CHEVROLET

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LIGHT DUTY TRUCK

SERVICE MANUAL

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effectively and economically solve certain specific problems without causing other difficulties. For example, if higher detergency is required to reduce varnish and sludge deposits resulting from some unusual operational difficulty, a thoroughly tested and approved additive - "Super Engine Oil Supplement"- is available.

Drive Belts

Drive belts should be checked every 6,000 miles or 4 months for proper tension. A loose belt will affect water pump and generator operation.

POSITIVE CRANKCASE VENTILATION VALVE

Every 24,000 miles or 24 months the valve should be replaced. Connecting hoses, fittings and flame arrestor should be cleaned. At every oil change the system should be tested for proper function and serviced, if necessary.

AIR INJECTION REACTOR SYSTEM (A.I.R.) CONTROLLED COMBUSTION SYSTEM (C.C.S.)

The Air Injection Reactor system should have the drive belt inspected for wear and tension every 4 months or 6,000 miles, whichever occurs first. In addition, complete effectiveness of either system, as well as full power and performance, depends upon idle speed, ignition timing, and idle fuel mixture being set according to specification. A quality tune-up which includes these adjustments should be performed periodically to assure normal engine efficiency, operation and performance.

EXHAUST GAS RECIRCULATION SYSTEM (EGR) -

At 12-month/12,000 mile intervals when operating with leaded fuels or at 24-month/24,000 mile intervals when using unleaded fuels remove, inspect, and if deposits exist, clean the EGR valve. Inspect the EGR passages in the inlet manifold and clean as required. A damaged EGR valve must be repaired or replaced.

GM EVAPORATION CONTROL SYSTEM

Every 24 months or 24,000 miles (more often under dusty conditions) the filter in the base of the canister must be replaced and the canister inspected.

MANIFOLD HEAT CONTROL VALVE

First 6,000 miles and every 12,000 miles or 12 months thereafter check valve for freedom of operation. If valve shaft is sticking, free it up with GM Manifold Heat Control Solvent or its equivalent.

AIR CLEANER

CAUTION: *Do not remove the engine air cleaner unless temporary removal is necessary during repair or maintenance of the vehicle. When the air cleaner is removed backfiring can cause fire in the engine compartment.*

NOTE: Under prolonged dusty driving conditions, it is recommended that these operations be performed more often.

Oil Wetted Paper Element Type

L-6 engine, replace every 12,000 miles. V-8 engine, every 12,000 miles inspect element for dust leaks, holes or other damage. Replace if necessary. If satisfactory, rotate element 180° from originally installed position. Replace at 24,000 miles. Element must not be washed, oiled, tapped or cleaned with an air hose.

Crankcase Ventilation Filter (Located Within Air Cleaner)

If so equipped, inspect every oil change and replace if necessary. Replace at least every 24,000 miles; more often under dusty driving conditions.

FUEL FILTER

Replace filter element located in carburetor inlet every 12 months or 12,000 miles whichever occurs first, or, if an in-line filter is also used, every 24,000 miles. Replace in-line filter every 24,000 miles.

DISTRIBUTOR

Replace cam lubricator at 24,000 mile intervals.

GOVERNOR

The attaching bolts should be kept tight, the optionally available governor should be kept clean externally and the filter element should be replaced every 12,000 miles.

ACCELERATOR LINKAGE

Lubricate with engine oil every 24,000 miles as follows:

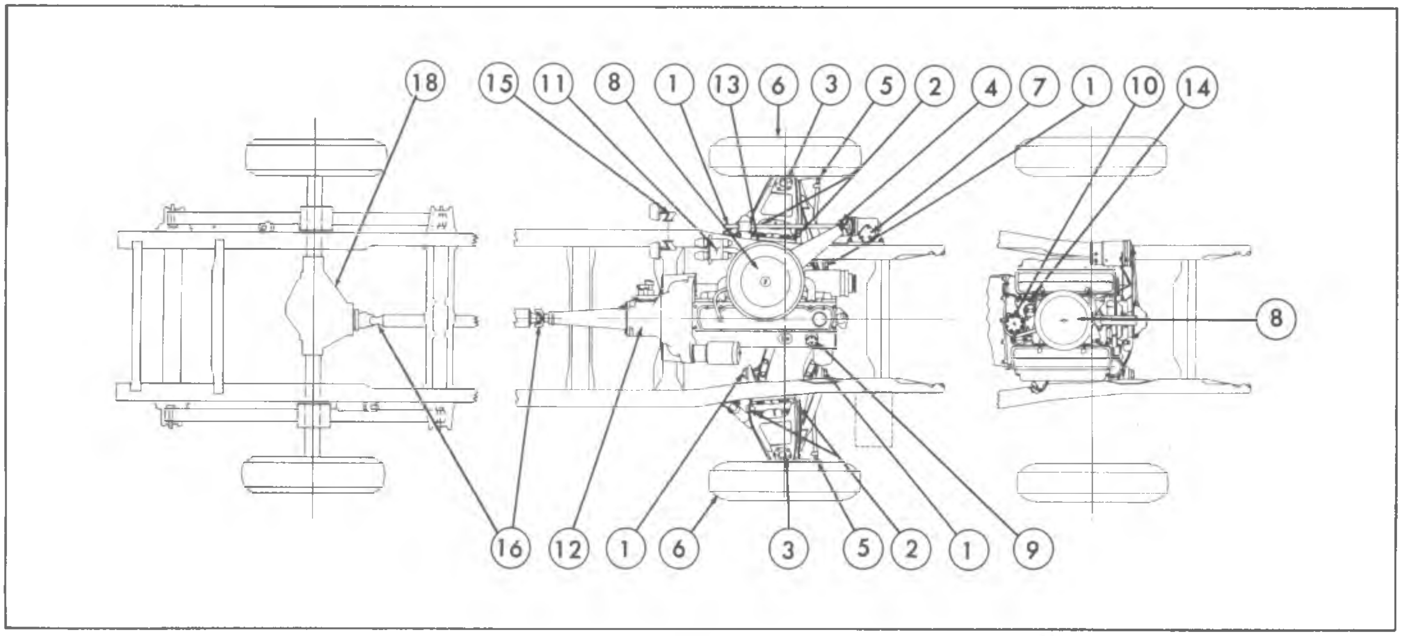
1. On V8 engine, lubricate the ball stud at the carburetor lever.
2. On L6 engine, lubricate the two ball studs at the carburetor lever and lubricate the lever mounting stud. Do not lubricate the accelerator cable.

AUTOMATIC TRANSMISSION FLUID RECOMMENDATION

Use only automatic transmission fluids identified with the mark **DEXRON®—II** or **DEXRON®**(or equivalent).

Check the fluid level at each engine oil change period. To make an accurate fluid level check:

1. Drive vehicle several miles, making frequent starts and stops, to bring transmission up to normal operating temperature (approximately 180-190°F).
2. Park vehicle on a level surface.
3. Place selector lever in "Park" and leave engine running.



No.	Lubrication Points	Lubrication Period	Type of Lubrication	Quantity	Remarks
1	Lower Control Arms	6,000 Miles	Chassis Lubricant	4 places as required	
2	Upper Control Arms	6,000 Miles	Chassis Lubricant	4 places as required	
3	Upper and Lower Control Arm Ball Joints	6,000 Miles	Chassis Lubricant	4 places as required	
4	Intermediate Steering Shaft (PA10)	6,000 Miles	Chassis Lubricant	2 places as required	
5	Tie Rod Ends	6,000 Miles	Chassis Lubricant	4 places as required	
6	Wheel Bearings	24,000 Miles	Whl. Brg. Lubricant	2 places as required	
7	Steering Gear	36,000 Miles			Check for Grease Leak—Do not Lubricate
8	Air Cleaner — Element	12,000 Miles			See Vehicle Maintenance Schedule
9	Distributor — L-6	24,000 Miles			Replace cam lubricator*
10	Distributor — V-8	24,000 Miles			Replace cam lubricator*
11	Master Cylinder	6,000 Miles	Delco Supreme No. 11 or DOT-3 fluids	As required	Check — add fluid when necessary
12	Transmission — Manual — Automatic	6,000 Miles 6,000 Miles	GL-5 Dexron® or equivalent	As required As required	Keep even w/filler plug. See Lubrication Section
13	Throttle Bell Crank — L-6	12,000 Miles	Engine Oil	As required	
14	Carburetor Linkage — V-8	12,000 Miles	Engine Oil	As required	
15	Brake and Clutch Pedal Springs	6,000 Miles	Engine Oil	As required	
16	Universal Joints	6,000 Miles	Chassis Lubricant	As required	
17	Propeller Shaft Slip Joint	6,000 Miles	Chassis Lubricant	As required	Not shown
18	Rear Axle	6,000 Miles	GL-5	As required	Check See Lubrication section

*Replace Points at 12,000 mile intervals.

Fig. 8—Lubrication - Conventional Models

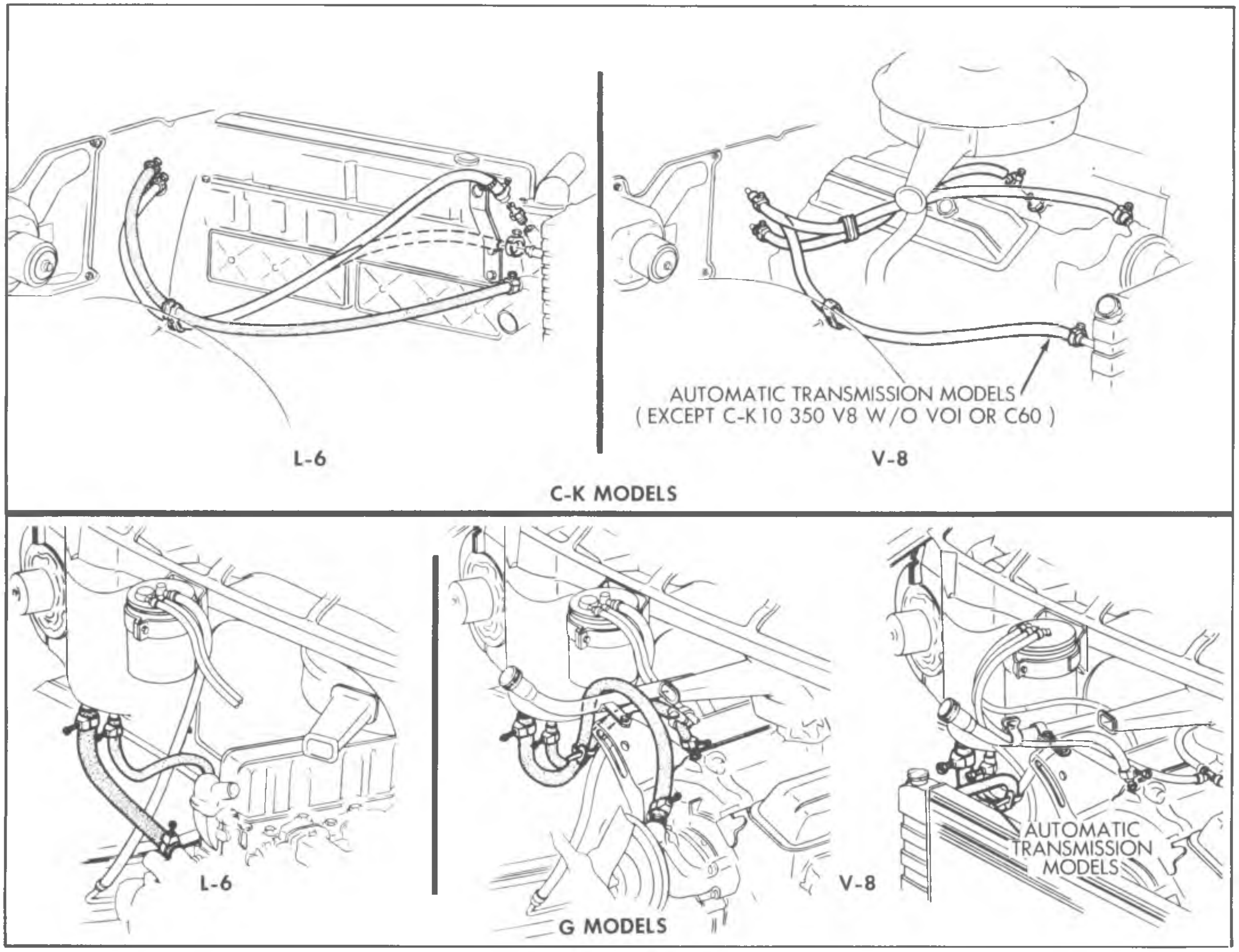


Fig. 7--Heater Hose Routings

2. Unsnap the engine cover front latches. Remove the two cover to floorpan screws and remove the cover.
3. Remove the heater core case and core as an assembly (see "Heater Distributor and Core-Replacement").
4. Disconnect the right hand heater outlet hose and the two defroster hoses from the distributor duct.
5. Disconnect the air and defroster door cables by prying off the eyelet clips and removing the cable attaching screws.
6. Pull the center distributor duct to the right and remove it from the vehicle.
7. To install, reverse Steps 1-6 above.

NOTE: Check cable and door operation; cables should be free from kinks or binding and doors should close properly. If cable adjustment is necessary, see "Bowden Cable-Adjustment."

LEFT DISTRIBUTOR DUCT - G Models

Replacement (Fig. 8)

1. Disconnect the battery ground cable.
2. Unsnap the engine cover front latches. Remove the two cover to floorpan screws and remove the cover.
3. Remove the duct bracket screw and remove the duct.
4. To install, reverse Steps 1-3.

NOTE: All three bowden cables are routed under the duct. It may be necessary to hold the cables down as the duct is being installed. Be sure the left duct is fully installed over the center duct.

DEFROSTER DUCT

The defroster hose and outlet assemblies are illustrated in Figure 9.

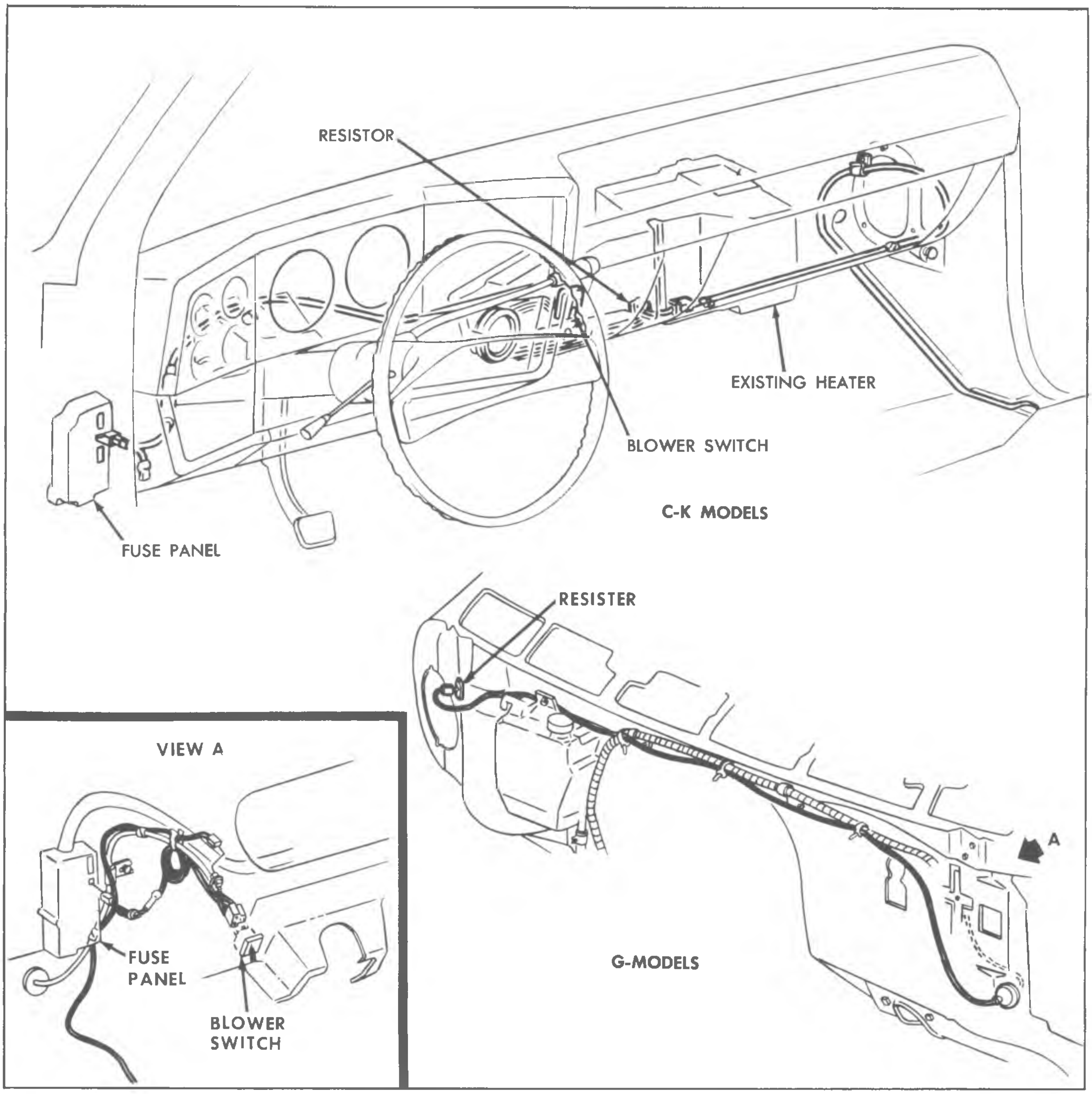


Fig. 19--Control and Resistor Mountings

COMPONENT REPLACEMENT AND REPAIRS

Since a detailed list of installation instructions is included with the auxiliary heater unit, replacement procedures will not be repeated in this section.

CAUTION: *G Models--When replacing heater hoses, maintain a 1/2" minimum clearance between hose clip and upper control arm, a 1-1/2" minimum clearance between hoses and propshaft and a 1-1/4" minimum clearance between the auxiliary heater core lines and the exhaust pipe as shown in Figure 20.*

All Models--Draw hoses tight to prevent sag or rub against other components. Be sure to route hoses through all clamps as originally installed.

to expand it and then letting the same amount of air out again to return the balloon to its original condition.

We know that any substance will condense at the same temperature at which it boiled. This temperature point is a clear-cut division like a fence. On one side, a substance is a liquid. Immediately on the other side it is a vapor. Whichever way a substance would go, from hot to cold or cold to hot, it will change its character the moment it crosses over the fence.

Water will boil at 212° under normal conditions. Naturally, we expect steam to condense at the same temperature. But whenever we put pressure on steam, it doesn't. It will condense at some temperature higher than 212°. The greater the pressure, the higher the boiling point and the temperature at which a vapor will condense. This is the reason why pressure cookers cook food faster, since the pressure on the water permits it to boil out at a higher temperature.

We know that R-12 **boils** at 21.7° below zero. A thermometer will show us that the rising vapors, even though they have soaked up lots of heat, are only slightly warmer. But the vapors must be made warmer than the room air if we expect heat to flow out of them. The condensing point temperature must be above that of room air or else the vapors won't condense.

This is where pressure helps, with pressure, we can compress the vapor, thereby concentrating the heat it contains. When we concentrate heat in a vapor that way, we increase the intensity of the heat or, we increase the temperature, because temperature is merely a measurement of heat intensity (fig. 31).

Pressure in Refrigeration

Because we must use pressures and gauges in air conditioning service, the following points are mentioned so that we will all be talking about the same thing when we speak of pressures.

All pressure, regardless of how it is produced, is measured in pounds per square inch (psi).

Atmospheric Pressure is pressure exerted in every direction by the weight of the atmosphere. At sea level atmospheric pressure is 14.7 psi. At higher altitudes air has less weight (lower psi).

Any pressure less than atmospheric (14.7) is known as a partial vacuum or commonly called a vacuum. A perfect vacuum or region of no pressure has never been mechanically produced.

Gauge pressure is used in refrigeration work. Gauges are calibrated in pounds (psi) of pressure and inches of Mercury for vacuum. At sea level, "O" lbs. gauge pressure is equivalent to 14.7 lbs. atmospheric pressure. Pressure greater than atmospheric is measured in pounds (psi) and pressure below atmospheric is measured in inches of vacuum. The "O" on the gauge will always correspond to the surrounding atmospheric pressure, regardless of the elevation where the gauge is being used.

Pressure-Temperature Relationships of R-12

A definite pressure and temperature relationship exists in the case of liquid refrigerants and their saturated vapors. Increasing the temperature of a substance causes it to expand. When the substance is confined in a closed container, the increase in temperature will be accompanied by an increase in pressure, even though no mechanical device was used. For every temperature, there will be a corresponsing pressure within the container of refrigerant. A table of the temperature-pressure relationship of R-12 is presented below. Pressures are indicated in gauge pressure, either positive pressure (above atmospheric) in pounds or negative pressure (below atmospheric) in inches of vacuum.

Thus if a gauge is attached to a container of R-12 and the room temperature is 70°, the gauge will register approximately 70 psi pressure; in a 100° room, the pressure would be 117 psi.

Pressure and Flow

When we use a tire pump to inflate an automobile tire, we are creating pressure only because we are "pushing" against the air already entrapped inside the tire. If a tire has a puncture in it, you could pump all day, and still not be able to build up any pressure. As fast as you would pump the air in, it would leak out through the puncture. Unless you have something to push against--to block the flow of air--you can't create more than a mere semblance of pressure.

The same situation holds true in an air conditioning system. The compressor can pump refrigerant vapor through the system, but unless it has something to push against, it cannot build up pressure. All the compressor

°F	Pressure (psi)	°F	Pressure (psi)
-40	11.0*	+50	46.7
-35	8.3*	+55	52.0
-30	5.5*	+60	57.7
-25	2.3*	+65	63.7
-20	0.6	+70	70.1
-15	2.4	+75	76.9
-10	4.5	+80	84.1
-5	6.8	+85	91.7
0	9.2	+90	99.6
+5	11.8	+95	108.1
+10	14.7	+100	116.9
+15	17.7	+105	126.2
+20	21.1	+110	136.0
+25	24.6	+115	146.5
+30	28.5	+120	157.1
+32	30.1	+125	167.5
+35	32.6	+130	179.0
+40	37.0	+140	204.5
+45	41.7	+150	232.0

* Inches of Vacuum

hole is required to prevent trapping of oil in the bottom of the accumulator; this oil bleed hole bleeds some liquid refrigerant as well.

Therefore, flow out of the accumulator to the compressor consists mostly of vapor with the addition of entrained liquid and liquid flow through the oil bleed hole.

A bag of desiccant (dehydrating agent) is located in the base of the accumulator as a moisture collecting device.

NOTE: There is no sight glass in the accumulator clutch cycle system.

Expansion Tube--C-K Models

Expansion tube flow rate depends on pressure difference and on subcooling; however, the flow rate is more sensitive to subcooling.

The expansion tube is located in the enlarged portion of the evaporator inlet line (fig. 38).

Thermostatic Switch

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 inserted into the evaporator core (C-K Four-Season System) or is located in the air stream as it leaves the evaporator (Motor Home Chassis Unit). 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

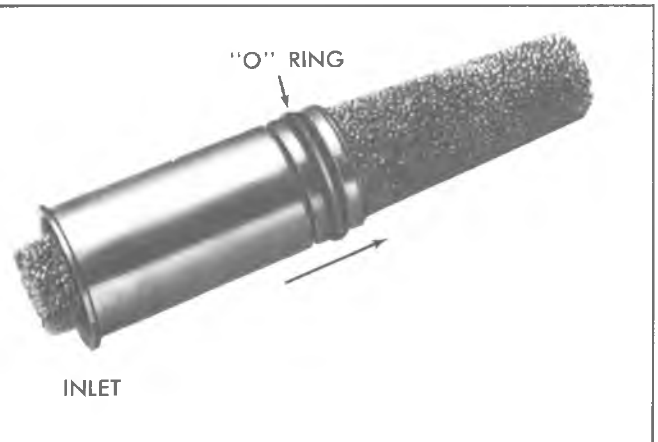


Fig. 38--Expansion Tube

gets colder, the gas in the thermostatic tube begins to reduce the pressure on the switch bellows. This allows the switch contacts to open and the compressor clutch disengages.

Low Refrigerant Charge Protection System

C-K-G Models

The compressor discharge pressure switch performs the function of shutting off the compressor when it senses low refrigerant pressure. The switch is located in the evaporator inlet line (high pressure). The switch electrically is wired in series between the compressor clutch and the master switch on the control. When the switch senses low pressure it breaks contact and opens the circuit to the compressor clutch, thus shutting off the A/C system and preventing compressor failure or seizure.

The compressor discharge pressure switch also performs the function of the ambient switch as the pressure at the switch varies directly with ambient temperatures. The compressor should **not** run below 25°F. ambient or 37 psi at the switch. The compressor should run in A/C modes above 45°F. ambient or 42 psi at the switch.

The switch interacts with other switches so that in an A/C system where the compressor will **not** operate above 45° ambient the following components should be checked for continuity:

1. Compressor discharge pressure switch.
2. Master switch (on control head).

If both switches show proper continuity, check the harness for shorts or improper ground conditions.

CHEMICAL INGREDIENTS OF AN AIR CONDITIONING SYSTEM

All systems involve metals, refrigerant, and oil which are basic and essential. The desiccant, or dehydrating agent, and another chemical ingredient, synthetic rubber, makes it even more complex.

All of these ingredients have chemical properties which are entirely different from each of the others. By proper selection of the ingredients and controlled processes in manufacture, plus careful servicing procedures, they can be combined so that they provide many years of satisfactory and trouble-free operation.

Only one undesirable element added or allowed to enter the system can start a chain of chemical reactions which upsets stability and interferes with the operation of the unit.

Chemical Instability and Refrigerant System Failures

A sealed refrigerating system is a complex physical-chemical combination which is designed for stability within certain operating limits. If these limits are exceeded, many physical and chemical reactions occur to the system. Since the results of these reactions within the number consists of a series of numbers and letters. This serial number should be referenced on all forms and correspondence related to the servicing of this assembly.

INSPECTION AND PERIODIC SERVICE

PRE-DELIVERY INSPECTION

1. Check that engine exhaust in suitably ventilated.
2. Check the belt for proper tension.
3. With controls positioned for operation of the system, operate the unit for five minutes at approximately 2000 rpm. Observe the clutch pulley bolt to see that the compressor is operating at the same speed as the clutch pulley. Any speed variation indicates clutch slippage.
4. Before turning off the engine, check refrigerant charge (see "Refrigerant Quick Check Procedure").
5. Check refrigerant hose connections:

   "O" Ring Connections -- Check torque of fittings as charted later in this section under "Refrigerant Line Connections;" retorque if required. Leak test the complete system.
6. If there is evidence of an oil leak, check the compressor to see that the oil charge is satisfactory.

   NOTE: A slight amount of oil leakage at the compressor front seal is considered normal.
7. Check the system controls for proper operation.

6000 MILE INSPECTION

1. Check unit for any indication of a refrigerant leak.
2. If there is an indication of an oil leak, check the compressor for proper oil charge.

   NOTE: A slight amount of oil leakage at the compressor front seal is considered normal.
3. Check refrigerant charge (see "Refrigerant Quick Check Procedure").
4. Tighten the compressor brace and support bolts and check the belt tension.
5. Check refrigerant hose connections as in Step 5 of "Pre-Delivery Inspection."

PERIODIC SERVICE

- Inspect condenser regularly to be sure that the fins are not plugged with leaves or other foreign material.
- Check evaporator drain tubes regularly for dirt or restrictions.
- At least once a year, check the system for proper refrigerant charge and the flexible hoses for brittleness, wear or leaks.
- Every 6000 miles check for low refrigerant level.
- Check belt tension regularly.

EVACUATING AND CHARGING PROCEDURES

AIR CONDITIONING SYSTEM CAPACITY

	Refrigerant Charge	Oil Charge
Four-Season System (C-K Models)	3 lbs. 12 oz.	10 oz. 525 Viscosity
Overhead System (C-K-G Models)	5 lbs. 4 oz.	13 oz. 525 Viscosity
C60 System (G Models)	3 lbs.	10 oz. 525 Viscosity
Dash Mounted Unit (Motor Home Chassis)	3 lbs. 4 oz.	10 oz. 525 Viscosity

INSTALLING CHARGING STATION

1. High and low pressure gauge line fittings are provided in the air conditioning system for attaching the Charging Station.

   C-K Models--The low pressure fitting is located on the accumulator and the high pressure fitting on the evaporator inlet line.

   G Models--The low pressure fitting is on the compressor inlet line and the high pressure fitting on the muffler.

   Motor Home Chassis--The low pressure fitting is on the compressor inlet line and the high pressure fitting is on the compressor outlet line.
2. With the engine stopped, remove the caps from the cored valve gauge fittings.
3. Install Gauge Adapters J-5420 and J-9459 onto the high and low pressure lines of the Charging Station.
4. Be certain all the valves on the Charging Station are closed.

must be removed before restoring the system to operation.

In the case of compressor mechanical failure, perform the following operations:

1. Remove the compressor.
2. Remove the receiver-dehydrator or expansion tube and discard the unit.
3. Flush the condenser to remove foreign material which has been pumped into it.
4. Disconnect the line at the evaporator core inlet (C-K Four-Season System) or inlet line to the expansion valve (except C-K Four-Season System). Inspect the expansion tube or inlet screen of the expansion valve for the presence of metal chips or other foreign material. If the tube or screen is plugged, replace it. Reconnect the line to the evaporator core or expansion valve.
5. Install the replacement compressor.
6. Add the necessary quantity of oil to the system (one fluid ounce because of receiver-dehydrator replacement plus the quantity needed for the replacement compressor -- see "Checking Compressor Oil Charge" under "Checking Oil."
7. Evacuate, charge and check system.

REFRIGERANT LINE CONNECTIONS

"O" Rings

Always replace the "O" ring when a connection has been broken. When replacing the "O" ring, first dip it in clean refrigeration oil. Always use a backing wrench on "O" ring fittings to prevent the pipe from twisting and damaging the "O" ring. Do not overtighten. Correct torque specifications are as follows:

CAUTION: *Where steel to aluminum connections are being made, use torque for aluminum tubing.*

Metal Tube O.D.	Thread and Fitting Size	Steel Tubing Torque*	Alum. Tubing Torque*
1/4	7/16	13	6
3/8	5/8	33	12
1/2	3/4	33	18
5/8	7/8	33	24
3/4	1-1/16	33	30

* Foot Pounds

Hose Clamps

When hose clamp connections are encountered, special procedures are necessary for both removal and installation.

Removal

1. Carefully, with a sharp knife, make an angle cut in the hose as shown in Figure 56. This should loosen the hose so that it may be worked off the fitting.
2. Cut off slit end of hose.

CAUTION: *Use only approved refrigeration hose. Never use heater hose. Use extreme care not to nick or score the sealing beads when cutting off the hose. Cutting the hose lengthwise may result in this problem.*

Installation

1. Coat tube and hose with clean refrigeration oil.
2. Carefully insert hose over the three beads on the fitting and down as far as the fourth, or locating bead. Hose must butt against this fourth bead.

CAUTION: *Use no sealer of any kind.*

3. Install clamps on hose, hooking the locating arms over the cut end of the hose.
4. Tighten the hose clamp screw to 35-42 in. lbs. torque. DO NOT RETORQUE. The clamp screw torque will normally decrease as the hose conforms to the force of the clamp. The screw should be retorqued only if its torque falls below 10 in. lbs. In this case, retorque to 20-25 in. lbs. Further tightening may damage the hose.

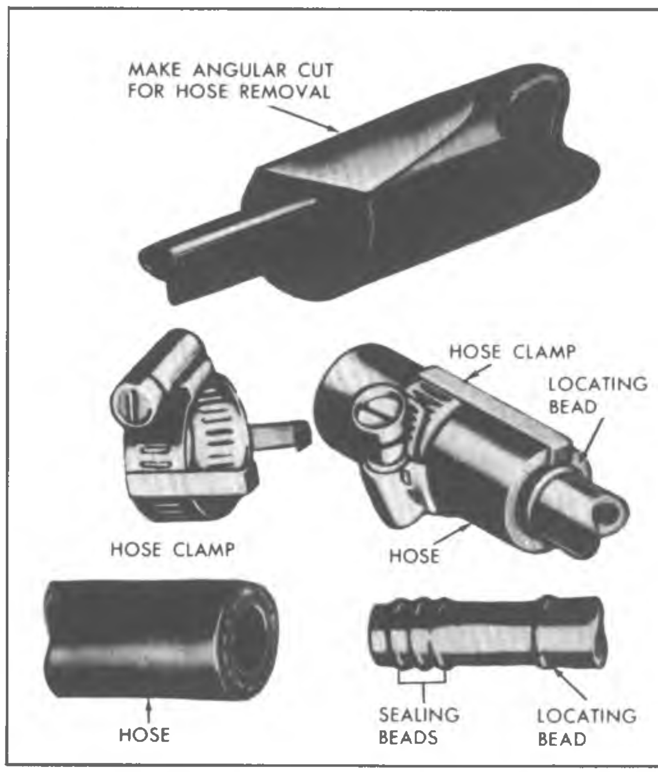


Fig. 56--Hose Clamp Connections

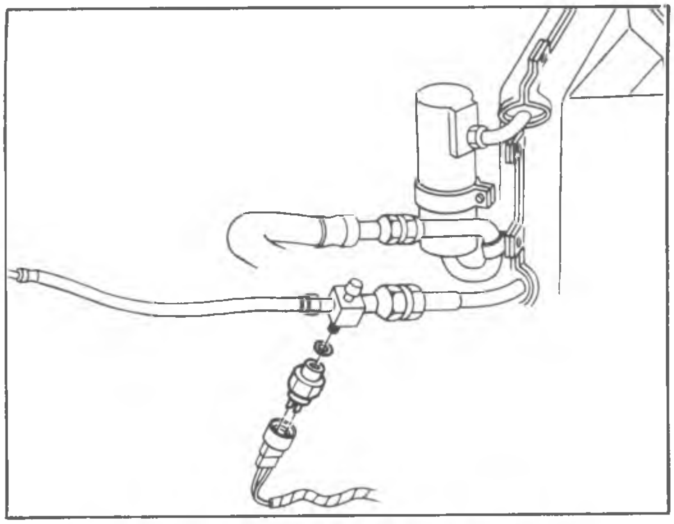


Fig. 69--Discharge Pressure Switch (C-K Models)

5. Drive the switch mounting screws, connect the wiring harness and the battery ground strap.

DISCHARGE PRESSURE SWITCH

The discharge pressure switch is located in the condenser to evaporator line (fig. 69).

Replacement

1. Disconnect the battery ground cable.
2. Purge the system of refrigerant.
3. Disconnect the wiring harness at the switch.
4. Remove the switch from the refrigerant line.
5. To replace, reverse Steps 1-4 above.

   NOTE: Be sure to use new "O" rings, coated with clean refrigeration oil, when installing the switch.

6. Evacuate charge and check system operation.

FUSE

A 25 amp fuse, located in the junction block protects the entire air conditioning system except for the blower when operating at HI.

A 30 amp fuse, to protect the HI speed blower circuit, is located in the electrical wiring between the junction block and the blower relay (fig. 70).

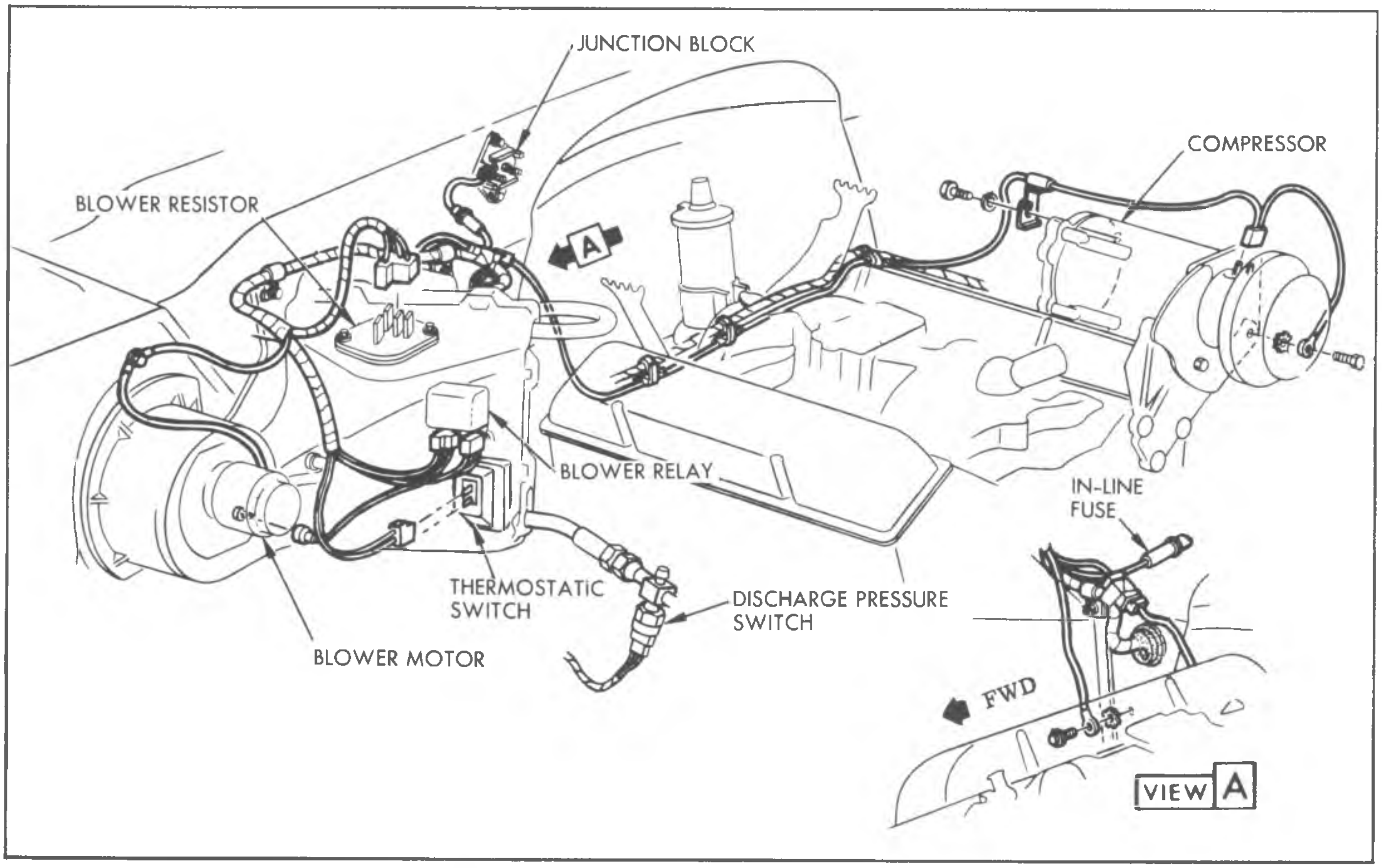


Fig. 70--Engine Compartment Wiring Harness (C-K Models)

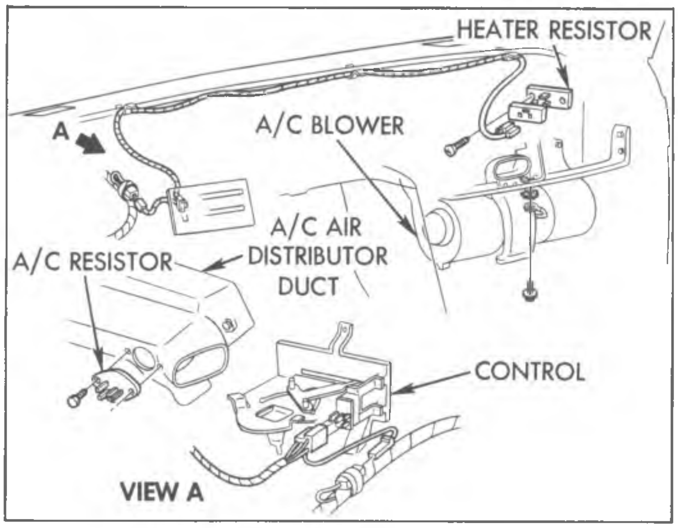


Fig. 83--Resistors (G Model C60 System)

conditioning). The A/C blower motor resistor is mounted in the forward face of the A/C air distribution duct (fig. 83).

Replacement

1. Follow Steps 1-8 of "A/C Air Distributor Duct-Replacement".
2. Disconnect electrical harness at the resistor.
3. Remove the resistor mounting screws and remove the resistor.
4. To install, reverse Steps 1-3 above.

BLOWER MOTOR RELAY

The blower motor relay is attached to the left end of the heater air distributor duct (fig. 84).

Replacement

1. Follow Steps 1-8 of "A/C Air Distributor Duct-Replacement".

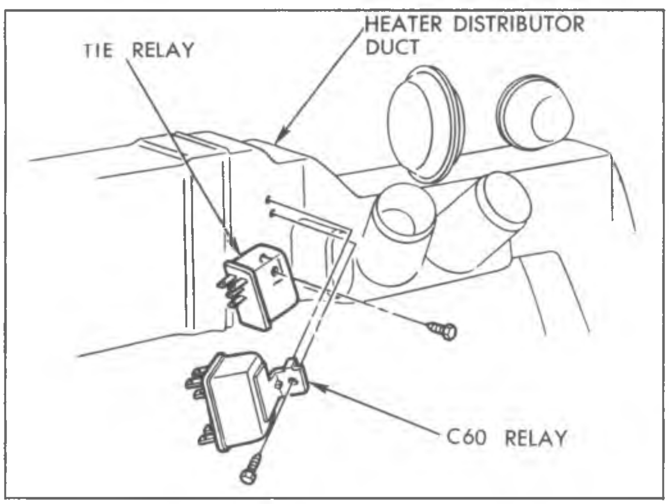


Fig. 84--Relays (C60 and Tie Relay with C69)

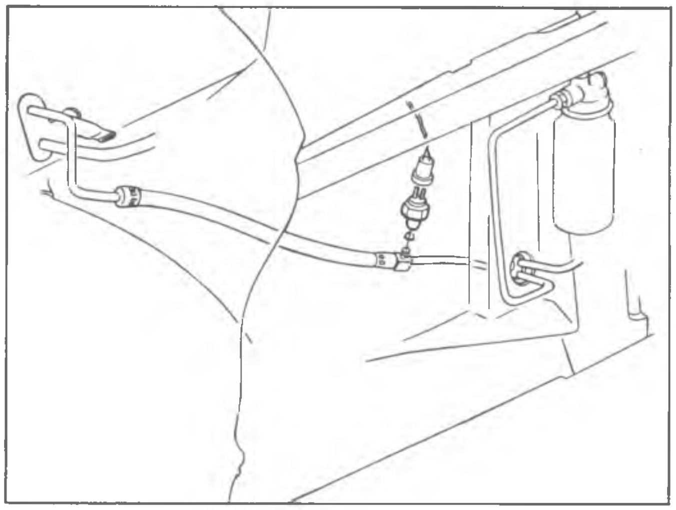


Fig. 85--Discharge Pressure Switch (G Models)

2. Disconnect electrical harness at the relay.
3. Remove the relay mounting screw and remove the relay.
4. To install, reverse Steps 1-3 above.

DISCHARGE PRESSURE SWITCH

Replacement (Fig. 85)

1. Raise the hood.
2. Purge the system of refrigerant.
3. Disconnect the electrical harness at the switch.
4. Remove the switch from the refrigerant line.
5. To install, reverse Steps 1-4 above.

   NOTE: Use a new "O" ring coated with clean refrigeration oil, when installing switch.

6. Evacuate, charge and check system operation.

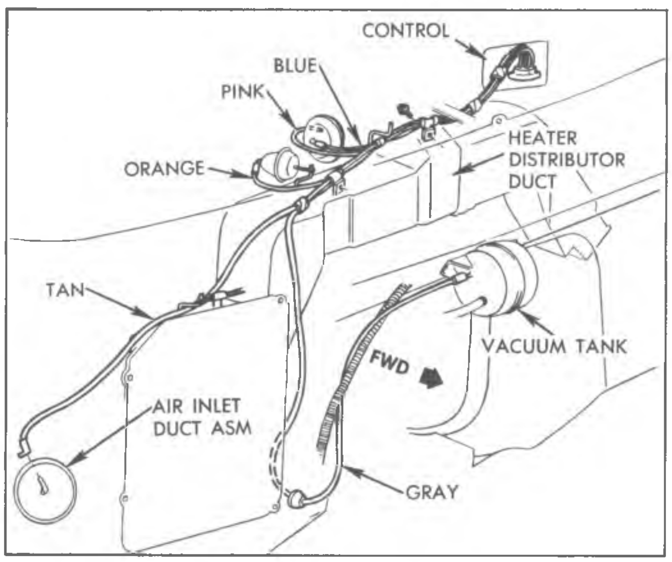


Fig. 86--Vacuum Harness (G Models)

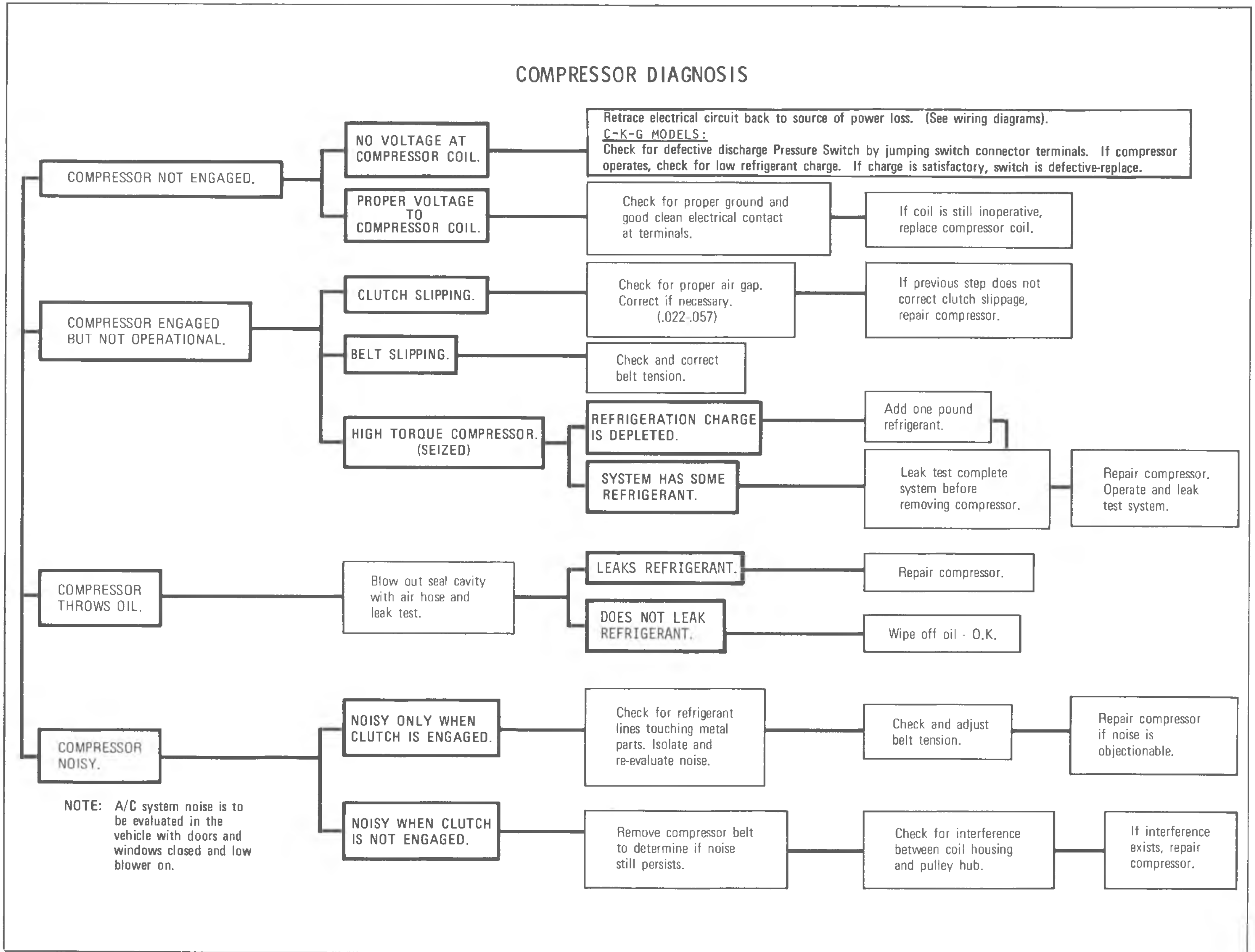
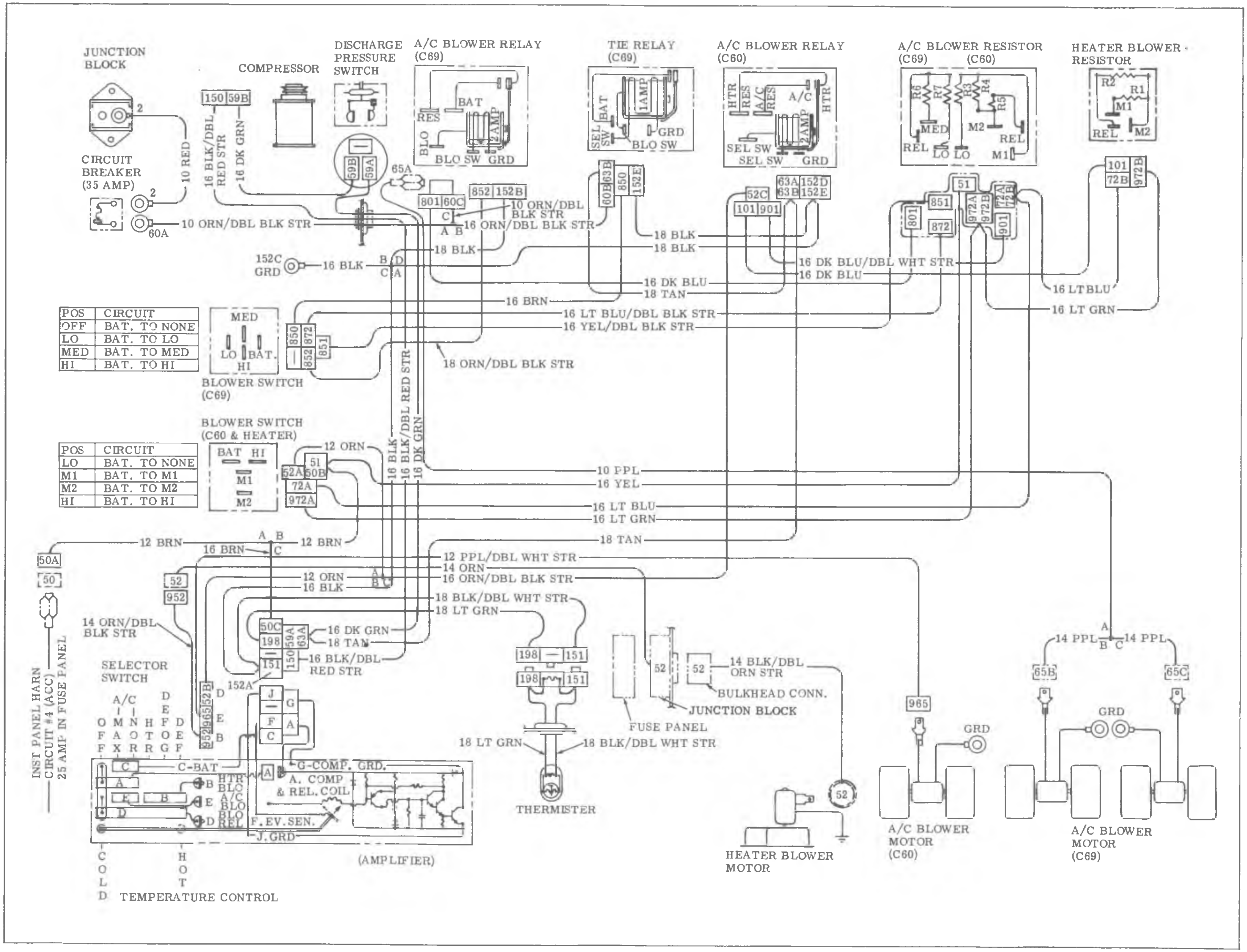


Fig. 101--Compressor Diagnosis



POS	CIRCUIT
OFF	BAT. TO NONE
LO	BAT. TO LO
MED	BAT. TO MED
HI	BAT. TO HI

POS	CIRCUIT
LO	BAT. TO NONE
M1	BAT. TO M1
M2	BAT. TO M2
HI	BAT. TO HI

Fig. 111--C60-Overhead System Wiring Diagram (G Models)

Fig. 14—Applying Pressure to Windshield

5. With the aid of an assistant outside the cab, remove the windshield from the opening. See figure 16.

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. Check flange area for solder, weld high spots, or hardened spot-weld sealer. Remove all high spots.
3. Check windshield glass to opening, by supporting glass with six spacers contained in packet J-22577. See figure 17.

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

4. 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.
5. 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.
6. Mark areas of body metal or flange to be reformed remove glass and correct as necessary.
7. Recheck windshield in its opening and if satisfactory proceed as follows.

Fig. 15—Assisting Weatherstrip over Flange

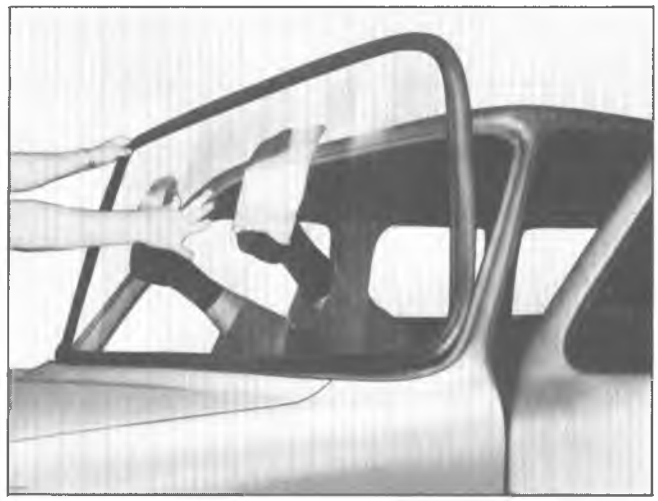


Fig. 16—Removing Windshield from Opening

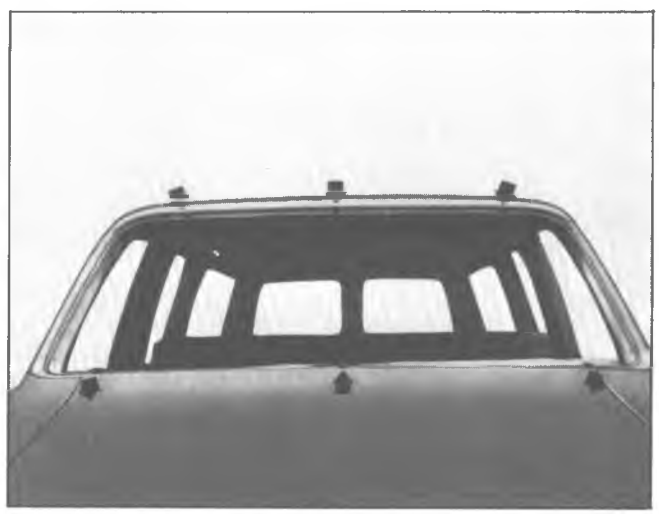


Fig. 17—Checking Windshield Opening

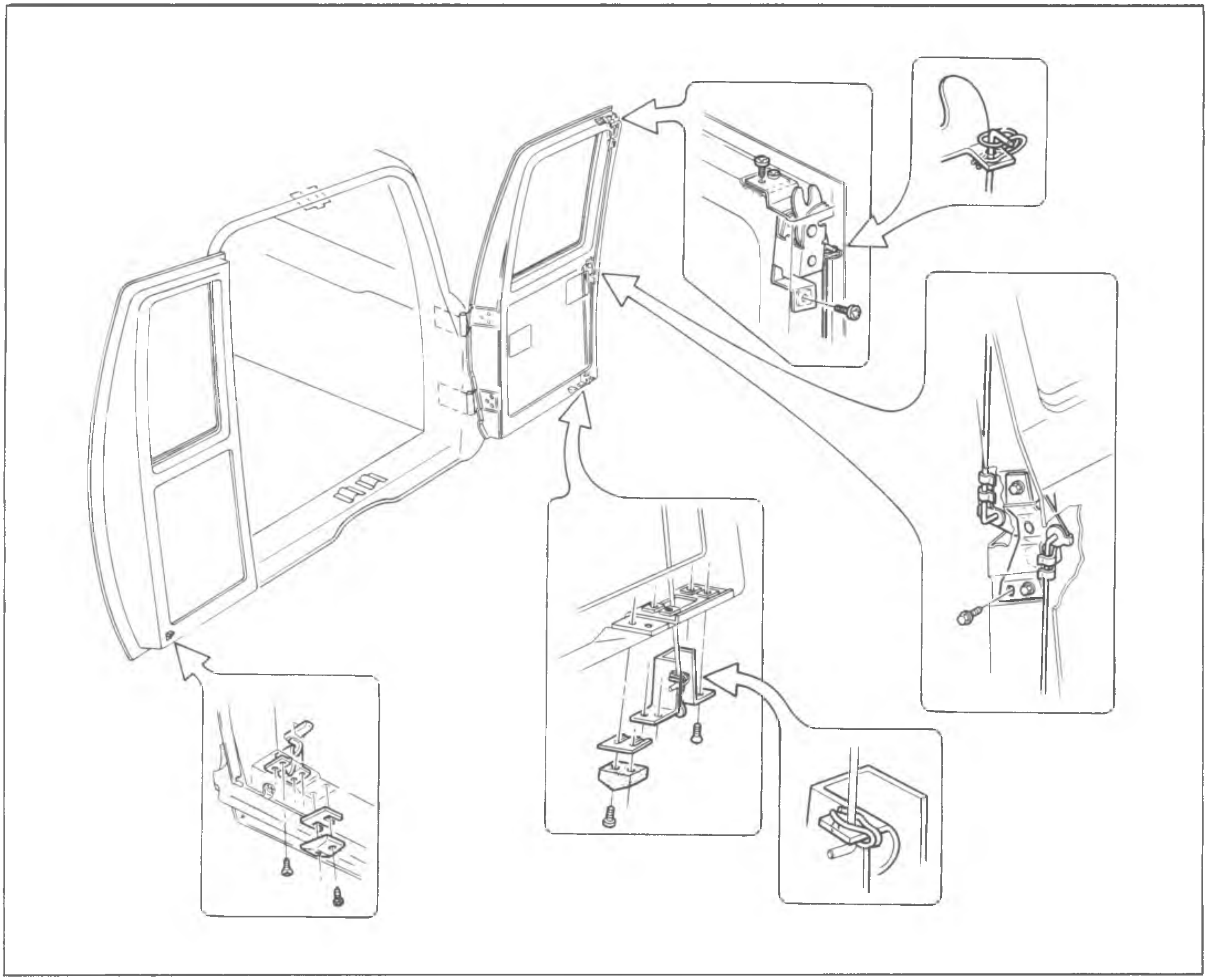


Fig. 45—Rear Door Controls

REAR DOORS (06 ONLY)

Adjustments

Rear doors may be adjusted in the body opening by loosening hinge bolts and repositioning door, then retightening bolts. See figure 47 for hinge bolt location. Rear door wedges and strikers should be adjusted as shown in figure 48.

LOCKS, HANDLES AND RODS

The rear door lock, outside handle, lock cylinder, control rods and latch are shown in figures 45 and 46. The rods can be disconnected from the lock, latch or handle by disengaging the retaining clips, as shown. The lock cylinder is removed in the same manner as the front side door lock cylinder.

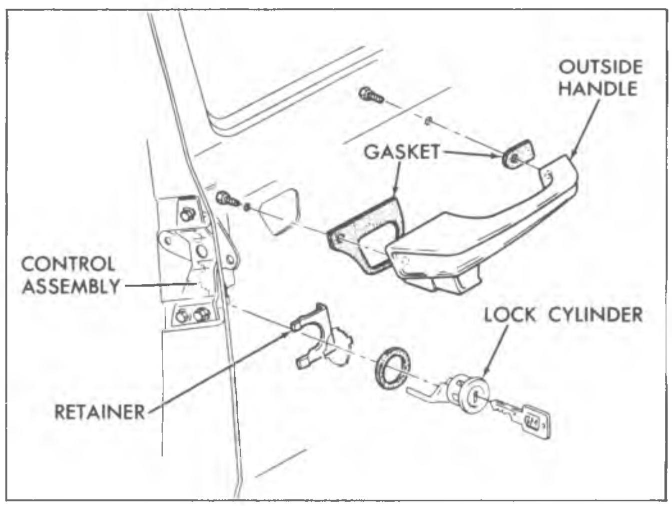


Fig. 46—Rear Door Outside Handle and Lock Cylinder

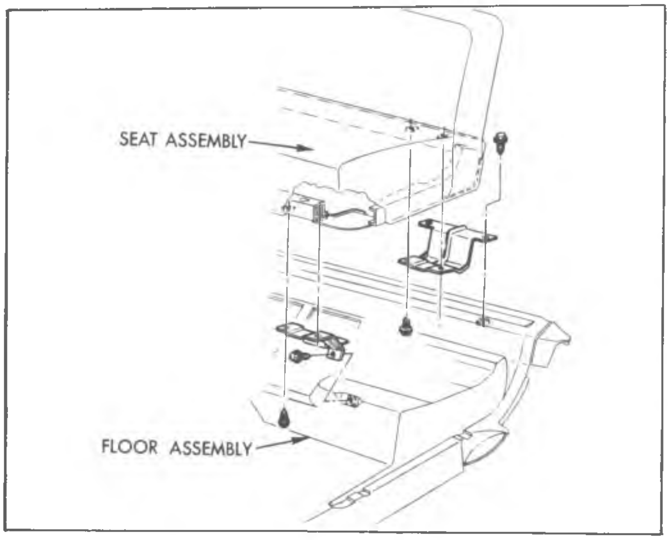


Fig. 78—Rear Bench Seat (63)

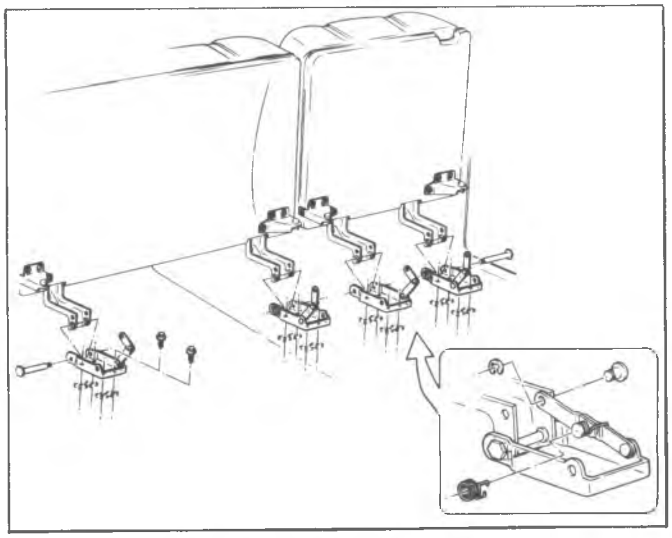


Fig. 80—Rear Folding Seat (06)

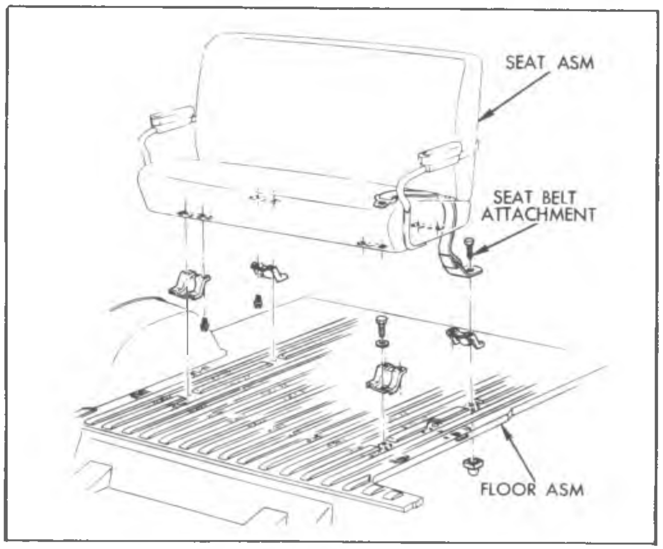


Fig. 79—Rear Bench Seat (06)

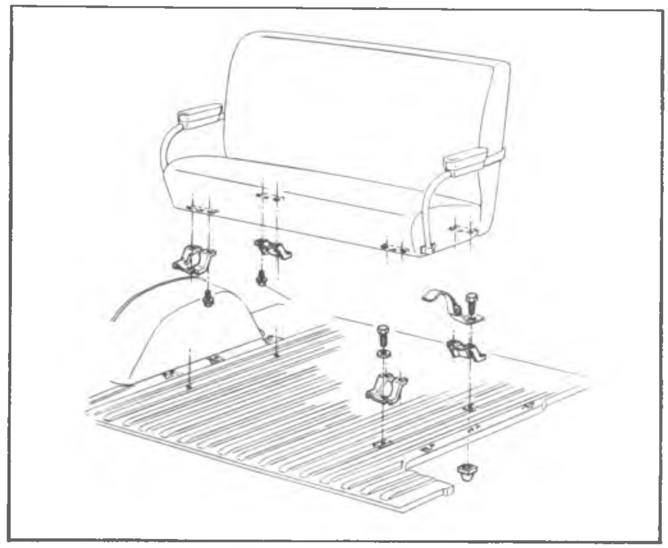


Fig. 81—Rear Bench Seat (14)

2. Make certain the rubber lip is positioned before tightening screws.
3. Slide door glass forward engaging glass in vent channel.
4. Reinstall all screws and tighten.
5. Install and tighten the three screws at the upper front of the door.

Adjustment

1. Adjust the ventilator adjusting nut by turning clockwise to increase operating tension, as shown in figure 17G.
2. After making adjustment bend tabs over the hex nut.
3. Install trim panel.
4. Install door and window regulator handles.

DOOR WINDOW ASSEMBLY

Replacement

1. Completely lower glass to bottom of door.
2. Remove inside door and window regulator handles using Tool J-7797.
3. Remove door arm rest and trim pad.
4. Mask or cover upper portion of door window frame. Remove ventilator assembly as previously outlined.
5. Slide glass forward until front roller is in line with notch in sash channel. Disengage roller from channel. See figure 18G.
6. Push window forward and tilt front portion of window up until rear roller is disengaged.
7. Put window assembly in normal position (level) and raise straight up and out.
8. Reverse above procedure for installation.

Fig. 17G—Adjusting Ventilator Tension

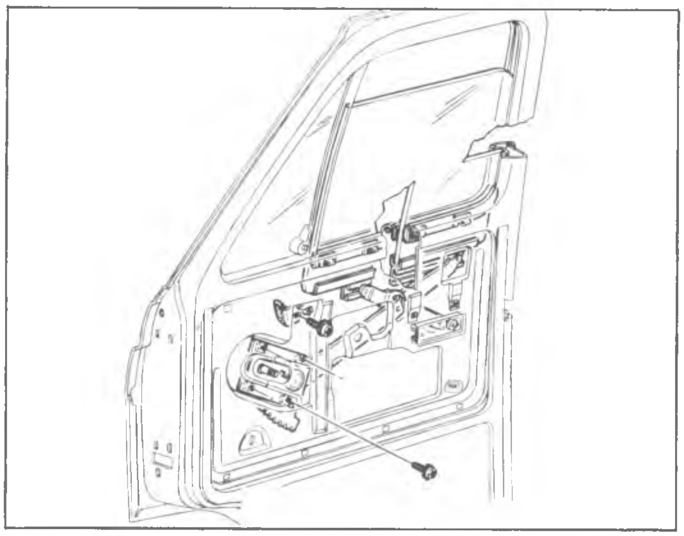


Fig. 18G—Window and Regulator

WINDOW REGULATOR

Replacement

1. Wind window all the way up.
2. Remove inside door handles with Tool J-7797.
3. Remove door trim pad.
4. Remove screws securing regulator to inner panel.
5. Push regulator out of door opening while holding rear of assembly, then slide assembly to the notches in the carrier channel and out through the door access hole.
6. Install regulator in reverse order of removal, lubricate regulator gears with lubriplate or equivalent.

DOOR LOCK—FIGURE 19G

Removal

1. Raise window.
2. Remove inside handles with Tool J-7797.
3. Remove trim panel.
4. Remove remote control sill knob.
5. From outside the door remove screws retaining lock to door edge and lower the lock assembly.
6. Remove screws retaining remote control.
7. Remove screws securing glass run guide channel.
8. Remove lock, push button rod and remote control rod as an assembly.

Installation

1. Transfer remote rod with clip to new lock.
2. Connect remote door handle rod to lock after lock is positioned.
3. Secure lock screws.
4. Secure remote handle.

NOTE: After removing the rear seat, reinstall the bolts into the anchor nuts to seal the openings from dirt and foreign matter.

3. Remove legs and support assembly.

Installation

1. Attach leg and support assembly to seat. Torque to specifications.
2. Attach seat belts. Torque bolts to specifications.

CAUTION: *Shoulder of Bolt must bottom on weld nut.*

3. Attach seat to floor. Torque bolts to specifications.

CARE AND CLEANING OF SEATS

Instructions on care and cleaning of interior soft trim may be found in "C-K Models—Seats", earlier in this section.

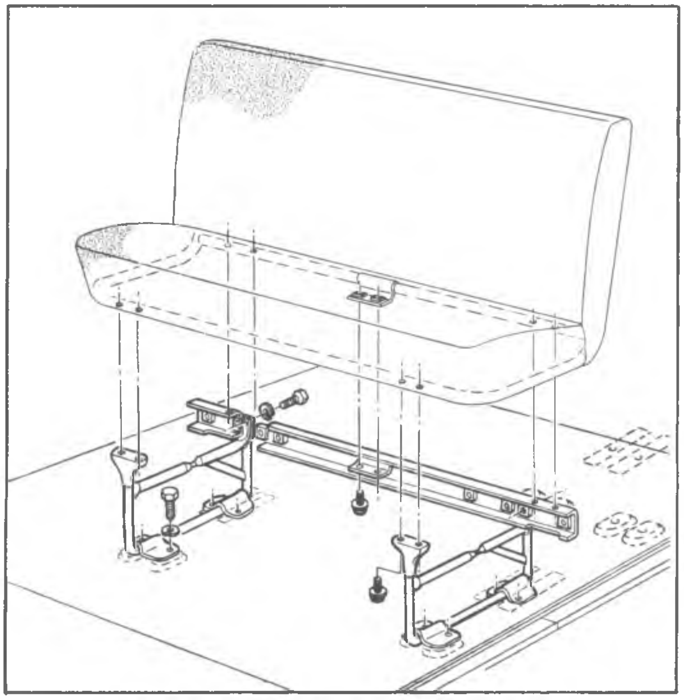


Fig. 37G—Bench Seat 2nd or 3rd Position

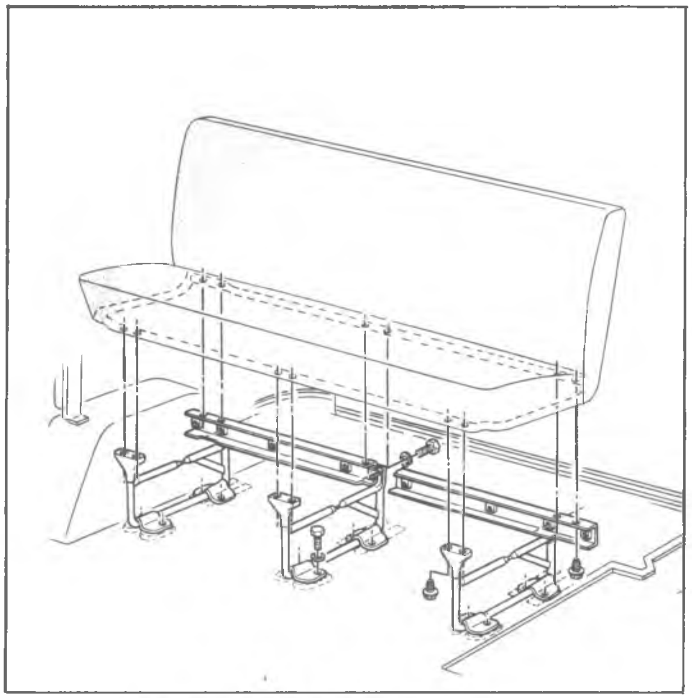


Fig. 38G—Bench Seat 4th Position

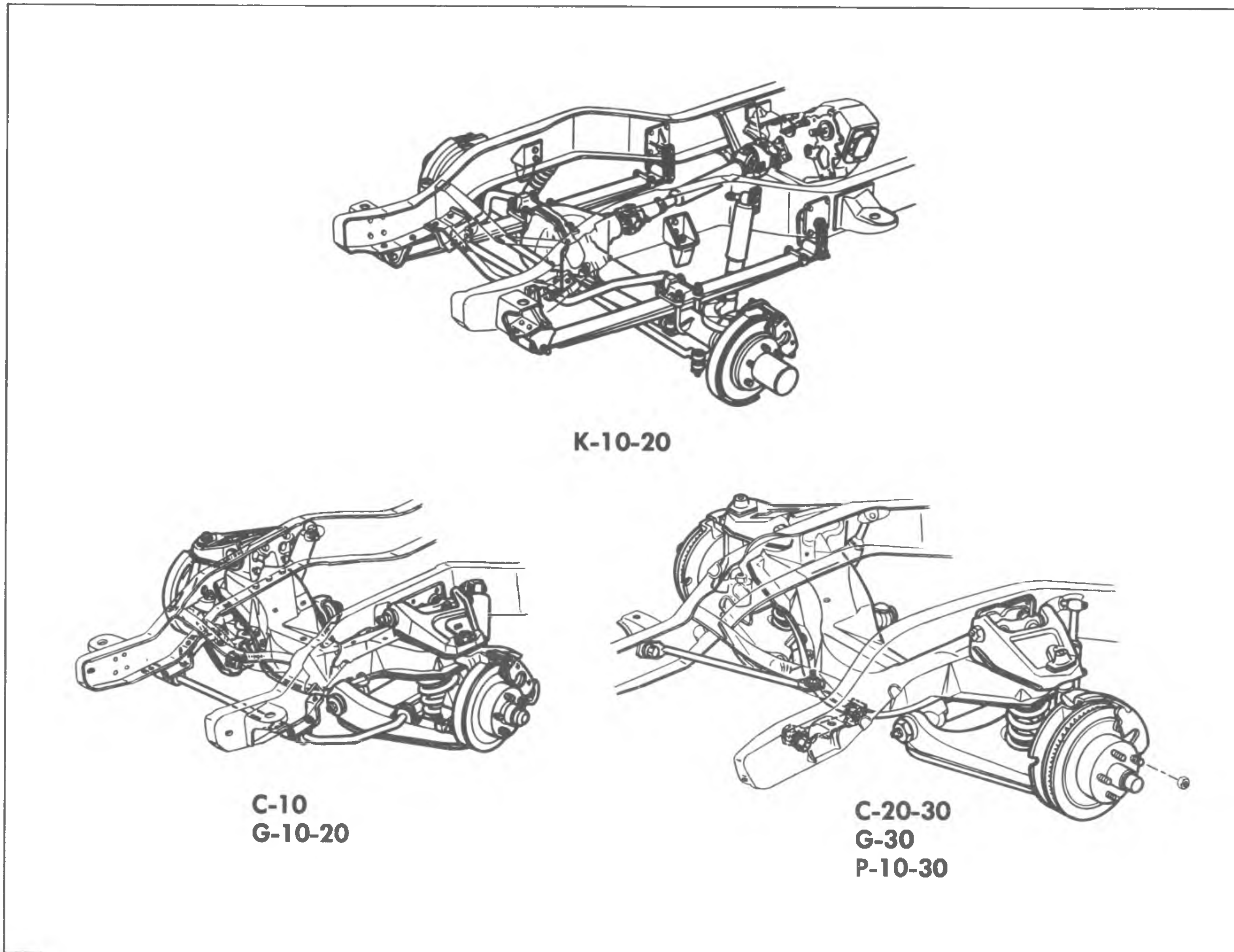


Fig. 2—Front Suspension C-P-K Typical

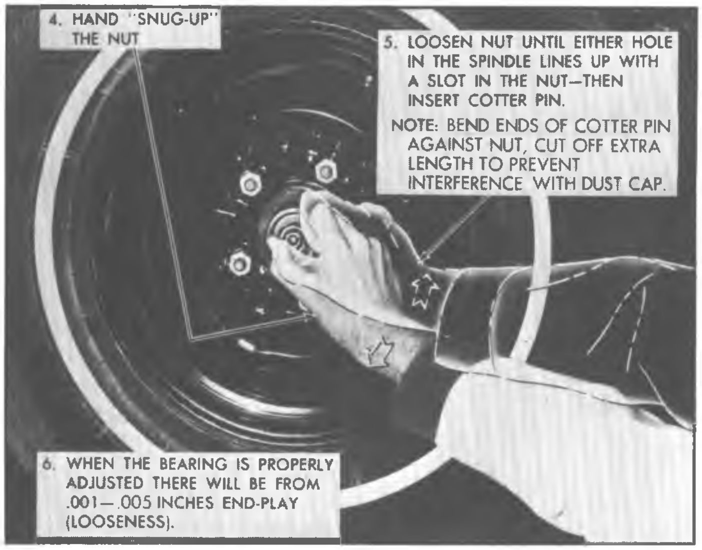


Fig. 17—Wheel Bearing Adjustment

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 .001 to .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.

FRONT ALIGNMENT (Fig. 18)

Satisfactory vehicle operation may occur over a wide range of front end wheel alignment settings. Nevertheless, should settings vary beyond certain tolerances, readjustment of alignment is advisable. The specifications stated in column 1 of the applicable vehicle chart in the specifications section of this manual should be used by owners, dealers and repairmen as guidelines in vehicle diagnosis either for repairs under the new vehicle warranty or for maintenance service at customer's request. These specifications provide an acceptable all-around operating range in that they prevent abnormal tire wear caused by wheel alignment.

Governmental Periodic Motor Vehicle Inspection programs usually include wheel alignment among items that are inspected. To provide useful information for such inspections, the specifications stated in column 2 of the aforesaid applicable chart are given and these are well within the range of safe vehicle operation.

In the event the actual settings are beyond the specifications set forth in column 1 or 2 (whichever is applicable), or whenever for other reasons the alignment is being reset, Chevrolet recommends that the specifications given in column 3 of the aforesaid applicable chart be used.

NOTE: A normal shim pack will leave at least two (2) threads of the bolt exposed beyond the nut. If two (2) threads cannot be obtained: Check for damaged control arms and related parts. Difference between front and rear shim packs must not exceed .30 inches. Front shim pack must be at least .24 inches.

Caster (Fig. 19)

All caster specifications are given assuming a frame angle of zero. Therefore, it will be necessary to know the angle of the frame (whether "up" in rear or "down" in rear) before a corrected caster reading can be determined. Camber and toe can be read "as is" from the alignment equipment.

How to Determine Caster

1. With the vehicle on a level surface, determine the frame angle "B" in Fig. 19, using a bubble protractor or clinometer.
2. Draw yourself a graphic as in Fig. 19 that is representative of the frame angle (either "up" in rear or "down" in rear).
3. Determine the caster angle from the alignment equipment and draw a line that is representative of the caster reading.
4. To determine an "actual (corrected) caster reading" with various frame angles and caster readings one of the following rules applys.
   a. A "**DOWN IN REAR**" frame angle must be **SUBTRACTED** from a **POSITIVE** caster reading.
   b. An "**UP IN REAR**" frame angle must be **ADDED** to a **POSITIVE** caster reading.
   c. A "**DOWN IN REAR** " frame angle must be

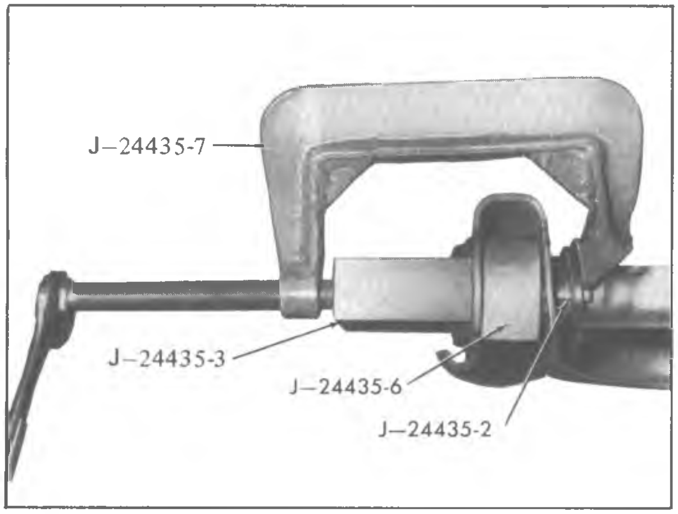


Fig. 33B—Lower Control Arm Rubber Bushing Removal

3. Install a chain over the upper arm inboard of the stabilizer and outboard of shock absorber as a safety measure.
4. Disconnect shock and stabilizer bar attachments at lower control arm.
5. Loosen shaft end nuts.
6. Remove "U" bolts that retain the inboard end of the lower control arm.
7. Lower jack SLOWLY to release spring compression (fig. 33A) and gain clearance to remove bushings.

> **WARNING:** Be sure all compression is released from coil springs.

8. Bushings may now be replaced. Install "C" clamps J-24435-7 and receiver J-24435-3 with remover J-24435-2 and spacer J-24435-6 as shown in figure 33B.
9. Remove the stakes on the front bushing using tool J-22717 or equivalent tool.
10. Tighten the "C" clamp to remove the bushing.
11. Remove tools and discard old bushing.
12. Pivot shaft may now be removed if necessary.
13. Remove second bushing (leave pivot shaft in to pilot tool) by the same method as in steps 8-12.

Bushing Installation (fig. 33C)

CAUTION: *See CAUTION on page 1 of this section regarding the fasteners referred to in step 5.*

1. Install new bushings as shown in figure 33C using spacer J-24435-6, installer J-24435-4 and "C" clamp J-24435-7.
2. Turn clamp in until bushing seats firmly.

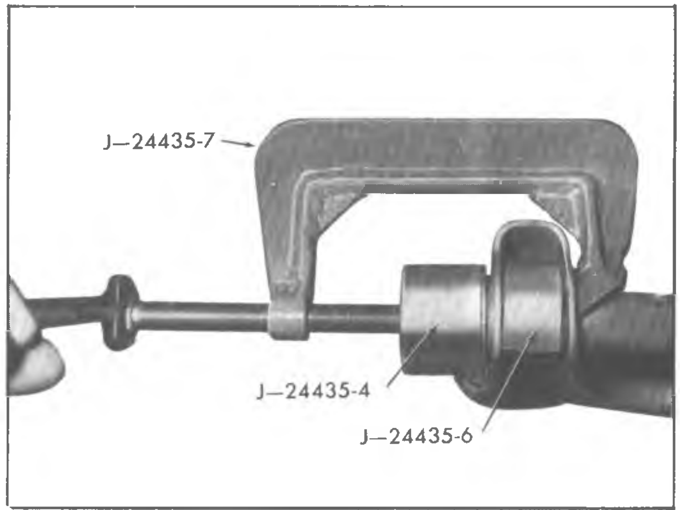


Fig. 33C—Lower Control Arm Rubber Bushing Installation

CAUTION: *Be sure spacer J-24435-6 is in position as shown in figure 33C to avoid collapsing control arm during assembly.*

3. Install one bushing then insert the pivot shaft and install second bushing.
4. Stake front bushing at least in two places when installed.
5. Install the lower control arm to the vehicle as described under "Lower Control Arm - Installation", being sure to torque all fasteners to the proper specification.

Lower Control Arm Installation

CAUTION: *See CAUTION on page 1 of this section regarding the fasteners referred to in steps 2 and 3.*

1. Install lower ball stud through steering knuckle and tighten nut.
2. Install spring and control arm as outlined under spring installation.
3. Torque lower control arm ball stud to specifications and install cotter pin.
4. Install brake caliper assembly if removed (see section 5).
5. Lower the vehicle to the floor.

BALL JOINT SERVICE—ON VEHICLE

Ball Joint—Inspection

The upper ball stud is spring loaded in its socket. This minimizes looseness at this point and compensates for normal wear, if the upper stud has any perceptible lateral shake, or if it can be twisted in its socket with the fingers, the upper ball joint should be replaced.

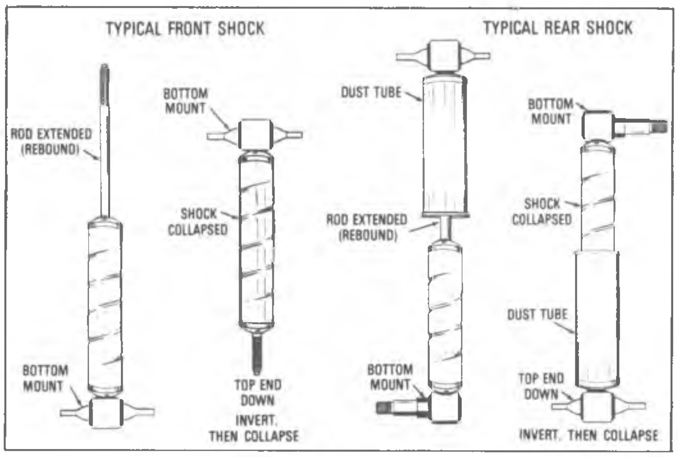


Fig. 46—Position for Purging Air From Shocks

3. Manually pump each shock by hand at various rates of speed and compare resistance of suspected shock with the new one.

   NOTE: Rebound resistance (extending the shock) is normally stronger than the compression resistance (approximately 2:1). However, resistance should be smooth and constant for each stroking rate.

4. Observe or listen for the following conditions that will indicate a defective shock:
   - a skip or lag when reversing stroke at mid travel.
   - seizing or binding condition except at extreme end of either stroke.
   - a noise, such as a grunt or squeal, after completing one full stroke in both directions.
   - a clicking type noise at fast reversal.
   - fluid leakage.
5. To check for a loose piston, completely extend shock to full rebound; then exert an extra hard pull. If a give is felt, a loose piston is indicated and shock should be replaced.

PLIACELL OR GENETRON

Pliacell and Genetron are some of the trade names used to indicate a gas-filled cell in the shock reservoir. The reservoirs of Pliacell and Genetron shocks are smooth, compared to the spiral groove type. The cell takes the place of air in the reservoir. Thus, aeration or foaming of the fluid is eliminated, as air and fluid cannot mix.

Due to this feature, these shocks should be bench checked in an **inverted position** (top end down). If, when stroked, a lag is noticed, it means the gas-filled cell has been ruptured, and the shock should be replaced. If no lag is noticed, the remainder of the bench check is the same as given in the Spiral Groove Reservoir, Section 1, Bench Check Procedure.

AIR ADJUSTABLE SHOCKS

This type of shock contains an air chamber like the spiral groove reservoir type, and must have the air purged from the working chamber. See Section 1, Spiral Groove Reservoir. After air has been purged from shock, proceed as follows:

(a) Clamp lower shock mounting ring in vise in vertical position with larger diameter tube at the top.

(b) Pump unit by hand at different rates of speed. Smooth resistance should be felt through the length of the stroke. Since the units are normally pressurized, the sound of air bubbles or a gurgling noise is **normal**.

(c) The remainder of the bench check is the same as given in the Spiral Groove Reservoir, Section 1, Bench Check Procedure.

BEARINGS AND RACES

BENCH DIAGNOSTIC PROCEDURE

This section describes common types of bearing distress and their causes. Illustrations are included to help diagnose the cause of distress and comments are provided to help make effective repairs.

Consider The Following Factors When Diagnosing Bearing Distress:

1. Note General Condition of all parts during teardown and examinations.
2. Classify the failure with the aid of these illustrations where possible.
3. Determine the cause. Recognizing the cause will permit correction of the problem and prevent a repeat failure of the same type.
4. Make all repairs following recommended procedures.

Common Causes For Bearing Distress Includes The Following:

1. Improper adjustment or preloading.
2. Mounting or teardown abuse.
3. Improper mounting methods.
4. Inadequate or wrong lubricants.
5. Entrance of dirt or water.
6. Wear from dirt or metal chips.
7. Corrosion or rusting.
8. Seizing or smearing from overload.
9. Overheating causing tempering.
10. Frettage of bearing seats.
11. Brinelling from impact loads and shipping.
12. Manufacturing defects.
13. Fatigue pitting and spalling.

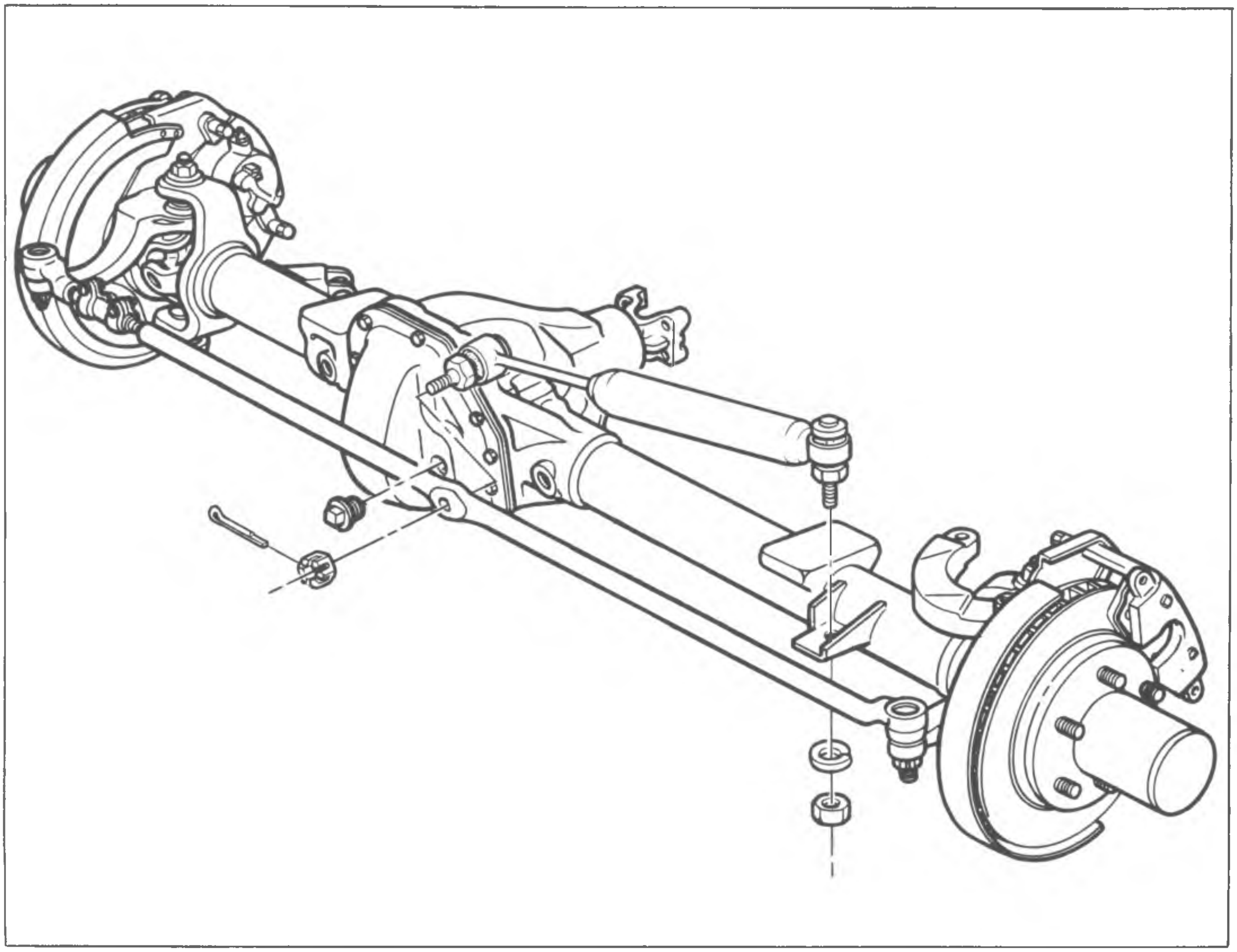


Fig. 55—Front Drive Axle Assembly

all fitting ends or cover with a rag to prevent contamination.

5. Disconnect shock absorbers from axle brackets.
6. Disconnect axle vent tube clip at the differential housing (see fig. 56).
7. Dismount "U" bolts from axle to separate axle from truck springs.
8. Raise truck to clear axle assembly and roll front axle out from under the truck.

Installation

CAUTION: *See CAUTION on page 1 of this section regarding the fasteners referred to in steps 3, 5, 6 and 8.*

1. Truck should be on jack stands as in Step 2 of removal instructions.
2. Place axle in position under truck.
3. Install "U" bolts attaching axle to front springs.
4. Attach shock absorbers to axle brackets.
5. Connect brake hoses to frame fittings bleed the brake system (see Section 5).
6. Attach connecting rod to steering arm.
7. Remove jack stands and lower front of truck.
8. Assemble propeller shaft to front axle differential.
9. Lower vehicle to floor.

Disassembly

NOTE: Refer to K10 or K20 free wheeling hub for removal of 4-wheel drive units with a free wheeling hub assembly, before starting the disassembly of the front axle assembly.

1. Securely mount the axle assembly in a suitable holding fixture.
2. If the vehicle is not equipped with RPO F76 free-wheeling hubs, remove the hub cap and snap ring.
3. Remove the drive gear and pressure spring. Place a hand over the drive gear and use a screwdriver to pry the gear out.

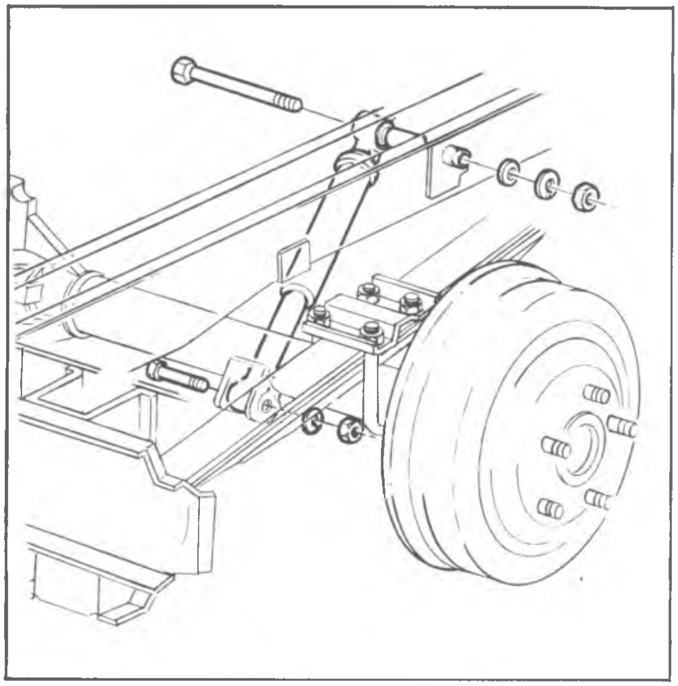


Fig. 6—Shock Absorber—G-10, 20, 30

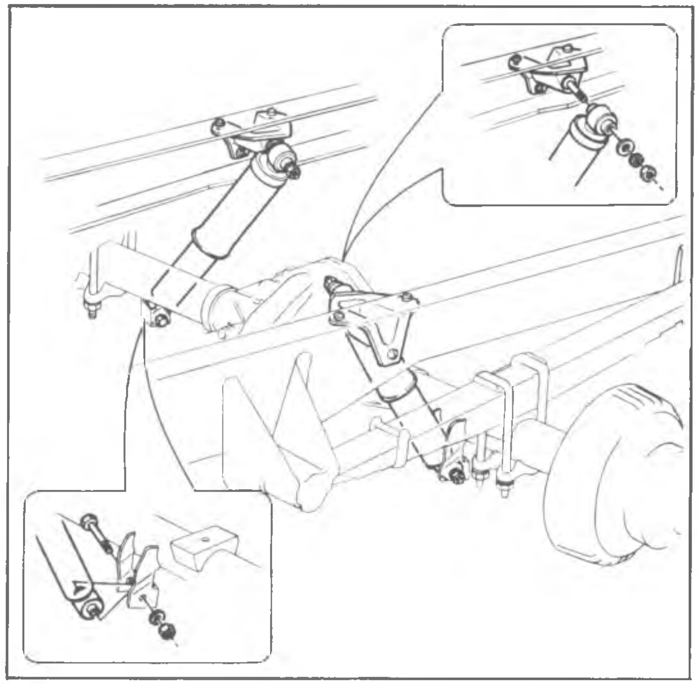


Fig. 8—Shock Absorber—P30

STABILIZER SHAFTS

Refer to figures 9, 10 and 11 for specific rear stabilizer shaft mounting on C and P models.

Replacement

1. Raise vehicle on hoist and support rear axle.
2. Remove nut, washer and grommet from link bolt at the frame side member on each side.
3. Withdraw link bolt, washers, grommets and spacer.
4. Remove brackets from anchor plates by removing attaching screws.
5. Remove stabilizer shafts.
6. Reverse above steps to install stabilizer shaft. On installation, position shaft so parking brake cable is routed over stabilizer.
7. Torque all bolts to specifications.

   CAUTION: *See CAUTION on page 1 of this section, regarding stabilizer fasteners.*

8. Lower hoist and remove vehicle.

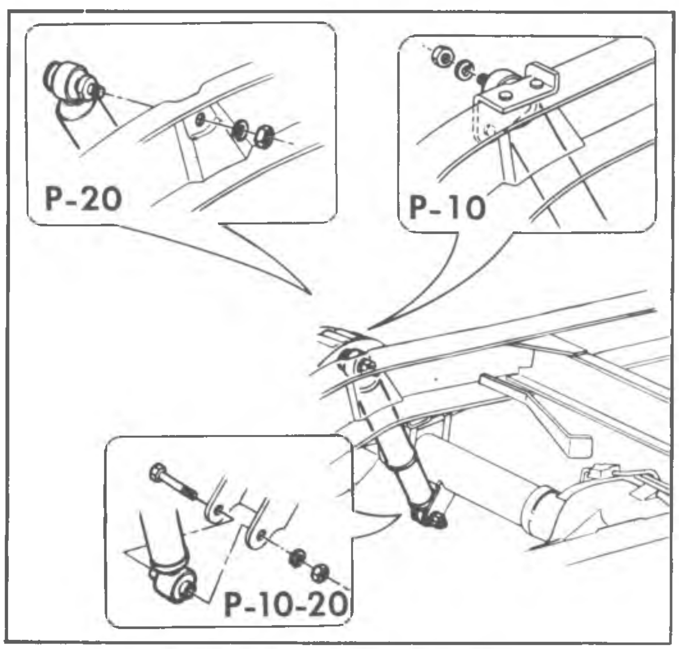


Fig. 7—Shock Absorber—P-10, 20

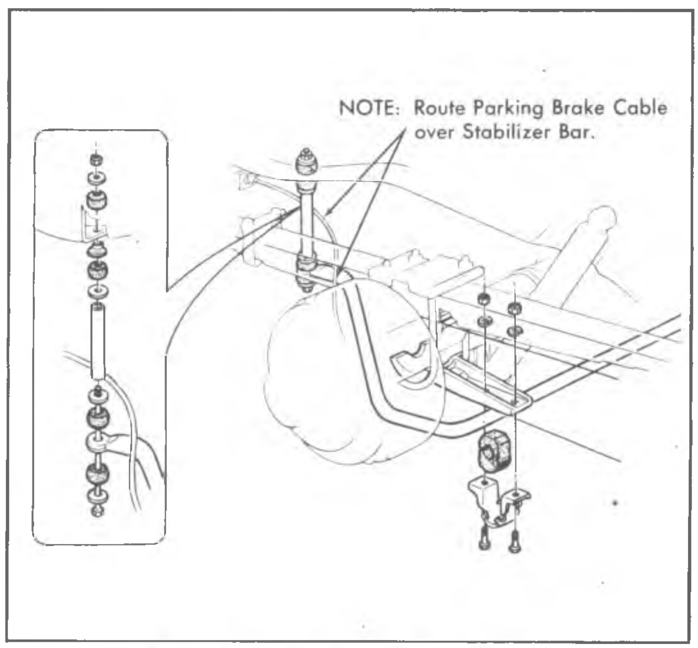


Fig. 9—Rear Stabilizer Shaft—C-20(03)

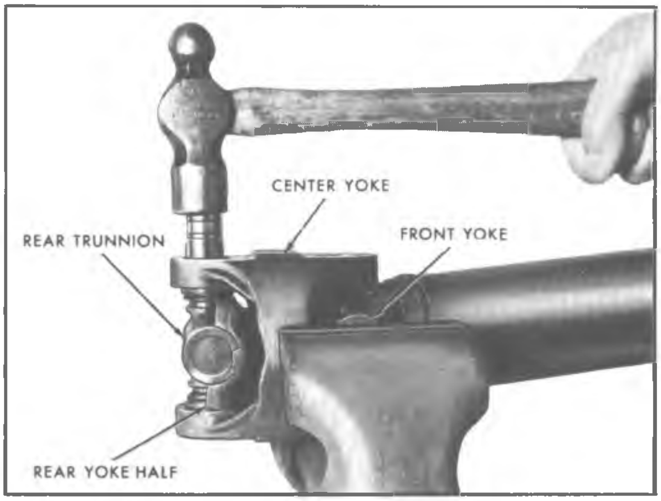


Fig. 30—Driving Out Bearing Cups

2. Remove rear trunnion snap rings from center yoke. Remove grease fitting.
3. Place propeller shaft in vice as shown in figure 30. Drive one rear trunnion bearing cap from center yoke as shown in figure 30 until it protrudes approximately 3/8".
4. Once the bearing cup protrudes 3/8", release vice. Grasp protruding portion of cup in vice and strike center yoke as shown in Figure 31 until cup is removed. Remove cup seal by prying off with a thin screwdriver.
5. Repeat steps 3 and 4 for remaining bearing cup.
6. Once the center yoke cups have been removed, remove rear yoke half bearing cups. Remove rear trunnion.
7. Gently pull rear yoke half from prop shaft. Remove all loose needle bearings. Remove spring seal.

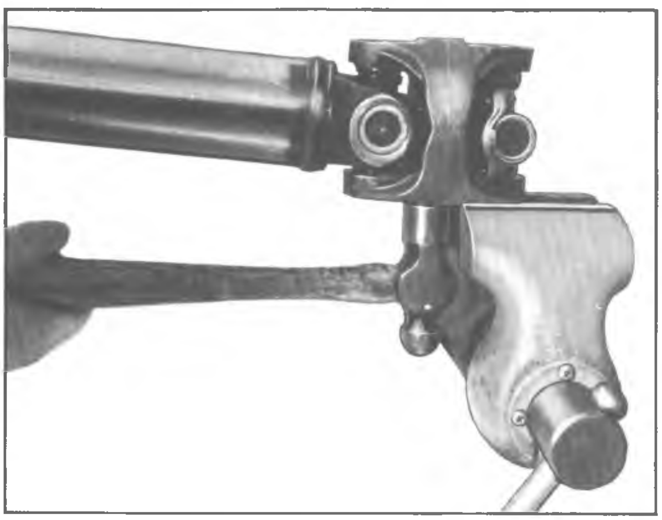


Fig. 31—Bearing Cup Removal

8. Remove front trunnion from center and front yoke in same manner as described in Steps 2, 3 and 4.

NOTE: Before front trunnion can be removed all four (4) bearing caps must be removed.

Assembly

1. Clean and inspect all needle bearings, cups, seals, fittings, trunnions and yokes. Assemble all needle bearings in caps (27 per cap); assemble needle bearings in front yoke (28 total). Retain bearings with a heavy grease. Assemble seals to bearing cups.
2. Place front trunnion in drive shaft. Place center yoke on front trunnion. Install one bearing cup and seal assembly in front yoke. Drive in to a depth that the snap ring can be installed. Install snap ring. Install remaining cup and seal in front yoke. Install snap ring.
3. Install front trunnion bearing cups in center yoke in same manner.
4. With front trunnion completely installed, install seal on prop shaft (large face first). Gently slip rear yoke half on prop shaft using care not to upset rollers. Insert rear trunnion in center yoke. Install rear yoke half bearing caps on rear trunnion. Install one rear trunnion bearing cap in center yoke and press into yoke until snap ring can be installed. Install remaining cap and snap ring.
5. Grease universal as outlined in Section 0 at all three (3) fittings (2 conventional type and one in rear yoke half) that requires a needle nose grease gun adapter.
6. Install propeller shaft with constant velocity joint next to transfer case. Torque U-bolts to specifications. The lubrication fitting at this location is shown in figure 32.

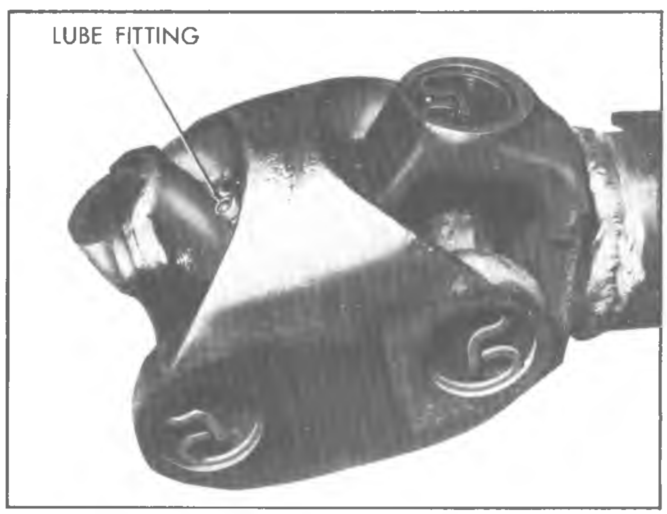


Fig. 32—Lubrication Fitting

mishandling in storage and installation. They are adversely affected by dirt and they should be protected from rust and corrosion.

Bearings are carefully assembled, washed, dried and either lubricated or treated with a rust preventative at the factory. They are then packaged for protection and shipped to a distributor or to the ultimate user.

Bearings should not be removed from the original packaging until they are ready for installation. When a bearing is shipped from the factory it is ready for installation. No cleaning or washing is recommended. Field washing of new bearings, prior to installation, seldom improves on the factory cleaning and could impair the original cleanliness of the bearing.

Once a bearing has been removed from the original packing, care must be exercised to prevent damage from dirt and corrosion. Many bearing failures are the result of improper handling, careless installation, misuse or abuse rather than actual wear or fatigue in service.

The useful life expectancy of bearings can be greatly extended if proper installation and maintenance practices are observed.

Removal Procedures

Regardless of the means used to remove bearings or races, it is absolutely essential that the driving force be directed through the **press fitted race**. For example, if a non-separable bearing is to be removed from a shaft, the force must travel through the inner race and never through the outer race, rollers or separator.

In most applications, it will be found that the roller bearing has been assembled with a tight press fit holding the rotating race, and with a relatively free fit holding the stationary race. Removing the race with the free fit can be done quite easily, but the race with the tight press fit will require considerable force, which must be applied in such a way that the bearings and component parts are not damaged.

The Arbor Press. The arbor press is one means of applying the force necessary to remove bearings or races from shafts and housings. Its action is rapid, smooth and positive, making it an especially useful tool where a great deal of bearing removal work is done. In addition, the arbor press can supply a greater force than is available from most other bearing removal appliances, making it possible to remove some bearings which might not even be budged by bearing pullers or by hammering.

With the arbor press, the bearing is supported on the press base plate with some simple accessories. These may consist of flat bars placed beneath the inner race adjacent to the shaft. A piece of flat stock with a U-shaped cutout is preferable when this operation has to be repeated often. A third type of accessory is the split ring, a circular ring bored slightly larger than the shaft diameter and sawed into two semi-circular segments.

The arbor press can only be used to remove races or bearings from housings which are so designed that some portion of the outer race can be exposed. In cases where the entire face of the outer race is exposed, a section of pipe or tubing, capped by a steel block, can be used. In other cases, the shoulders against which the outer races rest are slotted to allow a flat bar to contact the outer race in two diagonally opposite places. The important thing to remember in any of these operations is that the force should only be directed through the **press-fitted race**, and that the press base plate and accessories are clean, and that all contacting surfaces are flat and true.

Bearing Pullers. Bearing pullers are a useful and convenient means of removing bearings and races, where no arbor press is available, or where the shaft is too large or is obstructed and cannot go into a press.

The bearing puller must be applied so that the pressure is directed through the press-fitted race, and that no force is carried through the rollers or snap rings. The puller can be used without accessories to draw off inner races where no obstructions interfere and where long reach is not necessary. In most cases, the split collar puller plate is placed in back of the bearing to carry the load directly to the inner race. In some applications, a gear, pulley or cover plate can be used instead of the split collar. When bearing pullers having adjustable legs are used, it is important that the legs be of equal length and symmetrically placed.

Cleaning of Used Bearings

Bearings which have been removed from service should be cleaned before storing, even when the storage is to be only of short duration. The bearing should be cleaned thoroughly, removing all oil and hardened grease accumulations, as well as any sludge which may be deposited on the outer surfaces of the races. Remember that cleaning of bearings is important and, whenever possible, should be done before relubricating bearings.

Bearings can be cleaned easier and more thoroughly when they have been removed from their housings and shafts. When this is not possible, a light oil heated at

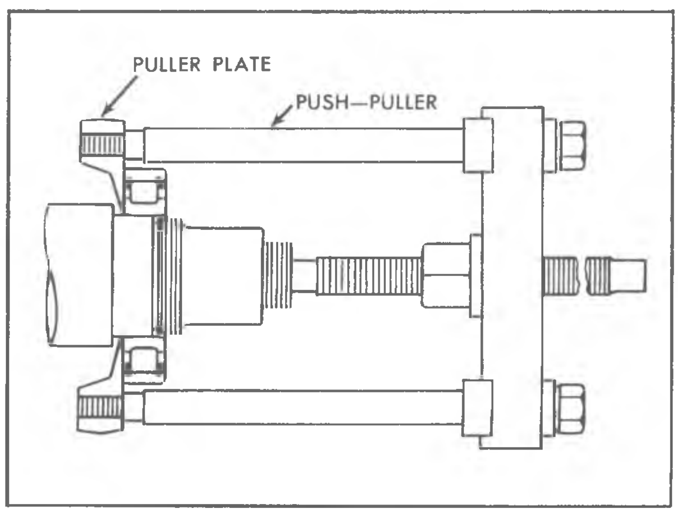


Fig. 43—Typical Inner Race Removal

back and forth, or by using a pry bar under tire. If bearings are properly adjusted, movement of brake drum in relation to brake flange plate will be barely noticeable and wheel will turn freely. If movement is excessive, adjust bearing as follows:

1. Remove axle shaft and raise vehicle until wheel is free to rotate.
2. Disengage tang of retainer from locknut and remove both locknut and retainer from axle housing tube.
3. Using J-2222, tighten inner adjusting nut to specified torque at the same time rotating hub to make sure all bearing surfaces are in contact. Then back off inner nut to specified amount of turn-back.

   See figure 68, and refer to Specifications Section for torque values.
4. Install tanged retainer against the inner adjusting nut. Align inner adjusting nut so short tang of retainer will engage nearest slot on inner adjusting nut.
5. Install outer locknut and tighten to correct specified torque. Then bend long tang of retainer into slot of outer nut. This method of adjustment will result in the proper bearing adjustment.

DRIVE PINION OIL SEAL

Replacement

NOTE: The pinion oil seal may be replaced with the carrier assembly installed in the vehicle.

1. Disconnect propeller shaft.
2. Scribe a line down the pinion stem, pinion nut and companion flange.
3. Use J-8614-11 to remove the pinion nut and the companion flange.
4. Pry the oil seal from the bore, using care not to damage the machined surfaces. Thoroughly clean all foreign material from contact area.

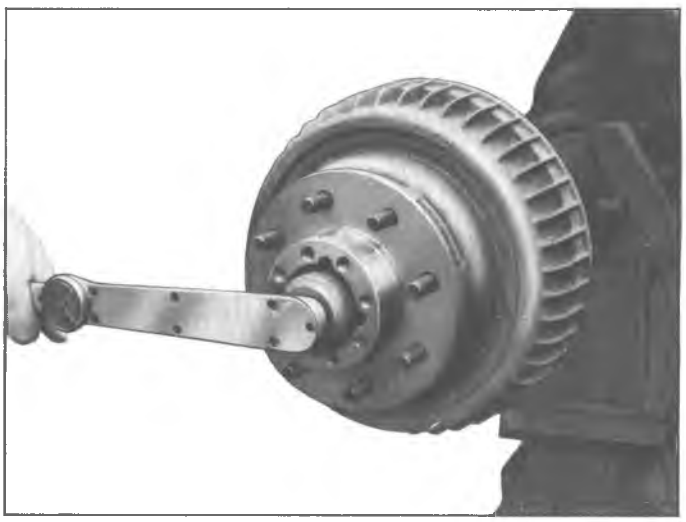


Fig. 68—Tightening Adjusting Nut—Typical

5. Lubricate the cavity between the seal lips with a high melting point bearing lubricant.
6. Install a new pinion oil seal into the bore, using J-24434.
7. Reinstall the companion flange, pinion nut and propeller shaft.

CAUTION: *See CAUTION on page 1 of this section, regarding the above fasteners.*

DANA 10-1/2 RING GEAR AXLE DANA 9-3/4 RING GEAR AXLE

Procedures for service to axle assembly, axle shafts, hub and drum components and bearing adjustments are identical to those listed for "Chevrolet 10-1/2 Ring Gear Axle".

Drive pinion oil seal replacement requires different special tools for the Dana axles. Follow the same procedure listed for "Chevrolet 10-1/2" Ring Gear Axle"; use J-24384 for seal replacement on Dana 10-1/2" Ring Gear Axles, and use J-22281 for pinion oil seal replacement on Dana 9-3/4" Ring Gear Axles.

12-1/4 RING GEAR AXLE

AXLE ASSEMBLY

The axle assembly removal and installation is identical to the procedure given earlier for "Chevrolet 10-1/2" Ring Gear Axle".

AXLE VENT

Replacement

Service replacement axle housing assemblies are not equipped with an axle vent; therefore, always make sure that a new vent assembly is installed when replacing the housing. If axle vent requires replacement, pry old vent from housing being sure that entire vent is removed. Prick punch around carrier hole to insure fit of replacement vent. Tap new vent into housing using a

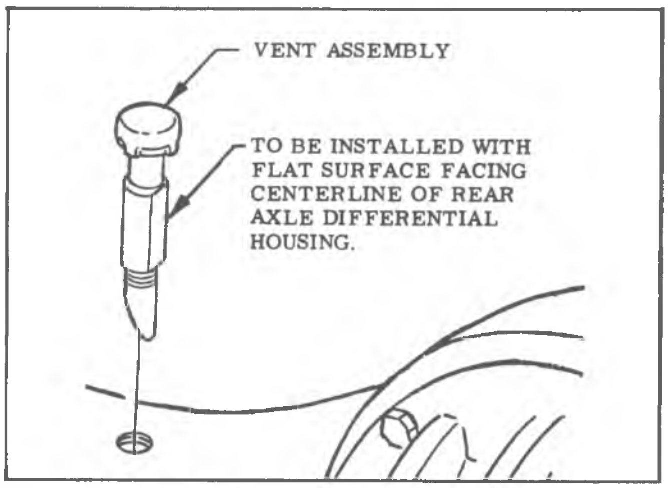
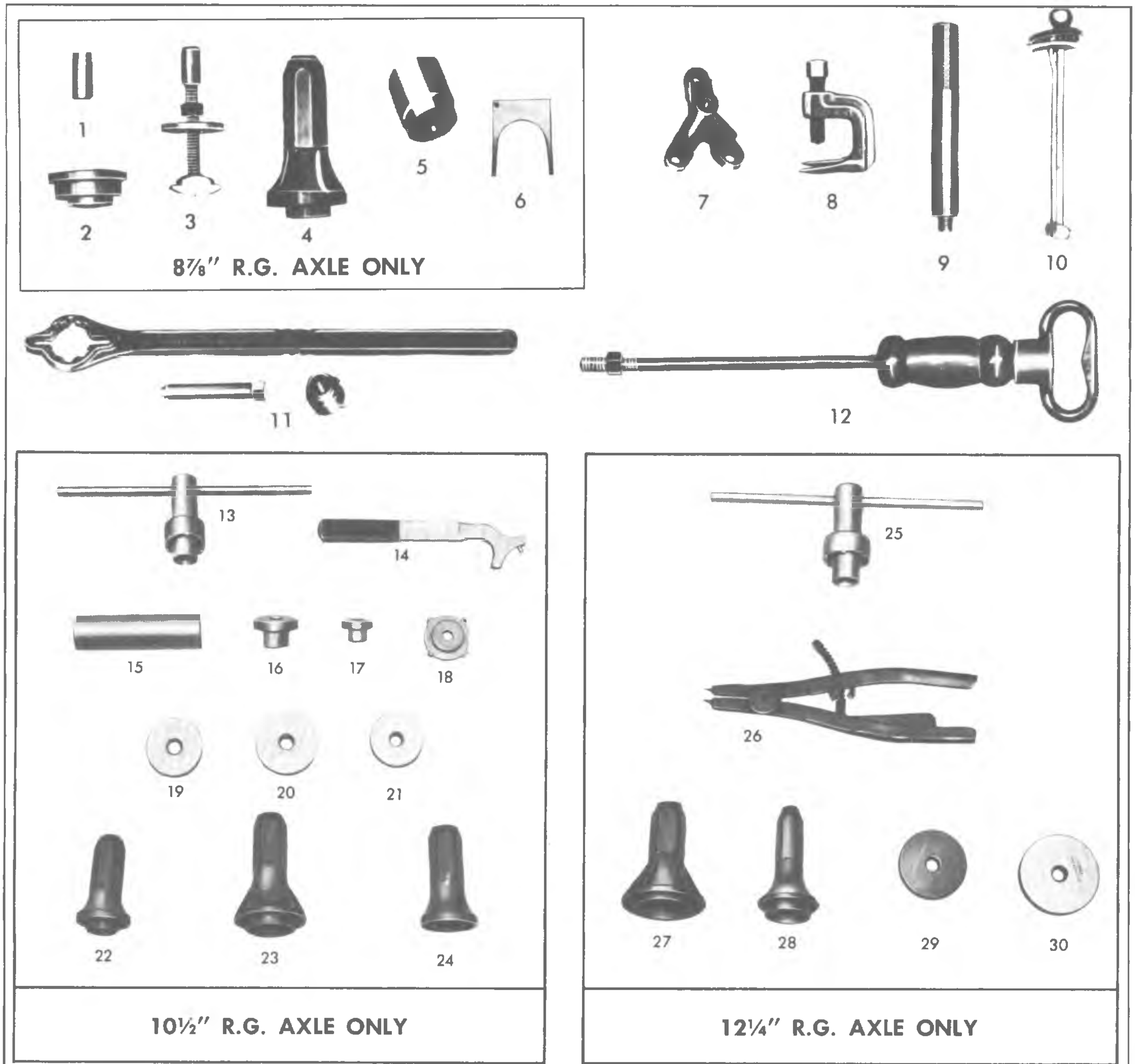


Fig. 69—Typical Axle Vent Installation

SPECIAL TOOLS



1.	J-21548	Trunnion Seal Installer
2.	J-23690	Axle Shaft Bearing Installer
3.	J-23689	Axle Shaft Bearing Remover
4.	J-21128	Axle Shaft Seal Installer
5.	J-21057	Pinion Oil Seal Installer
6.	J-22804-1	Pinion Seal Gauge Plate
7.	J-5748	Positraction Torque Measuring Adapter
8.	J-6627	Wheel Bolt Remover
9.	J-8092	Driver Handle
10.	J-5853	Torque Wrench - Inch/Pound
11.	J-8614-II	Companion Flange Holder
12.	J-2619	Slide Hammer
13.	J-2222	Wheel Bearing Nut Wrench
14.	J-24429	Adjusting Nut Wrench
15.	J-24433	Pinion Rear Bearing Installer
16.	J-24430	Differential Side Bearing Installer
17.	J-23322	Pinion Straddle Bearing Installer
18.	J-24426	Outer Wheel Bearing Cup Tool
19.	J-24432	Pinion Rear Bearing Cup Installer
20.	J-24427	Inner Wheel Bearing Cup Installer
21.	J-8608	Outer Wheel Bearing Cup Installer
22.	J-24384	Pinion Oil Seal Installer - Dana
23.	J-24428	Wheel Hub Oil Seal Installer
24.	J-24434	Pinion Oil Seal Installer - Chevrolet
25.	J-870	Wheel Bearing Nut Wrench
26.	J-22380	Tru-Arc Pliers
27.	J-22354	Wheel Oil Seal Installer
28.	J-22281	Pinion Oil Seal Installer
29.	J-8114	Wheel Bearing Outer Cup Installer
30.	J-8093	Wheel Bearing Inner Cup Installer

Fig. 83—Special Tools

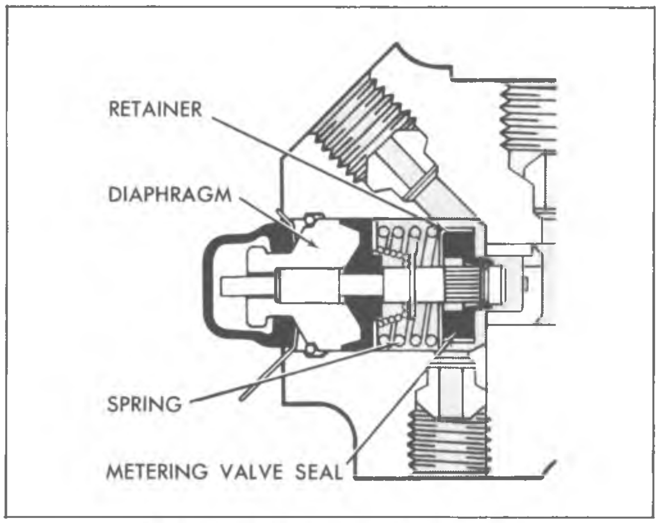


Fig. 13--Hold-Off and Blend Pressure

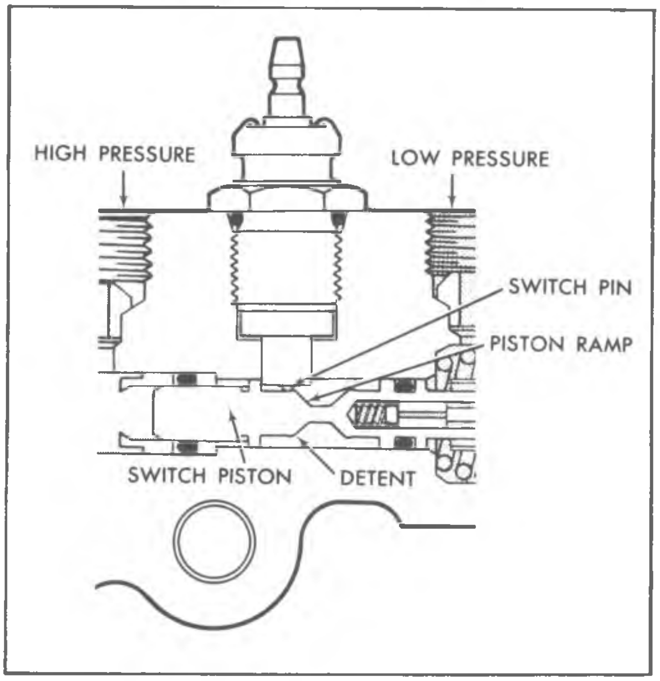


Fig. 14--Rear System Failure

BRAKE STOPLAMP SWITCH

The brake stoplamp switch is mounted on a flange protruding from the brake pedal support bracket below the instrument panel (fig. 17). When the brake pedal is depressed, the switch plunger (which is spring loaded), follows the brake pedal arm downward until the switch is in the "ON" position. When the brake is released, the brake pedal arm returns the switch plunger to the "OFF" position.

BRAKE PEDAL

The brake pedal is a lever, pivoted at one end, with the master cylinder push rod attached to the pedal near the pivot point. By this lever arrangement the force applied to the master cylinder piston through the push rod is

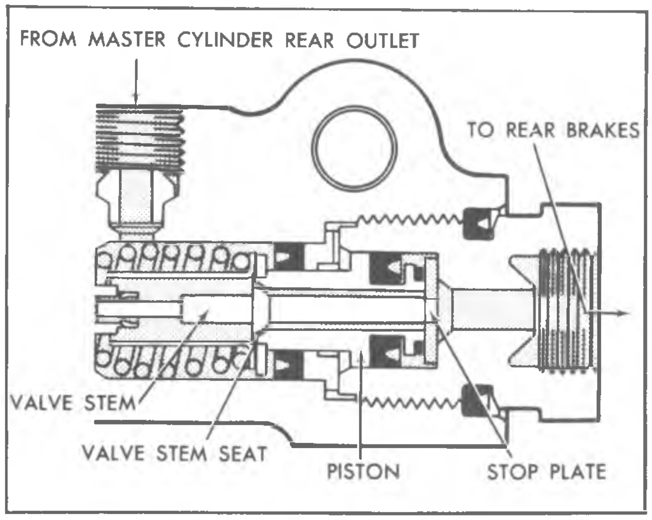


Fig. 15--Normal Brake Stop

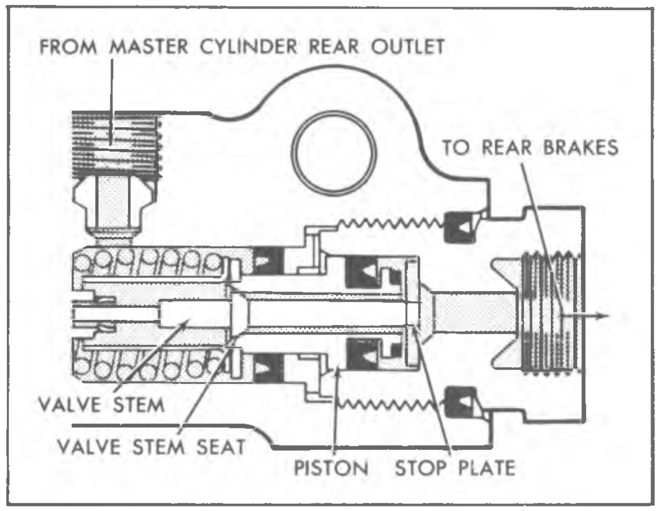


Fig. 16--Proportioning Action

multiplied several times over the force applied at the brake pedal (fig. 18).

Proper service of the brake pedal is vital to good brake performance, and pedal operation should be checked each time brakes are inspected. Weak or broken return springs or lack of lubrication can cause sluggish release of the brakes. Wear in the pedal linkage, pivot pins, or bushings, can cause loss of pedal or frequent need for brake adjustment. Pedal free play is the free travel of the pedal before any movement of the master cylinder piston occurs. Too little free play can cause brakes to drag. Too much free play may result in a low pedal. The free play at the brake pedal pad should be 1/16 to 1/4 inch for the standard height pedal.

OPERATION OF BRAKE MECHANISM

When the brakes are fully released, the master cylinder

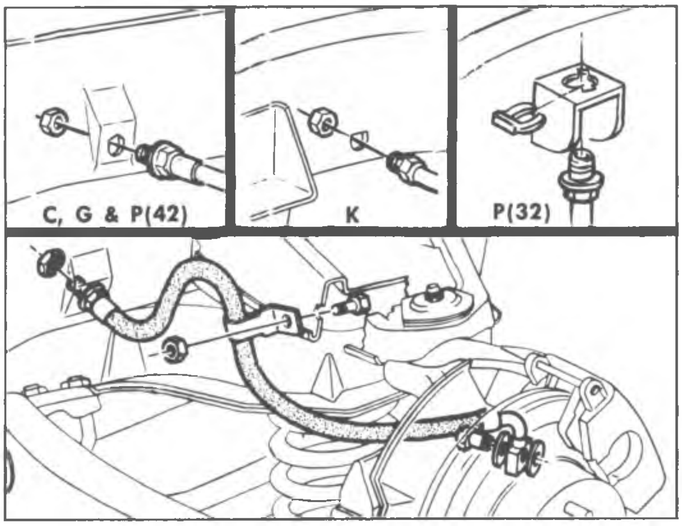


Fig. 32--Brake Hose Frame Support--Typical

HYDRAULIC BRAKE LINES AND TUBING (Figs. 32 and 33)

Hydraulic Brake Hose

The flexible hoses which carry the hydraulic pressure from the steel lines to the brake calipers are carefully designed and constructed to withstand all conditions of stress and twist which they encounter during normal vehicle usage.

These hoses require no service other than periodic inspection for damage from road hazards or other like sources. Should damage occur and replacement become necessary, the following procedure should be followed.

Removal

1. Clean all dirt and foreign material away from both hose fitting ends.
2. Separate steel line from flex hose. Use a back up wrench on the hose fitting.
3. Remove clip retainer from frame attachment.
4. Remove hose to caliper bolt and remove hose.

Installation (Fig. 32)

1. Install the hose to the caliper using new gaskets. Torque the mounting bolt.

   CAUTION: *See Caution on Page 1 of this section.*

   Hose line must be installed in caliper locating gate (except "K" models); connector arm in caliper locating gate ("K" series).

2. Insert hose into frame bracket or frame. This end of hose will properly mate to the bracket or frame in one direction only.
3. Install the clip retainer.
4. Install the steel line to the flex line using a back up wrench on the hose fitting. Inspect to ensure that hose replacement has not caused the support bracket to loosen; retorque bracket attachment if required.

   CAUTION: *See Caution on Page 1 of this section.*

5. Bleed brakes as outlined in this section.

Hydraulic Brake Tubing (Figs. 34 thru 38)

Hydraulic brake tubing used on all trucks is a double wall steel tubing which resists corrosion and has the physical strength to stand up under the pressures which are developed when applying the brakes. In making up hydraulic brake lines, it is important that the ends of the tubing be flared properly for the compression couplings.

CAUTION: *When necessary to replace brake tubing, always use double wall steel tubing which is designed to withstand high pressure and resist corrosion. Steel tubing must be equivalent to GM Specification GM123M, be annealed dead soft and super terne coated. ORDINARY COPPER TUBING IS NOT SATISFACTORY AND SHOULD NOT BE USED.*

When replacing brake lines, be sure to install new spring steel shielding material over the replacement line in the same areas as on the line removed.

Safety steel tubing must be double-lap flared at the ends in order to produce a strong leak-proof joint.

Brake Tube Flaring Tool J-2185-45° is used to form the double lap flare. It must be equipped with the proper size die block and upset flare punch for each size tubing to form the double-lap flare (fig. 34).

The proper size die blocks and upset flare punches are as follows:

Tubing Size	Die Block	Upset Flare Punch	Finish Flare Punch
3/16"	J-2185-27	J-2185-3	J-2185-26
1/4"	J-2185-28	J-2185-37	J-2185-26
5/16"	J-2185-29	J-2185-4	J-2185-26

Figure 35 shows two pieces of tubing, one with single-lap flare "A" and the other with double-lap flare "B". It will be noted that the single-lap flare in "A" split the tubing while the one shown in "B" is well-formed and unbroken due to the reinforcement of the double wall.

The following procedure should be followed in making up hydraulic brake lines.

Double Lap Flaring

1. Cut the tubing to the desired length, using Tool J-8000. Square off ends of tube and ream sharp

difference between these 4 readings must not exceed .006.

Cleaning

New brake drums are given a light coating of rust proofing oil to prevent the formation of rust on the critical braking surfaces during the time that the drums are in storage.

This rust proofing oil must be carefully removed before the drum is placed in service to prevent any of this oil from getting on the brake shoe facings.

It is recommended that a suitable volatile, non-toxic, greaseless type solvent be used to clean the oil from the braking surface of the new brake drums before they are placed in service to insure the cleanest possible surface.

Gasoline or kerosene should not be used as there is danger that a portion of the diluted oil substance may be left on the braking surface.

NOTE: All brake drums have a maximum diameter cast into them. This diameter is the maximum wear diameter and not a refinish diameter. Do not refinish a brake drum that will not meet the specifications as shown below after refinishing.

ORIGINAL DIAMETER	MAXIMUM REFINISH DIAMETER	REPLACEMENT (DISCARD) DIAMETER
11.000	11.060	11.090
12.000	12.060	12.090
13.000	13.060	13.090

SHOE AND LININGS—FRONT DISC BRAKE

The brake linings should be inspected any time that the wheels are removed. Check both ends of the outboard shoe by looking in at each end of the caliper. This is the point at which the highest rate of wear normally occurs. At the same time, check the lining thickness on the inboard shoe by looking down through the inspection hole in the top of the caliper--See "Brake Inspection".

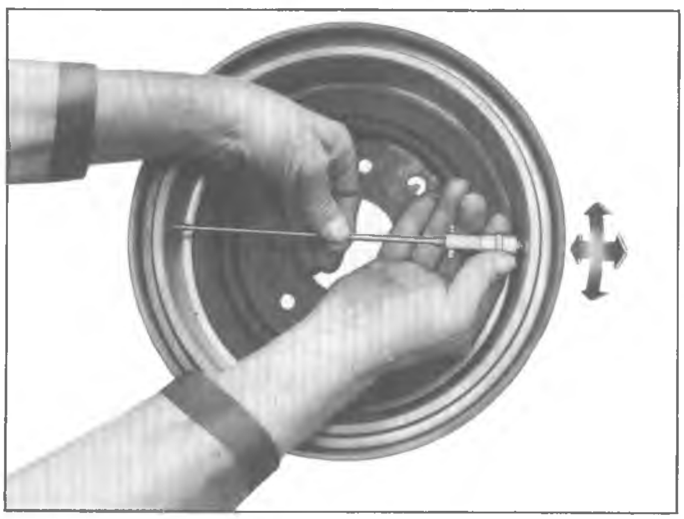


Fig. 52--Measuring Drum Diameter

The outboard shoes have ears near the outer edge which are bent over at right angles to the shoe. The top ends of the shoe have looped ears with holes in them which the caliper retaining bolts fit through. The large tab at the bottom of the shoe is bent over at a right angle and fits in the cut-out in the outboard section of the caliper.

NOTE: Outboard shoes (with formed ears) are designed for original installation only and are fitted to the caliper. The shoes should never be relined or reconditioned for reinstallation.

The inboard shoe and lining has ears on the top ends which fit over the caliper retaining bolts. A special spring inside the hollow piston supports the bottom edge of the inboard shoe.

A spring steel scraper (wear sensor) is riveted to the rear edge of each inner brake shoe (fig. 59). When the shoe lining has worn to within .030" of the rivet heads, the face of the scraper (sensor) contacts the rotor. At this point, an audible high frequency sound (squeal) is emitted to alert the vehicle operator that it is time to replace the brake linings. This warning sound is emitted continuously (provided the wheels are rotating and the brakes are **not** applied). Upon brake application, the warning sound may change or cease completely. If lining wear continues beyond the point at which linings should have been replaced, the warning sound may also cease.

Removal

1. Remove master cylinder cover and observe brake fluid level in reservoir for front brakes. If reservoir is more than 1/3 full, siphon the necessary amount out to bring the level to 1/3 full; this step is taken to avoid reservoir overflow when the caliper piston is pushed back into its bore.) Discard the brake fluid removed. Never reuse brake fluid.
2. Raise the vehicle and remove the front wheels.
3. Push the piston back into its bore. This can be accomplished by using a "C" clamp as shown in Figure 53.
4. Remove the two mounting bolts which attach the caliper to the support (fig. 54).
5. Lift the caliper off the disc.
6. Remove the inboard shoe. Dislodge the outboard shoe and position the caliper on the front suspension arm so that the brake hose will not support the weight of the caliper.

   CAUTION: *Mark shoe positions if they are to be reinstalled.*

7. Remove the shoe support spring from the piston.

Proportioning Valve

The function of this valve is prevent premature rear wheel slide. Line pressure is allowed to increase normally up to a certain point (determined by vehicle weight and braking distribution). When the predetermined pressure is reached, the valve begins to function and limit the amount of increase in hydraulic pressure passed to the rear brakes. This prevents the rear brakes from locking up before the full effective braking effort is produced by the front disc brakes.

NOTE: In the event of "front hydraulic system failure" the proportioning valve has a "by-pass" feature that assures full system pressure to the rear brakes.

Removal

1. Disconnect electrical lead.
2. Place dry rags below valve to absorb any fluid spillage.
3. Wipe off any dirt and disconnect hydraulic lines from valve--cover open lines to prevent foreign matter from entering the system.
4. Remove mounting screws and remove valve.

Installation

1. Make sure new switch is clean and free of lint. If any doubt exists, wash the switch in clean brake fluid.
2. Place new switch in position and secure with screws.

   CAUTION: *See "Caution" on Page 1 of this section.*

3. Connect hydraulic lines to valve.

   CAUTION: *See "Caution" on Page 1 of this section.*

4. Connect switch electrical lead.
5. Bleed the brake system.

Brake Warning Light Checking

1. Set parking brake and turn the ignition key to "ON".
2. Warning lamp should light.
3. If lamp does not light, bulb is burned out or electrical circuit is defective.
4. Turn ignition key off.
5. Replace bulb or repair circuit as necessary.

Testing Warning Switch

1. Raise vehicle on a hoist and attach a bleeder hose to a rear brake bleed screw and immerse the other end of hose in a container partially filled with clean brake fluid. Be sure master cylinder reservoirs are full.

   NOTE: When bleeding the brakes; the pin in the end of the metering portion of the combination valve must be held in the open position (not allowed to close). This can be accomplished by installing Tool J-23709 under the mounting bolt and depressing the pin a slight amount. Be sure to re-torque the mounting bolt after removing Tool J-23709 (fig. 28).

   CAUTION: *See "Caution" on Page 1 of this section.*

2. Turn ignition key "ON". Open bleed screw while helper applies heavy pressure to brake pedal. Warning lamp should light. Close bleed screw before helper releases pedal.

   NOTE: To "reset" switch, apply heavy pedal force. This force will apply hydraulic pressure which re-centers the switch contact.

3. Attach bleeder hose to front brake bleed screw and repeat Step 2.
4. Turn ignition key off. See Note under Step 2.
5. Lower vehicle to floor.

   NOTE: If warning lamp does not light during Steps 2 and 3 but does light when the parking brake is set, warning light switch is defective. Do not attempt to repair switch. A defective switch must be replaced with a new combination valve assembly.

   CAUTION: *Caution should be taken to prevent air from entering system during checks on switch.*

The recommended checking interval should be 24 months or 24,000 miles, any time major brake work is done or any time a customer complains of excessive pedal travel.

BRAKE PEDAL—SERVICE BRAKE (Fig. 71)

NOTE: The brake pedal mounting is an integral design with the clutch pedal (except automatic transmission), necessitating the removal of the clutch pedal before removing the brake pedal.

Removal

1. Remove the pull back spring from the body or brake pedal support bracket.
2. **Manual Transmission Vehicles**--Remove the clutch pedal as outlined under "Clutch Pedal" in Section 7.

   Automatic Transmission Vehicles--Remove pedal pivot bolt nut or pivot pin retainer and remove bolt or pin and bushings.

3. **P Models**--Remove the sleeve assembly screw attachment and remove sleeve.

DIAGNOSIS—DRUM BRAKES

REAR BRAKES DRAG

Probable Cause	Remedy
1. Maladjustment.	1. Adjust brake shoes and parking brake mechanism.
2. Parking brake cables frozen.	2. Lubricate with Delco Brake Lube #5450032 (or equivalent).

PULLS TO ONE SIDE

Probable Cause	Remedy
1. Grease or fluid soaked lining.	1. Replace with new linings or shoe and lining assemblies.
2. Adjustment not correct.	2. Adjust the brakes.
3. Loose wheel bearings, loose flange plate on rear axle or front axle or loose spring bolts.	3. Adjust the wheel bearing, tighten the flange plate on the rear and front axles and tighten spring bolts.
4. Linings not of specified kind or primary and secondary shoes reversed.	4. Install new linings or shoe and lining assemblies.
5. Tires not properly inflated or unequal wear of tread. Different tread non-skid design.	5. Inflate the tires to recommended pressures. Rearrange the tires so that a pair of non-skid tread surfaces of similar design and equal wear will be installed on the front wheels, and another pair with like tread will be installed on the rear wheels.
6. Linings charred.	6. Replace with new lining or shoe and lining assemblies.
7. Water, mud, etc., in brakes.	7. Remove any foreign material from all of the brake parts and the inside of the drums. Lubricate the shoe ledges and the rear brake cable ramps with Delco Brake Lube #5450032 (or equivalent).
8. Wheel cylinder sticking.	8. Overhaul or replace wheel cylinder.
9. Weak or broken retracting springs.	9. Check springs-replace bent, open-coiled or cracked springs.
10. Out-of-round drums.	10. Resurface or replace drums in left and right hand pairs.
11. Brake dragging.	11. Check for loose lining. Adjust.
12. Weak chassis springs or loose "U" bolts.	12. Replace springs or tighten "U" bolts.
13. Loose steering.	13. Repair and adjust.
14. Unequal camber.	14. Adjust to specifications.
15. Clogged or crimped hydraulic line.	15. Repair or replace line.
16. Wheel cylinder size different on opposite sides.	16. Replace with correct cylinders.
17. Loose king pin or bushings.	17. Replace king pins or bushings.
18. Bad drum.	18. Refinish drums in pairs.

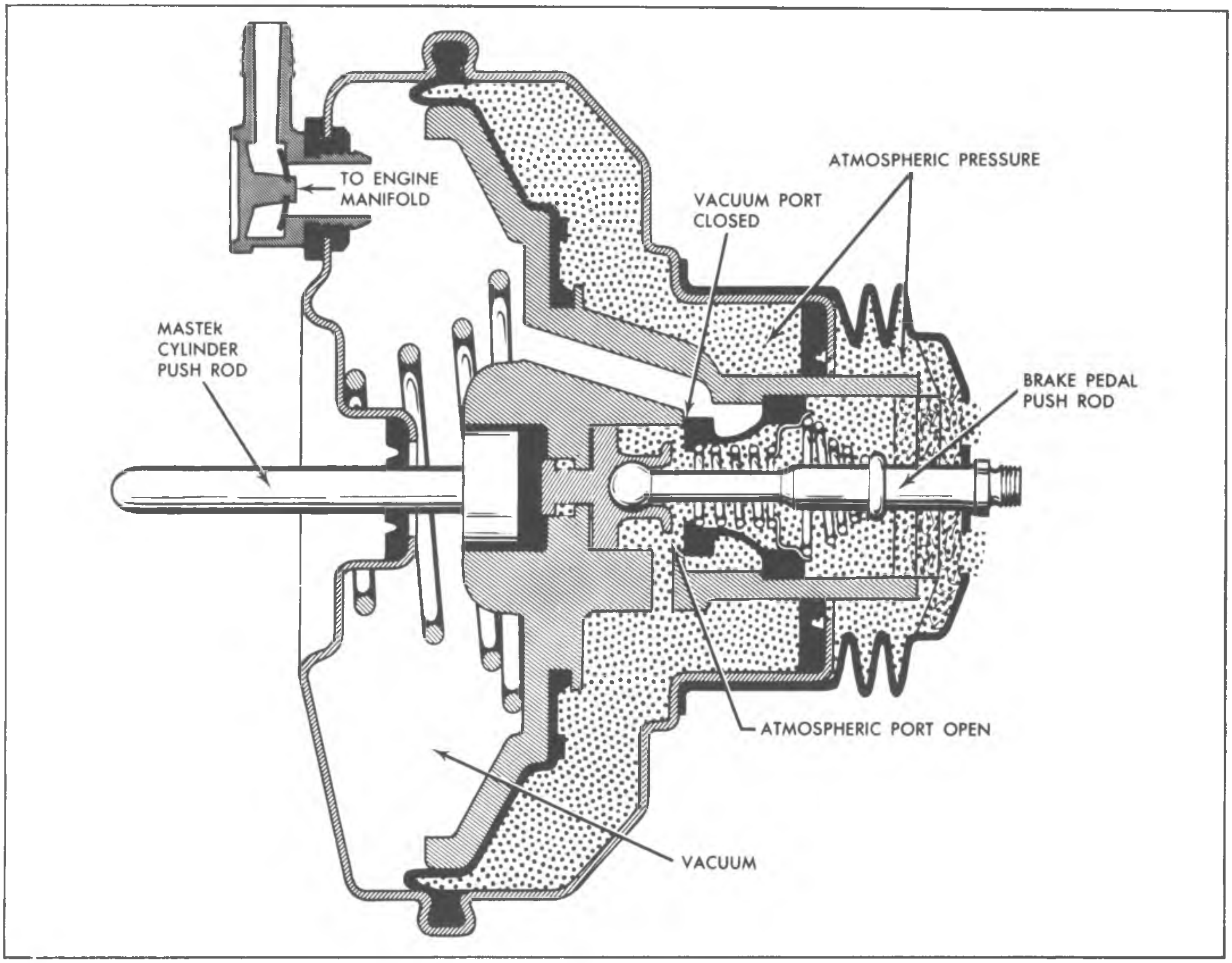


Fig. 85--Typical Circuit - Applying

As the power piston travels forward, the master cylinder piston rod carries the master cylinder primary piston further into the bore of the master cylinder. The force on the master cylinder primary piston spring forces the secondary piston to move forward. As the primary seal, on both the master cylinder primary and the secondary pistons pass the compensating ports in the bore, hydraulic pressure will build up in the lines to the front and rear brakes. As the pressure builds up on the end of the master cylinder piston, the hydraulic reaction plate is moved off its seat on the power piston and presses against the reaction levers. The levers, in turn, swing about their pivots and bear against the end of the air valve operating rod assembly. In this manner approximately 30% of the load on the hydraulic master cylinder piston is transferred back through the reaction system to the brake pedal. This gives the operator a feel, which is proportional to the degree of brake application.

7. Turn off the engine and check the fluid level in the reservoir; add fluid if necessary.
8. Lower the vehicle, start the engine and run at approximately 1500 rpm. Again, apply and release the brake pedal several times. Turn the steering wheel to full right and left.
9. Turn off the engine and check the fluid level in the reservoir; add fluid if necessary.
10. If the fluid is extremely foamy, allow the vehicle to stand a few minutes with the engine off, and repeat Steps 1 through 9 above.
11. Erratic pedal feel is an indication of excessive air in the power steering system. Allow vehicle to stand a few minutes with engine off and then repeat Steps 1-9 above.

BLEEDING BRAKE HYDRAULIC SYSTEM

Bleeding of the Hydraulic Brake System is described under "Bleeding Hydraulic System" in the Standard Brake portion of this section.

BRAKE PEDAL ADJUSTMENT

C Models

The brake pedal push rod is not adjustable on C models.

P30(32) Models

1. With the brake pedal pull back spring installed, brake pedal hard into bumper, brake master

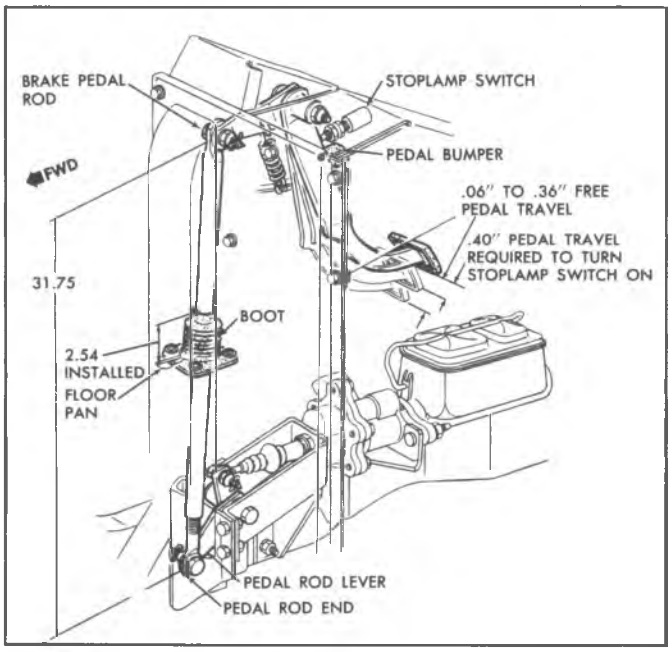


Fig. 94--Brake Pedal and Stop Lamp Adjustment--P30(32) Model

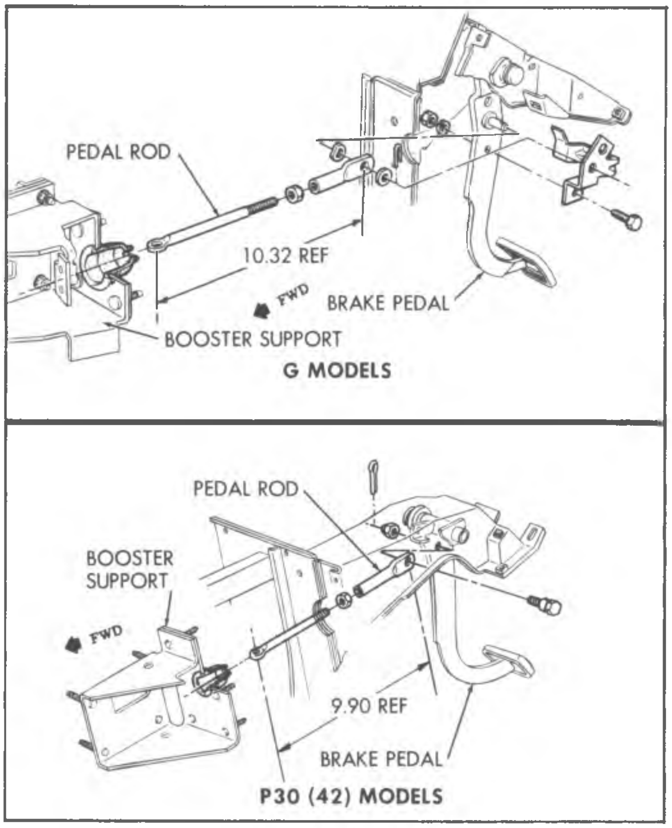


Fig. 95--Brake Pedal Adjustment--P30(42) and G Models

cylinder assembly and brake pedal rod lever at full return, install pre-assembled brake pedal rod assembly (rod, end and boot).

NOTE: Pre-assembled brake pedal rod assembly should be adjusted to dimension shown in Figure 94.

2. Adjust free pedal travel by turning the brake pedal rod end. Free pedal travel should be .06" to .36" (fig. 94).
3. Fasten boot to floorpan assembly and compress boot to 2.54" installed height.

NOTE: Pedal travel in a "power off" situation (engine off-accumulator depleted) should not be more than 6" under a 90# load.

P30(42) and G Models

1. Adjust the pedal rod to the length shown in Figure 95 and install in the vehicle.
2. Check pedal height and adjust to the dimensions shown in Figure 41.

STOPLAMP SWITCH ADJUSTMENT

1. Release the brake pedal to its normal position.
2. Loosen the switch locknut. Rotate the switch in its

DIAGNOSIS - HYDRO - BOOST SYSTEM

SLOW BRAKE PEDAL RETURN

Probable Cause	Remedy
1. Excessive seal friction in booster.	1. Replace all booster seals.
2. Faulty spool action.	2. Clean spool and replace all booster seals.
3. Broken piston return spring.	3. Replace spring.
4. Restriction in return line from booster to pump reservoir.	4. Replace line.
5. Broken spool return spring.	5. Replace spring.
6. Excessive pedal pivot friction.	6. Lubricate pivot bushings with Delco Brake Lube #5450032 (or equivalent) or replace bushings.

GRABBY BRAKES

Probable Cause	Remedy
1. Broken spool return spring.	1. Replace spring.
2. Faulty spool action caused by contamination in system.	2. Inspect, clean and replace all booster seals.

BOOSTER CHATTERS - PEDAL VIBRATES

Probable Cause	Remedy
1. Power steering pump belt slips.	1. Tighten belt.
2. Low fluid level in power steering pump reservoir.	2. Fill reservoir and check for external leaks.
3. Faulty spool operation caused by contamination in system.	3. Inspect, clean and replace all booster seals.
4. Excessive contamination in power steering fluid.	4. Flush power steering fluid from system and replace with new power steering fluid.

designed, particularly, for these engines; therefore, they must not be interchanged with or replaced by a carburetor or distributor designed for different applications.

SERVICE EXHAUST GAS RECIRCULATION (EGR) VALVE

The valve should be removed and inspected at intervals as specified in Section 0. Perform necessary service operations as specified in Section 6T.

CHOKE ADJUSTMENT

Inspect choke valve, choke rod, choke coil and housing for proper alignment, bends and binding — make necessary corrections to assure proper choke operation; then adjust choke as outlined in Section 6M.

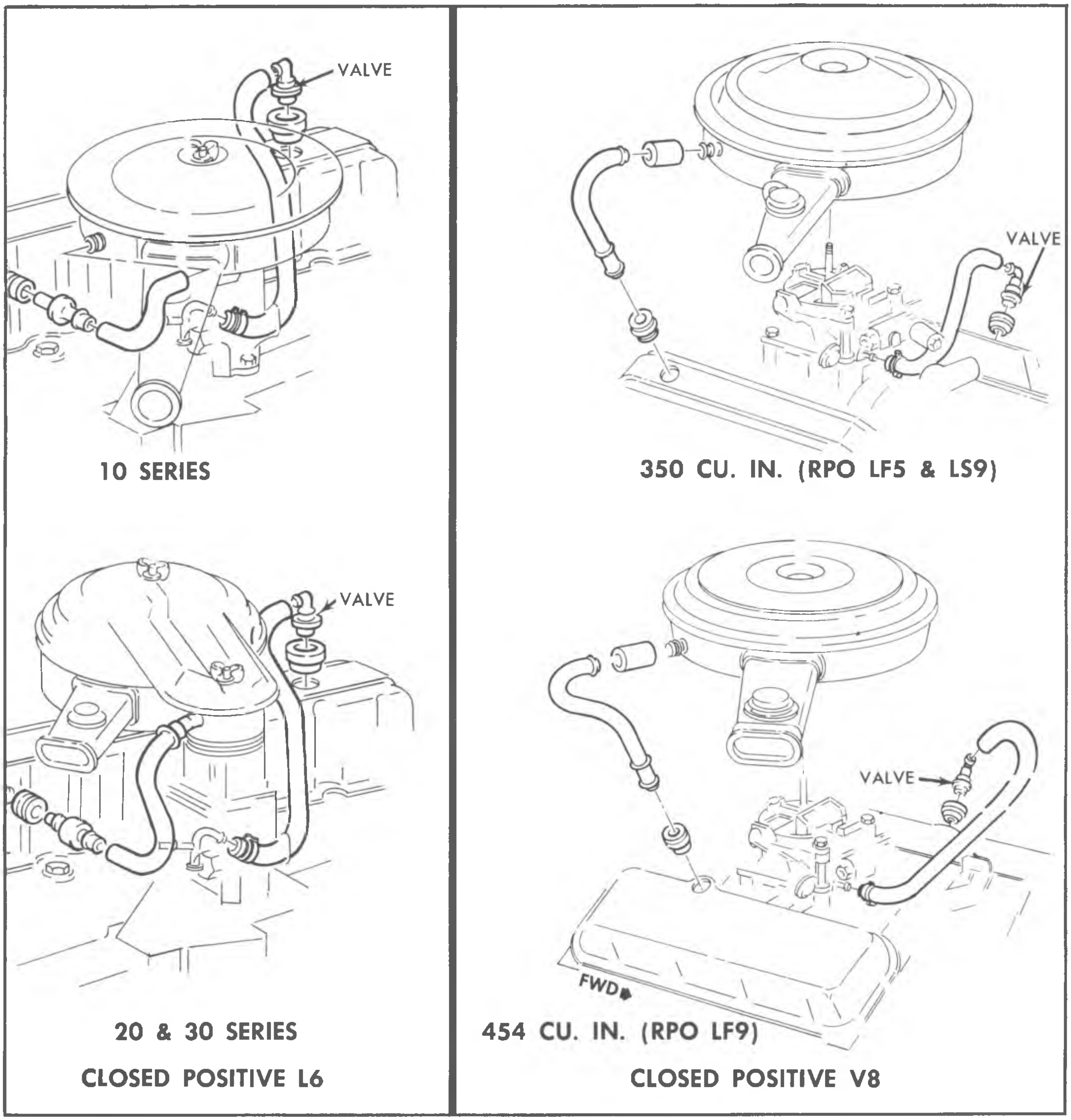


Fig. 11—Crankcase Ventilation Systems

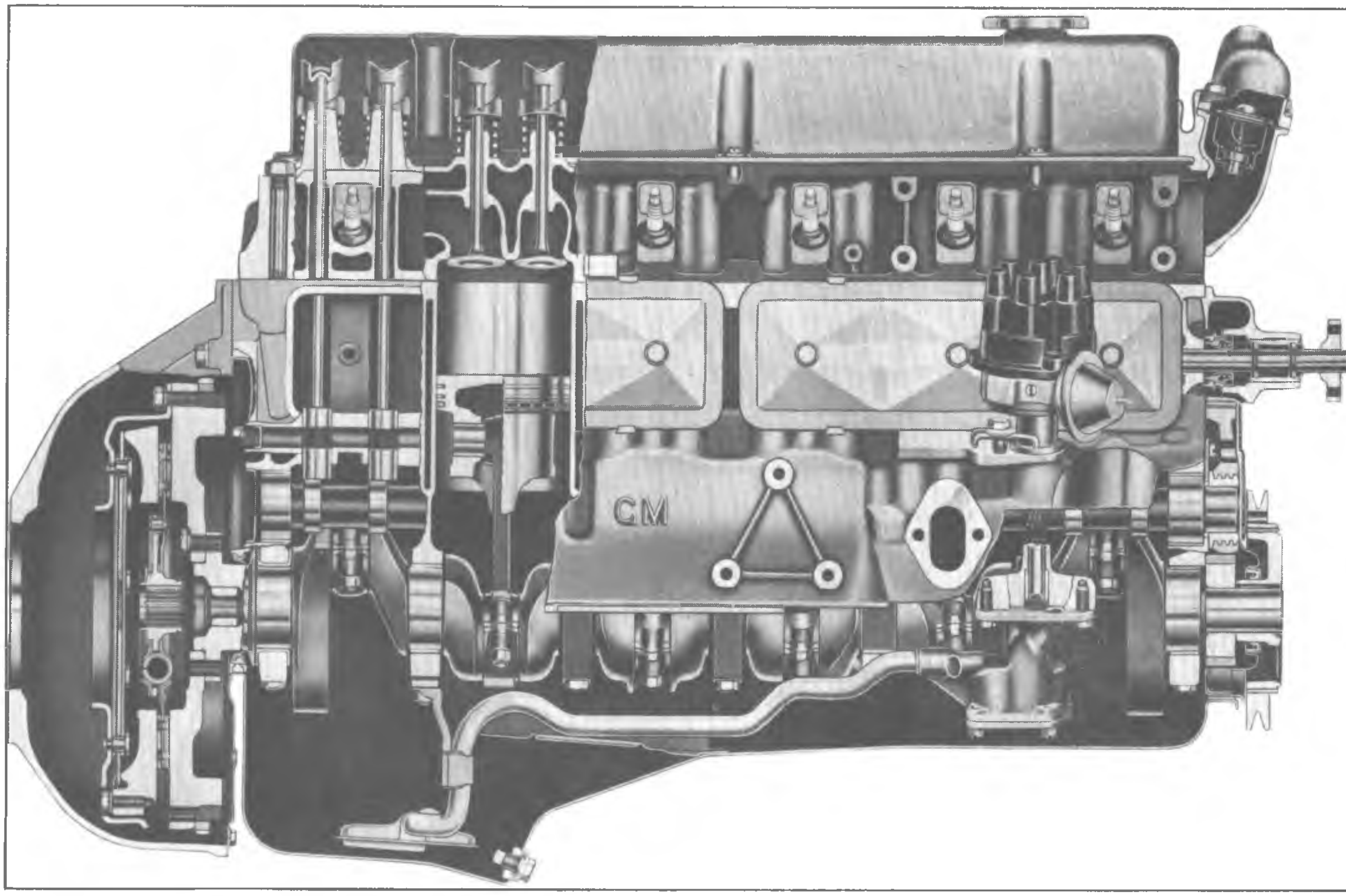


Fig. 2D—Sectional View of Six-Cylinder Engine

high pressure within the cylinder to push the piston down smoothly during the power stroke.

Compression Ratio

The compression ratio is a comparison of the volume of the cylinder and combustion chamber when the piston is all the way down, to the volume remaining when the piston is all the way up.

The main advantage of a **high** compression ratio is that it enables the engine to develop more power from a given charge of fuel. The combustion pressure exerted downward on the piston is always 3 or 4 times as great as the compression pressure. Consequently, an increase in compression pressure (input) means at least three times as great an increase in combustion pressure (output).

Valve Timing

As in most 4-stroke cycle engines, the intake valve begins to open before the piston reaches the top, and the exhaust valve remains open until after top dead center. This means that both valves are open for a short period of time. This condition is called valve overlap (Fig. 7D). The valve timing is arranged this way to use the inertia of the gas in evacuating and in filling the cylinders.

When the air-fuel mixture and exhaust gases move in or out of the cylinder, its weight gives it momentum in the established direction. When a valve opens, the initial air flow is slow. Valve timing allows for this lag in starting and stopping in the flow. In order to pack the maximum air-fuel mixture into the cylinder, each valve opens earlier and closes later than would be necessary if the mixture were weightless.

On the intake stroke, the exhaust valve stays open a little after top center to take advantage of the momentum of the exhaust gases rushing out through the valve, even though the piston has started down. With the exhaust valve still open, the cylinder continues to empty itself because of this momentum.

On the compression stroke, the intake valve stays open past bottom center because incoming gases will continue to pack their way in for a short time after the piston reverses direction, due to their momentum.

On the power stroke, the exhaust valve opens before bottom center to get the exhaust gases started out of the cylinder.

On the exhaust stroke, the intake valve opens before top center to start the air fuel mixture moving into the cylinder.

Valve timing is not variable with speed and load as is ignition timing. Except for very small variations due to the stack of tolerances in the valve train (Fig. 8D), valves always open and close at the same time in the cycle. There is, however, one particular speed for a given engine at which the air-fuel mixture will pack itself into

4. Connect crankcase ventilation hoses.
5. Install air injection hose.

Valve Mechanism

Removal

1. Remove rocker arm cover as outlined.
2. Remove rocker arm nuts, rocker arm balls, rocker arms and push rods.

   NOTE: Place rocker arms, rocker arm balls and push rods in a rack so that they may be reinstalled in the same location.

Installation and Adjustment

NOTE: Whenever new rocker arms and/or rocker arm balls are being installed, coat bearing surfaces of rocker arms and rocker arm balls with "Molykote" or its equivalent.

1. Install push rods. Be sure push rods seat in lifter socket.
2. Install rocker arms, rocker arm balls and rocker arm nuts. Tighten rocker arm nuts until all lash is eliminated.
3. Adjust valves when lifter is on base circle of camshaft lobe as follows:
   a. Mark distributor housing, with chalk, at number one and number six cylinder positions (plug wire) then disconnect plug wires at spark plugs and coil and remove distributor cap and plug wire assembly (if not previously done).
   b. Crank engine until distributor rotor points to number one cylinder position and breaker points are open. The following valves can be adjusted with engine in number one firing position.

      Number one cylinder-Exhaust and Intake

      Number two cylinder-Intake

      Number three cylinder-Exhaust

      Number four cylinder-Intake

      Number five cylinder-Exhaust
   c. Back out adjusting nut until lash is felt at the push rod then turn in adjusting nut until all lash is removed. This can be determined by checking push rod side play while turning adjusting nut (fig. 6L). When play has been removed, turn adjusting nut in one full additional turn (to center lifter plunger).
   d. Crank engine until distributor rotor points to number six position and breaker points are open. The following valves can be adjusted with engine in number six firing position:

      Number two cylinder-Exhaust

      Number three cylinder-Intake

      Number four cylinder-Exhaust

      Number five cylinder-Intake

      Number six cylinder-Intake and Exhaust
4. Install distributor cap and spark plug wire assembly.
5. Install rocker arm cover as outlined.
6. Adjust carburetor idle speed.

Valve Lifters

Hydraulic valve lifters very seldom require attention. The lifters are extremely simple in design. Readjustments are not necessary, and servicing of the lifters requires only that care and cleanliness be exercised in the handling of parts.

Locating Noisy Lifters

Locate a noisy valve lifter by using a piece of garden hose approximately four feet in length. Place one end of the hose near the end of each intake and exhaust valve with the other end of the hose to the ear. In this manner, the sound is localized making it easy to determine which lifter is at fault.

Another method is to place a finger on the face of the valve spring retainer. If the lifter is not functioning properly, a distinct shock will be felt when the valve returns to its seat.

The general types of valve lifter noise are as follows:

1. Hard Rapping Noise – Usually caused by the plunger becoming tight in the bore of the lifter body to such an extent that the return spring can no longer push the plunger back up to working position. Probable causes are:

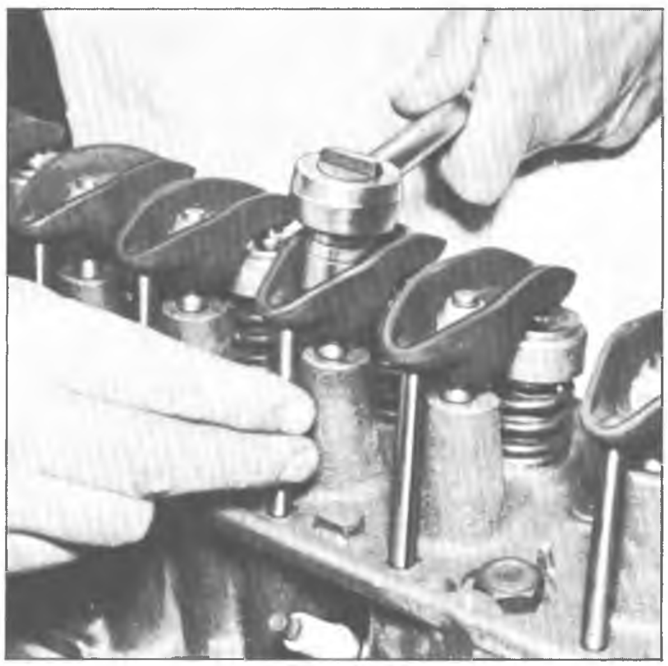


Fig. 6L—Valve Adjustment

points, lower the engine on the mounts and tighten the screws or nuts attaching the mount to the engine, frame, or bracket.

Rear Mount

Raise the vehicle on a hoist. Push up and pull down on the transmission tailshaft while observing the transmission mount. If the rubber separates from the metal plate of the mount or if the tailshaft moves up but not down (mount bottomed out) replace the mount. If there is relative movement between a metal plate of the mount and its attaching point, tighten the screws or nuts attaching the mount to the transmission or crossmember.

Front Mount Replacement

C, K and P Series

1. Remove frame bracket to mount bolt.
2. Raise engine enough to clear mount.
3. Remove mount and install new mount.
4. Install new mount and torque bolts to specifications.
5. Lower engine then install frame bracket to mount bolt and torque to specifications.

G Series

1. Raise vehicle on hoist.
2. On manual transmission equipped vehicles.
   a. Disconnect clutch rod at outboard lever on clutch cross shaft.
   b. Remove the two bolts securing clutch cross shaft bracket to frame side rail, and position clutch linkage away from engine mount.
3. Remove mount-to-bracket through-bolt.
4. Raise engine sufficiently to clear mount. Remove bolts securing mount to frame bracket.
5. Install new mount to frame bracket, and torque bolts to specifications.
6. Lower engine to align mount with engine bracket. Install through bolt and torque to specifications.
7. On manual transmission equipped vehicles.
   a. Position clutch cross shaft between frame side rail and ball stud on engine bracket. Install and torque frame bolts.
   b. Connect clutch rod at outboard lever on clutch cross shaft.
8. Lower vehicle on hoist and check operation of clutch.

Rear Mount Replacement

C, K and P Series

1. Raise and support vehicle.
2. Bend mount bolt french lock tabs away from bolt head, then remove mount bolts, lower mount and spacer.
3. Raise engine enough to clear upper mount assembly and remove upper mount from frame member.

   NOTE: On models using a propeller shaft brake of any type, it is necessary to remove screws from transmission hole cover to allow the engine to raise because of the limited clearance between the brake and transmission hole cover.

4. Place new upper mount in place on frame member, then lower engine to within 1/4 inch of mount.
5. Align mount so that guide dowel enters hole in mount, install bolt through french lock, lower mount and spacer, then install bolt up through frame, upper mount and thread into engine bell housing loosely.
6. Lower engine completely and tighten mount bolt, then bend tabs of french lock to lock the bolt in place.

G Series

1. Raise vehicle on hoist and support transmission so as not to interfere with support crossmember removal.
2. Remove bolts securing rear mount to support crossmember.
3. Remove support crossmember retaining bolts from underbody cross rail and withdraw support from vehicle.
4. Remove bolts securing mount to transmission extension.
5. Install new rear mount and torque bolts to specifications.
6. Position support crossmember to cross rail, install bolts then loosely install crossmember-to-mount retaining bolts.
7. Remove support from rear of transmission, torque remaining bolts to specifications and lower vehicle on hoist.

12. Mount engine in engine stand and remove lifting device and lifting adapter.

G Series

1. Remove vehicle grille as outlined in Section 13.
2. Drain cooling system and disconnect heater outlet hose at radiator and inlet hose at heater core tube.
3. Disconnect radiator lower hose at radiator; disconnect radiator upper hose at engine.
4. Disconnect automatic transmission cooler lines at radiator.
5. Remove fan shroud and radiator - position headlamp wiring out of the way.
6. Remove radiator upper tie bar and center support.
7. Disconnect battery cables at battery and at radiator support baffle - position cables over engine.
8. Disconnect engine wiring harness at dash mounted fuse panel; at cowl attachments, and position loose harness assembly on engine.
9. Disconnect oil pressure gauge, if so equipped.
10. Raise vehicle on a hoist and disconnect:
    - Fuel line (from tank) at fuel pump.
    - Engine ground strap(s).
    - Speedometer cable at transmission.
    - Exhaust pipe at manifolds.
    - Transmission at crossmember.
11. Disconnect clutch linkage and/or transmission linkage and remove cross shaft as outlined in Section 7.
12. Remove propeller shaft as outlined in Section 4 - install plug in transmission extension.
13. Remove engine mount-to-crossmember bracket attaching bolts (both sides of engine).
14. Remove engine mount through bolts; then raise engine and remove bracket and mount as an assembly.
15. Position blocks between engine mount brackets and crossmember to support engine; then lower engine onto supports.
16. Lower vehicle on hoist - leavy vehicle on hoist and approximately 12 inches off the floor.
17. Working from inside the vehicle - remove the engine access cover.
18. Remove the engine air cleaner assembly.
19. Disconnect power brake vacuum line at inlet manifold.
20. Disconnect linkage from carburetor throttle lever, disconnect carburetor fuel inlet line and remove carburetor and choke assembly from manifold.
21. Remove the two forward center inlet manifold bolts (numbers 3 and 4) (fig. 1V).

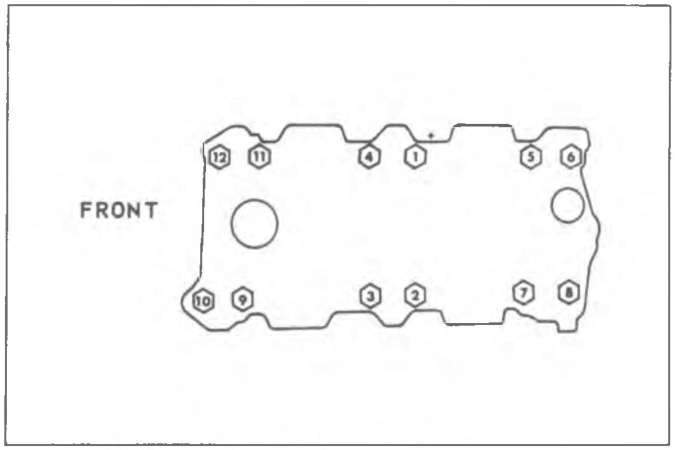


Fig. 1V—Inlet Manifold Attaching Bolts

22. Position Tool J-24680-1 (fig. 2V) to the engine and install with provided bolts (fig. 3V).
23. Attach lifting device to Tool J-24680-1, and with the

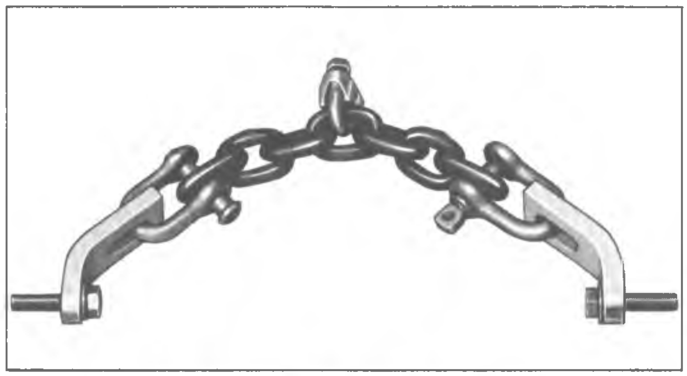


Fig. 2V—Engine Lifting Tool J-24680-1

Fig. 3V—Tool J-24680-1 Installed on Engine 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.

   NOTE: 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 as outlined.

Mark IV V8 Engine

1. Clean gasket surface on block and crankcase front cover.
2. Cut tabs from the new oil pan front seal (fig. 17V), use a sharp instrument to ensure a clean cut.
3. Install seal to front cover, pressing tips into holes provided in cover.
4. Coat the gasket with gasket sealer and place in position on cover.
5. Apply a 1/8 inch bead of silicone rubber sealer, part #1051435 (or equivalent) to the joint formed at the oil pan and cylinder block (fig. 18V).
6. Position crankcase front cover over crankshaft.
7. Press cover downward against oil pan until cover is aligned and installed over dowel pins on block.
8. Install and partially tighten the two, oil pan-to-front cover attaching screws.
9. Install the front cover-to-block attaching screws.
10. Torque all screws to specifications.
11. Install torsional damper and water pump as outlined.

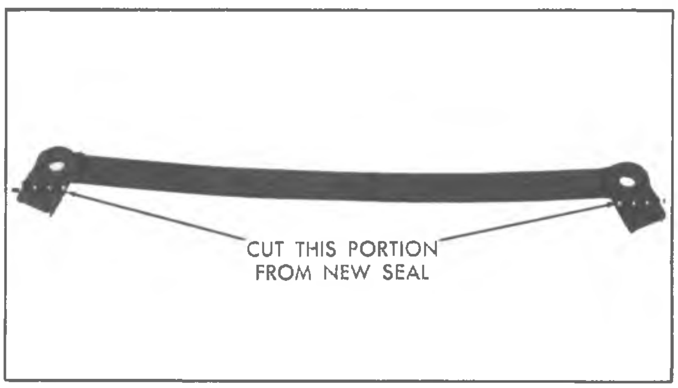


Fig. 17V—Oil Pan Front Seal Modification

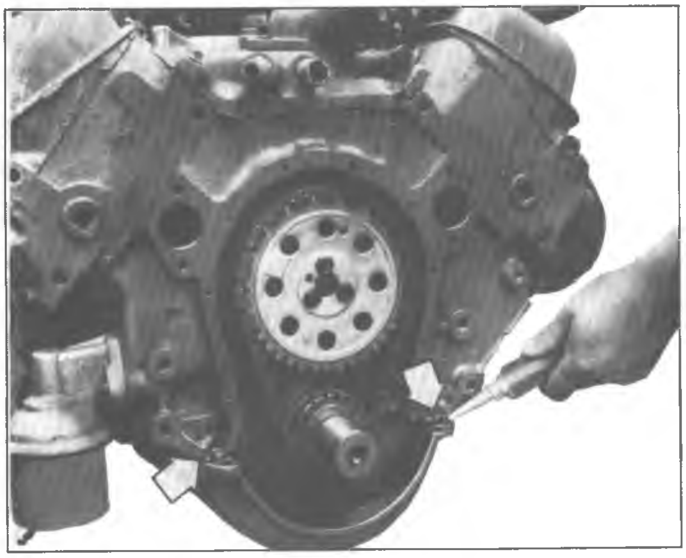


Fig. 18V—Applying Front Cover Sealer

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 on Small V8 engines or Tool J-22102 on Mark IV V8 engines (fig. 19V).

   CAUTION: *Support cover at seal area. (Tool J-971 may be used as support).*

Without Cover Removed

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

Fig. 19V—Installing Oil Seal (Cover Removed)

DIAGNOSIS

ENGINE FAILS TO START

CAUSE

a. Corroded or loose battery terminal connections and/or weak battery.

b. Broken or loose ignition wires and/or faulty ignition switch.

c. Excessive moisture on plugs, caps or ignition system.

d. Damaged distributor rotor, cracked distributor cap and/or corroded distributor contact points.

e. Fouled spark plugs and/or improper spark plug gap.

f. Weak or faulty coil.

g. Carburetor flooded and/or fuel level in carburetor bowl not correct.

h. Dirt and water in gas line or carburetor.

i. Sticking choke.

j. Faulty fuel pump.

k. Faulty solenoid or starting motor.

l. Park or neutral switch inoperative.

ENGINE LOPES WHILE IDLING

CAUSE

a. Air leaks between intake manifold and head.

b. Blown head gasket.

c. Worn timing chain or sprockets.

d. Worn camshaft lobes.

e. Overheated engine.

f. Plugged crankcase vent valve.

g. Faulty fuel pump.

h. Leaky exhaust gas recirculation valve.

ENGINE MISSES WHILE IDLING

CAUSE

a. Spark plugs damp or gap incorrectly set.

b. Excessive moisture on ignition wires and cap.

c. Leaks in ignition wiring.

d. Ignition wires making poor contact.

e. Uneven compression.

f. Burned, pitted or incorrectly set contact points.

g. Faulty coil or condenser.

h. Worn distributor cam or cracked distributor cap.

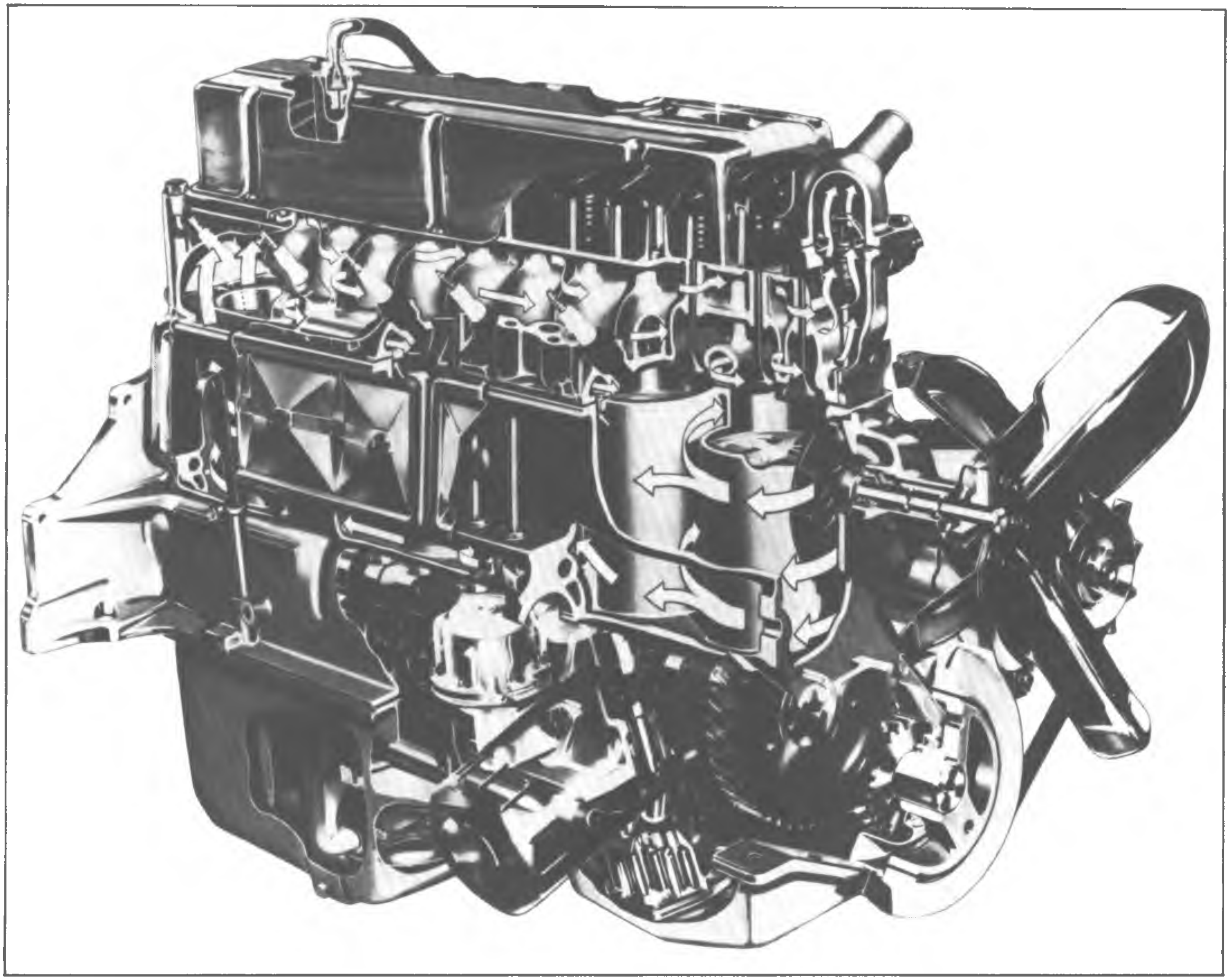


Fig. 4—Engine Coolant Circulation (Six-Cylinder)

COMPONENTS

Water Pump

The cooling system water pump is of the centrifugal vane impeller type. The impeller turns on a steel shaft that rotates on a double row of permanently lubricated ball bearings, which are sealed during manufacture to prevent loss of lubricant and to prevent entry of dirt and water.

The pump inlet is connected to the bottom of the radiator by means of a rubber hose. Pump outlet is separate from the pump and is located in the thermostat housing which is connected to the top of the radiator by a rubber hose.

Radiator

Radiators are designed to hold a large volume of coolant so that the coolant is also exposed to a large volume of air. The object being to transfer heat produced during combustion to the coolant and then to transfer heat in the coolant to air flowing passed the radiator.

Radiators are of the cross-flow type (Fig. 5). The water flows horizontally from the input (left) tank through the individual cores to the output (right) tank.

Radiators used on vehicles equipped with automatic transmission may, in some instances, have oil coolers into the right (output) tank. Inlet and outlet fittings for transmission fluid circulation are positioned vertically on the tank.

Radiator Cap

The pressure type radiator filler cap is designed to operate the cooling system at higher than atmospheric pressure. The higher pressure raises the boiling point of the coolant, which increases the efficiency of the radiator.

The radiator filler cap contains a pressure relief valve and a vacuum relief valve. The pressure relief valve is

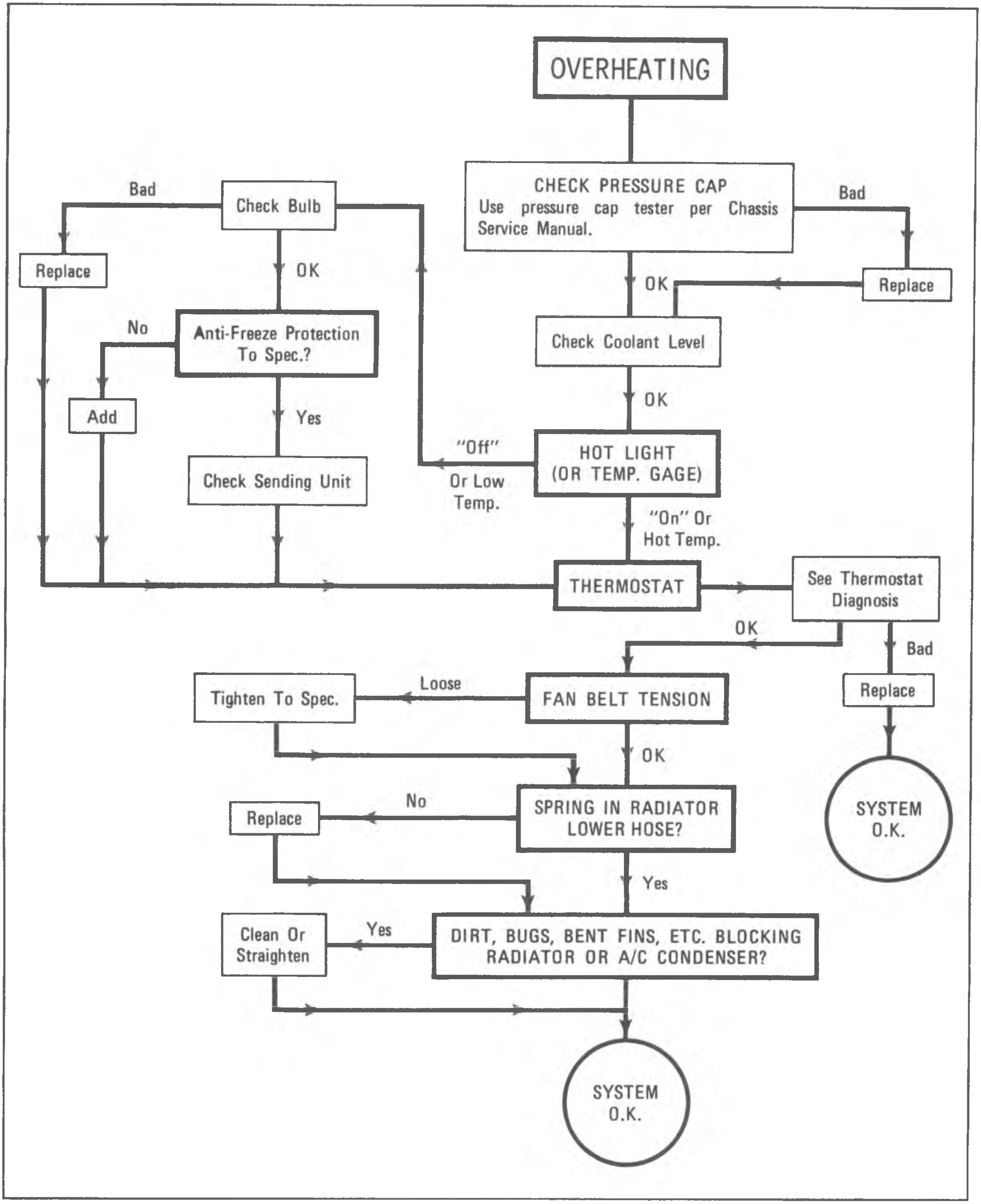


Fig. 16—Overheating Chart

while maximum power should be available when the throttle is opened for acceleration or top speed (Fig. 13).

Through this point, we have covered the engine's general requirements insofar as the need for both a vaporized mixture and the proportions, or ratio, of the air-fuel vapor for efficient combustion. This leaves only one question which needs clarification before we end this discussion of air-fuel requirements, that is, "Why are richer fuel mixtures needed for cold starts "

COLD STARTS

Recall for a moment that the cigarette lighter could be ignited easily indoors but after exposure to colder air, the lighter failed to light. It was concluded that the lighter failed to light because there was too little fuel vapor or actually the air-fuel ratio was too lean to burn.

Preheating to increase fuel vaporization to correct the air-fuel ratio is the answer in the case of the cigarette lighter but this would be impractical from a time and cost standpoint for automotive use.

We are all aware that a choke is used on carburetors to restrict the air flow and thereby enrich the fuel mixture. Because of this, many assume that a richer mixture is actually burned during cold engine operation but this is definitely not the case. Although the air-fuel ratio may vary fuel is always burned at a 15:1 ratio. While this may seem contrary to actual conditions, the key is the term "vaporize." Since only vaporized fuel burns and the vaporization rate is sharply reduced at lower temperatures, a rich fuel charge must be admitted so that the total resultant fuel vapor reaching the cylinders will be rich enough to create a combustible mixture.

The extra fuel (that which did not vaporize) is minimized, or in some engines is discharged from the port unburned as waste during the exhaust cycle and burned in the exhaust system. While this represents a considerable waste of fuel, it is necessary to provide combustible fuel mixtures until the engine is warmed up.

While the discussion of engine air-fuel requirements has been brief, the following points should be remembered:

- Only vaporized gasoline will burn
- Air-Fuel ratios are referenced in terms of weight
- Vaporization rates reduce as temperature declines
- Gasoline always burns at a 15-to-1 ratio; extra fuel is not burned but lost as waste.

BASIC CARBURETOR SYSTEMS

The carburetor performs a comparatively simple job but it does so under such varied conditions that it is necessary to have several systems to alter its functions so that it can adjust to various situations. Most carburetors contain the following six basic systems:

- Float System
- Idle System
- Main Metering System
- Power System
- Pump System
- Choke System

Float System

(Fig. 14)

Fuel in the carburetor float bowl must be maintained at a specified level for correct fuel metering under all driving conditions. The float system accomplishes this by using a float pontoon and attached leverage arm which exerts force against a needle valve, shutting off fuel flow when the specified level is reached in the carburetor bowl. Fuel enters the inlet and fills the carburetor bowl through the valve orifice (needle seat).

As the level in the bowl rises, the buoyant action of the float seats the needle valve. When fuel is being used from the bowl, the float drops sufficiently to allow the needle to unseat and fuel to enter past the needle to maintain the specified level in the float bowl.

The liquid level controlled by the float setting is an important part of the calibration of the carburetor. The effects of a low liquid level causes poor performance in the main metering system and could cause loss of power. High liquid level can result in premature main metering delivery and fuel spillage during normal car maneuvering, each of which causes excessive fuel consumption and an over-rich condition. The fuel level is controlled by a float and adjusted by bending a tab on the float arm. Accuracy of this adjustment may be measured by checking the physical relationship of the float to a particular area on the fuel bowl.

The float system is perhaps one of the most important

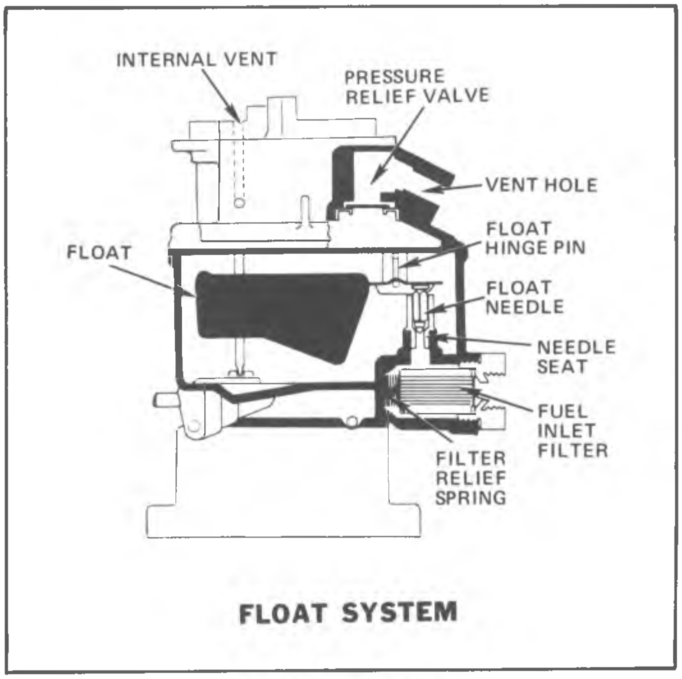


Fig. 14--Float System

HEAVY DUTY EMISSION VEHICLES

Engine Family	Max. Acceptable CO Level (%) @ Level	If Over Max. Acceptable Level Reset to (% or Less)
GM 111 (250 cu. in.)	2.0	2.0
GM 112 (292 cu. in.)	0.3	0.3
GM 113 (350 cu. in. 4bbl)	0.5	0.5
GM 115 (454 cu. in.)	0.5	0.5

FAST IDLE ADJUSTMENTS (Figs. 1C, 2C and 3C) ROCHESTER MV AND 4MV

NOTE: The fast idle adjustment must be set with transmission in "Neutral."

1. Position fast idle lever on high step of fast idle cam.
2. Be sure choke is properly adjusted and in wide open position - engine warm.
3. Set fast idle to specified rpm as follows:

   NOTE: Manual Transmission: Disconnect vacuum advance.

   a. Adjust fast idle screw on Rochester 4MV (Fig. 2C).
   b. Bend fast idle tang on throttle lever as required on Rochester MV to specified speed (Fig. 1C).

FAST IDLE ADJUSTMENT-ALL 2 BBL.

NOTE: The two barrel carburetors are preset to the approximate fast idle RPM noted in specifications, listed under "Fast Idle (Running) RPM adjustment", when low step idle is set. (Also note Low Idle RPM in specifications).

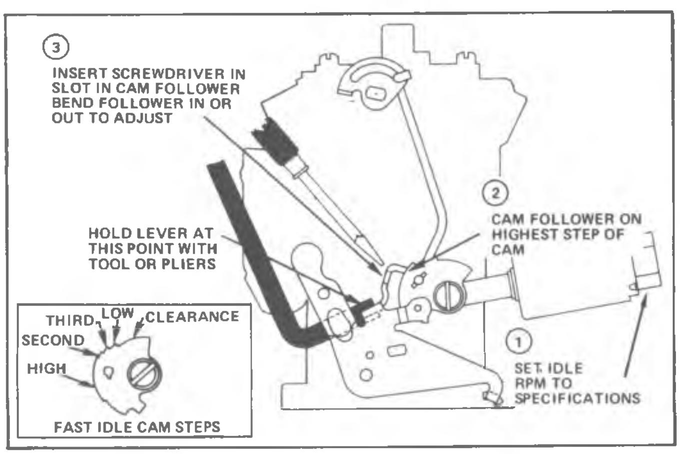


Fig. 1C--Fast Idle Adjustment (Rochester MV)

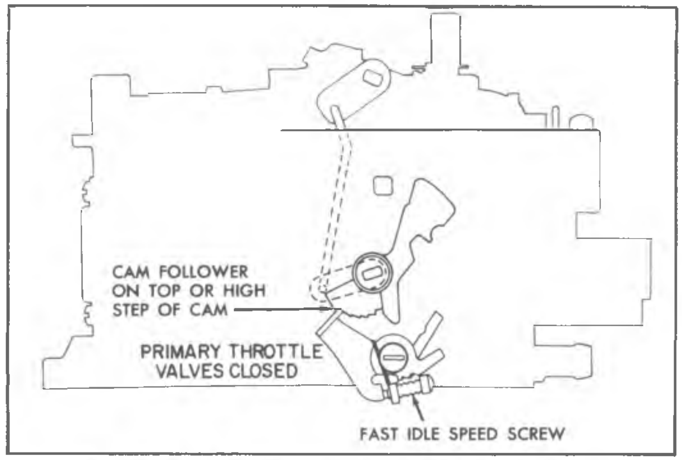


Fig. 2C--Fast Idle Adjustment (Rochester 4MV)

CHOKE ROD (FAST IDLE CAM) ADJUSTMENTS MV (Fig. 4C)

NOTE: Make sure that the fast idle adjustment is made previous to choke rod adjustment.

Automatic choke models with steps on fast idle cam. With fast idle adjustment made:

1. Place fast idle cam follower on second step of the

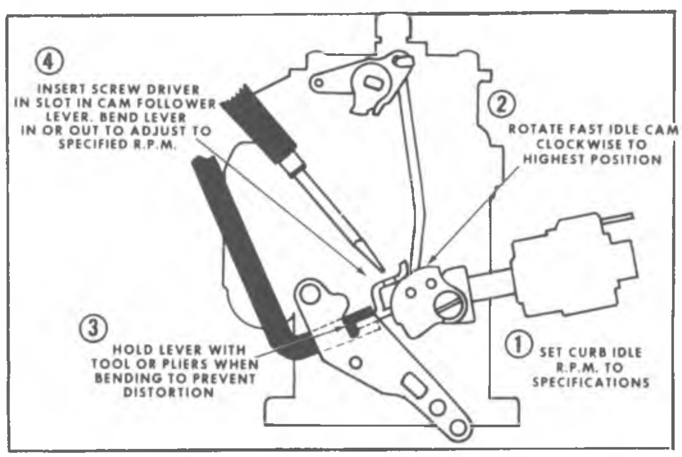


Fig. 3C--Fast Idle Adjustment (Manual Choke)

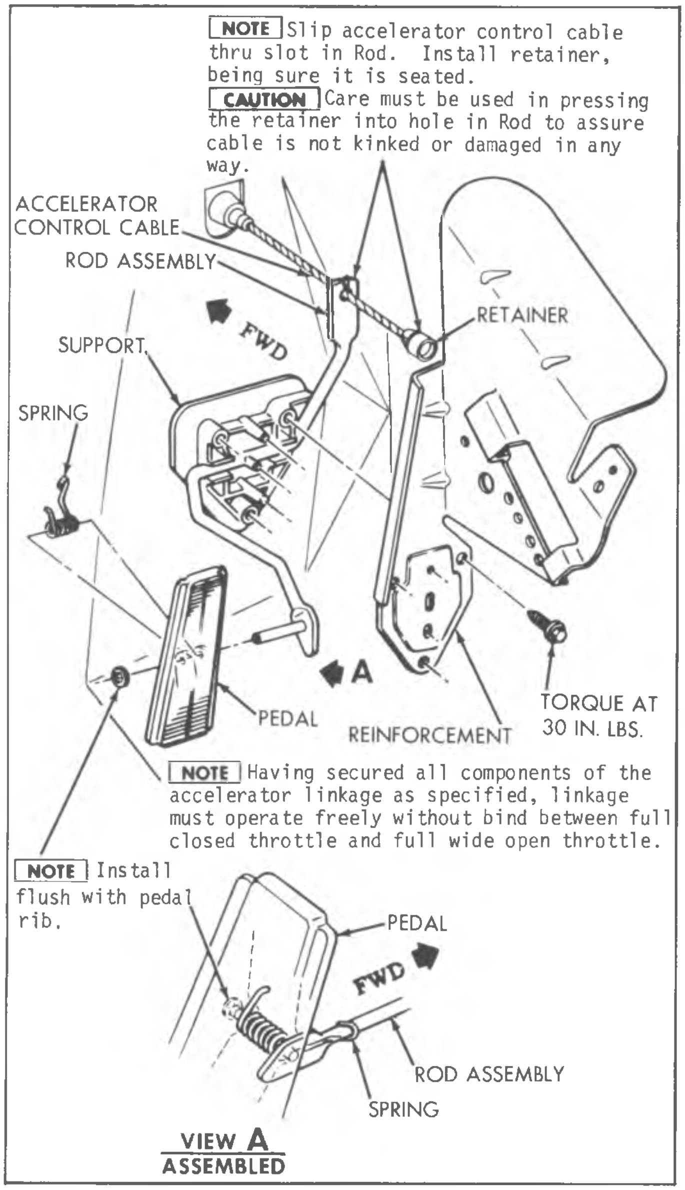


Fig. K8—Accelerator Pedal and Controls, C, K P10 thru 30 Series

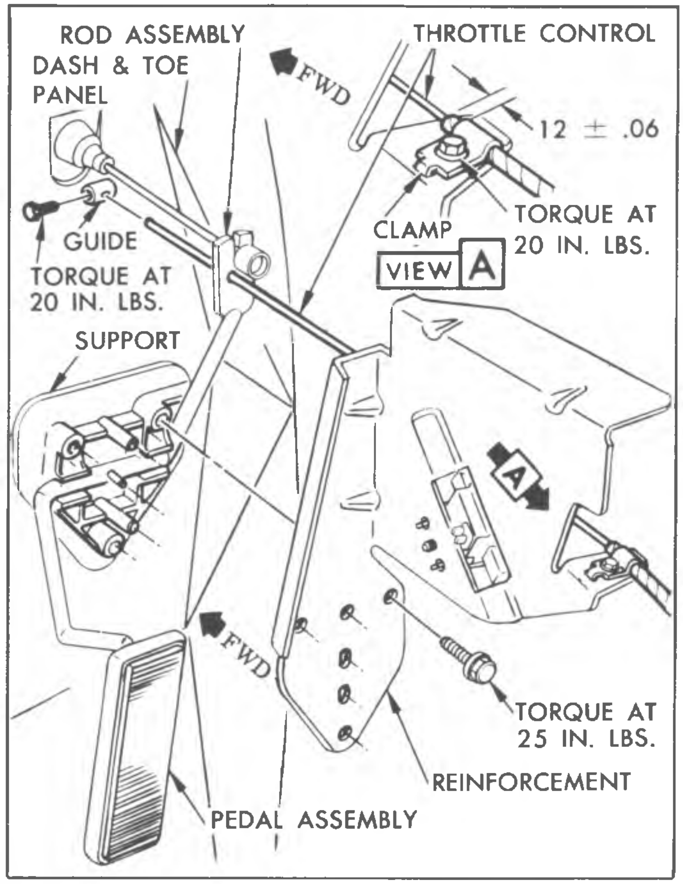


Fig. K9—Accelerator Controls (Manual Throttle) C-K

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certain that pump is operating within specified limits as follows:

a. Attach a fuel pump pressure test gauge to disconnect end of pipe.

b. Run engine at approximately 450-1,000 rom (on gasoline in carburetor bowl) and note reading on pressure gauge.

c. If pump is operating properly the pressure will be within specifications and will remain constant at speeds between 450-1,000 rpm. If pressure is too low, too high, or varies significantly at different speeds, the pump should be replaced.

REMOVAL

NOTE: When connecting fuel pump outlet pipe fitting always double wrench to avoid possible damage of pump.

1. Disconnect fuel inlet and outlet pipes at fuel pump.
2. Remove fuel pump mounting bolts and remove pump and gasket.
3. On V8 engines if push rod is to be removed, remove pipe plug and push rod (454 cu. in. engines), and fuel pump adapter and gasket and push rod 350 and 400 cu. in. engines).

INSTALLATION

1. On V8 engines, if fuel pump push rod has been removed, install push rod and pipe fitting or fuel pump adapter using gasket sealer on gasket or pipe fitting.

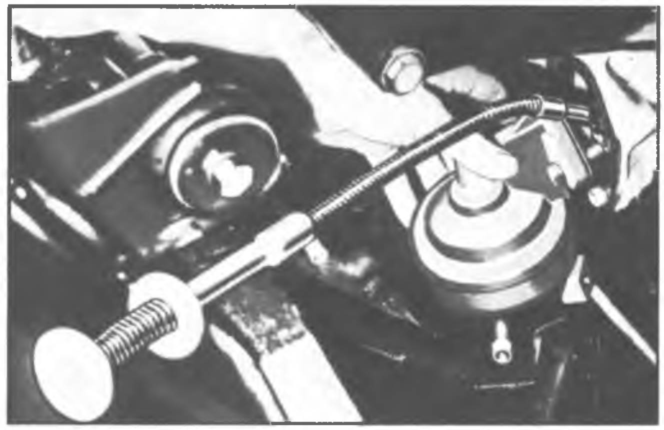


Fig. 4P--Installing V-8 Engine Fuel Pump

2. Install fuel pump using a new gasket and tighten securely. Use sealer on fuel pump mounting bolt threads.

   NOTE: On V8 engines, a pair of mechanical fingers or heavy grease may be used to hold fuel pump push rod while installing fuel pump (fig. 4P).

3. Connect fuel pipes to pump.
4. Start engine and check for leaks.

CARBURETOR DIAGNOSIS

MODELS M-MV, 2G-2GV, 4M-4MV

INDEX

PROPER CARBURETOR OPERATION IS DEPENDENT UPON THE FOLLOWING

1. Fuel Supply
2. Linkage and emission control systems.
3. Engine compression.
4. Ignition system firing voltage
5. Ignition spark timing
6. Secure intake manifold
7. Engine temperature
8. Carburetor adjustments

ANY PROBLEMS IN THE ABOVE AREAS CAN CAUSE THE FOLLOWING

1. No start or hard starting - (hot or cold)
2. Rough engine idle and stalling
3. Hesitation on acceleration
4. Loss of power on acceleration and top speed
5. Engine to run uneven or surge
6. Poor fuel economy
7. Excessive emissions

BEFORE PROCEEDING WITH CARBURETOR DIAGNOSIS, CHECK THE PRECEDING ITEMS FIRST.

ROCHESTER CARBURETOR DIAGNOSIS – MODELS 2G, 2GV – TWO BARREL

Problem: ENGINE STARTS AND STALLS

POSSIBLE CAUSE	CORRECTIVE ACTION
Engine does not have enough fast idle speed when cold.	Check and re-set the idle stop screw and fast idle cam. Use procedure F.
Choke vacuum break unit is not adjusted to specification or is defective.	Adjust vacuum break assembly to specification. Use procedure G or H. If adjusted O.K., check the vacuum break unit for proper operation as follows: Connect a piece of hose to the nipple on the vacuum break unit and apply suction by mouth or use vacuum source to apply vacuum. Plunger should move inward and hold vacuum. If not, replace the unit.
Choke coil rod out of adjustment.	Adjust choke coil rod. Use procedure J or K.
Choke valve and/or sticking or binding.	Clean and align choke valve and linkage. Replace if necessary. Re-adjust if part replacement is necessary. Use procedures F, G and H.
Idle speed setting	Adjust idle speed to specifications on decal in engine compartment.
Not enough fuel in carburetor.	Check fuel pump pressure and volume. Check for partially plugged fuel inlet filter. Replace if dirty. Check the float mechanism for binds or not enough float drop. Adjust as specified. Use procedure B or D.
Carburetor flooding. NOTE: Check by using procedure outlined under carburetor flooding. Page 1.	1. Check float needle and seat for proper seal. If a needle and seat tester is not available, mouth suction can be applied to the needle seat with needle installed. If needle is defective, replace with a factory matched set. 2. Check float for being loaded with fuel, bent float hanger or binds in the float arm. NOTE: A solid float can be checked for fuel absorption by lightly squeezing between fingers. If wetness appears on surface or float feels heavy (check with known good float, replace the float assembly). 3. Check float adjustments. Use procedure A and B or C and D. 4. If excessive dirt is found in the carburetor, clean the fuel system and carburetor. Replace fuel filters as necessary.

Problem: ENGINE IDLES ROUGH AND STALLS

Idle speed setting	Re-set idle speed per instructions on decal in engine compartment.
Manifold vacuum hoses disconnected or improperly installed.	Check all vacuum hoses leading into the manifold or carburetor base for leaks or being disconnected. Install or replace as necessary.
Carburetor loose on intake manifold.	Torque carburetor to manifold bolts (10-14 ft. lbs.).
Intake manifold is loose or gaskets are defective.	Using a pressure oil can, spray light oil or kerosene around manifold legs and carburetor base. If engine RPM changes, tighten or replace the manifold gaskets or carburetor base gaskets as necessary.

ROCHESTER CARBURETOR DIAGNOSIS – ALL MODELS 4M, 4MV – FOUR BARREL

Problem: NO POWER ON HEAVY ACCELERATION OR AT HIGH SPEED (CONT'D)

POSSIBLE CAUSE	CORRECTIVE ACTION
Power system not operating. (continued)	remove the carburetor air horn and check power piston and cavity for dirt or scores. Check power piston spring for distortion.
Float level too low.	Check and reset float level to specification. Use procedure A.
Float not dropping far enough in bowl.	Check for bind in float hanger and float arm, float alignment in bowl and needle pull clip for sufficient clearance on float arm.
Main metering jets or metering rods dirty, plugged or incorrect part.	1. If the main metering jets are plugged or dirty or excessive dirt is in fuel bowl, the carburetor should be completely disassembled and cleaned. 2. If the jets or rods are incorrect size, consult the parts list for proper usage. The last two digits stamped on the primary rods and jets are the last two digits of the part number. See identification chart J.

Problem: ENGINE STARTS HARD WHEN HOT

Choke valve not opening completely.	1. Check for binding choke valve and/or linkage. Clean and/or replace as necessary. Do not oil choke linkage. 2. Check and adjust choke thermostatic coil. Use procedure G.
Engine flooded, carburetor flooding.	See procedure under "Engine cranks, will not start - engine flooded."
No fuel in carburetor.	1. Check fuel pump. Run pressure and volume test. 2. Check float needle for sticking in seat, or binding float. 3. Check and adjust float level. Use procedure A.
Leaking float bowl.	Fill bowl with fuel and look for leaks.

Problem: ENGINE RUNS UNEVEN OR SURGES.

Fuel restriction.	Check all hoses and fuel lines for bends, kinks or leaks. Straighten and secure in position. Check all fuel filters, if plugged or dirty - replace.
Dirt or water in fuel system.	Clean fuel tank, lines and filters. Remove and clean carburetor.
Fuel level.	Adjust float. Use procedure A. Check for free float and float needle valve operation. Free up or replace as necessary.
Metering rods bent or incorrect part. Main metering jets dirty, defective, loose or incorrect part.	Clean or replace as necessary. See identification chart J.
Power system in carburetor not functioning properly. Power piston sticking.	Free up or replace as necessary.
Vacuum leakage.	It is absolutely necessary that all vacuum hoses and gaskets are properly installed with no air leaks. The carburetor and manifold should be evenly tightened to specified torque. Carburetor to manifold (10-14 ft. lbs.).

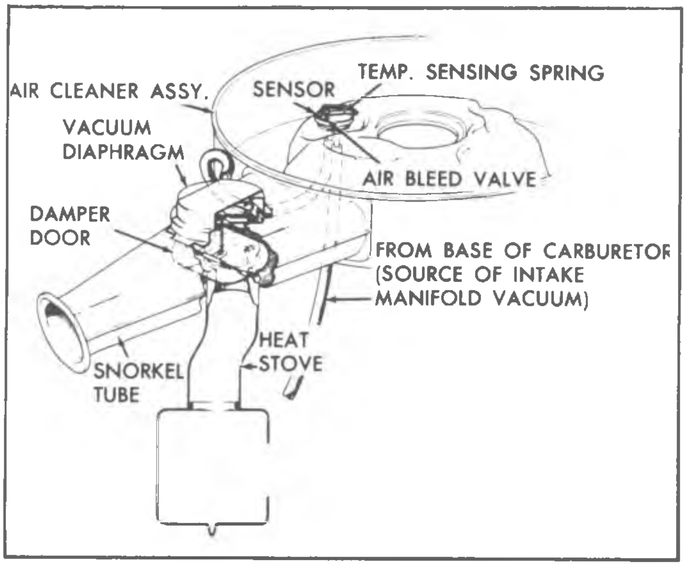


Fig. 5b—Thermostatically Controlled Air Cleaner

the body on the clean air side of the filter. The sensor unit regulates (depending upon the temperature of the air passing by it) the amount of vacuum supplied to the vacuum diaphragm. The vacuum diaphragm (depending on the amount of vacuum supplied to it by the sensing unit) opens the damper door allowing heated air from the heat stove to enter the cleaner and shuts off the passage for ambient air. The damper door is fully open (all warm air) at 8 inches of mercury and fully closed (ambient air only) at 6 inches of mercury or less. The vacuum signal measured at the diaphragm assembly will not be the same as actual engine vacuum as the thermostatic control valve in the sensor unit provides a controlled vacuum leak for regulation of the supply signal. A bi-metal strip in combination with a needle valve type operation accomplishes the temperature sensitive controlled vacuum leak.

The thermostatically controlled air cleaner functions as follows (Fig. 6b):

When the engine is "off" (View A), no vacuum is present at the sensor unit nor at the vacuum diaphragm. The force of the vacuum diaphragm spring closes off the "heated air" passage (snorkel passage open).

When the engine is initially started (View B), the sensor unit's bimetal strip senses cool air temperature (below 85°F). The thermostat control valve of the sensor unit closes its air bleed passage allowing maximum vacuum to the vacuum diaphragm. Maximum vacuum at the vacuum diaphragm completely opens the damper door, closing off the ambient air passage through the snorkel and opening the air passage feed by the air heat stove. Should the engine be heavily accelerated while in this mode, the vacuum level in the system will drop to a low enough level so that the diaphragm spring will overcome the vacuum and push the damper door closed permitting ambient air passage through the snorkel.

As the engine heats up and air passage past the sensor reaches approximately 128° F (View C), the sensor's thermostatic control valve bleed passage is completely opened by the bimetal spring acting upon the needle. Air bleeding into the vacuum acting on the diaphragm assembly lowers the vacuum level enough so that the diaphragm spring closes the damper door, thus opening the cold air passage (abmient air through snorkel) and closing the hot air passage (heat stove passage).

At temperatures between 85° and 128°F (View D), varying amounts of air is bled into the system, depending on the exact temperature at the sensor unit. This results in a vacuum level and damper position required to maintain carburetor air temperature at from 85° to 128°F when underhood temperatures are below this range.

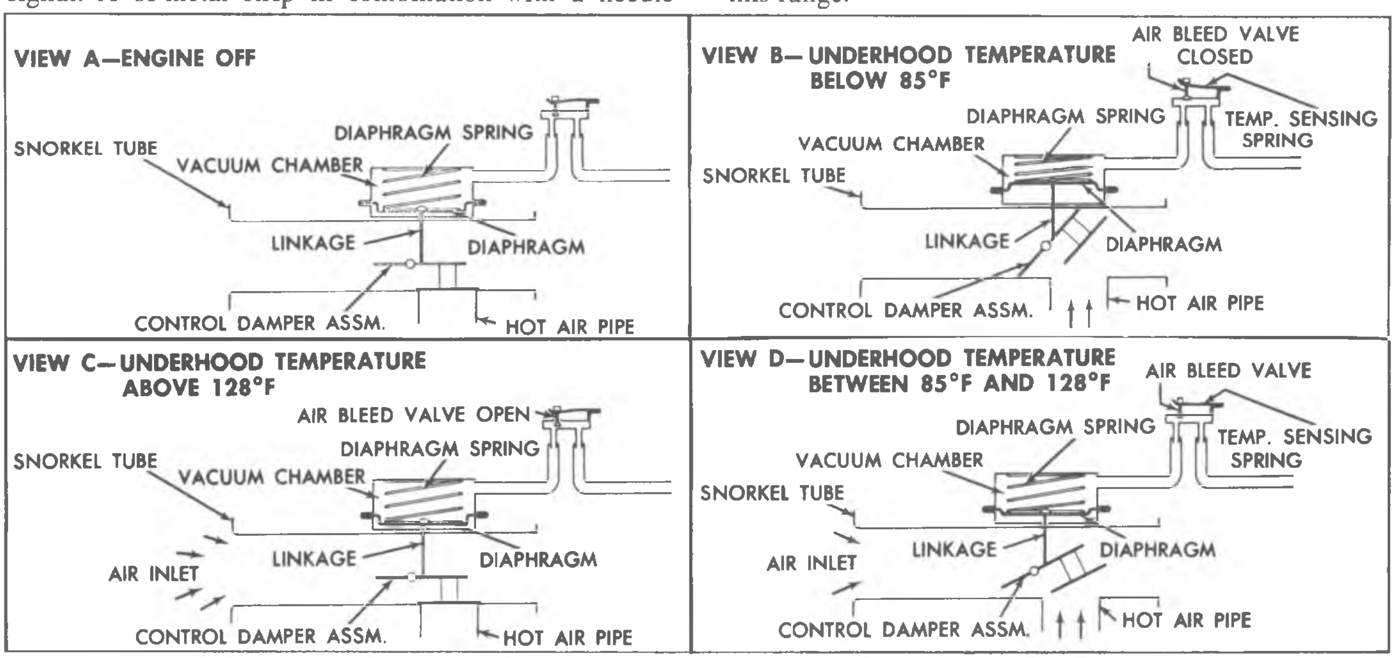


Fig. 6b—Thermostatically Controlled Air Cleaner Operation

allowing the throttle valve to close beyond the normal idle position when the ignition is turned off.

SYSTEM THEORY

The system components are shown in their normal at rest position with the engine off and cold (fig. 1e). The temperature switch points are closed, making contact with the cold terminal; the time relay points are closed; transmission switch points are open; idle stop solenoid is de-energized and plunger retracted; vacuum advance solenoid is de-energized with plunger shutting off the port to vacuum advance unit.

When the ignition switch is turned on, the idle stop solenoid is energized, extending the plunger to contact the throttle lever. A circuit is completed from the ignition switch through the vacuum advance solenoid and to ground through the temperature switch. At the same time another circuit is energized - this is from the ignition switch through the time relay coil and to ground, also as long as the relay points are closed, it provides a path to ground for the vacuum solenoid (fig. 2e).

With either one or both of the above circuits complete, the vacuum solenoid is energized permitting vacuum advance to the distributor.

In low gear operation, with engine temperature above 93 degrees, the temperature switch cold override points open (fig. 3e). If 20 seconds have elapsed, the time relay points are open also. This breaks the circuit(s) de-energizing the vacuum advance solenoid, allowing the plunger to block vacuum and open the advance unit to atmosphere.

When the transmission is shifted into high forward gear, the transmission switch points are closed by shift action. This completes the circuit from the ignition switch through the transmission switch to ground (fig. 4e). Vacuum advance solenoid is energized.

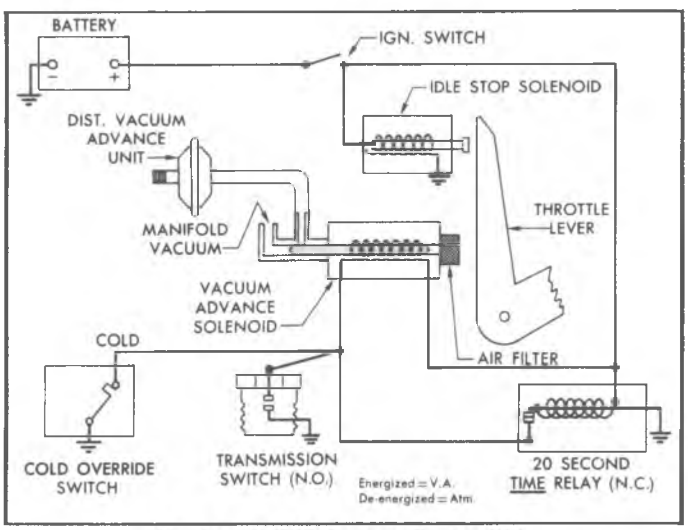


Fig. 1e—V8 TCS System (Engine Off)

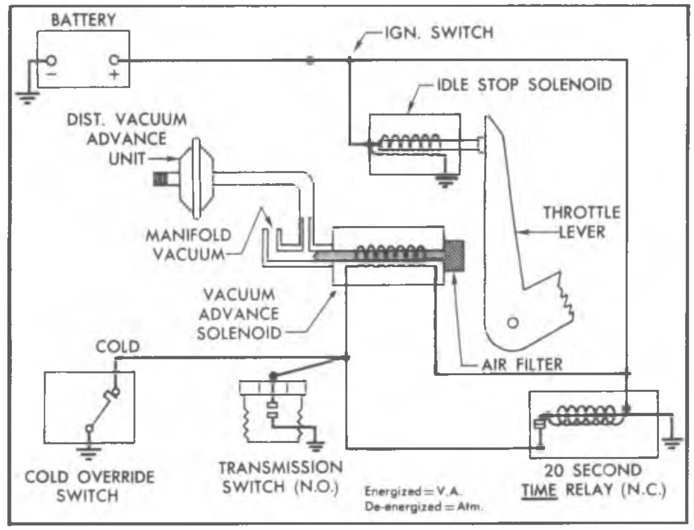


Fig. 2e—V8 TCS System (Cold Override Energized)

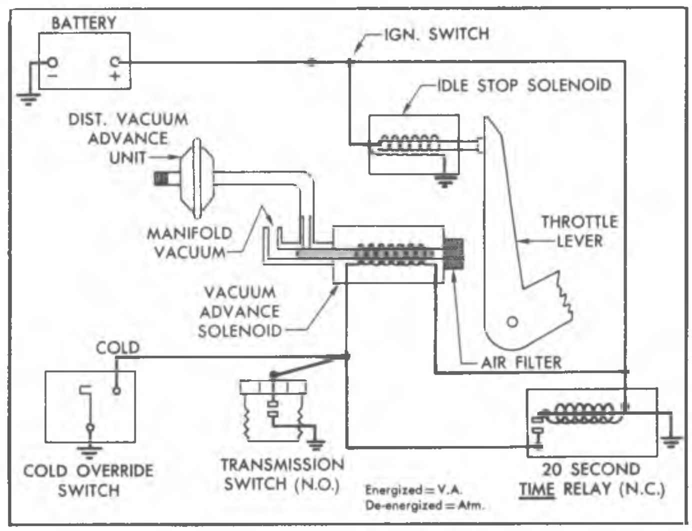


Fig. 3e—V8 TCS System (Low Gear Operation)

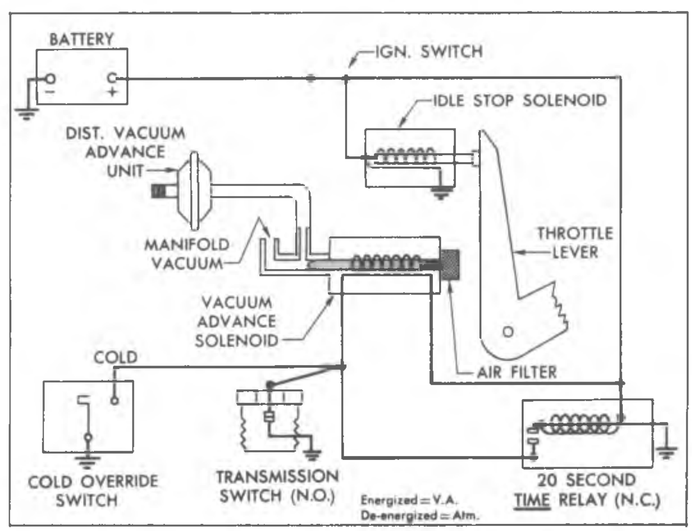


Fig. 4e—V8 TCS System (High Gear Operation)

through the exhaust system. Thus, the exhaust emitted at the tail pipe is low in hydrocarbon and carbon monoxide content.

Burning the unburned portion of the exhaust gases is much like fanning dying embers. When the gases leave the cylinders, they are extremely hot and still flammable if supplied with the other element of combustion - namely oxygen. This oxygen is supplied in the air being supplied by the pump (Fig. 6f). If oxygen is not supplied to this mixture when it first leaves the cylinders, the gases cool down to a non-flammable mixture by the time they enter the exhaust system.

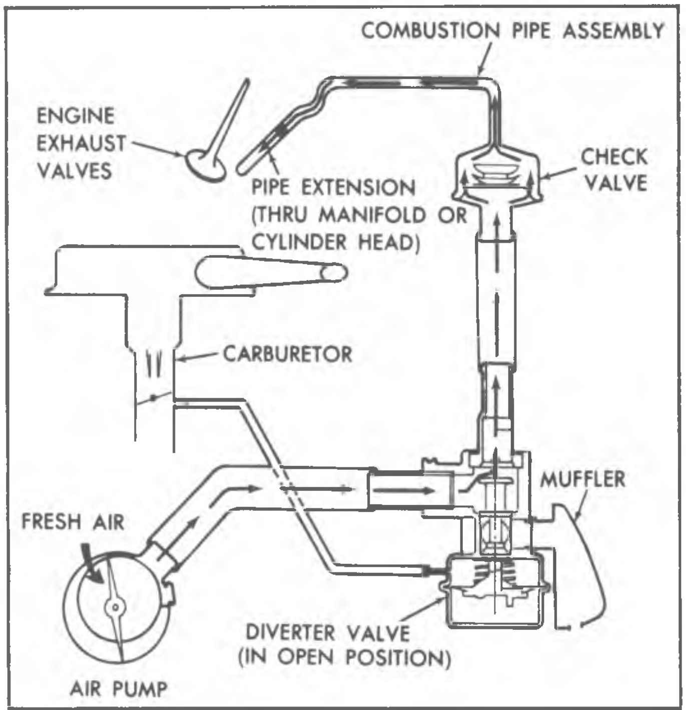


Fig. 5f—A.I.R. System Operation

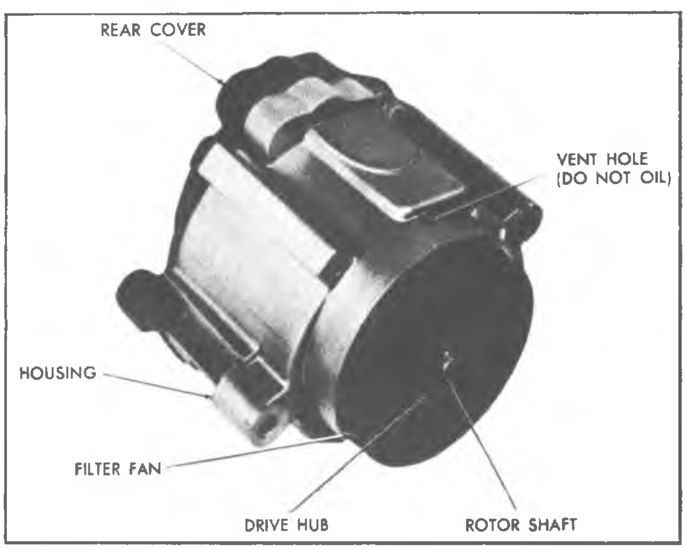


Fig. 6f—Air Injection Pump

One problem with such a system, however, is that during engine overrun or deceleration, the exhaust gases in the exhaust valve area are overly rich with fuel vapors. If this system was allowed to operate under this condition, a sizable backfire would result as soon as the fresh air from the pump mixed with the overly rich vapor. To eliminate this possibility, a diverter valve has been incorporated into the system.

The diverter valve is triggered by sharp rises in vacuum - the vacuum signal is taken from just beneath the carburetor throttle plate. When a sharp rise in vacuum is sensed, as during engine overrun, the diverter valve exhausts the air pump out-put into the atmosphere for a few seconds (Fig. 7f). Since the compressed air from air pump never reaches the air manifolds - no backfire occurs.

The check valves used in this system are nothing more than one-way valves which prevent exhaust gases from entering and damaging the air injection pump, if for any reason (such as drive-belt failure) the pump becomes inoperative. Under normal operating conditions, air pressure from the pump is sufficient to prevent exhaust gases from entering the pump.

One (1) check valve is used per air pipe assembly. L-6 engines use one air pipe assembly and thus one check valve. V-8 engines use two air pipe assemblies (one per bank) and thus two (2) check valves.

AIR PUMP

The 2-vane pump is used in all applications to compress the fresh filtered air and inject it into the exhaust manifold or cylinder head. Pump components and operation are described in the following text.

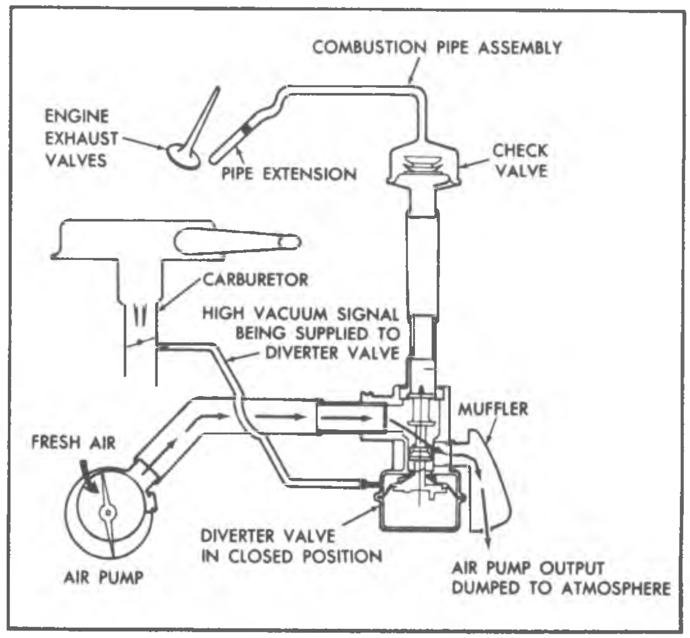


Fig. 7f—Diverter Valve Operation

SECTION 6Y

ENGINE ELECTRICAL

CONTENTS OF THIS SECTION

ENERGIZER/BATTERY

INDEX

GENERAL DESCRIPTION

The energizer (fig. 1b) is made up of a number of separate elements, each located in an individual cell in a hard rubber case. Each element consists of an assembly of positive plates and negative plates containing dissimilar active materials and kept apart by separators. The elements are immersed in an electrolyte composed of dilute sulfuric acid. Plate straps located on the top of each element connect all the positive plates and all the

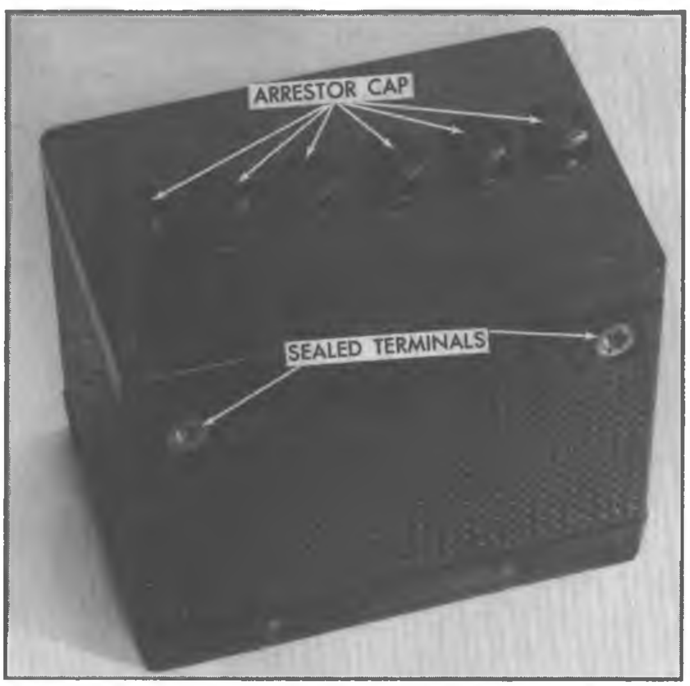


Fig. 1b—Energizer

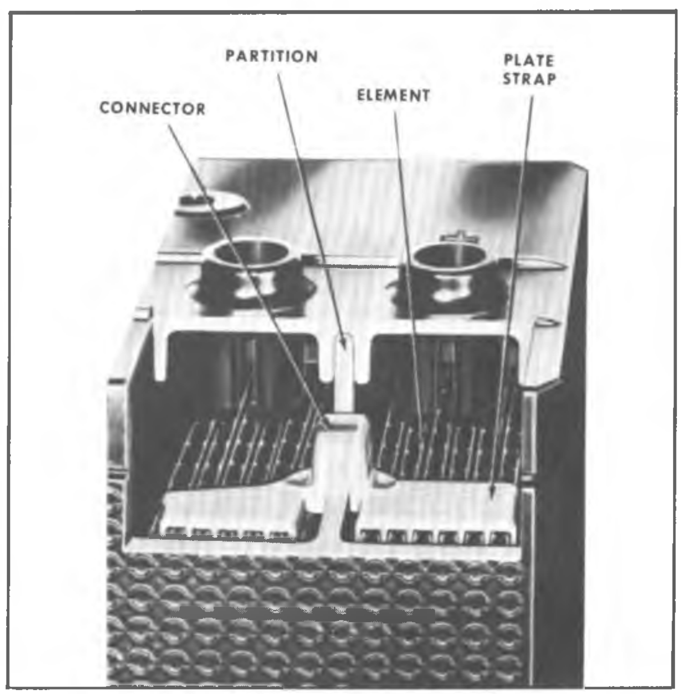


Fig. 2b—Internal View of Energizer

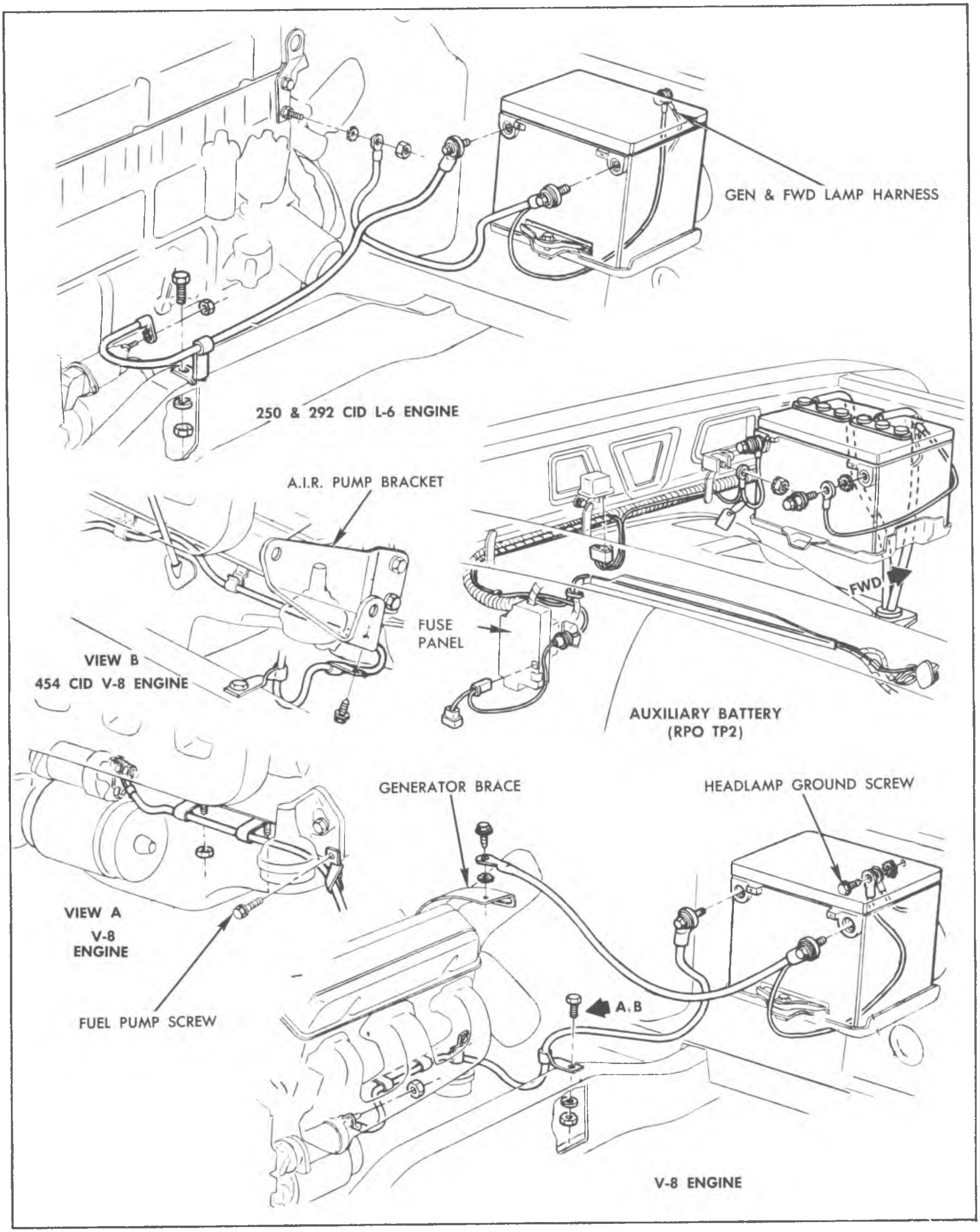


Fig. 14b—Battery Installation (C-K Series)

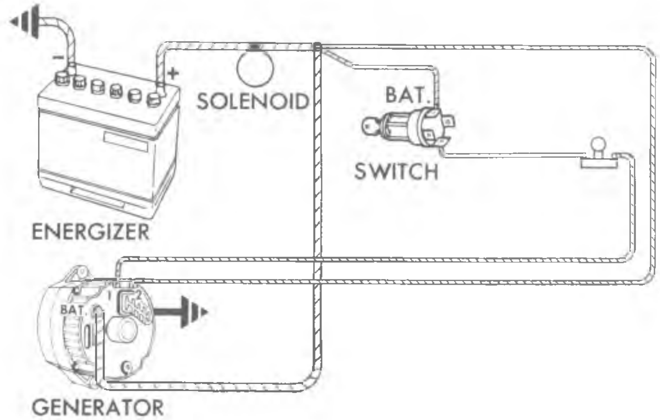


Fig. 6C—Basic Wiring Diagram

Switch	Lamp	Engine
OFF	OFF	STOPPED
ON	ON	STOPPED
ON	OFF	RUNNING

these two terminals, or by an open in the circuit. This condition can cause an undercharged Energizer. To determine where an open exists, proceed as follows:

a. Connect voltmeter from No. 2 generator terminal to ground. If reading is obtained, go to step b. If reading is zero, repair open circuit between No. 2 terminal and Energizer. If lamp now comes on, no further checks need be made.

b. With ignition switch on and with No. 1 and No. 2 terminal leads disconnected, at generator, momentarily ground No. 1 terminal lead.

CAUTION: *Do not ground No. 2 lead.*

c. If lamp does not light, check for a blown fuse, or fusible link, a burned out bulb, defective bulb socket, or an open in No. 1 lead circuit between generator and ignition switch.

d. If lamp lights, remove ground at No. 1 terminal and with No. 1 and No. 2 terminal leads connected at generator, insert screwdriver into test hold (fig. 7C) to ground winding.

e. If lamp does not light, check connection between wiring harness and No. 1 terminal of generator, and check brushes, slip rings, and field winding as covered in Overhual Manual.

f. If lamp lights and voltmeter reading is obtained in step a, replace regulator as covered in the Overhaul Manual.

3. Switch On, Lamp On, Engine Running—The possible causes of this condition are covered in the "UNDERCHARGED ENERGIZER" section.

UNDERCHARGED ENERGIZER CONDITION CHECK

This condition, as evidenced by slow cranking and low specific gravity readings, can be caused by one or more of the following conditions even though the ammeter may be operating normally.

1. Insure that the undercharged condition has not been caused by accessories having been left on for extended periods.
2. Check the drive belt for proper tension.

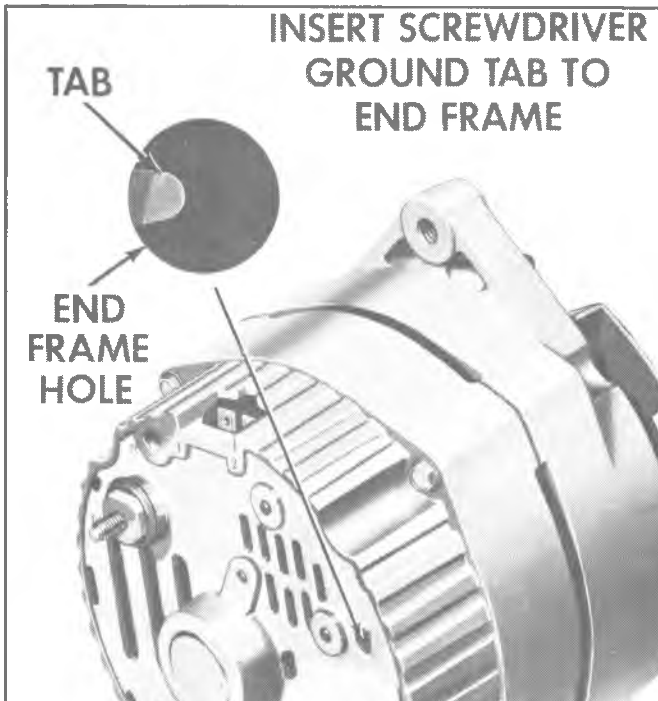


Fig. 7C—Delcotron End View

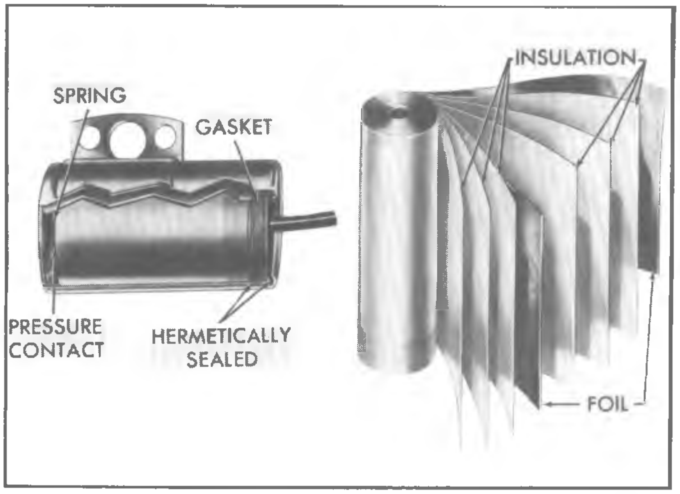


Fig. 9i—Ignition Condenser

separate; the capacitor acts initially like a short circuit and current flows into the capacitor to minimize arching at the contacts.

Ignition Coil

An ignition coil is a pulse transformer that steps up the low voltage from the battery or generator to a voltage high enough to ionize the spark plug gap and ignite the air-fuel mixture in the cylinder. A typical coil is made up of a primary winding, consisting of a few hundred turns of relatively large wire, and a secondary winding, consisting of many thousand turns of very small wire (Fig. 3i). These windings are assembled over a soft iron core and are enclosed by a sofe iron shell. This assembly is inserted into a one-piece, steel or diecast aluminum coil case, which is filled with oil and hermetically sealed by a coil cap made of molded insulating material. The cap contains the primary and secondary high voltage terminals.

The ignition coils are hermetically sealed to prevent the entrance of moisture, which would cause coil failure. During manufacture, the coil case also is filled with oil at a high temperature. As the oil temperature decreases to more nearly match the temperature of the surrounding air, the oil contracts to occupy less volume thus allowing room for expansion when the coil heats up during normal operation. The oil acts as an insulator to prevent high voltage arc-over within the coil.

In the design of an ignition system, sufficient primary circuit resistance must be present to protect the distributor contacts from excessive arcing and burning. In some ignition systems, part of this resistance may take the form of a separate resistor or a calibrated resistance wire connected between the ignition switch and the coil primary terminal. Since the value of this resistor along with the resistances of the other components in the entire primary circuit affects the coil performance at higher engine speeds, a 12-volt coil used on a 6-volt system without the external resistor, will not provide equal performance results. In other words, a 12-volt coil without the resistor is not necessarily a 6-volt coil.

During cranking, the external resistance on most applications is by-passed to provide full battery voltage to the coil for improved performance and easier starting. The by-pass wire may be connected to an "R" terminal on the cranking motor solenoid which contacts the contact disk during cranking, or to a separate terminal on the ignition switch, as shown in the previous section. The higher currents during cranking are not sufficient to cause distributor contact deterioration because of the short periods of time in the life of contacts spent during cranking. Also, the lowered battery voltage during cranking causes a lower primary current, so the resistor by-pass feature is an offsetting factor. By-passing the resistor with the engine operating will cause very rapid failure of the distributor contacts.

Spark Plugs

The spark plug (Fig. 10i) consists of a metal shell in which is fastened a porcelain insulator and an electrode extending through the center of the insulator. The metal shell has a short electrode attached to one side and bent in toward the center electrode. There are threads on the metal shell that allow it to be screwed into a tapped hole in the cylinder head. The two electrodes are of special heavy wire, and there is a specified gap between them. The electric spark jumps this gap to ignite the air-fuel mixture in the combustion chamber, passing from the center, or insulated, electrode. The seals between the metal base, porcelain, and center electrode, as well as the porcelain itself, must be able to withstand the high pressure and temperature created in the combustion chamber during the power stroke.

Some spark plugs have been supplied with a built-in resistor which forms part of the center electrode. The purpose of this resistor is to reduce radio and television interference from the ignition system as well as to reduce spark-plug-electrode erosion caused by excessively long sparking. We have been talking of the high-voltage surge from the ignition-coil secondary as though it were a single powerful surge that almost instantly caused the spark to jump across the spark plug gap. Actually, the action is more complex than that. There may be a whole series of preliminary surges before a full-fledged spark forms. At the end of the sparking cycle the spark may be quenched and may reform several times. All this takes place in only a few ten-thousandths of a second. The effect is that the ignition wiring acts like a radio transmitting antenna; the surges of high voltage send out impulses that causes radio and television interference. However, the resistors in the spark plugs tend to concentrate the surges in each sparking cycle, reduce their number, and thus reduce the interference and also the erosive effect on the plug electrodes.

Heat Range System

The "heat range" of a spark plug is determined primarily by the length of the lower insulator. The

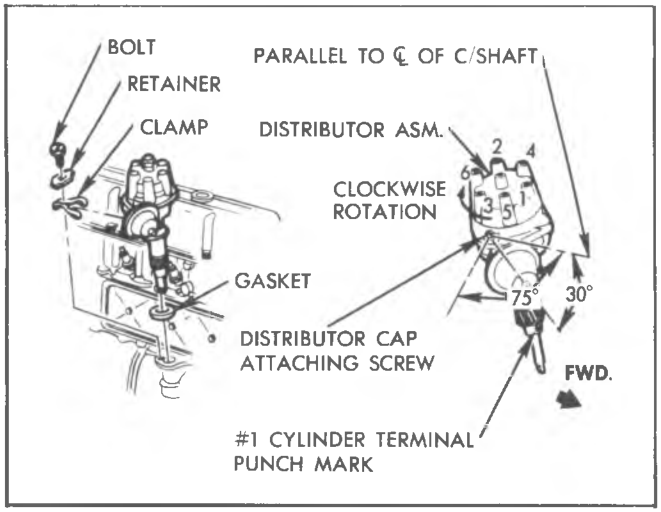


Fig. 21i—Six Cylinder Engine Distributor Installation

turn rotor counter-clockwise approximately 1/8 turn more toward left cylinder bank and push distributor down to engine camshaft. It may be necessary to rotate rotor slightly until camshaft engagement is felt.

4. While pressing firmly down on distributor housing, kick starter over a few times to make sure oil pump shaft is engaged. Install hold-down clamp and bolt and snug up bolt.
5. Turn distributor body slightly until points just open and tighten distributor clamp bolt.
6. Place distributor cap in position and check to see that rotor lines up with terminal for No. 1 spark plug.
7. Install cap, check all high tension wire connections and connect spark plug wires if they have been removed.
8. Connect vacuum line to distributor and distributor primary wire to coil terminal.
9. Start engine and set timing as described under Tune Up in Section 6.

Distributor Off-Engine Test

The distributor's centrifugal and vacuum advance can be checked in a distributor testing machine or synchroscope designed to accommodate the distributor. However, since this involves removing the distributor from the engine, this test may be postponed until other system checks have been made.

Coil Replacement

1. Disconnect ignition switch and distributor leads from terminals on coil.
2. Pull high tension wire from center terminal of coil.
3. Remove the two coil support mounting bolts or loosen friction clamp screw and remove coil.
4. Place new coil in position and install attaching bolts or tighten clamp screw.
5. Place high tension lead securely in center terminal of coil and connect ignition switch and distributor primary leads to terminals on coil.
6. Start engine and check coil operation.

Spark Plug and Wire Service

Removal and Inspection

1. To disconnect wires, pull only on the boot. Pulling on the wire might cause separation of the core of the wire. Remove spark plugs using a 5/8" deep socket on the 5/8" hex tapered plugs. Use care in this operation to avoid cracking spark plug insulators.
2. Carefully inspect the insulator and electrodes of all spark plugs. Replace any spark plug which has a cracked or broken insulator. If the insulator is worn away around the center electrode, or the electrodes are burned or worn, the spark plug is worn out and should be discarded. Spark plugs which are in good condition except for carbon or oxide deposits should be thoroughly cleaned and adjusted.
3. The spark plug wires are of a special resistance type. The core is carbon-impregnated linen. This wire is designed to eliminate radio and television interference radiation, but is also superior in resistance to cross fire. The resistance type wire, however, is more easily damaged than copper core wire. For this reason care must be taken that the spark plug wires are removed by pulling on the spark plug boots rather than on the wire insulation. Also, when it is necessary to replace a spark plug boot, the old boot should be carefully cut from the wire and a small amount of silicone lubricant used to aid in installing the new boot. If the wire is stretched, the core may be broken with no evidence of damage on the outer insulation. The terminal may also pull off the wire. If the core is broken, it will cause missing. In the case of wire damage, it is necessary to replace the complete wire assembly as a satisfactory repair cannot be made.
4. Wipe ignition wires with cloth moistened with kerosene, and wipe dry. Carefully bend wires to check for brittle, cracked, or loose insulation. Defective insulation will permit missing or cross-firing of engine, therefore defective wires should be replaced.
5. If the wires are in good condition, clean any terminals that are corroded and replace any terminals that are broken or distorted. Replace any broken or deteriorated cable nipples or spark plug boots.

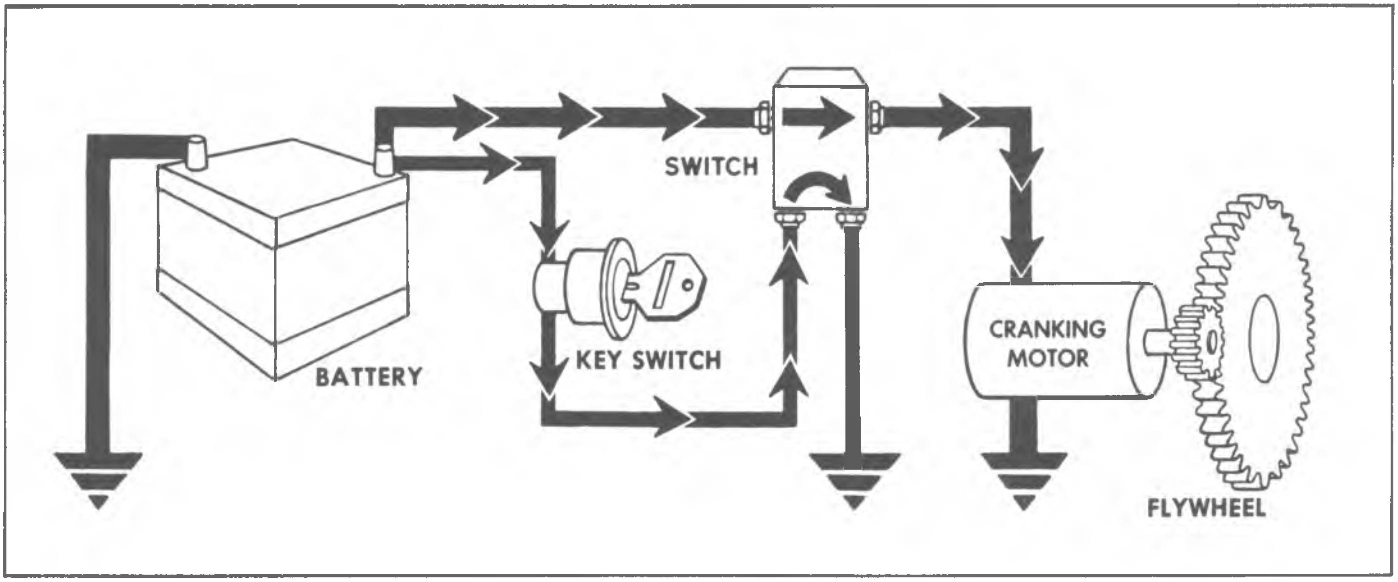


Fig. 2s—Typical Cranking System

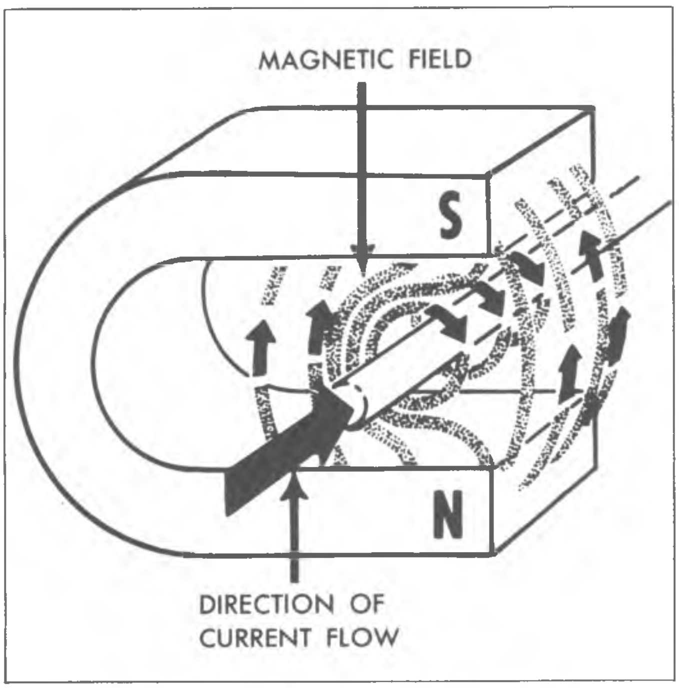


Fig. 3s—Magnetic Field of a Horseshoe Magnet

practical value. It would produce very little torque to crank an engine. It has served, however, to show the fundamental principles that operate a starter motor.

In the simplest terms, the armature is rotated by a concentration of magentic lines on one side of the armature conductor and a lack of magnetic lines on the other side of the conductor.

Construction

A cross-sectional view of a typical passenger car starter motor with a solenoid is shown in figure 1s.

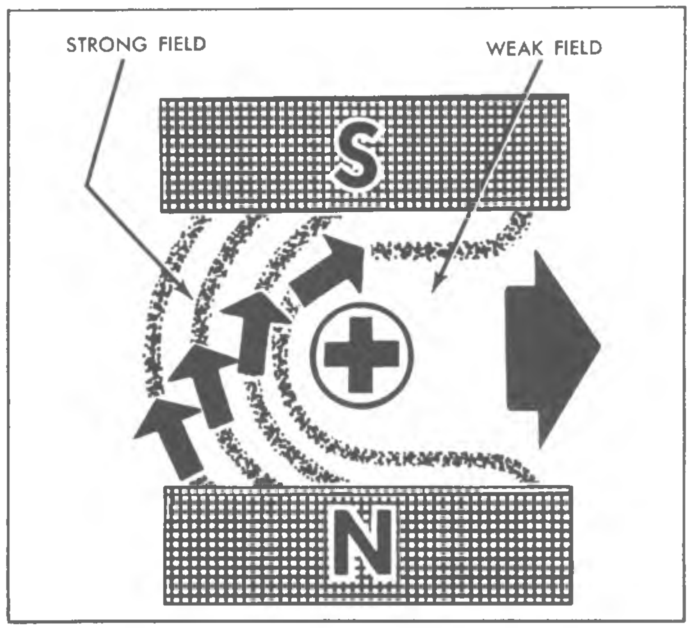


Fig. 4s—Magnetic Force

The starting motor assembly is made up of field coils placed over pole pieces which are attached to the inside of a heavy iron frame, an armature, an overrunning clutch-type drive mechanism, and a solenoid.

The iron frame and pole shoes not only provide a place for the field coils, but also provide a path for the magnetic lines produced by the field coil windings.

Armature

The armature assembly (Fig. 7s), consists of a stack of iron laminations placed over a steel shaft, a commutator assembly and the armature winding. The windings are heavy copper ribbon that are assembled into slots in the

SECTION 7M

CLUTCHES & MANUAL TRANSMISSIONS

CONTENTS OF THIS SECTION

CLUTCH CONTROLS

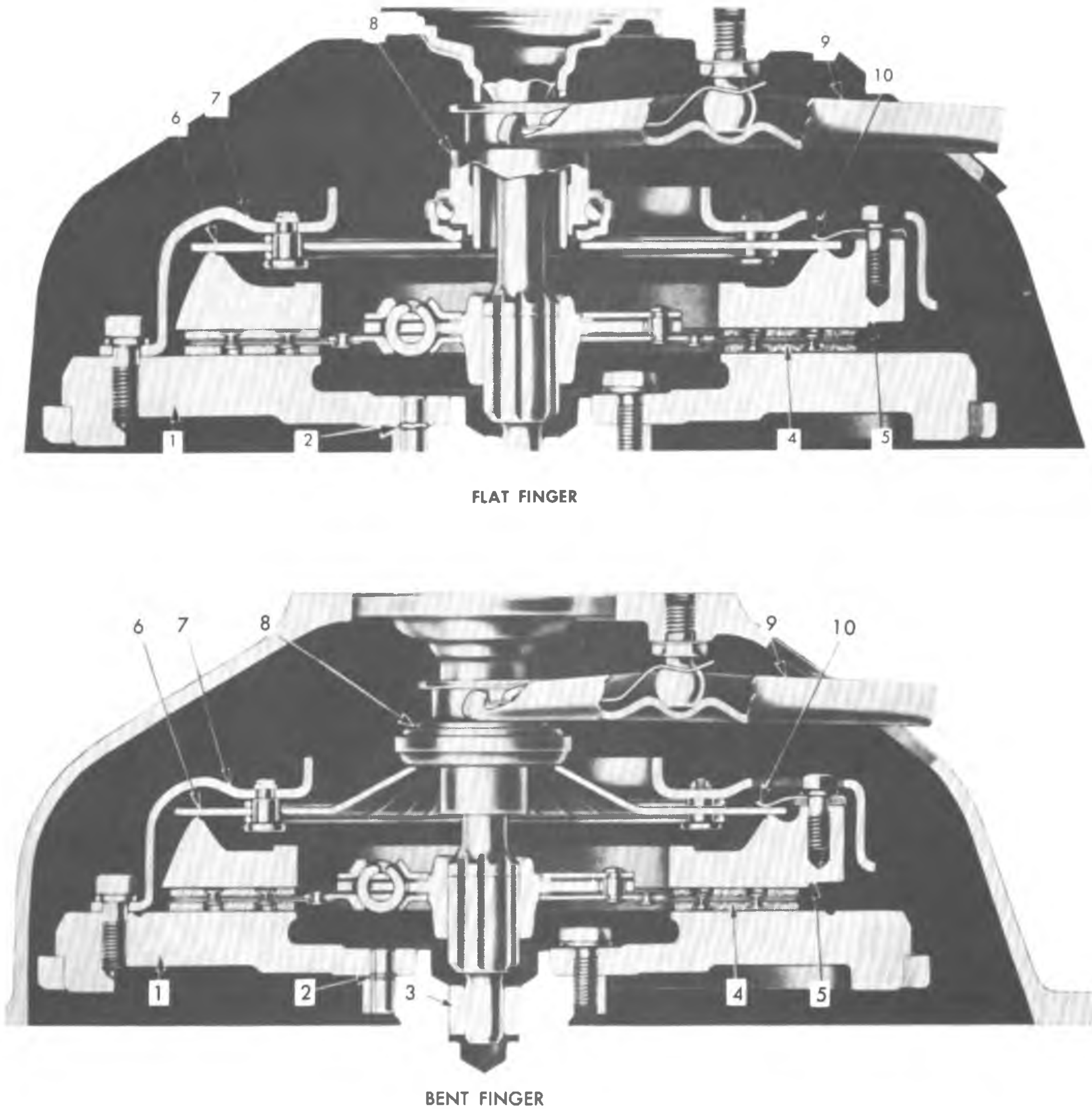
INDEX

GENERAL DESCRIPTION

The clutch operating controls for C-K trucks (fig. 1a) are a mechanical type consisting of a pendant type pedal, return spring, pedal push rod, cross-shaft, fork push rod, clutch fork and throwout bearing. The pedal push rod is routed vertically, inside the cab, from the pedal lever down through two boots on the toe pan, to the cross-shaft lever. When the clutch pedal is depressed, the pedal push rod moves rotating the cross-shaft, pushing the fork push rod rearward, and pivoting the clutch fork to move the throwout bearing against the clutch release fingers and releasing the clutch.

The clutch operating controls for "G" and "P" models are a mechanical type similar to the C-K models. On "G" models (fig. 1b), a pedal pull rod is routed vertically from the clutch pedal lever down through the toe panel to the cross shaft. When the pedal is depressed, the pedal pull rod moves rotating the cross shaft, pushing the clutch fork rod rearward and pivoting the clutch fork. This action moves the throwout bearing against the clutch release fingers, releasing the clutch.

"P" model controls (fig. 1c) have an upper pull rod connected from the clutch pedal shaft to a bell crank and a lower pull rod from the bell crank to the cross shaft. When the pedal is depressed, the pull rods are moved rotating the cross shaft and pushing the clutch fork rearward, thus subsequently activating the clutch release mechanism.



1. Flywheel
2. Dowel-hole
3. Pilot Bushing
4. Driven Disc
5. Pressure Plate
6. Diaphragm Spring
7. Cover
8. Throwout Bearing
9. Fork
10. Retracting Spring

Fig. 6—Diaphragm Spring Clutch Cross-section (Typical)

THEORY OF OPERATION

An internal combustion engine cannot develop appreciable torque at low speeds, and it develops maximum torque only at one speed. Also, the crankshaft of an engine must always rotate in the same direction. The transmission which provides a means of varying the gear ratio between the engine and rear wheels, then becomes necessary in automotive vehicles. The transmission provides the mechanical advantage that enables the engine to propel the vehicle under adverse conditions of load. It also furnishes the driver with a selection of vehicle speeds while the engine is held at speeds within the effective torque range; and allows disengaging and reversing the power flow from the engine to the wheels. In summary, the purpose of the transmission is to provide the operator with a selection of gear ratios between engine and wheels so that the vehicle can operate at best efficiency under a variety of driving conditions and loads.

SYNCHRONIZING MECHANISM

The entire synchronizing mechanism is installed on the mainshaft and the main drive gear. First, second, third speed are all synchronized by synchronizing clutches, which act as friction clutches. Each of the gears to be synchronized - main drive gear, second speed gear, and in this example, the first speed gear (5, Fig. 14) - has a cone surface (6, Fig. 14).

Only the hub and the gear carrier (3, Fig. 15), are tightly splined to the mainshaft, while the main drive gear, 1st, and 2nd speed mainshaft gears, can revolve on the mainshaft. Three keys (2, Fig. 15) slide in slots of the hub (3, Fig. 14), and these keys are spring-loaded by two synchronizer springs (4, Fig. 15). Between the hub and the mainshaft 1st speed gear a synchronizer ring (7, Fig. 14) is installed which, together with the cone surface, acts as a friction clutch.

The synchronizer ring (3, Fig. 15) has three slots in which the keys (4, Fig. 16) engage, and is thereby moved along with the guide unit (1, Fig. 16). The slots in the synchronizer cover are wider than the keys, so that the

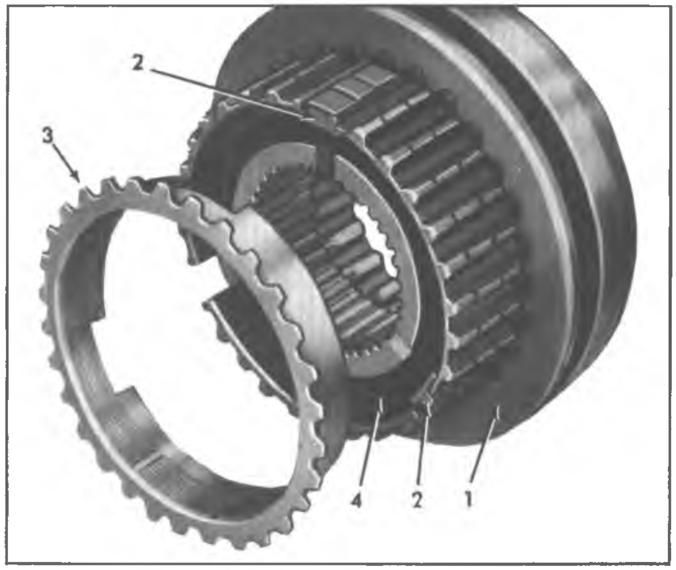


Fig. 15—Synchronizer Hub and Sleeve

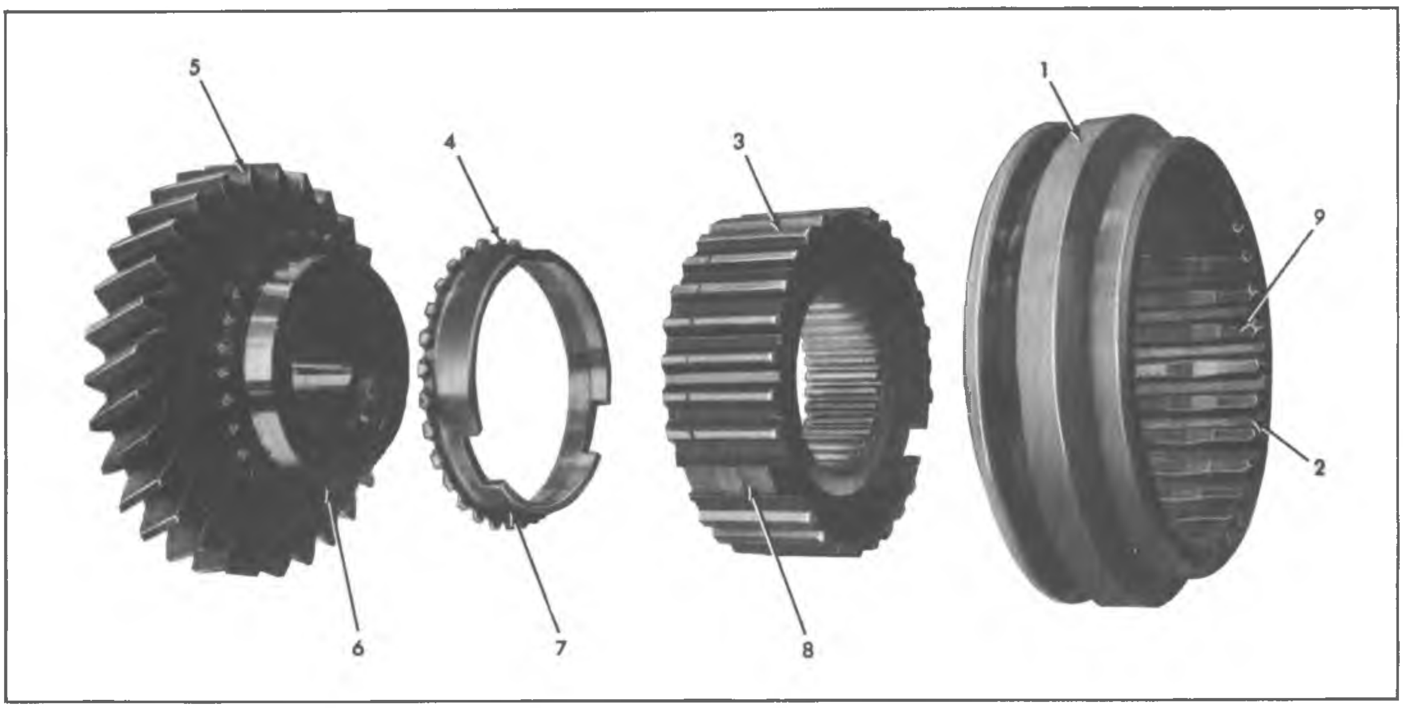


Fig. 14—Synchronizing Mechanism

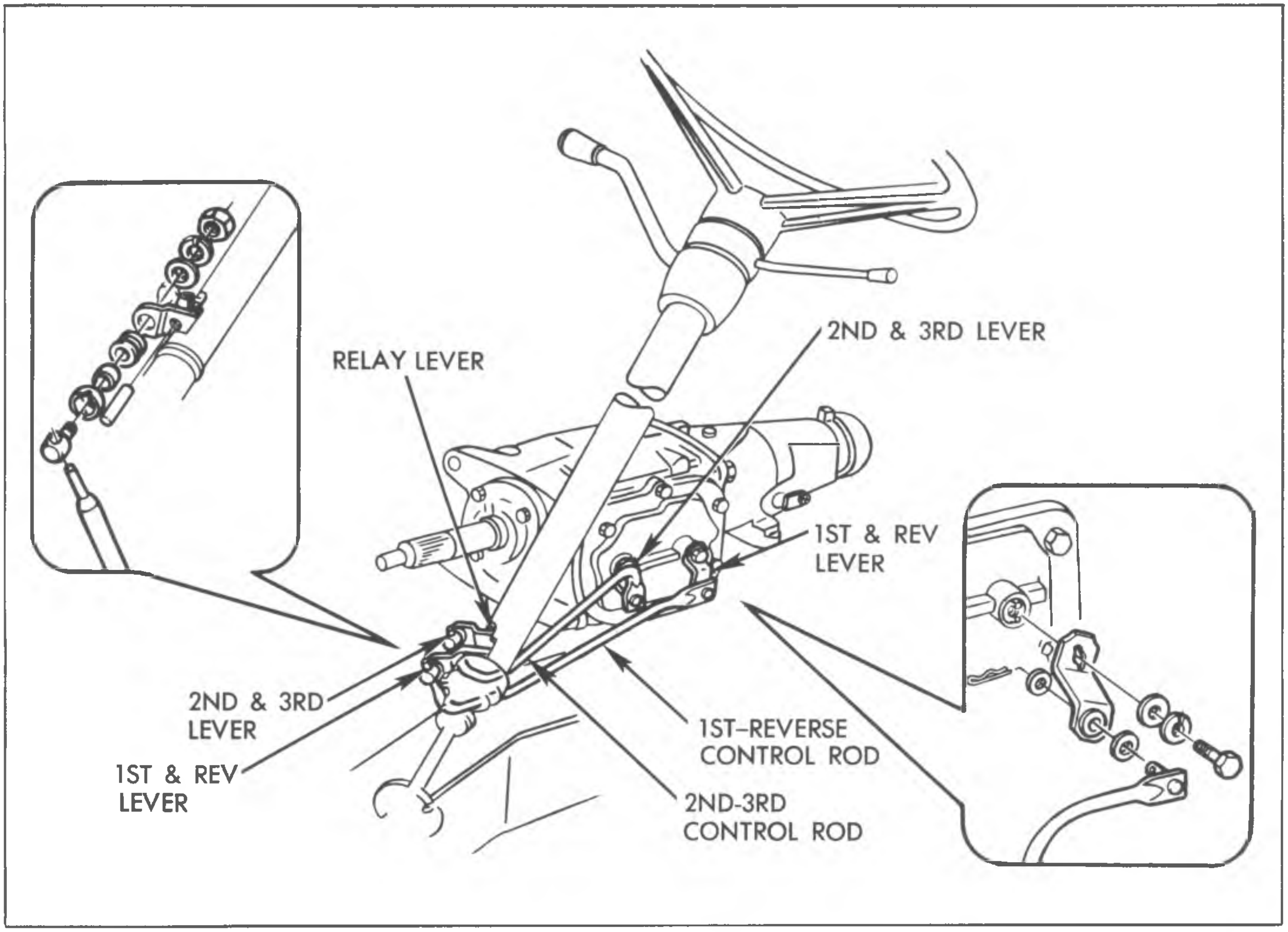


Fig. 24—Column Shift Controls (G Models)

assure free movement of clutch and transmission components during assembly.

CAUTION: *Do not apply an excessive amount of grease in the above areas, as under normal operation this grease would be thrown onto clutch facings resulting in clutch failure.*

2. Shift the transmission into high gear.
3. Mount transmission on dolly or jack and move into position under the vehicle.

CAUTION: *Avoid springing the clutch when the transmission is being installed to the engine. Do not force the transmission into the clutch disc hub. Do not let the transmission hang unsupported in the splined portion of the clutch disc.*

Install flywheel housing-to-transmission mounting bolts and washers. Tighten bolts to specifications.

4. Align the transmission main drive gear shaft with the clutch disc hub by rotating the transmission companion flange or output yoke. Move the transmission forward, guiding the main drive gear shaft into the clutch disc splines.
5. Install crossmember. Also, if vehicle is equipped with power take-off, reinstall unit and controls on transmission.
6. Connect propeller shaft to transmission as described in "PROPELLER SHAFTS" (Section 4) of this manual. Remove transmission jack.
7. Connect parking brake lever and controls (if used). Adjust brakes as outlined in "PARKING BRAKE" (Section 5) of this manual.
8. Install flywheel housing underpan. Tighten cap screws firmly.
9. Reconnect speedometer cable to adapter at transmission, connect back-up lamp switch wire and TCS switch.
10. Reinstall shift controls on transmission.

NOTE: On vehicle equipped with 3-speed transmission, reconnect shift levers to transmission side cover. On vehicle equipped with

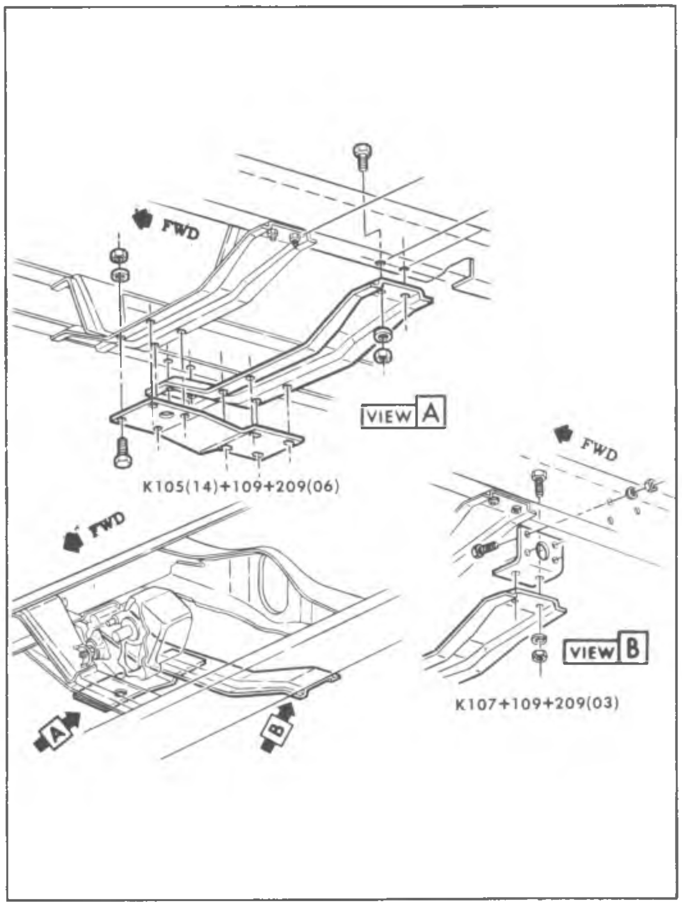


Fig. 34—Transfer Case Skid Plate (K105)

DIAGNOSIS

Before attempting to repair the clutch, transmission or related linkages for any reason other than an obvious failure, the problem and probable cause should be identified. A large percentage of clutch and manual transmission problems are manifested by shifting difficulties such as high shift effort, gear clash and grinding or transmission blockout. When any of these problems occur a careful analysis of these difficulties should be accomplished, and the following checks and adjustments performed in the presented sequence before removing the clutch or transmission for repairs.

CLUTCH ADJUSTMENT

A. Clutch Free Pedal Travel

1. The clutch free pedal travel adjustment should be made as outlined in the Clutch and Transmission section of the Chassis Service Manual for the specific vehicle involved.
2. Check clutch linkage for lost motion caused by loose or worn swivels, deflection of mounting brackets or damaged cordon shaft.

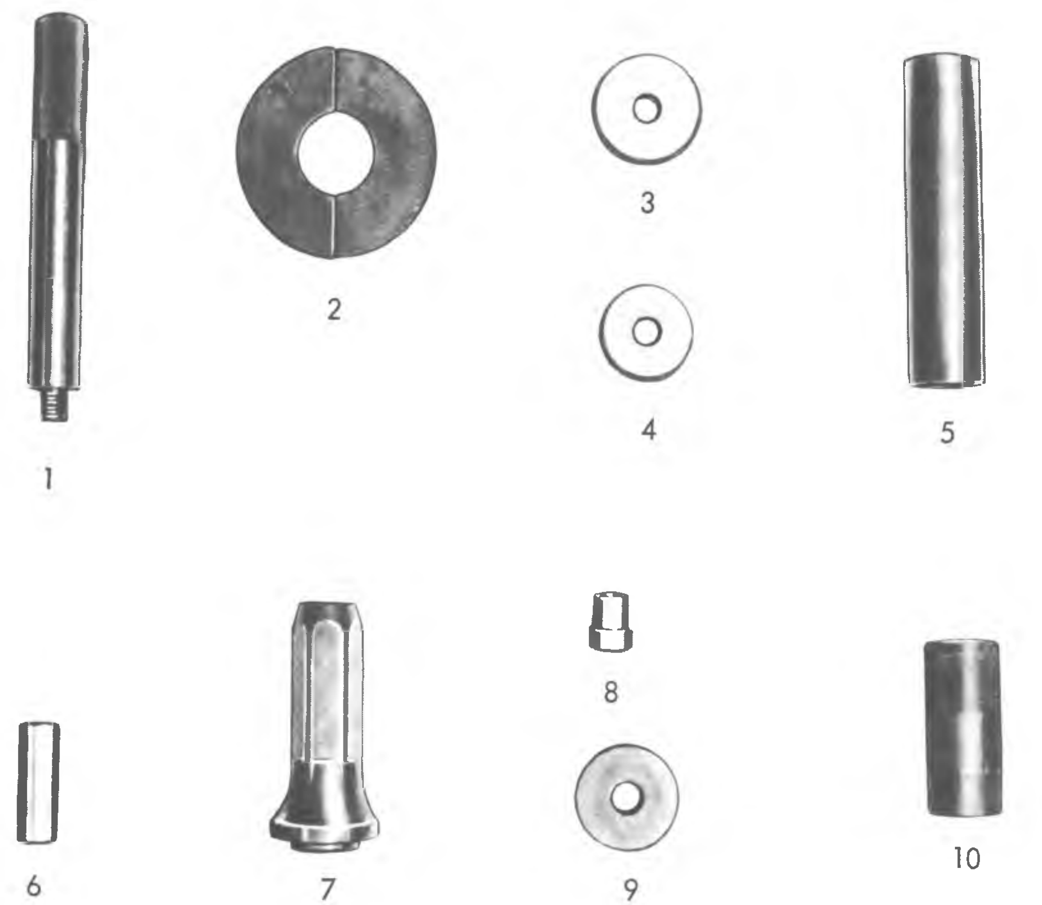
B. Clutch Spin Down Time

1. Run the engine at a normal idle with transmission in neutral and clutch engaged.
2. Disengage the clutch, wait nine seconds and shift the transmission to reverse. No grinding noise should be heard. A grinding noise indicates incorrect clutch adjustment, lost motion clutch misalignment, or internal problems such as failed dampers, facings, cushion springs, diaphragm spring fingers, pressure plate drive straps, etc.

SHIFT LINKAGE ADJUSTMENT

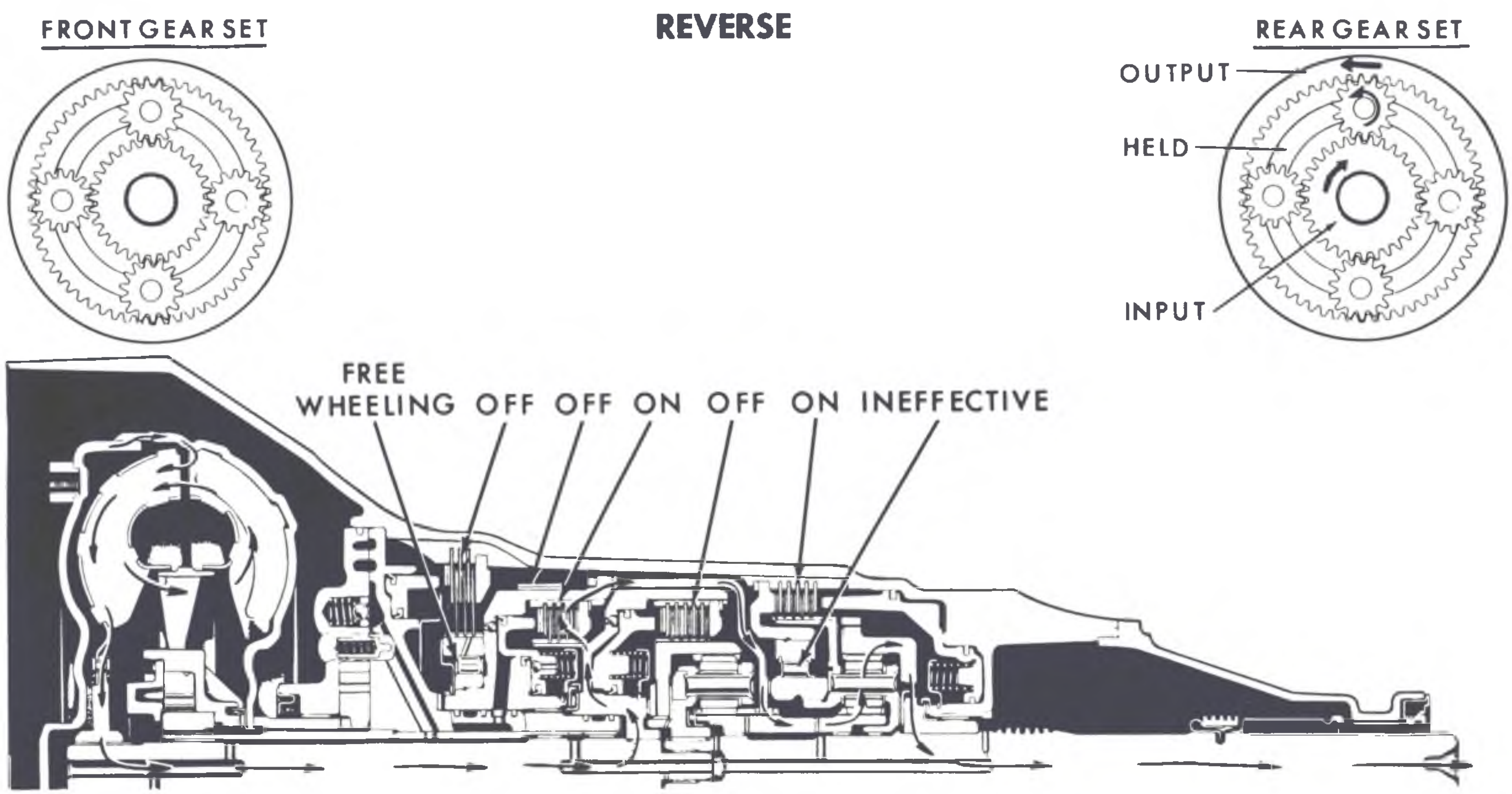
A. Steering Column Shift Control

1. Remove the shift control rods from the column levers.
2. Check shift effort at the shift control lever knob. (Effort should not exceed 2 lbs. with transmission linkage removed.)
3. If binding is felt, refer to the adjustment procedure for the steering column lower bearing for Manual



1. J-8092 Handle.
2. J-8331 Rear Output Shaft Front Bearing Remover.
3. J-23422 Rear Output Shaft Front Bearing Cup Installer
4. J-23423 Rear Output Shaft Rear Bearing Cup Installer.
5. J-5590 Bearing Installer.
6. J-23419 Intermediate Shaft Remove and Installer.
7. J-22833 Output Shaft Housing Seal Installer.
8. J-23420 Pilot Bearing Installer.
9. J-7137 Adapter Seal Installer.
10. J-6219 Front Output Shaft Bearing Installer.

Fig. 6ST—Dana Transfer Case Special Tools



Intermediate Clutch - OFF
Direct Clutch - ON
Forward Clutch - OFF
Low & Reverse Clutch - ON
Intermediate Overrun Roller Clutch - INEFFECTIVE
Low and Roller Clutch - INEFFECTIVE
Intermediate Overrun Band - OFF

In Reverse "R", the direct clutch is applied to transmit torque from the forward clutch housing to the sun gear drive shell and the sun gear. The low and reverse clutch is applied preventing the output carrier from turning. Clockwise rotation of the sun gear causes the reaction carrier pinions to turn counterclockwise, thus turning the output ring gear and output shaft counterclockwise in a reduction ratio of approximately 1.93 to 1.

Fig. 7M—Power Flow in Reverse Range · Typical

DRIVE RANGE – DIRECT (THIRD GEAR)

Intermediate Clutch - ON Direct Clutch - ON Forward Clutch - ON Low and Reverse Clutch - OFF	Intermediate Overrun Roller Clutch - FREE WHEELING Low and Roller Clutch - FREE WHEELING Intermediate Overrun Band - OFF

As vehicle speed and governor pressure increases, the force of the governor pressure (83 PSI @ W.O.T.) acting on the 2-3 shift valve overcomes the force of the 2-3 shift valve spring and modulator oil. This allows the 2-3 shift valve to move to the upshifted position feeding drive oil to the direct clutch. This oil is called 2-3 (direct) clutch oil.

Direct (2-3) clutch oil is directed from the 2-3 shift valve to:

1. Direct Clutch
2. 2-3 Accumulator

Basic Control

Direct (2-3) clutch oil from the 2-3 shift valve flows to the direct clutch and also to the 2-3 accumulator piston. The shift is cushioned by the R.N.D. oil force on the other side of the accumulator pistons.

Summary

The forward, intermediate and direct clutches are applied. The transmission is in drive range - third gear (direct drive).

When in drive range the full throttle 2-3 upshift will occur at approximately 85 MPH and minimum throttle 2-3 upshifts will occur at approximately 22 MPH.

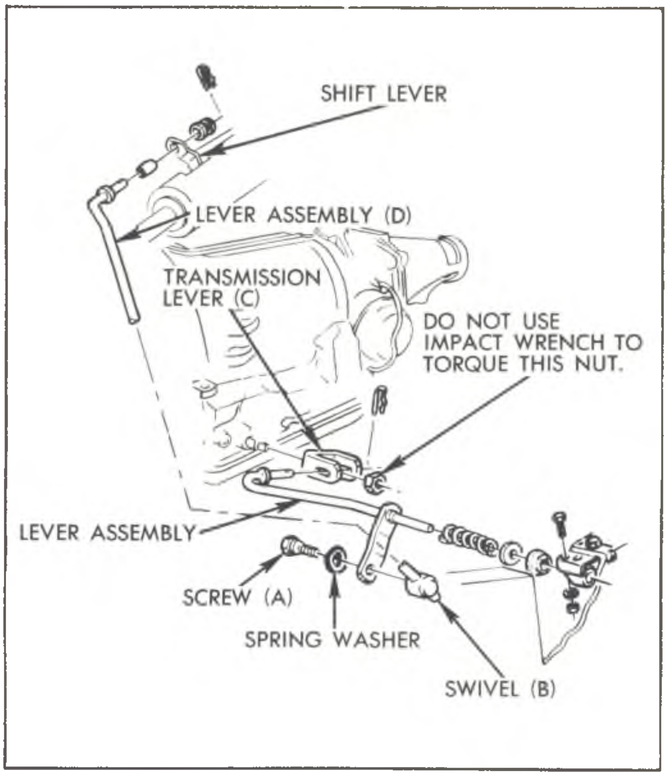


Fig. 26M—Column Shift Linkage - CK Series

12. Lower vehicle add approximately 5 pints U.S. measure (4 pints Imperial measure) of DEXRON® or DEXRON®II automatic transmission fluid or its equivalent through filler tube.
13. With selector lever in PARK position, apply hand brake, start engine and let idle (carburetor off fast idle step). DO NOT RACE ENGINE.
14. Move selector lever through each range and, with selector lever in PARK range, check the fluid level.
15. Add additional fluid to bring level to 1/4" below the ADD mark on the dipstick.

CAUTION: *Do not overfill. Foaming will result if overfull.*

Adding Fluid to Fill Dry Transmission and Converter Assembly

In cases of transmission overhaul, when a complete fill is required, including converter (approximately 20 pints), proceed as follows:

1. Add 8 pints of transmission fluid through filler tube.
2. With manual control lever in park (P) position, start engine and place on cold idle cam. DO NOT RACE ENGINE. Move manual control lever through each range.
3. Immediately check fluid level with selector lever in park (P), engine running and vehicle on LEVEL surface and add additional fluid to bring level to 1/4" below the "ADD" mark on the dipstick. Do not overfill.

CHECKING TRANSMISSION MOUNT

Raise vehicle on a hoist. Push up and pull down on transmission tailshaft while observing transmission mount. If rubber separates from metal plate of mount or if tailshaft moves up but not down (mount bottomed out) replace mount. If there is relative movement between a metal plate of mount and its attaching point, tighten screws or nuts attaching mount to transmission or crossmember.

SHIFT CONTROLS

Column Shift Linkage - CK and P Series (Figs. 26M and 27M)

1. The shift tube and lever assembly must be free in the mast jacket. See Section 9 for alignment of steering column assembly if necessary.
2. To check for proper shift linkage adjustment, lift the transmission selector lever towards the steering wheel. Allow the selector lever to be positioned in drive (D) by the transmission detent.

   NOTE: Do not use the indicator pointer as a reference to position the selector lever. When performing linkage adjustment, pointer is adjusted last.

3. Release the selector lever. The lever should be inhibited from engaging low range unless the lever is lifted.
4. Lift the selector lever towards the steering wheel, and allow the lever to be positioned in neutral (N) by the transmission detent.
5. Release the selector lever. The lever should now be inhibited from engaging reverse range unless the lever is lifted.
6. A properly adjusted linkage will prevent the selector lever from moving beyond both the neutral detent, and the drive detent unless the lever is lifted to pass over the mechanical stop in the steering column.
7. If adjustment is required, remove screw (A) and spring washer from swivel (B).
8. Set transmission lever (C) in Neutral position by moving lever counterclockwise to L1 detent and then clockwise three (3) detent positions to Neutral.
9. Position transmission selector lever in Neutral position as determined by the mechanical stop in steering column assembly.

   NOTE: Do not use the indicator pointer as a reference to position the selector lever. When performing linkage adjustment, pointer is adjusted last.

10. Assemble swivel, spring washer and screw to lever assembly (D) and tighten screw to 20 pound feet.
11. Readjust indicator needle if necessary to agree with the transmission detent positions. See Section 9.
12. Readjust neutral start switch if necessary to provide

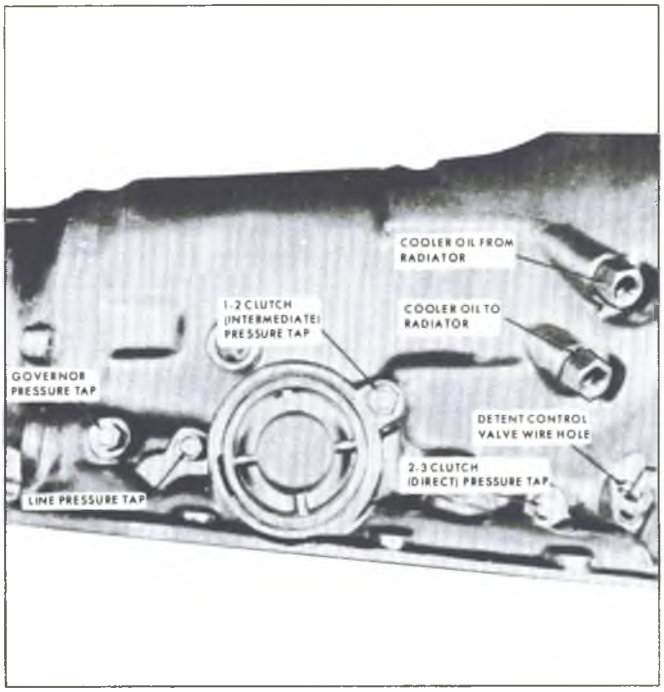


Fig. 38M—Pressure Tap Locations

the vehicle from 0 MPH. A 1-2 shift should occur at all throttle openings. (No. 2-3 shift can be obtained in this range). The 1-2 shift point will vary with throttle opening. As the vehicle decreases in speed to 0 MPH, a 2-1 shift should occur.

The 1-2 shift in INTERMEDIATE RANGE is somewhat firmer than in DRIVE RANGE. This is normal.

Low L1 Range

Position the selector lever in L1 RANGE and accelerate the vehicle from 0 MPH. No upshift should occur in this range.

2ND Gear — Overrun Braking: (L2)

Position the selector lever in DRIVE RANGE, and with the vehicle speed at approximately 35 MPH, move the selector lever to L2 RANGE. The transmission should downshift to 2nd. An increase in engine RPM and an engine braking effect should be noticed. Line pressure should change from approximately 100 PSI to approximately 125 PSI in 2nd.

1ST Gear — Overrun Braking: (L1)

Position the selector lever in L2 RANGE at approximately 30 to 50 MPH, with throttle closed, move the selector lever to L1. A 2-1 downshift should occur in the speed range of approximately 45 to 30 MPH, depending on axle ratio and valve body calibration. The 2-1 downshift at closed throttle will be accompanied by increased engine RPM and an engine braking effect should be noticed. Line pressure should be approximately 150 PSI. Stop vehicle.

Reverse Range: (R)

Position the selector lever in REVERSE POSITION and check for reverse operation.

TROUBLE DIAGNOSIS

Refer to Diagnosis Chart to determine a possible cause of a transmission problem.

Additional diagnosis of a malfunction is as follows:

No Drive in Drive Range

(Install pressure gauge)

- Low Oil Level - correct level and check for external leaks or defective vacuum modulator (leaking diaphragm will evacuate oil from unit).
- Manual Linkage - misadjusted, correct alignment to manual lever shift quadrant is essential.
- Low Oil Pressure - refer to LOW LINE PRESSURE below.
- Forward Clutch:
  a. Forward clutch does not apply - piston cracked; seals missing or damaged; clutch plates burned (see BURNED CLUTCH PLATES below).
  b. Pump feed circuit-to-forward clutch oil seal rings missing or broken on pump cover; leak in feed circuits; pump-to-case gasket mispositioned or damaged; clutch drum ball check stuck or missing.
- Low and Reverse Roller Clutch Assembly - broken spring, damaged cage or installed backwards.

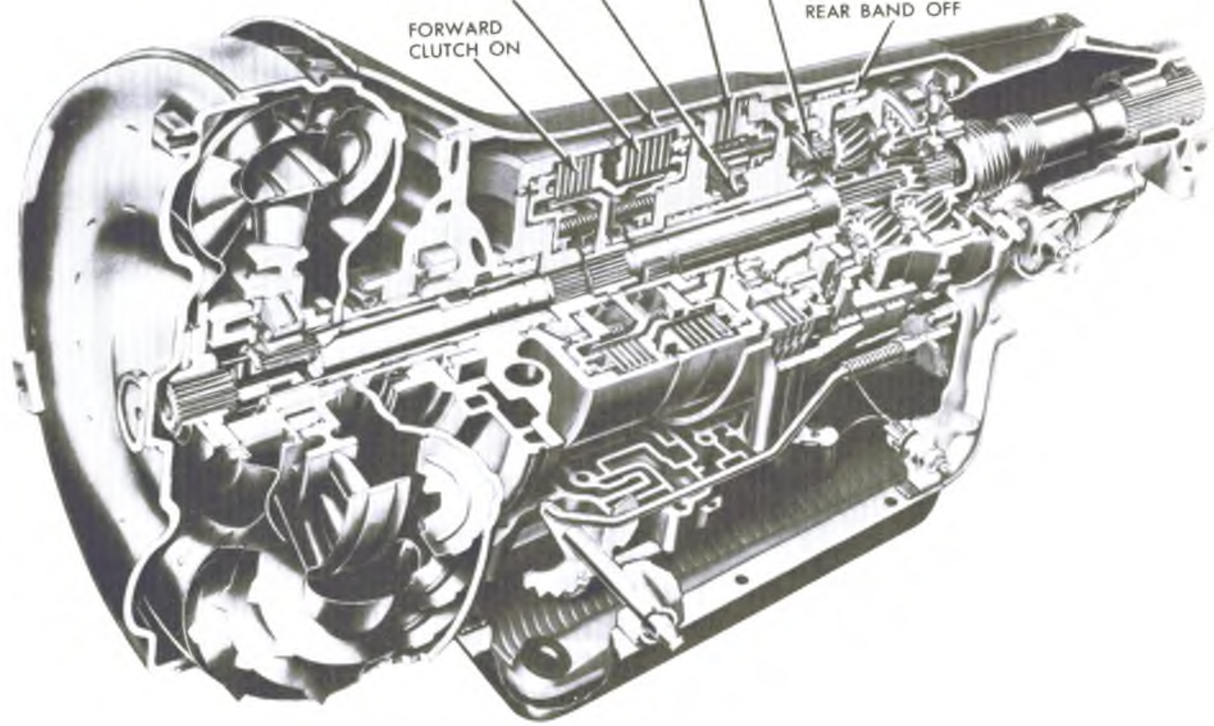
High or Low Oil Pressure

(Refer to OIL PRESSURE CHECKS)

High Line Pressure

- Vacuum Leak:
  a. Vacuum line disconnected.
  b. Leak in line from engine to moldulator.
  c. Improper engine vacuum.
  d. Leak in vacuum-operated accessory (hoses, vacuum advance, etc.).
- Moldulator:
  a. Stuck modulator valve.
  b. Water in modulator.
  c. Damaged, not operating properly.
- Detent System - detent valve or cable stuck in detent position.
- Valve Body:
  a. Pressure regulator and/or boost valve stuck.
  b. Boost valve sleeve broken or defective.
  c. Incorrect pressure regulator valve spring.

d. Operation of Components in Low – L^2 Range – Second Gear



In second gear, the intermediate clutch is applied to allow the intermediate roller clutch to hold the sun gear against counterclockwise rotation. Turbine torque through the forward clutch is now applied through the mainshaft to the rear internal gear in a clockwise direction.

Clockwise rotation of the rear internal gear turns the rear pinions clockwise against the stationary sun gear. This causes the output carrier and output shaft to turn clockwise in a reduction ration of approximately 1.5:1.

In L^2 Range second gear, overrun braking is provided by the front band as it holds the sun gear fixed. Without the band applied, the sun gear would overrun the intermediate roller clutch.

Fig. 4T—L2 Range · Second Gear

DRIVE RANGE-FIRST GEAR

Power Flow

Forward Clutch - On

Low Roller Clutch - Effective

Direct Clutch - Off

Front Band - Off

Rear Band - Off

Intermediate Clutch - Released

Intermediate Roller Clutch - Ineffective

Detent Solenoid - De-energized

With the selector lever in any forward range, the forward clutch is applied. This delivers turbine torque to the mainshaft and turns the rear internal gear in a clockwise direction, viewed from front (Converter torque ratio equals approximately 2:1 at stall).

Clockwise motion of the rear internal gear causes the rear pinions to turn clockwise, driving the sun gear counterclockwise. In turn, the sun gear drives the front pinions clockwise, thus turning the front internal gear, output carrier and output shaft clockwise in a reduction ratio of approximately 2.5:1.

Reaction of the front pinions against the front internal gear is taken by reaction carrier and roller clutch assembly to the transmission case (Approximate stall ratio equals 5:1).

Oil Flow

When the selector lever is moved to Drive position, the manual lever is repositioned to allow line pressure to enter the drive circuit. Drive oil then flows to the:

1. Forward Clutch
2. 1-2 Shift Valve
3. Governor Assembly
4. 1-2 Accumulator Valve
5. Detent Regulator Valve

Basic Control

Drive oil is directed to the foward clutch where it acts on two areas of the clutch piston to apply the forward clutch. The inner area is fed through an unrestricted passage. The outer area is fed through an orifice to insure a smooth shift from Park, Neutral and Reverse to Drive.

Drive oil at the governor assembly is regulated to a variable pressure. This pressure increases with vehicle speed and acts against the ends of the 1-2 and 2-3 shift valves and an area on the modulator valve. This variable pressure is called governor pressure.

Drive oil is also regulated to another variable pressure at the 1-2 accumulator valve. This pressure, called 1-2 accumulator oil, is controlled by modulator oil and is directed to the rear servo. 1-2 accumulator oil at the rear servo acts on the accumulator piston.

Summary

The converter is filled and the forward clutch is applied. The transmission is in Drive range - first gear.

L1 RANGE-FIRST GEAR

(Valves in First Gear Position)

Power Flow

Forward Clutch - On

Low Roller Clutch - Effective

Direct Clutch - Off

Front Band - Off

Rear Band - On

Intermediate Clutch - Off

Intermediate Roller Clutch - Ineffective

Detent Solenoid - De-energized

With the selector lever in L1 range, the forward clutch is applied. This delevers turbine torque to the mainshaft and turns the rear internal gear in a clockwise direction (Converter torque ratio equals approximately 2.00:1 at stall).

Clockwise motion of the rear internal gear causes the rear pinions to turn clockwise to drive the sun gear counterclockwise. In turn, the sun gear drives the front pinions clockwise, thus turning the front internal gear, output carrier and output shaft clockwise in a reduction ration of approximately 2.5:1. The reaction of the front pinions against the front internal gear is taken by the reaction carrier and roller clutch to the transmission case (Total stall ratio equals approximately 5.00:1).

Down hill or overrun braking is provided in L1 range by applying the rear band as this prevents the reaction carrier from overrunning the roller clutch.

Oil Flow

Maximum downhill braking can be attained at speeds below 40 mph with the selector lever in L1 range, as this directs L1 oil from the manual valve to the:

1. Rear Servo
2. 1-2 Accumulator Valve
3. Detent Regulator Valve
4. 1-2 Shift Valve

Basic Control

L1 oil flows past a ball check to the apply side of the rear servo piston and to the 1-2 accumulator valve to raise the 1-2 accumulator oil to line pressure for a smooth band apply.

L1 oil acts on the detent regulator valve. Combined with the detent spring, L1 oil holds the detent valve against line oil acting on the detent valve, causing drive oil to flow through the detent regulator valve into the detent and modulator passages. Moldulator and detent oil at line pressure, acting on the 1-2 regulator and 1-2 detent valve, overcomes governor oil and L1 oil on the 1-2 shift valve at any vehicle speed below approximately 40 mph and the transmission will shift to first gear.

In first gear - L1 range, the transmission cannot upshift to second gear regardless of vehicle or engine speed.

Summary

The forward clutch and rear band are applied. The transmission is in first gear - L1 Range.

		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. 31T—Oil Pressure Check - Road or Normal Operating Conditions

Approximate Altitude of Check (Ft. above sea level)	Drive Neutral Park	L1 or L2	Reverse
0	150	150	244
2,000	150	150	233
4,000	145	150	222
6,000	138	150	212
8,000	132	150	203
10,000	126	150	194
12,000	121	150	186
14,000	116	150	178

Fig. 32T—Oil Pressure Check - Vehicle Stationary, Vacuum Tube Disconnected

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

Fig. 33T—Oil Pressure Check - Vehicle Stationary, Vacuum Tube Connected

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. 34T). 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.

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

Bellows Comparison Check

Using a comparison gauge, as shown in Figure 35T, compare the load of a known good Hydra-Matic modulator with the assembly in question.

a. Install the modulator that is known to be acceptable on either end of the gauge (Fig. 36T).

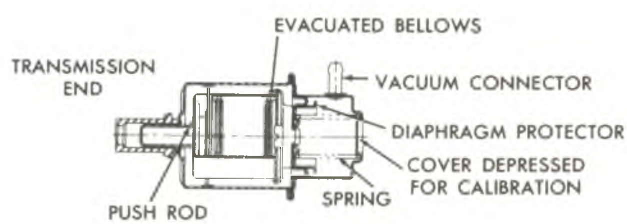


Fig. 34T—Vacuum Modulator

b. Install the modulator in question on the opposite end of the gauge. (Fig. 37T).

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 gauge (Fig. 38T). The gap between the opposite modulator sleeve end and the gauge line should then be 1/16" or less. If the distance is greater than this amount, the modulator in question should be replaced.

SECTION 8

FUEL TANKS AND EXHAUST

Also refer to the Emission Control Systems Booklet and Maintenance Schedule Folder for maintenance and warranty information.

CONTENTS OF THIS SECTION

DESCRIPTION

All cab model trucks have fuel tanks relocated and mounted outside of the cab, outboard of the right frame rail. The tank is constructed of two steel sections, seam welded, together. Because of the outside location of the base and optional auxiliary tank, a plastic shield is released for all series and models for 1974. The shield is fitted into seam welded flange to the tank and is bolted to the bracket mounting which is attached to the frame, protecting the full frontal area of the tank. Also a steel "bathtub type" skid plate, is bolted to frame and fuel tank bracket.

On 3/4 and 1 ton forward control models and cowl models, the tank is mounted on the outside of the right frame side rail. A strong mounting of two metal straps anchor these tanks to mounting brackets which are bolted to the frame side member.

On 1/2 and 3/4 ton conventional and 4-wheel drive models, Suburban and Utility, and 1/2 ton forward control models the tank is located to the rear of the axle and between the side rails and envelopes the forward edge of the spare tire. These tanks are supported by two steel straps which are held at either end by a hook into the side rail. Metal to metal contact between tank and brackets or straps is prevented by the use of anti-squeak material.

Upper and lower filler necks vary as to size, length and shape, depending on model requirements. These necks are treated so that rust will not form and get into the fuel system. Lower filler necks are first bolted or riveted (except on P10, CK1-200 (06-14 Models) or on RPO N20, P32 (50 gallon tanks) to the tank, except on cab models, and then sweat soldered in place to eliminate any possibility of leakage at this point.

The fuel pickup pipe is built integrally with the tank gauge unit, located at the top of the tank. A large area, fine-membrane material is located on the bottom of the fuel pickup pipe. This material is designed to prevent the entrance of dirt or water into the fuel system, and operates with a self-cleaning action.

Frame mounted tanks consist of an upper and lower half, each with a wide flange except for the new motor home 50 gallon tank which is a "wrap" type construction with bulkhead ends seam welded to tank walls.

The two tank sections are seam welded at the flange around the entire tank to assure leakproof construction. Exceptional stiffness is secured by the combination of the welded flanges and depressed ribs in both upper and lower tank sections.

EVAPORATION CONTROL SYSTEM (ECS)

The Evaporation Control System (ECS) is standard equipment under federal regulations for all truck series rated under 6,000 pounds maximum obtainable GVW and all people carrying vehicles. Important changes have been made to improve performance and increase reliability. The most noteworthy being in the area of fuel fill. Past versions used partial inner tanks as fuel fill limiter devices. Current designs use filler necks extended further into the fuel tank and a revised fill vent tube.

TANK FILLER NECK GAS CAP—10 SERIES AND TRUCKS CLASSED AS PEOPLE CARRIERS

The truck fuel tank filler cap has a pressure-vacuum safety relief valve.

> NOTE: The gas cap requires replacement, only a cap identified on the inside of the cap with "pressure-vacuum" should be used. Failure to use the correct cap can result in a serious malfunction of the system.

Inspection

1. Check hose connection openings. Assure that they are open.
2. Check operation of purge valve by applying vacuum to the valve. A good valve will hold vacuum.

Installation

1. Install new filter.
2. Assemble bottom of canister to canister body.
3. Install canister and tighten clamp bolts.
4. Connect hoses to top of canister in same position as in Step 3 above.

CANISTER PURGE VALVE (Fig. 14)

Disassembly

1. Disconnect lines at valve.
2. Snap off valve cap (slowly remove cap as diaphragm is under spring tension). Remove diaphragm, spring retainer and spring.
3. Replace parts as necessary. Check orifice openings.

Assembly

1. Install spring, spring retainer, diaphragm and cap.
2. Reinstall canister as previously outlined, connect lines to valve.

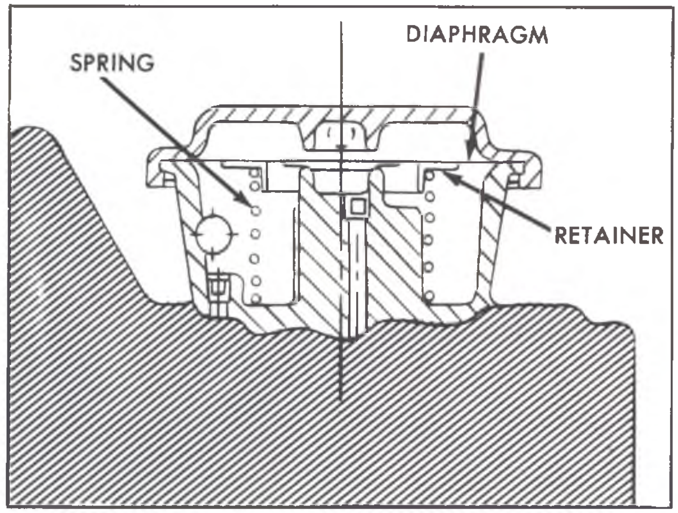


Fig. 14—Purge Valve

SEPARATOR

Removal

1. Raise vehicle on hoist.
2. Disconnect lines from separator.
3. Remove retaining screw and remove separator.

Installation

1. Install separator and its retaining screw.
2. Connect lines to separator.

   NOTE: If replacing hose, use only replacement hose marked EVAP.

3. Lower vehicle and remove from hoist.

FUEL TANK

Removal and installation procedures are the same as outlined for other models with exception of disconnecting and connecting fuel tank-to-separator vent lines. Refer to Fuel Tank Section.

EXHAUST SYSTEM

IMPORTANT: Make sure that exhaust system components have at least 3/4 inch clearance from the floor pan to avoid possible overheating of the floor pan and possible damage to the passenger compartment carpets.

SERVICE INFORMATION

When installing a new exhaust pipe, muffler or tailpipe, on any model, care should be taken to have the correct alignment and relationship of the components to each other. Particular care should be given to the installation of the exhaust pipe and crossover pipe assembly on V-8 engine single exhaust systems. Incorrectly assembled parts of the exhaust system are frequently the cause of annoying noises and rattles due to improper clearances or obstructions to the normal flow of gases. Leave all clamp bolts and muffler strap bolts loose until all parts are properly aligned and then tighten, working from front to rear.

NOTE: When reinstalling exhaust pipe to manifold, always use new packings and nuts. Be sure to clean manifold stud threads with a wire brush before installing the new nuts.

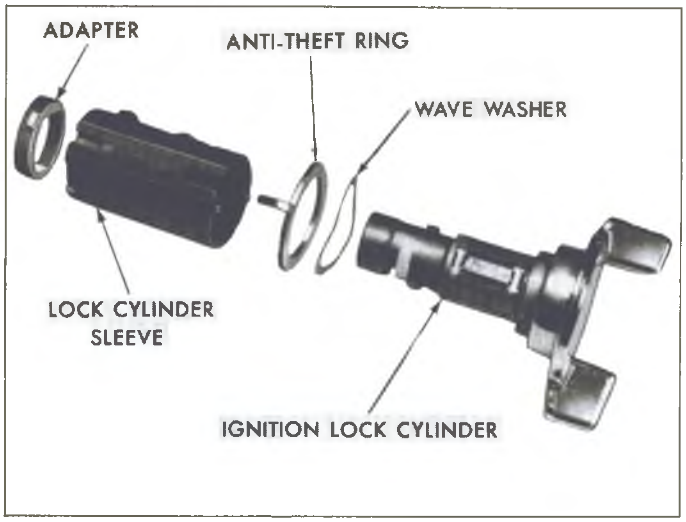


Fig. 10—Lock Cylinder Assembly

assembly is installed in a vehicle, it is no more susceptible to damage through usage than an ordinary column; however, when the column is removed, special care must be taken in handling this assembly. Only the specified wheel puller should be used. When the column is removed from the vehicle, such actions as a sharp blow on the end of the steering shaft or shift levers, leaning on the column assembly, or dropping of the assembly could shear or loosen the plastic fasteners that maintain column rigidity. It is, therefore, important that the removal and installation and the disassembly and reassembly procedures be carefully followed when servicing the assembly.

Whenever the column is removed on automatic transmission equipped vehicles, upon reinstalling the column it will be necessary to check the neutral start switch for proper operation, and reposition if needed. A typical standard column is shown in Figure 11.

TILT-COLUMNS

C and K Series

The function locking energy absorbing tilt steering column option is available on all C and K series trucks (fig. 12).

The tilt function locking column is designed for ease of entry and driver comfort. Tilt columns have seven different steering wheel angle position.

The tilt mechanism consists of an upper and lower steering shaft assembly with a universal joint between them. A support assembly is held to the mast jacket by a lock plate, and a bearing housing assembly is positioned over the upper steering shaft and secured to the support by two pivot pins. Two lock shoes are pinned to the housing assembly and engage a pin in the support assembly. When the release lever is pulled up and the lock shoes disengage the support pin, the steering wheel is pushed up by a spring compressed between the support and housing assemblies.

The tilt release lever is located on the left side of the steering column and below the directional lever. The tilt lever is pulled toward the steering wheel and the wheel moved to the desired angle.

G and P Series

A tilt column is also available for G and P (motor home) series trucks. It is the same as last years truck tilt column and all applicable service information will be found in the service section of this manual.

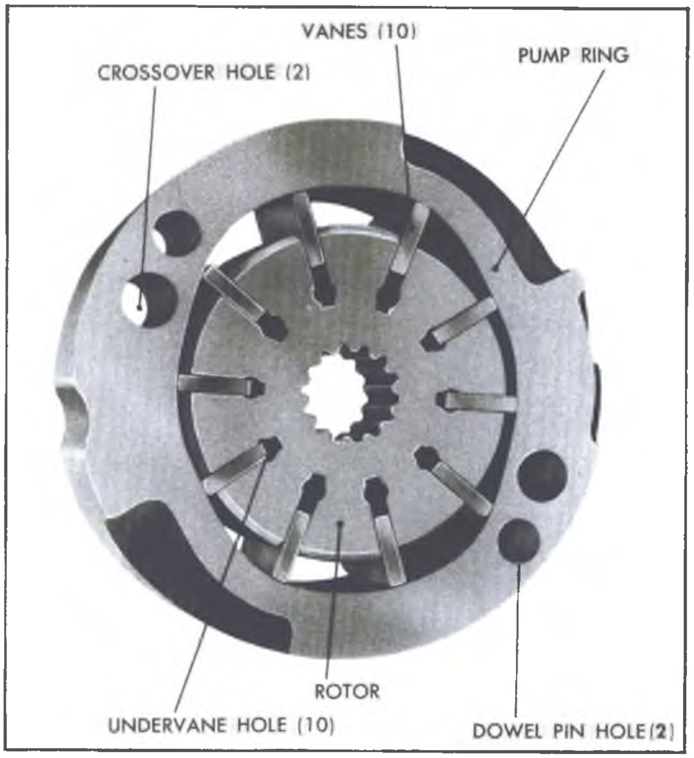


Fig. 23—Pump Components

the inner cam surface of the pump ring, moving outward and inward twice during each revolution. This results in a complete pumping cycle every 180 degrees of rotation (Fig. 23). Oil is moved in the spaces between the vanes. As the vane tips move outward, oil is sucked into the intervane spaces through four suction ports in the pressure and thrust plates. The pressure of the oil is raised, and the oil is discharged from the pump ring, as the vane tips move inward. High pressure oil discharges into cavity 1 (Figs. 25, 26 and 27), through two open ports in the pressure plate, and through two blind ports in the thrust plate, which are connected to cavity 1 by the cross-over holes in the ring. A portion of this oil is circulated through the central port system in the pressure plate, forcing the vanes to follow the cam surface of the ring. The ring-rotor leakage oil (12) is used for bushing lubrication and then bled to the reservoir.

SLOW CORNERING (Fig. 25)

During slow cornering maneuvers, the oil pressure required will usually not exceed 400 p.s.i. The speed of the pump is not high enough to require internal bypassing of oil, therefore, the pump by-pass port to (5) remains closed. The high pressure discharge oil (7) is slightly lower in pressure than the internal high pressure oil (1). The drop in pressure occurs as oil flows through the flow control orifice (2). This lower pressure is communicated to the bottom end of the pump control valve (9) via orifice (11) and passage (8), resulting in a pressure unbalance on the valve itself. The flow control valve moves away from the discharge fitting, but due to the force of the flow control spring (10) the valve remains closed to the bypass hole (5). The oil pressure does not build up high enough to cause the pressure relief valve to actuate, because the oil pumped through the steering gear is allowed to recirculate through the entire system.

MODERATE TO HIGH SPEED OPERATION (Fig. 26)

When operating at moderate to high speed, it is desirable to limit the temperature rise of the oil. This is done by flow controlling. The control valve in the steering gear is an open center rotary valve. When this valve is in the straight ahead position, oil flows from the pump through the open center valve and back to the pump reservoir without traveling through the power cylinder. When this flow exceeds the predetermined system requirements, oil is bypassed within the pump. This is accomplished by the pressure drop which occurs across the flow control orifice (2). The pressure is reduced at the bottom of the flow control valve (9) via orifice (11) and passage (8). The pressure unbalance on the valve is sufficient to overcome the force of the spring (10), allowing the valve to open the bypass hole (5), and diverting oil into the intake chamber (6). Supercharging of the intake chamber occurs under these conditions. Oil at high velocity discharging past the valve into the intake chamber picks up make-up oil at hole (4) from the reservoir on the jet pump principle. By reduction of velocity, velocity energy is converted into supercharge pressure in cavity (6). During this straight ahead driving condition, the discharge pressure should not exceed 100 p.s.i.

CORNERING AGAINST WHEEL STOPS (Fig. 27)

When the steering gear control valve is actuated in either direction to the point of cut-off, the flow of oil from the pump is blocked. This condition occurs when the front wheels meet the wheel stop, or when the wheel movement is otherwise blocked by a curb or deep sand or mud. The pump is equipped with a pressure relief valve. The relief valve is contained inside the flow control plunger (13). When the pressure exceeds a predetermined pressure, (greater than maximum system requirements) the pressure relief ball (14) opens, allowing a small amount of oil to flow into the bypass hole (5). This flow of oil passing through the pressure relief orifice (11) causes a pressure drop and resulting lower pressure on the bottom end of the control valve (9).

The pressure unbalance then causes the valve to compress the spring (10) allowing the major portion of the oil to bypass into the intake chamber (from 3 to 6) in the same manner as is accomplished by flow controlling. Relief pressures are usually between 900 and 1500 p.s.i. depending on the vehicle requirements.

travel (approximately 1/4 turn in each direction). Note the highest reading.

8. Tighten the pitman shaft adjusting screw and check torque at steering shaft nut until over-center preload and total steering gear preload falls within specifications. Refer to torque specifications at rear of manual for correct torque values.
9. Install horn button cap or shroud.
10. Connect the pitman arm to the pitman shaft, lining up the marks made at removal. Torque nut to specifications.
11. Lower vehicle to floor and connect the battery ground cable.

Pump Belt Tension

1. Loosen pivot bolt and pump brace adjusting nuts.

   CAUTION: *Do not move pump by prying against reservoir or by pulling on filler neck.*

2. Move pump, with belt in place until belt is tensioned to specifications as indicated by Tool J-23600 (Fig. 40).
3. Tighten pump brace adjusting nut. Then tighten pivot bolt nut.

FLUID LEVEL

1. Check oil level in the reservoir by checking the dip stick when oil is at operating temperature. On models equipped with remote reservoir, the oil level should be maintained approximately 1/2 to 1 inch from top with wheels in full left turn position.
2. Fill, if necessary, to proper level with GM Power Steering Fluid or equivalent. If this is not available, any automatic transmission fluid bearing the mark Dexron®, or Dexron® II, or it's equivalent may be used.

   NOTE: During flushing, overhaul or any operation where a complete change of fluid is necessary use only power steering fluid or equivalent upon refilling.

BLEEDING HYDRAULIC SYSTEM

1. Fill oil reservoir to proper level and let oil remain undisturbed for at least two minutes.
2. Start engine and run only for about two seconds.
3. Add oil if necessary.
4. Repeat above procedure until oil level remains constant after running engine.
5. Raise front end of vehicle so that wheels are off the ground.
6. Increase engine speed to approximately 1500 rpm.
7. Turn the wheels (off ground) right and left, lightly contacting the wheel stops.
8. Add oil if necessary.
9. Lower the vehicle and turn wheels right and left on the ground.
10. Check oil level and refill as required.
11. If oil is extremely foamy, allow vehicle to stand a few minutes with engine off and repeat above procedure.
    a. Check belt tighteness and check for a bent or loose pulley. (Pulley should not wobble with engine running.)
    b. Check to make sure hoses are not touching any other parts of the truck, particularly sheet metal except where design calls for a clamp.
    c. Check oil level, filling to proper level if necessary, following operations 1 through 10. This step and Step "D" are extremely important as low oil level and/or air in the oil are the most frequent causes of objectional pump noise.
    d. Check the presence of air in the oil. If air is present, attempt to bleed system as described in operations 1 through 10. If it becomes obvious

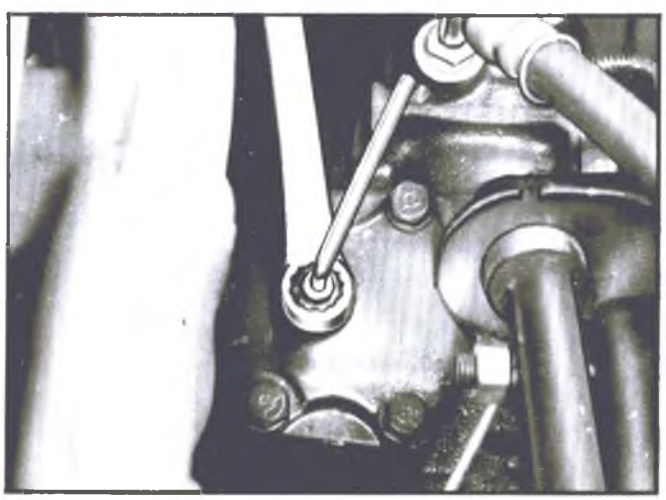


Fig. 39—Over-Center Adjustment

Fig. 40—Checking Belt Tension with J-23600

cylinder into abutment of cylinder and sector. Hold an .070" drill between the lock bezel and housing. Rotate the cylinder counterclockwise, maintaining a light pressure until the drive section of the cylinder mates with the sector. Push in until the snap ring pops into the grooves and the lock cylinder is secured in the housing. Remove the .070" drill. Check lock cylinder for freedom of rotation.

2. Install the Direction Signal Switch and Steering Wheel as outlined previously in this section.

IGNITION SWITCH (C AND K SERIES)

The ignition switch is mounted on top of the column jacket near the front of the dash. For anti-theft reasons, the switch is located inside the channel section of the brake pedal support and is completely inaccessible without first lowering the steering column (see steering column removal).

The switch is actuated by a rod and rack assembly. A portion of the rack is toothed and engages a gear on the end of the lock cylinder, thus enabling the rod and rack to be moved axially (with respect to the column) to actuate the switch when the lock cylinder is rotated.

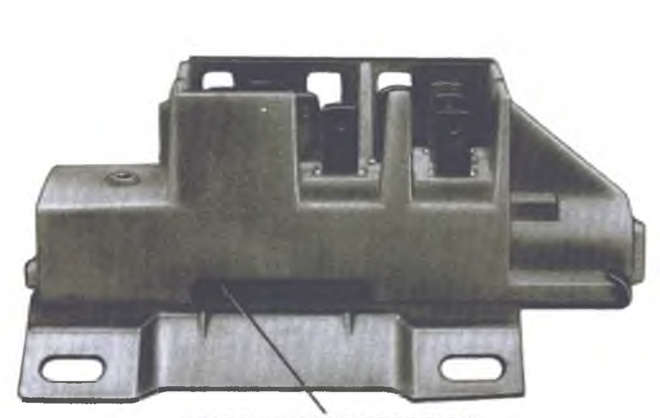


Fig. 59—Ignition Switch Assembly

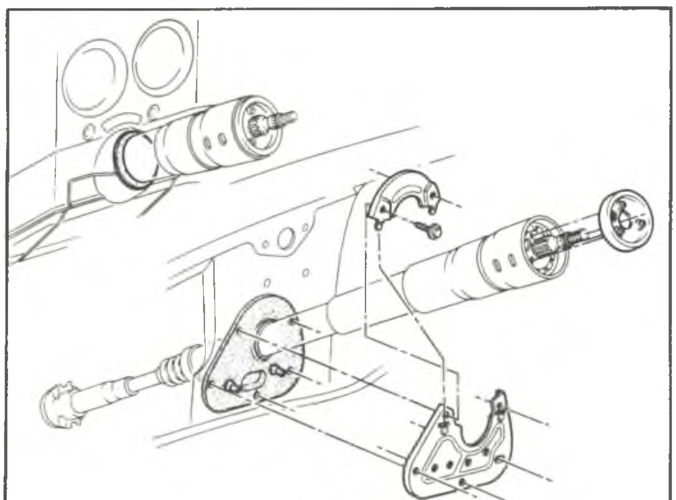


Fig. 60—Steering Column Cover and Seal

Removal

1. Lower the steering column as outlined under "Steering Column Removal" later in this section. It is not necessary to remove the steering wheel.

   CAUTION: *If the steering column is not removed from the vehicle, be sure that it is properly supported, before proceeding.*

2. The switch should be positioned in "Lock" position before removing. If the lock cylinder has already been removed, the actuating rod to the switch should be pulled up until there is a definite stop, then moved down one detent, which is the "Lock" position.
3. Remove the two switch screws and remove the switch assembly.

Installation

1. Before replacing the switch, be sure that the lock is in the "Lock" position. Make certain that the switch is in "Lock" position (fig. 59); if it is not, a screwdriver (placed in the locking rod slot) can be used to move the switch to "Lock".
2. Install the activating rod into the switch and assemble the switch on the column; tighten the mounting screws.

   CAUTION: *Use only the specified screws since over-length screws could prevent a portion of the assembly from compressing under impact.*

3. Reinstall the steering column assembly following the "Mandatory Installation Sequence" outlined later in this section.

STEERING COLUMN

All models which are equipped with the Function Locking Energy Absorbing Steering Columns are one of five basic designs.

1. **Synchromesh** – The synchromesh column is used on models with the standard transmission and column mounted shift levers. The shift tube, within the outer column jacket, includes two lower shift levers for connection to the transmission control linkage. This column does not lock the transmission when the lock cylinder is in the "lock" position.
2. **Floor Shift** – This column is used on models equipped with a manual transmission with the shift lever on the floor. This column does not lock the transmission when the lock cylinder is in the "lock" position.
3. **Automatic Column Shift**–this column is used on all models with an automatic transmission and a standard column. This column has a single lower shift lever for shifting the automatic transmission.

2. Loosely assemble (2) capsule nuts (H) at the instrument panel bracket (D).
3. Position lower clamp (J) and tighten attaching nuts (K) to specified torque.
4. Tighten two nuts (H) at capsules to specified torque.
5. Install seal (C) and covers (A and B) to dash.
6. Install attaching screws (L) and tighten to specified torque.
7. Tighten two nuts (F) at capsules to specified torque if not already done.
8. Remove plastic spacers from flexible coupling pins.
9. Install transmission indicator cable on column automatics.
10. Install the instrument panel trim cover.
11. Connect the transmission control linkage at the shift tube levers.
12. Install the steering wheel as outlined previously in this section.
13. Connect the battery ground cable.

Mandatory System Requirements

1. Pot joint operating angle must be 1 1/2° ± 4°.
2. Flexible coupling must not be distorted greater than ±.06 due to pot joint bottoming, in either direction.

STEERING COLUMN SERVICE FOR G AND P SERIES

STEERING COLUMN UPPER BEARING—G AND P SERIES

Standard Column

Removal

1. Remove steering wheel as outlined in this section.
2. Remove directional signal cancelling cam.
3. Pry out upper bearing.

Installation

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

1. Replace all component parts in reverse order of removal making sure that directional signal switch is in neutral position before installing steering wheel. Torque steering wheel nut to specifications.

Tilt Column

The upper bearings on the tilt column are spun into the bearing housing assembly. If the bearings indicate need of replacement, the entire bearing housing must be replaced. See "Tilt Steering Column - Disassembly and Assembly" for the correct replacement procedure.

STEERING COLUMN LOWER BEARING P SERIES

Removal

1. Remove the intermediate steering shaft and universal joint assembly as outlined earlier in this section. Remove the preload spring clamp and spring from the end of the steering shaft.
2. Pry out the lower bearing assembly.

Installation

CAUTION: *See CAUTION note on page 1 of this section regarding fasteners referred to in step 2.*

1. Place the new bearing over the end of the steering shaft and press into position in the column.
2. Install the preload spring and clamp and torque the clamp bolt nut to specifications while maintaining the dimension shown in Figure 36. Reinstall the intermediate shaft and universal joint assembly as outlined under "Intermediate Steering Shaft with Universal Joint Couplings - Installation".

DIRECTIONAL SIGNAL SWITCH—G AND P SERIES COLUMNS

If the directional signal switch must be replaced, the steering column does not have to be removed from the vehicle.

Removal

1. Remove the steering wheel as outlined under "Steering Wheel - Removal".
2. Remove the directional signal switch cancelling cam and spring.
3. Remove the column to instrument panel trim plate (if so equipped).

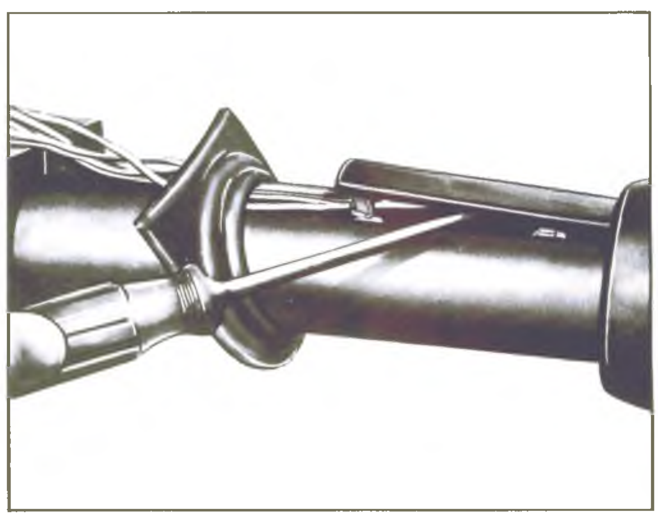


Fig. 83—Removing Wiring Harness Protector

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-22599) 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.

COLUMN INSTALLATION-MANDATORY SEQUENCE P SERIES (Fig. 87)

CAUTION: *See CAUTION note on page 1 of this section regarding the fasteners referred to in steps 1, 2, 3, and 10.*

1. Applying 50 lbs. force on the steering wheel end of the steering shaft, adjust the lower bearing preload to allow steering shaft end play as indicated in Figure 36. Tighten the shaft clamp on pot joint bolt to specifications.
2. From the passenger side of the dash panel, carefully insert the lower end of the steering column through the toe panel opening.

   Guide the steering shaft into the universal yoke, lining up the marks made at removal. Install the yoke pinch bolt and torque to specifications. The pinch bolt must pass through the shaft undercut.
3. Position and attach the lower clamp mounting bracket to the firewall. Locate the steering column protrusions against the toe pan bracket while at the same time, aligning protrusion in brake and clutch pedal support with index slot in the steering column, as shown in Figure 87. Install the column to bracket clamp and torque the clamp bolt to specifications.

   NOTE: The toe pan bracket must not override the protrusions on the steering column.
4. Position the steering column to dash panel bracket, install the attaching bolts and torque to specifications.
5. If plastic spacers were used on the flexible coupling alignment pins, remove the spacers after all bolts have been properly torqued.
6. Install the seal at the toe pan and then install the toe pan bracket screws; torque to specifications.
7. Install the dash panel trim plate (if so equipped).
8. Connect the transmission shift linkage on column shift models.

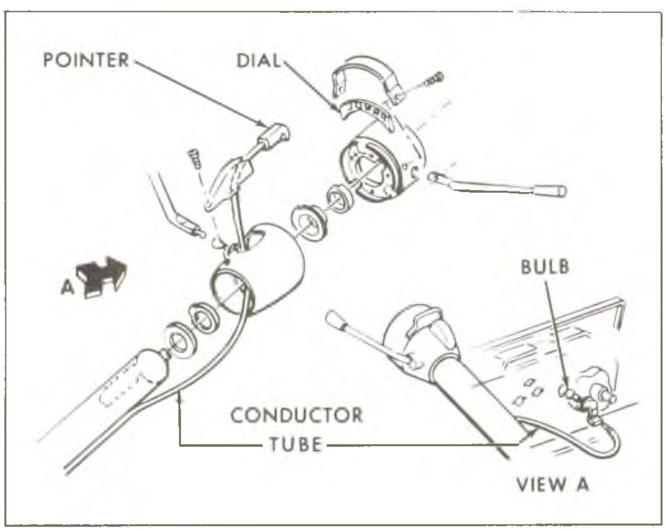


Fig. 100—Conductor Tube for Automatic Transmission Indicator

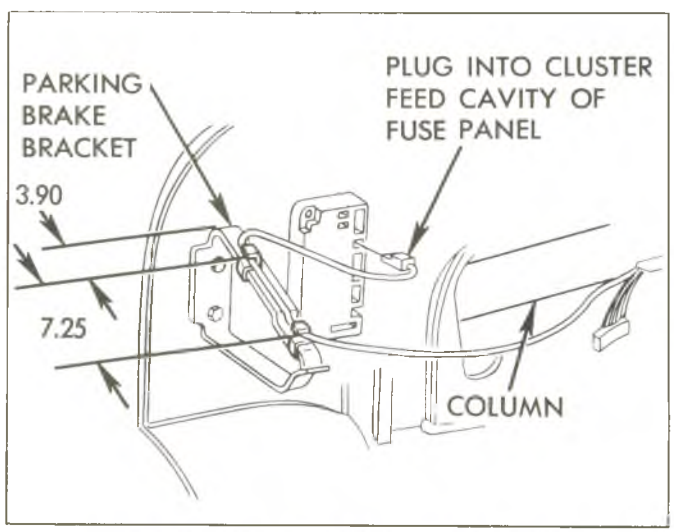


Fig. 101—Tilt Column Shift Indicator Light

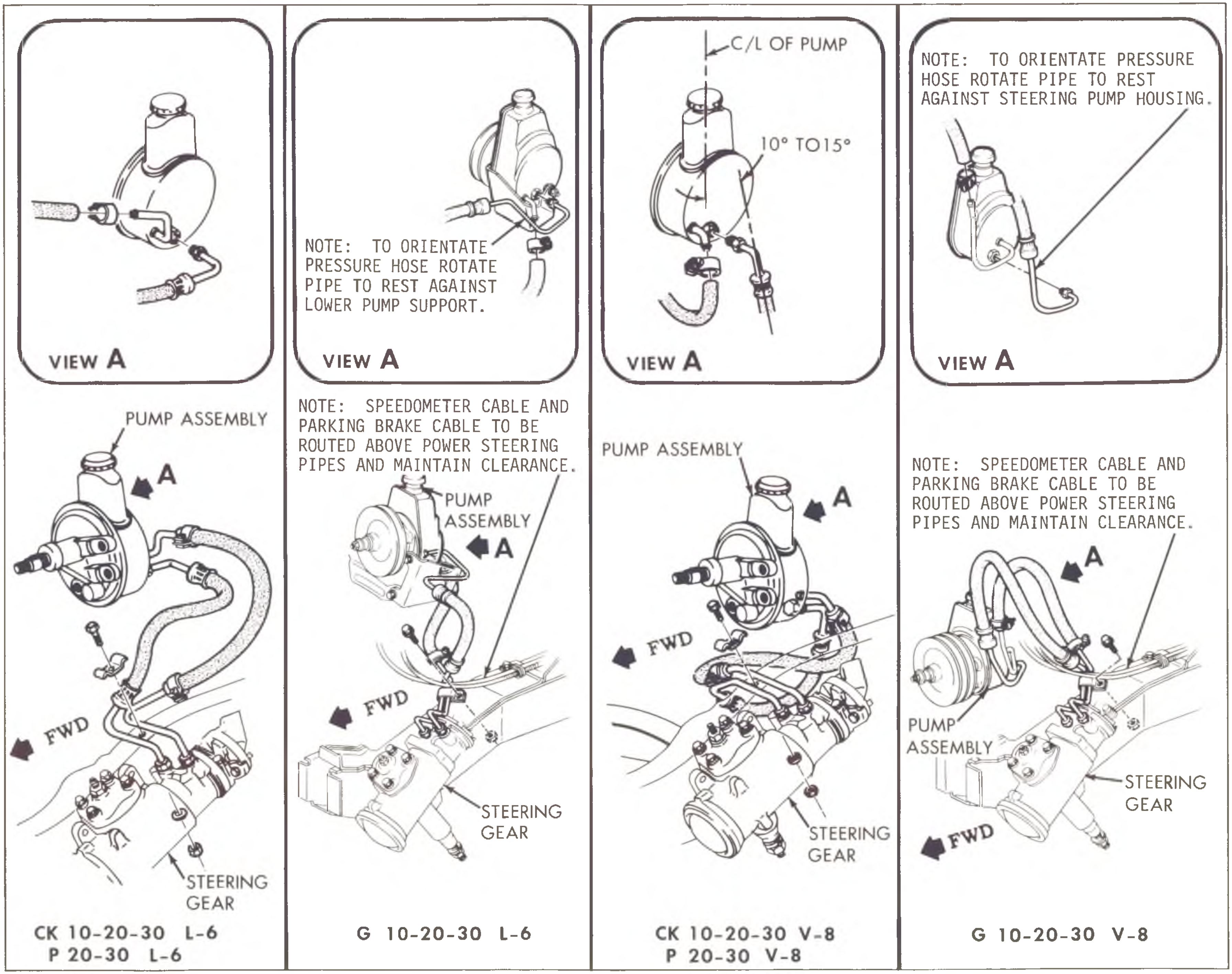


Fig. 107A—Power Steering Hose Routing—Typical

IGNITION SYSTEM – ELECTRICAL SYSTEM – WILL NOT FUNCTION (CONT'D.)

Cause	Solution
D. Defective ignition switch.	D. Replace ignition switch.
E. Ignition switch not adjusted properly.	E. Readjust ignition switch.

SWITCH WILL NOT ACTUATE MECHANICALLY

Cause	Solution
A. Defective ignition switch.	A. Replace igntion switch.

SWITCH CAN NOT BE SET CORRECTLY

Cause	Solution
A. Switch actuator rod deformed.	A. Repair or replace switch actuator rod.
B. Sector to rack engaged in wrong tooth (tilt).	B. Engage sector to rack correctly.

NOISE IN COLUMN

Cause	Solution
A. Coupling bolts loose.	A. Tighten pinch bolts to specified torque.
B. Column not correctly aligned.	B. Realign column.
C. Coupling pulled apart.	C. Replace coupling and realign column.
D. Sheared intermediate shaft plastic joint.	D. Replace or repair steering shaft and realign column.
E. Horn contact ring not lubricated.	E. Lubricate with lubriplate.
F. Lack of grease on bearings or bearing surfaces.	F. Lubricate bearings.
G. Lower shaft bearing tight or frozen.	G. Replace bearing. Check shaft and replace if scored.
H. Upper shaft tight or frozen.	H. Replace housing assembly.
I. Shaft lock plate cover loose.	I. Tighten three screws or, if missing, replace. CAUTION: Use specified screws. (15 in. lbs.)
J. Lock plate snap ring not seated.	J. Replace snap ring. Check for proper seating in groove.
K. Defective buzzer dog cam on lock cylinder.	K. Replace lock cylinder.
L. One click when in "off-lock" position and the steering wheel is moved.	L. Normal condition - lock bolt is seating.

Fig. 112—Automatic Transmission Column Diagnosis

POWER STEERING SYSTEM DIAGNOSIS

Complaints of faulty steering are frequently the result of problems other than the steering gear or pump. Those areas of the steering system which can be easily checked and quickly corrected without disassembly and overhaul of any major components should be attempted first.

Conditions such as hard or loose steering, road shock or vibrations are not always due to the steering gear or pump, but are often related instead to such factors as low tire pressure and front end alignment. These factors should be checked and corrected before any adjustment or disassembly of the power steering gear or pump is attempted.

SYSTEM CHECKS

Many factors affect power operation of the steering system, of which the most common are:

1. Fluid level and condition.
2. Drive belt tension.
3. Loose component mountings.
4. Loose pump pulley.

These factors must be checked and corrected before making any further diagnosis of the steering system. The need for proper diagnosis cannot be over-emphasized.

After the source of the problem has been found, determine the cause. For example, if the oil level in the reservoir is found to be low, refill and check the entire hydraulic system for oil leaks. Refilling the reservoir will not necessarily correct problem.

Fluid Level

1. Run engine to normal operating temperature, then shut engine off. Remove reservoir filler cap and check oil level to "hot" mark on dipstick.
2. If oil level is low, add hydraulic fluid to proper level on dipstick and replace filler cap.

   NOTE: When adding or making a complete fluid change, always use GM power steering fluid or equivalent.
3. When checking fluid level after the steering system has been serviced, air must be bled from the system. Proceed as follows:
   a. With wheels turned all the way to the left, add power steering fluid to "Cold" mark on dipstick.
   b. Start engine, and running at fast idle, recheck fluid level. Add fluid if necessary to "Cold" mark on dipstick.
   c. Bleed system by turning wheels from side to side without hitting stops. Maintain fluid level just above internal pump casting. Fluid with air in it will have a light tan or red appearance. This air must be eliminated from fluid before normal steering action can be obtained.
   d. Return wheels to center position and continue to run engine for two or three minutes, then shut engine off.
   e. Road test car to make sure steering functions normally and is free from noise.
   f. Recheck fluid level as described in steps 1 and 2, making sure fluid level is at "hot" mark on dipstick after the system has stabilized at its normal operating temperature approximately 170° to 190°F.

BELT ADJUSTMENT

When adjusting a power steering pump belt, never pry against the pump reservoir or pull against the filler neck. To increase belt tension move the pump outward by prying against the pump housing casting extension directly behind the pump drive pulley.

A belt that has been previously tensioned is considered to be a used belt and should be tightened to 75 pounds. A belt that has never been tensioned is considered to be a new belt and should be tightened to 125 pounds.

Place belt tension gage, J-23600 or equivalent midway between the pulleys on drive belt being checked. If the belt tension is incorrect proceed as follows:

1. When power steering pump is driven by a single belt:
   a. Loosen the pump attaching bolts and adjust the belt to correct tension by moving the pump outward, away from the engine.
   b. Snug all pump mounting bolts and remove pry bar.
   c. Tighten all pump mounting bolts to specified torque.
   d. Check belt tension and remove the belt tension gage.

HYDRAULIC SYSTEM CHECKS

The following procedure outlines methods to identify and isolate power steering hydraulic circuit difficulties. The test provides means of determining whether power steering system hydraulic parts are actually faulty. this test will result in readings indicating faulty hydraulic operation, and will help to identify the faulty component.

Before performing hydraulic circuit test, carefully check belt tension, fluid level and condition of driving pulley.

Power Steering Hydraulic System Test

Engine must be at normal operating temperature. Inflate front tires to correct pressure. All tests are made with engine idling, check idle adjustment and if necessary adjust engine idle speed to correct specifications listed in Section 6M and proceed as follows:

1. With engine NOT running disconnect pressure hose from pump and install Tool J-5176 using a spare

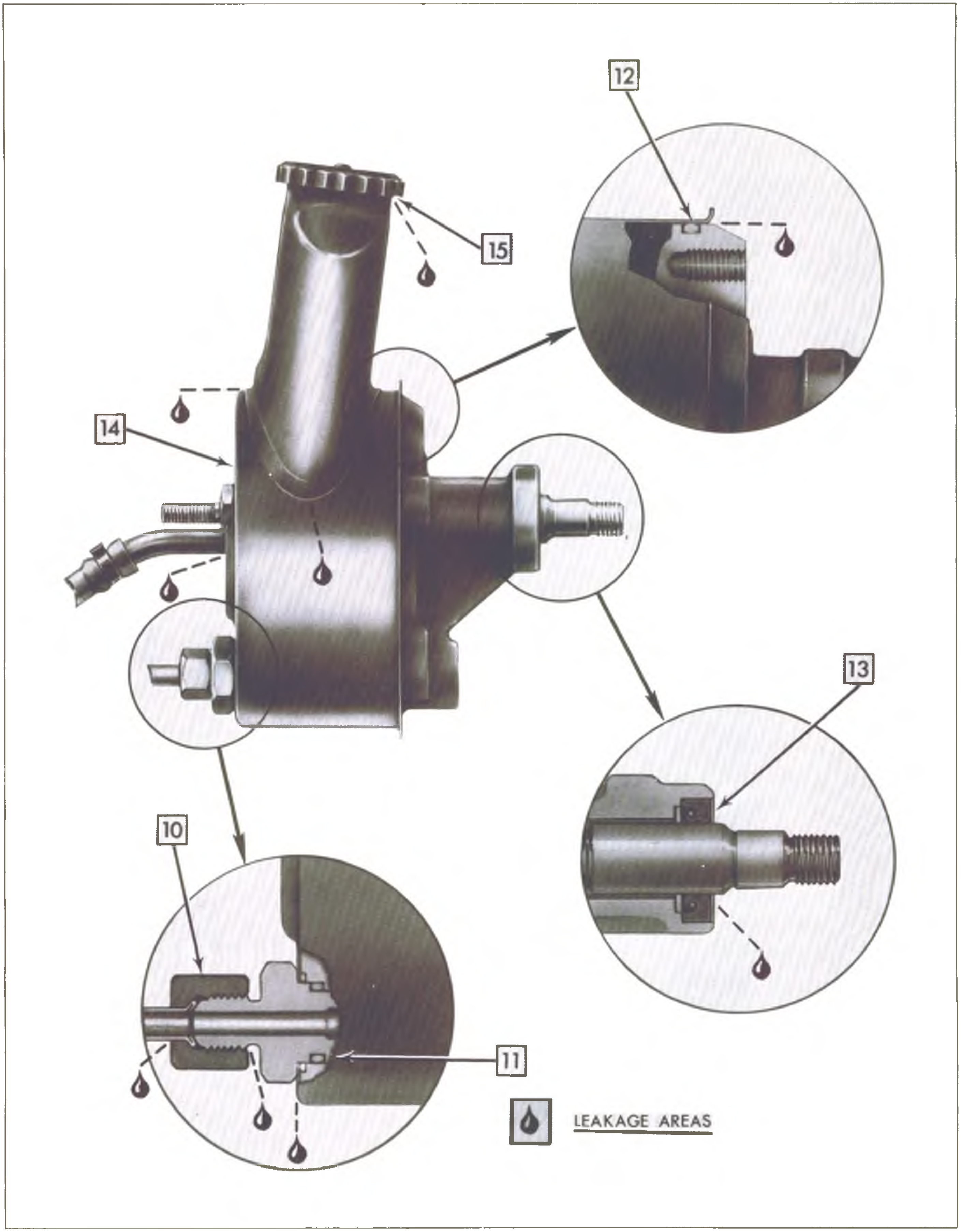


Fig. 133—Power Steering Pump Leakage

lower control arm pivot; **to raise front wheel of K models**, place jack under front axle near spring seat.

Dual and Single Wheels

When installing the tire and wheel on the vehicle, the following procedure should be followed:

After wheel nuts are put on loosely, turn the wheel until one nut is at the top of the bolt circle; tighten the nut just snug. Snug up the remaining nuts criss-cross to minimize runout, then tighten the nuts to the recommended torque alternately and evenly to avoid excessive runout.

When installing wheels on vehicles with dual rear wheels:

1. Install inner and outer wheel and clamp ring on rear, or wheel and clamp ring on front (be sure pins on clamp ring face outboard).
2. Install and snug nuts finger tight.
3. Torque nuts to specified torque in sequence shown in Figure 3.

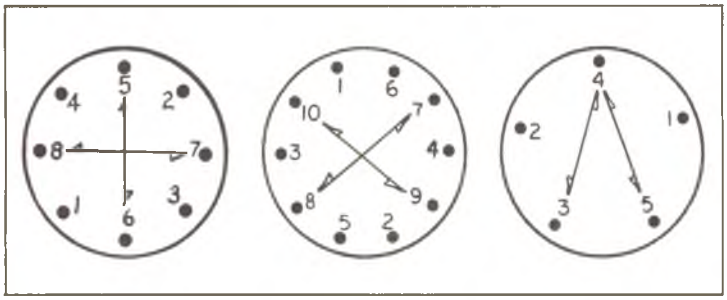


Fig. 3—Wheel Nut Tightening Sequence

Lateral runout should not exceed 1/8″ on front wheel or 3/16″ on rear wheel.

Matching Side and Lock Rings

Side and lock rings of different rim types are **not interchangeable**. Some may appear to be, but they do not fit properly on the rim base. Serious accidents have resulted from the use of mismatched rings. Rim base and rings must be matched according to manufacturer, size and type. This information is stamped on each part.

Installing Synthetic Tubes

CAUTION: *When tube and flap are not properly lubricated and mounted, they will stretch thin in the tire bead and rim region. This will cause premature failure.*

1. Before installing tube in tire, clean inside of casing thoroughly.
2. Insert tube in tire and inflate until it is nearly rounded out.
3. Inspect rim for rust scale and bent flanges--clean rust scale and straighten flanges where necessary.
4. Using a brush or cloth swab, apply a solution of neutral vegetable oil soap to the inside and outside of tire beads and also to the rim side of the tube. Do not allow soap solution to run down into tire.
5. When mounting tire and tube on a drop center rim, follow the standard procedure. Be sure tire is centered on rim so that beads are out of rim well before inflating. Do not allow tire to hang loosely on wheel while inflating.
6. Center valve and pull it firmly against the rim. Hold in this position and inflate until tire beads are firmly seated on rim against flanges.
7. Completely deflate tire by removing valve core.
8. Reinflate tire to recommended pressure.

TUBELESS TIRES

Tubeless tires mounted on one piece full drop center rims are standard on some trucks. These tires have a safety inner liner which if punctured, tends to cling to the penetrating object forming a partial seal until the object is removed from the tire.

The mounting and demounting of tubeless truck tires will present no problem when a rubber lubricant, such as Ru-Glyde or equivalent is applied to tire beads and rim flanges. Ru-Glyde or equivalent in addition to materially assisting in mounting and demounting also prevents rusting at the tire sealing area and thus prevents tires from adhering to the wheel.

CAUTION: *A hammer, or tools with sharp edges, should never be used to demount or mount tubeless tires as damage to rim flange or tire sealing bead may result.*

Inspection for Leaks

1. With wheel assembly removed from vehicle, inflate the tire to recommended operating pressure.
2. Check for leaks at rim bead by placing wheel and tire horizontal and allowing water to stand in groove between rim and tire. Check for large leaks by lowering assembly into water tank or running water over tire.

Demounting

1. Remove valve core to completely deflate tire. With tire lying flat on floor, loosen beads from rim seats by walking around on tire with heels at points close to rim. With wide side of rim down, apply tire lubricant to top bead. With stops toward rim, insert spoon ends of two tire irons about 10″ apart. While standing on tire to hold bead in gutter, pull one tool toward center of rim.
2. Hold one iron in position with foot and pull second iron toward center of rim. Progressively work bead off rim, taking additional bites if necessary.
3. Stand assembly in vertical position. Lubricate second bead. At top of assembly insert straight end of tire iron between bead and back flange of rim at about a 45 degree angle.

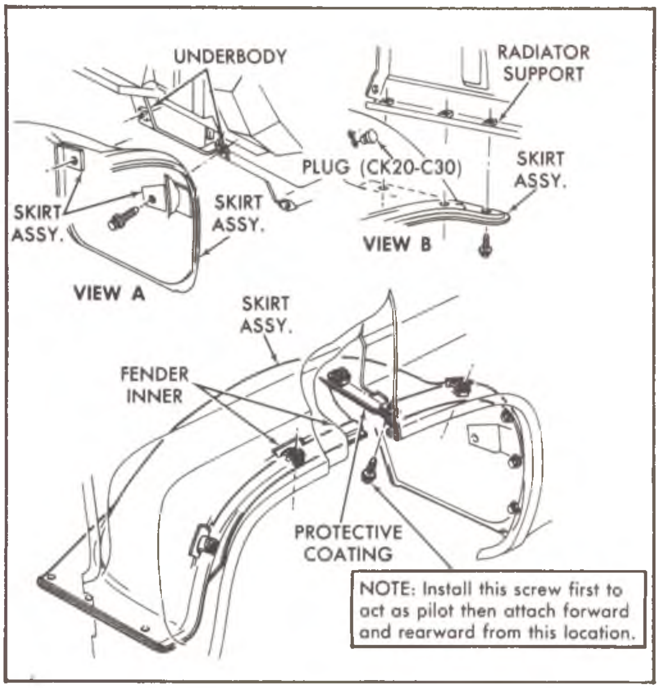


Fig. 9—Fender Skirt Assembly—CK Series

3. Install combination bolt and flat washer assembly into each fender reinforcement while inserting shims required between fender reinforcement and body (See Figure 10).
4. Install two bolts and shims required at each fender rear lower edge to hinge pillar.
5. Install bolt in each fender skirt to underbody.

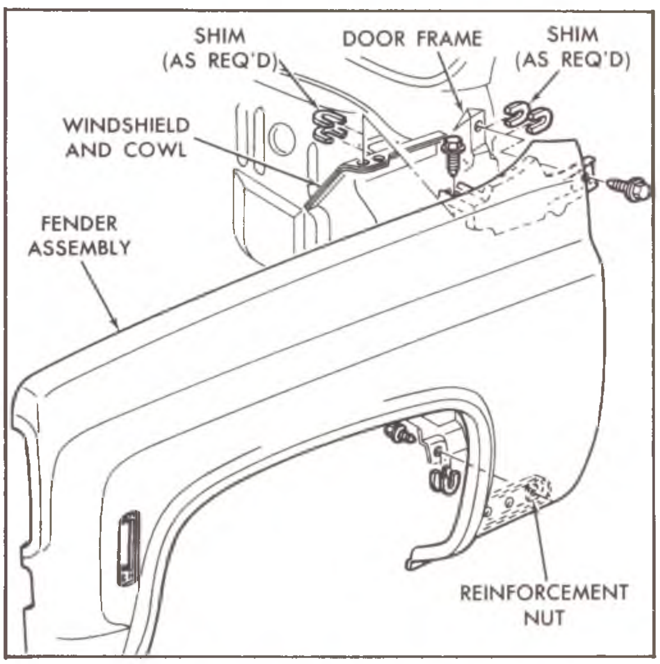


Fig. 10—Front Fender Assembly—CK Series

6. Install bolts at steering column skirt reinforcement, final torque 25 ft. lbs.
7. Tighten each radiator support mounting bolt 33 ft. lbs.
8. Torque bolts at fender to cowl 25 ft. lbs.
9. Install front bumper.
10. Connect wire connectors at dash and toe panel. Attach generator and regulator wires.
11. Connect upper and lower radiator hoses. Connect oil cooler lines to the radiator on models so equipped.
12. Connect battery and fill radiator. Start engine and check for leaks.

Radiator Support

Removal

1. Remove hood as described in this section.
2. Drain radiator, saving coolant, loosen attachments and remove radiator and coolant recovery tank.
3. Disconnect and remove battery.
4. Remove battery tray with battery hanger.
5. Remove wiring from radiator support.
6. Disconnect fan shroud and lay back on engine.
7. Remove both head lamp assemblies.
8. Remove grille assembly.
9. Remove upper and lower radiator grille panels. (Fig. 11).
10. Remove screws securing front fenders to radiator support.
11. Remove screws securing fender skirts to radiator support bottom. (Fig. 9).
12. Remove bolt securing center grille support to radiator support.
13. Remove bolts securing hood catch assembly to radiator support.
14. Remove radiator support bolts secured to frame.
15. Tilt radiator support rearward and lift up and off.

Installation

1. Rotate radiator support into position and loosely install attachments to frame.
2. Connect center grille support to radiator support.
3. Connect hood latch plate.
4. Connect radiator support brackets to fenders.
5. Connect support to fenders.
6. Connect screws from underside of fender skirts to support bottom.
7. Attach grille upper panel to fenders loosely.
8. Attach grille lower panel to fenders.

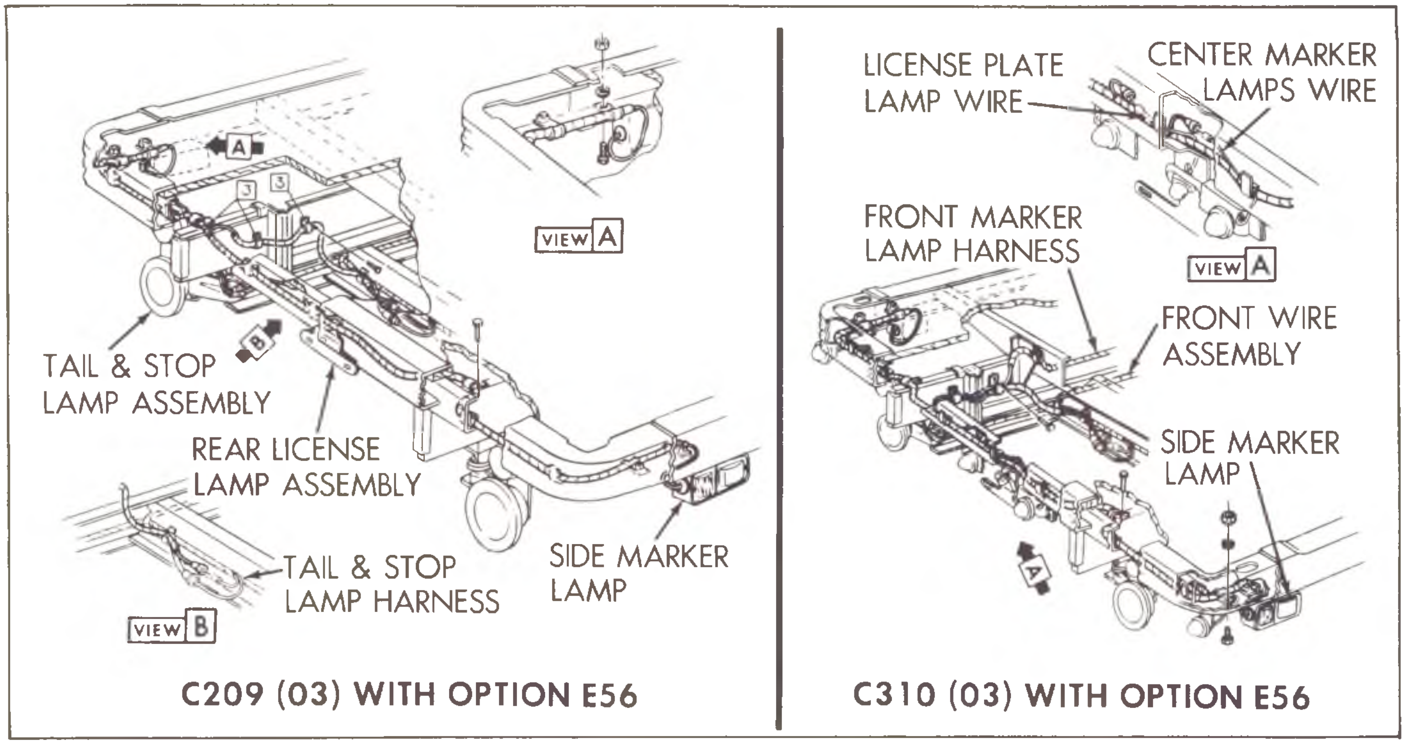


Fig. 7--Rear Lighting (C-K Platform and Stake Rack Models)

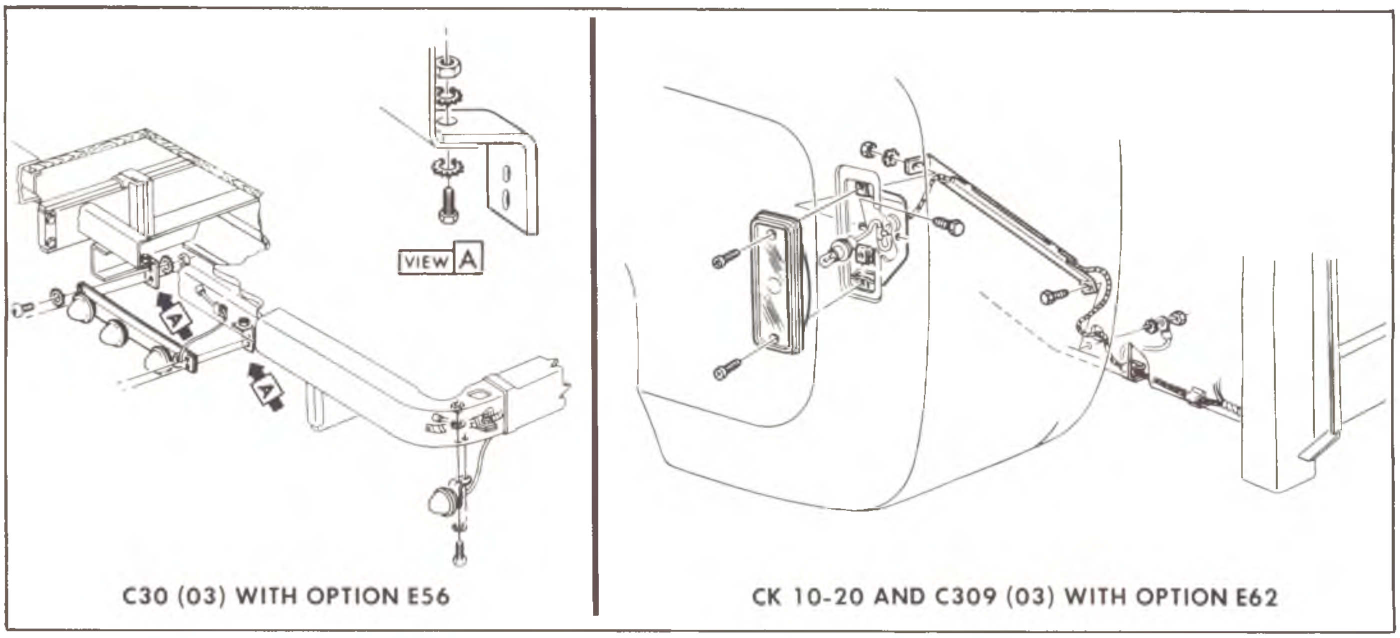


Fig. 8--Rear Lighting (C30 03 Models with E56 and C-K Models with E62)

3. Remove instrument cluster bezel screws on left end. Pull out on bezel and hold switch nut with a wrench.
4. Disconnect multiple wiring connectors at switch terminals.
5. Remove switch by rotating while holding switch nut.
6. To install, reverse Steps 1-5 above.

G Models (Fig. 11)

Replacement

1. Disconnect battery ground cable.
2. Reaching up behind instrument panel, depress shaft retaining button and remove switch knob-shaft.

THEORY OF OPERATION

ELECTRICAL CIRCUITS

The following facts should be kept in mind throughout the following explanation.

1. The wiper dash switch is a grounding type switch, and therefore must be securely mounted.
2. When installed in a vehicle, the wiper motor is connected to the chassis through a ground strap. This in effect connects the wiper housing to the ground side of the battery.
3. The ignition switch opens and closes the feed wire circuit to the wiper. Therefore, it must be turned ON to operate wipers.

The wiper motor operation is controlled by two switches—a dash control switch and a parking switch located in the wiper motor gear box.

The parking switch contacts are normally closed and are opened by a cam on the gear when the wiper blades

Fig. 17—Gear in PARK Position—Contacts Open

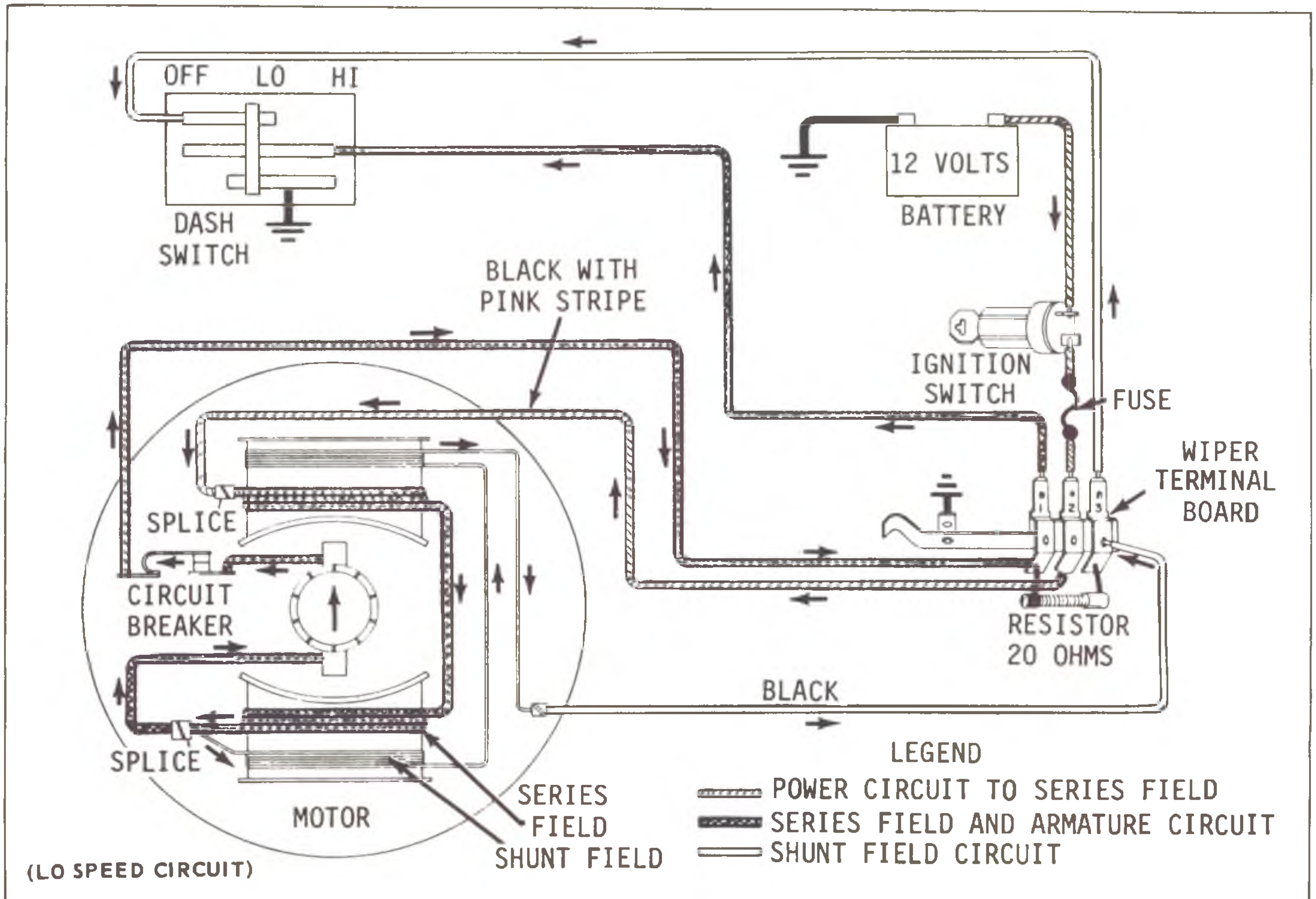


Fig. 18-LO Speed Circuit

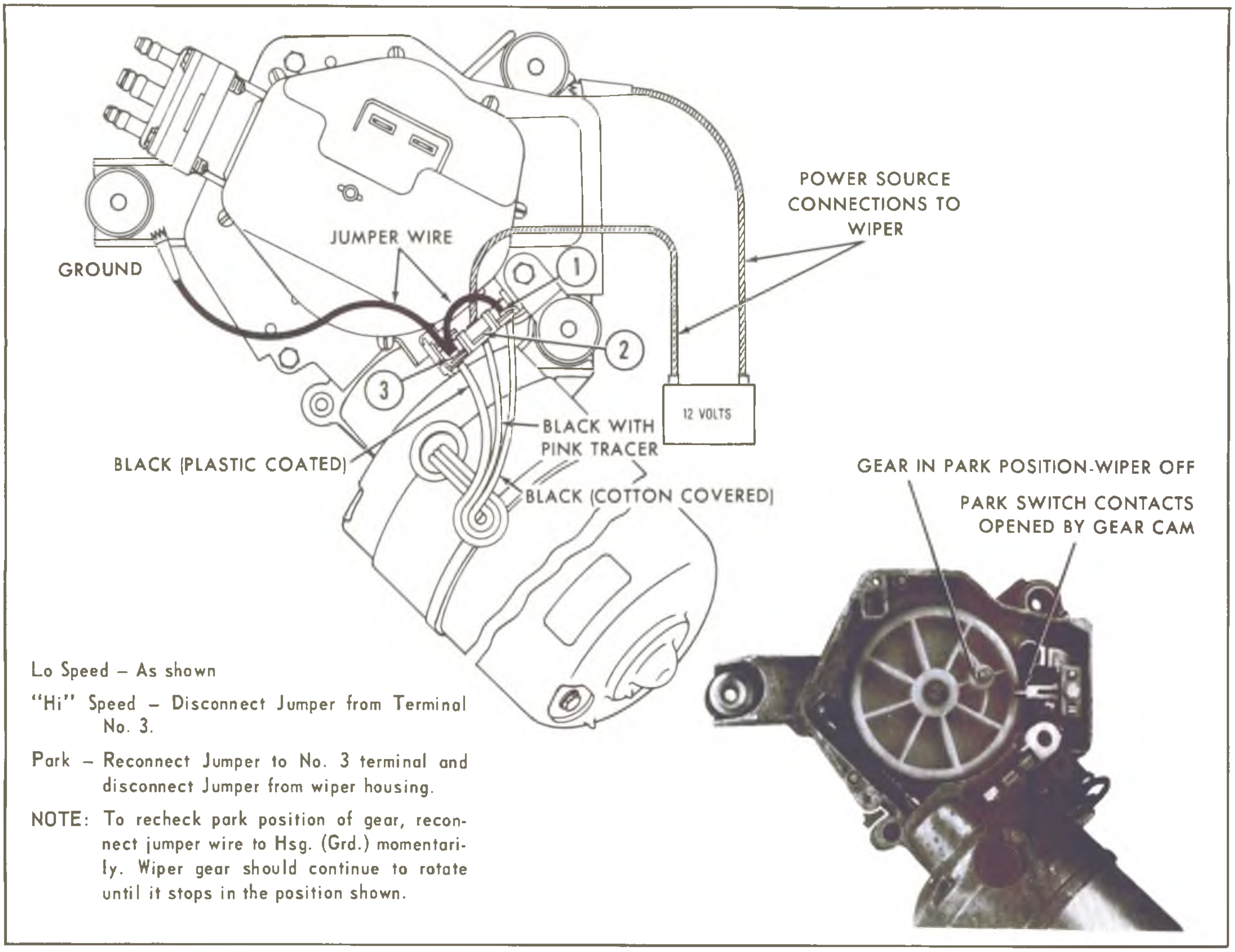


Fig. 36--Wiper Motor Diagnosis Diagram

WIPER - OFF VEHICLE

Connect Ammeter (0-30 amps), Power Source and Jumper wires to wiper as shown in Figure 36. Observe current draw, determine type of trouble that exists and refer to the TROUBLE CHART - WIPER DETACHED.

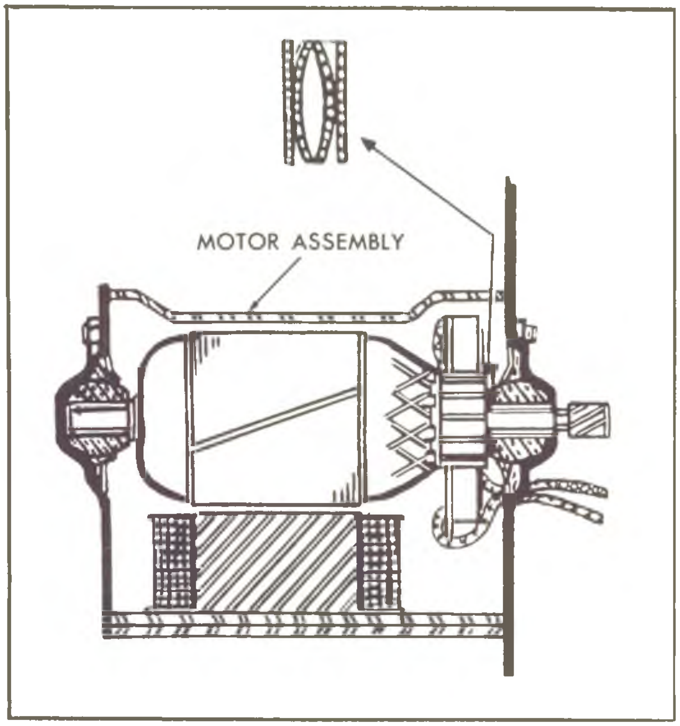


Fig. 41--End Play Wave Washer Installation

Motor

Reassemble motor using reverse of disassembly procedure.

NOTE: Armature end play is controlled by end play washers. See Figure 41 for proper assembly of end play washers. Lubricate armature shaft bushings with light machine oil.

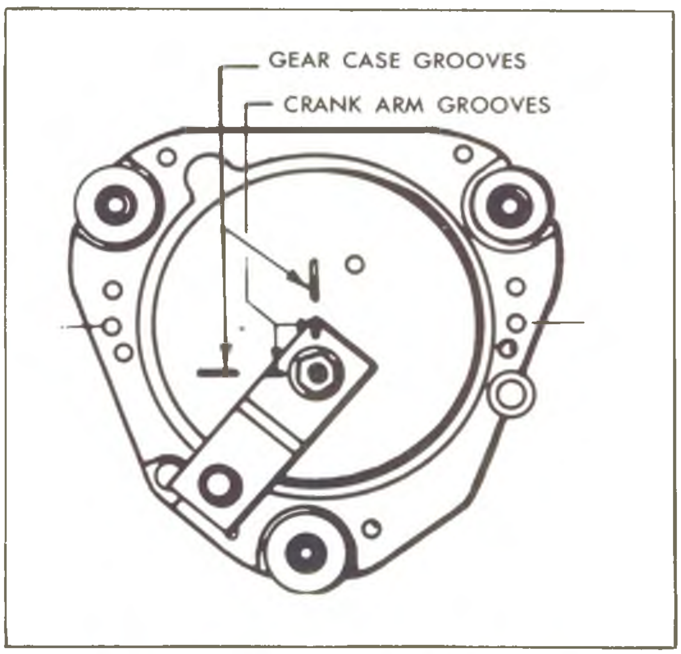


Fig. 42--Wiper Motor Crank Arm in Park Position

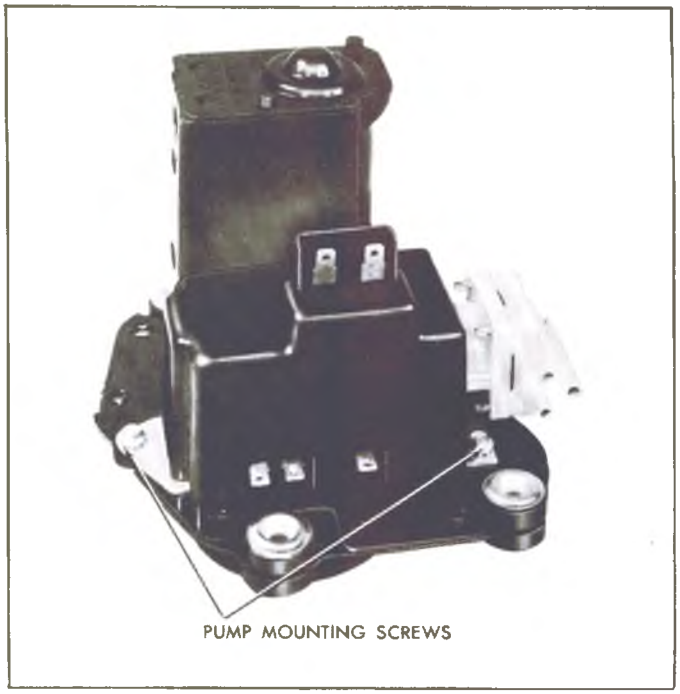


Fig. 43--Washer Pump Attaching Screws

Gear Box

1. Assemble gear box using reverse of disassembly procedure.

   NOTE: Lubricate gear teeth with Delco Cam and Ball Bearing lubricant (or equivalent). Be sure cover is properly located over dowel pins and be sure to reinstall ground strap.

2. Place wiper in park position and install crank arm on output shaft, rotate crank so alignment marks line up with those on cover (fig. 42).
3. Replace retaining nut, place crank arm in vise, tighten retaining nut.

WINDSHIELD WASHER

The positive displacement washer pump used on the two-speed non-depressed park wipers (fig. 43) use a pump mechanism consisting of a piston, piston spring and valve arrangement driven by a (4) lobe cam, and follower assembly (fig. 45). The cam is attached to one shaft of the wiper motor output gear (fig. 44). Programming is accomplished electrically and mechanically by a relay assembly and ratchet wheel arrangement.

Replacement

1. Disconnect battery ground cable.
2. Remove two (2) pump mounting bolts.
3. Remove washer pump assembly.

Upper or lower beam will not light or intermittent	1. Open connection or defective dimmer switch	1. Check dimmer switch terminals with test lamp. If bulb lights at light blue or tan wire terminals, repair open wiring between dimmer switch and headlights. If bulb will not light at one of these terminals, replace dimmer switch.
	2. Short circuit to ground	2. Follow diagnosis above (All headlights inoperative or intermittent)

SIDE MARKER LAMP DIAGNOSIS

Condition	Possible Cause	Correction
One lamp inoperative	1. Turn signal bulb burnt out (Front lamp)	1. Switch turn signals on. If signal bulb does not light, replace bulb. (Bulb filament provides ground path for marker lamp bulb through the light blue or dark blue/white strip wires).
	2. Side marker bulb burnt out	2. Replace bulb.
	3. Loose connection or open in wiring	3. Using test lamp, check brown wire terminal at bulb socket. If test lamp lights, repair open ground circuit. If lamp does not light, repair open brown wire circuit.
Front or rear lamps inoperative	1. Loose connection or open ground connection	1. If associated tail or park lamps do not operate, secure all connectors in brown wire circuit. If park and turn lamps operate, repair open ground connections.
	2. Multiple bulbs burnt out	2. Replace burnt out bulbs.
All lamps inoperative	1. Blown fuse	1. If park and tail lamps do not operate, replace blown fuse. If new fuse blows, check for short to ground between fuse panel and lamps.
	2. Loose connection	2. Secure connector to light switch.
	3. Open in wiring	3. Check tail light fuse with test lamp. If test lamp lights, repair open wiring between fuse and light switch. If not, repair open wiring between fuse and battery. (Possible open fusible link).

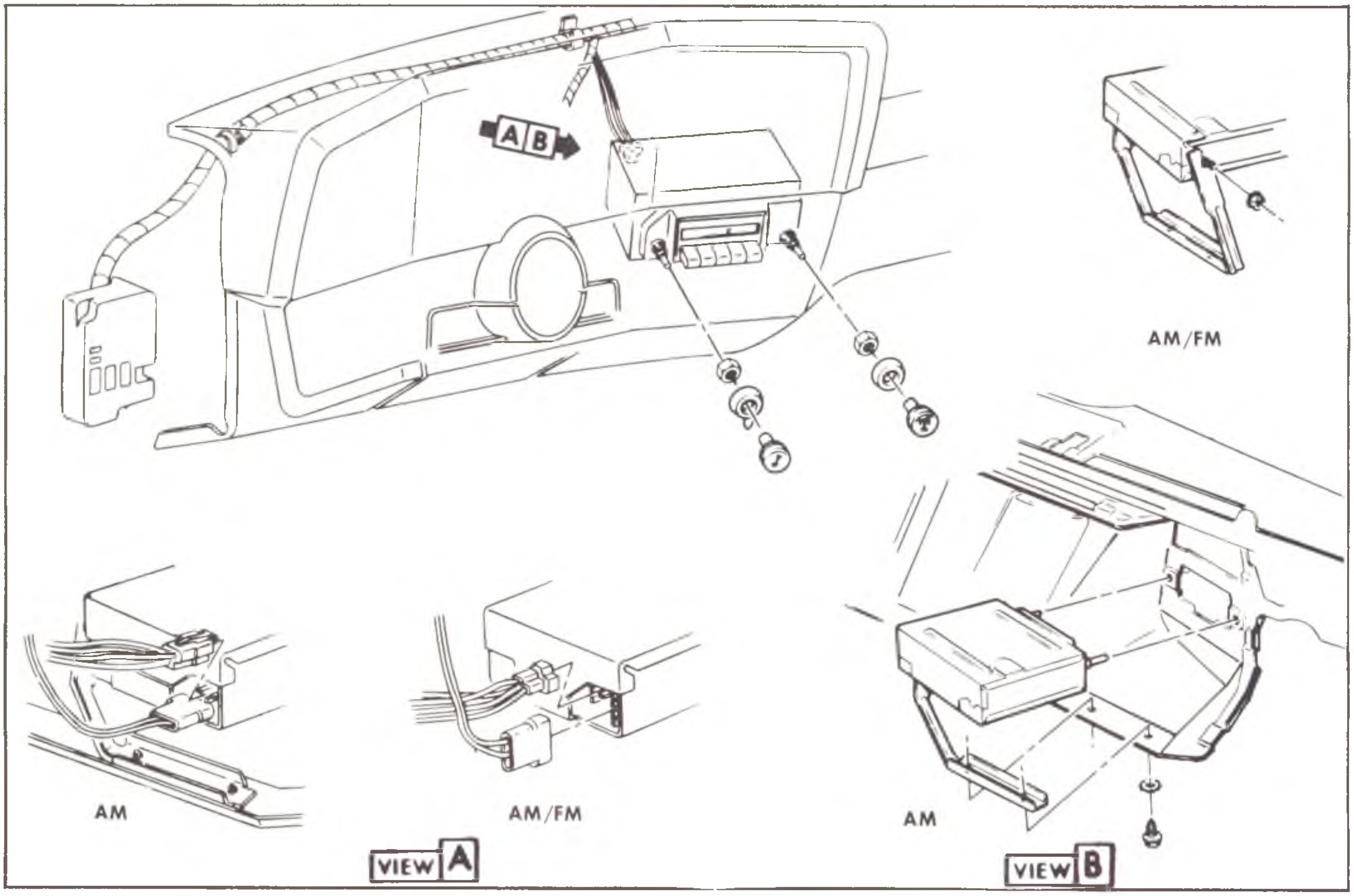


Fig. 2--Radio Installation (C-K Models)

COMPONENT PART REPLACEMENT

RADIO

C-K Models

Replacement (Fig. 2)

1. Disconnect the battery ground cable.
2. Pull off radio control knobs and remove knob bezels. Remove the nuts and washers from the control shafts using a deep well socket.
3. **AM Radio**-Remove the radio support bracket stud nut and lockwasher.

   AM/FM Radio-Remove the radio support bracket to instrument panel screws.
4. Lift up on the rear edge of the radio. Then push the radio forward until the control shafts clear the instrument panel. Lower the control far enough to disconnect the electrical harness.
5. Disconnect the power feed, speaker and antenna lead wires and remove the radio.
6. To install, reverse Steps 1-5 above.

G Models

Replacement (Fig. 3)

1. Disconnect ground cable from battery.
2. Remove engine cover.
3. Remove air cleaner on carburetor.
4. Remove stud in carburetor throat for mounting air cleaner.
5. Cover carburetor throat with clean plastic to prevent dirt or radio attachments from falling into carburetor.
6. Remove knobs, washers and nuts from control shafts on front of radio.
7. Remove bracket to radio receiver screw.
8. Now guide radio forward and then down through engine access area. Lower the radio far enough to disconnect electrical connectors and antenna lead. Remove radio.
9. Reverse Steps 1-8 for installation of radio.

REAR SUSPENSION

SECTION 4

TORQUE SPECIFICATIONS (FT. LBS.)

WHEEL BEARING ADJUSTMENT SPECIFICATIONS

Ring Gear Size	Bearing Adjusting Nut Torque*	Adjusting Nut Back-off*	Outer Locknut Torque	Resulting Bearing Adjustment	Type of Bearing
10-1/2" and 9-3/4"	50 Ft. Lbs.	**	65 Ft. Lbs.	.001 to .010 End Play	Tapered Roller
12-1/4"	75-100 Ft. Lbs.	1/8 *	250 Ft. Lbs.	Slight Preloaded	Barrel Roller

** Back-off nut and retighten to 35 Ft. Lbs. then, back-off nut 1/4 turn.
 * With wheel rotating.

Ring Gear Size	Lubricant Capacity
8-7/8"	3.5 Pints
Chevrolet 10-1/2"	5.4 Pints
Dana 10-1/2"	7.2 Pints
Dana 9-3/4	6.0 Pints
12-1/4"	14.0 Pints

UNIVERSAL JOINT ATTACHMENT TORQUE SPECIFICATIONS	
Strap Attachments	15 Ft. Lbs.
"U" Bolt Attachment.	20 Ft. Lbs.

DIFFERENTIAL SPECIFICATIONS

	8-7/8"	10-1/2" 9-3/4" Dana	10-1/2" Chevrolet	12-1/4"
Gear Backlash Preferred	.005"-.008"	.004"-.009"	.005"-.008"	.005"-.008"
Min. and Max.	.003"-.010"	.004"-.009"	.003"-.012"	.003"-.012"
Pinion Bearing Preload (In. Lbs.)				
New	20-25	20-40	25-35	
Used	5-10	10-20	5-15	

Bolt Torques (Ft. Lbs.)

Carrier Cover	23	35	18	—
Ring Gear	50	110	110	105
Differential Bearing Caps	55	85	100	205

	8-7/8"	10-1/2" 9-3/4" Dana	10-1/2" Chevrolet	12-1/4"
Filler Plugs	18	10	18	10
Differential Pinion Lock	25	—	—	—
Drive Pinion Nut	—	255	220	220
Differential Carrier to Axle Housing	—	—	45	85
Differential Bearing Adjusting Lock	—	—	15	15
Pinion Bearing Cage To Carrier	—	—	70	165
Thrust Pad Lock Nut	—	—	—	135
Brake - Backing Plate	40	105	105	155
Axle Shaft To Hub Bolts	—	90	90	15

*Initial Torque Only, Additional Torque as necessary.

ADJUSTMENTS

TRUCKS

Rochester Carburetors

Model	NUMBER (A) Automatic Trans. (M) Manual Trans.	Float Level	Float Drop	Metering Rod	Pump Rod	Choke Rod (Fast Idle Cam 2nd Step)	Air Valve Wind-Up	Choke Vacuum Break	Choke Unloader
MV	7044021(M)	.295		.080		.275		.350	.500
MV	7044022(A)	.295		.080		.245		.300	.500
MV	7044321(M)	.295		.080		.300		.375	.500
MV	7044025(AM)	1/4		.070		.245		.300	.521*
MV	7044026(AM)	1/4		.070		.275		.350	.521*
2GV	7044113(M)	19/32	1 9/32		1 9/32	.200		.140	.250
2GV	7044114(A)	19/32	1 9/32		1 3/16	.245		.130	.325
2GV	7044123(M)	19/32	1 9/32		1 9/32	.200		.140	.250
2GV	7044124(A)	19/32	1 9/32		1 3/16	.245		.130	.325
4QJ	7044202 & 502	1/4			13/32(*)	.430	7/8	.230	.450
4QJ	7044203 & 503	1/4			13/32(*)	.430	7/8	.230	.450
4QJ	7044218 & 518	1/4			13/32(*)	.430	7/8	.215	.450
4QJ	7044219 & 519	1/4			13/32(*)	.430	7/8	.215	.450
4QJ	7044213 & 513	11/32			13/32(*)	.430	7/8	.215	.450
4QJ	7044223 (227)	.675			13/32(*)	.430	7/16	.220	.450
4QJ	7044212 (217)	.675			13/32(*)	.430	7/16	.230	.450
4QJ	7044512 (517)	.675			13/32(*)	.430	7/16	.230	.450
4QJ	7044500 (520)	.675			13/32(*)	.430	7/16	.250	.450
4QJ	7044224	11/32			13/32(*)	.430	7/8	.215	.450
4QJ	7044214 & 514	11/32			13/32(*)	.430	7/8	.215	.450
4QJ	7044215 & 515	11/32			13/32(*)	.430	7/8	.215	.450
4QJ	7044216 & 516	11/32			13/32(*)	.430	7/8	.215	.450

* Measured at top of choke blade

FAST IDLE (RUNNING) RPM ADJUSTMENT

Carburetors — Rochester

Vehicles	MV		4QJ		2GV	
	Auto.	Man.	Auto.	Man.	Auto. and Manual	
All Trucks	1800 a, b		(M4)#†c	#†c	Advisory Setting	These settings are approximate with low idle at 500 RPM, as specified – with viscous clutch fans disengaged.
	2400 a † %		1600† a.	(**) a.	†1600 (1-1/2 S.A.E)	

†With vacuum advance without EGR signal

a. On high step

\# On M4, 1600 RPM for both Auto. and Manual except 7044212, 217, 512, 517, which is 1700 RPM

(**) L/D Truck – Manual, Q-Jet – 1300 RPM w/o Vac. Advance
H/D Truck – Manual, Q-Jet – 1600 RPM with Vac. Advance

b. w/o Vac. Advance, w/o EGR

% 7044025 & 7044026 only

c. w/o EGR, vacuum plugged on EGR equipped units

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