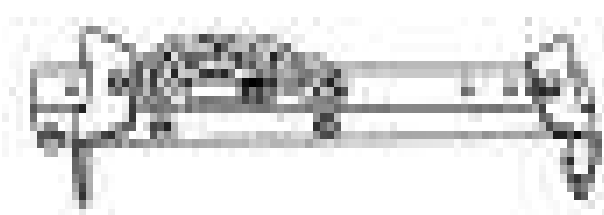
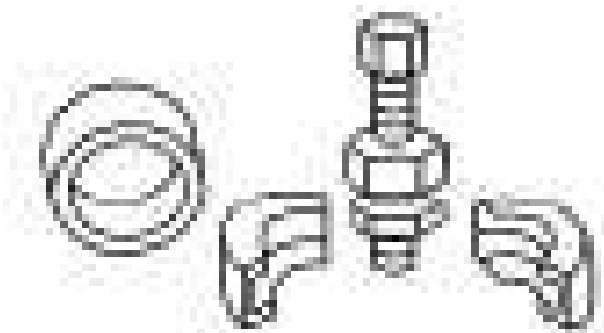


# REMOVAL

## ENGINE

### Special Tool(s)

#### SPECIAL TOOL CHART

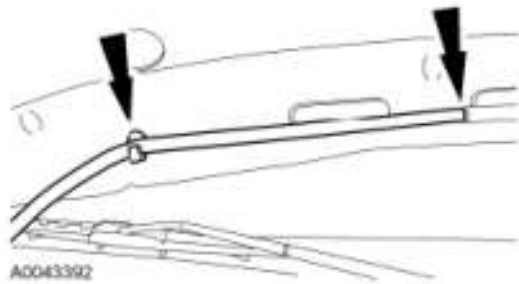
  <b>ST1377-A</b>	<p>Lifting Bracket, Engine 303-F047 (014-00073) or equivalent</p>
  <b>ST1290-B</b>	<p>Remover, Power Steering Pump Pulley 211-016 (T69L-10300-B)</p>

### Removal

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

**WARNING:** Before working on or disconnecting any of the fuel tubes or fuel system components, relieve the fuel system pressure to prevent accidental spraying of fuel. Fuel in the fuel system remains under high pressure, even when the engine is not running. Failure to follow this instruction may result in serious personal injury.

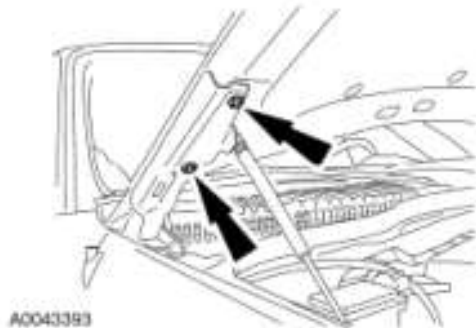
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to JACKING & LIFTING .
2. Disconnect the windshield washer hose.



**Fig. 275: Locating Windshield Washer Hose**  
Courtesy of FORD MOTOR CO.

3. **NOTE:** Index-mark the hood hinge location to aid in hood installation.

Remove the 4 bolts and the hood.

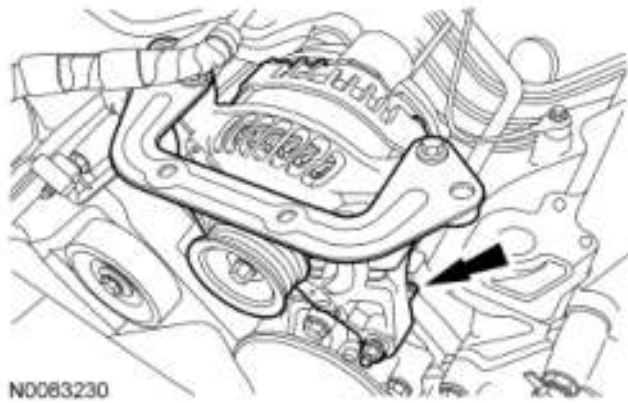


**Fig. 276: Locating Bolts And Hood**  
Courtesy of FORD MOTOR CO.

4. **NOTE:** If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

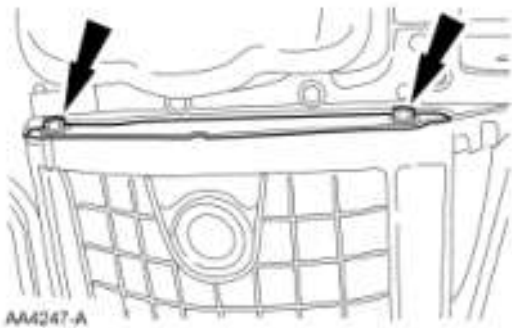
Remove the intake manifold. For additional information, refer to INTAKE MANIFOLD.

5. Remove the accessory drive belt.
6. Position the generator on the studs.



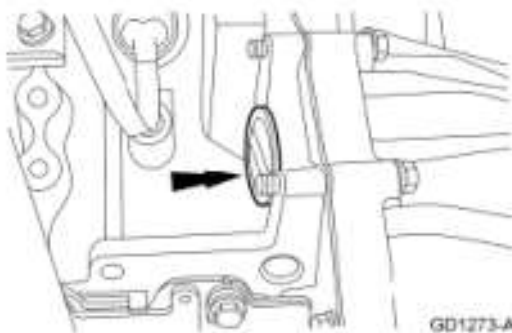
**Fig. 277: Locating Generator Studs**  
 Courtesy of FORD MOTOR CO.

7. Remove the cooling module. For additional information, refer to **ENGINE COOLING** .
8. Position the Power Distribution Box (PDB) and the wiring harness aside.
9. Remove the generator, generator bracket and wiring harness as an assembly.
10. Remove the starter. For additional information, refer to **STARTING SYSTEM** .
11. Remove the 2 bolts and the flexplate inspection cover.



**Fig. 278: Locating Flexplate Inspection Cover And Bolts**  
 Courtesy of FORD MOTOR CO.

12. Remove the cylinder block opening cover.



**Fig. 279: Locating Cylinder Block Opening Cover**  
 Courtesy of FORD MOTOR CO.

13. Remove the 4 torque converter-to-flexplate nuts.

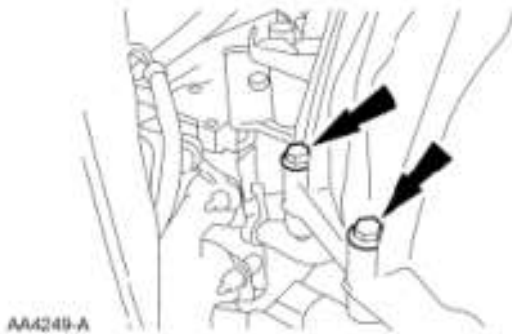
- Discard the nuts.



**Fig. 280: Locating Torque Converter-To-Flexplate Nuts**  
 Courtesy of FORD MOTOR CO.

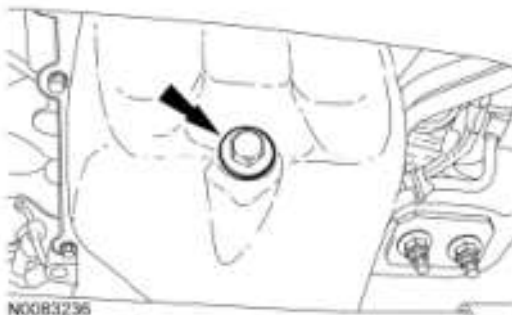
14. **NOTE:** The upper 2 transmission-to-engine bolts will be removed later.

Remove the lower 5 transmission-to-engine bolts.



**Fig. 281: Locating Lower Transmission-To-Engine Bolts**  
 Courtesy of FORD MOTOR CO.

15. Remove the drain plug and drain the engine oil. Install the drain plug when finished.
- Tighten to 23 Nm (17 lb-ft).



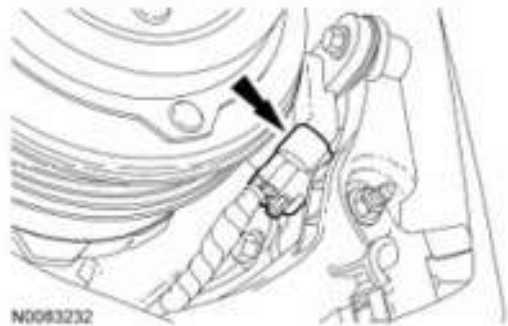
**Fig. 282: Locating Drain Plug**  
 Courtesy of FORD MOTOR CO.

16. Disconnect the A/C compressor electrical connector and the wiring harness retainer.



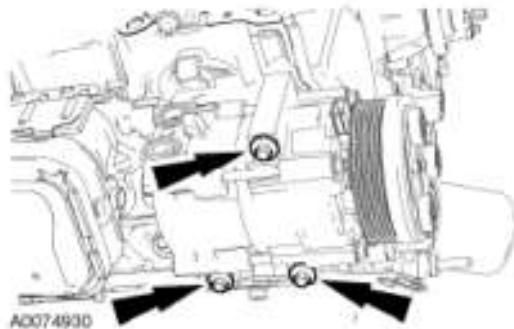
**Fig. 283: Locating A/C Compressor Electrical Connector And Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

17. Disconnect the Crankshaft Position (CKP) sensor electrical connector.



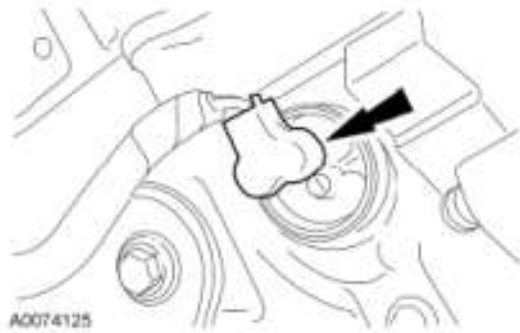
**Fig. 284: Locating Crankshaft Position (CKP) Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

18. Remove the 3 bolts and position the A/C compressor aside.



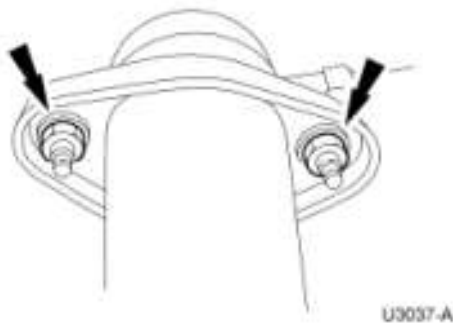
**Fig. 285: Locating Bolts And A/C Compressor**  
Courtesy of FORD MOTOR CO.

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



**Fig. 286: Locating Block Heater Electrical Connector**  
 Courtesy of FORD MOTOR CO.

20. Remove the 4 exhaust manifold flange nuts.

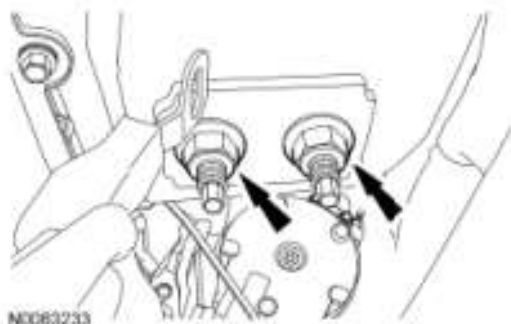


**Fig. 287: Locating Exhaust Manifold Flange Nuts**  
 Courtesy of FORD MOTOR CO.

21. **NOTE:** Only use hand tools when removing the engine support insulator nuts or the engine support insulator may be damaged.

**NOTE:** If during nut removal the stud bolt is extracted from the engine support insulator, separate the nut from the stud bolt prior to stud bolt installation.

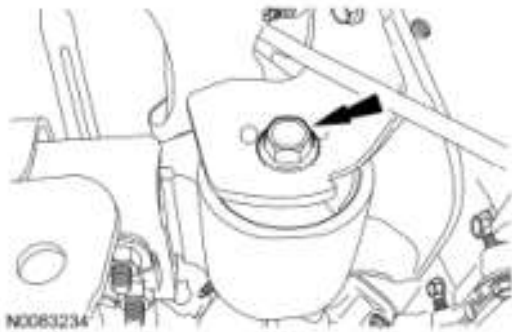
Remove the 2 RH engine support insulator nuts.



**Fig. 288: Locating RH Engine Support Insulator Nuts**  
 Courtesy of FORD MOTOR CO.

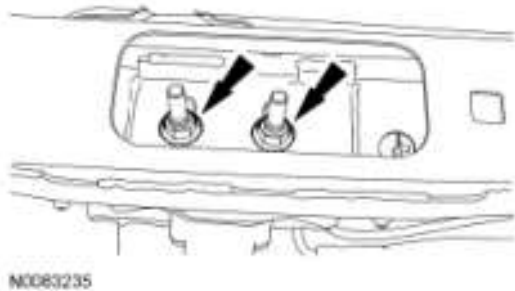
22. **NOTE:** Only use hand tools when loosening the engine support insulator through bolt or the engine support insulator may be damaged.

Remove the LH engine support insulator bolt.



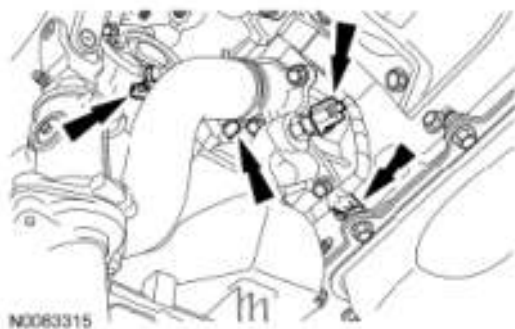
**Fig. 289: Locating Engine Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

23. Loosen the 2 transmission mount nuts.



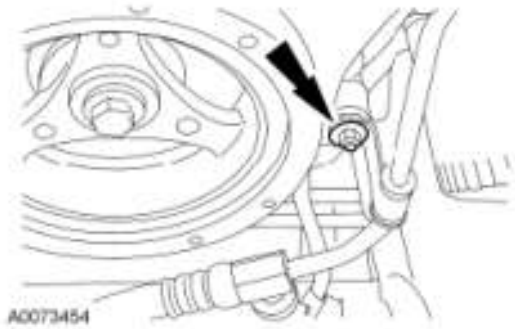
**Fig. 290: Locating Transmission Mount Nuts**  
Courtesy of FORD MOTOR CO.

24. Disconnect the oil pressure switch electrical connector and detach the wiring harness retainers from the oil pan bolt, the power steering pump stud bolt and the engine block.



**Fig. 291: Locating Engine Oil Pressure (EOP) Switch Electrical Connector And Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

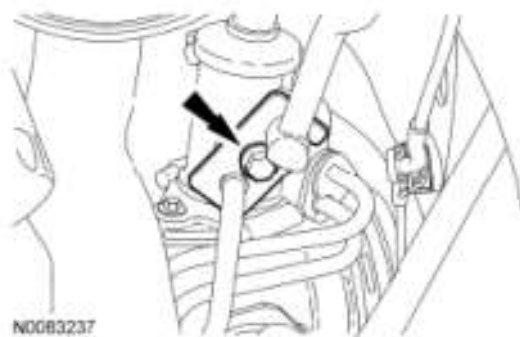
25. Remove the Power Steering Pressure (PSP) hose support bracket nut.



**Fig. 292: Locating Power Steering Pressure (PSP) Hose Support Bracket Nut**  
 Courtesy of FORD MOTOR CO.

26. **NOTE:** While servicing the power steering system, care should be taken to prevent the entry of foreign material or failure of the power steering components may result.

Remove the bolt and detach the power steering fluid tubes from the steering gear.



**Fig. 293: Locating Power Steering Hose Clamp Plate And Bolt**  
 Courtesy of FORD MOTOR CO.

27. **NOTE:** Do not install a power steering pump pulley that has been removed and installed twice or pulley failure and/or pump damage may occur. Inspect the pulley for paint marks in the web area near the hub. If there are 2 paint marks, discard the pulley and install a new one. If there is one paint mark or no paint marks, use a paint pencil to mark the web area of the pulley near the hub.

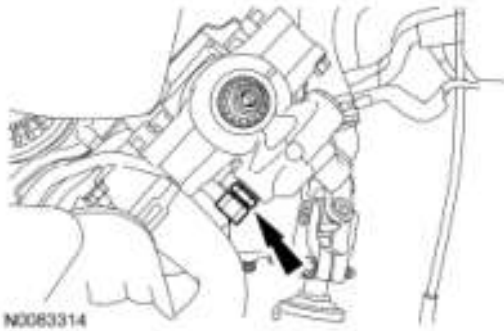
Using the Power Steering Pump Pulley Remover, remove the power steering pump pulley.





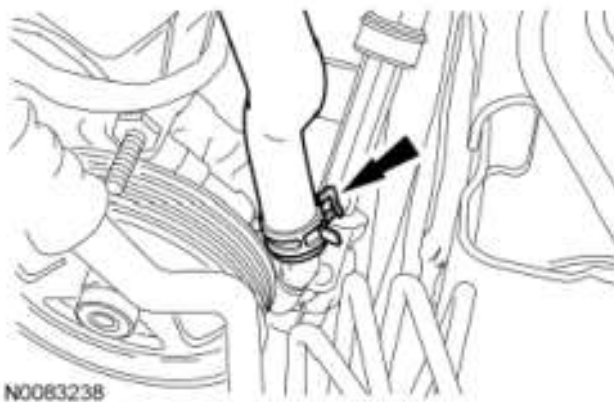
**Fig. 294: Identifying Power Steering Pump Pulley Remover**  
 Courtesy of FORD MOTOR CO.

28. Disconnect the **PSP** hose from the pump.
  - Drain the fluid into a suitable container.



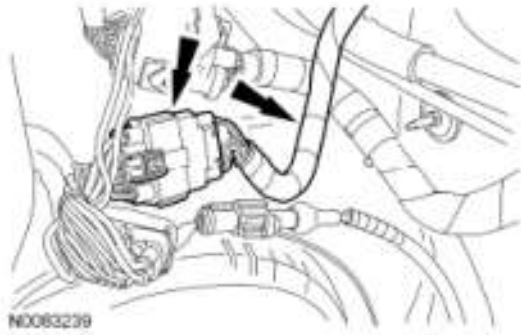
**Fig. 295: Locating PSP Hose**  
 Courtesy of FORD MOTOR CO.

29. Release the clamp and disconnect the power steering fluid reservoir-to-power steering pump hose from the power steering pump.
  - Drain the fluid into a suitable container.



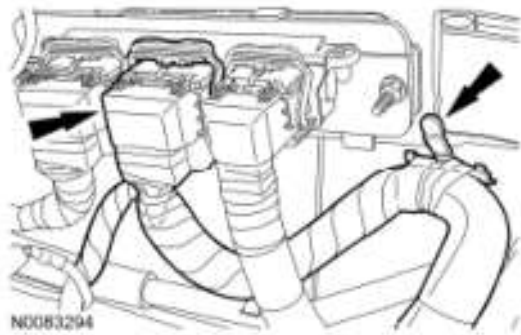
**Fig. 296: Locating Clamp And Power Steering Fluid Reservoir-To-Power Steering Pump Hose**  
 Courtesy of FORD MOTOR CO.

30. Disconnect electrical connector and detach the connector and wiring harness retainers.



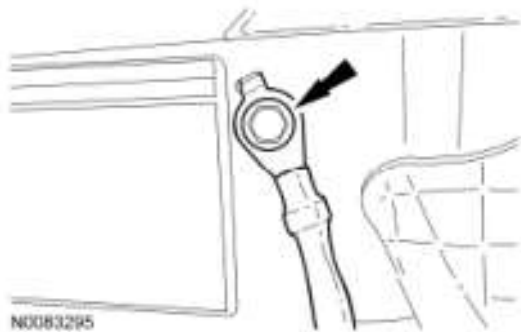
**Fig. 297: Locating Engine Harness Electrical Connector**  
Courtesy of FORD MOTOR CO.

31. Disconnect the PCM electrical connector and the engine wiring harness retainer and position the engine wiring harness aside.



**Fig. 298: Locating PCM Electrical Connector**  
Courtesy of FORD MOTOR CO.

32. Remove the ground strap bolt.



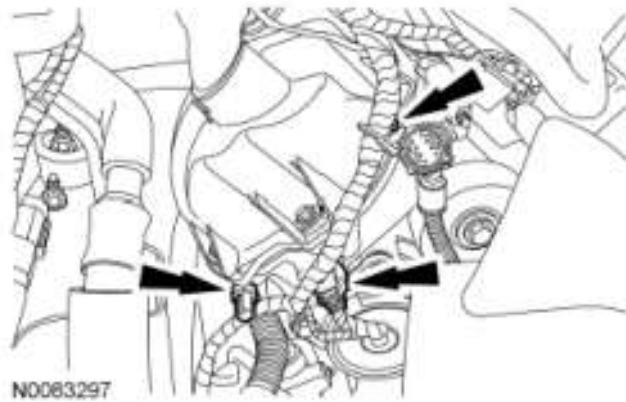
**Fig. 299: Locating Ground Strap And Bolt**  
Courtesy of FORD MOTOR CO.

33. Disconnect the heater coolant hose.



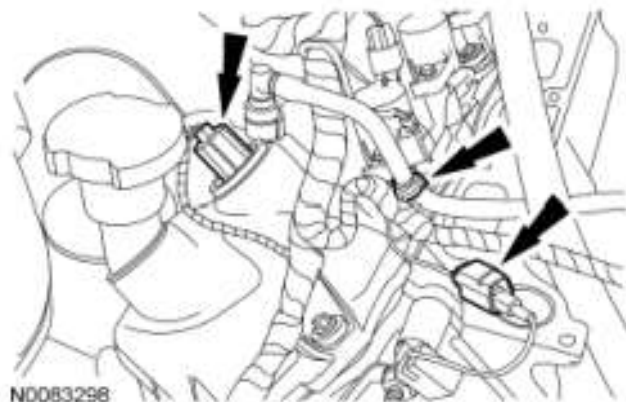
**Fig. 300: Locating Heater Coolant Hose**  
Courtesy of FORD MOTOR CO.

34. Disconnect the RH Camshaft Position (CMP) sensor electrical connector and the 2 wiring harness retainers.



**Fig. 301: Locating RH Camshaft Position (CMP) Sensor Electrical Connector And Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

35. Disconnect the RH Variable Camshaft Timing (VCT) solenoid and the RH radio ignition interference capacitor electrical connectors and detach the wiring harness retainer from the breather tube.



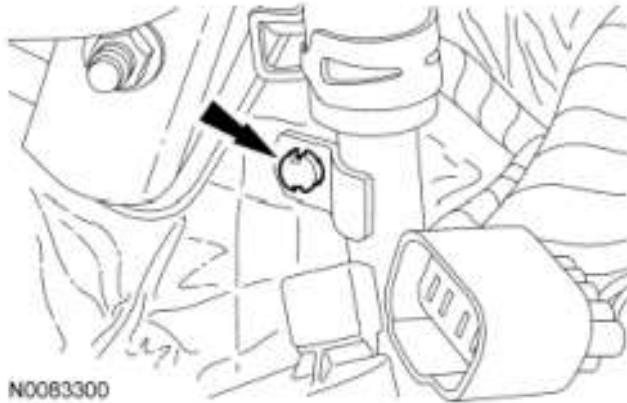
**Fig. 302: Locating Variable Camshaft Timing (VCT) Solenoid And Radio Ignition Interference Capacitor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

36. Disconnect the 4 RH ignition coil electrical connectors and the 2 engine wiring harness retainers from the RH valve cover studs.



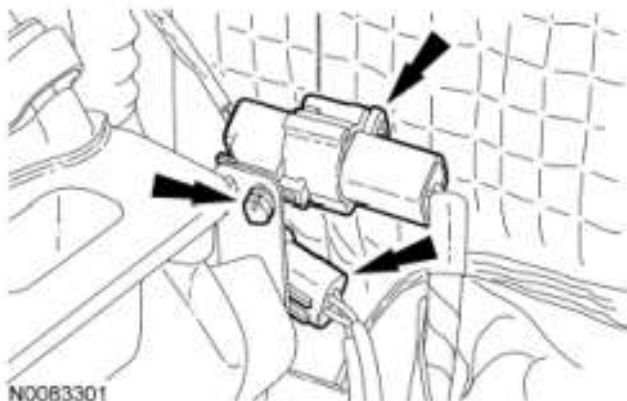
**Fig. 303: Locating Ignition Coil Electrical Connectors And Engine Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

37. Detach the wiring harness retainer from the heater coolant tube.



**Fig. 304: Locating Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

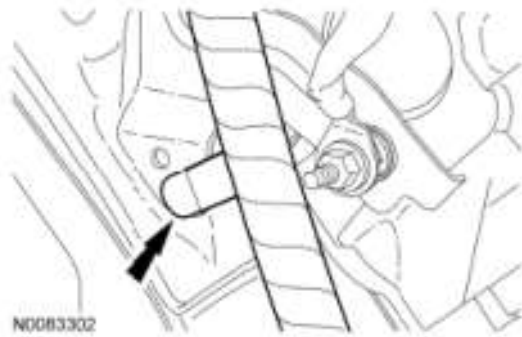
38. Disconnect the Cylinder Head Temperature (CHT) sensor electrical connector and detach the connector retainer from the bracket. Disconnect the Knock Sensor (KS) electrical connector.



**Fig. 305: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector And Connector Retainer**

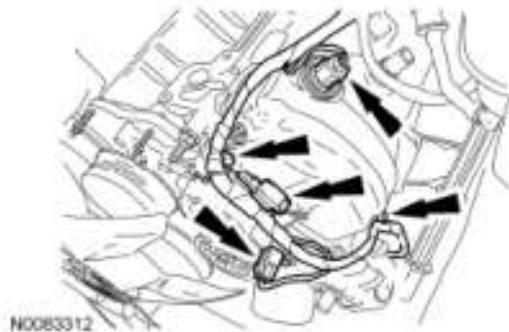
Courtesy of FORD MOTOR CO.

39. Detach the transmission wiring harness retainer from the heater coolant tube.



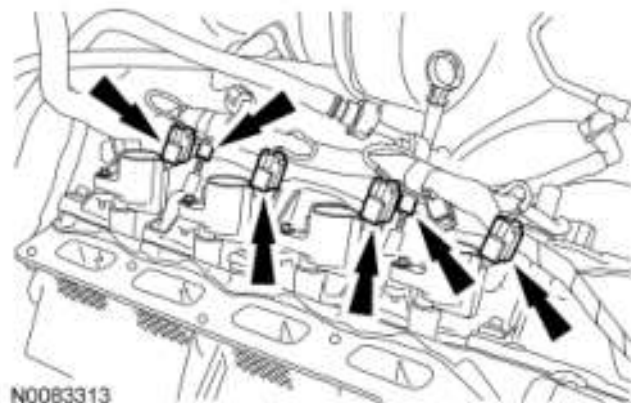
**Fig. 306: Locating Transmission Wiring Harness Retainer**  
Courtesy of FORD MOTOR CO.

40. Disconnect the LH CMP sensor, radio interference capacitor and VCT solenoid electrical connectors and detach the radio interference capacitor electrical connector retainer and the 2 wiring harness retainers.



**Fig. 307: Locating Radio Interference Capacitor Electrical Connector Retainer And Wiring Harness Retainers**  
Courtesy of FORD MOTOR CO.

41. Disconnect the 4 LH ignition coil electrical connectors and detach the 2 engine wiring harness retainers from the LH valve cover studs.



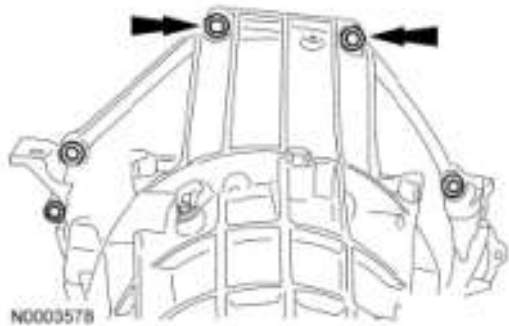
**Fig. 308: Locating Ignition Coil Electrical Connectors And Engine Wiring Harness Retainers**

Courtesy of FORD MOTOR CO.

- 42. Position the engine wiring harness aside.
- 43. Support the transmission.

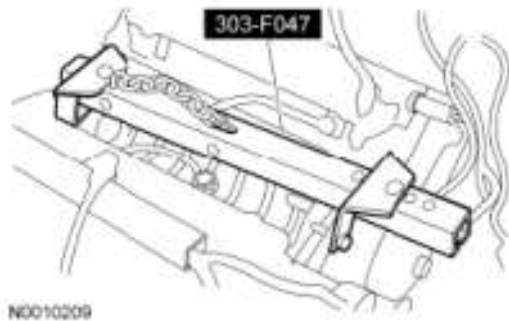
- 44. **NOTE:** On Four-Wheel Drive (4WD) vehicles, it may be necessary to reposition the transfer case vent hose to access the bolts.

Remove the upper 2 transmission-to-engine bolts.



**Fig. 309: Locating Upper Transmission-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

- 45. Install the Engine Lifting Bracket.



**Fig. 310: Identifying Engine Lifting Bracket (303-F047)**  
Courtesy of FORD MOTOR CO.

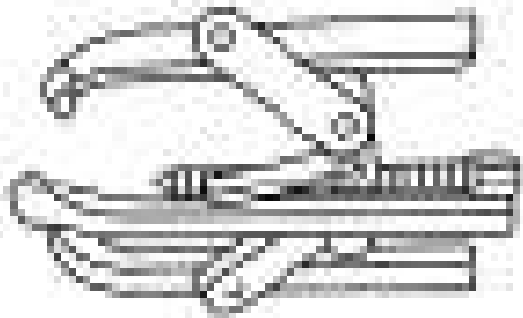
- 46. Using a suitable floor crane, remove the engine assembly from the vehicle.

## CYLINDER HEAD

Special Tool(s)

## SPECIAL TOOL CHART

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3 Jaw Puller  
303-D121

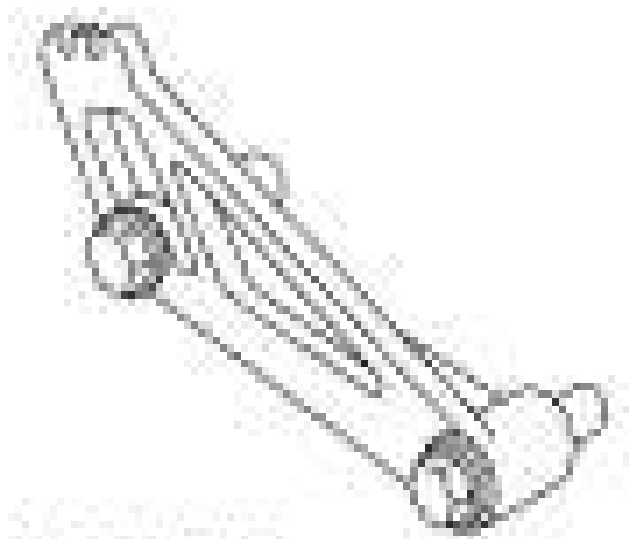
ST1184-A



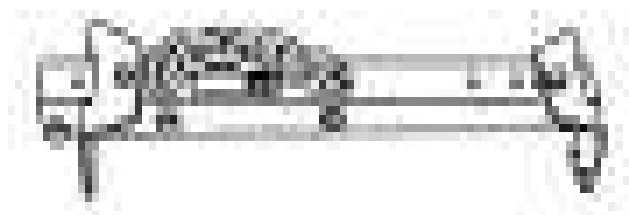
Compressor, Valve Spring  
303-1039

ST2604-A

Locking Tool, Cam Phaser  
303-1046



ST2807-A

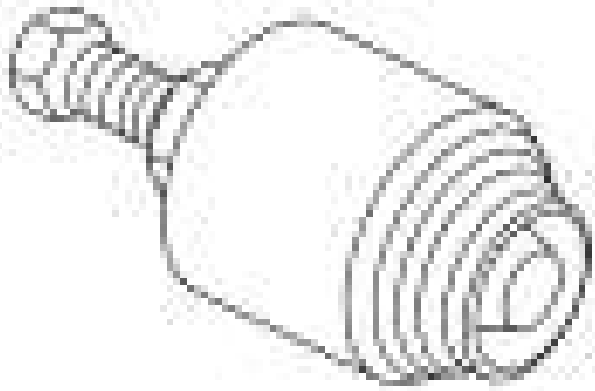


ST1377-A

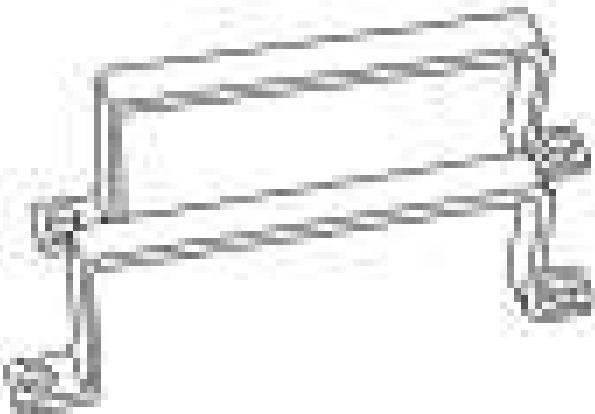
Lifting Bracket, Engine  
303-F047 (014-00073) or equivalent

Remover, Crankshaft Front Seal  
303-107 (T74P-6700-A)





**ST1730-A**



**ST1658-A**

Remover/Installer, Cylinder Head  
303-572 (T97T-6000-A)

**Material**

**MATERIAL SPECIFICATIONS**

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Silicone Gasket Remover ZC-30	-
Threadlock 262 TA-26	WSK-M2G351-A6

**All cylinder heads**

1. Remove the engine. For additional information, refer to **ENGINE**.
2. Mount the engine on a suitable work stand.
3. Remove the Engine Lifting Bracket.



**Fig. 311: Identifying Engine Lifting Bracket (303-F047)**  
Courtesy of FORD MOTOR CO.

4. If equipped with cylinder block drain plugs, remove the 3 bolts and the RH engine support insulator and the engine support insulator bracket as an assembly.

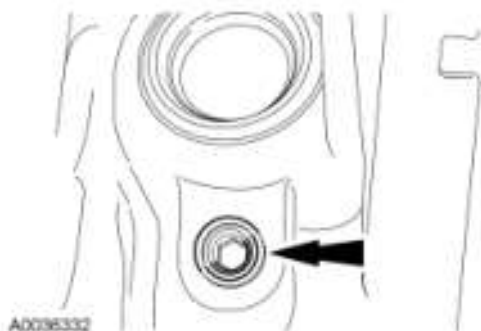


**Fig. 312: Locating Bolts And RH Engine Support Insulator**  
Courtesy of FORD MOTOR CO.

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

If equipped, remove the 2 cylinder block drain plugs and drain the coolant into a suitable container. Install the drain plugs when finished.

- Tighten to 24 Nm (18 lb-ft).



**Fig. 313: Locating Cylinder Block Drain Plugs**  
Courtesy of FORD MOTOR CO.

6. **NOTE:** Clean the engine support insulator-to-cylinder block mating surfaces of any dirt or foreign material prior to installation.

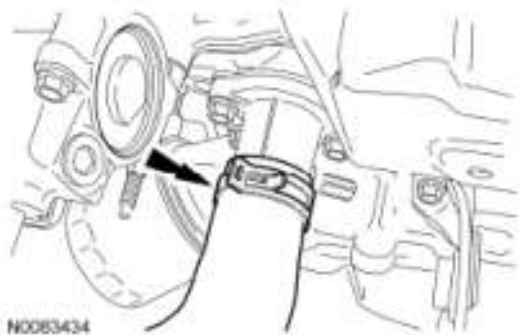
Position the RH engine support bracket and the engine support insulator as an assembly and install the 3 bolts.

- Apply threadlock to the bolt threads prior to installation.
- Tighten the bolts to 63 Nm (46 lb-ft).



**Fig. 314: Locating Engine Support Insulator Bolts**  
Courtesy of FORD MOTOR CO.

7. Release the clamp and remove the lower radiator hose.



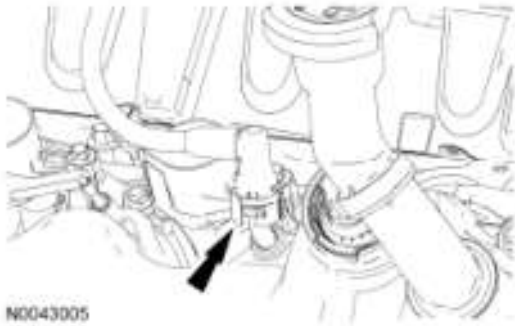
**Fig. 315: Locating Lower Radiator Hose**  
Courtesy of FORD MOTOR CO.

8. **NOTE:** When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube.

Remove the breather tube from the RH valve cover.

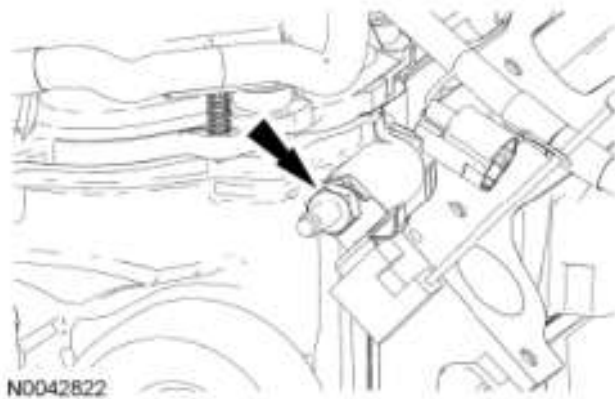
- Disconnect the quick connect fittings.
- Push the connector toward the valve cover to release pressure.
- Push the release tab clockwise.

- Disconnect the quick connect fitting.



**Fig. 316: Locating Quick Connect Fitting**  
Courtesy of FORD MOTOR CO.

9. Remove and discard the oil filter.
10. Remove the nut and the RH radio ignition interference capacitor.



**Fig. 317: Locating Nut And Radio Ignition Interference Capacitor**  
Courtesy of FORD MOTOR CO.

11. Remove the nut and detach the LH radio interference capacitor.

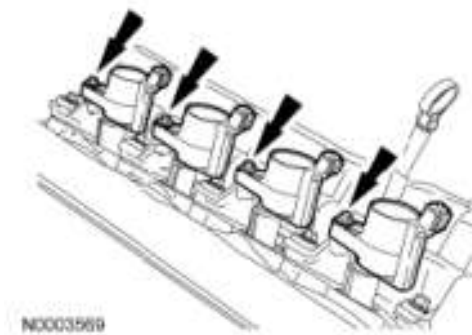


**Fig. 318: Locating Nut And Radio Interference Capacitor**  
Courtesy of FORD MOTOR CO.

- 12.

12. **NOTE:** LH shown in illustration, RH similar.

Remove the 8 bolts and the 8 ignition coils.



**Fig. 319: Locating Ignition Coils And Bolts**  
Courtesy of FORD MOTOR CO.

13. Remove the bolt and position the oil level indicator aside.



**Fig. 320: Locating Oil Level Indicator Bolt**  
Courtesy of FORD MOTOR CO.

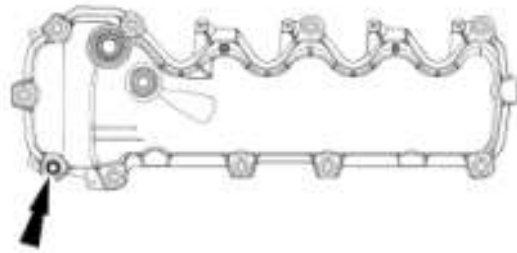
14. **NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

**NOTE:** Remove the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

**NOTE:** The bolts are part of the valve cover and should not be removed.

Loosen the 10 bolts and remove the LH valve cover.

- Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or a suitable solvent.



N0074177

**Fig. 321: Locating Valve Cover Bolt**  
Courtesy of FORD MOTOR CO.

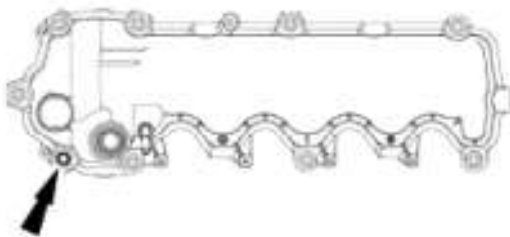
15. **NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

**NOTE:** Remove the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

**NOTE:** The bolts are part of the valve cover and should not be removed.

Loosen the 9 bolts and remove the RH valve cover.

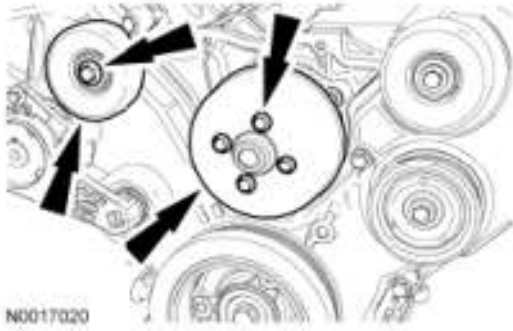
- Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or a suitable solvent.



N0074178

**Fig. 322: Locating Valve Cover Bolt**  
Courtesy of FORD MOTOR CO.

16. Remove the 5 bolts, the coolant pump pulley and the RH side accessory drive belt idler pulley.



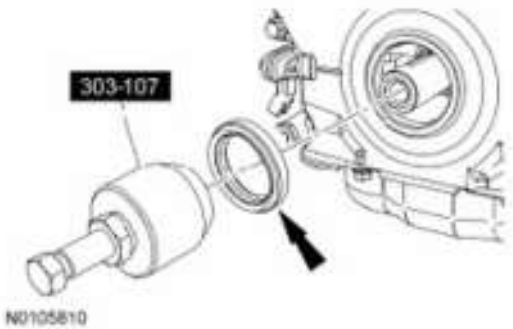
**Fig. 323: Locating Coolant Pump Pulley And RH Side Accessory Drive Belt Idler Pulley Bolts**  
 Courtesy of FORD MOTOR CO.

17. Remove and discard the crankshaft pulley bolt. Using the 3 Jaw Puller, remove the crankshaft pulley.



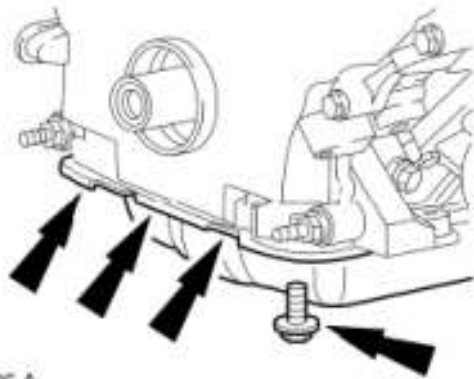
**Fig. 324: Identifying Jaw Puller**  
 Courtesy of FORD MOTOR CO.

18. Using the Crankshaft Front Seal Remover, remove the crankshaft seal.



**Fig. 325: Locating Crankshaft Front Seal**  
 Courtesy of FORD MOTOR CO.

19. Remove the 4 oil pan-to-engine front cover bolts.

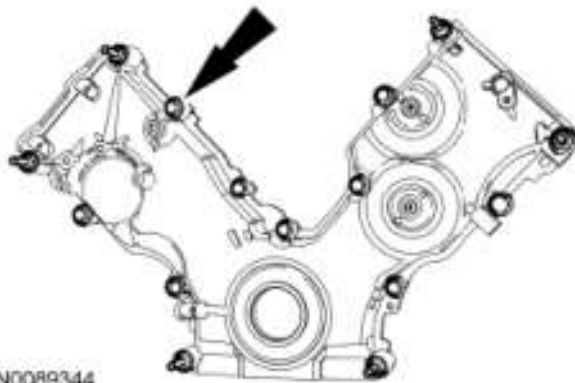


AA4226-A

**Fig. 326: Locating Oil Pan-To-Engine Front Cover Bolts**  
 Courtesy of FORD MOTOR CO.

20. **NOTE:** Correct fastener location is essential for the assembly procedure.  
 Record fastener location.

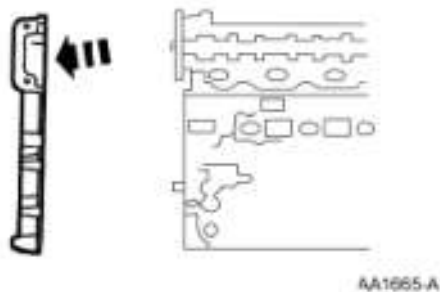
Remove the 15 engine front cover fasteners.



N0089344

**Fig. 327: Locating Engine Front Cover Fasteners**  
 Courtesy of FORD MOTOR CO.

21. Remove the engine front cover from the cylinder block.

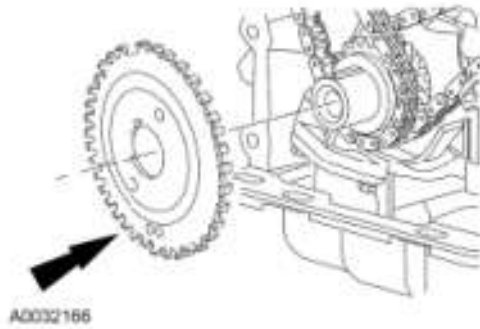


AA1665-A

**Fig. 328: Removing Engine Front Cover**  
 Courtesy of FORD MOTOR CO.

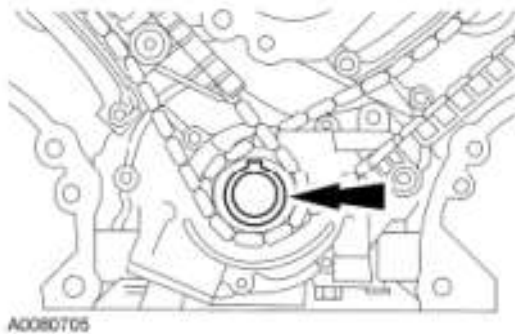
22. Remove the crankshaft sensor ring from the crankshaft.





**Fig. 329: Locating Crankshaft Sensor Ring**  
 Courtesy of FORD MOTOR CO.

23. Position the crankshaft keyway at the 12 o'clock position.



**Fig. 330: Locating Crankshaft Keyway**  
 Courtesy of FORD MOTOR CO.

**NOTE:** If the camshaft lobes are not exactly positioned as shown in illustration, the crankshaft will require one full additional rotation to the 12 o'clock position.

- 24.

The No. 1 cylinder camshaft exhaust lobe must be coming up on the exhaust stroke. Verify by noting the position of the 2 intake lobes and the exhaust lobe on the No. 1 cylinder.



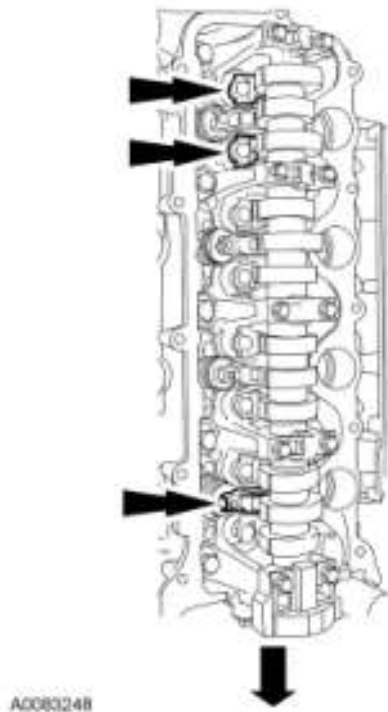
**Fig. 331: Identifying Camshaft Lobes**  
 Courtesy of FORD MOTOR CO.

**NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original

- 25.

25. **locations.**

Remove only the 3 roller followers shown in the illustration from the RH cylinder head.



**Fig. 332: Locating Roller Followers**  
Courtesy of FORD MOTOR CO.

26. **NOTE:** Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

**NOTE:** It may be necessary to push the valve down while compressing the spring.

Using the Valve Spring Compressor, remove the 3 roller followers designated in the previous step from the RH cylinder head.

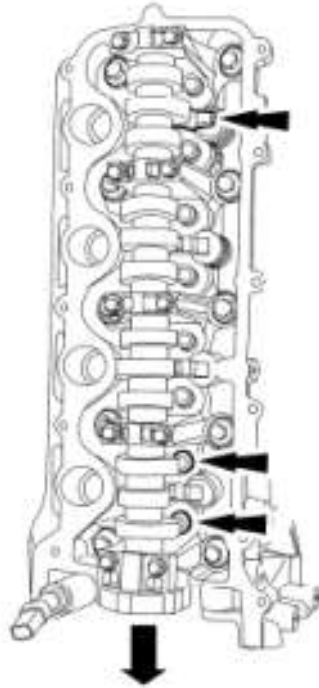


**Fig. 333: Identifying Valve Spring Compressor (303-1039)**  
Courtesy of FORD MOTOR CO.

**NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

27.

Remove only the 3 roller followers shown in the illustration from the LH cylinder head.



A0084479

**Fig. 334: Locating Roller Followers**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

28.

**NOTE:** It may be necessary to push the valve down while compressing the spring.

Using the Valve Spring Compressor, remove the 3 roller followers designated in the previous step from the LH cylinder head.

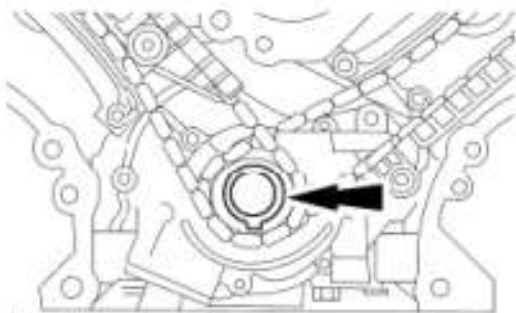


N0010191

**Fig. 335: Identifying Valve Spring Compressor (303-1039)**  
Courtesy of FORD MOTOR CO.

29. **NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set. If the crankshaft is turned, the valves and pistons will be damaged.

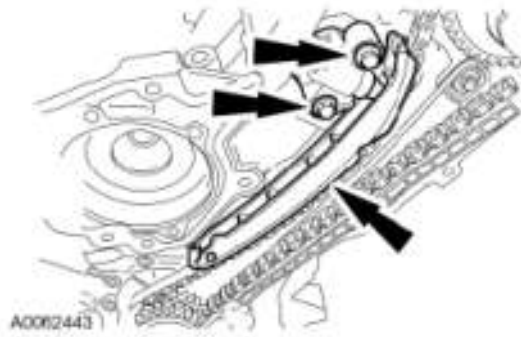
Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.



N0006305

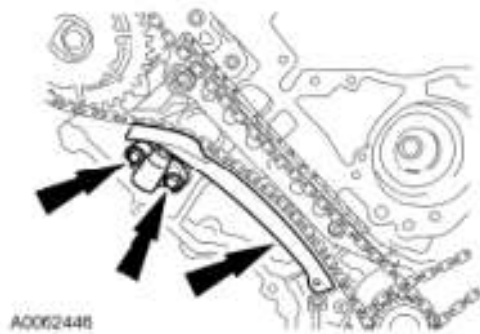
**Fig. 336: Locating Crankshaft Keyway**  
Courtesy of FORD MOTOR CO.

30. Remove the 2 bolts, the LH timing chain tensioner and tensioner arm.



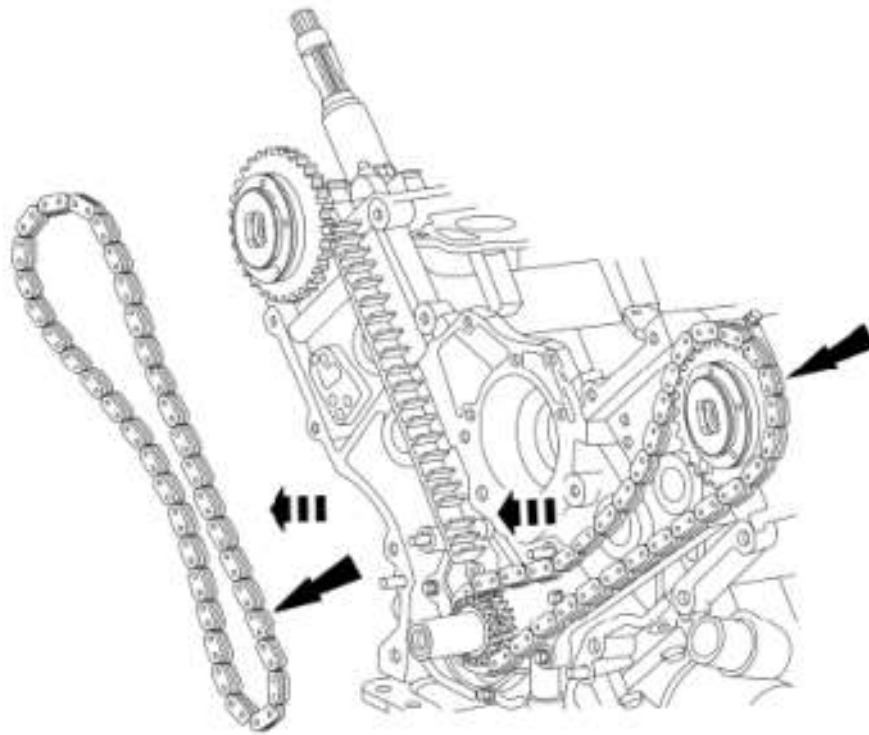
**Fig. 337: Locating Bolts And LH Timing Chain Tensioner**  
Courtesy of FORD MOTOR CO.

31. Remove the 2 bolts, the RH timing chain tensioner and tensioner arm.



**Fig. 338: Locating RH Timing Chain Tensioner And Bolts**  
Courtesy of FORD MOTOR CO.

32. Remove the RH and LH timing chains and the crankshaft sprocket.
- Remove the RH timing chain from the camshaft sprocket.
  - Remove the RH timing chain from the crankshaft sprocket.
  - Remove the LH timing chain from the camshaft sprocket.
  - Remove the LH timing chain and crankshaft sprocket.

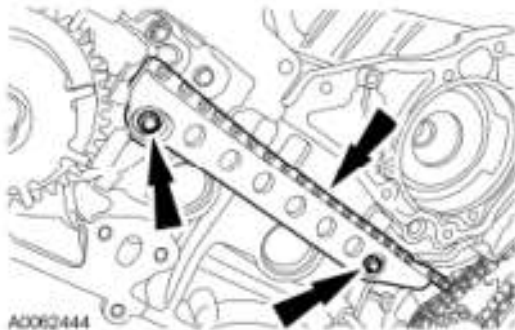


**Fig. 339: Removing Timing Chains And Crankshaft Sprocket**  
 Courtesy of FORD MOTOR CO.

33. **NOTE:** RH shown in illustration, LH similar.

Remove the LH and RH timing chain guides.

- Remove the 4 bolts.
- Remove both timing chain guides.



**Fig. 340: Locating Timing Chain Guide And Bolts**  
 Courtesy of FORD MOTOR CO.

LH cylinder head

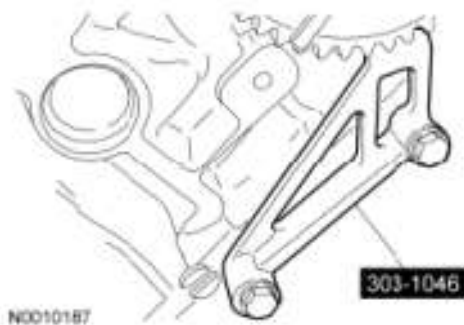
34. **NOTE:** Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

**NOTE:** Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

**NOTE:** Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

Using the Cam Phaser Locking Tool, remove the bolt and the LH camshaft phaser sprocket assembly.

- Discard the camshaft phaser sprocket bolt.

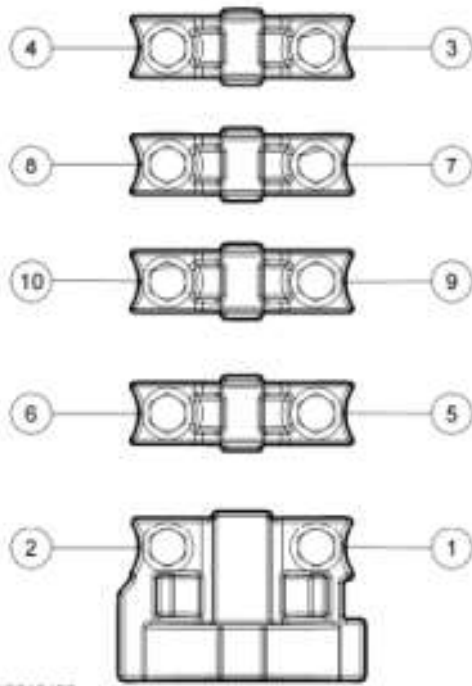


**Fig. 341: Identifying Cam Phaser Locking Tool (303-1046)**  
Courtesy of FORD MOTOR CO.

35. **NOTE:** Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from side loading.

**NOTE:** The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

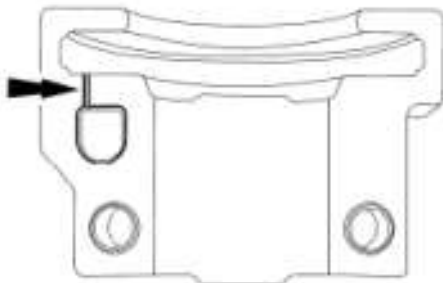
Remove the 10 bolts in the sequence shown in illustration. Remove the LH cylinder head front camshaft bearing cap, then the remaining bearing caps.



N0010190

**Fig. 342: Identifying Camshaft Bearing Caps Bolts In Sequence**  
 Courtesy of FORD MOTOR CO.

36. Clean and inspect the LH camshaft bearing caps.
- The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

**Fig. 343: Locating Thrust Bearing Cap Oil Metering Groove**  
 Courtesy of FORD MOTOR CO.

37. Remove the LH camshaft.

**NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

38.

Remove all of the remaining roller followers from the LH cylinder head.

**NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original

39.



39. **locations.**

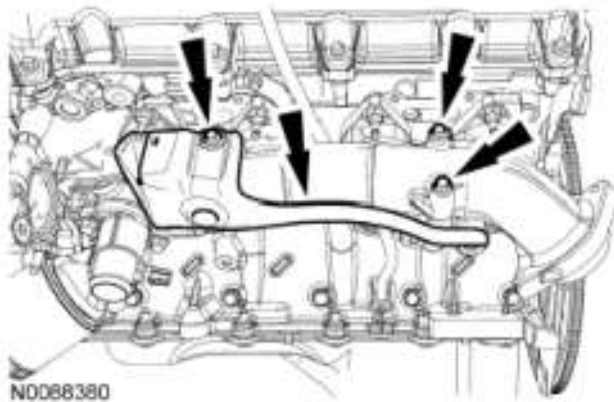
Remove the hydraulic lash adjusters from the LH cylinder head.

40. Install the Cylinder Head Remover/Installer onto the LH cylinder head.



**Fig. 344: Identifying Cylinder Head Remover/Installer (303-572)**  
Courtesy of FORD MOTOR CO.

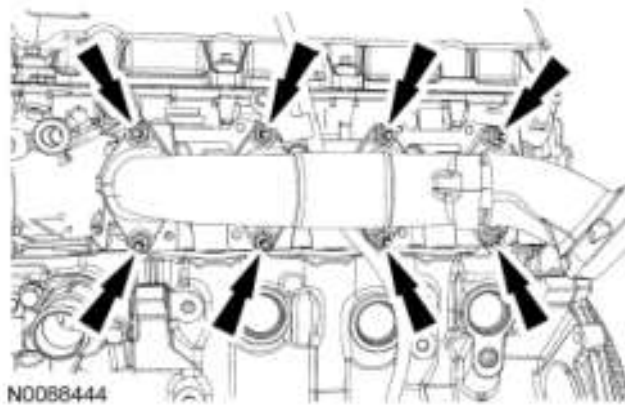
41. Remove the 3 bolts and the LH exhaust manifold heat shield.



**Fig. 345: Locating Bolts And LH Exhaust Manifold Heat Shield**  
Courtesy of FORD MOTOR CO.

42. Remove the 8 nuts, the LH exhaust manifold and the gaskets.

- Discard the nuts and the gaskets.

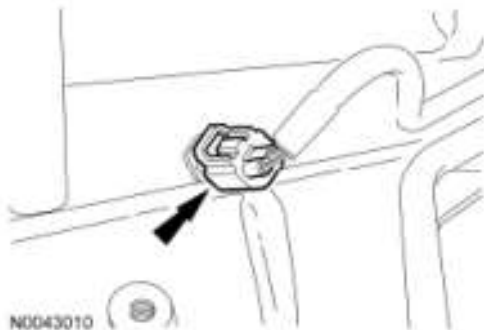


**Fig. 346: Locating Nuts And LH Exhaust Manifold**  
 Courtesy of FORD MOTOR CO.

43. Remove and discard the 8 LH exhaust manifold studs.

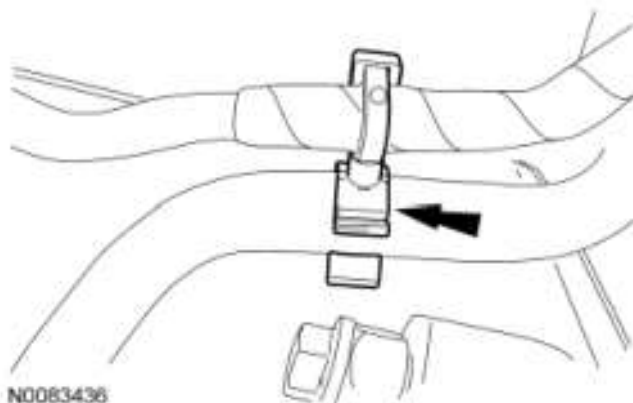
**RH cylinder head**

44. Disconnect the Cylinder Head Temperature (CHT) sensor electrical connector.



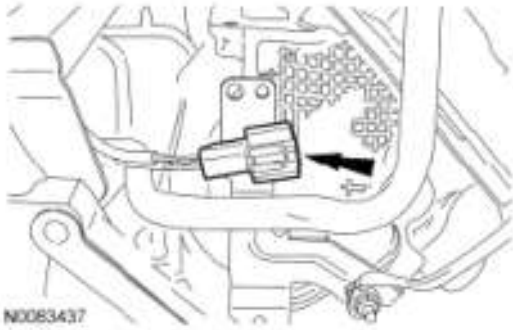
**Fig. 347: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector**  
 Courtesy of FORD MOTOR CO.

45. Detach the CHT sensor jumper wire retainer from the heater supply tube and remove the CHT jumper wire.



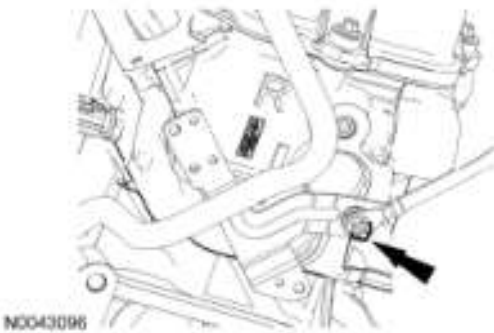
**Fig. 348: Locating CHT Sensor Jumper Wire Retainer**  
 Courtesy of FORD MOTOR CO.

46. Detach the Knock Sensor (KS) electrical connector from the heater supply tube.



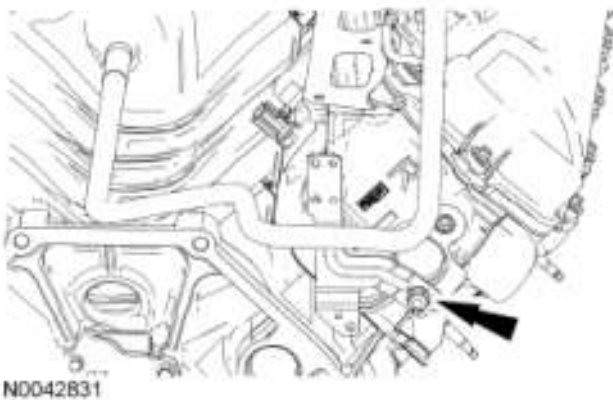
**Fig. 349: Locating Knock Sensor (KS) Electrical Connector**  
Courtesy of FORD MOTOR CO.

47. Remove the nut and the ground strap.



**Fig. 350: Locating Ground Strap Nut**  
Courtesy of FORD MOTOR CO.

48. Remove the stud bolt, the heater supply tube and hose as an assembly.
- Discard the 2 O-ring seals.



**Fig. 351: Locating Stud Bolt And Heater Supply Tube**  
Courtesy of FORD MOTOR CO.

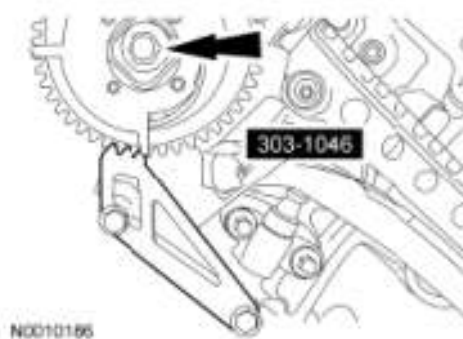
**NOTE:** Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

**NOTE:** Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

**NOTE:** Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

Using the Cam Phaser Locking Tool, remove the bolt and the RH camshaft phaser sprocket assembly.

- Discard the camshaft phaser sprocket bolt.



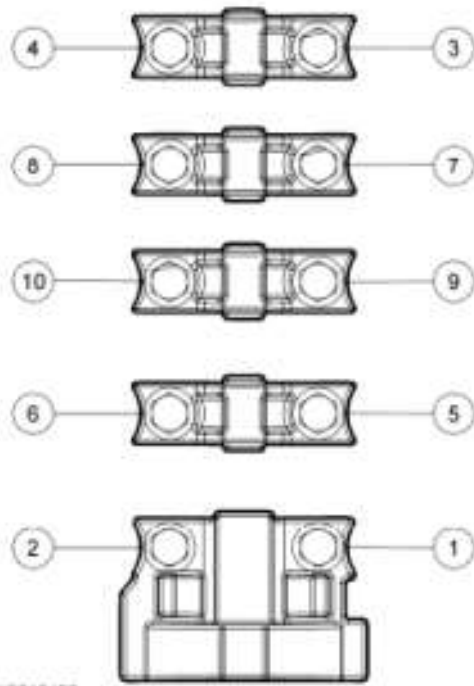
**Fig. 352: Identifying Cam Phaser Locking Tool (303-1046)**  
Courtesy of FORD MOTOR CO.

50.

**NOTE:** Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from side loading.

**NOTE:** The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

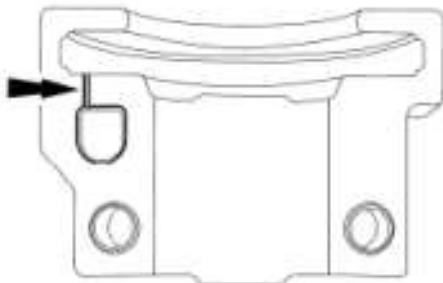
Remove the 10 bolts in the sequence shown in illustration. Remove the RH cylinder head front camshaft bearing cap, then the remaining bearing caps.



N0010190

**Fig. 353: Identifying Camshaft Bearing Caps Bolts In Sequence**  
 Courtesy of FORD MOTOR CO.

51. Clean and inspect the RH camshaft bearing caps.
  - The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

**Fig. 354: Locating Thrust Bearing Cap Oil Metering Groove**  
 Courtesy of FORD MOTOR CO.

52. Remove the RH camshaft.
 

**NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.
- 53.

Remove all of the remaining roller followers from the RH cylinder head.

54.
 

**NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original

54. **locations.**

Remove the hydraulic lash adjusters from the RH cylinder heads.

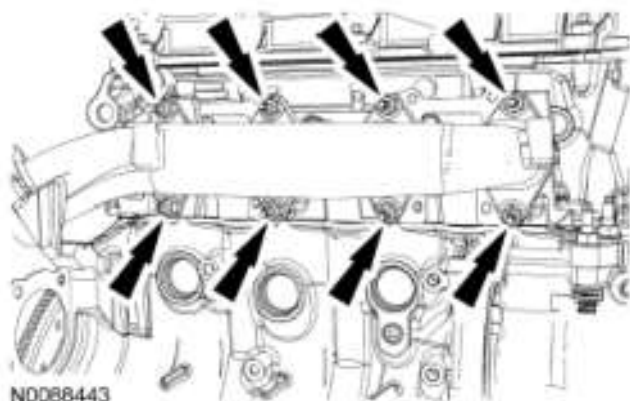
55. Install the Cylinder Head Remover/Installer onto the RH cylinder head.



**Fig. 355: Identifying Cylinder Head Remover/Installer (303-572)**  
Courtesy of FORD MOTOR CO.

56. Remove the 8 nuts, the RH exhaust manifold and the gaskets.

- Discard the nuts and the gaskets.



**Fig. 356: Locating Nuts And RH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

57. Remove and discard the 8 RH exhaust manifold studs.

**All cylinder heads**

**NOTE:** The cylinder head must be cool before removing it from the engine. Cylinder head warpage may result if a warm or hot cylinder head is removed.

58.

**NOTE:** Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.

**NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other

abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

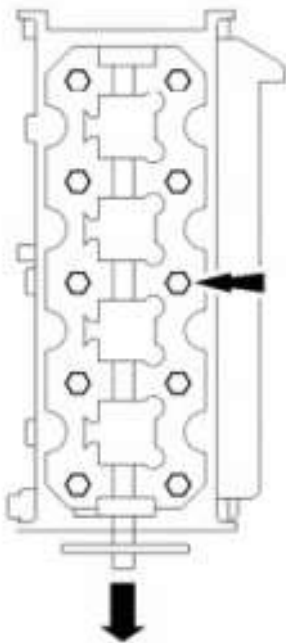
**NOTE:** Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface, or the cylinder head may be damaged.

**NOTE:** The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.

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

Remove the 20 bolts and the cylinder heads.

- Discard the cylinder head gaskets.
- Discard the cylinder head bolts.



N0067889

**Fig. 357: Locating Cylinder Head Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

59.

**NOTE:** Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

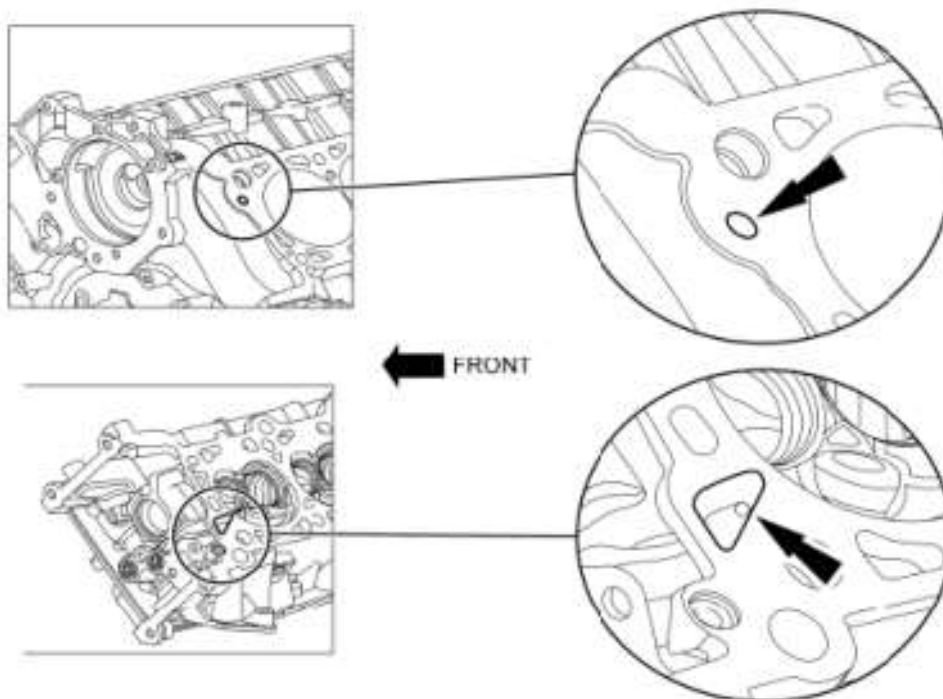
**NOTE:** If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block in the following sequence.

1. Remove any large deposits of silicone or gasket material with a plastic scraper.
2. Apply silicone gasket remover, following package directions and allow to set for several minutes.
3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
4. Apply metal surface prep, following package directions, to remove any remaining traces of oil or coolant and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

60. **NOTE:** LH shown in illustration, RH similar.

Support the cylinder heads on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion, paying particular attention to the oil pressure feed area. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** .



A0079634

**Fig. 358: Locating Oil Pressure Feed Area**  
Courtesy of FORD MOTOR CO.