X-7625

1976 MAINTENANCE MANUAL SUPPLEMENT

MOTORHOME
ZE06581, ZE06582
(EFFECTIVE WITH VEHICLE IDENTIFICATION NUMBER TZE166V100878)

TRANSMODE
ZE06083, ZE06583
(EFFECTIVE WITH VEHICLE IDENTIFICATION NUMBER TZE336V100880 (23')
TZE366V100883 (26')

When reference is made in this manual to a brand name, number, or specific tool, an equivalent product may be used in place of the recommended item.

GMC
TRUCK & COACH DIVISION
GENERAL MOTORS CORPORATION
PONTIAC, MICHIGAN 48053

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SECTION 0

GENERAL INFORMATION, PERIODIC MAINTENANCE, AND LUBRICATION

The information described in Maintenance Manual X-7525 (SEC. 0) is applicable to Models covered by this supplement with the exception of the following:

PERIODIC MAINTENANCE

AIR COMPRESSOR WET TANK

Effective with the movement of the suspension air compressor to the rear of the vehicle, the suspension air reservoir tank was replaced by a wet tank. Note, illustrations showing the location of the wet tank are provided in Section 4 of this supplement.

Servicing

The air compressor wet tank should be drained at 3 month or 3,000 mile intervals.

NOTE: More frequent drain intervals should be made if driving conditions and habits result in excessive air compressor operation.

VEHICLE IDENTIFICATION NUMBER

Figure 1 is an explaination of the vehicle identification number for all models covered by this supplement.

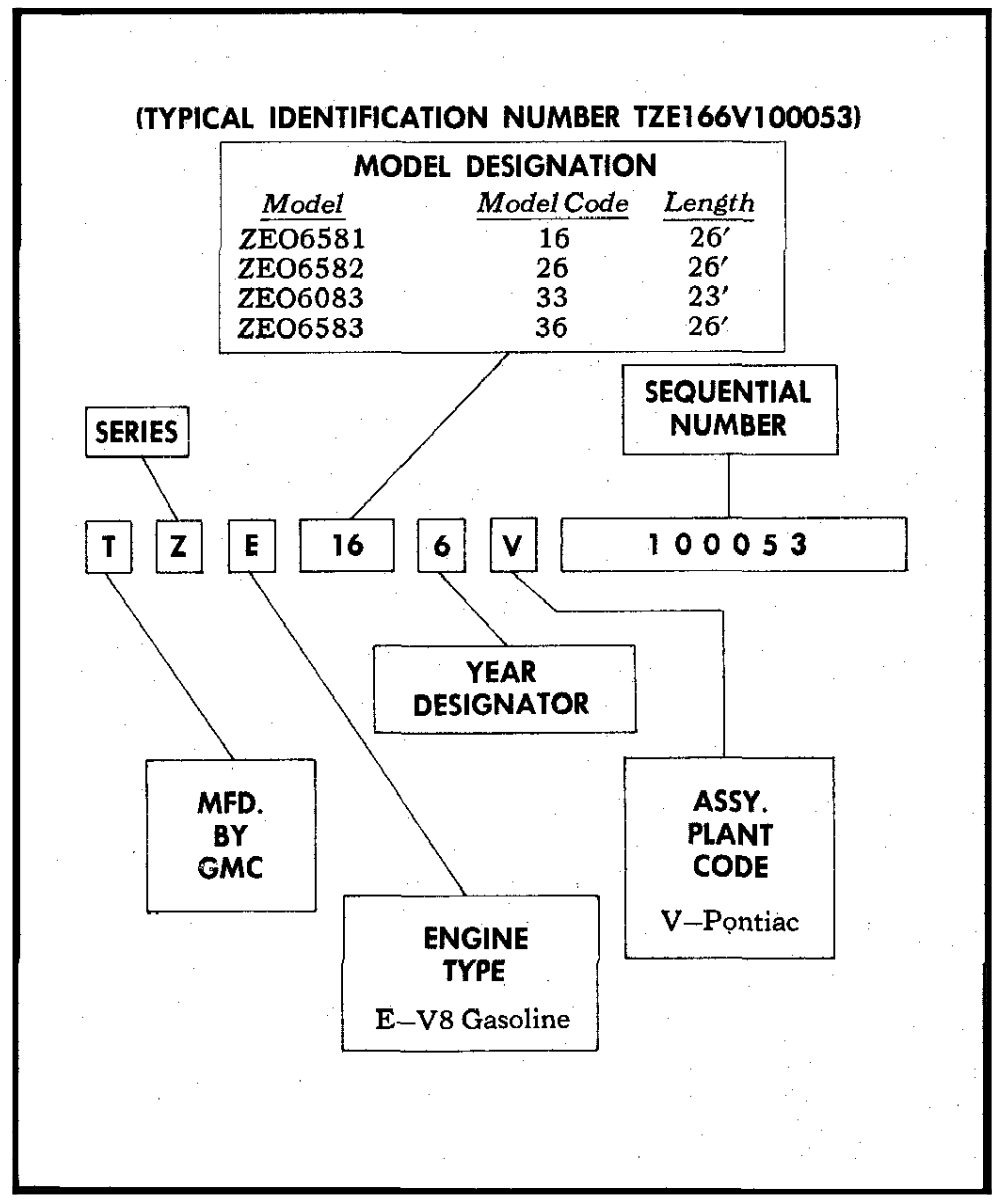


Figure 1—Vehicle Identification Number

SECTION 1
BODY, HEATING AND AIR CONDITIONING

This section is sub-divided into two parts:

SECTION 1A
BODY

The information described in Maintenance Manual X-7525 under the heading BODY, HEATING AND AIR CONDITIONING (SEC. 1) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

MOTORHOME AND TRANSMODE PAINT CODES

EXTERIOR PAINT CODES

RPO	Color	Fisher No.	DuPont Code No.	Refinish No.
583	Buckskin	WUEK 5275	826-Y-AH 715	44572U

Effective with vehicle serial number TZE 165V100089, vehicles are painted with DuPont urethane paint trademarked IMRON. Paint repairs should be made with IMRON (DuPont refinish No. ends in U) or equivalent, or a high grade enamel automotive paint. (DuPont acrylic enamel refinish No. ends with "A".)

NOTE: Lacquer should not be used to repair body finish on these vehicles.

GLASS

"HEHR" LIVING AREA WINDOW ASSEMBLIES

"Hehr" living area window assemblies have new formed retainers that screw directly to the sash assembly (figure 1). The trim molding has also been redesigned (figure 2), and installs directly into the sash retainer. No mounting screws are needed. These new features do not affect removal and installation procedures as outlined in "Screen and Vent Assembly," Section 1, Maintenance Manual X-7525.

REAR WINDOW REPLACEMENT

Rear windows are made of solid tempered glass. Care is necessary in handling and installation. If glass clearance of replacement window is too small, adjustment may be made by "trimming" fiberglass flange around window. Do not attempt to grind tempered glass. Grinding may cause glass to shatter.

WINDSHIELD WIPER SYSTEM

CAUTION: *When replacing the windshield wiper motor, correct routing of the power steering hoses is very important. Although sequence of assembly is not vital, the power steering hoses, when installed, must not be twisted, kinked, or tightly bent. The hoses should have sufficient natural curvature in the routing to absorb movement and hose shortening in operation. They should also be free of twist under strain. All fittings must be held while tightening or loosening nuts.*

ALUMINUM AND FIBERGLASS REPAIR

The aluminum and fiberglass panels on the body may be repaired if damaged. Refer to Sec. 1, Maintenance Manual X-7525 for fiberglass repair procedure. Filler putty can be used for minor dents, scratches and scrapes on the aluminum panels. However, *major damage* to a panel (fiberglass or aluminum) will require removal and replacement of the panel. Before this can be done all windows, access doors,

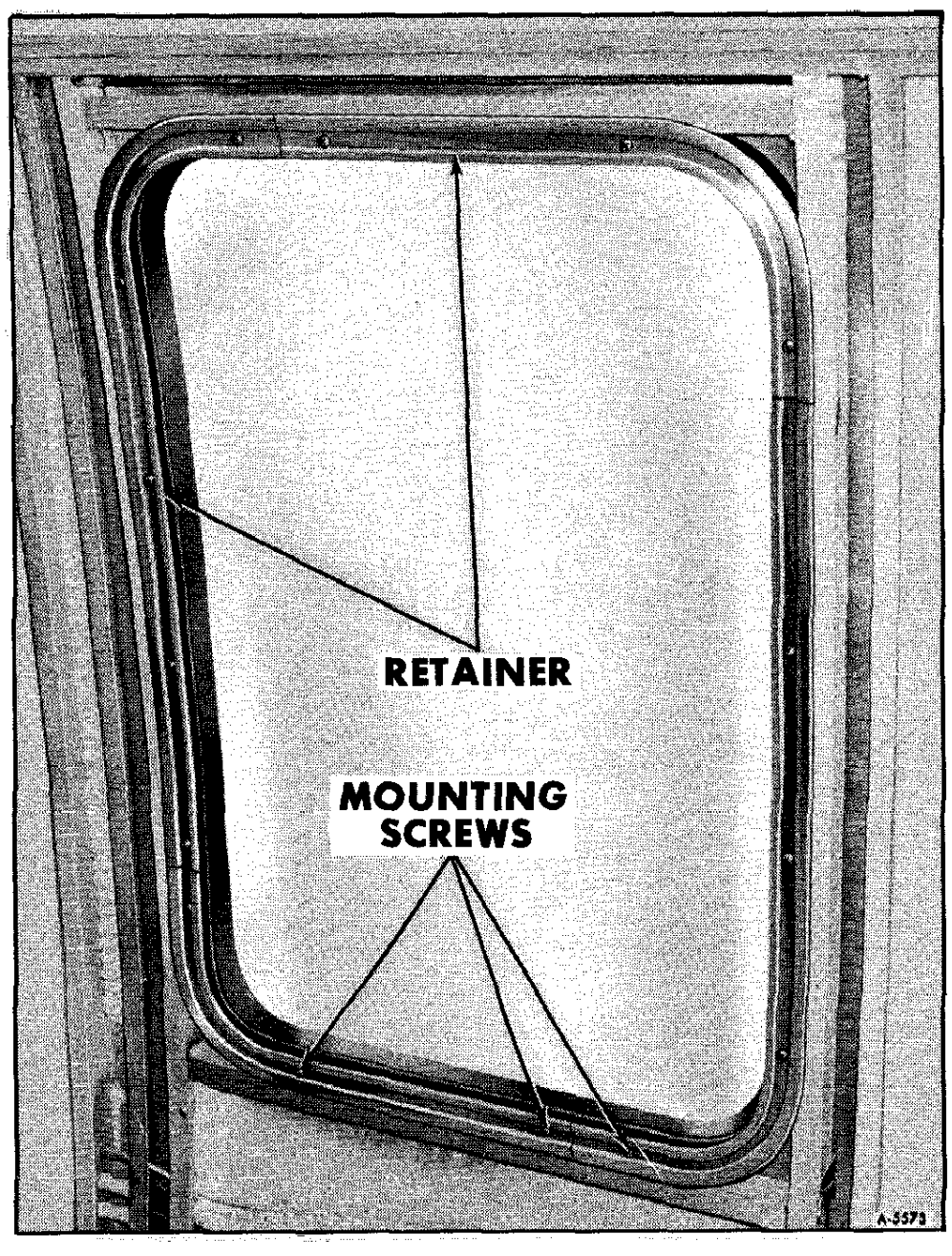


Figure 1—Sash Retainer

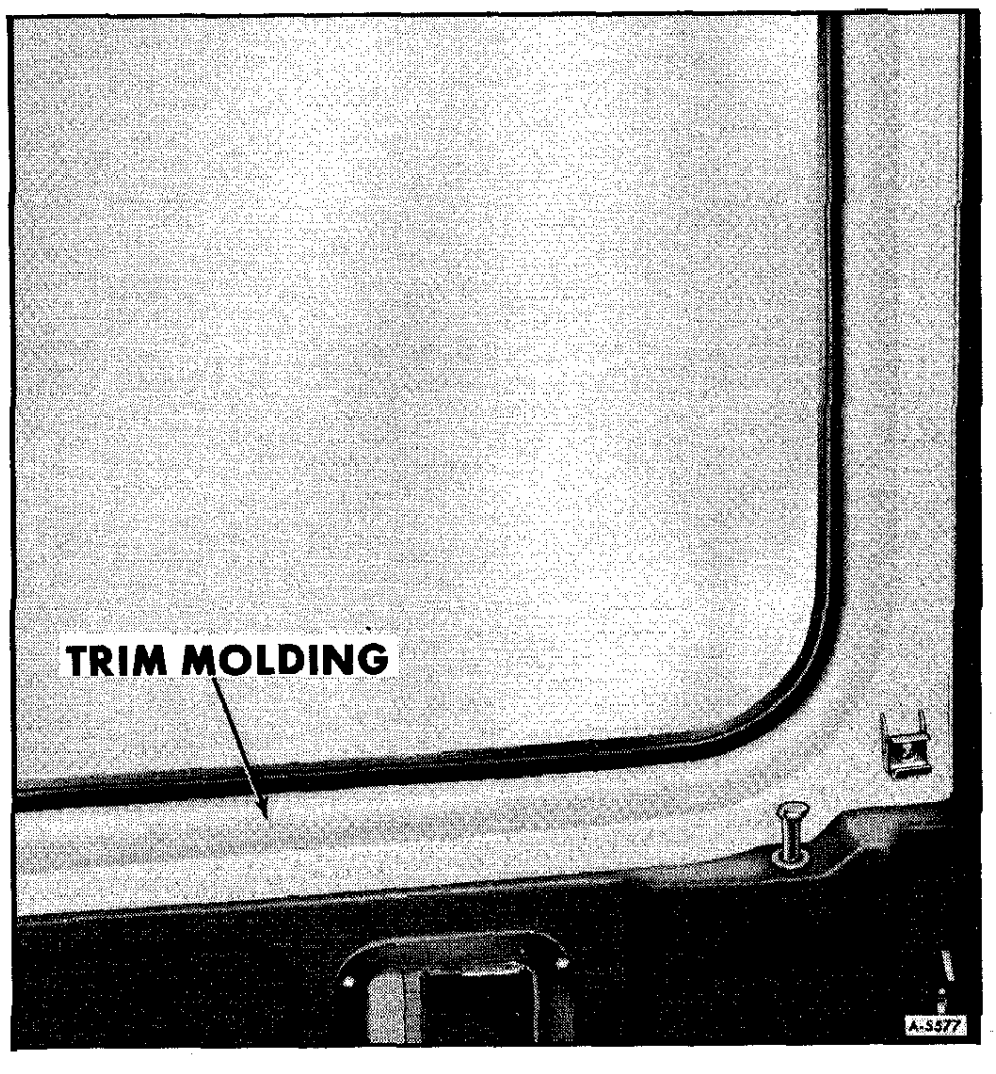


Figure 2—Window Trim

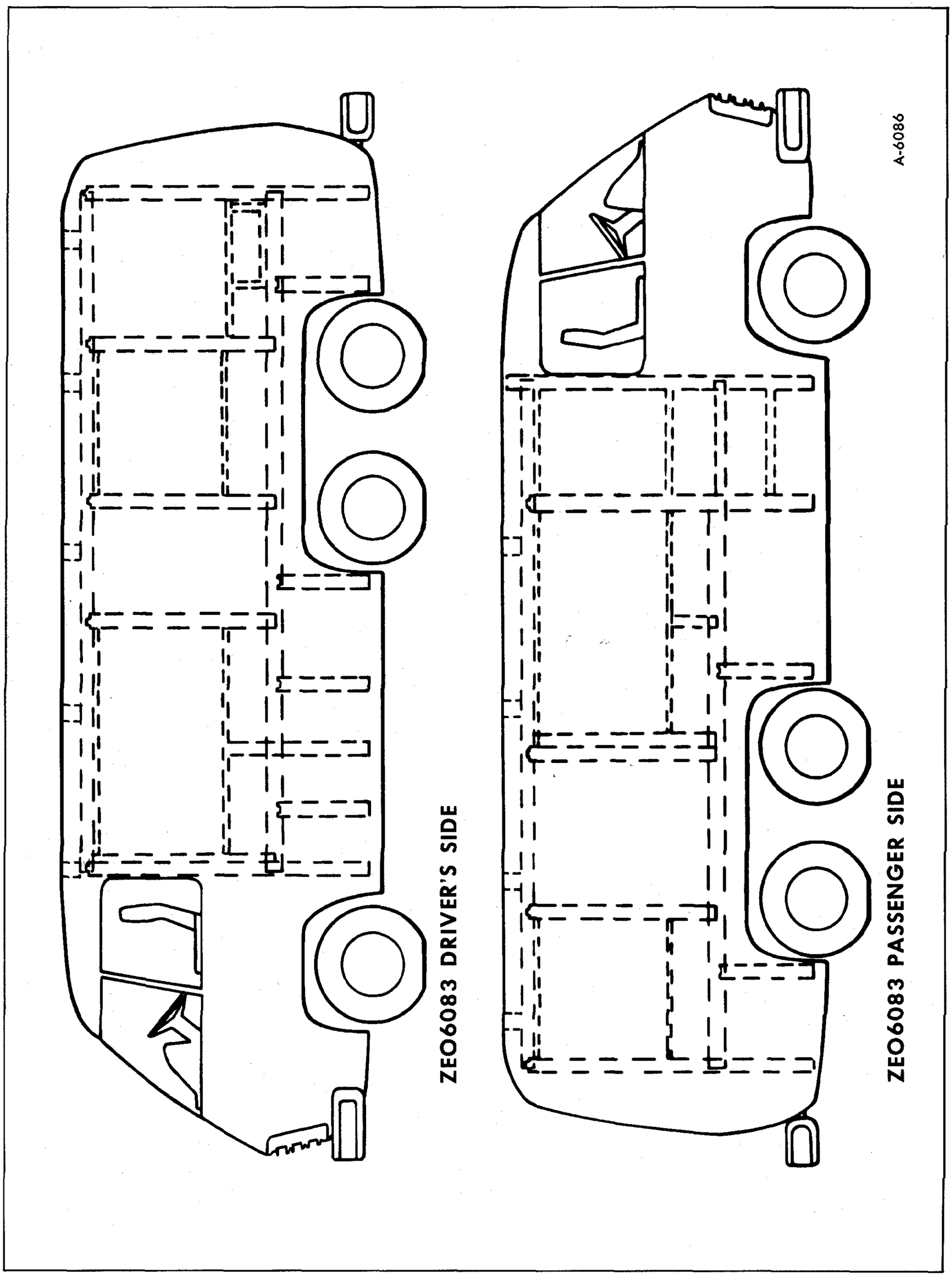


Figure 3—TransMode Body Side Structure (ZEO6083)

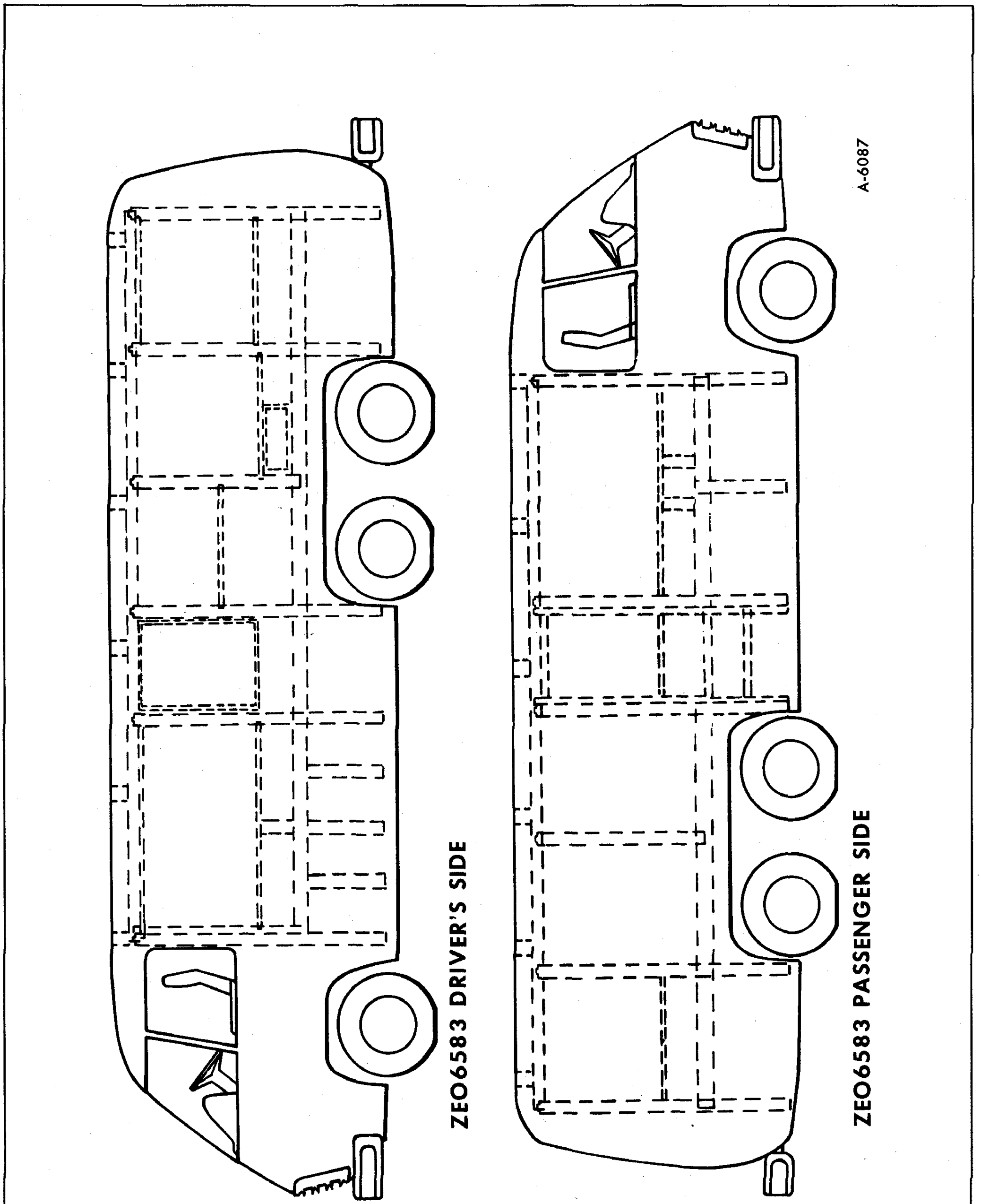


Figure 4—TransMode Body Side Structure (ZEO6583)

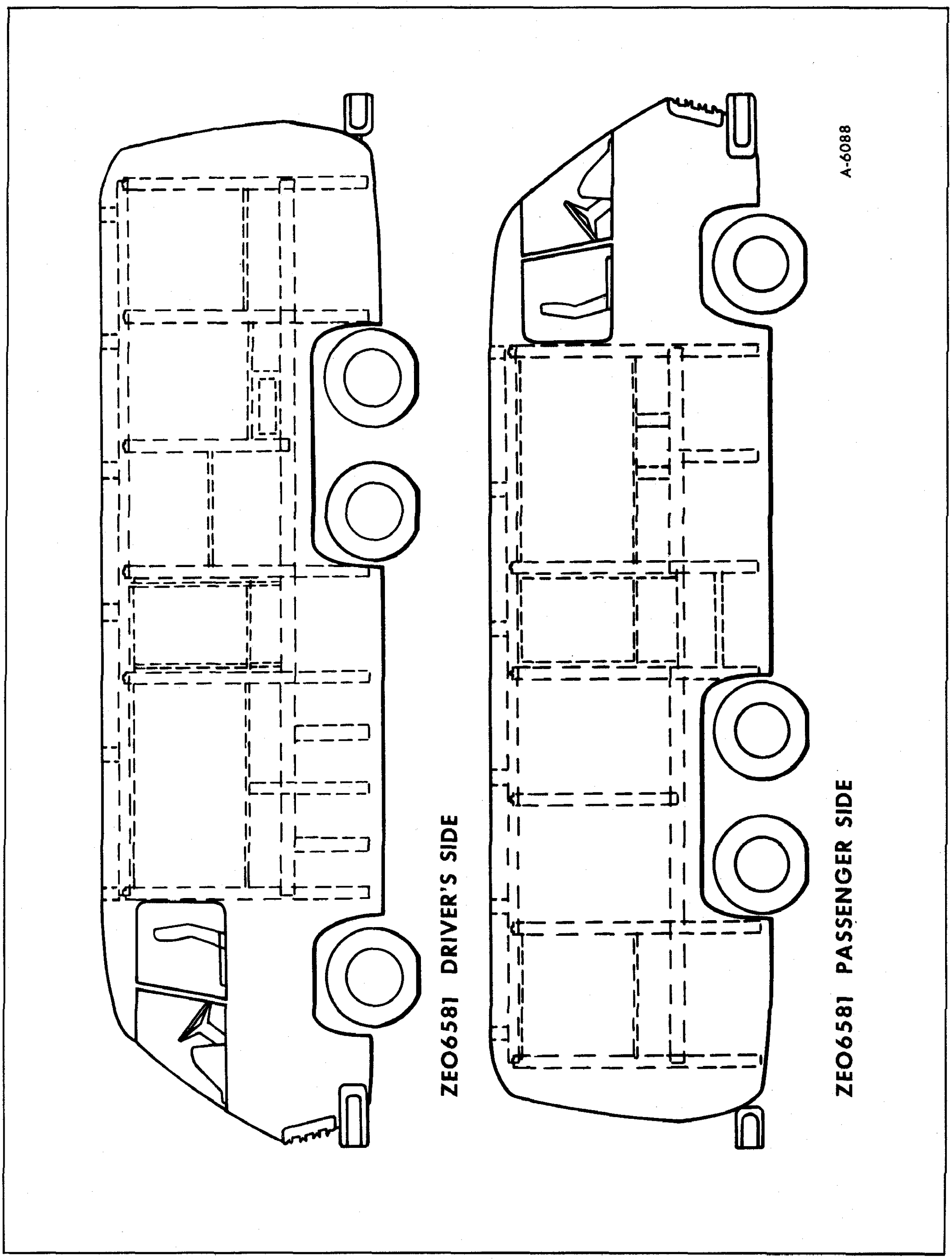


Figure 5—Motorhome Body Side Structure (ZEO6581)

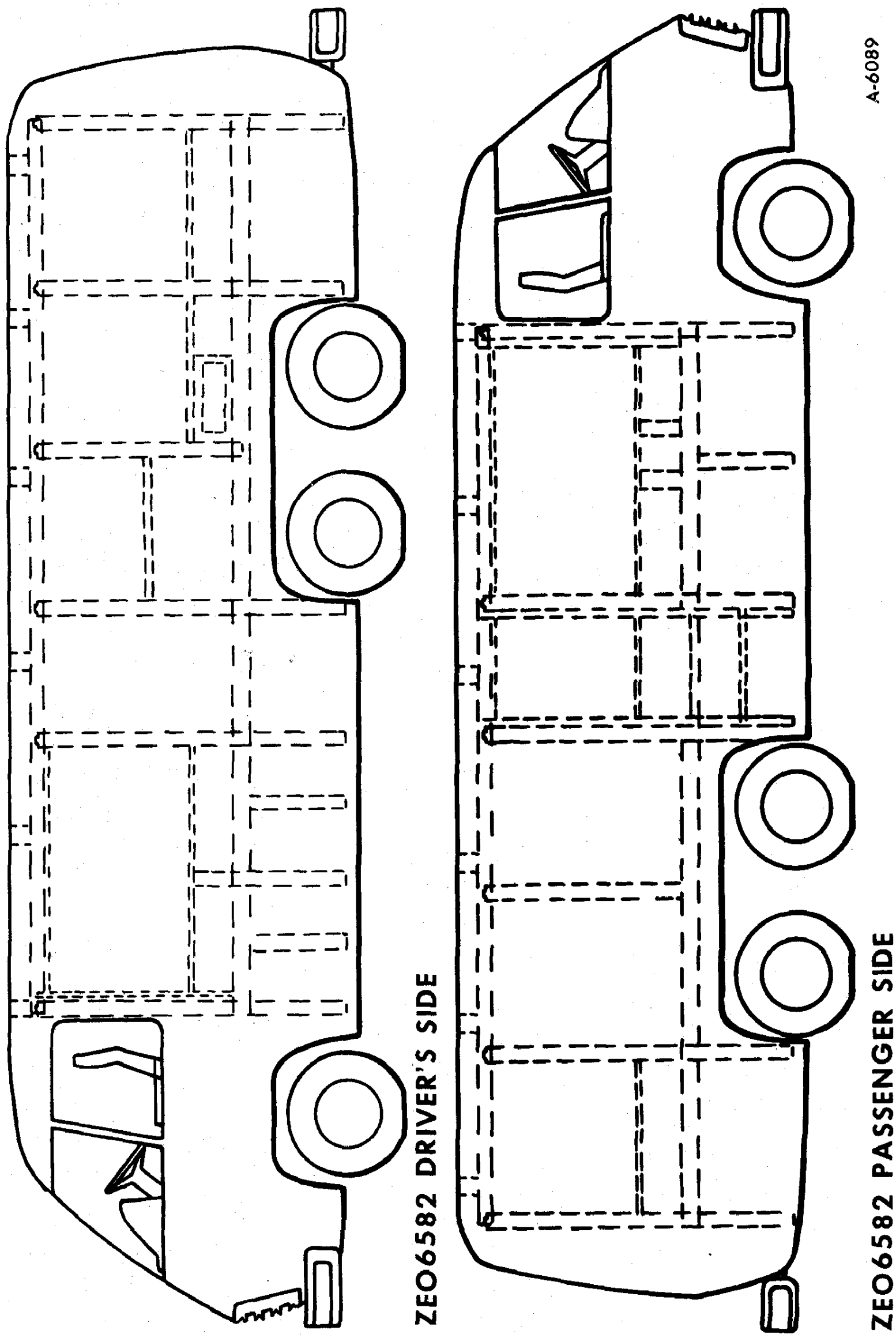


Figure 6—"Twin Bed" Motorhome Body Side Structure (ZEO6582)

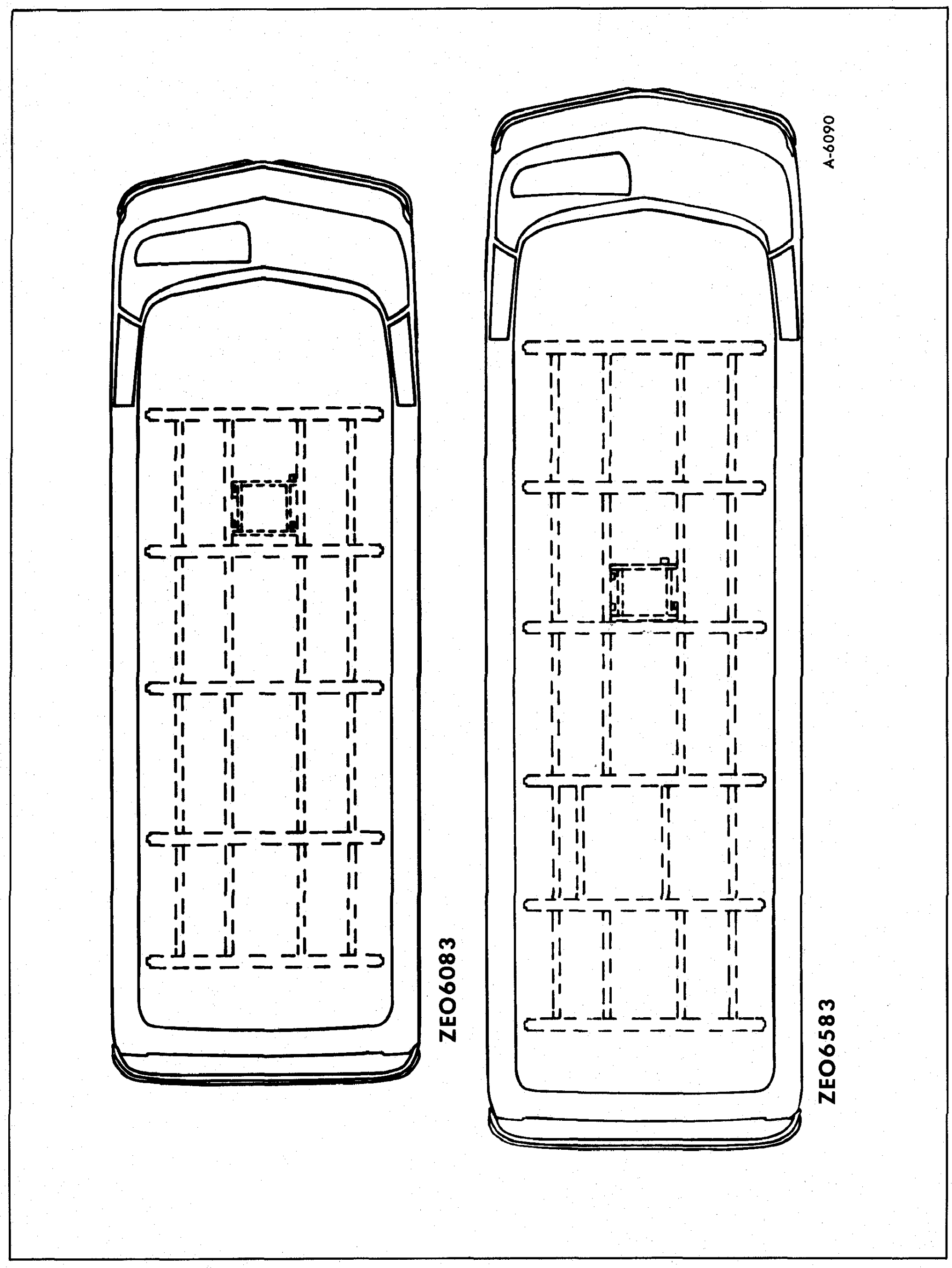


Figure 7—TransMode Roof Structure (ZEO6083, ZEO6583)

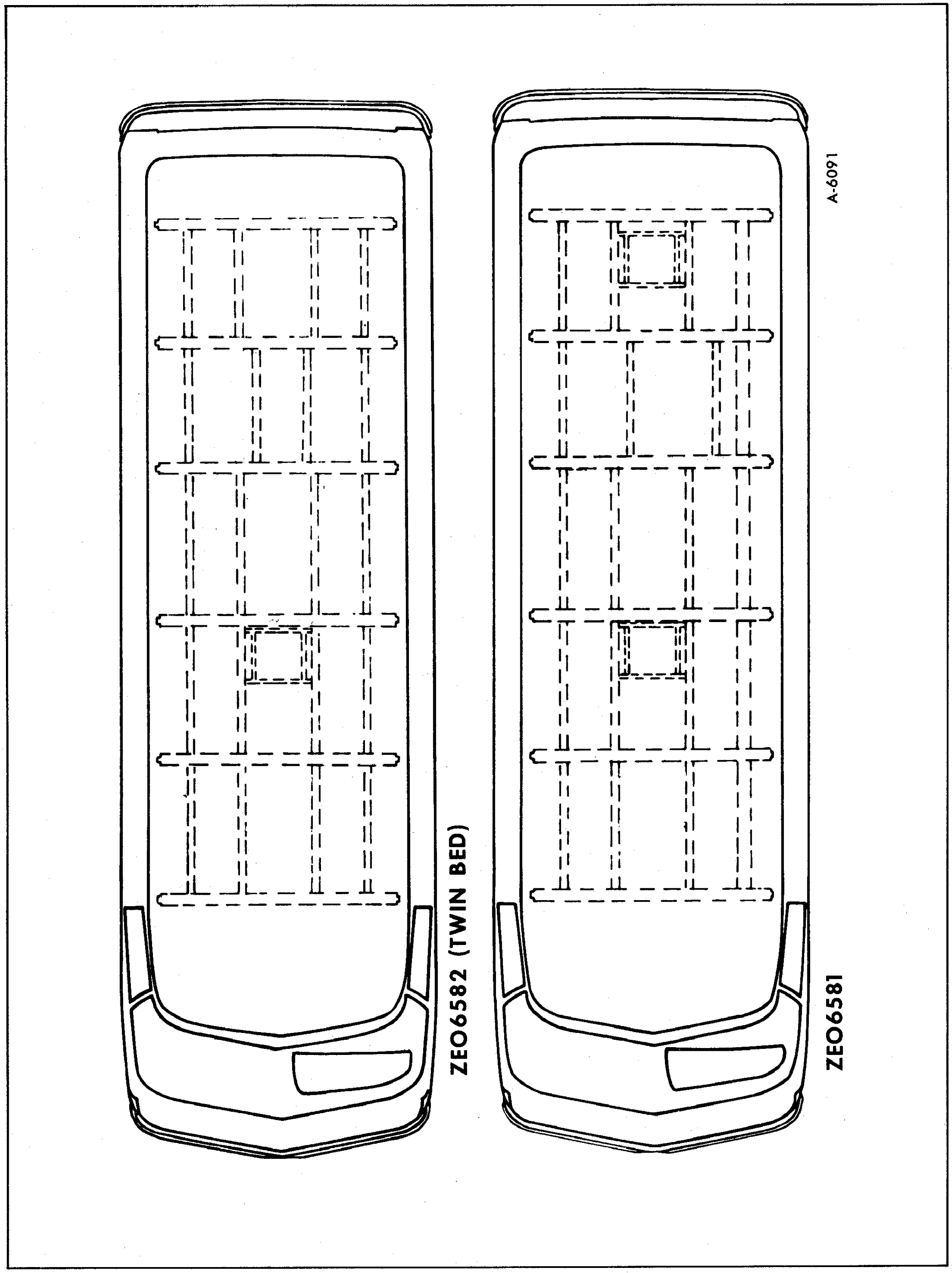


Figure 8—Motorhome Roof Structure (ZEO6581, ZEO6582)

vents, belt and roof line trim moldings in the damaged area should be removed. The panels, which are secured to the rib with a polyurethane adhesive, are difficult to separate and remove from the body. The suggested method which follows should make the repair job easier.

NOTE: There are numerous overlapping joints on the vehicle where the front and rear fiberglass panels are joined to the body structure and to each other. These joints are glued together. Some panels are also bolted together or held by fasteners behind the exterior skin. These panels include: (a) the lower front panel which is bolted to the lower front side panels at the front corners of the vehicle (5 bolts each side of vehicle), (b) the lower side panels, which are held to the main body side panels with two screws and a pop rivet, and (c) the rear corner pillar assemblies, which are bolted to the main rear side panels (8 bolts each side of vehicle).

Should the corners of the vehicle become damaged, or should any part of the front or rear "cap" need replacement, the lap joint bolts must be loosened or removed. To do so may require that specific interior components, trim panels, cabinets, dash panel, etc., be removed to allow access to certain of the bolts. When all the attaching bolts are loosened or removed, the adhesive bond between the joints must be broken. Then the exterior skin must be "peeled back" before the affected panel(s) can be pulled off the vehicle for repair or replacement.

NOTE: Carefully read and follow all manufacturer's safety precautions for primer, solvent and body adhesive.

PANEL REMOVAL

Typical positioning of body structural members (right and left hand views) in the standard TransMode and Motorhome vehicles is depicted in figures 3 through 6. Figures 7 and 8 illustrate TransMode and Motorhome roof structures.

NOTE: Individual Motorhome and TransMode vehicles may have structural additions and changes not represented by these veiws. If possible, determine vehicle alterations from standard before beginning body repair.

Using these figures for reference, it is essential to determine position of the rib

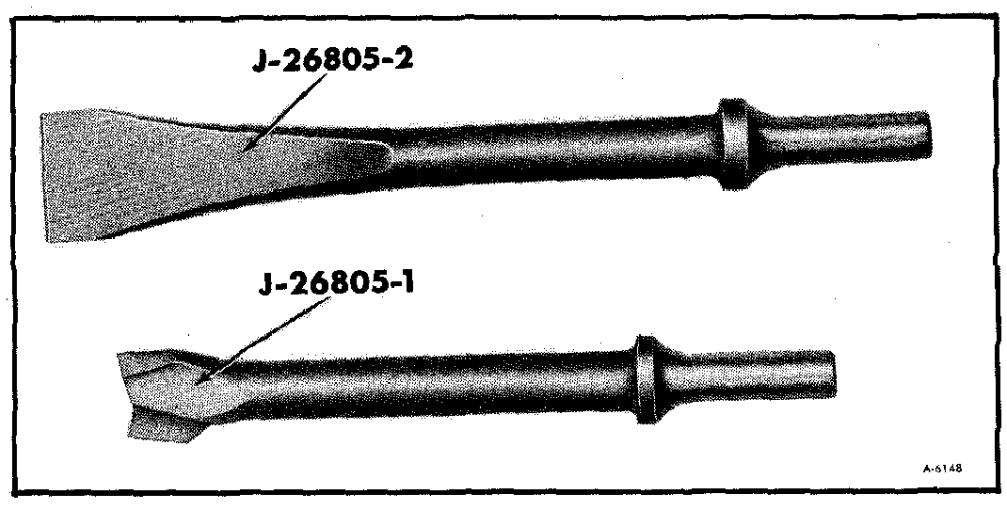


Figure 9—Pneumatic Chisel Set

structure of the vehicle prior to repair. This is important to avoid damaging structural components, piping, wiring, insulation, etc. located immediately behind the panels. It is suggested that each damaged panel be removed in two parts, using Special Tool J-26805 (figure 9). This tool is a Pneumatic Chisel Bit Set, to be used with a standard air chisel (parker shank) for body repair.

1. Remove all mechanical attachments. When removing rivets, drill only deep enough to remove the rivet, or piping, wiring, insulation, etc. directly behind the panels will be damaged. After rivet head is drilled off, use a punch to carefully drive out the rivet shaft.

2. Determine position of vehicle structural supports in area to be repaired. Trace frame or rib area with washable marker on outside of vehicle.

3. Working from the vehicle exterior and using a standard air chisel with a Rip Bit (J-26805-1), cut along the inside edge of the damaged panel, parallel to the ribs and approximately two inches "inside" of the rib structure. (See figure 10.) Then remove the cut-out section of the panel.

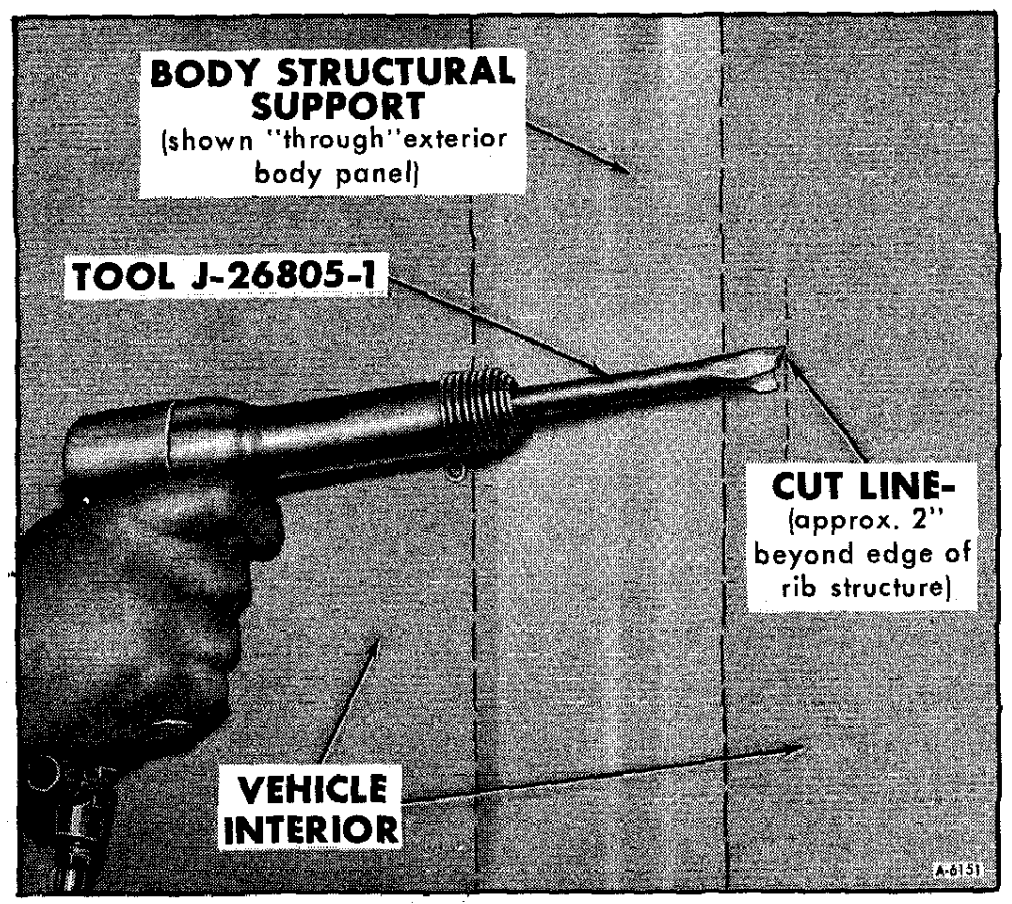


Figure 10—Panel Removal With Air Chisel—Step 3

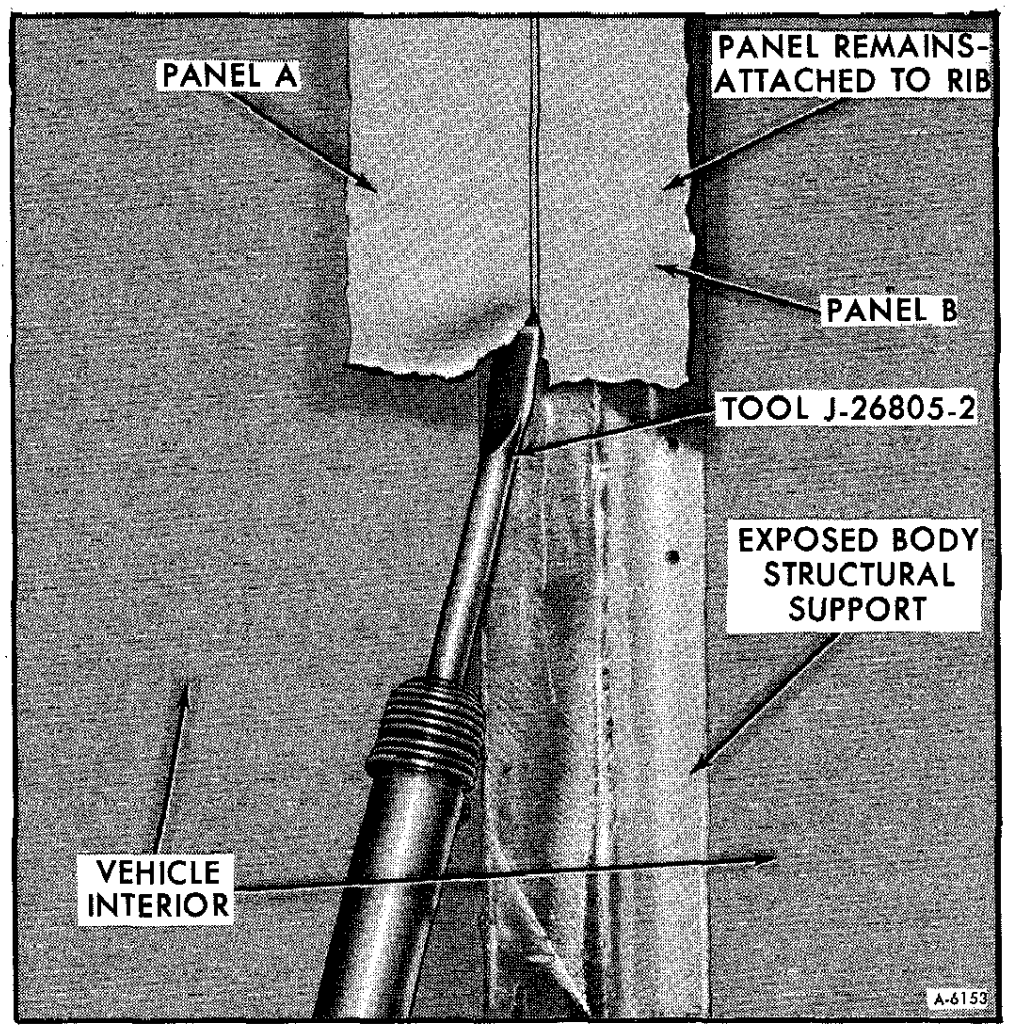


Figure 11—Panel Removal With Air Chisel—Step 4

With the largest part of the panel out of the way it will now be easier to remove the remainder of the panel (which is secured to the crossmember with adhesive) without damaging the crossmember.

4. Using a Flat End Scraper Bit (J-26805-2), operate the air chisel along the rib line and underneath the panel piece to break the adhesive bond between the panel and the rib. Note that figure 11 shows panel "remains" from two body side panels (panel A & panel B) being removed from the structural support. This would be necessary only if both panels were damaged. If only one panel needs replacement, only one panel is removed from the rib, using the visible seam between panels as a guide. (Refer to figure 11.)

Follow the same 2-part cutting method along the roof seams and any other structural supports that border damaged panels. Use care not to damage structural components behind adjacent panels. All small pieces which have broken free must be removed.

ADHESIVE REMOVAL

Before prefitting or any further structural work on the vehicle, the old cured adhesive must be removed from ribs and body structural supports. A suggested method would be to grind off the adhesive with an extra coarse disc on an air driven grinding wheel. An air chisel with Flat End Scraper Bit (J-26805-2) may also be used.

INSPECTION

Inspect crossmembers for damage. Any damaged rib will have to be straightened, replaced, or have shim material fastened to the rib so proper support will be provided for the panel.

PANEL INSULATION

New body panels must be insulated to insure temperature control and good performance of heating and air conditioning systems. Insulate with rigid urethane foam (available in aerosol cans) or 1-inch, 1 1/2 lb. density fiberglass insulation sheets, cut to fit. Both types of insulation are available locally. Do not cover areas which must remain accessible for servicing, such as structural flanges and interior component mounting sufaces. If urethane foam is used, take care not to spray adhesive bonding surfaces.

PREFITTING

A replacement panel should be prefitted for proper fixturing after panel has been insulated and ribs have been thoroughly cleaned of adhesive. This should be done before the ribs have been solvent wiped or primed, in order to prevent later contamination from dirt, grease, fingerprints, etc. in the glue line areas.

Next, with the panel held in place, use existing holes or drill holes through the panel and rib (at each corner and along the beltline or roof line) for using pop-rivets. After drilling first hole, make sure panel is flat before drilling second hole. The panel should not be bowed between holes.

ABRASION

Aluminum panels and body frame parts should be disc sanded to bare metal in areas which will be bonded. Fiberglass* may also be scuffed on bond line. Finished surface will be rough to the touch.

*Glass fiber reinforced panels, commonly called fiberglass. Not the same as fiberglass insulation referred to earlier.

SOLVENT

BEFORE WORKING WITH SOLVENT, BE SURE TO READ MANUFACTURER'S INSTRUCTIONS AND TAKE ALL NECESSARY SAFETY PRECAUTIONS.

Wipe bond surfaces on fiberglass and aluminum panels and on body structural

supports with Methylene Chloride solvent. It is important that all surfaces be clean and free of surface contaminants such as shop dirt, grease, drawing compounds, and overspray. Safety gloves should be worn when cleaning with solvent.

PRIMER

BEFORE WORKING WITH PRIMER, BE SURE TO READ MANUFACTURER'S INSTRUCTIONS AND TAKE ALL NECESSARY SAFETY PRECAUTIONS. SPECIFICALLY, AVOID ALL SKIN CONTACT AND USE ONLY IN WELL VENTILATED AREA.

Primer is used because it will promote adhesion and help prevent corrosion. It should be used on all bond surfaces before adhesive is applied.

It is important that primer base be thoroughly agitated. No settled pigment should remain on the bottom of the container. Mix equal parts by volume of primer base and accelerator, such as 3M EC-1945 B/A or equivalent. Follow manufacturer's mixing and use instructions.

Primer may be sprayed, or brushed on with a clean brush. Apply a "mist" coat or a thin brush coat of primer to all sanded structural surfaces. Do not spray heavy coat or let primer run on surface.

Drying time is dependent upon ambient temperature, air movement and relative humidity. Cure primer by air drying or heating to a minimum temperature of 150°F. (65°C.) for 15 to 30 minutes. Temperature must not exceed 250°F. (121°C.) at any time. Heat lamps normally used for paint curing may be used when heat drying. If air drying, cure for a minimum of one hour at room temperature.

NOTE: Adhesive must be applied within 16 hours of primer application to achieve maximum adhesion. If primer is exposed beyond 16 hours, surface must be reprepped and reprimed.

ADHESIVE

BEFORE WORKING WITH BODY ADHESIVES, BE SURE TO READ MANUFACTURER'S INSTRUCTIONS AND TAKE ALL NECESSARY SAFETY PRECAUTIONS. SPECIFICALLY, AVOID ALL SKIN CONTACT AND USE ONLY IN WELL VENTILATED AREA.

Use adhesive such as manufactured by Minnesota Mining and Manufacturing, EC-3549 B/A, or equivalent. This is a two-part (base and accelerator) urethane adhesive designed for bonding aluminum, polyester and steel. Adhesive should be used only at room temperature of about 75°F. (24°C.) as viscosity increases at lower temperatures. Also, if heat dry has been used for primed areas, be sure that panels and frame sections to be bonded are cooled to room temperature before proceeding. Hot surfaces will greatly shorten adhesive work life and lower ultimate bond strength.

It is essential that bonding surfaces be thoroughly clean, dry and grease-free to maintain good adhesion. Also, be sure that all fixtures, clamps, metering devices and safety equipment are at hand before mixing adhesive.

Mix adhesive just prior to application, keeping in mind that adhesive work life is from 15 to 30 minutes (normally closer to 15 minutes). Follow manufacturer's mixing and curing instructions. It is very important that mix be "on ratio" to obtain maximum bond strength.

Using disposable adhesive cartridge and applicator, apply about a 3/8-inch diameter bead to bonding surface (either stationary part or new panel, but not both). Use two beads for wide area. Application with putty knife not recommended. Adhesive must wet total surface area being bonded to assure maximum adhesion.

NOTE: After the new panel has been positioned on the body, it will be necessary to see a "witness bead" of excess adhesive along the edge of the panel. This will assure that adhesive has been properly applied. One 6-oz. cartridge will normally bond about 6-8 lineal feet unless large mismatch of parts requires greater quantity.

FIXTURING

Put replacement panel into position before adhesive cures and press firmly into place by hand. Clean cotton or plastic gloves are recommended to prevent contamination of primed panels and to keep adhesive off the hands.

NOTE: If adhesive gets on gloves, they should be discarded before further handling of panels. Adhesive will definitely leave blemish marks which are difficult to remove from exterior panel surface.

Next, insert pop-rivets where indicated to prevent movement of panel while adhesive is curing. Use closed-end (i.e., waterproof) rivets for roof seams. Clamp as practical and necessary.

Look for "witness bead" of excess adhesive around panel edges as assurance that adhesive has completely "wetted" the glue line area. *Then, remove excessive squeeze-out on exterior within one hour after application.* Use a plastic tool or a wooden tongue depressor for removal. Any excess remaining after this can be wiped off with a clean cloth dampened with white gasoline. (Be sure to use cautions as appropriate for flammable liquids.) It is important that excess adhesive be removed before curing takes place and before pop-rivets or clamps are removed. Discard all partially used containers of mixed primer and adhesive.

CURING

This adhesive must cure for 24 hours at room temperature (65-85°F.) (18-29°C.) before any structural work or movement of the vehicle is permitted. This will assure maximum bonding of the adhesive. After 24 hours the rivet heads may be ground off and the holes filled with a body putty. Proceed with final finishing work.

RUB RAIL

1976 vehicles are equipped with a new body rub rail which is installed the length of the vehicle at the belt line.

The rub rail is bonded to the belt rail with double-backed pressure-sensitive adhesive tape. In addition, retaining screws are used at the end of each individual strip of rub rail and at the front and rear side marker lamps to hold the lamps and the rub rail strips securely in place.

Rub rails may be replaced or repaired if necessary. On-vehicle repair may include: (1) application of adhesive to a small area directly behind rub rail where pressure-sensitive tape is not secure, or (2) addition of fasteners to secure a larger piece or pieces of the rub rail which are not adhering to the body. A combination of adhesive and fasteners may be necessary in certain repair situations. If adhesive is required, use GM#1051910 or equivalent. Be sure to follow all manufacturer's safety precautions (*included with adhesive package*). If additional fasteners are required, use a sheet metal screw to fasten rub rail to belt rail. Use GM# 2006755 screw and washer assembly (or equivalent), or a phosphate coated (black) flat or oval headed self tapping screw. Fasteners should be approximately .75" long.

RUB RAIL REPLACEMENT

If rub rail has been badly damaged and needs replacement, perform the following:

REMOVAL

1. Remove screws from ends of damaged rub rail pieces. If side marker lamp is damaged, remove screws (2) holding marker lamp into rub rail. Pull lamp forward and disconnect bulb socket from lamp. Take lamp out.
2. With all retaining screws removed, pull rub rail off of vehicle.

INSTALLATION

NOTE: Do not clean surface to be bonded or peel off adhesive tape backing from rub rail until just prior to installation of rub rail. If marker lamp was damaged, install new marker lamp assembly. Connect bulb socket and fasten two retaining screws.

When the bonding operation is to be performed, the rub rail and the bonding surface should be at a temperature of 70° to 90°F (21.1° to 32.2°C). If practical, it is desirable to lay the new rub rail out flat in the same environment as the vehicle for 24 hours prior to installation. This will assure temperature equilibrium between the replacement part and the application area. It will also help to eliminate problems of shrinkage and curling.

Clean the bonding surface on the vehicle thoroughly with isopropyl alcohol or equivalent. Dry the surface with a clean (lint-free) cloth. It is important that bonding surface remain clean and oil-free. Bond will not hold if surface contamination exists.

After cleaning, when ready to install rub rail, peel off backing paper. Line the strip up evenly with one edge of the aluminum belt rail. Do not touch the surface with hands and do not allow the tape backing to come into contact with dirt or foreign matter. Apply the rub rail with a uniform pressure of 20 lbs. minimum to seal the adhesive tape to the bonding surface. Secure rub rail pieces with screws where called for.

ENTRANCE DOOR

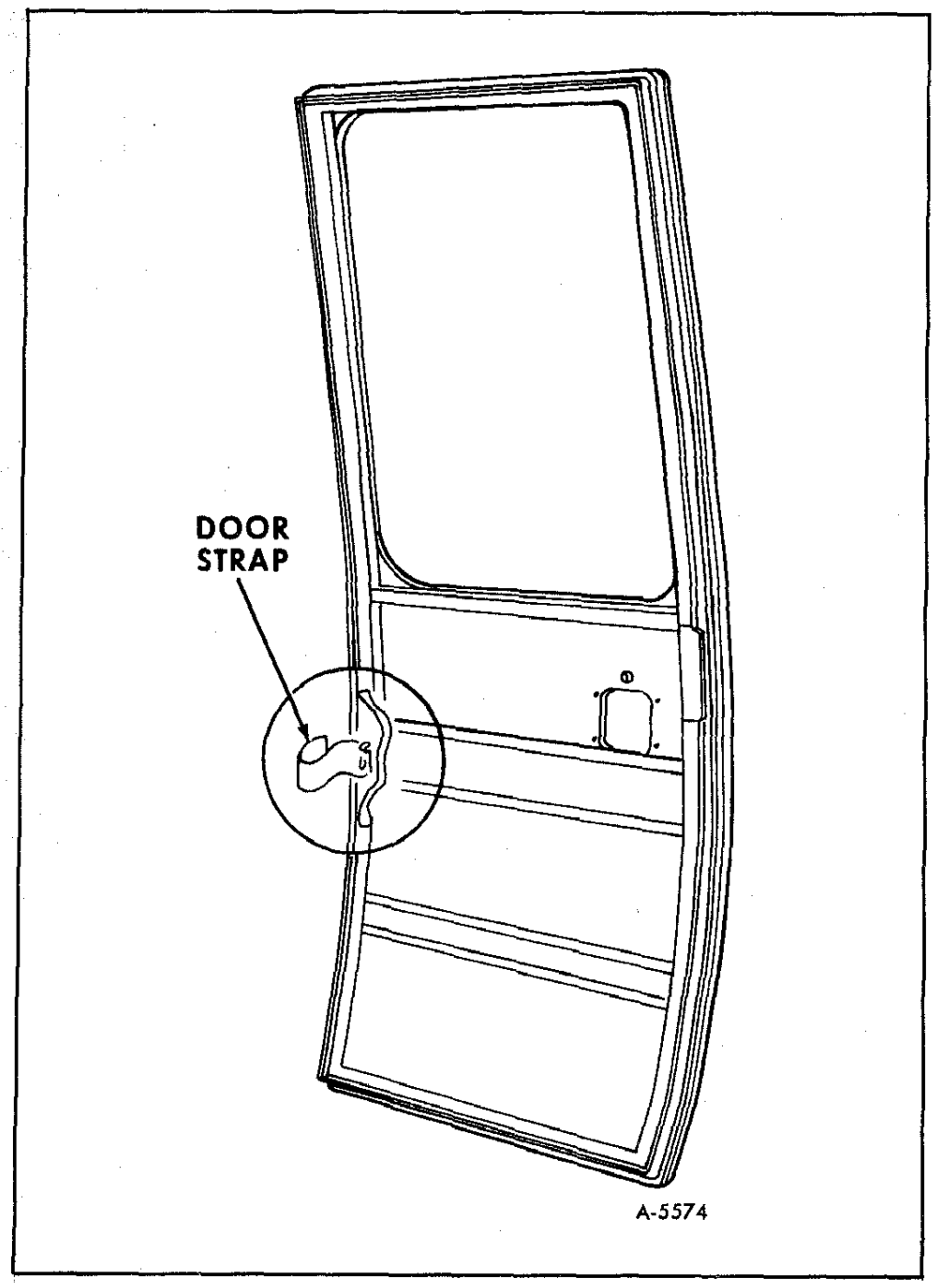


Figure 12—Door Strap

DOOR STRAP

The vehicle entrance door now has a check strap (figure 12) to prevent the door from opening out too far and making contact with the body panel. The strap assembly and bracket hardware may be replaced if necessary.

END CAP

NOTE: When installing new or repaired rear access panel, 32 retaining screws are needed. The seven lower screws are self tapping. The remaining 25 screws, on the sides and top of the rear access panel, are double helix thread ("hi-low") screws. To prevent damage to the threads in the vehicle fiberglass body when hi-low screws are installed, be sure to position screw in hole and then rotate counterclockwise. IMPORTANT: Before screws are installed, sealing is required to prevent water leaks in the vehicle. Using a caulking gun or any suitable applicator, apply a small amount of clear, air-dry rubber-based sealer into the screw holes in the fiberglass body. Sealer can be a butyl-type sealer, an RTV silicone, a windshield repair sealer, or equivalent.

FLOOR

GENERAL INFORMATION

The floor and floor sub-structure in late model 1976 vehicles have changed. Refer to figure 13 for typical layout. Note that sub-structure may vary with specific optional equipment.

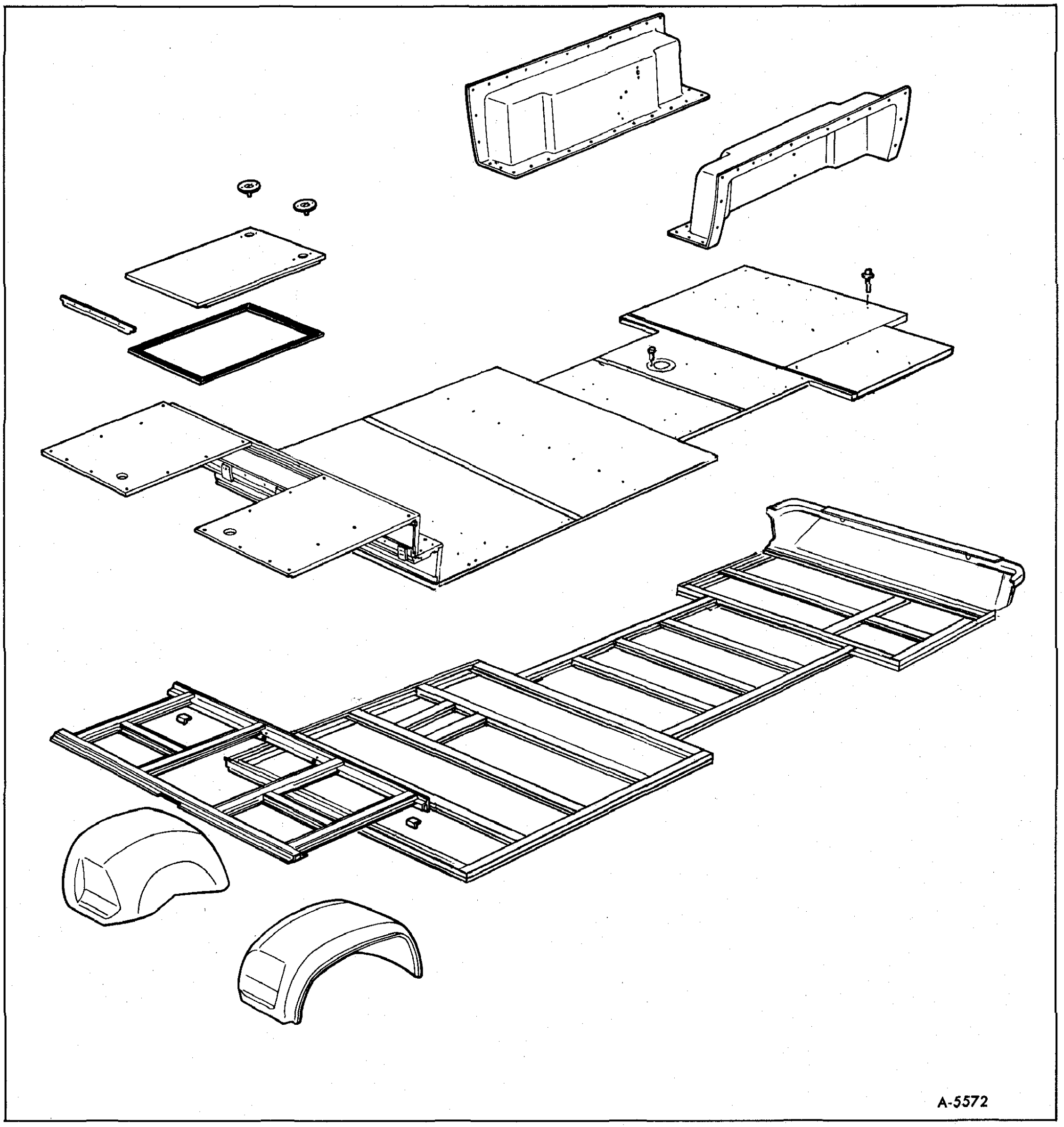


Figure 13—Wheel Housing, Floor, and Floor Sub-Structure (Typical)

SECTION 2
FRAME

The information described in Maintenance Manual X-7525 under the heading FRAME (SEC. 2) is applicable to models covered by this supplement with the exception of the following illustration of the new front body mountings and body insulators (figure 1).

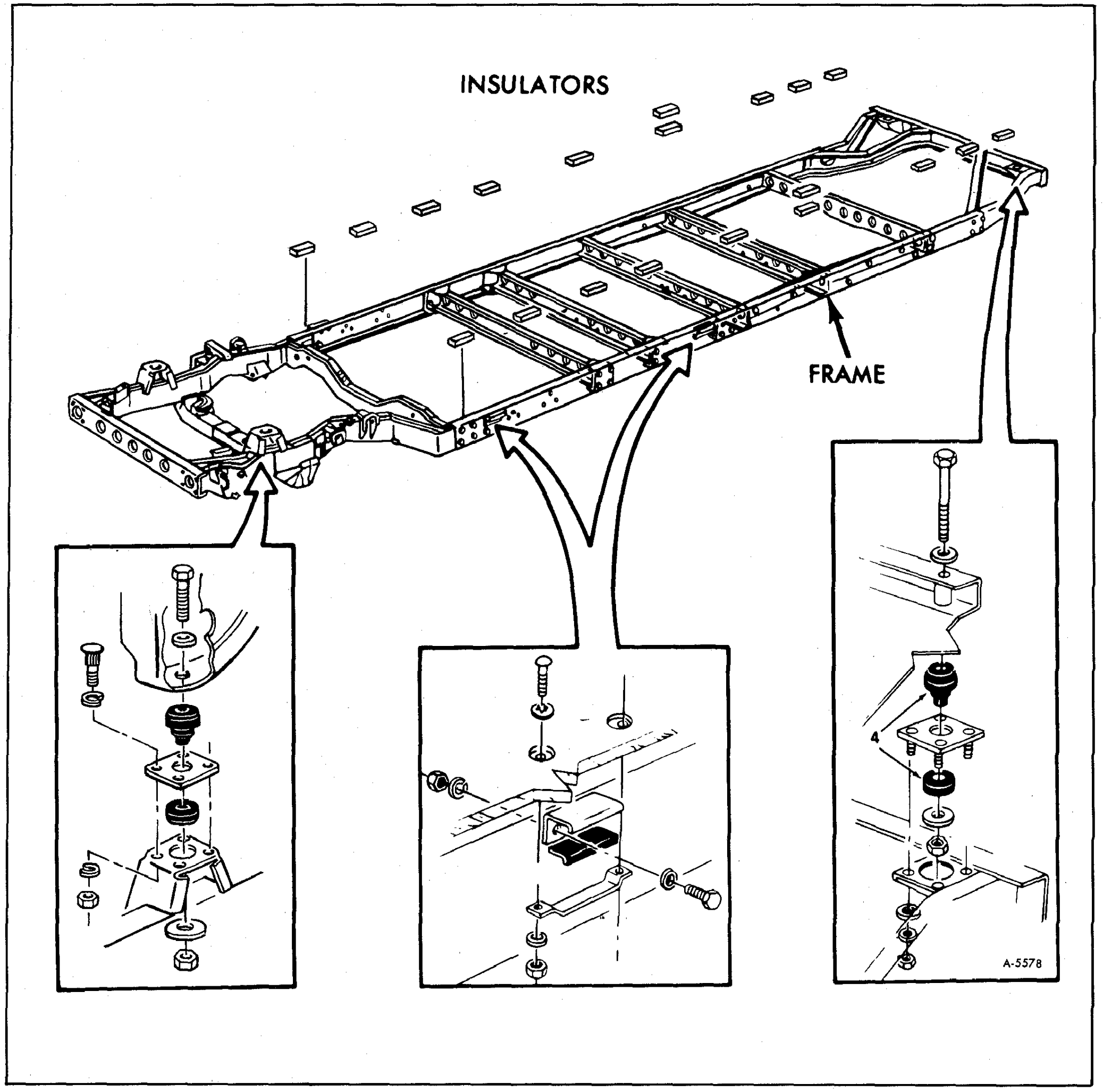


Figure 1—Body Mountings

SECTION 3A
FRONT SUSPENSION

CAUTION: FRONT SUSPENSION FASTENERS ARE IMPORTANT ATTACHING PARTS IN THAT THEY COULD AFFECT THE PERFORMANCE OF VITAL COMPONENTS AND SYSTEMS, AND/OR COULD RESULT IN MAJOR REPAIR EXPENSE. THEY MUST BE REPLACED WITH ONE OF THE SAME PART NUMBER OR WITH AN EQUIVALENT PART IF REPLACEMENT BECOMES NECESSARY. DO NOT USE A REPLACEMENT PART OF LESSER QUALITY OR SUBSTITUTE DESIGN. TORQUE VALUES MUST BE USED AS SPECIFIED DURING REASSEMBLY TO ASSURE PROPER RETENTION OF THIS PART.

NOTE: Never attempt to heat, quench or straighten any front suspension component. Replace it with a new part.

The information described in Maintenance Manual X-7525 under the heading FRONT SUSPENSION (SEC. 3A) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

FRONT SUSPENSION AND STEERING TROUBLE DIAGNOSIS

Before making any adjustment to a vehicle because of suspension, steering and tire wear problems, it is necessary to make a preliminary inspection of all moving parts from the steering wheel to the road wheels.

Wear, looseness or binding of any of the moving parts of the steering system and suspension system will affect vehicle alignment. Vehicle misalignment cannot be corrected as long as conditions of bind or looseness exist. A complete inspection should be made, even if the cause of the problem is suspected.

INSPECTION PROCEDURE

1. Inflate tires to proper pressure:
   - Steel belted bias ply tires —— 60 psi.
   - General Jumbo steel belted radial tires —— 65 psi.

2. Check ride height for sag and uneveness. Before adjusting front ride height, park the vehicle on a known level surface and adjust the rear ride height. (Refer to "RIDE HEIGHT" in Section 4 of this supplement.)

3. Adjust front ride height (figure 21). (Refer to "RIDE HEIGHT" discussed later in this section.)

If you are unable to adjust the front ride height to 13-1/8" plus or minus 1/4", it will be necessary to change the torsion bar anchor arm. Use the following guide to select the proper anchor arm:

Condition	Use Part Number	Anchor Arm Angularity
Vehicle too high	413683	23^{o}
Vehicle too low	418352	$25\ 1/2^{o}$
Vehicle extremely low	416373	28^{o}

If changing the anchor arm does not correct *the ride height, inspect the lower control arm* for galling, bulging or splitting, and inspect the control arm end of the torsion bar for wear. Replace as necessary.

3. Check shock absorber control. (Refer to "Front Suspension and Steering Trouble Diagnosis Chart" later in this section.)

4. Check wheels and tires for runout and wobble. (Refer to Sec. 10, Maintenance Manual X-7525.)

5. Check tires for side wear, misalignment wear, cornering wear or uneven wear. (Refer to Sec. 10, Maintenance Manual X-7525.)

6. Check brakes for dragging. (Refer to "Brake System Trouble Diagnosis," Sec. 5, Maintenance Manual X-7525.)

7. Check front hub bearings for wear or adjustment. (Refer to "Hub Bearing" later in this section.)

8. Check ball joints for looseness. (Refer to "Ball Joint Checks" later in this section.)

9. Check all steering connections for looseness or binding. (Refer to "Front Suspension and Steering Trouble Diagnosis Chart" later in this section.)

10. Inspect the intermediate rod for paralleism with the front axle to eliminate the possiblity of front tires wearing unevenly. The parallelism can be measured and corrected as follows (see figure A):

   a. Position vehicle on a level surface.
   b. Record the following measurements: (Refer to figure B)

		Col 1	Col 2
Entry D	*Distance from the flat surface* surrounding the relay lever ball stud nut to level surface.		——
Entry E	Distance from lower left hand control arm front pivot bolt to level surface.		——

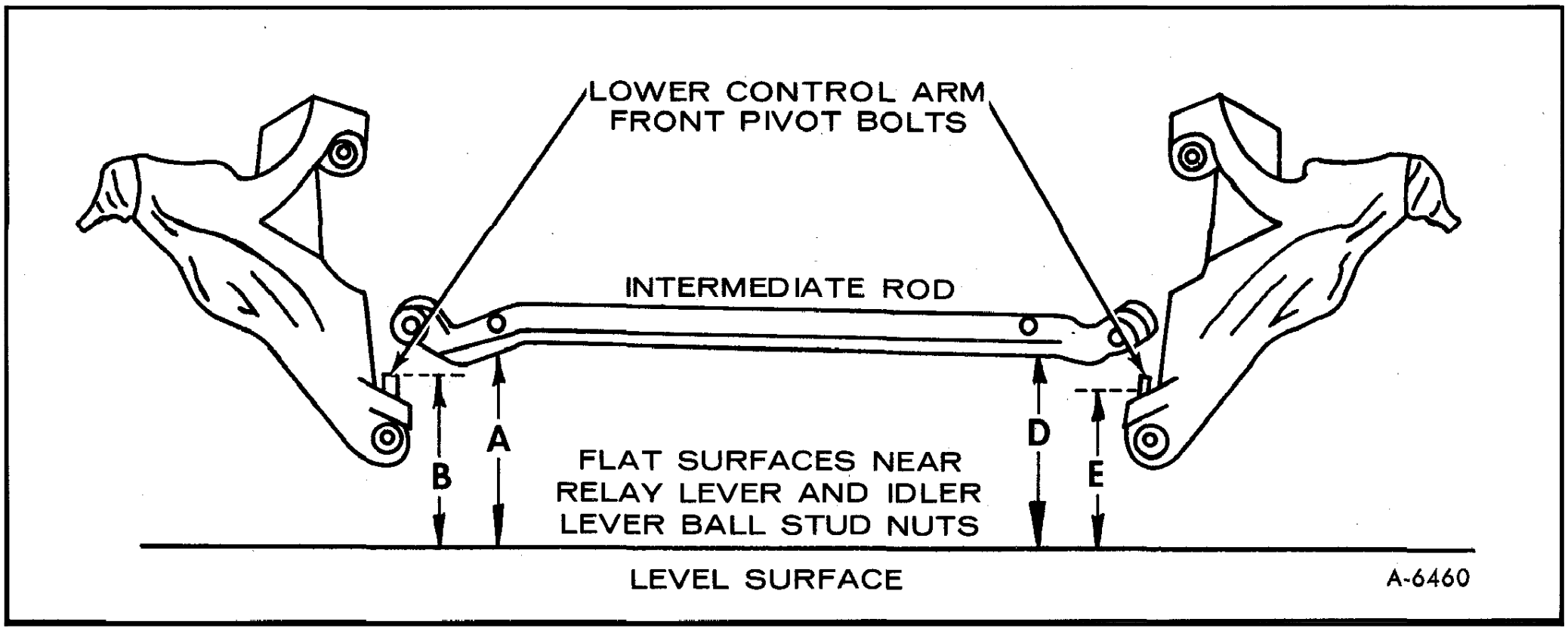


Figure A—Measuring Intermediate Rod Parallelism

		Col 1	Col 2
Entry F	Subtract entry "E" from entry "D" and record in column 2.	——	
Entry A	Distance from the flat surface surrounding the idler lever ball stud nuts to level surface.		——
Entry B	Distance from lower right hand control arm front pivot bolt to level surface.		——
Entry C	Subtract entry "B" from entry "A" and record in column 2.	——	
Entry G *	Subtract entry "C" from entry "F" and record in Column 2.	——	

*If entry "G" is .125" or greater, add two hardened steel washers under the idler lever pivot as shown in figure C. Otherwise, the intermediate rod parallelism is acceptable.

11. Check rear suspension for alignment (Refer to Section 4 of this supplement. Also GM Bulletin 76-IM-5A.)

If one side of the vehicle rear suspension appears to be the primary cause of excessive toe, use the following procedure for measuring toe on one side of the vehicle. This will assist you in determining which rear suspension component is defective or damaged.

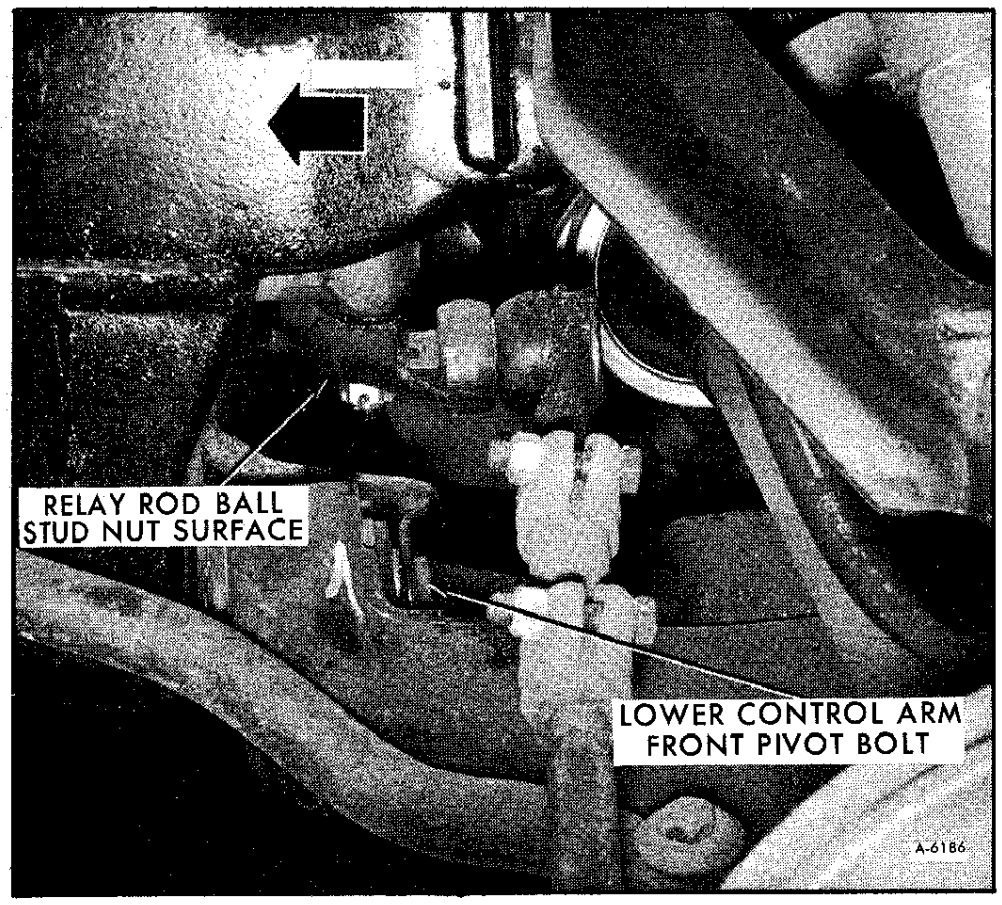


Figure B—Measuring Relay Rod Levelness

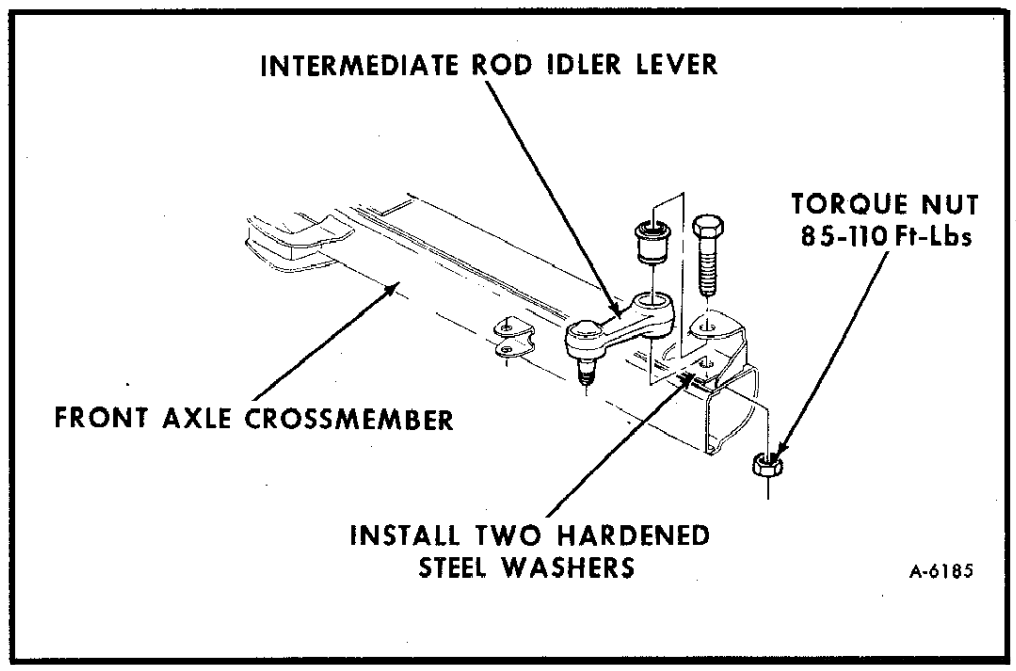


Figure C—Installing Washer Under Idler Pivot

- Drive vehicle straight forward onto a level surface.
- Remove wheel covers and outer dust cap.
- Place straight edge across face of wheels as shown in figure D.
- Measure distance from straight edge to frame at front tire and rear tire as shown. Toe should be A = B plus or minus .0625".
- Add toe shims as required. One toe shim changes A = B by .125".

12. Check steering gear for adjustment, binding and centering. (Refer to "Trouble Diagnosis," Section 9, Maintenance Manual X-7525.)

13. Check rear suspension bushings for wear. (Refer to bulletins 75-TM-23, 75-TM-4.)

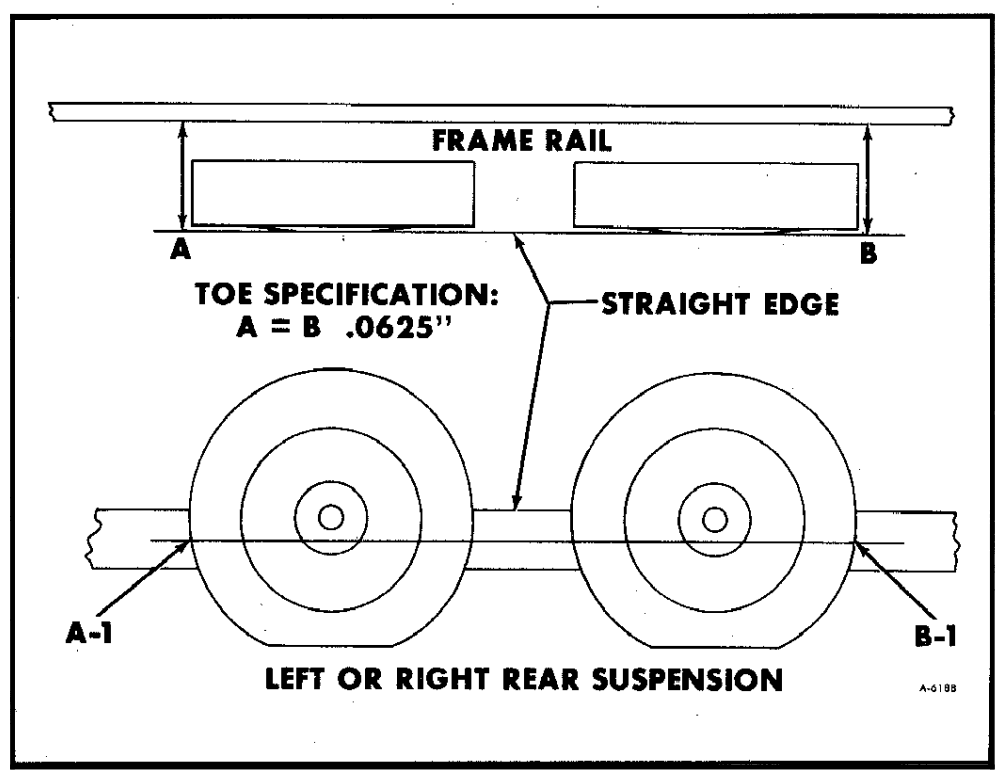


Figure D—Measuring Toe on Rear Suspension

FRONT SUSPENSION AND STEERING TROUBLE DIAGNOSIS CHART

PROBLEM	POSSIBLE CAUSE	CORRECTION
HARD STEERING EXCESSIVE EFFORT REQUIRED AT STEERING WHEEL	1. Low or uneven tire pressure. 2. Suspension ball joints or steering linkage need lubrication. 3. Tighten or frozen relay lever pivot or idler lever pivot. 4. Steering gear to column misalignment. 5. Steering gear adjusted too tightly. 6. Front wheel alignment incorrect. 7. Relay arm or idler arm pivot over-torqued. 8. Power steering partially or not operative.	1. Inflate tires to recommended pressure. 2. Lubricate ball joints and linkage with specified lubricant. 3. Lubricate or replace as necessary. 4. Align column. 5. Adjust preload to specification. 6. Check alignment and ride height and correct as necessary. 7. Torque to specification. 8. Check power steering components for proper operation.
FRONT WHEEL SHIMMY (SMOOTH ROAD SHAKE)	1. Tire and wheel out of balance, or out of round. 2. Worn tie rod ends. 3. Worn lower suspension ball joints. 4. Worn upper suspension ball joints. 5. Malfunctioning shock absorber. 6. Worn or loose wheel bearings.	1. Balance tires, check runout. 2. Replace tie rod ends. 3. Replace entire lower control arm assembly. 4. Replace upper ball joints. 5. Replace shock absorbers. 6. Replace or adjust wheel bearings.
VEHICLE PULLS TO ONE SIDE (NO BRAKING ACTION)	1. Low or uneven tire pressure. 2. Broken or sagging torsion bar. 3. Incorrect front wheel alignment (camber). 4. Wheel bearings worn out. 5. Brakes dragging.	1. Inflate tires to recommended pressure. 2. Replace torsion bar. 3. Check ride height and align front suspension. 4. Replace wheel bearings. 5. Inspect and adjust brakes.
POOR DIRECTIONAL STABILITY	1. Suspension ball joints and steering linkage need lubrication. 2. Low or uneven front or rear tire pressure. 3. Steering gear not on high point. 4. Incorrect front wheel alignment (caster). 5. Broken torsion bar. 6. Malfunctioning shock absorber.	1. Lubricate at proper intervals. 2. Inflate tires to recommended pressure. 3. Adjust steering gear. See Maintenance Manual X-7525, Sec. 9. 4. Check ride height and align front suspension. 5. Replace torsion bar. 6. Replace shock absorbers.

PROBLEM	POSSIBLE CAUSE	CORRECTION
POOR DIRECTIONAL STABILITY (CONT'D)	7. Broken stabilizer bar or missing link. 8. Intermediate rod not parallel.	7. Replace stabilizer or link. 8. Correct to specification.
EXCESSIVE PLAY IN STEERING	1. Front wheel bearings loosely adjusted. 2. Worn couplings or steering shaft U-joints. 3. Worn upper ball joints. 4. Steering wheel loose on shaft. 5. Incorrect steering gear adjustment. 6. Loose pitman arm, tie rods, steering arms or steering linkage ball studs. Worn intermediate rod or tie rod sockets. 7. Loose relay arm pivot. 8. Loose idler arm pivot.	1. Adjust bearings or replace with new parts as necessary. 2. Replace. 3. Replace. 4. Tighten to specified torque. 5. Adjust steering gear. See Maintenance Manual X-7525, Sec. 9. 6. Replace loose or worn parts. 7. Replace. 8. Replace.
POOR RETURNABILITY	1. Steering linkage or suspension ball joints need lubrication. 2. Steering gear adjusted too tightly. 3. Steering gear to column misalignment. 4. Front wheel alignment incorrect.	1. Lubricate with specified lubricant. 2. Adjust to specification. 3. Align column. 4. Check ride height alignment and correct as necessary.
NOISE IN FRONT END	1. Suspension ball joints and steering linkage need lubrication. 2. Shock absorbers loose or bushings worn. 3. Worn upper control arm bushings. 4. Worn lower control arm bushings. 5. Worn tie rod ends. 6. Loose stabilizer bar. 7. Loose wheel nuts. 8. Loose suspension bolts.	1. Lubricate at recommended intervals. 2. Tighten bolts and/or replace shock absorber. 3. Replace bushings. 4. Replace entire lower control arm assembly. 5. Replace tie rod ends. 6. Tighten all stabilizer bar attachments. 7. Tighten wheel nuts to proper torque. 8. Torque to specifications or replace.
TIRE THUMP	1. Tire and wheel out of balance 2. Tire and wheel out of round. 3. Blister or bump on tire. 4. Improper shock absorber action.	1. Balance wheels. 2. Replace tire. 3. Replace tire. 4. Replace shock absorber.

PROBLEM	POSSIBLE CAUSE	CORRECTION
EXCESSIVE OR UNEVEN TIRE WEAR	1. Underinflated or over-inflated tires. 2. Improper toe-in. 3. Wheels out of balance. 4. Hard driving. 5. Overloaded vehicle. 6. Improper camber. 7. Unparallel intermediate rod.	1. Inflate tire to recommended pressure. 2. Realign front end. 3. Balance wheels. 4. Instruct driver 5. Instruct driver. 6. Realign front end. 7. Correct as necessary.
SCUFFED TIRES	1. Toe-in incorrect. 2. Excessive speed on turns. 3. Tires improperly inflated. 4. Rear suspension arm bent or twisted. 5. Intermediate rod not parallel. 6. Incorrect ride height.	1. Adjust toe-in to specifications. 2. Advise driver. 3. Inflate tires to recommended pressure. 4. Replace arm. 5. Correct to specifications. 6. Adjust ride height.
CUPPED TIRES	1. Shock absorbers defective. 2. Worn upper suspension ball joint. 3. Worn lower suspension ball joint. 4. Wheel and tire out of balance. 5. Excessive tire or wheel runout.	1. Replace shock absorbers. 2. Replace upper ball joint. 3. Replace entire lower control arm assembly. 4. Balance wheel and tire. 5. Compensate for runout.
WEAR IN THE SECOND TREAD ROW ON EACH SIDE OF TIRE	1. Underinflation or inherent problem of bias belted tires.	1. Inflate tire to recommended pressure and rotate tires.
EXCESSIVE LOOSENESS IN TIE ROD OR INTERMEDIATE ROD PIVOTS, OR EXCESSIVE VERTICAL LASH IN IDLER PIVOT OR RELAY ARM PIVOT.	1. Seal damage and leakage resulting in loss of lubricant, corrosion and excessive wear or improper torque.	1. Replace damaged parts as necessary and check torque.
SHOCK ABSORBER—WEAK.	1. Low or uneven tire pressure. 2. Excessive or incorrect vehicle loading. 3. Worn out shock absorber. Front.	1. Inflate tires to recommended pressure. 2. Instruct driver. 3. Perform on-vehicle test. Push down and lift up at end of bumper nearest front shock in question. Right and left shocks must be comparable in rebound resistance to compression ratio (usually 2 to 1). If in doubt compare with vehicle having acceptable ride quality.

PROBLEM	POSSIBLE CAUSE	CORRECTION
SHOCK ABSORBER — WEAK. (CONT'D)	4. Worn out shock absorber. Rear.	4. Disconnect the lower shock mountings. Stroke shocks at various rates of speed through maximum travel in both directions. Compare side to side for rebound and compression resistance. Rebound resistance is normally stronger than compression (approximately 2 to 1). It is manadatory that right and left shocks feel comparable. If in doubt about condition, compare with a known good shock.
SHOCK ABSORBER—— NOISY.	1. Loose mounting. 2. Faulty shock absorber.	1. Check all shock mounting torques (bolt and/or nut). 2. Observe hoisting instructions and instructions for removal of front shock absorbers. Clamp shock upside down. Clamp vise on top mount with shock vertical in vise (do not clamp on reservoir tube). Rear shocks may be tested on the vehicle by disconnecting the lower mount. Completely extend to full rebound then exert an extra pull. If a "give" is felt, a loose piston is indicated and the shock should be replaced. A hissing noise (orifice swish) is normal; however, replace shock absorber for any of the following: 1. A skip or lag at reversal near mid-stroke. 2. A seize (except at either extreme end of travel). 3. A noise such as a grunt or squeal after completing one full stroke in both directions. 4. A clicking noise at fast reversal.
SHOCK ABSORBER—— LEAKS.	1. Faulty shock absorber.	1. A slight trace of shock fluid is NOT cause for replacement as the seal permits some seepage for lubrication of the piston rod. The shock contains a fluid reverse to compensate for seepage. A shock that is truly leaking is easily detected as there will be evidence of shock fluid around the seal cover and on down the reservoir tube; any leaking shock should be replaced.

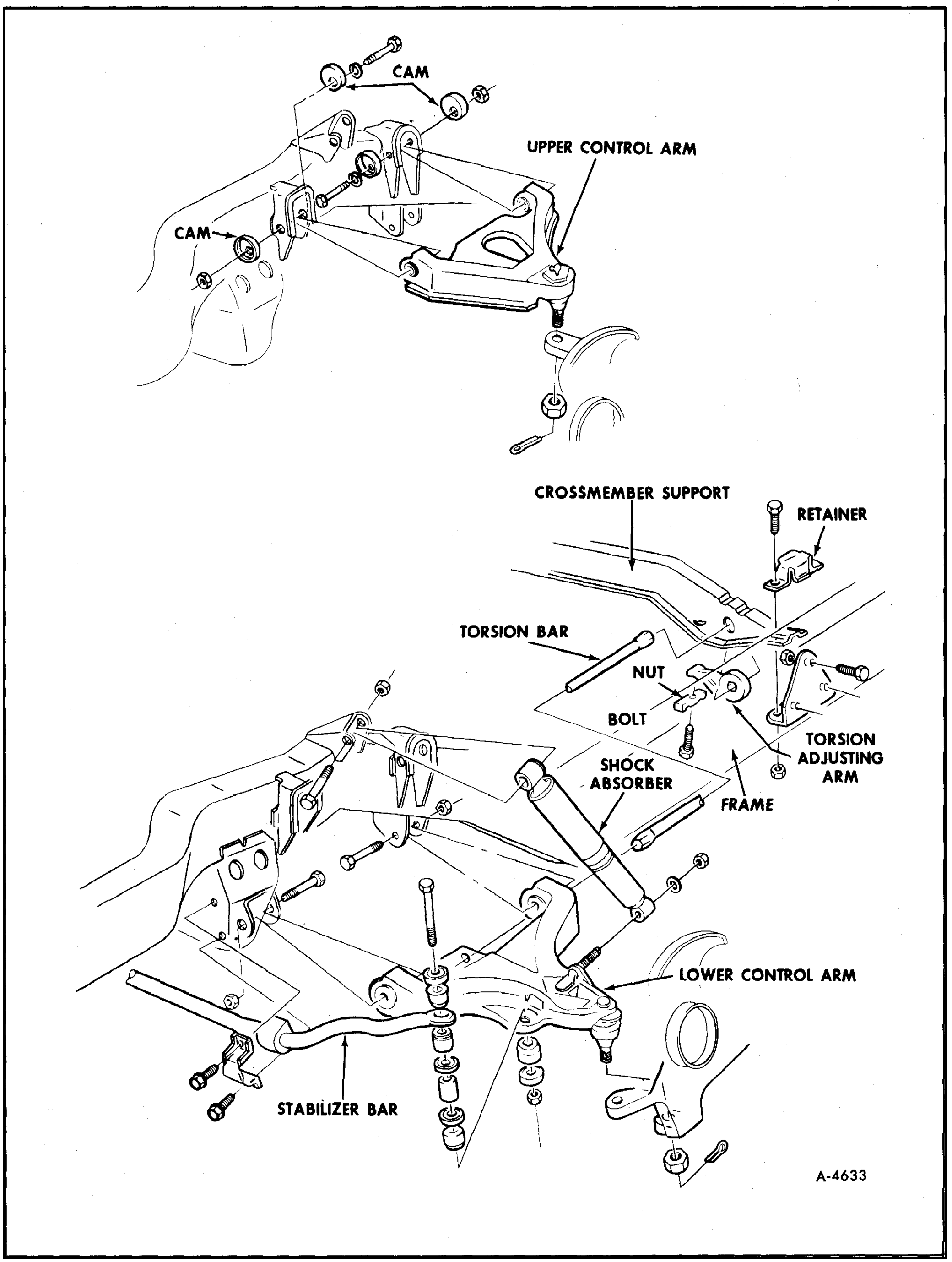


Figure 1—Front Suspension

GENERAL DESCRIPTION

The front suspension consists of control arms, stabilizer bar, shock absorbers and a right and left side torsion bar. Torsion bars are used instead of the conventional coil springs. The front end of the torsion bar is attached to the lower control arm. The rear of the torsion bar is mounted into an adjustable arm at the torsion bar crossmember support. The ride height of the vehicle is controlled by this adjustment (figure 1).

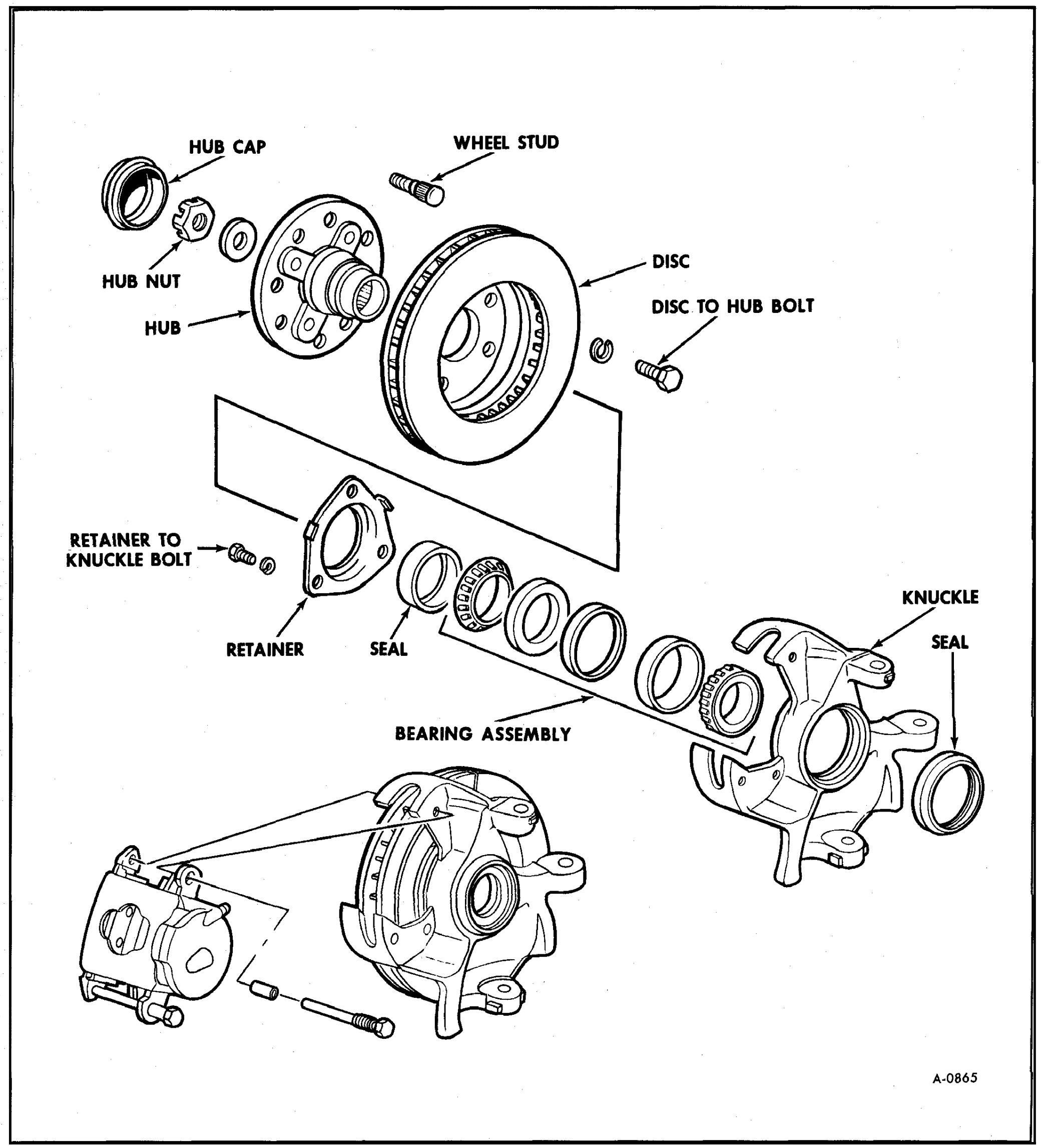


Figure 2—Disc and Hub Assembly

COMPONENT REPLACEMENT

DISC AND HUB

(Refer to Figure 2)

REMOVAL

1. Siphon approximately two-thirds of the brake fluid from the front reservoir of the master cylinder. Discard fluid.

NOTE: Do not empty front reservoir or it will be necessary to bleed the brake system.

2. Hoist vehicle. Remove eight hub nuts from wheel studs and remove wheel. Support vehicle with floor stands.

NOTE: Wheel studs and nuts should be checked after every wheel removal and replaced if necessary. If wheel studs require replacement, removal of studs from hub may be accomplished by the use of Wheel Stud Remover Tool J-5504-01.

3. Remove cotter pin, drive axle nut and washer.

4. Position Tool J-22269 on caliper as shown in figure 3.

5. Tighten screw of tool until caliper moves outboard far enough to push piston to bottom of piston bore. This will allow shoes to back off from the disc surface. Remove Tool J-22269.

6. Remove the two caliper-to-knuckle attaching bolts (figure 3).

7. Carefully lift caliper assembly from disc and reposition so that brake hose is not kinked or stretched.

8. Loosen uniformly and remove the three bolts securing the retainer to the knuckle (figure 4). Removal of these bolts may be expedited by the use of special Bolt Wrench J-22585 (figure 5).

9. Position Tool No. J-24717 on hub as shown in figure 6.

10. Operate slide hammer Tool No. J-2619, until assembly is free of knuckle. See figure 6.

11. Remove slide hammer and Tool No. J-24717.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

1. Lubricate O.D. of bearing with chassis grease. Clean bearing seat of knuckle where rust or dirt may fall during removal.

2. The outer race of the bearing is a snug fit into the knuckle. Light tapping on the hub's outer surface (not the disc) will aid assembly. Care must be used when installing hub assembly over drive axle splines so that splines are in correct alignment.

3. Install three bolts attaching bearing retainer to knuckle. Torque bolts. See Specifications at the end of this section for torque value and procedure.

4. Install drive axle washer and nut. Torque nut. See Specifications at the end of this section for torque value and procedure. If necessary to align cotter pin slot, tighten nut and install NEW cotter pin and crimp.

5. Replace wheel and secure with eight nuts on studs. Refer to Maintenance Manual X-

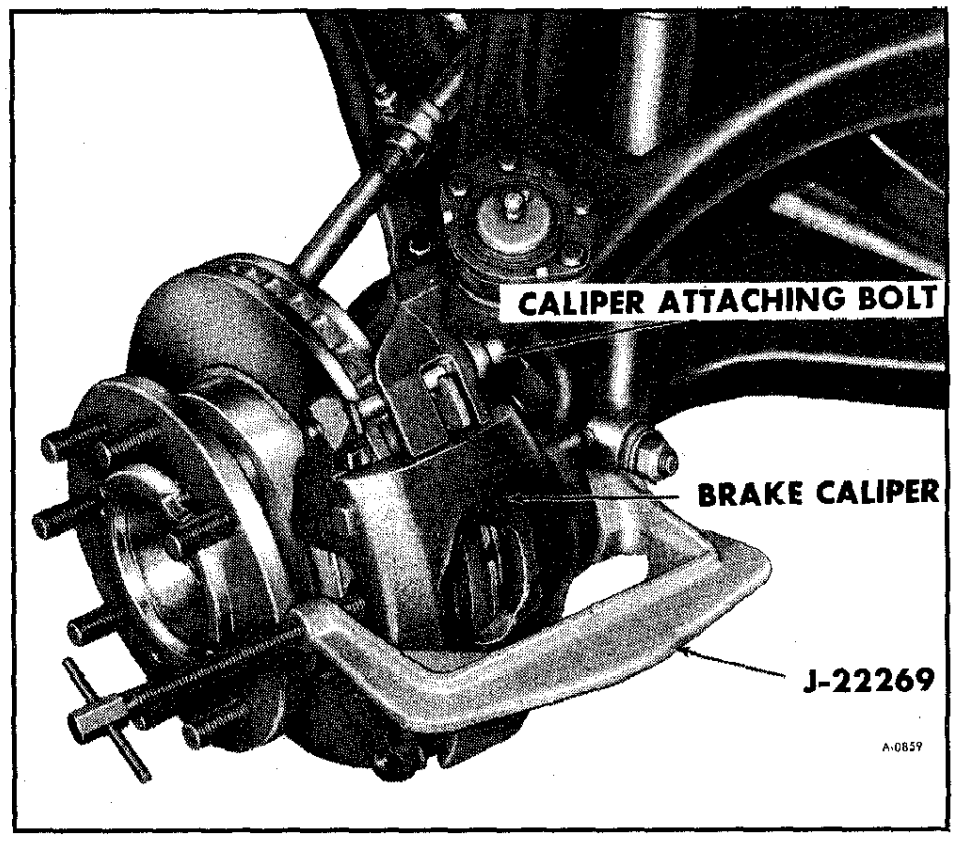


Figure 3—Caliper Removal

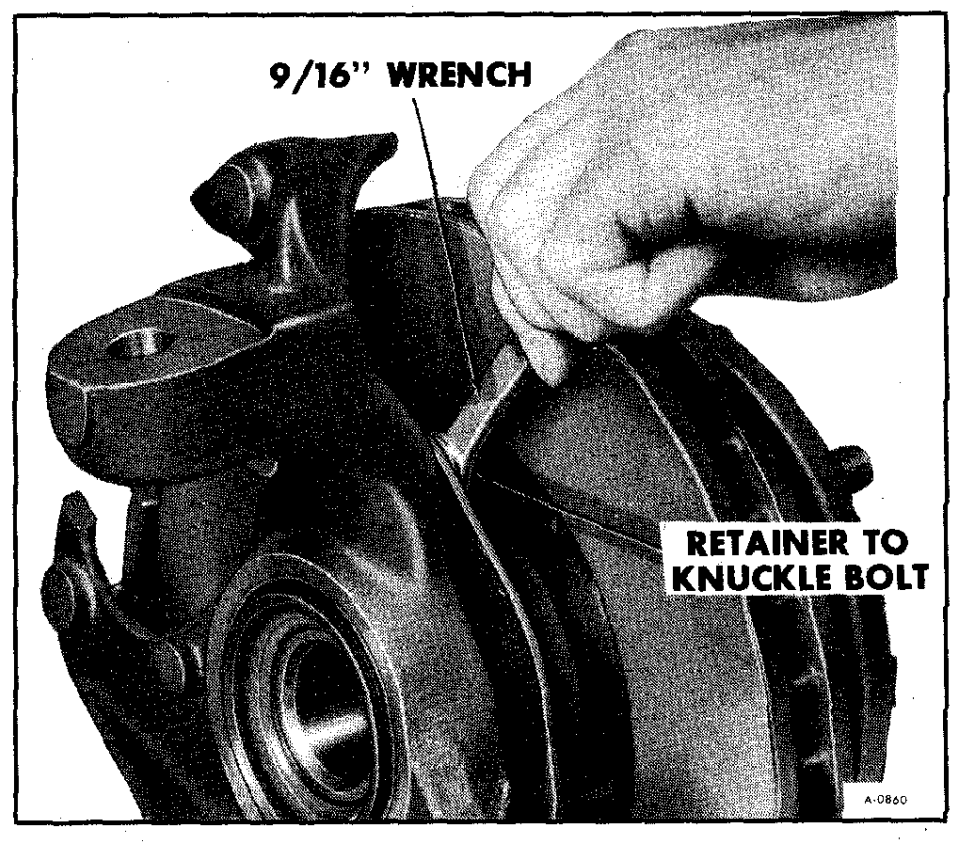


Figure 4—Retainer Bolt Removal

7525, Sec. 10 for torque values and tightening sequence. Refill master cylinder with new brake fluid.

6. Remove floor stands. Lower vehicle.

HUB BEARING

There is a new Bearing Puller Ring, Tool J-26559, used to facilitate the removal of front wheel bearings from the front hub/ rotor assembly (figure 7). This tool is to be used in conjunction with Puller Bar J-8433.

REMOVAL

1. Remove disc and hub assembly. Refer to "Disc and Hub Removal" covered earlier in this section.
2. Assemble Tool No. J-26559-1 to Tool No. J-8433.
3. Position tool assembly as shown in figure 7.

CAUTION: *The gripping or pulling edge of the tool must be under the inner race. If the tool slips up to the bearing cage, the bearing will be seriously damaged and need to be replaced.*

4. With Tool No. J-22214-6 in place, and a clamp in position, tighten center screw (J-22214-4) until bearing is free of hub.
5. Remove seal and retainer.
6. Clean bearing and inspect for wear or damage. If bearing condition is good repack with bearing grease. Use GM part No. 1051344 or equivalent, a premium high melting point lubricant.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

1. Postion retainer over hub.
2. Lubricate seal lips with Special Seal Lubricant No. 1050169 or equivalent, then position seal over hub with metal end toward retainer.
3. Install bearing as shown in figure 8.
4. Install disc hub assembly. Refer to "Disc and Hub Installation" covered earlier in this section.

DISC

REMOVAL (Figure 9)

1. Remove disc and hub assembly. Refer to "Disc and Hub -Removal"

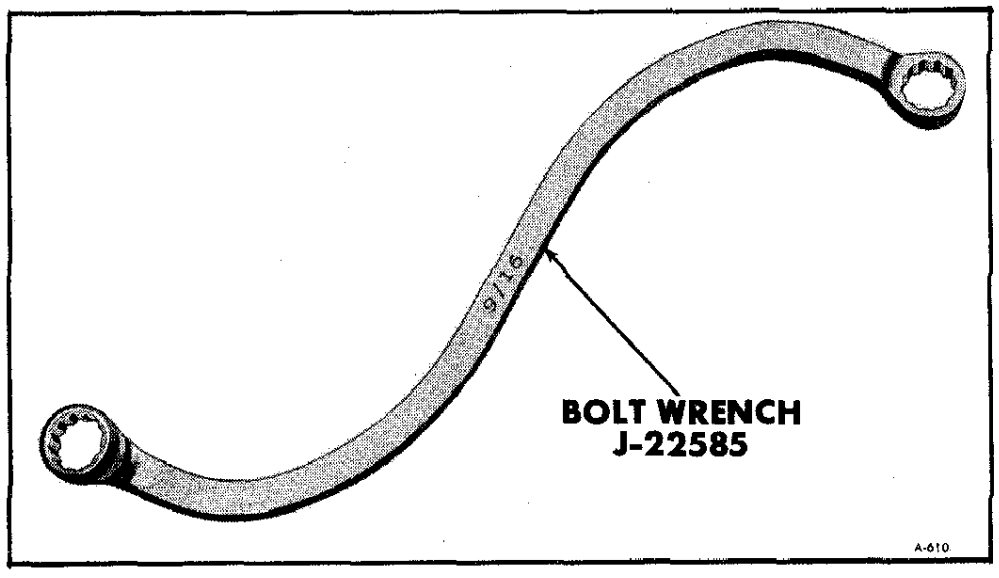


Figure 5—Front Hub Retainer Bolt Wrench J-22585

2. *Remove hub bearing. Refer to "Hub* Bearing Removal".
3. Remove bolts (4) and separate disc from hub as shown in figure 9.

INSTALLATION

1. Install four attaching bolts. See Specifications at the end of this section for torque value.
2. *Install hub bearing. Refer to "Hub* Bearing - Installation".
3. Install disc and hub assembly. Refer to "Disc and Hub Installation".

KNUCKLE SEAL

REMOVAL

1. Remove disc and hub. Refer to "Disc and Hub - Removal".
2. Pry seal from knuckle.

INSTALLATION

1. Lubricate seal inner lips with Special Seal Lubricant No. 1050169 or equivalent. Place knuckle seal on Tool J-26485. Insert tool as far as possible into knuckle and then drive it in with a hammer until it bottoms (figure 10). Remove tool.

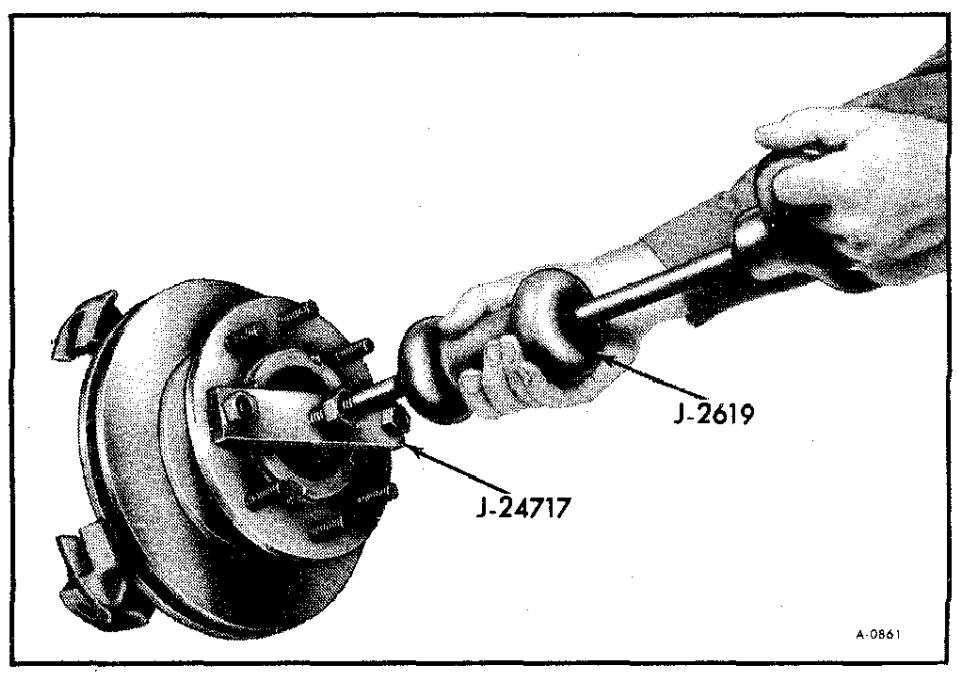


Figure 6—Hub and Disc Removal

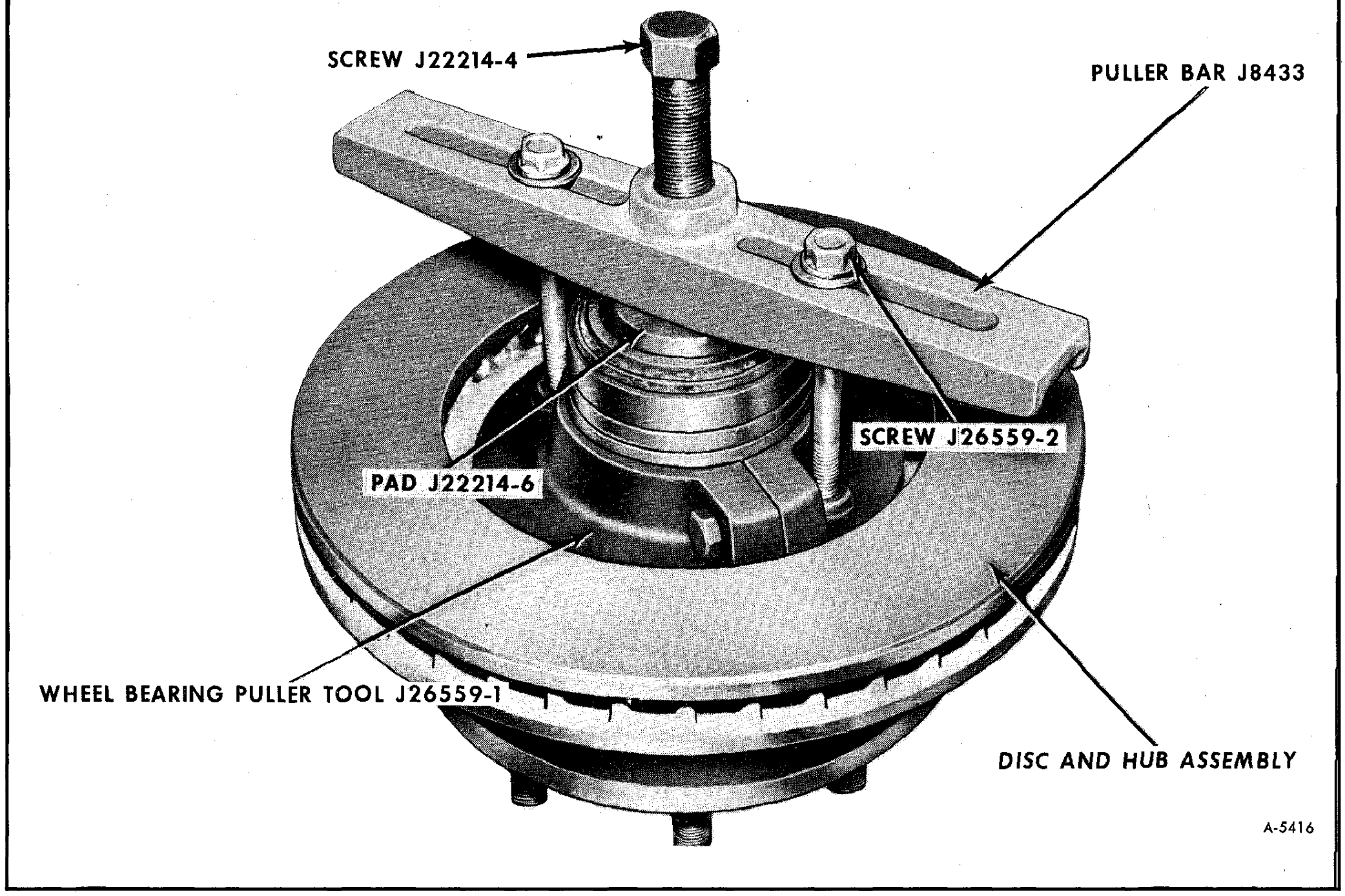


Figure 7—Wheel Bearing Puller Tool J-26559

2. Install disc and hub. (See "Disc and Hub - Installation").

KNUCKLE

REMOVAL

1. Remove disc and hub assembly (refer to "Disc Hub -Removal").
2. Remove upper ball joint cotter pin and nut.

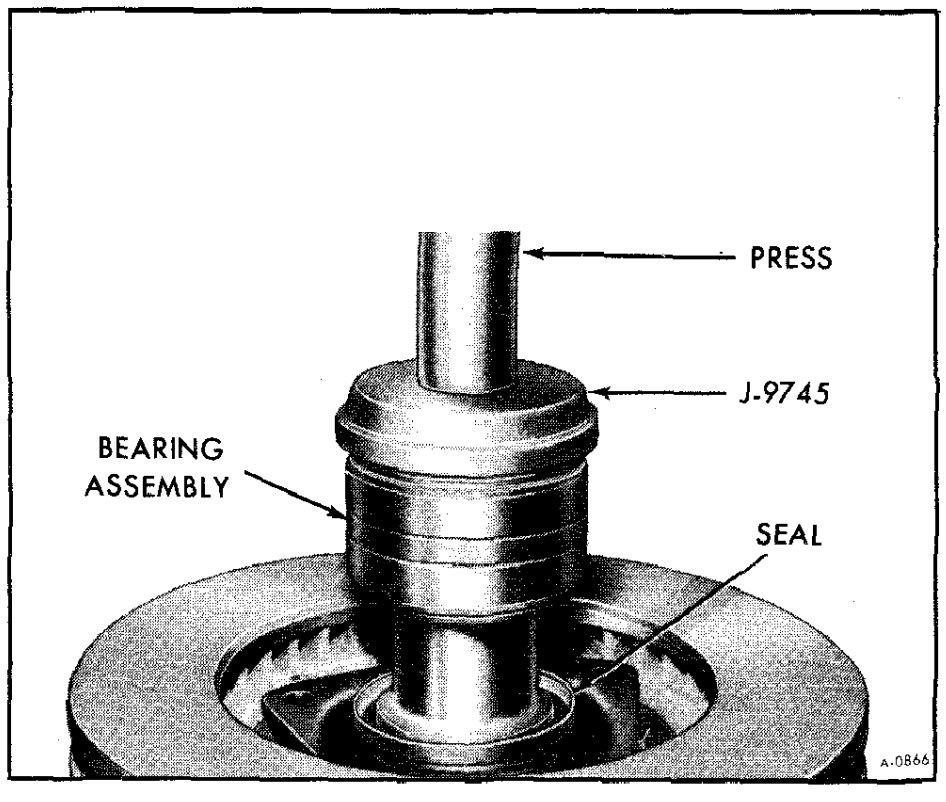


Figure 8—Installing Bearing

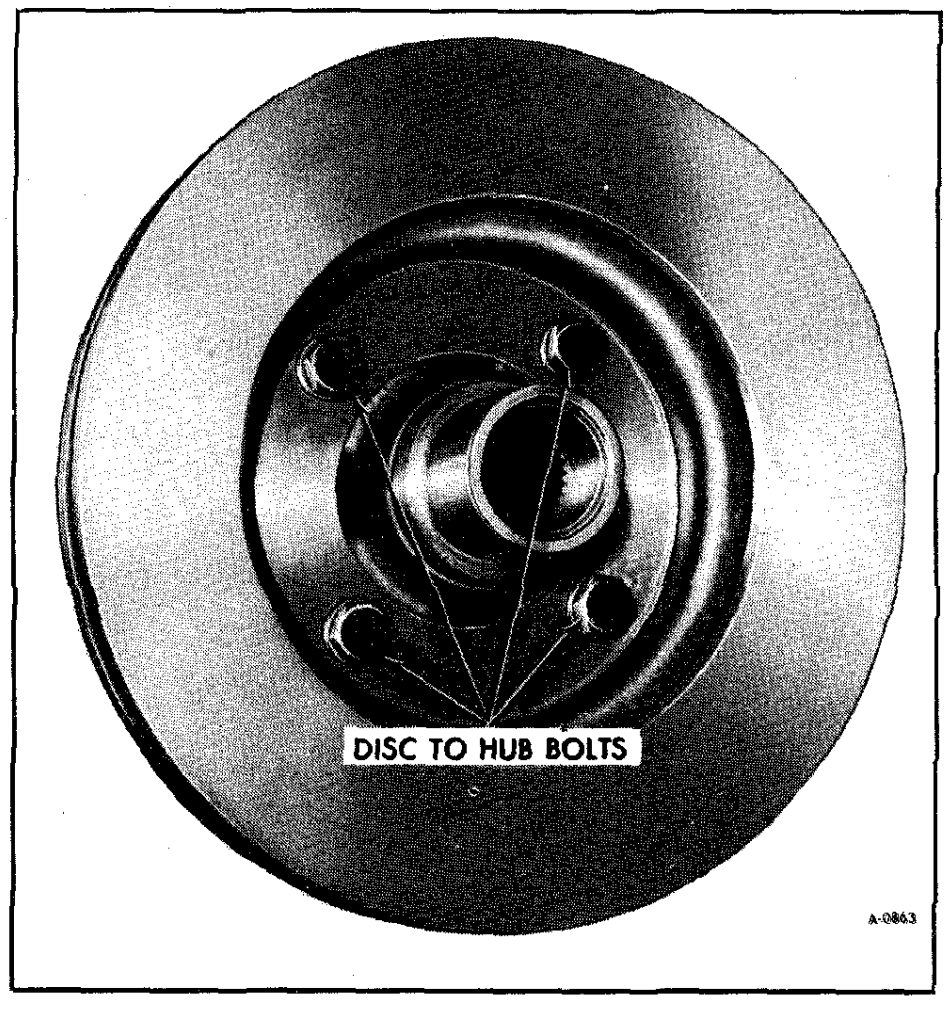


Figure 9—Disc Removal

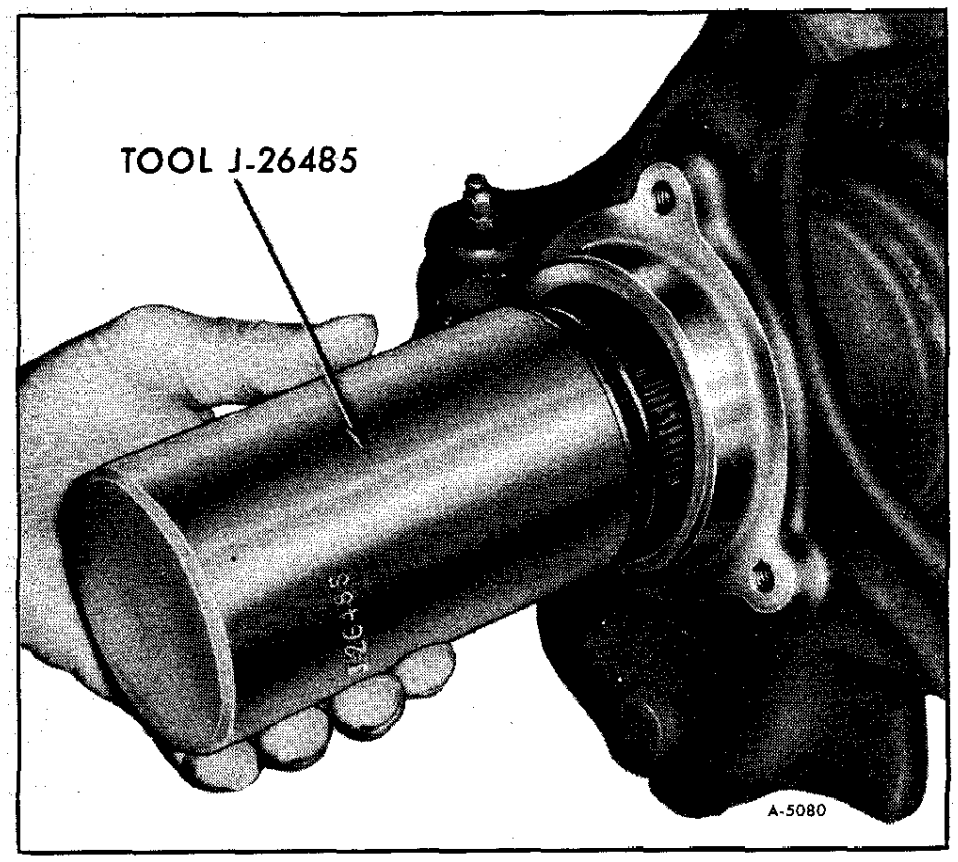


Figure 10—Installing Knuckle Seal

3. Remove brake line hose clip from ball joint stud.

NOTE: Do not loosen ball joint in upper control arm.

4. Using a brass drift and hammer, and a pry bar, placed as in figure 11, loosen upper ball joint stud from knuckle. Remove upper ball joint from knuckle.

5. Remove cotter pin and nut from tie rod end.

6. Using Tool J-21319, remove tie rod end as shown in figure 12.

7. Remove cotter pin and nut from lower (suspension) ball joint.

8. Using Tool J-24319 remove lower (suspension) ball joint from knuckle (figure 13).

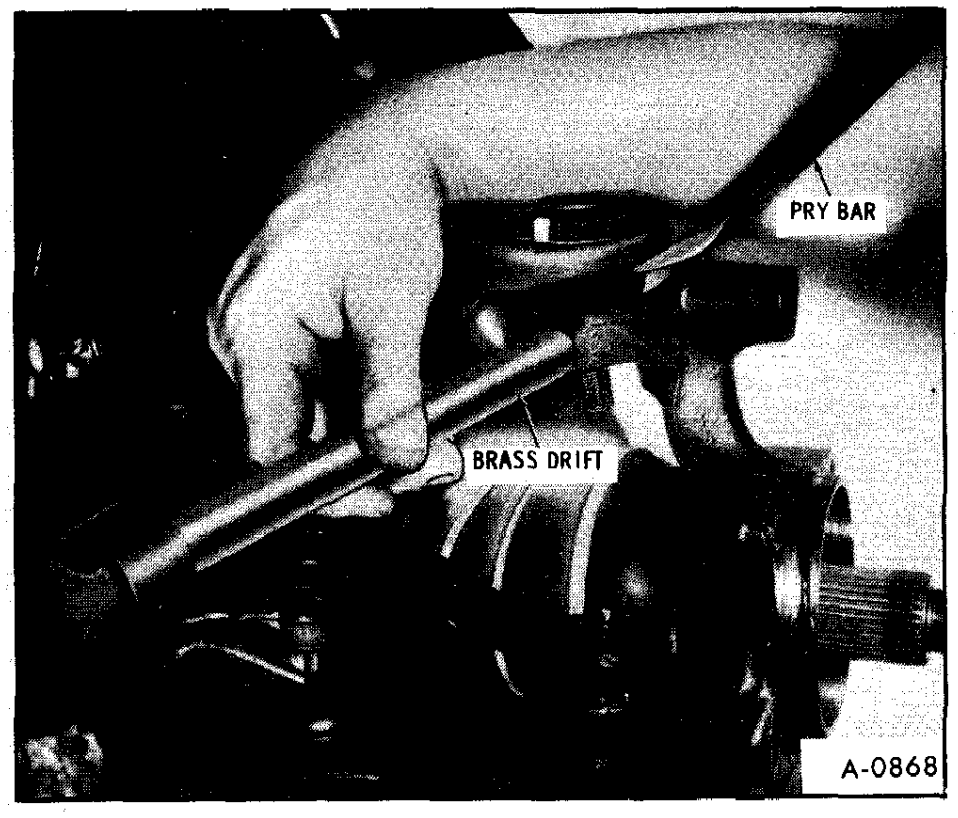


Figure 11—Removing Upper Ball Joint

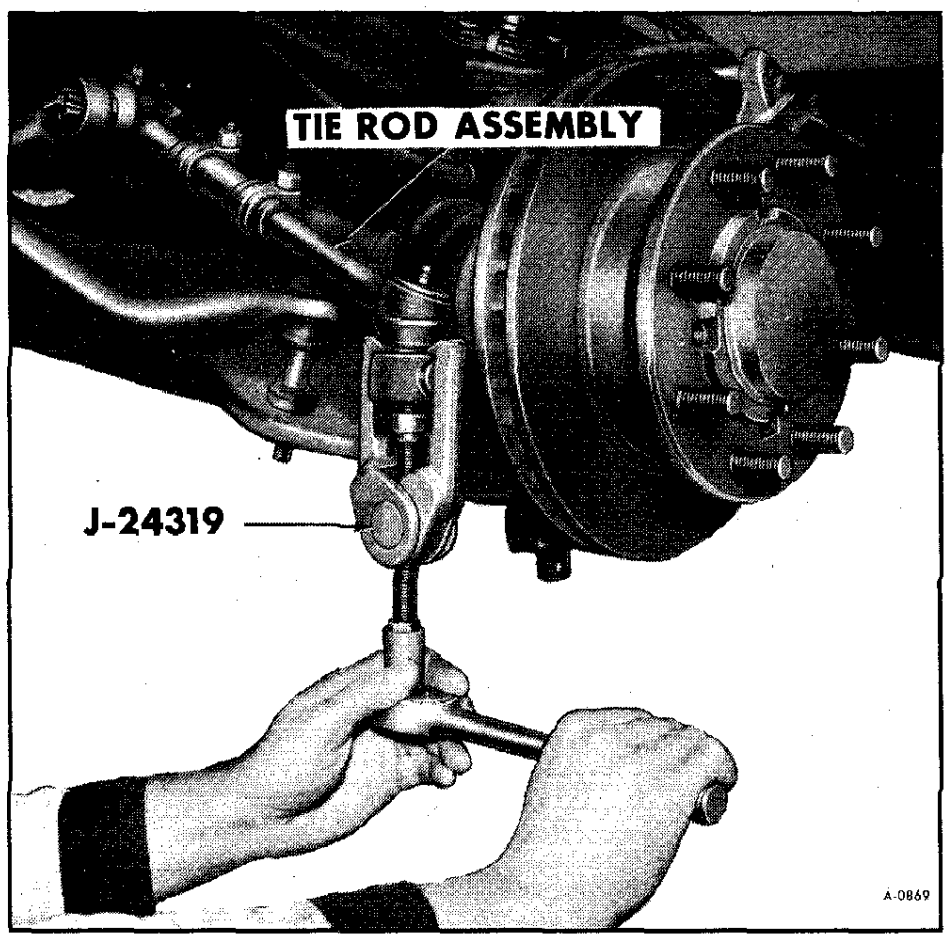


Figure 12—Removing Tie Rod End

9. Remove knuckle. Pry seal from knuckle.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

1. Lubricate seal inner lips with Special Seal Lubricant No. 1050169 or equivalent. Then, using Tool J-26485 install seal into knuckle until it bottoms.

2. Install lower ball joint stud into knuckle and attach nut. Do not torque. See Specifi-

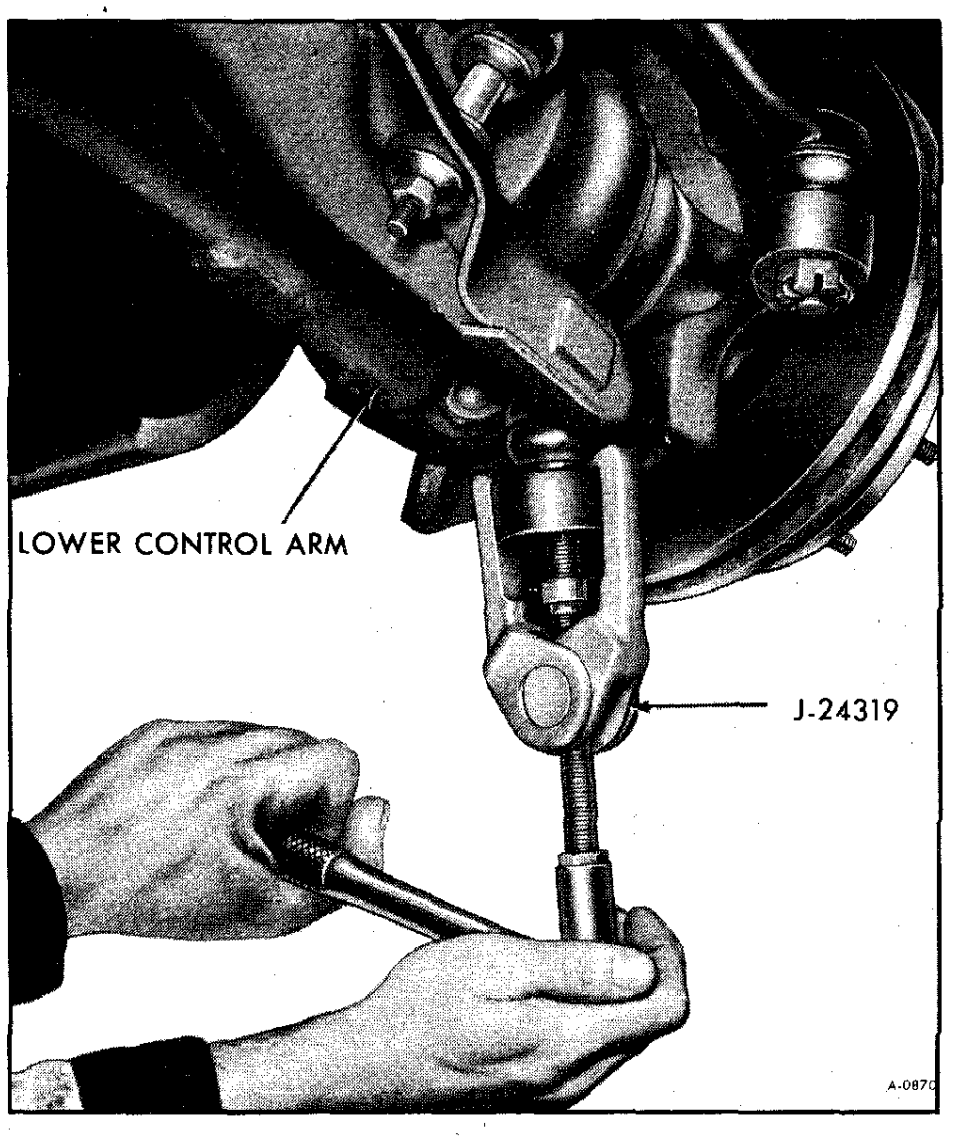


Figure 13—Removing Lower Ball Joint

cations at the end of this section for installation procedure.

3. Install tie rod end stud into knuckle and attach nut. Do not torque. See Specifications at the end of this section for installation procedure.

4. Install upper ball joint stud into knuckle. Attach nut. See Specifications at the end of the section for installation procedure. Attach brake line hose clip.

5. Torque ball joint stud nut. See Specifications at the end of this section for torque value and procedure. Tighten to install NEW cotter pins.

CAUTION: *Cotter pin on upper ball joint must be bent up only to prevent interference with C. V. joint seal.*

6. Torque tie rod end nut. See Specifications at the end of this section for torque value and procedure.

7. Install disc hub assembly (refer to "Disc and Hub -Installation").

UPPER CONTROL ARM

REMOVAL

1. Hoist vehicle and remove wheel. Place floor stand on each side, under and firmly against the lower control arm.

2. Remove upper shock absorber attaching bolt.

3. Remove cotter pin and nut from upper ball joint.

4. Disconnect brake hose clip from ball joint stud.

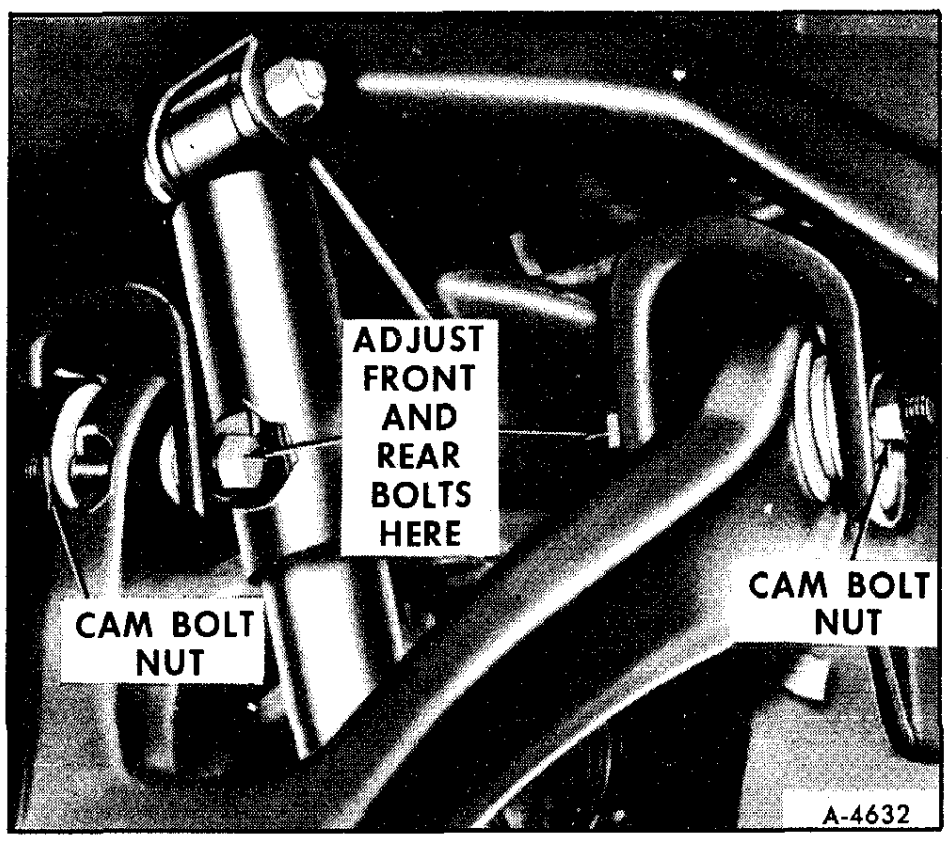


Figure 14—Upper Control Arm Attachment

5. Using hammer and a drift (figure 11), drive on spindle until upper ball joint stud is disengaged from knuckle.

6. Remove upper control arm cams, washers and nuts. Remove control arm from vehicle by guiding shock absorber through access hole.

NOTE: While cam is removed check cam adjustment surface of bracket for weld splatter. Weld splatter in this area will affect front end alignment. Remove weld splatter before reassembly.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

1. Guide upper control arm over shock absorber and install bushing end of control arm into frame bracket.

2. Install cams as shown in figure 1.

3. Install washers and nuts. Torque nuts. See Specifications at the end of this section for torque values.

4. Install ball joint stud into knuckle. See Specifications at the end of this section for installation procedure.

5. Install brake hose clip on ball joint stud.

6. Install ball joint stud nut. Torque nut. See Specifications at the end of this section for torque value and procedure.

CAUTION: *Cotter pin must be crimped toward upper control arm to prevent interference with outer C. V. joint seal.*

7. Install upper shock attaching bolt and nut. Torque nut. See Specifications at the end of this section for torque value.

8. Replace wheel and secure with eight nuts on studs. Refer to Maintenance Manual X-7525, Sec. 10, for torque values and tightening sequence.

9. Remove floor stands and lower hoist.

10. Check camber, caster and toe-in and adjust if necessary. Refer to FRONT END ALIGNMENT (Sec. 3A), Maintenance Manual X-7525.

UPPER CONTROL ARM BUSHING

Upper control arm bushings can be removed and installed while control arm is installed on vehicle.

REMOVAL

1. Hoist vehicle, place floor stands under and firmly against the lower control arm, and remove wheel.
2. Disconnect upper shock absorber attaching bolt (figure 14).
3. Remove cams, bolts, washers and nuts from control arm.
4. Move control arm out of frame brackets and attach bushing removal tools as shown in figure 15. Remove bushings.

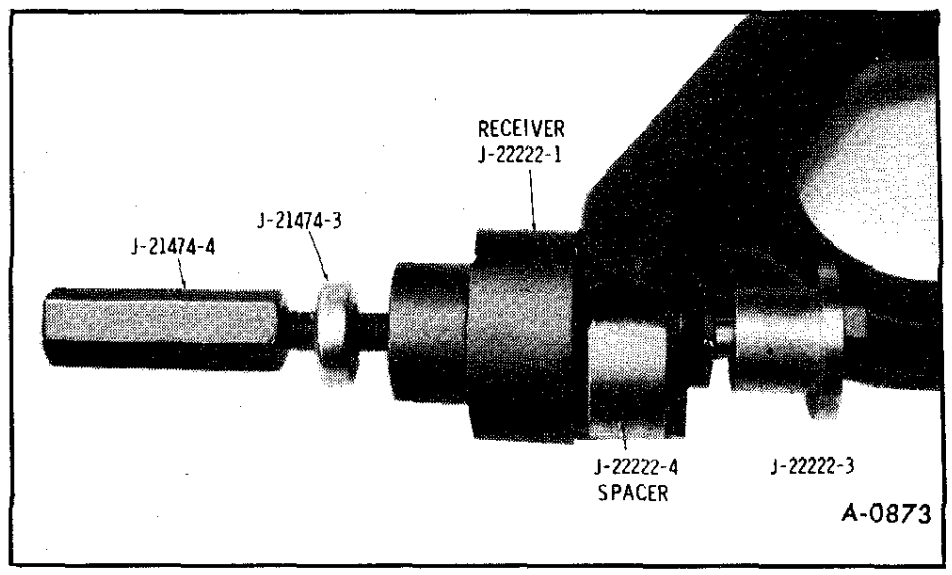


Figure 15—Removing Upper Control Arm Bushing

INSTALLATION

See CAUTION on Page 3A-1 of this section.

1. Install tools and press bushings into control arm (figure 16).
2. Move control arm into frame brackets and install cams, bolts, washers and nuts. The cams are installed with the bolts in the lower position. Torque cam nuts. See Specifications at the end of this section for torque value and procedure.
3. Connect upper shock attaching bolt. Torque nut. See Specifications at the end of this section for torque value and procedure.
4. Install wheel and secure with eight nuts on studs. Refer to Maintenance Manual X-7525, Sec. 10 for torque values and tightening sequence.
5. Remove floor stands and lower hoist.
6. Align front wheels. Refer to FRONT END ALIGNMENT (Sec. 3A), Maintenance Manual X-7525.

LOWER CONTROL ARM

NOTE: Service parts for lower control arm ball joints and bushings are no longer available. If lower control arm ball joints or bushings require replacement, entire lower control arm assembly must be installed.

REMOVAL

1. Hoist vehicle and remove wheel assembly.
2. Before using Tool J-22517-02, remove two nuts and center screw, then place tool over crossmember support. Align pin of tool into hole in crossmember. Install two nuts on tool and center screw. Turn center screw until seated in dimple of torsion adjusting arm.
3. Using a socket on the torsion bar adjusting bolt, turn counterclockwise, counting the number of turns necessary to remove.

NOTE: The number of turns to remove the adjusting bolt will be used when installing, to obtain the original carrying height.

4. Remove adjusting bolt and nut.
5. Turn center screw of Tool J-22517-02 until torsion bar is completely relaxed and remove torsion bar, noting which end is front.
6. Disconnect shock absorber and stabilizer link from lower control arm.
7. Remove drive axle nut.
8. Remove cotter pin and nut from lower ball joint stud.
9. Install Tool J-24319 and remove ball joint stud from knuckle (figure 13).
10. Remove bolts from lower control arm to frame and remove torsion bar.
11. Push inboard on drive axle and pull outward on knuckle to gain clearance, then remove lower control arm from knuckle.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

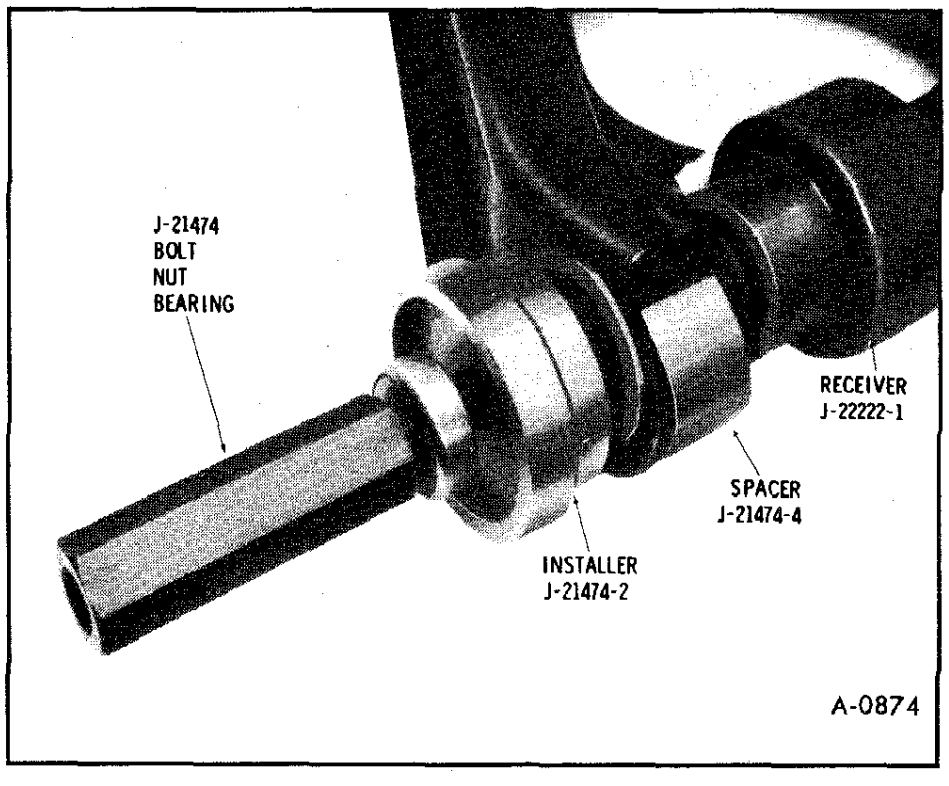


Figure 16—Installing Upper Control Arm Bushing

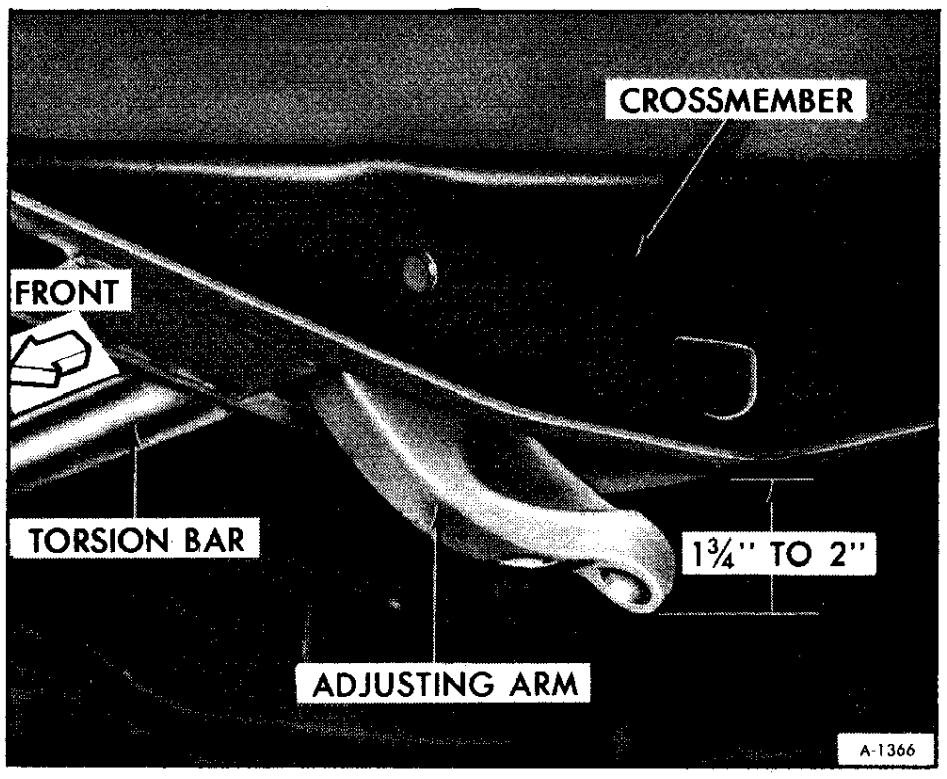


Figure 17—Positioning of Adjusting Arm

1. Install lower control arm. Make sure that shock absorber is guided onto lower control arm shock absorber mount and drive axle is positioned in knuckle. Guide ball joint stud into knuckle. Install but do not torque stud nut. See Specifications at the end of this section for installation procedure.

2. Install lower control arm to frame bracket bolts. Install nuts and torque. See Specifications at the end of this section for torque values.

3. Torque lower ball joint stud nut. See Specifications at the end of the section for torque value and procedure.

4. Install shock absorber nut, and torque. Install stabilizer link and torque nut. Install drive axle nut and torque. See Specifications at the end of this section for torque values.

5. Apply a liberal amount of chassis grease to both ends and place front end of torsion bar into control arm. Push torsion bar all the way forward into the control arm.

6. Insert adjusting arm into the crossmember and position approximately 1 3/4" below the centerline of the crossmember (see figure 17). Slide torsion bar rearward until it is flush with the rear face of the adjusting arm.

NOTE: There must be 3/16" to 1/4" clearance between the rear end of the torsion bar and the rear inside face of support crossmember.

7. Reposition Tool J-22517-02 making sure pin of tool is in hole in crossmember. Turn center screw of Tool J-22517-02 until adjusting arm is in position to allow installation of the adjusting nut.

8. Apply a liberal amount of chassis grease and install adjusting bolt. Tighten as necessary to obtain original ride height. (Check number of turns previously recorded).

9. Turn center screw until torsion is relaxed and remove tool.

10. Install wheel and secure with eight stud nuts. Refer to Maintenance Manual X-7525, Sec. 10 for torque values and tightening sequence. Lower vehicle.

11. Check ride height and adjust if necessary. Refer to RIDE HEIGHT, Sec. 3A, Maintenance Manual X-7525.

LOWER CONTROL ARM BUSHINGS

NOTE: Lower control arm bushings are no longer serviced separately. If bushings are worn and need replacement, it is now necessary to install entire right or left hand lower control arm assembly as needed.

BALL JOINT

Ball joint lubrication and seal inspection is important. Refer to Section 0, Maintenance Manual X-7525 for maintenance intervals.

BALL JOINT CHECKS

VERTICAL CHECKS

1. Raise the vehicle and position floor stands under the left and right lower control arms as near as possible to each lower ball joint. Vehicle must be stable and should not rock on the floor stands. Lower front hoist.

Figure 18—Ball Joint Vertical Check

2. Position dial indicator as shown in figure 18.

3. Place pry bar as shown in figure 19 and pry down on bar. Care must be used so that drive axle seal is not damaged. Reading must not exceed .125".

LOWER CONTROL ARM BALL JOINT

NOTE: Lower control arm ball joints are no longer serviced separately. If ball joints are worn, it is now necessary to install entire right or left hand lower control arm.

UPPER CONTROL ARM BALL JOINT

REMOVAL

1. Hoist vehicle under lower control arms and remove wheel.
2. Remove cotter pin and nut from upper ball joint stud.
3. Disconnect brake hose clip from upper ball joint stud.
4. Using hammer and a brass drift similar to figure 11, drive on spindle until upper ball joint stud is disengaged from spindle.
5. Raise control arm up and drill rivets with a 1/8" drill bit 3/8" deep.

NOTE: It may be necessary to use a block of wood between frame and control arm for support.

6. Drill off rivets using a 1/2" drill bit. Do not drill into control arm.
7. Using a punch, drive out rivets and remove ball joint.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

1. Install service ball joint into control arm (bolts must be installed from top side). Torque nuts (4). See Specifications at the end of this section for torque value.
2. Install service ball joint into knuckle. See Specifications at the end of this section for procedure. Do not torque at this time. Position brake hose clip over stud.
3. Install ball joint stud nut. Torque nut. See Specifications at the end of this section for torque value and procedure.

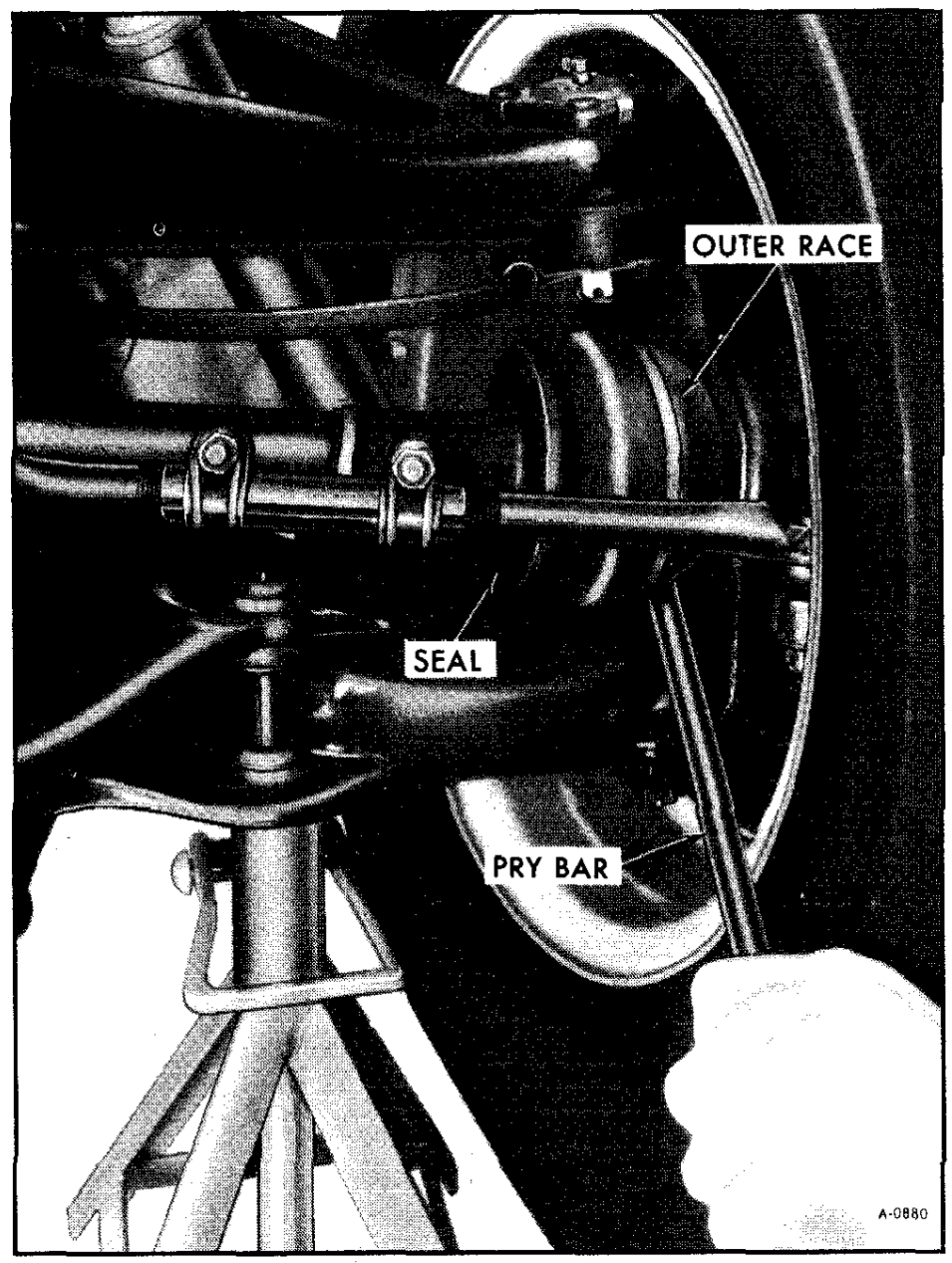


Figure 19—Pry Bar Installation

CAUTION: *Cotter pin must be bent up to prevent interference with outer C. V. Joint Seal.*

4. Install wheel and lower hoist.

STABILIZER BAR

REMOVAL

1. Remove link bolts, nuts, grommets, spacers and retainers from lower control arm. Discard bolts.
2. Remove bracket-to-frame attaching bolts and remove stabilizer bar from front of vehicle.

INSTALLATION

See CAUTION on Page 3A-1 of this section.

To install, reverse removal procedure.

NOTE: New link nuts must be torqued, then bolt cut off 1/4" below nut. See Specifications at the end of this section for torque value.

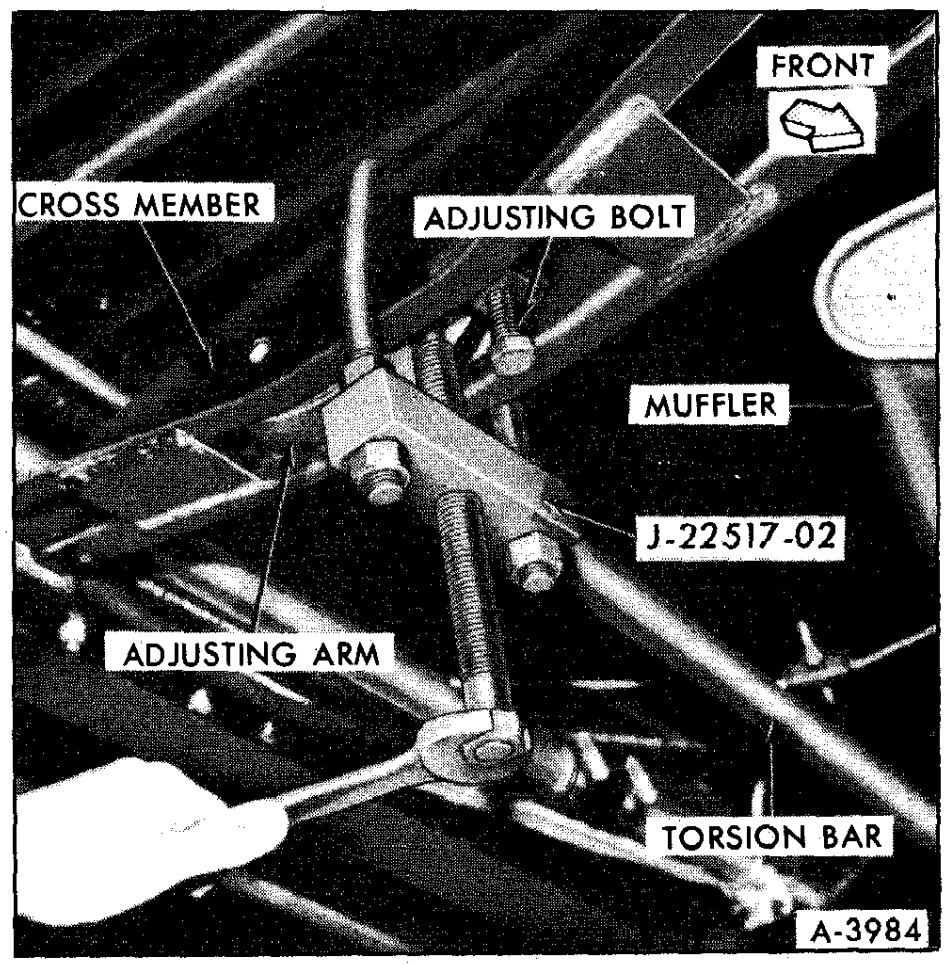


Figure 20—Removing Torsion Bar

SHOCK ABSORBER

(Refer to Figure 1)

REMOVAL

1. Raise vehicle. Place a safety stand under and firmly against the lower control arm.

CAUTION: *This must be done to prevent the lower control arm from shifting and damaging the tie rod.*

2. Remove wheel.
3. Remove upper shock attaching bolt.
4. Remove lower shock attaching nut and carefully guide shock through upper control arm.

INSTALLATION

1. Guide shock absorber through upper control arm and onto lower shock mounting stud.
2. Extend shock towards upper mount as necessary and install bolt and nut. Torque upper mounting nut. See Specifications at the end of this section for torque value.
3. Install lower shock mounting nut and torque. See Specifications at the end of this section for torque value.
4. Install wheel and wheel stud nuts finger tight.
5. Remove safety stands and lower vehicle. Torque wheel nuts. See Sec. 10, Maintenance Manual X-7525 for torque value and tightening sequence.

TORSION BAR AND/OR CROSSMEMBER SUPPORT

REMOVAL

1. Raise vehicle on a two-post hoist.
2. Remove two nuts and center screw from Tool J-22517-02. Position tool over crossmember, installing pin of tool into hole in crossmember. Install two nuts on tool, install counter screw. Grease center screw threads and the rounded end of the screw with chassis grease.
3. Turn center screw until seated in dimple of torsion bar adjusting arm. See figure 20.
4. Remove torsion bar adjusting bolt and nut. Count the number of turns necessary to remove and record.

NOTE: The number of turns necessary to remove the adjusting bolt will be used when installing to obtain the original ride height.

5. Turn center screw of Tool J-22517-02 until torsion bar is completely relaxed.
6. Remove Tool J-22517-02.
7. Repeat steps 2, 3, 4, 5 and 6 on opposite torsion bar.
8. Remove bolts and retainer from torsion bar crossmember at frame (figure 1).
9. Disconnect exhaust pipe hanger from crossmember and loosen pipe saddle and "U" clamp. Slide hanger backward.
10. Move crossmember rearward until torsion bars are free and adjusting arms are removed.
11. Move torsion bar crossmember sideways to the extreme left. Move crossmember upward and outward until opposite end clears exhaust pipe.
12. Remove torsion bars. Mark accordingly to insure proper installation.

INSTALLATION

1. Install torsion bars. New torsion bars are stamped on one end with an "R" for right or an "L" for left side. Apply a liberal amount of chassis grease to both ends.
2. Install crossmember insulators on the crossmembers.
3. Install crossmember and position approximately two inches rearward of its normal position.
4. Raise torsion bars and align with hole in crossmember. Move crossmember forward so torsion bars rest on edge of hole.
5. Insert torsion bar adjusting arm into crossmember. Position so the arm will engage the torsion bar and the end of the arm will be approximately 1 3/4" below the centerline of

the crossmember. (Refer to figure 17.). Tap crossmember forward enough to engage bar into arm.

6. Repeat step 5 for the other side of the vehicle.

7. Position crossmember to its normal position. Torsion bars should be through and flush with rear face of the adjusting arm. If torsion bar is not flush with rear face of adjusting arm, repeat steps 5 and 6 after pulling torsion bar slightly out from the lower control arm.

NOTE: There must always be 3/16" to 1/4" clearance between the rear end of the torsion bar and the rear inside face of support crossmember.

8. Install torsion bar retainer over each insulator on crossmember support. Torque nuts (torsion bar retainer bolt nuts). (See figure 1.) See Specifications at the end of this section for torque value.

9. Reposition and connect exhaust pipe hanger to crossmember and tighten saddle and "U" clamp. Torque U-clamp bolt nuts. See Specifications at the end of this section for torque value.

10. Position Tool J-22517-02 over crossmember, installing pin of tool into hole in crossmember. Install two nuts on tool, install center screw.

11. Turn center screw until adjusting arm is in a position to allow installation of adjusting nut. See figure 20.

12. Install nut and turn adjusting bolt the recorded number of turns to obtain previous ride height.

13. Turn center screw until torsion is completely relaxed. Remove tool and repeat steps 10, 11, 12, 13 on the opposite side.

14. Lower hoist.

15. If ride height requires adjustment, refer to "RIDE HEIGHT," Sec. 3A, Maintenance Manual X-7525.

ALIGNMENT AND RIDE HEIGHT

RIDE HEIGHT

When checking front ride height, have the vehicle parked on a known level surface, and tire pressure at specified psi.

NOTE: For details on adjusting rear ride height refer to Section 4, REAR SUSPENSION. If vehicle is equipped with the optional Electro-Level System, be sure power level control switches for right and left hand side of vehicle are in "OFF" position. Set center switch to "TRAVEL AUTO" position prior to adjusting front ride height.

Measurements must be taken from the top of oval hole in the frame rail to the floor (figure 21).

NOTE: Never attempt to increase the ride height of the vehicle using the adjusting bolt only (figure 22). The bolt will turn but will strip threads and will necessitate replacement of the bolt. Always use special tool.

RIDE HEIGHT ADJUSTMENT (Figure 21)

NOTE: Tool J-22517-02 (shown in figure 20) must be used the reset ride height. This tool will raise or lower the torsion bar rear anchor arm so that the adjusting bolt in not loaded.

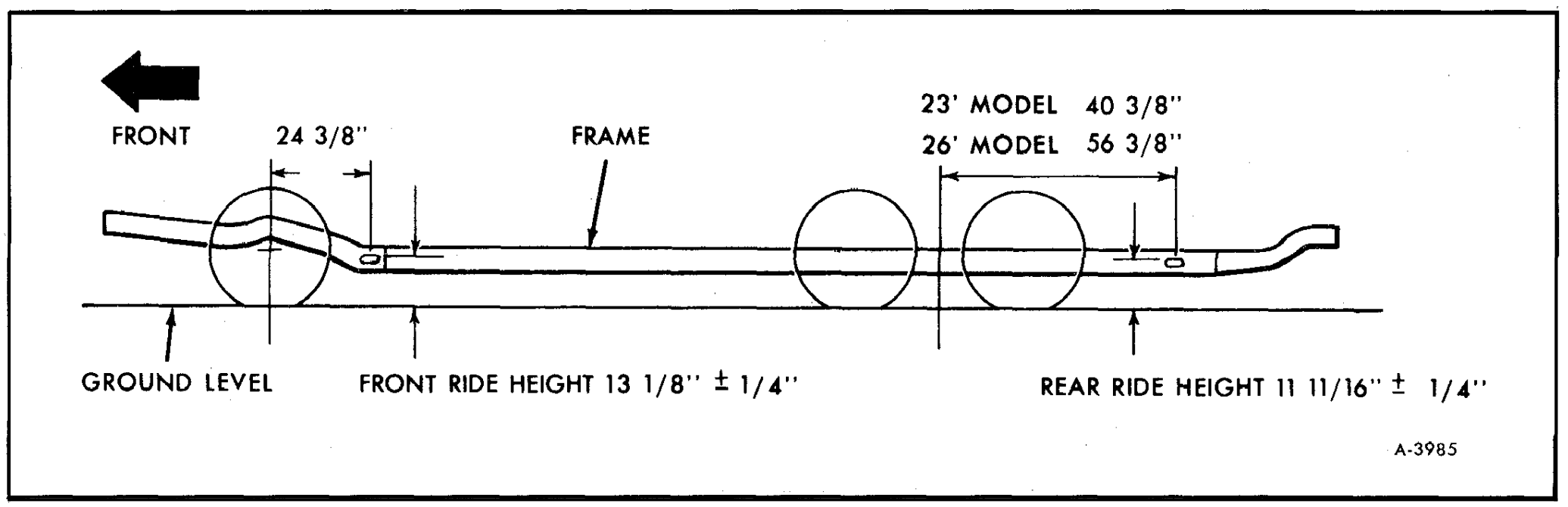


Figure 21—Vehicle Ride Height

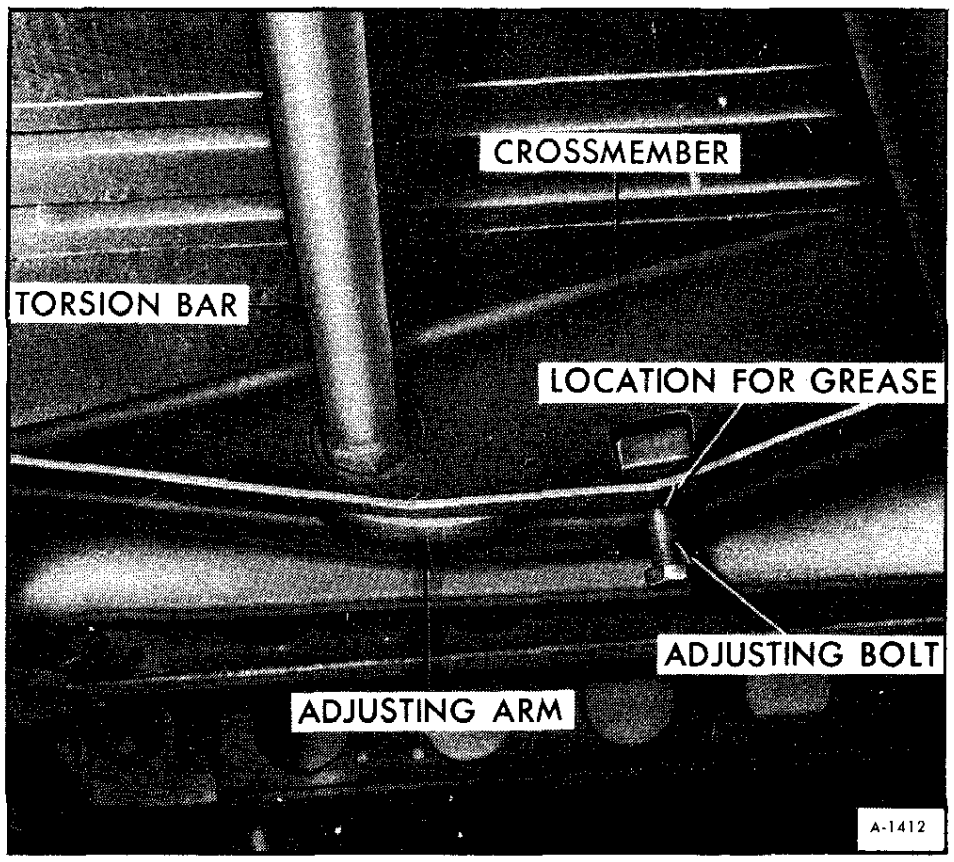


Figure 22—Location for Front Ride Height Adjustment

1. Install Tool J-22517-02 with pin of tool aligned into hole in crossmember. Seat center screw in dimple of torsion bar adjusting arm.
2. If vehicle must be raised, turn tool until proper adjustment level is reached, then turn the adjusting bolt until it makes contact with the adjusting arm. Remove tool.
3. If vehicle is to be lowered, raise adjusting arm from contact with adjusting bolt. Lower bolt, then lower arm with tool until proper ride height level is reached. Raise bolt to contact adjustment arm. Remove tool.

FRONT END ALIGNMENT

	Check	Set
Caster	+1-1/2° to + 2-1/2°	+ 2°
Camber—L.H.. .	+ 1/2° to 1°	+ 3/4°
Camber—R.H.. .	+ 1/4° to 3/4°	+ 1/2°
Toe	0 to -1/4" (toe out)	-1/8" (toe out)

Make adjustments as required. Refer to "ALIGNMENT ADJUSTMENT" below.

ALIGNMENT ADJUSTMENT

Camber

1. Loosen nuts on inboard side of upper control arm cam bolts. (figure 1).
2. Turn front cam bolt (inboard or outboard) to correct for 1/2 of incorrect setting found in checking.
3. Turn rear cam bolt (same way front bolt was turned) to correct for remaining 1/2 of incorrect setting found in checking.

Example:

Camber Reading (Checking)..... + 1-1/4°
Amount To Be Corrected..... 1/2°

1/2 of 1/2° = 1/4° Front Cam Bolt
Remaining 1/4° Rear Cam Bolt

4. Tighten upper control arm cam nuts (front and rear). Torque to Specifications while holding bolts with back-up wrench so that camber is not changed. See Specifications listed at the end of this section. Check caster; do not reset unless caster exceeds specifications.

NOTE: Check cam adjustment surface for weld splatter. Weld splatter in this area will affect front end alignment. Remove weld splatter if found.

Caster

1. Loosen front and rear cam nuts while holding bolts with back-up wrench so that camber is not changed.
2. Turn front cam bolt so that camber changes 1/4 of the desired amount of caster to be corrected.

Example:

Caster Reading (Checking).....+5°
Amount To Be Corrected.....3°
1/4 of 3° = 3/4° Front Cam Bolt

3. Turn rear cam bolt so that camber now returns to corrected setting.
4. Recheck caster setting.

This is a location to start from and a correct setting can be obtained with the above procedure.

NOTE: Torque upper control arm cam nuts to Specifications listed at the end of this section. Hold head of bolt securely; any movement of the cam will effect the final setting and caster-camber adjustment must be rechecked.

Toe-In Adjustment

1. Loosen the clamp bolts at each end of the steering tie rod adjustable sleeves. Tie rod assembly must be decreased in length in order to increase toe-in.

NOTE: Tie rod adjuster components often become rusted in service. In such cases, it is recommended that if the torque required to remove the nut from the bolt (after breakaway) exceeds 7 ft. lbs., discard the nuts and bolts. Apply penetrating oil between the clamp and tube and rotate the clamps until they move freely. Install new bolts and nuts to assure proper clamping at the specified nut torque. (Refer to figure 23.)

2. With steering wheel set in straight ahead position, turn tie rod adjusting sleeves to obtain the proper toe-in adjustment at curb load.

3. When adjustment has been completed according to the recommended specifications, check to see that the number of threads showing on each end of sleeve are equal and that the tie rod end housings are at right angles to steering arm. Position inner and outer tie rod clamps as shown in figure 23. Torque nuts to specifications listed at the end of this section.

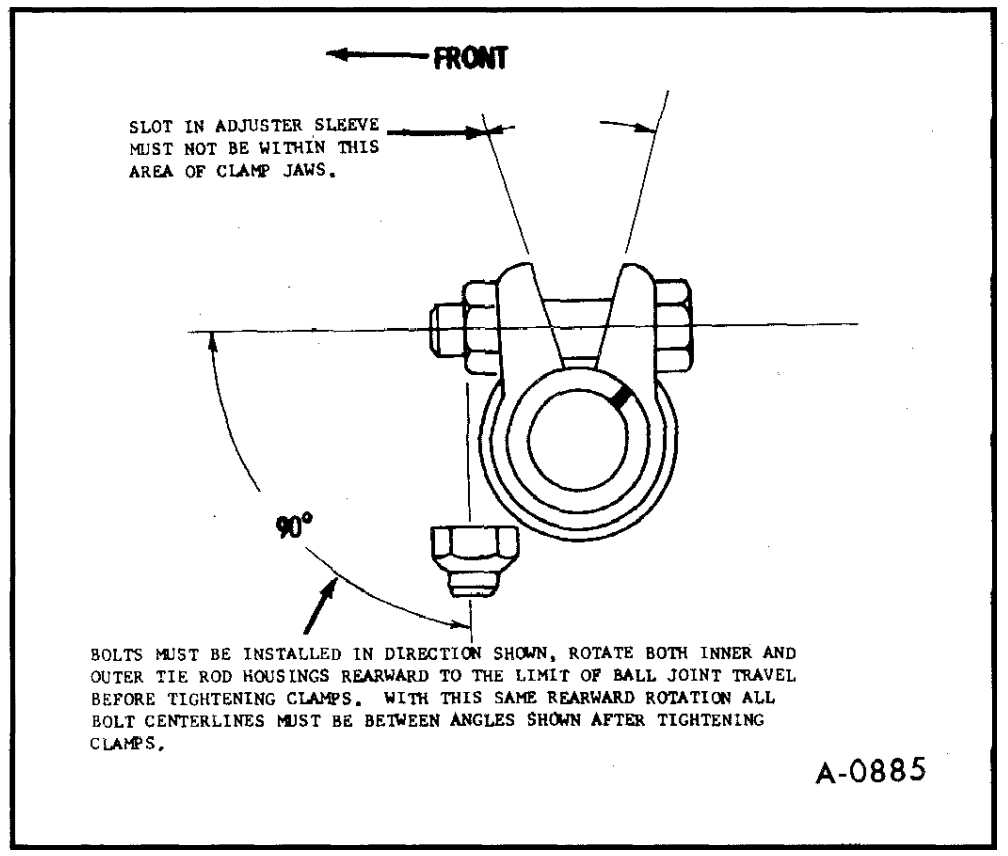


Figure 23—Positioning Tie Rod Clamp

TORQUE SPECIFICATIONS

APPLICATION	IN. LBS.
Exhaust "U" Clamp Bolts (2) (nut torque)	95 - 150
Exhaust Mounting Bracket to Crossmember Bolts (4) (nut torque)	95 - 120

APPLICATION	FT. LBS.
Bearing Retainer to Knuckle Bolts (3)	35
Drive Axle Nut *	110 - 140 (Do not exceed 280 ft. lbs.)
Disc to Hub Bolts (4)	35
Stabilizer Link Nut	10 - 15
Stabilizer Bracket to Frame Screw	20 - 28
Torsion Bar	
Retainer Bolts (2) (nut torque)	8 - 12
Crossmember Support Bracket to Frame Bolts (3) (nut torque)	25 - 30
Tie Rod to Knuckle Nut *	40 - 50
Tie Rod Clamp Nuts (2)	19 - 24
Shock Absorber	
Upper Attaching Bolt (nut torque)	80 - 95
Lower Attaching Bolt (nut torque)	80 - 95
Upper Control Arm Ball Joint to Control Arm Bolts (4) (nut torque)	20
Upper Control Arm to Frame Bracket Bolts (2) (cam nut toruqe)	80 - 95
Lower Control Arm to Frame Bracket Bolts (2) (nut torque)	75 - 85

TORQUE SPECIFICATIONS (Cont'd)

APPLICATION	FT. LBS.
Ball Joint Stud Nut - Lower*	40 - 60
Ball Joint Stud Nut - Upper *	100 - 125

NOTE: All stud tapers on all ball joints must be kept sufficiently free of lubricant to prevent excessive pull in mating tapered holes.

***NOTE:** After reaching minimum torque required, nut must always be tightened to inset cotter pin. Never back nut off.

SPECIAL TOOLS

J-2619-01	Slide Hammer
J-8433-1	Puller Bar
J-9745	Front Hub Bearing Installer
J-21474-3-4-5	Control Arm Bushing Remover and Installer
J-22214-4-6	Front Hub Bearing Screw and Adapter
J-26559	Front Wheel Bearing Puller Ring
J-22269	Brake Caliper Collapser
J-22517-02	Torsion Bar Unloader
J-24319-01	Ball Joint, Pitman Arm and Idler Arm Puller
J-24717	Front Hub Puller
J-26485	Knuckle Seal Installer
J-22585-01	Front Hub Retainer Bolt Wrench
J-5504-01	Wheel Stud Remover

SECTION 4

REAR SUSPENSION

The information described in Maintenance Manual X-7525 under the heading REAR SUSPENSION (SEC. 4) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

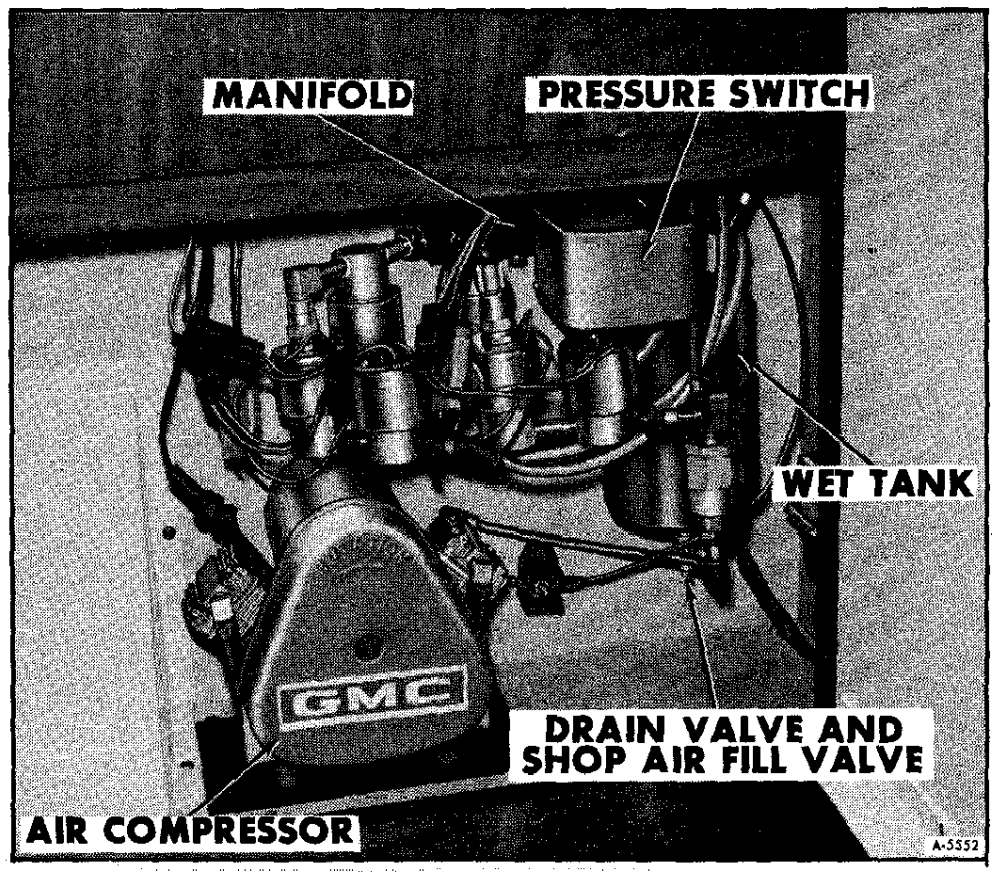


Figure 1—Air Suspension Control Components (Typical) (Model ZEO6581)

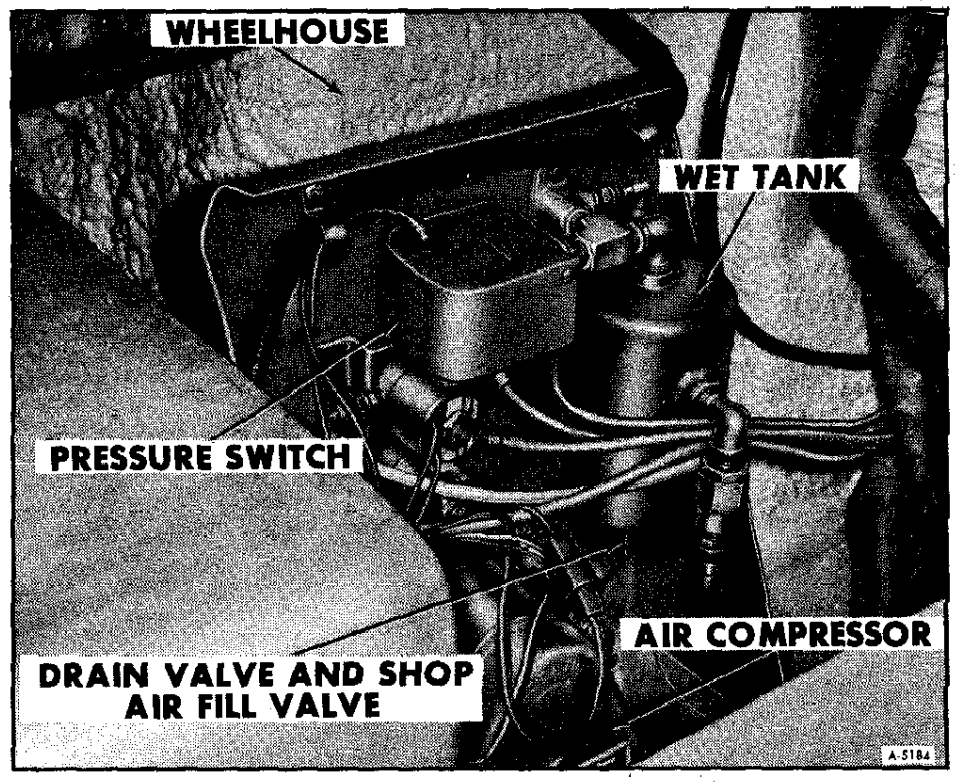


Figure 2—"TWIN BED" Air Suspension Control Components (Typical) (Model ZEO6582)

GENERAL DESCRIPTION

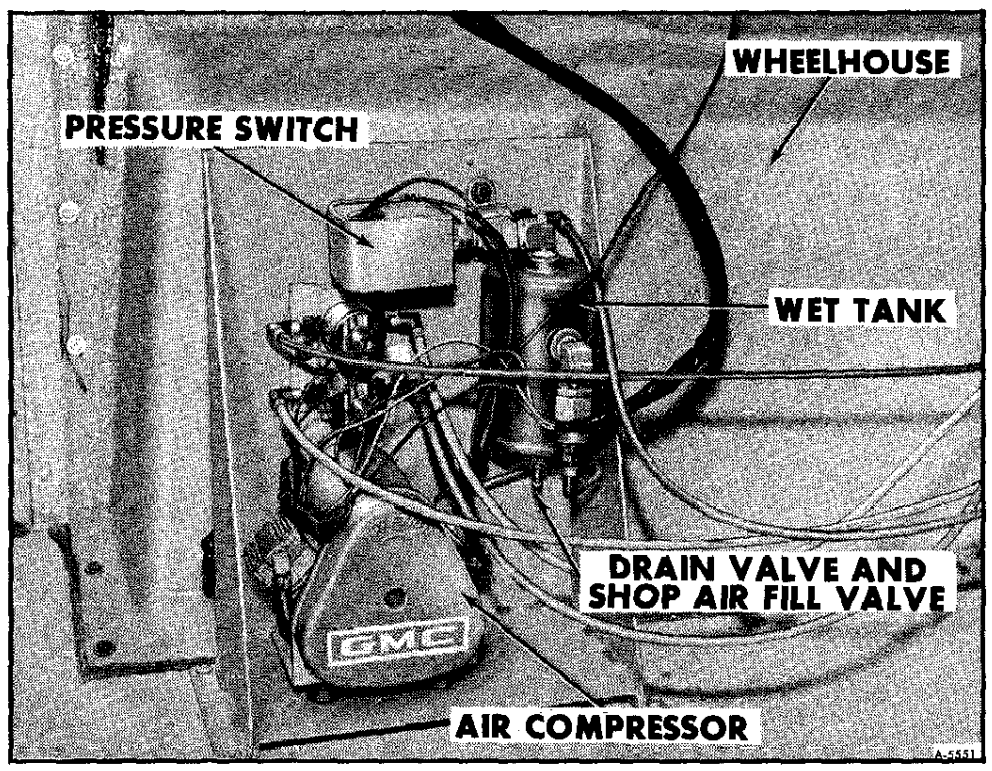


Figure 3—TRANSMODE Air Suspension Control Components, (Typical) (Models ZEO6083, ZEO6583)

There are two types of rear air suspension systems available in the Motorhome and TransMode vehicles — the standard system and the Electro-Level system (optional). The standard suspension system operates automatically as vehicle load varies to retain frame at proper ride height. The optional Electro-Level system provides the ability to raise or lower the rear of the vehicle approximately four inches from normal ride height.

The rear suspension system on the vehicle consists of air bellows, shock absorbers, control arms and height control valves. Control components — air compressor, wet tank, solenoid valves and pressure switch — are positioned in a control module. This module is located in the closet of Motorhome model ZEO6581 (figure 1), beneath the left rear twin bed in Motorhome model ZEO6582 (figure 2), and in front of the left rear wheelhousing in TransMode models ZEO6083 and ZEO6583 (figure 3).

SYSTEM OPERATION

STANDARD REAR SUSPENSION SYSTEM

As stated, the standard suspension system operates automatically as vehicle load varies to retain frame at proper ride height. Compressed air flows to and from the air bellow as determined by the height control valves.

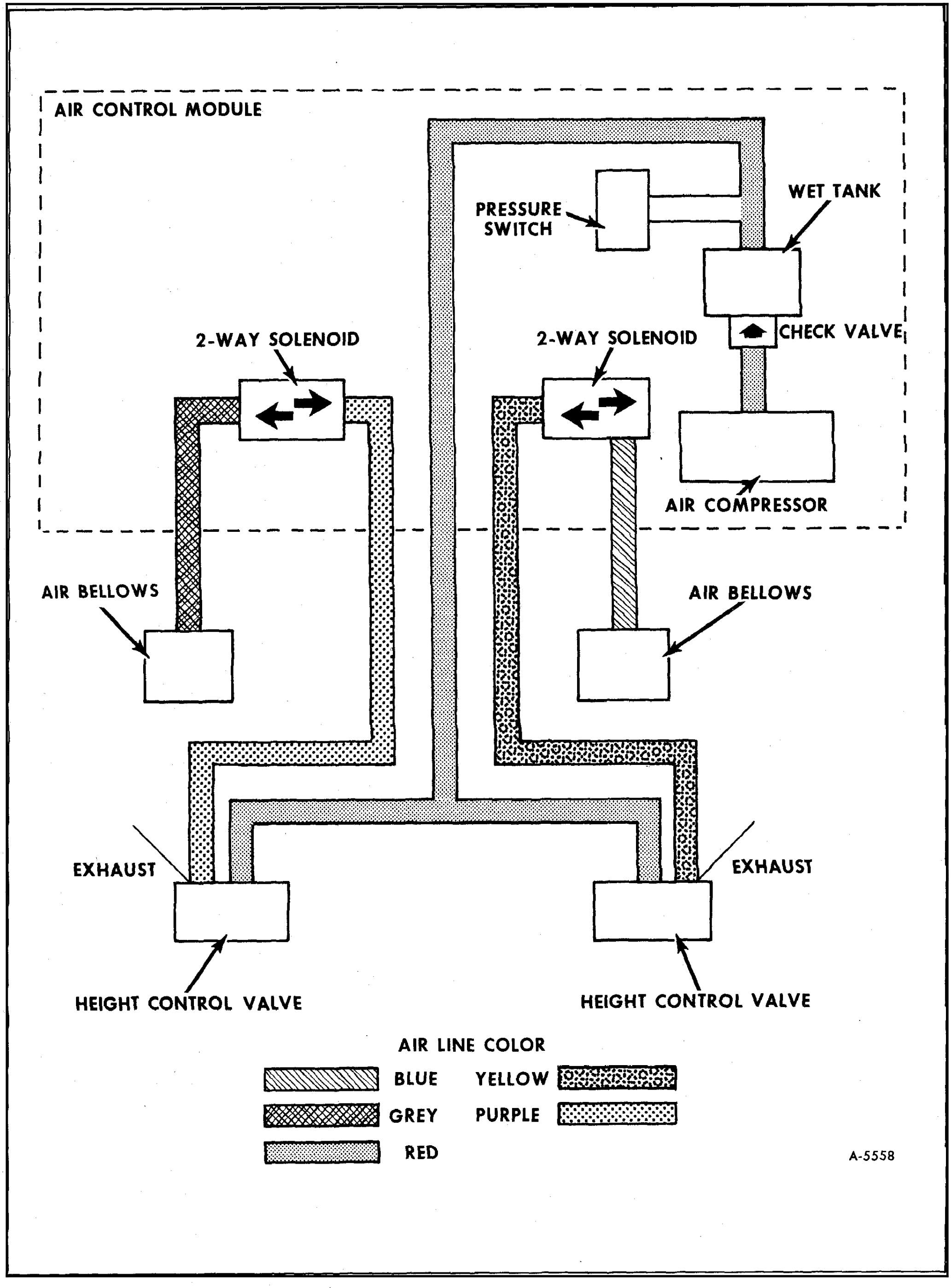
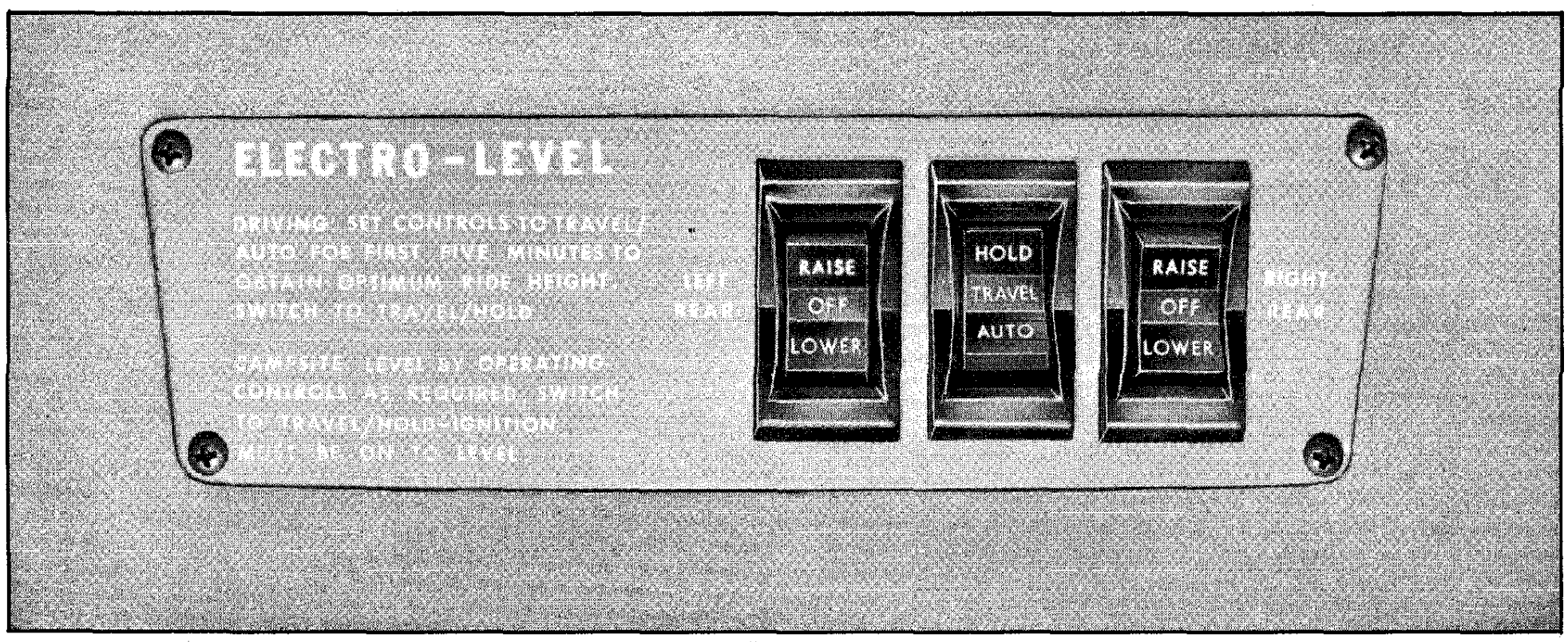


Figure 4—Standard Air Suspension System Schematic



A-6051

Figure 5—Electro-Level Controls

AIR FLOW (Refer to Figure 4)

The air flow in this system is controlled by two components: the height control valves (bolted to the wheel wells and linked to the control arm) and two 2-way normally closed solenoid valves (located in the air suspension control module). These electrically actuated air valves, when closed or de-energized, block air flow in either direction. This helps to maintain proper ride height with a minimum possibility of leak down.

When the ignition key is turned to the "ON" or "ACCESSORY" position, these valves are electrically energized, allowing positive air flow in either direction (ie., into or out of the bellows). The demand for air is "read" by the height control valves, which move up and down with the frame as ride height varies.

However, these valves will allow air into or out of the bellows only when a change in vehicle load causes actuation of the valve inlet or exhaust cores. Road bumps and irregularities move the HC valves within a free travel range, without adding or releasing compressed air to the system.

ELECTRO-LEVEL REAR SUSPENSION

The optional Electro-Level System provides the ability to raise or lower the rear of the vehicle approximately four inches from normal ride height. The control components and the physical system on the vehicle are the same as those on the standard system, with the addition of four 3-way solenoid valves.

The Electro-Level Controls are mounted on the lower dash panel to the right of the steering wheel (figure 5). The controls consist of three rocker switches that automatically or manually level the vehicle. Figure 6 is a schematic of the Electro-Level controls.

SWITCHES

The two RAISE-LOWER switches are used as necessary to raise or lower the rear of the vehicle (as when parked on surface that is not level). Engine need not be running to operate the system in either of these modes. However, the ignition switch must be in the "ON" or "ACCESSORY" position.

The center TRAVEL switch has two positions— TRAVEL HOLD and TRAVEL AUTO.

TRAVEL HOLD is the switch position to be used for normal highway driving. This mode allows the vehicle to maintain a designed ride height and eliminates unnecessary operation of the air compressor. TRAVEL AUTO is the position to be used to "ready" the vehicle for highway driving after it has been parked in a raised or lowered position. This leveling of the vehicle will take place in the first five minutes with the rocker switch in TRAVEL AUTO *position.*

AIR FLOW (Refer to Figure 7)

The air flow in the system (to or from the air bellows) is controlled by switch position on the Electro-Level control panel.

When the center switch is placed in TRAVEL AUTO, only the two-way solenoids "E" and "F" are open, i.e., energized. If air is needed in the system, this mode will allow air to flow from the compressor through the height control valve and further through solenoids "A", "C" and "E" on the left side to the bellows. On

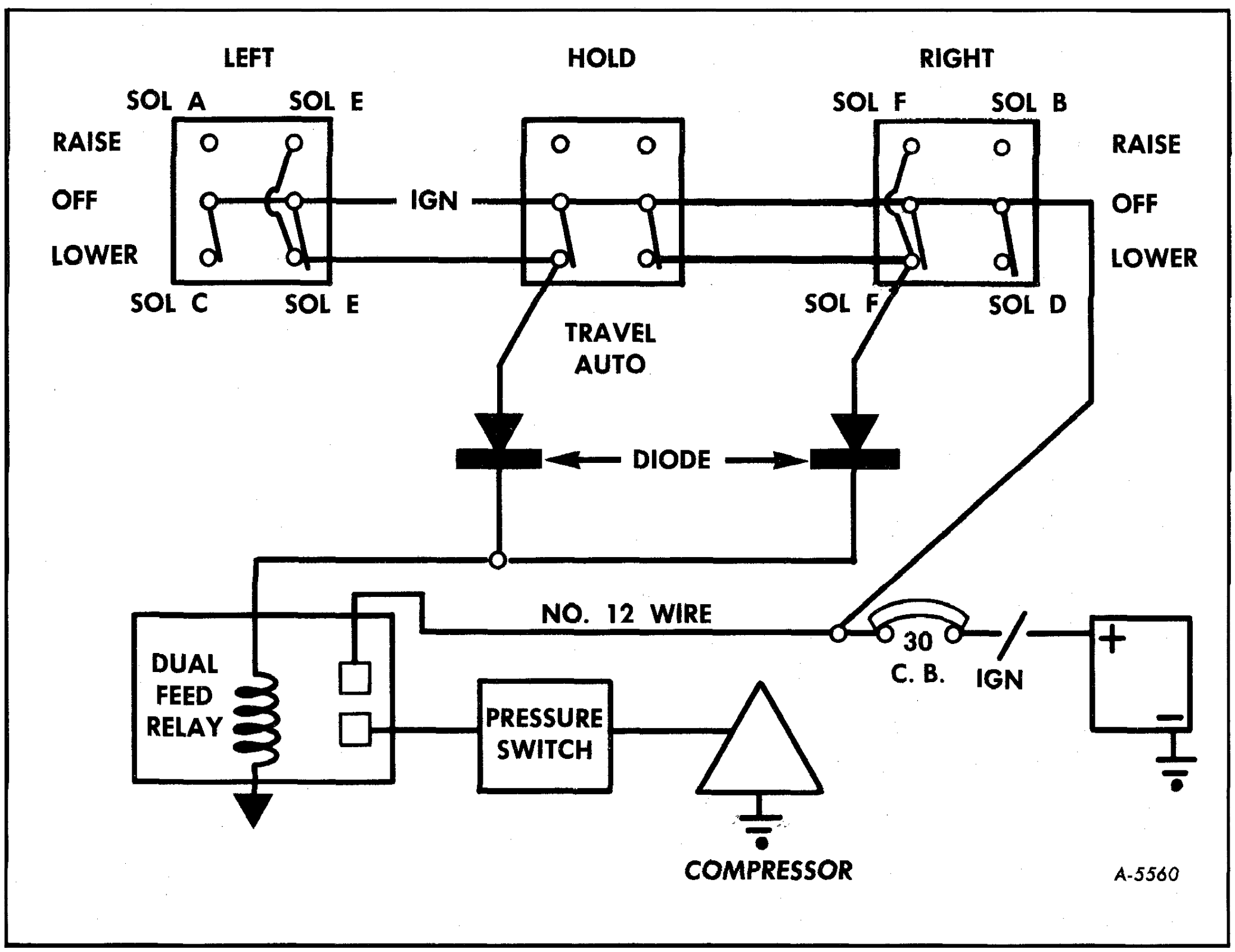


Figure 6—Electro-Level Controls Schematic

the right side, air will flow through solenoids "B", "D" and "F" to the bellows. The air flow can occur because the 3-way solenoids ("A", "B", "C", "D") will allow air to pass from the No. 3 port to the No. 2 port even though they are not electrically actuated. This is the normal air flow of these valves when they are de-energized.

When leveling requires pressure to be released from the system, TRAVEL AUTO position allows the necessary air flow from the bellows through the appropriate solenoids to the exhaust fitting at the height control valve. Two-way solenoids "E" and "F" are energized for this demand. Three-way solenoids "A", "B", "C" and "D" are de-energized yet will allow air to pass from the No. 2 to the No. 3 port.

When the vehicle is moving, the center switch should be in TRAVEL HOLD position, (with the RAISE-LOWER switches in "OFF"). In this mode the 2-way solenoids "E" and "F" are closed (i.e., de-energized), trapping air in the bellows and isolating them from the rest of the system. This means the only possible areas of leakage will be the bellows themselves, the fittings at the solenoids, or the air line running between. The same air flow situation exists when the vehicle is parked and the key is in "OFF".

When the vehicle is in RAISE position, air flow is different. Solenoids "A" and/or "B" are electrically actuated. System pressure no longer goes through these valves from the No. 3 port to the No. 2 port. Instead, this passage within each valve is blocked and air must flow from the No. 1 to the No. 2 port. This means that the height control valve is now taken "OUT" of the system. Air moving through solenoids "A" or "B" is regulated only by the rocker switch on the dash panel. Air flow will continue through solenoids "C" and "E" to the left side bellows or "D" and "F" to the right side bellows. In this mode, the two-way solenoids "E" and "F" are energized also.

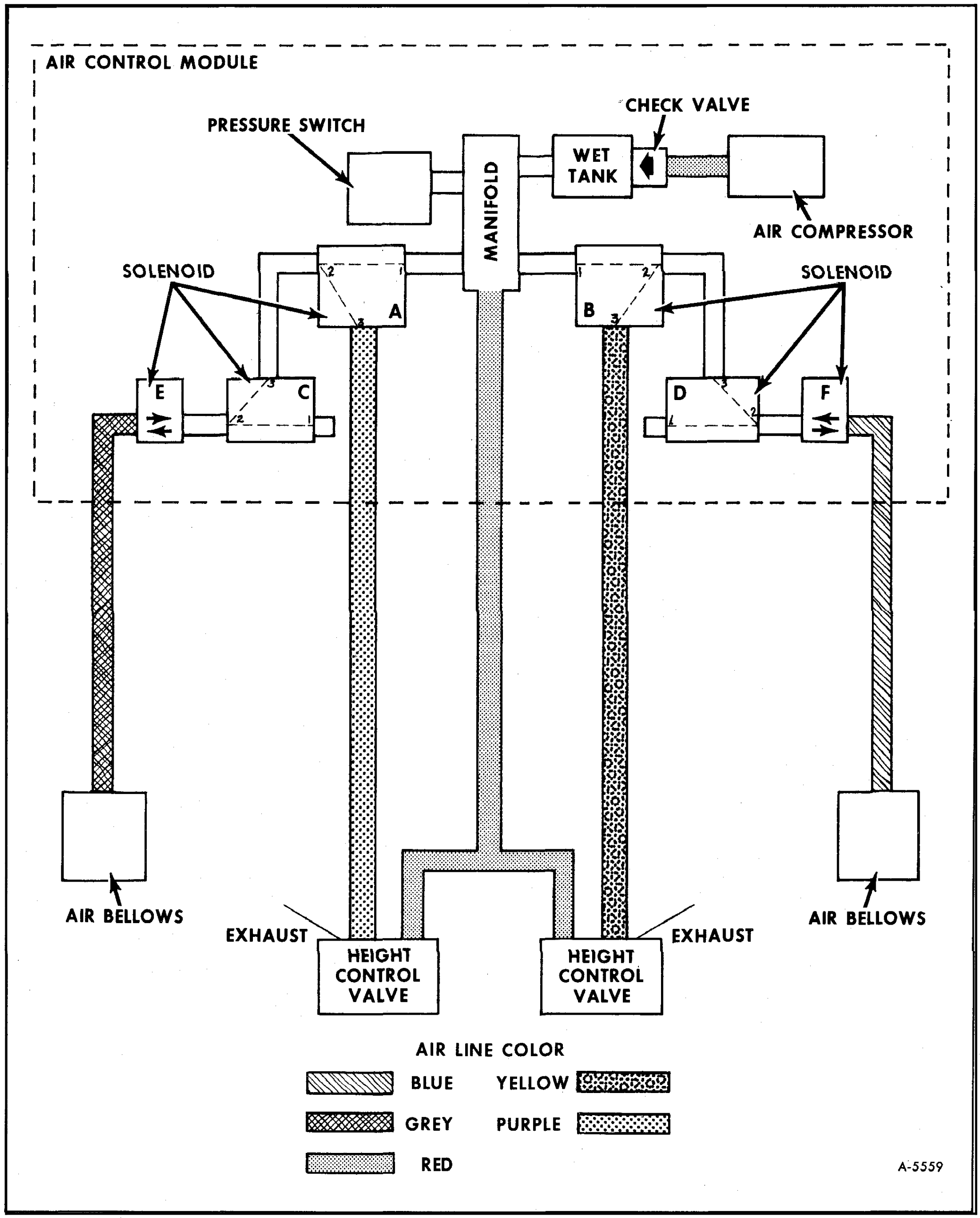


Figure 7—Electro-Level Air Suspension System Schematic

To lower the system, the RAISE-LOWER switch on the dash will be set in the LOWER position (right or left hand side, or both). With both RAISE-LOWER switches in LOWER, solenoids "C" and "D" are energized. This causes the normal passage of air between the No. 3

port and the No. 2 port to be blocked. Air flows instead from the bellows through open solenoids "E" and "F", and then from the No. 2 to the No. 1 (exhaust) ports in solenoids "C" and "D". Thus the vehicle ride height lowers by the release of air to the atmosphere through the exhaust ports of the "LOWER" solenoids.

SYSTEM COMPONENTS

AIR BELLOWS

The air bellows for the tandem rear wheels are mounted between the control arms. On each side of the air bellows is a piston which is connected directly to the control arm.

The air bellows serve as a flexible connection between the two control arms on each side of suspension bracket. The flexing of the air bellows allows the control arms to move up and down in relation to the frame. This action absorbs road shocks in the same manner as an inflated rubber tire cushions shock caused by road roughness.

SHOCK ABSORBERS

A double acting shock absorber is used at each wheel on the rear suspension. The shocks are mounted to the top of the control arms and to the frame at the bottom.

The shock absorbers are gas filled cell-type shocks. They are filled with a calibrated amount of fluid and sealed during production. They are non-adjustable, non-refillable and cannot be disassembled. The only service they require is replacement if they have lost their resistance, are damaged or leaking fluid.

HEIGHT CONTROL VALVE

(Refer to Figure 8)

Height control valve automatically maintains a constant vehicle height by controlling the flow of compressed air into or out of suspension system air bellows. A delay piston in each valve provides a momentary delay in intake and exhaust valve action. Therefore, air in bellows is exhausted only during load changes and not during intermittent road bumps.

The height control valve contains an intake valve, air bellows outlet, exhaust valve, delay piston, and overtravel control body. The overtravel control body contains a spring-loaded nylon piston which protects valve parts if overtravel lever is moved beyond normal operating range.

HEIGHT CONTROL VALVE OPERATION-(FIGURE - 9)

Loading

When vehicle is being loaded, frame tends to settle. Since valve is linked to control arm, and valve is bolted to wheel well, valve moves downward with frame as vehicle is loaded. As valve arm and control shaft turns, a force is applied to the delay piston which moves slowly and allows the intake valve lever to move against the intake valve core. As pin is pushed in, air pressure flows through height control valve into bellows. Increased air pressure expands the bellows and raises frame.

Inlet valve is "PROTECTED" by check valve in inlet adapter. Light spring in core freely admits reservoir air, but return flow of air is blocked.

Neutral Position

As increased air pressure expands bellows and lifts frame, the height control valve moves upward with frame. As frame is returning to normal ride height, valve arm and shaft return to a neutral position. Inlet valve lever also moves away from inlet valve core and inlet valve closes. This stops the flow of the air into bellows. The exhaust valve remains closed. Since the exhaust valve is closed, and the check valve in the inlet adapter prevents compressed air from returning to air reservoir, air is trapped in bellows and in valve. No

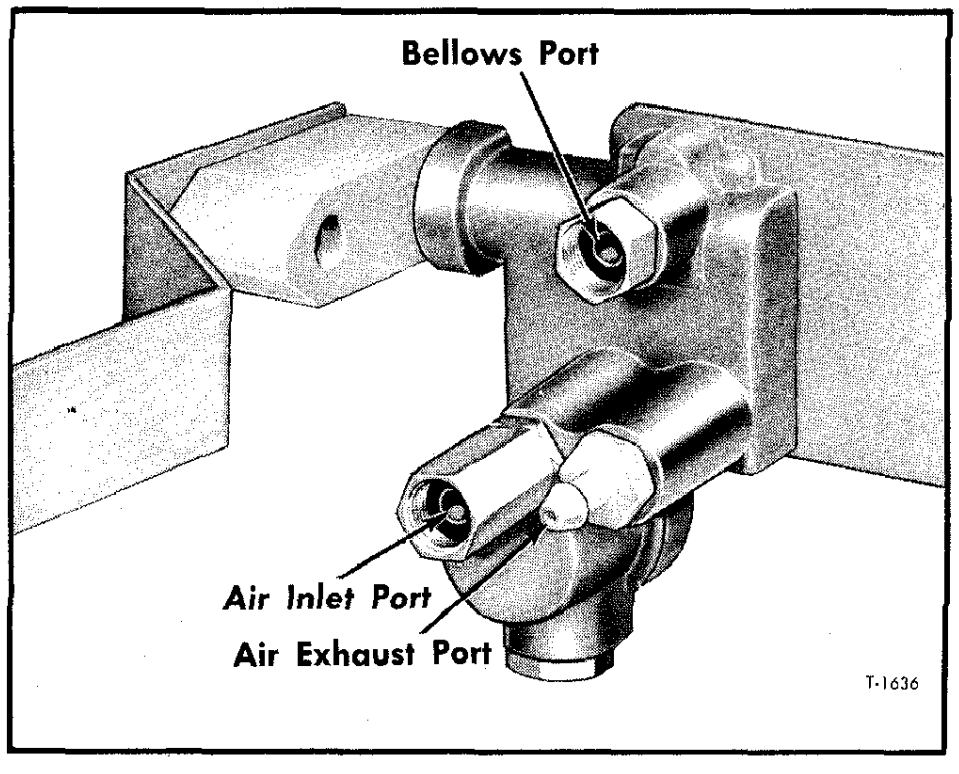


Figure 8—Height Control Valve (Port Identification)

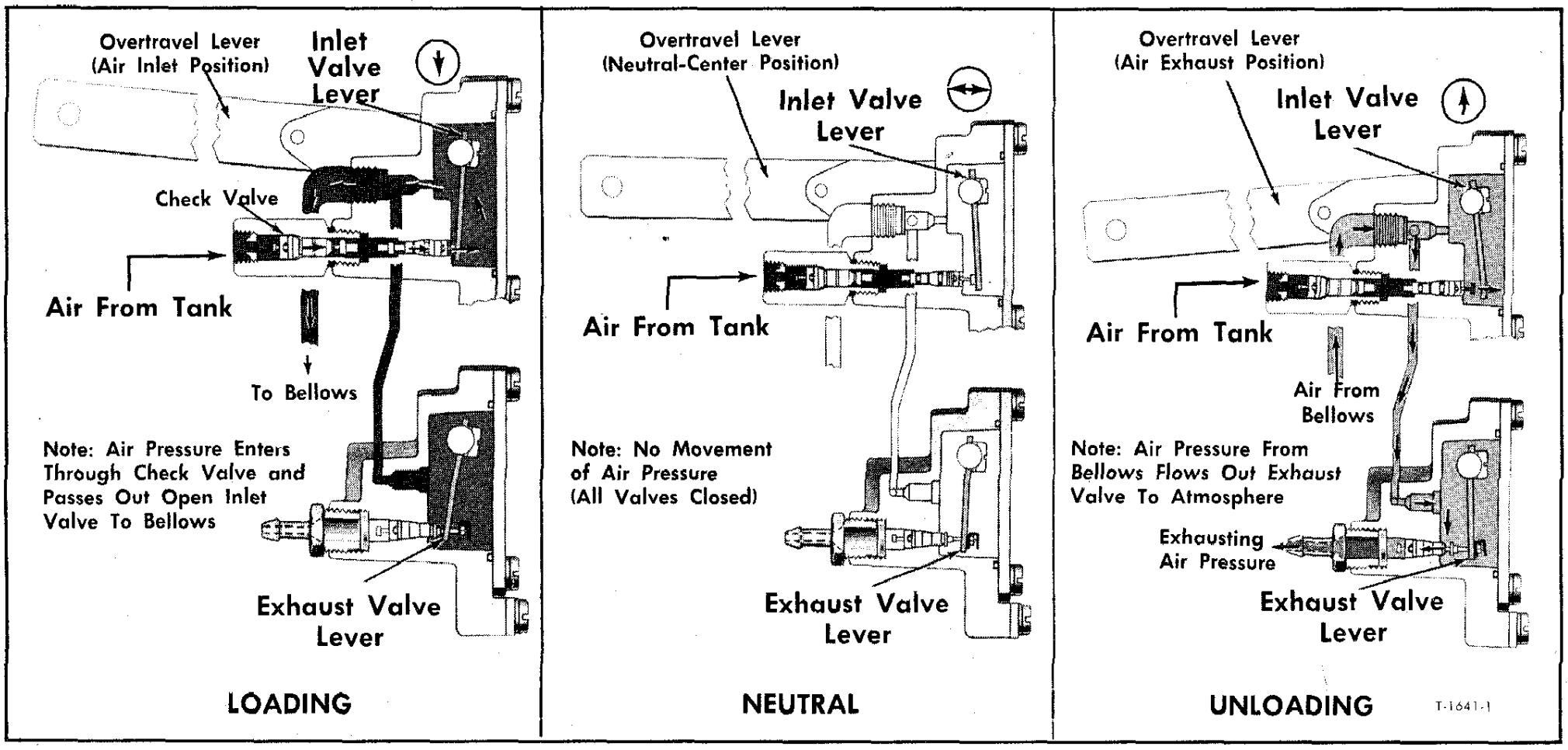


Figure 9—Operation of Height Control Valve

further valve action or air pressure change takes place until load is increased or decreased, moving valve arm out of neutral position for four seconds or more to actuate intake valve or exhaust valve.

Unloading

When part of load is removed, air pressure in bellows lifts frame. Valve arm, linked to axle, is pulled downward from neutral position. This applies a force on the delay piston, which moves it slowly. The exhaust valve lever moves with the delay piston. The outer end of exhaust valve lever fits around stem of exhaust valve core. As soon as lever moves beyond free-travel range, lever pulls on stem and opens exhaust valve. Inlet valve remains closed. Compressed air from bellows then flows through the open exhaust valve and out exhaust fitting to atmosphere. As the compressed air is exhausted from bellows, the frame lowers until overtravel lever and shaft are again in normal (neutral) position.

Valve Arm Free Travel

With vehicle in motion and frame at normal ride height, control valve arm and shaft are in neutral position. Small irregularities in road cause slight up and down movement of valve arm. Clearances are provided between operating levers and cores of inlet and exhaust valves, to permit 1/4-inch up or down movement of valve arm from neutral position without causing valve action. This compensates for small road bumps. The bumps are absorbed by tires and bellows without causing movement of compressed air either into or out of suspension system.

Hydraulic Delaying Action

Operation of delay piston in height control valve prevents change of bellows air pressure as a result of momentary road shocks, conserves air supply, and adds life to valve. The nylon piston moves inside cylinder containing a silicone type fluid. A flapper valve on either end of piston allows displacement of fluid or acts as a check valve, depending on direction piston moves. Delay piston is moved by piston pin that is threaded into overtravel shaft. A 4 to 18 second delay results from the closing of one valve to the opening of other valve.

Overtravel piston is held against flat side of overtravel shaft by two springs inside piston. Piston keeps overtravel shaft in proper position relative to valve arm. Piston also allows valve arm to rotate through a complete circle, if necessary, without damaging parts inside valve.

AIR COMPRESSOR

Compressed air for the system is supplied by an electric compressor which operates when the ignition key is in the "ON" or "ACCESSORY" position. It is a demand-type compressor which will start compressing air when the pressure in the system drops below 100 psi, and will shut off when the pressure reaches 120 psi.

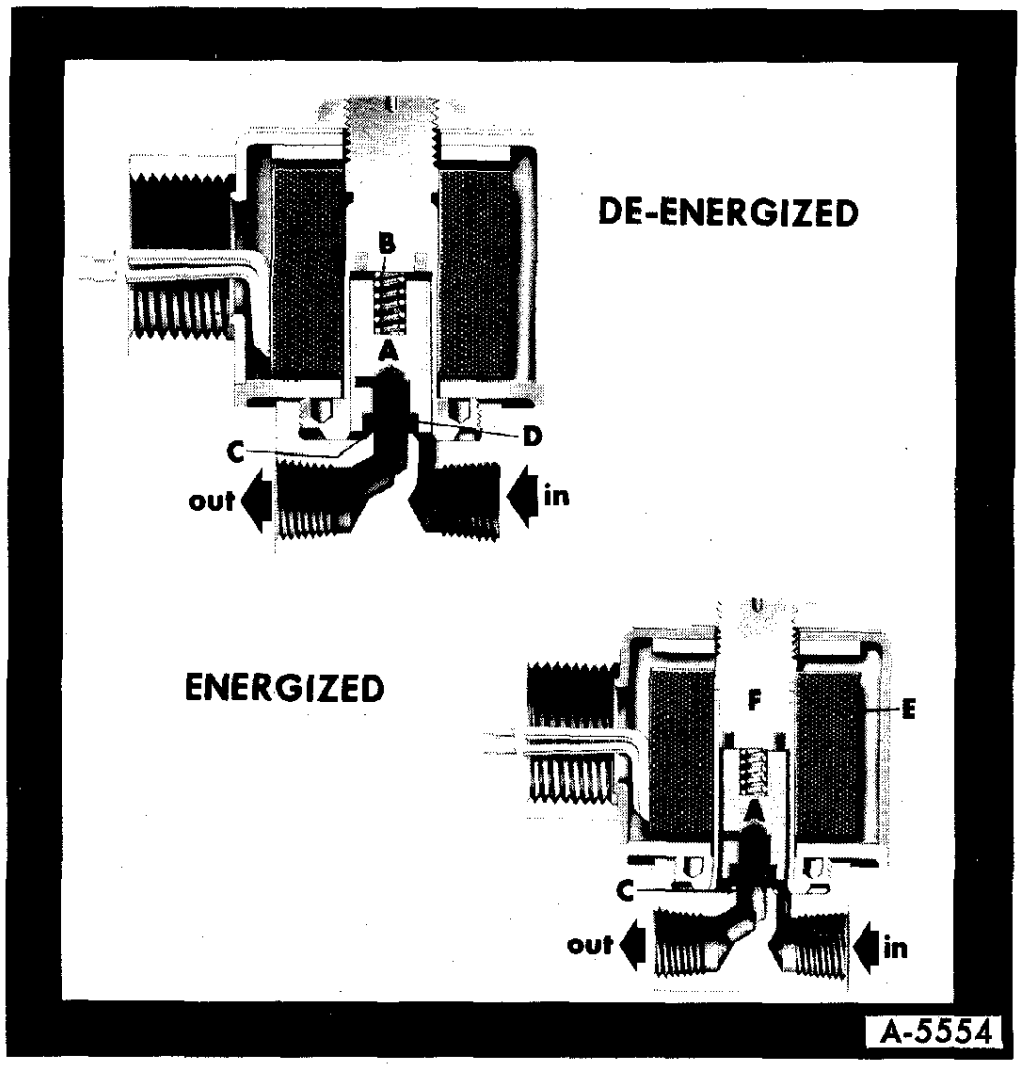


Figure 10—Two-Way Normally Closed Solenoid Valve

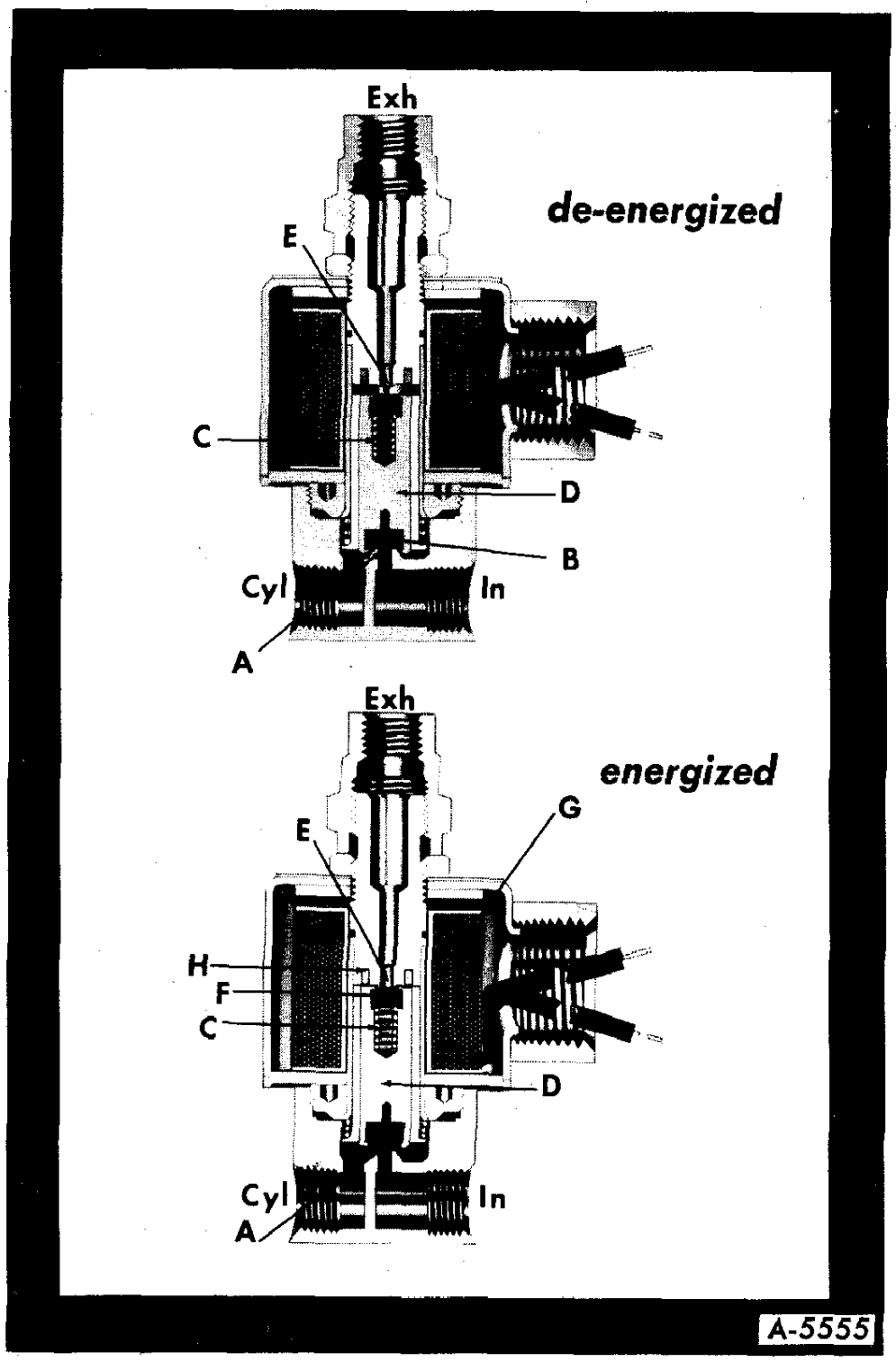


Figure 11—Three-Way Solenoid Valve

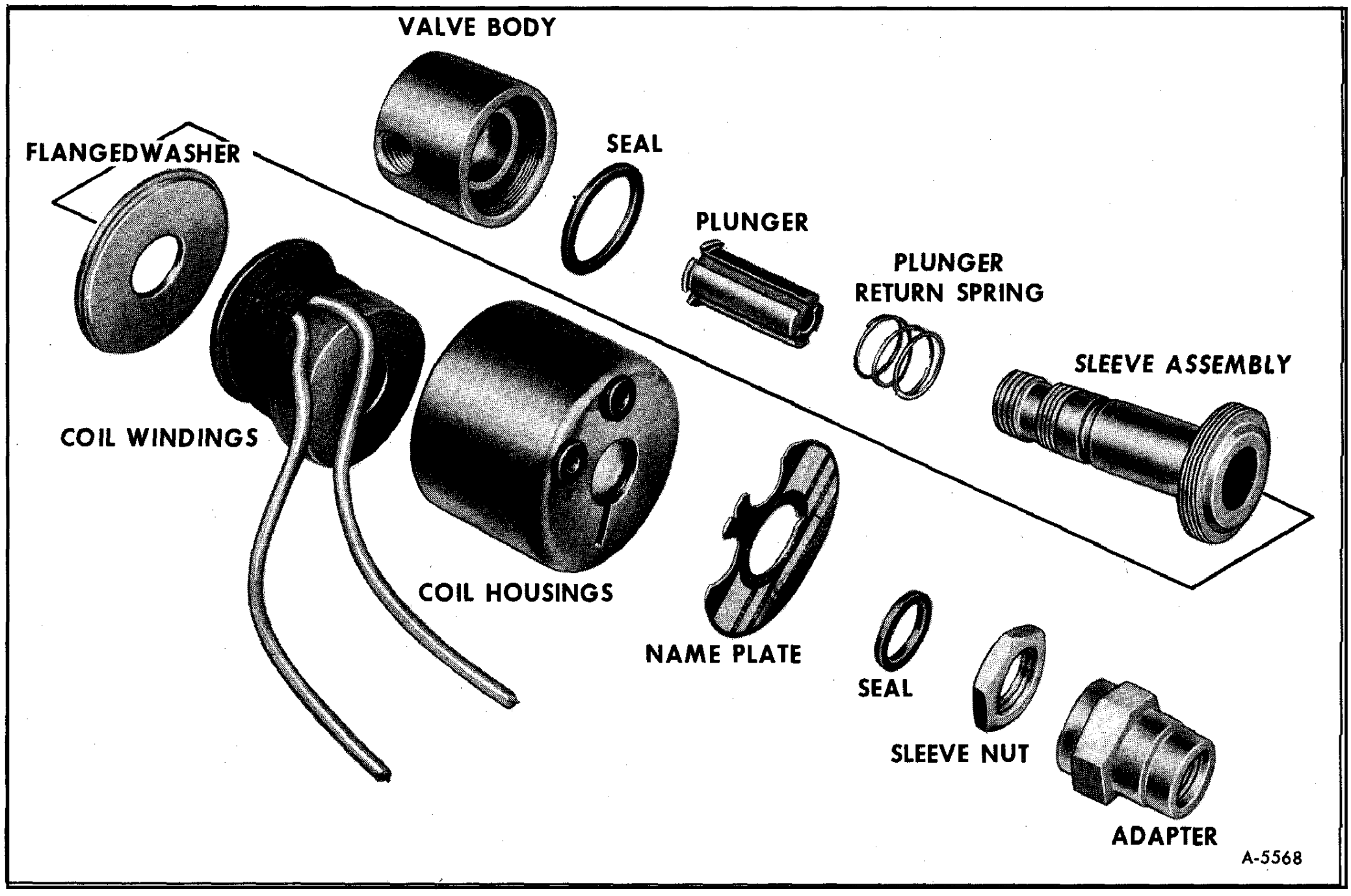


Figure 12—Exploded View of Solenoid Valve

WET TANK

The purpose of the wet tank (or air tank) is to provide a place where the air, heated during compression, can cool and water vapor can condense. A drain and shop air fill valve is located at the bottom of the tank. The wet tank should be drained at 3-month or 3,000-mile intervals, or more often if above normal air compressor operation is encountered.

PRESSURE SWITCH

The air pressure switch is designed to maintain air pressure in the wet tank between 100 and 120 psi. Switch activates at 100 psi and opens at 120 psi.

SOLENOID VALVES

Air flow in the rear suspension system is electrically controlled by two solenoid air valves on the standard system and four additional solenoid air valves on the optional Electro-Level System. The two valves on the standard system are two-way, normally closed valves. The four additional solenoid valves are three-way multipurpose valves plumbed to function either as a three-way normally closed valve or a three-way directional control valve.

TWO-WAY NORMALLY CLOSED SOLENOID VALVE —a valve in which the single orifice is closed in the de-energized position and no flow can exist between the inlet and the outlet ports (figure 10).

THREE-WAY VALVE—a valve that has 2 orifices and three ports. One orifice is always open when the other is closed and one port is always open to one of the other two ports. Flow is controlled by electrically opening or closing either of the two orifices (figure 11).

PRINCIPLES OF OPERATION

The solenoid valve is an electromagnet so arranged that when current is applied to the coil (when the valve is "energized") the plunger either opens or seals an orifice, therby controlling the flow of air. An exploded view of a typical solenoid valve is shown in figure 12.

The solenoid valve has two basic functional parts: a solenoid coil and a plunger or armature. The coil surrounds the plunger which has a soft synthetic seal at one end.

The valve body has an orifice which is sealed by the insert in the plunger. The orifice is opened or closed by the movement of the plunger. The coil causes the plunger to move when the coil is energized. When the coil is de-energized the plunger is returned to its original position by means of a spring.

The only moving parts of the valve are the plunger and the spring which are enclosed in the sleeve assembly. This arrangment within the sleeve is referred to as an internal solenoid. The plunger closes the negative circuit of the coil by coming into "face to face" contact with the stop. The stop, magnetic steel, is welded to a nonmagnetic steel tube which is welded to a magnetic stainless steel flange to make up the sleeve assembly. The "face to face" design permits the plunger to be spring loaded for positive operation regardless of valve mounting position.

TROUBLE DIAGNOSIS

AIR COMPRESSOR TROUBLE DIAGNOSIS CHART

(Refer to Figures 4 and 7)

PROBLEM	POSSIBLE CAUSE	CORRECTION
COMPRESSOR NOT OPERATING. NO AIR PRESSURE.	1. Open circuit breaker. (Circuit breaker is located behind glove box door.) 2. Faulty wiring. (Compressor feed at ground wire not connected.) 3. Low battery. 4. Faulty or pitted contacts on pressure switch. 5. Motor has developed an open circuit. 6. Defective diode. (Electro-Level option only.) 7. Defective relay.	1. Find cause of circuit breaker being open and correct it. 2. Check to see that wiring is intact. 3. The compressor runs off the automotive battery. Check battery condition and correct as necessary. 4. Replace pressure switch. 5. Motor brushes or commutator worn out. Replace motor. 6. Replace diode assembly in wiring harness. (See figure 17.) 7. Replace relay.
COMPRESSOR OPERATES. NO AIR PRESSURE.	1. Leak in air system. 2. Compressor valve seat or valve spring worn or broken. 3. Piston rings are worn—air leaks heavily at rings. 4. Pressure switch not properly adjusted.	1. Eliminate air leaks in system as described later in this section. 2. Replace valve seat and/or valve spring. 3. Replace piston rings. 4. Adjust pressure switch settings to operate at the 100-120 psi range.
AIR PRESSURE IN SYSTEM. COMPRESSOR OPERATES ERRATICALLY—TAKES TOO LONG TO PRESSURIZE SYSTEM.	1. Air leak in system. 2. Compressor valve seat or valve spring broken or worn. 3. Piston rings are worn—air leaks heavily by rings. 4. Pressure switch contacts are pitted causing improper compressor action.	1. Eliminate air leaks in system as described later in this section. 2. Replace valve seat and/or valve spring. 3. Replace piston rings. 4. Replace pressure switch.

PROBLEM	POSSIBLE CAUSE	CORRECTION
AIR PRESSURE IN SYSTEM. COMPRESSOR OPERATES ERRATICALLY—TAKES TOO LONG TO PRESSURIZE SYSTEM.	5. Battery voltage too low to operate motor. 6. Bearing failure which causes unit to seize occasionally and break loose if galling occurs.	5. Charge battery. 6. Replace bearings or parts with bearings.
AIR LINES FROZEN UP.	1. Water in lines.	1. Drain wet tank.

ELECTRO-LEVEL CONTROLS TROUBLE DIAGNOSIS CHART

(Refer to Figure 6)

PROBLEM	POSSIBLE CAUSE	CORRECTION
COMPLETE OR PARTIAL LOSS OF AIR WITH TRAVEL SWITCH IN "HOLD".	1. Leak in air bellows. 2. Leak at air lines between bellows and solenoid. 3. Leak in 2-way solenoid.	1. Eliminate air leak. 2. Eliminate air leak. 3. Service or replace solenoid.
COMPLETE OR GRADUAL LOSS OF AIR OVERNIGHT AT CAMPSIGHT WITH IGNITION OFF.	1. Leak at air bellows. 2. Leak in air line between solenoid and bellows. 3. Leak at fitting between solenoid and air line or bellows and air line. 4. Defective 2-way solenoid valve.	1. Eliminate air leak. 2. Eliminate air leak. 3. Eliminate air leak. 4. Service or replace solenoid.
COMPLETE OR PARTIAL LOSS OF AIR WITH TRAVEL SWITCH IN "AUTO", IGNITION ON. (COMPRESSOR RUNS TOO FREQUENTLY).	1. Air leak in system. 2. Defective height control valve.	1. Eliminate air leak. Note: Vehicle should be operated with travel switch in "HOLD" position. Do not operate vehicle with travel switch in "AUTO". 2. Service or replace valve.
TRAVEL SWITCH IN "AUTO". NOTHING HAPPENS.	1. Compressor not operating. 2. Defective control switch. 3. Defective pressure switch. 4. Defective diode. 5. Defective wiring. 6. Check relay. 7. Defective solenoid valves. 8. Leak at air bellows. 9. Leak in air lines.	1. Check feed at ground wire. 2. Replace switch. 3. Replace switch. 4. Check diode. Replace as required. 5. Check wiring and electrical connections. 6. Replace relay. 7. Service or replace solenoid valves. 8. Eliminate air leak. 9. Eliminate leak.
LEFT OR RIGHT SWITCH IN "RAISE" POSITION. VEHICLE DOESN'T RAISE. COMPRESSOR RUNS.	1. Leak in air lines. 2. Solenoid valves plumbed incorrectly. (RAISE solenoids.) 3. Faulty HOLD solenoid valves. 4. Faulty RAISE solenoid.	1. Eliminate air leak. 2. Properly install solenoid valve. 3. Service or replace valves. 4. Follow bench check of solenoid. Service or replace as necessary.

PROBLEM	POSSIBLE CAUSE	CORRECTION
LEFT OR RIGHT SWITCH IN "RAISE" POSITION. VEHICLE DOESN'T RAISE. COMPRESSOR RUNS.	5. Faulty control switch. 6. Defective wiring between control switch and solenoid.	5. Replace switch. 6. Check wiring and electrical connections.
LEFT OR RIGHT SWITCH IN "RAISE" POSITION. VEHICLE DOESN'T RAISE. COMPRESSOR NOT OPERATING.	1. Open circuit in compressor motor. 2. Defective relay. 3. Open in pressure switch. 4. Battery undercharged. 5. Defective diode. 6. Defective wiring. (Compressor feed at ground wire not connected.) 7. Open circuit breaker. 8. Faulty control switch.	1. Motor brushes or commutator worn out. Replace motor. 2. Clean contacts or replace relay. 3. Pitted contacts. Replace pressure switch. 4. Charge or replace automotive battery. 5. Replace diode. 6. Check wiring and electrical connections. 7. Check for cause of open circuit breaker. Reset. 8. Replace switch.
LEFT OR RIGHT SWITCH IN "LOWER" POSITION. VEHICLE DOESN'T LOWER.	1. LOWER solenoid valves incorrectly plumbed. 2. Undercharged battery. 3. Defective wiring. 4. Open circuit breaker. 5. Defective solenoid valves. 6. Defective control switch.	1. Correctly install solenoid valves. 2. Charge or replace battery. 3. Check wiring and electrical connections. 4. Find cause for open circuit breaker. Reset. 5. Service or replace solenoid valves. 6. Replace switch.

TROUBLESHOOTING TELL-TALE WARNING LIGHT "SET LEVEL TO TRAVEL AUTO"

(Refer to Figure 13)

PROBLEM	POSSIBLE CAUSE	CORRECTION
START VEHICLE. MOVE TRANSMISSION SELECTOR LEVEL TO "DRIVE" POSITION. TELL-TALE LIGHT DOES NOT ILLUMINATE.	1. Defective bulbs (two bulbs.) 2. Defective time delay relay. 3. Defective tell-tale warning light fuse. 4. Defective wiring. 5. Defective neutral, start, B/U, and safety switch.	1. Replace light bulbs. 2. Replace thermal time-delay relay (located behind instrument panel). (Refer to figure 4, Section 12 of this manual.) 3. Replace fuse. (Fuse is located in fuse panel behind glove compartment). 4. Check wiring and electrical connections. 5. Adjust switch or replace as necessary.

PROBLEM	POSSIBLE CAUSE	CORRECTION
START VEHICLE. MOVE TRANSMISSION LEVER TO "DRIVE" POSITION. TELL-TALE LIGHT ONLY PART-IALLY ILLUMINATES	1. Defective light bulb.	1. Replace burnt out bulb.
START VEHICLE. MOVE TRANSMISSION LEVER TO "DRIVE" POSITION. TELL-TALE LIGHT REMAINS ON AFTER 10-15 SECOND DELAY.	1. Defective time-delay relay.	1. Replace relay.
START VEHICLE. TELL-TALE LIGHT INTERMITTENTLY LIGHTS WHEN MOVING TRANS-MISSION SELECTOR LEVER TO "DRIVE"	1. Defective time-delay realy. 2. Defective neutral, start, B/U and safety switch.	1. Replace relay. 2. Adjust switch or replace as necessary.

SHOCK ABSORBERS

See "FRONT SUSPENSION", Section 3A of Maintenance Manual X-7525 for trouble diagnosis of shock absorbers.

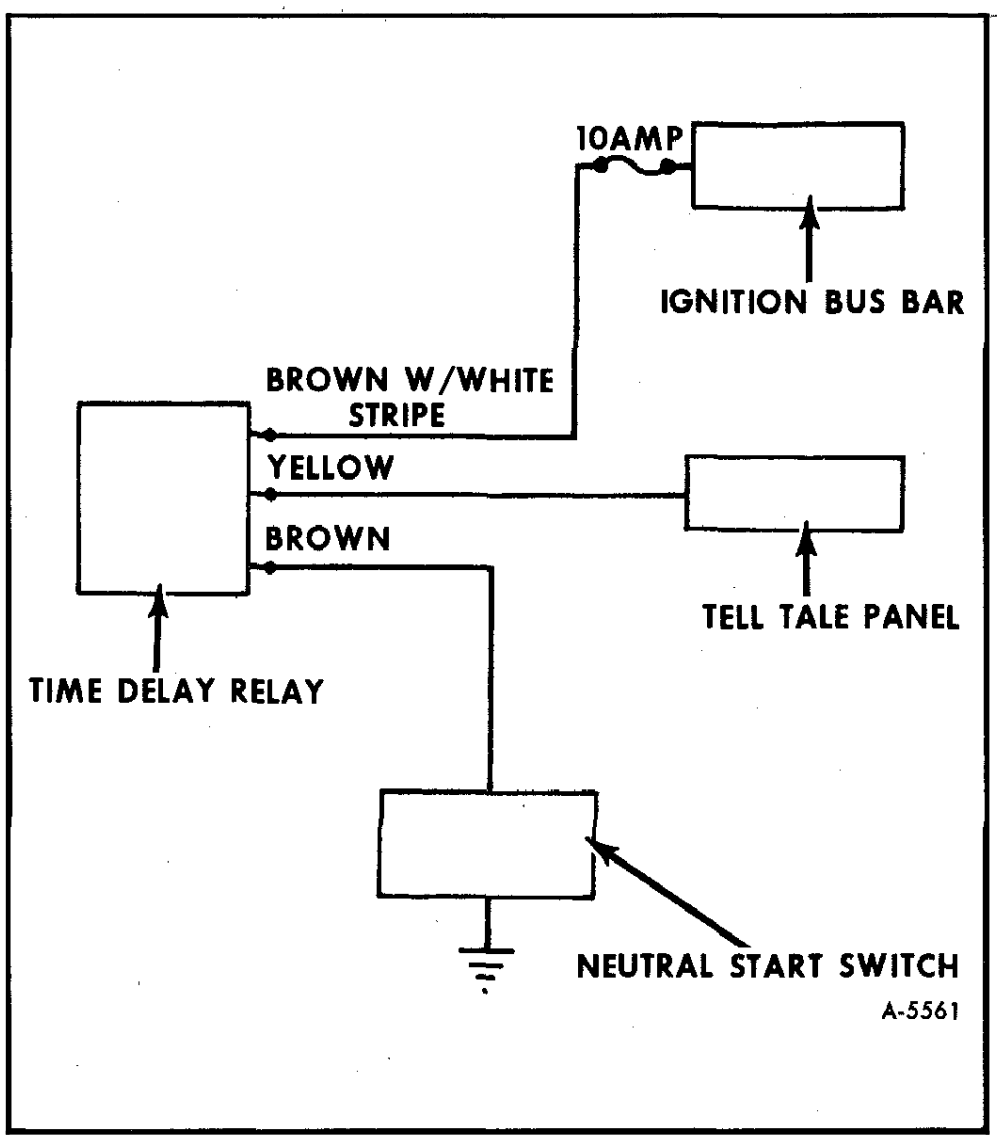


Figure 13—Tell-Tale Warning Light Schematic

AIR LEAKS

With the air system at normal operating *pressure coat all suspension air line connect*-ions with soap and water solution. Air leakage will produce soap bubbles. No leakage is permissible. Leakage at air line connections can sometimes be stopped by tightening connection. If this does not stop the leak replace the affected fittings.

1. Cut end of hose (tube) off square.
2. Place brass insert into end of tube and put appropriate fitting over it (figure 14).

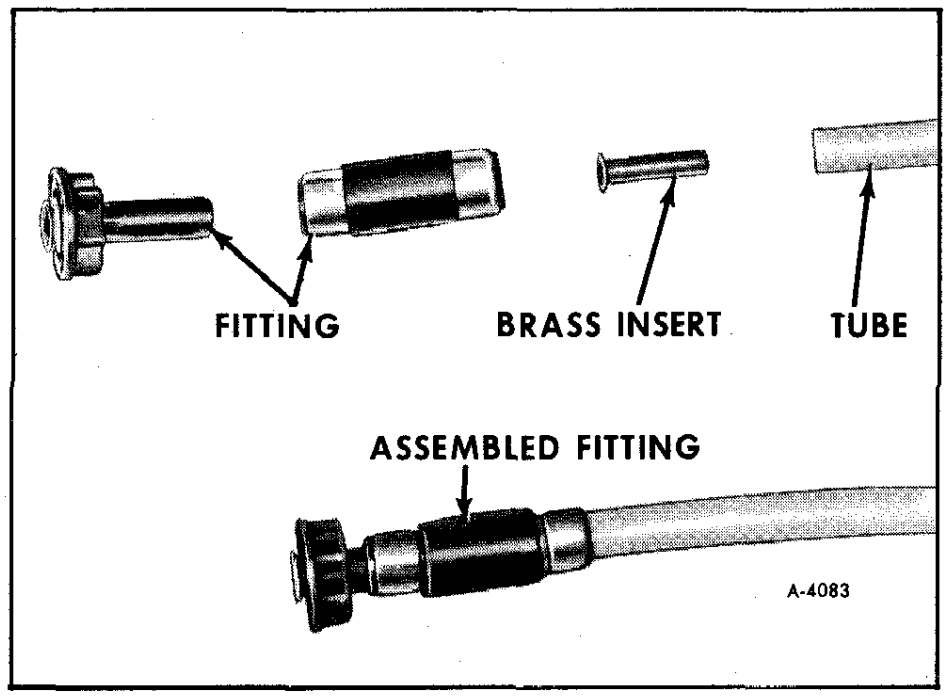


Figure 14—Coupling Assembly

3. Crimp fitting in place with Special Tool J-25520. This tool is designed so that crimp must be completed before tool will release (figure 15).

4. Air line leaks can be repaired with the coupling illustrated in figure 16.

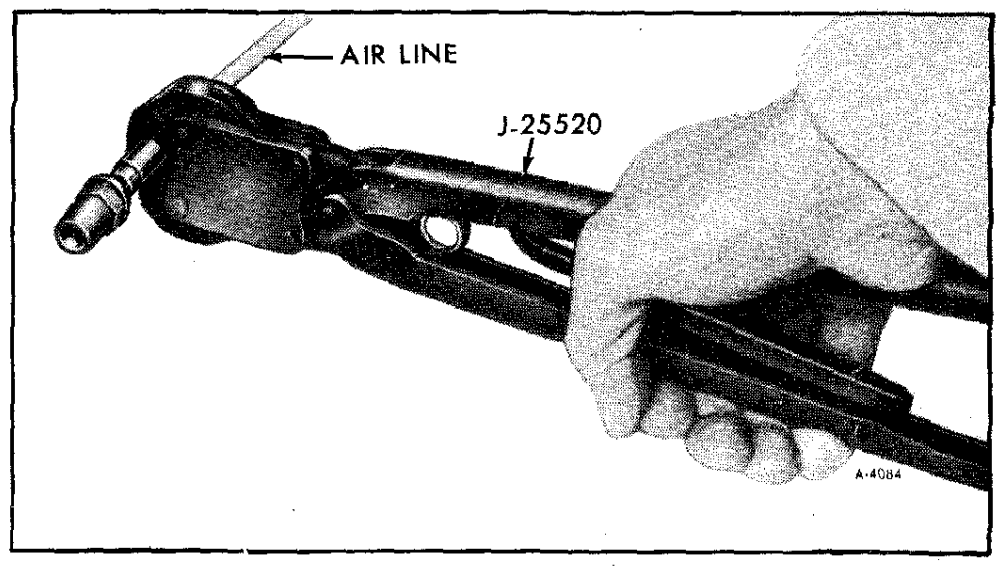


Figure 15—Special Tool J-25520 Crimping Air Line

HEIGHT CONTROL VALVE AIR LEAKAGE CHECK

NOTE: Air leakage check can be performed for air line connections only when valve is installed on vehicle. The following instructions give procedure for performing air leakage check on valve when valve is removed from vehicle.

1. Clean exterior of valve assembly.
2. Connect air pressure line to air inlet port, then open the air pressure (90-120 psi).
3. Submerge valve assembly in a container of water, then watch for air bubbles when the valve arm is in center (neutral) position. No air should escape from any point of valve assembly.
4. If bubbles appear from the bellows port, this is an indication the air inlet valve assembly is defective and must be replaced.
5. Remove air pressure line from air inlet fitting and connect it to the bellows port. If bubbles appear at the air inlet check valve port, this is an indication that check valve unit is defective and must be replaced.
6. If bubbles appear at the exhaust port it is an indication the exhaust valve assembly is defective and must be replaced.
7. If bubbles appear around edge of valve cover plate, the cover plate gasket must be replaced.
8. If no leaks are detected, remove valve assembly from water. Then, with air pressure still connected to bellows port, actuate valve arm to expel any water which may have entered exhaust valve chamber. Remove air line and connect it to air inlet port. Acutate valve with air pressure to remove water from air inlet valve chamber.

TROUBLE SHOOTING SOLENOID VALVES

If solenoid does not appear to be functioning properly, check to see that connections to air lines are not reversed. If solenoid is properly connected and still malfunctions, remove solenoid and use the following procedure to bench check solenoid. If solenoid fails bench test, unit can be disassembled for cleaning and inspection. Plunger, spring, and seals are available for service replacement. If replacing entire solenoid unit, be sure to use equivalent solenoid valve.

BENCH CHECK OF SOLENOID

An air source of approximately 50-100 psi and an electrical 12-volt source are required for a bench test of the solenoid. Apply air to the supply (IN) port of the solenoid. Actuate the valve from the electrical source and note air outlet change to the other port.

Two-Way Normally Closed Solenoid

Air pressure applied at inlet port. Air is stopped internally. No air at out port. With 12 volts applied (solenoid energized) air will flow from inlet port through out port.

Three-Way Multipurpose Valves

The three-way valves used are multipurpose valves and their operation as a normally open or normally closed valve depends upon hookup. Port stampings on multipurpose valves are as follows: "1" for normally closed, "2" for

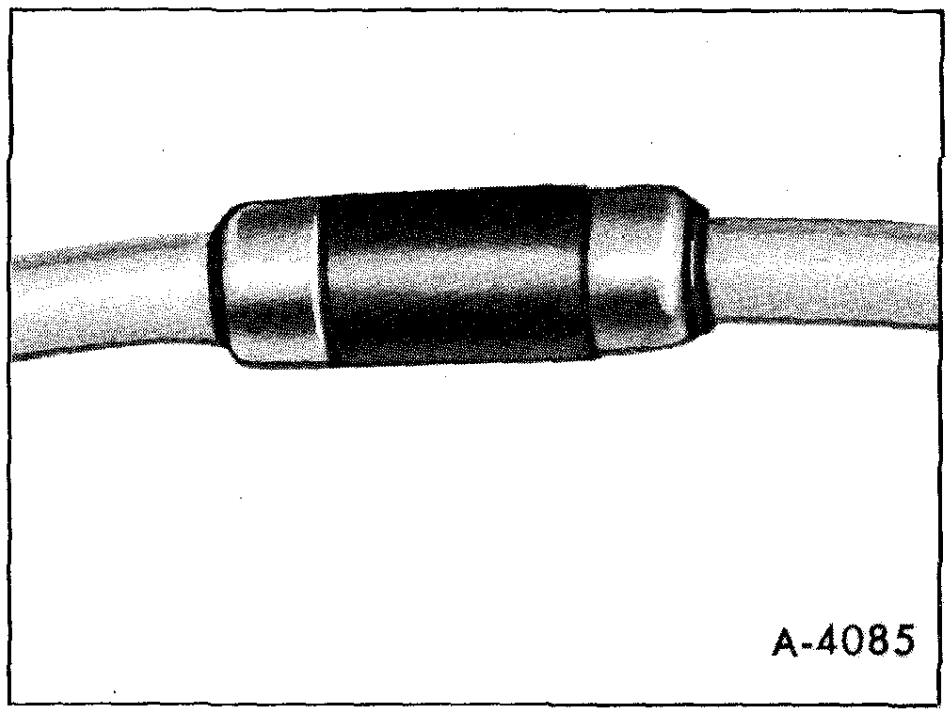


Figure 16—Air Line Repair Coupling

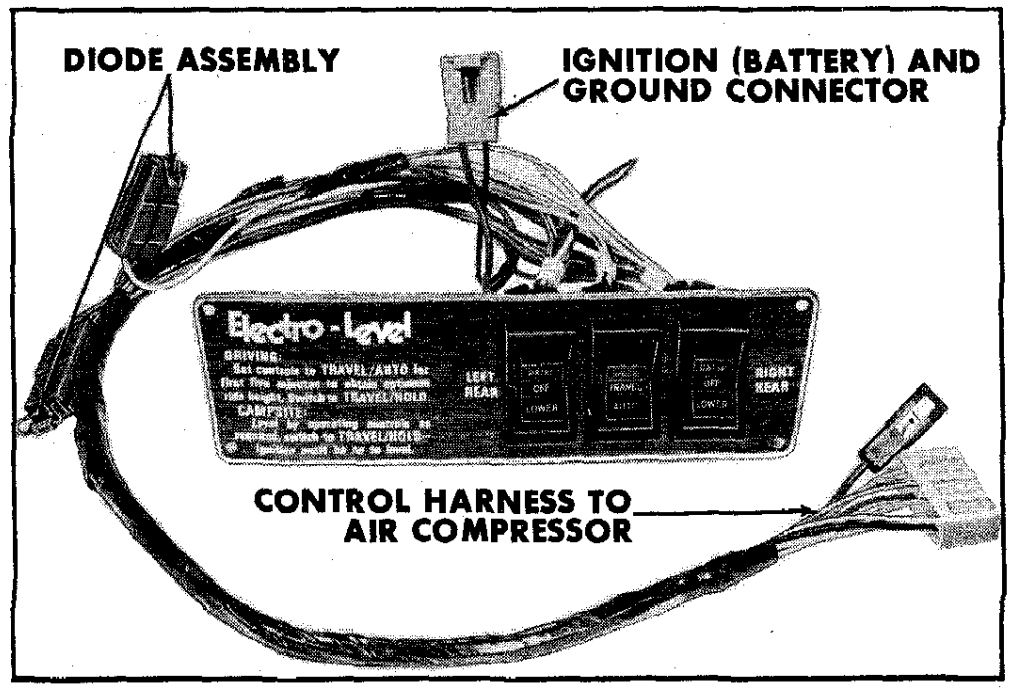


Figure 17—Measuring Resistance Across Diode

common, and "3" for normally open. Inlet pressure can be applied at any port.

- Inlet pressure applied at normally closed port (1): Air is stopped internally. With 12 volts applied (solenoid energized) air will flow from normally closed port (1) to common port (2). No air at normally open port (3).

- Inlet pressure applied at common port (2): Air flows out normally open port (3). *With 12 volts applied (solenoid energized)* air will flow from common port (2) through normally closed port (1). No air at normally open port (3).

- Inlet pressure applied at normally open port (3): Air flows out common port (2). With 12 volts applied (solenoid energized) air will flow from normally open port (3) to normally closed port (1). No air at common port (2).

MEASURING RESISTANCE OF DIODE

With the Electro-Level option there are two diode assemblies in the wiring harness (figure 17). These can be tested using a volt-ohmmeter. Holding two meter leads to either side of diode, measure the resistance in one direction. Reverse the test lead connections to measure the resistance in the other direction. If the diode is good, the resistance in one direction will be much higher than the resistance in the other direction. If diode does not test good, replace.

COMPONENT REMOVAL

CAUTION: *Whenever it is necessary to support the rear suspension with jack stands or other supporting equipment, be sure the jack stands are used only at junction points of the frame rail and crossmember. Failure to locate jack stand as instructed could result in damage to frame of vehicle.*

Removal procedure for height control valve, air bellows, control arm and shock absorber are given in REAR SUSPENSION (SEC. 4) of Maintenance Manual X-7525.

AIR COMPRESSOR REMOVAL

1. Release pressure in system through Schrader valve at wet tank.
2. Disconnect electrical leads at rear of compressor motor.
3. Disconnect air lines at back of compressor and at head of one piston.
4. Remove bolts securing compressor to mounting bracket and remove compressor.

PRESSURE SWITCH REMOVAL

1. Release pressure in system through wet tank Schrader valve.
2. Remove screw at top of pressure switch cover and remove switch cover.
3. Disconnect two electrical leads secured by screws inside switch body.
4. Remove bolts securing pressure switch in place. Remove copper fitting securing pressure switch to wet tank.
5. Remove pressure switch.

WET TANK REMOVAL

1. Release air from system at Schrader valve on wet tank.
2. Disconnect air lines.
3. Remove wet tank mounting elbow from manifold.
4. Remove copper fitting, check valve and Schrader valve from tank.

SOLENOID VALVE(S) REMOVAL

1. Release air from system at Schrader valve on wet tank.

2. Disconnect electrical leads from solenoid at connector.

3. Identify air lines and ports. Disconnect air lines to solenoid valve.

4. Remove solenoid.

ELECTRO-LEVEL CONTROL PANEL REMOVAL

1. Remove four screws securing control panel to lower dash panel.

2. Disconnect electrical leads at switches.

3. Remove switches from control panel.

COMPONENT OVERHAUL

Overhaul procedures for air compressor and height control valve are given in REAR SUSPENSION (SEC. 4) of Maintenance Manual X-7525.

SOLENOID VALVE OVERHAUL

Disconnect air lines from solenoid and remove solenoids from manifold (or bracket).

Solenoid valve shown in figure 12 can be disassembled for cleaning and inspection. Plunger, spring and seals are available for service replacement.

DISASSEMBLY

1. Remove adapter and seal from sleeve assembly, then remove sleeve nut which holds housing and coil assembly to sleeve assembly.
2. Remove name plate, housing, and coil assembly by sliding off lower end of sleeve assembly. Remove washer.
3. Using spanner wrench (SKINNER # VD-233, or equivalent) remove sleeve, plunger and spring from valve body. (See figure 18).
4. Separate plunger and spring from sleeve and remove nylon seal from valve body.

INSPECTION

1. Seals should be discarded and new seals installed when assembling valve.
2. Inspect plunger inserts (both ends) for cuts, nicks, and depressions caused from hitting valve seats. Replace if necessary. Wear must be significant before necessary to replace.
3. Replace spring if broken. If plunger is replaced, spring should be replaced at the same time. Plunger and spring are included in a repair kit.
4. Visually inspect valve threads for damage and clean if necessary.

ASSEMBLY

NOTE: DO NOT use any lubricant during assembly of valve components.

Reverse the disassembly procedure for reassembly of valve. DO NOT tighten excessively.

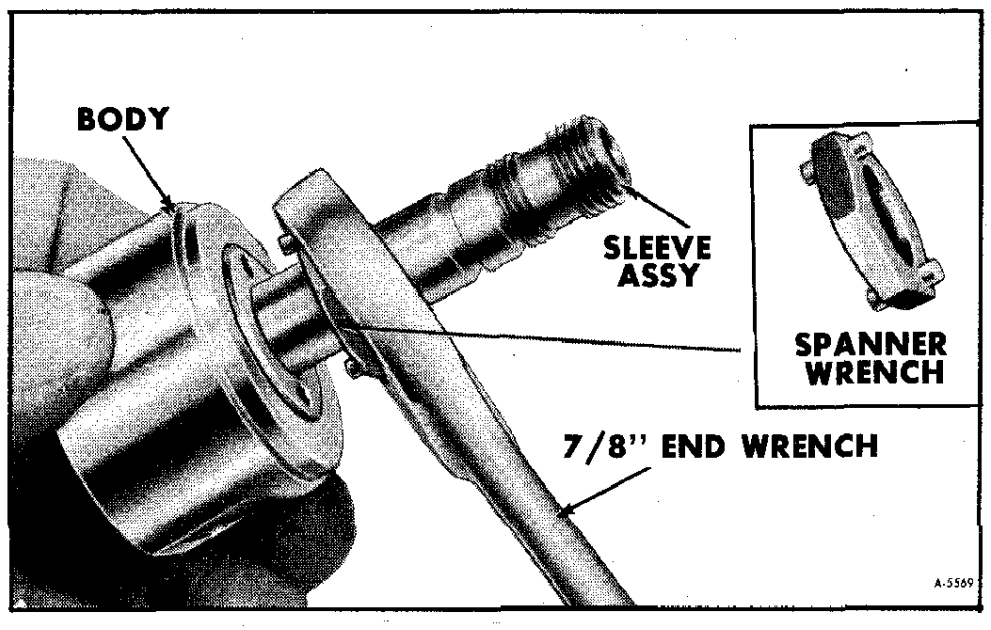


Figure 18—Removing or Replacing Sleeve with Special Tool (Spanner Wrench-Skinner #V0233)

COMPONENT INSTALLATION

AIR COMPRESSOR INSTALLATION

1. Install bolts securing compressor to mounting bracket.
2. Connect air lines at back of compressor and at head of one piston.
3. Connect electrical leads at rear of compressor.

PRESSURE SWITCH INSTALLATION

1. Install pressure switch at wet tank fitting. Install bolts securing pressure switch in place.
2. Connect electrical leads secured inside switch body with screws.
3. Install switch cover and secure with screw.

WET TANK INSTALLATION

1. Install check valve, Schrader valve and copper fittings at wet tank.
2. Connect air lines.
3. Install wet tank mounting elbow.

HEIGHT CONTROL VALVE INSTALLATION

Refer to Section 4, REAR SUSPENSION, Maintenance Manual X-7525 for height control valve installation procedure.

AIR BELLOWS INSTALLATION

Refer to Section 4, Maintenance Manual X-7525 for air bellows installation procedure.

CONTROL ARM INSTALLATION

Refer to Section 4, Maintenance Manual X-7525 for control arm installation procedure.

SHOCK ABSORBER INSTALLATION

Refer to Section 4, Maintenance Manual X-7525 for shock absorber installation procedure.

AIR LINE INSTALLATION

Refer to Section 4, Maintenance Manual X-7525 for air line installation procedure.

SOLENOID VALVE(S) INSTALLATION

1. Secure solenoid to bracket or copper fittings. Be sure to hook up solenoid ports identical to original installation.
2. Connect air lines to solenoid valve. Refer to air line schematics given in figures 4 and 7.
3. Connect electrical leads.

CONTROL PANEL INSTALLATION

1. Install switch into control panel.
2. Connect harness leads to switch.
3. Install control panel to lower dash panel and secure in place with four mounting screws.

ON-VEHICLE ADJUSTMENTS

REAR WHEEL ALIGNMENT

Proper rear wheel alignment must be maintained to ensure correct handling and satisfactory tire life.

Before checking alignment the following inspections should be made:

1. Check that tires are inflated to recommended pressure.
2. Check wheel bearing adjustment and correct if necessary.

NOTE: Rear wheel alignment requires the vehicle to be level while being checked. Vehicle must be empty and full weight must be on wheels.

TOE-IN MEASUREMENT

Toe-in may be measured from center of tire tread or from inside tires or rims. Measurements at both wheels must be made in same relationship (See "G" and "F", figure 19.)

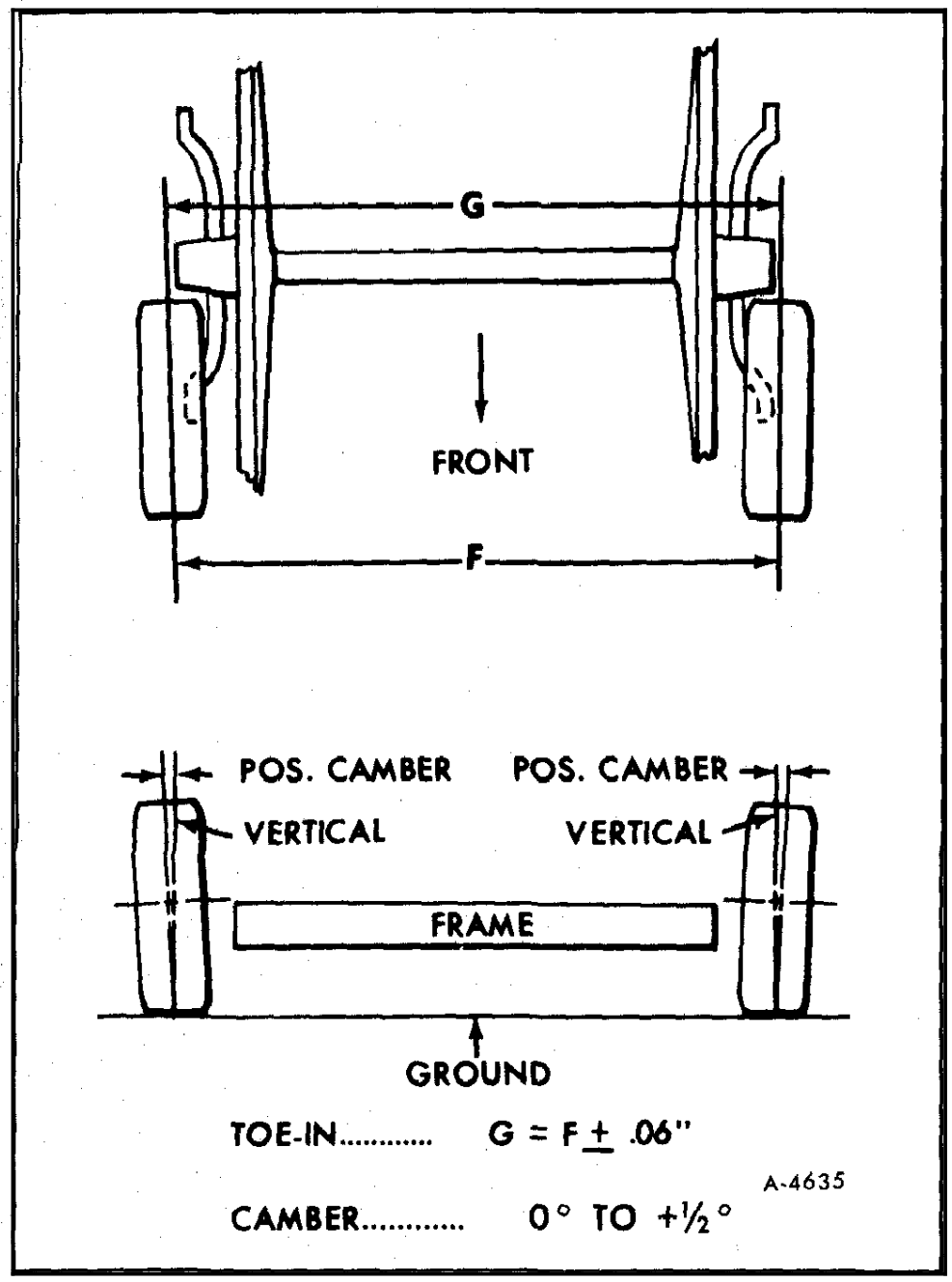


Figure 19—Rear Wheel Alignment Chart

If measurement is to be made from center of tire treads, first hoist vehicle and spin wheels to obtain a center line on tire tread. Roll vehicle ahead several feet to where the inspection is to be made. This will remove any slack caused by looseness in wheel bearings.

Measure at point "F" and "G". The toe-in should follow the relationship: G = F ± .06".

TOE-IN ADJUSTMENT

If toe-in is not correct, it must be shimmed as shown in figure 20. Follow this procedure for adjustment.

1. Raise vehicle off floor.
2. Loosen six bolts on mounting bracket.
3. Insert proper shim as shown in figure 21.
4. Tighten retaining nuts on frame rail. Tighten two retaining nuts on crossmember. See Specifications at the end of this section for torque values.
5. Lower vehicle to floor and recheck alignment.

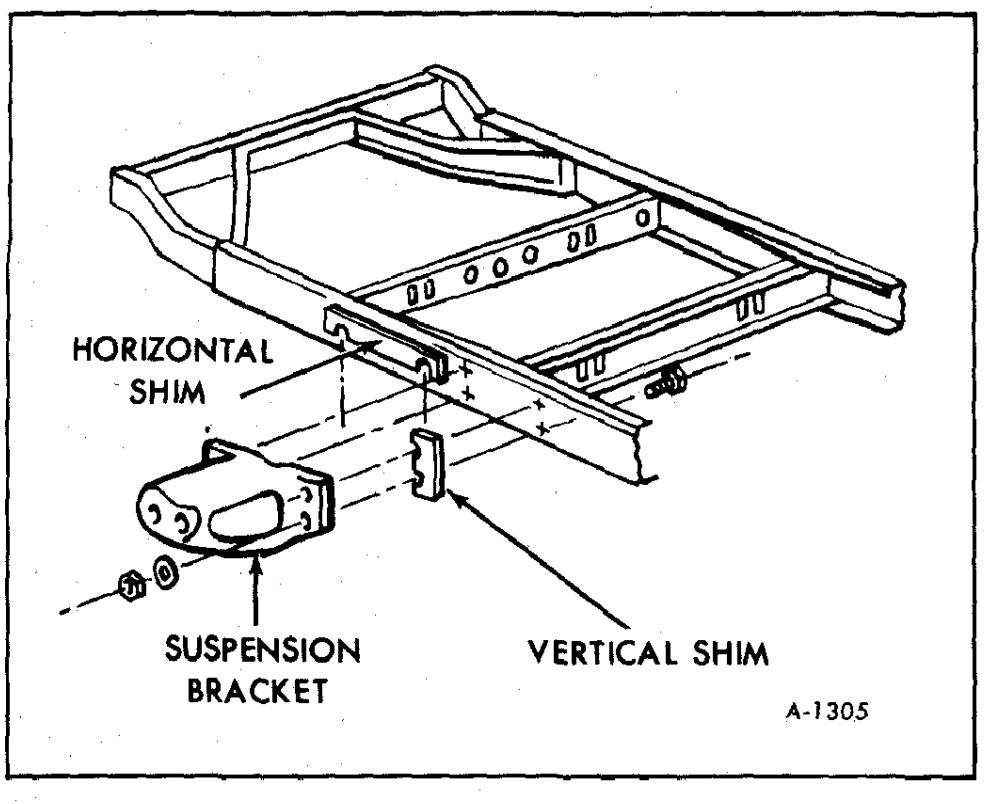


Figure 20—Rear Wheel Shim Location

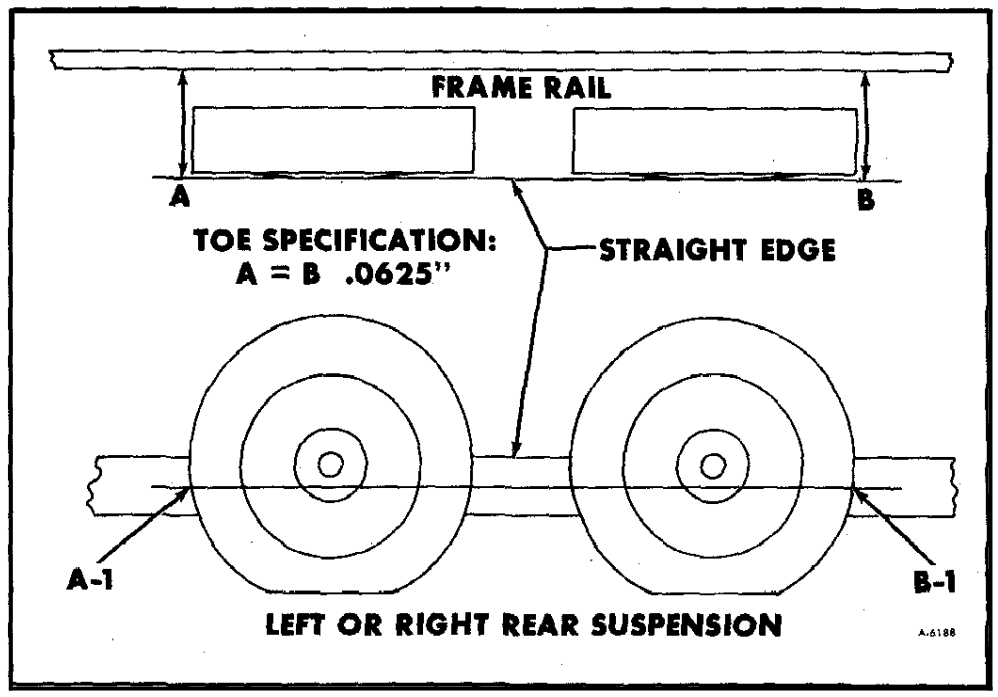


Figure 21—Measuring for Toe at Rear Suspension

If one side of the vehicle rear suspension appears to be the primary cause of excessive toe, use the following procedure for measuring toe on one side of vehicle.

1. Drive vehicle straight forward onto a level surface.
2. Remove wheel covers and outer dust cap.

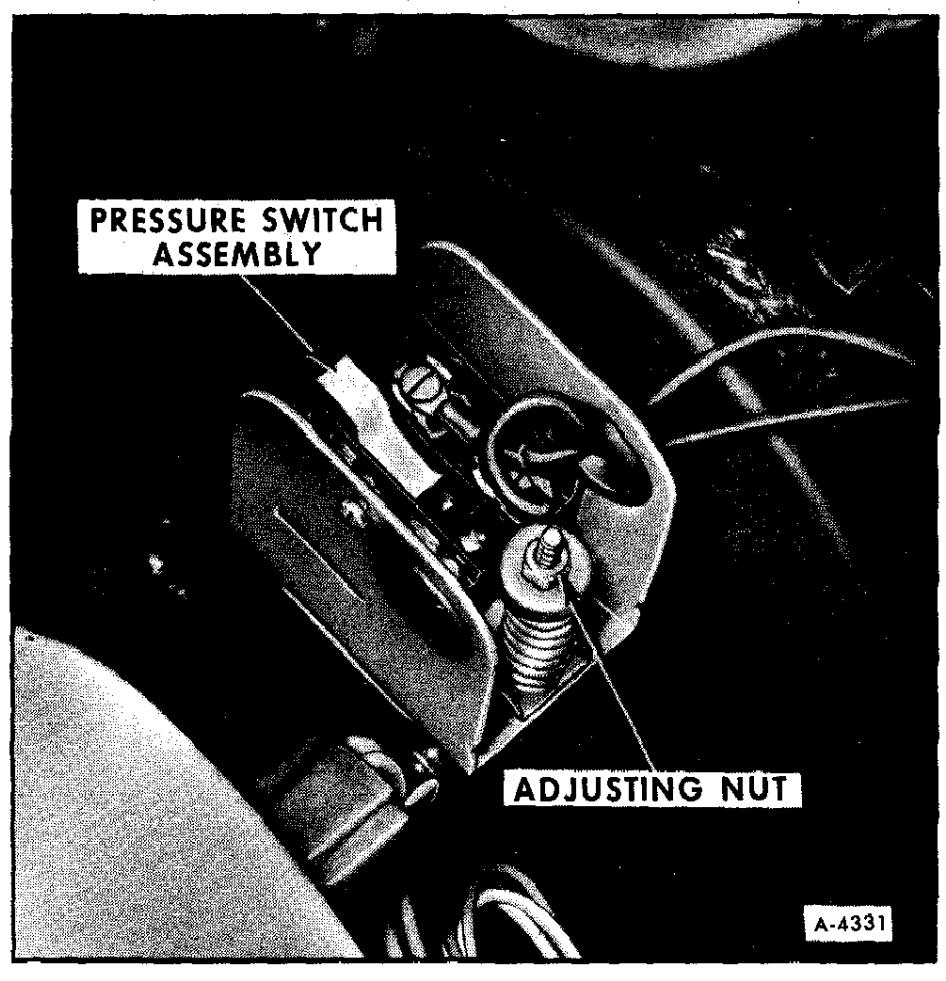


Figure 22—Air Compressor Pressure Switch Adjustment

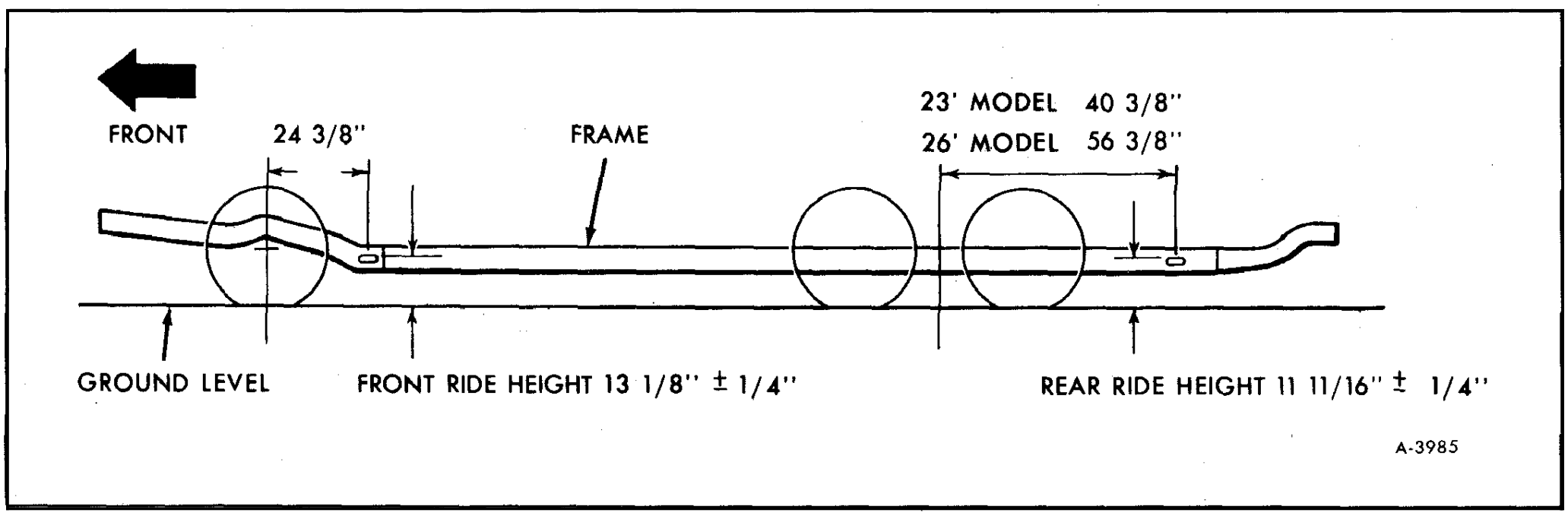


Figure 23—Checking Vehicle Ride Height

3. Place straight edge across face of wheels as shown in figure 21.

4. Measure distance from straight edge to frame at front tire and rear tire as shown. Toe should be A = B plus or minus .0625".

5. Add toe shims as required. One toe shim changes A = B by .125".

REAR WHEEL CAMBER

The rear wheels are set with positive camber. Positive camber is outward inclination of wheels at top.

To check camber, use an accurate gauge. The camber should be set at 0^{o} to $+1/2^{o}$. (See figure 19.)

Excessive positive camber results in irregular wear of tires at outer shoulder. Negative or reverse camber causes wear at inner shoulders.

Camber is adjusted by shimming as shown in figure 20. Follow the same shimming procedure used to set toe-in.

AIR COMPRESSOR PRESSURE SWITCH ADJUSTMENT

The switch is designed to maintain air pressure in the air reservoir between 100 and 120 psi. If the pressure in the reservoir drops to 100 psi the contact points will close and this will complete the circuit, supplying electricity to the compressor. If the pressure raises above 120 psi the contact points will open the circuit to the compressor. This setting may be adjusted at the nut which is located on the end of the spring inside the cover. (Refer to figure 22.) The pressure will rise by tightening the spring. Both the cut-in pressure and the cut-out pressure will be affected by this adjustment. The pressure can be measured at the Schrader valve on the wet tank.

RIDE HEIGHT ADJUSTMENT

Measure the rear suspension ride height at the elongated slot on the frame rail. Refer to figure 23.

To adjust ride height loosen adjustment nut on height control valve (See figure 24.) The valve arm has an elongated hole at the adjustment nut. This allows the valve arm to move in relation to the valve itself, and thus allows the ride height to change. Intake and exhaust valves of height control valve can then be operated independently of linkage. When proper ride height is reached tighten nut to 70-80 in. lbs.

Height control valve lever will move 1/4 inch up or down from neutral position (free travel) without causing any valve action. If amount of adjustment required falls within these limits, adjust lever the required amount.

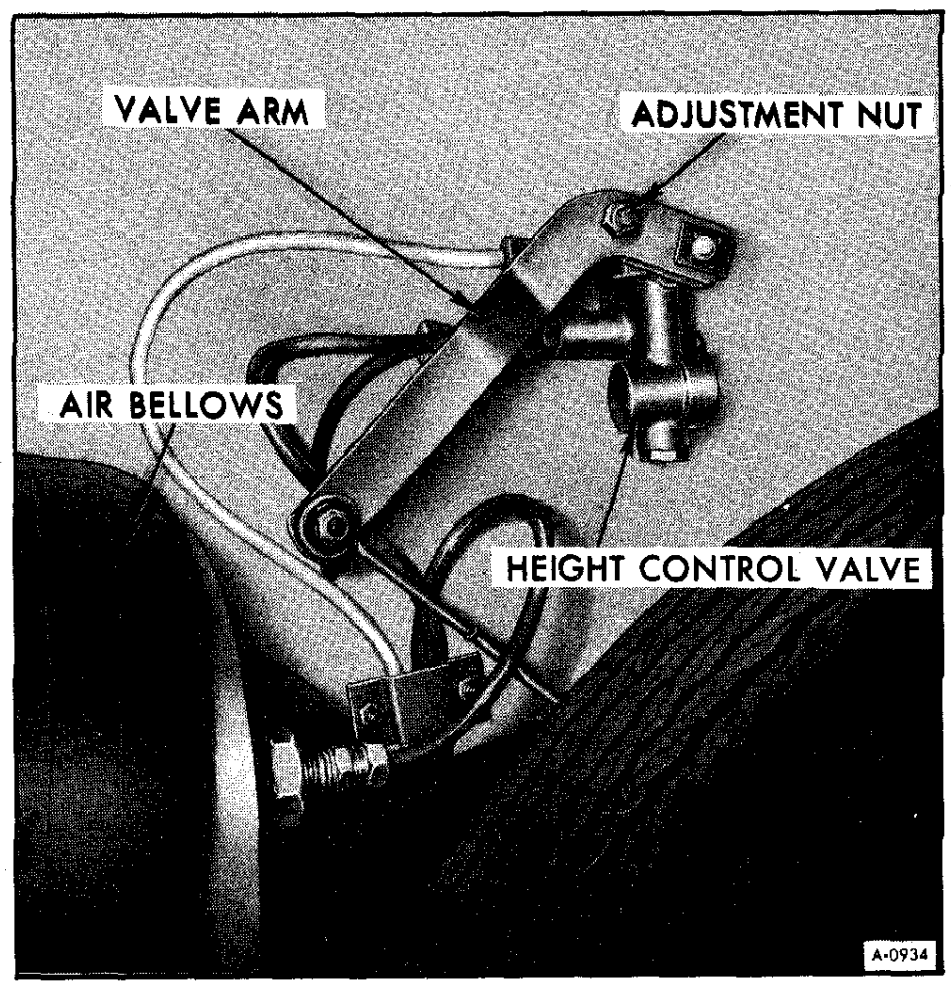


Figure 24—Location for Rear Ride Height Adjustment

However, frame will not raise or lower until load is increased or decreased to actuate height control valve.

If either of the height control valves does not function properly with the lever correctly adjusted, check for restricted air lines. If valve still does not hold frame at normal ride height with lever properly adjusted, and with no restirction in air line, valve should be overhauled or replaced with a new or rebuilt unit.

PERIODIC MAINTENANCE

AIR COMPRESSOR FILTER REPLACEMENT

The air filter on the compressor should be cleaned or replaced every six months or 6,000 miles.

Remove tubing at back of each housing assembly. Remove filter retainer and pull intake assembly off and carefully take filter out from behind inside retainer. Wash filter with soap and water, and dry completely before replacing.

WET TANK

Condensation should be drained at least once a month. To drain tank properly, leave Schrader valve drain cock open until all air escapes and draining stops.

Wet tank mounting bolts and brackets should be checked at regular intervals for looseness. Tighten if necessary. Wet tank may be cleaned inside using steam or hot water. If corrosion or other damage has weakened tank it must be replaced.

LUBRICATION

Details on lubrication of rear suspension components are covered in Section 0 of Maintenance Manual X-7525.

TORQUE SPECIFICATIONS

LOCATION	TORQUE
Center mounting bracket to frame rail nuts (4) (nut torque)	65-85 lb.-ft.
Center mounting bracket to crossmember nuts (2) (nut torque)	50-60 ft.-lbs.
Height control valve mounting bolt (bolt torque)	80-120 in.-lbs.
Height control valve link	
Link to arm nut	69-90 ft.-lbs.
Link to control arm nut	60-90 ft.-lbs.
Control arm lock nut	15-20 ft.-lbs.

SPECIAL TOOLS

J-25520 Air Line Crimp Tool

SECTION 5

BRAKES

The information described in Maintenance Manual X-7525 under the heading BRAKES is applicable to models covered by this supplement with the exception of the following:

CAUTION: ALL BRAKE SYSTEM FASTENERS ARE IMPORTANT ATTACHING PARTS IN THAT THEY COULD AFFECT THE PERFORMANCE OF VITAL COMPONENTS AND SYSTEMS, AND/OR COULD RESULT IN MAJOR REPAIR EXPENSE. THEY MUST BE REPLACED WITH ONE OF THE SAME PART NUMBER OR WITH AN EQUIVALENT PART IF REPLACEMENT BECOMES NECESSARY. DO NOT USE A REPLACEMENT PART OF LESSER QUALITY OR SUBSTITUTE DESIGN. TORQUE VALUES MUST BE USED AS SPECIFIED DURING REASSEMBLY TO ASSURE PROPER RETENTION OF THESE PARTS.

WARNING: WHEN SERVICING WHEEL BRAKE PARTS DO NOT CREATE DUST BY GRINDING OR SANDING BRAKE LININGS OR BY CLEANING WHEEL BRAKE PARTS WITH A DRY BRUSH OR WITH COMPRESSED AIR. (A WATER DAMPENED CLOTH SHOULD BE USED.) MANY WHEEL BRAKE PARTS CONTAIN ASBESTOS FIBERS WHICH CAN BECOME AIRBORNE IF DUST IS CREATED DURING SERVICING. BREATHING DUST CONTAINING ASBESTOS FIBERS MAY CAUSE SERIOUS BODILY HARM.

ON-VEHICLE SERVICING

BLEEDING BRAKE SYSTEM

A new brake bleeding sequence is shown in figure 1. This new sequence reduces the possibility of having to rebleed wheel cylinders a second time to eliminate air from the system.

REAR BRAKE SHOE ADJUSTMENT

Under normal operating conditions it is not necessary to make any manual adjustment to this type brake due to the automatic adjustment feature. However, when it is necessary to remove a brake drum it may also be necessary to "back-off" the adjusting screw in order to pull edge of drum past linings. (see figure 2)

1. If shoes are being adjusted for the first time, use a suitable punch to knock out the metal blank in backing plate (located at lanced area, see figure 3). Be sure all metal is removed from the brake assembly.
2. Install hub and drum assembly. Refer to BRAKE DRUM INSTALLATION.
3. Use brake adjusting tool (J-4735) to turn brake adjusting screw. Expand brake shoes at each wheel until the wheel can just be turned by hand. The drag should be equal at all wheels.
4. Back off brake adjusting screw (figure 2) at each wheel 30 notches. If shoes drag lightly on drum back off adjusting screw one or two additional notches.

NOTE: Brake should be free of drag when screw has been backed off approximately 12 notches. Heavy drag at this point indicates tight parking brake cables.

5. Install brake adjustment cover in backing plate when adjustment is completed.
6. Check parking brake adjustment.

COMPONENT REPLACEMENT

BRAKE DRUM REMOVAL

1. Hoist wheels off ground.

NOTE: It may be necessary to back off the brake shoe adjustment before the brake drum can be removed. To back off brake shoe adjustment, refer to Figure 2.

2. Remove wheel and tire.
3. Remove outer dust cap as shown in Figure 4, and then inner cap.

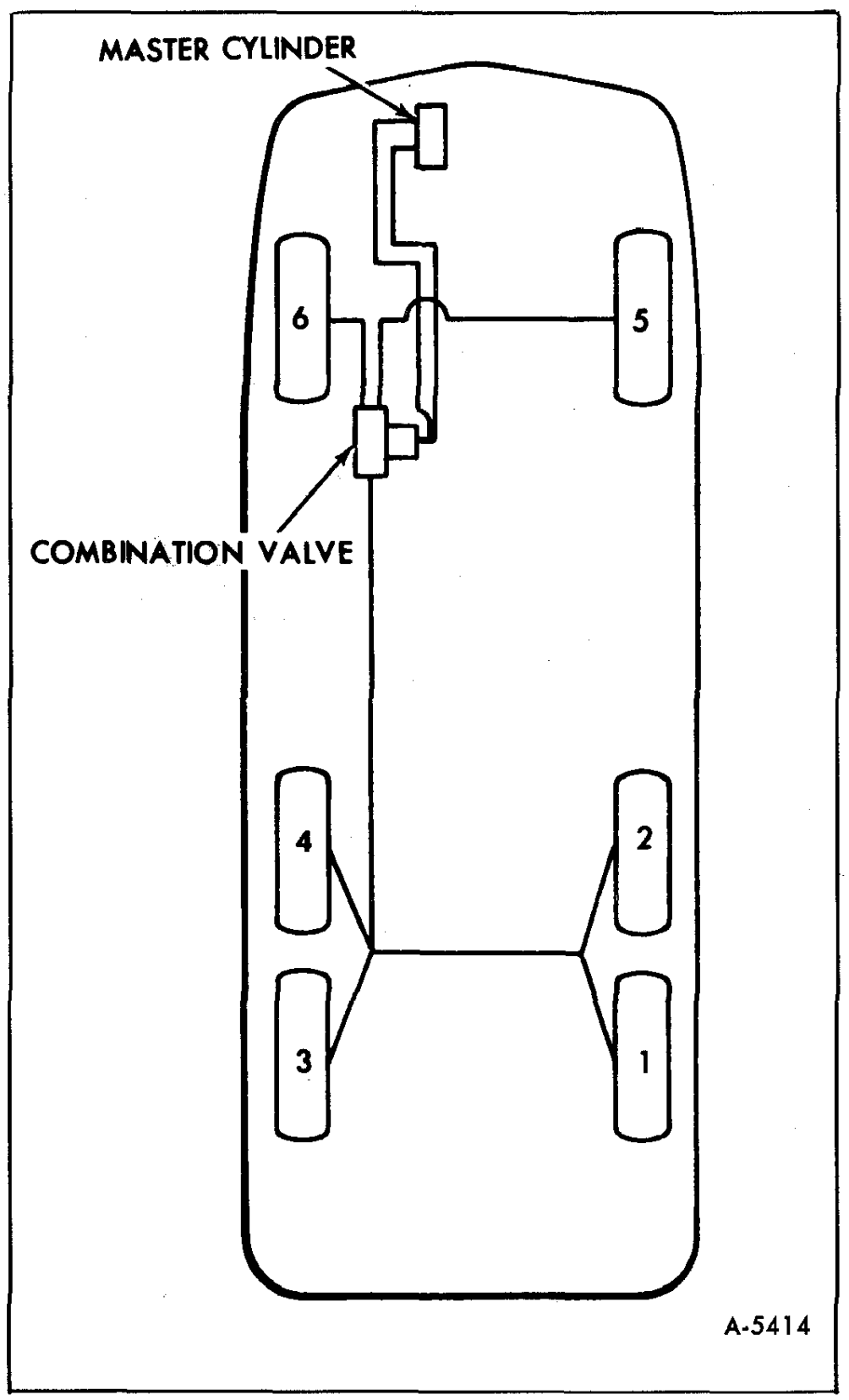


Figure 1—Brake Bleeding Sequence

4. Remove cotter pin and castillated nut from hub as shown in Figure 5.

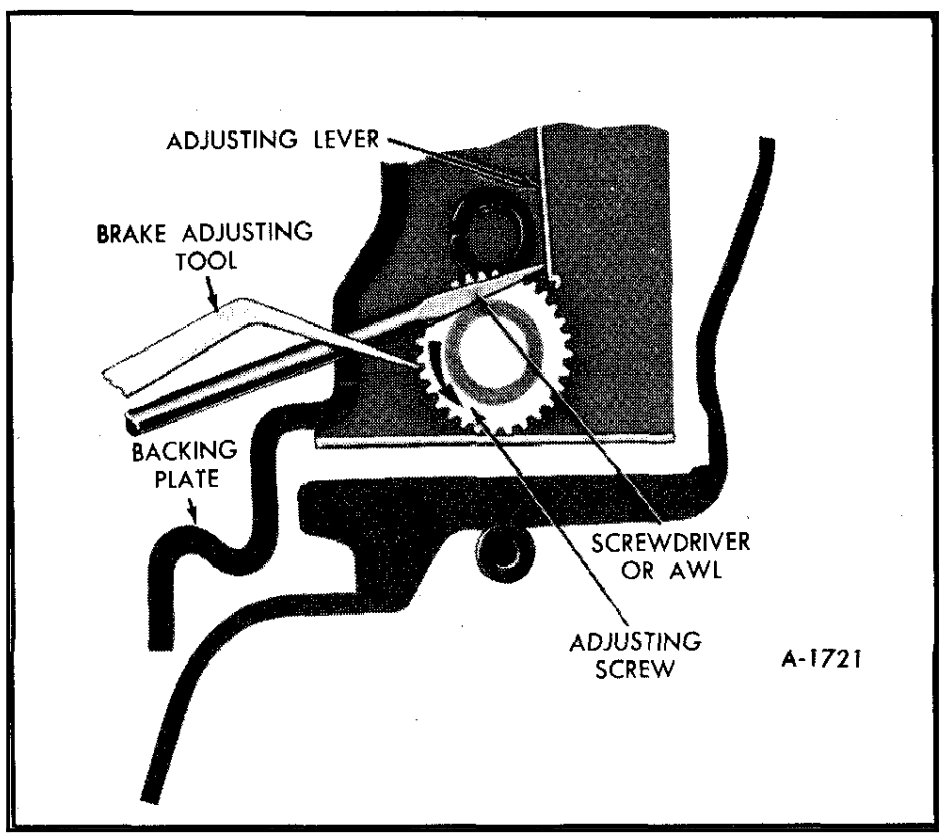


Figure 2—Backing Off Brake Adjustment

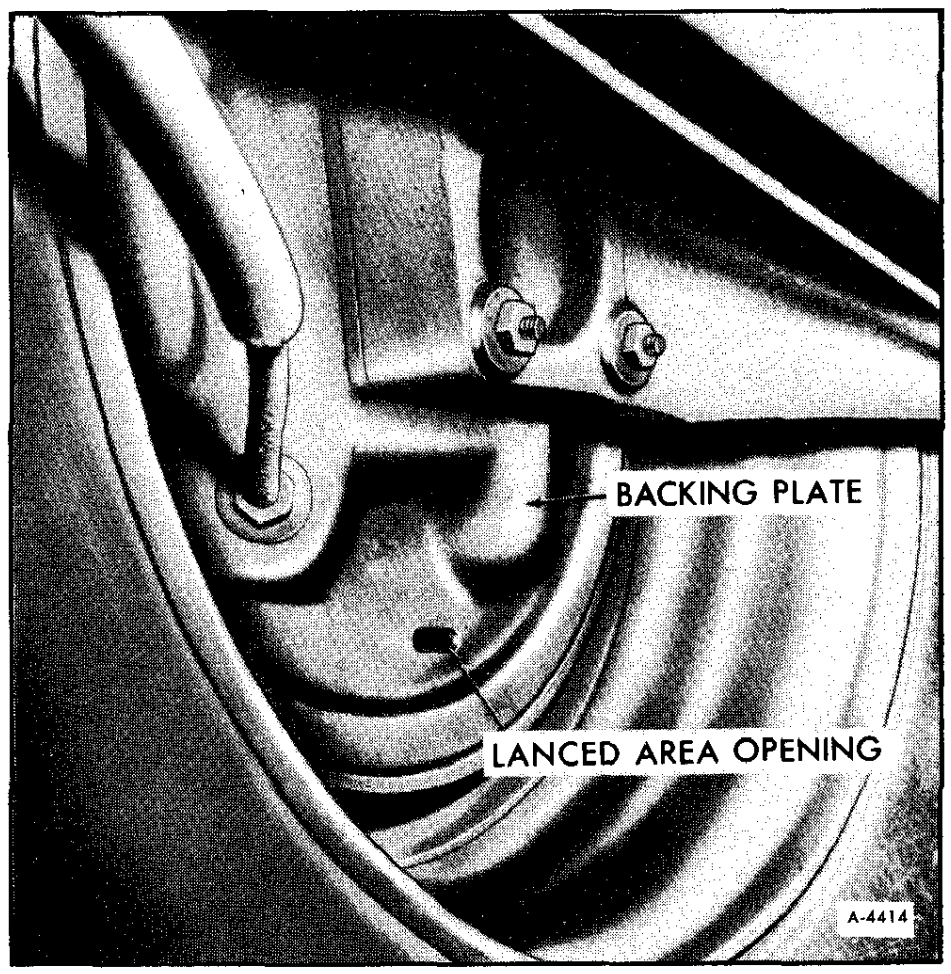


Figure 3—Lanced Area in Backing Plate

5. Hub and drum assembly can now be removed. See Figure 6.

6. Using a suitable punch, knock out the metal blank in backing plate (located at lanced area, see figure 3). Be sure all metal is removed from the brake assembly.

BRAKE DRUM INSTALLATION

1. Install hub and drum assembly (figure 6).
2. Install flat washer and castillated nut on hub while rotating hub and drum assembly.

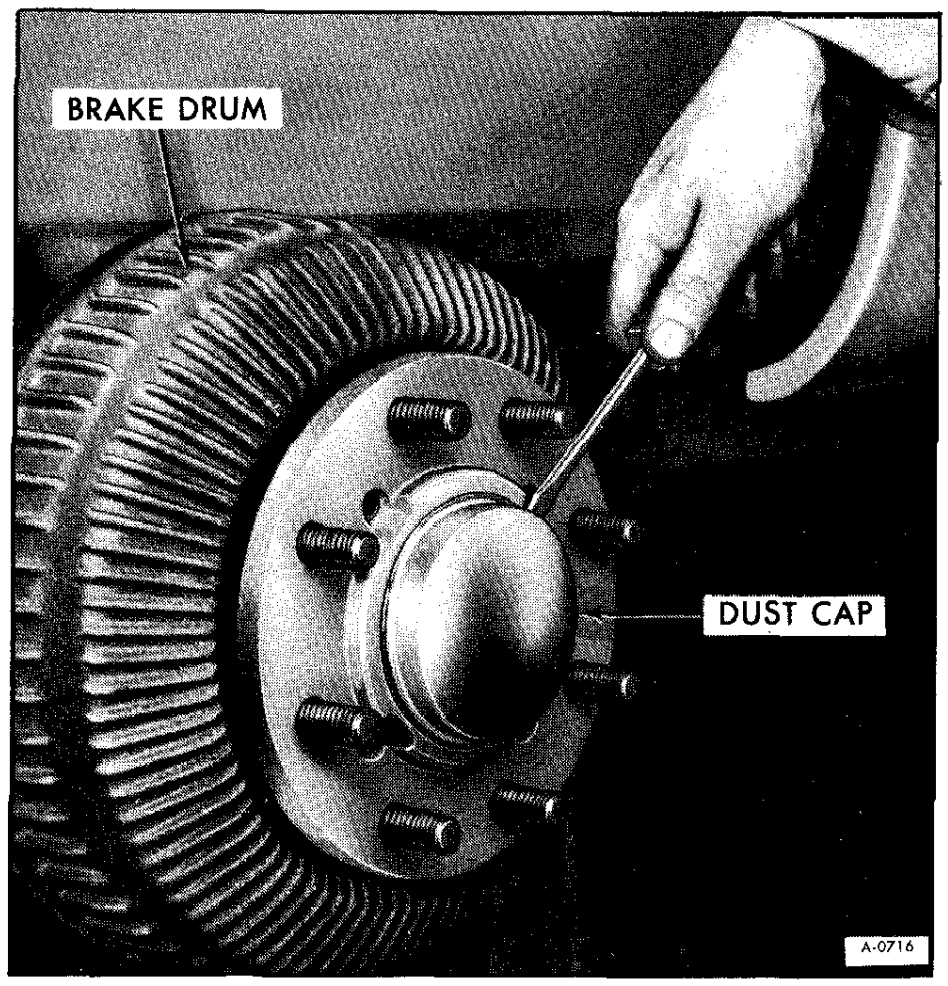


Figure 4—Removing Dust Cap

3. Tighten castillated nut to 25-30 lbs. ft. *torque to position bearings.* (*Be sure drum is* rotating while tightening nut).

4. Back off nut 1/2 turn.

5. Retighten nut finger tight, secure if possible with cotter pin.

6. If unable to secure at finger tight, back off nut to first securing position.

7. Check end play between hub and spindle it should be .001 to .005 inch.

8. Replace inner and outer dust caps.

9. Adjust brake shoes as outlined under BRAKE SHOE ADJUSTMENT.

10. Be sure brake adjustment cover is installed in lanced area opening of backing plate, see figure 3.

11. Install wheel and tire assembly. Refer to Section 10 of Maintenance Manual X-7525 for details.

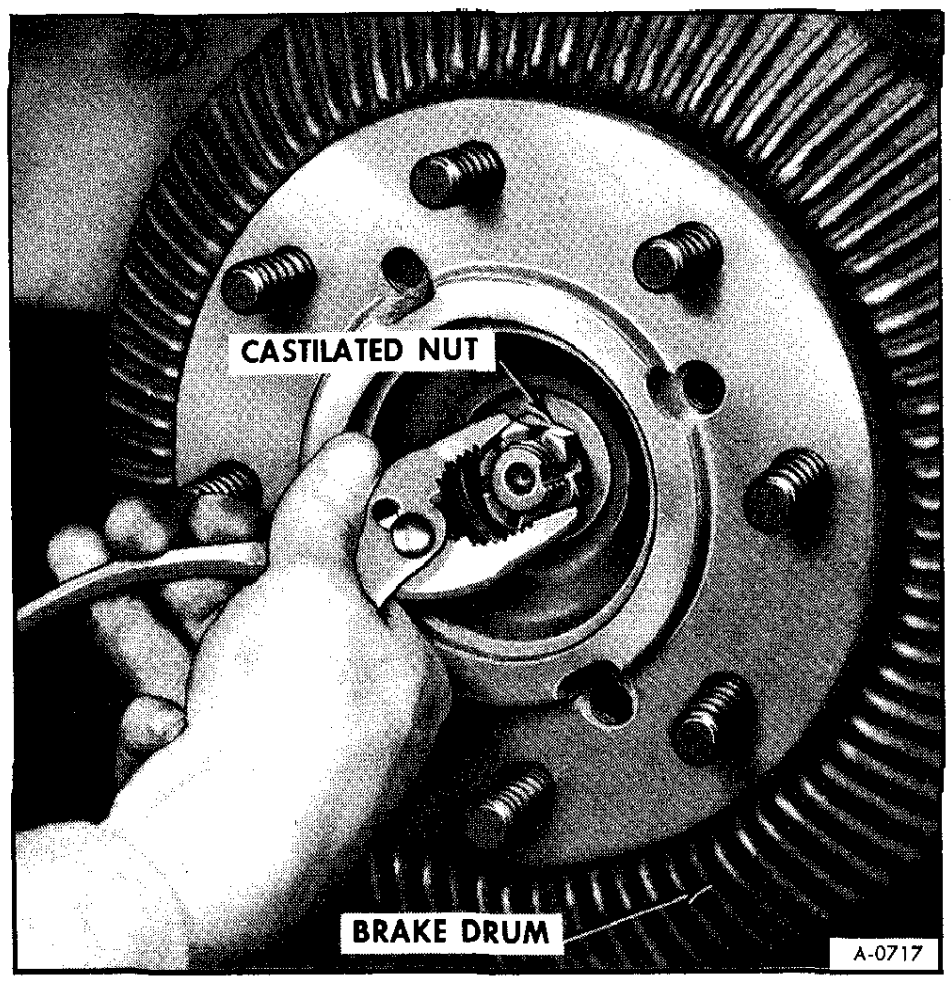


Figure 5—Removing Castillated Nut

REAR BRAKE SHOE REMOVAL

(Refer to Figure 7)

1. Hoist vehicle. Remove wheel and brake drum.

2. Remove the brake shoe return springs actuating link and guide.

3. Remove the brake shoe hold-down springs, adjuster lever, return spring and parking brake lever strut and spring.

4. Spread shoes to clear wheel cylinder links then remove the brake shoes as an assembly.

5. Disconnect the parking brake cable from the operating lever.

6. Using a suitable punch, knock out the metal blank in backing plate (located at lanced area, see figure 3). Be sure all metal is removed from the brake assembly.

REAR BRAKE SHOE INSTALLATION

WARNING: WHEN SERVICING WHEEL BRAKE PARTS DO NOT CREATE DUST BY GRINDING OR SANDING BRAKE LININGS OR BY CLEANING WHEEL BRAKE PARTS WITH A DRY BRUSH OR WITH COMPRESSED AIR. (A WATER DAMPENED CLOTH SHOULD BE USED.) MANY WHEEL BRAKE PARTS CONTAIN ASBESTOS FIBERS WHICH CAN BECOME AIRBORNE IF DUST IS CREATED DURING SERVICING. BREATHING DUST CONTAINING ASBESTOS FIBERS MAY CAUSE SERIOUS BODILY HARM.

1. Lubricate the adjusting screw threads, thrust washer mating surfaces and backing plate ledges with brake lubricant, such as Part No. 1050110 or equivalent.

2. Assemble the adjusting screw.

3. Attach the primary to secondary shoe spring to the shoes and install the adjusting screw. The primary to secondary shoe spring must not contact the adjusting screw sprocket.

4. Position shoe assembly on the backing plate. Be sure wheel cylinder links are properly positioned in the shoe notches.

5. Position the upper end of the actuating link on the brake shoe guide.

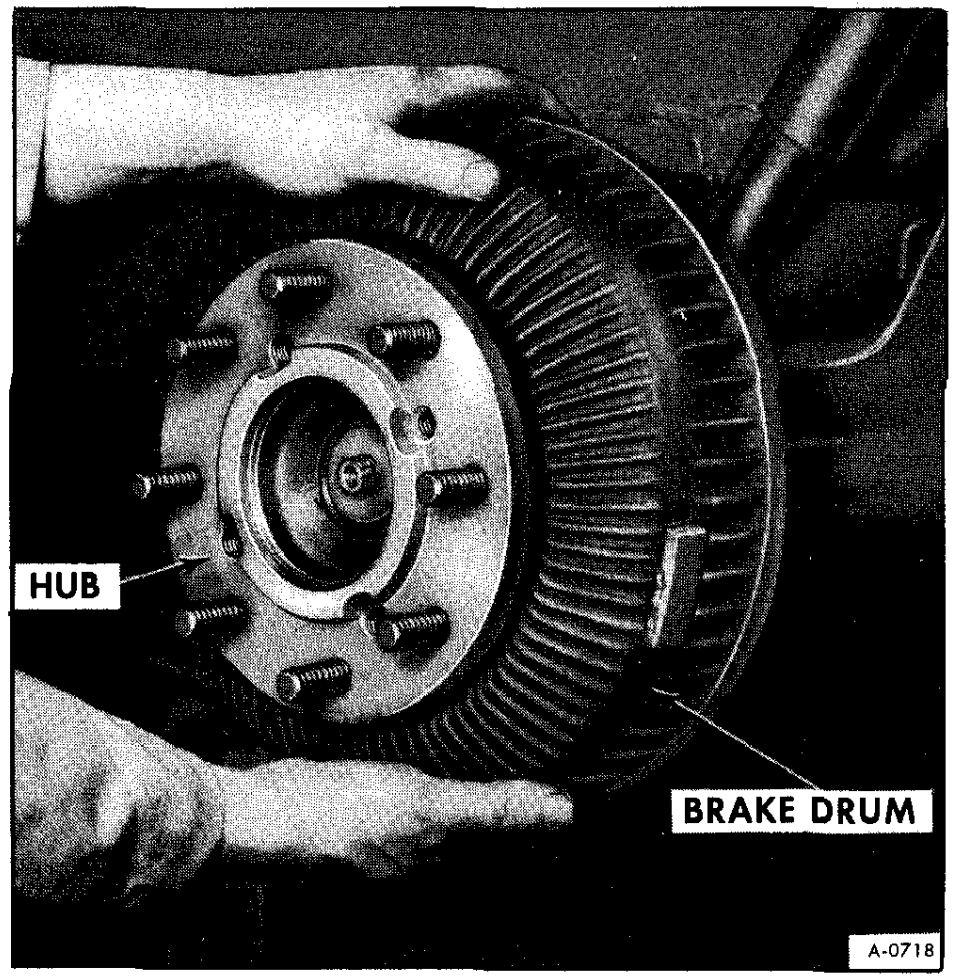
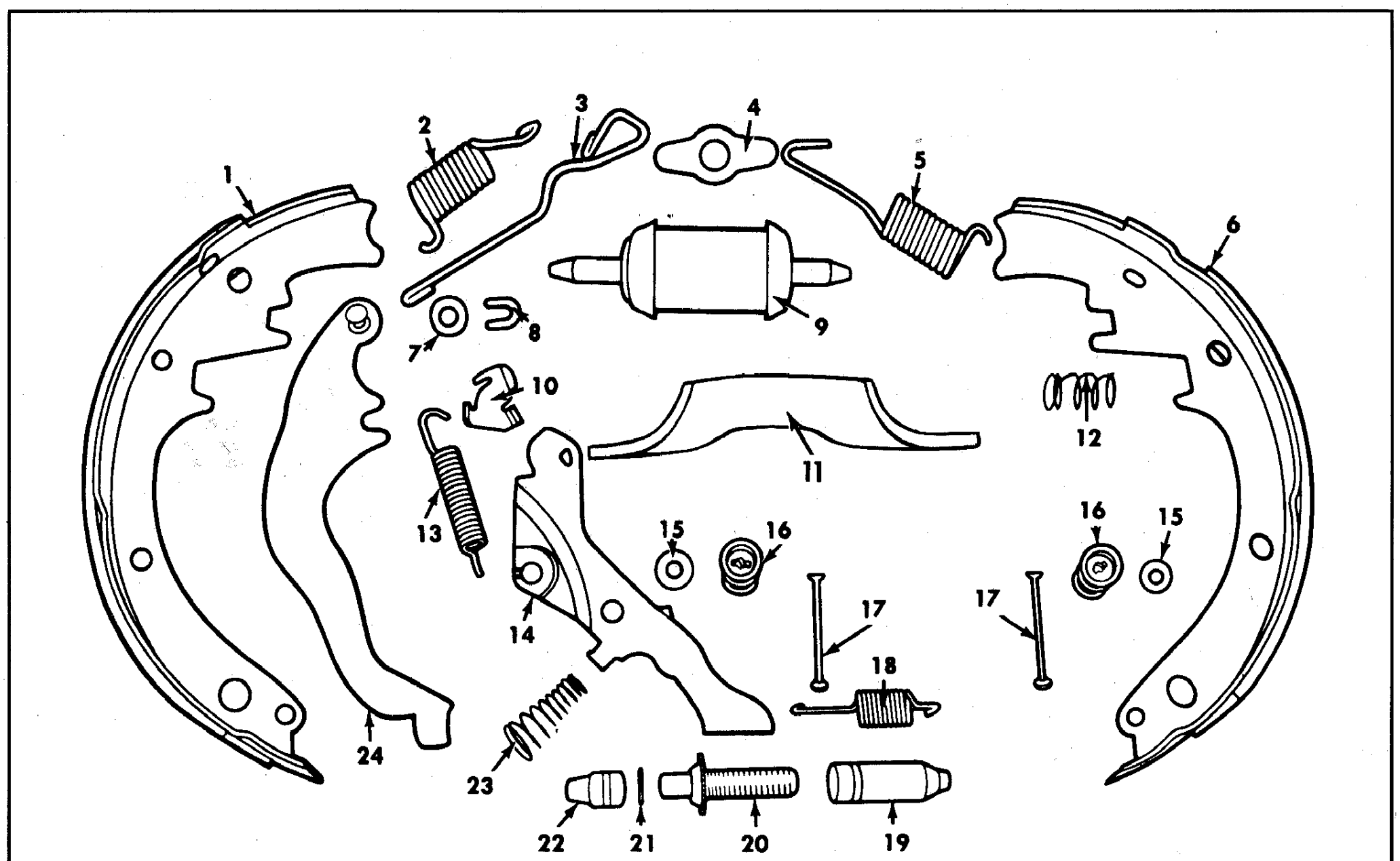


Figure 6—Removing Hub and Drum



1. Secondary Shoe And Lining
2. Return Spring
3. Actuating Link
4. Guide Plate
5. Return Spring
6. Primary Shoe And Lining
7. Washer
8. Clip
9. Wheel Cylinder
10. Pivot
11. Strut
12. Spring
13. Override Spring
14. Adjuster Lever
15. Washer
16. Hold Down Spring
17. Pin
18. Spring
19. Nut
20. Adjusting Screw
21. Washer
22. Socket
23. Return Spring
24. Lever

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Figure 7—Brake Assembly (Rear)

6. Engage the actuating link with the override pivot. Then position the adjuster lever and return spring on the secondary shoe. Position sleeve in the hole in secondary shoe and fasten to backing plate with hold-down spring assembly and pin.

7. Install the remaining primary hold-down spring, washer and pin.

8. Install the primary and secondary brake shoe return springs.

9. Install hub and drum assembly. Refer to BRAKE DRUM INSTALLATION.

10. Adjust brake shoes as outlined under BRAKE SHOE ADJUSTMENT.

11. If wheel cylinder was removed, bleed brakes.

12. Check fluid level in master cylinder. Fluid level should be no more than 1/4" below the reservoir opening at rear.

13. Install wheel and tire assembly. Refer to Section 10 of Maintenance Manual X-7525 for details.

COMPONENT REPAIR

DELCO-MORAINE DUAL DIAPHRAGM POWER BRAKE BOOSTER REPAIR

A new power booster repair procedure is required due to following internal component changes within the booster:

1. Secondary diaphragm and support ring has been replaced by a diaphragm with an integral ring.
2. The retainer plate has been deleted.
3. A new divider housing.

DISASSEMBLY

1. Scribe a mark on the top center of the front and rear housings in line with master cylinder reservoir cover to facilitate re-assembly.

2. Remove the two nuts which hold the master cylinder to the front housing, and remove the master cylinder from the mounting studs.

3. Remove front housing seal (figure 8).

4. Install booster assembly in brake booster separating fixture (J-23456) as shown in figure 9.

CAUTION: *When separating housings maintain light pressure on rear housing as it is under spring tension.*

5. With booster clamped slightly, rotate bar counterclockwise to unlock housings. If the front housing cannot be readily loosened, tap the rear housing lightly with a plastic hammer.

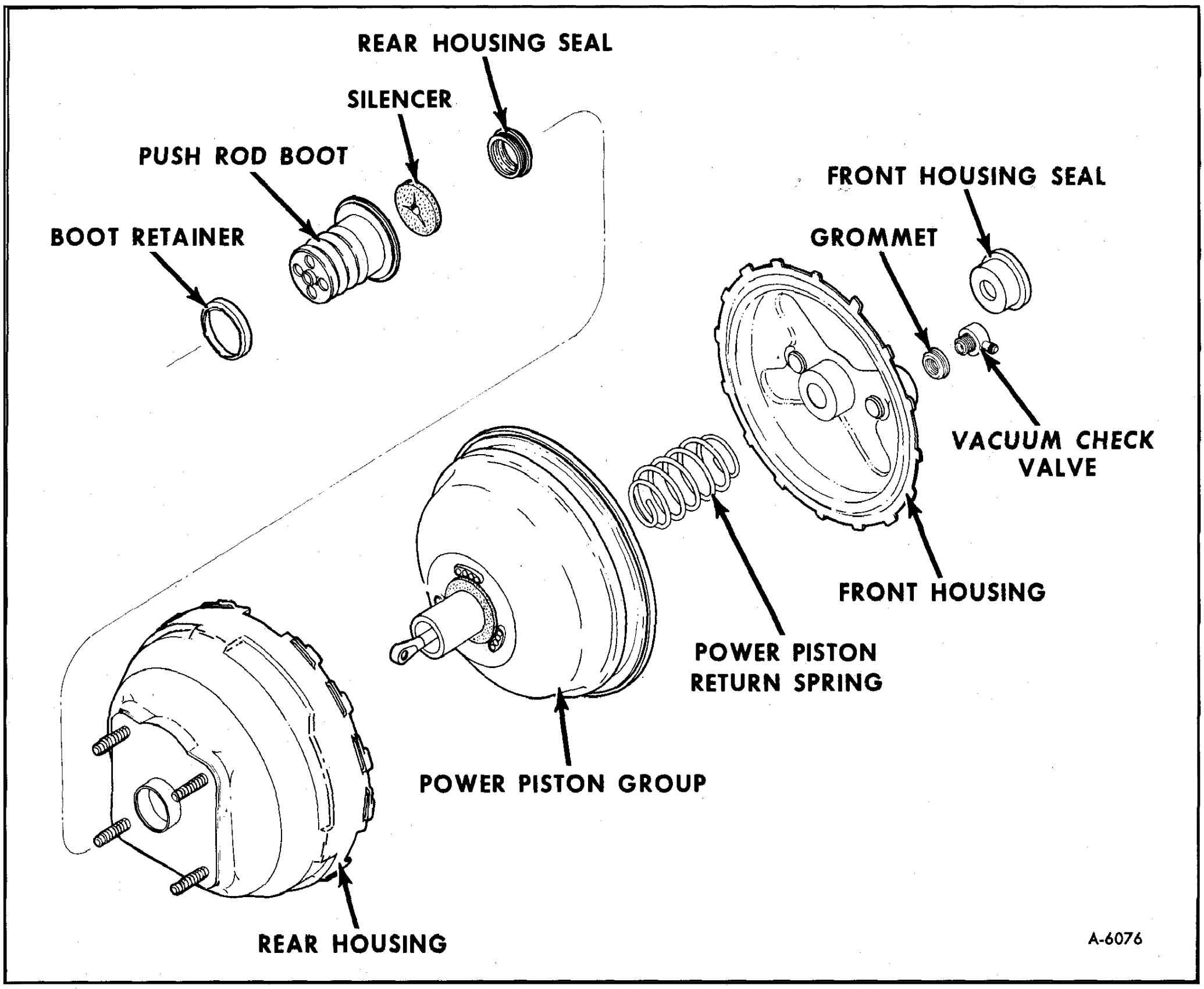

Figure 8—Delco-Moraine Power Booster Components

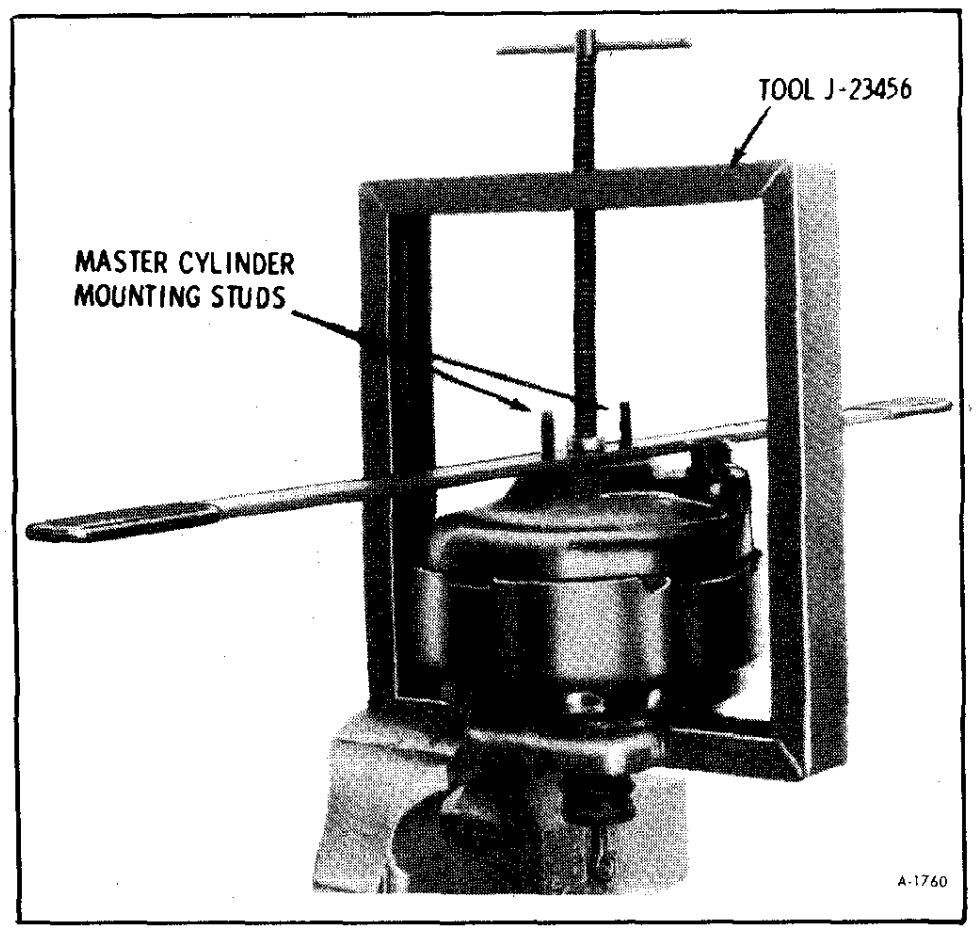

Figure 9—Using Brake Booster Separating Fixture

NOTE: Care must be exercised not to damage or loosen studs in housings. Also take care that no pressure is exerted on plastic power piston.

6. Back off the hold down bar sufficiently to remove front housing.

FRONT HOUSING GROUP DISASSEMBLY

1. Remove the power piston return spring and piston rod retainer.
2. Remove the vacuum check valve and grommet from the front housing. If the check valve is defective or the grommet cracked, cut or damaged it must be replaced.
3. Remove the front housing seal.

REAR HOUSING GROUP DISASSEMBLY

1. Remove the boot retainer and piston rod boot from the rear housing.
2. Remove the felt silencer from inside the piston rod boot.
3. Remove the power piston group from the rear housing.
4. Remove the rear housing seal from the center opening in the rear housing.

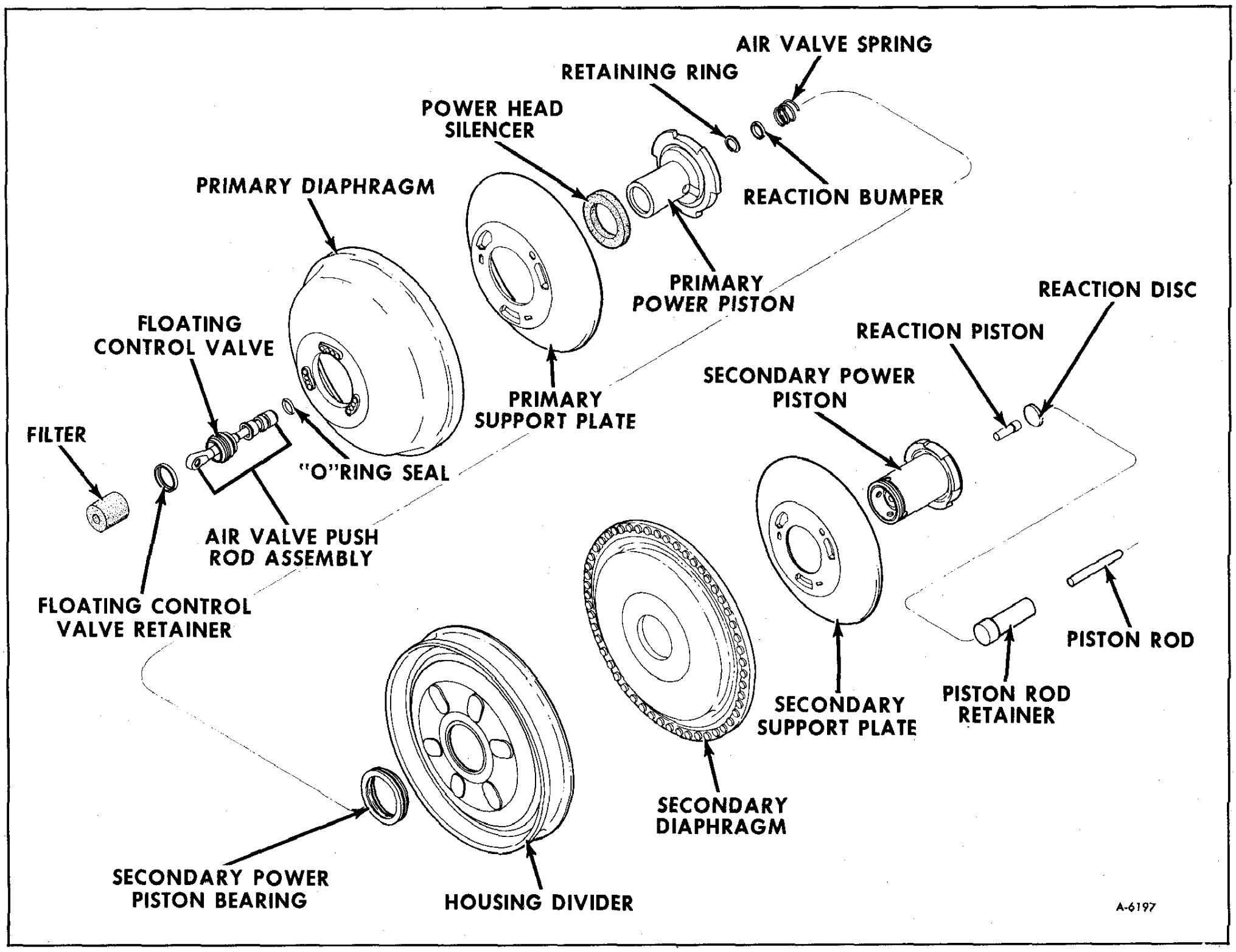

Figure 10—Power Piston Group

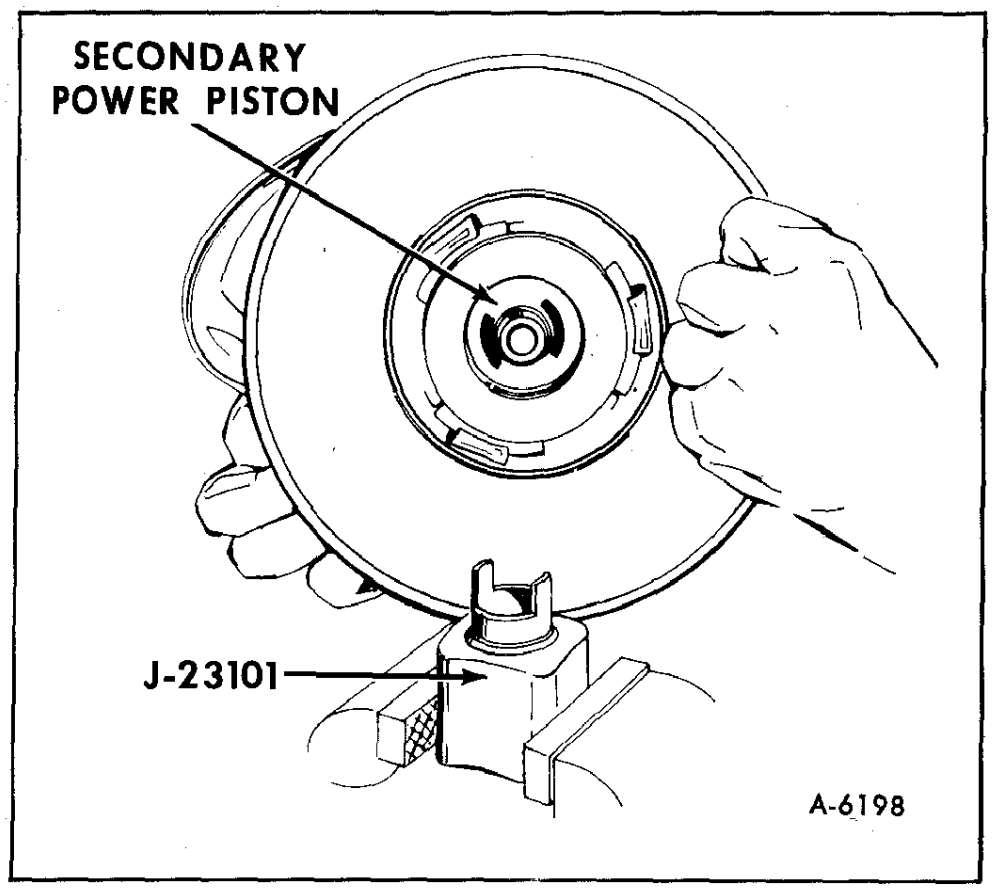

Figure 11—Positioning Secondary Power Piston on Tool J-23101

POWER PISTON GROUP DISASSEMBLY (Figure 10)

1. Lift the bead on the outside diameter of the secondary diaphragm.
2. Remove the piston rod retainer and piston rod from the secondary piston.
3. Mount double-ended Tool J-23101 (with large diameter end up) in a vise. Position the secondary power piston so that the two radial slots in the piston fit over the ears (tangs) of the tool (figure 11).
4. Fold back the primary diaphragm from the outside diameter of the primary support plate. Grip the edge of the support plate and rotate counterclockwise to unscrew the primary power piston from the secondary power piston.

NOTE: It is possible that the primary support plate will unlock from the primary piston before the primary piston unscrews from the secondary piston. If this happens, continue to turn the primary support plate counterclockwise. Tabs (stops) on the primary support will temporarily lock the primary support plate to the primary power piston and permit continued counterclockwise rotation to unscrew the primary power piston from the secondary power piston. (figure 12).

5. Remove the housing divider from the secondary power piston. Remove the secondary power piston bearing from the housing divider.
6. The secondary power piston should still be positioned on Tool J-23101. Fold back secondary diaphragm from outside diameter of

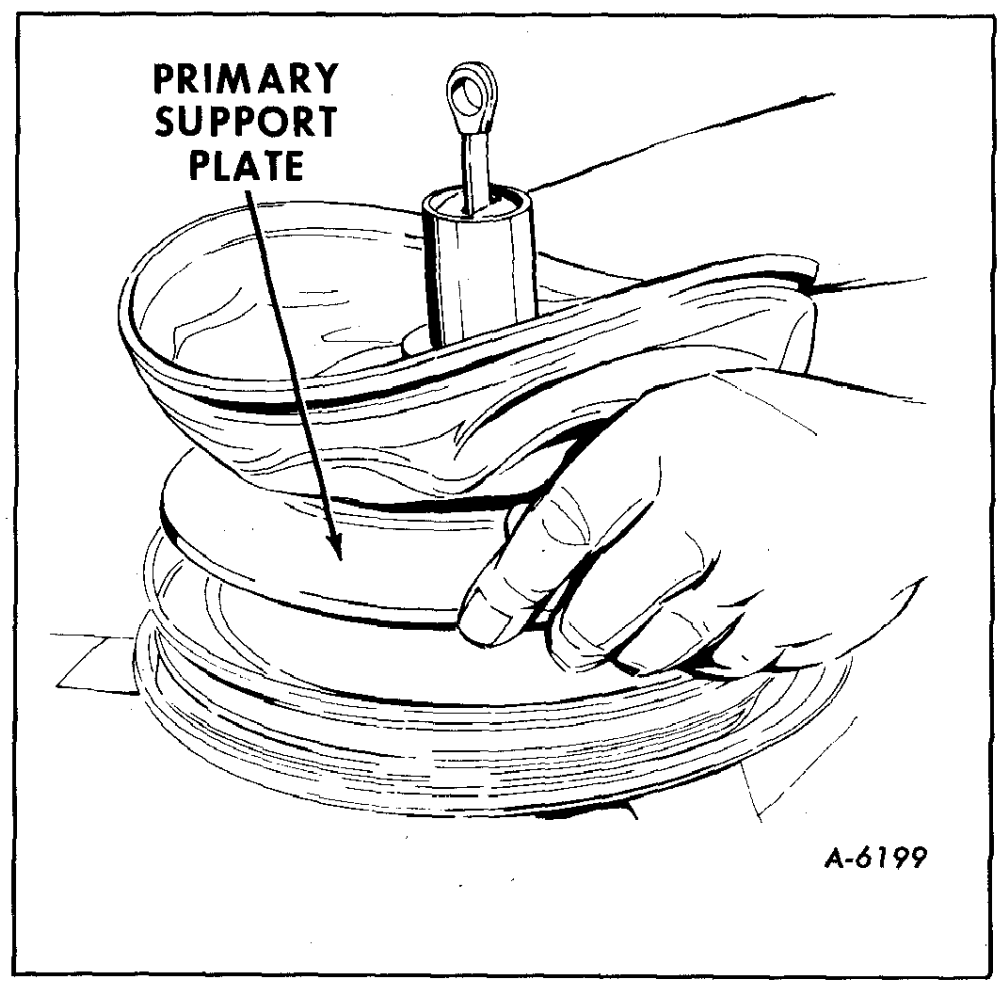

Figure 12—Locking or Unlocking Primary and Secondary Power Pistons

secondary support plate. Grip the edges of the support plate and rotate clockwise to unlock the secondary support plate from the secondary power piston (figure 13).
7. Remove the secondary diaphragm from the secondary support plate.
8. Remove the reaction piston and reaction disc from the center of the secondary power piston by pushing down on the end of the reaction piston with a small object, such as a pencil, wooden dowel or metal rod (figure 14).
9. Remove the air valve spring from the end of the air valve (if it didn't come off during disassembly of the power piston).
10. Mount Tool J-23101 in a vise (with small diameter end up). Position the primary power

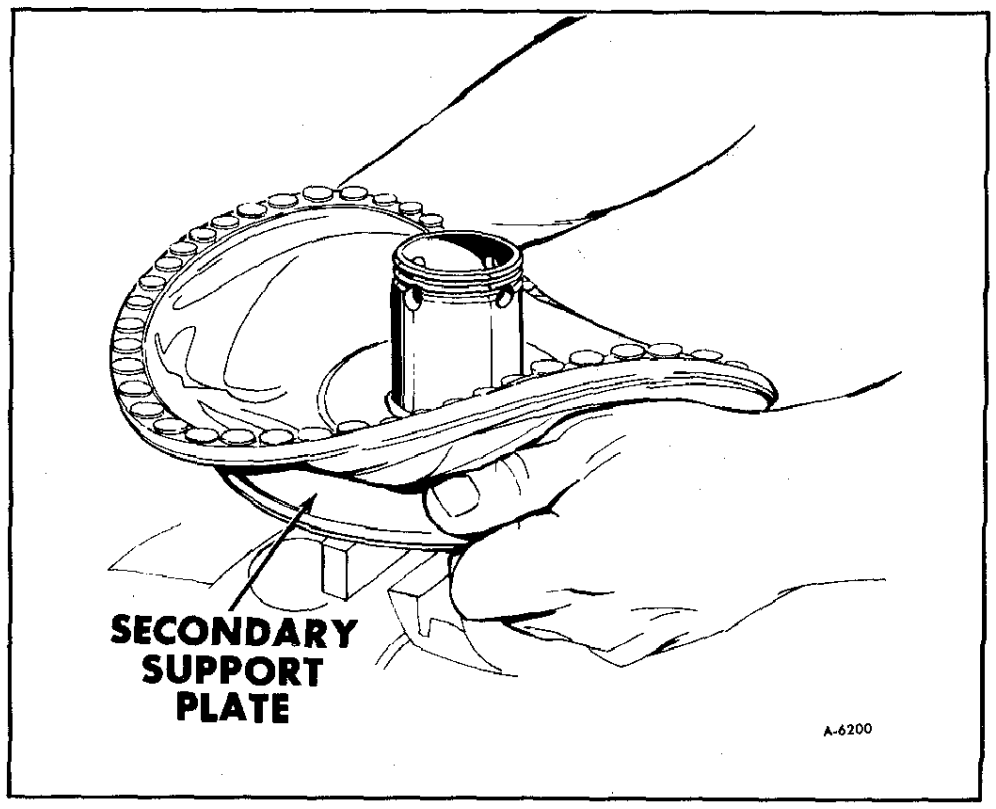

Figure 13—Locking or Unlocking Secondary Support Plate and Secondary Power Piston

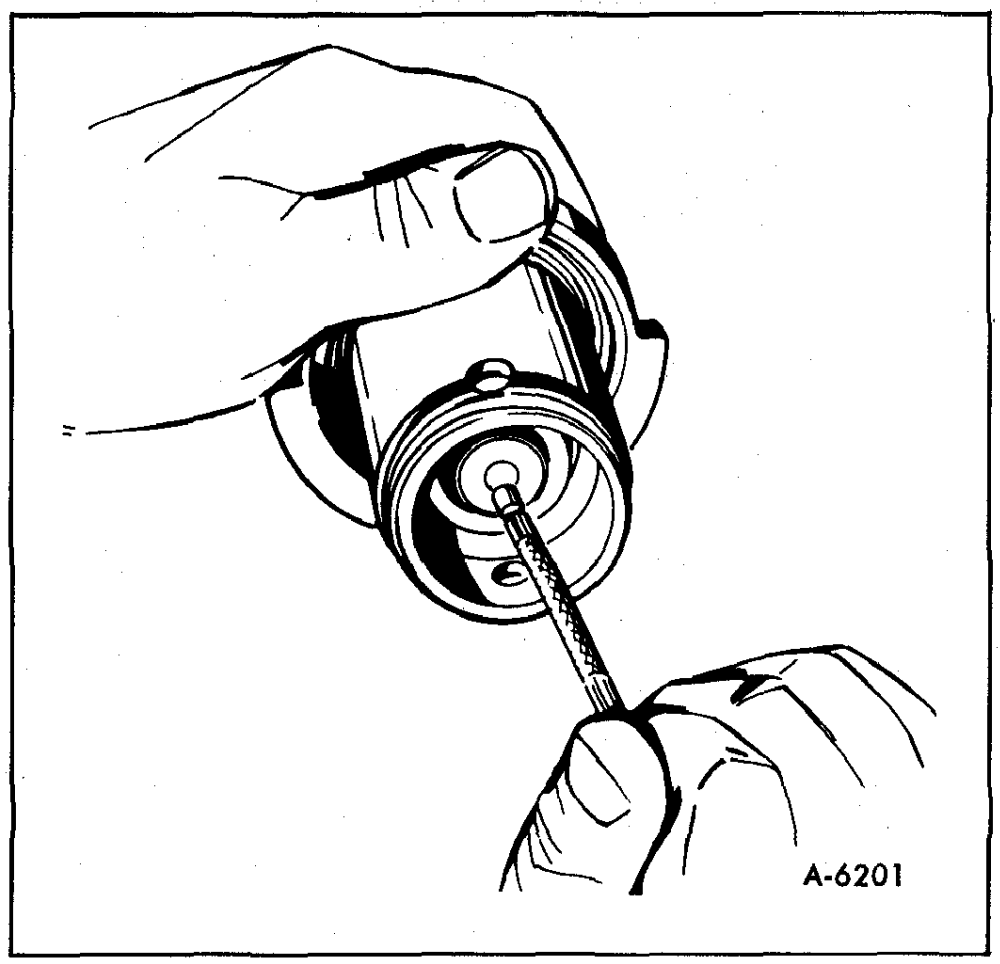

Figure 14—Removing Reaction Piston and Reaction Disc from Secondary Power Piston

piston so that the two radial slots in the piston fit over the ears (tangs) of the tool (figure15).

11. Fold back primary diaphragm from the support plate. Grip the edge of the support plate and rotate in a counterclockwise direction to unlock the primary support plate from the primary power piston (figure 16).

12. Remove the primary diaphragm from the *primary support plate.*

13. Remove the air filter from the tubular section of the primary power piston.

14. Remove the power head silencer from the neck of the power piston tube.

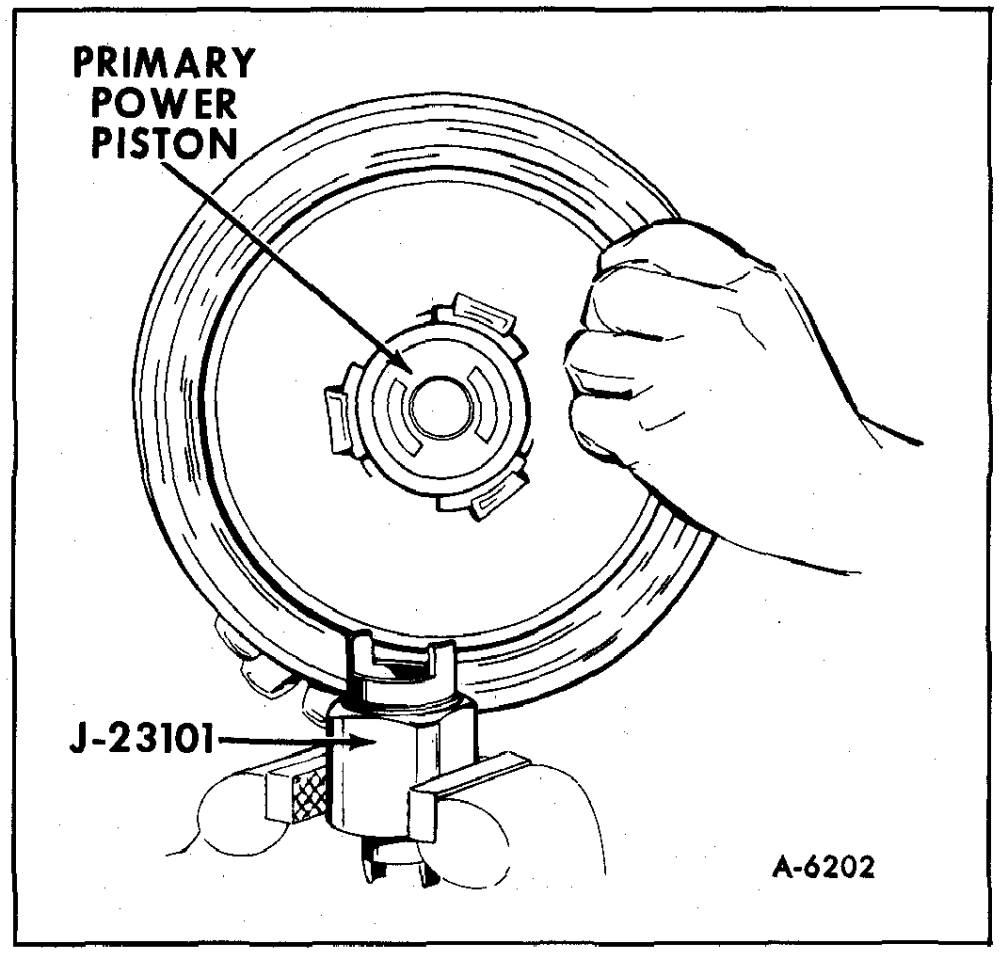

Figure 15—Positioning Primary Power Piston in Tool J-23101 (Small Dia. End Up)

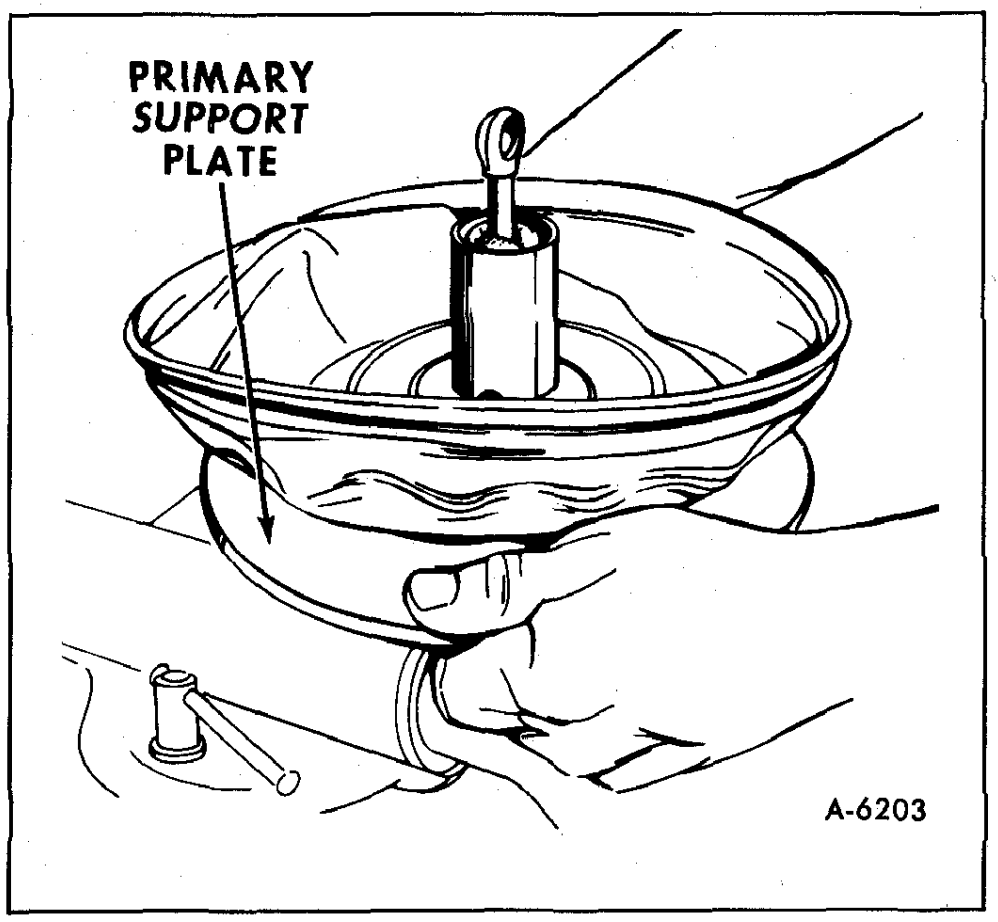

Figure 16—Locking or Unlocking Primary Support Plate from Primary Power Piston

15. Remove the rubber reaction bumper from the end of the air valve.

16. Using snap ring pliers J-4880, remove the retaining ring from the air valve (figure 17).

17. Remove the air valve-push rod assembly from the tube end of the primary power piston. The following removal method is recommended:

Place the primary power piston in an arbor press and press the air valve push rod assembly out the bottom of the power piston tube with a rod not exceeding 1/2" in diameter.

18. Removal of air valve push rod assembly will disassemble control valve retainer.

19. Remove "O" ring seal from air valve.

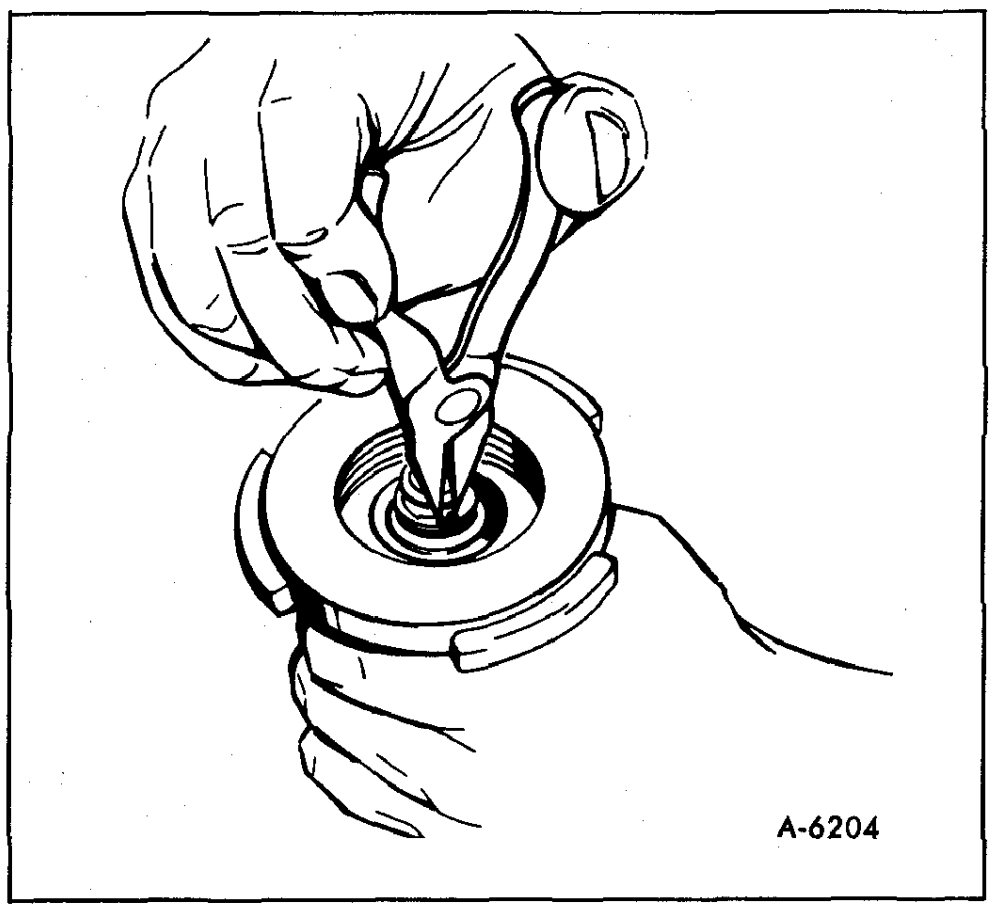

Figure 17—Removing Retaining Ring from Air Valve

INSPECTION CHART		
Part	**Inspect For**	**Corrective Action**
Power Pistons and Support Plates	1. Damaged threads.	1. Replace
	2. Cracks, distortion, chipping, pitted or rough holes, worn seal surfaces (tubes).	2. Clean up or replace.
Piston Rod Retainer	1. Cracks, distortion, chipping.	1. Replace
Air Valve—Push Rod Assembly	1. Air Valve scratches, dents, distortion, or corrosion of I.D. or O.D. All seats to be smooth and free of nicks and dents.	1. Do not repair—Replace.
	2. Push rod must move freely in air valve, but must not pull out.	2. If worn, replace air valve push rod assembly.
	3. Deterioration of rubber or warped valve face in floating control valve.	3. Replace
Spring Retainers	1. Check for cracks, deformation.	1. Replace
Front and Rear Housings	1. Scratches, scores, pits, dents, or other damage affecting rolling or sealing diaphragm or other seals.	1. Replace, unless easily repaired.
	2. Cracks, damaged threads on studs, broken studs.	2. Replace, unless easily repaired.
	3. Bent or nicked locking lugs.	3. Replace, unless easily repaired.
	4. Loose studs.	4. Replace or repair.
Filter and Silencers	1. Dirty	1. Replace

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Figure 18—Delco-Moraine Power Booster Inspection Chart

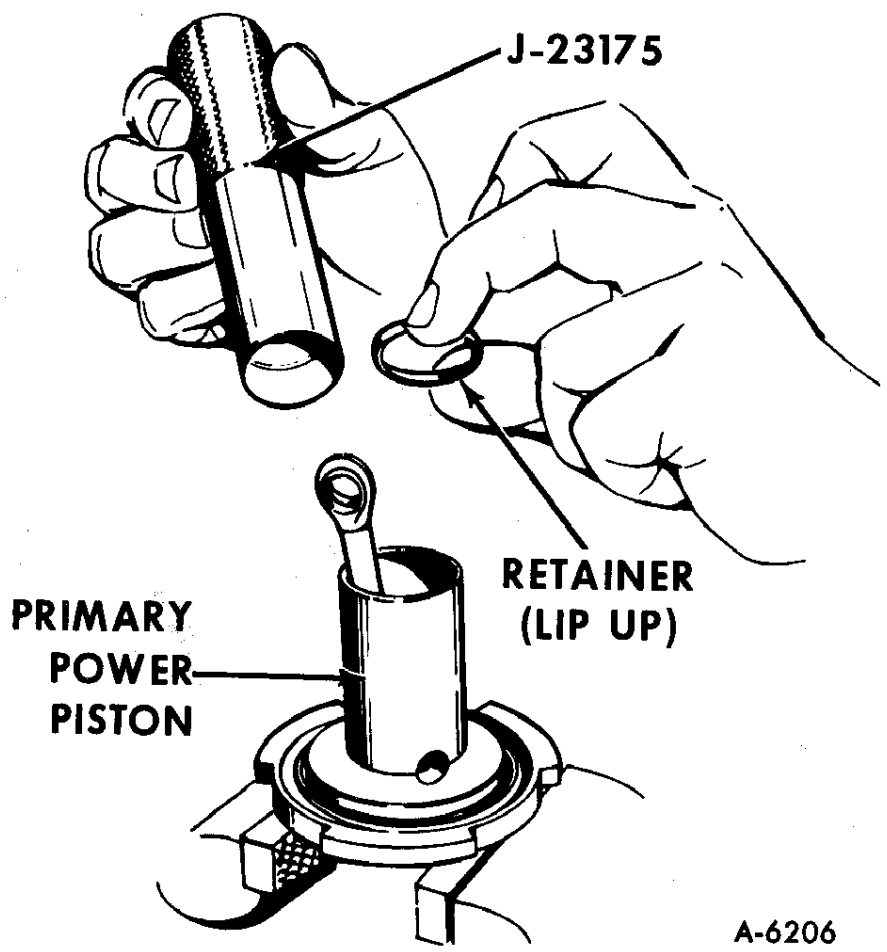

Figure 19—Installing Floating Control Valve Retainer with Installer J-23175

CLEANING

Use denatured alcohol to clean all metal, plastic and rubber parts of the power cylinder. Immerse parts in cleaning fluid and use a hair brush to remove foreign matter. Blow out all passages, orifices and valve holes. AIR DRY and place cleaned parts on clean paper or lint-free cloth. If slight rust is found on inside surface of power cylinder housing, polish clean with crocus cloth or fine emery cloth, then follow with a thorough cleaning as outlined above.

CAUTION: *Use of gasoline, kerosene, antifreeze alcohol or any other cleaner with even a trace of mineral oil, will damage rubber parts.*

INSPECTION

Wipe cleaning fluid from all parts and carefully inspect each part for damage and wear. Inspect rubber parts for cuts, nicks and distortion. These rubber parts are the key to control of air flow and should account for the majority of troubles traceable to leakage. If there is any question whatever as to serviceability of any part, replace it.

Refer to "Inspection Chart" (figure 18) for more detailed instructions.

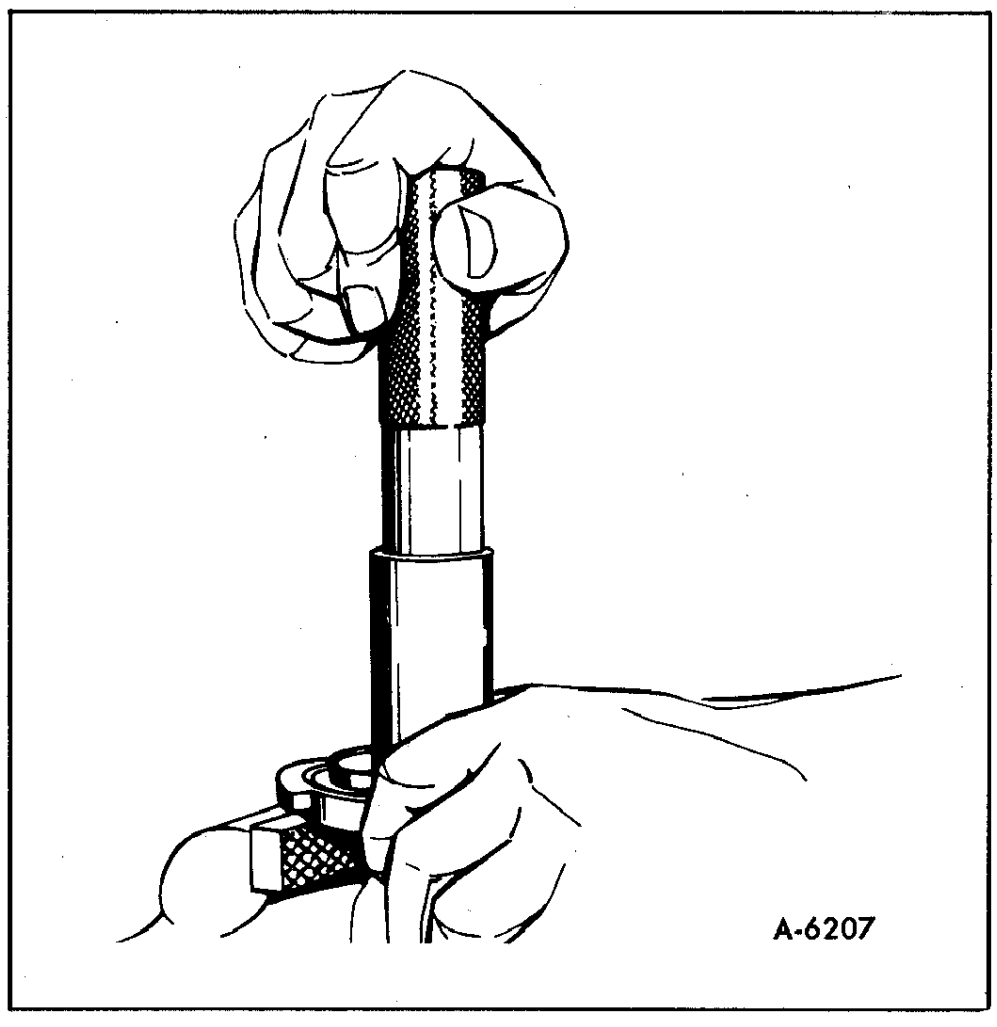

Figure 20—Seating Floating Control Valve with Installer J-23175

ASSEMBLY

CAUTION: *Be sure to keep parts clean until reassembly. Re-wash at reassembly if there is any occasion to doubt cleanliness - such as parts dropped or left exposed for eight hours or longer.*

If you suspect there is any contamination or any evidence of corrosion, completely flush the vehicle hydraulic brake system in accordance with the Maintenance Manual.

Lubricate rubber, plastic and metal friction points with Delco Silicone Lube #5459912 (or equivalent).

Front Housing Group

1. Replace vacuum check valve using a new grommet if old one is cracked or damaged.
2. Place new front housing seal in housing so flat surface of cup lies against bottom of depression in housing.

Power Piston Group

1. Lubricate the inside diameter and outside diameters of the "O" ring seal with Delco Silicone Lube #5459912 (or equivalent) and place on the air valve.
2. Wipe a thin film of Delco Silicone Lube #5459912 (or equivalent) on the large and small outside diameter of the floating control valve.

NOTE: If the floating control valve needs replacement, it will be necessary to replace the complete air valve-push rod assembly.

Since the floating control valve is a component part of this assembly and cannot be disassembled from the push rod.

3. Place the air valve end of the air valve push rod assembly into the tube of the primary power piston. Manually press the air valve push rod assembly so that the floating control valve bottoms on the tube section of the primary power piston. Installer Tool J-23175 can be used to manually press the floating control valve to its seat.

4. Place the inside diameter of the floating control valve retainer on the outside diameter of floating control valve Retainer Installer J-23175. Place over the push rod so that the closed side of the retainer seats on the floating control valve (figure 19). With Installer J-23175, manually press the retainer and floating control valve assembly to seat in the primary power piston tube (figure 20).

5. The filter element can now be stretched over the push rod and pressed into the primary power piston tube.

6. Using Snap Ring Pliers J-4880, place the retaining ring into the groove in the air valve (figure 17).

7. Position the rubber reaction bumper on the end of the air valve.

NOTE: Tolerances of component parts affecting output of the power booster are very critical. To maintain correct power brake output, the power piston assembly is serviced as an assembly which includes a pre-selected REACTION PISTON, PRIMARY POWER PISTON, and SECONDARY POWER PISTON. No gauging is required when power piston service package is used.

8. Assemble the primary diaphragm to the primary support plate from the side of the support plate opposite the locking tangs. Press the raised flange on the inside diameter of the diaphragm through the center hole of the support plate. Be sure that the edge of the support plate center hole fits into the groove in the raised flange of the diaphragm. Lubricate the diaphragm inside diameter and the raised surface of the flange (that fits into a groove in the primary power piston) with a light coat of Delco Silicone Lube #5459912 (or equivalent).

9. Mount Tool J-23101 (small diameter end up) in a vise. Position the primary power piston so that the two radial slots in the piston fit over the ears (tangs) of the tool (figure 15).

10. Fold the primary diaphragm away from the outside diameter of the primary support plate.

11. Holding the edges of the support plate, with the locking tangs down, place the primary support plate and diaphragm assembly over the tube of the primary power piston. The flange on the inside diameter of the primary diaphragm will fit into a groove in the primary power piston.

12. Grip the edges of the primary support plate, press down, and rotate clockwise until the tabs on the primary power piston contact the stops on the support plate (figure 16).

13. Place the power head silencer on the tube of the primary power piston so that the holes at the base of the tube are covered.

14. Apply Delco Silicone Lube #5459912 (or equivalent) to the outside diameter of the primary power piston tube.

15. Remove the primary piston assembly from Tool J-23101 and lay it aside.

16. Assemble the secondary diaphragm to the secondary support plate from the side of the support plate opposite the locking tangs. Press the raised flange on the inside diameter of the diaphragm through the center hole of the support plate. Be sure that the edge of the support plate center hole fits into the groove in the raised flange of the diaphragm. Apply a thin coat of Delco Silicone Lube #5459912 (or equivalent) to the inside diameter of the secondary diaphragm and the raised surface of the flange (that fits into a groove in the secondary power piston).

17. Mount Tool J-23101 (with large diameter end up) in a vise. Position the secondary power piston so that the radial slots in the piston fit over the ears (tangs) of the tool. Apply a light coat of Delco Silicone Lube #5459912 (or equivalent) to the tube of the secondary power piston (figure 11).

18. Fold the secondary diaphragm away from the outside diameter of the secondary plate.

19. Holding the edges of the support plate with the locking tangs down, place the secondary diaphragm and support plate assembly over the tube of the secondary power piston. The flange of the inside diameter of the secondary diaphragm will fit into the groove in the secondary piston.

20. Grip the edges of the secondary support plate, press down, and rotate counterclockwise until the tabs on the secondary power piston contact the stops on the support plate. Fold the secondary diaphragm back into position on the secondary support plate. Leave the secondary power piston assembly on Tool J-23101 in the vise (figure 13).

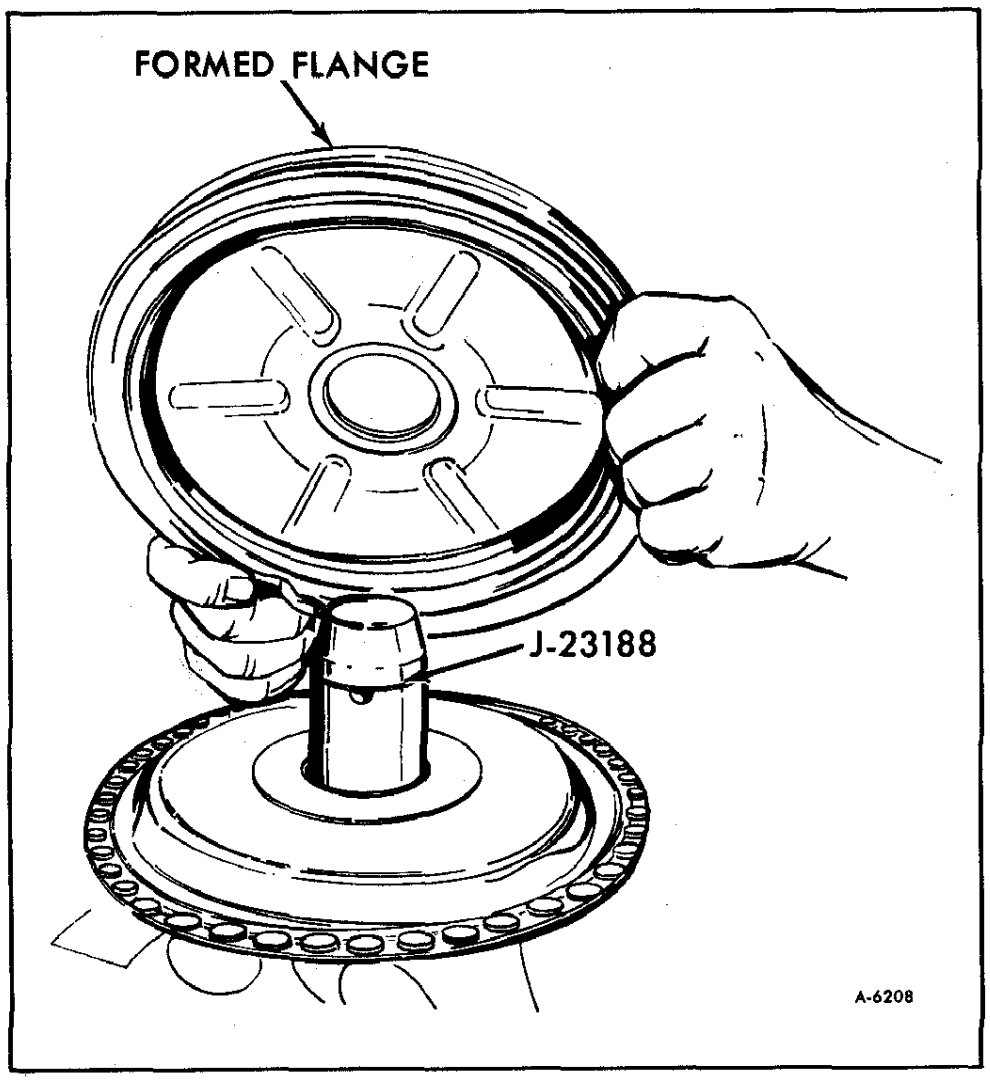

Figure 21—Positioning Housing Divider Over Secondary Bearing Protector Tool J-23188

21. Apply a light coat of talcum powder or Delco Silicone Lube #5459912 (or equivalent) to the bead on the outside diameter of the secondary diaphragm. This will faciltate reassembly of front and rear housings.

22. Hold the housing divider so that the formed over flange (that holds the primary diaphragm) of the divider faces down. Place the secondary bearing in the inside diameter of the divider so that the extended lip of the bearing faces up.

23. Lubricate the inside diameter of the secondary bearing with Delco Silicone Lube #5459912 (or equivalent).

24. Position secondary Bearing Protector Tool J-23188 on the threaded end of the secondary power piston (figure 21).

25. Hold the housing divider so that the six oblong protrusions on the middle of the divider are facing up. Press the divider down over the tool and onto the secondary power piston tube where it will rest against the diaphragm support ring. Remove Tool J-23188 from secondary power piston; however, do not remove the secondary power piston sub-assembly from Tool J-23101.

26. Pick up the primary power piston assembly and fold the primary diaphragm away from the outside diameter of the primary support plate.

27. Position the small end of the air valve return spring on the air valve so that it contacts the air valve retaining ring.

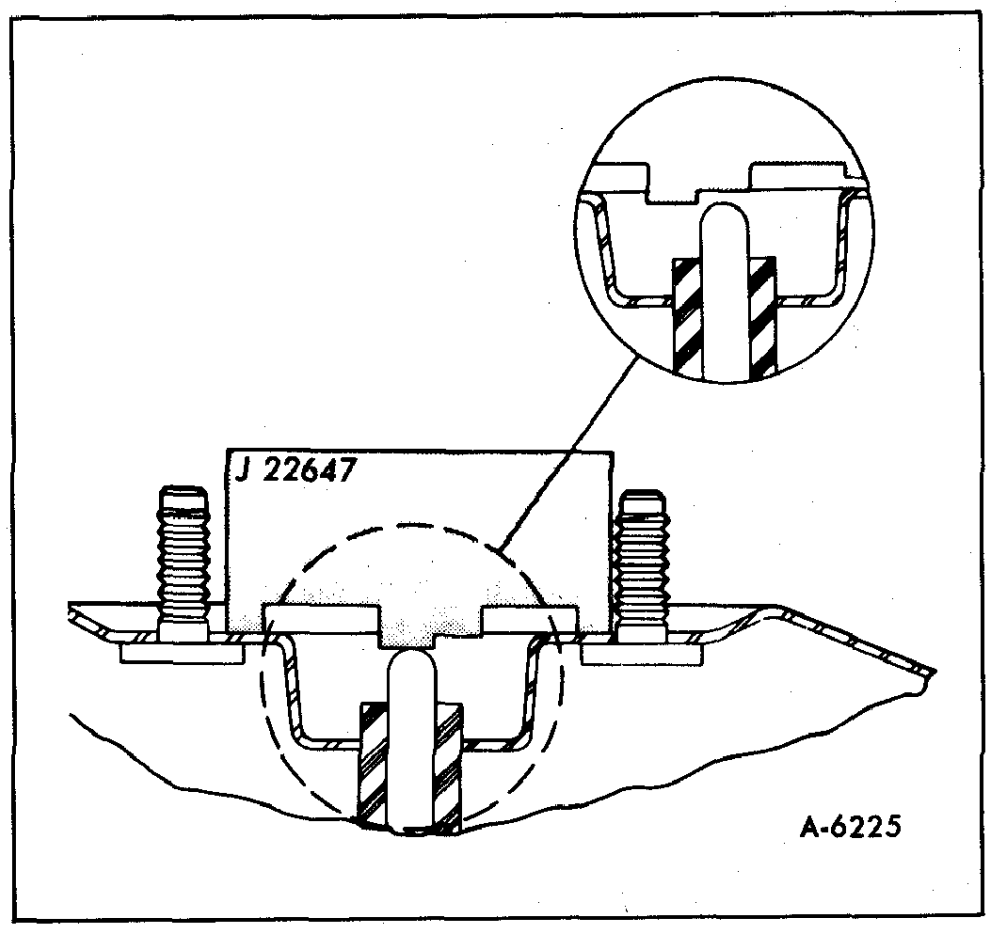

Figure 22—Gauging Piston Rod

28. Position the primary power piston on the tubular portion of the secondary power piston, making sure that the air valve return spring seats down over the raised center section of the secondary power piston.

29. Grip the edge of the primary support plate, press down, and start the threads on the secondary power piston into the threaded portion of the primary power piston by rotating in clockwise direction (figure 12).

30. Continue to tighten the primary power piston until it is securely attached (approximately 5-15ft. lbs.) to the secondary power piston.

31. Fold the primary diaphragm back into position on the primary support plate and pull the diaphragm outside diameter over the formed flange of the housing divider. Check that the bead on the diaphragm is seated evenly around the complete circumference.

32. Wipe a thin film of Delco Silicone Lube #5459912 (or equivlanet) on the outside diameter of the piston rod retainer. Insert the master cylinder piston rod so that the flat end bottoms against the rubber reaction disc in the bottom of the cavity.

Rear Housing Group

1. Coat the inside diameter of the rear housing seal with Delco Silicone Lube #5459912 (or equivalent).

2. Place the NEW seal in the rear housing center hole so that the formed flange of the housing center hole fits into the groove of the seal. The thin lip of the seal will protrude to the outside of the housing.

FINAL ASSEMBLY

1. Mount the front housing assembly in a vise.

2. Position the power piston return spring over the inset in the front housing.

3. Assemble the power piston group to the rear housing by pressing the tube of the primary piston through the rear housing bearing. Press down until the housing divider seats in the rear housing and the primary power piston bottoms against the housing.

4. Hold the rear housing assembly (with mounting studs up) over the front housing. (Make sure that the piston rod retainer does not dislodge from the secondary housing power piston during this operation.) Position the rear housing so that when the tangs on the edge of the front housing are locked in the slots on the edge of the front housing, the scribe marks on the top of the housings will be in line.

5. Lower the rear housing assembly onto the front housing. The power piston spring must seat in the depression in the face of the secondary power piston. Check that the bead on the outside diameter of the secondary diaphragm is positioned between the edges of the housing.

6. Continue to press down on the rear housing and fit the slots in the appropriate tangs on the front housing.

7. To facilitate locking, position front housing seal in the depression in the front housing and apply a vacuum source to the vacuum check valve in the front housing. Using Tool J-23456, press down and rotate the rear housing clockwise into the locked position. Remove Tool J-23456; remove the vacuum source. See Figure 9.

8. Place the silencer in the closed end of the power head boot. Push the boot retainer over the boot. Stretch the boot over the push rod and over the flange in the center of the rear housing.

9. Place the booster assembly in a padded vise with the front housing facing up. Insert the master cylinder push rod, flat end first, into the piston rod retainer.

10. Press down on the master cylinder piston rod (with approximately 40-50 pound load) to be sure it is properly seated.

11. Remove the front housing seal to be sure that no vacuum is in the power head while gauging.

12. Place gauge J-22647 over the piston rod in a position which will allow the gauge to be moved to the left or right without contacting the studs (see figure 22).

NOTE: The adjustment is correct if the lower step contacts the piston rod and the upper step clears the piston rod.

13. If the push rod is not within specifications and the push rod does not have an adjusting screw, a new service adjustable push rod must be installed and adjusted to specification. If the push rod being checked has an adjusting screw, adjust the push rod to specification.

14. Wipe a thin film of lubricant on the inside diameter of the front housing seal and position seal in the depression in the opening.

15. Position the master cylinder assembly on the front housing. Install the master cylinder retaining nuts and tighten to 28 foot - pounds torque.

SECTION 6A
ENGINE

The information described in Maintenance Manual X-7525 under the heading ENGINE (SEC. 6A) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

PISTON PINS

The correct piston pin fit in the piston is .0003" to .0005" loose. If the pin to piston clearance is to the high limit (.0005"), the pin can be inserted in the piston with very little hand pressure and will fall through the piston by its own weight. If the clearnce is .0003", the pin will not fall through. It is important that the piston pin hole be clean and free of oil when checking pin fit. The pin is a press fit in the connecting rod.

There is a new Piston Pin Tool Set, J-24086 (figure 1) for use whenever the replacement of a piston pin is necessary. The 455 cubic inch engine (with a piston pin diameter of .9803" – .9807") has a wide connecting rod pin boss. Use Pin Guide J-24086-2 (GREEN) for this engine application. The Installer J-24086-9 should be set at G-6 when new piston pins are being installed.

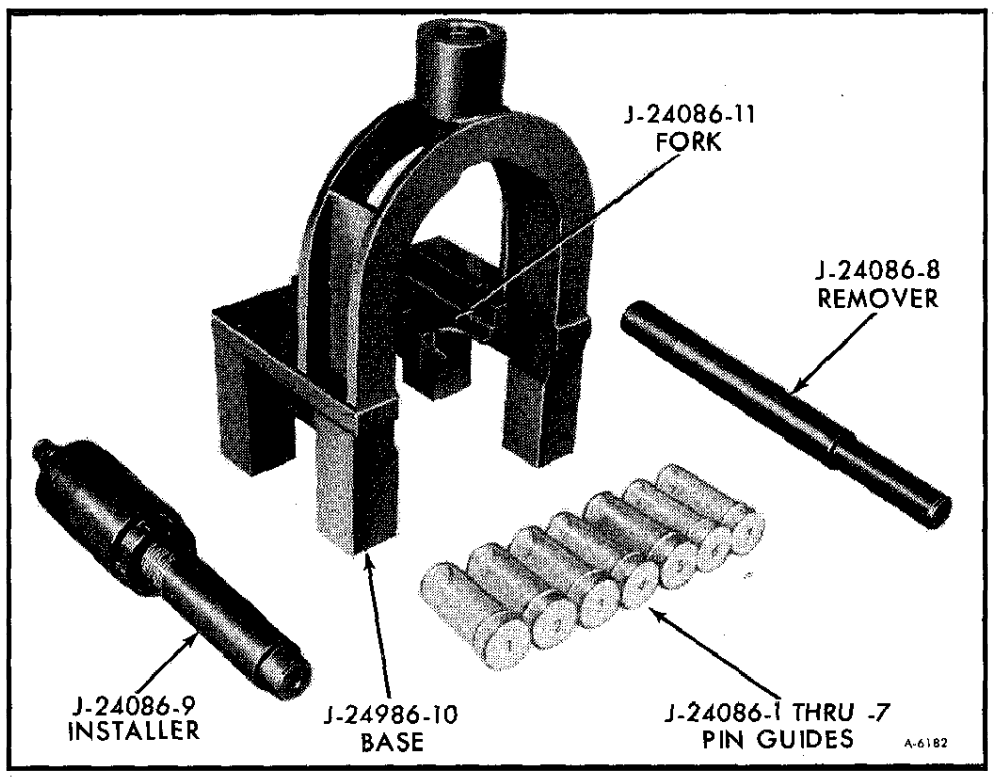

Figure 1—Piston Pin Tool Set J-24086

PISTON PIN REMOVAL

1. Position Tool J-24086-11, the Support Fork of the piston pin tool set, between the connecting rod and piston. (See figure 2.)

2. Install the J-24086-8 Removal Arbor through the alignment hole in the tool base.

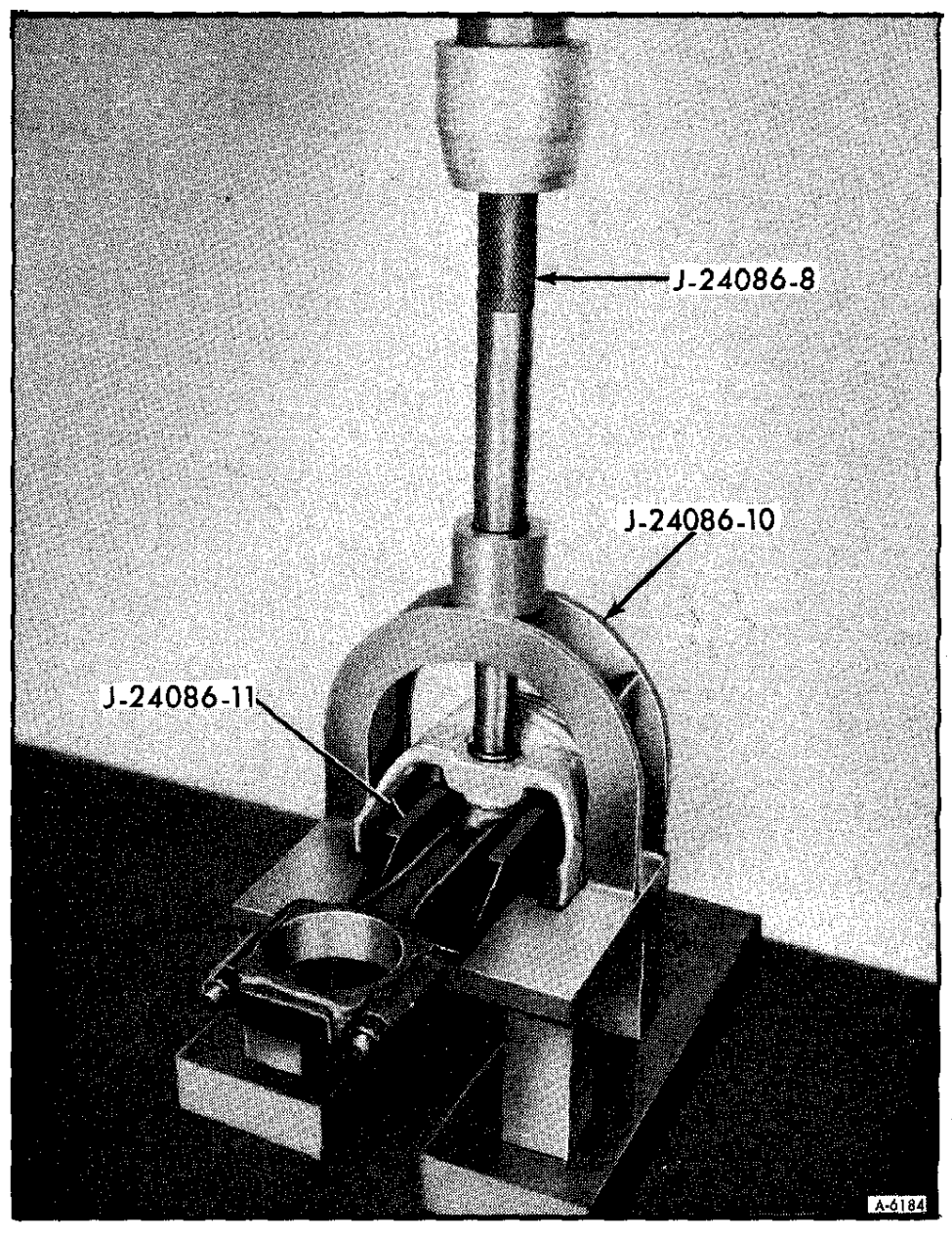

Figure 2—Removing Piston Pin with J-24086-8

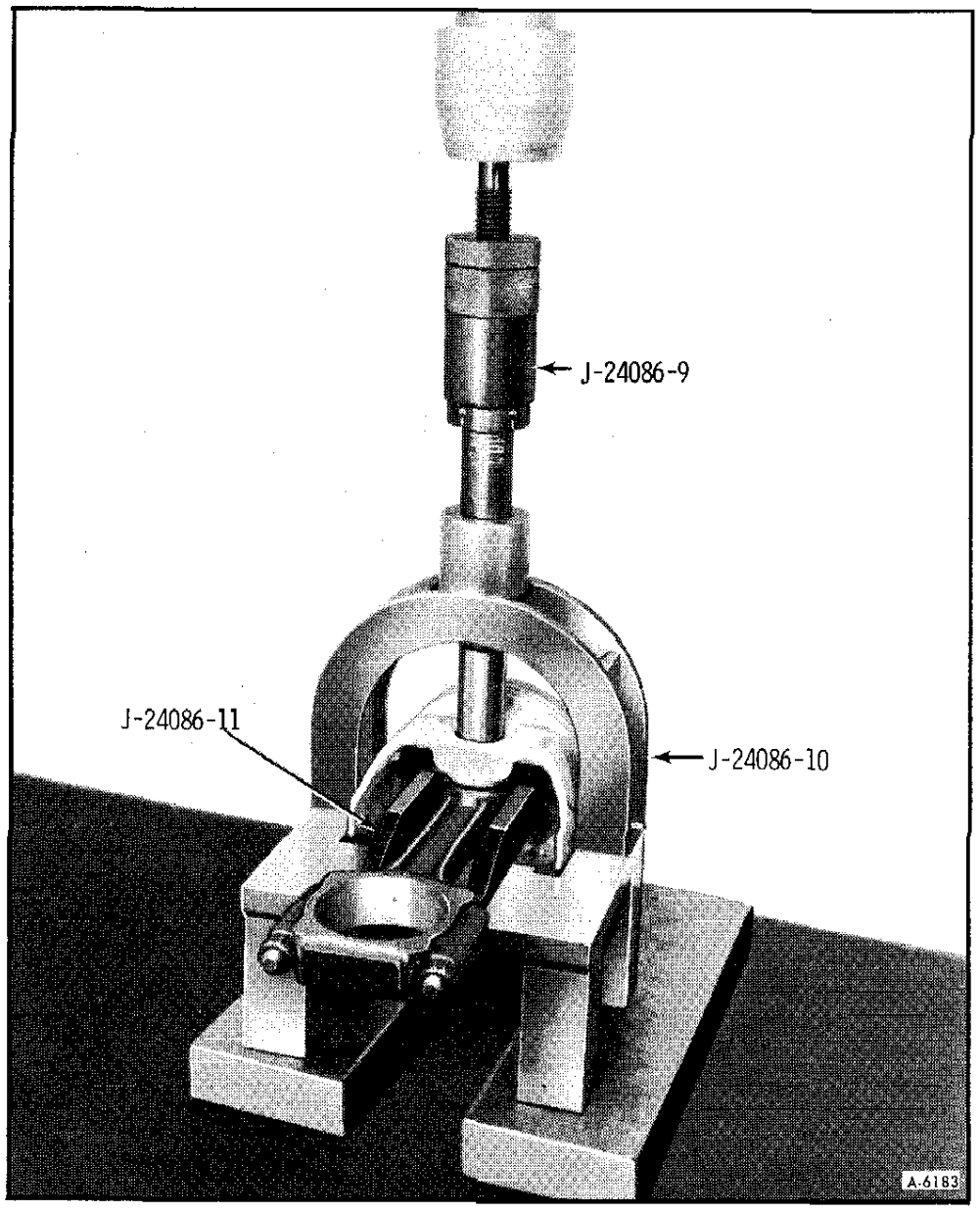

Figure 3—Installing Piston Pin with J-24086-9

NOTE: It is important that the piston, rod and pin assembly be centered with the removal arbor.

3. Press the piston pin out of the connecting rod.

PISTON PIN INSTALLATION

1. Install proper pin guide (J-24086-2, Green) through piston and into connecting rod. Hand tap pin guide into piston for proper retention. Drop piston pin into the other side of the piston.

NOTE: The pin guide centers the connecting rod in the piston. When the piston, connecting rod, piston pin and pin guide assembly are positioned on the fork of the tool, the pin guide will also center this assembly in the tool. If a pin guide that is too small is used, the piston assembly will not be located centrally in the tool, and damage may occur to the fork of the tool.

2. Install piston assembly onto fork *assembly of tool. Tool will support connecting* rod at the piston pin. Be sure piston assembly is slid onto the fork until the pin guide contacts the fork.

3. Adjust the Installing Arbor, J-24086-9, to the proper length by turning the numbered sleeve on the lettered shaft until the specified alphanumeric setting (G-6) is obtained. Turn knurled nut to lock numbered sleeve on shaft.

4. Insert the installing arbor through the hole in the arch of the tool (figure 3). Press piston pin into the connecting rod until the sleeve on the installing arbor contacts the top of the tool arch. The pin guide will fall out of the connecting rod as the piston pin is pressed in.

CAUTION: *Do not exceed 5000 lbs. of force when stopping the installing arbor sleeve against the arch.*

ENGINE REPLACEMENT

INSTALLATION CAUTION

CAUTION: *When installing new or repaired engine and its attachments, correct routing of the power steering hoses is very important. Although sequence of assembly is not vital, the power steering hoses, when installed, must not be twisted, kinked, or tightly bent. The hoses should have sufficient natural curvature in the routing to absorb movement and hose shortening in operation under pressure. They should also be free of twist under strain. All fittings must be held while tightening or loosening nuts.*

SECTION 6Y
ENGINE ELECTRICAL

The information described in Maintenance Manual X-7525 under the heading ENGINE ELECTRICAL (SEC. 6Y) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

MAINTENANCE-FREE BATTERIES

The maintenance-free battery is identified by the absence of vent plugs on the cover. The side-mounted positive and negative terminals are tightly sealed to retard possible leakage. Except for the small vent hole located on the side, the battery is completely sealed. The vent hole should be free from obstruction because it allows gases produced in the battery to escape. At normal charging voltages, the amount of these gases is extremely small, due to the special chemical composition in the battery grid design. Water never needs to be added to the maintenance-free battery.

CHARGE-TEST INDICATOR

A charge or test indicator in the battery cover provides a visual inspection area for testing purposes only. Correct use of this feature is important. Refer to "Testing Maintenance-Free Batteries" below. Refer also to figure 1 in this section.

TESTING MAINTENANCE-FREE BATTERIES

STEP 1 - VISUAL INSPECTION

Check for obvious damage, such as cracked or broken case or cover that could permit loss of electrolyte. If obvious physical damage is noted, replace battery. Determine cause of damage and correct as necessary.

STEP 2 - CHARGE OR TEST INDICATOR

The charge or test indicator, built into the top cover, provides a visual inspection area for battery testing only. This test indicator is to be used only with accepted diagnostic procedures. It is not to be used by itself to determine if the battery is good or bad, or charged or discharged. The indicator includes a plastic rod that extends into the electrolyte. At the bottom of the rod, a green plastic ball is suspended in a cage. When the electrolyte specific gravity is about 1.225 or above, the green ball floats against the end of the rod and becomes visible so that the indicator appears

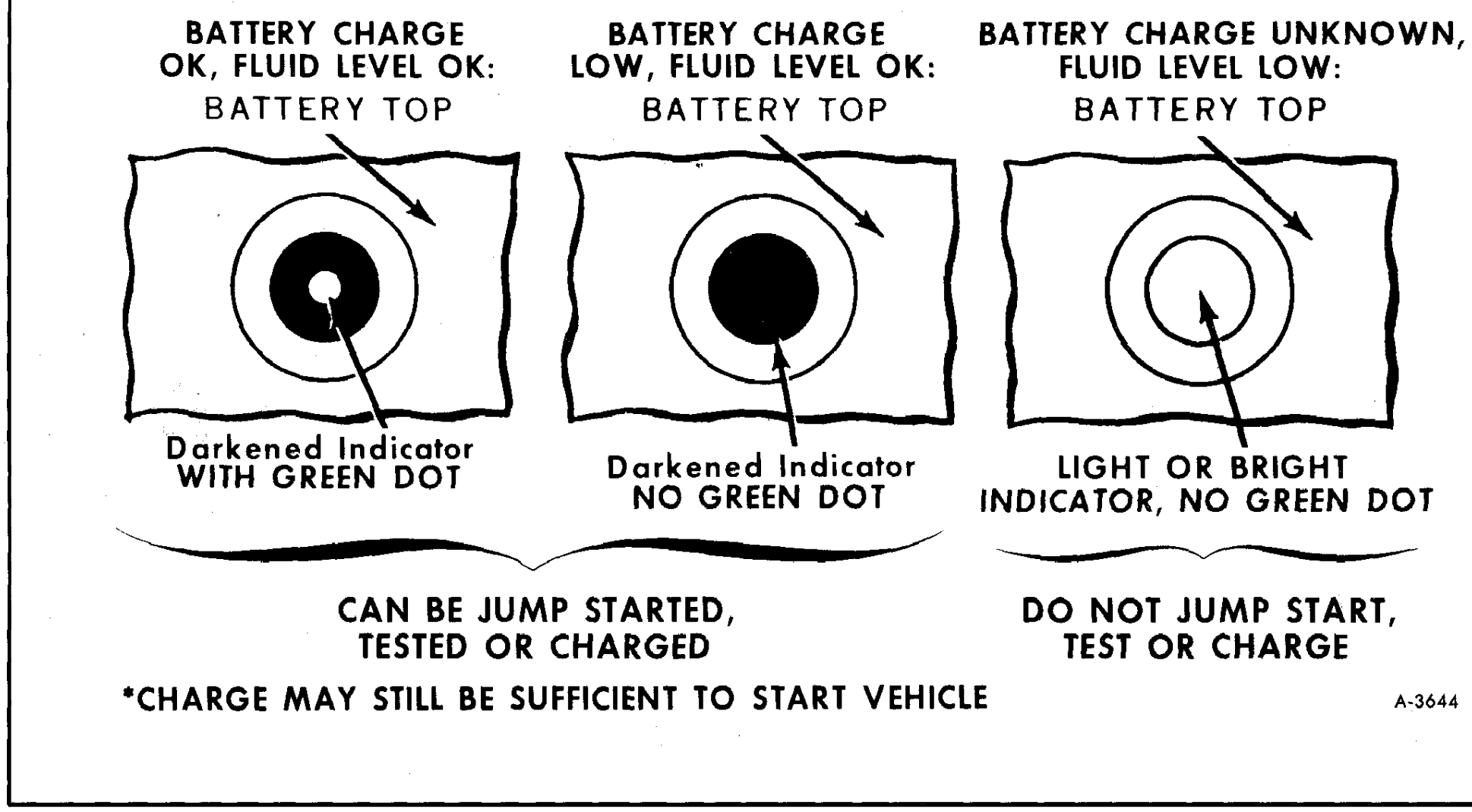

Figure 1—Charge or Test Indicator Conditions (Maintenance-Free Batteries)

GREEN. At this 1.225 specific gravity, the battery is approximately 3/4 full charge. When the battery is less than about 3/4 fully charged, the green ball sinks and the indicator appears DARK. When the electrolyte level drops below a minimum level, i.e., below the pointed tip of the rod, the indicator window changes to YELLOW or CLEAR. In this case the charging system should be checked. Although the battery is capable of further service, if a cranking complaint has been reported, replace the battery. DO NOT CHARGE, TEST OR JUMP START.

It is important when observing the test indictor that the battery be relatively level and have a clean top so that the correct indication may be seen. A light may be required in some poorly lit areas. Following are the possible test indicator readings:

A. GREEN DOT VISIBLE.

Any green appearance is interpreted as a "green dot" and the battery is ready for testing. Proceed to step 3.

B. DARK--GREEN DOT NOT VISIBLE.

Battery must be charged before testing. Refer to "Charging Guide" in Maintenance Manual X-7525, Sec. 6Y.

NOTE: Battery should be charged until green dot appears, but not more than 60 ampere hours (for example - 15 amperes for four hours). Do not charge a battery if the green dot is visible. (On rare occasions immediately following periods of prolonged cranking, the green dot may still remain visible. If left alone, the dot will disappear in a short time. Should this occur, a boost-charge of 20 ampere-hours is recommended.)

C. LIGHT.

DO NOT attempt charging or testing when charge indicator is light. Check charging system.

CAUTION: *To avoid explosion hazard, never attempt to charge or jump start a maintenance-free battery which exhibits a light indicator condition. Departures from this procedure could result in serious personal injury or property damage.*

STEP 3 - REMOVE SURFACE CHARGE

Connect 300-ampere load across terminals for 15 seconds to remove surface charge from the battery. If maintenance-free battery is in vehicle, connection may be made to existing terminals. If battery is out of vehicle, adapters for the side terminals are required.

STEP 4 - LOAD TEST

A. For battery model 89-5, connect voltmeter and 230-ampere load across term-

inals. For battery model 85-5, connect voltmeter and 170-ampere load across terminals.

B. Read voltage after 15 seconds with load connected, then disconnect load.

C. If minimum voltage is 9.6 or more, battery is good.

D. If minimum voltage is less than 9.6, replace battery.

The 9.6 voltage is to be used for battery ambient temperatures of 70°F. (21°C.) and above. For temperatures below 70°F. refer to "Voltage and Temperature Chart," Maintenance Manual X-7525, Sec. 6Y.

JUMP STARTING WITH AUXILIARY (BOOSTER) BATTERY

Both booster and discharged battery should be treated carefully when using jumper cables. Follow exactly the procedure outlined below, being careful not to cause sparks:

CAUTION: *Departures from these conditions or the procedure below could result in: (1) serious personal injury (particularly to eyes) or property damage from such causes as battery explosion, battery acid, or electrical burns; and/or (2) damage to electronic components of either vehicle.*

Never expose battery to open flame or electrical spark - batteries generate a gas which is flammable and explosive. Do not allow battery fluid to contact eyes, skin, fabrics, or painted surfaces- fluid is a corrosive acid. FLUSH ANY CONTACTED AREA WITH WATER IMMEDIATELY AND THOROUGHLY. Be careful that metal tools or jumper cables do not contact the positive battery terminal (or metal in contact with it) and any other metal on the vehicle, because a short circuit could occur. Batteries should always be kept out of the reach of children.

Jump starting done improperly may be dangerous and should be attempted ONLY if the following three conditions are met:

1. THE BATTERY IN THE OTHER VEHICLE: This must be 12-VOLT and NEGATIVELY GROUNDED, like the batteries in THIS vehicle. (Check the other vehicle's owner's manual to see if it is.)

2. THE BATTERY IN THIS VEHICLE: must be equipped with FLAME ARRESTOR TYPE FILLER/VENT CAPS on ALL filler openings (as was the original equipment battery), or it must be a sealed - type battery which does not have filler openings or caps, such as the maintenance-free batteries. (Each battery flame arrestor cap has a grey disc rather than a small hole. If the battery does not have flame arrestor caps, or is not a sealed - type battery, see "Alternate Procedure" before proceeding.)

3. IF THE BATTERY IS A SEALED - TYPE BATTERY: without filler openings or caps, its charge or test indicator MUST BE DARK, with or without green dot showing. (Refer to figure 1.) DO NOT ATTEMPT JUMP STARTING IF THE TEST OR CHARGE INDICATOR HAS A LIGHT OR BRIGHT CENTER. (If the vehicle will not start, and the charge or test indicator is light, replace the battery.)

JUMP START PROCEDURE

1. WEAR EYE PROTECTION and remove rings, metal watch bands, and other metal jewelry.

2. Set parking brake firmly and place automatic transmission in "PARK" in both vehicles (DON'T LET VEHICLES TOUCH); and turn ignition key to "LOCK" in vehicle with discharged battery. (Neutral and "OFF" in vehicles with manual transmission). Also turn off lights, heater, and all unnecessary electrical loads.

3. If either battery is so equipped, remove vent caps and check fluid level. If fluid level is OK, REPLACE CAPS BEFORE PROCEEDING; if level is low, add drinking water, and REPLACE CAPS BEFORE PROCEEDING. If no water is available, leave caps off and cover filler openings with a cloth BEFORE PROCEEDING. Dispose of cloth and replace caps after jump starting.

4. Attach one end of a jumper cable to the positive terminal (identified by a red color, "+", or "P" on the battery case, post, or clamp) of the battery in the other vehicle, and the other end of the same cable to positive terminal junction block stud, marked "VEHICLE BATTERY POSITIVE." This is located behind the right access door above the main (automotive) battery.

5. Attach the remaining jumper cable FIRST to the negative terminal (black color, "–", or "N") of the OTHER vehicle's battery

(regardless of which vehicle has the discharged battery), and THEN attach to the right radiator mounting bracket in THIS vehicle - thus taking advantage of the battery's flame arrestor feature, should a spark occur.

6. Start engine in the vehicle that is providing the jump start (if it was not running). Let run a few minutes, then start the engine in the vehicle that has the discharged battery.

7. Reverse the above sequence EXACTLY when removing the jumper cables, taking care to remove the cable from the right radiator mounting bracket in THIS vehicle as the FIRST step.

ALTERNATE PROCEDURE

If the battery in this vehicle has been replaced and does not have flame arrestor caps, or is not a sealed - type maintenance-free battery, one of the following alternatives should be followed:

A. If the battery in the other vehicle is equipped with flame arrestors, follow the procedure above but make the final connection at the other vehicle's battery. Then when removing cables, remove connection first from the other vehicle's battery.

B. If neither battery has flame arrestor caps, remove the filler/vent caps from the battery in this vehicle and place a disposable cloth over the filler openings. Follow the procedure above but make the final connection on this vehicle's right radiator mounting bracket.

MAINTENANCE-FREE BATTERY SPECIFICATIONS

Part No.	1980402	1980400
Model No.	R89-5	R85-5
Volts	12	12
Watt Rating @ 0°F. (–17.8°C.)	4000	3200
Cold Cranking Rating (in Amps) @ 0°F. (–17.8°C.)	465	350
Cold Cranking Rating (in Amps) @ –20°F. (–29°C.)	375	270
Minutes Reserve Capacity @ 25 Amps	125	80
Amps for Load Test	230	170

GENERATING SYSTEM

GENERATOR QUICK CHECK

When generator tell-tale light is on, following procedure will aid in determining cause of problem:

1. With vehicle not running, attach voltmeter leads across automotive battery terminals, the red lead to the battery positive (+) terminal and the black lead to the battery ground (–) terminal.

2. Check voltage reading. If battery is fully charged, voltage reading should be approximately 12.6 volts. If battery is discharged, voltage will be less.

3. Crank the engine. With engine running at fast idle, there should be an immediate voltage rise to approximately 13.6 to 14.2 volts. This indicates that the generator is functioning. If voltage does not rise when engine is started, then problem exists in generator circuit itself. To check, refer to "Generating System Trouble Symptoms," Sec. 6Y, Maintenance Manual X-7525.

If voltage rises to 13.6 volts or above when engine is started, but tell-tale light remains on, then problem exists in tell-tale circuit. Proceed to check tell-tale warning circuit.

GENERATING SYSTEM DIAGNOSIS

UNDERCHARGED BATTERY

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 indicator lamp may be operating normally. The following procedure also applies to circuits with an ammeter:

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.
3. If a battery defect is suspected, see "Battery Service And Diagnosis" earlier in this section.
4. Inspect the wiring for defects. Check all connections for tightness and cleanliness, including the slip connectors at the generator and firewall, and the cable clamps and battery posts.
5. Check operation of diode assembly as follows:

   With the engine operating at fast idle, use a voltmeter to measure voltage at the three terminals of the diode assembly. Attach the positive lead to the indicated terminal, the negative lead to chassis ground.

   a. With positive lead to generator terminal on diode assembly and negative lead to ground, reading should be 13.1 to 15.5 volts. If reading at generator terminal is zero volts, check wiring to generator for open connection.
   b. With positive lead to bat. No. 1 terminal on diode assembly and negative lead to ground, reading should be 12.1 to 14.5 volts.
   c. With positive lead to bat. No. 2 terminal and negative lead to ground, reading should be 12.1 to 14.5 volts.

   If reading on bat. terminal No. 1 or No. 2 is zero volts, replace diode assembly. Reading at battery terminals No. 1 and No. 2 should be approximately 1.0 volts less than reading at generator terminal. If reading at bat. terminals is more than 1.0 volts less than generator terminal reading, replace diode assembly.

   If readings at generator terminal and bat. terminals are identical, see "Discharged Batteries" in this chart.
6. With engine running, connect a voltmeter from:
   a. Generator "BAT" terminal to ground.
   b. Generator No. 1 terminal to ground.
   c. Generator No. 2 terminal to ground.

   A zero reading indicates an open between voltmeter connection and battery.
7. If previous Steps 1 through 6 check satisfactorily, check generator as follows:
   a. Disconnect battery ground cable.
   b. Connect an ammeter in the circuit at the "BAT" terminal of the generator.
   c. Reconnect battery ground cable.
   d. Turn on radio, windshield wipers, lights high beam and blower motor high speed. Connect a carbon pile across the battery.
   e. Operate engine at moderate speed as required, and adjust carbon pile as required, to obtain maximum current output.

If ampere output is within 10 amps of rated output as stamped on generator frame, generator is not defective; recheck Steps 1 through 6.

If amperes output is not within 10 amps of rated output, determine if test hole is accessible.

If test hole is accessible, ground the field winding by inserting a screwdriver into the test hole.

CAUTION: Tab is within 3/4-inch of casting surface. Do not force screwdriver deeper than 1-inch into end frame.

Operate engine at moderate speed as required, and adjust carbon pile as required to obtain maximum current output.

If test hole is not accessible, disassemble generator and make tests listed in "GENERATOR REPAIR."

If output is not within 10 amps of rated output, check the field winding, diode trio, rectifier bridge, and stator as covered in "GENERATOR REPAIR."

If output is within 10 amps of rated output, test regulator with an approved regualtor tester, and check field winding as covered in "GENERATOR REPAIR."

OVERCHARGED BATTERY

1. To determine battery condition, see "Battery Service And Diagnosis" earlier in this section.
2. Connect a voltmeter from generator No. 2 terminal to ground. If reading is zero, No. 2 lead circuit is open.
3. If battery and No. 2 lead circuit check good, but an obvious overcharge condition exists as evidenced by excessive battery water usage, proceed as follows:

   a. Separate end frames as covered in "Disassembly" under heading of "GENERATOR REPAIR." Check field winding for grounds and shorts, If defective, replace rotor and test regulator with an approved regulator tester.
   b. Connect ohmmeter using lowest range scale from brush lead clip to end frame; then reverse lead connections.
   c. If both readings are zero, either the brush lead clip is grounded or regulator may be defective.
   d. A grounded brush lead clip can result from omission of insulating washer, omission of insulating sleeve over screw, or damaged insulating sleeve. Remove screw to inspect sleeve. If satisfactory, test regulator with an approved regulator tester.

DISCHARGED BATTERIES

This condition could exist if a failed diode assembly allows the vehicle automotive battery or living area battery to be discharged by the other circuit (i.e., no isolation between battery circuits) during times when the engine is not in operation. To check diode continuity and resistance:

1. Disconnect all leads to diode assembly.
2. Connect ohmmeter leads to generator terminal and bat. No. 1 terminal at diode assembly. Using appropriate scale, observe reading. Reverse lead connections to terminals and observe reading using appropriate scale. If both readings are the same, replace diode assembly. A good diode section will give one high and one low reading.
3. Repeat above procedure with ohmmeter leads connected to generator terminal and bat. No. 2 terminal. Using appropriate scale, observe reading. Reverse lead connections to terminals and observe reading using appropriate scale. If this test gives one high and one low reading, diode assembly is good. If both readings are the same, replace diode assembly.

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FAULTY INDICATOR LAMP OPERATION

Check the indicator lamp for normal operation as shown below:

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

If the indicator lamp operates normally, proceed to "Undercharged Battery" or "Overcharged Battery" section. Otherwise, proceed to either one of the following three abnormal conditions:

Switch On, Lamp Off, Engine Stopped - This condition can be caused by the defects listed in "Switch Off, Lamp On" under "GENERATOR TROUBLESHOOTING," or by an open in the circuit.

Switch Off, Lamp On - In this case, *disconnect the two leads* from the generator No. 1 and No. 2 terminals. If the lamp stays on, there is a short between these two leads. If the lamp goes out, replace the rectifier bridge as covered in the "GENERATOR REPAIR." This condition will cause an undercharged battery.

Switch On, Lamp On, Engine Running - *Check for a blown fuse* (where used) between indicator lamp and switch. The other possible causes of this condition are covered in "UNDERCHARGED BATTERY" on this page.

To determine where an open exists, check for a blown fuse, a burned out bulb, defective bulb socket, or an open in No. 1 lead circuit between generator and ignition switch.

If no defects are found, proceed to "UNDERCHARGED BATTERY" above.

A-6194

HIGH ENERGY IGNITION SYSTEM

All 1976 certified engines in Motorhome and TransMode vehicles are equipped with high energy ignition systems.

GENERAL DESCRIPTION

The eight cylinder HEI distributor combines all ignition components in one unit. The ignition coil is in the distributor cap and connects directly to the rotor. HEI performs basically the same function as a conventional ignition system, except the module and pick-up coil of the HEI system do electronically what the contact points of the conventional system do mechanically.

The high energy ignition system is a pulse triggered, transistor - controlled, inductive discharge ignition system. This system features a built - in ignition coil, an electronic module and a magnetic pick-up assembly. This assembly, located inside the distributor, contains a permanent magnet, a pole piece with internal teeth, and a pick-up coil. When the teeth of the timer core rotating on the distributor shaft inside the pole piece approach the teeth of the pole piece, voltage is induced in the pick-up coil. The electronic module then turns the ignition coil primary current "on." As the teeth align and then separate, a reversal in voltage potential signals the module to open the ignition coil primary circuit. When the primary circuit opens, a high voltage induced in the ignition coil secondary winding is directed through the rotor and high voltage leads to fire the spark plugs. The capacitor in the distributor is for noise suppression.

The module automatically controls the dwell period, stretching it with increasing engine speed. The HEI system also features a longer spark duration, made possible by the higher amount of energy stored in the coil primary. This is desirable for firing lean fuel mixtures.

IGNITION COIL

In the eight cylinder HEI system, the ignition coil is built into the distributor cap. The coil is somewhat smaller physically than a conventional coil, but has more primary and secondary windings. It is built more like a true transformer with the windings surrounded by the laminated iron core. A conventional coil has the iron core inside the windings. Although the HEI coil operates in basically the same way as a conventional coil, it is more effective in generating higher secondary voltage when the primary circuit is broken.

ELECTRONIC MODULE

The electronic module is a solid state unit containing five complete circuits which control spark triggering, switching, current limiting, dwell control and distributor pick-up. Dwell angle is controlled by a transistor circuit within the module and is varied in direct relation to engine speed.

POLE PIECE AND PLATE ASSEMBLY

The pole piece and plate assembly (often referred to as the pick-up coil assembly) consists of the following:

1. A stationary pole piece with internal teeth.
2. A pick-up coil and magnet which are located between the pole piece and a bottom plate.

CENTRIFUGAL AND VACUUM ADVANCE

The centrifugal and vacuum advance mechanisms are basically the same types of units that provide spark advance in the breaker-type system. Centrifugal advance is achieved through the rotation of the timer core in relation to the distributor shaft. Vacuum advance is achieved by attaching the pick-up coil and pole piece to the vacuum advance unit actuating arm.

THEORY OF OPERATION

The pick-up coil is connected to the electronic module, which in turn is connected to the primary windings in the ignition coil. There is a magnetic field surrounding the permanent magnet and pick-up coil, which increases in strength as the teeth of the timer core approach alignment with the teeth of the pole piece.

This increasing magnetic field induces a voltage in the pick-up coil, and current then flows to the ignition coil primary winding. When the teeth are exactly aligned and start to separate, the polarity of the pick-up coil voltage is reversed.

It is this reversal of voltage potential which signals the module to electronically shut off the ignition coil primary circuit. This in turn collapses the coil magnetic field and induces high voltage in the ignition coil secondary, firing one spark plug. A typical HEI schematic and basic wiring diagram are shown in figures 2 and 3.

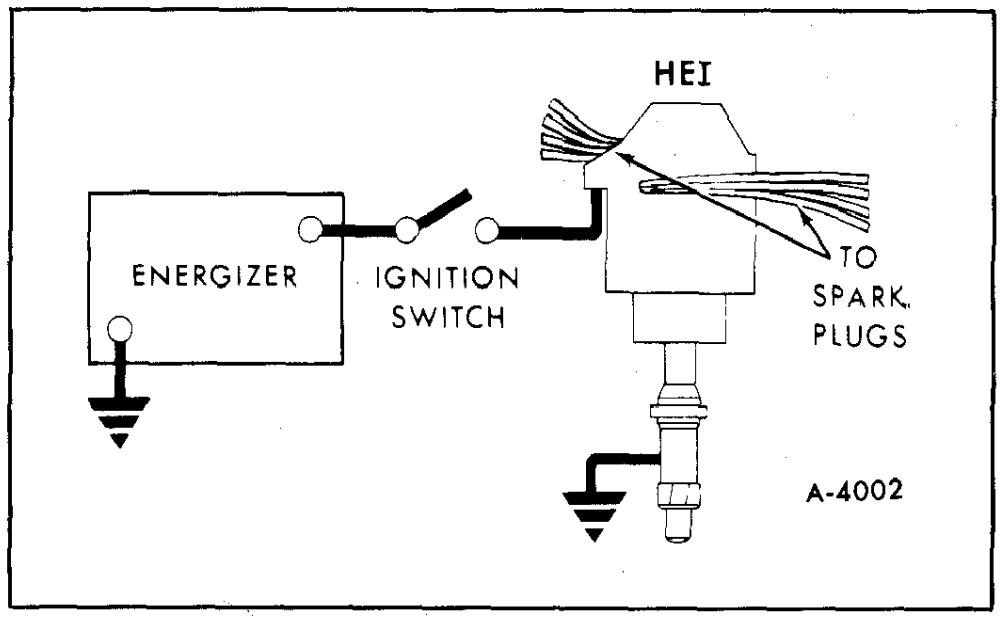


Figure 2—HEI Schematic

The electronic module delivers full battery voltage to the ignition coil, which is limited to 5.0 to 5.5 amps. There is no primary calibrated resistance wire in the HEI system. The electronic module acts as an "ON - OFF" switch for primary current, triggered by changing polarity of pick-up coil voltage. There is no energy lost due to breaker point arcing or capacitor charging time lag. The capacitor in the HEI unit functions only as a radio noise suppressor.

The higher current and instantaneous circuit triggering enables the HEI system to deliver up to approximately 35,000 volts through the secondary wiring to the spark plugs.

An exploded view of the HEI system is shown in figure 4.

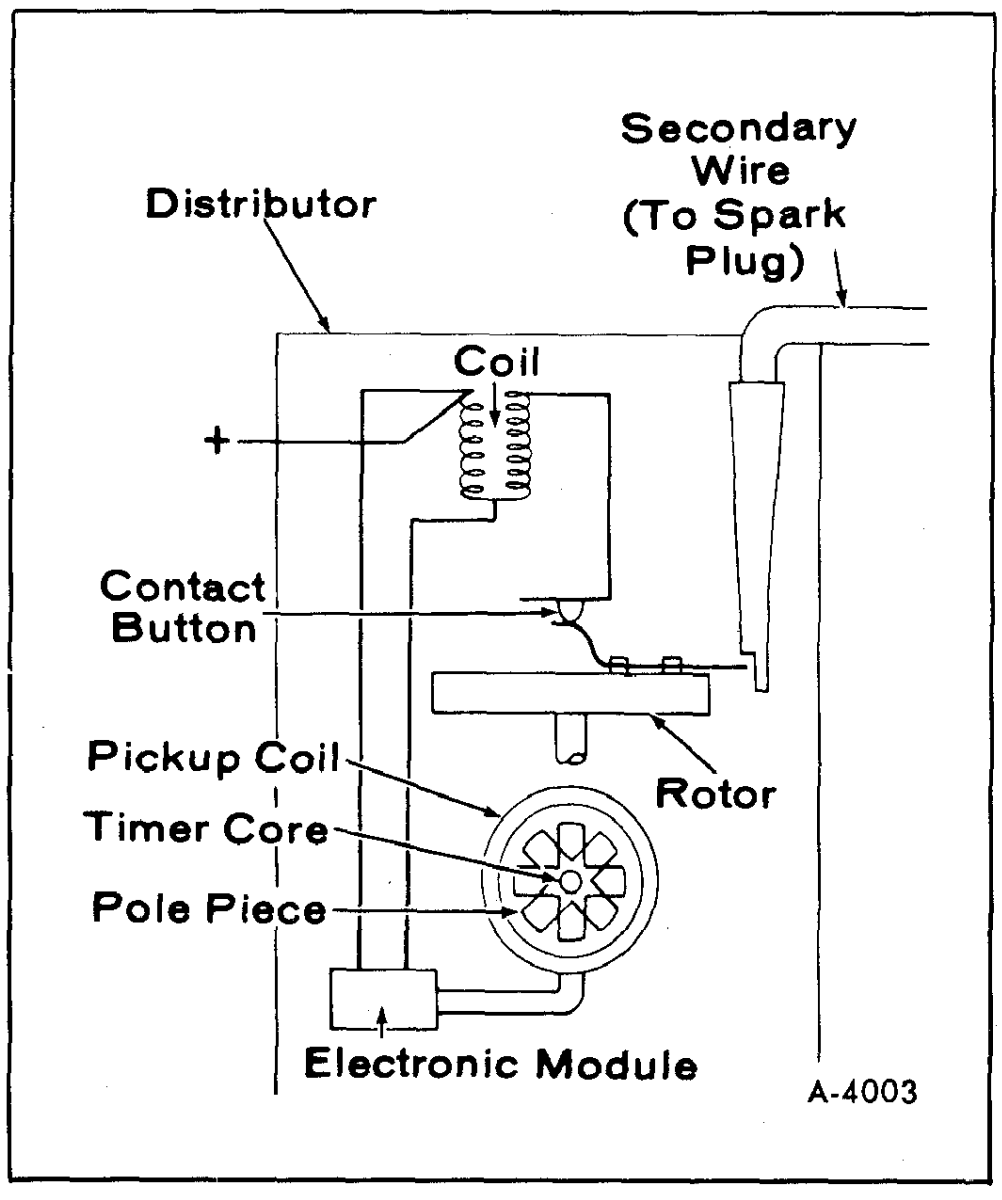


Figure 3—HEI Basic Wiring Diagram

SERVICE OPERATIONS

SERVICING PRECAUTIONS

NOTE: For HEI systems, engine diagnostic analyzers using oscilliscopes will require a special adapter and distributor machines will also require modifications. Major manufacturers of such equipment have instructions on how such modifications can be performed on their equipment.

The HEI system is capable of producing up to 35,000 volts as compared to 25,000 volts with conventional systems. Use care when working with these higher voltages to avoid contact with high voltage points such as spark plug leads.

Care should be taken when connecting timing light or other pick-up equipment. Use proper adapters. Do not force contacts between the boot and secondary wiring, and do not puncture the silicone jackets (the high voltage available will cause arcing from the puncture point to ground).

If secondary wiring is punctured or burned, it must be replaced to prevent misfiring. If boots and nipples on the spark plug wires are damaged, the arc will also go to ground, causing misfiring.

Care should be used when connecting battery or in jump starting with the battery. Reversing the connections or polarity could cause damage to electronic module.

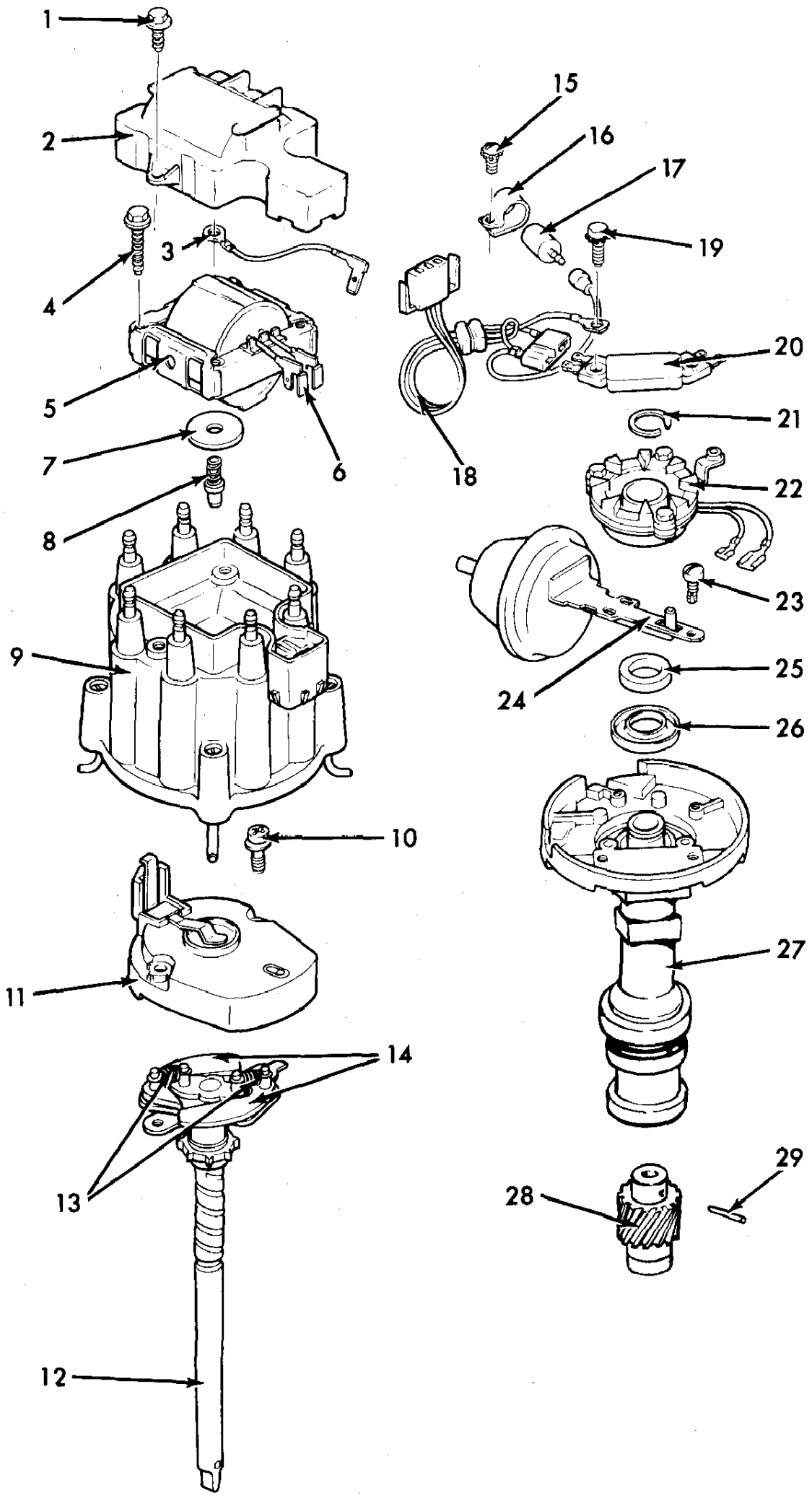
Also, do not operate the engine with one or more spark plug wires disconnected. (To do so may cause arcing to occur in the distributor cap and cause carbon tracking.)

Do not ground the tachometer connection. This could cause damage to the electronic module. (Make certain that tachometer is designed for HEI operation.)

When making compression checks, the ignition switch connector should be disconnected from the HEI distributor.

ELECTRONIC MODULE

The electronic module is serviced by complete replacement only. When replacing the module, small "dabs" of special silicone grease MUST be applied to the flat portion of the module which will rest on the metal mounting surface. If this grease is not applied the module will not cool properly, which can cause the module to malfunction. A tube of this special silicone grease is supplied with each replacement module. Make certain the replacement module is the correct part number.



1. Cover Attaching Screw (2)
2. Cover
3. Ground Lead
4. Coil Attaching Screw (4)
5. Ignition Coil
6. Coil Terminals
7. Rubber Seal
8. Brush (Spring and Button)
9. Cap
10. Rotor Attaching Screw (2)
11. Rotor
12. Shaft Assembly
13. Springs
14. Weights
15. Bracket Attaching Screw
16. Capacitator Bracket
17. Capacitator
18. Wiring Harness
19. Module Attaching Screw (2)
20. Electronic Module
21. Retainer (Thin "C" Washer)
22. Pole Piece and Plate Assembly (Pick-up Coil)
23. Vacuum Advance Attaching Screw (2)
24. Vacuum Advance Control
25. Felt Washer
26. Plastic Seal
27. Housing
28. Gear
29. Pin

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Figure 4—HEI Distributor Exploded View

CAUTION: *When connecting battery, as in jump starting, reversing connections or polarity can result in damge to the electronic module.*

POLE PIECE AND PLATE ASSEMBLY

The pole piece and plate assembly (often referred to as the pick-up coil assembly) is also serviced by complete replacement only. Make certain the replacement assembly is the correct part number. Early 1976 vehicles contained a color-coded yellow plastic tie around the pick-up coil leads; later 1976 vehicles contain pick-up coils with leads that terminate in a yellow connector body that attaches onto the module. The pole piece and plate assembly should not be unnecessarily dissembled as the polarity of the assembly could be changed and affect proper operation of the vehicle.

SPARK PLUG WIRES

Because of the higher voltage, the HEI system has larger diameter (8 millimeter) spark plug wires with silicone insulation. This silicone wire is gray in color, more heat resistant than standard black wire and less vulnerable to deterioration. However, silicone insulation is soft and very pliable, so that scuffing and cutting is easier than on standard black wires. It is important that these more pliable cables not be mishandled and that they be routed correctly to prevent chafing or cutting.

The silicone spark plug wire boots seal more tightly to the spark plugs than ordinary boots. Removal of boots from spark plugs must be done with care. The old practice of pulling them by the wires or with pliers will almost always cause damage to the boot or wire joint. It is recommended that the boot be twisted about a half turn in either direction to break the seal before pulling on the boot to remove the wire.

The spark plug cable retainer is designed to hold the wires firmly to prevent chafing or cutting. The wires in the retainer cannot be repositioned until the cable retainer is unlocked. Any attempt to pull the spark plug wires with the retainer in lock position could result in damage to the plug wires. To unlock the cable retainer, use a small screwdriver between the tab and the lock.

To remove wiring harness from cap, release wiring harness from latch and remove wiring harness, both right and left side.

The eight spark plug wires and holder are replacable only as an assembly. However, if it is necessary to remove an individual wire from the wiring harness assembly, hold grommet of wire down and press retainer tab out of wire holder. To reinstall, lightly lubricate tab end of spark plug wire with silicone. Rotate wire until seated in holder.

WARNING: DO NOT REMOVE SPARK PLUG WIRES WITH THE ENGINE RUNNING. THE HIGHER SECONDARY VOLTAGE IS CAPABLE OF JUMPING AN ARC OF GREATER DISTANCE AND COULD CAUSE AN ELECTRIC SHOCK. OPERATING THE ENGINE WITH ONE OR MORE SPARK PLUG WIRES DISCONNECTED CAN ALSO RESULT IN DAMAGE TO THE DISTRIBUTOR CAP.

CHECKING SPARK PLUG WIRES

Resistance specifications for both 7mm wires used with standard systems and 8mm wires used with HEI systems are identical (3,000 to 5,000 ohms per foot). Inspect all spark plug wires for high resistance and continuity with an ohmmeter.

Ohmmeter Test

NOTE: For proper operation, it is necessary to keep ignition wires and distributor clean and free of any dirt or corrosion.

1. Disconnect both ends of ignition cable being tested and clean terminals.
2. Set ohmmeter on high scale and connect ohmmeter to each end of cable being tested. Twist cable gently while observing ohmmeter.
3. If ohmmeter reads above 25,000 ohms or fluctuates from infinity to any value, replace cable being tested.
4. If the resistance of each cable is not within the following bands, replace the cable being tested: (for example)

0 to 15" cable - 3,000/10,000 ohms
15 to 25" cable - 4,000/15,000 ohms
25 to 35" cable - 6,000/25,000 ohms

Insulation Test

If the engine periodically runs rough, stalls, or won't start, the problem could be related to precipitation, condensation, or road splash situation which coats the ignition system with moisture. To determine if this is the trouble, the following procedure can be used:

1. Carefully remove the distributor spark plug and coil wire retaining cap (hard hat) from the distributor. Then remove the spark plug and coil nipples from the retainer and reconnect them to the distributor.

2. Connect a ground probe to the engine. (The probe can be made by attaching one end of a 3-foot insulated wire to a screwdriver blade and the other end to a suitable engine ground.)

3. Start the engine and let it idle at the hot rpm specification.

4. Use a water spray bottle (household cleaning solution bottle with manual spray pump) to wet the insulation, simulating the conditions it might encounter in wet weather driving.

5. Starting at either end of the suspect wire, thoroughly trace the insulation of the wire, boot and nipple, observing for spark jumping through the insulation to the test probe.

6. Use particular care to probe the underside and lower edges of the spark plug boot. Also, carefully probe the joint areas where the wire enters the boot and nipple.

7. Test the suspect wire(s) for internal conductor damage using the ohmmeter procedure described previously.

It is recommended that the aforementioned procedure be performed in subdued light. It should be noted, however, that a faint arcing or "corona phenomena" (a faint glow adjacent to the surface of an electrical conductor at high voltage) will always be present in various degrees of intensity, dependent on humidity and lighting conditions. This condition is not usually indicative of enough leakage to produce the subject complaint unless the engine falters noticeably.

If a strong arc or any opening in the insulation of wire, boot or nipple is observed and the engine falters noticeably, the wire(s) should be replaced.

CAUTION: *Plug wires are damaged by Refrigerant-12. When charging air conditioning, avoid Refrigerant-12 contact with spark plug wires. If air conditioning system has had a leakage failure, check spark plug wires as described above.*

SPARK PLUGS

Note revised spark plug firing order for 455 cubic inch engine with high energy ignition system (figure 4A).

DIAGNOSING HIGH ENERGY SYSTEM

If engine will not start, perform this on-vehicle test of the ignition system BEFORE checking HEI module with tester J-24642:

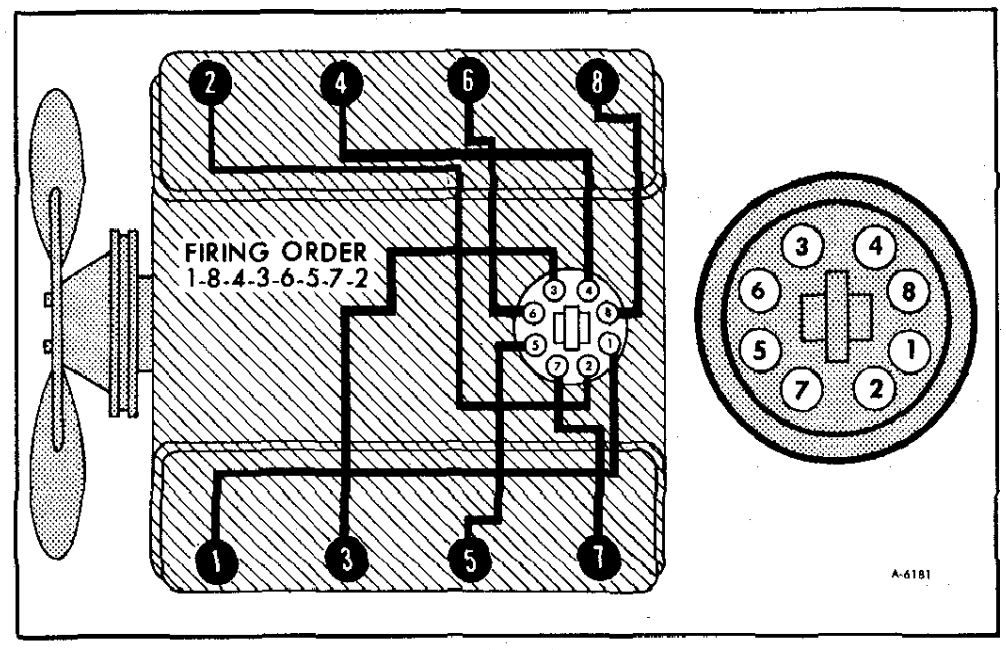


Figure 4A—Secondary Wiring

1. Insure that wiring connector is properly attached to connector at side of distributor.

2. Check that all spark plug leads are properly connected at distributor and spark plugs.

3. Connect voltmeter or test light from "BAT" terminal lead on distributor to ground (figure 5).

4. Turn on ignition switch. If voltage is zero or test light does not come on, repair open circuit between "BAT" terminal and battery.

5. When reading is battery voltage, or test light lights, remove one spark plug lead by twisting spark plug boot to loosen. Insert extension, hold spark plug lead with insulated pliers so extension is 1/4" away from dry area of engine block while cranking engine, or

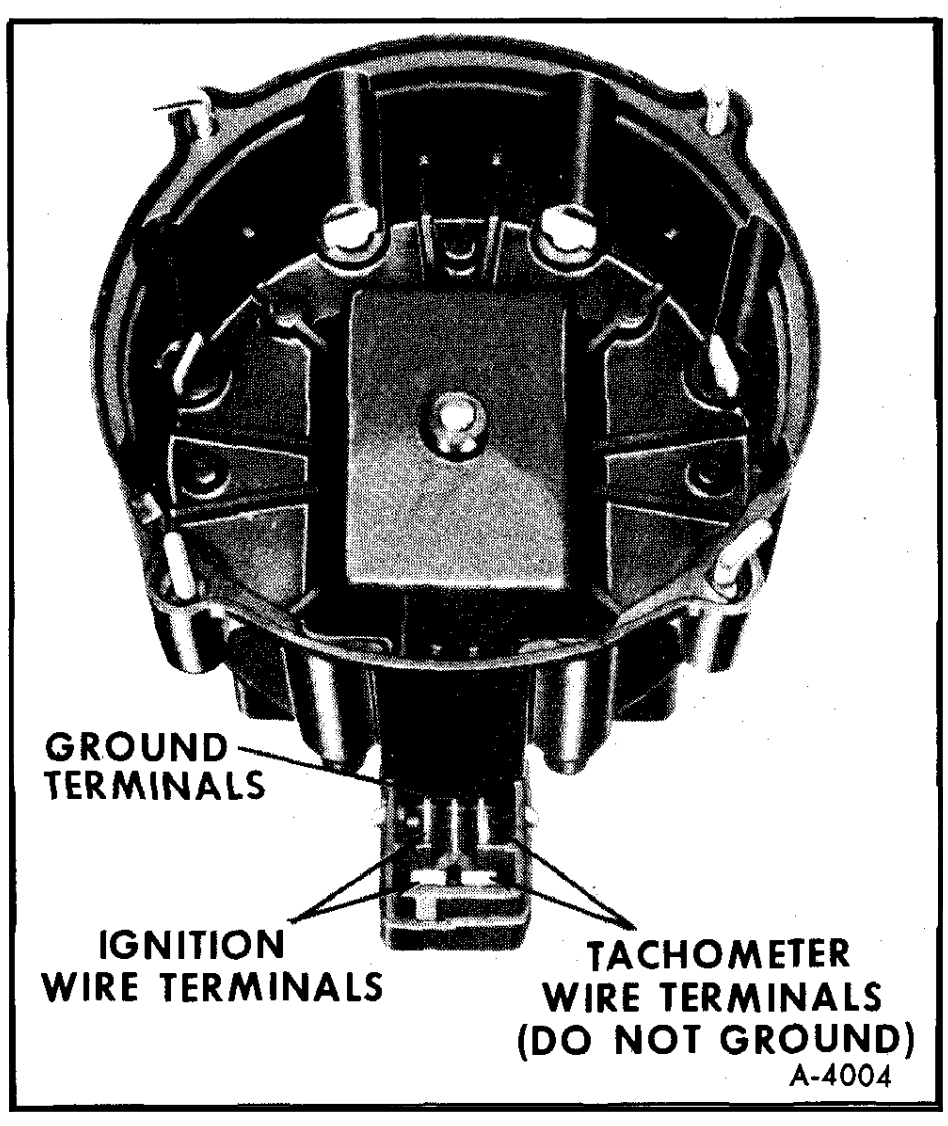


Figure 5—Terminals on Distributor Cap

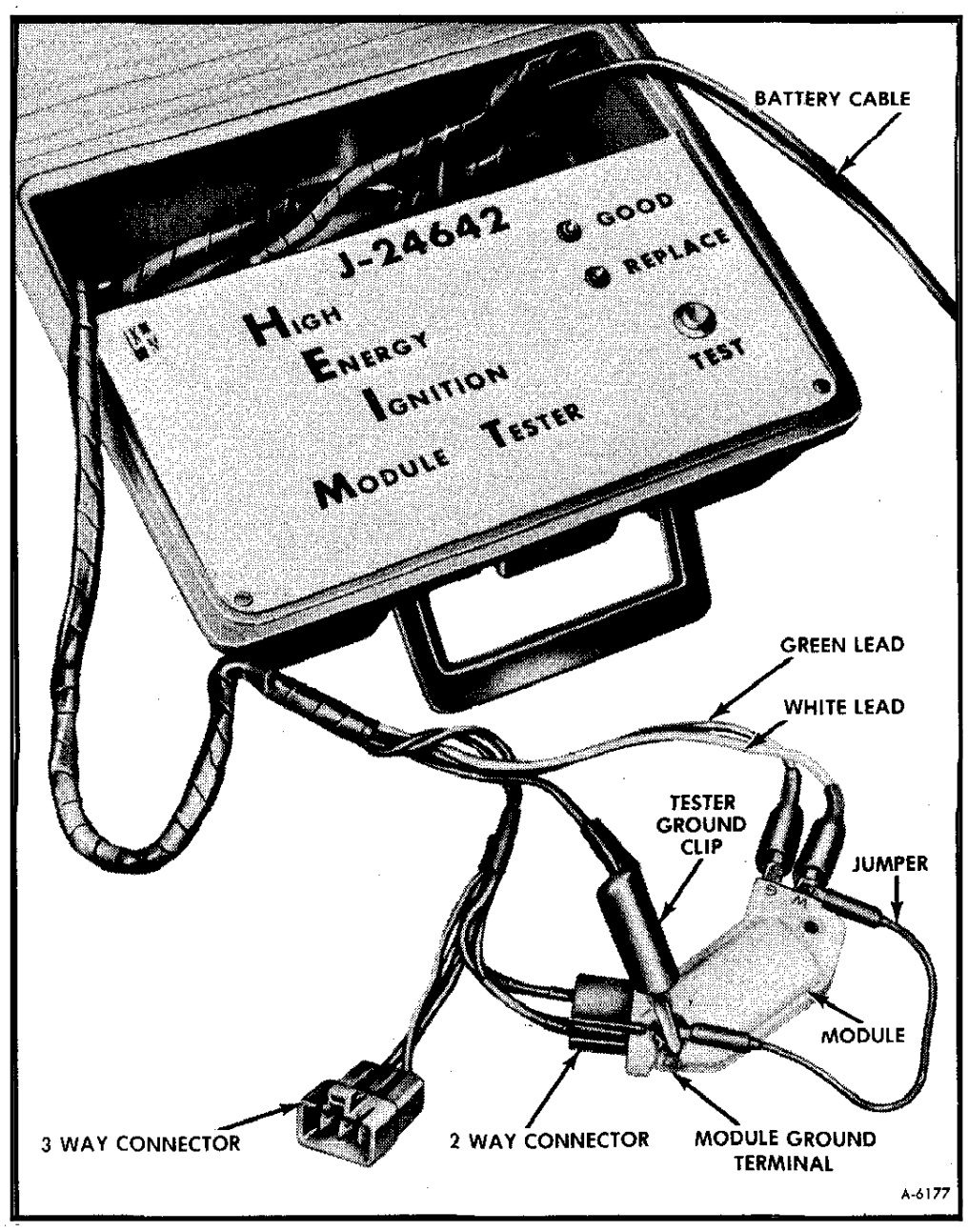


Figure 6—Check No. 3 with J-24642-101

install any good spark plug with .080 gap in lead and lay on engine block while cranking engine.

6. If sparking occurs trouble is not ignition distributor. Check fuel system and spark plugs. Check timing. Distributor may have shifted.

7. If no spark, make test No. 1 with Module Tester J-24642 or equivalent.

TESTING TESTER J-24642

Before module tester J-24642 is used, proper operation of the tester can be verified by the use of special tool J-24642-101, Tester Verification Kit.

The series of checks in the verification procedure are performed with the following items:

1. A test resistor-connector J-24642-101 (100 Ohms ±5%, 2 Watts).
2. A known good HEI module.
3. A fully charged 12-volt automotive battery.
4. A jumper wire (18 ga. x 20" is adequate)
5. The J-24642 tester.

Check No. 1

1. Connect the tester's battery cable to a fully charged automotive battery (11-1/2 - 12-1/2 volts), with red lead of tester to battery positive terminal (+) and black lead of tester to battery negative terminal (–). Make no other connections to the tester.

Observe both indicator lights. If either or both lights are on, the module tester is defective.

2. Press the "TEST" button and observe the lights.

- RED "REPLACE" light should come on and stay on.
- GREEN "GOOD" light should remain off.

The tester is defective if these two conditions are not met.

Check No. 2

1. Connect the tester and a known good HEI module in the following manner:

A. Connect the two-way connector of the tester to the module.
B. Connect the green and white tester leads to the corresponding "G" and "W" terminals of the module.
C. Connect red lead of tester to 12-volt automotive battery positive (+) terminal and black lead of tester to battery negative (–) terminal.
D. Connect ground lead of tester to HEI module ground terminal. The module ground is located at the mounting screw hold-down nearest two-way connector terminals.

2. Press "TEST" button and observe the lights.

- RED "REPLACE" light should come on momentarily and then go out.
- GREEN "GOOD" light should come on and stay on.

If not, the tester is defective.

Check No. 3

1. To the setup of Check 2, add a jumper wire connecting the "W" and ground "G" terminal of the module as shown in figure 6.

NOTE: Do not connect the jumper from the "G" terminal of the HEI module to ground as damage to the tester will result.

2. Press "TEST" button and observe the lights.

- Red "REPLACE" light should come on and stay on as long as button is held down.
- Green "GOOD" light should remain off.

Tester is defective if these two conditions are not met.

Check No. 4

1. From the setup of Check 3, remove the jumper wire. Disconnect the tester ground lead from the module ground terminal. Using a jumper wire, connect the module ground lead to the negative terminal of the battery. Plug the J-24642-101 resistor-connector (or equivalent) into the 3-way connector as shown in figure 7.

2. Press the "TEST" button and observe the lights.

- RED "REPLACE" light should come on and stay on.
- If GREEN "GOOD" light comes on while the button is pressed, the tester is defective.

When the tester has passed these four checks, its proper operation is verified. You may now begin diagnosis of the high energy ignition system.

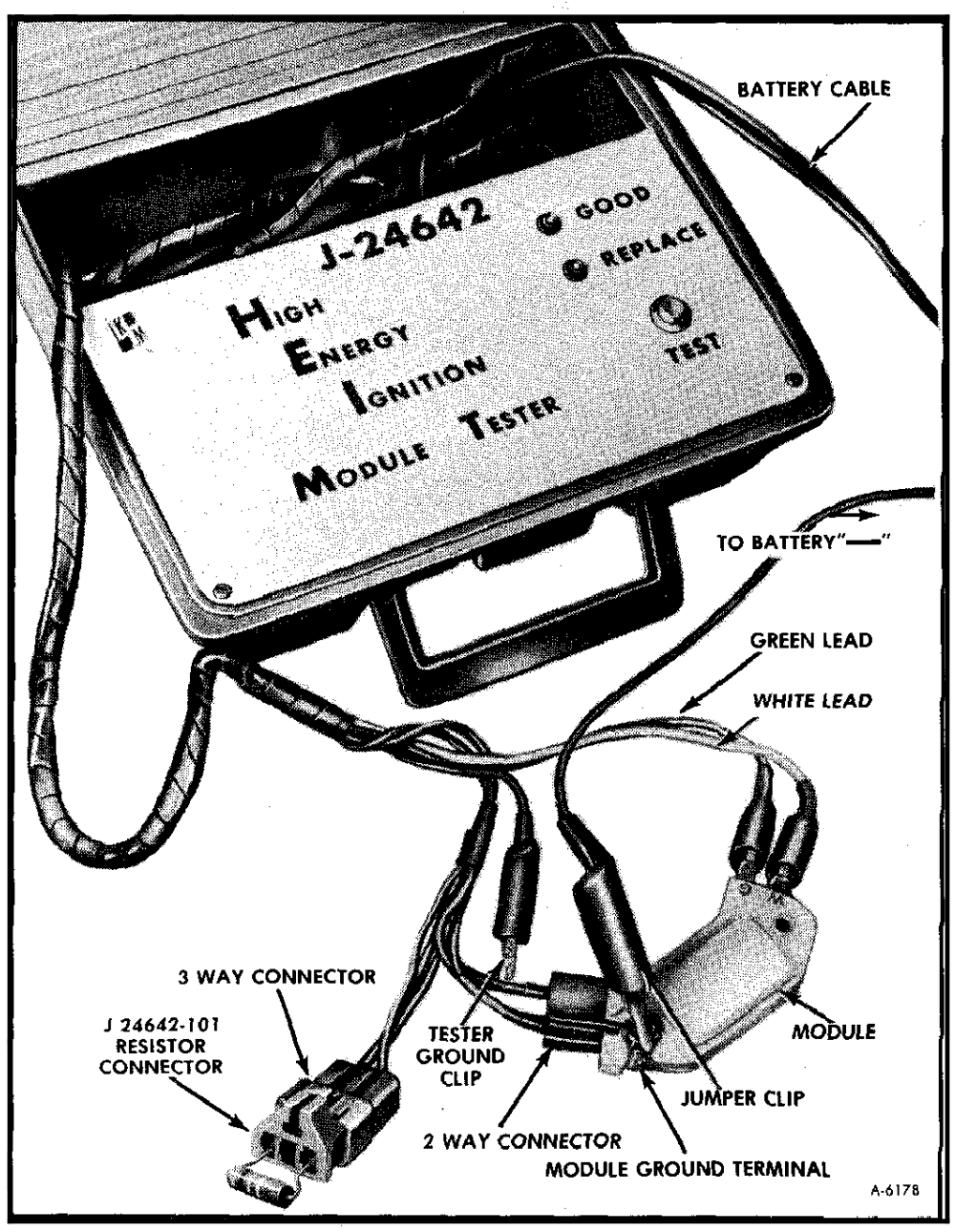


Figure 7—Check No. 4 with J-24642-101

TESTING PROCEDURE FOR HEI MODULE USING TESTER J-24642

The module tester provides the means of checking the HEI module in or out of the vehicle. It operates by generating a signal equivalent to the pick-up coil signal, measuring the output of the HEI module and determining whether or not it is within the specified range. There are three tests and some subtests performed by the tester. TEST 1 is used if the vehicle does not run, TEST 2 if the vehicle runs but not satisfactorily, and TEST 3 if the module is out of the vehicle and must be checked. In all tests, the battery must be fully charged. Low voltage or slow cranking speeds will result in a false "REPLACE" indication.

Test No. 1 - CRANK TEST, Distributor Cap in Place (Engine does not run) (Figure 8)

1. Disconnect (pull) module 3-way harness connector from its socket in the side of the distributor cap.

2. Connect 3-way connector of tester J-24642 to the module harness connector.

NOTE: The 3-way connector should connect only one way to the module connector. Match wire colors between module connector and tester 3-way connector.

3. Connect red lead of tester J-24642 to battery positive (+) terminal and black lead to battery negative (–) terminal.

4. Crank engine, press and hold "TEST" button.

NOTE: During cranking, battery voltage must be 9 volts or more and engine speed 100 rpm or more for tester to be accurate.

5. A momentary indication on the red "REPLACE" light and then a steady indication on the green "GOOD" light means that both the HEI module and the pick-up coil are good.

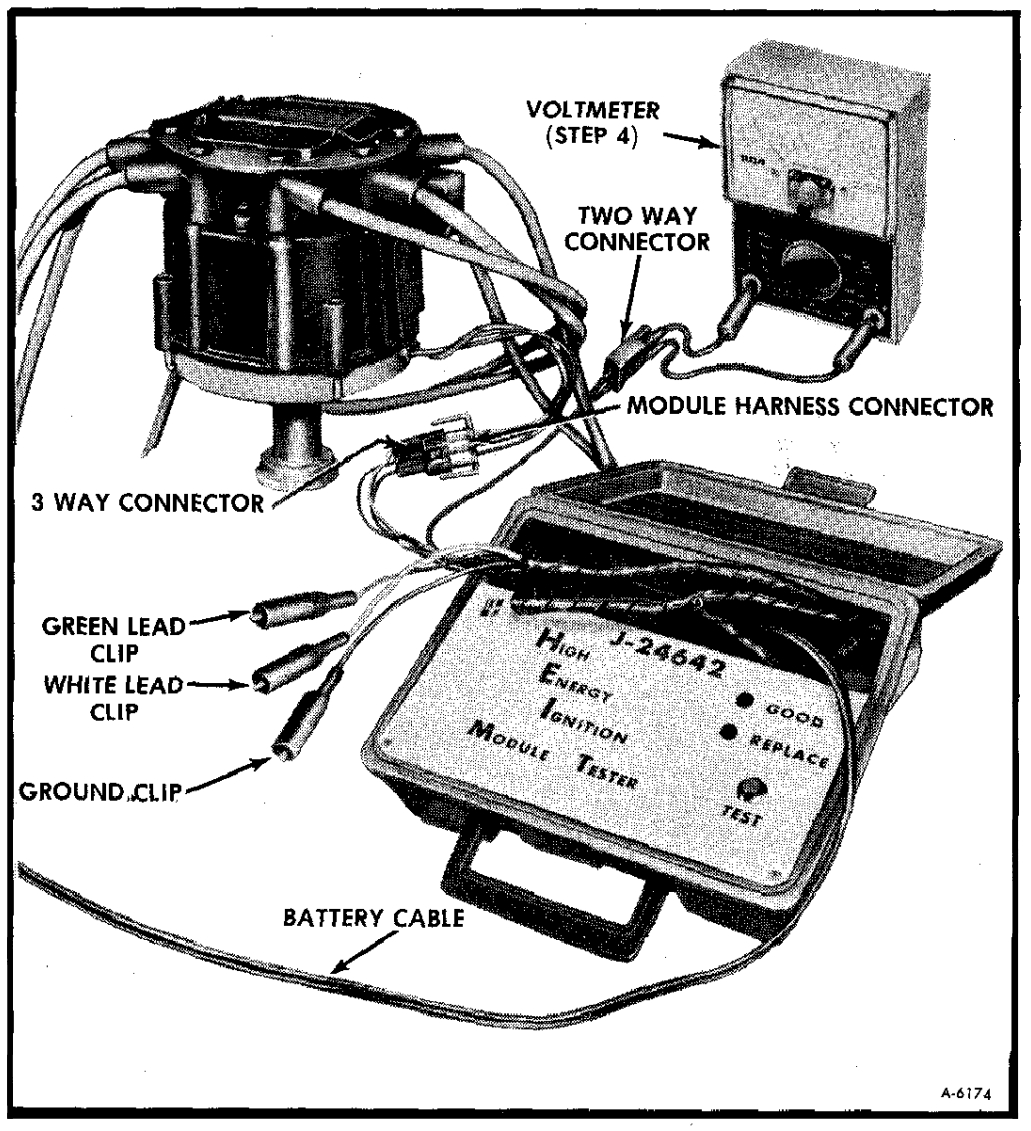


Figure 8—Test No. 1, Using Tool J-24642 (Crank Test)

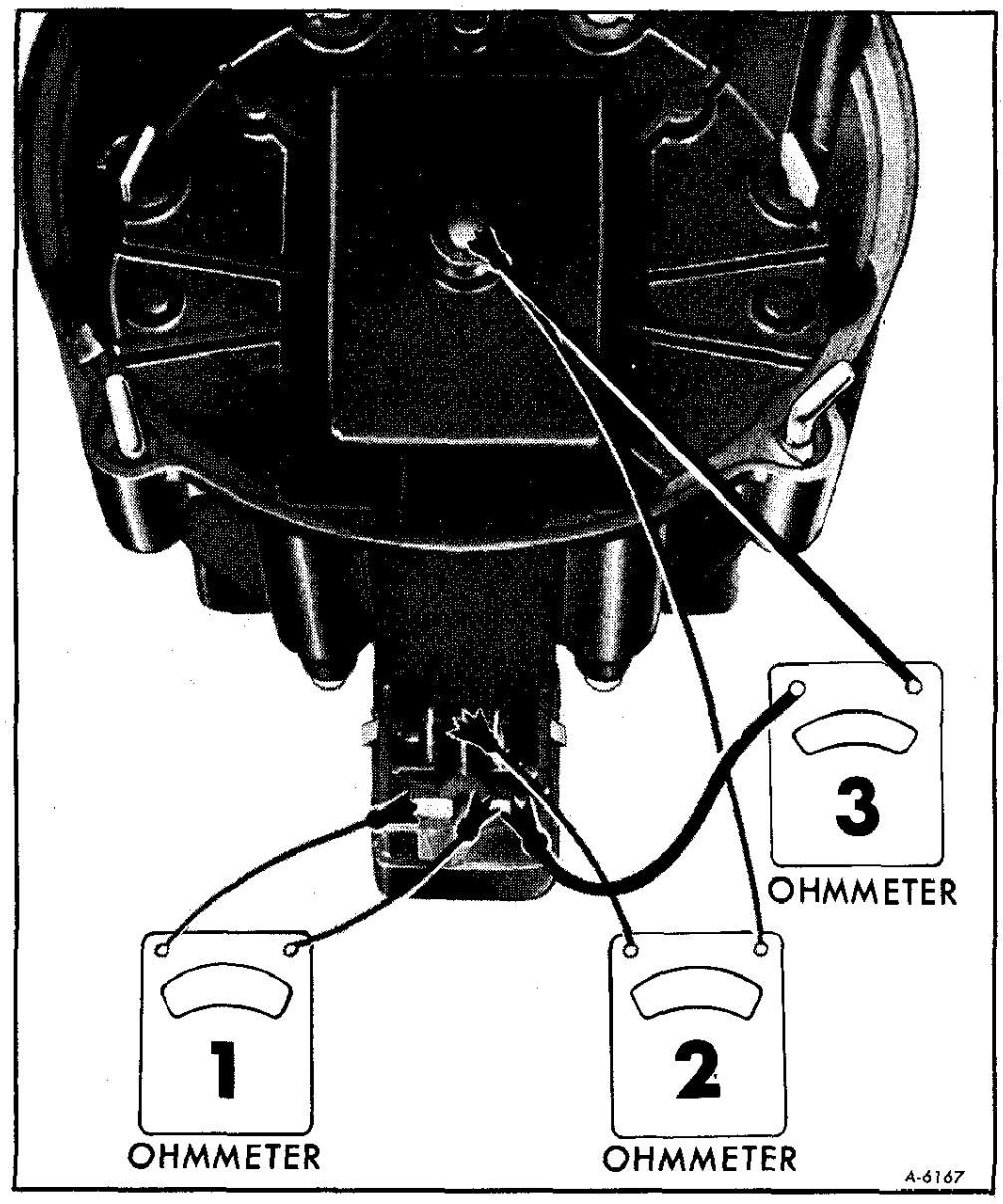


Figure 9—Ohmmeter Check of Ignition Coil

Proceed to step 6. A steady indication of the red "REPLACE" light means that either the pick-up coil or the HEI module is defective.

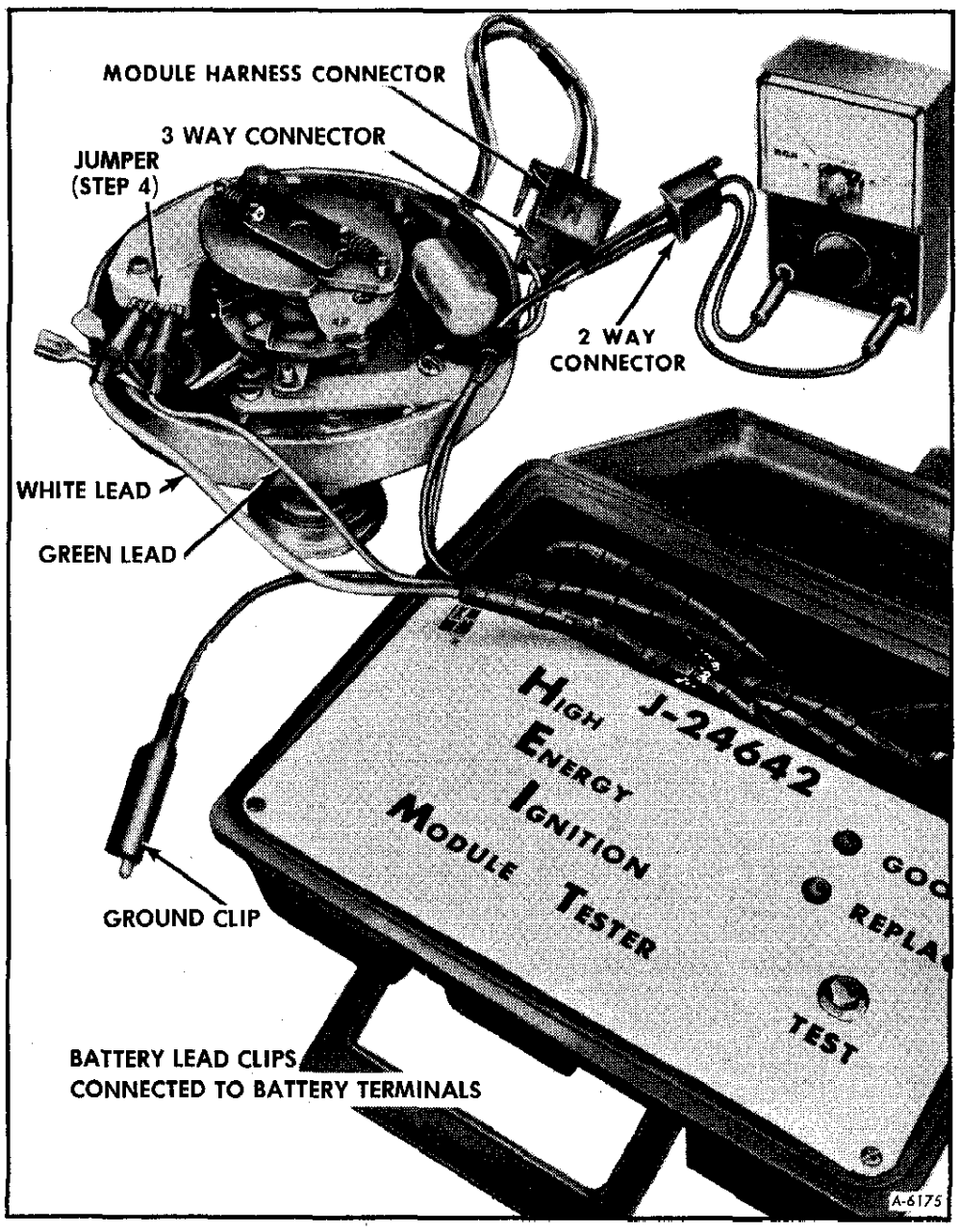


Figure 10—Test No. 2, Using Tool J-24642

Check the HEI module with TEST 2 and check the pick-up coil with Ohmmeter (see chart on diagnosing the HEI system, figure 14).

NOTE: A tester check is complete within a few seconds. Prolonged holding of the "TEST" button in excess of 15 seconds will cause the module and/or the resistor to heat and may produce erratic test results or damage to the resistor, module or tester.

6. If pick-up coil and module test good, remove distributor cap and coil assembly by turning four latches.

7. *Check primary of ignition coil in cap for* continuity with an Ohmmeter. (Refer to figure 9, step 1.) Reading should be zero or near zero. If not, replace ignition coil. After coil is replaced, proceed to steps 10 and 11.

8. Check secondary of coil (figure 9, step 2.) Use high scale. Reading should not be infinite. If everything checks good to this point, the HEI system is good.

9. If reading is infinite, check cap and rotor button for arced or burned condition. If necessary, replace cap. If cap and carbon button do not appear defective, replace ignition coil. After ignition coil is replaced, *proceed with steps 10 and 11.*

10. Continue module check by connecting a voltmeter to the two way connector, the red lead to the positive (+) terminal and the brown lead to the negative (–) terminal. Select the scale which best covers the 0-10 volt DC range. The meter should read "zero" volts.

11. Press and hold the "TEST" button. The voltmeter should continue to read "zero" volts. If the meter gives a voltage indication, the module is defective and should be replaced.

Test 2 - MODULE IN VEHICLE, Distributor Cap Removed (Engine runs Poorly) (Figure 10)

1. *Perform steps 1 through 4 of TEST 1.*

2. Disconnect green and white pick-up coil leads from the HEI module and attach the green and white tester leads to the "G" and "W" terminals of the module.

3. Press and hold the "TEST" button. A momentary indication on the red "REPLACE" light, then a steady indication on the green "GOOD" light means the HEI module is good. A steady indication on the red "REPLACE" light means that the module is defective and should be replaced. If the module is good, check the pick-up coil (see chart-figure 14, steps C-9 and C-10).

4. *Check the ignition coil primary for con-*tinuity with an ohmmeter (figure 9, step 1). Reading should be zero or near zero. If

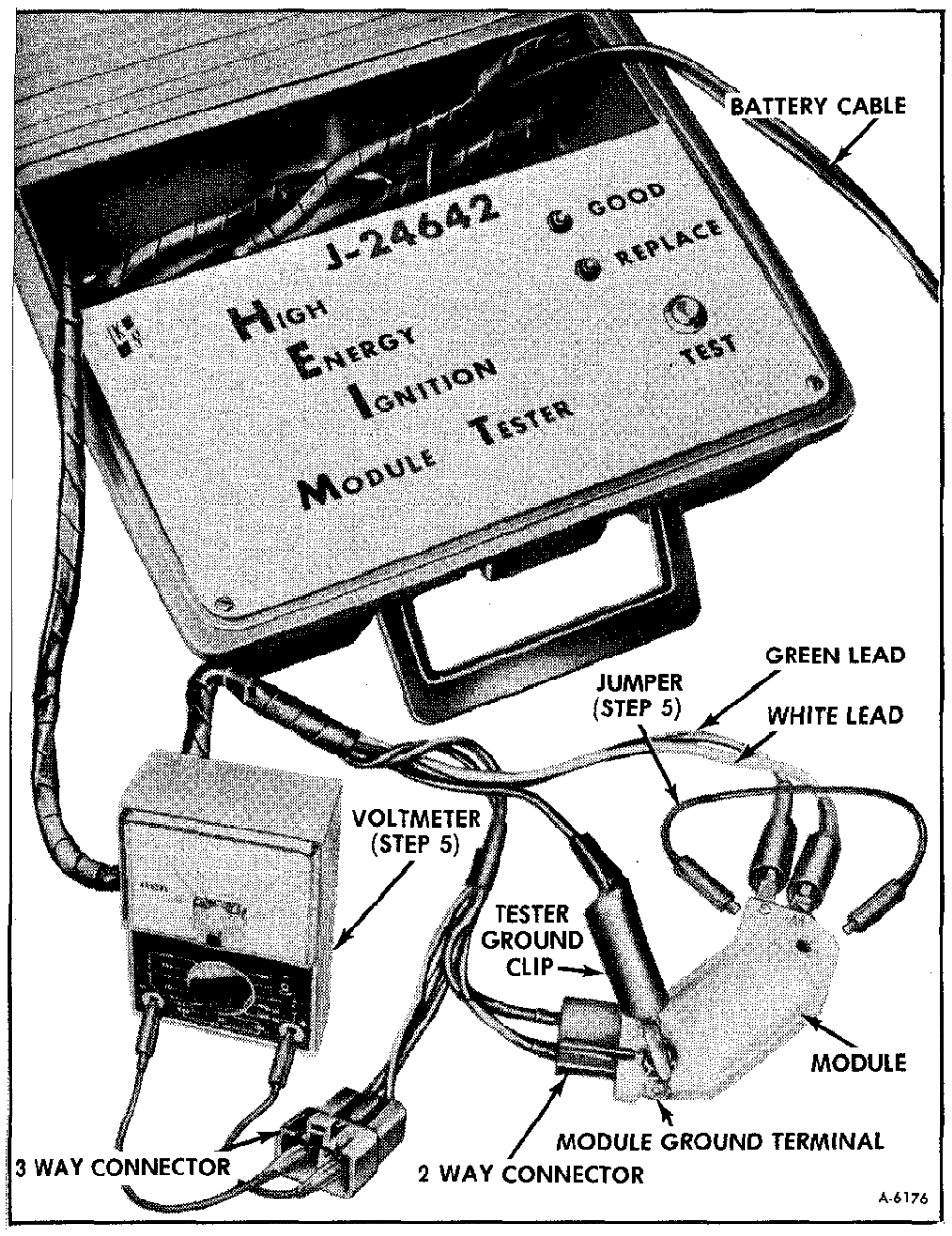


Figure 11—Test No. 3, Using Tool J-24642

everything checks good to this point, the HEI system is good. If the coil is open, replace it and proceed with steps 10 and 11 of Test 1.

Test 3 - MODULE OUT OF DISTRIBUTOR (Figure 11)

1. Connect the two-way connector of the tester to the HEI module and the green and white tester leads to the corresponding "G" and "W" terminals of the module.

2. Connect red lead of tester to battery positive (+) terminal of 12-volt automotive battery, and black lead of tester to battery negative (–) terminal.

3. Connect ground clip of tester to HEI module ground terminal. The module ground is located at the mounting screw hold-down nearest two-way connector terminals.

4. Press and hold the "TEST" button. A momentary indication of the red "REPLACE" light, then a steady indication of the green "GOOD" light means that the module is good. A steady indication on the red "REPLACE" light means the module is defective and should be replaced.

5. Perform steps 10 and 11 of TEST 1, except connect the voltmeter in this check to the 3-way connector, as shown in figure 11.

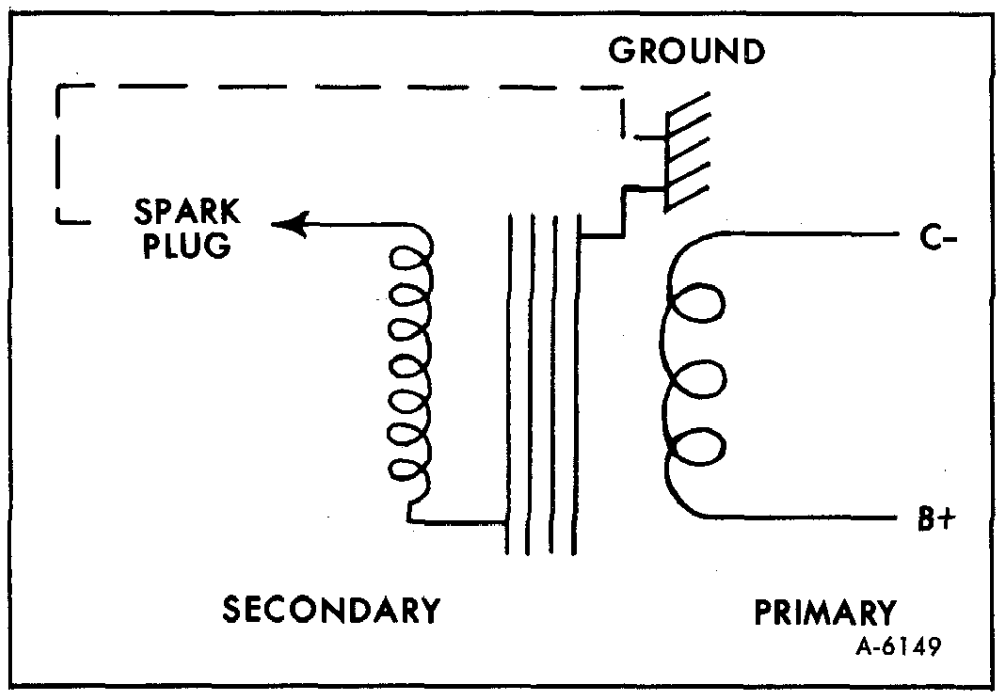


Figure 12—Ignition Coil Schematic

COMPONENT REPLACEMENT

IGNITION COIL REMOVAL
(Refer to Figure 4)

1. Disconnect battery ground cable from automotive battery.

2. Disconnect spark plug wire holder from distributor cap terminals; disconnect ignition/tachometer wiring harness connector from ignition coil terminal connector.

NOTE: Use care not to damage ignition/tachometer wiring harness connector latches.

3. Remove three screws securing coil cover to distributor cap.

4. Remove four screws securing ignition coil to distributor cap, and remove two ground wires.

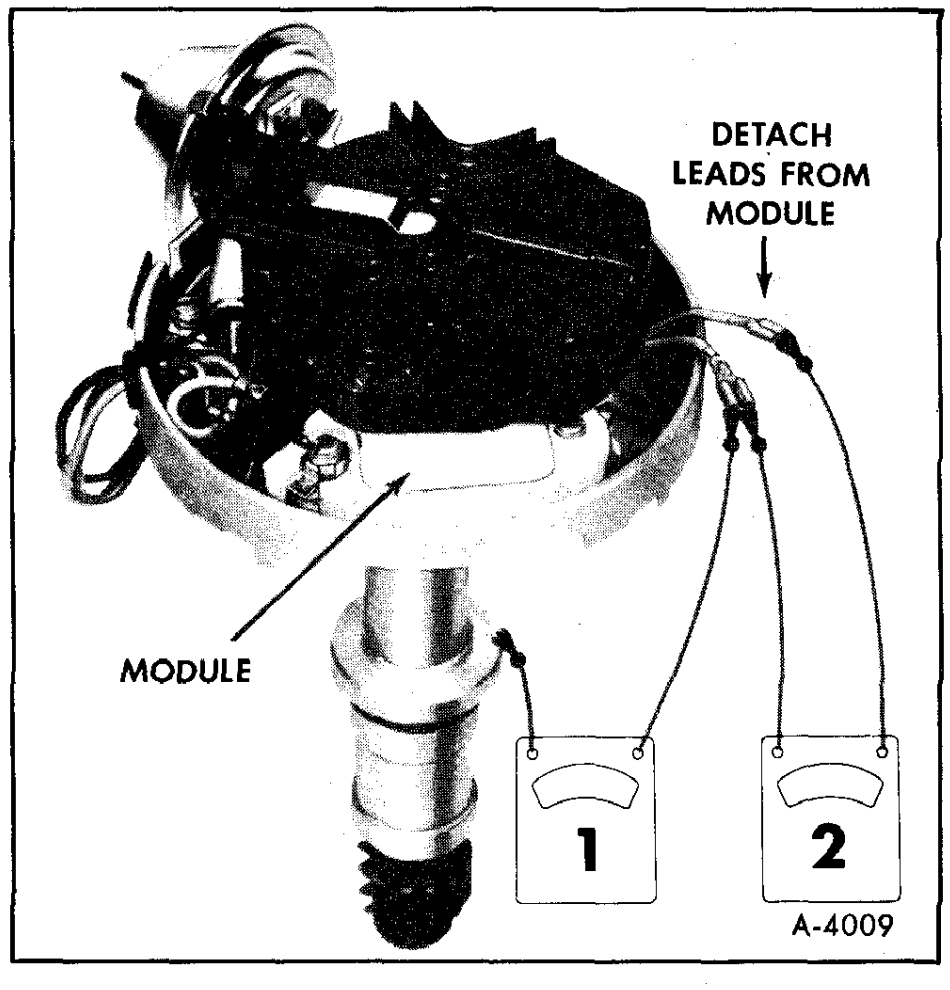


Figure 13—Ohmmeter Check of Pick-Up Coil

DIAGNOSING HIGH ENERGY IGNITION SYSTEM WITHOUT USE OF MODULE TESTER J-24642

A-6173

Careful adherence to the following procedures will lead to the location and correction of HEI system problems. Normally only a portion of the procedures need be performed.

1. Insure that wiring connector is properly attached to connector at side of distributor.
2. Insure that all spark plug leads are properly connected at distributor and spark plugs.

SYSTEM CHECKS ON THE VEHICLE

A. ENGINE WILL NOT START. USE VOLTMETER OR TESTLIGHT.

A-1. Connect voltmeter from "BAT" terminal lead on distributor to ground.

A-2. Turn on ignition switch.

A-3. If voltage is zero, repair open circuit between "BAT" terminal and battery.

A-4. If reading is Battery voltage, twist spark plug boot to loosen, remove lead, insert extension, hold spark plug lead with insulating pliers so extension is ¼" away from dry area of engine block while cranking engine or remove one spark plug lead. Install any good spark plug with .080 gap in lead and lay on engine block while cranking engine.

A-5. If sparking occurs trouble is not ignition distributor.

A-6. Check fuel system and spark plugs and secondary wiring. Check timing (distributor shifted).

A-7. Proceed to Component Checks.

B. ENGINE RUNS ROUGH.

B-1. Insure that proper fuel is being delivered to carburetor.

B-2. Check all hoses for leakage.

B-3. Visually inspect and listen for sparks jumping to ground.

B-4. Check initial timing (distributor shifted).

B-5. Check centrifugal advance on engine.

B-6. Twist boots to loosen, remove all spark plugs and check for usual defects — proper gap, fouling, cracked insulators, inside and out, etc. Check secondary wiring.

B-7. If no defects are found follow procedure under Component Checks.

C. COMPONENT CHECKS USING OHMMETER.

C-1. Remove cap and coil assembly by turning four locking latches.

C-2. Inspect cap and coil assembly and rotor for spark arc-over.

C-3. Check primary coil. Connect ohmmeter, Step 1, Figure 9. Use low scale. Reading should be zero. If not, replace coil.

C-4. Check secondary of coil. Connect ohmmeter, Step 2, Figure 9. Use high scale. Reading should be high but not infinite.

C-5. If reading is infinite, check cap and carbon button for arced or burned condition. If necessary, replace cap. If cap and rotor button do not appear defective, replace ignition coil.

C-6. In Step 3, Figure 9, check that primary and secondary are not shorted together. Refer to Figure 12. Reading should be infinite.

C-7. Connect test stand vacuum source to vacuum unit.

C-8. If vacuum unit is inoperative, replace.

C-9. Check pick-up coil for broken wire or open. Connect ohmmeter, Step 1, Figure 13. Use middle scale. If ohmmeter reads less than 500 ohms or more than 1500 ohms (while flexing leads) replace pick-up coil. (C-11 below).

C-10. If Step 1 is ok, check pick-up coil for ground with ohmmeter, Step 2, Figure 13. Use high scale. If reading is not infinite (no deflection on meter) replace coil. (C-11 below).

C-11. Remove unit from engine, remove rotor and shaft assembly from housing and remove thin "C" washer to replace pick-up coil (refer to distributor component repair).

C-12. If no defects have been found, remove connector and two attaching screws and replace module.

Figure 14—Diagnosing High Energy Ignition System Without Use of Module Tester J-24642

5. Disengage yellow and red coil wire terminals by pushing coil leads from underside of connector, and remove ignition coil from distributor cap.

NOTE: The yellow and red wires are both primary. The two black wires are ground for secondary. The primary and secondary coil windings are isolated, as shown in figure 12.

6. Check condition of seal and resistor brush (spring and button). (Refer to figure 4.)

NOTE: Do not wipe silicone lubricant from seal.

IGNITION COIL INSTALLATION

1. Position resistor brush (spring and button) and seal in distributor cap.

NOTE: Make sure seal is coated with silicone lubricant and properly positioned in place.

2. Position coil into distributor cap with terminals over connector at side of cap.

NOTE: If replacing ignition coil, be sure part number is correct.

3. Push coil lead wires into connector on side of cap (figure 15).

4. Install two ground wires and four coil attaching screws.

5. Install coil cover onto distributor cap with three attaching screws.

6. Position distributor cap on housing, making sure cap is seated properly, and engage four locking latches.

7. Connect ignition/tachometer wiring harness connector at ignition coil terminal; connect spark plug wire holder at distributor cap terminal.

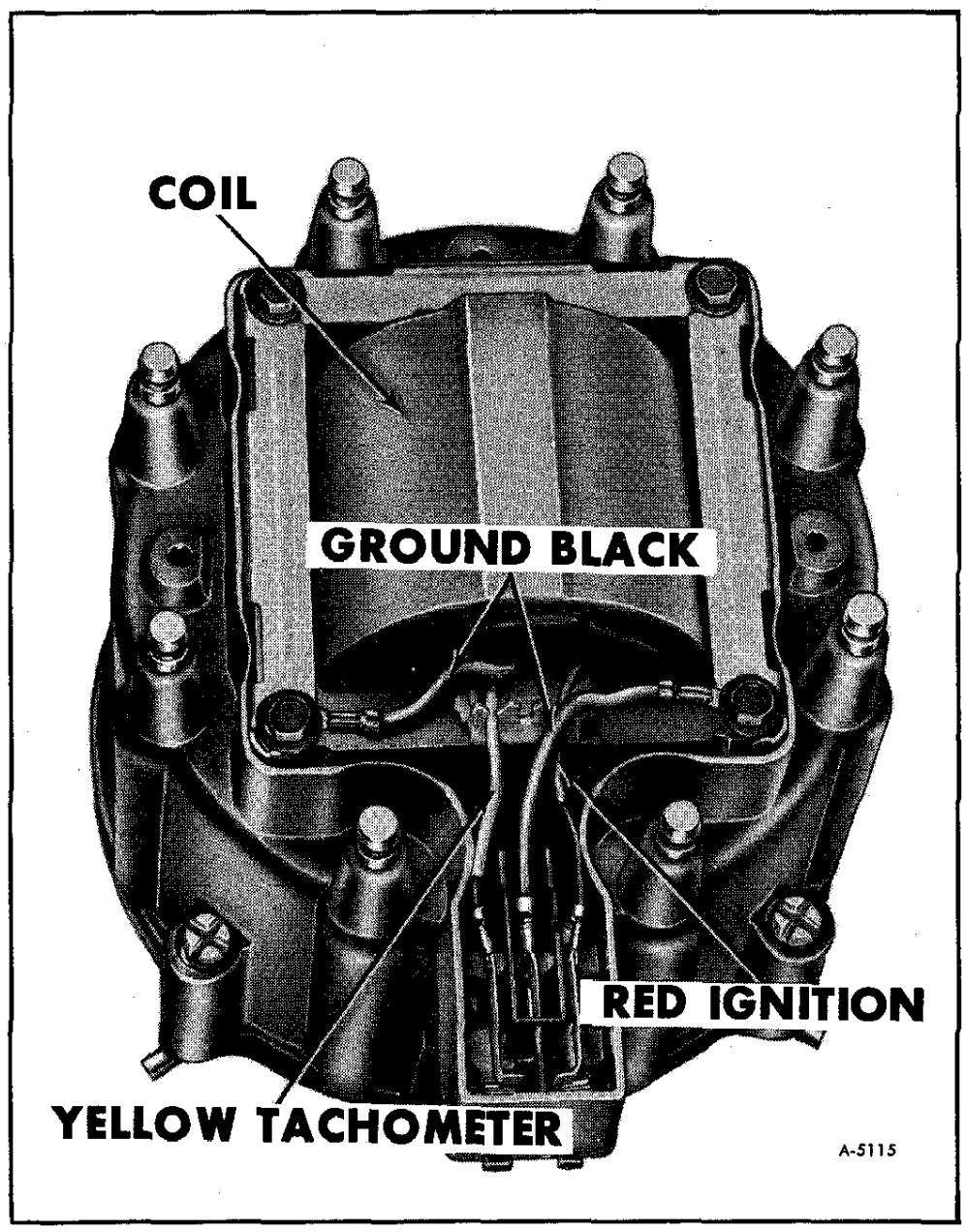


Figure 15—Coil Replacement

ELECTRONIC MODULE REMOVAL

1. Disconnect ignition/tachometer wiring harness connector at ignition coil terminal connector.

2. Disconnect spark plug wire holder from distributor cap terminals.

3. After releasing four lock latches, remove distributor cap and position out of way.

4. Remove rotor from distributor shaft by loosening two screws.

5. Remove module attaching screws (2) and lift module from housing. Disconnect wiring leads from module where connector attaches to module "B" and "C" terminals, and remove two leads from "W" and "G" module terminals.

NOTE: Do not wipe lubricant from module or distributor housing unless replacing the module. A tube of special silicone grease is supplied with each replacement module. When installing module, be sure module has "dabs" of silicone grease on back of module where module rests on metal mounting surface. If not applied, the module will not cool properly, which can cause the module to malfunction.

ELECTRONIC MODULE INSTALLATION

1. Install module with attaching screws (2).

2. Install connector to "B" and "C" terminals on module with tab on top and connect green wire to "G" terminal and white wire to "W" terminal.

3. Install rotor to advance weight plate and tighten retaining screws.

4. Position distributor cap to housing with tab in base of cap aligned with notch in housing, and secure with four latches.

5. Connect wiring harness connector to terminals on side of distributor cap.

VACUUM ADVANCE UNIT REMOVAL

1. Remove distributor cap and rotor.
2. Remove two vacuum advance attaching screws.
3. Turn pick-up coil clockwise and push rod end of the vacuum advance down so that it will disengage and clear the pick-up coil plate.

VACUUM ADVANCE UNIT INSTALLATION

To install, reverse removal procedure.

SECTION 9
STEERING

CAUTION: ALL STEERING LINKAGE FASTENERS ARE IMPORTANT ATTACHING PARTS IN THAT THEY COULD AFFECT THE PERFORMANCE OF VITAL COMPONENTS AND SYSTEMS, AND/OR THEY COULD RESULT IN MAJOR EXPENSE. THEY MUST BE REPLACED WITH ONE OF THE SAME PART NUMBER OR WITH AN EQUIVALENT PART IF REPLACEMENT BECOMES NECESSARY. DO NOT USE A REPLACEMENT PART OF LESSER QUALITY OR SUBSTITUTE DESIGN. TORQUE VALUES MUST BE USED AS SPECIFIED DURING REASSEMBLY TO ASSURE PROPER RETENTION OF THESE PARTS.

The information described in Maintenance Manual X-7525 under the heading STEERING (SEC. 9) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

POWER STEERING HOSE CAUTION

CAUTION: *Correct routing of the power steering hoses is very important. Although sequence of assembly is not vital, the power steering hoses, when installed, must not be twisted, kinked, or tightly bent. The hoses should have sufficient natural curvature in the routing to absorb movement and hose shortening in operation. They should also be free of twist under strain. When poor hose assembly routing exists, hose and assemblies should not be bent or mutilated by pulling on them. The situation should be corrected by loosening the fittings and properly repositioning the hose assembly before retightening nuts. All fittings must be held while tightening or loosening nuts.*

STEERING SYSTEM DIAGNOSIS

Wear, looseness or binding of any of the moving parts of the steering system and suspension system will affect vehicle alignment. Accurate alignment cannot be achieved as long as such conditions go uncorrected.

For detailed diagnosis of front suspension and steering system problems (such as hard steering, poor directional stability, excessive play in system, and other problems) refer to FRONT SUSPENSION (Sec. 3A) in this supplement.

STEERING COLUMN

CAUTION: ALL COLUMN FASTENERS ARE IMPORTANT ATTACHING PARTS IN THAT THEY COULD AFFECT THE PERFORMANCE OF VITAL COMPONENTS AND SYSTEMS, AND/OR COULD RESULT IN MAJOR REPAIR EXPENSE. THEY MUST BE REPLACED WITH PARTS OF THE SAME PART NUMBERS OR WITH EQUIVALENT PARTS IF REPLACEMENT BECOMES NECESSARY. DO NOT USE REPLACEMENT PARTS OF LESSER QUALITY OR SUBSTITUTE DESIGN. TORQUE VALUES MUST BE USED AS SPECIFIED DURING REASSEMBLY TO ASSURE PROPER RETENTION OF THESE PARTS.

GENERAL INFORMATION AND OPERATION

The function-locking steering column includes important features in addition to the steering function:

1. The ignition switch and lock are mounted conveniently on the column.
2. With the column-mounted lock, the ignition, steering and gearshifting operation can be locked to inhibit theft of the vehicle.

The tilt function-locking columns are designed for ease of entry and driver comfort. These columns have seven different steering wheel angle positions.

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 steering 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 operation of the lock is the same as in other GM vehicles. To start the vehicle, you insert the key in the lock, turn the unit clockwise to "start" and let the switch return to the "on" position. The "off", "lock" and "accessory" positions are also the same as in other GM vehicles. When you engage the shift lever in "park" and lock the ignition, the steering wheel locks and the gearshift locks.

The function-locking column may be easily diassembled and reassambled. If the column is serviced, it is important that only the specified screws, bolts and nuts be used as designated. Equally as important is correct torque of bolts and nuts.

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 lever, 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.

LOWER STEERING SHAFT

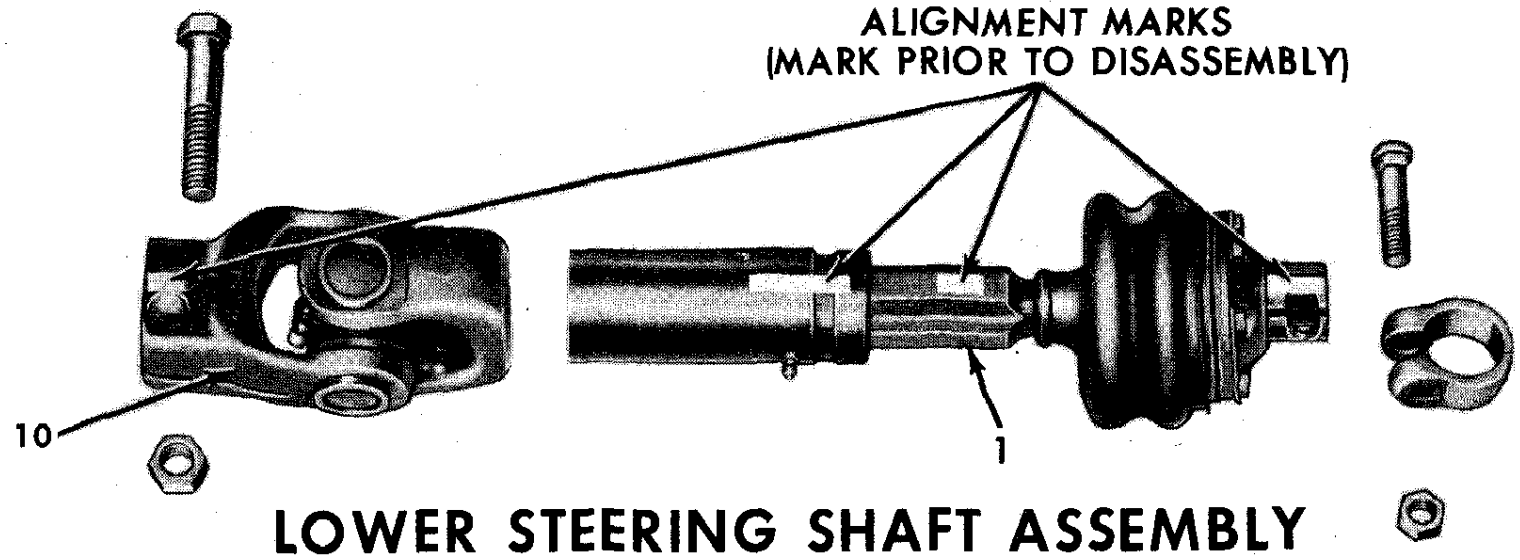
(Refer to Figure 1)

REMOVAL

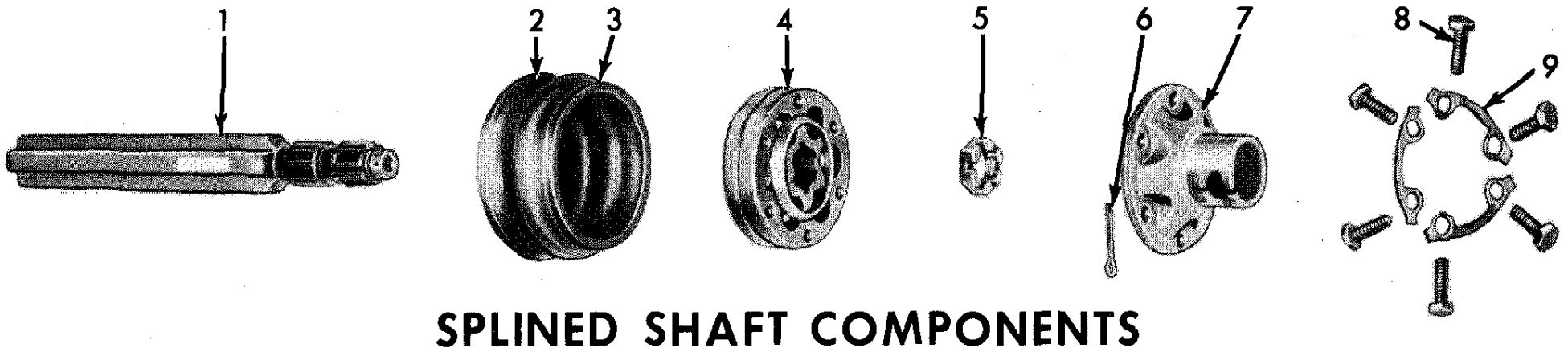
1. Set front wheels in straight ahead position. This can be done by driving the vehicle a short distance on a flat surface. Block wheels fore and aft so that vehicle cannot move.
2. Mark relationship between companion flange and splined ship shaft, and between splined slip shaft and slip yoke assembly. (See figure 1.) Also mark relationship between lower steering shaft yoke end (universal joint) and steering gear input shaft.
3. Remove clamp bolt and nut attaching lower steering shaft to steering column.
4. Remove bolt and nut securing lower steering shaft to steering gear input shaft.
5. Compress splined shaft into steering slip yoke assembly, and carefully lift lower steering shaft out of vehicle.

DISASSEMBLY

With lower steering shaft assembly on a bench, separate the splined shaft from the slip yoke assembly.



LOWER STEERING SHAFT ASSEMBLY



SPLINED SHAFT COMPONENTS

1. Splined shaft
2. Dust Boot
3. Retainer Strap (Not Shown)
4. "CV" Joint Assembly
5. Nut
6. Cotter Pin
7. Flange
8. Screw
9. Lock Washer
10. Yoke-Universal Joint

A-6166

Figure 1—Lower Steering Shaft (Disassembled)

NOTE: Whenever steering shaft is disassembled, it is mandatory that exposed spline areas be protected from nicks, scratches, and contamination until shaft is reassembled.

CONSTANT VELOCITY (CV) JOINT DISASSEMBLY

1. Remove retainer strap holding dust boot to CV joint assembly. Slip boot off of CV joint.
2. Remove locks (lock tab washers) on companion flange. MARK RELATIONSHIP BETWEEN COMPANION FLANGE AND SPLINED SLIP SHAFT (if not already marked). Then remove 6 bolts attaching flange to CV joint assembly (figure 1).
3. Remove cotter pin and large nut from splined shaft, then remove CV joint assembly from shaft.

NOTE: The CV joint is not to be repaired. It must be replaced as a new unit only.

YOKE DISASSEMBLY (CROSS-TYPE UNIVERSAL JOINT)

1. With steering shaft removed from vehicle, remove the snap rings from universal bearings. Discard snap rings.
2. Support yoke in arbor press (clamp yoke end) and drive one side of bearing until opposite bearing comes out of yoke. Use of soft drift and hammer may aid in bearing removal.
3. Turn yoke over and drive out the opposite bearing. Remove the remaining two bearings the same way. Note position of grease fitting for reassembly.
4. Remove journal cross.

ASSEMBLY

CV UNIVERSAL JOINT ASSEMBLY

1. Install new CV joint assembly on splined shaft.

CAUTION: *When tightening large nut to retain CV joint, do not hold splined shaft in coated area as damage to this surface may result.*

CAUTION: *See "CAUTION" on page 1 of this section.*

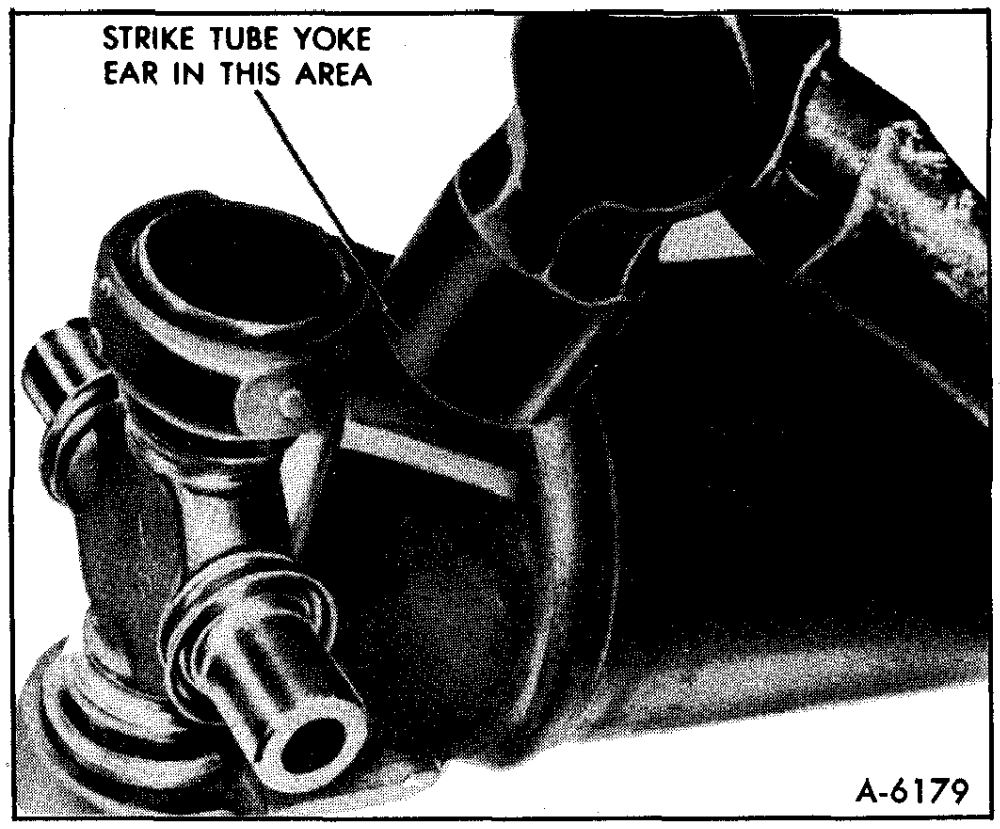


Figure 2—Seating the Snap Rings

2. Install large nut on shaft. Torque nut. See Specifications at the end of this section for torque value. Install new cotter pin through holes in shaft. See "NOTE" in Specifications at the end of this section.

3. Pull dust boot up and into groove on side of CV joint assembly. Be sure that boot groove is free of grease prior to assembly of boot. Install new retainer strap and pull tight with a force of 40-45 pounds.

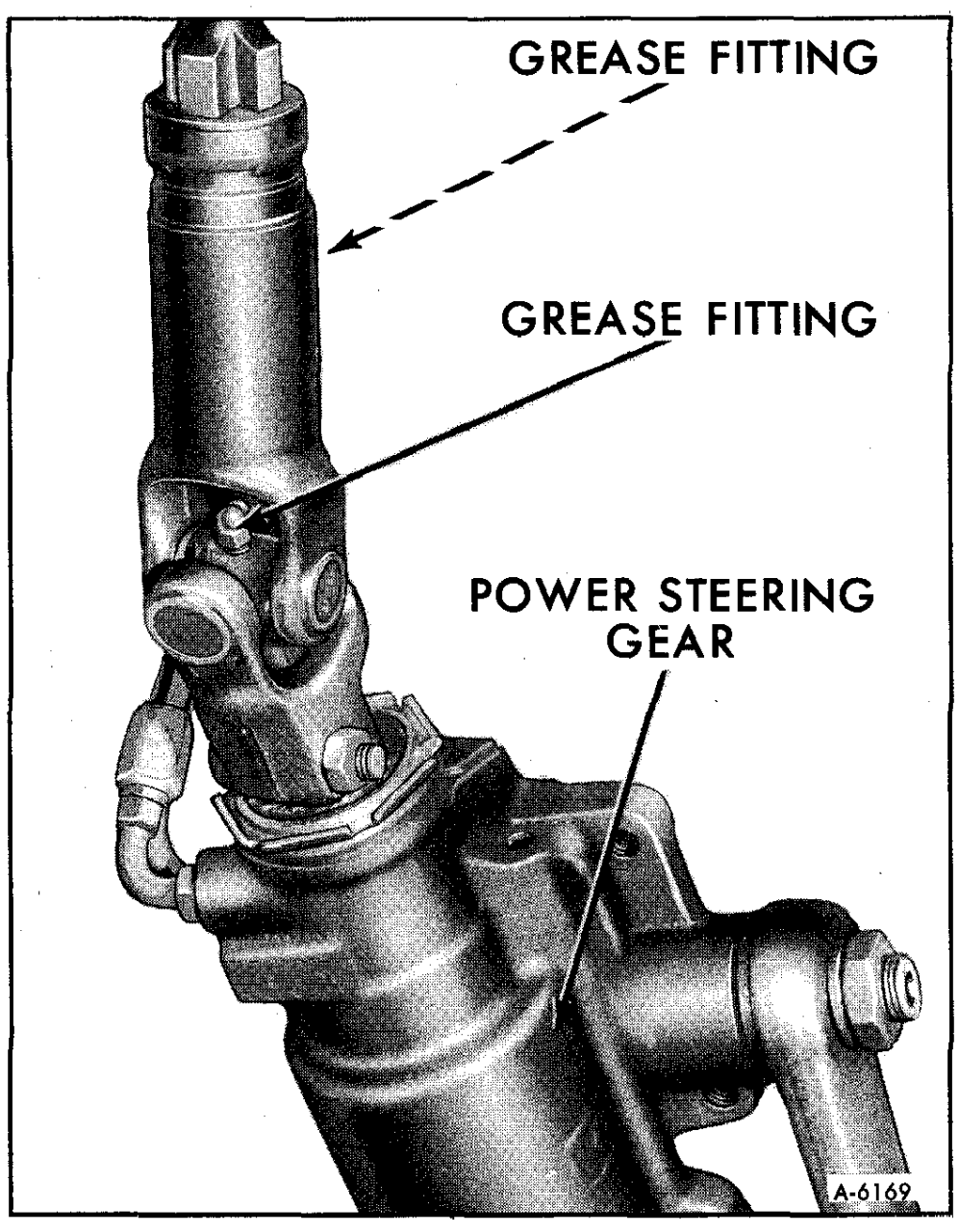


Figure 3—Lower Steering Shaft Grease Fittings

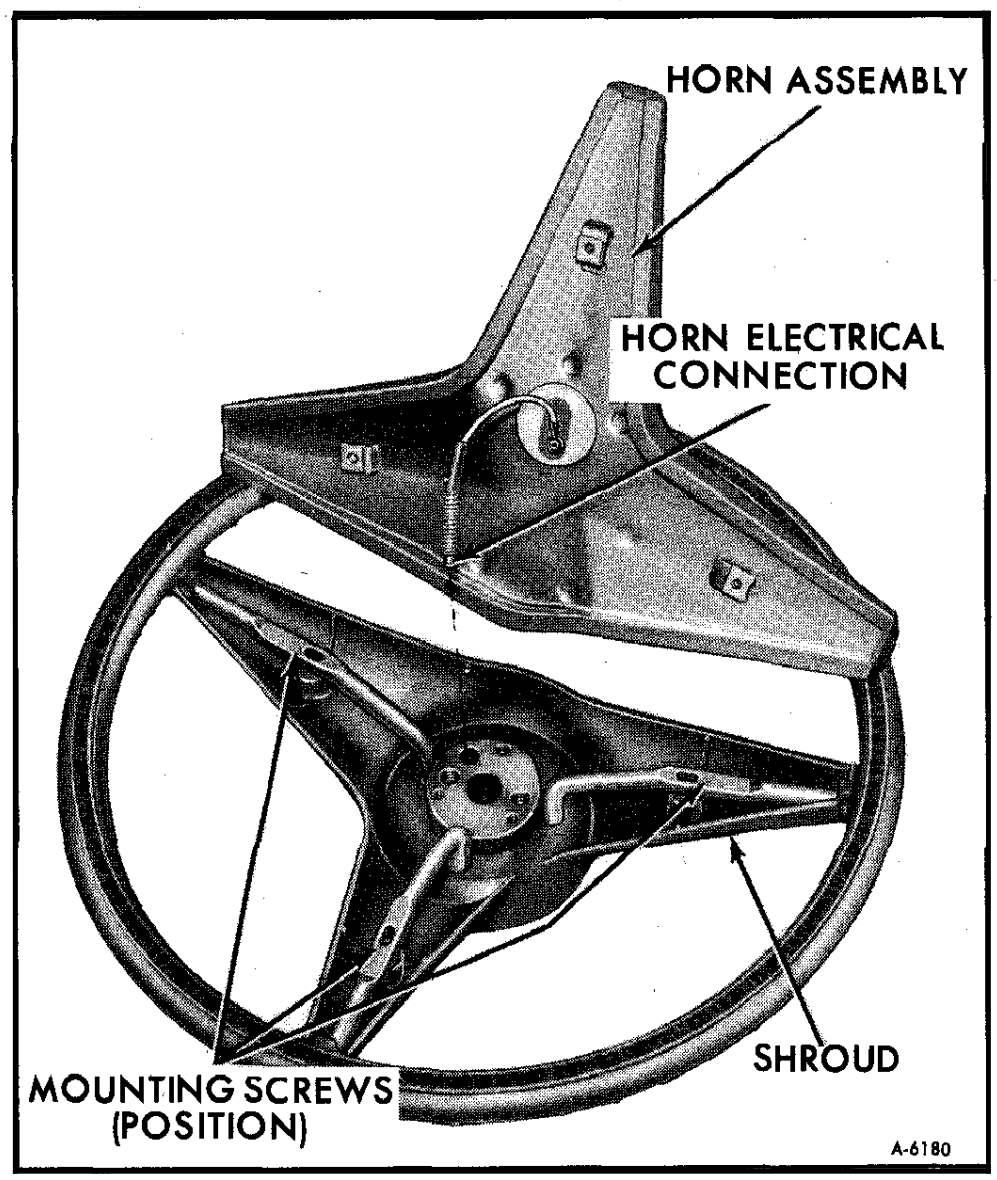


Figure 4—Horn Assembly

NOTE: Before proceeding with step 4, the cavity between the flange coupling and the CV joint assembly must be packed with lubricant. (Use a Lithium-soap base grease having extreme pressure properties meeting GM 6031-M, or equivalent.)

4. Install companion flange (align marks made during disassembly for correct relationship between flange and splined slip shaft) and install six bolts with lock-tab washers.

5. Torque companion flange bolts. See Specifications at the end of this section for torque value. Then, bend up lock tabs against bolt heads.

YOKE ASSEMBLY (CROSS-TYPE UNIVERSAL JOINT)

1. Align yoke end and steering slip shaft as marked during removal. Install journal cross into yokes with grease fitting in position as noted during removal.

2. Insert two bearings into one yoke and insert journal cross into bearing on one side. Press both bearings in far enough to install new snap rings.

NOTE: If difficulty is encountered in seating snap rings, strike the yoke firmly with a hammer to aid in seating the snap rings. This springs the yoke ears slightly (figure 2).

3. Turn shaft one-half turn and install remaining two bearings and new snap rings into adjacent yoke.

4. Lubricate universal joint at grease fitting (figure 3), using a Lithium-soap base grease having extreme pressure properties meeting GM 6031-M, or equivalent.

INSTALLATION

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

1. Align marks made at removal and assemble the lower shaft yoke end (universal joint) onto the steering gear input shaft. Install clamp bolt and nut, and torque nut to Specifications listed at the end of this section.

NOTE: If alignment marks have not been made, or if new parts are being used, be certain that steering gear input shaft is in high point of travel (centered position) before clamp bolt and nut are installed.

2. Raise lower steering shaft into position and guide companion flange (CV joint end) onto the steering column.

3. Install steering clamp bolt and nut, and torque nut to Specifications listed at the end of this section.

STEERING WHEEL HORN ASSEMBLY

(Refer to Figure 4)

REMOVAL

1. To remove horn assembly from steering wheel, loosen and remove mounting screws (3) securing horn assembly to shroud.

2. Disconnect horn electrical connection at center of shroud.

3. Lift off horn assembly.

INSTALLATION

To install, reverse removal procedure.

SPECIFICATIONS

LOWER STEERING SHAFT	TORQUE
CV Joint Nut* (CV Joint to Splined Steering Shaft)	20 - 30 lb. ft.
Companion Flange Bolts (6)	8 - 12 lb. ft.
Shaft Bolt Nut (Universal Joint to Steering Gear)	40 - 45 lb. ft.
Steering Clamp Bolt Nut (Companion Flange to Steering Column)	40 - 45 lb. ft.

***NOTE:** After reaching minimum torque required, nut must always be tightened to insert cotter pin. Never back nut off.

SECTION 10

WHEELS AND TIRES

The information described in Maintenance Manual X-7525 *under the heading* WHEELS AND TIRES (SEC. 10) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

RADIAL TIRES

Most late model Motorhome and TransMode vehicles are equipped with steel belted radial tires, Size 8.75 - 16.5 LT, load range "D." The cold inflation pressure for these tires is 65 psi. For continuous high speed operation over 65 mph (105 km/h), increase tire inflation pressure to 75 psi. NOTE: Radial tires may have the appearance of being under-inflated when at recommended cold inflation pressure. Refer to figure 1 for view of properly inflated radial tire.

TIRE REPLACEMENT

CAUTION: *Do not mix different construction types of tires on the vehicle such as radial, bias, and bias-belted tires, because vehicle handling may be seriously affected.*

When replacing tires, you should use size 8.75-16.5 LT or 8.75R-16.5 LT, load range "D." Construction type must be bias ply steel belted, or steel belted radial. Note: TransMode vehicles may also be equipped with bias ply tires. Use of any other size, load range or other construction type of tires may seriously affect load carrying capacity, ride, handling, speedometer/odometer calibration, vehicle ground clearance, and tire clearance to the body and chassis. If replacing only a single tire, it should be paired on the same axle with the least worn tire of the vehicle.

WHEEL REPLACEMENT

When replacing wheels for any reason, the replacement wheels should be equivalent in load capacity, inflation pressure capacity, diameter, width, offset and mounting consideration to those originally installed on the vehicle. Be sure the word "RADIAL" is stamped on the rim.

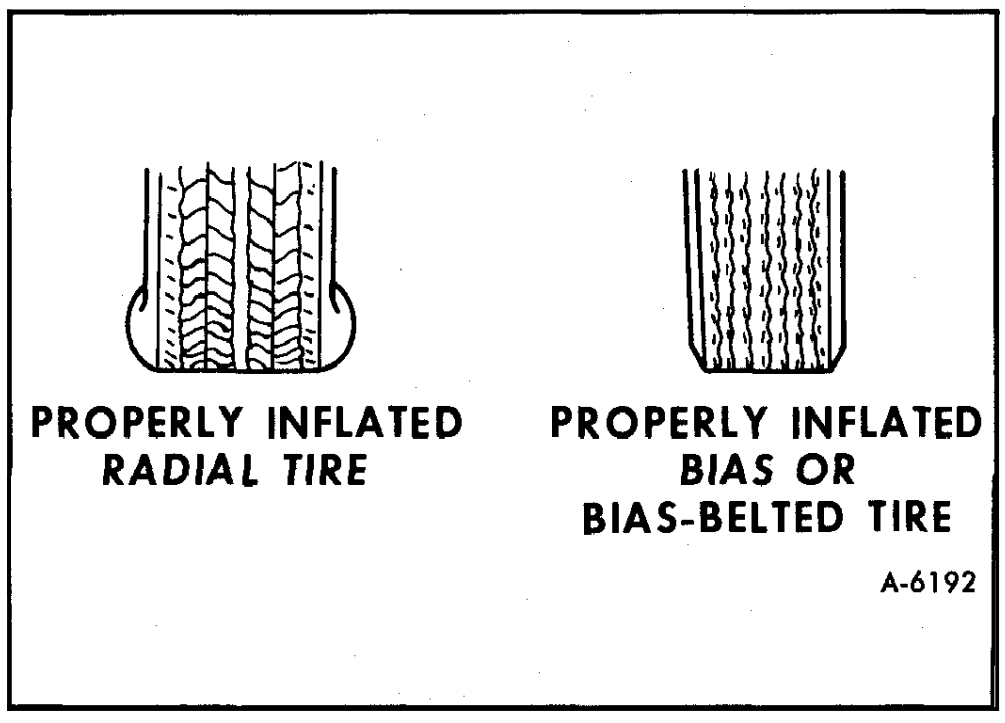


Figure 1—Tire Inflation

SECTION 12
CHASSIS ELECTRICAL

The information described in Maintenance Manual X-7525 under the heading CHASSIS ELECTRICAL (SEC. 12) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

INSTRUMENT AND GAUGES

SPEEDOMETER AND GAUGE CLUSTER

(Refer to Figure 1)

"Face" changes have taken place on the speedometer head and gauge cluster. The speedometer now includes kilometers per hour as well as miles per hour. Both components are serviced as before.

PRINTED CIRCUITS

CHECKING TELL-TALE PRINTED CIRCUIT USING TELL-TELL LIGHT PANEL
(Refer to Figure 2)

To check "Engine Water" tell-tale circuit proceed as follows:

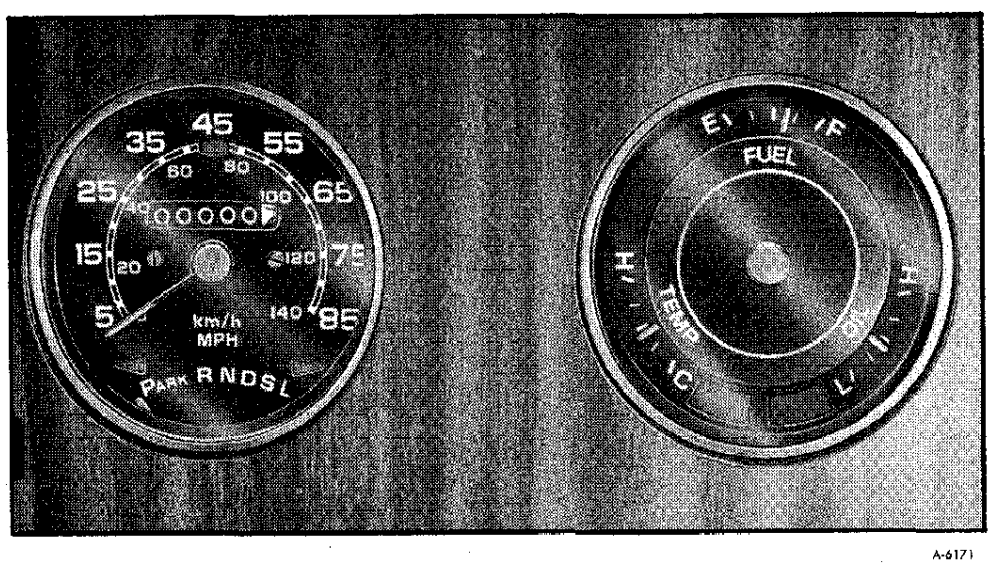


Figure 1—Speedometer and Gauge Cluster

1. Remove instrument panel rear cover.

2. Remove tell-tale light panel connector and remove the tell-tale panel.

3. With a continuity light, connect one probe of test light to "41" of the printed circuit ("FEED") and the other probe to "937". If the test light lights, bulb and circuit are good. If the test light does not light, remove the "937" bulb and check bulb. If bulb is good, problem is in the printed circuit board.

NOTE: There is no "low air" warning system on circuit "900".

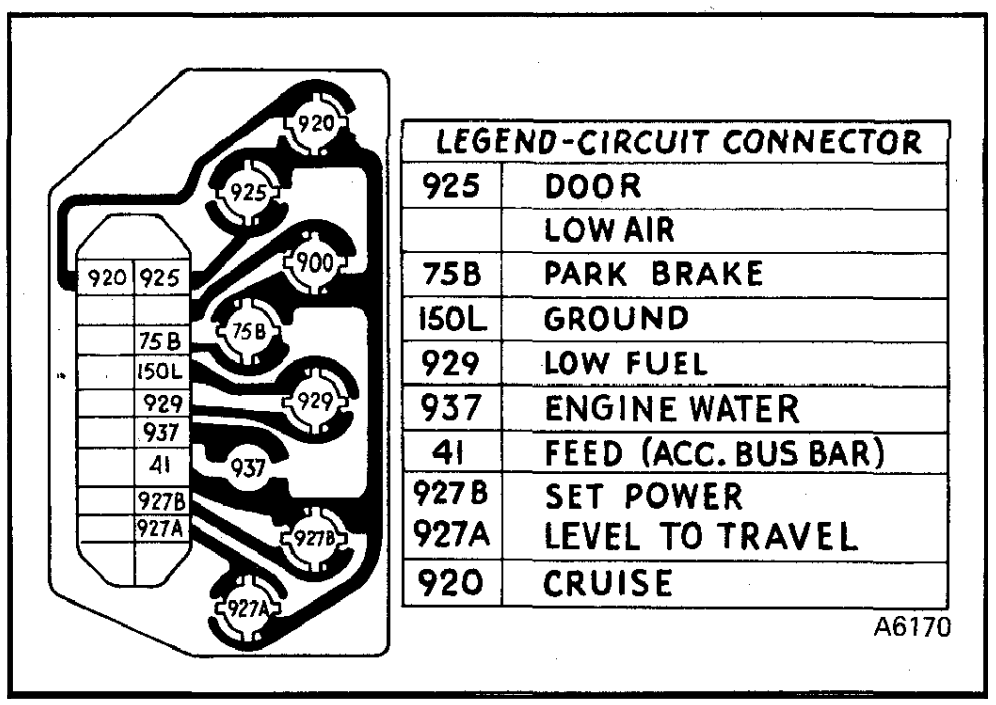


Figure 2—Tell Tale Printed Circuit

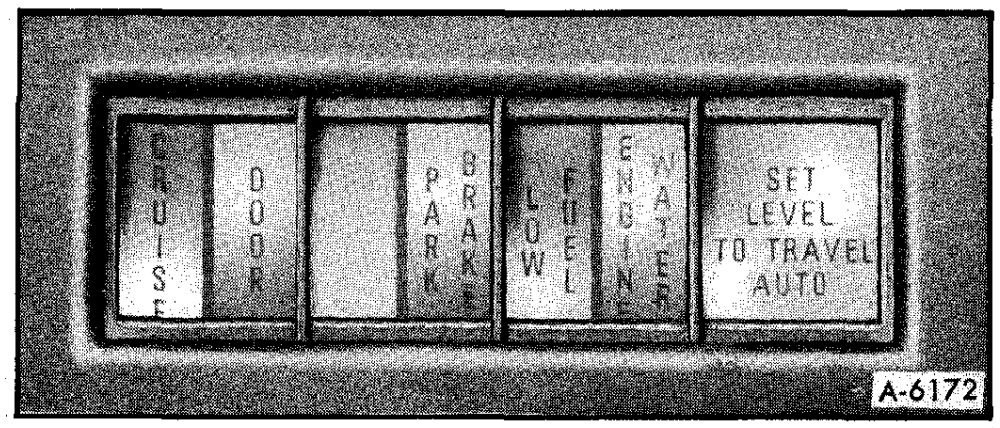


Figure 3—Tell Tale Panel

COOLANT LEVEL—ENGINE WATER—INDICATOR

All vehicles are equipped with a coolant level warning light, "Engine Water," which illuminates in the printed circuit tell-tale panel (see figure 3) when a cooling system low water condition occurs in the radiator of the vehicle. The indicator module is located in the instrument panel wiring harness beneath the speedometer connector. If "Engine Water" indicator system malfunctions, refer to "Coolant Level Indicator Diagnosis Chart", Sec. 12, Maintenance Manual X-7525. See servicing details before refilling coolant as discussed in Sec. 13, RADIATOR AND COOLANT RECOVERY SYSTEM, Maintenance Manual X-7525.

MODULE REPLACEMENT

The engine water (low coolant) module is replaced from the rear of the instrument panel. The module is taped to the instrument panel wiring (see figure 4) below the speedometer connector, and is connected to the wiring harness through a 5-wire connector. Low coolant level schematic is shown in figure 5.

1. Remove instrument panel rear cover.
2. Remove tape from module. Remove module from dash panel by removing two securing screws.
3. Disconnect electrical connector from module.
4. Install replacement module in reverse sequence of removal.

PROBE REPLACEMENT

1. Disconnect lead wire from probe sensor.
2. Unscrew probe sensor from radiator.
3. Install replacement probe sensor in reverse sequence of removal. Torque probe sensor to 25-30 in. lbs.

ENGINE WATER "SYSTEM" CHECK

Disconnect lead wire from sensor probe in radiator. Turn ignition key to "ON" position. Check for illumination of "Engine Water" bulb

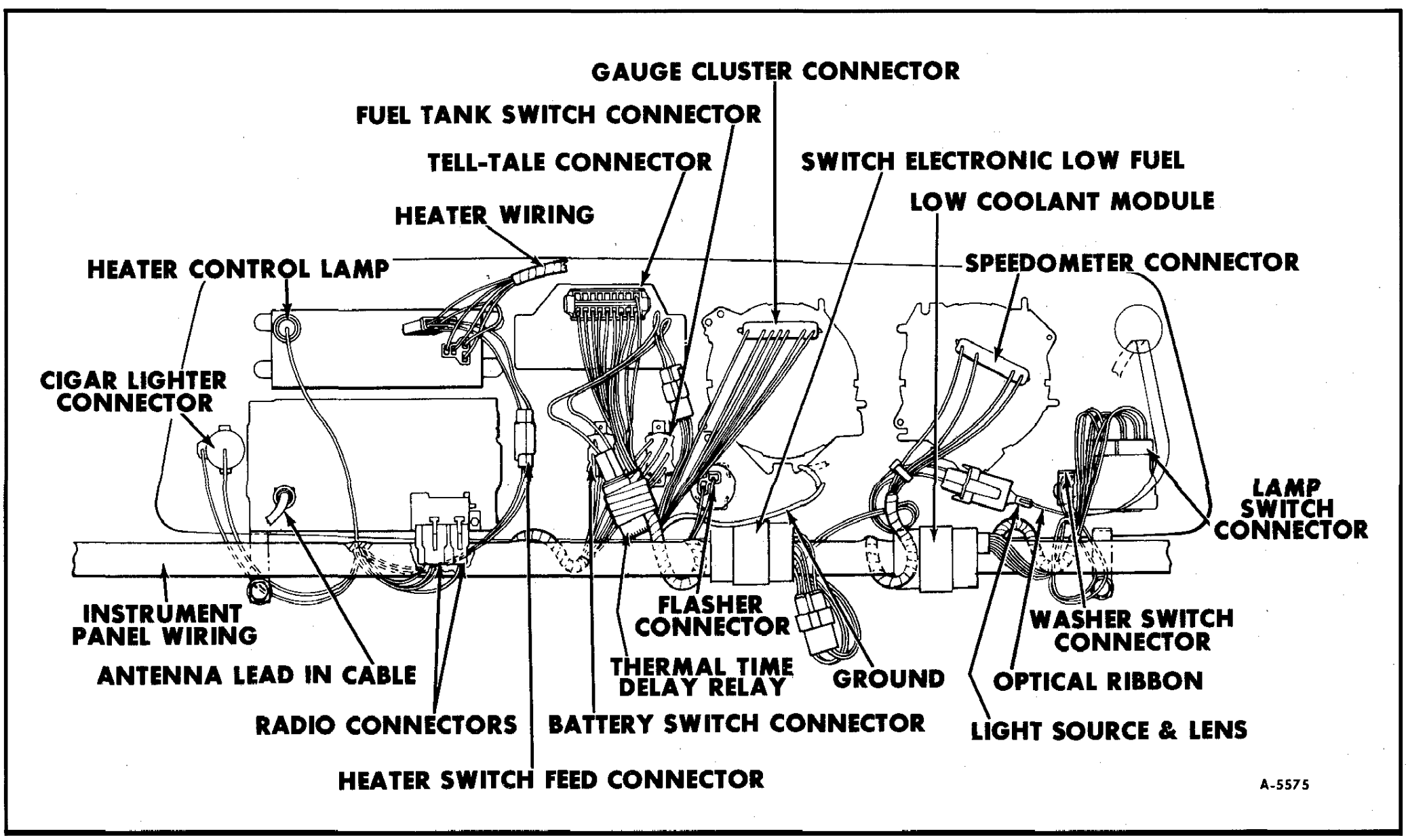
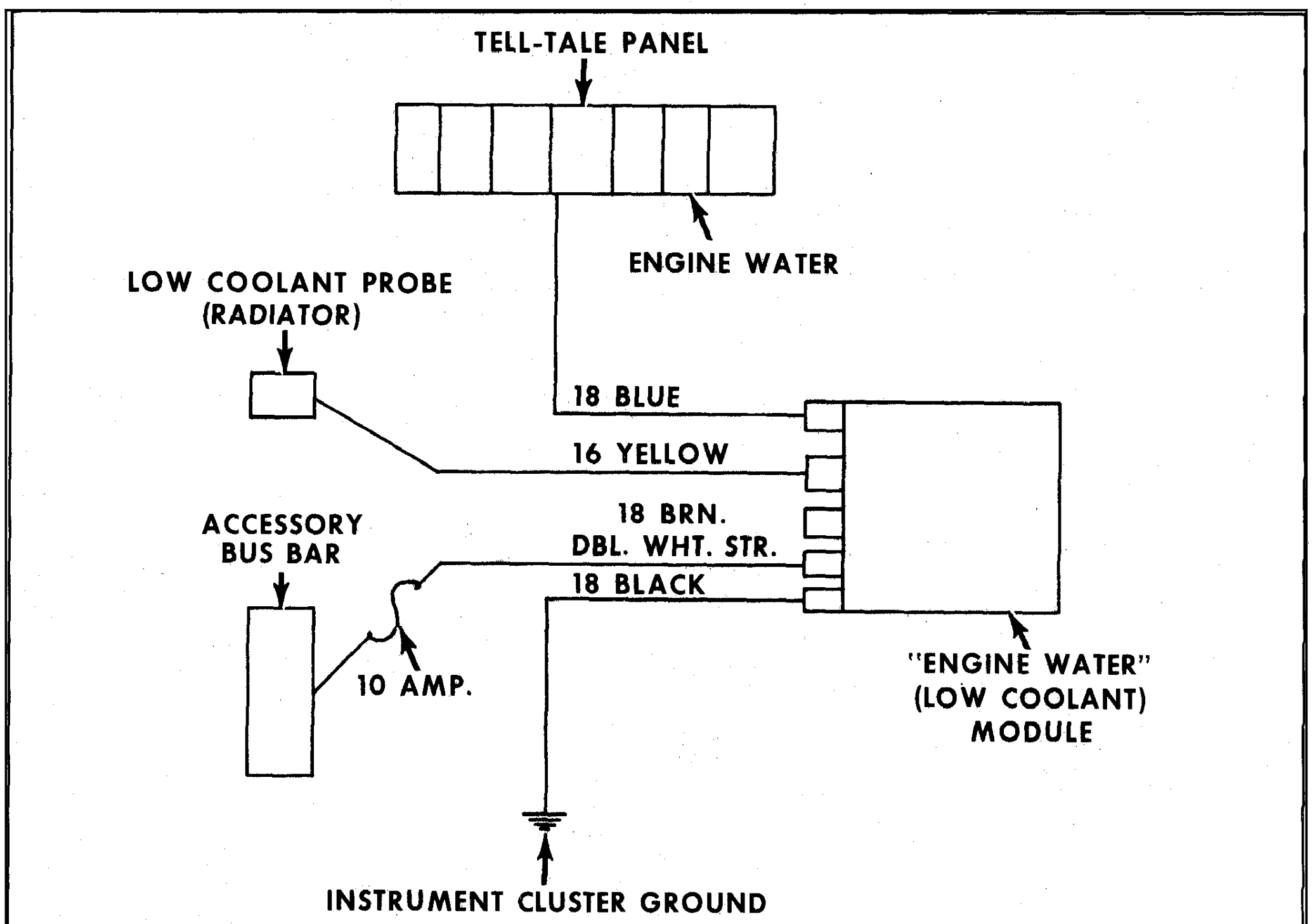


Figure 4—Instrument Panel Wiring (Typical)



SYSTEM OPERATION: The Engine Water (Low Coolant) indicator system is a D. C. powered, transistorized circuit utilizing a stainless steel probe to sense the presence of coolant in the Motorhome cooling system. When coolant level in radiator is satisfactory, the 16/Yellow wire is grounded through the radiator probe. When fluid level in the radiator drops below the probe, probe resistance increases. If probe resistance is high enough to trigger the integrated circuit of the module, a ground path is provided for the tell-tale panel, turning the "ENGINE WATER" light on. A-6168

Figure 5—Engine Water (Low Coolant) Schematic

in tell-tale panel. If bulb does not light, then problem is in low coolant module or tell-tale printed circuit board. See tell-tale printed circuit check procedure or "Coolant Level Indicator Diagnosis" chart, Sec. 12, Maintenance Manual X-7525.

WIRING

INSTRUMENT PANEL WIRING

Wiring to the instrument panel in late model '76 vehicles has been revised. Refer to figure 4 for panel wiring and proper connector locations.

HORN

The two air-tone "S" type vibrating electric horns in late '76 model vehicles are mounted typically as shown in figure 6 (behind the left front access door). The electric air-tone "S"

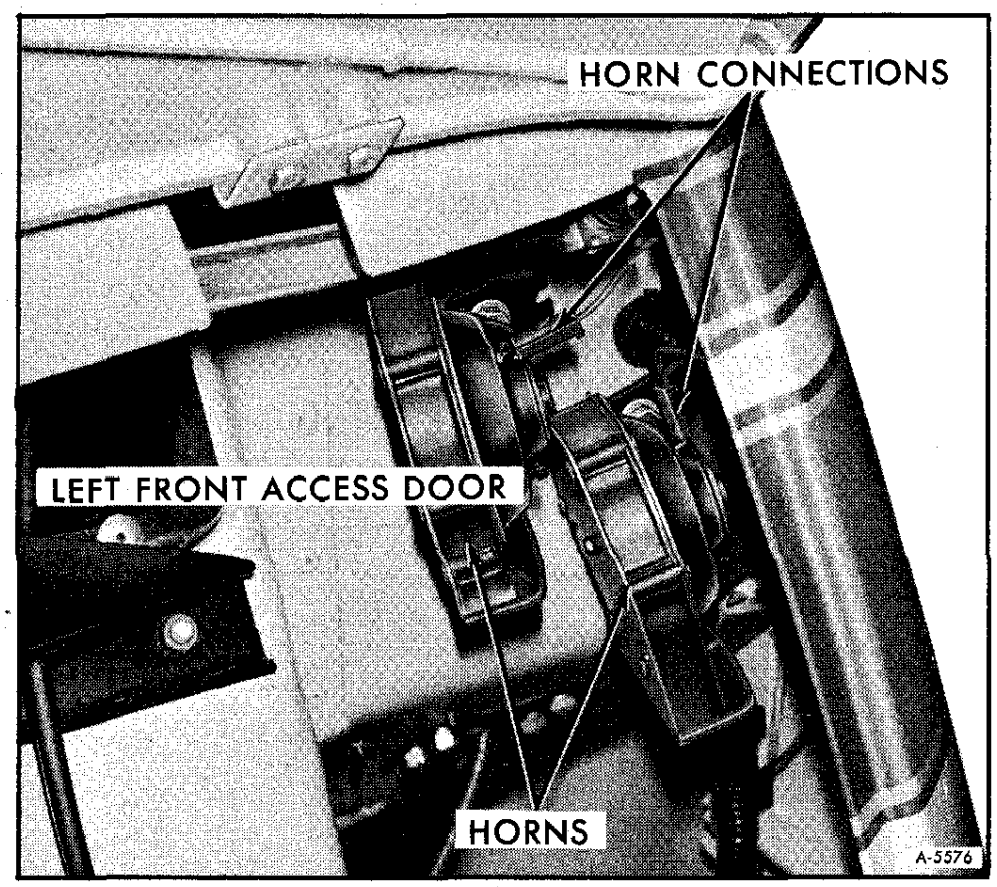


Figure 6—Horn Installation (Typical)

type horn is carefully adjusted and inspected during manufacture and should operate indefinitely without attention. The horn assembly should not be adjusted or repaired. Horn diagnosis and component replacement are not affected by new installation.

RADIO AND TAPE PLAYER

STEREO TAPE PLAYER CONVECTOR

Late model '76 vehicles equipped with optional stereo tape player have an integral radio convector. Convector test and replacement procedures specified in Maintenance Manual X-7525 are no longer applicable. If radio is to be removed from vehicle for repairs, convector will be checked by radio repair station.

LIGHT BULB SPECIFICATIONS

BULB APPLICATION	QUANTITY	BULB NO.	PART NO.
Engine Water Tell-Tale	1	74	(part of Tell-Tale Assm.)

SECTION 13

RADIATOR AND COOLANT RECOVERY SYSTEM

The information described in Maintenance Manual X-7525 under the heading RADIATOR AND COOLANT RECOVERY SYSTEM (SEC. 13) is applicable to models covered by this supplement with the addition of the following illustration, showing new radiator support bracket mounts (figure 1).

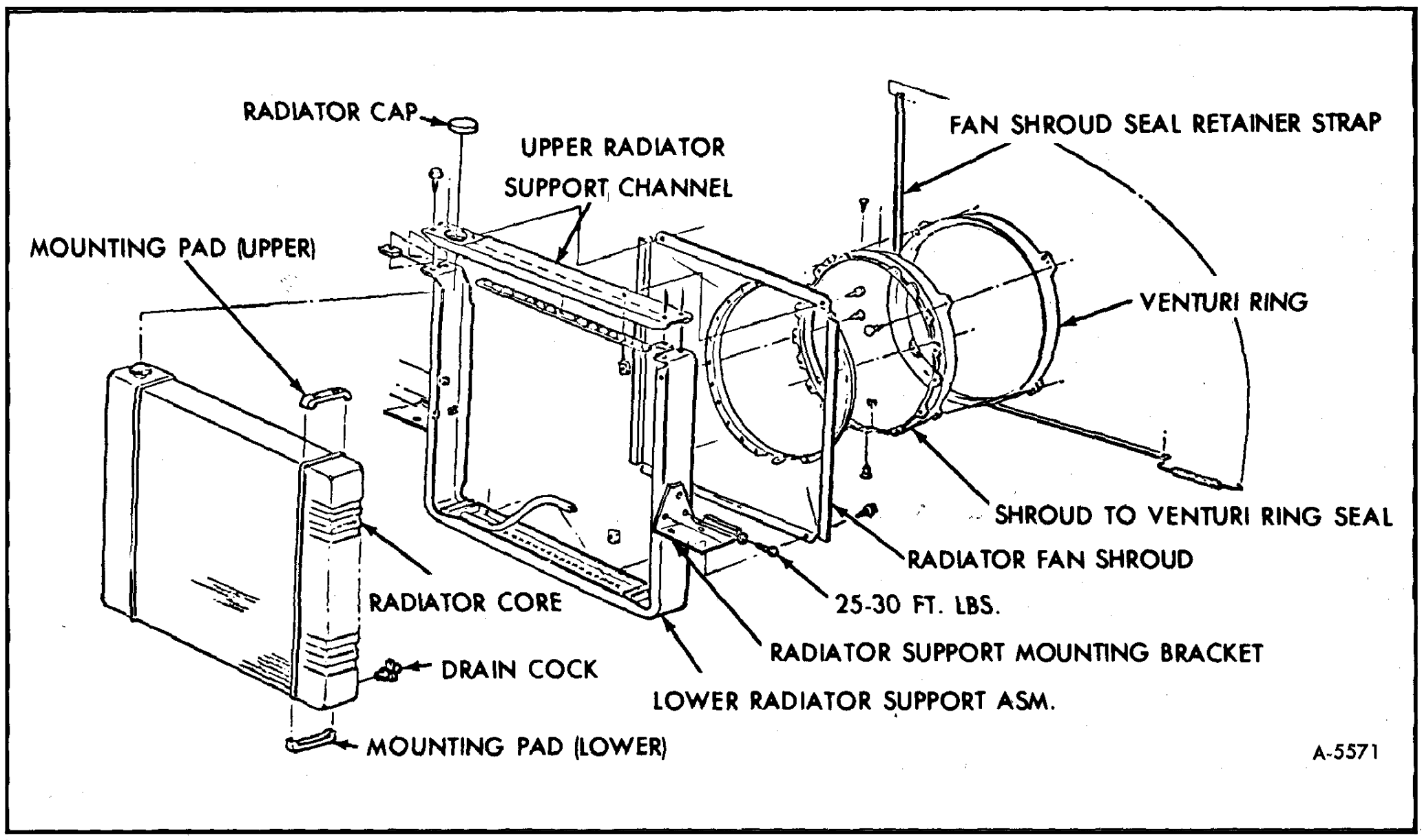


Figure 1—Radiator Assembly (Typical)

SECTION 24

MISCELLANEOUS GMC LIVING AREA FACILITIES

The information in this section pertains to components and/or systems found in the GMC Motorhome (Models ZEO6581 or ZEO6582) ONLY.

Contents of this section are listed below:

SECTION 24B

LIVING AREA ELECTRICAL

The information described in Maintenance Manual X-7525 under the heading LIVING AREA ELECTRICAL (SEC. 24B) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

MODEL ZE06582 ONLY

GENERAL INFORMATION

The 12-volt living area circuits are protected by automotive-type fuses, and the 120-volt circuits are protected by circuit breakers like those found in modern homes. The 12-volt living area fuse block is located in the bathroom vanity beneath the sink, as shown in figure 1. In the event of an overloaded circuit, the cause should be corrected and a new fuse of the same capacity must be installed.

The main circuit breaker panel (figure 2) is located at the left rear twin bed behind the heater closure. To gain access to panel, push lightly on access door. The panel contains circuit breakers that are designed to snap to the neutral position in the event of an overloaded 120-volt circuit. Once the cause of an overload is corrected, the circuit breaker must

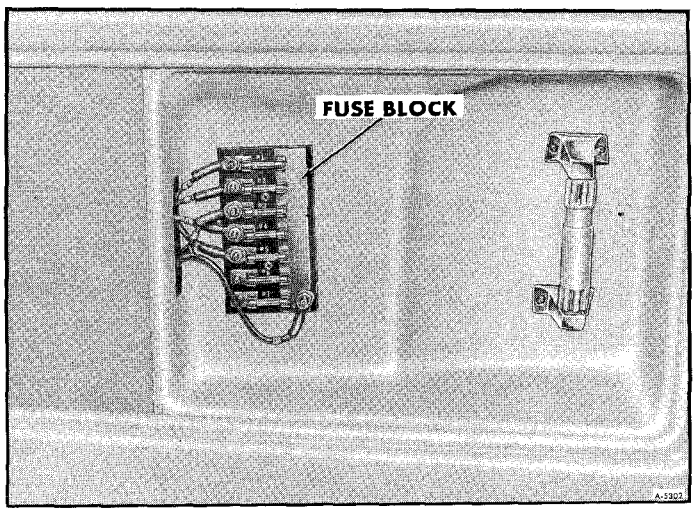


Figure 1—Fuse Panel Location (Model ZEO6582)

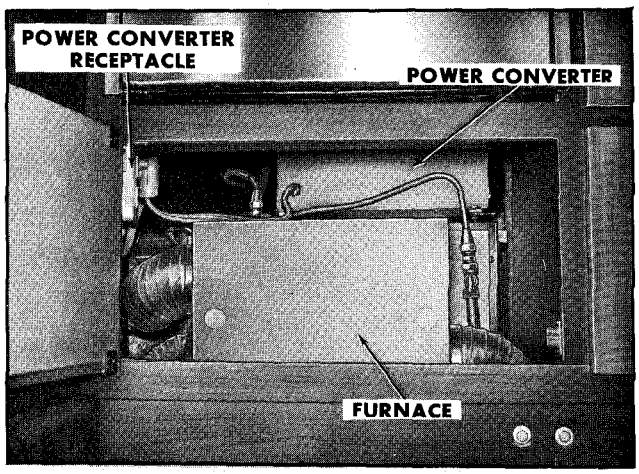


Figure 3—Converter Location (Model ZEO6582)

be moved first to the "OFF" position and then to the "ON" position.

The 120-volt/12-volt power converter is located behind the oven, above the furnace (figure 3). When the vehicle is plugged into 120-volt external power source, the converter powers all 12-volt components and recharges the living area battery.

For explanation of 12-volt fuse block number code, refer to figure 4. The circuit breakers for the 120-volt system and the circuits they protect are shown in figure 5.

HOLDING TANK GAUGE

The holding tank gauge, shown in figure 6, is located at eye level above the light switch panel. The gauge is activated by a push button. Holding tank should never be allowed to reach the "FULL" mark on gauge. If the holding tank is overfilled, the overflow will back up through the bathroom shower drain.

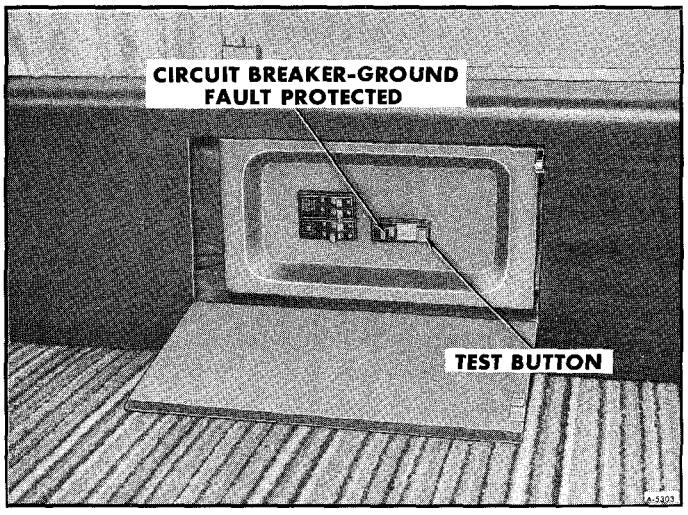


Figure 2—Circuit Breaker Panel (Model ZEO6582)

TESTING HOLDING TANK GAUGE

Before replacing holding tank gauge, check gauge to determine if it is malfunctioning. Use gauge replacement procedure for access to 3-way connector. Test gauge with following procedure, making use of Fuel Gauge Sending Unit Tester (J-24538) or Tester BT-11-7.

1. Connect tester leads and 12-volt battery leads to gauge 3-way connector (as in figure 7). Connector terminals are coded ("H" for ground, "J" for 12-volt DC, and "K" for sending unit) to guide correct connections. Caution should be used when connecting the circuit, as improper power supply polarity or improper connections can permanently damage the unit.
2. The "push-to-read" switch should be depressed. As the rheostat is varied from "100" to "0", the lights indicating 1/4 full, 1/2 full, 3/4 full, and full should light sequentially. The "E" lamp (indicating empty) should light at all times, independent of the rheostat setting. Thus, the "E" lamp may be used as an indicator, verifying that power is being applied to the internal meter circuitry.
3. The lamps should light in sequence and remain lit within the following limits:

Description	Limits of Rheostat Setting	Nominal
Lamp for "E"	always on	- - -
Lamp for 1/4 mark	64-76	70
Lamp for 1/2 mark	45-55	50
Lamp for 3/4 mark	25-35	30
Lamp for "F"	5-15	10

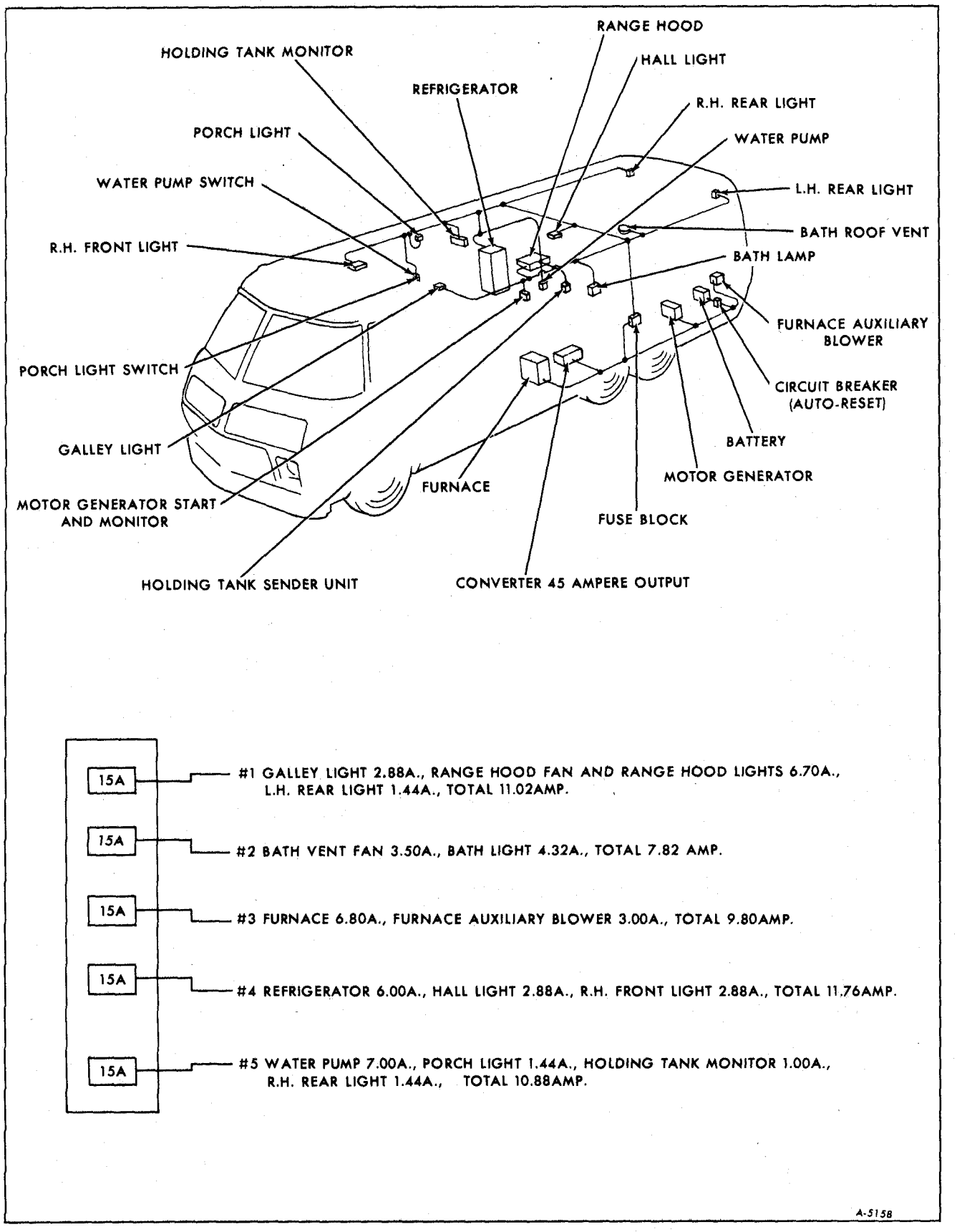
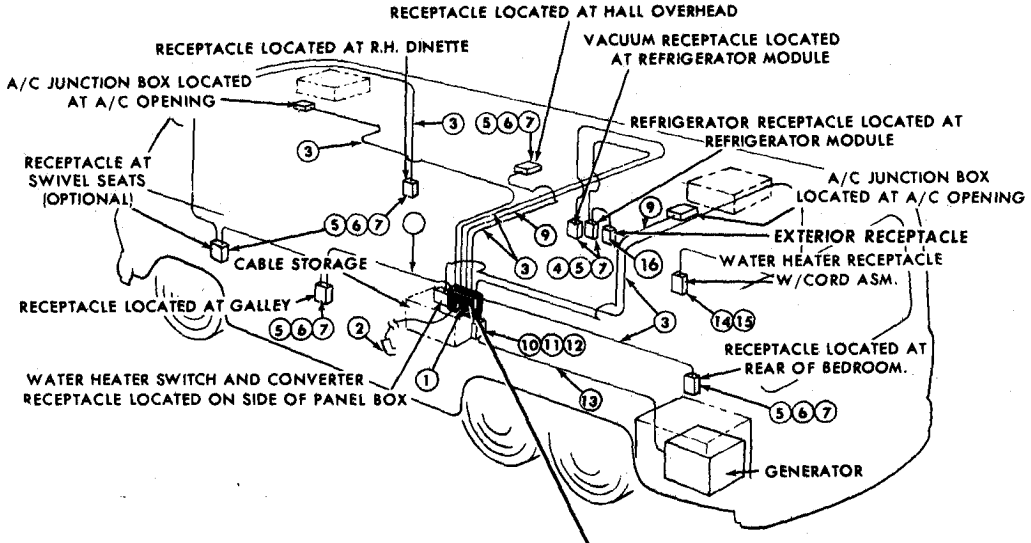


Figure 4—Living Area 12-Volt DC Electrical System (Typical, Model ZEO6582)



ITEM NO.	PART NAME
1	MAIN PANEL BOX
2	#8-4 WIRE CORD TYPE '50' W/PLUG
3	WIRE 12/2 W/GROUND WIRE
4	SINGLE RECEPTACLE
5	OUTLET BOX
6	DUPLEX RECEPTACLE
7	OUTLET PLATE
8	SWITCH & RECEPTACLE
9	14/2 W/GROUND WIRE
10	3 POLE 4 WIRE RECPTACLE
11	OUTLET BOX
12	OUTLET PLATE
13	#6-2 WIRE CORD IN METAL CONDUIT
14	'J' BOX
15	BLANK COVER PLATE
16	EXTERIOR RECETACLE

CIRCUIT BREAKER PANEL				
CIRCUIT #1	CIRCUIT #2	CIRCUIT #3	CIRCUIT #4	CIRCUIT #5
FRONT AIR COND. RECEPT.	WATER HEATER RECEPT.	HALL OVER RECEPT.	VACUUM RECEPT.	REAR AIR COND. RECEPT.
	CONVERTER RECEPT.	BEDROOM RECEPT.		
		GALLEY RECEPT.		
		SWIVEL CHAIR RECEPT.(OPT.)		
		R.H. DINETTE RECEPT.		
		REFRIGERATOR RECEPT.		
		EXTERIOR RECEPT.		

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Figure 5—Living Area 120-Volt AC Electrical System (Typical, Model ZEO6582)

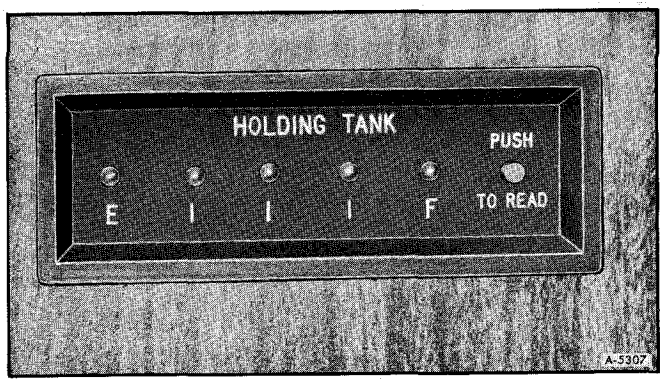

Figure 6—Holding Tank Gauge (Model ZEO6582)

4. If unit under test does not operate properly, test circuit connections (including polarity of input power) should be verified.

If connections are correct, and the holding tank gauge does not operate as described above, a failure is indicated. Replace the unit.

HOLDING TANK GAUGE REPLACEMENT

1. Disconnect battery ground cable from living area battery. Unplug converter at 120-volt outlet.

2. Remove refrigerator. (Refer to Maintenance Manual X-7525, Sec. 24D - "Refrigerator.")

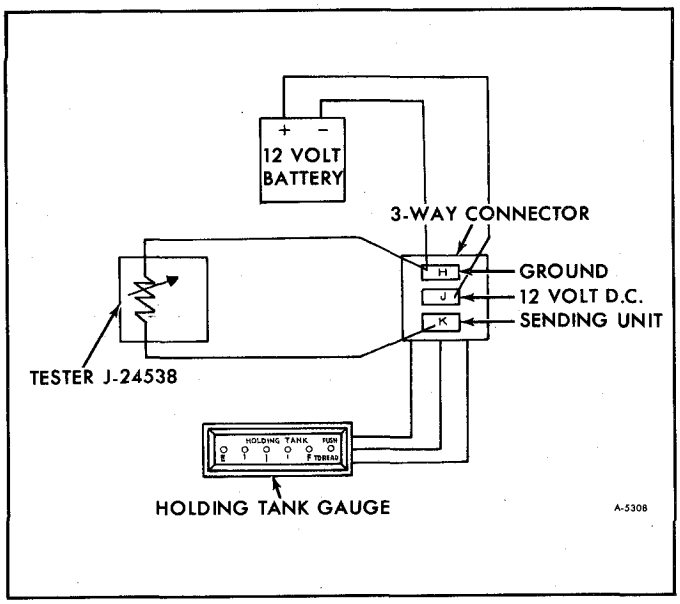

Figure 7—Holding Tank Gauge Test Circuit

3. Through access hole and behind gauge, remove gauge clamp.

4. Pull gauge forward out of cut-out in wall.

5. Disconnect gauge 3-way connector, and remove holding tank gauge.

6. Reverse this procedure for installation.

HOLDING TANK GAUGE DIAGNOSIS CHART

PROBLEM	POSSIBLE CAUSE	CORRECTION
GUAGE READS "F" ALL THE TIME	1. Circuit grounded between sending unit and tank. 2. Malfunction in gauge. 3. Tank float hang-up.	1. Insulate grounded circuit. 2. Test gauge and replace as required. 3. Free binding float or install new tank unit.*
GAUGE READS "E" ALL THE TIME	1. Open circuit between sending unit and tank. 2. Open circuit between tank unit slider resistor and ground. 3. Malfunction in gauge. 4. Tank float hang-up.	1. Clean terminals or repair wires. 2. Install new tank unit.* 3. Test gauge and replace as required. 4. Free binding float or install new tank unit.*
ERRATIC READING	1. Loose connection anywhere in circuit.	1. Inspect and if necessary, clean and tighten all connections in circuit.

PROBLEM	POSSIBLE CAUSE	CORRECTION
READING DOES NOT CHANGE	1. Malfunction in gauge. 2. Tank float hang-up.	1. Test gauge and replace as required. 2. Free binding float or install new tank unit.*
GAUGE GIVES OTHER THAN CORRECT READING	1. Tank float hang-up or malfunction in sending unit. 2. Malfunction in gauge.	1. Free binding float or install new tank unit.* 2. Test gauge and replace as required.
NO READING	1. Open ground at gauge. 2. Lack of 12-volt supply to gauge. 3. Malfunction in gauge.	1. Check wiring for loss of ground. 2. Check power supply, fuse, and wiring. 3. Test gauge and replace as required.

* Electrical power must be off before removing tank sending unit, otherwise full voltage may destroy unit or possibly ignite L.P.G. vapor. Disconnect battery ground cables and remove monitor panel fuse at living area fuse panel.

GROUND FAULT INTERRUPTER CIRCUIT BREAKER

In Model ZEO6582, the circuit breaker panel includes a ground-fault interrupter circuit breaker designed to protect user from the hazards of line to ground electric shock. (See figure 2)

The ground-fault interrupting circuit breaker is designed to protect individuals using appliances plugged into the bedroom, galley, dinette, refrigerator, bath, and optional exterior receptacle.

If an appliance continuously trips the circuit breaker, the appliance is defective and should be repaired or replaced. Circuit breaker may also trip if circuit is overloaded. Problem should be corrected before circuit breaker is reset.

TESTING THE CIRCUIT BREAKER

For maximum protection against electrical shock hazard, the circuit breaker should be tested at least once a month and the test date recorded.

Test Procedure

1. Push "test" button. The circuit breaker should move to the center position, which indicates that power to the protected circuit is discontinued.

2. To restore power, push the circuit breaker to "OFF" position before resetting circuit breaker to "ON" position.

CAUTION: *If circuit breaker does not trip when the test button is pushed, a loss of ground fault protection is indicated and a potentially lethal situation exists. The circuit breaker should be replaced.*

120-VOLT TO 12-VOLT CONVERTER AND BATTERY CHARGER

Model ZEO6582 converter is located behind the oven, above the furnace. (Refer to figure 3.) If power converter does not appear to be functioning properly, be certain that ground wire is connected securely to frame and that positive lead is securely fastened at circuit breaker above converter.

NOTE: Converter humming does not indicate failure.

CONVERTER REPLACEMENT

1. Shut off LP gas at tank.

2. Disconnect battery ground cable from living area battery.

3. Unplug converter at 120-volt outlet near furnace.

4. Disconnect gas lines at range. Remove range/oven. (Refer to "Range/Oven Unit Replacement," Maintenance Manual X-7525, Sec. 24H for detailed procedure.)

5. Remove mounting bolt "A" at upper end of rear mounting bracket. (See figure 8.)

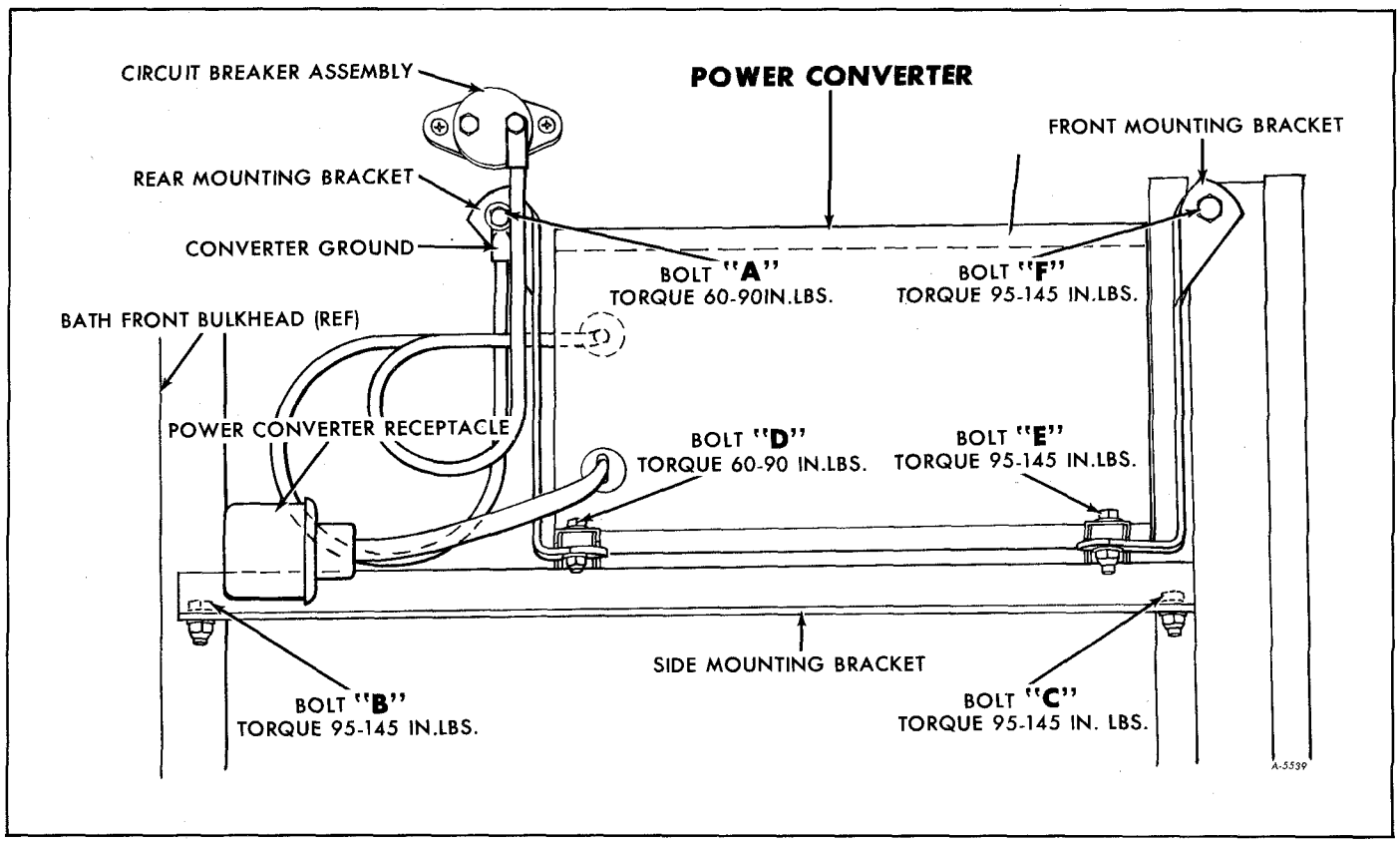

Figure 8—Converter Installation (Model ZEO6582)

Disconnect converter ground wire from frame. Disconnect converter feed at circuit breaker.

NOTE: This circuit breaker is an automatic reset type, rated at 60 amps.

6. Remove two bracket bolts "B" and "C" (figure 8) securing side bracket to furnace mounting bracket. Next, remove front and rear bracket bolts "D" and "E" (figure 8), closest to vehicle interior. Lift off rear mounting bracket.

7. Loosen remaining front bracket bolt "F", and rotate front mounting bracket forward, allowing converter to be pulled out. Converter will be removed with side mounting bracket attached.

8. Remove side mounting bracket from converter. Secure to replacement converter assembly. Refer to figure 8 for torque values (bolts "B" and "C").

9. Converter installation is reverse of removal procedure. Tighten all attaching parts to torque indicated in figure 8.

EXTERIOR RECEPTACLE

The optional exterior receptacle in model ZEO6582 is located on the right side of the vehicle, behind the refrigerator grille. The exterior receptacle is wired into circuit #3 in the circuit breaker panel, which is ground fault protected. This is designed to protect anyone using appliances that are plugged into this receptacle from the hazards of line to ground electric shock.

If an appliance continuously trips the circuit breaker, the appliance is defective and should be repaired or replaced.

MODEL ZE06581

CONVERTER REPLACEMENT

1. Disconnect battery ground cable from living area battery. Unplug converter at 120-volt outlet.

2. Disconnect converter lead at fuse panel. (See figure 9.)

3. Remove converter mounting bolts (4). (Refer to figure 9.) Pull converter forward (or

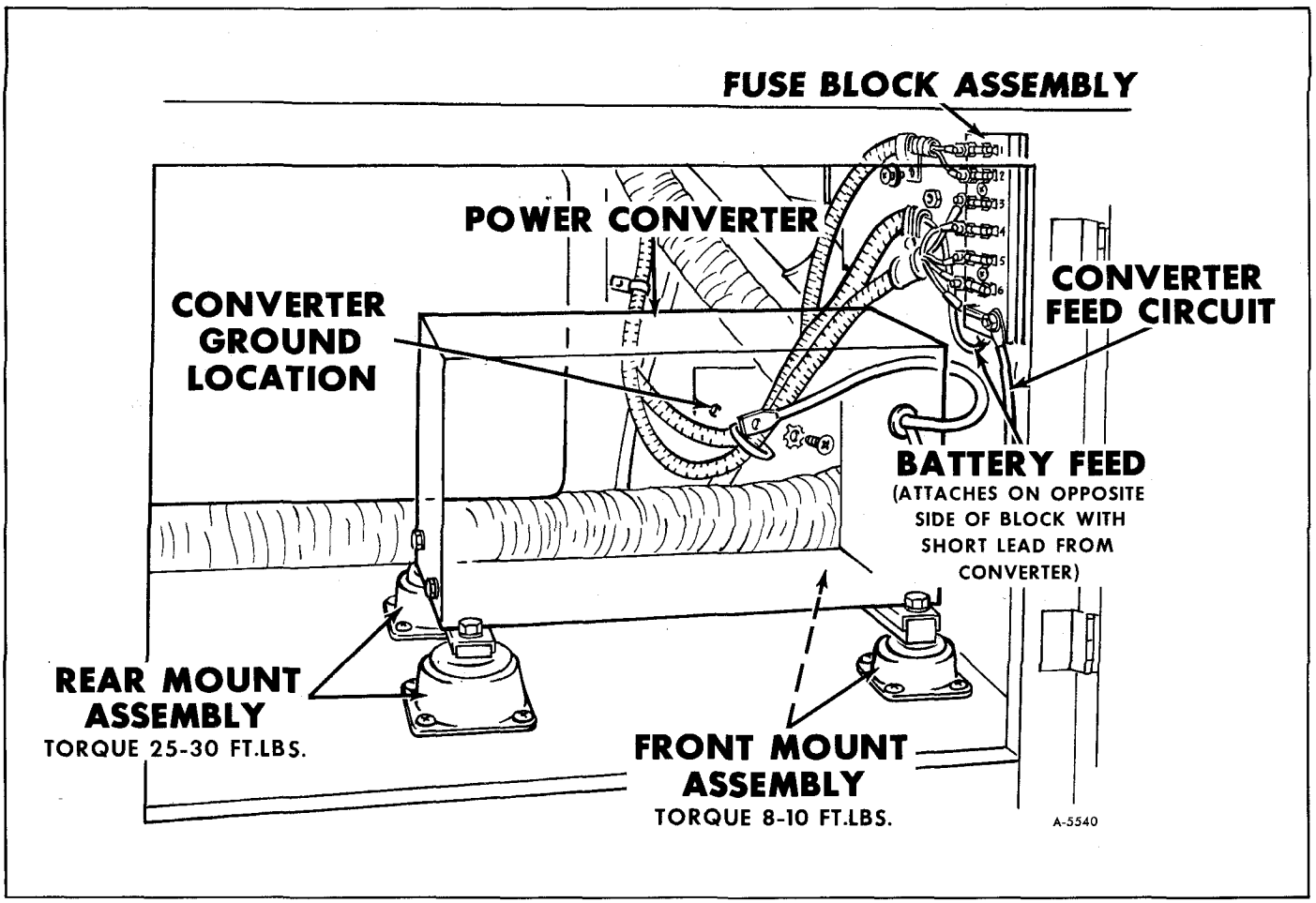

Figure 9—Converter Installation (Model ZEO6581)

tip sideways if possible) to allow access to wall panel retaining screws.

4. Remove wall panel retaining screws (behind power converter) and pull wall forward.

5. Disconnect ground screw and converter ground wire from frame (belt rail) behind wall panel. (See figure 9.) Lift out converter.

6. Converter installation is reverse of removal procedure. Be sure to attach converter ground wire securely before converter is placed in position. Torque mounting bolts to specification (see figure 9).

SPECIFICATIONS

LIVING AREA 12-VOLT SYSTEM FUSES (MODEL ZE06582 ONLY)

The following are located in the fuse block in the bathroom vanity beneath the sink. Do not use fuses of higher amperage rating than those specified below or damage may result.

Usage	No. on Fuse Block	Fuse Type
Galley Light Range Hood Vent Fan and Lights Rear L.H. Light	No. 1	AGC-15
Bath Vent Fan Bath Light	No. 2	AGC-15
Furnace Furnace Auxiliary Blower	No. 3	AGC-15
Refrigerator Hall Light R.H. Front Light	No. 4	AGC-15
Water Pump Porch Light Holding Tank Monitor R.H. Rear Light	No. 5	AGC-15

LIGHT BULB SPECIFICATIONS (LIVING AREA) (MODEL ZE06582 ONLY)

Usage	Quantity	Bulb No.
R. H. Front Light	2	1141
Kitchen Light	2	1141
Hall Light	2	1141
Porch Lights	1	1141
Range Hood Lights	2	1156
Rear Compartment Lights	2	1141
Bathroom Lights	3	1141

120-VOLT SYSTEM CURRENT RATING (MODEL ZE06582 ONLY)

Water Heater	8.7 Amp.
Power Converter	6.8 Amp.
Refrigerator	0.6 Amp.
Front Roof Mount Air Conditioner	15.0 Amp.

12-VOLT LIVING AREA COMPONENTS CURRENT RATING (MODEL ZEO6582 ONLY)

R. H. Front Light	2.88 Amp.
Hall Light	2.88 Amp.
Kitchen Light	2.88 Amp.
Rear Compartment Lamps	1.44 Amp./side
Porch Light	1.44 Amp.
Bathroom Lights	4.32 Amp.
Range Hood Vent Fan and Light	6.70 Amp.
Furnace Blower	6.8 Amp.
Water Pump	5.5 Amp.
Refrigerator	5.0 Amp.
Holding Tank Gauge	0.5 Amp.
Bath Vent Fan	3.50 Amp.
Furnace Auxiliary Blower	3.0 Amp.

120-VOLT SYSTEM CURRENT RATING (MODEL ZEO6581 ONLY)

Refrigerator	0.7 Amp.
Rear Roof Mount Air Conditioner	12.0 Amp.

12-VOLT LIVING AREA COMPONENTS CURRENT RATING (MODEL ZEO6581 ONLY)

Water Pump	5.5 Amp.

SPECIAL TOOLS

J-24538	Universal Fuel and Temperature Gauge Tester
BT-11-7	Gauge Tester

SECTION 24C
MOTOR GENERATOR

The information described in Maintenance Manual X-7525 under the heading MOTOR GENERATOR (SEC. 24C) is applicable to models covered by this supplement with the exception of the following:

Contents of this section are listed below:

MOTOR GENERATOR CAUTION

CAUTION: *Do not interfere with or bypass electrical circuit breaker or attempt in other ways to defeat its purpose. Don't fill fuel tank while engine is running and don't smoke when filling fuel tank. Wipe up any oil and gasoline spills immediately and make sure oily rags aren't left on the power plant or in its compartment. Replace any compartment insulation that may become fuel or oil soaked. Do not use flammable materials directly above or around the power plant compartment. Make sure the ventilation system provides a constant flow of air to expel any fuel vapor from motor generator compartment while vehicle is in transit. Also, be sure any openings made in the motor generator compartment for conduit, wiring, etc. are sealed to prevent toxic gases from entering vehicle interior. Do not remove oil-fill cap while engine is running.*

IGNITION AND BATTERY CHARGING SYSTEM

ONAN MOTOR GENERATOR (6KW AND 4KW)

BREAKER POINT ADJUSTMENT AND TIMING PROCEDURE

To maintain maximum efficiency from the Onan unit, check the breaker points every 100 hours and change the breaker points every 200 hours of operation. The breaker point box may be of two types, refer to figure 1 or figure 2. To change the breaker points and set the ignition timing, use the procedure appropriate to particular unit.

TYPE 1 BREAKER POINTS

1. Remove the two screws and the cover on the breaker box.
2. Remove the two spark plugs so the engine can easily be rotated by hand. Check condition of spark plugs at this time.
3. Remove mounting screw (A) and pull the points out of the box just far enough so screw (B) can be removed and leads disconnected.
4. Remove screw (C) and replace condenser with a new one. Tighten screw (C).
5. Replace points with a new set. Tighten screw (B) but do not completely tighten mounting screw (A).
6. Remove push-on terminal from ignition coil negative terminal. Connect test lamp, one lead to battery positive (+) terminal at starter, the other lead to push-on terminal (–)

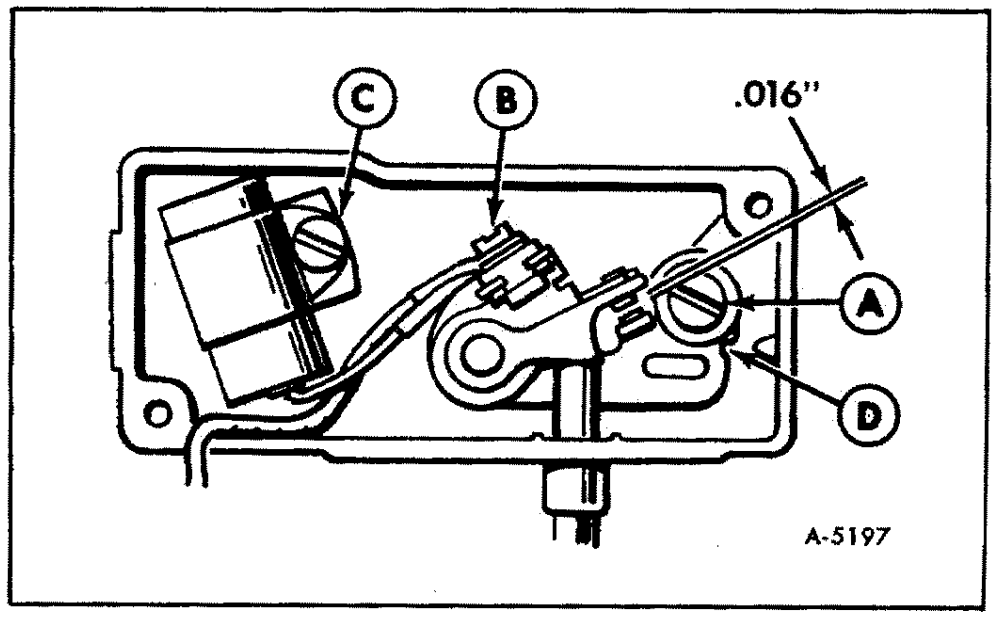

Figure 1—Breaker Point Adjustment—Type 1

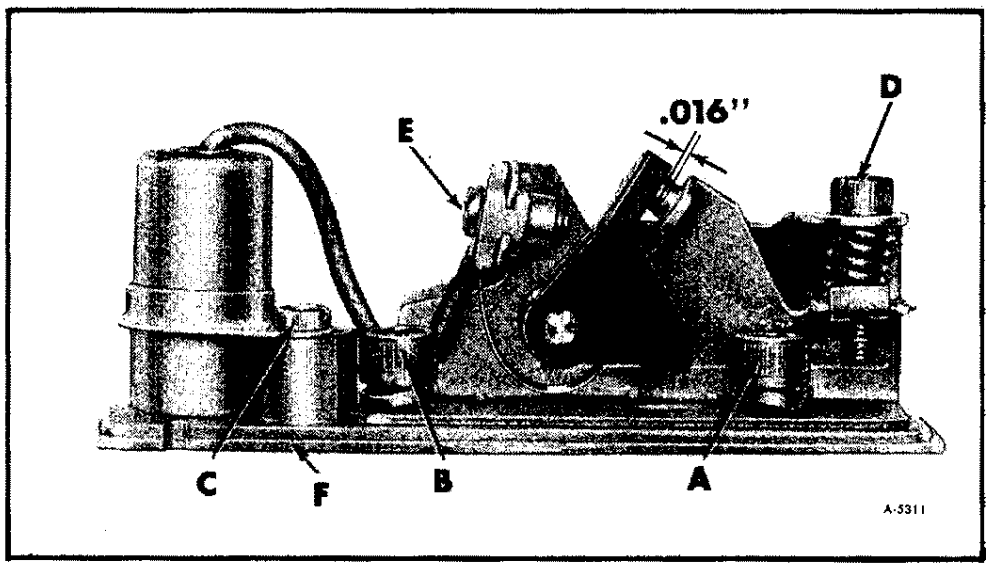

Figure 2—Breaker Point Adjustment—Type 2

removed from ignition coil terminal. (To use Ohmmeter or self-powered test lamp, remove push-on terminal from ignition coil negative terminal. Connect one of meter leads to removed terminal, the other to suitable engine ground. Do not connect Ohmmeter to battery positive lead at starter or damage to instrument could result.)

7. Rotate engine clockwise (facing flywheel) by hand until 20° BTDC mark on flywheel aligns with center of timing access hole. (Note, early units marked at 25° BTDC should be set at 25° BTDC.) Then, using a screwdriver inserted in notch (D) on the left side of the points (reverse view of figure 1), adjust points until test lamp just goes out (or Ohmmeter reads Infinity). Tighten screw (A).

8. To check, turn crankshaft against rotation (counterclockwise) until points just close. At this time test lamp should light (or Ohmmeter should read "Zero"). Now slowly rotate the engine clockwise. Lamp should go out (or Ohmmeter read Infinity) just as the points break, which is the time at which ignition occurs. (6KW — 20° BTDC or 25° BTDC, whichever is marked on flywheel.) Breaker points are now adjusted properly and timing is set.

NOTE: Type 1 breaker box assembly may be converted to Type 2 breaker box assembly to provide easier access to ignition contacts.

TYPE 2 BREAKER POINTS

1. Remove single screw and the breaker point cover box.

2. Remove the two spark plugs so the engine can easily be rotated by hand. Check condition of spark plugs at this time.

3. Using a screwdriver, remove mounting screw (C). Use an Allen wrench to remove mounting screws (A) and (B). Loosen screw (E) to remove leads. Remove points and condenser from base (F).

4. Replace points and condenser with a new set. Tighten screws (A), (B) and (C). Connect leads and tighten screw (E).

5. Remove push-on terminal from ignition coil negative terminal. Connect test lamp, one lead to battery positive (+) terminal at starter, the other lead to push-on terminal (–) removed from ignition coil terminal. (To use Ohmmeter or self-powered test lamp, remove push-on terminal from ignition coil negative terminal. Connect one of meter leads to removed terminal, the other to suitable engine ground. Do not connect Ohmmeter to battery positive (+) lead at starter or damage to instrument could result.

6. Rotate engine clockwise (facing flywheel) by hand until 20° BTDC mark on flywheel aligns with center of timing access hole. (Note, early units marked at 25° BTDC should be set at 25° BTDC.) Then, using an Allen wrench inserted in screw (D), adjust points until test lamp just goes out (or Ohmmeter reads Infinity).

7. To check, turn crankshaft against rotation (counterclockwise) until points just close. At this time test lamp should light (or Ohmmeter should read "Zero" resistance). Now slowly rotate engine clockwise. The lamp should go out (or Ohmmeter read Infinity) just as the points break, which is the time at which ignition occurs. (6KW—20° BTDC or 25° BTDC, whichever is marked on flywheel.) Breaker points are now adjusted properly and timing is set.

SECTION 24D
REFRIGERATOR

The information described in Maintenance Manual X-7525 under the heading REFRIGERATOR (SEC. 24D) is applicable to models covered by this supplement with the exception of the following:

GENERAL INFORMATION

The Norcold six cubic foot refrigerator will be used in model ZEO6582. The refrigerator will operate on either 12-volts D.C. or 120-volts A.C. This dual voltage refrigerator automatically switches from A.C. to D.C. or D.C. to A.C.

The six cubic foot refrigerator cooling system is basically the same as the seven and one-half cubic foot refrigerator with the exception of the power required to operate the swing motor compressor. Refer to "Compressor Voltage Check" and "Compressor Amperage" for specific values required.

REFRIGERATOR SERVICING

COMPRESSOR VOLTAGE CHECK

The voltage is checked at the compressor terminals with an A.C. voltmeter (Figure 1).

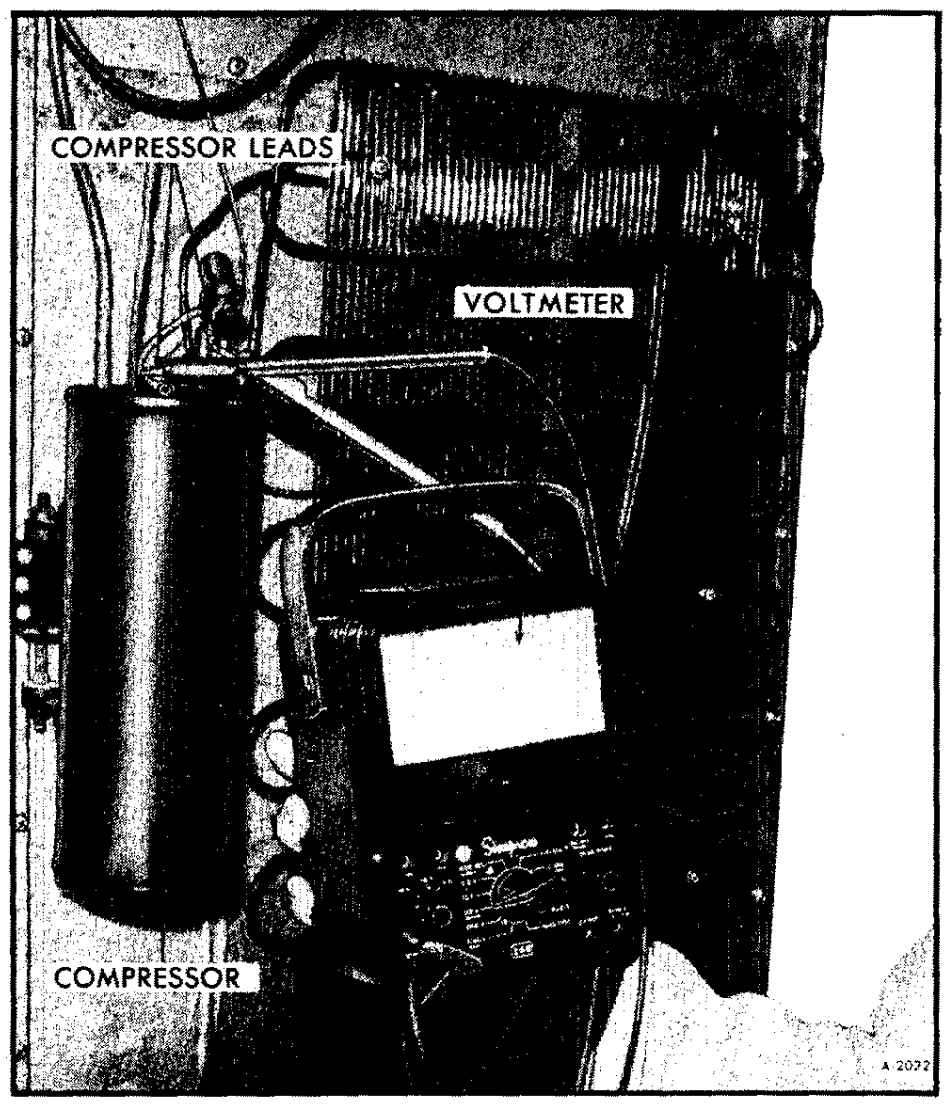

Figure 1—Checking Compressor Voltage

NOTE: A standard (RMS) A.C. voltmeter will read a high A.C. compressor voltage on D.C. operation. The reason being the inverter does not produce a true sine wave on D.C. operation. The 120-volt A.C., 60 cycles/second, will produce a true sine wave which an A.C. voltmeter is designed to read.

If the voltage at the compressor is not adequate the voltage source should be checked.

A.C. Operation

Using a standard (RMS) A.C. voltmeter the voltmeter reading should be:

6 cubic foot model = 19 to 21 volts
7-1/2 cubic foot model = 22 to 24 volts

D.C. Operation

Using a standard (RMS) A.C. voltmeter the voltmeter reading should be:

6 cubic foot model - 27.2 to 29.2 volts
7-1/2 cubic foot model - 31.5 to 33.5 volts

COMPRESSOR AMPERAGE

One method of determining whether or not the proper amount of freon is in the cooling

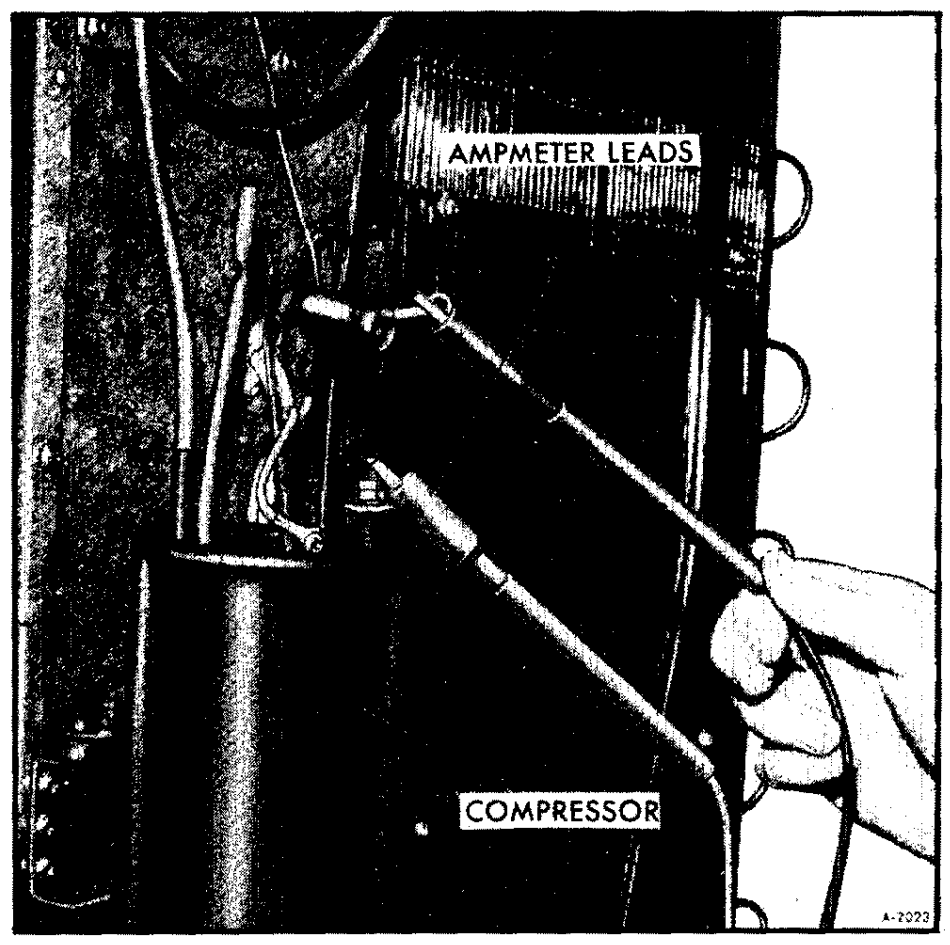

Figure 2—Checking Compressor

system is to measure the number of amps drawn by the compressor when connected to a 120-volt source.

This is done by removing one of the compressor leads and connecting a 0-5 A.C. ammeter in series with the compressor (figure 2). A reading of 2 amps should be read for the six cubic foot model and approximately 2.6 amps for the seven and one-half cubic foot model.

If the amperage reading is high, this is an indication the system is undercharged. If a low reading is obtained the system is overcharged. If it is determined that the system is under or overcharged, the entire cooling system must be replaced.

NORCOLD REFRIGERATOR SPECIFICATIONS

Model	6 Cubic Foot	7.5 Cubic Foot
Compressor Power	40 Watts	60 Watts
Compressor Amps Required	2 Amps	2.6 Amps
Compressor Volts Required (A.C. Operation)	19 to 21 Volts A.C.	22 to 24 Volts A.C.
Compressor Volts Required (D.C. Operation)	27.2 to 29.2 Volts A.C.	31.5 to 33.5 Volts A.C.
Compressor Motor Resistance	2 to 3 Ohms	2 to 3 Ohms
Compressor Motor Speed	60 Strokes/Sec.	60 Strokes/Sec.
Inverter Output	11 Volts A.C.	11 Volts A.C.
Transformer Output	20 Volts A.C.	23 Volts A.C.
Input Voltage	12 Volts A.C. or 120 Volts A.C.	12 Volts D.C. or 120 Volts A.C.
Refrigerant	R 12	R 12
Refrigerant Charge	2.56 Ounces	17 Ounces

SECTION 24G
FURNACE

The information described in Maintenance Manual X-7525 under the heading FURNACE is applicable to models covered by this supplement with the exception of the following:

FURNACE REPLACEMENT

WARNING: BEFORE ANY REMOVAL OR DISASSEMBLY PROCEDURES ARE PERFORMED ON THE FURNACE, BE SURE L.P. GAS IS COMPLETELY TURNED OFF AT THE L.P. GAS TANK AND REMOVE FURNACE FUSE FROM FUSE BLOCK.

WARNING: DUE TO THE POSSIBILITY OF INJURY ON SHARP SHEET METAL, CARE SHOULD BE TAKEN ANY TIME SERVICE IS PERFORMED ON THE FURNACE.

MODEL ZE06581

REMOVAL

1. Shut off L.P. gas at L.P. tank and remove furnace fuse from fuse block in living area electrical compartment.

2. Depending on whether furnace is equipped with a davo or swivel chairs perform one of the following:

A. Equipped with davo Raise davo seat back and support for access to davo mounting bolts. Remove davo kick pad. Remove two heat ducts under davo. Remove floor carpeting under davo. Remove eight davo mounting bolts and remove davo.

B. Equipped with swivel chairs - Remove swivel chair and base (chair located next to furnace, only). Remove screws retaining duct panel assembly to floor and sink module. Carefully raise panel and disconnect ducts from right side of furnace. Remove panel assembly.

3. Remove lower shelf from compartment to left of furnace.

4. Disconnect furnace electrical connector.

5. Disconnect L.P. gas supply line from furnace.

7. Remove furnace to floor mounting bolts (3 or 4) and four screws at top, back of furnace.

8. Shut off water pump and water heater. Relieve water pressure at kitchen sink faucet. Remove sink trap. Label water lines at faucet and disconnect. Remove cupboard partition behind sink trap. Note an offset cross-recessed screwdriver will aid in removing screws from upper right and left corner of partition.

9. Remove two upper rear sink module mounting bolts (with spacers). Use care when removing bolts to avoid dropping spacers located between sink module and outer wall of vehicle. Remove two lower sink module mounting bolts (front lower right). Then loosen two screws (front lower left of module). Remove courtesy lamp wiring clip from transition on furnace.

NOTE: Sink module is still attached at upper left oven end.

10. Carefully pull furnace end of sink module about one inch away from outer wall.

11. Slide furnace toward center of vehicle until vents on furnace clear vent tubes on vehicle outer wall. Then pull furnace towards front of vehicle until clear of sink module.

INSTALLATION

1. Slide furnace into sink module. Be sure vents in back of furnace are aligned with vent tubes in outer wall of vehicle. Then slide furnace outward, being sure furnace vents are engaged in the vent tubes.

2. Install furnace to floor mounting bolts and four screws at top, back of furnace.

3. Slide sink module back into position against outer wall. Install two upper rear sink module mounting bolts (with spacers). Install

two lower sink module mounting bolts (front lower right). Tighten two screws located at front lower left of module. Connect courtesy lamp wiring clip to transition on furnace.

4. Install cupboard partition behind sink trap. Connect water lines at sink faucet. Install sink trap.
5. Connect all ducts to furnace.
6. Connect L.P. gas supply line to furnace.
7. Connect furnace electrical connector.
8. Install furnace fuse in living area fuse block.
9. Turn on L.P. gas at tank. Check for L.P. gas leaks at furnace and correct as necessary. Then check furnace for proper operation.
10. Install any remaining furniture components, such as: Davo, swivel chair trim panels, and lower shelf to left of furnace.
11. Check furnace for proper operation.

MODEL ZE06582

REMOVAL

1. Shut off L.P. gas at L.P. tank.
2. Disconnect living area battery negative (–) cable from battery.
3. Remove range/oven as described in Maintenance Manual X-7525 (Section 24H).
4. Unplug electrical power converter from 120-volt outlet.
5. Disconnect converter 12-volt positive lead from circuit breaker and negative lead from body structural member.
6. Remove converter and converter mounting bracket. Refer to Section 24B of this supplement for details.
7. Remove the following sink module fasteners:

A. Three screws retaining sink module to bath module.
B. Bolt and spacer located at the rear middle of sink module. Use care when removing bolt to avoid dropping spacer located between sink module and outer wall of vehicle.
C. Two bolts at floor level beside furnace.

NOTE: Sink module is still attached at forward end.

8. Carefully pull furnace end of sink module about one inch away from outer wall.
9. Remove L.P. gas line that goes to both range/oven and furnace (fitting located at floor level on the left-side of furnace.
10. Disconnect furnace electrical connector.
11. Disconnect all ducts from furnace.
12. Remove furnace plenum from unit.
13. Remove furnace to floor mounting bolts and four screws located at top back of furnace.
14. Slide furnace toward center of vehicle until vents on furnace clear vent tubes on vehicle outer wall. Then remove furnace through the range/oven opening.

INSTALLATION

1. Position furnace in sink module through range/oven opening. Be sure vents in back of furnace are aligned with vent tubes in outer wall of vehicle. Then slide furnace outward, being sure furnace vents are engaged in the vent tubes.
2. Install furnace to floor mounting bolts and four screws located at top back of furnace.
3. Install furnace plenum on unit.
4. Connect all ducts to furnace.
5. Connect L.P. gas supply line to floor fitting and furnace.
6. Connect furnace electrical connector.
7. Slide sink module back into position against outer wall. Then, install the following module fasteners:

A. Bolt and spacer located at the rear middle of sink module.
B. Three screws retaining sink module to both module.
C. Two bolts at floor level beside furnace.

8. Install converter and converter mounting bracket. Also connect converter 12-volt positive lead to circuit breaker and negative lead to body structural member. Plug converter cord into 120-volt outlet.
9. Install range/oven as described in Maintenance Manual X-7525 (SECTION 24H).
10. Turn on L.P. gas at tank. Check for L.P. gas leaks at furnace and range/oven. Correct as necessary.
11. Connect living area battery negative (–) cable to battery.
12. Check furnace for proper operation.

SECTION 24J
LIVING AREA WATER SYSTEM

The information described in Maintenance Manual X-7525 under the heading LIVING AREA WATER SYSTEM (Sec. 24J) is applicable to models covered by this supplement with the exception of the following:

GENERAL INFORMATION

The water system in model ZE06582 (illustrated in figure 1) functions basically the same as model ZE06581, with the exception of the component location and the addition of a new dry bath.

WATER SYSTEM SERVICING (ZEO6582)

GALLEY SINK FAUCET

REMOVAL

1. Turn off water pump at water pump switch located beside entrance door. Open faucet to reduce line pressure.
2. Disconnect water lines from faucet.
3. Remove faucet retaining nut and special washer from underneath sink.
4. Remove faucet from sink.

REPAIR

The galley sink faucet can be repaired by procuring parts from a local plumbing supply distributor.

INSTALLATION

1. Position faucet assembly on sink.
2. Install special washer and faucet retaining nut from underneath sink.
3. Connect water lines to faucet.

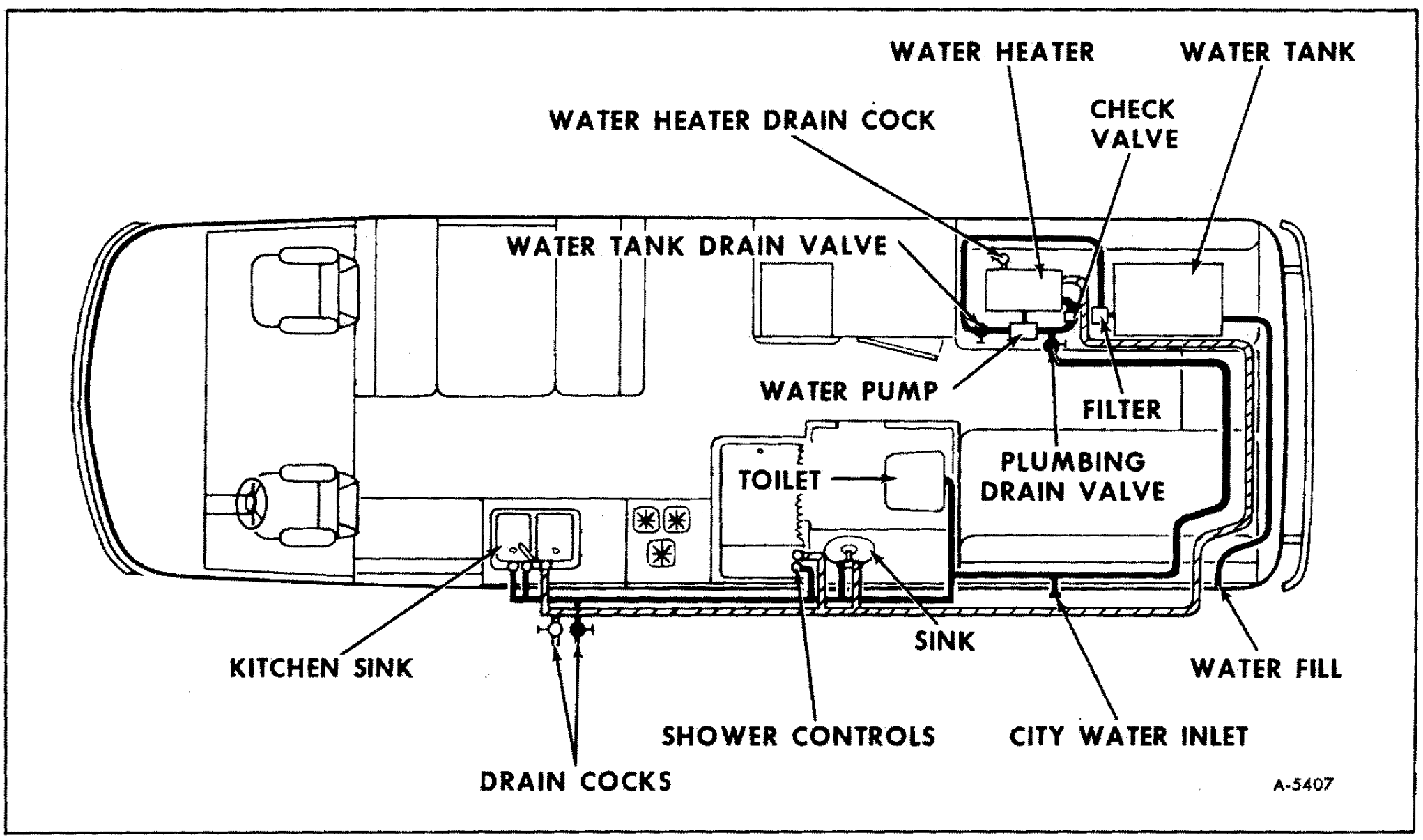

Figure 1—Living Area Water System

4. Turn on water pump and operate faucet. Check for leaks.

NOTE: For a reverse water supply installation (cold water supply on the left and hot water on the right), it is only necessary to remove the faucet handle and rotate the cam 180°. Reinstall faucet handle and check for proper operation.

SHOWER FAUCET

REMOVAL

1. Turn off water pump at water pump switch located beside entrance door. Open faucet to reduce line pressure.
2. Remove screws retaining track of vanity compartment located underneath bathroom sink. Note that 12-volt living area fuse block is located in this compartment. Remove compartment only sufficiently to gain access to shower faucet.
3. Tag water lines (hot and cold) for installation. Disconnect water lines from back of faucet.
4. Remove elbows from backside of faucet.
5. Remove retaining nuts and washers that hold faucet to shower wall. Remove faucet.
6. Disconnect hose to shower head from faucet.

REPAIR

The shower faucet can be repaired by procuring parts from a local plumbing supply distributor.

INSTALLATION

1. Connect hose from shower head to faucet.
2. Position faucet on shower wall. Install washers and retaining nuts that hold faucet to shower wall.
3. Install two elbows to backside of faucet.
4. Connect water lines to elbows on back of faucet.
5. Turn on water pump and operate shower. Check for leaks.

BATHROOM SINK FAUCET

REMOVAL

1. Turn off water pump at water pump switch beside entrance door. Open faucet to reduce line pressure.
2. Remove doors from vanity compartment underneath bathroom sink.
3. Disconnect water lines from faucet.
4. Remove retaining nuts that hold faucet to sink. Remove faucet.

REPAIR

The bathroom sink faucet can be repaired by procuring parts from a local plumbing supply distributor.

INSTALLATION

1. Position faucet on sink. Install retaining nuts that hold faucet to sink.
2. Connect water lines to faucets.
3. Turn on water pump and operate faucet. Check for leaks.
4. Install doors in vanity compartment underneath sink.

WATER TANK

REMOVAL

1. Remove bolsters (back cushions), if so equipped, from right rear corner of vehicle.
2. Remove right twin bed to gain access to water compartment.
3. Turn off water pump at switch beside entrance door. Turn off water heater at switch located in bathroom.
4. Open tank drain valve and allow tank to drain (see figure 1).
5. Disconnect inlet, outlet, and vent hoses from tank.
6. Disconnect the tank hold down straps.

NOTE: Do not cut straps to remove tank.

7. Remove water tank.

INSTALLATION

1. Position tank in water compartment.
2. Connect tank hold down straps.
3. Install inlet, outlet, and vent hoses on water tank.
4. Close water tank drain valve (see figure 1).
5. Fill water tank and turn on water pump to pressurize the system. Check for leaks.
6. Install right twin bed over water compartment
7. Install bolsters (back cushions), if so equipped, in right rear corner of vehicle.

WATER PUMP

REMOVAL

1. Remove bolsters (back cushions), if so equipped, from right rear corner of vehicle.
2. Remove right twin bed to gain access to water compartment.

3. Turn off water pump at switch beside entrance door. Turn off water heater switch located in bathroom.
4. Open tank drain valve and plumbing drain valve (valves are located on either side of pump) (figure 1).
5. Disconnect 12-volt electrical supply to pump by removing pump fuse.

NOTE: Water pump fuse is located in fuse holder, just to the left of the water pump.

6. Disconnect electrical leads from water pump.
7. Disconnect inlet and outlet hose from pump.
8. Remove four water pump mounting bolts and remove pump.

INSTALLATION
1. Position pump in water tank compartment. Install four pump mounting bolts.
2. Connect inlet and outlet hoses at pump.
3. Connect electrical leads to water pump.
4. Connect electrical supply to water pump by installing pump fuse in fuse holder that is located just to the left of water pump.
5. Close the tank and plumbing drain valves.
6. Fill water tank and turn on water pump to pressurize the system. Check for leaks.
7. Install right twin bed over water compartment.
8. Install bolsters (back cushions), if so equipped, in right rear corner of vehicle.

WATER HEATER

REMOVAL
1. Remove bolsters (back cushions), if so equipped, from right rear corner of vehicle.
2. Remove right twin bed to gain access to water compartment.
3. Turn off water pump at switch beside entrance door. Turn off water heater switch located in bathroom. Be sure motor generator is turned off and external power cord is not connected to an external power source.
4. Open plumbing drain valve (figure 1) and water heater drain valve (located underneath the water heater).
5. Remove access panel on water heater Disconnect two electrical leads and ground wire from water heater. Remove electrical supply cord and conduit from water heater.
6. Remove hose from pressure temperature relief valve.
7. Disconnect inlet (cold) and outlet (hot) water hoses from water heater.

WARNING: IF WATER HEATER IS EQUIPPED WITH A PRE-HEAT ASSEMBLY BE SURE ENGINE HAS BEEN ALLOWED TO COOL ONE-HALF HOUR BEFORE ATTEMPTING TO REMOVE PRE-HEAT ASSEMBLY TO AVOID PERSONAL INJURY.

8. If water heater is equipped with pre-heat assembly, remove from water heater with pre-heat hoses remaining attached to unit.
9. Remove four water heater to floor mounting bolts and remove water heater.

INSTALLATION
1. Install water heater and secure to floor with four mounting bolts.
2. If water heater was equipped with pre-heat assembly, install unit in water heater with pre-heat hoses remaining attached.
3. Connect inlet (cold) and outlet (hot) water hoses to water heater.
4. Install hose to pressure temperature relief valve.
5. Install electrical supply cord and conduit to heater. Connect two electrical leads and ground wire to water heater.
6. Close plumbing drain valve (figure 1) and water heater drain valve (located underneath the water heater).
7. Turn on the water pump and open the hot water faucet in the bathroom, until water heater is filled (air no longer coming out of faucet). Check system for leaks.
8. Turn on water heater switch with 120-volt power supply connected to the Motorhome power cord. Check for proper water heater operation.
9. Shut off water heater and water pump switch.
10. Install right twin bed over water compartment.
11. Install bolsters (back cushions), if so equipped, in right rear corner of vehicle.

WATER HEATER CHECK VALVE

(Refer to Figure 1)

A check valve is installed in the cold water line (inlet) at the water heater to prevent hot water from entering the Motorhome's cold water system.

REMOVAL

1. Remove bolsters (back cushions), is so equipped, from right rear corner of vehicle.

2. Remove right twin bed to gain access to water compartment.

3. Turn off water pump at switch beside entrance door. Turn off water heater switch located in bathroom.

4. Open plumbing drain valve and water heater drain valve (located underneath the water heater).

5. Disconnect hoses from check valve and remove.

INSTALLATION

1. Connect hoses to check valve.

NOTE: Be sure arrow molded into body of check valve is pointing toward water heater.

2. Close plumbing drain valve and water heater drain valve (located underneath water heater).

3. Turn on water pump and open the hot water faucet in the bathroom, until water heater is filled (air no longer coming out of faucet). Check for leaks.

4. Install right twin bed over water compartment.

5. Install bolsters (back cushions), if so equipped, in right rear corner of vehicle.

DRAINING LIVING AREA WATER SYSTEM (ZEO6582)

1. Open the holding tank dump valve, after making proper connection to approved dumping station.

2. Turn off water heater at switch located in the bathroom.

3. Remove bolsters (back cushions), if so equipped, from right rear corner of vehicle.

4. Remove right twin bed to gain access to water compartment.

5. Open the water heater drain cock (located underneath the water heater). Open the tank drain valve and plumbing drain valve (valves are located on either side of water pump).

6. Open the water tank drain valve and plumbing drain valve (figure 1).

7. Open the two water line drain cocks at the kitchen sink. To gain access to water line drain cocks for the kitchen sink, remove the second drawer located to the left of the kitchen sink compartment.

8. Open the kitchen and bathroom faucets.

9. Turn the flush knob on top of the toilet 90^{0} clockwise until water no longer enters the toilet bowl.

10. Open the shower head shut-off valve and open shower faucets, with shower head extended toward shower stall drain.

11. At the external water connection (inside external utilities compartment), remove hose connection cover. Depress momentarily the button on the check valve to allow this portion of plumbing to drain. Install hose connection cover.

12. Using low air pressure (30 psi maximum), blow back through all faucets, forcing water from any low areas. Allow system to drain.

13. Turn on water pump, momentarily, to remove any water remaining in pump housing, then shut off.

14. Close all water line drain cocks and valves, including the water heater drain cock. Close kitchen, bathroom, and shower faucets. Close holding tank dump valve and latch. Stow holding tank tubes and replace dust cap.

WATER TREATMENT UNIT

During the 1976 model year a change occured in the water treatment unit (formerly water purifier) that effects service on the unit. On vehicles equipped with the new cartridge assembly (see figure 2), the lower two cartridges are identified with two stickers ("A" and "B"). Servicing this unit is described by the following:

NOTE: Under normal family usage the cartridge assembly is designed to last for several years. Interval for replacement of either cartridge may be determined by restriction of water flow at treated faucet. The filter cartridges are designed to restrict water flow when replacement is required. Be sure the cartridge assembly (all three tanks) is removed from the vehicle when unheated, and temperatures fall below freezing. The cartridge assembly should then be stored in a heated facility.

WATER TREATMENT UNIT CARTRIDGE REPLACEMENT

(Refer to Figure 2)

NOTE: Replace the primary cartridge "A" (refer to sticker on cartridge for identification) when the flow rate diminishes. Cartridge "B" may also require replacement after an extended period of use. This replacement is to be made when the replacement of cartridge "A" fails to restore the flow rate of assembly to a satisfactory level.

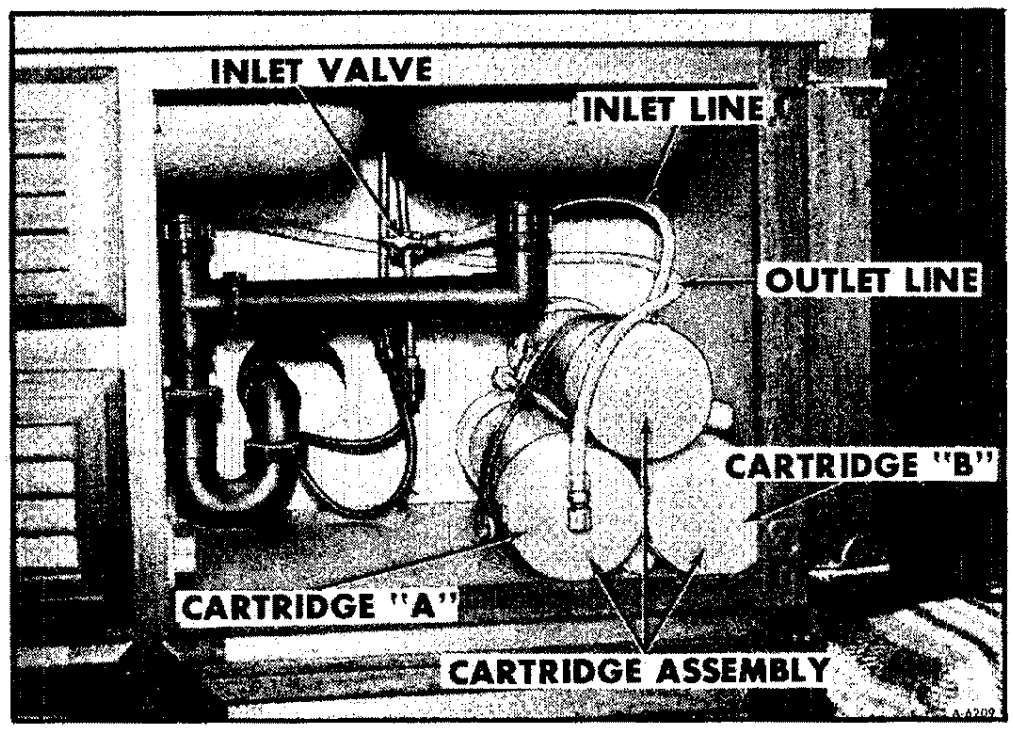

Figure 2—Water Treatment Unit Cartridge Location

1. Shut off water pump and close inlet valve to cartridge assembly.

2. Remove plastic tubing connectors at either end of old cartridge.

3. Remove old cartridge and discard.

4. Locate the new replacement cartridge in the same position as the one just removed with arrow on label pointing to the outlet end of unit.

5. Connect plastic tubing to the new cartridge making certain that the tubing coming from the inlet valve connects to the "INLET" fitting.

6. Open the inlet valve, turn on water pump and then place water treatment faucet handle in the "UP" position water treatment faucet is located beside the galley sink faucet). Allow a full flow of water from faucet for about 15 minutes. Water treatment unit is now ready for normal usage.

SECTION 24K
TOILET

The information described in Maintenance Manual X-7525 under the heading TOILET (Sec. 24K) is applicable to models covered by this supplement with the addition of the following:

AQUA-MAGIC III

GENERAL INFORMATION

The Aqua-Magic III toilet (figure 1) is a fresh water, permanently installed flushing system. It uses a pressure flushing system. The fresh water flushing system cleans bowl with a minimum of water. No-splash bowl feature, maintains water seal even while vehicle is in motion.

TOILET TROUBLE DIAGNOSIS

Problem	Possible Cause	Correction
WATER KEEPS RUNNING INTO THE BOWL	1. Water trap in the bottom of the bowl not closing completely, which in turn keeps the ball valve partially open.	1. Remove foreign matter from water trap. Check to see that flush knob closes all the way (rotates through 90^{o} rotation).
	2. If running water persists, and the knob works satisfactorily, faulty ball valve.	2. Replace ball valve.
TOILET LEAKS. THERE IS WATER ON THE FLOOR.	1. Leak at water supply connection.	1. If the leak is in the back of the toilet, check the water supply connection. Correct as necessary.
	2. Closet flange base seal.	2. If the leak is at the closet flange area, check the closet flange nuts for tightness. If leak continues, remove the toilet and check the closet flange height. The height should be 1/4" to 7/16" above the floor. Adjust closet flange height accordingly and replace closet flange seal.
POOR FLUSH	1. Flush knob not fully opened.	1. The knob must be held fully open during the flush. A good flush should occur within five seconds. If the problem persists, remove the water supply line and check the water supply. The flow rate should be at least eleven quarts per minute to ensure an adequate flush.

1. Cover
2. Hinge Pin Retainer
3. Hinge Pin
4. Flush Knob
5. Knob Retainer
6. Top
7. Knob Crank
8. Stein Retainer
9. O-ring
10. Screw
11. Ball Valve
12. Screw
13. Vacuum Breaker Cover
14. Float Seal
15. Float
16. Star Washer
17. Bowl
18. Spring Mounting Bracket
19. Push Link
20. Spring
21. Water Trap Crank
22. Screw
23. Washer
24. Seal
25. Water Trap
26. Base
27. Flange Seal
28. Nut
29. Bolt
30. Sealant
31. Water Trap Seal
32. Screw
33. Seal
34. Screw
35. Seat

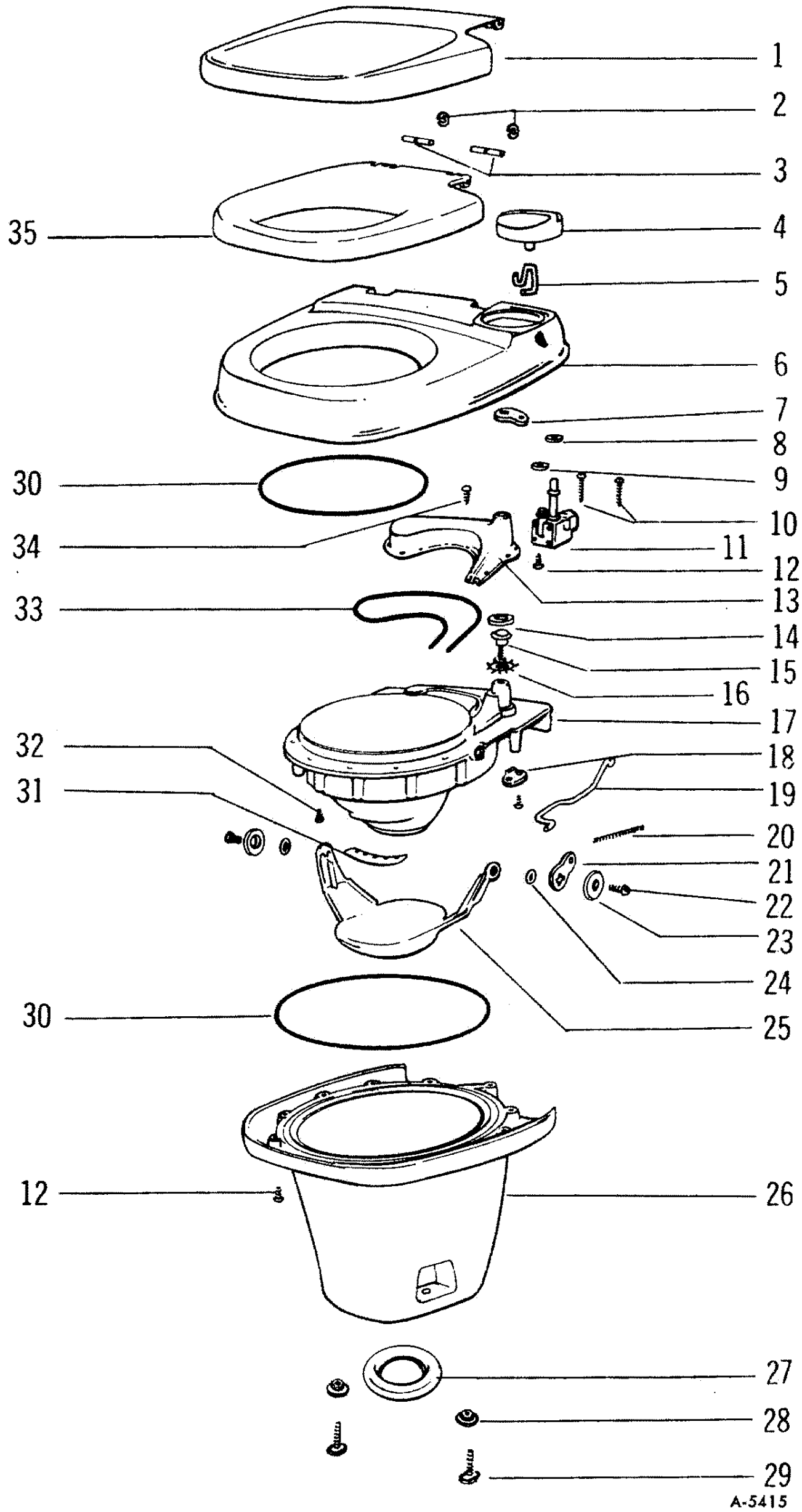

Figure 1—Aqua-Magic III Toilet

TOILET REPLACEMENT

REMOVAL

1. Turn off water pump at water pump switch located beside entrance door. Open cold water faucet in bathroom sink to reduce line pressure.
2. Disconnect toilet water fill line at right rear corner of toilet (below flush knob).
3. Flush toilet several times, if necessary, to remove water from water trap.
4. Remove two nuts located at base of toilet.
5. Lift toilet off mounting studs and remove from vehicle.
6. To avoid holding tank fumes entering vehicle place suitable air tight covering over toilet mounting flange.

INSTALLATION

1. Remove air tight covering (if used) from toilet mounting flange.
2. Install new flange seal.
3. Set toilet in place and install two mounting nuts located at base of toilet.
4. Connect toilet water fill line at right rear corner of toilet (below flush knob).
5. Turn on water pump and momentarily open cold water faucet to bleed out air in water line.
6. Flush toilet several times and check for leakage. Correct as necessary.

COMPONENT REPLACEMENT

(Refer to Figure 1)

BALL VALVE REPLACEMENT

1. Remove flush knob by pulling straight upward.
2. Remove 12 screws from underside of base. Remove base from bowl and lid assembly.
3. Remove 8 screws holding bowl to lid assembly. Carefully separate bowl from lid assembly, noting they are held together by a non-hardening type caulking material.
4. Remove 3 screws securing ball valve to bowl, and remove ball valve.
5. Install ball valve by reversing steps 1-4. Note the two long ball valve retaining screws are installed from the top, and the one short screw is installed from underneath.

VACUUM BREAKER COVER REPLACEMENT

1. Remove flush knob.
2. Remove 12 screws from underside of base. Remove base from bowl and lid assembly.
3. Remove 8 screws holding bowl to lid assembly. Carefully separate bowl from lid assembly, noting they are held together by a non-hardening type caulking material.
4. Remove 17 screws retaining vacuum breaker cover to bowl assembly.
5. Install vacuum breaker cover by reversing steps 1-4.

WATER TRAP REPLACEMENT

1. Remove flush knob.
2. Remove 12 screws from underside of base. Remove base from bowl and lid assembly.
3. Remove 8 screws holding bowl to lid assembly. Carefully separate bowl from lid assembly, noting they are held together by a non-hardening type caulking material.
4. Remove 2 screws holding water trap to bowl. Then disconnect push link from water trap. Remove water trap.
5. Install water trap by reversing steps 1-4.

MAINTENANCE

No routine maintenance is required to clean the unit, use any high grade, non-abrasive cleaner. Do not use highly concentrated or high acid content household cleaners (no scouring powder).

SECTION 24L

HOLDING TANK AND DRAINAGE SYSTEM

The information described in Maintenance Manual X-7525 under the heading HOLDING TANK AND DRAINAGE SYSTEM (Sec. 24L) is applicable to models covered by this supplement with the addition of the following illustration (figure 1).

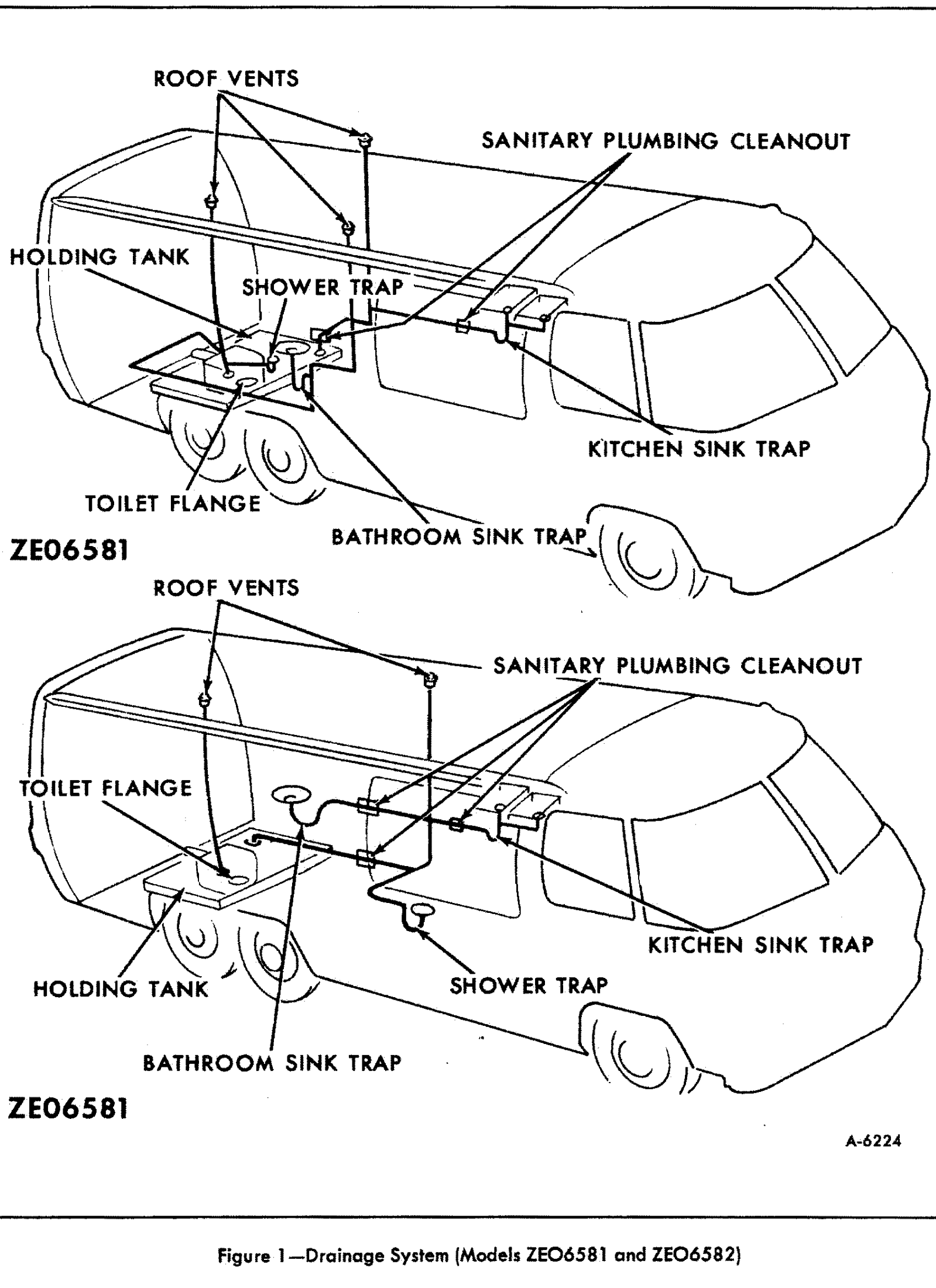

Figure 1—Drainage System (Models ZEO6581 and ZEO6582)

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GMC

1976 MAINTENANCE MANUAL SUPPLEMENT

Motorhome

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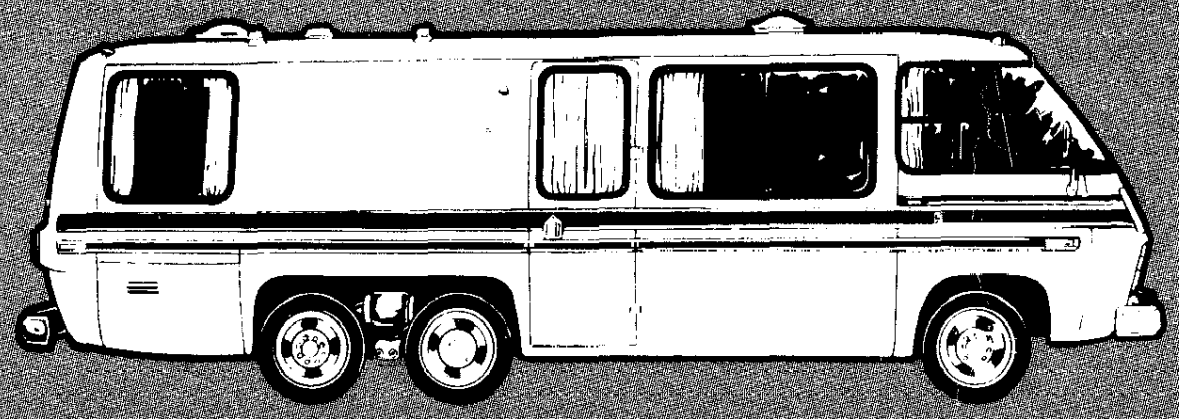
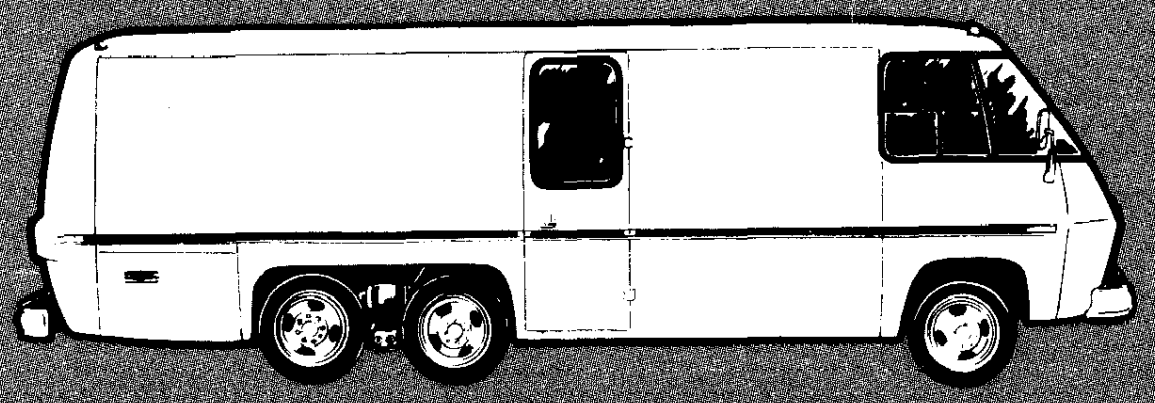
ZEO6582



EFFECTIVE WITH VEHICLE IDENTIFICATION NUMBER
TZE366V100878

TransMode

ZEO6083
ZEO6583



EFFECTIVE WITH VEHICLE IDENTIFICATION NUMBER
TZE336V100880 (23)
TZE366V100883 (26)

GMC TRUCK & COACH

Division of General Motors Corporation

INTRODUCTION

Information in this Supplement when used in conjunction with the *1975 & 1976* Maintenance Manual (Form No. X-7525) provides coverage for all 1976 Motorhomes and TransModes.

References are made to special tools in the various sections of this supplement. These tools or their equivalent, are necessary and are recommended to readily and efficiently accomplish certain service operations. The tools, however, are not supplied by General Motors Corporation. Information regarding the availability of these tools can be obtained from the Zone Office or from the Service Department at the factory.

All information, illustrations and specifications contained in this supplement are based on the latest product information available at the time of publication approval. The right is reserved to make changes at any time without notice.

GMC

TRUCK & COACH DIVISION

GENERAL MOTORS CORPORATION

PONTIAC, MICHIGAN 48053

IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service procedures recommended by GMC Truck & Coach and described in this manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various Warning and Cautions which should be carefully read in order to minimize the risk of personal injury to service personnel or the possibility that improper service methods will be followed which may damage the vehicle or render it unsafe. It is also important to understand that these Warnings and Cautions are not exhaustive. GMC Truck & Coach could not possibly know, evalutate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, GMC Truck & Coach have not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by GMC Truck & Coach must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service method he selects.

Wiring Diagrams

Living Area

120v AC - ZEO6581

120v AC - ZEO6582

12v DC - ZEO6581

12v DC - ZEO6582

Chassis Electrical

Motorhome

Transmode