

FIG. 11 Valve Push Rod Removal

head and block. Install guide studs at each end of the cylinder block (Fig. 12).

2. Position the cylinder head gasket over the guide studs on the cylinder block.
3. Install a new gasket on the flange of the muffler inlet pipe.
4. Lift the cylinder head over the guides and slide it down carefully, connect the muffler inlet pipe to the exhaust manifold.
5. Install, but do not tighten two bolts at opposite ends of the head to hold the head and gasket in position. Remove the guides and install the remaining bolts.
6. The cylinder head bolts are tightened in three progressive steps. Torque all the bolts in sequence (Fig. 13) to specifications. When cylinder head bolts have been tightened following this procedure, it is not necessary to retorquing the bolts after extended operation. However, on cylinder heads with composition gaskets, the bolts may be checked and retorqued, if desired. Tighten the exhaust manifold flange attaching nuts to specification.
7. Apply Lubriplate or equivalent to both ends of the push rods. Install the push rods in the original bores, positioning the lower end of the rods into the tappet sockets. Apply Lubriplate or equivalent to the valve stem tips and to the rocker arm pads.
8. Install the valve rocker arm shaft assembly following procedures under Valve Rocker Arm Shaft Installation.  
Check the valve clearance, following the procedure outlined under Valve Clearance Adjustment.
9. Install the muffler inlet pipe lock washers and attaching nuts. Torque the nuts to specifications.
10. Connect the radiator upper hose at the coolant outlet housing.
11. Position the distributor vacuum line and the carburetor fuel inlet line on the engine. Connect the fuel line at the fuel filter using a new clamp, then connect the distributor vacuum line at the carburetor.
12. Connect the accelerator control cable bracket. Connect the transmission kickdown rod.
13. Connect the accelerator control cable retracting spring. Connect the accelerator control cable at the carburetor.
14. Connect the distributor vacuum line at the distributor. Connect the carburetor fuel inlet line at the fuel pump. Connect all vacuum components and lines using previous identification for proper connection.

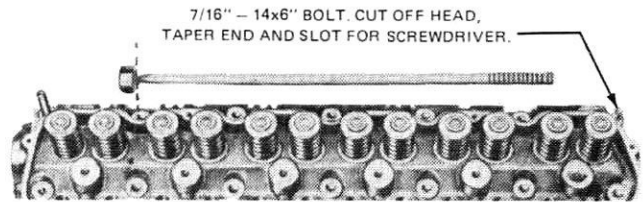


FIG. 12 Cylinder Head Guide Studs

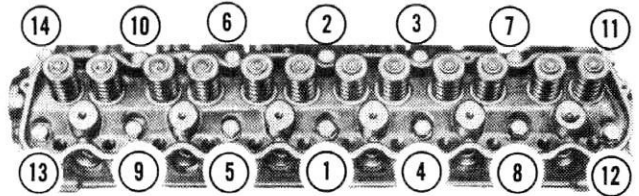


FIG. 13 Cylinder Head Bolt Torque Sequence

15. Connect the temperature sending unit wire at the sending unit. Connect the spark plug wires.
16. Fill and bleed the cooling system.
17. Install the crankcase ventilation system.
18. Install the air cleaner assembly.
19. Start the engine and check for coolant, fuel, oil and vacuum leaks.

## HYDRAULIC TAPPETS

Before replacing a hydraulic tappet for noisy operation, be sure the noise is not caused by improperly adjusted valve clearance or by worn rocker arms or push rods.

### Removal

1. Remove the cylinder head and related parts following the procedure under Cylinder Head Removal.
2. Using a magnet, remove the tappets (Fig. 14). Place the tappets in a rack so they can be installed in the original positions.

If the tappets are stuck in their bores by excessive varnish or gum, it may be necessary to use a plier-type or claw-type tool (T70L-6500-A) to remove the tappets. Rotate the tappet back and forth to loosen any gum and varnish which may have formed. **Keep the assemblies intact until they are to be cleaned.** If the tappets are to be tested or disassembled and cleaned, follow the procedures in Part 21-01. If a hydraulic tappet has been disassembled and cleaned, **be sure to fill it with test fluid before installing it in the engine.** New tappets already contain test fluid.

### Installation

1. Install new (or cleaned) hydraulic tappets through the push rod openings with a magnet (Fig. 14).
2. Install the cylinder head and related parts.

## EXHAUST MANIFOLD

### Removal

1. Remove the air cleaner assembly and related parts. Disconnect the muffler inlet pipe from the exhaust manifold, and remove the automatic choke hot air tube.
2. Remove or disconnect the EGR tube and all other emission components that interfere with the removal of the exhaust manifold.
3. Bend the exhaust manifold attaching bolt lock tabs back and remove the bolts. Remove the exhaust manifold.

### Installation

1. Clean the mating surfaces of the exhaust manifold and cylinder head. Scrape the gasket material from the mounting flange of the exhaust manifold and muffler inlet pipe.
2. Position the exhaust manifold on the cylinder head and install the attaching bolts and tab washers. Torque the bolts and studs in sequence shown in Fig. 15. Refer to specifications.

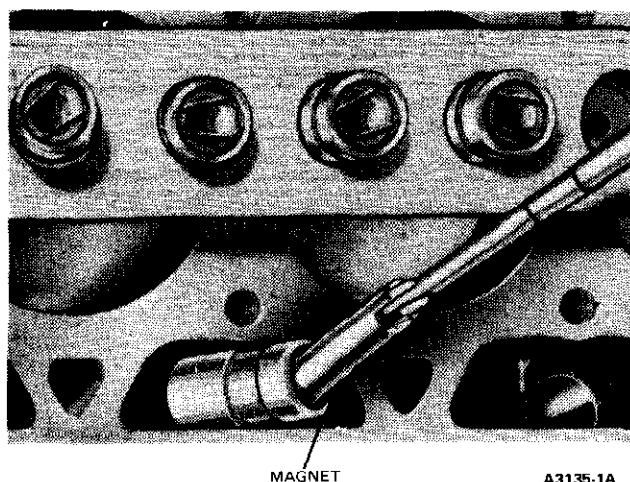


FIG. 14 Removing Hydraulic Tappets

3. Place a new gasket on the muffler inlet pipe. Position the muffler inlet pipe to the manifold. Install and torque the attaching nuts to specifications. Install the automatic choke hot air tube.
4. Install or connect the emission components previously disconnected.
5. Install the air cleaner assembly and related parts. Start the engine and check for exhaust leaks.

## WATER PUMP

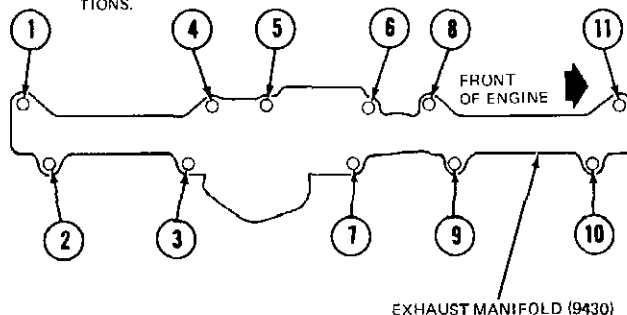
### Removal

1. Drain the cooling system. Remove the Thermactor pump, power steering and air conditioner drive belts, if so equipped.
2. Disconnect the radiator lower hose at the water pump. Remove the drive belt, fan, or fan and drive clutch, and water pump pulley.
3. Disconnect the heater hose at the water pump.
4. Remove the water pump.

### Installation

1. If a new water pump is to be installed, remove the heater hose fitting from the old pump and install it on the new pump. Clean the gasket surfaces on the water pump and cylinder block. **The 4.1L (250 CID) I-6 uses a one piece gasket for the cylinder front cover and water pump. Trim away the old gasket at the edge of the cylinder front cover. Use a water pump service gasket to replace it.**
2. Coat the new gasket on both sides with water-resistant sealer and position it on the cylinder block.
3. Position the water pump and install the lockwashers and attaching bolts (the alternator adjusting arm is secured by one water pump bolt). Torque the bolts to specifications.
4. Connect the radiator lower hose and the heater hose to the water pump.
5. Install the water pump pulley and fan. Torque the bolts evenly and alternately to specifications.
6. Install the Thermactor pump, power steering and air conditioner drive belts, if so equipped and adjust the tension to specifications.

INSTRUCTIONS:  
 INSTALL 3/8-16 STUD & WASHER ASSEMBLY - HOLES NUMBERED 4 & 5  
 TORQUE TO SPECIFICATIONS.  
 3/8-16 X 2.62 BOLT - HOLES 3-6-7-8 TORQUE TO SPECIFICATIONS.  
 3/8-16 X 1.12 BOLT - HOLES 1-2-9-10-11 TORQUE TO SPECIFICATIONS.



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FIG. 15 Torque Sequence—Exhaust Manifold

7. Fill and bleed the cooling system. Operate the engine until normal operating temperature is reached. Check for leaks and check the coolant level.

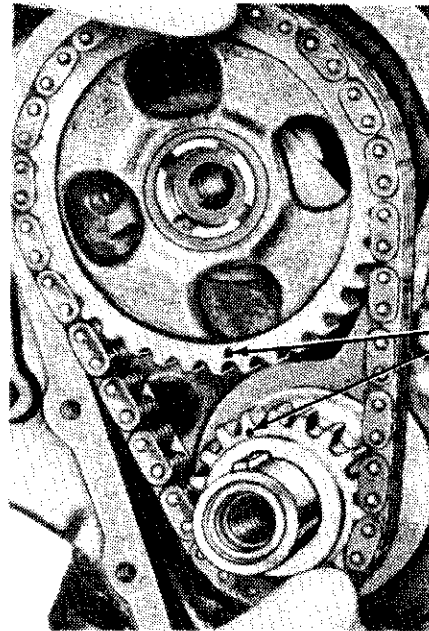
## CYLINDER FRONT COVER AND TIMING CHAIN

### Removal

1. Drain the cooling system and the crankcase. Disconnect the radiator upper hose at the coolant outlet housing and the radiator lower hose at the water pump. On a vehicle with automatic transmission, disconnect the transmission oil cooler lines from the radiator.
2. Remove the radiator. Remove the drive belt, fan and pulley. On a vehicle with air conditioning, remove the condenser attaching bolts and position the condenser forward. **Do not disconnect the refrigerant lines.** Remove the compressor drive belt. If so equipped, remove the accessory drive pulley. Using Tool T-58P-6316-B, remove the crankshaft damper.
3. On a 3.3L (200 CID) I-6 engine, remove the cylinder front cover attaching screws from the cover and from the oil pan. Pry the top of the front cover away from the block slightly and, using a thin bladed knife, cut the oil pan gasket flush with the front face of the cylinder block.
4. On a 4.1L (250 CID) I-6 engine, remove the oil pan following instructions under Oil Pan Removal. Remove the cylinder front cover.
5. Clean any gasket material from the surfaces.
6. Check timing chain deflection following the procedures given in Part 21-01. If the deflection exceeds specification, replace the timing chain and sprockets.
7. Crank the engine until the timing marks are aligned as shown in Fig. 16. Remove the camshaft sprocket attaching bolt and washer. Slide both sprockets and timing chain forward and remove them as an assembly (Fig. 17).

### Installation

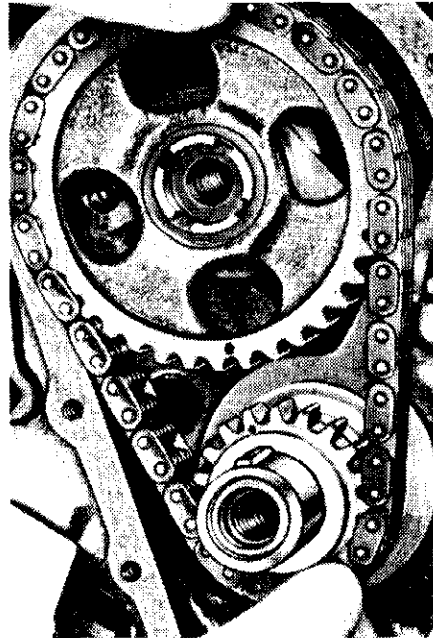
1. Clean and inspect all parts before installation. Oil the timing chain after installing it on the camshaft and crankshaft. Be sure the timing marks on the sprockets are positioned as shown in Fig. 16. Install the camshaft sprocket attaching bolt and washer. Torque the bolt to specifications.
2. Apply oil-resistant sealer to a new cylinder front cover gasket and position the gasket on the cylinder front cover. Apply sealer to the exposed area of the gasket. **On a 3.3L (200 CID) I-6 engine,** coat the gasket surface of the oil pan with oil resistant sealer. Cut and position the required portions of a new gasket on the oil pan. Apply sealer to the exposed areas of the gasket, including the corners where they contact the front cover gasket. **On a 4.1L (250 CID) I-6 engine, install the timing chain snubber in the front cover (Fig. 18).**
3. Install the cylinder front cover using the tool shown in Fig. 19. **On a 4.1L (250 CID) I-6**



TIMING MARKS

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FIG. 16 Aligning Timing Marks



A2792-1B

FIG. 17 Timing Chain and Sprockets Removal

**engine,** no adjustment is needed on the chain snubber (Fig. 18) as this is automatically obtained during front cover alignment. Torque the attaching bolts to specifications.

4. Lubricate the hub of the crankshaft damper with Lubriplate or equivalent to prevent damage to the seal during installation or initial engine start. Using Tool T52L-6306-AEE, install the crankshaft damper. Torque the attaching bolt to specifications.
5. On a 4.1L (250 CID) I-6 engine, install the oil pan and related parts, following the instructions under Oil Pan Installation.
6. Install the fan, pulley and drive belt. Adjust the drive belt.
7. Install the radiator. Connect the radiator upper and lower hoses. **Refill the crankcase with the**

**proper grade and quantity of engine oil before starting the engine.**

8. Fill and bleed the cooling system.
9. Start the engine. Operate the engine at fast idle and check all hose connections and gaskets for leaks.

## FRONT OIL SEAL

### Removal

1. Remove the cylinder front cover.
2. Drive out the oil seal with a pin punch. Clean the recess in the cover.

### Installation

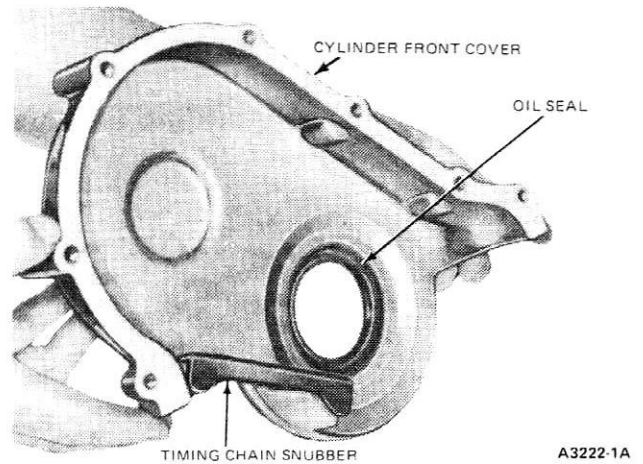
1. Coat a new seal with grease and install the seal. Drive the seal in until it is fully seated in the recess (Fig. 20). Check the seal after installation to be sure the spring is properly positioned in the seal.
2. Replace the cylinder front cover.

## CAMSHAFT

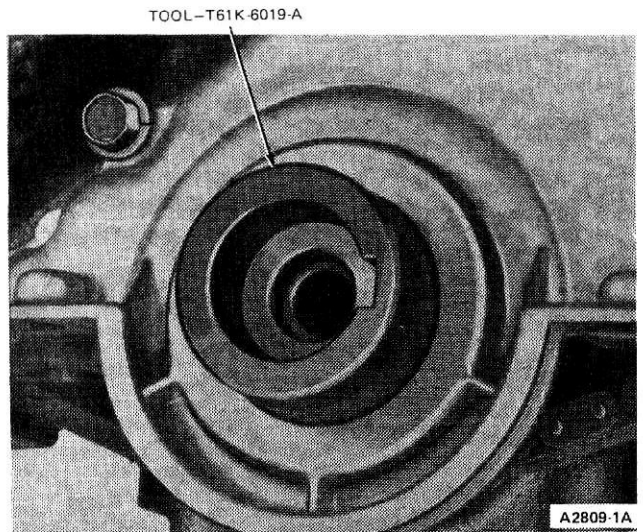
The camshaft and related parts are shown in Fig. 21.

### Removal

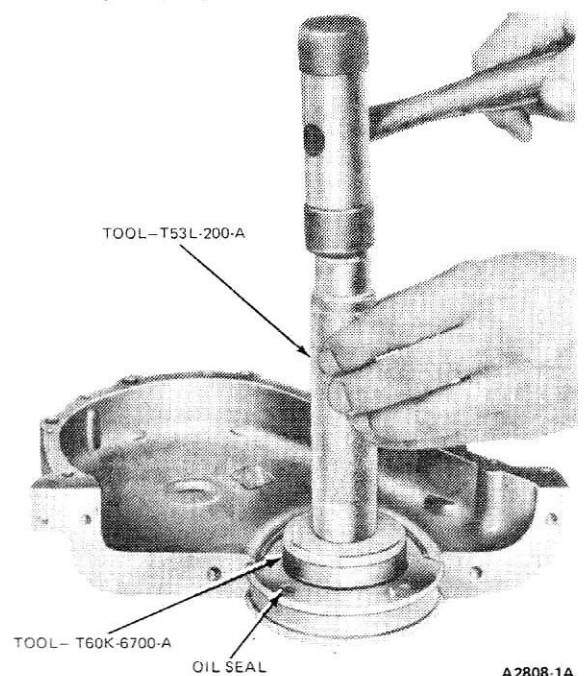
1. Drain the cooling system and the crankcase. Remove the air cleaner assembly.
2. Disconnect the radiator hoses from the coolant outlet housing and the water pump. Remove the radiator. Remove the grille. On a vehicle with air conditioning, remove the condenser attaching bolts, and position the condenser to one side. **Do not disconnect the condenser refrigerant lines.**
3. Disconnect the accelerator control cable from the carburetor and from the bracket. Disconnect the bracket from the carburetor.
4. Disconnect the fuel inlet line at the fuel filter, and the vacuum hoses and connectors that are connected to the cylinder head directly or indirectly line from the carburetor.
5. Disconnect the muffler inlet pipe from the exhaust manifold. Pull the muffler inlet pipe down. Remove the gasket.
6. Disconnect the carburetor fuel inlet line from the fuel pump.
7. Disconnect the spark plug wires from the spark plugs and the coil high tension lead at the coil.
8. Disconnect the engine temperature sending unit wire from the sending unit. Disconnect the flexible fuel line from the fuel pump line and plug the line. Remove the distributor, the fuel pump, and the oil filter.
9. Remove the crankcase vent hose, regulator valve, valve rocker arm cover and cylinder head by following steps 8 thru 11 under Cylinder Head Removal.
10. Using a magnet, remove the hydraulic tappets and keep them in order so that they can be installed in their original locations (Fig. 14). If the tappets are stuck in the bores by excessive varnish, etc., it may be necessary to use a claw-type tool to remove them.



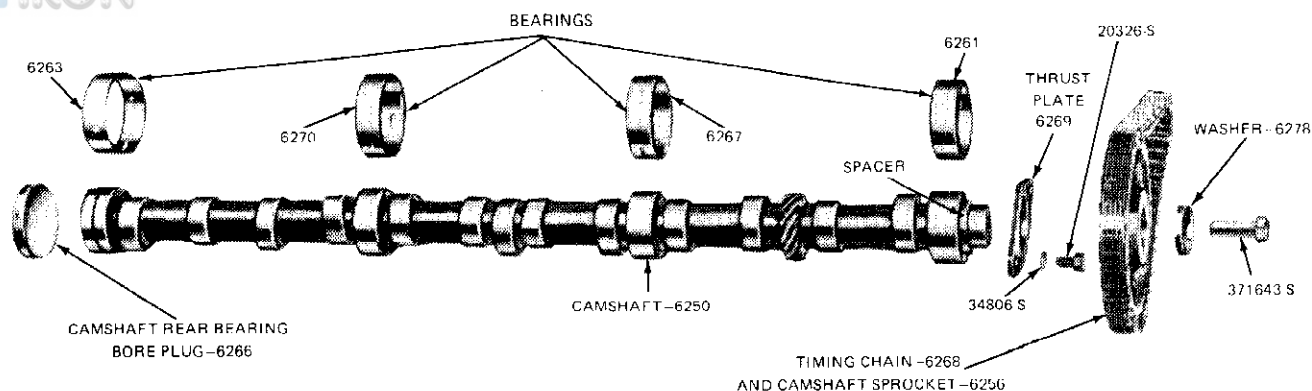
**FIG. 18 Timing Chain Snubber Installation—4.1L (250 CID) I-6**



**FIG. 19 Aligning Cylinder Front Cover**



**FIG. 20 Crankshaft Front Oil Seal Replacement**



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**FIG. 21 Camshaft and Related Parts**

- Loosen and remove the drive belt, fan and pulley. Remove the crankshaft damper using Tool T58P-6316-B.
- Remove the oil level dipstick. Remove the oil pan on 4.1L (250 CID) only, following instructions under Oil Pan Removal. Remove the oil pump and inlet tube assembly.
- Remove the cylinder front cover and gasket.
- Check camshaft end play as detailed in Part 21-01. If the end play is excessive, replace the thrust plate.
- Remove the timing chain and sprockets as detailed under Cylinder Front Cover and Timing Chain Removal.
- Remove the camshaft thrust plate. Carefully remove the camshaft by pulling it toward the front of the engine. **Use caution to avoid damaging the journals and lobes.**
- Dip the base of each hydraulic tappet body in lubriplate or equivalent, or lubricate tappets or tappet bores with heavy oil SE before installation. Install the tappets in their original bores.
- Install the cylinder head, push rods and the valve rocker arm shaft assembly by following the procedure under Cylinder Head Installation.
- Using a new gasket, install the fuel pump and connect the flexible fuel line. Install a new oil filter.
- Position the No. 1 piston at TDC after the compression stroke. Position the distributor in the block with the rotor at the No. 1 firing position. Install the distributor hold-down clamp.
- Connect the engine temperature sending unit wire. Connect the coil primary wire. Install the distributor cap. Connect the spark plug wires and the coil high tension lead.
- Install the carburetor fuel inlet line, using a new clamp on the filter tubing. Connect the distributor vacuum line to the carburetor.
- On a vehicle with air conditioning, position the condenser and install the attaching bolts. Install the radiator and connect the radiator upper and lower hoses and the coolant expansion bottle system reservoir.
- Connect the accelerator retracting spring. Connect the accelerator control cable at the carburetor.
- Fill the cooling system. (See Part 27-01.) Fill the crankcase with an approved weight and grade of engine oil.
- Install air cleaner assembly.
- Start the engine and check and adjust the ignition timing. Connect the distributor vacuum line to the distributor. Check for coolant, oil, fuel and vacuum leaks. Adjust the engine idle speed and the idle fuel mixture.

**Installation**

- Clean the oil passage at the rear of the cylinder block that feeds the rocker arm shaft by blowing compressed air into the opening in the block. Camshaft lobes are to be coated with Lubriplate or equivalent and the journals lubricated with heavy oil SE before installation. Carefully slide the camshaft through the bearings.
- Install the thrust plate with the oil groove toward the rear of the engine and torque the attaching bolts to specifications. Replace the crankshaft front oil seal.
- Install the sprockets and timing chain, cylinder front cover and crankshaft damper as detailed under Cylinder Front Cover and Timing Chain Installation.
- Clean the oil pump inlet tube screen, oil pan, and block gasket surfaces. Prime the oil pump by filling the inlet opening with oil and rotate the pump shaft until oil emerges from the outlet opening. Install the pump inlet tube. Install the oil pump and oil pan. Install the oil level dipstick.
- Install the fan, fan pulley and drive belt. Adjust the belt tension. Install the radiator and the grille.

**FLYWHEEL****Removal**

- On a manual-shift transmission, remove the transmission, clutch pressure plate and disc, following the procedures in Volume One. Group 16—Clutch. Do not drain the transmission.