1980 CHEVROLET

LIGHT DUTY TRUCK

SERVICE MANUAL

ST 330-80

SECTION 0B

MAINTENANCE AND LUBRICATION

CONTENTS

GENERAL

The maintenance schedule for a gasoline engine follows two formats, Light Duty Emissions and Heavy Duty Emissions (Fig. 0B-1 and 0B-2). A separate vehicle maintenance schedule is provided for those vehicles with a V-8 diesel engine (Fig. 0B-3).

The maintenance schedule is provided in the glove box with the vehicle.

SERIES	DESCRIPTION	TORQUE
K10	7/16" BOLTS (6)	70-90 FT. LBS. 95-120 N•m
C10, G10, G20 AND P10	1/2" BOLTS (5)	75-100 FT. LBS. 100-140 N•m
C20, K20, C30, G30, P20 AND P30 SINGLE WHEELS	9/16" BOLTS (8)	90-120 FT. LBS. 120-160 N•m
C30, K30, G30 AND P30 DUAL WHEELS	9/16" BOLTS (8)	110-140 FT. LBS. 150-190 N•m
	HEAVY DUTY WHEELS 5/8" BOLTS (10)	130-180 FT. LBS. 175-245 N•m

Fig. 0B-12--Wheel Nut Torque

or disc mounting surface by scraping and wire brushing. Installing wheel without good metal-to-metal contact at the mounting surfaces can cause the wheel nuts to loosen, which can later allow a wheel to come off while the vehicle is moving, possibly causing loss of control.

Dual Tire Operation

The outer tire of a pair on dual wheel installations generally wears faster than the inner tire. if this occurs, reverse position of the tires to equalize wear and achieve optimum tire life.

In addition, when trucks are driven continuously on high crown roads, an increase in air pressure of from 5 psi (35 kPa) to 10 psi (70 kPa) in the outside tire of each dual produces maximum tire life. Be sure not to exceed the inflation pressure limits shown in the Load and Inflation Charts in Section 3E.

Wheel Nut Torque (Fig. 0B-12)

Caution:

Trucks With Single Wheels:

As soon as possible after installing a wheel- and at the intervals shown on the chart in the Maintenance Schedule have a mechanic tighten wheel nuts with a torque wrench to the correct torque listed on the chart which follows.

Trucks With Dual Wheels:

Have a mechanic tighten wheel nuts with a torque wrench as stated above for single wheels for both front and rear wheels. **In addition** , when the truck, or wheel, or fasteners are new, also have the torque set at the first 100, 1,000, and 6,000 miles (160, 1 600, and 9 600 km). This precaution is necessary because the clamping system used on this type of wheel in some cases needs to seat before the fasteners will hold a uniform clamp load and remain fully tightened.

For both single and dual wheels, wheel nuts should be tightened alternately and evenly to the correct torque in the sequence shown in Section 3E. Never use oil or grease on studs or nuts. Improperly tightened wheel nuts could eventually allow the wheel to come off while the vehicle is moving, possibly causing loss of control.

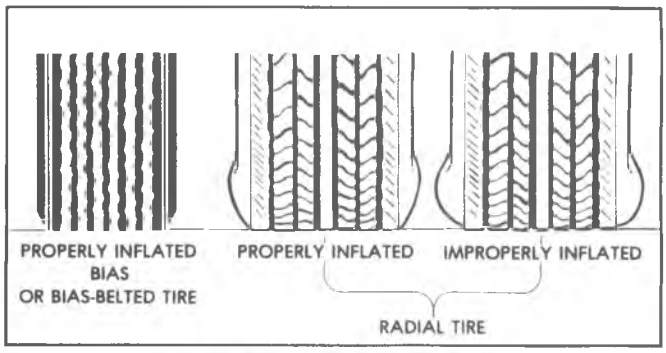


Fig. 0B-13--Properly Inflated Tire

CAUTION: This vehicle has some parts dimensioned in the metric system as well as in the customary system. Some fasteners are metric and are very close in dimension to well-known customary fasteners in the inch system. Mismatched or incorrect fasteners can result in damage to the vehicle or possibly personal injury.

Inflation Pressure (Fig. 0B-13)

The cold inflation pressures for the factory installed tires are on the label on the rear of the driver's door. The tires must be inflated to these pressures to obtain the GVWR (Gross Vehicle Weight Rating) or GAWR (Gross Axle Weight Rating). Incorrect tire inflation pressures can have adverse effects on tire life and vehicle performance. Too low an air pressure causes increased tire flexing and heat build-up. This weakens the tire and increases the chance of damage or failure and can result in tire overloading, abnormal tire wear, adverse vehicle handling, and reduced fuel mileage. Too high an air pressure can result in abnormal wear, harsh ride, and also increase the chance of damage from road hazards.

Lower inflation pressures can be used for light truck-type tires with reduced vehicle loads. After finding the load on each tire by weighing the vehicle on a scale, the minimum cold inflation pressures can be found in Section 3E.

Tire inflation pressures should be checked at least monthly (including the spare if so equipped). Always check tire inflation pressures when tires are "cold".

1. The "cold" tire inflation pressure applies to the tire pressure when a vehicle has not been driven more than one mile (1.6 km) after sitting for three hours or more.

2. It is normal for tire pressures to increase 4 to 8 pounds per square inch (30 to 60 kilopascals) or more, when the tires become hot from driving. **Do not** "bleed" or reduce tire inflation pressures after driving vehicle. Bleeding serves to reduce "cold" inflation pressure and increase tire flexing which can result in tire damage and failure.

Passenger-Car-Type tires:

For sustained driving at speeds of 75 mph of 85 mph (120 km/h to 140 km/h), in countries where such speeds are permitted by law , cold inflation pressures must be increased 4 psi (30 kPa) above the stated cold inflation pressures on the Certification Label. when the 4 psi (30 kPa) adjustment would require pressures greater than the maximum pressures stated for each load

Fig. 1A-2–Heater Control-C-K Models

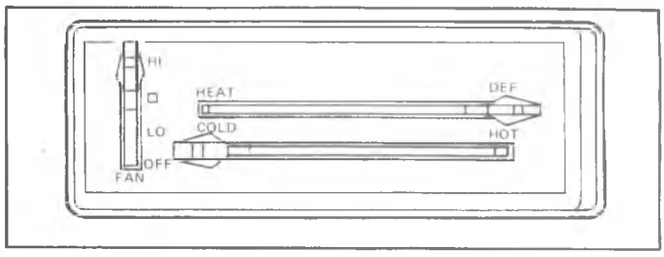


Fig. 1A-3–Heater Control-G Models

outlet air is dependent of the ratio of heated to unheated air (controlled by the temperature door).

CONTROLS

Heater controls for CK & G Models are shown in Figures 1A-2 and 1A-3.

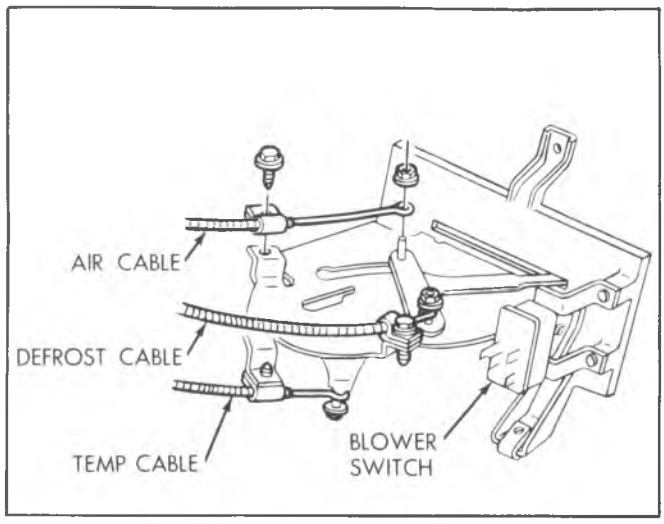


Fig. 1A-15–Control Assembly-G Models

4. Remove the control through the opening above the control.

5. If a new unit is being installed, transfer the blower switch to the new unit.

6. To reinstall, reverse Steps 1-4 above.

G Models

Replacement (Fig. 1A-15)

1. Disconnect the battery ground cable.

2. Remove I.P. bezel as outlined in Section 8C of this manual.

3. Remove the control to instrument panel mounting screws (3) and carefully pull the control rearward far enough to gain access to the bowden cable attachments. Care should be taken to prevent kinking the bowden cables while lowering the control.

4. Disconnect the bowden cables, the control illumination bulb, the blower switch connector and remove the control from the vehicle.

5. Remove the blower switch screws and remove the blower switch.

6. To install, reverse Steps 1-4 above.

CONTROL CABLES (Fig. 1A-16 & 1A-17)

C-K Models

Replacement

1. Disconnect the battery ground cable.

2. Remove the instrument panel bezel.

3. Remove the control to instrument panel screws.

4. Raise or lower control as necessary to remove cable push nuts and tab attaching screws.

5. Remove glove box and door as an assembly.

6. Remove cable push nut and tab attaching screw at door end of cable.

7. Remove cable from retaining clip and remove cable assembly.

8. To install, reverse Steps 1-7 above. Be careful not to kink the cable during installation. Be sure to route the cable as when removed. Check cable adjustment.

G Models

Replacement (Fig. 1A-17)

Heater and defroster cable routing and attachment to control and to distributor case is illustrated in Figure 1A-17.

If cable adjustment is required, see below.

Adjustment - CK Series

1. Disconnect the battery ground cable.

2. Remove glove box and door as an assembly.

3. Pry off the appropriate cable eyelet clip and disconnect the cable from the door.

4. Remove the cable retaining screw.

5. While holding the cable with pliers, rotate the mounting tab on the cable to lengthen or shorten the cable, whichever is required.

NOTICE: Do not pinch the cable too tightly or damage to the cable could result.

6. Install the cable, reversing Steps 1-4 above.

Adjustment - G Van

1. Attach inner cable and sheath to I.P. Control.

2. With I.P. installed, move temperature cable to cold and attach loop on inner cable to temperature door on heater case.

3. Attach cable sheath to heater case.

4. Move temperature lever to full heat. This will require some effort due to force required to slide inner cable clip to its proper position.

BLOWER SWITCH

C-K Models

Replacement (Fig. 1A-14)

1. Disconnect the battery ground cable.

2. Remove the instrument panel bezel.

3. Remove the control to instrument panel screws and lower the control onto the radio.

4. Disconnect the switch electrical harness.

5. Remove the switch attaching screws and remove the switch.

6. To install, reverse Steps 1-5 above.

G Models

Replacement (Fig. 1A-15)

1. Disconnect the battery ground cable.

2. Disconnect the blower switch wiring harness connector at the switch.

3. Remove the two switch attaching screws and remove the switch assembly.

4. To install a new switch, reverse Steps 1-3 above.

RESISTOR

Replacement (Figs. 1A-5 and 1A-18)

1. Disconnect the wiring harness at the resistor connector.

2. Remove the two resistor mounting screws and remove the resistor.

3. To install a new resistor, reverse Steps 1 and 2 above.

Thermostatic Switch - Motor Home Chassis Units Only

System temperature is controlled by running the compressor intermittently, automatically turning it on and off as necessary to maintain proper temperatures. The compressor is started and stopped through the use of an electro-magnetic clutch and a thermostat affected by variations in temperature.

The thermostatic switch incorporates a metallic tube which contains a highly expansive gas. This tube is located in the air stream as it leaves the evaporator. The tube leads to a bellows operated switch. As air temperature rises, the gas inside the tube expands, travels through the tube to the bellows and closes the electrical switch which engages the compressor clutch.

As soon as the compressor starts running, the temperature begins to go down. As the air being cooled gets colder, the gas in the thermostatic tube begins to reduce the pressure on the switch bellows. This allows the switch contact to open and the compressor clutch disengages.

Pressure Cycling Switch - Low Refrigerant Charge Protection System-CK&G Series

Low refrigerant charge protection is afforded by the pressure cycling switch as a secondary function. When refrigerant pressure drops below a certain predetermined level, the switch opens the compressor clutch circuit, shutting the system off.

SYSTEM CONTROLS

C60 SYSTEM (C-K and G SERIES) - FIG. 1B-5

System Operation - CK Truck

System operation is as illustrated in Fig. 1B-6.

Vacuum Schematic - CK Truck

The CK Truck air conditioning vacuum schematic is illustrated in Figure 1B-7.

System Operation - G Models

System operation is illustrated in Fig. 1B-8.

Vacuum Schematic - G Models

G Model vacuum schematic is illustrated in Fig. 1B-9.

OVERHEAD SYSTEM (C-K and G SERIES)

This system operates in conjunction with the C60 System. Since refrigerant flow is controlled by the front system, the only control provided for on the overhead system is a three-speed fan switch (LOW, MED, HI). The fan switch is mounted in the instrument panel, to the right of the steering coloumn (fig. 1B-10).

In the OFF position, the blower is inoperative; however, refrigerant is circulating in the system if the C60 System is ON. In any of the three blower positions (LOW, MED, HI), the blower will be operative regardless if the Four-Season System is ON.

To obtain maximum cooling, the Four-Season System should be on A/C, temperature lever on COLD, blower switch on HI and the overhead unit blower switch should be on HI.

OVERHEAD SYSTEM (G MODELS)

This system operates in conjunction with the C60 system. Since refrigerant is controlled by the C60 system, the only control provided on the rear overhead system is a three speed blower switch (fig. 1B-11).

In the OFF position, the blower is inoperative; however, refrigerant is circulating in the system if the front system is ON. To operate the rear overhead system, simply select the desired blower speed (LOW, MED, HI).

When air circulation only is desired, the rear A/C blower motor may be operated independent of the front A/C blower motor and without the cooling function.

DASH MOUNTED UNIT (MOTOR HOME CHASSIS UNITS)

This system is self contained and is mounted below the dash by the body manufacturer. System controls consist of an AIR knob and TEMP knob located in the center of the unit face plate (fig. 1B-12).

Air Knob

Turning the AIR knob clockwise operates a three speed (LOW-MED-HI) blower motor.

Temp Knob

This knob is used to control the degree of cooling desired. Fully clockwise at CITY provides maximum cooling, while turning the knob to HIWAY provided adequate cooling for highway operation.

Reduced cooling could be encountered when operating at highway speeds with the controls at the CITY setting. The heater must be fully off to obtain maximum cooling.

CCOT SYSTEM COMPONENTS

CCOT Refrigerant System components and refrigerant flow are illustrated in Figure 1B-13. Chart 1B-1 shows pressure temperature relationships of R-12.

Refrigerant and Oil Capacities

Refrigerant and oil charge is shown in Chart 1B-2.

PRECAUTIONS IN HANDLING REFRIGERANT-12

1. Do not leave drum of Refrigerant-12 uncapped.
2. Do not carry any container of Refrigerant-12 in passenger compartment of car.
3. Do not subject any container of Refrigerant-12 to high temperature.
4. Do not weld or steam clean on or near system.
5. Do not fill drum of Refrigerant-12 completely.
6. Do not discharge vapor into area where flame is exposed.
7. Do not expose eyes to liquid.

CAUTION: If Refrigerant-12 liquid should strike the eye, call a doctor immediately.

a. DO NOT RUB THE EYE. Splash the affected area with quantities of cold water to gradually get the temperature above the freezing point.

b. The use of an antiseptic oil is helpful in providing a protective film over the eyeball to reduce the possibility of infection.

ELECTRICAL/VACUUM TROUBLE DIAGNOSIS

When diagnosing problems in the electrical and vacuum systems of the air conditioning system, consult electrical wiring diagrams and vacuum diagrams.

Ports on rotary vacuum valves are illustrated in a manner to provide simplicity in following vacuum schematic lines but are numbered in consecutive order on the actual valve.

Operational Test

To aid in determining whether or not the air conditioning electrical, air, vacuum and refrigeration systems are operating properly and efficiently, a table of performance characteristics is shown in Chart 1B-3.

1. Operation of the air conditioning blower at all four speeds and engagement of the compressor clutch would indicate that electrical circuits are functioning properly.

2. The same hand-felt temperature of the evaporator inlet pipe AND the accumulator can surface of an operating system would indicate a properly charged Refrigeration-12 system.

3. Operation of the A/C control selector (mode) lever to distribute air from designed outlets would indicate proper vacuum and diaphragm function.

VACUUM SYSTEM DIAGNOSIS

(C-K-G C60 SYSTEM)

Start the engine and allow it to idle - move the selector lever to each position and refer to the vacuum diagrams and operational charts for proper airflow, air door functioning and vacuum circuits. If air flow is not out of the proper outlets at each selector lever position, then proceed as follows:

1. Check for good hose connections--at the vacuum actuators, control head valve, reservoir, tees, etc.

2. Check the vacuum source circuit as follows:

Install vacuum tee and gage (with restrictor) at the vacuum tank outlet (see Vacuum Diagram). Idle the engine and read the vacuum (a normal vacuum is equivalent to manifold vacuum) at all selector lever positions.

a. Vacuum Less Than Normal At All Positions -

Remove the tee and connect the vacuum gage line directly to the tank - read the vacuum. If still low, then the problem lies in the feed circuit, the feed circuit to the tank or in the tank itself. If vacuum is now normal, then the problem lies downstream.

b. Vacuum Less Than Normal at Some Positions -

If vacuum was low at one or several of the selector lever positions, a leak is indicated in these circuits.

c. Vacuum Normal at All Positions -;

If vacuum was normal and even at all positions, then the malfunction is probably caused by improperly connected or plugged lines or a defective vacuum valve or valves.

3. Specific Vacuum Circuit Check

Place the selector lever in the malfunctioning position and check for vacuum at the pertinent vacuum actuators. If vacuum exists at the actuator but the door does not move, then the actuator is defective or the door is mechanically bound. If low or no vacuum exists at the actuator, then the next step is to determine whether the cause is the vacuum harness or the vacuum valve. Check the vacuum harness first.

4. Vacuum Harness Circuit Check

a. Disconnect the vacuum harness at the control head.

b. The black line (#1) should show engine vacuum - if not, trace back through connector to vacuum tank.

c. To check any individual circuit place the selector lever at the involved circuit position and check for vacuum presence.

VACUUM AND WIRING DIAGRAMS

Refer to Figures 1B-14 thru 1B-22.

INSUFFICIENT COOLING "QUICK-CHECK" PROCEDURE

The following C.C.O.T. "Hand-Feel" procedure can be used to quickly determine whether or not the A/C system has the proper charge of Refrigerant-12 (providing ambient temperature is above 70°F (21°C). This check can be made in a matter of minutes, simplifying system diagnosis by pinpointing the problem to the amount of R-12 charge in the system or by eliminating this possibility from the overall checkout.

1. Engine must be warm (CHOKE OPEN and OFF FAST IDLE SPEED CAM).
2. Hood and body doors open.
3. Selector lever set at NORM.
4. Temperature lever at COLD.
5. Blower on HI.
6. Normal engine idle.
7. "Hand-Feel" temperature of evaporator inlet pipe AND accumulator can surface with compressor engaged.

a. BOTH SAME TEMPERATURE AND SOME DEGREE COOLER THAN AMBIENT--Proper condition: check for other problems (see A/C System Diagnostic Procedure).

b. INLET PIPE COOLER than accumulator surface low refrigerant charge.

- Add slight amounts (1/4 lbs.) of refrigerant UNTIL BOTH feel the same temperature. Allow stabilization time between additions.
- Then add 480 ml (14 oz.) (1 can) additional refrigerant.

c. INLET PIPE HAS FROST ACCUMULATION-Accumulator surface warmer; proceed as in Step b above.

Engine Idle Compensator

On V8 Engines, with factory installed air conditioning systems, the compensator is located within the carburetor and is accessible when the engine air cleaner is removed.

All compensators are factory set and non adjustable.

A malfunctioning unit should be replaced.

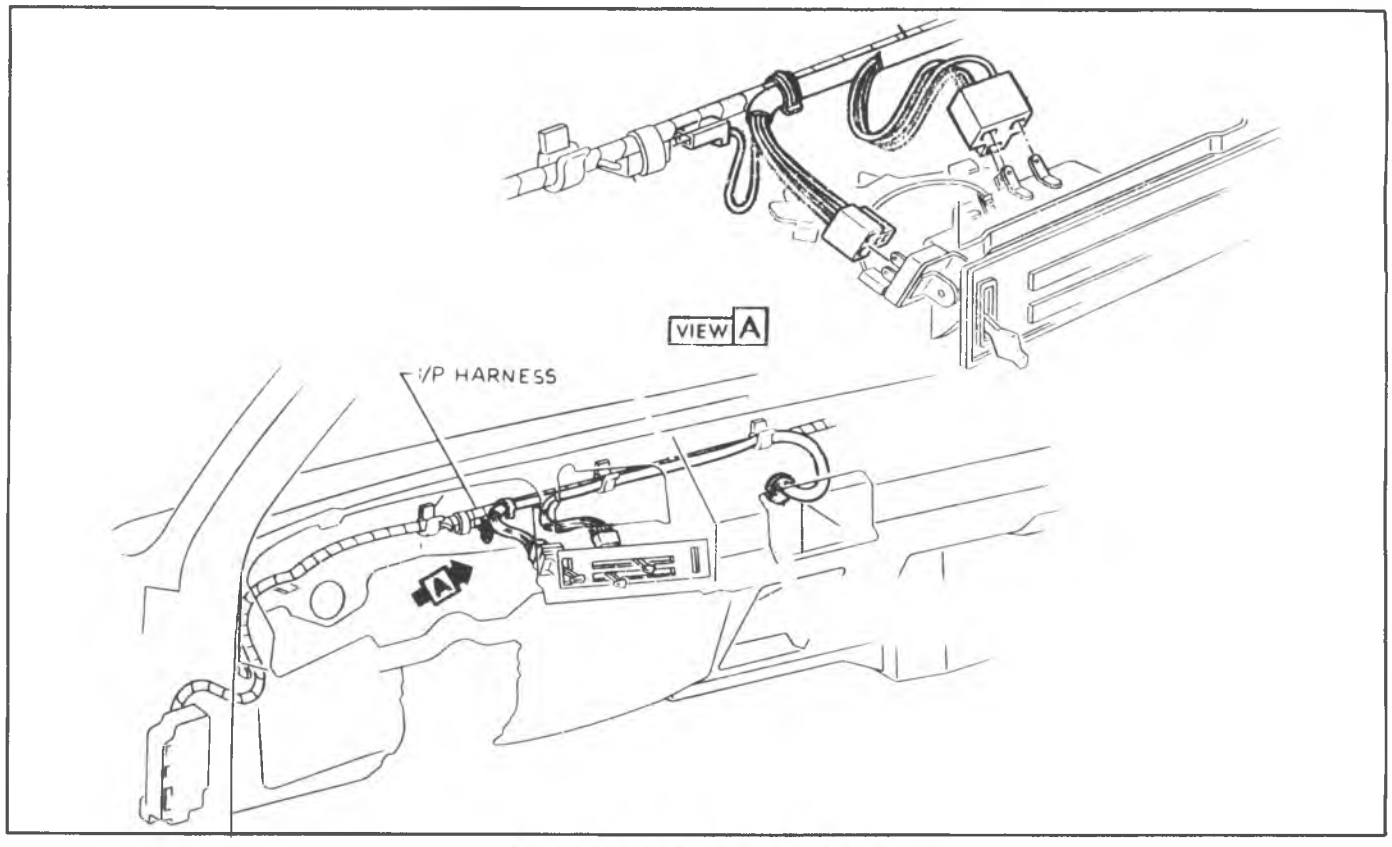


Fig. 1B-20–I.P. A/C Harness Wiring

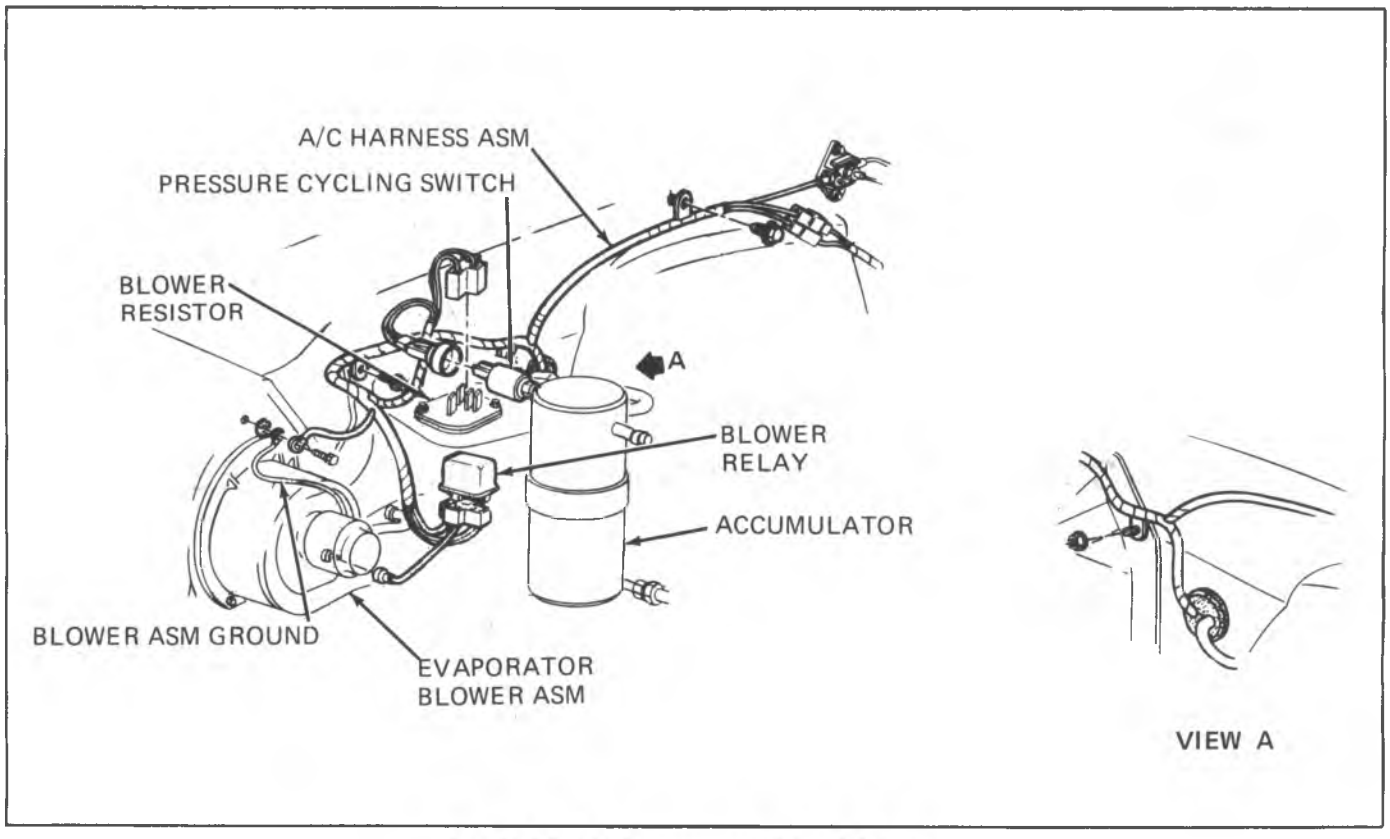


Fig. 1B-21–A/C Compressor Wiring-CK Series

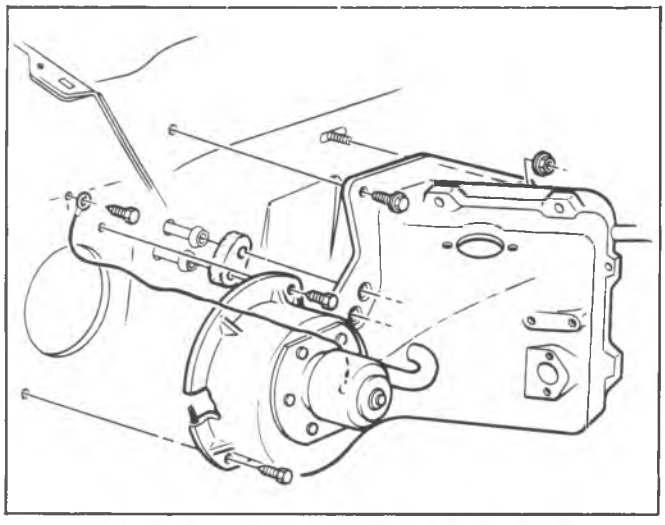


Fig. 1B-28–Blower-Evaporator (C-K Series)

EXPANSION TUBE-CK, G

The expansion tube is located in the evaporator core inlet line.

Replacement

1. Discharge system.
2. Disconnect the condenser to evaporator line at the evaporator inlet. Cap the open line at once.
3. Using needle-nose pliers, remove the expansion tube from the evaporator core inlet line.
4. Remove the expansion tube "O" ring from the core inlet line.
5. To install, reverse Steps 1-4 above.

Install the expansion tube using a new "O" ring coated with clean regrigeration oil, by inserting the short screen end of the tube into the evaporator inlet line.

6. Evacuate, charge and check the system.

SELECTOR DUCT AND HEATER CORE ASSEMBLY-CK

Replacement (Fig. 1B-30)

1. Disconnect the battery ground cable.
2. Drain the radiator and remove the heater hoses from the core tubes. Plug the core tubes to prevent coolant spillage during removal.
3. Remove the glove box and door as an assembly.
4. Remove the center duct to selector duct and instrument panel screws and remove the center lower and center upper ducts.
5. Disconnect the bowden cable at the temperature door.
6. Remove the nuts from the three selector duct studs projecting through the dash panel.
7. Remove the selector duct to dash panel screw (inside vehicle).
8. Pull the selector duct assembly rearward until the core tubes clear the dash panel. Lower the selector assembly far enough to gain access to all vacuum and electrical harnesses.
9. Disconnect the vacuum and electrical harness and remove the selector duct assembly.
10. Remove the core mounting strap screws and remove the core.
11. To install, reverse Steps 1-10 above.
12. Refill coolant system and connect the battery ground strap. Check temperature door cable adjustment.

KICK PAD VALVE - CK SERIES

Replacement (Fig. 1B-31)

1. Disconnect the vacuum hose at the actuator.
2. Unhook the valve return spring at the actuator end.
3. Remove the actuator bracket mounting screws.
4. Remove the cam to actuator arm screw and separate the actuator and bracket from the cam.
5. Remove the actuator to bracket nuts and separate the actuator and bracket.
6. To install reverse Steps 1-5 above.

PLENUM VALVE - CK SERIES

Replacement (Fig. 1B-31)

1. Raise the hood.
2. Remove the cowl plastic grille.
3. Remove the three cowl to valve assembly screws and remove the valve assembly from the vehicle.
4. Remove the actuator arm push nut.
5. Remove the actuator to valve nuts and separate the valve and actuator.
6. To install, reverse Steps 1-5 above.

CONTROL ASSEMBLY - CK SERIES

Removal (Fig. 1B-32)

1. Disconnect the battery ground cable.
2. Remove the radio as outlined in Section 8 of this manual.
3. Remove the instrument panel bezel.
4. Remove the control to instrument panel screws and lower the control far enough to gain access to the control assembly.

Be careful not to kink the bowden cable.

5. Disconnect the bowden cable, vacuum harness and electrical harness at the control.
6. Remove the control.
7. If a new unit is being installed, transfer the master blower switches to the new control.
8. To reinstall, reverse Steps 1-6 above. Check control operation.

TEMPERATURE DOOR CABLE ADJUSTMENT - CK MODELS

1. Remove glove box and door assembly.
2. Loosen the cable attaching screw at the selector duct assembly.
3. Make sure the cable is installed in the bracket on the selector duct assembly.
4. Place temperature lever in full COLD position and hold while tightening cable attaching screw.

MASTER SWITCH AND/OR BLOWER SWITCH - CK SERIES

The master switch is located on rear of the control assembly.

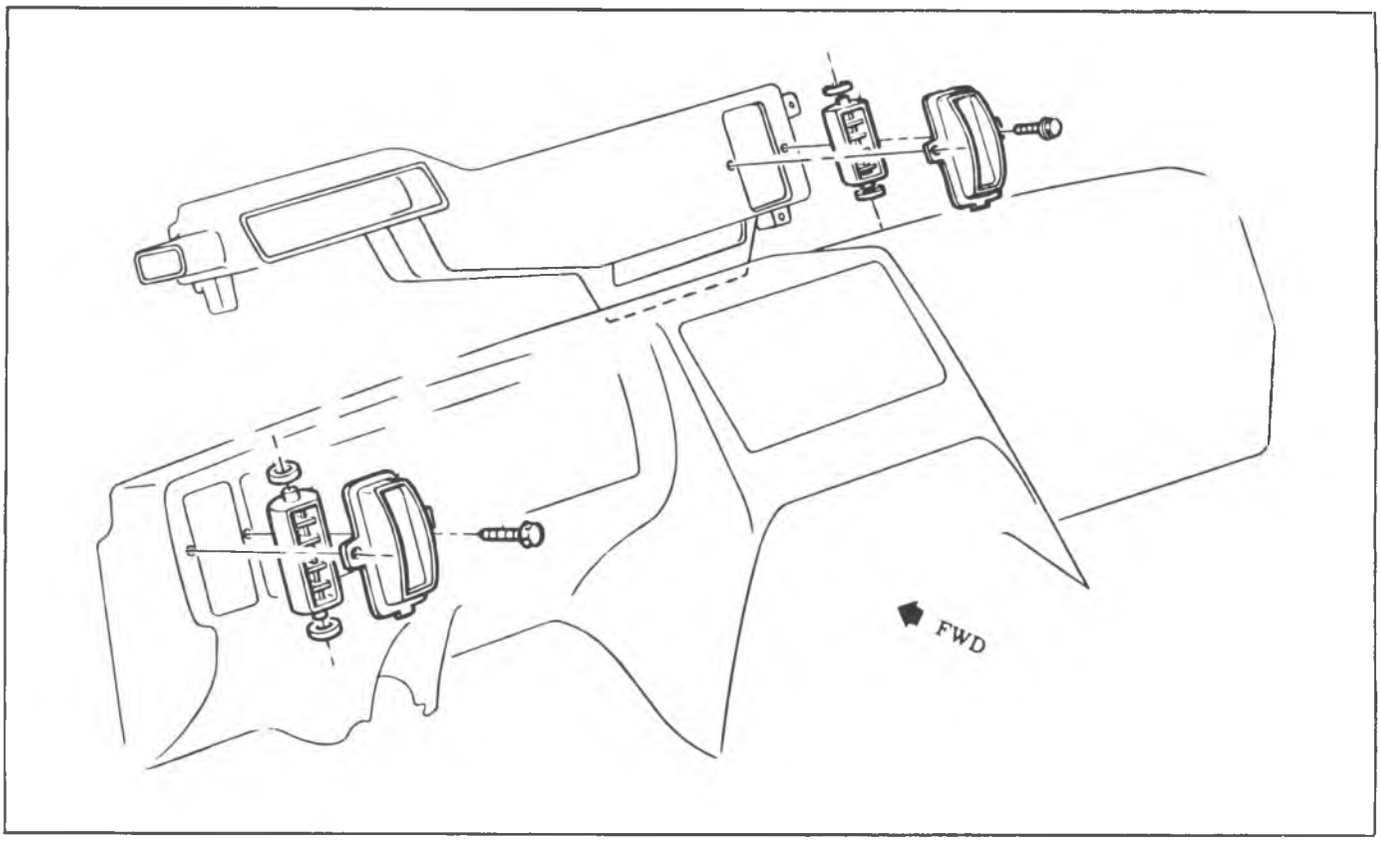


Fig. 1B-47--Air Deflector Outlets (G Series C60 System)

3. To install, reverse Steps 1-3 above.

BLOWER MOTOR RELAY - G SERIES

Replacement (Fig. 1B-49)

1. Disconnect electrical harness at the relay.
2. Remove the relay mounting screw and remove the relay.

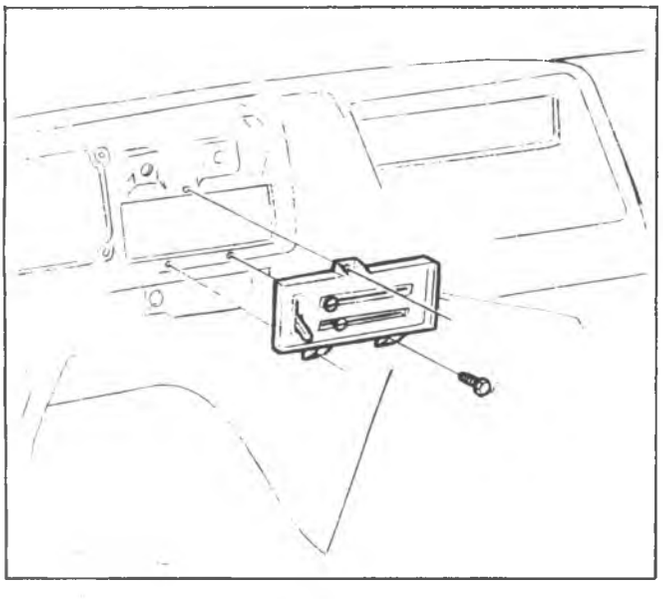


Fig. 1B-48--Control (G Series C60 System)

3. To install, reverse Steps 1-3 above.

CENTER A.C OUTLET - G SERIES

Replacement

1. Disconnect negative battery cable.
2. Remove engine cover (see Section 6A).
3. Remove steering column to I.P. attaching screw.
4. Remove radio support bracket screw.
5. Remove I.P. attaching screws.
6. Pull right side of I.P. rearward.

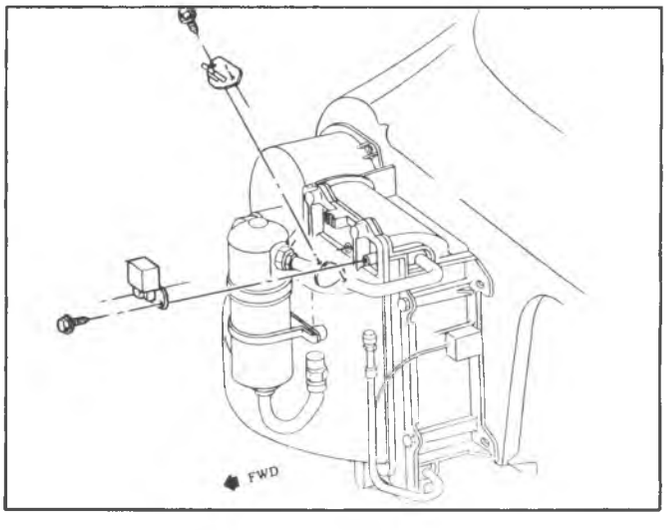


Fig. 1B-49--Blower Motor Relay

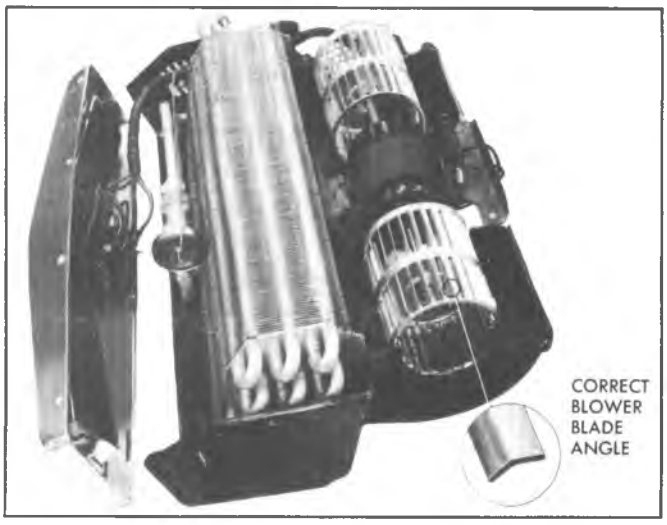


Fig. 1B-71–Blower Assembly (Motor Home Chassis Unit)

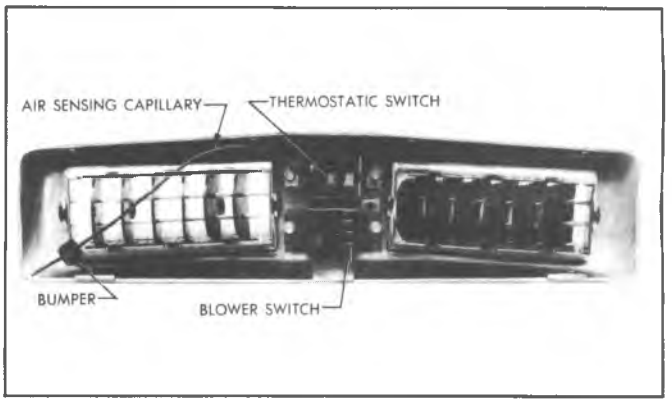


Fig. 1B-73–Thermostatic and Blower Switches

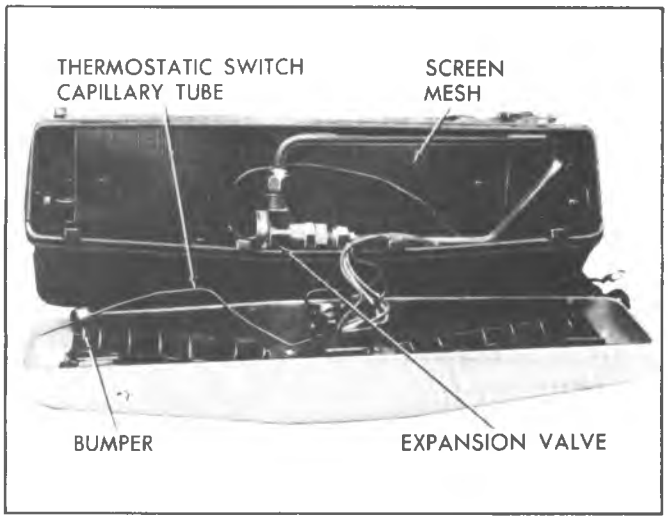


Fig. 1B-72–Expansion Valve (Motor Home Chassis Unit)

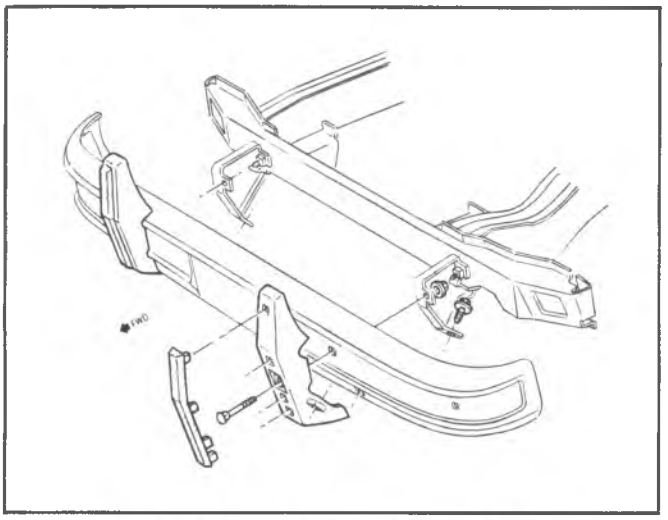


Fig. 2B-6–G-Models Front Bumper Guards

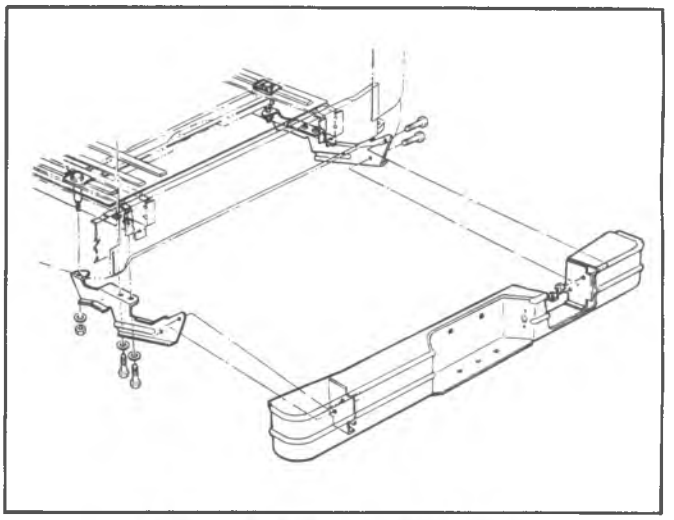


Fig. 2B-8–G-Model Rear Step Bumper

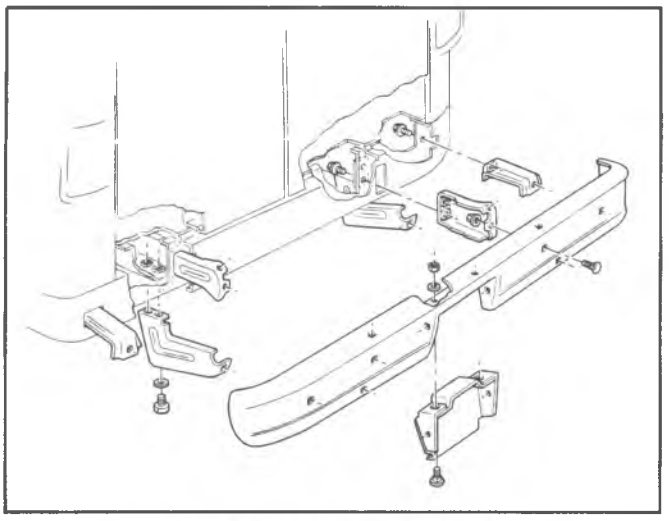


Fig. 2B-7–Rear Bumper-G Models

SPECIFICATIONS

TORQUE SPECIFICATIONS C, P AND K

Front Bumper	35 ft.-lbs.
Front Bumper Bracket and Brace	70 ft.-lbs.
Rear Bumper to Outer Bracket	35 ft.-lbs.
Rear Bumper Outer Bracket and Brace	50 ft.-lbs.
License Plate Bracket	18 ft.-lbs.
Gravel Deflector	85 in.-lbs.
Rear Step Bumper to Bracket or Frame	40 ft.-lbs.

TORQUE SPECIFICATIONS G

Front Face Bar to Bracket	24 ft.-lbs.
Bracket to Cross Sill	24 ft.-lbs.
License Plate Bracket to Face Bar	100 in.-lbs.
Rear Face Bar to Brackets	55 ft.-lbs.
Bracket to Floor	55 ft.-lbs.

Fig. 2B-ST–Specifications

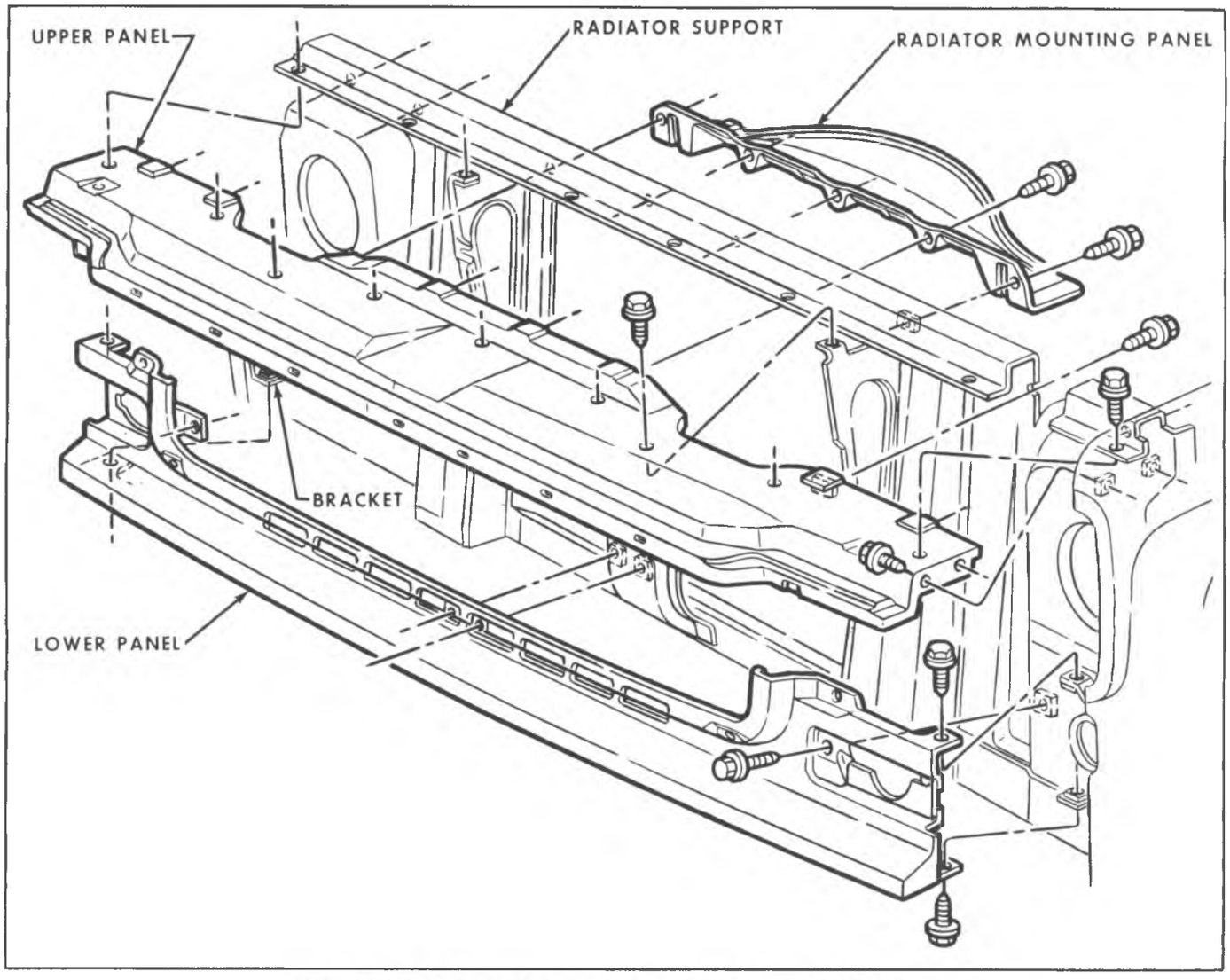


Fig. 2C-20–Radiator Upper and Lower Grille Panels–CK Models

11. Install radiator coolant recovery tank hoses and shroud.
12. Connect removed wiring to radiator support.
13. Install both head lamp assemblies.
14. Tighten all previously installed bolts and screws.
15. Install battery and connect leads and wires.
16. Install grille assembly.
17. Fill radiator with coolant as specified in Section 13.
18. Install hood on previously marked outline.

FRONT FENDER (FIG. 2C-19)

Removal

1. Remove hood and hinge assembly.
2. Remove head lamp bezel, wiring and attachments from fender.
3. Remove screws attaching upper and lower radiator grille panels.
4. Remove screws attaching fender wheel opening flange to skirt.
5. Remove skirt to fender bolts, located inboard on underside of skirt.
6. Remove two (2) screws attaching support bracket to fender.
7. Remove five (5) screws attaching radiator support to front fender.
8. Remove bolt and shim attaching trailing edge of fender to hinge pillar.
9. Remove two bolts and shims at top rear of fender attaching to cowl.

Installation

To install, reverse the removal procedure using sealing tape between filler panel and fender. Check sheet metal alignment.

FRONT FENDER AND SKIRT (FIGS. 2C-18 AND 2C-19)

Removal

1. Remove hood and hood hinge assembly.
2. Disconnect and remove battery (right side or auxiliary left side).
3. Remove head lamp bezel, wiring and attachments from fender.

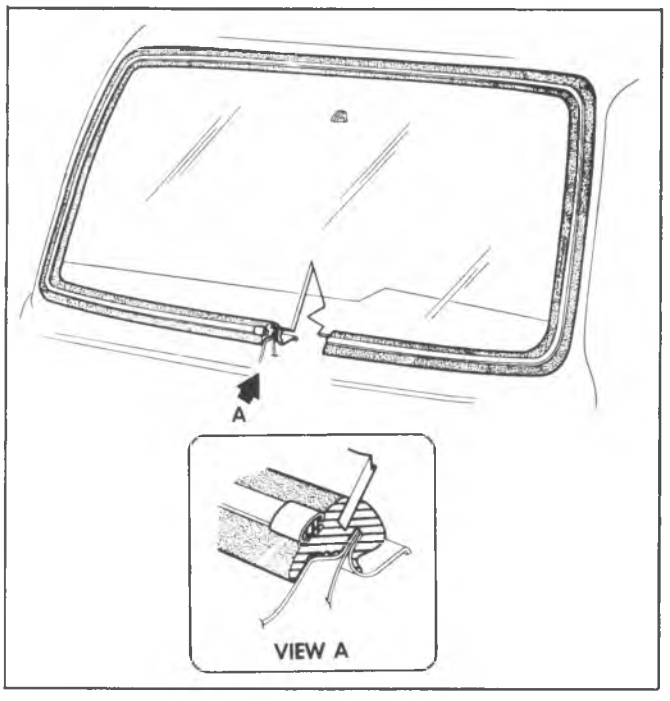


Fig. 2D-13–Typical Windshield

When replacing a cracked windshield glass, it is very important that the cause of the glass breakage be determined and the condition corrected before a new glass is installed. Otherwise, it is highly possible that a small obstruction or high spot somewhere around the windshield opening will continue to crack or break the newly installed windshield especially when the strain on the glass caused by this obstruction is increased by such conditions as wind pressures, extremes of temperature, motion of the vehicle, etc.

To replace a window installed with urethane adhesive requires replacement of the adhesive material. Adhesive service kits No. 1052420 and No. 9631000 contain some of the materials needed to remove and replace a urethane adhesive installed glass. These kits and other materials that may be required can be obtained through the service parts system. The components of glass adhesive kits (urethane) No. 1052420 and 9631000 are as follows:

1. One tube of urethane adhesive material.
2. One dispensing nozzle.
3. Steel music wire.
4. Rubber cleaner.
5. Rubber primer.
6. Pinch-weld primer.
7. Blackout primer.
8. Filler strip (for use on windshield installations on vehicles equipped with embedded windshield antenna).
9. Primer applicators.

Additional Material Required:

1. Rubber lubricant No. 1051717 (available through the service parts system).
2. Alcohol for cleaning edge of glass.
3. Adhesive dispensing gun No. J-24811 or a standard household cartridge type gun reworked as follows:

Fig. 2D-14–Applying Pressure to Windshield

a. Widen end slot to accept dispensing end of adhesive material tube.

b. Reduce diameter of plunger disc on rod so that disc can enter large end of adhesive material tube.

4. Commercial type razor knife (for cutting around edge of glass).
5. Weatherstrip tool set J-2189.
6. Six glass spacers J-22577 (for checking windshield glass to opening).

Removal

1. Before removing the windshield, mark the location of the break on the windshield rubber channel and the body. Protect the paint finish inside of the cab. Mask around the windshield opening and outside, lay a suitable covering across the hood and fenders.
2. Remove windshield reveal molding (lock strip) and reveal molding cap.
3. To free windshield rubber channel of weatherstrip loosen the lip of the windshield weatherstrip from the pinchweld flange along the top and at the sides by applying firm, controlled pressure to the edge of the glass. At the

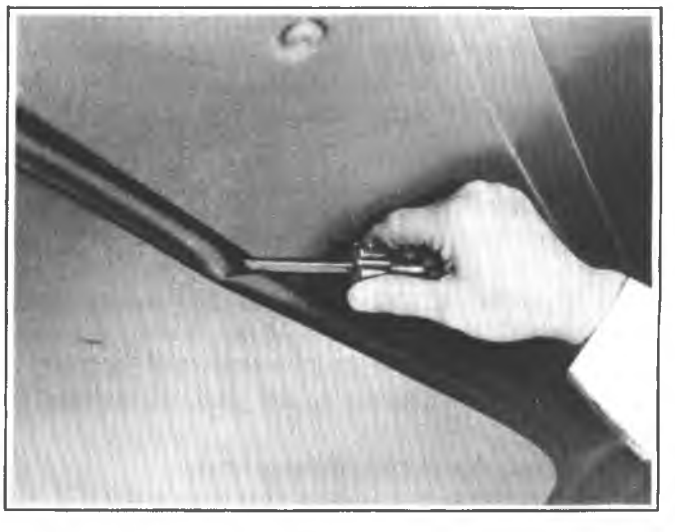


Fig. 2D-15–Assisting Weatherstrip over Flange

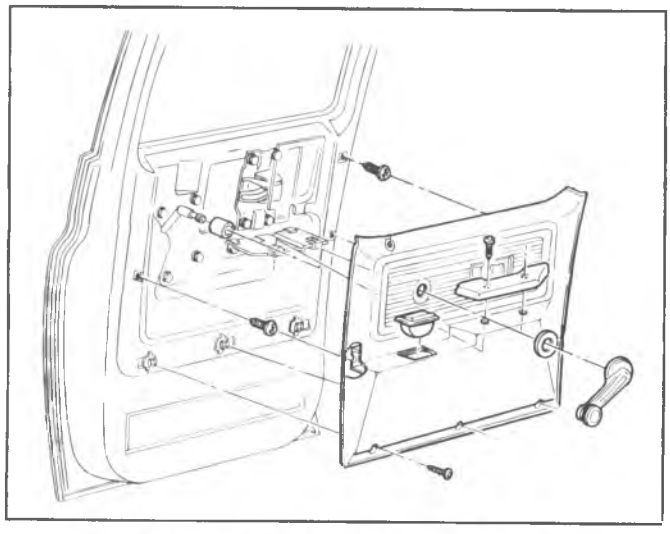


Fig. 2D-43–Side Rear Door Trim Pad

STATIONARY GLASS–REAR DOOR

Replacement

1. Lower window to full down position.
2. Remove remote control knob and window regulator handle.
3. Remove screws retaining door trim pad, and remove trim pad. See figure 2D-43.
4. Remove glass run channel by removing screws retaining channel to door. See figure 2D-44.
5. Remove stationary glass.
6. Replace glass by reversing above procedure.

Glas Run Channel Adjustment

Figure 2D-45 illustrates the front run channel. At the lower end, a slotted bracket provides for in-and-out adjustment. The screw and locknut at that bracket allow fore-and-aft adjustment. Together, this allows proper alignment of the glass to the rear glass run channel for full up and down travel.

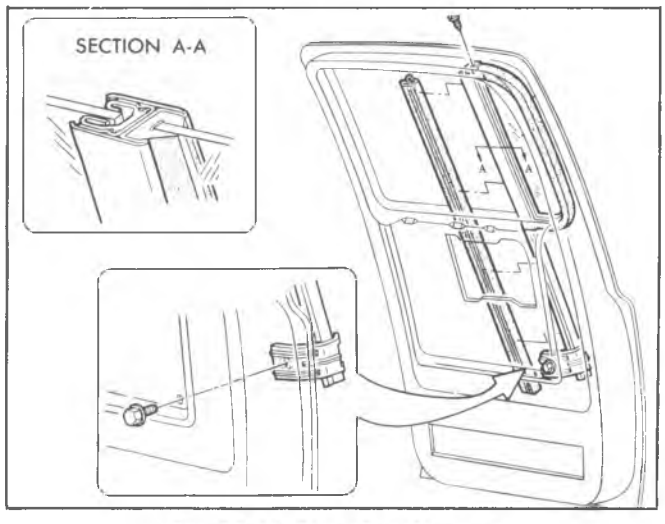


Fig. 2D-44–Glass Run Channel

Fig. 2D-45–Glass Run Channel Adjustment

WINDOW GLASS–FIG. 2D-46

Replacement

1. Lower glass to full down position.
2. Remove remote control push botton knob, window regulator handle and trim pad.
3. Remove stationary glass as previously outlined. Remove screws from rear division channel, and slide channel rearward in the opening.
4. Raise glass as far as possible, then slide glass until the roller is in line with the notch in the sash channel. See figure 2D-46. Disengage roller from channel.
5. Tilt window outboard and move until other roller can be removed from channel.
6. Raise window up and out.
7. Reverse above procedure for installation.

WINDOW REGULATOR ASSEMBLY–FIG. 2D-46

Replacement

1. Remove trim pad, stationary glass, and window glass as outlined earlier.
2. Remove screws attaching regulator assembly to door inner panel.
3. Remove regulator assembly through opening in door.
4. Install regulator by reversing above procedure. Lubricate regulator gear with lubriplate or equivalent.

LOCKS HANDLES AND RODS

Lock Assembly–Fig. 2D-47

Replacement

1. Remove window regulator handle, remote control push button knob and trim pad as outlined previously.
2. Disengage three clips which retain control rods to lock assembly.

SEATS

SEAT BELTS

SERVICING LAP AND SHOULDER BELTS - ALL MODELS

Before servicing or replacing lap and shoulder belts, including single loop belt systems, refer to the following precautionary items:

1. Lap and shoulder belts will be serviced as follows:

a. All belts will be serviced in complete sets.

b. Do not intermix standard and deluxe belts on front or rear seats.

2. Keep sharp edges and damaging objects away from belts.

3. Avoid bending or damaging any portion of the belt buckle or latch plate.

4. Do not bleach or dye belt or strap webbing (clean with a mild soap solution and water).

5. When installing lap or shoulder belt anchor bolt, start bolt by hand to assure that bolt is threaded straight.

6. Do not attempt repairs on lap or shoulder belt retractor mechanisms or lap belt retractor covers. Replace defective assemblies with new service replacement parts.

7. Do not attempt to remove seat belt retractor cover. The cover and the long rivet securing the cover to the retractor are not available as service replacement parts.

LAP BELTS AND SHOULDER BELTS

The shoulder belts and lap belts are attached to the front seat lap belt latch plate and connected to an inertia locking retractor installed to the floor or quarter inner panel above the right and left side of the front seat. The belts remain unlocked to allow occupants to move freely while the vehicle is being operated. When the vehicle decelerates or changes direction abruptly, the belts are locked in position by a pendulum that causes a locking bar to engage a cog of the retractor mechanism.

Removal and Installation

Refer to illustrations on following pages and select the appropriate illustration for removing and installing lap belts and shoulder belts.

Internal drive thread-forming anchor bolts are used to secure lap belts to the floor pan. To remove or install internal drive anchor bolts, use door lock striker and lap belt anchor bolt removal tool J-23457 or equivalent. Start bolt by hand to assure that bolt is threaded straight.

SEAT MOUNTING

Typical Seat Mounting provisions are shown in figures 2D-83 through 2D-89.

NOTICE: See NOTICE on page 1 of this section regarding fasteners used on seats and seat belts.

SEAT SEPARATOR COMPARTMENT

Figure 2D-90 illustrates assembly and installation of the CK model seat separator compartment.

BODY MOUNTING

The sequence of mounting attachments is shown in figures 2D-91 through 2D-94.

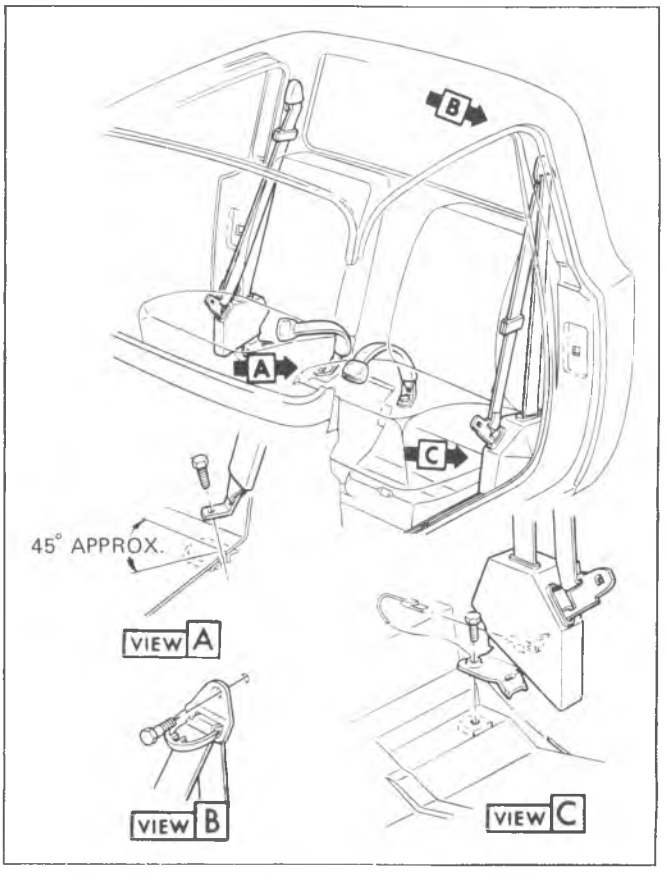


Fig. 2D-80--Seat Belt Installation (03) Models

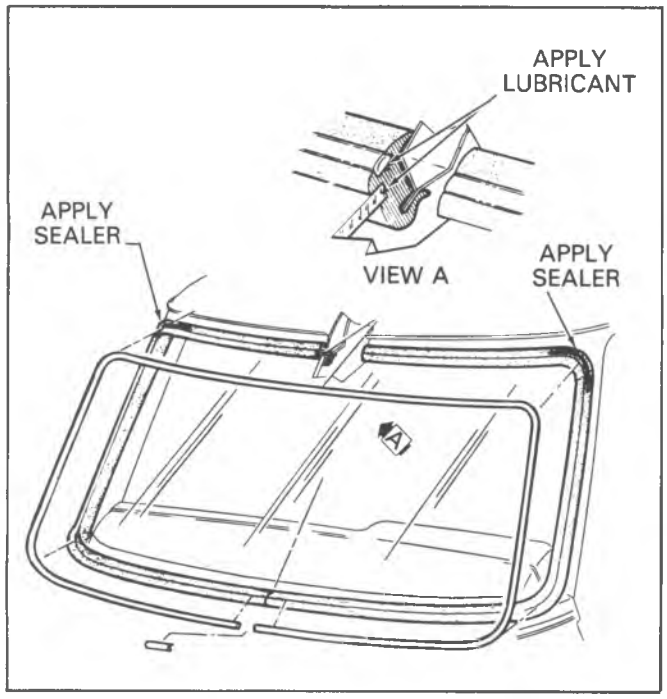


Fig. 2D-101–Windshield Glass

2. Do not try to remove reveal moldings while windshield is in body opening. Remove reveal molding from custom weatherstrip retention groove after windshield is removed from body opening.

3. To free windshield rubber channel of weatherstrip loosen the lip of the windshield weatherstrip from the pinchweld flange along the top and at the sides by applying firm, controlled pressure to the edge of the glass. At the same time assist the lip of the rubber weatherstrip channel over the pinchweld flange with a flat bladed tool.

Checking Windshield Opening

Due to the expanse and contour of the windshield it is imperative in the event of a stress crack that the windshield opening be thoroughly checked before installing a replacement windshield. The replacement glass is used as a template.

1. Check for the following conditions at the previously marked point of fracture.

a. Chipped edges on glass.

b. Irregularities in body opening.

c. Irregularities in rubber channel weatherstrip.

2. Remove all sealer from flange and body around windshield opening.

3. Check flange area for solder, weld high spots, or hardened spot-weld sealer. Remove all high spots.

4. Check windshield glass to opening, by supporting glass with six spacers contained in packet J-22577, as shown in figure 2D-102.

It is necessary to modify the spacers by cutting off 3/16″ from the back of the spacer with a knife, as shown in figure 2D-102.

NOTICE: Do not strike glass against body metal. Chipped edges on the glass can lead to future breaks.

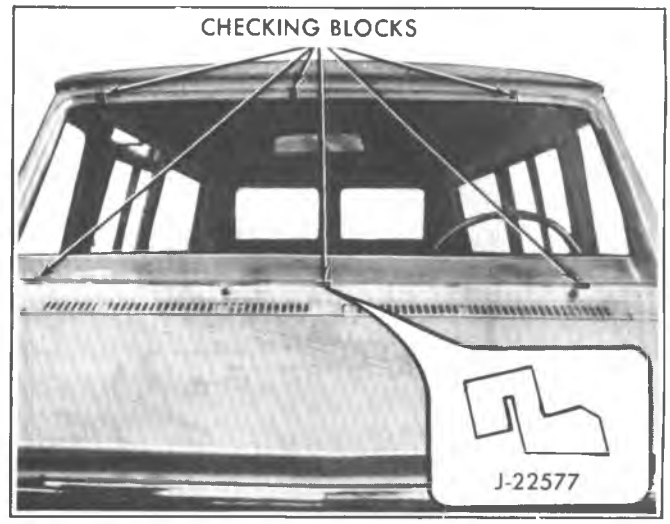


Fig. 2D-102–Checking Windshield Opening

5. With the windshield supported and centered in its opening, check the relationship of the glass to the body opening flange around the entire perimeter of the glass.

6. Check the relationship of glass to opening as follows:

a. Inside edge of glass to body flange.

b. Outer edge of glass to parallel body metal.

7. Mark areas of body metal or flange to be reformed, remove glass and correct as necessary.

8. Recheck windshield in its opening and if satisfactory proceed as follows:

Installation

Installation procedure is same as procedure used for CK models, with the exception of the steps relating to urethane adhesive. Refer to "CK Truck Windshield Replacement" found earlier in this section.

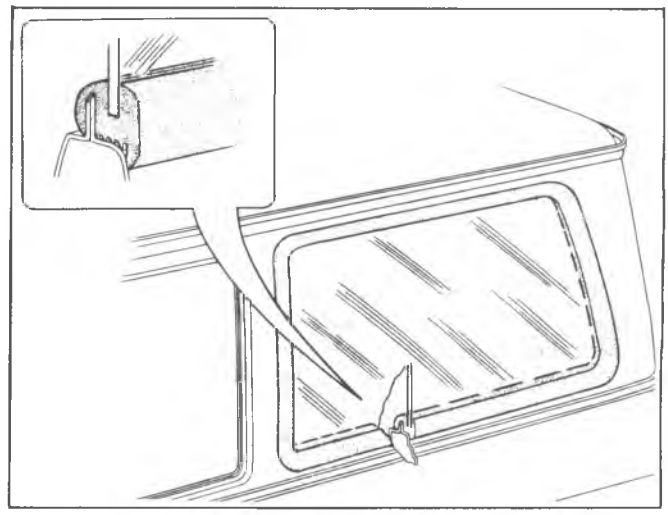


Fig. 2D-104–Body Window Glass

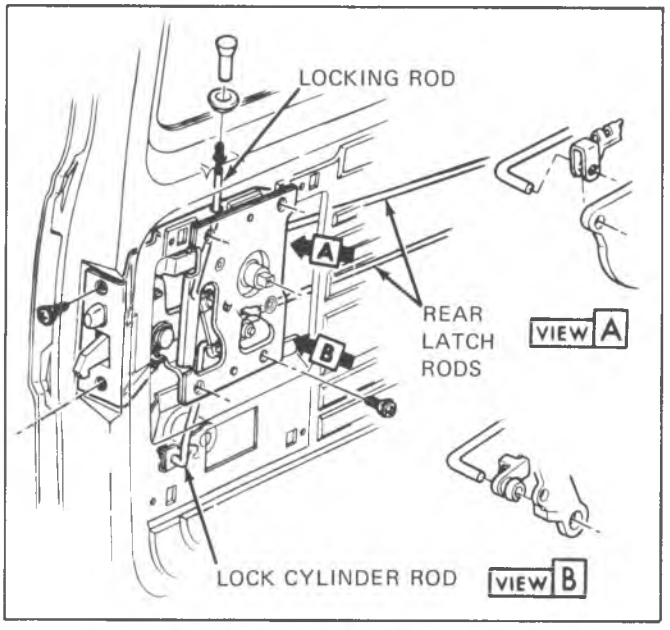


Fig. 2D-121–Sliding Door Front Latch

Installation

1. Install latch assembly into door by working latch assembly behind the lower hinge door catch.
2. Connect lower hinge door catch, lock cylinder rod, door lock rod, and both rear latch rods.
3. Install latch assembly-to-door attaching screws. Torque to specifications.
4. Install door lock knob and door handle.
5. Install access cover and trim panel.
6. Adjust door front striker as outlined earlier under "Adjustments".

REAR LATCH AND/OR LATCH ACTUATING RODS

Removal

1. Remove trim panel (if so equipped).
2. Remove front latch assembly access cover.

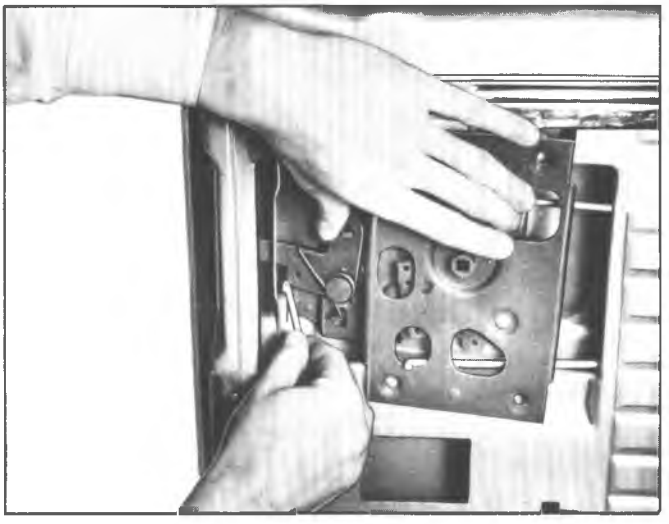


Fig. 2D-122–Disconnecting Lower Latch Rod from Latch

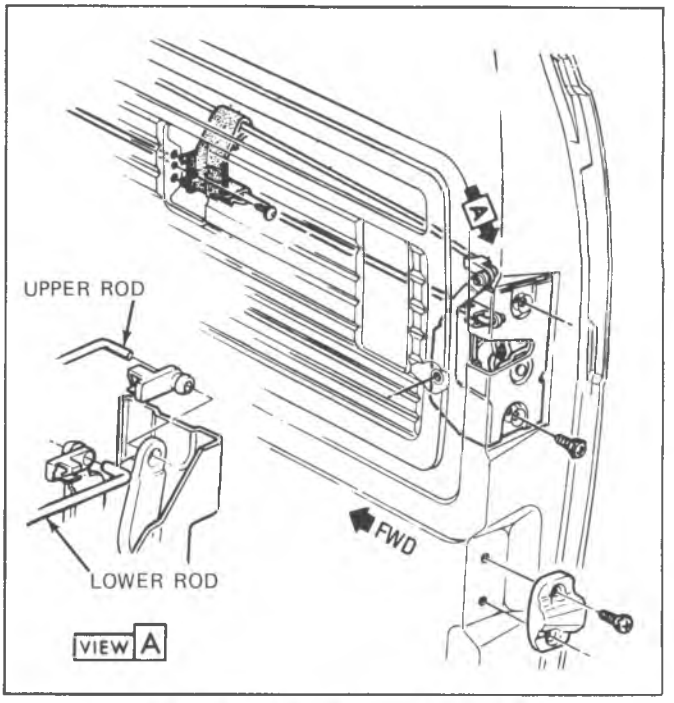


Fig. 2D-123–Sliding Door Rear Latch

3. Disconnect rear latch rods from front latch assembly, shown in figure 2D-121.
4. Remove rear latch attaching screws. See figure 2D-123.
5. Slide rear latch toward front of door until rod clips become exposed. Disconnect rod clips and remove latch from door.

Installation

1. Connect rods to latch and install latch to door. Torque screws to specifications.
2. Connect rods to front latch assembly.
3. Install access covers and trim panels (if so equipped).
4. Adjust rear latch striker as outlined earlier under "Adjustments".

UPPER REAR HINGE

Removal

1. Remove the hinge cover and rear track cover. See figures 2D-118 and 2D-124.
2. Open the door.
3. Disengage spring from bolt, using a spring removal tool.
4. Close the door.
5. Remove the hinge assembly.

Installation

When holding hinge assembly as in figure 2D-126, the lower latch must engage cam.

1. Install hinge assembly to door. Torque bolts to specifications.
2. Check and adjust latch to striker position as outlined under "Adjustments".

SECTION 3A

FRONT ALIGNMENT

CONTENTS

GENERAL DESCRIPTION

FRONT ALIGNMENT

The term "front alignment" refers to the angular relationships between the front wheels, the front suspension attaching parts and the ground.

The pointing in or "toe-in" of the front wheels, the tilt of the front wheels from vertical (when viewed from the front of the vehicle) and the tilt of the suspension members from vertical (when viewed from the side of the vehicle), all these are involved in front alignment. The various factors that enter into front alignment are covered here each one under its own heading.

CASTER

Caster is the tilting of the front steering axis either forward or backward from the vertical (when viewed from the side of the vehicle). A backward tilt is said to be positive (+) and a forward tilt is said to be negative (–).

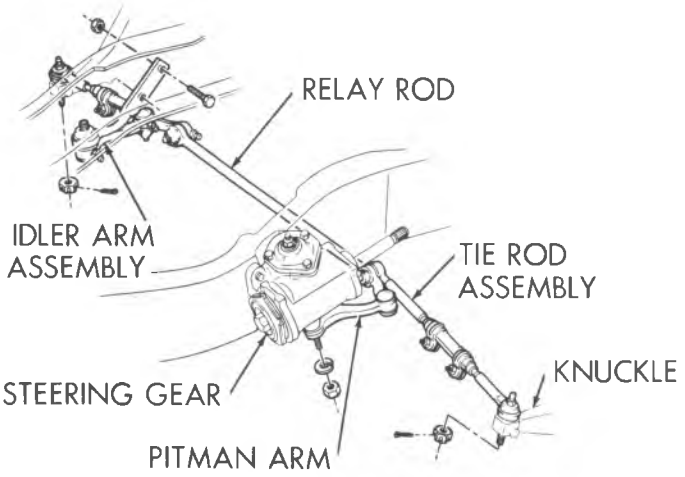
On the short and long arm type suspension you cannot see a caster angle without a special instrument, but you can understand that if you look straight down from the top of the upper control arm to the ground you would find that the ball joints do not line up (fore and aft) when a caster angle other than 0° is present. If you had a positive caster angle the lower ball joint would be slightly ahead (toward the front of the vehicle) of the upper ball joint center line. In short then, caster is the forward or backward tilt of the steering axis as viewed from a side elevation. Caster is designed into the front axle assembly on all K series vehicles (four-wheel drive), and is non-adjustable. See caster copy under ADJUSTMENTS.

CAMBER

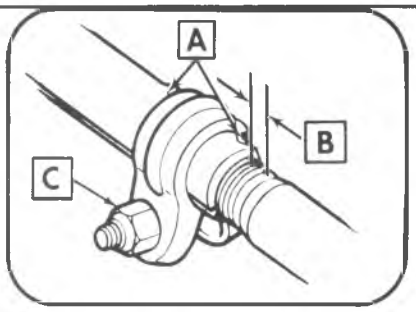
Camber is the tilting of the front wheels from the vertical when viewed from the front of the vehicle. When the wheels tilt outward at the top, the camber is said to be positive (+). When the wheels tilt inward at the top, the camber is said to be negative (–). The amount of tilt is measured in degrees from the vertical and this measurement is called the camber angle. Camber is designed into the front axle assembly of all K series vehicles and is non-adjustable. See camber copy under ADJUSTMENTS.

TOE-IN

Toe-in is the turning in of the front wheels. The actual amount of toe-in is normally only a fraction of an inch. The purpose of a toe specification is to ensure parallel rolling of the front wheels. (Excessive toe-in or toe-out will cause tire wear). Toe-in also serves to offset the small deflections of the wheel support system which occurs when the vehicle is rolling forward. In other words, even when the wheels are set to toe-in slightly when the vehicle is standing still, they tend to roll parallel on the road when the vehicle is moving. See toe-in copy under ADJUSTMENTS.



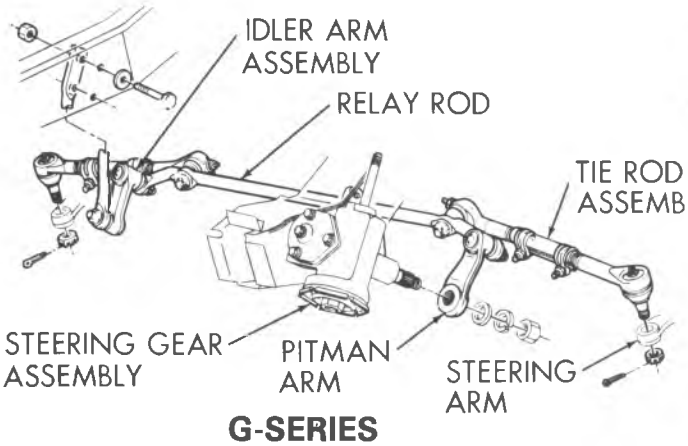
C-SERIES



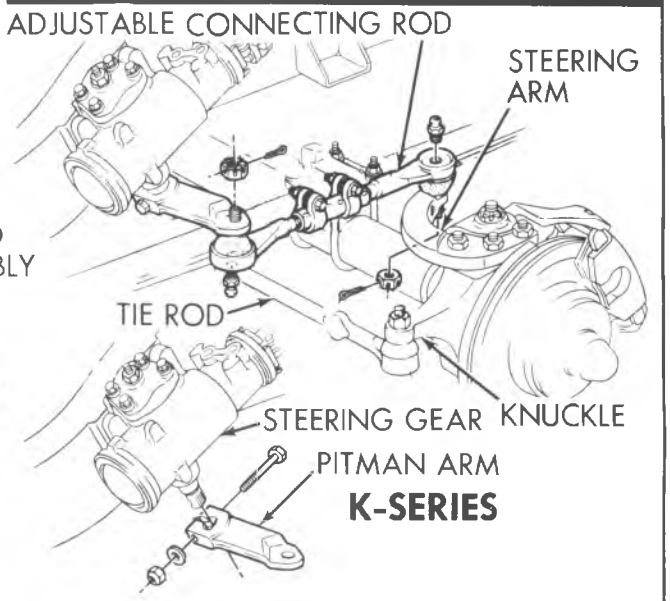
A CAUTION All clamps must be between & clear of dimples before torquing nut.

B Exposed socket thread length must be equal within ±.06 at each end of adjusting sleeve on L.H. & R.H. tie rod asm.

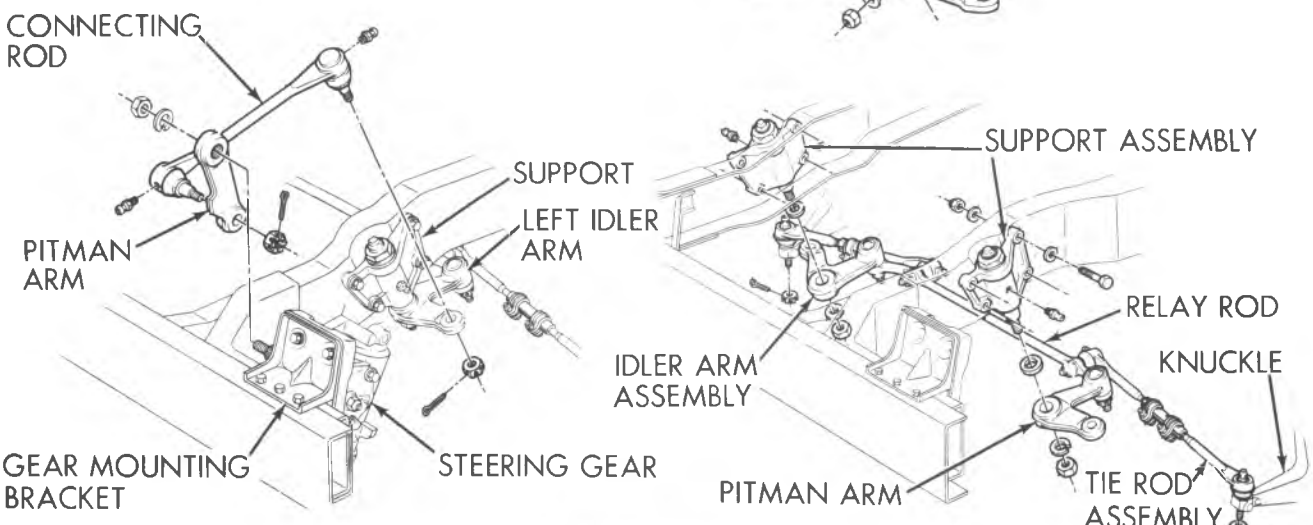
C All bolts must be installed in directions shown -



G-SERIES



K-SERIES



P-SERIES

Fig. 3B1-5–Steering Linkage

CONDITION	POSSIBLE CAUSE	CORRECTION
SYSTEM NOISE There is some noise in all power steering systems. Common complaints are listed as follows:		
Pump noise-"chirp".	Loose belt.	Adjust belt tension to specification.
Belt squeal.	Loose belt.	Adjust belt tension to specification.
Gear noise ("hissing" sound)	There is some noise in all power steering systems. One of the most common is a hissing sound most evident at standstill parking. There is no relationship between this noise and performance of the steering. "Hiss" may be expected when steering wheel is at end of travel or when slowly turning at standstill.	Do not replace valve unless "hiss" is extremely objectionable. Slight "hiss" is normal and in no way affects steering. A replacement valve will also exhibit slight noise and is not always a cure for the objection. Investigate clearance around flexible coupling rivets. Be sure steering shaft and gear are aligned so flexible coupling rotates in a flat plane and is not distorted as shaft rotates. Any metal-to-metal contacts through flexible coupling will transmit "hiss" into passenger compartment. Also, check for proper sealing between steering column and toe pan.
Rattle.	Pressure hose touching other parts of car. Loose pump pulley nut Pump vanes not installed properly. Pump vanes sticking in rotor slots.	Adjust hose position. Replace nut, torque to specs. Install properly. Free up by removing burrs, varnish or dirt.
Gear noise (rattle or chuckle).	Improper over-center adjustment NOTE: A slight rattle may occur on turns because of increased clearance off the "high point". This is normal and clearance must not be reduced below specified limits to eliminate this slight rattle. Loose pitman arm. Gear loose on frame.	Adjust to specifications. Tighten to specifications Check gear-to-frame mounting bolts. Tighten bolts to 70 foot-pounds.
Rattle or chuckle.	Steering linkage looseness.	Check linkage pivot points for wear. Replace if necessary.
Groan. Groan.	Low oil level. Air in the oil. Poor pressure hose connection.	Fill reservoir to proper level. Bleed system by operating steering from right to left full turn. Check connections, torque to specs.
Growl.	Excessive back pressure caused by hoses or steering gear. (restriction)	Locate restriction and correct. Replace part if necessary.

Fig. 3B3-2–Power Steering System Diagnosis Chart A

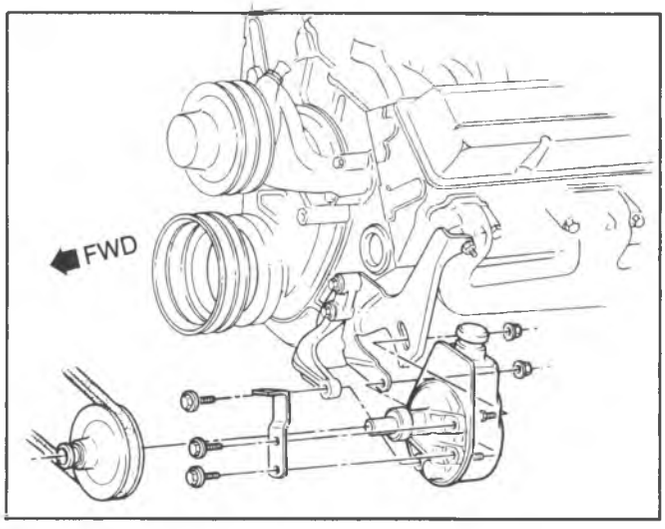


Fig. 3B3-22--P/S Pump Mounting; G100, G200, G300
LE4, LF4, LG9, LS9, LT9

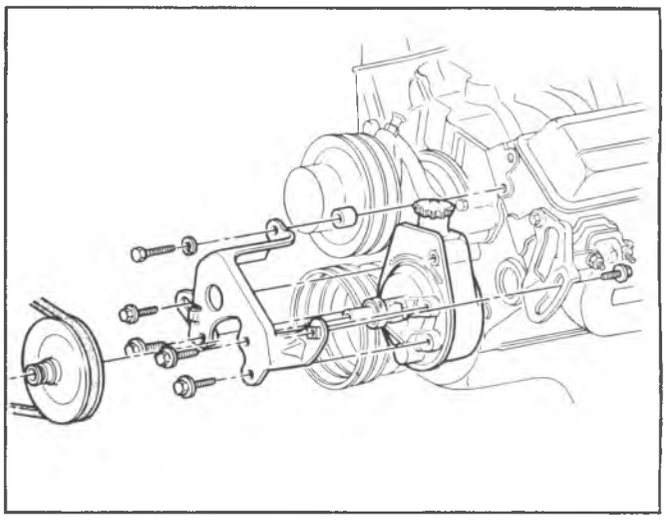


Fig. 3B3-24--P/S Pump Mounting; P200, P300 (42)
With LT9 (Exc. JB8)

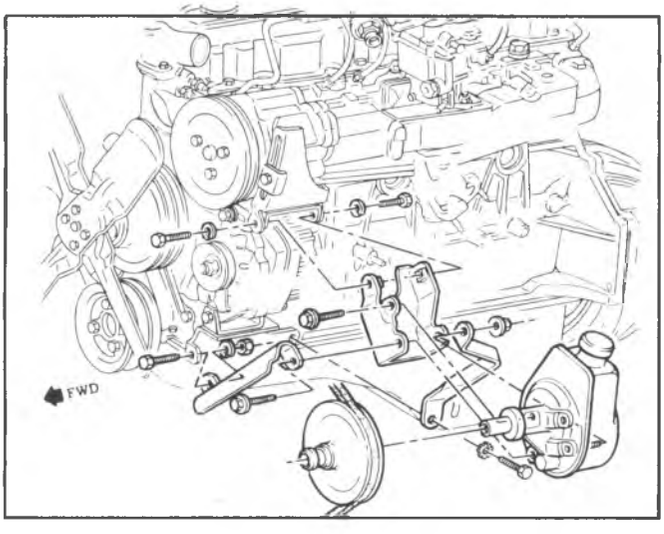


Fig. 3B3-23--P/S Pump Mounting; P200, P300 (42)
With L25 Engine

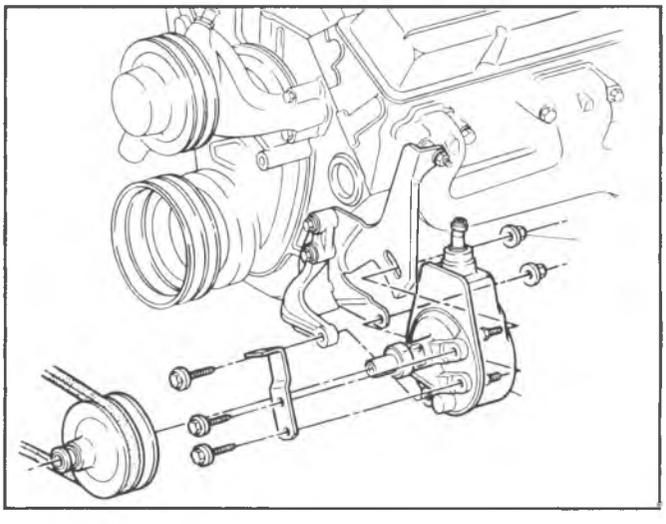


Fig. 3B3-25--P/S Pump Mounting; P200, P300 (32)
With LT9 Engine

HIGH STEERING SHAFT EFFORT

Cause	Solution
A. Column assembly misaligned in vehicle.	A. Realign.
B. Improperly installed or deformed dust seal.	B. Remove and replace.
C. Tight or frozen upper or lower bearing.	C. Replace affected bearing or bearings.
D. Flash on I.D. of shift tube from plastic joint.	D. Replace shift tube.

HIGH SHIFT EFFORT

Cause	Solution
A. Column not aligned correctly in car.	A. Realign.
B. Improperly installed dust seal.	B. Remove and replace.
C. Lack of grease on seal or bearing areas.	C. Lubricate bearings and seals.
D. Burr on upper or lower end of shift tube.	D. Remove burr.
E. Lower bowl bearing not assembled properly (tilt).	E. Reassemble properly.
F. Wave washer with burrs (tilt only).	F. Replace wave washer.

IMPROPER TRANSMISSION SHIFTING

Cause	Solution
A. Sheared shift tube joint.	A. Replace shift tube assembly.
B. Improper transmission linkage adjustment.	B. Readjust linkage.
C. Loose lower shift lever.	C. Replace shift tube assembly.
D. Improper gate plate.	D. Replace with correct part.
E. Sheared lower shift lever weld.	E. Replace tube assembly.

LASH IN MOUNTED COLUMN ASSEMBLY

Cause	Solution
A. Instrument panel mounting bolts loose.	A. Tighten to specifications. (20 ft. lbs.)
B. Broken weld nuts on jacket.	B. Replace jacket assembly.
C. Instrument panel bracket capsule sheared.	C. Replace bracket assembly.
D. Instrument panel to jacket mounting bolts loose.	D. Tighten to specifications. (15 ft. lbs.)
E. Loose shoes in housing (tilt only).	E. Replace.
F. Loose tilt head pivot pins (tilt only).	F. Replace.
G. Loose shoe lock pin in support (tilt only).	G. Replace.

MISCELLANEOUS

Cause	Solution
A. Housing loose on jacket - will be noticed with ignition in "Off-Lock" and a torque applied to the steering wheel.	A. Tighten four mounting screws - (60 in. lbs.)
B. Shroud loose on shift bowl.	B. Bend tabs on shroud over lugs on bowl.

Fig. 3B4-6--Automatic Transmission Column Diagnosis Chart D

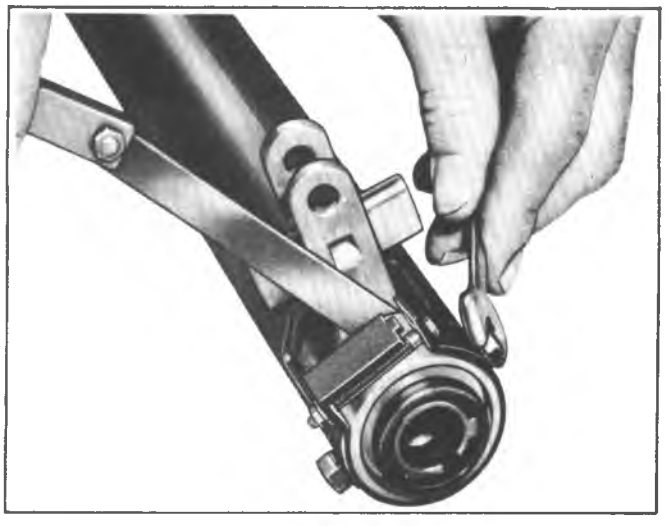


Fig. 3B4-19–Shift Tube Adjustment-3 Speed Manual Transmission

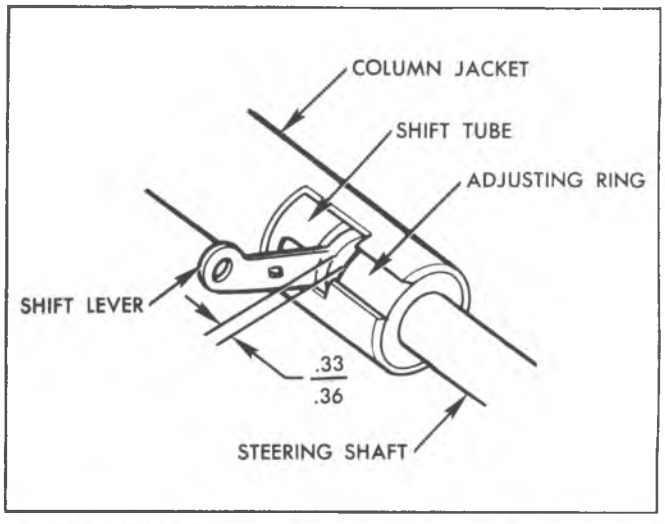


Fig. 3B4-20–Shift Tube Adjustment-Automatic Transmission

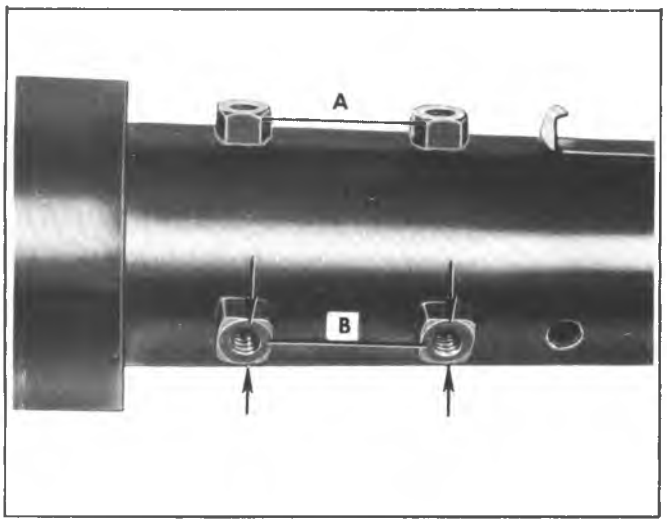


Fig. 3B4-41--Installing Steering Column in Vise

13. Remove the two screws holding the back-up switch or neutral-safety switch to the column and remove the switch.

14. Remove the lower bearing retainer clip (Fig. 3B4-45).

15. **Automatic and Floorshift Columns** - Remove the lower bearing retainer, bearing adapter assembly, shift tube thrust spring and washer. The lower bearing may be removed from the adapter by light pressure on the bearing outer race. Slide out the shift tube assembly.

Manual Transmission - Column Shift - Remove the lower bearing adapter, bearing and the first reverse shift lever. The lower bearing may be removed from the adapter by light pressure on the bearing outer race. Remove the three screws from bearing at the lower end and slide out the shift tube assembly. Remove the gearshift housing lower bearing from the upper end of the mast jacket.

Assembly of Standard Columns

Apply a thin coat of lithium soap grease to all friction surfaces.

1. Install the sector into the turn signal and lock cylinder housing. Install the sector in the lock cylinder hole over the sector shaft with the tang end to the outside of the hole. Press the sector over the shaft with a blunt tool.

2. Install the shift lever detent plate onto the housing.

3. Insert the rack preload spring into the housing from the bottom side. The long section should be toward the handwheel and hook onto the edge of the housing (Fig. 3B4-46).

4. Assemble the locking bolt onto the crossover arm on the rack and insert the rack and lock bolt assembly into the housing from the bottom with the teeth up (toward hand-wheel) and toward the centerline of the column (Fig. 3B4-43). Align the 1st tooth on the sector with the 1st tooth on the rack; if aligned properly, the block teeth will line up when the rack assembly is pushed all the way in.

5. Install the thrust cup on the bottom hub of the housing.

6. Install the gearshift housing lower bearing. Insert the bearing from the very end of the jacket. Aligning the indentations in the bearing with the projections on the jacket (Fig. 3B4-47). If the bearing is not installed correctly, it will not rest on all of the stops provided.

7. Install the shift lever spring into the gearshift lever (or lock tube) housing. Install the housing and shroud assemblies onto the upper end of the mast jacket. Rotate the housing to be sure it is seated in the bearing.

8. With the shift lever housing in place, install the turn signal and lock cylinder housing onto the jacket. The gearshift housing should be in "Park" position and the rack pulled downward. Be sure the turn signal housing is seated on the jacket and drive the four screws.

9. Press the lower bearing into the adapter assembly.

10. Insert the shift tube assembly into the lower end of the jacket and rotate until the upper shift tube key slides into the housing keyway.

11. **Automatic and Floor shift Columns** - Assemble the spring and lower bearing and adapter assembly into the bottom of the jacket. Holding the adapter in place, install the lower bearing reinforcement and retainer clip. Be sure the clip snaps into the jacket and reinforcement slots.

12. **Manual Transmission - Column Shift** - Loosely attach the three screws in the jacket and shift tube bearing.

Assemble the 1st-Reverse lever and lower bearing and adapter assembly into the bottom of the jacket. Holding the adapter in place, install the bearing reinforcement and retaining clip. Be sure the retaining clip snaps into the jacket and reinforcement slots.

Refer to Fig. 3B4--48 for adjustment procedure.

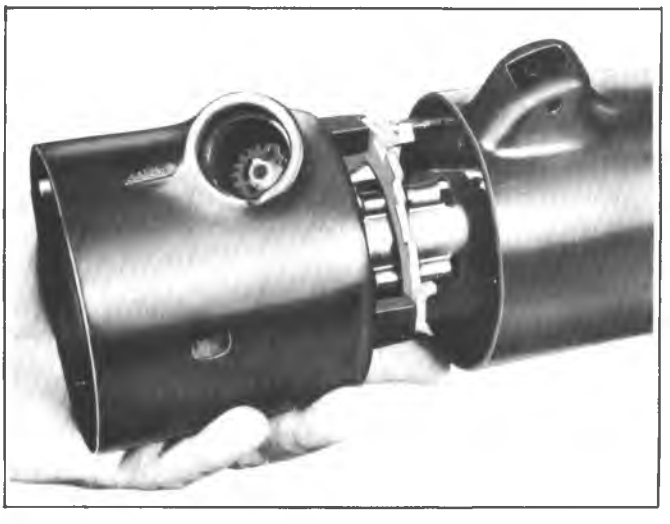


Fig. 3B4-42--Removing Turn Signal Housing

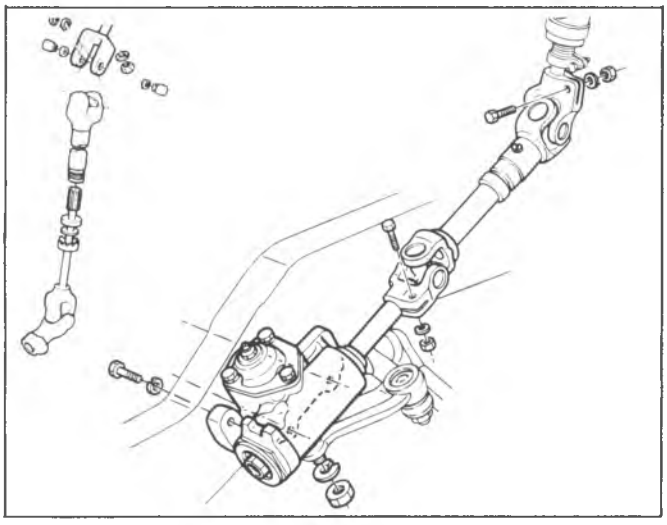


Fig. 3B4-63–Intermediate Steering Shaft-P Series

Installation

NOTICE: See NOTICE on page 1 of this section regarding the fasteners referred to in steps 1, 3 and 4.

1. Install the intermediate shaft assembly onto the steering shaft, aligning the flat on the shaft with the flat in the coupling. Install the pot joint clamp bolt and torque to specifications.

2. Lift the steering gear into position, guiding the flexible coupling bolts into the shaft flange holes.

3. Install the steering gear to frame bolts and torque to specifications.

4. Install the flexible coupling to steering shaft flange bolt lockwashers and nuts. Check that the coupling alignment pins are centered in the flange slots and then torque the coupling bolts to specifications.

INTERMEDIATE STEERING SHAFT WITH UNIVERSAL JOINT COUPLINGS

Removal (Fig. 3B4-63)

1. Set front wheels in straight ahead position. This can be done by driving the vehicle a short distance on a flat surface.

2. Mark upper universal joint yoke to steering shaft relationship and lower yoke to steering gear wormshaft relationship.

3. Remove both upper and lower universal yoke pinch bolts.

4. Remove steering gear to frame bolts and lower the gear. It is not necessary to disconnect the pitman arm from the steering gear pitman shaft.

5. Remove the intermediate steering shaft and universal joint assembly.

Disassembly

1. If the upper or lower half of the intermediate steering shaft is to be replaced, proceed as follows:

a. With the shaft assembly on a bench, straighten the tangs on the dust cap. Separate the upper and lower portions of the shaft assembly.

b. Remove the felt washer, plastic washer and dust cap. Discard the felt washer.

2. If the trunnion assemblies are to be replaced, proceed as follows:

a. Remove the snap rings retaining the trunnion bushings in one of the yokes.

b. Support the yoke on a bench vise and drive out one bushing by tapping on the opposite bushing using a soft drift and hammer.

c. Support the other side of the yoke and drive out the remaining bushing as in Step b above.

d. Move the yoke on the trunnion as necessary to separate the upper and lower yokes.

e. Remove the trunnion from the lower yoke as outlined in Steps a through d above. Remove and discard the seals.

Assembly

1. If the yoke trunnions were removed, reassemble as follows:

a. Place the new trunnion into the lower yoke.

b. Place new seals onto the trunnion and then press the new bushings into the yoke and over the trunnion hubs far enough to install the snap rings.

c. Install the snap rings.

d. Repeat Steps a through c to attach the upper yoke to the trunnion.

2. Reassemble the intermediate shaft assembly as follows:

a. Place the dust cap, plastic washer and a new felt seal over the shaft on the lower yoke assembly.

b. Align the arrow on the lower yoke assembly shaft with the arrow on the upper yoke assembly tube and push the two assemblies together.

c. Push the dust cap, plastic washer and felt washer into position on the lower end of the upper yoke assembly and bend the tangs of the dust cap down against the yoke tube.

Installation

NOTICE: See NOTICE on page 1 of this section regarding the fasteners referred to in steps 1, 3 and 4.

1. Align the marks made at removal and assemble the intermediate shaft lower yoke onto the steering gear wormshaft. Install the pinch bolt and torque to specifications. The pinch bolt must pass through the shaft undercut. If a new yoke was installed, the slit in the yoke should be in the 12 o'clock position.

2. Raise the steering gear into position while guiding the upper yoke assembly onto the steering shaft.

The marks on the coupling and steering shaft must align. If a new yoke was installed, assemble the upper yoke to the steering shaft with the steering wheel in straight ahead position (gear must be on high point).

3. Install the steering gear to frame bolts and torque to specifications.

4. Install the upper yoke to steering shaft pinch bolt and torque to specifications.

NOTICE: The pinch bolt must pass through the shaft undercut, or damage may occur to the components.

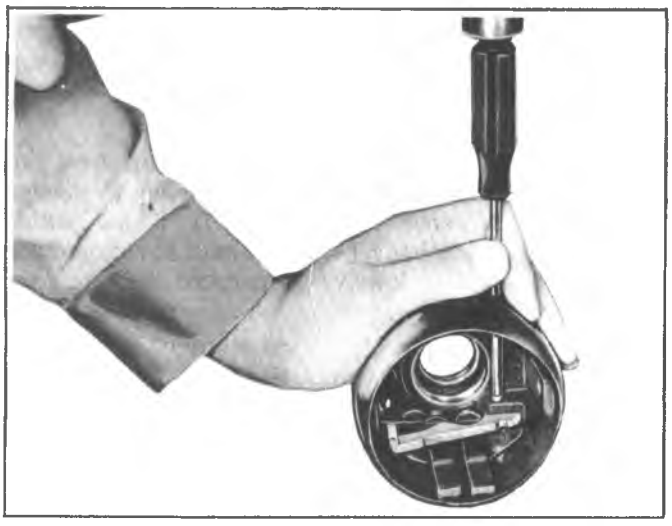


Fig. 3B4-80–Removing Release Lever Pivot Pin

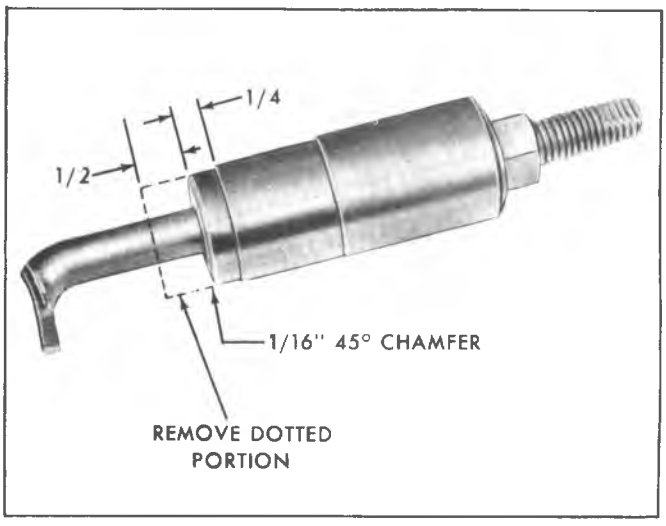


Fig. 3B4-82–Revised Shift Tube Removing Tool J-22551

11. Assemble the bearing housing as follows:

a. Press the new upper and lower bearing races into the bearing housing.

b. Lubricate and install the bearings into the bearing races.

c. Place the lock shoe springs in position in the housing. Install each shoe in place and compress the spring until a suitable size straight punch can be used to hold the shoes in position (it may be necessary to acquire assistance to install the shoes). Once the shoes are in place, drive in the shoe retaining pin.

d. Install the shoe release lever and drive in the pivot pin.

e. Install the tilt release lever.

f. Lubricate the shoes and release lever.

12. Install the bearing housing assembly to the support. Hold the tilt release lever in the "up" position until the shoes have fully engaged the support. Lubricate and install the bearing housing pivot pins. Press the pins in flush with the housing.

13. Place the housing in the full "up" position and then install tilt spring and retainer (tapered end of spring first). Push into the housing approximately 3/16" and rotate counter clockwise 1/8 turn.

14. Lubricate and install the upper bearing upper race, race seat and locknut. Tighten the locknut (using Socket J-22549) to remove the lash and then further tighten 1/16 to 1/8 of a turn (column must be in straight ahead position).

15. Remove the tilt release lever.

16. Install the directional signal switch as outlined under "Directional Signal Switch-Installation".

17. Column Shift Models - Install the shift lever and pivot pin.

18. Install the neutral-safety or back-up lamp switch.

19. Remove the column from the bench vise.

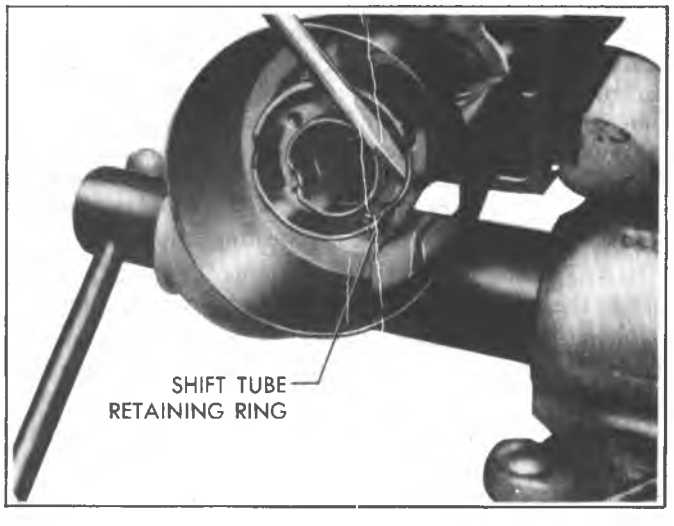


Fig. 3B4-81–Removing Shift Tube Retaining Ring

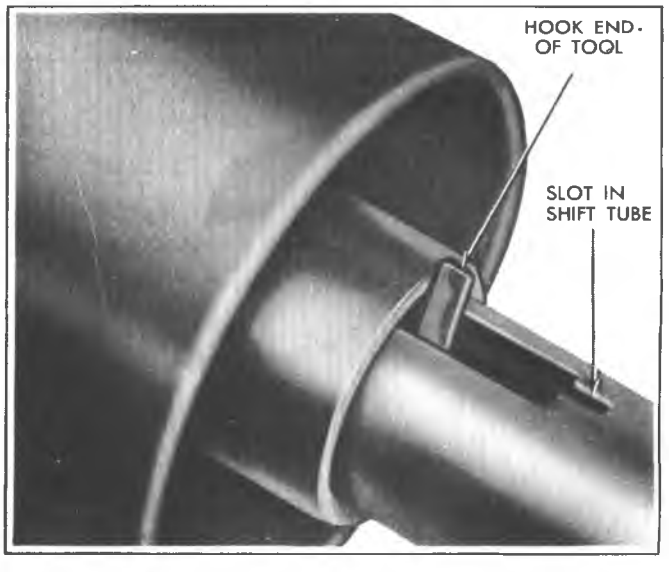


Fig. 3B4-83–Removing Shift Tube Assembly

MAINTENANCE AND ADJUSTMENTS

NOTICE: See NOTICE on page 1 of this section regarding the fasteners referred to in the maintenance and adjustment procedures below.

WHEEL BEARINGS-CHECK ADJUSTMENT

NOTICE: Tapered roller bearings are used on all series vehicles and they have a slightly loose feel when properly adjusted. A design feature of front wheel taper roller bearings is that they must NEVER be pre-loaded. Damage can result by the steady thrust on roller ends which comes from preloading.

1. Raise vehicle and support at front lower control arm.
2. Spin wheel to check for unusual noise or roughness.
3. If bearings are noisy, tight, or excessively loose, they should be cleaned, inspected and relubricated prior to adjustment. If it is necessary to inspect bearings, see "Wheel Hubs, Bearings" under "Component Parts Replacement."

To check for tight or loose bearings, grip the tire at the top and bottom and move the wheel assembly in and out on the spindle. Measure movement of hub assembly. If movement is less than .025 mm (.001") or greater than .127 mm (.005"), adjust bearings per adjustment procedure.

ADJUSTMENT OF WHEEL BEARINGS (FIG. 3C-3)

1. Remove hub cap or wheel disc from wheel.
2. Remove dust cap from hub.
3. Remove cotter pin from spindle and spindle nut.
4. Tighten the spindle nut to 16.26 N·m (12 ft. lbs.) while turning the wheel assembly forward by hand to fully seat the bearings. This will remove any grease or burrs which could cause excessive wheel bearing play later. See Fig. 3C-3.
5. Back off the nut to the "just loose" position.
6. Hand tighten the spindle nut. Loosen spindle nut until either hole in the spindle lines up with a slot in the nut. (Not more than 1/2 flat).
7. Install new cotter pin. Bend the ends of the cotter pin against nut, cut off extra length to ensure ends will not interfere with the dust cap.
8. Measure the looseness in the hub assembly. There will be from .025 mm (.001) to .127 mm (.005 inches) end play when properly adjusted.
9. Install dust cap on hub.
10. Replace the wheel cover or hub cap.
11. Lower vehicle to floor.
12. Perform the same operation for each front wheel.

Fig. 3C-3--Wheel Bearing Adjustment

FRONT WHEEL BEARING DIAGNOSIS (CONT'D)

CRACKED INNER RACE

RACE CRACKED DUE TO IMPROPER FIT, COCKING, OR POOR BEARING SEATS.

REPLACE BEARING AND CORRECT BEARING SEATS.

FATIGUE SPALLING

FLAKING OF SURFACE METAL RESULTING FROM FATIGUE.

REPLACE BEARING – CLEAN ALL RELATED PARTS.

BRINELLING

SURFACE INDENTATIONS IN RACEWAY CAUSED BY ROLLERS EITHER UNDER IMPACT LOADING OR VIBRATION WHILE THE BEARING IS NOT ROTATING.

REPLACE BEARING IF ROUGH OR NOISY.

FRETTAGE

CORROSION SET UP BY SMALL RELATIVE MOVEMENT OF PARTS WITH NO LUBRICATION.

REPLACE BEARING. CLEAN RELATED PARTS. CHECK SEALS AND CHECK FOR PROPER LUBRICATION.

STAIN DISCOLORATION

DISCOLORATION CAN RANGE FROM LIGHT BROWN TO BLACK CAUSED BY INCORRECT LUBRICANT OR MOISTURE.

RE USE BEARINGS IF STAINS CAN BE REMOVED BY LIGHT POLISHING OR IF NO EVIDENCE OF OVER HEATING IS OBSERVED.

CHECK SEALS AND RELATED PARTS FOR DAMAGE.

HEAT DISCOLORATION

HEAT DISCOLORATION CAN RANGE FROM FAINT YELLOW TO DARK BLUE RESULTING FROM OVER LOAD (WAGON'S) OR INCORRECT LUBRICANT.

EXCESSIVE HEAT CAN CAUSE SOFTENING OF RACES OR ROLLERS.

TO CHECK FOR LOSS OF TEMPER ON RACES OR ROLLERS A SIMPLE FILE TEST MAY BE MADE. A FILE DRAWN OVER A TEMPERED PART WILL GRAB AND CUT METAL, WHEREAS, A FILE DRAWN OVER A HARD PART WILL GLIDE READILY WITH NO METAL CUTTING.

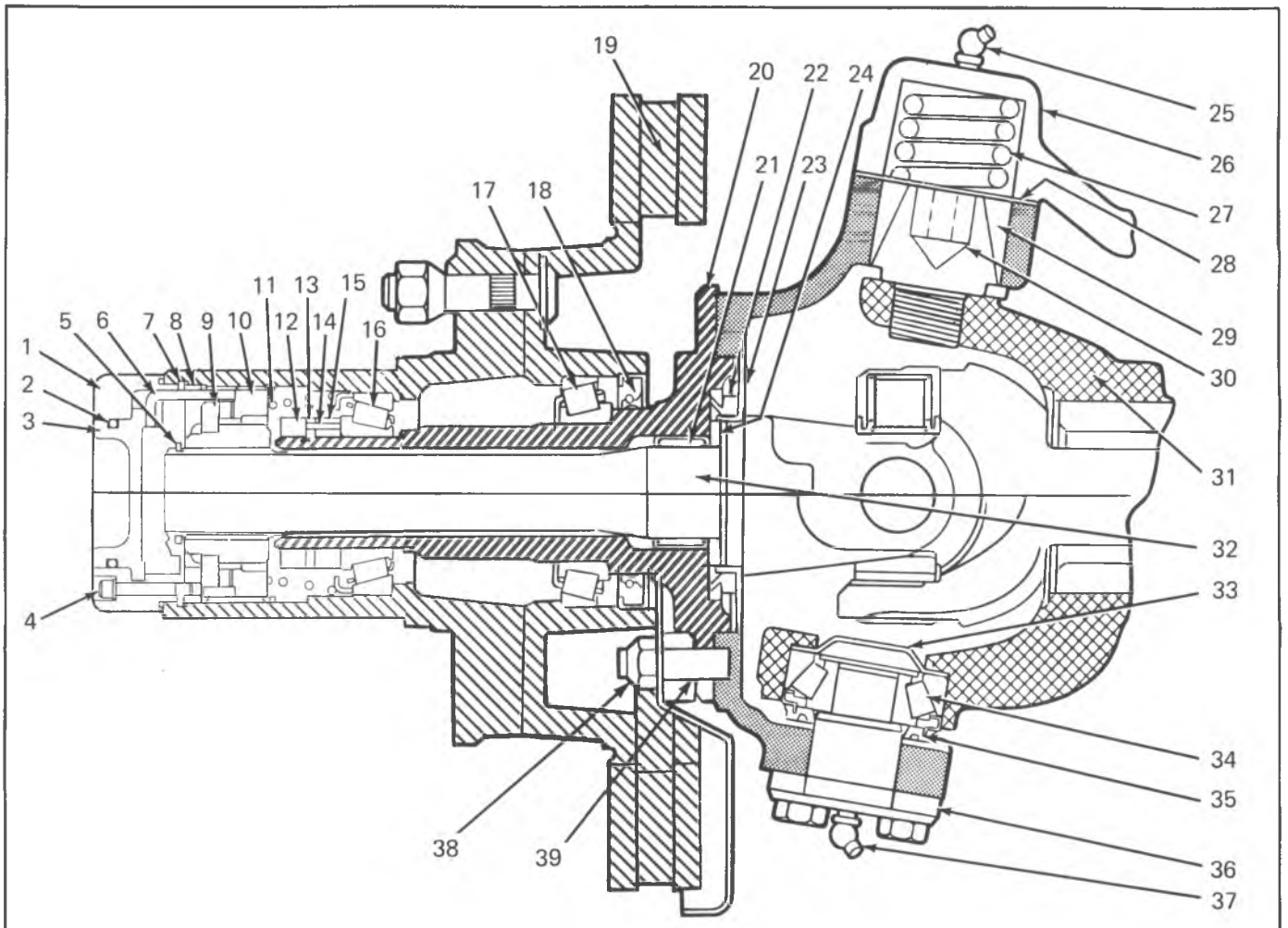
REPLACE BEARINGS IF OVER HEATING DAMAGE IS INDICATED. CHECK SEALS AND OTHER PARTS.

SMEARS

SMEARING OF METAL DUE TO SLIPPAGE. SLIPPAGE CAN BE CAUSED BY POOR FITS. LUBRICATION, OVERHEATING, OVERLOADS OR HANDLING DAMAGE.

REPLACE BEARINGS, CLEAN RELATED PARTS AND CHECK FOR PROPER FITS AND LUBRICATION.

Fig. 3C-13–Bearing Diagnosis, Illustration B



1. RETAINING PLATE
2. "O" RING
3. ACTUATOR KNOB
4. RETAINING PLATE BOLT
5. AXLE SHAFT SNAP RING
6. ACTUATING CAM BODY
7. INTERNAL SNAP RING
8. OUTER CLUTCH RETAINING RING
9. AXLE SHAFT SLEEVE AND CLUTCH RING
10. INNER CLUTCH RING
11. SPRING
12. LOCK NUT
13. LOCK-ADJ. NUT
14. PIN-ADJ. NUT
15. ADJUSTING NUT
16. OUTER WHEEL BEARING
17. INNER WHEEL BEARING
18. SEAL
19. HUB-AND-DISC ASM
20. SPINDLE
21. SPINDLE BEARING
22. SEAL
23. DEFLECTOR
24. SPACER
25. LUBE FITTING
26. UPPER BEARING CAP
27. PRESSURE SPRING
28. GASKET
29. BUSHING, KING-PIN
30. KING-PIN
31. YOKE
32. OUTER AXLE SHAFT
33. GREASE RETAINER
34. LOWER BEARING
35. SEAL
36. BEARING CAP
37. LUBE FITTING
38. SPINDLE ATTACHING NUT
39. SPINDLE ATTACHING BOLT

Fig. 3C-2K--K30 with Free-Wheeling Hub and King-Pins

MAINTENANCE AND ADJUSTMENTS

BALL JOINT ADJUSTMENT (K10, K20)

Front axle ball joint adjustment is generally necessary only when there is excessive play in steering, irregular wear on tires or persistent loosening of the tie rod is observed.

1. Raise vehicle on hoist then place jack stands just inside of front springs.

2. Disconnect connecting rod and tie rod to allow independent movement of each steering knuckle.

3. Apply a fish-scale to the tie rod mounting hole of the steering knuckle arm. With the knuckle assembly in the straight-ahead position, determine the right angle pull required to keep the knuckle assembly turning after initial

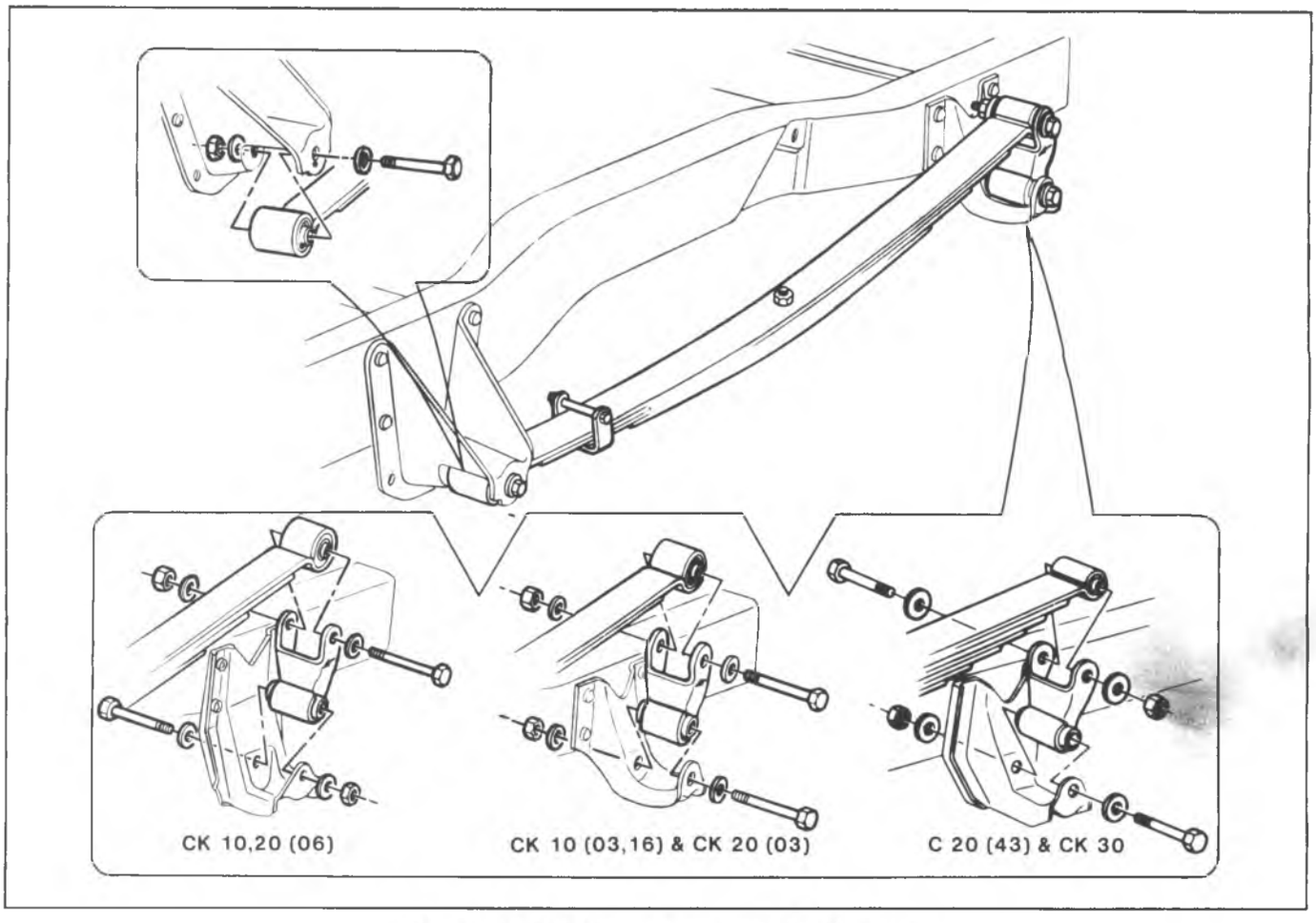


Fig. 3D-17–Rear Spring Installation-C-K Models

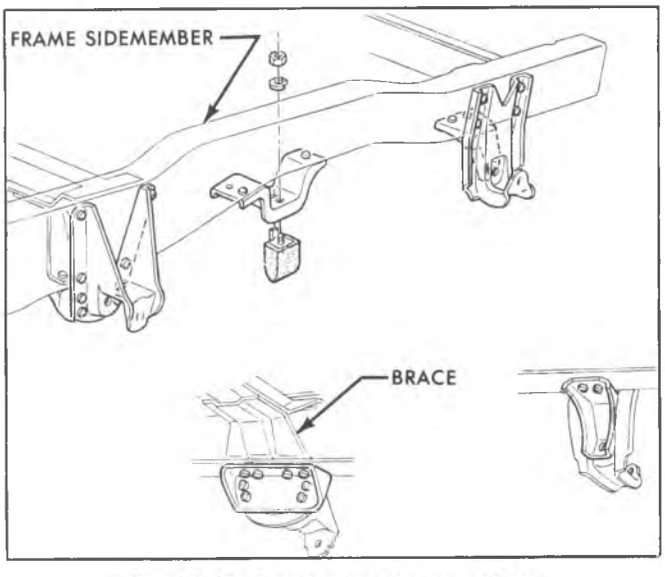


Fig. 3D-18–Rear Spring Hangers (K30)

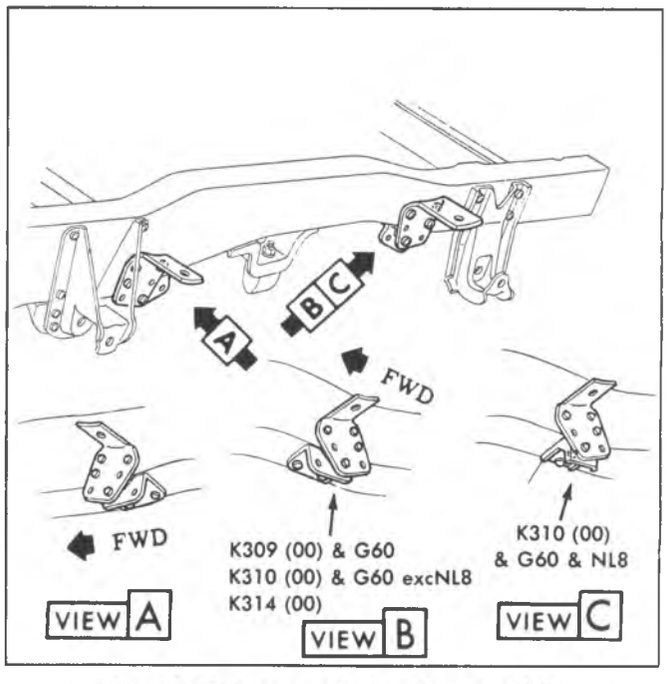


Fig. 3D-19–Auxiliary Spring Bracket (K30)

RADIAL TIRES

Recommended truck tire mounting and inflation procedures are especially important with radial truck tires. Failure to follow these recommendations can cause bead deformation in both tube type and tubeless tires due to incorrect bead seating. Bead deformation may lead to chafing, lower sidewall and bead area cracking, demounting difficulties, eccentric wear, ride vibration and non-retreadable casing.

Mounting

To insure correct mounting and bead seating and to prevent bead deformation, the following steps must be taken:

A. Tube Type Tires

1. Only use rims approved for radial tire usage by rim manufacturer. Thoroughly clean rim parts, removing all rust and other foreign material. Make sure rim parts match and are not sprung or broken.

2. Thoroughly lubricate tire beads, portion of tube between beads, and flaps with an approved rubber lubricant. Radial tubes are identifiable by the letter "R" in the size designation. Example 100R20. Also, to further identify the radial tube, a red band on the valve stem has been required since March, 1975. Radial flaps are also identified by the letter "R". Example - 20R8.

NOTICE: Do not use silicone base lubricants - this could cause the tire to slip on the wheel.

3. Double inflate. Inflate to operating pressure, deflate completely and reinflate to operating pressure. This allows tube, flap and tire to fit together properly.

4. Check bead seating. Visually check slot and side ring gap (on two piece rim) to make sure bead is seated. The flange and one of the three lower sidewall rim line rings while the tire is laying flat (measurements should be taken each 90° around the circumference of the rim flange). If spacing is uneven around bead from side to side, repeat Step 1 through 3, and recheck.

B. Tubeless Tires.

1. Only use rims approved for radial tire usage by rim manufacturer. Thoroughly clean rim, removing all rust and other foreign material.

2. Thoroughly lubricate tire beads and rim bead seats with an approved rubber lubricant.

NOTICE: Do not use silicone base lubricants - this could cause the tire to slip on the wheel.

Series	Description	Torque
K	7/16" Bolts (6)	70-90 Ft. Lbs.
C10,P10,G10,G20	1/2" Bolts (5)	75-100 Ft. Lbs.
C20, P20 C30, P30 and K20, G30 Single Wheels	9/16" Bolts (8)	90-120 Ft. Lbs.
CKPG30 Dual Wheels	9/16" Bolts (8)	110-140 Ft. Lbs.
	Heavy Duty Wheels 5/8" Bolts (10)	130-180 Ft. Lbs.

Fig. 3E-12–Wheel Nut Torque

3. Inflation. Inflate tire to operating pressure. Due to the construction of radial truck tires, particularly in the lower sidewall and bead area, it may be difficult to get the tire to take air. An inflation aid may be necessary to help seat the bead of tubeless radial tires. Two types of inflation aids are commercially available, (1) metal rings which use compressed air to seat beads, and (2) rubber rings which seal between the tirebead and rim bead seat allowing the bead to move out and seat. Lubrication is mandatory with both items.

4. Check bead seating. This check is made by measuring the space between the rim flange and one of the three lower sidewall rim line rings while the tire is laying flat (measurements should be taken each 90° around the circumference of the rim flange. If spacing is uneven around the bead from side to side, repeat Steps 1 through 3, and recheck.

It's important that this procedure be followed to insure proper bead seating in order to prevent bead deformation.

Radial tires, as well as the bias tires, must be mounted and inflated in accordance with safety precautions noted in RMA Radial and Bias Truck Tire Service Manuals.

TIRE REPAIR

There are many different materials and techniques on the market to repair tires. As not all of these work on all types of tires, tire manufacturers have published detailed instructions on how and when to repair tires. These instructions can be obtained from the tire manufacturer.

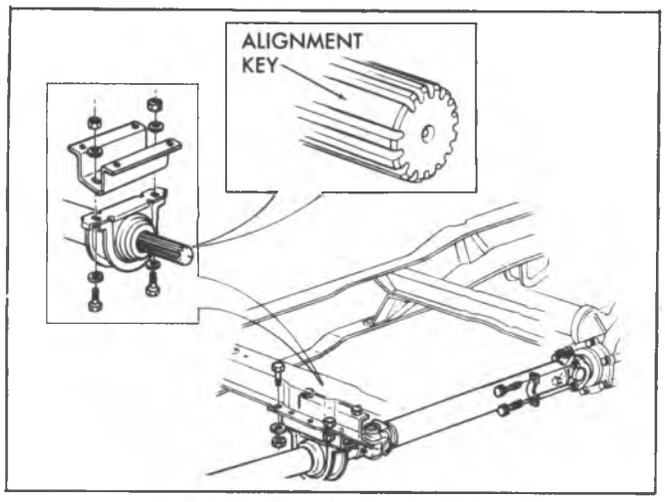


Fig. 4A-18–Alignment Key

G and K models with 16 splines must be phased as shown in figure 4A-19.

1. For models with one piece propeller shafts, slide shaft into transmission and attach rear U-joint to axle.

On vehicles with two piece propshafts, the front propshaft yoke must be bottomed out in the transmission fully forward before installation to the hanger .

2. For C-P models with two-piece propeller shafts, proper phasing is accomplished with the alignment key, shown in figure 4A-18.

3. For G-K models with two piece shafts, install front half into transmission and bolt support to crossmember.

a. Slide grease cap and gasket onto rear splines.

b. Rotate shaft so front U-joint trunnion is in correct position. See figure 4A-19.

c. Take rear propeller shaft and before installing, align U-joint trunnions as shown in figure 4A-19. Attach rear U-joint to axle. Tighten grease cap.

d. Torque bearing support to crossmember and U-joint to axle attachments.

CONSTANT VELOCITY UNIVERSAL JOINT (Snap Ring Type) RETENTION

Disassembly

1. Remove auxiliary front propeller shaft from vehicle.

2. Remove rear trunnion snap rings from center yoke. Remove grease fitting.

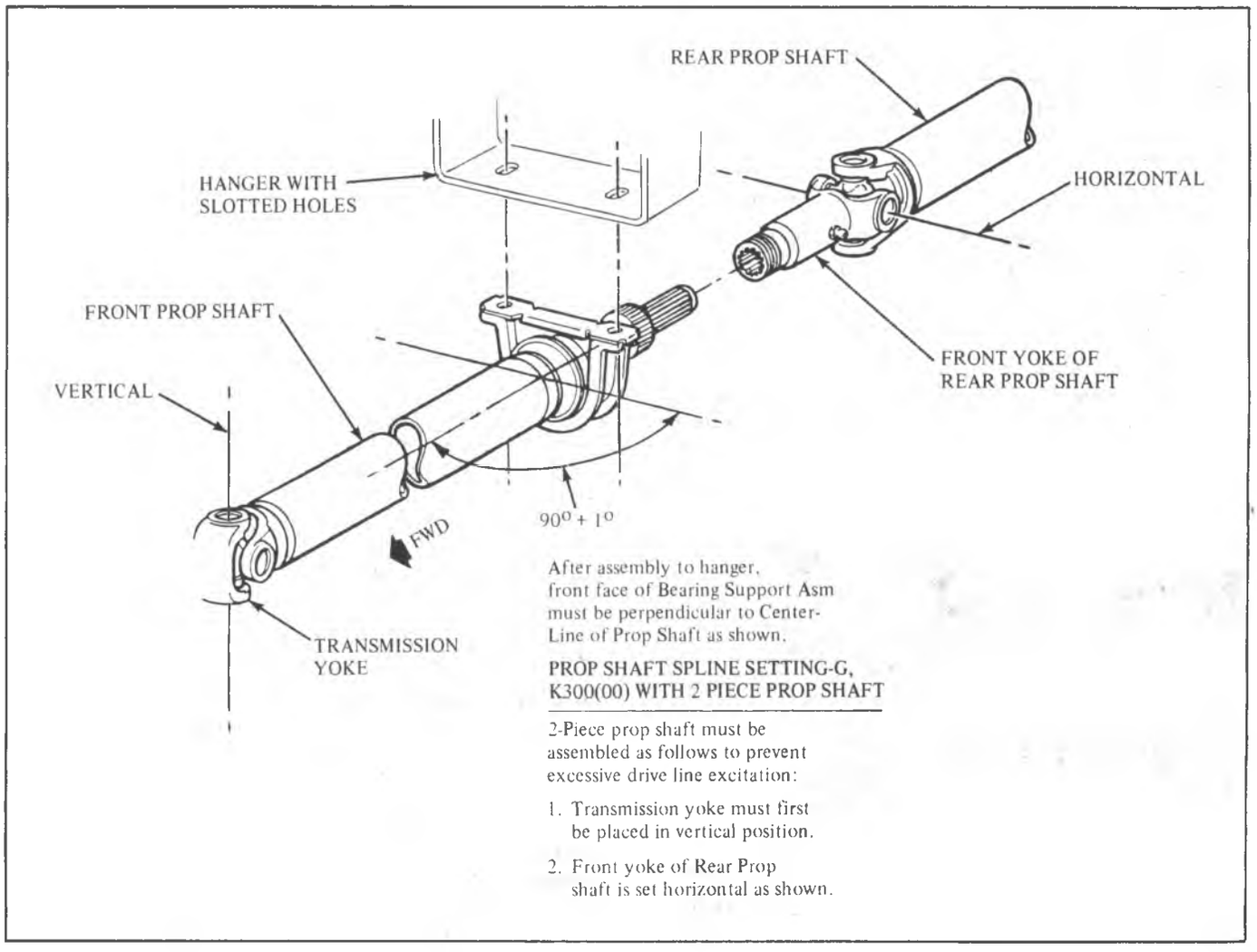


Fig. 4A-19–Alignment for Phasing

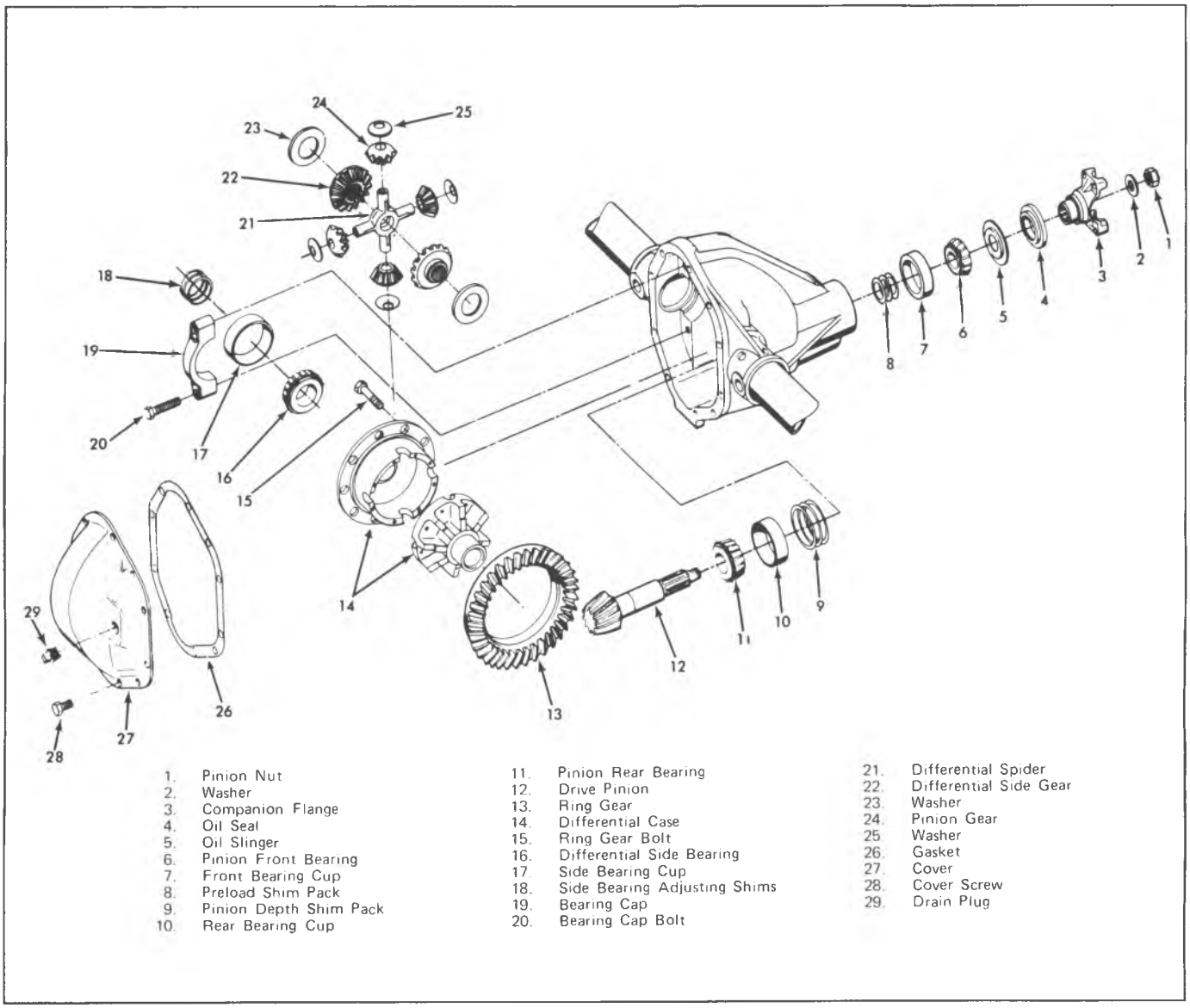


Fig. 4B-6–Dana 10-1/2" Ring Gear Axle Exploded View

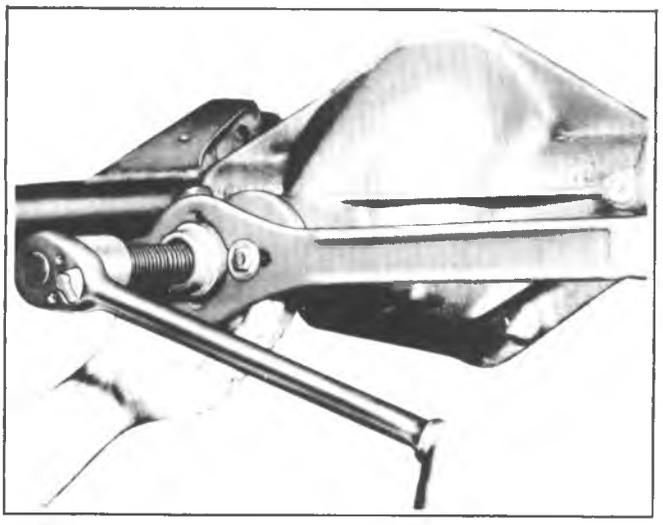


Fig. 4B-27--Drive Pinion Flange Removal

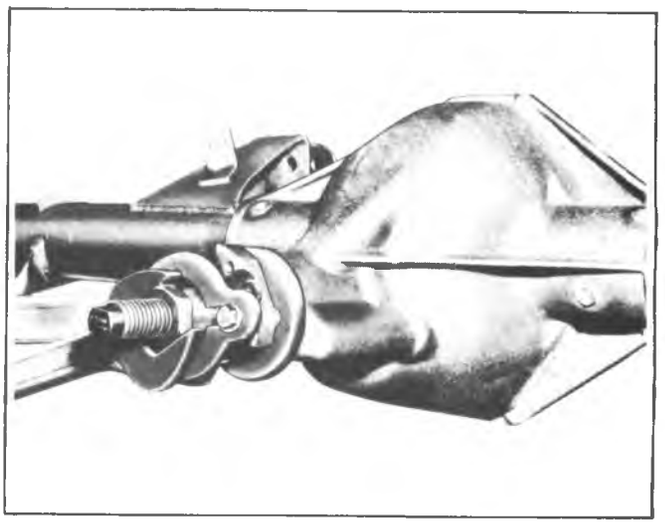


Fig. 4B-29--Installing Pinion Flange

installed position; seal must be square in carrier bore to seal properly against pinion flange.

4. Pack the cavity between end of pinion splines and pinion flange with a non-hardening sealer (such as Permatex Type A or equivalent) prior to installing washer and nut on pinion.

5. Using J-8614-11 as shown in figure 4B-29, install flange onto pinion. Install washer and nut, and tighten nut to original position. Refer to scribe marks and number of exposed threads, recorded earlier.

NOTICE: Do not attempt to hammer the flange onto pinion shaft. To do so may damage the ring gear and pinion.

6. Measure rotating torque of pinion and compare with torque recorded before removal. Tighten pinion nut in additional **small** increments until the torque necessary to rotate the pinion exceeds the original figure by 1 to 5 inch pounds. **Do not** exceed the original torque by more than 5 inch pounds.

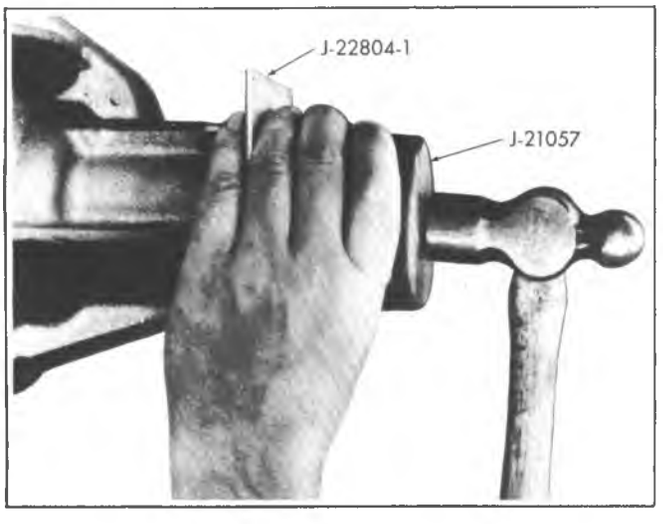


Fig. 4B-28--Pinion Oil Seal Installation

7. Reattach propeller shaft and torque to specifications. Reinstall brake drums and wheels.

NOTICE: See NOTICE on page 1 of this section regarding the fasteners referred to in step 7.

8. Lower vehicle and remove from hoist.

CHEVROLET 10-1/2" RING GEAR AXLES

AXLE ASSEMBLY

Service operations on these axle assemblies may be performed with the housing installed in the vehicle or with the housing installed in a holding fixture. There may be occasions, however, when it will be necessary to remove the complete housing assembly. The following axle assembly removal and installation procedure, therefore, is necessary only when housing replacement is required.

NOTICE: All axle attachments are important attaching parts. See NOTICE on page 1 of this section.

Removal

1. Raise vehicle, place stand jacks under frame side rails, and remove rear wheels.

2. Remove two trunnion bearing "U" bolts from the rear yoke, split rear universal joint, position propeller shaft to one side, and tie it to the frame side rail.

The bearings can be left on the trunnion and held in place with tape.

3. Remove hub and drum assembly and disconnect parking brake cable at lever and at flange plate. See Section 5 for cable removal.

4. Disconnect hydraulic brake hose at connector on rear axle housing. Refer to Section 5.

5. Disconnect shock absorbers at axle brackets.

6. Support axle assembly with hydraulic jack, remove spring "U" bolts, and lower axle assembly to the floor.

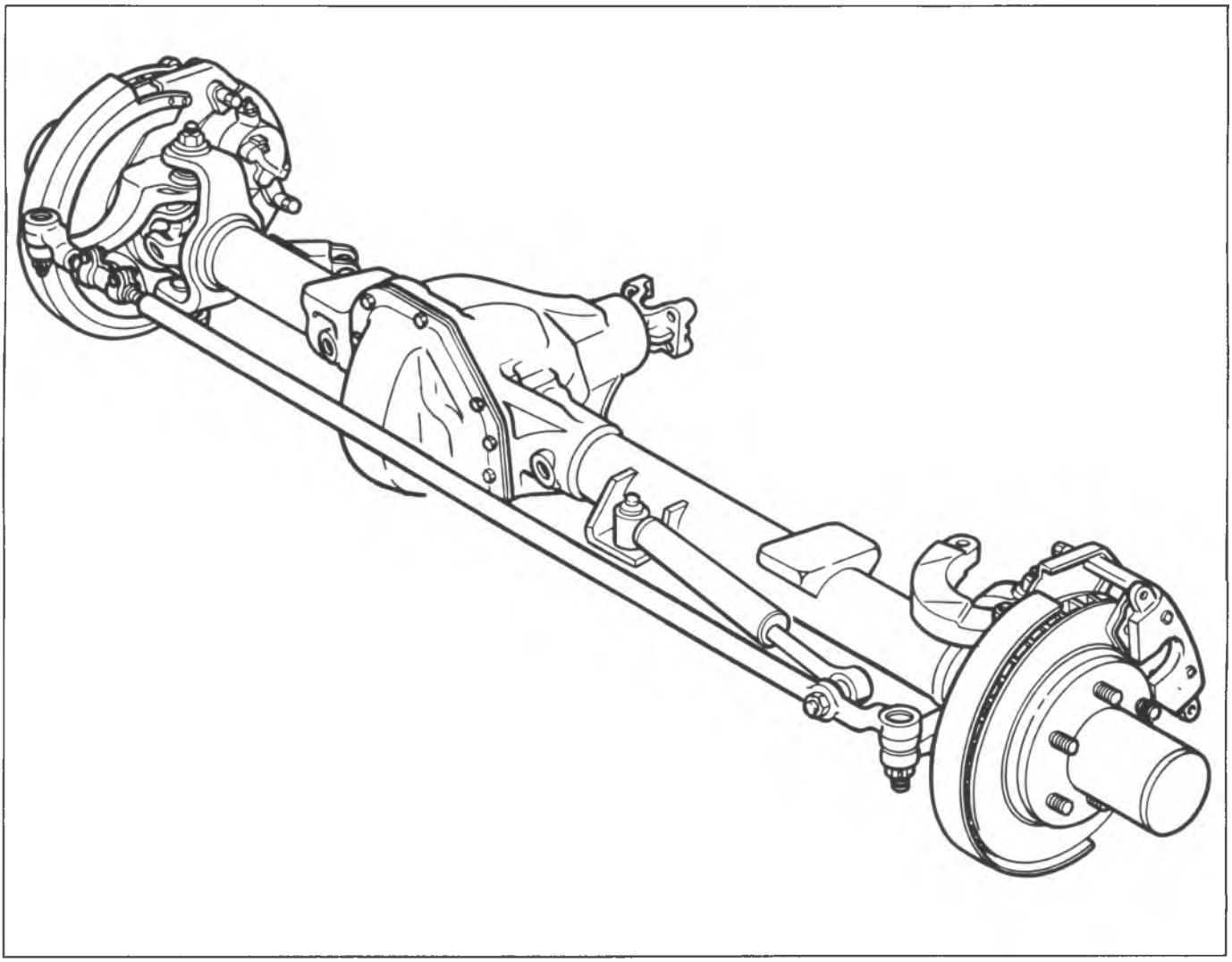


Fig. 4C-2--Front Drive Axle Typical

If the disc or other brake components require repairs or replacement, refer to Section 5.

Repair The Axle Joint Components:

1. Remove the lock rings after removing pressure from the trunnion bearings by squeezing the ends of the bearing in a vise.

2. Support the shaft yoke in a bench vise or on a short length of pipe.

3. Using a brass drift and a soft hammer, drive on end of one trunnion bearing just far enough to drive opposite bearing from yoke.

4. Support the other side of the yoke in the vise and drive the other bearing out by tapping on the end of the trunnion using a brass drift.

5. Remove trunnion.

6. Clean and inspect bearings. Lubricate with a high melting point type wheel bearing grease.

7. Replace trunnion and press new or relubricated bearings into yoke and over trunnion hubs far enough to install lock rings.

8. Hold trunnion in one hand and tap yoke lightly to seat bearings against lock rings.

Assembly

Reverse disassembly procedure.

CONDITION	POSSIBLE CAUSE	CORRECTION
Brake roughness or chatter (Pedal Pulsates) — Continued	5. Shoe reversed (steel against iron).	5. Replace shoe and lining and machine rotor within specifications.
Excessive Pedal Effort	1. Malfunctioning power brake.	1. Check power brake and repair if necessary.
	2. Partial system failure.	2. Check front and rear brake system and repair, if necessary. Also, check and repair brake warning light circuit if a failed system is found and light did not function.
	3. Excessively worn shoe and lining.	3. Check and replace in axle sets.
	4. Piston in caliper stuck or sluggish.	4. Remove caliper and rebuild.
	5. Fading brakes due to incorrect lining.	5. Remove and replace with original equipment lining (or equivalent).
Excessive Pedal Travel	1. Partial brake system failure.	1. Check both front and rear system for a failure and repair. Also check and repair warning light circuit. It should have indicated a failure.
	2. Insufficient fluid in master cylinder.	2. Fill reservoirs with approved brake fluid. Check for leaks. Check warning light.
	3. Air trapped in system.	3. Bleed system.
	4. Rear brake not adjusting.	4. Adjust rear brakes and repair auto adjusters.
	5. Bent shoe and lining.	5. Replace axle set of shoe and lining.
Dragging Brakes (A very light drag is present in all disc brakes immediately after pedal is released.)	1. Master cylinder pistons not returning correctly.	1. With reservoir cover off, check for fluid spurt at bypass holes as pedal is depressed. Adjust push rod, if necessary, or rebuild master cylinder.
	2. Restricted brake pipes or hoses.	2. Check for soft hoses or damaged pipes and replace with new hoses and new double-walled steel brake tubing.

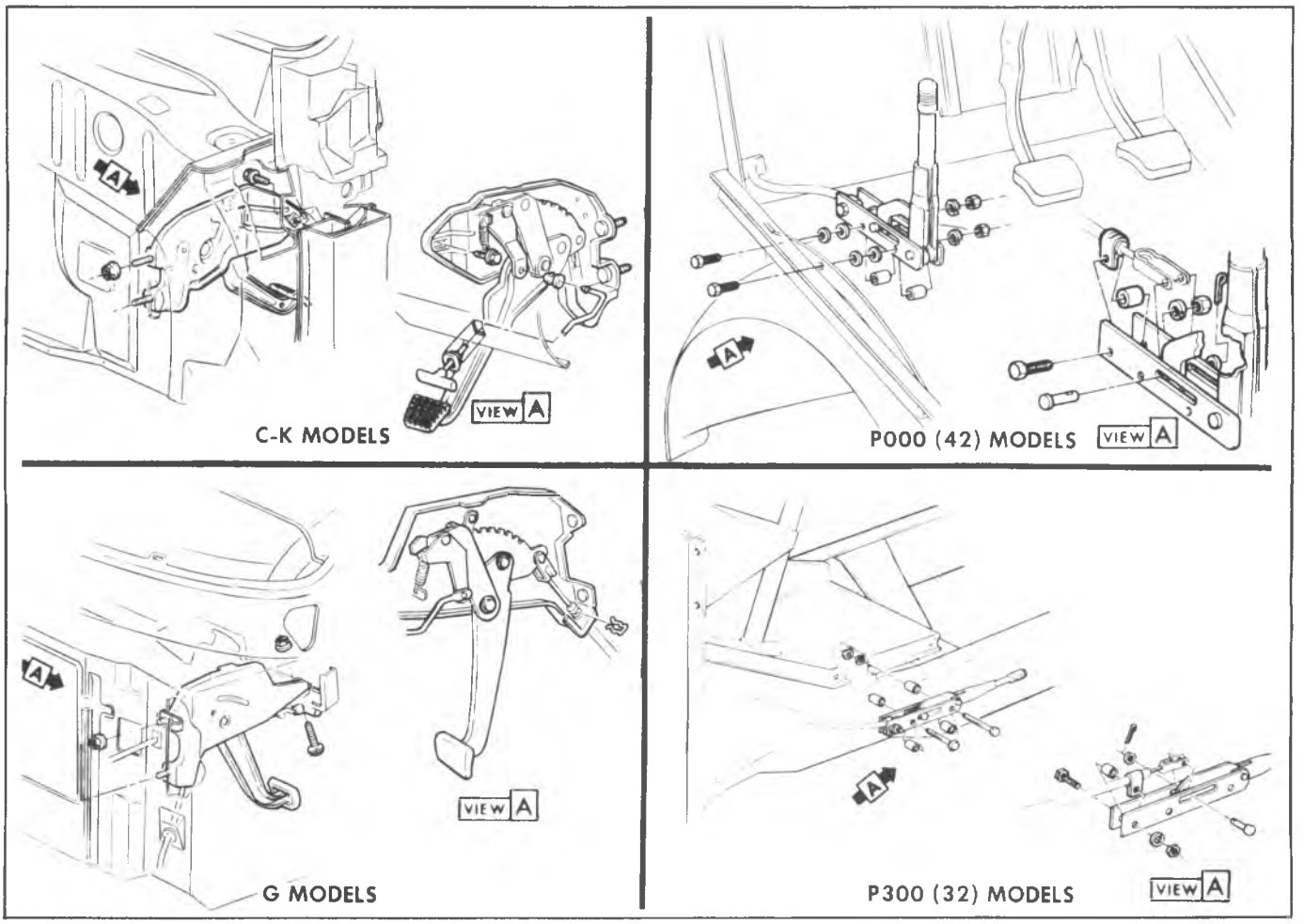


Fig. 5-9--Parking Brake Assembly--Typical

PARKING BRAKE ADJUSTMENT

Adjustment of parking brake cable is necessary whenever holding ability is not adequate or whenever the center brake cables have been disconnected.

The service brake must be properly adjusted as a base for parking brake adjustment; conversely the parking brake must be properly adjusted for the service brake to function as intended.

Inspection

If complete release of the parking brake is not obtained, unless it is forcibly returned to its released position, or if application effort is high, check parking brake assembly for free operation. If operation is sticky or a bind is experienced, correct as follows:

1. Clean and lubricate brake cables and equalizer with Delco Brake Lube (or equivalent).
2. Inspect brake assembly for straightness and alignment (replace if necessary).
3. Clean and lubricate parking brake assembly with Delco Brake Lube (or equivalent).
4. Checking routing of cables for kinks or binding.

Adjustment--Foot Pedal Type

Before adjusting parking brake, check service brake condition and adjustment.

1. Raise vehicle on hoist.
2. Loosen the equalizer adjusting nut.
3. Apply parking brake 4 notches from fully released position.
4. Tighten the equalizer nut until a moderate drag is felt when the rear wheels are rotated forward.

NOTICE: See "Notice" on Page 1 of this section.

5. Fully release parking brake and rotate the rear wheels. No drag should be present.
6. Remove vehicle from hoist.

Adjustment--Orscheln Lever Type

1. Turn adjusting knob on parking brake lever counterclockwise to stop.
2. Apply parking brake.
3. Raise vehicle on a hoist.
4. Loosen nut at intermediate cable equalizer and then adjust nut to give light drag at rear wheels.

NOTICE: See "Notice" on Page 1 of this section.

5. Readjust parking brake lever knob to give a definite snap-over-center feel.

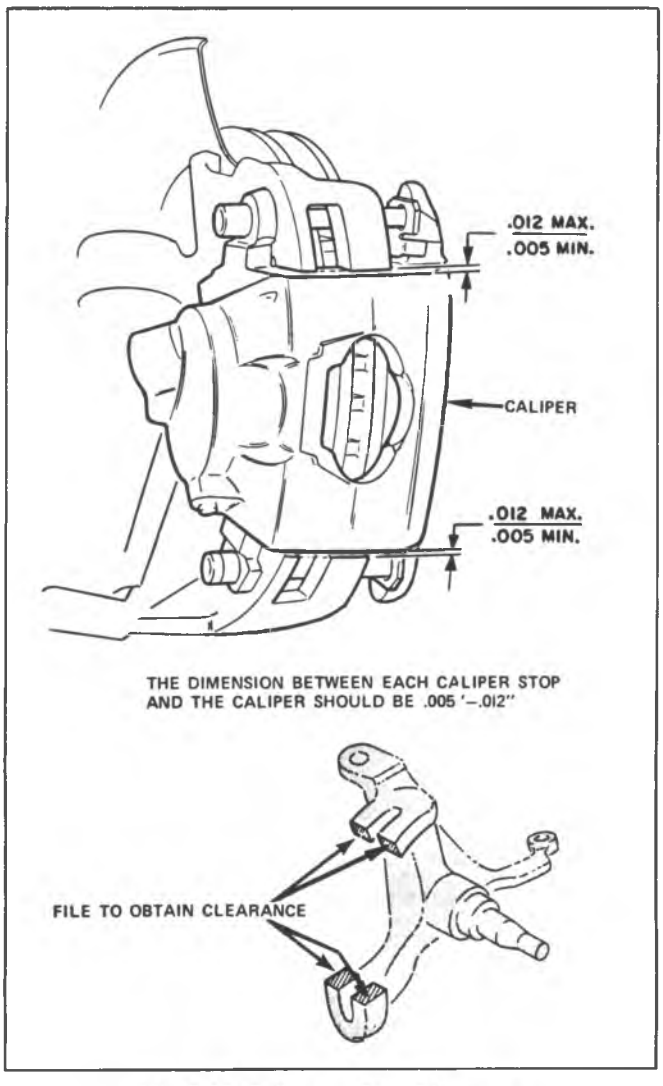


Fig. 5-23–Caliper to Stop Clearance

spring end of the inboard shoe spring over the bottom edge of the shoe so that they engage the shoe securely, as shown in Figure 5-26.

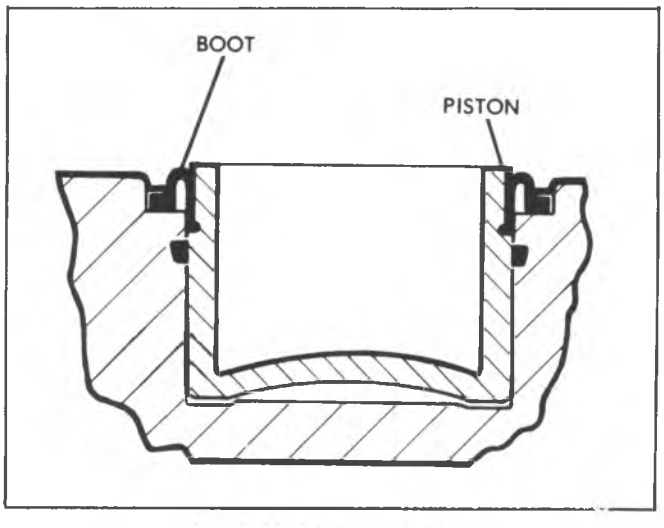


Fig. 5-24–Boot Installation

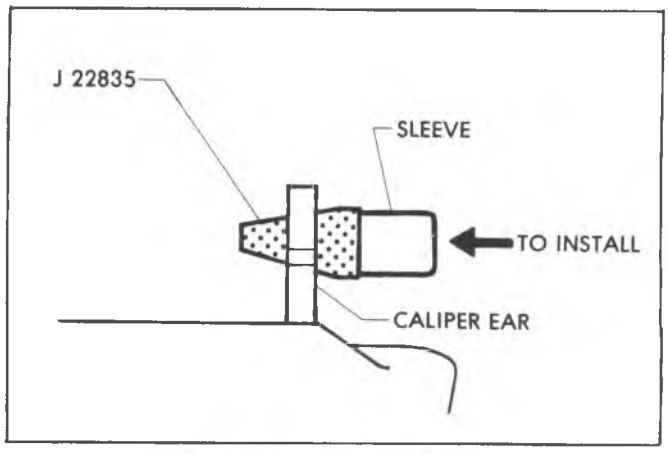


Fig. 5-25–Sleeve Installation

4. Position the inboard shoe and lining assembly (with spring attached) in the caliper so that the ear end of the shoe and lining is down and the bottom end up at an angle with the spring resting on the piston I.D. (fig. 5-27). Press down on both ends of the shoe until the shoe is in a flat position, resting on the piston. The spring end of the inboard shoe support spring should be resting on the I.D. of the piston.

NOTICE: On inboard shoes there is a specific left hand and right hand shoe. When properly installed the wear sensor will be toward rear of caliper.

5. Position the outboard shoe in the caliper, with the ears at the top of the shoe over the caliper ears and the tab at the bottom of the shoe engaged in the caliper cut-out (see fig. 5-28). Be sure to note right and left brake shoes.

6. Postion the caliper over the rotor, lining up the holes in the caliper ears with the holes in the mounting bracket.

NOTICE: When reinstalling caliper be sure you haven't turned it over, end over end. This would cause a severe twist in the brake hose. After positioning caliper on disc, observe brake hose being sure it is not

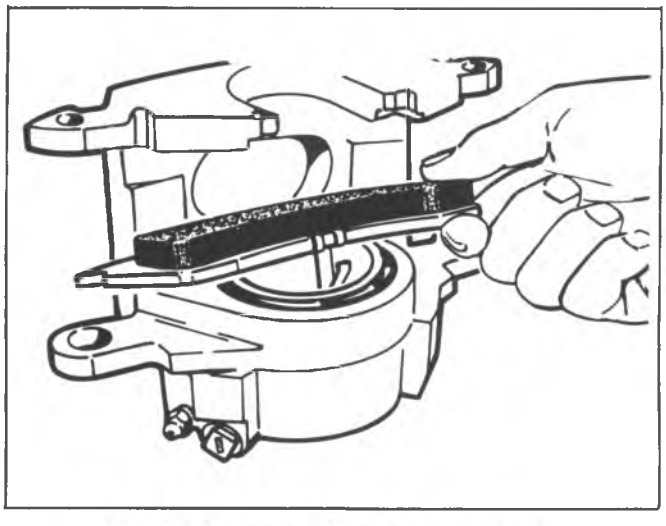


Fig. 5-26–Inserting Shoe Support Spring

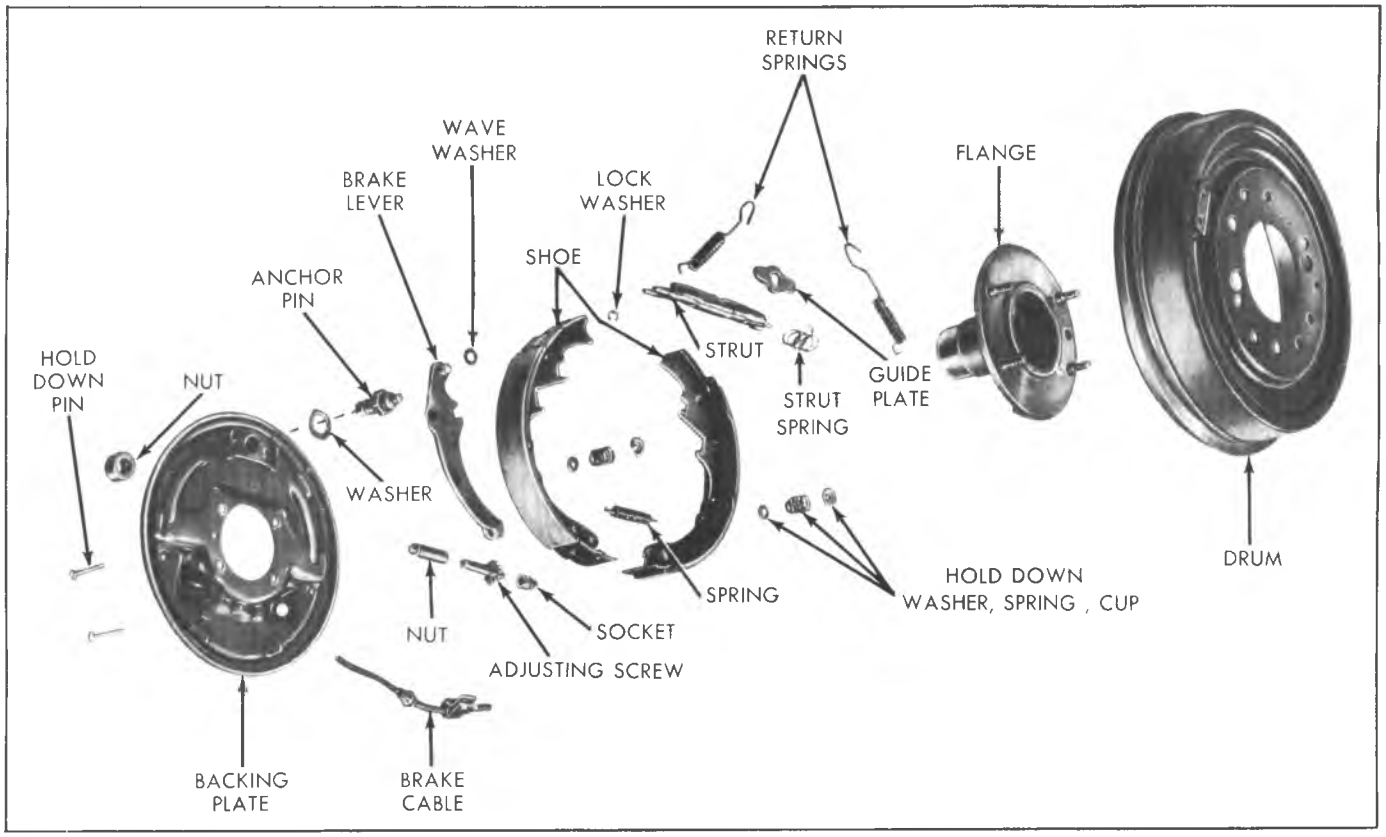


Fig. 5-47--Propshaft Parking Brake Components

8. Move the shoes toward each other until the adjusting bolt and connecting spring drop off.

9. Remove the clip holding the brake lever to the primary shoe (shoe with short lining).

10. Compress the spring on the brake cable and remove the cable from the lever.

11. If necessary to remove the anchor pin, straighten the washer from pin hex and reinforcement. Remove reinforcement and washer with anchor pin.

12. If necessary to remove the cable, compress tangs on cable and pull assembly out of the hole in the flange plate.

13. If necessary to remove the flange plate, remove the transmission flange nut and transmission output flange. Remove bolts holding the flange plate to bearing retainer and remove the flange plate.

Inspection

Replace any worn or broken parts.

Installation

NOTICE: Refer to "Notice" on Page 1 of this section when installing fasteners in steps 1, 2 and 4 below.

1. Place the flange plate in position on the rear bearing retainer and fasten with four bolts. Torque bolts to 24 lb. ft. (33 N·m).

2. Install transmission output flange on spline of mainshaft and fasten with flange nut. Torque nut to 100 lb. ft. (136 N·m).

3. Install cable assembly from back of flange plate. Push retainer through hole in flange plate until tangs securely grip the inner side of the plate.

4. Place washer and reinforcement over the threaded end of anchor pin. Hold anchor pin nut (flat side against flange on flange plate) in position behind flange plate and insert threaded end of anchor pin from front side. Thread the anchor pin into nut and tighten securely (140 lb. ft.--190 N·m). Bend tang of washer over reinforcement and side of washer over hex of anchor pin.

5. Install lever on cable by compressing spring and inserting cable in channel of lever. Release spring.

6. Install primary shoe (short lining) to lever as follows: Place pin in lever, place washer on pin and push pin through hole in primary shoe. Fasten parts together by installing the clip in groove of pin.

7. Fasten two brake shoes and linings together by installing connecting spring. Move the shoes toward each other and install adjusting screw.

8. Lubricate the flange plate contact surfaces with a very light coat of Delco Brake Lube (or equivalent).

9. Place shoe and linings in position on flange plate.

When facing the brake assembly, the shoe with the short lining should be to the left with the lever assembled to it (automatic transmission), to the right (manual transmission).

10. Pull brake shoes apart and install strut lever and spring between them. The loop on the strut spring should be in the "up" position.

11. Install hold down pins, washers, springs and cups from flange plate to shoes.

12. Place guide plate on anchor pin.

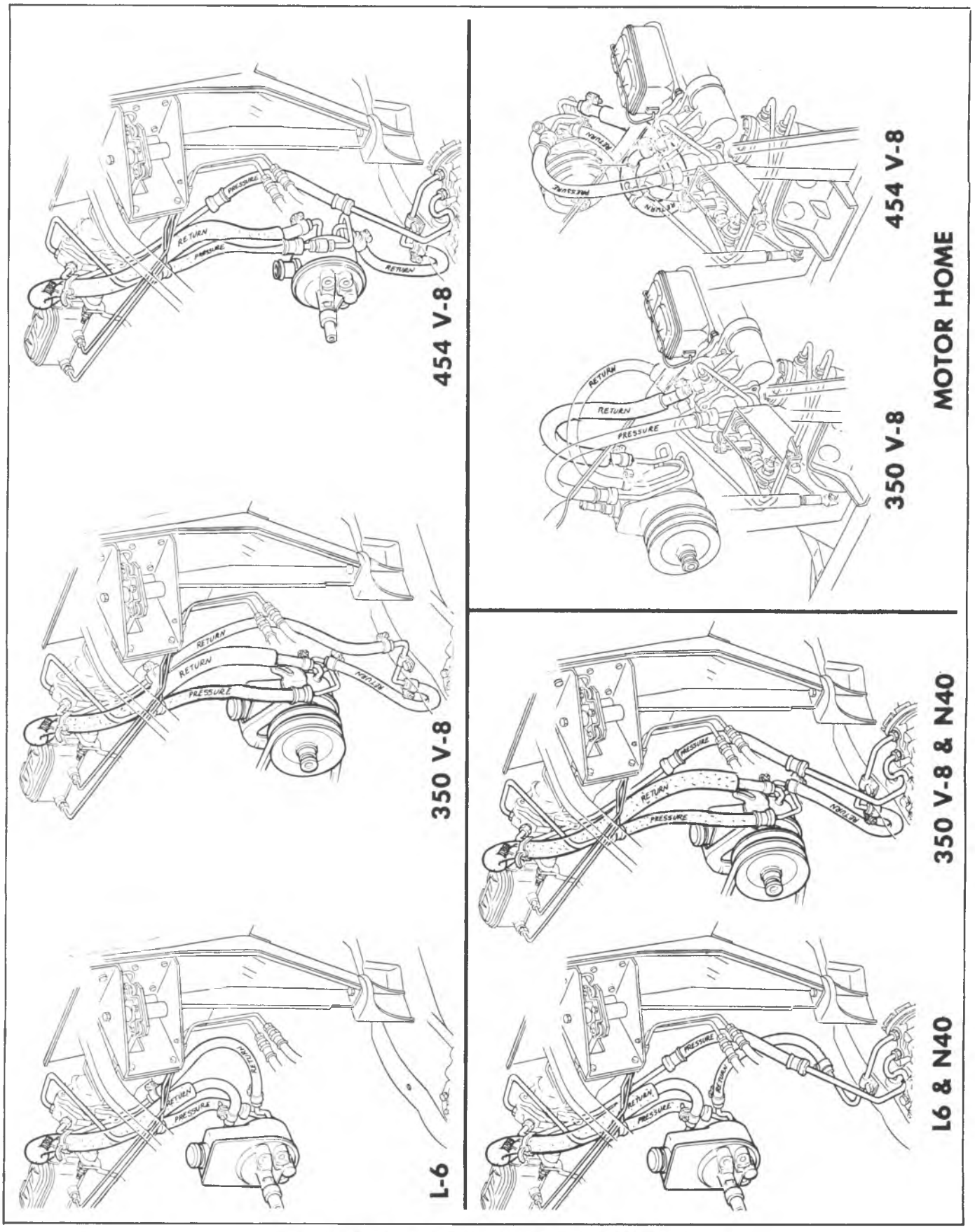


Fig. 5-59--Power Steering Hose Routing--P Models

NOISY MAIN BEARINGS

a. Check low oil pressure and/or insufficient oil supply and correct as necessary.

b. Check for excessive bearing clearance and correct as necessary.

c. Check for excessive crankshaft end play and correct as necessary.

d. Check for eccentric or out-of-round crankshaft journals and correct as necessary.

e. Check for excessive belt tension and adjust as necessary.

f. Check for loose torsional damper and replace as necessary.

NOISY VALVE LIFTERS

a. Check for broken valve springs and replace as necessary.

b. Check for worn or sticking rocker arms and repair or replace as necessary.

c. Check for worn or bent push rods and replace as necessary.

d. Check for valve lifters incorrectly fitted to bore size and correct as necessary.

e. Check faulty valve lifter plunger or push rod seat and replace lifters as necessary.

f. Check for plungers excessively worn causing fast leakdown under pressure and replace as necessary.

g. Check for excessively worn camshaft lobes and replace if necessary.

h. Check valve lifter oil feed holes plugged causing internal breakdown and correct as necessary.

i. Check faulty valve lifter check ball. (nicked, flat spot, or out of round) and replace as necessary.

j. Check rocker arm retaining nut to be installed upside down and correct as necessary.

k. Check for end of push rod excessively worn or flaked and replace as necessary.

ENGINE DETONATION

a. Check for overadvanced ignition timing and/or faulty ignition system and correct as necessary.

b. Check for loose or improper application of spark plugs, or spark plugs with cracked or broken ceramic cores and replace as necessary.

c. Check for the use of sub-standard fuel and correct as necessary.

d. Check for foreign material in fuel lines and/or carburetor and correct as necessary.

e. Check for restricted fuel delivery to carburetor (pinched lines, faulty fuel tank cap or pick-up) and correct as necessary.

f. Check fuel pump operation and replace if necessary.

g. Check EFE system operation and repair or replace as necessary.

h. Check EGR system operation and correct as necessary.

i. Check thermostatically controlled air cleaner operation and correct as necessary.

j. Check P.C.V. system operation and correct as necessary.

k. Check for vacuum leaks and repair or replace as necessary.

l. Check engine operating temperature and correct as necessary.

m. Check for excessive combustion chamber deposits and correct as necessary.

n. Check for leaking, sticking, or broken valves and repair or replace as necessary.

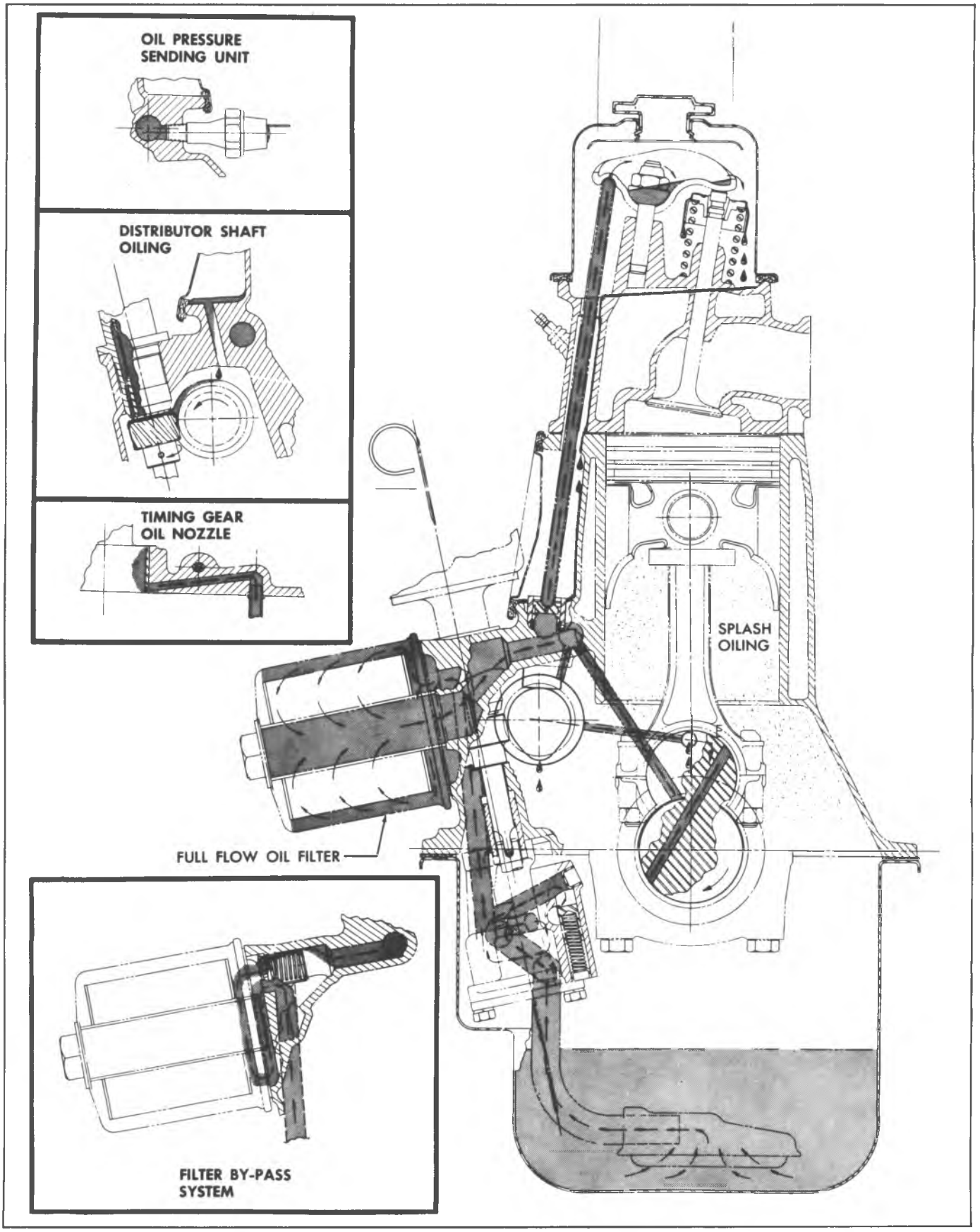


Fig. 6A1-1--In-Line Engine Lubrication

Fig. 6A1-13--Removing Ball Check Valve

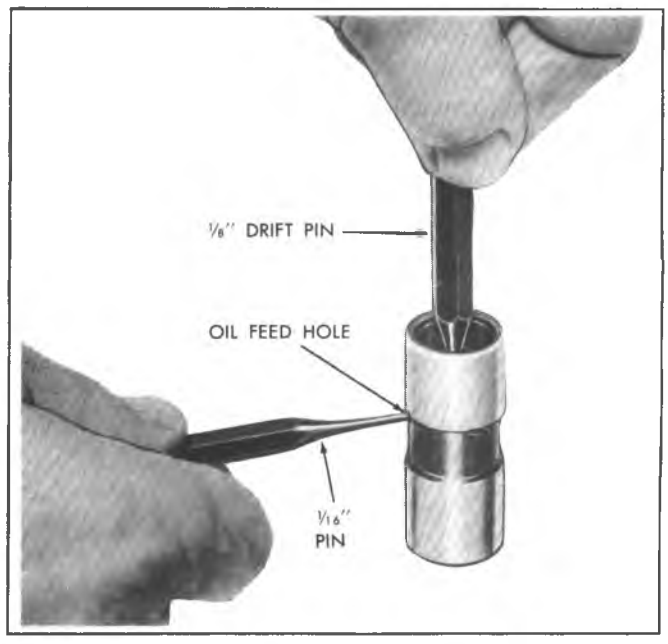


Fig. 6A1-15--Assembling Hydraulic Lifter

bore, if the bottom of the lifter is scuffed or worn inspect the camshaft lobe, if the push rod seat is scuffed or worn inspect the push rod.

An additive containing EP lube, such as EOS, should always be added to crankcase oil for run-in when any new camsahft or lifters are installed. All damaged or worn lifters should be replaced.

For proper lifter rotation during engine operation, lifter foot must be convex.

Assembly

1. Place the check ball on small hole in bottom of the plunger.

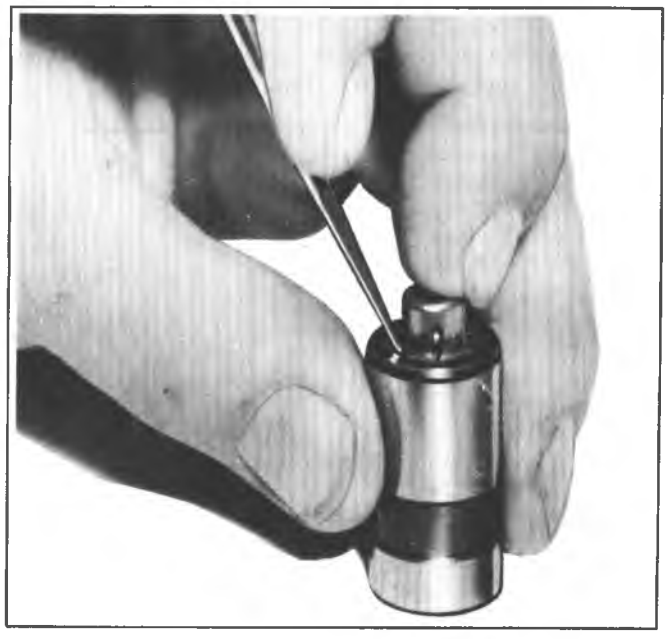


Fig. 6A1-14--Installing Ball Check Valve

2. Insert check ball spring on seat in ball retainer and place retainer over ball so that spring rests on the ball. Carefully press the retainer into position in plunger with the blade of a small screw driver (fig. 6A1-14).

3. Place the plunger spring over the ball retainer and slide the lifter body over the spring and plunger, being careful to line up the oil feed holes in the lifter body and plunger.

4. Fill the assembly with SAE 10 oil, then insert the end of a 1/8" (3mm) drift pin into the plunger and press down solid. (Do not attempt to force or pump the plunger). At this point oil holes in the lifter body and plunger assembly will be aligned (fig. 6A1-15).

5. Insert a 1/16" (1.6mm) drift pin through both oil holes to hold the plunger down against the lifter spring tension (fig. 6A1-15).

6. Remove the 1/8" (3mm) drift pin, refill assembly with SAE 10 oil.

7. Install the metering valve and push rod seat (refer to fig. 6A1-12).

8. Install the push rod seat retainer, press down on the push rod seat and remove the 1/16" (1.6mm) drift pin from the oil holes. The lifter is now completely assembled, filled with oil and ready for installation.

Installation

1. Coat foot of valve lifters with "Molykote" or its equivalent. Install valve lifters.

2. Using a 1/8" (3mm) bead of RTV, #1052366 or equivalent, on the covers, install push rod side covers and torque bolts to specifications.

3. Install distributor cap.

4. Install push rods and adjust valve mechanism as outlined.

5. Adjust ignition timing and carburetor idle speed.

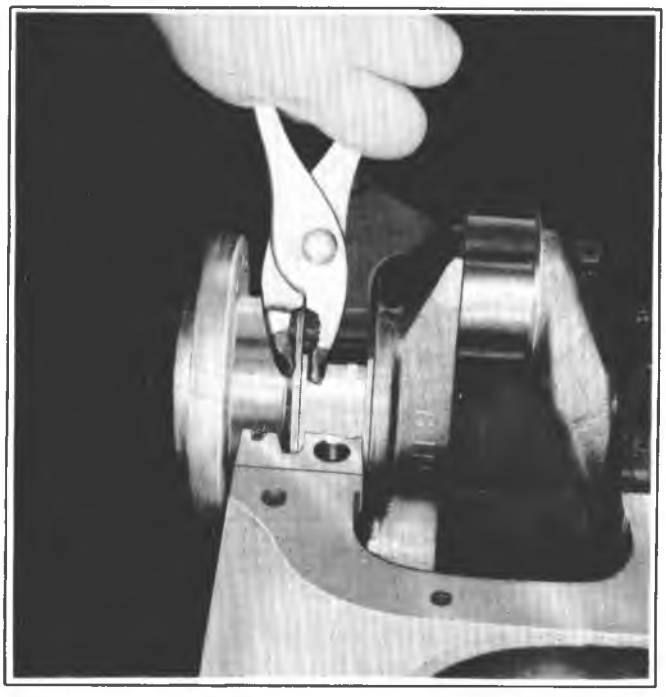


Fig. 6A1-33--Replacing Upper Main Bearing

and lower insert as a unit.

If a new bearing cap is being installed and clearance is less tha .001", inspect for burrs or nicks; if none are found then install shims as required.

7. A standard, .001" or .002" undersize bearing may produce the proper clearance. If not, it will be necessary to regrind the crankshaft journal for use with the next undersize bearing.

After selecting new bearing, recheck clearance.

8. Proceed to the next bearing. After all bearings have been checked, rotate the crankshaft to see that there is no excessive drag.

When checking #1 main bearing, loosen accessory drive belts so as to prevent tapered reading with plastic gage.

9. Measure crankshaft end play (see specifications) by forcing the crankshaft to the extreme front position. Measure at the front end of the rear main bearing with a feeler gage (fig. 6A1-32).

10. Install a new rear main bearing oil seal in the cylinder block and main bearing cap.

Replacement

Main bearings may be replaced with or without removing the crankshaft.

With Crankshaft Removed

1. Remove and inspect the crankshaft.

2. Remove the main bearings from the cylinder block and main bearing caps.

3. Coat bearing surfaces of new, correct size, main bearings with oil and install in the cylinder block and main bearing caps.

4. Install the crankshaft.

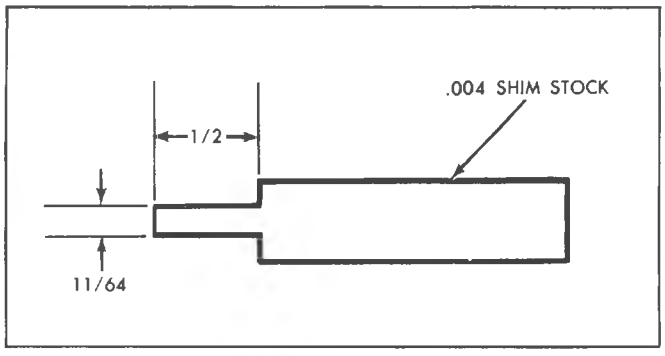


Fig. 6A1-34--Oil Seal Installation Tool

Without Crankshaft Removal

1. With oil pan, oil pump and spark plugs removed, remove cap on main bearing requiring replacement and remove bearing from cap.

2. The rear main journal has no oil hole. Replace the rear main bearing upper half as follows:

a. Use a small drift punch and hammer to start the upper bearing half rotating out of block.

b. Use a pair of pliers (with taped jaws) to hold the bearing thrust surface to the oil slinger and rotate the crankshaft to remove bearing (fig. 6A1-33).

c. Oil new selected size upper bearing and insert plain (unnotched) end between crankshaft and indented or notched side of block.

d. Use pliers as in removing to rotate bearing into place. The last 1/4" (6.5mm) movement may be done by holding just the slinger with the pliers or tap in place with a drift punch.

3. All other crankshaft journals have oil holes. Replace the main bearing upper half as follows:

a. Install a main bearing removing and installing tool, such as Tool J-8080, in oil hole in crankshaft journal. If such a tool is not available, a cotter pin may be bent as required to do the job.

b. Rotate the crankshaft clockwise as viewed from the front of engine. This will roll upper bearing out of block.

c. Oil new selected size upper bearing and insert plain (unnotched) end between crankshaft and indented or notched side of block. Rotate the bearing into place and remove tool from oil hole in crankshaft journal.

4. Oil new lower bearing and install in bearing cap.

5. Install main bearing caps with arrows pointing toward front of engine.

6. Torque all main bearing caps **except the rear main cap** to 65 lb. ft. (88N·m). Torque rear main bearing cap to 10-12 lb. ft. (14-16N·m) then tap end of crankshaft, first rearward then forward with a lead hammer. This will line up rear main bearing and crankshaft thrust surfaces. Retorque **all** main bearing cap bolts to 65 lb. ft. (88N·m).

OIL SEAL (REAR MAIN)

Replacement

The rear main bearing oil seal can be replaced (both halves) without removal of the crankshaft. Always replace the upper and lower seal as a unit. Install seal with lip facing front of engine. Extreme care should be exercised when installing this seal to protect the sealing bead located in the

VALVE SYSTEM			LE3	L25
LIFTER			HYDRAULIC	
ROCKER ARM RATIO			1.75:1	
VALVE LASH	INTAKE		ONE TURN DOWN FROM ZERO LASH	
	EXHAUST			
FACE ANGLE (INT. & EXH.)			45°	46°
SEAT ANGLE (INT. & EXH.)			46°	
SEAT RUNOUT			.002 MAX.	
SEAT WIDTH	INTAKE		1/32-1/16	
	EXHAUST		1/16-3/32	
STEM CLEARANCE	PRODUCTION	INT.	.0010-.0027	
		EXH.	.0015-.0032	
	SERVICE		HI LIMIT	+ .001 INTAKE + .002 EXHAUST
VALVE SPRING (OUTER)	FREE LENGTH		1.88	1.90
	PRESSURE LBS. @ IN.	CLOSED	56-64 @ 1.66	78-86 @ 1.66
		OPEN	166-178 @ 1.26	170-180 @ 1.26
	INSTALLED HEIGHT ± 1/32"		1-21/32	1-21/32
DAMPER	FREE LENGTH		NONE	1.94
	APPROX. # OF COILS		NONE	4

TORQUE SPECIFICATIONS

Camshaft Thrust Plate .....80 lb. in.
Crankshaft Front Cover .....80 lb. in.
Flywheel Housing Cover .....80 lb. in.
Oil Pan (To Crankcase) (1/4-20) .....80 lb. in.
Oil Pan (To Front Cover) .....50 lb. in.
Oil Pump Cover .....70 lb. in.
Rocker Arm Cover .....45 lb. in.
Connecting Rod Cap .....35 lb. ft.*
Clutch Pressure Plate .....20 lb. ft.*
Oil Pan (To Crankcase) 5/16-18) .....75 lb. in.
Oil Pump .....115 lb. in.
Push Rod Cover .....50 lb. in.
Water Pump .....15 lb. in.
Clutch Pressure Plate .....30 lb. ft.@
Distributor Clamp .....25 lb. ft.
Flywheel Housing .....30 lb. ft.
Manifold (Exhaust) .....30 lb. ft. [2]
Manifold (Exhaust To Inlet) ..... 45 lb. ft
Manifold To Head ..... 40 lb. ft.
Thermostat Housing .....30 lb. ft.
Water Outlet .....30 lb. ft.
Connecting Rod Cap .....40 lb. ft.@
Main Bearing Cap .....65 lb. ft.
Flywheel .....60 lb. ft.*
Torsional Damper .....60 lb. ft.@ [1]
Cylinder Head .....95 lb. ft.
Temperature Sending Unit .....20 lb. ft.
Oil Filter .....Hand Tight
Oil Pan Drain Plug .....20 lb. ft.
Flywheel .....110 lb. ft.@
Spark Plug .....17-27 lb. ft.

* 4.1 (D) only
@ 4.8 (T) only
1 Except LH Front Bolt 85 lb. ft.
2 Non-Integral Head

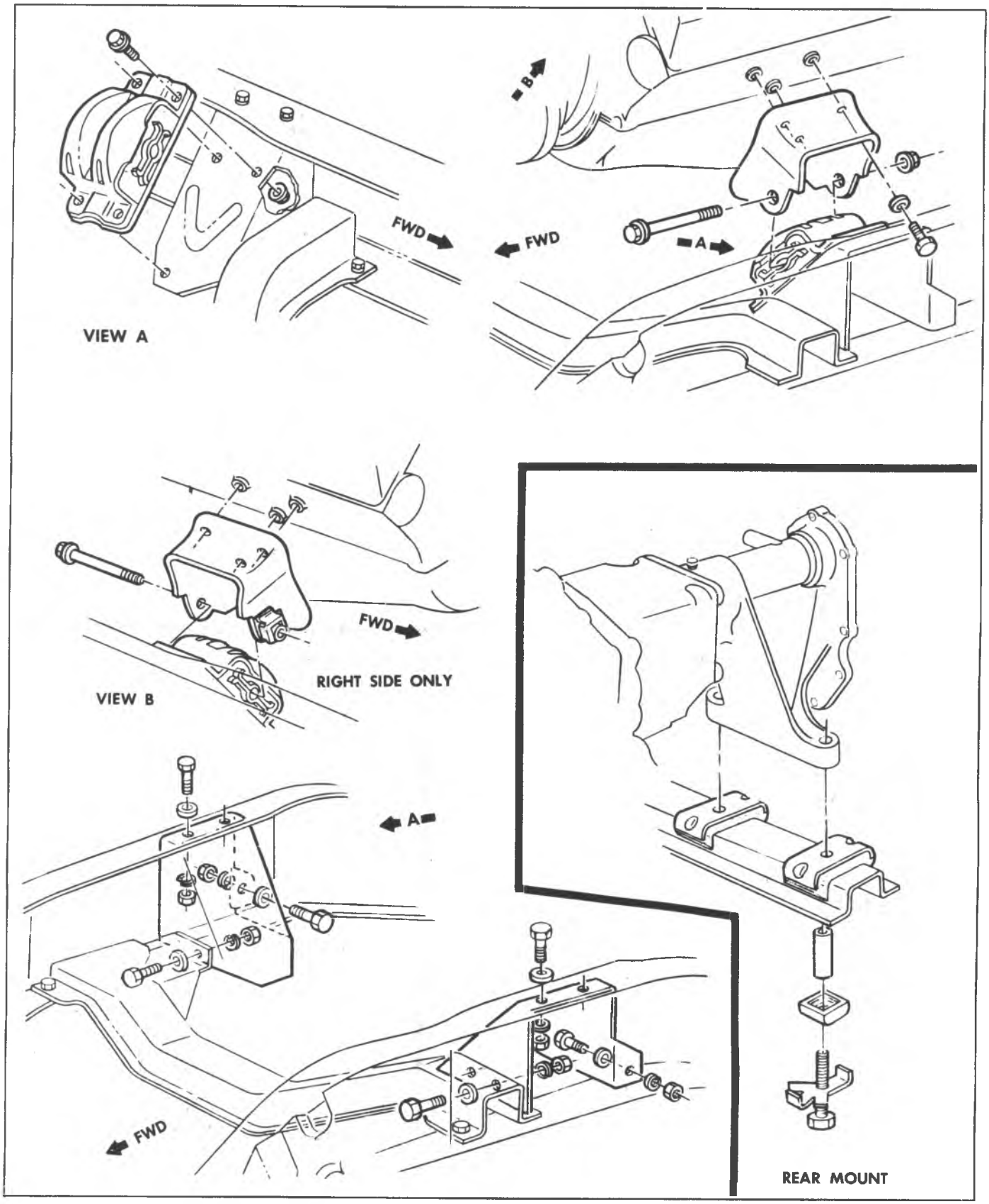


Fig. 6A4-7–"K" Series Engine Mounts

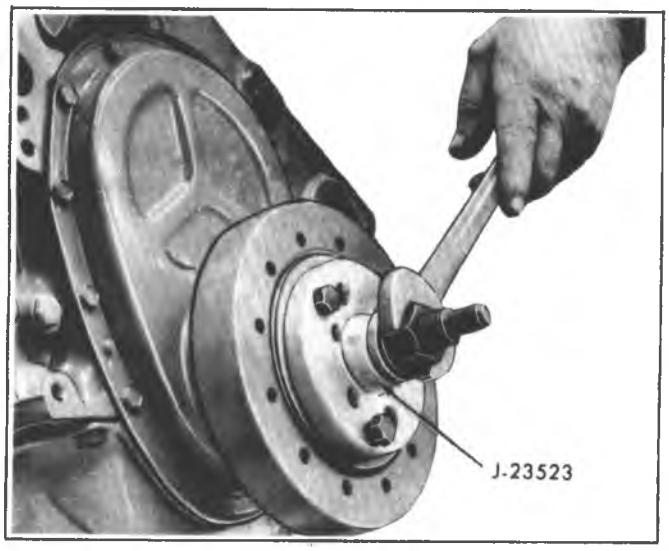


Fig. 6A4-31–Installing Torsional Damper

8. Fill cooling system (see section 6B) and check for leaks.

CRANKCASE FRONT COVER

Removal

1. Remove torsional damper as previously outlined.

2. Remove water pump (see section 6B).

3. Remove crankcase front cover attaching screws and remove front cover and gasket, then discard gasket.

Installation

1. Clean gasket surface on block and crankcase front cover.

2. Use a sharp knife or other suitable cutting tool to remove any excess oil pan gasket material that may be protruding at the oil to engine block junction.

3. Apply a 1/8" (3mm) bead of RTV, #1052366 or equivalent, to the joint formed at the oil pan and cylinder block.

4. Coat the cover gasket with gasket sealant and place in position on cover.

5. Install cover-to-oil pan seal, lightly coat bottom of seal with engine oil, and position cover over crankshaft end.

6. Loosely install the cover-to-block upper attaching screws.

7. Tighten screws alternately and evenly while pressing downward on cover so that dowels in block are aligned with corresponding holes in cover. Position cover so that dowels enter holes in cover without binding. Do not force cover over dowels so that cover flange or holes are distorted.

8. Install remaining cover screws and torque to specifications.

9. Install torsional damper and water pump as previously outlined.

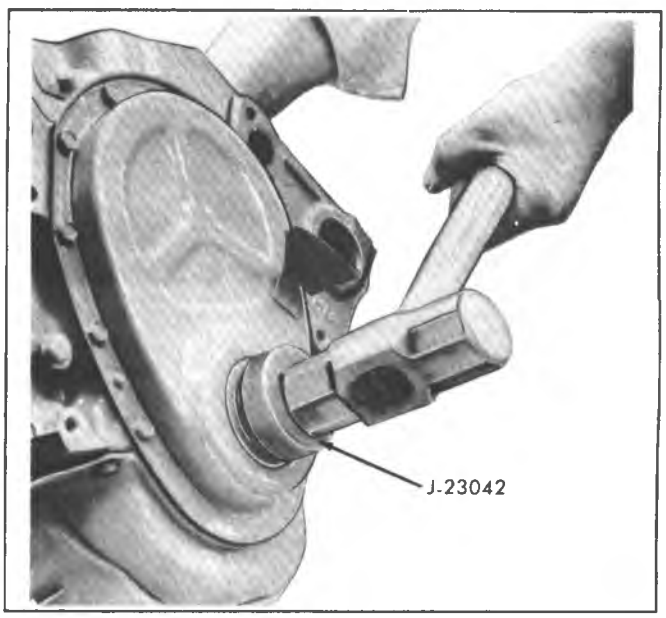


Fig. 6A4-32–Installing Oil Seal

OIL SEAL (FRONT COVER)

Replacement

With Cover Removed

1. With cover removed, pry oil seal out of cover from the front with a large screw driver.

2. Install new seal so that open end of the seal is toward the inside of cover and drive it into position with Tool J-23042. Support rear of cover at seal area.

With Cover Installed

1. With torsional damper removed, pry seal out of cover from the front with a large screw driver. Be careful not to damage the surface on the crankshaft.

2. Install new seal so that open end of seal is toward the inside of cover and drive it into position with Tool J-23042 (fig. 6A4-32).

CAMSHAFT

Measuring Lobe Lift

1. Remove the valve mechanism as previously outlined.

2. Position indicator with ball socket adapter (Tool J-8520) on push rod (fig. 6A4-33). Make sure push rod is in the lifter socket.

3. Rotate the crankshaft slowly in the direction of rotation until the lifter is on the heel of the cam lobe. At this point, the push rod will be in its lowest position.

4. Set dial indicator on zero, then rotate the crankshaft slowly, or attach an auxiliary starter switch and "bump" the engine over, until the push rod is fully raised position.

- Whenever the engine is cranked remotely at the starter, with a special jumper cable or other means, the distributor primary lead should be disconnected from the distributor (coil).

5. Compare the total lift recorded from the dial indicator with specifications.

6. If camshaft readings for all lobes are within specifications, remove dial indicator assembly.

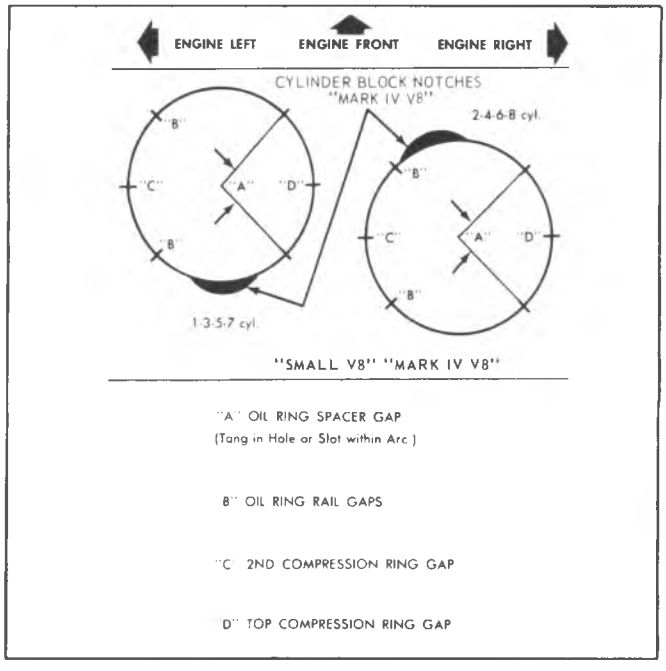


Fig. 6A4-56--Ring Gap Location

d. Flex the oil ring assembly to make sure ring is free. If binding occurs at any point the cause should be determined. If binding is caused by ring groove, correct by dressing groove with a fine cut file. If binding is caused by a distorted ring, check a new ring.

e. Install second compression ring (manufacturer mark up) with gaps properly located.

f. Install top compression ring (manufacturer mark up) with gap properly located.

9. Proper clearance of the piston ring in its piston ring groove is very important to provide proper ring action and reduce wear. Therefore, when fitting new rings, the clearances between the surfaces of the ring and groove should be measured (fig. 6A4-57). (See Specifications).

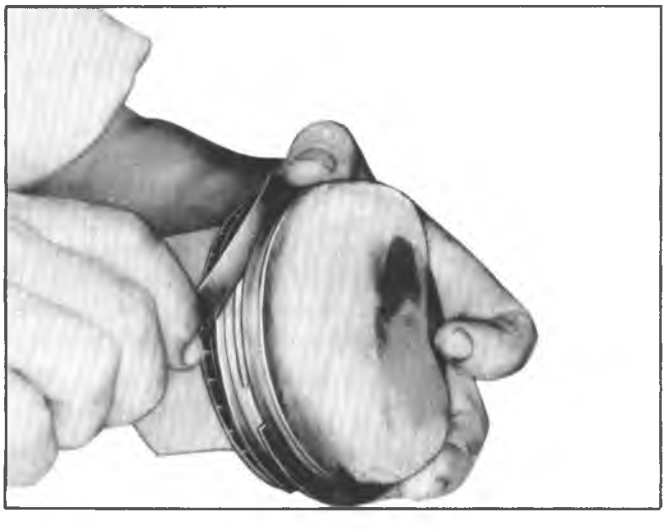


Fig. 6A4-57--Measuring Ring Groove Clearance

Fig. 6A4-58--Installing Connecting Rod & Piston Assembly

Installation

Cylinder bores must be clean before piston installation. This may be accomplished with a hot water and detergent wash or with a light honing as necessary. After cleaning, the bores should be swabbed several times with light engine oil and a clean dry cloth.

1. Lubricate connecting rod bearings and install in rods and rod caps.

2. Lightly coat pistons, rings and cylinder walls with light engine oil.

3. With bearing caps removed, install Tool J-5239 (3/8") on connecting rod bolts.

4. Install each connecting rod and piston assembly in its respective bore. Install with connecting rod bearing tang slots on side opposite camshaft. Use Tool J-8037 to compress the rings (fig. 6A4-58). Guide the connecting rod into place on the crankshaft journal with Tool J-5239 (3/8") Use a hammer handle and light blows to install the piston into the bore. Hold the ring compressor firmly against the cylinder block until all piston rings have entered the cylinder bore.

5. Remove Tool J-5239.

6. Install the bearing caps and torque nuts to specifications.

Be sure to install new pistons in the cylinders for which they were fitted, and used pistons in the cylinder from which they were removed. Each connecting rod and bearing cap should be marked, beginning at the front of the engine. Cylinders 1,3,5 and 7 are the left bank and, 2 4, 6 and 8 are the right bank. The numbers on the connecting rod and bearing cap must be on the same side when installed in the cylinder bore. If a connecting rod is ever transposed from one block or cylinder to another, new bearings should be fitted and the connecting rod should be numbered to correspond with the new cylinder number.

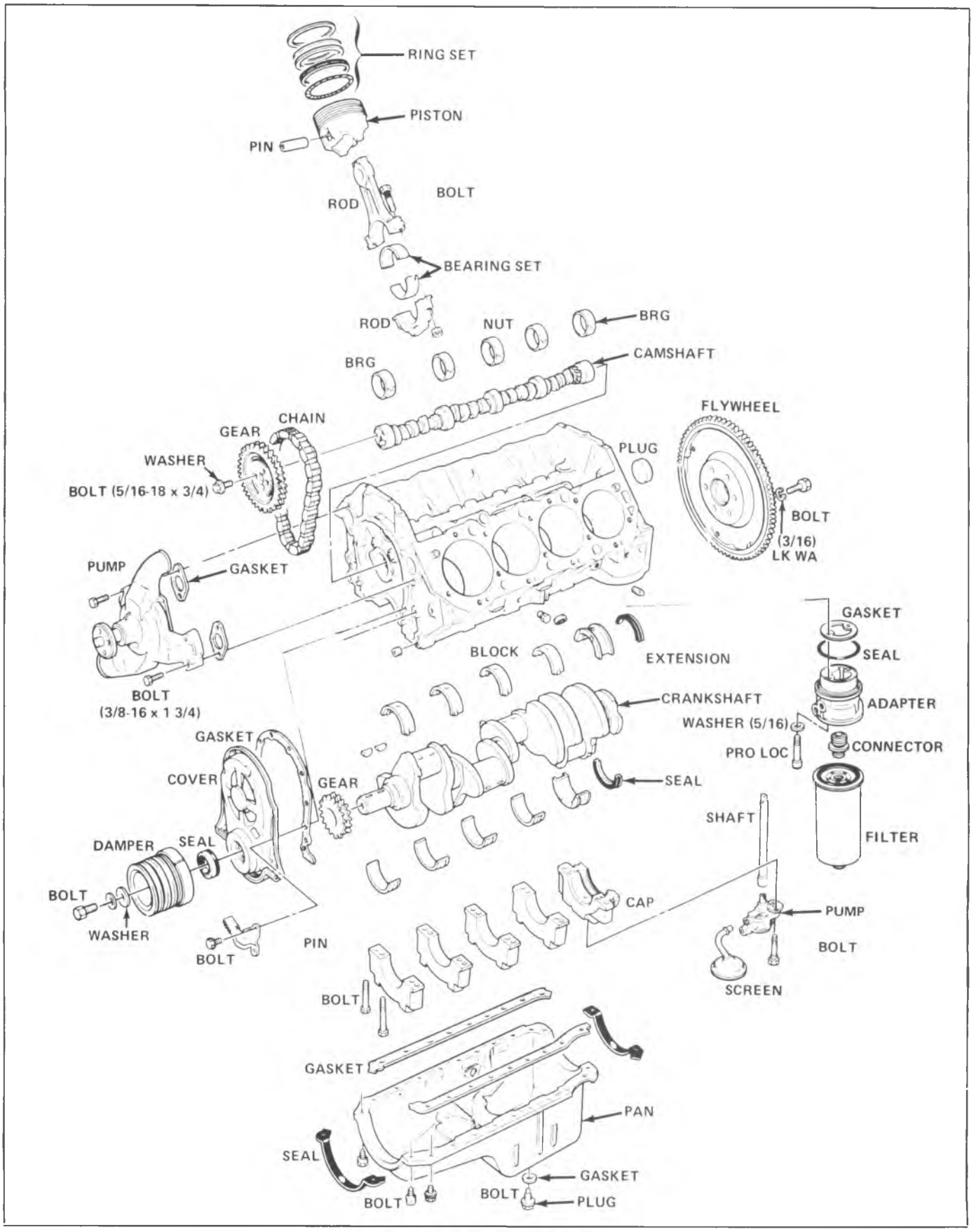


Fig. 6A5-2–Engine Lower End

Fig. 6A5-15--Removing Ball Check Valve

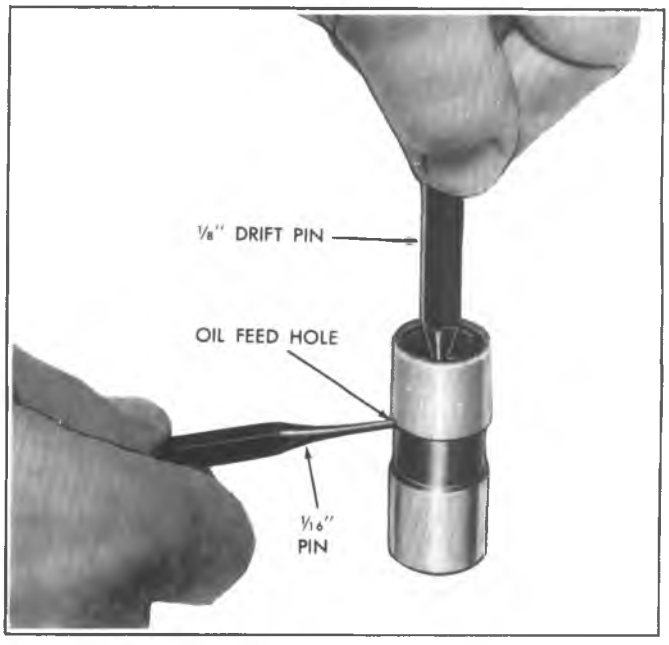


Fig. 6A5-17--Assembling Hydraulic Lifter

or worn lifters should be replaced.

• For proper lifter rotation during engine operation, lifter foot must be convex.

Assembly

1. Place the check ball on small hole in bottom of the plunger.

2. Insert check ball spring on seat in ball retainer and place retainer over ball so that spring rests on the ball. Carefully press the retainer into position in plunger with the blade of a small screw driver (fig. 6A5-16).

3. Place the plunger spring over the ball retainer and slide the lifter body over the spring and plunger, being careful to line up the oil feed holes in the lifter body and plunger.

Fig. 6A5-16--Installing Ball Check Valve

4. Fill the assembly with SAE 10 oil, then insert the end of a 1/8" drift pin into the plunger and press down solid. Do not attempt to force or pump the plunger. At this point, oil holes in the lifter body and plunger assembly will be aligned (fig. 6A5-17).

5. Insert a 1/16" drift pin through both oil holes to hold the plunger down against the lifter spring tension (fig. 6A5-17).

6. Remove the 1/8" drift pin, refill assembly with SAE 10 oil.

7. Install the metering valve and push rod seat (fig. 6A5-14).

8. Install the push rod seat retainer, press down on the push rod seat and remove the 1/16" drift pin from the oil holes. The lifter is now completely assembled, filled with oil and ready for installation. Before installing lifters, coat the bottom of the lifter with "Molykote" or its equivalent.

CYLINDER HEAD ASSEMBLY

Removal

1. Remove intake manifold as previously outlined.

2. Remove generator lower mounting bolt and lay unit aside.

3. Remove exhaust manifolds as previously outlined.

4. If vehicle is equipped with A/C, remove A/C compressor and forward mounting bracket. Lay unit aside.

5. Remove valve mechanism as previously outlined.

6. Drain cylinder block of coolant.

7. Remove cylinder head bolts, cylinder head and gasket. Place cylinder head on two blocks of wood to prevent damage.

Disassembly

1. With cylinder head removed, remove valve rocker arm nuts, balls and rocker arms (if not previously done).

2. Using Tool J-8062, compress the valve springs (fig. 6A5-18) and remove valve keys. Release the compressor

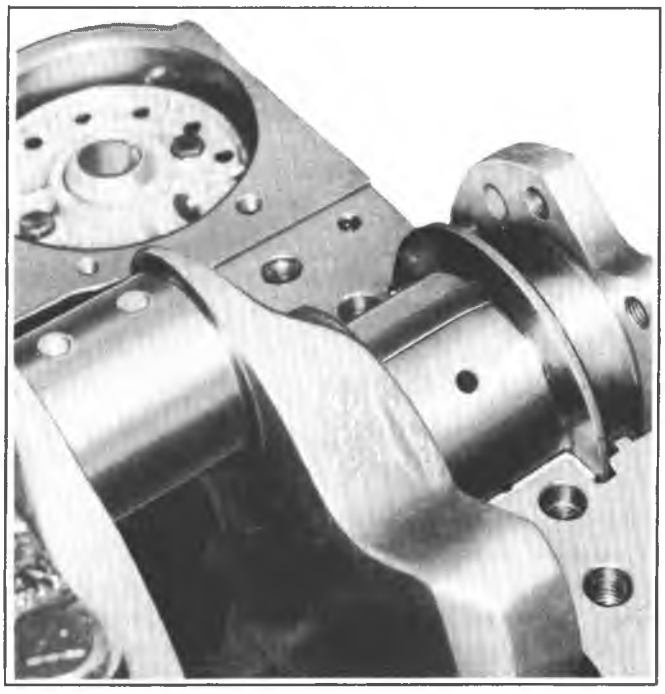


Fig. 6A5-44--Gaging Plastic on Journal

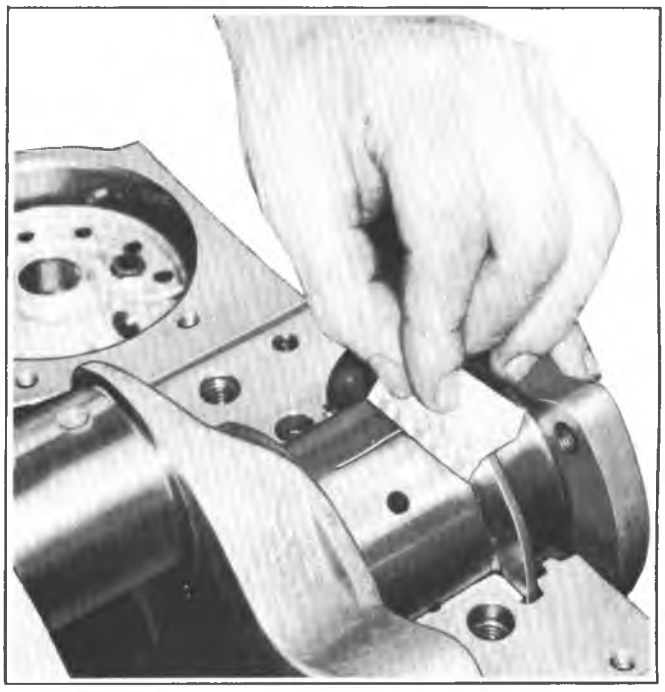


Fig. 6A5-45--Measuring Gaging Plastic

without damaging either surface, certain precautions should be observed.

If the engine is out of the vehicle and upside down, the crankshaft will rest on the upper bearings and the total clearance can be measured between the lower bearing and journal. If the engine is to remain in the vehicle, the crankshaft must be supported upward to remove the clearance from the upper bearing. The total clearance can then be measured between the lower bearing and journal.

To assure the proper seating of the crankshaft, all bearing cap bolts should be at their specified torque. In addition, preparatory to checking fit of bearings, the surface of the crankshaft journal and bearing should be wiped clean of oil.

1. With the oil pan and oil pump removed, and starting with the rear main bearing, remove bearing cap and wipe oil from journal and bearing cap.

2. Place a piece of gaging plastic the full width of the bearing (parallel to the crankshaft) on the journal (fig. 6A5-44). Do not rotate the crankshaft while the gaging plastic is between the bearing and journal.

3. Install the bearing cap and evenly torque the retaining bolts to specifications. Bearing cap **MUST** be torqued to specifications in order to assure proper reading. Variations in torque affect the compression of the plastic gage.

4. Remove bearing cap. The flattened gaging plastic will be found adhering to either the bearing shell or journal.

5. On the edge of gaging plastic envelope there is a graduated scale which is correlated in thousandths of an inch. Without removing the gaging plastic, measure its compressed width (at the widest point) with the graduations on the gaging plastic envelope (fig. 6A5-45).

Normally main bearing journals wear evenly and are not out-of-round. However, if a bearing is being fitted to an out-of-round (.001″ max.), be sure to fit to the maximum diameter of the journal: If the bearing is fitted to the minimum diameter and the journal is out-of-round .001″, interference between the bearing and journal will result in rapid bearing failure. If the flattened gaging plastic tapers toward the middle or ends, there is a difference in clearance indicating taper, low spot or other irregularity of the bearing or journal. Be sure to measure the journal with a micrometer if the flattened gaging plastic indicates more than .001″ difference.

6. If the bearing clearance is within specifications, the bearing insert is satisfactory. If the clearance is not within specifications, replace the insert. Always replace both upper and lower inserts as a unit. If a new bearing cap is being installed and clearance is less than .001″, inspect for burrs or nicks; if none are found then install shims as required.

7. A standard, .001″ or .002″ undersize bearing may produce the proper clearance. If not, it will be necessary to regrind the crankshaft journal for use with the next undersize bearing. After selecting new bearing, recheck clearance.

8. Proceed to the next bearing. After all bearings have been checked rotate the crankshaft to see that there is no excessive drag. When checking #1 main bearing, loosen accessory drive belts so as to prevent tapered reading with plastic gage.

9. Measure crankshaft end play (see specifications) by forcing the crankshaft to the extreme front position. Measure at the front end of the rear main bearing with a feeler gage (fig. 6A5-46).

10. Install a new rear main bearing oil seal in the cylinder block and main bearing cap.

Replacement

Main bearings may be replaced with or without removing the crankshaft.

SECTION 6A6-

5.7 L (Z) 350 Diesel

Contents

GENERAL DESCRIPTION

ENGINE CONSTRUCTION

The engine is a 5.7 Liter V-8 four cycle diesel fuel engine. Cylinder numbers 1, 3, 5 and 7 are on the left bank. Cylinder numbers 2, 4, 6 and 8 are on the right bank. The firing order is 1-8-4-6-6-5-7-2. The major difference between a gasoline engine and the diesel is in the cylinder heads, combustion chamber, fuel distribution system, air intake manifold and method of ignition. The cylinder block, crankshaft, main bearings, rods, pistons and pins are of a heavier construction because of the high compression ratio required to ignite diesel fuel. Diesel ignition occurs because of heat developed in the combustion chamber during compression. This eliminates the need for spark plugs and high voltage ignition.

Intake and exhaust valves in the cylinder heads operate the same as in a gasoline engine, but are of a special design and material for diesel operation. The stainless steel pre-chamber inserts in the cylinder head combustion chambers are serviced separately from the head. With the cylinder head removed they can be pushed out after removing the glow plugs and injection nozzles. Glow plugs are threaded, injection nozzles are retained by a bolt and clamp. The injection nozzles are spring loaded and calibrated to open at a specified fuel pressure.

FUEL SYSTEM (Figs. 6A6-1, 2, 3&4)

The diesel fuel injection pump is mounted on top of the engine. It is gear driven off the camshaft and turns at camshaft speed. It is a high pressure rotary pump that injects a metered amount of fuel to each cylinder at the proper time. The eight high pressure delivery pipes from the pump to the injection nozzle in each cylinder are the same length to prevent any difference in timing, cylinder-to-cylinder. The fuel injection pump provides the required timing advance under all operating conditions. Engine RPM is controlled by a rotary fuel metering valve. Pushing down on the accelerator pedal moves the throttle cable to open the metering valve and allow more fuel to be delivered. The injection pump also has a low pressure transfer pump to deliver fuel from the fuel line to the high pressure pump.

The fuel filter is located between the mechanical fuel pump and the injection pump. The diaphragm type mechanical fuel pump is mounted on the right side of the engine and driven by a cam on the crankshaft. The fuel tank is connected by fuel pipes and hoses to the mechanical fuel

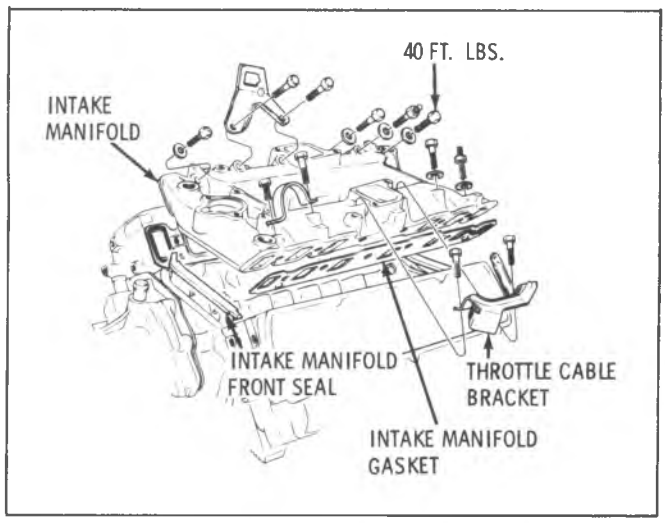


Fig. 6A6-30--Intake Manifold & Gasket

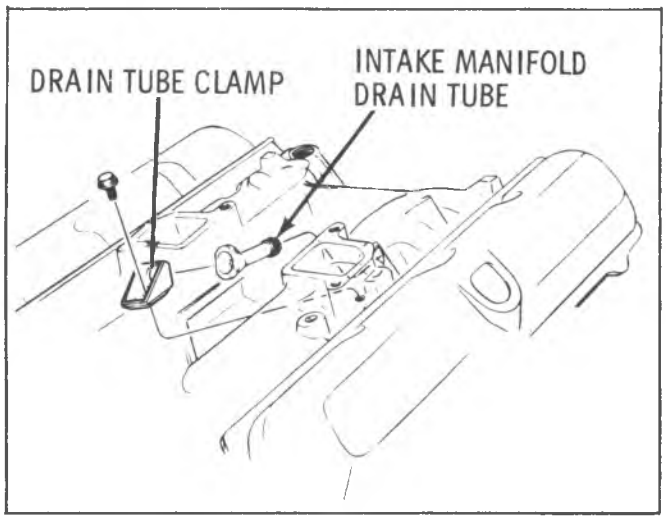


Fig. 6A6-32--Intake Manifold Drain Tube

10. Disconnect high pressure lines at nozzles and remove injection pump and cap all open lines and fittings on injection pump, filter and nozzles. **DO NOT BEND INJECTION PUMP LINES.**

11. Disconnect fuel return line from injection pump.

12. Disconnect vacuum lines at vacuum pump and remove vacuum pump.

13. Remove drain tube.

14. Remove intake manifold bolts, then remove intake manifold. Remove adapter seal.

15. Remove injection pump adapter.

16. Clean machined surfaces of cylinder head and intake manifold with a putty knife. Use care not to gouge or scratch machines surfaces.

Installation

1. Coat both sides of gasket sealing surface that seal the intake manifold to the head with #1050805 sealer, or equivalent, and position intake manifold gasket. (Fig. 6A6-30).

2. Install end seals, making sure that ends are positioned under cylinder heads.

3. Position intake manifold on engine.

4. Dip intake manifold bolt in engine oil and torque in sequence shown to 15 lbs. ft. (20 N·m). Then re-torque to 40 lbs. ft. (54 N·m) (Fig. 6A6-31).

5. Install drain tube (Fig. 6A6-32).

6. Apply chassis lube to seal area on adapter, taper edge and seal area in intake manifold then install injection pump adapter - leave loose.

7. Apply chassis lube to I.D. and O.D. of adapter seal and to seal installing tool J-28425. Install seal on tool.

8. Push seal on injection pump adapter with tool J-28425 (fig. 6A6-33).

9. Remove tool and inspect to see if properly positioned.

10. Torque adapter bolts to 25 lbs. ft. (34 N·m).

11. Remove caps from injection pump lines. Align offset tang on pump drive shaft with offset in pump driven gear then install injection pump. Connect injection pump lines to nozzles. Align mark on injection pump with mark on adapter. Use a 3/4" open end wrench on the boss at the front of the injection pump to aid in rotating the pump to align the marks.

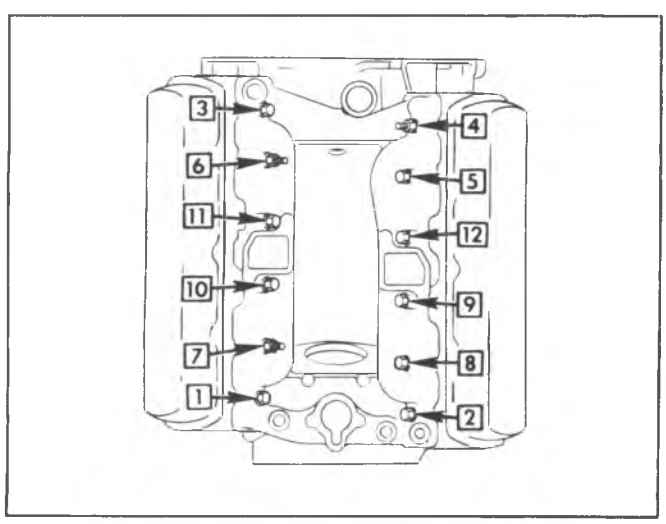


Fig. 6A6-31--Intake Manifold Torque Sequence

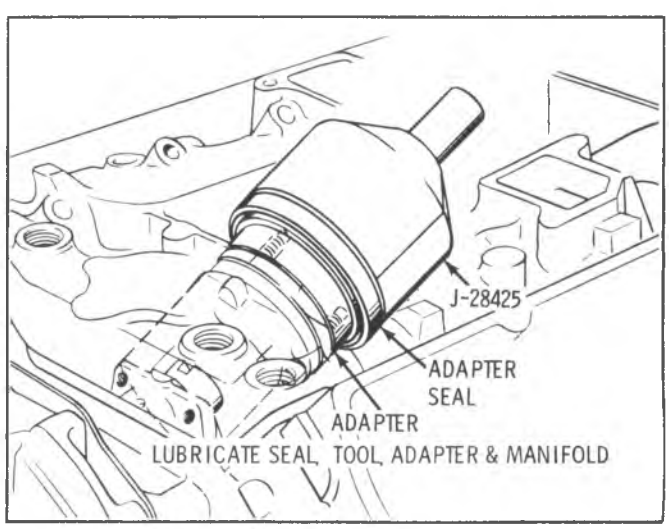


Fig. 6A6-33--Installing Adapter Seal

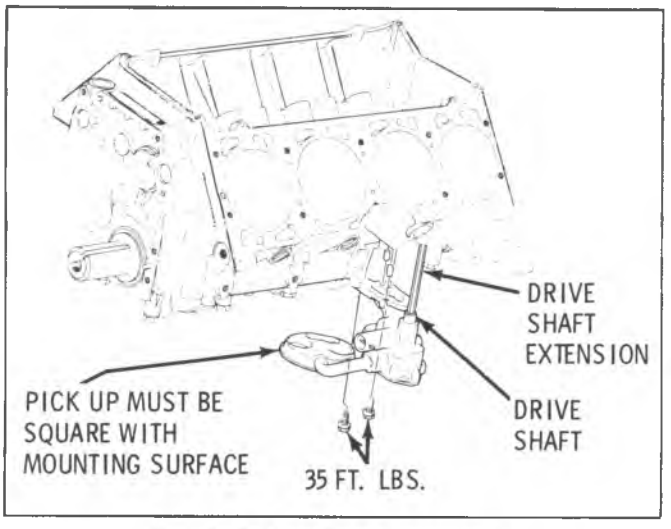


Fig. 6A6-61–Oil Pump Installation

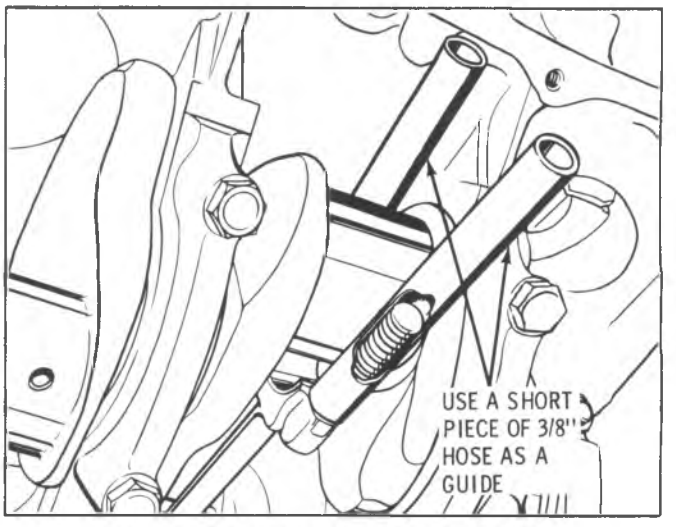


Fig. 6A6-62–Connecting Rod Bolt Guide

Inspection

Check the gears for scoring or other damage. If they are damaged, new gears should be installed. During assembly, the gear end clearance should be gaged. Proper end clearance is .0005″ to .0075″. Also check the pressure regulator valve, valve spring and bore for damage. Proper valve to bore clearance is .0025″ to .0050″. The checking of gear end clearance will be covered in "Assembly". Check the extension shaft at each end for abnormal wear. The shaft is hardened at both ends and identified by a red dye marking.

Assembly

1. Install the gears and shaft in the oil pump body and check the gear end clearance by placing a straight edge over the gears and measure the clearance between the straight edge and the gasket surface. The clearance should be between .0005″ to .0075″. If the end clearance is to the high limit, check for scores in the cover that would bring the total clearance over the specified amount.

2. Install the cover screws and tighten alternately and evenly. The torque is 8 lbs. ft. (11N·m).

3. Position the pressure regulator valve into the pump cover, closed end first, then install the spring and retaining pin.

4. When assembling the drive shaft extension to the drive shaft, THE END OF THE EXTENSION NEAREST THE WASHERS MUST BE INSERTED INTO THE DRIVE SHAFT.

Installation

1. Insert the drive shaft extension through the opening in the main bearing cap and block until the shaft mates into the vacuum pump driven gear.

2. Position pump onto the rear main bearing cap and install attaching bolts. Torque bolts to 35 lb. ft. (47 N·m) (Fig. 6A6-61).

3. Install the oil pan. Refer to OIL PAN Installation.

CONNECTING ROD AND PISTON

Removal

1. Remove intake manifold, head or heads.
2. Remove oil pan.
3. Remove oil pump assembly.
4. Stamp cylinder number on the machined surfaces of the bolt bosses of the connecting rod and cap for identification when reinstalling. If the pistons are to be removed from the connecting rod, mark cylinder number on piston with a silver pencil or quick drying paint for proper cylinder identification and cap to rod location. The right bank is numbered 2-4-6-8, left bank 1-6-5-7.
5. Examine the cylinder bore above ring travel. If ridge exists, remove ridge with ridge reamer before attempting to remove the piston and rod assembly.
6. Remove rod bearing cap and bearing.
7. Install guide hose over threads of rod bolts. This to prevent damage to bearing journal and rod bolt threads. (Fig. 6A6-62).
8. Remove rod and piston assembly through the top of the cylinder bore.
9. Remove other rod and piston assemblies in the same manner.

ROD BEARINGS

The connecting rod bearings are designed to have a slight projection above the rod and cap faces to insure a positive contact.

Connecting rod bearings can be replaced without removing the rod and piston assembly from the engine.

1. Remove oil pan.

● It may be necessary to remove oil pump to provide access to rear connecting rod bearings.

2. With crankpin at the bottom, stamp cylinder number on machined surfaces of connecting rod and cap for identification when reinstalling, then remove caps.

3. Inspect crankpins for roughness and wear. Slight roughness may be removed with a fine grit polishing cloth saturated with engine oil. Burrs may be removed with a fine oil stone by moving the stone on the crankpin circumference. Do not move the stone back and forth across the crankpin. If the crankpins are scored or ridged, the

12. Remove engine mount through bolts.

13. Remove three bolts, transmission to engine on the right side. Disconnect wires from starter and remove starter.

14. Lower vehicle.

15. Place board on top of jack and slightly raise transmission. Remove three left transmission to engine bolts. Remove engine.

16. If vehicle is to be moved, install converter holding tool J-21654 and support transmission with chain support.

Installation

1. Install engine in place. Locate engine dowels into transmission and position through bolts into mounts and tighten. Install three left transmission to engine bolts. Remove support chains and jack.

2. Raise vehicle. Replace three transmission to engine bolts on the right side. Replace starter and attaching bolts and attach wires.

3. Install three converter to flywheel bolts and torque converter cover bolts to 40 lbs. ft. (54 N·m).

4. Connect exhaust pipes and lower vehicle.

5. Install radiator and upper radiator support.

6. Connect radiator hoses, cooler lines, heater hoses, vacuum hoses, power steering pump hoses at pump, power steering hose bracket to engine, air conditioning compressor, fuel hose to fuel pump and wiring.

7. Position bellcrank and cables to intake manifold. Install bellcrank. Install throttle rod to bellcrank. Connect breather pipes and connect fuel return line to pump.

8. Install air cleaner.

9. Install and align hood with scribe marks.

10. Connect battery cables and ground wires.

11. Add engine oil and coolant.

CRANKSHAFT

Removal (Cylinder Heads On)

1. With engine on stand and oil pan, oil pump and front cover removed, rotate crankshaft to the position where the connecting rod nuts are most accessible. Fig. 6A6-91 shows the engine with the #3 and #4 rods in the fully extended position.

2. Remove connecting rod caps and install thread protectors. Remove fuel pump eccentric from crankshaft.

3. Remove main bearing caps.

4. Note position of keyway in crankshaft so it can be installed in the same position.

5. Lift crankshaft out of block. Rods will pivot to the center of the engine when the crankshaft is removed. Do not allow pistons to move in their bore during or after crankshaft removal.

Installation

1. Install sufficient oil pan bolts in pan rails to align rods with rubber bands. Align rods so that the inner thread protectors of adjacent rods overlap approximately one inch as shown. Alignment can be adjusted by increasing tension on rubber bands with additional turns around the pan bolts or thread protectors.

2. Measure the crankshaft journals and crankpins with a micrometer to determine the correct size rod and main bearings to be used.

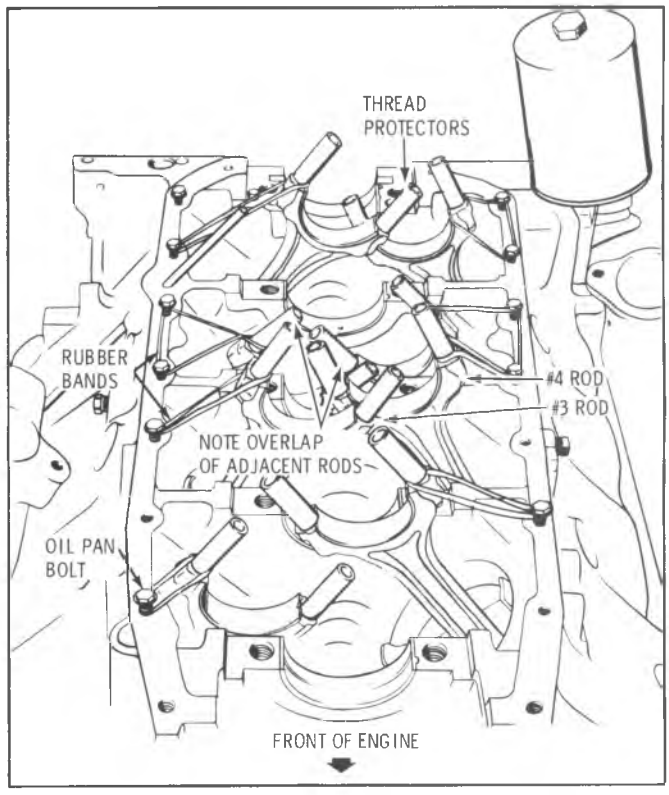


Fig. 6A6-91--Crankshaft Removal

• Whenever a new or reconditioned crankshaft is installed, new connecting rod bearings and main bearings should be installed.

3. Position crankshaft keyway in the same position as removed and lower into block. The connecting rods will follow the crankpins into the correct position as the crankshaft is lowered.

4. Remove rubber bands, thread protectors and pan bolts and assemble engine.

Removal (Cylinder Heads Removed)

1. With engine on stand, remove oil pan, front cover, connecting rods, oil pump and fuel pump eccentric from crankshaft.

2. Remove main bearing caps and lift crankshaft out of block.

Installation

1. Measure the crankshaft journals and crankpins with a micrometer to determine the correct size rod and main bearings to be used.

• Whenever a new or reconditioned crankshaft is installed, new connecting rod bearings and main bearings should be installed.

2. Position upper half of main bearings in block and lubricate with engine oil.

3. Install a new rear main bearing seal. (Fig. 6A6-92). Rear bearing must be removed to replace seal.

4. After oil passages in crankshaft have been checked for being open and shaft is clean, place shaft in block. Lubricate thrust flanges of the center bearing with #1050169 Lubricant or equivalent. Install caps with lower half of bearing lubricated with engine oil. Lubricate cap bolts with engine oil and install, but do not tighten.

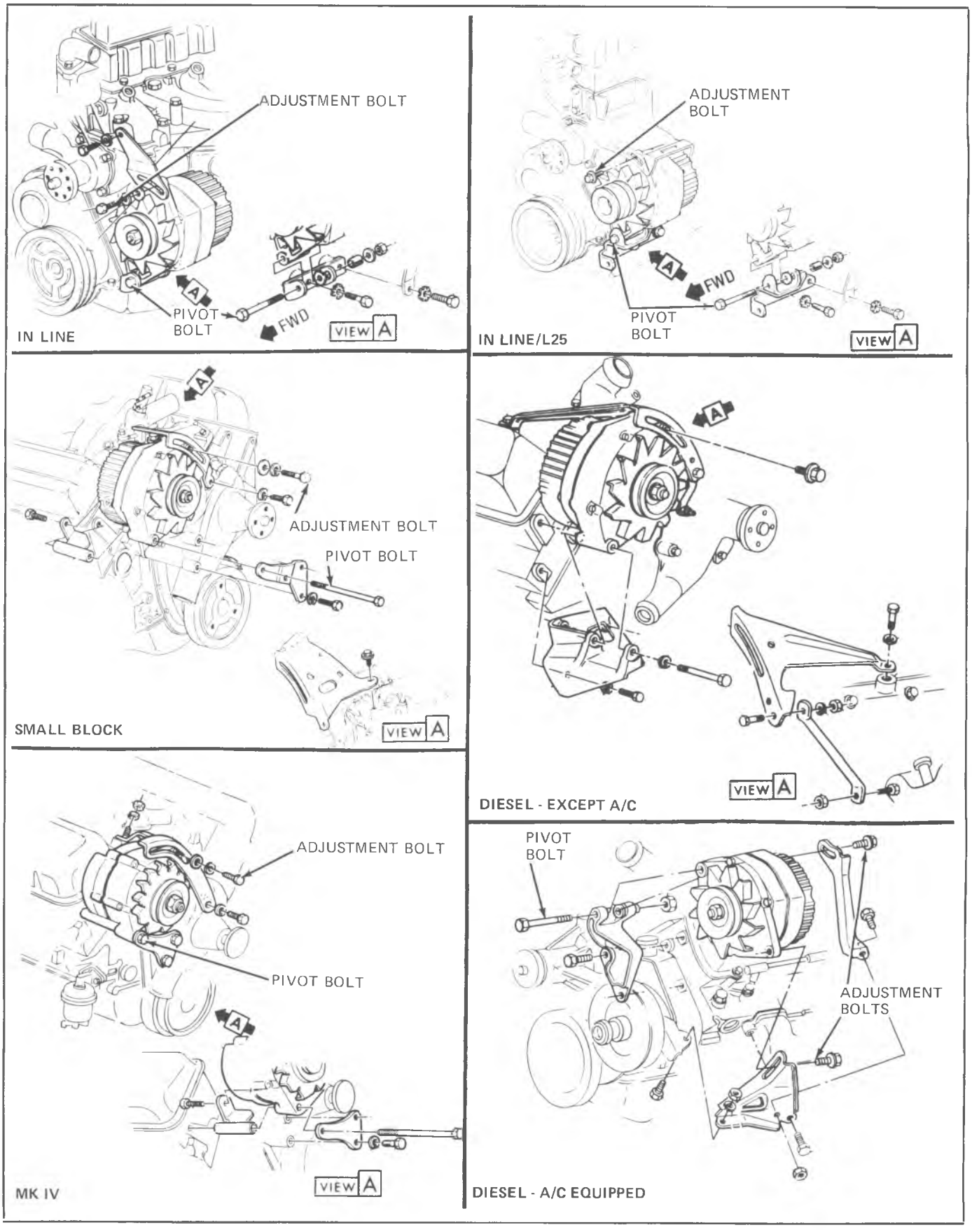


Fig. 6B-3--Generator Adjustment

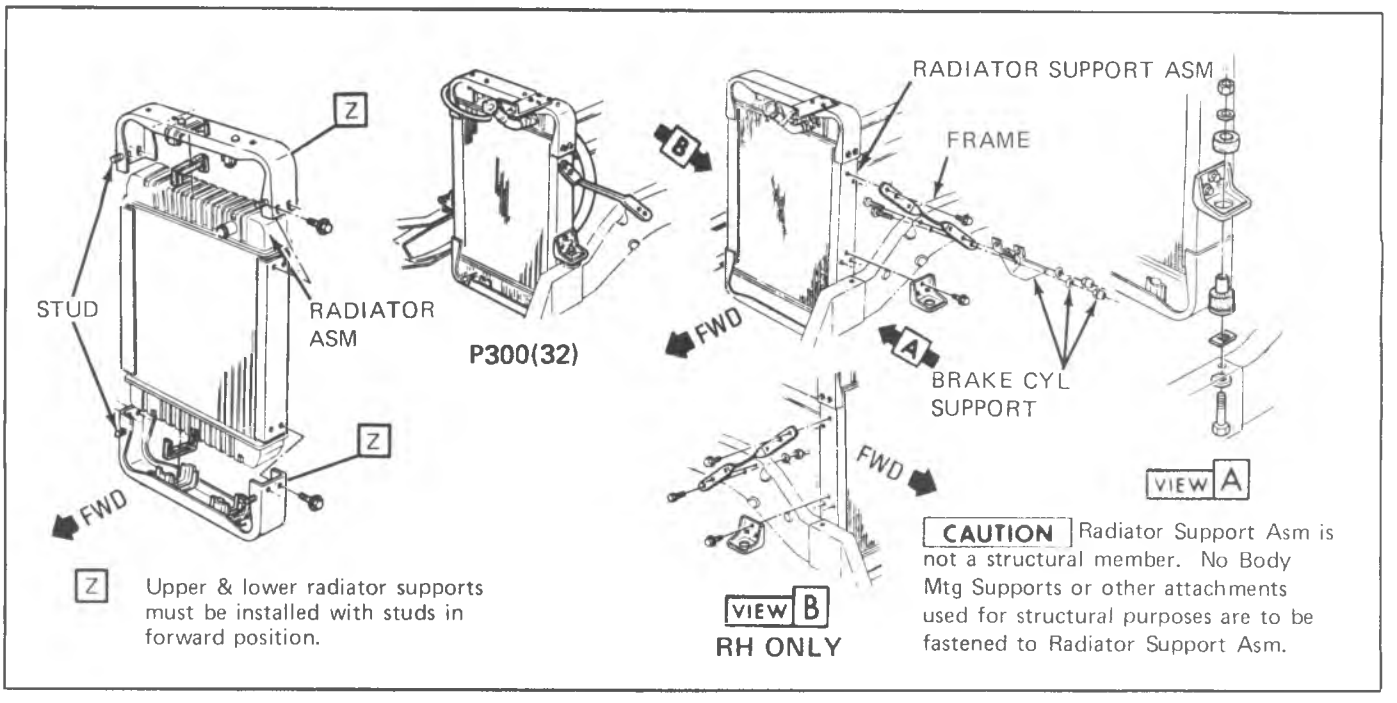


Fig. 6B-9–'P' (32) Radiator Mounting

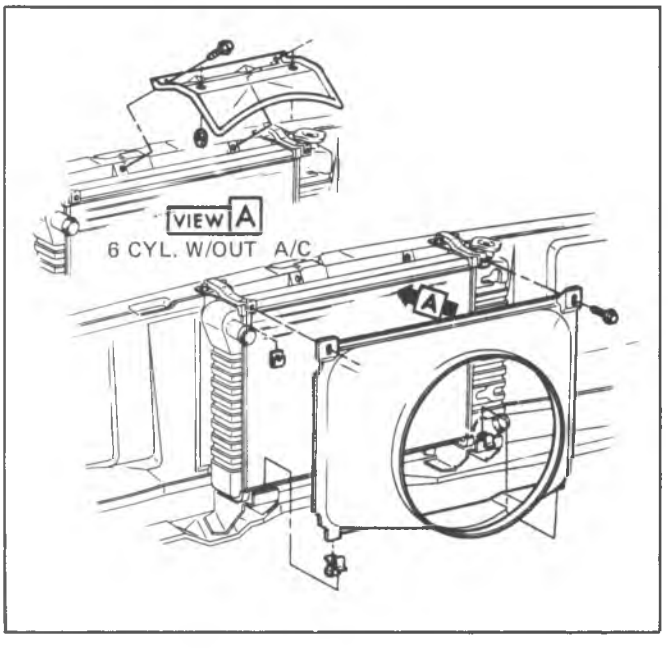


Fig. 6B-10–"G" Van Fan Shroud

1. Install bottle in vehicle and retain with appropriate fasteners.

2. Connect coolant overflow hose to recovery bottle.

3. Fill recovery bottle to appropriate mark with a 50/50 solution of water and ethlyne glycol base anti-freeze.

4. Connect battery cable.

ENGINE OIL COOLER

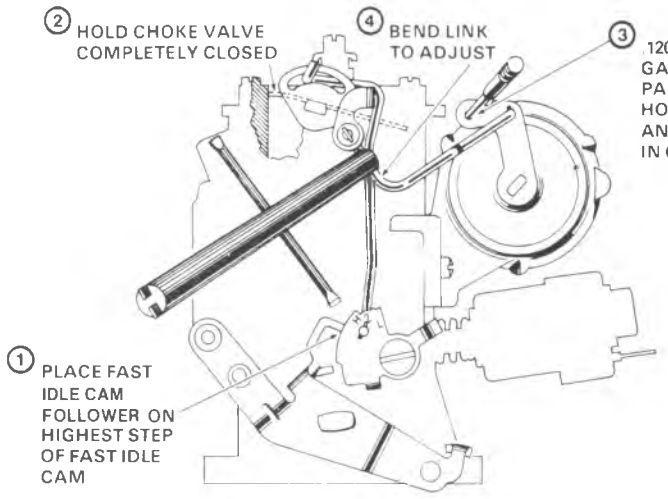
All truck vehicle lines have available, as either standard or optional equipment, oil coolers for the engine oil. For the location of these units, refer to figures 6B-15 & 6B-16.

CARBURETOR DIAGNOSIS CONT'D.

CONDITION	POSSIBLE CAUSE	CORRECTION
Engine Has Less Than Normal Power At Normal Accelerations. (Continued)	Air cleaner temperature regulation improper.	Check regulation and operation of air cleaner system.
	Transmission malfunction.	Refer to transmission diagnosis.
	Ignition system malfunction.	Check ignition system. See Section 6D. Refer to H.E.I. diagnosis.
	Exhaust system.	Check for restrictions. Correct as required.
Less Than Normal Power On Heavy Acceleration Or At High Speed	Carburetor throttle valves not going wide open. Turn off engine and check by pushing accelerator pedal to floor.	Correct throttle linkage to obtain wide open throttle in carburetor.
	Secondary throttle lockout not allowing secondaries to open.	Check for binding or sticking lockout lever.
		Check for free movement of fast idle cam.
		Check choke heated air system for proper and tight connections plus flow through system.
		Check adjustment of choke thermostatic coil.
		Make necessary corrections and adjustments.
	Spark plugs fouled, incorrect gap.	Clean, regap, or replace plugs.
	Plugged air cleaner element.	Replace element.
	Air valve malfunction. (Where applicable)	Check for free operation of air valve.
		Check spring tension adjustment. Make necessary adjustments and corrections.
	Plugged fuel inlet filter.	Replace with a new filter element.
	Insufficient fuel to carburetor.	Check fuel pump and system, run pressure and volume test. See FUEL SYSTEM DIAGNOSIS, Section 6.
	Power enrichment system not operating correctly.	Remove the air horn and check for free operation of both power piston(s), clean and correct as necessary.
	Choke closed or partially closed.	Free choke valve or linkage.
		Check for loose jets.
	Float level too low.	Check and reset float level to specification.

Fig. 6C-6--Diagnosis 6 of 9

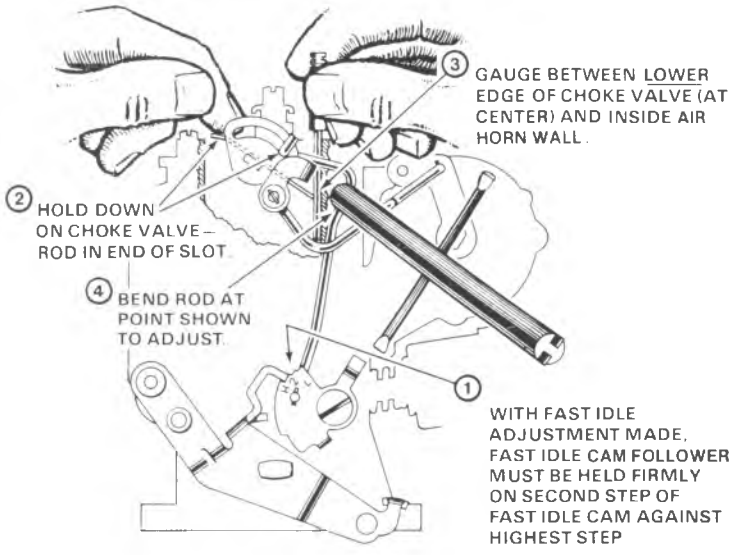
4



CHOKE COIL LEVER ADJUSTMENT - 1ME

CARB. NO.	PLUG GAUGE
17080009 17080309 17080359	.120"

5



CHOKE ROD (FAST IDLE CAM) ADJUSTMENT (2ND STEP)

CARB. NO.	INDEX MARK
17080009 17080309 17080359	.275"

Fig. 6C1-10--1ME Adjustments - 2 of 3

SECTION 6C2

MODEL 2SE CARBURETOR

CONTENTS

GENERAL DESCRIPTION

The Model 2SE is a two barrel, two stage carburetor of down-draft design for use on the 4.1 litre engine. To reduce carburetor weight, aluminum die castings are used for the air horn, float bowl, throttle body and choke housing. A heat insulator gasket is used between the throttle body and float bowl to reduce heat transfer to the float bowl.

The primary stage has a triple venturi, with a small 35mm bore that results in good fuel control during idle and part throttle operation.

The secondary stage has a large 46mm bore that provides sufficient air capacity for engine power requirements. An air valve is used in the secondary stage with a single tapered metering rod.

On the 2SE models, an integral 2" pleated paper fuel filter with check valve is mounted in the front of the float bowl behind the fuel inlet nut to give maximum filtration of incoming fuel. The check valve is used to shut off fuel flow to the carburetor and prevent fuel leaks if a vehicle roll-over should occur.

The float chamber is located adjacent to the primary and secondary bores (Fig. 6C2-3). This feature assures adequate fuel supply to both carburetor bores during all vehicle normal maneuvers. A single pontoon float, brass needle seat, and a rubber tipped float valve with pull clip are used to control fuel level in the float chamber. The float chamber is internally vented through a vertical vent cavity in the air horn. Above this vent cavity is a removable vent stack assembly that has a small meshed screen as its top portion. This vent stack provides the correct height for the internal vent and the screen offers necessary backfire protection to the float chamber.

The Model 2SE float chamber also is externally vented through a tube in the air horn. A hose connects this tube directly to a vacuum operated vapor vent valve located in the vapor canister. When the engine is not running, the canister vapor vent valve is open allowing fuel vapors from

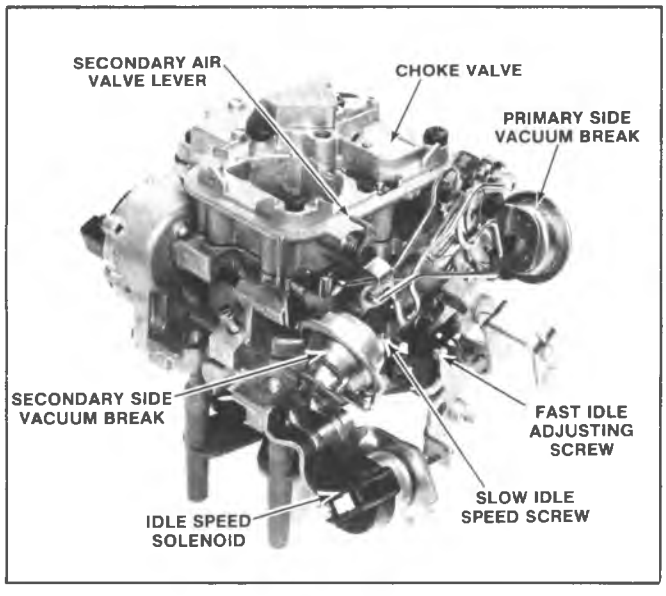


Fig. 6C2-1--Model 2SE Carburetor

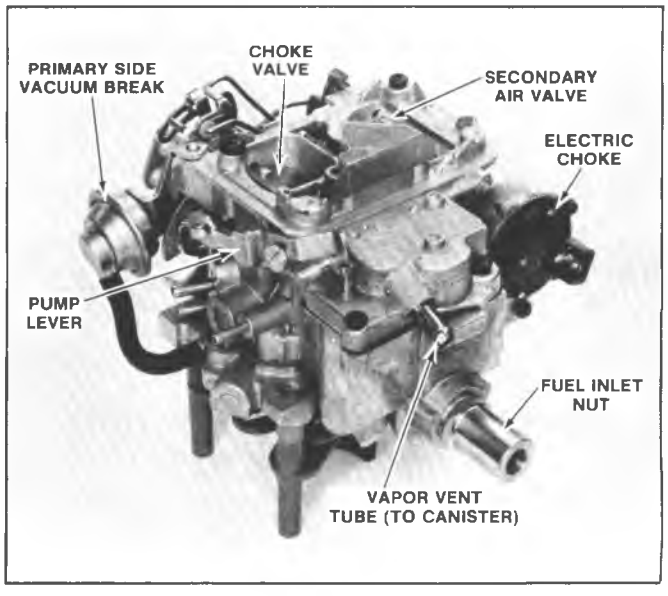
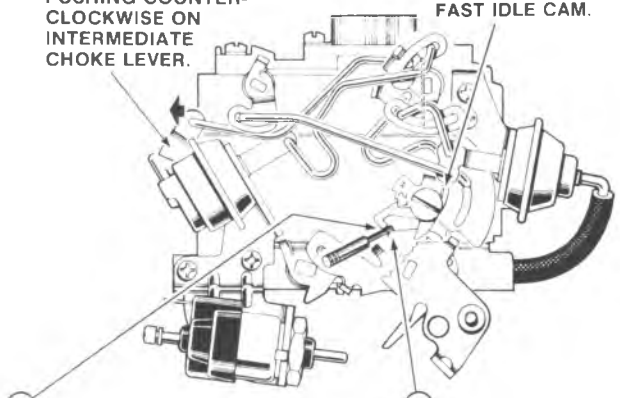


Fig. 6C2-2--Model 2SE Carburetor

10

1. HOLD CHOKE VALVE WIDE OPEN BY PUSHING COUNTER-CLOCKWISE ON INTERMEDIATE CHOKE LEVER.
2. OPEN THROTTLE LEVER UNTIL END OF SECONDARY ACTUATING LEVER IS OPPOSITE TOE OF LOCKOUT LEVER.
3. GAUGE CLEARANCE - DIMENSION SHOULD BE AS SPECIFIED.
4. IF NECESSARY TO ADJUST, BEND LOCKOUT LEVER TANG CONTACTING FAST IDLE CAM.

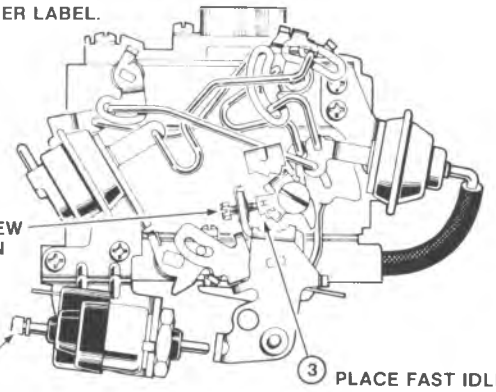


SECONDARY LOCKOUT ADJUSTMENT

CARB. NO.	PLUG GAUGE
ALL	.011–.040 (.3–.1mm)

11

1. PREPARE VEHICLE FOR ADJUSTMENTS - SEE EMISSION LABEL ON VEHICLE. NOTE: IGNITION TIMING SET PER LABEL.
2. ADJUST CURB IDLE SPEED IF REQUIRED
3. PLACE FAST IDLE SCREW ON HIGHEST STEP OF FAST IDLE CAM
4. TURN FAST IDLE SCREW IN OR OUT TO OBTAIN SPECIFIED FAST IDLE R.P.M. - (SEE LABEL)

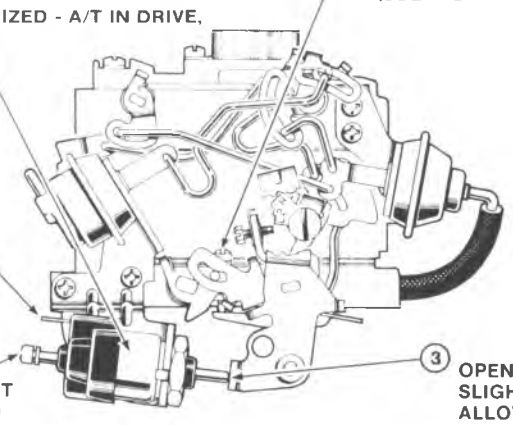


FAST IDLE ADJUSTMENT
(ON VEHICLE)

CARB. NO.	R.P.M.
17080621 17080622 17080623 17080626 17080720 17080721 17080722 17080723	SEE EMISSION LABEL

12

1. PREPARE VEHICLE FOR ADJUSTMENTS - SEE EMISSION LABEL ON VEHICLE. NOTE: IGNITION TIMING SET PER LABEL.
2. SOLENOID ENERGIZED - A/T IN DRIVE, M/T IN NEUTRAL
3. OPEN THROTTLE SLIGHTLY TO ALLOW SOLENOID PLUNGER TO FULLY EXTEND
4. TURN SOLENOID SCREW TO ADJUST CURB IDLE SPEED TO SPECIFIED RPM (SOLENOID ENERGIZED)
5. TURN IDLE SPEED SCREW TO SET BASE IDLE SPEED TO SPECIFICATIONS (SOLENOID DE-ENERGIZED)
6. RECONNECT SOLENOID ELECTRICAL LEAD AFTER ADJUSTMENT



IDLE SPEED ADJUSTMENT
(ON VEHICLE)

CARB. NO.	R.P.M.
17080621 17080622 17080623 17080626 17080720 17080721 17080722 17080723	SEE EMISSION LABEL

Fig. 6C2-17–2SE Carburetor Adjustments

metering rod into the jet to prevent damaging the metering rod tip. Press down firmly on plastic power piston retainer to make sure the retainer is seated in recess in bowl and the top is flush with the top of the bowl casting. If necessary, tap retainer lightly in place using a drift and small hammer.

18. Install plastic filler block over float valve, pressing downward until properly seated (flush with bowl casting surface).

19. Install air horn gasket on float bowl by carefully sliding slit portion of gasket over the two dowel locating pins on the float bowl.

20. Install pump return spring in pump well.

21. Install pump plunger assembly in pump well.

Air Horn

Assembly

1. If removed, install choke shaft, choke valve, and two attaching screws. Tighten screws securely and stake lightly in place. Check choke valve for freedom of movement and proper alignment before staking screws in place.

2. If used, install new pump plunger stem seal and retainer in air horn casting. Lightly stake seal retainer in three places, choosing locations different from the original stakings.

Air Horn To Bowl

Installation

1. Rotate fast idle cam to the full UP position and tilt the air horn assembly to engage lower end of fast idle cam rod in slot in fast idle cam (Fig. 6C2-24); then, holding down on the pump plunger assembly, carefully lower air horn assembly onto float bowl, guiding pump plunger stem through hole in air horn casting. Do not force air horn assembly onto bowl, but rather lightly lower in place.

2. Install vent and screen assembly on air horn assembly located in area between the primary and secondary bores (Fig. 6C2-23). Then, install (7) air horn to bowl attaching screws and lockwashers. (4) long air horn screws are located in the primary and secondary venturi area of which (2) longer screws hold the vent and screen assembly in place and one (1) larger head screw goes next to the choke valve on the primary side. In addition (2) short screws are located on the fuel inlet side; and (1) short screw is located in the area beneath the hot idle compensator valve. All air horn screws must be tightened evenly and securely. See Fig. 6C2-39 for proper tightening sequence.

3. If equipped, install new seal in recess of float bowl; then install hot idle compensator valve and retain with (2) small attaching screws. Tighten screws securely.

4. Install plastic bushing in hole in choke lever, making sure small end of bushing faces retaining clip when installed. With inner choke coil lever at (12 o'clock) position, install intermediate choke rod in bushing. Retain rod with new clip, pressing clip securely in place using tool J-28697 or needlenose pliers. Make sure clip has full contact on rod but is not seated tightly against the bushing. Rod to bushing clearance should be .030".

Retaining clip is "dished". Install clip on rod with outward bend of self-locking lugs facing end of rod. Check that clip fully engages rod and that clip is not distorted.

5. If removed, install solenoid in hole on bracket, large lockwasher and retaining nut. Tighten nut securely. Then, bend back (2) retaining tabs on lockwasher to fit in slots in bracket.

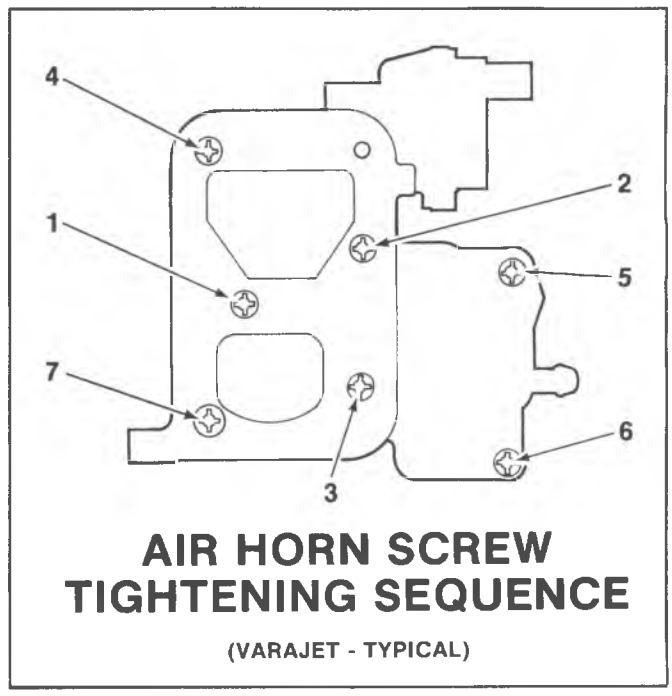


Fig. 6C2-39--Air Horn Tightening Sequence

6. If removed, install plastic bushing in hole in secondary side vacuum break plunger, making sure small end of bushing faces retaining clip when installed. Then, install secondary side vacuum break rod and secure new clip to rod using tool J-28697 or needlenosed pliers.

Retaining clip is "dished". Install clip on rod with outward bend of self-locking lugs facing end of rod. Check that clip fully engages rod and that clip is not distorted.

7. Rotate solenoid bracket and insert end of secondary side vacuum break rod into upper slot of vacuum break lever. Install bracket on throttle body and install countersunk screws. Tighten screws securely (Fig. 6C2-20).

8. If removed, install plastic bushings in holes in primary side vacuum break plunger, making sure small end of bushings face retaining clips when installed. Then install vacuum break rod in upper hole of plunger and air valve rod in lower hole of plunger and secure new clips to rods using tool J-28697 or needlenosed pliers.

Retaining clip is "dished". Install clip on rod with outward bend of self-locking lugs facing end of rod. Check that clips fully engage rods and that clip is not distorted.

9. Rotate primary side vacuum break bracket to engage vacuum break and air valve rods in vacuum break and in air valve lever, positioning bracket over locating lug on air horn. Install (2) countersunk screws and tighten securely (Fig. 6C2-20).

10. Install pump rod in hole in pump lever by rotating lever (Fig. 6C2-19). Install retaining screw in pump lever, then install washer and pump lever to air horn. Then, holding down on pump plunger stem, install pump lever to air horn with retaining screw. Make sure shoulder on screw seats in hole in lever and goes between lever and air horn casting. Holding down pump plunger stem, install pump lever on air horn. Tighten screw securely.

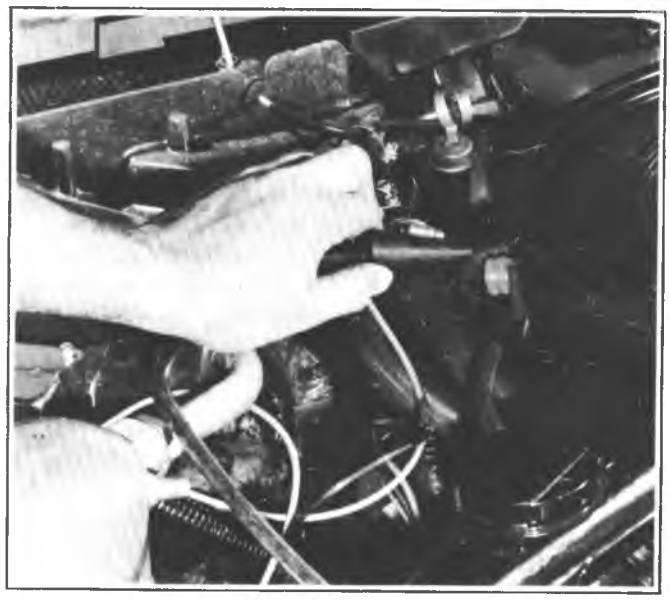


Fig. 6C3-14--Propane Air Cleaner Connection

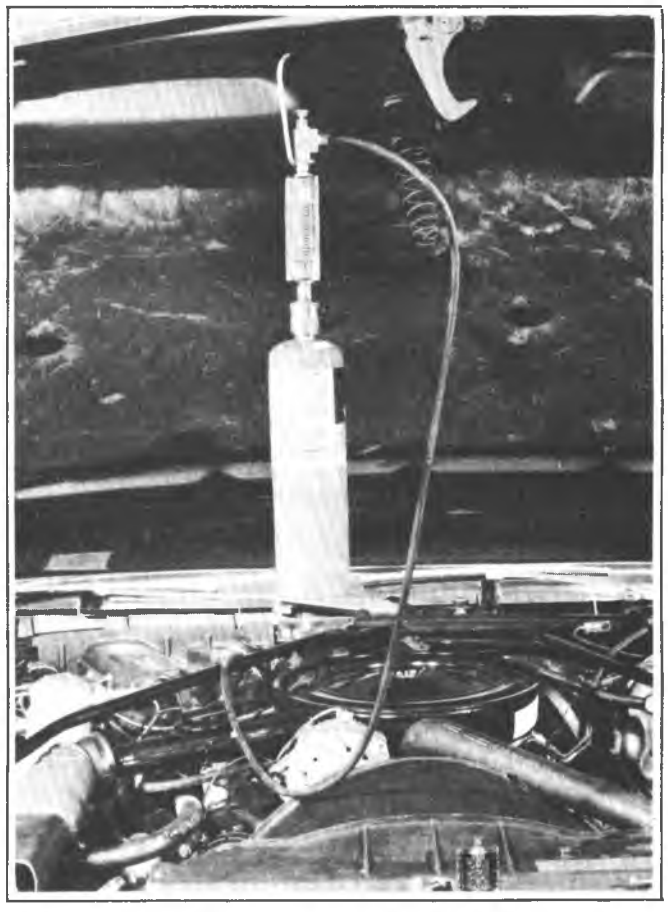


Fig. 6C3-15--Propane Tool Position

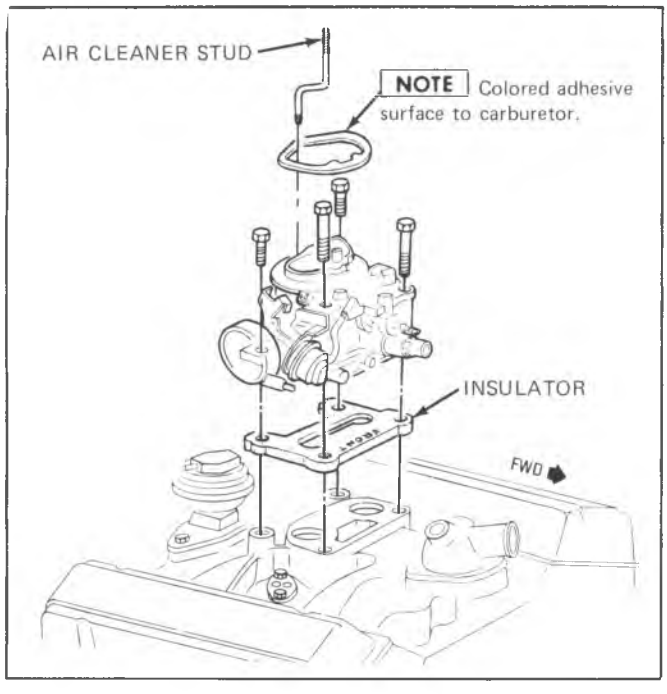


Fig. 6C3-16--Carburetor Replacement

3. Position carburetor over insulator and install bolts. Torque bolts to correct torque (See Carburetor Mounting Torque).

4. Connect downshift cable as required.

5. Connect cruise control cable as required.

6. Connect accelerator linkage.

7. Connect electrical connections.

8. Connect fuel pipe and vacuum hoses.

9. Connect solenoid wire as required.

10. Install air cleaner.

11. Check and adjust idle speed.

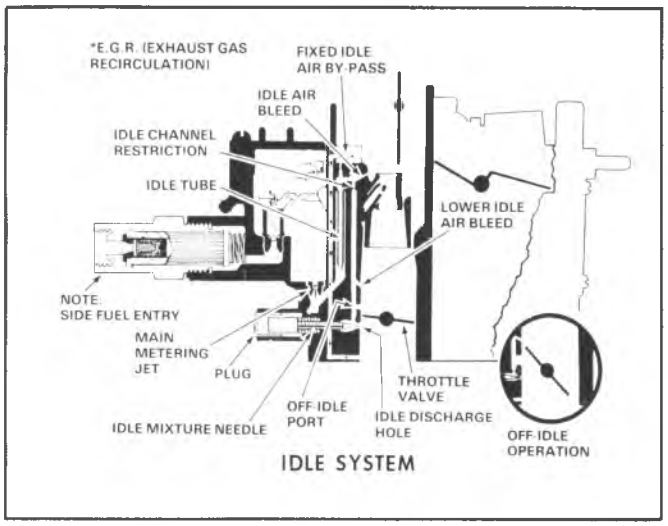


Fig. 6C4-6--M4MC With H.D. Emissions

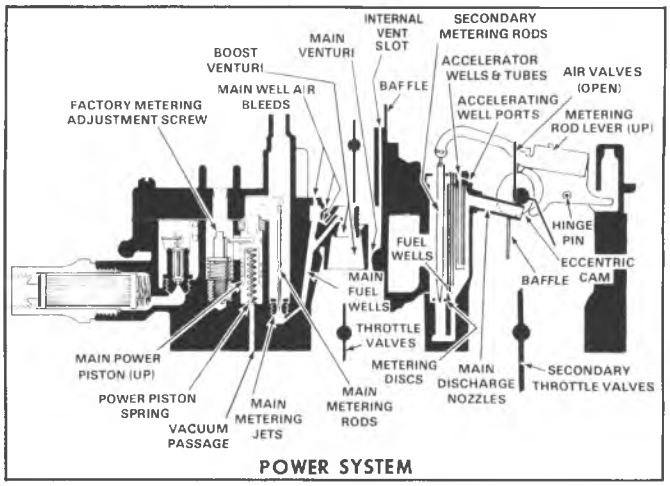


Fig. 6C4-8--Power System-M4MC

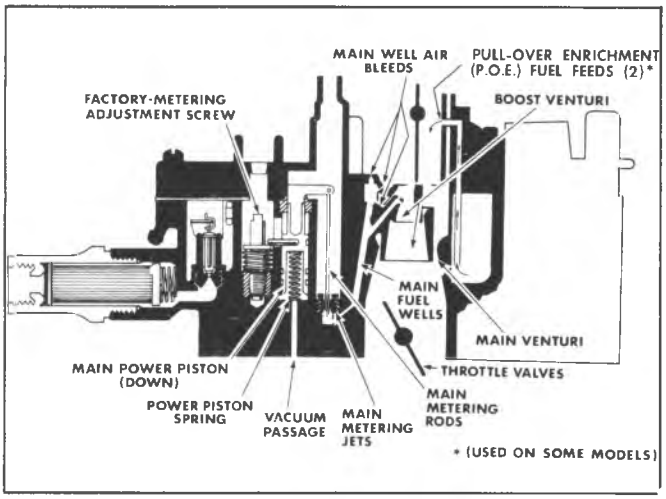


Fig. 6C4-7--Main Metering System-M4MC

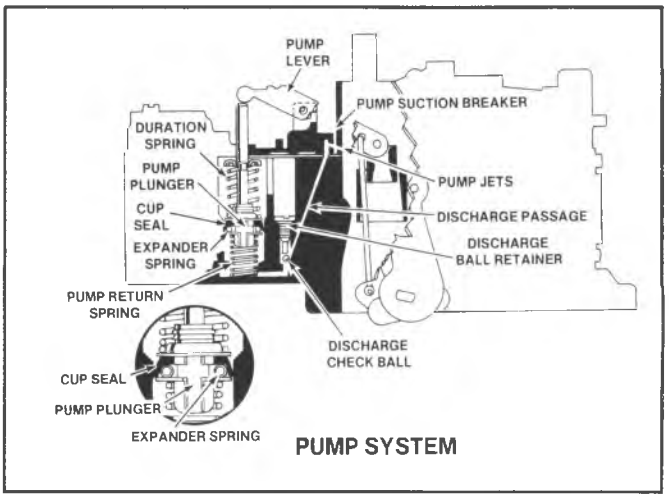


Fig. 6C4-9--Pump System-M4MC

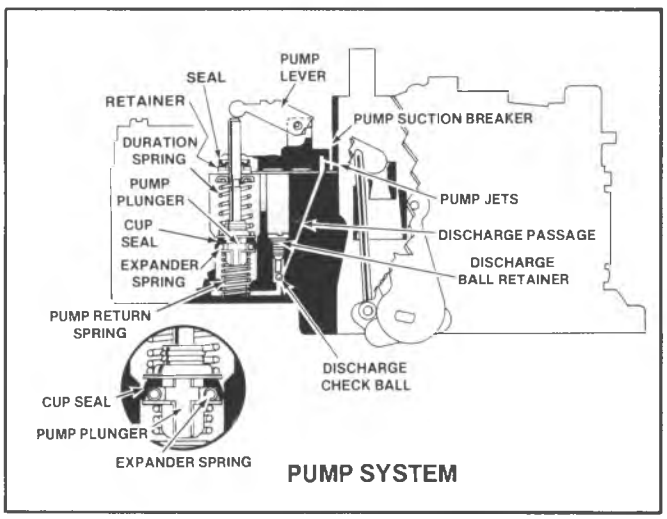


Fig. 6c4-10--Pump System - M4MC

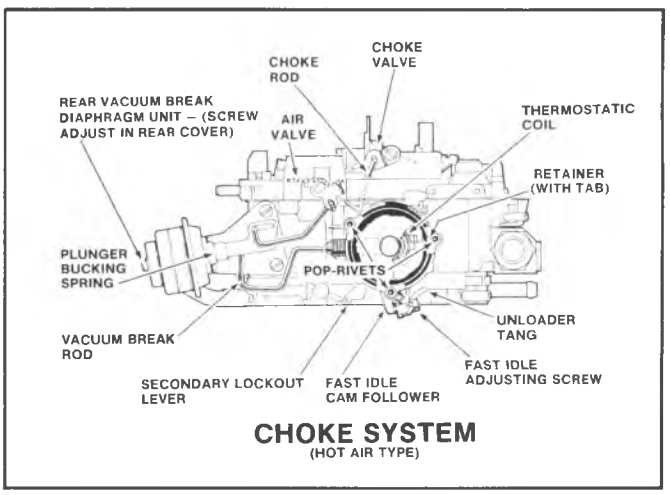
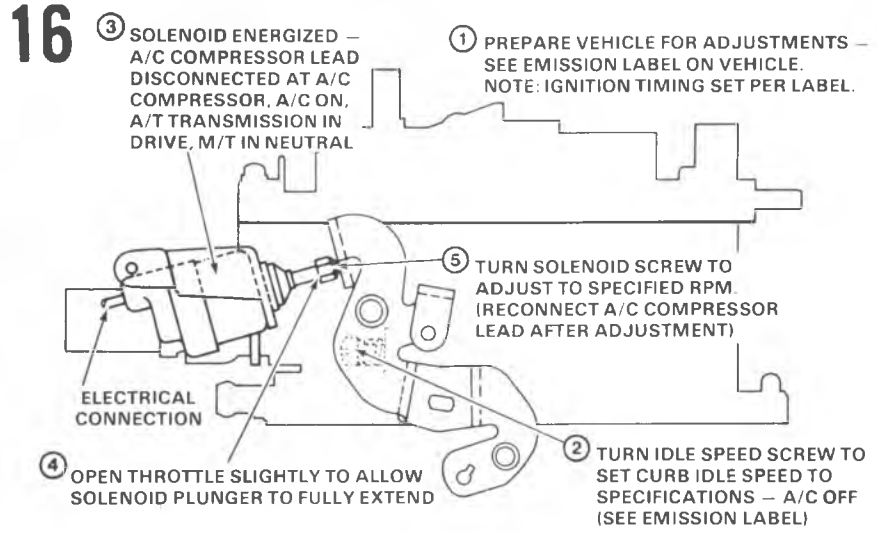
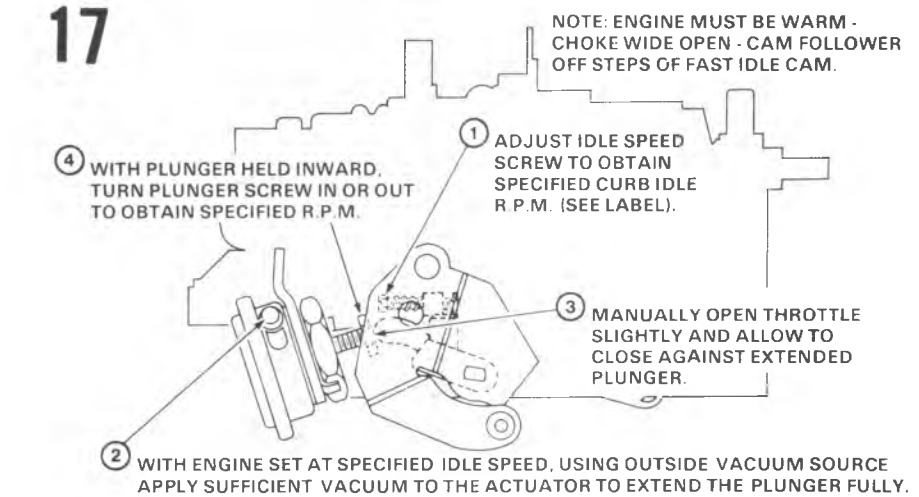


Fig. 6C4-11--M4MC With L.D. Emissions



A/C IDLE SPEED ADJUSTMENT - WITH SOLENOID



THROTTLE LEVER ACTUATOR ADJUSTMENT
(ON CAR)

Fig. 6C4-21--M4MC Adjustments 9 of 9

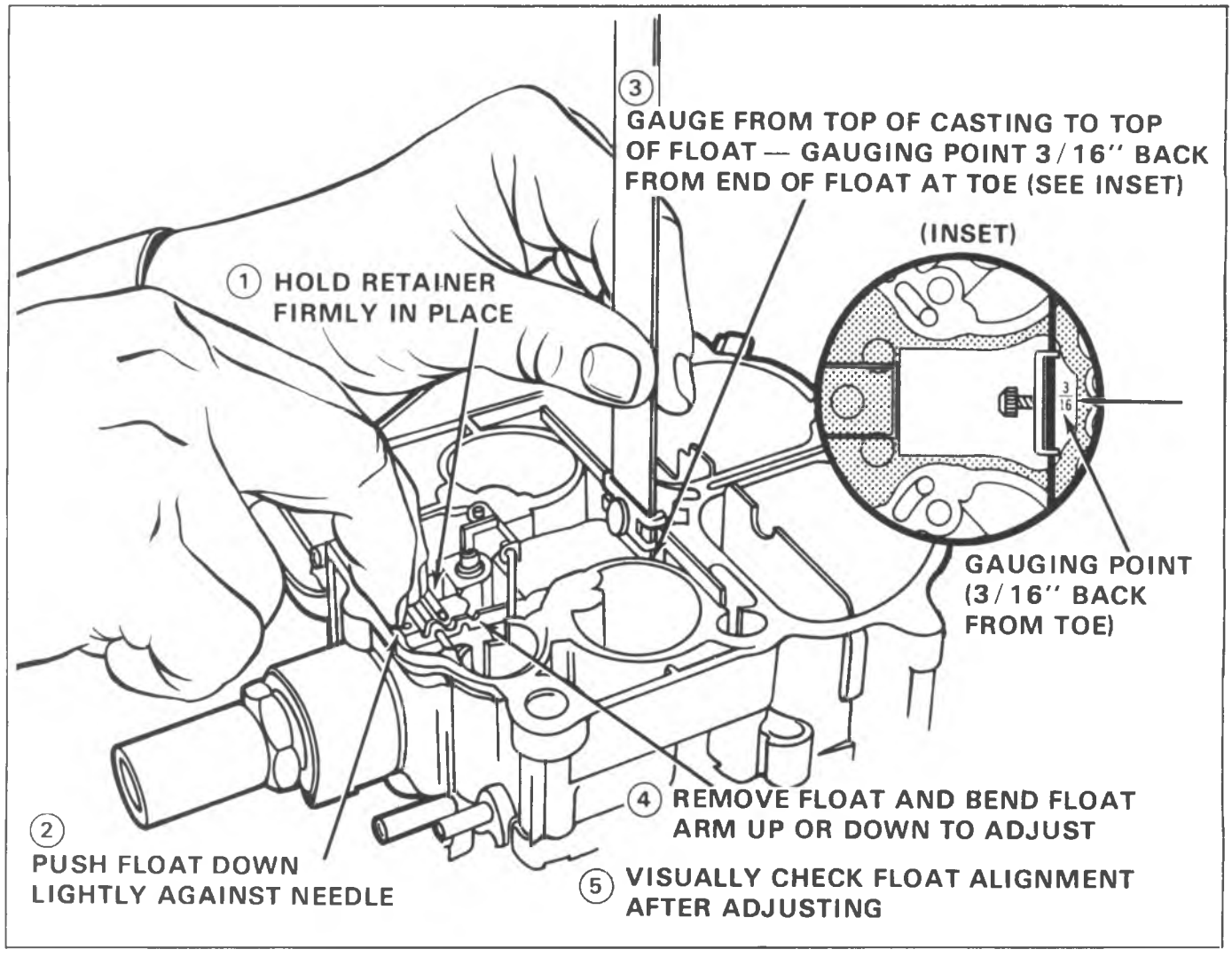


Fig. 6C4-48--Float Level Adjustment

11. Install pump return spring in pump well.

12. Install pump plunger stem seal if removed.

13. Install air horn gasket by carefully sliding tab of gasket around main metering rods and beneath the power piston hanger. Position gasket over the two dowel pins on the float bowl.

14. Carefully lift one corner of the air horn gasket and install pump plunger in the pump well by pushing the plunger to the bottom of the well against return spring tension. While holding in this position, align pump plunger stem with hole in gasket and press gasket in place.

Air Horn

1. If removed, install choke shaft, choke valve, and two attaching screws. Tighten screws securely and stake lightly in place.

2. Check choke valve for freedom of movement and proper alignment before staking screws in place.

Air Horn to Bowl Installation

1. Holding down on air horn gasket at pump plunger location, carefully lower air horn assembly onto float bowl making sure that the bleed tubes, accelerating well tubes, pull-over enrichment tubes (if used), and pump plunger stem are positioned properly through the holes in the air horn gasket.

Do not force the air horn assembly onto the bowl but rather lightly lower in place.

2. Install two long air horn screws with lockwashers, and two countersunk screws located next to the venturi area.

Install secondary air baffle beneath screw number 3 and 4.

All air horn screws must be tightened evenly and securely. See Figure 6C4-49 for proper tightening sequence.

3. Install vacuum break diaphragm rod into the slot in lever on the end of the air valve shaft. Then install the other end of rod into hole in the front vacuum break diaphragm plunger. Install front vacuum break control and bracket assembly to air horn using two retaining screws through the bracket. Tighten screws securely.

Do not attach vacuum break hose until vacuum break adjustment is completed. Refer to On Vehicle Service for adjustment procedure.

4. Connect upper end of pump rod to pump lever by placing rod in specified hole in lever. Align hole in pump lever with hole in air horn casting using J-25322. Using

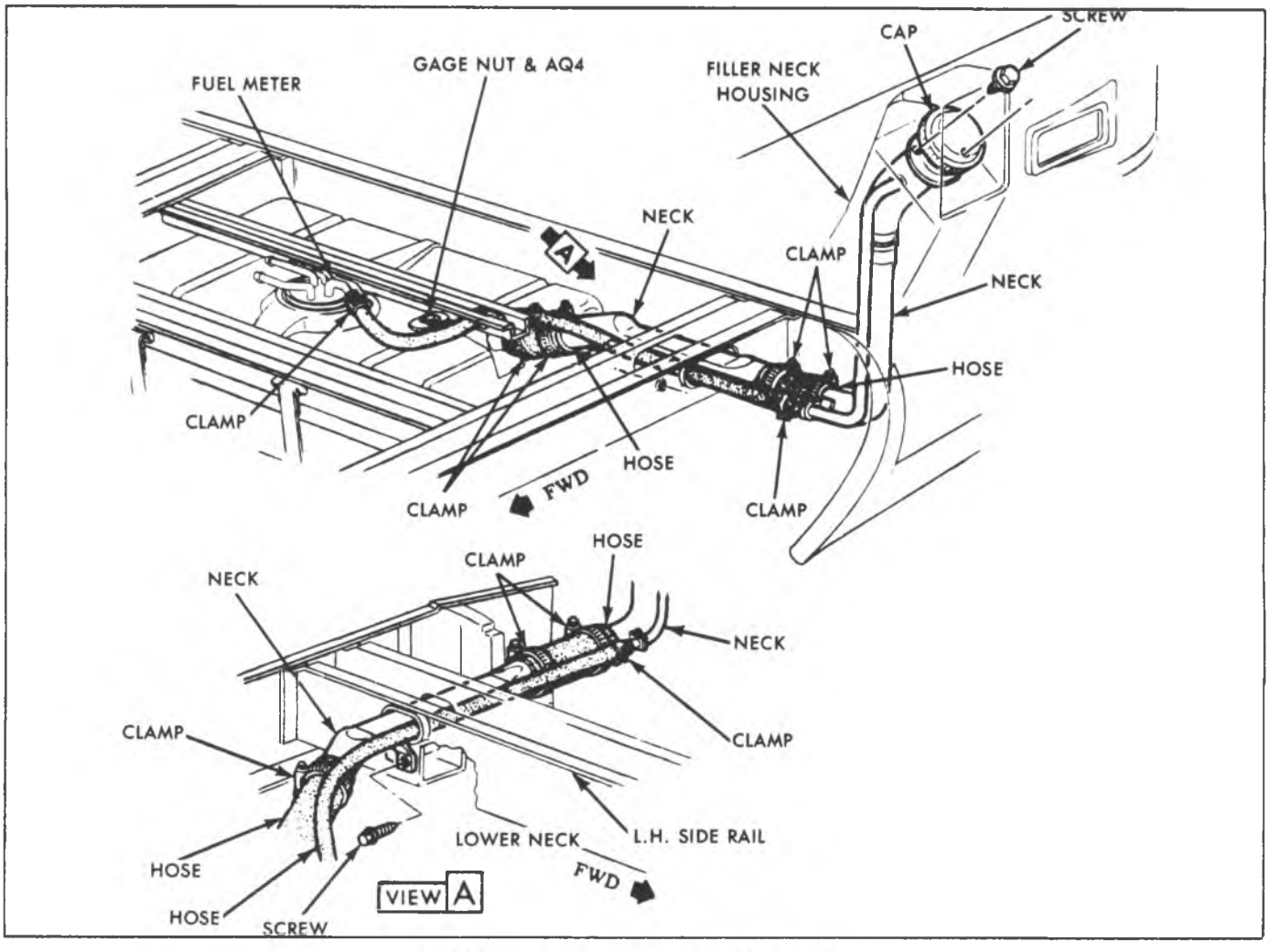


Fig. 6C5-14–Fuel Tank and Filler Neck G Van

ANGLE DEGREE TO DECIMAL CONVERSION
MODEL M2MC, M2ME AND M4MC CARBURETOR

THE RELATION BETWEEN DECIMAL AND ANGLE READINGS IS NOT EXACT DUE TO MANUFACTURING TOLERANCES OF THE COMPONENT PARTS. THIS CHART IS SUPPLIED FOR USE BY THE MECHANIC WHO HAS ACCESS TO PLUG GAUGES ONLY. THE RECOMMENDED TOOL IS AN ANGLE GAUGE FOR ACCURACY AND BEST OVERALL PERFORMANCE AND EMISSIONS.

ANGLE DEGREES	DECIMAL EQUIV. TOP OF VALVE	ANGLE DEGREES	DECIMAL EQUIV. TOP OF VALVE
5	.023	33	.203
6	.028	34	.211
7	.033	35	.220
8	.038	36	.227
9	.043	37	.234
10	.049	38	.243
11	.054	39	.251
12	.060	40	.260
13	.066	41	.269
14	.071	42	.277
15	.077	43	.287
16	.083	44	.295
17	.090	45	.304
18	.096	46	.314
19	.103	47	.322
20	.110	48	.332
21	.117	49	.341
22	.123	50	.350
23	.129	51	.360
24	.136	52	.370
25	.142	53	.379
26	.149	54	.388
27	.157	55	.400
28	.164	56	.408
29	.171	57	.418
30	.179	58	.428
31	.187	59	.439
32	.195	60	.449

Fig. 6C5-28–Angle to Decimal Conversion

GENERAL DESCRIPTION

The basic charging system is the SI integral regulator charging system (Fig. 6D-1C). The internal components are connected electrically as shown in Fig. 6D-2C. The generator is connected to the car electrically as shown in Fig. 6D-3C.

The 15-SI generator is similar to the 10-SI except that:

1. It is slightly larger physically.
2. It produces 70 amps output at full speed.
3. It uses different drive end and slip ring and bearings.
4. The stator uses delta windings, which cannot be checked for opens.

The brown field wire to the generator is used to initially activate the generator. The 10 ohm resistance, provided by either the generator warning lamp or the resistance wire with optional gages, is needed to protect the diode trio.

Although several models of generators are available with different outputs at idle and different maximum outputs, their basic operating principles are the same.

The generator features a solid state regulator that is mounted inside the generator slip ring end frame. All regulator components are enclosed into a solid mold, and this unit along with the brush holder assembly is attached to the slip ring end frame. The regulator voltage setting never needs adjusting, and no means for adjustment is provided.

The generator rotor bearings contain a supply of lubricant sufficiently adequate to eliminate the need for periodic lubrication. Two brushes carry current through the two slip rings to the field coil mounted on the rotor, and under normal conditions will provide long periods of attention-free service.

The stator windings are assembled on the inside of a laminated core that forms part of the generator frame. A recitifier bridge connected to the stator windings contains six diodes, and electrically changes the stator a.c. voltages to a d.c. voltage which appears at the generator output terminal. Generator field current is supplied through a diode trio which also is connected to the stator windings. A capacitor or condenser, mounted in the end frame protects the rectifier bridge and diode trio from high voltages, and suppresses radio noise.

No periodic adjustments or maintenance of any kind are required on the entire generator assembly.

NOISY GENERATOR

Noise from a generator may be caused by a loose drive pulley, loose mounting bolts, worn or dirty bearings, defective diode, or defective stator.

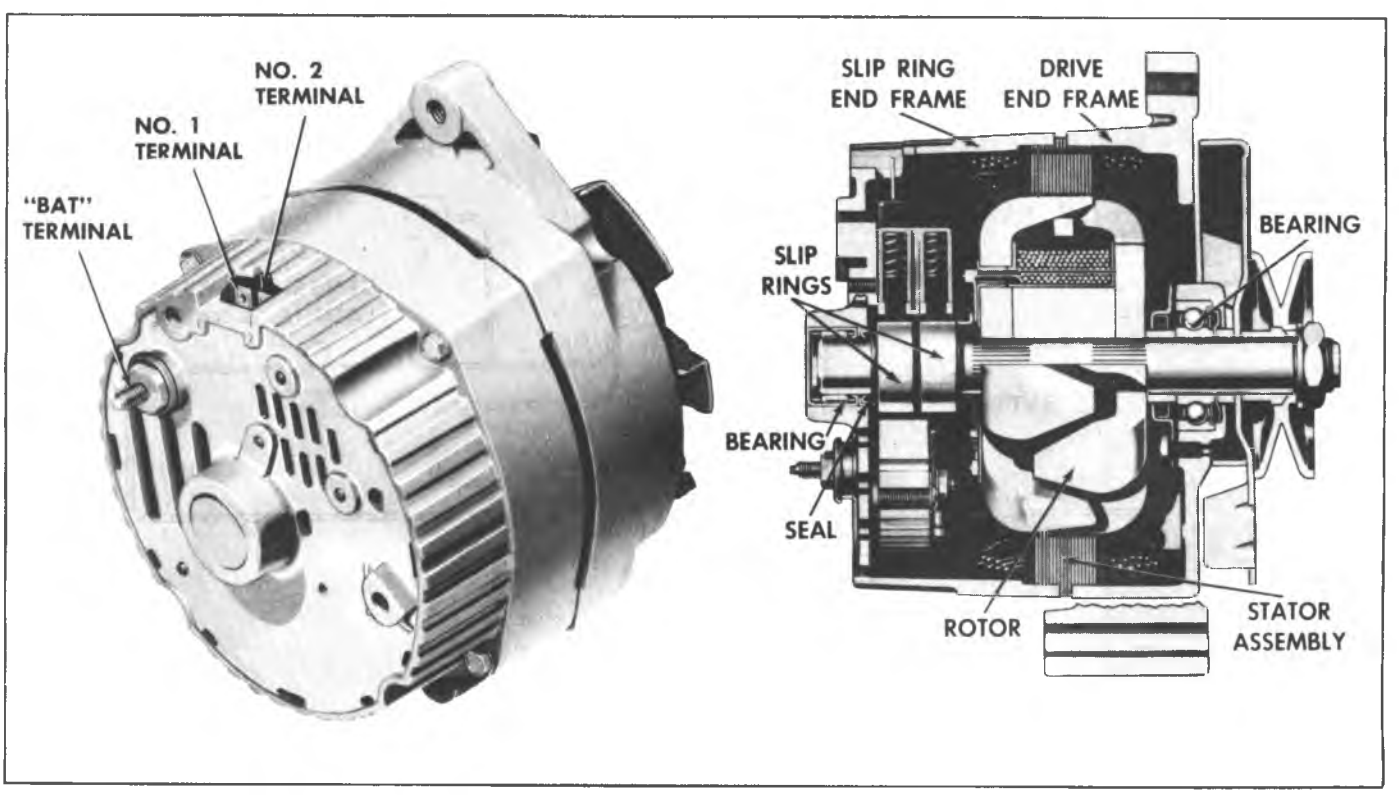


Fig. 6D-1C–10SI Generator

The electronic module provides automatic system shutdown due to a malfunction and disconnects glow plug relay from battery plus **and** ground.

Thermal Probe

The thermal probe, mounted on the engine in such a position as to sense engine temperature, transmits this information to the electronic module for controlling glow plug operation.

Glow Plugs

The glow plugs used in this sytem are 6 volt units operated at system voltage (12 volts), to provide rapid heating.

Glow Plug Relay

The glow plug relay is used to switch power to the glow plugs, on or off, as determined by the electronic module.

Fast Idle System

The fast idle relay increases engine speed at cold start or low engine temperature or with A/C on, and after each ignition cycle.

Auto Disengagement Lockout Relay

This relay senses "engine running" condition and disengages starter circuitry at start up.

STARTER GENERATOR MOUNTING

Starter and Generator mounting is illustrated in Figures 6D-7D through 6D-9D.

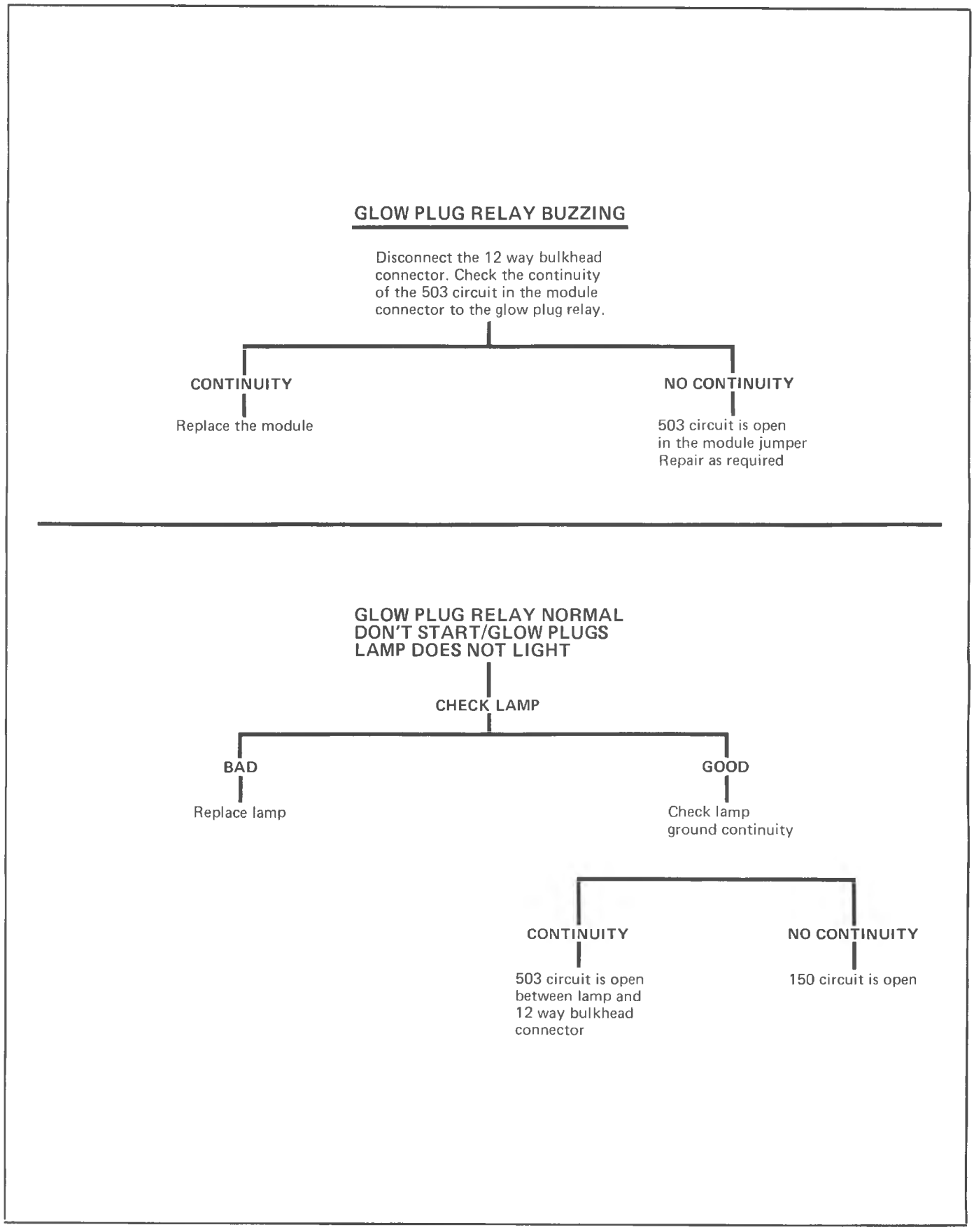


Fig. 6D-13D–C-10 Series Diesel Electrical System Diagnosis

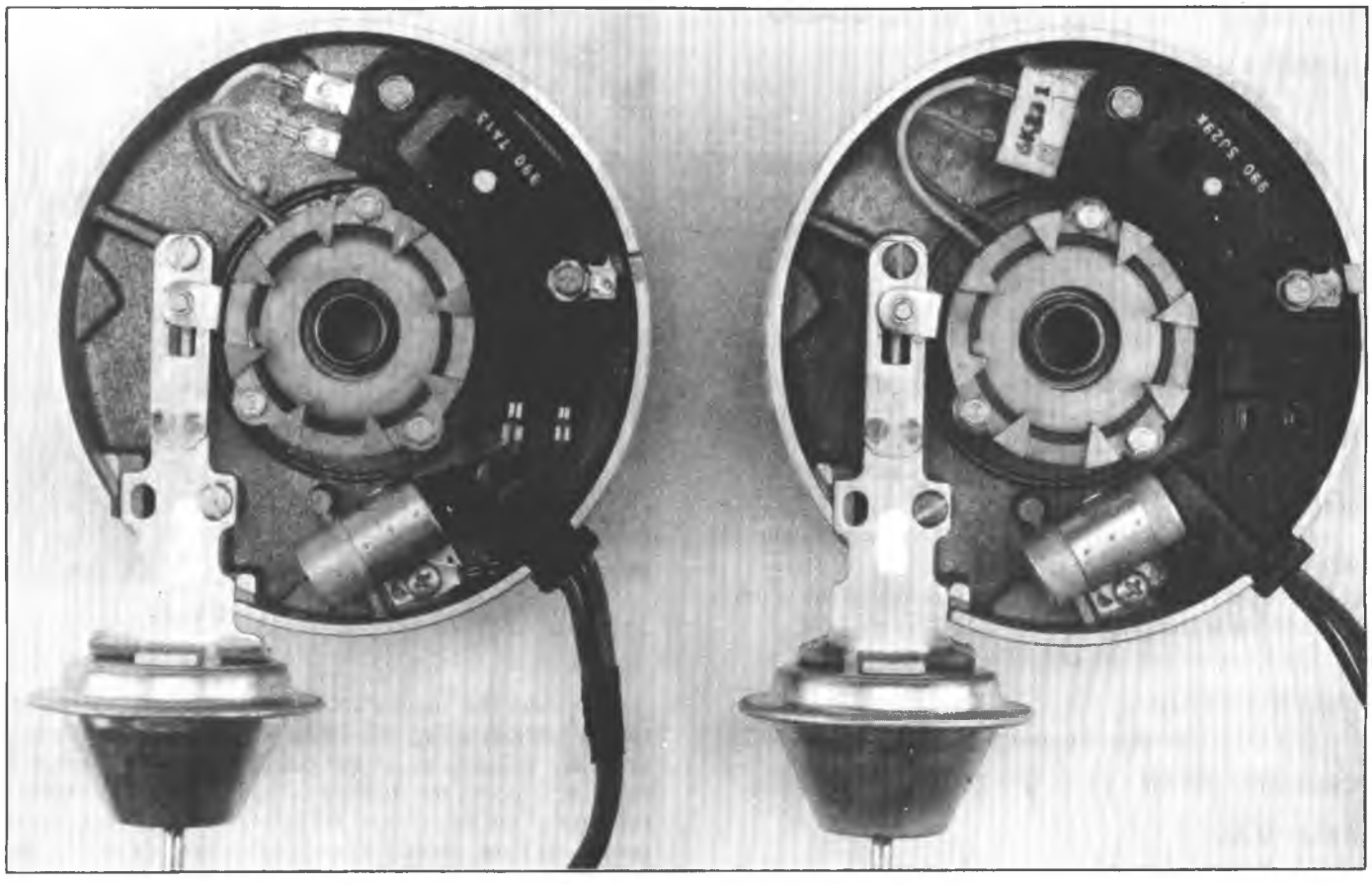


Fig. 6D-25D–Distributor Base and Components

a. Remove No. 1 spark plug.

b. Place finger over No. 1 spark plug hole and crank engine slowly until compression is felt.

c. Align timing mark on pulley to "O" on engine timing indicator.

d. Turn rotor to point between No. 1 and No. 8 spark plug towers on distributor cap.

e. Install distributor and connect ignition feed wire.

f. Install distributor cap and spark plug wires.

g. Check engine timing (see Set Ignition Timing below).

Module (Refer to Fig. 6D-25D)

It is not necessary to remove the distributor from vehicle.

REMOVAL

1. Remove distributor cap and rotor.
2. Disconnect two pick-up leads from module. (Observe color code on leads as these cannot be interchanged.)
3. Remove two module attaching screws.
4. Remove module from distributor base and remove two wire connectors.

NOTICE: Do not wipe grease from module or distributor base if same module is to be replaced. If a new module is to be installed, a package of silicone lubricant will be included with it. Spread the lubricant on the metal face of the module and on the distributor base where the module seats. This lubricant is important as it aids heat transfer for module cooling.

INSTALLATION

To install, reverse removal procedure.

Pick-Up Coil (Refer to Fig. 6D-25D)

REMOVAL

1. Remove distributor from vehicle. Mark distributor shaft and gear so that they may be reassembled in the same position (see Distributor Removal above).
2. Drive out the roll pin and remove gear.
3. Remove distributor cap.
4. Remove distributor shaft with rotor and advance weights.
5. Remove the thin "C" washer on top of pick-up coil assembly, remove pick-up coil leads from module, and remove the pick-up coil assembly. (Do not remove the three screws.)

INSTALLATION

To install reverse removal procedure noting alignment marks when installing gear.

Rotor (Refer to Fig. 6D-25D)

The rotor is retained by two screws and is provided with a slot which fits over a square lug on the advance weight base, so that the rotor can be installed in only one position.

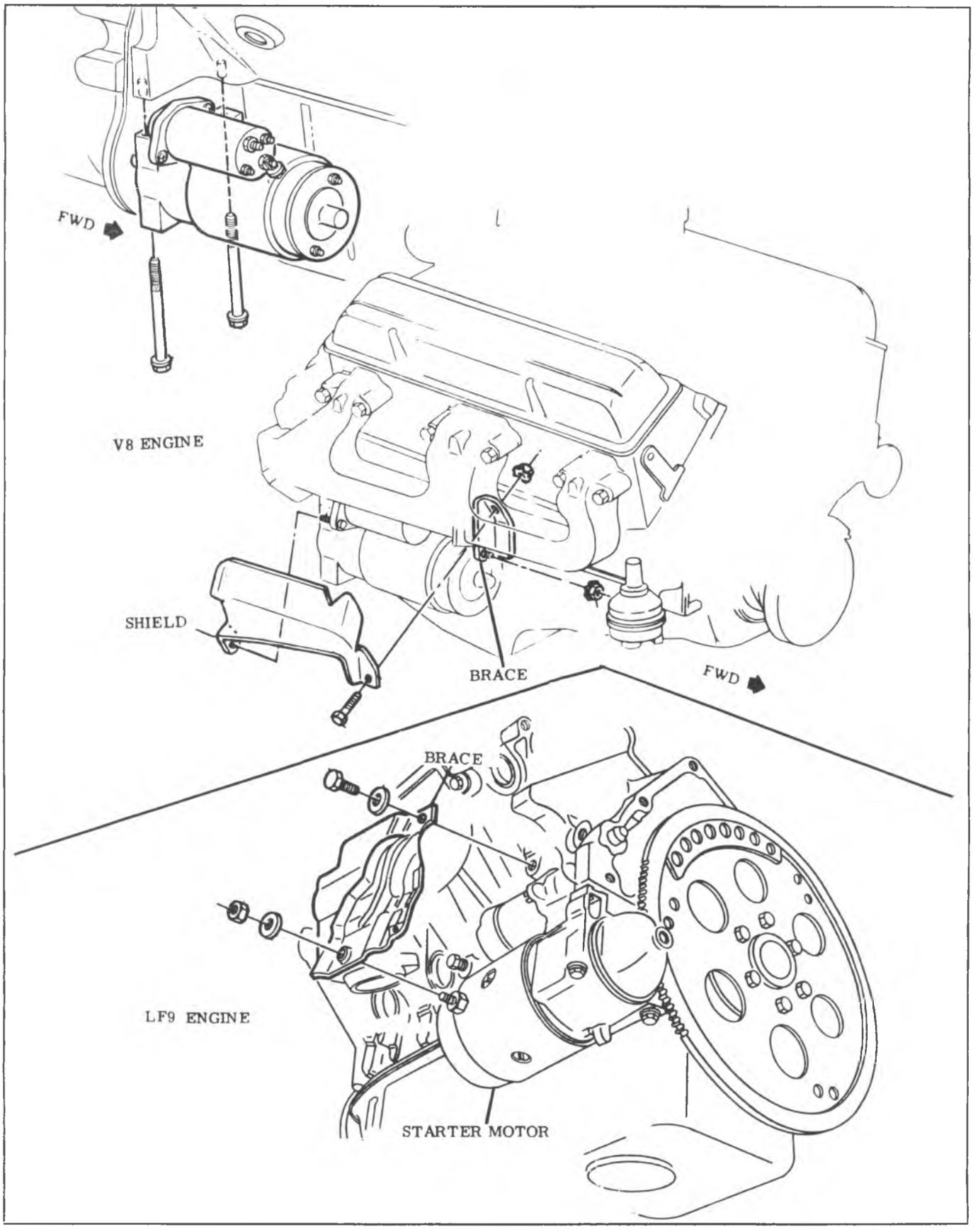


Fig. 6D-8E--Starter Motor Mounting

SPECIFICATIONS

DISTRIBUTOR & SPARK PLUGS

Distributor and spark plug specifications are shown in the Emission Control Chart in Section 6E Specifications.

BATTERY

MODEL NO.	APPLICATION	COLD CRANK RATE @ 0°F (-18°C)	AMPS FOR LOAD TEST	25 AMP. RESERVE CAPACITY (MINUTES)
85-4	250 L-6 (LD4)	275 Amps	130	60
85-5	292 L-6 (L25) 305 V-8 (LG9) 350 V-8 (LS9) 400 V-8 (LF4)	350 Amps	170	80
89-5	454 V-8 (LF8) RPO UA1	465 Amps	230	125
87-5	RPO TP2	430 Amps	210	100

STARTING MOTOR

MODEL NO.	APPLICATION	SPEC. NO.	VOLTS	FREE SPEED AMPERES	RPM
1108778	250 L-6 (LD4) (C & K-10)	3573	9	50-80*	5500-10500
1108779	250 L-6 (LD4) (G-Van)	3573	9	50-80*	5500-10500
1108780	292 L-6 (L25)	2438	9	50-80*	3500-6000
1109056	305 V-8 (LG9) (C & K)	3573	9	50-80*	5500-10500
1109798	305 V-8 (LG9) (G-Van)	3573	9	50-80*	5500-10500
1109052	350 V-8 (LS9)	3563	9	65-95*	7500-10500
1108776	400 V-8 (LF4) 454 V-8 (LF8)	3563 Insert Chart 6D-S2	9	65-95*	7500-10500

*Includes Solenoid

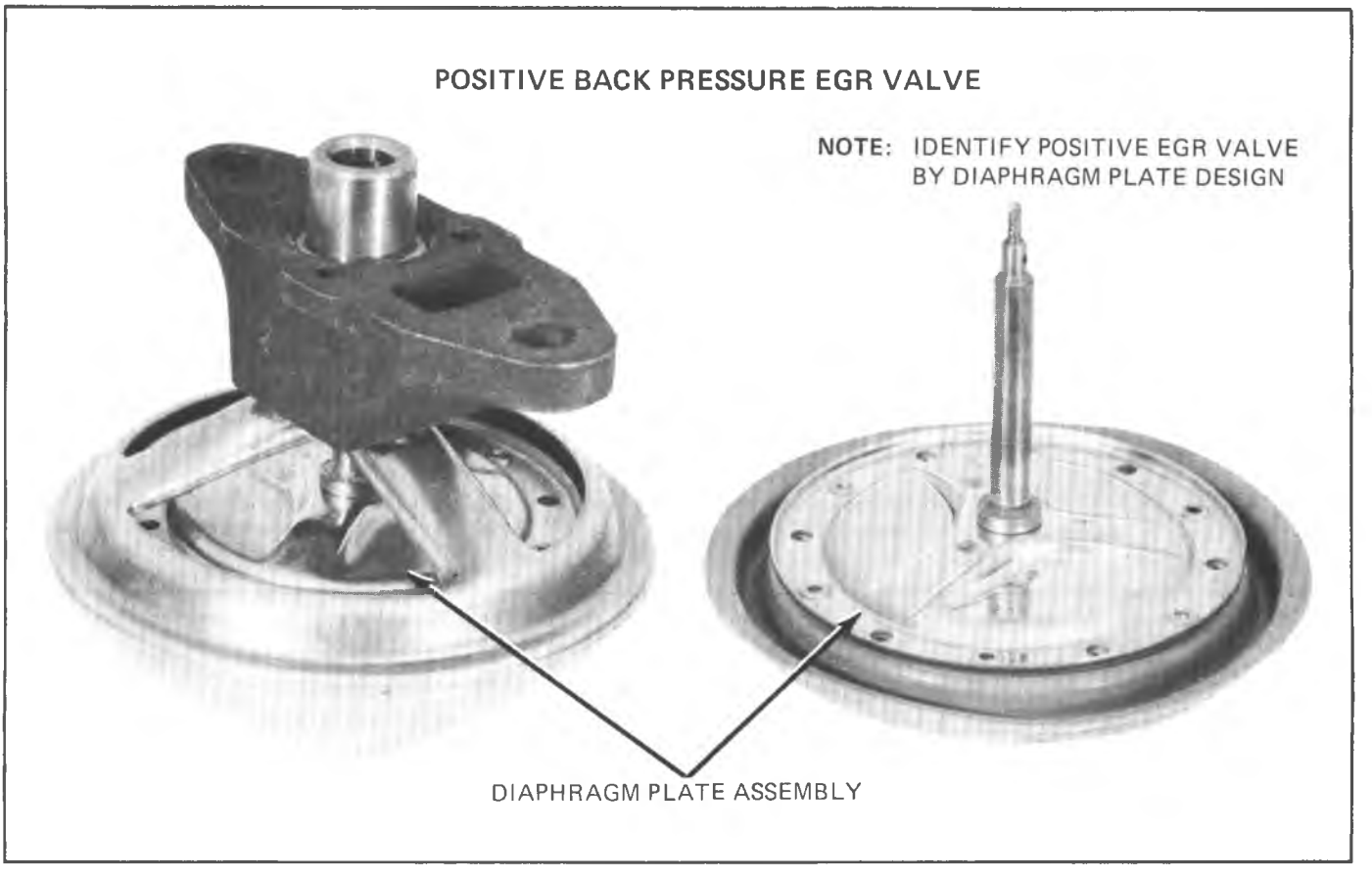


Fig. 6E-10–Positive EGR Identification

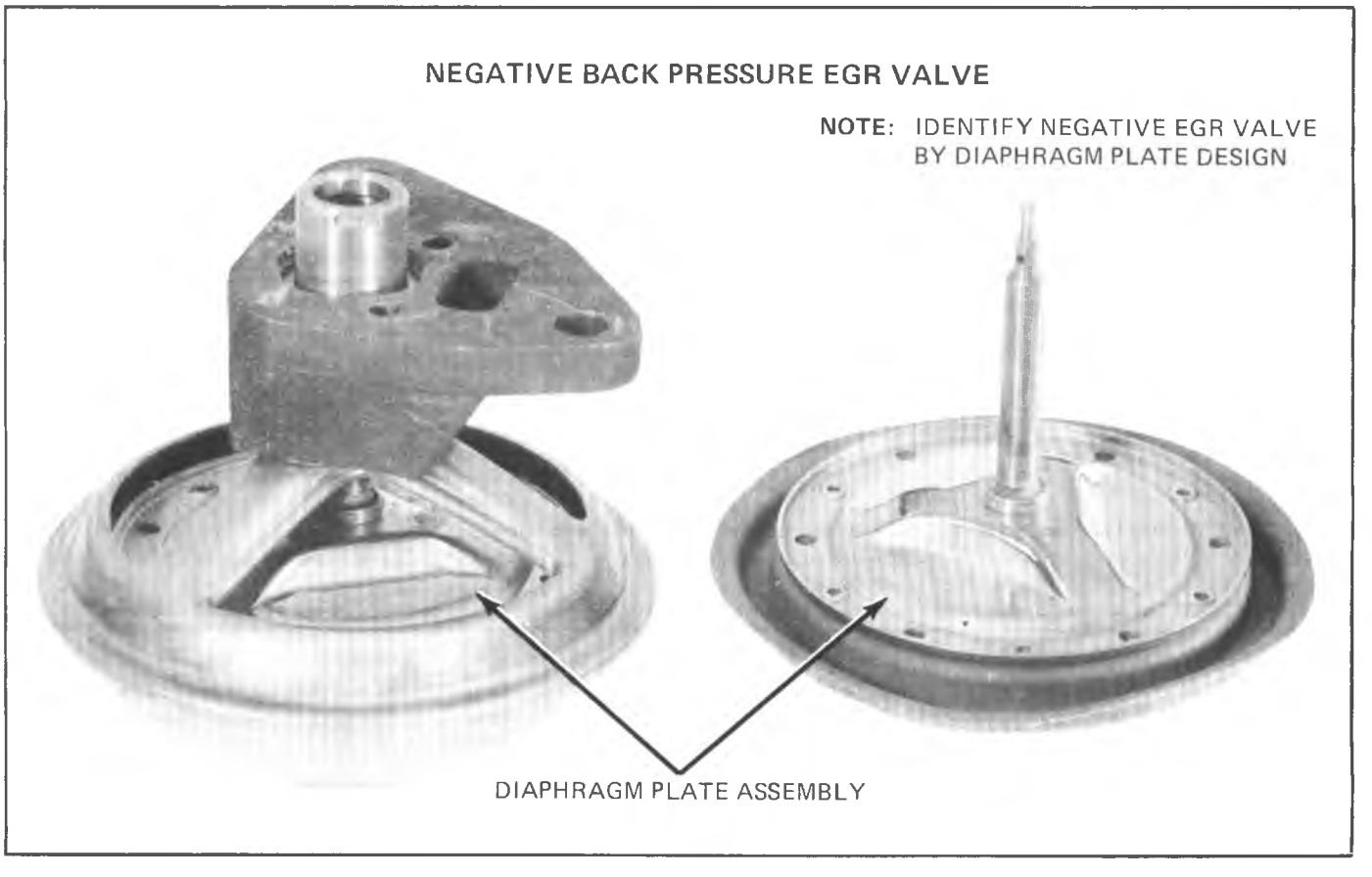


Fig. 6E-11–Negative EGR Identification

DIAGNOSIS – AIR INJECTION REACTOR SYSTEM

CONDITION	POSSIBLE CAUSE	CORRECTION
No air supply – accelerate engine to 1500 rpm and observe air flow from hoses. If the flow increases as the rpm's increase, the pump is functioning normally. If not, check possible cause.	1. Loose drive belt.	1. Tighten to specifications.
	2. Leaks in supply hose.	2. Locate leak and repair
	3. Leak at fittings.	3. Tighten or replace clamps.
	4. Air expelled through by-pass valve.	
	4a. Connect a vacuum line directly from engine manifold vacuum to by-pass valve.	4a. If this corrects the problem go to step b. If not, replace air by-pass valve.
	4b. Connect vacuum line from engine manifold vacuum source to by-pass valve through vacuum differential valve directly, by passing the differential vacuum delay and separator valve.	4b. If this corrects the problem, check differential vacuum, delay and separator valve and vacuum source line for plugging. Replace as required. If it doesn't, replace vacuum differential valve.
	5. Check valve inoperative.	5. Disconnect hose and blow through hose toward check valve. If air passes, function is normal. If air can be sucked from check valve, replace check valve.
	6. Pump failure.	6. Replace pump.
Excessive pump noise, chirping, rumbling, knocking, loss of engine performance.	1. Leak in hose.	1. Locate source of leak using soap solution and correct.
	2. Loose hose.	2. Reassemble and replace or tighten hose clamp.
	3. Hose touching other engine parts.	3. Adjust hose position.
	4. Vacuum differential valve inoperative.	4. Replace vacuum differential valve.
	5. By-pass valve inoperative	5. Replace by-pass valve.
	6. Pump mounting fasteners loose.	6. Tighten mounting screws as specified.
	7. Pump failure.	7. Replace pump.
	8. Check valve inoperative.	8. Replace check valve.
Excessive belt noise.	1. Loose belt	1. Tighten to spec.
	2. Seized pump	2. Replace pump.
Excessive pump noise. Chirping	1. Insufficient break-in	1. Run vehicle 10-15 miles at interstate speeds--recheck.
Centrifugal filter fan damaged or broken.	1. Mechanical damage	1. Replace centrifugal filter fan.
Exhaust tube bent or damaged.	1. Mechanical damage	1. Replace exhaust tube.
Poor idle or driveability.	1. A defective A.I.R. system cannot cause poor idle or driveability.	1. Do not replace A.I.R. system.

Fig. 6E-31–Diagnosis-Air Injection Reactor System

LIGHT DUTY TRUCK ENGINE PERFORMANCE SPECIFICATION CHART (Continued)

ENGINE & CODE (See Section "0" for Location of Engine and VIN Codes)	IGNITION TIMING B.T.D.C. DEGREES	SPARK PLUG TYPE & GAP	SOLENOID SCREW (RPM)	CURB IDLE (RPM)	FAST IDLE (RPM)	CARBURETOR IDENTIFICATION	DISTRIBUTOR		VACUUM & MECHANICAL ADVANCE	
							DIST. MODEL	VACUUM MODEL	VACUUM ADVANCE (In Crank Degrees @ Inches of Vacuum)	MECHANICAL ADVANCE (Crank Degrees @ Engine RPM)
5.7 L (350 C.I.D.) (VIN L) (LS9) FED./MANUAL K10, 20	8°	R45TS	—	700 (N)	1300 (N)	17080205	1103436	691	0° @ 3" 2° @ 7.5"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600
5.7 L (350 C.I.D.) (VIN L) (LS9) FED./MANUAL C10, 20 G10, 20	8°	R45TS (.045)	—	700 (N)	1300 (N)	17080201	1103372	604	0° @ 4" 14° @ 8"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600
5.7 L (350 C.I.D.) (VIN L) (LS9) CALIF./MANUAL K10, C20	8°	R45TS (.045)	—	700 (N)	1300 (N)	17080524	1103339	626	0° @ 4" 10° @ 8"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600
5.7 L (350 C.I.D.) (VIN L) (LS9) NATION./MANUAL C10,	8°	R45TS (.045)	—	700 (N)	1600 (N)	17080291 17080503	1103435	644	0° @ 3" 16° @ 6.5"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600
5.7 L (350 C.I.D.) (VIN L) (LS9) NATION./MANUAL C10, 20	6°	R45TS (.045)	—	700 (N)	1600 (N)	17080201 17080526	1103339	626	0° @ 4" 10° @ 8"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600
5.7 L (350 C.I.D.) (VIN L) (LS9) FED./MANUAL K10	8°	R45TS (.045)	—	700 (N)	1600 (N)	17080291	1103436	691	0° @ 3" 2° @ 7.5"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600
5.7 L (350 C.I.D.) (VIN L) (LS9) FED./AUTO. C10, 20 G10, 20	8°	R45TS (.045)	600 (D)	500 (D)	1600 (P) or (N)	17080205 17080206	1103372	604	0° @ 4" 14° @ 8"	0° @ 1100 12° @ 1600 16° @ 2400 22° @ 4600

LIGHT DUTY TRUCK ENGINE PERFORMANCE SPECIFICATION CHART (Continued)

ENGINE & CODE (See Section "0" for Location of Engine and VIN Codes)	IGNITION TIMING B.T.D.C. DEGREES	SPARK PLUG TYPE & GAP	SOLENOID SCREW (RPM)	CURB IDLE (RPM)	FAST IDLE (RPM)	CARBURETOR IDENTIFICATION	DISTRIBUTOR		VACUUM & MECHANICAL ADVANCE	
							DIST. MODEL	VACUUM MODEL	VACUUM ADVANCE (In Crank Degrees @ Inches of Vacuum)	MECHANICAL ADVANCE (Crank Degrees @ Engine RPM)
5.7 L (350 C.I.D.) (VIN M) (LT9) FED./AUTO. CK20, 30 G30 P20, 30	4°	R44T (.045)	*1600	700 (N)	1900 (N)	17080213	1103375	626	0° @ 4" 10° @ 8"	0° @ 1150 17° @ 2900 22° @ 4200
						17080215	1103439	604	0° @ 4" 14° @ 8"	0° @ 1000 8° @ 1600 19° @ 3450
5.7 L (350 C.I.D.) (VIN M) (LT9) CALIF./AUTO. CK10, 30 G30	6°	R44T (.045)	*1500	700 (N)	1900 (N)	17080513 17080515	1103420	681	0° @ 10" 10° @ 13"	0° @ 1800 24° @ 4000
6.6 L (400 C.I.D.) (VIN X) (LE4) FED./AUTO. K20, 30 G30	4°	R44T (.045)	*1600	700 (N)	1900 (N)	17080229	1103375	626	0° @ 4" 10° @ 8"	0° @ 1150 17° @ 2900 22° @ 4200
6.6 L (400 C.I.D.) (VIN X) (LE4) CALIF./AUTO K20, 30 G30	6°	R44T (.045)	*1500	700 (N)	1900 (N)	17080529	1103420	681	0° @ 10" 10° @ 13"	0° @ 1800 24° @ 4000
7.4 L (454 C.I.D.) (VIN W) (LE8) NATION./AUTO./MAN. C20, 30 P30	4°	R44T (.045)	*1500	700 (N)	1900 (N)	17080212 17080213	1103376	682	0° @ 8" 10° @ 13"	0° @ 1100 14° @ 2800 20° @ 4200

*TRC ACTUATOR SPEED

Fig. 6E-42--Engine Performance Specifications

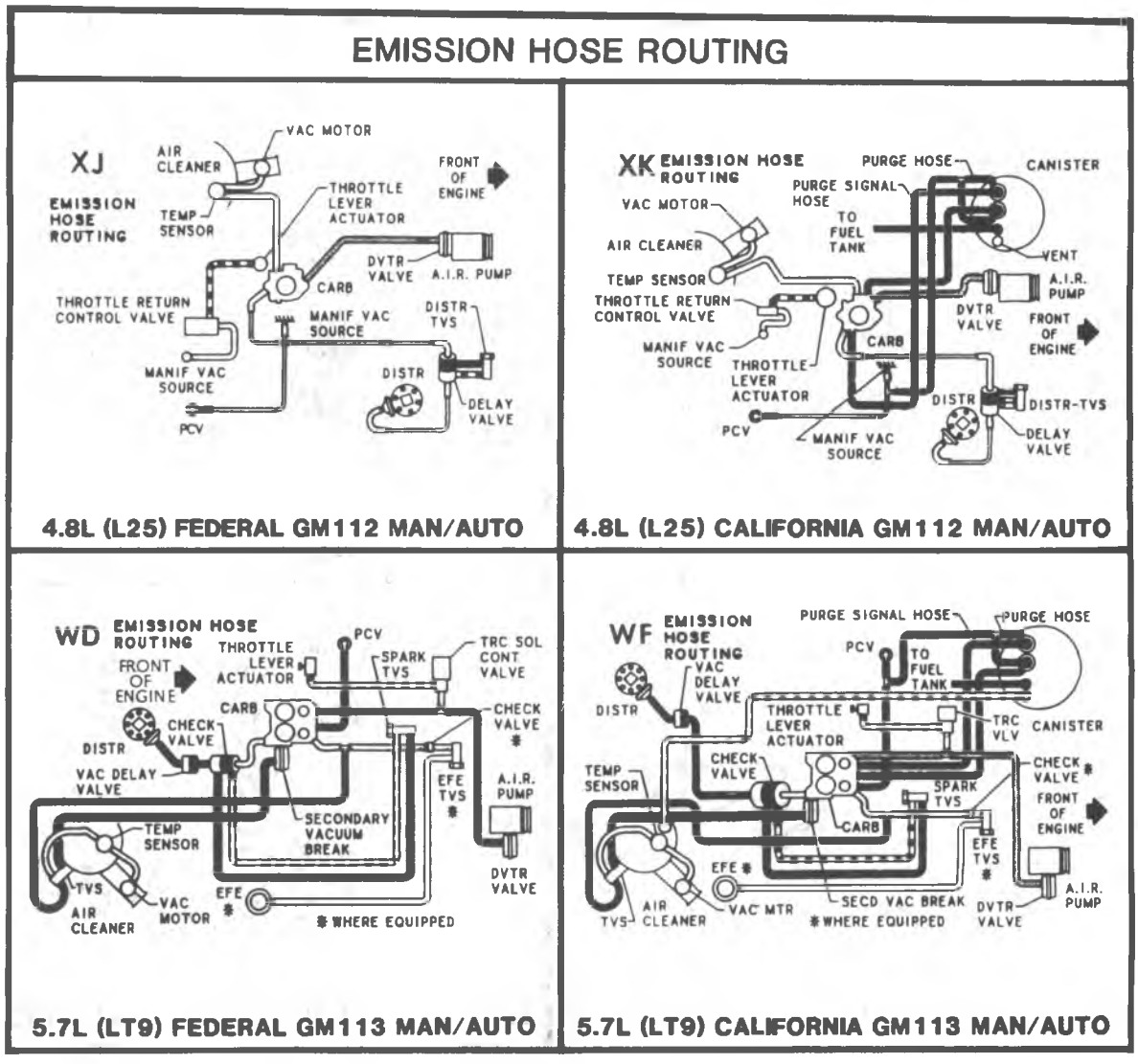


Fig. 6E-51--Emission Hose Routing

SECTION 7A

AUTOMATIC TRANSMISSION

CONTENTS

TORQUE CONVERTER CLUTCH (TCC)

INDEX

GENERAL DESCRIPTION

The torque converter clutch (as shown in Fig. 7A-1a) is an internal mechanism (with a friction material attached to the front plate) splined to the turbine assembly, and when operated applies against the converter cover. This provides a mechanical direct drive coupling of the engine to the planetary gears. By applying the converter clutch, slippage is eliminated, resulting in improved fuel economy and reduced fluid operating temperatures.

The operation of the converter clutch is determined by a series of controls, and by drive range selection (as shown in Fig. 7A-2a and 2b). The converter clutch is applied in direct drive and above a minimum preset vehicle speed. At wider throttle openings, where the 2-3 upshift occurs above converter clutch apply, the apply of the converter clutch will occur immediately after the 2-3 shift. When vehicle speed decreases or the transmission shifts out of direct drive, the fluid pressure is released, the converter clutch is released, and the converter operates in a conventional manner.

The apply or release of the converter clutch is also determined by the direction that converter feed oil is fed to the converter. Converter feed oil from the pressure regulator valve flows to the converter clutch apply valve. The position of the converter clutch apply valve controls which direction converter feed oil flows to the converter.

A spring loaded damper assembly is splined to the converter turbine assembly. The converter clutch pressure plate is attached to the pivoting mechanism of the damper assembly. This pivoting action allows the pressure plate to rotate independent of the damper assembly, up to approximately 45 degrees. The rate of independent rotation is controlled by the pivoting mechanism acting on the springs in the damper assembly. The spring cushioning effect of the damper assembly aids in reducing converter clutch apply "feel."

To further aid the apply and release of the converter clutch during various driving situations, controls have been incorporated in the electrical system. The converter clutch is applied when all of the following conditions exist:

- Transmission in 3rd gear
- Vehicle exceeds 24 to 30 mph (38 to 48 km/h)
- Engine coolant is above 130° F (54°C)
- Engine vacuum is above 2.5 in. hg.(8 kPa)
- Brake pedal is released

Oil leaks around the engine and transmission are generally carried toward the rear of the vehicle by air stream. For example, a transmission oil filler tube to case leak will sometimes appear as a leak at the rear of the transmission. In determining the source of a leak, proceed as follows:

1. Degrease underside of transmission.
2. Road test to get unit at operating temperature.
3. Inspect for leak with engine running.
4. With engine OFF, check for oil leaks due to the raised oil level caused by drain back.

Possible Points of Oil Leak

1. Transmission Oil Pan Leak.
a. Attaching bolts not correctly torqued.
b. Improperly installed or damaged pan gasket.
c. Oil pan gasket mounting face not flat.
2. Extension Housing.
a. Attaching bolts not correctly torqued.
b. Rear seal assembly damaged or improperly installed.
c. Square seal, extension to case, damaged or improperly installed.
d. Porous casting. Refer to Subparagraph C.
3. Case Leak.
a. Filler pipe seal damaged or missing; misposition of filler pipe bracket to engine.
b. Modulator assembly "O" ring seal damaged or improperly installed.
c. Detent cable connector seal damaged or improperly installed.
d. Governor cover not tight.
e. Speedometer gear "O" ring damaged.
f. Manual shaft seal damaged or improperly installed.
g. Line pressure tap plug loose.
h. Vent pipe (refer to item 5).
i. Porous casting. Refer to Subparagraph C.
4. Leak at Front of Transmission.
a. Front pump seal leaks.
1. Seal lip cut. Check converter hub, etc.
2. Bushing moved and damaged, Oil return hole plugged.
3. No oil return hole.
b. Front pump attaching bolts loose or bolt washer type seals damaged or missing.
c. Front pump housing "O" ring damaged or cut.
d. Converter leak in weld area.
e. Porous casting (pump).
5. Oil Comes Out Vent Pipe.
a. Transmission overfilled.
b. Water in oil.
c. Foreign material between pump and case or between pump cover and body.
d. Case - porous near converter bosses. Front pump cover or housing oil channels shy or stock near breather. See Subparagraph C.
e. Pump to case gasket mispositioned.

FLUID PRESSURE CHECK

While vehicle is stationary (service brake ON), engine speed set to 1200 rpm, transmission oil pressure gage attached as shown in Fig. 7A-10B, and vacuum modulator tube **disconnected** , the transmission line pressure tap should read 167 psi (1152 kPa) in Drive(D), 166 psi (1145 kPa) in L1 or L2, and 254 psi (1752 kPa) in reverse.

While vehicle is stationary (service brake ON), engine speed set to maintain 12 in. hg. (39 kPa) absolute manifold pressure, transmission oil pressure gage attached, and vacuum modulator tube **connected** , the transmission line pressure tap should read 85 psi (586 kPa) in DRIVE (D), 105 psi (724 kPa) in L1 or L2, and 129 psi (890 kPa) in reverse.

CASE POROSITY REPAIR

External oil leaks caused by case porosity can be successfully repaired with the transmission in the vehicle by using the following recommended procedures:

1. Road test and bring the transmission to operating temperature, approximately 180°F (82°C).
2. Raise vehicle on a hoist or jack stand, engine running, and locate source of oil leak. Check for oil leaks in Low(L), Drive(D), and Reverse(R).
3. Shut engine off and thoroughly clean area to be repaired with a suitable cleaning solvent and a brush and air dry.

A clean, dry soldering acid brush can be used to clean the area and also to apply the epoxy cement.

4. Using instructions of the manufacturer, mix a sufficient amount of epoxy to make the repair. Make certain the area to be repaired is fully covered.
5. Allow cement to cure for 3 hours before starting engine.
6. Road test and check for leaks.

VACUUM MODULATOR DIAGNOSIS

A defective vacuum modulator can cause one or more of the following complaints.

1. Harsh upshifts and downshifts.
2. Delayed upshifts.
3. Soft upshifts and downshifts.
4. Slips in Low(L), Drive(D) and Reverse(R).
5. Transmission overheating.
6. Engine burning transmission oil.

If any one of the above complaints are encountered, the modulator must be checked.

Vacuum Diaphragm Leak Check

Insert a pipe cleaner into the vacuum connector pipe as far as possible and check for the presence of transmission oil. If oil is found, replace the modulator.

Gasoline or water vapor may settle in the vacuum side of the modulator. If this is found without the presence of oil, the modulator is serviceable and should not be changed.

Atmospheric Leak Check

Apply a liberal coating of soap bubble solution to the vacuum connector pipe seam, the crimped upper to lower housing seam (Fig. 7A-8). Using a short piece of rubber tubing, apply air pressure to the vacuum pipe by blowing into the tube and observe for leak bubbles. If bubbles appear, replace the modulator.

ON VEHICLE SERVICE

TRANSMISSION REPLACEMENT

(All Except K Model)

If necessary, the catalytic converter may have to be disconnected to provide adequate clearance for transmission removal. This procedure will include removal of the converter support bracket.

1. Before raising the vehicle, disconnect the negative battery cable detent downshift cable at carburetor and release the parking brake.
2. Raise vehicle on hoist.
3. Remove propeller shaft.
4. Disconnect speedometer cable, detent downshift cable, modulator vacuum line and oil cooler pipes at transmission.
5. Disconnect shift control linkage.
6. Support transmission with suitable transmission jack.
7. Disconnect rear mount from frame crossmember.
8. Remove two bolts at each end of frame crossmember. Remove crossmember.
9. Remove converter under pan.
10. Remove converter-to-flexplate bolts, as shown in Fig. 7A-14.
11. Lower transmission until jack is barely supporting it.
12. Remove transmission to engine mounting bolts and remove oil filler tube at transmission.
13. Raise transmission to its normal position, support engine with jack and slide transmission rearward from engine and lower it away from vehicle.

Use suitable converter holding tool when lowering transmission or keep rear of transmission lower than front so as not to lose converter.

The installation of the transmission is the reverse of the removal with the following added step. Before installing the flexplate-to-converter bolts, make certain that the attaching lugs on the converter are flush with the flex plate and the converter rotates freely by hand in this position. Refer to Fig. 7A-14 for instructions on attaching the converter-to-flexplate. This will insure proper converter alignment.

After installation of transmission, lower vehicle and remove vehicle from hoist. Check linkage for proper adjustment.

Check transmission fluid level.

TRANSMISSION REPLACEMENT (K MODEL)

1. Disconnect battery cable.
2. Remove transmission dipstick.
3. Disconnect detent downshift cable at carburetor.
4. Remove transfer case shift lever knob and boot.
5. Raise vehicle on hoist.

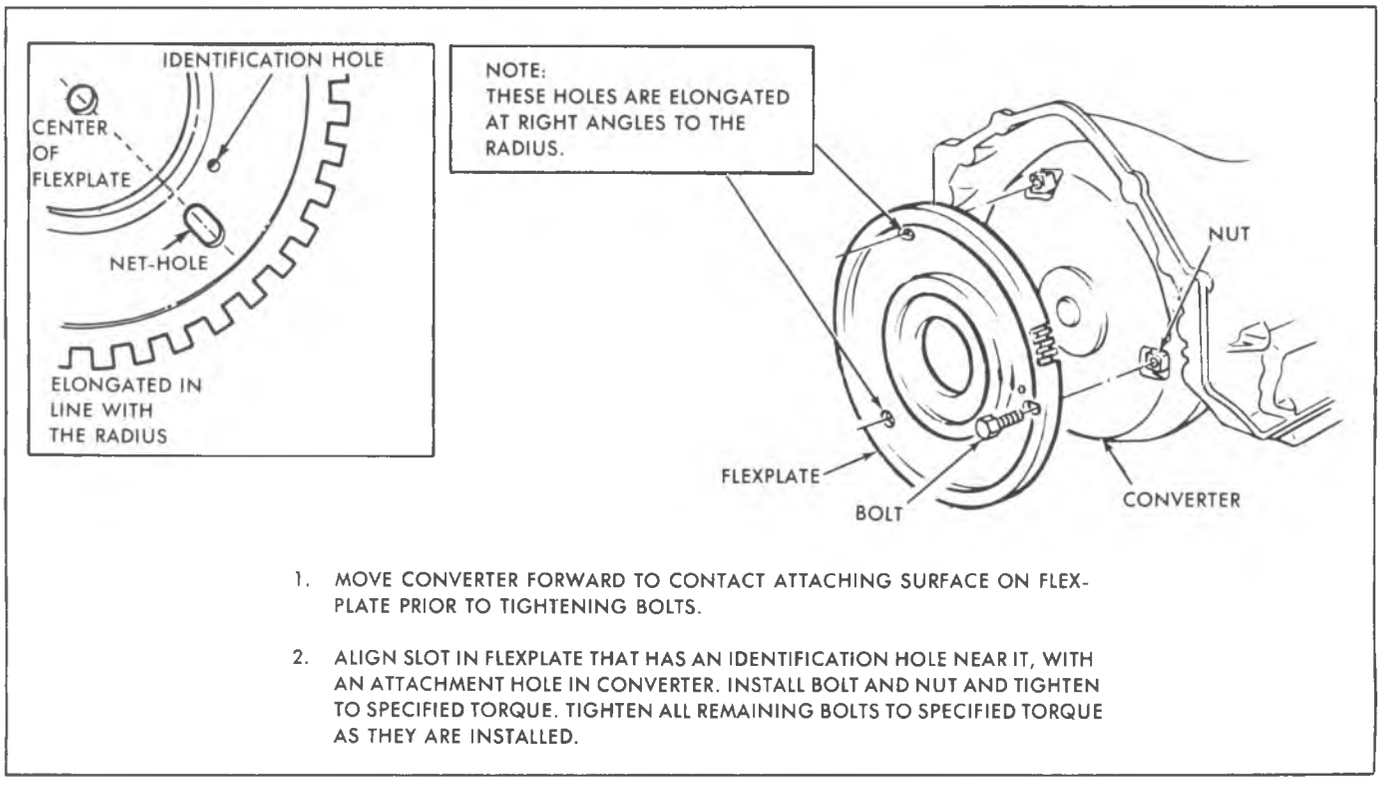


Fig. 7A-14--Typical Transmission Mounting, Net-Hole Design

		Minimum	Maximum
L2-2nd Gear - Steady road load at approximately 25 mph		145 psi	155 psi
Gear	Selector Lever Position	Minimum	Maximum
1st 2nd 3rd	Drive ("Zero" throttle to full throttle.	60	150
3rd	Drive Range, Zero Throttle at 30 mph	60	
Reverse	Rev. (Zero to full throttle	95	260

Fig. 7A-35--Fluid Pressure Check - Road or Normal Operating Conditions

Vehicle Stationary - Engine at 1200 RPM

With the transmission oil pressure gage attached and the vacuum modulator tube **disconnected** , the transmission pressures should check approximately as shown in Fig. 7A-36.

Vehicle Stationary - Engine at 1000 RPM

With the transmission oil pressure gage attached and the vacuum modulator tube **connected** for normal modulator operation, the transmission pressure should check approximately as shown in Fig. 7A-37.

Pressures are not significantly affected by altitude or barometric pressure when the vacuum modulator tube is connected.

Case Porosity Repair

External leaks caused by case porosity have successfully been repaired with the transmission in the vehicle by using the following recommended procedures:

1. Road test and bring the transmission to operating temperature, approximately 180 degrees (82°C).

2. Raise vehicle on hoist or jack stand, engine running and locate source of oil leak. Check for leak in all operating positions. Use of a mirror is helpful in finding leaks.

3. Shut engine off and thoroughly clean area to be repaired with a cleaning solvent and a brush air dry.

4. Using instructions of the manufacturer, mix a sufficient amount of epoxy to make repair. Observe cautions of manufacturer in handling.

5. While the transmission case is still HOT apply the epoxy to the area to be repaired. A clean, dry soldering acid brush can be used to clean the area and also to apply the epoxy cement. Make certain the area to be repaired is fully covered.

6. Allow cement to cure for three hours before starting engine.

7. Road test and check for leaks.

Drive, Neutral, Park	L_1 or L_2	Reverse
150	150	233

Fig. 7A-36--Fluid Pressure Check - Vehicle Stationary, Vacuum Tube Disconnected

VACUUM MODULATOR DIAGNOSIS

A defective vacuum modulator can be determined by performing the following procedures.

Vacuum Diaphragm Leak Check

Insert a pipe cleaner into the vacuum connector pipe as far as possible and check for the presence of transmission oil. If oil is found, replace the modulator.

Gasoline or water vapor may settle in the vacuum side of the modulator. If this is found without the presence of oil, the modulator should not be changed.

Atmospheric Leak Check

Apply a liberal coating of soap bubble solution to the vacuum connector pipe seam, the crimped upper to lower housing seam, and the threaded screw seal (Fig. 7A-38). Using a short piece of rubber tubing apply air pressure to the vacuum pipe by blowing into the tube and observe for leak bubbles. If bubbles appear, replace the modulator.

NOTICE: Do not use any method other than human lung power for applying air pressure, as pressures over 6 psi (41 kPa) may damage the modulator.

Bellows Comparison Check

Using a comparison gage, as shown in Figure 7A-39, compare the load of a known good modulator with the assembly in question.

a. Install the modulator that is known to be acceptable on either end of the gage (Fig. 7A-40).

b. Install the modulator in question on the opposite end of the gage. (Fig. 7A-41).

c. Holding the modulators in a horizontal position, bring them together under pressure until either modulator sleeve end just touches the line in the center of the gage (Fig. 7A-42). The gap between the opposite modulator sleeve end and the gage line should then be 1/16 in. (1.5 mm) or less. If the distance is greater than this amount, the modulator in question should be replaced.

Drive, Neutral, Park	L1 or L2	Reverse
60	150	107

Fig. 7A-37--Fluid Pressure Check - Vehicle Stationary, Vacuum Tube Connected

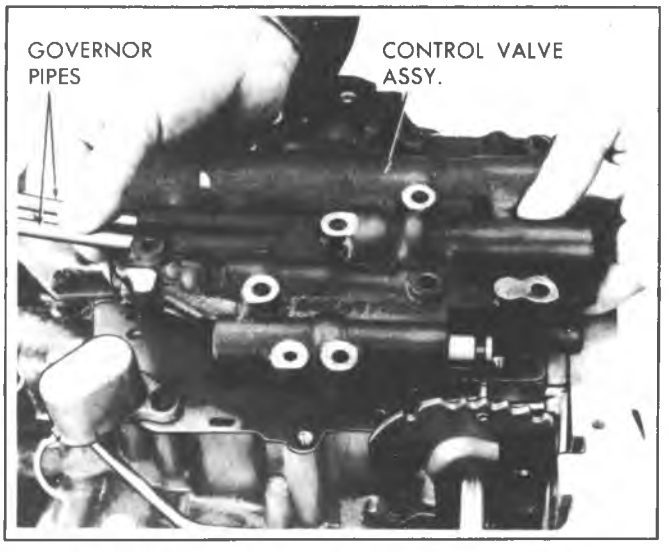


Fig. 7A-49--Removing Control Valve and Governor Pipes

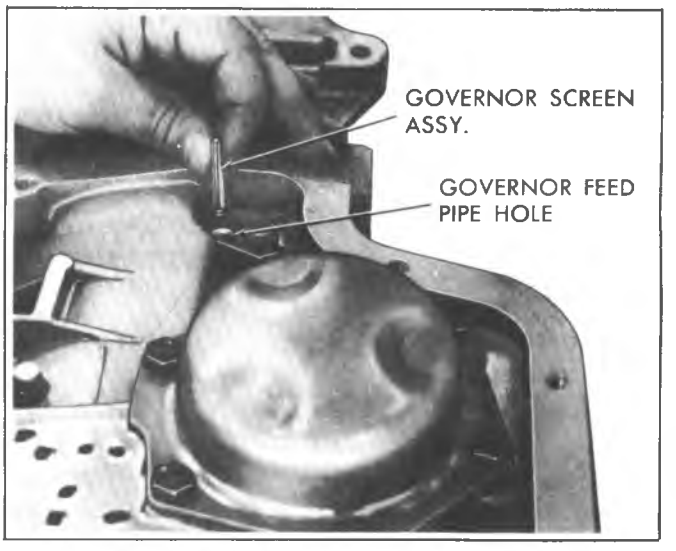


Fig. 7A-50--Governor Screen Position

The following steps should be completed unless part replacement is required.

8. Remove parking pawl shaft retainer.

9. Remove parking pawl shaft, cup plug parking pawl shaft, and parking pawl.

Installation

Installation of the parking linkage is the reverse of the removal. Use new seal and cup plug, if removed, and new bottom pan gasket.

CONTROL VALVE BODY

Removal

1. Remove bottom pan and filter.

2. Disconnect lead wire from pressure switch assembly.

3. Remove control valve body attaching screws and detent roller spring assembly.

Do not remove solenoid attaching screws.

NOTICE: If the transmission is in the vehicle, the front servo parts may drop out as the control valve assembly is removed.

4. Remove control valve body assembly and governor pipes. If care is taken in removing control valve body the six (6) check balls will stay in place above the spacer plate. Refer to Fig. 7A-49.

5. Remove the governor screen assembly from end of governor feed pipe or from the governor feed pipe hole in the case (Fig. 7A-50). Clean governor screen in clean solvent and air dry.

NOTICE: Do not drop manual valve.

6. Remove the governor pipes and manual valve from control valve body.

Installation

Installation of control valve body is in reverse of removal. See Overhaul Manual. Adjust fluid level.

PRESSURE REGULATOR VALVE

Removal

1. Remove bottom pan and filter.

2. Compress regulator boost valve bushing against pressure regulator spring and remove snap ring, using J-5403 pliers.

3. Remove regulator boost valve bushing and valve.

4. Remove pressure regulator spring.

5. Remove spring retainer, washer spacer(s) if present, and regulator valve.

Installation

A solid type pressure regulator valve must only be used in a pump cover with a squared-off pressure regulator boss (Refer to Figure 7A-51). A pressure regulator valve with oil holes and orifice cup plug may be used to service either type pump.

Installation of the pressure regulator valve is the reverse of the removal. Install new gasket on oil pan and adjust fluid level.

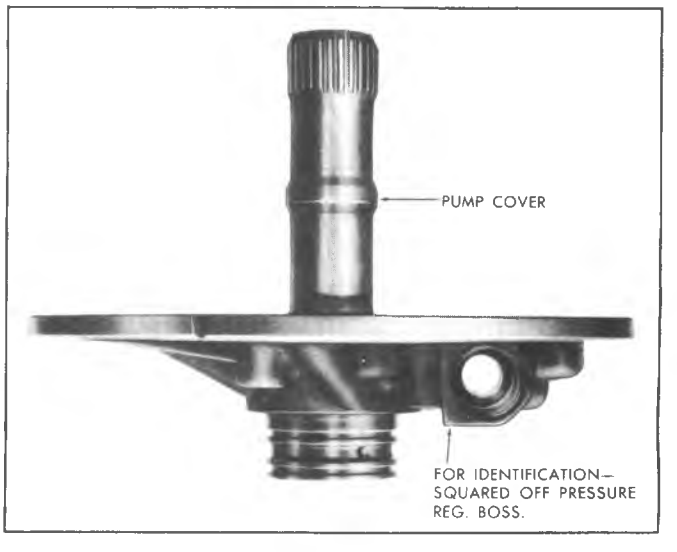
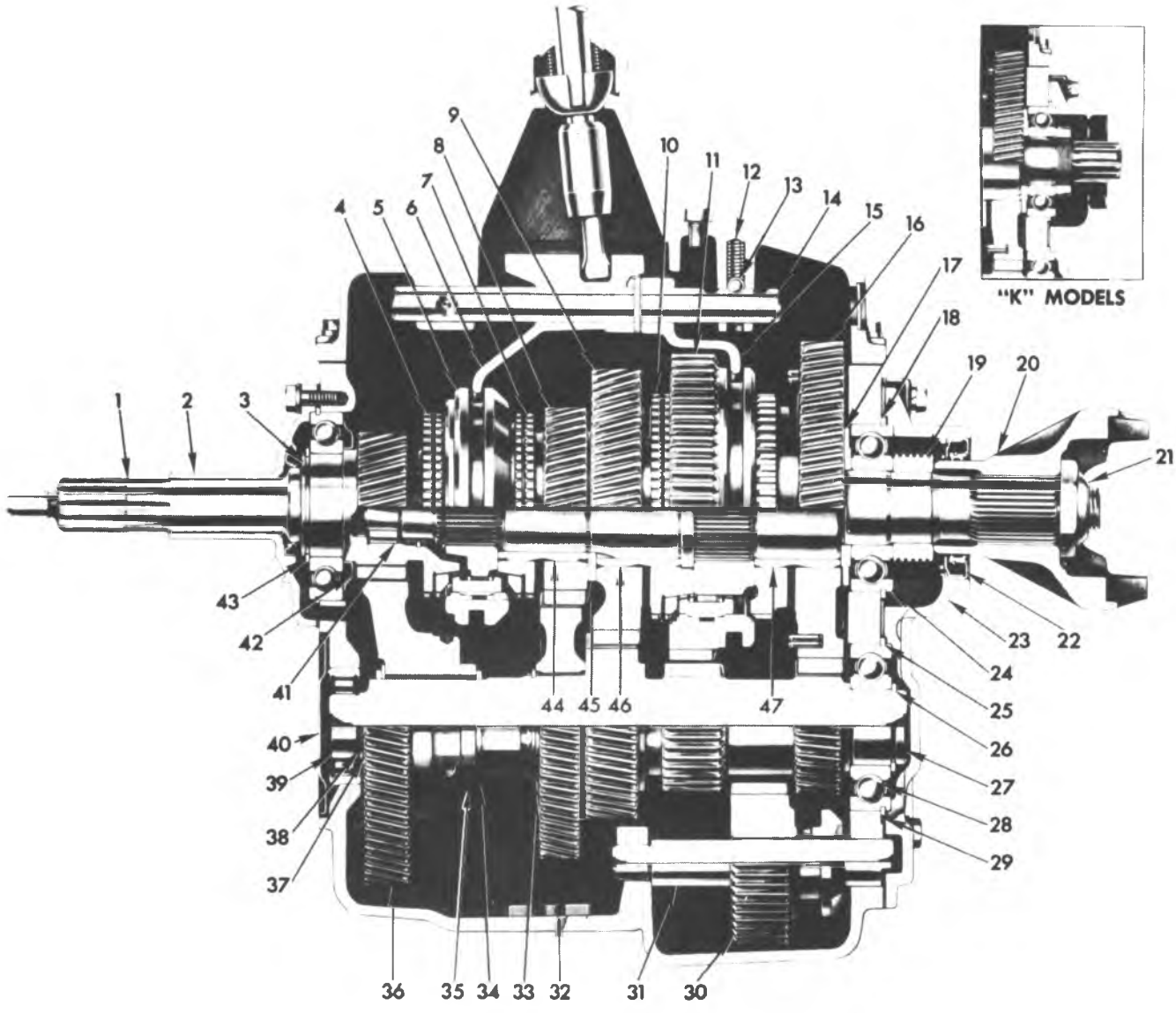


Fig. 7A-51--Pressure Regulator Valve



1. Main Drive Gear
2. Drive Gear Bearing Retainer
3. Snap Ring-Outer
4. 3rd and 4th Synchronizer Ring
5. 3rd and 4th Synchronizer Collar
6. 3rd and 4th Shift Fork
7. 3rd and 4th Speed Synchronizer Ring
8. 3rd Speed Gear
9. 2nd Speed Gear
10. 1st and 2nd Synchronizer Assembly
11. Reverse Driven Gear
12. Poppet Spring
13. Poppet Ball
14. Shift Rail
15. 1st and 2nd Shift Fork
16. 1st Speed Gear
17. Thrust Washer
18. Bearing Snap Ring
19. Speedometer Drive Gear
20. Output Yoke
21. Flange Nut
22. Rear Bearing Retainer Oil Seal
23. Rear Bearing Retainer
24. Mainshaft Rear Bearing
25. Rear Bearing Snap Ring
26. Snap Ring
27. Countershaft
28. Countershaft Rear Bearing
29. Bearing Snap Ring
30. Reverse Idler Gear
31. Reverse Idler Shaft
32. Case Magnet
33. Snap Ring
34. Snap Ring
35. Spacer
36. Countergear
37. Thrust Washer
38. Snap Ring
39. Front Countershaft Bearing
40. Countergear Front Cover
41. Pilot Bearing Rollers
42. Clutch Gear Oil Slinger
43. Snap Ring
44. 3rd Speed Gear Bushing
45. Thrust Washer
46. 2nd Speed Gear Bushing
47. 1st Speed Gear Bushing

Fig. 7B-4--4-Speed, 117mm, Cross-Section

9. Remove the 2 top transmission to clutch housing cap screws and insert 2 transmission guide pins, Tool J-1126 in these holes.

10. Remove the 2 lower transmission-to-clutch housing cap screws.

11. Slide the transmission and adapter assembly straight back on guide pins until the clutch gear is free of splines in the clutch disc.

NOTICE: The use of the 2 guide pins during this operation will support the transmission and prevent damage to the clutch disc through springing.

12. Remove the transmission and adapter as an assembly from under the body.

13. Remove adapter from transmission.

14. To install, reverse removal procedure.

4-Speed Transmission Removal

K Series

1. Remove attaching screws from transfer case shift lever boot retainer and remove retainer.

2. Remove attaching screws from transmission shift lever boot retainer. Slide boot and retainer up lever and remove transmission shift lever using Tool J-8109 as shown in Figure 7B-14.

3. Remove floor mat or carpeting from compartment.

4. If necessary, remove center floor outlet from heater distributor duct. If equipped with a center console, remove console before proceeding to next step.

5. Remove transmission floor cover attaching screws and cover. Rotate cover approximately 90° to clear transfer case shift lever while lifting cover from vehicle.

6. Disconnect shift lever rod assembly from transfer case shift rail connecting link.

7. Remove shift lever attaching bolt and shift lever control from adapter.

8. Raise and support vehicle on hoist. Support engine with suitable floor stand. Drain transfer case and transmission assemblies.

9. Disconnect speedometer cable from transfer case.

10. Disconnect prop shaft at rear of transfer case and tie up away from work area.

11. Disconnect front prop shaft from transfer case and tie up away from work area.

12. Open lock tabs and remove transmission mount-to-frame crossmember bolts.

13. Support transmission and transfer case assembly with suitable floor stand.

14. Remove frame to crossmember bolts and remove crossmember from vehicle. Rotate crossmember to clear frame rails.

15. On V-8 engine models, remove exhaust crossover pipe.

16. Remove transmission to clutch housing attaching bolts.

NOTICE: Remove upper bolts first and install transmission guide pins J-1126. Use of the guide pins will prevent damage to the clutch assembly.

17. Slide transmission rearward until main drive gear clears the clutch assembly and lower assembly from vehicle.

4-Speed Transmission Installation

K Series

1. Position transmission, with transfer case attached, to the clutch housing. Install bolts attaching transmission to clutch housing.

2. On V-8 models, install exhaust crossover pipe.

3. Position frame crossmember and install retaining bolts. Install bolts retaining adapter assembly to crossmember and transfer case to frame rail bracket. Torque all bolts to specification.

4. Torque front and rear transfer case yoke lock nuts to specifications.

5. Install front and rear propshafts to transfer case output yokes.

6. Connect the speedometer cable.

7. Fill transmission and transfer case to proper level with lubricant specified in Section 0-B.

8. Install transfer case shift lever assembly and attaching bolt. Connect shift lever rod to shift rail connector link.

9. Install transmission floor cover and attaching bolts.

10. Install heater distributor duct center outlet.

NOTICE: On models with center console, install console and retaining bolts.

11. Install floor mat, transfer case shift lever retainer and attaching screws.

12. Install transmission shift lever, boot and retainer.

TRANSMISSION ALIGNMENT

In some instances where excessive gear whine or high gear hop out, particularly at 50 MPH (80 km/h) and up, are encountered, and after all other probable causes have been checked, an alignment check of the transmission and clutch housing may be helpful.

A special tool, on which a dial indicator is mounted, is necessary to check the transmission case rear bore alignment. This tool may be made from a new or good used clutch gear which has a good bearing surface on the crankshaft pilot end and at the front main bearing location.

The splines on the clutch gear shaft and the teeth on the clutch gear should be ground off so the shaft may be rotated in a clutch disc hub without interference when assembled in the car. Weld a piece of 1/4" rod in the mainshaft pilot bore long enough to extend out the case rear bore. Assemble a good bearing on the clutch gear shaft and secure it with the clutch gear bearing snap ring. Attach a suitable dial indicator to the rod.

1. Remove the transmission from the vehicle and completely disassemble, except for the reverse idler gear.

NOTICE: In any case where the clutch gear pilot or pilot bearing is excessively loose or worn, the pilot bearing should be replaced before checking the transmission case rear bore alignment by the dial indicator method.

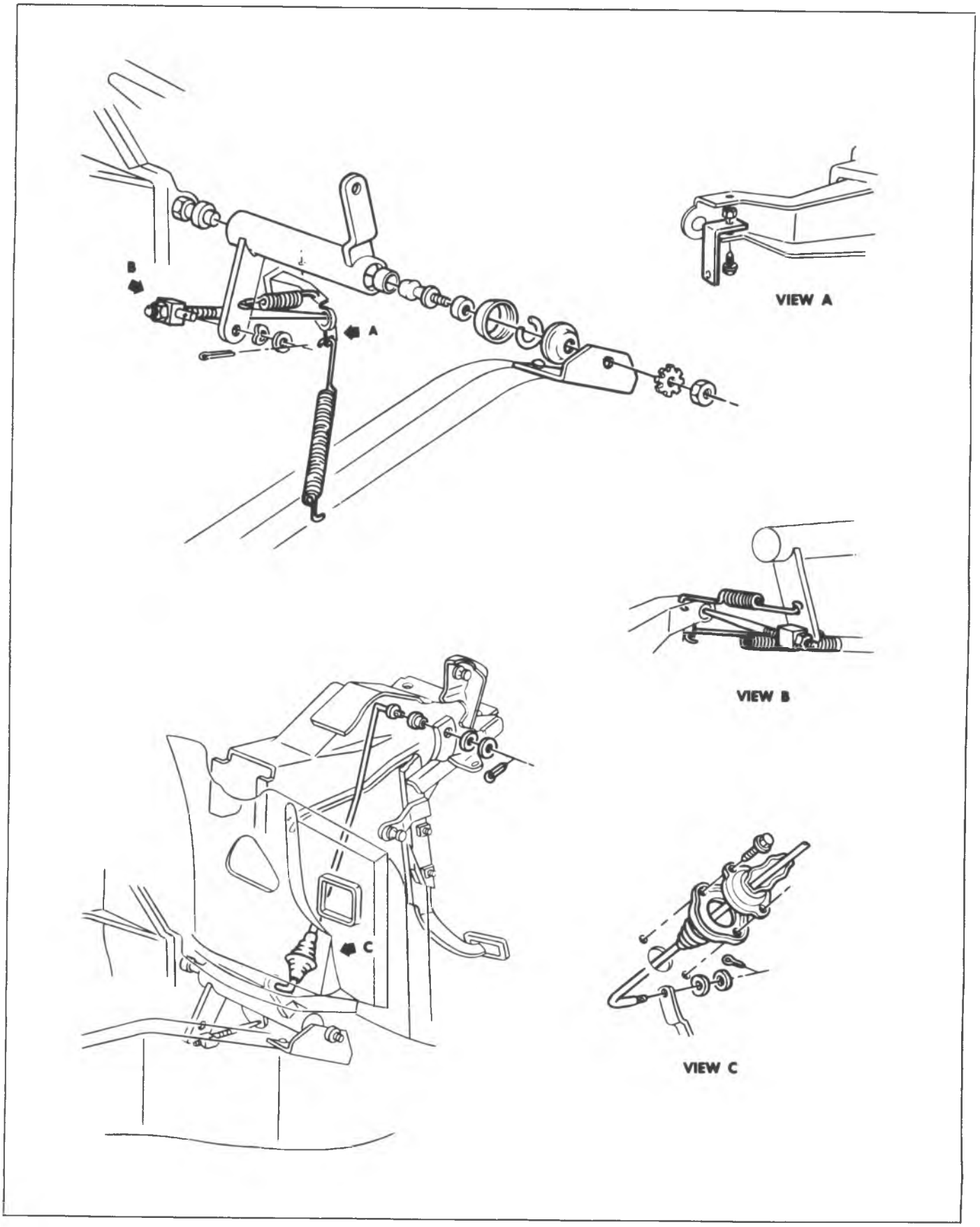


Fig. 7C-6–C-K Clutch Controls

SECTION 7E

TRANSFER CASE

INDEX

GENERAL DESCRIPTION

TRANSFER CASE

A transfer case mounts behind the transmission, as shown in Fig. 7E-1, and allows drive torque to be transmitted in a proportional split to both the front axle and the rear axle, resulting in four-wheel drive. The shift control lever for the transfer case is floor-mounted in the passenger compartment. Depending on the type of transfer case and the shift lever position, various combinations of rear wheel drive, four wheel drive, high traction (gear reduction) or direct drive may be selected.

Model 205, Part-Time

The model 205 transfer case shown in Fig. 7E-2 is a two-speed unit which can be used for either two-wheel or four-wheel drive. Direct drive (1:1 ratio) is available in two modes, 2H for two-wheel drive, or 4H for four-wheel drive. Gear reduction (1.96:1 ratio) is used in the 4L position. This unit uses constant mesh helical gears to connect the input shaft, idler gear and two output gears, thus allowing gear selection to match driving conditions. The front input shaft gear (Item #27) is in constant mesh with the idler gear (#44) and, through the idler gear, with the front output gears (#59 and #67) and the rear output gear (#17). Sliding clutches (#26, #64) allow for selective gear engagement resulting in High or Lo range, and two-wheel or four-wheel drive. Ball bearings support the input shaft, rear output shaft and front output shaft. Tapered roller bearings are used on the idler shaft. When driving in a four-wheel mode (4L or 4H) the hubs on the front wheels must be turned to the "Locked" position.

SECTION 8A

ELECTRICAL - BODY AND CHASSIS

LIGHTING SYSTEM

CONTENTS

LIGHTING SYSTEM
GENERAL DESCRIPTION

The lighting system includes the main light switch; stop light, dimmer and backing lamp switches; head and parking lamps; stop, tail, side marker, clearance and identification lamps; instrument illumination, directional signal and indicator lamps and the necessary wiring to complete the various circuits.

A bulkhead fuse panel (fig. 8A-1) provides convenient power taps and fuse clips for the appropriate circuits. The engine wiring harness and forward lamp harness connectors are bolted to the fuse panel.

All wiring systems not protected by a fuse or circuit breaker incorporate a fusible link which provides increased overload protection. The starting motor circuit is the exception.

Composite wiring diagrams are available in a separate manual. The standardized color code is common to all wiring harnesses. The wire covering color designates a particular circuit usage. Wire size designations are metric, conversions to AWG sizes are provided.

The number molded into lens face must be at top.

6. Install retaining ring then check operation of unit and install bezel.

PARKING LAMP BULB

Replacement (Figs. 8A-3 and 8A-4)

1. Remove lens retaining screws and remove lens from the housing.
2. Replace bulb and check lamp operation.
3. Install lens and retaining screws.

PARKING LAMP HOUSING

C-K Models

Replacement (Fig. 8A-3)

1. Remove parking lamp lens screws and remove the lens.
2. Remove lamp housing retaining screws and pull housing forward.
3. Disconnect parking lamp wiring harness from housing by rotating bulb socket counterclockwise.
4. Connect wiring harness to new housing by inserting bulb socket into housing and rotating clockwise.
5. Install bulb if removed during disassembly. Install lens and retaining screws.

G Models

Replacement (Fig. 8A-4)

Right Side

1. Remove both headlamp bezels.
2. Remove both parking lamp lens.
3. Remove grille.
4. Remove battery and battery box.
5. Disconnect wiring harness at connector.
6. Remove housing stud nuts and remove housing with pigtail.
7. To install, reverse removal steps.

Left Side

1. Remove two screws and parking lamp lens.
2. Disconnect wiring harness at connector.
3. Remove housing stud nuts and remove housing with pigtail.
4. To install, reverse removal steps.

FRONT SIDE MARKER LAMP BULB AND/OR HOUSING

All Models

Replacement

For housing replacement follow procedure for the right side bulb replacement below.

1. **Left Side** - Raise hood.

Right Side - Remove lamp assembly retaining screws and pull outward on assembly.

2. Twist wiring harness socket 90° counterclockwise and remove harness and bulb from housing.
3. Replace bulb and check lamp operation.
4. Insert bulb into housing, press in on harness socket and twist 90° clockwise. Check that socket is securely attached.
5. **Left Side** - Lower hood.

Right Side - Install housing in opening and install retaining screws.

REAR SIDE MARKER LAMP BULB AND/OR HOUSING

C-K 03 models with E62 and G Models

Replacement

Same as Right Front Side Marker Lamp Bulb and/or Housing Replacement - All Vehicles. Bulb on G Models without interior trim may be removed from inside the vehicle.

C-K 16, 03 and 63 with E63, and 06 Models

Replacement

1. Remove lens to housing four screws.
2. Replace bulb and check operation.
3. Position lens and install four attaching screws.

Platform and Stake Rack Models (E56)

Exploded view of the different rear lighting arrangements are shown in Figures 8A-7 and 8A-8. The bulbs may be replaced by removing the lamp lens attaching screws and lamp lens. The lamp housings may be replaced by removing housing attaching nuts or screws, or by removing nuts and bolts from bracket.

TAIL, STOP AND BACKUP LAMP BULBS

Replacement

1. Remove lens to housing attaching screws.
2. Replace bulb and check operation.
3. Position lens and install attaching screws.

TAIL, STOP AND BACKUP LAMP HOUSING

C-K 16, 03 and 63 w/E63 and 06 Models

All G Models

Replacement

1. Remove lens to housing attaching screws.
2. Remove bulbs from sockets.
3. Remove housing attaching screws (nuts on G Models).
4. Rotate wiring harness sockets counterclockwise and remove housing.
5. To install, reverse Steps 1-4 above.

DIRECTIONAL SIGNAL LAMPS

Directional signal lamps are an integral part of parking and tail lamp assemblies. Refer to the applicable lamp or bulb replacement procedures covered previously.

CLEARANCE, LICENSE PLATE AND IDENTIFICATION LAMPS

Refer to Figures 8A-7 through 8A-10 for clearance, license plate and identification lamp installations.

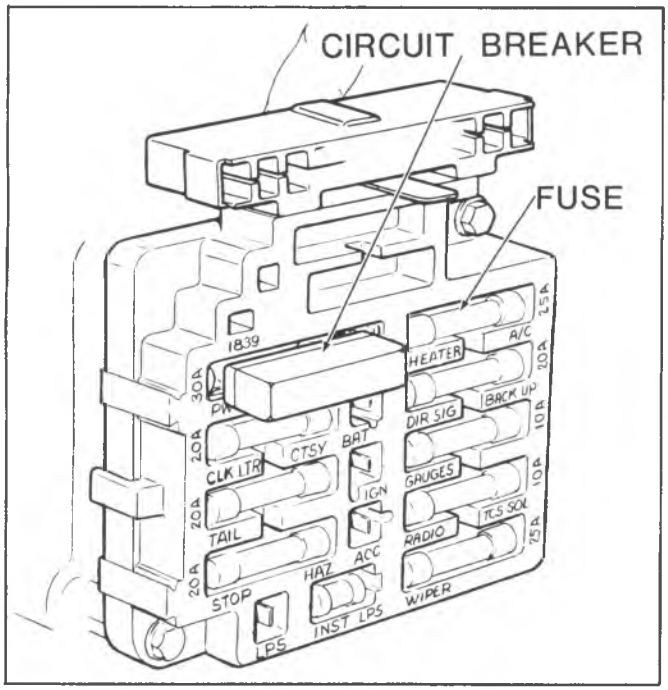


Fig. 8B-8--Fuse and Circuit Breaker

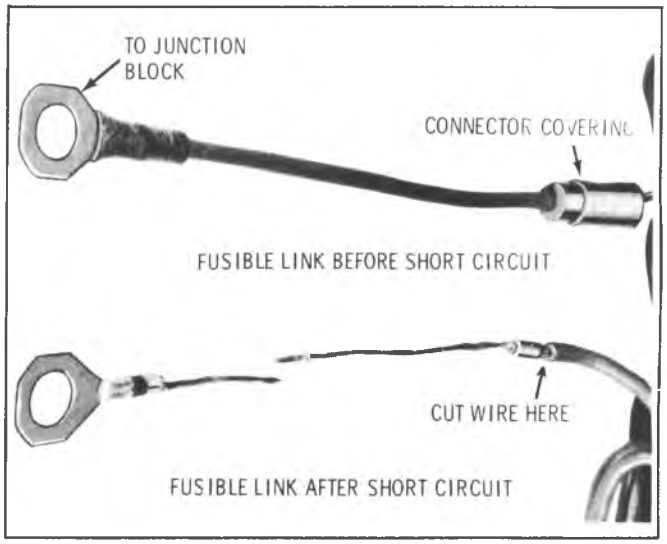


Fig. 8B-9--Fusible Link

insulation must be used when replacing a fusible link.

The links are:

1. A molded splice at the starter solenoid "Bat" terminal, 14 gage red wire. Servicing requires splicing in a new link.

2. A 16 gage red fusible link is located at junction block to protect all unfused wiring of 12 gage or larger. The link is molded into the bulkhead connector.

3. The generator warning light and field circuitry (16 gage wire) is protected by a fusible link (20 gage red wire) used in the "battery feed to voltage regulator #3 terminal". The link is installed as a molded splice in the circuit at the junction block. Service by splicing in a new 20 gage wire.

DIAGNOSIS

Failures in a circuit are usually caused by short or open circuits. Open circuits are usually caused by breaks in the wiring, faulty connections or mechanical failure in a component such as a switch or curcuit breaker. Short circuits are usually caused by wires from different components of the circuit contacting one anothe or by a wire or component grounding to the metal of the body due to a screw driven through the wires, insulation cut through by a sharp metal edge, etc.

The following information may aid in locating and correcting a failure in the body wiring electrical system.

1. If a major portion of the electrical circuit becomes inoperative simultaneously, the failure may be due to improper connections between the front and rear harness, or between the front harness and the chassis wiring connector on top of fuse block.

2. If only one of the circuits is inoperative, the failure is due to and open circuit or short in the affected circuit. Short circuits usually result in blown fuses or in the case of power equipment circuits, in the circuit breaker opening the circuit. If the fuse is not blown and the circuit affected is a lamp circuit, check the bulb before proceeding with any checking procedures.

3. The dome lamp and courtesy lamp circuits are designed so that the switches are in the "ground" side of the circuit. If a condition is encountered where the lamps remain "on" even though the jamb or courtesy lamp switches are not actuated, the failure is probably due to defective switches, or to the wire leading to the switches being grounded to the metal body.

HORNS WILL NOT OPERATE

Cause	Correction
Loose connections in circuit.	Check and tighten connections. Be sure to check ground straps.
Defective horn switch.	Replace defective parts.
Defective horn relay.	Replace relay.
Defects within horn.	Replace horn.

HORNS HAVE POOR TONE

Cause	Correction
Low available voltage at horn.	Check battery and charging circuit.
Defects within horn.	Although horn should blow at any voltage above 7.0 volts, a weak or poor tone may occur at operating voltages below 11.0 volts. If horn has weak or poor tone at operating voltage of 11.0 volts or higher, remove horn and replace.

HORNS OPERATE INTERMITTENTLY

Cause	Correction
Loose or intermittent connections in horn relay or horn circuit.	Check and tighten connections.
Defective horn switch.	Replace switch.
Defective relay.	Replace relay.
Defects within horn.	Replace horn.

HORNS BLOW CONSTANTLY

Cause	Correction
Sticking horn relay.	Replace relay.
Horn relay energized by grounded or shorted wiring.	Check and adjust wiring.
Horn button can be grounded by sticking closed.	Adjust or replace damaged parts.

SPEEDOMETER

Cause	Correction
Noisy speedometer cable.	1. Loosen over-tightened casing nuts and snap-on at speedometer head. 2. Replace housing and core.
Pointer and odometer inoperative.	Replace broken cable.
Inaccurate reading.	1. Check tire size. 2. Check for correct speedometer driven gear.
Kinked cable.	Replace cable. Reroute casing so that bends have no less than 6" radius.
Defective speedometer head.	Replace or have repaired at authorized service station.

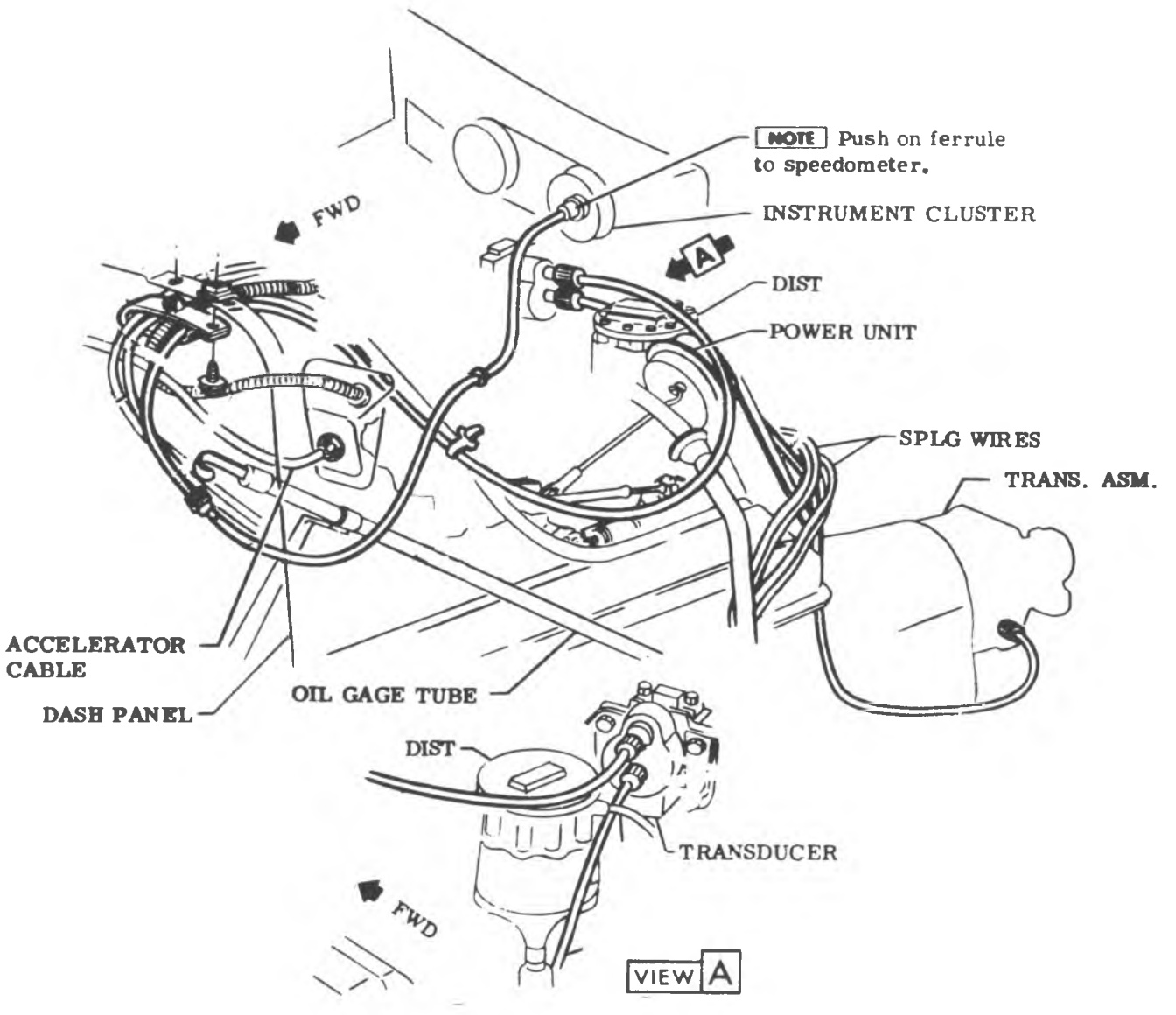
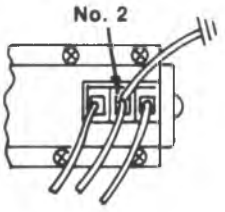


Chart 8C-G2–Speedometer Cable Routing

PROCEDURE 3 ("Hi" Speed Only) (Inop in Lo)

STEP 1 — Ignition switch "ON". Dash switch in "Lo" speed position. Leave wiring connected to wiper and connect jumper wire from terminal no. 2 to grd.



Wiper Runs in Lo

Problem is on open wire from wiper terminal no. 2 to dash switch or The Dash Switch.

Wiper Inop.

Repair wiper motor (Look for Lo speed hung brush.)

PROCEDURE 4 (One speed - same in both Lo and Hi).

STEP 1 — Remove wiring from wiper motor terminals 1, 2 and 3 and operate wiper in Lo and Hi as shown in Figure (NOTE: Current draw is usually above normal - approx. 6.0 amps.

Wiper operates correctly

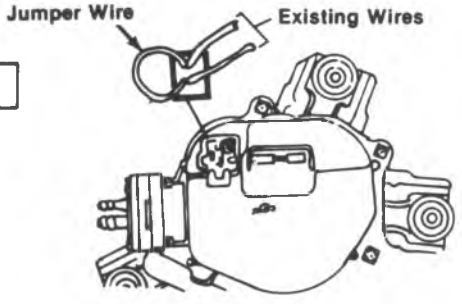
Problem is in wiring between dash switch and wiper or a defective dash switch.

Problem still present

Repair wiper motor. Check for Lo and Hi speed brush leads shorting together internally.

PROCEDURE 5
(Wiper shuts off but blades don't return to park position)

STEP 1 — Ignition switch "ON". Dash switch in "OFF". Leave wiring connected to wiper and connect a jumper wire across terminals 4 and 5.



Wiper Runs

Replace wiper park switch assy.

Wiper Inop.

Wire from wiper terminal no. 5 to dash switch open or dash switch is problem

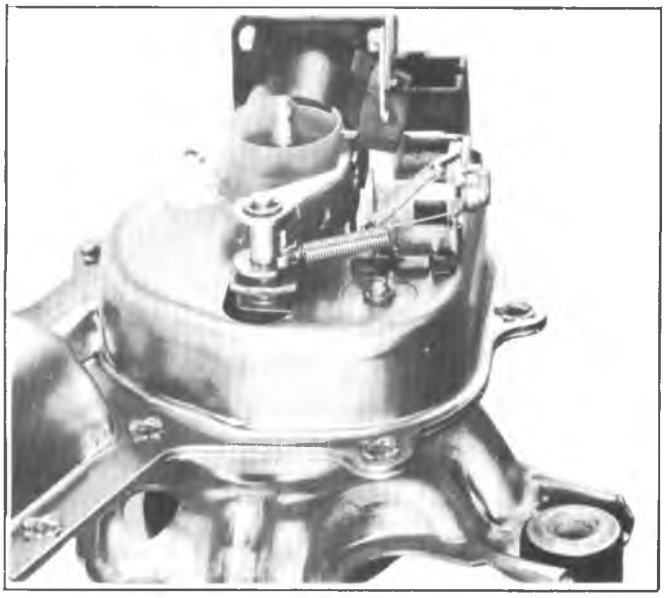


Fig. 8C-20--Relay Coil Assembly

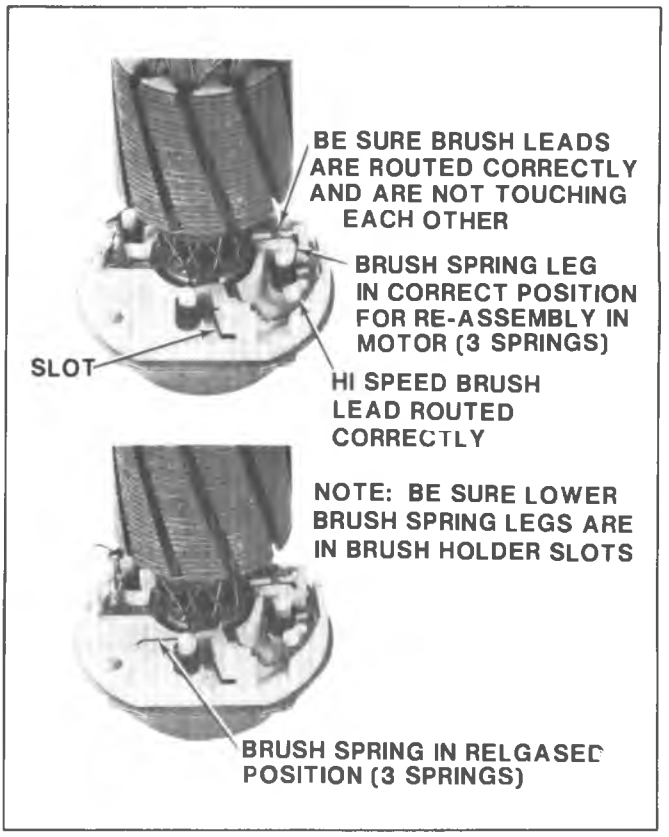


Fig. 8C-22--Brush Spring--Brush Spring-Released Position

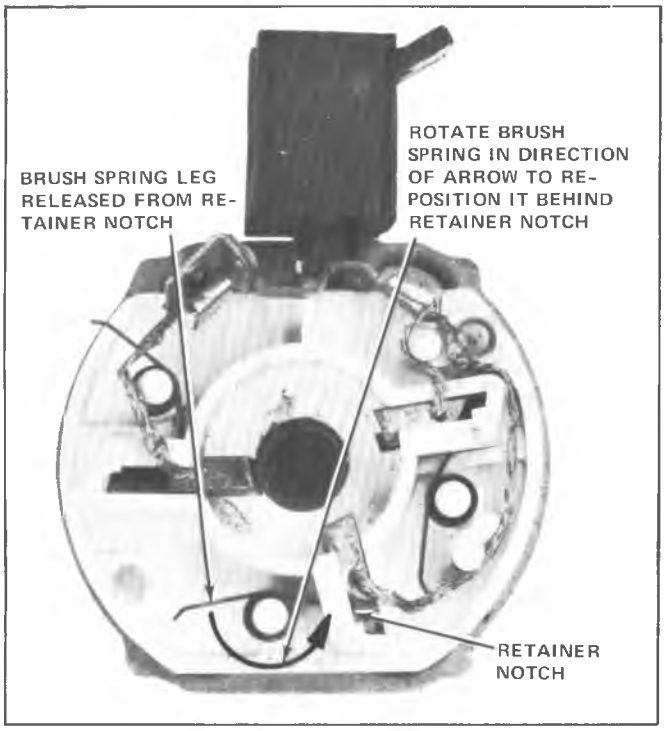


Fig. 8C-21--Releasing Brush Spring Tension

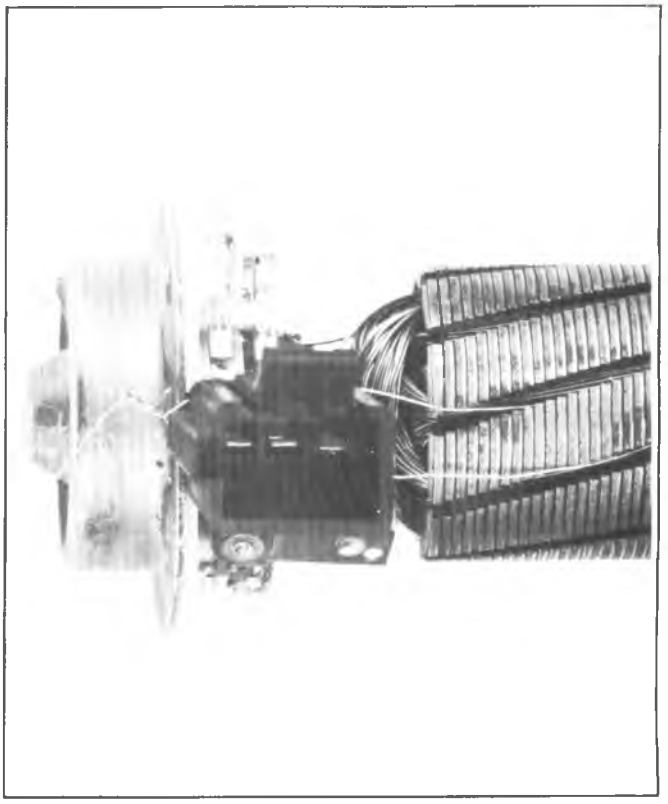


Fig. 8C-23--End Cap Assembly

ON-VEHICLE SERVICE

WIPER MOTOR

Wiper motor replacement procedures are not included here since installation is performed by the individual body manufacturers; however, disassembly of the unit will be covered.

UNIT REPAIR

WIPER MOTOR

Disassembly (Fig. 8C-34)

Gear Box

1. Remove the two washer pump mounting screws and lift pump off washer.

2. Remove washer pump drive cam as required (figs. 8C-33 and 8C-34). The cam is pressed on the shaft but can be wedged off by using two screwdrivers between cam and plate.

3. Clamp crank arm in a vise and remove crank arm retaining nut.

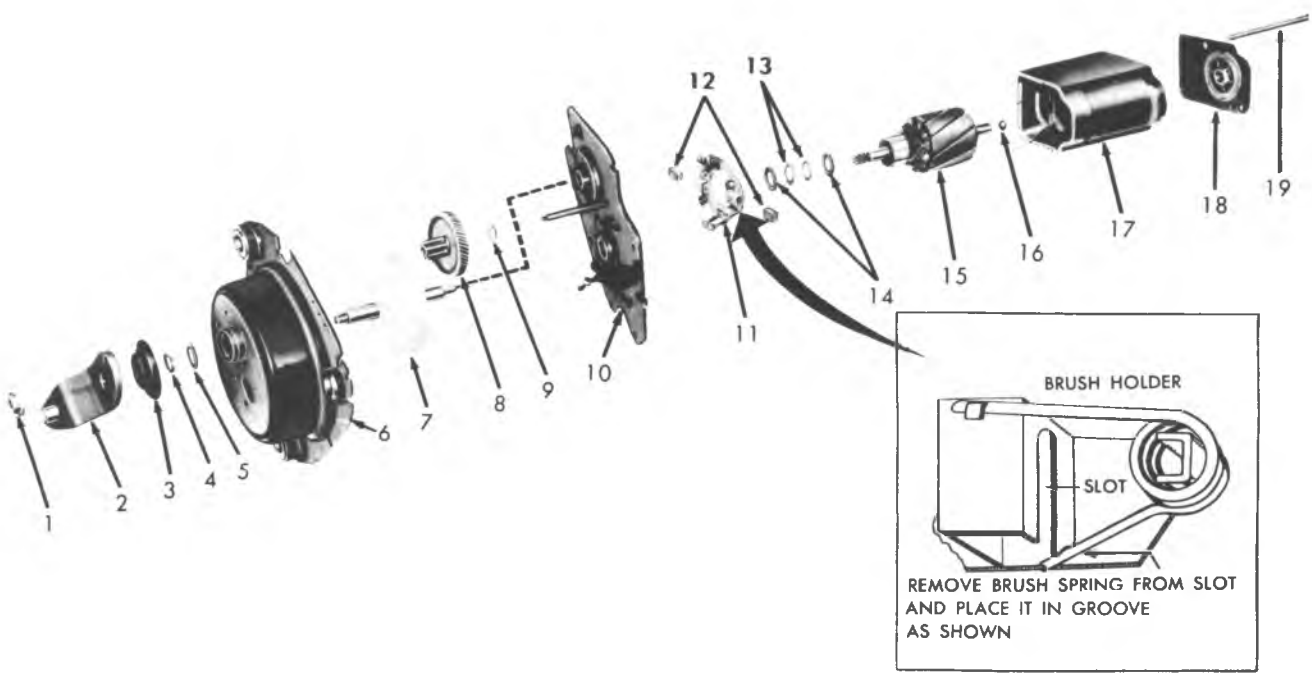
NOTICE: Failure to clamp crank arm may result in stripping of wiper gears.

4. Remove crank arm, seal cap, retaining ring, and end-play washers.

Seal cap should be cleaned and repacked with a waterproof grease before reassembly.

5. Drill out gear box cover retaining rivets, remove cover from gear train.

Screws, nuts and lockwashers for reassembling cover to wiper are contained in the service repair package.



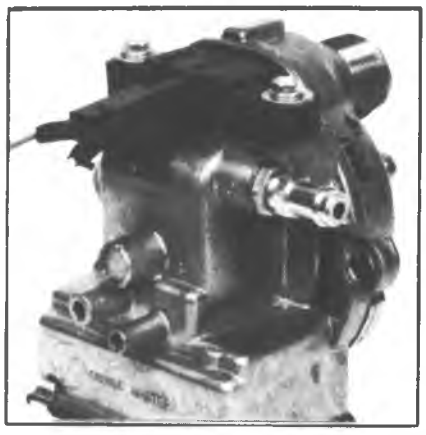
1. Nut
2. Crank Arm
3. Seal Cap
4. Retaining Cap
5. Washer
6. Gear Box Cover
7. Output Gear and Shaft Assembly
8. Intermediate Gear
9. Wave Washer
10. Gear Box Housing
11. Brush Plate Assembly and Mounting Brackets
12. Brushes
13. Wave Washers
14. Flat Washers
15. Armature
16. Thrust Plug
17. Frame and Field
18. End Plate
19. Tie Bolts (Two Required)

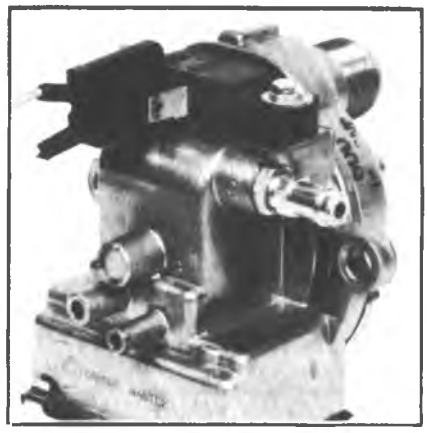
Fig. 8C-34--Wiper Motor and Gear Box Assembly

CHEVROLET CRUISE MASTER TROUBLESHOOTING

CHECK I FOR SYSTEMS WITH ERRATIC CRUISE PERFORMANCE

CHECK II FOR INOPERATIVE SYSTEMS MAKE ALL TESTS WITH TRANSMISSION SELECTOR IN "PARK" & PARKING BRAKE ON EXCEPT WHERE INDICATED OTHERWISE. RECONNECT ANY DISCONNECTED HOSES AND/OR ELECTRICAL CONNECTORS IN PROPER MANNER AT THE COMPLETION OF TEST.





CHECK I

1. CHECK POWER UNIT ADJUSTMENT - SEE SERVICE ADJUSTMENT PROCEDURE
2. CHECK FOR PINCHED, KINKED, PLUGGED, OR DAMAGED VACUUM HOSES. ALSO CHECK VACUUM FITTINGS.
3. CHECK SPEEDOMETER CABLE ROUTING. IT MUST NOT BE KINKED OR HAVE TOO SHARP A TURNING RADIUS (NOT LESS THAN 6" RADIUS). CHECK DRIVE CABLE FOR DISTORTED OR BENT TIPS. FERRULES MUST BE SNUG.
4. CHECK FOR A BINDING THROTTLE LINKAGE CONDITION.
5. CHECK ADJUSTMENT OF BRAKE RELEASE SWITCH & VACUUM RELEASE VALVE. (SEE SERVICE & ADJUSTMENTS)
6. CHECK FOR PROPER OPERATING PROCEDURE OF THE ENGAGE SWITCH.
7. IF STEPS 1 THROUGH 6 DO NOT SOLVE THE PROBLEM PROCEED WITH CHECK II.

SPECIAL NOTE PERTAINING TO ENGAGEMENT-CRUISING SPEED ZEROING.

IF THE CAR CRUISES BELOW ENGAGEMENT SPEED, SCREW THE ORIFICE TUBE OUTWARD. IF THE CAR CRUISES ABOVE THE ENGAGEMENT SPEED, SCREW THE ORIFICE TUBE INWARD. EACH 1/4 TURN WILL CHANGE THE CAR SPEED APPROXIMATELY ONE MPH. ENGAGEMENT ACCURACY TESTING TO BE DONE AT 60 MPH. SNUG UP LOCK NUT AFTER EACH ADJUSTMENT.

CAUTION: DO NOT REMOVE ORIFICE TUBE FROM CASTING.

Fig. 9-4C–Cruise Master System Diagnosis Chart A

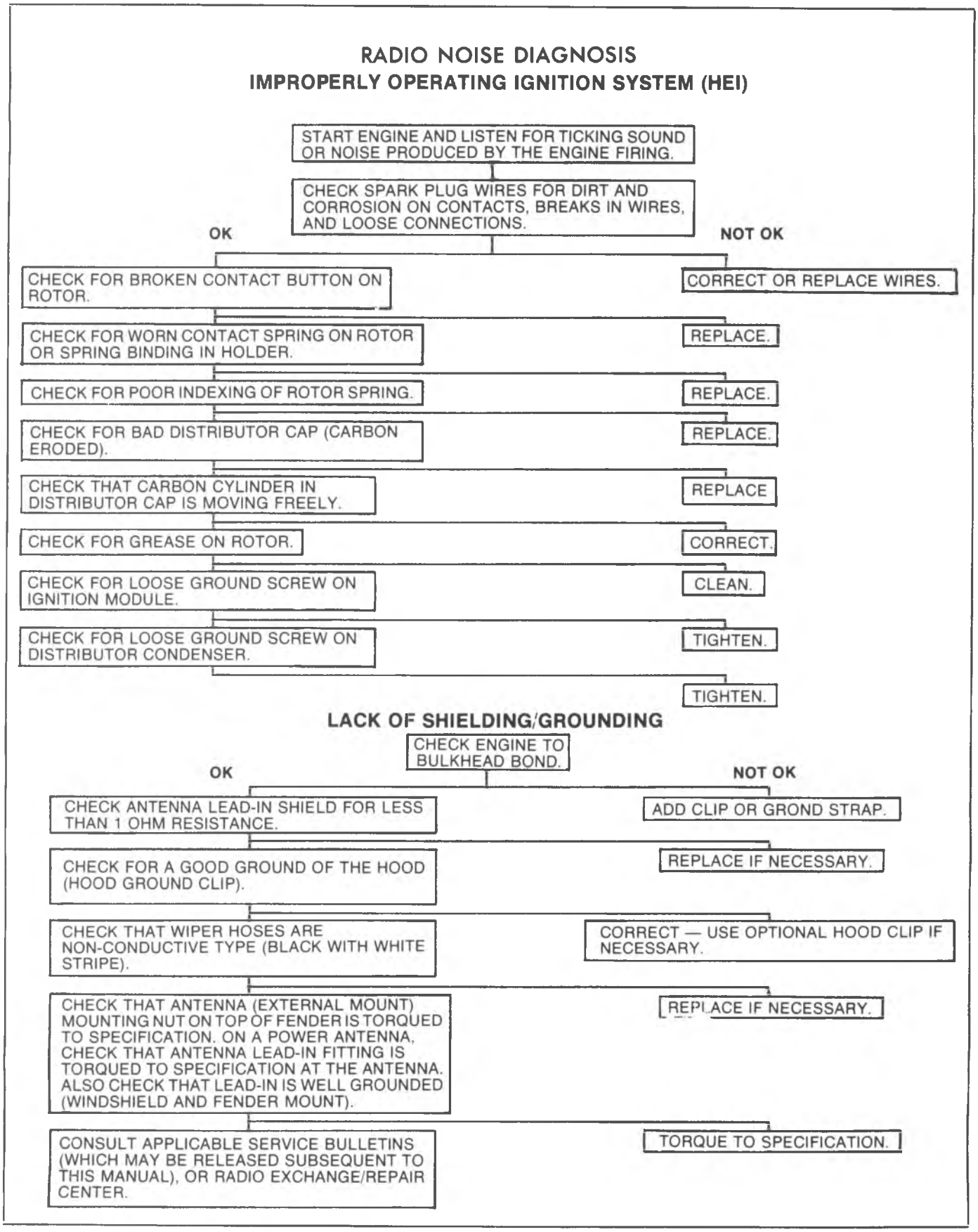


Fig. 9-5R--Radio Diagnosis, Chart A

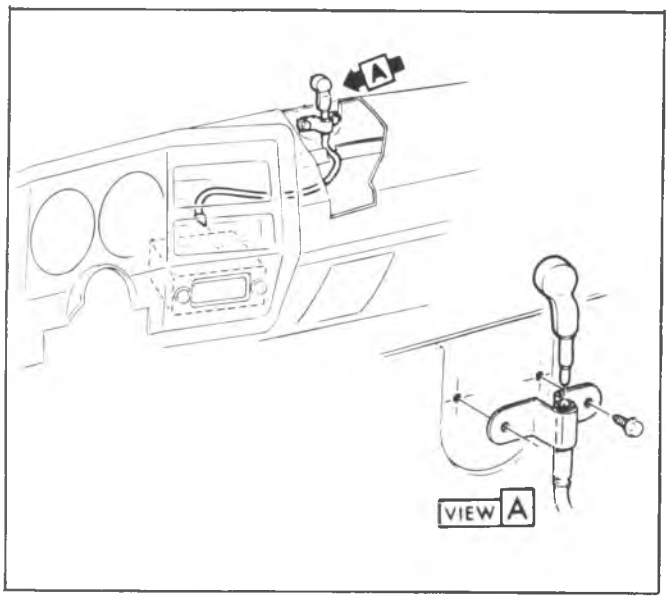


Fig. 9-17R--Antenna Lead (C-K Models)

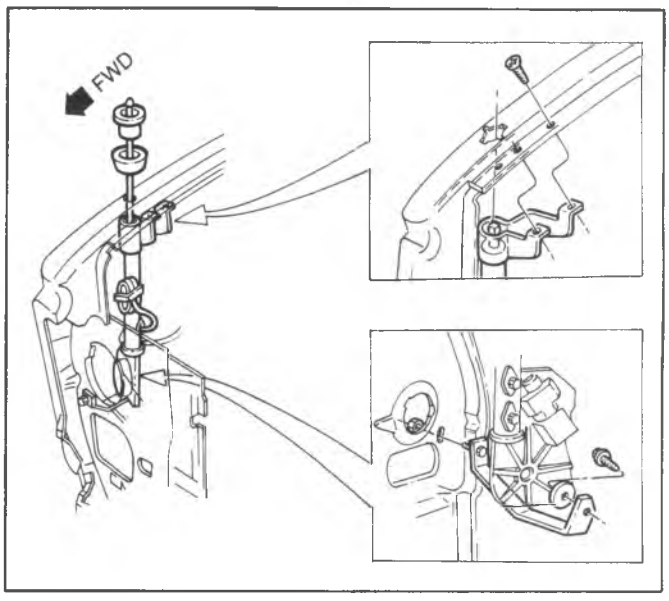


Fig. 9-19R--G Model Power Antenna

4. Perform Steps 2-8 of "Radio Receiver Removal". Refer to Section 8.

5. Disconnect cable at rear of receiver.

6. Insert new cable through the dash panel (from the forward side).

7. Reverse Steps 1-5 above to complete installation.

Be sure cable grommet is properly positioned in dash panel.

POWER ANTENNA

DESCRIPTION AND OPERATION

The power antenna used on "G" models operates automatically whenever the radio is turned on. The drive gear unit on the automatic system consists of a drive gear and pulley assembly and a spool for storing the excess nylon drive cable when the mast is in the retracted position, plus two limit switches and a gear operated cam system to actuate the switches. The limit switches are used to open the motor circuits when the mast reaches the full up or down positions.

When the motor circuit is completed by the radio or ignition switch, the motor drives the gear and pulley to extend the drive cable and antenna.

The gear is coupled to the drive pulley by a torque limiting clutch that permits continued gear rotation when the mast reaches the limit of travel. The antenna mast fully retracts into the fender or extends 31-1/4" and has no intermediate position.

POWER ANTENNA - G MODELS

Replacement (Fig. 9-19R and 9-20R)

1. Lower antenna by turning off radio or ignition.
2. Disconnect battery ground cable.
3. Remove coolant recovery bottle.
4. Remove motor lower bracket retaining nut and upper bracket screws.
5. Disconnect electrical leads and remove antenna and motor assembly.

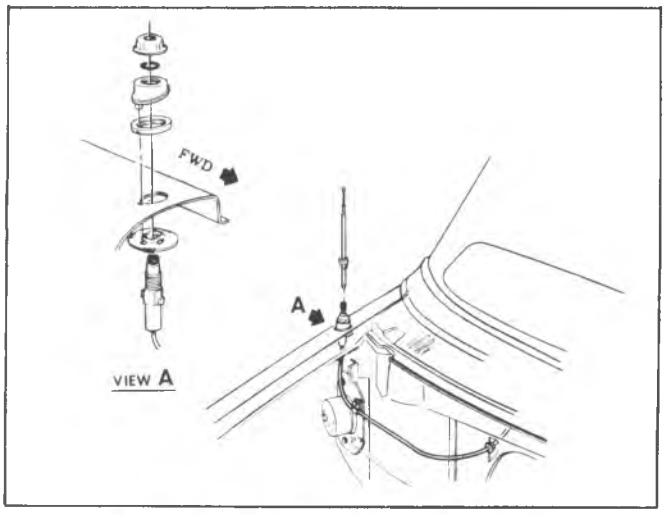


Fig. 9-18R--Antenna Installation (G Models)

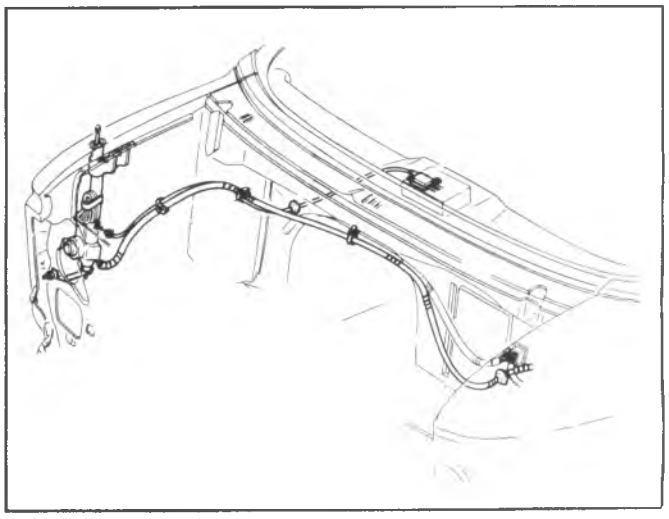


Fig. 9-20R--G Model Power Antenna Wiring

DECIMAL AND METRIC EQUIVALENTS

Fractions	Decimal In.	Metric MM.	Fractions	Decimal In.	Metric MM.
1/64	.015625	.39688	33/64	.515625	13.09687
1/32	.03125	.79375	17/32	.53125	13.49375
3/64	.046875	1.19062	35/64	.546875	13.89062
1/16	.0625	1.58750	9/16	.5625	14.28750
5/64	.078125	1.98437	37/64	.578125	14.68437
3/32	.09375	2.38125	19/32	.59375	15.08125
7/64	.109375	2.77812	39/64	.609375	15.47812
1/8	.125	3.1750	5/8	.625	15.87500
9/64	.140625	3.57187	41/64	.640625	16.27187
5/32	.15625	3.96875	21/32	.65625	16.66875
11/64	.171875	4.36562	43/64	.671875	17.06562
3/16	.1875	4.76250	11/16	.6875	17.46250
13/64	.203125	5.15937	45/64	.703125	17.85937
7/32	.21875	5.55625	23/32	.71875	18.25625
15/64	.234375	5.95312	47/64	.734375	18.65312
1/4	.250	6.35000	3/4	.750	19.05000
17/64	.265625	6.74687	49/64	.765625	19.44687
9/32	.28125	7.14375	25/32	.78125	19.84375
19/64	.296875	7.54062	51/64	.796875	20.24062
5/16	.3125	7.93750	13/16	.8125	20.63750
21/64	.328125	8.33437	53/64	.828125	21.03437
11/32	.34375	8.73125	27/32	.84375	21.43125
23/64	.359375	9.12812	55/64	.859375	21.82812
3/8	.375	9.52500	7/8	.875	22.22500
25/64	.390625	9.92187	57/64	.890625	22.62187
13/32	.40625	10.31875	29/32	.90625	23.01875
27/64	.421875	10.71562	59/64	.921875	23.41562
7/16	.4375	11.11250	15/16	.9375	23.81250
29/64	.453125	11.50937	61/64	.953125	24.20937
15/32	.46875	11.90625	31/32	.96875	24.60625
31/64	.484375	12.30312	63/64	.984375	25.00312
1/2	.500	12.70000	1	1.00	25.40000