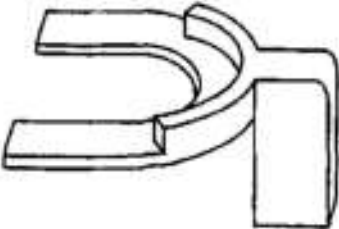


	<p>Compressor, Valve Spring 303-381 (T91P-6565-AH)</p>
	<p>Spacer, Valve Spring Compressor 303-382 (T91P-6565-AH)</p>
	<p>Installer, Valve Stem Oil Seal 303-383 (T91P-6571-A)</p>
	<p>Aligner, Camshaft Position 303-557 (T96T-6256-B)</p>

Fig. 448: Identifying Special Tools
Courtesy of FORD MOTOR CO.

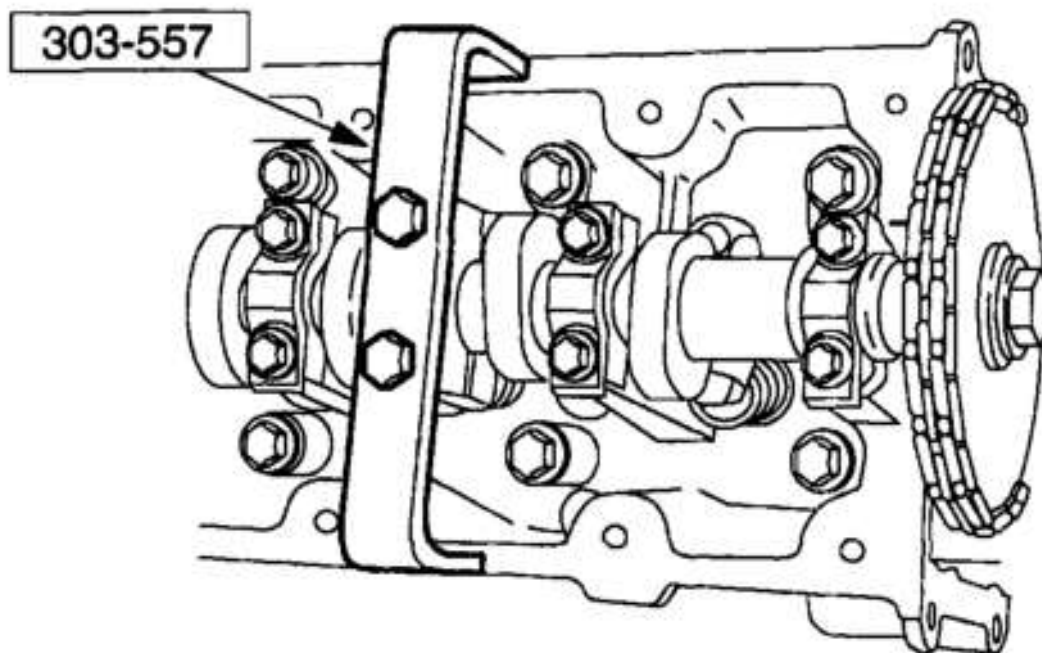
Item	Specification
Motorcraft Silicone Gasket Remover ZC-30	—
Motorcraft Metal Surface Prep ZC-31	—
SAE 5W-20 Premium Synthetic Blend Engine Oil XO-5W20-QSP	WSS-M2C153-H

G01544973

Fig. 449: Material Specification Chart
Courtesy of FORD MOTOR CO.

Cylinder heads removed in-vehicle

1. Remove the special tool from the camshaft.



G01544974

Fig. 450: Removing Special Tool From Camshaft
Courtesy of FORD MOTOR CO.

2. Position the camshaft lobe of the valve being serviced at base circle.

CAUTION: Do not remove the camshaft before removing the roller followers.

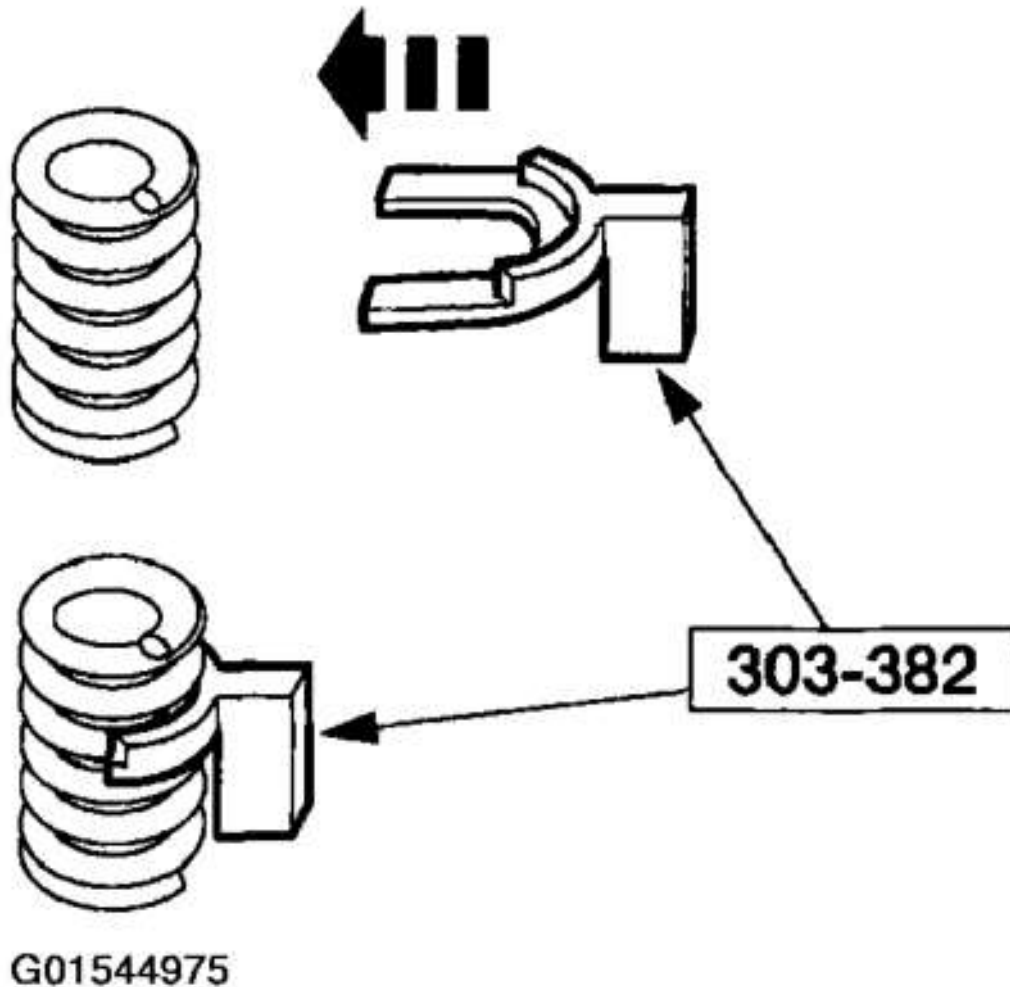
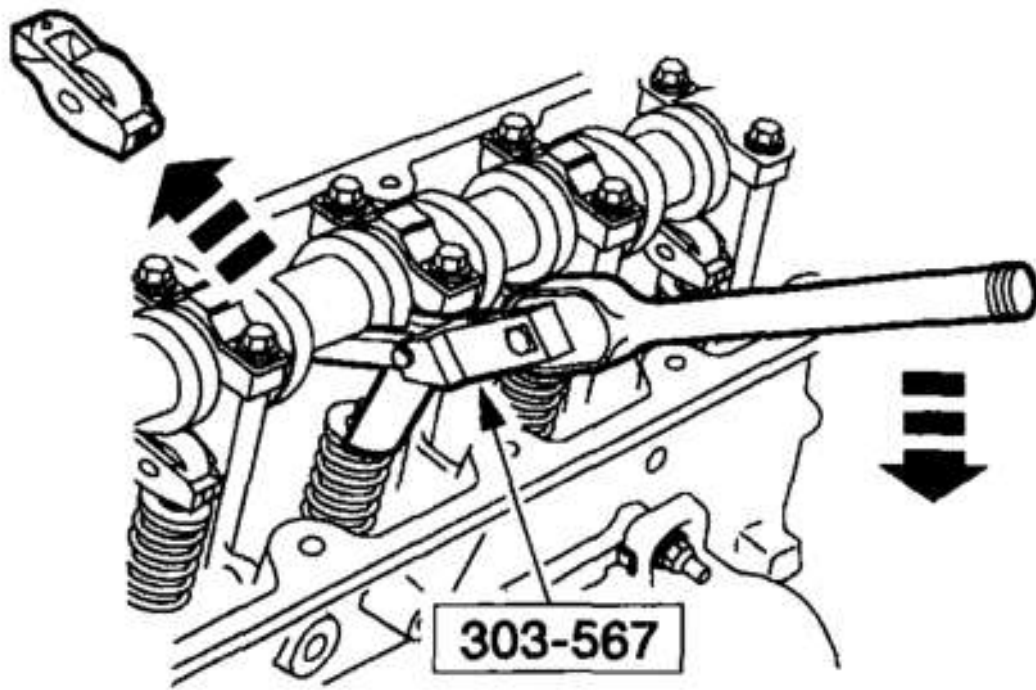


Fig. 451: Installing Special Tool Between Valve Spring Coils
Courtesy of FORD MOTOR CO.

3. Install the special tool between the valve spring coils to prevent valve stem seal damage.

NOTE: The camshaft roller followers must be reinstalled in their original locations. Record the camshaft roller follower locations.



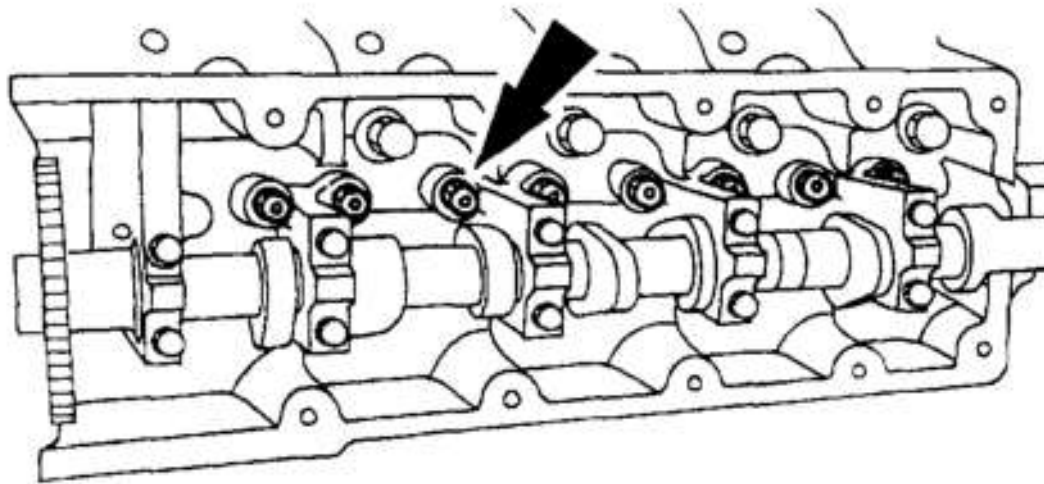
G01544976

Fig. 452: Compressing Valve Springs Using Special Tool
Courtesy of FORD MOTOR CO.

4. Use the special tool to compress the valve springs, and remove the camshaft roller followers.

All cylinder heads

NOTE: The hydraulic lash adjusters must be reinstalled in their original locations. Record the hydraulic lash adjuster locations.



G01544977

Fig. 453: Removing Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

5. Remove the hydraulic lash adjusters.
6. Install the special tool between the valve spring coils to prevent valve stem seal damage.

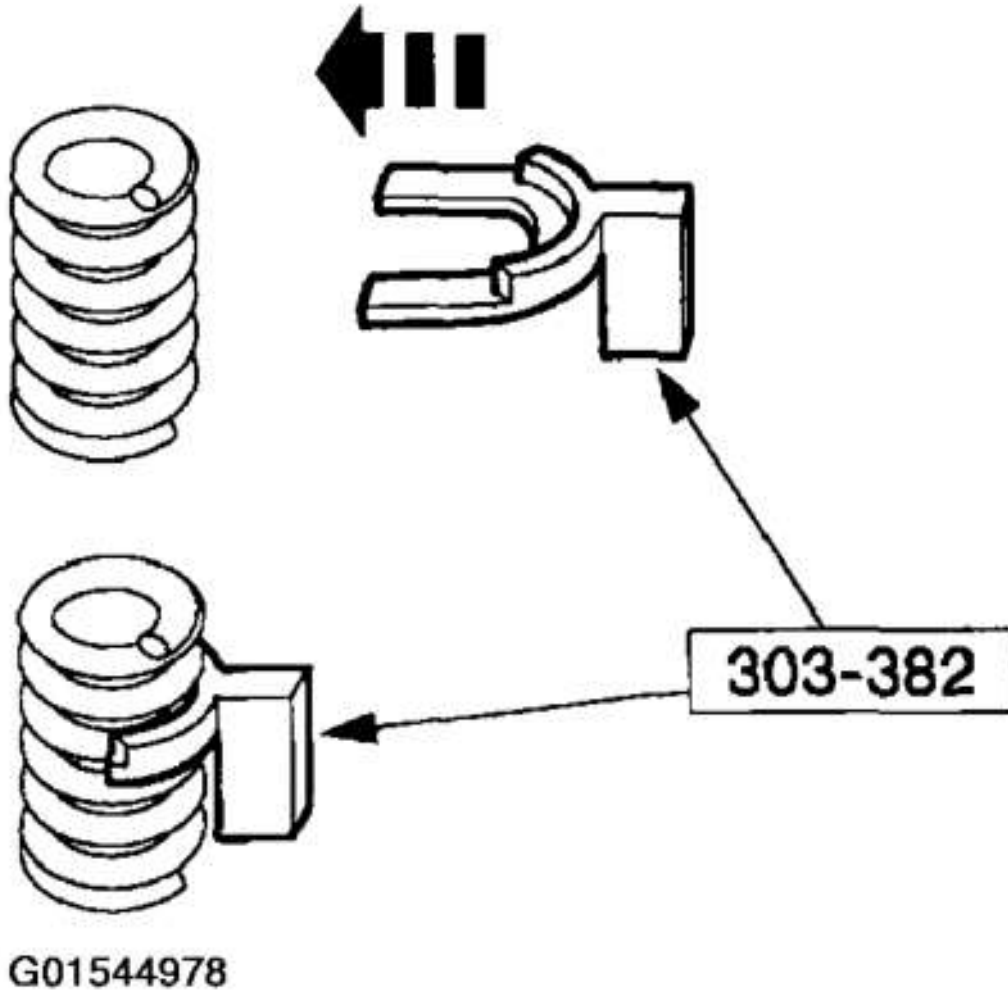


Fig. 454: Installing Special Tool Between Valve Spring Coils To Prevent Valve Stem Seal Damage

Courtesy of FORD MOTOR CO.

7. Use the special tool to compress the valve springs.

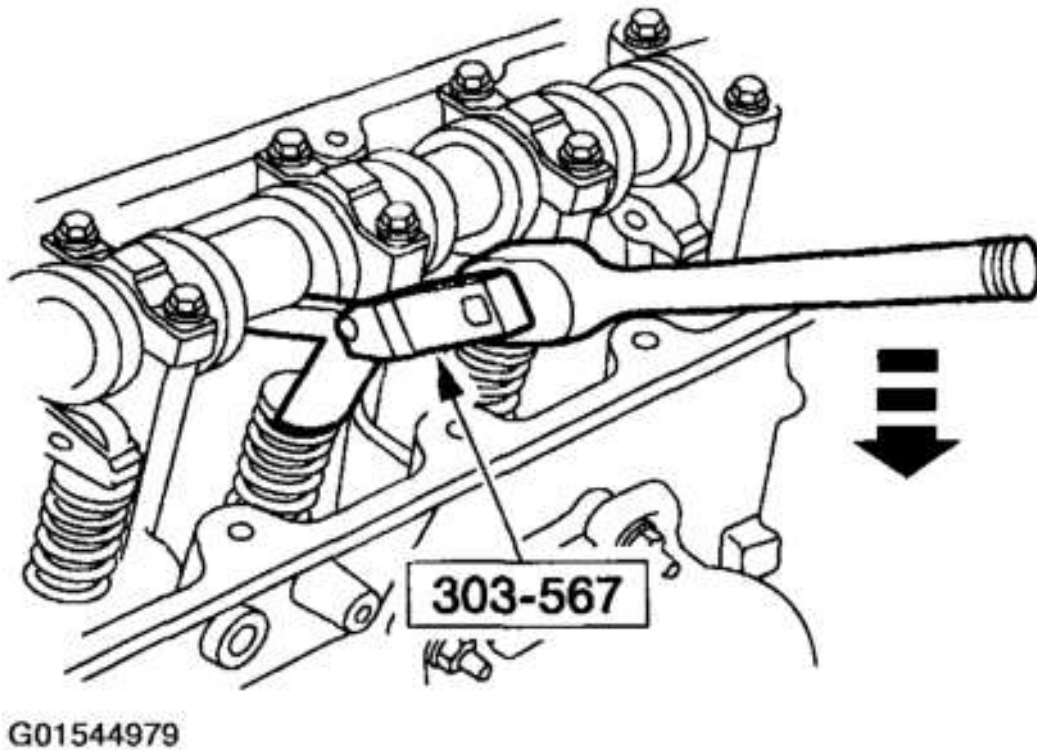
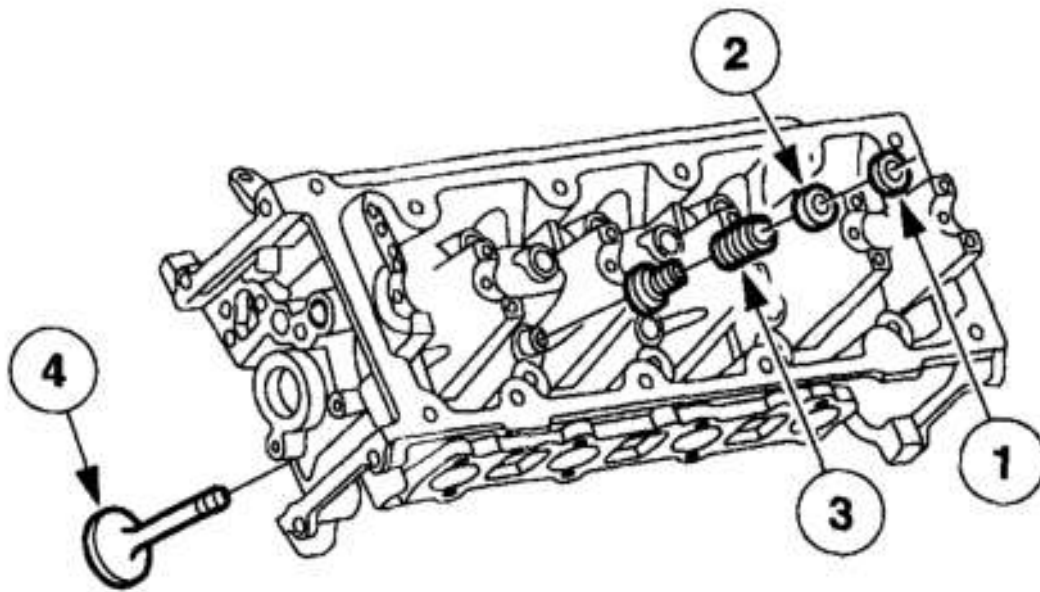


Fig. 455: Compressing Valve Springs Using Special Tool
Courtesy of FORD MOTOR CO.

CAUTION: Keep the valves and valve spring retainer keys in order so they can be reinstalled in their original locations.

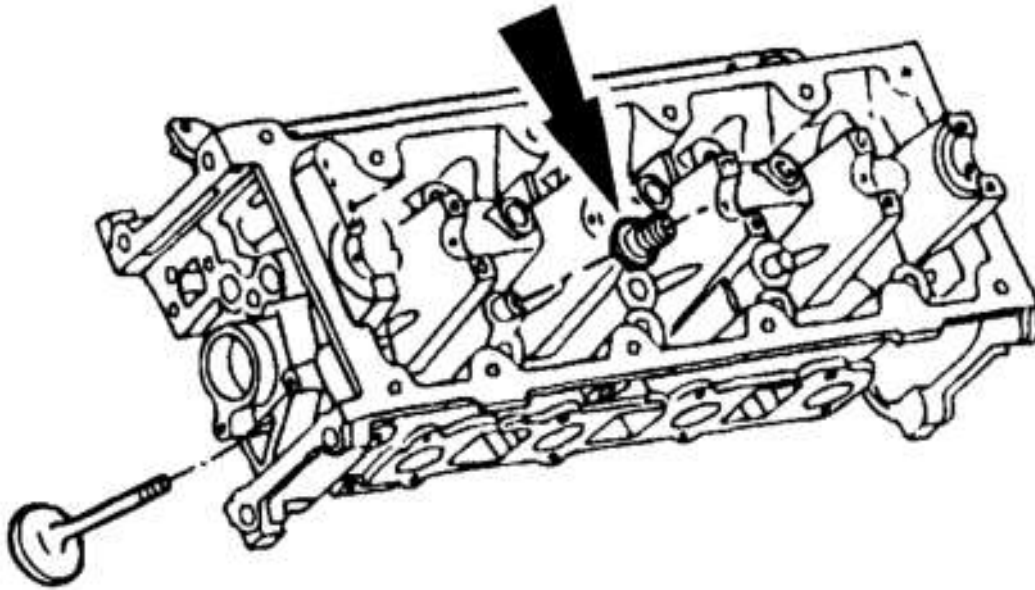
NOTE: Shown without camshaft for clarity.



G01544980

Fig. 456: Removing Valves
Courtesy of FORD MOTOR CO.

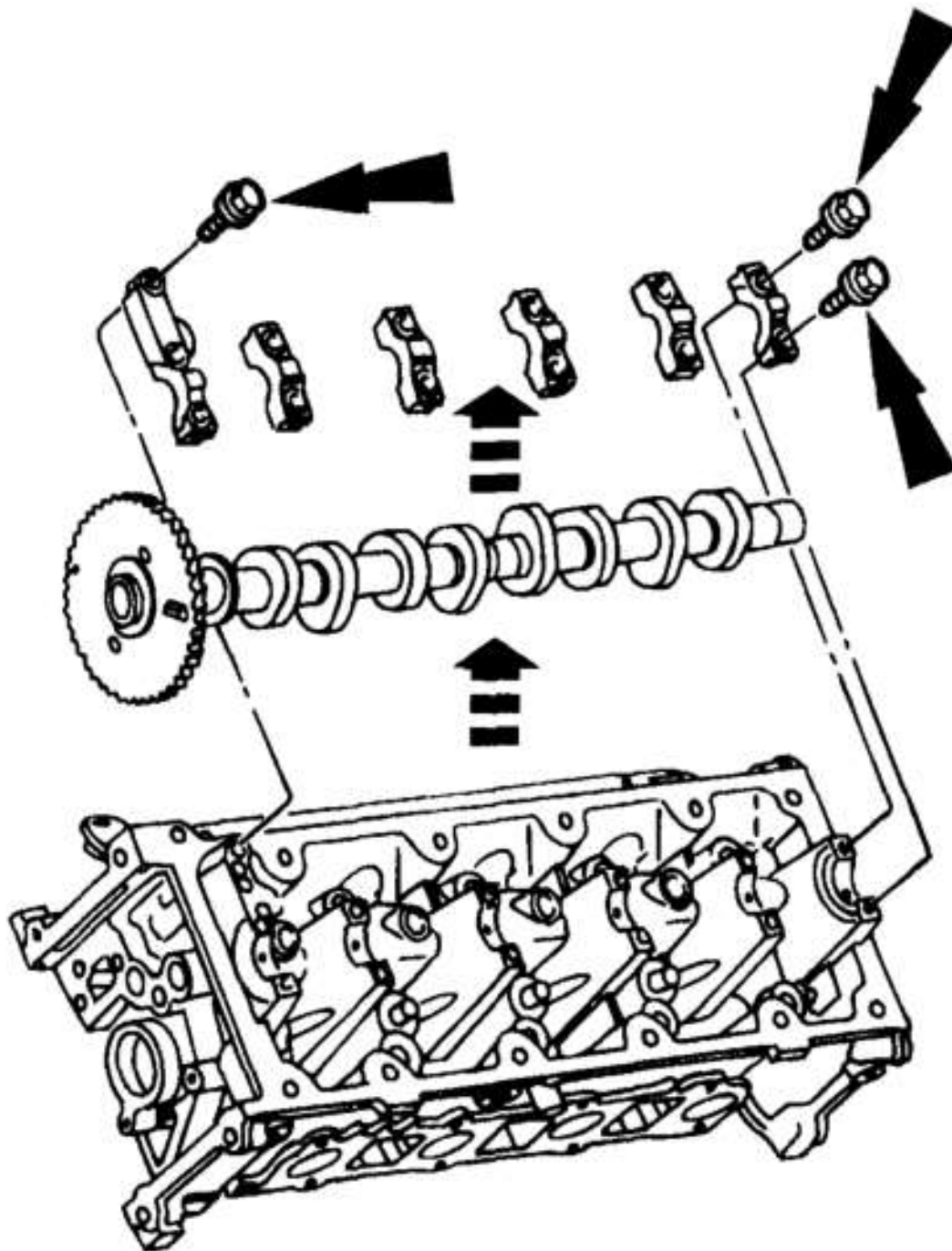
8. Remove the valves.
 1. Remove the valve spring retainer keys.
 2. Remove the valve spring retainers.
 3. Remove the valve springs.
 4. Remove the valves.
9. Remove the valve stem seals.



G01544981

Fig. 457: Removing Valve Stem Seals
Courtesy of FORD MOTOR CO.

NOTE: The camshaft bearing caps must be reinstalled in their original locations. Record the camshaft bearing cap locations.

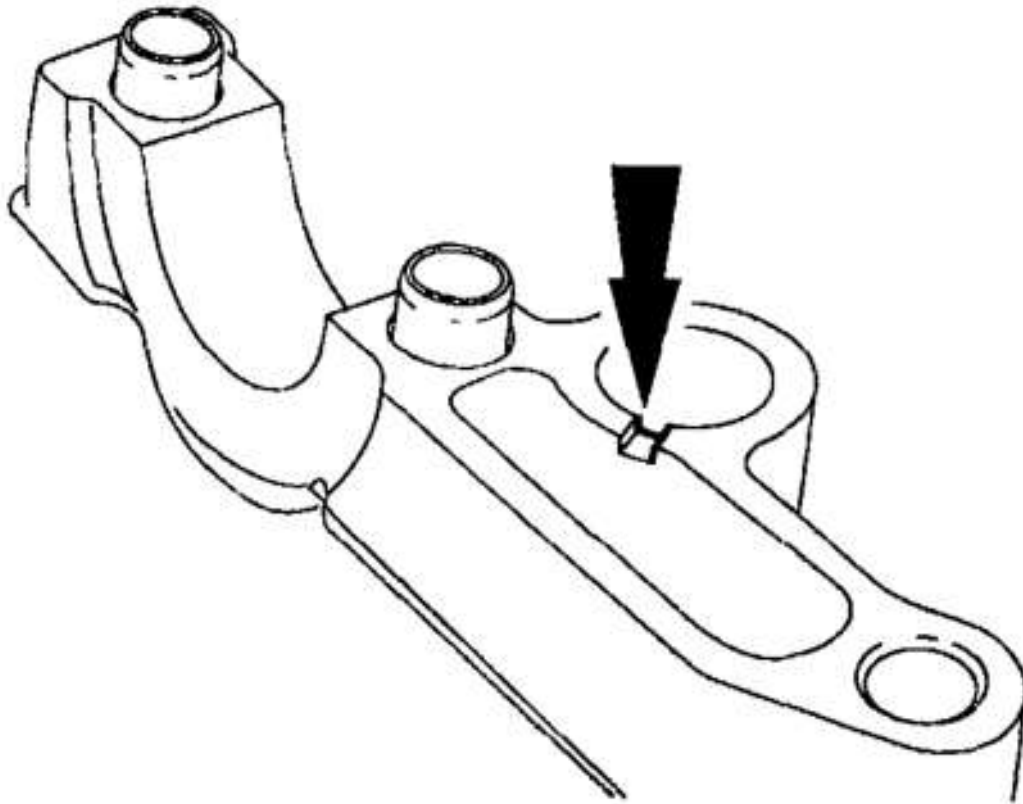


G01544982

Fig. 458: Removing Bolts, Bearing Caps And Camshaft
Courtesy of FORD MOTOR CO.

10. Remove the bolts, the bearing caps and the camshaft.
11. Clean and inspect the camshaft bearing caps.
 - One of the bearing caps contains an oil flow restriction groove. Make sure the groove is free of

foreign material.



G01544983

Fig. 459: Identifying Bearing Caps Oil Flow Restriction Groove
Courtesy of FORD MOTOR CO.

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

CAUTION: 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.

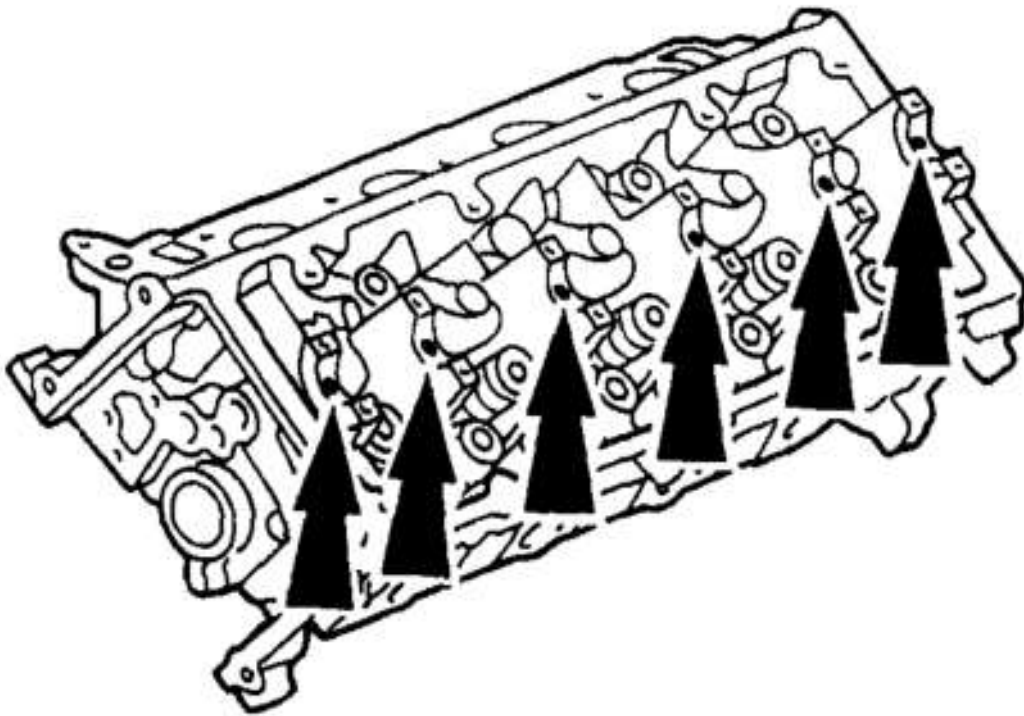
12. Clean the cylinder head sealing surfaces.
 1. Remove any large deposits of silicone or gasket material with a plastic scraper.

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.

Assembly

All cylinder heads

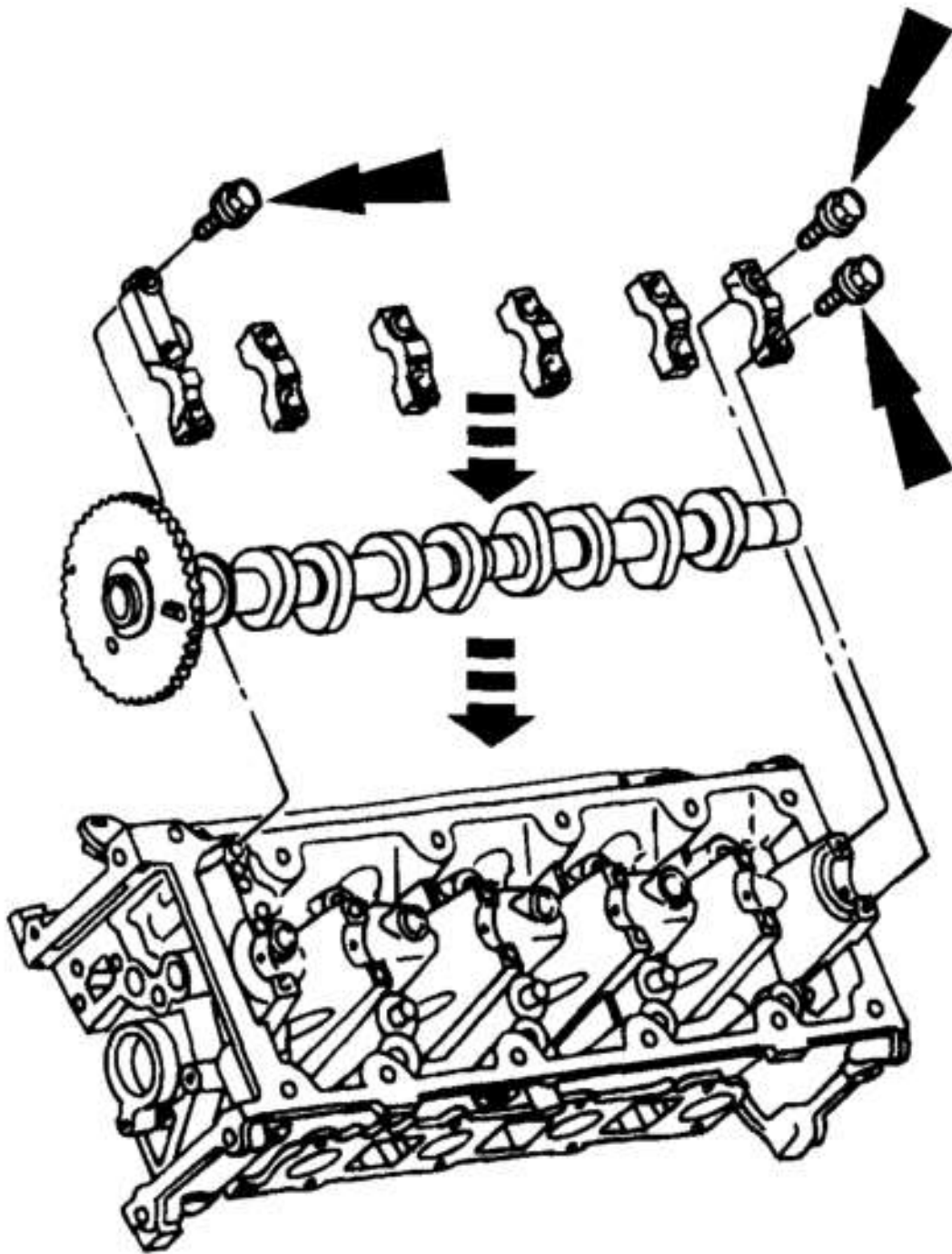
1. Lubricate the camshaft journals with clean engine oil.



G01544984

Fig. 460: Lubricating Camshaft Journals With Clean Engine Oil
Courtesy of FORD MOTOR CO.

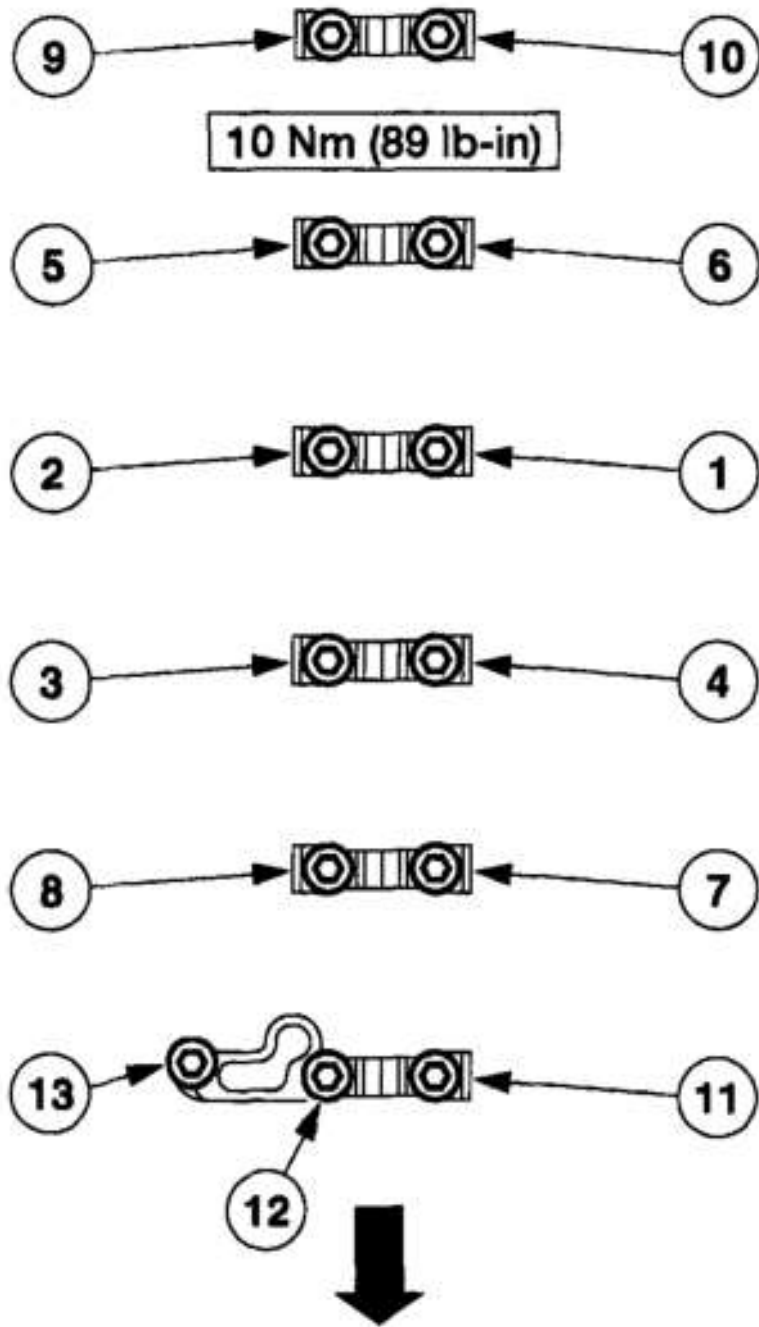
2. Install the camshaft and the camshaft bearing caps in their original locations.
 - Lubricate the camshaft bearing caps with clean engine oil.
 - Position the camshaft bearing caps.
 - Install the bolts loosely.



G01544985

Fig. 461: Installing Camshaft And Camshaft Bearing Caps
Courtesy of FORD MOTOR CO.

3. Tighten the bolts in the sequence shown.

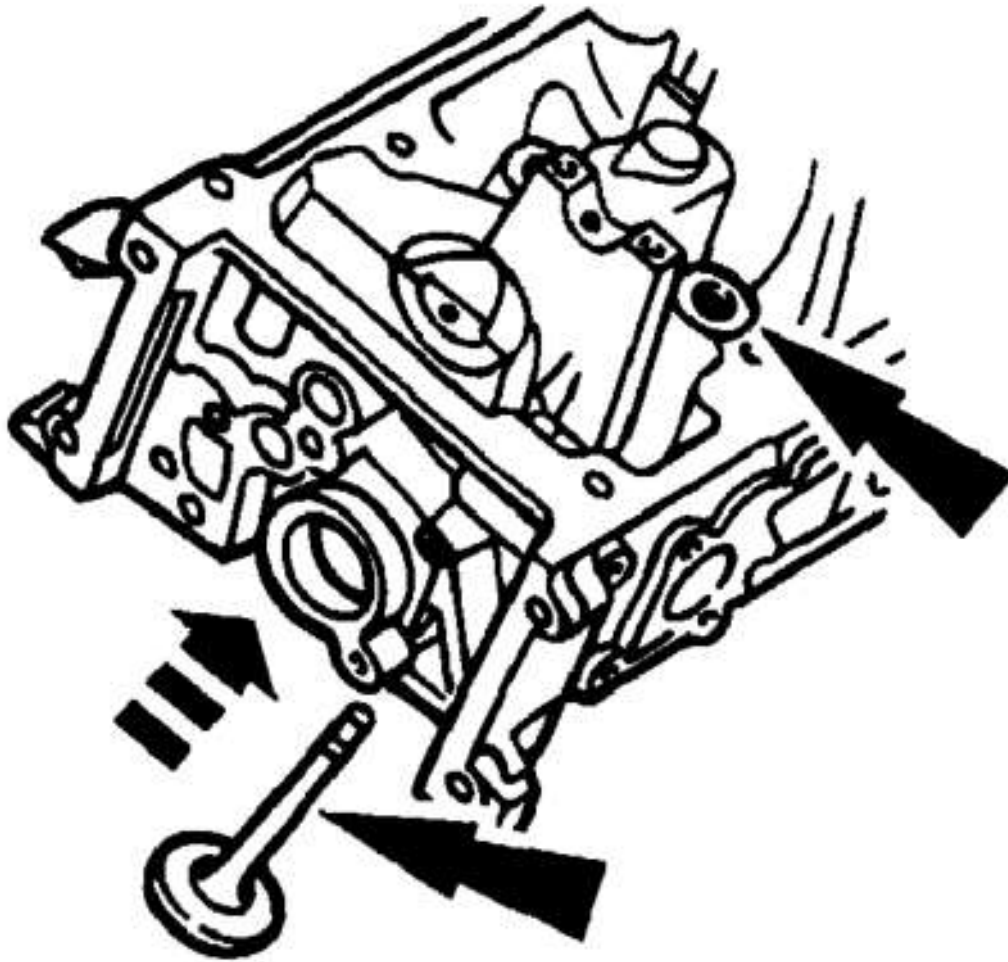


10 Nm (89 lb-in)

G01544986

Fig. 462: Identifying Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

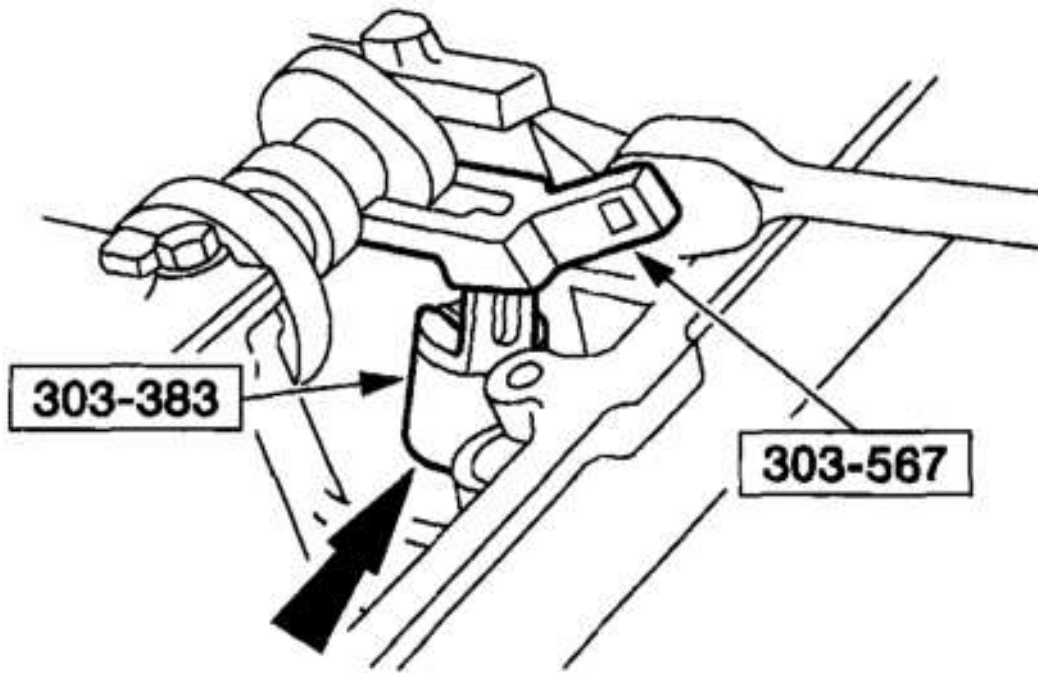
NOTE: Lubricate the valve stems using clean engine oil.



G01544987

Fig. 463: Installing Valves In Valve Guides In Cylinder Head
Courtesy of FORD MOTOR CO.

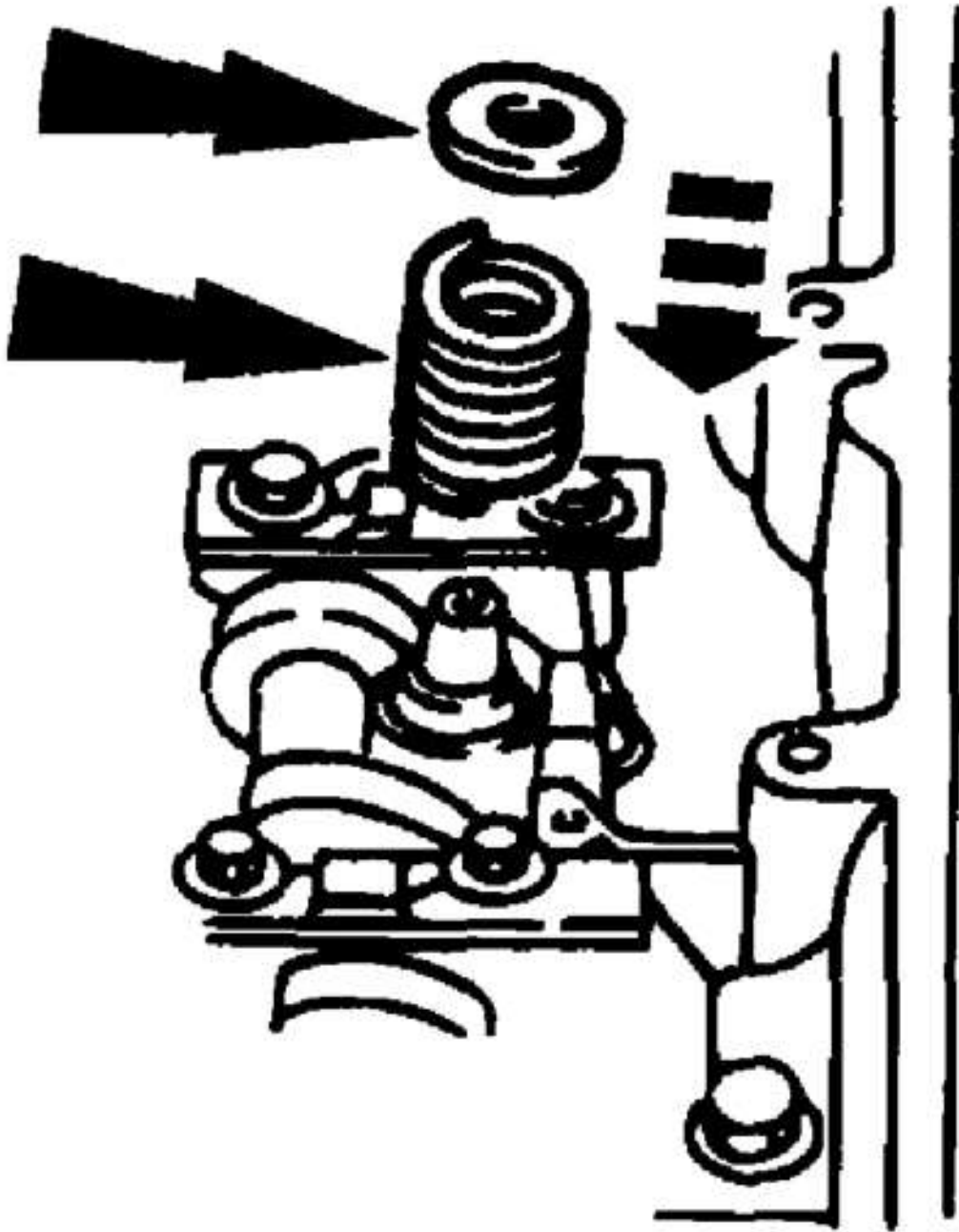
4. Install the valves in the valve guides located in the cylinder head.
5. Use the special tools to install the valve stem seals.



G01544988

Fig. 464: Installing Valve Stem Seals Using Special Tools
Courtesy of FORD MOTOR CO.

6. Install the valve springs and the valve spring retainers onto the valves.



G01544989

Fig. 465: Installing Valve Springs And Valve Spring Retainers Onto Valves
Courtesy of FORD MOTOR CO.

7. Install the special tool between the valve spring coils to prevent valve stem seal damage.

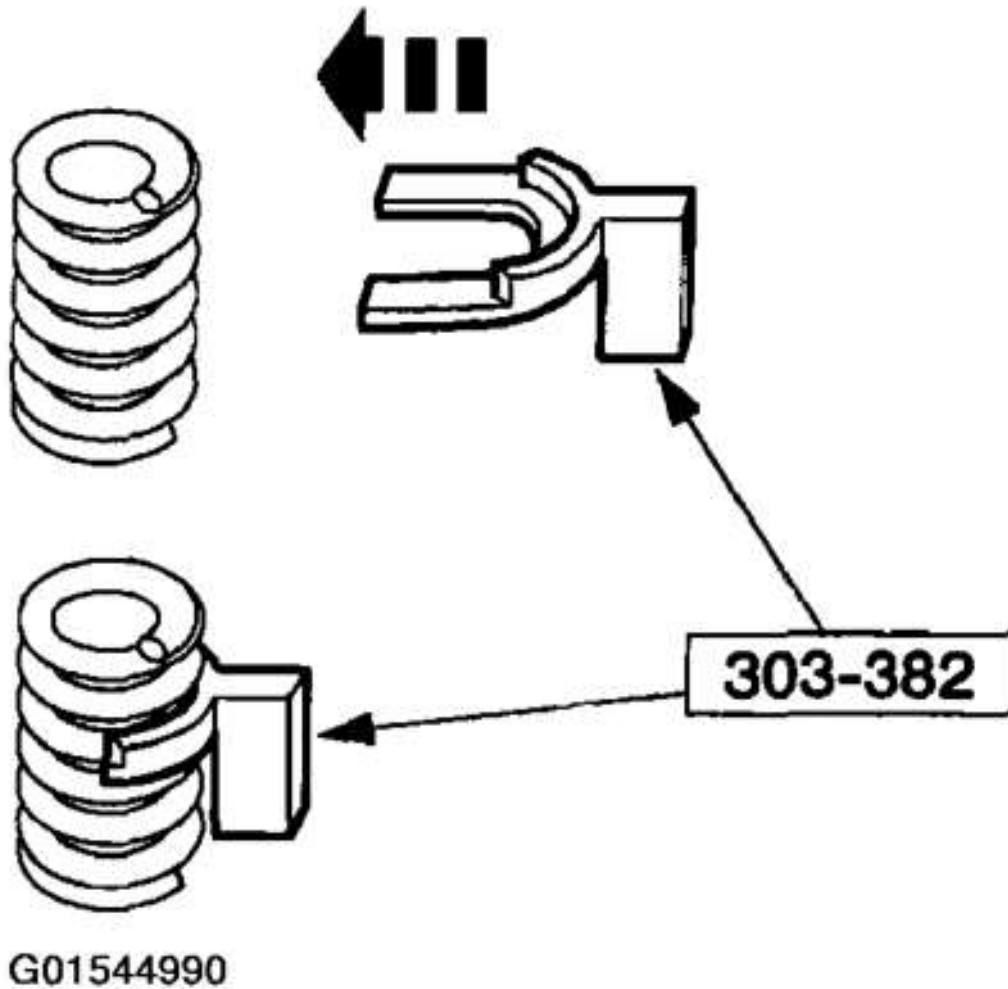
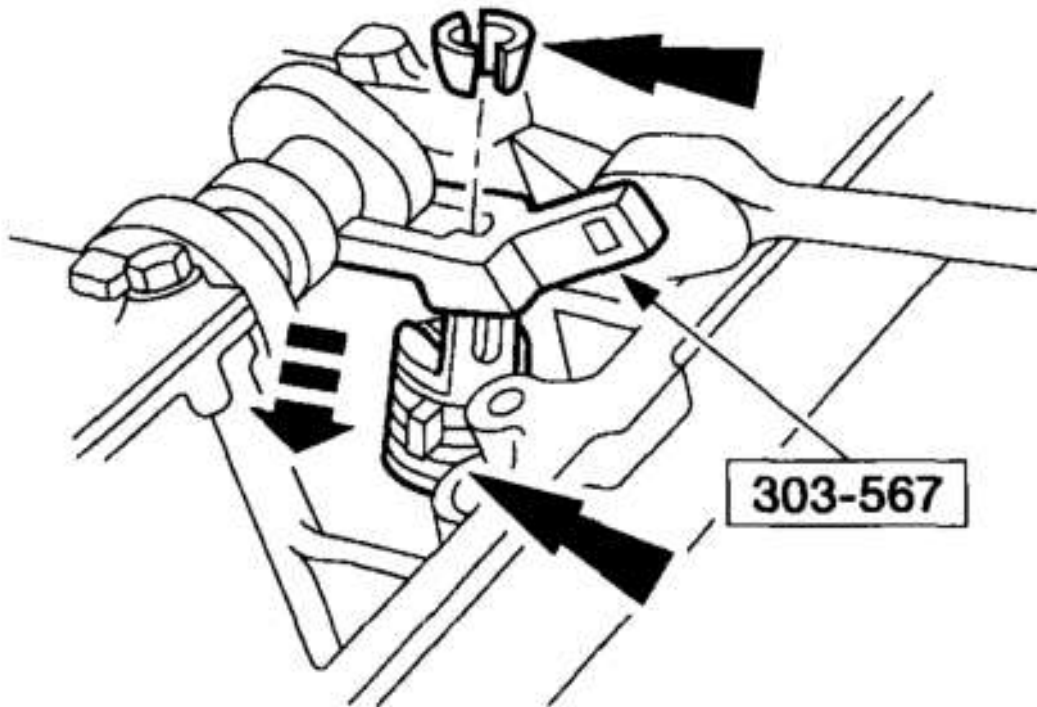


Fig. 466: Installing Special Tool Between Valve Spring Coils
Courtesy of FORD MOTOR CO.

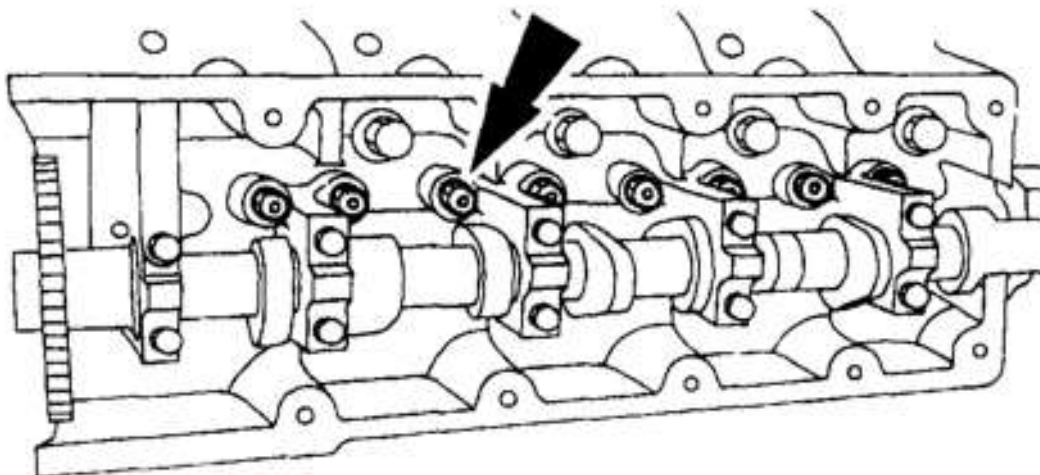
8. Use the special tool to compress the valve springs. Install the valve spring retainer keys.



G01544991

Fig. 467: Compressing Valve Springs Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the hydraulic lash adjusters using clean engine oil.



G01544992

Fig. 468: Installing Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

9. Install the hydraulic lash adjusters in their original locations.
10. Remove the special tool, unless the cylinder head is to be installed in-vehicle.

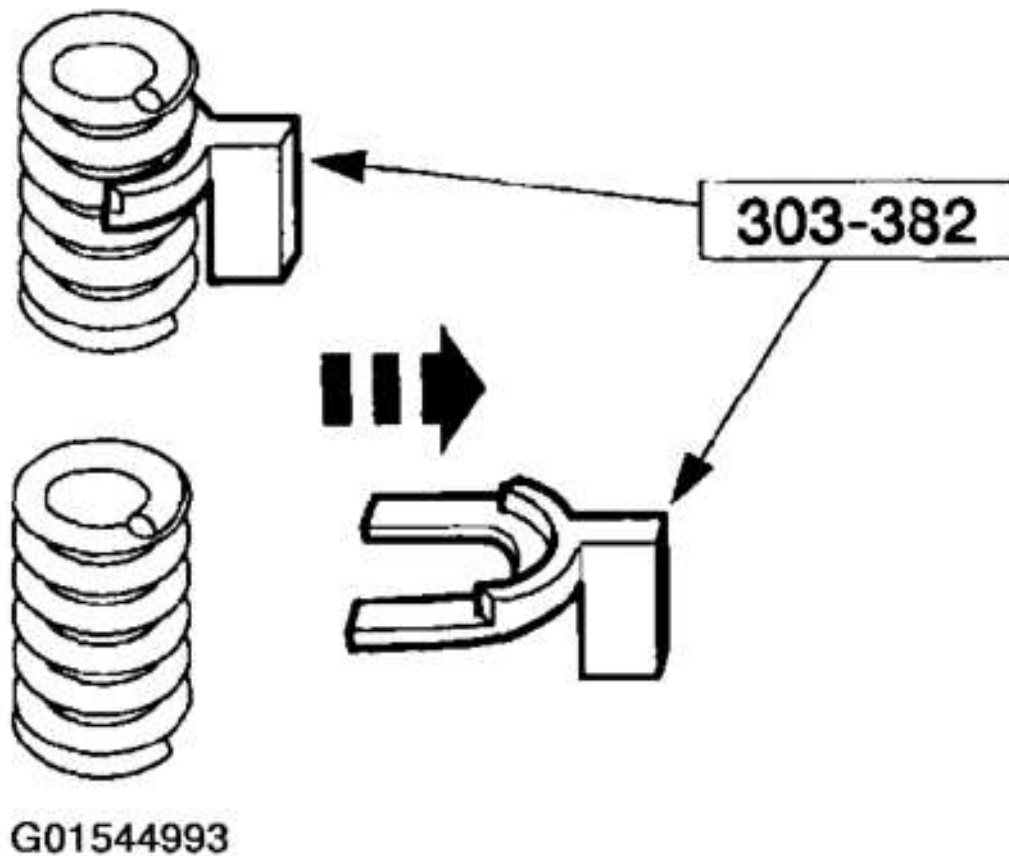
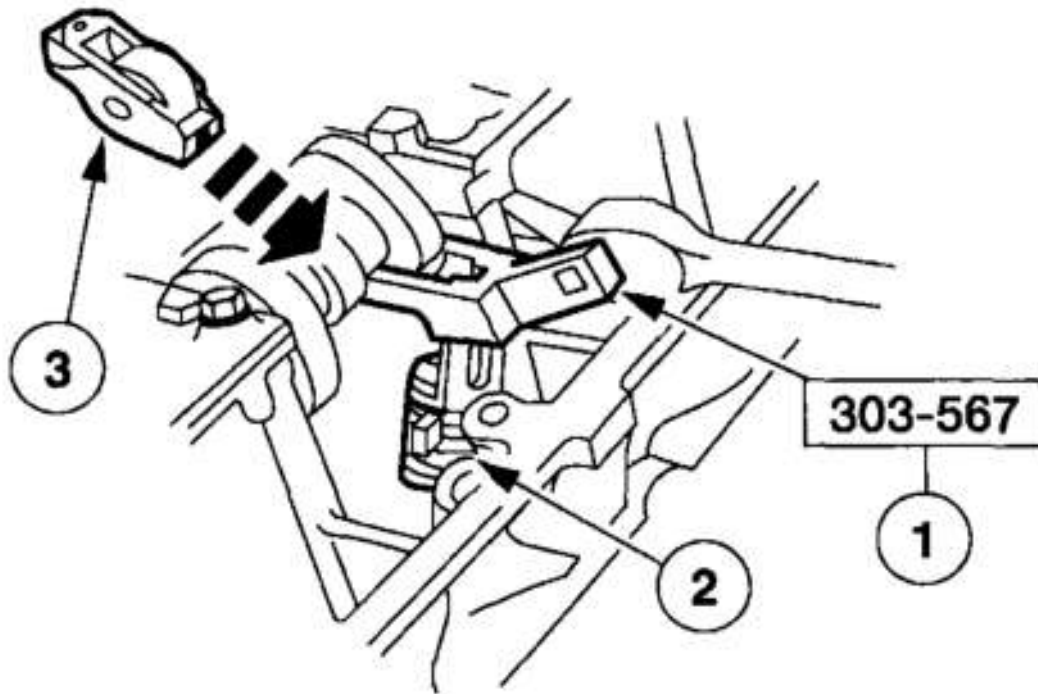


Fig. 469: Removing Special Tool
Courtesy of FORD MOTOR CO.

Cylinder heads for in-vehicle installation

11. Position the camshaft lobe of the valve being serviced at base circle.

NOTE: Lubricate the camshaft roller followers using clean engine oil.



G01544994

Fig. 470: Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

12. Install the camshaft roller followers.
 1. Install the special tool.
 2. Compress the valve spring.
 3. Install the camshaft roller followers in their original locations.
13. Remove the special tool.

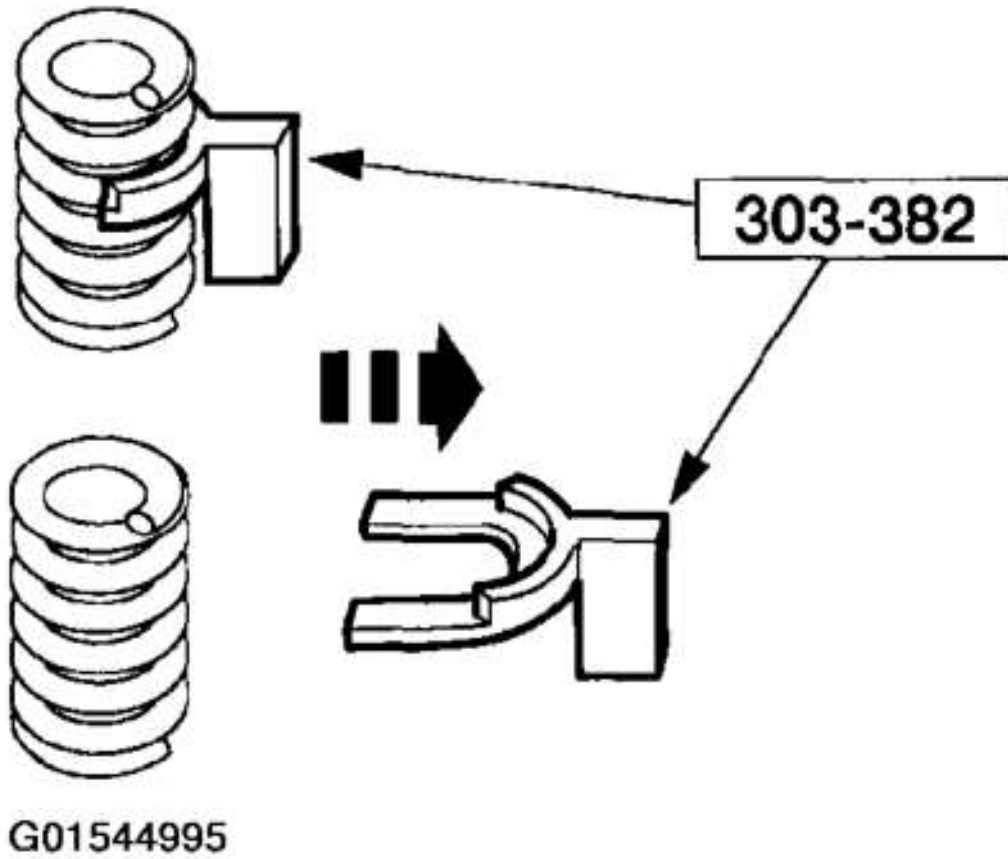
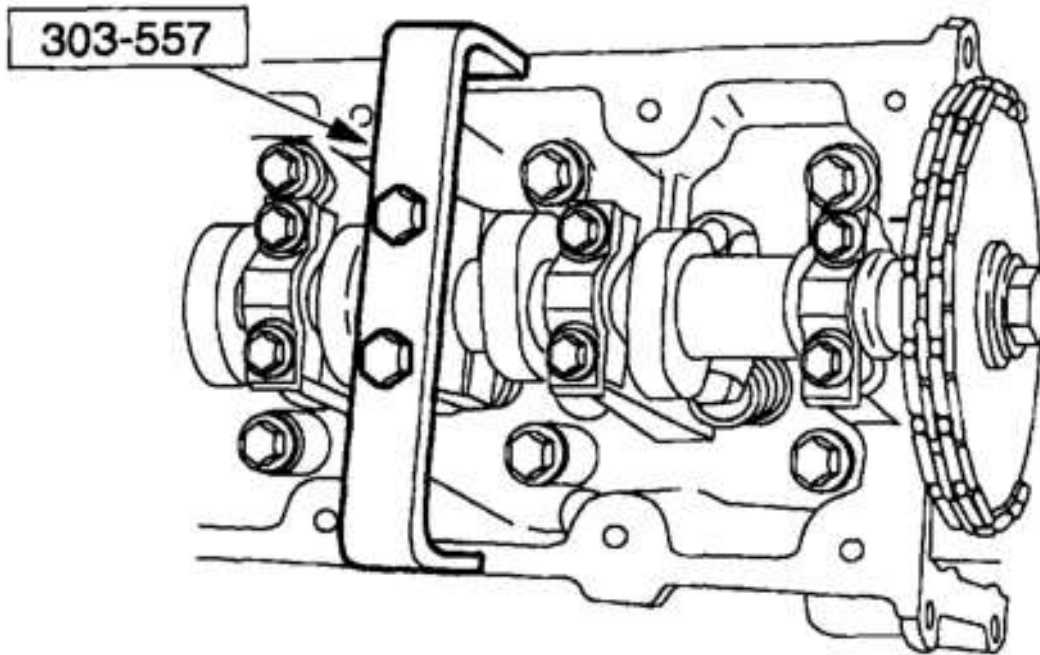


Fig. 471: Removing Special Tool
Courtesy of FORD MOTOR CO.

14. Loosely install the special tool.



G01544996

Fig. 472: Installing Special Tool
 Courtesy of FORD MOTOR CO.

PISTON - PIN CONNECTING ROD, FLOATING PIN

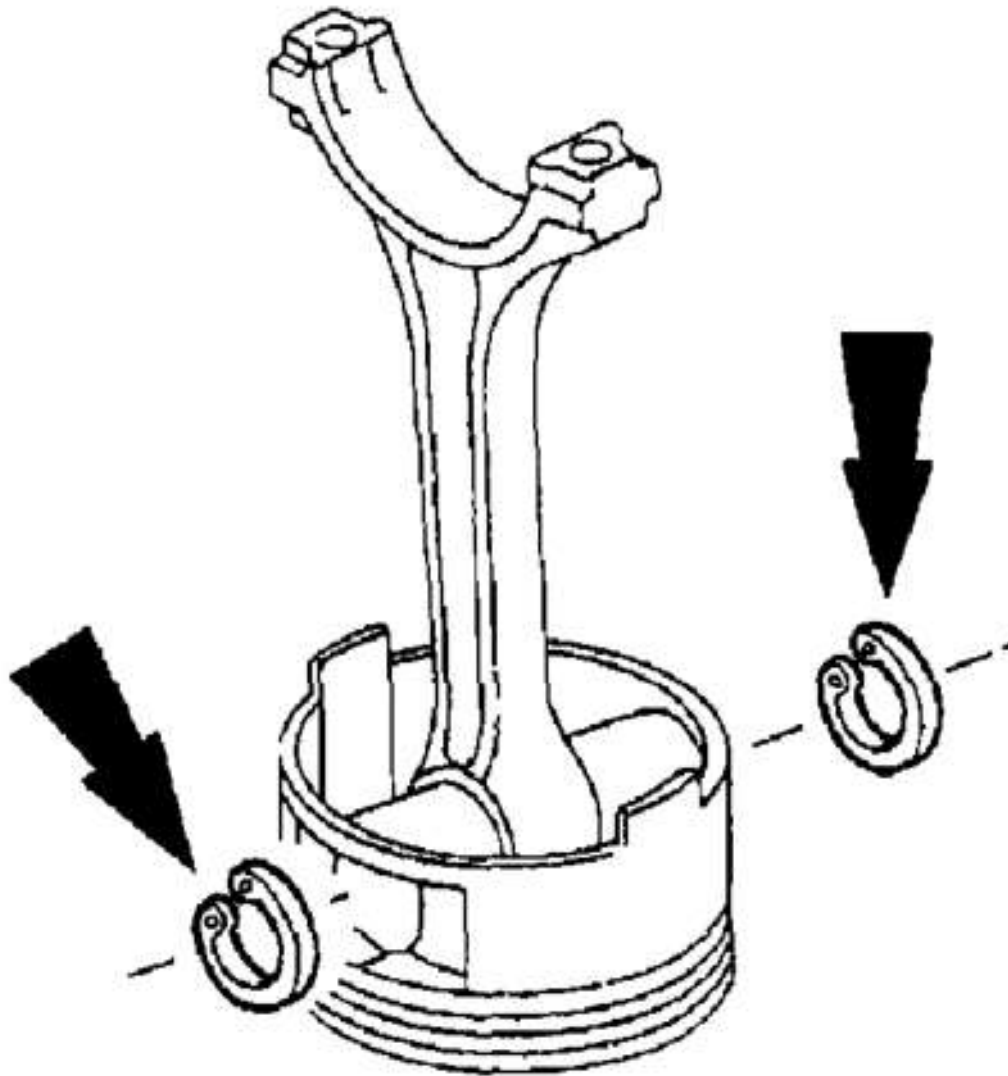
Item	Specification
Super Premium SAE 5W-20 Engine Oil XO-5W20-QSP or equivalent	WSS-M2C153-H

G01544997

Fig. 473: Material Specification Chart
 Courtesy of FORD MOTOR CO.

Disassembly

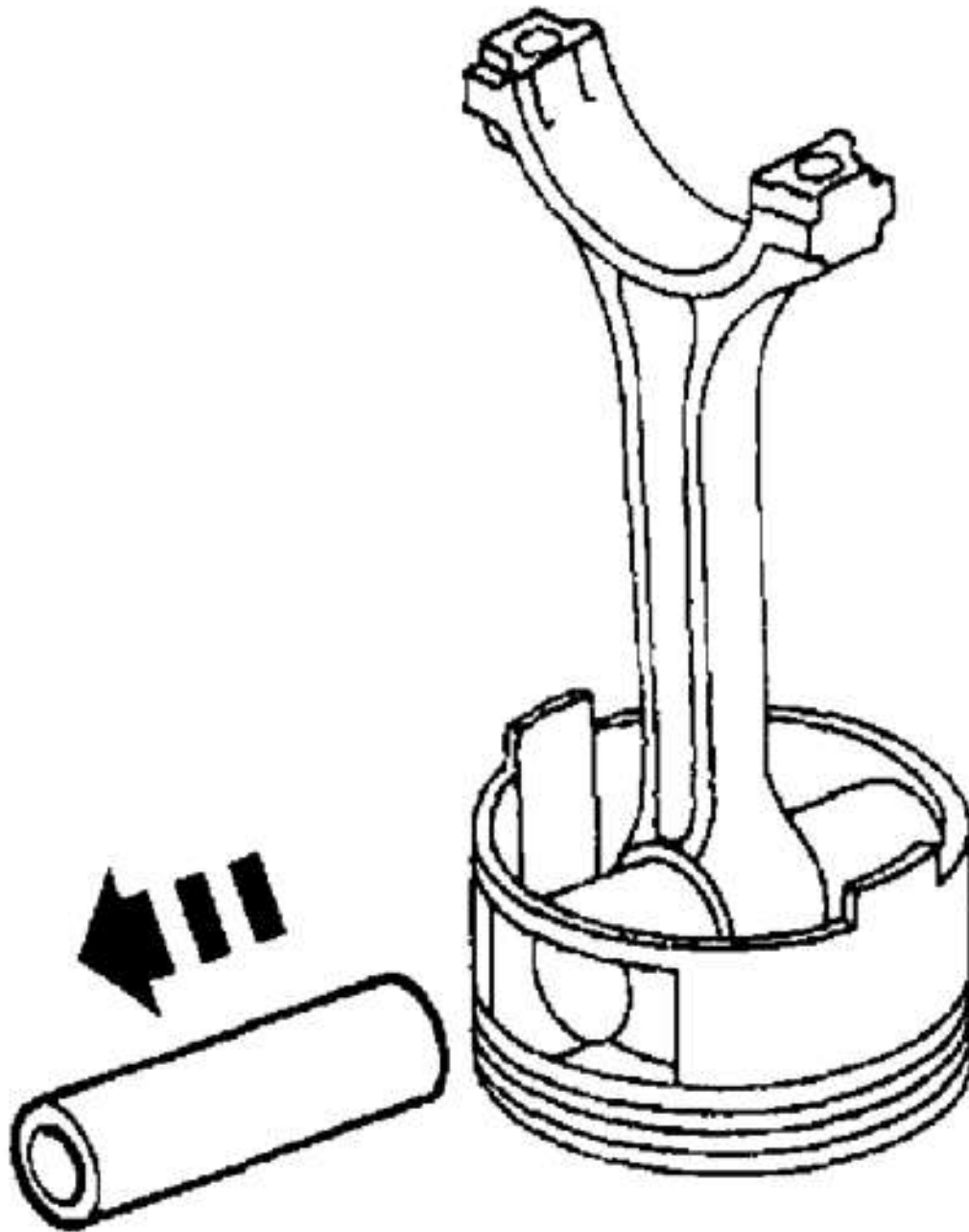
1. Remove the clips.



G01544998

Fig. 474: Removing Clips
Courtesy of FORD MOTOR CO.

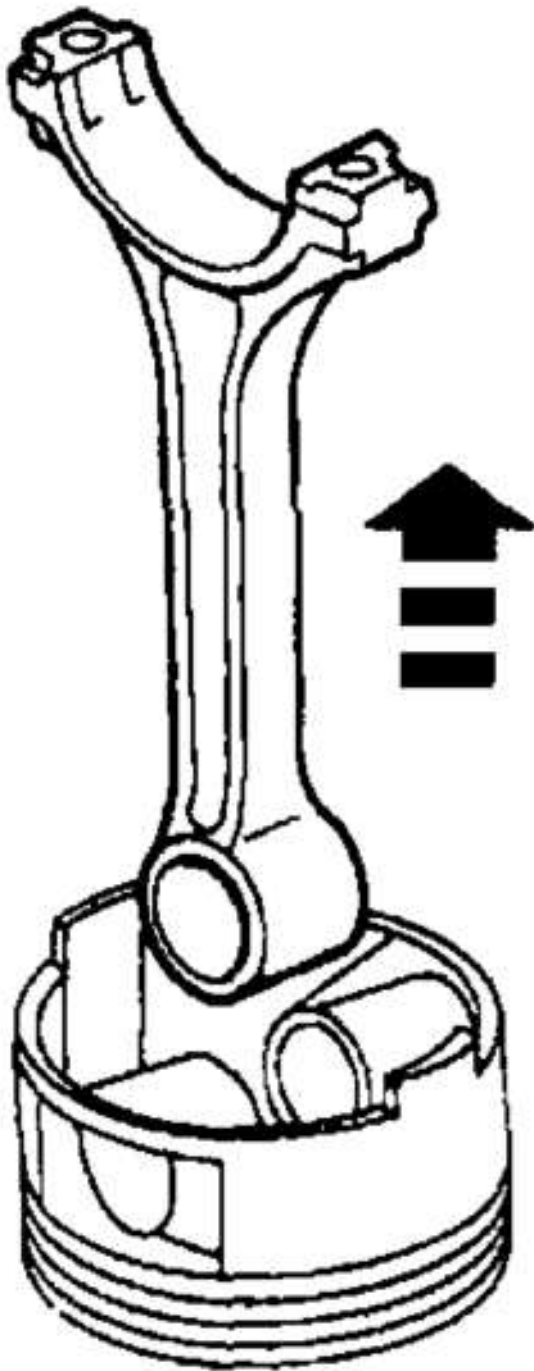
2. Remove the piston pin from the piston and connecting rod assembly.



G01544999

Fig. 475: Removing Piston Pin From Piston And Connecting Rod Assembly
Courtesy of FORD MOTOR CO.

3. Remove the connecting rod from the piston.



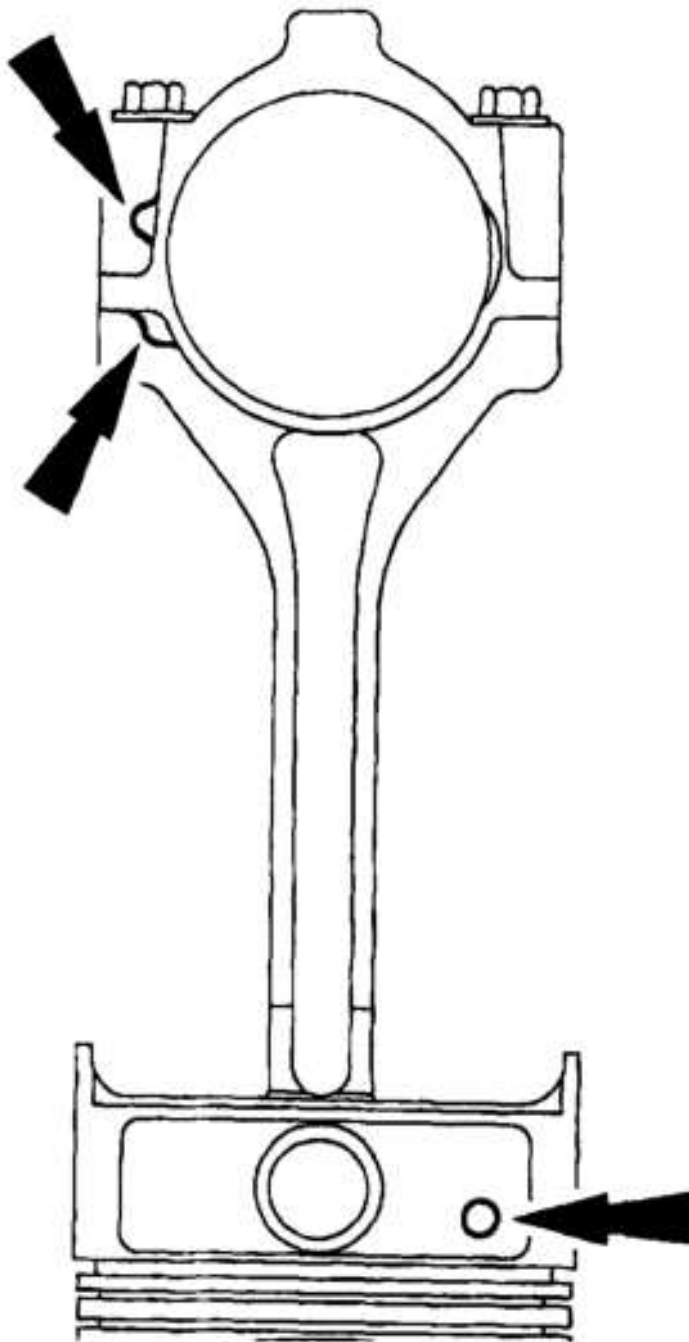
G01545000

Fig. 476: Removing Connecting Rod From Piston
Courtesy of FORD MOTOR CO.

4. Clean and inspect the piston and connecting rod. Refer to **ENGINE SYSTEM - GENERAL INFORMATION** .

Assembly

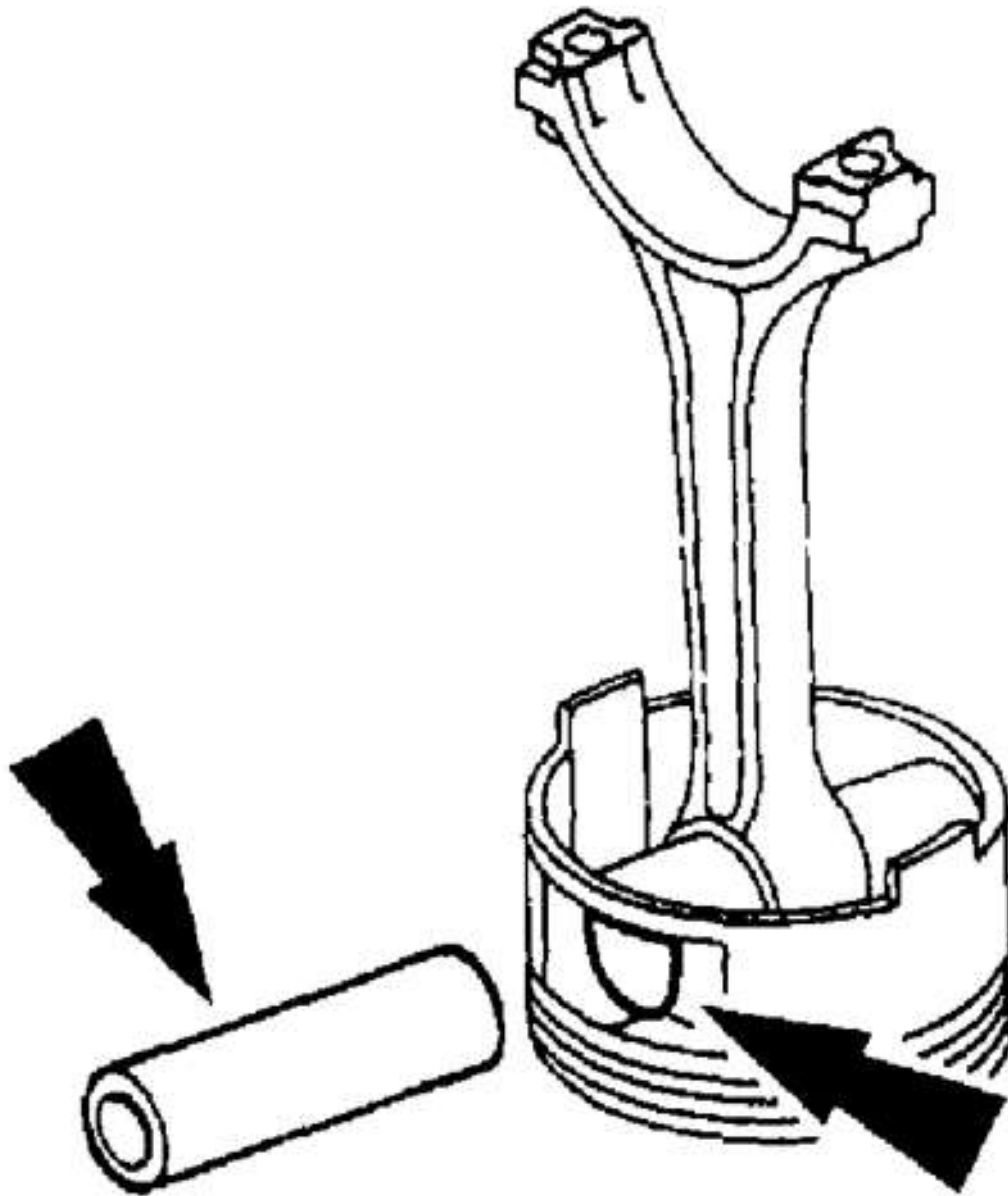
NOTE: Connecting rod must be installed into piston with identification markings toward front.



G01545001

Fig. 477: Positioning Connecting Rod In Piston
Courtesy of FORD MOTOR CO.

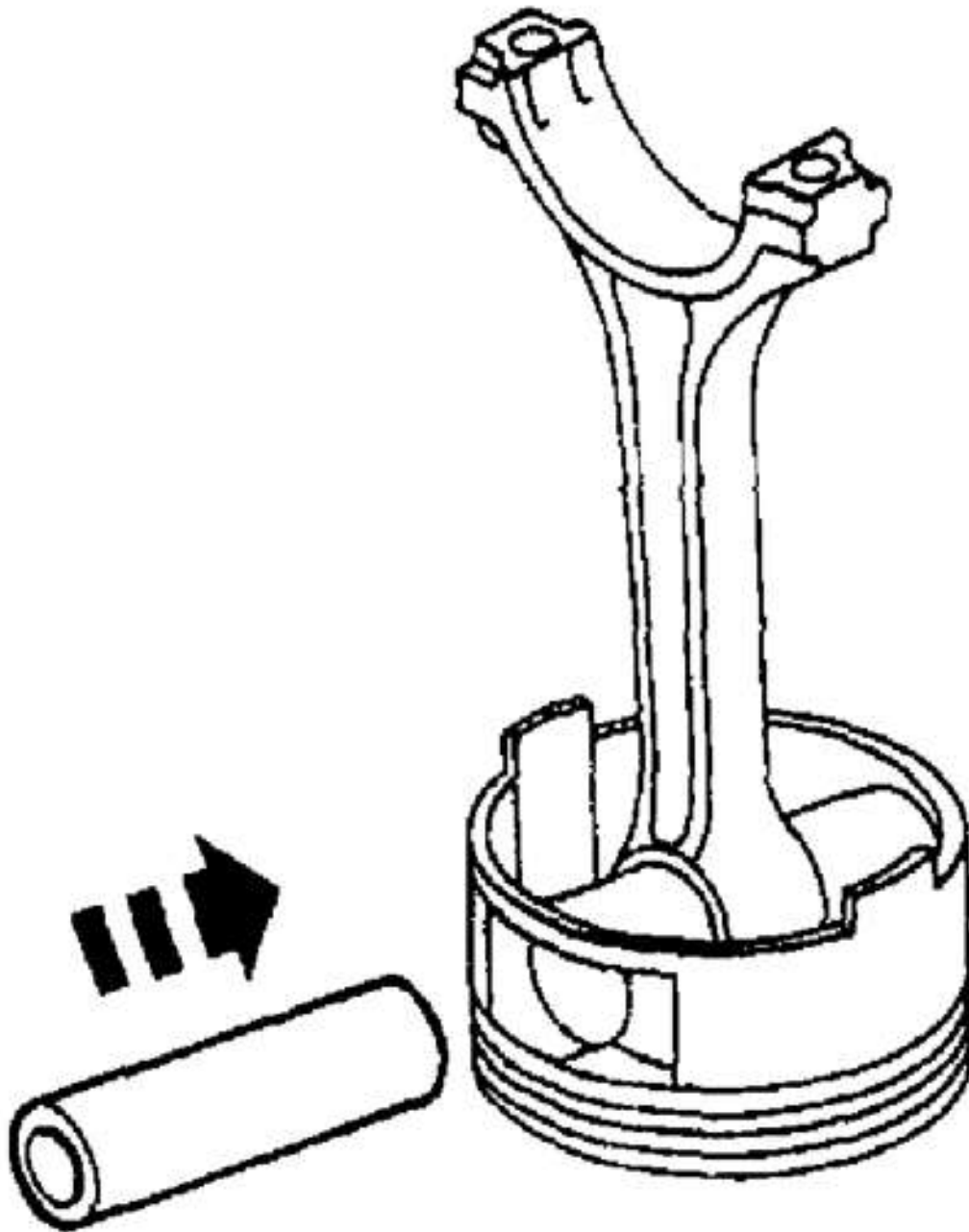
1. Position the connecting rod in the piston.
2. Lubricate the piston pin and pin bore with clean engine oil.



G01545002

Fig. 478: Lubricating Piston Pin And Pin Bore With Clean Engine Oil
Courtesy of FORD MOTOR CO.

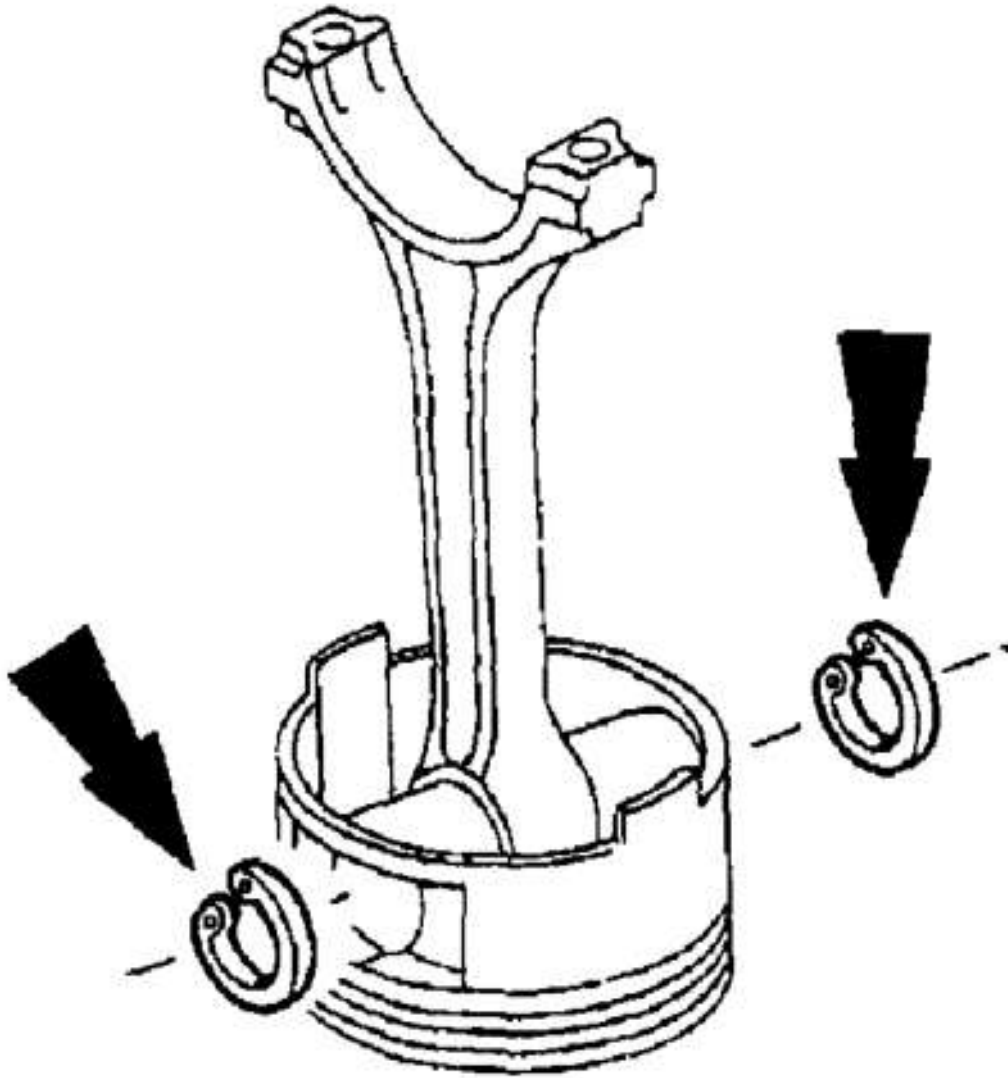
3. Install the piston pin in the piston and connecting rod assembly.



G01545003

Fig. 479: Installing Piston Pin In Piston And Connecting Rod Assembly
Courtesy of FORD MOTOR CO.

4. Install the piston pin retaining clips in the piston.



G01545004

Fig. 480: Installing Piston Pin Retaining Clips In Piston
Courtesy of FORD MOTOR CO.

INTAKE MANIFOLD ASSEMBLY

Item	Specification
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A

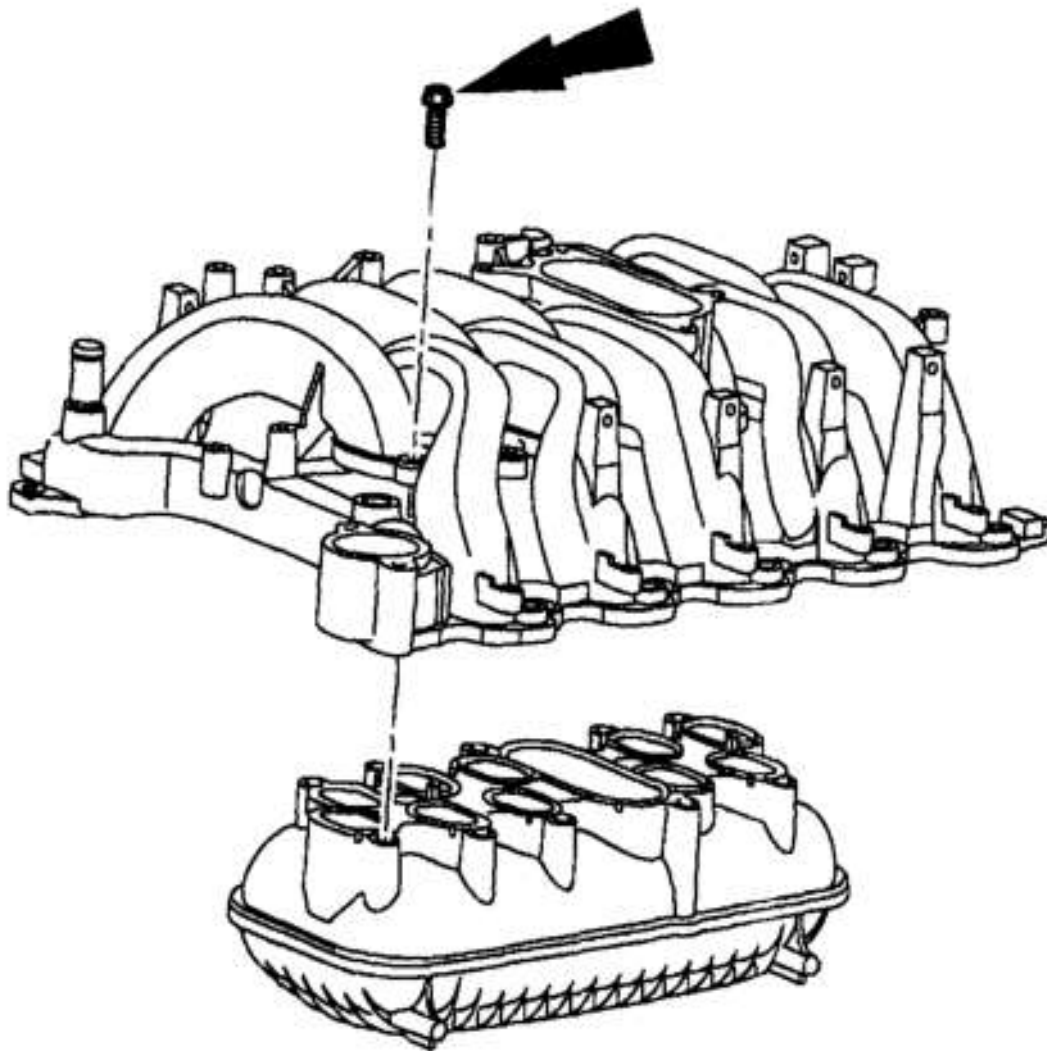
G01545005

Fig. 481: Material Specification Chart

Courtesy of FORD MOTOR CO.

Disassembly

1. Separate the upper and lower intake manifolds.
 - Remove the bolts.
 - Discard the intake manifold gasket.



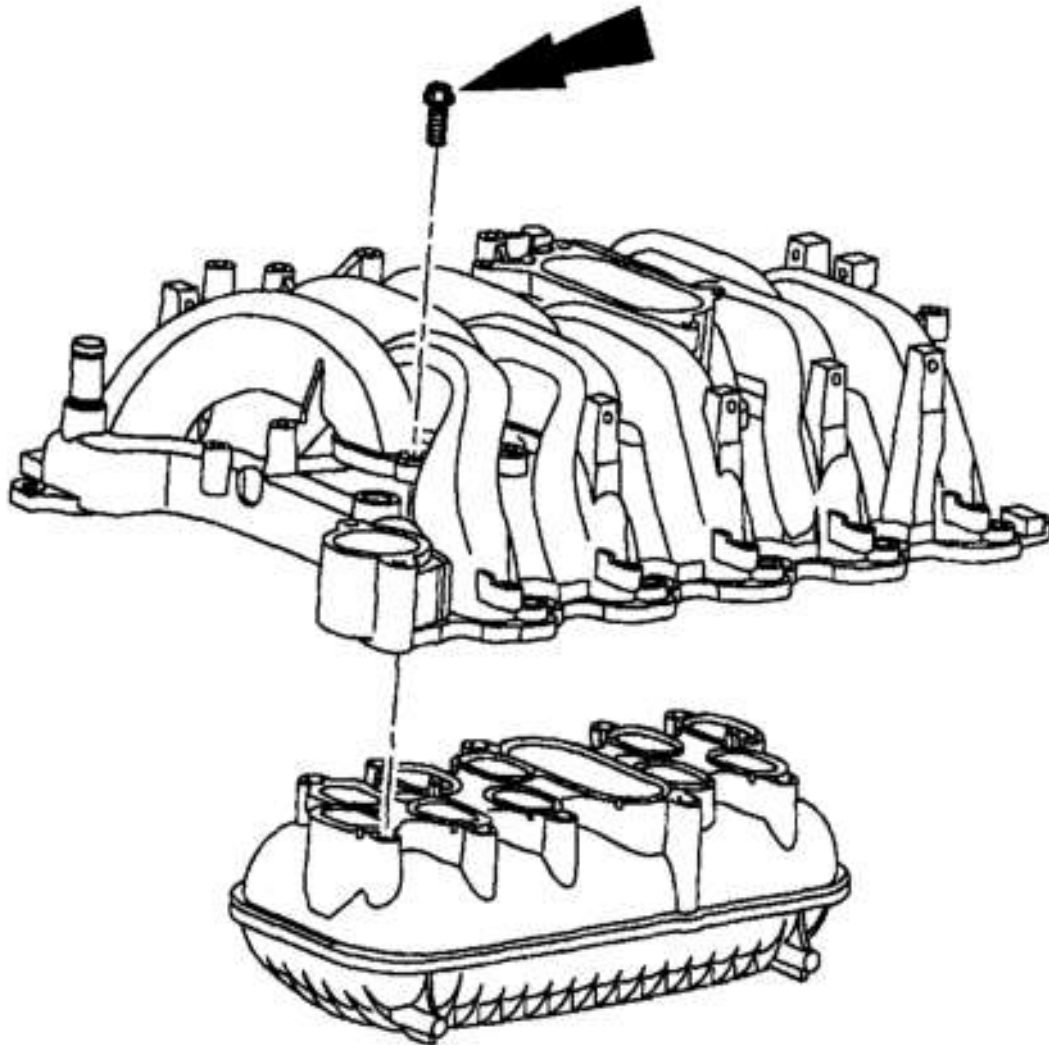
G01545006

Fig. 482: Separating Upper And Lower Intake Manifolds
Courtesy of FORD MOTOR CO.

2. Using clean metal surface cleaner, clean and inspect the upper and lower manifold internal passages and mating surfaces.
3. Allow the upper and lower intake manifolds to dry completely.

Assembly

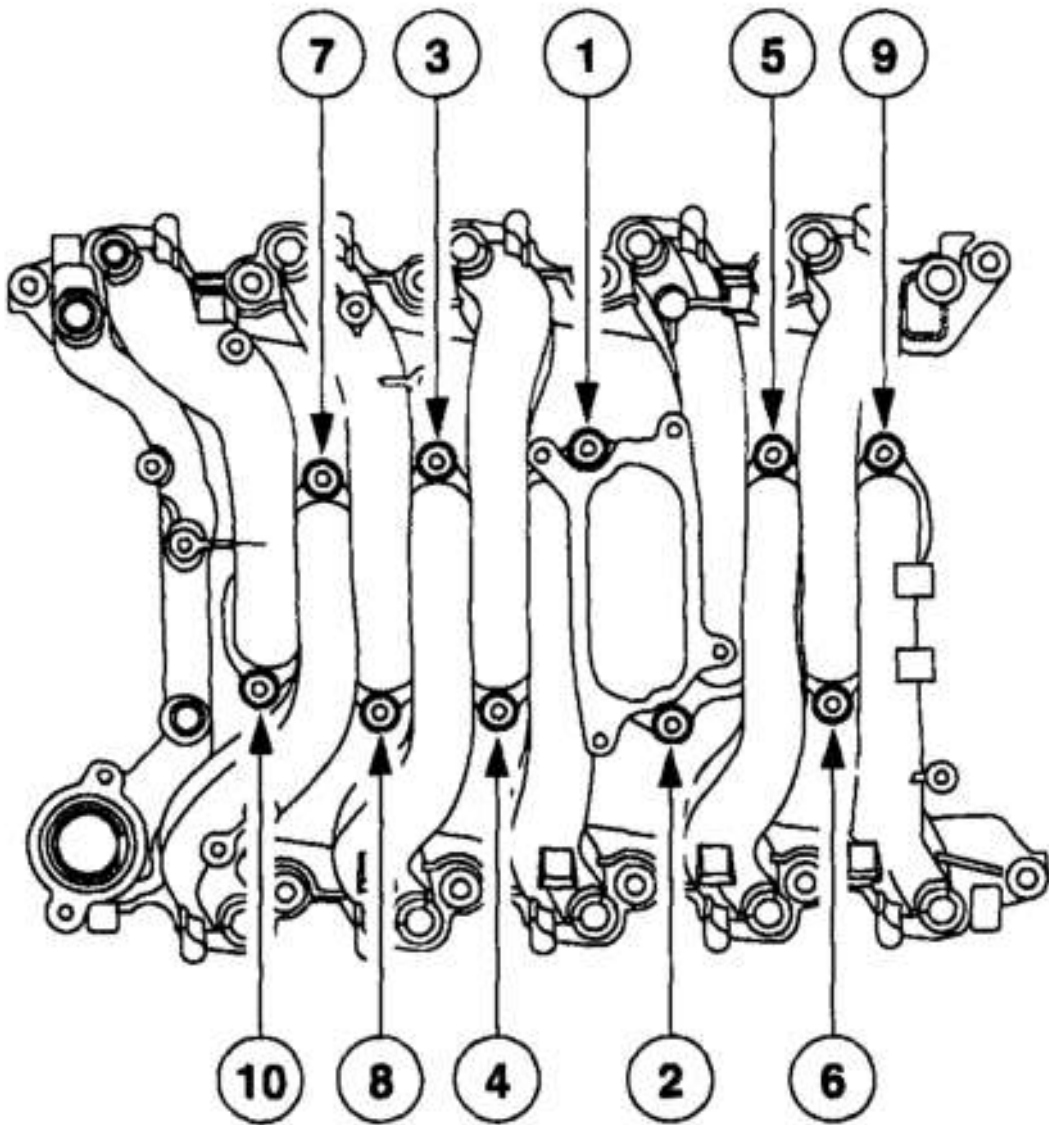
1. Position a new lower intake manifold gasket and the upper intake manifold on the lower intake manifold and loosely install the bolts.



G01545007

Fig. 483: Installing Upper And Lower Intake Manifolds
Courtesy of FORD MOTOR CO.

2. Tighten the bolts in two stages using the sequence shown.
 - Stage 1: Tighten to 2 Nm (18 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).



G01545009

Fig. 484: Identifying Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.