

## MC-9 MAINTENANCE MANUAL

# SECTION 3

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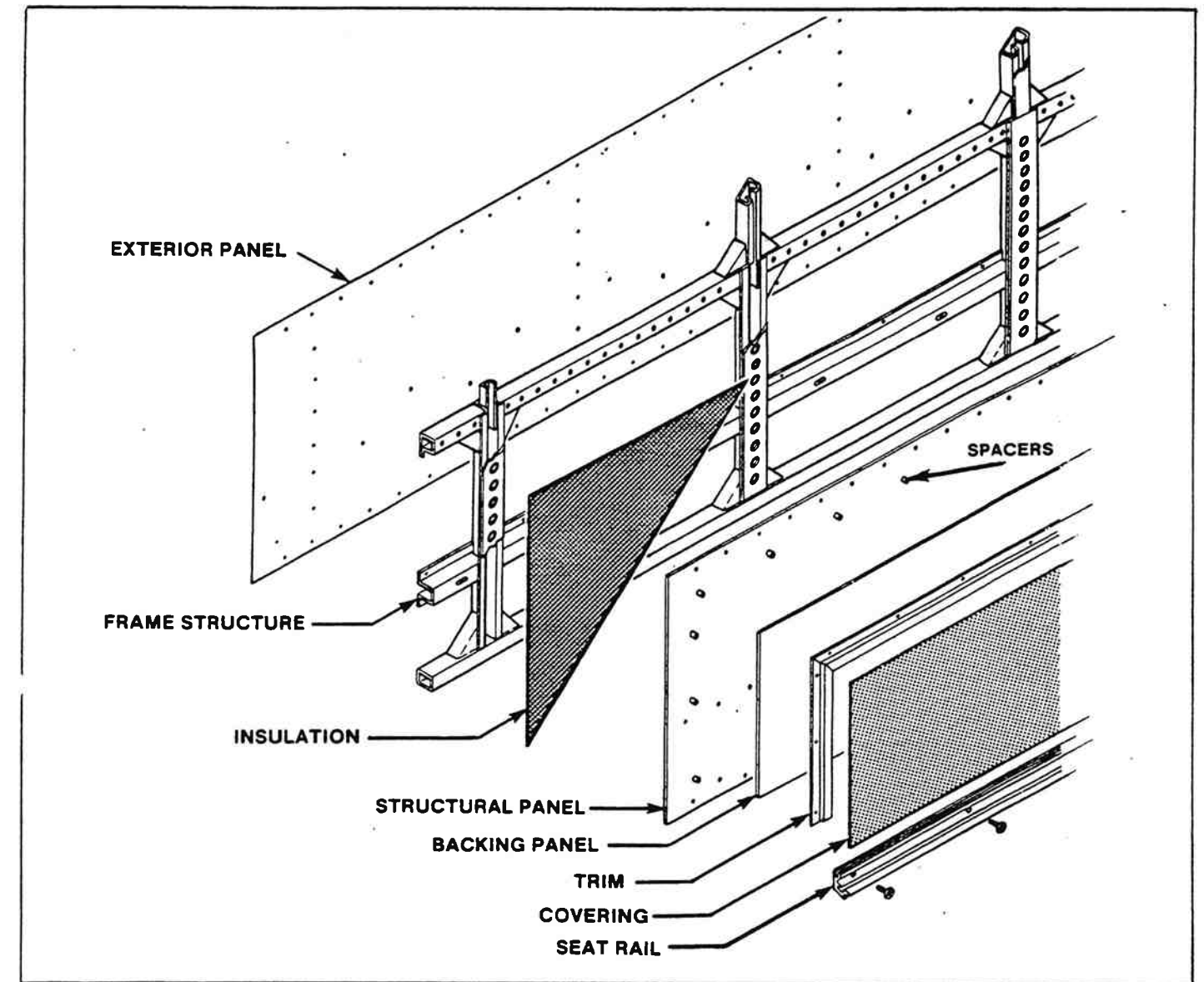
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**COACH BODY**

**Figure 3-1. Sidewall Construction.**

**BODY PANELS**

The MC-9 coach uses a welded, single-piece monocoque frame. Below the belt rail 16 and 18 gauge stainless steel is used while the upper body is framed in high tensile, low alloy steel, primed before installation. Front body panels are 24 gauge (.6 mm) stainless steel with a 20 gauge (1 mm) stainless steel trim panel provided between the headlights. Removable stainless steel iron moldings are used under the windshields providing access to the windshield wipers and door control. All side panels below the floor line are 24 gauge (.6 mm) stainless steel fluted on 4" (102 mm) centers. See figure 3-1.

The exterior center roof and sidewall panels immediately below the passenger windows are high tensile .064" (1.6 mm) prestressed primed and painted aluminum. The interior has aluminum alloy panels riveted to the frame with one panel used to provide a continuous airway for the heated or cooled air from the main ducts. The rear panel above the floor line is

24 gauge (.6 mm) smooth stainless steel and the lower panels on the service doors are beaded 24 gauge (.6 mm) stainless steel. Condensation drain tubes are provided within the frame.

The front roof cap and the rear crown panel are 1/8" (3.17 mm) thick molded fiberglass and incorporate molded indentations for lamps. Main roof panels are .051" (1.29 mm) high tensile aluminum prestretched on installation and riveted in place.

All exterior panels are riveted securely to the frame members. Dissimilar metals are separated by mastic tape or mylar tape. Roof and sidewall panels are insulated with 2" (51 mm) medium density, fiberglass, compressed during application of interior panels, with joints sealed with aluminum pigmented mastic. Sidewall insulation is contained in waterproof envelopes. High density fiberglass with an asbestos blanket is used for insulation and sound-deadening at the rear bulkhead. A double floor construction over the axles is filled with insulating material to reduce the transfer of heat and noise to the inside of the coach.

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## MOLDINGS

Extruded aluminum drip moldings extend along the sides of the coach above the window line. Exterior trim moldings are attached to the body to cover the horizontal rivet lines at both sash and belt lines while black painted aluminum moldings cover the window posts. Stainless steel screws and nylon washers are used to eliminate the contact of dissimilar metals to prevent corrosion of the moldings.

## BAGGAGE COMPARTMENTS

Three full-width, underfloor compartments are provided between front and rear drive axles. Total capacity is 300 cubic feet (8.5 cubic meters), with a clear, 33" x 54 1/2" (840 mm x 1380 mm) opening provided to each compartment on both sides of the coach. All compartment doors are full sealed, Pantograph, vertical lift type, and each has a flush mounted breakaway-type latch handle with provision for padlock and customs seals. All doors are interchangeable.

## BUMPERS

The standard rear bumper is made of 12" (305 mm) wide, extruded, hard alloy anodized aluminum, back-ribbed for maximum strength. An optional energy absorbing rear bumper may be installed in place of the standard rear bumper. The front bumper is hinged at the top for easy access to the spare tire compartment. The rear bumper is easily removed for access to the engine compartment. Extruded anodized aluminum corner bumperettes are mounted on rubber cushion pads at all four corners of coach and extruded aluminum rub rails extend along each side of the coach to offer maximum protection to lower body panels from baggage carts and vehicles. Molded rubber fenders are installed at front wheelhousings and the rear wheelhousings are trimmed with anodized aluminum bars. Three-piece fenders can be installed at the rear housings as optional equipment. Front and rear wheel splash aprons are optional. For coach dimensions, see figure 3-2.

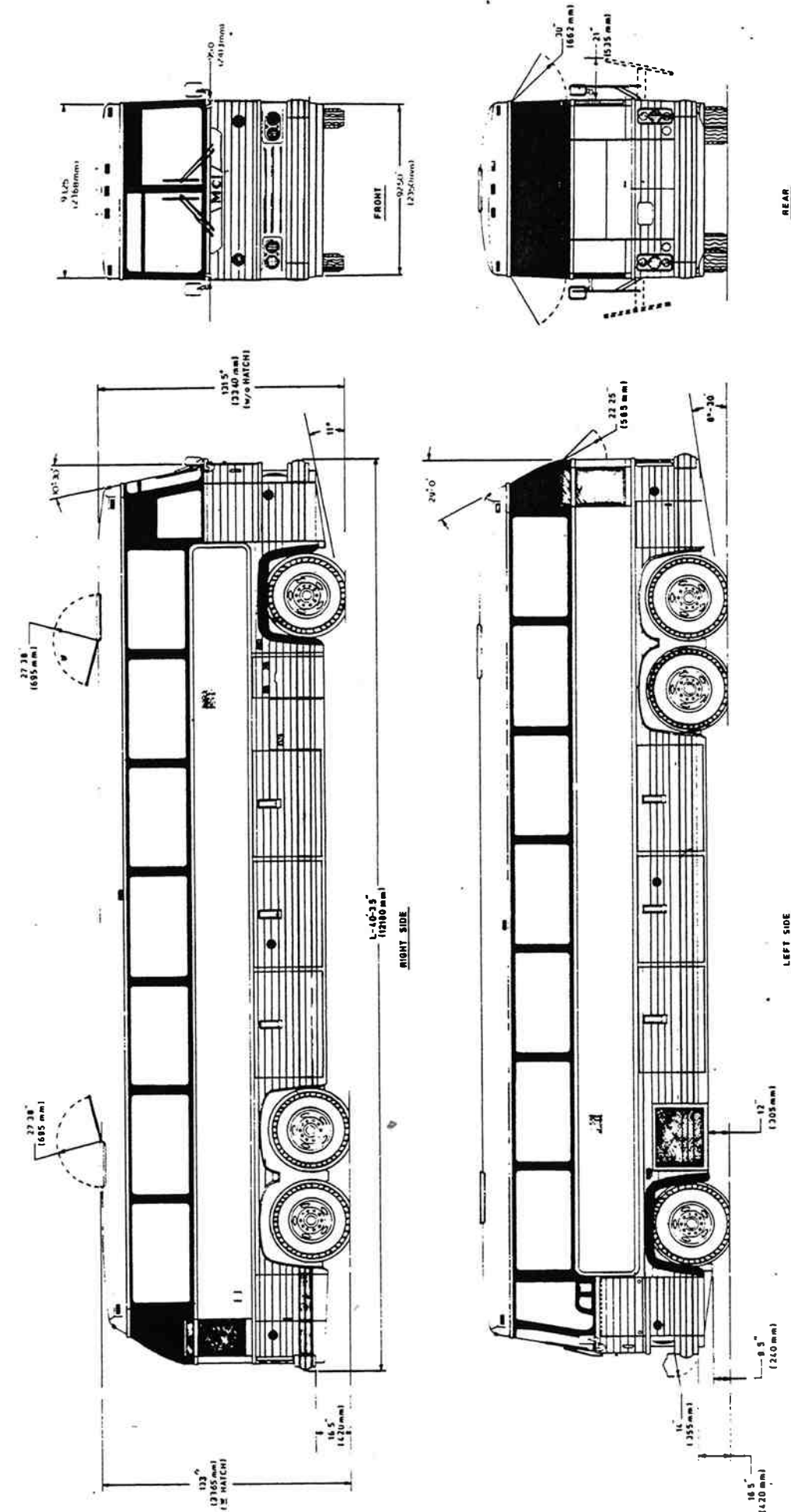


Figure 3-2. MC-9 Dimensional Chart.

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## INTERIOR

The driver's floor, front entrance area and front aisle are all at the same level. The floor is 1/2" (13 mm) thick 5-ply waterproof fir plywood. The floor is securely attached to the underframe with elevator bolts and self-tapping, countersunk screws and all joints are sealed with mastic. The underside of the floor is treated with fire retardant paint and the top is sanded and covered with a heavy duty, quality rubber. The following are used: 5/16" (8 mm) ribbed, metal backed stepwell tread plates; 3/16" (5 mm) ribbed entrance area and ramped aisle area (no metal back); 1/8" (3 mm) smooth driver's area; 1/8" (3 mm) smooth center aisle; 1/8" (3 mm) smooth under seats.

The seats are securely fastened with high tensile tee-bolts in a high strength aluminum alloy track on the wall and a stainless steel track in the floor which are securely welded to the coach frame. Tracks are flush to top of floor covering.

Vinyl clad aluminum alloy luggage racks are mounted in extruded clear anodized aluminum alloy channels. The aisle side extrusion incorporates tracked passenger reading lights and a continuous length ribbon switch for the passenger chime system. The wall side extrusion incorporates an indirect interior lighting system. Transverse strips on the interior surface of the parcel rack prevents shifting of parcels. Front of parcel racks have end caps in color matched, self-skinned urethane foam. The parcel rack hangers are formed stainless steel.

The ceiling at the extreme front and the rear window area is color impregnated, fiberglass reinforced plastic, molded panels while the main ceiling area is vinyl clad aluminum. Vinyl and aluminum moldings cover panel joints. Lower side wall trim below windows is melamine paneling.

## COMPARTMENT DOORS

### SURGE TANK FILLER DOOR

The surge tank filler door is located on the right hand side of the coach at the rear above the radiator compartment. The door is front hinged, piano type and is spring loaded in the closed position.

### FRONT SERVICE DOOR

A left front service door below the driver's floor is front hinged, held closed by two quarter-turn Dzus fasteners. Access is provided to the accessory and air ride tank, charging valve, steering components, windshield washer and horns.

### CONDENSER COMPARTMENT DOOR

The condenser compartment door is front hinged, piano type and is held closed by quarter-turn Dzus fasteners. A rod type prop automatically holds the condenser door when fully opened. Access is provided to condenser fan and motor, receiver tank and other air conditioning components.

### BATTERY COMPARTMENT DOOR

The battery compartment door is top hinged and held closed by an over-center spring loaded latch. A prop rod holds the door open while providing access to batteries, air conditioning filter and battery disconnect switch.

### ELECTRICAL JUNCTION PANEL SERVICE DOOR

The electrical junction panel service door is located below the driver's window. It is top hinged and held closed by two quarter-turn Dzus fasteners. A prop rod holds the door open.

### ENGINE SERVICE DOORS - REAR

The rear engine compartment service doors are side hinged. A flush-mounted paddle handle latch is installed on right door which overlaps the edge of the left door. Prop rods are provided on both doors to hold the open position.

### BLOWER COMPARTMENT DOOR

The blower compartment door is top hinged and held closed by two spring loaded latches. A prop rod automatically holds door when fully opened. Access is provided to blower gear box, sight glass, blower fans and scrolls, and blower pulley.

### FUEL TANK FILLER DOOR

The fuel tank filler door is front hinged with dual over-center springs to securely hold door both opened and closed. Provision is made in the body paneling for access to the fuel tank assembly and drain plug if removal is necessary. This panel is retained at the top by two bolts and at the bottom by a pin.

### RIGHT REAR SIDE SERVICE DOOR

The right rear side service door is front hinged with upper and lower brackets. To open turn handle counterclockwise. Access is provided to the chemical tank and waste water tank drain valves, air conditioning compressor, switches, solenoids, trailing axle air dump valve and left bank of engine.

### LEFT REAR SIDE SERVICE DOOR

The left rear side service door is front hinged with upper and lower brackets. To open turn handle counterclockwise. Access is provided to the rear junction box components, alternator, air cleaners and right bank of engine.

## EXTERIOR MAINTENANCE

Regular washing to remove accumulated dust and dirt is recommended. This is all that is required on the exterior stainless steel panels below the windows. The panel caps between the windows are anodized aluminum. Avoid the use of alkaline cleaners on aluminum parts as they will attack and corrode aluminum just as iron and steel will rust. Use only a mild detergent and a soft brush. Abrasive cleaners, polish or steel wool should not be used as they will remove the protective coating and may scratch and discolor the finish.

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## CORROSION PREVENTION

Preventive maintenance is a key factor in avoiding corrosion and must be considered as part of the regular service intervals.

The entire underside of the coach is sprayed with a heavy application of asphalt base undercoating. Also, all fasteners are corrosion resistant.

The type of operating environment a coach is exposed to determines the amount of dirt and corrosion that it will accumulate over any given operating period. Corrosion is one of the most costly factors of part failure and abbreviated part life. It is, however, an item that can be controlled when it is conscientiously looked for and the proper steps taken within a reasonable amount of time.

Certain areas of the coach are more vulnerable to corrosion than others and it is these areas that should be addressed. For example, the rear baggage compartment bulkhead in the rear wheelhousing area should be examined regularly for corrosion. This location contains many key components: relay valve, suspension air filter, dry air tank, inversion valve, parking brake, pressure regulator, and numerous other valves and fittings. Other areas include the front wheelhousing area, spare tire compartment, front left side service area, and engine compartment.

Road splash will affect undercarriage, sides of coach, fresh air intakes, condenser coil and engine compartment. These areas must be thoroughly cleaned to remove "dirt packs" from flanges, channel and ledges. These places accumulate dirt and salt and hold it in direct contact with steel and aluminum surfaces. Use an understructure high pressure spray as part of a regular wash. Damaged undercoating or paint should be promptly repaired before corrosion can start.

Frequency of wash periods depends on operating conditions. During periods of exposure to salt daily washing as described above is necessary.

If underbody parts show evidence of rust or corrosion, treat as follows:

1. Clean. Remove dirt, grease and oil, by solvent washing.
2. Remove corrosion as well as all loose deadener coating by sanding with wire brush or with other means.

**CAUTION: Sandblasting can be used for cleaning bulkheads, brackets and other structural members. However, it should not be used for exterior side paneling. Extreme care should be taken not to sandblast excessively.**

After removing all corrosion, correct priming, painting and undercoating must be applied to prevent further damage.

## ROUTINE CLEANING

Wash and rinse water should be free of solids. It is especially important to assure that recirculating systems are properly designed, maintained and monitored for efficiency. In all cases suppliers of recirculating systems should provide assurance that their equipment and techniques will function satisfactorily with Lucite® windows.

Two types of detergent are necessary for optimum washing efficiency. A solvent-based dissolving type of detergent should be used with the prewash spray. A highly lubricating type of detergent should be used with brushes.

In each case, the detergent manufacturer should be consulted regarding recommendations on concentration. Additionally, the water/detergent mixture should be 90°F to 110°F to improve cleaning efficiency.

Most high quality detergents contain sequestering agents and are effective in water of up to eight grains hardness. This does, of course, depend heavily on the particular detergent and its concentration. If the detergent does not contain sequestering agents, water should be softened to four grains hardness or less for effective detergent action. In all cases, the detergent supplier should be contacted for recommendations on detergent and soft water requirements.

A good, high pressure water spray prewash is vital to remove as much grit and grime as possible before brushing. Detergent may or may not be employed with the prewash. If detergent is used, follow the recommendations above, allowing enough time for the detergent to soften the grime before other washing steps. If detergent is not used in this step, please follow the directions under "Detergent Prewash" below. For alternative washer arrangements, please see figure 3-3.

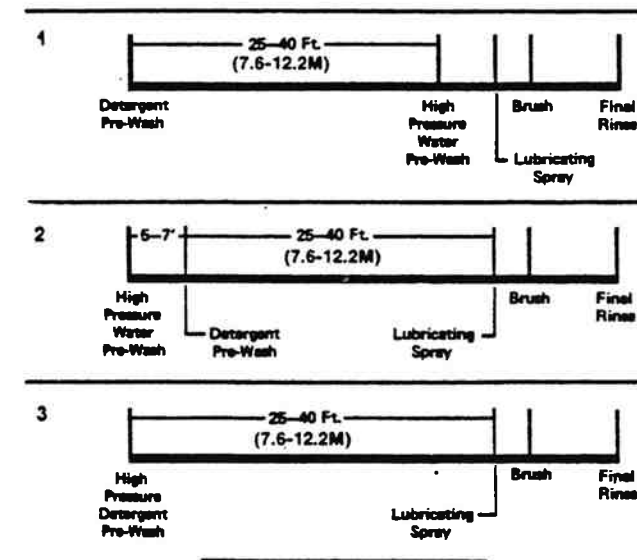


Figure 3-3. Washing Equipment Schematic.

## DETERGENT PREWASH

In cases where the initial prewash spray does not contain detergent, we recommend that a small additional spray arm be installed to cover the window area only. This arm should be located far enough from the prewash spray so that its effect is not diluted by additional water (probably 5-7 feet [1.5-2.1 m]). Alternatively, this could be located in front of the main prewash station if sufficient distance can be provided so as to allow the detergent time to act (25 to 40 feet at 1-2 MPH [7.6-12.2 m at 1.6-3.2 km/h]). Where possible, warm water (90°-110°F [32°-43°C]) should be used with detergent.



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## FILAMENT

Like the washer, a wide variety of filaments can be employed for washing. Although expensive and hard to get, Tampico fiber is one of the best. Filament having a high wax content (i.e., certain polyethylenes) should be avoided since the wax deposits on windows and painted surfaces. Polypropylene is normally satisfactory and may be flagged for optimum performance.

Synthetic filament is normally supplied as an "X" cross-sectional shape. Since this type of cross-section can trap grit against the side, it is recommended that filament of a round or circular cross-sectional shape be used. Filament suppliers make round filament available upon request.

Brush pressure (see below) and amount of filament in contact with the coach are the two factors most damaging to windows of Lucite SAR and to painted coach surfaces. It is most important that no more than six inches of filament overlap the bus side as the brush turns. The less filament in contact with Lucite SAR, the better the guard against scratches during cleaning. It may be necessary to provide a soft roller or wheel guide on the brush arm to prevent over-engagement of bus and brush.

## BRUSH PRESSURE

Normally, the amount of filament in contact with the window and brush pressure are directly proportional to one another. As brush pressure is lowered, the amount of filament in contact with the window is less. Total pressure should be as low as possible. Again, the wheel concept outlined above can be used to prevent excessive brush contact.

Many washers, particularly those with "wrap-around" features, are designed with more than one set of side brushes. Since abrasion occurs when brushes contact the coach, it is important to minimize exposure of the windows to brushing. Therefore, it is recommended that one set of brushes be deactivated from the side washing function.

Where two sets of side brushes are deemed necessary, it is especially important that they be properly adjusted and maintained to minimize abrasion potential.

## LUBRICATING SPRAY AT BRUSH/WINDOW INTERFACE

Spray in this area must effectively lubricate the brush/coach interface. Since this is the point of greatest mechanical agitation (and, therefore, greatest potential for scratching), lubrication at this point is essential. We recommend installation of a spray line to provide lubrication directly at the brush/coach interface rather than wet the bus or brush independently. A high lubrication detergent should be used along with warm water. If desired, this spray line can be used for the window area only.

## RINSE SPRAY

Many washers already include a rinse spray to clean grit from the brush. This should be retained and its position optimized to do the most effective job. The final rinse should be a high pressure, high volume (with emphasis on the high volume) rinse with a minimum delivery of 125 GPM (473 l/minute).

## VEHICLE SPEED

Speed of the coach through the prewash, wash and rinse should be one to two MPH (1.6-3.2 KPH). The bus should never be stopped while in contact with the brushes.

## CLEANING LUCITE® WINDOWS

Conventional techniques may be used to clean Lucite® S-A-R. However, care should be taken to use a clean, soft (unsized) cloth. The surface of the window should be wetted with the cleaning solution before wiping. When oily surface contamination is present, the cleaning solution may not wet the surface thoroughly until it is rubbed with the cloth.

Household cleaners which have been tested and found effective in cleaning Lucite® S-A-R include Easy-Off, Windex, Glass Plus, Top Job, Mr. Clean and Fantastik. Industrial cleaners effective on the acrylic windows are Neleco Subway Soil Solvent (Neleco Products, Inc.) and C-1102 Alkaline Cleaner (DuBois Chemicals).

To remove paint, ink marks and graffiti which are resistant to household cleaners, use a soft cloth saturated with isopropanol or an aliphatic hydrocarbon solvent. Do not use abrasive cleaners. Avoid using razor blades or other sharp instruments which might gouge the surface.

Two commercially available anti-static cleaners which effectively clean Lucite® S-A-R windows and reduce the tendency for static charge build-up are "Like-Magic" Type NI-5, Merchandise Presentations, Inc., 3960 Merritt Avenue, New York, NY 10466 and "Trend" Antistat Cleaner, Dawn Products, P.O. Box 24, Englewood, Colorado 80110. Follow the manufacturers' instructions when using the antistatic cleaners.

## REPAIR

The following information concerns acrylic windows which have been damaged by being lightly coated with conventional automobile paste wax and polished with an electrically operated buffing pad. Do not use a cleaner/polish (wax) since the fine abrasives in such compounds will scratch the surface of the window.

When buffing, speed and pressure are critical factors. The acrylic must not be overheated; the buffing wheel should be kept in constant motion across the window surface to prevent overheating.

Deeper or wider scratches may be made less offensive by applying acrylic lacquer directly on the scratch. Such a coating may be based on EVALCITE® 2041 acrylic resin. Solvents should be toluene and xylene in a 75/25 blend, although this ratio may be changed to adjust drying time.

**WARNING: Toluene and xylene are hazardous materials. Read and follow all precautions on containers. Use of a proper respirator is recommended to avoid breathing vapors. Adequate ventilation should be provided. Protect eyes and skin from contact with these solvents.**

The prepared lacquer may be applied with an artist's paint brush (natural bristle only) or from a glass (not plastic) syringe. For assistance in preparing such a lacquer, you may want to contact a local paint company.

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For deep scratches and gouges, the window surface must be removed and the substrate repaired for the most effective repair. Such procedures have not been developed by the manufacturer.

For all lacquer-repaired acrylic windows, the repaired area will exhibit less abrasion resistance than the surrounding surface area.

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## LIFTING AND TOWING

TMC/MCI has available an I-beam frame assembly which can be used for lifting and towing. The dolly (part No. 20-300) is recommended whenever a coach is to be towed with the front wheels off the ground. It is shown in Figure 3-4.

**CAUTION: The following procedure explains the use of the dolly developed for use by authorized and experienced tow truck operators to lift and tow only the affected coach models. This tool and procedure are NOT approved for any other coach models or applications. Prior coach models have not been approved for lifting and towing.**

**Also, this procedure explains only the recommended method to attach the tool to the coach. It does not attempt to explain or instruct personnel in all conceivable proper methods and details for safe lifting and towing of buses. TMC and MCI recommend that this tool and procedure be used only by tow truck operators authorized and experienced in towing intercity coaches.**

**TMC/MCI cannot be responsible for the improper use of this equipment by inexperienced or unauthorized individuals.**

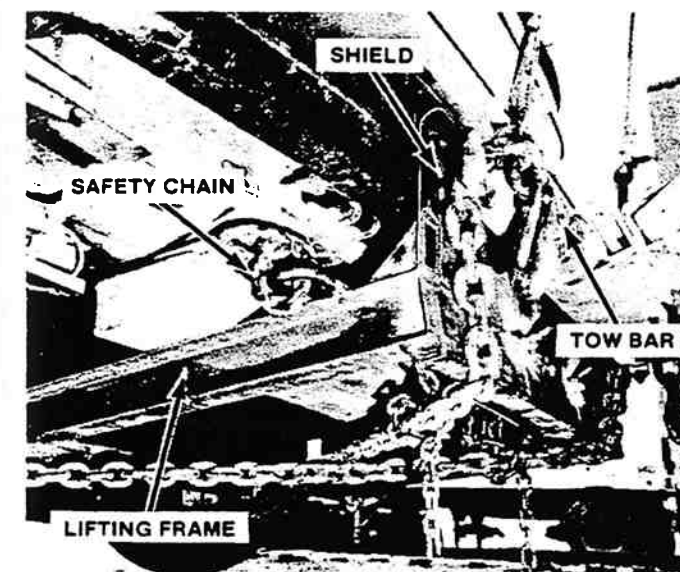


Figure 3-4. Lift Dolly Chain Placement.

To use the frame, you will need to have a hardwood plank for placement between the coach undercarriage and the lifting tool. See figure 3-5. The dimensions of the plank are minimum 4" high x 8" wide x 60" long.

## LIFTING PROCEDURE

Read the entire procedure before starting step 1.

1. Remove both drive axle shafts to prevent transmission damage.
2. On three-axle coaches, shut off the trailing axle air valves. They are located inside the right engine side compartment.
3. If the coach engine will not be operating during the tow, attach an external air pressure line, from the tow truck, to the emergency air fill valve in the front service compartment under the driver's floor. The air pressure must be a minimum of 75 psi, and the line should be attached with a clip-on air chuck affixed to the air line.

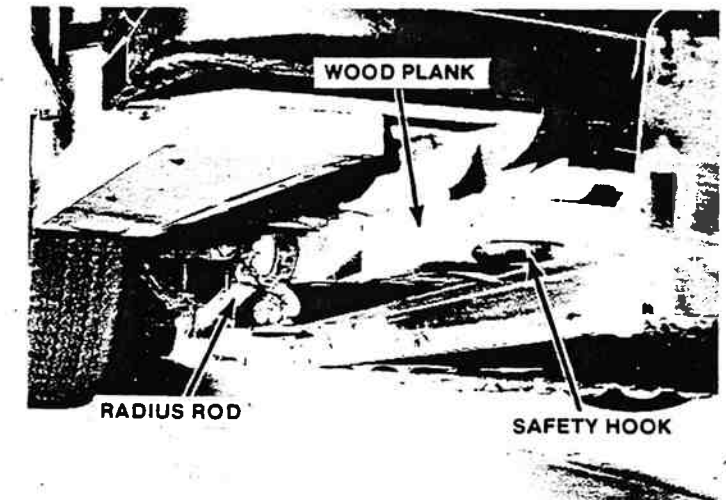


Figure 3-5. Dolly and Plank Position.

**CAUTION: Do not tow the coach without external air pressure applied to the emergency air fill if the coach engine will not be operated. Without brake system air pressure, the brakes may apply automatically if system air pressure falls to approximately 40 psi.**

4. Spread the tow truck lifting chains under the front area of the coach in an "X" configuration. Approximately two feet of the end of the typical tow truck chain should extend out from under the coach, past the bumper.
5. Roll the lift frame under the coach (over the chains) until the front shield is below, and slightly in front of, the coach bumper. The frame must be laterally centered under the coach center line.
6. Raise the rear of the lift frame until it contacts the coach undercarriage near the front of the radius rods. Support the rear of the frame in this position.
7. As shown in figure 3-5, wrap the tow chains around the radius rods in the following manner:
  - a. Bring each chain up through the "D" ring on the lift frame.

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b. Wrap the chain around the radius rod from inside to outside.

c. Secure the hook onto the chain, as tight as possible, on the radius rod.

8. Place the hardwood plank on the frame so that when the frame is raised, the plank will contact the tow hooks or eye support area on the coach. If the bus has a retractable step, keep the plank approximately 4" away from the step.

9. Raise the front of the lift frame and locate the shield in front of, and tight against, the bumper. Support the frame in this position. Locate the plank directly under the coach tow eye support.

10. At opposite corners from each radius rod, bring the tow chains up the front of the frame shield and around the lift bar on the tow truck.

**CAUTION: Take precautions to eliminate the slack from the chains under the frame before lifting the coach. This will ensure the truck tow bar does not "ride up" over the shield and against the front of the coach.**

11. Check that the plank is in proper location against the coach tow eyes. Carefully raise the coach front with the tow truck winch.

12. Place two safety chains at the front of the lift frame as follows:

a. Route each chain down through the tow hook on the coach frame.

b. Bring the chain down the outside, and up through the safety hook on the lift frame.

c. Secure the hook onto the chain to provide a tight attachment.

13. Bring the free end of each safety chain across to the opposite lifting chain. Tighten by using a chain tensioner to eliminate all slack. Make sure the safety chains are tight to prevent side-slip of the lift frame under the coach.

14. Observe the normal precautions including, but not limited to, the ones listed below when towing the coach:

a. Make sure the park brake is released before towing.

b. Do not allow passengers inside the coach during towing.

c. Do not exceed a prudent, safe towing speed. Be aware of changing conditions.

d. Avoid "tight" turning. Accelerate and decelerate slowly, with caution.

e. After approximately two miles towing, check and retighten the safety chains as necessary.

## TOWING WITHOUT LIFTING COACH

**NOTE: When towing without lifting the coach, use only a tow truck equipped with a standard tow bar and related equipment. All other means of towing are unauthorized.**

1. Disconnect both drive axle shafts to prevent damage to the transmission.

2. Operate the coach engine during the tow to maintain brake system air pressure. If the engine cannot be operated, attach an external air pressure line, from the tow truck, to the emergency fill valve in the service compartment under the driver's floor. The air pressure must be 75 psi min., and the line should be attached with a clip-on air chuck affixed to the air line.

3. Position the tow truck so that the truck's tow bar contacts the front bumper of the coach.

4. Attach the tow truck chains in the coach tow eyes and take up all slack.

5. Attach safety chains as applicable.

6. Observe the normal towing precautions including, but not limited to, the ones listed below when towing the coach:

a. Make sure the park brake is released before towing.

b. Do not allow passengers in the coach during towing.

c. Do not exceed a prudent, safe towing speed. Be aware of changing conditions.

d. Avoid "tight" turning. Accelerate and decelerate slowly, with caution.

e. After approximately two miles towing, check and retighten the safety and tow chains as necessary.

## COACH JACKING POINTS

When it is necessary to raise the vehicle by using jacks under body members instead of under axles, care should be taken to ensure that pressure is applied only at the points indicated in Figures 3-6 and 3-7; otherwise, distortion or damage may occur to body sections.

**CAUTION: On either automatic or manual transmission the drive axle shafts must be removed when being towed to avoid possibility of damage to transmission.**

Remove stud nuts and washers retaining axle shafts, rap center of axle shaft flange sharply to loosen dowels and pull out axle shaft. Plug axle tube to prevent oil loss.

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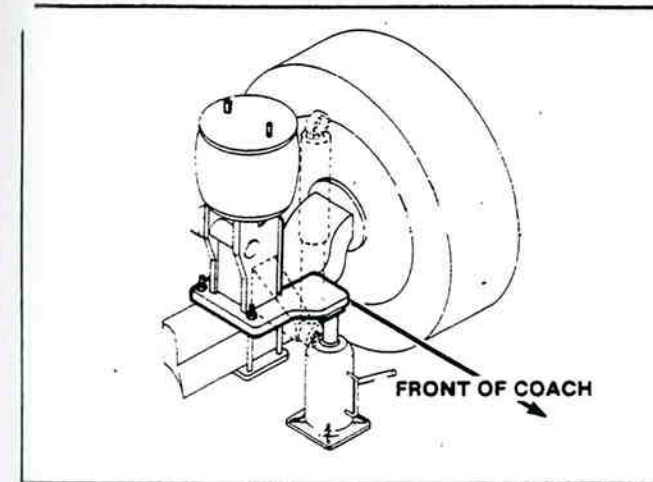


Figure 3-6. Front Jacking Points.

## BODY REPAIRS

### WELDING

**NOTE: Refer to the welding caution in the introductory pages of this manual before starting any welding operation.**

The entire frame structure is a welded design. Self-contained suspension bogies for the front and rear are jig

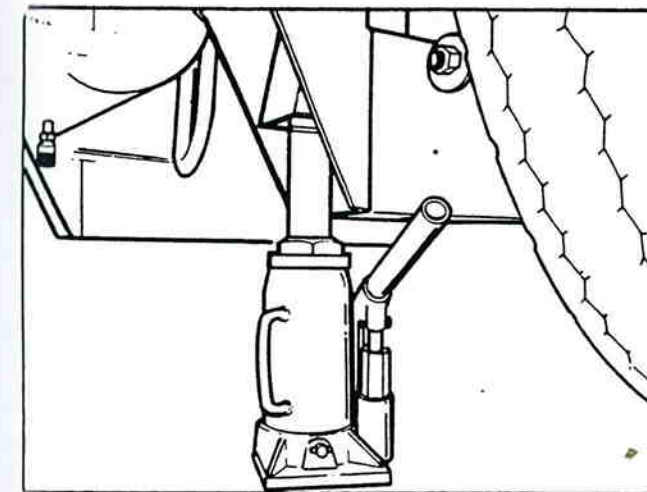


Figure 3-7. Rear Jacking Points.

welded to ensure proper alignment of the main radius rod attaching points.

All the lower parts of the framework, from the main floor to the skirt rail, are manufactured from stainless steel. This prevents rust and corrosion on the frame members due to moisture and road salts. The repair of these sections can be carried out in the conventional manner.

The following welding rods should be used when making welding repairs to the body structure:

APPLICATION	DIAM.	A.W.S.
SS to SS or Corten, Light Gauge	3/32" (2.4 mm)	No. 308
SS to SS or Corten, Heavy Gauge	1/8"-5/32" (3.2-4.0 mm)	No. 308
Corten to Corten Light Gauge	3/32"-1/8" (2.4-3.2 mm)	No. 6011
Corten to Corten Heavy Gauge	3/32"-5/32" (2.4-4.0 mm)	No. 7018
Air Beam Reservoirs Heavy Plate Sections	5/32" (4.0 mm)	No. 7018

## RIVETING

There are a number of types of rivets used in the manufacture of the coach and a general classification of these types follows:

6053-T6 — used on side paneling, where strength is required and the rivet can be reached for bucking.

1200 F — used on baggage doors - strength not too critical and can be reached for squeezing.

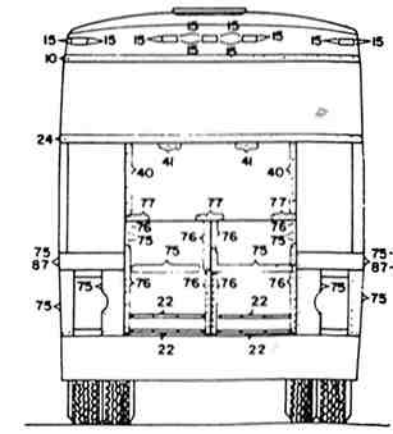
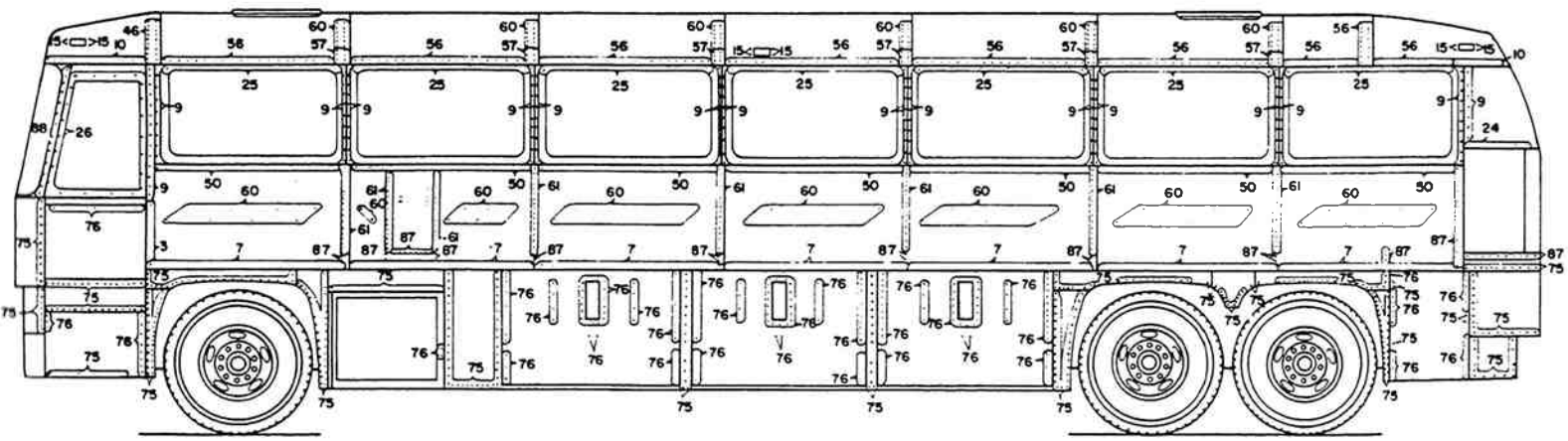
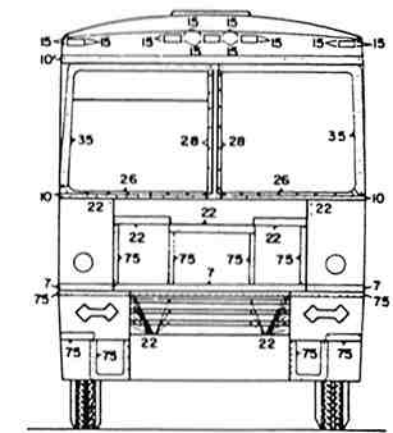
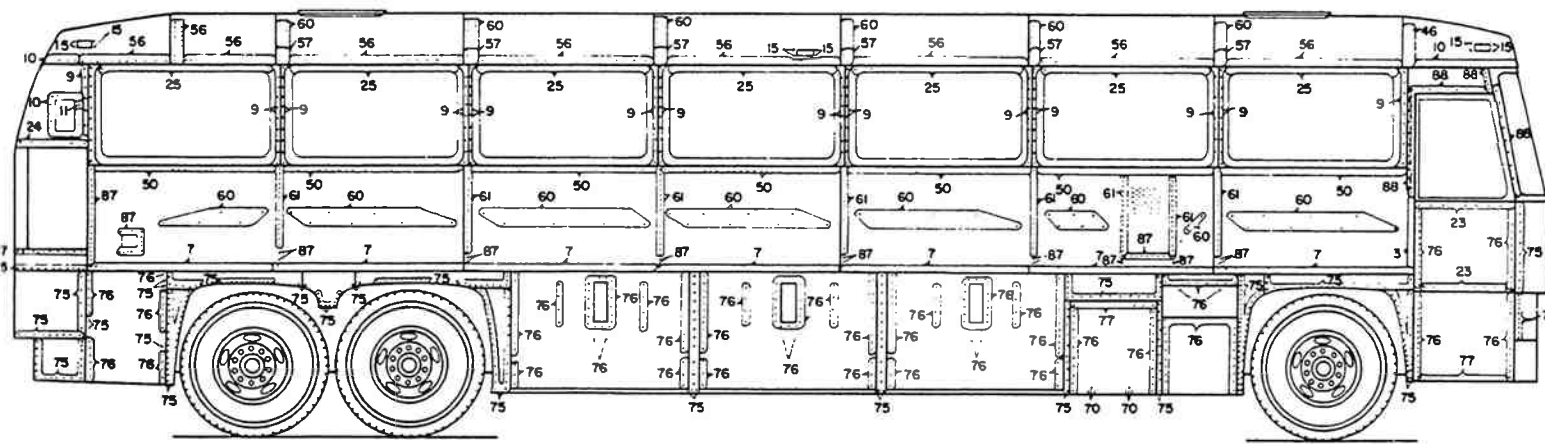
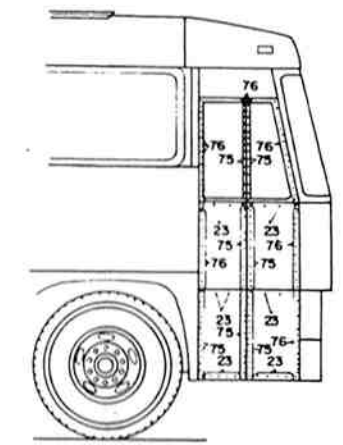
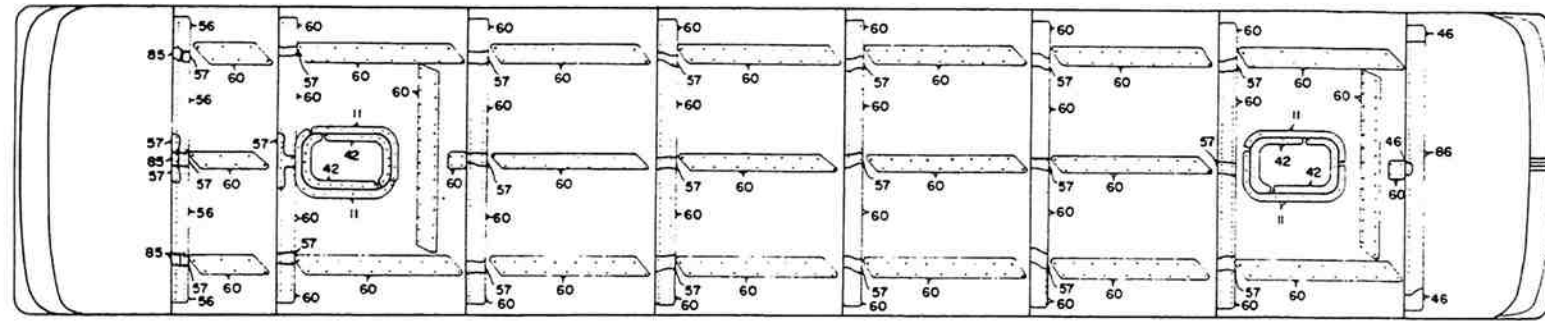
AD-43-BS — U.S.M.C. "Pop" rivets on all other inaccessible points or accessible places where ease of installation is required.

Cherry and Cherry Monobolt — used where strength is required and the rivet is not readily reached for bucking.

Hand-type guns for pulling up cherry rivets and lazy tongs for Imex and "Pop" are available for repair work. Contact Service Parts department for information.

Repairing and replacement of body parts will require removal of rivets. Aluminum rivets can be removed by cutting off the rivet head with a sharp chisel, or by drilling out the rivet with a drill slightly smaller than the body of the rivet. On a rivet with a large head, first cut a groove across the center of the rivet head with a cape chisel, then cut off with a flat chisel. When drilling out pop rivets, always push out the stem first.





KEY NO.	PART NO.	DESCRIPTION
1	19-13-10	Rivet - Cherry, 763W-6-B, 3/16"
3	19-13-12	Rivet - Cherry, 763W-8-6, 1/4"
4	19-13-13	Rivet - Cherry, 763W-8-10, 1/4"
7	19-13-14	Rivet - Cherry, CCR73M-6-4, 3/16"
9	19-13-19	Rivet - Pop. AD66M, 3/16"
10	19-13-22	Rivet - Pop. AD68M, 3/16"
11	19-13-27	Rivet - Pop. AK66M, 3/16"
15	19-13-28	Rivet - Pop. AK440 BS, 1/8"
22	19-13-32	Rivet - Pop. Monel, MD545-BS, 5/32"
23	19-13-33	Rivet - Pop. Monel, MD636-BS, 3/16"
24	19-13-112	Rivet - Pop. Monel, MD650-BS, 3/16"
25	19-13-54	Rivet - 1/8" x 1/4" Fl.Hd. Csk. Al. 25F Cl. Anod.
26	19-13-55	Rivet - 1/8" x 3/8" Fl.Hd. Csk. Al. 25F Cl. Anod.
28	19-13-58	Rivet - 5/32" x 1/2" Fl.Hd. Csk. Al. 25F Cl. Anod.
35	19-13-35	Rivet - 1/8" x 3/8" B.Hd. Al. 25F Cl. Anod.
40	19-13-39	Rivet - 3/16" x 3/8" B.Hd. Al. 25F Cl. Anod.
41	19-13-40	Rivet - 3/16" x 1/2" B.Hd. Al. 25F Cl. Anod.
42	19-13-41	Rivet - 3/16" x 5/8" B.Hd. Al. 25F Cl. Anod.
46	19-13-110	Rivet - 7/32" x 5/8" B.Hd. Al. 25F Cl. Anod.
50	19-13-66	Rivet - 3/16" x 1/2" U.Hd. Al. 25F Cl. Anod.
56	19-13-47	Rivet - 7/32" x 1/2" B.Hd. Al. 55S Cl. Anod.
57	19-13-49	Rivet - 7/32" x 5/8" B.Hd. Al. 55S Cl. Anod.
60	19-13-44	Rivet - 7/32" x 3/8" B.Hd. Al. 55S Cl. Anod.
61	19-13-45	Rivet - 7/32" x 1/2" B.Hd. Al. 55S Cl. Anod.
70	19-13-74	Rivet - 3/16" x 3/8" B.Hd. Semi-Tubular
75	19-13-137	Rivet - Cherry, Pop. CC P-6-4, 3/16" S.S.
76	19-13-138	Rivet - 3/16" x 1/4" T.Hd., Semi-Tubular, S.S.
77	19-13-140	Rivet - 3/16" x 3/8" T.Hd., Semi-Tubular, S.S.
79	19-13-131	Rivet - 3/16" x 1/2" B.Hd. Al. 25F Black Anod.
80	19-13-143	Rivet - 3/16" x 5/8" B.Hd. Al. 25F Black Anod.
85	19-13-125	Rivet - 7/32" x 7/8" B.Hd. Al. 55S Cl. Anod.
86	19-13-152	Rivet - 7/32" x 1/2" B.Hd. Al. 25F Cl. Anod.
87	19-13-156	Rivet - Cherry "Monobolt" Clear Anod, 1/4" x 3/8"
88	19-13-155	Rivet - Cherry "Monobolt" Black Anod, 1/4" x 3/8" Alum.
89	19-13-168	Rivet - Cherry "Monobolt" 3/16" CCPV-6-4 S.S. Alternative Audel "Monobolt" 2711-D613

EXTERIOR RIVET CHART  
MODEL: MC-9

75-STAINLESS STEEL PANELS  
87-ALUMINUM PANELS

# MC-9 MAINTENANCE MANUAL

## UPHOLSTERY

Coach seats are lightweight, with foam-padded backs and cushions. Arm rests are provided at both the wall and aisle sides on two passenger seats. Outside back panels are scuff resistant plastic. Removable upholstery covers are standard with vinyl side boxing at headrest areas and woven fabric facings on cushions and backs.

### ROUTINE CLEANING

In both appearance and wearability, best results are obtained if upholstery is cleaned at regular intervals before dirt, dust and grit have been ground into the fabric.

All that is required to remove the dirt is a gentle beating with the hand or the back of a brush. This will bring the dirt to the surface where it is easily removed by a vacuum or a soft brush. It is preferable to vacuum or brush in the direction of the pile which can easily be recognized by running a hand lightly over the pile. Cleaning should be carried out as often as possible. If the fabric becomes excessively dirty, particles of grit will cause gradual wear to take place, reducing the life of the fabric.

### DRY CLEANING

If covers are to be removed for cleaning, dry cleaning is recommended since washing might cause some shrinkage, preventing the covers from being reapplied to the seats without damage. Stoddard Solvent is recommended as the dry cleaning agent because most covers used on seats are a combination of cloth and vinyl, and this product assures longer vinyl life. Other than spot cleaning, dry cleaning the covers while they are in place is not recommended; the resulting fumes could be hazardous in the confines of the coach and the solvent could be detrimental to the foam padding of the seats.

### CLEANING WITH COVERS IN PLACE

The most effective and economical method to clean the woven fabric seat covers is by washing with either an approved foam upholstery cleaner or with a mild household detergent such as *Joy*, *All* or *Tide*.

Follow this procedure when cleaning seat backs and cushions:

1. Thoroughly vacuum clean the upholstery and if spots or stains are to be removed, do so before the seats are washed in order to avoid a "cleaning ring."
2. Dilute household detergent or liquid foam cleaner according to directions on the container, pour a small quantity into a flat pan and work into a thick foam with a sponge or brush.
3. Apply **only** the foam to the fabric using a brush, sponge or turkish towel. Clean only a small area of the fabric at a time with the foam. **AVOID SOAKING!** Rub vigorously. If the fabric is mohair, brush the dampened surface in the direction of the pile several times with a stiff brush. When dry, brush against the pile to restore the nap.
4. Follow the scrubbing by sponging the suds from the fabric with a clean sponge or a clean cloth moistened with water. Rinse the sponge or cloth often, and change the water when it becomes dirty and/or "sudsy."
5. Before the coach goes back into service, the upholstery should be allowed to dry. To speed up the drying, excess moisture can be blown off the fabric with compressed air.

**NOTE: Oil in the air line will soil the fabric. Blow the line clear and test air discharge against a plain white piece of paper. It is also effective to press the edge of a flat stick of hardwood down on the cushion and slowly draw it across the fabric.**

Even very soiled areas can be returned to their original appearance by a thorough cleaning. But a regular schedule of cleanings that keeps your upholstery reasonably clean at all times will add months to the service life of coach upholstery.

### RECOMMENDED UPHOLSTERY CLEANING SCHEDULE

After the vehicle comes off its regular run, seats should be brushed after the floor of the bus has been swept. A whisk broom is generally used.

**NOTE: Maintenance personnel often use sweeping compound to inhibit dust.**

Once a week at minimum, the seat cushions and seat backs should be vacuum cleaned. Then the seats should be wiped with a damp, clean cloth to remove any dust or dirt raised to the surface of the fabric but not removed by the vacuum.

At each mechanical check-up during which the vehicle remains in the shop for 24 hours or more, the seat upholstery should be vacuum cleaned, spots removed and then "shampooed."

### REMOVAL OF STAINS FROM FABRIC TYPE UPHOLSTERY

**CAUTION: Do not use soap, washing powder, ammonia, soda or bleach, nor any cleaning product that contains any of them.**

**NOTE: Prompt and proper cleaning will remove most stains from coach upholstery. Improper treatment may increase the damage.**

Alcoholic liquids — Sponge with water followed by Method 2, below.

Battery acid — Saturate with a solution of Sodium Bicarbonate, leave a few minutes before drying out. It is important for the above treatment to be carried out immediately to avoid serious damage to the fabric.

Beverage stains — Use Method 1, below; if stain persists, try Methylated spirits.

Bloodstains — Use Method 2, below.

Burns — Scrape blackened area with a knife and treat with Method 2, below. Restoration after extensive burns requires attention from a tailor or seamstress.

Chewing gum — Soften with Cyclohexanone and scrape off carefully with a knife.

Cosmetics — Use Method 1, below, followed by Method 2.

Ballpen ink — Treat with Methylated spirits, blotting frequently to avoid ink spreading. Use cleaning Method 2, below, to complete the removal.

Copying ink — Treat same as ballpen ink.

Marking ink (from felt-tipped pens) — Treat with Methyl Ethyl Ketone (MEK) followed by Method 2, below.

Writing ink — Use Method 2, below. If brown stain remains, treat as for rust.



# MC-9 MAINTENANCE MANUAL

Oil, grease or paint marks — Remove excess substance with a knife or spoon, then treat with Method 1, below, followed by Method 2. If stains reappear, repeat the cleaning process.

Rust — Use Method 2, below, followed by a warm solution of Oxalic Acid and complete treatment by sponging with water.

Tar — Soften with Benzene and then treat with Method 1, below, followed by Method 2.

Urine — Use Method 2.

Vomit and excrement — Use Method 2.

## METHOD 1

Apply a nonflammable solvent (Trichloroethylene) with a clean, white, absorbent material. Treat small areas, working from the outer edge toward the center of the stain. Blot frequently with a dry clean cloth to avoid rings.

## METHOD 2

Sponge the stain with a solution of household detergent and lukewarm water. Do not soak. Follow this by rubbing with a damp cloth, rinsing the cloth between each treatment.

## CLEANING VINYL COVERS AND VINYL TRIM

The vinyl on the seats requires periodic cleaning to retain a neat appearance.

Use only mild household detergents such as No. 409 Cleaner with warm water and apply with a sponge or soft cloth to remove most soiling. In addition, a soft bristle brush may be used after the detergent has been applied to the surface.

**CAUTION: Do not use harsh solvent type cleaners such as *Lestoil* or *Fantastic*. Such solvent cleaners cause cracking, crazing and general deterioration of the vinyl and thread materials.**

In case of stubborn or embedded dirt, a non-abrasive cleaner such as *Bon Ami* can be effective. Before the surface dries, wipe with a clean, dry cloth to remove residue. This procedure may have to be repeated to remove some stains and dirt.

## REMOVAL OF SPOTS AND STAINS FROM VINYL COVERS/TRIM

The following suggestions are often effective in removing the types of stains and spots listed.

- Ink can sometimes be removed by use of alcohol.
- Paint, shoe polish and tar can best be removed by using naphtha or kerosene on a clean white cloth.
- Chewing gum may be removed by first carefully scraping the surface and then using naphtha or kerosene on the remainder.

Do not use any stronger solvents as they will attack vinyl and plastic compositions. After using solvents, wash the vinyl surface with detergent solution and rinse with clean water. Dry with soft, clean cloth.

Badly stained vinyl surfaces can be rejuvenated with *Color Hit*, a flexible color coating made by Advance Color Corporation, 800 South Vail Avenue, P.O. Box 54870, Los Angeles, California 90054. This product is an opaque, water-base coating available in 25 standard colors.

## CARPETING

### ROUTINE CLEANING

A regular maintenance plan will help you maintain the beautiful appearance of your carpeting for many years. To maintain the best appearance level possible, follow the basic maintenance plan below.

**CAUTION: Do not use soap, washing powder, ammonia, soda or bleach. Prompt cleaning will remove most stains. Improper treatment may increase the damage.**

Light vacuuming or carpet sweeping is usually needed daily in heavy traffic areas. This is to pick up most surface dust, lint and soil. Carpet sweeper or canister type vacuums work well for quick cleaning.

A vacuum equipped with a beater bar or a very high air velocity commercial vacuum is needed for thorough vacuuming. The beater agitates the pile to free abrasive dirt particles buried below the surface. Move the vacuum slowly to give the dirt time to be shaken loose and drawn up by the vacuum.

Commercial cleaning of the carpet is recommended each year, depending on conditions, for those who want the best appearance and longest life from their carpet.

### STAIN REMOVAL

The following materials can be readily obtained for use in a spot removal kit. Bottle and label them for future use.

Dry cleaning fluid (nonflammable such as Perchloroethylene).

Detergent solution — mix one teaspoon (5 ml) of neutral powder type of detergent in ½ pint (280 ml) of water.

Solution to neutralize acid stains (fruit juices). Mix one tablespoon (15 ml) ammonia to ¾ cup (177 ml) of water.

Solution to neutralize alkaline stains (bleach, wine, urine). Mix 1/3 cup (79 ml) of white vinegar with 2/3 cup (157 ml) of water.

Can of Freon 12, if needed (available at refrigeration outlets). Clean, white absorbent cloths, a sponge, an eyedropper.

Alcohol — Detergent solution.

Ballpoint Ink — Dry cleaning fluid.

Beer — Detergent solution followed by small amount of vinegar.

Blood — Detergent solution followed by ammonia solution, then vinegar solution and a dry cleaning fluid after spot is dry.

Butter — Dry cleaning fluid.

Candy — See section on "Difficult Stains."

Carbon Black — Detergent solution.

Chocolate — Apply dry cleaning fluid followed by detergent solution.

Coffee — Detergent solution.

Cosmetics — Dry cleaning fluid (except lipstick).

Crayon — Dry cleaning fluid.

Crepe Paper — Detergent solution.

Egg — Treat as for chocolate.

Excrement — Remove all solids, then treat as for beer.

Food Color — Detergent solution.

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Food Stains — Remove all solids, then treat as for chocolate.  
Fruit Juice — Detergent solution followed by ammonia solution.

Gelatin — Detergent solution.

Glue — Detergent solution.

Grass — Treat as for chocolate.

Gravy — Treat as for chocolate.

Grease — Dry cleaning fluid.

Gum — See section on "Difficult Stains."

House Cement — Dry cleaning fluid.

Ice Cream — Detergent solution.

Iodine — Detergent solution.

Ketchup — Detergent solution.

Metal Polish — Dry cleaning fluid.

Milk — Treat as for chocolate.

Mustard — Detergent solution.

Nail Polish — See "Difficult Stains."

Oils — Dry cleaning fluid.

Permanent Ink — Detergent solution.

Rust — See "Difficult Stains."

Shoe Polish — Dry cleaning fluid.

Soft Drinks — Detergent solution.

Soot — Detergent solution.

Tar — Dry cleaning fluid.

Tea — Detergent solution.

Toothpaste — Detergent solution.

Urine — See "Difficult Stains."

Vaseline — Dry cleaning fluid.

Vomit — Remove all solids, then treat with detergent solution.

Water Colors — Detergent solution followed by ammonia solution.

Wax — Dry cleaning fluid.

Wine — Detergent solution followed by vinegar solution.

## DIFFICULT STAINS

**CANDY** — Use the stain removal method for chocolate but apply the vinegar solution and then water once the stain is removed.

**GUM** — Easily removed by quick freezing it with dry ice or a freon aerosol spray and hitting it sharply with a hammer or hard instrument. Then scrape it off and remove any residue with dry cleaning solvent.

**NAIL POLISH** — Can be satisfactorily removed with nail polish remover, but it can seriously damage any carpet containing acetate fibers. Test it first sparingly in some inconspicuous area of the carpet and, should the color run, contact a professional cleaner for assistance.

**STRONG ACIDS** — Such as carbolic acid disinfectant and some tile cleaning compounds require drastic and immediate action to prevent serious damage. Quickly flush the affected area with water. Sponge up excess water, and repeat several times to dilute acid and wash it away. Sponge the area with ammonia solution and rinse again. Be sure to dry the carpet as quickly and thoroughly as possible, using a fan or vacuum cleaner.

**STRONG ALKALIES** — Such as lye, caustic soda, oven cleaner and paint cleaner can cause serious damage. Imme-

diately attention is essential. Quickly flush the affected area with water as described under "Strong Acids." Then sponge area with vinegar solution and rinse again. Dry the carpet as in "Strong Acids."

**URINE** — Absorb all liquid with a tissue or paper towel. Work (do not rub) a neutral detergent into stain and repeat. Apply one part white vinegar to two parts water and work (do not rub) into yarns. Allow it to set and then absorb excess liquid. Place absorbent material on top and weigh it down (books, etc.) and leave for six to eight hours to dry.

**UNKNOWN STAINS** — If they are "set" or are not identifiable, try detergent and water first. If this does not work, let stain dry and then try dry cleaning fluid. If this does not remove the stain, contact a professional carpet cleaner for assistance.

## DRIVER'S AND PASSENGER'S MODESTY PANELS

The modesty panels are made of fiberglass with a smooth, easily cleaned gel-coat finish.

Cleaning with mild detergent and water will remove most surface soiling. Tar, gum, etc., may be removed with a solvent such as kerosene. Volatile solvents, such as acetone, are not recommended. After using a solvent, clean the area with mild detergent and water.

### DRIVER'S ACRYLIC GUARD PANEL

An acrylic panel is mounted above the driver's modesty panel. Care should be taken when cleaning it.

The panel should first be dusted very lightly (not wiped) with a soft, clean cloth. The surface can then be wiped carefully with a soft, wet cloth or chamois. The cloth or chamois should be kept free of grit by rinsing it often in clean water. A mild dish-washing detergent may be used if necessary.

Grease and oil may be removed with hexane, kerosene, or aliphatic naphtha (no aromatic content).

**CAUTION: Do not use solvents such as acetone, benzene, carbon tetrachloride, fire extinguisher fluid, dry cleaning fluid, or lacquer thinners, since they soften and distort acrylic material. Do not use window sprays or kitchen scouring compounds.**

If, after washing, the surface shows minor scratches, most of them can be removed or reduced by hand polishing. The polishes can be best applied with a small pad of soft cotton flannel which has been dampened with water. Rub the panel in a straight to-and-fro motion parallel with the light scratches to be removed, or with a circular motion. Excessive rubbing at one spot should be avoided. Several applications may be necessary, but most minor scratches can be reduced and clarity improved within a relatively short time.

After the scratches are removed or reduced, the cleaner should be removed with a clean, soft cloth.

### VINYL REPAIR

Remove existing damaged vinyl covering from metal panel. Thoroughly clean the panel. Use a toluene cleaning fluid. Apply a coat of No. 1368 3M contact cement to panel and bottom side of vinyl. Allow cement to dry until tack-free before applying vinyl to panel.

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**NOTE: Cement must be sprayed on smoothly. If spraying equipment is not available, the cement can be brushed on; however, application must be thin, uniform and smooth.**

1. Apply masking tape around the outside area of the precise area to be covered by the patch. Using medium grit (120) sandpaper on a sanding block, thoroughly abrade the entire area that is to be covered. Wipe all residue off the surface with a tack-rag or with a clean cloth dampened with isopropyl alcohol. Spray or brush a thin, uniform DI-NOC brand primer 8004 on the surface and allow to dry for approximately 15 minutes. Remove all masking tape before the primer dries.

2. Cut the patch of 3M vinyl to the precise size of the area to be covered. Oversized patches will not adequately adhere to the unprimed edges and undersized pieces will leave non-coated areas of film which would be susceptible to staining and discoloration.

3. To remove the liner, place the vinyl face down on a clean, flat surface, hold firmly and remove the liner or backing with a smooth 180° motion. During hot or humid weather a slight jerking motion will aid in the liner or backing removal.

**NOTE: Always remove the liner or backing from the vinyl; never the vinyl from the liner or backing as vinyl stretching may result.**

4. Cut the liner or backing into two pieces (about 1/3 and 2/3 of its original size). Do not cut the vinyl. See figure 3-8. Place patch face down on a flat surface. Peel back and cut off approximately 1/3 from one edge.

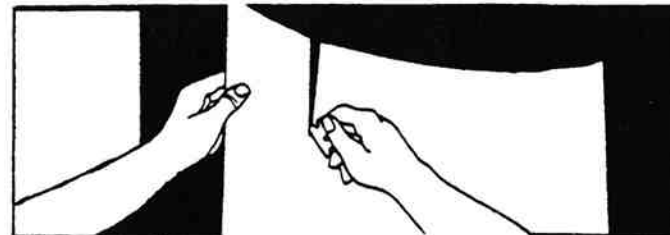


Figure 3-8. Cutting Liner or Backing.

5. Replace the two liner or backing pieces on the vinyl (adhesive side), leaving a gap of one to two inches between the two pieces (figure 3-9). Replace liner paper on adhesive, plastic side down, exposing about 1-2" (25.4-50.8 mm) of adhesive.

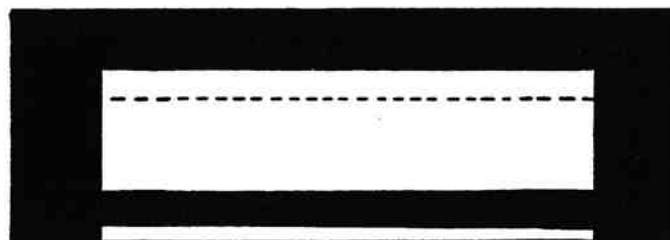


Figure 3-9. Replacing Lining Paper.

6. Use plastic applicator to burnish the exposed section of the vinyl. Use firm, overlapping strokes working from the center to the edge. This section will now act as a hinge when applying the rest of the vinyl. Apply marking along line of exposed adhesive. This will now act as a hinge.

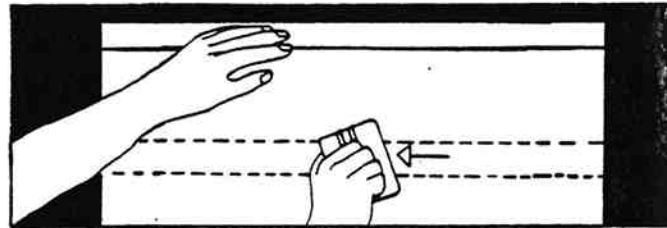


Figure 3-10. Burnishing Vinyl.

7. Lift the smaller (1/3) section of the vinyl and remove the liner or backing as you "squeegee" with firm, overlapping strokes. Repeat with larger (2/3) section. Go over all edges to ensure that they are firmly adhered. See figure 3-10.

## CLEAN-UP

Use a clean cloth dampened with either MEK (Methyl Ethyl Ketone) or lacquer thinner to clean up any residual adhesive which may have oozed out from beneath the vinyl.

**WARNING: DI-NOC brand Primer 8004, MEK (Methyl Ethyl Ketone) and lacquer thinner are flammable liquids. Use only in well ventilated areas away from flames or sparks. Do not soak the vinyl with these materials.**

## ALTERNATE METHOD OF VINYL REPAIR

A vinyl repair product is available from Advance Color Corporation, 800 South Vail Avenue, P.O. Box 54870, Los Angeles, California 90054. This product, called *Instant Vinyl*, is used for repairing cuts, tears, cigarette burn holes and the like in any vinyl upholstery material. *Instant Vinyl* is a clear, jelly-like substance which acts as a bond between the edges of the original vinyl and, in effect, replaces vinyl, providing a smooth and completely flexible seam or weld.

## REPLACEMENT OF FLOOR COVERING

1. Remove existing damaged floor covering from wood floor. Thoroughly clean the floor by wire brushing or sanding.

2. Remove all sanding dust and other foreign matter. Floor must be clean before applying adhesive.

3. Under passenger seats, on center aisle, driver's area and entrance area, apply a coat of Armstrong Lino Cement No. SP235 (M.C.I. Part No. 19-16-353) adhesive to plywood floor. Vinyl covering can be applied immediately.

## IMRON PAINT

If sheet metal parts are purchased from Universal Coach Parts Inc., Northlake, Illinois and in Canada from Motor Coach Industries, Service Parts Division, they will be forwarded in a primed condition. It is then only necessary to apply finish coats as outlined.

MCI model coaches are painted with Dupont Imron paint. Instructions on painting with Imron follow.

This high gloss polyurethane enamel finish is designed for exposure to extreme conditions. The 2-package product is

# MC-9 MAINTENANCE MANUAL

comprised of a pigmented base and an activator. Companion products include an optional dry-time accelerator, an additive to eliminate fish-eyes, and a reducer.

The following specifications cover refinishing of both bare metals and fiberglass as well as painted metals and fiberglass.

Care should be exercised in storing, handling, mixing and applying Imron paint and Imron chemical materials listed in this manual. The topcoat, primer, solvent, catalysts, accelerators, activators and cleaners are highly volatile and/or toxic. In addition to observing the safety instructions listed on the packaging, the following safety precautions should be observed.

A. No smoking in the paint room or any adjacent area exposed to residue fumes.

B. Only NIOSH (National Institute for Occupational Safety and Health) approved respirators should be used.

C. Adequate ventilation must be maintained.

D. Wash hands prior to eating.

E. Wear rubber gloves, rubber apron, and face shield during all phases of paint and chemical handling.

F. If available, operator supplied air (Independent Breathing Apparatus) should be used.

Activator — Imron must be activated with 192S Activator. Ratio: One part 192S Activator to three parts Imron. Mix thoroughly.

Additives - 189S Dry-Time Accelerator — to be used for faster tape-free time. Ratio: up to four ounces of 189S to one gallon of mixed Imron.

259S Fish Eye Eliminator — when necessary, use to eliminate fish eyes. Use up to two ounces per gallon.

Reducers — 8485S used to reduce Imron to a viscosity of 18-22 seconds in a Dupont M-50 Viscosity Cup. 8100S used as an Imron retarder.

Air Pressure — 50 psi "at the gun" for solid colors; 65 psi "at the gun" for metallic colors.

Application — for solid colors (non-metallic), spray a medium first coat. Allow to become tacky and follow with a full second coat. For metallic colors, spray three light to medium coats. After hiding has been achieved, reduce activated Imron 15% with 8485S Imron Reducer. Apply one or two mist coats to improve flow out and reduce mottling.

Two-Toning — at 77°F (25°C) and 50 percent humidity, two-toning can be done in six to ten hours. If 189S Accelerator is used, two-toning can be done in two to four hours minimum at 70-75°F (21-24°C).

**CAUTION: Clean all equipment with 3602S Lacquer Thinner or 8485S Reducer immediately after use.**

## DECAL APPLICATION

The following drying times should be observed to prevent blistering when applying decals over Imron paint. Overnight drying following 30 minutes drying at 180°F (82°C), 60 minutes drying at 140°F (60°C) or 120 minutes drying at 110°F (43°C). If sufficient time and temperature is allowed in the cure of the

Imron, it is possible to apply decals to the Imron surface without experiencing the blistering effect.

**NOTE: Allow wheel hubs to come to room temperature prior to painting so a condensate does not appear causing lack of adhesion of paint.**

When painting the flat black area on stainless steel sections of radiator and blower doors, treat these parts with Red Corlar primer 825S. The same procedure can be used on the fiberglass window panes on the side of the coach.

## STEEL

1. Surface Preparation — Wash with 3812S Enamel Reducer and wipe dry with clean cloths.

2. Apply 5717S Metal Conditioner — In a plastic container, mix 5717S Metal Conditioner with two parts water and apply to the surface with a cloth or sponge; if rust or corrosion is present, use a Scotch-Brite or similar abrasive pad. While still wet, wipe dry with clean cloths.

3. Apply 224S Conversion Coating — In a plastic container and without dilution, use a Scotch-Brite or similar pad and apply to the treated metal surface. Leave on the surface two to five minutes. Work only as much area as can be coated and rinsed before the solution dries. Reapply if surface dries before rinsing. Rinse by flushing the surface with cold water or mop with a damp sponge or cloth rinsed occasionally in clean water. Wipe dry with clean cloths or air dry. Apply primer.

4. Apply 825S Corlar Epoxy Primer.

## STAINLESS STEEL

1. Surface Preparation — Wash with 3812S Enamel Reducer and wipe dry with clean cloths. Fine particle sand blast or sand well.

2. Apply 5717S Metal Conditioner — In a plastic container, mix 5717S Metal Conditioner with two parts water and apply to the surface with a cloth or sponge; if corrosion is present, use a Scotch-Brite or similar abrasive pad. While still wet, dry with clean cloths.

3. Apply 224S Conversion Coating — In a plastic container and without dilution, use a Scotch-Brite or similar pad and apply to the treated metal surface. Leave on the surface two to five minutes. Work only as much area as can be coated and rinsed before the solution dries. Reapply if surface dries before rinsing. Rinse by flushing the surface with cold water or mop with a damp sponge or cloth rinsed occasionally in clean water. Wipe dry with clean cloths or air dry. Apply primer.

4. Apply 825S Corlar Epoxy Primer.

## ALUMINUM

1. Surface Preparation — Wash with 3812S Enamel Reducer and wipe dry with clean cloths.

2. Apply 225S Aluminum Cleaner — In a plastic container, mix 225S Aluminum Cleaner with two parts water and apply to the surface with a cloth or sponge; if rust or corrosion is present, use a Scotch-Brite or similar abrasive pad. While still wet, wipe dry with clean cloths.

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3. Apply 226S Conversion Coating — In a plastic container and without dilution, use a Scotch-Brite or similar pad and apply to the treated metal surface. Leave on the surface two to five minutes. Work only as much area as can be coated and rinsed before the solution dries. Reapply if surface dries before rinsing. Rinse by flushing the surface with cold water or mop with a damp sponge or cloth rinsed occasionally in clean water. Wipe dry with clean cloths or air dry. Apply primer.

4. Apply 824S/825S Epoxy Primer.

## FIBERGLASS PANELS

1. Surface Preparation — Wash the surface with 3819S PrepSol. While still wet, wipe dry with clean cloths.

2. Sand thoroughly, clean and apply 824S/825S Corlar Epoxy Primer.

## PRIMING STEEL, STAINLESS STEEL, ALUMINUM, FIBERGLASS

825S Corlar Epoxy Primer (red) is our recommendation for steel, stainless steel and aluminum. 824S Corlar Primer (gray) is our recommendation for fiberglass and may also be used on aluminum.

Activation — to two parts 824S/825S Primer, and one part 826S Activator.

Induction Period — allow activated primer to stand one hour at 70°F (21°C) and above; two hours when temperature is below 70°F (21°C). This will allow the chemical reaction to take place.

Pot Life — three days at 70°F (21°C).

Reduction — reduce activated primer 33-1/3 percent by volume (ratio 3 to 1) with 3602S Lacquer Thinner to a viscosity of 21-24 sec. in a Dupont M-50 Viscosity Cup or equivalent.

Application — Using 45-55 psi "at the gun," spray one full wet coat to give a dry film thickness of 0.7 to 1.0 mils.

Drying Time — two to six hours depending on temperature and film thickness. Overnight dry may be necessary when 2 or 3 coats have been applied and/or when temperatures are low.

## PRIMING PREVIOUSLY PAINTED STEEL, STAINLESS STEEL, ALUMINUM, FIBERGLASS

1. Wash the painted surfaces with soap and water to remove dirt and water-soluble contaminants.

2. Wipe the painted surfaces with 3919S Prep-Sol to remove wax, grease and other contaminants. While solvent is wet, wipe dry.

3. Repair flaws in the painted surface by grinding off paint in the damaged areas and fill in body filler, if necessary. Feather-edge ground-off areas by machine or hand sanding. Treat bare metal areas with the appropriate conditions and conversion coatings.

4. Apply 824S, 825S, 100S or 110S as recommended above.

Prime as follows:

825S Corlar Epoxy Primer (red) is our recommendation for priming or spot priming previously painted surfaces where the metal substrate is steel, stainless steel or aluminum. 824S -Corlar Epoxy Primer (gray) is our recommendation for priming or spot priming previously painted surfaces where the substrate is fiberglass (can also be used on aluminum).

Activation — to two parts 824S/825S Primer, add one part 826S Activator.

Induction Period — allow activated primer to stand one hour at 70°F (21°C) and above; two hours when temperature is below 70°F (21°C). This will allow the chemical reaction to take place.

Pot Life — three days at 70°F (21°C).

Reduction — For spot repairs, reduce the activated primer 20 percent by volume (ratio 5 to 1) with 3602S Lacquer Thinner.

Application — using 45-55 psi "at the gun," spray until satisfactory filling is achieved (2 to 4 coats).

Drying Time — with this heavier mixture, drying time will be extended to four to eight hours and overnight dry may be necessary.

## SPOT PRIMING

100S Gray/110S Red Oxide Multi-Purpose Acrylic Lacquer Primer may be used as an alternate priming system for making spot repairs on small bare metal areas. Metal to be treated as described above.

Reduction — 80 to 125 percent by volume (ratio 1 to 1) to a viscosity of 23-24 sec. on a Dupont M-50 Viscosity Cup or equivalent with 3661S Lacquer Thinner in the the mid-temp ranges and 3602S Lacquer Thinner during warm weather.

Application — using 35-45 psi "at the gun," spray three or more coats as needed. Allow each coat to completely flash.

Drying Time — allow to dry thoroughly before sanding — 30 to 60 minutes.

## FIBERGLASS REPAIRS

All repairs to fiberglass parts consist of filling the damaged area with fiberglass cloth and resin or strand fiberglass and resin. The repair is allowed to harden and then the finishing operations are performed. Use of the various materials is determined by the type of repair to be made. Large holes, torn sections and separated joints require the adhesive qualities of the resin and the reinforcing qualities of the fiberglass. Small dents, scratches or pits can be repaired using resin, strand fiberglass and filler mixed into paste. Instructions for either mix are explained later.

The following additional tools and materials will assist in making repairs. Hacksaw blade, assorted files, emery paper or cloth (No. 150 grit or finer), scissors or tin snips, wax paper or cellophane sheets, small 3" (76.2 mm) paint roller, paint brush, putty knife, acetone and one or more heat lamps.

For best results the ambient temperature should be 70° to 75°F (21-24°C) when making repairs.

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**CAUTION: Some people experience a skin reaction to resins. If this happens, wipe off skin with denatured alcohol or clean thinner. There are several protective hand creams available and their use is recommended.**

If any disc grinding or sanding is to be done in an enclosed area, a respirator should be used and goggles should be worn.

Extreme care must be taken if the sander is electrically operated as dust of some resins is combustible when subjected to sparks or open flame. The proper tool for sanding resin is a low speed, air driven disc sander with a water attachment or a dry sander having a vacuum bag attachment. Either will eliminate fiberglass and resin dust.

## FIBERGLASS CLOTH PROCEDURE.

1. Remove all loose particles or damaged material using a power sander or rasp and where necessary sand paint away. On underside of coach scrape undercoating off and wipe clean with solvent. Remove all dirt, grease and paint to 1/2" around damaged area and feather the cleaned area all around.

2. Grind or file the damaged area to form a "V" at the broken or cracked portion. Sides of the "V" should have a shallow pitch for maximum bonding area.

**NOTE: Roughening the surface improves adhesion of resin.**

3. If paneling is warped, use C clamps and improved clamp plates to align surfaces. Preheat area to be repaired using one or two heat lamps positioned 12 to 15 inches (305-381 mm) from repair area.

**CAUTION: 200°F (93°C) is the high limit for this material. To go higher is to risk material distortion or crystallizing.**

4. Cut a piece of fiberglass one to three inches larger than the area to be repaired and impregnate with general purpose polyester resin catalyzed normally. Mix the desired quantity of resin and hardener in proportions of 1/2 tablespoon hardener to one quart resin. Do not use wax cups for mixing and prevent contamination between resin and hardener cans. A thin mixture can be thickened by adding powdered filler.

5. Use a clean paint brush to apply the resin placing the impregnated mat over the hole and pressing onto the surface with the brush to obtain good adherence. Another coat of resin may be applied at this time. Alternate layers of mat and cloth saturating each layer of fiberglass as it is placed over the damaged area. Smooth out the wrinkles while ensuring that the general contour of the area is maintained. Bubbles and wrinkles can be rolled out using a roller.

6. When the required strength and thickness is obtained (two 1 1/2 oz. [52.5 g] mats and one 9 oz. [255 g] cloth), allow the area to harden. Allow sufficient time for the patch to cool off properly before proceeding.

**NOTE: Be sure all air is removed from between surfaces being joined.**

**CAUTION: Once the resin and hardener have been mixed, the pot life (working time) of the mix is approximately 15 minutes. Any accidental contamination to the skin, clothing, tools, etc., must be removed within this period. Use acetone to remove uncured resin.**

7. Heat resin material again placing lamps 12 to 15 inches (305-381 mm) from repaired area. Allow 12 to 15 minutes for repair to cure.

8. After repair is cured, grind, file or sand to contour. Files other than body files may be more suitable. Feather edge and finish sanding.

9. After rough sanding, small pits or irregularities may appear in the finished surface. Repair following the instructions under Fiberglass Paste Repairs. Smooth off the surface with 100 sandpaper and finish with 120 sandpaper. Reprime and repaint according to appropriate painting instructions.

## FIBERGLASS PASTE REPAIRS

A fiberglass paste is used for repairing small dents, scratches, and pits. The paste is made by mixing resin, hardener and fiberglass strand or filler to the consistency of putty.

1. Where necessary, sand paint away around damaged area. On underside of coach, scrape away undercoating from damaged area and wipe clean with solvent.

2. Preheat the area to be repaired using heat lamps. Mix desired quantity of resin and hardener (refer to manufacturer's instructions on container). Add powdered fiberglass strand into mixture to thicken it into a putty state.

**CAUTION: If repair is to be made on a vertical surface, adding of powdered filler material to mixture will reduce tendency of hot resin to flow or run.**

3. Apply the material with a putty knife or similar object, building material up to desired contour. For deep filling and on vertical surfaces several layers of material may be needed.

4. A hacksaw blade held flat to adjacent contour and then pulled, using sawing action across repair when the resin is in the jell stage will remove excess resin from repair.

5. Finish repair in the same manner as when using fiberglass cloth.

## FIBERGLASS ROOF PANEL REPLACEMENT

Should replacement of a complete fiberglass roof panel assembly be required, it is recommended that the panel be fitted to the roof section and marked from the underside in the areas where the roof bows are located.

1. If the roof bow channels are bent or damaged, they should be altered or replaced in order to match the contours of the



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fiberglass panel. Some areas may require shims. The location and necessary thickness for each shim should also be marked for required additions.

2. The panel should then be removed and sanded in the marked areas in order to roughen the mounting surfaces. Apply Dolphinite sealer to the channel mounting surface and the sanded area of the fiberglass panel. Place and clamp panels in place complete with any necessary shims. Inspect the panel for proper fitting.

3. Drill holes through the panel from the underside of the channel. Existing holes in the roof bow channel may be used as a template.

**NOTE: Only drill four to five holes at one time. Do not attempt to drill all the holes and then rivet. Prior to riveting, check to ensure that misalignment and gapping have not occurred.**

## WINDOWS

### DESCRIPTION

Seven passenger side windows are provided on each side of the coach. They are fixed, single glazed, heat absorbing AS-3 laminated float safety glass mounted in black anodized extruded aluminum frames. Stainless steel sash hinges with phosphor bronze removable pins are mounted on the top. The sash may be pushed out for emergency escape by lifting the aluminum release bar at the lower edge which disengages the safety latches. Emergency operating instructions on metal plates are attached to the release bars at each seat location. All side window glass is interchangeable. Double glazed sashes are available and as well "Lucite" SAR acrylic sheet is available as an option with single glazing only. See washing for correct washing procedure for "Lucite" windows.

The side windows are readily removed once the window is in the emergency release position. Remove the snap rings from each end of the hinge pin, then remove the pins from the hinges. Push out at top of sash and lower window assembly from opening.

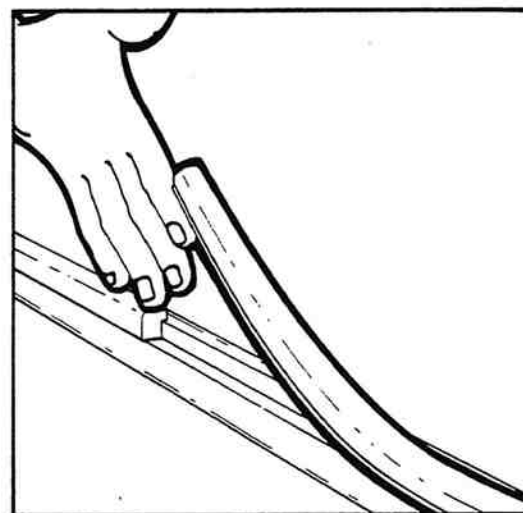


Figure 3-11. Removing Retaining Rubber.

### TO REPLACE GLASS

Remove the retaining rubber around the glass from the interior side of the frame. Find the spot where the two ends of the retaining rubber meet and pry one end up as shown in photo. Once the retaining rubber is removed, the glass can be pushed out of the frame. After replacing glass, place the ends of the retaining rubber at the middle of the frame and press down tightly. Work your way around the glass pressing the retaining rubber down tightly until it is in place.

Access to the window frame mounting hinges may be gained from the exterior of the coach by lifting the rubber molding. When re-installing the assembly, the protective molding must be sealed in place with a quality rubber cement.

**NOTE: During removal and installation of side sash assembly, care should be taken to ensure proper placement of all window components. Weatherstripping, exterior molding, etc., cannot be reinstalled once cut or damaged.**

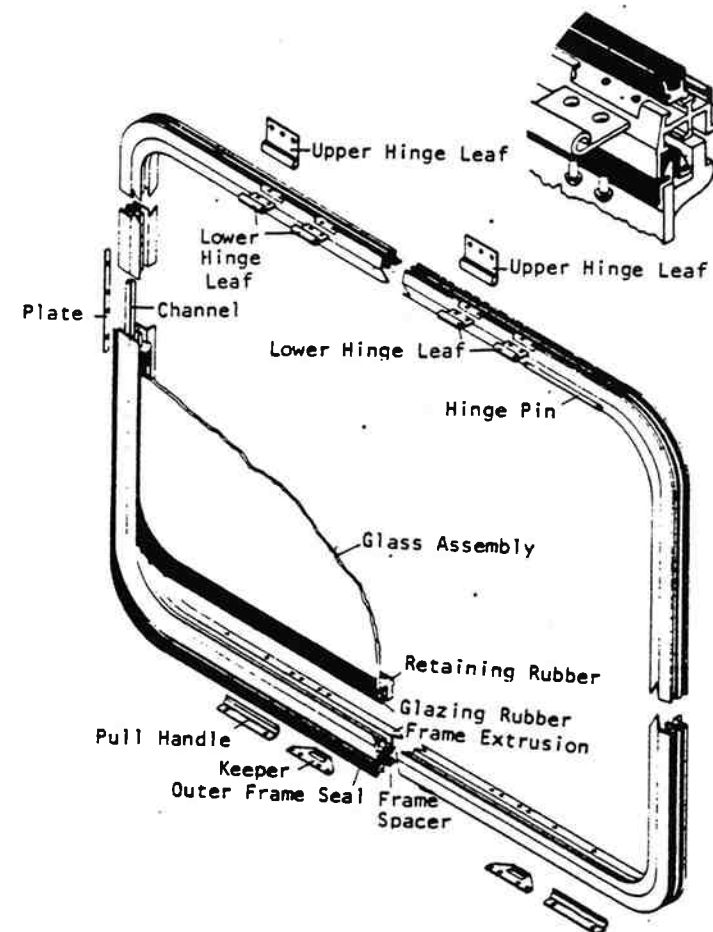


Figure 3-12. Side Window Installation.

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## REAR WINDOW

A one-piece, color-impregnated, molded, reinforced fiberglass panel is riveted to the main structure. The panel is insulated with a 2" (51 mm) fiberglass blanket.

Sash assembly complete with hinge and retainer may be removed by removing the screws attaching the hinge retainer to the body.

## DRIVER'S WINDOW

A single-glazed, fixed, one-piece, full-vision-type driver's window is provided with anodized aluminum frame. A small sliding section for signaling and mirror adjustment is provided at the lower rear corner. An optional double-glazed, one-piece driver's window with a small sliding section is also available. Window glass is AS-2 laminated safety glass with a 9-inch mask applied to the top portion of the window.

**NOTE: During removal and installation of the driver's window, care should be taken to ensure proper placement of all window components. Weatherstripping, wear plates, etc., are not shown in the assembly drawing, but their locations may be determined from the MC-9 Parts Manual.**

5. Seal glass perimeter approximately 12" each direction from each corner with E-708C black (Protective Treatment, Inc.) sealant or equivalent.

6. Apply soap solution to the lacing and, using a windshield lacing tool, install lacing into the groove.

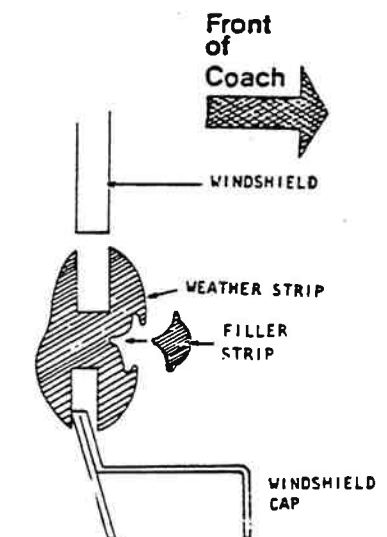


Figure 3-13. Windshield Cross-section.

## WINDSHIELDS

### DESCRIPTION

Two large curved windshields of AS-1 laminated safety glass provide an unmasked area of 43½" x 26" (1105 mm x 660 mm). They are interchangeable from either side. The windshields are laced to a flange around the opening by means of a one-piece black rubber extrusion and rubber filler strip.

### WINDSHIELD INSTALLATION

Windshield installation must be performed by more than one person. refer to figure 3-13.

1. Apply butyl tape to lip of windshield frame opening.
2. Install weatherstrip into opening.
3. Apply Glass-Slip or equivalent into the weatherstrip channel.
4. Using wooden or plastic tool, tuck glass into weatherstrip. Begin at top corner of windshield post and work around.

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LY

piece driver's window is pro-  
n frame (figure 3-14). A small  
d mirror adjustment is provided

ved by first removing all screws  
e. Then remove the glass from

**NOTE:** During removal and installation of the driver's window, care should be taken to ensure proper placement of all window components.

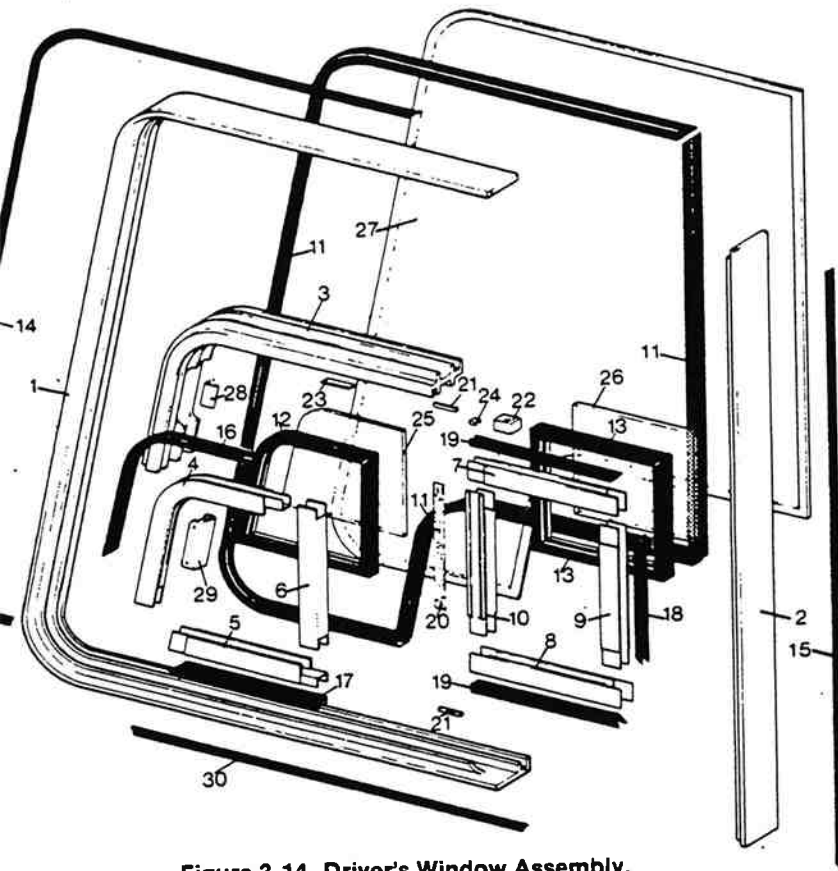


Figure 3-14. Driver's Window Assembly.

1. Front Frame Rail  
2. Rear Frame Rail

16. Curved Weatherstrip  
17. Bottom Weatherstrip

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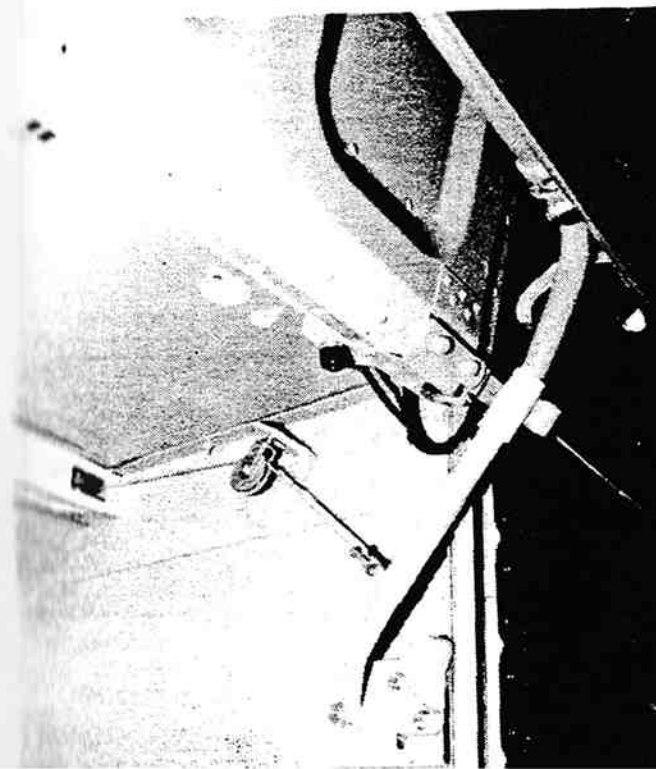
## BAGGAGE DOORS

Baggage compartment doors are pantograph, vertical-lift type and are fully sealed. Each door has a flush-mounted latch handle. Doors are counterbalanced with springs for ease of operation and have a safety hold-open catch (figure 3-15). To open, insert fingers under latch, then pull outward and up. To close, hold latch in open position, pull downward on door and push down on latch to secure door. Rubber bumpers prevent the door from contacting the body when opened. Each door latch has provisions for a padlock and customs seal.

### REMOVAL

**WARNING:** Because of their size and weight, removal of baggage doors should be performed by two persons.

1. Open door to half position. Remove the baggage compartment light and switch.



3. Using the baggage door cable pulling tool (20-46), pull cable back to facilitate the removal of the clevis pins that retain the pulley cables to hinge tubes.

4. Remove the capscrews that secure hinge tubes to the bracket and carefully remove the door from the coach.

**WARNING:** The pulley cable is under considerable tension. Exercise extreme caution during removal and installation.

### INSPECTION

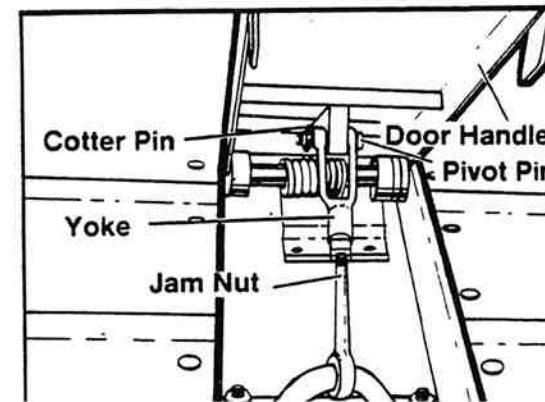
1. Inspect the pulley cables for fraying. Replace the cables if necessary.
2. Check the pulleys for wear and cracks. Replace them if either of these conditions exist.

### INSTALLATION

1. Position and support the baggage door in the fully open position. Install the capscrews that secure the hinge tubes to the brackets.
2. Using the baggage door cable pulling tool (20-46), pull cable into position and insert the clevis pin into the yoke at the end of cable. Secure with new cotter pin.
3. Partially close baggage door and install screws securing hinge panel to coach body.
4. Install baggage compartment light and switch. Before closing door, ensure that pulley cables are aligned on pulleys.

### ADJUSTMENT

1. If baggage doors lock too tightly and pinch seals at either top or bottom, or lock too loosely, it may be corrected by adjusting upper or lower catches on the inside edges of the baggage



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## DRIVER'S WINDOW ASSEMBLY

A single glazed, fixed, one-piece driver's window is provided with anodized aluminum frame (figure 3-14). A small sliding section for signaling and mirror adjustment is provided at the lower rear corner.

The driver's window is removed by first removing all screws from the interior retaining frame. Then remove the glass from the rubber retainer.

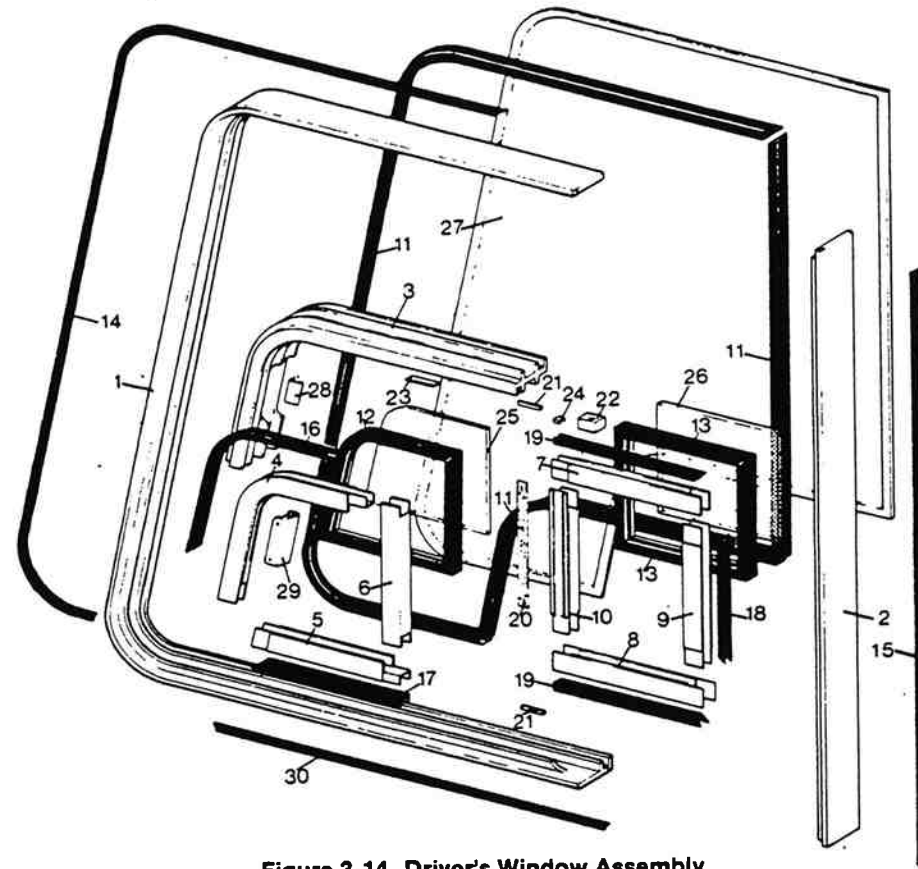


Figure 3-14. Driver's Window Assembly.

- |                                |                                 |
|--------------------------------|---------------------------------|
| 1. Front Frame Rail            | 16. Curved Weatherstrip         |
| 2. Rear Frame Rail             | 17. Bottom Weatherstrip         |
| 3. Curved Inside Frame Rail    | 18. Side Weatherstrip           |
| 4. Curved Sliding Rail         | 19. Top & Bottom Weatherstrip   |
| 5. Bottom Sliding Rail         | 20. Weatherstrip                |
| 6. Side Sliding Rail           | 21. Top & Bottom Felt           |
| 7. Top Stationary Rail         | 22. Sash Stop                   |
| 8. Bottom Stationary Rail      | 23. Nylon Wear Plate            |
| 9. Rear Side Stationary Rail   | 24. Nylon Wear Shoe             |
| 10. Front Side Stationary Rail | 25. Sliding Glass Unit          |
| 11. Main Unit Rubber Glazing   | 26. Stationary Glass Unit       |
| 12. Slider Rubber Glazing      | 27. Glass Unit                  |
| 13. Stationary Rubber Glazing  | 28. Sash Lock Keeper            |
| 14. Front Rubber Seal          | 29. Driver's Sliding Sash Lock  |
| 15. Side Rubber Seal           | 30. Driver's Window Rubber Seal |

**NOTE:** During removal and installation of the driver's window, care should be taken to ensure proper placement of all window components.

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## BAGGAGE DOORS

Baggage compartment doors are pantograph, vertical-lift type and are fully sealed. Each door has a flush-mounted latch handle. Doors are counterbalanced with springs for ease of operation and have a safety hold-open catch (figure 3-15). To open, insert fingers under latch, then pull outward and up. To close, hold latch in open position, pull downward on door and push down on latch to secure door. Rubber bumpers prevent the door from contacting the body when opened. Each door latch has provisions for a padlock and customs seal.

### REMOVAL

**WARNING:** Because of their size and weight, removal of baggage doors should be performed by two persons.

1. Open door to half position. Remove the baggage compartment light and switch.

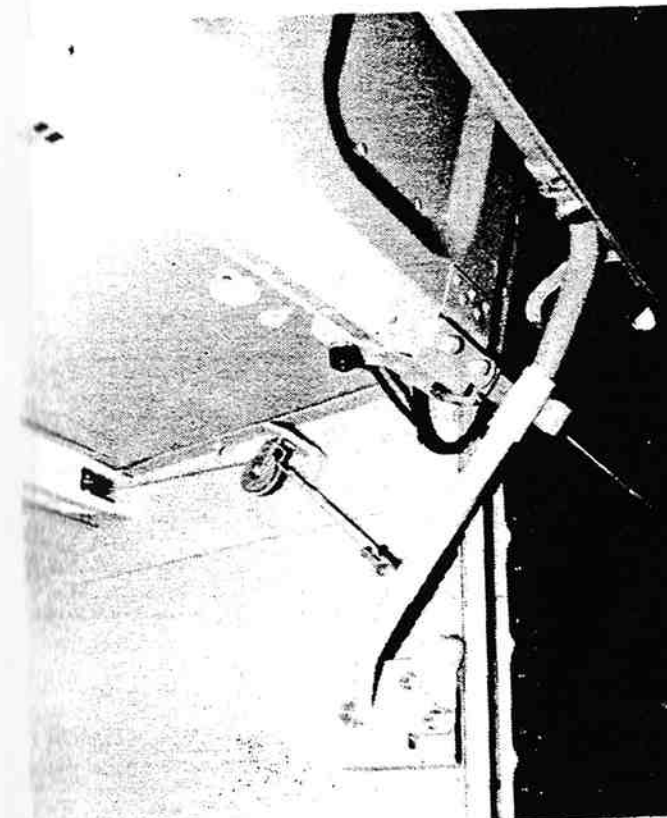


Figure 3-15. Baggage Door Hinge and Cable.

2. Remove the screws that secure the hinge panel to the coach body. Ensure that the door remains vertical. Open the door to its full position until the hinges engage with the hinge lining clips.

**WARNING:** Baggage door must be supported at this stage to prevent it from falling during final removal procedures.

3. Using the baggage door cable pulling tool (20-46), pull cable back to facilitate the removal of the clevis pins that retain the pulley cables to hinge tubes.

4. Remove the capscrews that secure hinge tubes to the bracket and carefully remove the door from the coach.

**WARNING:** The pulley cable is under considerable tension. Exercise extreme caution during removal and installation.

### INSPECTION

1. Inspect the pulley cables for fraying. Replace the cables if necessary.
2. Check the pulleys for wear and cracks. Replace them if either of these conditions exist.

### INSTALLATION

1. Position and support the baggage door in the fully open position. Install the capscrews that secure the hinge tubes to the brackets.
2. Using the baggage door cable pulling tool (20-46), pull cable into position and insert the clevis pin into the yoke at the end of cable. Secure with new cotter pin.
3. Partially close baggage door and install screws securing hinge panel to coach body.
4. Install baggage compartment light and switch. Before closing door, ensure that pulley cables are aligned on pulleys.

### ADJUSTMENT

1. If baggage doors lock too tightly and pinch seals at either top or bottom, or lock too loosely, it may be corrected by adjusting upper or lower catches on the inside edges of the baggage

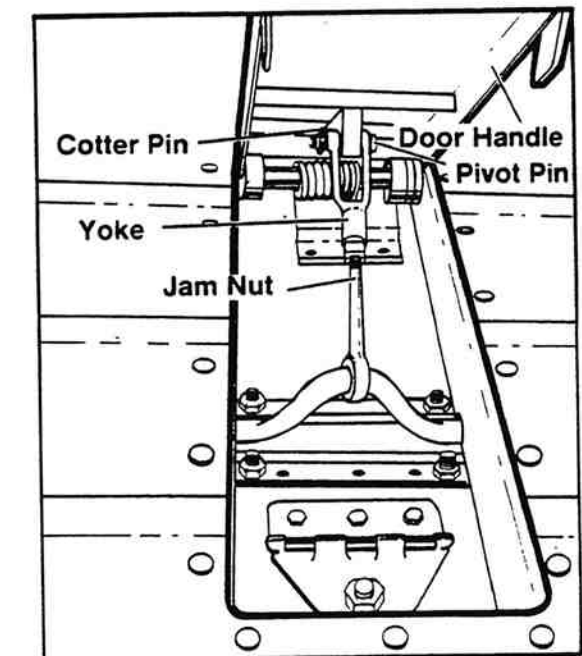


Figure 3-16. Baggage Door Catch.



# MC-9 MAINTENANCE MANUAL

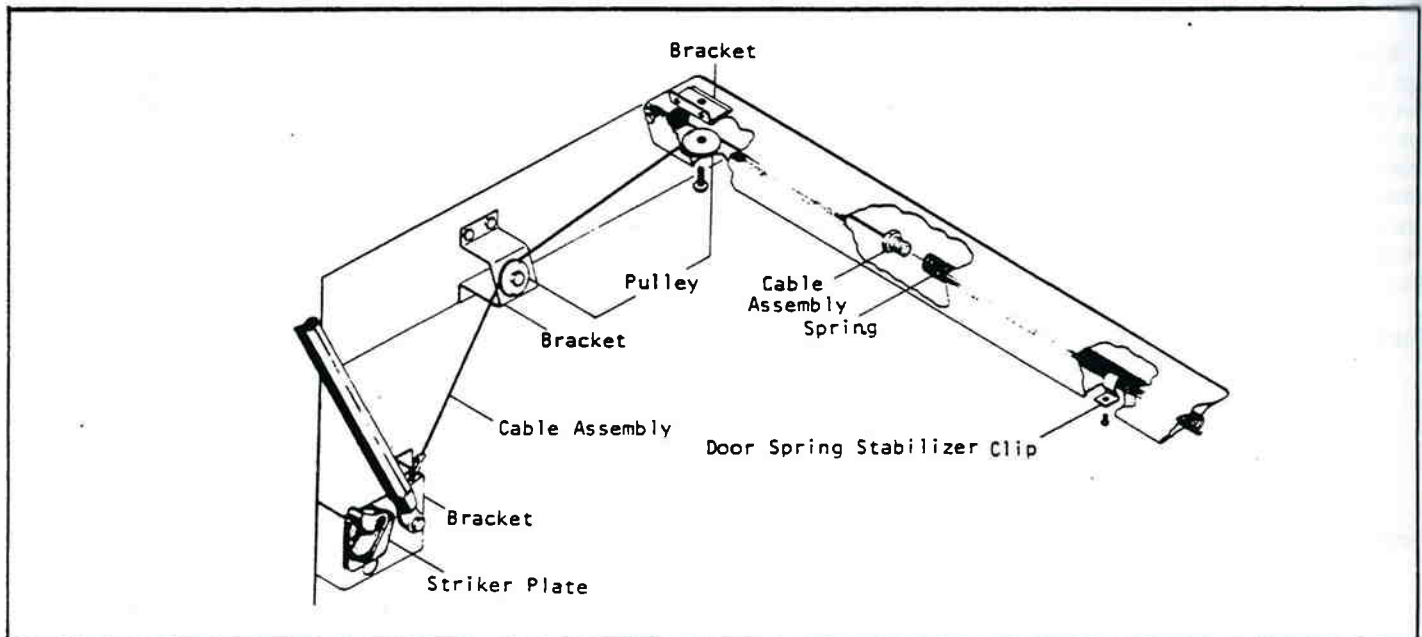


Figure 3-17. Baggage Door Opening Mechanism.

compartment. Loosen retaining capscrews and slide upper or lower catches to desired position and retighten.

2. Baggage door locks may be adjusted to provide an over-center lock. Remove cotter pin (on inside of operating latch—figure 3-16), retaining yoke pivot pin. Slide out yoke pivot pin. Loosen jam nut and turn threaded yoke to desired length.

3. Tighten jam nut and reverse procedure to reassemble.

## DOOR SPRING REMOVAL

1. Fully open baggage door and support it to prevent it from falling when cables are removed.

2. Remove the two clips under the seat mounting rail.

3. Using the cable pulling tool (20-46) and the method outlined previously under removal, remove the two clevis pins that secure the pulley cables to the hinge tubes.

4. Remove the pulley and bracket assemblies at the seat mounting rail.

5. Pull cable and spring assembly out of seat mounting rail.

**NOTE:** In order to facilitate installation of a new spring, attach a stiff wire to one of the cables and pull the spring out of the rail at the opposite end. When the new spring is attached to the cable, pull the wire completely through the seat mounting rail. This will draw the spring into position inside the rail.

## REASSEMBLY

1. Once the spring is in position inside the seat mounting rail, install the bracket and pulley assemblies.

2. Using the cable pulling tool and the procedure outlined previously, install the cables onto the hinge tube with the clevis pins.

3. Install the clips under the seat mounting rail. Before operating door, ensure that cables are aligned on pulleys.

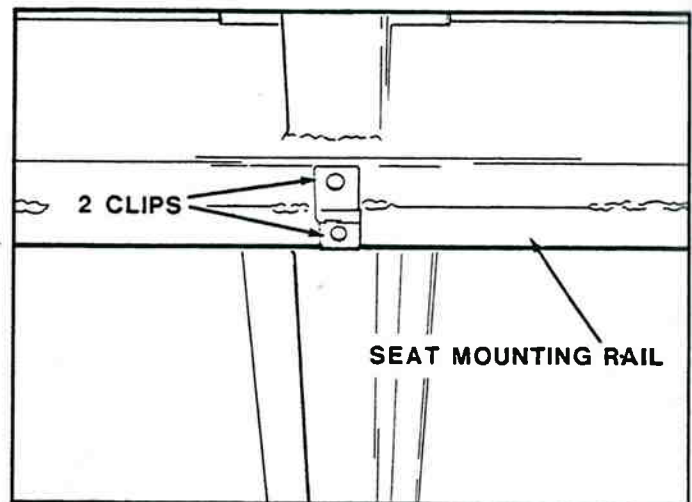


Figure 3-18. Clips Installed on Seat Mounting Rail.

## AIR OPERATED BAGGAGE DOOR LOCKING SYSTEM

An optional air operated baggage door locking system locks all six (6) baggage doors automatically with release of the parking brake.

To disengage the baggage door locking system, the parking brake must be applied, then a control button, located on the right hand portion of the dash directly below the entrance door air lock overrule valve, must be depressed. When the coach air system drops to approximately 60 PSI, the air operated baggage doors will lock and can only be released when the coach air pressure is returned to normal.

Separate restrictors are installed in air lines on each side in case of air line leakage on other side. In the event of total air loss to both air lines, an emergency air fill provision is located in L.H. front service compartment to permit operation of air cylinder to open baggage doors. Refer to figure 3-19.

1. Tubing-Accessory Air Tank to Emergency Fill Valve
2. Tubing-Accessory Air Tank to Door Valve Supply
3. Tubing-Door Valve Delivery Port to Door Cylinder Tee
4. Tubing-Door Valve Exhaust Port to Park Brake Valve
5. Tubing-Door Cylinder Tee to L.H. Interior Tee
6. Tubing-Door Cylinder Tee to R.H. Interior Tee
7. Tubing-R.H. Center Door Cylinder to Interior Tee; also L.H. Front Door Cylinder to Interior Tee
8. Tubing-L.H. Rear Door Cylinder to Interior Tee
9. Tubing-Interior Tee to Interior Tee (2 Places)
10. Tubing-L.H. Center Door Cylinder to Interior Tee; also R.H. Front Door Cylinder to Interior Tee
11. Tubing-R.H. Rear Door Cylinder to Interior Tee
12. Street Tee-1/8"NPT Brass
13. Reducer Coupling-1/4"Pipe X 1/8"Pipe Brass
14. Check Valve
15. Air Filter
16. Elbow-1/4" NPT Steel
17. Drop Elbow
18. Elbow-1/4"Tube X 1/8"NPT Brass
19. Reducer Bushing-1/4"NPT X 1/8"NPT Female
20. Valve
21. Plug-1/8"NPT Brass
22. Male Connector-1/4"Tube X 1/8" NPT Brass
23. Valve
24. Button
25. Restrictor Jet-.046 Orifice
26. Tee-1/4"NPT Brass
27. Street Tee-1/4" NPT Brass
28. Air Cylinder
29. Union Tee-1/4" Tube Brass
30. Plunger
31. Lockwasher-5/8"
32. Clamp-3/8"
33. Clamp-1/4"
34. Air Cylinder Mounting Bracket
35. Capscrew-1/4-20 UNC X 3/4"
36. Nut-1/4-20 UNC
37. Lockwasher-1/4"
38. Tapping Screw-#8-32 UNC X 1/2"
39. Machine Screw-#8-32 X 3/4"
40. Machine Screw-#8-32X1/2"
41. Hex Nut-#8-32 UNC
42. Lockwasher-#8
43. Reinforcing Hat Channel
44. Backing Washer
45. Nameplate-"Baggage Door Lock-Push to Open"
46. Nameplate-"Emergency Fill Valve-Door Locks"
47. Rivet-1/8"
48. Grommet-1/4" I.D. X 3/32" Groove
49. Tyrap
50. Loom-5/16" I.D.
51. Rivet-3/16" Stainless Steel
52. Lockwasher-1/4"
53. Flatwasher-1/4"

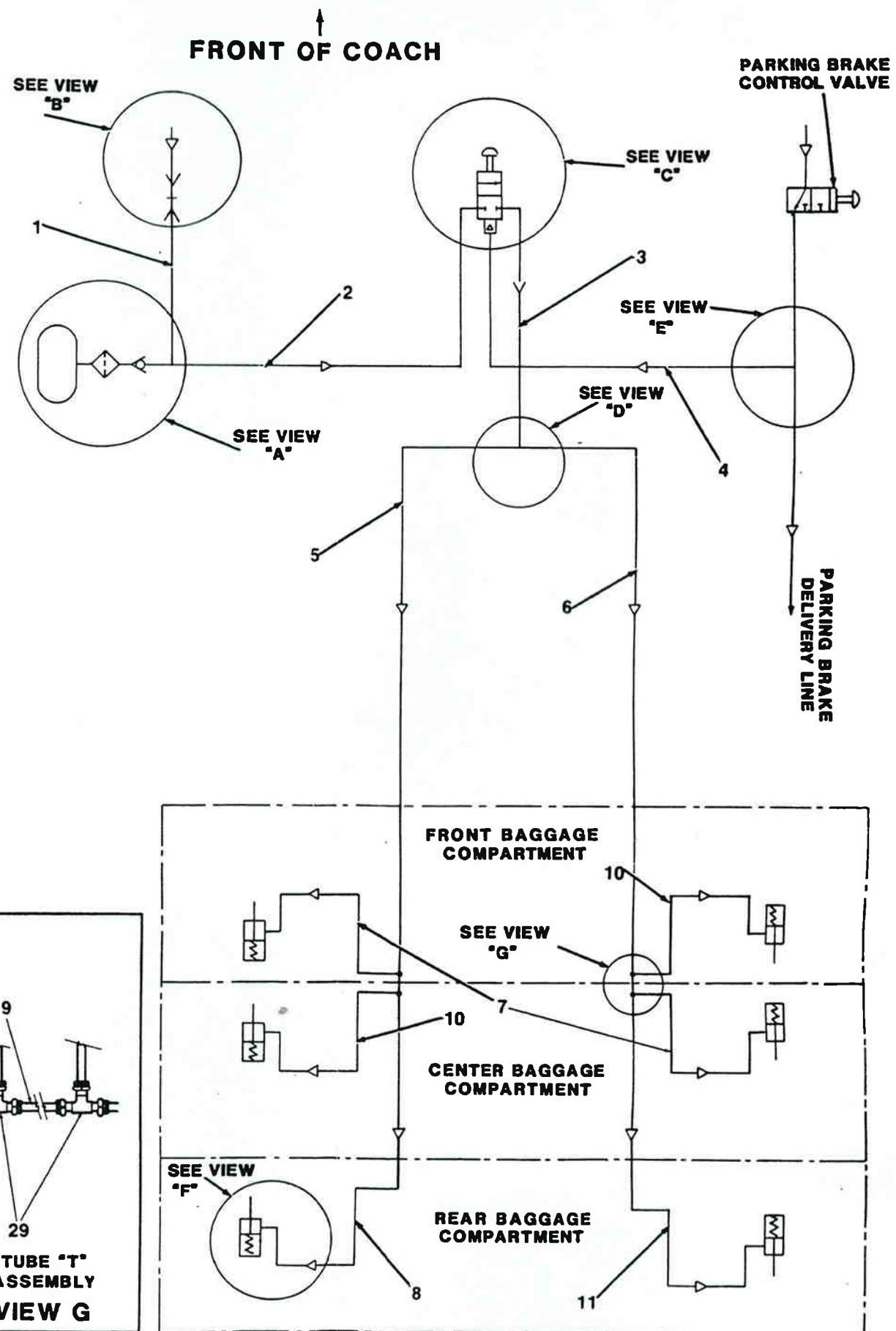
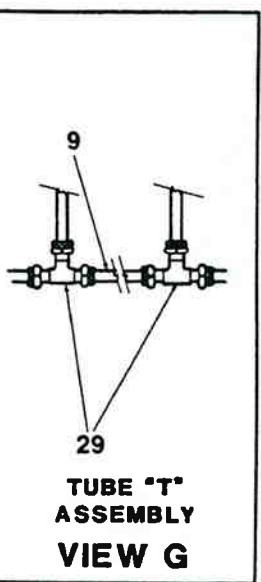
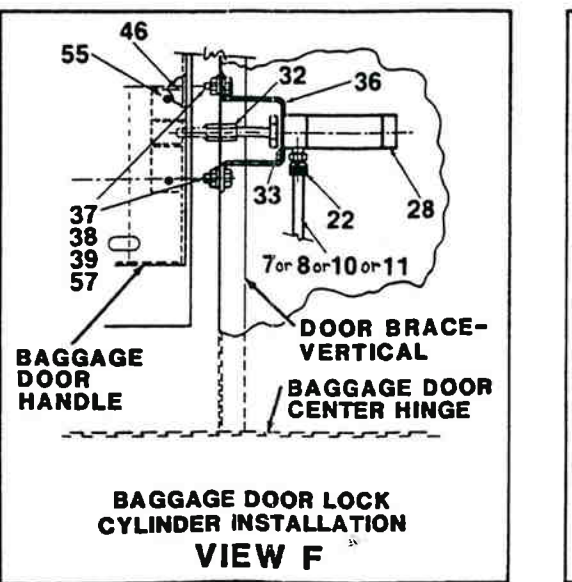
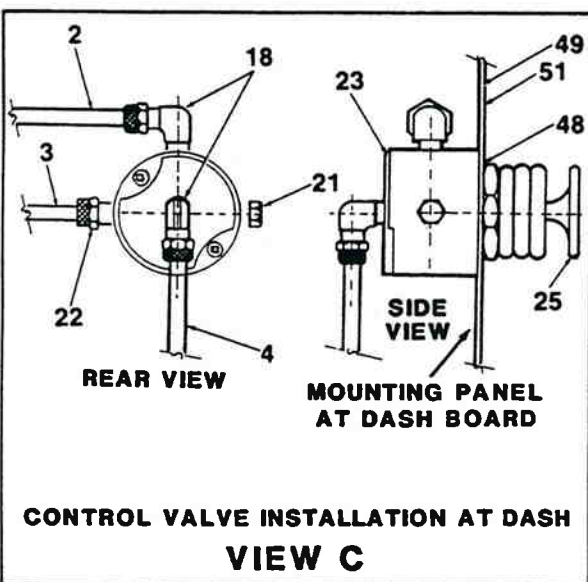
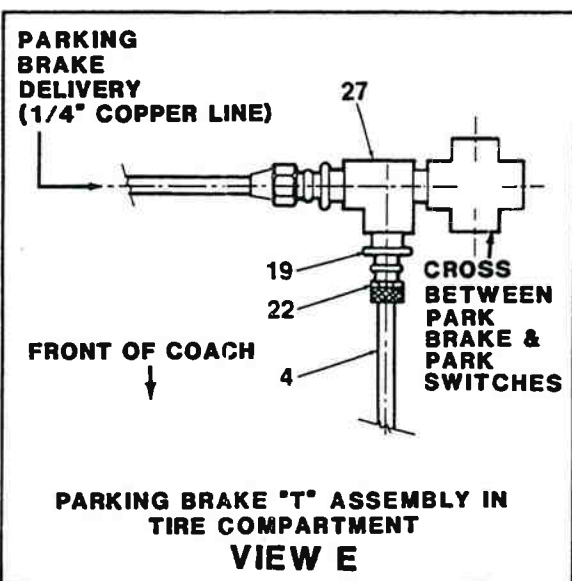
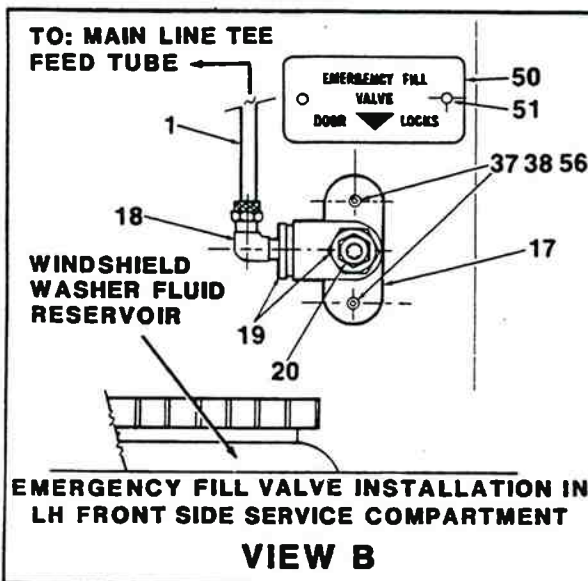
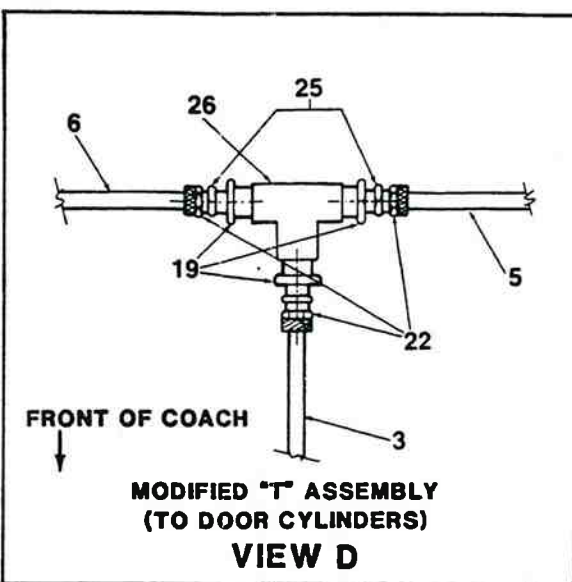
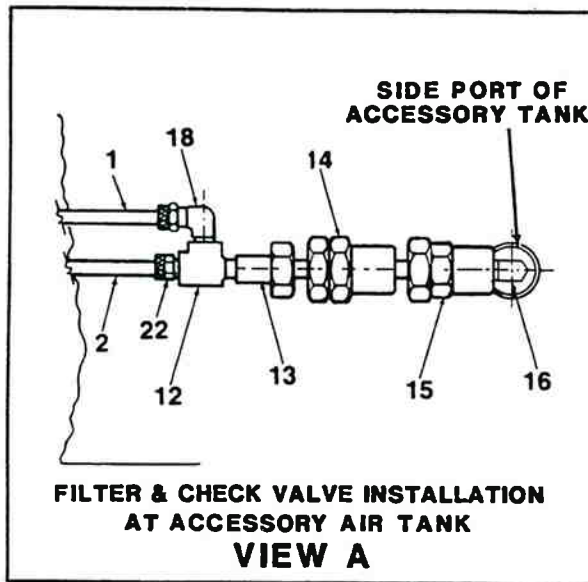


Figure 3-19. Air Operated Baggage Door Locking System.

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Figure 3-20. Emergency Escape Hatch.

## EMERGENCY ESCAPE HATCHES

Two emergency escape hatches are located in the roof, opening size approximately 18" x 25" (457 x 635 mm). To open in case of emergency, pull handle fully to unlock and push hatch open. See figure 3-20. To close, pull hatch down with handle in open position, then push handle to lock hatch.

For ventilation, the hatch may be partially opened as above, then held by engaging the spring and prop mechanism. From this position, upward pressure on the hatch will release spring engagement and allow hatch to be fully opened. If hatch is to be closed from a partially open position, the prop must be disengaged by either opening the hatch until prop is freed or by pivoting the prop arm out of the open end of spring.

## ADJUSTMENT

The emergency escape hatch in the roof can be checked and adjusted for correct hatch sealing as follows:

1. Open the emergency hatch and examine the surface of the rubber seal surrounding the hatch opening. An impression should be seen in the rubber where the sealing lip of the hatch has made contact. If the impression shows as a continuous unbroken line, the sealing is good and requires no adjustment.
2. If the line runs off the rubber across the forward edge, the hatch must be adjusted back toward the rear of the coach. This can be done by loosening the catch retaining bolts on both sides of the hatch opening and moving the catches back the required amount.
3. Close and then open the hatch to check the seal to determine if the hatch is centered; readjust if necessary. To obtain a clear impression of where the lip of the hatch contacts the rubber seal, it may help to chalk the edge of the lip.

**NOTE:** If additional forward or rearward adjustment is required, it may be necessary to remove the catches and elongate the slotted holes. If the line runs off the rear edge of the rubber seal when checking as above, the hatch must be adjusted forward.

## ENTRANCE DOOR

### DESCRIPTION

A manually operated, sedan type entrance door is provided ahead of the front axle on the right side of the coach. A handle on top of the dash convenient to the driver provides over-center control for both open and closed positions. Positive automatic air lock with overrule is also provided. The air lock is automatically actuated by a microswitch at the over-center position when door is closed. A plunger release with provision for padlock is provided at the front of coach.

The door is constructed of a welded stainless steel frame with a stainless steel beaded panel riveted on the outside. A vinyl-clad aluminum panel is used on the inside of the door with a stainless steel kick panel on lower portion. Stainless steel snap-on moldings cover all panel joints and the perimeter. A sturdy hinge casting is used at top and a powder-coated hinge casting with chrome self-aligning ball bearing is used at the bottom of the door. The sash is a one-piece, fixed type in a black anodized aluminum extruded frame with double glazing. Clear door opening is 30" (760 mm) wide x 84½" (2,150 mm) high.

The door is held in the closed position during coach operation by an air cylinder-operated locking mechanism. A single-acting air cylinder is used, having a return spring in the cylinder body. The air cylinder is controlled by an electrically operated valve which is energized by a microswitch located in the manual door control mechanism.

With the entrance door in the closed position, the microswitch is closed, energizing the air valve and loading the door lock cylinder. The cylinder moves the door lock in a position which engages a latch on the entrance door, holding the door positively closed.

To open the door, initial movement of the door operating handle opens the microswitch, de-energizing the air valve and venting the cylinder. The action of the return spring in the cylinder moves the door lock away from the latch. Further movement of the door control handle opens the door. Additional leverage is provided by an optional door control handle which is 1¼" longer than the standard handle.

An adjustment is provided at the microswitch in the event that this unit requires replacement. The microswitch is located under the dash directly beneath the door control handle. The correct adjustment is obtained when the microswitch contacts close as the door control mechanism begins to pass center during closing of the door.

An overrule switch, which opens the air valve circuit regardless of the position of the microswitch, is provided under the dash at the operator's position. This is designed for use in emergencies or when the door control system does not function properly.

### ADJUSTMENTS

Provisions are made for the height adjustment of the entrance door by means of a threaded shaft on the upper hinge



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arm. Locate the adjusting nuts behind the upper hinge cover. Loosen the upper jam nut. Rotate the lower nut either up or down, depending on the desired door movement. Once the adjustment is completed, tighten the top jam nut.

If the entrance door bottoms out, a second adjustment may be made at the lower hinge arm. Two screws are located at the slotted holes on the lower hinge arm. To lower the door further, loosen the screws, lower the door the necessary amount, and tighten the screws.

**CONTROL ROD** — The entrance door control rod may be adjusted with a lock type turnbuckle. Turnbuckle is accessible by an access door at the top right hand side of dash. Tighten nuts after desired adjustment is obtained.

If further adjustments are necessary, remove target panel at front below windshields, the jam nut at uniball end can be loosened and adjustments can be made by turning uniball end in or out as required. To retighten jam nut, it may be necessary to use a vise grip or a pipe wrench to hold control rod from turning.

**CAUTION: Control rod bend at uniball end must point toward rear of coach when adjustment is completed.**

**CONTROL HANDLE** — The open-lock and closed-lock positions can be adjusted. Viewing linkage from underside of dash, proceed as follows:

1. Loosen jam nuts on stop screws protruding from the control handle lever.
2. Turn stop screws in or out to desired setting.
3. Tighten jam nut and check adjustment by moving control handle from open lock to closed-lock positions. Properly adjusted mechanism will swing over center and lock door firmly in both fully-open or closed positions.

**MICROSWITCH** — This can be adjusted if it does not energize or de-energize at correct times. The mounting bracket of the switch has slotted holes allowing it to be moved backward or forward. By loosening the mounting bolts, the bracket and switch can be set to a position where it will energize at correct position of lever and entrance door.

**CAUTION: Switch must energize when entrance door is fully closed. If switch is set too far forward, it would energize and actuate the solenoid valve, which in turn controls the air cylinder, before the door is fully closed. If switch is set too far back, it would not be actuated and the door would not lock.**

## DOOR CONTROL SOLENOID

The door control solenoid located in the spare tire compartment controls the air supply to the door lock cylinder.



Figure 3-21. Entrance Door Solenoid Valve Installed.

### DISASSEMBLY

1. Refer to figure 3-21. Shut off pressure to the valve and disconnect wiring harness.
2. Remove nut at top of coil cover. Cap, coil housing and coil can then be removed from body.
3. Unscrew the sleeve assembly from the body (figure 3-22).

**CAUTION: Do not use a pipe wrench, as a wrench may crush the sleeve assembly and make the valve inoperative.**

### REPAIR

1. If the solenoid has failed to operate, the coil should be checked to make sure it is not shorted or open.
2. Occasionally valves may leak at the flange seal. Such a leak may damage the coil. A flange leak may be corrected by tightening the sleeve assembly into the valve body and/or replacing the seal.
3. If the valve leaks at the seat, or the plunger sticks in the energized position, examine the soft inserts in the plunger and the inside of the sleeve assembly for the presence of excessive dirt or wear. If the inserts show considerable wear, the plunger should be replaced.
4. If the solenoid develops a loud buzzing noise, examine the inside of the sleeve assembly and upper portion of the plunger. Remove all foreign matter imbedded in these parts.
5. If the valve leaks internally, examine the piston insert for excessive wear. Also inspect main exhaust orifice for dirt accumulation, scratches and nicks. Replace parts as necessary.
6. If the valve is sluggish during operation, check for dirt accumulation or wear on both piston and piston bore. The piston should slide freely into the piston bore without binding. Inspect and clean all passageways of dirt.

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### REASSEMBLY

1. Reassemble the valve by following the disassembly procedure in reverse order. Make sure the seal at the flange end of the assembly and the return spring are in place when the sleeve is screwed into the body.

2. After screwing the flange into the body and before assembling the coil to the valve, it is advisable to apply air pressure to the part which leads to the body chamber and check for leak-

age around the flange. If the valve has a sleeve port, this port at the top of the valve must be capped to make this test. If the medium is air or gas, leakage can be noted by applying water to the joint and watching for air bubbles. If the medium is liquid, leakage is readily apparent.

**CAUTION: Do not excessively tighten the nut at the top of the coil housing, since doing so will put undue strain on the sleeve assembly.**

## ENTRANCE DOOR AIR CYLINDER

### DESCRIPTION

The entrance door air cylinder is a single-acting type which holds the door in the closed and locked position during coach operation.

### MAINTENANCE

It is recommended that the entrance door air cylinder be lubricated at regular intervals, approximately every 30,000 miles (48,000 km). The recommended procedure is as follows: Remove air feed hose and put in a few drops of SAE-30 engine oil into the cylinder through air hose connector. Reconnect the feed hose, reverse the air supply to the cylinder; this will lubricate the other end of the cylinder. Check air cylinder for leaks. It should also be noted that when overhauling air cylinder, it is important to replace all seals, felts, cups and O-rings with new parts for proper operation. Also, when overhauling air cylinder the new parts should be coated with SAE-30 oil before assembly.

### ADJUSTMENT

The entrance door air cylinder can be adjusted to provide close fitting of door. If door vibrates or is not locked firmly in position, make adjustments in the following manner.

1. Remove panel on rear wall of stepwell to gain access to air cylinder.
2. Remove cotter pin and yoke pivot pin to free yoke at anchor end of air cylinder.
3. Loosen jam nut and turn yoke to lengthen or shorten stroke of piston rod as necessary.
4. Tighten jam nut and reassemble.

Further adjustments can be made to provide a closer fit between latch nose and latch pad. Slotted holes are provided in the latch nose mounting for this purpose. To adjust, loosen the mounting bolts and set latch nose at the desired position. Retighten bolts.

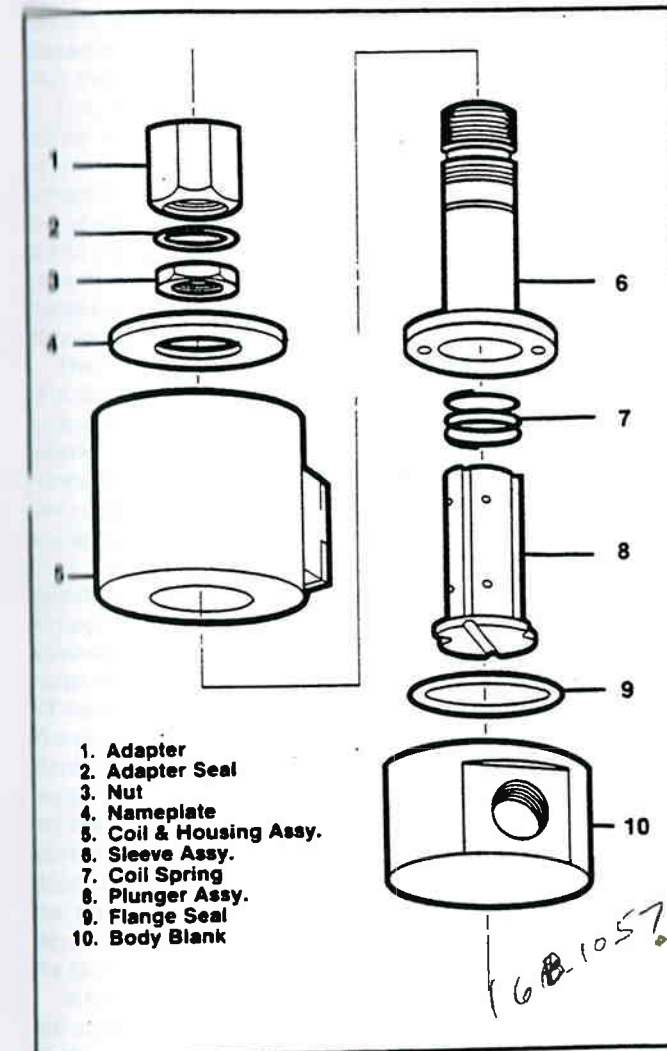


Figure 3-22. Entrance Door Solenoid.

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## BI-PARTING ENTRANCE DOOR

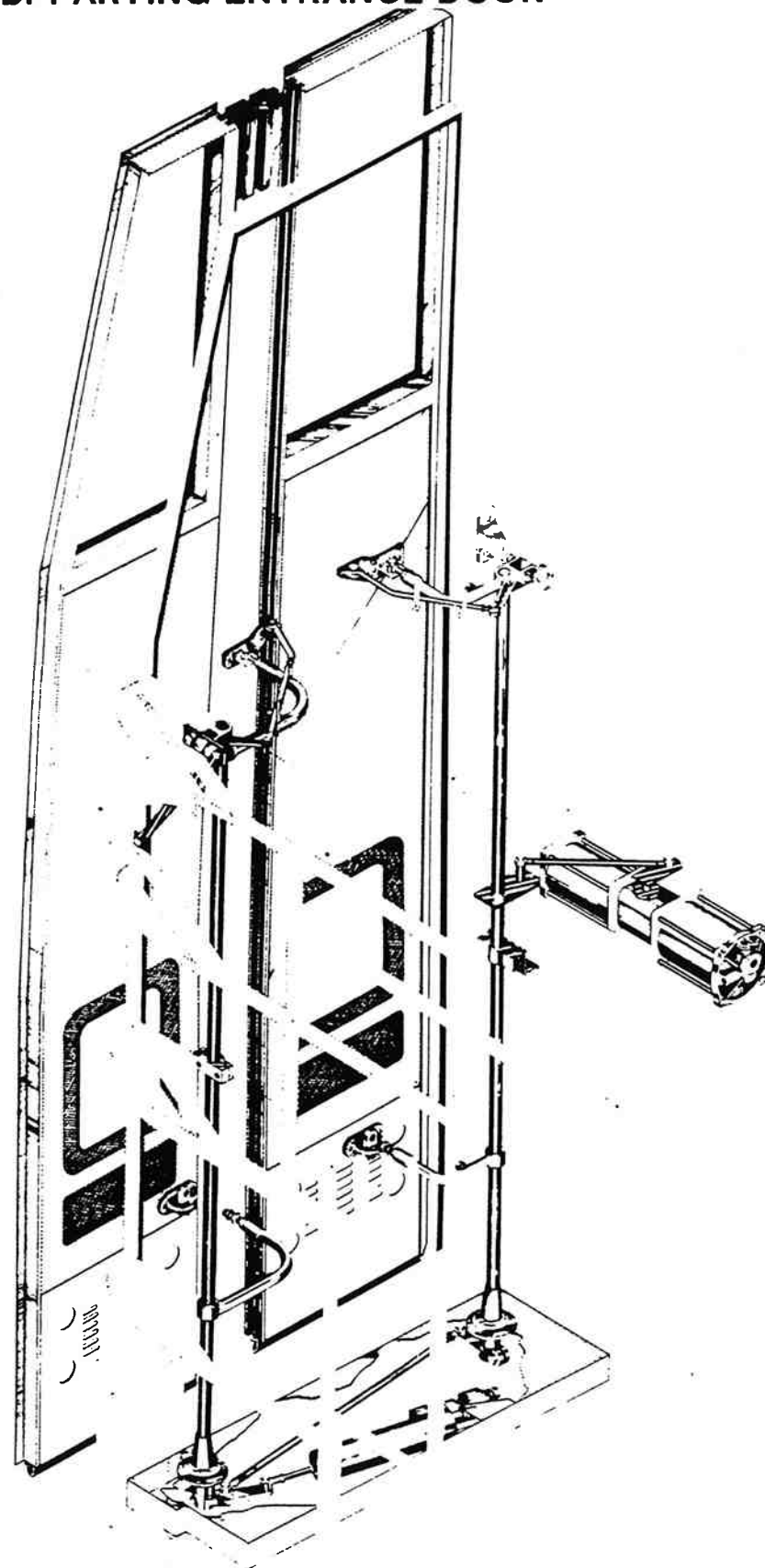


Figure 3-23. Bi-Parting Door And Linkage.

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## MCI BI-PARTING ENTRANCE DOOR (OPTION) AND CONTROL MECHANISM

### DESCRIPTION

The Bi-Parting Entrance door is an air power operated, two-piece, outward opening type door. Clear opening of the entrance door is 24 inches by 83 inches (609.6 by 2108 mm). Meeting edges of the door panels are provided with flexible rubber cushions, 2 inches (51 mm) wide for passenger protection. Door panels are double glazed at the top with single-strength tempered safety glass. Lower windows are single glazed with Lucite panels. The front panel has an exhaust outlet near the bottom on the interior side.

The door panels and operating shafts are mechanically linked to a master air-operated cylinder. The master air-operating cylinder is a geared-differential, air-operated device consisting of two horizontally opposed cylinders of different diameters. A rack gear connects the pistons which operate within the cylinders. The rack meshes with a gear which converts the straight line motion of the pistons into rotary motion necessary for operation of the linkage and door shaft assemblies.

The master cylinder is designed to operate at 60 to 120 PSI (414-828 kPa) air pressure. During normal operation, air pressure is continually applied to both cylinders — directly to the smaller "opening" cylinder from the reservoir, and from the normally open solenoid valve to the larger or "closing" cylinder. Door operating pictorial and air system schematic diagrams are found at the end of this writeup.

In the door-opening process, air pressure to the large cylinder is shut off and permitted to bleed off at a controlled rate through adjusting ports back through the exhaust port in the solenoid valve. At a predetermined point in the opening cycle, horizontal movement of the rack-and-piston assembly closes off the primary air exhaust port by action of the seal cushion. The greater pressure in the smaller cylinder causes the movement of the piston in the large cylinder to compress the remaining air which is bleeding off more slowly through the cushioning speed port. This compressing action provides the means of controlling the opening action of the doors, thus preventing the door panels from slamming open. As the doors are fully opened, the remaining air pressure in the large cylinder is slowly depleted through the cushioning speed port and out through the solenoid valve exhaust port.

In the door-closing process, air pressure is admitted through the opening-speed port cavity which was sealed by the seal cushion. With the aid of the compression spring, the cavity is soon opened and the main area of the large cylinder begins to fill with air. Due to the larger piston area in the opening cylinder, the net force difference causes the rack to move in the closing direction, thus closing the doors.

The rear panel and shaft is the driving medium for the front panel and shaft. The front panel is controlled by the movement of the rear shaft through a linkage bar below the lower step. A push-pull slave cylinder is connected to the front panel shaft to provide the necessary force to tightly close the front panel. When the door opens the slave cylinder quickly exhausts and the master and slave cylinders pull both panels to the open position.

### DRIVER'S SWITCH

This is a toggle switch with legend plate, located to left of driver's position, on top forward face of switch panel. This switch is provided for normal opening and closing of the door by the operator while within the coach.

### EXTERIOR SWITCH

The door is opened or closed from the exterior of the coach by means of a momentary-type toggle switch. The switch must be held in the desired position until the door has completed its movement. A legend plate is attached just under the switch.

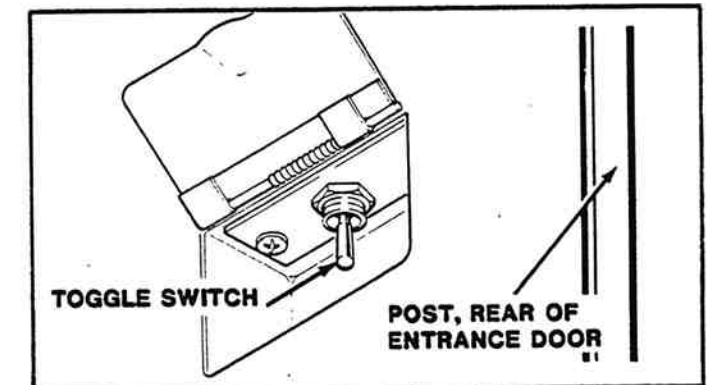


Figure 3-24. External Entrance Door Switch Control.

The switch is located in a pocket in the exterior body panel below the #1 RH passenger window and to the rear of the entrance door. The pocket has a spring-loaded cover which conceals and protects the switch (figure 3-24).

### MANUAL AIR DUMP

If the electrical circuit to the solenoid valve fails while the operator is inside the vehicle, a hand operated air valve is provided, which allows exhausting of all air from the door operating cylinder (figure 3-25). With the air exhausted, the door panels can be manually pushed to the open position. The air dump valve is located to the right of driver's position and below the dash panel. This valve can be identified by a legend plate with instructions for use, and is further identified by a lever with a small red knob.

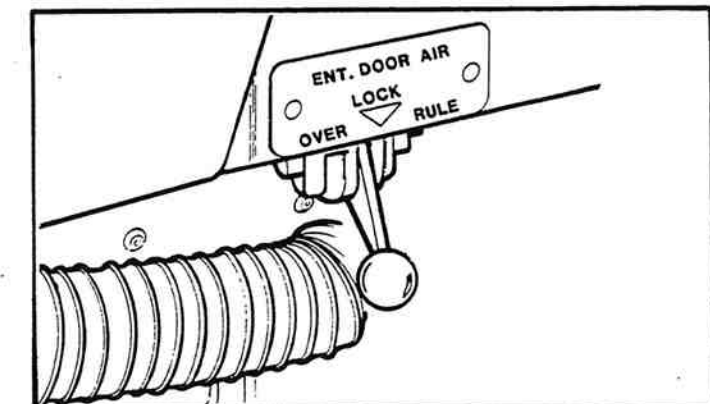


Figure 3-25. Air Dump Valve.



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In the event that an electrical malfunction occurs while the operator is outside the vehicle, the above dump valve can also be controlled from outside the vehicle. A push-pull control cable is located in the left front electrical junction box (figure 3-26).

The control cable can be reached by opening the exterior junction box access door. By pulling the black knob to full out position, the air dump valve described above is actuated to the exhaust position. The door panels can then be manually pulled to the open position from outside the vehicle.

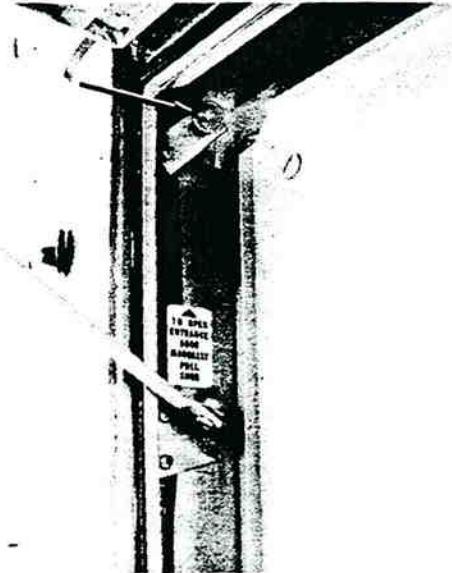


Figure 3-26. External Push-Pull Air Dump Valve Control.

## STEPLIGHT - PRESSURE SWITCH

Automatic actuation of the steplight is provided by means of a pressure-type switch in the door control air system. The pressure switch is installed in the air line to the slave cylinder.

With the steplight and chime switch in the "on" position, and with door in open position, air pressure is exhausted out of the slave cylinder line. The loss of pressure energizes the switch and illuminates the steplight. Conversely, when the door is in closed position, air pressure is present in the slave cylinder line and the pressure switch "breaks" to put the steplight off.

In the open position, the steplight pressure switch can be overruled to turn the steplight off by selecting "off" position with the steplight and chime switch.

## ADJUSTMENT PROCEDURES

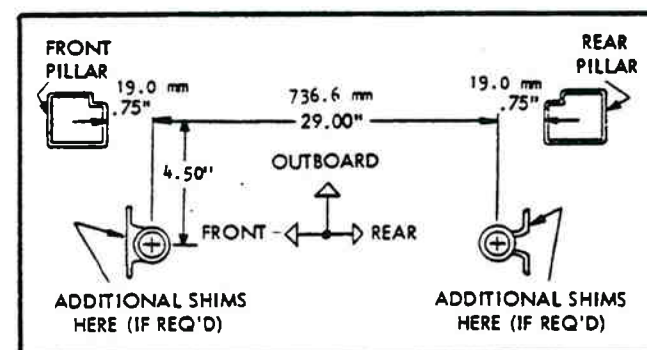


Figure 3-27. Adjustment of Upper Brackets.

1. Refer to figure 3-27. Check fore and aft dimension between shaft centers. Centers should measure 29.00 in. (736.6 mm). If centers are less than 29.00 in. (736.6 mm), remove shims between brackets and spacers.

**NOTE: Always shim both brackets equally to keep shafts centered in door opening.**

2. Conversely, if the center distance between brackets is greater than 29.00 in. (736.6 mm) in addition to the standard spacer, a shim pack of the correct thickness should be added. Insure that both brackets are shimmed equally.

## INSTALLING REAR SHAFT ASSEMBLY

1. Place bottom of rear shaft assembly through bore of lower rear bearing assembly until upper pin of shaft can be inserted through bottom of spherical bearing in upper bracket.
2. Lift shaft until shoulder seats on bottom of spherical bearing.
3. Install self-locking nut on top of shaft.

## INSTALLING FRONT SHAFT ASSEMBLY

Follow same procedure for installation for front shaft as for rear shaft, above.

## INSTALLATION - SHAFT BEARING BLOCKS

1. Select a matched set of reamed bearing blocks. Position base block between shaft and mounting bracket. Shim between base block and bracket as required.

2. Position cap block over shaft and align mounting holes. Install cap screws with lockwashers and nuts on rear of brackets.

This procedure is the same for both the front and rear shafts.

## INSTALLATION - BOTTOM LINKAGE

1. Tighten all lower bearing mounting nuts below bottom step.
2. Slide bearing locking collar up shaft into contact with bearing.
3. Rotate collar until tight.
4. Tighten set screw in locking collar.
5. Install woodruff keys in keyseats on shafts.
6. On rear shaft, align keyway in lever arm, with key in shaft and slide arm up shaft until approximately  $\frac{1}{16}$  inch (1.5 mm) of shaft protrudes through bottom of arm. Tighten cap screws in lever arm to lock arm on shaft.

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7. For front shaft, follow same procedure using lever arm.

8. When installing linkage rod, insure that center-to-center of rod eyes is 28  $\frac{1}{4}$  inches (733.4 mm). Install rod assembly between rear shaft lever arm and inner hole of front shaft lever arm. Install with capscrews and self-locking nuts on bottom end.

**NOTE: Do not install capscrews from bottom up.**

9. Install capscrew through rod eye of slave air cylinder and outer hole of front lever arm.

## INSTALLING AIR-OPERATED CYLINDER LINKAGE

1. Measure linkage rod assembly to insure that center-to-center of rod eyes is 9  $\frac{1}{4}$  inches (235 mm). Install rod assembly with lubrication fittings facing stepwell.
2. Install flatwasher and capscrew in top of lever arm stud at cylinder.
3. Install self-locking nut on stud of shaft lever arm.

## ADJUSTING SHAFT BUMPER STOPS

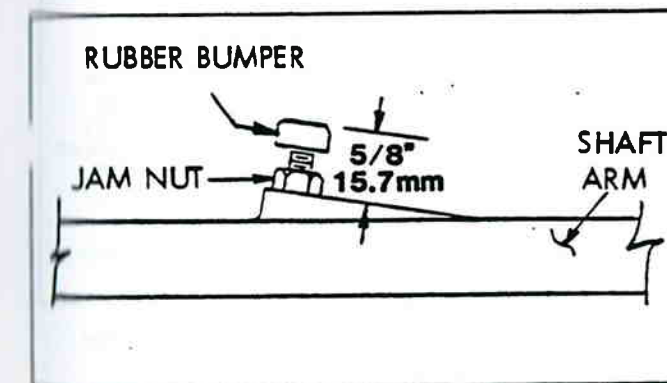


Figure 3-28. Adjustment - Shaft Bumper Stops.

1. Refer to figure 3-28. Adjust rubber bumper stops on both shafts to  $\frac{1}{8}$  inches (15.9 mm). Tighten jam nuts.
2. Manually move shafts and linkage through full travel. Check for smooth movement without any binding. Action should be stiff but not excessively hard to move manually.

## SHAFT SOCKET ASSEMBLIES ADJUSTMENT

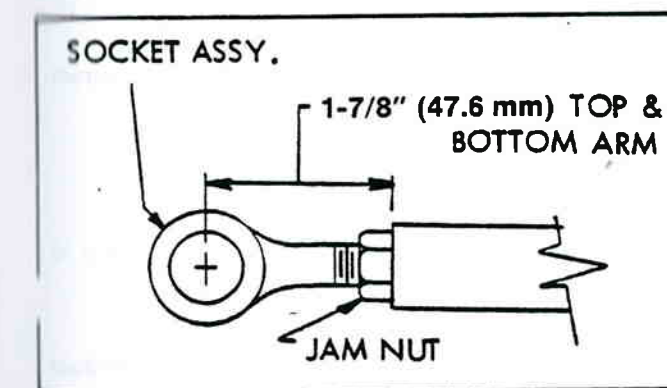


Figure 3-29. Adjustment - Shaft Socket Assemblies.

Adjust socket assemblies on shaft arm ends to dimensions shown in figure 3-29.

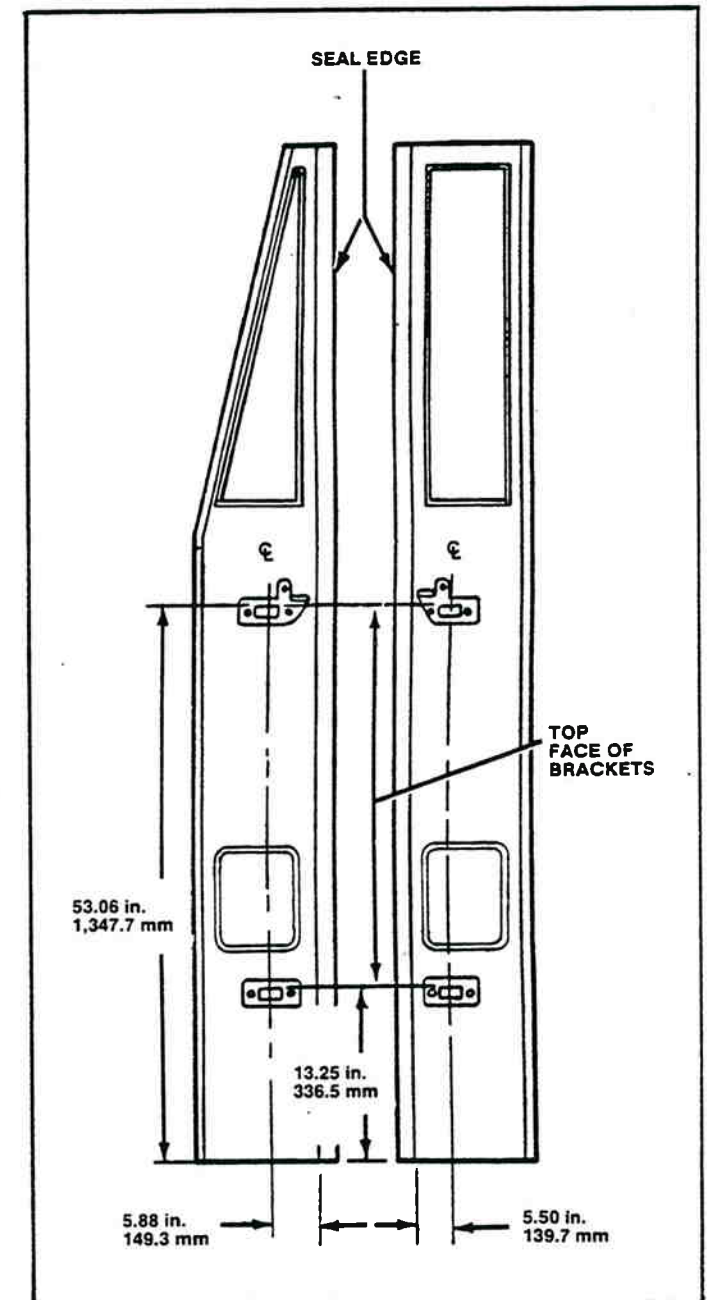


Figure 3-30. Installation - Door Panels.

## INSTALLATION OF DOOR PANELS

1. Check position of upper and lower hanger brackets on each door section. Insure that brackets are positioned in accordance with dimensions shown in figure 3-30.



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2. Position each door panel on shaft arms with tapered stud of socket assembly through hole in upper and lower door-mounting brackets.

3. Install castellated nuts on bottom end of tapered stud. Install cotter pins in stud ends.

## INSTALLATION OF CONTROL ARMS

1. Measure rear door control arm to insure that center-to-center of rod eyes is  $11\frac{1}{16}$  inches (293.7 mm) measured in a straight line, eye to eye.

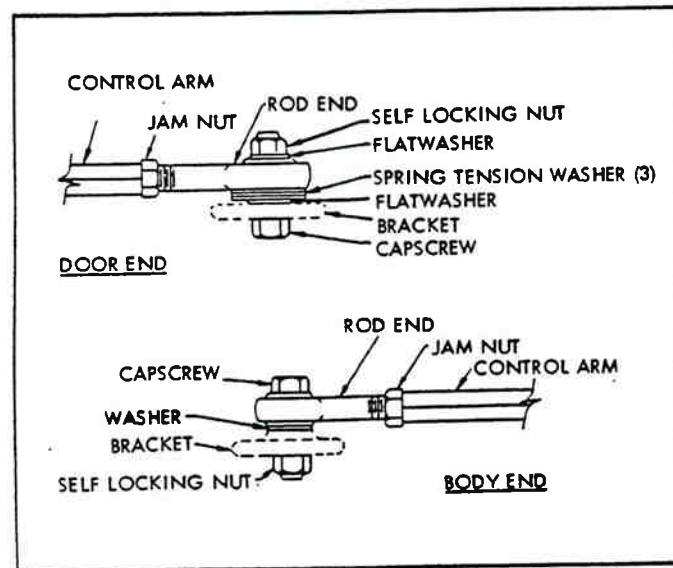


Figure 3-31. Installation-Control Arms.

2. Install rod assembly with bend to rear of coach. Both ends of rod are to be installed as shown in figure 3-31.

3. Measure front door control arm to insure that center-to-center of rod eyes is  $12\frac{1}{16}$  inches (305.2 mm) measured in a straight line, eye to eye. Install rod assembly with bend to front of coach. Both ends of rod are to be installed as shown.

## DOOR OPERATION CHECK

1. Move both door panels manually through full open and closed positions. Check for interference between front door panel and body panels, RH exterior rear view mirror, corner bumper, etc.

2. Move door panels to closed position. Check for door to body clearances.

3. Place battery switch in ON position. Place manual air valve at driver's position to air on position.

4. Check both the interior and exterior operator's door control switch to cycle door from both positions.

**NOTE: To check door operation, coach air system should have a minimum of 85 PSI (586 kPa).**

5. With air on and door closed, check for the following:
  - a. A proper seal takes place between both door panels.
  - b. Clearance between doors and body should be  $\frac{1}{4}$  inch (6.35 mm) minimum from top to bottom. At top of doors, clearance should be  $\frac{1}{8}$  inch (3.17 mm). If these clearances are not correct, refer to Final Adjustments for corrective procedure.
  - c. Inner feather body seal fits snug to sides and top of doors.
  - d. Check contour of doors with contour of body. Door panels should follow contour of body from top to bottom, and be parallel with vertical door opening.
  - e. Control arms should be loose (no pressure) when door is closed.
6. With air on and door open, check for conformance to dimensions as shown in figure 3-32.

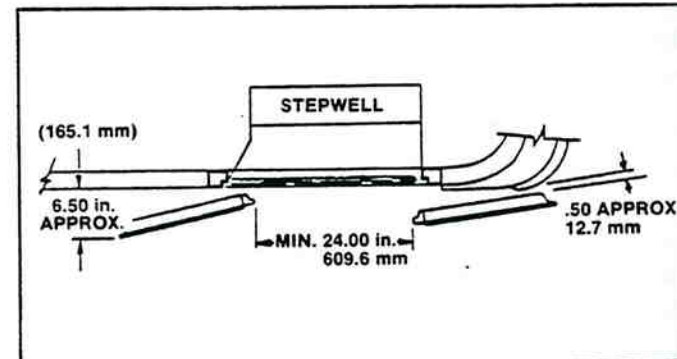


Figure 3-32. Door Open Dimensions.

## FINAL ADJUSTMENTS

1. If further adjustments are required to door panels, refer to the following procedures:

### Door panel too high or too low.

- a. Loosen capscrews in both upper and lower hanger brackets.
- b. Move door panel up or down as required.
- c. Tighten capscrew in brackets.

### Door panel on angle.

- a. Loosen capscrews in top or bottom bracket.
- b. Move door panel in direction required to correct clearance between door and body.
- c. Tighten capscrew in brackets.

### Rear panel angle incorrect.

- a. Remove one end of rear control arm.
- b. Loosen jam nut on rod end.
- c. Turn rod end out to increase angle. Turn in to decrease angle.
- d. Tighten jam nut.

### Front panel angle incorrect.

Same procedure as for rear panel. Also, check for door to mirror arm clearance and minimum opening dimension.

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## Door control arms binding.

The center of the door control arms should be free to move up and down slightly with the doors fully closed. If any are tight, release air from the door system with the air dump valve next to the driver's area, disconnect one rod end on the end of the tight arm(s), close doors manually, and reapply air. Note that doors should be in the closed position during this adjustment. Adjust rod end until it can be easily reinstalled. Replace and tighten nut.

If further adjustments are required to the shafts and control linkages, refer to the following procedures:

### Insufficient travel of rear shaft and arm.

- a. Loosen jam nuts on master cylinder linkage rod.
- b. Turn rod required number of turns to increase length of rod.
- c. Tighten jam nuts.

### Too much travel of rear shaft and arm.

- a. Loosen jam nuts on master cylinder linkage rod.
- b. Turn rod required number of turns to decrease length of rod.
- c. Tighten jam nuts.

### Insufficient travel of front shaft and arm.

- a. Loosen jam nuts on bottom linkage rod below stepwell.
- b. Turn rod required number of turns to decrease length of rod.
- c. Tighten jam nuts.

### Too much travel of front shaft and arm.

- a. Loosen jam nuts on bottom linkage rod below stepwell.
- b. Turn rod required number of turns to increase length of rod.
- c. Tighten jam nuts.

### Insufficient inward pressure of door to seals.

- a. Remove door panel assembly from shaft arms.
- b. Loosen jam nuts on socket assembly.
- c. Turn socket assembly in to increase pressure.

### Too much inward pressure of door to seals.

- a. Remove door panel assembly from shaft arms.
- b. Loosen jam nuts on socket assembly.
- c. Turn socket out to decrease pressure.

## ADJUSTMENT OF MASTER AIR CYLINDER

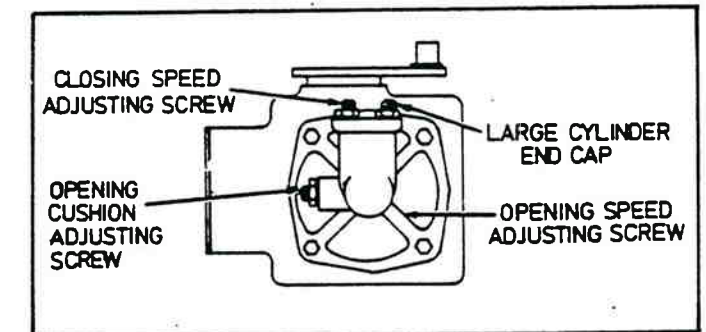


Figure 3-33. Master Air Cylinder Adjusting Screws.

The door master cylinder has factory pre-set adjustment for proper opening, closing and cushioning speeds. However, if adjustments are required, the following procedure should be followed. Refer to figure 3-33.

1. To increase the door-closing speed, loosen the locknut which secures the closing-speed adjusting screw and turn the screw outward. To decrease the closing speed, turn the screw inward. Be sure to tighten the locknut to maintain the adjustment.

2. To increase the door-opening speed, loosen the locknut which secures the opening-speed adjusting screw and turn the screw outward. To decrease the speed, turn the screw inward. Tighten the locknut to maintain adjustment.

3. To adjust the cushioning during the opening cycle, loosen the locknut and carefully adjust the opening cushion screw. Be sure to tighten the locknut after making adjustment.

**NOTE: When making adjustments, always adjust the closing speed first since this adjustment also affects the door-opening speed.**

**CAUTION: Never force adjusting screws when adjusting in a clockwise direction. Excessive tightening pressure will damage orifices in cylinder and cap.**



# MC-9 MAINTENANCE MANUAL

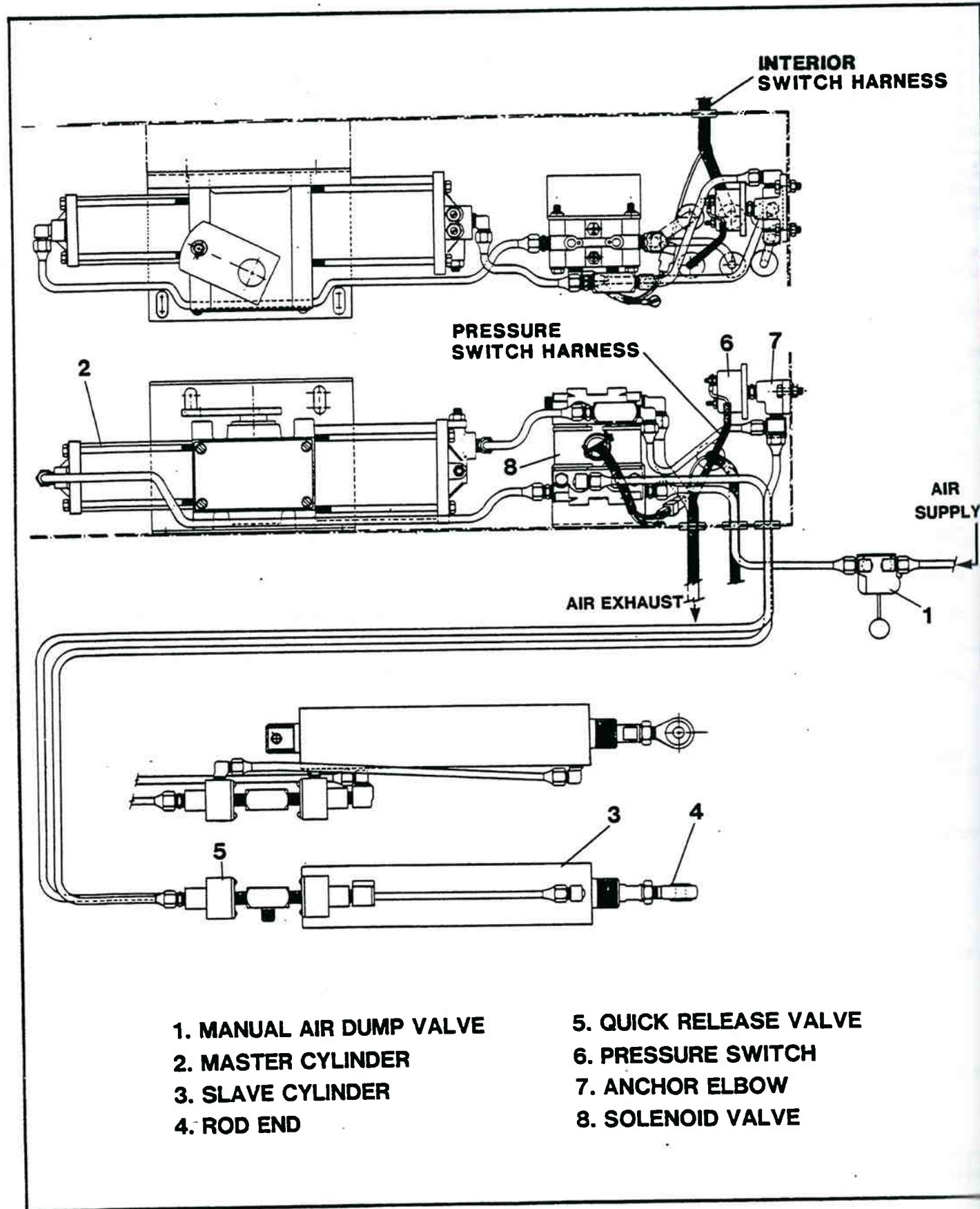


Figure 3-34. Bi-Part Door Master Air Cylinder Layout.

# MC-9 MAINTENANCE MANUAL

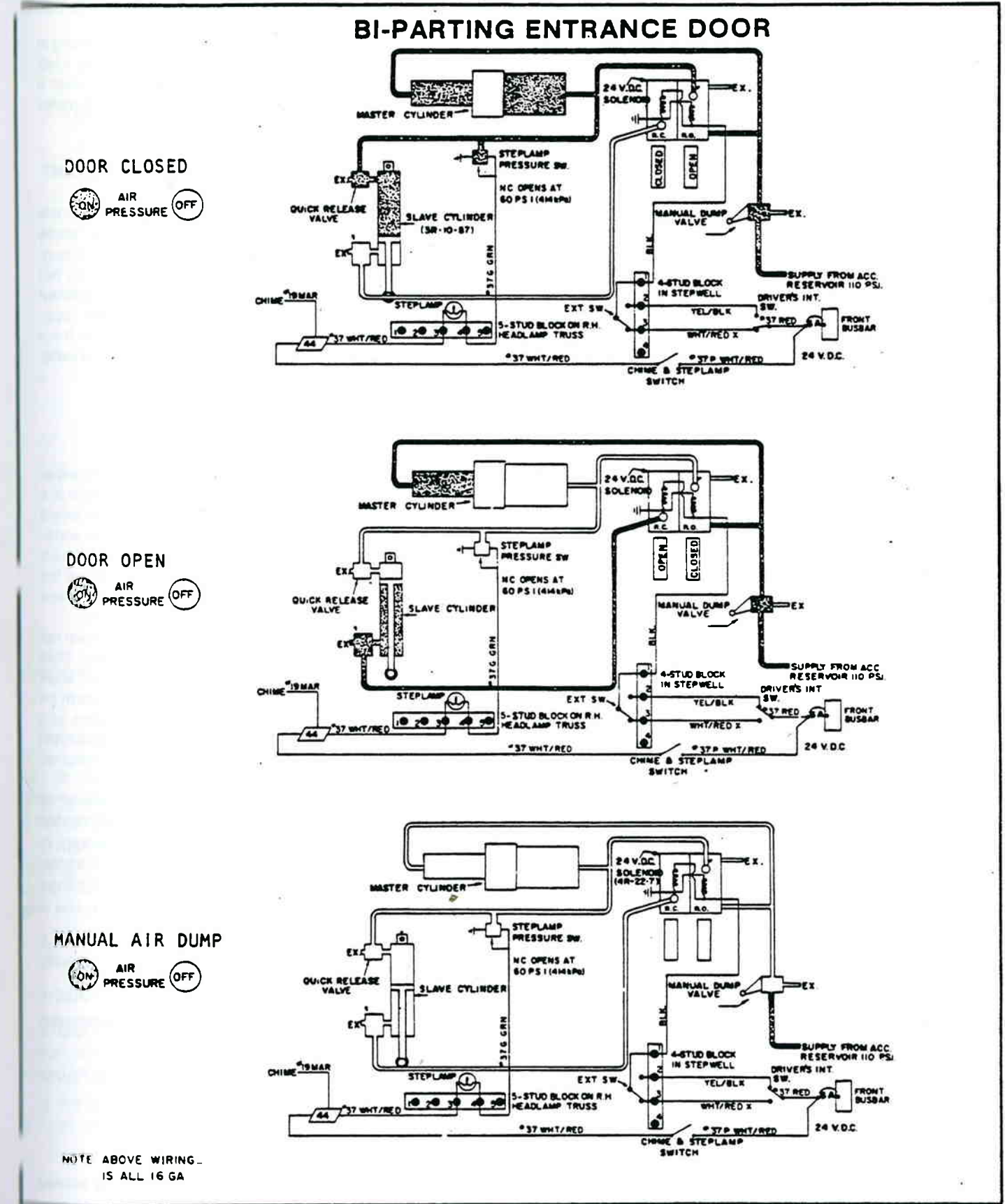


Figure 3-35. Bi-Parting Door Air System.

# MC-9 MAINTENANCE MANUAL

## WINDSHIELD WIPERS

Two heavy duty air operated "Air Push II" windshield wipers are installed, one for each windshield. Individual control valves with built-in air pressure regulators are provided on the front dash. Regulators provide constant speed as adjusted by the control valve. Air pressure variations do not affect wiper action. Wiper motors are removable from the exterior of the coach. Each motor incorporates a 2" (51 mm) diameter piston and a 5/8" (16 mm) diameter drive shaft. Wipers are "self parking" pantograph with 20" (508 mm) flexible wiper blades.

## MAINTENANCE

Wiper motor, control valves require no periodic maintenance between overhaul. At overhaul, the windshield wiper motors and wipers should be disassembled, cleaned and lubricated with Sprague Wiper Lube. The following guidelines are to be used on new or rebuilt wiper motors to increase service life.

A. One of the best preventive actions is not to let the wiper system sit too long without operation. Wiper systems should run every other day, if only for a few cycles. This action will keep the lubricant and O-rings movable and less likely to "take a set." This is very important on older vehicles or systems which pass along a large amount of air line contamination. Contaminants tend to thin lubricant and wash it from the motor valve. It can be strong enough to attack O-rings, causing swelling and deterioration.

B. If the system has seen heavy usage or is an older unit, it is recommended that it be removed and updated with new O-rings and fresh lubricant. Additional lubricants can be used as a preventive maintenance or as a field fix for sticky units. If O-rings are not damaged and the motor is not frozen, lubricant injected in the air lines will keep a motor running. We recommend that 1/2 ounce be injected into each motor at a location as close to the motor valve as possible. Allow motor to run 15 minutes (remove arm or place a rag under blade) to work through the valve.

Lubricating in this manner every six months is sufficient. Where heavy contamination is present, more frequent applications may be required. We recommend using Sprague Wiper Lube, part number Y-143. Do not use any type of penetrating fluid or oil. While these will free a motor, they will break down lubricants in the motor and attack O-rings. Only under emergency situations should these be used and should be followed by the addition of lubricating oil and, if possible, a breakdown and manual regreasing of the motor.

C. Every 100,000 miles (161,000 km), the air strainer should be disassembled and cleaned.

D. In-line oilers will act as an air filter as well as keep a supply of oil going to the wiper system. These should have a drain and oil change at least twice a year.

E. Alcohol injectors are very useful for vehicles operating in severe cold conditions. Precautions should be taken to keep sufficient lubricant in the motor as alcohol will tend to wash it away. If used heavily, it may be necessary to remove the motor valve and manually regrease unit.

## WINDSHIELD WIPER ARM AND BLADE REPLACEMENT

During initial installation or spot check, be sure the motor is in full park position. Be sure blade is assembled in the "blade saddle" correctly. Tighten screw and nut assembly until snug. Blade should have free movement in the saddle — do not crush saddle over blade. If saddle portion of arm is not attached to arm, be sure during assembly to place saddle on main wiper arm (larger of two), not on the follower (smaller of two). If not already done, install follower arm and tighten nuts and bolts. Parts should move freely in bearings.

## WIPER BLADE ANGLE ADJUSTMENT

Pantograph shaft length is adjustable to allow setting wiper blade angle. Each blade should travel across windshield in a position so that when the arm is at the end of its outward sweep, the wiper blade is parallel with the edge of the windshield. Adjust angle of blade by placing blade rubber 1" from molding while motor is in park position. By hand, move the wiper arm to mid-position (perpendicular) on glass. Place wiper blade in vertical position parallel with main arm.

Loosen lock nuts on pantograph shaft. Remove crown nut which attaches shaft arm to pivot shaft. Remove arm from shaft. While holding outer end of pantograph shaft, turn shaft arm to shorten or lengthen shaft assembly. Reinstall arm on pivot shaft. Force arm and blade across wetted glass and check angle of blade. Repeat if necessary, then install crown nut on pivot shaft and tighten firmly. Tighten lock nuts on pantograph shaft.

Turn motor unit to ON position; take note if wiper pattern is centered and tips of wiper blades are not touching rubber moldings. If the sweep is off center, it will be necessary to move main arm clockwise or counterclockwise on diameter segment to center the sweep. After each change it will be necessary to re-center the blade in mid-position.

## MOTOR DISASSEMBLY AND REPAIR

1. Remove windshield wiper blades, arms and pantograph arms.
2. Remove wiper shaft spacer retainer nut. Remove left or right hand corner moldings.
3. Disconnect air lines to wiper motor.
4. Remove wiper motor mounting panel retaining screws and lift out the complete assembly.

# MC-9 MAINTENANCE MANUAL

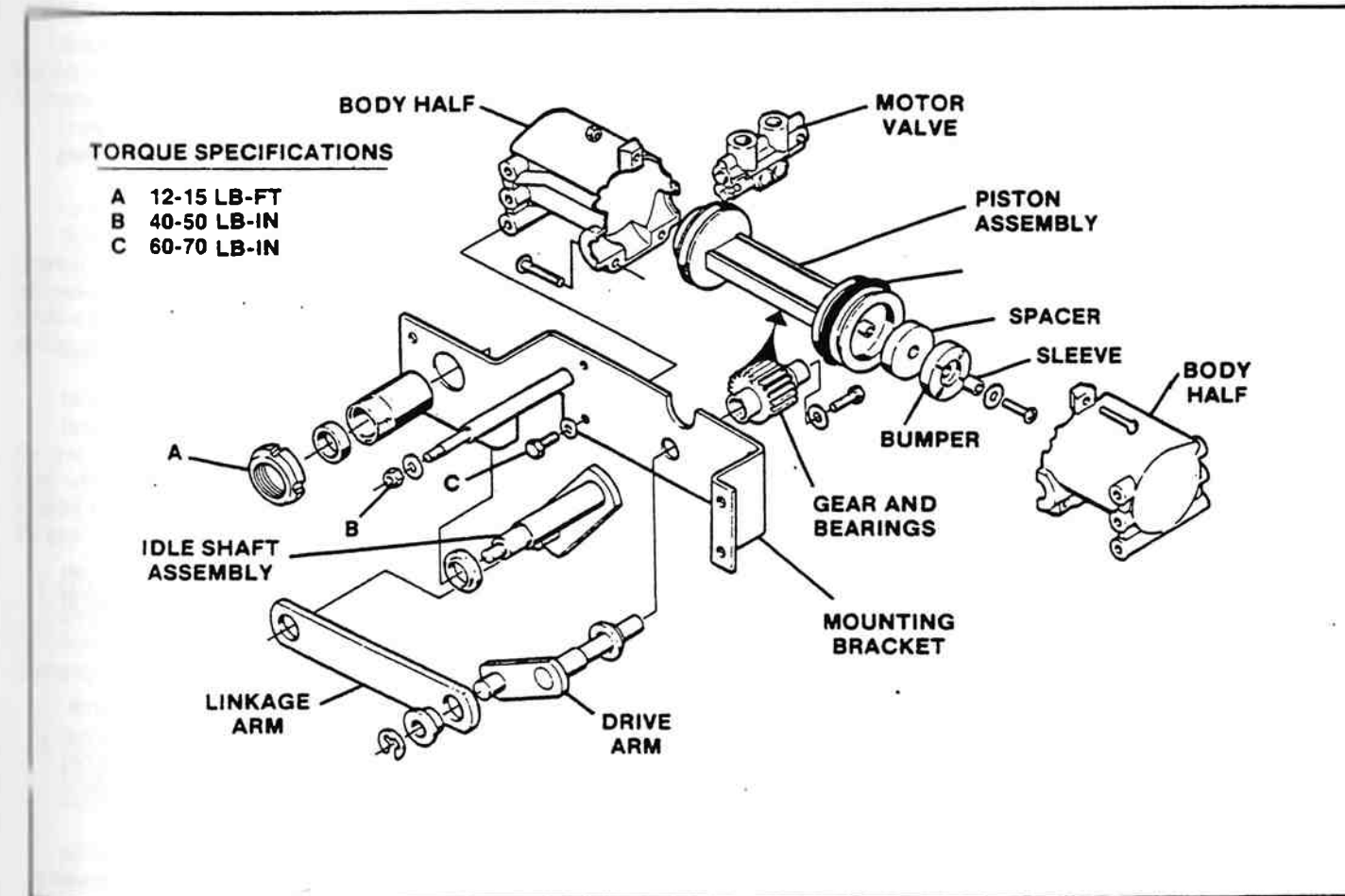


Figure 3-36. Windshield Wiper Motor.

The motor consists of four subassemblies: valve, body (two halves), piston, and shaft and gear assembly. Subassemblies may be replaced as complete units, or they may be disassembled and repaired. See figure 3-36. Follow this procedure to disassemble wiper motor:

1. Remove the three screws holding the body halves together. Holding the shaft in one hand, separate the halves. Note position of motor valve in body half and position of timing marks on gear and rack.
2. Remove the shaft, gear and sleeve assembly. Disassemble the subassemblies accordingly.
3. BODY HALVES: No further disassembly is required.
4. MOTOR VALVE ASSEMBLY: Remove from body half. No further disassembly is required. Replace if necessary with motor valve.
5. PISTON ASSEMBLY: Remove from body halves. Remove O-rings, rubber bumpers and spacers.

6. SHAFT AND GEAR ASSEMBLY: Remove shaft and bearings and check for concentricity. If gear has excessive wear, replace.

7. Clean all metal parts with an approved solvent, inspect for excessive wear and replace where necessary. Check both body halves for excessive scoring and replace if necessary.

8. Always replace main cylinder O-rings and valve body seals when assembling.

**NOTE: Blow all air passages clear.**

9. Lubricate parts with Sprague Air Push grease only.

10. Assemble the four subassemblies in reverse order.

11. Install motor valve in proper position. Check the assembled motor for excessive air leakage with leak detector and tighten carefully where necessary.



# MC-9 MAINTENANCE MANUAL

## WINDSHIELD WIPER CONTROL VALVE

Windshield wipers are controlled by two small knobs situated at the lower right side of the instrument panel. Each knob controls its corresponding windshield wiper.

To operate wipers, turn control knob for wiper desired toward direction indicating ON until required speed is reached. To stop wipers, turn knob to OFF position.

## REMOVAL

Individual wiper motor control motor valves (figure 3-37) can be removed from the vehicle for cleaning or repair if necessary. Before removing valve assembly, vent air pressure from system.

Remove the four screws (11) which attach cover (3) to the body (1). Separate cover from the body.

Pull parking valve stem (4) with O-ring from the valve body (1). Remove valve spring (5).

Using pliers with a small, thin nose, pull pressure regulating ram (9) with guide washer (10) from the valve body (1). Remove pressure regulating coil spring (8).

**NOTE: Do not disassemble valve further if not necessary.**

Clean all parts in solvent; then, applying air pressure into valve body ports, blow any dirt and solvent from valve body. Using a soft material object, force valve seat and retainer (7 and 8) back and forth within the body; then repeat cleaning procedure.

**NOTE: If retainer, valve seat assembly appear to be damaged, repair or replace entire hand control valve assembly.**

Apply small quantity of wiper motor lubricant to valve surfaces and rubber rings. Install valve and check operation.

## WINDSHIELD WIPER TROUBLESHOOTING

### 1. MOTOR WILL NOT OPERATE

Inadequate air supply to motor

Solution: Check the air compressor operation and air lines leading to the control valve for contamination, breakage or leaks.

Defective control valve

Solution: Check the control valve knob for sticky conditions, or check intake and feeder ports for blocked operations. Also check O-rings in control valve for leaks, and air lines leading from control valve to motor for air leaks, contamination or breaks.

1. Body Assembly
2. Cam
3. Cover Cap
4. Parking Valve Stem Assembly
5. Spring
6. Valve Stem
7. O-Ring Retainer
8. Spring
9. Pressure Regulating Ram
10. Guide Washer
11. Screw
12. Plastic Knob
13. Cam Rod
14. O-Ring
15. Nut

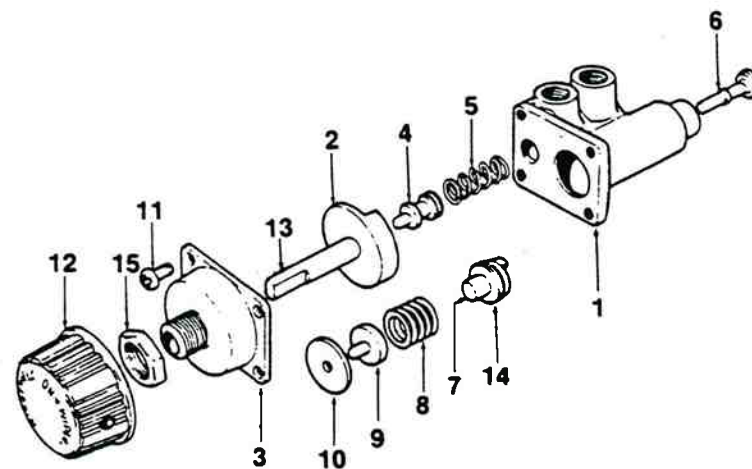


Figure 3-37. Wiper Control Valve.

# MC-9 MAINTENANCE MANUAL

Defective motor valve

Solution: Check the primary and secondary valve rods to see if they are binding in the chambers. Check for defective O-rings on the rods.

Clogged air passages in motor

Solution: Disassemble the motor and clear air passages.

Linkage locked up

Solution: Check that transmission shaft has been properly inserted. Also check drive pin for excess wear and proper lubrication. Check to see if linkage is hitting against the coach window side. This may be due to improper size drive bar or pin, pulling linkage out of proper line of travel.

Motor is getting air, but shaft is not turning

Solution: Check all drive components for broken valve gear or rack. Also, examine gear and rack for excessive wear which may be making improper gear engagement. If a tapered shaft is used, check to see if it has broken loose from the gear.

MOTOR OPERATES BUT WIPER ARM DOES NOT MOVE

Shaft is operating but arm does not move

Solution: Check if arm driver is cracked, or has become disengaged through wear or some other cause.

MOTOR OPERATES AT LESS THAN FULL POWER

Air leak in the Control Valve

Solution: Check O-rings for wear or flat spots.

Air leak in the Wiper Motor

Solution: Examine the large O-rings on piston rack for wear or flat spots. Also, examine the cylinder walls of the motor to see if they are scored to allow air to bypass the O-rings.

MOTOR OPERATES IN AN ERRATIC MANNER

Reverser "T" drilled off center, not drilled deep enough, or may hang up on reverser rod

Solution: Disassemble motor and examine reverser "T" to see if the hole for the valve pin is drilled on center and deep enough to allow full acceptance of pin. If "T" is hanging up on rod lubricate the "T" and examine bore for flash. Examine rod for sludge deposit which could cause "T" to stick.

O-rings fit too tightly in bore of motor valve

Solution: Disassemble motor valve by removing the end plate. Examine primary and secondary valve rods to see if any O-rings show a high spot or complete oversize.

O-rings too tight in main cylinder bore

Solution: Examine large O-rings on piston assembly for high spots or complete oversize. Also, examine cylinder wall to see if there is dirt or sludge on which piston may be sticking.

Exhaust ports plugged

Solution: Examine ports to see if plugged or blocked. Clean and clear them to allow free escape of air from motor.

Unused parking end plate plugged

Solution: If motor valve has parking end plate on both ends, check to see that the unused park end plate is not plugged.

5. SLAMMING ACTION BY ARM ON ONE SIDE OF SWEEP

Loss of pressure at one end of cylinder, causing no back pressure on returning swing of motor

Solution: Replacement of main O-ring. Clean port to allow air passage to maintain proper air pressure in cylinder. Examine O-rings on primary and secondary rods and replace if worn.

6. MOTOR SWEEPS "SHORT" IN ONE DIRECTION

Reverser "T" drilled off center

Solution: Disassemble motor and examine reverser "T" on reverser rod. Hole for valve pin must be drilled on center.

Defective primary valve rod

Solution: Remove primary valve rod from motor valve and see if the rod is sticking due to sludge or residue in bore cylinder. Clean bore and lubricate. Check and replace improperly sized or worn O-rings.

Defective cylinder or cylinder O-ring

Solution: Disassemble motor and examine large O-rings on piston rack for wear. Examine cylinder wall for sludge which would cause piston to stick or stop short of full travel. Check cylinder wall for defects or cracks which could stop the piston travel.

7. MOTOR OVERSWEEPS (OFF THE GLASS)

Worn transmission gear rack in motor

Solution: Disassemble motor and check gear and rack for wear. Replace worn parts.

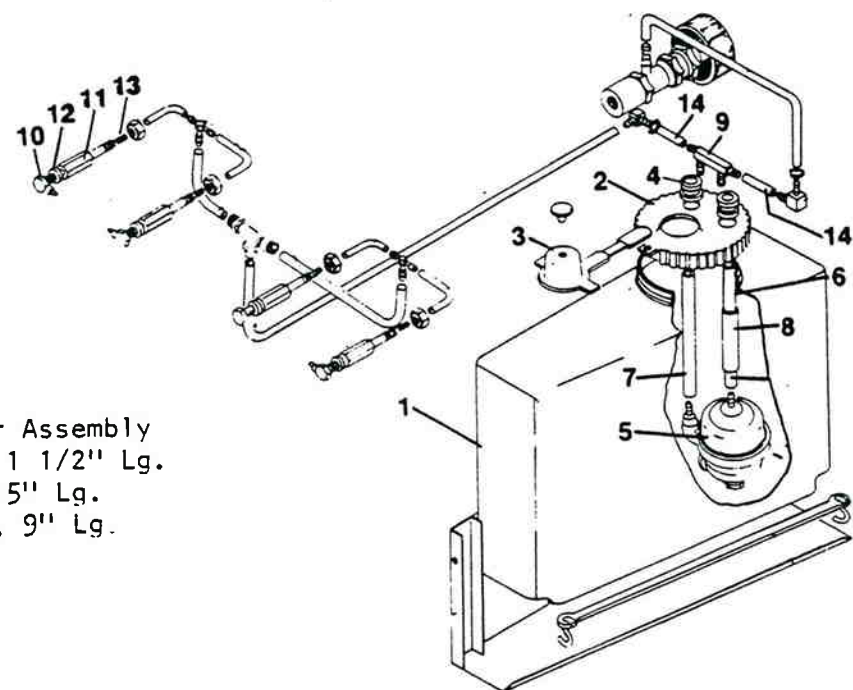
Piston stops worn or broken

Solution: Examine piston rack to see if piston stops on the reverse rod are still proper length. Replace as necessary.

Worn arm pivot points, causing arm to slip on shaft when shaft stops

Solution: Examine the shaft first to be sure it is not slipping in the gear. If not, examine the point when the shaft attaches to the arm. See if arm driver is worn or broken. If so, replace arm or arm driver.

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1. Reservoir
2. Cover
3. Umbrella Valve
4. Rubber Grommet
5. Diaphragm Chamber Assembly
6. Rubber Tubing - 11 1/2" Lg.
7. Rubber Tubing - 15" Lg.
8. Plastic - Tubing, 9" Lg.
9. Purge Tee
10. Nozzle Assembly
11. Nozzle Tower
12. Gasket
13. Hose Fitting
14. Hose - 9/64" I.D. x 28" Lg.

Figure 3-38. Windshield Washer Solution Tank.

## WINDSHIELD WASHERS

The three-gallon (11.4 liter) polyethylene windshield washer fluid reservoir is in the left front service compartment below the driver's floor. Two outlet nozzles are located below each half of the windshield and are adjustable 360° vertically and horizontally. Lines are purged automatically before and after each spray cycle, eliminating freezing or clogging of lines and nozzles. A closing plate is provided on top of the reservoir for refilling purposes.

## WINDSHIELD WASHER CONTROL VALVE

Air-operated windshield washers have an independent washer control knob on the lower right side of the instrument panel alongside the two windshield wiper knobs.

To operate windshield washers, press control knob. The washers will operate for a period of time while the control knob is held in this position. Release knob for approximately 1/2 minute to allow pump to refill before operating windshield washer again. Turn windshield wipers on when using windshield washers.

## REMOVAL

1. Before removing washer control valve, vent air pressure from system.

2. Disconnect the air lines and mark lines for identification when assembling.
3. Loosen set screw and remove knob.
4. Remove nut and washer from the plunger rod. Remove valve assembly from dash.  
Reverse procedure to install.

## WINDSHIELD WASHER TROUBLESHOOTING

1. FAILS TO EMIT WASHER SOLUTION  
Reservoir empty  
Solution: Add proper fluid.

If below 32°F (0°C) improper washer fluid-frozen  
Solution: Store vehicle or parts in heated area. Then purge system with low-temperature solution.

Contamination in tubing or nozzles  
Solution: Remove with compressed air. If severely clogged, replace items.

Tubing damage  
Solution: Replace section.

Tubing bent (kinked) or off one or more connections  
Solution: Realign tubing and/or refit. Trim end to ensure proper fit or replace.

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- 0 CONTROL VALVE FAILS TO OPERATE  
Vehicle air system low  
Solution: Establish a minimum of 90 psi (621 kPa).  
Vehicle air pressure inadequate — air to valve below 90 psi (621 kPa).  
Solution: Check lines for kinks.

Air pressure from valve outlet below 35 psi (241 kPa).  
Solution: If air pressure to valve is correct, check for clogged inlet port. If clear, replace valve.

- 0 CONTROL VALVE OPERATIVE BUT SYSTEM INOPERATIVE  
Diaphragm damaged  
Solution: Replace valve.

- 4 INADEQUATE EXPULSION OF WASHER SOLUTION  
Tubing failure  
Solution: Replace tubing.

- 6 AIR LINES BLOWING  
Damaged tubing  
Solution: Replace tubing.

- 6 SLOW OPERATION  
Inadequate air pressure  
Solution: Check air system.

Improper solution  
Solution: Replace with proper type solution.

- 7 JET STREAM IMPROPERLY DIRECTED  
Solution: Reposition nozzles.

- 8 DIAPHRAGM DOESN'T REFILL  
Faulty diaphragm  
Solution: Replace diaphragm.

Faulty control valve  
Solution: Replace control valve.

Valve assembly atop the reservoir is stuck in the open position  
Solution: Remove, clean and lubricate or replace.

## DESTINATION SIGN

### DESCRIPTION

The destination sign is located above the front windshield. An optional side destination sign is mounted on the right hand front side of the coach.

### MAINTENANCE

It is recommended that the following inspections and checks be made on a regularly scheduled basis:

1. Check to see if mechanism runs free and easy. Crank handle on destination sign; if it seems to bind, check gears for lodgement of foreign objects.
2. Check for loose items such as wires, clips, hanging tape, etc. Repair or remove such items.
3. Inspect the inside of the destination sign compartment. Remove dirt and foreign objects. Clean inside of compartment well and keep door closed.
4. If curtain is loose on rollers, run curtain to one end and turn crank handle until curtain roll is tight on roller. Run actuating mechanism through full cycle of curtain and repeat tightening action on opposite end of curtain.
5. The destination sign mechanism has nylon gears; therefore, no lubrication to the mechanism is required.

## SIGN CURTAIN REPAIR

In the event a destination sign curtain is torn, it can be repaired with 3M polyester tape or any equivalent cellophane tape. When repairing a tear, the tape should be used on both sides of the curtain.

When it becomes necessary to install or add curtain inserts, butt splice or overlap and apply strip of 3/4" (19.0 mm) wide polyester tape over front and rear seam.

The above method is an easier and more accurate way of installing inserts than the sewn methods. It also makes for considerably less bulk and better turning of curtain rolls.

## DRIVER'S SEAT

The driver's seat may be adjusted fore and aft by pushing in the lock lever located at left front of seat. When seat is positioned, release the lever. The back of the seat cushion can be tilted up or down by grasping the large knob at left corner of driver's seat and turning forward to lower and backward to raise. Seat may be raised by grasping and firmly pulling seat frame up. To lower, raise seat to highest position, then lower seat to lowest position. From there raise seat to desired height.



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## SEAT BELT

**WARNING: Seat belt is to be used at all times when coach is in motion.**

The seat belt is self-adjusting and equipped with a recoil-lock mechanism. In case the reel operation becomes "sluggish" lightly spray it with aerosol lubricant while holding the belt fully extended.

## MAINTENANCE OF SEAT BELTS

The seat belt mounting must be inspected for looseness at least twice a year. If it becomes necessary to clean the webbing, use a mild detergent with lukewarm water. Do not re-dye or use solvent type cleaners on webbing. This may weaken the fibers or affect the original dye. When fraying takes place, replace belt.

## EXTERNAL REAR VIEW MIRRORS

### DESCRIPTION

Two exterior rear view mirrors are installed on the coach, one on the left hand side and one on the right hand side. The mirrors have replaceable glass and can be easily replaced if broken. To prevent breakage of the windshield glass and driver's window by sudden slamming, adjustable bumper stops are installed in the mirror mounting brackets. Also, four (4) rubber bumpers are installed in each left and right hand mirror bezel to prevent glass breakage.

### ADJUSTING MIRROR HEAD

At the bottom end of the mirror arm (23,31) tighten or loosen socket head screw (30,38) which will tighten or loosen tension

- |                            |                            |
|----------------------------|----------------------------|
| 1. R.H. Bracket            | 32. Spring Retainer        |
| 2. Stud                    | 33. Spring                 |
| 3. Rollpin                 | 34. Seat                   |
| 4. Rubber Bumpers - Brkt.  | 35. Ball Stud              |
| 5. Nut - Bumper Retaining  | 36. Retaining Cap          |
| 6. Washer                  | 37. Machine Screw          |
| 7. Spacer                  | 38. Set Screw              |
| 8. Spring Washers (4)      | 39. Bezel                  |
| 9. Nut - Self-Locking      | 40. Glass                  |
| 10. Washer                 | 41. Back - R.H.            |
| 11. Cap                    | 42. Back - L.H.            |
| 12. L.H. Bracket           | 43. Rubber Bumpers - Bezel |
| 13. Stud                   | 44. Set Screw              |
| 14. Rollpin                | 45. Heating Element        |
| 15. Rubber Bumpers - Brkt. | 46. Convex Mirror          |
| 16. Nut - Bumper Retaining |                            |
| 17. Washer                 |                            |
| 18. Spacer                 |                            |
| 19. Spring Washers (4)     |                            |
| 20. Nut - Self-Locking     |                            |
| 21. Washer                 |                            |
| 22. Cap                    |                            |
| 23. R.H. Arm               |                            |
| 24. Spring Retainer        |                            |
| 25. Spring                 |                            |
| 26. Seat                   |                            |
| 27. Ball Stud              |                            |
| 28. Retaining Cap          |                            |
| 29. Machine Screw          |                            |
| 30. Set Screw              |                            |
| 31. L.H. Arm               |                            |

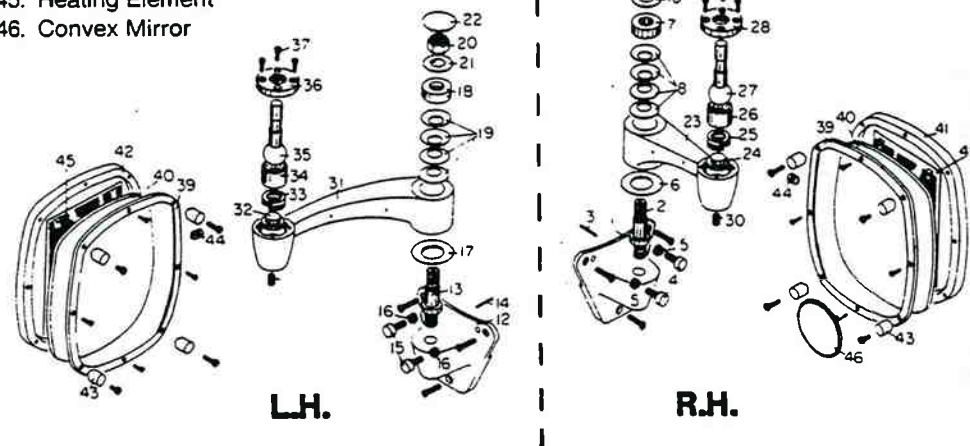


Figure 3-39. External Rear View Mirrors.

# MC-9 MAINTENANCE MANUAL

in the mirror head ball stud (27,35). If necessary, loosen or tighten the set screw (44) on the side of the mirror head to facilitate the adjustment. The mirror arm can be disassembled and tension components replaced or repaired.

### ADJUSTING ARM TO BRACKET TENSION

At body end of mirror arm (23,31) remove the caps (11,22) to expose the self-locking nut (9,20). Tighten or loosen nut to desired tension. If necessary, arm can be disassembled and tension components replaced.

### ADJUSTING MIRROR ARM STOPS

On the mirror arm brackets (1,12) loosen the lock nuts retaining the bumper stops (4,15). With the mirror arm to bracket tension slack, swing the arm to the extreme end of travel, touching coach body, windshield or window glass. Turn out bumper stops to provide sufficient clearance to prevent glass, body or mirror damage. Secure bumper stops by tightening lock nuts.

### DISASSEMBLY OF MIRROR ARM

At mirror end of arm, loosen set screw (30,38) to relieve spring tension on ball stud (27,35). Remove the four screws (30,37) attaching ball stud cap (28,36) to arm. Remove the cap, ball stud, ball stud seat (26,34), spring (25,33), and spring retainer (24,32) from the arm. At the bracket end of arm, remove cap (11,22), nut (9,20), washer (10,21), spacer (7,18), and spring washers (8,19). Remove arm from stud. Assembly is reverse of disassembly procedure.

### REPLACEMENT OF MIRROR GLASS

Remove the eight screws which attach the bezel (39) to the mirror head. Then with a thin blade pry bezel from head. Remove broken mirror glass, then position new glass with tape in mirror head. Position bezel over glass and secure with eight screws.

**IMPORTANT: Tighten screws evenly and firmly.**

### HEATED EXTERNAL REAR VIEW MIRRORS (OPTIONAL)

Heated external rear view mirrors may be provided to prevent the mirrors from frosting up in cold weather. A heating element is installed inside both mirrors and is activated by a switch located on the left of the driver on the switch panel.

The switch is wired in series with the Coach Heat switch; therefore, both must be activated before the mirror heating element will energize. Once energized, the mirror heating element is kept at a sustained temperature by a heat regulated disc thermostat. See figure 3-40. A wiring diagram can be found in section 7 of this manual.

To service the mirror glass or the heating element, refer to the previously described procedures for servicing the mirror glass in the nonheated style mirrors.

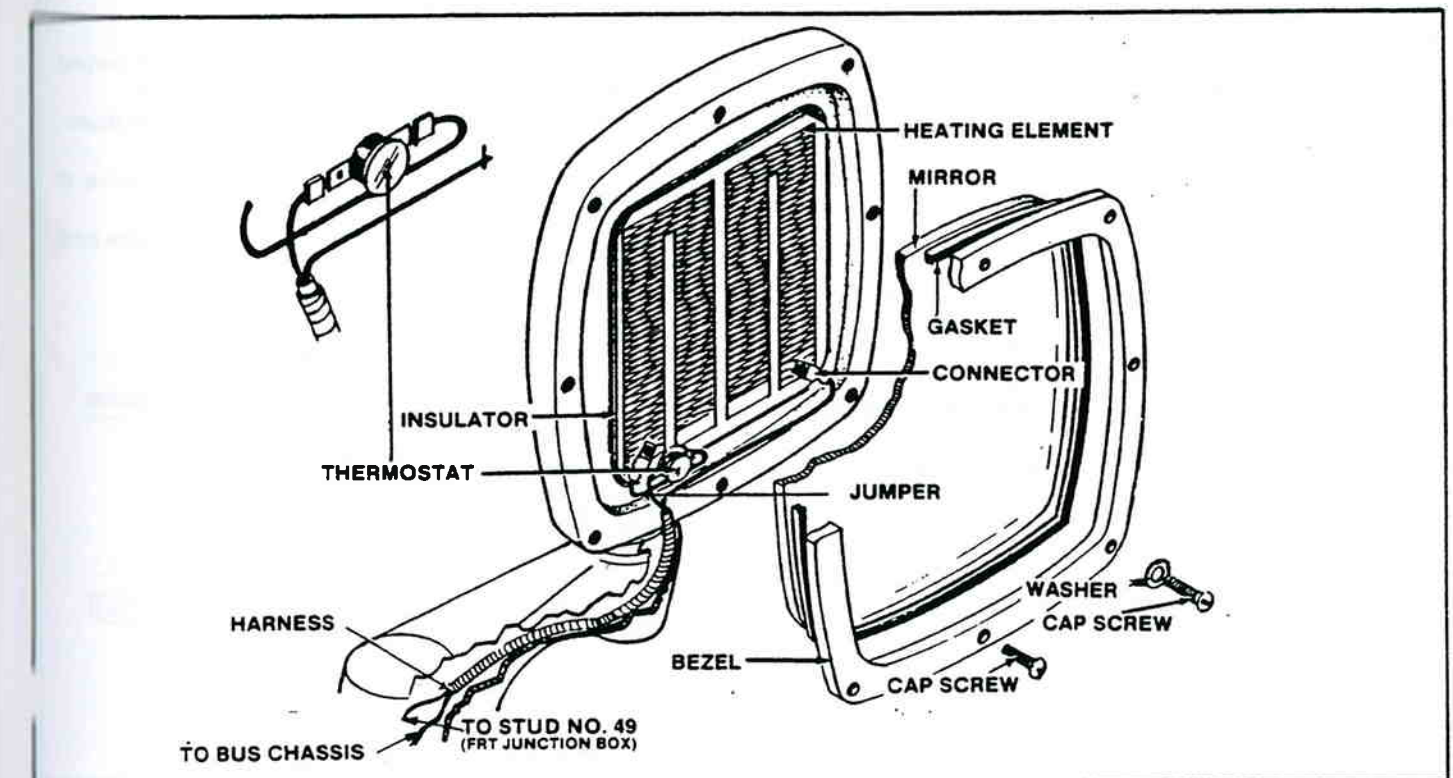


Figure 3-40. Heated Rear View Mirror.



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## RETRACTABLE ENTRANCE STEP (OPTIONAL)

The air operated retractable step permits easier passenger boarding by providing an additional step below the lower coach step. Step height is 8½" (216 mm). It is shown in figure 3-41.

The retractable step is controlled by a Step In-Out switch located on the driver's switch panel.

### OPERATION

When the step is in the retracted position (no voltage applied), air pressure is automatically applied through the four-way valve to the "in" side of the air cylinder, thus holding the step in. A locking air cylinder extends through two aligned holes in the step assembly to lock it in place only when coach air pressure is below approximately 75 psi (517 kPa).

The step can only be extended if all of the following conditions are met:

- Coach air pressure is above 75 psi (517 kPa).
- Park brake is in the ON position.
- Entrance door is open.
- Step switch is actuated in the OUT position.

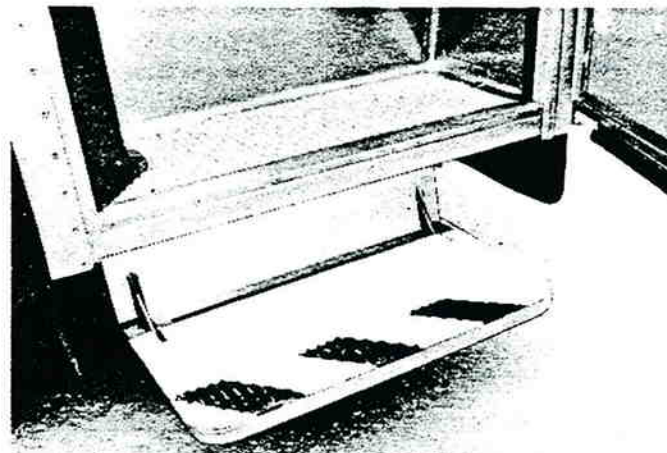


Figure 3-41. Retractable Entrance Step.

This will energize the four-way valve and the step relay. The four-way valve then applies air in order to extend the step and exhaust air from the "in" side. The Step-Out tell-tale light located in the driver's instrument panel will illuminate.

Anytime the step switch is turned to the IN position, the park brake is pushed into the OFF position, or the entrance door is closed securely, power will be removed and the step will retract. Any one of these situations breaks the supply voltage to the four-way valve, thus de-energizing the relay and causing relay contacts to fall open. Simultaneously, the shutting off of power will automatically cause the four-way valve to reverse the air to the step, thus pushing it "in" and exhausting the "out" position.

Because the relay contacts have fallen open, the Step Out tell-tale light will go out.

Anytime the air pressure drops below 60 psi (413.68 kPa), a locking air cylinder will not permit operation of the step. Air pressure this low is considered unsafe to operate the step.

**NOTE:** In order to retract step when lock cylinder is engaged, the system must be cycled.

## SERVICING INDIRECT LIGHTS

1. When servicing the indirect lights, first remove the gray vinyl snap-in molding by inserting a flat tip screwdriver under the lip of the molding (near molding joint).

- Pry the molding from the housing track (see photo).
- Remove lens to expose the bulbs for the indirect lights.
- To replace lens, first position lens in the housing groove.
- Then position molding in the housing track and push up to snap lock molding.

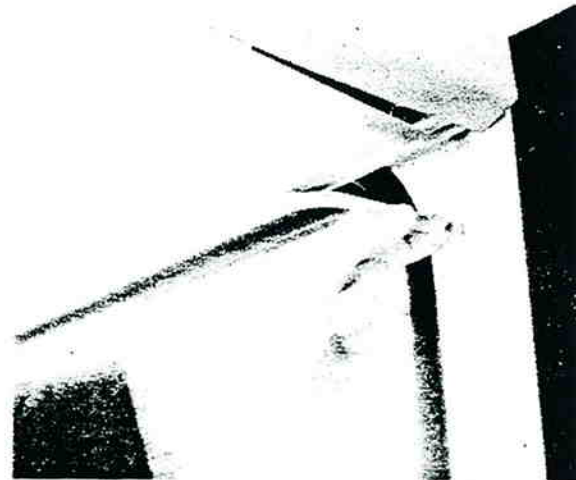


Figure 3-42. Servicing Indirect Lights.

## SERVICING IN-STATION LIGHTS

- Remove lens by inserting a flat-tip screwdriver behind lens at notch in end of light housing (see figure 3-43).
- Apply downward pressure on lens until lens is disengaged from housing grooves.
- To replace lens, first position lens in one groove in housing assembly.
- Then apply upward pressure along center of lens until lens snaps into place in opposite housing groove.

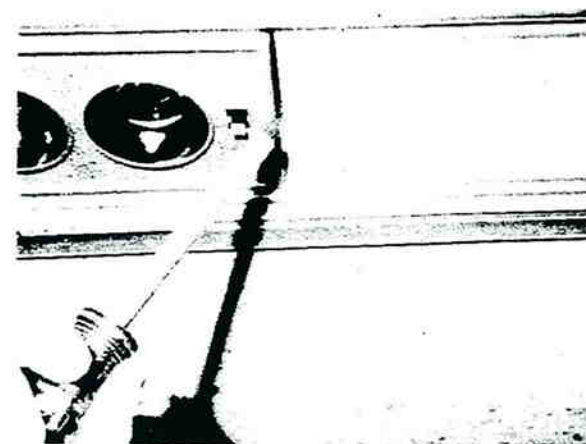


Figure 3-43. Servicing In-Station Lights.

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## MAXI GALLEY

### DESCRIPTION

The optional maxi galley is located at the rear of the coach behind the number 6 and 7 left hand side sash assemblies. The galley cabinet is constructed of ¾-inch plywood and contains the following components:

- a four cubic foot absorption type refrigerator complete with freezer compartment.
- three hot/cold liquid containers.
- a multiplex AM/FM radio, cassette stereo system with public address.
- a large countertop work area complete with fluorescent lamp.
- five keyed-alike locking cupboards with a storage capacity of seventeen cubic feet.
- a 2½-pound fire extinguisher.
- a coat rack.
- a hostess seat (optional).

The refrigerator and liquid containers may be powered by either the 24-volt DC coach electrical system or, to conserve the coach batteries, the 110-volt AC in-station electrical system. The liquid containers will switch from one power source to the other automatically; however, the refrigerator must be manually converted. This is accomplished by flipping the toggle switch on the galley cabinet to the desired power source. Tell-tale lights are provided on the galley switch panel to indicate which power source is being used. The stereo system is powered by 24-volt coach electrical system only.

**NOTE:** To prevent excessive battery discharge, it is recommended that the stereo system be operated only when the coach is running.

Access to most of the maxi galley wiring is made possible by opening the #7 left hand side sash. To inspect the wiring on the galley switch panel, it is necessary to remove the mounting screws and carefully pull the panel away from the cabinet.

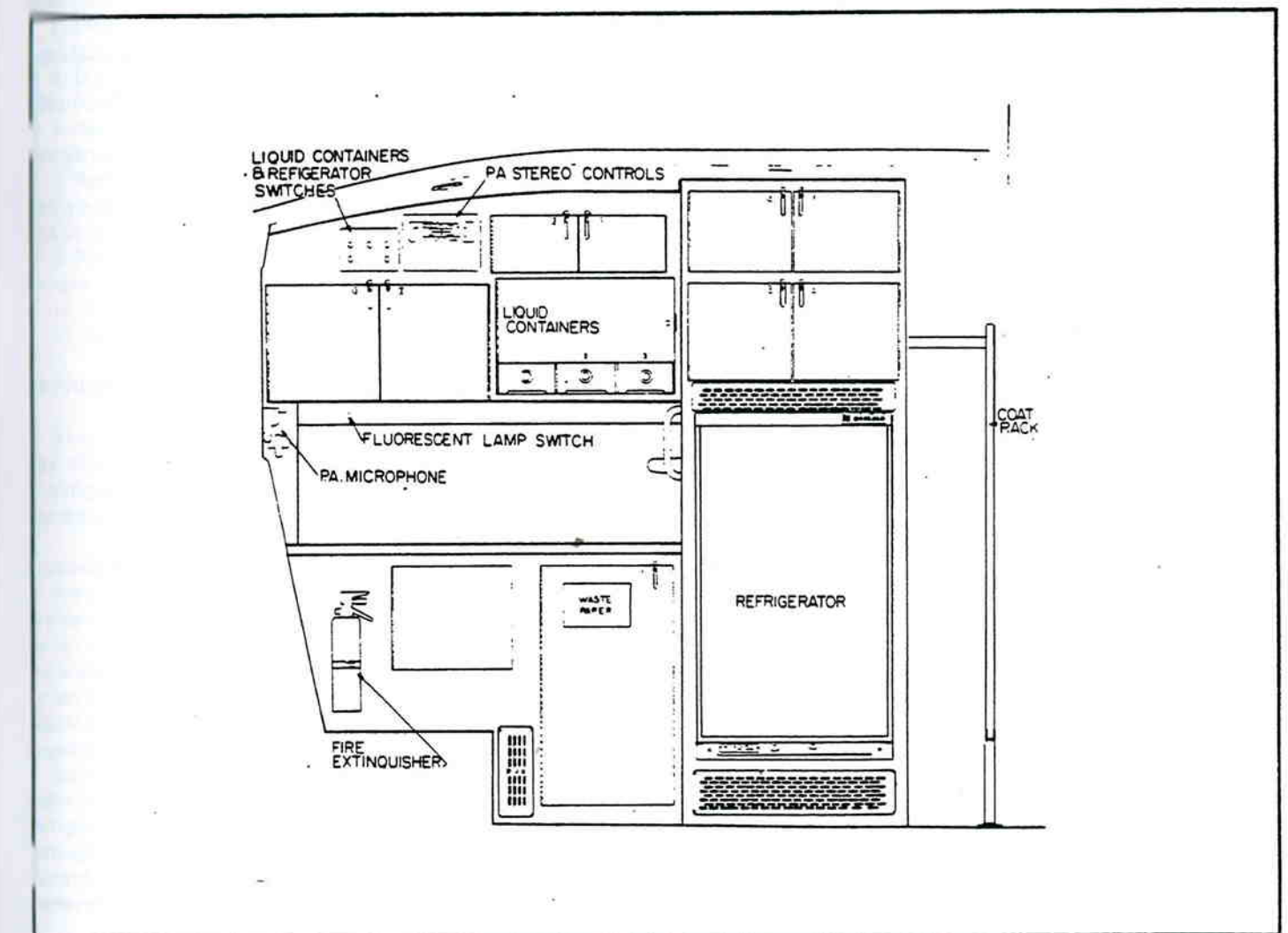


Figure 3-44. Maxi Galley.



# MC-9 MAINTENANCE MANUAL

## LIQUID CONTAINERS

Three insulated liquid containers, each fitted with a thermostatically controlled heating element, are contained within the maxi galley cabinet. The containers are of stainless steel construction and each one has a capacity of 2 U.S. gallons (7.6 liters). They are provided for keeping coffee, soup and other hot beverages at a temperature of between 170° and 190°F (77°-88°C). By turning the switch at the hostess station "OFF" and placing ice in the center ice well of the liquid container, the insulated containers become suitable for storing cold beverages. Without power and an initial temperature of 180°F (82°C) liquids may be held for up to five hours before the temperature falls below 140°F (60°C).

The liquid containers can be powered by either the 24-volt DC coach electrical system or, to conserve the coach batteries, the 110-volt AC in-station electrical system. There is no manual voltage selection necessary, as the switching control box automatically switches from 24 volts to 110 volts when the in-station electrical system is plugged in and back to 24 volts when unplugged.

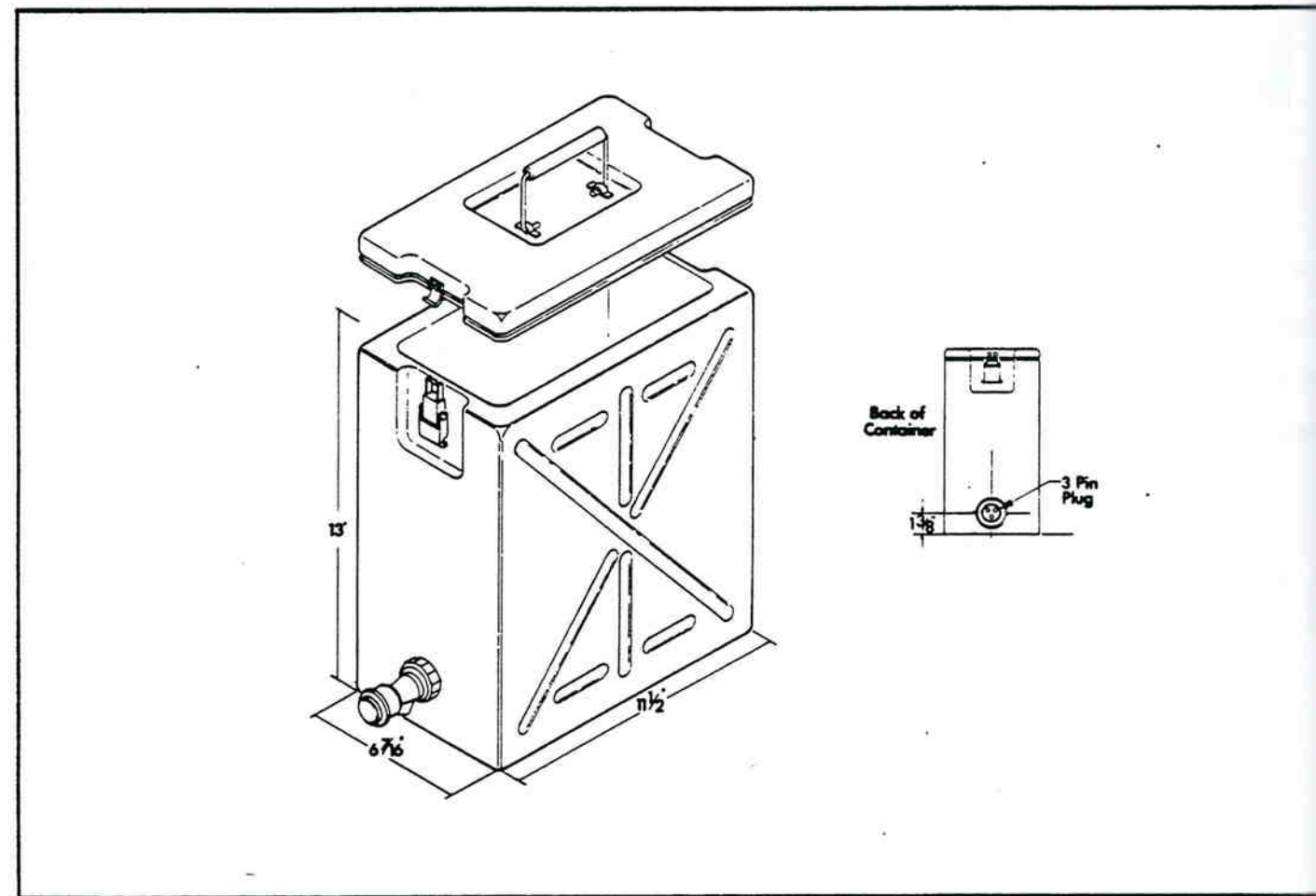


Figure 3-45. Liquid Containers.

## REMOVAL OF LIQUID CONTAINERS

The removal of the liquid containers is necessary to clean or fill them, or in the event that a spigot or heating element needs replacing.

To remove the containers, release the spring-loaded catch and open the door at the front of the liquid containers. Lift the front of the container high enough to clear the tray and pull the container forward. When installing, slide the container into position and push firmly to ensure that the self-aligning three-pin plug makes full contact. There are two screws on the female plug bracket, should adjustment of the plug be necessary.

# MC-9 MAINTENANCE MANUAL

## REFRIGERATOR

The maxi galley comes equipped with a Norcold Model FG3 absorption type refrigerator, which is fitted into the lower section of the cabinet assembly. Measuring 40 1/2" (102.87 cm) high x 22" (55.88 cm) wide x 22-11/16" (57.62 cm) deep, the refrigerator has a storage capacity of 4 cubic feet. Other features of the refrigerator include: an adjustable shelf, a full width crisper, in-door storage, and a separate freezer compartment with two ice trays.

**CAUTION: Turn refrigerator off before charging batteries.**

## REMOVAL OF REFRIGERATOR

1. Turn the main battery switch "OFF."
2. Open the trash bin door on the galley. Reach in and lift the release bar to open the window behind the maxi galley.
3. Prop open the window from outside of the coach to gain access to the maxi galley electrical components.
4. Disconnect the red wire of the refrigerator feeder harness from stud #8 of the ten terminal stud block.
5. Disconnect the white wire of the refrigerator feeder harness from stud #10 of the ten terminal stud block.
6. Disconnect the green wire of the refrigerator feeder harness from the terminal near the bridge rectifier.
7. Remove and retain the three clamps that secure the refrigerator feeder harness.
8. Remove the clamp that secures the three-prong plug cable and unplug the refrigerator. Return to the inside of the coach to complete the removal procedure.
9. Remove the four retaining screws from the outside hinges of the refrigerator.
10. Remove the upper grill from the galley cabinet.
11. Carefully remove the refrigerator from the cabinet.

## REFRIGERATOR TROUBLESHOOTING

If the outside of the refrigerator is warm but the refrigerator has not been cooling for an extended period of time, the cooling system is blocked. Refer to **Procedure #1** to correct a blocked system.

### Procedure #1

For proper operation of the absorption system, it is necessary for the ammonia and water to mix together. If the refrigerator is not kept in a level position, the ammonia will boil out of the water, causing a blocked system. To remedy this situation, remove the refrigerator from the coach and place it on its left side for one hour. This will allow the water and ammonia to mix together.

Install the refrigerator and operate it for one to two hours to determine if the cooling process has been restored. If the refrigerator is not cooling after this time and **Procedures 2** through **6** have determined that all electrical systems are functioning properly, the cooling system must be removed and replaced.

## 24-Volt Operation

If the refrigerator is not cooling properly while operating on 24 volts, the following series of tests should be performed to determine where the problem exists.

### Procedure #2

With the main battery switch "ON" and the refrigerator switch at the hostess station in the "24 VOLT" position, proceed as follows:

1. Open the trash bin door on the galley. Reach in and lift the release bar to open the window behind the maxi galley. Prop the window open to gain access to the electrical components at the rear of the galley.
2. Using a voltmeter, determine if 24 volts is present at stud #1 on the ten terminal stud block. If 24 volts is present at stud #1, proceed to step 3. If 24 volts is not present, check the 20-amp circuit breaker in rear junction box. If 24 volts is not present at the circuit breaker, it should be replaced.
3. Determine if 24 volts is present at stud #8 on the ten terminal stud block. If no voltage is present, the refrigerator switch at the hostess station is defective and should be replaced. If 24 volts is present at stud #8, turn the main battery switch "OFF" and continue with step 4.
4. Open the refrigerator door. Inspect the fuse in the fuse holder, located on the refrigerator control panel, and replace it if it is burned out.
5. Turn the main battery switch "ON" and allow the refrigerator to operate for about five minutes.
6. After five minutes, flip the refrigerator switch at the hostess station "OFF" and inspect the fuse again. If the fuse is burned out, continue with **Procedure #2**. If the fuse is not burned out, reinstall it, flip the refrigerator switch at the hostess station to "24 VOLTS" and close the refrigerator door. Periodically check the freezer compartment to determine if the refrigerator is cooling properly. If the refrigerator is not cooling after 1 to 2 hours, continue with **Procedure #4**.

### Procedure #3

If after **Procedure #2** step 5, the refrigerator fuse burned out, perform the following inspection:

1. Remove the refrigerator from the cabinet; refer to **REMOVAL OF REFRIGERATOR**.
2. Disconnect the yellow and black feed wires from the refrigerator heater element feed wires.
3. Using an ohmmeter set on the R x 1 scale, check the yellow and black lead wires to the heater element. If a reading of 3.6 ohms ( $\pm 0.2$  ohms) is not attained, the heater element is defective and should be replaced.
4. If a reading of 3.6 ohms ( $\pm 0.2$  ohms) was attained in step 3, a short exists between the heater element and the 15A fuse. Inspect all connections between the heater element and the fuse and eliminate the cause of the short.



# MC-9 MAINTENANCE MANUAL

## Procedure #4

If the fuse was not burned out after **Procedure #2 step 6**, and the refrigerator is not cooling after 1 to 2 hours of operation, proceed with the following:

1. Turn the main battery switch "OFF."
2. Remove the refrigerator from the cabinet; refer to **REMOVAL OF REFRIGERATOR**.
3. Disconnect the yellow and black feed wires from the refrigerator heater element lead wires.
4. Using an ohmmeter set on the R x 1 scale, check the yellow and black leads of the heater element. A reading of 3.6 ohms ( $\pm .2$  ohms) indicates that the heater element is functioning correctly. If no resistance or very high resistance is found, replace the refrigerator heater element.
5. If the heater element is functioning correctly, place one ohmmeter probe on the black feed wire that was disconnected from the heater element. Place the other probe on the white (negative) 24V feed wire that was disconnected from stud #10 of the ten terminal stud block. If there is infinite resistance, adjust the thermostat control to either extreme while observing the ohmmeter scale. If the ohmmeter registers any resistance while adjusting the thermostat, the circuit is functioning correctly. If the ohmmeter registers no resistance while adjusting the thermostat, proceed to step 6.
6. Remove the four screws that secure the control panel to the refrigerator and remove the panel.
7. Place the probes of the ohmmeter across both terminals of the thermostat and then across both terminals of the snap switch. In either case, little or no resistance indicates that the component is functioning correctly. If there is very high or infinite resistance, replace the faulty component.

## 110-Volt Operation

If the refrigerator is not cooling properly while operating on 110 volts, the following series of tests should be performed to determine where the problem exists.

## Procedure #5

1. Remove the refrigerator from the coach; refer to **REMOVAL OF REFRIGERATOR**.
2. Plug the 110-volt refrigerator cord into an alternate 110-volt socket.

**NOTE: When the refrigerator is plugged in, there should be an audible "CLICK." If no "CLICK" is heard, the 110-volt supply cord is faulty and should be replaced.**

3. Allow the refrigerator to operate for 1 to 2 hours. If the refrigerator is cooling properly after this time, the problem lies in the coach wiring. If the refrigerator is not cooling and the outside of the unit is warm, the cooling system is blocked. Refer to **Procedure #1** to correct a blocked system. If the refrigerator is not cooling after performing **Procedure #1**, continue with **Procedure #6**.

## Procedure #6

With the refrigerator removed from the coach and plugged into an alternate 110-volt outlet, proceed as follows:

1. Using a voltmeter set on the appropriate AC scale, carefully measure the line voltage (110-120 volts) on the red and black lead wires of the refrigerator heater element. If no voltage is present, adjust the thermostat control from one extreme to the other while observing the voltmeter scale. If voltage is present while adjusting the thermostat, proceed to step 2. If voltage is not present, proceed to step 3.
  2. Unplug the refrigerator from the AC outlet and disconnect the red and black feed wires from the heater element lead wires. Using an ohmmeter set on the R x 1 scale, measure the resistance on the red and black lead wires of the heater element. If the resistance is not 72 ohms ( $\pm 3$  ohms), the heater element should be replaced.
  3. If there was no voltage present after step 1, unplug the refrigerator, remove the four screws that secure the control panel, and remove the control panel.
  4. Plug the refrigerator into a 110-volt AC outlet. Using a voltmeter set on the appropriate AC voltage scale, measure the voltage across relay contacts #8 and #11. If no voltage is present, the relay is defective and should be replaced. If line voltage (110-120 volts) is present, this indicates that either the thermostat or the snap switch is defective. Check both components with an ohmmeter. Whichever one has very high, or infinite, resistance is the faulty component and should be replaced.
- After performing all of the electrical tests, it may be determined that the cooling system of the refrigerator needs replacing. In such cases, TMC/MCI recommends that the unit be repaired by professional refrigerator service personnel.

# MC-9 MAINTENANCE MANUAL

## MINI GALLEY

### DESCRIPTION

A mini galley is available as optional equipment on MC-9 coaches. Its major components are a refrigerator, twin coffee warmers, a cup dispenser, a drip tray, a storage cupboard, and a switch panel. The unit is fitted at the rear of the coach between the lavatory and rear seat. It is designed to operate on both the 24-volt DC coach electrical system and a 110-volt AC in-station power supply.

### Drip TRAY

The hostess center is fitted with a molded fiberglass drip tray and stainless steel rack to catch spigot drippings and the overflow from overfilled cups.

The drip tray drains into a small plastic jug located in the storage cupboard. Because of the jug's small (2 liter) capacity, it should be emptied and rinsed after each trip.

### CUP DISPENSER

The cup dispenser is mounted between the two coffee warmers. To refill, remove by grasping the cylinder and push-

ing toward rear of coach. This will slide it out of its mounting bracket. Once released from mounting bracket, it can be filled with a line of stacked cups (bottom down) and replaced.

### COFFEE WARMERS

The coffee warmers are similar to those used in the maxi galley. By turning the element "OFF" at the switch panel, the insulated containers are suitable for storing cold beverages.

The warmers can be run off the 24V DC coach electrical system or off the 110V AC in-station electrical system to conserve the coach batteries. Unlike the refrigerator, there is no manual voltage selection necessary. The power switching controller box automatically switches from 24V to 110V and back again.

To remove the containers, slide the locking lever on the switch panel, grasp the spigot, and pull the container out. The containers can then be washed and filled. To reinstall, again move the locking lever and slide the container in. Push firmly to ensure that the self-aligning three-pin plug makes contact. There are two phillips screws on the female plug bracket for adjustment of alignment. The heating elements and spigots are replaceable.

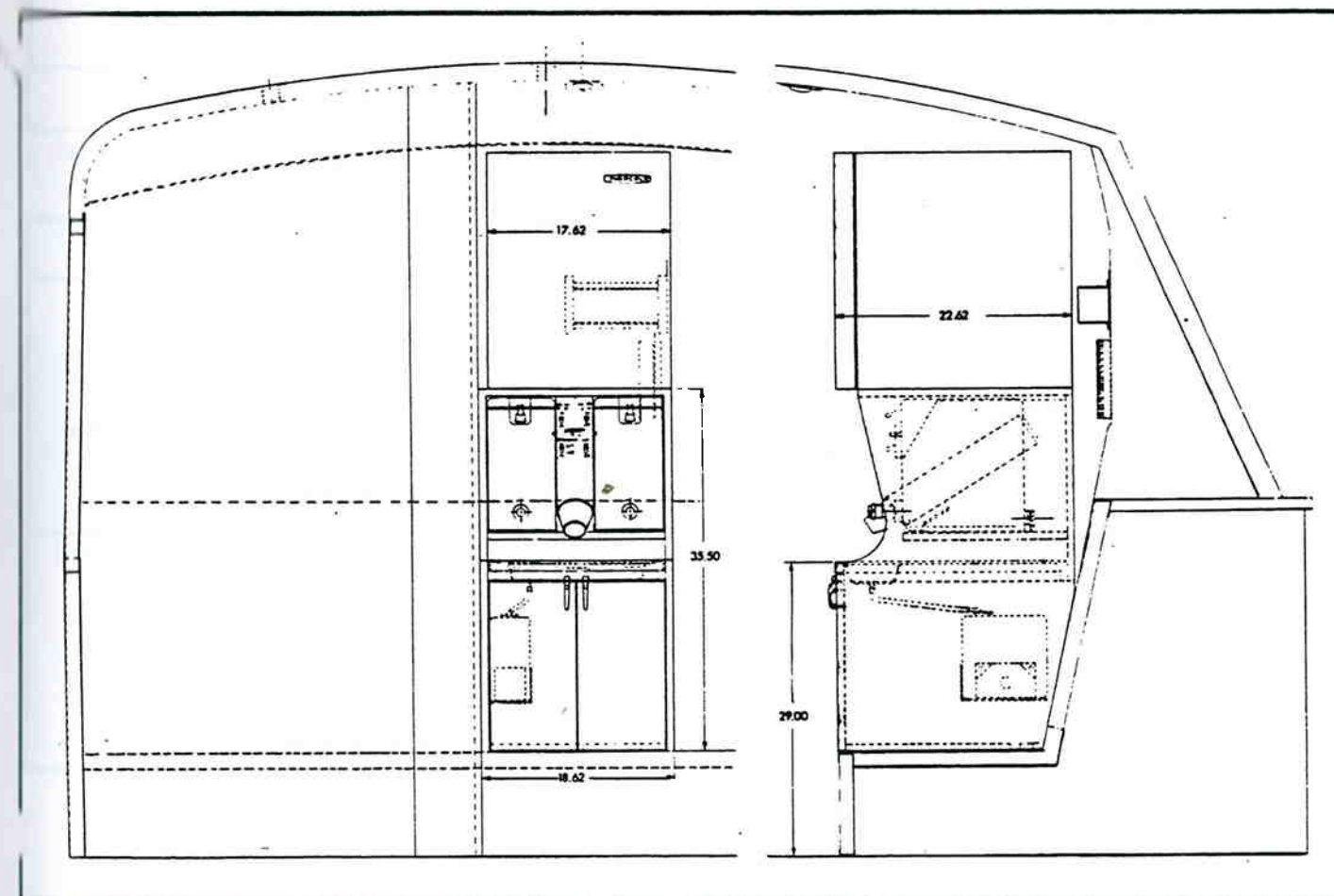


Figure 3-46. Mini Galley.



# MC-9 MAINTENANCE MANUAL

## REFRIGERATOR (NORCOLD DE-250E)

The refrigerator is a compact 110-volt AC/12-volt DC unit with a 1.84 cubic foot (52 liter) capacity. It is hooked up to the 24-volt coach electrical system through a power converter.

The refrigerator can be turned off either at the switch panel or at the thermostat located inside the refrigerator. The thermostat also is provided with a reverse-polarity circuit breaker to guard against improper hook-up.

The refrigerator can also be run from 110-volt AC power supply to conserve the coach batteries, or to maintain refrigeration when the master switch in the battery compartment is turned off. To use the 110-volt supply, complete the in-station hook-up and set the switch panel to the 110-volt position. If not switched to 110V, the unit will continue to run on 24V. When returning to the 24-volt mode, the switch must be reset to the 24-volt position or no power will be supplied to the refrigerator. If desired, the refrigerator can be powered from the 24V coach power system even if an in-station hook-up has to be made.

**NOTE: Turn refrigerator off before charging batteries.**

The storage volume of the unit is 1.84 cu. ft. (52 liters) at a standard temperature automatically controlled at  $41^{\circ}\text{F} \pm 4^{\circ}\text{F}$  ( $5^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ) at an ambient temperature of  $90^{\circ}\text{F}$  ( $32^{\circ}\text{C}$ ). The cooling unit is a swing motor hermetically sealed compressor, with an air-cooled condenser, aluminum evaporator, operation on AC 20 volt, 60 Hz, 40 watt with a power supply transistorized input DC 12 volt. Weight of the unit is 53 lbs. (24 kg).

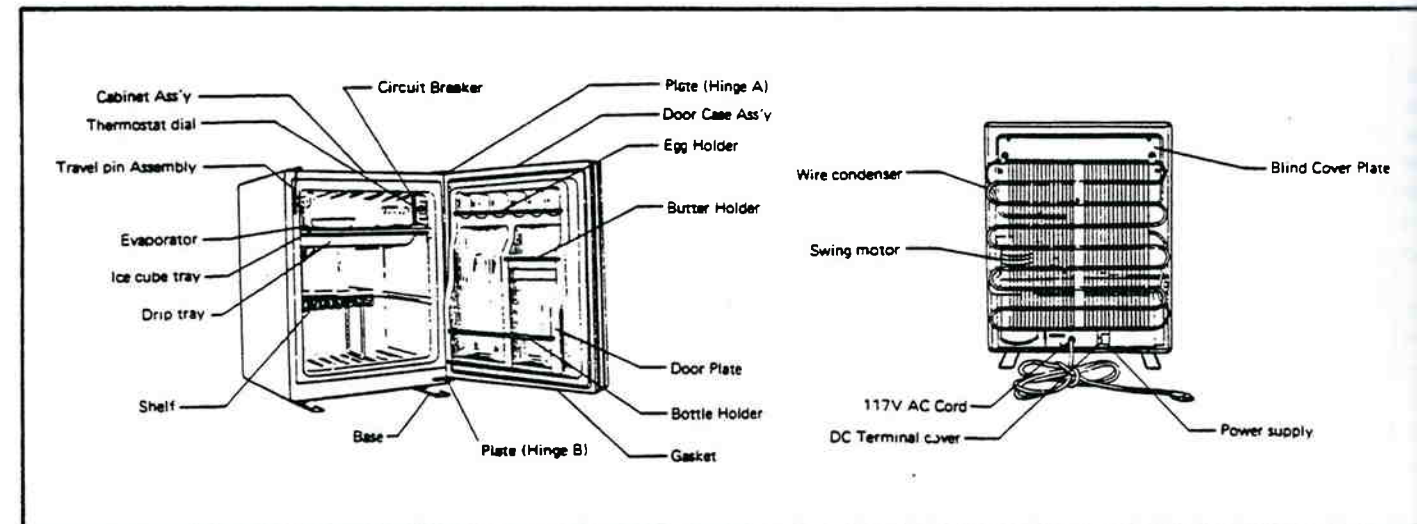


Figure 3-47. Norcold DE-250E.

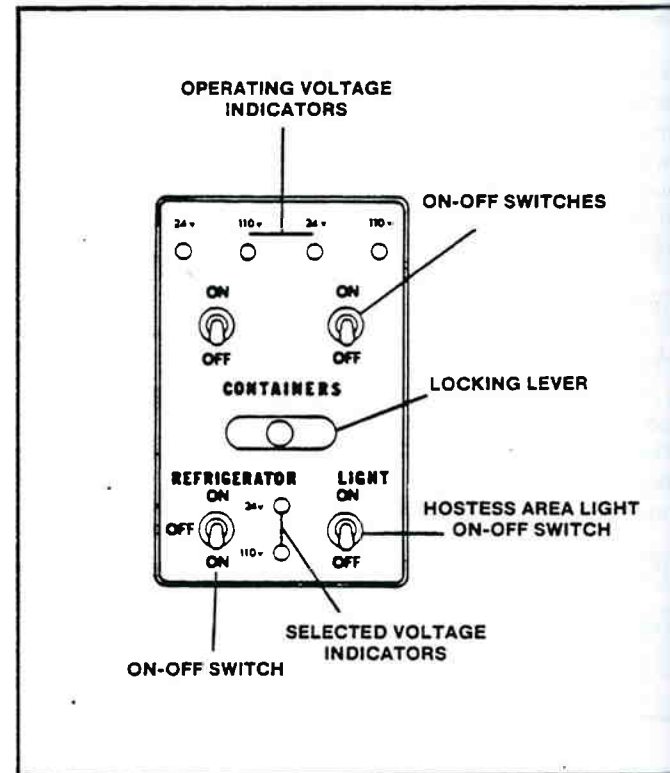


Figure 3-48. Mini Galley Control Panel.

# MC-9 MAINTENANCE MANUAL

## REPLACING COOLING UNIT

Disconnect all power sources and remove all food. Remove the three screws which secure the thermostat assembly to the cabinet. Remove the two nuts on the evaporator, lower the front and carefully pull it forward out of its holder.

Remove power supply couplers and ground wire, then remove the eight screws holding on the rear cover plate. Remove both flange nuts from the cooling unit and slowly pull forwards by holding onto the hanger. Ensure the evaporator does not catch on the inner case.

Remove both cords from the swing motor.

Allow the cooling unit to lay on the condenser side, remove the two screws from the blind cover and the capillary tube located at the bottom of the evaporator. Move the inner suction pipe inner bushing as indicated in figure 3-50 and remove.

For installation follow the reverse order of disassembly.

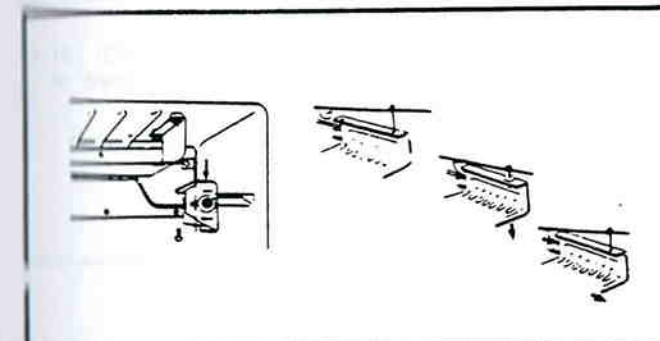


Figure 3-49. Removing Thermostat And Evaporator.

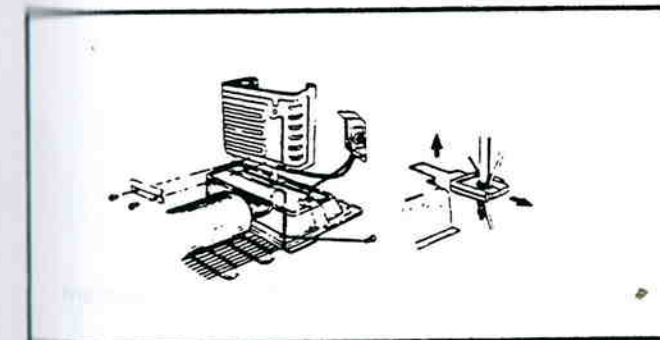


Figure 3-50. Removing Capillary Tube And Bushing.

## REPLACING THERMOSTAT

Remove the three screws on the thermostat mounting and the two screws holding the capillary tube underneath the evaporator. Pull off the thermostat dial and detach the set plate from the thermostat support in the direction shown in figure 3-51.

Peel off the dial mark from the cover and remove the two screws holding the thermostat to its support. Detach the thermostat receptacle and disengage the two grey wires from the slip-on connectors. To replace the thermostat follow the reverse order of disassembly.

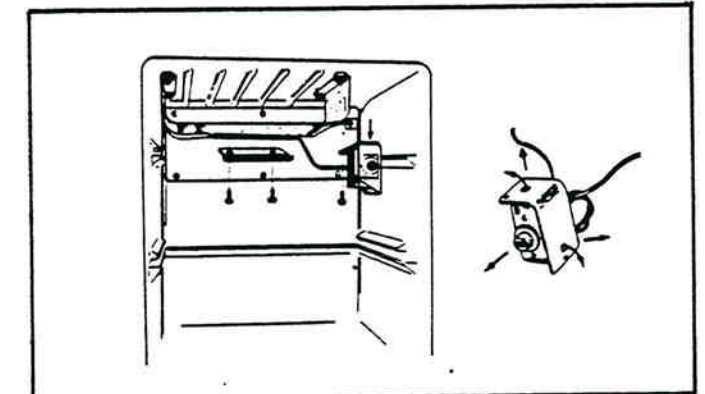


Figure 3-51. Removing Capillary Tube And Thermostat.

## REPLACING THE POWER SUPPLY

Remove the seven screws securing the power supply to the rear of the cabinet. Remove the ground cord and disconnect the two power supply cords. Remove the transformer assembly from the power supply. Cut off the AC supply cord at its connecting point and release the grommet securing it to the case. Release the grommet securing the DC cord to the power supply case.

Remove all the screws securing the oscillator assembly and relay to the power supply case. Disconnect the 9-pole coupler connecting the oscillator assembly and the transformer assembly. Replace the transformer or oscillator following the reverse order of disassembly.

When replacing with new parts, ensure that wires are connected exactly as removed.

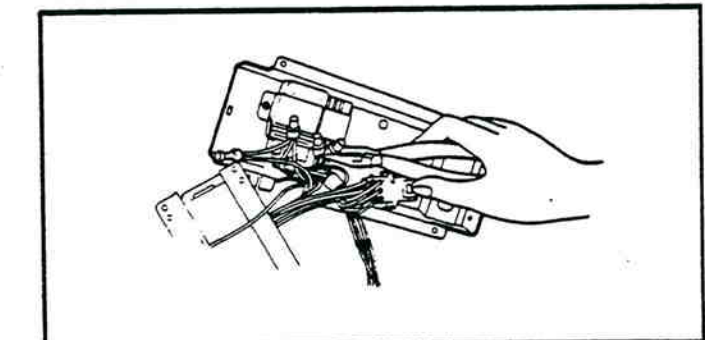


Figure 3-52. Cut Off AC Supply Cord.

# MC-9 MAINTENANCE MANUAL

## TROUBLESHOOTING

There are basic steps in troubleshooting the dual-voltage refrigerator that, if followed, make problem pinpointing a simple process. The three major component assemblies that will prevent operation are:

### 1. Compressor and System Assembly

This assembly consists of the swing motor compressor, condenser, dryer, capillary tube, and evaporator plate. After these components have been connected to form a closed loop or circulator system, this system is then charged with a measured amount of refrigerating gas Dichlorodifluoromethane R-12 and sealed to form a noncontaminated, closed system through which the gas is recycled over and over again during the refrigeration process.

Should a leak occur at any time in this system which allows this gas to escape, then the refrigeration capabilities of the system are terminated. A common symptom that the system has a leak is that the compressor runs continuously, but no cooling is obtained.

### 2. The Oscillator Transformer Assembly

This assembly consists of a dual-voltage transformer and a solid-state oscillator. The oscillator is in operation on DC only and its only function is to invert the 12-volt DC power supply to 110 volts AC. The dual-voltage transformer ensures that the correct AC voltage (20V AC) is supplied to the swing motor compressor.

### 3. The Thermostat

This item is an adjustable temperature cold control that senses the temperature within the refrigerator and maintains it at the desired setting. Should this control fail, it may produce two different reactions: (a) The refrigerator will not operate and the unit will begin defrosting, or (b) the unit will not cycle but will run continuously, with the result that refrigeration temperatures are extremely cold in some cases, causing foodstuffs such as milk, soft drinks, or other liquids to freeze.

Troubleshooting your refrigerator becomes much easier if the conditions of operation with relation to the malfunction are known. An inoperative unit, dependent upon what component has caused the malfunction, has certain symptoms that, if known, will facilitate repairs. These symptoms are:

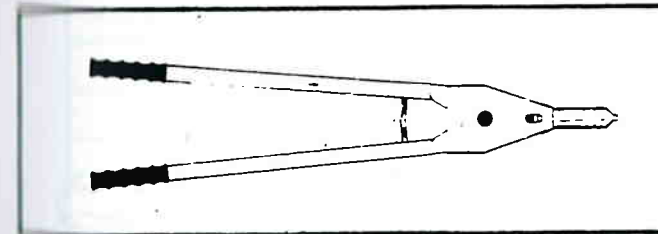
1. **Insufficient Cooling (compressor does not run)**  
Gas leak or defective contacts at thermostat  
Short circuit in motor, blown fuse, broken power supply cord or faulty transformer connections  
Transformer burned out  
Incorrect voltage supply
2. **Insufficient Cooling (compressor runs)**  
Refrigerant leak  
System freeze-up, clogging or uneven distribution of compressor oil (shut off until cool, run for 5 minutes, shut off, run for 5 minutes, and repeat).  
Dirty condenser  
Insufficient cooling air to condenser
3. **Refrigerator Too Cold**  
Thermostat incorrectly set, points worn, shorted or grounded out  
Loose thermostat capillary tube
4. **Abnormal Loud Noise**  
Loose parts in machine compartment  
Compressor mounting springs touching
5. **Compressor Does Not Operate On Both AC And DC**  
Polarity reversed  
Weak battery  
Faulty thermostat  
Oscillator defective  
Faulty transformer
6. **Intermittent Running**  
Oscillator transistors shorted
7. **Excess Frost Build-Up**  
Too much food stored blocking cooling air movement  
Defrost refrigerator

# MC-9 MAINTENANCE MANUAL

## SERVICE TOOLS

Some of the tools used for the maintenance procedures outlined in this section are nonstandard. They are, however, available for purchase from Motor Coach Industries, Transportation Manufacturing Corporation and Universal Coach Parts. Where practical, they may be fabricated by the service facility.

### HAND RIVET GUN (AVDEL NO. 165)



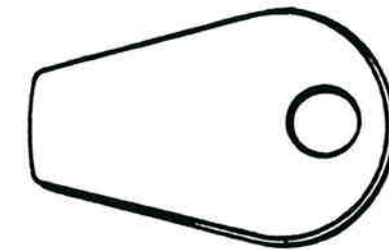
20-161 (C/W tip for 1/4" Monobolt Rivets)

### POWER RIVETER (GH743) 20-160



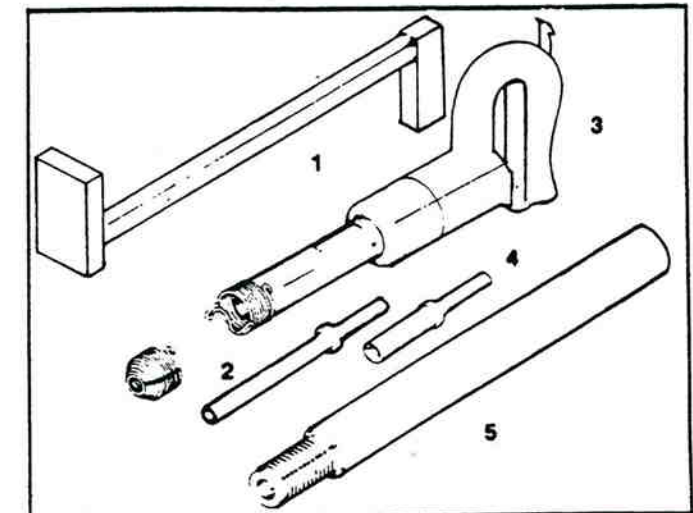
(also available, lighter duty No. GH703 not shown)

- 20-170 Nosepiece - 1/4" Monobolt Rivet
- 20-160 Pulling Head - 3/16" Cherry "N" & Cherry "Q" Rivets
- 20-162 Pulling Head - 3/16" Cherry "C" Rivets



3J-15-150: Dzus Tool

### Bucking or Squeezing



- 20-7: Buck Riveting Tool Kit - for brazier head, universal head, round head and flat head rivets of aluminum, steel or copper.  
Consists of:
1. Rivet Bucking Foot.
  2. 5/32" Brazier Head.
  3. CP-4444 "A" Pneumatic Hammer Pistol Grip.
  4. 7/32" Brazier Head.
  5. Bucking Dolly Tool Holder.



