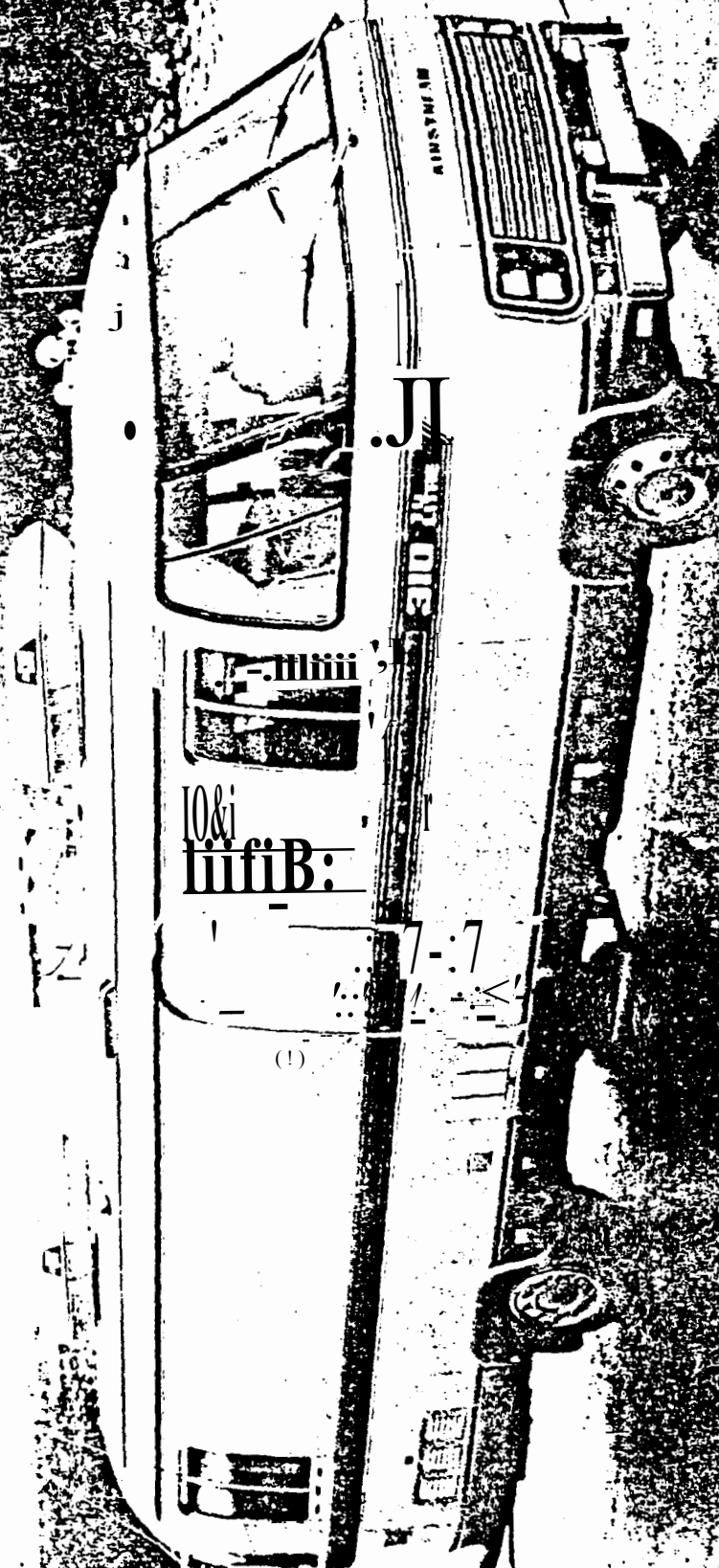


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Airstream Motor Home Owner's Manual



AIRSTREAM MOTORHOME SERVICE MANUAL

This manual includes procedures for maintenance and adjustments, service operations, removal and installation for components, including options for Airstream motorhomes.

The Section Index on the following page enables the user to quickly locate any desired section. At the beginning of each section containing more than one major subject is an Index, which gives the page number for each major subject.

Airstream motorhomes are built on a Chevrolet P-32 forward control motorhome chassis. The proper servicing of these chassis is a primary concern of the Chevrolet Motor Division of General Motors Corporation, and their dealer's service departments are equipped and trained to handle such problems. We encourage Airstream dealers to refer all other problems to their nearest Authorized Chevrolet dealer, or Isuzu dealer.

Major component suppliers, such as Chevrolet, Isuzu, Kohler and Onan, have detailed service manuals available. An order blank for the Chevrolet manuals is located in the back of the Chevrolet Driver's Manual furnished with each motorhome. Isuzu, Kohler and Onan manuals may be purchased through their distributors or dealers.

All information, illustrations and specifications contained in this literature are based on the

latest product information available at the time of publication approval. The right is reserved to **make** changes at any time without notice.

Airstream, Inc.
Jackson Center, Ohio 45334

SECTION INDEX

CHASS IS	A
EXTERIOR	B
INTERIOR	C
WATER SYSTEM	D
DRAINAGE SYSTEM	E
L.P.G	F
ELECTRICAL SYSTEM	G
ICE MAKER	H
FURNACE	I
AIR CONDITIONER	J
WATER HEATER	K
RANGE AND OVEN	L
REFRIGERATOR	M

Engine battery condition lead wire comes from fuse on generator
so does power on lead.

CHASSIS

PERIODIC INSPECTION & MAINTENANCE	A-1
DIESEL ENGINE REMOVAL	A-3
TRANSMISSION (DIESEL UNITS ONLY)	A-4
AIR FILTER	A-5
RACOR FUEL FILTER	A-6
DRAINAGE	A-8
ENGINE REMOVAL AND REPLACEMENT (Chevrolet) ..	A-11
DRIVE SHAFTS, 310 & 300 SERIES	A-13
REAR AIR SUSPENSION	A-15
LUBRICANT CAPACITIES	A-17
VACUUMATIC STEP	A-18
BUMPER ASSEMBLIES	A-20
CRUISE CONTROL	A-21
Signal Generator	A-24
Electrical Check Procedure	A-25
Trouble Shooting Guide	A-28
Speed Control System Tester	A-30
Speed Control Cable Replacement	A-32
AIRSTREAM AC-HEATER	A-33
WINDSHIELD WASHER/WIPER	A-35

Instrument Panel -

C - J

PERIODIC INSPECTION & MAINTENANCE

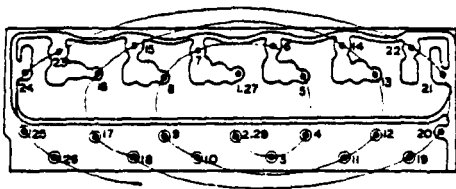
Cylinder Head & Associated Parts

Retightening of cylinder head bolts

Through hours of engine operation, the cylinder head is bedding down, requiring the cylinder head bolts to be retightened. When retightening the cylinder head bolts, make sure to tighten them to the specified torque. An offset 17MM wrench designed to enable you to retorquer head bolts without removing the valve train may be purchased from Isuzu dealers under the part #1-8511-1003-0. The standard tightening sequence are as follows:

Tightening torque: 11.5 kg-m
(83.2 ft-lb)
(If new bolts are used: 9.5 kg-m)
(68.7 ft-lb)

Sequence of tightening



When checking and retightening the cylinder head bolts, also check the manifold mounting and injection nozzle bracket nuts and tighten them to the specified torques, if found to be loosened.

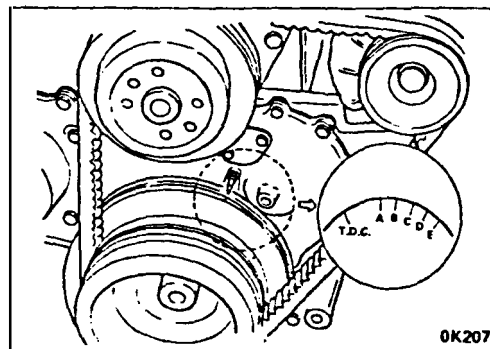
Tightening torque:
Manifold mounting nut 26.kg-m
Injection nozzle bracket (18.8
nut ft-lb)

Adjustment of valve clearances

Incorrect valve clearance will result in increased engine noise and lower engine output, thereby adversely affecting performance. Retorque rocker shaft bracket nuts before checking and adjusting valve clearance.

ADJUSTMENT PROCEDURE:

1) Bring the notched line (0-degree) on the pulley (4BD1) or pulley damper (6BD1) into alignment with the pointer as shown in figures below (or look through the hold in the lower part of the flywheel housing and align the TC mark on the flywheel with the pointer)

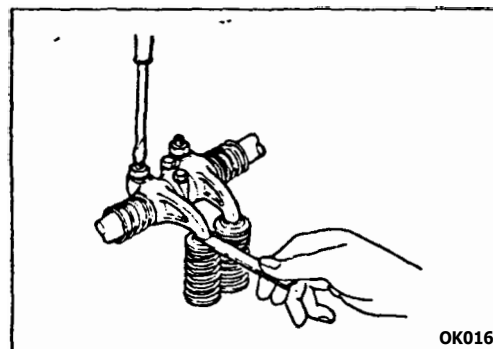


Then, check state of the rocker arms to find the cylinder in which the piston is at the top dead center on compression stroke. If the exhaust valve rocker arm on the No.4 (4BD1) or No.6 (6BD1) cylinder is held pushed down and intake valve rocker arm is about to be depressed, it indicates that the piston in the No.1 cylinder is at the top dead center on compression stroke.

2) To check to see if the piston in the No.4 (4BD1) or No.6 (6BD1) cylinder is at the top dead center on compression stroke, turn the crankshaft one full turn and check state of the rocker arms on the No.1 cylinder. If the intake valve rocker arm is about to be depressed, it indicates that the piston in the No.4 (4BD1) or No.6 (6BD1) cylinder is at the top dead center.

3) Adjust the valve clearances commencing with the cylinder in which the piston is at the top dead center on compression stroke. Adjust the clearance between the valve rocker arm and valve stem end, using a feeler gauge.

Valve clearance	Both intake & exhaust valves
(cold)	.04 mm (0.016 in.)



4) Adjust the clearance of the valves marked with circle if adjustment operation is commenced with the No. 1 cylinder. Adjust clearance of the valves marked with double circle if adjustment operation is commenced with the No. 4 (4BD1) or No. 6 (6BD1) cylinder. When valve clearance adjustment operation is completed, securely tighten the lock nuts and recheck the valve clearances.

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S'isbp	I	E	I	E	I	E	I	E	I	E	I	E
Tebk mfpqk k Kl+ F vifkabo p 'q QA@k 'ljmobppfk pqolhb+	0	0	0			0	0			0		
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DIESEL ENGINE REMOVAL

It is recommended that the following procedure be attempted only by qualified personnel.

Before starting this procedure, disconnect the batteries, drain coolant from radiator and engine block, drain transmission and engine oil.

1. The engine must be removed from the front of the vehicle. It will be necessary to remove the following in order to gain access:
 - A. Engine access door.
 - B. Center Grille Section.
 - C. Front Bumper.
 - D. Lower Center Plastic Shroud.
 - E. Engine Oil Cooler (Gas only)
 - F. Air conditioner condenser.
 - G. Sheet metal splash panels.
 - H. Radiator.
 - I. Radiator support frame.
 - J. Radiator shroud.
 - K. Front frame crossmember (cut so it may be welded back in place).
 - L. Second frame crossmember.
 - M. All hoses, lines, and wires must be disconnected from the engine assembly and laid back out of the way.
 - N. Remove engine accessory components which protrude and could be damaged, such as alternator, fan, power steering pump, air conditioner compressor, turbo charger.
2. From inside the vehicle:
 - A. Remove the complete engine cover
 - B. Disconnect exhaust pipe and remove.
3. From under the vehicle:
 - A. Support transmission and disconnect from engine at housing and flywheel.
4. Working from the front of the vehicle, position a lifting ring. Lift the engine enough to take the weight off the front engine mounts. Disconnect the engine from the mounts, then lift just enough to clear the mount attaching brackets.
5. Remove the mount attaching brackets from the frame engine mount members.
6. The engine can now be removed from the front of the vehicle. Use extreme caution to avoid damage to surrounding plastic or sheet metal components. Check frequently to make sure all electric and hydraulic lines have been properly disconnected.

TRANSMISSION (DIESEL UNITS ONLY)

Reprogramed Chevrolet 475 Turbo Hydra-Matic

IMPORTANT: This information must be provided to anyone repairing your transmission.

Only qualified personnel should be allowed to work on the transmissions in the diesel powered motorhomes. Should the transmission technician have any questions on the reprograming of the transmission he should be advised to contact Airstream, Inc. at (513) 596-6111. The transmission was reprogramed to obtain optimum performance with the diesel engine in the following manner:

1. The two orange springs were removed from the governor and one yellow spring installed.
2. Separator plate, gasket and check balls were changed.
3. Installed governor stabilizing orifice in valve body passage at bottom of No. 2 governor tube bore.
4. Installed an additional blue spring inside of the existing blue spring in the 3-2 shift valve.
5. Vacuum modulator replaced with mechanical modulator.
6. Pink spring installed on modulator valve.
7. The modulator valve was modified by grinding outside land down to the diameter of the valve shank.
8. Installed Trans Star filter.

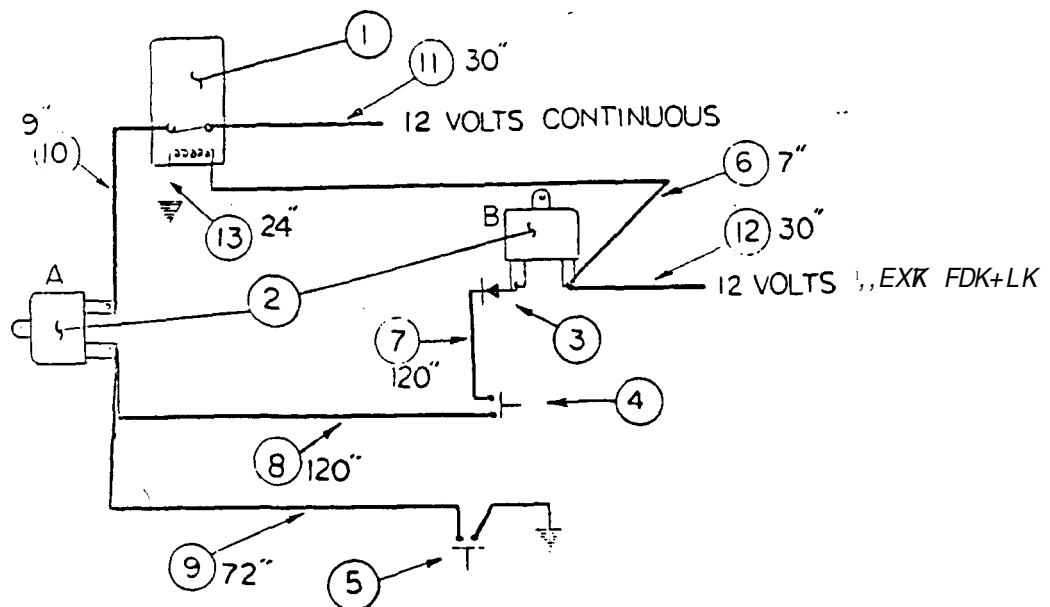
ALLISON 545 TRANSMISSION

If your motorhome is equipped with an Allison Transmission we recommend only Allison trained personnel be allowed to service it. From the numbers stamped on the transmission they will be able to obtain a complete set of specifications from Allison's headquarters.

The following list of parts are items Airstream uses in conjunction with the installation of the Allison Transmission. Most transmission experts will recognize the parts by their physical appearance; however, this list including the manufacturer's name and part number may be useful in some instances.

Parking Brake	Detroit Diesel Allison	#6834476
Yoke, Brake Drum	Rockwell	#148NYS29
U-Joint	Dana	5-160 series 1480
Transmission Cooler	Hayden	#1299
External oil filter Element	AC	PF-897
Speedometer drive gear	Detroit Diesel Allison	#3756920
Cable, Trans Shifter	Felsted	Type 4333 (4 Serie 120 in.

ALARM SYSTEM, ALLISON TRANSMISSION



- | | |
|------------------------|--------------------------|
| 1. Relay N.C. | 9. Wire, Green, 18 ga. |
| 2. Buzzer | 10. Wire, Brown, 18 ga. |
| 3. Diode | 11. Wire, Yellow, 16 ga. |
| 4. N-Start Switch | 12. Wire, Red, 18 ga. |
| 5. Mercury Switch | 13. Wire, White, 16 ga. |
| 6. Wire, Red, 18 ga. | 14. Connector, 6 pc. |
| 7. Wire, Black, 18 ga. | 15. Connector, 2 pc. |
| 8. Wire, Black, 18 ga. | |

SEQUENCE OF OPERATION

Relay (1) is normally closed and is energized when the ignition is on. Buzzer "A" is disabled at this time. If the ignition is off 12 volts are applied to the positive side of Buzzer "A". If switch (5) is closed, Buzzer "A" will sound. (Switch 5 is mounted on the parking brake handle and is closed when the parking brake is off.) Buzzer "B" has 12 volts applied to the positive side when the ignition is on. When the parking brake is off, Switch 5 is closed. Switch 4 is normally open and is closed when the transmission is in neutral. Buzzer "B" now sounds until the parking brake is applied. Diode (3) prevents interaction between Buzzers A and B.

AIR FILTER

The K&N air filter on the Isuzu diesel is completely reusable. It may be washed in common dish soap and water, and rinsed from the inside out. When operating in extremely dusty conditions the filter, once dry, should be "misted" with a spritz bottle containing oil prior to reinstallation.

CAUTION: Under no circumstances should a high pressure air hose be used to dry filter or blow out dirt.

In normal operating conditions the filter should be cleaned every 30,000 miles. In adverse conditions, or if a loss of power is noted, it should be cleaned more frequently.

The air filter is mounted in front of the roadside front wheel inside a black canister. To remove for cleaning it is necessary to take the hose clamp off that holds the steel air intake tube to the support bracket inboard of the filter. This will allow the complete air filter canister to be lowered enough to loosen a second hose clamp attaching the air intake tube to the air filter. The air filter is held in the canister by one nut on the top.

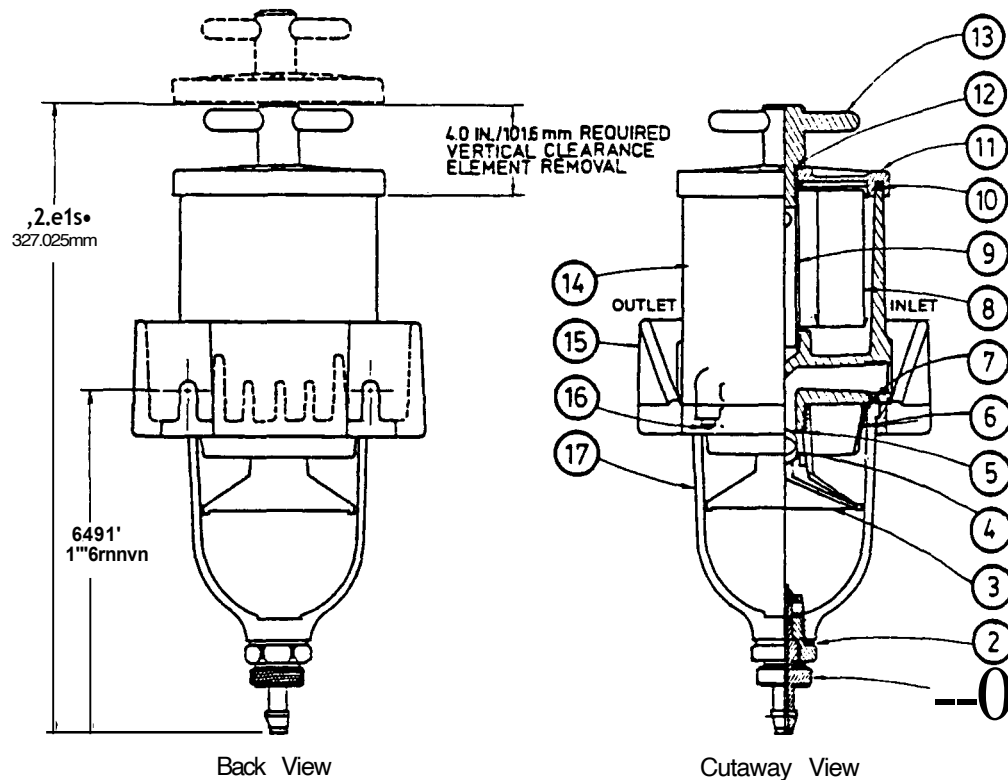
RACOR FUEL FILTER

The Racor fuel filter and water separator is located in the curbside front wheel well to the rear of the tire. A protective cover surrounds the filter, but is open on the top and bottom to allow the water to be drained and the filter changed.

The water should be drained from the filter every 2,000 miles or every other fuel fill. This is done by unscrewing the knurled fitting (by hand) on the bottom of the bowl until the water comes out. Once the liquid flow turns to fuel the fitting should be closed.

If the engine will not start after draining refer to the Isuzu instruction book for procedures on repriming the fuel system.

The diagrams and part number on the following page were provided by Racor, where parts may be purchased. A list of Racor Distributors is supplied in every diesel packet sent with the Isuzu powered motor-homes.



MODEL SOOFG

No.	Description		
1	Drain valve	14	Body
2	Bowl drain gasket	15	Ring/bracket
3	Turbine centrifuge	16	Bowl retainer screw (10-24:
4	Check ball	17	Clear bowl
5	Check ball gasket		
6	Conical baffle		Maximum Rated Flow 41/Min (1.05 GPM:
7	Bowl O-Ring		Port Size: 9/16" x 18 UNF Str Thd
8	Element		w/)-Ring
9	Return tube		
10	Lid gasket		
11	Lid		
12	O-Ring		
13	T-Handle		

DRAINAGE

The Racor fuel filter located in the rear of the curbside front wheel well should be routinely drained at 2,000 mile intervals, or every other fuel stop. At first glance it appears to be difficult because of the location. Once it's done the first time you will realize it's simple to reach under the protective cover and open the drain valve.

After opening the valve, fluid should be allowed to drain until it is solid diesel fuel. In some instances the engine may die shortly after starting when the air in the fuel filter, accumulated after draining, reaches the injectors. If the water in the filter has been drained routinely keeping the amount of fluid lost to a minimum, the engine will restart after very little cranking by the starter. If a large amount of fluid was lost fuel priming instructions should be followed as described in the Isuzu instruction booklet.

The filter element in the Racer fuel filter should be changed at each oil change. Contaminates in diesel fuel varies throughout the country and from supplier to supplier. It would not be unusual to find it necessary to replace the element at more frequent intervals.

If there is a loss of power and the filter has not been changed for a couple thousand miles, this would be the first step to take in locating the problem.

SERVICE

1. Remove lid.
2. Inspect gaskets. Replace only if necessary.
3. Remove element by means of bale.

4. Insert genuine Racor replacement element only, over center return tube with tuxning motion. See specification chart for correct element number.

5. Top off by pouring clean diesel fuel into filter cylinder until full.

6. Replace lid and hand tighten T-Handle.

SUMP OR BOWL MUST BE DRAINED AT OR BEFORE CONTAMINANT REACHES THE BOTTOM OF THE CENTRIFUGE ASSEMBLY.

WARNING: Use of additional methanol or alcohol based additives may damage the clear bowl or centrifuge.

MAINTENANCE AND TROUBLE-SHOOTING PROCEDURES

New Elements - Normal vacuum reading can be 1" to 5" at full governed RPM, depending on the hose ID, length, elbows, pump efficiency, and height of lift from tank.

Idle RPM should be "0" reading with clean element where pump capacity is dictated by engine RPM.

If vacuum reading does not return to 1" to 5" Hg after element change, check for the following:

Collapsed fuel lines:

Tank shut-off valves closed:

Plugged fuel lines:

If the inlet to the Racer filter/separator is plugged, disconnect inlet line, open drain petcock, and blow out with compressed air. In case of severe stoppages remove bowl and centrifuge unit and clean with compressed air.

Racer filter/separator systems eliminate the need for "sight glasses" to check air suction leaks. If air bubbles are rising from centrifuge action in the clear bowl, the air leak is between inlet side

of the Racor system and tank.

Check for:

- Loose fittings.
- Pin holes in lines.
- Cracked tank stand pipe.
- Out of fuel condition.
- O ring not seating.
- Improper flare angles on hose fittings.*

If no bubbles are noted in bowl and air suction is still evident, check outlet side of Racor system to fuel pump.

Check for:

- Loose fittings.
- Pin holes in line.
- O ring not seating.
- Improper flare angles on hose fittings.*
- Fuel pump seals.
- Bleed off fitting on top of Cummins fuel pump.
- Top gaskets on Racor filter/separator.

* (For example, a 37° flared female hose fitting pulled up tightly to a 45° male fitting sometimes causes a hair line crack, resulting in air suction.)

If Racor filter/separator is sucking air at bowl, drain fitting gasket or T-handle and top, and cannot be stopped by wetting gasket with fuel and HAND TIGHTENING ONLY, replace gasket.

BLEED BACK - If fuel in the filter/separator bleeds back to the tank an air leak or check valve seating problem is indicated. To inspect check valve seat remove bowl ring, bowl and turbine centrifuge, turning counterclockwise. (See parts diagram for identification of parts.)

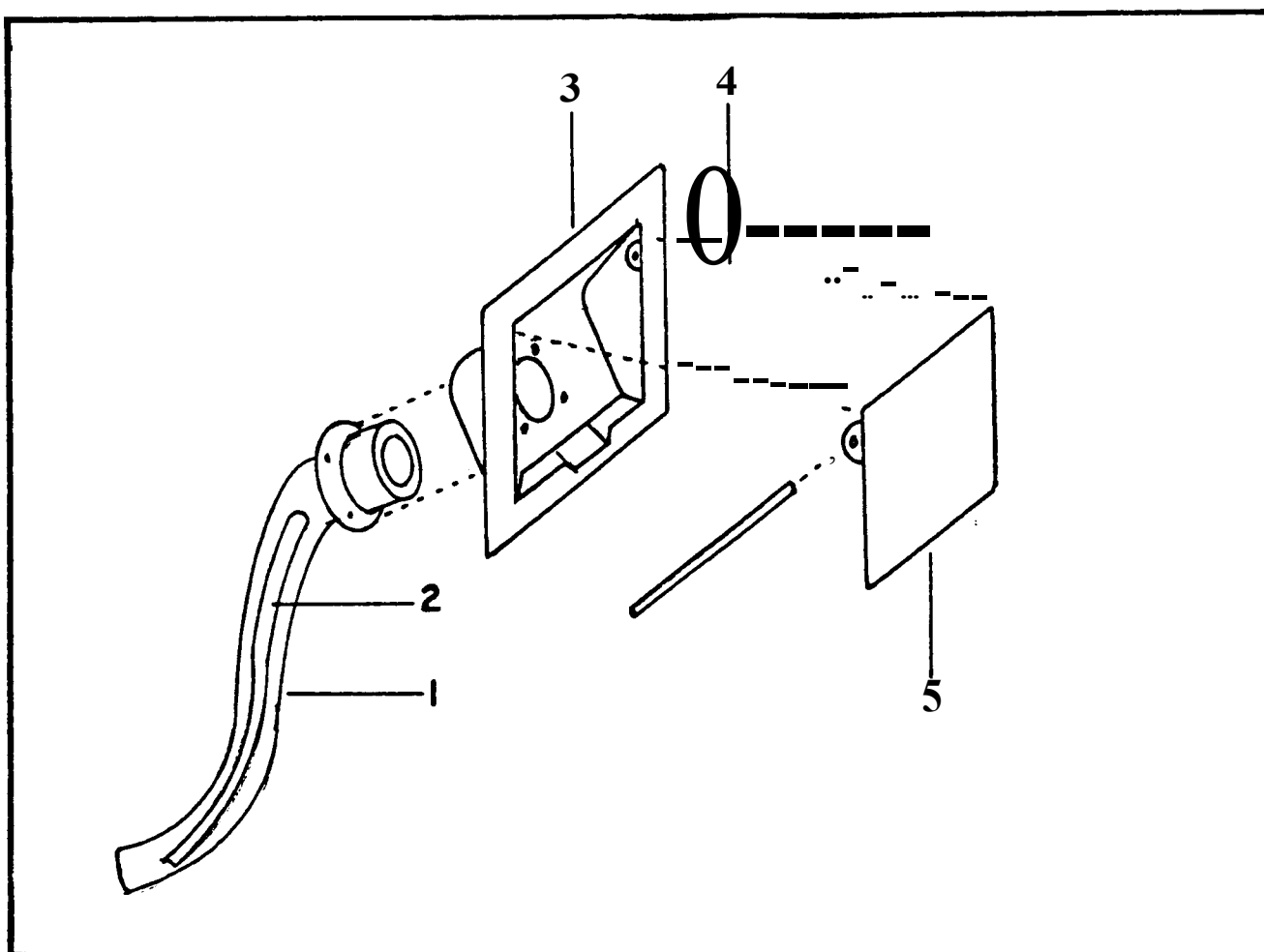
Inspect check valve and seat.

Clean or replace seat and check valve and reinstall centrifuge HAND TIGHT. Overtightening causes gasket to warp. Replace bowl ring gasket and reinstall bowl and ring. Fill unit with fuel.

Fuel additives, such as isopropyl, can cause the bowl to turn white or develop hair line cracks inside. It will also damage the centrifuge unit and coalescer cone. Use of fuel additives is NOT recommended. Water dispersing additives are not needed with the Racor system.

FUEL FILL NECK REPLACEMENT

1. Remove the four screws going through fuel fill housing into the flange of the fill neck.
2. From underneath unit remove hose clamps and hoses from the fill neck and vent tube ..
3. Remove all sealer from around fill neck and vent tube where they go up through floor.
4. By turning and twisting the fill neck it can be pulled out through the bottom.
5. When replacing hoses make sure they don't sag and form a trap that will make fuel fill ups difficult.



- 1. Fill Neck
- 2. Vent Tube
- 3. Fuel fill housing
- 4. Fuel cap
- 5. Fuel fill door

ENGINE REMOVAL AND REPLACEMENT (Chevrolet)

It is recommended that the following procedure be attempted only by qualified Chevrolet Dealer personnel. For more complete engine removal instructions, refer to the Chevrolet Light Duty Truck Service Manual.

Before starting this procedure, disconnect the batteries, drain coolant from radiator and engine block, drain transmission and engine oil.

1. The engine must be removed from the front of the vehicle. It will be necessary to remove the following in order to gain access:
 - 1a) Engine oil cooler
 - 1b) Air conditioner condenser
 - 1c) Sheet metal splash panels
 - 1d) Radiator
 - 1e) Radiator support frame
 - 1f) Radiator shroud
 - 1g) All hoses, lines, and wires must be disconnected from the engine assembly and laid back out of the way.
 - 1h) If the vehicle is equipped with a California type emission control system, all of the components attached to the engine must be removed.
 - 1i) Remove engine accessory components which protrude and could be damaged, such as alternator, fan, power steering pump, air conditioner compressor.
2. From inside the vehicle:
 - (a) Remove the complete engine cover.
 - (b) Remove carburetor and distributor.
3. From under vehicle:
 - (a) Remove oil filter and filter valve.
 - (b) Disconnect right and left exhaust pipes.
 - (c) Support transmission and disconnect from engine at housing and flywheel.
4. From Wheel Wells:
 - (a) Raise front of vehicle and remove both front wheels to provide access.
 - (b) Working in the wheel wells, remove right and left exhaust manifolds.
5. It will be necessary to fabricate an engine lifting tool as follows:
 - (a) Cut a piece of 3/8" or 1/2" steel plate to fit over the carburetor mounting location on the intake manifold.
 - (b) Weld a 3" ring, or similar fabricated "U" bracket to the center of the steel plate, to form a lifting ring. This ring must be of heavy enough stock to act as the lifting ring and support the engine.

- (c) Drill holes through the plate corresponding to the carburetor mounting points. Attach the fabricated lifting tool to the intake manifold, using hardened steel cap screws.
- 6. Working from the front of the vehicle, position a lifting ring. Lift the engine enough to take the weight off the front engine mounts. Disconnect the engine from the mounts, then lift just enough to clear the mount attaching brackets.
- 7. Remove the mount attaching brackets from the frame engine mount members.
- 8. The engine can now be removed from the front of the vehicle. Use extreme caution to avoid damage to surrounding plastic or sheet metal components. Check frequently to make sure all electric and hydraulic lines have been properly disconnected.

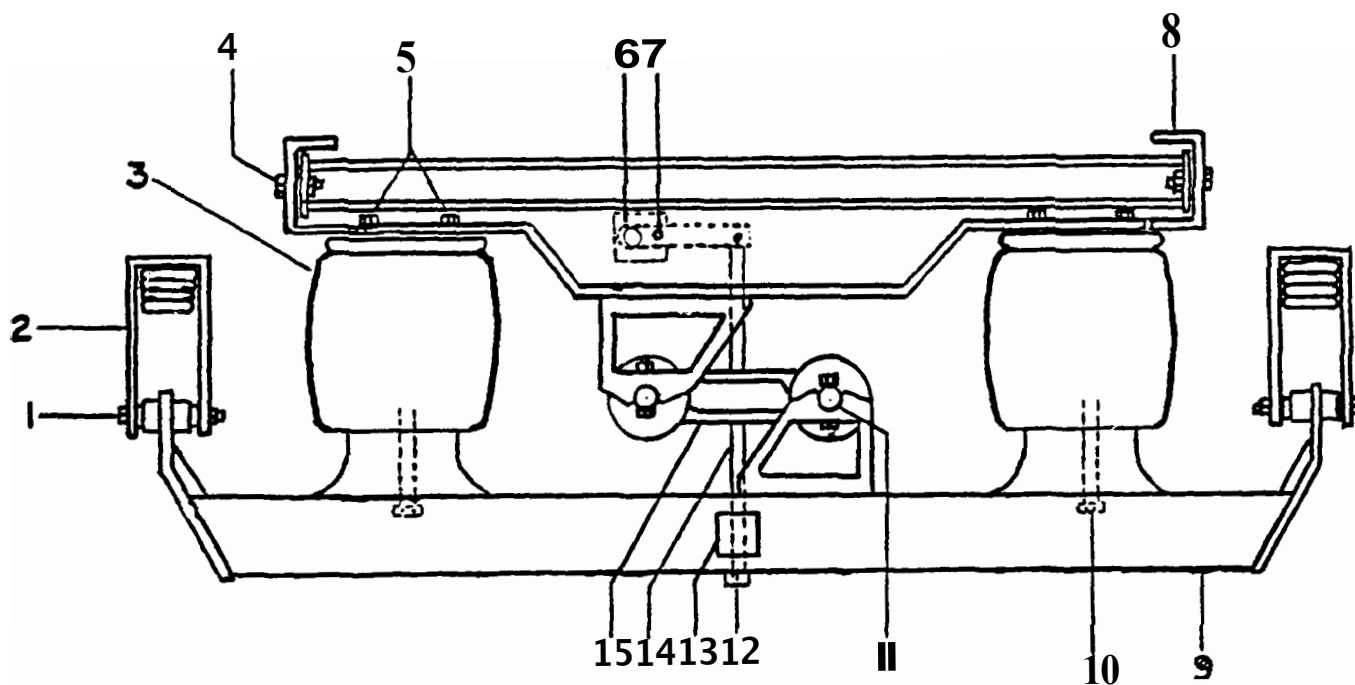
DRIVE SHAFTS, 310 & 300 SERIES

The three piece drive shafts on the 310 and 300 series motorhomes is installed on the Chevrolet chassis by Airstream. Replacements are available through the Airstream Parts Department.

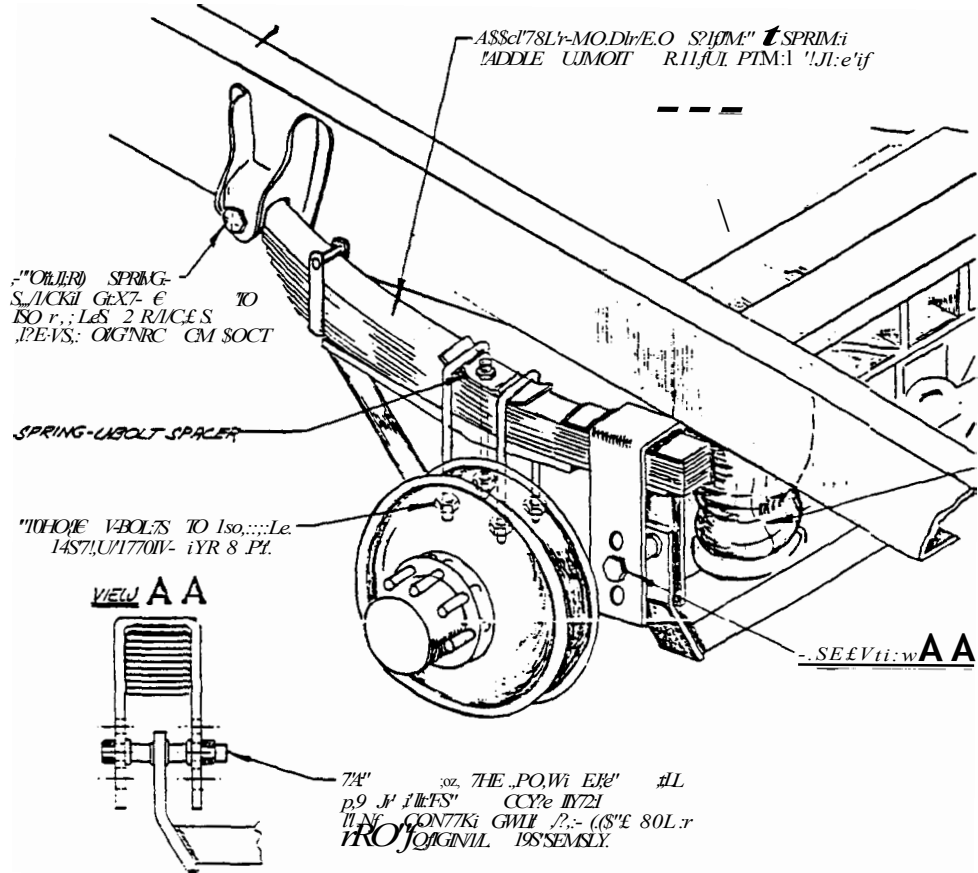
Carrier bearings are DANA/SPICER #210391-1X and are commonly available through automotive parts dealers. Universal joints are DANA/SPICER #S-160X and are also readily available.

AIR RIDE ASSEMBLY, AMERICAN CARRIER

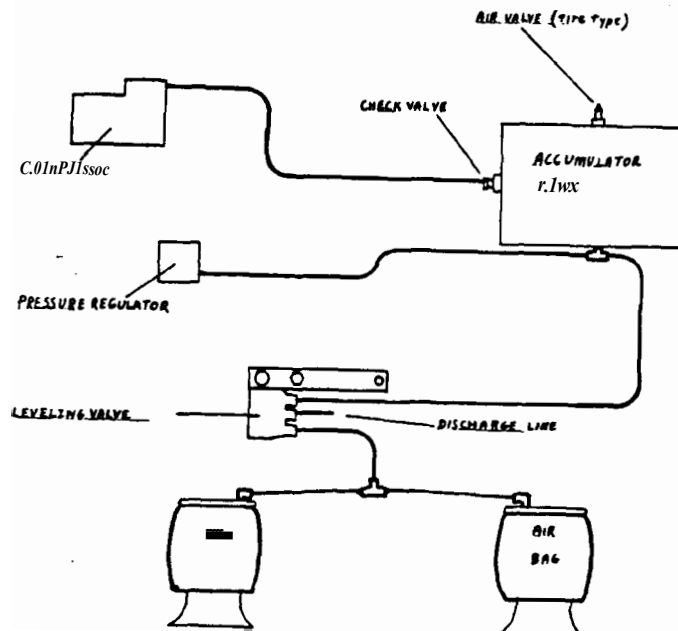
1. Rear shackle bolt
2. Stirrup
3. Air bag
4. Bolt, 1/2-20 Grade 5
5. Bolt, bag mounting, upper
6. Leveling valve
7. Adjusting nut, valve arm
8. Chassis frame
9. Support beam air bag
10. Stud, bag mounting lower
11. Straddle pin
12. Mounting tab, metering arm
13. Serial number plate
14. Height metering arm
15. Transverse rod



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AIR LINE SCHEMATIC



REAR AIR SUSPENSION

The rear air suspension is manufactured by American Carrier and installed on the Chevrolet chassis by Airstream.

A 12 volt compressor, powered from the accessory side of the automotive fuse block provides the air supply to the system. The compressor and pressure regulator is mounted in the roadside rear storage compartment. The air supply tank is located underneath the unit directly behind the fuel tank.

The logic of the air system is as follows: The compressor supplies air pressure through a check valve into the air supply tank. The air supply tank provides pressure to the intake side of the leveling valve. When the leveling valve is opened by the body of the coach lowering over the chassis, the air pressure is supplied to both air bags through a "T", raising the coach back to the proper height.

COMPRESSOR

The compressor is fused at the automotive fuse block. The 12 V power is only available at the compressor when the ignition key is in the "ON" or accessory position. The power is fed to a set of points in the pressure regulator. When the air pressure at the regulator drops below 85 psi the points close, sending the 12 V current on to the compressor motor.

The compressor motor will run until the air pressure reaches 100 psi and the points in the regulator open. The pressure regulator may be adjusted.

AIR SUPPLY TANK

Three parts are used on the tank. The adapter fitting in the tank where the inlet line attaches contains a check valve to prevent air pressure from leaking back out through the compressor. The exhaust port is teed with one line going to the leveling valve and the other line going to the pressure regulator. The third port is the tire type air valve on the bottom of the tank. This air valve should be depressed frequently to prevent water that is formed by compressing air, from building up in the system and damaging components. A good idea is to routinely depress the valve at each oil change. This valve may also be used to pressurize the system from an outside source if the compressor should fail.

LEVELING VALVE

A link, attached to the air bag support beam on the bottom and the leveling valve arm at the top, acts as a measuring device monitoring the height of the body above the chassis. If the body lowers over the chassis because of added weight or loss of air, the link will raise the leveling valve arm allowing more air pressure into the air bags. The height of the coach may be varied a small amount by adjusting the leveling valve arm in relation to the nylon blocks it is mounted against.

This is accomplished by loosening the mounting nut and sliding the slotted arm up or down over the mounting bolt as desired. **WARNING:** Movement of the leveling valve arm may cause a sudden lowering of the vehicle body. Caution must be used to avoid becoming trapped or pinned under the vehicle.

Three air ports are on the leveling valves. The port by itself feeds the air pressure to the air bags. The other two ports are side by side. The inside port (closest to the mounting plate) is the intake from the air supply tank. The outside port is exhaust air being expelled from the bags.

The valves have a built-in time delay system to prevent air from constantly being expelled and taken in by the air bags. When adjusting the valves for height they will have to be held in the desired position for approximately 30 seconds before air will pass through the valve. If air passes immediately through the valve it is defective and should be replaced. The delay in the valve is regulated by a fluid with a consistency of about 40 weight oil. The valves should not be opened for repairs. The ideal height for all around ride and clearance is 10" measured from the top of the air bag support beam to the bottom of the main frame chassis rail. It is normal for this measurement to vary as much as 1/4" from side to side.

AIR BAGS

The air bags are a simple rubber bladder that will not need any servicing. If a bag develops a leak it is replaced by removing the two 3/8 bolts fastened down through the top and the threaded rod that goes up through the bottom. Remove air line and the bag **will** slide out from in between the support beams.

LEAF SPRING ASSEMBLY

The "Stirrup" going over the top of the rear of the leaf spring and attaching to the lower air bag support beam has three different mounting holes. If the height of the rear of the coach needs to be altered to any great amount, one of the other mounting holes may be used. Spring assemblies should only be removed by qualified personnel. The front and rear spring mounting bolts appear to be identical but are of a different temper. Care must be used to make sure they are not switched from one mounting location to the other. The torque specification on the shackle bolt is 150 ft. lbs.

The rear mounting bolt through the stirrup should only be tightened until all pack surfaces are in firm contact. Torque specifications on the "U" bolts is 180 ft. lbs. and should be retorqued after test riding for at least five miles.

REAR SUSPENSION 325-345 SERIES

The rear suspension on the 325 & 345 series motorhomes consist of the American Carrier Air Ride assembly on the drive axle and Dura-Torque tag axle. The Dura-torque axle is the same construction as the axles used on the Airstream trailers for many years.

Both the 325 and 345 series use a leveling valve at each wheel of the tag axle. If the weight of the coach increases the valves will open increasing the air pressure in the air bags on the drive axle. With the leveling valves mounted on the tag axle the weight is kept more or less constant on the tag and varied on the drive axle. This configuration prevents the tag axle from becoming over loaded and traction being lost on the drive axle.

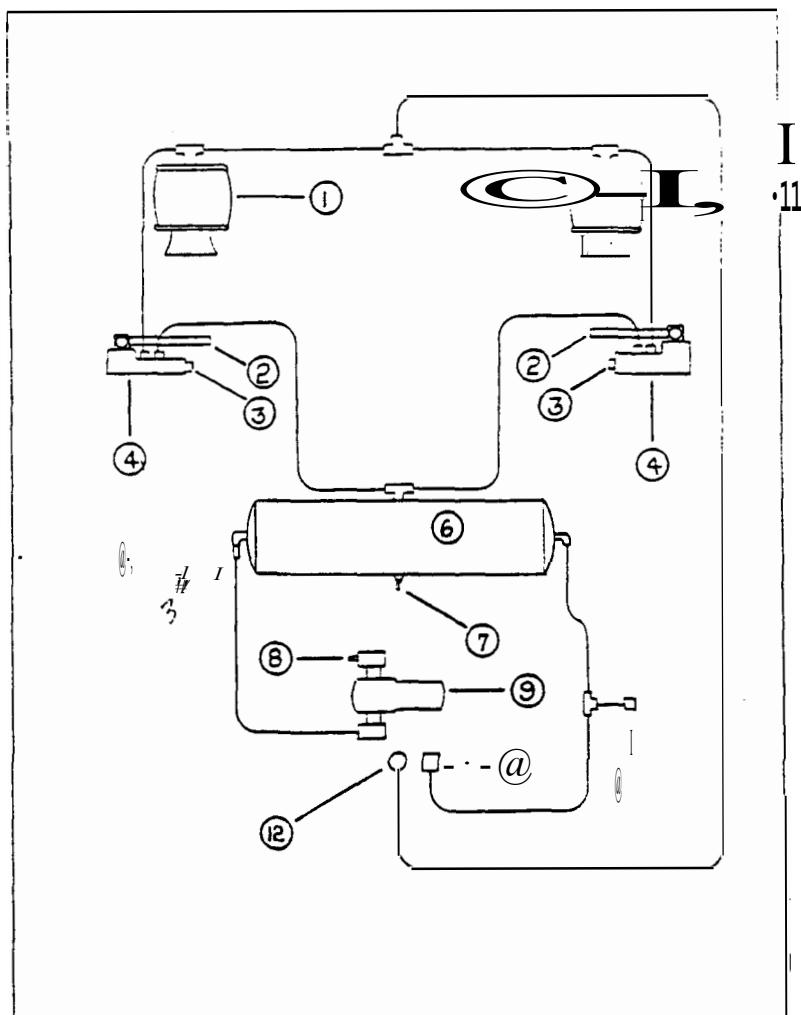
The air compressor, relay and pressure switch is located in the cabinet on the curbside in the rear of the coach. Main power to the relay comes from an automatic circuit breaker mounted next to the isolator. Power to activate the relay comes from the automotive fuse block. The terminal used is only "hot" with the ignition key turned on.

If the air in the accumulator tank drops below approximately 80 psi the pressure switch will close completing the circuit from the relay to the compressor motor; but, only if the ignition key is "on". The pressure switch breaks the circuit when 100-110 psi is reached in the tank.

On the bottom of the air tank is a tire type air valve. The stem should be depressed to allow any moisture to be expelled, whenever the engine oil is changed. This air valve may also be used to pressurize the system in case of failure.

AIR LINE SCHEMATIC

325 & 345 MOTORHOME



- 1. Air Bags
- 2 • Activating lever, leveling valve
- 3. Exhaust port, leveling valve
- 4. Leveling valve
- 5 • Check valve
- 6. Accumulator tank

- 7. Port, tire type
- 8 • Relief valve
- 9 • Compressor
- 10. Switch, high pressure
- 11. Coupling, hose push type
- 12. Switch, low pressure

THEORY OF OPERATION

The two leveling valves are the heart of the system. They have three ports. One port has high pressure air coming to it from the air accumulator tank. An air line from a second port runs to the air bag. The third port is for exhausting air if the pressure in the bags needs reduced.

The activating lever of the leveling valve is attached to the swing arm of the tag axle, while the valve body is attached to the chassis. If weight is added to the motorhome the swing arm of the tag axle, with the

activating lever attached, is forced up. The activating lever opens the ports in the leveling valve allowing higher air pressure into the air bags. As the air bag increases in pressure and the motorhome raises, the tag axle swing arm returns to its normal position and the activating lever closes the ports in the leveling valve.

With the system plumbed in this manner, the weight on the tag axle is kept constant while the varying load rests on the drive

axle. This system prevents the tag axle from being overloaded and obbing traction giving weight from the driver's axle. There is a short delay (much shorter than on single axle systems) built into the leveling valves to prevent the fluctuation of air pressure in the bags as the normal highway bumps are encountered. The leveling valves are adjusted at the factory and no further adjustment should be required.

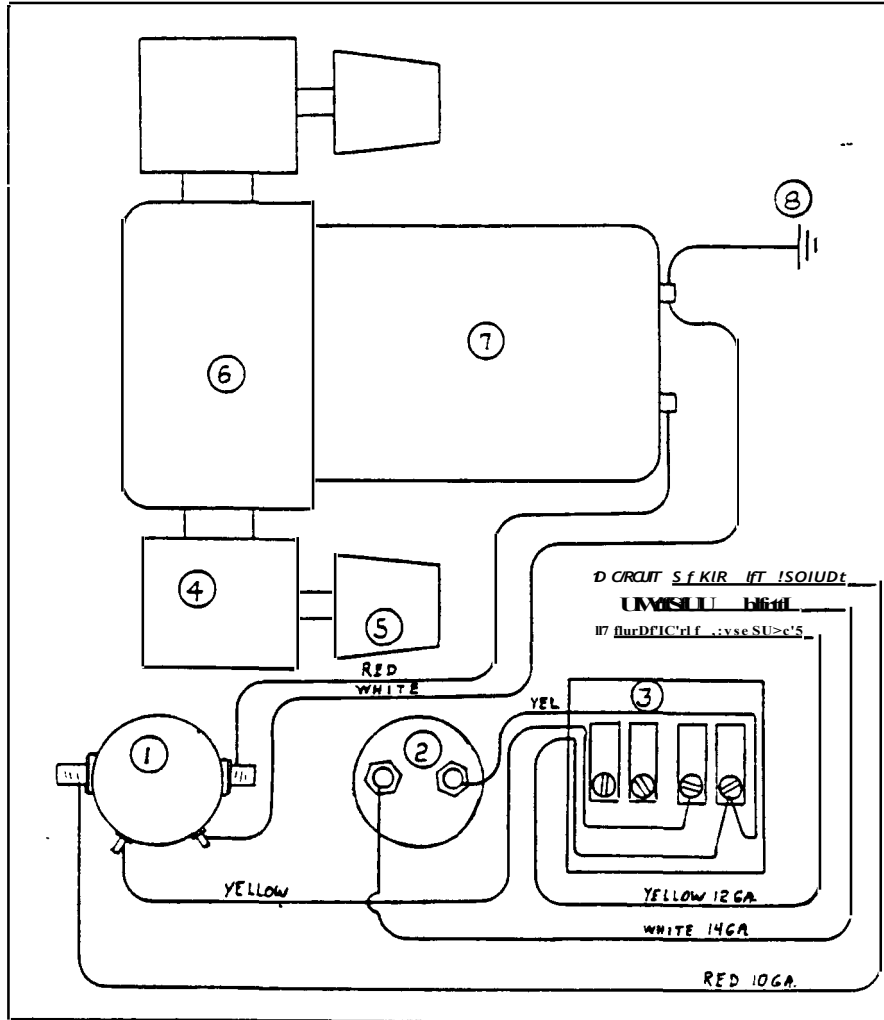
The compressor and high pressure switch work together to keep the air pressure in the accumulator tank between 80 and 105 psi that is needed for the air bags to support the weight. Since compressing air forms moisture, a tire type air valve is located on the bottom of the tank. This valve should be depressed during each engine oil change to allow any water in the tank to be expelled. If the motorhome is operated in constant high humidity the moisture should be expelled on a more frequent basis. This tire type air valve can also be used to pressurize the system if the compressor should fail to operate.

An air coupling, accessible in the large luggage compartment, has been provided so customers may tap into the system and use the air pressure for inflating tires, air mattresses etc.

The low air pressure switch performs one function. If the air pressure in the bags drops below 30 psi the switch closes and provides current to the low air warning light on the dash. If the motorhome has not been used for a couple of days it is normal for the light to come on when the unit is first started, but the compressor should build the pressure up quickly. If the warning light does not go out, the motorhome should not be used until the system is corrected. In an emergency the unit may be driven at speeds under 30 MPH and distances not to exceed 40 miles. If road surfaces are irregular the speed must be reduced even further.

WIRING- AIR SUSPENSION COMPRESSOR

325 & 345 Series



1. Relay
2. Switch, low air pressure
3. Switch, high air pressure
4. Cylinder head, compressor

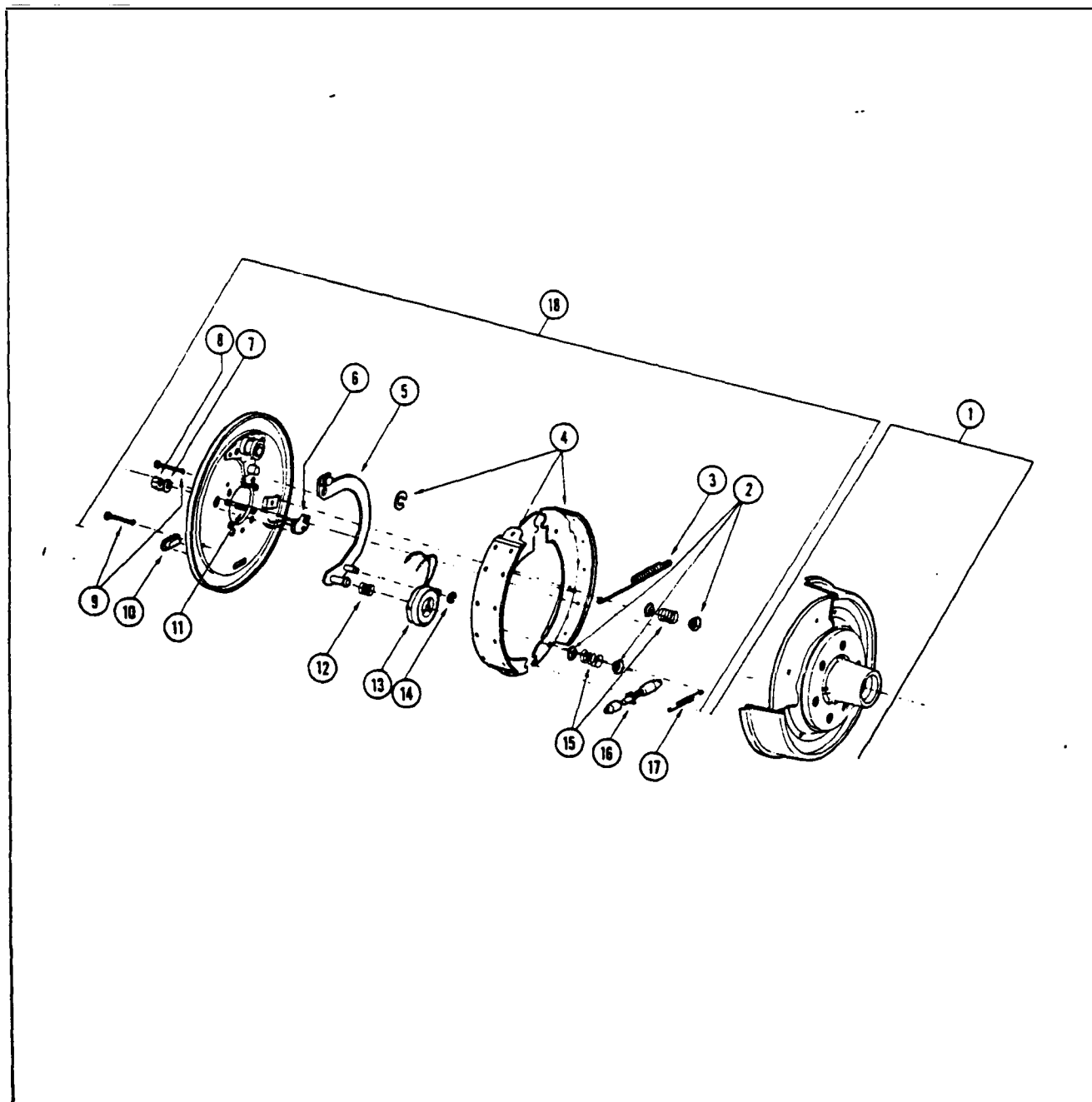
5. Filter, air intake
- 6 • Housing, crank and fan
- 7 • Motor, compressor
8. Ground connection on inside wa:

THEORY OF OPERATION

Constant 12 volt power is provided on one side of the relay from an automatic circuit breaker located at the front of the motorhome next to the isolator. Power, when the ignition is turned "ON" is provided to the high pressure switch from the automotive fuse block. If the pressure to the leveling valve drops below 80 psi the point in the high pressure switch closes and power to activate the relay is obtained. When the relay is activated the circuit is completed through the heavy terminals of the relay and the compressor runs. When the air pressure is built back up to

approximately 105 psi the points on the pressure switch open, deactivating the relay which cuts the power off to the compressor. Remember, the ignition must be "ON" for there to be power at the high pressure switch. The low pressure switch picks up power by being connected, inside the high pressure switch, to the same terminal picking up current from the automotive fuse block when the ignition is "ON". If pressure to the air bags drops below 30 psi the switch closes, and power is supplied to the low air warning light on the dash. It is normal for the light to come on if the motorhome has not be

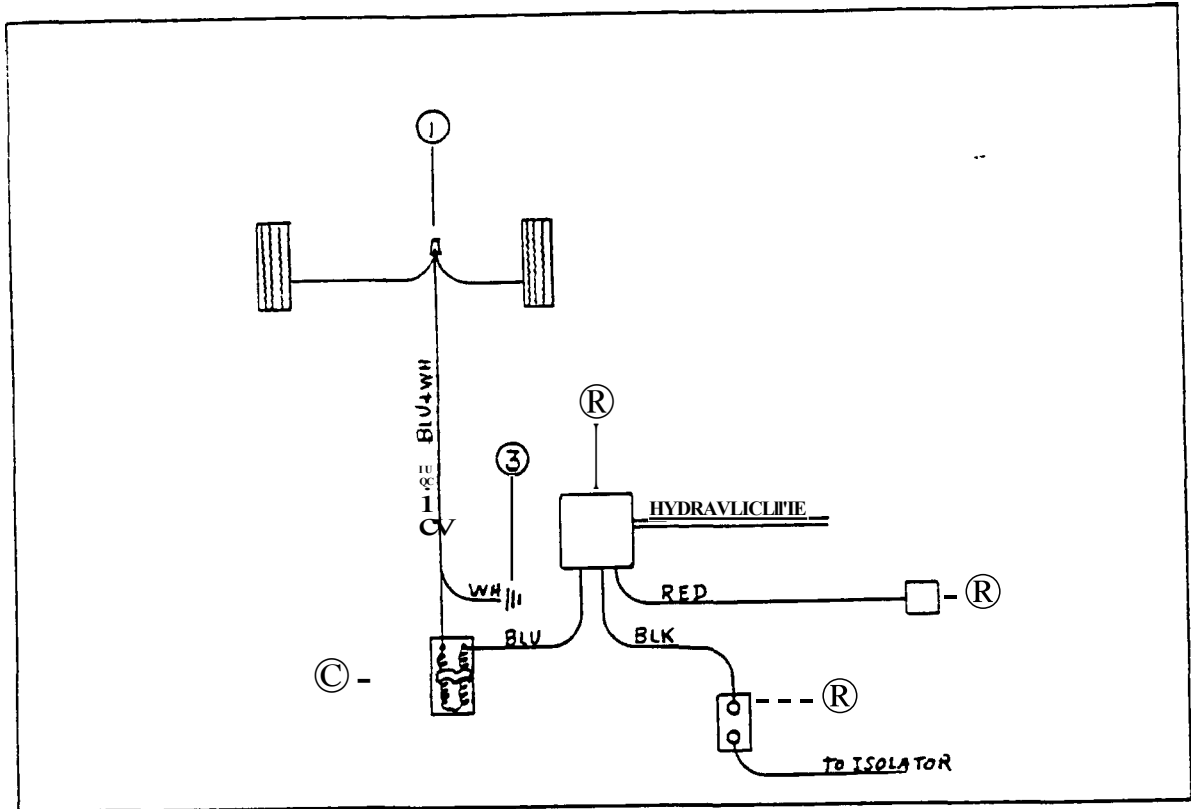
TAG AXLE ELECTRIC BRAKE ASSEMBLY



KELSEY-HAYES BRAKE ASSEMBLY 12 "

- | | |
|---|------------------------------|
| 1. Unicast hub and drum | 10. Brake adj. hole cover |
| 2. Hold down cups | 11. Brake mounting stud |
| 3. Retractor Spring | 12. Magnet spring |
| 4. Shoe and lining (1 primary, 1 secondary) | 13. Magnet assembly |
| 5. Lever (RH, LH) | 14. Magnet retaining ring |
| 6. Connector (magnet leads) | 15. Hold down springs |
| 7. Brake mounting washer | 16. Adjusting screw assembly |
| 8. Brake mounting nut | 17. Adjusting screw spring |
| 9. Hold down pins | 18. Brake assembly (RH, LH) |

WIRING - TAG AXLE BRAKES



- .. Tee, brake wire
- .. Brake Controller
- 3. Ground, next to resistor

- 4. Resistor
- 5. Circuit breaker, automatic
- 6. Brake light switch, Chevrolet

THEORY OF OPERATION

Power to the brake controller comes from an automatic circuit breaker mounted next to the isolator. When the brake pedal is depressed, hydraulic pressure, picked up from the Chevrolet brake system, forces points over a resistor in the controller. The harder the brakes are pushed the further the points move, increasing the current output. Pushing the hand lever over in the controller performs the same function. A second set of points in the controller provides full 12 volt current to the brake lights. The connection is made next to the Chevrolet brake light switch.

When operated, the current out of the controller goes to a resistor, then on back to the brake magnets. Without the resistor the brake action would be too "strong" and the tag axle brakes would lock-up prematurely. The amount of resistance is preset at the factory. Once the tag axle brakes are "worn" in it may be necessary to adjust the resistor to prevent premature brake lock up.

CHECKING ELECTRICAL BRAKE SYSTEM

The test instrument needed is a D.C. ammeter with a minimum range of 0-10 amps.

NOTE: Whenever connecting the ammeter you can avoid possible damage to the ammeter by connecting one lead then just touching the other lead quickly. If the needle goes the wrong way you have reversed the polarity. To correct, simply reverse the leads, then complete the connection.

1. Checking complete circuit

A. Connect both wires going to resistor on the same terminal so the resistor will be bypassed.

B. Connect ammeter as shown in Figure 1.

C. Now operate controller slowly. The lowest reading when the ammeter cuts in should be 1-2 $\frac{3}{4}$ amp.

D. Move controller completely to the right. Maximum reading should be 6.0-6.5 amps.

If the ammeter registers the correct high and low readings and shows smooth current modulation, you may assume that the controller is functioning properly. If you do not show the correct high and low, or the modulation is poor, check the following electrical circuit problems.

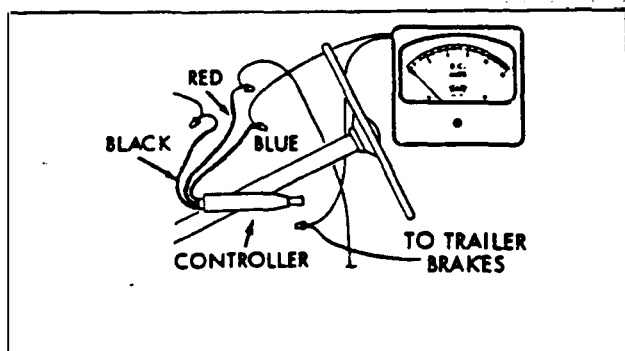


Fig 1.

1. Check connections.

a. At circuit breaker leading to controller.

b. Connections on controller wires.

c. Connections on resistor.

d. Connection at rear axle where brake wire "tees" off to each wheel.

e. Connection to brake magnet leads at wheels.

f. Connection to electrical ground next to resistor.

2. Controller check.

a. Remove controller from vehicle and connect leads as shown in Figure 2.

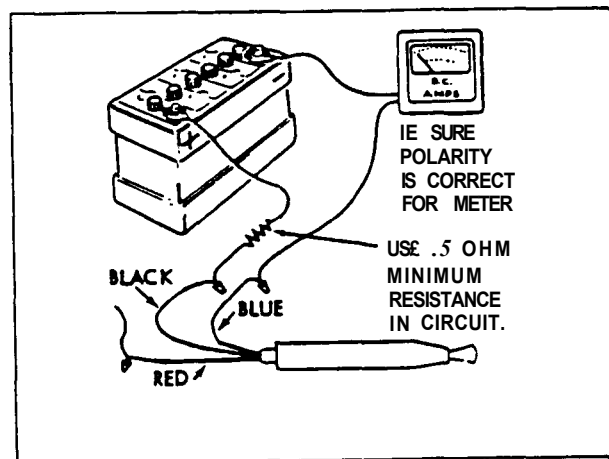


Fig. 2

The ammeter should vary smoothly from "off" to "on". If it does not vary smoothly or shows no current when the controller is at full "on", remove the controller cover and inspect the resistor coil. If the coil is burned out replace controller. A burned out coil can be detected by visual inspection.

WARNING: The resistor coil should last indefinitely under normal operating conditions. If the coil is burned out, carefully check the entire electrical system for a short circuited condition. A short circuit can damage any electric brake controller.

3. Magnet check.

- a. Remove magnet and connect as shown in Figure 3.
- b. Wiggle magnet leads and rap on magnet.
- c. If ammeter shows any current a short is indicated and magnet should be replaced.
- d. Reconnect magnet as shown in Figure 4.
- e. Current reading should be 3.0 to 3.5 amps. If not replace magnet.

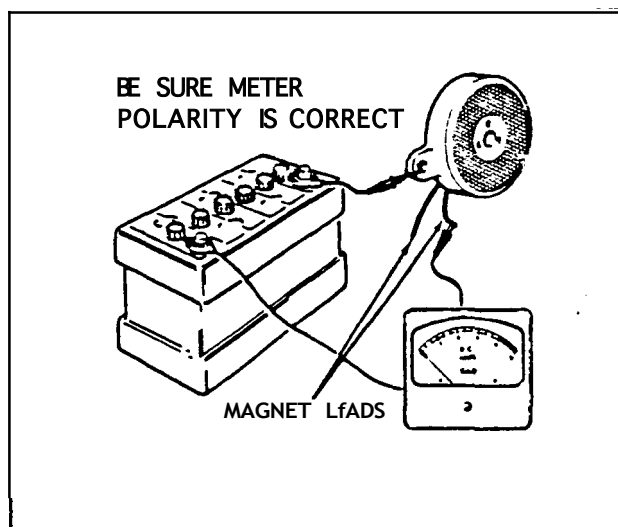


Fig. 3

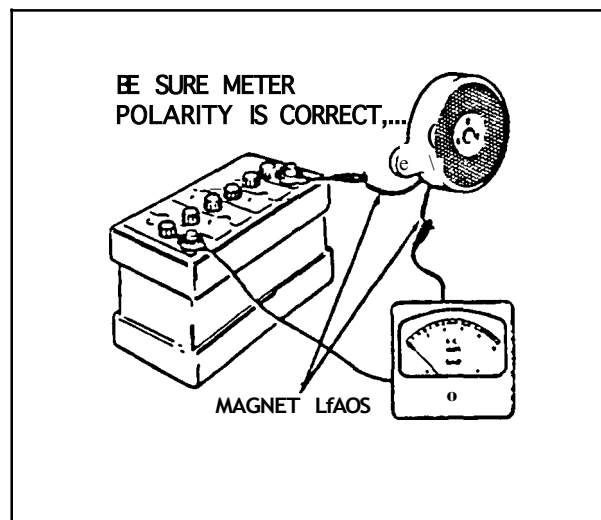


Fig 4

CHECKING MECHANICAL BRAKE COMPONENTS

1. Magnet check.

- a. Check angle of wear pattern as shown in figure 5 with a straight edge.
- b. If the magnet rubbing surface is flat it need not be replaced until the friction element shows signs of wearing through.
- c. A magnet that is not wearing flat must be replaced, since it cannot function efficiently. Before replacing with a new magnet, determine the cause of the improper wear. First check the magnet lever pivot. A worn Fivot bushing can cause the magnet lever to cock, thus allowing the magnet to trip against the armature plate. If this condition exists, the lever assembly should be replaced. When reinstalling magnets be sure to install the loom (lead wires) properly, avoiding kinks and allowing ample clearance for the lever to move through its full travel. Operate the lever in

both directions to be sure the loom moves properly without binding, kinking, or interfering with lever movement.

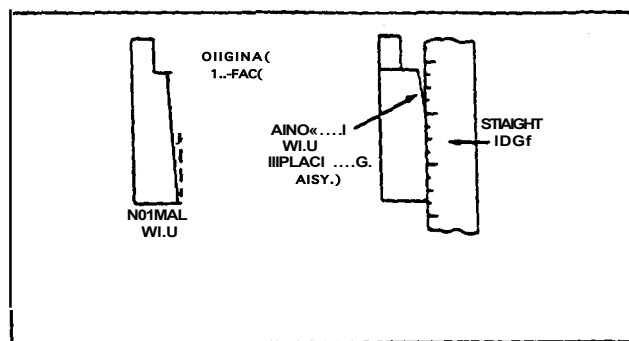


Fig. 5

2. Wheel Bearing Maintenance

- a. Pull dual drive wheels up on ramp approximately 2' high until tag axle tires clear ground.
- b. set hand brake and chock tires securely.
- c. Place index marks on wheel and drum so they can be mated back in the same position.
- d. Remove wheel from drum.
- e. Remove spindle cover, dust cap, cotter key, spindle nut and washer.
- f. Remove outside bearing and brake drum.
- g. Lay down drum with inside grease seal down. Knock out inner bearing and grease seal using wood or plastic dowel and hammer.
- h. Clean all parts thoroughly with kerosene.
- i. Check all bearings for chips or roughness of any kind. Always replace both bearing and race if damage is found on either.

j. If bearing packing equipment is not available place a quantity of grease in the palm of one hand and push the large end of the bearing cone down into the grease.

k. Rotate bearing and continue forcing large end down into grease until grease is extruded up through small end and completely around circumference of bearing.

1. Use No. 2 grade 265 ASTM penetration or equivalent grease.

m. Liberally coat outside of inner bearing, place in drum and install new grease seal with wooden or leather mallet.

n. Carefully place drum on spine to avoid damaging grease seal.

o. Install packed and coated outer bearing, spindle washer and spindle nut.

p. While rotating the wheel tighten the spindle nut with a 12 inch wrench until there is a slight tension. Then back off one notch and install cotter pin. There should now be from .001" to .010" end play in hub. If not back off one more notch.

q. Align index marks and install tire and wheel torquing lugs to 130-150 ft. lbs. Recheck or advise customer to recheck at 50 miles and again at 200 miles to assure tightness.

3. Armature Plate (The surface the magnet contacts when brakes are applied)

- a. Under normal conditions the armature plate should last indefinitely. However, if an armature plate shows excessive galling due to contamination (mud, small stones etc.) the complete drum must be replaced.

4. Brake Drum

- a. Inspect the brake drum rubbing surface. This surface should have a dull grey appearance free from heavy scoring and/or excessive wear. One or two light score marks are not cause for reboring the drum. If the drum has heavy scoring, is worn more than .020", oversized, or has more than .015" runout, the drum should be rebored. A standard drum lathe may be used, taking care not to remove more than .060" from the original drum diameter (.030" per side). The drum should be discarded if it must be bored more than .060" over its original diameter to clean up the surface.

5. Brake Lining

- a. Inspect the brake linings for wear. If a lining is worn to the rivets, it should be replaced. Inspect for uneven lining wear patterns such as shown in Figure 6, and replace if this condition exists. Wear patterns such as this may indicate improperly located flanges or a bent backing plate. Also, if lining is badly contaminated with grease, oil, etc., it must be replaced, since contamination of this type cannot be sanded or dissolved out.

IMPORTANT: Always replace brake linings in sets - both brakes on the same axle.

- b. If the lining is worn to the rivets without evidence of uneven wear, simply replace with new Kelsey-Hayes factory ground shoe and lining assembly.

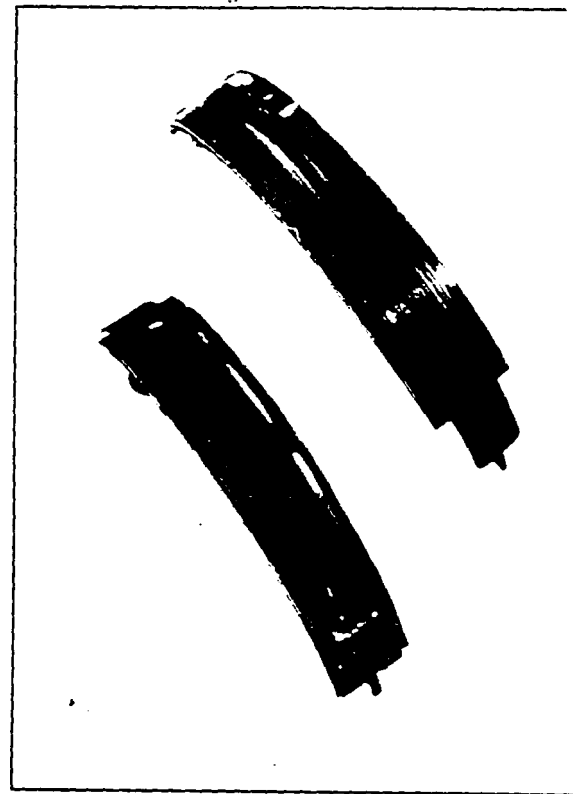
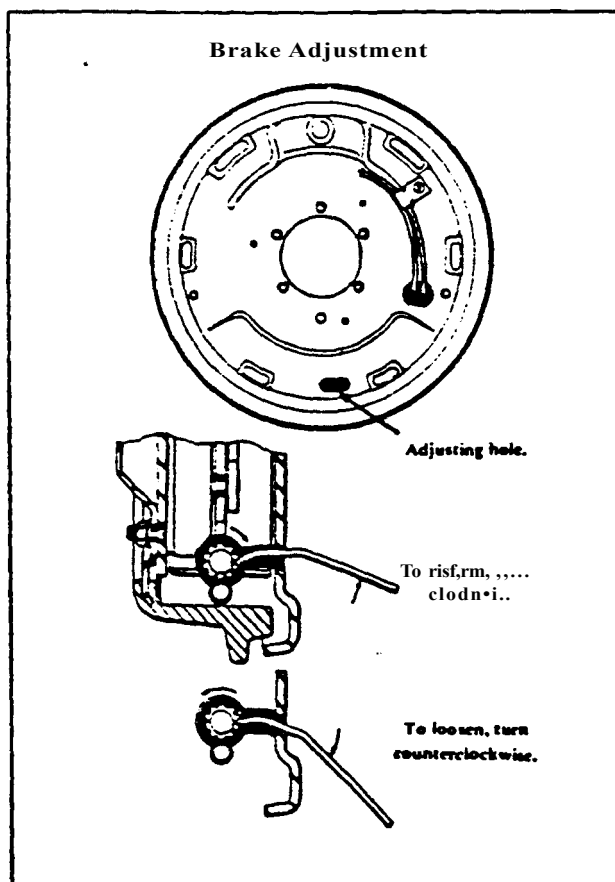


Fig. 6

BRAKE ADJUSTMENT

1. Pull dual drive wheels up on ramp approximately 8" high until tag axle tires clear ground.
2. Set hand brake and chock tires securely.
3. Remove rubber plug and tighten the brake adjustment screw while spinning the wheel until heavy drag is felt.
4. Back off adjustment until tire spins freely.
5. Repeat on other side.



TROUBLE SHOOTING

1. PROBLEM: GRABBY OR LOCKING BRAKES.

PROBABLE CAUSE: Controller not modulating.

REMEDY: 1. Disconnect red wire on controller. Road test for braking modulation. If modulation is okay check red wire (stop lights).
2. Bench check controller. Replace if necessary.

PROBABLE CAUSE: Improper lining.
REMEDY: Check lining. Replace if necessary.

PROBABLE CAUSE: Grease on lining.
REMEDY: Check for contamination. Replace seals and lining.

PROBABLE CAUSE: Loose parts in brakes.
REMEDY: Check for loose rivets, broken springs, etc. jammed in brakes.

PROBABLE CAUSE: Rust in armature plate and/or brake drums.
REMEDY: Caused by non-use. Usually corrected by normal continued use.

PROBABLE CAUSE: Selective resistor setting incorrect.
REMEDY: Readjust to increase resistance.

2. PROBLEM: WEAK BRAKES

PROBABLE CAUSE: Poor connection.
REMEDY: Check that all connections are clean and tight.

PROBABLE CAUSE: Poor ground.
REMEDY: Check for proper grounding next to resistor.

PROBABLE CAUSE: Short Circuit.
REMEDY: Check electrical circuit.

PROBABLE CAUSE: Selective resistor setting incorrect.
REMEDY: Check for proper setting to avoid too much resistance.

PROBABLE CAUSE: Worn or defective magnets.

REMEDY: Replace magnets

PROBABLE CAUSE: Poor brake adjustment.

REMEDY: Adjust brakes.

PROBABLE CAUSE: Backing plates bent or misaligned.

REMEDY: Check backing plate and flanges. Correct if necessary.

PROBABLE CAUSE: Greasy lining.
REMEDY: Check for worn or damaged grease seals. Replace if necessary. Make sure bearings are packed with high grade bearing grease not cup grease or chassis lubricant.

PROBABLE CAUSE: Using trailer brakes only.

REMEDY: Use of trailer brakes only can cause early fade or loss of friction due to excessive heat.

3. PROBLEM: NO BRAKES

PROBABLE CAUSE: Open circuit.
REMEDY: Check for broken wires, loose connections, improper grounding.

PROBABLE CAUSE: Improperly wired or inoperative controller.
REMEDY: Check controller operation

PROBABLE CAUSE: Poor brake adjustment.
REMEDY: Adjust brakes.

PROBABLE CAUSE: Selective resistor defective.
REMEDY: Check resistor for loose connections.

PROBABLE CAUSE: Worn or defective magnets.
REMEDY: Replace magnets.

PROBABLE CAUSE: Short Circuit
REMEDY: Check electrical circuit.

4. PROBLEM: INTERMITTENT OR
SURGING BRAKES

PROBABLE CAUSE: Out of round drums.
REMEDY: Rebore drums if more than
.015 out of round.

PROBABLE CAUSE: Broken magnet lead
wires.
REMEDY: Bench check magnets. Re-
place if necessary.

PROBABLE CAUSE: Loose wheel bear-
ings.
REMEDY: Check and adjust bearings.

5. PROBLEM: DRAGGING BRAKES

PROBABLE CAUSE: Brakes adjusted
incorrectly.
REMEDY: Check brake adjustment.

PROBABLE CAUSE: Electrical defect
in controller.
REMEDY: Insufficient gap between
controller contactor strip and coil
may cause brakes to be on continu-
ously. Correct condition.

PROBAB!E CAUSE: Hydraulic defect
in controller.
REMEDY: Too high a residual pres-
sure in the tow car hydraulic sys-
tem or a "gummed up" controller
cylinder may cause the controller
to be held "on" slightly. Check
and repair.

PROBABLE CAUSE: Badly corroded
brake assemblies.
REMEDY: Check brake assemblies
for severe corrosion. Check to
be sure magnet levers operate
freely. Clean and lubricate
brake assemblies.

PROBABLE CAUSE: Weak or broken
shoe return spring.
REMEDY: Check and replace if
necessary.

6. PROBLEM: NOISY BRAKES

PROBABLE CAUSE: Lining worn to
rivets.
REMEDY: Check and reline linings

PROBABLE CAUSE=.. Loose parts -
rivets, broken springs, etc.
REMEDY: Check and repair.

PROBABLE CAUSE: Bent backing
plate.
REMEDY: Check and repair if nec-
essary.

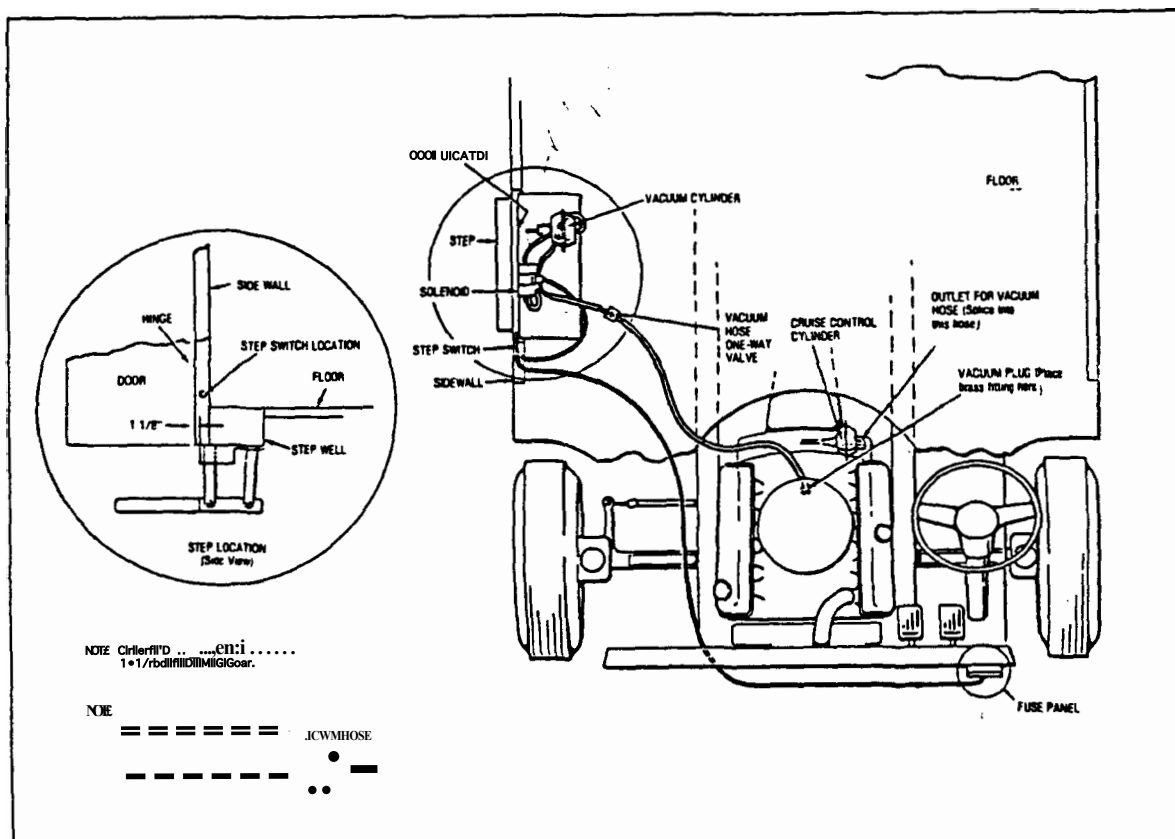
PROBABLE CAUSE: Grease on lining.
REMEDY: Check and reline if nec-
essary.

PROBABLE CAUSE: Improper bearing
adjustment
REMEDY: Check and adjust bearings.
Check for worn or damaged bearings
Replace if necessary.

PROBABLE CAUSE: Poor adjustment.
REMEDY: A certain amount of
noise is normal when the brake
releases. Proper adjustment will
minimize the noise.

LUBRICANT CAPACITIES

Item	U.S. Measure	Imperial Measure
Crankcase		
454 VOS	12.0 Pints	10.0 Pints
353-6 Diesel	28.0 Pints	23.3 Pints
Add 1 qt. for filter		
Oil Filter		
353 Diesel		
Isuzu 1-87810075-1	2.0 Pint	1.5 Pints
454 Cu. In.		
AC PF-35: Throwaway Type	2.0 Pints	1.5 Pints
Fuel Tank (Cap. Approx.)	60.0 Gallons	50.0 Gallons
Automatic Transmission		
Turbo Hydra-Matic 475 Total	19.0 Pints	16.0 Pints
Refill	7.5 Pints	6.0 Pints
Cooling System {Approx.}		
454 Cu. In V-8	27.0 Quarts	22.4 Quarts
353 Cu. In 6 (Diesel)	23.0 Quarts	19.0 Quarts



VACUUMATIC STEP ASSEMBLY

- | No. | Description |
|-----|-------------------------------|
| 1. | Vacuum Step |
| 2. | Bolt - 1/4 x 1 - Self Tapping |
| 3. | Step Latch Assembly |

VACUUMATIC STEP REMOVAL/INSTALLATION

The Vacuumatic Step Assembly is attached to the underside of the step well with attaching bolts and lock nuts. Engine vacuum is supplied to operate the step vacuum pump by means of a hose which runs from a vacuum connection on the vehicle intake manifold to a connection on the step solenoid. Twelve volt power to operate the solenoid is provided by a wire which runs through the main door step switch to the solenoid.

To remove the step assembly:

1. Make sure the motorhome engine is shut off. Disconnect the battery.

2. Slip the engine vacuum hose off the fitting on the step solenoid.
3. Disconnect the lead wire from the solenoid.
4. Disconnect step switch wire by cutting through plastic crimp connector.
5. Remove the bolts attaching the step assembly to the step well. Remove step assembly.
6. For installation, reverse removal procedures. Use new crimp connector.

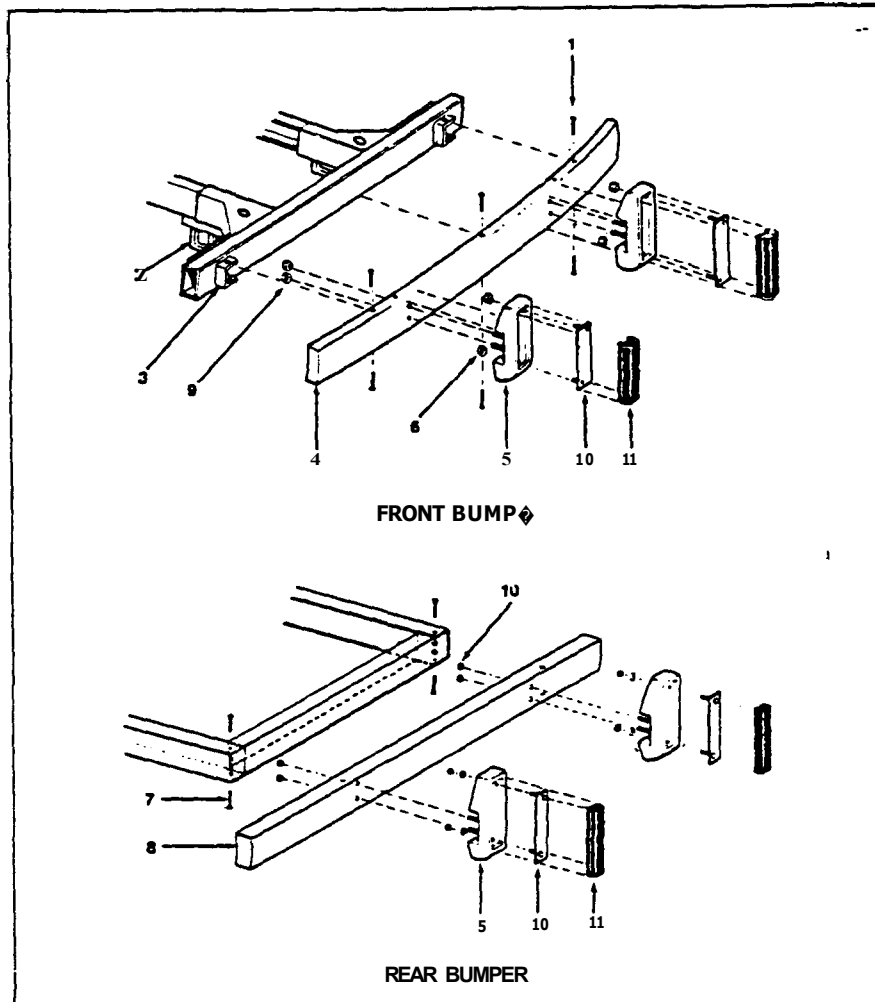
VACUUMATIC STEP PRINCIPLES OF OPERATION

The Vacuumatic Step is powered by a built-in vacuum unit which is connected to the vacuum system of the motorhome engine and electrically activated. The vacuum power which keeps the step in the up position is shut off when the engine is turned off - or when the entrance door is opened, so the step is automatically lowered to the down position.

When the engine is turned on and the door closed, the vacuum automatically returns the step to the up position, ready for traveling. If the door is opened while the engine is running, and electric solenoid is engaged, cutting off engine vacuum and the Vacuumatic Step automatically lowers to the down position (and locks in position). It raises again when the door is closed.

The diesel engines have vacuum pumps to supply power to all vacuum accessories.

FRONT AND REAR BUMPER ASSEMBLIES



FRONT AND REAR BUMPER ASSEMBLIES

No.	Description		
1	Screw 5/16-18 x 7/8", hex head	10	Bumper guard base assy.
2	Tow hook	11	Bumper guard rubber
3	Bumper support side	<p>Not shown are wedge shaped cast aluminum pieces that go inside the bumper and over the bumper guard mounting bolts. These wedges are shaped so one side will conform to the inner radius of the bumper while the other side will be at right angles to the bolt allowing the nuts to be drawn down securely. Two different shapes are used to fit the different radii.</p>	
4	Bumper front		
5	Bumper guard (optional)		
6	Nut - 1/4"		
7	Screw 1/4-20 x 3/4", Phillips head		
8	Bumper rear		
9	Nut - 1/4"		

CRUISE CONTROL

OPERATING INSTRUCTIONS

In the regulator box of your Speed Control is a safety switch which will not let the system operate until your vehicle is moving above a pre-selected low speed. At the factory this "low speed switch" is set to close between 27 and 33 MPH. It should, however, be checked during the Road Test.

The **CONTROL SWITCH** is the switch you use to operate all features of the system described in the following paragraph. It is installed where the turn signal lever is normally located and serves that purpose as well.

SET SPEED. On the control switch move the slide button to the ON position and drive at any speed above 32 MPH at which you want automatic control. Hold that speed with your foot while you press and release the SET/COAST button. One second after release, take your foot off the accelerator pedal.

You can increase speed at any time with the accelerator pedal. When you release the pedal, you will return to the set speed.

ACCELERATION. Hold the slide button in the RESUME/ACCEL position and your vehicle will accelerate until you release it; then your vehicle will slow to your set speed and again control there.

If you want to make the higher speed your new set speed, release the slide button when you reach the speed you want, and as you do, quickly press and release the SET/COAST button. Remember, you set speed as you release the button - not when you press it.

COAST. When you press and hold the SET/COAST button, you erase the set speed from the regulator's memory and allow the vehicle to coast. Just before you reach the lower speed you want, release the button and it will control there, providing it is above the low speed setting.

DISENGAGEMENT. Depress the brake pedal about an inch and you again are in control of the vehicle speed. You can also disengage the Speed Control by pushing the slide button to OFF, but this erases the set speed from the regulator's memory.

RESUME. When you disengage the system with the brake, you do not erase the set speed from the regulator's memory, even if you come to a complete stop. To return to your chosen speed, drive to a speed above 32 MPH, then move the slide button to the RESUME/ACCEL position and release it. The Speed Control will take you back to your set speed and control there.

If the rate of acceleration is faster or slower than you like, drive with the accelerator to a speed close to the set speed, then slide the button to the RESUME/ACCEL position and release it.

UNUSUAL CONDITIONS. When the regulator is adjusted right, your selected speed should be held within plus or minus 4 MPH so long as grades do not exceed 7% (most interstate highways). Since the Speed Control is vacuum operated, this speed range **will** widen as you drive at higher altitudes.

Any opening of the throttle lowers the vacuum to some degree. A wide open throttle can drop the vacuum almost to zero. When you are pulling an extra heavy load, climbing a very steep hill, or bucking a severe head wind, a much wider than normal throttle opening is called for, but this drops the vacuum so low that the throttle is deprived of the strength it needs to hold speed.

The way to handle these once-in-a-while problems is to bring the vehicle up to speed with the accelerator pedal - and then let the Speed Control take over again.

THERE IS NO DRAIN ON THE BATTERY WHEN THE IGNITION SWITCH IS OFF - EVEN IF THE CONTROL SWITCH IS LEFT ON.

CAUTION: Do not use your Speed Control on slippery roads, nor in heavy traffic.

INSTALLATION INSTRUCTIONS

Refer to Figure 1 to become familiar with the different parts of the Electronic Speed Control. The major components of the system are: the SIGNAL GENERATOR, attached to the speedometer cable drive adaptor at the transmission; the REGULATOR, a computer mounted behind the instrument panel; the SERVO, which is mounted in the engine compartment and is linked to the throttle; the CONTROL SWITCH, which also functions as a turn signal lever; and the DISENGAGEMENT SWITCH AND VALVE ASSEMBLY, operated by the brake pedal. All other parts in the kit are for connecting these components to the vehicle and to each other.

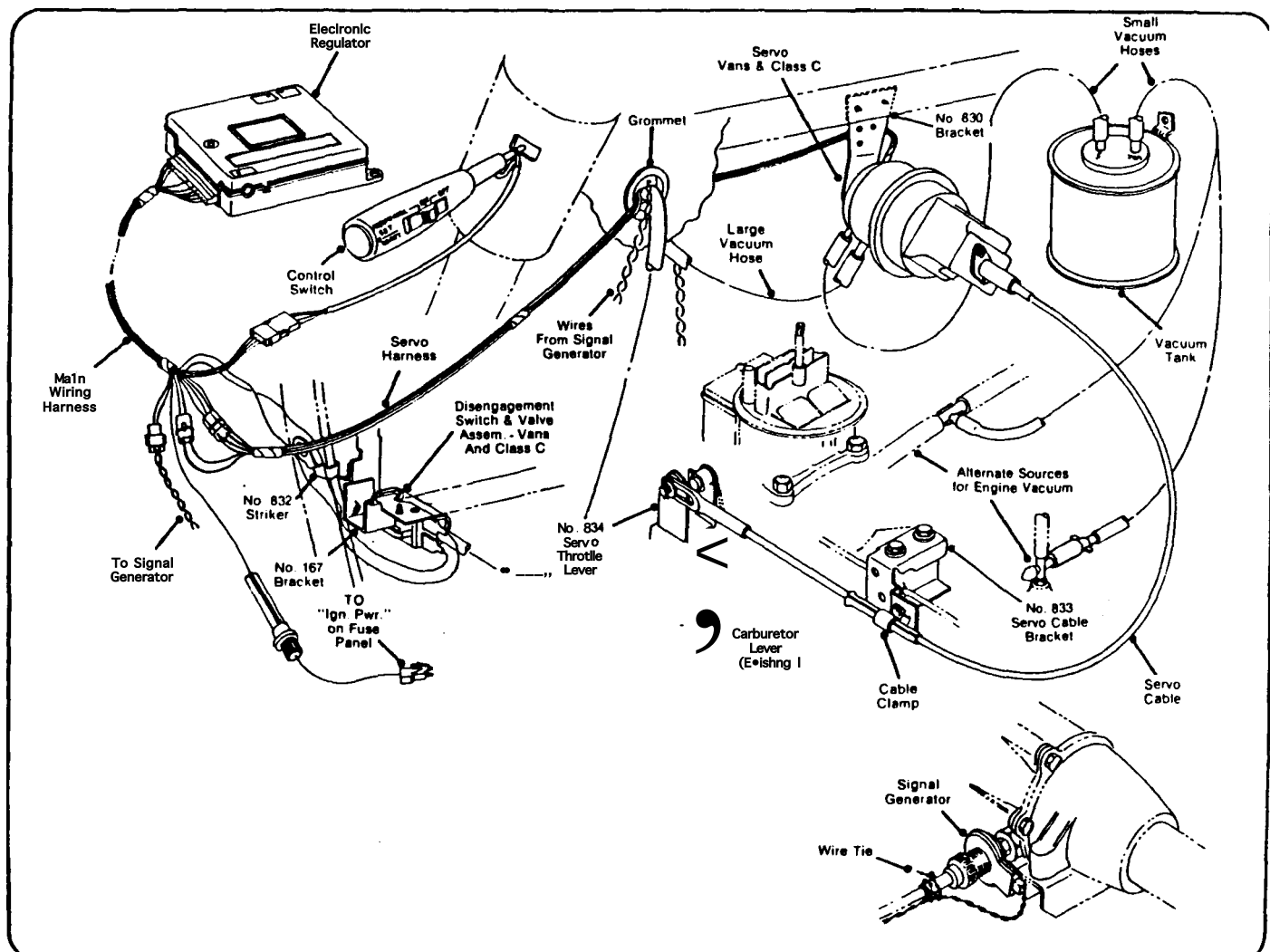


Figure 1

SIGNAL GENERATOR (See Figure 2)

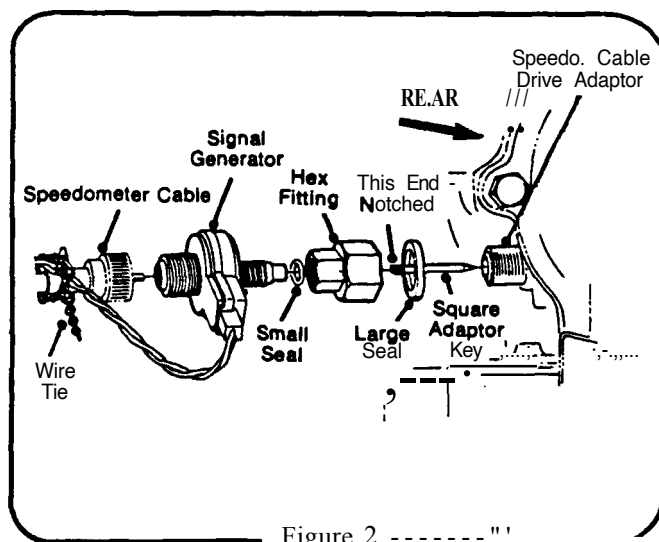
A. Put small O-ring over bronze extension, then screw small end of hex fitting onto generator and snug it up.

B. Seat larger seal ring in large end of hex fitting and insert notched end of square adaptor key into same end of generator shaft.

C. Disconnect speedometer cable from transmission, screw hex fitting of generator onto transmission, rotating generator so wires are toward rear of vehicle and slightly downward, then tighten hex fitting.

D. Connect speedometer cable to generator and tighten cable nut while holding generator from rotating out of position.

CAUTION: Be SURE all square driving members are properly engaged with square holes and rubber sealing rings are in place.



ELECTRICAL CHECK PROCEDURE Use a 12-volt Test Light To Perform These Checks		
CONDITION	POSSIBLE CAUSE	REMEDY
Ignition Switch OFF. Control Switch ON. Ground one lead of test light. touch other lead to each terminal of connector individually.	Light OFF; all terminals	None. system O.K.
	Test light ON at terminals 5 7 and 14.	Red fused wire connected to wrong power source. Use a "switched" power source at fuse block. Test light should be "ON" when ignition switch is "ON" and "OFF" when ignition switch is "OFF".
Ignition Switch ON. Control Switch ON. Ground one test light lead. Touch other lead to each terminal of connector individually.	Test light ON at terminals 5, 7 and 14 only.	None. system O.K.
	No light on any terminal.	Reolace fuse, if blown. Connect red wire to ignition switched power source.
Ignition Switch ON. Control Switch ON. Ground one test light lead. Press and hold SET SPEED button and touch other test lead to terminal 14.	Test light OFF at terminal 14.	None. system O.K.
	Test light ON at terminal 14.	See Trouble Shooting Guide • Control Switch
Ignition Switch ON. Control Switch ON. Ground one test light lead. Press and hold Slide switch to RESUME while touching other lead to terminal 10 and 14 individually.	Test light ON at terminal 10 and 14	None. system O.K.
	No light at terminal 10 and/or 14.	See Trouble Shooting Guide • Control Switch
Ignition Switch ON, Control Switch ON. Touch one test light lead to terminal No. 5 and other lead to terminal No. 13.	Test light ON; push brake and test light goes OFF.	None. system O.K.
	Test light OFF.	Adjust disengagement switch plunger travel to get test light ON: OFF wher. brake or clwtch pedal is pushed Ground green servo wire with eyelet terminal. Check light green wire connections

ELECTRICAL CHECK

A. A Test light or Yolt-ohmmeter is needed to perform these checks. If you have neither, a test light can be made as shown in Figure 18.

B. There is available from your dealer a Speed Control System Tester which **will** quickly indicate any problem area. The Dana part number is 56L-08X29 B. More information is given on later pages.

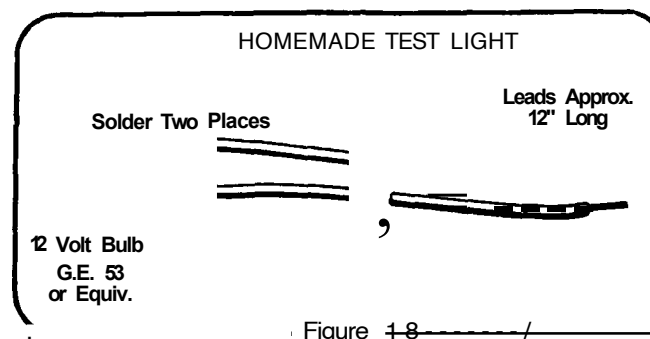


Figure 18

c. To make this check, the 14-pin connector must be disconnected from the regulator. If it has already been connected, Figure 19 shows how to unplug it. The terminal numbers are very small and are molded on the wire side of the connector. Wire colors for the system are shown in the Wiring Schematic later on in this section.

D. When electrical check is done, turn ignition Off. To connect 14-terminal connector, hold regulator with RELEASE hole up. Hold connector so dark green wire is to your right. Start one end in first with release latch under circuit board in regulator, then push firmly into place. Let regulator hang down for now because it must be adjusted during road test.

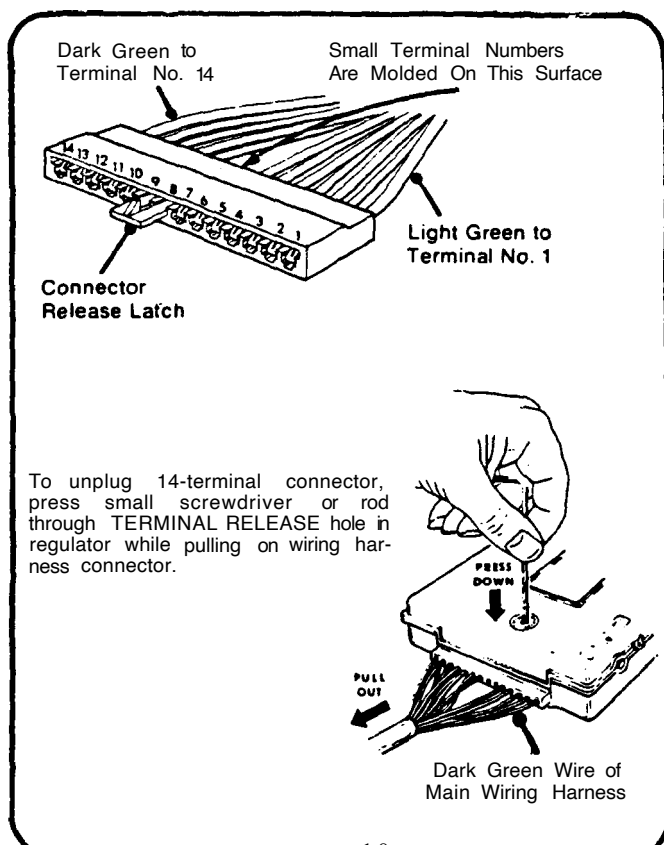


Figure 18

PRELIMINARY OPERATIONAL CHECK

Regular Check

A. Set parking brake hard, put shift lever in "park" and start engine.

B. Keep one hand on ignition key and with other hand push slide button on control switch to ON position.

C. Press and hold SET/COAST button for two or three seconds, then release it. The system should NOT engage. If it does (indicated by engine racing faster than cold idle), turn off ignition switch immediately. If system passed electrical check above, and in this check, engine did not race until SET/COAST button was pressed, regulator must be replaced.

Vacuum Check

D. Run engine at idle. Unplug hose from "VAC" fitting on tank and put your finger over end. You should feel a strong suction. If you do, put hose back on tank. If not, find another place to get vacuum that gives you suction at idle.

ROAD TEST

For Regulator Adjustments

NOTE: The adjustments on the Regulator (Low Speed Switch, Centering, and Sensitivity) are set nearly correct at the factory. However, the regulator can be adjusted if necessary. Full adjustment range is 1/3 of a turn. DO NOT force beyond stops. A small screwdriver may be inserted through the appropriate hole to engage the adjusting slot.

WARNING: To insure driving safety a passenger should accompany the driver to make adjustments.

Low Speed Switch Adjustment

1. Start vehicle and make ready for the road.
2. Move slide button to ON position. Drive at about 45 MPH. Press and release SET/COAST button to activate the system. Apply brake and reduce speed to about 18 MPH.
3. Move slide button to RESUME/ACCEL position and hold it. Accelerate slowly, noting speed at which accelerator pulls away from your foot. This is the LOW SPEED switch setting. It should be within the range of 27-33 MPH. If it is not, adjust the "LOW SPEED SW ADJ" on the regulator.
4. Turn clockwise to increase the setting, or counterclockwise to decrease setting.

Centering Adjustment

1. Move slide button to ON position.
2. On a level road drive at about 45 MPH then push and release the SET/COAST button. The system should engage, and the speed should be within 2 MPH of your selected speed. If it is not, adjust the "CENTERING ADJ" on the regulator.
3. Turn clockwise if the speed decreased, or counterclockwise if the speed increased. Make these adjustments in small steps.

Sensitivity Adjustment

The "SENSITIVITY ADJ" is set at the factory. No further adjustment is required. It should be set to full clockwise position.

Final Test

After adjustments have been made use all the features of the system - Set Speed, Coast, Resum, Accelerate - and move slide button to "OFF". If everything checks satisfactorily, you are done with the road test. If it does not, see the Trouble Shootii Guide.

TROUBLE SHOOTING GUIDE

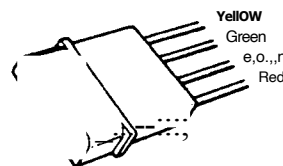
CONDITION	POSSIBLE CAUSE	REMEDY
Does not operate. "ON-OFF" switch "ON" NOTE: System will not engage if vehicle is not moving faster than the low speed HttIng.	No voltage at either brown wire of 14 pin connector, main wiring harness.	Check for correct power source. blown fuse. broken red wire, broken brown wire(s) or loose connections. Replace, repair, or tighten.
	Poor electrical ground connection at servo and/or servo bracket.	Check light green wire & its eyelet terminal. Tighten "servo-to-bracket" nut. Tighten "bracket-to-body" screws (this is part of electrical ground return circuit).
	Disengagement switch and valve assembly improperly adjusted; Switch "open" valve "closed".	Adjust switch. Must be "closed" when brake pedal is released. See Section 8A3 or 8B4.
	Ported vacuum (above throttle plate), restricted vacuum, or no vacuum.	Check for full vacuum at hot idle ("vac" hose at vacuum tank). Pinched, disconnected, or cut vacuum hoses. Hoses reversed at vacuum tank, "S" to servo, "Vac" to engine.
	Electrical	See "Electrical Check", Section 9, and Schematic Page 16.
	In-line fuse blown, red wire.	Check for short(s). Replace fuse (5 amp max.).
	Control Switch faulty	Replace Control Switch. See Section 7. For Control Switch check, see end of "Trouble Shooting", "Control Switch".
	Signal Generator faulty. No continuity between blue wire & gray wire.	Replace Signal Generator. See Section 1, "Signal Generator".
	Square adaptor key broken or missing, signal generator-to-transmission. (Speedometer will be inoperative).	Replace square adaptor key. See Section 1, "Signal Generator".
	At regulator: electrical terminals in 14-pin connector of main wiring harness not making good contact with printed circuit board in regulator.	Bend contacts up slightly with small sharp probe. Must be above small plastic separators of main wiring harness 14-pin connector body.
	Low speed switch set too high.	Turn "low speed switch adj" clockwise. See Section 11 A "Road Test".
	Servo cable not connected	Check cable connections at servo and at throttle. See Section 3 and back cover.
Engine accelerates when started	Regulator faulty.	Replace regulator.
	No clearance at carburetor end of servo cable.	Adjust clearance at cable clevis. See Section 3G.
Vehicle continues to accelerate after depressing and releasing "SET/COAST" button.	Servo faulty.	Replace servo.
	Regulator faulty.	Replace regulator.
"RESUME/ACCEL" inoperative	Poor electrical ground connection at servo and/or servo bracket.	Check light green wire & its eyelet terminal. Tighten "servo-to-bracket" nut. Tighten "bracket-to-body" screws. (This is part of electrical ground return circuit).
	Control switch faulty.	Replace Control Switch. See Section 7. For Control Switch Check, See end of Trouble Shooting, "Control Switch".
Does NOT disengage when brake pedal is depressed.	Disengagement Switch and Valve Assembly improperly adjusted; switch "CLOSED", valve "CLOSED" when brake pedal is depressed.	Adjust switch. Must be "OPEN" when brake pedal is depressed. See Section 6A3 or 6B4.
	Servo cable kinked or binding.	Replace servo cable. See back cover and Section 3.
	Servo faulty.	Replace servo.
System in use, brake pedal depressed, system disengages. Then release brake pedal and system re-engages.	Disengagement switch and valve assembly faulty (electrical portion only).	Replace switch and valve assembly. See Section 8A3 or 8B4.
	Regulator faulty.	Replace regulator.

TROUBLE SHOOTING GUIDE (Cont.)

CONDITION	POSSIBLE CAUSE	REMEDY
"Resume" does not cancel when ignition switch is turned off.	Wrong power source. Power supply is always on.	Select 12 volt power source for fused red wire which is "Hot" when ignition switch is "ON" and "COLD" (no voltage) when ignition switch is "Off"
Carburetor does not return to normal idle.	No clearance at carburetor end of servo cable.	Adjust clearance at cable clevis. See Section 3G.
	Improper vehicle accelerator linkage adjustment.	Adjust vehicle accelerator linkage.
	Weak or disconnected vehicle throttle return spring(s).	Replace or connect vehicle throttle return spring(s).
Vehicle speed increases or decreases more than 2 miles per hour when setting speed with "SET/COAST" button	"Center & Act," improperly set.	Adjust "Centering Adj." at regulator. See Section 11 8.
Erratic operation or surging-of Speed Control.	Loose speedometer cable nut and/or loose double hexagon adaptor at Signal Generator.	Tighten cable nut and/or adaptor. See Section 1, "Signal Generator".
	Bent drive tip(s), kinked or worn (relaxed) speedometer cable core.	Replace Speedometer cable. See Section 1, Signal Generator.
	Ported vacuum (above throttle plate)	Check for full continuous vacuum at hot idle ("Vac" hose at vacuum tank). Section 10D.
	Servo faulty.	Replace servo.
	Regulator faulty.	Replace regulator.
System disengages on level road without depressing brake pedal.	Loose wiring connections.	Tighten connections. especially at all plastic connector bodies of wiring harness(s).
	Loose or leaky vacuum connections.	Tighten connections.
	Disengagement Switch and Valve Assembly not adjusted correctly.	Adjust switch. Must be "Closed" when brake pedal is released. See Section 8A3 or 884.
System engages but loses speed; then slowly returns to "SET SPEED" selected.	Vacuum leak at valve of disengagement switch & valve assem., or leak(s) in large hose.	Adjust or replace switch. Must be "Closed" when brake pedal is released. See Section 6A3 or 684. Repair or replace hose.
Alter system has been used and working for some time, Speed Control operation ceases. Speedometer may be inoperative.	Poor electrical ground connection at servo and/or servo bracket.	Check light green wire & its eyelet terminal. Tighten "servo-to-bracket" nut. Tighten "bracket-to-body" screws. (This is part of electrical ground return circuit).
	Square adaptor key broken.	Replace square adaptor key. See Section 1, Signal Generator.

CONTROL SWITCH

Use 12 volt test light and jumper wire. Disconnect **Control Switch** at flat, 4-wire harness connector. Connect jumper wire from 12 volt power source to red wire terminal of **Control Switch**.

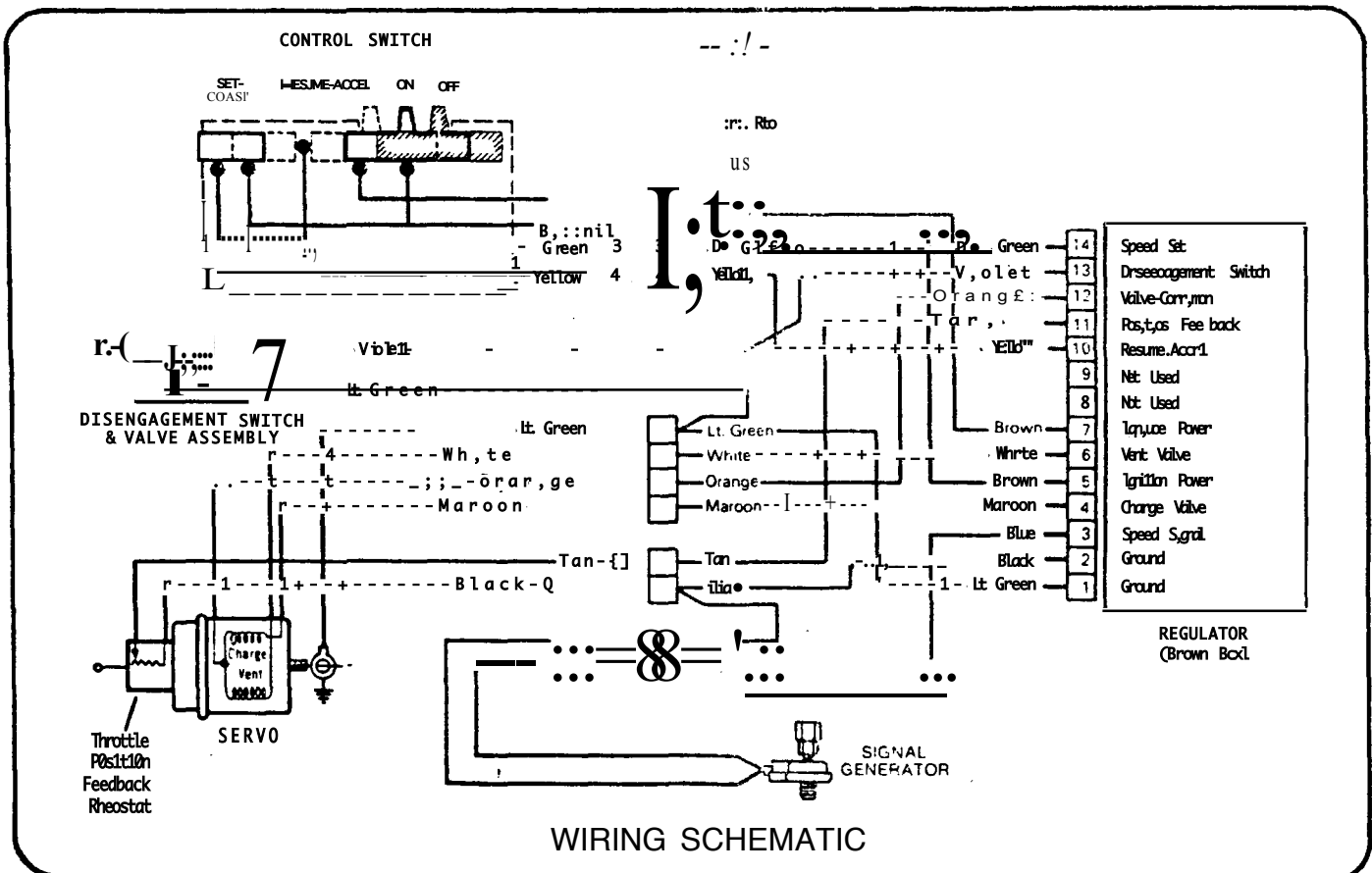
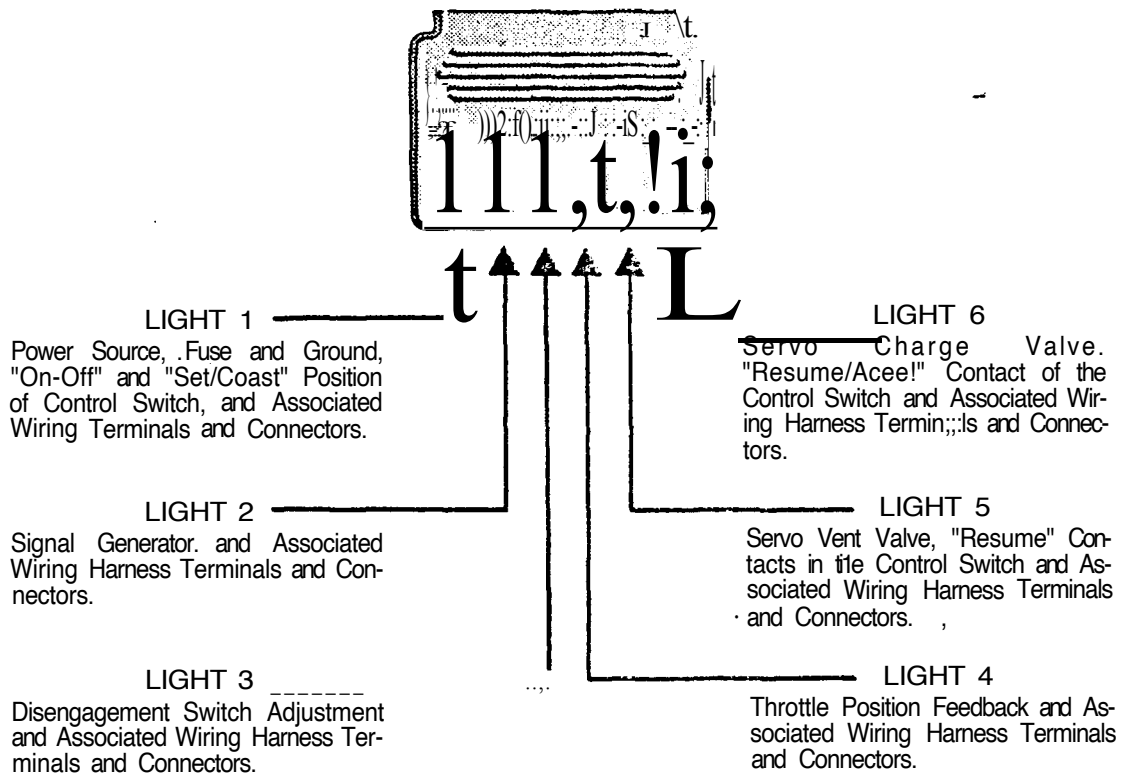


TEST CONDITION	WIRE COLOR	LIGHT	
		SWITCH O.K.	REPLACE SWITCH
Slide switch OFF, ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	OFF OFF OFF	ON ON ON
Slide switch ON , ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	ON ON OFF	OFF OFF ON
Slide switch ON , hold "SET/COAST" button in. Ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	ON OFF ON	OFF ON OFF
Press and hold "RESUME/ACCEL" slide. Ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	ON ON ON	OFF OFF OFF

THIS PROCEDURE FOR TESTING SYSTEM WITH BROWN BOX REGULATOR

SPEED CONTROL SYSTEM TESTER

EACH LIGHT CHECKS THE FOLLOWING



THE TESTER IS AVAILABLE THROUGH YOUR DEALER

DANA PART NUMBER 56L-08X29-B

To Test, Disconnect Harness From Regulator and Connect To Tester

T u t No. and Condition	Correct Response	Trouble Shooting For Incorrect ResponH
f Correct Power Source: Ignition Switch "On" Control Switch "On"	AU. LIGHTS OFF	ANY LIGHT ON DURING TEST NO. 1 Red Wire Connected Directly To Constant Power Source.
2. System's Electrical Continuity: Ignition Switch "On" Control Switch "On"	LIGHTS ON 1,2,3,&4 OFF 5&6	These Are Checks To Make For Im:ornct Lights In Tests 2 Thru 1 Replace Components If Necessary. ALL LIGHTS OFF • Check Red Wire Fuse; Check Light Green Wire Ground.
3 Disengagement Switch Con- tinuity: Ignition Switch "On" Control Switch "On" Push and Hold Brake Pedal	LIGHTS ON 1,2,&4 OFF 3,5,&6 Release Brake Pedal and Light 3 Will Go "On"	LIGHT 1 OFF • Check Red, Brown and Green Wires and Terminal at Control Switch Connectors; Check Dark Green Wire (No. 14) at 14-Pin Connector; Check all Light Green Connections between 14-Pin Connector and Servo. LIGHT 2 OFF • Check Continuity between Blue and Grey Wires of Signal Generator Harness; Check Light Green Wire Connections between U-Pin Connector and Servo; and Connections of Black, Blue, Brown (No. 5) and Grey Wires in Main Wiring Harness. LIGHT 3 OFF • Check Disengagement Switch Adjustment; Check No. 7 Brown Wire at 14-Pin Connector; Check both Violet Wire Connections and All Light Green Wire Connections between Disengagement Switch and Servo.
4. Servo Cont'nuity Ignition Switch "On" Control Switch "On" Push and Hold Set-Coast Button	LIGHTS ON 2,3,4,5,&6 OFF 1	LIGHT 4 OFF • Check Continuity between Black and Tan Wires of Servo Harness; Check Light Green Wire Connections between 14-Pin Connector and Servo; Check Connections of Black and Tan Wires in Main Wiring Harness. LIGHTS OFF • Check Continuity between Orange and White Wires in Servo Harness; Check All Connections of White, Yellow and Orange Wires in Main Wiring Harness. LIGHT 6 OFF • Check Continuity between Orange and Maroon Wires in Servo Harness; Check All Connections of Maroon, Yellow and Orange Wires in Main Wiring Harness. ALL LIGHTS OFF • Alter Pushing "SET-COAST" or "RESUME-AC-CEL" in Tests 4, 5, or 6 Blown Fuse; Maroon or White Wires Shorted: Bad Servo.
5. Control Switch Contact Check: Ignition Switch "On" Control Switch "On" Slide and Hold On-Off Switch to "Resume-Acee!"	ALL LIGHTS ON	
5. Start Engine Momentarily Hold SET-GOAST Button IN and Flefase It When Engine Starts to Flace.	Engine Should Run in a Normal Manner Throttle Will Open Quickly and Light 4 Will Dim	IF THROTTLE DOES NOT OPEN , Check Connection of Servo Cable to Servo and Servo Cable to Carbure:or. Che, Ad; still'ent of Disengagement Switch; Check Attachment at Both Ends of Vacuum Hoses.
7. With Engine Still Running, Hold Slide Button to RESUME-ACCEL Position and A• Engine Starts to Race, Apply and Hold BrakH.	When Brakes Are Applied, Throttle Will Close, Light 3 Will Go "Off", and Light 4 Will Brighten. TURN IGNITION OFF	IF THROTTLE DOES NOT CLOSE , Check Large Vacuum Hose for Kinks or Blockage; Check Valve Portion of Disengagement Switch and Valve Assembly - Replace Assembly if Necessary.

TESTER CANNOT BE USED TO ROAD TEST SPEED CONTROL

SHOULD IT BECOME NECESSARY TO
REPLACE SPEED CONTROL CABLE, USE
THIS PROCEDURE:

A. To remove old cable, slide rubber sleeve off cable end fitting so slots are exposed.

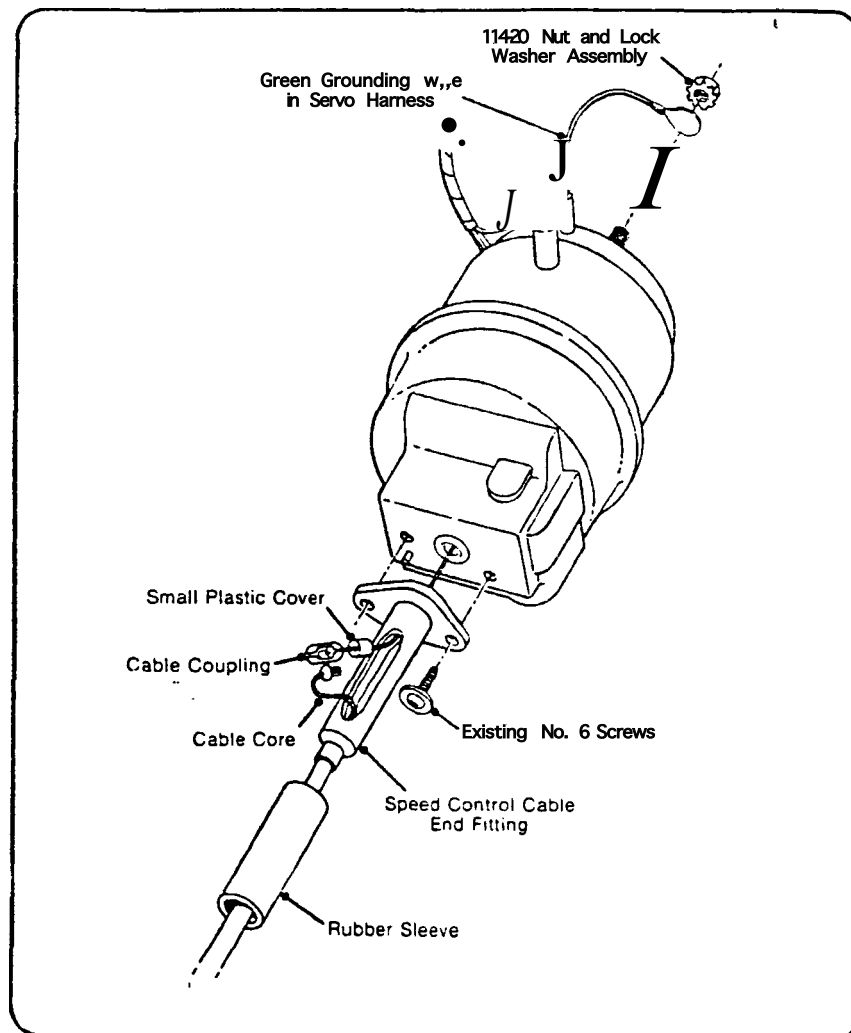
B. Slide small plastic cover off coupling and onto servo coupling cable. Use side cutter pliers or small screwdriver to spread coupling. Remove core end of old cable from coupling.

C. Remove and retain two No. 6 screw and washer assemblies attaching cable end fitting to servo.

D. Thread servo coupling cable into end fitting of new Speed Control cable and out through slot. Attach cable to servo with two screws retained.

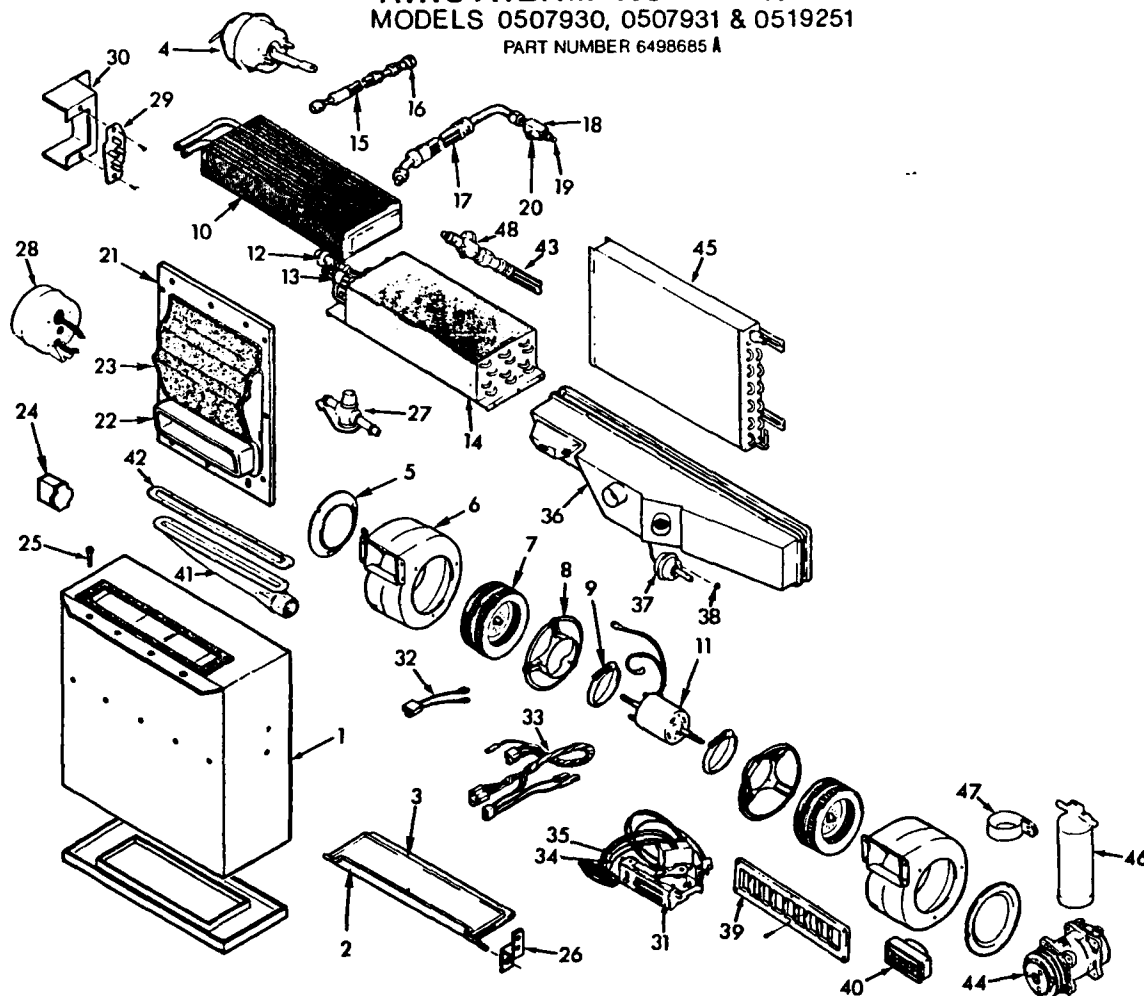
E. Put core end of cable in coupling and squeeze it closed with pliers. Slide small plastic sleeve back onto coupling.

F. From other end of cable, pull all slack from cable core and slide rubber sleeve back into place over end fitting slots.



AIRSTREAM AC-HEATER

MODELS 0507930, 0507931 & 0519251
PART NUMBER 6498685 A



- | No. | Description |
|-----|----------------------|
| 1. | Case bottom |
| 2. | Door |
| 3. | Motor, Vacuum |
| 5. | Ring Inlet High Temp |
| 6. | Housing Blower |
| 7. | Wheel, Blower |
| 8. | Mount, Motor |
| 9 • | Clamp |
| 10. | Core heater |
| 11. | Motor |
| 12. | Valve Expansion |
| 13. | Clamp Valve |
| 14. | Evap Coil |
| 15. | Hose, Liquid |
| 16. | Fitting, Aeroquip |
| 17. | Hose, Suction |
| 18. | Service Valve |
| 19. | Seal Rotolock Cap |
| 20. | Cap |
| 21. | Case Top |
| 22. | Duct Return Air |
| 23. | Insulation |
| 24. | T-stat |

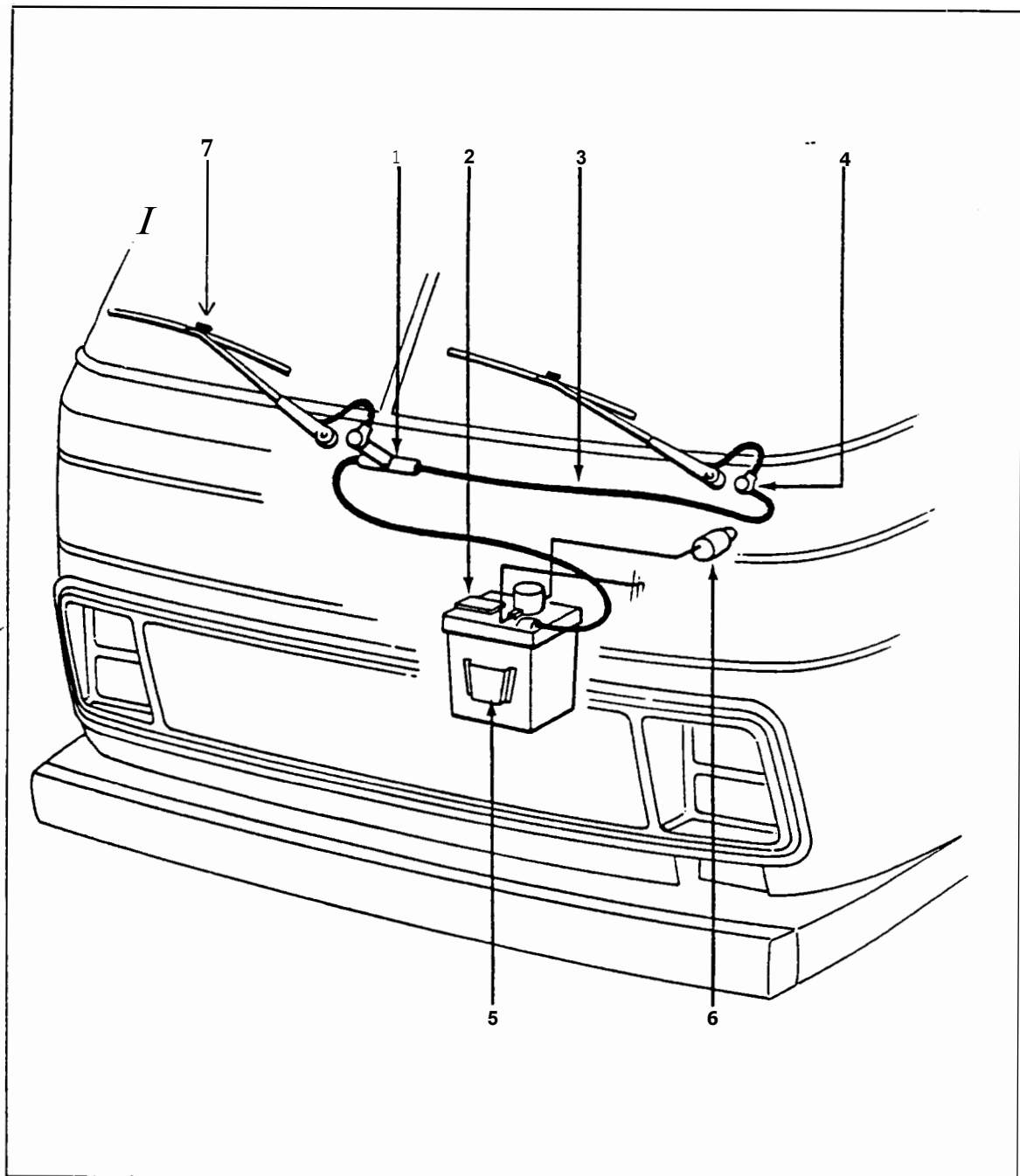
- | | |
|-----|---|
| No. | Description |
| 25. | Screws |
| 26. | Bracket, Door supp. |
| 27. | Valve, manual heater |
| 28. | Reservoir, Vacuum |
| 29. | Resistor |
| 30. | Bracket, mtg. resistor |
| 31. | Control head |
| 32. | Jumper, control switch |
| 33. | Wire Harness |
| 34. | Bowden Cable |
| 35. | Harness Vacuum |
| 36. | Plenum Assy |
| 37. | Vac. Motor |
| 38. | Nut Kep 10-24 |
| 39. | Grill Return Air |
| 40. | Louver Assy |
| 41. | Duct, Defrost |
| 42. | Outlet Defroster |
| 43. | Discharge hose assy. |
| 44. | Compressor, Sankyo 510
w/tube o head |
| 45. | Condenser Coil |
| 46. | Receiver drier |
| 47. | Bracket, Receiver drier mtg. |
| 48. | Service valve discharge |

DASH AIR CONDITIONER/HEATER (ARA)

Access to blower motor, heater core and evaporator.

1. Remove one screw in bottom center of kick panel in front of passenger seat.
2. Grasp edge of panel next to engine and pull panel out. This is normally a tight fit, so don't be afraid to use considerable force.
3. Remove perimeter screws from face panel of case and remove panel.
4. All components can now be removed.

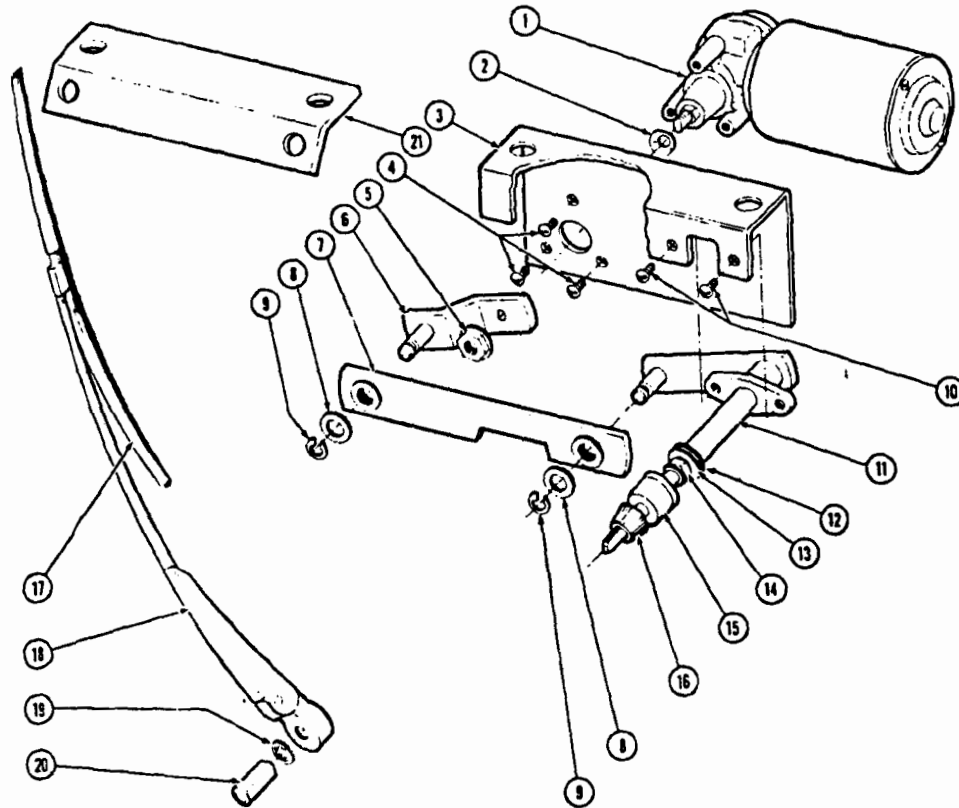
Only trained air conditioner technicians with proper tools and gauges should **work** on the refrigerant system. The ARA air conditioning system being used is one of the most popular in the country, and is well represented with service facilities.



WINDSHIELD WASHER KIT ASSEMBLY

No.	Description	7	Washer nozzle
	Windshield washer kit assy.		
	Trice no. 309-11		
1	T-connection 3/16 x 3/16 x 3/16		
2	Reservoir with electromatic pump		
3	Rubber hose 3/16		
4	Cow fitting		
5	Mounting strap		
	Screw no. 10 hex head - self tapping		
6	Switch - American Bosch		

Windshield Wiper Assembly



No. Description

1. Motor
2. Washer
3. Bracket
4. Screw
5. Nut
6. Drive arm
7. Link, connecting
8. Washer, spacer
9. Spring clip
10. Screw
11. Pivot Arm and shaft
12. Washer

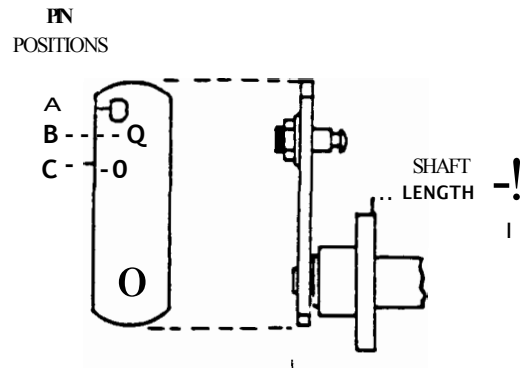
No. Description

13. Washer
14. Nut
15. Cap
16. Knurled driver
17. Blade
18. Wiper arm
19. Washer
20. Nut
21. Bracket, windshield wiper assembly attachment curbside, roadside

SWIVEL ARM REMOVAL/REPLACEMENT

1. Remove wiper arm and blade.
2. Disconnect extended link from pivot arm.
3. Using a 90 degree or stubby Phillips screwdriver, remove two Phillips head screws attaching pivot arm and shaft assembly to mounting bracket. Remove ar and shaft assembly.
4. To install, reverse removal procedures.

NOTE: If the pivot stud between the pivot arm and link is removed care must be taken to make sure the stud is replaced in the proper position. Only position should be used.



WINDSHIELD WIPER MOTOR REMOVAL/REPLACEMENT

1. Remove windshield washer hose from fitting on end shell.
2. Remove nut securing wiper arm to pivot arm and shaft assembly.
3. Disconnect electrical connections to motor.
4. Remove 2 bolts securing mounting bracket to end shell structure and remove.
5. For installation, reverse above procedures.

1

EXTERIOR

SHELL EXPLODE	B-1
FRONT END SHELL	B-2
REAR END SHELL	B-3
EXTERIOR MAINTENANCE	B-6
END SHELL SEGMENT REMOVAL/REPLACEMENT	B-6
SIDE AND ROOF PANEL REMOVAL/REPLACEMENT	B-7
ROOF VENT FRAME REMOVAL/REPLACEMENT	B-9
EXTERIOR CONSTANT SECTION	
Rain Leaks	B-9
Rib Splice and Horizontal Stringer	B-9
Vent Termination Removal/Replacement	B-10
Range Exhaust Vent Removal/Replacement	B-10
Front Bumper Fairing Removal/Replacement	B-10
GRILLE ASSEMBLY	B-11
MAIN AND SCREEN DOOR ASSEMBLIES	B-12
Main Door Removal/Replacement	B-12
Main Door Adjustment	B-12
Main Door Lock	B-12
Screen Door Adjustrnt	B-14
Plastic Screen Door Insert Removal/Replace	B-14
Assist Handle Removal/Replacement	B-14
Main Door Jamb Removal/Replacement	B-15
Slide Bolt Removal/Replacement	B-15
ACCESS DOOR ASSEMBLIES	B-16
Refrigerator Access Door Assembly	
Removal/Replacement	B-16
Rear Lower Corner Wrap Removal/Replacement	B-16
WINDSHIELD AND CAB SIDE WINDOW ASSEMBLIES	B-17
Forward Service Door	B-17
Windshield Glass Removal/Replacement	B-20
Side Window Glass (Sliding Portion)	
Removal/Replacement	B-20
Cab and Side Window Frame Removal	B-20
Cab Sliding Window Sash and Glass	
Removal/Replacement	B-21

EXTERIOR CONTINUED .•.

WINDSHIELD AND CAB SIDE WINDOW ASSEMBLIES (CONT'D)

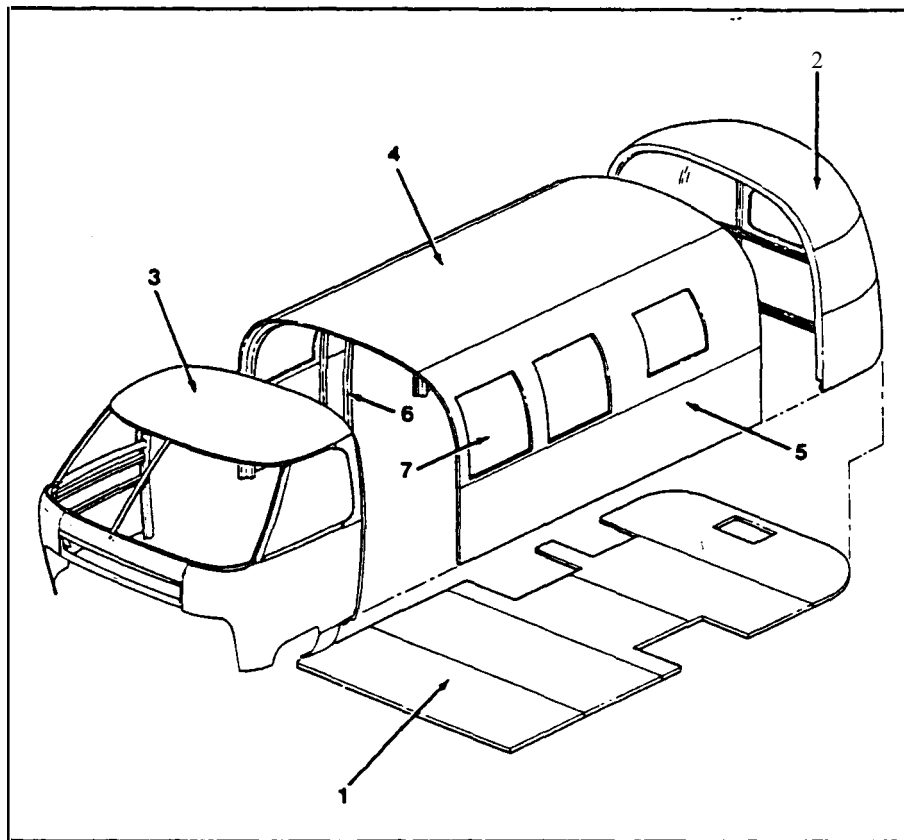
Rear Center Window Frame Removal	B-21
Rear Center Window Frame Replacement	B-21
Fixed Window Removal/Replacement	B-21
Rear Window Glass and Sash Removal/Replace	B-22
Lifting Arm Removal/Replacement	B-22
Window Lock Removal/Replacement	B-22
Window Screen Removal/Replacement	B-22

OLYMPIC RIVETS AND WEDGE LOCKS	B-24
Drilling Holes for Installation	B-24
Removal of Olympic Rivets	B-26
Wedge Locks	B-26

12 VOLT EXTERIOR LIGHTS	B-27
Exterior Light Assemblies	B-27
Headlight Removal/Replacement	B-28
Taillight Housing Removal/Replacement	B-28
License Plate Bracket and Light Removal Replacement	B-28
Clearance, Side Marker Light, Front and Rear Identification light Removal/Replacement	B-28
Side Marker Reflector Cast Bezel Removal/ Replacement	B-28

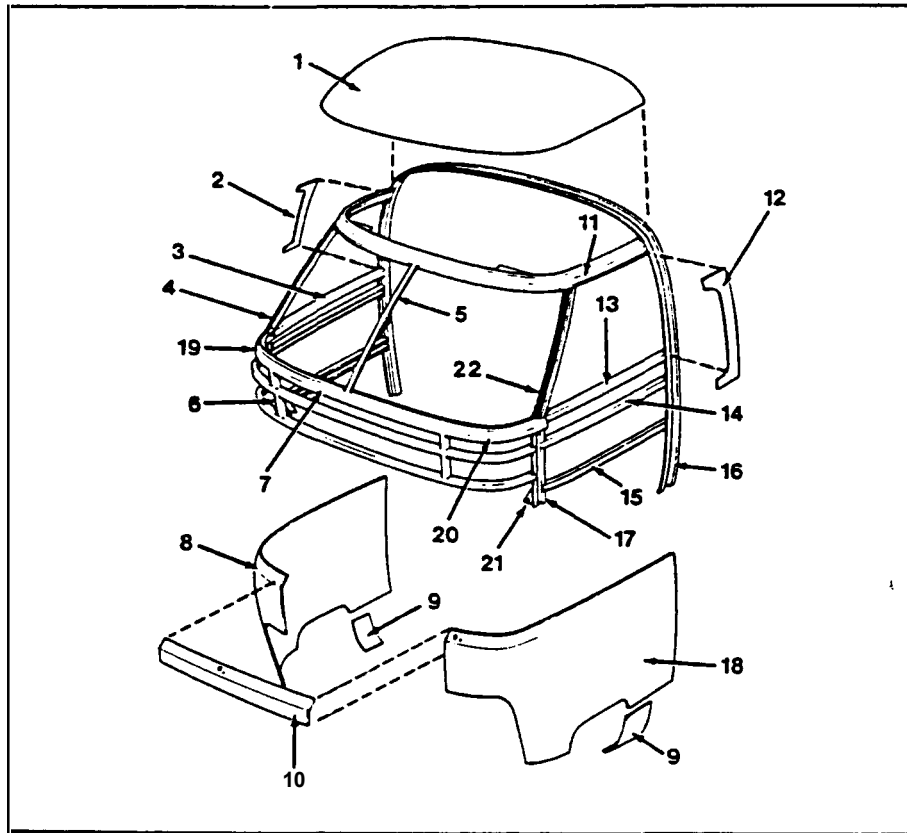
EXTERIOR TRIM

Belt Line and Rub Rail Trim Removal/ Replacement	B-28
Wheel Well Trim Removal/Replacement	B-28



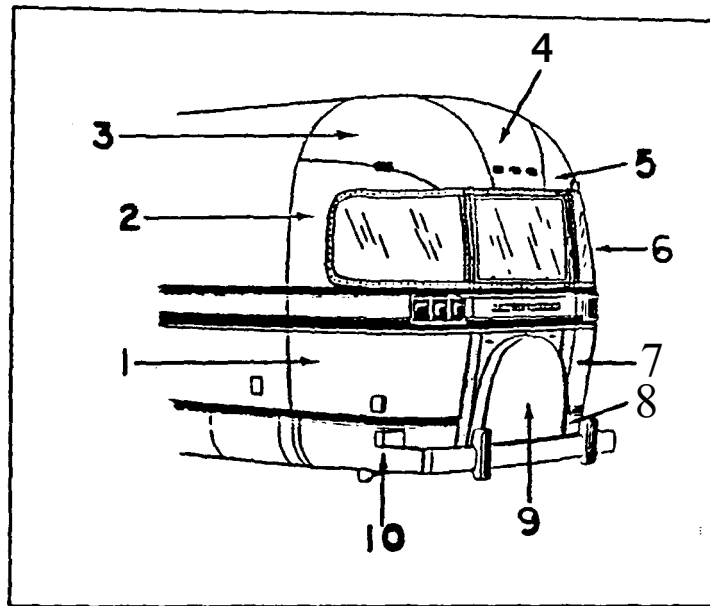
SHELL EXPLODE

No.	Description
1	Floor assembly
2	Rear end shell
3	Front end shell
4	Roof section
5	Side aluminum
6	Main bows w/notches
7	Window installation



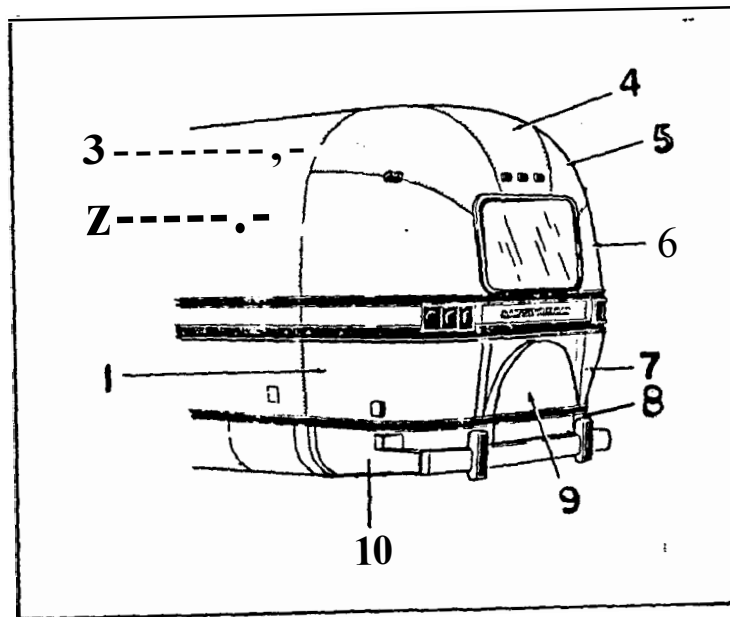
FRONT END SHELL

No.	Description		
1	Formed top	13	Lower windshield bow - road side
2	Window trim - curbside	14	Belt line bow
3	Lower windshield bow - curbside	15	Grille bow
4	"A" pillar - curbside	16	Main bow
5	Center divider - windshield	17	Pillar extrusion - roadside
6	Pillar extrusion - curbside	18	Stretch formed segment - lower roadside
7	Lower windshield bow		
8	Stretch formed segment - lower curbside	19	Lower windshield bow casting - roadside
9	Underbelly section	20	Lower windshield bow casting - curbside
10	Stretch formed segment - front	21	"A" pillar attachment
11	Upper windshield bow	22	"A" pillar - roadside
12	Window trim - roadside .040 Alum.		



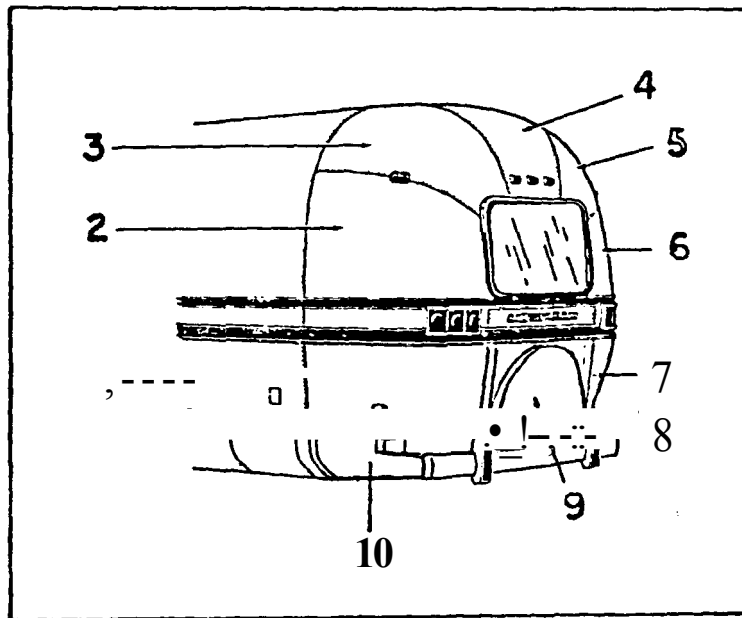
REAR END SHELL, 310 SERIES

- 1. Segment #5
- 2 • Segment #12
- 3. Segment #22
- 4. Segment #10
- 5. Segment #21
- 3+ Segment #11
- 4+ Segment #4
- 8. C.S. lower wrap ABS
- 6+ Spare tire cover
- 10. R.S. Lower wrap ABS



REAR END SHELL, 300 SERIES

1. Segment #5
2. Segment #2
3. Segment #19
4. Segment #1
5. Segment #20
6. Segment #3
7. Segment #4
8. C.S. lower wrap ABS
9. Spare tire cover
10. R.S. Lower wrap ABS



REAR END SHELL, 270 SERIES

1. Segment #5
2. Segment #2 Modified
3. Segment #19 Modified
4. Segment #1
5. Segment #20 Modified
6. Segment #3
7. Segment #4
8. C.S. lower wrap ABS
9. Spare tire cover
10. R.S. Lower wrap ABS

EXTERIOR MAINTENANCE

The Motorhome is covered by a clear acrylic lacquer finish. With these high quality finishes certain precautions must be taken to protect them. Oil, grease, dust and dirt may be removed by washing with any mild non-abrasive soap or detergent. Automatic dishwasher detergents and acid etch cleansers are too strong and should never be used. ALWAYS CLEAN YOUR AIRSTREAM MOTORHOME IN THE SHADE OR ON A CLOUDY DAY WHEN THE EXTERIOR SHELL IS COOL. Cleaning should be followed by a thorough clean water rinse. Spots and streaks may be prevented by drying unit with a chamois or a soft cloth. After cleaning and drying, a good grade of nonabrasive automotive paste or liquid wax will increase the life of the finish, especially in coastal areas where the finish is exposed to salt air or in polluted industrial areas. It will also protect the shell from minor scratches and make subsequent cleaning easier. Wax should normally be applied every three to six months.

It is important to remove sap, seeds, gum, resin, asphalt, etc., as soon as possible after they appear by washing and rewaxing. Sunlight and time will bake-harden these materials making them almost impossible to remove without heavy buffing. If asphalt remains on the Motorhome after washing, use a small amount of kerosene-on a rag and wipe the spots individually, being careful not to scratch the aluminum or paint.

END SHELL SEGMENT REMOVAL/REPLACEMENT

L Using a No. 30 drill (aircraft type 135° split point), remove the rivets from all the seam lines of the damaged segment.

2. After all rivets have been removed from the damaged segment, it may be necessary to use a putty knife to loosen the seams, due to caulking which is applied at the time of manufacture. This is also necessary at window areas and at seams, where curved segments and side and roof sheets meet. (Be careful not to scratch or damage surrounding segments or panels when prying loose),

3. After all seams are loose, segment can now be removed,

4. After damaged segment is removed it will be necessary to use it as a pattern for cut-out or trim areas.

5. If damaged segment is dented, use a hammer to partially straighten. Tape all edges with masking tape to keep damaged segment from scratching new segment when using it as a pattern.

6. Place new segment on a flat surface.

7. Overlay the damaged panel on the new segment, being very careful not to scratch or damage new segment. Make sure damaged segment is in correct position, with top and bottom corresponding with new segment. Once correct position is obtained, use a grease pencil to mark the ends and cut out areas.

8. After segment is marked, remove damaged segment. With a pair of metal snips, trim new segment where marked.

9. Segment is now ready for lay-up. Before laying-up, apply a strip of furnace tape to top edge of new segment. Also place a strip of tape on the top edge of remaining lower segment which the new segment will overlay. This is to prevent scratching.

10. Place segment in position and fit top corner under sheet which will overlay new segment. Very carefully slide new segment under roof or side sheets ••• depending on area in which you are installing.

11. After panel is started under roof or side sheets, work bottom end under window seam or front parts, depending on which segment is being replaced. Once segment is started at both ends and at top, it can now be fitted into proper position.

12. Once segment is fitted to proper position it can be drilled to be held in place with wedge-lock fasteners. Start in middle of top of new segment, use a No. 30 bit and very carefully drill through every fourth existing hole. Use a sharp drill and allow drill to feed itself through the metal without force. As soon as drill is through new segment, remove and install a wedge-lock. Be sure that seams are tight and no gaps are occurring.

13. At lower edge, lay out new holes 1 3/8" on centers with 3/8" edge distance on new segment. These holes should be spaced at least 1/2" from old holes in remaining segments. Starting from middle, drill every fourth hole with No. 30 drill bit and install wedge-lock as in step 12.

14. Fit a piece of seam tape under roof or side sheet to make a waterproof seal on the rib seam. As

soon as tape is in place, drill and hold with a wedge-lock as in step 12.

15. Should opposite end fit under the window frame, use window seam tape to make the waterproof seal in this area. Install and hold with wedge-locks as in step 12.

16. When all wedge-locks are in place on all four sides, use a No. 21 drill and drill remaining holes,

17. As soon as all holes are drilled, remove top wedge-locks and clean out drill shavings. Caulk a long segment in line with drill holes using Vulkem seal and replace wedge-locks. Repeat for bottom. Do not use an excessive amount of sealant.

18. Install Olympic rivets in all holes where there are no wedge-locks. Start from middle and work to edges.

19. As soon as rivets are in place, remove wedge-locks and redrill these holes using a No. 21 drill. Rivet with Olympic rivets.

20. When all rivets are in place, use a sharp knife to trim and remove excess tape and sealer from the edge of the seams.

21. When excess tape is removed, panel is to be repainted.

NOTE: For front and rear center segments, apply furnace tape to adjacent remaining segments only.

SIDE AND ROOF PANEL REMOVAL/ P-EPLACEMENT

1. Determine seam line of damaged area to be replaced. Using a No. 30 drill (aircraft type split point 135°), remove

the rivets from the damaged section. Start the drill in the center of the rivet head (to start bit, do one turn by hand) and as soon as the head is drilled off, continue to drill until the shank of the rivet drops from the hole. Start in the center of the damaged area. All windows must be disconnected from inside skin by drilling out pop rivets in interior. Remove these components completely before removing exterior panel and **save** them for installation into new panel.

2. After all rivets have been removed from the damaged panel it is now ready for removal. It may be necessary to use a putty knife to pry panel loose. Be very careful when using tools to pry panels loose so as to avoid damage to the surrounding panels.

3. All areas of cut-outs which were located in damaged section should be measured very carefully for transferring to the same locations on the new panel. Areas that are to be cut out can have rough cuts made at this time.

4. At least two people will be required to start lay-up. Seam tape should be used on front and rear ribs before replacing a new panel.

5. Use a grease marking pencil and mark vertical ribs and horizontal bars on remaining panels.

6. Tape top edge on new panel with furnace tape and slide it under the top existing sheet. All overlapped seams should have the top sheet overlapping the bottom

7. When sliding sheet under top panel, be very careful not to install it past the tape as the new panel is readily scratched.

9. Once panel is fitted to proper position, it can be held in place with wedge-lock fastener. Start in middle of top of new panel (use No. 30 drill bit) and very carefully drill through every fourth existing hole of the overlaying panel. Use a sharp drill and allow drill to feed itself through the metal without force. As soon as drill is through new panel, remove and insert wedge-lock in the hole. Be sure that seams are tight and no gaps are occurring.

10. Use a chalk line to mark off bars and ribs; after lines have been marked off, use a drill marker to show rivet spacing. (Drill marker can either be metal or wood, approximately 3/4 inch wide, 4 feet long and straight on both sides.) On one edge, mark seam rivet spacings 1 3/8" on center. On other side, mark rib and bar rivet spacings 4" on centers.

11. After sheet is marked off, doublecheck markings for straight and **even** spacings. Start in middle and install wedge-lock in every third location.

12. At lower edge, lay out new holes 1 3/8" on center with 3/8" edge distance on new panel. These holes should be spaced at least 1/2" from old holes in remaining panel. Starting from middle, drill every fourth hole with No. 30 drill bit and insert wedge-locks.

13. After all wedge-locks are in place, use a No. 21 bit and drill out all remaining rivet locations.

14. As soon as all holes are drilled, remove top wedge-locks and clean out drill shavings. Caulk along panels in line with drill holes using Vulkem seal and replace wedge-locks. Repeat for

bottom. Do not use an excessive amount of sealant.

15. Install rivets in all holes where there are no wedge-locks. For Olympic rivet installation see page B-22. Start from middle and work to edges.

16. As soon as rivets are in place, remove wedge-locks and redrill these holes using a No. 21 drill and rivet with Olympic rivets.

17. When all rivets are in place, use a sharp knife to trim and remove excess tape and sealer from the edge of the seams.

18. Reinstall all 4 components removed in Step No. 1.

19. When excess tape and sealer is removed, panel is to be painted.

ROOF VENT FR?- IB REMOVAL/REPLACEMENT

1. Remove fan and disconnect wire if so equipped.

2. Drill and pop rivets securing ceiling skin to vent frame flange.

3. Drill out hard rivets securing vent from flange to roof.

4. Remove vent frame by lifting from roof.

5. Reverse above procedures for reinstallation, using caulking liberally under and around roof flange.

RAIN LEAKS

Whenever rain leaks occur, the area in which the leak is originating must be determined.

1. Using a water hose, and starting in the general area in which the leak is appearing, water check

the exterior surface.

2. With someone inside the unit watching for the leak, start at the bottom and work upward with the water test (covering approximately 4 sq. ft. section at a time). Allow a few minutes between each move for leaks to appear inside. As soon as the person inside detects leaks, they can advise the person checking with the hose. This will help to determine the area in which to concentrate for correcting leaks.

3. After unit has been dried flow a bead of sealer along the seams of the metal, around any loose rivets which may appear, or around the window frames. Recaulk as necessary around exterior lights, lettering and any other point where an opening has been made through exterior metal sheets.

4. Allow sealer to dry at least one hour, then repeat water test as in Step No. 2.

RIB SPLICE AND HORIZONTAL STRINGER

1. Determine height of damage or bent area of rib.

2. Cut out damaged section approximately 10" above damaged area.

3. Measure length of rib needed for replacement, allowing 6" more in length for splice.

4. Fit replacement rib into floor channel and allow the other end to overlap replacement rib.

5. Drill six (6) evenly spaced holes (using a No. 30 drill), through both ribs and rivet together. (Use 1/8" diameter medium length hard bucking rivets.)

6. Using a 1" square angle of 14-GA metal, attach rib to floor

channel with (2) 1" No. 8 sheet metal screws. After the screws are secured to the floor channel, drill (2) holes with a No. 30 bit and rivet rib to bracket with (2) 1/8" diameter, medium length bucking rivets.

VENT TERMINATION REMOVAL/REPLACEMENT

1. Drain line vent casting. Remove No. 8 sheet metal screws and, using putty knife, carefully pry off of roof skin. When reinstalling use new gasket.

2. Refrigerator vent cap. Using No. 30 drill, drill out attaching rivets. With putty knife, carefully pry off roof skin. Reinstall using Olympic rivets.

RANGE EXHAUST VENT REMOVAL/REPLACEMENT

1. Detach cable from operating arm.

2. Remove cover (lid) by lifting (bending) up the metal tab covering hinge end, and sliding lid laterally.

3. Reverse procedure for reinstallation of lid.

4. To remove cylindrical collar, remove the pop rivets from flange.

5. Lift collar from position.

6. Reverse above procedures for reinstallation using caulking under collar flange.

FRONT BUMPER FAIRING REMOVAL/REPLACEMENT

1. Remove front bumper and short trim extrusion.

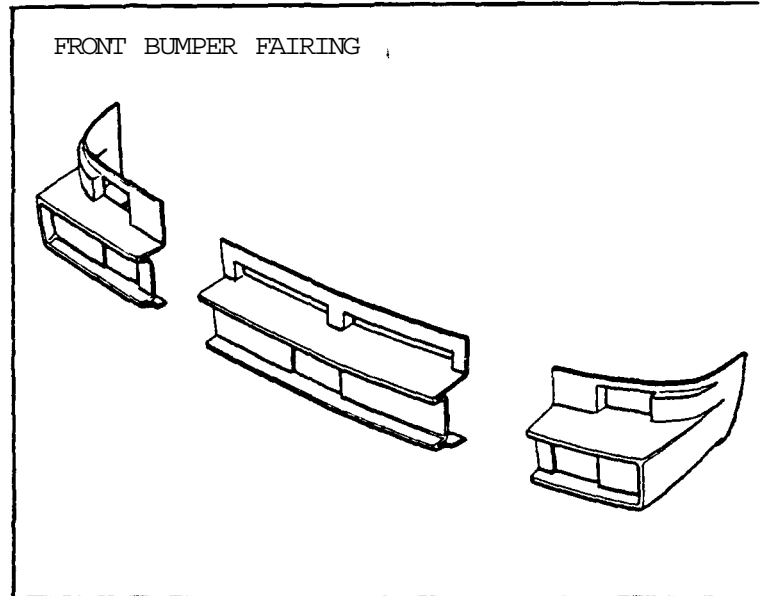
2. Loosen forward edge of front wheel well trim, both sides.

3. Remove rivets attaching fairing to lower end of support brace that is located in each wheel well.

4. Remove rivets attaching fairing to body sheet metal.

5. Disconnect turn signal lamp wires.

6. Remove fairing assembly.



GRILLE AND HEADLIGHT CASTING REMOVAL/REPLACEMENT

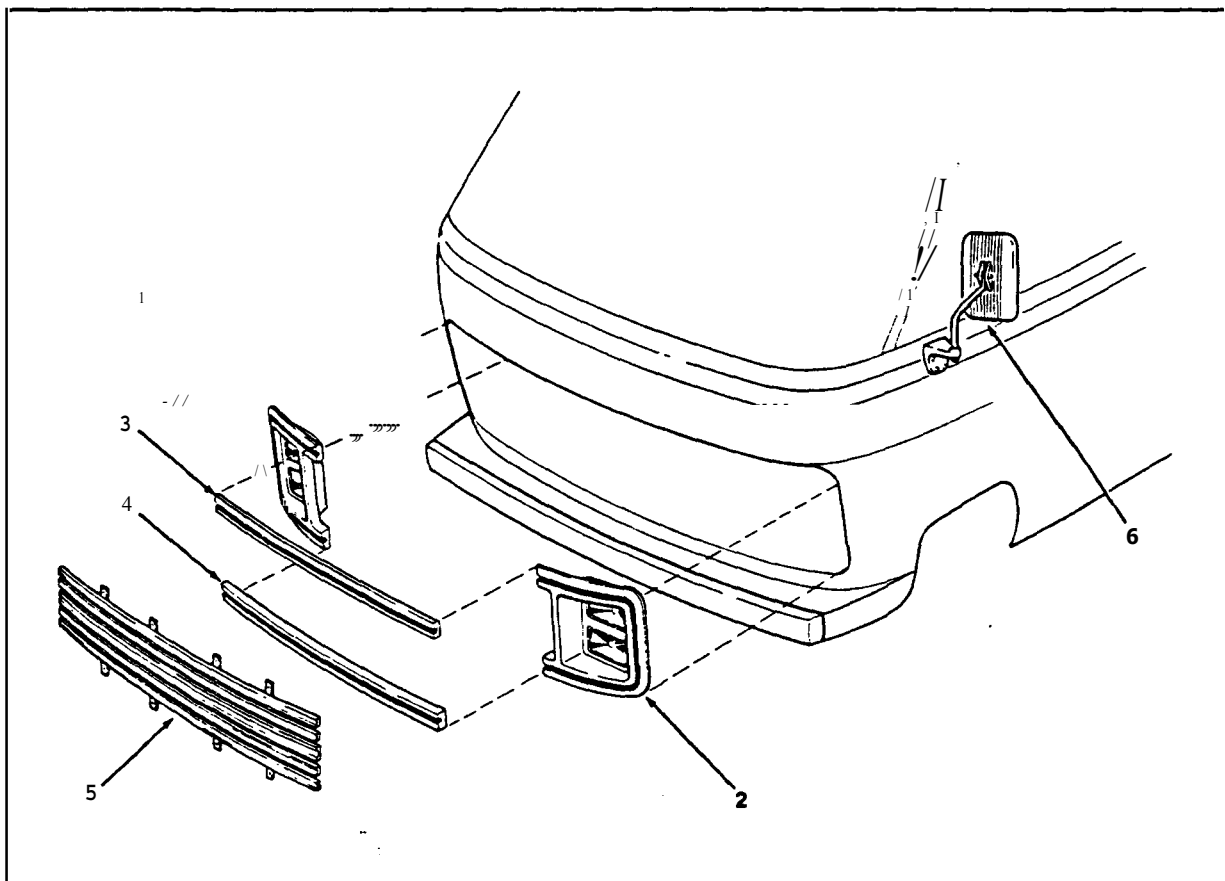
1. Remove bolts securing center grille section to end shell castings, remove center section.
2. Disconnect electrical connections to headlights and parking lights.
3. Drill out or cut off rivets securing headlight castings to end shell. Remove castings.
4. Remove headlights, parking

lights, and rear plastic liners and reinstall the in new headlight castings.

5. For installation, reverse above procedures.

6. After replacement of headlight castings the headlights may have to be readjusted.

NOTE: use No. 30 drill for pop rivet removal.



GRILLE ASSEMBLY

No.	Description
1	Headlight casting, curbside
2	Headlight casting, roadside
3	Upper grille support
4	Lower grille support
5	Grille bow casting
	Grille bow casting, narrow
	Grille bow casting, wide
6	Mirror, roadside
	Mirror, curbside

MAIN DOOR REMOVAL/REPLACEMENT

1. Remove inside door trim (see door jamb replacement).
2. *Remove rivets from top edge and side of table credenza next to door jamb (some models).
3. Remove window shade track.
4. Remove inner window trim.
5. Access to upper hinge is gained by removing rivets in piece of inside skin between window and door jamb until it can be raised enough to get at bolts without kinking.
6. *Access to lower hinge bolts is gained by notching the inside skin (some models).

* On those units without the ABS table credenza, rivets in the lower inside skin sheet are removed until the sheet can be pulled out far enough to reach hinge bolts.

MAIN DOOR ADJUSTMENT

1. Recontouring door for proper mating with jamb.
 - a) To adjust top half of door, drill rivets from inside skin of door face. Start approximately 6" above center of door on lock side. Use a No. 30 drill and remove the rivets up the side of the door, across the top of the door, and down the hinge side, to within 6" of center.
 - b) After rivets are removed, door will not be able to flex. Close door to determine how much door must be formed. With one person holding door, and the second person forming it, the adjustment can be made.
 - c) After adjustment is made with one person holding door frame in

correct position, the second person will drill new holes in door skin and place a rivet (AD45BS-paint match for vinyl skin) in each top corner and close door to make sure position has not changed.

d) If it is found to be correct, open door and continue to pop rivet skin in place, installing new rivets, equally spaced between original holes.

2. To adjust bottom half of door, start drilling rivets out 6" below center of door, down and across bottom, then up the lock side. Follow same adjustment procedure as used in top half.

3. Striker Pocket Adjustment. (Main door lock)

a) Using grease pencil, mark bevel of strike bolt of lock and close door to determine vertical misadjustment of pocket.

b) Drill rivets from strike pocket and adjust pocket to proper height.

c) Rerivet pocket in new position with a rivet at top and bottom of pocket. Double check latching and ease of door closing.

d) Lateral adjustment may be necessary to gain ease of latching.

e) When correct, install remaining rivets (never file lock bolt).

LOCK REMOVAL/REPLACEMENT

1. Remove screws from door frame, securing lock to the frame. They are located just above and below the bolt.

2. Remove three mounting screws that attach inside bezel to lock body and remove bezel with handle attached.

3. Remove **lock** assembly.

4. To install, reverse removal procedures.

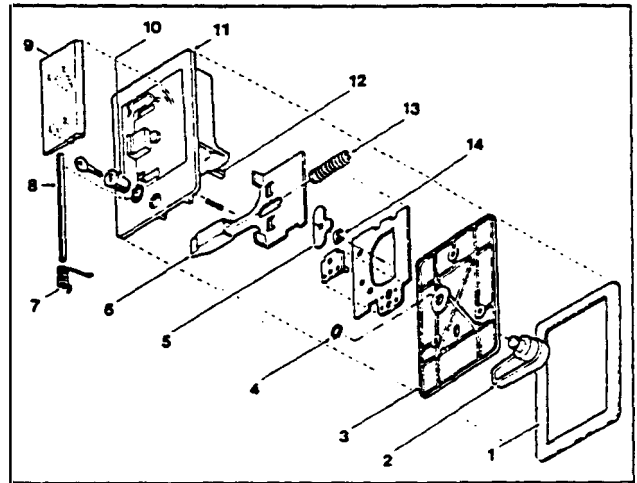
LOCK CYLINDER REMOVAL/REPLACEMENT

1. To remove lock cylinder with lock installed in trailer, drill center of lock cylinder with a No. 20 drill bit as a pilot hole to a depth of approximately 1/2". After reaching this depth, change drill size to a 3/8" and very carefully redrill same hole to same depth. Lock cylinder is held in place by a spring-loaded horseshoe keeper on back side of cylinder. By drilling a hole in the cylinder, this will allow keeper to drop out and lock cylinder can be pulled from back.

2. To remove cylinder with lock removed from trailer, insert a small flat bladed screw driver through the small rectangular hole in the top of the lock housing and depress the spring loaded horseshoe keeper spanning the back end of the lock cylinder.

3. **While** holding the keeper in the depressed position, push the cylinder out through the front of the housing.

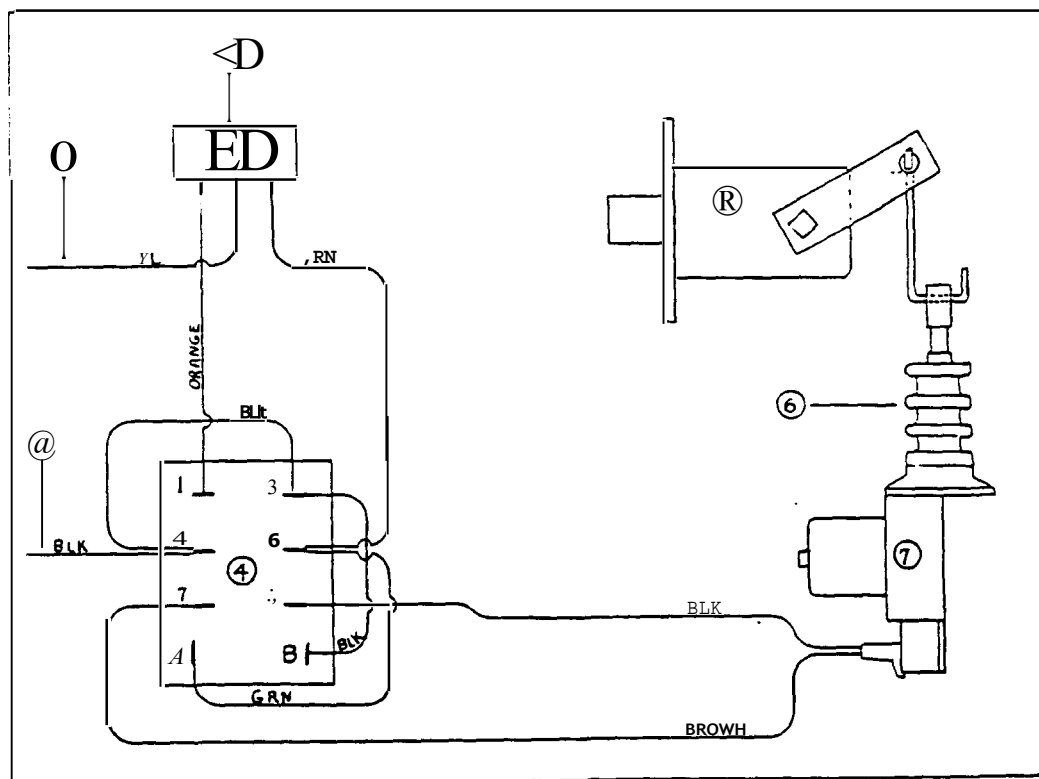
4. To replace, press horseshoe keeper flush with cylinder, and insert into hole. With key in upright position, press cylinder into hole until it is fully in place. Spring will allow keeper to snap into place, locking cylinder into position. Lock should now operate.



MAIN DOOR LOCK

No.	Description
1.	Gasket seal
2.	Handle- inside
3.	Bezel
4.	Clip
5.	Cam
6.	Bolt plate sub-assy.
7.	Spring-grip
8.	Pin, vertical (outside handle)
9.	Handle, outside
10.	Tumbler cylinder and keys
11.	Outside housing
12.	Chill
13.	Spring - bolt
14.	E Ring

POWER DOCR LOCK



- | | |
|--------------------------------------|----------------------------|
| 1. Dash Switch | 5. Dead Bolt |
| 2. Positive wire to Chevy fuse block | 6. Plunger |
| 3. Ground wire to vacuum gauge | 7. Motor and gear assembly |
| 4. Relay | |

THEORY OF OPERATION

The key to the operation of the door lock is the fact the motor is polarity sensitive. In other words, if the positive and negative wires providing current to the motor are reversed it will run in the opposite direction.

Power to the system comes from the automotive fuse block via the yellow wire. Ground is usually picked up from the vacuum gauge. When the left side of the dash switch is depressed the relay provides positive current on the black wire to the motor and

negative ground on the brown. The motor runs and extends the plunger, locking the dead bolt. When the right side of the switch is depressed the relay provides positive current on the brown wire and negative on the black. The motor runs in the opposite direction, retracting the plunger and unlocking the door.

SCREEN DOOR ADJUSTMENT

1. Door not square in opening.

a) Using a No. 20 drill, remove rivets attaching screen door to hinge.

b) Properly locate screen door into door jamb.

c) Hold in this position and have second person drill two new holes from hinge through door.

d) Install S/32 pop rivet in these holes.

e) Check if properly located and then install balance of pop rivets.

2. Recontouring door for proper mating with jamb (two people required.)

a) If too much curvature is in screen door, hold center firmly against jamb from the outside and pull on top or bottom till proper contour is achieved.

b) If not enough curvature is in screen door, place 6" 2 x 4 wood spacer at center in latch area. Close screen door and push on top or bottom until proper contour is achieved. Increase spacer if necessary.

3. Replacing foam tape.

a) Starting at bottom of door, peel gasket seal from frame. This is a self-adhesive gasket, and should be able to be removed very easily.

b) Clean frame surface with lacquer thinner and wipe clean.

c) To replace, peel paper backing from new gasket. Starting at the bottom, form around door.

PLASTIC SCREEN DOOR INSERT REMOVAL/REPLACEMENT

1. Push upward on panel as far as it will go, and pull out on bottom.
2. To reinstall, reverse above.

ASSIST HANDLE REMOVAL/REPLACEMENT

1. Carefully measure and drill 1/2" holes in inner skin directly opposite upper and lower handle attaching points.

2. Working through holes drilled in step 1, remove nuts securing handle. Remove handle.

3. Reverse above steps to reinstall.

4. After replacing handle, cover holes drilled in step 1 with 1/2" dia. spring clip type chrome hole plugs. These plugs should be readily available locally.

5. Holes may also be covered by cutting a piece of matching vinyl clad inner skin aluminum long enough to run from floor to a point above top hole and wide enough to fill space between door trim and refrigerator panel or fixed window and galley. Rivet this piece to inner skin using colored pop rivets.

MAIN DOOR JAMB REMOVAL AND REPLACEMENT

1. Remove pop rivets from inside door jamb that go outward through T leg of trim.

2. Gently pry out inside door **trim**.

3. Using a No. 30 drill, remove pop rivets attaching inside skin to door jamb.

4. Using No. 30 drill, remove rivets attaching exterior skin to door jamb.

5. Remove screws attaching door jamb to floor.

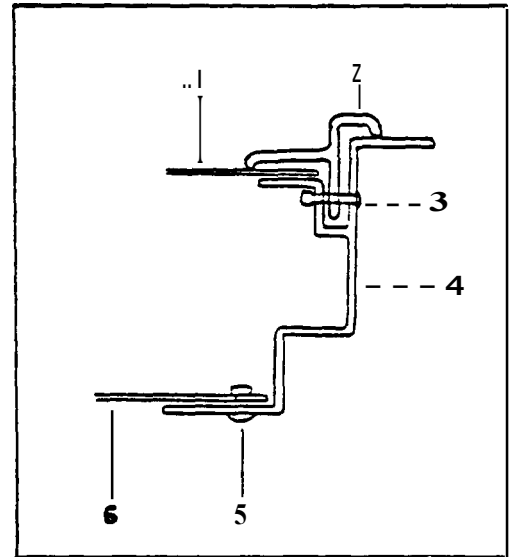
6. On models with door side **TV** credenza, remove screws and/or rivets attaching credenza to inner skin, pull away far enough to allow trim to be removed.

7. Remove pop rivets attaching inner skin approximately 12" to the rear of the door jamb.

8. Hold inner skin away from door jamb in hinge area and remove nuts attaching hinge to jamb and remove door.

9. Remove door jamb.

10. For installing, reverse procedures using AD45 pop rivets for attaching inner skin and olympic rivets for attaching exterior skin. AD48 pop rivets must be used when installing inner door jamb trim.



DOOR JAMB AND TRIM

No.	Description
1	Inside skin
2	Inside door jamb trim
3	Pop rivet AD48
4	Door jamb
5	Bucked rivet
6	Outside skin

SLIDE BOLT REMOVAL/REPLACEMENT

1. Slide bolt forward to reveal rearmost attaching rivet in slide base. Drill out rivet.

2. Repeat step 1 with forward rivet. Remove slide bolt.

3. To install, reverse removal procedures.

REFRIGERATOR ACCESS DOOR ASSEMBLY REMOVAL/REPLACEMENT

1. Access door removal.

a) Using No. 30 drill bit, drill out rivets attaching piano hinge to door frame.

b) To install rivet hinge to door frame using Olympic rivets.

2. Lock Removal (all access doors) •

a) Remove pawl by removing Phillips head screw on back of lock cylinder.

b) Remove large threaded lock ring nut securing lock assembly to door. Remove lock assembly.

c) To install, reverse the removal procedure.

3. Jamb removal and installation.

a) Using No. 30 drill, remove rivets around periphery on the inside and outside.

b) Gently pry away from ext. skin with putty knife.

c) To install, apply foam tape gasket under flange and place in opening. Pop rivet inside skin to frame with 1/8 rivets-in existing holes. Attach to exterior **skin** using Olympic rivets.

ACCESS DOOR LOCK CYLINDER REMOVAL/REPLACEMENT

1. Remove lock assembly from door.

2. With a narrow bladed screw driver, depress the spring loaded pawl which projects into one of the four small rectangular shaped channel openings in the back portion of the lock cylinder housing.

3. With the pawl depressed, push the lock cylinder assembly out or the front of the housing.

4. Remove the small die cast keeper directly in front of the spring loaded paw. This keeper is loose and should fall out when the cylinder assembly is inverted.

5. Remove the inner "key" portion of the lock cylinder.

6. To install, reverse the removal procedures.

REAR LOWER CORNER WRAP REMOVAL/ REPLACEMENT

1. Remove rear bumper.

2. Remove rub rail adjacent to damaged wrap.

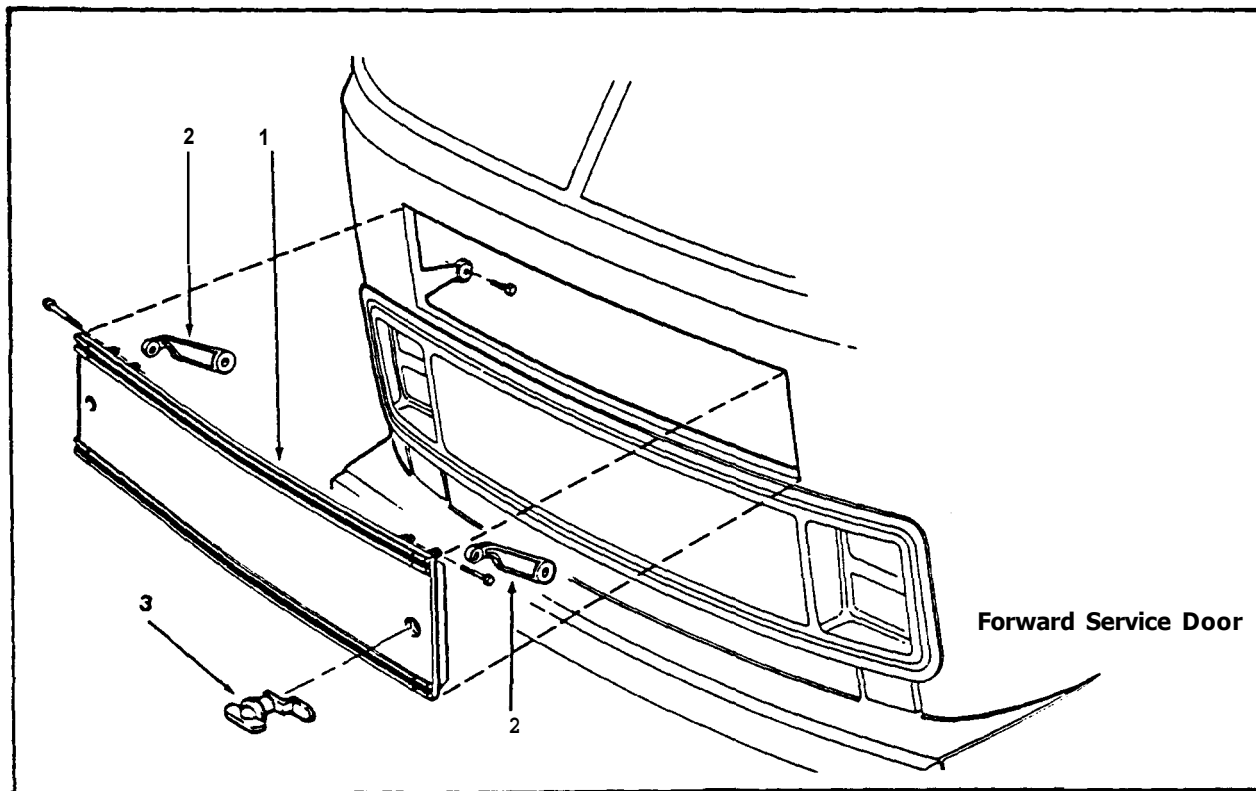
3. On roadside wrap, remove screws attaching sewer line cover to wrap.

4. Remove pop rivets that secure wrap to outer skin and center lower filler pane.

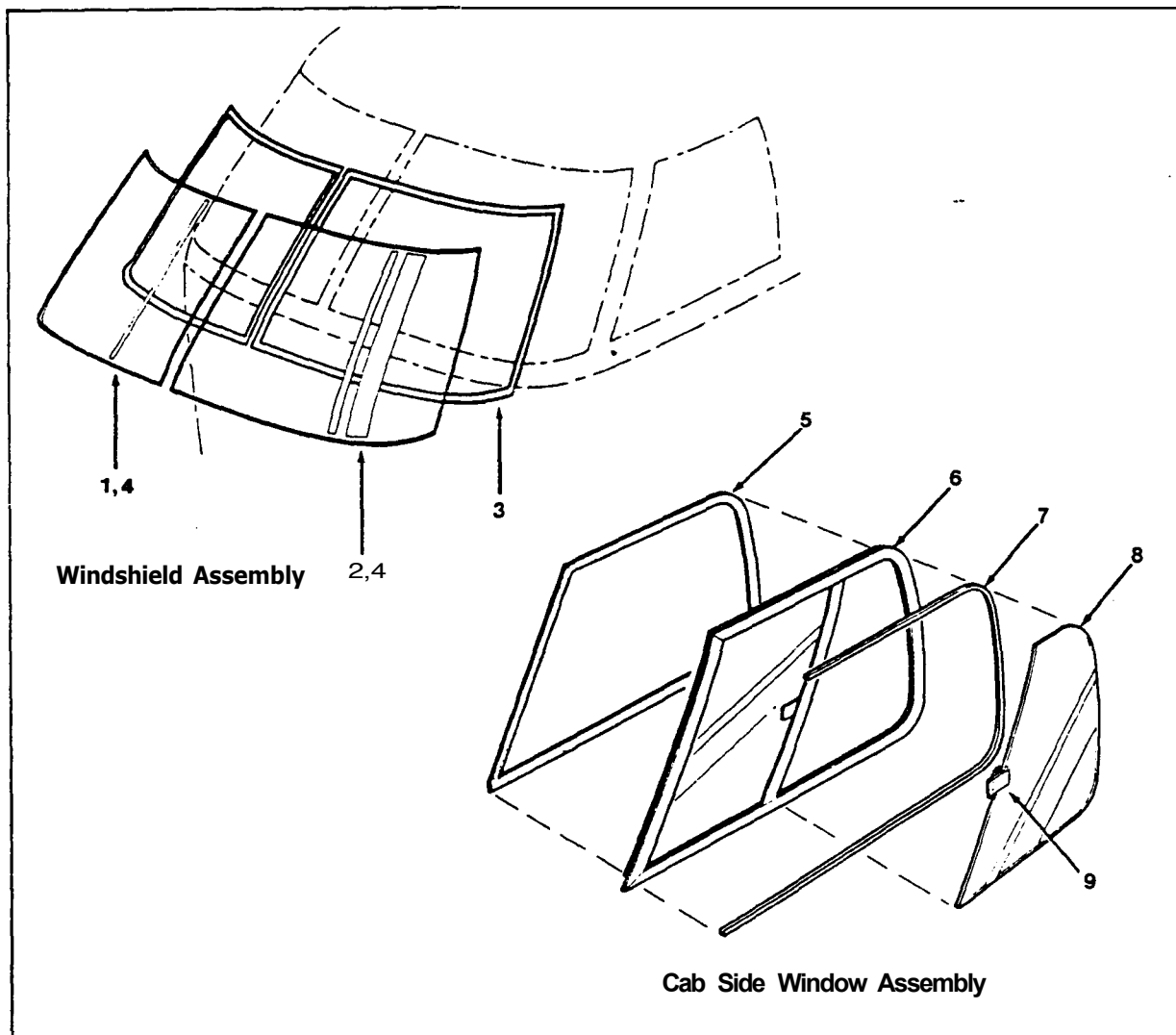
5. For installation, reverse above procedures.

NOTE: Use No. 30 drill for pop rivet removal.

FORWARD SERVICE DOOR

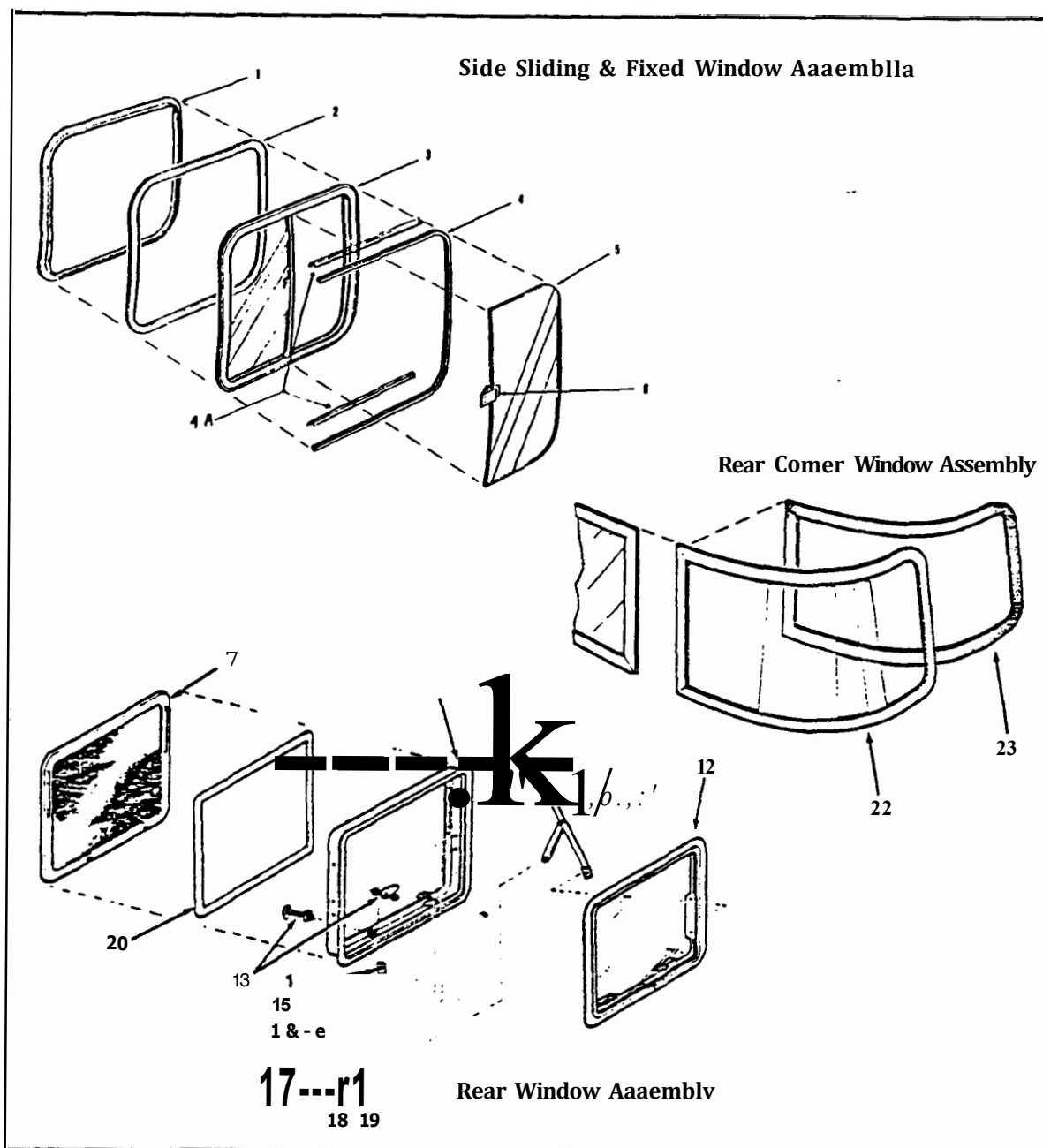


1. Forward Service Door
2. Mounting am, curbside
Mounting am, roadside
3. Service door lock



WINDSHIELD AND CAB SIDE WINDOW ASSEMBLIES

No.	Description
1	Windshield - tinted - curbside
2	Windshield - tinted - roadside
3	Molded rubber gasket
4	Molded rubber gasket insert
	Cab side window assy. - curbside
	Cab side window assy. - roadside
5	Gasket, vinyl foam tape
6	Frame assy., including stationary glass - curbside
	Frame assy., including stationary glass - roadside
7	Glass run channel
8	Glass - sliding - curbside
	Glass - sliding - roadside
9	Lock assembly



No.	Description		
	Side window assy. tall, curbside and roadside	8	Frame assembly
	Side window assy. short, curbside and roadside.	9	Handle assembly
	Fixed window assembly, 30" x 30", 18" x 27", 18" x 33"	10	Lever arm assembly, short
1	Inside trim	11	Lever arm assembly, long
	Inside trim short	12	Glass and sash assy, rear
2.	Gasket, vinyl foam tape	13	Latch assembly
3 •	Frame Assy. including stationary glass-curbside and roadside	14	Track-guide
4.	Glass run channel	15	Track-catch
4 a.	Plastic window track	16	Stop-block
5	Glass sliding - curbside, tall	17	Screw-link arm
	Glass sliding - roadside, tall	18	Bushing-link arm
	Glass sliding - roadside, short	19	Pivot-block
6	Lock assembly	20	Window seal - 1/2"
7	Screen, rear window, RB & CB	21	Bug seal
		22	Rear corner window assy - curbside, roadside
		23	Gasket, vinyl foam tape

WINDSHIELD GLASS REMOVAL/REPLACEMENT

1. Remove rubber locking strip around entire perimeter of piece of glass that is to be replaced.
2. From the inside push out at the top of the glass and lower out.
3. To reinstall glass, set lower edge of glass into rubber gasket and gently ease glass into position. Gasket at top has to be held in the open position in order to let glass seat properly.
4. Reinstall rubber locking strip using a locking strip tool (Douglas Tool Company, Locking strip tool #161 or equivalent).

NOTE: Minimum of 2 men will be required.

SIDE WINDOW GLASS (SLIDING PORTION) REMOVAL/REPLACEMENT

1. Remove valance. The attaching screws are through angle extrusion up into the bottom of the roof-locker and one on each end into the side wall. Use caution to avoid soiling the draperies and venetian blinds.
2. Remove venetian blinds. Attachments are exposed when the valance has been removed.
3. Remove window close out trim.
4. Remove screw securing the end of upper plastic slide channel strip to window frame.
5. Slide by-pass window and screen open about 1/2 way.
6. Grasp free end of upper plastic channel locking strip and pulling firmly, slide strip from window channel.

7. Lift up on screen, swing bottom inward and remove.

8. Repeat with window.

9. From outside motorhome remove screws securing fixed sash and glass. Remove sash and glass.

10. For installation, reverse removal procedures.

CAB AND SIDE WINDOW FRAME REMOVAL

1. Remove interior trim frame by removing pop rivets.
2. Remove all pop rivets securing window frame to interior skin.
3. Using #30 drill, drill out all rivets securing frame to exterior skin.
4. With putty knife, gently pry window frame loose from shell.

CAB AND SIDE WINDOW FRAME REPLACEMENT

1. Apply foam tape gasket under window flange.
2. Insert window into opening.
3. Rivet window flange to exterior skin using Olympic rivets.
4. Pop rivet window flange to interior skin.
5. Pop rivet interior trim frame to interior skin.
6. Using rawhide or plastic mallet, tap down any high areas between exterior rivets.

CAB SLIDING WINDOW SASH AND GLASS REMOVAL/REPLACEMENT

1. Move the sliding portion of the glass to the full open position.
2. Starting at the forward end of top section, carefully work the flexible schlegle window glass channel out of its groove in the window frame.
3. Grasp the loose end and pull flexible channel top section out of window frame.
4. Move the sliding portion of the glass forward into the channel groove in the frame. Remove from vehicle by lifting up on glass, swinging bottom out of lower channel.

GLASS RUN SCHLEGLE CHANNEL REMOVAL/ REPLACEMENT

1. Remove sliding window as described in previous paragraphs.
2. Starting at one end, pull glass run channel out of groove in window frame.
3. Start new glass run channel in window frame groove. DO NOT cut to length yet.
4. Starting with a piece of 3/8" x 4" x 6" paneling, cut a radius on one end slightly smaller than the radius in the curved corners of the window frame.
5. Insert the radiused end of the paneling into the new channel and tap firmly until channel bottoms out in window frame groove.
6. Use the opposite end of the paneling and finish tapping the straight sections into place.

7. Any excess length can now be trimmed with side cutter type pliers.

8. Any loose areas can be spot glued with contact cement.

FRONT CENTER WINDOW FRAME REMOVAL

1. Remove glass and sash assembly.
2. Using No. 30 drill remove pop rivets attaching interior skin to window frame.
3. On outside, using No. 30 drill, remove rivets attaching window frame loose from shell.

REAR CENTER WINDOW FRAME REPLACEMENT

1. Apply foam type gasket under window flange.
2. Insert window in opening.
3. Rivet window flange to exterior skin using Olympic rivets.
4. Using rawhide or plastic mallet, tap down any high areas between exterior rivets.

FIXED WINDOW REMOVAL/REPLACEMENT

1. Drill out rivets and remove inner window close out.
2. Remove rivets from exterior window frame by drilling out with number 30 drill.
3. Remove window sash and glass,
4. Reverse procedure for installation.

NOTE: Caulk liberally between exterior window flange and side of trailer to prevent rain leakage.

REAR WINDOW GLASS AND SASH REMOVAL/REPLACEMENT

1. Remove nuts from lifting arms and slip arm out of pivot mounts.
2. Remove nut and bolt holding knobs to arms, remove knobs.
3. Remove screws attaching lifting arm brackets to window frame.
4. Rotate window upward past horizontal and it will drop out of stationary hinge.

S. To replace, reverse the above being sure hinge on window is inside locations on stationary hinge.

LIFTING ARM REMOVAL/REPLACEMENT

1. From inside motorhome:
 - a) Unlock window latches.
 - b) Open window to 3rd position.
 - c) Remove handle assemblies from L.H. and R.H. lever arm using screwdriver to loosen.
2. From outside motorhome:
 - a) Remove (1) #10-24 x 1/2" type "F" screw from (1) link arm (be careful not to lose bushing).
 - b) Lower window to closed position allowing lever arm guide block to drop out of sash track.
 - c) Raise and position window. Remove lever arm assembly from frame track guide block by twisting out of block. Pull lever arm through slot in window frame.
 - d) Slide new lever arm assy. into window frame slot and assemble

stud into guide block. Lower window, assemble guide block on end of lever arm to sash track.

- e) Re-install (1) #10-24 x 1/2" type "F" screw at link arm (make sure bushing is on screw) and tighten to jam bushing against pivot block.

NOTE: These screws must be extremely tight.

- f) Repeat Items a. through e. for remaining arm assembly.

3. From inside motorhome:

- a) Re-assemble handles.

WINDOW LOCK REMOVAL/REPLACEMENT

1. From outside of motorhome:

- a) Remove locking pawl and retainer nuts from shaft.

- b) Remove large nut from threaded housing.

2. From inside of motorhome:

- a) Pull old lock inside motorhome:

- b) Replace new lock through window frame.

3. From outside motorhome:

- a) Replace large nut on threaded housing.

- b) Replace locking pawl and retainer nuts on shaft.

- c) Adjust pawl on shaft to give proper tension on window.

WINDOW SCREEN REMOVAL/REPLACEMENT

1. Remove inside lifting grip by removing #10-24 x 1/2" type "F" screw.

2. Remove No. 8 sheet metal screws attaching screen to window frame.

3. Turn window locking arms to horizontal position and slide screen off.

4. To replace, reverse the above.

WINDOW SCREEN REPLACEMENT, SLIDING

1. Slide screen to center of window opening.

2. Grasp screen on each side and pull towards inside to invert curvature of screen frame. Use caution to make sure radius of curve is as large as possible and is even throughout the height of the screen.

3. As the screen is gradually bent towards the interior it will become short enough to come out of the upper and lower channels.

4. Reverse procedures to reinstall.

OLYMPIC RIVETS

DRILLING OF HOLES FOR INSTALLATION

1. Hole diameter recommended for blind rivets (XA 4167 is .160/164, No. 21 drill) .
2. Hold drill at right angle to structure to obtain a round hole. (See Fig. No. 22)
3. Avoid excessive pressure on drill to prevent distortion to the structure. (See Fig. No. 23)

*4. Correct rivet grip length.

Material Thickness .050 to .150
Correct Olympic Rivet 682614

Material Thickness .251 to .250
Correct Olympic Rivet 682615

Use of the Olympic "Hook" gauge allows a direct reading on the correct rivet grip length. (See Fig. No. 24)

The thickness of metal on the exterior shell is .032 gauge. Keep this in mind while determining the grip range needed.

*5. Rivet Installation:

Use either Olympic RV50 pulling gun or RV36 with Olympic RV855-4 pulling head is recommended. Hold the gun in line with the axis of the hole to prevent cocking of the rivet in the hole. Exert firm pressure against the structure to obtain proper seating of the rivet head. (See Fig. No. 25)

6. Protrusion Limits:

The installed rivets should conform to the stem and collar protrusion limits shown in Fig. No. 26.

7. Shaving of Rivet Head

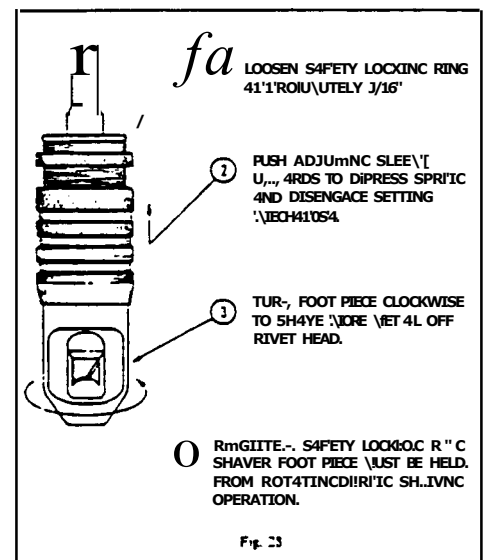
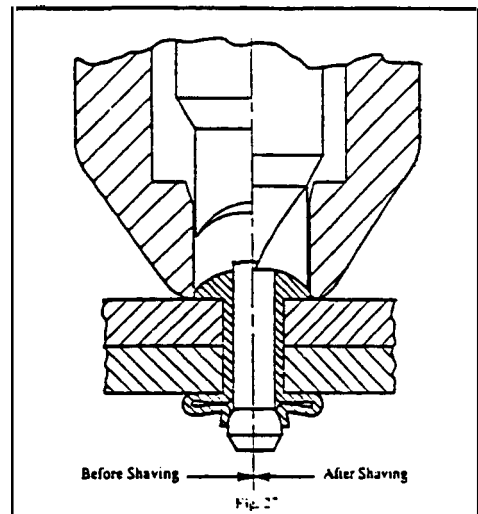
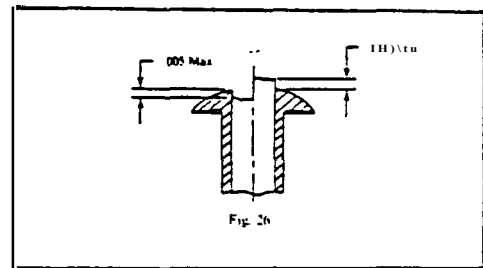
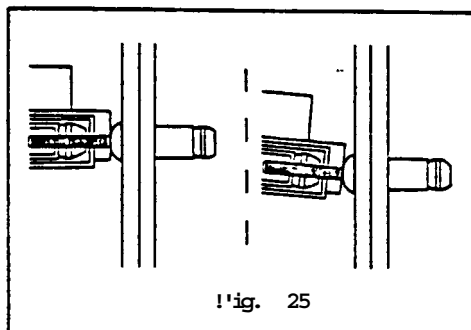
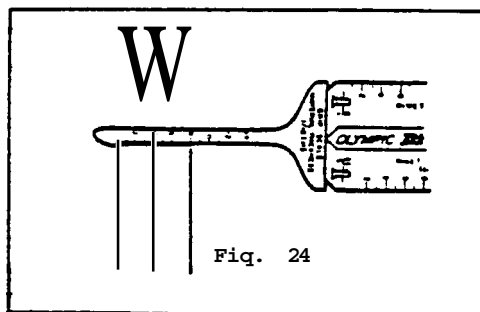
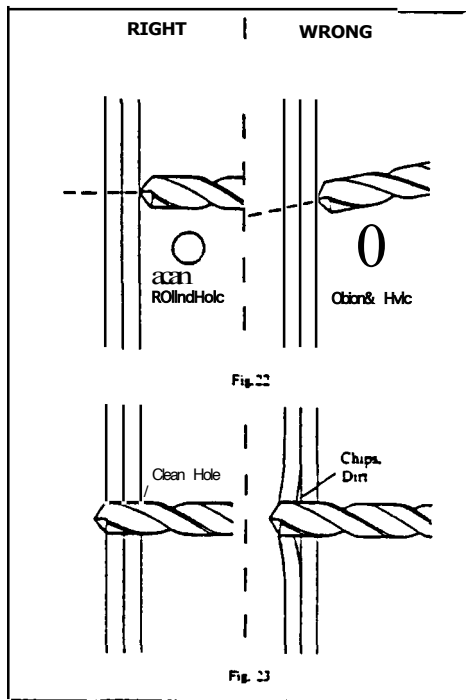
After rivet is installed the head can be shaved using the HS210 shaver to give the appearance of a bucked rivet.

Fig. No. 27 shows a section through the rivet head before and after shaving, as well as the correct adjustment of the shaving tool.

Adjust the shaving tool to remove the minimum amount of metal necessary to clean up the rivet head. (See Fig. No. 28)

8. If the Olympic Rivets are being used in roof sheets or segments, rubber "O" rings (available through the Airstream Parts Department) should be used to insure a water tight installation.

**NOTE: In June of 1982 Olympic rivets #682614 and 682615 ceased to be manufactured, although many were still available at Airstream dealerships. The Olympic rivet replacing them is a number 682616 that may be used in either application. The new rivet requires a different pulling head insert #685205.*



REMOVAL OF OLYMPIC RIVETS

1. Should it be necessary to remove an improperly installed blind rivet, the following procedure is recommended:
 - a. Punch a drill start into center of head.
 - b. Drill (No. 21) through the head of the rivet only. The drill should be the same size as the rivet shank.
 - c. Pry the head of the rivet with a punch.
 - d. Push or drill out the remainder of the rivet. Be careful not to enlarge the hole in the structure. (See Fig. 29).

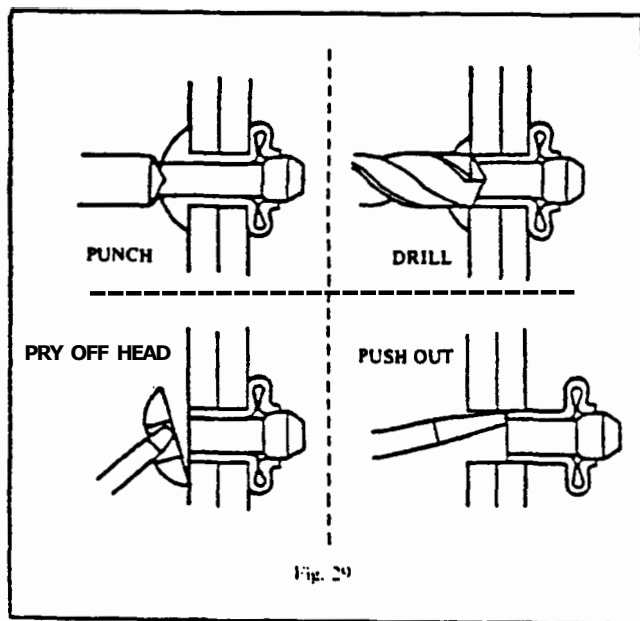


Fig. 29

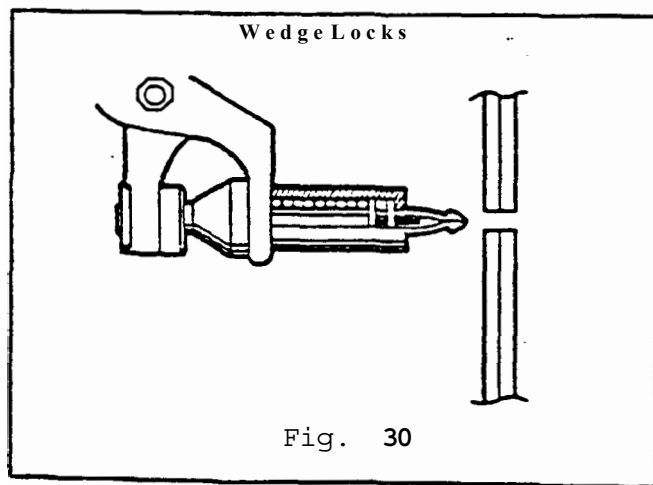


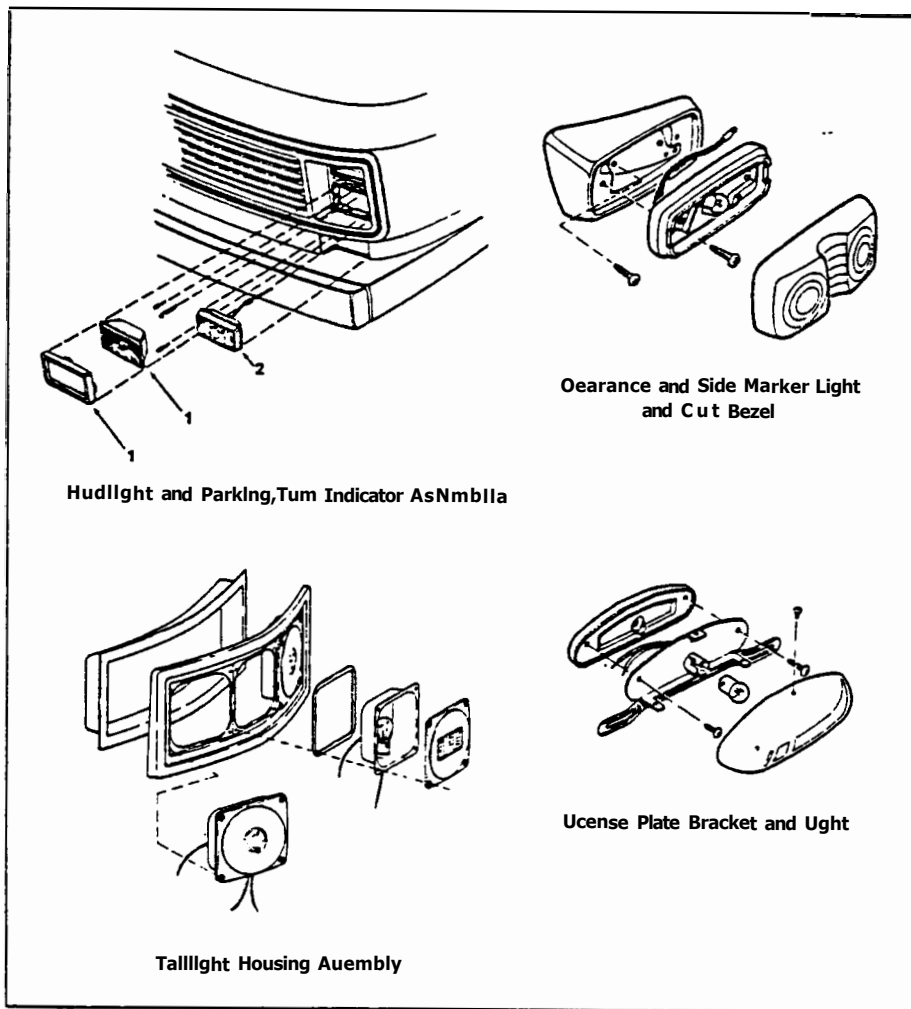
Fig. 30

WEDGE LOCKS

use wedge-locks when pinning up replacement metal panels. Wedge-locks hold the sheet in place and, when properly spaced, hold the sheet flat. This prevents cans or pockets from forming in the metal due to **excess** metal.

The wedge-lock is a spring-loaded type fastener, which is installed by means of special pliers. (These tools are available from Factory **Parts** Department.)

1. Using a No. 30 drill, drill hole in replacement sheet where fastener is to be placed.
2. After hole is drilled, place fastener in pliers and apply pressure to pliers. This compresses fastener spring, allowing fastener tip to retract for inserting in hole on panel. (See Figure 30.)
3. After inserting fastener into hole, release pressure on Pliers. Fastener is now locked into position to hold replacement panel.
4. All sheets should be pinned up with fasteners approximately **every** fourth hole across top, bottom and sides, and every third hole on center of sheet **seams**.
5. When pinning up segments, space wedge-lock fasteners every third hole to be sure of a tight seam.
6. To remove fasteners, place Pliers in position on fasteners and apply pressure. Then remove from hole.



EXTERIOR LIGHT ASSEMBLIES

No.	Description	
1	Headlight assemblies (specify beam & side)	Lens, back-up
	Low beam, roadside & curbside	Bulb, G. E. #1156
	High beam, roadside & curbside	Clearance and side marker light
2	Parking-turn indicator assy.	Clearance light lens
	Taillight assembly	Bulb, #1895
	Pocket	License plate bracket and light
	Bezel	License plate light bracket
	Lens, tail, stop & turn	Bulb, #95
	Double contact taillight bulb	
	Gasket	
	Bulb, G.E. #1157	
	Single contact backup light	

HEADLIGHT REMOVAL/REPLACEMENT

1. Remove 3 screws securing metal retaining ring and remove.
2. Pull headlight out and remove electrical connector from backside of headlight.
3. For installation, reverse above procedures.

TAILLIGHT, STOP, TURN & BACKUP LIGHT HOUSING REMOVAL/REPLACEMENT

1. Remove 4 screws securing bezel to rear corner wrap.
2. Using putty knife carefully pry bezel away from wrap.
3. Disconnect lamp wires.
4. To remove individual lamps, drill out pop rivets.

5. To install, reverse removal procedures.

LICENSE PLATE BRACKET AND LIGHT REMOVAL/REPLACEMENT

1. Remove three screws securing light cover.
2. Remove two screws securing light base and license holder.
3. Unplug **wire**.
4. Reverse above procedure for reinstallation.

CLEARANCE, SIDE MARKER LIGHT, FRONT AND REAR IDENTIFICATION LIGHT REMOVAL/REPLACEMENT

1. Carefully remove lens with screwdriver by prying from light base.
2. Remove two screws securing base (one serves as electrical ground contact).

3. Unplug wire.

4. Reverse above procedure for reinstallation.

BELT LINE AND RUB RAIL TRIM REMOVAL/REPLACEMENT

1. Remove pop rivet and cleat at end of vinyl insert.
2. Remove vinyl insert by grasping one end and pulling from the metal trim.
3. Remove the metal trim by drilling out the pop rivets with a No. 30 bit.
4. Reverse procedure for reinstallation.

a) Fill old holes with pop rivets and caulk to prevent rain leakage.

b) Vinyl insert is installed by placing one edge into metal trim then pushing other edge in with thumb •

c) Caulk top of metal trim to prevent rain leakage.

WHEEL WELL TRIM REMOVAL/REPLACEMENT

1. Remove screws around inner perimeter of trim and pull outer trim off.
2. Drill out pop rivets attaching inner trim to wheel well.
3. Apply caulking in groove of new inner trim piece and slide up over the wheel well and outer side sheet.
4. Starting in center and working both ways rivet inner trim.

5. Starting in center and working
both ways screw inner trim to
outer trim.

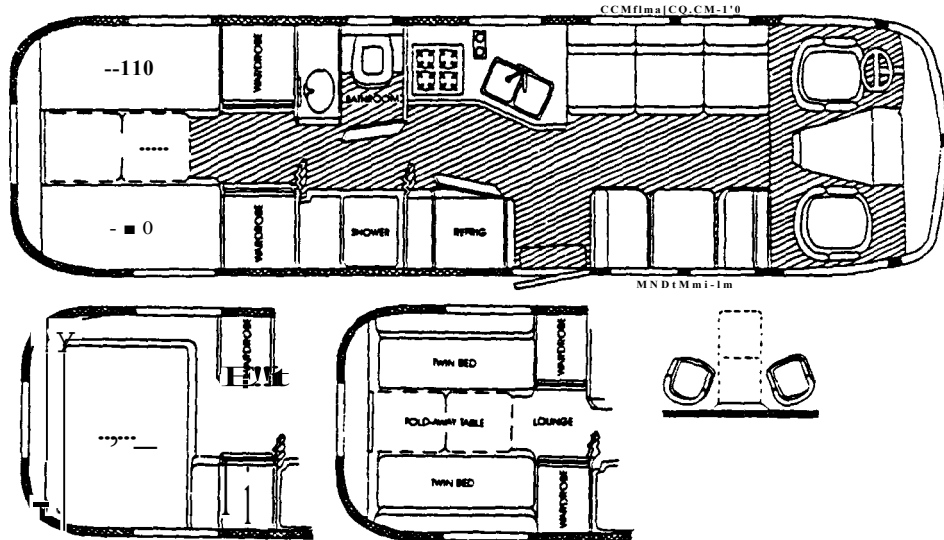
INTERIOR

FLOOR PLANS	C-1
INSTRUMENT PANEL ASSEMBLY AND CONTROLS	C-3
Instrument panel removal and replacement	C-4
SEATS AND BELTS	C-6
Removal and Replacement	C-6
ROOFLOCKER ASSEMBLIES	C-7
Rooflocker removal and replacement	C-9
GALLEY ASSEMBLIES	C-10
Galley top, galley sink, spice rack	
Removal and Replacement	C-10
REFRIGERATOR CABINET AND PANTRY ASSEMBLIES	C-12
Refrigerator, control panel, sliding door,	
microwave, pantry removal and replacement	C-14
REAR BEDROOM (310 SERIES) ASSEMBLIES	C-15
Wardrobe, night stand, bed, credenzas, clock,	
tambour door removal and replacement	C-20
BEDROOM, TWIN MODEL (300 SERIES) ASSEMBLIES	C-22
Flip lounge, bed light, wardrobe, vanity	
removal and replacement	C-26
LIVING ROOM ASSEMBLIES	C-28
Flip lounge, auxiliary heater, cocktail chairs,	
wall panels, bar module, flip table and cabinet,	
dinette removal and replacement	C-32
CENTER BATHROOM ASSEMBLIES	C-35
Lavatory panels, toilet seat, tank cover,	
lights, medicine cabinet, fixtures, lavatory	
top, sweeper, shower door, shower faucet, shower	
stall, shower pan removal and replacement	C-38
REAR BATH (300 SERIES) ASSEMBLIES	C-41
Lavatory top, bath panel, medicine cabinet,	
sliding door removal and replacement	C-44

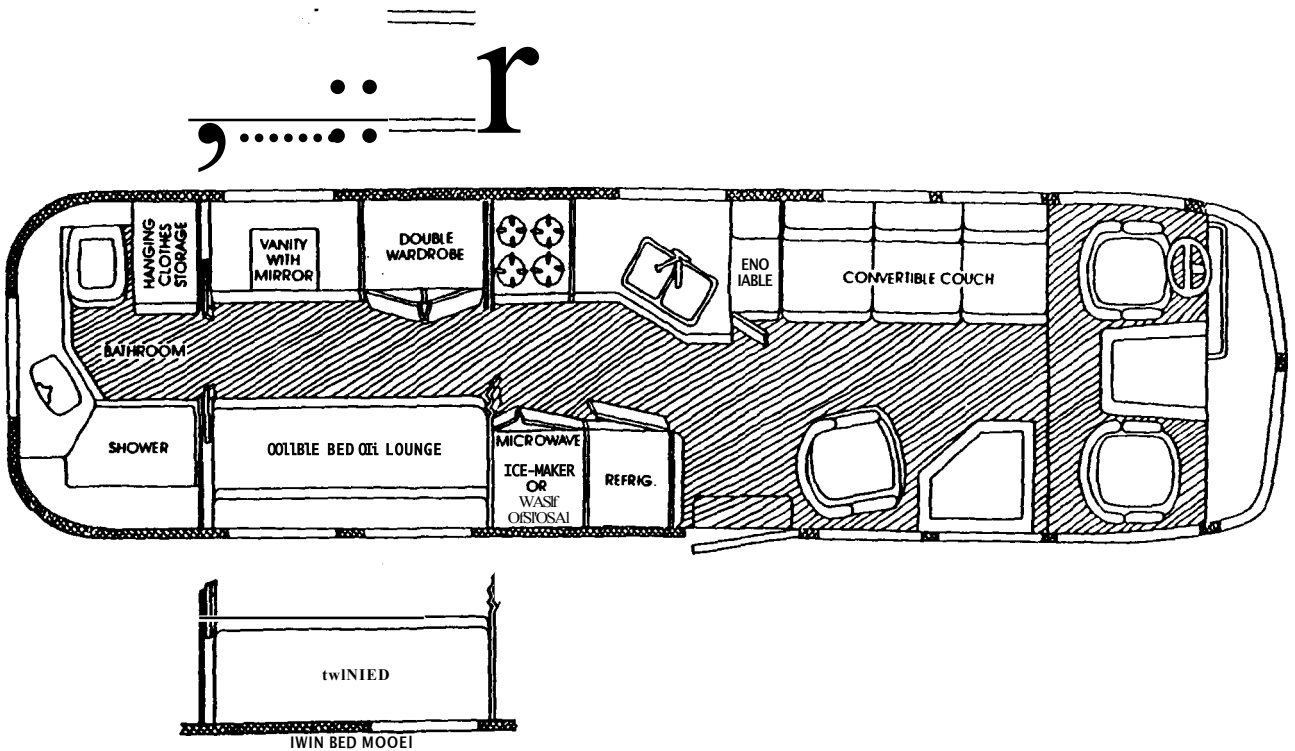
BATHROOM (270 SERIES) ASSEMBLIES	C-46
Lavatory top, lavatory cabinet, panel,	
shower door frame, shower stall, shower pan,	
bath door header, toilet bench, holding tank ..	
cover removal and replacement	C-49
END LINER ASSEMBLIES	C-51
Removal and replacement	C-52
MULTI DOME INSTALLATION	C-53

FLOOR PLANS

310 SERIES

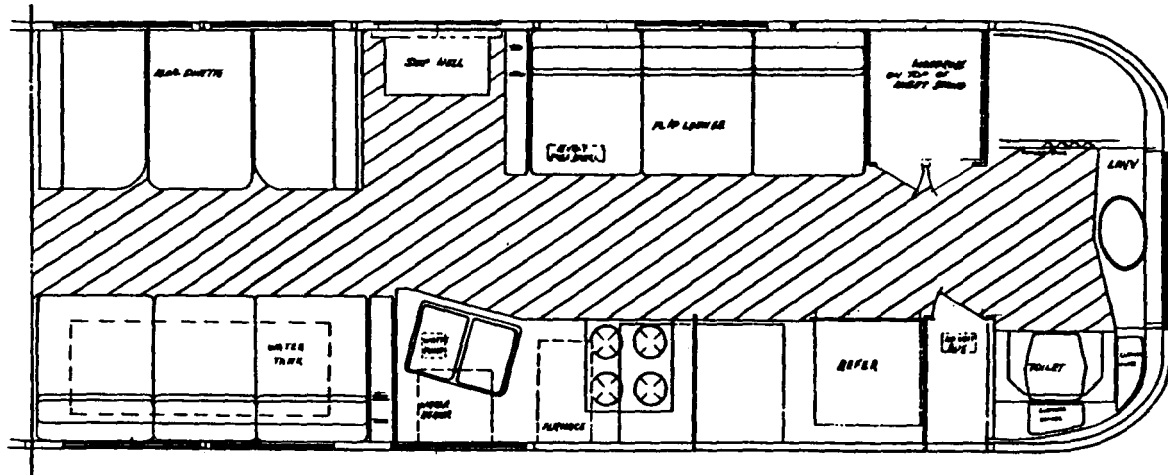


300 SERIES

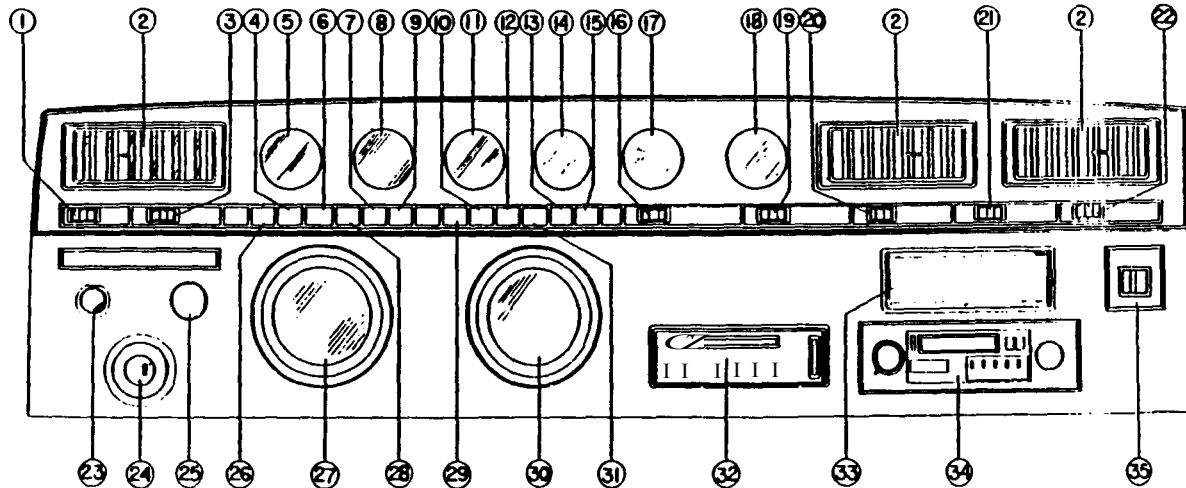


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270 SERIES



INSTRUMENT PANEL ASSEMBLY AND CONTROLS



No. Description

1. I.C.C. Blink
2. Air conditioner outlets
3. Driving lights
4. Water in fuel (diesel only)
5. Fuel gauge
6. Low fuel warning
7. Step warning light
8. Voltmeter
9. Brake indicator
10. Low coolant warning
11. Temperature gauge
12. Overheating warning light
13. Glow plug (diesel only)
14. Oil pressure gauge
15. Right turn signal indicator
16. Auxiliary heater switch
17. Fuel economy gauge, gas engine
- 17a. Boost gauge, Isuzu diesel
18. Exhaust gas temperature, Isuzu only

No. Description

19. Aisle lights
20. Exterior compartment lights
21. Main door dead bolt
22. Map light switch
23. Head light switch
24. Ignition switch
25. Wiper/Washer switch
26. Left turn indicator
27. Speedometer
28. Low washer fluid
29. High beam indicator
30. Tachometer
31. Low oil pressure warning
32. Heater/air conditioner control
33. Stereo amplifier (optional)
34. Radio/Tape player
35. Generator start/stop switch

NOTE: Further explanations on following pages.

DASH INSTRUMENT ACCESS

1. Prior to loosening the instrument cluster from the dash, padding should be taped to the gear shift indicator to prevent the face of the cluster from being marred when it is tipped out.
2. Remove the screws across the top of the cluster going into the dash and also the screws along the bottom of the cluster going up into the lower support bar.
3. Very carefully pull the cluster from the recess of the dash. The edges of the cluster are fairly sharp and care must be used to prevent the face of the cluster from cutting the padding around the recess. If work is to be done on an instrument or wiring, the edges should be protected to prevent damage while you are concentrating on other problems.
4. Setting the brake and moving the gear shift lever to LO will allow further access to the back of the panel.

VENT LOUVER REMOVAL

1. The **swivel** portion of the louver is "snapped" out by prying end ways with a broad bladed tool such as a putty knife until the pivot point clears its recess.
2. Once the swivel portion is removed, the same tool can be used to slide carefully under the ends of the housing to depress the prongs holding the housing in the dash.

DASH INSTRUMENT REMOVAL (NOTE: Wiring diagrams are in electrical section.)

1. Remove wires from back of instrument and bend or tape clear of other **wires** to prevent accidentally shorting.

2. Remove "U" shaped mounting bracket from back of gauge and pull the gauge out of the front.
3. Install new gauge-making sure its lettering is horizontal and the gauge is centered in the opening.

CAB SIDE PANEL REMOVAL

1. Carefully pry center woodgrain decorative insert from perimeter trim. Remove screws located behind insert.
2. Pull off vertical trim along rear edge and drill out rivets.
3. Unfasten carpet along lower edge (about 7" up from floor) and drill out rivets.
4. Disconnect wires from light and power seat switch if applicable.
5. On roadside panels the instrument cluster will have to be tipped out and two screws removed going from the left side of the instrument cluster recess into the side panel.

GLOVE BOX REMOVAL

1. Open glove box and drill out rivets attaching box to bottom of dash.
2. Drill out rivets in hinge holding box down to housing. There are about 15 rivets through the hinge, but only 3 or 4 actually hold the box in position. These rivets are usually slightly out of line with the rest so you can tell which they are.
3. The glove box can now be removed.

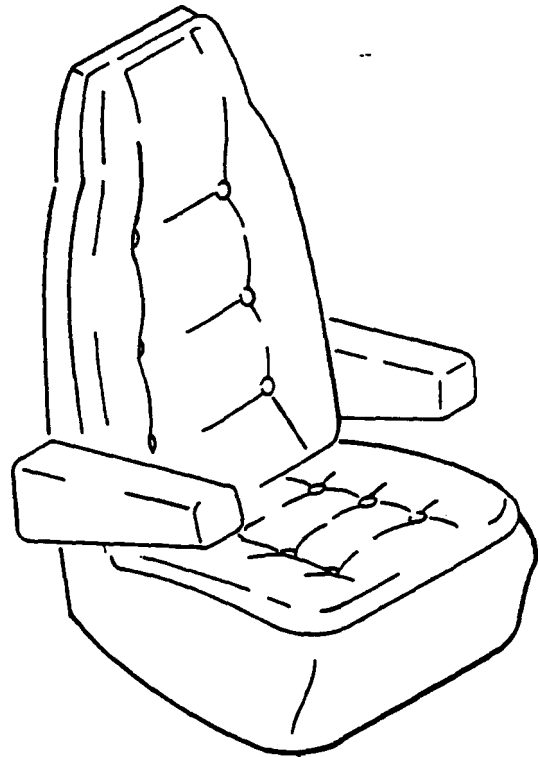
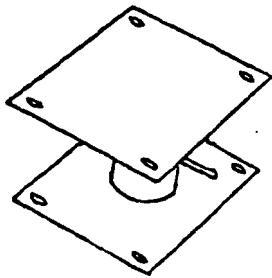
DASH REMOVAL

1. Loosen instrument cluster and remove glove box as described in earlier paragraphs.
2. Remove trim from vertical post at back of windshield ("A" pillar).
3. Remove screws attaching dash to lower windshield bow.
4. Remove screws located in the bottom edge of the dash face running from one side to the other.
5. In recess for instrument cluster remove two screws going out through left side in the side panel.
6. Pull bottom front edge of dash out and up over stiffener bar until dash is loose.
7. Cut the lower dash bar that runs below the instrument panel about 2" in from each end of the recess. This will allow the dash to be removed without disconnecting the wires from the instrument cluster.
8. Cut the lower bar on the new dash about 2 1/2" to 3" in from each end of the recess. This **will** allow the lower bar from the old dash to overlap the new cuts for a neat appearance when reinstalling.

CAB SEAT REMOVAL/REPLACEMENT

The cab seats are bolted down on each corner of the base. The bolts extend completely through the floor and the nuts are accessible in the front wheel well.

In turn, the pedestal is attached to the seat by four bolts. The air cylinders controlling the reclining movement and the slide assembly are accessible once the pedestal and seat have been separated.



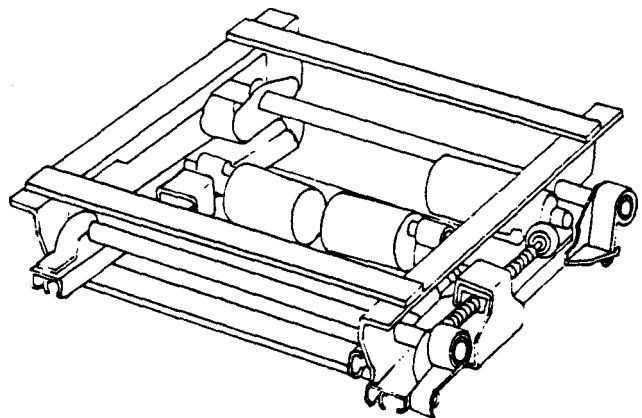
ARM REST REMOVAL

The arm rests on Kustom Fit seats are removed by unzipping the cover and peeling it up until a slit in the foam over the pivot point is exposed. Spreading the split will allow access to the bolt on which the arm rest pivots.

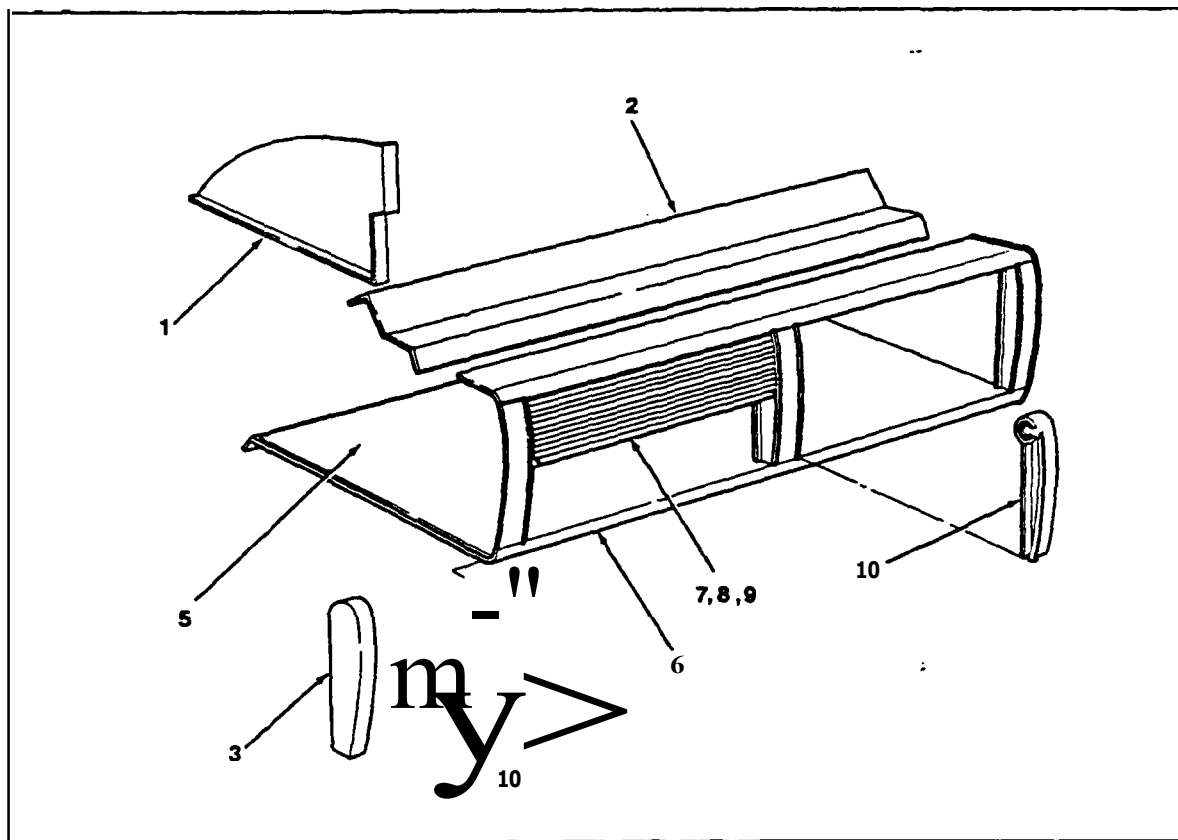
The arm rests on Flex Steel seats pivot on a spring loaded stud with a cross pin. To remove, start with the arm rest in the vertical position, depress firmly on the pivot point, and rotate backwards. When the cross *pin* reaches a slotted area of the pivot hole the arm rest **will** come loose. The spring is stiff and considerable pressure is required to depress the arm rest far enough to allow it to rotate.

POWER SEAT MECHANISM

The power seat mechanisms are protected by a 15 amp automatic circuit breaker. Repeated operation of switches or holding the switch on after the seat has come against a stop **will** cause the circuit breaker to trip. DO NOT install a heavier amperage breaker which can allow one of the three motors to burn out.

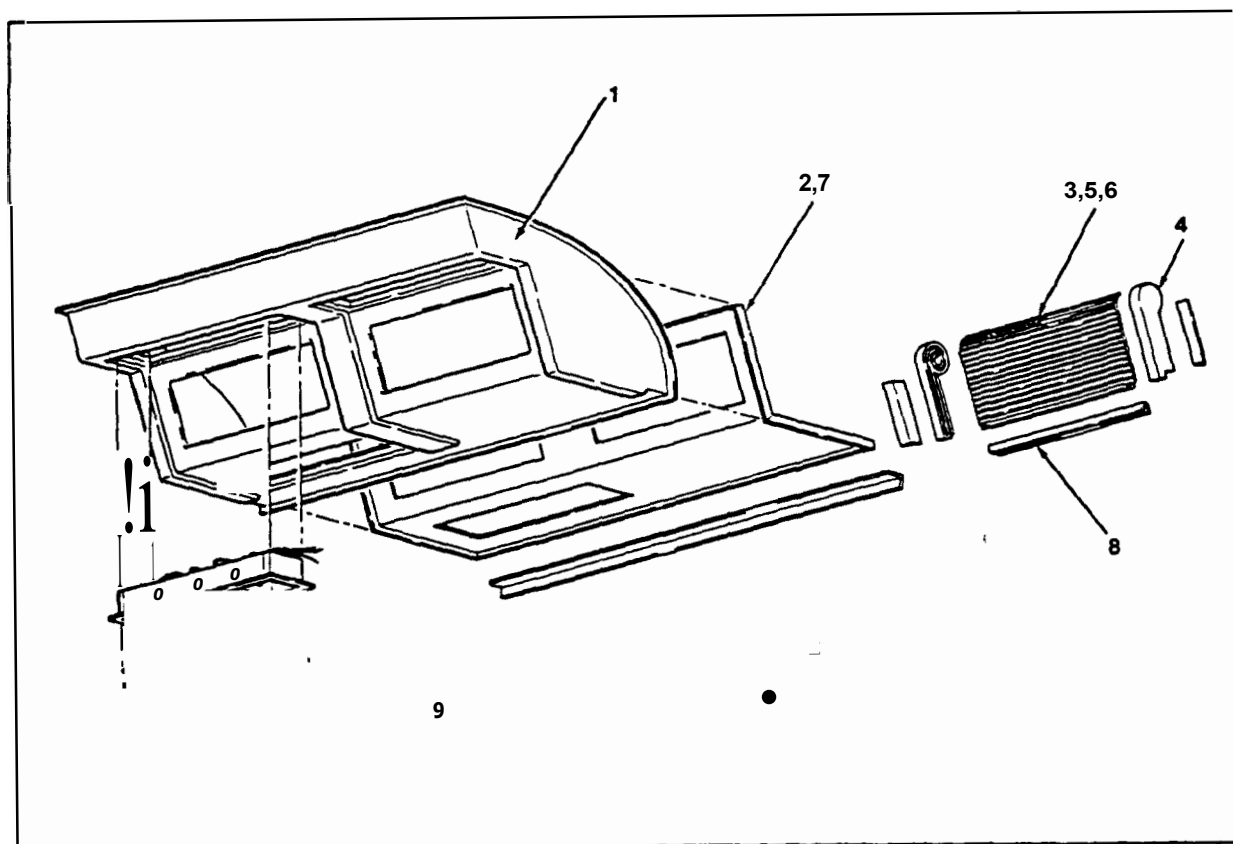


BEDROOM ROOFLOCKER



- 1 Divider
- 2 Support Bracket
- 3 End Cap, LH-RH
- 5 Vinyl Coated Wood
- 6 Rooflocker Skin
- 7 Tambour
- 8 Aluminum Extrusion, Tambour
- 9 End Cap - 2 per set
- 10 Spiral - 2 per set

GALLEY ROOFLOCKER



- 1 ABS Galley Locker
- 2 Aluminum
- 3 Tambour
- 4 Rooflocker Spiral-Brown
- 5 Extrusion - Handle
- 6 End Caps
- 7 Felt
- S Flex Trim
- 9 Ceiling and Galley Lamp

BEDROOM ROOFLOCKER REMOVAL/ REPLACEMENT

1. Drill out rivets attaching rooflocker rear flange to motor-home side wall.
2. Drill out rivets attaching rooflocker upper bracket to motor-home ceiling.
3. Drill out rivets attaching rooflocker to top wardrobe extrusion.
4. Inside wardrobe, remove clothes hanger rods from bottom of rooflocker.
5. Remove rooflocker.
6. to Install, reverse removal procedures.

GALLEY AND LOUNGE ROOFLOCKER REMOVAL/REPLACEMENT

1. Disconnect univolt batteries.
2. Remove valance.
3. Remove window shade, galley.
4. Remove screws and drill out rivets attaching spice rack to rooflocker flange.
5. Galley rooflocker, on models with floor mounted oven, remove the inspection plate from the side of the vent fan lever housing. Disconnect cable and switch wires.
6. Remove control panel and disconnect all wire leads.

7. Remove galley or lounge light lens. Remove and disconnect light.

8. Drill out rivets attaching rooflocker rear flange to motor-home wall.

9. Drill out rivets and/or screws attaching rooflocker upper brackets to motorhome ceiling.

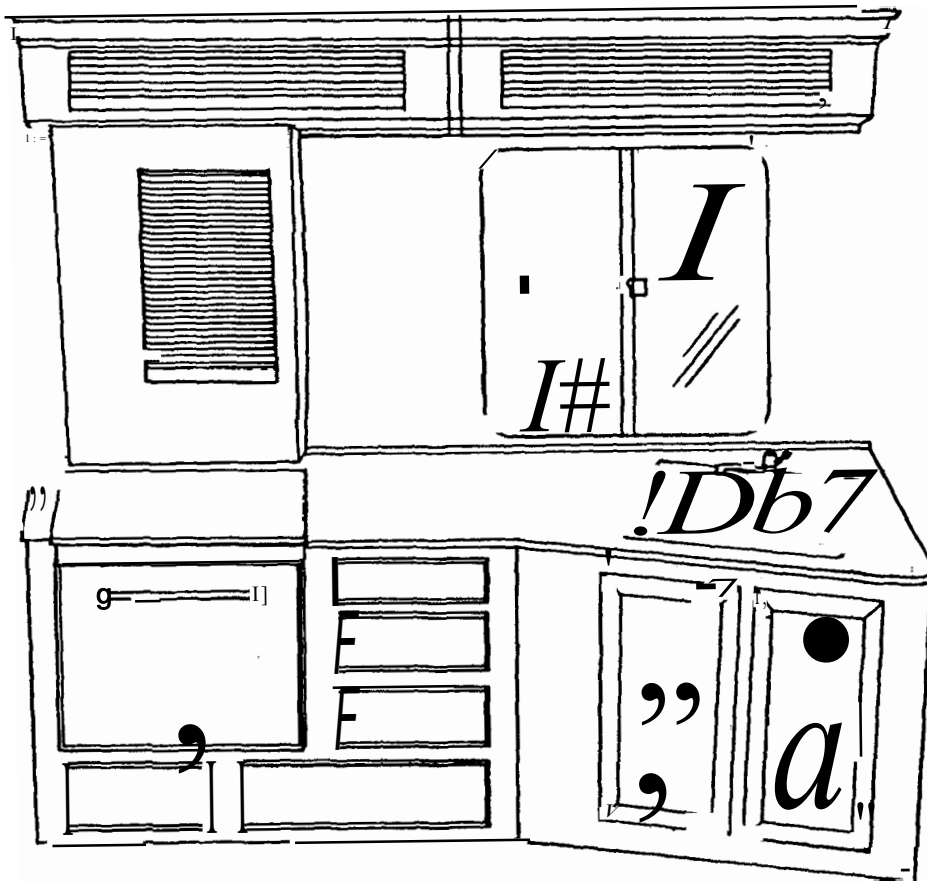
10. Remove rooflocker.

11. For installation, reverse removal procedures. Be sure to remove all usable vent and control panel components from old rooflocker and install on new.

TAMBOUR DOOR REMOVAL/REPLACEMENT

1. Open door.
2. Remove rivets securing plastic track and coil to angle bracket. Carefully push assembly into cavity.
3. Rotate entire assembly and remove.
4. Handle is secured by indentions from the back side. Remove and transfer handle to the new door securing it with screws or pop rivets.
5. To install, reverse above procedure.

GALLEY REMOVAL/REPLACEMENT



1. Cover carpet with a plastic sheet to protect it from water and oil stains.

2. Disconnect city water supply and shut off pump switch.

3. Open faucet and drain.

4. Shut off gas supply.

5. Disconnect 120 V line, 12 V univolt batteries.

6. Remove range. See "Galley Top Removal".

7. Disconnect plastic plumbing lines from copper pigtails in galley faucet.

8. Disconnect line from Everpure water filter.

9. Disconnect 120 V connection to Nutone Food Center.

10. Disconnect P-Trap.

11. Galley is secured to floor, to wall at rear of galley top, and panel to the rear and/or front of galley with PK screws. Remove all attaching screws. Remove galley.

12. When installing a new galley, remove plumbing from the old galley and attach to the new.

13. To install, reverse removal procedures.

GALLEY TOP REMOVAL/REPLACEMENT

1. This requires removing the range. (Be sure to shut off gas supply and disconnect the line before removal is started.) Range is held in place by screws mounted through side trim into galley top. To locate these screws raise cover and burner top.
2. Shut off water supply, open faucets to relieve pressure and disconnect water lines to faucets.
3. Galley top is secured to galley frame by screws located under galley.
4. Remove screws along wall going up through angle bracket into top.
5. Be sure to check for screws located in panels adjacent to the galley top.
6. Remove galley top.
7. Replace by reversing above procedures.

GALLEY SINK REPLACEMENT

1. Cover carpet with heavy paper or suitable material for protection.
2. Open galley doors.
3. Cover galley shelves with corrugated paper. Have drain pan and towels under sink trap.
4. Loosen swivel nuts at sink drains and "P" trap. Remove drain assembly.
5. Disconnect plastic water lines at faucet copper pigtails and remove faucets.
6. Loosen and remove all clamps on under side of galley top at sink perimeter.

7. Sink then can be brought straight upward to remove from galley top.

a. To install, clean edge of galley top.

9. Seal edge of sink with putty tape and install in galley with clamps. Clean off surplus putty.

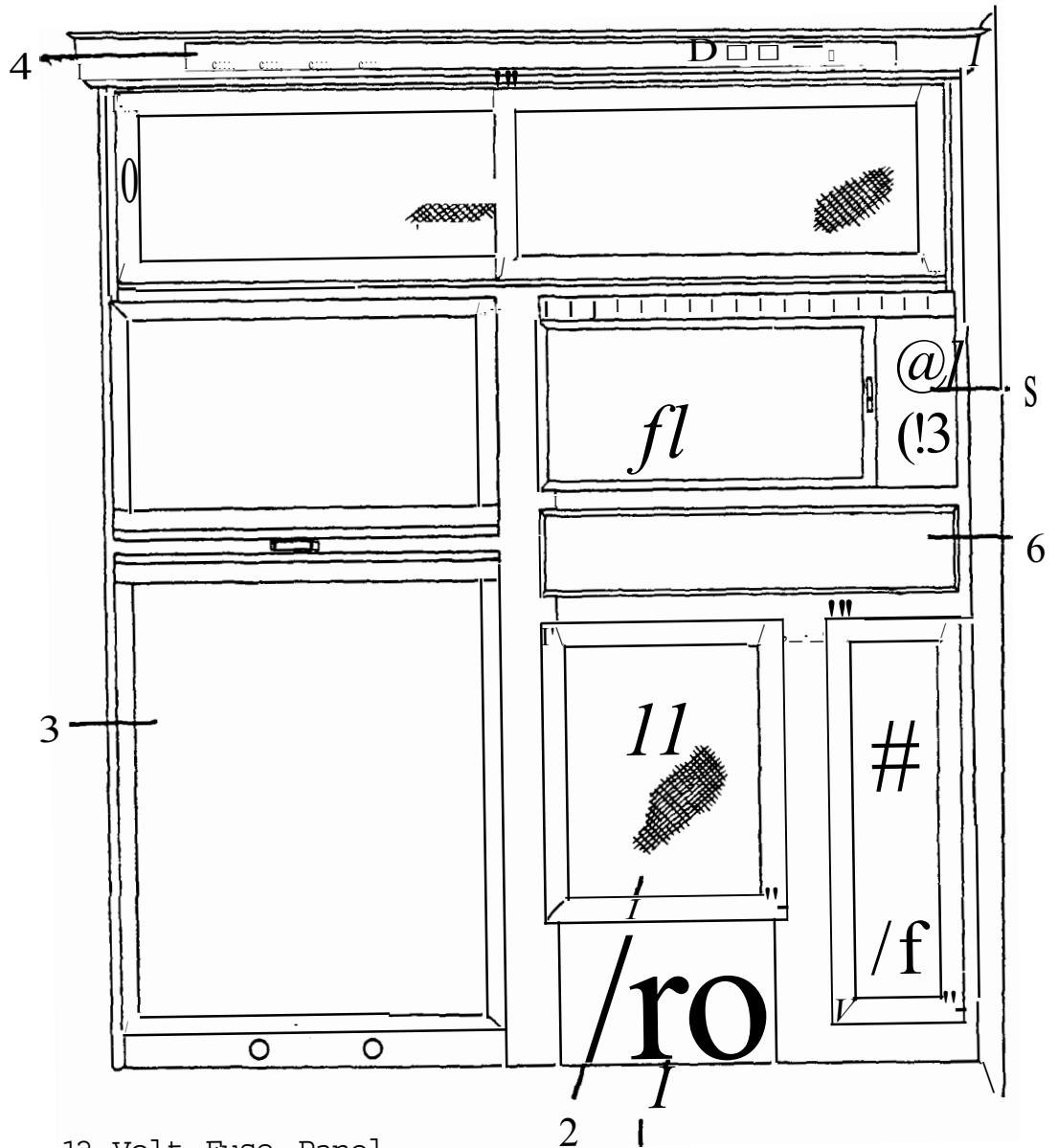
10. Install metal stopper bodies in sink with putty tape under edge. Tighten in place and clean surplus putty off sink.

SPICE RACK REMOVAL

1. Remove trim piece around top perimeter.
2. Drill out pop rivets in flange on right side.
3. Remove Philips head screws from left side.

REFRIGERATOR CABINET AND PANTRY

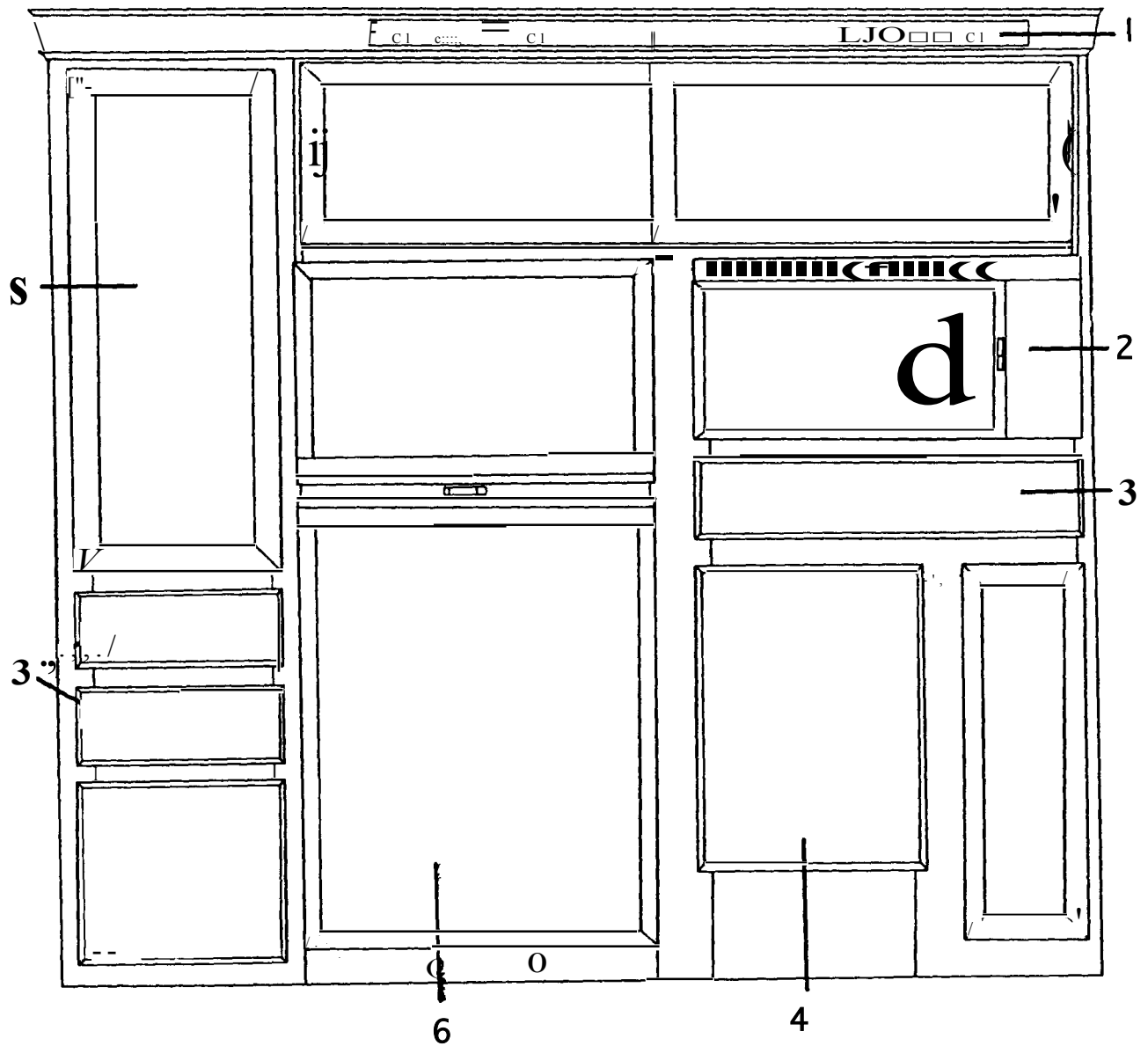
310 & '300 SERIES



1. 12 Volt Fuse Panel
2. Glide-Out Pantry
3. Refrigerator
4. Control Panel
5. Micro-Wave
6. Storage Drawer

REFRIGERATOR CABINET AND PANTRY

270 SERIES



1. Control Panel
2. Micro-wave
3. Storage Drawer
4. Glide-Out Pantry
5. Pantry
6. Refrigerator

REFRIGERATOR REMOVAL

1. Turn off LP gas supply and pull main 12 volt fuses.
2. Open exterior access door and:
 - a. Remove gas line from valve (Use two wrenches)
 - b. Unplug 120 volt cord
 - c. Mark 12 volt feed wires and remove.
 - d. Remove lag screw going down through runners into floor.
3. Remove screws going down through sliding door track into top of refrigerator.
4. Open refrigerator and freezer doors, then remove rubber plugs from main door jamb.
5. Remove screws exposed by taking out rubber plugs.
6. Place cardboard or paneling on floor in front of refrigerator to avoid damaging carpet.
7. Twist refrigerator side to side and slide out onto cardboard.

CONTROL PANEL

1. The control panel is held in place by spring clips. Grasp control panel with finger tips in about a foot from each end and "tug".
2. Unplug main wiring harness.
3. Mark and disconnect generator switch wiring.

CONTROL PANEL HOUSING

1. Remove screws going up through sliding door track into housing. Usually only two of the screws in the track are long enough to secure the housing. By reaching ui into the housing from **inside the cabinet the extra long screws can be located.**

2. Remove upper trim strip next to multidome.

3. On some units a screw may be located under the padded end piece next to the doorway.

SLIDING DOOR REMOVAL

1. Slide door to center of cabinet.
2. Push door up and swing bottom out. The amount of pressure needed to force the door high enough to clear the bottom track will vary from unit to unit.

MICRO-WAVE/CONVECTION OVEN REMOVAL

1. Slide storage drawer under oven out until it comes against stops.
2. Release latches in drawer track and remove drawer.
3. Remove four screws going up through oven shelf into the corners of the oven.
4. Slide oven part way out. Unplug cord. Remove the rest of the way.

MICROWAVE OVEN REMOVAL

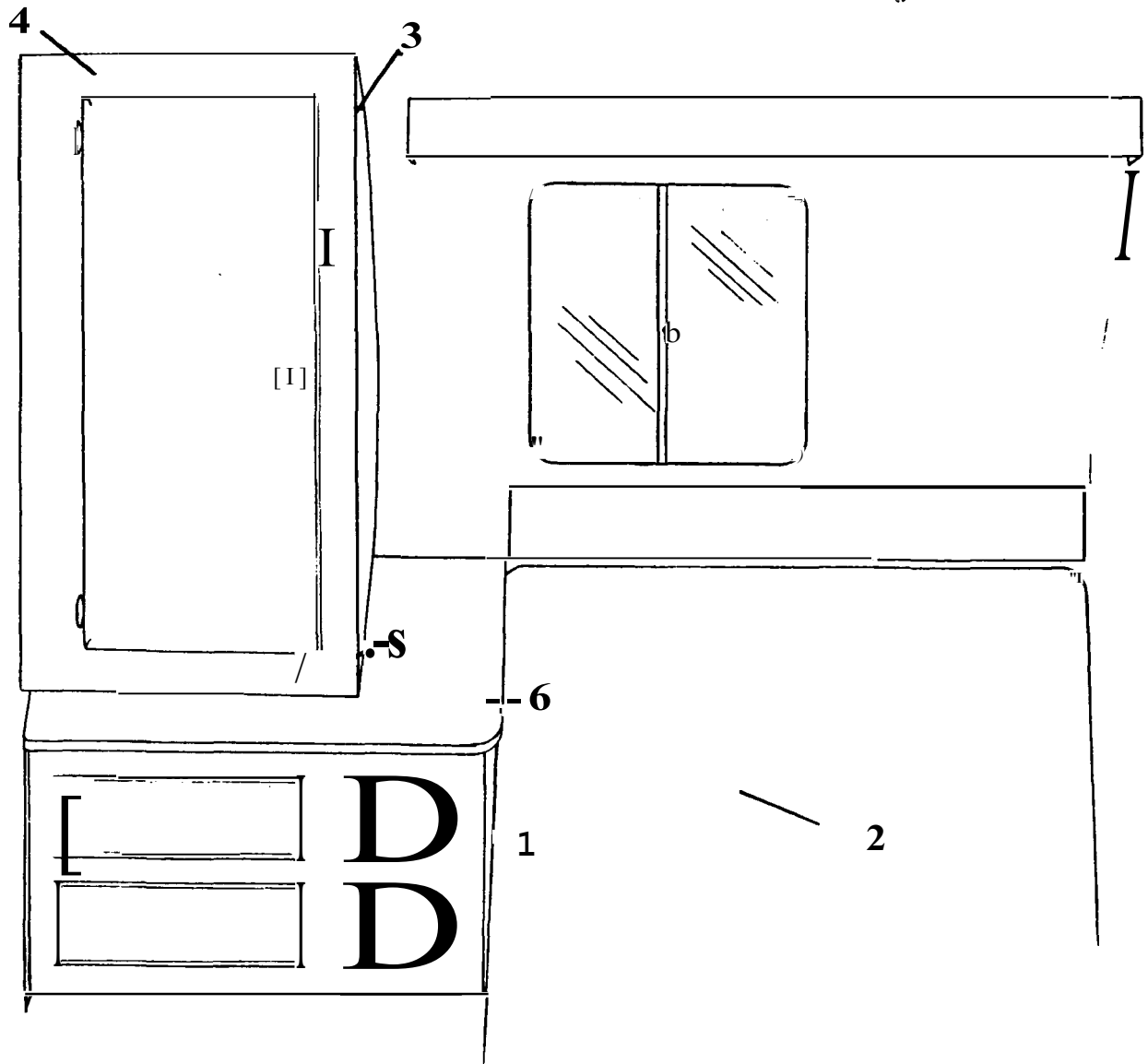
1. Remove screws around perimeter of oven face.
2. Slide oven part way out. Unplug cord. Remove the rest of the way.

GLIDE-OUT PANTRY

1. Depress latch on upper left corner.
2. Slide out to stops.
3. Release stop latch in each track.
4. Pantry can now be pulled free of the cabinet.

REAR BEDROOM 310 SERIES

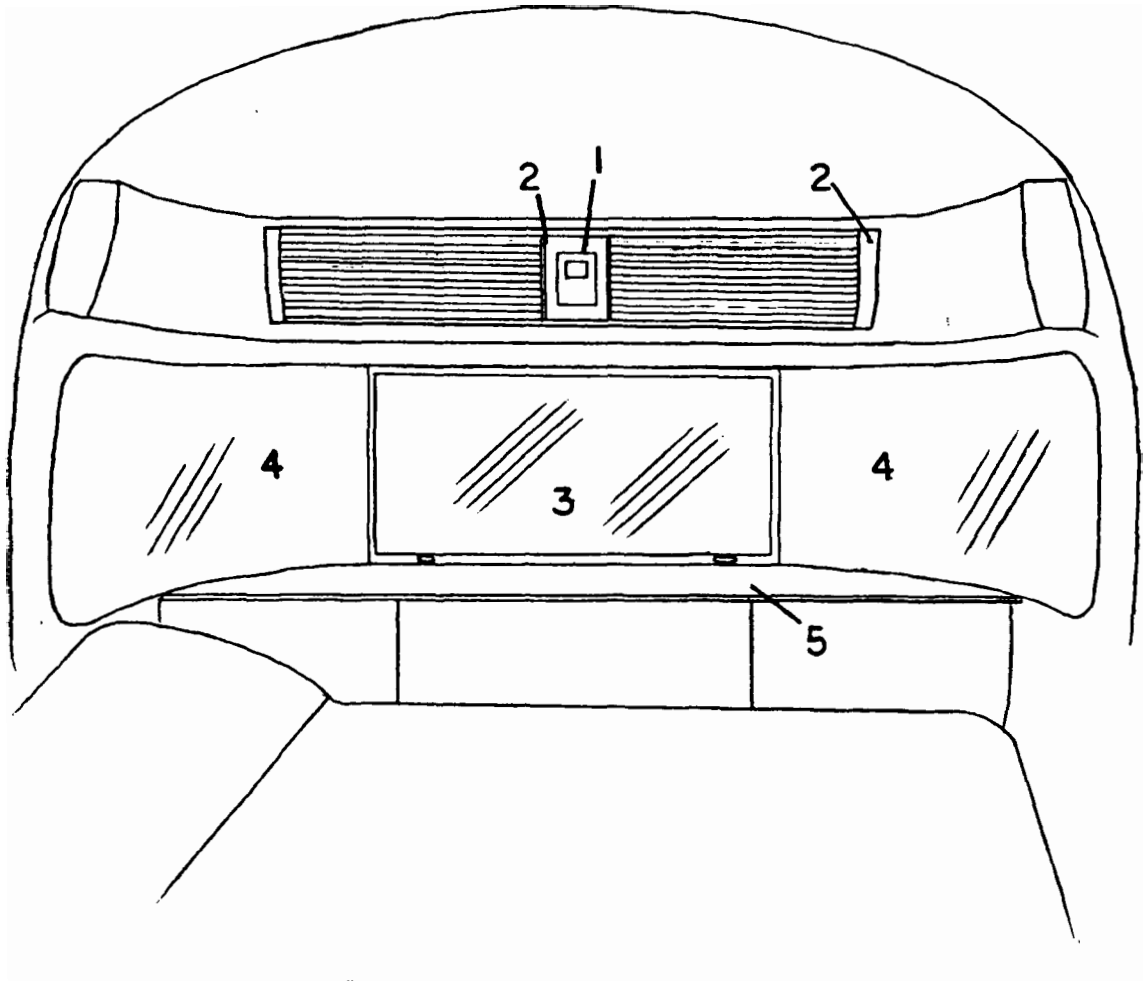
DOUBLE BED MODELS



1. Bed top (not shown)
2. Mattress
3. Aft vertical wardrobe panel
4. Forward vertical wardrobe face
5. Wardrobe threshold
6. Night Stand Top
7. Night Stand vertical end panel

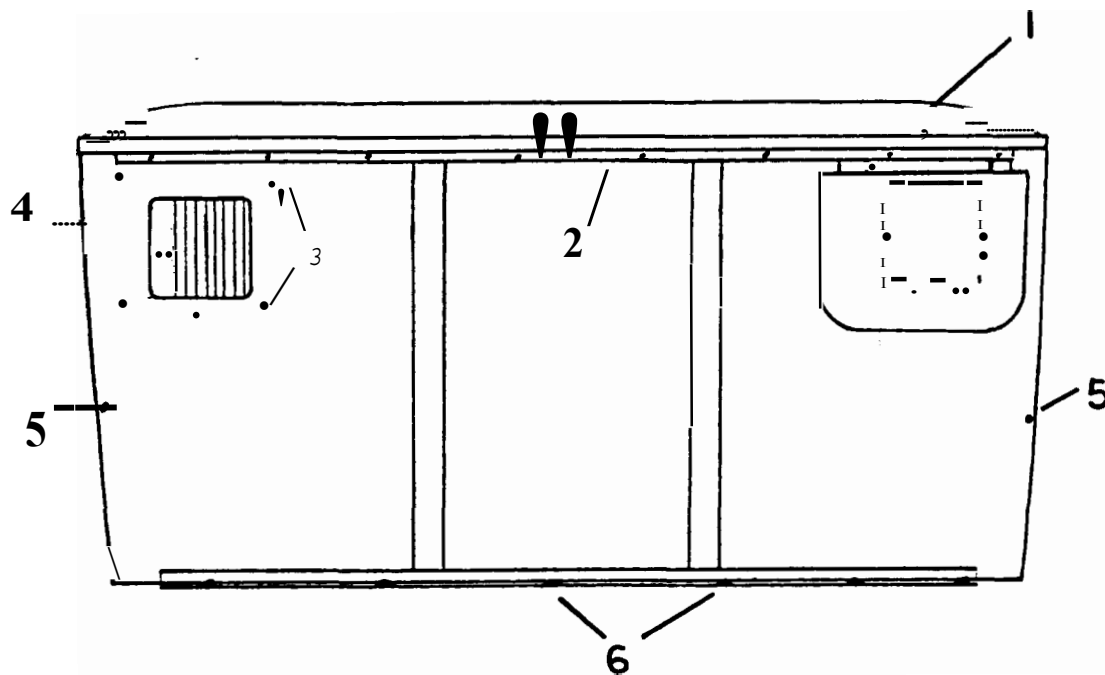
REAR BEDROOM 310 SERIES

DOUBLE BED MODEL



- 1. Clock
- 2. Vertical Spiral
- 3. Center Window
- 4. Panoramic Windows
- 5. Credenza Top

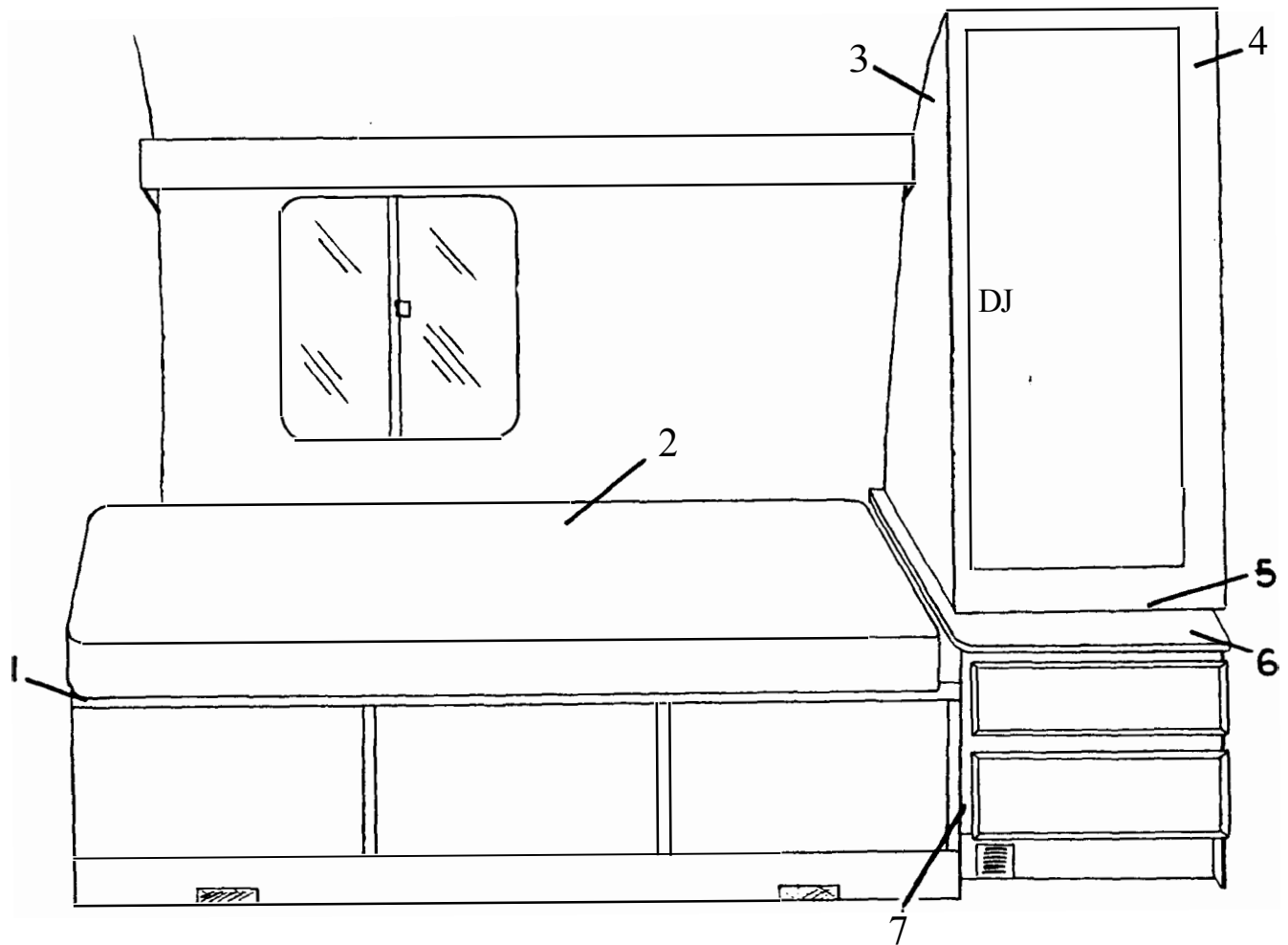
REAR BEDROOM 310 SERIES
DOUBLE BED MODEL CREDENZA



1. Credenza Top
2. Attachments, vertical face to top
3. Storage pocket attaching screws
4. Storage pocket
5. Attachments, vertical face to wall
6. Screws, vertical face to floor

REAR BEDROOM 310 SERIES

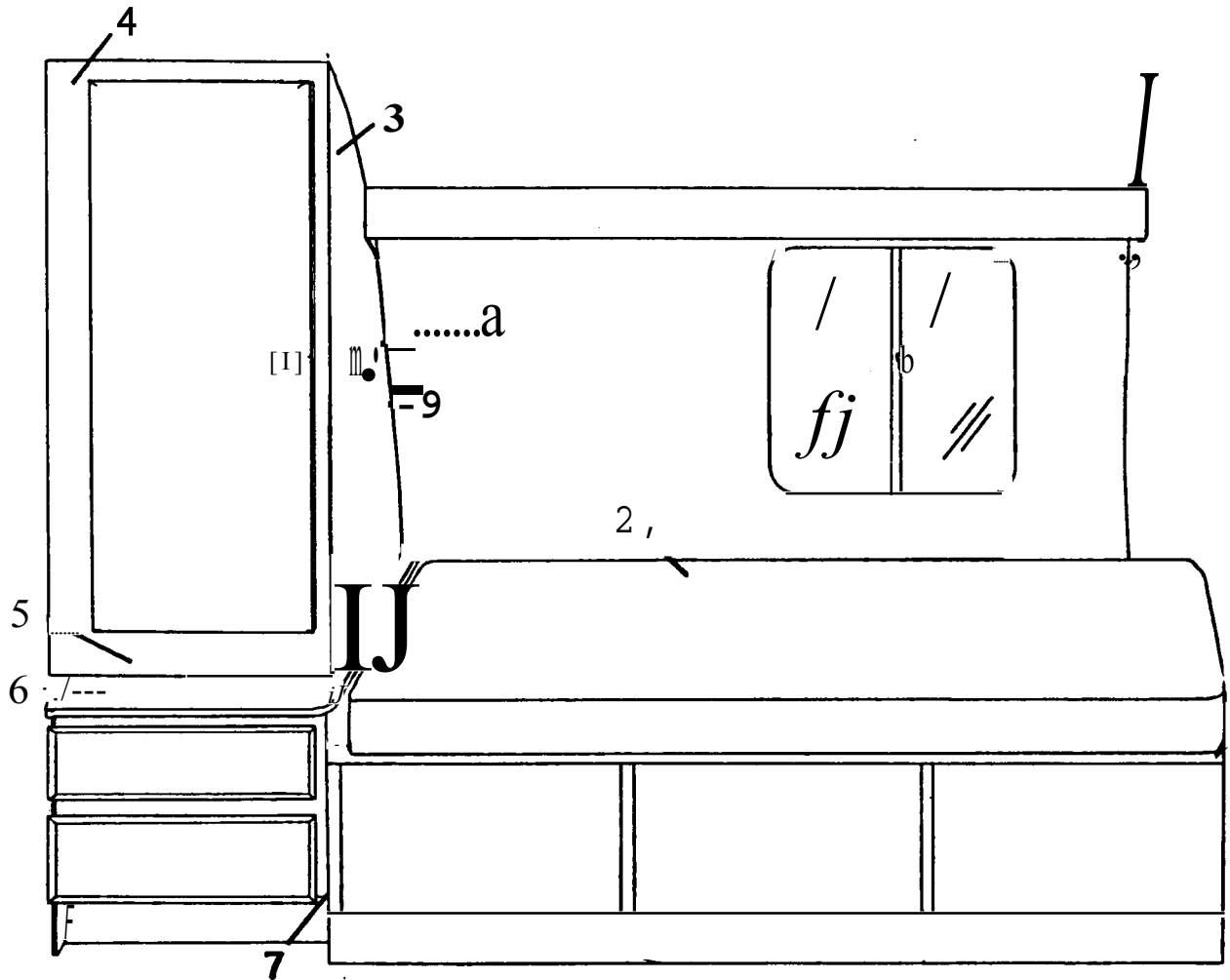
ROADSIDE TWIN



1. Bedtop
2. Mattress
3. Aft Vertical Wardrobe Panel
4. Forward Vertical Wardrobe Face
5. Wardrobe Threshold
6. Night Stand Top
7. Night Stand Vertical End Panel

REAR BEDROOM 310 SERIES

CURBSIDE TWIN



1. Bedtop
2. Mattress
3. Aft Vertical Wardrobe Panel
4. Forward Vertical Wardrobe Face
5. Wardrobe Threshold
6. Night Stand Top
7. Night Stand Vertical End Panel
8. Furnace Thermostat
9. Light Switch

REAR BEDROOM

WARDROBES

1. From inside wardrobe drill out pop rivets attaching aft vertical panel to wall extrusion.
2. Remove screws attaching threshold to top of night stand.
3. Remove screws attaching top of wardrobe face to ceiling.
4. Remove rivets attaching forward shelf support to panel.
5. Remove screws attaching forward vertical face frame to vertical bath panel. In curbside wardrobes it will be necessary to remove screw and backing strip attaching foldette door to wardrobe face.
6. Disconnect wires from light, light switch and thermostat where applicable.
7. The wardrobe face and aft vertical panel are now free.

NIGHT STAND TOP

1. Remove wardrobe as described above.
2. Pull top drawer out to stop. Release latch in drawer guide. Pull drawer free.
3. Going through drawer opening, remove screws attaching top to vertical side panels, cabinet face and outer wall.
4. Remove screw attaching rear drawer support to top.

NIGHT STAND

1. Remove wardrobe and night stand top as described above.
2. Pull carpet loose from lower

face and remove screw going into floor.

3. Through bed door, remove screw going into rear vertical face frame.
4. Remove attachments to bed and wall.
5. Remove screws going into forward vertical panel (foldette door must be removed).

BEDS (See Living Room Section if Convertible Couch)

1. Remove mattress.
2. Take out screws and remove bed top.
3. Pull carpet loose from perimeter and remove screws fastening to floor.
4. Remove attachments to wall.
5. Remove attachment to vertical end panels.

REAR CREDENZA TOP

1. Remove screws going down through top next to wall.
2. Remove attachments fastening top to vertical credenza face.

CREDENZA STORAGE COMPARTMENT AND TAMBOUR DOOR

1. Remove top as described above.
2. Remove screws going through vertical face into perimeter of storage pocket.
3. Storage pocket can now be removed allowing access to tambour door.

CREDENZA

1. Remove screws going down through top next to wall.
2. Remove screws going through each end of vertical face, (About half way down) into wall.
3. Pull back carpet and remove screws attaching vertical face to floor.

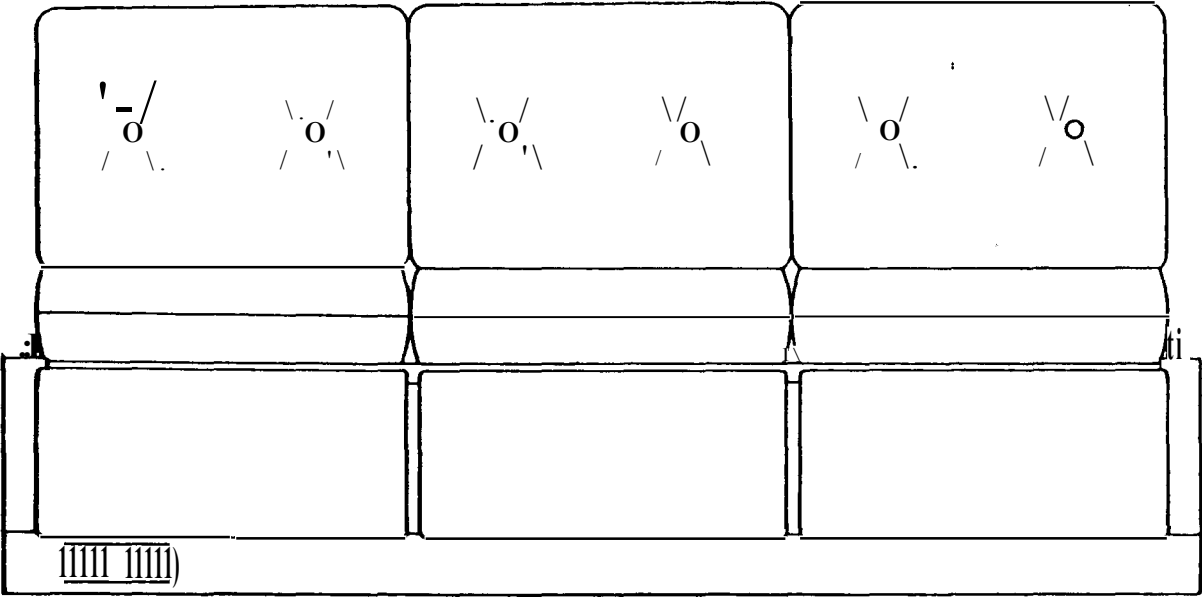
CLOCK

1. Open tambour rooflocker doors.
2. Remove two screws from each side going through the vertical tambour door spiral into the clock housing.
3. Pull clock out from behind locker center stile.
4. Mark and disconnect wires.

TAMBOUR DOORS

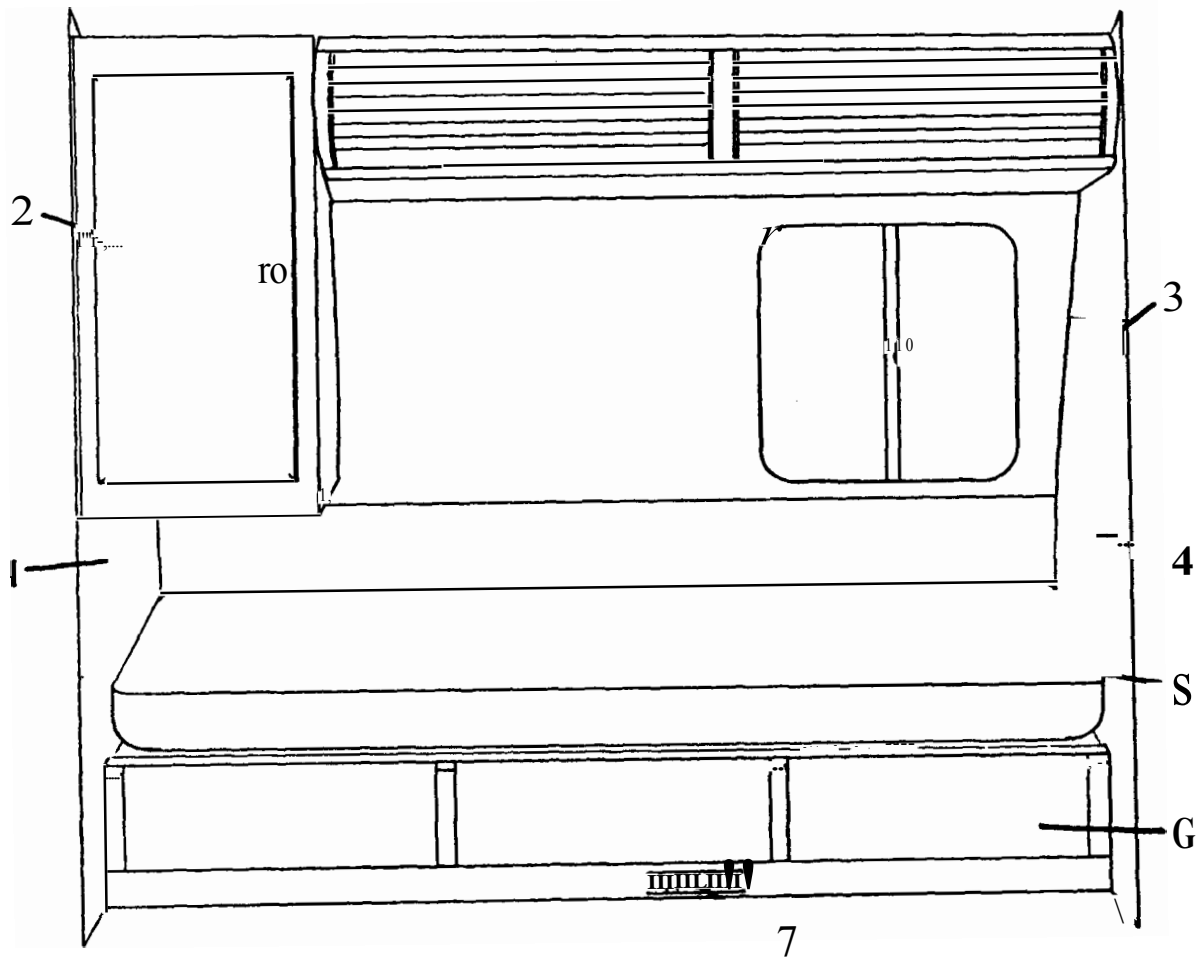
1. Open door.
2. Remove fasteners attaching spiral track to vertical end pieces.
3. Push entire assembly into locker.
4. Turn assembly and pull out of opening.
5. Handles are secured by indentations on backside. Drive putty knife between door and indentation to remove.
6. Center handle on new door and secure with short pop rivets or screws from back side.

FLIP LOUNGE
310, 300, 270 SERIES



BEDROOM - TWIN MODEL

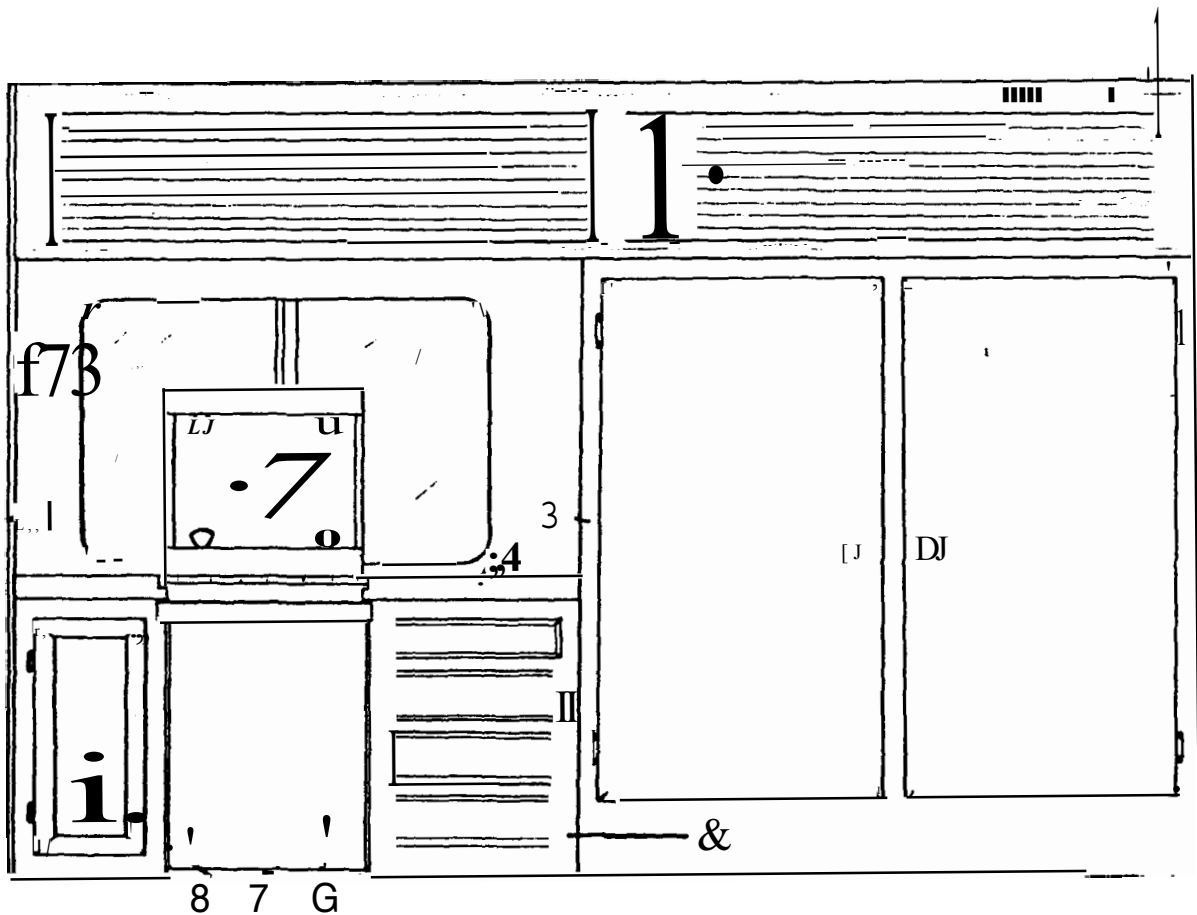
300 SERIES



1. Aft Vertical Panel
2. Hanging Wardrobe
3. Bed Light
4. Forward Vertical Panel
5. Twin Bed Mattress
6. Twin Bed Frame
7. Heat Duct Louver

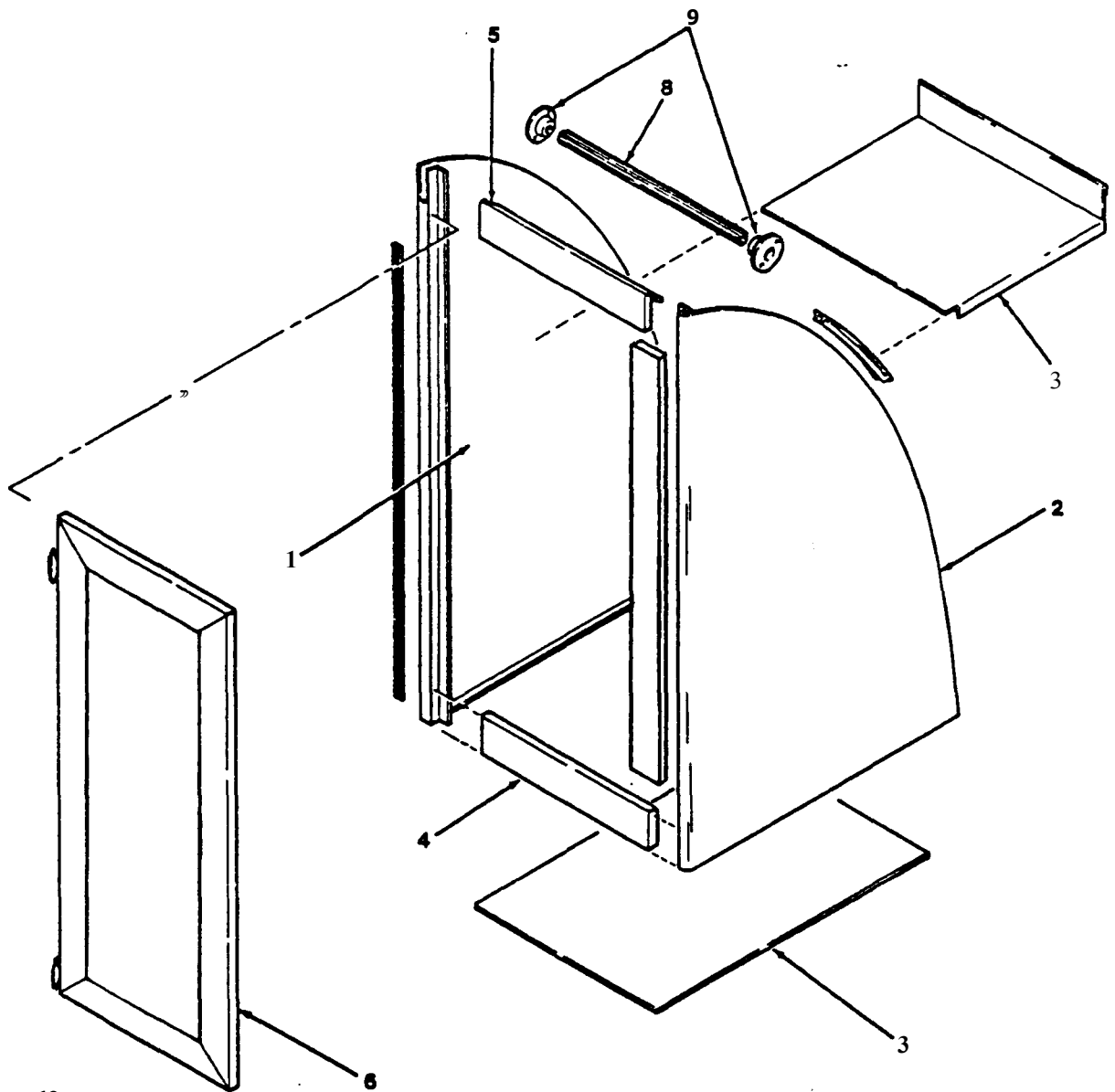
BEDROOM - DOUBLE MODEL

300 SERIES



1. Vertical Panel, Aft of Vanity
2. Vanity Mirror and Light Assembly
3. Vertical Panel, Wardrobe
4. Vanity Top
5. Vanity Cabinet Vertical Face
6. Vanity Kick Panel
7. Heat Duct Grille
8. Aisle Light

HANGING WARDROBE



- | | |
|------------------------------------|------------------|
| 1. Panel, Hanging Wardrobe, LH, CS | 6. Door |
| 2. Panel, Hanging Wardrobe, RH, CS | 8. Rod |
| 3. Shelf, Bottom, Hanging Wardrobe | 9. Brackets, Rod |
| 4. Header, Lower | 11. Hinge |
| 5. Header, Top | |

FLIP LOUNGE REMOVAL

1. Lift front of couch seat up about 45° from horizontal, and prop.
 - *2. On each end of couch there is a "TT" shaped bracket holding the pivot pin of the lounge in place. Remove the bolts from the bracket with the easiest access.
 3. Slide lounge out of opposite bracket.
 4. Lounge can now be lifted from base.
- *On some models the bolts can be reached through exterior access doors.

BED LIGHT REMOVAL

1. Turn light on to warm lens. Squeeze in middle and remove.
2. Remove screws around perimeter of light frame.
3. Pull frame from base and disconnect wires.

DOUBLE WARDROBE REMOVAL

1. Through rooflocker drill out pop rivets going down into aft vertical panel.
2. Open wardrobe doors and remove closeout and bottom shelf.
3. Remove speaker **wire** cover and disconnect wires.
4. Drill out rivets going up through the top face frame into bottom of roof locker.
5. Loosen carpet and pull back far enough to remove **fasteners** holding **wardrobe face** to floor.

6. Remove attachments holding forward vertical face plate to galley end panel.
7. Pull out vanity drawers and remove screws holding vanity cabinet to wardrobe panel.
8. From inside wardrobe remove any screws going through vertical panel into edge of vanity top.
9. Remove clothes rod.
10. Remove rivets attaching wall extrusion to aft vertical panel.
11. Squeeze wardrobe light lens and remove.
12. Remove light base and disconnect wire.
13. Lift up on rooflocker and carefully slide wardrobe out (tack strip may have to be removed.)

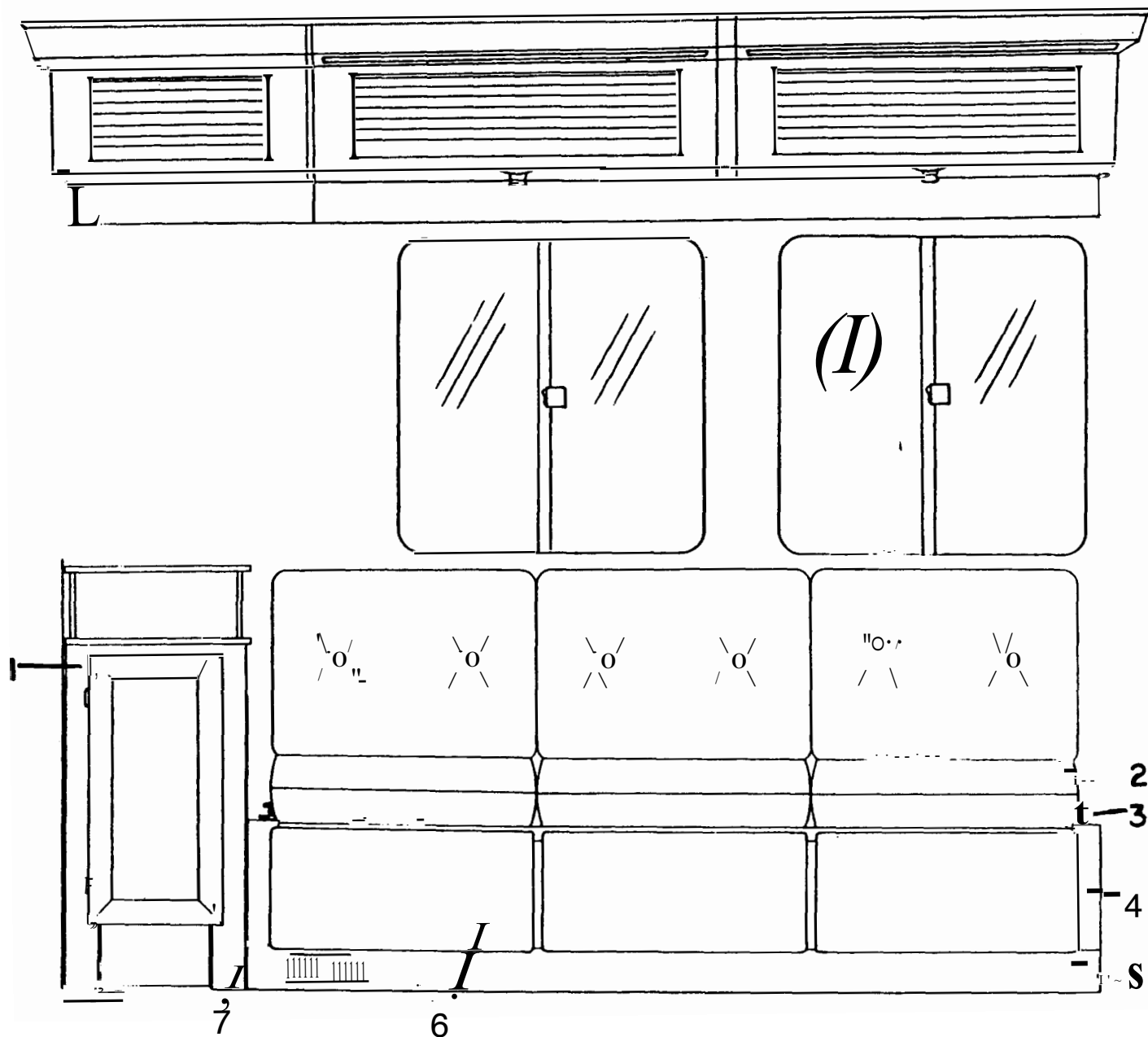
VANITY TOP

1. Remove heat duct grille.
 2. Remove screws in vanity kick panel and remove panel.
 3. Slide drawers out to stop. Release latch in drawer track and pull drawers out.
 4. Going through drawer opening and **kick** panel opening, remove screws attaching top to cabinet **and wall**.
 5. Remove mirror support
 6. Disconnect wires to mirror **light**.
 7. Remove any screws in double wardrobe going into the edge of the vanity top.
- B. **Being careful** not to scratch vertical panels on either side, slide top out.

VANITY CABINET

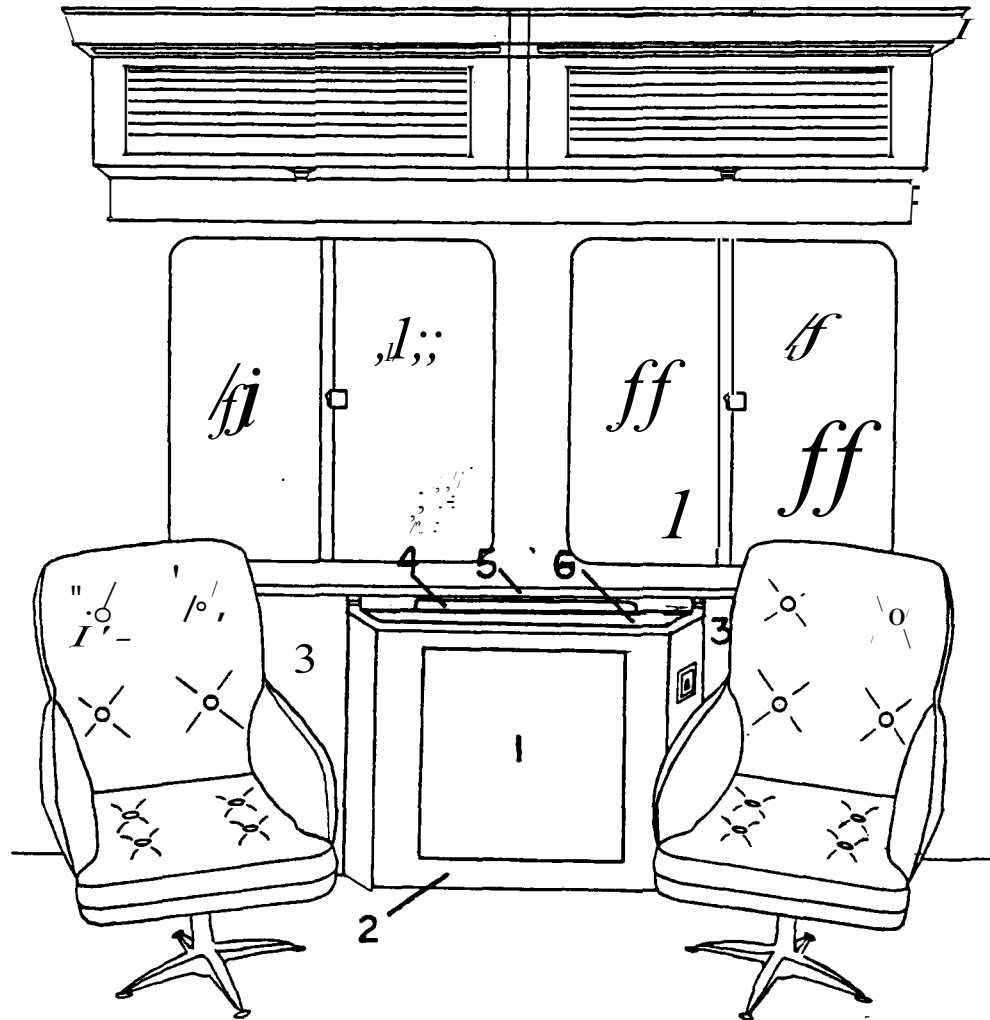
1. Remove vanity top as described in the previous paragraph.
2. With drawers out and door open, remove screws holding vertical face to the panels on each side of the cabinet.
3. Going through door opening, remove screws attaching 120 volt breaker box support to shelf.
4. Remove screws attaching shelf to vertical panel
5. Through drawer and door openings remove screws holding vanity to floor.
6. Disconnect aisle light.
7. Carefully remove cabinet to avoid damaging panels on either end.

LIVI G ROOM (300 SHOWN)



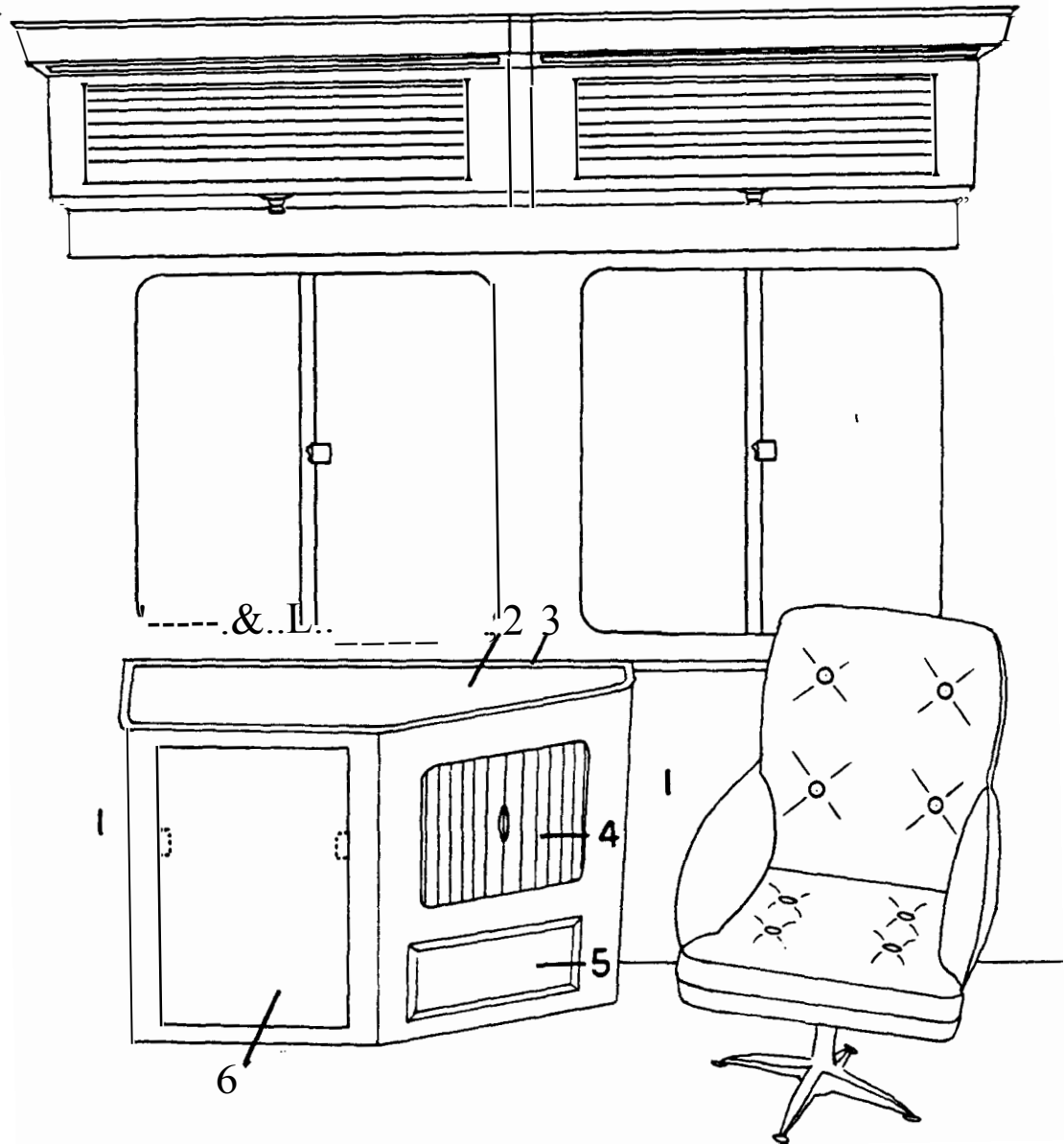
1. End Table, 300 only
2. Lounge Seat
3. Pivot Pin
4. Vertical end panel, forward
5. Vertical Face
6. Lounge door with speaker
7. Vertical end panel, aft

FLIP TABLE



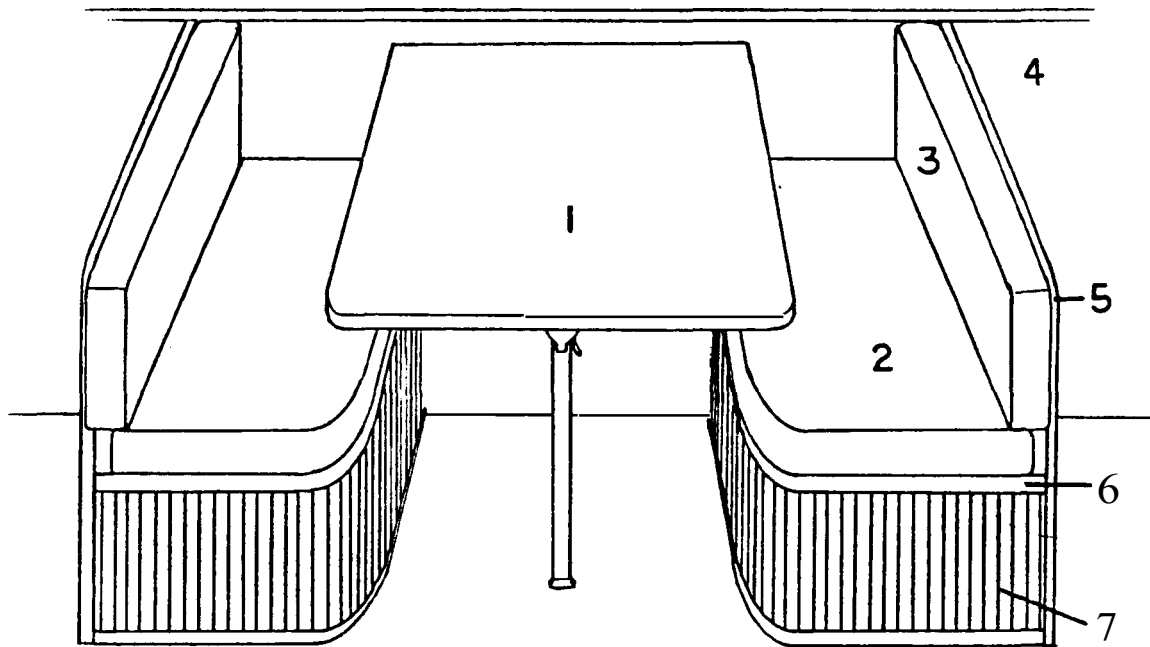
1. Cabinet Door
2. Cabinet frame
3. Upholstered wall panel
4. Cabinet Top
5. Shelf
6. Flip Table

BAR MODULE



1. Upholstered Wall Panel
2. Top
3. Shelf
4. Tambour Door
5. Drawer
6. Glide-Out Storage

DINETTE ASSEMBLY



1. Dinette Table
2. Dinette Seat
3. Dinette Back Rest
4. Upholstered Wall Panel
5. Back Rest Support
6. Upper Tambour Door Track
7. Tambour Door

LIVING ROOM

FLIP LOUNGE REMOVAL (All Models)

1. Lift front of couch seat up about 45° from horizontal and prop.
- 2. On each end of couch there is a "U" shaped bracket holding the pivot pin of the lounge in place. Remove the bolts from the bracket with the easiest access.
3. Slide lounge out of opposite bracket.
4. Lounge can now be lifted from base.

*On some models the bolts can be reached through the exterior access door.

LOUNGE BASE

1. Remove flip lounge as described above.
2. Remove pedestal table storage pan if applicable.
3. Pull carpet loose along face and remove screws in floor.
4. Remove attachments to outside wall.
5. Remove attachments to vertical end panels.

LOUNGE DOOR WITH SPEAKERS

1. Lift couch seat up about 45° and prop.
2. From back side of door, remove screws going into each end of doors.

AUXILIARY HEATER REMOVAL

1. Prop flip lounge seat up.
2. Remove pedestal table storage pan if applicable.
3. Remove heat duct shroud from front of heater.
4. Remove screws attaching heater to bottom heat duct.
5. Disconnect wires.

COCKTAIL CHAIRS

1. Cocktail chair seats are removed from the base by lifting straight up.
2. The legs are attached to the floor by self-tapping screws or machine bolts.
3. On the machine bolts it **will** be necessary to have a second person hold the nut from underneath the couch as the bolt is being removed from above.

UPHOLSTERED WALL PANELS (Curbside)

1. Remove screws toe nailing bottom of panel to floor.
2. Pull back carpet and remove tack strip.
3. Swing bottom of panel out and pull down out from underneath shelf.

BAR MODULE TOP

1. Slide glide out bar storage to stop.
2. Release latches in track assembly and remove storage module.

3. Open tambour doors.

4. Remove upholstered wall panels as described above.

5. Remove screws going up through vertical cabinet face into top.

6. Going through glide-out storage opening and tambour door opening, remove screws going up through rear corner cabinet brackets into top.

7. Remove screws from "L" shaped bracket going into top. These brackets are accessible when upholstered wall panels are removed.

BAR MODULE

1. Remove upholstered wall panels as previously described in this section.

2. Remove glide-out bar storage and drawer.

3. Remove screws next to wall going through the "L" shaped bracket into top. These can't be seen until upholstered panels are removed.

4. Remove screws at front and rear of cabinet attaching base to floor.

5. Disconnect wires i6 receptacles, TV switch and TV jack.

BAR MODULE - TAMBOUR DOOR

1. Pry out staples attaching tambour door to vertical hardwood handle.

2. Slide door back into cabinet until clear of track.

3. When replacing door use small screws in place of staples.

FLIP TABLE

1. Remove screws holding lower liquor storage shelf.

2. Raise front of shelf until table rollers drop down out of track.

3. Pull bottom of table toward aisle so rollers clear track and slide table up out of storage slot.

FLIP TABLE CABINET TOP

1. Remove upholstered wall panels as described earlier in this section.

2. Remove "L" shaped brackets attaching top to window shelf.

3. Remove screws going down through shelf into each end of top.

4. Open cabinet door and remove screws going up through cabinet frame (front and rear) into top.

FLIP TABLE CABINET

1. Remove upholstered wall pads as previously described in this section.

2. Remove "L" bracket attaching top to window shelf.

3. Remove two screws going down through window shelf into top.

4. Remove screws from lower liquor storage shelf.

5. Remove screws inside cabinet going into floor.

6. Lift table and remove attachments holding cabinet to wall.

DINETTE ASSEMBLY - 310 SERI S

TABLE REMOVAL

1. On wall underneath table, slide pivot bracket latches open.
2. Lift up on front of table until hooks on table clear wall bracket.
3. Lower table until resting flat and remove pivot rod from wall pivot bracket.
4. Lift table clear.

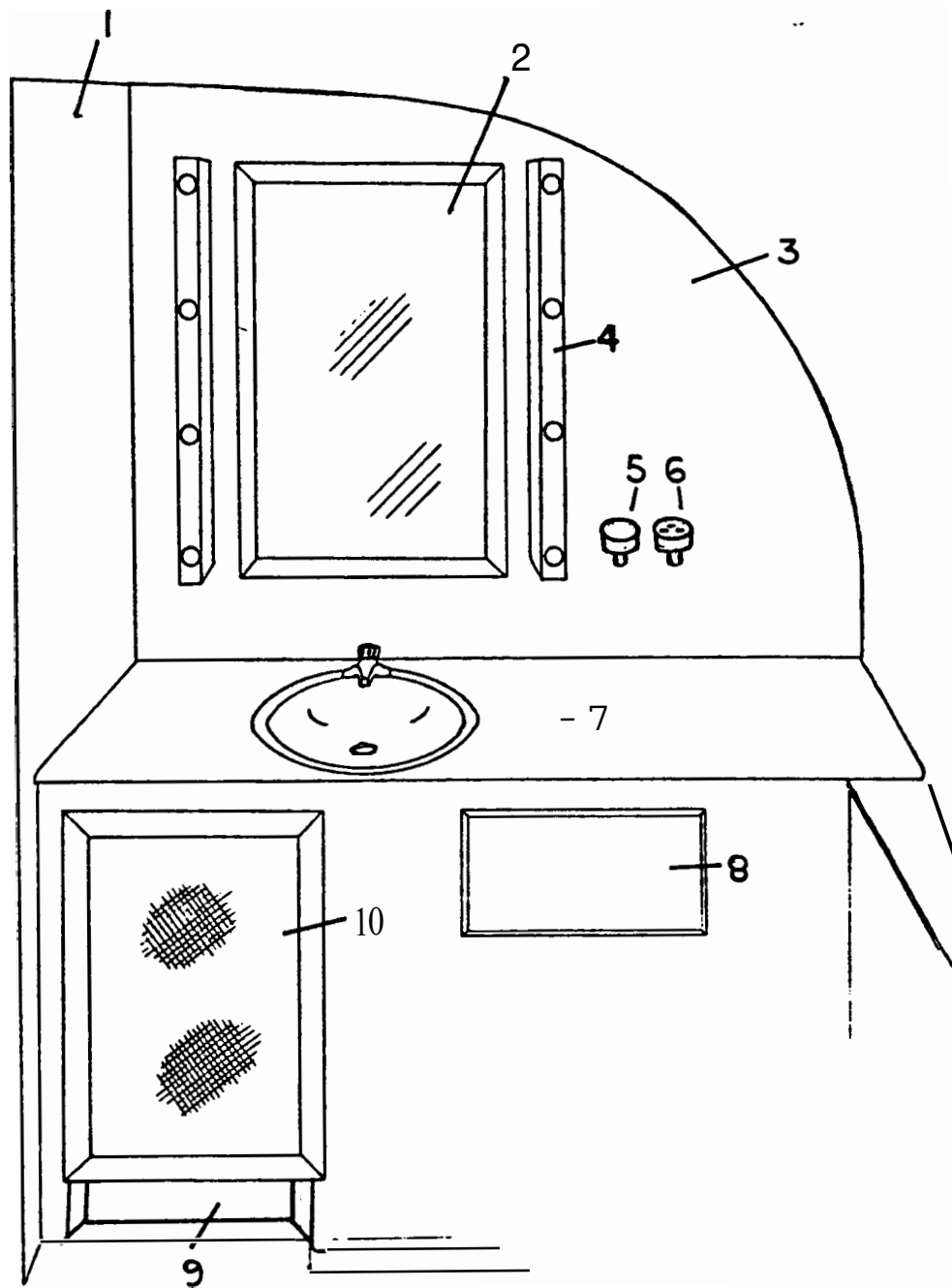
TAMBOUR DOORS

1. Pull seat cushion free from velcro strips.
2. Remove screws holding bed top in place.
3. Slide tambour door to open position.
4. Remove screws attaching center vertical supports to upper tambour door track.
5. Raise up on track and slide track out.

DINETTE SEAT BASE

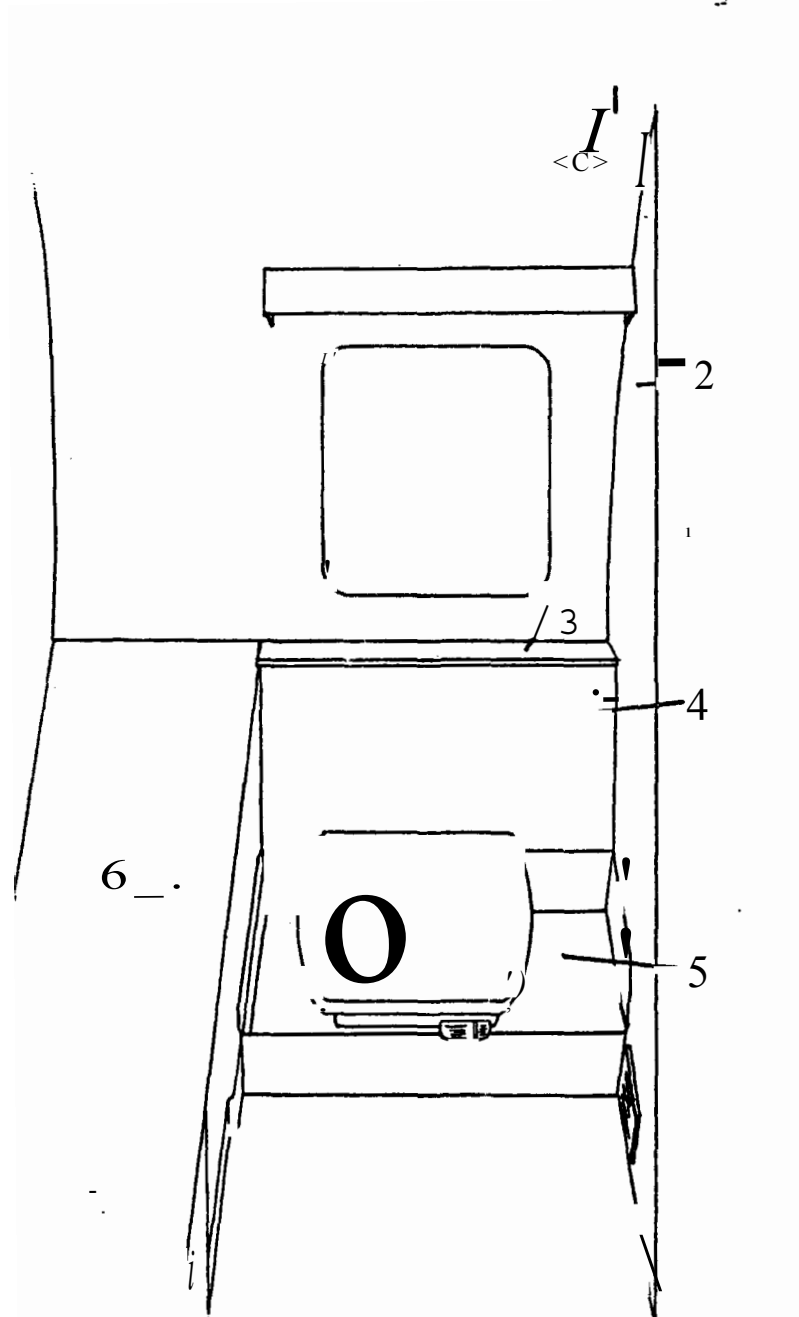
1. Pull seat and back rest cushions from velcro strip.
2. Open tambour door-and remove all screws attaching base to floor and wall.
3. Remove upholstered wall panel as described previously in this section.
4. Remove screws attaching back rest to wall.

CENTER BATH LAVATORY



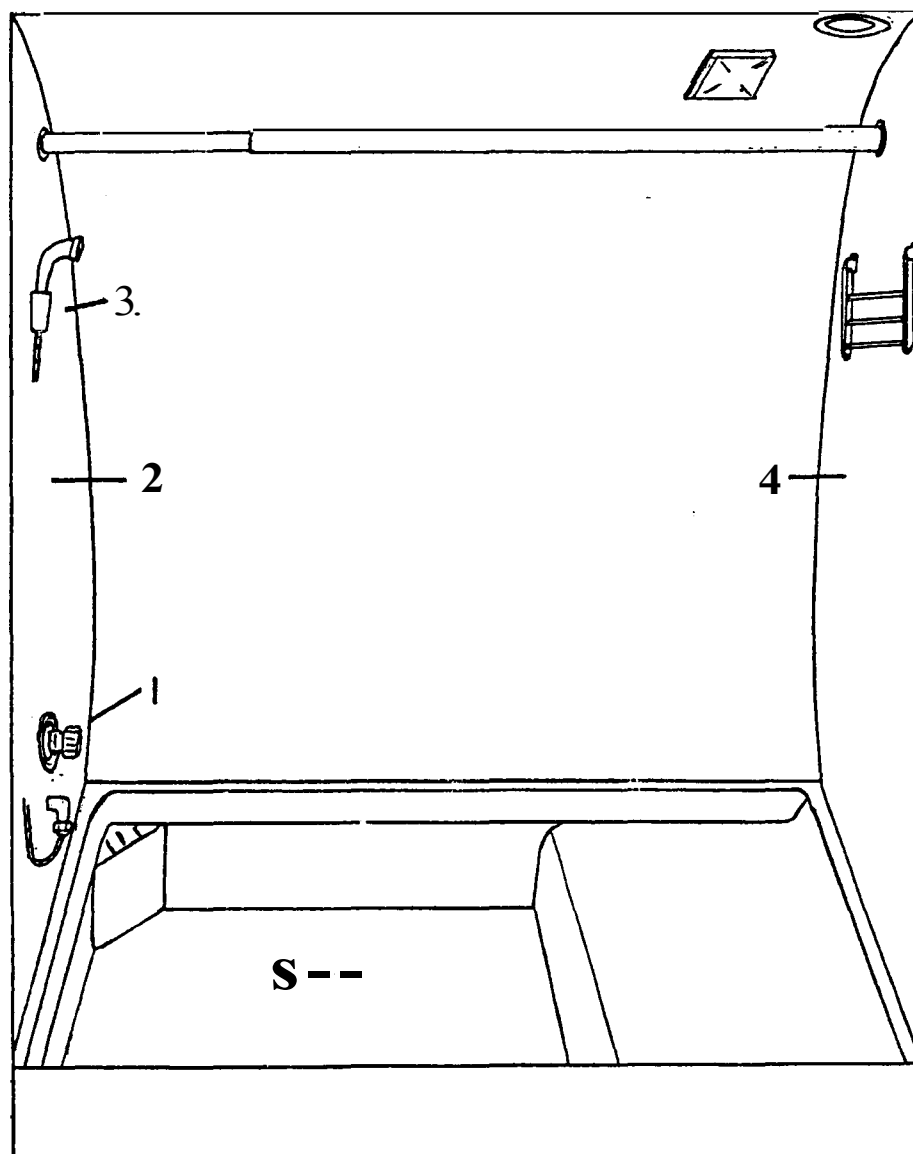
- | | | | |
|----|--------------------|-----|------------------------|
| 1. | Aisle Wall | 6. | Toothbrush Holder |
| 2. | Medicine Cabinet | 7. | Lavatory Top |
| 3. | Aft Vertical Panel | 8. | Drawer |
| 4. | Lavatory lights | 9. | Vertical Face Lavatory |
| 5. | Tumbler Holder | 10. | Lavatory Cabinet Door |

CENTER BATH LAVATORY



1. Bath Exhaust Fan
2. Forward Vertical Panel
3. Padded Shelf
4. Padded Back Rest
5. Tank Cover
6. Lavatory Top

CENTER BATH SHOWER STALL



1. Shower Faucet
2. Forward Shower Stall Wall
3. Telephone Shower Head
4. Aft Shower Stall Wall
5. Shower Pan

CENTER BATH

LAVATORY AFT PANEL AND AISLE WALL

NOTE: The aft end aisle panel of the lavatory is a one piece unit.

1. Remove c rbside rear wardrobe as described in the rear bedroom section.
2. Remove false panel on wardrobe side of lavatory panel.
3. From wardrobe side remove screws attaching lavatory panel to plastic ceiling liner of lavatory.
4. Going through night stand drawer opening, remove screws attaching night stand frame to lavatory panel.
5. Through lavatory cabinet door and drawer opening, remove screws attaching lavatory top, shelf and cabinet frame to walls.
6. Remove attachments in angle at ceiling.
7. Pull back carpet and remove screws attaching aisle panel to floor.
8. Mark and disconnect wires from mirror light.
9. Remove pop rivets holding door header to **aisle wall**.

LAVATORY FORWARD PANEL

1. Remove oven as described in galley section.
2. Remove screws going through galley cabinet frame and galley top into panel.
3. Remove spice rack.
4. Take out screws attaching anel to wull extrusion (if any are located behind rooflocker or galley top, chisel them off with putty

knife),

5. Remove rivets attaching bath door header to panel.
6. From inside lavatory remove any screws going into galley top.
7. Cut any sealer along edge of panel.
8. Pull back carpet in lavatory along wall and remove screws attaching panel to floor.
9. Pull back carpet in aisle at front edge of panel and remove screws in "L" bracket attaching panel to floor.

PADDED TOILET SEAT, BACK REST AND SHELF.

1. The hinged padded seat and side pieces lift straight up and out.
2. Disconnect water line going to toilet and push through back rest.
3. Remove screws attaching back rest to shelf.
4. Remove back rest to expose screws holding shelf to wall.

TANK COVER

1. Remove padded toilet seat, back rest and toilet line as described above.
2. Remove front and rear bolts attaching toilet to flange and remove toilet.
3. Mark location of flange bolts and remove screws holding flange to tank cover.
4. Pull back carpet and remove screws attachi?g cover to floor.

LAVATORY LIGHTS

1. Remove bulbs (push in - turn counterclockwise and pull out.)
2. Remove upper and lower screws holding cover to base and pull free.
3. Remove screws holding base to aft panel.
4. Pull base free, mark and disconnect wires.

LAVATORY MEDICINE CABINET

1. Open cabinet door and remove screws on left going through back of cabinet into wall.

2. From inside wardrobe behind cabinet remove screws going through false panel in cabinet while someone holds against in corner.

'UNBLENDER, TOILET BRUSH AND TOILET'
?, _PEN: > R. DERS

1. Slide tumbler, or rust holder up off dark plastic racket.
2. Gasp dark plastic bracket at bottom and tug firmly out and pull from base. Toilet paper brackets snap out in the same manner.
3. Remove screws attaching base to panel.

LAVATORY TOP

1. Through lavatory cabinet door and drawer opening, remove screws going up into the top around the perimeter.
2. Lift padded toilet seat and arm rest straight up from around toilet and set aside.

3. Remove screws attaching vertical padded back rest behind toilet to padded shelf.

4. Remove screws attaching padded shelf to wall.

5. Reaching through the opening exposed by removal of the padded shelf and back rest, remove the 5 screws attaching the top to the outer wall with "L" shaped brackets. There should be one at each corner.

6. Disconnect faucet water lines and sink drain line.

SWEEPER

1. Going through lavatory cabinet door, remove the perimeter fasteners in cabinet shelf.

2. Remove screw or screws going through the bottom frame of door opening into lower cabinet face panel.

3. Pull carpet back from face panel and remove screws holding face panel to floor.

4. Remove face panel and take out three screws holding sweeper to floor.

5. Unplug from 120 volt wall receptacle.

6. Disconnect hose and wire from vacuum outlet in wall.

SHOWER DOOR FRAME

1. Remove screws holding shower door to frame.

2. Place a soft block of wood against the edge of shower door frame and tap gently.

3. The frame will slide off the jamb.

SHOWER. FAUCE

1. Open small pantry door forward
if phone is pulled.
2. Pull carpet loose from pantry
floor.
3. Remove screws holding false
panel to floor, shower stall wall
and outside wall.
4. Pull false panel out of pantry
and disconnect water lines.
5. Remove screws from base.

SHOWER STALL AFT PANEL

1. Remove wardrobe, shelf and
clothes rod as described in
backpack, section.
2. Remove screws attaching panel
to wall extrusion.
3. Remove night stand drawers and
take out screws attaching night
stand from wall.
4. Remove screw holding panel to
floor.
5. Cut sealer with utility knife
or razor blade.
6. Remove rivets attaching aisle
wall to panel.

SHOWER STALL FORWARD PANEL

1. Remove screws attaching vertical
forward shower stall panel to
aisle face panel.
2. Remove even as described in
gallery section.
3. Slide drawer out to stop. Release
latch in track and remove drawer.
4. Going through small pantry door
remove false panel.

5. Remove screws attaching cabinet
frame and roof lock to panel.

6. Remove screws attaching panel
to shower panel.

7. Remove faucet as described
previously in this section.

8. Remove screws and rivets
attaching panel to wall extrusion.

9. Cut nealer along panel with
utility knife or razor blade.

10. Pull carpet back from in
front of panel and carefully work
it out.

SHOWER PAN

1. Ceiling a soft block of wood
against the edge of shower door
frame, tap lightly and remove
the high stiff and lower door
seal.

2. Remove rivets and screws
attaching aisle wall to shower
pan.

3. Slide out drawer of night stand
to stop, release latch in track
and remove drawer.

- Reaching through night stand
drawer opening, remove screws
going through vertical panel into
shower pan.

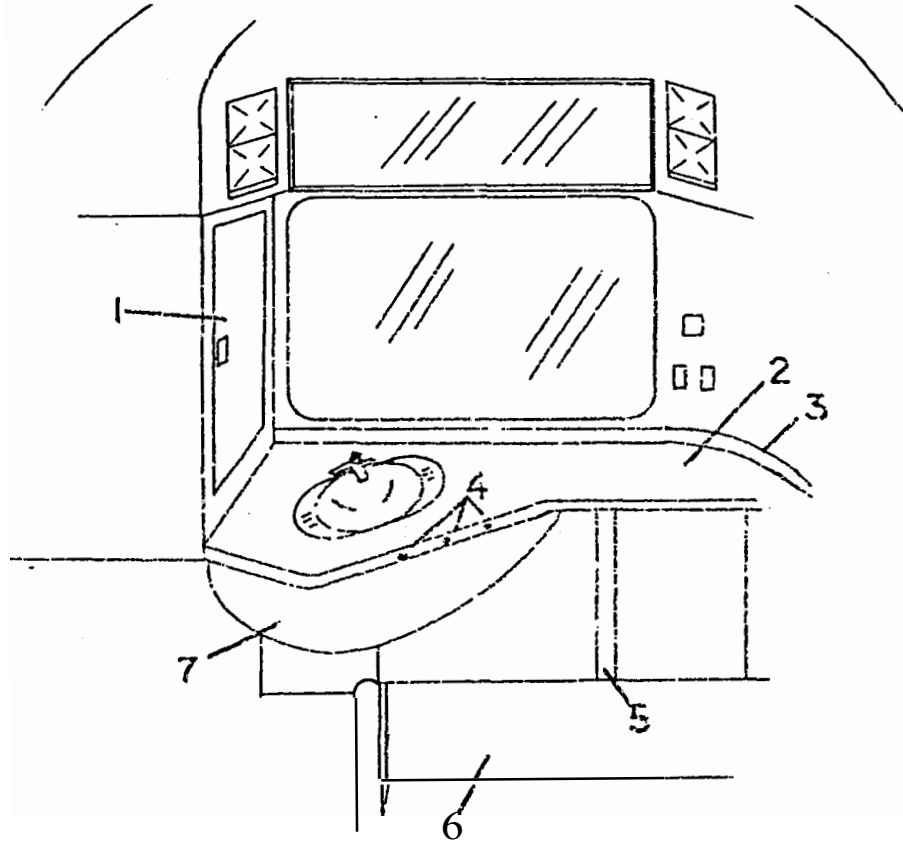
5. Going through small pantry
door remove false panel.

6. Remove screws behind false
panel going into shower pan.

7. Cut sealer with utility knife
or razor blade.

8. Remove drain.

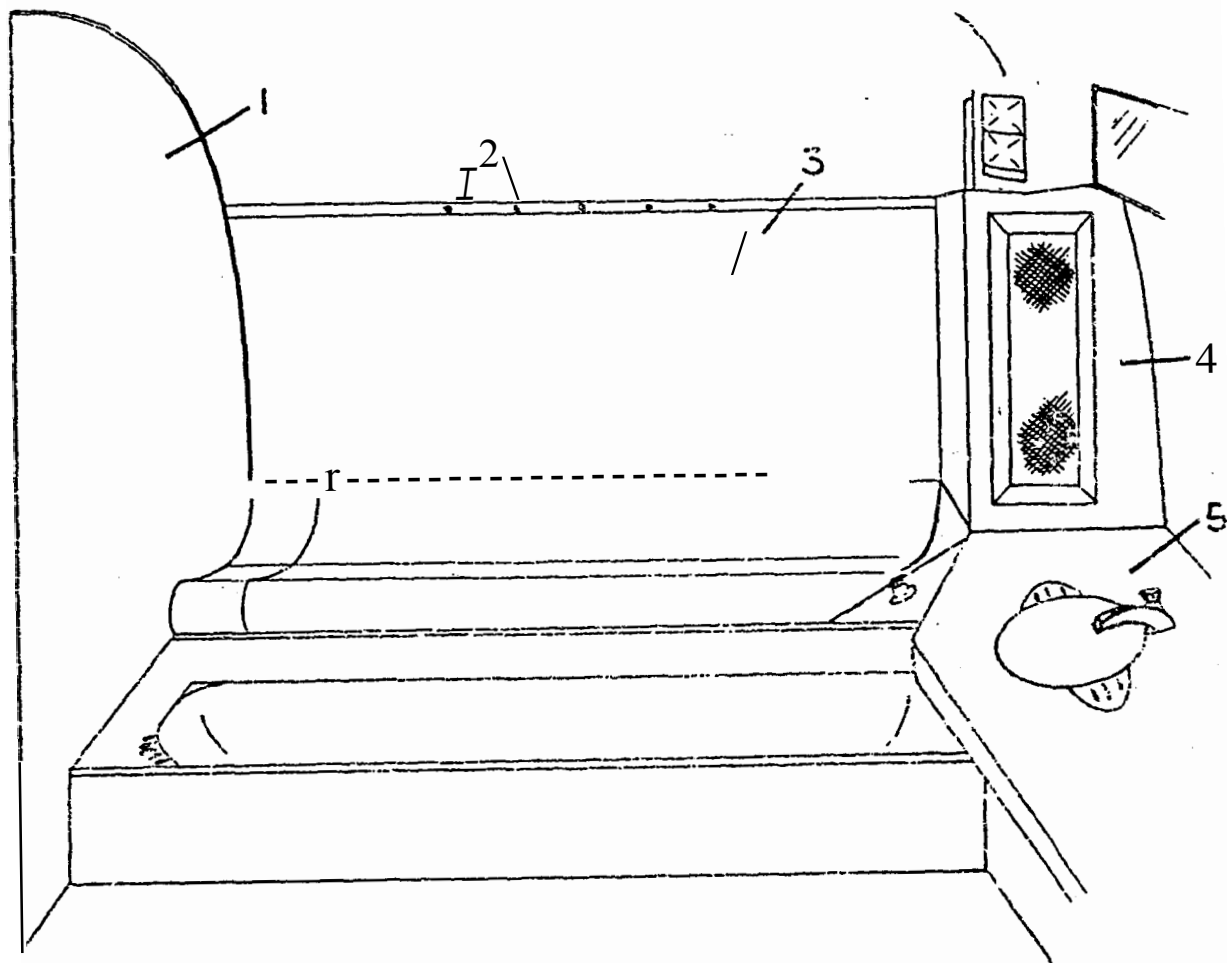
REAR BATH 300- SERIES
LAVATORY



1. Medicine Cabinet
2. Lavatory Top
3. Lavatory Top Wall Trim
4. Plastic Buttons
5. Lavatory Cabinet Vertical Trim
6. Lower Lavatory Cabinet Face
7. Lavatory Shroud

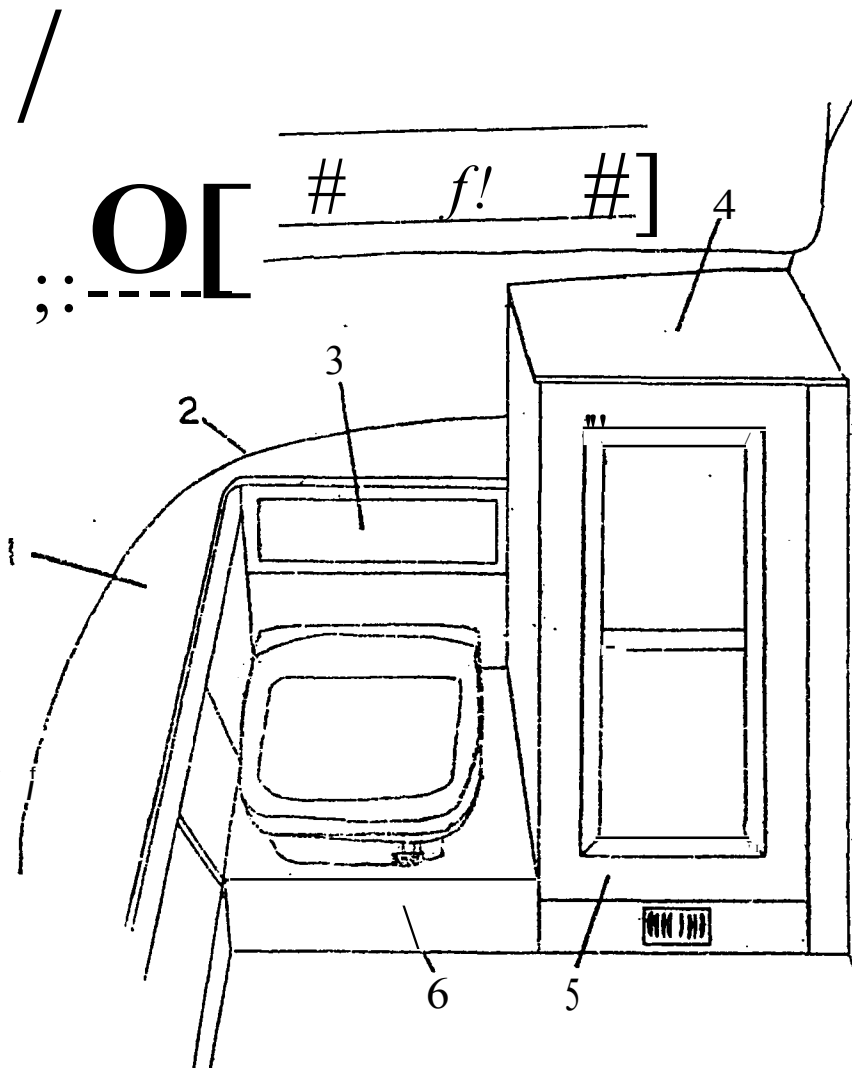
REAR BATH 300 SERIES

Spout-p



1. Bath Vertical Panel
2. Plastic Caps
3. Shower Wall
4. Medicine Cabinet
5. Lavatory Top

REAR BETH 300 SERIES TOILET



1. Lavatory Top
2. Lavatory-Top Wall Trim
3. Hamper Door
4. Linen Closet Top
5. Linen Closet Vertical Face
6. Waste Tank Cover

REA BATH 300 SERIES

LAVATORY TOP?

1. Lift out padded top piece around toilet.
2. Pull carpet loose along top, bottom and left side of lower lavatory cabinet face.
3. Remove pop rivets and screws holding lower lavatory face in place and remove face.
4. Reaching up from bottom remove screws attaching lavatory shroud to lavatory cabinet vertical trim piece.
5. Pry off plastic buttoca along front of lavatory top and drill out rivets. Replace with rivets are part number 30007.
6. The wall trim cap - the lavatory top is refueled at the end next to the linen closet. Remove the corner or rivet rough end of trim, chisel... (width 1 1/2 inches) of front, extend two or three rivets to left of linen closet. & on a circular bend in end of rim until it can be pulled out.
7. Remove screws attaching lavatory shroud to tub.
8. With putty knife chisel off rivets between lavatory shroud and bottom of medicine cabinet and remove shroud.
9. Remove attachments between end of lavatory top and medicine cabinet.
10. Disconnect faucet water lines and lavatory drain lines.
11. To replace rivets described in step 8, remove bottom shelf in medicine cabinet and reach down through opening.

BATH VERTICAL PANEL, CURBSIDE

1. Remove head of bedroom side of bath door assembly.
2. Remove hanging wardrobe.
3. Remove attachments holding panel on wall extrusion.
4. Remove screws holding panel on floor.
5. When replacing panel, slide bath door to center of coach to avoid accidental damage.
6. Removal of bedroom side vertical panel exposes all the attachment for the vertical panel at the end of the tub.

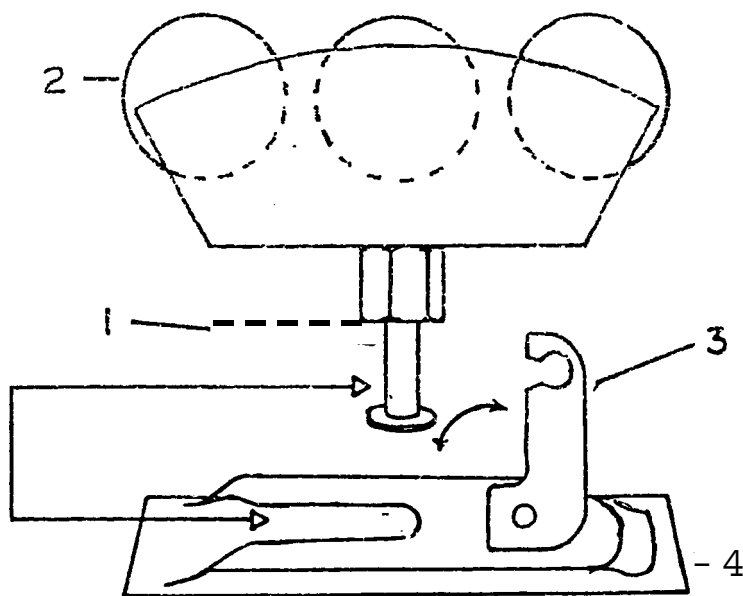
MEDICINE CABINET/SHOWER WALL

1. Remove plastic cap from attachment along upper edge of vertical.
2. Remove screws holding wall to tub.
3. With putty knife chisel off rivets attaching cabinet and wall to lavatory top and shroud.
4. Remove bath vertical panels as previously described.
5. Remove faucet knob and faucet mounting screws.
6. Cut sealer with utility knife or razor blade.
7. To replace rivets described in step 3 remove bottom shelf of medicine chest and reach down through hole.

BATH SLIDING DOOR

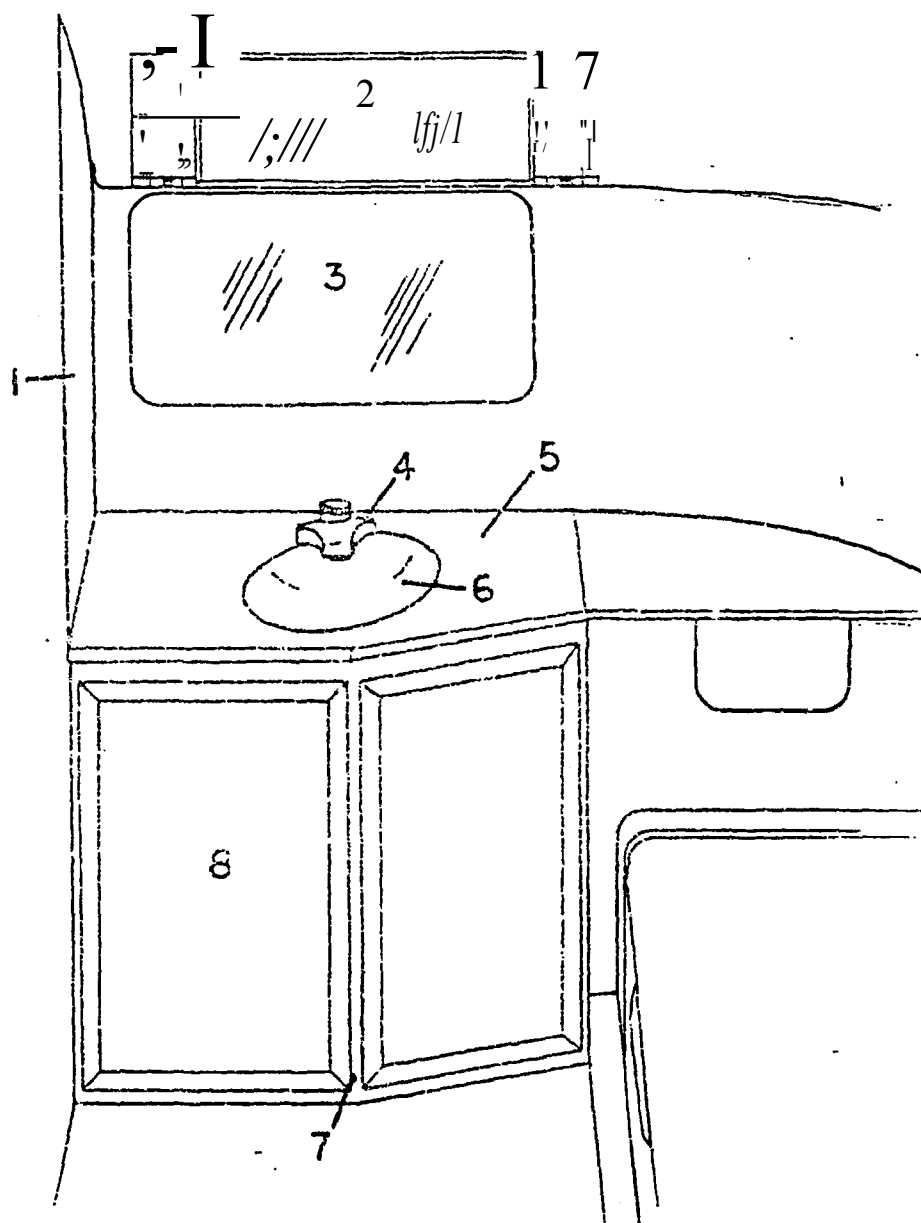
1. Slide door about half closed.
2. With small screw driver, unhook retainer clip from roller support pin.
3. Hold screw driver against support pin and jiggle door toward open position so support pin will slide out of bracket.
4. Repeat with other rollers.

NOTE: To replace roller, remove vertical panel.



1. Roller Support Pin
2. Rollers
3. Retainer Clip
4. Door Bracket

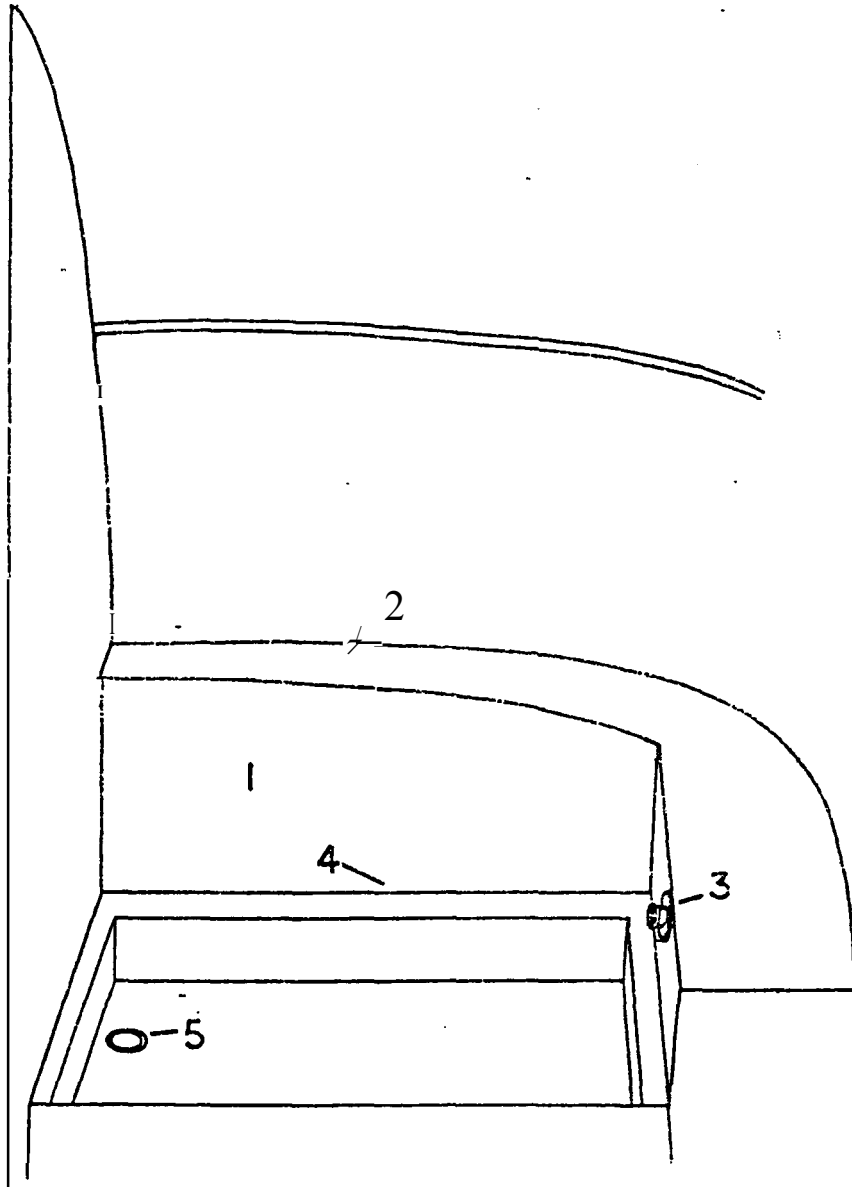
LAVATORY 270 SERIES



1. Vertical Panel
2. Mirror
3. Rear Window
4. Lavatory Faucet

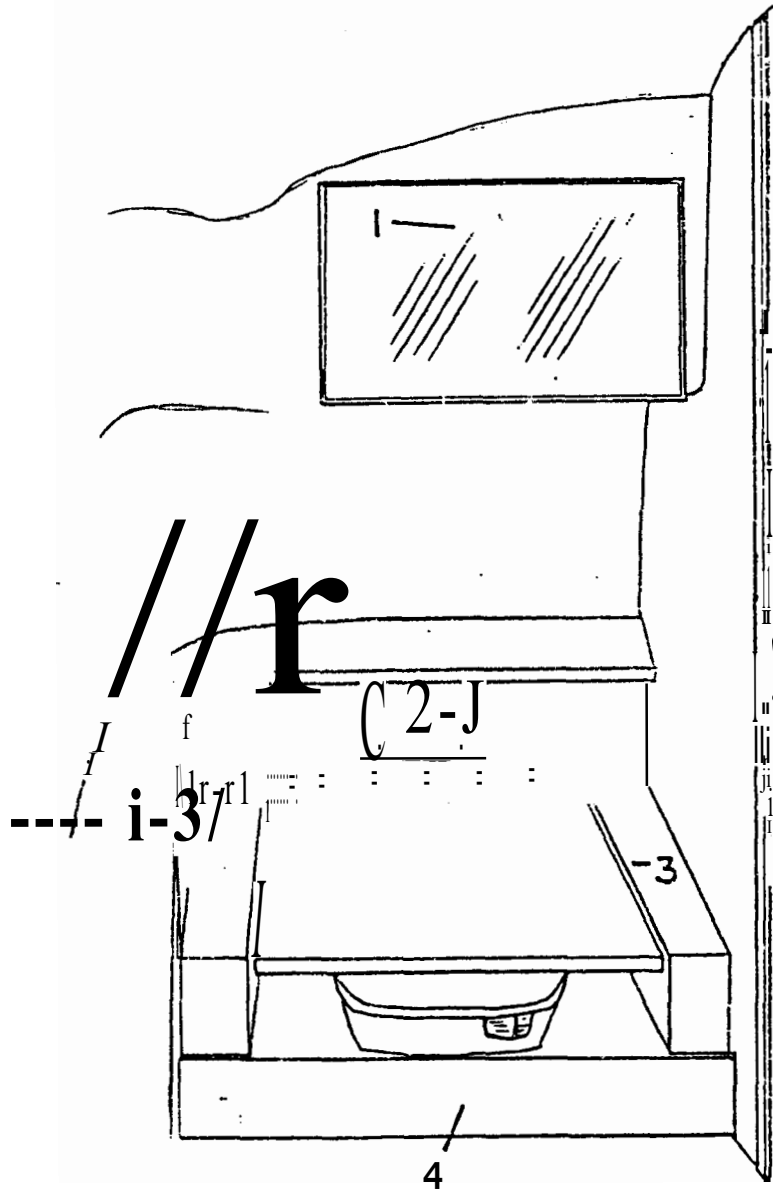
- 5... Lavatory Top
6. Lavatory
7. Vertical Cabinet Face
8. Lavatory Cabinet Door

SHOWER STALL 270 SERIES



1. Shower Stall
2. Upper Insert Trim
3. Shower Faucet
4. Lower Insert Trim
5. Drain

TOILET 270 SERIES



1. Mirror
2. Hamper Door
3. Padded Toilet Bench
4. Tank Cover Vertical Face

REAR BATH 210 SERIES

LAVATORY TOP

1. Reaching through cabinet doors remove screws on all four sides going up into cabinet top.
2. Disconnect lavatory drain line.
3. Disconnect lavatory faucet.

LAVATORY CABINET

1. Open doors and remove screws attaching lavatory top on both sides and up through the vertical face of the cabinet.
2. Remove screws attaching vertical cabinet panels and shelf to adjacent panels.
3. Pull carpet back and remove screws cladding vertical face of floor.

VERTICAL PANEL (Between lavatory and Shower)

1. Remove shower door frame.
2. Remove rivets holding panel in vertical wall extrusion.
3. Open lavatory doors and remove screws attaching lavatory top, vertical face and shelf to panel.
4. Pull back carpet and remove screw toenailing panel to floor.

SHOWER DOOR FRAME

1. Remove screws holding shower door to frame.
2. Place a soft block of wood against the edge of shower door frame and tap gently.
3. The frame will slide off the jamb.

SHOWER STALL

1. Pull out insert trim at top and bottom of shower stall.
2. Drill out all rivets in insert trim track.
3. Cut any tub sealer in joints with utility knife or razor blade.
4. Remove vertical panel next to lavatory as described previously.
5. Disconnect shower faucet and telephone shower hose.

SHOWER PAN

1. Remove shower stall as described above.
2. Remove screws attaching panel to shower door frame.
3. Unscrow drain.
4. Cut seal in joints with utility knife or razor blade.

BATH DOOR HEADER

1. The hardwood trim on the header is nailed in place. Carefully insert a thin bladed tool between trim and header and pry loose.
2. Remove two screws going up through header into ceiling.
3. Header will now come down.

PADD TOILET BENCH

1. The toilet bench is wedged behind hooks around the perimeter. Simply lift out.

SOLING TANK COVER

1. Lift out padded bench.

2. Reaching through rear hamper door turn off water valve to toilet.

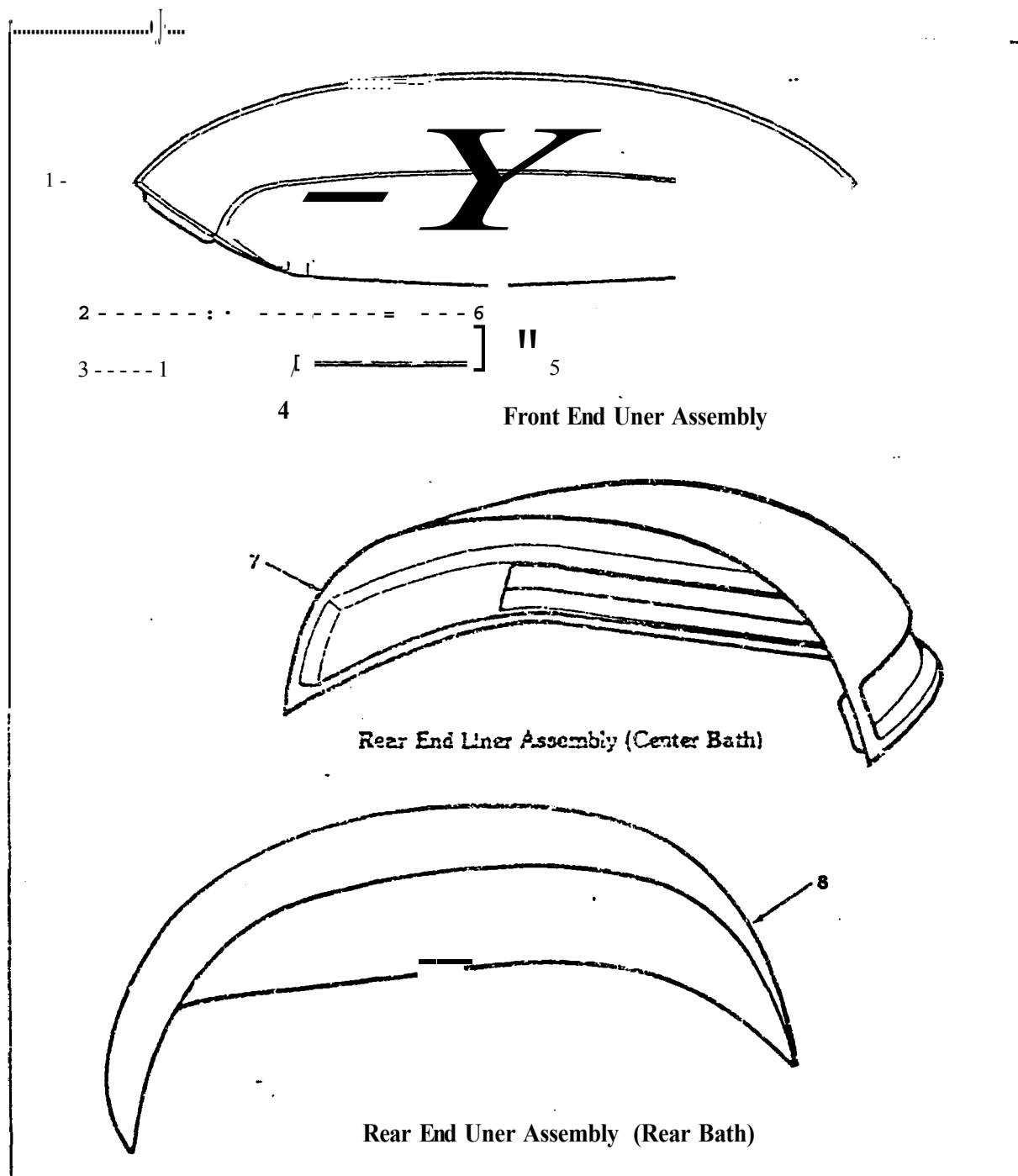
3. Disconnect water supply.

4. Remove flange bolts from toilet and lift out.

5. Remove perimeter screws from flange, unscrew flange from tank.

6. Pull back carpet and remove screws to install vertical brace to floor:-,

End Liners



- 1 Front End Line Assembly (Rear Bath)
- 2 Bracket
- 3 Screw *Bx 1-1/2"
- 4 Sun Visor Assembly
- 5 Plastic Tip - S n Visor Rod
- 6 Sun Visor Center Casting
- 7 Rear End Liner Assembly (Center Bath)
- 8 Rear End Liner Assembly

FROM END OF IT: "E" O T/
REPLACEHENT

1. Remove sun visors.
2. Remove end ~~line~~ trim.
3. Remove cal: wi:;dcw ~~tr~~.
4. Remove pop rivets holding end liner in place.
5. Pull interior skin away from front liner and slide liner back under skin. Then slide forward and down to remove.
6. For installation, reverse above procedure.

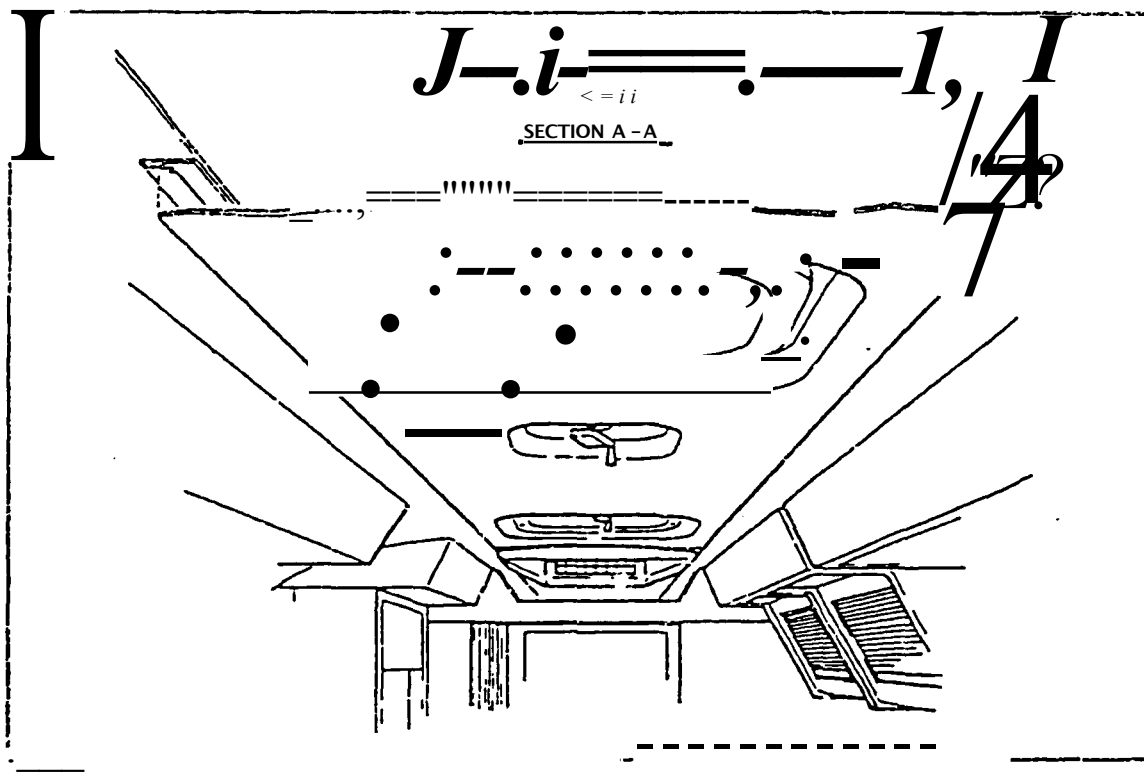
NOTE: Use No. 30 drill for removal of pop rivets.

REAR END Liner Removal

1. Remove end liner trim and trim that runs around perimeter of window.
2. Remove pop rivets holding end liner in place.
3. With interior skin held out of way, rotate end liner down and out.
4. For installation, reverse above procedures.

NOTE: Use No. 30 drill for removal of pop rivets.

Multi Dome Installation



.....-1,TE?.....COR! "N : 'E!-! : ,v;G/
:?.E: ?L; ..cE 'vl...; :t

?EF?.IGE?.ATOR VENT SCOOP REM.OV.LU,/
?.Er...;CS s "T

1. Remove noes & y fu: it =e te
p r z=c ss to =a; d i e= cr
s ,ti:.

1. Remove refrigerator panel.

2. Remove shelf above refrigerator.

2. Splices are permitted at ribs
only.

3. Remove roof lock above re-
frigerator.

3. Splices, where permitted, should
always lap on the rear.

4. Remove rivets securing vent
scoop.

4. Splices are usually made where
the seam will be concealed by
a piece of furniture.

5. Remove vent scoop.

6. To install, reverse procedure.

NOTE:: Use No. 30 drill to remove
rivet. Use No. 30 properly
colored rivets for installation
of new metal. Install rivets at
4 centers on **seams** and 6" centers
in all other areas.

7. Be sure that ventilation area
behind refrigerator is sealed
from interior of trailer.

MULTI-DOVE .P.ZHOVAL/R.S?LACE1.iE;)!T

1. Remove ceiling 1 S c (see
electrical section,)

2. Remove vent screen .

3. Remove door C ea er t
galley End bedroom.

4. Remove ir.sic. shroud of
conditioner.

5. Using No. 30 drill, drill
out rivets from each end of
multidome,

6. By pulling down on center of
multidome it can be removed
from trim strip.

7. Drill 1/8" hole in
pop rivets.
D(8 S. hole=1/8"

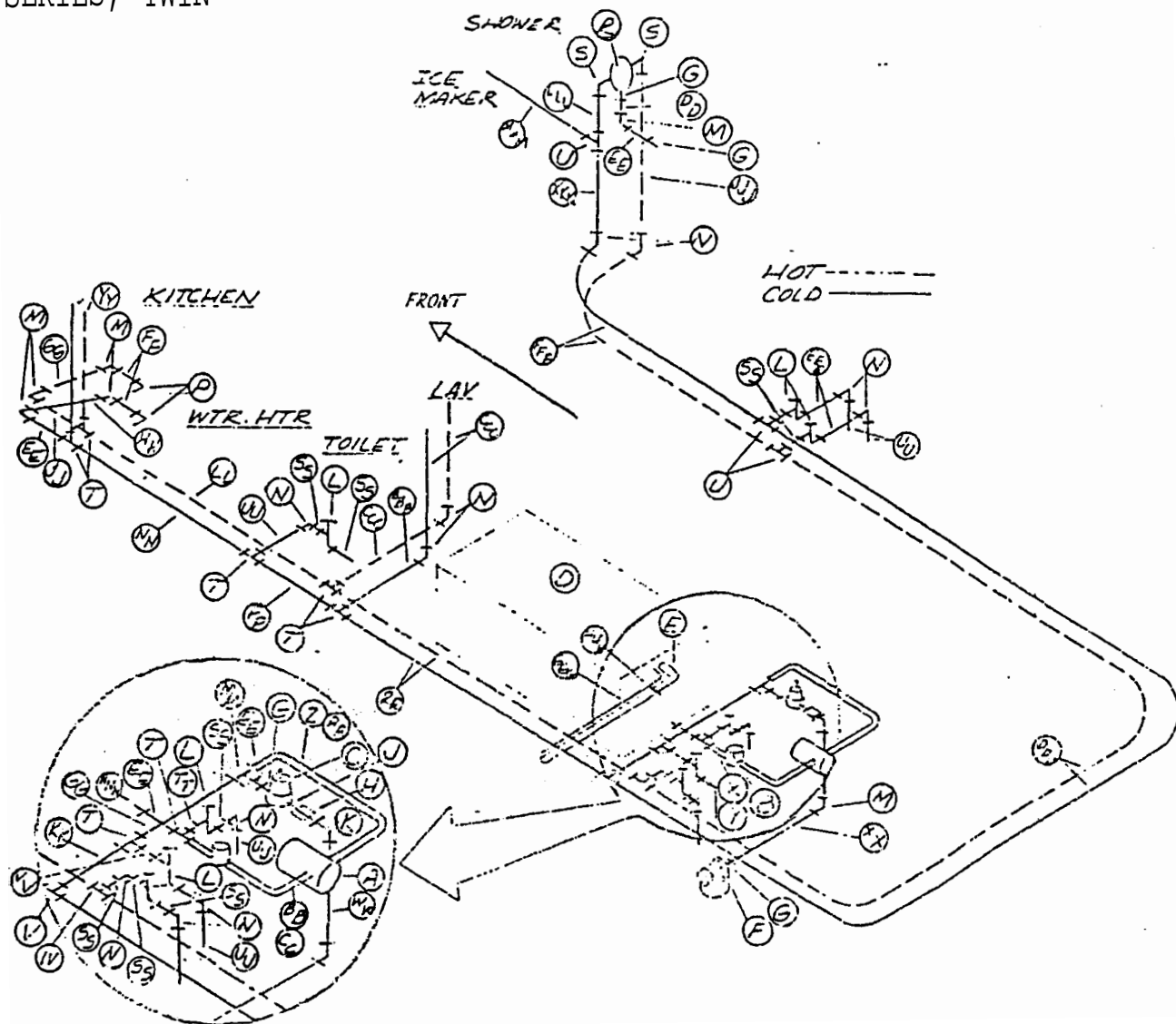
NOTE: Use No. 30 drill for removal
of pop rivets.

WATER SYSTEM

310	WATER DISTRIBUTION SYSTEM	D-1
300	WATER DISTRIBUTION SYSTEM	D-5
270	WATER DISTRIBUTION SYSTEM	D-7
CITY WATER INLET		D-9
City Water Inlet Check Valve Removal/ Replacement		D-9
City Water Pressure Regulator Removal/ Replacement		D-9
Water Fill Spout Removal/Replacement		D-9
Plastic Line		D-10
Water Mark		0-10
=';..UCE'ASSEM?LIES GALLEY ;..NDGALLEY FILTER		D-11
LA.VATOR FF-UCEJ' ASSZIEI,Y		D-15
Lva.to:-y Faucet c.ndSho.,,;eMi:-:ingValve		J-15
C rtridg Removal		D-15
Sl:cwer: .M:.;,:::Valve Rem:-Jval/Replacement		D-16
WATERt FILTER ASSEMBLY		D-19
WATER PUMP ASSEMBLY		D-20
WATER PUMP FILTER ?SSEMBLY		:)-25
WINTERIZING PROCEDURE		D-25

WATER DISTRIBUTION

310 SERIES, TWIN

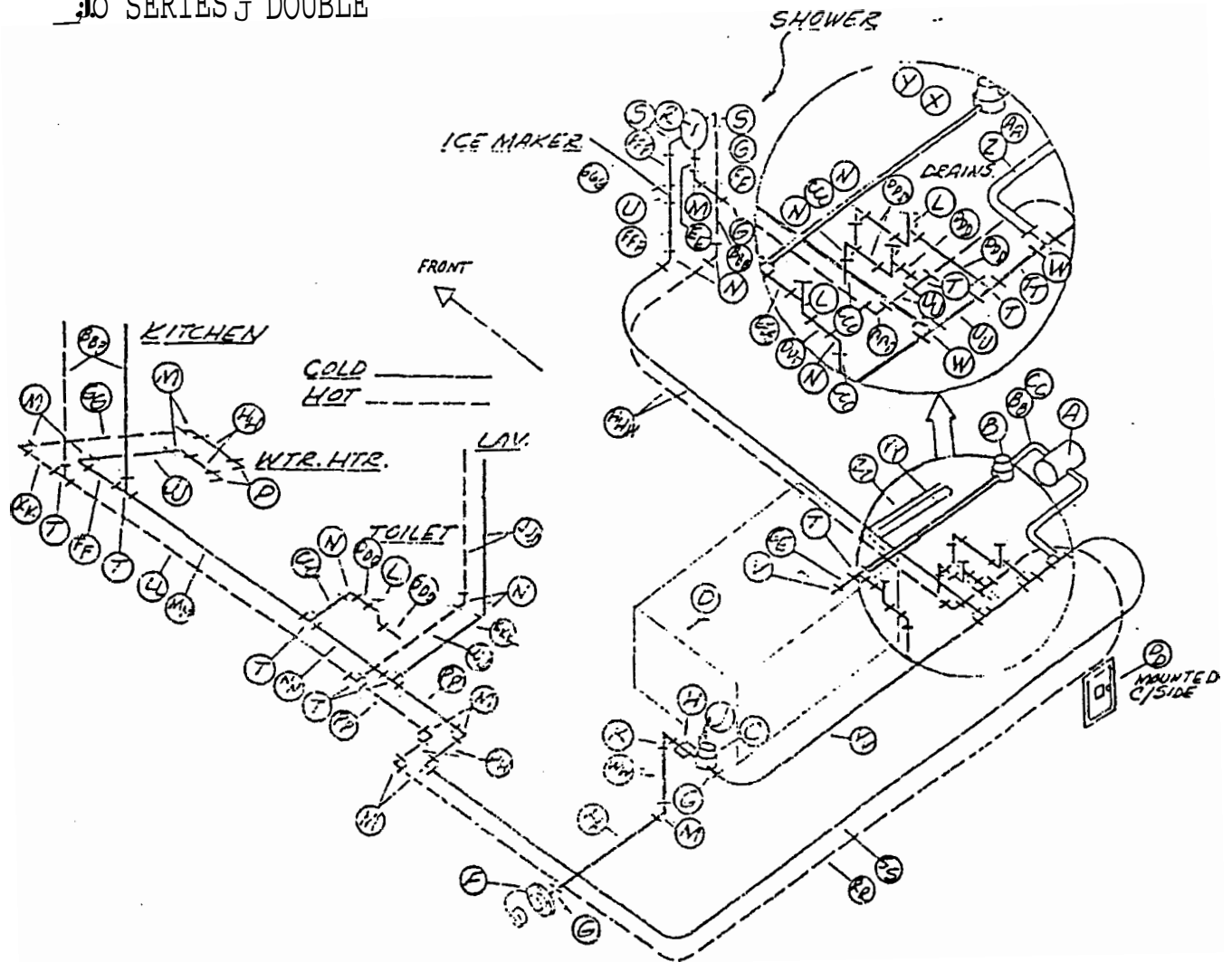


A. Demand Pi::mp
 B. Water Filter
 C. ?::ess, ?::ex;i::latc:::-
 . Water:: cArk
 F... 1-1/2, so ° Ell
 F. SwivE::1. Assy.
 G. 1/2 MPT x 1/: Barb Cc 9,
 H. Check Valve
 I. 1/2 Bre. s Nipple
 K. 1/2 F?! 1/2 barb 1 goo E
 . 3/8 Shut off Valve
 L. 1/2, 90 ° barb Ell
 . 3/8, go ° b::b Ell
 . ;/2 M:::"X j::" Ba=b 90c
 . Showe valve
 . 1/2 :> . :>3/0 3C::j
 F... 1/2 1/2 3/€ TE.e
 . 3/8 "f::
 V. 1/2 x 3/8 x 1/2 Tee
 W. 1/2 x 3/8 3/8 't'ee
 . 5/8 CD hes 4"
 . Spring (i::s::C:e} "
 ... 5/S OD hose " 14"
 AA. Spring x 15 "
 EE. 5/8 OD Hose x €-1/2"
 CC. Spring x 7-1/2"
 DD. 1/2 ID x 3
 EE. 1/2 ID x 1-1/2
 FF. 1/2 ID x 4
 GG. 1/2 ID x 12
 H:- 1/2 ID x 1.6

KI 1/2 IO 2-1/2
 K.X. 1/2 ID x 3
 LL. 1/2 ID x 101
 MM. 1/2 Tee
 N4. 1/2 ID x 69
 PP. 1/2 ID ; 31-1/2
 iF. P- Ir; x 89
 SS. 1/8 ID x 1 1/2
 T. 3/8 ID x 2-1/2
 UU. 3/8 ID x 3
 VV. 3/8 ID x 3-1/2
 WW. 1/2 ID x 10
 :<X 1/:? ID x 14"
 YY. /8 ID x 36
 33B. :/e ID x 2·0-3/
 C. 3/8 :D x 24
 D.JD, 3/8) x 157-1/2
 F. 3/8 II: x 10
 FFF. 3/8 ID x 76-1/2
 GGG. -1/2 Flexible hose-: x 10 ..
 E.... 1/2 ID vent tubing x 14"
 . 3/8 ID x 27
 KKK. 3/8 ID x 19-1/2
 LLL. 3/8 ID x 6-1/2
 MMM. 3/8 ID x 30
 N IN• 3/S MPT x 1/2 barb Coup.

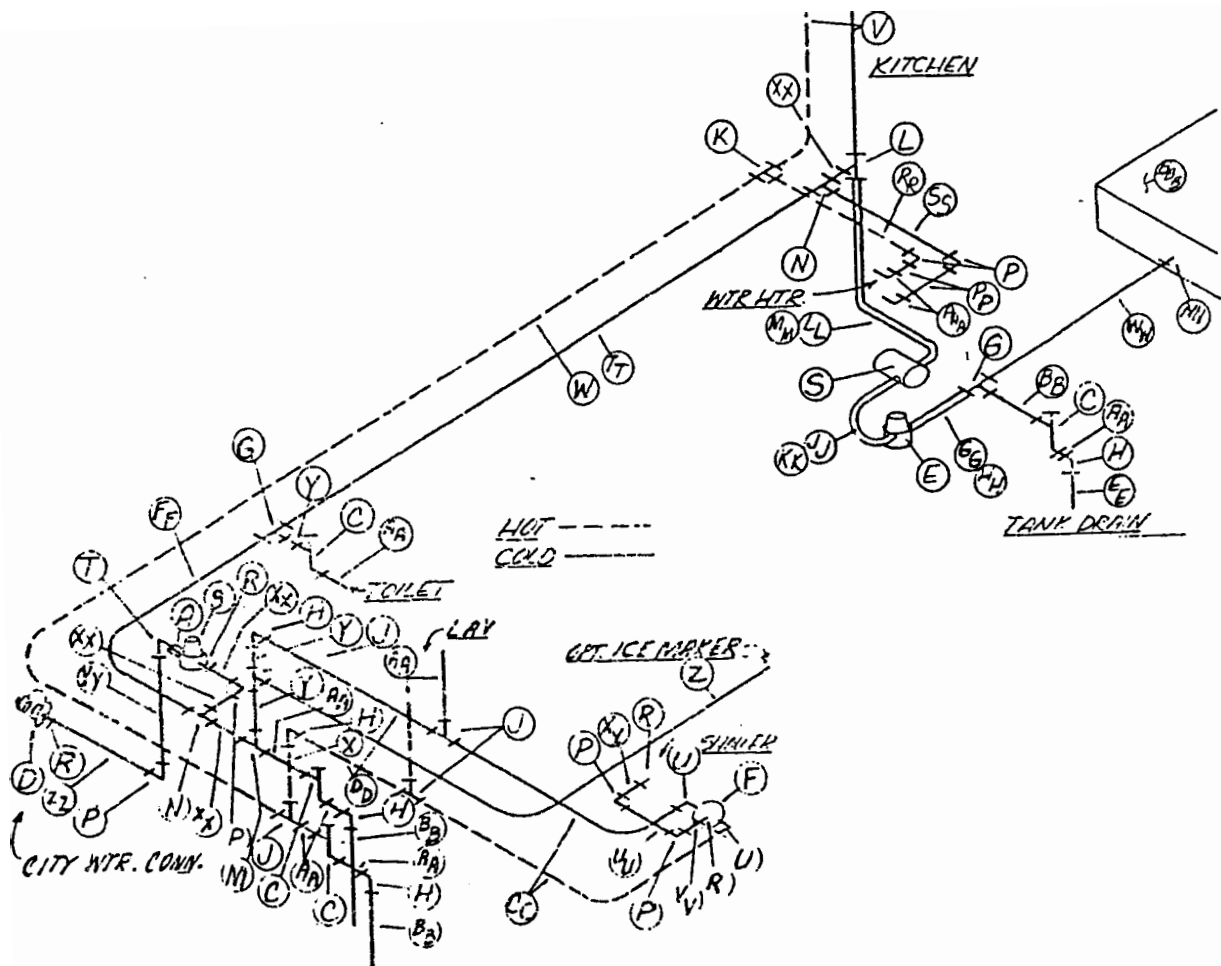
WATER DISTRIBUTION

JO SERIES J DOUBLE



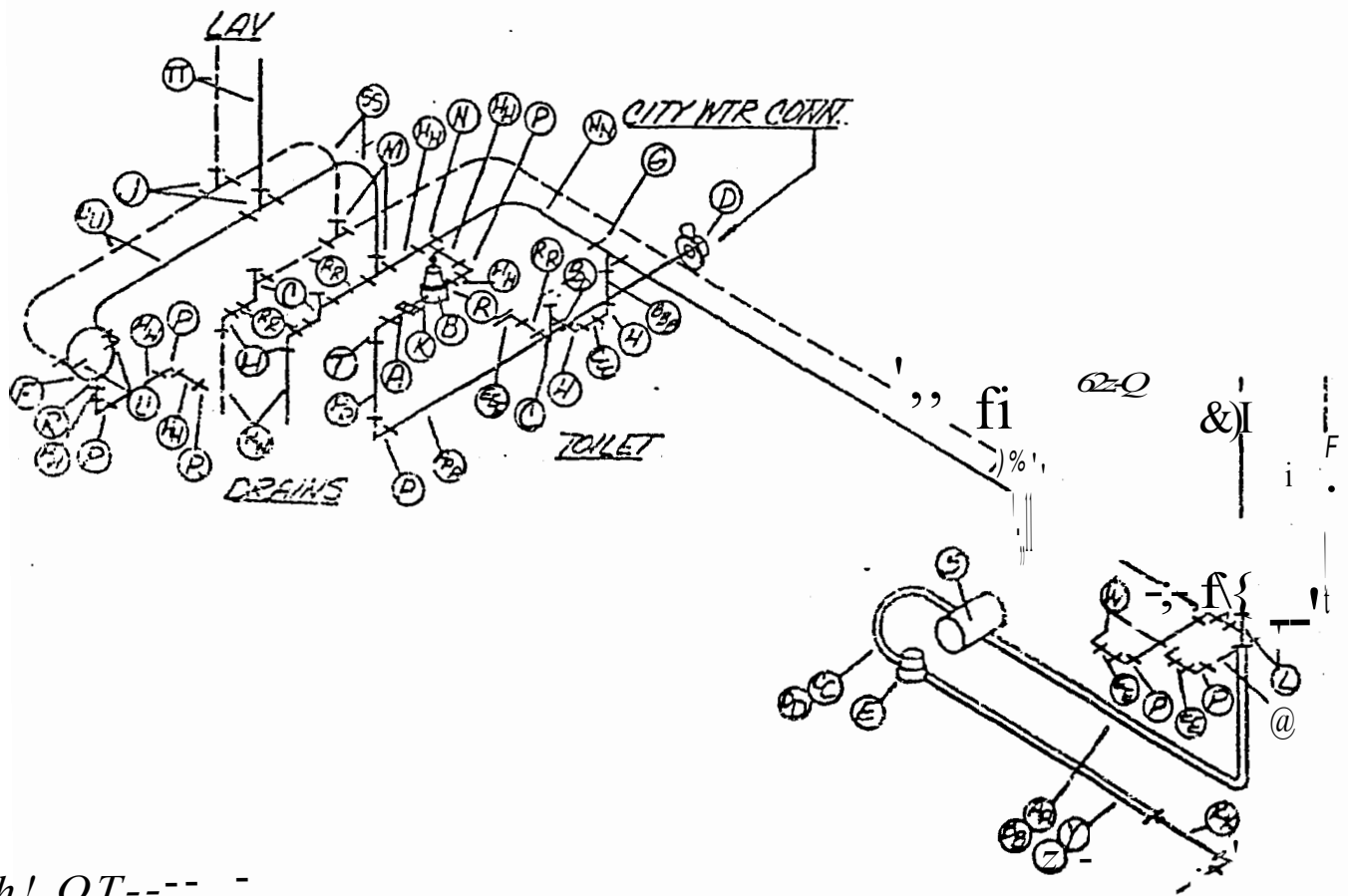
A. De :i.a c::: 1 →P	EH. 1/2 !!) x 4
3. Wate.c :i..te	Uz' /: ID > 16
C. !'res s. Regulator	kK. 1/2 ID x 2-1/2
D. rlate:- 'Z'ahk	T ... 1/2 I x 98-1/2 "
F. swivel As.sy.	VV. 1/2 !D : 63
G. 1/2 .. - :< 1/2 Ba::h Conn.	mr. 1/2 :D x 34-3/4
H. Check 'vc:Me	?? . 1/2 !D x 37-1/2
J. 1/2 Brass n:::,plc	RR.● 1/2 ID : li7
m. 1/2.J..f_TX 1/2 B.a.r.b, 90 ° Ell	SS. I/I :i:DX 172
L. 3/8 Shut off ,..alve	TT. J..* :n x 1
H. 1/2" 90 ° barb Ell	uu. 1/2 !!) >: 7-1/2
N. 3/8" 90 ° Barb Ell	VV. 1/:2 r> x 43-1/2
P. I i 2 " HP': ' x 1/2 Barb , 90 °	W:.... 1/2 :n x 10
F.. S:howe:r 'tal ve	XX ● 1/2 :r x :;1.
B. 1/2 ' . 3/e Earb, 90 c	Y?. :-- / : :●J.e:dbj.e :ose
m i 1/2 x : ' x :/s Tee	ZZ. 1/2 ::, ven.t tubi g
1. 3/8" 'se	AAA, 3/S b::r::: '!! = :2arb ; 90 ° E"...1
V. :1/8 M? r :12 :Sa:b Coc.p.	BBB 3/e ID : 36
. 1/2 Tee	CCC. 3/€ ID x 3
.(. 5/8 OD hose x :C	ODD. 3/6 I::, x 1-1/2
. Spring (!:-s.de} x 19	EEE. 3/8 :D x 7
7. 5/8 OD HOS': x i4	: 'FF. 3/8 ID x 18
AP..● Spring (! :.de) z 15	GGG. 3/8 ID x ,z
BB. 5/8 OD Hose x 7	RHH. 3/8 ID x 130
CC. Spring (Inside) x 8	JJJ. 3/8 ID x 24
DD. Water Fill Sousing	KKKc 3/8 ID x 20-3/4
EE. 1/2 ID x 3	
FF. 1/2 ID x 1-1/2	
GG. 1/2 !D x 12	

WATER DISTRIBUTION 300 SERIES



A.	Ch ck. Valve	EE.	3/8 ID x 46
B.	Watts Regulator	FF.	3/8 ID x 7
C.	3/8 Shut Off Valve	GG.	5/8 OD; hose x 22
D.	Swivel Assembly	H.H.	Spring (inside) x 23
E.	Water Filter	JJ.	5/8 OD hose x 6
F.	Showei Valve	KK.	Spring (inside) x 7
G.	1/2 x 1/2 x 3/8 Tee	LL.	5/8 OD hose x 45
H.	3/8 Barb, 90° Ell	MM.	Spring (inside) x 46
J.	3/8 Tee	N.	1/2 Barb x 3/8 MPT
K.	3/8 x 3/8 x 1/2 Tee	PP.	1/2 ID x 1
L.	1/2 x 3/8 x 1/2 Tee	RR.	1/2 ID x 14
M.	1/2 x 3/8 x 3/8 Tee	SS.	1/2 ID x 16
N.	1/2 Tee	TT.	1/2 ID x 16
O.	1/2 Barb, 90° Ell	UU.	1/2 ID x 8 1/2
P.	1/2 MPT x 1/2 Bsrvc Co. p.	V.	1/2 ID x 1 1/2
Q.	Demaid Pump	WW.	1/2 ID x 24
R.	1/2 EPT x 1/2 B, 90° Ell	XX.	1/2 ID x 1 1/2
S.	1/2 MPT x 3/8 B, 90° Ell	YY.	1/2 ID x 10
T.	3/8 ID x 36	ZZ.	1/2 ID x 7
U.	3/8 ID x 192	AA.	1/2 MPT x 1/2 B, 90° Ell
V.	3/8 ID x 18	BB.	1/2 MPT x 1/2 B, 90° Ell
W.	3/8 ID x 8 1/2	CC.	1/2 MPT x 1/2 B, 90° Ell
X.	3/8 ID x 240	DD.	3/8 ID x 48
Y.	3/8 ID x 1 1/2		
Z.	3/8 ID x 11 1/2		
AA.	3/8 ID x 90		
BB.	3/8 ID x 48		

WATER DISTRIBUTION 270 SERIES

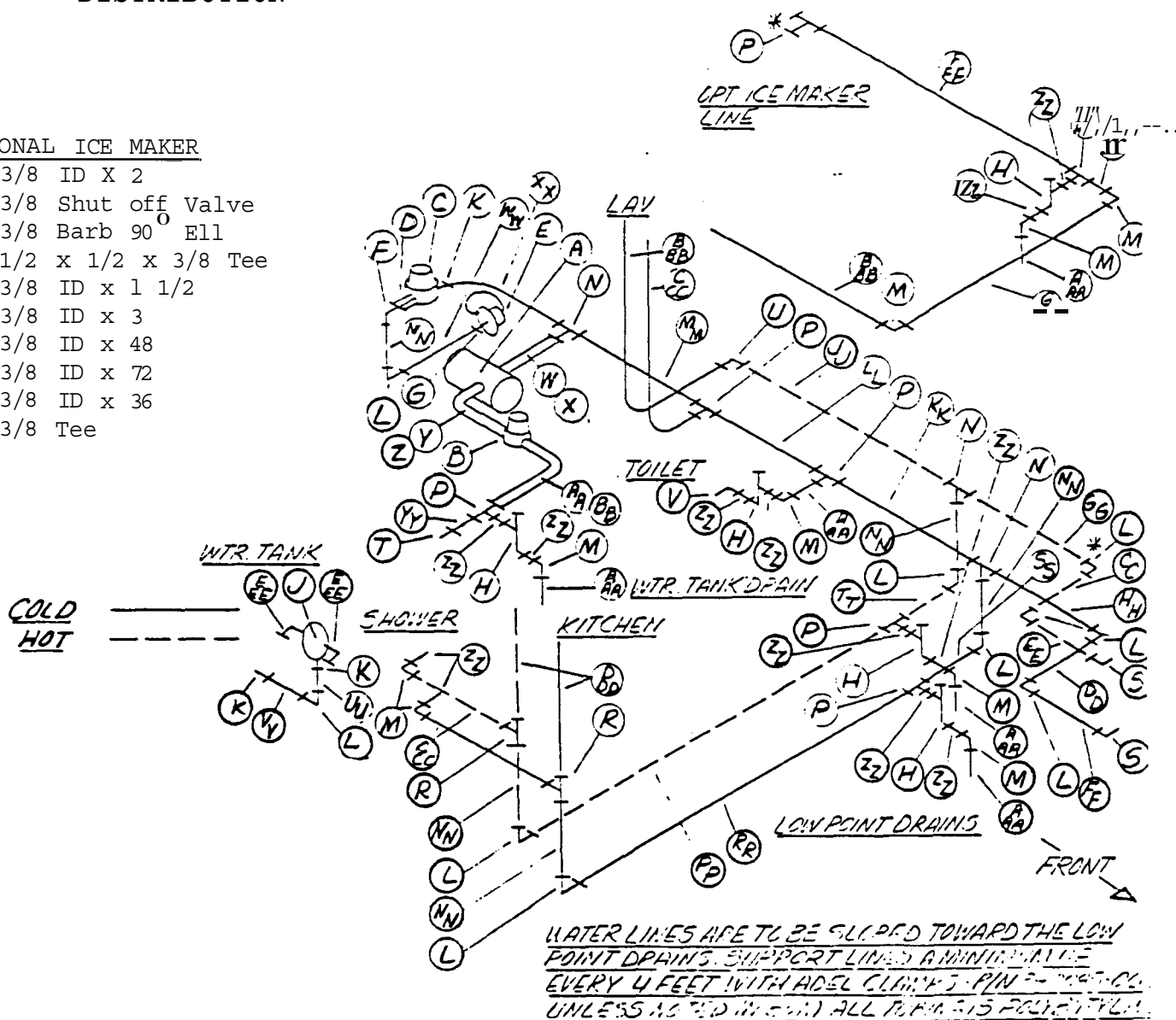


1\• Chec:-!Jalve	GG. 1/2 2D 5 //
B. Regulator	EE.. 1/2 ID x 1 J./2
C. 3/0 S 11.1toff Valve	JJ. 1/2 ID x 22
D. Swivel Assembly	AA J./2 ID x 3
E. Water Filter	L. 1/2 :D x 1 C
F. Shower Valve	X11 1/2 ID x 1.30 <u>1/2</u>
G. 1/2 x 1/2 : 3/8 Tee:	NN. 1/2 1:1 33
H. 3/8 :Sa:cb, oo Ell	PP. 1/2 ID x 18
J. 3/8 Tee	RR. 2/8 :i:D; 1 5,5=
K. 1/2" £:-a£ N i:,ipl e	SS. 3/8 IJ x
L. 1/2 > 3/8 x :./2 • ee	MM. 1/3 1/2 x C
M. 1/2 : 3/8 :-.:;a c e	tt'(j. :./2 ID x 48
N. 1/ 9:Cf	TT. :;S :; x 11 1/2
p. 1/2 3a:-!J , 1/2 Ell	,;W. 1/2 :D x 18
R. 1/2MPT x 1/2 Barb Coup.	XX : /8 :D x E
qq. Denta:-d Pt:n.p	5- /8 1/2 x 3
r. 1/2 E:-T x 1/2 5, SO,, Ell	8-877 1/2 ..U 19
li. 1/2 XPT x 3i3 B, 10. ;;JJ	BEZ. :;S :C : 2 3/4
V. Water tank	CCC 3/8 7A x 9 2.. 15
w. 1/2 MPT x 1/2 3, 90., 1/2	DDD. 3/8 il x 3 1/2
X. 1/2 Barb x 1/2 MP';'	EEP . Toilet Conn.
Y. 5/8 OD hose: x /-	
Z. Sp:..:rig (ir,side) x 21	
AA. 5/8 OD hose x 1-	
BB. Spring (inside) x 41	
CC. 5/8 OD hose x 6	
DD. Spring (inside) y 7	
EE. 1/2 ID : 4	
FF. 1/2 ID x 4	

290 WATER DISTRIBUTION

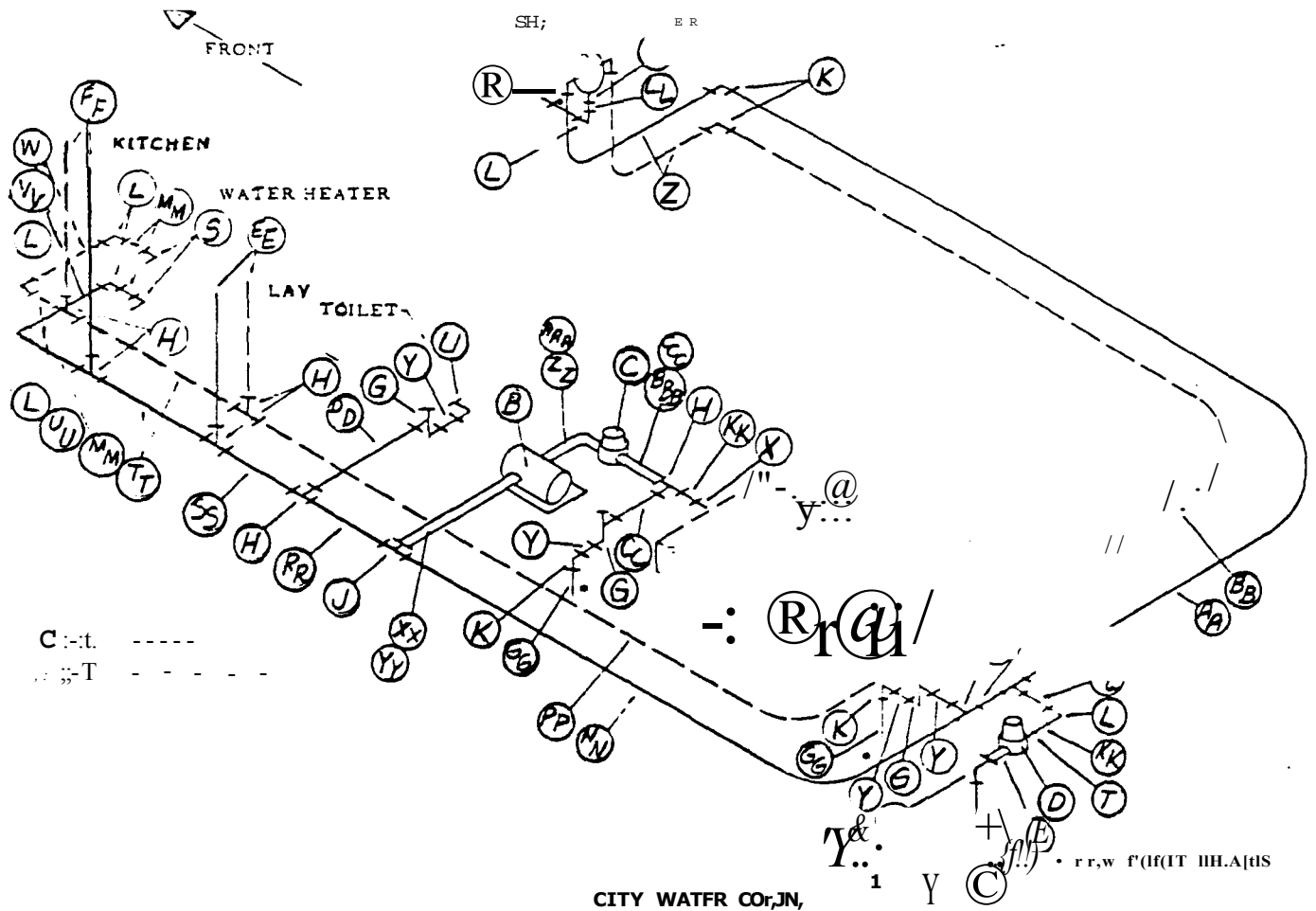
OPTIONAL ICE MAKER

YY.	3/8 ID X 2
H.	3/8 Shut off Valve
M.	3/8 Barb 90° Ell
P.	1/2 x 1/2 x 3/8 Tee
ZZ.	3/8 ID x 1 1/2
AAA.	3/8 ID x 3
BBB.	3/8 ID x 48
FFF.	3/8 ID x 72
GGG.	3/8 ID x 36
HRH.	3/8 Tee

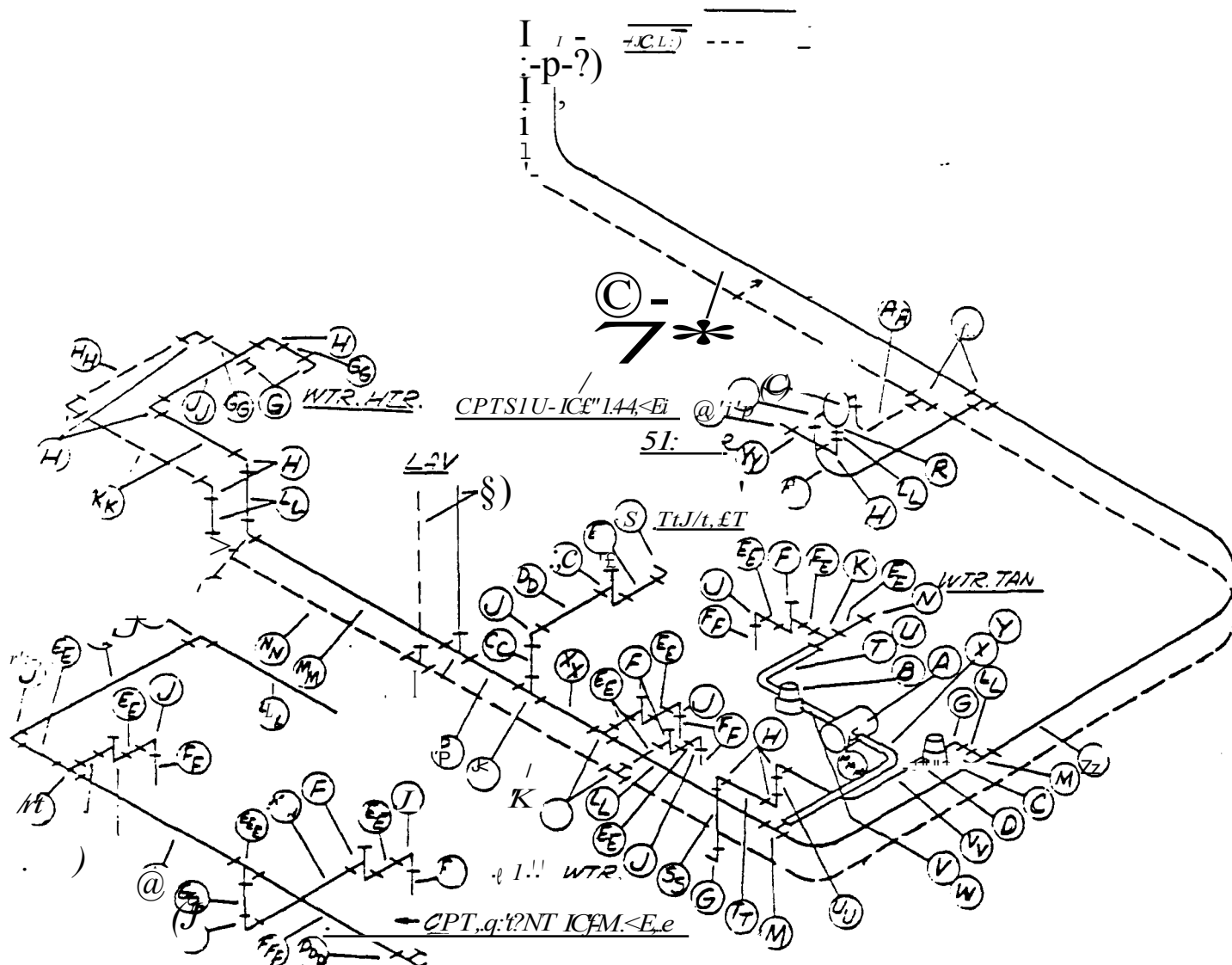


A. Demand Pump	W. 5/8 OD hose x 14	SS. 1/2 ID x 17 1/4
B. Water Filter	X. Spring (Inside) x 15	TT. 1/2 ID x 15 1/4
C. Pressure Regulator	Y. 5/8 OD hose x 6	UU. 1/2 ID x 3
D. Check Valve	Z. Spring (Inside) x 7	VV. 1/2 ID X 1 1/2
E. City Wtr Connection	AA. 5/8 OD hose x 11	WW. 1/2 ID x 19
F. 1/2 EPT x 1/2 Barb 90° Ell	BB. Spring (Inside) x 12	XX. 1/2 ID X 24
G. 1/2 Nipple	CC. 1/2 ID x 12 1/2	YY. 1/2 ID x 2
H. 3/8 Shut Off Valve	DD. 1/2 ID x 11 3/4	ZZ. 3/8 ID X 1 1/2
J. Shower Valve	EE. 1/2 ID x 10 3/4	AAA. 3/8 ID x 3
K. 1/2 MPT x 1/2 barb coup	FF. 1/2 ID x 11	BBB. 3/8 ID x 48
L. 1/2 barb, 90° Ell	GG. 1/2 ID x 20 1/4	CCC. 3/8 ID x 40
M. 3/8 Barb, 90° Ell	HH. 1/2 ID x 21 1/2	DDD. 3/8 ID x 32
N. 1/2 Tee	JJ. 1/2 ID x 73 1/2	EEE. 1/2 MPT x 3/8 Barb 90°
P. 1/2 x 1/2 x 3/8 Tee	KK. 1/2 ID x 35 3/4	
R. 1/2 x 3/8 x 3/8 Tee	LL. 1/2 ID x 34 1/4	
s. 1/2 MPT x 1/2 barb 90° Ell	MM. 1/2 ID x 91	
T. 3/8 MPT x 1/2 barb Coup	NN. 1/2 ID x 10	
U. 3/8 MPT x 1/2 barb 90° Ell	PP. 1/2 ID x 69 1/2	
V. Toilet Connection	RR. 1/2 ID x 67 1/2	

325 WATER DISTRIBUTION

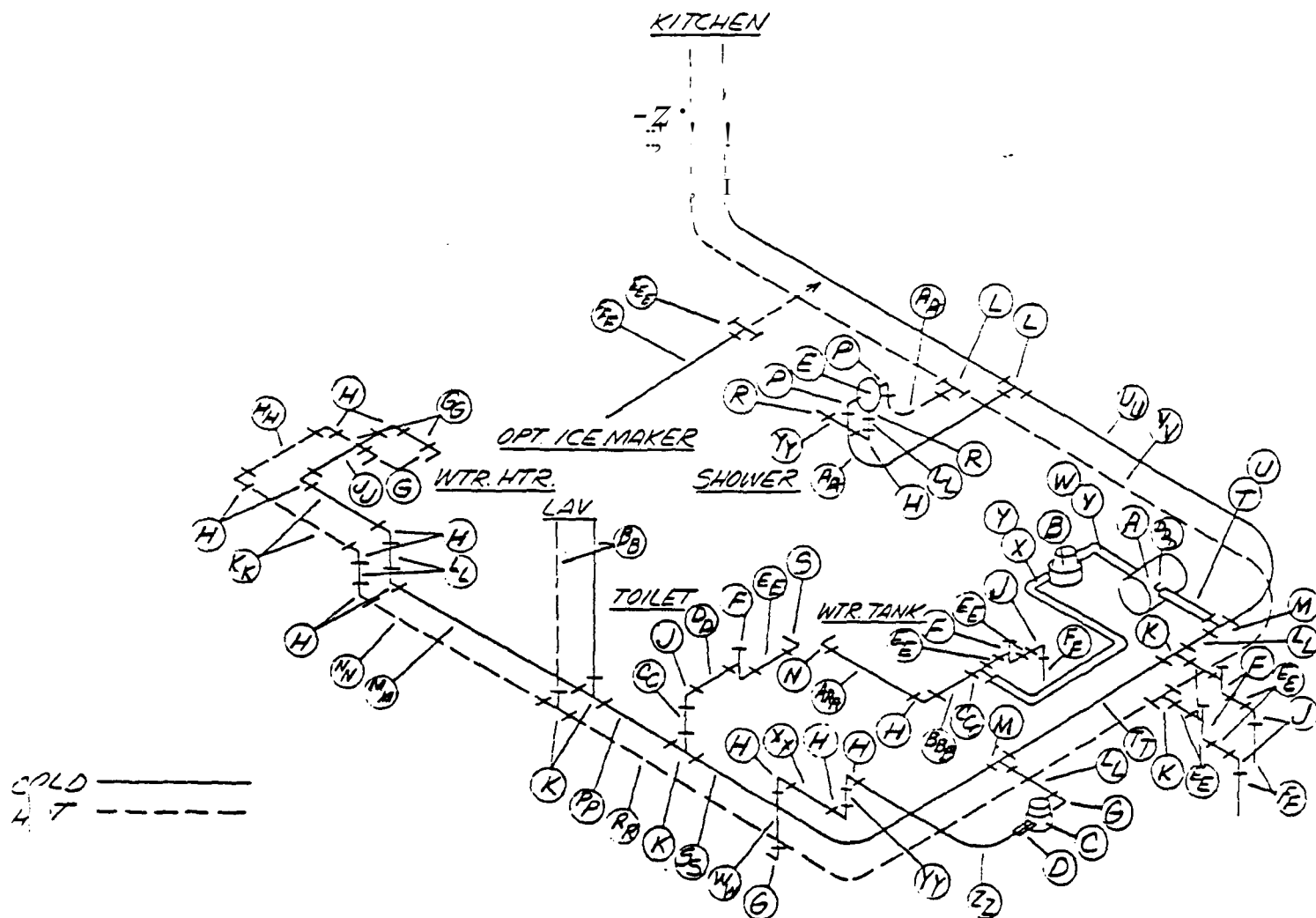


A. Water Tank	V. 1/2 Nipple	NN. 1/2 ID x 65
B. Water Pump	W. Swivel Assembly	PP. 1/2 ID x 130
C. Water Filter	X. 3/8 MPT x 1/2 barb Coupler	RR. 1/2 ID x 31 1/4
D. Pressure Regulator	Y. 3/8 ID x 1 1/2"	SS. 1/2 ID x 29 1/4
E. Check Valve	Z. 3/8 ID x 30	TT. 1/2 ID x 80
F. Shower Valve	AA. 3/8 ID x 152	UU. 1/2 ID x 5
G. 3/8" Shut Off Valve	BB. 3/8 ID x 169	VV. 1/2 ID x 16
H. 1/2 x 1/2 x 3/8 Tee	CC. 3/8 ID x 12	WW. 1/2 ID x 13
J. 1/2 Tee	DD. 3/8 ID x 16	XX. 5/8 OD hose x 20
K. 3/8 Barb, 90° Ell	EE. 3/8 ID x 12 1/2	yy. Spring (inside) x
L. 1/2 Barb 90° Ell	FF. 3/8 ID x 36	ZZ. 5/8 OD hose x 4
M. 1/2 x 3/8 x 3/8 Tee	GG. 3/8 ID x 3	MA. Spring (inside) :
N. 1/2 x 3/8 x 1/2 Tee	HH. 1/2 ID x 7	BBB. 5/8 OD hose x 6
P. 1/2 MPT x 3/8 Barb 90° Ell	JJ. 1/2 ID x 9	CCC. Spring (inside) :
R. 1/2 EPT x 1/2 Barb 90° Ell	KK. 1/2 ID x 1 1/2	
S. 1/2 MPT x 1/2 Barb 90° Ell	LL. 1/2 ID x 3	
T. 1/2 MPT x 1/2 barb 90° Ell	MM. 1/2 ID x 4	
U. 90° swivel Elbow		



- | | | |
|--------------------------------------|-------------------------------|-------------------------------------|
| A. Demand Pump | X. 5/8 OD hose x 25 | UU. 1/2 ID x 3 3/4 |
| B. Water Filter | Y. Spring (inside) x 26 | VV. 1/2 ID x 45 |
| C. Pressure Regulator | Z. 3/8 ID x 116 | WW. 1/2 ID x 26 |
| D. Check Valve | AA. 3/8 ID x 40 | XX. 1/2 ID x 78 |
| E. Shower Valve | BB. 3/8 ID x 21 | YY. 1/2 ID x 1 1/2 |
| F. 3/8 Shut Off Valve | CC. 3/8 ID x 2 | ZZ. 1/2 ID x 166 |
| G. 1/2 MPT x 1/2 Barb 90° Ell | DD. 3/8 ID x 15 1/2 | AAA 1/2 ID x 181 1/1 |
| H. 90° 1/2 Barb Ell | EE. 3/8 ID x 15 1/2 | OPTIONAL ICE MAKER ADD |
| J. 90° 3/8 Barb Ell | FF. 3/8 ID x 3 | EEE. 3/8 Tee |
| K. 1/2 x 1/2 x 3/8 Tee | GG. 1/2 ID x 4 | CCC. 3/8 ID x 24 |
| L. 1/2 x 3/8 x 3/8 Tee | HH. 1/2 ID x 11 | FOR OPT FRONT ICE MAKER |
| M. 1n e | I. 1/2 ID x 14 | ADD 2 (f) , 5 (J) , 4 (EE) , |
| N. 3/8 MPT x 1/2 Barb Couo. | KK. 1/2 IO x 18 | 2 (FF) Also Add |
| P. 1/2 MPT x 3/8 Barb 90° Ell | LL. 1/2 ID x 3 | DDD. 1/2 x 3/8 x 1/2 Tee |
| R. 1/2 MPT x 1/2 Barb Coup | MM. 1/2 ID x 40 1/2 | EEE. 3/8 Tee |
| s. swivel Toilet Conn | NN. 1/2 ID x 41 | FFF. 3/8 ID x 45 |
| T. 5/8 OD hose x 15 | PP. 1/2 ID x 38 | GGG. 3/8 ID x 7 |
| U. Spring (inside) x 16 | RR. 1/2 ID x 123 | HHH. 3/8 ID x 24 |
| V. 5/8 OD hose x 5 | SS. 1/2 ID x 5 3/4 | JJJ. 3/8 ID x 155 |
| W. Spring (inside) x 6 | TT. 1/2 ID x 8 3/4 | KKK. 3/8 ID x 86 |
| | | LLL. 3/8 ID x 60 |
| | | DELETE 1 (H) |
| | | MMM. 90° Swivel AninA |
- D-8c**

345 TWIN WATER DISTRIBUTION



- A. Demand Pump
- B. Water Filter
- C. Pressure Regulator
- D. Check Valve
- E. Shower Valve
- F. 3/8 Shut off Valve
- G. 1/2 MPT x 1/2 barb 90° Ell
- H. 90° 1/2 Barb Ell
- J. 90° 3/8 Barb Ell
- K. 1/2 x 1/2 x 3/8 Tee
- L. 1/2 x 3/8 x 3/8 Tee
- M. 1/2 Tee
- N. 3/8 MPT x 1/2 Barb 90° Ell
- P. 1/2 MPT x 3/8 Barb 90° Ell
- R. 1/2 MPT x 1/2 barb coupler
- S. Swivel Toilet Conn
- T. 5/8 OD hose x 15 1/2
- U. Spring (inside) x 16 1/2
- V. 5/8 OD hose x 5
- W. Spring (inside) x 6
- X. 5/8 OD hose x 60
- Y. Spring (inside) x 61
- Z. 3/9 ID x 117

- AA. 3/8 ID x 40
- BB. 3/8 ID x 21
- CC. 3/8 ID x 2
- DD. 3/8 ID x 15 1/2
- EE. 3/8 ID x 1 1/2
- FF. 3/8 ID x 3
- GG. 1/2 ID x 4
- HH. 1/2 ID x 11
- JJ. 1/2 ID x 14
- KK. 1/2 ID x 18
- LL. 1/2 ID x 3
- MM. 1/2 ID x 40 1/2
- NN. 1/2 ID x 41
- PP. 1/2 ID x 38
- RR. 1/2 ID x 193
- SS. 1/2 ID x 115
- TT. 1/2 ID x 42
- UU. 1/2 ID x 109
- VV. 1/2 ID x 120
- WW. 1/2 ID x 5 3/4
- XX. 1/2 ID x 8 3/4
- YY. 1/2 ID x 3 3/4
- ZZ. 1/2 ID x 50

- AAA. 1/2 ID x 16 3/4 .
- BBB. 1/2 ID x 12
- CCC. 1/2 x 3/8 x 1/2 Tee
- DDD. 90° Swivel Adapter
- OPTIONAL ICE MAKER STD
- LOCATION ADD
- EEE. 3/8 Tee
- FFF 3/8 ID x 24

CITY WATER INLET

CITY WATER INLET CHECK VALVE REMOVAL AND REPLACEMENT

1. Unhook water supply.
2. Shut off pump switch.
3. Open faucet.
4. Open drain valve.
5. Use 2 wrenches. Hold 90 degree elbow with one and loosen flare nut with the other.
6. Remove screw from support clamp and remove clamp.
7. Thread check valve and 90 degree fitting from adapter.
8. Separate check valve from 90 degree fitting.
9. Reverse above to reinstall.
10. Use Teflon thread tape on fitting and valve threads.

CITY WATER PRESSURE REGULATOR REMOVAL AND REPLACEMENT

Start with above instructions for check valve removal, then proceed as follows:-

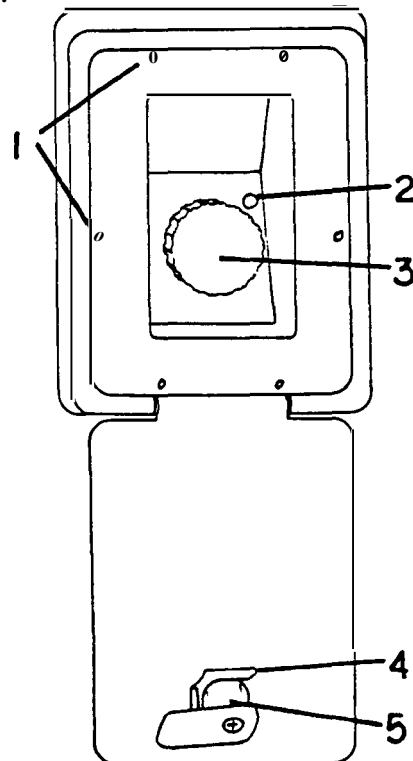
1. Use back-up wrench on water feed line fitting and second wrench on regulator outlet casting. Thread valve out of fitting.

Reverse above to install. Use Teflon tape on threads.

NOTE: Pressure regulator set at 32 to 38 PSI at 75 PSI line pressure.

WATER FILL REMOVAL

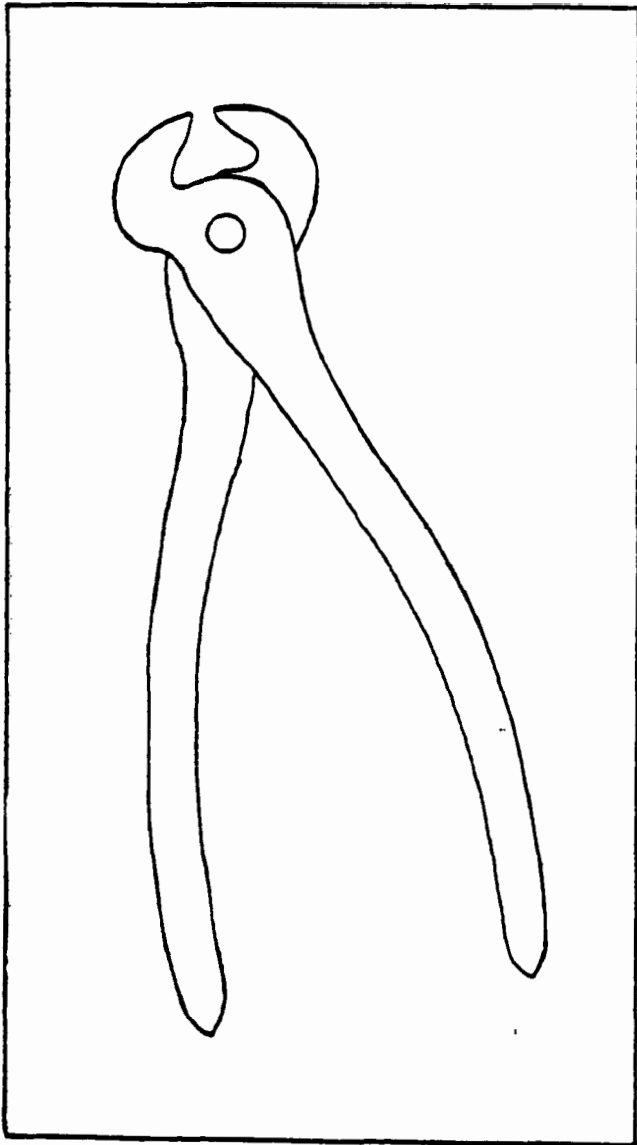
1. (a) On 270..and 300 series raise front lounge, prop and remove pedestal table storage pad if so equipped.
2. (b) On 310 series remove the rear bed top on double and twin bed models, or prop up seat on roadside if unit has flip lounge.
2. Remove hose clamps from fill hose and vent line attached to water fill pocket.
3. On outside of unit open water fill door and remove the six screws attaching water fill pocket to shell.
4. Drive putty knife type tool between pocket and shell. Cut sealer being careful not to mar body.



1. Mounting Screws
2. VP-nt Hole
3. Cap, **Water** Fill
4. Timmerman Clif
5. Lock Assy.

PLASTIC LIUE REMOVAL AND REPLACEMENT

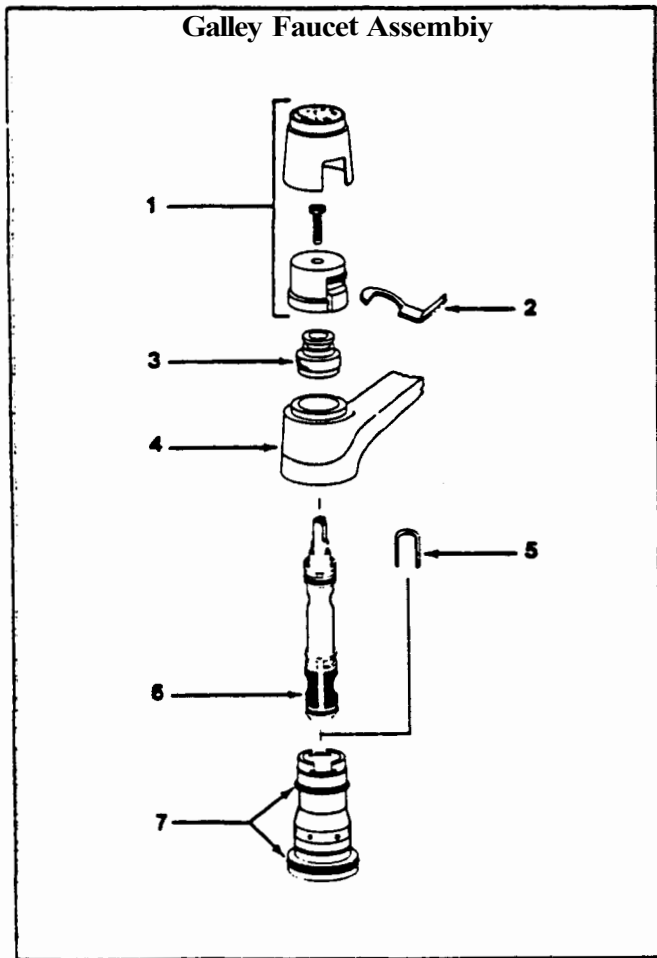
1. Cul metal band with end cutting nippers (see illus.) If nippers are held **at a** slight angle to ridge on band, neither the line or fitting will be damaged.
2. Use proper size $3/8$ " or $1/2$ " hose clamps when replacing line. These small clamps are **available** from the Factory Parts departments.



WATER TANK REMOVAL

1. Drain water
2. Remove bed.
3. Disconnect inlet and outlet hose.
4. **Mark and** remove probe wires.
5. Reverse procedures to re-install.

MOEN GALLEY FAUCET



COMPLETE ASSEMBLY, MOEN
CHATEAU 7631

1. Handle assembly kit
Handle cap
Handle screw
Handle body
2. Handle lever
3. Retainer pivot nut
4. Spout assembly
5. Retainer clip
6. Cartridge
7. Spout seal kit

MOEN GALLEY FAUCET DISASSEMBLY AND ASSEMBLY

To Disassemble: (Need Pliers
and Screwdriver.)

1. Turn "OFF" both hot and cold water supplies and remove handle screw.
2. Pull handle down. Place screwdriver in screw hole and press down on cartridge stem. Lift and tilt handle housing off.
3. Remove pivot nut with pliers.
4. Lift and twist spout off.
5. Pry out retainer clip with screwdriver.
6. **Grasp** cartridge stem with **pliers**. Lift cartridge out.
7. To flush supply lines, turn on both hot and cold water supplies slowly.

To Assemble:

1. With cartridge stem UP, insert cartridge and push DOWN by its **ears**.
2. Turn cartridge ears to front and **back**.
3. Turn red {notched} flat of cartridge stem toward sink {NOTE: for cross piping installations where supply piping is reversed, red (notched) flat faces BACK of sink.
4. Replace clip all the way.

- S. Replace spout. Push down until it nearly touches the faucet escutcheon.
6. Screw on pivot nut. Do not cross thread. Tighten with pliers.
7. **Press** cartridge stem down. Kolding **handle** OP, hook ring in **handle** housing into groove on **sleeve**.
- a. Swing handle back and forth until it drops down into place.
9. Replace handle screw. Tighten securely.

c. For proper water flow, aerator must be free of foreign particles. If flow is weak or irregular, unscrew aerator, clean and replace.

To Flush the Installation:

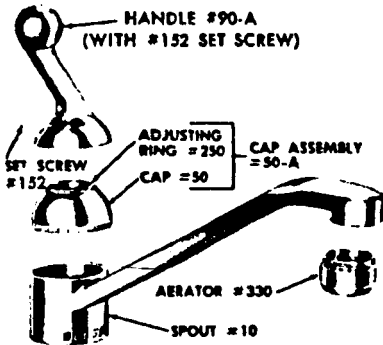
1. Faucet body and supplies should be flushed under pressure to remove pipe chips or other foreign material that might clog faucet when in service. To do this, make sure the water supplies are "OFF". Follow the detailed instructions below and disassemble the faucet. Turn on both hot and cold water supplies slowly, and thoroughly flush the installation. Reassemble faucet as shown in the instructions below.

NOTE:

a. If the handle won't operate properly, you have not hooked handle ring into sleeve groove. (See Step 7)

b. If hot and cold reversed, red (notched) flat not toward sink. Remove handle assembly. Turn red (notched) edge of stem so it faces sink. (See Step C.)

DELTA GALLEY FAUCET



CAM ASSIMILY # I.I.,

IAL

IIISIA t

ASSIMILY # IJC A



...-U>121

"O" RING SIALS #15

' - - DIVILFFL ASSIMILY #U A

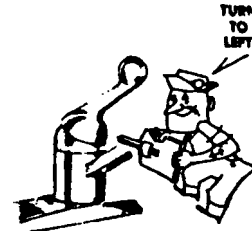
INTERNAL MAINTENANCE SOLUTIONS

DELTA SINGLE HANDLE FAUCETS

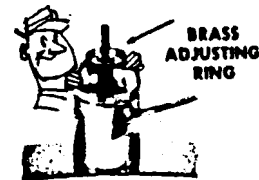
1. If you have a leak under handle, tighten adjusting ring. If leak persists, replace cam assembly.
2. If you have a constant dripping from spout, replace seats and springs. If leak persists, replace ball.
3. If you have a leak around spout collar, replace O-Rings.
4. If kitchen spray does not work properly, remove diverter assembly, wash and replace. If symptom persists, install new diverter.

5. If shower diverter sticks or does not divert water from tub filler to showerhead, remove and clean. If symptom persists, install new diverter.

INSTRUCTIONS



STEP 1: Loosen set screw and pull off handle.



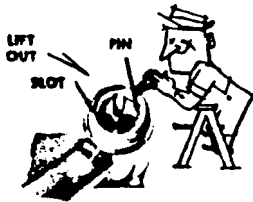
STEP 2: To disassemble unscrew and remove cap assembly. Note: Tighten threaded ring in top of cap until handle is hard to move and then loosen only enough to allow easy operation.



STEP 3: Pull up on ball stem to remove cam and ball assembly.

MOEN BATH FAUCETS

MOEN LAVATORY FAUCET



STEP 4: NOTE: If leak is from spout outlet replace rubber seats and springs by lifting seat and springs out of pockets in body. Check ball and replace if sharp edge or roughness is found around either of two small holes. Make adjustment shown in Step 2 above. Make sure that SLOT in side of ball is INSERTED OVER PIN inside body and LUG on side of cam is INSERTED INTO SLOT on side of body.



STEP 5: To check "O" rings and diverter pull up on spout and remove.

= IDY U MI



STEP 6: Pull out diverter unit to clean. NOTE: If leak is from top or bottom of spout body, replace body "O" rings.

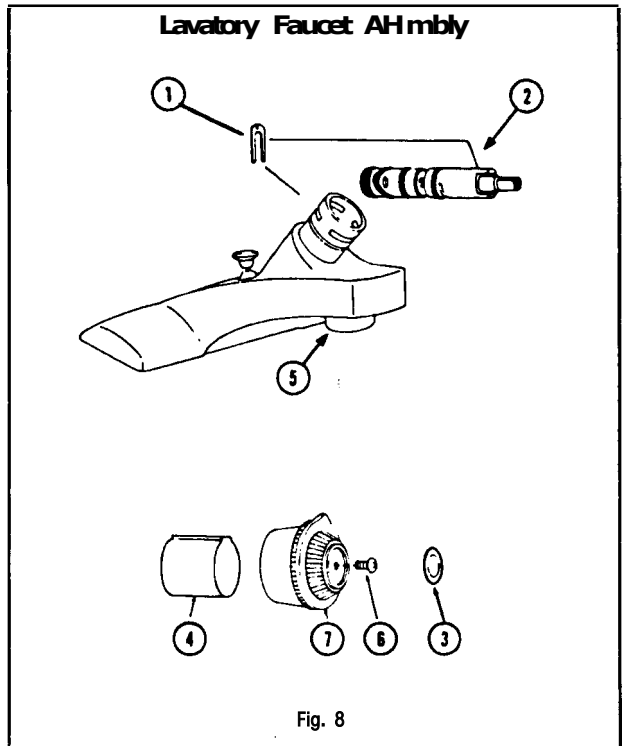


Fig. 8

1. Retainer clip (knob handles)
2. Valve cartridge
3. Handle cover (knob handles) 7/16
Handle cover (knob handles) 3/8
4. Stop tube (knob handles)
5. Aerator - male thread
6. Handle screw (knob handles)
7. Handle assembly (knob handles)

LAVATORY FAUCET REMOVAL AND REPLACEMENT

1. Disconnect city water supply.
2. Shut off pump switch.
3. Open faucets.
4. Open drain valves (see Water Distribution Section for location).
5. Using tubing wrench, loosen flare fitting and disconnect plastic cold water line from copper line at faucet.
6. Repeat Step 5 removing hot water line going to faucet.
7. Form lines from faucet so they are paralleled with one another.
8. Remove nuts and washers securing faucet in place.
9. Remove faucet by lifting it from its position.
10. To replace, reverse above procedure.
11. Check for leaks.

GALLEY FAUCET, LAVATORY FAUCET & SHOWER MIXING VALVE CARTRIDGE REMOVAL

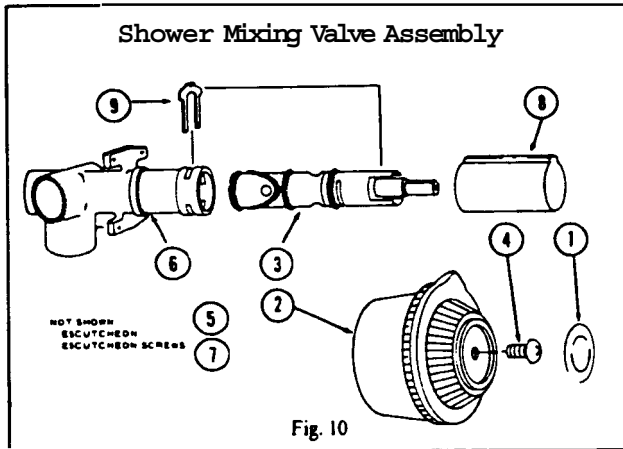
Shut off water pressure for entire system.

DISASSEMBLE: Remove handle cover. Take out handle screw and remove handle and stop tube. Lift out retaining clip and pull the cartridge out of the body by the stem.

CAUTION: Reinsert cartridge by pushing it all the way into the body and until the front of the ears on the cartridge shell are flush and aligned with the body. Replace the retainer clip so that the legs straddle the cartridge ears and slide down into the bottom slot in the body. This prevents the cartridge from rotating and locks it in the body. Reinstall stop tube and handle. Tighten handle screw securely, and replace the handle cover. The red flat on the stem must point UP when mounting the knob handle (down for lever handle).

If cold water is on left side and hot water is on right side (red flat pointed down) remove cartridge and reinstall 180 degree.

SHOWER MIXING VALVE ASSEMBLY



1. Handle cover
2. Handle
3. Cartridge
4. Handle screw
5. Escutcheon
6. Valve body
7. Escutcheon screw
- a. Stop tube
9. Retainer clip

SHOWER MIXING VALVE REMOVAL AND REPLACEMENT (SIDE BATH)

1. Cover carpet and cover bottom of shower pan to protect them from damage.
2. Disconnect city water. Shut off water pump.
3. Open drain valves (See Water Distribution Section for location.)
4. Open galley, lavatory and shower faucets and allow water to drain from lines.
5. Open door under lavatory cabinet and remove hose clamps holding the lines attached to the shower faucet.
6. Remove mounting nuts securing faucet in place.

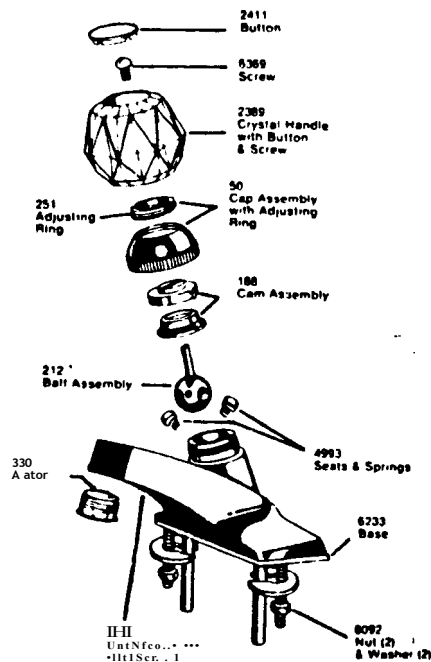
7. Disconnect shower hose.
- B. Remove shower faucet.
9. Reverse above for reinstallation. (NOTE: If existing hose clamps were destroyed in removal, they should be replaced with screw type clamps.)

SHOWER MIXING VALVE AND TELEPHONE SHOWER REMOVAL AND REPLACEMENT (REAR BATH)

1. Disconnect city water supply.
2. Shut off pump switch.
3. Open rear compartment door.
4. Open 2 drain valves inside rear compartment lower left corner.
5. Cover carpet completely and cover bottom of bathtub to protect from damage.
6. Open all faucets.
7. Remove bottom shelf of medicine chest and remove hose clamps holding the lines attached to the shower faucet.
 - a. Pop out metal insert in control valve handle. Remove screw and pull knob off.
9. Remove 4 screws in escutcheon plate.
10. Disconnect shower hose.
11. Using wrench, hole adaptor fitting behind chrome 90 degree fitting.

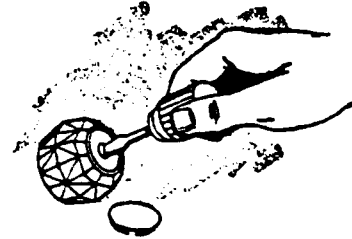
12. Wrap masking tape on chrome fitting so as not to scratch chrome.
13. Remove fitting.
14. Mixing valve, shower outlet, tube and hot and cold feed line assemblies may then be removed from behind skirt by pulling upward and outward through medicine chest. It may be necessary to straighten copper lines slightly in order to remove. Use caution not to kink.
15. Reverse above for reinstallation. (NOTE: If existing hose clamps were destroyed in removal, they should be replaced with screw type clamps).

DELTA BATH FAUCET

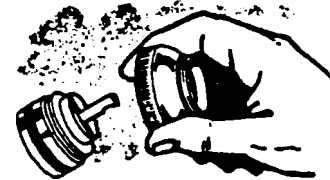


INTERNAL MAINTENANCE

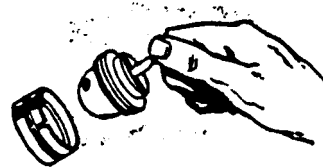
SHUT OFF WATER SUPPLY



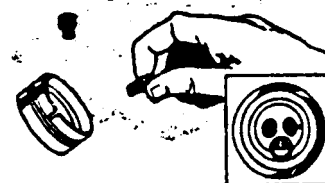
STEP 1: Pry off handle button, remove screw and lift off handle.



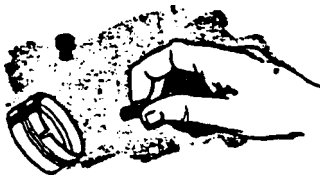
STEP 2: Unscrew cap assembly and lift off.



STEP 3: Remove cam assembly and ball by lifting up on ball stem.



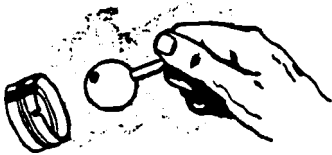
STEP 4: Remove seats and springs.



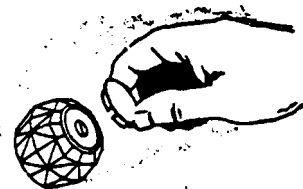
STEP 5: Place new seats over new springs and insert into sockets in body.



STEP 9: Tighten ring until no water will leak around stem when faucet is on and pressure is exerted on handle to force ball into socket.



STEP 6: Place ball into body over seats.



STEP 10: Replace handle. Tighten handle screw - tight. Replace handle button with "ON" arrow pointing up.



STEP 7: Place cam assembly over stem of ball and engage tab with slot in body. Push down.

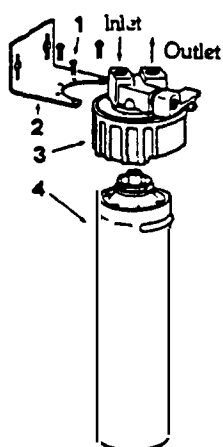
A. If you should have a leak under handle - tighten adjusting ring following steps 1 and 9. Reassemble as in step 10.

B. If you should have a leak from spout - shut off water supply and follow steps 6, 7, and a. Set adjusting ring as in 9. Replace handle as in 10.



STEP 8: Partially unscrew adjusting ring and then place cap assembly over ball stem and screw down tight onto body.

Water Fitter Assembly



COMPLETE ASSEMBLY QC2-AC

1. Screw No. 10-32 (3)
2. Bracket
3. **Head QC2**
4. Cartridge

WATER FILTER CARTRIDGE REMOVAL AND REPLACEMENT

To remove used cartridge:

1. Shut off pump switch.
2. Place shallow pan under filter to catch surplus **water**.
3. Shut off water by lifting valve handle. Move counter-clockwise as far as possible.
4. Turn colored ring all the way to the left. Ring will drop about 1/2".
5. Lift cartridge slightly and turn it further to the **left** until it **can be disengaged**.

6. **Lower cartridge** to disengage it from ring. **Discard used cartridge**.

To install new cartridge:

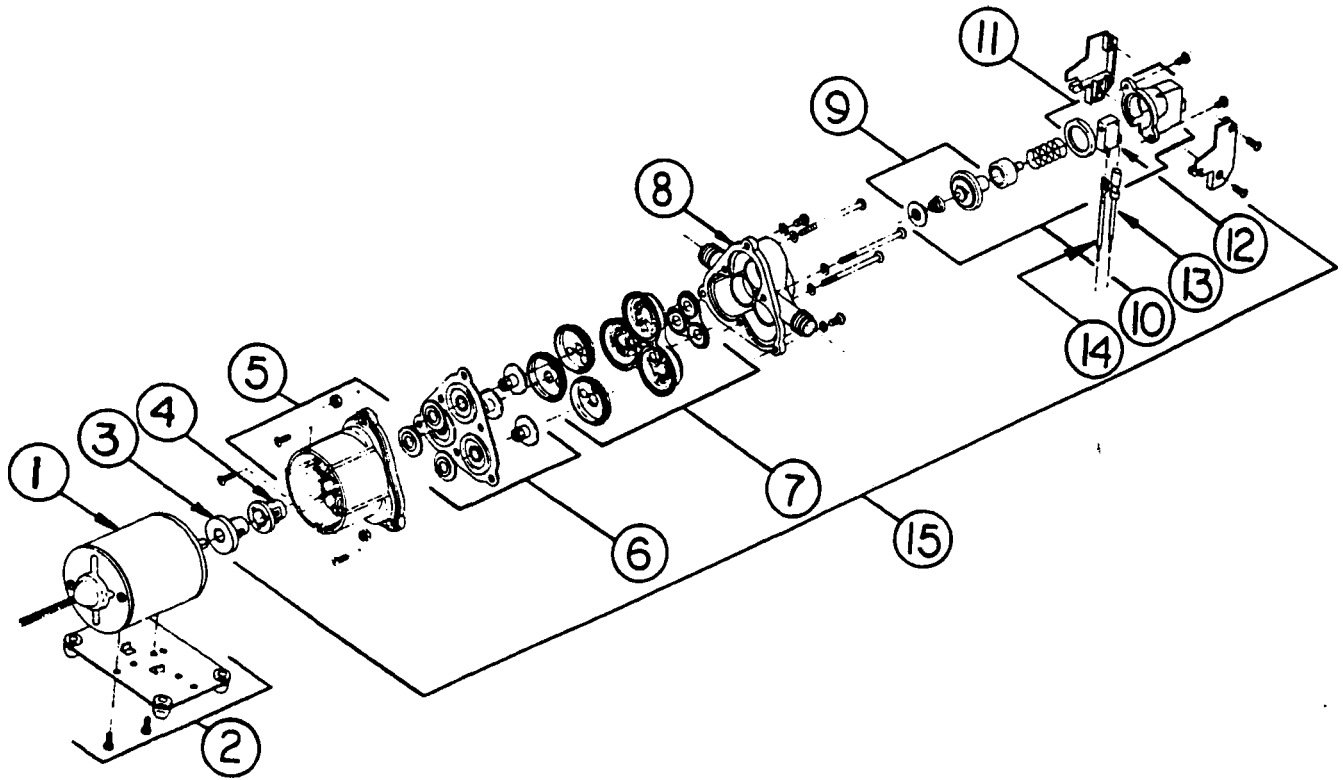
1. With colored ring in lowered position (turned all the way to the left) orient lug on cartridge with cutout under label on ring.
2. Insert cartridge straight up into ring **as far as** it will go. Holding colored ring **steady**, turn cartridge **as far** to the right as possible.
3. Then turn colored ring far to right to drive cartridge up into head.
4. To lock ring in place and turn water on, move **valve handle** down. Be sure handle **engages** ring locking-lug.
5. Turn pump switch on.

NOTE: Cartridge should be changed when flow of water of cold side of galley faucet becomes too slow for your convenience, or at least once a year.

WATER FILTER REMOVAL AND REPLACEMENT

Before starting any of these procedures, be sure to cover surrounding floor **areas** with a protective plastic sheet. **Have** pan and towel **available** to catch surplus water.

SHURFLO WATER PUMP - MODEL 205 - 213



1. Motor
2. Base Plate
3. Drive Coupling
4. Flexible Drive Bushing
5. Lower Housing Assembly
6. Diaphragm Assembly
7. Valves
8. Upper Housing
9. Switching Diaphragm
10. Switching Diaphragm and Cap Assy.
11. Switch Cap
12. Switch
13. Pigtail, Insulated
14. Pigtail, Plain
15. Pump head assembly

SWITCH & CHECK VALVE REPAIR

The check valve, hydraulic switch mechanism and microswitch are accessible by removing the switch cover.

CAUTION: Care should be taken in removing the switch cover screws. Within the mechanism is a spring under compression.

REPLACEMENT OF MICRO SWITCH

Occasionally the micro switch fails or an electrode is broken off. Proceed as follows: Remove the two screws holding the cap to the main body. Remember a spring under compression is retained by this cap. With both screws out, **allow** the spring to extend fully. Then carefully lift off cap and spring. If only the micro switch is at fault, avoid disturbing the hydraulic elements remaining in the head. If examination of the hydraulic parts is required, remove them carefully by pulling. Be sure to note the order of removal.

To replace the micro switch, remove the spring and pull out the black retaining ring. This will allow the micro switch to fall free. Replace parts in the reverse sequence: micro switch, black retainer and the spring.

Reassemble cover to the main body. Switch cap may be pointed up or down as desired, providing wire has not been shortened.

Having replaced the micro switch, be careful to rewire correctly.

NOTE: If the positive wire from the battery is connected to the nsⁿ terminal the switch is bypassed and the pump cannot shut off.

Pressure will build up until the motor stalls. If the proper fuse has been used, it will blow. If a larger fuse than recommended has been used, the motor will stall and may burn out.

CHECK VALVE PROBLEMS

Due to contamination from debris or lime build-up the check valve may fail to properly seat. To correct, clean out the **area** and replace the check valve element. If checking the check **valve** with **air**, be certain to moisten the check valve to get an accurate check. The rubber **seals** more effectively when wet.

PUMP OPERATION

PRE-OPERATION CHECK-COT

With installation complete, run a quick check on the following points:

- Clamps tight?
- Kinks in hose?
- Fuse good?
- Battery fully charged?
- If using power converter, is it at least 10 amp capacity?
- Water tank full?
- Air bled from all lines and water heater tank?

To check for leaks we recommend a positive pressure check with a pressure gauge. The smallest leak will cause a drop in the pressure.

PROPERLY INSTALLED, THE SHURFLO PUMP WILL:

Prime. Pump will automatically prime **itself**.

Air-lock. Pump will not air-lock as the compression **stroke is** powerful enough to **pressurize** the entrapped air and force the check valve open.

Run Dry. Pump will run dry for extended periods without **damage**.

Battery Drain. At free flow the pump draws a mere 7 to 7-1/2 **amps**.

Check Valve. Built-in **check valve prevents back-flow and can** protect the pump from **the dangers** of high city **water pressure** (up to **200 psi**).

Fully Automatic. The Shurflo pump will automatically com• on **when the faucet or valve is** opened. It deliver■ a smooth steady flow of **water** and shuts off automatically when the faucet is closed.

TROUBLE SHOOTING

MOTOR DOES NOT OPERATE

- Is battery discharged?
- Are any **wires** disconnected?
- Are terminals corroded?
- Is switch n "ON" position?
- **Is fuse** good?
- Is water frozen in pump head?

MOTOR RUNS BUT NO WATER FLOWS

- Is water tank empty?
- Are there kinks in the inlet hose?
- Is air leaking into inlet hose fittings?
- **Is inlet line** or in-line **filter** plugged?
- If using a **filter**, check the **line just before the filter**.
- Is outlet **hose kinked**?

MOTOR RUNS BUT WATER "SPUTTERS"

Check to be certain that air has been bled off the lines and water heater. Also check for air leaks in the input side of the pump.

PUMP CYCLES ON AND OFF WHEN ALL OUTLETS ARE CLOSED

The pump will normally cycle (go on and off) when a faucet is partially opened. If, however, it cycles when all valves are closed, check for a leak in the lines. It may be a leaky toilet valve or a dripping faucet. Do not forget to check the outside city water entry valve. It may be leaking.

If no leak can be detected, shut pump off. Remove the output hose where it joins the system (not at the pump). Insert a plug in the hose and clamp it. (You can **make a** perfect plug from a barb fitting. 1/2" size with a cap tightly screwed on the threads.) Turn the pump switch on. The pump should come on, run a few seconds, and then shut off. If it remains off, the problem is NOT the pump. The

problem is in the system. If, however, the pump goes on and off there may be a problem in the pump.

There may be an internal leak in the pump which allows water to escape from the high pressure area back into the low pressure area. Look for a pump valve held open or a crack in the plastic parts.

PUMP DOES NOT ACHIEVE SHUT OFF

The wall switch may be used for temporary control of the pump. A low battery charge may be the cause. or the pump switch mechanism may be stuck. Try tapping the switch cap on the end of the pump with the handle of a screwdriver. If the pump appears in all other respects to run normally, but fails to shut off, you may have to replace the switch mechanism.

PUMP HEAD LEAKS

If the pump head leaks, first try to tighten the screws in the pump head assembly until they are snug. CAUTION: Do not overtighten. The leak may be from a crack in the pump head assembly. If so, then replace.

One cause of the pump head cracking may be water freezing inside the pump head. If the leaking water is escaping back near the motor, check for a leaking or broken piston.

WINTERIZING

Satisfactory winterizing requires draining the water from the entire water system. Because of the

check valve mechanism built into the pump blowing the lines will not remove the water from the pump and tank. For the best results in removing all the water from your water system, follow the four steps below:

1. Drain the water tank through the drain on the tank. If the tank has no drain then open a faucet and allow the pump to pump the tank dry.
2. Now drain the lines by opening the lowest outlet or drain in the system.
3. Remove the outlet hose on the pump. Turn the pump on, allowing the pump to pump out any remaining water... about a cupful. A towel or rag can be used to catch this water. Should you wish to blow the lines out with air, apply the air nozzle to the system where the outlet hose has been removed. Be sure all valves are open.
4. Having removed the water from the system, attach the pump hose now... or later. The system is now winterized. NOTE: It is much **easier** to winterize using the potable antifreeze solutions available.

PUMP REPAIR -MODEL 205-213

Screws (A) hold the entire pump head assembly to the motor.

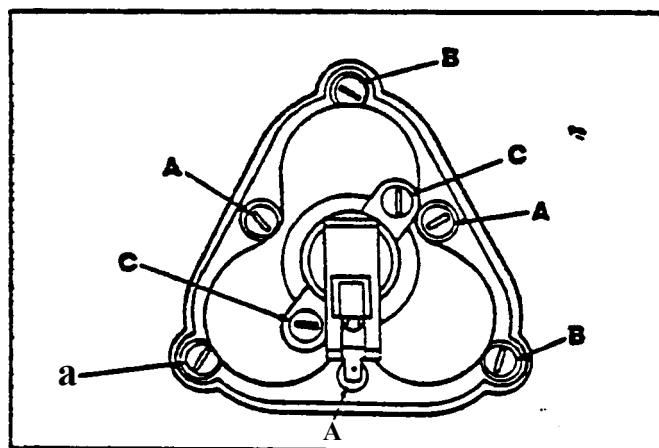
Screws (B) hold the pump head face to the pump head main body.

Screws (C) hold the switch assembly to the front of the pump head.

Screws (A) would be removed to correct a problem in the "drive train" between the motor and pump head.

Screws (A) & (B) would be removed to correct a problem in the pump head valves or pumping chambers.

Screws (C) would be removed to correct a problem in the automatic switch or check valve.



POMP HEAD REPAIR

Motor and drive train **area** - Rarely does a problem occur in this **area** of the pump head. If a part does fail it is quite **easily** replaced. Just be certain to follow closely the sequence of parts as shown in the figure. **Also be careful to align the flat surface in the drive adapter with the flat surface on the motor shaft.**

LUBRICATION

If the lubricant appears dried out, it should be wiped off the bearing assemblies. A small amount of automotive wheel bearing grease should be applied to both sides of each bearing;

FAILURE TO PRIME

Failure to prime can be caused by the presence of some foreign matter lodged in the valve preventing it from seating. To correct remove any such foreign bodies.

CAUTION: Do not remove the stainless steel screens. These filter screens should be cleaned without removing them from the plastic housing.

PUMP CHAMBER REPAIR

Replacement of broken piston.

To remove a piston, back out the screw holding the defective piston.

Now lift the corner of the diaphragm and remove the broken piston. Insert the new piston through the diaphragm and slide the retaining ring on. Rotate the piston until it drops into place in the drive plate.

Replace the screw and tighten until snug.

CAUTION: Do not attempt to re-use a piston once it has been removed. The plastic stem, if used a second time, may not hold securely. The second thread path removes additional material and there is then no real bite.

REPLACE A DIAPHRAGM

To replace the diaphragm follow the procedure used in removing the pistons. After removing the three pistons the diaphragm is loose and easily removed.

Screws (A) hold the piston.

Screws (B) hold the drive mechanism and should not be removed when replacing piston.

WATER PUMP FILTER REMOVAL AND REPLACEMENT

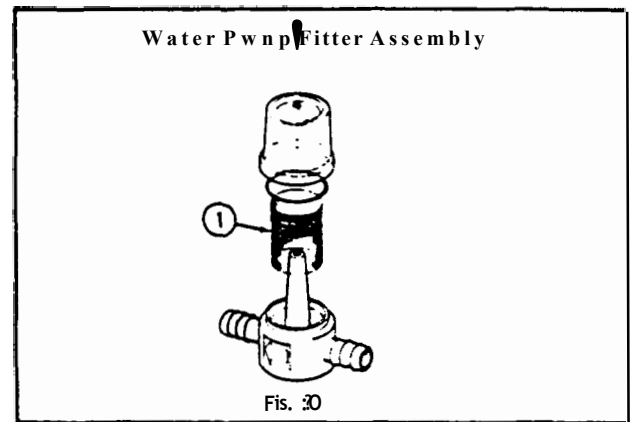
1. With screwdriver, loosen clamps on both hoses at filter.
2. Remove hoses.
3. Remove screws attaching filter to platform.
4. Remove filter.

5. Replace by reversing above procedure. Note that arrow on side of filter points in direction of flow (toward pump).

DISASSEMBLE PUMP FILTER

1. Remove screw through top.
2. Pull top from base. Do not damage "O" ring seal.
3. Remove screen to clean or replace.
4. Lift "O" ring from its cavity, lubricate with silicone grease.

5. Assemble by reversing above procedure.



1. Filter Screen

WINTERIZING PROCEDURE

1. Level the motorhome from side to side and front to rear. Open all faucets.

2. Turn the water pump switch to the ON position to expel water from the storage tank.

3. Open all drain valves.

4. While the water is draining from the system, open and flush the toilet flushing valve. Depress hand spray lever while holding the spray head down inside the bowl. Depress hand spray lever while holding the spray head down inside the bowl. Depress hand spray thumb button and hold the spray head down inside the tub and drain all water from telephone booth. Uncrew the heads on both spray unit and store.

5. After pump has removed all water from the storage tank, turn the pump switch OFF.

6. Remove exhaust hose from water pump.

7. Disconnect the water pump inlet connection, and with check valve removed, turn the pump by hand until all the water is expelled.

a. After the water has stopped running from the drain lines, apply air pressure at the city water inlet, be sure all drain valves and faucets are open. This will force any remaining water from the water heater and remove any water which may be trapped in low areas.

9. Pour a cup of antifreeze (Glycol) into the lavatory, sink, and tub drains to prevent freezing of water in traps.

10. Be sure to open the water-holding tank drain valves and drain and flush the tanks thoroughly. (This is very important as the sewage in the tanks, if frozen, could seriously damage the tanks.)

11. Remove the lower portion of the **water** purifier, if your motorhome is so equipped, and drain the purifier.

12. It is very important for optimum life of your battery to check it periodically and to keep it fully charged. This is especially true in winter months when the temperature may drop below freezing. **Please** refer to the battery section for more information on battery maintenance.

13. Remove any items (food, cosmetics, etc.) from motorhome interior that might be damaged by freezing - or might damage the motorhome if containers break.

For additional winterizing protection add a nontoxic antifreeze (approved for drinking water systems) to the water lines using the following procedure:

1. Reconnect all lines except the hose to the pump inlet port. Close all drain valves (see step No. 3).

2. Attach a length of hose to the pump intake port. This piece of hose should be long enough for the free end to be inserted into and reach the bottom of the antifreeze container.

3. Dilute the antifreeze solution in accordance with the manufacturer's instructions.

4. Open all water faucets.

5. Insert hose length into the antifreeze container, turn the pump switch on, and run the water pump until the antifreeze solution fills all water lines and the water heater. Flush toilet, work hand spray while holding down in bowl. Work hand shower spray while holding down in tub.

6. Shut off the pump and close all faucets.

7. Disconnect the hose length from pump inlet fitting and reconnect water system inlet line.

NOTE: It is possible to bypass the water heater in order to cut down on the amount of antifreeze necessary. A kit for this purpose is available through Wally Byam Stores.

DRAINAGE SYSTEM

DRAINAGE SYSTEM CLEANING	E-1
DRAINAGE SYSTEM REPAIR	E-1
TOILET INSTALLATION	E-1
TOILET DISASSEMBLY	E-2
TOILET VACUUM BREAKER ASSEMBLY	E-3
OPERATING INSTRUCTIONS	E-3
MAINTENANCE	E-4
WINTERIZING	E-4
TROUBLE SHOOTING	E-4
TERMINATION VALVE REMOVAL/REPLACEMENT	E-5
TERMINATION VALVE REBUILDING	E-6
HOLDING TANK REMOVAL	E-7
DRAIN LINES	E-11

DRAIN SYSTEMS CLEANING

The following cleaning agents can be used without causing harm to the system.

1. Naptha
2. Household soaps
3. Soapless detergents
4. Trisodium phosphate
5. Household ammonia
6. 10\ hydrochloric acid (solution)
7. S\ sulfuric acid (solution)
8. Hypochlorite bleach (Chlorox)
9. 10\ sodium hydroxide (solution)

Never use any other type cleaners unless marked approved for ABS drainage systems.

When winterizing drains, use only trailer plumbing system type anti-freeze. (These are sold through the Wally Byam stores). Do not use abrasive cleaners.

DRAIN SYSTEM REPAIR

Fittings are cemented together with ABS corlon cement and therefore cannot be successfully separated. Section to be repaired must be cut out of the drain system using a hacksaw. Surfaces to be cemented must be clean and dry.- Use a small 1/2" paint brush to apply the cement. Fittings must be installed immediately as the cement dries rapidly and bonding action is in seconds. For this reason it is best to have all pieces pre-cut and a trial assembly made without the use of cement.

TOILET INSTALLATION

1. Water line connection: The water line connection is a union type fitting that is hand tight...In some cases it may be necessary to loosen fitting with channel lock type pliers.
2. Closet flange seal: Place closet flange seal over the mechanism ring found on the under side of the toilet.
3. Rear Bolt Nut; You assemble the rear closet bolt flange nut by reaching your right hand through the rear access hole (shown in Fig. 4). The header points on the closet bolts will help start the nut. Tighten the nut until the base of the toilet contacts the floor.

NOTE: If the space around the toilet does not permit the above method, access to the rear nut can be gained by removing the access plug {shown in Fig. 4}. Plug is removed by pressing down on the plug's edge closest to the bowl. You assemble the rear closet bolt flange nut by reaching through the access hole with a socket, a universal and a 12" extension. The flange nut may be held in the socket with a small dab of sealer.

4. Front Bolt: Depress the pedal and insert a round object such as a soft drink bottle into the outlet located at the bottom of the bowl.

Release the pedal slowly until the blade touches and holds the object. The object will hold a pedal down and provide access to the front flange bolt.

b) Assemble the front flange nut. Tighten nut until the **base** of the toilet contacts the floor. This stabilizes the toilet **installation** and provides an odor-tight **seal** to the closet **flange**.

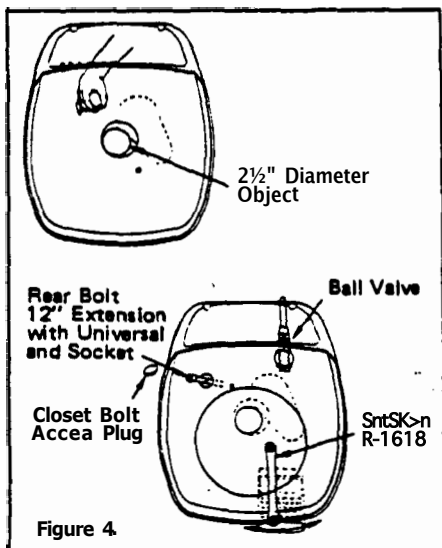
S. Remove by reversing **above** procedure.

a) Cover floor **area** to protect from water damage. .

b) Shut off water supply valve at rear of toilet.

c) Remove -water supply line from back of toilet.

d) Lift toilet seat ring and remove plastic plug to gain access to rear flange bolt.



TOILET DISASSEMBLY

1. Removal of seat and cover:

Raise seat and cover, this will expose hinge pins. Remove MC" rings with a pair of pliers.

Remove pins by pushing them **toward** the center of the toilet with a screwdriver.

2. Removal of vacuum breaker assembly:

Remove **seat** and cover. Turn toilet upside down. Remove **water** lines from vacuum breaker **base**. Pinch hose clamps with a pair of pliers and slide them up the water line. Pull water lines off. Remove 2 screws that hold vacuum breaker to toilet top.

3. Removal of valve mechanism assembly:

Turn toilet upside down. Remove the six screws that **a e** now visible. Lift up mechanism to gain access to water lines hose clamps. Pinch hose clamps with a pair of pliers and slide them up the water line. Pull water lines off of mechanism.

4. Service and replacement of bowl subassembly:

Bowl subassembly may **be serv•**iced by removing the above 3 sub•assemblies.

S. Plastic water inlet valve removal:

The **plastic water inlet valve** can be removed without **disas-**sembly of the toilet. It **is** necessary to remove the toilet from the floor to remove this **valve**.

Remove the toilet from the floor and set it upside down on a padded bench. Using a 1/2" wrench, **remove** the 1/2" nut and the lock washer. Next, remove the two Phillips head screws. The water inlet valve can now be removed. Pull the valve free and

pinch home clamps with the air of plier and slide it up the plastic tube. Then remove plastic tube from ball valve.

NOTE: When disconnecting the water line, be sure to brace the inlet valve with I wrench. Under no circumstances should the water connection be either tightened or loosened without a wrench bracing the inlet valve.

VACUUM BREAKER ASSEMBLY AND DIS-ASSEMBLY AND SISASSEMBLY

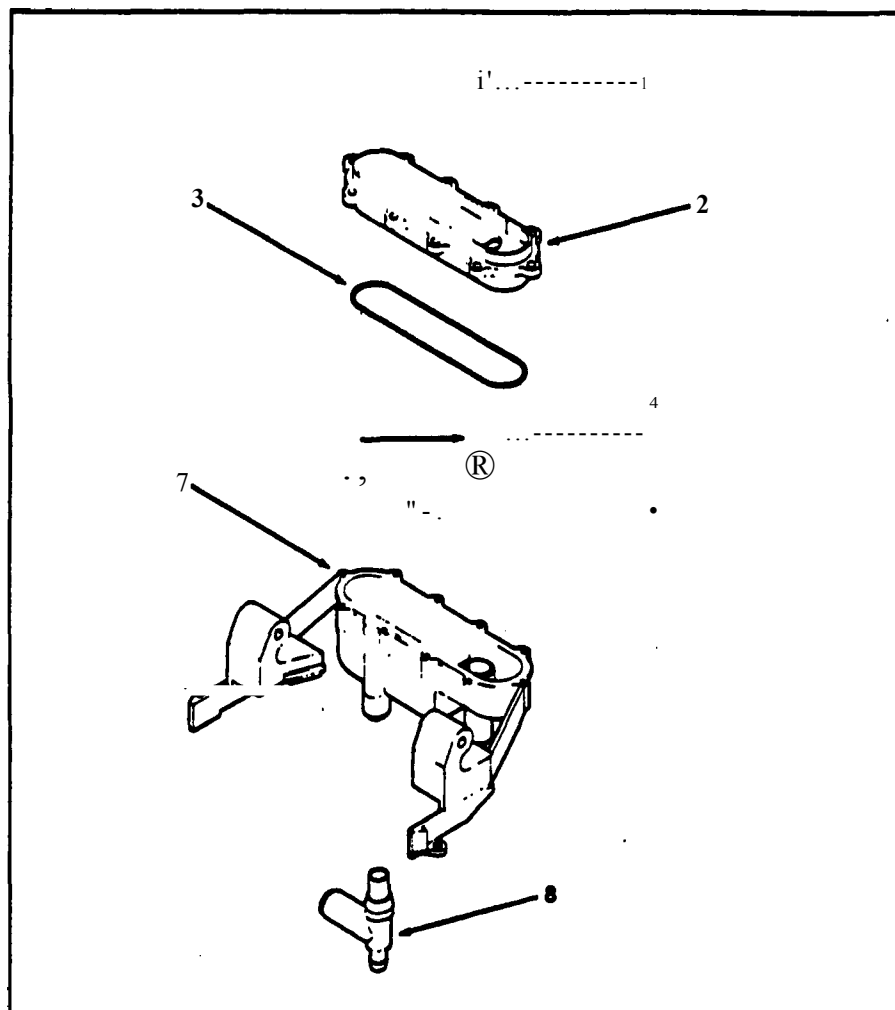
Remove vacuum breaker from toilet as described. Remove 10 screws holding the cover to the housing. This exposes the vacuum breaker float, float seal and cover seal. The float is free in its chamber and is easily lifted or dumped out.

NOTE, When reassembling the unit make sure the housing is free of dirt and the raised collar, that the float seal sits on, is clean and free of burrs.

When the cover is reinstalled, it is important that the screws be turned backward until they jump, so that when they are tightened, they are in the original thread.

OPERATING INSTRUCTIONS

1. Directions for automatic flush and refill. Depress the foot pedal until the Micro Rinse completely cleanses the bowl, then release.
2. Directions for water control pedal. If you wish to add water into the bowl without flushing,



depress the small, right hand pedal until desired water level is reached, then release.

MAINTENANCE

If the bowl sealing blade does not operate freely after extended use, it may be restored to its original, smooth operating condition by applying a light film of silicone spray to the blade. To clean the toilet use Thetford Aqua Bowl or any other high grade, non-abrasive cleaner. Do not use highly concentrated or high acid content household-C-"leaners. They may damage the rubber seals.

WINTERIZING

1. Draining methods

Completely drain the toilet water supply line. Leave any water supply line valves open. Depress right hand pedal and place a block of wood or other similar object between the pedals. This will hold the water control valve open and prevent any residual water from being trapped there when frozen.

2. Non-toxic anti-freeze method:

Use Recreational Anti-Freeze. Follow directions on the container.

TROUBLE SHOOTING

1. Symptoms Water keeps-running into the bowl.

Cause: The blade in the bottom of the bowl is not closing completely, which in turn keeps the water control valve partially open. The groove into which the blade seats when completely closed is clogged with foreign material.

Cure: Insert the end of a coat hanger or similar object into the sealing groove and remove the

foreign material. Avoid damaging the rubber **seal** while cleaning.

2. Symptom: Toilet leaks.

There is water on the floor.

Specify the symptom Determine if water is leaking from:

a) The vacuum breaker.

b) The water control valve.

c) Bowl to mechanism seal (if this is the problem, the water would not stay in the bowl).

d) Closet flange base seal

Cures

a) The vacuum breaker - if the vacuum **breaker leaks** when flushing the toilet, replace the vacuum **breaker**.

b) If the vacuum breaker **leaks** when the toilet is not in operation, replace the water control valve.

c) Leaks at the bowl to mechanism seal - remove mechanism, and replace mechanism seal.

d) **Leaks** at closet flange **area** - check front and rear closet flange nuts for tightness. If **leak** continues remove the toilet, check the closet flange height. The height should be between 1/4" and 7/16" above the floor. Adjust closet flange height accordingly and replace closet flange seal •.

3. Symptom: Foot pedal operates harder than normal or the blade sticks.

Cure:

a) Apply a light film of Silicone spray to blade.

b) Check closet bolt tightness. If closet bolts are over

tightened the mechanism may be distorted.

4. Symptom: Bowl will not hold water, i.e., water leaks from bowl down into holding tank.

Cure: Using a bent screwdriver or similar object, **scrape** the groove in front of the mechanism blade. Generally, paper or other foreign material is lodged in this groove causing the leak.

CAUTION:

Use care not to damage the blade seal always make certain that the tool is under the lip of the seal, **not above** it.

The tool can easily be made by bending a coat hanger or screwdriver over about 7/8 of an inch.

GATE VALVE REMOVAL/REPLACEMENT

1. **Make** sure both tanks are empty.
2. Drill rivets out attaching extension handle to shaft.
3. Remove eight screws attaching both valve to tank and remove complete assembly.

NOTE: Either or both gate valves can be rebuilt without removing from drain line assembly.

4. Using a back saw blade, saw **gate** valve off flush with end of drain line.

5. With a narrow, chisel like tool (an old screw driver works just fine) break the glue loose between the remainder of the gate valve and the drain line. This is done by driving the chisel in between the **gate valve and drain** line a short **distance** and continuing the **same** **action** around the **assembly** each time going a little deeper. The

glue will break loose and the gate valve piece "peeled" out of the drain line.

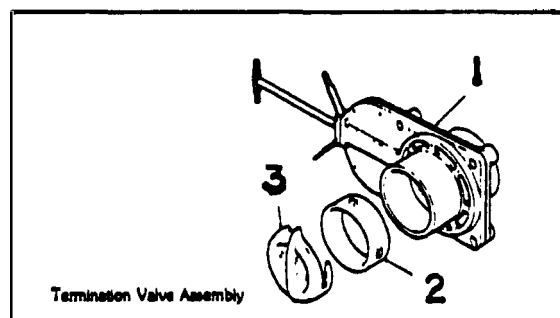
6. Attach new valve to tank.

7. Apply plastic glue to inner surface of drain line assembly and neck of new gate valve.

8. Quickly slide drain line in position making sure the mounting holes of the valve not replaced line up properly before glue sets up.

9. Install mounting screws and handle extensions.

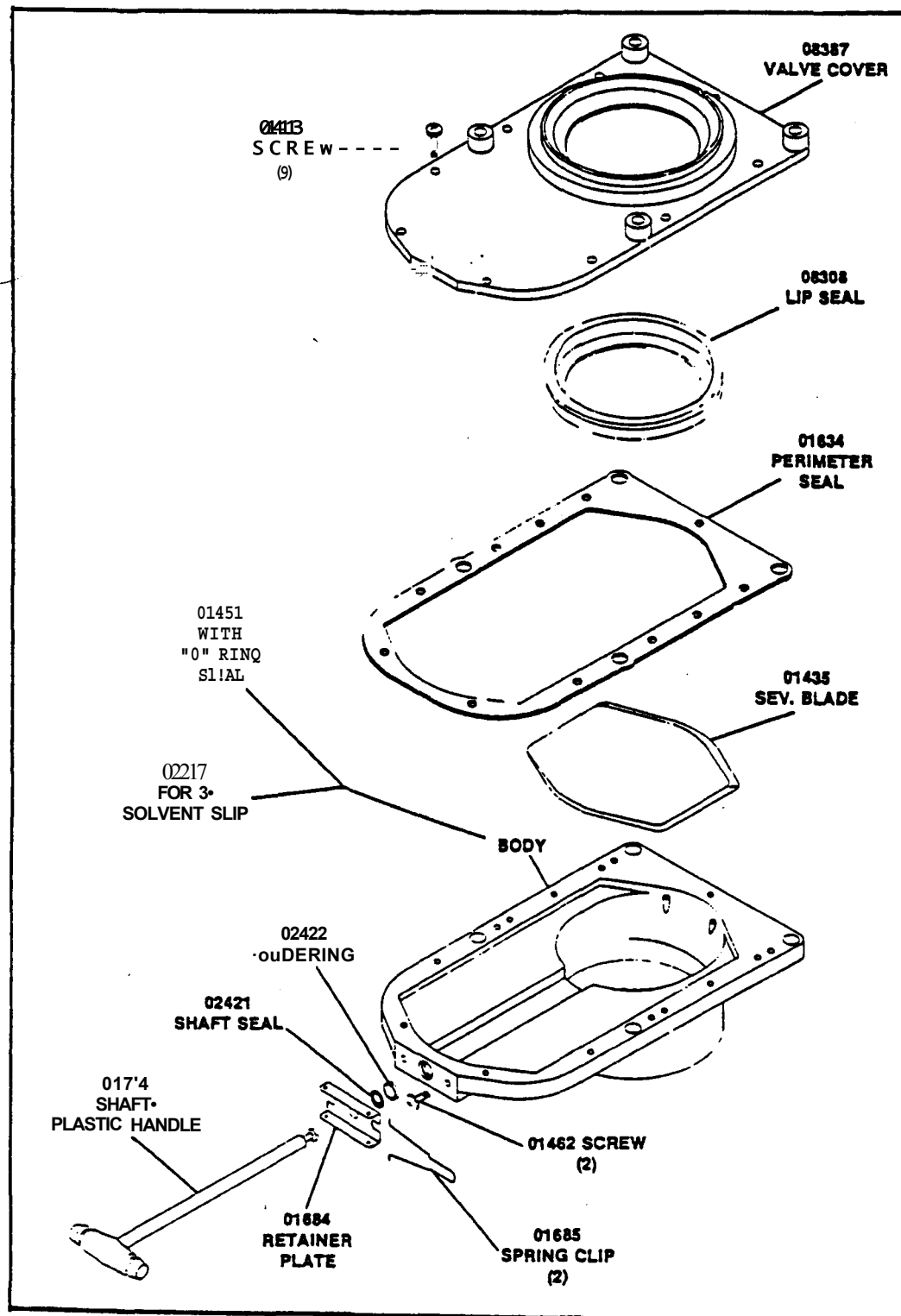
10. Fill tanks and check for leaks.



1. Main dump valve assembly.
2. Bayonet ring
3. Cap

GATE VALVE REBUILDING

The gate valve may be rebuilt using kits available through the Airstream Parts Department. Instructions are included with each kit.



GRAY TANK REMOVAL, CENTER BATH

1. Drain and flush both holding tank.s.
2. Remove bolts attaching both gate valves to tanks and remove as an assembly.
3. Loosen hose clamp on inboard drain line adapter.
4. Support tank with jack or stands and remove the three bolts from inboard support bracket.
5. Lower inboard side tank just enough to **allow** the hose clamp to be loosened on outboard **drain** line adapter.
6. Remove stand or jack and pull tank towards center of vehicle to free it from outboard support bracket.

BLACK **TANK** REMOVAL, CENTER BATH

1. Drain and flush both holding tanks.
2. Remove bolts attaching both gate valves to tanks and remove **as an** assembly.
3. From inside coach lift padded trim pieces out from round toilet.
4. Remove water line at union (finger tight) on back of toilet.
5. Remove front and rear bolts **attaching** toilet to **flange and** lift toilet out.

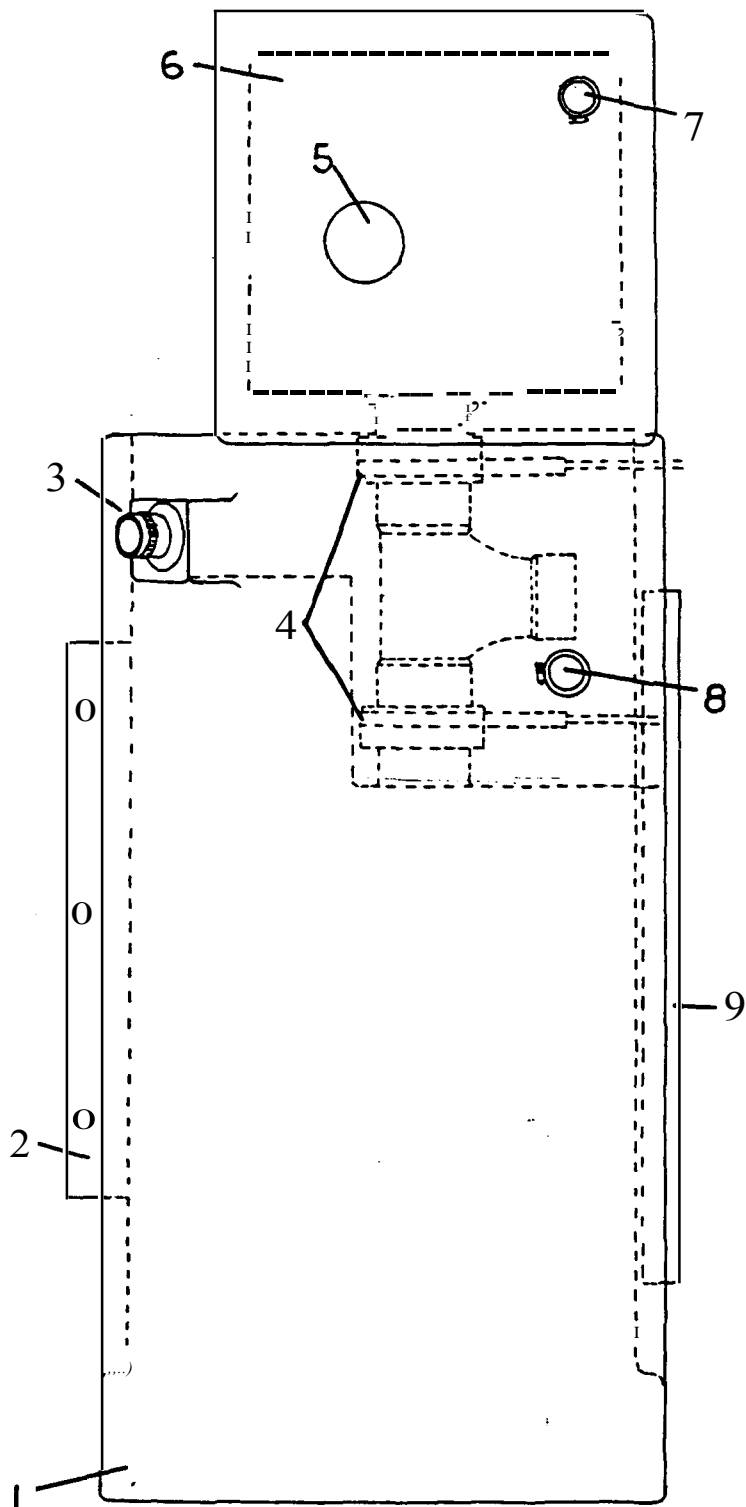
6. Remove screws around perimeter of flange and unscrew flange from tank.

7. Pull back carpet along floor next to vertical face of tank cover and remove screws attaching tank cover to floor.

8. Remove clamp from tank vent.
Note: Tank vent pipe may have to be cut and shortened.

9. Remove holding tank cover and lift tank up ,through floor.

CENTER BATH MODELS



1. Gray Water Tank
- 2 • Inboard Support Bracket
3. Inboard Drain Line Adaptor
4. Gate Valves
- 5 • Flange Mounting Hole
6. Black Water Tank
7. Tank Vent
8. Outboard drain line adaptor.
9. Outboard Tank Support Bracket

GRAY TANK REMOVAL, REAR BATH

1. Drain and flush tank.
2. Remove bolts attaching gate valve to tank and loosen clamps on caulder coupling. Remove 3" drain line as an assembly.
3. Loosen clamp on inboard drain line adaptor.
4. Support tank with jack or stands and remove the 3 bolts from inboard tank support.
5. Lower inboard side of tank just enough to allow the hose clamp to be loosened on the outboard drain line adaptor.
6. Remove stand or jack and pull tank towards center of vehicle to free it from outboard support bracket.
7. Pull back ca pet along floor next to vertical face of tank cover and remove screws attaching tank cover to floor.
8. Remove clamp from tank vent.
Note: Tank vent pipe may have to be cut and shortened.
9. Remove holding tank cover and lift tank up through floor.

BLACK TANK REMOVAL, REAR BATH

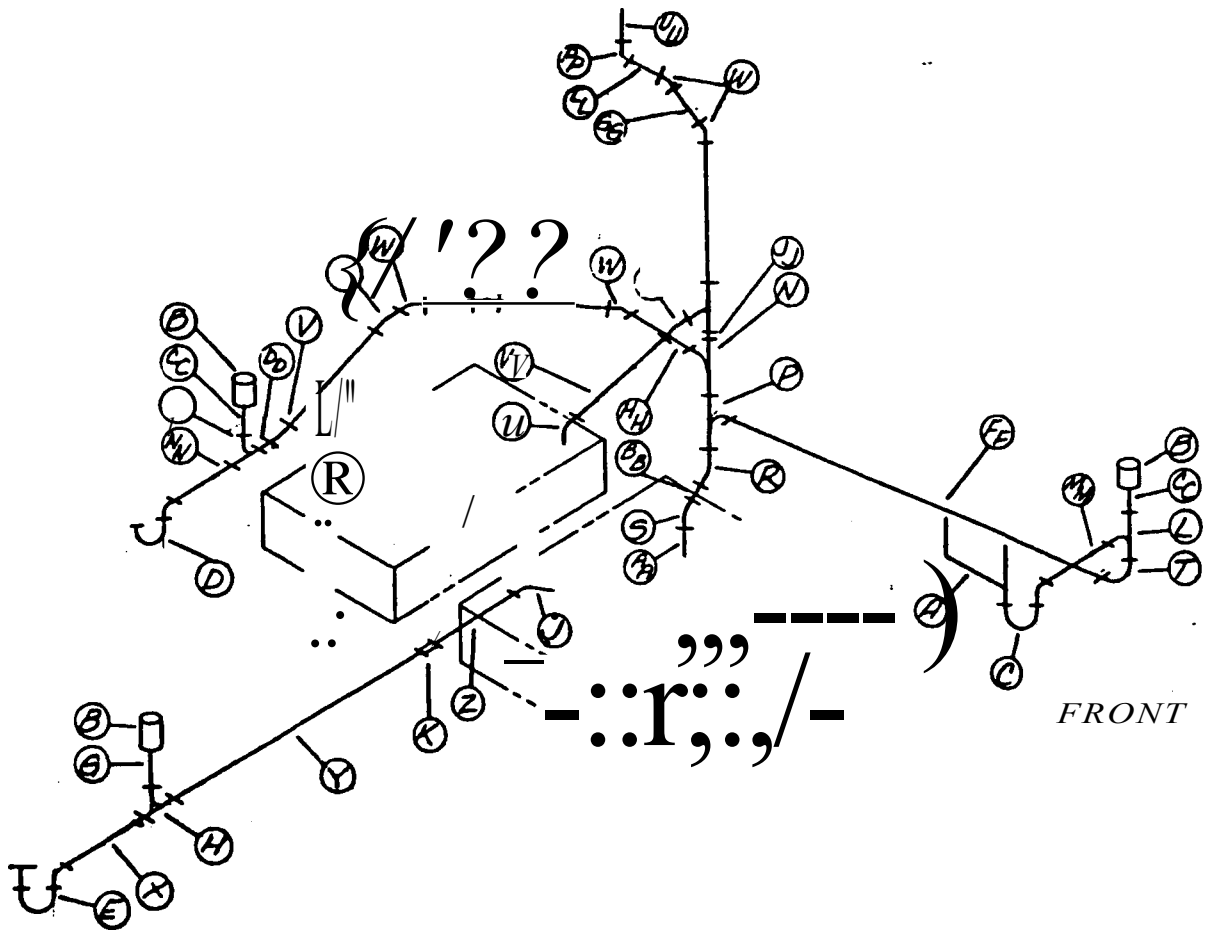
1. Drain and flush both tanks.
2. Remove bolts attaching both **gate valves** to tanks and remove as an assembly.
3. From inside coach lift padded trim pieces out from around toilet.
4. Remove **water** line at union (finger tight) on back of toilet.
5. Remove front and rear bolts attaching toilet to flange and lift toilet out.
6. Remove screws around perimeter of flange and unscrew flange from tank.

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DRAIN LINES 270 SERIES

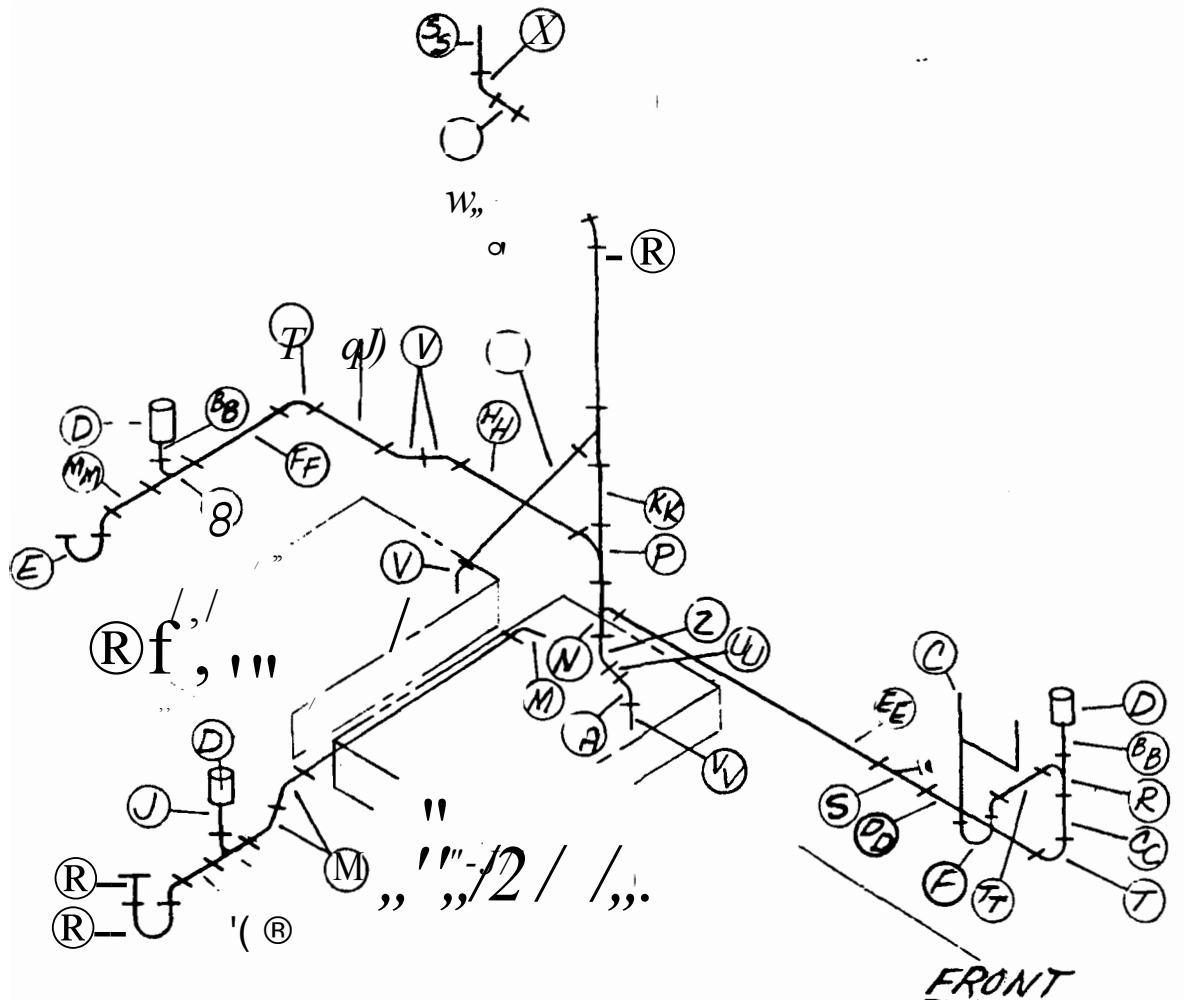


- A. Cont. Waste
- B. Auto Vent
- C. 1 1/2" P-Trap
- D. 1 1/2" P Trap w/ Slip
- E. 1 1/4" P Trap
- F. Swivel Strainer
- G. Auto Vent Adapter
- H. 1 1/2" San. Tee
- J. 1 1/4, 45° St. Ell
- K. 1 1/4" Coupler
- L. 1 1/2" San Tee
- M. 1 1/2", 45° Wye
- N. 2 x 1 1/2 x 1 1/2 St. S. Tee
- P. 2 x 2 x 1 1/2 S. Tee
- R. 2", 45° St. Ell
- S. 2", 45° Ell
- T. 1 1/2", 90° XLT Ell
- U. 1 1/2", 45° St. Ell
- V. 1 1/2", 45° Ell
- W. 1 1/2" 22 1/2° Ell

- X. 1 1/4 Dia. x 7 1/2
- Y. 1 1/4 Dia x 20 1/4
- Z. 1 1/4 Dia x 18 1/2
- AA. 2" Dia X 6 1/2
- BB. 2" Dia X 3
- CC. 1 1/2" Dia x 3
- DD. 1 1/2" Dia x 3 1/2
- EE. 1 1/2" Dia x 3 1/4
- FF. 1 1/2" Dia x 113
- GG. 1 1/2" Dia x 7 1/2
- HH. 1 1/2" Dia X 16
- JJ. 1 1/2" Dia x 2 1/2
- KK. 1 1/2" Dia X 8
- LL. 1 1/2" Dia x 12 1/4
- MM. 1 1/2" Dia x 9
- NN. 1 1/2" Dia x 8 1/2
- PP. 1 1/2, 90° Vent Ell
- RR. 1/2" Dia x 33 1/4
- UU. 1 1/2 Dia x 6
- VV. 1 1/2 Dia x 11 1/2

DRAIN LINES 300 SERIES

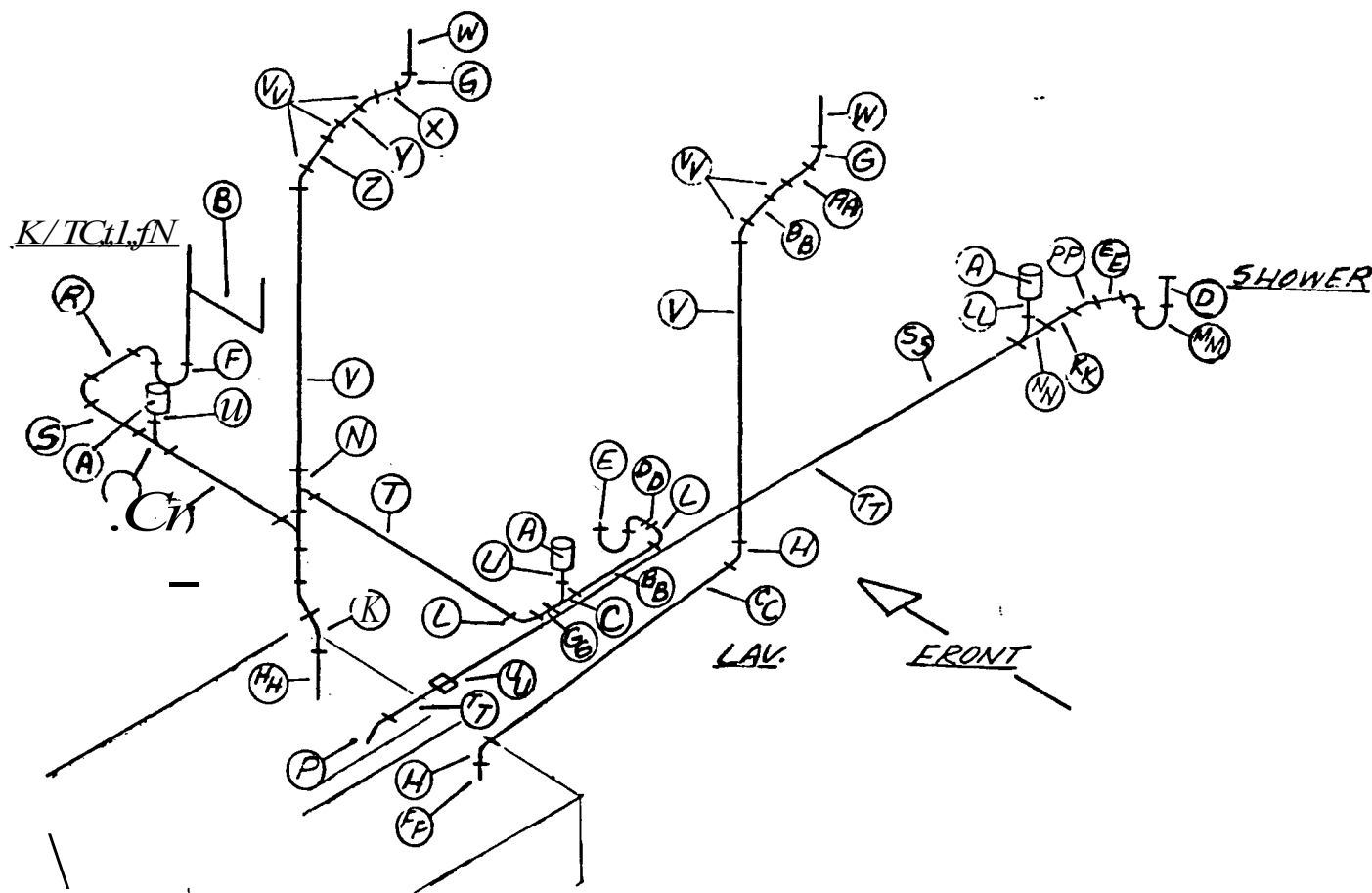
COMMON VENT



- A. Black tank
- B. Grey Tank
- C. Cont. Waste
- D. V200 Auto Vt.
- E. P-Trap w/ slip
- F. P-Trap 1/1/2"
- G. 1 1/4" P-Trap
- H. 1 1/4 x 1 1/2 Swivel Strainer
- J. Auto Vt. Adapter
- K. 1 1/4" San. Tee
- M. 1 1/4", 45° St. Ell
- N. 2 x 2 x 1 1/2 San. Tee
- P. 2 x 1 1/2 x 1 1/2 St. S. Tee
- R. 1 1/2 San. Tee
- S. 1 1/2 Clean out
- T. 1 1/2, 90° XLT Ell
- V. 1 1/2, 45° St. Ell
- W. 1 1/2, 22 1/2° Ell
- X. 1 1/2, 90° Vt. Ell
- Y. 1 1/2, 45° Wye
- Z. 2", 45° St. Ell

- AA. 2", 45° Ell
- BB. 1 1/2 Dia X 3
- CC. 1 1/2 Dia X 2 1/2
- DD. 1 1/2 Dia X 3 1/2
- EE. 1 1/2 Dia X 122
- FF. 1 1/2 Dia X 10
- GG. 1 1/2 Dia X
- HH. 1 1/2 Dia X 13
- JJ. 1 1/2 Dia X 13 1/2
- KK. 1 1/2 Dia X
- LL. 1 1/2 Dia X
- MM. 1 1/2 Dia X 26 1/2
- NN. 1 1/2 Dia X 4
- PP. 1 1/2 Dia X 4 1/2
- RR. 1 1/2 Dia x 9 5/8
- SS. 1 1/2 Dia X 6
- TT. 1 1/2 Dia X 7 1/2
- UU. 2 Dia X 3 1/2
- VV. 2 Dia X 6 1/2
- WW. 1 1/4 Dia X 8 1/8
- XX. 1 1/4 Dia x 24

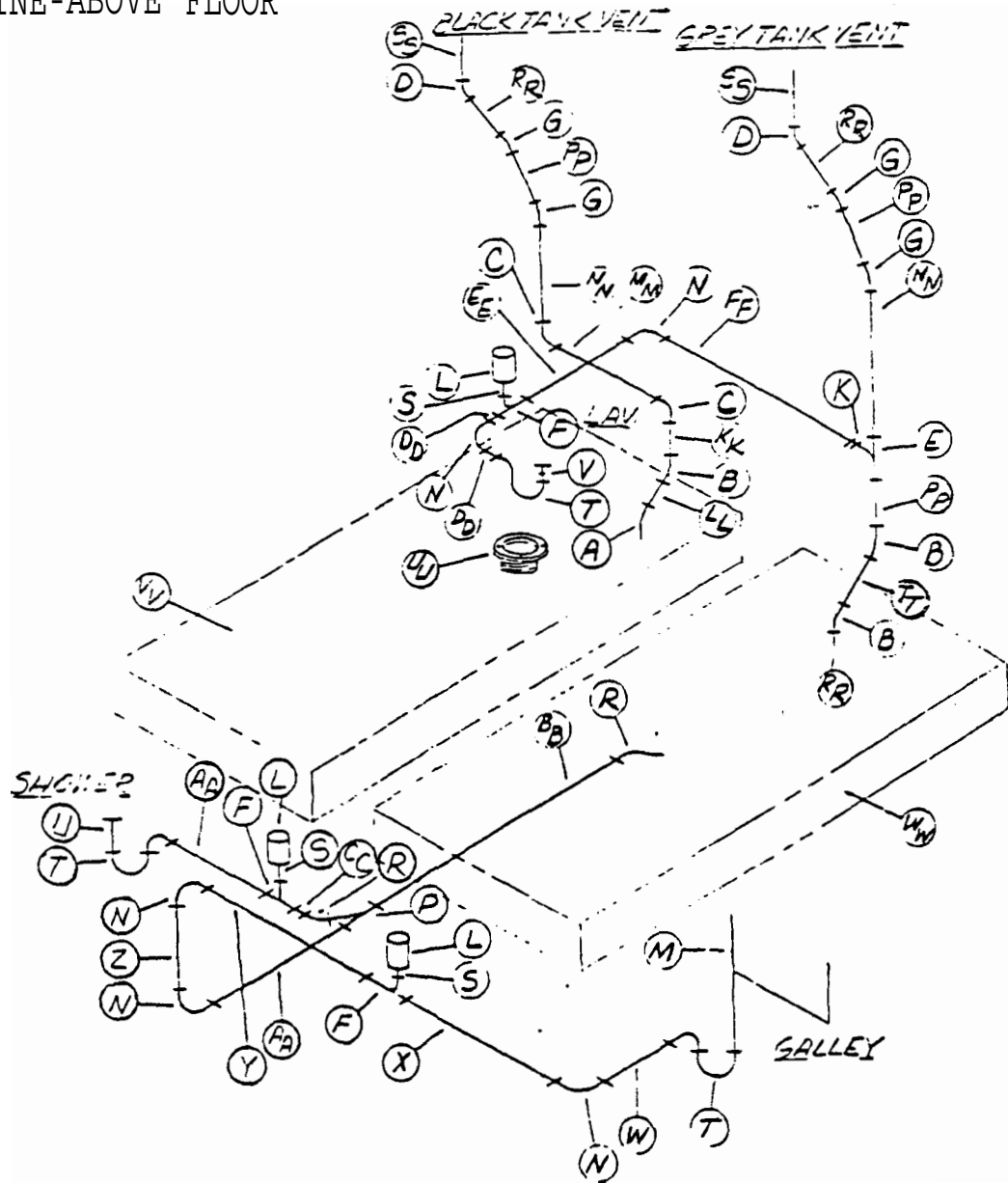
DRAIN LINES 310 SERIES



A- Auto Vent
B. Cont. Waste
C. 1 1/2 San. Tee
D. 1 1/2 x 1 1/4 Swivel Strainer
E. P-Trap w/ Slip
F. P-Trap
G. 1 1/2 Vent Ell, 90°
H. 1 1/2, 45° Ell
J. 2" 45° St. Ell
K. 2" 45° Ell
L. 1 1/2, 90° Ell
M. 2 x 2 x 1 1/2 San. Tee
N. 2 x 1 1/2 x 1 1/2 St. Tee
P. 1 1/4, 45° St. Ell
R. 1 1/2 Dia x 11 3/4
S. 1 1/2 Dia x 7
T. 1 1/2 Dia x 40 1/2
U. 1 1/2 Dia x 3
V. 1 1/2 Dia x 30
W. 1 1/2 Dia x 6
X. 1 1/2 Dia x 5 1/2
Y. 1 1/2 Dia x 6 1/2
Z. 1 1/2 Dia x 5

AA. 1 1/2 Dia x 6 1/4
BB. 1 1/2 Dia x 9
CC. 1 1/2 Dia x 29 1/2
DD. 1 1/2 Dia x 1 1/2
EE. 1 1/4 Dia x 3 1/2
FF. 1 1/2 Dia x
GG. 1 1/2 Dia x 4
HH. 2" Dia x 10
JJ. 2" Dia x 6
KK. 1 1/3 Dia x 2 1/2
LL. Auto Vt. Adapt.
MM. P-Trap 1 1/4
NN. 1 1/4 San. Tee
PP. 1 1/4, 22 1/2° Ell
SS. 1 1/4 Dia x 37 1/2
TT. 1 1/4 Dia x 3
UU. 1 1/4 x 1 1/4 Coupler
VV. 1 1/2, 22 1/2° Ell

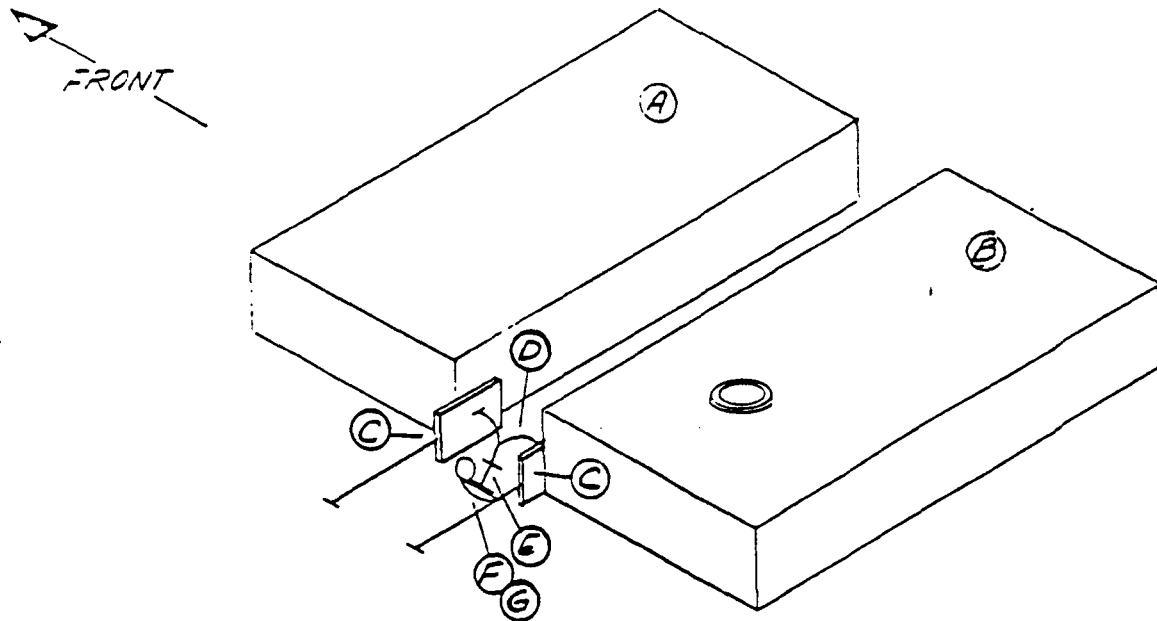
290 DRAIN LINE-ABOVE FLOOR



- A. 1 1/2 45° St. Ell
- B. 1 1/2 45° Ell
- C. 1 1/2 90° XLT Ell
- D. 1 1/2 90° Vent Ell
- E. 1 1/2 San Tee
- F. 1 1/4 San Tee
- G. 1 1/2 22 1/2 Ell
- K. 1 1/4 x 1 1/2 Reducer
- L. 1 1/2 Auto Vent
- M. 1 1/2 x 1 1/4 Cont Waste
- N. 1 1/4 90° XLT Ell
- P. 1 1/4 45° Wye
- R. 1 1/4 45° St. Ell
- S. 1 1/2 x 1 1/2 auto vent adap
- T. 1 1/4 P Trap hub and hub

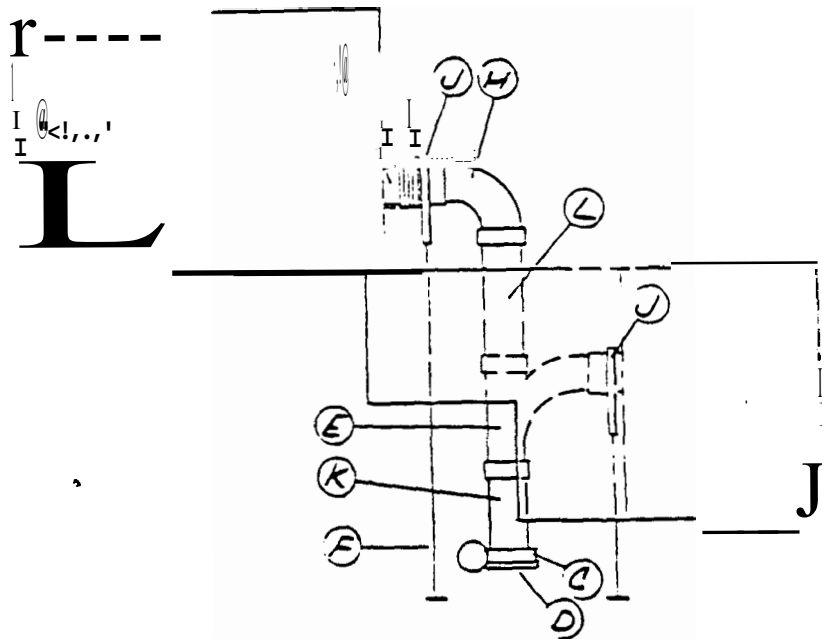
- U. 1/2 x 1 1/4 Swivel Strain PP. 1 1/2 DIA x 11
- V. 1 1/4 Pipe trap adaptor
- W. 1 1/4 DIA x 9 1/2
- X. 1 1/4 DIA x 22 1/2
- Z. 1 1/4 DIA x 11
- AA. 1 1/4 DIA x 12
- BB. 1 1/4 DIA x 56 1/4
- CC. 1 1/4 DIA x 3
- DD. 1 1/4 DIA x 1 1/2
- EE. 1 1/4 DIA x 12 3/4
- FF. 1 1/4 DIA x 12 3/4
- KK. 1 1/2 DIA x 2
- LL. 1 1/2 DIA x 3
- MM. 1 1/2 DIA x 14
- NN. 1 1/2 DIA x 31
- PP. 1 1/2 DIA x 11
- RR. 1 1/2 DIA x 7
- SS. 1 1/2 DIA x 6
- TT. 1 1/2 DIA x 4
- UU. Closet Flange 4x3
- VV. Black TanJc
- WW. Grey Tanuc

290 DRAIN LINE - BELOW FLOOR



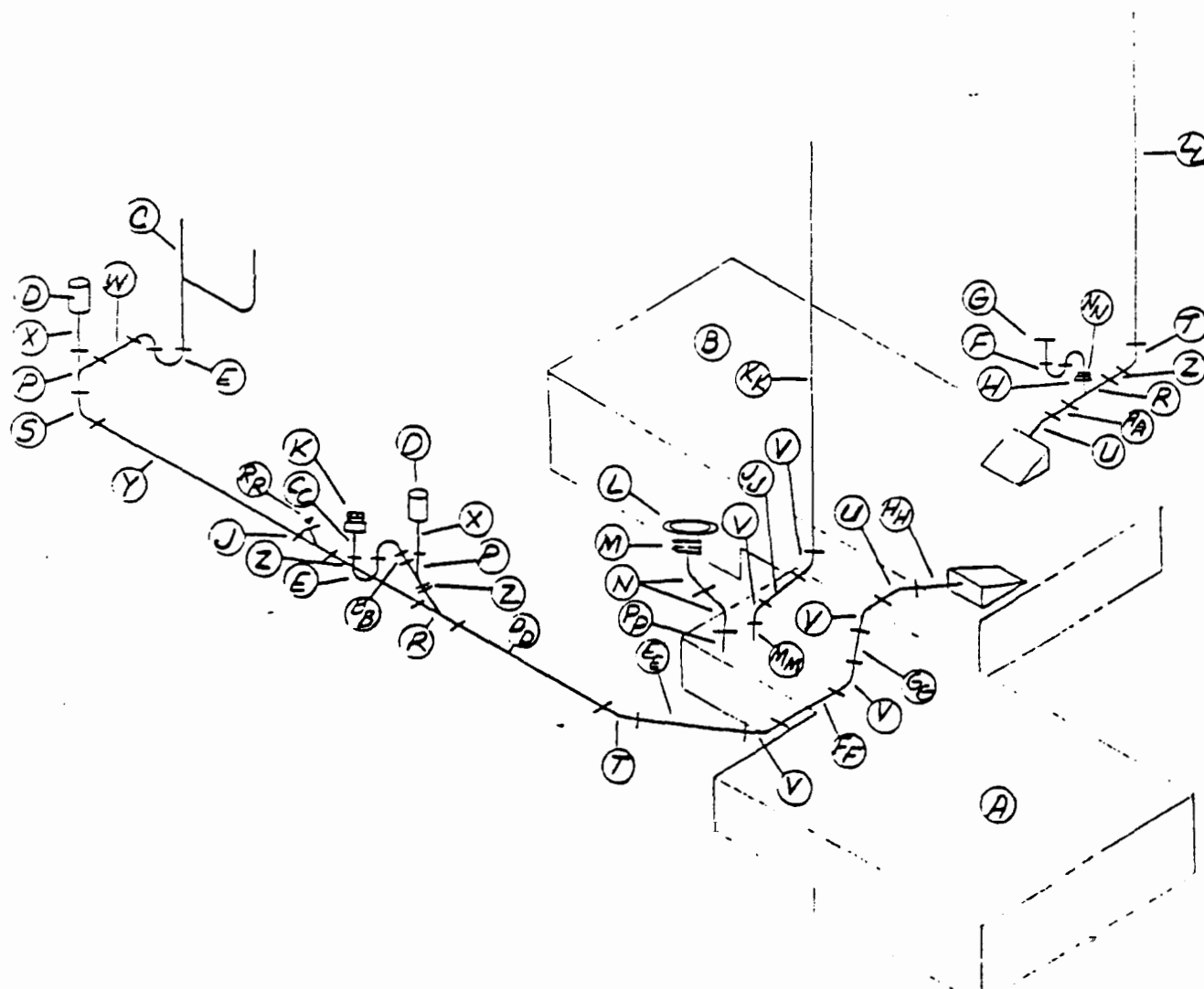
- A. Grey Tank
- B. Black Tank
- C. Gate Valve
- D. 3 Way Elbow
- E. 3" DIA x 3 3/4"**
- F. Bayonet Ring
- G. Bayonet Cap

325 - 345 DRAIN LINES - BELOW FLOOR



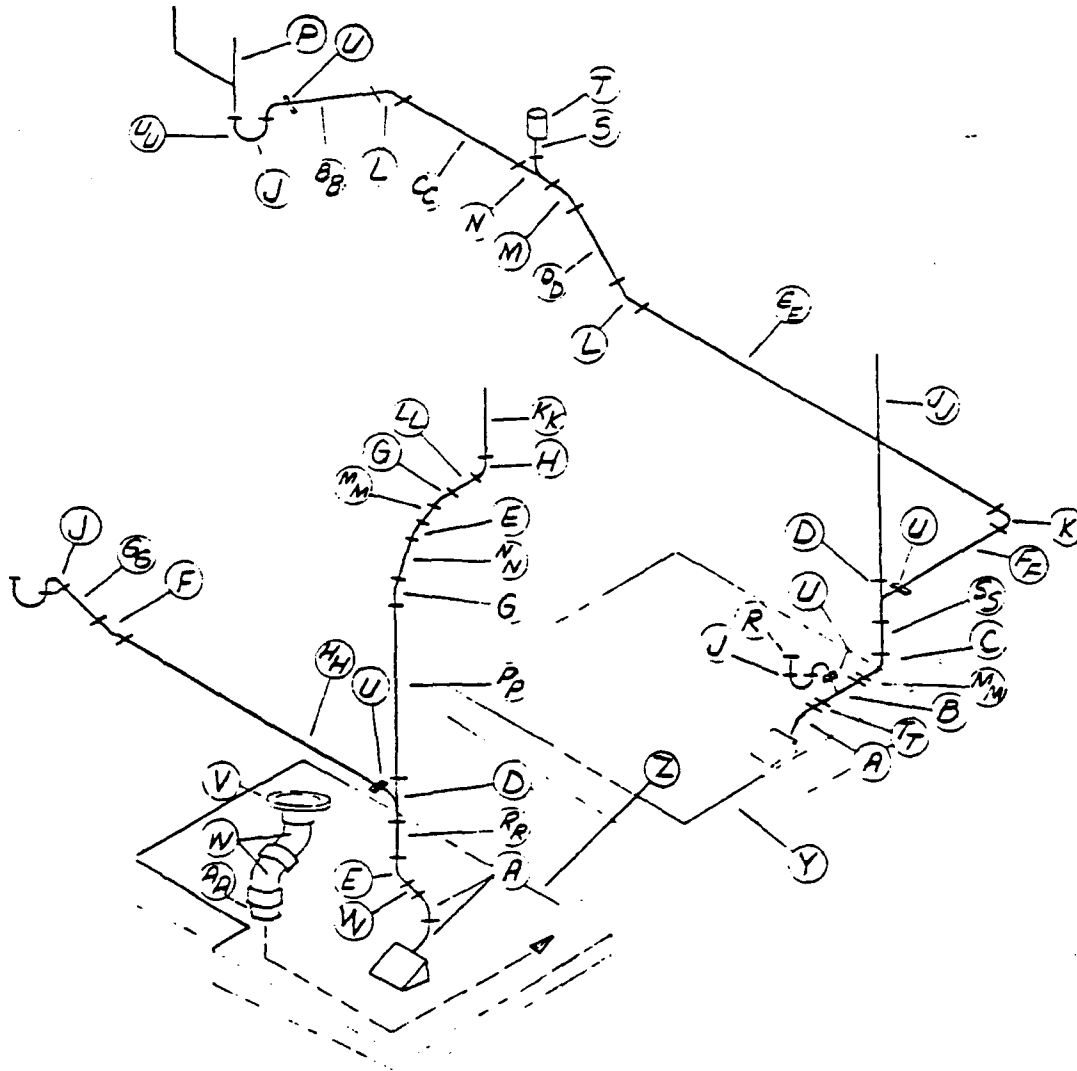
- A. Grey Holding Tank
- B. Black Holding Tank
- C. Bayonet Ring
- D. Bayonet Cap
- E. 3 X 3 X 3 Wye
- F. Extension Handle
- G. 3" caulder Coupler
- H. 3" 90° XLT Elbow
- J. 3" Gate Valve
- K. 3" DIA X 4 1/2
- L. 3" QIA X 16 1/2
- M. 3" DIA X 2

325 DRAIN LINES - ABOVE FLOOR



- | | | |
|--------------------------------|---------------------------|--------------------------|
| A. Black Holding Tank | S. 1 1/2 90° XLT ST Elbow | |
| B. Grey Holding Tank | T. 1 1/2 90° XLT Elbow | |
| C. 1 1/2 Cont. Waste | U. 1 1/2 45° St Elbow | |
| D. 1 1/2 Auto Vent | W. 1 1/2 DIA x 7 1/2 | |
| E. 1 1/2 P Trap | X. 1 1/2 DIA x 4 | JJ. 1 1/2 DIA x 8 3/4 |
| F. 1 1/4 P Trap | Y. 1 1/2 DIA x 81 | KK. 1 1/2 DIA x 78 |
| G. 1 1/4 x 1 1/2 Swivel Strain | Z. 1 1/2 DIA x 1 1/2 | LL. 1 1/2 DIA x 85 |
| H. 1 1/2 x 1 1/4 Adaptor | AA. 1 1/2 DIA x 2 1/2 | MM. 1 1/2 DIA x 3 |
| J. 1 1/2 Clean out | BB. 1 1/2 DIA x 3 1/4 | NN. 1 1/4 DIA x 1 1/2 |
| K. 1 1/2 x 1 1/4 Trap Adap | CC. 1 1/2 DIA x 2 3/4 | PP. 6" Nipple, cut in ha |
| L. 4x3 Closet Flange | DD. 1 1/2 DIA x 19 1/4 | RR. 1 1/2 Clean out plug |
| M. 3" Caulder Coupler | EE. 1 1/2 DIA x 13 3/4 | |
| N. 3" 45° St. Elbow | FF. 1 1/2 DIA x 6 3/4 | |
| P. 1 1/2 San Tee | GG. 1 1/2 DIA x 4 3/4 | |
| R. 1 1/2" 45° Wye | HH. 1 1/2 DIA x 5 3/4 | |

345 DRAIN LINES - ABOVE FLOOR



- A. 1 1/2 45° ST Ell
- B. 1 1/2 x 1 1/2 x 1 1/2 45° Wye
- C. 1 1/2 XLT Ell
- D. 1 1/2 San Tee
- E. 1 1/2 45° Ell
- F. 1 1/4 , 22 1/2° Ell
- G. 1 1/2 , 22 1/2° Ell
- H. 1 1/2 , 90° ST vent Ell
- J. 1 1/4 P Trap
- K. 1 1/4 90° XLT Ell
- L. 1 1/4 45° Ell
- M. 1 1/4 45° St Ell
- N. 1 1/4 San Tee
- P. Cont. Waste
- R. 1 1/4 x 1 1/2 Swivel Strain
- S. Auto Vent Adapter
- T. Auto Vent
- U. 1 1/2 to 1 1/4 Adapter
- V. Closet Flance 4x3
- W. 3" 45° St Elbow

- Y. Grey Tank
- Z. Black Tank
- AA. 3" Dia x 2 1/2
- BB. 1 1/4 DIA x 14
- CC. 1 1/4" DIA x 26
- DD. 1 1/4 DIA x 14
- EE. 1 1/4 DIA x 56
- FF. 1 1/4 DIA x 16 :
- GG. 1 1/4 DIA x 8
- HH. 1 1/4 DIA x 34
- JJ. 1 1/2 DIA x 75
- KK. 1 1/2 DIA x 14
- LL. 1 1/2 DIA x 4 3/4
- MM. 1 1/2 DIA x 1 1/2
- NN. 1 1/2 DIA x 8 1/2
- PP. 1 1/2 DIA x 36
- RR. 1 1/2 DIA z 8
- SS. 1 1/2 DIA z 6 1/2
- TT. 1 1/2 DIA z 2 1/2

- UU. 1 1/2 P Trap w/ Sli
- VV. 1 1/2 DIA x 3 1/4

LPG SYSTEM

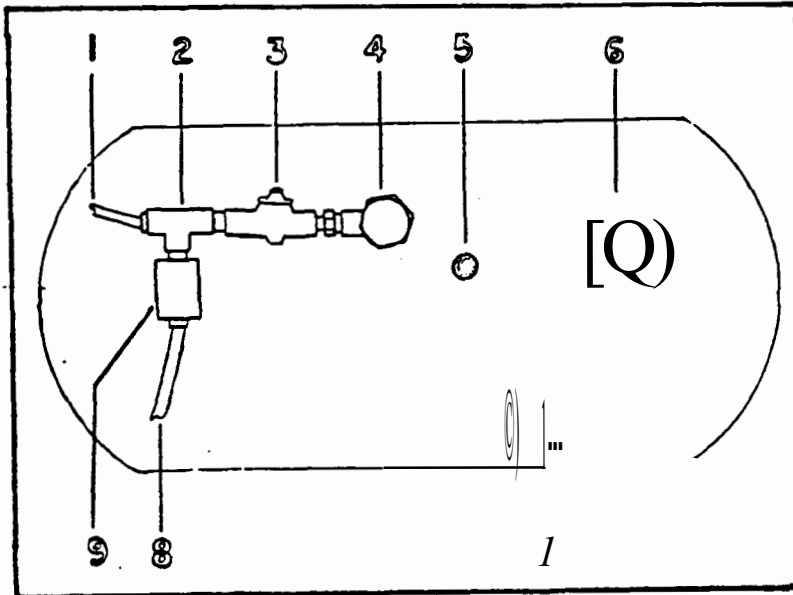
LPG TANK REMOVAL/REPLACEMENT , ; .. F-1

GAS REGULATOR REMOVAL/REPLACE.MENT .. , . , F-1

LPG SYSTEM PRESSURE CHECK F-2

COPPER TUBE FLARING, , F-2

L.P. TANK INSTALLATION



No.	Description
1	*Line to generator
2	Brass tee
3	First stage regulator
4	Shut-off valve
5	Ten percent valve
6	Fill valve
7	Gauge
8	Line to appliances
9	Second stage regulator

*A separate second stage regulator is located in the generator compartment on diesel powered motor-homes.

LPG TANK REMOVAL/REPLACEMENT

The LPG tank is located in a compartment beneath the sub-frame just forward of the main oor. To gain **access**, unlock the compartment door, **release** the latches and let the door swing down.

1. Shut off main gas supply at th, tank.

2. Remove the plastic protective cover from the - egulator assembly and disconnect the flexible tubing from the regulator. Always use two wrenches when loosening or tightening a fitting, one to hold the fitting, one to turn the flare nut.

NOTE: The flexible tubing nut has a left hand thread and must be turned clockwise to loosen.

3. Disconnect the level gauge wire.

4. From the tank fitting support the tank with, a floor jack and remove bolts and nuts attaching the tank mounting flanges (one to the front of the tank and two on the rear} to the chassis sub-frame brackets.

5. Carefully lower and remove the tank.

6. To install, reverse removal procedure.

7. Check all fittings for leaks by spraying with "snoop" and watching for bubbles.

GAS REGULATOR REMOVAL/REPLACEMENT

1. Shut off main gas supply at the tank.

2. Remove the plastic protective cover from the regulator assembly.

3. Using two wrenches, one to hold the line fitting and one to turn the flare nut, disconnect the regulator from the flexible rubber line.

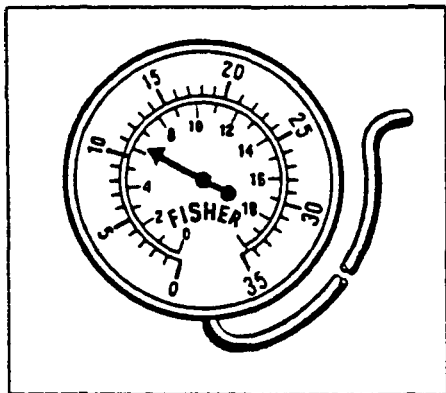
4. Disconnect the regulator from the tank fitting. Remove regulator

5. To replace, reverse the removal **procedures**.

LPG SYSTEM PRESSURE CHECK

Use a pressure gauge (Fisher, see Fig. No. 2).

This gauge is calibrated to read in "inches of water column pressure." It is a standard manometer reading and is colored red.



To take the test reading at one of the range burners.

1. Remove the burner assembly from the burner valve.
2. Insert the gauge hose onto the burner valve and turn valve on.
3. Test reading should be a minimum of 11 and a maximum of 12 inches of water column pressure. All appliances are made to operate at this pressure.
4. After any pressure adjustments shut off burner valve and remove tube from burner to allow pressure to bleed off. Then reinstall and check again as in step b.

FIRST STAGE REGULATOR

The first stage regulator reduces tank pressure down to approximately

25 p.s.i. If pressure to the generator drops below 11 inches of water column when other appliances are operated to the pressure from the first stage regulator may be increased to alleviate the problem. This is done by turning the adjustment screw under the regulator cap clockwise one full turn.

COPPER TUBE FLARING

1. Tools required:

- a) Tubing cutter
- b) Two piece flaring tool

2. Using a pencil or scribe, mark the point on the tubing where the cut is to be made.
3. Slide the tubing along the "V" formed by the rollers of the cutting tool until the point marked in step 2 is directly under the cutting wheel.
4. Tighten the cutter clamp screw until the tubing is held firmly against the cutter wheel.
5. Rotate the tool completely around the tubing several times. The wheel should follow the direction of rotation, not lead it.
6. Tighten the clamp slightly and repeat step 5. Continue to tighten and rotate until the tubing is cut completely through.
7. After cutting, use the reamer on the tool to ream the inside of cut to the original I.D.
8. Slide the correct size flare nut on the tubing with the threaded portion and flare seat facing the cut end.

9. Insert the tubing in the correct opening of the flare tool clamping mandrel. Allow tubing to extend 1/32" above mandrel tapered seat.

10. Slide the flaring head over the mandrel with the clamp fingers on the underside and the flaring tip directly over the clamped end of the tubing. Slowly tighten the flaring tip as far as possible.

11. Loosen and remove flaring head, open clamp tool and remove flared pipe.

ELECTRICAL

12 VOLT EXTERIOR	G-1
UNIVOLT INTERIOR	G-2
BATTERY SERVICE	G-3
LOCATING SHORTS AND OPENS	G-3
VEHICLE FUSE BLOCK	G-7
IN LINE FUSES	G-8
CHASSIS WIRING	G-9
Starter wiring, Isuzu	G-10
Isolator	G-11
Main Battery Solenoid	G-12
Dash Instruments	G-13
Dash Light Bar	G-14
Dash Harness Plug	G-15
Dash Switch Bar	G-16
Dash to Body Lights & Appliances	G-17
Windshield Wipers	G-18
Dash Heater and Air Conditioner	G-19
Generator Switch Wiring	G-20
Glow Plug Circuit	G-21
SPOT LIGHT	G-22
CONTROL PANEL	G-24
12 VOLT FUSE PANEL, INTERIOR	G-27
12 VOLT WIRING DIAGRAMS	G-29
TV ANTENNA	G-39
RANGE EXHAUST FAN	G-45
BATH EXHAUST FAN	G-47
STEP LIGHT	G-48

ELECTRICAL CONTINUED ●●●●●.....

LOUNGE & GALLEY LIGHT ASSEMBLY ●...●●●●●...●●●●●... G-49

CEILING LIGHT ASSEMBLY .●●●●●●●...●...●...●...●... G-50

DIGITAL CLOCK ●●●...●●●●●...●...●...●...●...●...●... **G-51**

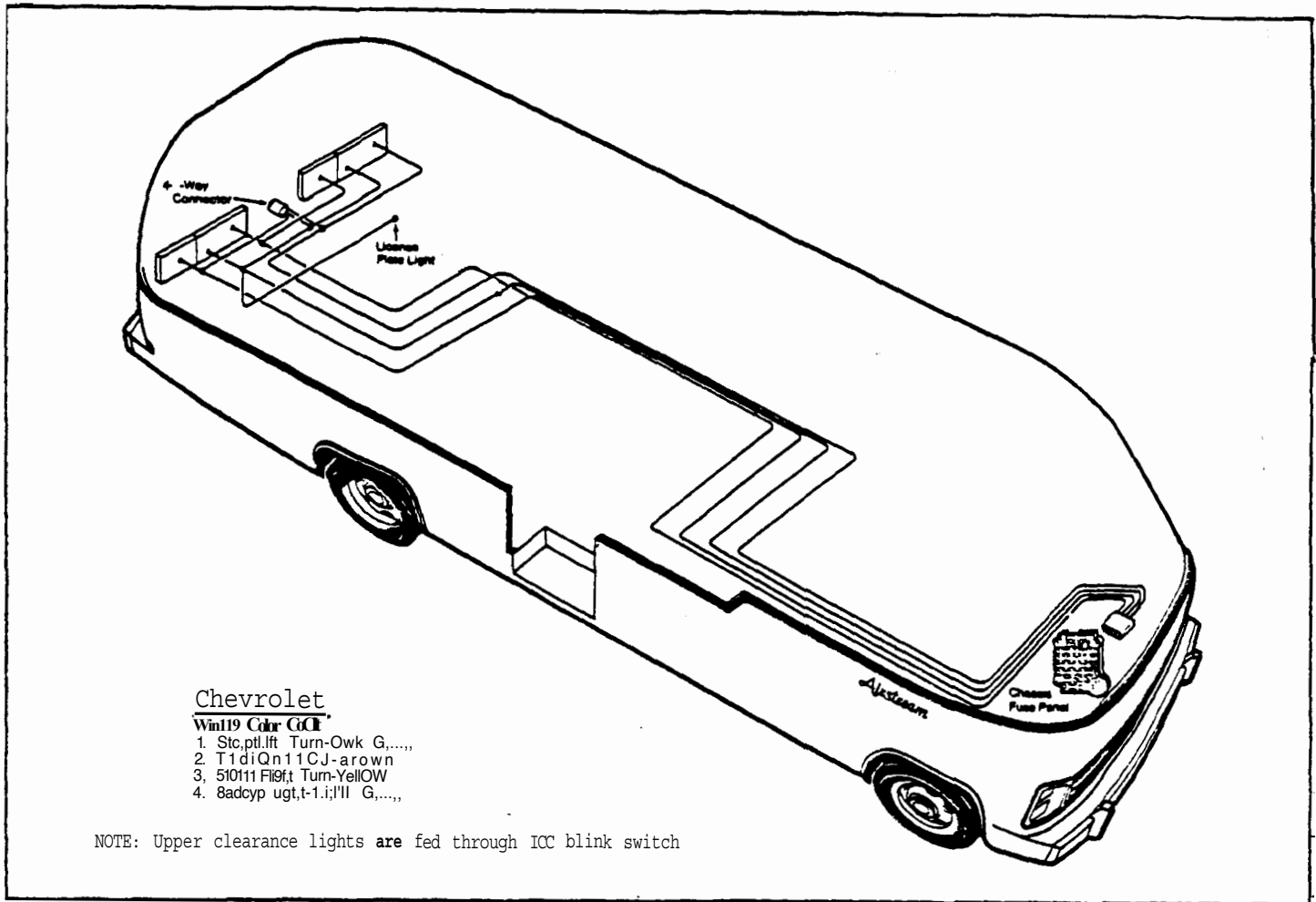
120 VOLT ELECTRICAL PANEL ●...●...●...●...●...●... G-52

GROUND FAULT INTERRUPTER ●●●●●...●...●...●... G-53

120 VOLT SHORTS AND OPENS .●●...●●...●...●...●... G-55

120 VOLT WIRING DIAGRAM ●●●●●...●...●...●... G-56

TYPICAL 12 VOLT EXTERIOR WIRING



The exterior lights of the Airstream motorhome are fed current from the Chevrolet chassis wiring harness. The wiring harness to the taillights plugs into the back of the automotive fuse block on the front of the fire wall. The lower front clearance lights and turn signals also pick power up from this location. The upper clearance lights are fed through the ICC blink switch which picks up power from the head light switch.

The wiring harness for the **tail-**lights run past the left side of the engine, back the left frame rail then up into the body.

The most common failure in the exterior electrical system is an

open circuit. An open circuit is an interruption in the current flow which may be in either the **wire** to the component or in the ground return. Check the following areas for open circuits.

1. Light bulb (filament open)
2. Loose or corroded connections at lighting device. .
3. Loose or corroded connections **at 7-way** connectors.
4. Improper grounding at the lighting device.

A continuity light or an ohmmeter will help you isolate the point of the "open" on the circuit.

Another cause of failure is a short circuit usually resulting in a blown fuse or cycling circuit breaker at the power source. A short is usually caused by the wire coming in contact with a sharp edge. The sharp edge **wears** the wire's insulation away until the "hot" wire shorts to ground.

UNIVOLT INTERIOR ELECTRICAL SYSTEM

The univolt system is the interior low voltage electrical system which enables you to use the interior lights, fans, pumps and 12 volt appliances whether operating on self contained battery power or 120 volt city power.

MAIN CHARGE LINE POW--Z SOURCE

The main line circuit completes the path of current from the vehicle's generator or alternator to the batteries. The purpose of this circuit is to charge the motorhome batteries.

BATTERY POWER SOURCE

The 12-volt motorhome batteries are connected in parallel to the Univolt system. They provide current to the interior lights, fans and 12-volt appliance when your motorhome is disconnected from city power or when an overload of interior lights and fans exists with city power connected.

UNIVOLT CONVERTER

The univolt converter transforms 120 volt alternating current (A.C.) into 12 volt nominal direct current (D.C.). This provides power to charge the motorhome battery and to operate the 12 volt interior lighting, fans and appliances.

The converter is energized when the motorhome is hooked up to 120 volt city power, or utilizing 120 volt generator power.

UNIVOLT TESTING

The Univolt may be tested when installed in the motorhome with either the Newmark tester or the Triad tester.

The Newmark tester should be set on the Zener position only. The Triad tester has only one position.

1. Confirm 120 volt power is going into Univolt.
2. Remove all fuses from remote fuse panel.
3. Connect black lead of tester to terminal marked "ammeter red only." (Any one of the four terminals on the negative side of univolt may be used.)
4. Connect the red lead of tester to any fuse clip on the fuse panel.
5. The voltage must be within 13.8 and 14.2 volts. (The meter of the tester should be calibrated periodically.)
6. If Univolt is not within these voltages, replace it.

UNIVOLT REPAIR

The case cover to the univolt must not be removed. (There is high voltage within the case which is dangerous.) The Univolt should be returned to Airstream for repair.

UNIVOLT REMOVAL

1. Disconnect power cord for 120 volt supply.

2. switch circuit breakers to off position.
3. Disconnect lead-in wires running from Univolt assembly to 12 volt distribution panel.
4. Remove four screws mounting the Univolt assembly to the floor.
5. Remove the Univolt assembly.
6. To install, reverse the removal procedures.

BATTERY SERVICE

A **safe** level of charge for your battery is a specific gravity reading of **1.225**. A fully charged battery has a specific gravity of **1.250** to **1.280**. Always use a hydrometer which has a temperature correction scale. Maintain a clean battery top and check terminals and cables for tightness and cleanliness. A dirty battery will dissipate its charge through surface contamination. Clean battery top with a damp cloth and dry thoroughly. The terminals should be tight and **free** of corrosion. To clean terminals, neutralize with a solution of baking soda, rinse in clear water, and dry. To insure maximum battery capacity on both charge and discharge, the battery terminals and the inside portion of the cable connector should be scraped or brushed until both of these surfaces are shiny bright. The cable connectors should then be reconnected to the battery and tightened. The complete assembly, battery post and cable connector should be coated with a heavy bodied mineral **grease** or petroleum jelly.

IMPORTANT

Reconnect the battery cables to the correct posts. The black cable should be connected to the negative (-) post and the red cable to the positive (+) post.

All batteries except those that are permanently sealed must be inspected periodically by removing each cap and checking fluid level. Do not fill battery above lower ring. As the battery is charged, the electrolyte expands, causing an overfilled battery to spill acid through the vents. Permanently sealed batteries (those with no filler caps) need no checking or filling.

1. How to Use a Hydrometer

a) "Squeeze the soft rubber bulb and insert the nozzle in the cell. **Release** the bulb slowly, drawing electrolyte up into the barrel.

b) Adjust the electrolyte level in the barrel so that the float rides free of the bottom but is not striking the top,

c) Hold the hydrometer in vertical position, making sure that the float moves freely. Now read the scale at the level of the electrolyte in the barrel.

d) Return Electrolyte to the cell from which it was removed.

NOTE, Handle hydrometer carefully in making tests - guard against drops of acid falling on person, clothing or motorhome. After completing test, flush hydrometer with clean water,

LOCATING SHORTS AND OPENS

The key in locating shorts and opens is isolation. The first step is to isolate circuit with the short or open and then isolate the section of the circuit at the fault. Once the section is identified, the specific problem can be located. The cause may be a loose or corroded connection, cut **wire**, worn insulation, defective component, etc. The following

paragraphs describe methods of isolating shorts and opens. There are several other approaches that may be used, however, these may be used as a guide,

SHORTS

1. Locate circuit which has short by noting fuse blown,

2. Remove fuses and open all switches, and check for continuity between (+) 12 volt wire of shorted circuit and ground. (If it cannot be determined if switch is in open position, remove lead from switch.) Continuity to ground indicates there is a short,

3. Remove leads of shorted circuits from univolt and components one at a time. After disconnecting each component, check continuity of the +12 volt wire to ground. If there is no continuity, the short is in the component removed. If continuity still exists, continue with steps below.

4. Inspect leads carefully where they pass through the skin or near sharp edges.

5. Note objects attached to skin after manufacturing. The mounting screws or rivets may be causing the short.

6. Remove multidome to expose main body of harness. Inspect harness for cause of short, such as rivets or screws in harness or evidence of drilling.

7. If short cannot be found, cut circuit into sections, checking each section for continuity. Short can be isolated by this method.

8. Examples of shorts are:

a) The (+) 12 volt wire contacting (-) negative wire or grounded surface.

b) Internal short in a 12 volt component or appliance,

OPENS

1. Check all components on circuit which have opens. If all components are without power, begin to look for open on distribution panel,

2. Check for voltage on each side of the fuse. Sometimes a fuse has an open even though it is visually good. Check for tightness of fuse clip to fuse.

3. After inspecting all accessible wire on circuit for opens, remove multidome. Remove tape and inspect splices for poor connection.

4. A continuity light is a useful tool in locating an open. Each section of circuit can be checked for continuity. By a process of elimination the open may be found.

5. Examples of open are:

a) Wire is cut.

b) Connector falls off component's terminal.

c) Loose or corroded connection,

d) Contacts in switch do not touch.

12 VOLT DISTRIBUTION FUSE PANEL

All connections of wires to the fuse panel must be clean and tight,

Prior to replacing fuses make sure inside surfaces of fuse clips are clean and squeeze clip to provide adequate tension against the fuse. Dirt or inadequate clip tension will produce a greater

resistance resulting in heat and voltage drop,

BRANCH CIRCUITS

The five interior branch circuits distribute 12 volt D.c. power from the univolt's remote fuse panel to the interior lights, fan, water pump and other 12 volt appliances. Each circuit is protected by a 20 amp fuse in the remote fuse panel.

The Univolt batteries are used for interior lighting, exhaust fans, water pump, central control panel, entertainment center, optional 12 volt convenience outlets and the refrigerator when it is switched to 12V power. To gain access, lift the latch from the recess and rotate. These batteries are charged by the engine's alternator, when driving, by the Univolt when the power cord is connected to 120 volt city power or by the 120 volt auxiliary power plant that is in operation. Univolt batteries can be used to start your engine, using jumper cables, if the engine battery has become totally discharged. A battery isolator, located in the engine service compartment, electronically isolates the auxiliary batteries from the engine battery, allowing operation of accessories without draining the start battery. The engine alternator properly charges each battery as the motorhome is driven.

Both UNIVOLT BATTERIES and the ENGINE BATTERY are located under the floor directly behind the step well.

Check fluid level in the Univolt batteries. Add only colorless, odorless drinking water or distilled water to bring level to split ring in filler opening. The engine chassis uses a Delco sealed type battery. Periodically check battery charge (test) indicator on top of battery to determine charge of battery. The test

indicator provides information for testing purposes only. The fluid level need not be checked.

A normal battery will discharge by itself over a period of time when not in use, therefore, IT IS NECESSARY TO PERIODICALLY CHECK THE BATTERY AND CHARGE IT AS NECESSARY. We suggest checking the battery at least every two weeks in freezing weather. The temperature at which a battery will freeze depends on the condition of its charge. As an example, a completely discharged battery will freeze at +19°F. The following table shows the freezing points of batteries at various specific gravity readings, temperature corrected to 80°F.

1.265-71.3 °F	1.150+5 °F
1.250-62 °F	1.100+19 °F
1.200-16 °F	

NOTE: Do not add water to a battery in freezing temperatures unless the vehicle will be put in use at once. Otherwise, the added water may freeze. Neglect is expensive. Care costs little. Check batteries regularly.

Maintain a clean battery top and check terminals and cables for tightness and cleanliness. A dirty battery will dissipate its charge through surface contamination. Clean battery top with a damp cloth and dry thoroughly. The terminals should be tight and free of corrosion. To clean terminals, neutralize with a solution of baking soda, rinse water, and dry.

IMPORTANT

ALWAYS RECONNECT THE BATTERY CABLES TO THE CORRECT BATTERY TERMINALS. The black cable should be connected to the negative terminal (-) and the red cable to the (+) terminal. During the winter the batteries should be removed

from the vehicle and stored in a cool, dry place, kept full of water, cleaned and charged monthly. A battery which is allowed to completely lose its charge will never regain its original power, or a full charge.

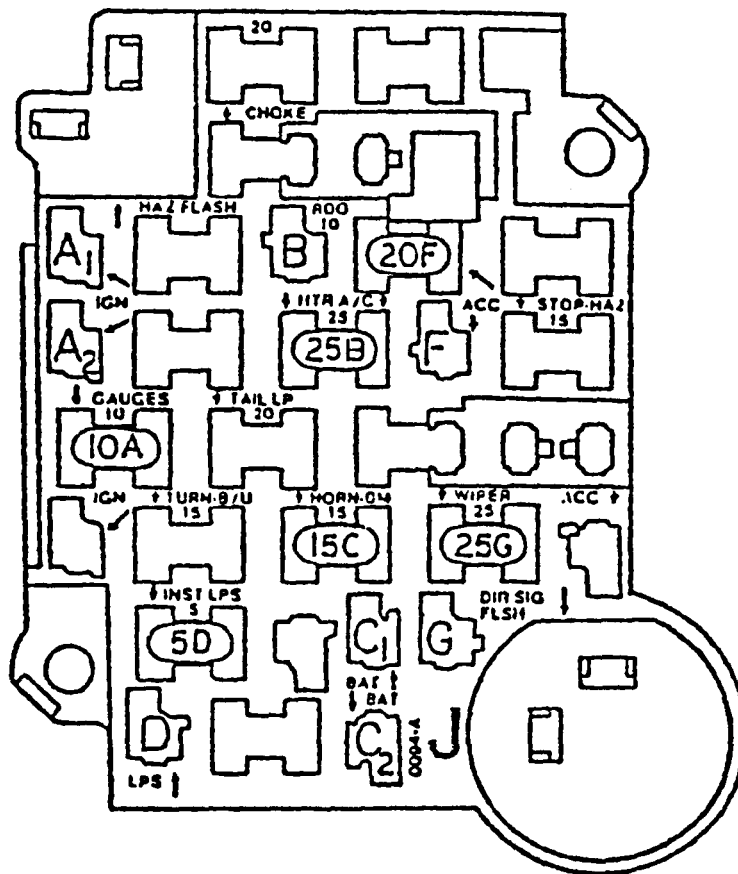
For battery service or replacement, go to any service station or dealer who sells and services the battery.

CAUTION:

Never expose battery to open flame or electric spark •••battery action generates hydrogen gas which is flammable and explosive. Don't allow battery fluid to contact skin, eyes, fabrics, or painted surfaces- fluid is a sulfuric acid solution which could cause serious personal injury or property damage. Flush any contacted area immediately with water. Wear eye protection such as industrial safety spectacles or goggles when working on or near battery. Remove rings, metal watchbands and other metal jewelry before jump starting or working around a battery, and be careful in using metal tools - if such metal should contact the positive battery terminal (or metal in contact with it) and any other metal on the vehicle, a short circuit may occur which could cause personal injury. Batteries and battery acid should always be kept out of reach of children.

Accessories powered by the ignition circuit of the chassis are plugged into terminals on the chassis fuse block. The illustration of the fuse block indicates the terminals, location and color, as well as wire color, fuse that feeds the terminal and the accessory that is powered.

The irregular shaped outlines with capitol letters indicate the plug-in terminals. The "H" shaped block with ovals containing a digit and a letter represents the fuses. The digit in the oval is the amperage of the fuse, and the letter matches the terminal the fuse powers.



CIR- CUIT	FUSE	CONNECTOR COLOR	WIRE	FUNCTION
A1	20 amp	Clear	Red 18 ga.	Cruise control
A2	20 amp	Clear	Yellow 14 ga.	Step
B	25 amp	Brown	Black 12 ga.	Front & auxiliary heaters
			Yellow 16 ga.	
C1	25 amp	Black	Orange 14 ga.	CS lighter & clock memory
			Red 18 ga.	
C2	25 amp	Black	Orange 14 ga.	RS lighter & visor mirror
			Blue 14 ga.	
D	5 amp	Green	Grey 18 ga.	Gear indicator
E1	20 amp	Grey	Yellow 12 ga.	Air bag compressor
E2	20 amp	Grey	Yellow 18 ga.	Door Lock
F	25 amp	Blue	Yellow 10 ga.	Wipers, refrigerator
			Red 16 ga.	

1984 MOTORHOME

MISCELLANEOUS 12 VOLT FUSES

EQUIPMENT	LOCATION	FUSE SIZE
C.B. Radio	Under dash - behind radio - in line	3 amp AGC
	Under dash - behind radio - in line	3 amp AGC
Radio/Tape	By Chevrolet fuse block - in line	10 amp SFE
Flood light (2)	Behind switch plate - in line	10 amp AGC
	Behind switch plate - in line	1.5 amp AGC
Driving Lights (2)	Front access door, above isolator - in line	15 amp AGC
	Under dash - behind head light switch	2 amp AGC
Cruise Control	Under dash - above steering column - in line	4 amp SFE
Onan (2)	On generator - twist cap	5 amp !-TH
	On generator - twist cap	5 amp MTH
Kohler	In generator control box - in line	10 amp ABC
Refrigerator	On back of refrigerator - fuse block	*25 amp

*The 25 amp fuse used in the refrigerator is the same type as used in many European manufactured cars. These are readily available at many service stations and most automotive parts outlets.

12 VOLT - DIESEL CHASSIS

The installation of the diesel engine into the Chevrolet P-30 Chassis has required Airstream to become involved in chassis wiring.

STARTING

Our first concern would be the starting circuit. When the ignition switch is closed, two solenoids are activated. One is the solenoid on the starter, and the other is the battery solenoid located on the back of the battery drawer. When the battery solenoid is activated all three batteries provide power to the engine starter. When the ignition key is turned from the start position to "on" the battery solenoid opens.

With the key "on" and the engine running, the auxiliary batteries are recharged through the battery isolator. In the "off" position both the battery isolator and battery solenoid are deactivated breaking all connections between the engine battery and auxiliary batteries.

The glow plug circuit is powered through a solenoid mounted on a vertical post at the right rear of the engine. 12 volt power is supplied to one side of the solenoid and on to the dash switch. When the switch is closed it activates the solenoid, sending current to the indicator light and on to the glow plugs.

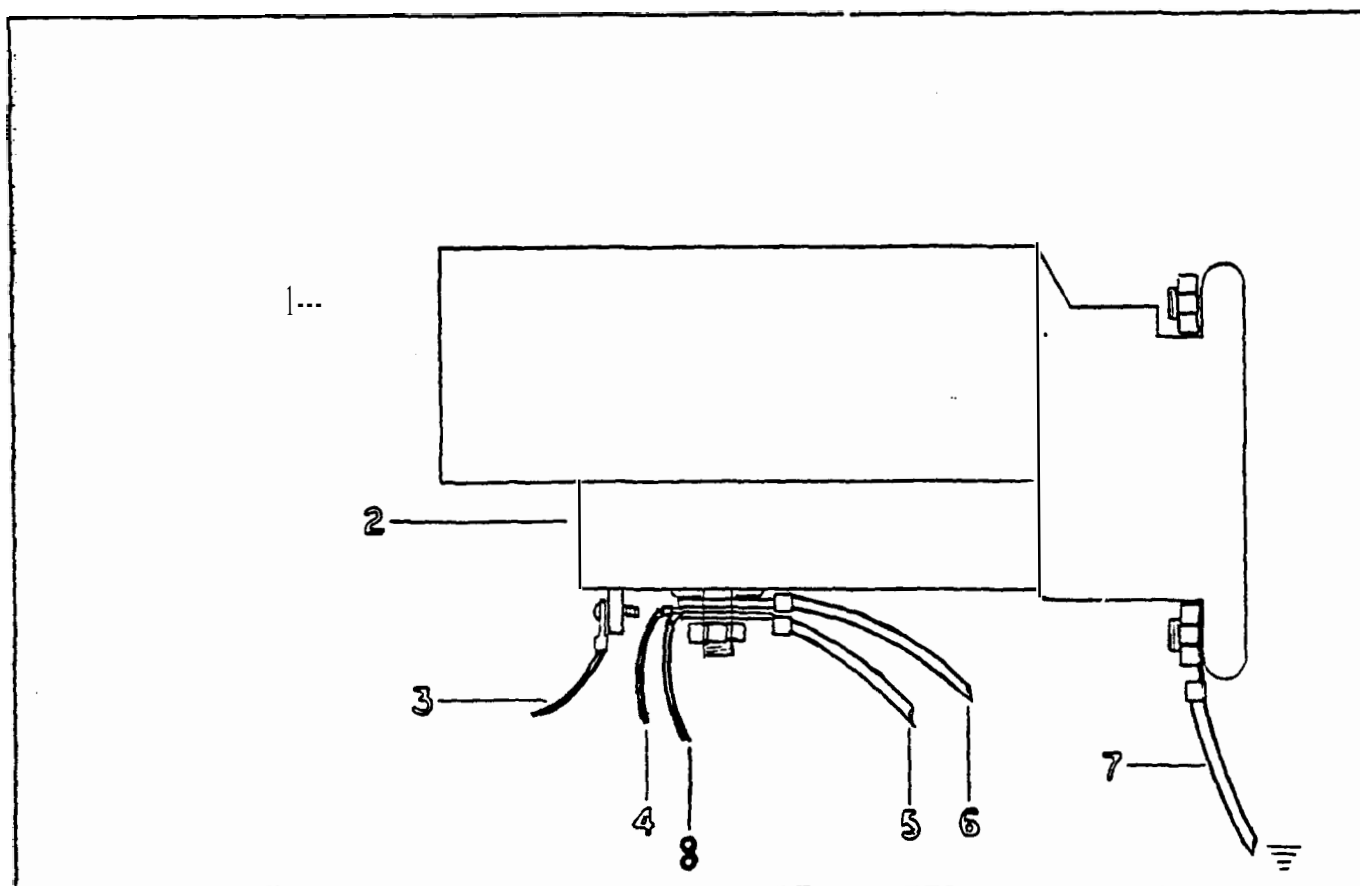
The large positive terminal on the starter acts as a major junction point in the 12 volt chassis wiring. It is important to note two fusible links are located in

this area. One fusible link feeds the head light switch, and the other fusible link feeds the ignition.

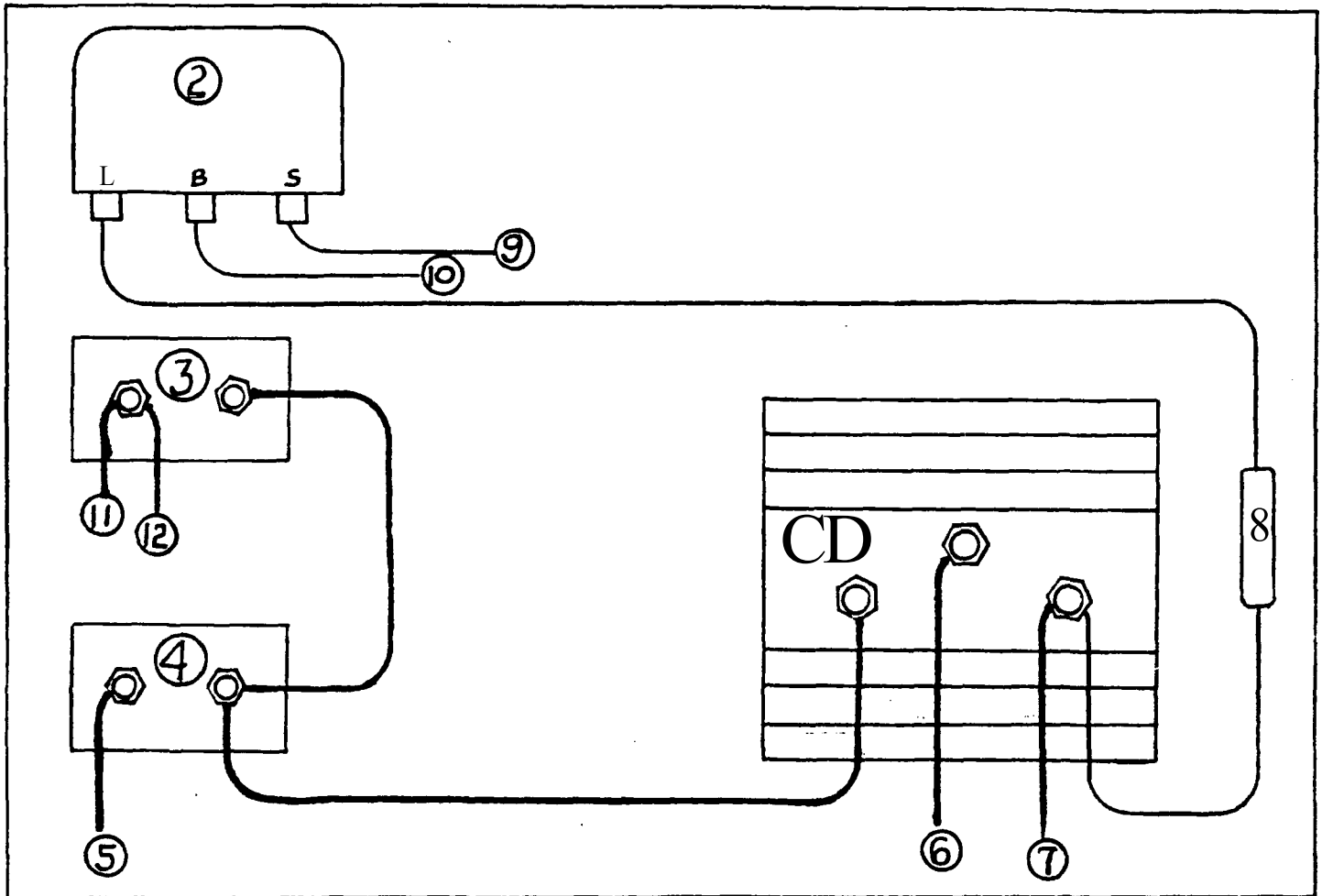
CHARGING

Both the alternator and voltage regulator are Isuzu components. A **six way** plug is on the voltage regulator. Three of the wires run to a three way plug connecting to the alternator, and the three wires connect to the Chevrolet wiring harness.

STARTER WIRING, ISUZU



1. Starter motor
2. Starter solenoid and reduction gears
3. To Chevrolet solenoid (Chevrolet harness)
4. Fusible link to headlight
5. To engine battery
6. To generator
7. To ground
8. Fusible to ignition

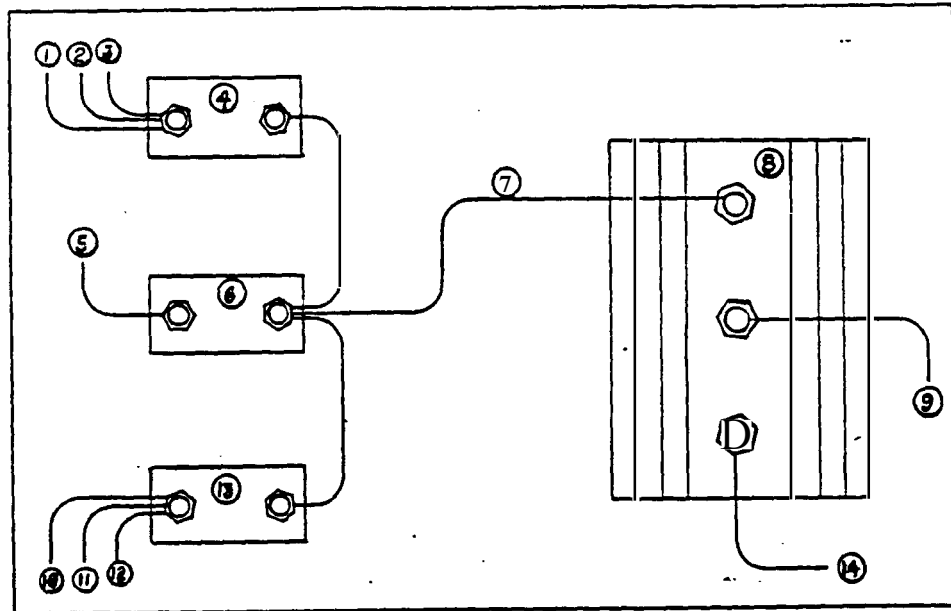


1. Isolator
2. Driving Light Relay
3. 25 Amp, 12 volt breaker (with spot light and/or power seat options.
4. 50 Amp, 12 volt breaker
5. To main battery solenoid
6. To Alternator
7. To Engine Battery (through Chevrolet harness)
8. In line fuse, driving lights
9. To driving light switch

10. To driving lights
11. To spot light switch
12. To power seat breakers (mounted on steering column support bracket)

The function of the isolator is to allow the coach batteries to charge up from the alternator when driving, yet prevent the engine battery from becoming discharged when the ignition key is turned off.

ISOLATOR - CIRCUIT BREAKER WIRING

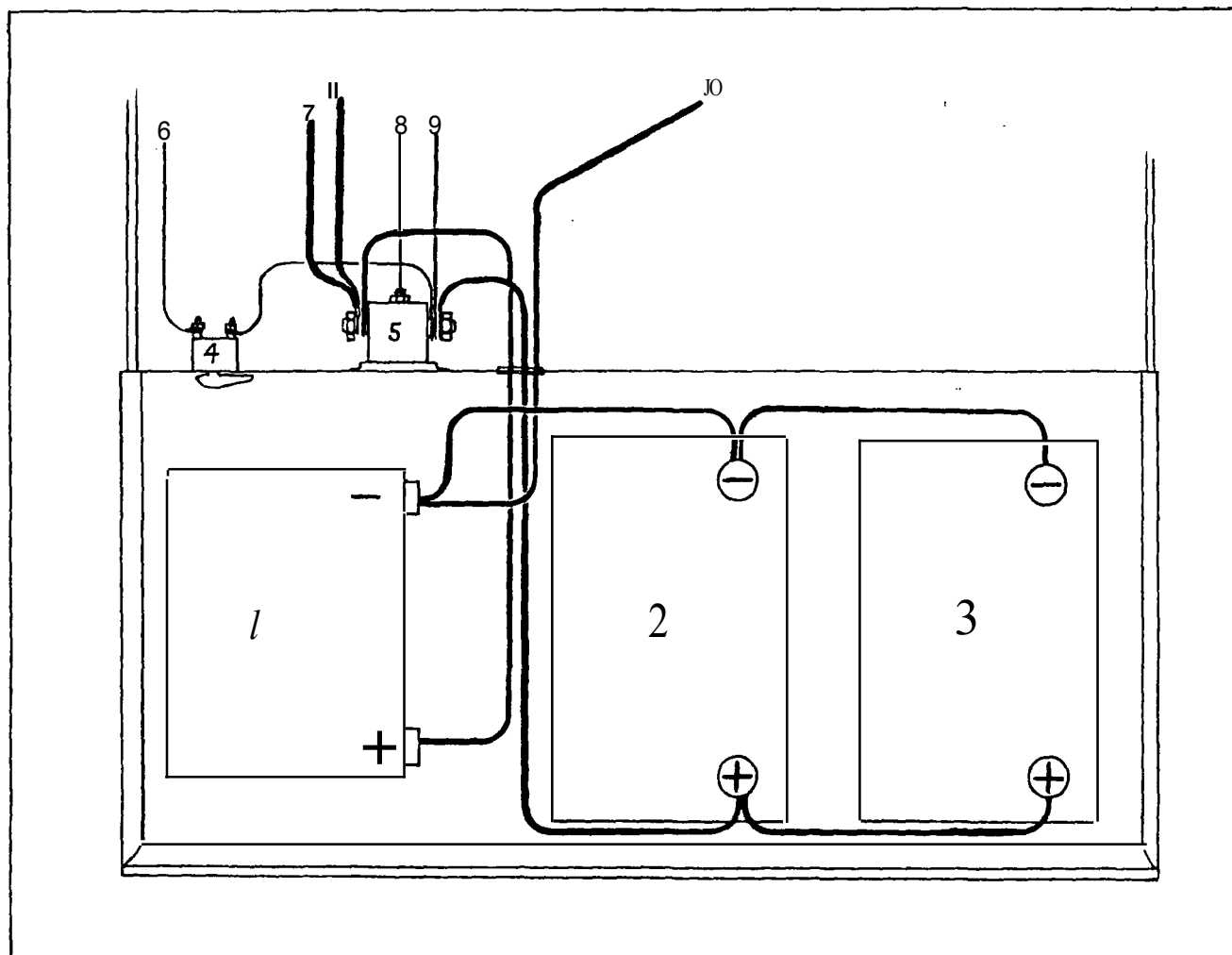


- 1+ To start assist switch
- /ē To brake control, tag axle
- 0+ To spot light switch
- 1ē Circuit breaker, 12V-30Amp
- 2+ To coach batteries, junction at main solenoid
- 3+ Circuit breaker, 12V-50Amp
- 4+ Isolator to main breaker

- 8. Isolator
- 9• To Alternator
- 10. To compressor for air ride
- 11. To power seat, Roadside
- 12. To power seat, Curbside
- 13. Circuit breaker, 12V-30Amp
- 14. To engine battery, junctions at starter and main solenoid

The function of the isolator is to allow the coach batteries to charge up from the alternator when driving, yet prevent the engine battery from becoming discharged when the ignition key is turned off.

MAIN BATTERLS ENOID AND "KILL" SWITCH



1. Engine Battery
2. Coach Battery
3. Coach Battery
4. "Kill" Switch (always leave switch on when operating interior lights and appliances.)
5. Main Battery Solenoid
6. To 12 volt fuse panel
7. To starter
8. To ignition "start" wire
9. To isolator
10. Grounded on frame
11. To Generator, 270 model only

The main battery solenoid and kill switch is mounted on the back of the battery slide out compartment. When the ignition key is turned to start, power is fed to the solenoid, closing the points, which connects all three batteries together when the engine cranks.

The Kill switch, in the off position, breaks the circuit between the coach batteries and the 12 volt interior fuse panel.

CAUTION: Never operate the interior lights and appliances without the kill switch on. The system is designed to operate with the batteries in the circuit. Operation on univolt power only will blow radio fuses, shorten 12 volt motor life, and can cause damage to transistorized components.

OPERATION

The main battery solenoid, 80 amp circuit breaker and nkillⁿ switch are mounted on the back of the battery slide out drawer. On gasoline powered vehicles the solenoid contacts are only closed when the auxiliary start switch located in the glove box is activated. This ties all three batteries together for emergency cranking power.

On diesel powered units the solenoid is tied into an ignition start wire so the batteries are automatically tied together whenever the ignition key is turned to the start position.

Item 12 is a heavy duty junction block mounted to the frame rail. Its purpose is to give a convenient terminal to connect the heavy wires together between the solenoid, 110 volt generator, hydraulic jack pump and engine starter.

The Kill switch, in the off position, breaks the circuit between the coach batteries and the 12 volt interior fuse panel.

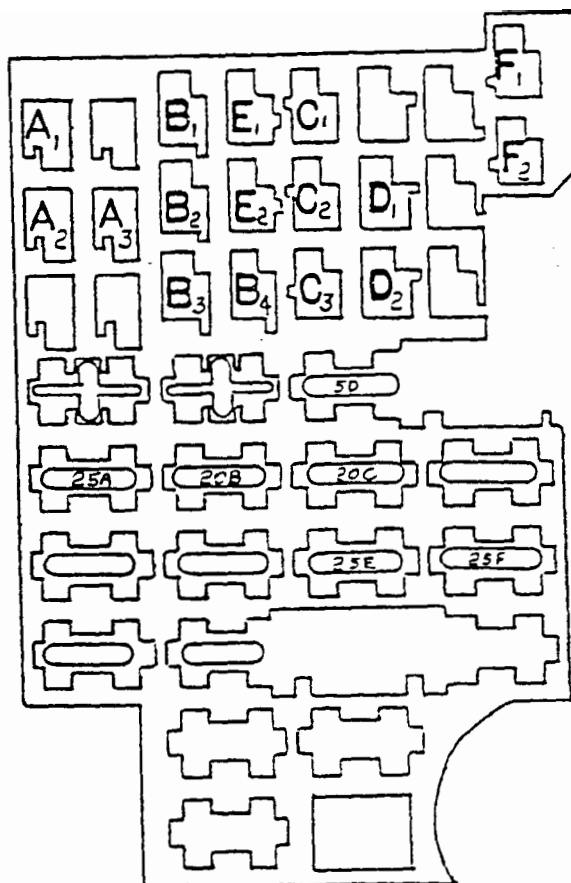
CAUTION: Never operate the interior lights and appliances without the kill switch on. The system is designed to operate with the batteries in the circuit. Operation on univolt power only will blow radio fuses, shorten 12 volt motor life, and can cause damage to transistorized components.

1985 CHEVROLET FUSE BLOCK

On the drawing of the 1985 Chevrolet fuse block the upper section with large letters and small numbers represent the circuits Airstream uses.

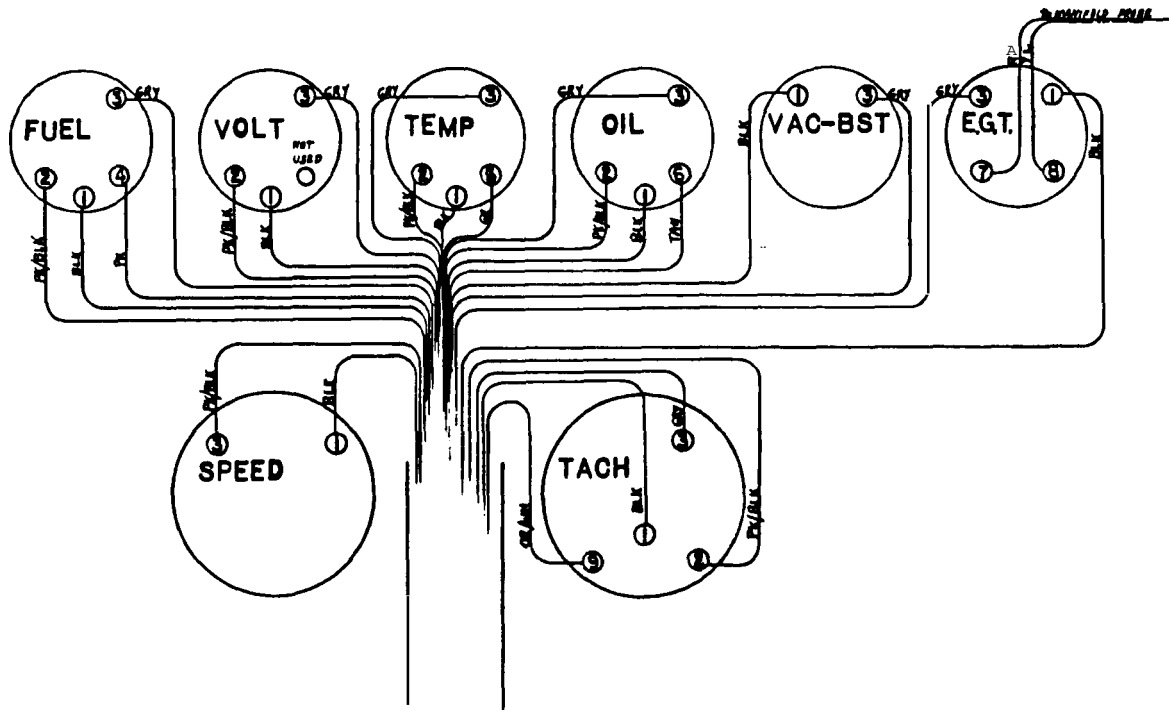
The lower section is for the fuses. Airstream uses the fuses where the amperage size and circuit is noted. (ie: ZOC is a 20 amp fuse feeding all three C circuits in the upper section.)

Other fuses in the block are standard Chevrolet fuses not used or modified by Airstream.



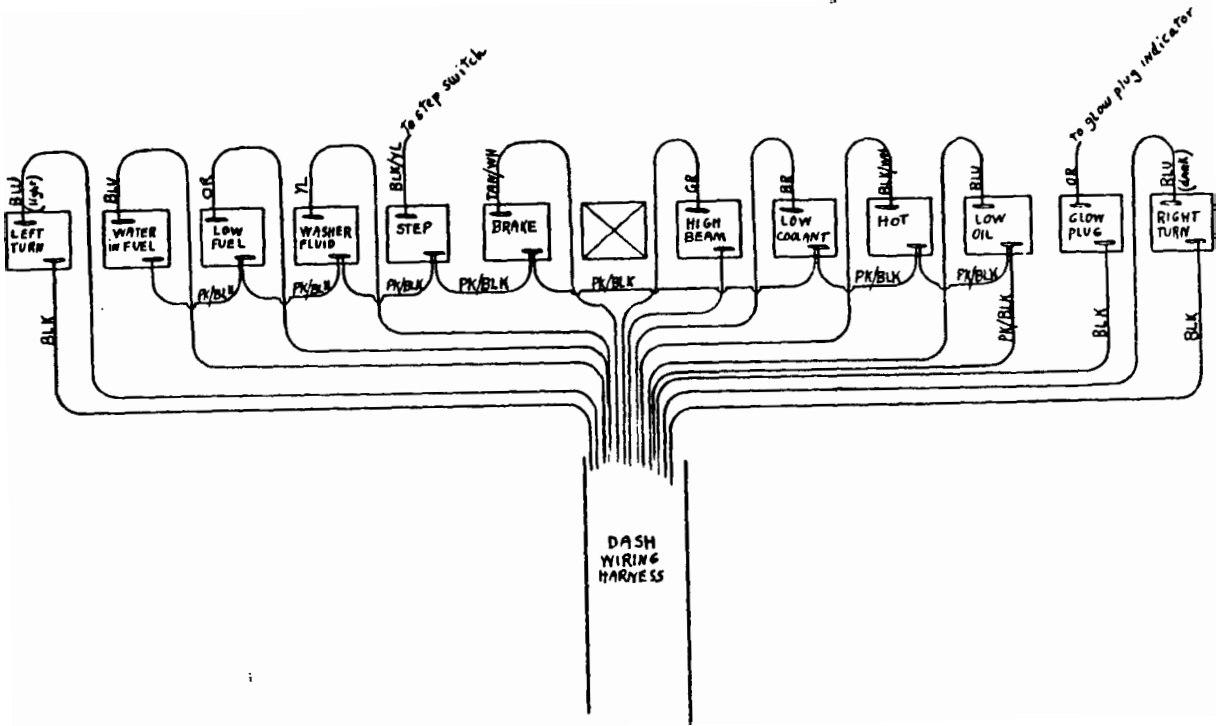
<u>Circuit</u>	<u>Fuse</u>	<u>Connector Color</u>	<u>Wire Color and Gauge</u>	<u>Function</u>
A1	25 amp	Black	Yellow, 16 ga.	Parking brake warning w/Allison Trans.
A2	25 amp	Black	Blue, 14 ga.	Visor light, horn
A3	25 amp	Black	Orange, 14 ga.	Cigarette lighter
B1	20 amp	White	Yellow, 14 ga.	Step Solenoid
82	20 amp	White	Red, 18 ga.	Tire tele system
83	20 amp	White	Red, 18 ga.	Cruise Control
84	20 amp	White	Red, 16 ga.	Allison buzzer
C1	20 amp	Brown	Yellow, 10 ga.	Compressor relay for air bags
C2	20 amp	Brown	Red, 16 ga.	Back up monitor
C3	20 amp	Brown	Yellow, 14 ga.	Door lock
01	5 amp	Green	Gray, 18 ga.	Light at cigarette lighter
02	5 amp	Green	Gray, 18 ga.	Light at gear indicator
E1	25 amp	Blue	Black, 14 ga.	Dash heater and air conditioner
E2	25 amp	Blue	Red, 14 ga.	Auxiliary heater
F1	25 amp	Gray	Red, 16 ga.	Refrigerator relay only
F2	25 amp	Gray	Yellow, 14 ga.	Wipers

DASH INSTRUMENTS

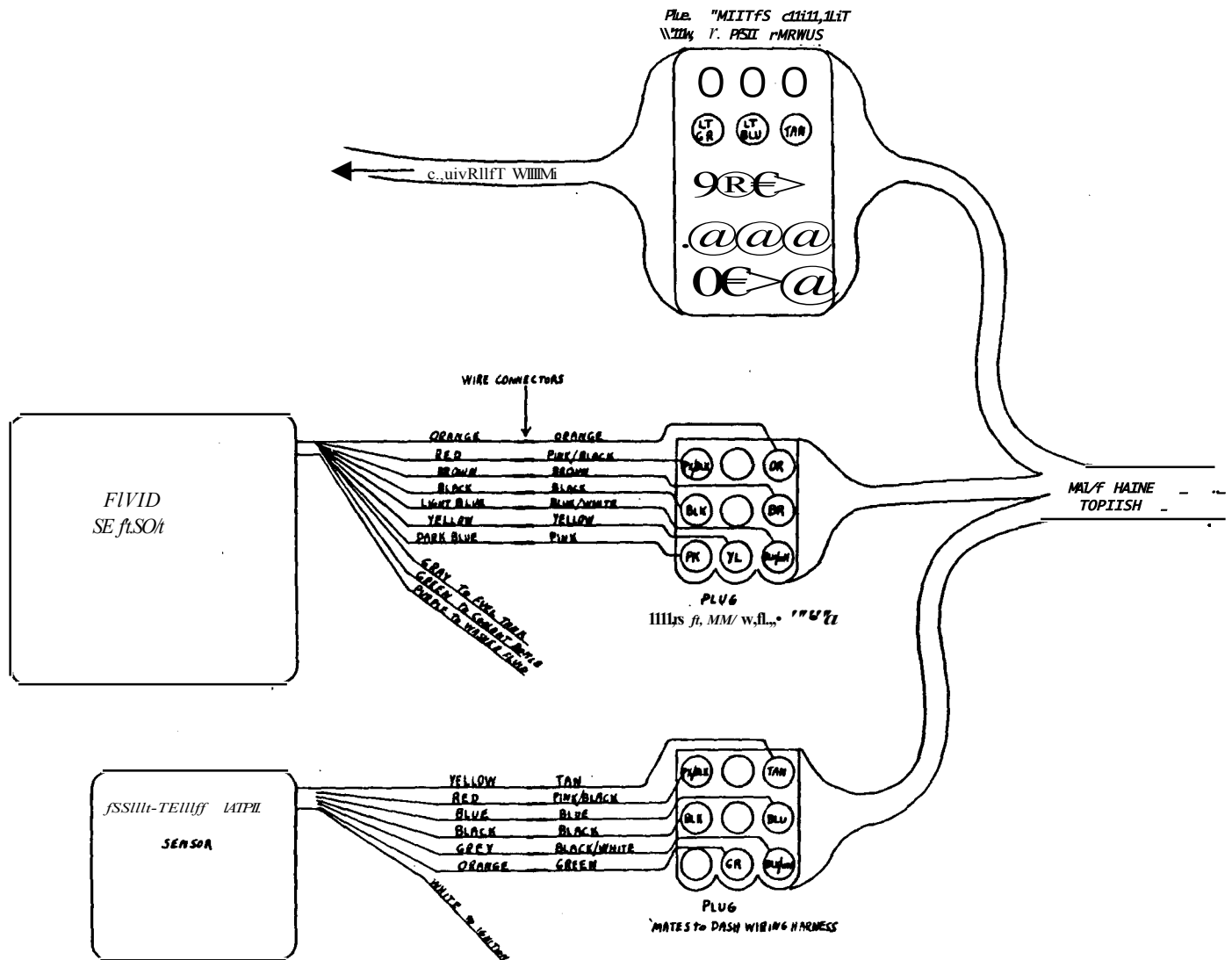


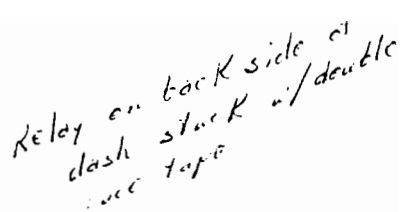
1. Black wire - ground
2. Pink w/ black tracer - hot ignition
3. Grey - display lights - tied into head light switch
4. Pink - to Chevrolet harness - fuel tank sender
5. Green - to Chevrolet harness - temperature sender
6. Tan - to Chevrolet Harness - oil pressure sender
7. Red - to exhaust manifold probe
8. Yellow - to exhaust manifold probe
9. Orange w/ white tracer - to Chevrolet harness - electronic distributor

DASH LIGHT BAR

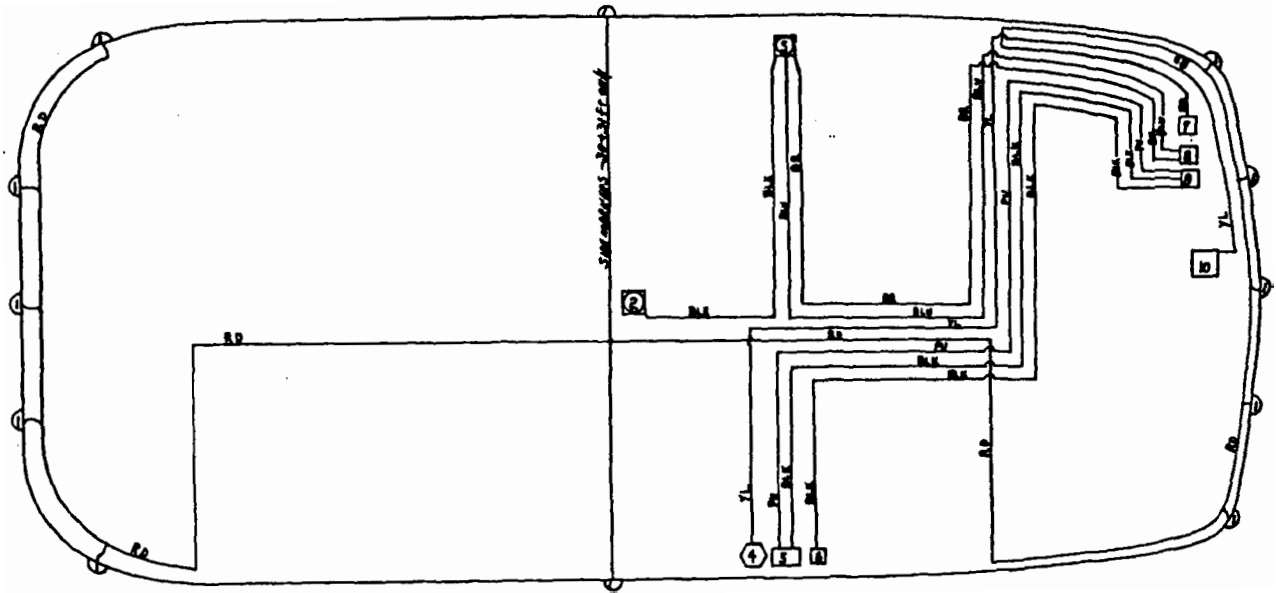


DASH HARNESS PLUGS



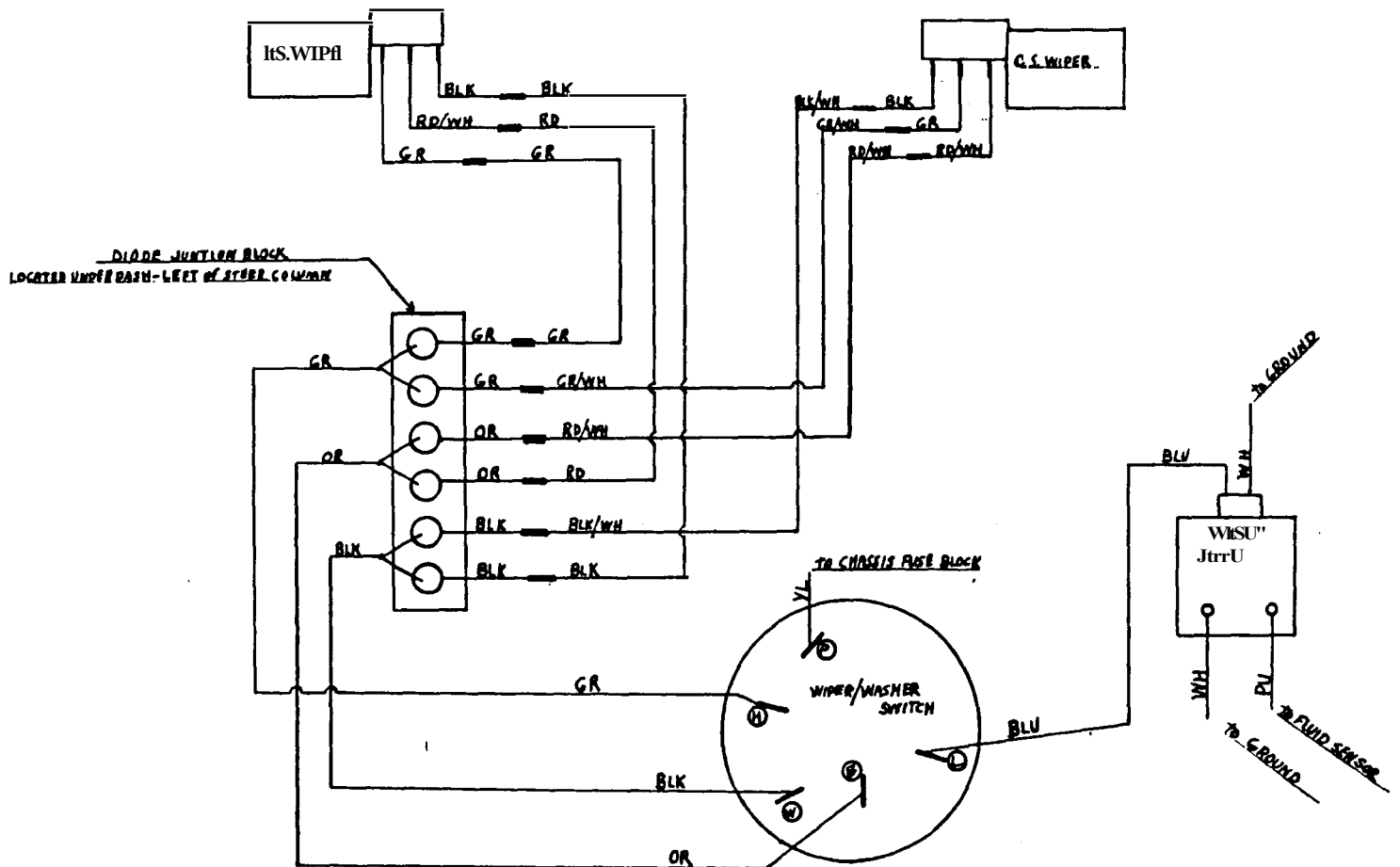
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DASH TO BODY LIGHTS AND APPLIANCES

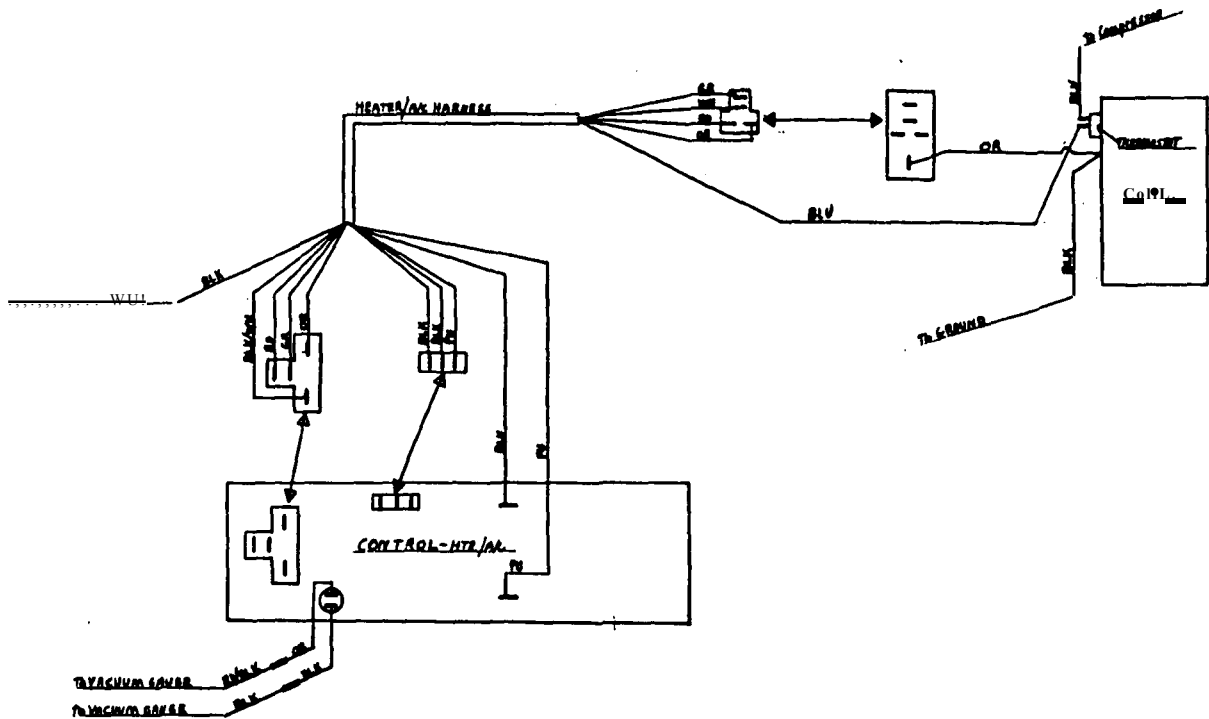


1. Clearance lights
2. Ceiling fan
3. Auxiliary heater
4. Refrigerator
5. Electric dead bolt
6. Switch, Mercury, dead bolt
7. Switch, I.C.C. blink
8. Switch, auxiliary heater
9. Switch, dead bolt
10. Fuse block, 12 volt chassis

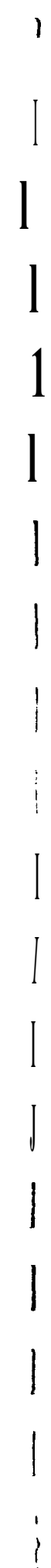
WINDSHIELD WIPERS



DASH HEATER AND AIR CONDITIONER

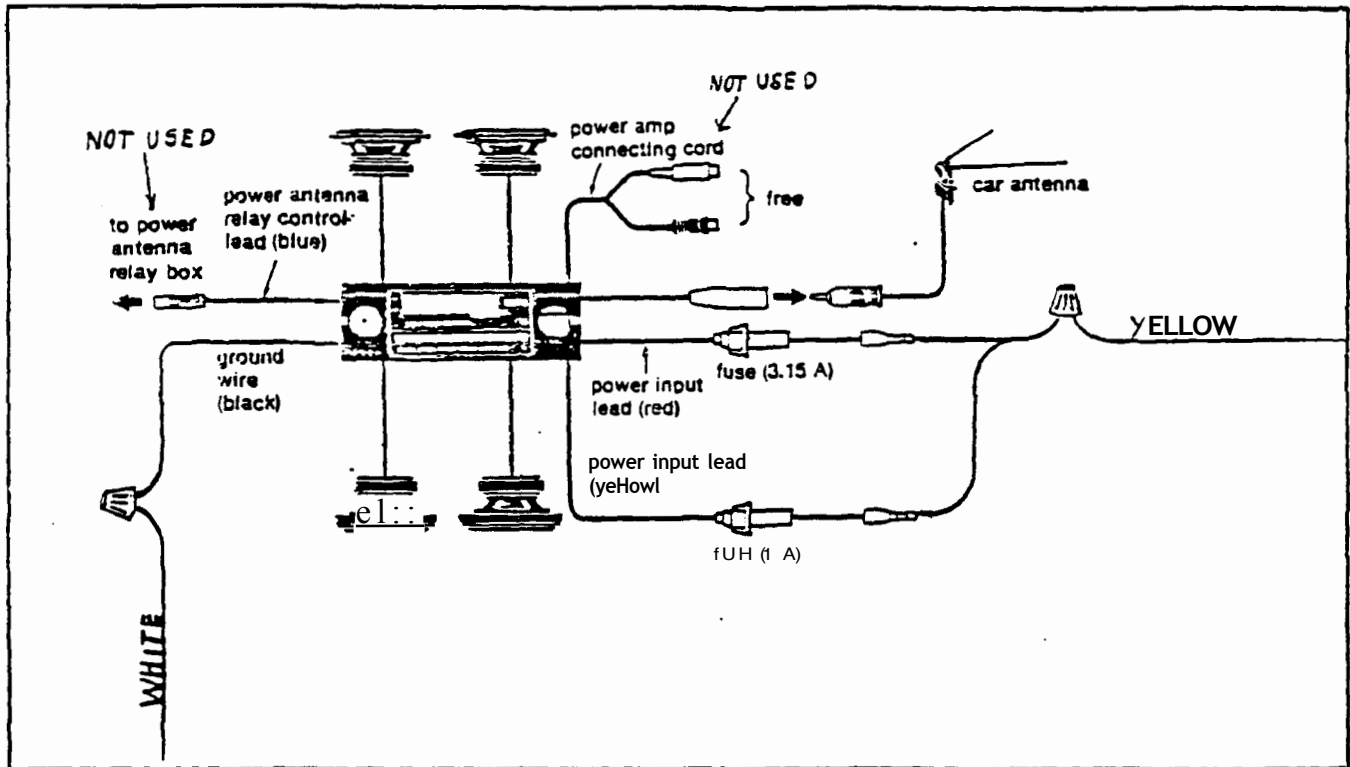


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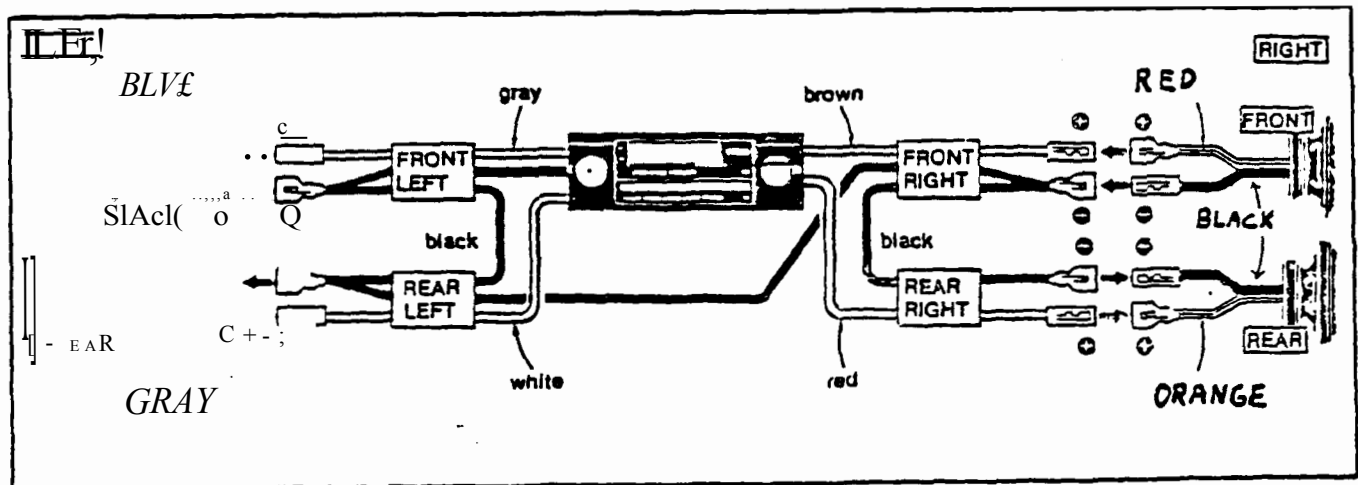


ENTERTAINMENT CENTER WIRING, SONY XR-45

POWER SUPPLY

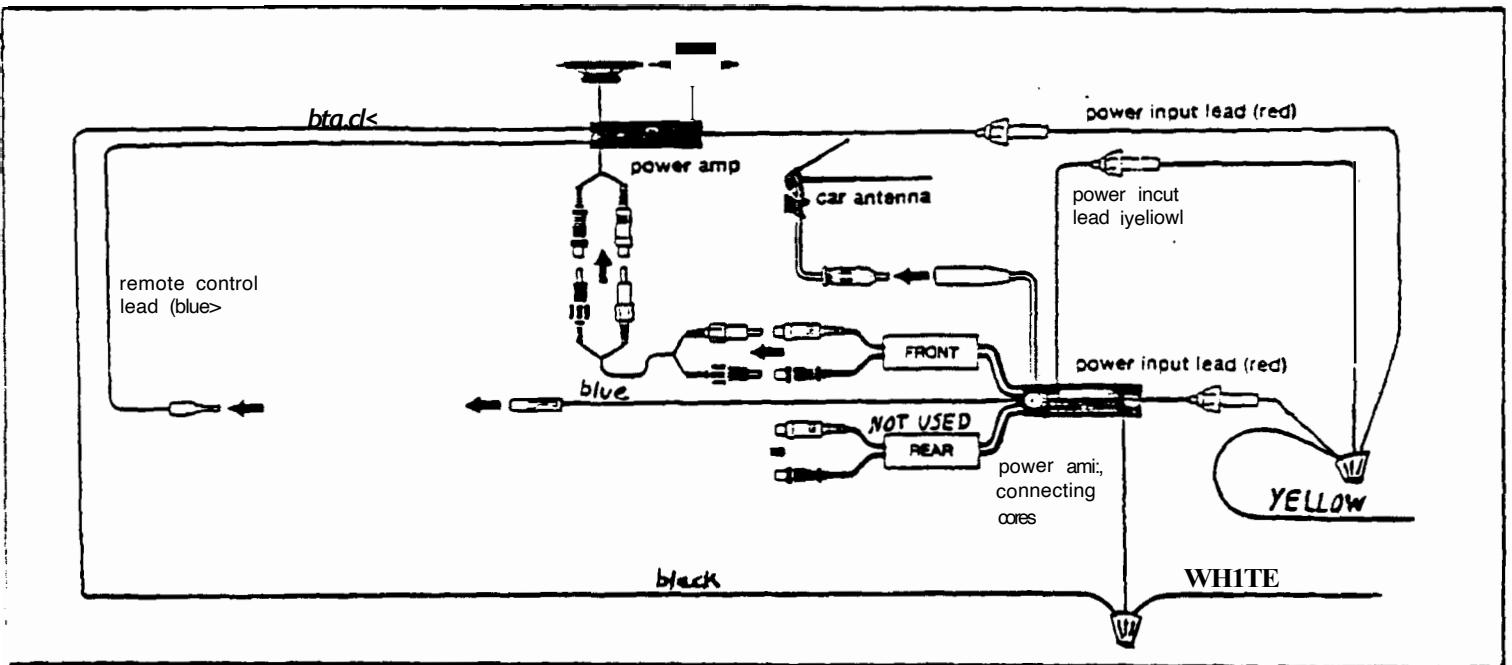


SPEAKER

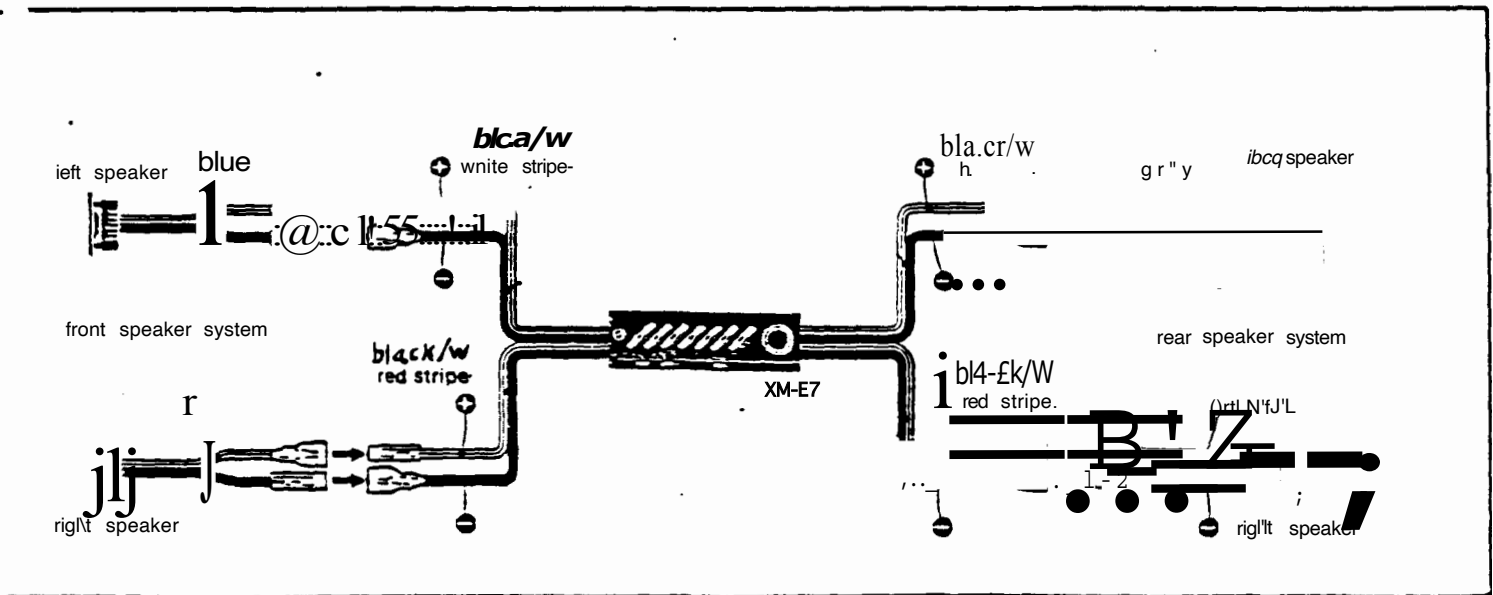


SONY XR-7 WITH XM-E7 POWER AMPLIFIER

POWER SUPPLY TO RADIO - CONNECTION RADIO TO POWER AMPLIFIER



SPEAKER

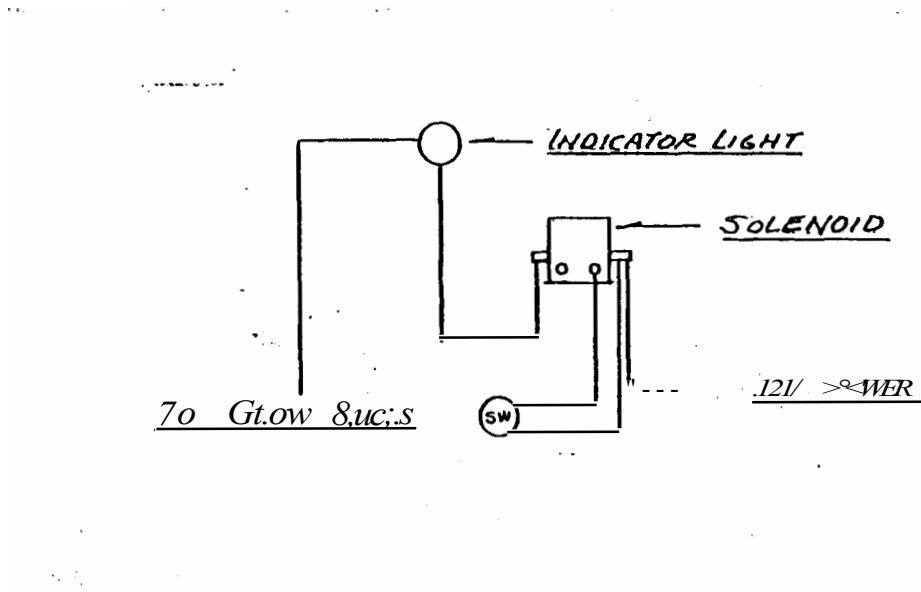


It should be noted the Sony system is designed for many different applications, so you will find many wires not used.

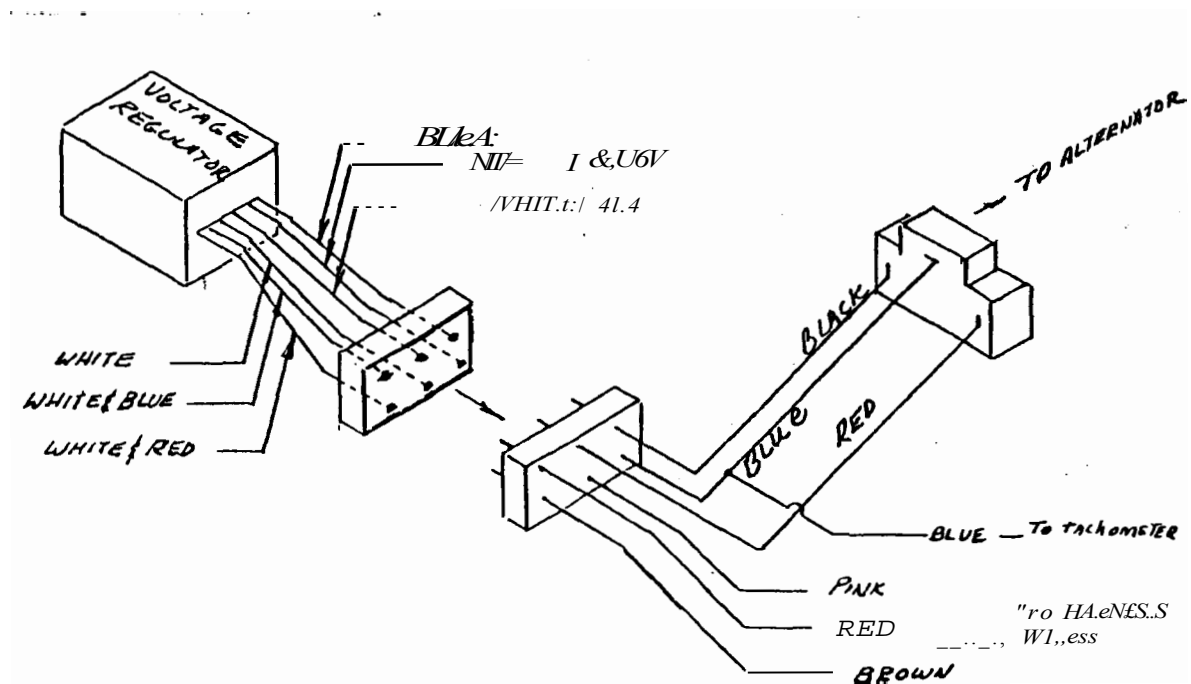
The wires we use from the power amplifier to the front speakers are tagged "FRONT". The rear speaker wires we use are identical in appearance to the front, but are not tagged.

In the ten speaker system with the power amplifier, the upper mid speakers are tied in with the front speakers. The dual lower mid speakers are tied in with the rear. The speaker wire junction for the mid speakers is located in the roof of the motor home and is not affected by the wiring at the dash units.

GLOW PLUG CIRCUIT



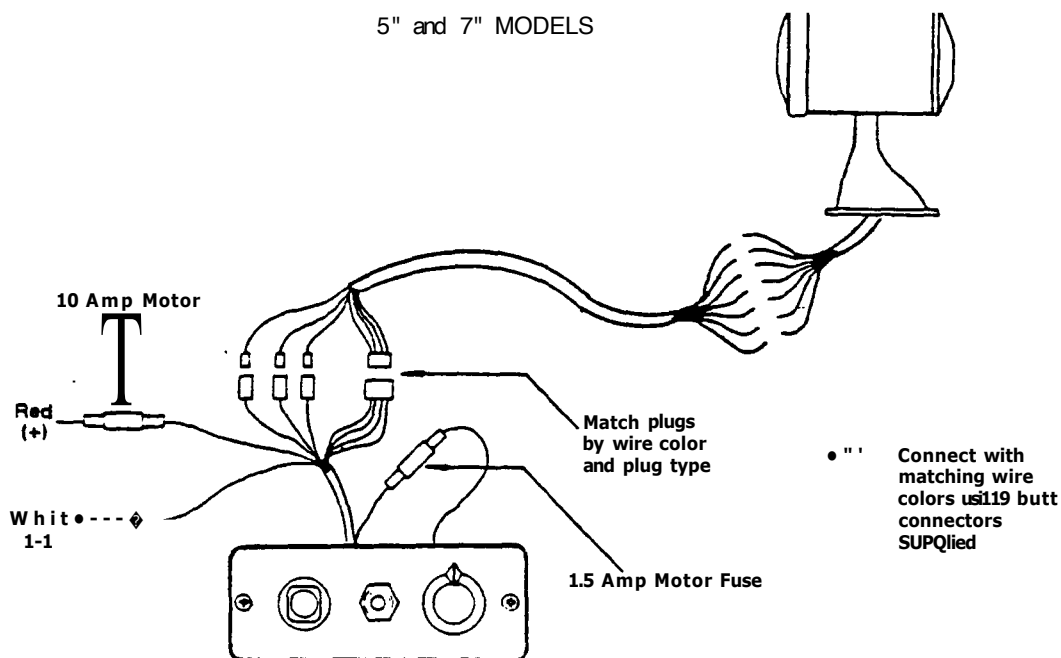
ALTERNATOR WIRING



SPOT LIGHT

WIRING DIAGRAM, SINGLE PANEL CONTROL

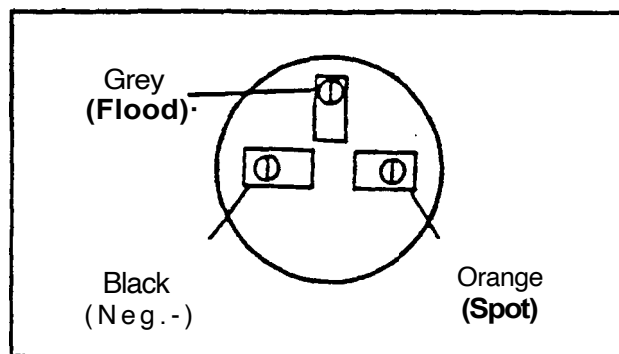
5" and 7" MODELS



Power to the spot light is supplied from the 25 amp automatic circuit breaker mounted next to the isolator. The fuses shown in the above diagram are both accessible by removing the switch panel.

BULB REPLACEMENT

Loosen screw and remove bulb retaining ring. Disconnect wires from faulty bulb. Connect wires to new bulb as shown in diagram. Install bulb and fasten with bulb retaining ring.



TROUBLESHOOTING

All lights are thoroughly inspected before shipping and are warranted to operate within specifications. If light does not operate correctly, CHECK FUSES, **WIRE HARNESS CONNECTIONS AND COLOR MATCHING OF WIRES**. ~~Proceeding~~ **PROCEEDING** WITH THIS TROUBLESHOOTING.

PROBLEM

SOLUTION

1. Dual filament bulb works in reverse (up is spot, down is flood) •

Disconnect orange and ray wires.
Reconnect as follows,

(Orange from light) to (Grey from switch)

(Grey from light) to (Orange from switch)

2. Control lever works in reverse in all directions (left is right, down is up, etc.)

Reverse Red and White battery connections.

3. Control lever works in reverse in horizontal direction only (left is right and right is left).

Disconnect Yellow and Blue wires.
Reconnect as follows:

(Yellow from light) to (Blue from switch)

(Blue from light) to (Yellow from switch).

4. Control lever works in reverse in vertical direction only (up is down, and down is up)

Disconnect Green and Violet wires.
Reconnect as follows:

(Green from light) to (Violet from switch)

(Violet from light) to (Green from switch)

5. Light moves in only three of the four possible directions:

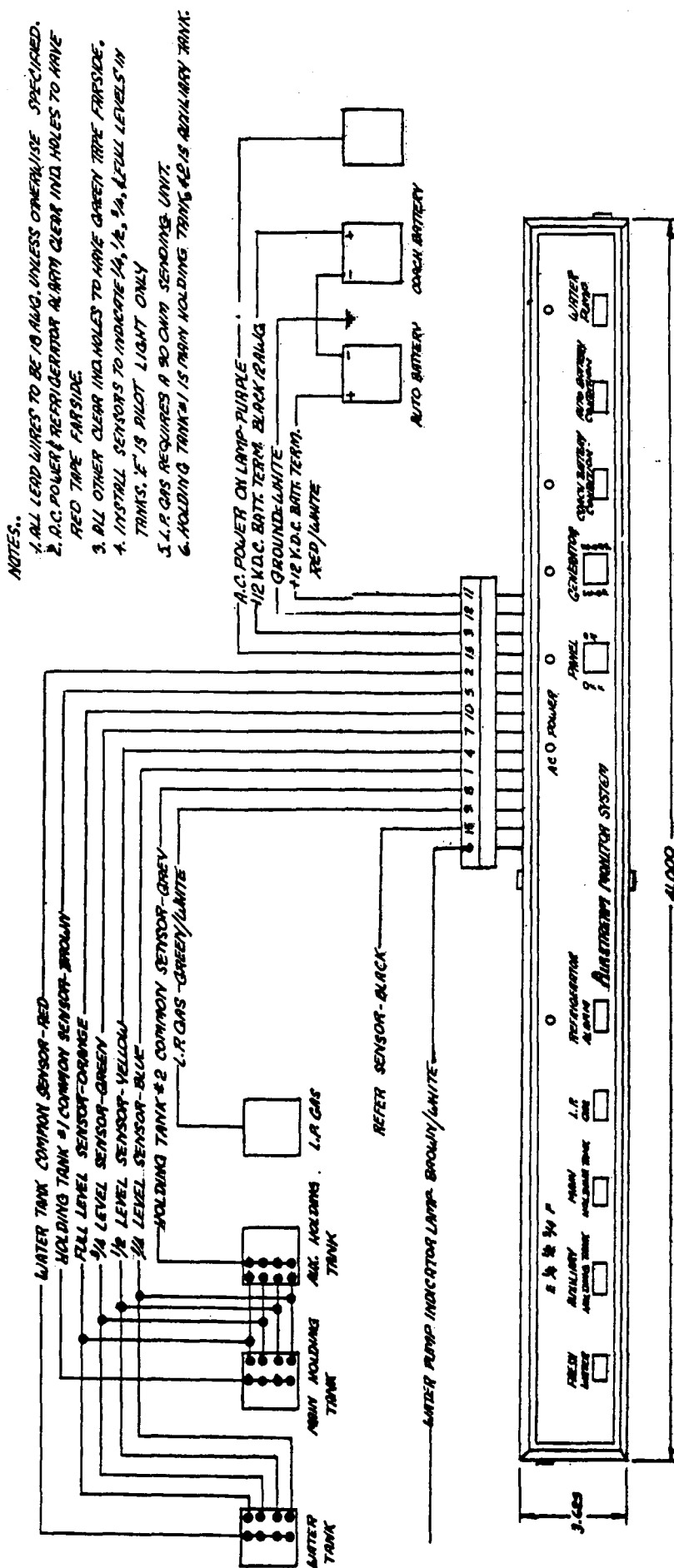
a. One horizontal direction is inoperative.

Reverse connections as in Step 3. If opposite horizontal motion becomes inoperative, replace the switch. If problem persists, return light for service.

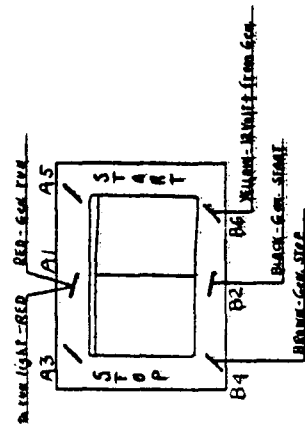
b. One vertical motion is inoperative.

Reverse connections as in Step 4. If opposite vertical motion becomes inoperative, replace the switch. If problem persists, return light for service.

MOTORHOME CONTROL PANEL WIRING DIAGRAM



MOTORHOME CONTROL PANEL WIRING DIAGRAM



CONTROL PANEL REMOVAL

1. Remove main 50 amp fuses from 12 volt distribution panel.
2. Using care not to damage the surrounding cabinet, **gently** pry the control panel out. It is held in position with spring clips that snap into position.
3. Note wiring connections on generator switch for reference, and remove wires.
4. Cut wire between generator run light and switch wires, keeping in mind it will have to be spliced back together.
5. Disconnect main harness.
6. Reverse procedures to reinstall.

BULB REPLACEMENT

1. Follow the first two steps described above.
2. On single bulb installations the bulb bracket is removed from the control panel by squeezing the sides inward to release the prongs.
3. Slide the cardboard cylinder off the bulb socket
4. Depress bulb and twist 1/4 turn counterclockwise.
5. On bulbs connected to circuit boards the boards must be taken loose from their mounting studs to gain access to the bulbs.

TANK PROBES

OPERATION

1. Each tank has one common probe and four additional probes at specific levels in the tank.

2. The stainless steel pin of the probe is exposed to the interior of the tank.
3. Continuity of the level indicator circuitry is completed when the liquid contacts both the common probe and the probe set at the specific level. Probes are placed at the 1/4, 1/2, 3/4 and full level.

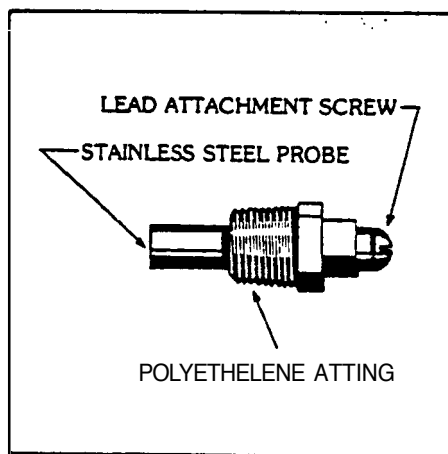
MAINTENANCE

1. Accumulations of oxides, dirt, etc., may build up on the probe pins, thus increasing the resistance between the common probe and level probes. However, excessive resistance will require the probe to be removed and cleaned, or replaced with a new probe.
2. The waste tank probes are located directly above and beside the gate valves. (Water tank usually never needs cleaned.)
3. The probe assemblies may be removed by rotating the probe assembly counterclockwise. The probe body has a square head for an open end wrench.

TESTING

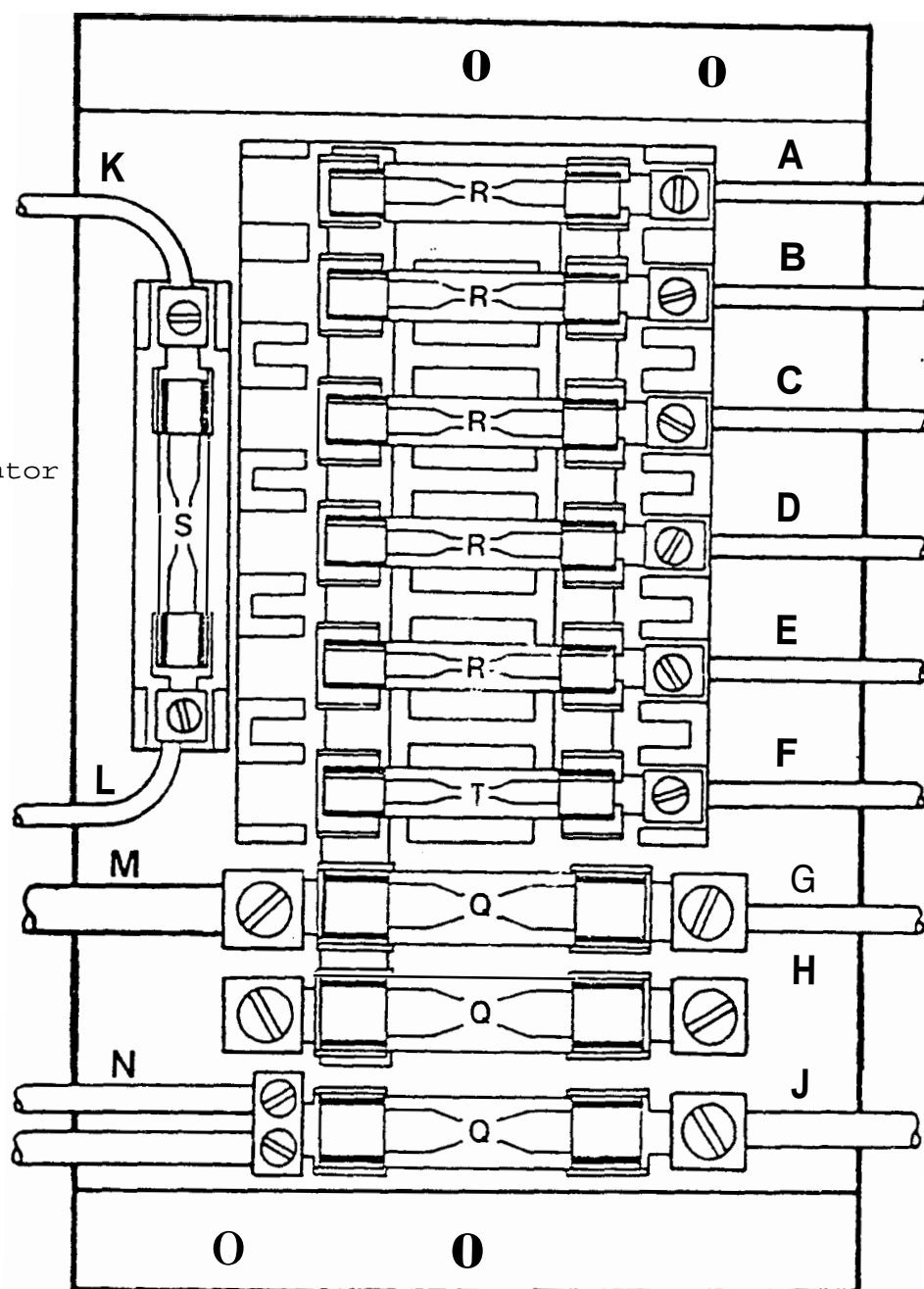
1. Drain tank completely.
2. With tanks empty, push display button. If any of the lights light up, the problem is a dirty or defective probe. Remove probe and clean or replace as necessary.
3. If none of the lights light up when the display button is pushed, check the display lights as follows:
 - a. Connect a wire from the common probe (brown lead) to the empty probe (red lead). If the empty light lights up when the display button is pressed, the circuit and lights are okay.

- b. Repeat this procedure for each probe circuit. If any light fails to light up, check the wire leading to the control panel for shorts or opens. Repair or replace as necessary.
- c. If the problem is in the control panel, replace the entire panel.



12 VOLT DISTRIBUTION PANEL

- A. Circuit #1
- B. Circuit #2
- C. Circuit #3
- D. Circuit #4
- E. Circuit #5
- F. Circuit #7
- G. Coach Battery Isolator + (pos)
- H. Spare Fuse
- J. Coach Battery - (Neg)
- K. Power on Light (Control panel)
- L. Power On (Univolt)
- M. Univolt + (pos)
- N. Univolt - (neg)
- Q. AGU 50 amp fuse
- R. SFE 20 amp fuse
- S. SFE 4 amp fuse
- T. SFE 30 amp fuse



12 VOLT DISTRIBUTION FUSE PANEL

All connections of wires to the fuse panel must be clean and tight.

Prior to replacing fuses make sure inside surfaces of fuse clips are clean and squeeze clip to provide adequate tension against the fuse. Dirt or inadequate clip tension will produce a greater resistance resulting in heat and voltage drop.

BRANCH CIRCUITS

The six interior branch circuits distribute 12 volt D.C. power from the univolt's remote fuse panel to the interior lights, fans, water pump and other 12 volt appliances. The circuits are protected by a 20 amp fuse in the remote fuse panel, except for circuit #7 going to the refrigerator which has a 30 amp fuse.

UNIVOLT CONVERTER

The univolt converter transforms 120 volt alternating current (A.C.) into 12 volt nominal direct current (D.C.). This provides power to charge the motorhome coach batteries, and to operate the 12 volt interior lighting, fans, and appliances.

The converter is energized when the motorhome is hooked up to 120 volt city power, or utilizing 120 volt generator power.

12 VOLT WIRING DIAGRAMS

The wiring diagrams on the following pages are designed to be representative of the 1983 1/2 and 1984 motorhomes. Occasionally a wire color will be substituted, but this should not cause any particular problem. Turning on all the lights and pulling the fuse on each circuit one at a time will indicate which wire was changed.

The first set of diagrams shows the wires from the 12 volt fuse panel to their termination point.

The second set of diagrams shows wires from remote switches to the lights or appliances powered by them.

The third set of diagrams shows the control panel wiring within the body of the unit.

The figure contains two line graphs. The left graph has a y-axis labeled 'Rate of reaction' and an x-axis labeled 'Temperature'. The curve starts at a low rate at low temperature and rises steeply, becoming a nearly vertical line at higher temperatures. The right graph also has a y-axis labeled 'Rate of reaction' and an x-axis labeled 'Temperature'. This curve starts at a low rate at low temperature and rises more gradually and linearly as temperature increases.

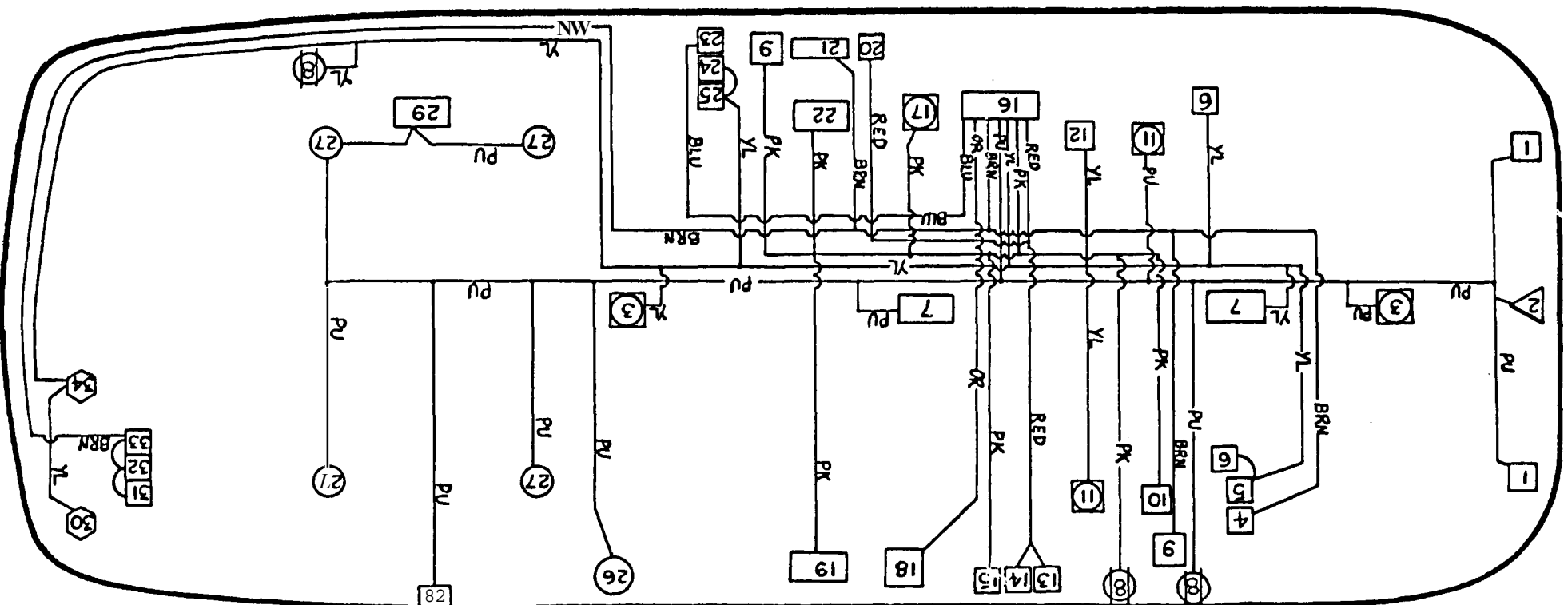


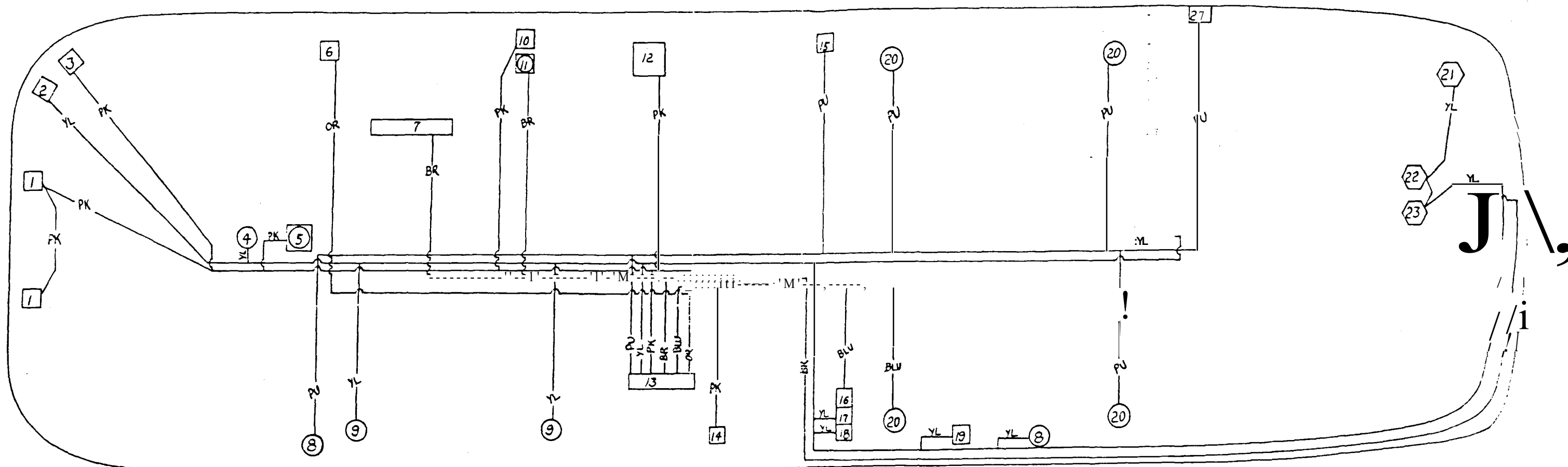
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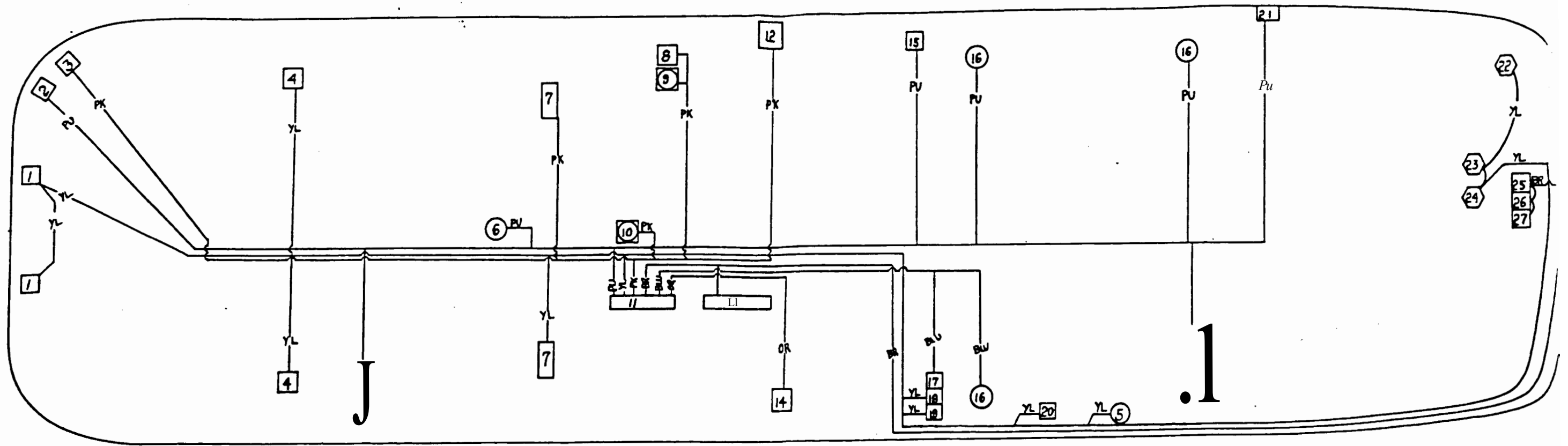
The diagram shown is for the 325 and 345 series. The 310 wiring diagram in your 1984 Service Manual covers the 290 series.





1984 - 270 SERIES
FUSE PANE TO SWITCH. OR APPLIANCE

- | | | | |
|-------------------------|------------------------|--------------------------------|--------------------------------|
| 1. Bath lights | 8. 12 volt outlet | 20+ Switch, galley lights | 22. Stereo amplifier |
| 2. Switch, bath exhaust | 9. Reading lights | 20+ Switch, living room lights | 23. Radio tape player |
| 3. Switch, water heater | 10. Oven | 17. Switch, step light | 24. Switch, map light |
| 4. Ceiling light | 11. Range Exhaust | 18. Switch, flood light | 25. Switch, compartment lights |
| 5. Ceiling vent fan | 12. Furnace | 19. Switch, TV antenna | 26. Walkway lights |
| 3 Refrigerator | 13. 12 volt fuse panel | 14+ Reading lights | 27. Door bell |
| 7. Control Panel | 14. Switch, bed lights | 14+ C.B. radio | |



1984 - 300 SERIES

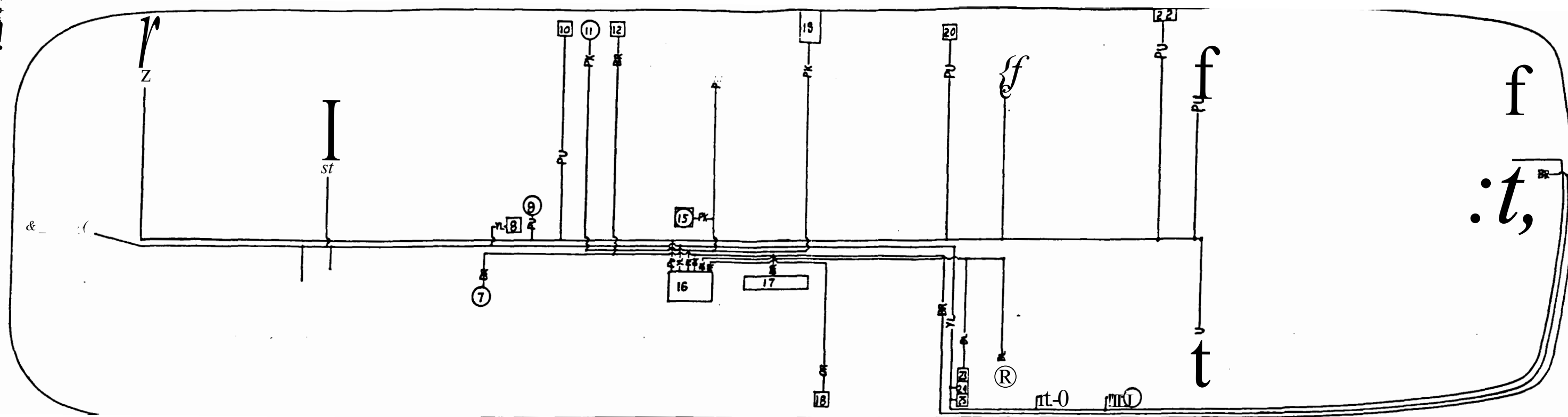
-FUSE PANEL TO SWITCH OR APPLIANCE

1. Bath lights
2. Bath exhaust fan switch
3. Water heater switch
4. Hanging wardrobe lights
5. 12 volt outlet
6. Ceiling light
7. Bed lights

8. Oven
9. Range exhaust
10. Ceiling vent fan
11. 12 volt fuse panel
12. Furnace
13. Control panel
14. Refrigerator

15. Galley light switch
16. Reading lights
17. Living room light switch
18. Step light switch
19. Flood light switch
20. TV antenna switch
21. Door bell

22. C.B. radio
23. Stereo amplifier
24. Radio, tape player
25. Map light switch
26. Compartment light switch
27. **Walkway** light switch



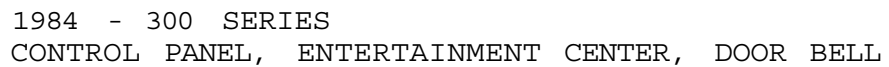
1984 CENTER BATH SERIES 310
12 VOLT FUSE PANEL TO SWITCH OR APPLIANCE

1. Light, rooflocker
2. Digital cloik
3. 12 volt outlet
4. Light, wardrobe
5. Switch, bedroom light
6. Light, wardrobe
7. Light, shower
8. Switch, shower exhaust fan

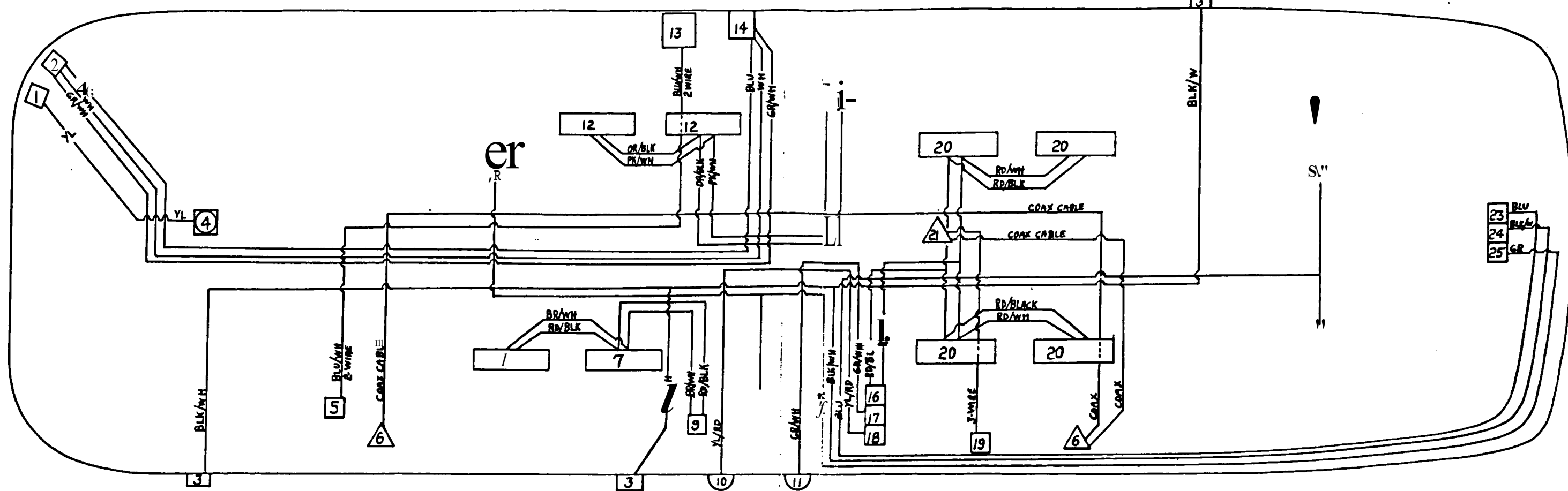
9. Light, ceiling
10. Switch, bath exhaust
11. Switch, bathroom light
12. Switch, water heater
13. Light, oven
14. Fan, range exhaust
15. Fan, ceiling vent
16. 12 volt fuse panel

17. Control panel
18. Refrigerator
19. Furnace
20. Switch, galley lights
21. Lights, reading
22. Door bell
23. Switch, living room lights
24. Switch, step light

25. Switch, flood light
26. Switch, TV antenna
27. Switch, **walkway** lights
28. Switch, compartment lights
29. Switch, map lights
30. Radio/tape player
31. Stereo amplifier
32. C.B. radio



- G-34



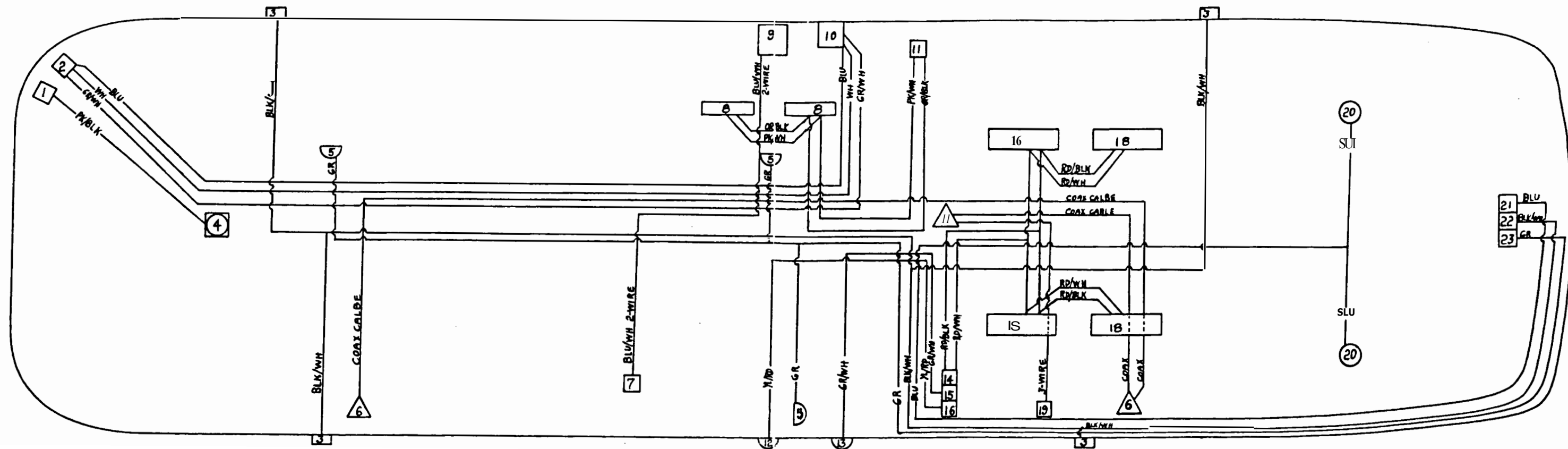
1984 - 270 SERIES
SWITCH TO LIGHT OR APPLIANCE

1. Switch, bath exhaust
2. Switch, water heater
3. Compartment light
4. Bath exhaust fan
- S. Thermostat, furnace
6. TV jack

7. Bed lights
8. Walkway lights
9. Switch, bed lights
10. Flood light
11. Step light
12. Galley lights

13. Furnace
14. Water heater
15. Switch, galley lights
16. Switch, living room lights
17. Switch, step lights
18. Switch, flood light

19. Switch, TV antenna
20. Living room lights
21. TV antenna
22. Map lights
23. Switch, map light
24. Switch, compartment lights
25. Switch, Walkway lights



1984 - 300 SERIES
SWITCH TO LIGHT OR APPLIANCE

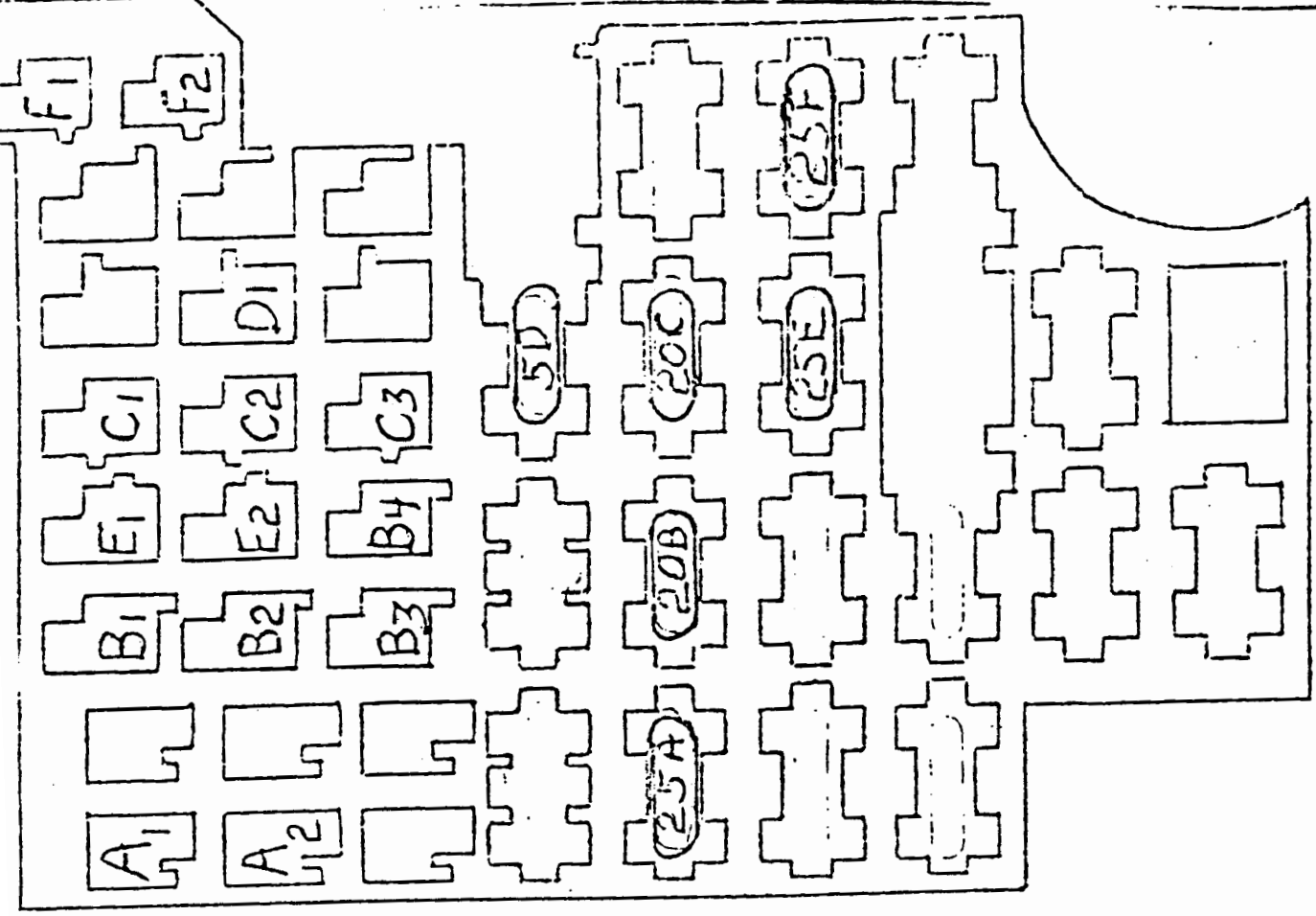
1. Bath exhaust switch
2. Water heater switch
3. Compartment lights
4. Bath exhaust fan
5. Walkway lights
6. TV jacks

7. Furnace thermostat
8. Galley lights
9. Furnace
10. Water heater
11. Galley light switch
12. Flood light

13. Step light
14. Living room light switch
15. Step light switch
16. Flood light switch
17. TV antenna
18. Living room lights

19. TV antenna switch
20. Map lights
21. Map light switch
22. Compartment light switch
23. Walkway light switch

2/10/86



CIRCUIT FUSE	CONN. COLOR	WIRE COLOR GAUGE	FUNCTION
A-1 25 AMP	BLACK	Blue-16 ga	mag light, horn
A-2 25 AMP	BLACK	ORANGE-14 ga	cigarette lighter
B-1 20 amp	White	yellow 14 ga	step, extend
B-2 20 amp	White	red 16 ga	refrigerator relay
B-3 20 amp	White	red 18 ga	cruise control
B-4 20 amp	White	yellow 14 ga	compressor for air bag
C-1 20 amp	Brown	yellow 14 ga	door lock
C-2 20 amp	Brown	red, 16 ga	back up monitor
C-3 20 amp	Brown	red, 18 ga	tire valve
D-1 5 amp	Green	gray 18 ga	light at cigarette lighter
E-1 25 amp	Blue	black 12 ga	dash heater and air conditioner
E-2 25 amp	Blue	red 12 ga	auxiliary heater
F-1 25 amp	Gray	yellow 14 ga	wiper
F-2 25 amp	Gray	yellow 14	exterior mirror

TANDY TV ANTENNA

OPERATION

With the TV set on and a station tuned in, rotate the antenna by pressing the rocker switch located on the control unit. Pressing the right side of the switch will turn the antenna in a clockwise direction. Pressing the left side will turn it counterclockwise. Although the actual antenna movement cannot be seen, the indicator arrow on the control unit will light, showing the direction of antenna rotation.

When the antenna has made one full turn (360 degrees), the End of Rotation light will come on.

Observe the picture while rotating the antenna first in one direction and then the other, until the best picture quality is obtained.

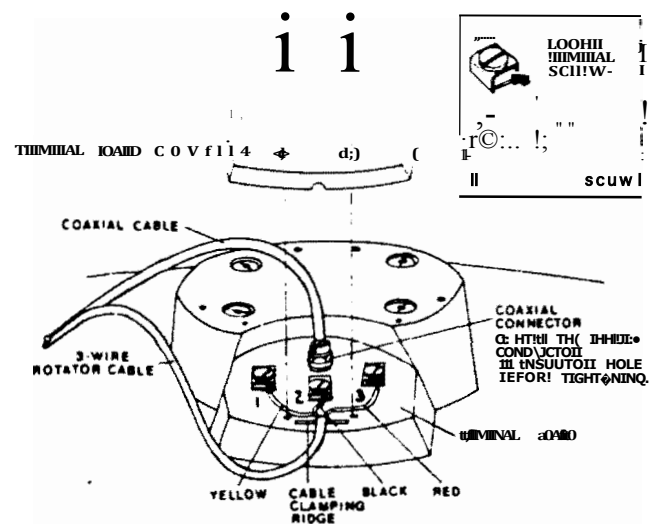
CIRCUIT DESCRIPTION

The Mini-State 5MS660 system consists of an antenna amplifier, rotator drive unit, rotator control unit, wall plate, power supply and VHF/UHF band separator.

The VHF section of the antenna is a circularly shaped, slot tuned, broadband, unidirectional traveling wave antenna. The UHF section is a broadband multi-element array. The VHF signal is amplified and combined with the UHF signal by means of an adder circuit. The combined VHF/UHF signal travels down a coaxial cable to the power supply and through C1 to the band separator, where they are separated and transformed to 300 ohms for connection to the TV set.

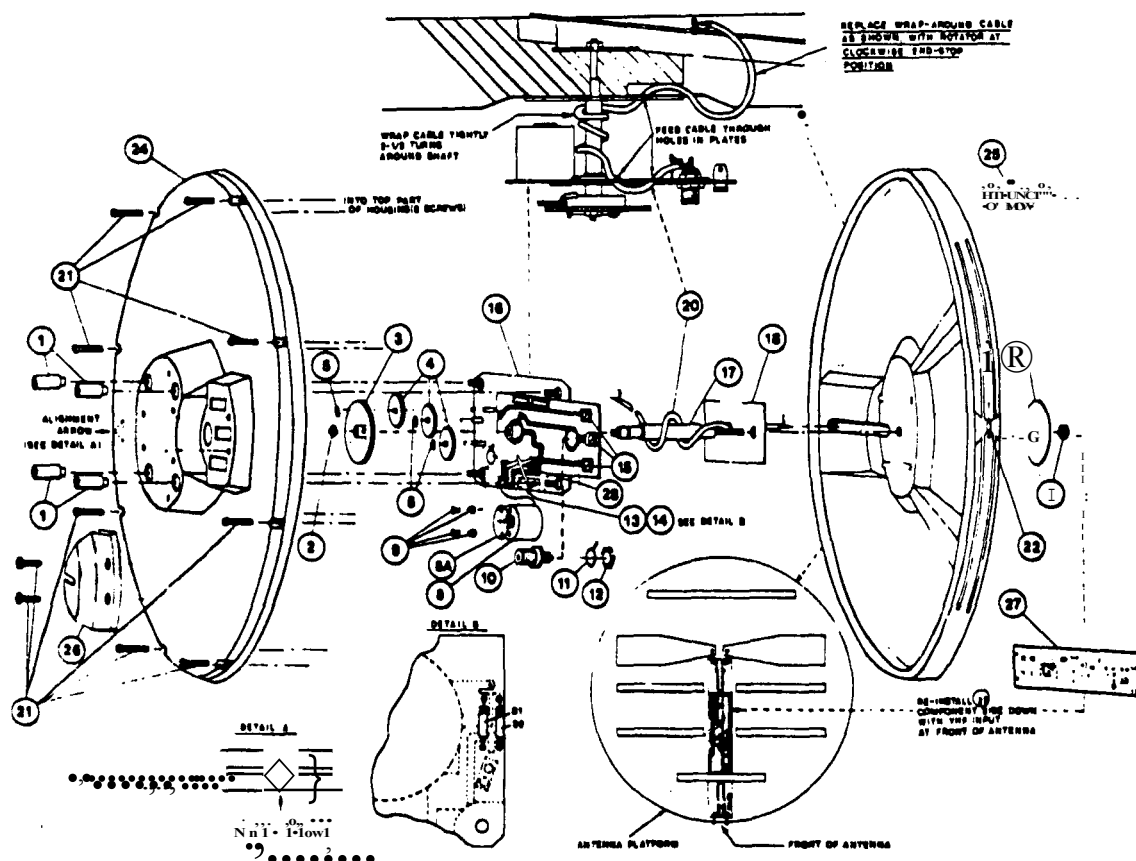
The main wall plate distributes all the operating voltages for the system. Eleven volts DC for amplifier power is supplied through the RF coaxial cable. The ground return circuit for the amplifier is via the coaxial cable shield. The wall plate also provides DC voltage at socket pins 4 and 5 to energize the rotator motor and lamp circuits.

A small DC motor turns the antenna. Direction of rotation is determined by switch SWL. An end-stop switch opens the motor circuit when the antenna has rotated to its end position. Diodes D1 and D2 allow the motor to reverse and rotate off the end-stop.



Connections to Antenna Terminal Board.

TDP MINI-STATE ANTENNA



ANTENNA UNIT

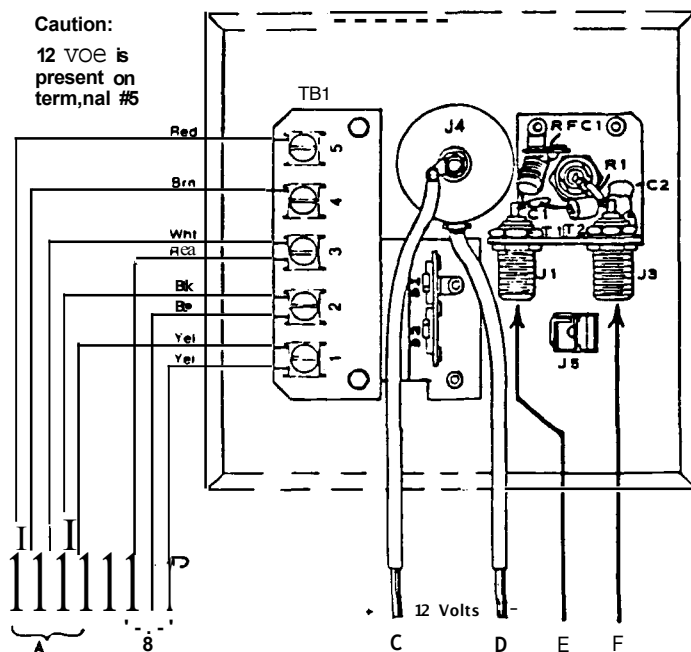
- 22 Resistor, antenna termination
- 24 Antenna Housing, bottom section
- 25 Antenna Housing, top section
- 26 Cover, Terminal Board

- 14 Diode, CW end stop
- 15 Terminal, w/ screw and nut
- 16 Gear Plate Assy' w/ PC board
- 17 Shaft, Drive plate support
- 19 Washer, Fiber
- 20 Cable, Coaxial wrap-a-round
- 28 Switch, End stop

ROTATOR UNIT

- 1 Insert, Mounting
- 2 Nut, self threading
- 3 Gear, Drive w/ spring finger contact
- 4 Gear, Idler
- 5 Washer, retaining
- 8 Motor, w/ pinion, mounting screws and washer
- 8A Insulator, motor
- 9 Screw and washer, motor mtg.
- 10 Coaxial Connector, Chassis
- 11 Washer w/ solder lug
- 12 Nut, Connector
- 13 Diode, CCW end stop

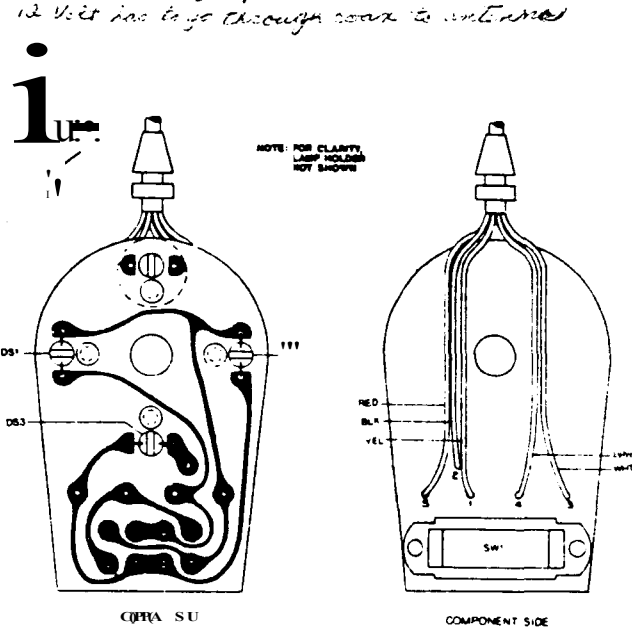
MAIN WALL PLATE, COMPONENT SIDE



- (A) 5 wire Extension control Cable to Secondary Wall Plate
- (B) 3 wire Control Cable from Antenna Unit
- (C) DC power wire - 12 V (pos)
- (D) DC power wire - neg. ground
- (E) RG59/U Coaxial cable from antenna unit
- (F) RG 59/U Coaxial Cable to secondary wall plate

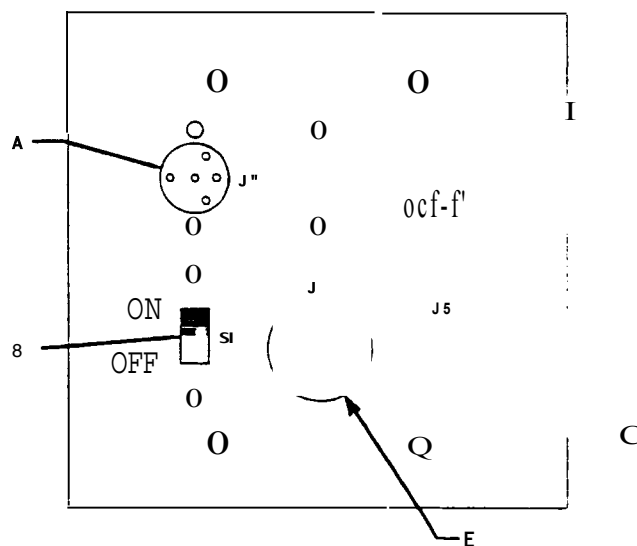
MAIN WALL PLATE

RT2 Thermistor, PTC
 DC1, Diode
 DC2 Diode
 RFC1 Coil, RF
 R1 47 Ohm 5\ 1/2W
 C1 2200 pF 500 V ceramic
 J4 Socket, DC
 JS 5 pin socket
 SL Switch, slide SPOT



CONTROL UNIT

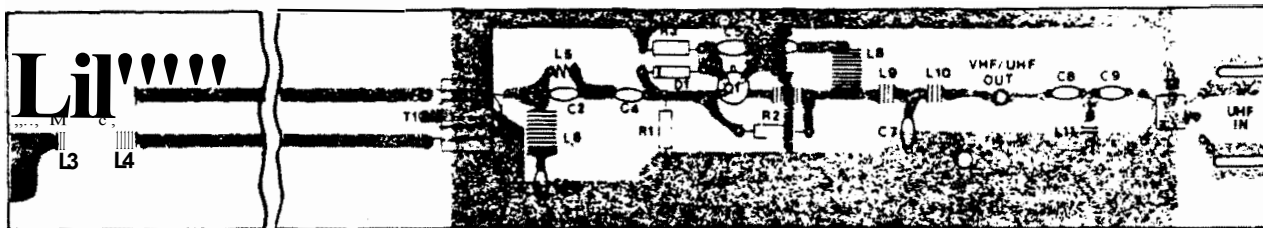
DS1 Lamp Indicator
 SW1 Switch, Control
 Lens, Indicator
 Control cable w/ plug



MAIN WALL PLATE, FACE

- (A) Rotator control unit connection
- (B) On-off switch (amplifier power)
- (C) DC power receptacle for 12V TV set
- (D) Coaxial connector - feeds television signal to TV set
- (E) 12 V DC input jack (for 120VAC/12VDC adapter)

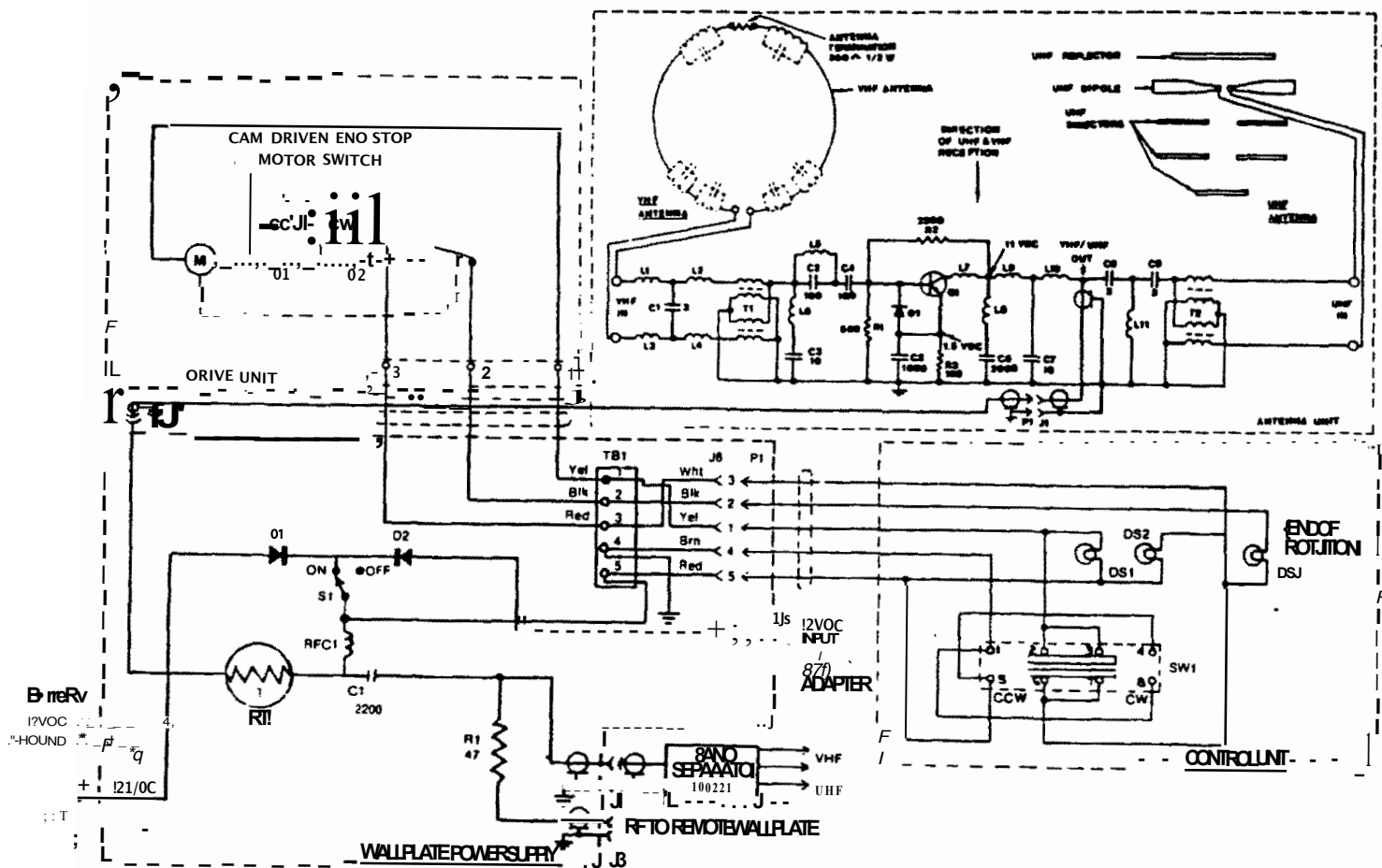
AMPLIFIER COMPONENTS



AMPLIFIER

C1,8,9 3pF, 50 V ceramic
 C2,4 100 pF, 10\ 50 V ceramic
 C3,7 10 pF, 50 V Ceramic
 cs 1000 pF, 50 V ceramic
 C6 2000 pF, 50 V ceramic

D1 Diode
 Q1 Transistor, 2SC1424
 R1 560 Ohms, 5\ 1/4W
 R2 2200 Ohms, 5\ 1/4W
 R3 100 Ohms, S\ 1/4W



TROUBLESHOOTING

SYMPTOM

Antenna will not rotate:
direction indicator lamps do
not light.

Antenna will not rotate:
Direction indicator lamps light
properly.

Antenna at end stop:
Will not rotate

Antenna rotating in a wrong
direction: CW direction indicator
arrow lights when control switch
is pressed on left side and CCW
direction indicator arrow lights
when control switch is pressed
on right side.

Weak picture: no noticeable
difference in picture when antenna
is rotated, or when the 12 vac
switch is "off".

PROBABLE CAUSE

- a. No DC voltage to wall plate
- b. Defective D1 in wallplate

- a. 3 wire rotator cable open or
incorrectly connected.
- b. Defective motor
- c. Defective end stop switch

- a. End stop switch defective
- b. End stop diodes D1 or D2
defective.

- a. Control cable connections 1
and 3 reversed.

- a. Defective amplifier transistor
Q1
- b. Open connection between antenna
and amplifier
- c. Open or shorted coaxial lead-in
cable.
- d. Shorted or open amplifier
coaxial wrap-around cable inside
antenna housing.
- e. Defective power supply.

*NOTE: With amplifier and wall plate
properly connected, voltage be-
tween RFCl in wall plate and
ground should be approximately
11 volts DC during non-rotating
operation. During rotation, this
voltage may decrease slightly.
During 12 VDC battery operation,
if the battery is simultaneously
being charged, this voltage may
increase by several volts. Very
low or zero voltage may indicate
a shorted C1, C2, C3, C4 or C5
capacitor, shorted coaxial cable,
or short on amplifier board.*

SYMPTOM

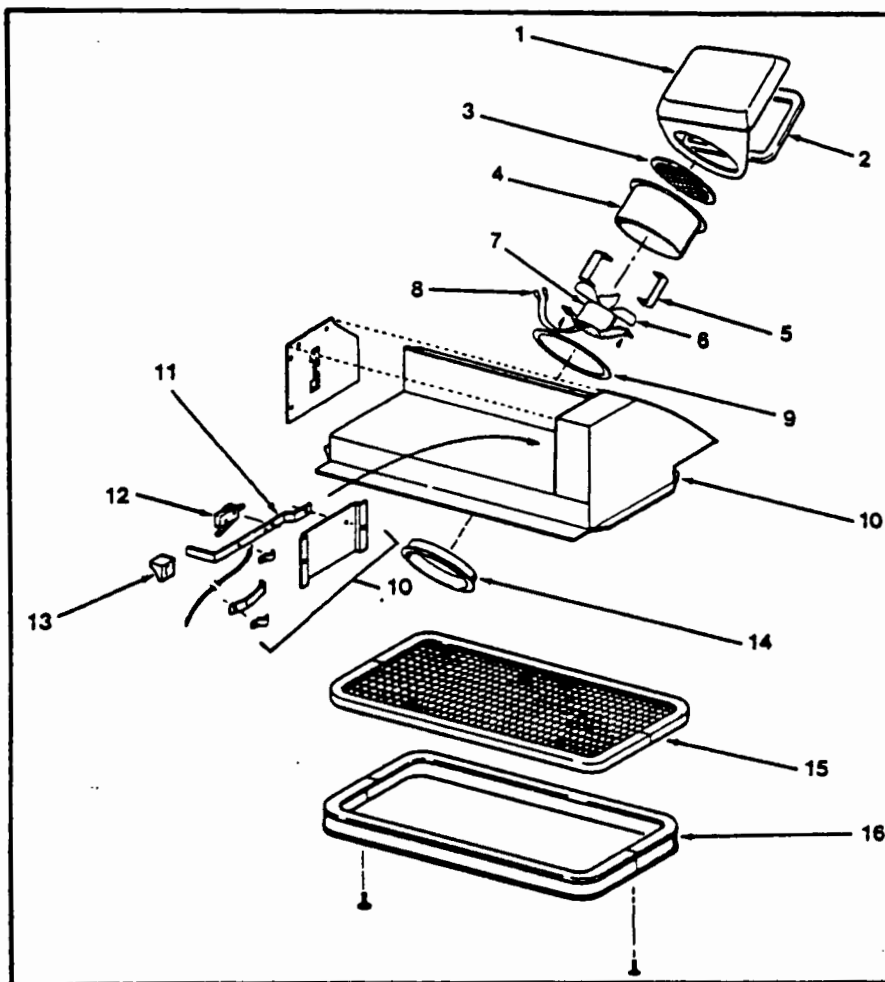
Loss of color or snowy picture.
(Channel 6 only)

PROBABLE CAUSE

a. Amplifier coil IS improperly
adjusted.

NOTE: FM trap coil LS was carefully adjusted at the factory. Normally it should require no further adjustment. If adjustment is necessary, LS should be spread or compressed until the first FM trap null occurs at 96 MHz. 88 MHz will then occur outside of FM trap with nominal gain of 21 dB. (This adjustment should be made only by qualified service technicians using RF sweep equipment and crystal markers.)

RANGE EXHAUST HOOD ASSEMBLY



1. Vent Shroud
2. Gasket, Vinyl Foam Tape
3. Screen
4. Fan Shroud
5. Motor Bracket
6. 7" Fan Blade
7. Fan Motor
8. Bullet Terminal 51372
9. Foam Tape Ring
10. Range Exhaust Hood Assy.
11. Vent Linkage Assy
12. Fan Motor Switch
13. Knob, Exhaust Hood
14. Flange
15. Filter
16. Trim ring Assy.

MICRO SWITCH REMOVAL/ REPLACEMENT

1. Remove filter.
2. Disconnect quick disconnect connectors from micro switch.
3. Remove screws which secure switch to brackets.
4. Remove switch.
5. After reinstalling switch, adjust leaf of switch to "Close" when shutter is near fully opened position.
6. Reverse procedure for installation.

FILTER REMOVAL & CLEANING

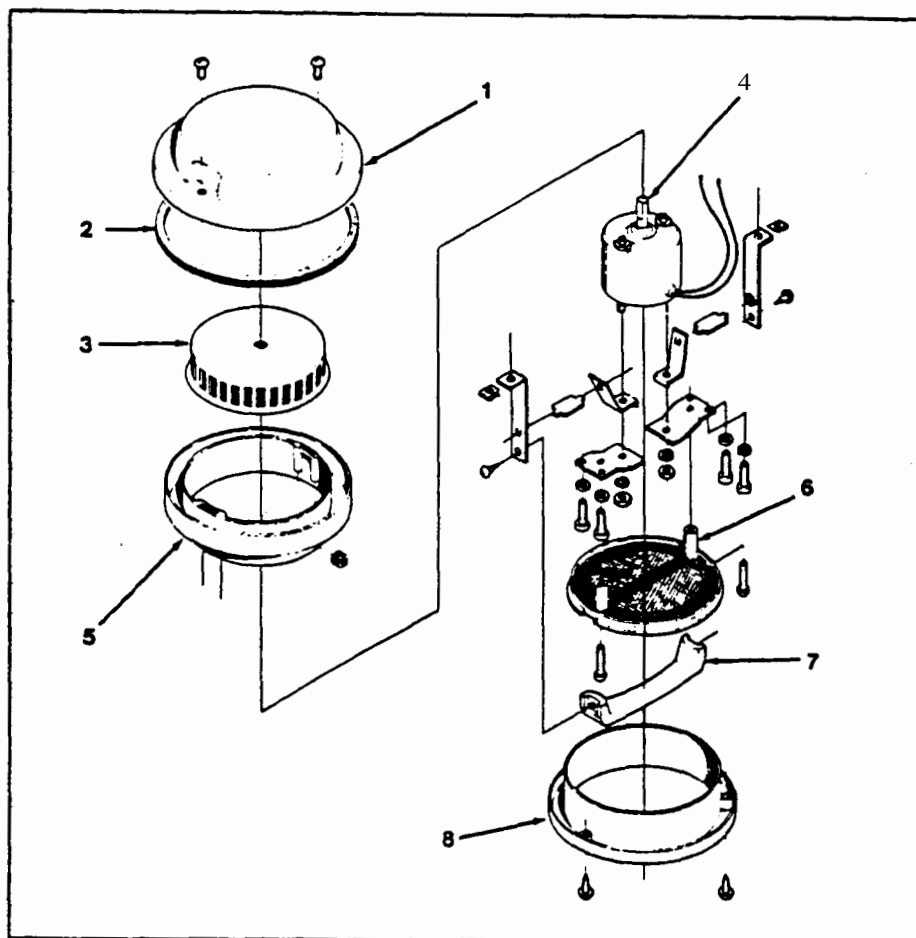
1. Remove screws which secure trim ring and filter to underside of galley rooflocker.
2. Remove trim ring and filter (NOTE: If filter is secured with pop rivets, it will be necessary to drill the rivets out. It will not be necessary to rerivet for installation).
3. Clean filter by soaking in soapy water and rinse thoroughly. Allow to air dry.
4. Reverse procedure for installation.

FAN REMOVAL/REPLACEMENT

1. Remove filter.
2. Open shutter.
3. Remove screws securing fan bracket to vent's shroud.
4. Lower fan assembly.
5. Reverse procedure for installation.

RANGE EXHAUST HOOD ASSEMBLY REMOVAL/REPLACEMENT

1. **Remove** filter and disconnect flexible cable•
2. Remove screws and/or rivets attaching exhaust hood to floor of galley rooflocker and side skin of motorhome.
3. Remove exhaust hood assembly from rooflocker.
4. Disconnect (quick disconnect) micro switch wires at harness.
5. Reverse procedure for installation.

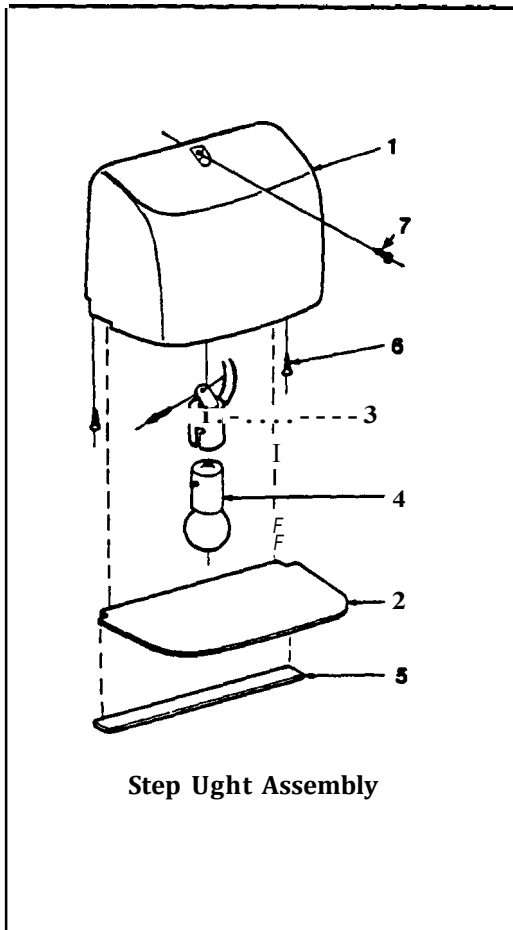


1. Cover Assembly
(Includes Gaskets)
2. Gasket Assembly
3. Blower Wheel Assy.
4. Motor Assy.
5. Ring Body Assy.
6. Grille Assy.
7. Handle Assy.
8. Trim Ring Assy.

BATHROOM EXHAUST FAN ASSEMBLY REMOVAL/REPLACEMENT

1. Working from the outside top of motorhome, remove the screws holding the fan protective cap, and remove the cap.
2. Remove the 6 screws securing the fan flange to the outer skin.
3. Pull the fan out to the extent of the wiring harness and unplug the harness,
4. Remove the fan assembly.
5. To install, reverse the removal procedures.

STEP LIGHT ASSEMBLY

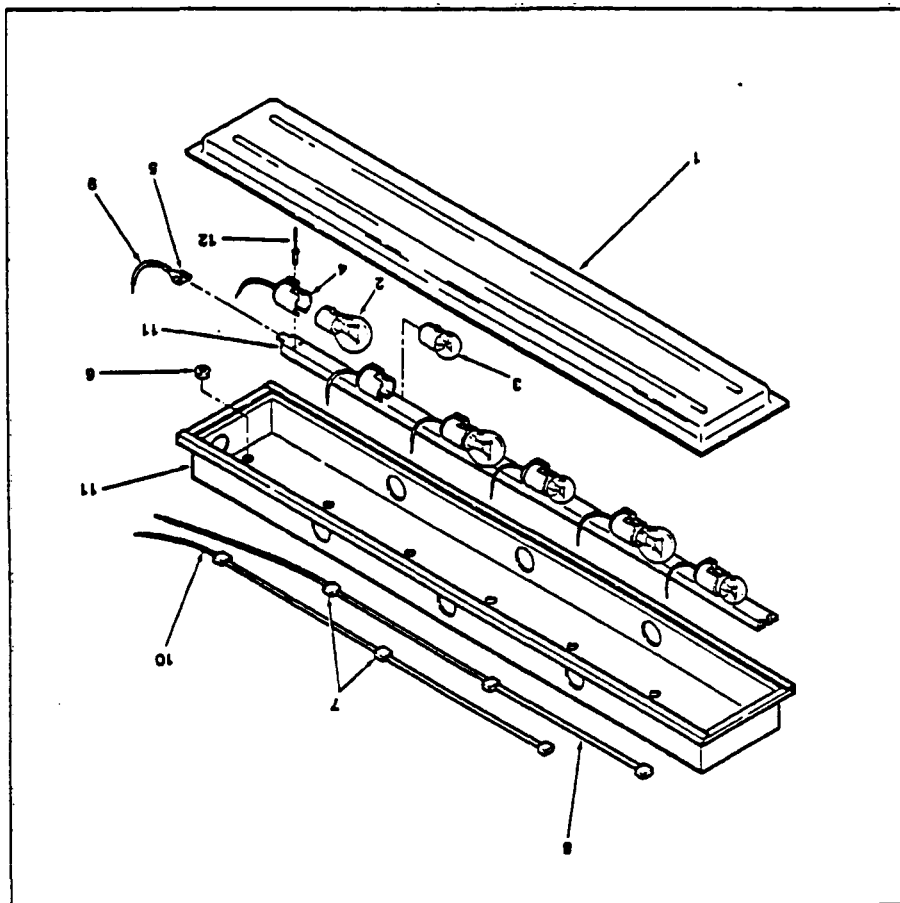


1. Casting, Step Light
2. Lens, Step Light
3. Lamp Socket w/ Bracket
No. 10-08
4. Bulb, 1141
5. F amstick - 6-1/8"
6. Screw No. 6 x 1/2"
P.H. Phillips
7. Screw No. 6 x 3/4"
Stainless Steel

STEP LIGHT ASSEMBLY BULB REPLACEMENT

1. Remove two screws which retain light housing to main door jamb's eyebrow.
2. Remove screw which secures rear of housing to exterior skin.
3. Lift housing and slide lens out.
4. Replace bulb.
5. Prior to re-assembly, seal around wire at hole in skin.

LOUNGE AND GALLEY LIGHT ASSEMBLY

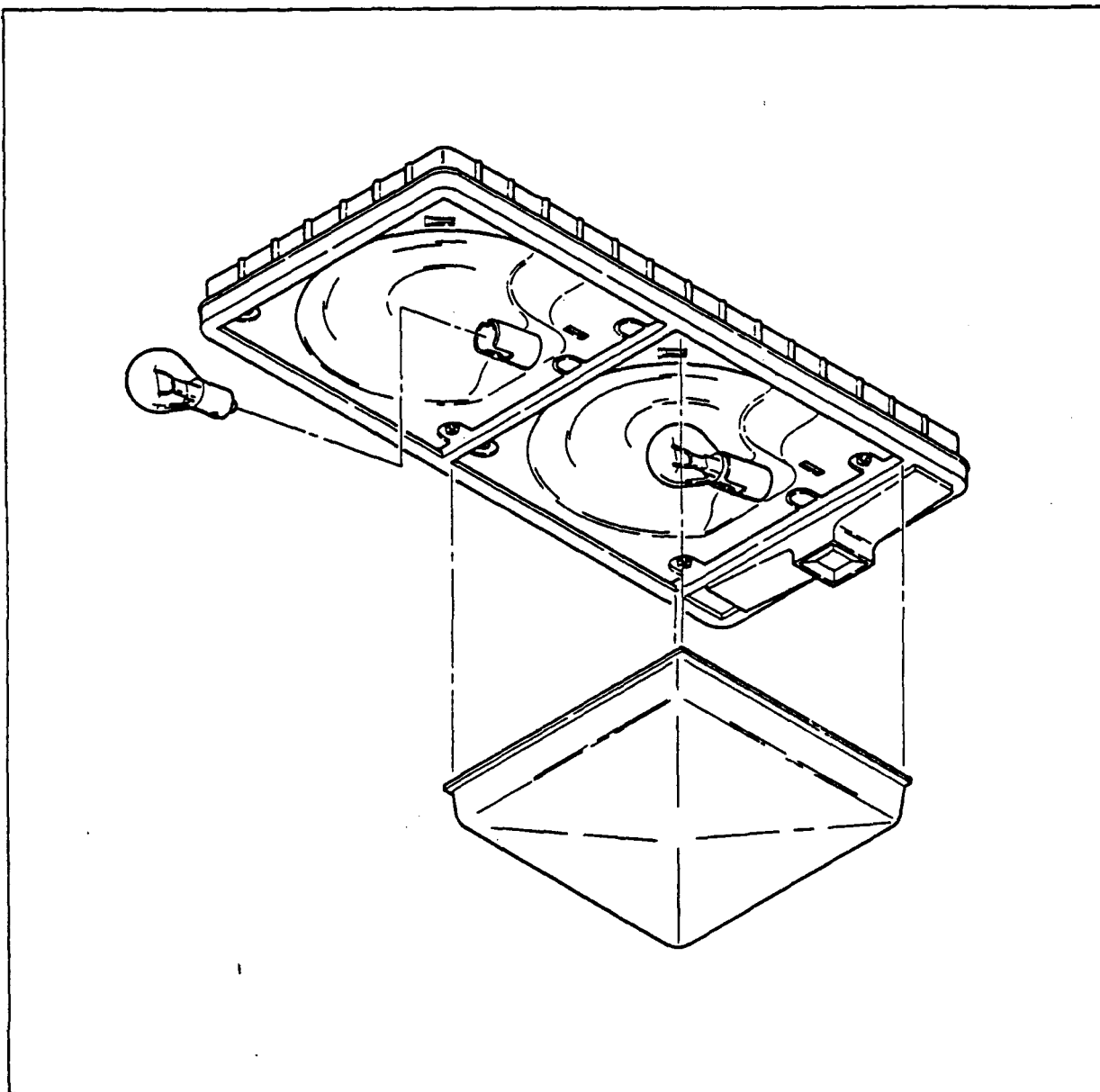


- 1. Lens
- 2. Lamp Bulb
- 3. Lamp Bulb, 12 Volt
- 4. Lampholder
- 5. Connector
- 6. Bushing
- 7. Connector
- B. Wire #12, Black
- 9. Wire #12, White
- 10. Wire #12, Red
- 11. Housing
- 12. Rivet

SHADE AND BULB REMOVAL

1. If temperature is below 70 ° turn light on high intensity to warm shade and make it more **flexible**.
2. Using a thin bladed tool, such as a putty knife, carefully pry the **lens** out from underneath the **metal** flange surrounding the lens. Start in the center and work toward both ends.
3. Bulbs are removed by pushing them down into the spring loaded socket and turning 1/4 turn counterclockwise.

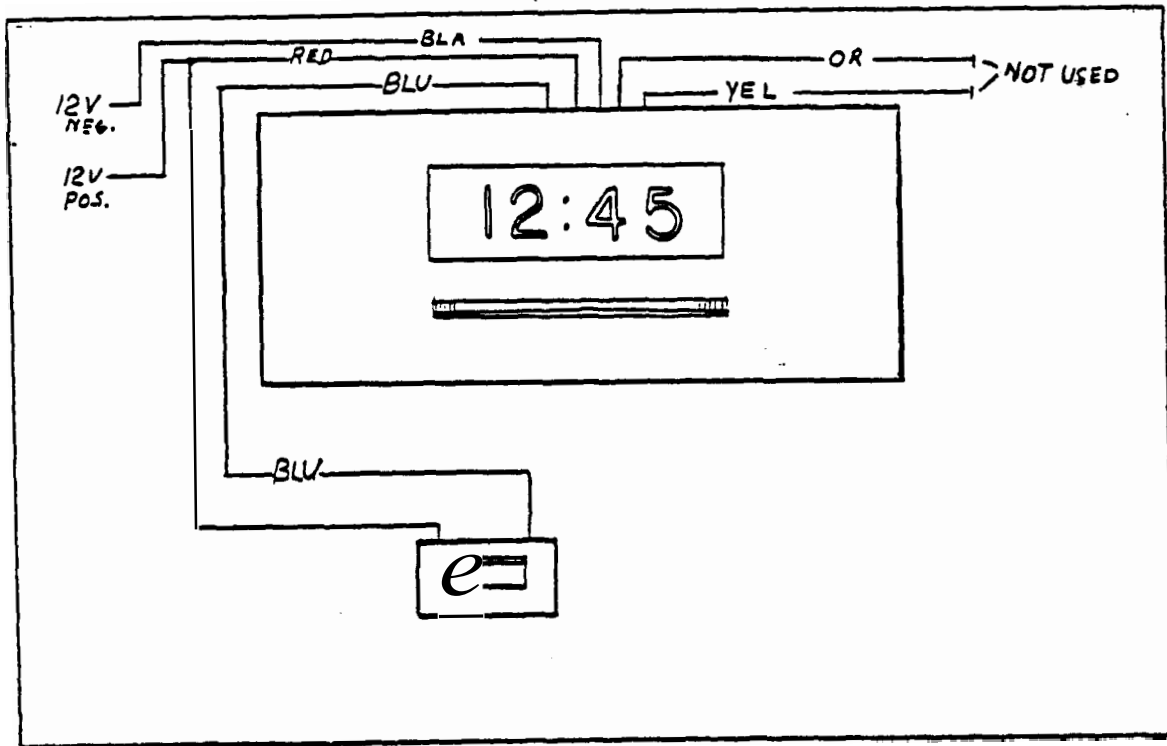
CEILING LIGHT ASSEMBLY



BULB REMOVAL/REPLACEMENT (CEILING, GALLEY, LOUNGE, AND VANITY LIGHT)

1. Carefully squeeze lens and snap out of lamp housing.
2. Remove bulb by pressing in and turning counterclockwise approximately 1/4 turn.
3. Remove bulb.

DIGITAL CLOC



As the diagram illustrates, constant 12 volt power is supplied to clock works (**red** wire) and the display switch via a short jumper wire. When the switch is turned on power is fed to the display through the blue wire. The black wire is the ground line. Neither the yellow or orange is used in Airstream's application.

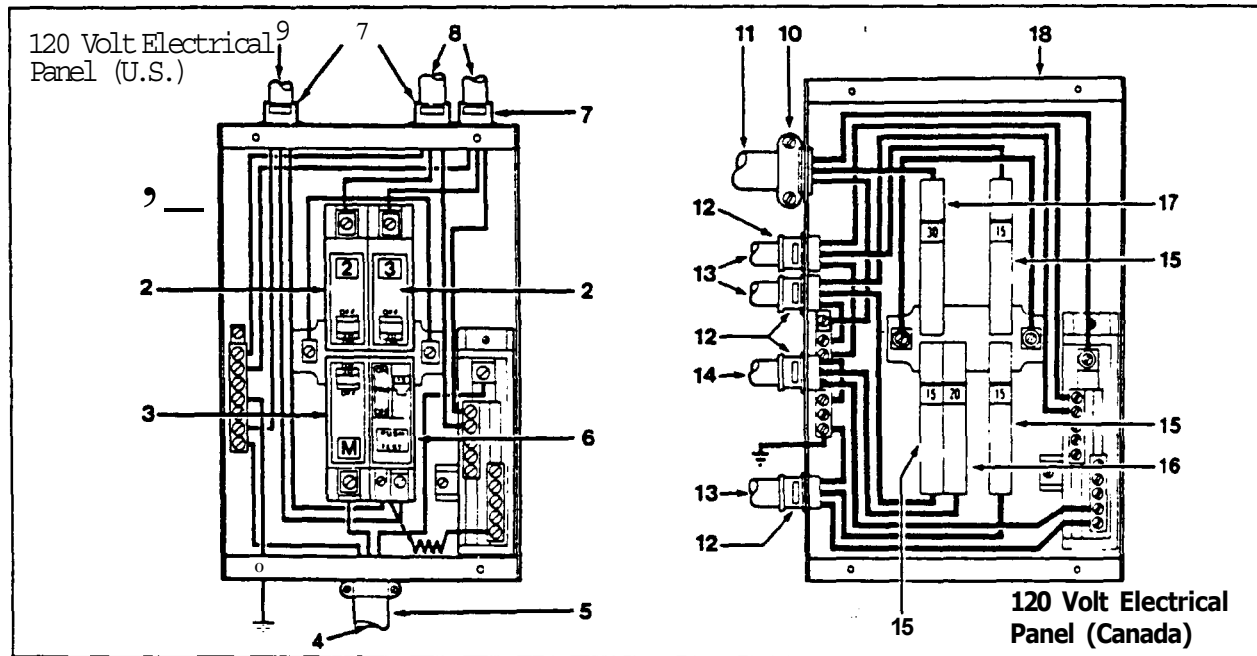
REMOVAL AND REPLACEMENT

1. Raise tambour doors on both sides of clock.

2. Remove screws going through tambour door spiral into clock mounting bracket.

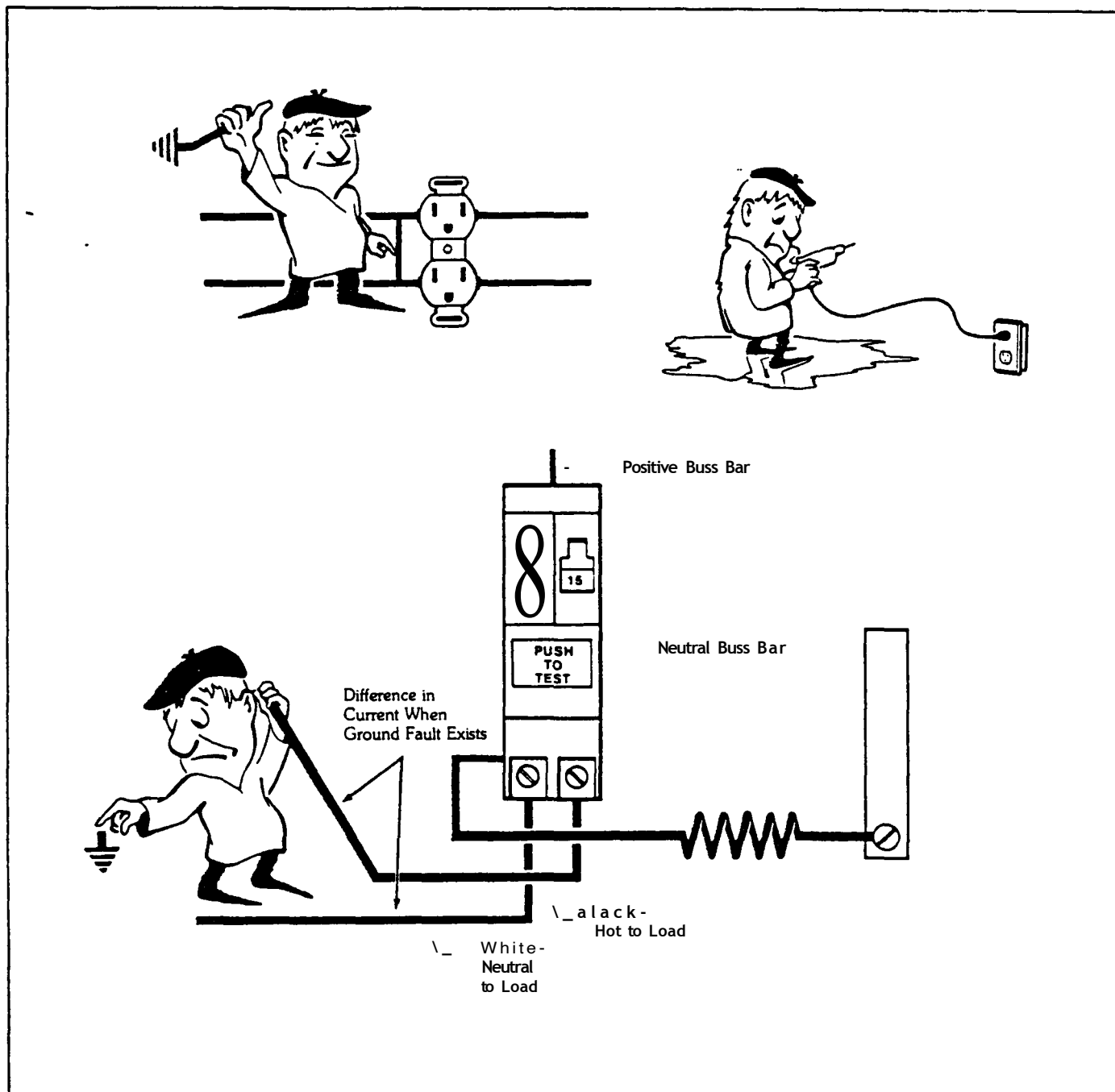
3. Pull clock back into roof locker and disconnect wires.

TYPICAL
120 VOLT ELECTRICAL PANEL



1. Breaker box G.E. TL410ST
- 2 • Breaker TQL 1120 20 Amp
- 3 • Breaker TQL 1130 30 amp main
4. Power supply cord
5. Clamp Romex 3/4"
6. Ground Fault Breaker THQL 1115 GF
7. Romex clamp T&B 3300
8. Romex
9. Romex
10. Clamp Romex 3/4"
11. Power supply cord Romex N.M.D. 7
12. Romex clamp T&B 3300
13. Romex N.M.D. 7
14. Romex N.M.D. 7
15. Breaker THQP 115 15 Amp
16. Breaker THQP 120 20 Amp
17. Breaker THQP 130 30 Amp main
18. Breaker Box G.E. T.L. 410 S.T.

GROUND FAULT CIRCUIT INTERRUPTER (GFCI)



Many states require R.V.'s which are sold in their state and which have exterior 120 volt receptacles to have a ground fault circuit interrupter. Units manufactured for sale in these states have type THQL 15 amp GFCI breakers installed on the general circuit, since the exterior breaker is on this circuit. This breaker replaced the standard TQL-15 amp breaker.

When properly installed the GFCI Circuit Breaker provides reliable overload and short circuit protection PLUS protection from Ground Faults that might result from contact with a "HOT" load wire and ground.

IMPORTANT NOTE: The GFCI Circuit Breaker will NOT reduce shock hazard if contact is made between a "HOT" Load Wire and a Neutral Wire or 2 "HOT" Load Wires.

Each GFCI Circuit Breaker is calibrated to trip with a ground current of 5 milliamperes or more. Since most persons can feel as little as 2 milliamperes, a distinct shock may be felt if the need for protection exists. However, the shock should be of such short duration that the effects will be reduced to less than the normally dangerous level. However, persons with acute heart problems or other conditions that can make a person particularly susceptible to electric shock, may still be seriously injured.

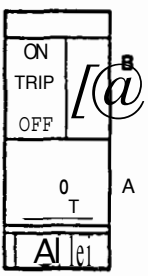
While the GFCI Circuit Breaker affords a high degree of protection, there is no substitute for the knowledge that electricity can be dangerous when carelessly handled or used without reasonable caution.

WARNING: The GFCI Circuit Breaker provides protection only to the circuit to which it is connected. It does NOT provide protection to any other circuit.

OCCUPANT: MAKE THIS TEST EACH MONTH AND RECORD THE DATE ON THE CHART

1. With handle B in "ON" position, press PUSH TO TEST button A.
2. Handle B should move to TRIP position, indicating that GFCI Breaker has opened the circuit.
3. To restore power, move handle B to "OFF" and then to "ON".

Important - If handle B does not move to TRIP position when test button is pressed, the GFCI Breaker Protection is not complete. If this happens, replace GFCI Breaker.



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11.982												
h9e3												
11984												

LOCATING SHORTS AND OPENS

The key in locating shorts and opens is isolation. The first step is to isolate the circuit with the short or open. The second step is to then isolate the section of the circuit with the fault. Once the section is identified, the specific problem can be located. The cause may be a loose or corroded connection, cut wire, worn insulation, defective component, etc. The following procedure is one method for isolating shorts and opens.

SHORTS

1. Isolate the circuit which has the short by noting which circuit breaker has tripped.
2. Disconnect the power inlet cord from the power source.
3. Using the 120 volt schematic as a reference, disconnect outlet boxes one at a time starting at the box furthest from the distribution panel. After disconnecting each box check for continuity between the black wire and ground or common {white} wire, on the distribution panel side of the circuit. When a continuity light or OHM meter indicates no continuity, the short is either in the receptacle just removed or the section of Romex wire between this receptacle and the previous receptacle removed.
4. Examples of a short are:
 - a) the black wire of the 120 volt system contacting the white wire, bare wire or grounded surface.

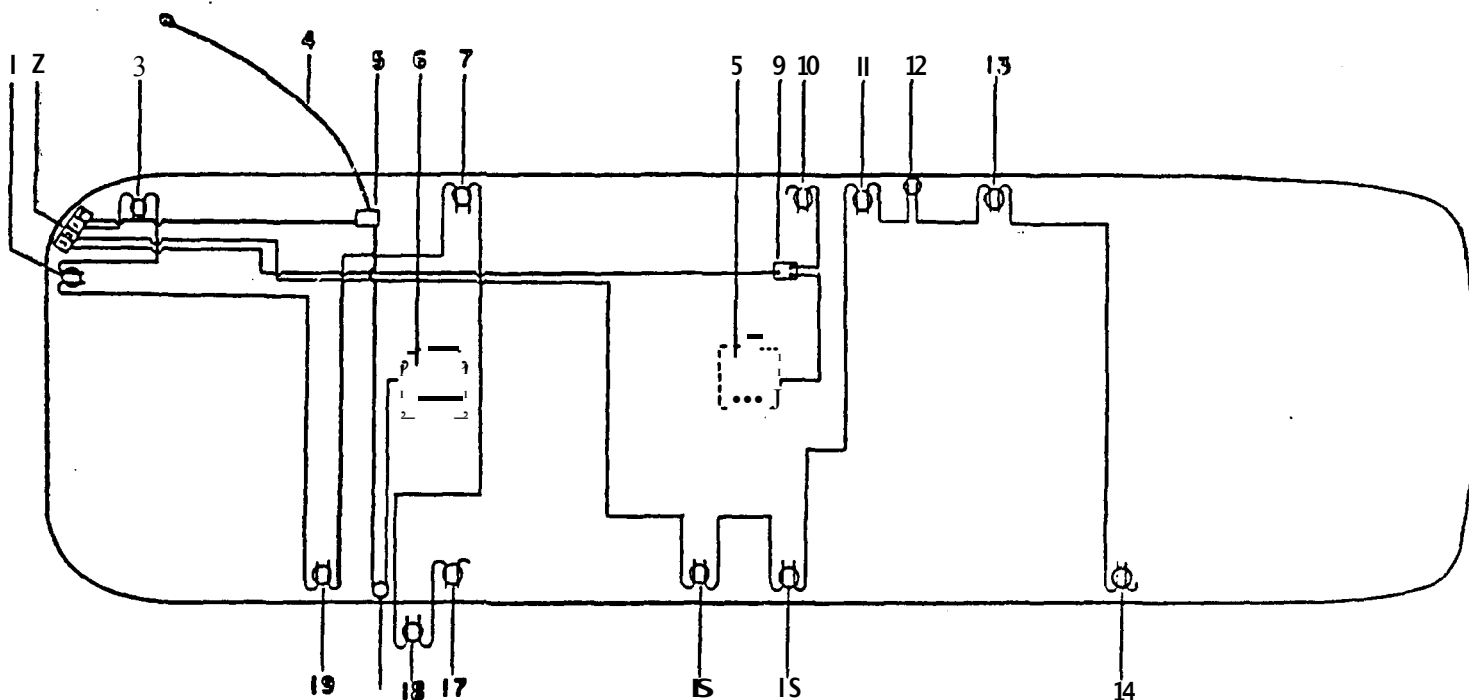
- b) An internal short in a 120 volt appliance.

Any damaged wire must be replaced. The National Electrical Code does not permit splicing 120 volt wiring outside an outlet box or junction box. Also, the wire must not be exposed to an area such as a sharp metal edge, which may damage the wire.

OPENS

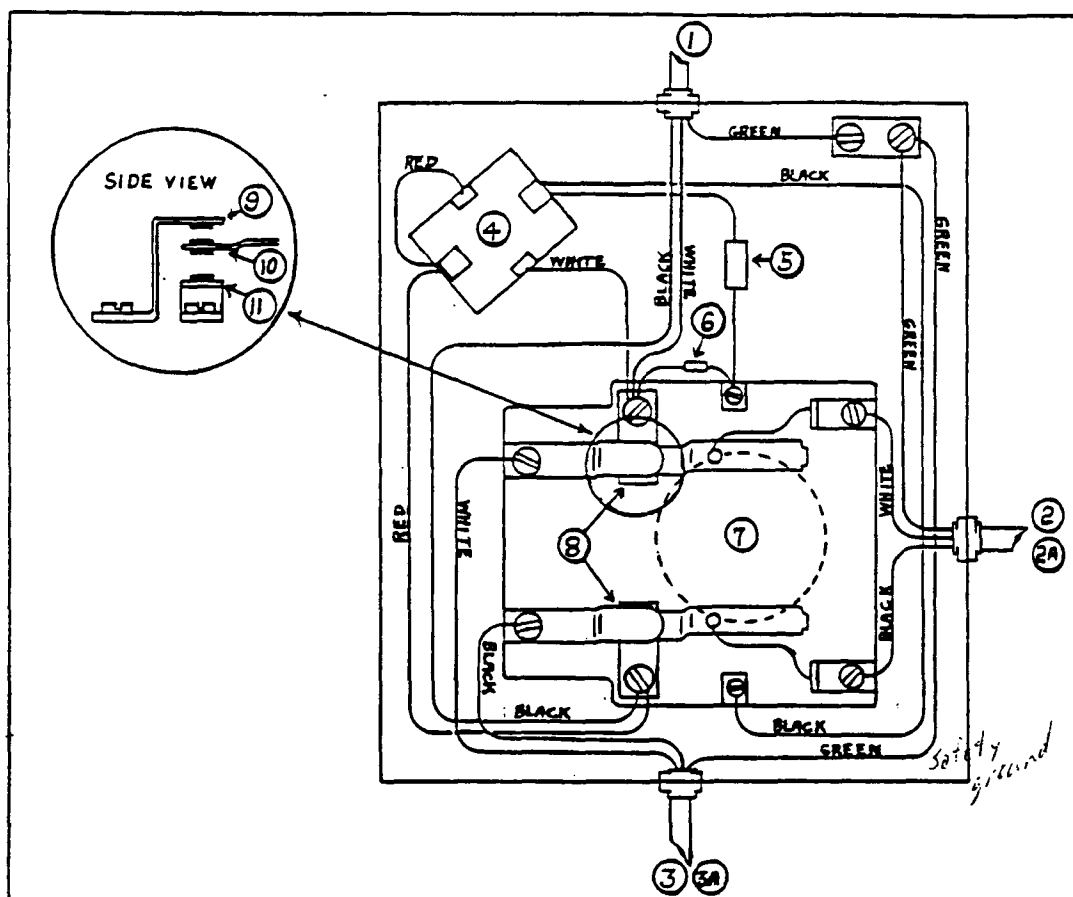
1. Check all receptacles and components for voltage on the circuit which has the open.
2. If all receptacles and components of the circuit are without power, begin to look for open in the distribution panel.
3. Inspect for loose or corroded connections and a faulty circuit breaker.
4. Check for power on both ends of circuit breaker. If there is no power on the inlet side of circuit breaker, the open is between the power cord's male connector and the distribution panel.
5. The open can be isolated by noting the outlets which do not have power. Example: If the bath outlet in the rear bath model has power, and the converter has no power, the open is between the bath outlet and converter outlet.
6. Examples of an open are:
 - a) Loose or corroded connections.
 - b) A wire disconnected from a terminal.
 - c) Contacts in the circuit breaker which do not **make** contact.
 - d) A broken wire.

TYPICAL
120 VOLT DISTRIBUTION



- | | |
|--|-----------------------------------|
| 1. 120 V outlet, bathroom | 11. 120 V outlet, galley |
| 2. 120 V circuit breaker box | 12. Junction box, Nutone (opt) |
| 3. 120 V outlet, linen closet (opt) | 13. 120 V outlet, galley |
| 4. Power cord | 14. 120 V outlet, dinette |
| 5. Switch over box - generator to city power | 15. 120 V outlet, refrigerator |
| 6. Secondary air conditioner (opt) | 16. 120 V outlet, ice maker (opt) |
| 7. 120 V outlet bedroom | 17. 120 V outlet, Univolt |
| 8. Primary air conditioner | 18. 120 V outlet, Exterior |
| 9. Switch, microwave - air conditioner | 19. 120 V outlet, Bedroom |
| 10. 120 V outlet microwave | |

GENERATOR SWITCH-OVER RELAYS (MAIN AND REAR AIR CONDITIONER CIRCUIT)



- | | |
|--|---------------------------------|
| 1. Power from generator | 6. Diode |
| 2. Power to main 110V breakers | 7. Electro-magnet |
| 2a. Power to rear air conditioner | 8. Point assembly |
| 3. Power from 110V city power cord | 9. Points, city power, incoming |
| 3a. Power from 110V rotary selector switch | 10. Points, outgoing power |
| 4. Time delay device | 11. Points, generator, incoming |
| 5. Capacitor | |

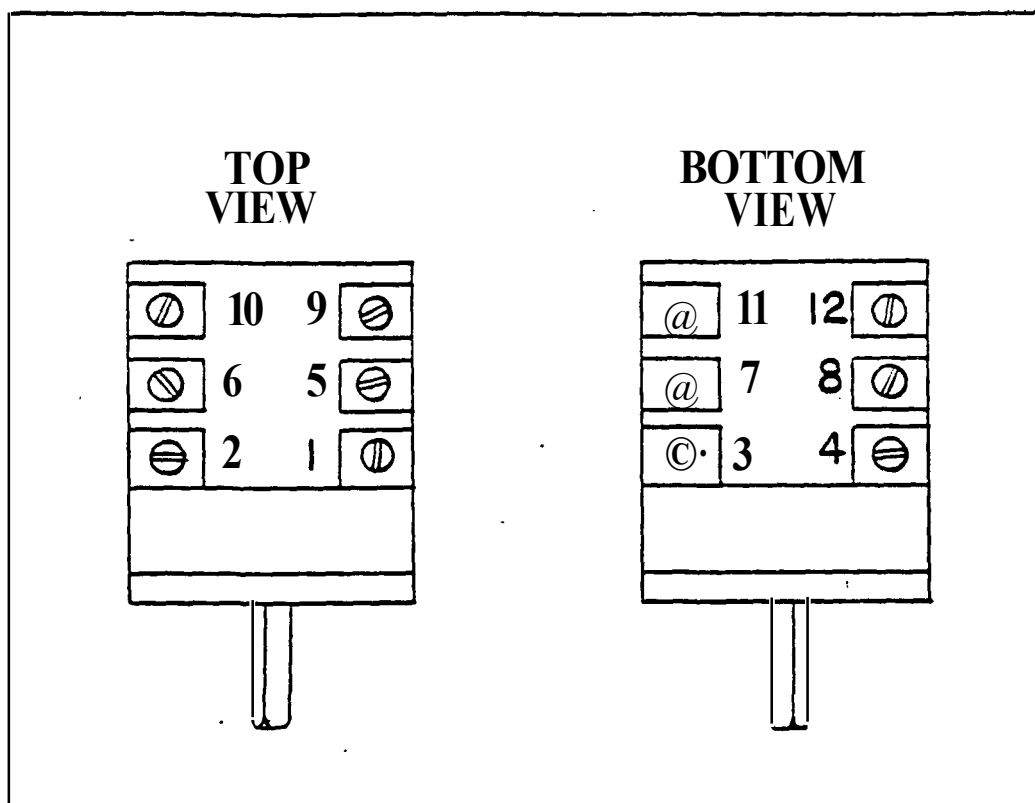
All motorhomes have a generator switch-over relay mounted near the junction of the 110V power cord to the vehicle. Motorhomes with two roof air conditioners will have a second relay mounted on the interior of the generator close-out. The relays are identical; but, of course, are wired differently according to the function being performed.

Let's look at the main switch over relay first. Points #9 & #10 are normally closed. The power cord #3 provides current to point #9. The current is passed through to point #10 and on out of the relay through wire #2 feeding the main 110V breaker box.

When the generator is started, power coming in #1 is fed to point #11 and to the time delay #4. When the time delay is satisfied (about 45 seconds) the circuit to the electro-magnet #7 is completed and the magnet pulls point #10 down to point #11 completing the circuit between the generator wire coming in and the 110V wire #2 going to the main circuit breaker box.

When the Switch-Over Relay is used on the rear air conditioner circuit, point #9 is fed from the rotary selector switch via wire #3a. Point #10 is connected to the rear air conditioner via wire #2a.

ROTARY SELECTOR SWITCH, 110 VOLT

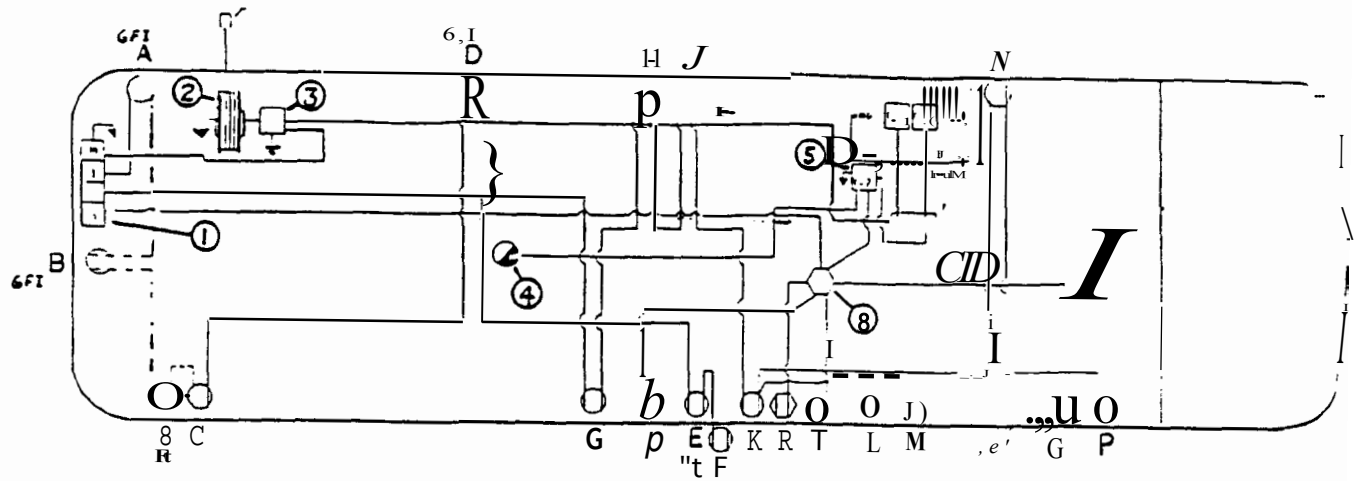


The Rotary Selector Switch is used to allow many 110 volt appliances to be permanently wired into the motorhome circuit, yet overloading is avoided since only one appliance may be used at a time.

Power comes in to the switch on terminal #1. External jumpers on the switch ties terminal w1 together with terminals 5, 9, 3, 7, and 11.

The wiring on the remaining six terminals is as follows:

- #2 Microwave
- #6 Open. This circuit not currently being used.
- #10 Trash Compactor
- #4 Front air conditioner
- #8 Blender
- #12 Rear air conditioner



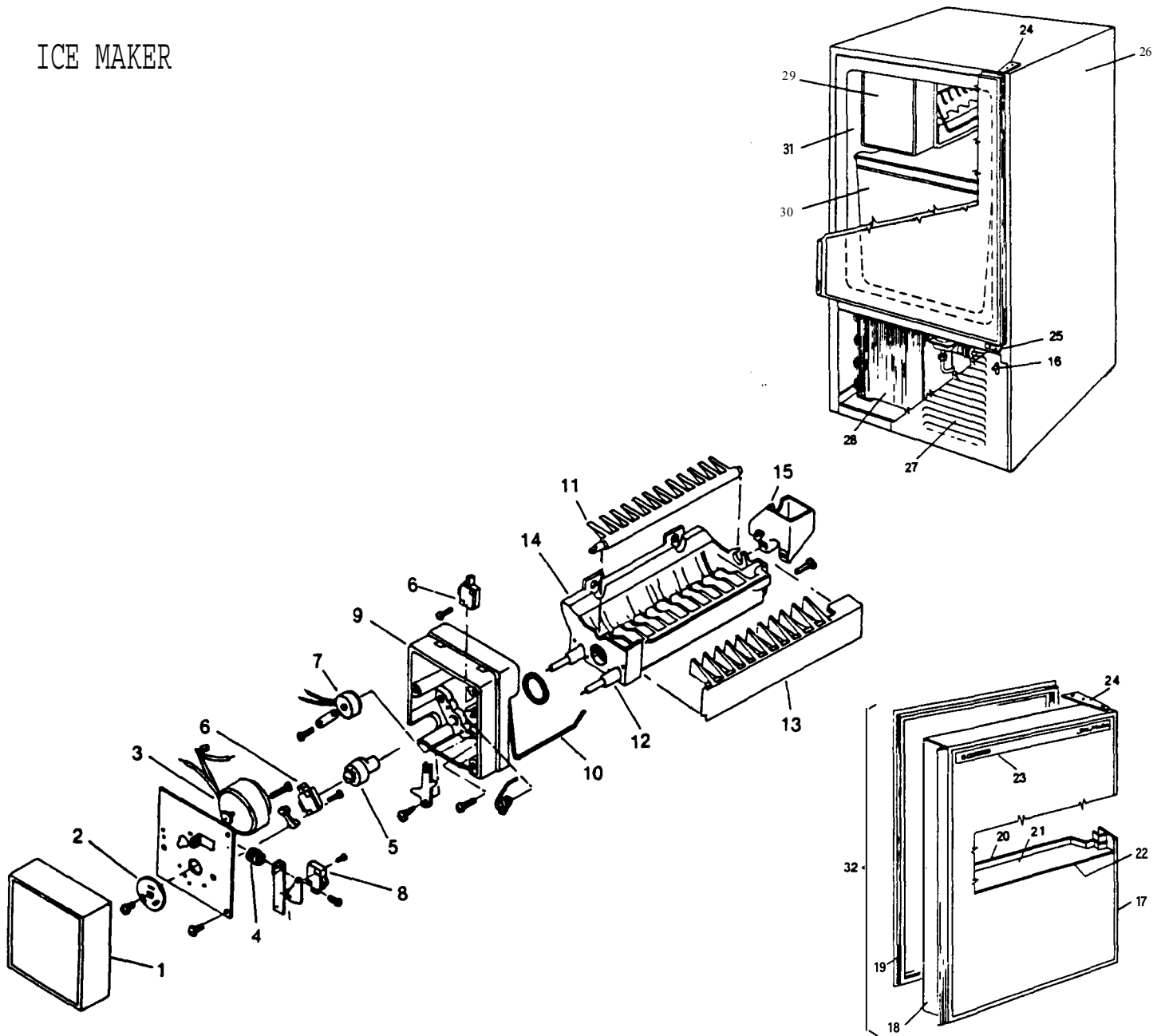
- A. Roadside Bedroom
- B. Curbside Bedroom (Twin only)
- C. Curbside Bedroom (Double only)
- D. Bath, convenience outlet
- E. Conveator
- F. Exterior
- G. Ice Maker (Optional location)
- H. Refrigerator
- J. Dinette
- K. Galley
- L. Switch (hot water tap)
- M. Hot Water Tap
- N. Lounge
- P. Credenza
- R. Blender
- s. Microwave
- T. Trash Compactor

- 1. Main Breaker Box, 30 amp
- 2. Power Cord Reel
- 3. Relay w/ time delay
- 4. Air conditioner, rear
- 5. Relay w/.time delay, rear A/C
- 6. Secondary breaker box, 20 amp
- 7. Air conditioner, front
- 8. Rotary Selector Switch

ICE MAKER

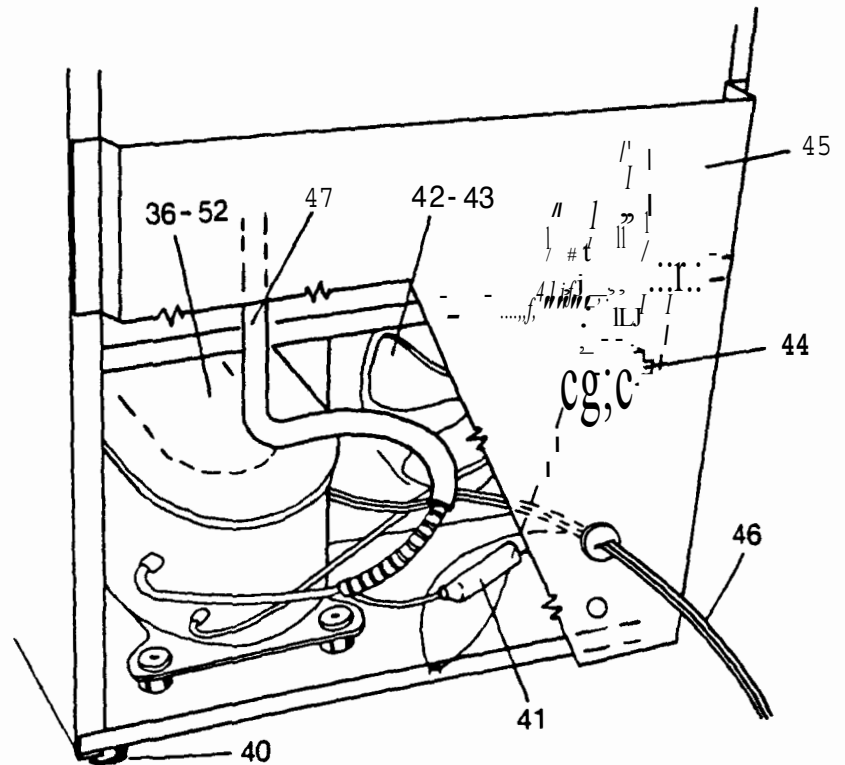
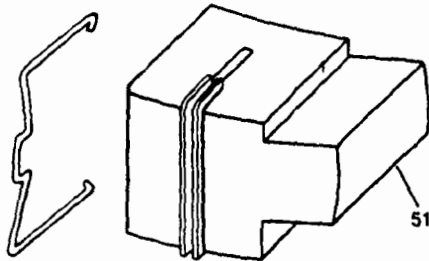
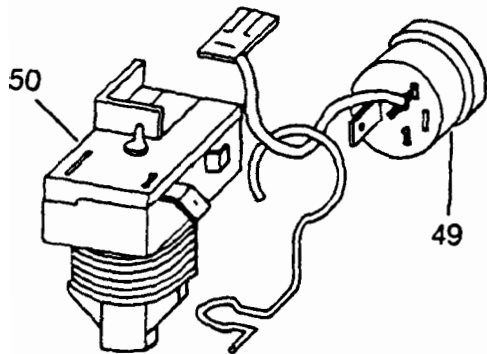
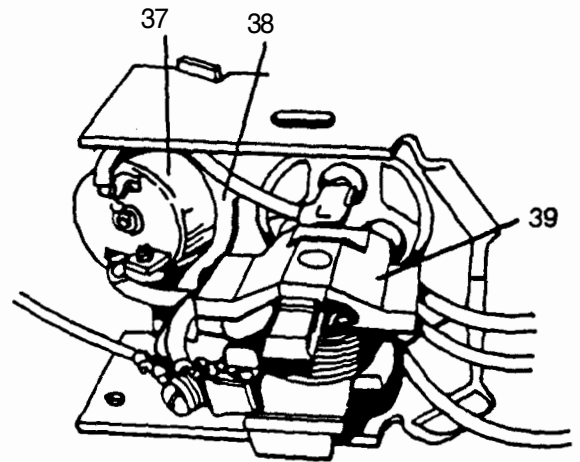
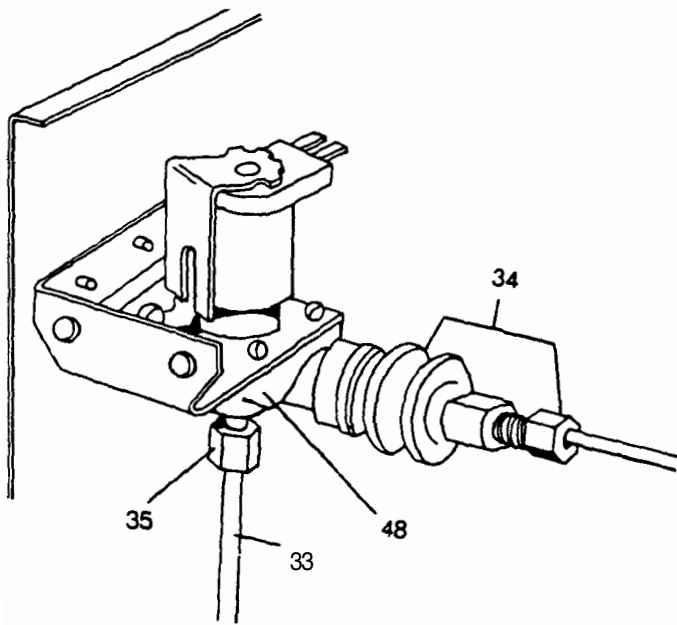
PARTS DIAGRAMS	H-1
OPERATION ●●...●.....●●●.....●.....●.....	H-3
TROUBLE DIAGNOSIS	H-4
QUESTIONS AND ANSWERS	H-5
PARTS REMOVAL AND REPLACEMENT	H-8

ICE MAKER



1. cover
- 2 • Gear
- 3 • Motor
4. Spring
5. cam
- 6 • Switch S.O.D.T.
7. Limit Switch
8. Switch S.P.D.T.
9. Support
10. Arm, Shut-Off
11. Ejector
12. Mold Heater
13. Stripper, Ice
14. Mold & Heater Assy.
15. Fill Trough & Bearing
16. Switch - Off-On

17. Door Frame
18. Handle
19. Door Gasket
20. Inner Door Panel
21. Door Foam
22. Outer Door Panel
23. Name Plate
24. Pivot Hinge - top & screws
25. Pivot Hinge - Bottom
26. Outer Shell
27. Grille (vinyl coated)
28. Condenser Assembly
29. Ice Maker Assembly
30. Ice Bucket
31. Inner Liner Assy/Evap.
32. Complete Door Assy.



- 33. Water Line
- 34. Water Line Connection
- 35. Plastic Nut & Sleeve Assy.
- 36. Compressor
- 37. Overload
- 38. Overload Spring
- 39. Relay
- 40. Cabinet Foot
- 41. Dryer
- 42. Fan Motor

- 43. Fan Blade
- 44. Control
- 45. Back Panel Formed
- 46. Power Cord
- 47. Insulator Tube
- 48. Solenoid Valve
- 49. Overload
- 50. Relay
- 51. Cover
- 52. Compressor

OPERATION

Your ice maker has been designed to provide continuous and automatic supply of ice cubes. With only 31 seconds very little attention is required. The following suggestions are made for best results.

1. Starting - Once the ice maker unit be connected to a water supply line it is possible that dirt or scale will be displaced into the line. This will cause discolored and dirty cubes during the first few cycles. As a precaution we suggest you throw away all cubes during the first two to three hours.

2. Do not cut off air circulation from entering the front grille by putting the unit behind closed doors.

3. Unit must be installed level to the floor of vehicle.

4. When the ice maker is still making ice, the main switch will be off, but the electrical system will continue to cycle to maintain the cube supply. Under this condition the cubes may be collected, but the ice will be soft. To avoid this, it is suggested that the ice maker be used only when the vehicle is running. NEVER USE AN ICE PICK, KNIFE, OR OTHER SHARP INSTRUMENT which may damage the plastic interior.

5. If the ice maker is not set to regulate the supply of ice, it will be emptied periodically. (Once a week to ten days) to insure fresh cubes.

6. AVOID SALES REPRESENTATIVE AGENTS, ABRASIVES, DETERGENTS THAT MIGHT IMPART TASTE TO THE ICE CUBES. The exterior may be cleaned with cleaners and polish as used on the furniture. The condenser behind the grill should be cleaned periodically, generally twice to four times per year. To remove the grill, put fingers in the slot and lift up and out.

7. Your ice maker should be defrosted periodically.

8. The defrosting or shut off for any period of time, the door must be propped open two inches.

9. To set control, turn the screw located through the hole in the rear of the cabinet 1/4 turn clockwise. Turn counter-clockwise for warmer setting. The colder the control is set, the slower the ice cut harvest will be.

10. Storage - If the ice maker is to be shut off, the switch located behind the grill should be switched off. The ice must be removed and the DOOR MUST BE PROPPED OPEN at least two inches to provide air circulation to dry the interior and prevent mold and odor.

11. Once every year, or as often as needed, shut off water, remove the brass nut at water inlet valve, and use toothbrush to clean sediment from the screen to prevent sediment and impurities from entering the water supply.

TROUBLE DIAGNOSIS

Nature of Defect	Cause	Remedy
1. Machine fails to operate	a. Power supply b. Off-on switch	a. Check power supply, replace fuses if needed. b. Check off-on switch for continuity in on position. Replace if defective.
2. Compressor fails to start	a. Temperature control b. Relay c. Overload d. Control	a. Check temperature control for continuity when cube maker contains water only. Replace if defective. b. & c. Eliminate relay and overload by using test cord on compressor. Replace either or both if defective. d. Check control. Replace if defective.
3. Cube maker fails to fill with water	a. Water supply b. Solenoid water valve c. Water valve switch	a. Check water supply at inlet of solenoid water valve. b. Check screen, and clean if needed, also check valve coil by energizing terminals with test cord. c. Check switch for continuity.
4. Ice maker will not eject frozen cubes	a. Cube tray large b. Fan limit switch c. Fan relay d. Frost defrosting e. Mold retractor f. Holding switch g. Cube maker motor h. Shut-off alarm switch i. Cam	a. Defrost machine, remove some water from tray, adjust water- till to 120c.c. or 4½ oz. (see Fig. 3) b. Test for continuity, replace if defective. c. Test for continuity, replace if defective. d. Defrost, remove some water from cube tray with cloth, check door gasket seal . e. Check for continuity, replace if defective. f. Check for continuity, replace if defective. g. Use test cord to energize motor leads. Replace if motor dead or internal gear stripped. h. Check for continuity, replace if defective. i. Check whether loose wire has jammed in cam.
5. Water fails to freeze	a. See 1 and 2 b. Fan motor c. Temperature control d. Refrigeration system e. Dirty condenser	a. Check fan motor. Replace if not working while compressor is running. b. Test continuity through terminals No. 2 & 3 on control. Clean internal contacts or replace control. c. System shall be serviced and checked only in unit compartment. Attach gauge to process tube and at no time should suction pressure be lower than 0 pounds within 5 minutes of cut-off. d. Clean lint and dust from condenser.

QUESTIONS & ANSWERS

1. There is water in the bucket?
 - a. The machine's net level, and the 'N' indicator runs out of the freezer, mold into the storage compartment, or bucket.
 - b. Poor gasket seal, or something holding the door open, like the bucket not being pushed in far enough,.
 - c. A defective water valve switch.
2. The ice sticks together?
 - a. Water splashes out of the fill cup during water fill cycle.
 - b. A faulty door seal, and the ice on top will be frosty and sticking together.
 - c. The front grille is being blocked by putting it behind closed doors and not letting air through the front grille for circulation.
 - d. You have it located in a "hot spot" where fresh air cannot enter the grille. You are recirculating the hot air from the unit compartment back through the grille.
3. Have to defrost it weekly?
 - a. You have it located in a "hot spot" where fresh air cannot enter the grille. You are recirculating the hot air from the unit compartment back through the grille.
 - b. You have a poor door seal causing the warm air to enter the storage compartment, which will freeze, or the door is not closed tightly.
 - c. The chemical content of the water is different in each locality, and therefore the freezing temperature of ice differs. To lower the temperature, turn the control, located through the rear of the cabinet, one-quarter turn clockwise. The reverse should be done if you want to raise the temperature to a Normal setting.
4. The ice maker freezes up?
 - a. A poor door seal, letting the warm air come in.
 - b. Water splashing out of the Ice Maker mold into the storage compartment or bucket.
 - c. Slow leakage through the electric solenoid valve, which would mean a replacement.
5. The Ice Maker won't make ice?
 - a. The Ejector Blades are frozen in and cannot eject the cubes. Defrost the machine.
 - b. The electricity in the room could have been turned off, or the switch in the unit compartment could be turned to the "off-position". Maybe the cord is not tight in the wall socket.
 - c. Someone has shut off the water supply to the machine.
 - d. Defective cold control.
6. The ice is too soft and wet?
 - a. The Control setting is too warm, and it should be turned one-quarter turn to the right. It is located through the rear of the cabinet.
7. It keeps making ice and won't stop?
 - a. The Shut-Off Arm switch is not working properly.
 - b. The Shut-Off Arm is frozen in the ice. It moves cubes from the machine.
 - c. The end of the Shut-Off Arm is stuck under the freezing tray.
8. It is not making enough ice?
 - a. The Control is set too cold. Back it off half turn to the left. It is located through the rear of the cabinet.
 - b. The location is bad, creating a "hot spot". Instead of fresh air coming in through the grille, the hot air which has been expelled is being re-circulated.
 - c. Cubes too large. Adjust water fill.
 - d. Fan Motor is not running.
 - e. The Condenser coil behind the grille is dirty and needs cleaning.
9. The ice cubes are cloudy?
 - a. This is nothing more than the air being trapped in the water due to fast freezing. It has nothing to do with the health, taste, or chemical makeup of the water. It is the same air that is in every glass of water you drink.
10. Too much water is coming out?
 - a. Water Valve Switch needs adjusting. Remove front cover and adjust screw. (Fig. 3)
 - b. The Control failed and needs replacing.
 - c. Leakage through the Solenoid Valve, which needs replacing.

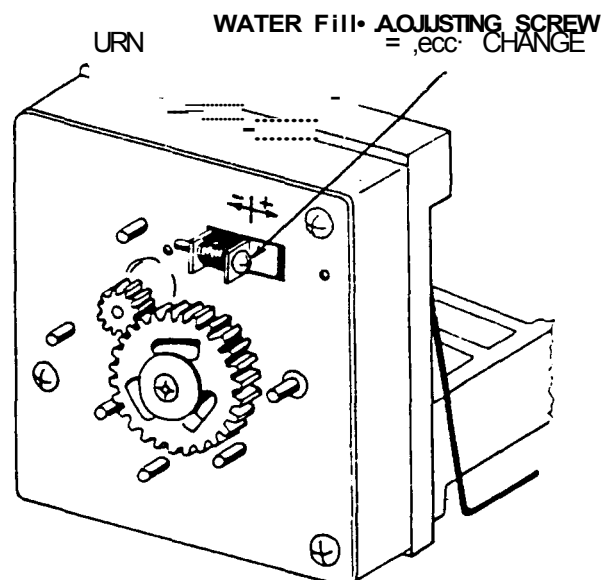


FIG. 3
ADJUSTING WATER FILL

QUESTIONS & ANSWERS {cont.}

1. The ejector blades are frozen into the ice cubes?
 - a. Too much water coming in. Adjust water, as in No. 10.
 - b. Defrost machine.
 - c. Cubes piled too high melted back into freezing tray. Treat as in "b" above.
12. Why must you install it level?
 - a. The front cube will be larger than the rear cubes, thereby taking a longer time to eject.
 - b. If you tilt it to the rear, you will get a "frost-back" on the suction line, and you will not be able to eject ice cubes. (See No. 5)
13. How do you level the Ice Maker?
 2. Put a level gauge alongside the inside of the Ice Maker mold itself, not on top of the cabinet.
14. How can I eliminate cubes sticking together?
 - a. Be sure you have a good gasket seal.
 - b. Be sure the Cold Control is cold enough so that the ice is dry and hard, but not too cold, which will cut down the production of the Ice Maker. (See No. 3c)
 - c. Be sure the door is kept closed.
 - d. See No. 11 it is not behind closed doors, cutting out circulation. (See No. 2c, d)
 - e. Remove the cubes periodically or remove a few cubes. Any loose ice, no matter what the temperature is, will eventually fuse together, if not ruffled or disturbed. Weight or compression causes ice to melt together.
15. What do I do if I need service?
 - a. Contact the dealer from whom you purchased the unit.
16. The Ice Maker is hooked up but no **water** comes in?
 - a. The water has not been turned on at the saddle Valve clamp or at the water supply.
 - b. The two wires to the Solenoid Valve behind the grille have come off. Reach in and put them on.
 - c. The Ice Maker is not running, and you must listen for the compressor.
 - d. Always reach in with your hand and pull the ejector blades in the mold up around one turn to start the Ice **Maker** activating.
 - e. Sediment has plugged the Solenoid Valve inlet screen. Clean it. Shut off water, remove water line at large brass hose nut on Valve inlet, use toothbrush to clean sediment from inlet screen. **Do not remove screen.**
17. The Ice Maker is refrigerating but won't make **any cubes**?
 - a. Be sure that the water is turned on at the source.
 - b. The Solenoid Valve does not work properly.
 - c. Water line is freezing at top, under rear panel.
 - d. A defective Limit Switch or Holding Switch.
 - e. The Shut-Off arm has been put up into the off position.
18. The Ice Maker won't reject ice cubes?
 - a. The ejector blades are frozen into the Ice Maker mold. Defrost.
 - b. A faulty Limit Switch or Shut-Off Arm switch.
 - c. The control is not working.
19. The Compressor won't run?
 - a. Check that you have electricity at the wall outlet.
 - b. Check to see that the switch behind the front grille is on.
 - c. Most common cause is that the relay or overload has failed.
20. The cubes are frosty on top?
 - a. This is due to a poor gasket seal, where air is coming into the unit. (See No. 2)
 - b. If the cubes have not been refrigerated for a long time.
21. How can you test the switches to see if they are active?
 - a. Water Valve Switch, Holding Switch, Shut-Off Arm Switch - can be tested by seeing if the little black button clicks when depressed. If it does not, then the switch needs replacing.
22. How do you get a better door seal?
 - a. Adjust hinges, bend door into shape, or shim door gasket where needed.
23. The water keeps running and won't shut off?
 - a. A faulty water valve switch.
 - b. Defective Solenoid Valve.
 - c. Defective Cold Control.
 - d. Set water as in No. 10.
24. The Compressor has a knocking noise?
 - a. Machine is not level. (See No. 12)
 - b. Faulty compressor, and it should be replaced.
 - c. Fan Motor not running.
25. How can I make smaller cubes?
 - a. This is not advisable, but you can do so by adjusting the Water Valve Switch to permit less water to enter the Ice Maker mold. (See No. 10)

26. How do you drain the entire system so it won't freeze up?
 - a. Shut off water supply to the machine.
 - b. Disconnect the water lines when it enters the Solenoid Valve in the melt compartment. Allow the machine to run for one hour so that all water is drained through the system.
 - c. Leave disconnected until ready to use.
 - d. Mop out any remaining water in the Ice Maker mold.
 - e. Leave door closed when two inches so that humidity will not build up inside the cabinet and corrode the micro switches.
27. Do I need to worry if there is a lot of ice on the Ice Maker?
 - a. No, as long as the Ice Maker is harvesting ice, this is all that is required.
28. Is the Ice Maker Automatic Defrosting?
 - a. Yes, and this pertains only to the Ice Maker mechanism itself, without which you could not insure continuous ice production.
 - b. It is not "manually free".
29. What happens when the Ice Bucket is full?
 - a. The Ice Maker ceases to produce more ice, but the unit keeps running to keep the ice (>ic. The bin arm switch regulates this.
30. There is a high pitch or ring in the Unit Compartment?
 - a. Check for refrigerant level. If touching the (2 bin) it is vibrating.
31. The Compressor runs all the time?
 - a. The Control is set too cold.
 - b. The unit is located in a "hot spot" and not enough new fresh air is coming into the unit compartment, or the fan is not running.
 - c. Something is blocking the front grille and preventing air from entering.
 - d. The Condenser should be clean of lint.
32. When do the heater elements in the Ice Maker go on?
 - a. The heaters go on during the harvesting of the ice only.
33. How do you determine when a Solenoid Valve is defective?
 - a. If water slowly drips into the Ice Maker mold, while the ice is freezing.
 - b. If there is a restriction in the valve, and no water comes into the Ice Maker mold.
 - c. There will be no evidence of dripping in the compressor compartment whether the Solenoid Valve is good or bad.
34. The Ice Maker Ejector Motor runs, but the Ejector Blades do not turn?
 - a. Stripped gear in the Ejector Motor.
35. The Ice Maker Ejector Motor and Ejector Blades turn continuously?
 - a. Defective Cold Control.
 - b. Defective Holding Switch.
36. What is the size of the cube?
 - a. The cube is 1/2" wide, 2 1/2" high. 1-1/2" thick.
37. My Ice Maker leaks?
 - a. This cannot happen if installed properly.
 - b. Check to see that the saddle valve to the water pipe and the connection in the compressor compartment are tight.

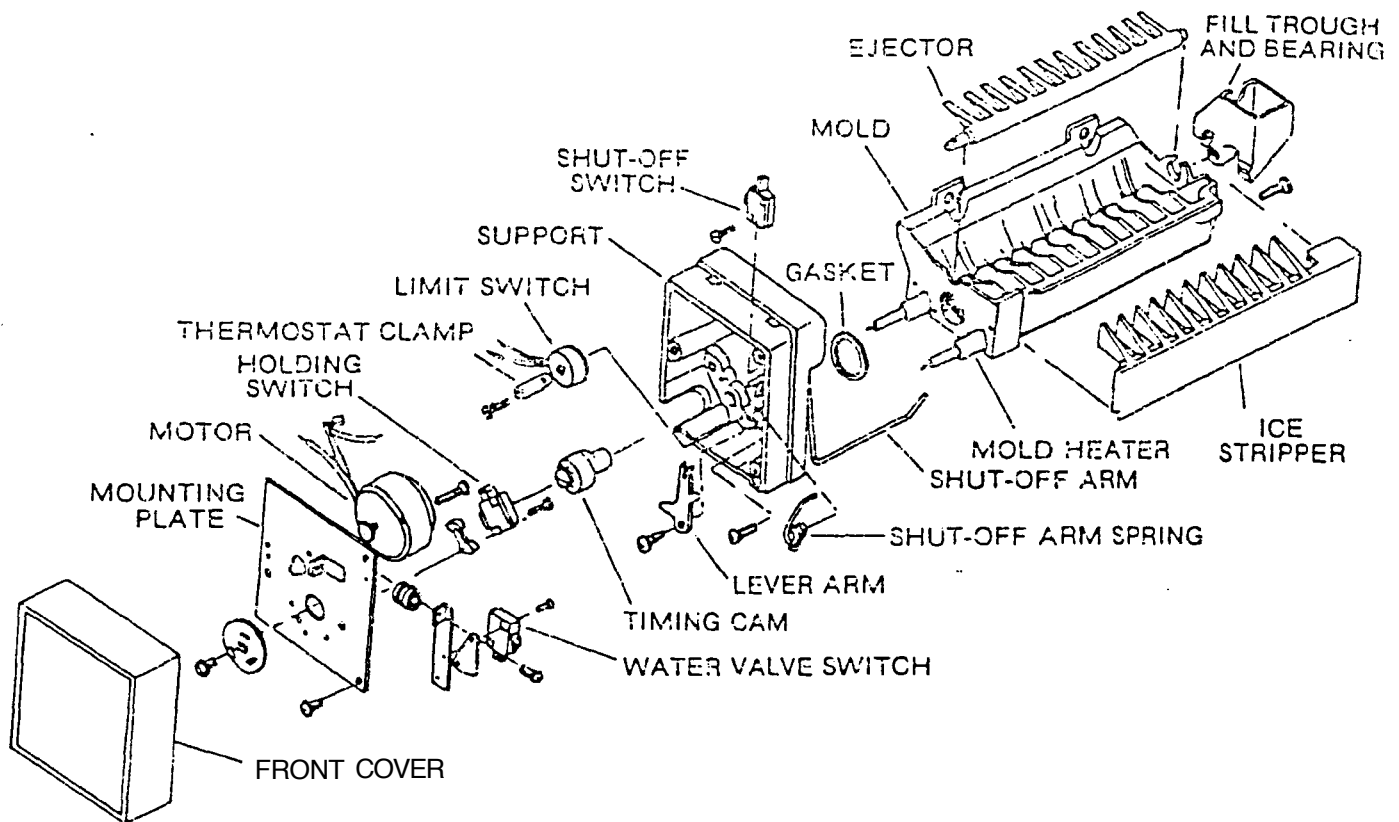


FIG. 4 - ICE MAKER ASSEMBLY

PARTS REMOVAL & REPLACEMENT

Removal and replacement of each component is described on the following pages. The disassembly order (Fig. 1) is included to illustrate the relative position of components and to become familiar with the names of the major parts.

Before attempting any repair, disconnect the appliance service cord from the power supply. A wiring diagram (Fig. 5) is provided at the right.

1. ICE STRIPPER

- Remove ice maker trim cabinet.
- Remove retaining screw at back of mold.
- Pull Stripper back to disengage from front of mold.
- Replace in reverse order.

2. FILL TROUGH AND BEARING

- Remove Ice Stripper.
- Push retaining tab back, away from mold.
- Rotate counter-clockwise until trough is clear.
- Pull from back to detach from mold and ejector blades.
- Replace in reverse order.

3. EJECTOR BLADES

- a. Remove Ice Stripper.

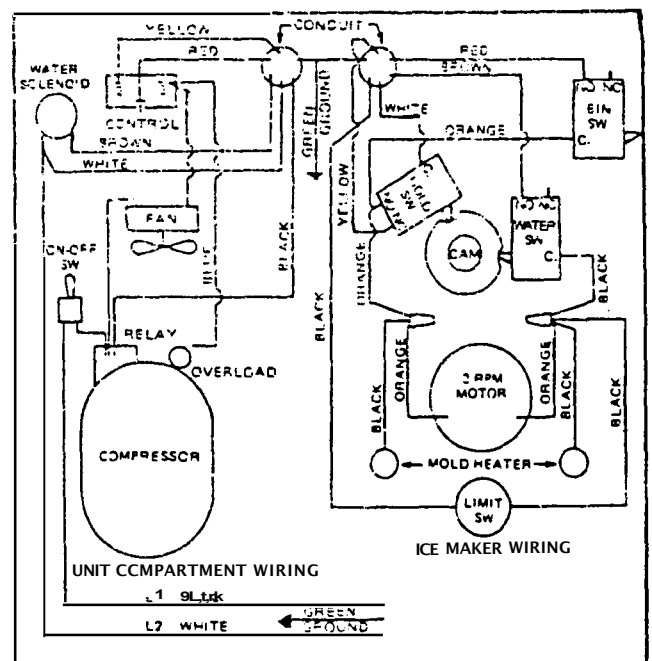


FIG. 5 - WIRING DIAGRAM

- b. Remove Fill Trough & Bearing.
- c. Force back r.ind up to detach from front bearing.
- d. Place small amount of silicone grease on bearing ends of replacement.
- e. Replace in reverse order, noting that blades are in same position as original.

PARTS REMOVAL & REPLACEMENT (cont.)

4. FRONT COVER

- a. Place coin in slot at bottom of mold support and pry cover loose.
- b. To replace, be sure retaining tabs inside cover are located on top and bottom, then snap in place.

5. MOUNTING PLATE

- a. Remove Front Cover.
- b. Remove 3 retaining screws, holding plate in place.
- c. Carefully remove plate, disengaging end of shut-off arm and noting relative position of shut-off arm spring.
- d. Before replacing plate be sure all wiring is orderly and shut-off arm spring is in place.
- e. Replace in reverse order.

6. MOTOR

- a. Remove front cover.
- b. Remove mounting plate (3 screws).
- c. Disconnect wiring.
- d. Remove motor (2 screws).
- e. Replace in reverse order.

7. WATER VALVE SWITCH

- a. Remove front cover.
- b. Remove mounting plate (3 screws).
- c. Disconnect wiring.
- d. Remove switch (2 screws).
- e. Replace in reverse order, making sure switch insulator is in place.
- f. Check water fill and adjust if required.

8. HOLDING SWITCH

- a. Remove front cover.
- b. Remove mounting plate (3 screws).
- c. Disconnect wiring.
- d. Remove switch (2 screws).
- e. Replace in reverse order, making sure switch insulator is in place.

9. SHUT-OFF SWITCH

- a. Remove front cover.
- b. Remove mounting plate (3 screws).
- c. Raise shut-off arm.
- d. Disconnect wiring.
- e. Remove switch (2 screws).
- f. Replace in reverse order.

10. LIMIT SWITCH

- a. Remove front cover.
- b. Remove mounting plate (3 screws).
- c. Loosen limit switch clip mounting screw.
- d. Disconnect wiring and remove limit switch.

- e. Apply alumilastic to sensing surface of replacement limit switch and bond to mold.
- f. Replace in reverse order.

12. MOLD HEATER

- a. Remove stripper (1 screw).
- b. Remove front cover.
- c. Remove mounting plate (3 screws).
- d. Detach limit switch from mold.
- e. Detach heater leads.
- f. Remove mold from support (4 screws).
- g. With a flat bladed screwdriver, pry defective heater from bottom of mold.
- h. Clean all alumilastic from groove in bottom of mold.
- i. Apply new alumilastic to groove in mold.
- j. Install replacement heater, using 4 screws in holes adjacent to heater groove.
- k. Replace parts in reverse order of removal.

13. CONTROL (THERMOSTAT)

- a. Remove rear panels from cabinet.
- b. Remove mounting plate (2 screws).
- c. Remove control from plate (2 screws).
- d. Remove wires (3 terminals).
- e. Remove control element from upper rear cabinet.
- f. Straighten 12 inches of element on new control to insert into small diameter aluminum tube control well. Control will not work if not inserted in control well.
- g. Assemble in reverse order.

14. SOLENOID WATER VALVE

- a. Shut off water supply.
- b. Remove water connections from valve.
- c. Remove mounting screws (2).
- d. Remove electrical connector.
- e. Replace in reverse order.

15. ICE MAKER

- a. Remove formed rear panel.
- b. Disconnect 6 wires.
- c. Use Allen Wrench to remove 2 screws holding Ice Maker to left side wall.
- d. Remove 3 hex head screws from bottom of Ice Maker.
- e. Carefully pull Ice Maker out of cabinet.
- f. Apply Alumilastic and assemble in reverse order.

16. TIMING CAM

- a. Remove front cover.
- b. Remove large white plastic gear.
- c. Remove mounting plate.
- d. Remove plastic timing cam.
- e. Grease new cam with silicone grease.
- f. Assemble in reverse order.

FURNACE

FURNACE ASSEMBLIES

Cabinet and Vent I-1
Combustion Chamber I-1
Blower I-1
Burner I-1

HEATER REMOVAL AND REPLACEMENT I-3

OPERATING INSTRUCTIONS I-3

MAINTENANCE AND CLEANING I-5

SERVICE HINTS, DIAGNOSIS AND

CORRECTIVE MEASURES I-5
Vent Cap Installation I-10

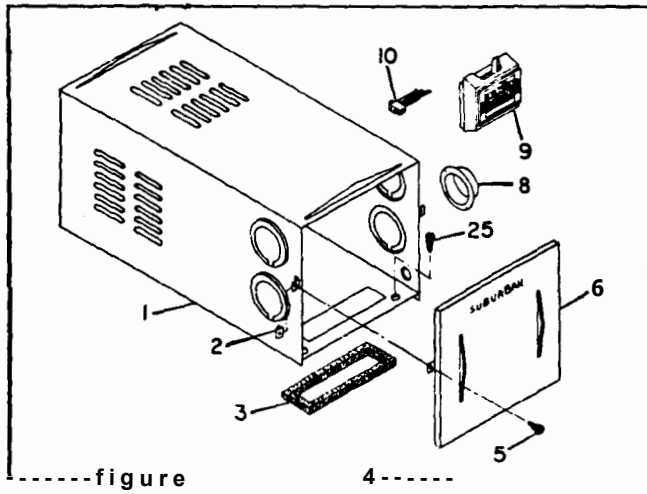
COMPONENT REPLACEMENT PROCEDURE I-11

WIRING DIAGRAM I-20

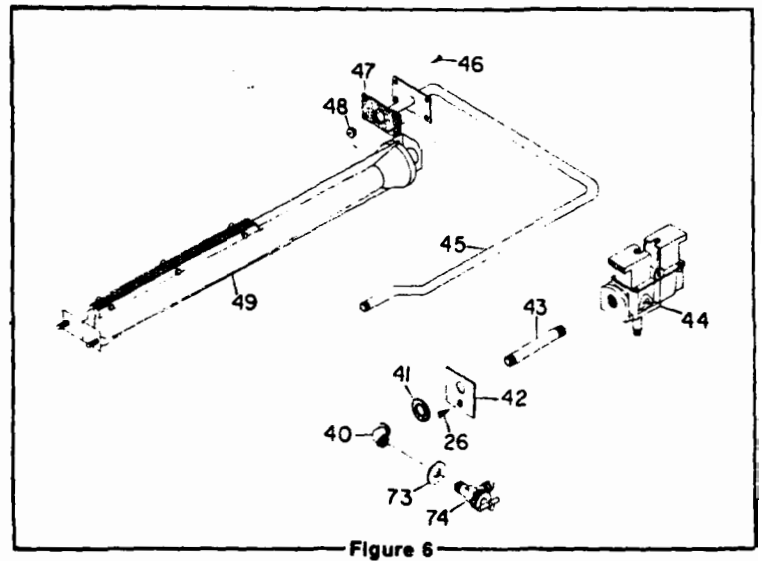
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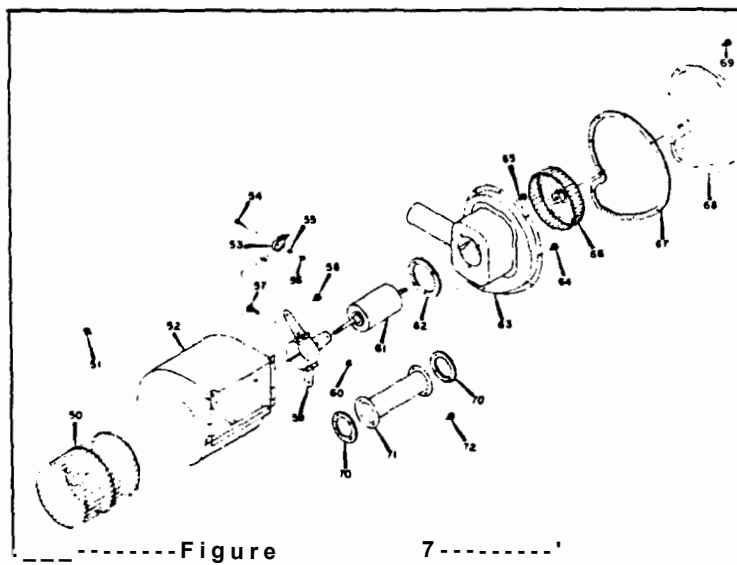
Cabinet and Vent Assembly



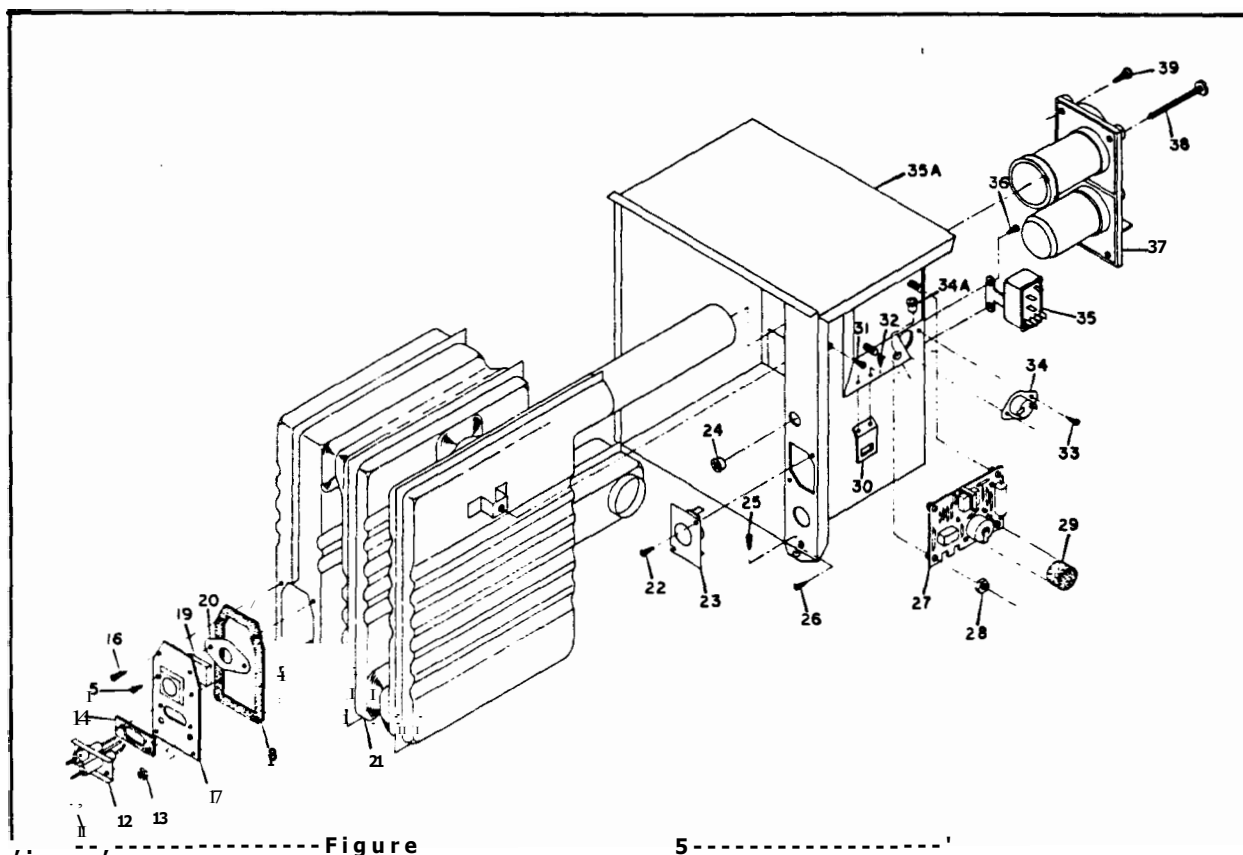
Burner or Assembly Complete



BLOWER ASSEMBLY COMPLETE



COMBUSTION CHAMBER ASSEMBLY COMPLETE



- | | |
|---------------------------------|----------------------------------|
| 1. Cabinet Assembly | 16. Screw #10 x 1/2 Serrated Hd. |
| 2. Tinnerman "U" Clip | 17. Door, Burner Access |
| 3. Gasket, Bottom Duct Adaptor | 18. Gasket, Burner Access door |
| 5. Screw #10 x 3/4 | 19. Glass Disc |
| 6. Cabinet front | 20. Cover plate |
| 8. Duct Collar | 21. Combustion Chamber Assy |
| 9. Thermostat | 22. Screw #8 x 3/8 |
| 10. Power Supply Harness | 23. Limit Switch |
| 11. Screw, 8-32 x 1/2 | 24. Bushing |
| 12. Electrode Assy | 25. Screw, #10 x 3/8 |
| 12A. Electrode Wire (not shown) | 26. Screw, #10 x 3/8 |
| 13. Nut, Hex | 27. Module Board |
| 14. Gasket, Electrode | 28. Nut, Hex 6-32 |
| 15. Screw #8 x 3/8 | 29. Cap Insulator |
| | 30. Bracket, Power Supply |

- 31. Screw, #10 x 3/8
- 32. Screw, #8 x 3/8
- 33. Screw, #10 x 1/4
- 34. Fan Switch
- 34A. Bushing
- 35. Thermostat Relay
- 35A. Radiation Shield Assy
- 36. Screw, il0 x 1/4
- 37. Vent Cap Assy
- 38. Screw, i8, x 3"
- 39. Screw, il0 x 3/4
- 40. Elbow, 90 degree
- 41. Gasket, Gas Inlet Pipe
- 42. Cover Plate, Gas Inlet Pipe
- 43. Pipe, Gas Inlet
- 44. Valve
- 45. Mainfold Assy
- 46. Screw, il0 x 1/2 Serrated hd.
- 47. Gasket, Manifold
- 48. Orifice, Main Burner
- 49. Burner Assy
- 50. Wheel, Room Air
- 51. Screw, il0 x 1/4
- 52. Blower Housing Assy
- 53. Microswitch Assy
- 54. Screw, i2-56
- 55. Washer, Lock i2
- 56. Nut, Hex i2-56
- 57. Screw, 10-24 x 1/2
- 58. Screw, il0 x 1/2 serrated hd.
- 59. Bracket, Motor Mount
- 60. Nut, Hex 10,24
- 61. Motor
- 62. Gasket, Motor Mount
- 63. Combustion Air Housing Assy
- 64. Screw, 10-16 x 1/2
- 65. Screw, 10-]6 x 1/2
- 66. Wheel, Combustion Air
- 67. Gasket, Combustion Air Housing
- 68. Housing Combustion Air (outside)
- 69. Screw, #8 x 3/8
- 70. Gasket, Crossover Tube
- 71. Crossover Tube
- 72. Screw, #10 x 1/2 Serrated hd.
- 73. Gasket, Assy, Gas Inlet
- 74. Valve, Manual Shut-off

1. Shut off main gas supply and cover carpet for protection.
2. Disconnect battery,
3. Unfasten latches on each side of furnace face cover and remove, On some models the right side latch is partially covered by **heat** duct and on those units the left side latch is unfastened and the cover is swung open like a hinged door and unhooked from the right side latch,
4. Remove 90° sheet metal heat duct elbow attached to right lower side of furnace cabinet, to provide access to electrical connector,* Disconnect electrical connector (quick disconnect plug on right side of cabinet).
5. Unscrew gas line and remove 90° ELL gas line fitting. If the thread compound installed in production has taken a firm set, it may be necessary to cut a slot in the furnace cabinet wall so the furnace can be removed without removing the 90° fitting.
6. Remove the vent cap screws and remove vent cap from outside trailer.
7. Remove screw on right side of furnace assembly attaching it to furnace cabinet and slide assembly out.
- a. To install, reverse removal procedures. (Be sure to re-rivet during installation).

* On some models it may be possible to remove this elbow fitting, On these models, leave the electrical connector plugged in until the furnace can be moved out far enough to gain access.

1. LIGHTING INSTRUCTIONS

- a. To light the furnace, turn the manual valve to the "off" position and wait 5 minutes with blower running. (Set thermostat above actual temperature to operate blower).
- b. After 5 minutes, set the thermostat to the "off" position.
- c. Open manual valve. (Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed).
- d. Set thermostat on desired temperature.
- e. Allow 30 seconds for main burner to light,
- f. If the burner does not light, set thermostat on "off" and repeat steps 1 thru 5.
- g. If after 3 tries and no ignition, go to shut down and determine cause.

2. TO SHUT DOWN

- a. Turn manual valve to the "off" position,
- b. Set thermostat on "off".

3. BURNER ADJUSTMENT

To adjust primary air to the main burner, the small sheet metal cover found just below and to the right of the lighter opening must be removed. **Behind** the cover is a slotted screw head. With a screwdriver, turn screw head counterclockwise for less primary air and clockwise for more primary air, A symptom of too much primary air will be a howling or screeching noise when burner is on (reduce air to correct). A symptom of too

little primary air will be sooting on the exterior vent and a distinct yellow and floating flame (increase air o correct). A hard blue flame is the sign of correct adjustment.

4. SEQUENCE OF NORMAL OPERATION

- a. When the thermostat calls for heat, the blower motor is energized immediately,
- b. As the blower motor reaches approximately 75 percent of the normal r.p.m, (within 3 to 5 seconds) the micro-switch, in response to the air flow, will engage allowing current flow to the solenoid valve and the spark ignition system.
- c. The current to the valve opens it and allows gas to the main burner. The spark then ignites the main burner.
- d. After main burner ignition, the flame detector will sense the presence of flame (usually within 7 seconds) and deenergize the lockout feature. If the main burner does not ignite or the flame detector does not deenergize the lockout features within 7 seconds, the unit will go into lockout. At this time it will be necessary to set the thermostat on "off" and repeat steps 1 thru 5 of the lighting instructions,
- e. If after 3 tries and no ignition or main burner continues to go off within 7 seconds, go to shut down and determine cause.
- f. If within a **period** of approximately 2 minutes after the main burner is lit, the thermostat is turned back, both the blower motor and solenoid valve are deenergized. However, if the furnace continues to run longer than 2 minutes, which it normally should, a slight snap can be heard from within the casing. The snap is caused by the fan switch

as it changes its position. After this occurs, if the thermostat is satisfied or turned back, the solenoid valve will close, the flame on the main burner will go out, but the blower will continue to run for a short period of time and will then shut off. The purpose of this is to remove most of the remaining gases from the heat exchanger. Be assured that this period of blower override is a part of the unit's normal operation.

5 • FAN SWITCH

The purpose of the fan switch is to control the sequence of the blower operation. The fan **is a** two pole switch. When the bimetal disc of the fan switch is heated to the operating temperature, the switch closes. This completes a circuit through the motor from a direct source. The blower will continue to run as long as the chamber is hot even though the thermostat is satisfied and the main burner is off. When the chamber cools, the fan switch changes back to its original position and shuts the blower off. If burner and blower shut off simultaneously after thermostat is satisfied, then the fan switch failed change over. This is a symptom of a faulty switch - replace it.

6. LIMIT CONTROL

The purpose of the limit control is to turn off the gas to the main burner if, for any reason, the furnace becomes hotter than is safe. Improper operation of the furnace, due to the limit control, does not always indicate a defective control. If the circulating air is blocked or only partially so, the limit control will function and cause the main burner to cycle. Cycling on the limit is not always undesirable - if it happens only occasionally. This is a good indication of safe

of safe operation and will most likely happen on a warm day. If cycling happens too often or for an extended period, the circulating air system should be thoroughly cleaned.

If the limit control is found to be defective, there is no recommended method of repairing it. Because of its importance for safety reasons, it should be replaced with a new one.

CAUTION: Never shut the limit control even for temporary operation.

7. MICRO SWITCH

The microswitch has two purposes.

- a. It is an "air prover." It operates in response to the current of air generated by the blower. Hence, if the air from the blower is not sufficient, the switch will not operate. This may be caused by a slow motor due to low voltage, restricted return air, or lint accumulation on the blower wheel.
- b. The switch allows time for the blower to pull in a sufficient amount of air to support combustion before it engages. Once it engages, the solenoid valve opens, gas flows to burner, and ignition occurs.

8. BLOWER ASSEMBLY

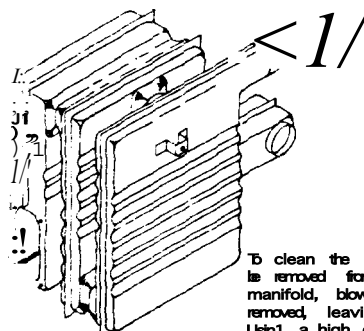
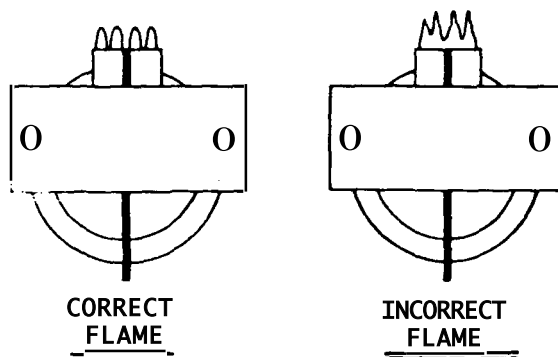
Although one motor drives all wheels, the blowers are separate. The combustion air blower is sealed so no air will pass between it and the circulating room air blower. The combustion air blower draws air from the outside atmosphere, discharges it into the combustion chamber and forces the combustion products out the exhaust tube. The circulating room-air blower pulls return air in and forces it across the heat chamber, discharging into the area to be heated.

MAINTENANCE AND CLEANING

We recommend that the furnace be inspected and thoroughly cleaned by a qualified service agency before each heating season. This would include the combustion chamber, the main burner, the blower assembly, and all control parts. A careful inspection of all gaskets should be made and if any gaskets show signs of leakage or deterioration, they should be replaced.

Cleaning of the chamber and main burner will be required if the unit has been allowed to operate with a high yellow flame. The yellow flame is due to incomplete combustion (lack of air) and will deposit a soot formation inside the chamber and on the main burner.

To clean the chamber, main burner, blower assembly and controls, the chamber assembly must be pulled from the furnace cabinet. (See instructions for removing chamber.)



To clean the chamber, the furnace must be removed from the cabinet and the manifold, blower assembly, and controls removed, leaving chamber as shown. Use a high compression air hose, blow through the exhaust tube. As shown by arrow, to remove soot or loose debris.

NOTE: To service, furnace must be removed from cabinet.

A. COMPLAINT-NO HEAT

1. Thermostat off -

Check to be sure thermostat is calling for heat. Wire to thermostat could be off terminal.

2. Gas supply -

Be sure manual gas valve is in the open position (level parallel to gas line).

3. Electrical connections and power -

Battery must be charged. If battery is low, there will be sufficient power to run the blower at full speed. If blower doesn't run at its prescribed speed, the microswitch cannot be engaged and gas will not flow to the main burner nor will the spark begin. Be sure the connection of the voltage lines in the terminals are tight.

4. Malfunctioning microswitch -

Be sure the microswitch is sailing in far enough to open the solenoid valve and to energize the spark module board. If the switch is not sailing in, clean any dust or dirt from the actuator pin. Other reasons for switch not sailing in are:

- a. Insufficient blower speed (slow motor due to low charged battery, faulty motor, lint and dust accumulation on the blower wheels, or restriction of return air to furnace). Check wiring in accordance with unit's wiring diagram to assure the proper polarity of the 12 Volt DC power supply is observed.

This polarity must be observed so the motor will run the proper direction of rotation to insure correct air delivery.

- b. Faulty microswitch-Replace switch if valve does not open when switch is manually engaged, Switch should also be replaced if battery is fully charged and blower motor running at top speed fails to engage switch within 6 to 7 seconds.

- c. Inadequate duct discharge area - (See duct requirements on page 5, paragraph Funder General Notes.)

NOTE: To service switch, combustion chamber must be pulled out.

5. Gas valve -

Within 30 seconds after motor reaches 75% of its r.p.m. and microswitches engage, check the following:

- a. Voltage at valve-If voltage is present but valve is not opening, check wire connection in valve circuit.
- b. Wire connections OK, replace valve.
- c. No voltage at valve-Check circuit completion through microswitch, limit switch and module board.

6. Blower not operating -

Possible causes:

- a. Check power supply to furnace (blown fuse) •

b, Check electrical connections at furnace,

c, With thermostat points closed, check for circuit completion across terminals 2 and 4 of thermostat relay. If there is continuity across terminals 2 and 4 and wiring to motor is OK, replace motor.

d. No circuit across terminals 2 and 4 and wiring to relay OK, replace relay,

7. Short cycling (fan switch) -

If burner and fan shut off simultaneously when the thermostat is satisfied, it indicates a defective fan switch, Replace switch (chamber must be removed),

a. Defective relay -

Relay may be faulty if motor fails to start when thermostat calls for heat. This will be evidenced by a click when the thermostat is raised and motor fails to operate,

9. Ignition failures - CAUTIONS:

a. Never operate the furnace with the electrode wire disconnected nor with the electrode assembly removed from the furnace.

b. Never use a battery charger to check out an electronic ignition furnace.

c. Never use a screwdriver on any part of the electrode assembly while furnace is in operation.

d, Be certain that the spark from the electrode never reaches the flame sensor portion of the electrode assembly.

e. Be sure the electrode assembly screws are snug at all times, especially after the electrode has been removed and reinstalled.

f. DISCHARGE MODULE BOARD
BEFORE REMOVING FROM FURNACE.

This is accomplished by placing a screwdriver on the terminal coming out of the coil (where electrode wire connects) and grounding it to some portion of the furnace,

g. If the module board is found to be defective, it must be replaced-it is not field repairable, Any attempts to repair the board may alter the board and cause it to operate in an unsatisfactory manner.

h. Insure that the gap between electrode and ground is always 1/8". The gap between the ground and the flame sensor should be approximately twice the gap between electrode and ground to insure no sparking to sensor, Sparking to sensor will damage module board.

The electronic ignition system is made up of three main parts. The module board, the electrode assembly and the electrode wire. The module board is the brain of the electronic ignition system and it has four functions:

1, When the blower reaches full r.p.m., a circuit is completed to the module board.

2. After a 12-18 second delay, a circuit is completed to the solenoid valve.

3, At the same instant, the electrode produces a spark as indicated by the small neon bulb on the board as it flashes.

4. The module board also performs the lockout function in cases where the spark fails to light the burner. When lockout occurs, the spark stops and the voltage from the module board to the

gas valve is discontinued and the valve closes. The unit will remain in lockout and the blower will continue to run until the thermostat is turned off.

It is important to determine the type problem being experienced and then the proper checkout procedure can be made. The following is a list of problems, how to identify in which area the problem is located, and to correct it:

1. Electrode not sparking - with blower running and microswitch engaged, check the following:
 - a. Check for proper voltage at spark module board after the blower motor reaches full r.p.m. If no voltage, check back through circuit to determine cause.
 - b. Voltage is present but no spark at electrode after 12-18 second delay, check electrode wire connections.
 - c. Wire connections OK but electrode wire does not show continuity through it-replace electrode wire.
 - d. Electrode wire does show continuity through it - check electrode gap.
 - e. Electrode gap OK - check electrode assembly for possible cracks or carbon on tip of electrode.
 - f. Electrode OK - replace module board.
2. Electrode sparking but gas not coming through burner:
 - a. Check to see if voltage is coming out of module board to gas valve after 12-18 second delay. If no voltage and wire connections are OK, replace module board.

- b. Voltage is coming out of module board to gas valve but gas valve does not open-replace gas valve.

3. Electrode sparking and gas valve opening but burner will not light:

- a. Check to see if gas is coming through the burner. If no gas is coming through the burner, check for obstruction in gas line, in main burner orifice, or in main burner.
- b. Gas is coming through burner but spark will still not ignite burner - check gas pressure to be certain that it is 11 inches water column at furnace •
- c. Gas pressure OK - check for obstruction in main burner, check to be sure that air shutter is not completely closed and be sure electrode is positioned approximately 1/4" above and directly over one of the sawed slots on the main burner.
- d. Check all gaskets to be sure they are tight and forming a good seal.

4. Burner ignites but goes off and into lockout:

- a. Check to be certain that flame sensor is over one of the slots in the main burner and that the main burner flame is burning against the tip of the flame sensor - adjust by sliding burner sensor in direction necessary.
- b. Burner still goes off and into lockout, check wire connections at flame sensor and a module board.
- c. **Wire** connections OK-check continuity through flame sensor wire.

d. Continuity of flame sensor wire OK-check with micro amp meter in series with flame sensor wire to be certain that the flame sensor is generating at least seven micro amps within seven seconds after the burner is ignited. Replace electrode assembly if test is negative.

e. Flame sensor OK but burner still goes off and into lock-out - replace the module board.

5. Repeated module board failure:

a. Check to be certain that the electrode spark is not sparking against the flame sensor portion of the electrode assembly.

b. Check to be sure module board is not shorted to the chamber wrapper.

c. Be sure fish paper insulator covering the electrode wire connection on the coil of the module board is in place.

d. High voltage - 14.5 Volts DC, maximum.

6. Customer complains of unit going into lockout only once in a while:

a. We have found that lockout can occur if the gas pressure fluctuates at the time the thermostat calls for heat. Pressure fluctuations can be caused by a malfunctioning gas bottle regulator, an obstruction or a kink in the gas bottle regulator or in the gas lines.

It is difficult to check for these fluctuations that will not noticeably affect any other appliance in the coach. However, isolating the furnace from the coach gas system will determine if the gas system is responsible. This isolation procedure can be done by connecting a separate upright bottle, regulator and gas

line directly to the furnace, eliminating the coach gas system. If the occasional lock-out still exists, then the furnace should be thoroughly tested to determine the cause; however, if the furnace works properly on this separate system, then the coach gas system should be checked.

When moisture in the gas system is suspected as being the problem, especially where the horizontal type gas bottle is being used, the following steps should be taken to prepare the gas system against further moisture problems.

Corrective Measures:

1. Disconnect gas bottle and drain it completely dry of all gas and moisture.

2. Disconnect and blow out all gas lines completely dry.

3. Install a new pressure regulator on the gas bottle.

4. Add the drying agent. 1/2 pint of methanol alcohol per 100 pound bottle capacity is recommended.

5. Never fill the gas bottle over 80%.

6. Do not use gas bottle completely dry to avoid using up the drying agent.

We found the above procedures to be effective in over 95% of all occasional lockout problems. All of these steps must be performed as described for the preparation of a contaminated gas system to be 100% effective.

B. COMPLAINT - EXCESSIVE NOISE

1. Blower out of balance - replace blower.

2. Motor hum - replace motor.

3. Air adjustment - a screeching or howling noise while burner is on

is due to excessive primary air. To adjust for less air, see instructions under Burner Adjustment.

C. COMPLAINT - ERRATIC BLOWER OPERATION

1. If blower is going off and on, check the following:
 - a. Thermostat **points** - if points are opening and closing, see Service Hints, line 2, below.
 - b. If thermostat points are remaining open or closed, the internal overload switch in the motor is defective - replace motor.
2. If thermostat points are observed opening and closing rapidly when furnace first starts, check the following:
 - a. Quick disconnect plug on side of furnace. Plug must be wired as shown on electrical diagram.

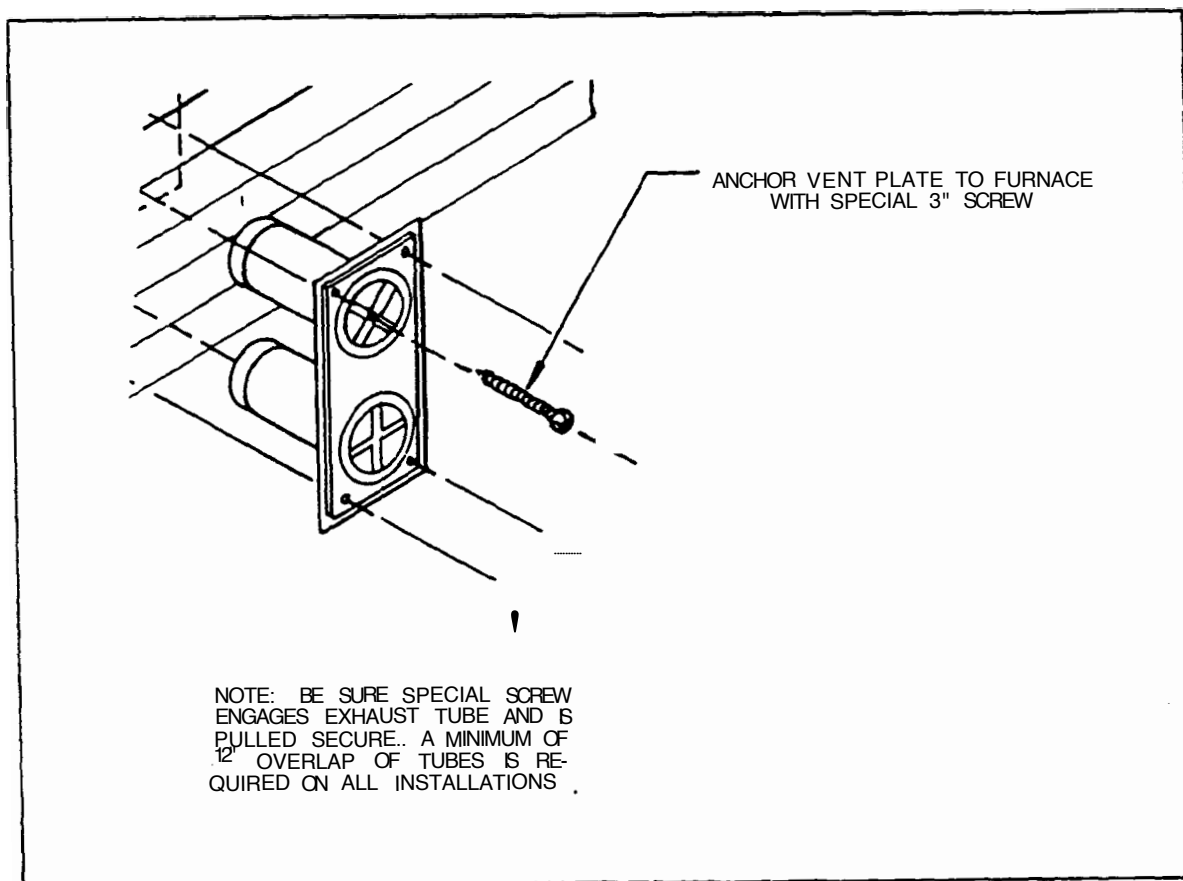
b. Miswiring at thermostat relay (See wiring diagram).

c. Shorted gas valve - if furnace runs properly with wires at gas valve disconnected, replace gas valve.

a. Short in wiring - check all connections including thermostat.

D, MAIN BURNER WILL NOT CYCLE OFF

1. Check thermostat points - points should break cleanly.
2. Check solenoid valve - valve may be stuck open. If so, replace. DO NOT ATTEMPT TO REPAIR VALVE.



COMPONENT REPLACEMENT PROCEDURE

COMPONENTS

1. Replace gas valve

2. Replace main burner orifice

PROCEDURES

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Remove chamber assembly.
- h. Remove two valve wires.
- j. Remove valve and replace.

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws.
- f. Remove 3" screw (center of exhaust, outside).
- g. Disconnect manifold tubing.
- h. Remove screws from burner compartment door.
- j. Remove burner assembly and replace main burner orifice.

~~COMPONENTS~~

PROCEDURES

3. Replace main burner

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Remove screws from burner compartment door.
- h. Remove two gas valve wires.
- j. Disconnect manifold tubing.
- k. Pull burner assembly.
- l. Remove burner.

4. Replace microswitch

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting,
- c. Remove cabinet front,
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Remove chamber assembly,
- h. Remove two screws and nuts holding microswitch assembly on blower housing.
- j. Remove wires.
- k. Remove switch.

COMPONENTS

PROCEDURES

5. Replace motor

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Remove chamber assembly.
- h. Remove two microswitch wires from terminal block. Disconnect two motor wires.
- j. Disconnect metal crossover tube.
- k. Remove blower from firewall.
- l. Remove motor and blower wheels.
- m. Loosen Allen screw on circulating wheels and remove from motor shaft.
- n. Replace motor.

6. Replace blower assembly

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screws (center of exhaust, outside).
- g. Remove chamber assembly.
- h. Disconnect microswitch **wires**.
- j. Remove microswitch.
- k. Remove screws holding blower to firewall.

7. Replace limit switch

1. Remove metal crossover tube.
- m. Remove blower.
- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber **shield** to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Remove chamber assembly.
- h. Remove two wires from limit switch,
- j. Remove limit switch.

a. Replace fan switch

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Pull chamber assembly.
- h. Remove 2 wires from fan switch.
- j. Remove fan switch.

COMPONENTS.

PROCEDURES.

9. Replace large blower wheel

- a. Disconnect gas and power supply (quick disconnect).
- b, Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside),
- g. Pull chamber assembly.
- h, Remove microswitch wires,
- j. Disconnect motor wires.
- k. Remove blower from firewall.
- l, Remove large blower with 1/8" Allen wrench,

10, Replace small blower wheel

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f, Remove 3" screw (center of exhaust, outside).
- g. Pull chamber assembly.
- h, Remove two microswitch wires from terminal block.
- j, Disconnect motor wires.
- k. Remove blower from firewall.
- l. **Remove** screws on motor housing.
- m. **Remove** small blower with 1/8" Allen wrench.

COMPONENTS

PROCEDURES

11. Replace complete chamber assembly

- a. Disconnect gas and power supply (quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Pull chamber assembly.

12. Replace chamber only

- a. Disconnect gas and power supply.
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap screws (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Pull chamber assembly.
- h. Remove chamber from chamber wrapper.
- j. Remove electrode assembly.
- k. Remove blower assembly.
- l. Remove main burner and valve assembly.
- m. Remove relay, fan switch and limit switch.
- n. Remove module board.

COMPONENTS

13. Replace thermostat

14. Replace burner assembly

15. Replace vent cap

16. Replace thermostat relay

PROCEDURES

a. Turn power off or thermostat to "off" position.

b. Remove thermostat cover.

c. Remove two screws holding thermostat body to wall.

d. Remove two wires.

a. Disconnect gas and power supply (quick disconnect).

b. Disconnect gas manifold from piping at union fitting.

c. Remove cabinet front.

d. Remove shipping screw securing chamber shield to cabinet.

e. Remove vent cap screws (outside).

f. Remove 3" screw (center of exhaust, outside). -

g. Pull chamber assembly.

h. Remove two valve wires.

j. Remove screws from burner compartment door.

k. Remove burner assembly.

a. Remove vent cap screws (outside).

b. Remove 3" screw (center of exhaust, outside).

a. Disconnect gas and power supply (quick disconnects).

b. Disconnect gas manifold from piping at union fitting.

c. Remove cabinet front.

d. Remove shipping screw securing chamber shield to cabinet.

e. Remove vent cap screws (outside).

f. Remove 3" screw (center of exhaust, outside).

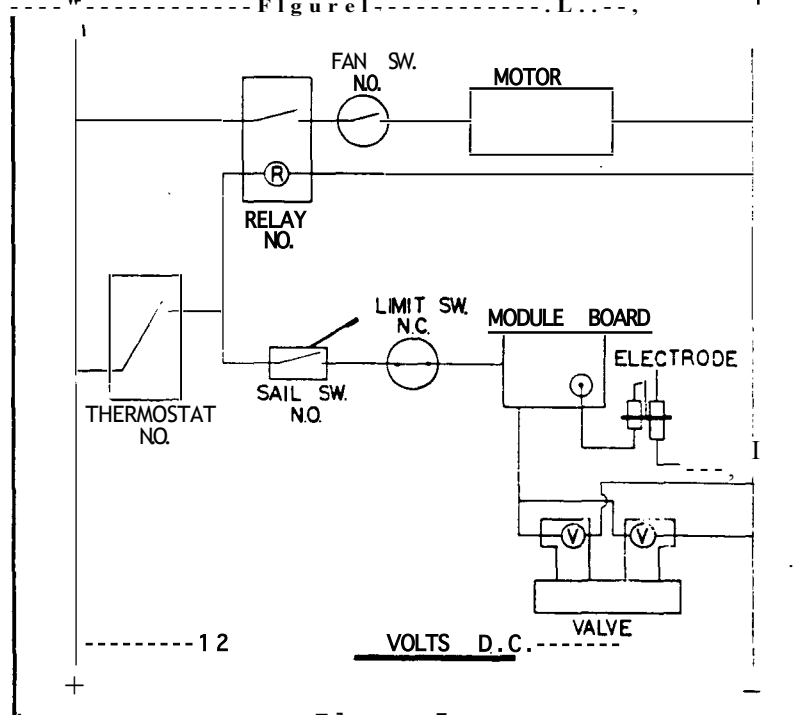
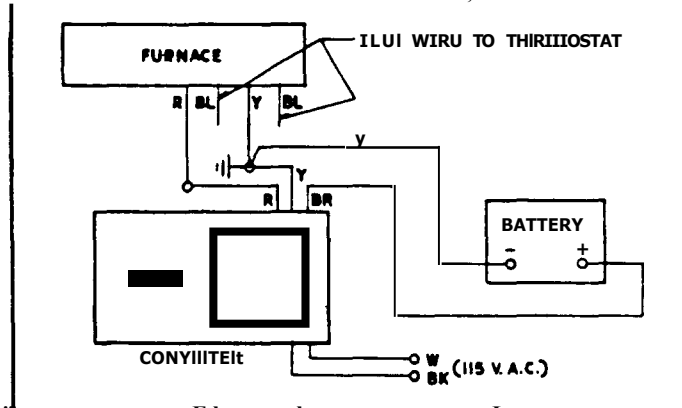
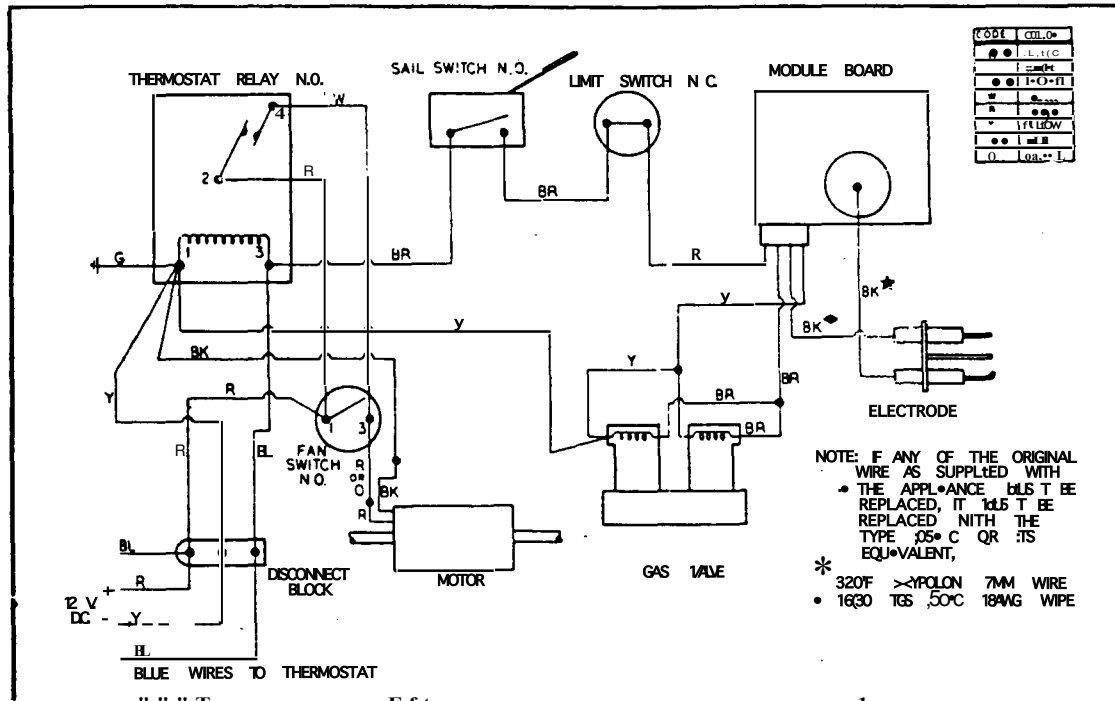
COMPONENTS

PROCEDURES

17. Replace module board

- g. Pull chamber assembly.
- h. Remove screws from relay.
- j. Disconnect electrical leads to relay and replace.
- a. Disconnect gas and power supply .(quick disconnect).
- b. Disconnect gas manifold from piping at union fitting.
- c. Remove cabinet front.
- d. Remove shipping screw securing chamber shield to cabinet.
- e. Remove vent cap -crews (outside).
- f. Remove 3" screw (center of exhaust, outside).
- g. Pull chamber assembly.
- h. Remove electrode wire at board.
- j. Disconnect wiring at board (quick disconnect).
- k. Remove board.

FURNACE WIRING DIAGRA 1



AIR CONDITIONER

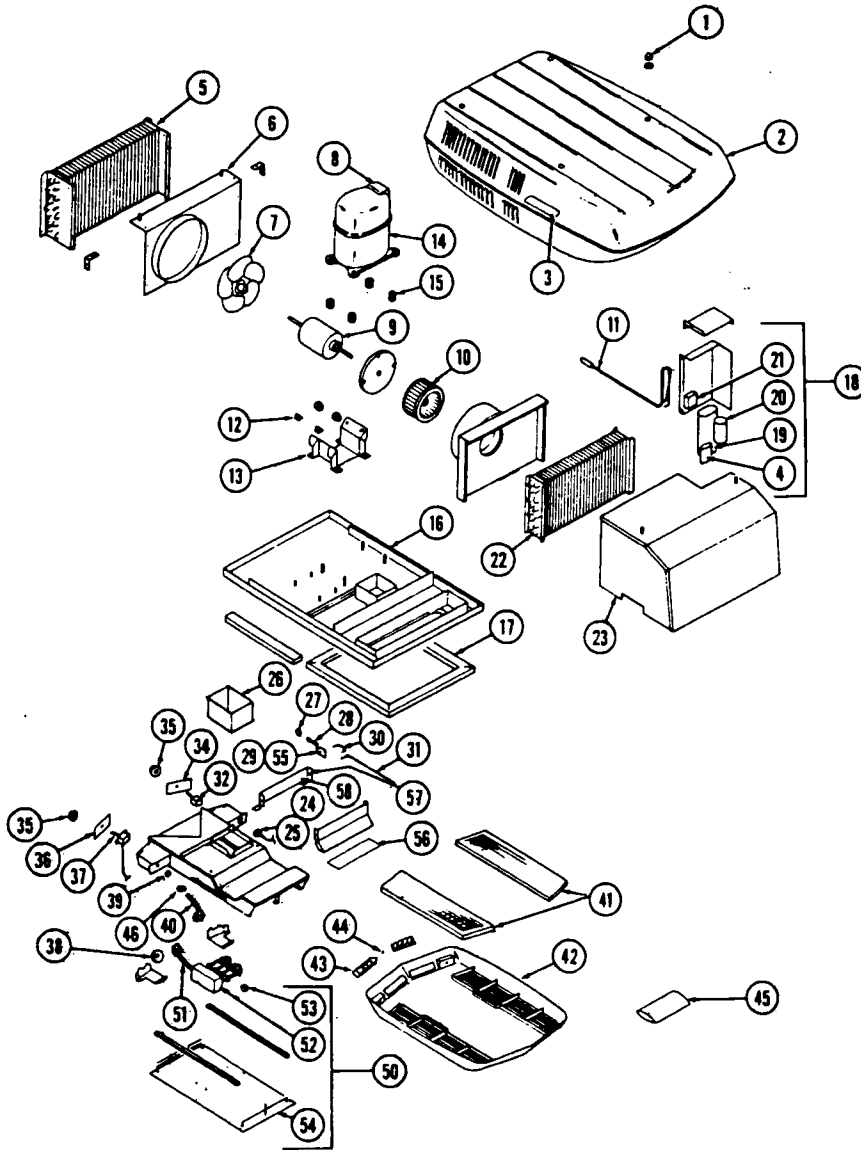
AIR CONDITIONER ASSEMBLY J-1

WIRING DIAGRAM..... J-3

INSTALLATION J-3

TROUBLE SHOOTING J-4

Coleman Air Conditioner



1. Acorn nut and washer
2. Shroud (Ivory-less logos)
3. Coleman logo
4. Fan capacitor (7-5 Mfd. 370V)
5. Condenser coil (McQuay No. CZ1503 12 x 20)
6. Fan shroud
1. Fan (4 blade, 11" dia. 40° pitch, 150 bore LAU No, F02Y11 Revcor No. T1104)
8. Overload (T.l. No. CRA1743-138)
9. Motor 115V. 2.0A, ,60HZ (RMR No, N416CCW68, GE No• SKCP39CGD)
10. Impeller (polypropylene 7" dia, x 2.ao wide)
11. Cap tube (formed w/strainer)
12. Motor mount (rubber)
13. Motor mount (steel)
14. Compressor (Copeland RRK4-0125-PAA.)
15. Compressor mount, neoprene
16. Base pan assembly
17. Gasket pkg.
18. Junction box assembly, complete
19. Run capacitor (30 mfd. 370V.)
20. Start capacitor (88-108 mfd. 2SOV.)
21. Start relay (RBM128s96-1945SB)
22. Evaporator coil (10 x 17-7/8 McQuay No. 2Ez1404)
23. Evaporator cover assembly
24. Wiring and conduit assembly
25. Plug connector - plastic
26. Duct collar
27. Lever cap
28. Lever
29. Nut
30. Linkage - short
31. Linkage - long
32. Selector switch Arkless No. 2807H463
34. Decal; selector switch Model 6723A716
35. Knob
36. Decal, thermostat
37. Thermostat - 92° in 60° out
38. Grommet, 1/B"ID x 3/8"OD
39. Connector, 3/8" Romex
40. Wire bundle w/plug connector
41. Filter package
42. Ceiling shroud, ivory
43. Louver, ivory w/waaher
44. Washer package, Nylon 3/8" dia.
45. **Single parts** package 3/8" x 6-3/4" bolts, knobs and wire nuts
46. Strain relief
50. Heat strip assy, complete
51. Wire bundle, heater box
52. Heat element, 1600 w/120V AC-Gould
53. Limit switch, open 160C110T1 No. 20601L
54. Heat strip bottom
55. Neoprene washer
56. Damper shield
57. Damper pin
58. Damper

SPECIFICATIONS

Model	Cooling Capacity Btu.	Charge oz. of R22	-----Full Load Amperes----- Heating Element Fan Com-pressor	Total Heat	Total Cool	LRA Com-pressor
6746A 808	13,500	19.8	13.2 2.8 13.2	16.0	16.0	72.5

INSTALLATION MEASUREMENTS

Trailer Length

Air Conditioner Distance
From Rear Seam

27' Rear Bath

105 "

31' Rear Bath

112 "

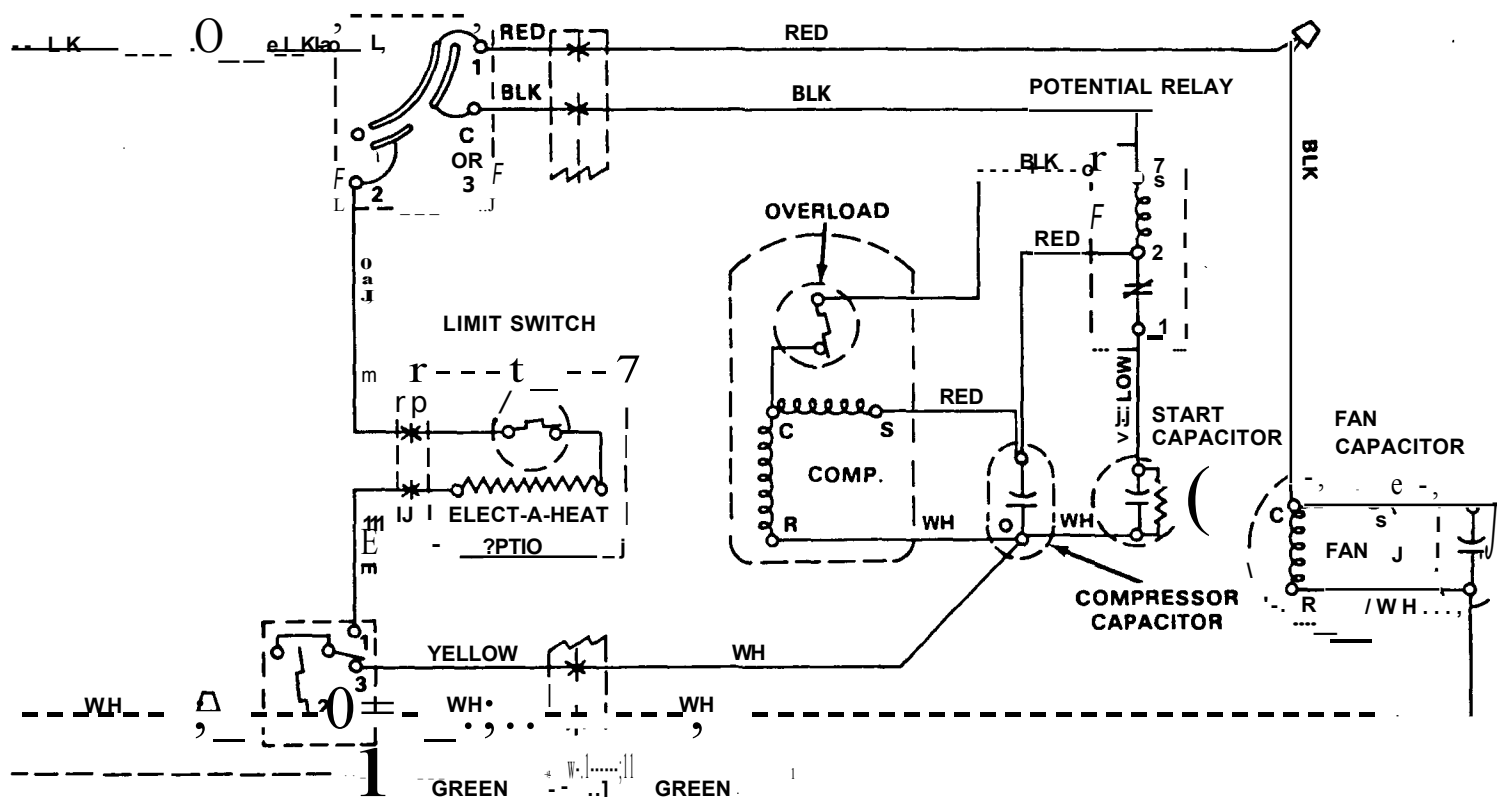
31' Center Bath

120 "

34' Center Bath

15 4"

SCHEMATIC WIRISG DIAGRAM



TROUBLE SHOOTING

PROBLEM

1. Nothing Runs.

The customer turns the selector switch to the "Cool" position and the thermostat to a low temperature (below room temperature) and nothing happens. This is surely a serious problem, but it is usually the easiest to correct.

Question: "What are the possible causes?"

Answer: 1. The power supply could be "dead". Check for open circuit breaker or fuse at service panel. Check for 115 volts between hot line (black) and neutral (white) at power entrance to unit.

Answer: 2. The selector switch could be open. With all switches turned on and thermostat turned to "Cool", check around selector switch with volt meter (terminal LI to terminal C or 3). If meter reads 0 volts, selector is OK. If meter reads 115 volts, the switch is open and selector must be replaced.

PROBLEM

2. Inadequate cooling.

The customer says he gets inadequate cooling for a while after he turns the system on and then it seems to quit cooling completely. As soon as the housing is removed from the unit with the system running we observe that the suction line is coated with frost.

We feel the compressor housing and it is cool. We check the current draw and find that it is low.

QUESTION: "Could the system be low on charge or the cap tube plugged?"

Answer: "No."

Question: "Why not?"

Answer: "Because, if it were low on charge or if the cap tube were even partially plugged, the low side would be starved for refrigerant; and, therefore, the suction line would be warm. Also, the compressor housing would be hot."

Question: "Then why isn't it cooling properly?"

Answer: "Because the evaporator is not picking up the heat load."

Question: "What could cause the evaporator to not pick up the heat load?"

Answer: (possible causes and repair) 1. "The filter could be dirty." This is the most probable cause and, of course, the easiest to check and correct.

Answer: 2. The evaporator air control damper could be staying in the "quiet cool" position. This problem is easy to find and it is usually corrected by adjustment or tightening of the cable or linkage.

Answer: 3. "The fan could be at fault." A mechanical problem such as the wheel (squirrel cage) loose on the shaft is usually rather obvious. Checking why a fan motor does not come up to speed is a little more involved.

a. Seized bearings - This does not often occur; but, if it does, a few drops of oil will usually at least temporarily

free them. If the shaft is scored in the bearings, it will soon tighten up again. Now is the time to replace it.

b. Partially burned motor windings - See fan motor check procedure.

c. Shorted or open capacitor- See capacitor test.

Answer: 4. "The evaporator coil face could be coated with lint, dirt, etc." Dirt, or lint on the coil will restrict the flow of air through the coil and the unit must be removed from the recreational vehicle and the coil must be thoroughly cleaned with strong detergent (Coil X, Calclean, etc.) and water. Be sure to protect the fan motor and electrical controls during cleaning by covering them with polyethylene sheet. After the system is cleaned, allow it to thoroughly dry for several hours (before turning it on) to prevent electrical shorts.

Before system is put back into operation be sure filter is properly installed to prevent recurrence of dirty coil.

PROBLEM

3. No Cooling.

The customer turns the selector switch to "cool" and the thermostat to a low temperature (below room temperature). The fan runs OK, but the unit does not cool. When the unit housing is removed, we observe that the compressor does not run and it does not hum (the compressor is completely dead).

Question: "What are the possible causes?"

Answer: 1. The selector switch may be open to the compressor. Check around selector switch (L1 to C or 3) with volt meter.

Answer: 2. Thermostat may be open. Check around thermostat with volt meter.

Answer: 3. Overload switch may be open. Check around overload switch with volt meter.

Answer: 4. Compressor winding may be open. Check out compressor windings with ohm meter.

PROBLEM

4. No Cooling

The customer turns the selector switch to "Cool" and the thermostat to a low temperature (below room temperature). The fan runs OK, but the unit does not cool. When the unit housing is removed, we observe that the compressor does not run; however, it periodically hums for 15 to 30 seconds.

Question: "Could the cause of the trouble be the circuit breaker or fuse, the selector switch, or the thermostat?"

Answer: "No-because we know that power is getting to the common and run terminals of the compressor to make it hum and the Thermal-Current Overload switch is breaking the circuit to protect the compressor from burn out.

Question: "What are the possible causes of the problem?"

Answer: 1. "The voltage could be low".

a. Check the voltage between #1 on the overload switch and the "R" terminal of the compressor while it is not humming. This voltage must be 115 V plus or minus 10,.

b. Check the voltage from 'C' to 'R' of the compressor while it is humming (trying to start). The latter reading will probably be lower, but it still must be 103.5 volts minimum (115 volts - 101).

If the first reading is above 103.5V and the second is under 103.5V there is too much voltage drop in the lines - a situation which must be corrected for the air conditioner to perform safely and satisfactorily.

Answer: 2. "A capacitor could be shorted, weak, or open." Turn the power off at the selector switch. Remove the capacitor and relay box and carefully (do not jar it any more than absolutely necessary) lay it down beside the unit with all wires still attached. Recheck to be sure the power is off by checking the voltage from -

a. #5 (hot lead) on the potential relay to ground.

b. neutral (white lead on fan capacitor or center terminal on dual capacitor) to ground.

c. neutral to #5 on the potential relay.

All three checks must read 0 volts. Caution: There is always a chance that a capacitor is holding a residual charge, so before touching a terminal, short across the terminals of each capacitor with a screw driver (hold insulated handle) to discharge it.

Remove capacitors, visually examine them, and test them per instructions.

If the capacitors test OK, replace them and carefully reconnect the wires. Be sure the wires are connected to the right terminals (check the wiring diagram).

Answer: 3. "Start relay contacts could be open". Turn on the power at the selector switch. You now have power to the unit-so proceed carefully. With a well insulated (plastic handle) screw driver shunt or jump across terminals 1 and 2 of the potential relay while the compressor is humming (trying to start). NOTE1 you should hear a rather loud zap when the screw driver bit touches the two terminals. Be ready for the zap and don't let it frighten you, but remember that you are into high voltage-dangerous electric power so don't touch anything but the plastic handle of the screw driver. If you hear the zap and the compressor starts, it will run normally and you have corrected the problem, but you have not corrected the cause of the problem. If you now turn the switch off and then back on, the compressor will very probably start-every time- as long as you are there. But, if you call it fixed and leave, it will fail again. The only way to really correct the cause of this problem and say with confidence that it will continue to perform satisfactorily is to install a new relay. Now is the time to install a new relay - not as a result of an embarrassing call back.

Answer: 4. "Compressor start winding could be open - or grounded." Check compressor windings per instructions.

Answer: 5. "Compressor could be mechanically stuck." This very rarely occurs, and, when it does occur, it is usually after a lengthy shut down. This should be considered only after all the above possible causes have been positively eliminated. To free a stuck compressor use your hermetic analyzer (Anna A 12) according to the manufacturers instructions. If you do not have a hermetic analyzer proceed as follows:

1. Turn the power off at the selector switch.
2. Remove the compressor terminal cover and disconnect the red and white wires.
3. Connect the white wire to "S" terminal (lower left) and connect the red wire to the "R" terminal (lower right).
4. Just momentarily, turn the selector switch to "Cool" with power on. The compressor should start, but it will be running in reverse. Never operate a compressor this way for more than a second or two. If the compressor did momentarily start, it will be freed up and should operate OK.
5. Disconnect the red and white wires and reconnect them to their regular terminals - white to "R" (lower right), red to "S" (lower left).

PROBLEM

S. Compressor trips breaker or thermal current overload.

Compressor trips circuit breaker or thermal current overload immediately {no hum}. Note that this problem is different from the previous one in that in the

previous problem the compressor did hum for several seconds.

With the selector switch in "Fan Only" position, the fan works OK.

QUESTION: "What are the possible causes?"

Answer: 1. The compressor winding is shorted or grounded: or

Answer: 2. The circuit breaker or thermal current overload is weak, (this rarely occurs, but it can occur after the switch has tripped out many times. The only repair is to replace the circuit breaker or overload).

Question: "How do I repair it?"

Answer: 1. "With the power turned off at the service panel, check the resistance between #5 on the potential relay and ground. If any continuity is found, locate the ground and correct it.

Answer: 2. Check compressor windings per instructions.

Answer: 3. If the above checks are OK, replace the switch that is tripping out.

PROBLEM

6. Compressor makes loud growling noise.

Customer has turned the unit off and called for service because he believes the air conditioner is surely burning up since it makes such a loud noise. On inspection we find that the compressor starts but draws high current and continues to make the growling noise until the thermal current overload trips out.

Question: "Which components can we determine are working OK from the symptoms?"

Answer: 1. The power is getting to the compressor.

Answer: 2. The start circuit is starting the compressor OK.

3. The capacitors and relay are providing the starting torque.

Question: "Then why the noise?"

Answer: The start capacitor is staying in the circuit and the compressor is running with too much capacitance. This condition is caused by (1) the compressor does not come up to speed and does therefore not supply adequate voltage to actuate the potential relay or (2) the potential relay contacts are welded shut or (3) the potential relay coil is open.

Question: "How do I repair it?"

Answer: 1. Check the voltage between "C" and "R" terminals of the compressor to not come up to speed.

Answer: 2. Check out the potential relay with Hermetic analyzer (Annie A 12) or try a new potential relay.

Answer: 3. Check compressor windings per instructions.

PROBLEM

7. Noisy compressor

The compressor seems to perform satisfactorily (does not draw high current as in the previous problem), but it makes an un-

pleasant noise. This can be caused by one of many malfunctions. Loose rod bearing, loose main bearing, inadequate clearance between compressor and housing, broken mounting spring. etc. The cause doesn't really matter, because if the noise comes from inside the compressor, it must be replaced to stop the noise.

PROBLEM

a. Fan vibration

The customer complains that the unit vibrates excessively. We turn selector switch to "Fan Only" and the vibrations are not appreciably reduced (we quickly eliminate the compressor as the source of vibration).

The fan motor and fans were carefully balanced at the factory, but they are fragile enough that they can be bent by rough handling.

Question: "How can I determine which part of the fan assembly is causing the vibration?"

Answer: By removing the fan wheels one at a time and running it each time until the vibration stops. To correct the problem replace the faulty part.

PROBLEM

9. Fan won't run.

The customer turns the system to fan only and nothing happens. When he turns the selector switch to "cool" the compressor starts, but still no fan.

Question: "What could cause the fan to be dead?"

Answer: 1. The fan switch in the selector could be open. With the power on and the selector switch in "Fan Only" position check from L1 to #1 on selector switch with a volt meter. If meter reads 115 volts, replace selector.

Answer: 2. Circuit could be open in hot lead to "C" on fan motor.

Answer: 3. Fan motor windings could be open, shorted, or grounded. Be sure power is still off at selector switch. Check motor windings per instructions.

Answer: 4. Fan capacitor may be shorted, weak or open. To check fan capacitor follow same procedure that is outlined for compressor run capacitors.

PROBLEM

10. Fan reverses on "Cool".

The customer complains of inadequate air flow and inadequate cooling. On examination we find that the system performs normally with the selector switch in "Fan Only" position but, when selector is turned to "Cool" position, the compressor starts and then the fan immediately reverses rotation. Note: this can only occur with "B" or dash models.

There is only one possible cause for this problem i.e. the common terminal on the dual run capacitor is open to the inside of the capacitor. To correct it replace the capacitor.

PROBLEM

11. Compressor runs but won't pump.

The customer turns the selector to "Cool" and the thermostat to

a low temperature setting (below room temperature). The fan runs OK, but the unit does not cool. On examination we find that the compressor does run. It runs quietly and smoothly. We check the compressor current and find that it is below the FLA rating on the specification sheet. The evaporator is warm, the suction line is warm, and the compressor housing is hot.

There is only one possible interpretation of the above symptoms the compressor valves are broken. The compressor must be replaced.

PROBLEM

12. Compressor cycling off and on.

The customer says he gets inadequate cooling even though he has several times set the thermostat down to call for a lower temperature until it is now all the way down to the lowest possible setting.

On investigation we find that the compressor is cycling off and on.

Question: "What could cause the compressor to cycle off and on?"

Answer: 1. The thermostat is out of calibration. While the compressor is not running and with power on check for voltage between terminals #2 (white wires) and #3 (yellow wire) on "A" models - between the two terminals on "B" or dash models. If the meter reads 115 volts the thermostat is out of calibration and it must be replaced.

Answer: 2. The compressor is cycling on the thermal current

overload. With the power on check the voltage between the terminals of the overload while the compressor is not running. If the meter reads 115 volts, the compressor is cycling on this switch.

Question: "What could cause the switch to open and close?"

Answer: Compressor is running hot or compressor is drawing excess current, or both.

Check by:

1. Feeling the compressor dome - it will normally during warm weather {above 85 degrees) be too hot to be comfortable if you keep your hand on it. If it is burning hot, it is probably overheating. The normal compressor housing temperature varies with outside temperature and evaporator load so determining whether or not it is too high is a matter of judgement based on experience.

2. Measuring the current (amperes) through the black wire which leads from #5 on the potential relay to the overload switch. This current may be compared to the FLA rating shown in the specifications.

Remember that the overload switch is sensitive to both high temperature and high current. Since this is true, we can't specify a definite temperature or amperage at which the switch will open. As the temperature rises the current at which the switch will open goes down. As the temperature goes down the current at which the switch will open goes up.

Question, "What could cause the compressor to draw over current or to over heat?"

Answer 1. Dirty condenser coil. Check the appearance of the coil. If it is coated with lint, cotton-wood fuzz, leaves, etc. it is insulated and it cannot give up its heat to the outside air. A dirty condenser will cause high head pressure which will in turn cause both high current draw and high temperature at the compressor

Answer, 2. Condenser fan does not come up to speed. Check fan blade, fan motor, and capacitor.

Answer: 3. High or low voltage. High voltage can drive excessive current through the motor windings, low voltage can cause the compressor to slow down, overload, and draw excessive current. Check the voltage between "C" and "R" terminals on the compressor while it is running. The volt meter must read between 103.5 volts and 126.5 volts.

Answer - overcharge or non-condensables in the system. Either an over charge of refrigerant or non-condensables in the system will cause high head pressure and consequently excessive current. Be especially suspicious of one or both of these conditions if you discover evidence of the system having been open (service valves in the system, extra pinch off marks, etc.) The indications of over charge are;

- a. Over current which may be checked as outlined above.

b. Cooler than normal suction line. With an over charge the suction line will usually sweat all the way to the compressor and even. the compressor housing can sometimes sweat.

c. Cooler than normal discharge line. The discharge line should be highly super heated and, therefore, at high temperature. When the outdoor temperature is above 85 degrees, and the system has been in operation for 10 minutes or longer, if you touch the discharge line and it burns your fingers, that is as it should be. If you can hold on to it for a second or two with any degree of comfort, it is probably too cool because the system is over charged and the compressor is running flooded. This condition will nearly always accompany a cooler than normal suction line.

d. Cooler than normal liquid. The liquid exists in the tube leading from the bottom of the condenser to the cap tube. The temperature of this tube should be 'about 15 degrees higher than outdoor temperature. It is difficult to determine the **exact** temperature of this line in the field, so don't take too much stock in this check.

Feeling lines with your fingers is a very inexact method of gathering information and cannot be considered accurate. So use this information only to form judgement in your diagnosis of trouble and consider as many indicators as possible in coming to a conclusion.

The indications of non-condensables in the system area

- a. Over current.
- b. Higher than normal discharge line temperature.
- c. Higher than normal liquid line temperature.
- d. Higher than normal compressor temperature.

Answer: 5. Low charge. The compressor is dependent on a good supply of cool suction gas for cooling. If the system charge is low, there will be less than a normal amount of refrigerant passing through the compressor, less compressor heat will be carried away by the refrigerant, and therefore, the compressor will over heat.

NOTE: Low charge will not cause over-current. It will, in fact, cause the current to be low.

Indicators of low charge are:

a. The evaporator will be starved for liquid refrigerant so the suction line and a portion of the evaporator coil will be warmer than normal. This is the condition we refer to as too much super heat. How much of the evaporator coil will be starved for liquid refrigerant depends on the degree of under charge.

b. The active portion of the evaporator coil which does have some liquid refrigerant will be colder than normal and many times will frost because the suction pressure will be low. How much of the coil is active also depends on the degree of under charge.

c. The discharge temperature will be noticeably higher than normal.

d. The compressor temperature will be noticeably higher than normal.

NOTE: Unless the thermal current over load switch saves the system, these last two indicators (c and d) are sure to burn the system out. The high temperature at the discharge port will destroy the refrigerant and oil, and the high compressor temperature will burn up the compressor motor windings.

6•. "Plugged up cap tube."

A **cap** tube can become stopped up by oil sludge or contaminants in the system. This will only occur if the system has been open to **allow** moisture or other contaminants to enter the system, or if the compressor has been over heated for a lengthy period of time.

It is difficult to determine the difference between a stopped up cap tube and a low charge because the symptoms will be nearly the same.¹

To repair either a low charge or stopped up cap tube we will **have** to install service valves and attach gauge manifold. If after the correct amount of refrigerant has been charged into the system, it has low charge symptoms, we will know the cap tube is plugged and will have to be replaced.

PROBLEM

13. No Heat.

The customer says that he has turned the selector switch to "Heat" position and the blower

works OK, but no heat.

Question, "What are the possible causes of "no heat" problem"?

Answer: 1. The limit switch or the heating element could be open. With the power on, the thermostat set for a high temperature (above room temperature), and the selector switch in "Heat" position, check for voltage across the terminals of the limit switch. If the meter reads 0 volts, the switch is OK. If the meter reads 115 volts, the switch is open and must be replaced. If the switch is OK, check the voltage across the heater element (blue wire to limit switch terminal). If the meter reads 115 volts and the heater is not heating, the heater element is open and must be replaced. If the meter reads 0 volts, the problem is elsewhere in the circuit so proceed with the following checks.

Answer: 2. The selector switch could be open. With the power on, the thermostat set for a high temperature (above room temperature), and the selector switch in "heat" position, check for voltage from terminal 11 to terminal 2 on the selector switch. If the meter reads 0 volts, the switch is OK. If the switch reads 115 volts, the switch is open and must be replaced.

Answer: 3. The thermostat could be open. With the power on, the thermostat set for a high temperature (above room temperature}, the the selector switch in "Heat" position check for voltage terminal 2 (white wire) to terminal 1 (blue wire) on the thermostat. If the meter reads 0, the thermostat is OK. If the meter reads 115 volts, the thermostat is open and must be replaced.

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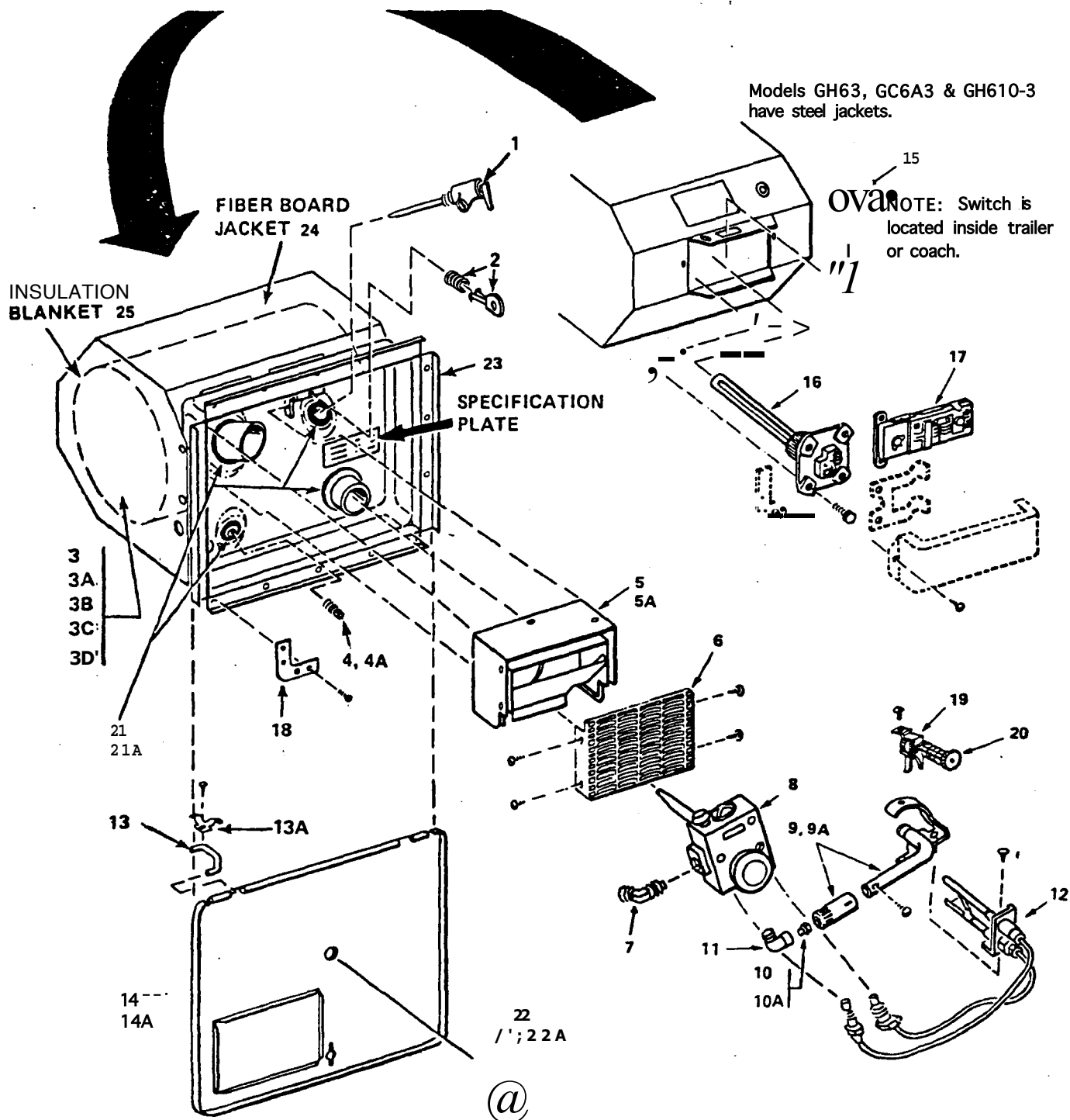
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WATER HEATERS

GAS-Models: G6A-3, GGI0-3, G610-3B
 GAS/ELECTRIC COMBINATION-Model: GC6A3
 HEAT EXCHANGER-Model GHG-3, GH610-3



- | | |
|---|--|
| 1 Relief valve 1/4" fitting | 14A Access cover, colonial white |
| 2 Cam-loc fastener | 15 On/off switch, GC6A-3 |
| 3 Inner tank G6A3 | 16 Heating element 118V -1000W
(w/gasket) GC6A-3 |
| 3A Inner tank GH6-3 | 17 Thermostat 118V GC6A-3 |
| 3B Inner tank GC6A-3 | 18 Corner brackets (set of 4) |
| 3C Inner tank G610-3 & 3B | 19 Spark ignitor bracket, G610-3B |
| 3D Inner tank GH610-3 | 20 Spark ignitor, G610-3B |
| 4 Drain plug 1/8" | 21 Standard 6 gal. gasket kit |
| 4A Drain plug 1/2" | 21A High performance 6 gal.
gasket kit |
| 5 Flue box | 22 Gasket for sight window |
| 5A Flue box G610-3 & 3B | 22A Access cover for sight window |
| 6 Exhaust grille | 23 Drawn pan |
| 7 45 degree elbow fitting 3/8"
N.P.T. x 3/8" flare | 24 Fiberboard jacket |
| 8* Thermostat 3/8" N.P.T., inlet | 25 Insulation blanket, 6 gal. |
| 9 Main burner | |
| 9A Main burner G610-3 & 3B | * The two types of thermostats,
Robertshaw and ITT are
interchangeable. |
| 10 Main burner orifice, 6 gal. | ** Item 12, jade pilot, mounts
on the right side of burner
and has flexible gas lines. |
| 10A Main burner orifice G610-3
& 3B | |
| 11 Main burner orifice elbow | |
| 12**Safety pilot assembly, jade,
includes thermocoupler &
tubing. | |
| 13 Hinge pin | |
| 13A Hinge clip | |
| 14 Access cover, gray | |

CHECKING, REMOVAL, REPLACEMENT AND MAINTENANCE

WATER HEATER REMOVAL AND REPLACEMENT

1. Shut off water supply and open hot water faucets.
2. Open drain valve on water heater tank and drain completely.
3. After tank is drained, disconnect inlet and outlet water lines. These are located inside trailer by opening cabinet door. With a wrench, loosen the two flare nuts connecting these lines to the tank.
4. Shut off gas supply and disconnect gas lines, both at control **valve** of water heater and shut-off valve under trailer. Remove gas line completely.
5. Drill pop rivets from rub rail along bottom of water heater using a No. 30 drill bit. Drill to gain access to Phillips screws in bottom of water heater flange.
6. Remove screws along heater mounting flange, top, bottom and both sides.
7. Heater is now ready for removal and can be moved from trailer body. Sealers used to prevent rain leaking around installation flange may bind heater to body of trailer. With a putty knife or screwdriver carefully pry heater loose.

- a. Install by reversing above steps. Before pushing heater into place remove all the old gasket from the flange and replace with new gasket material.
9. When installing gas line be careful not to get any dirt into line when pushing through the underbelly.
10. Check all gas connects for leaks, using soapy water.

THERMOSTAT REMOVAL AND REPLACEMENT

1. Shut off water supply.
2. Open water heater drain valve. Open hot water faucets.
3. Shut off gas valve.
4. Disconnect gas at thermostat control valve.
5. Disconnect pilot gas line and thermocouple lead at thermostat control valve.
6. Using thermostat wrench remove thermostat.
7. Replace by reversing above procedure.

MAIN BURNER AND/OR ORIFICE REMOVAL AND REPLACEMENT

1. Remove hexnut.
2. Remove main burner assembly and flint lighter.
3. Remove main burner orifice.
4. Clean with alcohol and compressed air or replace.

- S. Replace by reversing above procedure.

MAIN BURNER AIR ADJUSTMENT

1. Loosen screw.
2. Slide air adjustment sleeve to gain proper air adjustment. (Primary air should be adjusted so that slight yellow streaks may be seen in the flame. This flame should have slightly forceful noise.)

THERMOCOUPLE AND PILOT ASSEMBLY REMOVAL AND REPLACEMENT

1. Remove main burner assembly.
2. Remove pilot line and thermocouple lead at thermostat control valve.
3. Remove screw.
4. Replace by reversing above procedure. The thermocouple nut should be started and turned all the way in by hand. An additional quarter turn with a small (4") wrench will then be sufficient to seal the lock washer! (CAUTION: Overtightening may cause damage to the thermocouple or magnet and is unnecessary.)

GENERAL DESCRIPTION

The Unitrol R103-RV-LP-78 is a combination water heater thermostat, 100G automatic pilot, built-in automatic over temperature "ENERGY CUT-OFF" device, balanced adjustable main gas pressure regulator, pilot filter, separate fixed setting pilot gas regulator, with main and pilot gas cock in one compact unit.

BALANCED PRESSURE REGULATION

The main gas regulator, located within the manual valve, has a balancing diaphragm in addition to the main pressure regulator diaphragm to balance the effect of pressure differential across the regulator valve.

The location of the regulator in the normal gas flow pattern, without materially diverting the normal flow, -minimizes the pressure drop within the control.

The combined advantages of using a balanced regulator plus its optimum regulator location within the control makes possible a combination control with improved characteristics using a regulator of greatly reduced size.

The Unitrol R110R-LP-TP for L.P. gas has a pressure adjustment range of 10" - 12" w.c.

BUILT-IN E.C.O. OPERATION

In addition to the previous features of the Unitrol, the new Unitrol R110RT-P with built-in E.C.O. provides the following additional function: in case of excessive water temperature in the heater, a switch inside the shank assembly shuts off the automatic pilot and all gas to the heater. The Unitrol R110RT-P provides a completely self-contained automatic gas shut-off system.

PILOT REGULATOR

A separate pressure regulator for pilot gas is located in the control **down** stream of the pilot filter to control pilot gas pressure independently. No pilot adjustment key is provided or needed on controls with pilot regulators.

INSTALLATION INSTRUCTIONS

Piping

Make sure that the piping is clean and free from scale and burrs. Apply a small amount of good quality pipe thread compound which is suitable for the type gas being used. Thread compound should be used sparingly and on male threads only, leaving the first two threads clean. Pipe dope or thread compound should never be used on female threads as it may be pushed into the valve body.

THERMOCOUPLE

The thermocouple nut should be started and turned all the way in by hand. An additional quarter turn with a small (4") wrench will then be sufficient to seat the lock washer. CAUTION: Overtightening may cause damage to the thermocouple or magnet and is unnecessary.

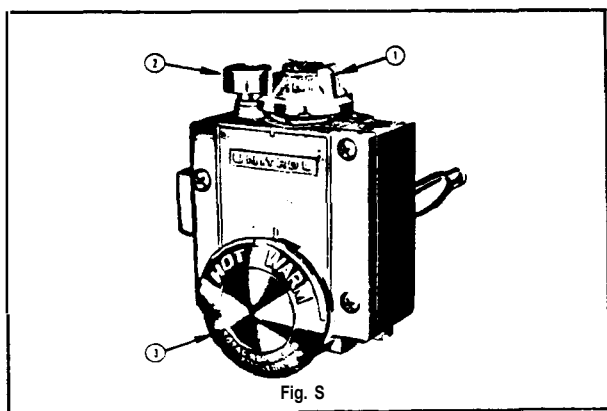


Fig. 5

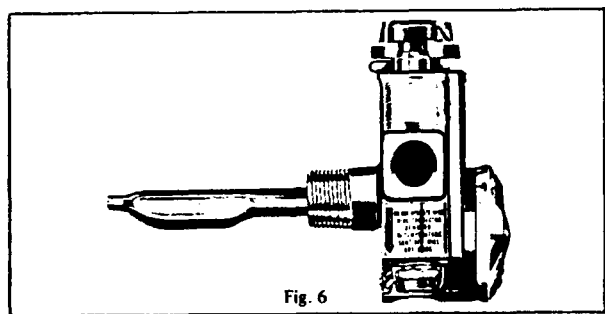


Fig. 6

PROCEDURE FOR LIGHTING OR RELIGHTING (See Fig. 5)

1. Turn GAS COCK DIAL (1) to OFF, position.
2. Wait sufficient length of time to allow gas which may have accumulated in burner compartment to escape (at least 5 minutes).
3. Turn GAS COCK DIAL (1) to PILOT position. Depress and hold SET BUTTON (2) while lighting pilot burner.
4. Allow pilot to burn approximately one-half minute before releasing RESET BUTTON. If pilot does not remain lighted, repeat operation allowing longer period before releasing SET BUTTON.
5. Turn GAS COCK DIAL (1) to ON position and turn TEMPERATURE DIAL (3) to desired position.

AUTOMATIC PILOT VALVE AND MAGNET ASSEMBLY REPLACEMENT

1. Shut off gas at line valve or meter.
2. Remove thermocouple.
3. With small screwdriver, remove TERMINAL RETAINER.
4. With narrow blade screwdriver pry TERMINAL from magnet base slot working from both sides to avoid TERMINAL damage.
5. Remove MAGNET ASSEMBLY by unscrewing 3/4" hexagon magnet base.

6. When replacing MAGNET ASSEMBLY apply thread lube and tighten sufficiently to prevent gas leakage.
7. Reinstall TERMINAL in magnet base slot (it may be necessary to reposition TERMINAL wires).
8. Reinstall THERMAL RETAINER (snaps on).
9. Reinstall thermocouple (see "Installation INstructions" for proper thermocouple installation).
10. Re-establish gas supply and leak test with soap solution.

NOTE: Pilot pressure regulator is non-adjustable.

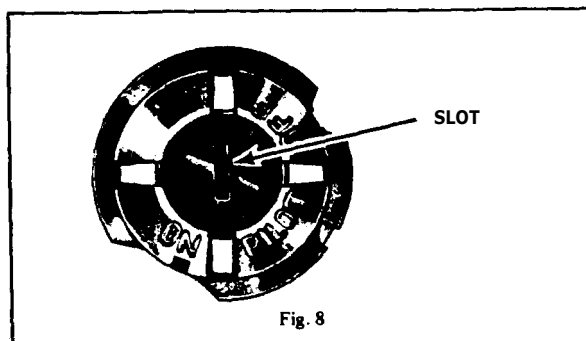


Fig. 8

BUILT-IN E.C.O. TEST PROCEDURE UNITROL 110T SERIES

Follow standard procedure for lighting or relighting.

PRESSURE REGULATOR ADJUSTMENT

The main burner pressure regulator adjustment screw slot is filled to seal the factory pressure setting: the regulator should never need readjustment. If, however, adjustment should be necessary a qualified serviceman can proceed as follows:

1. Remove regulator adjustment cap by inserting screwdriver in slot and rotating counterclockwise (See Fig. 8)
 2. With small screwdriver, remove sealant from adjustment screw slot, if necessary.
 3. Rotate adjustment screw "clockwise" to increase or "counterclockwise" to decrease pressure.
 4. Replace regulator adjustment cap.
1. If heater does not start up immediately under standard procedure for lighting, check the following:
 - a. Check thermostat valve action. Thermostat valve leaks can result in overheating of tank water and result in shutdown due to E.C.O. action. If valve is found to leak, clean valve: if valve still leaks, replace thermostat.
 - b. Check Thermostat calibration at highest setting.
 - 160 degree thermostats - (Hot-Warm, Dial)
 - If top temperature exceeds 160 degrees F at shut-off, shutdown was likely due to E.C.O. action. Recalibrate so top setting is in 155 degree F range.
 - 180 degree thermostats - (Very Hot Dial)
 - If top temperature exceeds 180 degree F at shut-off, recalibrate so top setting is in 175 degree F range.

c. If none of the above conditions exist, shutdown was most likely due to other causes.

2. If standard procedure for lighting does not result in start up, proceed to Sections 3, 4 and 5, if test kit is available, or Sections 6, 7, and 8 if test kit is not available. A proven "good" magnet is required for tests outlined in Sections 6, 7, and 8.

If test kit is available.

3. Make closed circuit millivolt check as follows:
- Use Graysen Test Kit No. B165-34 or equivalent millivolt meter.
 - Connect Adaptor No. 75036 and Test Kit as shown in Figure 10, being sure connections are tight.
 - Follow standard lighting procedure.
 - Check closed circuit output, if less than eight millivolts replace the thermocouple.
 - Repeat standard lighting procedure after thermocouple replacement.

If closed circuit millivolt check is greater than eight millivolts, or Section c. does not secure start up, proceed to Section d.

4. With adaptor connected as in Fig. 10, check as follows:
- Follow standard lighting procedure.
 - With closed circuit output in excess of eight millivolts, blow out pilot.

c. A good magnet should remain locked up for a drop of five millivolts or more from original stabilized output.

d. If magnet does not operate properly, replace magnet.

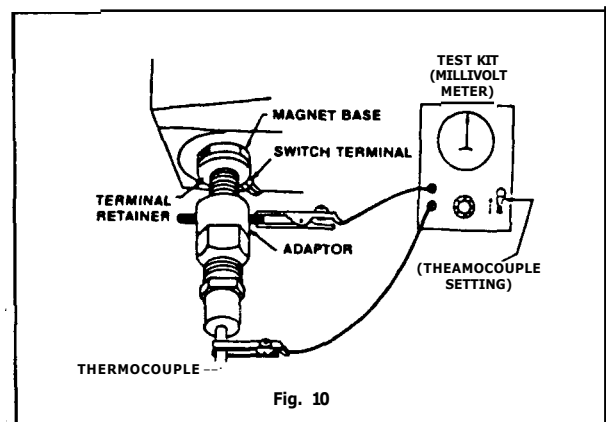
e. Repeat standard lighting procedure.

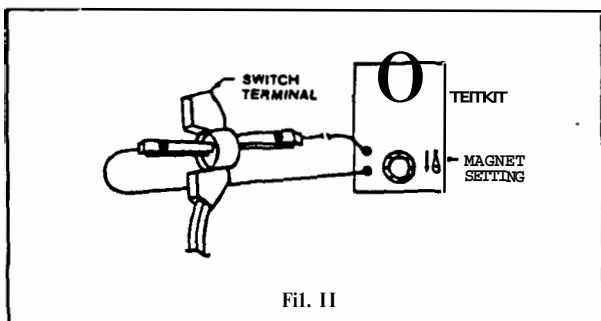
If Section d. does not result in start-up, proceed to Section 5.

S. Check E.C.O. switch for closure.

a. Be sure water at thermostat level is below 120 degrees F. To insure this draw water from hot water faucet until thermometer registers 120 degrees For less.

b. With Test Kit on "Magnet" setting and dial set for maximum amperage, check for switch closure and continuity through the switch by touching clips to opposite switch terminal contacts as shown in Fig. 11.





1. If switch is closed essentially full amp-erage reading will be obtained (approaching maximum needle deflection to the right.)
2. If switch is open, no current will be shown (no meter needle deflection).
- c. If switch contacts are open, replace control.
- d. If switch contacts are closed, follow standard lighting procedure if these checks do not result in start-up, replace control.

Without Test Kit ;

6. To check Thermocouple:

- a. Remove thermocouple nut from Magnet Base and connect "Known Good Magnet" to thermocouple.
- b. Follow standard lighting procedure, holding reset button down at least 30 seconds after lighting pilot.
- c. Lock-tip "Known Good Magnet" by depressing magnet valve face. If thermocouple is

good, magnet should remain locked up for at least 30 seconds after pilot is extinguished.

- d. If thermocouple does not lock up "Known Good Magnet" replace thermocouple.
 - e. If thermocouple is good, proceed to Section g.
- #### 7. To Check Magnet
- a. With small screwdriver remove E.C.O. Terminal retainer.
 - b. With narrow blade screwdriver pry E.C.O. terminal from magnet base slot, working from both sides to avoid terminal damage.
 - c. Follow thermocouple installation instructions, leaving switch terminal out of magnet base.
 - d. Follow standard lighting procedure.
 - e. After thermocouple temperature is stabilized (pilot burning at least 2 minutes) blow out pilot, if magnet is good it should remain locked-up for at least 30 seconds after pilot is extinguished.
 - f. If magnet will not lock-up, or will not remain locked-up for at least 30 seconds after pilot is extinguished, replace magnet following Magnet Replacement Instructions. If magnet is good, proceed to Section a.

CAUTION: Never leave water heater with switch terminal disconnected from magnet at conclusion of service call.

- a. To Check E.C.O. Switch
 - a. Be sure water at thermostat level is below 120 degrees For less.
 - b. Light pilot. If pilot does not remain lit when reset button is released, proceed as follows:
 - c. Remove thermocouple from magnet base.
 - d. Remove E.C.O. terminal retainer.
 - e. Remove E.C.O. switch terminal.
 - f. Install thermocouple in magnet base.
 - g. Light pilot. If pilot remains lit when reset button is released and if tests in section 6 and 7 prove thermocouple and magnet are good, E.C.O. switch is not closing. Replace entire control.

CAUTION: Never leave water heater with switch terminal disconnected from magnet at conclusion of service call.

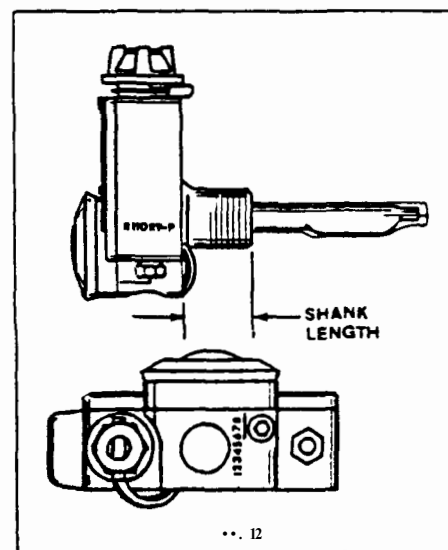
ORDERING INFORMATION

When ordering Control specify:

1. Model - Unitrol (see smooth side of casting for stamped model number).

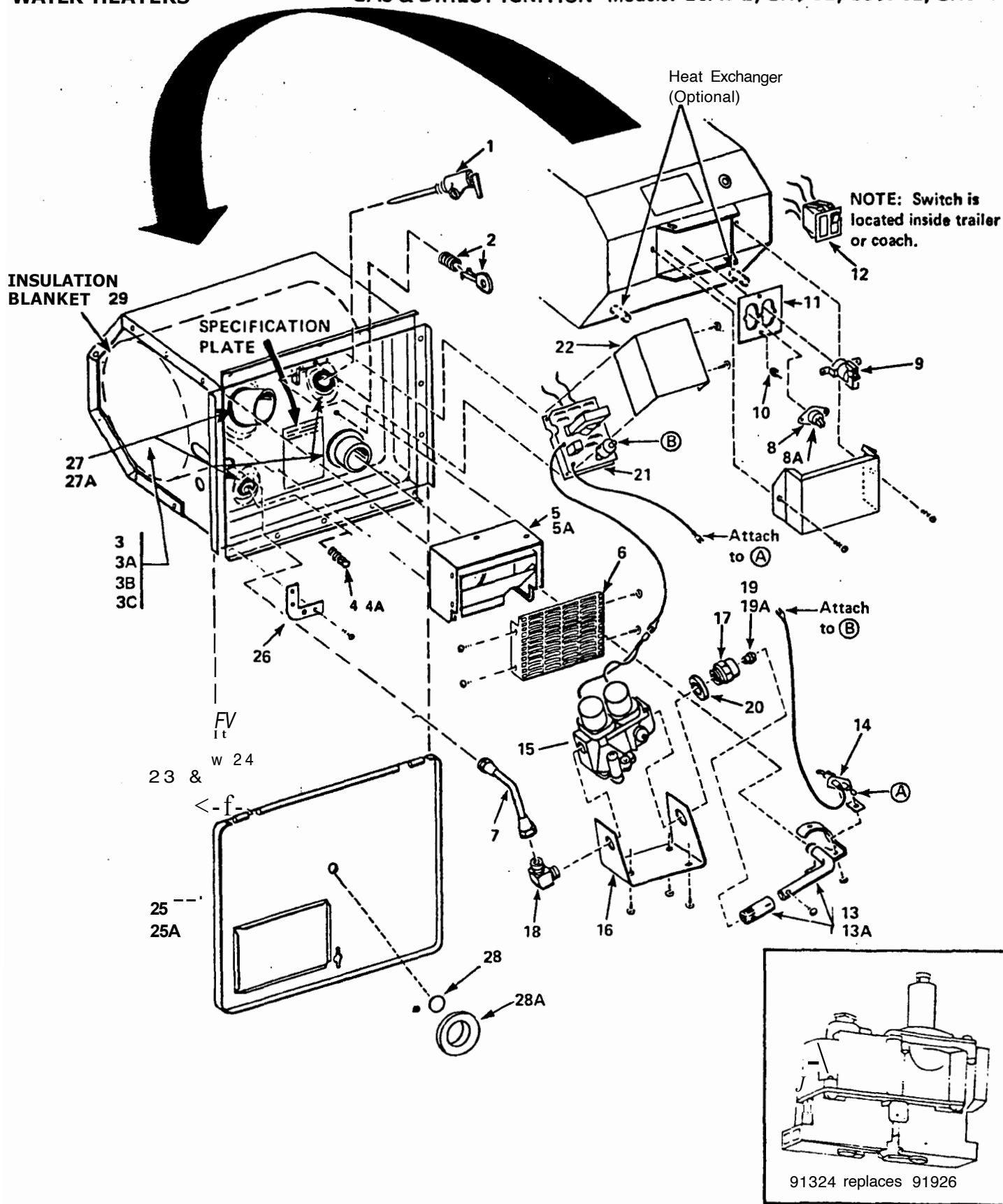
2. Outlet Size - 1/2" inverted flare, 3/8" pipe.
3. Shank Length (See Fig. 12)
4. Temperature Dial
Hot - R11ORTP
Very Hot - R11ORTBP
Dials not interchangeable.

Water Heater Service Analysis			
EFFECT			CAUSE
Pilot will not stay on	Not enough hot water	Over heated water	
X			Too much Primary air
	X		Dirt in orifice
X			Defective magnetic vain
X			Need new thermocouple lead
X			Thermocouple lead connection loose
X			Pilot line clogged
	X		Dirt in pilot orifice
X	X		Improper pressure on regulator
X			Pilot not striking thermocouple properly
		X	Thermostat set too hot
	X		Thermostat set too low
		X	Dirt on thermostat seat
X			Wrong pilot burner
	X		Heater too small for the job
	X		Sediment or lime in tank
			Wrong piping connections
	X		leaky faucets
	X		Long runs of exposed piping
X	X		Heater subjected to strong cold drafts
	X	X	Defective thermostat
	X	X	Improper calibration
X			E.C.O. switch contacts open (See test procedure for E.C.O.)



WATER HEATERS

GAS & DIRECT IGNITION—Models: G6A3-E, GH6-3E, G610-3E, GH610-3E



1	Relief valve 1/2" fitting	14	Spark probe assembly
2	Cam-loc fastener	15	Gas valve
3	Inner tank G6A-3E	16	Valve bracket
3A	Inner tank GH6-3E	17	Orifice holder
3B	Inner tank G610-3E	18	Elbow fitting
JC	Inner tank GH610-3E	19	Main burner orifice G6A3E
4	Drain plug 1/8"	19A	Main burner orifice G610-3E
4A	Drain plug 1/2"	20	Washer gasket
S	Flue box	21	Circuit board
SA	Flue box -G610-3 & 3B	22	Circuit board cover
6	Exhaust grille	23	Hinge pin
7	Gas inlet tube	24	Hinge clip
8	Thermostat 12 VDC-140 degrees, preset	25	Access cover, gray
BA	Thermostat 12 VDC-120 degrees, preset	25A	Access cover, colonial white
9	ECO switch	26	Corner brackets (set of 4)
10	Loe-nut	27	Standard 6 gal. gasket kit
11	Control retainer plate	27A	High performance 6 gal. gasket kit
12	Switch package	28	Gasket for sight window
13	Main burner G610-3E	28A	Access cover, sight window
13A	Main burner G6A3E	29	Insulation blanket, 6 gal.

PRINCIPLE OF OPERATION

When the switch is turned on, power is supplied to the thermostat (located inside the junction box at back of water heater). When the thermostat senses the water in the tank requires heat (below 160 degrees F) its contacts close, it completes the circuit to the circuit board.

This will energize the coils in the dual solenoid gas valve allowing gas to flow out of the main burner orifice, mix with air at the ventura (air adjusting slots), then flow out of the end of the main burner.

Simultaneously the coil on the circuit board provides a high voltage current to reach the **spark** probe at the main burner. This ignites the gas. When the flame is sensed by the probe, current is conducted to the relay and the valve remains energized. Sparking ceases when the electrode to ground current path is altered by the presence of flame. The water heating process begins.

When the water in the tank reaches the temperature of 160 degrees F, the contacts in the thermostat open, shutting off the power to the circuit board, the gas **valves** close and the gas is shut off.

When the water in the tank drops below 160 degrees F., the process will automatically repeat itself.

SAFETY

ECO Switch: The unit is equipped with an ECO (energy cut-off) **switch**. This is located next to

the thermostat and should the water exceed 190 degrees F, the contacts in the ECO switch will open and completely shut-off the power to the unit.

It is unlikely, but should this occur, it is necessary to move the rectangular cover from the back (inside) of the unit and manually depress the red button. The unit should then be checked before continuing use to determine why the water overheated. Refer to trouble shooting section.

Relief Valve: Each unit is equipped with a temperature pressure relief valve. Should the water in the tank exceed 210 degrees F, or 125 PSI, the valve **will** open and allow cold water to enter and reduce the temperature of the water or release the pressure build-up.

Circuit Board Lock-out: Should the spark not ignite the gas, a built-in timing circuit in the circuit board will shut down and the red light next to the interior switch will come on. It is necessary to shut this switch "off", wait 30 seconds, then turn switch back on. If unit again fails to light, check trouble shooting section.

STORAGE AND WINTERIZATION PROCEDURE FOR WATER HEATERS

Normal storage and winterization procedures would be as follows:

1. Thoroughly drain the inner tank. Simply open the pet-cock drain **valve** contained at the front base of the unit. To assist in draining, plus to eliminate the chance of developing an air lock, also open your relief valve.

2. Once the unit has been thoroughly drained, approximately two quarts of water will remain in the base of the tank due to the position of the pet-cock drain valve. Strictly for winterization precautions, these remaining two quarts of water will not harm the unit. As these two quarts of water freeze, it has ample room for expansion without causing freezing damage.

ADJUSTMENT FOR DIRECT IGNITION WATER HEATER

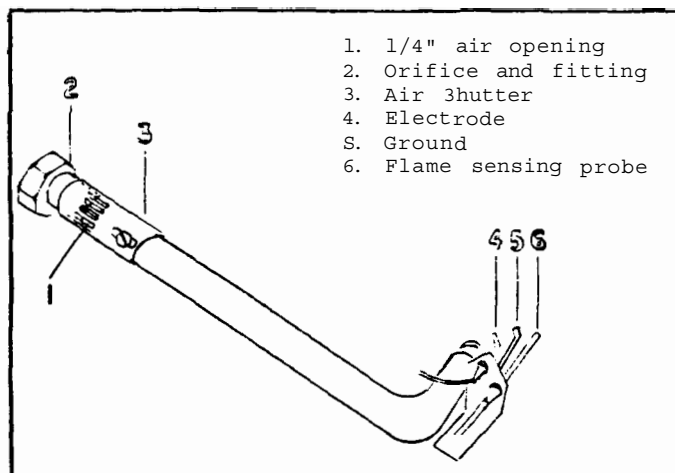
The following are adjustments that can be made to all direct ignition water heaters. These adjustments will improve initial start up and recycling capabilities of the unit.

AIR SHUTTER POSITIONING The air shutter should be positioned in such a manner that will allow the main burner flame to be blue with a trace or flash of yellow appearing through the flame. Approximate positioning is 1/4 way open. Note illustration. The importance of this adjustment is to allow an adequate air/gas mix to be ignited by the electrode at the end of the burner tube. If the air shutter is not positioned properly this will minimize the units start up and recycling capabilities.

MAIN BURNER ALIGNMENT It is important that the air shutter is fitted over the orifice holder. It is also important that the orifice is centered in the main burner tube. This adjustment allows for the proper air/gas mix.

ELECTRODE POSITIONING The electrode and the ground probe should be positioned in the area between

the end of the burner tube and the flame spreader. This adjustment allows for instantaneous start up and recycling. The flame sensing probe should not be grounded on the flame spreader or any other metal object in the combustion chamber. The sensing probe is the component part of the electrode that relays to the circuit board that a flame is present and everything is functioning properly. The flame sensing probe sends microamps to the circuit board. When the circuit board receives the proper amount of microamps it allows the gas valve to stay open and the main burner flame to stay on. The male connector on the back of the flame sensing probe should be clean and free of corrosion, also, the female connector on the white wire. If the water heater initially starts up, runs for 1 minute or less, the probe could be at fault. First clean it. If this does not correct the problem, replace the electrode assembly. It is important to note that the air adjustment shutter positioning plays an important part in the functioning of the flame sensing probe. When the main burner flame is blue and not roaring the flame spreads correctly and the sensing probe is heated quicker.



TROUBLE SHOOTING DIRECT
IGNITION SYSTEM

PROBLEM

switch on red light does not
flash.

Switch on red light remains on
(not a flash).

REMEDY

a. Water in tank at 160 degrees
drain off water below 160
degrees then observe unit for
start up.

b. Unit must be connected
direct to battery. Battery
must produce at least 10 volts
DC. If lower, charge battery.

c. Remove cover from back of
water heater and manually
depress red reset button.

d. Check wiring of switch with
diagram.

e. Defective interior switch.
Replace.

f. Defective ECO switch. Check
for closed contacts with
continuity cester. Replace.

g. Defective thermostat. Con-
tacts should be closed when
thermostat is cooled. Replace.

a. Inadequate voltage1 check
battery.

b. Improper wiring1 check with
diagram.

c. Circuit board ground wire
or ground at back of unit
broken or disconnected.

d. Flame sensing probe ground-
ing to flame spreader or
burner. Check by removing lead
from probe. If unit goes
through lock-out cycle, bend
sensing probe away from flame
spreader and replace lead.

Switch on red light flashes then stays on.

e. Top of SCR contacting sheet metal casing with power off, bend SCR top until contact with sheet metal is broken.

a. No gas supply-check all valves to open. Unit must have minimum of 11" water column pressure.

b. Check connection to solenoid valve with volt meter. Should have 12 V DC.

c. Defective solenoid valve, test with good battery. One lead on case, one lead on white wire. An audible click should be heard.

d. Water temperature may be **160** degrees causing contacts to fluctuate.

e. Defective circuit board. Replace.

Switch on red light flashes one time, then goes out. Unit not lit.

a. Spark probe grounded. Proper gap 1/8" from center wire, burner tube and/or flame spreader.

b. Broken or shorted spark probe lead **wire** (**heavy** insulated, light brown).

c. Temperature of water at **160** degrees allowing thermostat contacts to fluctuate.

d. Possible defective circuit board. Replace.

Yellow main burner flame.

a: Improper air adjustment.

b. Partially plugged main burner orifice. Remove and clean. **DO NOT ENLARGE.**

c. Obstruction in main burner tube; spiders, rust etc. Remove and clean.

d. Bent or missing flame spreader. Straighten or replace.

e. Inadequate gas pressure into **valve**. Check with manometer. 11" water column minimum.

f. Inadequate gas pressure at outlet side of valve. Remove pressure tap plug located at right front of solenoid valve. Insert 1/8" NPT pipe nipple. Hook up manometer, turn on unit.

g. Grille in upper left hand side of grille obstructed. Filters, tape, etc. should not be used to block any portion of this grille.

e. Gas solenoid bracket bent, orifice not pointed up center of main burner.

Relief valve drips or weep .

a. This is a normal condition when heating a tank of cold water.

b.If drip continues, flip handle several times to dislodge foreign material on valve seat.

c. A partially filled tank may create steam and pop valve open. Purge all air from water system. Run faucet until air is released from system.

d. If weeping persists, change valve.

Tank leaks water.

a. Check all plumbing fittings for leaks.

b. Tank corrosion. Refer to warranty with unit.

Spark igniter continues to spark while burner is on.

a. Flame sensor not correctly positioned in flame.

RANGE AND OVEN

RANGE A: DOVEN ASSEMBLY....., L-1

CHECKING, REPLACING & MAINTENANCE

Flame Removal and Replacement....., 5
Propane Burner Adjustment
and Cleaning..... L-5
Removal of Range Top Burner
Valve..... L-6
Range Top Pilot Light
Adjustment....., L-6
Oven Thermostat Removal
and Replacement..... L-6
Oven Automatic Shut Off
Valve Removal and Replacement... L-6
Oven Burner Removal and
Replacement..... L-7
Oven Pilot Light Assembly
Removal and Replacement.....-... L-7
Oven Thermostat Calibration..... L-7

DOUBLE SHOOTING

Range- Top..... L-6
Oven..... -9

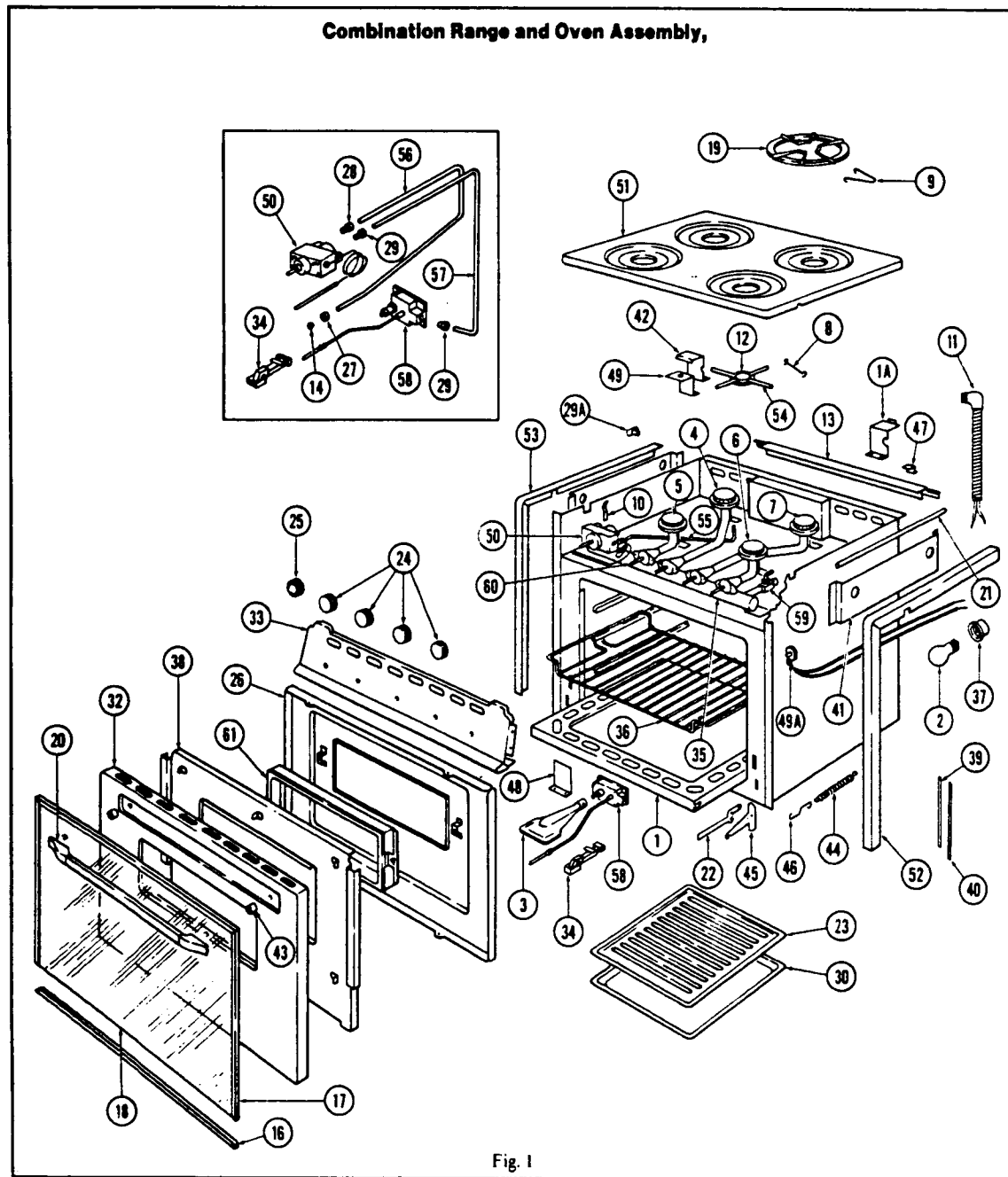
MAINTENANCE....., L-10

RANGE TOP, FOUR BURNER..... L-11

OVEN PILOT LOCATION..... L-11

RANGE AND OVEN ASSEMBLY

Model No. BT22KA-4TVX-M3



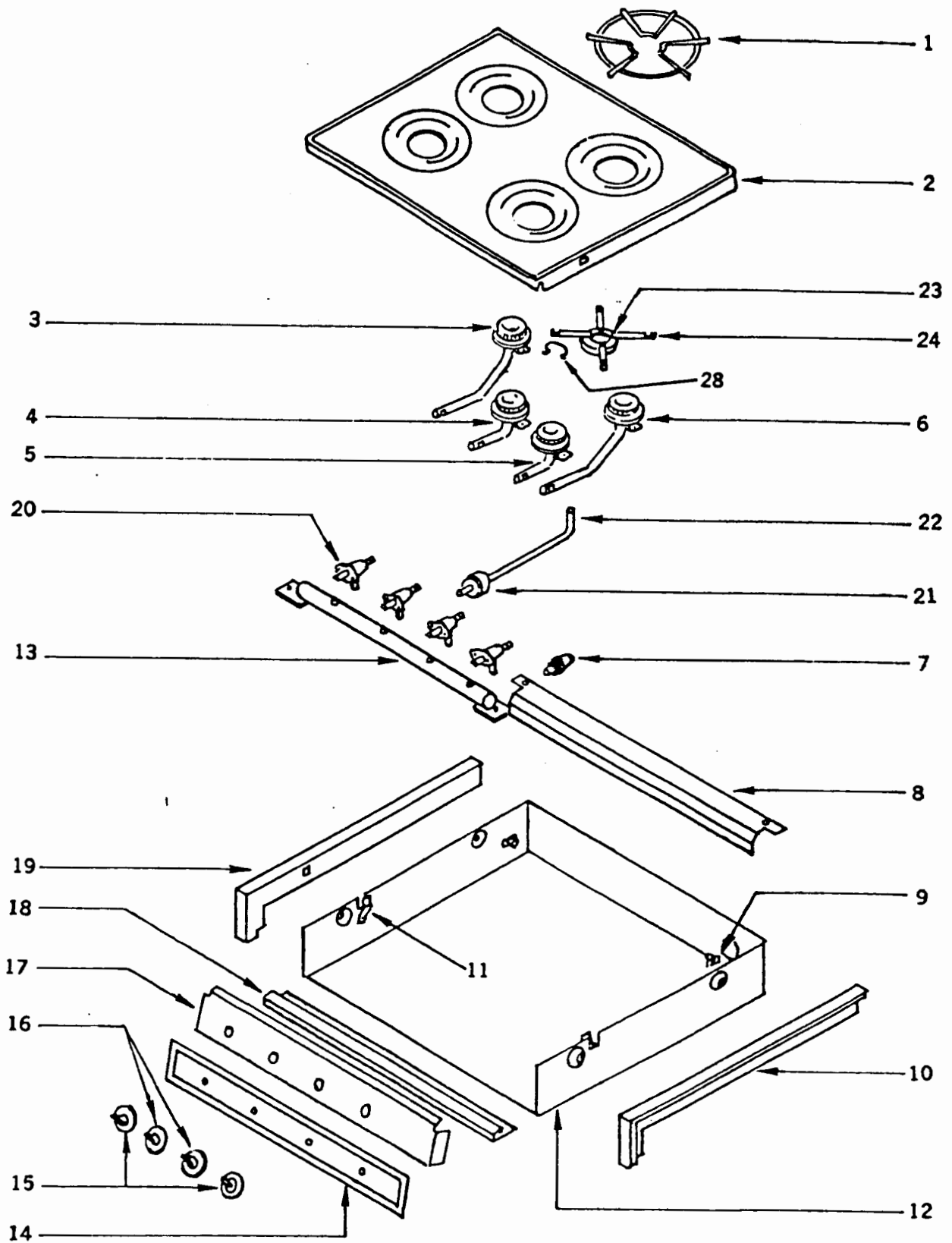
PARTS DESCRIPTION

Model No. BT22KA-4TVX-M3

1	Bottom, oven	23	Insert, broiler pan
1A	Junction box		Insert, burner (not shown)
2	Bulb, oven light	24	Knob, top burner
	Burner, oven	25	Knob, thermostat
4	Burner, top - left rear	26	Liner, oven door
5	Burner, top - left front	27	Nut, compression 1/8"
6	Burner, top - right front		Nut, compression 3/16"
7	Burner, top - right rear	28	Nut, loxit - 3/16"
	Button, plug (not shown)	29	Nut, loxit - 1/4"
8	Clip, flashtube	29A	Nut, tee
9	Clip, grate	30	Pan, broiler
10	Clip, main top	32	Panel, oven door - black
	Clip, thermostat bulb (not shown)	33	Panel, manifold
11	Conduit assembly and service cord	34	Pilot, oven
12	Cup, lighter assembly	35	Pipe, manifold
13	Deflector, flue	36	Rack, oven
14	Ferrule - 1/8"	37	Receptacle, oven light
	Fitting, thermostat-inlet (not shown)	38	Retainer, insulation
16	Frame, lower glass	39	Retainer, seal
17	Frame, upper glass		Screw, door frame (not shown)
18	Glass, outside		Screw, main top clip (not shown)
19	Grates, top		Screw, door handle (not shown)
20	Handle, oven door		Screw, Frame (not shown)
21	Harness, tube oven light	40	Seal, door - top
22	Hinge, oven door -R.H.		Seal, door - side
	Hinge, oven door -L.H.		

RANGE TOP

BT85JS-4T



PARTS DESCRIPTION

BT85JS-4T

* (Used with Micro Wave)

- 1 Burner Grate
- 2 Main Top
- 3 Burner - Left Rear
- 4 Burner - Left Front
- 5 Burner - Right Front
- 6 Burner - Right Rear
- 7 Half Union
- 8 Top Rear Trim
- 9 Tee Nut
- 10 Burner Box Trim - Right
- 11 Main Top Hold Down Clip
- 12 Burner Box
- 13 Manifold Pipe
- 14 Manifold Panel Trim
- 15 Burner Knob - Rear
- 16 Burner Knob - Front
- 17 Manifold Panel Back-up
- 18 Mainfold Panel Lower Trim
- 19 Burner Box Trim - Left
- 20 Burner Valve
- 21 Top Pilot Filter
(4T Models & 3T)
- 22 Pilot Tube
- 23 Lighter Cup Assy
- 24 Flashtube Extension
- *25 Top Pilot Support
- *26 Top Pilot Shield
- *27 Shutoff Valve
- 28 Flashtube Hold-Down Clip

*
Micro wave oven may only be serviced by
trained personnel.

CHECKING, REPLACEMENT & MAINTENANCE

GAS RANGE & OVEN REMOVAL AND REPLACEMENT

1. Shut off gas supply at gas bottles.
2. Disconnect gas supply line at range and oven unit.
3. Remove 2 screws located in bottom end of slide trim and 4 screws under burner top attaching unit to galley.
4. Remove range and oven unit.
5. Replace by reversing above procedure.

CAUTION: Check all gas line connections for gas leaks with soap solution.

INSTRUCTIONS FOR PROPER BURNER ADJUSTMENT AND CLEANING

1. Oven Section -

IMPORTANT: There is no By-Pass adjustment for oven burner on this control. Below 550 degrees the oven burner will turn on and off automatically to maintain proper temperature. At the Broil position, a constant modulated burner flame is maintained.

The oven thermostat on this range **will** enable you to turn off the **Oven** Constant Pilot and top burner pilot by simply turning the thermostat to the "PILOTS OFF" position. When the dial is in this position, you cannot light the oven or top burner pilots. When the dial is in the "OFF" position, gas flows to the pilots.

When turning from "PILOT OFF" position to "OFF" position, **pilots** must be relighted immediately.

There is no pilot adjustment on the thermostat or for the oven pilot. Control has been factory pre-set for use on LP gas. No field adjustments necessary.

- a. Oven Air Shutter Adjustment
To adjust main oven burner air shutter. The air shutter has been adjusted at the factory, however, it may require some additional adjustment when used at high altitude.

To adjust, open the air shutter to the full open position where you will have a blowing condition. Begin closing the shutter slowly. When you reach the correct adjustment point the blowing will stop and the burner should have a sharp blue flame approximately 3 inches long.

2. Top Pilot Adjustment on Ranges so equipped:

Adjust top pilot so that the tip of the flame is just over the edge of the inner cone and the lighting of the burner is within 4 seconds. Adjusting screw is located at bottom right corner of thermostat. Remove thermostat knob to provide access to adjustment screw.

3. Cleaning Instructions after Oven is in Use:

Spill-overs or spotting in oven or broiler are more easily removed if done promptly after they occur. Never wash porcelain while warm. Never use cleaning powder containing lye or acid.

NOTE: If oven bottom is removed for cleaning or servicing, be sure that oven bottom is locked in place when it is put back into the range.

4. Cleaning instructions after top burners are in use.
 - a. To assist in cleaning the area under the burners the main top has been hinged so it can be raised. Care should be taken during the cleaning operation that you do not touch the hot pilot shield.
 - b. If top burner heads are cleaned with any cleaning compound, care should be taken to see that all ports are opened up with a metal pin to insure proper operation. It is especially important that the lighter ports and slots on the side of the burner heads be kept clean.

REMOVAL OF RANGE TOP BURNER VALVE

1. Shut off gas supply at bottles.
2. Remove knobs.
3. Remove burner grates, main top, and top burners.
4. Remove two bolts from thermostat and raise slightly to permit removal of manifold.
5. Remove gas inlet tube from half union and move tube out of way.
6. Remove two screws, one from each end of manifold assembly.
7. Remove manifold assembly from range.
8. Remove defective valve (screw counterclockwise).
9. To install, reverse above procedure. (Apply LP Pipe seal to new valve thread before installing.)
10. Check for gas leaks at all connections with a soap solution before lighting burners.

RANGE TOP LIGHT ADJUSTMENT

1. Remove thermostat knob to provide access to adjusting screw. Adjusting screw is located at bottom right corner of thermostat.
2. Adjust so that the tip of the flame is just over the edge of the inner cone and the top burner lights within four seconds.

OVEN THERMOSTAT REMOVAL AND REPLACEMENT

1. Shut off gas at LPG tanks.
2. Remove main top and grates.
3. Disconnect pilot fuel line and 1/4 main fuel line at thermostat.
4. Remove two screws mounting thermostat to manifold pipe.
5. Open oven door and remove capillary bulb clips in top of oven.
6. Pull capillary bulb up through top of stove and remove thermostat.
7. To install, reverse above procedure. Make sure gasket is in place before installing thermostat.
 - a. Check for gas leaks at all connections with soap solution.

OVEN AUTOMATIC SHUT-OFF VALVE REMOVAL AND REPLACEMENT

1. Shut off gas.
2. Remove oven racks and oven bottom. To release oven bottom push bottom toward

back of oven and raise up at front.

3. Remove mounting screw from oven burner and remove burner.
4. Disconnect 1/4 supply tube from shut-off **valve**.
5. Loosen screw holding sensing bulb to pilot light assembly.
6. Remove sensing bulb.
7. Remove 2 screws attaching automatic oven shut-off valve support and remove automatic oven shut-off valve.
- a. To install, reverse above procedure.
9. Check for gas leaks at all connections with soap solution.

OVEN BURNER REMOVAL AND REPLACEMENT

1. Shut off gas.
2. Remove oven racks and oven bottom.
3. Remove mounting screws from oven burner and remove burner.
4. To install, reverse above procedure.
5. See "Instructions for Proper Burner Adjustment & Cleaning" for Air Shutter Adjustment.

OVEN PILOT LIGHT, ASSEMBLY REMOVAL AND REPLACEMENT

1. Shut off gas.
2. Remove oven racks and bottom.
3. Remove screw holding sensing bulb to pilot assembly.
4. Remove sensing bulb from pilot assembly.
5. Remove pilot fuel tube.
6. Remove nut and bolt attaching pilot assembly to support.
7. Remove pilot assembly.
8. To install, reverse above assembly.
9. Check for gas leaks at oil connections with soap solution.

OVEN THERMOSTAT CALIBRATION

Before having oven calibration changed be sure that utensil problems and/or user misunderstanding of oven operation are not the real cause of the service complaint. Here are several possible factors to check:

Setting the Dial. Oven temperatures will be most accurate when you set the dial by turning just TO temperature - not to a higher temperature and then back.

Aluminum Foil. Foil should never be used to cover oven..., racks or so that it blocks off any of the oven openings provided for air circulation. If you use foil, cut a piece just a little larger than the pan and place on the oven bottom.

Oven Cleaners. Oven cleaners, particularly the spray type, can coat the thermostat temperature bulb so that it does not sense oven temperatures accurately. Carefully clean any residue off the sensing bulb.

Pan too large for Oven. The most common offender is a cookie sheet which is too big - a special problem with RV range ovens because of their small size. There should be at least 1 or 2 inches between the edge of a utensil and any oven surface.

If none of these factors apply, and if cooking results have been consistently poor, recalibration is necessary. It is recommended that the calibration is done by qualified service personnel.

1. With an accurate thermometer placed in the oven, light the oven burner.
2. Place reliable mercury thermometer (or other suitable instrument) in center of oven.
3. Set knob to 350 degree setting.
4. **Allow** oven to operate at least 20 minutes with 3 readings every 5 minutes. Thermostat calibration is necessary only if temperature is not within 20 degrees of setting.
5. Recalibrate as follows:
 - a. Place reliable mercury thermometer (or other suitable instrument) in center of oven.
 - b. Set knob to 300 degree setting.
 - c. Allow oven to operate at least 20 minutes.
 - d. Calibration adjustment is in center of knob stem.
 - e. Insert screwdriver into knob stem and engage slotted calibration shaft. Hold screwdriver so it does not turn and rotate knob or knob stem to match temperature recorded in oven.

TROUBLE SHOOTING RANGE TOP

1. Gas Odor

TURN OFF GAS SUPPLY at tanks; then open door and windows to evacuate gas from trailer before re-lighting pilots or checking for leaks.

Probable Cause
Pilot light out

Remedy
Light and adjust if required

Probable Cause
Leaky fittings

Remedy
Soap test all fittings. Tighten or replace.

Probable Cause
Pilot won't stay lit

Remedy
Check for defective pressure regulator. Check pilot adjustment.

2. one or more burners won't ignite or improper flame.

Probable Cause
Flash tube out of position

Remedy
Position burner or flash tube

Probable Cause
Pilot flame out of adjustment

Remedy
See Section on Flame Adjustment.

Probable Cause
Clogged burner parts

Remedy
Clean with small steel pin
(Do not damage ports)

Probable Cause
Low gas pressure

Remedy
See Gas System Section

3. Porcelain Breaking off grates

Probable Cause
Operating burners without pan on grate

Remedy
Always have pan on grate when burners are ignited

4. Scorching of Main Top

Probable Cause
Pans are too large

Remedy
Use pans that do not exceed grate by more than 2"

TROUBLE SHOOTING - OVEN

1. Gas Odor

TURN OFF GAS SUPPLY at tanks, then open door and windows to evacuate gas from trailer before re-lighting pilots or checking for leaks.

Probable Cause
Pilot light out

Remedy
Relight pilot

Low gas pressure (See Gas system section.)

Faulty thermostat. **Replace** thermostat **if gas is** not sufficient to maintain constant pilot.

Check air shutter adjustment on main burner. See Oven Section for proper adjustment, poor setting will blow out pilot.

2. Runaway oven - overcooking - temperature too hot.

Probable Cause
Thermostat out of calibration.

Remedy
Recalibrate. See Oven thermostat calibration.

Probable Cause
Heater pilot flame not cycling off

Remedy
High pressure could cause the constant or standing pilot flame to act as a heater pilot flame. Check pressure and proceed as follows: (A) **Pressure regulated appliance. Check pressure regulator** for

proper pressure on LP gas (11" water column). (B) Replace thermostat if problem is not due to Step A.

Probable Cause
Faulty safety valve. Safety valve will not turn off main oven burner when heater pilot is turned off.

Remedy
Replace safety (automatic shut-off) valve.

Probable Cause
Aluminum foil covering racks and/or for bottom

Remedy
Aluminum foil should never be used to cover oven racks or so that it blocks off any of the oven openings provided for air circulation. If you use foil, cut a piece just a little larger than the pan and place on the oven bottom.

Probable Cause
Broken capillary tube

Remedy
Replace thermostat

Probable Cause
Pilot not positioned properly

Remedy
Relocate pilot

3. Oven Undercooking - Temperature not hot enough - Oven slow heating up.

Probable Cause
Thermostat out of calibration

Remedy
Recalibrate

Probable Cause
Low gas pressure

Remedy
See Gas System Section)

4. Oven Burner will not go on.

Probable Cause
Constant pilot not lit.

Remedy
Check to see that constant pilot is lit

Probable Cause
Pilot assembly out of position

Remedy
Position pilot assembly (See diagram)

Probable Cause
Safety valve sensing element not positioned.

Remedy
Loosen screw and position as shown in diagram.

Probable Cause
Heater pilot flame not heating sensing bulb.

Remedy
Low gas pressure (See gas system section)

Probable Cause
Heater pilot flame too low

Remedy
Gas line pinched or dirty.
Faulty thermostat-replace.

Probable Cause
Safety valve will not open with proper heater pilot setting.

Remedy
Check position of sensing bulb. (See, diagram)

Replace safety (automatic shut-off valve.)

MICROWAVE OVEN

Servicing of the microwave ovens may only be done by qualified personnel. Please refer to the literature supplied with each microwave for further information.

FOUR BURNER RANGE (Used with Microwave option)

The four burner range may be serviced by following the proceeding directions pertaining to the range top section of the standard combination units.

Oven Pilot Location

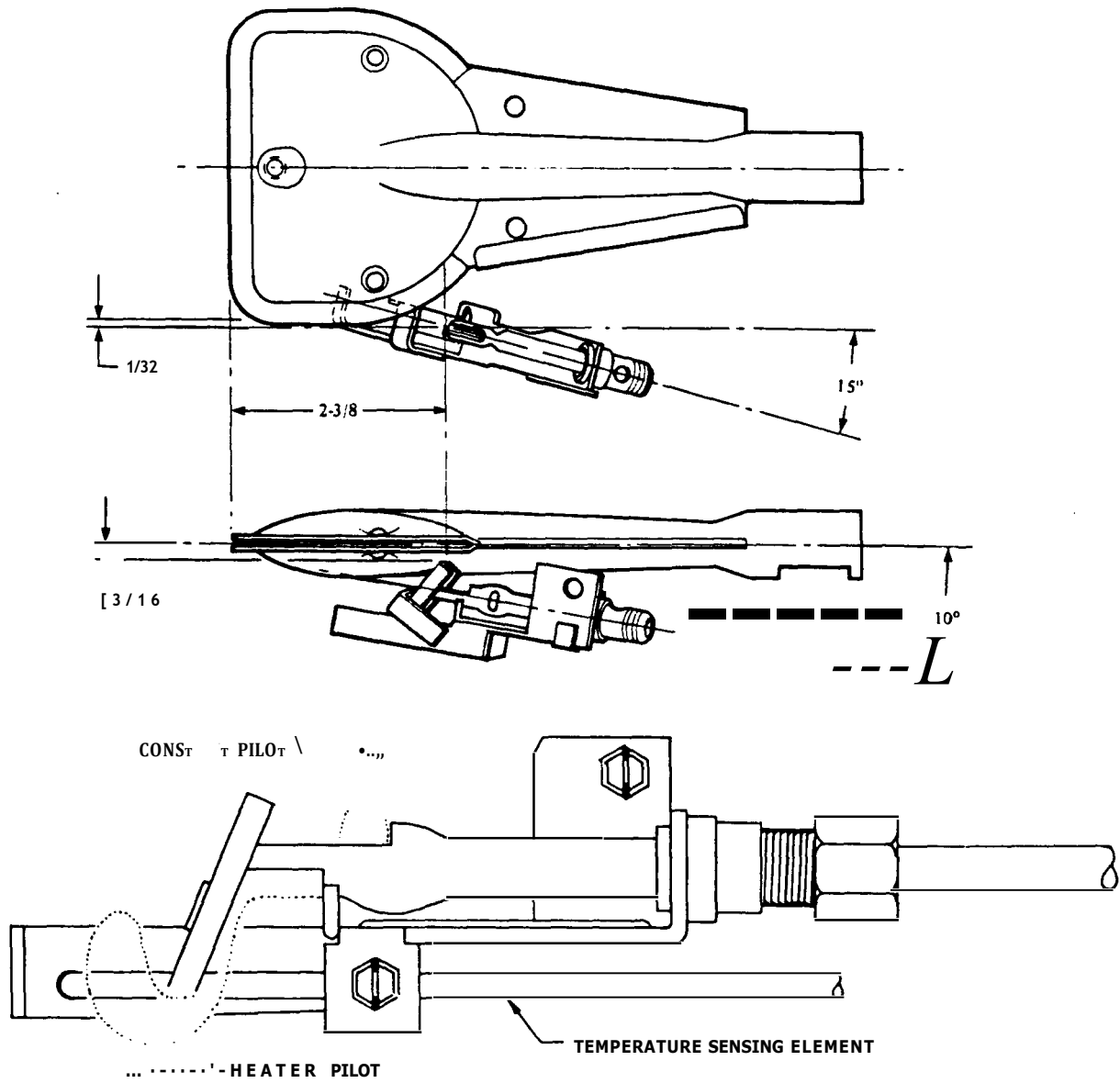
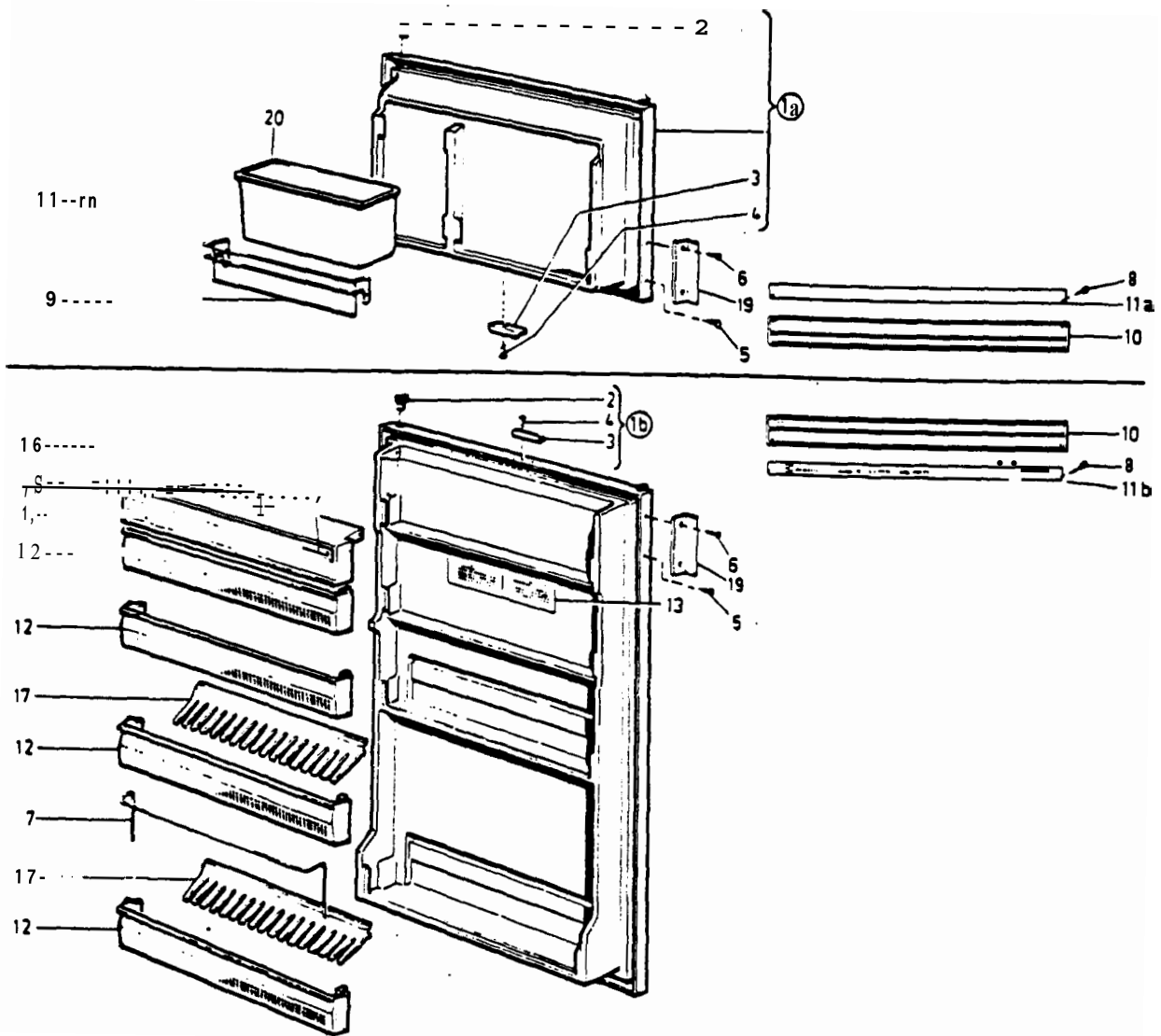


Fig. 3

REFRIGERATOR RM1303

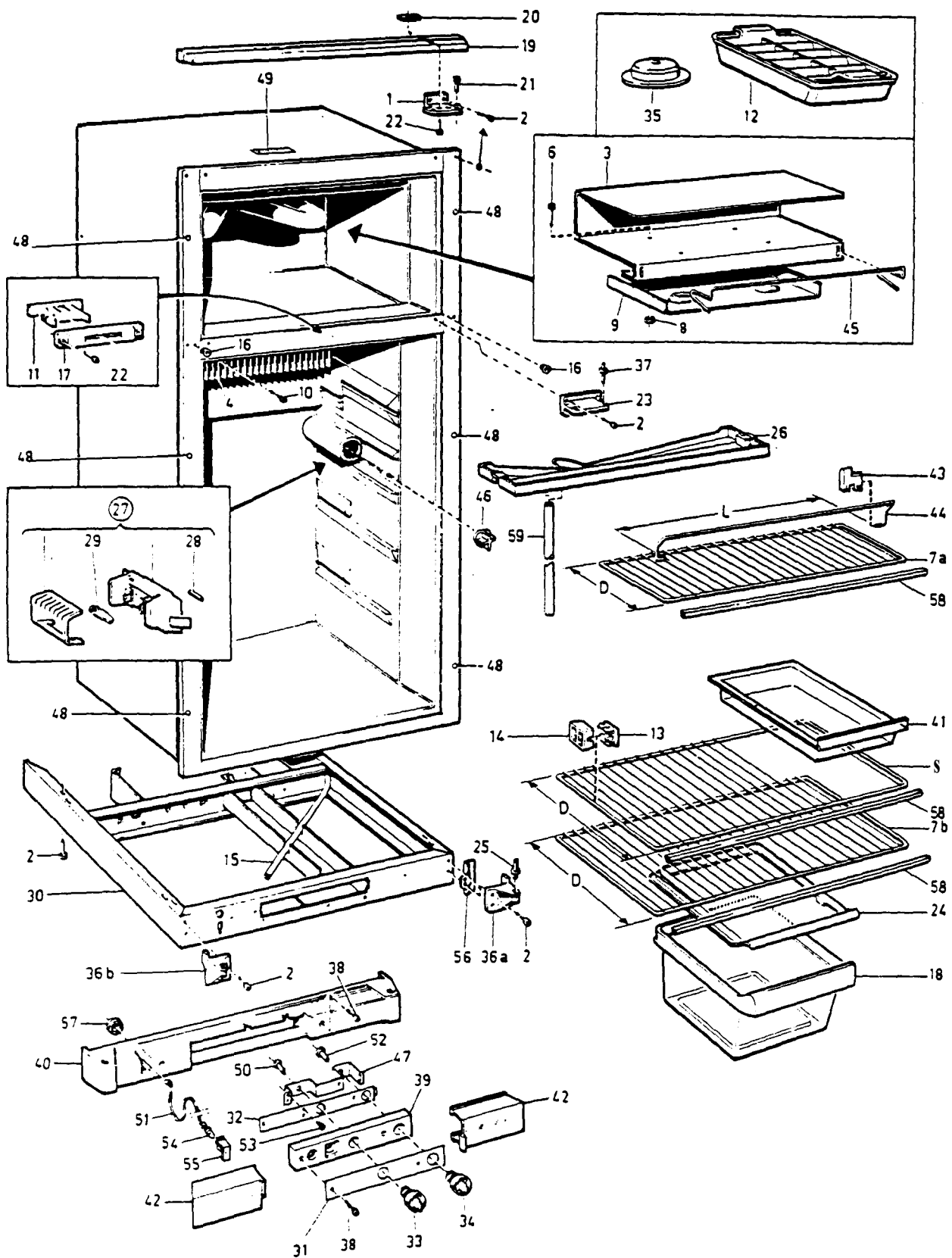
RM1303 REFRIGERATOR

Door Assembly	M-1
Cabinet Assembly	J*/
Cooling Unit	M-4
ABSORPTION COOLING UNIT	M-6
AUTOMATIC DEFROST DEVICE	M-8
REMOVAL AND REPLACEMENT OF RM 1303 REFRIGERATOR	M-9.
TROUBLE SHOOTING GUIDE	M-10
WIRING DIAGRAM	M-13

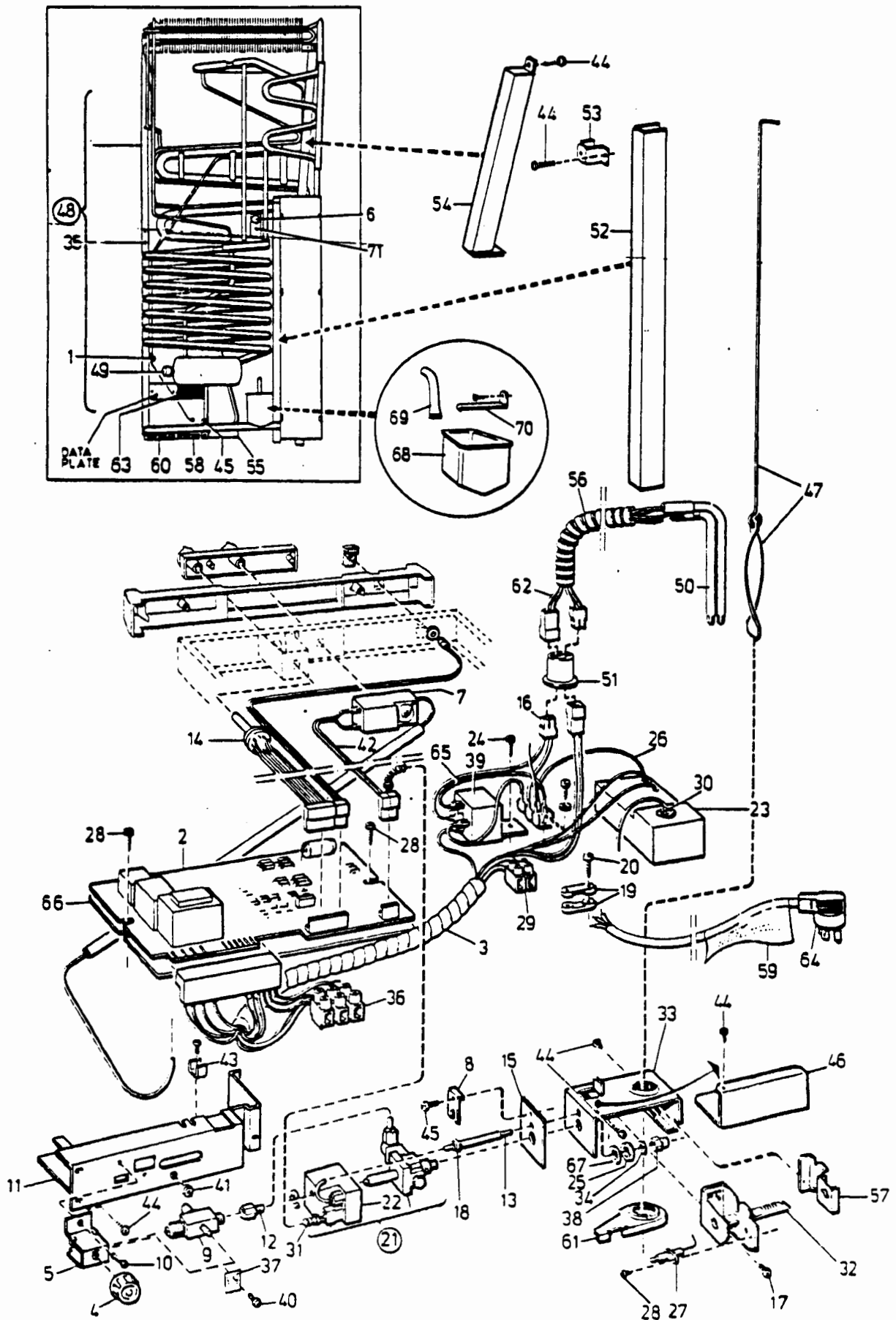


- 1a. Door, upper, w/o Basket & Shelf
- 1b. Door, lower, w/o compartments
- 2. Bushing
- 3. Catch retainer
- 4. Pop Rivet
- 5. Plug, grey
- 6. Screw FXSB 4x9, 5 Z.pl.
- 7. Bar
- 8. Screw RXSB 4x6, 5 Z.pl.
- 9. Shelf
- 10. Decoration
- 11a. Decoration strip

- 11b. Decoration Strip
- 12. Door compartment, Brown
- 13. warning label
- 14. Shutter, brown
- 15. Name plate "Dometic"
- 16. Tap
- 17. Bottle holder, brown
- 18. Basket
- 19. Handle
- 20. Box, Brown

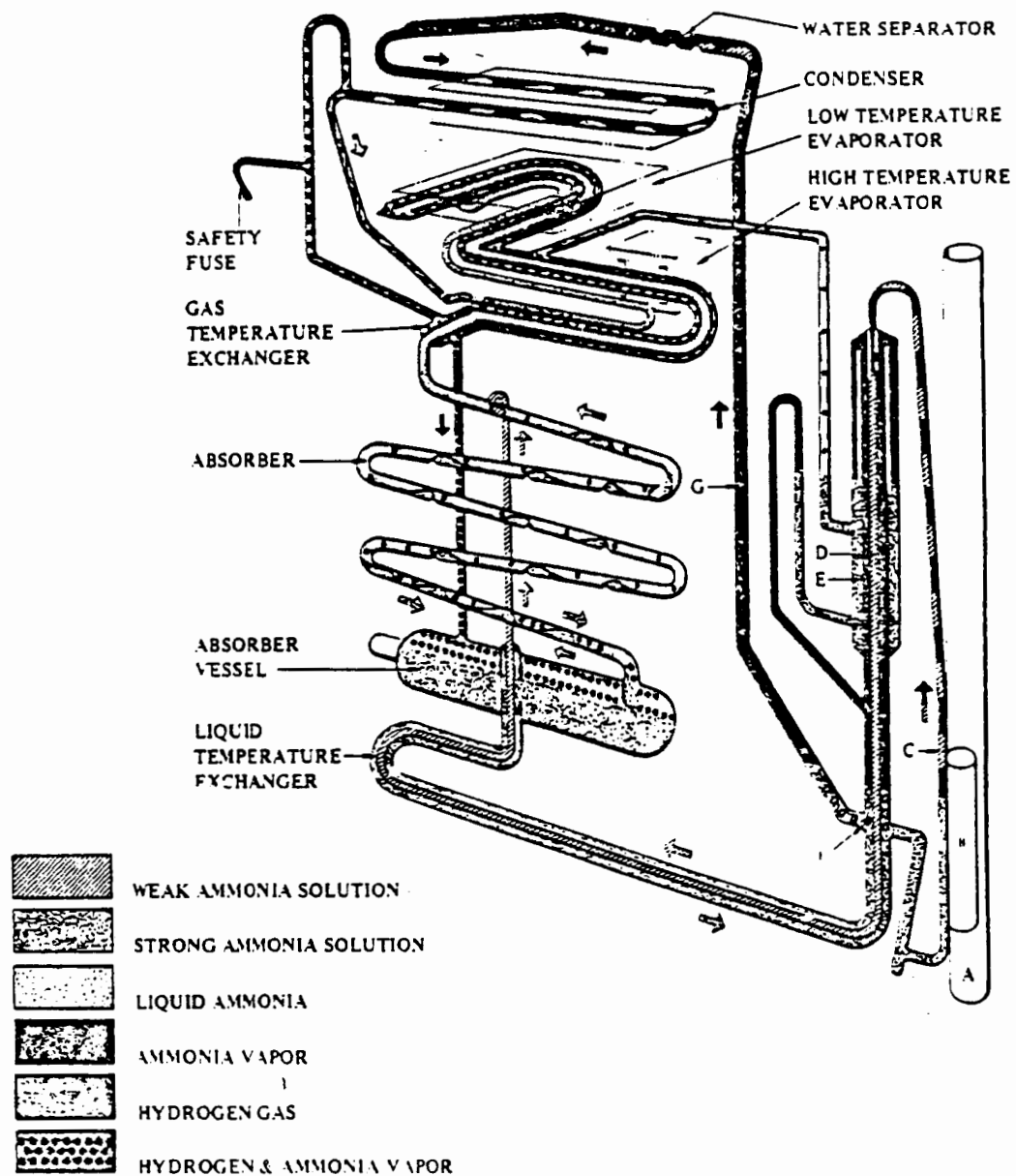


1. Hinge, upper
- 2 • Screw M 5x14, Z.PL.
- 3 • Shelf
4. Cooling flange
- 5 • Shelf, D Approx 12"
- 6 • Screw M65 5x22 brass NI.PL.
- 7a. Shelf, compl. D approx 7"
- 7b. Shelf, D approx. 12"
- 8 • Nut ML6M NL.PL.
- 9 • Retaining plate
10. Screw RXS B10x38, NL.PL
11. Latch, Dark brown
12. Ice Tray
13. Shelf lock, outer
14. Shelf lock, inner
15. Tube
16. Plug
17. Latch housing, **dark** brown
18. Crisper, Brown
19. Front decoration, upper, Dk. Br.
20. Fixing plate
21. Hinge pin, upper
22. Screw RXS B6x13 Z.PL.
23. Hinge
24. Cover, Brown
25. Hinge pin
26. Drip shute
27. Cabinet lamp fitting, compl.
28. Fuse
29. Lamp 12V, 10W
30. Cabinet base
31. Panel decoration
32. Mounting plate
33. Knob, thermostat
34. Knob, switch
35. Spirit level
- 36a. Hinge, RH
- 36b. Hinge, LH
37. Hinge pin
38. Screw RXS Bx19 Z.PL.
39. Panel, beige
40. Base front, dk. Br.
41. Drawer
42. Shutter
43. Retainer
44. Bar, L approx. 15"
Bar, L. approx. 16"
Bar, L. approx. 9"
45. Bar
46. Cable clamp
47. Bracket
48. Masking plug, brown
49. Label
50. Adapter, thermostat
51. Lead
52. Adapter, switch
53. Screw RXS B6x6,5 Z,PL.
54. Lamp
55. Lamp socket
56. Sealing plate
57. Grommet
58. Decoration strip
59. Hose

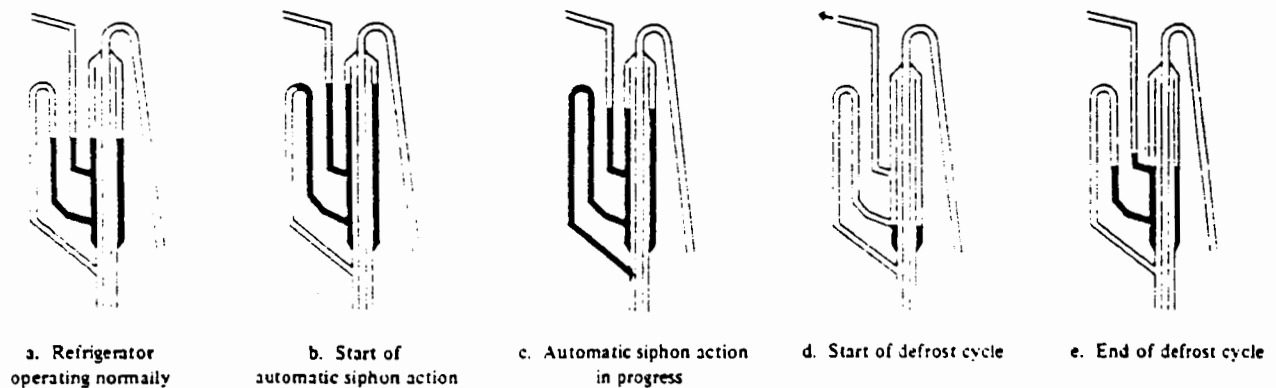


- | | |
|---|---------------------------------|
| 1. Clamp | 50. Heater, 120V, 325 W |
| 2● Circuit board | Heater 12V, 275 W |
| 3● Cable compl. | 51. Bushing |
| 4● Knob gas valve | 52. Channel |
| 5. Retainer, gas valve | 53. Retainer |
| 6● Plug | 54. Flue |
| 7● Thermostat | 55. Label for 12/120V |
| 8● Retainer | 56. Protection hose |
| 9. Gas valve | 57. Burner guide |
| 10. Screw MCS Sx10 Z.PL. | 58. Plate "Install only w/ kit" |
| 11. Mounting plate | No. 4A" |
| 12. Gas tube compl. | 59. Electrical grounding |
| 13. Thermo couple element | instructions |
| 14. Switch | 60. Warning label |
| 15. End piece | 61. Clamping plate |
| 16. Lead | 62. Lead |
| 17. Screw MRX 4x8, Z.PL. | 63. Plate"installation |
| 18. Washer | Clearances" |
| 19. Anti-strain clip | 64. Flexible cord |
| 20. Screw RXS B6x19 Z.PL. | 65. Lead, eart!ing |
| 21. Thermo-electric solenoid valve cpl. | 66. Insulation plate |
| 22. Solenoid valve | 67. Washer |
| 23. Igniter | 68. Evaporation tray |
| 24. Screw RXS B4x19 Z. PL. | 69. Waterseal |
| 25. Nut | 70. Retainer |
| 26. Lead | 71. Retaining plate |
| 27. Electrode | |
| 28. Screw RXS B4x6 Z. PL. | |
| 29. Terminal block | |
| 30. Lead | |
| 31. Lead | |
| 32● Burner | |
| 33. Burner housing | |
| 34. Washer | |
| 35. Screw MS, Z.PL. | |
| 36. Terminal block | |
| 37. Plate "12 volts" | |
| 38. Burner jet No. 58 for propane | |
| Burner jet No. 53 for butane | |
| 39. Relay | |
| 40. screw axs B6X6, 5 Z.PL. | |
| 41. Grommet | |
| 42. Lead | |
| 43. Nut clamp | |
| 44. Screw RXS B6x9, 5 Z.PL. | |
| 45. Screw M4x10 Z.PL. | |
| 46. Cover | |
| 47. Flue baffle | |
| 48. Cooling unit 614A | |
| 49. Filling cap | |

Absorption Type Cooling Unit



Automatic Defrosting Device



ABSORPTION TYPE COOLING UNIT

The continuous absorption type of cooling unit is operated by the application of a limited amount of heat furnished by LPG or electricity. No moving parts are employed.

The unit consists of four main parts - the boiler, condenser, evaporator and absorber. Further this unit is provided with an automatic defrosting device.

The unit can be run on either electricity or LPG. When the unit is operated on LPG the heat is supplied by a burner which is fitted underneath the central tube (A) and when the unit operates on electricity the heat is supplied by a heating element inserted in the pocket (B).

The unit charge consists of a quantity of ammonia, water and hydrogen at a sufficient pressure to condense ammonia at the room temperature for which the unit is designed.

When heat is supplied to the boiler system, bubbles of ammonia gas are produced which rise and carry with them quantities of weak ammonia solution through the siphon pump (C). This weak solution passes into the tube (D) while the ammonia vapor passes into the outer tube (E) and on to the point (F) where it is enriched by bubbling through the liquid before rising into the vapor pipe (G) and on to the water separator. Here any water vapor is condensed and runs back into the boiler system leaving the dry ammonia vapor to pass to the condenser.

Air circulating over the fins of the condenser removes heat from the ammonia vapor to cause it to condense to liquid ammonia in which state it flows into the low temperature evaporator into the high temperature evaporator.

Both the low and the high temperature evaporators are supplied with hydrogen. The hydrogen passes across the surface of the ammonia and lowers the ammonia vapor pressure sufficiently to allow the liquid ammonia to evaporate. The evaporation of the ammonia extracts heat from the evaporator which, in turn, extracts heat from the food storage space, as described above, thereby lowering the temperature inside the refrigerator.

The mixture of ammonia and hydrogen vapor passes from the evaporators to the absorber.

Entering the upper portion of the absorber is a continuous trickle of weak ammonia solution fed by gravity from the tube (D). This weak solution, flowing down through the absorber, comes into contact with the mixed ammonia and hydrogen gases which readily absorb the ammonia from the mixture, leaving the hydrogen free to rise through the absorber coil and to return to the evaporator.

The strong ammonia solution produced in the absorber flows down to the absorber vessel and then to the boiler system: thus completing the full cycle of operation.

The liquid circulation of the unit is purely gravitational. It is therefore essential that the unit stands level.

Heat is generated in the absorber by the process of absorption. This heat must be dissipated into the surrounding air. Heat must also be dissipated from the condenser in order to cool the ammonia vapor sufficiently for it to liquefy. Free air circulation is therefore necessary over the absorber and condenser.

The whole unit operates by the heat applied to the boiler system and it is of paramount importance that this heat is kept within the necessary limits and is properly applied.

AUTOMATIC DEFROSTING DEVICE

The absorption unit shown in diagram incorporates a unique, fully automatic defrosting device for the general food storage compartment which eliminates the necessity for manual defrosting at frequent intervals normally associated with most conventional refrigerators. Furthermore, the time interval of each defrosting cycle, and the frequency, have been so arranged that during defrosting there is no noticeable effect upon the temperature of the foods stored in the refrigerator, and frozen food storage conditions can be maintained at all times in the frozen storage compartment.

HOW AUTOMATIC DEFROSTING WORKS

The defrosting action is brought about by diverting hot gas from the boiler to the high temperature evaporator at periodic intervals, and this hot gas melts the ice

on the fins of the evaporator coil. The resulting defrost water runs off into the drip tray.

The operation of the defrost cycle is completely automatic and the frequency with which it takes place is determined by an automatic siphon arrangement (see diagram) in the boiler system, which periodically empties an associated siphon chamber, allowing hot gas to pass through the chamber and thence along a by-pass pipe to that section of the evaporator which cools the general food storage compartment.

During the normal refrigeration process the by-pass pipe outlet from the siphon chamber is closed by condensed liquid, and over a period of 15-25 hours solution continues to condense in the chamber and the liquid level rises slowly until it reaches the siphoning height.

The automatic siphon then empties the siphon chamber and thereby uncovers the outlet to the by-pass pipe. This allows the hot gas from the boiler to by-pass the condenser, passing, instead, through the siphon chamber direct to the cabinet cooling coil of the evaporator.

The defrost period lasts about half an hour, after which time the solution condensing in the siphon tube once again closes the outlet to the by-pass pipe, and defrosting ceases. The refrigerator unit then continues to operate normally for another 15-25 hours, and the defrosting cycle is repeated.

REMOVAL AND REPLACEMENT OF RM1303 REFRIGERATOR

1. Open exterior refrigerator access door and remove the two large phillips head screws going through the base of the refrigerator into the floor.
2. Open refrigerator doors and remove screws concealed by rubber plugs on each side of face frame.
3. On some models screws will be located in the cabinet above the refrigerator going down into the top of refrigerator.
4. Shut off main LP tank valve and remove gas line from gas valve. Be sure to support valve body with a wrench when removing flare nut to avoid damage.
5. Note color and position of **12** volt wire in terminal block and remove. Tape hot wire or pull fuse from distribution panel to avoid accidental short circuits.
6. Remove electric plug from electric outlet.
7. Lay a piece of plywood 1/4" thick by 3' square, or heavy cardboard, on the floor at the face of the refrigerator. Tip back slightly and pull forward on refrigerator until refrigerator starts into plywood. As soon as it is started continue to pull refrigerator from wall until it clears opening. (Be very careful when removing refrigerator not to damage furniture.
8. Reinstall by reversing above steps. Check all gas connections for leaks with soapy water or leak detector.

R. 1303 TROUBLE SHOOTING GUIDE

GREEN INDICATOR LIGHT ON - INTERIOR LIGHT OK - NO FUNCTIONAL OPERATIONS

1. Turn switch off and back on.
2. Check thermostat for continuity. CAUTION - Remove wires.
3. Check wire lead to thermostat for continuity.
4. Insure that wire lead from thermostat to circuit board is properly connected.
5. Document procedures and replace circuit board.
6. Insure that lead from switch is properly connected to circuit board.
7. Remember, if the problem is related to the thermostat it will affect all functions.

GREEN INDICATOR LIGHT ON - INTERIOR LIGHT OK - 120V OPERATES - NO GAS IGNITION SPARK

1. Disconnect wire to solenoid. If igniter starts to spark, replace the circuit board - if not, replace the igniter.
2. Insure no 12V through tag line.
3. Turn switch off and back on.
4. Set thermostat to maximum.
5. Check the igniter, following these steps:

Pull the control panel out, connect a jumper wire from the 12V positive terminal on the igniter. (This is a black #18 Awg. wire). If no spark occurs

the igniter is faulty and must be replaced.
If ignition spark occurs, replace the circuit board.

GREEN INDICATOR LIGHT ON - INTERIOR LIGHT OK - 120V OPERATES - 12V D.C. OPERATES - IGNITION SPARK OCCURS - FLAME DOES NOT LIGHT

1. Check for gas supply.
2. Insure on/off valve is open.
3. Check thermo-electric solenoid valve as follows:

Remove plastic wiring plug from solenoid.

CAUTION: Do not check for resistance across these terminals as damage to the circuit board will occur.

Connect a jumper wire from the 12V positive terminal on the refrigerator to the lower terminal on the solenoid valve.

If the valve does not open it is defective and must be replaced.
If the valve does open, follow these steps:

A. Be sure the wire lead from the valve to the circuit board is properly connected.

B. Using a D.C. voltmeter, measure the voltage between the yellow wire (marked L) on the igniter and ground. The voltage must be 20V minimum to open the solenoid valve. If less than 20V replace the igniter. If 20V or more replace the circuit board.

NO GREEN INDICATOR LIGHT - NO
INTERIOR LIGHT - NO FUNCTIONS

1. Be sure switch is on.
2. Check for 12V DC supply and polarity at the +/- terminals on the rear of the refrigerator.
3. Check in line fuse.
4. Insure all wire leads are connected to circuit board.
5. Insure wire leads are connected to back of switch.
6. Replace circuit board.

GREEN INDICATOR LIGHT OKAY -
INTERIOR LIGHT ON - 12V DC OPERATES -
GAS SYSTEM OPERATES - NO 120V
OPERATION

1. Check 120V power supply.
2. Be sure the refrigerator is plugged in.
3. Be sure there is a charged battery in line.
4. Check the pin connectors and wires to the switch and circuit board.
5. Replace the circuit board.
6. Unplug 120V heater & check for continuity.

GREEN INDICATOR LIGHT OKAY -
INTERIOR LIGHT ON - 120V OPERATES -
GAS SYSTEM OPERATES - NO 12V DC
OPERATION

1. Check for 12V DC at ignition terminal on rear of refrigerator.
2. Be sure there is a charged battery in line.

3. Replace the circuit board.

4. Unplug 12V heater and check for continuity.

OVERFREEZING

1. Check for proper positioning of the capillary tube (correct length is approx. 32-1/2").
2. Check thermostat for continuity.
3. Replace thermostat.
4. Replace circuit board.

INSUFFICIENT COOLING

1. Check thermostat setting.
2. Check for proper positioning of the capillary tube.
3. Pull capillary tube completely out and run overnight.
4. Diagnose and, if necessary, replace the cooling unit.

INSUFFICIENT COOLING IN COLD
WEATHER

1. Check capillary tube for proper positioning.
2. Completely insulate the capillary tube holder.
3. Restrict air flow through lower vent. CAUTION: Be sure obstruction is removed when ambient temperature reaches 30 degrees.

INDICATOR LIGHT CONSTANT RED
(GREEN FLASHING INSTEAD OF RED)

1. Indicator bulb in upside down.

INDICATOR LIGHT CONSTANT GREEN -
12V OPERATES - GAS OPERATION
INTERMITTENT - NO 12V OPERATION

1. Insure that wire lead from switch is properly connected to circuit board.

2. Check for defective switch.

RELAY CHATTER

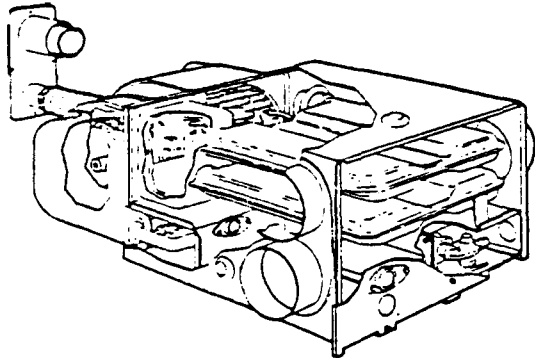
1. Check for defective or inadequate fuse. Replace with 30 amp circuit breaker or quality **fuse**.

2. Check for 12V DC power supply from battery.

[illegible]

Vuo1HERM OWNER'S MANUAL 900 Series

Gas Direct-Vent Forced Air
Furnaces for Mobile Homes
or Recreational Vehicles



**DIRECT SPARK
IGNITION MODELS**



FOR YOUR SAFETY

IF YOU SMELL GAS:

1. OPEN WINDOWS
2. DON'T TOUCH ELECTRICAL SWITCHES
3. EXTINGUISH ANY OPEN FLAME
4. VACATE PREMISES UNTIL VENTILATION IS COMPLETE AND GAS SOURCE IS FOUND AND CORRECTED.
5. IMMEDIATELY CALL YOUR SUPPLIER

FOR YOUR SAFETY

NOTHING OR OTHER FLAMMABLE MATERIAL SHOULD NOT BE PLACED ON OR NEAR THE APPLIANCE.

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

CHILDREN AND ADULTS SHOULD BE ALERTED TO THE HAZARDS OF HIGH SURFACE TEMPERATURES AND SHOULD STAY AWAY TO AVOID BURNS OR CLOTHING IGNITION

YOUNG CHILDREN SHOULD BE CAREFULLY SUPERVISED WHEN THEY ARE IN THE SAME ROOM AS THE APPLIANCE.

**-IMPORTANT INSTRUCTIONS-
MUST STAY WITH UNIT
OWNER - READ CAREFULLY**

WARNING

THIS UNIT MUST BE SERVICED ONLY BY AN AUTHORIZED SERVICEMAN. MODIFICATION OF THE APPLIANCE CAN BE EXTREMELY HAZARDOUS AND COULD LEAD TO SERIOUS INJURY OR DEATH.

FUEL BURNING APPLIANCES GENERATE TOXIC FLUE PRODUCTS. MODIFICATION OR IMPROPER MAINTENANCE CAN CAUSE CARBON MONOXIDE IN DEADLY AMOUNTS. TO PREVENT THIS, MAINTAIN APPLIANCE IN SAFE OPERATING CONDITION.

DO NOT BLOCK OR MODIFY ANY COMBUSTION AIR OR FLUE GAS PASSAGEWAYS.

DO NOT ADD ANY DEVICES OR ACCESSORIES TO THIS APPLIANCE EXCEPT THOSE SPECIFICALLY AUTHORIZED BY DUO-THERM.

ALWAYS CONSULT YOUR AUTHORIZED SERVICEMAN FOR ANY PROBLEMS OR QUESTIONS YOU MAY HAVE PERTAINING TO THIS APPLIANCE.

ALWAYS INSPECT THE APPLIANCE BEFORE STARTING A NEW HEATING SEASON, PAYING SPECIAL ATTENTION TO COMBUSTION AIR, FLUE GAS PASSAGEWAYS AND FUEL LINES.

The area in which this furnace is installed must be kept clean. DO NOT store flammable liquids, oil, or other materials which restrict the air flow to the blower which is located at the rear of the furnace. NEVER place hazardous materials such as aerosol cans, plastic containers, gasoline, or any other flammable materials near the furnace.

BEFORE PROCEEDING CHECK ALL CONNECTIONS WITH A SOAP SOLUTION TO DETECT LEAKS. THIS ALSO SHOULD INCLUDE A CHECK OF THE FURNACE CONTROLS AND PIPING. NEVER CHECK FOR LEAKS WITH A LIGHTED MATCH.

[1] OPERATING INSTRUCTIONS AUTOMATIC "DIRECT SPARK" IGNITION MODELS

IMPORTANT: FAILURE TO FOLLOW THESE LIGHTING INSTRUCTIONS EXACTLY MAY RESULT IN DAMAGE TO THE UNIT.

1. Set thermostat on "OFF" position. Remove cover plate on front of furnace. (2 wing screws). See FIG. 1A.
2. Turn gas valve to "OFF" position. See FIG. 1B. Wait 5 minutes.
3. Turn gas valve to "ON" position. See FIG. 18. Set thermostat to "ON" position and adjust to desired setting.
4. Allow 15 to 30 seconds for burner to ignite.
5. If burner does not light, set thermostat on "OFF" position, wait 5 seconds then re-set thermostat to "ON" position.
6. If ignition is not obtained after 3 tries, go to complete shut-down and determine cause.
7. Replace furnace cover plate (See FIG. 1A).

COMPLETE SHUT-DOWN

8. Turn gas valve knob to "OFF" position.
9. Set thermostat on "OFF" position.

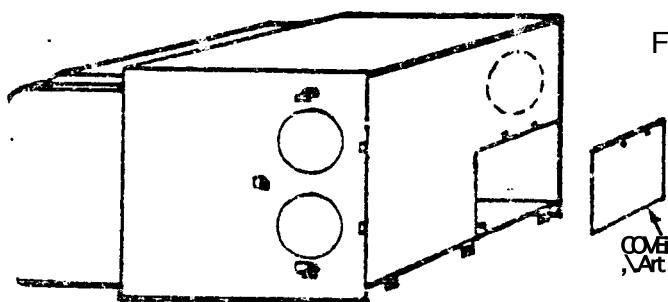
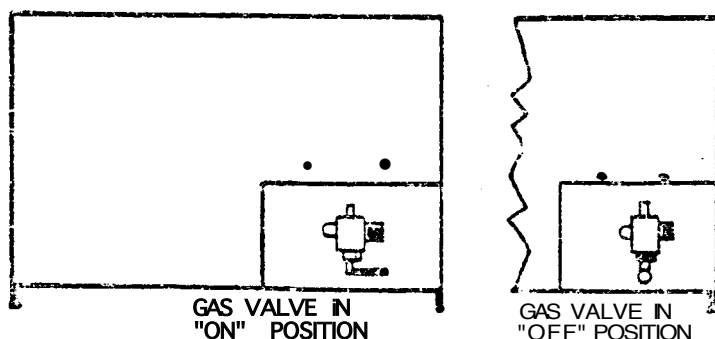


FIG. 1A

FIG. 18



[2] SEQUENCE OF NORMAL OPERATION

1. When the thermostat calls for heat a delay of 15 to 30 seconds will elapse before the time delay relay energizes the fan motor.
2. As the fan motor reaches approximately 75% of the normal r.p.m. (within 1 to 2 seconds) the sail switch, in response of the air flow, will engage allowing current flow to the gas valve.
3. The gas valve will open and allow gas to flow to the main burner where it is ignited by a direct spark ignited main burner.
4. If the thermostat is satisfied or turned back, the gas valve will close and the flame on the main burner will go out. The blower will continue to run for a short period of time, and will then shut off. The purpose of this is to remove most of the remaining gas and heat from the combustion chamber.

[3] TIME DELAY FAN RELAY

This relay controls the sequence of the blower operation. When the bimetal disc of the relay is heated internally to operating temperature, the switch closes. This completes the circuit to the motor. The blower will continue to run as long as the relay is hot even though the thermostat is satisfied and the main burner is off. When the relay sensor cools, after the thermostat is satisfied, the switch opens and the blower shuts off.

[4] LIMIT SWITCH

The purpose of the limit control is to turn off the gas to the main burner if for any reason the furnace becomes abnormally hot. If the circulating air is blocked, even partially, the limit control will function and cause the main burner to cycle.

If the limit control is damaged, it cannot be repaired. It must be replaced with a new one. **CAUTION:** NEVER SHORT ACROSS OR BYPASS THE LIMIT CONTROL EVEN FOR ONLY TEMPORARY OPERATION.

[5] AIR SWITCH

The combustion air switch has two purposes:

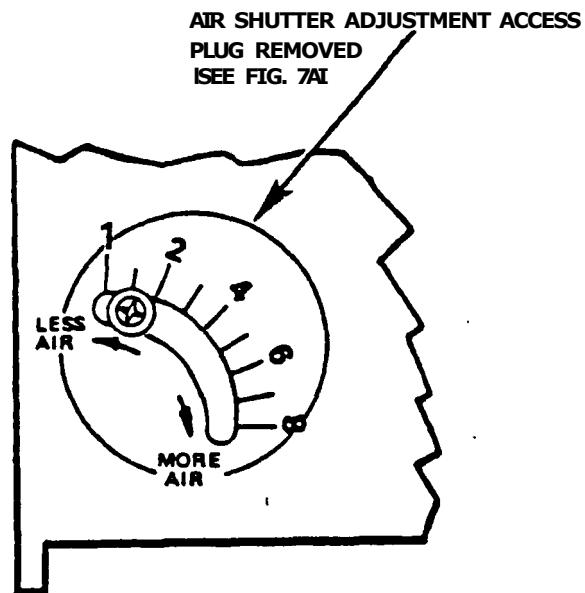
1. It is an "air prover". It operates in response to the flow of air generated by the blower wheel. Hence, if for any reason, the air from the blower wheel is not sufficient, the switch will not operate. One cause of insufficient air is a short circuit caused by low voltage.
2. The switch allows time for the blower to pull in a sufficient amount of air for combustion before it engages. Once engaged, the gas valve opens and gas flows to the combustion air blower mixing chamber.

[§] AIR SHUTTER ADJUSTMENT

res furnace operates most efficiently when the air shutter is set for the altitude at which it will be used. The following chart is a guideline for proper air shutter adjustment:

FURNACE MODEL No.	ALTITUDE (Ft.)	Air Shutter Setting
90020	0-5000	15
	5000-8000	4.5
	Above 8000	8
90025	0-5000	2
	5000-8000	4
	Above 8000	8
90030	0-5000	1.5
	5000-8000	3
	Above 8000	5

NOTE: CGA Certification is for Oto 4500 Ft. above S. uvel,



BLOWER ASSEMBLY /BURNER

One motor is used to drive both the combustion air and the circulating air blower wheels. Although one motor drives both wheels, the blowers are separate. The combustion air blower is sealed so as to allow no passage of air between it and

the circulating room air blower. Also the combustion air blower serves to "PRE-MIX" the gas and air before it is burned. The combustion air blower draws air from the outside atmosphere and at the same time, the gas control allows gas to flow in the combustion air stream where it is mixed, then expelled through a ceramic burner head where it is ignited in the combustion chamber. See FIG. 7A.

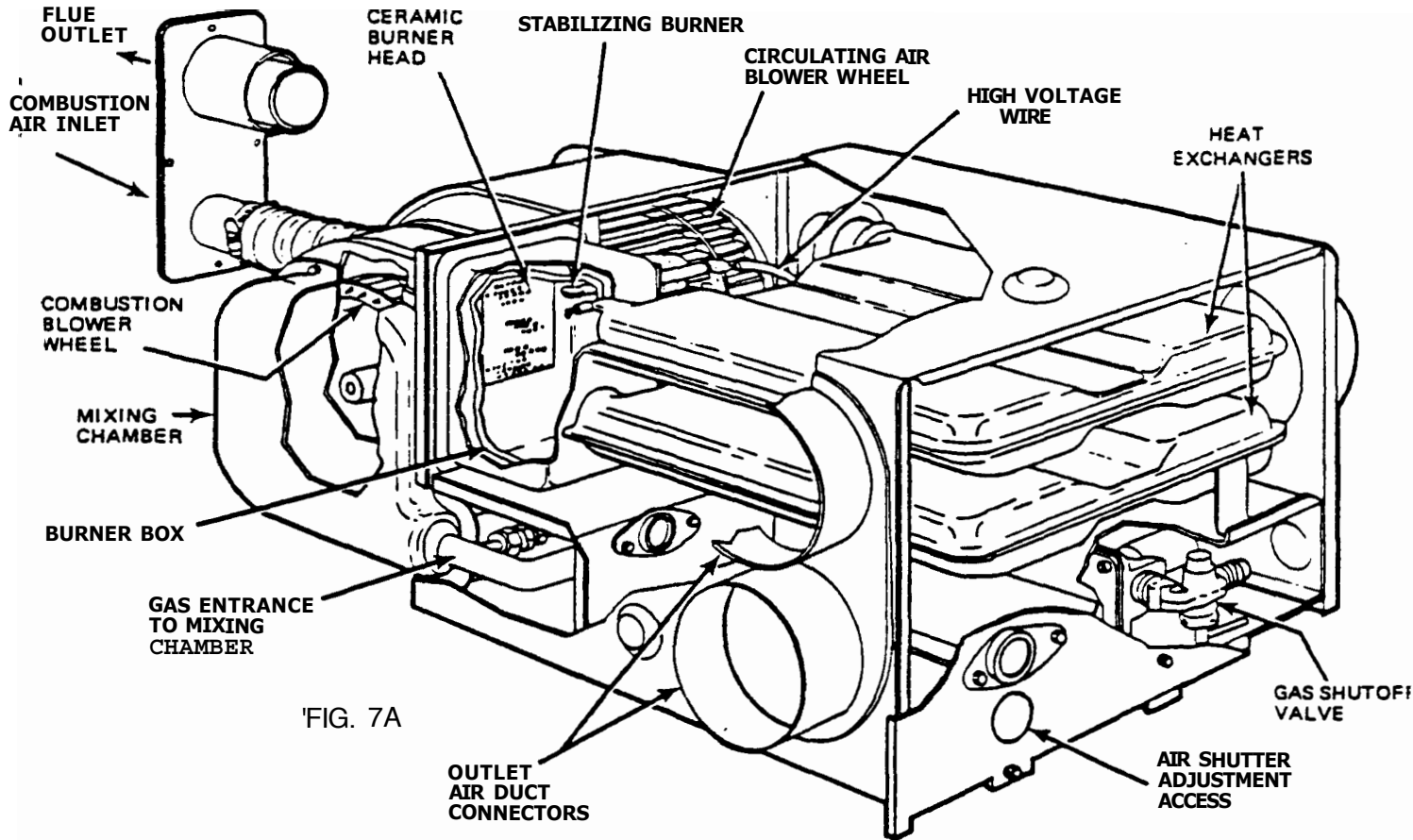


FIG. 7A

OPTIONAL AC-DC CONVERTOR

A converter is available to operate this unit from a 120 Volt AC power supply. The converter contains a switching relay which automatically changes over to the 120 Volt power supply whenever the vehicle is connected to an outside power source, thus saving the vehicle battery.

9 MAINTENANCE AND CLEANING

NOTE: For continued satisfactory performance of this unit it is important that the control compartment be kept clean. It is also important that the appliance area be clean, and free of combustible materials, vapors and liquids.

Routine inspection, maintenance and cleaning of venting system and gas connections is recommended at least on a yearly basis.

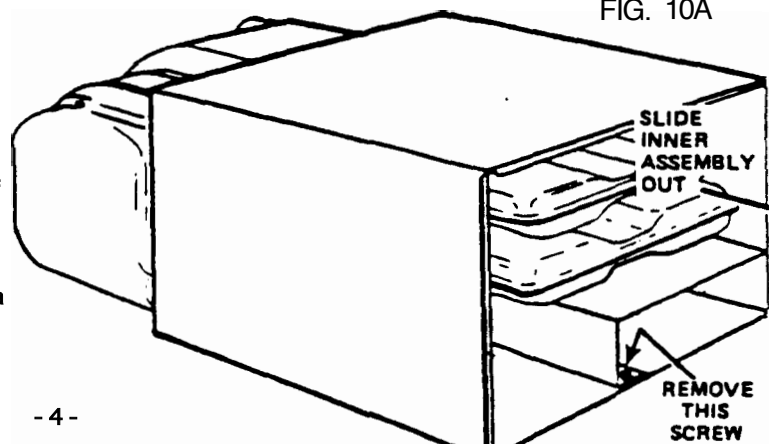
This unit is equipped with a sealed motor and requires no oiling.



10 TO REMOVE FURNACE FOR SERVICE

1. Remove front panel. (5 screws).
2. Turn off gas supply to furnace and disconnect.
3. Turn off power supply to furnace and disconnect wiring.
4. Remove flue vent assembly outside vehicle and disconnect flexible combustion air hose.
5. Remove screw on bottom flange of electrical box which secures inner furnace assembly to the casing bottom. See FIG. 10A.

FIG. 10A



THERMOSTAT ADJUSTMENT

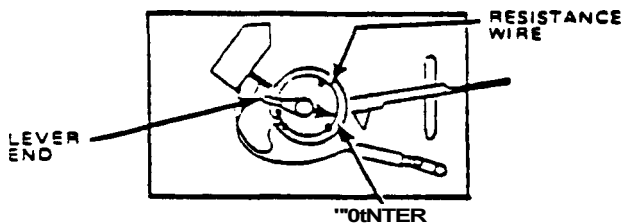
If a unit is equipped with an adjustable thermostat. Improper setting of the heat anticipator can cause either abnormally long or short heating cycles resulting in discomfort.

For correct heating anticipator adjustment, proceed as follows:

Cycle system to determine if cycling rate is satisfactory. If adjustment is necessary, move pointer to a higher setting for longer "ON" cycle and to a lower setting for shorter "ON" cycle.

Factory setting is:

- .6 for single function valve
- .8 for FENWAL double function valve
- 1.0 for JOHNSON double function valve



SERVICE HINTS, DIAGNOSIS AND CORRECTIVE MEASURES

INSTALLATION AND SERVICE SHOULD BE DONE BY A QUALIFIED SERVICE PERSON. THE APPLIANCE SHOULD BE INSPECTED BEFORE USE AND AT LEAST ANNUALLY BY A PROFESSIONAL SERVICE PERSON. MORE FREQUENT CLEANING MAY BE REQUIRED DUE TO EXCESSIVE LINT FROM CARPETING, BEDDING MATERIAL, ETC. IT IS IMPERATIVE THAT CONTROL COMPARTMENTS, BURNERS AND CIRCULATING AIR PASSAGES OF THE APPLIANCE BE KEPT CLEAN.

A. COMPLAINT-NO HEAT

1. Check electrical supply to make sure that 12 volt d.c. is available at unit. Battery must be charged. If battery is low, there may be sufficient power to run the blower but not enough to run the blower at full speed. If blower does not run at its prescribed speed, the combustion air switch cannot engage and gas will not flow. Be sure the connections to the voltage lines are tight.

2. Manually rotate fan to make sure motor is free to turn.

3. Check for blown fuse in 12 volt circuit to furnace.

SHORT CIRCUIT CHECKOUT

4. If fuses are blown, a short is indicated and should be checked.
 - a. Turn off all appliances including furnace.
 - b. Install an ammeter on the positive (+) side of the battery. Amperage reading should be 0. If an amperage reading is noted, a short exists in the vehicle electrical system.
 - c. Disconnect the red (+) d.c. lead at the furnace. If the amperage continues, the short is exterior to the furnace. If the amperage reading ceases, the furnace electrical system is shorted or miswired (see Section C-O-COMPLAINT-AMPERAGE DRAW THROUGH FURNACE WITH THERMOSTAT "OFF") and should be checked.

5. GAS SUPPLY: Be sure manual gas valve is in the open position.

6. THERMOSTAT OFF: Check to be sure thermostat is properly wired and is calling for heat.

7. MALFUNCTIONING COMBUSTION AIR SWITCH: Be sure the combustion air switch is moving far enough to close its contacts. If the switch is not closing, clean any dust or dirt from the actuator pin. Other reasons for switch not operating are:

- a. Insufficient fan speed (slow motor due to low charged battery, faulty motor or line and dust accumulation restricting return air to furnace). Check wiring in accordance with unit's wiring diagram to assure that the proper polarity of the 12 volt d.c. power supply is observed. On certain models this polarity must be observed so the motor will run the proper direction of rotation to insure correct air delivery.

- b. Faulty Combustion Air Switch: Replace switch if valve does not open when switch is engaged. Switch should also be replaced if battery is fully charged and with the fan motor running at top speed the switch fails to engage within 3 to 4 seconds.

8. GAS CONTROL VALVE: With test light check valve terminals. If voltage is present, but valve is not opening (when combustion air switch engages), replace control valve.

9. FAN NOT OPERATING: Check for burned-out motor or loose wiring terminals.

10. DEFECTIVE FAN RELAY: Relay may be at fault if motor fails to start when thermostat calls for heat. This can be suspected if the thermostat is raised and the motor fails to operate within 60 seconds.

B. COMPLAINT-EXCESSIVE NOISE

1. Motor or blower wheel out of balance. Replace motor or blower wheel.
2. Motor hum. Replace motor.

C. COMPLAINT-ERRATIC FAN OPERATION

A loose terminal or a defective relay may cause the motor to cycle off while the thermostat is calling for heat. Reopen terminal or replace relay.

D. COMPLAINT-AMPERAGE DRAW THROUGH FURNACE WITH THERMOSTAT "OFF"

1. Incorrect wiring. If 12 Volt and thermostat wires are not connected properly at the furnace a continuous circuit can be created through the heater of the fan relay. If this condition exists the blower will start as soon as the thermostat closes and will shut off when the thermostat opens, instead of having a delayed action. In some cases this will also burn out the heat anticipator in the thermostat.

Refer to the wiring diagram for correct connections.

2. Internal short to ground in gas control or motor. Disconnect all wiring to control or motor (disconnect ground screw on black motor lead from casing) and use an ohmmeter to check for shorts to ground. At no point should there be a reading between the electrical circuit of the motor or control and ground.

DIRECT SPARK IGNITION SYSTEM

DESCRIPTION

The direct spark ignition system consists of 1 solid state printed circuit control module, 1n electrode assembly, a 12 volt s control and connecti high and low voltage wires.

To ignite the burner it is necessary only to set the thermostat. The thermostat, in series with the air prover switch, powers the igniter to simultaneously open the main burner valve and provide the ignition spark. Should the flame not be established within 1 period of 7 seconds, the system provides safety shut-down.

Electronic flame sensing circuitry in the igniter detects the presence or absence of main burner flame. If the flame is not established during the Flame Establishing Period, the system closes the gas valve and locks out. If the flame is extinguished during the ignition cycle, the igniter will provide one retry for ignition, before going into lock-out. To reactivate or retry for ignition, if lock-out has occurred, set the thermostat to the "OFF" position for 4 to 5 seconds, then reset to the "ON" position.

TROUBLE SHOOTING GUIDE

CAUTION

SERVICING THIS DEVICE SHOULD ONLY BE PERFORMED BY A QUALIFIED SERVICEMAN WITH DUE REGARD FOR SAFETY AS IMPROPER ACTIONS COULD RESULT IN A HAZARDOUS CONDITION, RESULTING IN SERIOUS INJURY OR DEATH.

WARNING

DO NOT APPLY POWER TO CONTROL MODULE UNLESS WIRING CONNECTIONS ARE COMPLETE AND ELECTRODE IS PROPERLY GROUNDED.

USE EXTRA CAUTION IN AREAS WHERE HIGH VOLTAGE IS PRESENT.

- A. Input Polarity: If a spark is present and the gas valve opens but the system shuts down after the trial period, check input voltage for proper polarity.
- B. Grounding: It is essential to proper operation that the system be properly grounded. If a spark is present and the gas valve opens but the system shuts down after the trial for ignition period, check for proper ground. The following items should be checked:
1. The ground screw connecting the black motor lead, yellow power supply lead, and blue thermostat wire to the casing.
 2. The screws attaching the stabilizing burner/electrode assembly to the burner box.
- C. Wiring: Check all wiring for proper and secure connections. Be sure the AMP connector is fully engaged on the control board. Check the high voltage wire for proper connection at both ends. Observe any corrosion that may interfere with good electrical contact.

D. High Voltage Malfunction: (See Caution below). If during the trial for ignition, the spark is intermittent (the valve may or may not open) the following should be checked:

1. Electrode spark gap • should be 1/8" to 1/32".
2. Ceramic insulators • check for cracks.
3. Electrode lead wires • check for cracks or breaks.

CAUTION

THE ELECTRODE WIRES ARE VERY BRITTLE AND WILL EASILY BREAK OFF IF ATTEMPTS ARE MADE TO BEND THEM.

E. Valve Malfunction: If there is power to the gas valve and a spark during the trial for ignition, but the valve will not open, check the valve for an open coil or other malfunction.

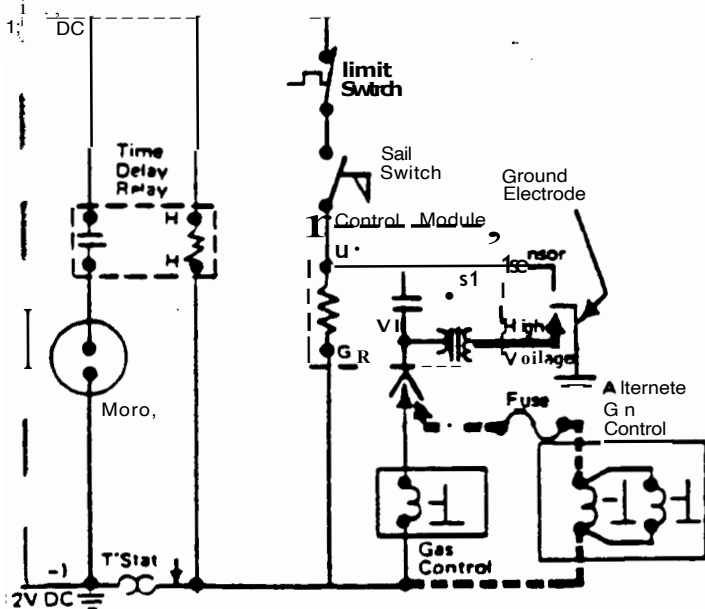
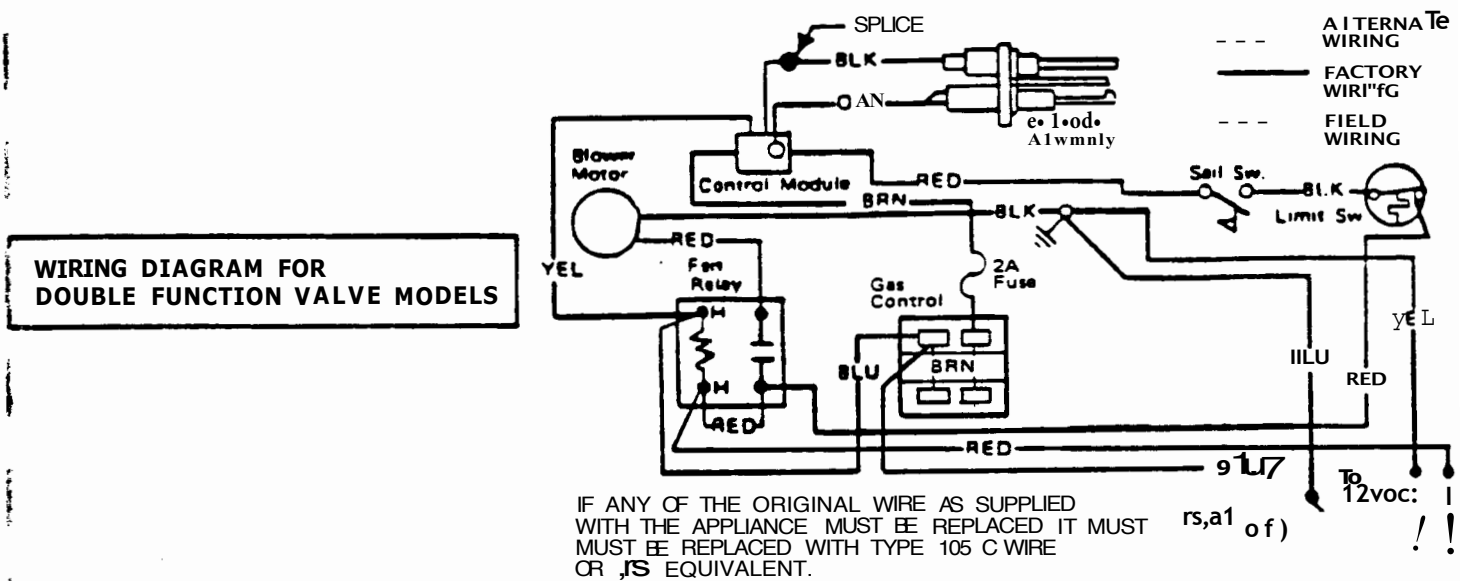
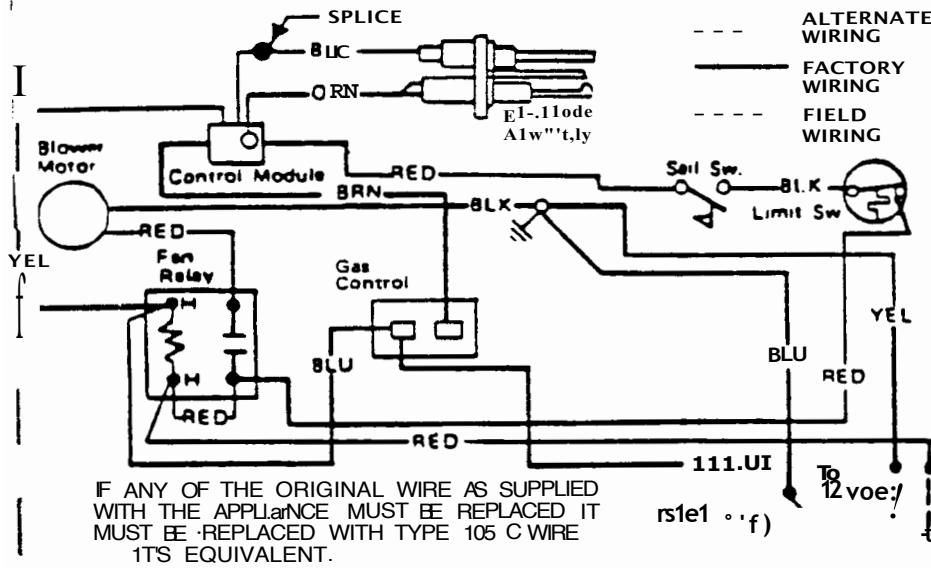
F. Erratic Operation: If the system operates properly for a period of time but randomly shuts down during the duty cycle, or will not operate during cold starts, check the flame proving circuit (sensor wire) with a D.C. Microamp Meter. The current should be at least 5 microamps at ignition. A low or marginal flame current may cause nuisance tripping. After three minutes operation, a reading of at least 8 microamps is normal.

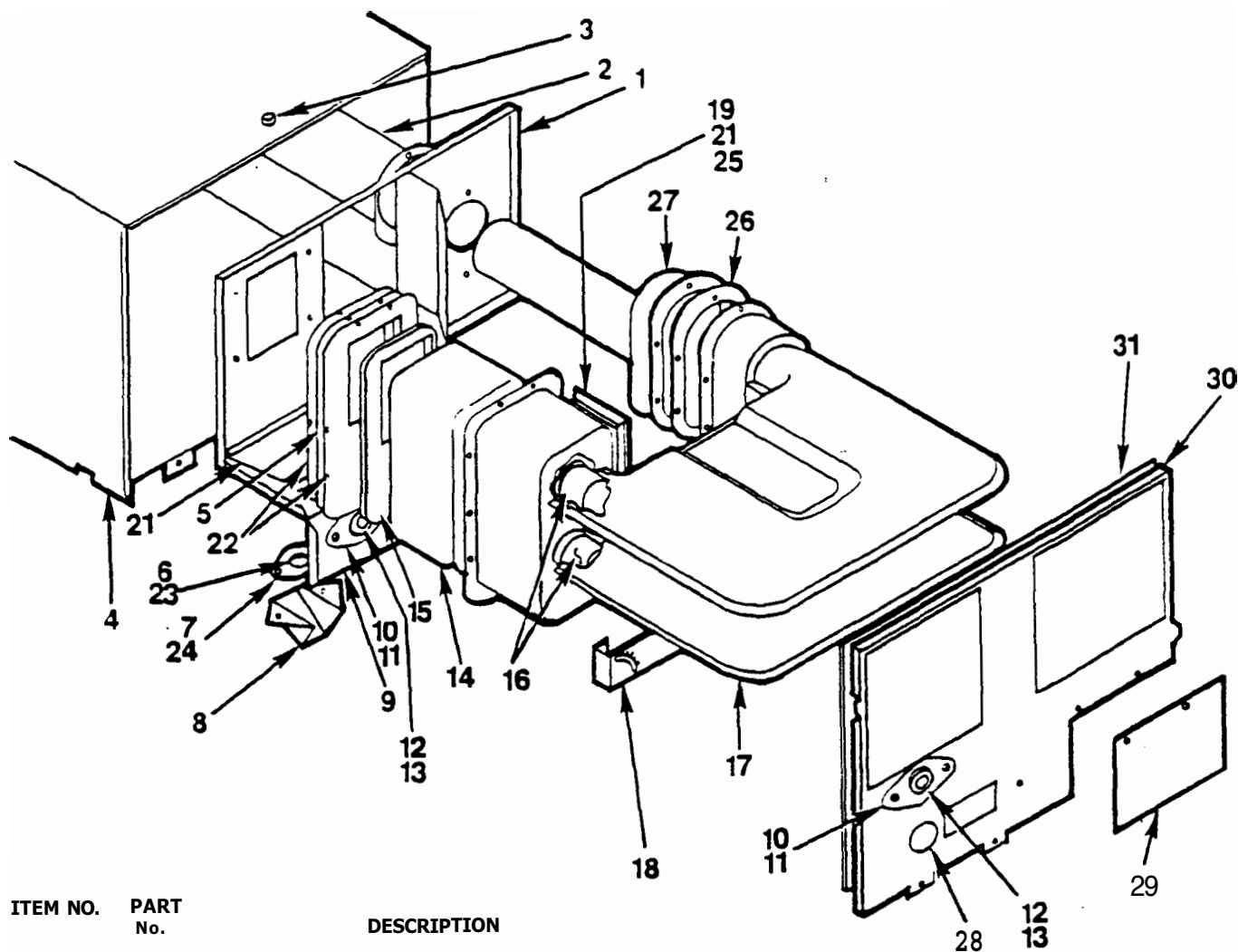
If low readings are encountered, check the sensor circuit wiring to be sure the connectors are tight and the sense wire is not in direct contact with metal or the spark wire.

G. The solid state control module is not field repairable. Any modifications or repair could alter the function of sensitive electronic circuits, and cause unsafe operation.

For more detailed service information on the DIRECT SPARK IGNITION SYSTEM refer to the Duo-Therm OSI Service Guide (Form No. 11085).

WIRING DIAGRAM AND SCHEMATIC

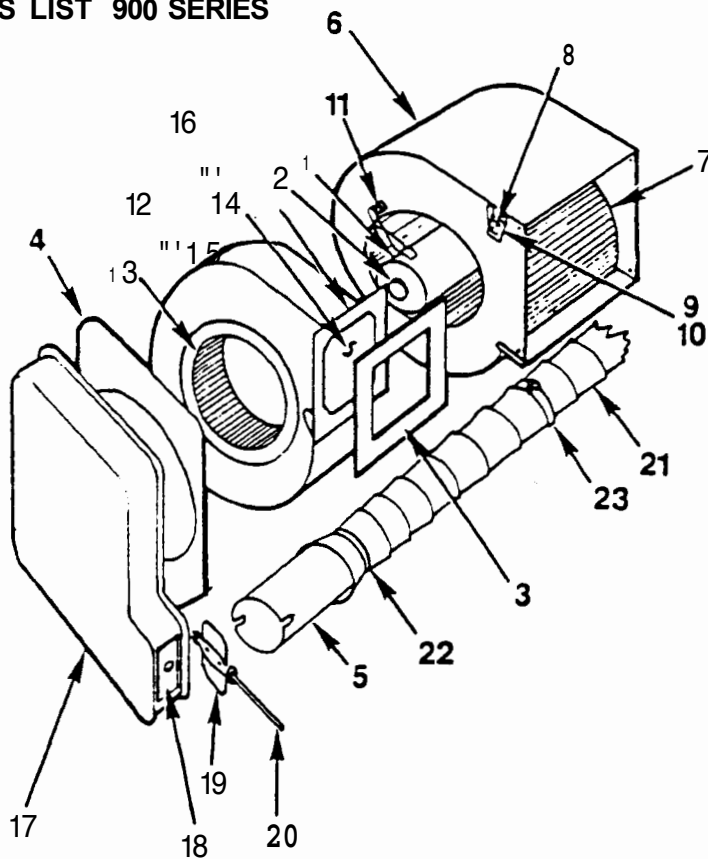




ITEM NO.	PART No.	DESCRIPTION
1	J.18196-002	Blower Mounting Panel, 90020
	J.18196-001	Blower Mounting Panel, 90025, 90030
2	J.18037	Flue shield
3	3-18081	Spacer (6 req.)
4	J.18125	Casing
5	J.17410	Burner Box Cover
6	J.17846	Sight glass, small
7	J.17919	Sight glass retainer, small
8	J.17495	Observation mirror
9	J.17866	Divider panel
10	J.6121	Sight glass retainer, large
11	3-0122	Retainer gasket
12	J.2818	Sight glass, large
13	6-114563	Sight glass gasket
14	J.17887	Burner box liner
15	J.17888	Liner cov.-
16	J.17942	Heat chamber collar (2 req.)
17	J.18070	Hot chamber
18	J.17869	Air adjustment bracket
19	J.17497	Pilot-igniter assembly (includes orifice)
20	J.16082-003	Pilot orifice, .014
21-28	13-1 4453-008	Gaslet sat, heat chamber
21	J.17885	Gasket, burner box end
22	J.17396	Gasket, burner box (2 req.)
23	J.17921	Gasket, sight glass
24	J.17920	Gasket, retainer
25	J.17442	Gasket, pilot-igniter
28	3-12593	Gasket, flue box
27	J.18075	Flue box.
28	J.11401-003	Plug button
29	J.18025	Control access box
30	J.17878	Front cover
31	J.18244	Front cover insulation

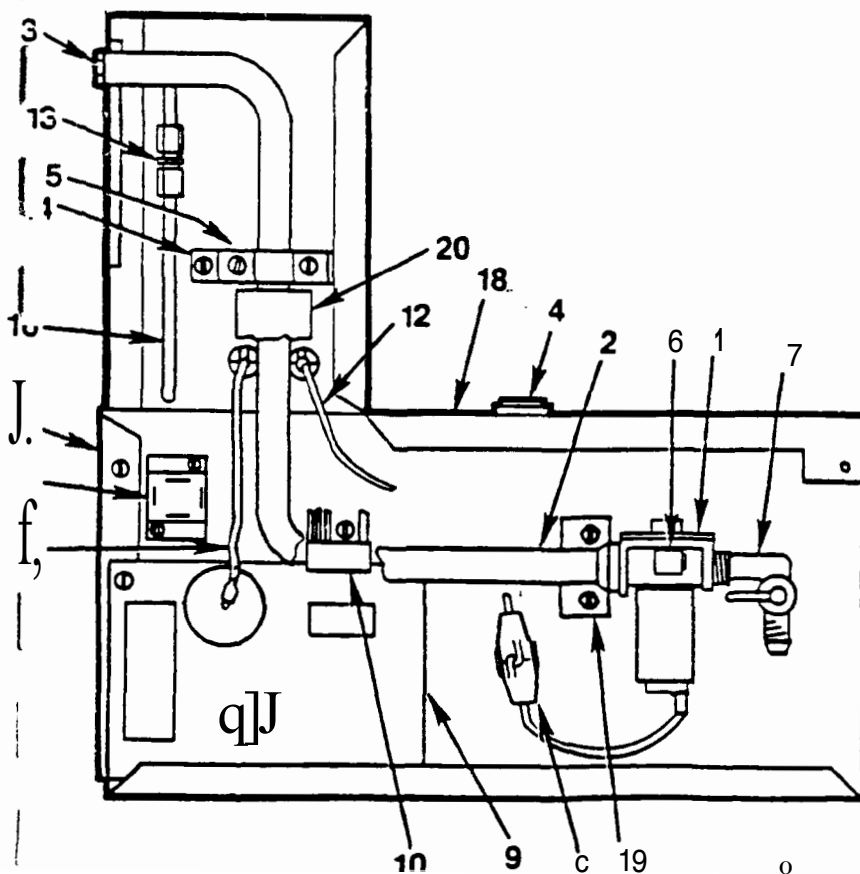
PARTS LIST 900 SERIES

BLOWER SECTION



Item No.	Part No.	Description
1	13-18030	Motor, 90020 (Incl. gasket set)
	13-17461	Motor, 90025, 90030 (Incl. gasket set)
2-4	13-14453-005	Gasket Set
2	3-17564	Gasket, Motor
3	3-17886	Gasket, burner mounting flange
4	3-17402	Gasket, pre-mix chamber
5	3-18160	Combustion air pipe, 90020, 90025
	3-17873	Combustion air pipe, 90030
6	3-18123	Blower housing, circulating air
7	3-18049	Blower wheel, circulating air
8	3-14346	Air prover switch
9	3-17546	Switch mounting plate
10	3-13073	Switch mounting gasket
11	107779-001	Motor Mounting grommet (3 req.)
12	3-18124	Blower housing, combustion air
13	3-17566	Blower wheel, combustion air
14	3-18009-001	Burner head
15	3-17988	Burner head gasket (not shown)
16	3-17872	Burner mounting flange
17	3-18076-001	Pre-mix chamber
18	3-17884	Gasket, burner pipe
19	3-18156	Air shutoff disc
20	3-17420	Air shutoff rod
21	3-18098-001	Combustion air duct
22	3-18080	Air duct clamp
23	3-17228-004	Tie strap

CONTROL BOX SECTION



Item No.	Part No.	Description
1 Use	13-17172-002	Gas control, single operator, for models with suffix -212, -412, -612
	3-18195	Gas control, dual operator for models with suffix -111, -311, -511
2	3-17814-001	Burner pipe, for models with suffix -212, -412, -C12
	3-17814-002	Burner pipe, for models with suffix -111, -311, -511
3	6-111255-055	Main orifice, 9002[
	6-111255-053	Main orifice, 90025
	6-111255-052	Main orifice, 90030
4	3-14549-015	Auto. limit switch, 190° F for 90020
	3-14549-011	Auto. limit switch, 2r, 5° F., for 90025
		-311, -412
	3-14549-017	Auto limit switch, 210° F. for 90030
		-311, -412
	3-14549-016	Auto. limit switch, 160° F. for 90025
		-111, -212, and 90030-111, -212
5	3-18050-001	Fuseholder with fuse (for CGA Models 01)
	3-13803-009	Fuse only, 2 amp (for CGA models Only)
6	3-18026	Strt elbow, 90° (incl. with 911 control)
7	3-16943	Shutoff valve
8	3-14437	Blower relay, time delay
9	3-15526	Ignition module board
10	3-17510	Wiring harness, with plug
11	3-17511	High voltage wire
12	3-14409-002	Sensor wire
13	3-18048-001	Union, with nuts and ferrules
14	3-17870-001	Burner pipe support bracket
15	3-17871	Burner pipe retainer
16	13-11668	Pilot tube kit
17	3-18136	Electrical box back
18	3-17867	Electrical box
19	3-17533-001	Burner pipe support
20	3-17310-004	Burner pipe insulation

12 Volt wiring diagram

325 & 345

wiring shown from 12 volt distribution panel to switch or appliance

1. reading lights, rear
2. clock
3. ceiling vent fans
4. switch, to rear vanity lights
5. switch, to indirect lighting
6. wardrobe light
7. center ceiling light
8. 12 volt outlet (shaver socket)
9. furnace
10. light, to lavatory
11. 2 fans, bath exhaust
12. light, shower
13. ^{switch} water heater switch
14. ^{switch} to bath indirect lighting
15. switch, to bath mirror lights
16. 12 volt distribution panel
17. fan, range exhaust
18. refrigerator
19. light, dinette
20. switch, galley ceiling light
21. Monitor panel
22. light, galley
23. switch, forward ceiling lights
24. switch, step light
25. switch, flood light
26. lamp, wall mount
27. reading lights, front
28. door bell
29. light, entertainment module
30. C.B. radio
31. switch, map light
32. switch, walkway lights
33. switch, compartment & docking light
34. radio-tape player