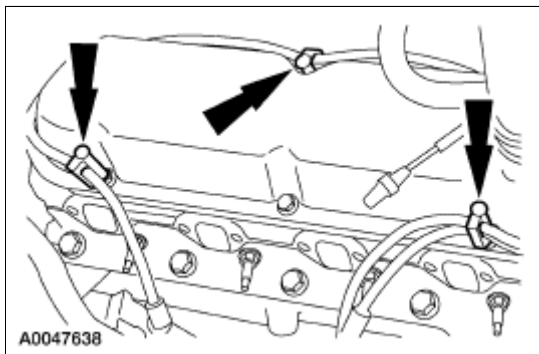
64. Install the upper intake manifold cover plate.



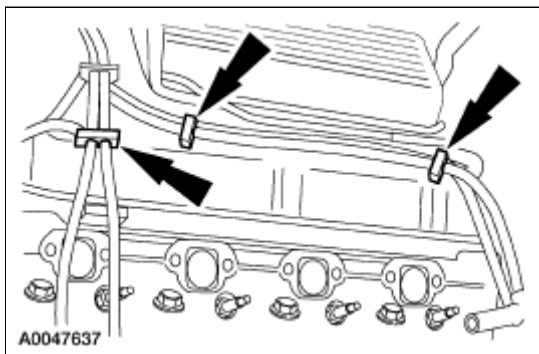
65. Install the ignition coils and bracket assembly.
1. Install the ignition coils and bracket assembly.
  2. Install the three retainers.
  3. Connect the ignition coils electrical connectors.



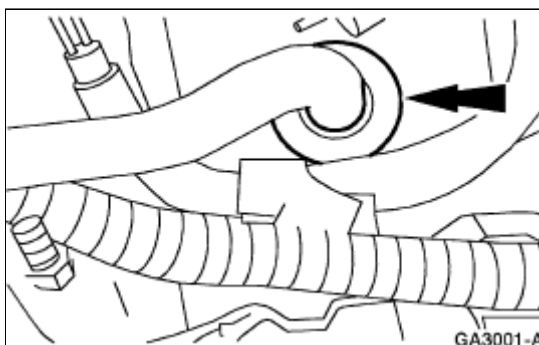
66. Connect the RH spark plug wire retainers to the valve cover.



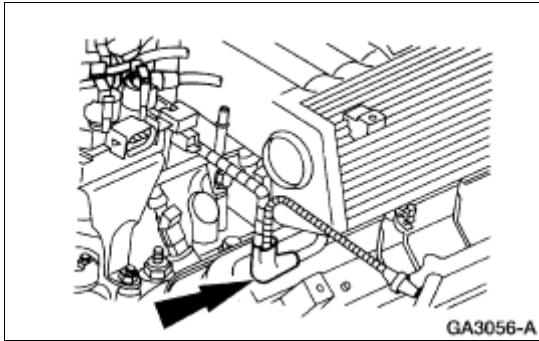
67. Connect the LH spark plug wire retainers to the valve cover.



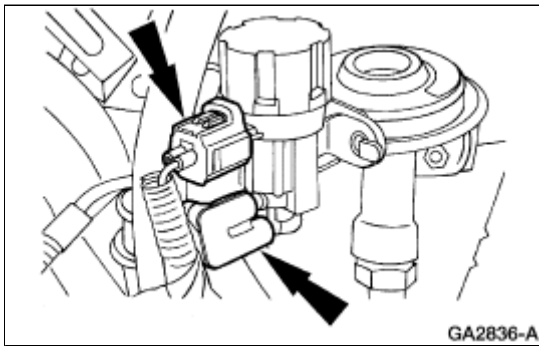
68. Connect the positive crankcase ventilation (PCV) hose to the intake manifold.



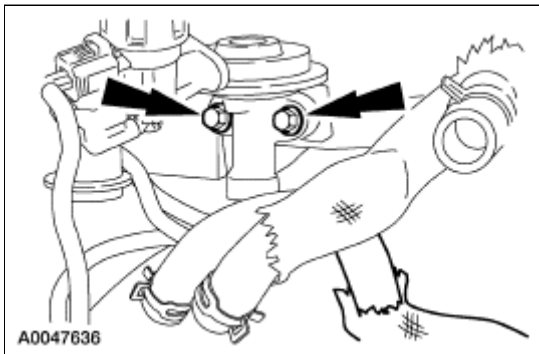
69. Connect the two upper intake vacuum connections and the two PCV heater hoses.



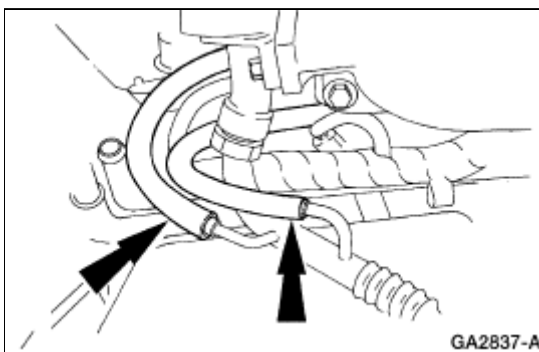
70. Connect the exhaust gas recirculation (EGR) vacuum regulator solenoid electrical and vacuum connections.



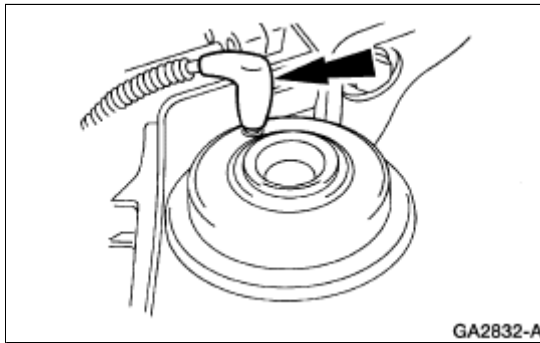
71. Install the EGR valve and tube assembly. Install the retainers hand-tight only.



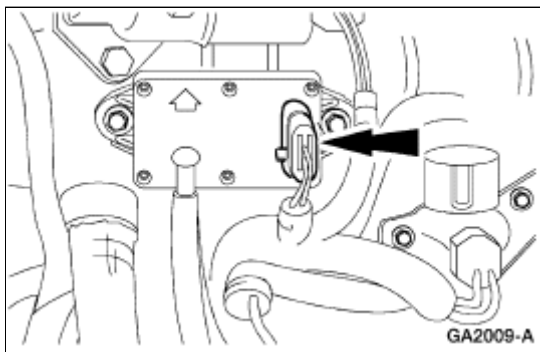
72. Connect the two pressure transducer hoses.



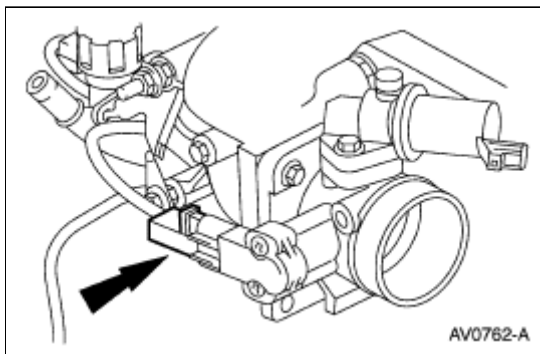
73. Connect the EGR valve vacuum connector.



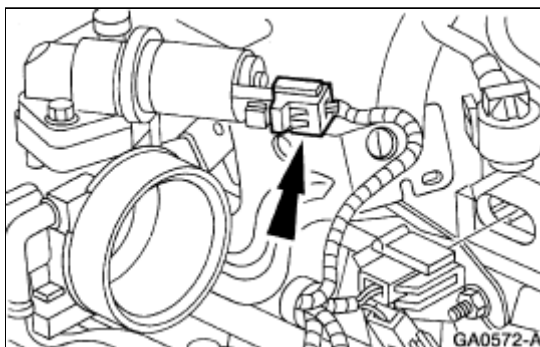
74. Connect the EGR backpressure transducer electrical connector.




75. Connect the throttle position (TP) sensor electrical connector.

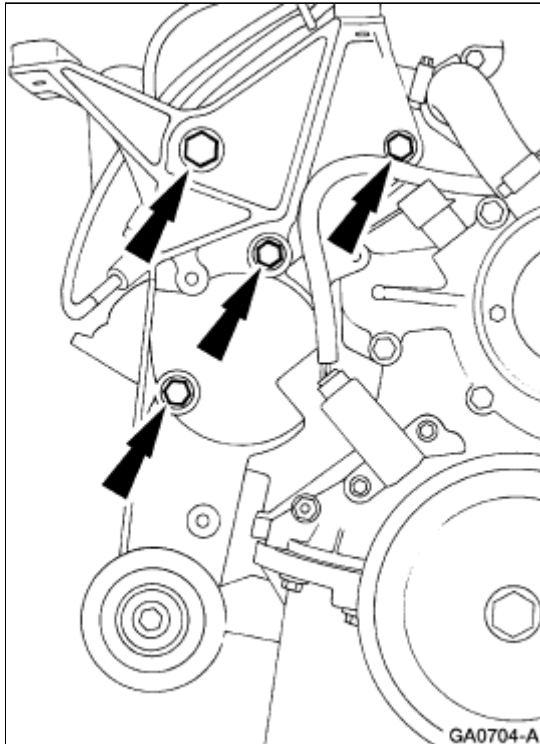


76. Connect the idle air control (IAC) bypass electrical connector.



77.  **CAUTION:** These bolts require special torque values. Correct tightening is necessary to prevent excessive accessory drive vibrations.

Position the generator bracket and install the bolts (RH only).

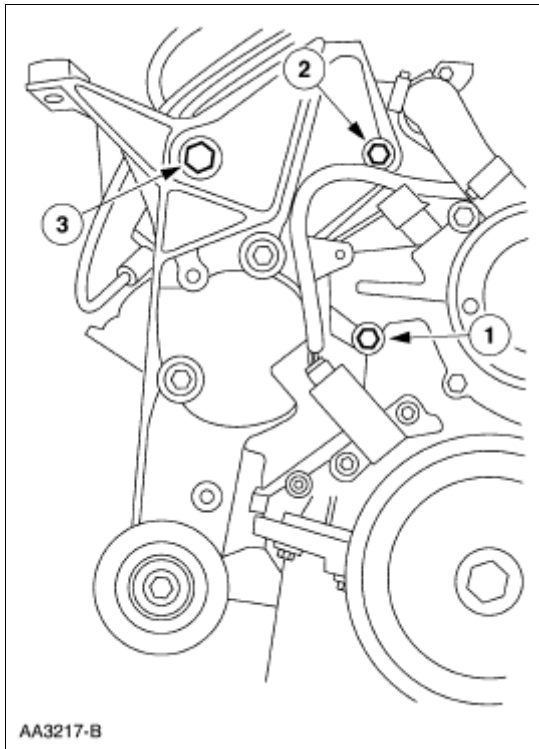


78. **NOTE:** Tighten the generator bracket in two steps.

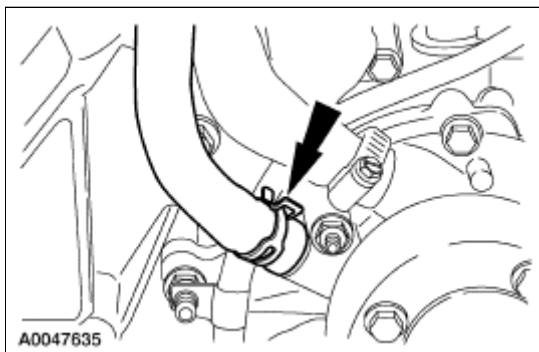
Tighten the bolts in the sequence shown (RH only).

- Step 1: Tighten bolts 1 and 2 to 35 Nm (26 lb-ft).
- Step 2: Tighten bolt 3 to 65 Nm (48 lb-ft).

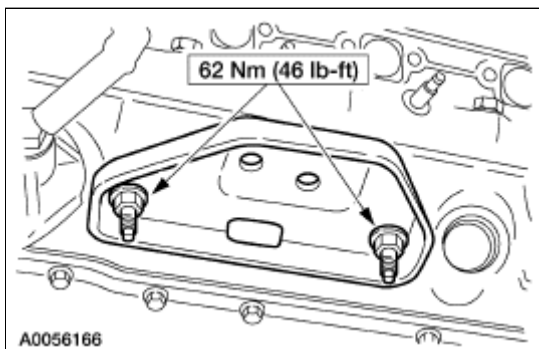




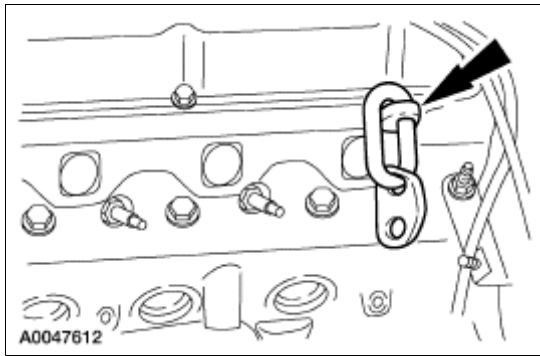
79. Connect the heater hose to the water pump.



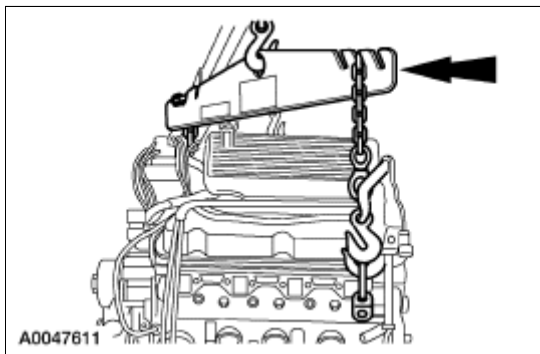
80. Install the RH and LH engine mount brackets.



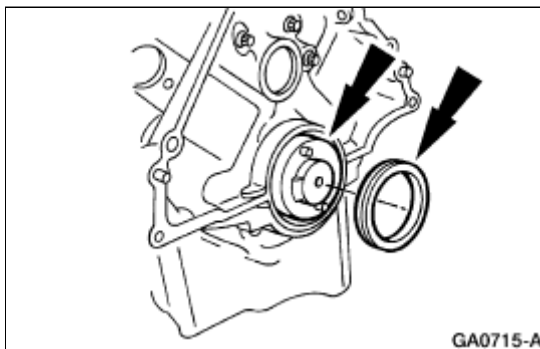
81. Install the engine lifting brackets.



82. Attach the spreader bar to the engine. Remove the engine from the engine stand.

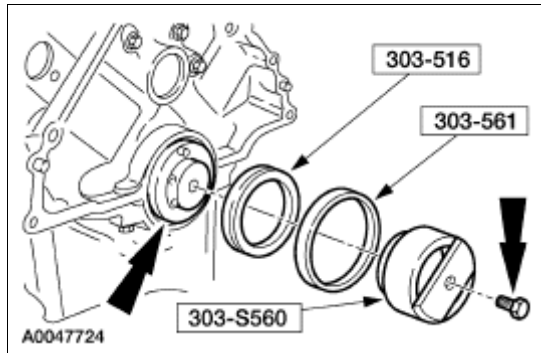


83. Lubricate the crankshaft rear oil seal and the crankshaft sealing surface with clean engine oil.

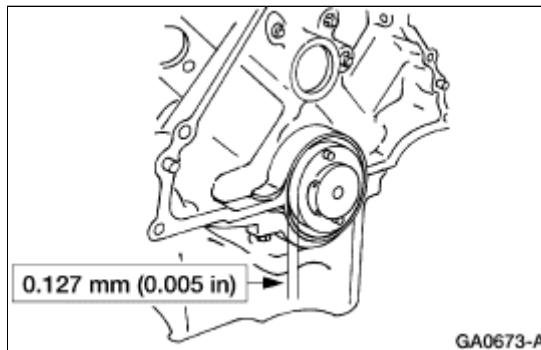


84. **NOTE:** Be sure the crankshaft rear sealing surface is clean and free of any rust or corrosion. To clean the crankshaft rear sealing surface, use extra-fine emery cloth or extra-fine 0000 steel wool with metal surface cleaner.

Using the special tools, install the crankshaft rear oil seal.



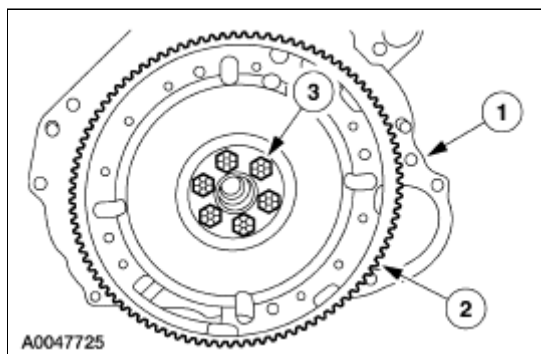
85. Check that the crankshaft rear oil seal is within specification.



86. Install the camshaft rear plug.
87. **NOTE:** Install new flywheel mounting bolts.

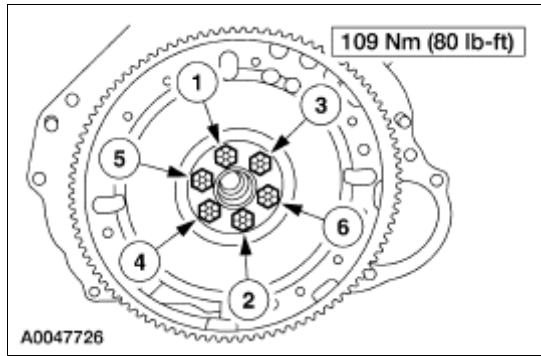
Install the spacer plate and the flywheel.

1. Install the spacer plate.
2. Install the flywheel.
3. Install the bolts.



88. **NOTE:** Sealant must be removed from the bolt holes prior to reassembly.

Tighten flywheel bolts in sequence shown.

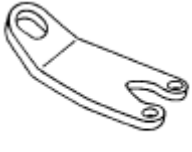
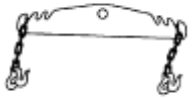


SECTION 303-01C: Engine — 5.0L  
INSTALLATION

2000 Explorer/Mountaineer Workshop Manual

## Engine

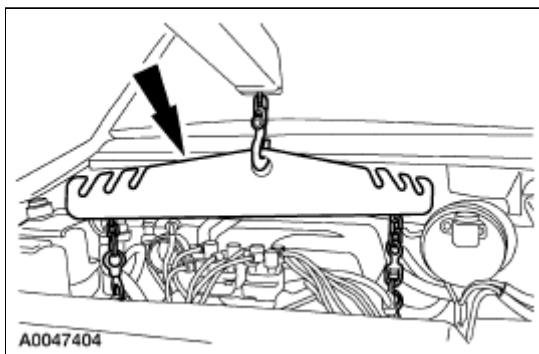
### Special Tool(s)

 ST1621-A	5.0L Lifting Bracket 303-D096 (D94P-6001-B) or equivalent
 ST1602-A	Spreader Bar 303-D089 (D93P-6001-A3) or equivalent

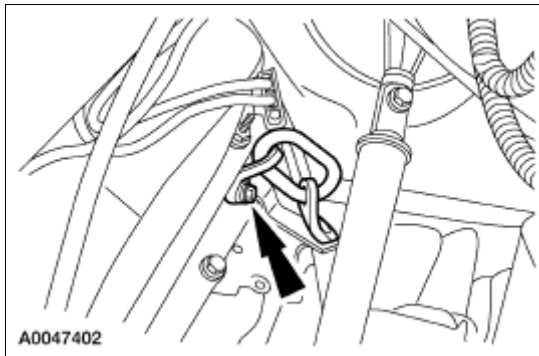
### Material

Item	Specification
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent	WSS-M2C153-G

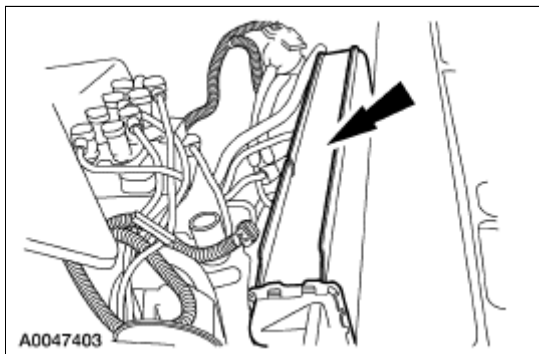
1. Position the engine in the vehicle.
2. Remove the spreader bar.



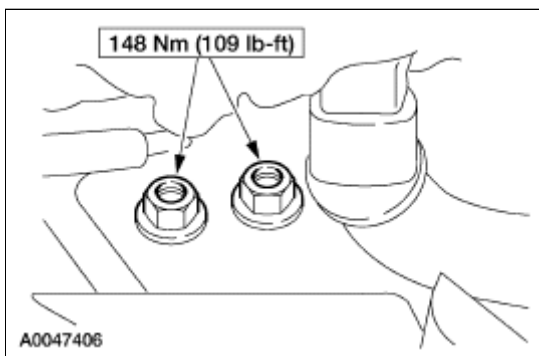
3. Remove the engine lifting brackets.



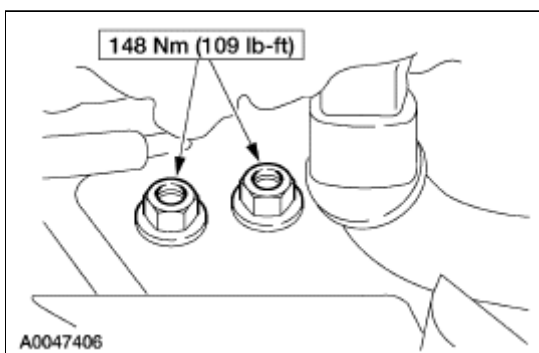
4. Install the radiator and the condenser assembly.



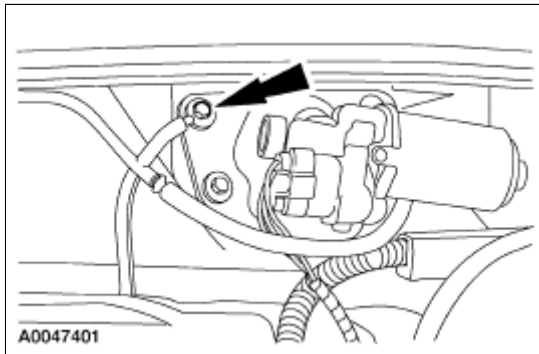
5. Install the RH motor mount nuts.



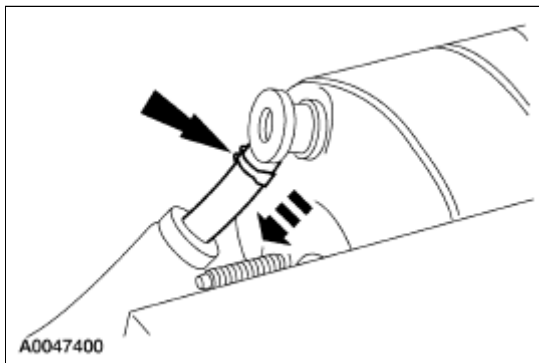
6. Install the LH motor mount nuts.



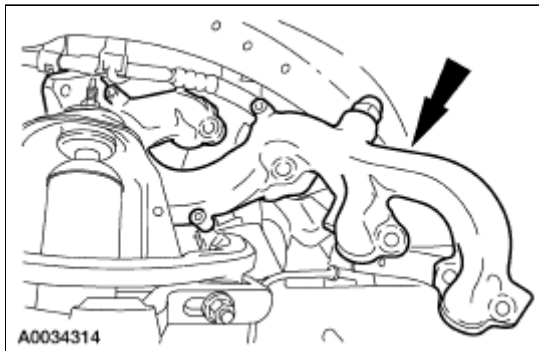
7. Install the engine ground strap at the bulkhead.



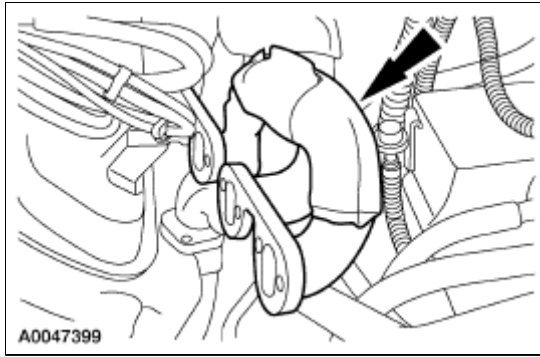
8. Connect the vacuum hose to the brake booster.



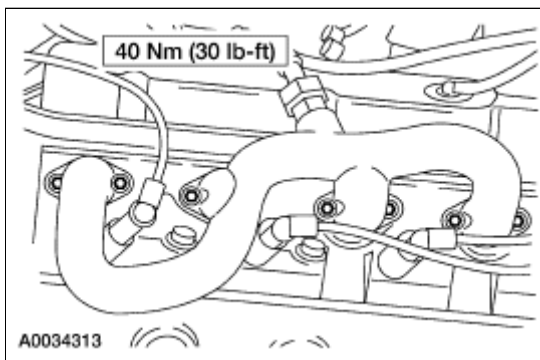
9. Install the RH exhaust manifold and gasket.



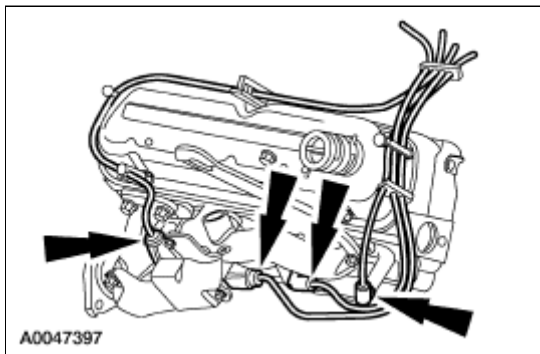
10. Install the left exhaust manifold and gasket.



11. Raise and support the vehicle. For additional information, refer to [Section 100-02](#).
12. Install RH exhaust manifold retainers.

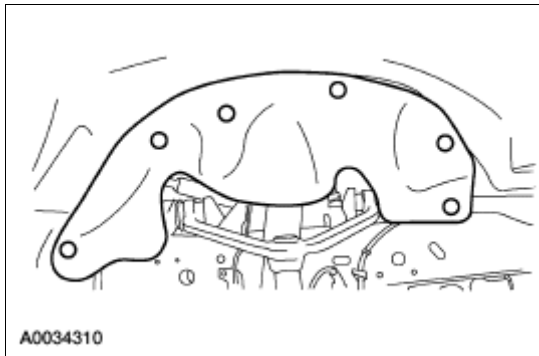


13. Connect the spark plug wires to the RH spark plugs.



14. Install the right side wheel well splash shield.

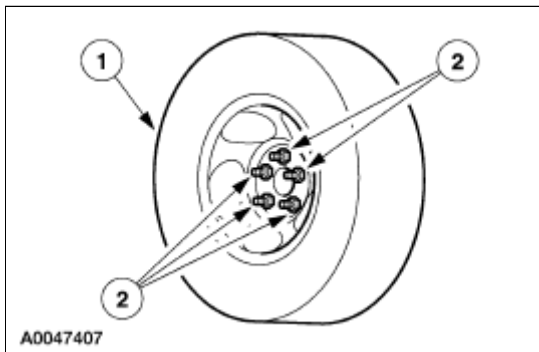




15. **WARNING:** Whenever a wheel is installed, always remove any corrosion, dirt or foreign material present on the mounting surfaces of the wheel or the surface of the wheel hub, brake drum or brake disc that contacts the wheel. Installing wheels without correct metal-to-metal contact at the wheel 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 can result in personal injury.

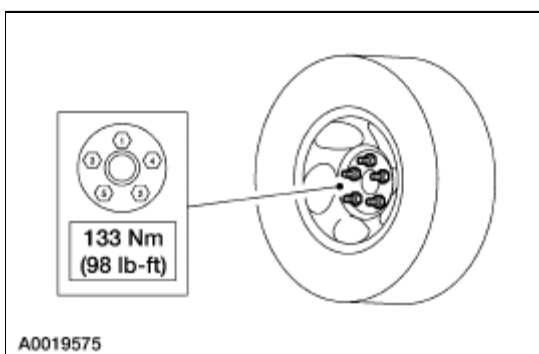
Clean the right front wheel hub mounting surface and the wheel pilot.

16. Install the right front tire and wheel assembly.
1. Position the tire and wheel assembly.
  2. Install the wheel nuts, then lower the vehicle.

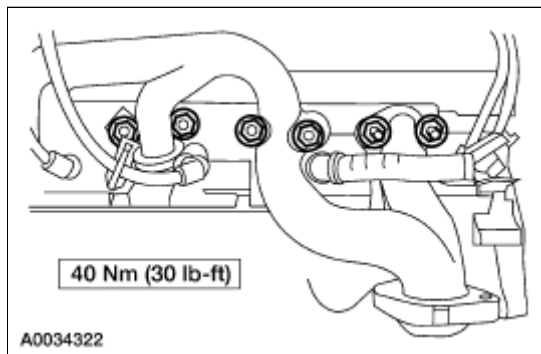


17. **CAUTION:** Failure to tighten the wheel nuts in a star pattern can result in high brake disc runout, which will speed up the development of brake roughness, shudder and vibration.

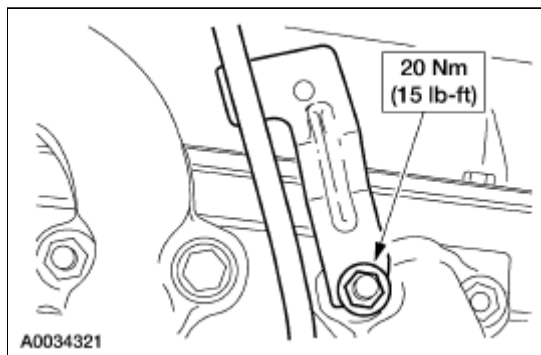
Tighten the wheel nuts in the sequence shown.



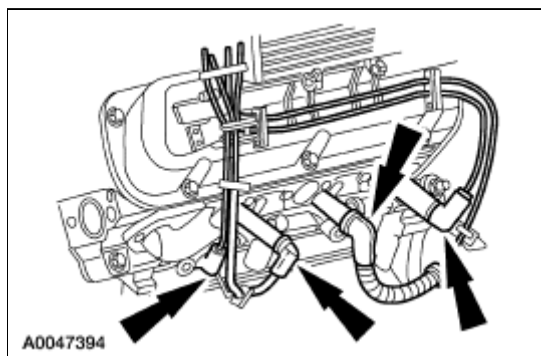
18. Install the center cap.
19. Install the LH exhaust manifold retainers.



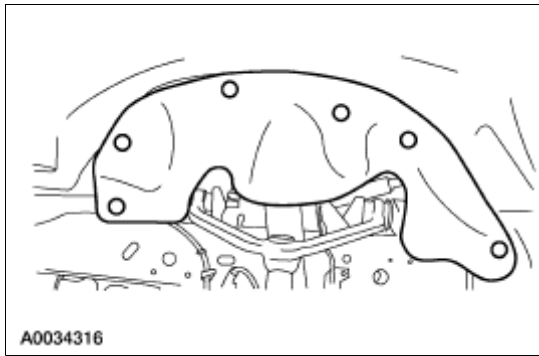
20. Install the engine fluid level indicator tube.




21. Connect the spark plug wires to the LH spark plugs.



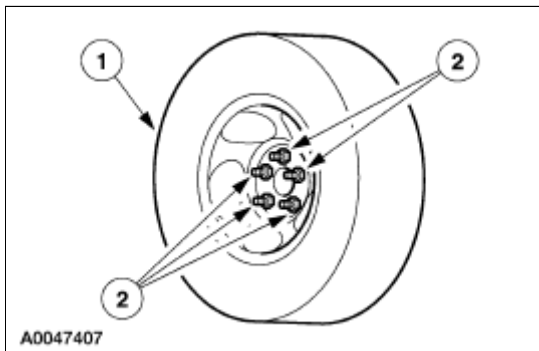
22. Install the left front wheel well splash shield.



23.  **WARNING:** Whenever a wheel is installed, always remove any corrosion, dirt or foreign material present on the mounting surfaces of the wheel or the surface of the wheel hub, brake drum or brake disc that contacts the wheel. Installing wheels 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 can result in personal injury.

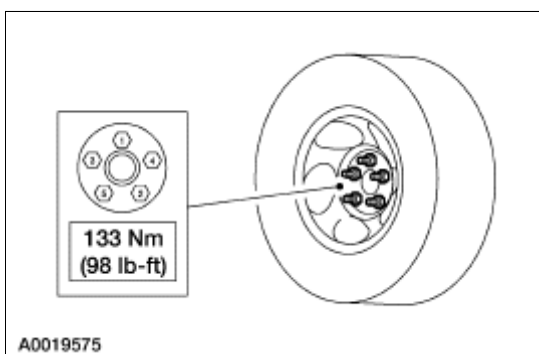
Clean the left front wheel hub mounting surface and the wheel pilot.

24. Install the left front tire and wheel assembly.
1. Position the tire and wheel assembly.
  2. Install the wheel nuts, then lower the vehicle.

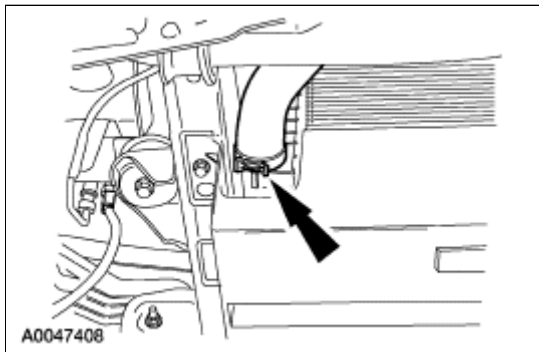


25.  **CAUTION:** Failure to tighten the wheel nuts in a star pattern can result in high brake disc runout, which will speed up the development of brake roughness, shudder and vibration.

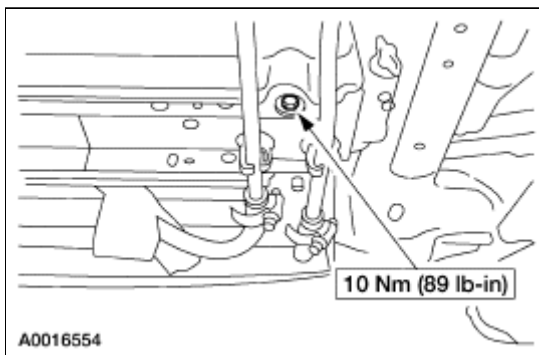
Tighten the wheel nuts in the sequence shown.



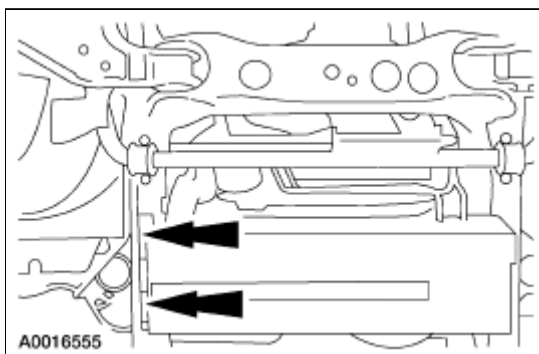
26. Install the center cap.
27. Connect the lower radiator hose to the radiator.



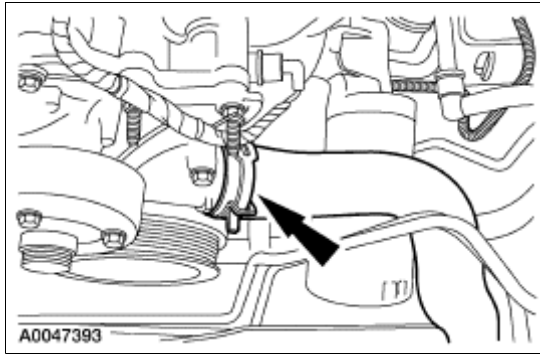
28. Install the bolt.



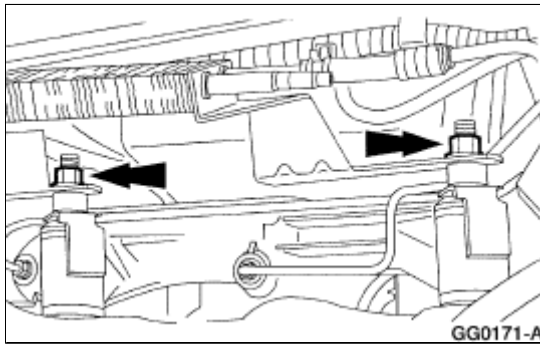
29. Install the air deflector.



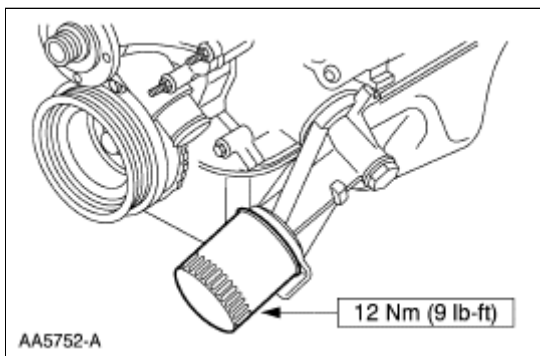
30. Connect the lower radiator hose to the water pump.



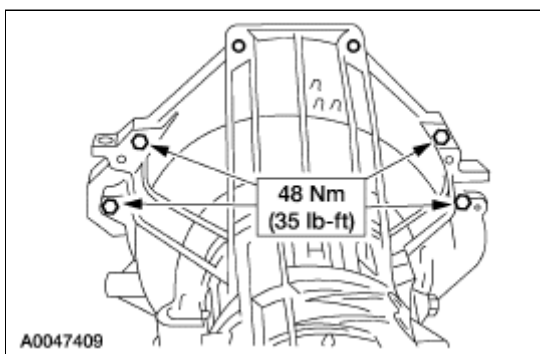
31. Install the power steering cooler.



32. Install the oil bypass filter.

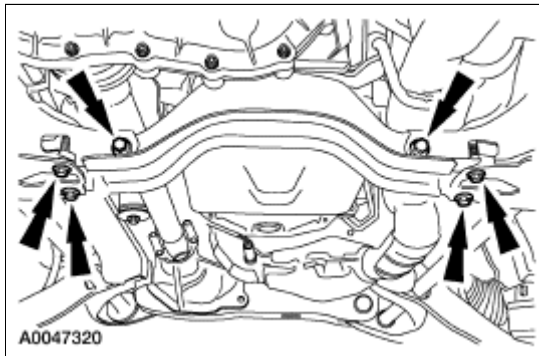


33. Install transmission-to-engine lower bolts.



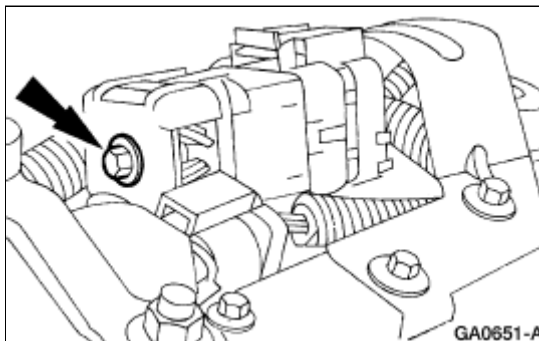
34. Remove the transmission mount retaining nuts. Using an adjustable jack, raise the transmission

slightly. Remove the crossmember and lower the transmission.

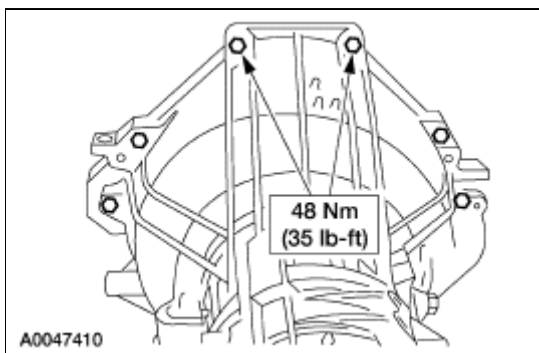


35. If equipped, connect the low oil level sensor electrical connector.

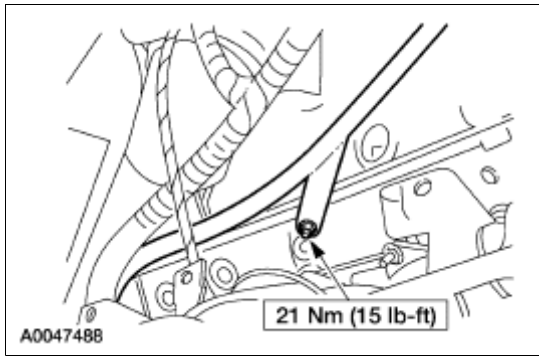
36. Connect the transmission bulkhead connector.



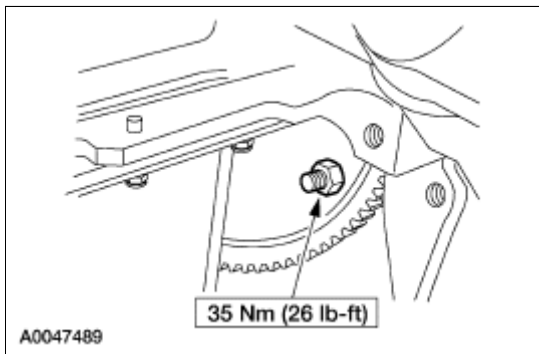
37. Install the transmission-to-engine upper bolts and raise the transmission to the installed position.



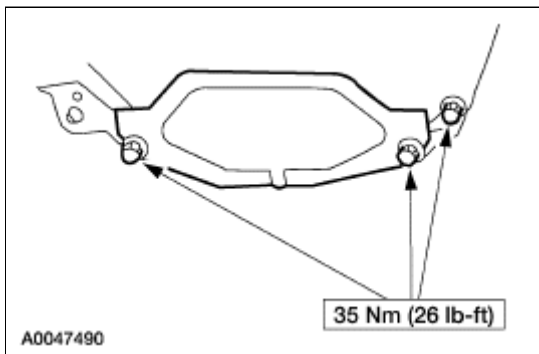
38. Install the transmission fluid level indicator tube.



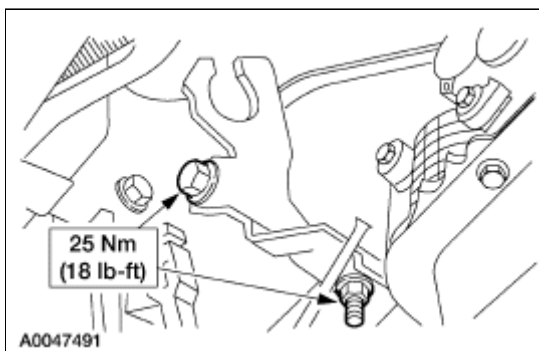
39. Install the torque converter retaining nuts.



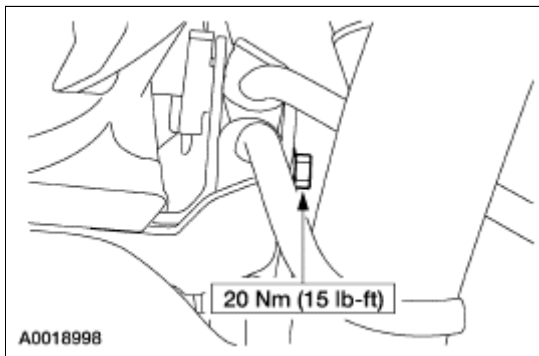
40. Install the transmission inspection cover.



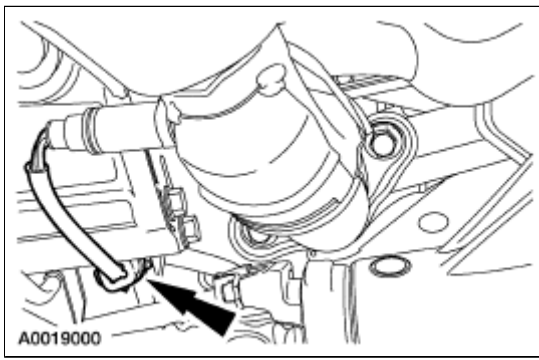
41. Install the transmission cable bracket.



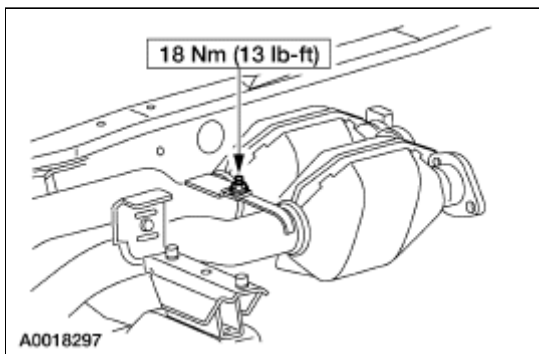
42. Install the bolt and the three-way catalytic converter (TWC).



43. Connect the electrical connectors for the heated oxygen sensors and the catalyst monitor sensors.

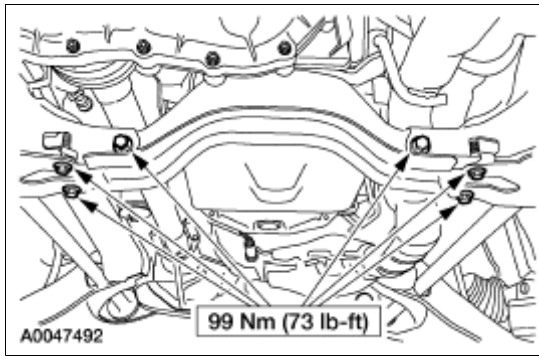


44. Install the nut.

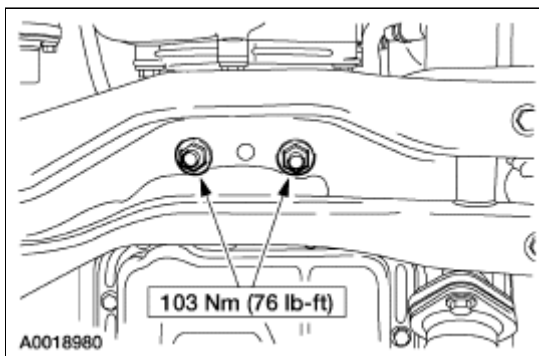


45. Install the transmission crossmember.

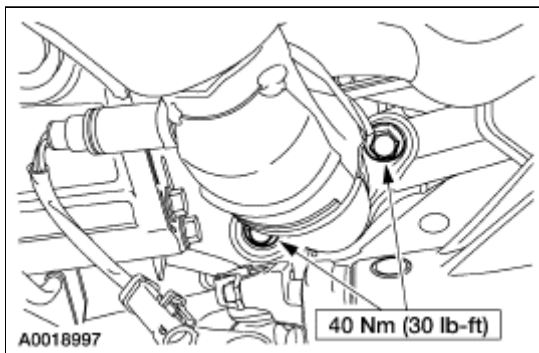




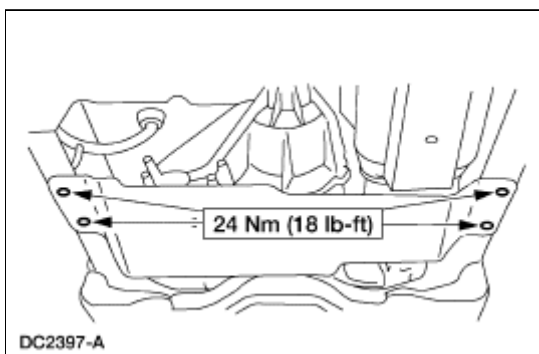
46. Install the nuts.
- Remove the transmission jack.



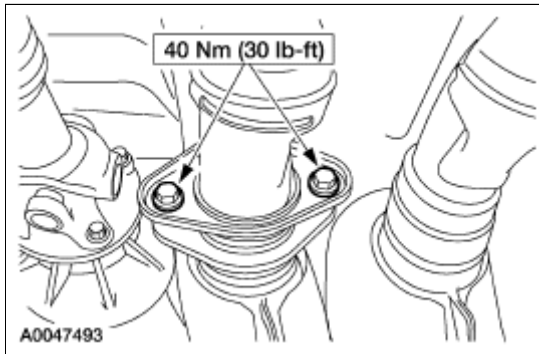
47. Install the bolts for the RH and the LH catalytic converters.



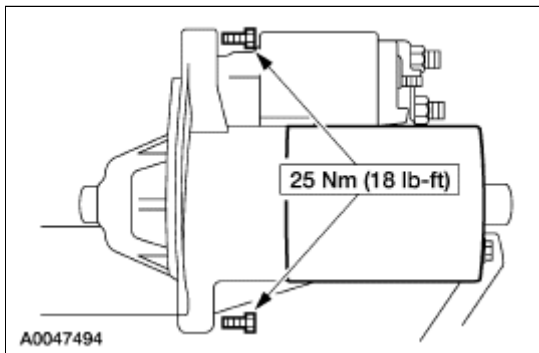
48. If equipped, install the skid plate.



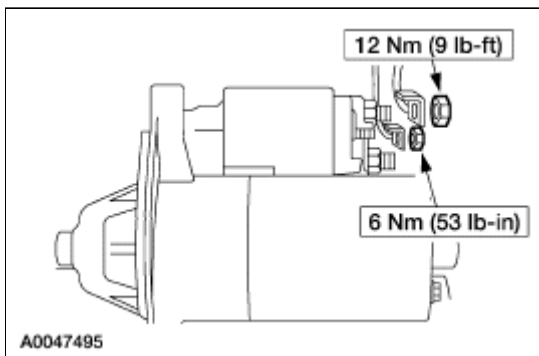
49. Install the bolts from the muffler to the catalytic converter.



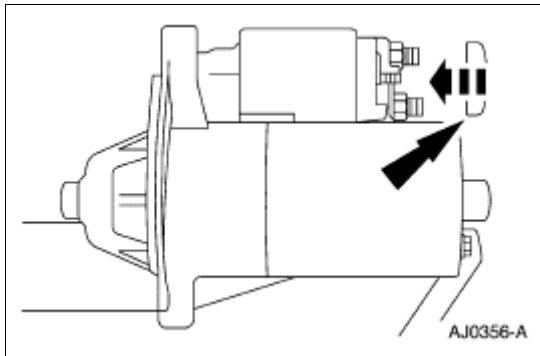
50. Position the starter motor and install the bolts.



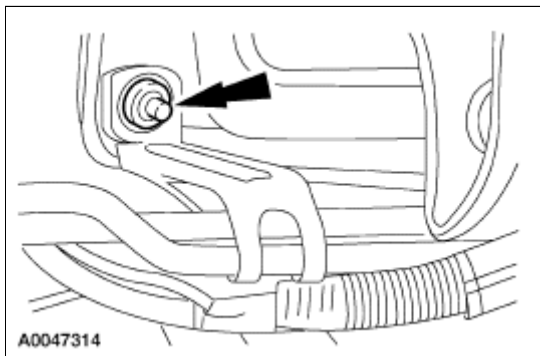
51. Connect the starter motor solenoid wiring.



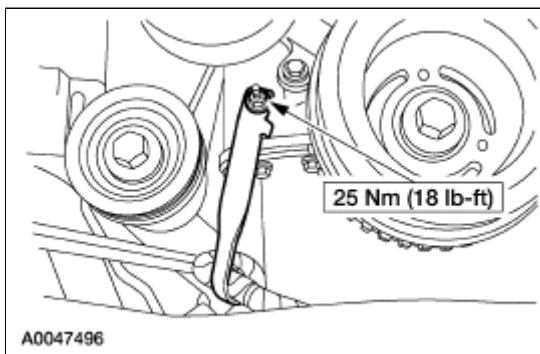
52. Install the starter motor solenoid terminal cover.



53. Install the transmission cooler tubes brace to the RH engine mount.

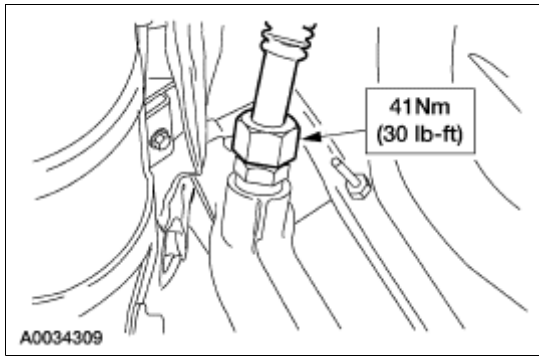


54. Lower the vehicle.
55. Install the wiring brace to the engine front cover.

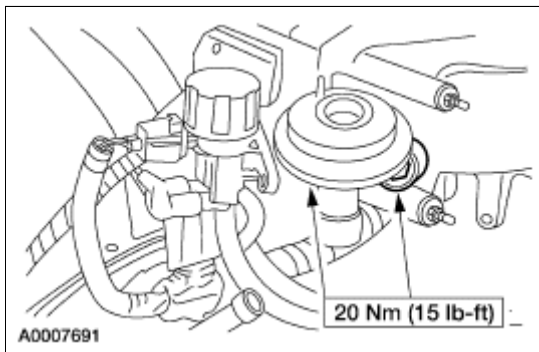


56. **NOTE:** If engine has been disassembled it will be necessary to tighten the EGR valve after connecting the tube to the exhaust manifold.

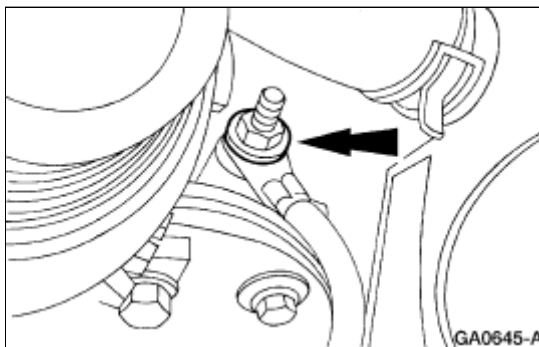
Connect the exhaust gas recirculation (EGR) tube to the exhaust manifold.



57. Tighten the bolts.

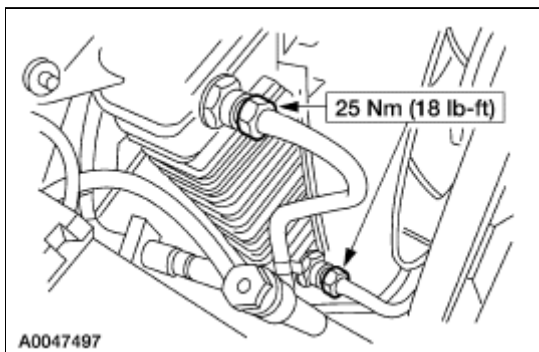


58. Connect the ground cable to the engine front cover.

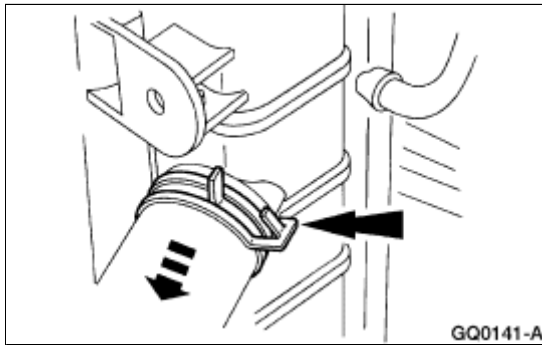


59. **NOTE:** To avoid disturbing the transmission oil cooler fittings, use a backup wrench.

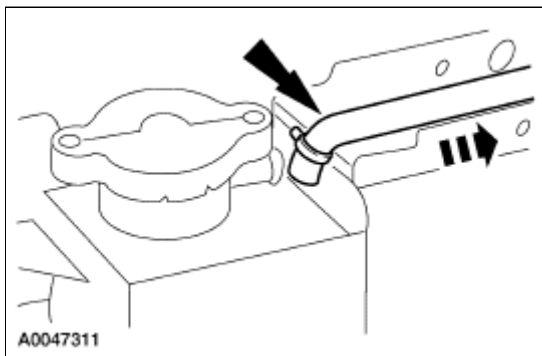
Connect the two transmission cooling tubes.



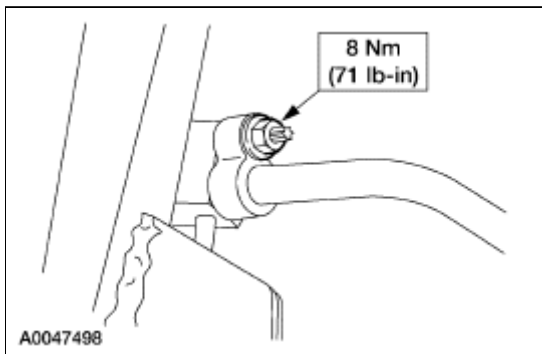
60. Connect the upper radiator hose.



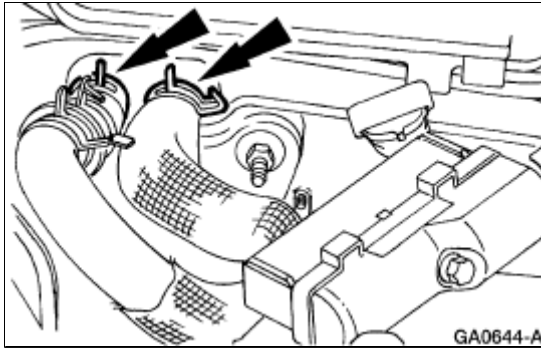
61. Connect the coolant overflow hose.



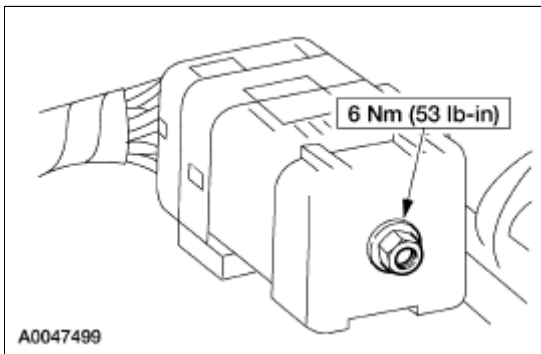
62. Connect the A/C manifold and tube, and the condenser-to-evaporator tube, to the A/C condenser core.



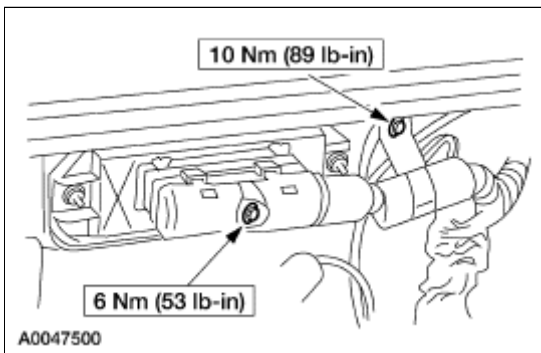
63. Connect the heater water hoses.



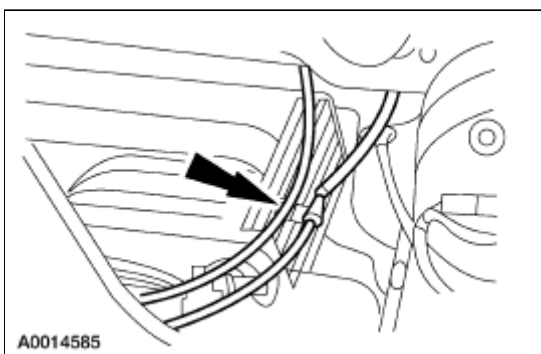
64. Connect the engine bulkhead connector.



65. Connect the powertrain control module (PCM) connector and the body ground connector.

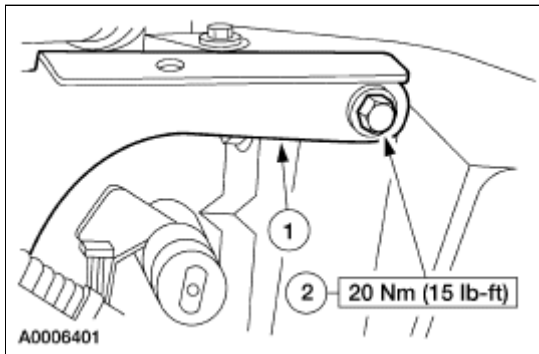


66. Install the accelerator and speed control cables to the clip.

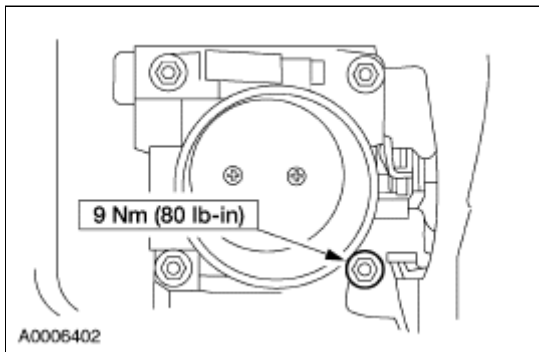


67. Install the accelerator cable bracket.

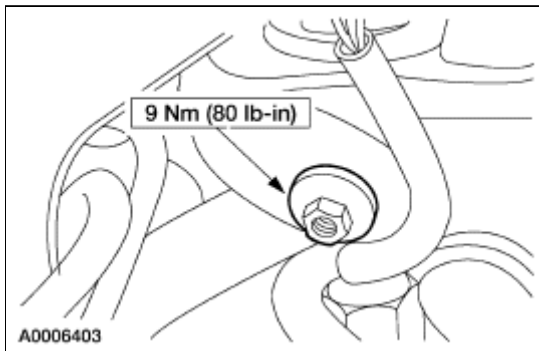
1. Install the bracket.
2. Install the bolt.



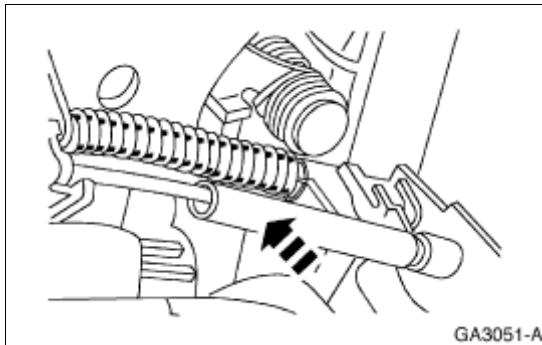
68. Install the lower accelerator cable bracket nut.



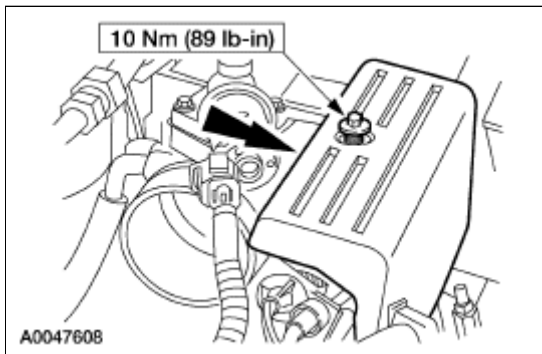
69. Install the accelerator cable bracket nut.



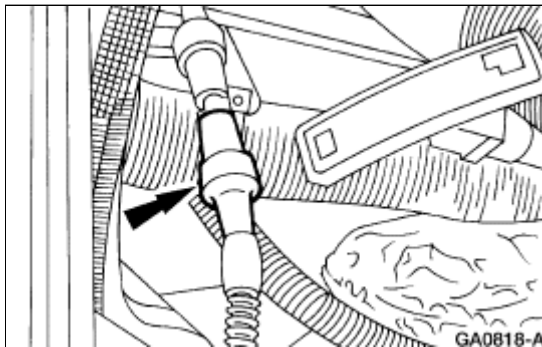
70. Connect the accelerator and speed control cables to the throttle linkage.



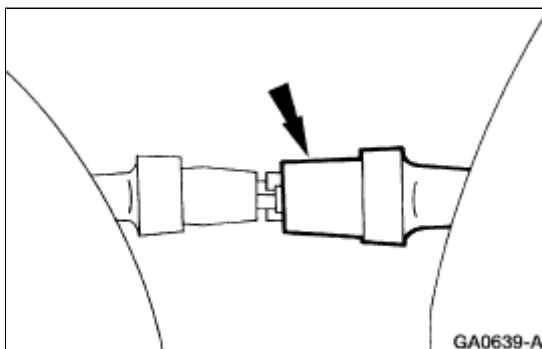
71. Install the accelerator control snow shield.



72. Connect the LH vacuum connection.

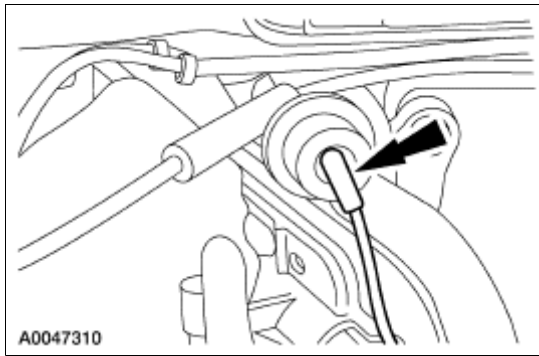


73. Connect the RH vacuum connection.

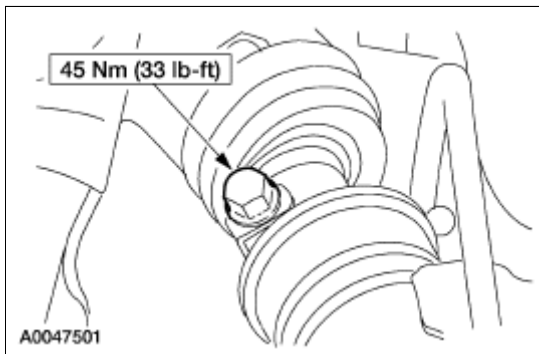


74. Connect the vacuum tube to the heater control valve.

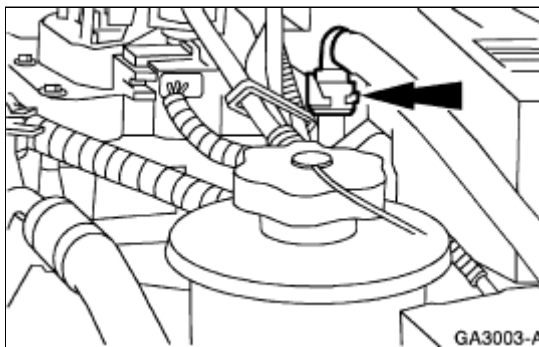




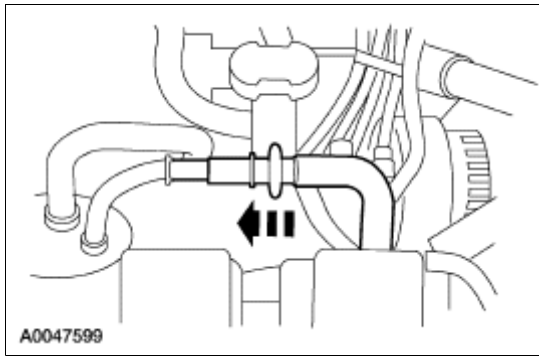
75. Position the lower steering column shaft and install the bolt.



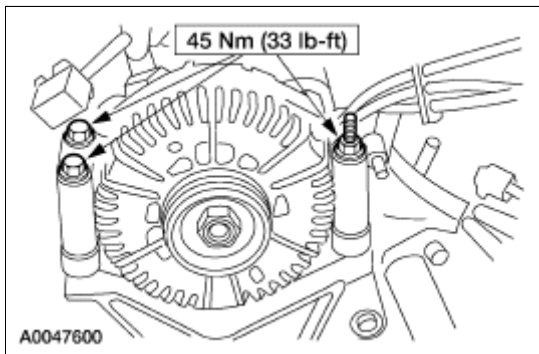
76. Connect the evaporative emissions (EVAP) canister purge solenoid vapor hose.



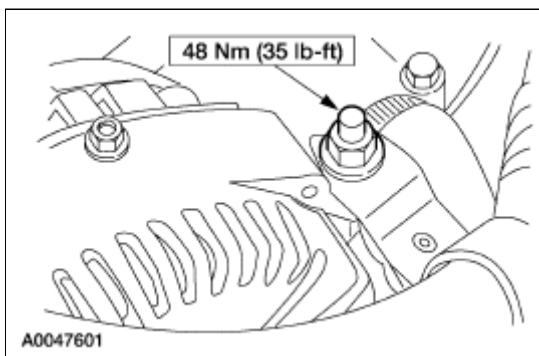
77. Connect the fuel lines at the spring lock couplings. For additional information, refer to [Section 310-00](#).
78. Connect the A/C manifold and tube spring lock coupling to the suction accumulator/drier.



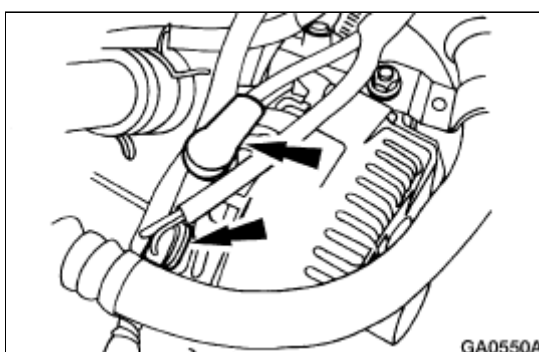
79. Install the generator.



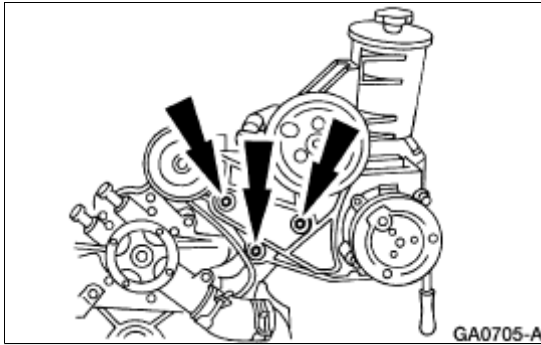
80. Install the nut on the generator stud.



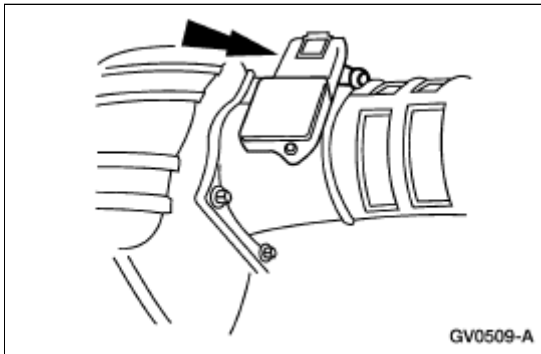
81. Connect the generator electrical connectors.



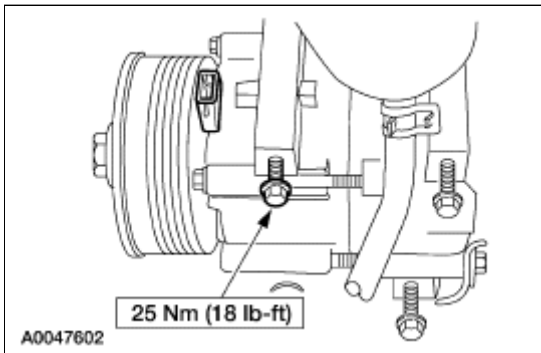
82. Install the bracket and the bolts.



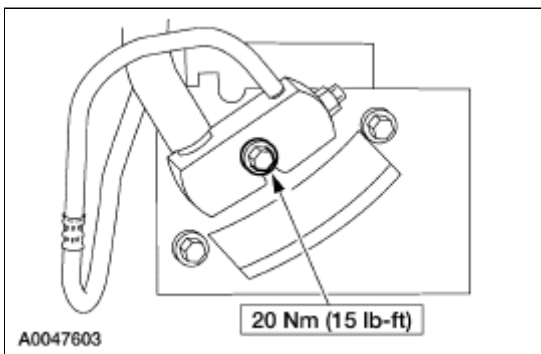
83. Connect the mass airflow (MAF) sensor electrical connector.



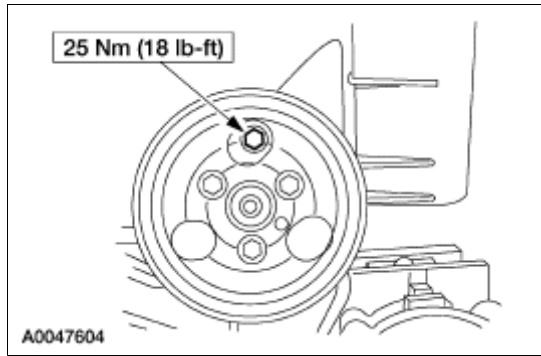
84. Install the A/C compressor.



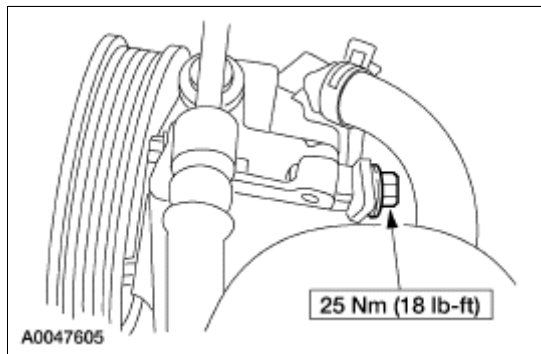
85. Install A/C manifold assembly to the A/C compressor.



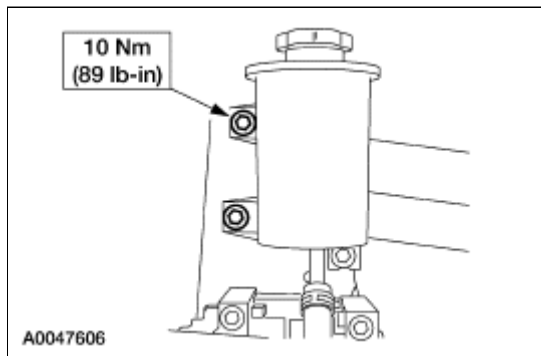
86. Position the power steering pump and install the bolts.



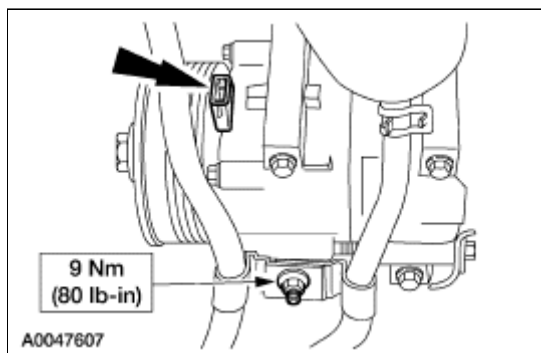
87. Install the rear power steering pump bolt.



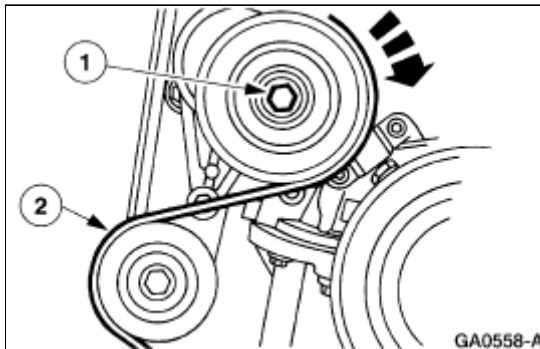
88. Install the power steering reservoir and the bolts.



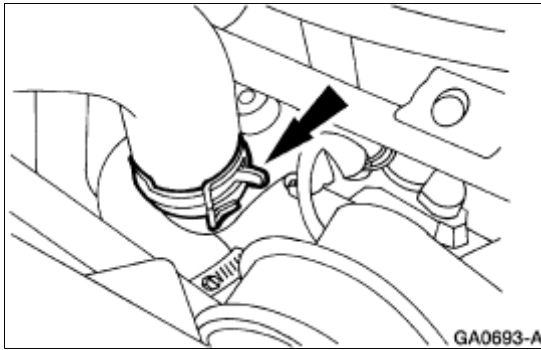
89. Install the power steering tube clamp and connect the A/C compressor electrical connector.



90. Install the drive belt.
1. Rotate the drive belt tensioner clockwise.
  2. Install the drive belt.



91. Install the fan shroud. For additional information, refer to [Section 303-03](#).
92. Connect the upper radiator hose.



93. Install the battery. For additional information, refer to [Section 414-01](#).
94. Fill the engine with clean engine oil.
95. Fill and bleed the engine cooling system. For additional information, refer to [Section 303-03](#).
96. Recharge the A/C system. For additional information, refer to [Section 412-00](#).
97. Install the hood.

