SECTION 5

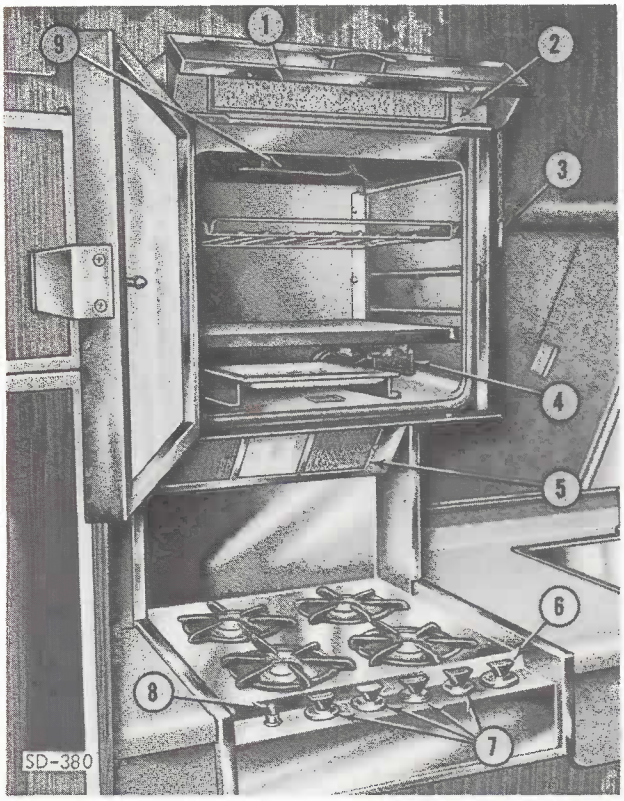
LIVING IN THE COACH

5-1. KITCHEN

a. Oven/Range

The eye-level oven with the full width glass window and the counter-high range allow you to do all your cooking without bending. This convenience, coupled with the fact that you have full visibility of both front and rear burners, proves vacation meals need not be a chore.

The interior of the oven and cooking areas are illuminated by low voltage lights. Both lights are controlled by one switch located next to the range knobs. In addition, this appliance is equipped with a vented power exhaust hood to remove cooking odors, heat, and smoke (fig. 5-1).



1. POWER VENT FILTER
2. FAN SWITCH
3. LOCKING PIN
4. OVEN PILOT LIGHT
5. RANGE EXHAUST FILTER
6. OVEN AND PILOT LIGHT CONTROL
7. RANGE CONTROLS
8. LIGHT SWITCH
9. TEMPERATURE SENSOR

Figure 5-1. Oven/Range

The oven/range combination has been certified for performance and safety by the American Gas Association for use with liquid petroleum (propane) gas only. The approved burner inputs are: range burners, 5200 BTU/hour; oven burner, 10,500 BTU/hour.

The thermostat dial (fig. 5-2) permits total gas shutoff for both oven and range pilot lights, an added convenience when breaking camp.

Hold-down clips (fig. 5-4) keep the burner grates and oven rack in position while you are traveling, and a travel lock on the oven door eliminates accidental opening.

(1) Preliminary Procedures. Before opening the LP gas service or outlet valve (fig. 5-40), make certain that all range control knobs are in "OFF" position, and the oven thermostat control is in the "PILOTS OFF" position. This will reduce chance of gas accumulation.

The oven thermostat dial, located at the extreme right of the control panel, allows you to turn off the oven and range pilots by simply turning the dial to "PILOTS OFF" position. With the dial in this position, you will not be able to light either pilot. Before opening the LP gas service valve, make certain the dial is in "PILOTS OFF" position.

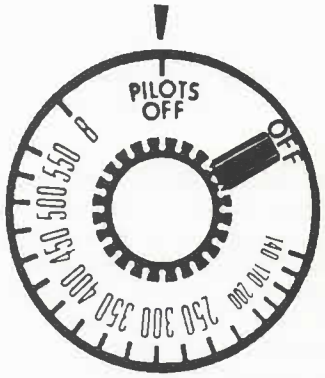


Figure 5-2. Oven Thermostat Dial

To prepare the oven/range for operation, turn on the LPG service valve at the tank (fig. 5-40), then set the oven thermostat dial to "OFF" and light the oven and range pilot lights. After turning on the service valve, allow a few minutes before attempt-

ing to light the burner. This will allow any air in the gas lines to escape. Now light one or two range burners, then check to see that the range pilot is still on.

> **Warning**
>
> Be sure both pilot lights are burning before turning on the burners. An unlit pilot light may create a dangerous accumulation of gas.

(2) Operation. The oven temperature is controlled by the thermostat dial. To use the oven, merely push down and turn the thermostat dial counterclockwise to the desired temperature setting. With the pilot light ON, the burner should light within 15 seconds. This delay is the time required for the pilot to bring the safety thermal shutoff valve up to temperature. To avoid inaccurate settings when using the oven dial, turn the control up to the required temperature setting. Do not pass the setting, then back up. Do the same when lowering the temperature.

> **Warning**
>
> We recommended that you do not use the range or oven to heat the coach, especially when retiring, because of the danger from oxygen consumption by the gas burners and the possibility of leaking gas fumes. As a normal precaution, be sure a window or vent is open when you use any LP gas appliance.

Each burner on the range has its own control. When the range pilot is lit, the range burners operate automatically when you turn their respective controls. Fast and efficient cooking is a special advantage with gas cooking. However, there is a certain point when a higher flame does not offer any better results. A few general rules for selecting the right burner flame height are as follows:

(a) Never allow the flame to extend beyond the edge of the pan.

(b) Use low or medium flame when cooking *with stainless steel and cast iron pans, which heat slowly.*

(c) Use gently boiling water, rather than furiously boiling, since it is just as efficient and water boils at 212°F, gently or furiously.

NOTE

Boiling point of water lowers 2°F for every 1,000 feet increase in elevation; e.g., 208°F at 2,000 feet of elevation.

(d) Cover pans as much as possible, so foods cook at maximum speed with minimum cleanup.

Before using either the range or oven, open the hinged door at the front of the ventilating hood (fig. 5-3). This will turn on the exhaust fan to vent cooking gases. When most of the cooking is to be done on the range top, open the power vent door just enough to release the "ON-OFF" switch. This action will start the fan and draw most of the cooking gases to the rear vent and up through the back flue. Setting the vent door fully open will vent the cooking area for both the range and oven. The fan operates from the 12-volt domestic supply and should not be allowed to run for long periods of time while the coach is parked, since this would place an undue strain on the domestic batteries.

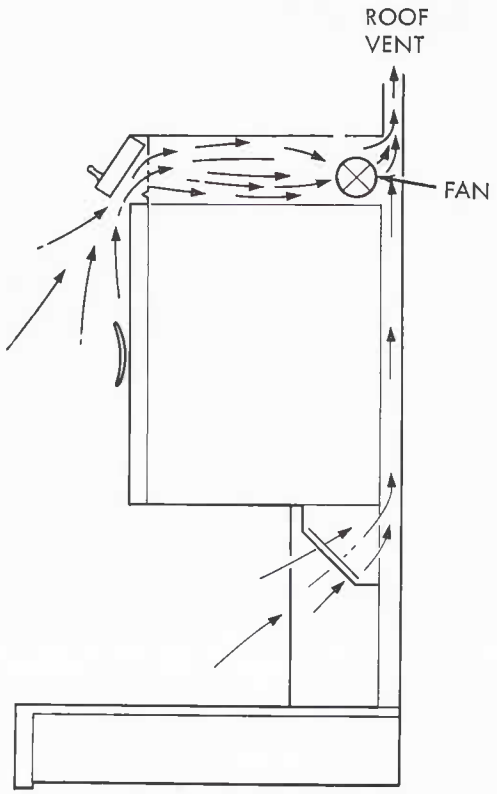


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Figure 5-3. Power Hood Ventilation

The hold-down clips for the burner grates (fig. 5-4), used when traveling, may be left in place even when operating the stove. Two clips are provided for each grate. Insert one leg (leg "A") of the clip under the range top between the grate and the top, and wrap the remaining leg under the grate finger.

(3) Maintenance. To turn off the gas supply to the oven/range appliances only, the range thermostat dial must be set to the "PILOTS OFF" position (fig. 5-2).

If the oven or range will not operate, check the gas supply first. If the oven burner will not light but the range burners do, check the oven pilot light. If a range burner will not light but at least one other range burner does, check for dirty burners.

Warning

If the pilot light flame for the range should go out, there will be a small gas leak. Propane has a distinct garlic-like odor. Learn this odor to assist in detecting a gas leak. If you do smell gas near the stove, check the pilot lights. If they are not lit, be sure the oven temperature control knob is turned to "PILOTS OFF."

Regular cleaning with a warm detergent solution and a soft cloth will keep the oven/range in proper condition. Food spills or spots in the oven or broiler are more easily removed if you wipe them up promptly after they occur. However, we recommended that you do not wash the porcelain surfaces when they are warm. Never use cleaning powder containing abrasives or acids.

Warning

Be sure to set the thermostat to "PILOTS OFF" before beginning any major cleaning. This will allow the pilot lights to cool as well as avoid any accumulation of gas around the pilot lights in the range.

Oven cleaners (especially of the spray can type) are not recommended because they can coat the thermostat sensing device and alter the temperature sensitivity of the thermostatic system. If the oven has become so stained that oven cleaners are necessary, follow directions explicitly and remember to thoroughly wipe any residue from the temperature sensor (or metal tube) in the oven.

To clean the area under the top burners, remove the range cover. Be careful not to touch the pilot shield until it has cooled. After cleaning under the range cover, be sure the flash tubes are all in place.

If the burner heads are cleaned with a cleaning compound, open up all parts with a toothpick afterward to insure proper operation. Use only a toothpick to clean the burner head orifices or parts – never a metal instrument because it may distort or enlarge the orifices.

Both the power vent and range exhaust filters should be removed periodically for cleaning. To remove filter, slide it upward then pull out and down on lower edge of frame. Flush each filter with warm water and dish soap. The inside of the vent housings should also be kept free of grease and dirt accumulation by periodic washing.

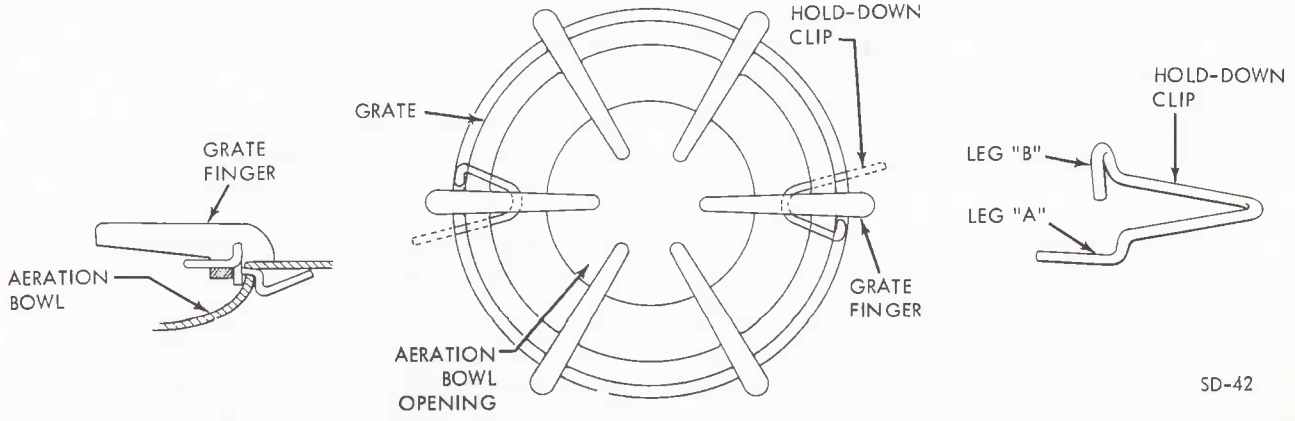


Figure 5-4. Grate Hold-Down Clip

b. Microwave Oven (Optional Equipment) (fig. 5-5)

(1) General. The Model MC11 Thermador Thermatronics microwave oven (option) is an eye-level unit mounted above the range. The oven can be used as a microwave oven or as an infrared oven for browning. Oven venting, to remove moisture and odors, is a built-in feature with venting to the coach power exhaust hood which operates when the power vent cover is opened.

(2) Description. The MC11 oven is operated on 120 VAC and uses a 2450 Mhz frequency for cooking. Cooking controls are simple: two selector switches and a 35-minute timer. One switch turns the range ON and OFF, the other selects either microwave cooking or infrared browning. The range may be used in two ways: microwave only, or infrared only. Microwave and infrared cannot be used together. As the microwave process cooks from the inside out, an infrared browning element has been added.

The oven interior is constructed from nickel stainless steel; the outer door is fitted with black glass, with clear glass in the inner door panel; a fluorescent light, self-starter equipped, illuminates the interior when the oven switch is in the ON position. Two shelf positions are provided; the lower is usually used for microwave cooking, while the upper position is usually used for infrared. To increase oven efficiency, a microwave stirrer is employed. The stirrer is a slowly rotating fan that distributes the microwave energy throughout the range.

The timer, located on the lower half of the control panel, allows a maximum cooking time of 35 minutes. When the oven is turned ON, the timer light is energized. To set the timer, turn the knob clockwise to the desired time. The timer is energized in either the microwave mode of operation or the infrared (when the door is closed). If the door is opened to inspect the food, the timer stops and the microwave emission ceases. When the door is closed, the timer restarts without re-setting and the microwave cooking continues.

(3) Safety Features. There are a number of design features which keep the microwaves inside the oven: first, the door seal which is a conductive seal consisting of a silicone rubber tube, overknit with two layers of monel wire mesh; second, the door latch which positively compresses the seal against the food cavity; third, two electrical interlocks that turn off the microwaves when the door is opened. The first interlock is operated by the movement of the handle. The microwave stops before the door moves even a tiny fraction of an inch, and while the seal is still making 100% contact. The second interlock backs up the first and operates with the very first movement of the door towards open. The fourth safety feature is the metal screen between the inner and outer glass panels on the door. The nature of the microwaves prevents their passing through the holes in this screen.

(4) How To Cook With Microwave. Microwave cooking is a bulk heating process where the food is heated simultaneously to the depth of microwave penetration (approximately one inch); beyond this area, the food is cooked by conventional conduction. Consequently the cooking process is very rapid and requires some changes in food preparation. To obtain the most satisfactory cooking results, a Thermador Cookbook is supplied with the microwave oven. Your favorite recipes may be adapted to microwave cooking by using this cookbook as a guide.

THINGS TO REMEMBER

When the amount of food is increased, the cooking times must be increased. However, the time increase is not always proportional to the food increase, as foods have different densities.

Moisture evaporation from the food is more rapid in microwave cooking, consequently moisture will collect in the oven cavity and between the two glass windows. Interior condensation may be wiped off with a cloth or sponge. Condensation between the glass windows will evaporate when the cooking ceases.

It is easy to overcook with microwave. When determining time for foods, always choose the minimum time and check frequently. It is easy to add a few seconds.

Remember, all cooking times are approximate. Each person cooks differently; what is cooked to one may be overcooked to another.

All frozen meat, fish, and poultry should be thawed before cooking.

When a plate of different foods is reheated at the same time be sure to cover with a lid or plastic wrap. Different foods heat at different speeds; this allows you to reheat the entire plate of foods at one time without loss of moisture.

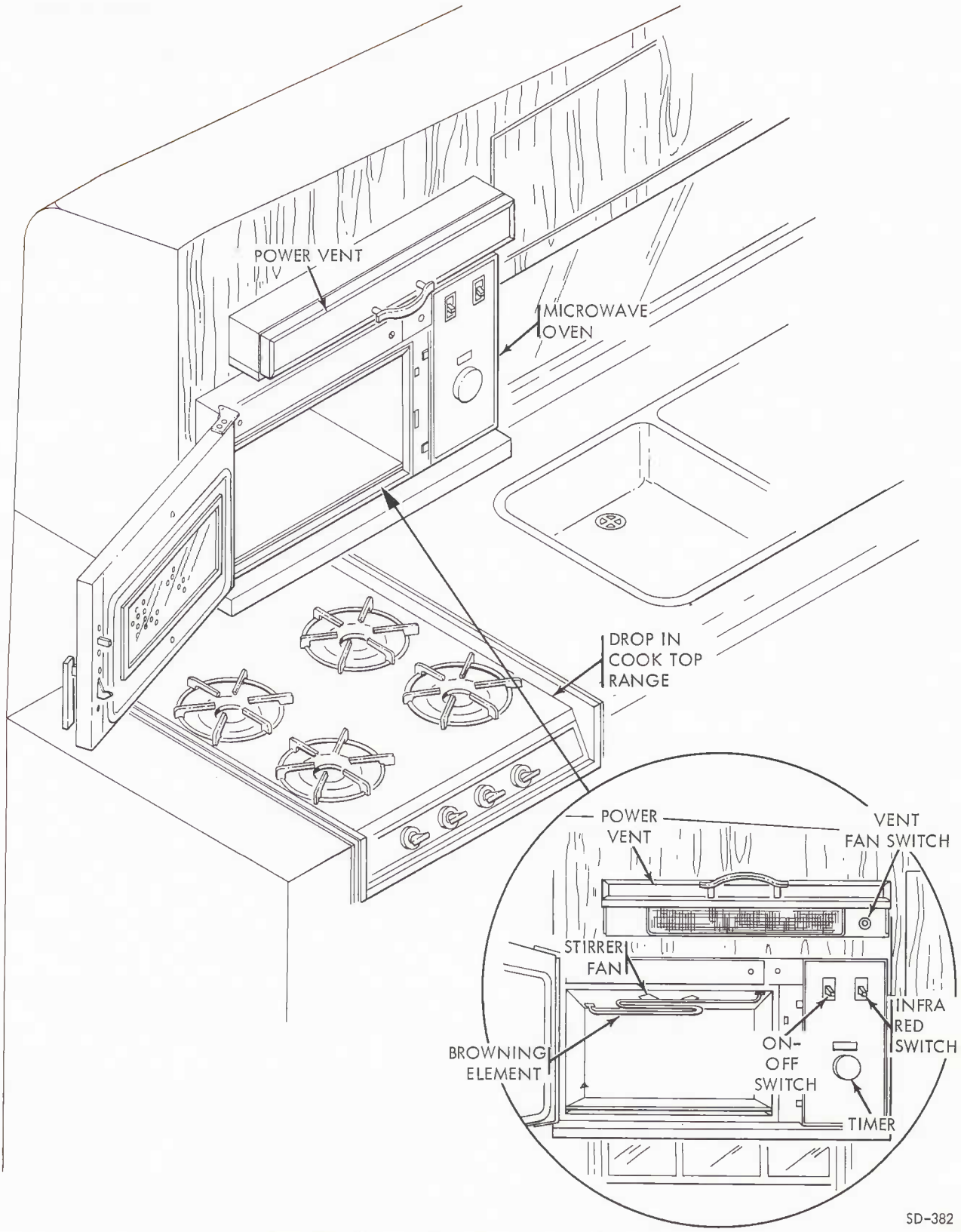


Figure 5-5. Microwave Oven/Range (Optional Equipment)

When cooking large quantities of food that cannot be stirred, turn the container one half-turn, at least once, during the cooking time. This will result in more even cooking.

SOME DON'TS

DO NOT use a meat thermometer in the oven when it is operating. Meat thermometers should be placed in the meat outside the range and removed if meat is replaced for additional cooking.

DO NOT wrap food in aluminum foil when cooking in the oven. The foil will reflect the microwaves and therefore food will not cook.

DO NOT cover glass shelf with aluminum foil.

DO NOT use metal cooking utensils over 7/8 inch in height.

DO NOT cook eggs in the shell. Pressure may cause an eruption.

DO NOT cook vegetables in boilable pouch unless the bag has been pierced. Pouch may burst from steam pressure.

DO NOT cook foods with a skin or outside covering unless the skin has been pierced (potatoes, apples, tomatoes, etc.).

DO NOT overcook. Undertime to prevent foods from getting tough or dehydrated.

DO NOT operate the oven empty. Prolonged no-load operation could damage components.

DO NOT salt meat before cooking. Salt draws moisture from meat and will toughen the outer layer. Other seasonings may be used during cooking.

DO NOT use wooden bowls or boards in the oven. The heat will dry them out resulting in cracking or splitting.

SELECTING PROPER COOKING UTENSILS

You must select cooking utensils which transmit microwaves and thus remain cool. Many utensils will either absorb or reflect microwaves and thus interfere with cooking time, cause uneven cooking or damage food. You may usually cook in your serving dishes. Glass, ceramic, and china can be used as cooking utensils.

With foods that take a long period of time to cook, use oven-proof dishes because there is considerable heat transfer from the food to the cooking utensil. Always use oven proof dishes when using the browing element. DISHES WITH A METAL TRIM (GOLD OR SILVER) SHOULD NOT BE USED BECAUSE THE METAL TRIM MAY BE DAMAGED BY THE HEAT.

Some ceramic dishes will absorb energy. When using this type dish, remember that cooking time will be lengthened. To determine if a utensil absorbs microwave energy, place it empty inside the oven, close the door, set the timer for 30 seconds. If the utensil is warm, it absorbs microwave energy. If you use this type dish be sure to lengthen cooking time slightly.

Plastics must be used with caution. Avoid plastic or plastic combinations that are not heat proof. Transfer of heat from the food may distort the container. Some plastics absorb enough energy to cause charring in places. This type of plasticware quickly becomes too hot to handle.

Wooden bowls or boards are not recommended for cooking as they dry out and may split or crack.

You may also heat foods that come in a boilable pouch. DO NOT heat canned foods in the can.

When reheating food you may use paper dishes. Plastic coated paper dishes are recommended to retard the absorbtion of juices. Paper towels placed under the food being cooked will absorb the moisture and grease. Placing paper towels over the food will reduce spatter. DO NOT use the browning element with paper.

HOW TO OPERATE OVEN

1. Place food in oven and close door.

2. Turn switch ON, then select either microwave or infrared.

NOTE

Infrared is designed to be used only for browning – not for cooking.

3. Set timer to the desired cooking time. For more accuracy in short cooking times, turn the timer beyond two or three minutes, then back to the desired cooking time.

4. When cooking time is finished, a bell will ring continuously. Turn switch and timer to OFF position.

MICROWAVE INDICATOR LIGHT. The microwave indicator light is located on the right rocker switch (fig. 5-5). This light will glow red whenever microwave energy is being generated by the magnetron tube. When the door is opened the light will go out indicating that the microwave energy is OFF.

OVEN CLEANING

DOOR. Clean door and glass with warm, soapy water, rinse, and dry.

DOOR SEAL. Clean seal with warm, soapy water, rinse, and dry. Do not allow food or grease to build up on the seal.

Warning

Be alert for any seal damage. Do not operate oven if seal is damaged.

OVEN INTERIOR. To clean walls wipe with a damp cloth or clean with a mild detergent in warm water, rinse and dry. If spatters are greasy, spray household cleaner (with ammonia) on area, wipe, rinse and wipe dry.

GLASS SHELF. To clean the shelf, tilt up and remove. Wash in warm, soapy water, rinse and dry.

INFRARED BROWNING ELEMENT. This unit will clean itself.

MICROWAVE STIRRER. The microwave stirrer can be removed for cleaning by holding blade tip and removing nut. HANDLE WITH CARE. DO NOT drop or bend.

METAL TRIM. Metal trim is aluminum. Use hot sudsy water, rinse and dry.

(5) Name Plate. The name plate containing the catalog number and serial number is located on the Thermatronic cavity frame adjacent to the latch opening. When requesting service or parts always give the complete catalog number, serial number and date of purchase.

Warning

For your safety, microwave energy cannot be generated by this oven unless the door is closed and latched. For continued safety throughout the life of this unit, the following precautions should be read and observed in order to avoid possible exposure to microwave radiation:

1) Do not operate the oven with door open, with an object between the door and the oven, if the door does not close firmly against the appliance front, if there is a broken hinge, if door gasket or the door seal is damaged, if the door is bent or warped, or if there is any other visible damage to the range.

2) Do not defeat or tamper with the safety interlock switches.

3) Grease, soil, or splatter should not be allowed to build up on the door seal or door surfaces as such a buildup could result in leakage of microwave energy from the range.

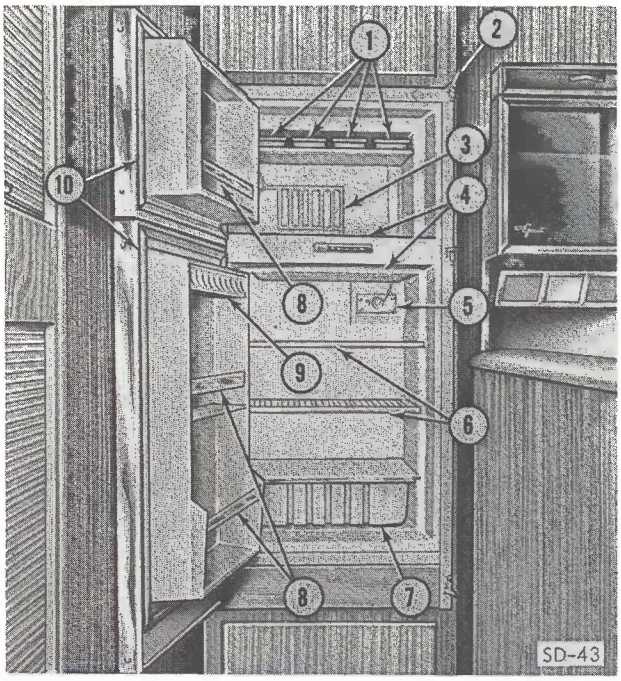
4) This oven should be serviced by no one other than an FMC-RVD or Thermador authorized service center.

c. Refrigerator (fig. 5-6). The double-door freezer-refrigerator combination, located in the center of the coach, has a capacity of 8 cubic feet. The across-the-top freezer holds over 25 pounds of frozen food, with additional storage on the door. The 6-cubic-foot food compartment provides three shelves for storage plus a full width vegetable crisper. The full width door storage of this compartment contains an egg keeper and two shelves with storing retainers, for safer storage when traveling.

Unlike many units, this refrigerator will operate efficiently in an off-level condition (as much as 30°) and also during traveling.

The coldest areas of the refrigerator are at the top and bottom of the food compartment. The area of least cold is at the upper shelves of the door where the eggs are stored.

As in your home refrigerator, the food compartment is tightly sealed and unventilated when closed to maintain the constant low temperatures. Because of this, all stored foods should be covered to reduce stronger odor foods being absorbed by other foods, as well as to preserve the crispness of salads and vegetables.



1. ICE TRAYS
2. TRAVEL LOCK
3. CONDENSER
4. EVAPORATOR
5. THERMOSTAT CONTROL
6. REMOVABLE STEEL SHELVES
7. VEGETABLE CRISPER
8. STORAGE RETAINER
9. EGG STORAGE
10. MAGNETIC DOOR GASKETS

Figure 5-6. Refrigerator

(1) Operation. A single thermostat control adjusts the refrigerator operating temperature. This control is mounted at the rear of the lower cabinet in the upper right hand corner. The control dial is marked with six settings: "OFF" and "1" through "5". The higher the selected number the cooler the temperature.

To start the refrigerator, set the control to the desired temperature (most common is "3"). As soon as the required temperature inside the cabinet is reached, the thermostat opens and cuts off the electrical voltage from the domestic supply. To shut off the refrigerator, set the control to "OFF".

The freezing compartment is not designed for deep or quick freezing. However, meat or fish can be stored about three times longer in the freezer than in the lower compartment. To store foods in this manner and not put a large demand on the freezer, they should first be precooled in the lower compartment then transferred to the freezer. Keeping all foods covered with plastic or aluminum foil will prevent them from drying out or being "freezer burned."

You can speed up making ice cubes by setting the thermostat to maximum. Do this a few hours before you need the ice and one hour before traveling; but be sure to reset the thermostat control to its normal setting as soon as ice cubes are made.

The travel locks on each door eliminate accidental opening when traveling. The doors close quietly and tightly through use of magnetic gaskets.

To conserve battery power, we suggest you use the lowest setting that will provide adequate refrigeration for your needs. This practice will reduce the running time of the refrigerator and cause minimum drain on the battery supply.

The refrigerator operates on the 12 VDC domestic system (inverting it for the 22 VAC compressor motor) or the 110 VAC system (using transformer reduction for the 22 VDC) at the refrigerator motor.

(2) Maintenance. Before operating the refrigerator for the first time or after the unit has been in storage for some time, make an initial operation inspection.

First, check that the thermostat control is in the "OFF" position. Next, set the control to "3" and listen for the compressor motor. You may have to place your ear against the door to hear the motor operate.

Wait for approximately 2 minutes of operation, then open the freezer compartment door. Place your hand on the right rear corner of the evaporator plate, the area that will begin to cool first. If you notice cooling at this point, then the refrigeration unit is functioning properly.

Now, close the refrigerator door and allow the refrigerator to run. If the unit automatically turns off within 10 to 20 minutes from initial turn on, the thermostat circuit is operating properly.

If the refrigerator is not cooling satisfactorily, check the thermostat control setting, how space is used in the food compartment to allow for air circulation, and for excess frost or ice coating on the evaporator.

Periodic defrosting and cleaning of the refrigerator reduces minor problems. Wash the ice trays and shelves with warm water. DO NOT use strong chemicals or abrasives. During extended periods of coach storage, the refrigerator should be emptied and cleaned and the door left slightly open to reduce buildup of musty odors.

Warning

Never leave an unattended refrigerator door open if children might gain access to your coach. The door seals tight upon closure. Remove refrigerator door when storing your coach.

Repairs on the refrigerator must be made by an approved service representative. However, problems that can be solved by the coach owner without special service experience are listed below.

d. Kitchen Sink

The heavy gage stainless steel sink will give you maximum durability with minimum care. After use, rinse sink thoroughly with warm water and wipe dry with a cloth to avoid streaks and spots. For stubborn stains, a slight abrasive cleaner can be used. But be sure to wipe in the direction of the steel finish to help maintain the original appearance. Always wash the surface before applying a complete wax coating; regular cleaning prevents wax buildup.

Caution

Abrasive cleaners will scratch sink counter top surface.

Boiling water will not harm stainless steel; however, salt, mustard, mayonaise, ketchup, and other similar food acids could cause pitting. If any of these are spilled on the surface, clean immediately.

See paragraph 5-5e for kitchen sink faucet maintenance.

5-2. DINETTE AND REAR COMPARTMENT

The dinette and rear compartment areas are multipurpose and can be configured to fit your travel or sleeping needs.

Refrigerator Troubleshooting

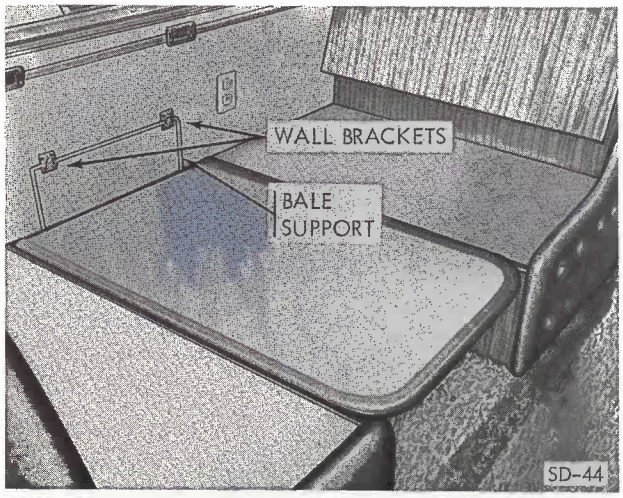
SYMPTOM	CAUSE
No refrigeration, or you cannot obtain correct degree of coolness	1. Improper food storage, preventing proper air circulation 2. Incorrect thermostat setting
Rapid formation of frost, and you cannot obtain correct degree of coolness	1. Improper food storage 2. Leaky cabinet seals 3. Dirt in thermostat
Too cold	1. Incorrect thermostat setting 2. Room temperature too low 3. Dirt in thermostat
Cabinet odor	1. Strong odor from foods unwrapped 2. Refrigerator turned off and stored with door closed 3. Infrequent cleaning of interior

a. Dinette (fig. 5-7). The dinette area (floor plan "A") can be used as a travel lounge, a work area, a dining area, or for additional sleeping accommodations.

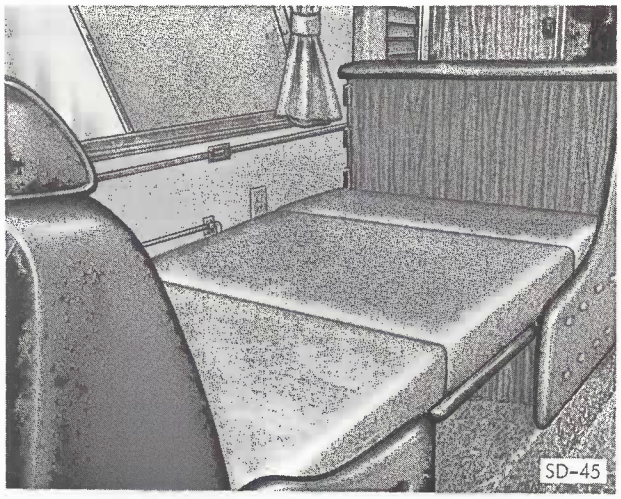
To convert the kitchen table and seats to sleep two adults, move passenger seat to full forward position and remove all the dinette cushions. Fold back the table leg, raise the table to about 12 inches, and push down on the wall side of the table to release it from the wall brackets. Lower the table, allowing it to swing outward on the clamped bale support, until it is even with the dinette seats (fig. 5-7). Replace the cushion backs crosswise on the table top to complete the bed (fig. 5-7).

To convert the area to a dining or work area; remove plug in sofa base and install pedestal of table (fig. 5-8a) in floor sockets. Place table on pedestal and open to full extent. Store table and pedestals in closet when not in use.

To convert the area to sleep two adults; remove bolster from right side of passenger seat and push seat back support to its full forward position (5-8b). Pull out release latch before attempting to push passenger seat back support into its forward location. Pull out sofa and slide sofa back bolsters into position along coach wall. Insert passenger seat bolster next to wall at head of bed.



A. Table Lowered

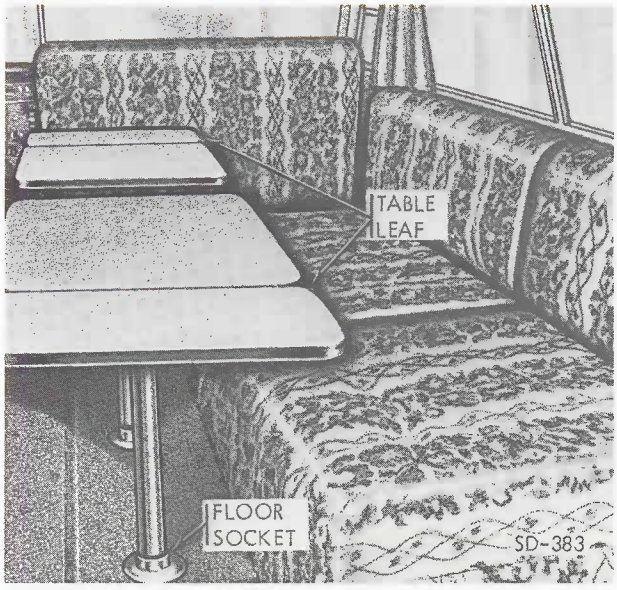


B. Bed Configuration

Figure 5-7. Dinette Bed (Floor Plan "A")

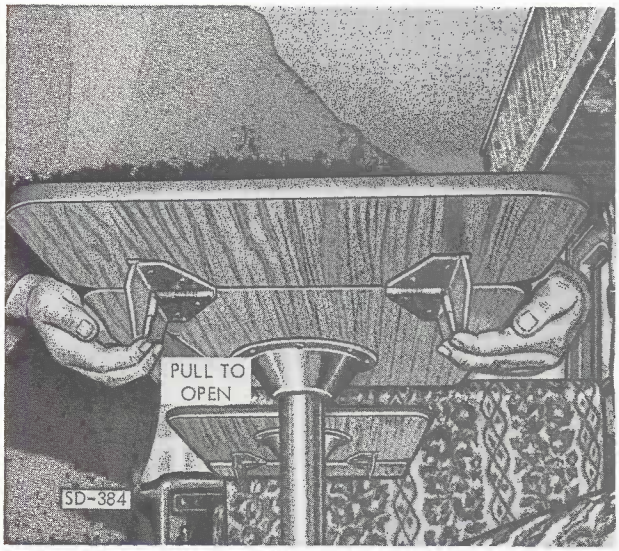
b. Dinette (Floor Plan "J") (fig. 5-8). The dinette area can be used as a travel lounge, a work area, a dining area, or for additional sleeping accommodations.

c. Rear Compartment (Floor plans "A" and "J"). While you travel, the rear compartment is normally arranged as a travel lounge.



Dining-Working Set Up

Passenger Seat-Back

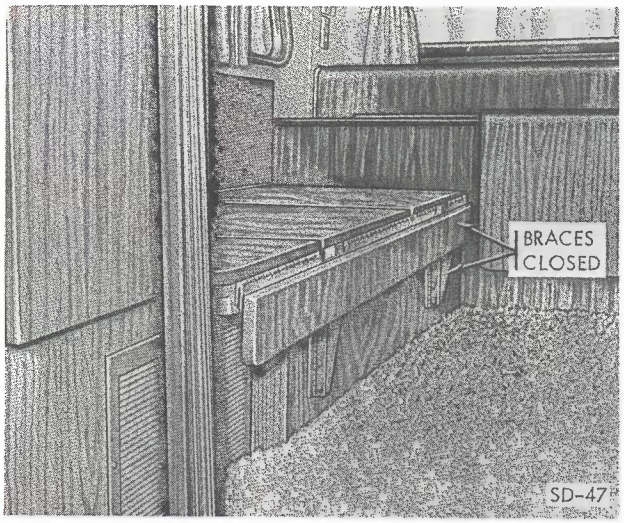


Securing Table Leaf

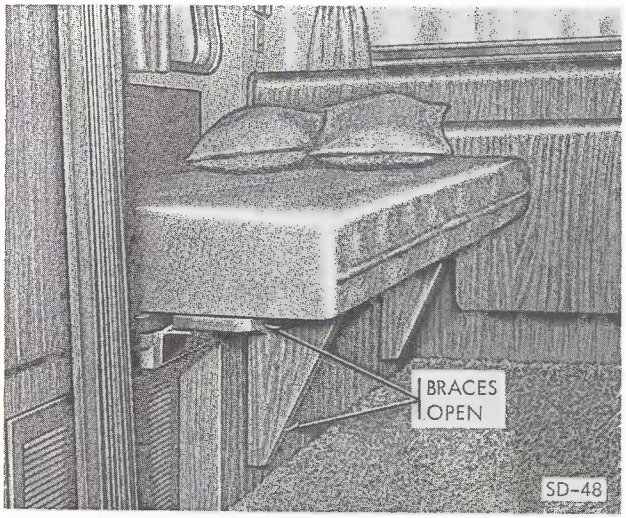
Sleeping Set Up

Figure 5-8. Dinette Bed (Floor Plan "J")

To convert the sofas to twin-size beds, lift the hinged panel, swing out the two braces (fig. 5-9a), and position the seat cushion (fig. 5-9b).



A. Cushions Removed

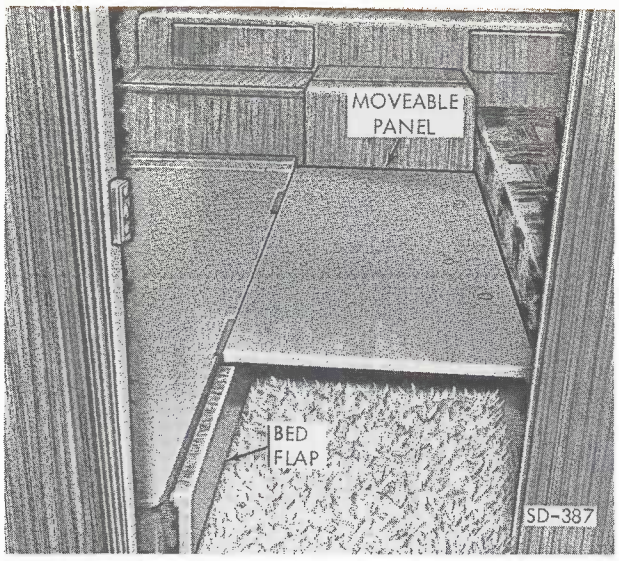


B. Twin Bed Cushions/In Place

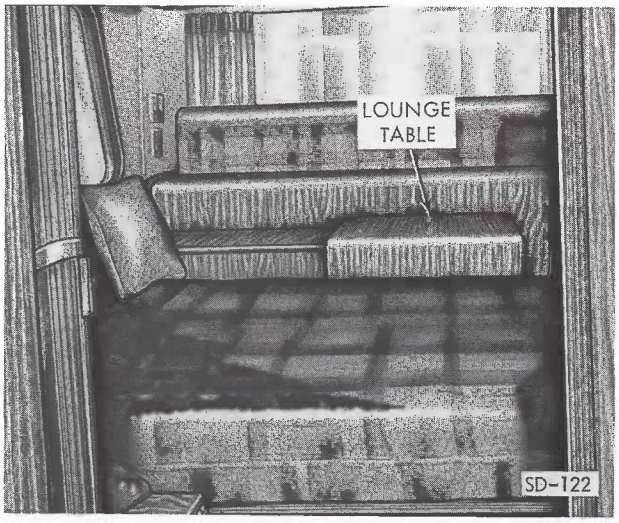
Figure 5-9. Twin Bed

To accommodate a queen-size sleeping arrangement, both sofas are joined by two panels located under the right sofa cushion.

To prepare the queen-sized bed, remove all cushions from both sofas and place the two panels across the aisle way (fig. 5-10a). To complete the base of the queen-size bed, place the large cushions on these panels, with head of the bed at either the left or right side of coach (fig. 5-10b).



A. Right Sofa Panels



B. Queen Bed in Place

Figure 5-10. Queen Bed

d. Folding Door. Privacy between the kitchen area and rear compartment is obtained by using the folding door. This accordian type door is permanently attached to the right side of the hallway and hangs on nylon carriers. It is made of a vinyl coated material that is washable. A magnetic catch secures the door across the front end of the bedroom area, providing complete privacy.

e. Closet. The double-door closet provides storage space for suits and dresses and all garments you want to store unfolded. The closet also contains a large dressing mirror mounted on the left-hand (or forward) closet door. The closet and

bedroom lounge table mirrors on early models are "plexiglass" and should be cleaned with a cotton flannel cloth using Johnson's Pledge or equivalent. Later models use glass mirrors.

The rear compartment provides additional storage in the areas over the lounges, under the left lounge, and at the rear of the coach.

f. Ceiling Vents. There are two ceiling vents: one located at the rear of the kitchen area, the other in the bathroom. The vent near the kitchen can help to remove cooking smoke and odors. Each of the vent lids is operated by a hand crank.

> **Caution**
>
> Close all vent lids while traveling to prevent damage from strong winds.

g. Windows. All windows are tinted safety glass, and enclosed in metal frames. Eight of the side windows are of the aluminum sliding-sash type, with a squeeze catch that secures them when closed. All these windows slide horizontally except for two–in the bathroom and on the passenger door–which slide vertically. The rear window does not open.

5-3. BATHROOM

a. Vanity. The one-piece modular vanity top is molded acrylic. Harder than most plastic laminates, it provides a continuous surface, free of joints and crevices, and eases the chore of cleaning.

The vanity sink area (fig. 5-11) contains a mixing water valve, aerator, pop-up drain assembly, and a hidden front overflow outlet. See par. 5-5e for vanity faucet maintenance.

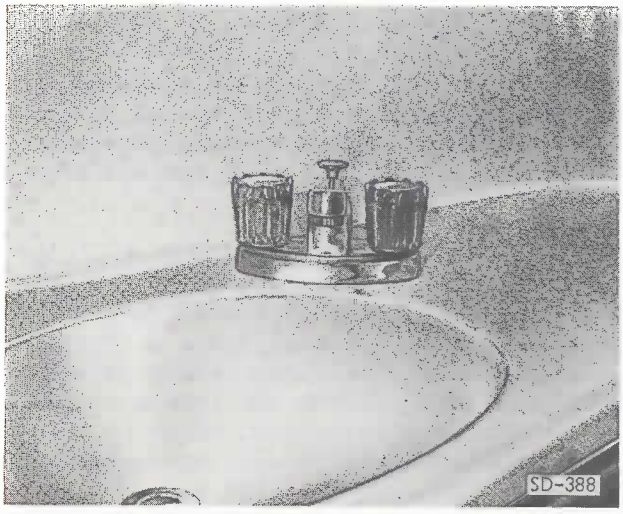


Figure 5-11. Vanity

Cabinets above the vanity top (fig. 5-12) provide more storage area than a standard household medicine cabinet. Tall glass bottles or delicate articles susceptible to breakage should not be stored in these cabinets while traveling. Place these in the storage area under the vanity top, behind the two sliding doors.

Figure 5-12. Bathroom Cabinet

b. Shower. The shower module (fig. 5-13) is a one-piece molded fiberglass unit. It contains a two-valve faucet, shower head, vertical traverse rod, and drain. A shower curtain drawn across the opening completes the shower stall.

> **Caution**
>
> Abrasive cleaners will scratch shower module surface.

With the detachable shower-head secured to its traverse rod (fig. 5-13) the unit is similar to a home wall-mounted shower. Additionally, you can adjust this head vertically along the traverse rod to vary the water outlet height.

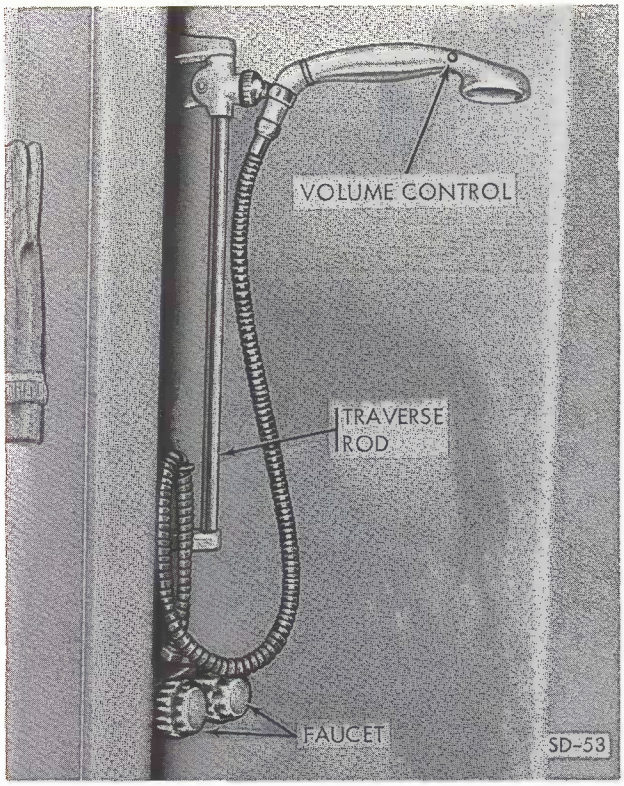


Figure 5-13. Shower Head

The shower head can also be hand-held for water conservation while you shower. The convenient built-in push button is a water volume control that permits fingertip control from full shower spray to nearly complete shutoff. Because this volume control is not a shutoff valve, a slight water trickle may be evident when the control is in closed position; complete water shutoff must be done at the faucet handles.

To use a minimum amount of water, we suggest the following: Before stepping into the shower, slip shower head off the holding bracket. With shower head facing into the stall, press metal pushbutton to the left, use faucet handles to adjust water temperature and flow desired. After adjustment, press pushbutton to the right to turn off the shower head and return to holding bracket. Next, step into shower, turn on shower and soak yourself completely, then turn off shower. Apply soap, lather up, and again taking the shower head in hand, rinse. The water that would normally have been running during the lather-up phase has been saved, without turning off the water at the faucets, which requires a second temperature/flow adjustment.

c. Toilet. The toilet (fig. 5-14) is a permanently installed sanitation unit. Using the high velocity water injection principle, it consumes a minimum amount of fresh water for flushing and washing down the bowl. This toilet provides a sliding self-cleaning positive seal blade, which seals out odors from the holding tank and eliminates mechanical adjustments.

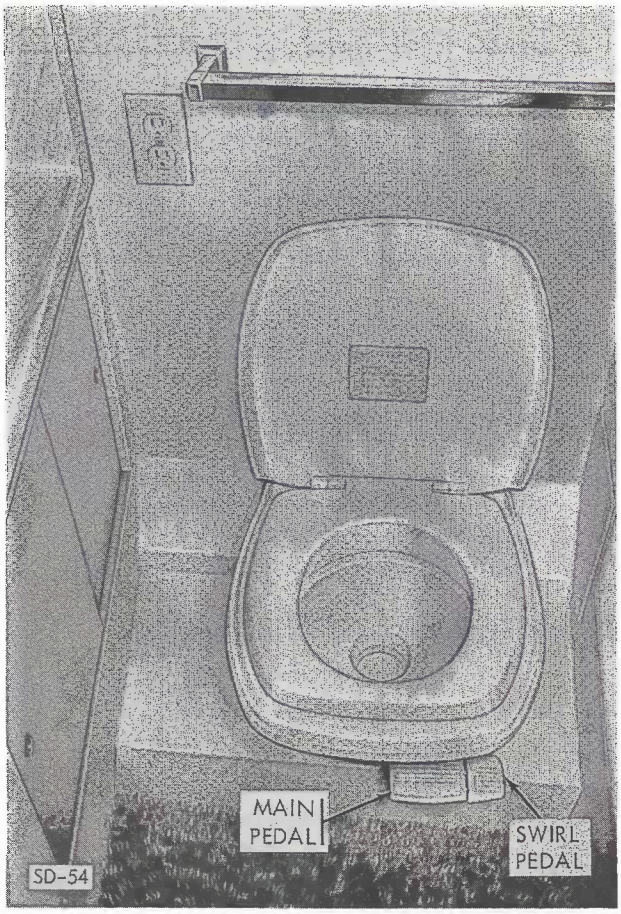


Figure 5-14. Toilet

(1) Operation. The toilet operates similarly to your home unit, except that is uses two foot pedals instead of a hand lever. No mandatory chemical additives are required, since each and every washdown uses fresh water.

When connected to a city water source, press both pedals to provide a clean flush, bowl rinse, and bowl refill. However, when operating in the self-contained mode and conserving water, use the following procedure: First, press down on the small swirl (right) pedal. When the water starts to swirl, release. Then step on the main (left) foot pedal to automatically open the slide valve that drops waste into holding tank. Hold the pedal down for 1 to 3 seconds to allow water to swirl about the bowl,

rinse it, and drain. At the same time, a water compartment in the bowl rim also fills, which will be used to refill the bowl when you release the foot pedal to close the slide valve.

To obtain more water in the bowl without flushing, press the right hand (smaller) pedal until the desired water level is reached.

(2) Care and Cleaning. The toilet requires no special maintenance except regular cleaning and disinfecting. If the slide blade valve does not operate freely after extended use, you can restore smooth operation by cleaning the blades and applying a light coat of silicone spray on blade surfaces. Maintaining water in the bowl at all times prevents holding tank odors from re-entering toilet compartment.

There are certain items that should never be put in the toilet or holding tanks. Some of these items are: facial tissue, sanitary napkins, paper wrappers, detergents, antifreeze, ammonia, alcohol, and other items that you would not normally deposit in a household toilet. For example, nearly all facial tissue are treated to give them wet strength, which makes it very difficult for them to dissolve in water, if at all; whereas most toilet tissues are made to dissolve after a short time. In the motor coach, the dissolving action is helped by the vehicle's motion while traveling.

Use a household soap or detergent and water for general cleaning. The bowl and toilet components may be cleaned using a solution of 1/2 cup household bleach with 1 gallon of water. For a more thorough cleaning, use a high grade, non-abrasive cleaner, similar to Thetford Aqua Bowl, or equivalent.

> **Caution**
>
> Abrasive cleaners will scratch the surface of the toilet and should not be used.

Wipe all components thoroughly, then rinse, since soap and detergent residue may deteriorate the lubricating oils and greases. Use a nonsolvent base wax on exterior surfaces to enhance the appearance of the toilet.

> **Caution**
>
> To avoid damage to rubber seals and components, do not use household cleaners that are highly concentrated, or that contain high acid content. Failure to comply with this caution voids the warranty on the toilet.

After cleaning the toilet components, a tank deodorizer can be added. Remember, use of any other than an approved chemical may cause damage to your toilet; do not use detergents or bleaches as a tank deodorizer. Check with your RVD dealer for approved toilet chemicals.

If the toilet is not to be used for a period of a week or more, drain and clean thoroughly.

NOTE

To avoid overflow of the toilet because of full holding tanks, we suggest that you empty the holding tanks whenever water is added to the fresh water system.

(3) Storage. If the coach is to be stored for a long time, such as during the winter months, you should perform the following precautionary procedure:

Completely drain the water supply line to the toilet. Leave all water valves open. Open slide valve, insert a round object (e.g., soft drink bottle) in the chamber, and carefully close the valve blades on the object. This will keep the water control valve open, which prevents water residue from being trapped there and frozen.

Do not add solutions containing antifreeze, ammonia, alcohol, acetone, or any other chemicals not recommended by your RVD Dealer. Such liquids might contain chemicals that would damage valve parts, drain hose, tank or tank parts. For protection against freezing, use a nontoxic solution such as Thetford Aqua Kem, or equivalent. Follow directions provided on container (see par. 5-8g).

(4) Troubleshooting. See following chart.

SYMPTOM	CAUSE	REMEDY
(a) Water keeps running into the bowl.	Slide valve not completely closed, which keeps the water control valve open. Groove for blade seat is clogged with foreign material.	Use a wire coat hanger or similar object to remove material. **Caution** Do not damage rubber seal during cleaning.

SYMPTOM	CAUSE	REMEDY
(b) Operation pressure for foot pedal has increased.	Sliding blades of main valve are sticking.	Spray silicone lubricant directly on cleaned blades.
(c) Toilet leaks, water on floor:		
(1) Leak increases when flushing toilet.	Vacuum breaker leaks.	Replace breaker.
(2) Leak continues, with toilet drained, and not being flushed.	Water check valve leaks.	Replace valve.
(3) Leak ceases when toilet is drained, greatly increases when water is added using right hand pedal.	Seal between bowl and mechanism assembly is damaged.	Replace seal between bowl and mechanism.
	or	
	Closet flange seal between mechanism assembly and top of holding tank is damaged or misaligned.	Replace seal between mechanism and top of holding tank, or loosen flange nuts, check flange alignment, and tighten loose flange nuts.

5-4. ENVIRONMENTAL AIR

a. Central Heating. The central heating system consists of a forced air furnace, three outlet registers, and one intake register. The sealed combustion system furnace has been listed for safety and performance by the American Gas Association and is designed for propane gas only. It also features a 100% safety shutoff gas control and manual electric ignition.

Heat registers have been placed within the coach to provide total heat distribution: one for each end of the coach and one for the bathroom. The ambient air intake register is located below the range and in front of the furnace panel. The front panel is easily opened to permit furnace lighting (fig. 5-16).

Once the furnace is lit, the on-off cycling of the furnace is automatically controlled by the full comfort-range thermostat mounted on the hallway wall (fig. 5-17). The thermostat adjusts the temperature between 50° and 90°F.

A combustion blower forces flue gases to the outside of the coach through a vent located at the plumbing and heating service access (left side of coach).

(1) Preliminary Furnace Turn-On Procedure (fig. 5-18).

(a) Open the furnace access door.

(b) Remove furnace front panel (fig. 5-16) by turning panel latch 1/2 turn, pulling the panel slightly out and upward.

(c) Turn inline gas valve off (fig. 5-18) (lever handle crossways to gas line), and wait 5 minutes to allow any accumulated gas to escape.

(d) While waiting, remove observation window (fig. 5-18), check that the LP gas service valve is on, and set the wall thermostat (fig. 5-17) to "OFF," so the main burner will not light when you start the pilot light.

(e) After allowing 5 minutes, replace the observation window.

(2) Electric Ignition of Furnace. This method utilizes the glow coil pilot ignition system, which operates on the 12-volt domestic electrical power supply. Perform preliminary steps (a) through (e) above and then:

(a) Turn on inline gas valve (fig. 5-18) and pilot valve.

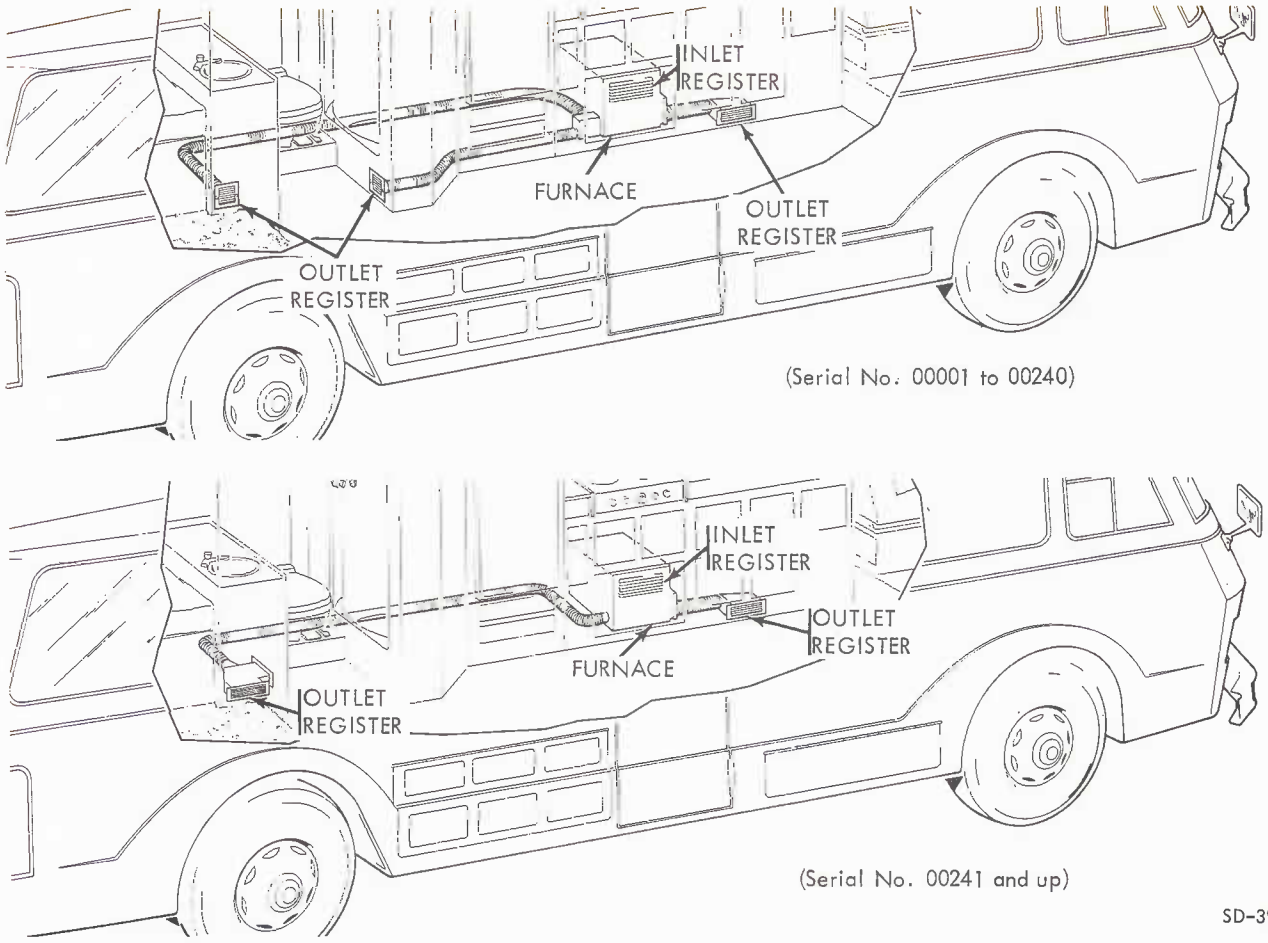


Figure 5-15. Central Heating

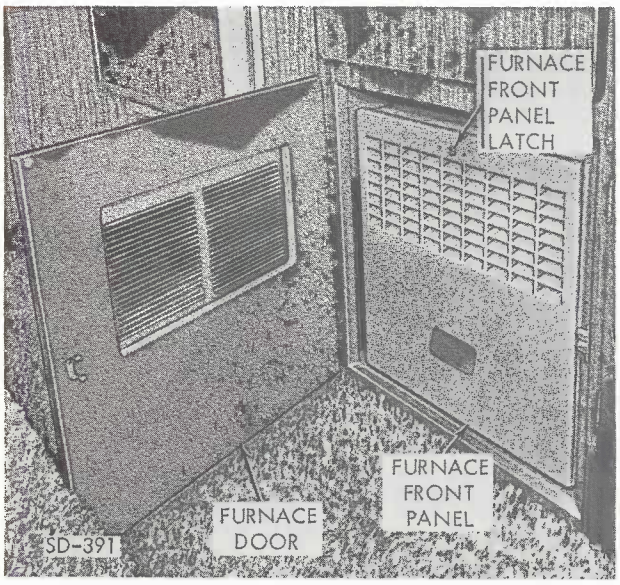


Figure 5-16. Furnace Unit, with Front Panel Removed

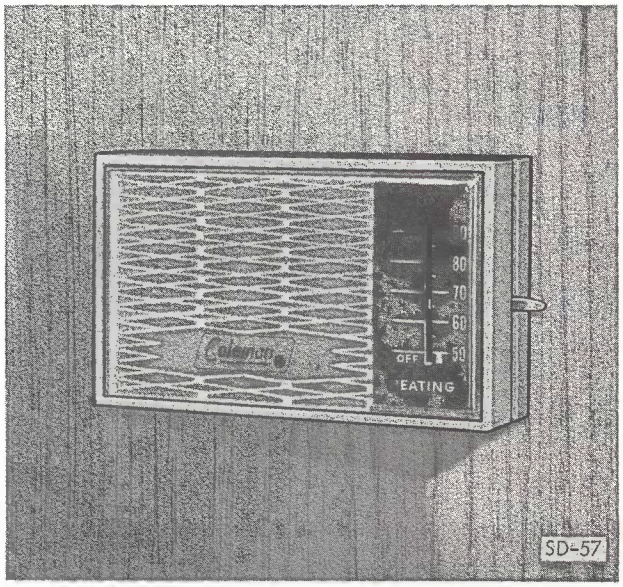
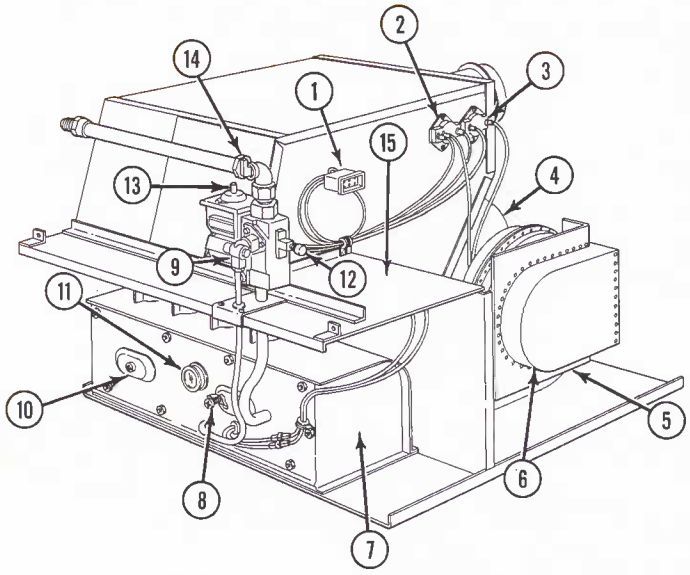
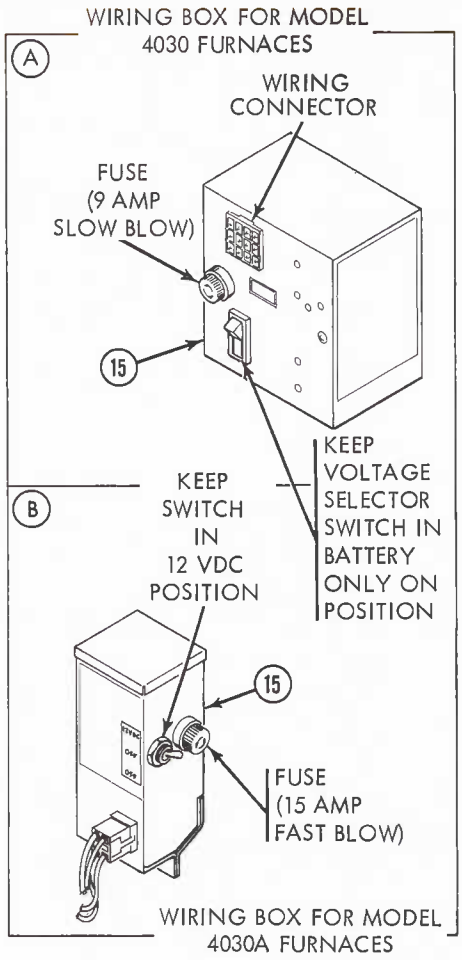


Figure 5-17. Central Heating Thermostat





1. CONNECTOR (TO WIRING BOX)
2. LIMIT SWITCH
3. FAN SWITCH
4. MAIN BLOWER
5. BLOWER
6. AIR INTAKE DUCT
7. COMBUSTION CHAMBER
8. MAIN BURNER AIR ADJUSTMENT
9. PILOT VALVE
10. BURNER DOOR
11. OBSERVATION WINDOW
12. IGNITION PUSHBUTTON (RED)
13. GAS CONTROL
14. INLINE GAS VALVE
15. WIRING BOX COMPONENTS SHOWN IN DETAILS (A) AND (B)

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Figure 5-18. Furnace Assembly

(b) Press the red ignition pushbutton (fig. 5-18) and hold in as far as possible. Watch for glow coil action through observation window.

NOTE

If the glow coil does not heat and glow, check the fuse and selector switch on the wiring box; see figure 5-18.

(c) After pilot light is lit, continue holding in pushbutton for about 1 minute until upon release, the pilot light remains lit. If pilot light requires adjustment, refer to the maintenance information paragraph (4).

(d) Replace furnace front panel and close air intake register door (fig. 5-16).

(e) Select desired temperature on wall thermostat. Furnace will now operate automatically.

(3) Operation. When the temperature of the coach drops below the temperature setting of the thermostat, the contacts close to operate the main blower. The air flow created by the blower closes an air-actuated switch that in turn energizes a solenoid valve which opens the gas lines to the main burner.

When the temperature exceeds the thermostat setting, the contacts open. This shuts off the gas supply to the burner, but the blower continues until the residual heat within the furnace is sufficiently cooled, then a thermostatically controlled relay turns off the blower.

Air for the combustion chamber is pulled in from outside the coach, routed around the heat exchanger, then exhausted through the same venting unit. The venting unit is located on the left side of coach, as shown in figure 5-19.

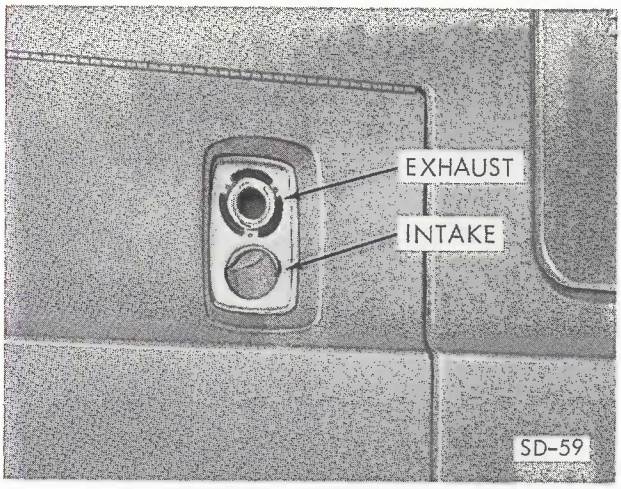


Figure 5-19. Furnace Air Intake and Combustion Exhaust Vent

(4) Maintenance. In order for the furnace to stay in top condition and provide years of trouble-free service, an annual periodic inspection and cleaning of the components is required.

(a) Pilot Burner Adjustment. Observe the pilot flame through the observation window; the tip of the flame should be a pale blue. If the pilot requires adjustment, remove the cap screw at the center of the pilot valve. Turn screw counterclockwise to raise the flame, clockwise to lower.

(b) Main Burner Adjustment. Observe the main burner flame through the observation window; it should be blue with slightly yellow tips. Operating the burners with a high yellow flame can create a carbon deposit buildup. The main burner may require adjustment from time to time for correct air to fuel mixture to maintain a blue flame. To adjust, open door below kitchen sink and remove furnace panel. Loosen locknut just to the right of the observation window and turn air adjustment screw in or out until proper blue flame is acquired. Secure locknut and reinstall furnace panel.

NOTE

If furnace whines or screeches, the air adjustment screw on the main burner is out of adjustment. To correct, loosen locknut and turn air adjustment screw in or out (as above) until noise stops.

(c) Furnace Casing. Wipe and vacuum the areas within and around the main or circulating air blower, the combustion air blower, and the general area inside the furnace casing. Also, the pilot light and burners should be thoroughly cleaned. Clean the slots, then expel loose debris and carbon deposits with air pressure. This can usually be done at any gas station.

(d) Registers and Ducts. Clean the registers with a soft brush and vacuum cleaner. The ventilating ducts, when opened for adjustments or repairs, may also be cleaned with a vacuum cleaner, using the brush attachment.

(5) System Turn Off. Whenever the central heating system requires shutting down for adjustments, cleaning, or repair, proceed as follows:

(a) Set the wall thermostat (fig. 5-17) to "OFF."

(b) Turn off pilot valve (fig. 5-18).

(c) Turn off inline gas valve (lever crossways to gas line) (fig. 5-18).

b. Off-Road Cooling System (fig. 5-20). Cooling of environmental air is controlled at the central air conditioning panel above the hallway closet door (fig. 5-21). The output registers for cooling the front and rear of the coach are located at the left and right side of the closet. The adjustable louvers at each register can be positioned for the best air distribution.

Conditioned air is maintained throughout the vehicle interior with a twin motor blower system, which provides high velocity air movement through individually controlled outlets. Air-conditioning cool-down occurs faster if all windows, doors, and vents are closed. The intake registers for the recirculated air are located below the closet.

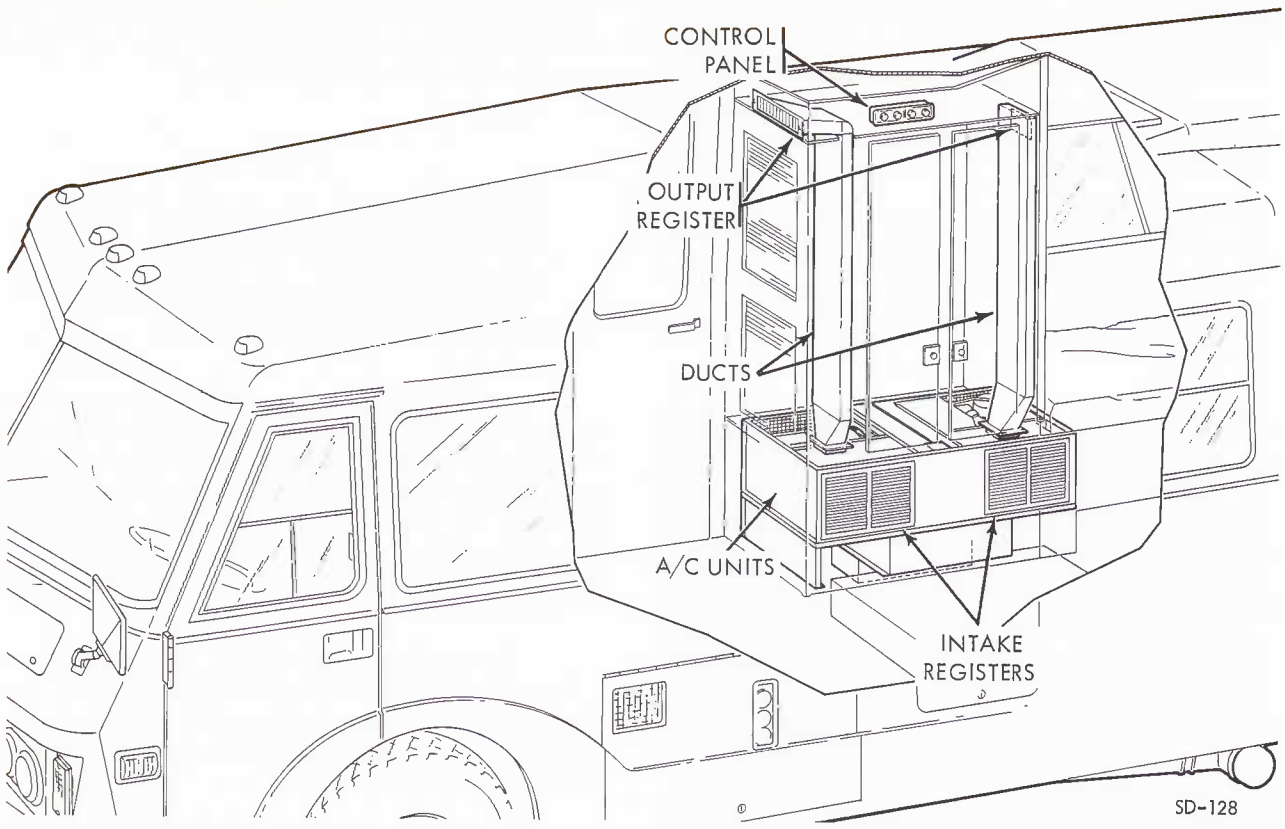


Figure 5-20. Off-Road Cooling System

The off-road cooling system unit is located under the hallway closet (fig. 5-20). The system operates on 120-volt electrical power from either an auxiliary power unit (APU) or external city power. To provide maximum versatility and range control, the system actually consists of two AC units operating in parallel – one for the forward area, the other for the rear – each of which may be operated independently.

(1) Operation. Before operating the air conditioner, close all doors, windows, and ventilators. This will allow the recirculating air system to provide faster cooldown.

> ***Caution***
>
> Make certain winterizing foam pads and exhaust vent pan are removed.

The AC unit has a built-in time delay to protect it from the initial turn-on load created by both the fan and compressor. When it turns on, the fans will start, and after about 2 minutes the compressors will start. Remember that whenever the unit has been turned off, there will be a 2 minute delay before the compressor can restart again.

The control panel (fig. 5-21) is divided into two sections: "1" for the forward area and "2" for the rear. Each section of the panel contains two controls: "COOLER" control and "FAN" control. The "COOLER" control sets the desired temperature. The "FAN" control selects the low, medium, and high speeds of the fan. The fan can operate with the air conditioner ("LOW COOL" – "MEDIUM COOL" – "HIGH COOL") or independently ("LOW FAN" – "MEDIUM FAN" – "HIGH FAN") for air circulation without cooling.

When the outside temperature is high, set the fan control to "HIGH COOL" and turn the "COOLER" control completely clockwise. When a comfortable environment is reached, set the fan control to "LOW COOL" and the "COOLER" control as required. To turn off the unit entirely, set the "FAN" control to "OFF."

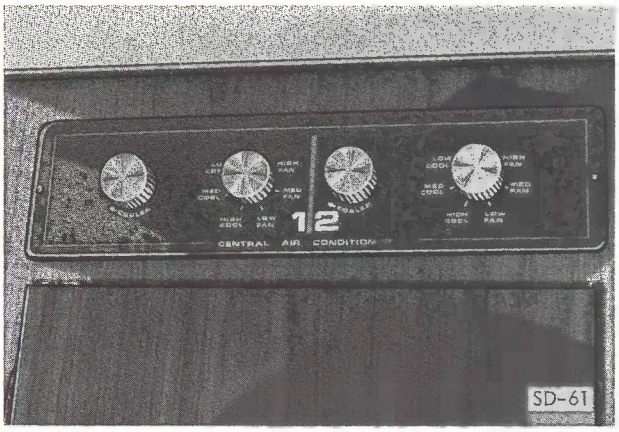


Figure 5-21. Off-Road Cooling System, Control Panel

Maximum air conditioning efficiency depends on the outside temperature and operating voltage level. The system creates the largest single load for the coach's electrical system. Since it is extremely important that power to start and operate the system be of sufficient capacity to obtain full efficiency, we recommend that you shut off other electrical appliances during AC operation.

If external city power is being used and the system is not operating efficiently, this may be caused by lower voltage. Turning on the APU at the domestic panel will create enough power and automatically disconnect city power and supply the required 105 to 120 VAC.

Before starting the APU, make certain that the air conditioner is off to permit the APU to start with only a light load. Let the APU run at least 5 minutes, to warm up and produce the proper voltage and frequency output. Then turn on the air conditioner.

The APU must be kept in good running condition and be correctly adjusted and serviced. With no load, output of the APU must be 125 volts at 60 Hertz.

(2) Maintenance. If the air conditioner does not start, check to see if the service line is properly connected to external city power, or that the APU has been turned on.

Repair service on the air conditioner must be performed by an authorized representative. Service access for this unit is located outside and to the rear of the passenger door (fig. 5-22).

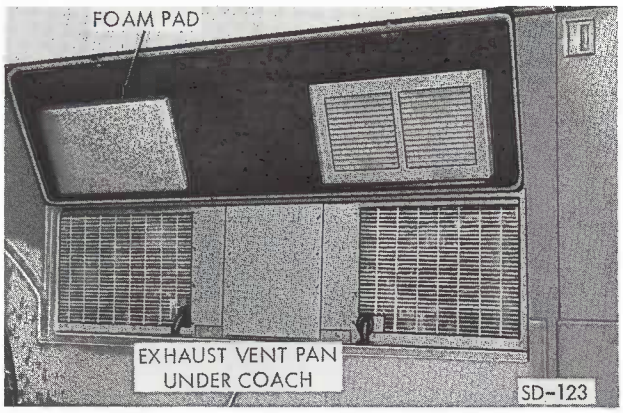


Figure 5-22. Off-Road Cooling, Service Access

5-5. FRESH WATER SYSTEM

a. General Description. Your FMC motor coach is equipped with a self-contained water system (fig. 5-23), which provides the same type of water delivery that you enjoy in your home. The system includes: storage tanks, pump, filter, accumulator, water heater, built-in freeze protection, and water purifier. Sturdy polyethylene water tanks store fresh water for both kitchen and bathroom facilities.

You can determine water level by referring to the indicators located on the domestic panel (fig. 5-30). The fresh water fill is located behind the access door on the front cowling: for coaches 00001 to 00075, on the passenger side of the coach; for coaches 00076 and up, on the left side of the coach. With water in the tanks, set the WATER PUMP switch to ON, and the system is ready for operation.

The 60-gallon fresh water supply is stored in two tandem tanks in the forward coach area. The water storage units consist of a 38-gallon tank mounted on the underside of the coach between the front wheels, and a 22-gallon tank stored under the forward seat of the dinette on floor plan "A" and under passenger seat on floor plan "J." Copper and plastic tubing is used thorughout to carry water from the tanks to the outlets.

When city water is not used, water pressure is maintained by the 12-volt water pump. This pump places water at constant pressure at all faucets. It runs quietly when a faucet is opened and automatically turns off when the faucet is closed.

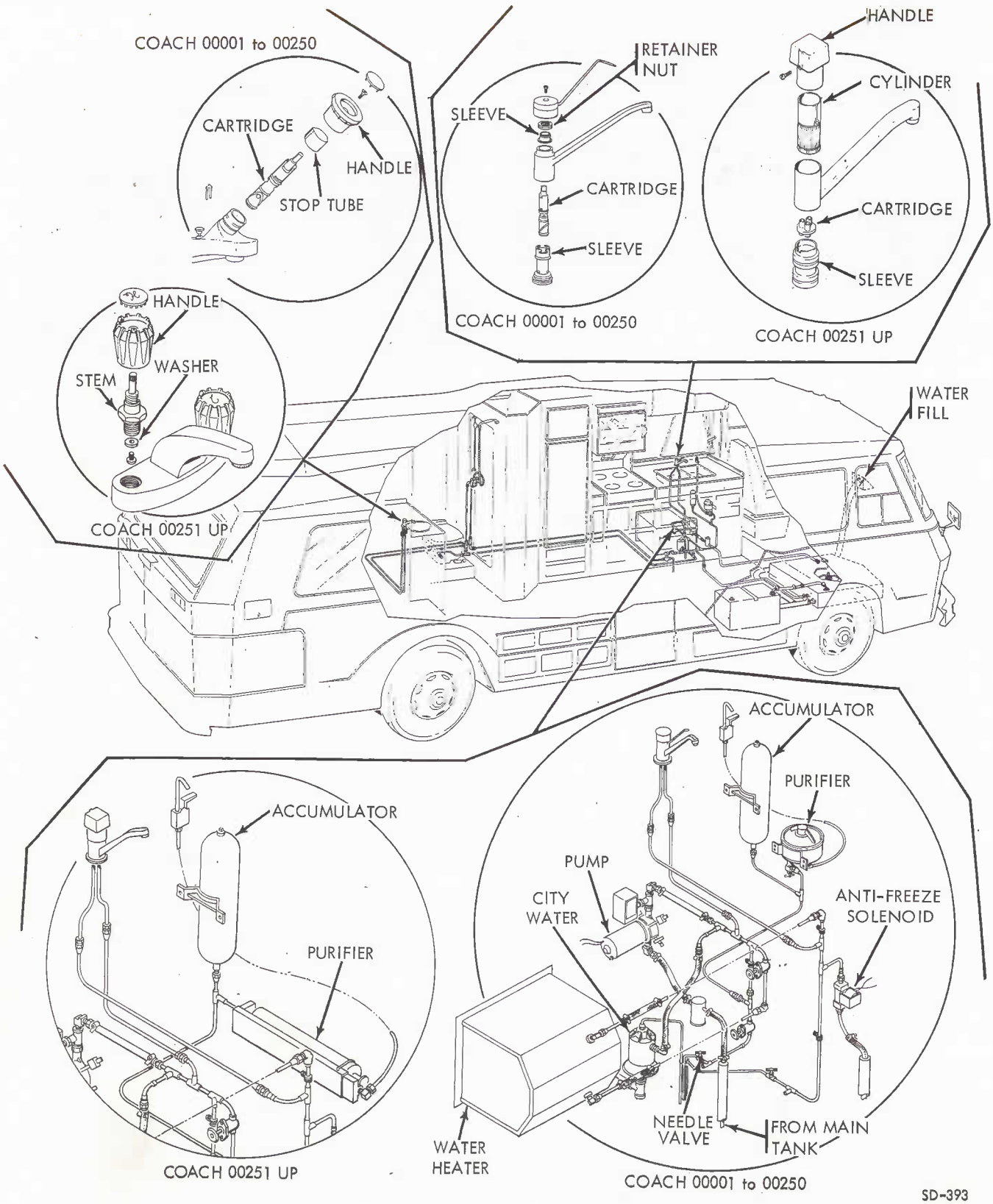


Figure 5-23. Fresh Water System

An accumulator tank acts as a buffer between the pump and water faucets to smooth out the flow of water and assure an extra reserve of water under pressure when needed, such as flushing the toilet. This unit also reduces the rapid on/off pump cycling which would place a high drain on the domestic battery.

The continual supply of hot water is maintained by a fast recovery water heater. Operating on liquid petroleum gas (LPG), the heating unit contains a 100% shutoff valve which automatically interrupts the gas supply if the pilot light should go out or the water temperature become excessive. The heater increases the system water capacity by 10 gallons, so that the complete water system will hold up to 70 gallons of potable water.

An antifreeze unit is built into the system, so that you can operate the coach in freezing weather without losing the use of your fresh water system. This unique feature protects the water tanks from freezing during extremely cold weather.

The water purifier filters, purifies, and disinfects water – all in one operation. The purifier supplies drinking water free of rust, algae, sulphur, cloudiness, chlorine taste, and other unpleasant residue. The unit is not a water softener and will not remove minerals, but it will provide pure and safe water for drinking and cooking when properly maintained.

b. Operation. When operating the self-contained water system after a storage period, or when storage tanks have been drained, follow the special procedures in paragraph d below. If the system has been correctly prepared for storage, the pump switch should be "OFF," the water heater elements "OFF," and the drain and fill caps secure.

NOTE

Know how much water you have in supply. Running out of water can be a nuisance and will require you to repeat the preconditioning procedures for the whole system.

(1) Water Tanks. To completely fill the tanks, the coach should be level, and you should allow enough time during filling for the water to displace any air trapped in the system. We suggest that you use a lightweight heavy-duty plastic garden hose for filling the system to reduce the chance of adding any foreign taste to the water.

Warning

These tanks are for potable water only. Sanitize, flush and drain before using. Detailed descriptions are provided in paragraph d below.

When a water hose is not available, you can fill the tanks by using a pail. Remove the outside filler cap and fill through front water fill.

If the water tanks are filled to capacity, they may appear to be leaking, but the water you see on the ground is probably coming from the vent/overflow line. This condition is normal and will stop when the water level drops slightly, or when the coach is moved to a level area. Sudden starting and stopping, or parking on unlevel ground, will cause additional water to drain overboard and need not be cause for concern.

While the water system is in operation, a built-in freeze protection feature keeps the water above 38°F. But if you are expecting extended freezing weather while the coach is being stored, take steps to adequately protect the system from damage by draining the lines.

(2) Water Pump. The "WATER PUMP" switch, "WATER LEVEL" switch, and indicators are located on the domestic panel (fig. 5-30). When the indicator is on, the water pump is either operating or in standby.

When starting the pump for the first time, or when the pump has not been operated for some time, open the kitchen cold water faucet before setting the pump switch on the domestic panel (fig. 5-30).

This will release any line pressure and clear the lines of air when the pump starts.

The pump can automatically maintain enough pressure to insure a steady flow of up to 3.5 gallons per minute. Operating pressures are 8 psi "ON," and 20 psi "OFF." The pump is not used when the coach is connected to a city water supply and should be turned off. It should also be kept off whenever you leave the coach for an extended period of time, and when driving. This will prevent an unnecessary drain on the water system and domestic battery, should a slow faucet leak develop.

Running the pump when the water tanks are dry can cause the pump motor to overheat. A built-in thermostat rod housed in the pump motor detects

excessive temperature increases and will automatically turn off the pump before it can be damaged.

> **Caution**
>
> To prevent unnecessary wear and/or pump overheating, set the pump switch (on the domestic panel, fig. 5-30) to "OFF" when the tank is empty, the system is being drained, or the coach is to be stored.

(3) Bathroom and Kitchen Lines. Be sure the main water valve is turned on and the water heater is off. (The access door for the water heater is to the rear of left front wheel. See Plumbing Heating Service Access, fig. 4-2.) Turn the bathroom hot water faucet fully "ON." As the water heater fills, water will start to come in short spurts from the faucets. When this starts, turn the faucet "OFF." Now gradually open and close the faucet until the water flows evenly, then turn it "OFF." Do the same with the hot water faucet in the shower, then with the kitchen hot water faucet. This procedure will properly fill the water heater and free the hot water lines of air. Repeat this same procedure for the cold water lines, starting with the bathroom faucet, the shower, then the kitchen. The water pump will continue to run until all the faucets are closed and the pressure reaches 20 psi (about 10 to 15 seconds) at which time the pump automatically shuts off. Whenever the coach is parked and not in use or left unattended, set the pump switch to "OFF."

The water system is now completely primed. Now top off the water tanks to replace the lost water.

> **Caution**
>
> Whenever your coach is to be stored, unused, and unheated during freezing weather, the water system must be drained. Follow those procedures outlined in paragraph d below.

(4) Freeze Protection. The main component in this unique freeze protection feature is an inline solenoid valve. This valve is connected to the output side of the water heater, through a tee-connection (see fig. 5-25).

When water temperature in the tank drops below 38°F, the temperature sensor in the tank opens the solenoid valve. This releases warm water into the tank and creates a drop in pressure in the water lines. The drop in pressure causes the pump to operate, thus pumping more hot water into the tank. When the water temperature in the tank rises to 41°F, the solenoid valve closes. The pump continues to operate until the line pressure reaches 20 psi, at which time it turns off. This procedure is repeated whenever the water temperature drops below 38°F.

c. City Water Connection. City water hook-up is located under the coach, to the rear of the left front wheel (fig. 4-2). Connecting a hose from this fitting to a city water source will supply constant water pressure for the total system. This connection (fig. 5-24) should be made with a hose capable of withstanding high pressures over an extended period without bursting.

A check valve included in the system prevents backflow through the pump when connected to city water. However, the pump switch on the domestic panel (fig. 5-30) should be set to "OFF." To drain this section of the fresh water system, remove access plug (fig. 5-24), insert a rod or dowel pin to depress the check valve and allow the water to drain. Replace access plug.

NOTE

The fresh water storage tanks cannot be filled through the city water connection.

d. System Maintenance. A major requirement in system maintenance is to keep the water fresh, clean, and odor-free at all times. The following information will acquaint you with procedures for trouble-free operation of the water system.

(1) Draining (fig. 5-23). To completely drain system, open system needle valve located under coach next to the city water connection. Then open all faucets (kitchen sink, shower, vanity). Remove main tank drain plug (between front wheels) and drain tank. From inside coach, remove plug at top of accumulator and open the two drain valves (fig. 5-25) under kitchen sink to drain the hot and cold water lines.

NOTE

Set the water pump switch to "OFF" whenever the water system is being drained.

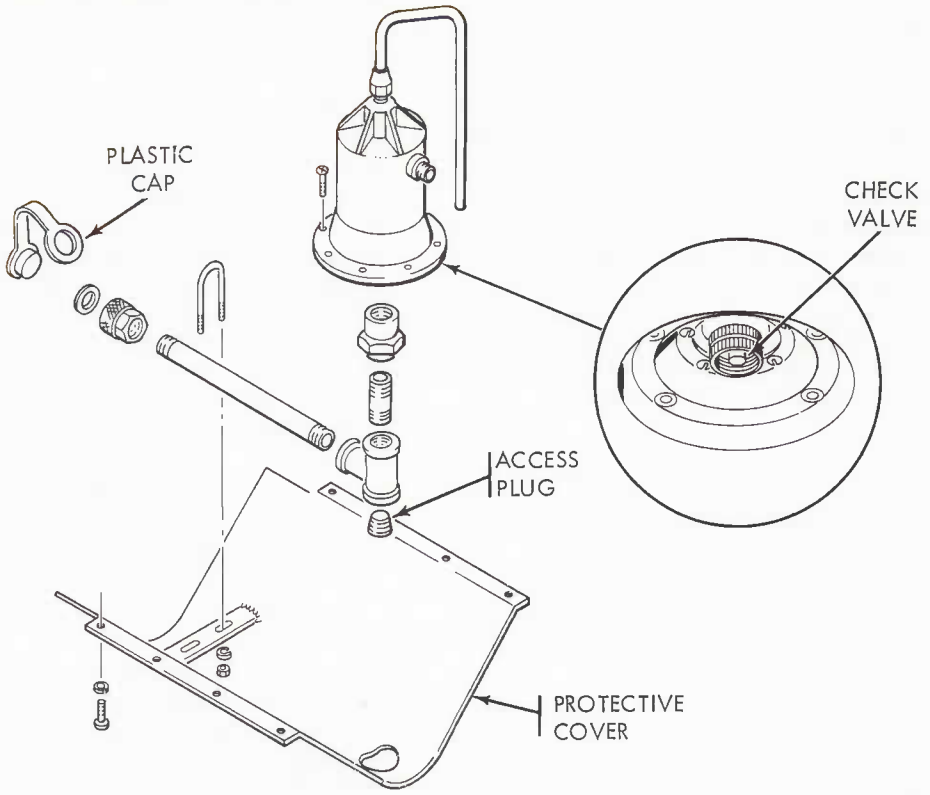


Figure 5-24. City Water Connection (Underside of Coach)

Flush toilet and blow any residual water out with compressed air into drainage system. From outside coach, press button in center of city water connection (fig. 5-24), and drain any water. Then open hot water heater tank drain valve (fig. 5-27). When draining is complete, close all valves and install water accumulator plug before refilling system with fresh water. If coach is to be stored we recommend that you leave valves open in event of a freeze.

(2) Flushing. If the water supply should become musty and bad tasting, use a baking soda solution to clean and freshen the tank to provide a palatable water supply. Drain the water system (see above), and add a cup of baking soda to a gallon of water, shake well, and immediately pour into the water fill. Fill the tank with water, and allow to set for several hours. Then agitate the solution by vehicle motion and remove main tank drain plug located between the front wheels. Follow the draining with one or two fresh water flushes to remove all traces of the soda solution. Then, turn on the pump and taste test the water at each faucet to be certain the soda solution has been completely rinsed out of the system.

(3) Sanitizing (Superchlorination). Before filling the water tanks for the first time, after storage, or if the water has become contaminated, sanitize the tank to assure a potable water supply.

First, completely drain the water system (par. (1) above). Then pour 1 cup of ordinary household bleach (5% sodium hypochlorite) into a gallon of water. (This quantity is based on 1 teaspoon of Clorox or Purex in ten gallons of water, providing 6.7 parts per million chlorine level.) Pour 4 gallons of this prepared solution into the water fill. This makes a very strong disinfectant solution – over 200 ppm chlorine dosage. Now, completely fill the water system with fresh water, and allow to stand for 3 to 4 hours. Then turn on the water pump and open all faucets. This will allow the chlorine solution to sanitize the entire system. For a badly contaminated water system, this procedure may

require repeating until the odor of protective chlorine is detected in the running water at the bathroom hot and cold water faucets. As the system empties, add more water through the water fill. Continue this operation for about thirty minutes, then add one more tank of water, drain, and flush the tanks as outlined in par. (1) above. To remove an excessive chlorine taste or odor that might remain, prepare a solution of 1 quart vinegar to 5 gallons of water and pour into the water fill. Allow the solution to agitate in the tank for a few days by operating the coach, then flush the tanks as outlined in paragraph (1) above. Thereafter, chlorinate each time water is added to the tanks to keep it safe and prevent unsanitary conditions.

> ***Caution***
>
> Keep the vinegar solution off the exterior paneling of the coach because it might soften the fibreglass surfaces. Wash off any spilled solution immediately.

(3) Purification. The chemical content of available water supplies varies in different parts of the country. Your coach has a water purifier installed in the kitchen to supply drinking water which is free of rust, algae, cloudiness, chlorine taste and other unpleasant residue. To avoid the possibility of these impurities multiplying and becoming injurious to health (or clogging the water purifier), the water purifier should be serviced as described in paragraph 5-5 (fig. 5-25).

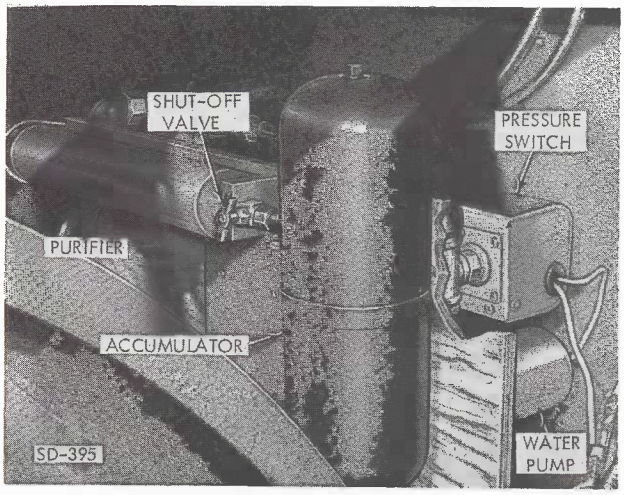
To purify the water contained in storage tanks, the following method is recommended. Completely drain the water system (par. (1) above). Set the water pump switch to "OFF" before draining. Refill the tanks and add 1 ounce (2 tbsp. or 1/8 cup) of ordinary household bleach. If the tanks are contaminated, see paragraph d(2) above. A convenient method is to place the bleach into the hose used for filling, before connecting it to a water source, then fill the water system. Water treated in this manner will kill bacteria, virus, and other slime-forming organisms.

NOTE

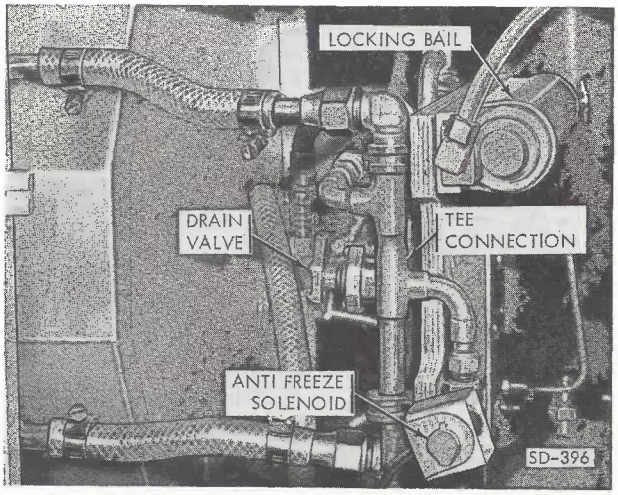
Water purified in this manner should be drained 10 days after filling and/or purifying.

If you plan to remain for some time where city water is available, drain the water tank and refill with fresh water before departing. Check valves in the water lines protect the water system components, therefore, the system cannot fill while you are connected to a city water supply.

e. Component Maintenance. The access door to inspect and service the water pump, accumulator, and purifier is located in front and below the kitchen sink (see fig. 5-25).



Accumulator and Purifier



Purifier Locking Bail

Figure 5-25. Water System Components (Under Kitchen Sink)

(1) Water Pump (fig. 5-25). The water pump is designed for long and reliable service; however, if a malfunction should occur, the following information will assist you in isolating the problem. We recommend that the water pump be serviced only by a qualified service technician.

(a) If pump runs, but sputters or does not pump water, check for empty tank (refill), or an air leak in inlet line (locate leak and repair line), or a leak at shaft seal (replace seal).

(b) If the pump does not operate, check for low voltage on the domestic battery (recharge), or a blown fuse in the converter under passenger seat (check for short circuit, malfunctioning pump, or improper regulation) or a loose or broken wire (check and repair wiring).

(c) If pump runs intermittently with all faucets closed, check for a leak in outlet lines (check hot and cold faucet washers), or the main valve in the pump is not seating (replace pump).

(d) If pressure switch "CHATTERS" - switches on and off repeatedly-when the faucet is not completely closed, there is too much back pressure in the system (check connections at accumulator tank, or replace the "air cushion" in accumulator-see paragraph e(2) below).

(e) If pump runs continuously with all faucets closed, the tanks may be empty (refill), or there is a leak in the system (check plumbing), or a defective pressure switch, or a damaged impeller (replace pump).

If the pump requires replacement, connect pump electrical leads as indicated in figure 5-26.

> ***Caution***
>
> Be sure all power is off when making any electrical connections. Observe correct wiring connections, because incorrect polarity will damage motor. DO NOT REMOVE SWITCH COVER OR TAMPER WITH THE POSITIVE LEAD OF THE MOTOR.

When the "ON" indicator for the "WATER PUMP" (fig. 5-30) is lit and water does not flow through an open faucet within 30 seconds, turn off the pump and check water level and voltage level. To operate the water level indicators, press up on the "WATER LEVEL" switch momentarily, and note the approximate water level registered on the panel above the switch (fig. 5-30).

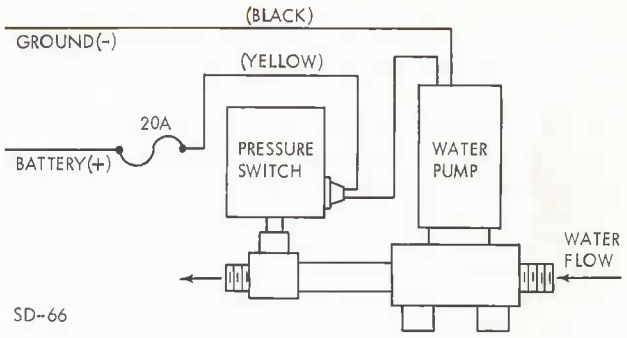


Figure 5-26. Water Pump Wiring

(2) Accumulator (fig. 5-25). The accumulator provides an "air cushion" within the water system which smooths out the flow of water and minimizes the effects of water-hammering. After prolonged use, this air cushion can be absorbed. This condition is usually first noticed when the pump cycles on and off very rapidly. If this becomes evident, turn off the "WATER PUMP" switch and open cold water faucet in bathroom. Open panel below kitchen sink and drain water by opening the cold water drain valve (fig. 5-25). Remove plug from top of accumulator to allow water to drain through system lines. Replace plug, close drain valve, and turn on water pump. The water system will reactivate and the accumulator will then function.

(3) Bathroom and Kitchen Faucets. Faucets in both the bath and kitchen were changed at coach serial number 00250 and up. On the kitchen faucet used from coach 00001 to 00250 replace valve cartridge as follows: Turn off water supply. Remove handle screw, press cartridge stem down, lift and tilt handle off. Unscrew retainer nut and lift off sleeve, twist spout up and off, then slide retainer clip and pull out cartridge. Push new cartridge into spout keeping stem up, turn ears to front and back and turn red flat on cartridge stem towards the front of the sink. Install retainer clip, spout, sleeve, and retainer nut. Press cartridge stem down and install handle by holding lever up and hooking handle ring into grooved sleeve. Replace and tighten handle screw.

NOTE

If handle won't operate properly . . . you have not hooked handle ring into sleeve groove. If hot and cold is reversed, the red flat is not toward sink . . . remove handle assembly and turn red edge of stem so it faces sink.

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

On the kitchen faucet used from coach 00251 and up replace cartridge as follows: Turn off water supply. Pull up on handle and rotate cylinder to left or counterclockwise. Handle can then be removed and you can lift out cartridge. Install new cartridge and line up mating slot in faucet with ear on handle, then thread cylinder into faucet opening. Turn on water supply. Pull up for water, push down to shut off water. Turn handle to your right for cold water, to your left for hot water. Center position is for warm water.

On the vanity faucet used from coach 00001 to 00250 replace cartridge as follows: Turn off water supply. Remove handle cover and handle screw, lift handle off, pull off stop tube and slide out retainer clip, then pull out cartridge. Install new cartridge into body with stem pulled out, turn ears front to back and turn red flat on cartridge stem up, slide in retainer clip, install stop tube and handle. Keep handle pointer up and tighten handle screw. Snap in handle cover.

NOTE

If hot and cold positions are reversed, remove handle, turn cartridge flats 180 degrees and re-install handle with pointer up.

Caution

Re-insert cartridge by pushing it all the way into body until the ears on cartridge are flush with body. Insert retainer clip so that the legs straddle the cartridge ears and freely slide down into the bottom slot in the body.

On the vanity faucet used from coach 00251 and up replace washer by removing handle and stem. Install new washer on stem and insert into faucet. Open and close a few times to seat washer.

(4) Water Purifier. (Coach 00001 to 00250). The water purifier used on early coaches will be effective for approximately 200 gallons of water. The exact amount depends upon the water pressure and the rate of flow. When the water flow through the goose-necked spout at the kitchen sink (fig. 5-23) becomes too slow, change the purifier cartridge. We recommend you change the purifier cartridge annually for best service. To replace cartridge, turn off water pump, or if using city water, turn off city water connection. Open faucet to relieve stored pressure. Now open valve at top of filter unit. Remove retainer knob, then twist base 1/4 turn to your right, working the base down approximately 1/4 inch. Allow any trapped water in filter to drain. Pull base and filter straight down and out of the case. Remove filter cartridge by unscrewing it from the base. Install a new cartridge in filter case. Secure base with retainer rod, being sure rod is completely inserted so the knob rests against the case. Close drains and turn on pump. If city water is being used, turn on the valve slowly to let the filter fill.

(5) Water Purifier. (Coach 00251 and up). The water purifier used on later coaches will be effective for approximately 600 gallons of water. The exact amount depends upon the water pressure and the rate of flow. When the water flow through the goose-necked spout at the kitchen sink (fig. 5-23) becomes too slow, change the purifier cartridge. We recommend you change the purifier cartridge annually for best service. To replace cartridge, place "WATER PUMP" switch to "OFF" (fig. 5-30) or turn off city water connection. Close purifier shut-off valve (fig. 5-25). Press spout valve to relieve stored pressure. Pull locking bale (fig. 5-25) inboard. Lift purifier cartridge away from mounting bracket and work cartridge away from outboard end adapter block (red end). Remove elbow adapter from cartridge and install in new cartridge (blue end). Position cartridge in adapter block (red end) and bottom. Position elbow adapter and bottom. Swing locking bale into position over cartridge. Open purifier shut-off valve, place "WATER PUMP" switch to "ON", press spout valve and run water until it is clear and drinkable.

(6) Water Heater. Your coach is equipped with a Bowen LPG water heater with a gas input of 9,600 BTU. Built-in temperature and relief safety valves operate at 210°F and 125 psi, respectively.

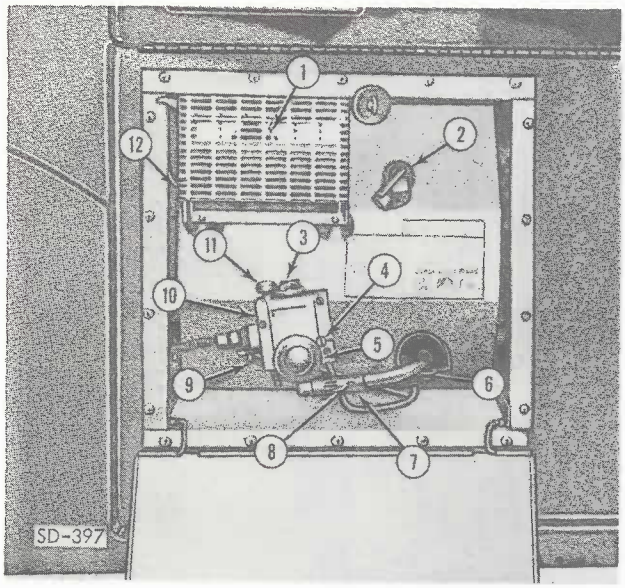
You will find the procedures for initial filling with water or for refilling an empty heater in paragraph 5-5b(3). Lighting and adjustment procedures for the pilot and main burner are described below.

f. Lighting/Relighting of Water Heater. Before attempting any lighting or relighting procedures, be sure the heater is filled with water and that all air has been removed from the hot water line.

Open a hot water faucet in the bathroom. If water flows evenly, the heater is full and the lines are free of air.

Access for lighting and servicing heater is through an outside panel on driver's side of coach (fig. 4-2).

Turn gas cock valve (see fig. 5-27) to "OFF" and set the water temperature dial to the low end of the "WARM" scale. Wait at least 5 minutes to allow any residual gas to escape from the burner compartment. Turn gas cock valve to "PILOT." Depress and hold reset button while lighting pilot burner with a stick match. Allow 30 seconds for pilot to light. After lighting pilot, allow it to burn approximately 30 seconds before releasing reset button. If pilot goes out, repeat the operation but hold the button down a little longer before releasing. After pilot is satisfactorily operating, turn gas cock valve "ON" to start the gas heater. Now set the water temperature dial to "NORMAL," (center mark). This dial is a graduated thermostat from "WARM" (120°) to "HOT" (160°). Usually the normal setting is used, which supplies water at a temperature of 140° when fully heated.



1. EXHAUST VENT
2. TEMPERATURE RELIEF VALVE
3. GAS COCK VALVE
4. PILOT ADJUSTMENT CAP
5. WATER TEMPERATURE THERMOSTAT
6. MAIN BURNER TUBE
7. AIR SHUTTER
8. SHUTTER SET SCREW
9. TANK DRAIN
10. GAS CONTROL VALVE
11. RESET BUTTON
12. AIR INTAKE

Figure 5-27. Water Heater

NOTE

All temperature values are approximate and could vary plus or minus by 10%.

g. Pilot Flame Adjustment - Water Heater. The pilot flame is adjusted at the factory, however, it should be checked occasionally to conserve LPG. A small yellow tip at the top of the pilot flame, indicates that the pilot is not getting enough gas. A large full yellow flame indicates excessive gas pressure which will shorten pilot life. If either condition exists, the pilot requires adjustment. To adjust the pilot flame, remove the pilot adjustment cap located in the lower right corner of the control unit (fig. 5-27) to gain access to the pilot adjustment screw. For a blue flame turn the adjustment screw clockwise (reduces flow of gas to the pilot). For a yellow flame turn the adjustment screw counterclockwise (increases gas flow). Now adjust pilot flame to 1/2-inch high or until a slight yellow tip appears in pilot flame.

h. Main Burner Adjustment of Water Heater. For efficient and clean heating, the air and fuel mixture for the main burner should be properly adjusted. A yellow smoking flame indicates a lack of air (or oxygen) and a blue and noisy flame, an excess of air. If either condition exists, the air shutter on the main burner should be adjusted.

The main burner orifice is adjusted by sliding the air shutter (fig. 5-27) along the main burner tube. To adjust the orifice, loosen the air shutter set screw and slide the shutter: to the right increases the yellow flame tipping (increases air mixture), to the left, reduces the yellow tipping (decreases air mixture). To adjust main burner orifice, slide shutter to the right far enough for yellow tip to appear in flame, then slowly slide shutter to the left until yellow tip disappears. Tighten set screw.

NOTE

Upon completion of any water heater servicing, always be sure that access door is locked and secured.

5-6. ELECTRICAL SYSTEM

a. General. The coach electrical system (fig. 5-28 and 5-29) enables you to use all the available lights and appliances in your coach whether you are operating in the external city power mode (AC voltage) or self-containment mode (DC voltage).

This section provides descriptions of the AC electrical system (110 VAC), DC electrical system (12 VDC), the domestic panel, and the 6.5 kw auxiliary power unit (APU).

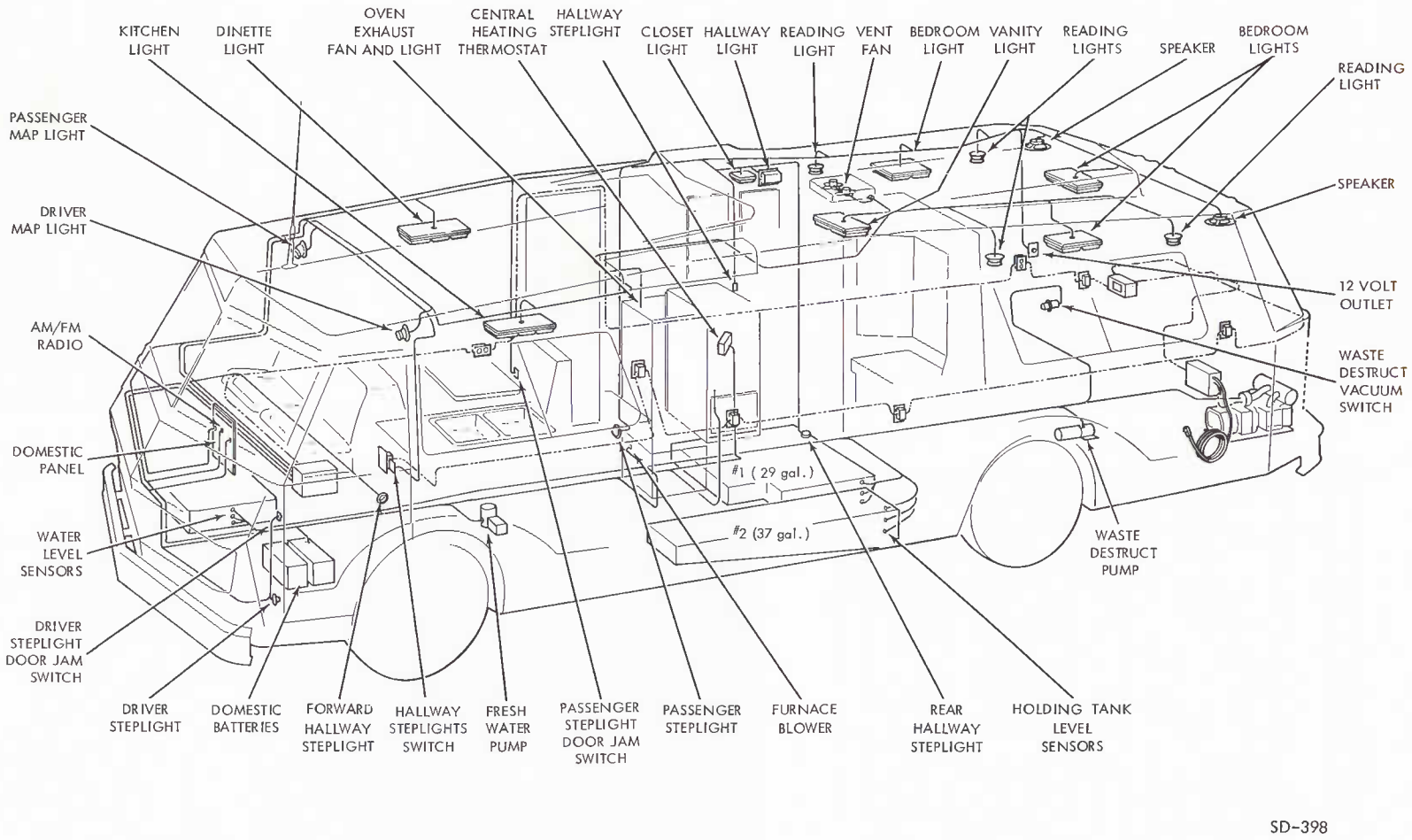


Figure 5-28. Electrical System 12 V Domestic

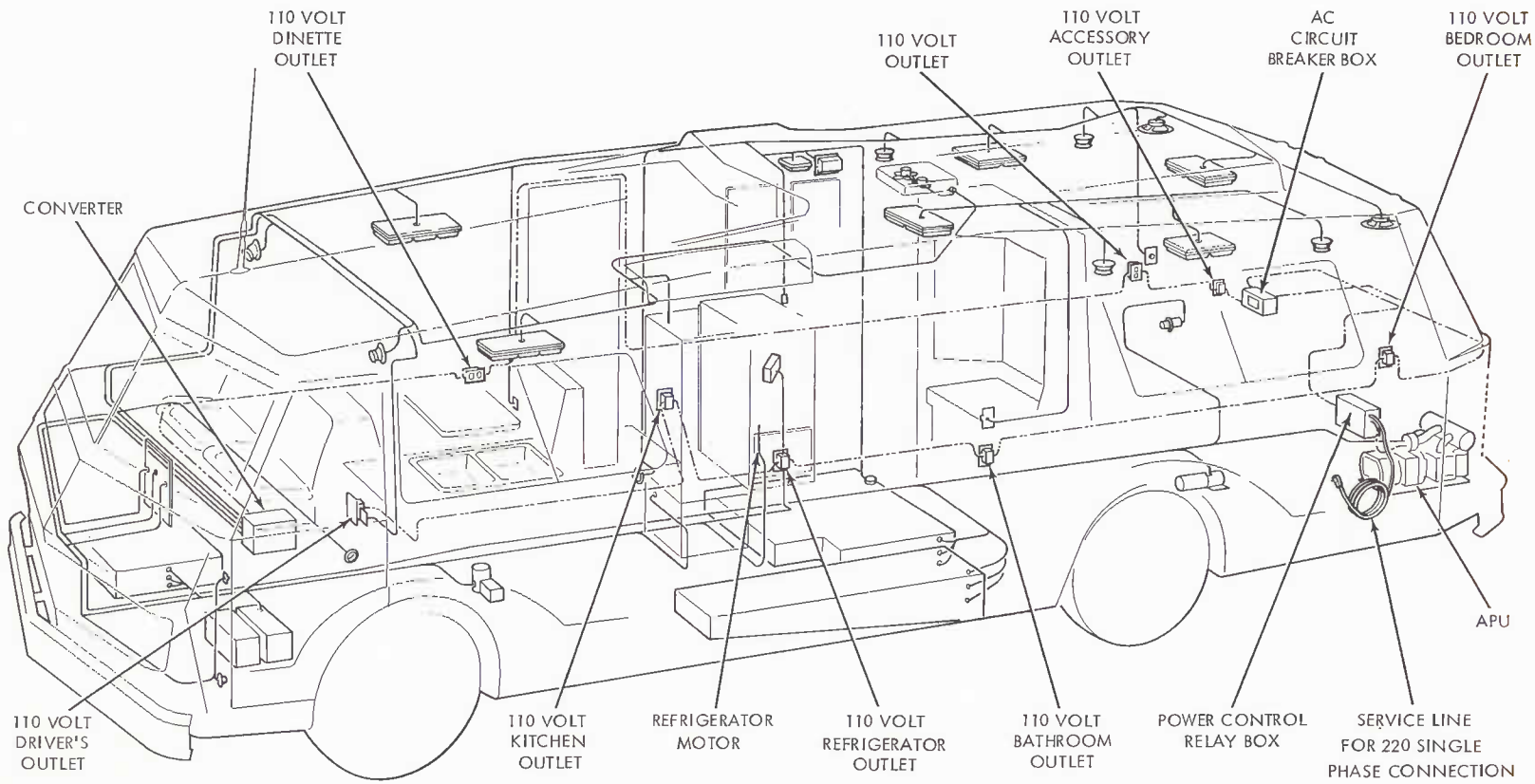
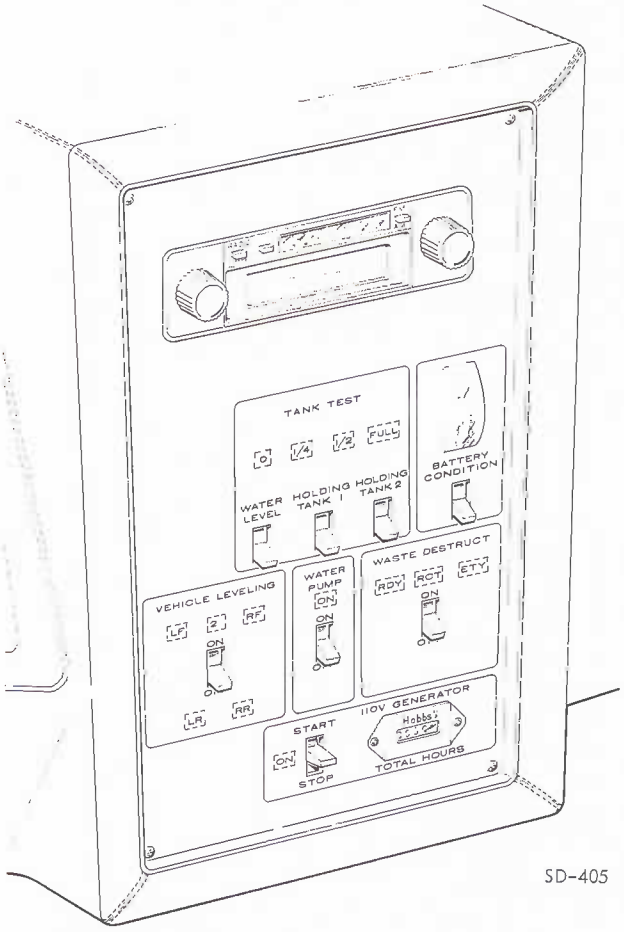


Figure 5-29. Electrical System 110 V

b. Domestic Panel. The domestic panel (fig. 5-30) contains a combination of indicators and controls to monitor and initiate performance checks of the coach's domestic facilities. These include functions for the radio, holding tanks, water storage, battery, vehicle leveling, water system pump, waste destruct, and APU.

This panel is located at the front of the coach between the driver and passenger seats, and all controls are within easy reach of driver and passenger. Familiarize yourself with the purpose and location of each function, and practice scanning the panel before each trip so you can make status checks at a glance while traveling.

Back-lighted indicators are used for domestic functions that require only a quick glance to check status and which do not make radical changes. Meters are used where more accuracy is required.



NOTE [ ] INDICATES LEGENDS BACKLIGHTED WHEN ACTIVATED.

Figure 5-30. Domestic Panel

The domestic functions controlled or monitored at the domestic panel are described below:

(1) Radio. The controls on the 12-volt transistorized radio operate similarly to standard car radios. For best results, use the antenna in the fully extended position. The radio system has four speakers: the two forward speakers are mounted on the wall, one near the driver's seat and the other near the passenger seat; the two rear speakers are mounted in the rear left and right hand corners of the bedroom ceiling.

(2) Tank Test. This panel area provides four indicators for three functions. The three functions – "WATER LEVEL," "HOLDING TANK 1," and "HOLDING TANK 2," – use the following indicators: "0," "1/4," "1/2," and "FULL." By the indications displayed, you can see the amount of fluid in each tank.

(3) Water Level. When you press it upward, this spring-loaded switch will light the indicator most closely related to the quantity of water remaining in the 60-gallon fresh water system. Only the following indicators are used with the "WATER LEVEL" switch: "1/2" for more than half full, "1/4" for less than half full, and "0" for empty.

NOTE

If tank is filled with pure water, and the indicators are not operating, add 1 teaspoon of everyday household bleach (like Clorox or Purex) for each 10 gallons of water. See paragraph 5-5d(3).

(4) Holding Tank No. 1 (Waste-Water). When you press this spring-loaded switch upward, the indicator most closely related to the quantity of the liquid waste in holding tank No. 1 (29-gallon) will light. Only the following indicators are used with "HOLDING TANK NO. 1." "1/2" for more than half full, and "FULL" for warning that the tank is more than 3/4 full and should be emptied before any extended use.

(5) Holding Tank No. 2 (Sewage). When you press this spring-loaded switch upward, the same type of indications will be displayed for the holding tank No. 2 (37-gallon) as described above for tank No. 1.

(6) Battery Condition. Pressing this spring-loaded switch upward (when the ignition is off and/or AC voltage is not applied to the coach) causes the meter to indicate level of charge on the domestic battery system. With ignition on or AC voltage applied, the meter will indicate output level of the automotive alternator or AC-DC converter (under load).

(7) Vehicle Leveling. This switch will start the leveling detection system. The appropriate indicators light for the lowest corner of the coach: "LF" (left front), "RF" (right front), "LR" (left rear), and "RR" (right rear). When the coach is within 2 degrees of a level plane, the 2-degree indicator will light. When the coach levels within 1 degree, all lamps go off.

(8) Water Pump. Placing this switch in the upper position lights the "ON" indicator and presets the water pump to automatically respond to demand-type requirements. Thus, when the water system pressure drops (water faucet open), the pump operates. With no demands (water system closed), the pump remains inactive but the indicator remains on to indicate the pump is ready for operation.

(9) Waste Destruct. This switch will set the waste destruct system in the "RDY" (ready) mode. When the coach is moving at the prescribed speed and the exhaust system reaches the proper temperature, the "RCT" (react) indicator will light and the system is fully operational. When holding tanks No. 1 and No. 2 have been evacuated of all liquid waste, the "ETY" (empty) indicator will light.

(10) Generator 110 Volt. Press this spring-loaded switch upward to start the APU; when it is operating, the "ON" indicator will stay lit. Pressing the switch downward momentarily will stop the APU and the "ON" indicator will go out. Operating hours for the generator are recorded on the numerical display to 1/10 of an hour. One operating hour is equal to approximately 41 miles of road travel.

c. Internal Power Source. All appliances which are an integral part of the coach operate from the 12 VDC source, whether 110 VAC is available or not (except the refrigerator, which may operate from 110 VAC or 12 VDC). When 110 VAC is unavailable, the 12 VDC domestic power is obtainable by operating the APU which provides 12 VDC via the converter, or the domestic batteries may be used if APU cannot be operated. With 110-volt operation, the 12-volt system demands are automatically switched from the domestic battery to the 12-volt output of the AC to DC converter. The appliances included in this system are shown in figure 5-28 with the schematic shown in figure 5-31.

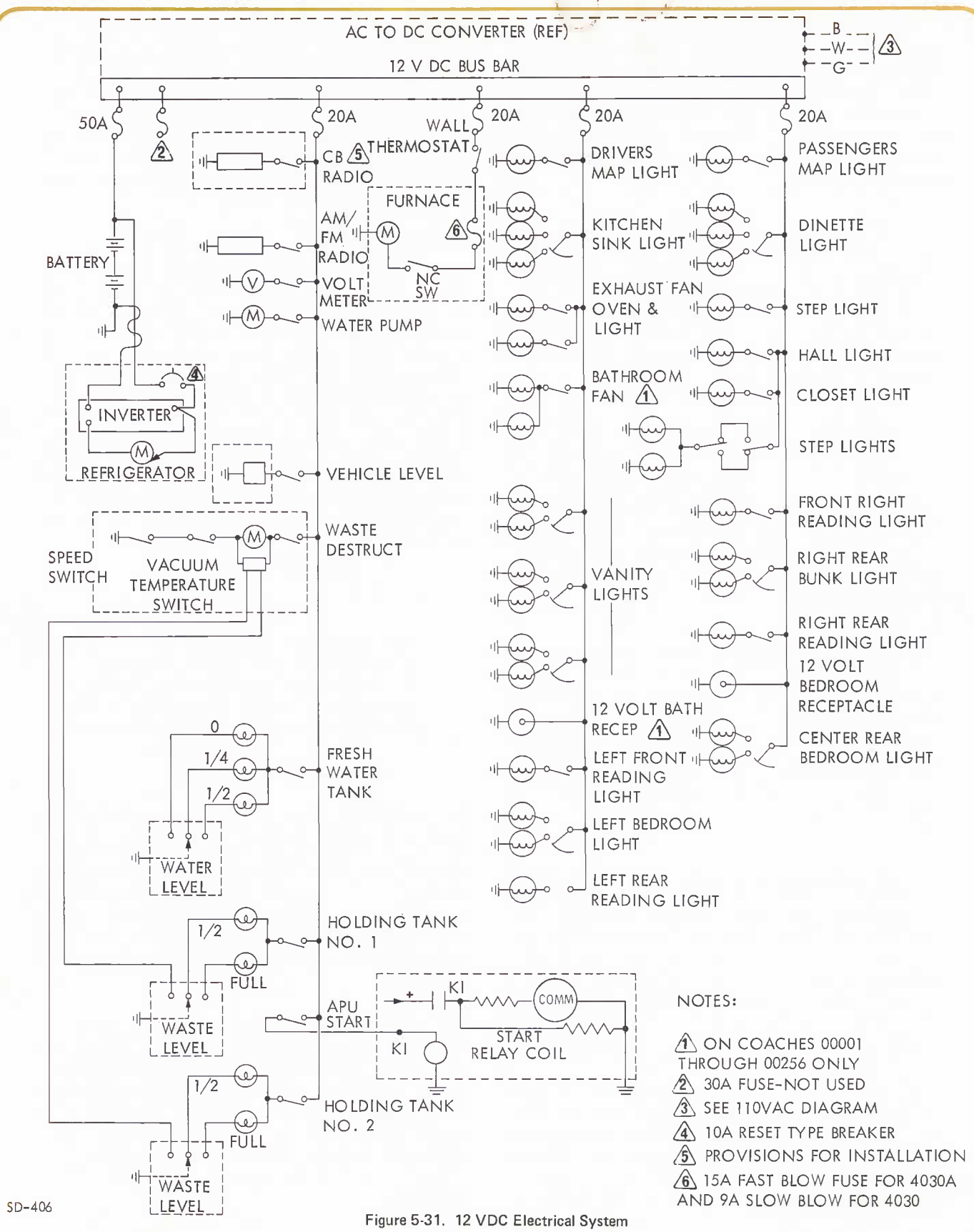
(1) AC to DC Converter. The 12 VDC electrical system will automatically switch power source from battery power to converter power the instant the coach is connected to a 110 VAC source or when APU is started. With 110 VAC applied from either APU or service line, the converter (located under the passenger seat) will automatically charge the domestic batteries. The batteries will be on 1 to 6 ampere charge even though most of the converter 12 VDC power is used for lights, appliances, or other purposes. This permits the domestic batteries to maintain charge and be held in reserve for self-containment operation, when 110 VAC power (APU or external service line) is unavailable.

NOTE

The domestic batteries also receive an on-demand charge when coach engine-driven alternator is operating, through an equalizer device incorporated in the 12 VDC automotive power supply system.

The converter uses a voltage-sensing device to supply the proper voltage for operating the system and charging the domestic batteries. The amount of current allocated to operating or charging depends on the demand. If the system load is high or the domestic supply is low, the overall current output increases. With a low system load or with the batteries fully charged, the converter output decreases.

When the requirements of the system exceed converter capacity, the domestic battery will provide the supplemental power. The system is fuse protected should the load and charging requirement exceed the rated current for a short period of time. Fuses are in converter cover, located under the passenger seat. However, long durations of over-rated current draw can not be tolerated.



NOTES:

1. ON COACHES 00001 THROUGH 00256 ONLY
2. 30A FUSE-NOT USED
3. SEE 110VAC DIAGRAM
4. 10A RESET TYPE BREAKER
5. PROVISIONS FOR INSTALLATION
6. 15A FAST BLOW FUSE FOR 4030A AND 9A SLOW BLOW FOR 4030

SD-406

Figure 5-31. 12 VDC Electrical System

(2) Domestic Batteries. There are two batteries which supply the demands for domestic operation. These are heavy-duty 6-volt batteries connected in series to provide 12 volts at 220 ampere hours. Both are located under the floor directly in front of the driver's seat (fig. 5-32). The domestic battery can be charged by running the coach engine, the APU, connecting to an external city facility with the service line, or by a 12 VDC battery charger. An 8-ampere-hour charging rate is recommended.

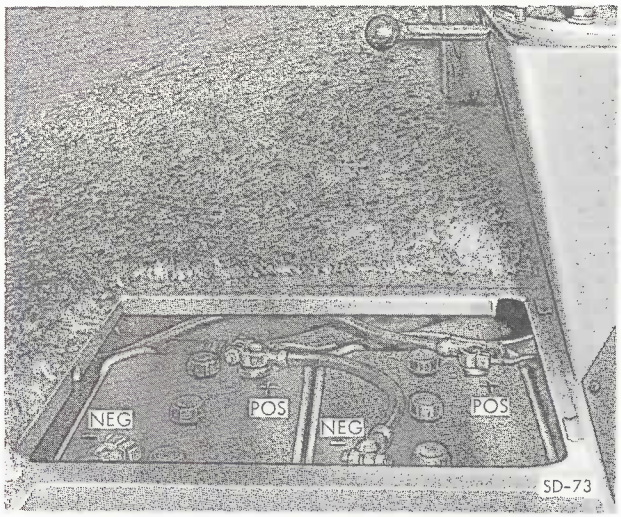


Figure 5-32. Domestic Batteries

> **Caution**
>
> Batteries must not be fast charged (a fast charger is a charger that has a rated capacity of 60 to 100 ampere-hours).

Make an effort to keep the batteries fully charged because fully charged batteries have less tendency to sulfate and will give substantially longer, more reliable service.

When the coach engine is running, the domestic batteries are charged by the automotive alternator. With service line or APU operation, the converter charges the batteries. The charge rate control of the automotive voltage regulator and the voltage sensing circuit of the converter prevent the batteries from being overcharged.

Remember to adjust battery use to your length of stay. The number of lights left on in the coach, water service operation, radio and TV, and the use of other 12-volt appliances determine the length of time your battery charge will last. When you are going to operate exclusively on the domestic batteries during the night, you must match battery capacity with requirements.

> **Caution**
>
> It takes approximately 4 hours of driving time to recharge domestic batteries after you have been exclusively on battery power in the campground during the night. It will take longer if domestic batteries were slightly discharged to begin with.

(3) Fuse Panel. This panel is located inside the door (cover) of the AC-DC converter unit. It holds six fuses; four 20-amp, a 30-amp, and a 50-amp. There is one 20-amp fuse for each of the following 12-volt branches: the right side of the coach, the left side of the coach, the furnace, and the domestic panel controls and indicators. The 30-amp fuse is not used on the 2900R; the 50-amp fuse protects the domestic batteries and the refrigerator. If a short circuit occurs, the respective fuse will blow, disabling the circuit.

(4) Maintenance. Battery maintenance is the same for the domestic batteries as it is for the automotive battery. Proper care will greatly lengthen the period of trouble-free service.

Check battery water level every month, and more frequently during hot weather. Keep electrolyte at proper level, as indicated on vent caps, using distilled water. If water is needed frequently, check that the battery is not overcharging. Also, if the battery terminals have become corroded, clean with baking soda and water solution then dry and buff with a wire brush. A thin coat of petroleum jelly should be applied to terminal posts and cable attaching clamps.

During extended periods of storage or when winterizing the coach, the domestic batteries should be fully charged and have the correct electrolyte level. Check batteries every 30 days with a hydrometer; if readings are below 1.250, recharge at a rate not exceeding 8 ampere hours. The battery is capable of supplying adequate amounts of power for normal camping needs without recharging. We recommend that the battery charge be maintained by utilizing the "trickle" charge capability of the converter by plugging in the external service line or by running the APU.

If a battery requires recharging and you use a portable recharger, be sure to set it for a SLOW charge since a quick charge will shorten the usefull life of the battery. Also, be sure that the battery is not overcharged.

When 110 VAC is applied to the electrical system, the converter will override the domestic batteries to supply 12 VDC. But should the converter become inoperable, the domestic batteries will assume the full circuit load. Therefore, during extended stop-overs, an occasional converter check is advisable. First, disconnect the service line and/or shut down the APU. Next, remove the 50-amp battery fuse from the converter under the passenger seat. As shown in figure 5-31, removing the 50-amp fuse disconnects the battery from the 12-volt lines. Reapply 110 volts to the system and turn on one coach light. If the light operates, the converter is working. Remove the 110 VAC source, return the fuse, and re-apply 110-volt source in that order.

When a fuse blows, turn off all lights and motors. Replace blown fuse, or fuses. If the fuse blows immediately after replacement check for a short circuit or circuit overloading.

(5) Battery Warranty. The coach batteries are warranted by the battery manufacturer. For service or replacement, go to any dealer who sells and services this brand of battery. A list of battery dealers is provided in the plastic case provided with each coach.

d. External Power Source. The AC electrical system operates through the service line from either city power or through the APU.

This system is designed for 110-volt operation. However, due to the circuit loading of the off-road cooling system, and the possible demands created at the coach outlets, the external AC input source must be 220 volts single phase. This requirement is satisfied through the service line, which is permanently attached to the coach.

Each 110-volt line within the coach is designed for a maximum load of 30 amperes, which is equal to approximately 3,300 watts. The off-road cooling system will require 2,000 watts from each of the two 110 VAC lines, which will probably be the largest single load within the coach.

The system includes AC outlets, fuses, circuit breakers, power control relay, service line, an AC to DC converter, and an APU.

(1) AC Outlets. Dual outlets are available throughout the coach for 110 VAC connections. The location of each outlet is shown in figure 5-29.

Warning

Never attempt to apply power into the outlet located in the ski compartment on right side of coach.

(2) Circuit Breakers. The circuit breaker box is located in the right rear ski compartment on coaches 00001 to 00350, and in the upper bedroom cabinet from coach 00351 and up. The box contains four, 20 ampere fusible plug-in units each of which is equipped with an integral blown fuse indicator (light), and two 30 ampere switch-type circuit breakers (see fig. 5-33). If trouble develops in the lighting circuits, check fuse box. If fuse indicator (light) is illuminated on a 20 ampere fuse it indicates that the fuse is blown and must be replaced. To replace fuse: Pull fuse unit out of box and remove blown fuse by prying fuse from clips. A pry slot is provided in the side of the fuse unit. Install a new SC20 fuse in clips and place fuse unit into box with the white corner marker next to the "ON" lettering. Press fuse unit all the way in until firmly seated. To temporarily disconnect a circuit, remove fuse unit and insert in box with white corner marker diagonally opposite the "ON" lettering, or leave fuse unit out of box during repairs.

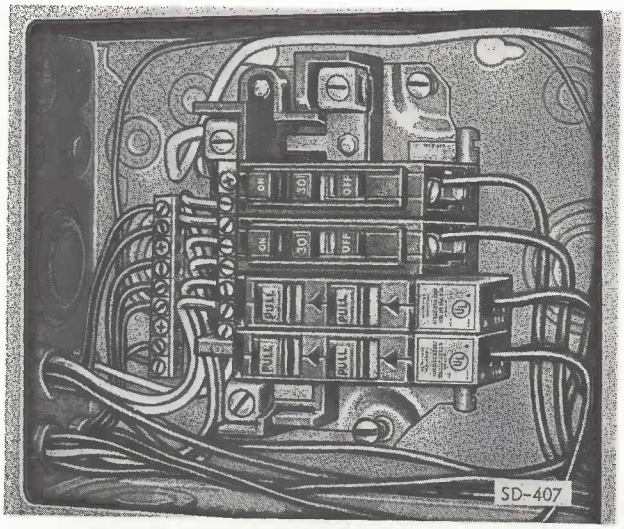


Figure 5-33. Circuit Breaker Box

Each 30-amp breaker line (fig 5-34) splits into two 20-amp breaker lines, one for each of the following: converter and all outlets on right side of coach, the off-road cooling unit No. 1; the off-road cooling unit No. 2 and all outlets on left side of coach.

(3) Power Control Relay. This relay routes the AC voltage input from either the service line or an APU. If an AC output is available from both sources at the same time, this relay unit will disconnect the service line circuits in favor of the APU. The power control relay unit is mounted on the fire wall within the APU compartment.

The 110 VAC supply is acquired either through the service line or the APU, which are both located behind the left rear access panel (see fig. 4-2). The service line has been designed for a 220 VAC single phase source and permits use of the air conditioner, home appliances and other equipment. Proper mating connections are available at all improved campsites. However, if you do find a city facility with 110 VAC only, request either the park owners or the local Housing Authority office to recommend a correct adapter.

Warning

Do not use a two-prong extension cord when adapting to a 110 volt camp outlet.

(4) Service Line. To operate from external city power, open auxiliary power unit access door, uncoil only enough of the service line to reach the city service outlet.

Caution

Make certain that the external power source is 120-240 VAC, 60 HZ (cycles). Do not connect to higher voltage.

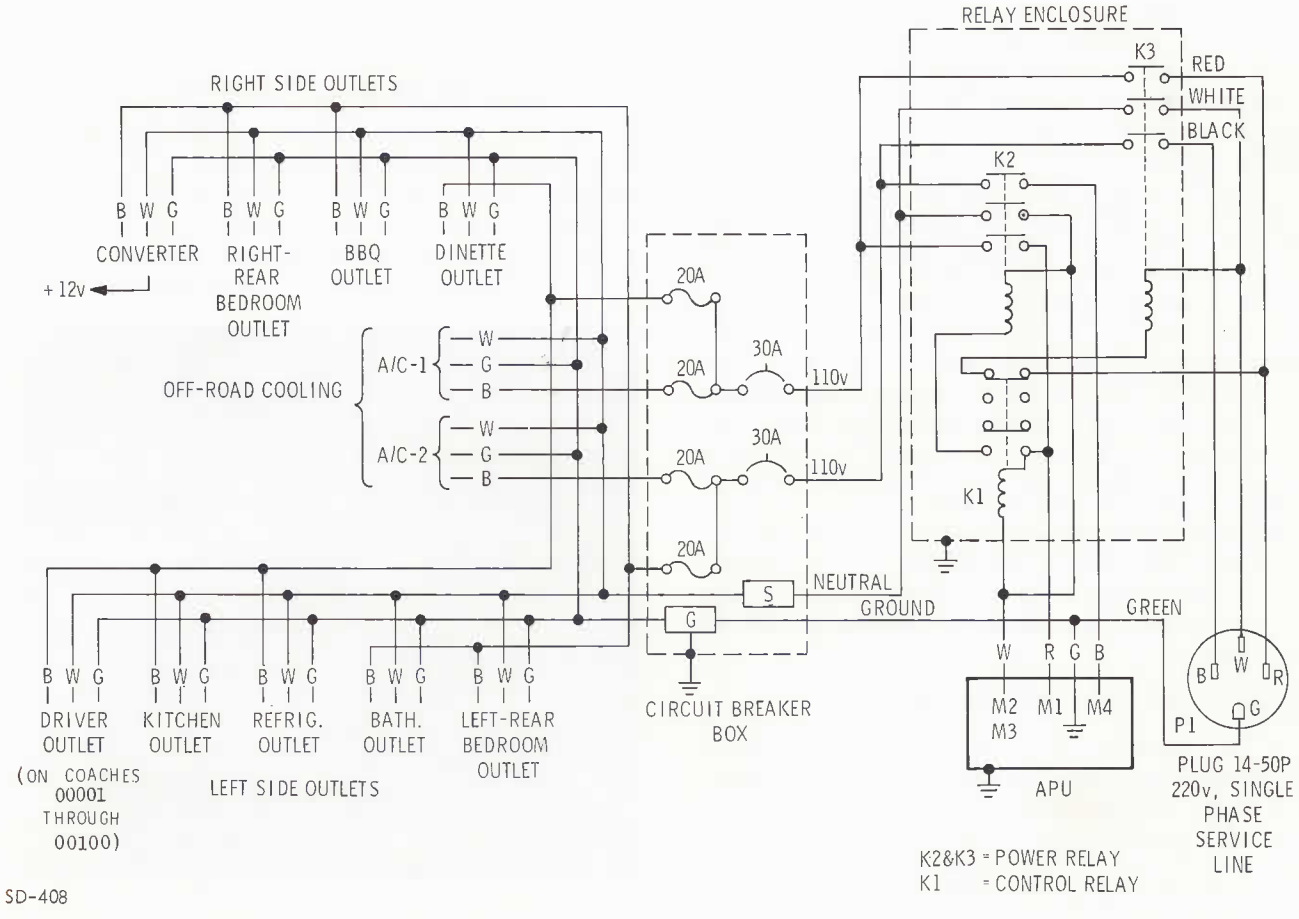


Figure 5-34. 110 VAC Electrical System

(5) AC to DC Converter. The converter transforms and rectifies the 110 VAC source from either the service line or the APU, to provide the 12 VDC for the domestic appliances.

In addition, this unit will charge the domestic battery without requiring personal monitoring or manual switching. The 12-volt output remains effectively constant over a wide range of AC input power variations (95 to 130 VAC), which could be encountered in remote areas.

The converter, located under the passenger seat, operates on the AC branch line on the right side of the coach and is rated at 45 amperes (70 amps max.) continuous current.

(6) Auxiliary Power Unit (APU). This electrical generating plant will provide all the necessary 110 VAC power, when external city power is unavailable. As explained in paragraph 5-6e, the 6.5 kw APU can be started or stopped from either the domestic panel or from the APU.

(7) Operation. When operating from external city service, connect plug P-1 of the service line to 220 VAC single phase. This will supply 110 VAC to each of the two electrical branches. Both 110-volt branches (red and black leads) connect to the circuit breaker box (load center) (see fig. 5-34) through one set of relay contacts of power relay K3. Relay K3 is energized by one branch (red lead) through relay contacts of the control relay K1 when K1 is de-energized (APU inoperative). If the APU is providing current for two 110 VAC electrical branches, one branch from the APU (red lead, M1) will energize relay K1, which in turn opens the circuit of the service line (red lead) which had energized K3. Energizing K1 permits the M1 line from the APU to energize K2 relay coil. Relay K2 will now route the 110 VAC power to the circuit breaker box (load center) through the contacts of relay K2. The 110 voltage from the APU opens the circuit of the service line to electrically disconnect external power even with the service line connected physically to a 110 VAC source.

e. Auxiliary Power Unit (APU).

(1) General. The auxiliary power unit (APU) is mounted at the rear left of the coach to the left of the automotive power plant (see fig. 5-29). The APU supplies electric current for the domestic appliances and for recharging the domestic and automotive batteries. The unit is for use in remote areas or where campground electric power is not available.

The APU is cooled by air that enters through the grill at left rear of coach and flows through the generator, around the crankcase cylinders, and exhausts out and downward at the rear of the coach. The engine exhaust is also vented, through a muffler and tail pipe arrangement, out and downward at the rear of the coach where it blends with the cooling air flow to force exhaust gases away from the coach. A spark arrestor must be attached to the exhaust elbow if it is required in your area. Check local regulations.

Warning

Operation of the APU without a spark arrestor is illegal in all national forests and national state parks and in certain agricultural areas in California. You as owner/operator could be considered liable and negligent for all damages in case of fire. Take no chances; spark suppress the unit. Contact your RVD dealer or Onan representative.

(2) Operation.

(a) Starting. The APU can be started from either the domestic panel (fig. 5-30) in the coach or by the "START-STOP" switch mounted on the forward end of the APU (fig. 5-35). When starting from inside the coach, press up on the "START" switch for "110 V GENERATOR." From outside on the unit, hold switch in "START" position. Release either switch when engine starts.

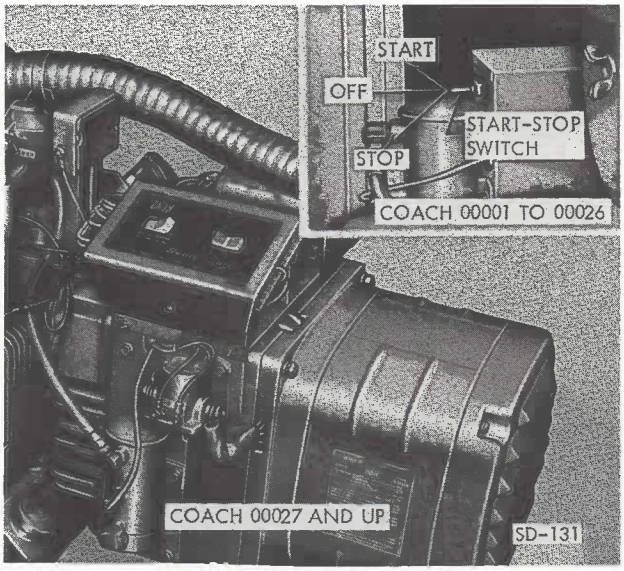


Figure 5-35. APU Start-Stop Switch

(b) Applying Load. Allow APU to warm up for a few minutes before connecting a heavy load. Keep the load within rating of the APU. For example, do not turn on domestic air conditioning if high wattage appliances (coffee percolator, toaster, electric fry pan) are in use. Startup wattages for some items are three to four times higher than their running wattages.

(c) Stopping. To stop unit from inside coach, press switch on domestic panel down to "STOP" position; from outside, press switch on APU (see fig. 5-35) down to "STOP" position. Release either switch when engine stops.

(d) Hot and Cold Climates. To avoid heat build-up during hot weather, see that air flow over APU is unobstructed. Keep cooling fins on generator and engine cylinders clean and free of dirt. Have ignition timing checked and set by a qualified service representative. When operating in cold weather, make certain that the crankcase oil is of the proper viscosity; see Periodic Maintenance Chart, figure 4-19. Change oil if necessary, but drain only when engine is warm. Protect against moisture and condensation. Have carburetor main jet adjusted for a slightly richer fuel mixture (fig. 5-36). Keep ignition system clean and properly adjusted. Check specific gravity of automotive battery (see Section 6) and keep it in a fully charged condition. Partially restrict cool air flow into APU compartment but use care to avoid overheating.

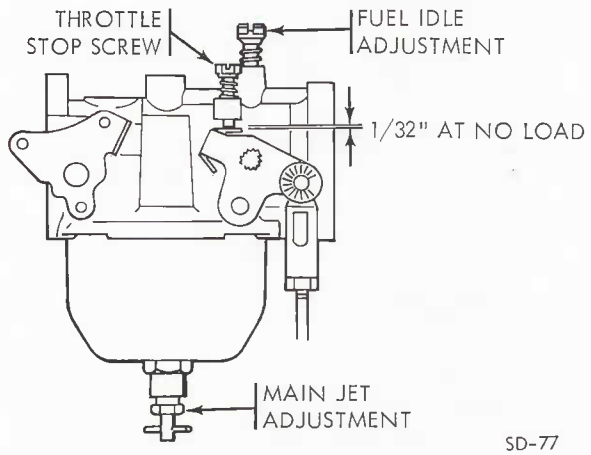


Figure 5-36. APU Carburetor Adjustment

Caution

Never remove APU oil filler cap when APU is operating.

(e) High Altitude. For operation of APU at altitudes over 2,500 feet above sea level, the carburetor should be adjusted for proper (leaner) air-to-fuel ratio. To adjust, turn carburetor main jet adjustment clockwise. Remember, maximum power will be reduced approximately 4% for each 1,000 feet increase above sea level.

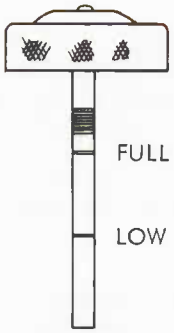
(3) Maintenance. Regularly scheduled maintenance of the APU is essential for long service life. The Periodic Maintenance Chart (fig. 4-19) can be used as a guide; however, actual operating conditions under which a unit is run should be the determining factor in any maintenance schedule. When operating in dusty or dirty conditions, increase the frequency of service. Check the condition of the crankcase oil and filter, air cleaner, etc., frequently.

(a) Crankcase Oil Level Dipstick (fig. 5-37). The oil capacity is 4 U.S. quarts (4-1/2 with a filter change). Fill to "FULL" mark on the oil level indicator. When adding oil between changes, always use the same brand that is in the crankcase. Various brands of oil may not be compatible when mixed together. Change oil at frequency listed and use oil of viscosity and grade specified in figure 4-19.

(b) Crankcase Oil Filter (fig. 5-37). Change the crankcase oil filter every 200 hours (fig. 4-19). If oil becomes so dirty that the markings on the oil level indicator cannot be seen, change the oil and filter and shorten the filter replacement interval.

(c) Air Cleaner (fig. 5-37). Proper maintenance of the air cleaner is extremely important. Neglecting regular routine maintenance will result in reduced engine life.

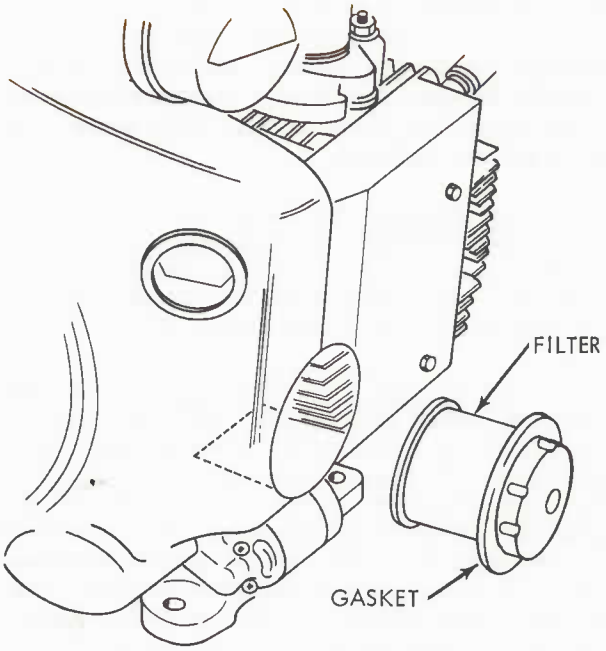
Allowing the element to become plugged with dirt will restrict the intake of air into the engine. Inspect the element for tiny holes or tears that would permit particles of dust or dirt to enter the engine.



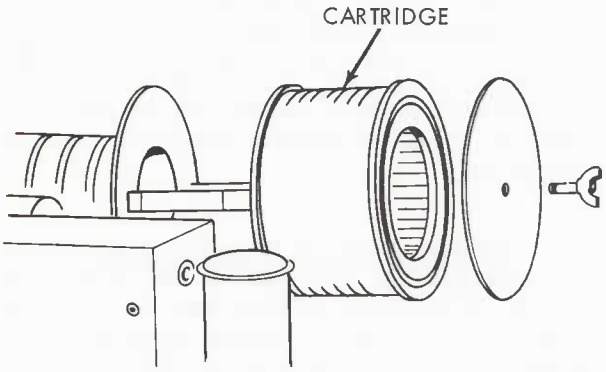
Caution

DO NOT REMOVE WHEN
APU IS RUNNING

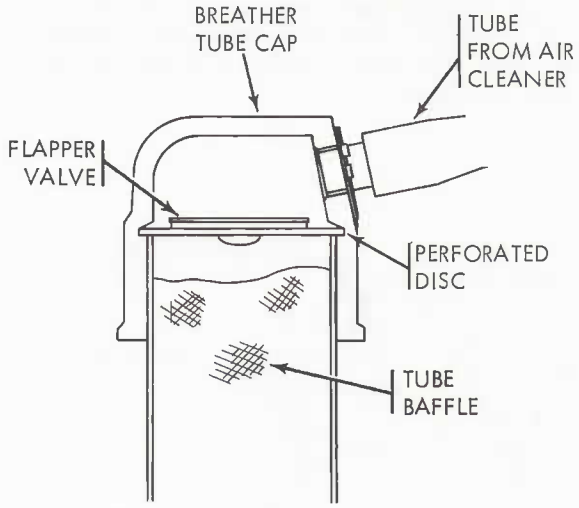
OIL FILLER CAP AND DIPSTICK



OIL FILTER



CARBURETOR AIR CLEANER



Caution

INSTALL VALVE WITH PERFORATED
DISC ON LOWER SIDE TOWARD ENGINE.
FAILURE TO OBSERVE THIS CAUTION
WILL RESULT IN OIL PRESSURE LEAKS.

CRANKCASE BREATHER

SD-409

Figure 5-37. Auxiliary Power Unit (APU) – Maintenance Views
(Cont'd to 5-38)

The element will normally require cleaning every 100 operating hours and replacement every 500 operating hours, or more often under severe operating conditions. See figure 4-19 for further service information.

(d) Crankcase Breather (fig. 5-37). Detach tube and lift off rubber breather cap. Carefully pry flapper valve from cap. Otherwise, press hard with both thumbs on top of cap, and fingers below, to release valve from rubber cap. Wash this fabric flapper-type check valve in a suitable solvent. Dry and install.

> ***Caution***
>
> Position perforated disc toward engine.

(e) Fuel System (fig. 4-21). The APU uses regular grade gasoline supplied from the coach fuel tank. The unit has its own fuel pump with filter, carburetor, and lines. Empty the carburetor and sediment bowls of any accumulated sediment. Clean the fuel pump screen thoroughly in a suitable solvent. If engine fails to start, remove spark plugs and clean and set gap (0.025 inch); dry thoroughly and reinstall. Install new plugs if old ones are excessively pitted or fouled.

The APU incorporates a "sisson" choke. This choke uses a heat sensitive bimetal element to control the choke plate position. In addition to this, a solenoid is actuated during engine cranking, closing the choke all the way. The bimetal is factory set to position the choke to the proper opening under any ambient condition. If adjustment of the bimetal is needed, it must be made at ambient temperature. Do not attempt adjustments until engine has been shut down for at least one hour. Loosen the screw which secures the choke actuating arm to the linkage. Shortening the actuating arm makes the fuel mixture richer. Lengthening the arm makes the fuel mixture lean. For ambient temperatures above 85°F, the choke should be fully opened. For ambient temperatures below 25°F, the choke should be opened 1/4 inch with the solenoid not engaged. Upon completion, tighten the screw that secures the choke actuating arm to the linkage.

(f) Spark Plug Gap. Gap spark plug to 0.025 inch using a spark plug gapping tool.

(g) Generator Maintenance (fig. 5-38). The generator normally needs little care other than a periodic check of the brushes, commutator and collector rings. If a major repair job on the generator should become necessary, have the equipment serviced by an Onan dealer who is thoroughly familiar with the operation of electric generating equipment.

(1) Generator Brushes. Install new brushes when the old ones are worn to the dimensions shown in figure 5-38. Remove the end bell band and the end cover to expose the brush holders. Remove the three screws holding each brush holder in place. Remove the old brushes and clean the holders so the new brushes can move easily in their holders. Install the new brushes in the same manner as the old ones. Never substitute a brush which may appear to be the same, for it may have different characteristics. New brushes are shaped to fit and seldom need sanding to seat properly. If some brush sparking occurs after replacing brushes, run the APU under a light load until the brushes wear to a good seat.

(2) Generator Rings. Collector rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright, newly machined appearing surface.

(h) Vacuum Speed Booster. Use a fine wire to clean the small hole in the lower side of the vacuum booster mounted on the top of the engine intake manifold. Do not enlarge this hole.

If there is tension on the external spring when the plant is operating with a light or no-circuit load, the tension may be due to improper adjustment, restricted hole, or a leak in the booster diaphragm or gasket. See figure 5-38.

(i) Governor Linkage. The linkage must be able to move freely through its entire travel. Clean the joints (do not lubricate) every 50 hours of operation and adjust if necessary as shown in figure 5-38. Also inspect the linkage for binding, excessive slack, and wear.

(j) Battery Charging. The charging rate for the domestic batteries is controlled by the converter and the automotive voltage regulator. If frequent starts and short operating periods require an increased charging rate, have a service mechanic make the proper adjustment.

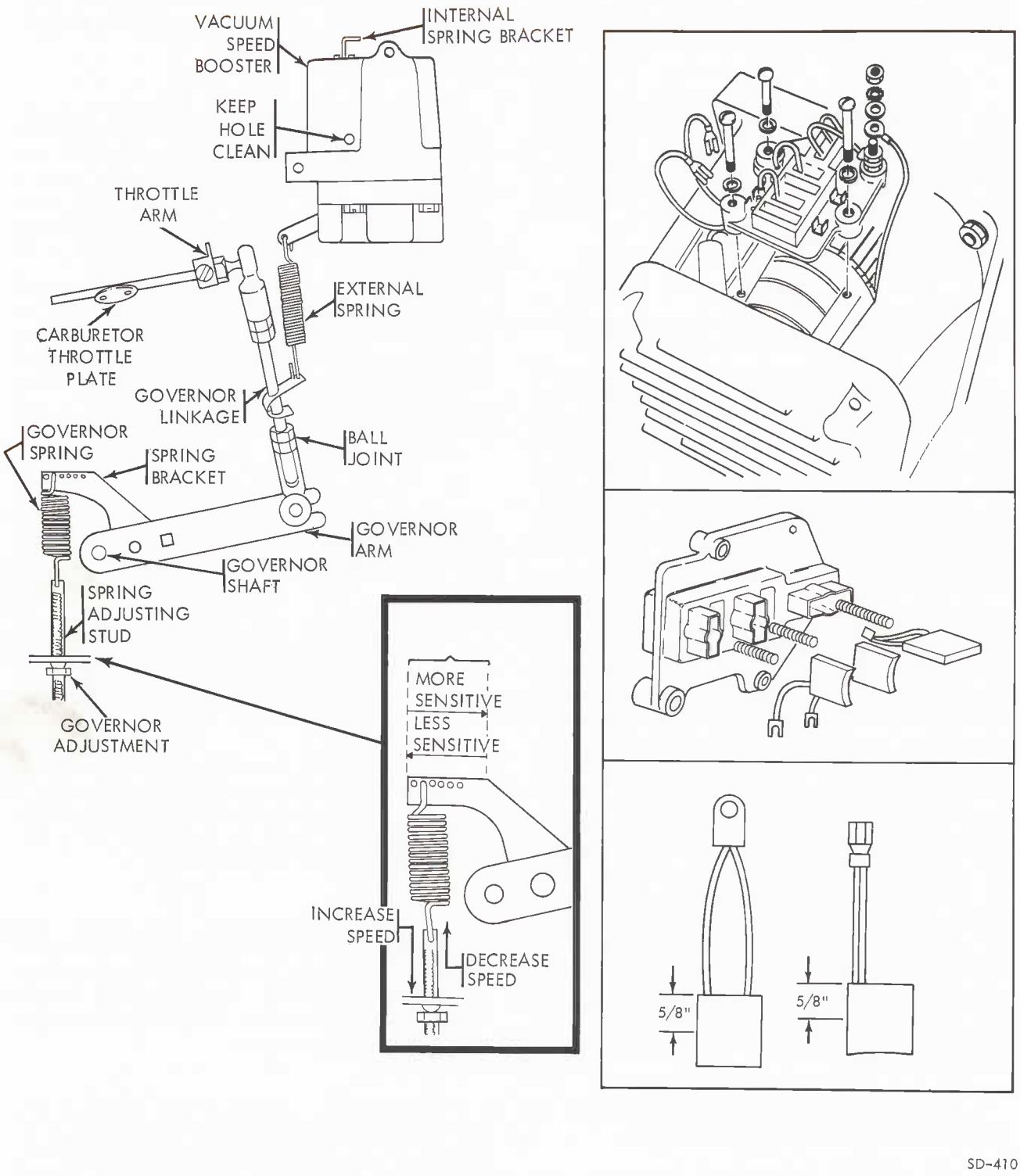


Figure 5-38. Auxiliary Power Unit (APU) – Maintenance Views (Cont'd from 5-37)

5-7. LIQUID PETROLEUM GAS (LPG) SYSTEM

a. General Description. The LPG system provides the fuel to operate your range, oven, water heater, and furnace central heating. This system consists of an LP gas tank, safety valve, fill valve, outage valve, service outlet valve, two-stage regulator with gas supply lines and connectors. It is important for you as a coach owner to be familiar with the location, controls, and operation of the gas system.

b. Liquid Petroleum Gas. Liquid petroleum gas is a compressed gas, stored in liquid form, which allows modern living convenience no matter where you travel. Known also as "Butane," "Propane," or "bottled gas," it is safe, economical, and easy to transport. LP gas burns with a clean blue flame.

Warning

DO NOT connect natural gas or any other gas unapproved for this system. The system is designed for liquid petroleum gas only. Improper use and/or handling of liquid petroleum gas can present an extreme danger to the operator. Besides being highly flammable, it is also potentially lethal, and breathing in this colorless gas must be avoided. Only a qualified service representative should be allowed to make any repairs or major adjustments.

c. Storage Tank. The storage tank for the LPG system is located at the right rear of the coach (fig. 5-39), and holds up to 20 gallons of "Propane." An automatic safety device on each appliance shuts off the associated gas supply line from the

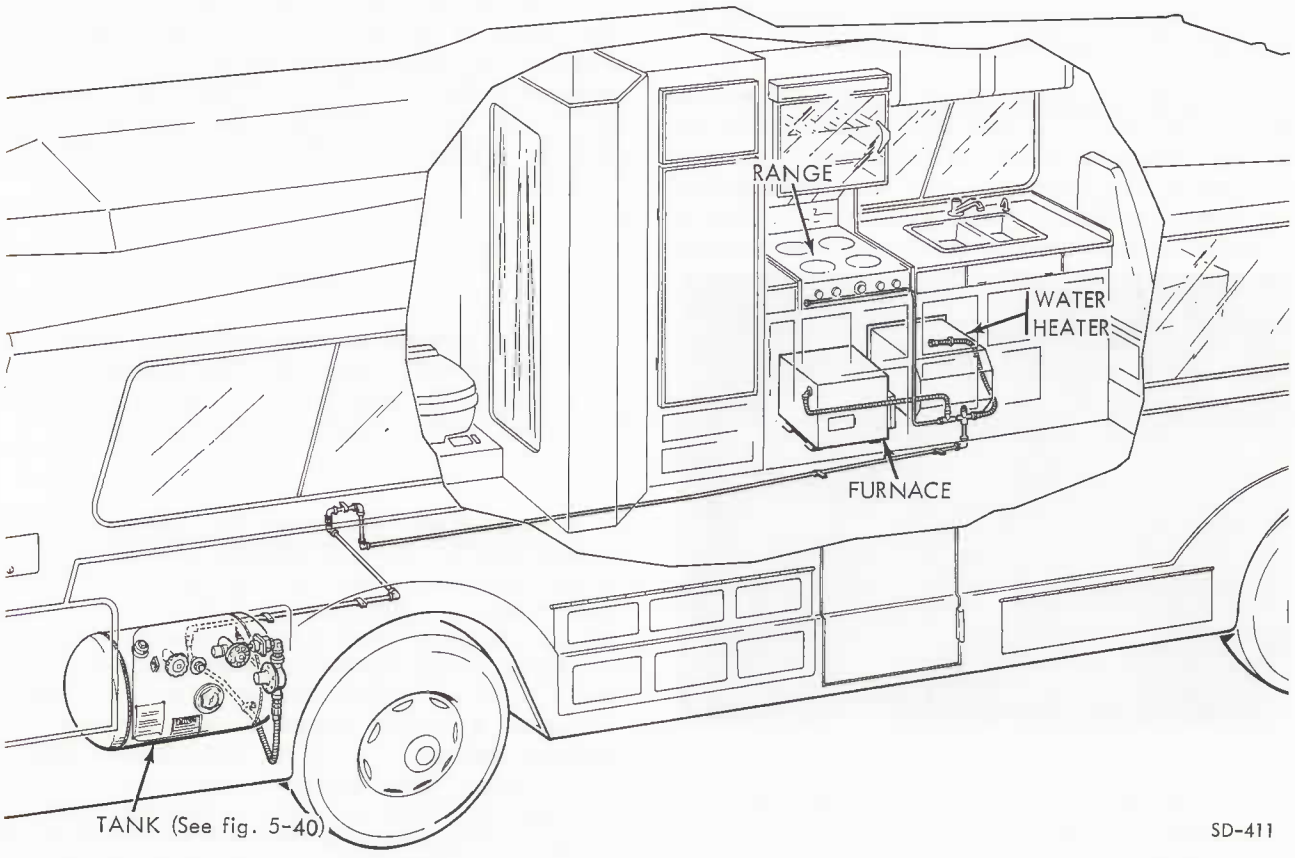


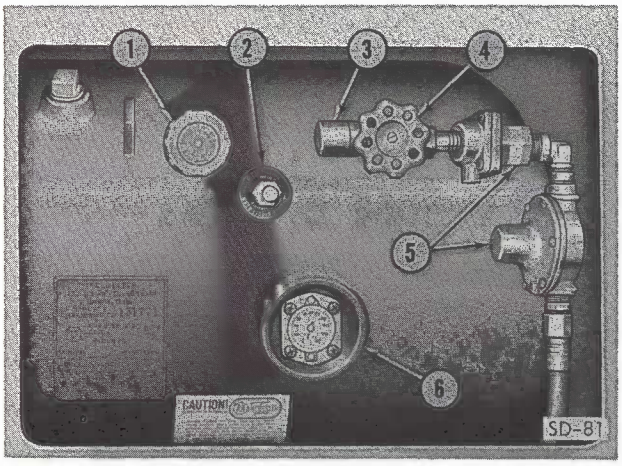
Figure 5-39. LPG System

tank should the tank become empty. The one exception to this is the top burners on the gas range, which can be closed only by the front range control knobs. Before some of the appliance pilot lights can be relit, the safety shutoff valve on each appliance must be reset.

> ***Warning***
>
> When refueling the gas system, turn off all appliances, vehicle ignition, and auxiliary power unit. Do not smoke, strike a match, or operate any exposed electrical motors or devices in the service area during or immediately after filling.

The capacity of the LPG system in operational hours can not be estimated for all conditions. But as a general rule, a family of four can expect approximately two weeks use from a full gas supply. This capacity is directly dependent on the living habits of your family. If there is extensive cooking or baking, large hot water usage, or the furnace operates often, these variable demands will alter the available LP gas supply.

d. Safety Relief Valve (fig. 5-40). To protect against any condition that might create an excess of gas pressure in the storage tank – such as overfilling, high temperatures, or a combination of both – a safety relief valve is installed to automatically discharge this excess onto the ground.



1. FILL VALVE
2. OUTAGE VALVE
3. RELIEF VALVE
4. MAIN OR SERVICE VALVE
5. TWO-STAGE REGULATOR
6. LP GAS LEVEL METER

Figure 5-40. LPG Tank

This valve operates when the combination of ambient temperature and volume of stored gas creates a pressure greater than 312 psi.

e. Fill Valve (fig. 5-40). The fill valve provides a standard propane connection that will permit fast and easy filling at most stations. Never allow the tank to be filled above legal liquid level capacity, as explained in k below.

f. Outage Valve (fig. 5-40). The outage valve indicates the legal liquid level. During the filling operation, this valve is opened. As soon as the liquid propane spills on the ground from the valve, stop filling the tank. At this point, the tank is 80% filled (19.8 gal.). The valve insures that the remaining space in the tank (20%) is reserved for gas vapor, and for expansion due to normal temperature increases.

g. Main or Service Outlet Valve (fig. 5-40). The only valve the operator will be concerned with is the main or service outlet valve. Connected with a left-hand thread to the regulator, this valve controls all the gas for the LPG system. When the coach is parked and the LP gas appliances require fuel, you open the outlet valve all the way counterclockwise until it stops, then move it back 1/4 turn clockwise. This allows you to quickly determine whether the valve is open or closed.

NOTE

It is illegal in some states to leave the shutoff valve on while traveling. Check the regulations of those areas that will concern your coach travel.

h. Two-Stage Regulator (fig. 5-40). As the stored gas is used, it passes through the two-stage regulator, which reduces the system pressure from about 100 psi at the tank to about 0.5 psi at the appliance. Gas pressure flowing from the regulators to the appliances must always be within the 6 ounce per square inch (or 14 inches of water column). A higher pressure may permanently damage the controls of the gas-operated appliances, and a lower pressure may cause them to malfunction. Never attempt to adjust the regulator yourself. This should be done only by an authorized service representative. The pressure regulator is connected directly to the appliances through the gas supply lines and connectors.

i. Gas Supply Lines. The gas supply lines are designed for LP gas operation only. Do not attempt to use any other gas. The gas supply is routed through a gas manifold to three gas lines which are connected directly to the oven and range, water heater, and furnace.

j. LP Gas Level Meter (fig. 5-40). The percentage of usable gas remaining in the LP system is indicated on an "LP GAS LEVEL" meter, mounted on the tank. The tank can be refilled when the meter indicates 25% full or less.

k. Refilling the LPG System. There are many LP gas suppliers located throughout the country. Convenient locations can be found in a local telephone directory under "GAS-Liquified Petroleum-Bottled and Bulk." Some of the major fuel companies also publish directories listing locations of fueling stations.

Propane gas, rather than butane, should be used whenever the outside temperature is expected to be below 32°F. Butane gas does not vaporize at temperatures below 32°F, but propane gas vaporizes down to -44°F.

You are not permitted to fill your own LP gas tanks, but if you are familiar with the proper procedures you can guide the LP gas attendent in performing his service more efficiently.

(1) Pre-Filling Procedures. Turn off the gas supply at the main valve. Check that all pilot lights, vehicle ignition, and the auxiliary power unit are shut down.

Warning

Do not smoke, strike a match or operate any electrical motors or devices during or immediately after filling.

(2) Filling Procedures (for gas attendent).

(a) Shut off service or main valve at tank.

(b) Clear lines by lighting burner at kitchen range and allowing it to burn until flame burns completely out (approx 15 sec).

(c) Turn burner off and be certain all other burners and pilot lights are off.

(d) Connect filler nozzle to tank and open outage valve.

(e) Open valve on filler hose and fill until liquid appears at outage valve.

(f) Shut off filler valve, shut off outage valve, and disconnect filler nozzle.

(g) Follow instructions for relighting each appliance.

(3) Post-Filling Procedures. When refilling an empty tank, or filling the tank for the first time, system may have to be bled to remove any trapped air in the lines. With the main valve on and all other appliances off, light one of the range burners. More than one match may be required before the air is removed and the gas starts through the burners. When burner lights, the major portion of air in the system has been removed. The other appliances should now be easy to light.

Caution

Prior to initial filling of LPG tank, it should be purged at least 4 times with LP vapor up to 15 psig.

1. Maintenance. Since LP gas is heavier than air, it will settle toward the ground or floor of the vehicle when released to the atmosphere. And since the gas cannot rise, it takes longer to dissipate and disappear. Because of this, lack of knowledge of the handling characteristics can be extremely dangerous. Periodically inspect the gas lines for damage or deterioration.

Practice safety at all times. Know the distinctive garlic-like odor of LP gas. Perform a general inspection of the entire system for possible leakage when it's filled, before and after each trip, and any time trouble is suspected. Ask the LP gas dealer or attendant to check the system, and to answer any questions you may have about LP gas or the operation of the various gas-operated appliances.

If a leak is suspected, turn off the service or main outlet valve immediately. Open all windows, vents. and doors. Do not light any matches or turn on any electrical equipment until the leak is found and corrected, or until the interior of the coach is free of all gas vapors.

To test the gas lines and connections for leakage, turn on gas and apply a soapy water or bubble solution directly to the area in question.

Warning

DO NOT use matches to detect leaks in the LPG system.

Whenever any part of the system has been disconnected, the system must be retested for leakage. Be sure all gas connections are made by an experienced technician in compliance with national, state, and local regulations in force.

Never use a wrench to tighten the main outlet valve (fig. 5-40). The valve is designed to close leaktight by hand. Do not force it. If a leak does occur and cannot be stopped by hand, have an authorized repairman check the valve for repair or replacement. This is a machined brass fitting and no sealing compound is required.

If a sealing compound is to be used on any gas connection, you must apply it sparingly and to the male threads only. Any gas connection which has been loosened or tightened must be checked for gas leaks, using a soap solution. Seal all leaks and finally, wipe away all traces of the solution.

No special maintenance of the container or its controls are required except to keep the immediate area clean and free of dirt, mud and debris. The container and valves are designed and tested to meet certain specifications. Do not alter, tamper, modify, or attach anything to the container at any time.

Keeping the container's service or main outlet valve closed when not in use—even if the container is empty—will prevent moisture from collecting inside the container or regulator. Moisture can cause regulator freeze-up, which may damage the regulator. In areas where it can occur, an LPG dealer will inject a little dry methyl alcohol—approximately 1 ounce of methyl alcohol to 20 pounds of fuel, or one pint to 100 gallons—into the container to prevent freeze-up.

5-8. DRAINAGE SYSTEM

a. General. Your coach is equipped with a drainage system that provides maximum flexibility and convenience. It allows the full use of all sanitary facilities during long trips, as well as extended stays at campsites with disposal stations.

The drainage system (fig. 5-41) has been designed to function in both independent and dependent situations. If you are in an area where there are no sewage facilities, your self-contained coach allows you full use of the toilet and drains. Or, if at an improved campsite, you can connect the coach system to the camp's standard disposal stations.

NOTE

Sewage tank should always be filled with water to 1/8 or 1/4 full before use to prevent solids from drying in tank. Tank should be flushed periodically depending on extent of coach use even with Waste Destruct System in good operating condition.

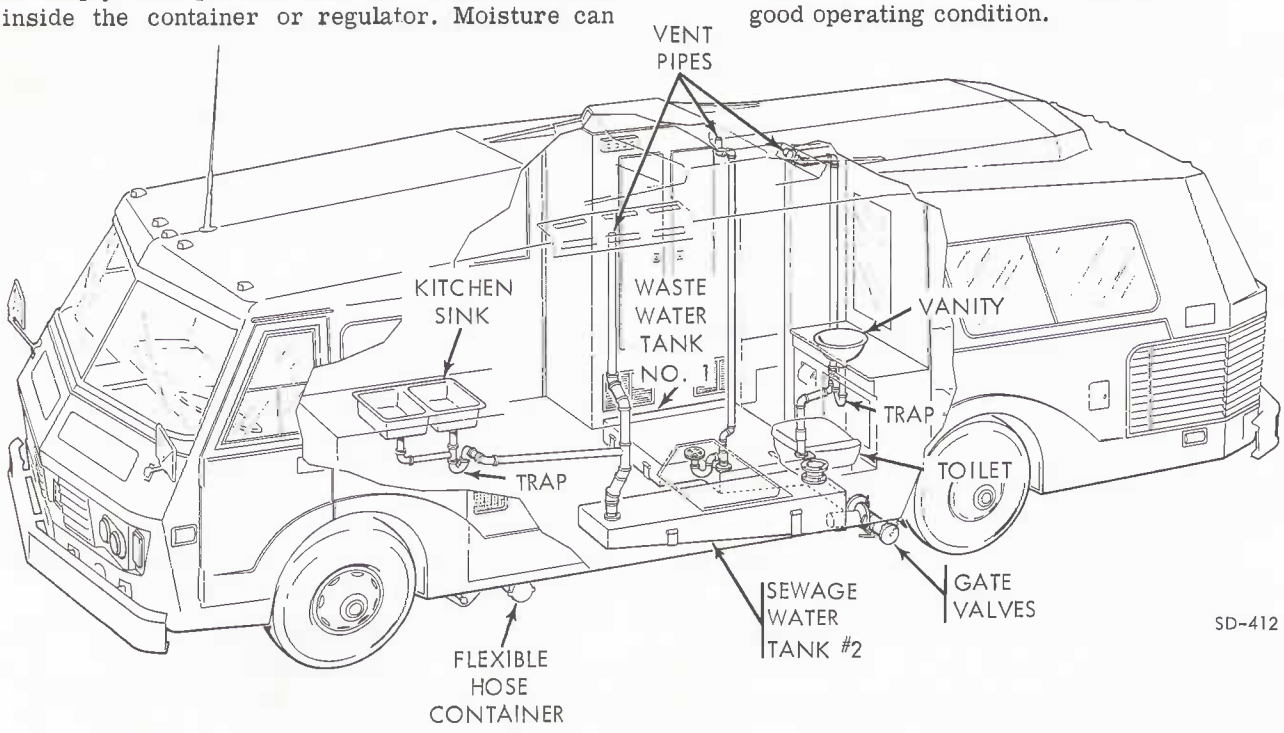


Figure 5-41. Drainage System

The waste water of the bathroom sink and shower can be drained separately from the sewage water of the kitchen sink and bathroom toilet–yet the system is designed so that only one connection is required to drain both tanks. This dual-tank feature permits continued drainage of waste water whereas sewage water can be retained for later disposal.

b. Campsite Drainage. In addition to understanding and abiding by local regulations regarding waste/sewer water disposal, it is the responsibility of every "good neighbor" to use utmost discretion when emptying the drainage system. There are acceptable and convenient methods and facilities available to you for the proper disposal of sewage. Help yourself and your fellow travelers by practicing good housekeeping at all times.

Most states have strict laws and regulations that prohibit dumping of any type of sewage above ground, on public highways, road beds, in rivers, lakes, public parks, and beaches. Offenders may be subjected to heavy fines.

In addition, we suggest that you practice water conservation while camping and thus avoid excessive drainage/sewage dumping.

c. Disposal Stations. Disposal or sanitary stations are common throughout the USA and Canada. They are located in improved campsites, rest stops, and service stations. A current directory, which is periodically updated, may be obtained from your FMC Dealer, travel club, or through any leading recreational magazine. Service stations that provide this disposal service usually do so for a minimum charge.

The 3-inch diameter flexible drain hose provided with your coach connects between the main drain outlet and the facilities of the disposal station to permit safe and sanitary drainage of all waste materials. This drain hose uses a universal connector and should fit all standard installations.

d. Holding Tanks. The drainage system contains the dual holding tanks; one for retaining the waste wash water, and the other for the sewage water (fig. 5-41). A 29-gallon waste water holding tank (tank No. 1) collects the drainage from the vanity sink and shower. A 37-gallon sewage water holding tank (tank No. 2) collects drainage from the kitchen sink and toilet. You can determine waste water level of each tank by glancing at indicators on the domestic panel (fig. 5-30).

NOTE

When operating in the self-contained mode, it is important to monitor the level of the holding tanks. Overfilling will result in liquids backing up into the piping system.

The drainage holding tanks are made of black seamless polyethylene which is completely free from corrosion problems. Location of each tank is on the underside of the coach as shown in figure 5-41. The drain outlet, common to both tanks, is located in front of the left rear wheel (fig. 5-42).

e. Drain Control. The waste gate valves control the discharge of waste material from the holding tanks. They can be easily reached and operated, although not in immediate view when standing next to your coach. Remember that each waste holding tank has its own separate spring-loaded valve, which can lock in either the open or closed position (see fig. 5-42).

On the left side of the coach, facing the drain outlet assembly, the valve handle on the left is the sewage tank (toilet and kitchen sink) gate valve which controls drainage from tank No. 2; the valve handle on the right (longer of the two handles) is the waste water (shower and vanity) gate valve which controls drainage from tank No. 1.

NOTE

When either one or both of the waste holding tanks are to be emptied, be sure that the waste water gate valve and the sewage tank gate valves are closed before removing the protector cap.

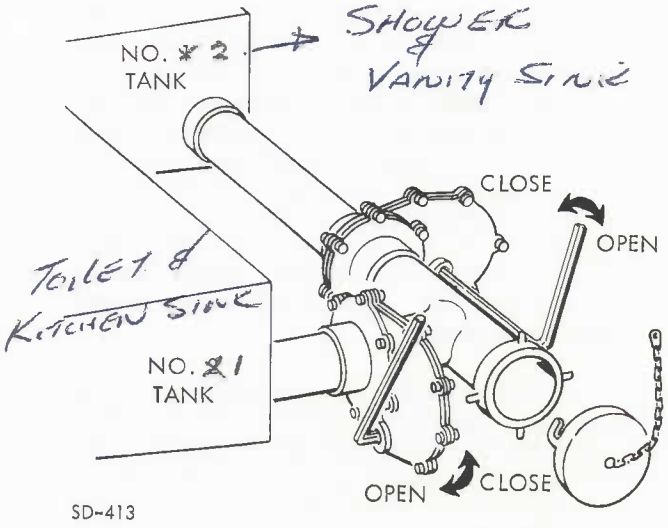


Figure 5-42. Drain Control Gate Valves

The flexible hose is stored in a separate compartment located to the rear of the left front wheel (see fig. 5-41). Because the output from the two gate valves discharges into a single pipe, only one connection is required for both tanks. Connect this 3-inch diameter hose to the drain outlet by inserting the bayonet fitting onto the drain outlet, then twist clockwise for a secure connection. To allow complete drainage, make certain there are no sags in the flexible hose.

Depending on your camping arrangements, you will find that one holding tank will fill faster than the other (usually tank No. 1 fills first). In an emergency or special situation, both tanks can be interconnected to allow a greater holding capacity.

To interconnect the holding tanks, twist the drain outlet cover cap to secure the bayonet type connection. Then, open both gate valves, allowing the contents of both tanks to reach a common level. Now both tanks can be used simultaneously.

After you have been using this method and are ready to drain the system, close both gate valves and place a bucket under the drain cap. Slowly remove the cap so the waste water trapped between the valves and drain cap can be caught in the bucket. Then attach the flexible hose and proceed to drain the system as previously instructed.

If you have been using the drainage system with the gate valves open, turn off each valve and place a bucket under the drain outlet, between the outlet and the drain cap, before removing the cap.

If you are using a sewer hookup while parked, keep both gate valves closed. Only open the valves when draining a full system, or when preparing to leave. The coach toilet, unlike your home facilities, does not have a large volume of water available for each flush. Therefore during use, the waste liquids in the coach drain immediately, allowing the solids to settle to the bottom of the tank. But by keeping the valves closed during use, the solids will be held suspended in the liquids of the tank. Then during the draining operations, solids can be carried out with the rush of the liquids as the gate valves are opened.

After the holding tanks are completely drained, close the gate valves and add about 20 gallons of water through the toilet and shower drains to the holding tanks. This should insure that all material has been flushed out. Open the gate valves again to drain the tanks.

Now add some odor control chemicals to the tanks and add enough water to fill the tanks approximately 1/8th full. This will prevent solids from drying and adhering to the tank which causes cleaning problems. Clean the flexible hose and return it to the storage compartment.

f. Drainage Hole–(Remote Locations). In remote locations where there are no sanitation facilities, a drainage hole can be used to empty the holding tank.

NOTE

Be certain to check for local regulations which may prohibit this drainage method.

The drainage hole should be a minimum of 15 inches in diameter and 30 inches deep, larger if possible (see fig. 5-43). Do not locate the drainage hole within 100 feet of lakes or streams and 200 feet of a fresh water well. Cover the hole with a board that has a 3-inch circular cutout in the center. Place this cover over the hole and insert the end of the flexible hose through the cutout. The end of the flexible hose should be able to drop straight through this cutout. Pack some of the loose dirt around the board to seal the hole and prevent any rain or dirt from filling in the hole.

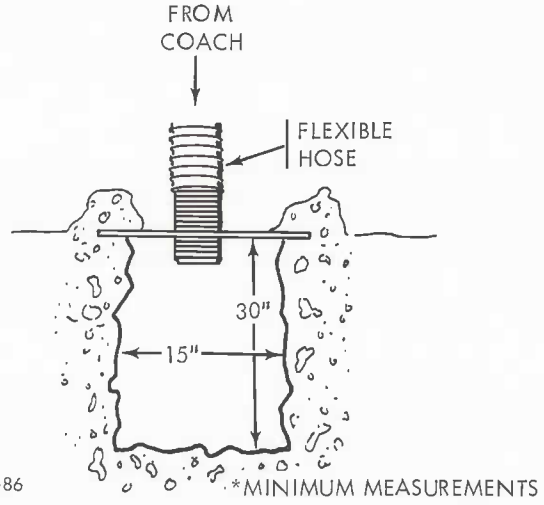


Figure 5-43. Drainage Hole

It is good practice to drain the holding tank the night before leaving the campsite. This will allow time for the ground to absorb most of the drainage, and making filling and covering the hole an easier task.

g. Waste Destruction System. The heart of the "WASTE DESTRUCT" system is a Thermasan unit. This unique unit utilizes the main engine exhaust heat to convert waste into a harmless emission.

The system provides you with the freedom and convenience of self-containment. The Thermasan unit does not increase the amounts of atmosphere pollutants and is designed to operate with engine exhaust systems which meet federal and state emission standards.

The operation of the waste destruct system is controlled at the domestic panel by a single switch-"WASTE DESTRUCT." There are three phases of operation indicated on the panel: (1) when the system is in the "RDY" (standby or ready) mode. (2) when the system is burning waste or the "RCT" (reaction) mode. (3) when the system has completely destroyed all available waste or the "ETY" (empty) mode. The last mode indicates both holding tanks have been evacuated and are ready for further use.

In general, the Thermasan unit operates as follows (see fig. 5-44).

By agitation through vehicle motion, waste is broken down into minute particles and suspended in the waste water.

The vacuum-temperature switch closes when the exhaust temperature reaches the "RCT" (reaction) temperature. The speed sensor switch closes when the coach speed is about 35 miles per hour, indicating that the exhaust system is at the proper temperature. With these switches closed, the metering injection pump begins to draw the waste from the holding tanks. The waste is filtered to allow only liquids and minute particles to reach the pump. The solid wastes are left behind for further decomposition.

The waste is then pumped and injected, in controlled volume, through an injector into the coach's exhaust system. The injector screens and sprays the prepared waste into the stream of the engine exhaust. The heated exhaust then destroys all the waste and bacteria, and emits gaseous by-products which are invisible, bacteria free, odorless, and harmless.

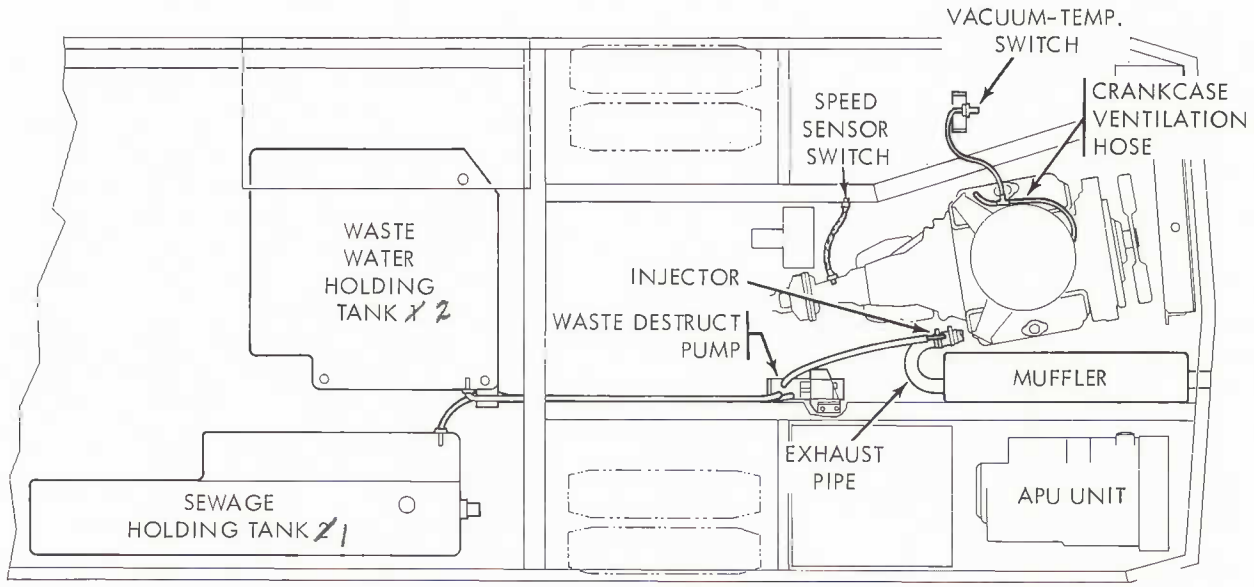


Figure 5-44. Waste Destruct System

Even with the waste destruct system, occasional draining of the two holding tanks (using the conventional sewer hookups) is required. The Thermasan unit does not prevent you from using the regular method of draining the holding tanks. Tanks should be drained a minimum of once each year to remove any foreign particles that may have been chemically insoluble, and to drain all waste below the probe which does not normally burn off.

To reduce chance of a frozen holding tank, it is recommended that you add an approved antifreeze solution such as Thetfords Aqua-Kem, or its equivalent.

No lubrication or adjustments are required on the waste destruct system, so it is virtually maintenance-free. However, when replacing the exhaust muffler, please advise the mechanic to use care in removing the Thermasan injection components.

> ***Caution***
>
> Do NOT use kerosene, fuel oil, alcohol, or other similar products as antifreezing agents in your holding tanks. Avoid disposing of paper products with "wet strength" such as Kleenex, napkins, and other similar articles into the holding tanks.

h. Maintenance.

(1) Vanity, Shower, and Kitchen Drains. If the coach drainage system becomes sluggish, it probably means that one of the traps needs cleaning. Location of drainage traps is shown in figure 5-41.

Any drainage trap can be cleaned by using a plunger or by removing the trap. Do not use liquid or powder cleaning compounds, since these could damage the drain lines.

(2) Holding Tanks. When the drain outlet is connected to an external drainage system with the gate valves open, the tanks drain continuously. This will leave the solid wastes in the holding tanks and create a very unpleasant cleaning task. Should this happen, close the gate valves, fill the holding tanks (through the toilet) half full of water, and agitate by vehicle motion. The turbulence and surging of the water should loosen the solids for adequate drainage.

5-9. FIRE EXTINGUISHER

A portable, multi-purpose dry chemical fire extinguisher is located behind the driver's seat, attached to the wall. To use, release the clamp and remove the extinguisher from the bracket. Pull the safety pin from the handle, squeeze handles, and apply chemical under flame.