

**ASSEMBLY**

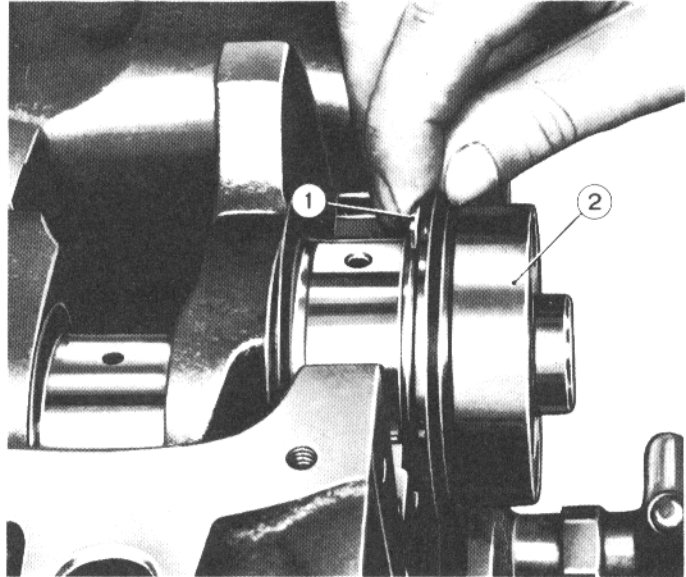
Install cylinder block on workstand.

After thorough lubrication with clean engine oil, put main bearing inserts into position and install crankshaft (2).

**NOTE:** Before and during installation of crankshaft refer to Crankshaft and Flywheel for procedures and inspections.

The two thrust ring halves (1) are positioned at the flywheel and saddle bore. Thrust rings may be installed before or after mounting crankshaft.

- 1. Thrust ring half
- 2. Crankshaft

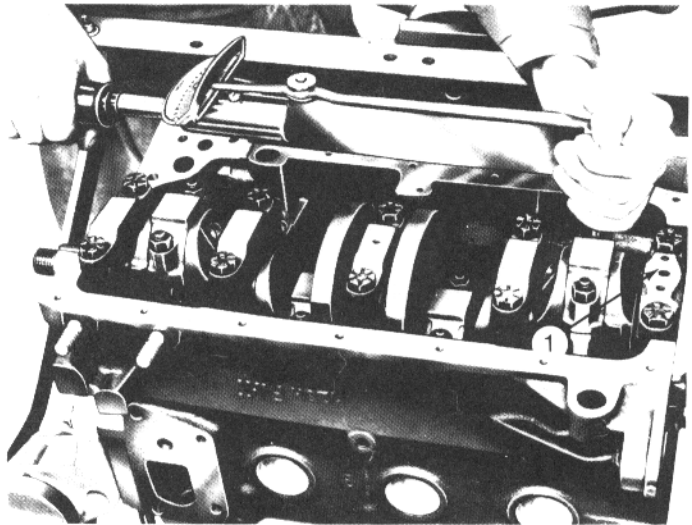


Install main bearing caps (1) and lubricated inserts.

Make sure caps are installed at proper location. Cap without notch is at timing gear end of crankcase, then cap with one notch, etc.

Torque cap bolts to 59 ft. lbs. (8.2 kgm).

- 1. Main bearing caps

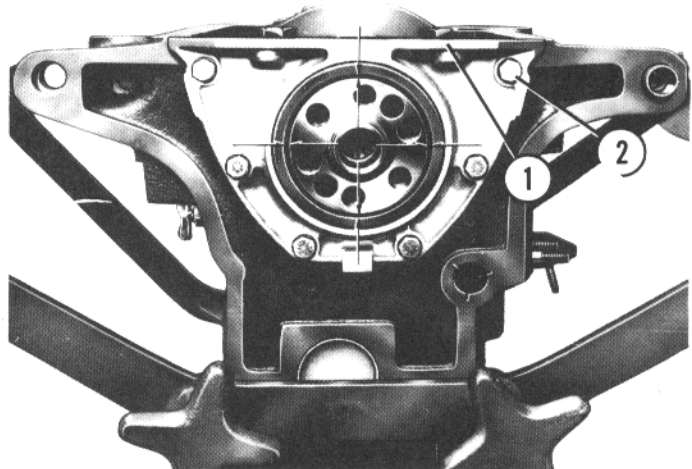


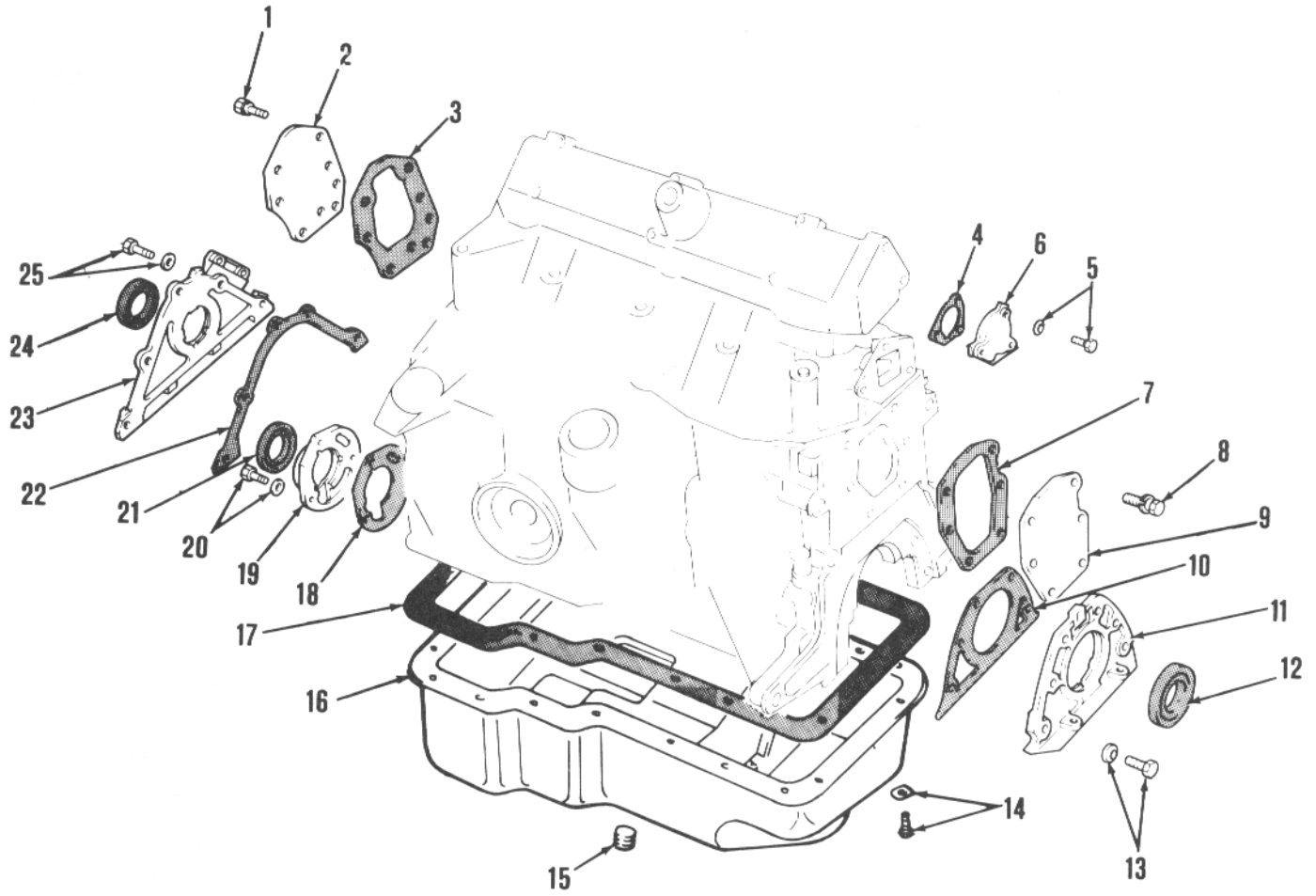
Install new seal and gasket on flywheel end cover plate (1).

Install cover/seal to crankcase with six bolts (2) and lock-washers.

**NOTE:** Arrows in illustration indicate that with cover installed, the distance between cover seal and crankshaft should be equal all around.

- 1. Flywheel end cover plate
- 2. Bolt





- 1. Bolt and lockwasher
- 2. Water jacket cover plate
- 3. Gasket
- 4. Gasket
- 5. Bolt and lockwasher
- 6. Cover plate
- 7. Gasket
- 8. Bolt and lockwasher
- 9. Water jacket cover plate

- 10. Gasket
- 11. Flywheel end cover plate
- 12. Oil seal
- 13. Bolt and lockwasher
- 14. Bolt and lockwasher
- 15. Oil drain plug
- 16. Oil sump
- 17. Gasket

- 18. Gasket
- 19. Auxiliary shaft lockplate
- 20. Bolt and lockwasher
- 21. Oil seal
- 22. Gasket
- 23. Timing gear end cover plate
- 24. Oil seal
- 25. Bolt and lockwasher

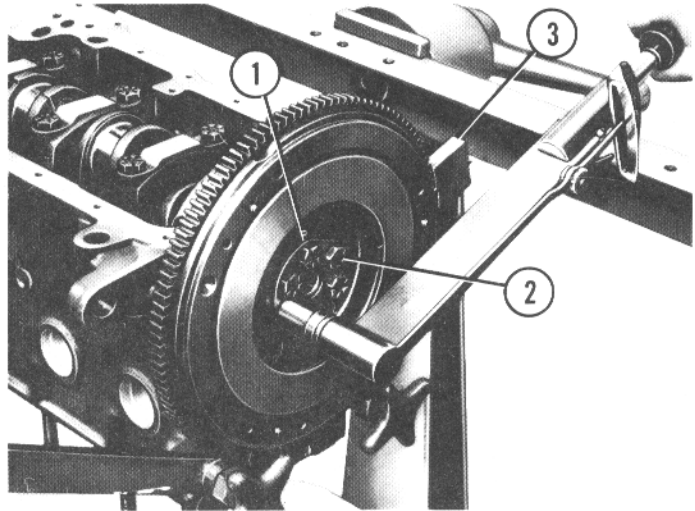
## GASKETS AND SEALS

Secure flywheel to crankshaft with washer plate (1) and six bolts (2).

Lock crankshaft against turning with tool A.60640 (3).

Torque bolts to 61 ft. lbs. (8.5 kgm).

1. Washer plate 2. Bolt 3. Tool A.60640

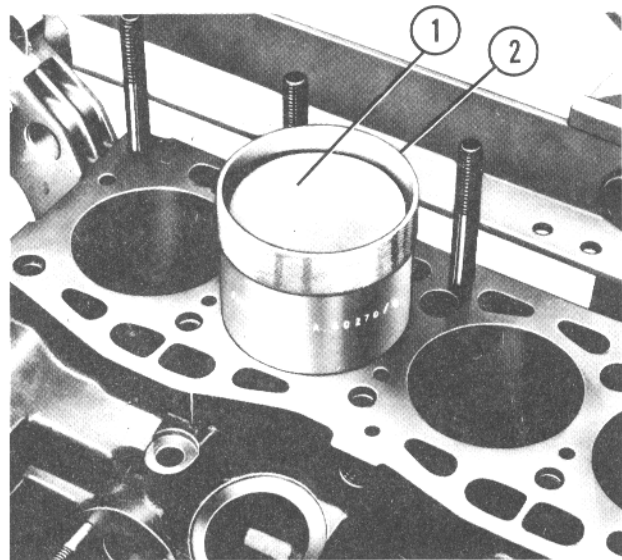


After lubricating pistons (1) and cylinder bores with clean engine oil, install connecting rod-piston assemblies in cylinder bores using appropriate piston ring compressor (2).

**NOTE:** Before and during installation of connecting rod-piston assemblies, refer to **CONNECTING RODS AND PISTONS** for procedures and inspections.

Install assemblies in the proper cylinder, according to number stamped on connecting rods and caps. When installation is complete these numbers should face away from auxiliary shaft.

1. Piston 2. Piston ring compressor

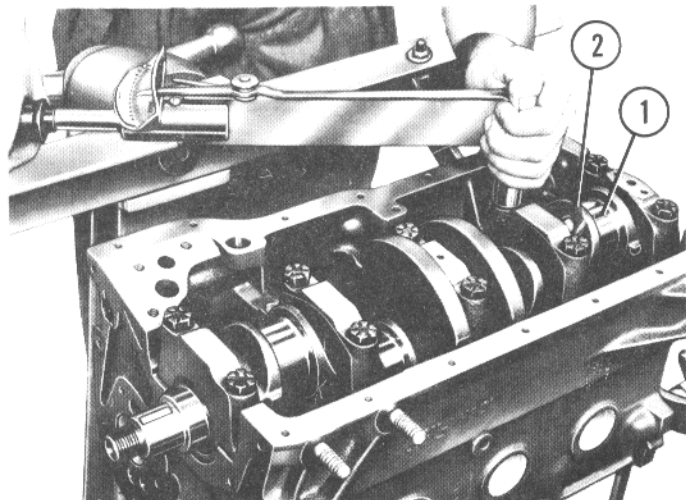


Lubricate bearings and crankpins with clean engine oil.

Attach connecting rods/bearings to crankpins.

Install end caps/bearings (1) and torque nuts (2) to 38 ft. lbs. (5.2 kgm).

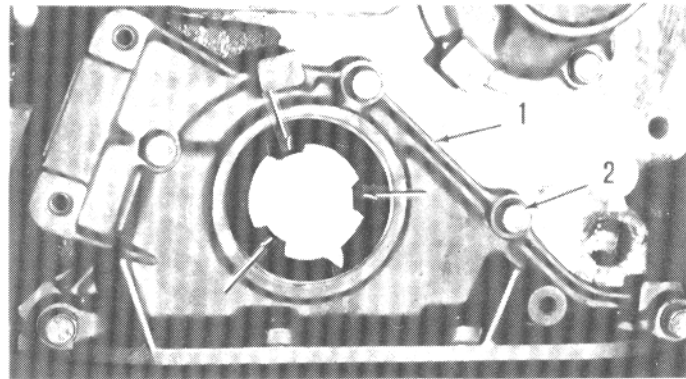
1. Connecting rod end caps 2. Nut



Install new seal and gasket on timing gear end cover plate (1).  
Install cover/seal to crankcase with five bolts (2) and lock-washers.

**NOTE:** Arrows in illustration point to references for controlling centering with respect to crankshaft.

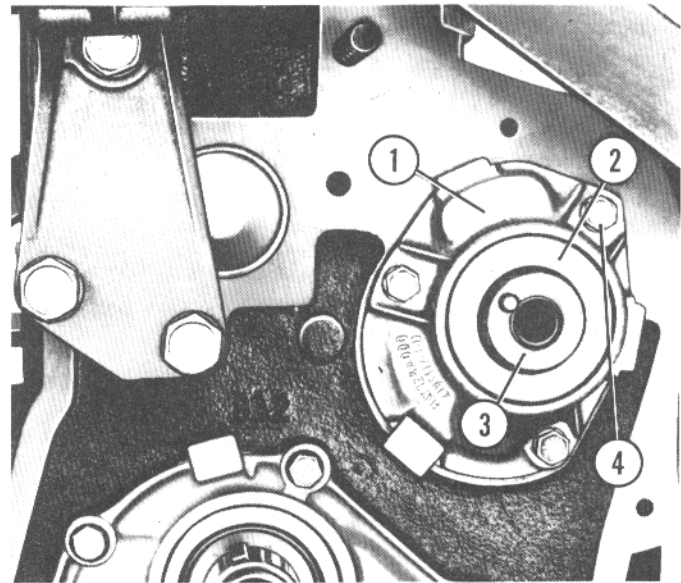
1. Timing gear end cover plate 2. Bolt



Lubricate bushings for auxiliary shaft (3) with clean oil, install shaft. Secure shaft in place with three bolts (4), lockwashers, lockplate (1), new seal (2) and gasket.

Install auxiliary shaft sprocket with bolt and washer, do not torque fully at this time.

1. Lockplate 2. Seal 3. Auxiliary shaft 4. Bolt



Install oil pump (1) and gasket. Before final tightening of bolts (5), install oil pump and distributor drive gear, coupling it to gear on auxiliary shaft.

Temporarily fit distributor (3) into crankcase.

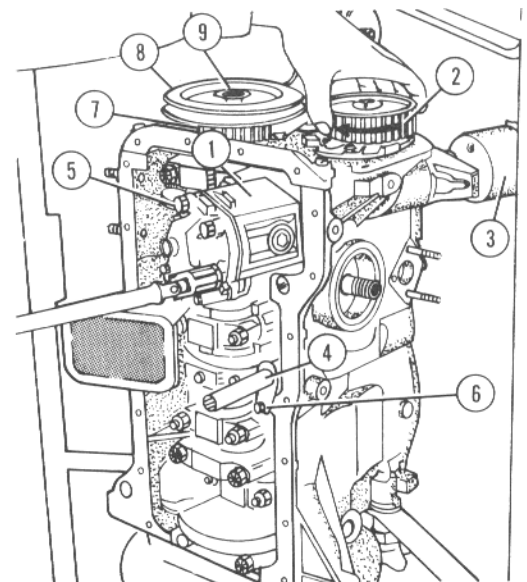
While using sprocket (2) to rotate auxiliary shaft, secure oil pump by tightening the three bolts alternately.

**NOTE:** If auxiliary shaft binds or crawls during rotation, loosen pump and repeat operation.

Install oil return pipe (4) with one bolt (6) and lockwasher.

Install timing belt drive sprocket (7) and generator drive pulley (8). Install pulley nut (9), and with flywheel blocked, torque nut to 101 ft. lbs. (14 kgm).

1. Oil pump 2. Auxiliary shaft sprocket 3. Ignition distributor  
4. Oil return pipe 5. Bolt 6. Bolt 7. Timing belt drive sprocket  
8. Generator drive pulley 9. Pulley nut



Install oil sump and gasket with twenty bolts and lockwashers.  
 Install cylinder head gasket, making sure that word "ALTO" is facing up.

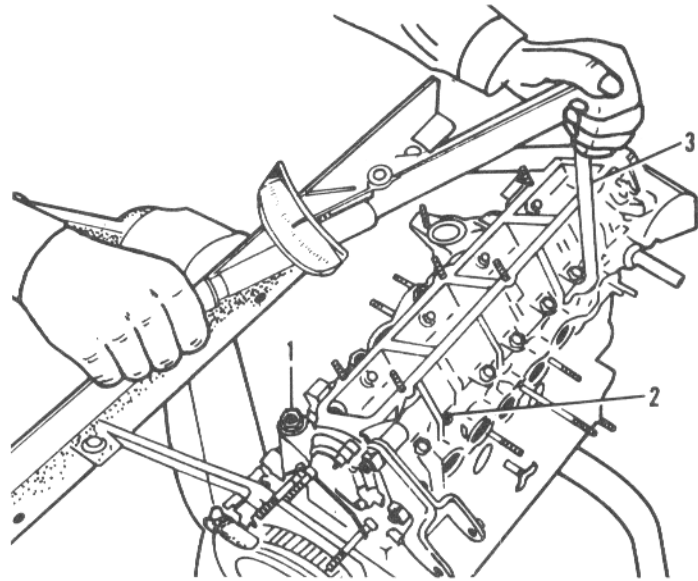
Install head assembly complete with valves, springs, and camshaft bearing assembly.

**NOTE:** Before and during cylinder head installation refer to CRANKCASE AND CYLINDER HEAD Section for procedures and inspections.

On vehicles with 19 mm hex nuts and bolts, install five bolts (1), and nuts (2), and flat washers.

Gradually tighten in sequence shown and in at least two stages. Final torque will be 69 ft. lbs. (9.5 kgm).

Special wrench A.50131 (3) is required for intake side nuts.



1. Bolt 2. Nut 3. Wrench A.50131

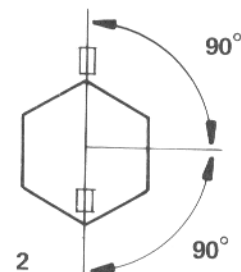
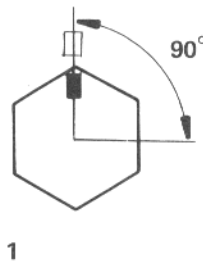
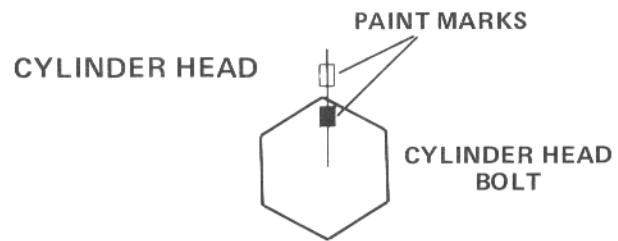
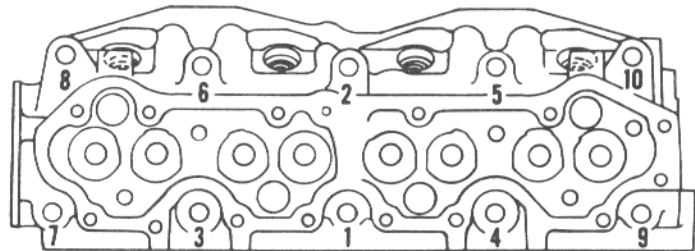
On vehicles with 17 mm hex bolts, torque the bolts as follows:

- Lubricate all head bolts and washers with SAE 30 engine oil. Let excess oil drop from bolts and washers for 30 minutes.

**NOTE:** In the next steps tighten and torque cylinder head bolts in sequence as shown.

- Using wrenches A.50172, torque all cylinder head bolts to 14.5 ft. lbs. (2 kgm).
- Retorque all cylinder head bolts to 29 ft. lbs. (5 kgm).
- Apply paint marks to one corner of all the head bolts and a corresponding mark to the cylinder head.
- Using wrenches A.50172, tighten all head bolts to a 90° angle (1).
- Retighten all head bolts to a second 90° angle (2).

**NOTE:** All cylinder head bolts must have been tightened a total of 180° in two separate stages.



Install belt guards (17 and 18).

Install camshaft sprocket (14) with bolt (11) and washer.

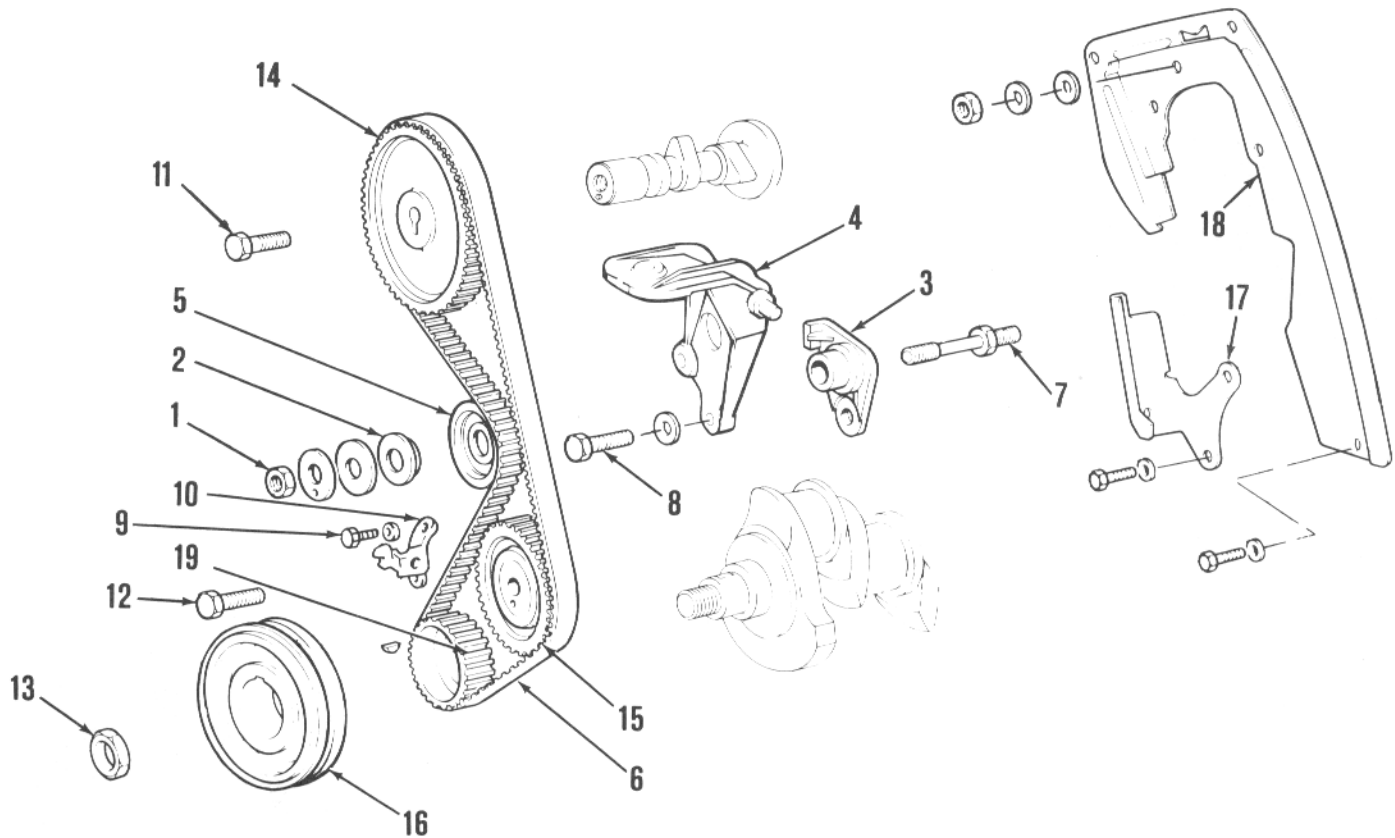
Install right engine mount (4) with three bolts (8) and lockwashers.

Install spring tensioner in its seat in mount.

Install tensioner pulley support stud (7) and bracket (3) to crankcase.

Install tensioner pulley (5) to bracket and lock it temporarily with nut (1), washers and spacer (2).

Install timing indicator (10) with two bolts (9) and lockwashers.



- 1. Nut
- 2. Spacer
- 3. Tensioner support bracket
- 4. Right engine mount
- 5. Tensioner pulley

- 6. Timing belt
- 7. Stud
- 8. Bolt
- 9. Bolt
- 10. Timing indicator

- 11. Bolt
- 12. Bolt
- 13. Nut
- 14. Camshaft sprocket
- 15. Auxiliary shaft sprocket

- 16. Drive pulley
- 17. Belt shield
- 18. Belt shield
- 19. Belt drive sprocket

Crank engine with tool A.50459 until crankshaft pulley mark (3) is aligned with TDC timing mark (7).

Position camshaft sprocket so that marks (1) and (2) are aligned.

**NOTE:** Auxiliary shaft sprocket (8) does not have to be aligned.

Move idler pulley in direction of arrow as far as possible and secure in place with nut.

Install timing belt (9) with slack on tensioner side.

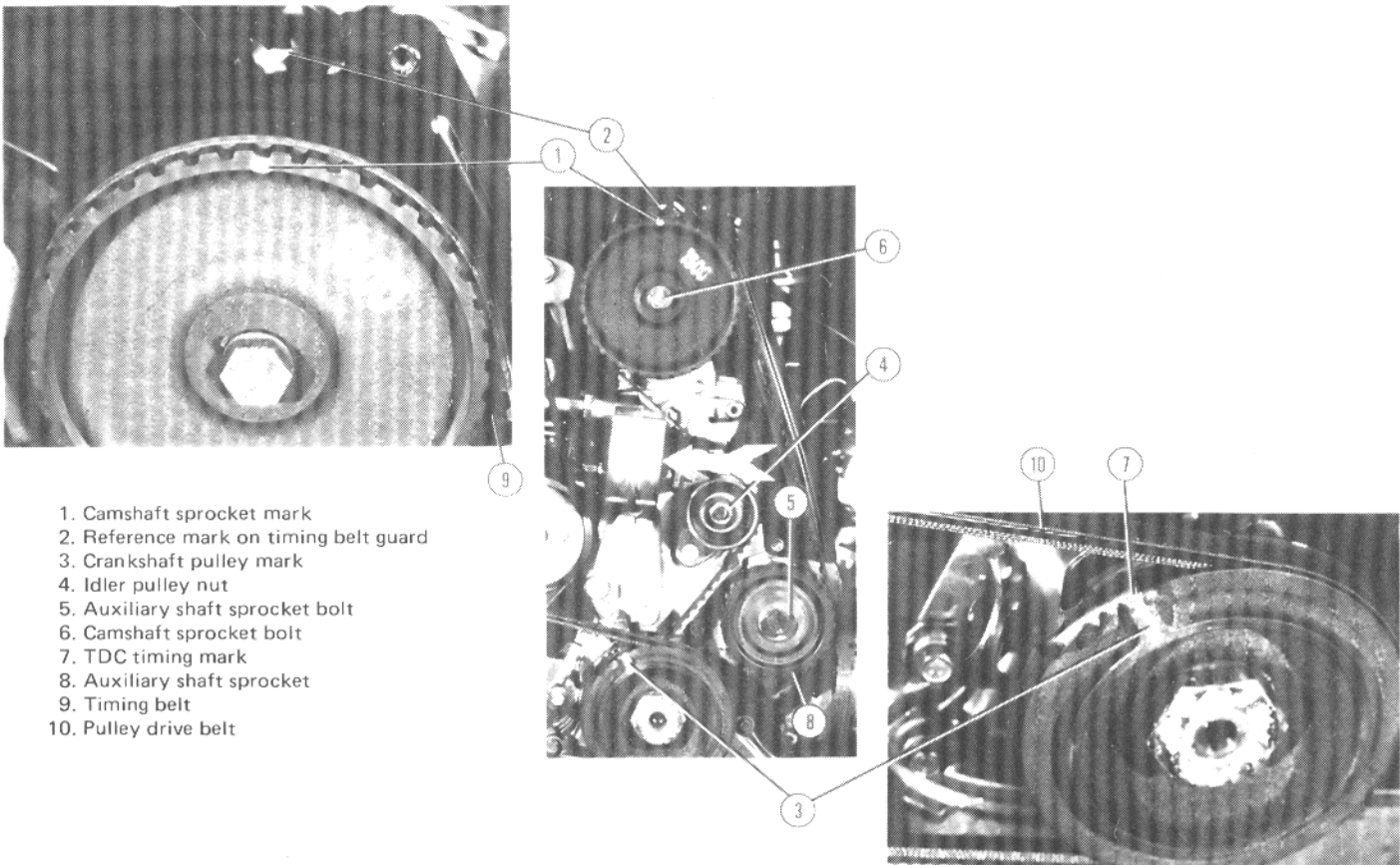
**CAUTION:** Always install a new timing belt. Timing belts cannot be reused. Under no circumstances must belt tension be adjusted following its initial installation.

Ensure that timing belt teeth are perfectly coupled with sprockets.

Loosen idler pulley nut (4) and tensioner will tighten belt. Torque idler pulley nut in this position to 33 ft. lbs. (4.5 kgm).

Check that timing marks are still correctly aligned.

With flywheel blocked, torque auxiliary shaft sprocket bolt (5) and camshaft sprocket bolt (6) to 61 ft. lbs. (8.5 kgm).



1. Camshaft sprocket mark
2. Reference mark on timing belt guard
3. Crankshaft pulley mark
4. Idler pulley nut
5. Auxiliary shaft sprocket bolt
6. Camshaft sprocket bolt
7. TDC timing mark
8. Auxiliary shaft sprocket
9. Timing belt
10. Pulley drive belt

# Engine Assembly

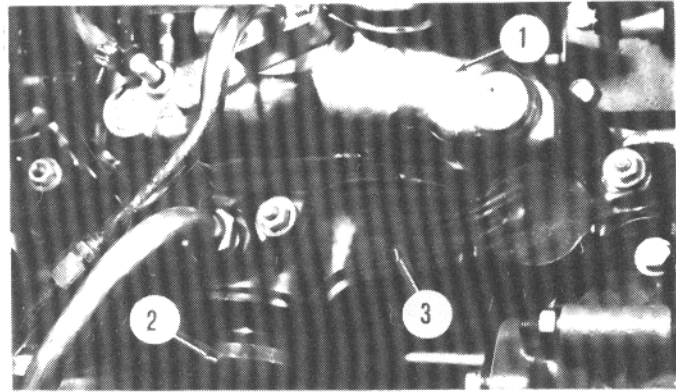
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On vehicles with carburetor, install intake manifold (1), exhaust manifold (2), and gaskets with seven nuts and washers. Torque to 20 ft. lbs. (2.8 kgm).

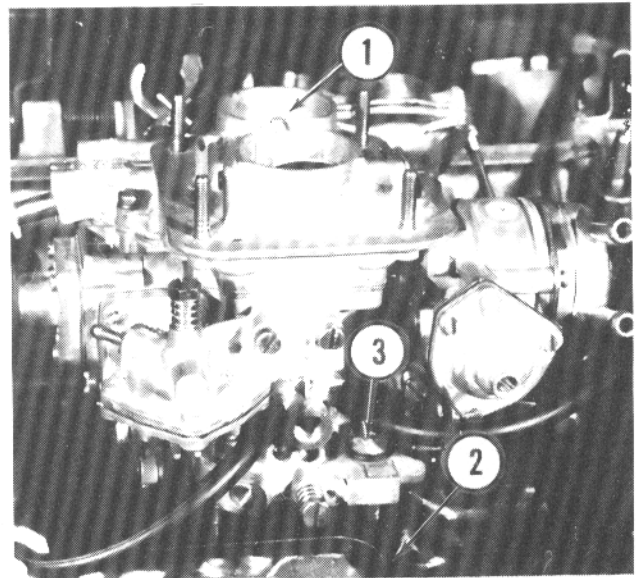
Install shield (3) with three nuts and washers.

1. Intake manifold 2. Exhaust manifold 3. Shield



On vehicles with carburetor, install carburetor (1) and spacer (2) with four nuts (3) and washers.

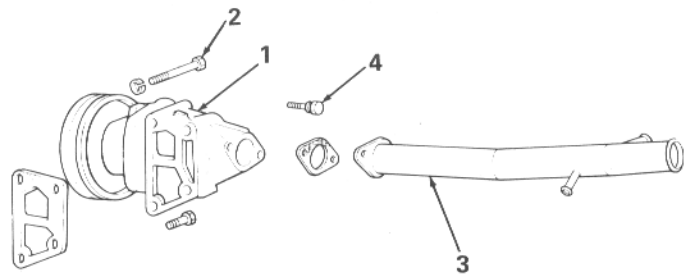
1. Carburetor 2. Spacer 3. Nut



Install water pump (1) and gasket with four bolts (2) and lockwashers. Torque to 22 ft. lbs. (3 kgm).

Install water manifold (3) and gasket with two bolts (4) and lockwashers.

1. Water pump 2. Bolt 3. Water manifold 4. Bolt

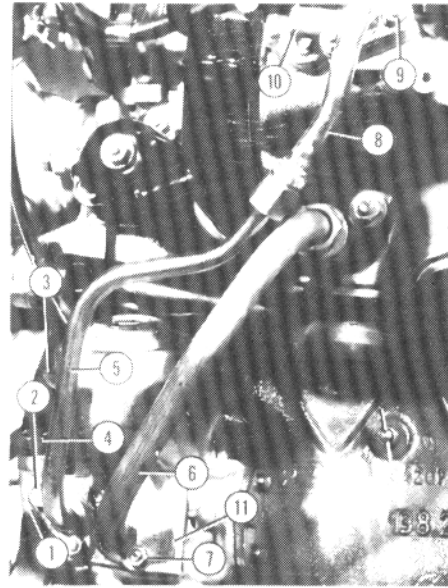




On vehicles with carburetor, install EGR mounting base (1), gasket and tube (5) with two bolts (2) and lockwashers.

Install tube (6) and shield (11) to exhaust manifold fitting and to EGR mounting base with two nuts (9) and lockwashers.

Install EGR valve (3) and gasket with two bolts (4) and lockwashers.

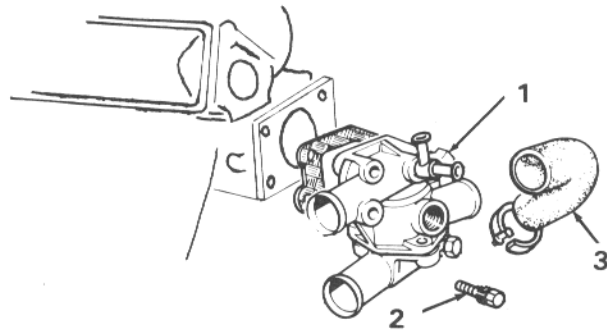


- 1. EGR mounting base 2. Bolt 3. EGR valve 4. Bolt 5. Tube
- 6. Tube 7. Nut 8. Tube 9. Nut 10. Spacer 11. Shield

Attach thermostat housing (1) and gasket to cylinder block with four bolts (2) and lockwashers.

Attach water manifold hose (3) to thermostat housing.

- 1. Thermostat housing 2. Bolt 3. Water manifold hose

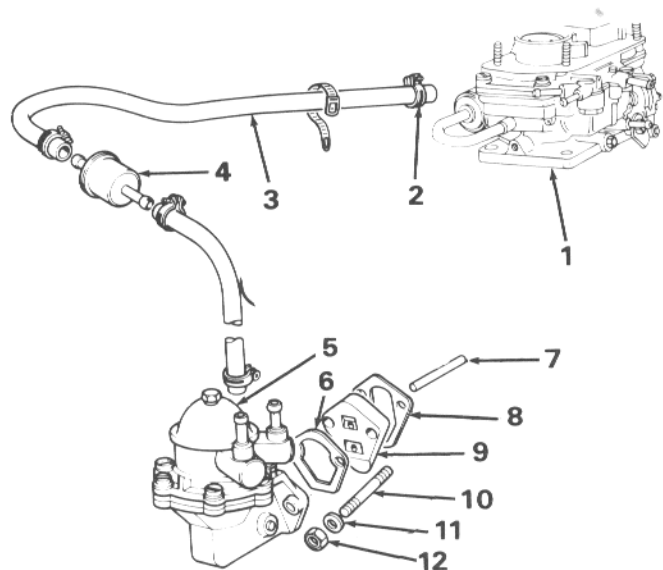


On vehicles with carburetor, install fuel pump (5) with gaskets (6 and 8), insulator (9), and actuating rod (7).

Retain pump to studs (10) with two nuts (12) and washers (11).

**NOTE:** Gasket (8) comes in three different sizes which are used to adjust pump stroke (pressure).

Secure fuel lines (3) and filter (4) to carburetor with clamps (2).



- 1. Carburetor 2. Clamp 3. Fuel hose 4. Filter 5. Fuel pump
- 6. Gasket 7. Actuating rod 8. Gasket 9. Insulator 10. Stud
- 11. Washer 12. Nut

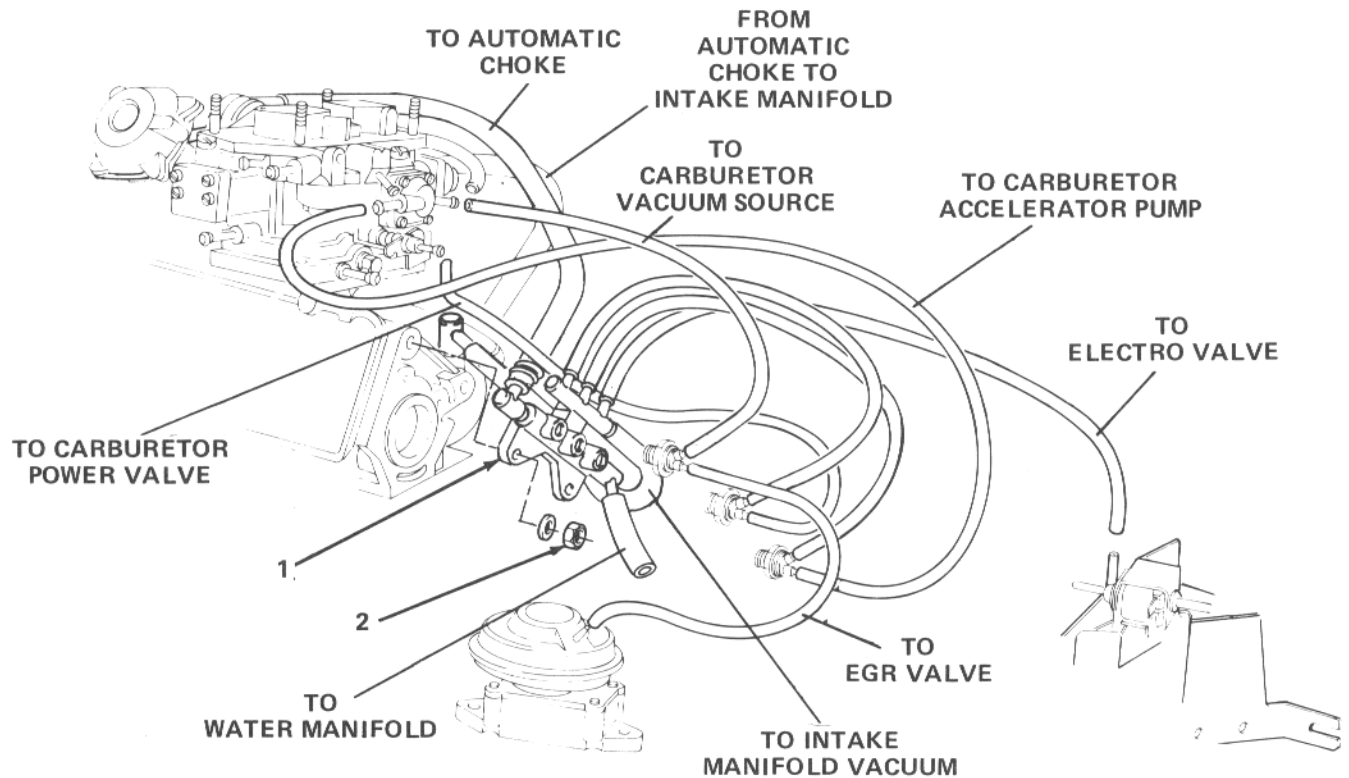
# Engine Assembly

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On vehicles with carburetor, install thermovalve housing assembly (1) with two nuts (2) and lockwashers. Attach vacuum and water lines as shown.

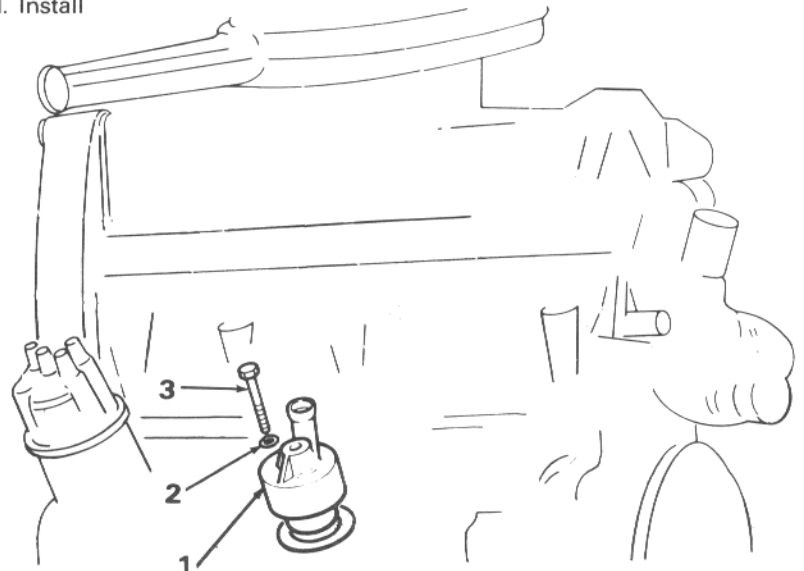
1. Thermovalve housing assembly 2. Nut



Install cyclonic trap (1) in engine with hose attached. Install bolt (3) and lockwasher (2).

Torque to 17 ft. lbs. (2.3 kgm)

1. Cyclonic trap 2. Lockwasher 3. Bolt



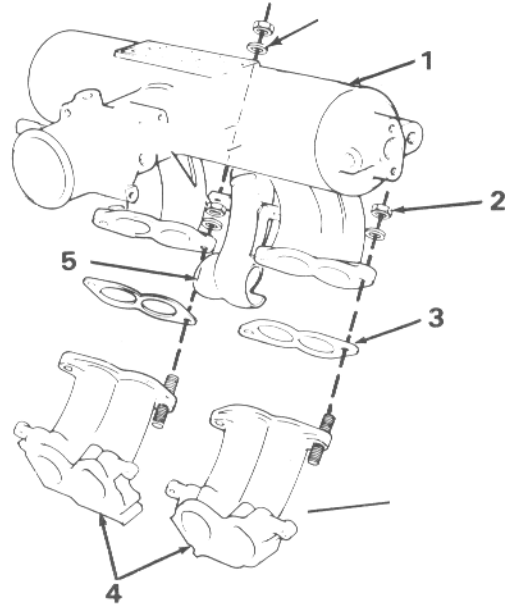
On vehicles with fuel injection, install intake manifolds (4) to cylinder head.

Install air intake (1) and gaskets (3) to intake manifolds with nuts (2) and washers.

Install cooling air duct (5).

Attach auxiliary air regulator to engine with two Allen bolts and washers. Install regulator with hoses attached. Make sure that clip is installed under both clamps.

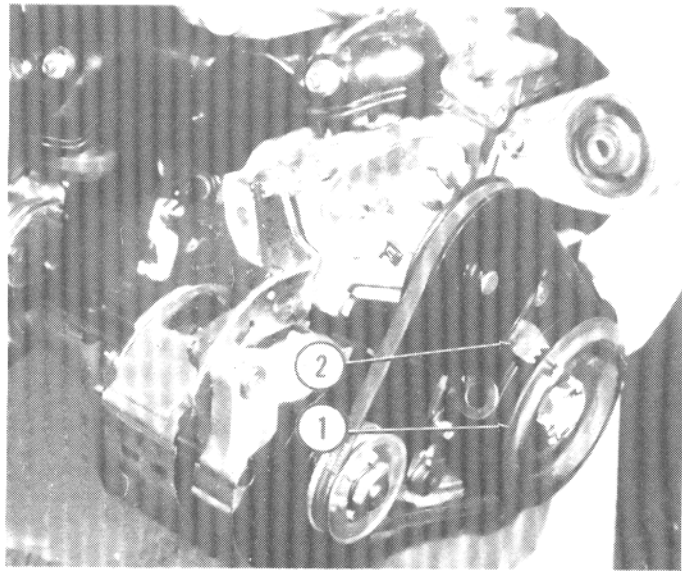
1. Air intake 2. Nut 3. Gasket 4. Intake manifolds  
5. Cooling air duct



Install distributor, make sure that cylinder No. 1 is on compression stroke (both valves closed).

Turn crankshaft until notch on pulley (1) is lined up with TDC indicator plate (2).

1. Pulley 2. TDC indicator plate



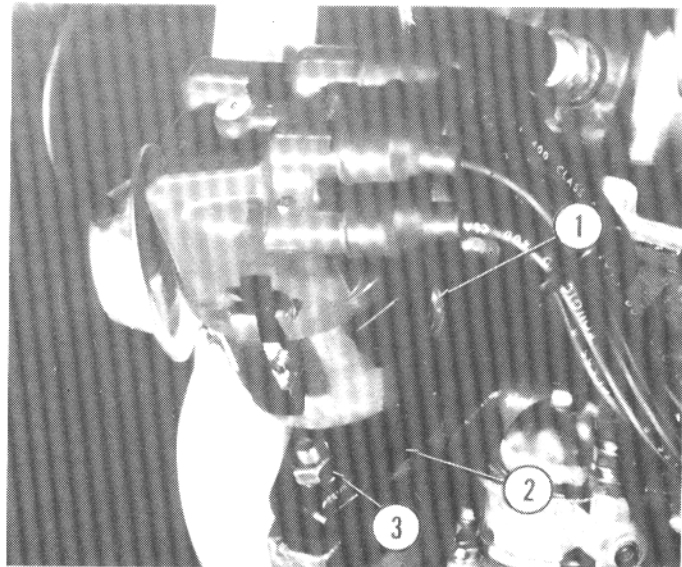
Remove distributor cap and rotate shaft until rotor faces terminal on cap corresponding to cylinder No. 1.

Without moving the rotor from its original position, insert distributor (1) in crankcase.

Secure distributor with nut (3) and clamp (2).

Final adjustment of timing will be accomplished with a timing light. Refer to 551.01.

1. Distributor 2. Clamp 3. Nut



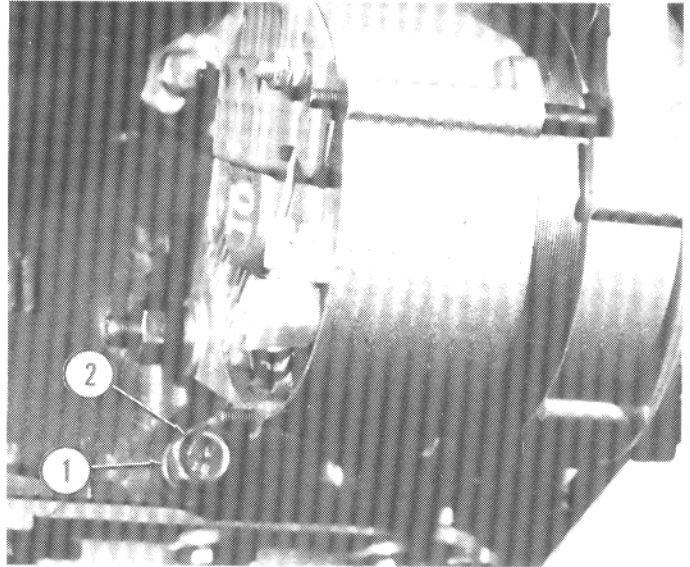
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Install alternator support (1) to engine with 4 bolts (2) and torque to 36 ft. lbs. (5 kgm).

1. Alternator support 2. Bolt



Install alternator bracket (4) to water pump housing with two bolts.

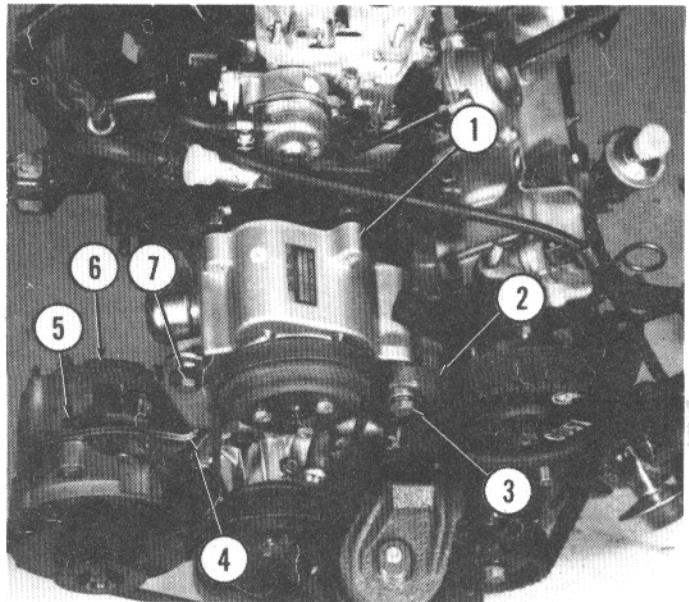
Place alternator (6) on bracket and secure in place with two bolts (5).

If equipped with air pump, install pump support (2) to cam housing with four bolts and torque bolts to 22 ft. lbs. (3 kgm).

Attach air pump (1) to bracket (4) and support (2) and secure in place with two bolts (3 and 7).

To adjust belts, refer to 101.15.

1. Air pump 2. Support 3. Bolt 4. Bracket 5. Bolt 6. Alternator 7. Bolt



If equipped with air conditioning, attach compressor (1) and brackets (2) to support and alternator (4) with bolts, washers, and nuts (3).

To adjust belt, refer to 101.15.

1. Air conditioning compressor 2. Bracket 3. Nut 4. Alternator

