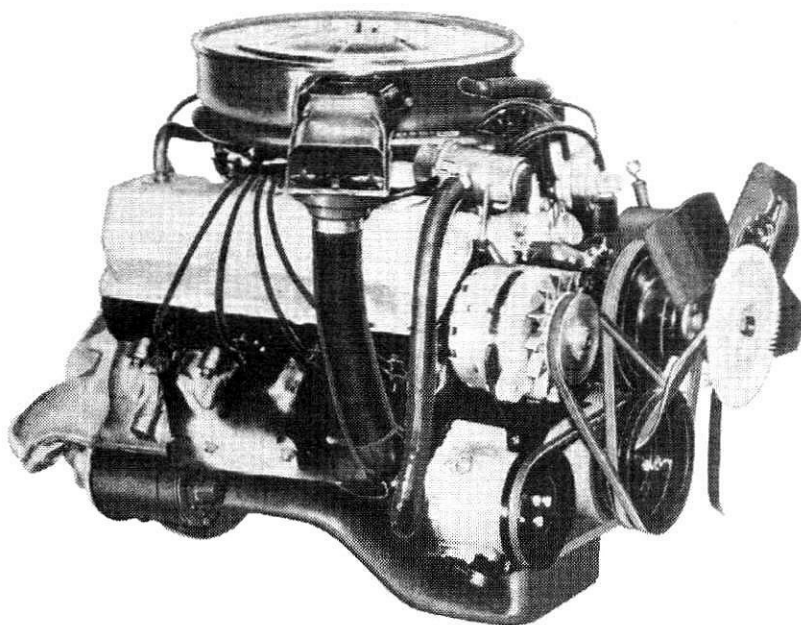
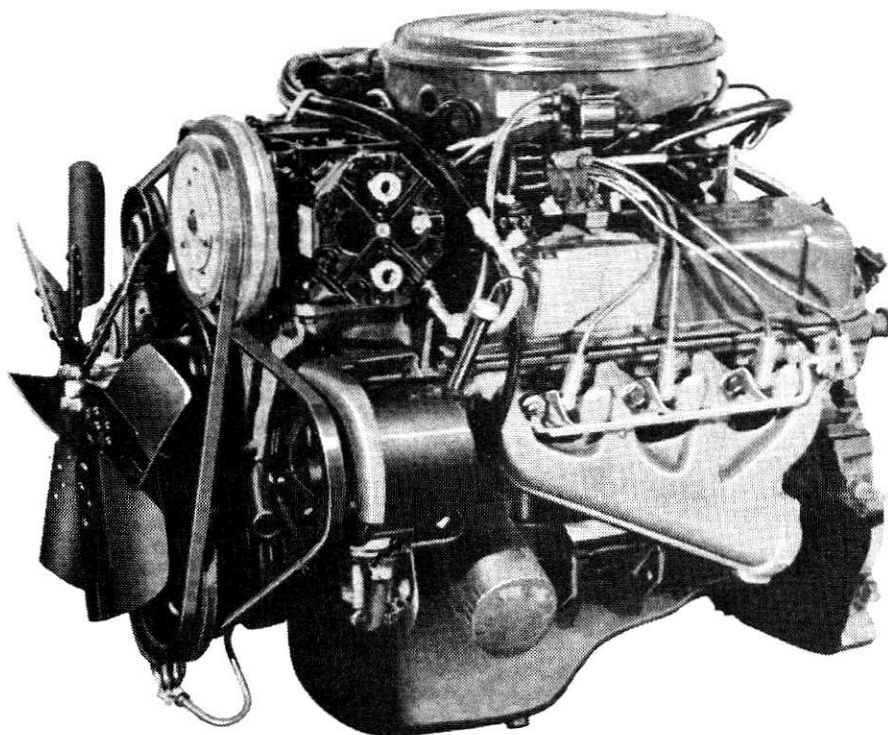




A3287-2^B

FIG. 1 3/4 Right Front View—5.0L (302 CID) V-8 Engine



A2715-2^E

FIG. 2 3/4 Left Front View—5.8L (351 "W" CID) V-8 Engine

REMOVAL AND INSTALLATION

CAUTION: Do not operate the engine with the hood open until the fan has been first examined for possible cracks and separation.

When installing nuts or bolts that must be torqued, oil the threads with light weight engine oil. **Do not oil threads that require oil-resistant or water-resistant sealer.**

Refer to Part 21-01 for Cleaning and Inspection and engine test procedures.

ENGINE ASSEMBLY

The Engine Removal and Installation procedures are for the engine only without the transmission attached. If the engine is equipped with the Thermactor system, remove or disconnect parts that will interfere with removal or installation of the engine.

Removal

1. Drain the cooling system and the crankcase.
2. Remove the hood. Disconnect the battery and alternator ground cables from the cylinder block.
3. Remove the air cleaner and intake duct assembly.
4. Disconnect the radiator upper hose from the coolant outlet housing and the radiator lower hose at the water pump.

On a vehicle with an automatic transmission, disconnect the transmission oil cooler lines from the radiator.

Remove the bolts attaching the fan shroud to the radiator, if so equipped.

5. Remove the radiator. Remove the fan, spacer, belt pulley and shroud.
6. Remove the alternator bolts and position the alternator out of the way.
7. Disconnect the oil pressure sending unit wire from the sending unit, and the flexible fuel line at the fuel tank line. Plug the fuel tank line.
8. Disconnect the accelerator cable from the carburetor.

On a vehicle with an automatic transmission disconnect the throttle valve vacuum line from the intake manifold. Disconnect the manual shift rod and disconnect the retracting spring at the shift rod stud. Disconnect the transmission filler tube bracket from the cylinder block.

On a vehicle with an air conditioner, isolate and remove the compressor as outlined in Group 36.

On a vehicle with power steering, disconnect the power steering pump bracket from the cylinder head. Remove the drive belt. Position the power steering pump out of the way and in a position that will prevent the fluid from draining out.

On a vehicle with vacuum boosted power brakes, disconnect the brake vacuum line from the intake manifold.

9. Disconnect the heater hoses from the water pump and intake manifold. Disconnect the coolant temperature sending unit wire from the sending unit.

10. Remove the flywheel or converter housing to engine upper bolts.
11. Disconnect the primary wiring connector from the ignition coil. Remove the wire harness from the left rocker arm cover and position the wires out of the way. Disconnect the ground strap from the block.
12. Raise the front of the vehicle. Disconnect the starter cable from the starter. Remove the starter.
13. Disconnect the muffler inlet pipes from the exhaust manifolds. Disconnect the engine support insulators from the brackets on the frame.

On a vehicle with a manual-shift transmission, remove the bolts attaching the clutch equalizer bar to the frame rail and remove the equalizer from the engine block. Remove the remaining flywheel housing to engine bolts.

On a vehicle with an automatic transmission, disconnect transmission cooler lines from retainer and remove the converter housing inspection cover. Disconnect the flywheel from the converter. Secure the converter assembly in the housing. Remove the remaining converter housing to engine bolts.

14. Lower the vehicle, and then support the transmission. Attach the engine lifting sling, Tool No. T53L-300-A or equivalent and hoist to lifting brackets on intake manifolds.
15. Raise the engine slightly and carefully pull it from the transmission. Carefully lift the engine out of the engine compartment (avoid bending or damaging the rear cover plate or other components). Install the engine on a work stand.

Installation

1. Attach the engine lifting sling, Tool No. T53L-300-A or equivalent, and lifting brackets to intake manifold. Hoist the engine from the work stand.
2. Lower the engine carefully into the engine compartment. Make sure the exhaust manifolds are properly aligned with the muffler inlet pipes.

On a vehicle with an automatic transmission, start the converter pilot into the crankshaft.

On a vehicle with a manual-shift transmission, start the transmission main drive shaft into the clutch disc. It may be necessary to adjust the position of the transmission in relation to the engine if the input shaft will not enter the clutch disc. **If the engine hangs up after the shaft enters, turn the crankshaft slowly (transmission in gear) until the shaft splines mesh with the clutch disc splines.**

3. Install the flywheel or converter housing upper bolts, making sure that the dowels in the cylinder block engage the flywheel housing.
4. Install the engine support insulator to bracket attaching nuts. Disconnect the engine lifting sling and remove the lifting brackets.
5. Raise the front of the vehicle. Connect both muffler inlet pipes to the exhaust manifolds. Torque the nuts to specifications.
6. Install the starter and the starter cable.

On a vehicle with a manual-shift transmission, install the remaining flywheel housing to engine bolts. Position the clutch equalizer bar to the engine block and install the equalizer bar bracket on the frame side rail.

On a vehicle with an automatic transmission, remove the retainer holding the converter in the housing.

Attach the converter to the flywheel. Install the converter housing inspection cover. Install the remaining converter housing attaching bolts.

7. Remove the support from the transmission and lower the vehicle.
8. Connect the wiring harness to the left valve rocker arm cover and connect the coil wiring connector.
9. Connect the coolant temperature sending unit wire. Connect the heater hose to the intake manifold.
10. Connect the bellcrank to the intake manifold.

On a vehicle with an automatic transmission, connect the transmission filler tube bracket. Connect the manual shift rod and connect the retracting spring. Connect the throttle valve vacuum line.

Connect the accelerator cable.

11. Remove the plug from the fuel tank line and connect the fuel line and the oil pressure sending unit wire.
12. Install the pulley, belt, spacer and fan.
13. Position the alternator and install the alternator bolts. Connect the alternator and the battery ground cables. Adjust the belt tension to specifications.

On a vehicle with an air conditioner, install the compressor as outlined in Group 36.

On a vehicle with power steering, install the drive belt and power steering pump bracket. Install the bracket attaching bolts. Adjust the drive belt tension to specifications.

On a vehicle with vacuum boosted power brakes, connect the brake vacuum line.

14. Place the radiator shroud over the fan, if so equipped. Install the radiator. Connect the radiator upper and lower hoses. On a vehicle with an automatic transmission, connect the transmission fluid cooler lines. Install the shroud bolts if so equipped.
15. Connect the heater hose at the water pump. Fill and bleed the cooling system. Fill the crankcase with the proper grade and quantity of oil.
16. Adjust the transmission throttle linkage.
17. Operate the engine at fast idle and check all gaskets and hose connections for leaks.
18. Install the air cleaner and intake duct assembly.
19. Install and adjust the hood.

ENGINE FRONT SUPPORTS

The front supports are located on each side of the cylinder block (Figs. 3 thru 7). The procedures given apply to either a right or left installation. **Whenever self-locking mounting bolts and nuts are removed, they must be replaced with new self-locking bolts and nuts.** See (*) in Figs. 3-7.

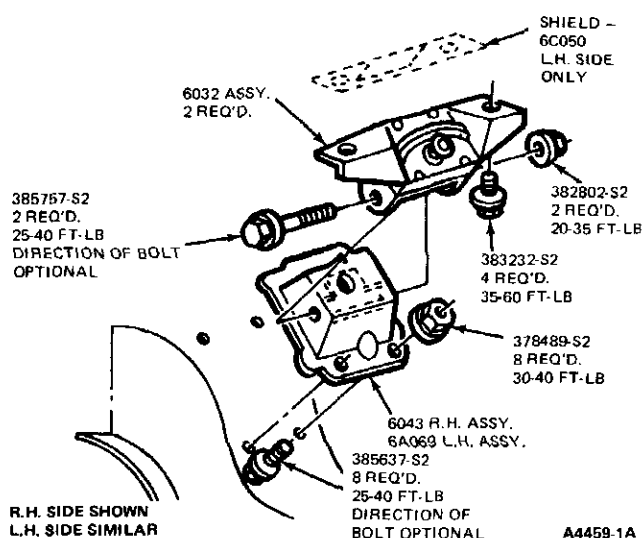


FIG. 3 Engine Front Supports—Ford and Mercury

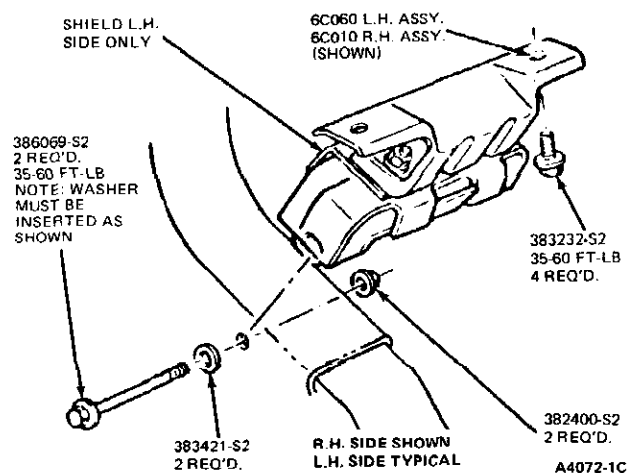


FIG. 4 Engine Front Supports—Granada, Monarch and Versailles

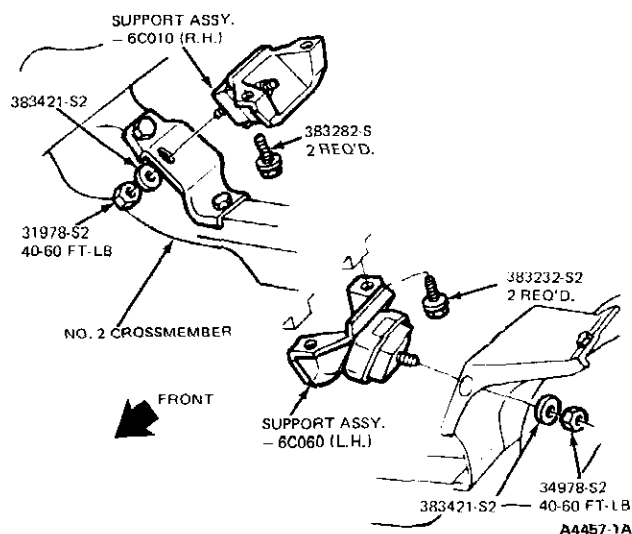


FIG. 5 Engine Front Supports—Fairmont and Zephyr

Granada, Monarch and Versailles**Removal**

1. Support the engine using a jack and wood block placed under the oil pan.
2. Remove the nut and through bolt attaching the insulator to the insulator support bracket (Fig. 4).
3. Raise the engine slightly with the jack.
4. Remove the engine insulator and bracket assembly to cylinder block attaching bolts. Remove the engine insulator assembly and the heat shield, if so equipped.

Installation

1. Position the engine insulator assembly and the heat shield, if so equipped, to the cylinder block and install the attaching lock bolts. Torque the bolts to specifications.
2. Lower the engine into position, install the engine insulator assembly to insulator support bracket through bolt and remove the jack and wood block.
3. Install the engine insulator assembly to insulator support bracket lock nut. Torque the nut to specifications.

FAIRMONT AND ZEPHYR

Wherever self-locking fasteners are removed, they must be replaced with new self-locking fasteners.

Removal

1. Remove the fan shroud attaching screws.
2. Remove the nuts attaching the insulators to the lower bracket (Fig. 5).
3. Raise the engine using a jack and wooden block placed under the oil pan.
4. Remove the bolts attaching the insulator assembly to the engine block. Remove the engine insulator assembly.

Installation

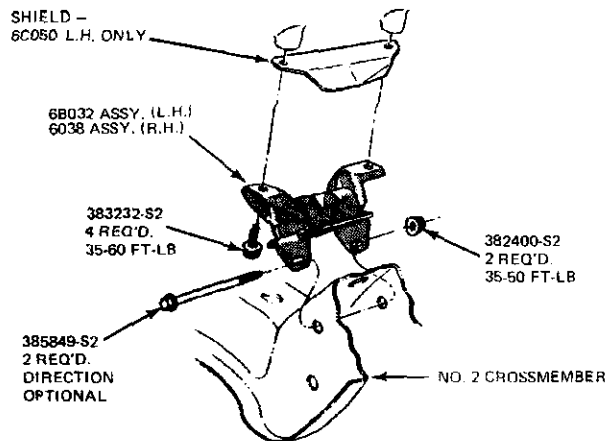
1. Position the engine insulator assembly to the engine block and install the attaching lock bolts. Torque the bolts to specification.
2. Lower the engine into position and install the lock nut. Torque the nut to specification.
3. Remove the jack and wood block.
4. Install fan shroud attaching screws and torque to specification.

LTD II, Cougar, Thunderbird, and Mustang II**Removal**

1. Remove the fan shroud attaching screws.
2. From under the car support the engine using a wood block and jack placed under the oil pan.
3. Remove the nut and through bolt attaching the insulator to the frame crossmember (Figs. 6 and 7).
4. Raise engine enough to remove insulator and heat shield (if so equipped).

Installation

1. Position the insulator assembly and heat shield, if so equipped, to the engine block and torque the attaching screws to specification.



A3232-1G

FIG. 6 Engine Front Supports—LTD II, Cougar and Thunderbird

2. Lower the engine until the through bolt can be inserted through the insulator and crossmember. Be sure the locator boss on the insulator and the locator hole in the crossmember are properly aligned.
3. Install the through bolt nut and torque to specification.
4. Remove the jack and wood block, install the fan shroud attaching screw.

ENGINE REAR SUPPORT

The rear support is located at the transmission extension housing (Figs. 7 through 11).

Whenever self-locking mounting bolts and nuts, are removed, they must be replaced with new self-locking bolts and nuts. See (*) in Figs. 8 through 11.

Mustang II, LTD II, Cougar and Thunderbird**Removal**

1. On LTD II, Cougar and Thunderbird models, support the engine with a jack and wood block under the oil pan and remove the support insulator to crossmember attaching nuts.
2. Remove the support insulator to transmission extension housing bolts and support insulator to crossmember nuts.
3. On all models except those with floor shift manual transmissions, raise the transmission with a floor jack. Remove the support insulator and retainer.
4. On floor shift manual transmission models, support the transmission with a floor jack and remove the frame crossmember from the frame and from the engine rear support; then remove the rear support from the transmission. **Do not apply upward pressure on the transmission shift lever console or mounting plate will result.**

Installation

1. Position the support insulator and retainer on the transmission extension housing.

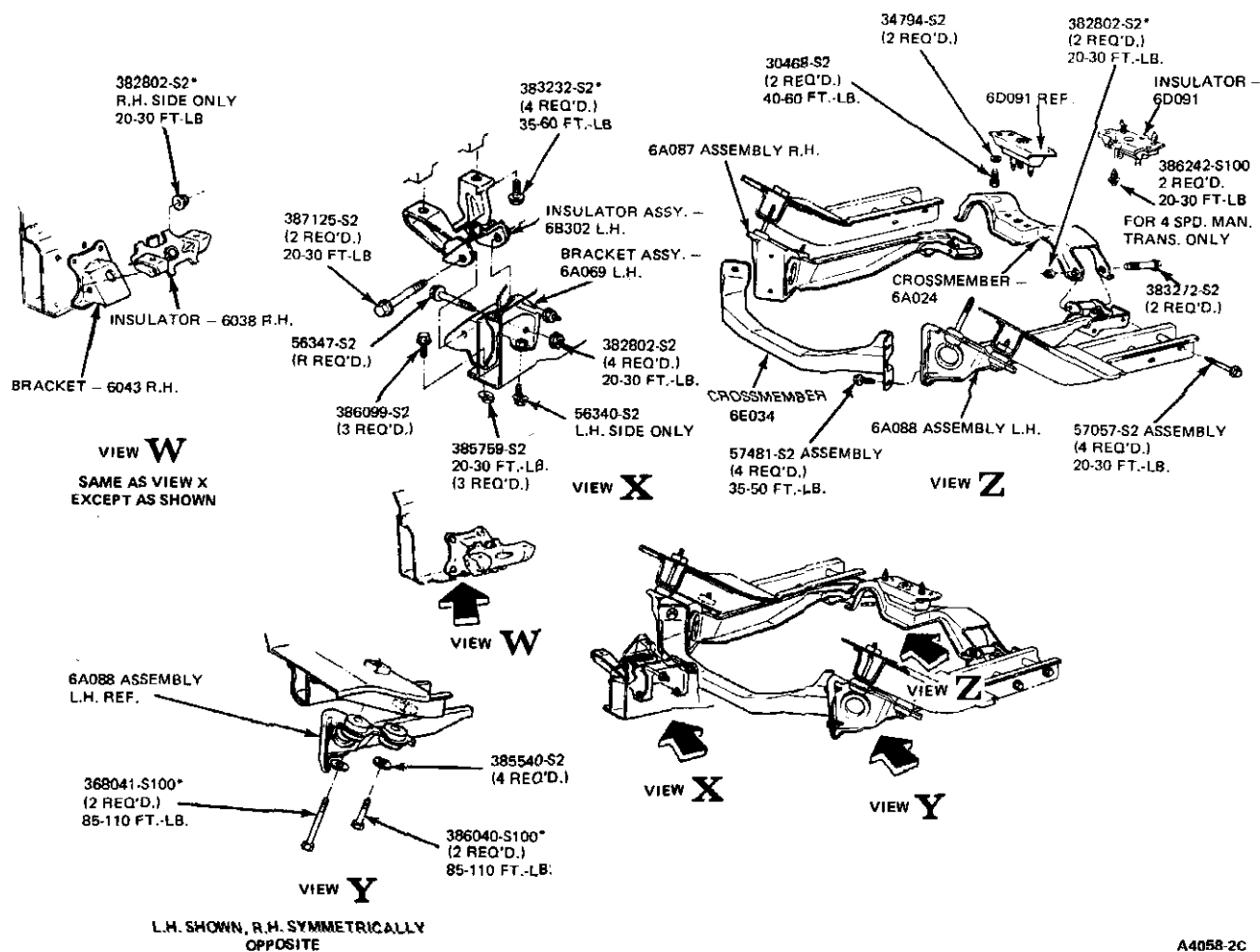


FIG. 7 Engine Rear Supports—Mustang II

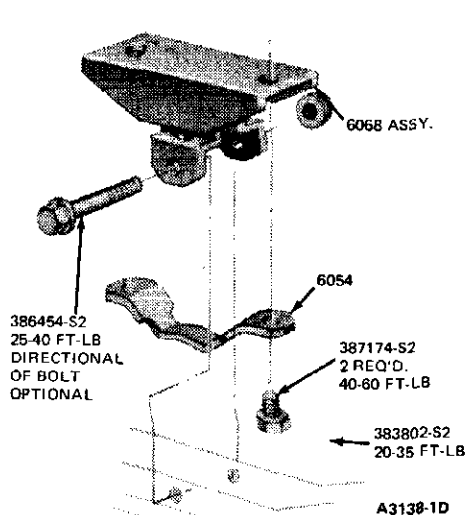


FIG. 8 Engine Rear Support—Ford and Mercury

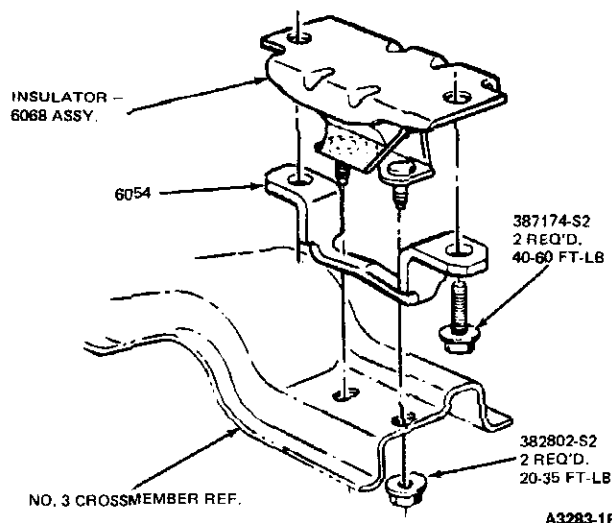


FIG. 9 Engine Rear Supports—LTD II, Cougar and Thunderbird

- On all models except those with floor shift, install the support insulator to transmission extension housing bolts and lockwashers. Torque the bolts to specifications. Lower the transmission.

- On models with floor shift manual transmission, position the rear support to the transmission and install and torque the attaching bolts. Position the removable crossmember to the frame and install the

through-bolts. Remove the supporting jack, install the nuts and washers attaching the support to the crossmember and torque the nuts to specifications.

- On LTD II, Cougar and Thunderbird models, install the support insulator to crossmember attaching nuts. Tighten the nuts to specifications.

MUSTANG II, FAIRMONT AND ZEPHYR

Removal

- Place a block of wood and a jack under the transmission.
- Remove the two nuts attaching the insulator to the crossmember (Fig. 11). Raise the transmission enough to allow removal of the insulator from the crossmember.
- Remove the two bolts and nuts attaching the crossmember to the frame side rails and remove the crossmember.
- On those vehicle so equipped, remove the fasteners attaching the exhaust hanger to the rear engine mount.
- Remove the two bolts attaching the insulator to the transmission and remove the insulator (and retainer, if so equipped).

Installation

- Position the insulator (and retainer, if so equipped) to the transmission. Install the two attaching bolts and torque to specification.
- If required, install the fasteners attaching the exhaust hanger to the insulator and torque to specification.
- Install the crossmember to the frame rails and torque the attaching nuts and bolts to specification.
- Lower the transmission and install the insulator to crossmember attaching nuts and torque to specification.
- Remove the jack and wood block from under the transmission.

CRANKCASE VENTILATION SYSTEM

The positive closed-type crankcase ventilation system components are shown in Fig. 9.

Removal

- Remove the ventilation system air intake hose from the air cleaner and the right valve cover.
- Remove the air cleaner and intake duct assembly.
- Disconnect the crankcase vent hose from the carburetor spacer.
- Pull the regulator valve out of the oil filler cap in the left valve cover.
- Disconnect the vent hose from the canister purge solenoid.

Installation

- Insert the regulator valve into the oil filler cap on the left valve cover.
- Connect the vent hose to the regulator valve, the carburetor spacer and the canister purge solenoid.
- Install the air cleaner and intake duct assembly.
- Install the ventilation system air intake hose to the air cleaner and the right valve cover fitting.

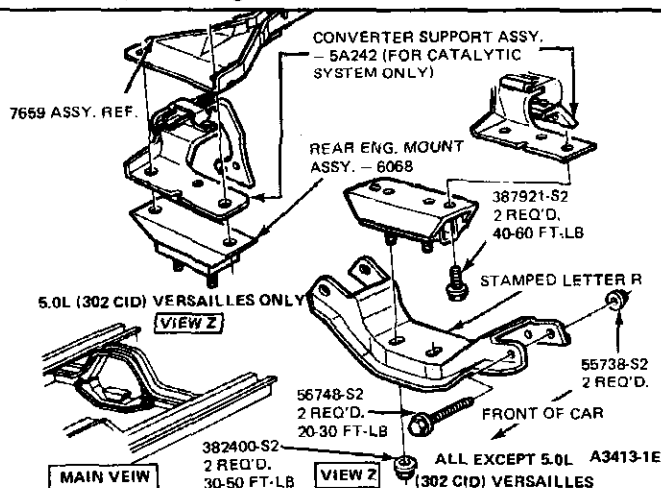


FIG. 10 Engine Rear Supports—Granada, Monarch and Versailles

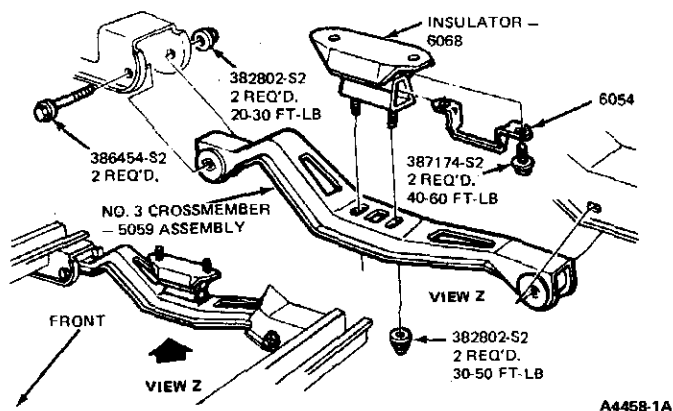
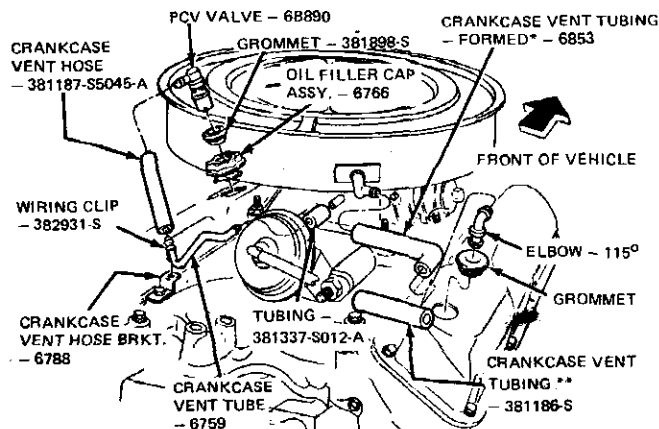


FIG. 11 Engine Rear Support—Fairmont and Zephyr



* LTD II, COUGAR AND THUNDERBIRD WITH A/C
** ALL OTHER APPLICATIONS

A4070-1C

FIG. 12 Typical Crankcase Ventilation System Components

- Start the engine and check for leaks.

EGR COOLER

Removal

- Drain the radiator.
- Disconnect the EGR cooler attaching bracket at the exhaust and intake manifolds, (Fig. 13).

NOTE: If the rocker arm cover is not being removed, remove only the 1/2-inch attaching screws at the top of the bracket to disconnect the cooler assembly.

2. Cut the cooler exhaust inlet and outlet tube clamps (one at the front of the cooler and one at the EGR valve) using Tool T78P-9481-A or equivalent (follow tool manufacturer's instructions). Rotate the cooler by hand to separate the tubes after the clamps are cut.
4. Disconnect inlet and outlet coolant hoses and remove the cooler assembly.

Installation

1. Install the coolant hoses. Align the bracket and cooler assembly.
2. Position the exhaust inlet and outlet tubes—front and rear—to the cooler assembly using new gaskets and clamps.
3. Position and tighten the clamps using Tool T78P-9481-A or equivalent (follow tool manufacturer's instructions). Be sure cooler and tubes are in position before clamping.
4. Attach the cooler bracket at the exhaust and intake manifolds, or the 1/2-inch top hold-down screw (if the rocker arm cover was not removed).
5. Close the radiator drain petcock and refill the radiator according to instructions in Part 27-01. Operate engine and check for coolant or exhaust leaks.

VALVE ROCKER ARM COVER AND ROCKER ARM

The valve rocker arm assembly sequence is shown in Fig. 14.

Removal

1. To remove a valve rocker arm from the right cylinder head, remove the air cleaner assembly, disconnect the automatic choke heat chamber air inlet hose from the inlet tube near the right valve rocker arm cover, if so equipped.

Remove the EGR cooler assembly, if equipped.

Remove the automatic choke heat tube, if equipped. Remove the crankcase ventilation fresh air tube from the valve rocker arm cover. Disconnect the EGR vacuum amplifier hoses.

2. Remove the Thermactor by-pass valve and air supply hoses as necessary to provide clearance.
3. Disconnect the spark plug wires from the spark plugs using Tool No. T68P-6666-A. Do not pull on wire. Remove the wires and bracket assembly from the rocker arm cover attaching stud and position the wires out of the way.
4. On a left side rocker arm cover, remove the wire harness from the retaining clips. Remove the valve rocker arm cover attaching bolts and remove the cover.
5. Remove the valve rocker arm stud nut, fulcrum seat and rocker arm.

If removal of the rocker arm stud is necessary, refer to the procedure under Cylinder Head Repairs in Part 21-01.

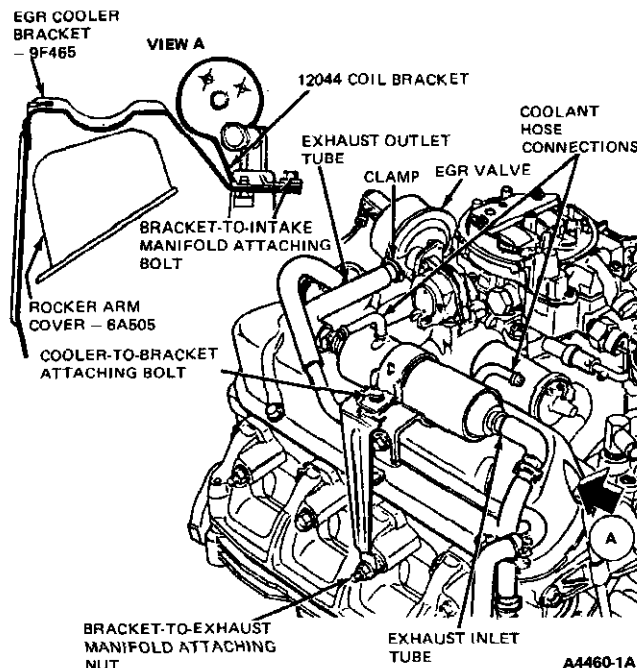
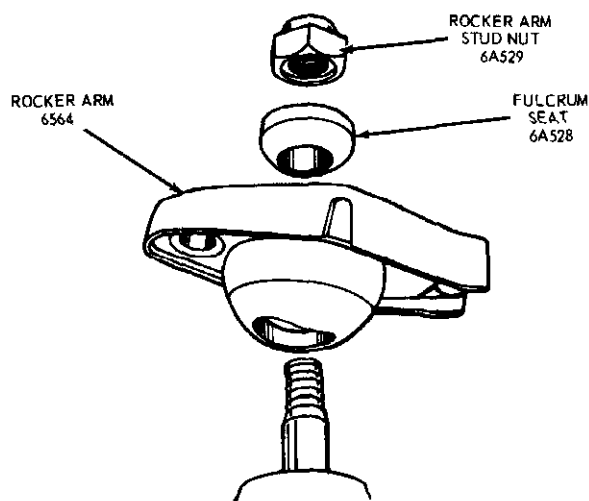


FIG. 13 EGR Cooler Installation—Versailles



A1634-1E

FIG. 14 Valve Rocker Arm

Installation

All rocker arms and fulcrum seats are to be lubricated with heavy engine oil SE before installation.

1. Apply Lubriplate, or equivalent, to the top of the valve stem and underside of the fulcrum seats.
2. Inspect the stud nut for damage. The chamfer on the nut should not be over 1/16-inch wide. A nut with a chamfer larger than 1/16-inch can cause the valves to be held open. (Refer to Part 21-01).
3. Rotate the crankshaft until the tappet is on the cam base circle (all the way down), and install the rocker arm, fulcrum seat and stud nut. Torque nuts to specification.
4. Clean the valve rocker arm cover(s) and the cylinder head gasket surface(s). Position a new service valve

rocker cover gasket in each cover, making sure that the tabs engage the notches in the cover.

5. Position the cover(s) on the cylinder head(s). Install the bolts and wire loom clips on left hand cover. The cover is tightened in two steps. Torque the bolts to specifications. Two minutes later, torque the bolts to the same specifications.

Install the crankcase ventilation hoses in the covers. Install the automatic choke heat tube and connect the automatic choke heat chamber air inlet hose at the air cleaner.

6. Install the spark plug wires and bracket assembly on the rocker arm attaching stud. Connect the spark plug wires. See Part 23-01 for special instructions. Install the air cleaner and intake duct assembly.
7. Install the Thermactor by-pass valve and air supply hoses.
8. Install EGR cooler assembly, if equipped.
9. Run engine and check for leaks.

VALVE SPRING, RETAINER AND STEM SEAL

Broken valve springs or damaged valve stem seals and retainers may be replaced without removing the cylinder head, provided damage to the valve or valve seat has not occurred.

Removal

1. Remove the valve rocker arm cover and the applicable spark plug. Make sure the piston is at the top of its stroke with both valves closed to prevent accidental dropping of the valve into the cylinder.
2. Install an air line with an adapter in the spark plug hole and turn on the air supply. Failure of the air pressure to hold the valve(s) closed while performing the following steps as an indication of valve seat damage and necessitates removal of the cylinder head.
3. Remove the valve rocker arm stud nuts, fulcrum seats, valve rocker arms and push rods from both intake and exhaust positions, the applicable cylinder and note their positions so they can be reinstalled in their original positions. Remove the exhaust valve stem caps.
4. Install the stud nut and position the compressor tool as shown in Fig. 15. Compress the valve spring and remove the retainer locks, sleeve, spring retainer and valve spring.
5. Remove and discard the valve stem seal (Fig. 16).
6. **If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve(s) to fall into the cylinder. A rubber band, tape or string wrapped around the end of the valve stem will prevent this from happening but will still allow enough travel to check the valve for binds.**

Installation

1. Remove air pressure from spark plug adaptor. Inspect the valve stem for damage. Rotate the valve and check the valve stem tip for eccentric movement during rotation. Move the valve up and down through normal travel in the valve guide and check the stem for binds. **If the valve has been**

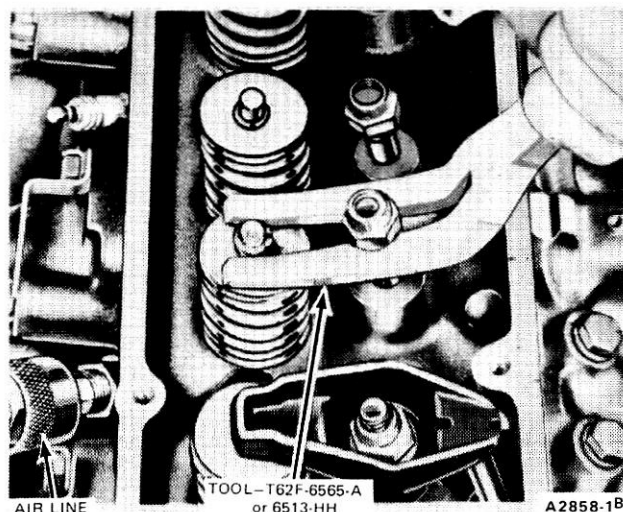


FIG. 15 Compressing Valve Spring—In Chassis

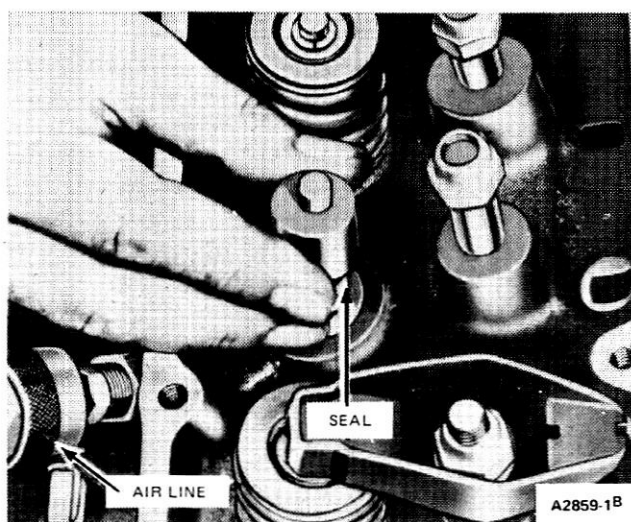


FIG. 16 Removing or Installing Valve Stem Seal

damaged, it will be necessary to remove the cylinder head for repairs as outlined in Part 21-01.

2. If the condition of the valve is satisfactory, apply heavy engine oil SE to the valve stem and hold the valve closed. Apply the air pressure within the cylinder.
3. Install a new valve stem seal (Fig. 16). Use a 5/8-inch deep wall socket and a light hammer or mallet to seat the seal on the valve stem. Place the spring in position over the valve and install the valve spring retainer and sleeve, if so equipped. Compress the valve spring and install the valve spring retainer locks. Remove the compressor tool and stud nut.
4. Turn off the air pressure and remove the air line and adaptor. Install the spark plug.
5. Apply Lubriplate or equivalent to both ends of the push rods. Install the push rods. Apply Lubriplate or equivalent to the tip of the valve stems. On exhaust valves, install the valve stem cap.