LP GAS SYSTEMS

LP Gas Systems – Your coach uses liquid-petroleum (LP) gas as a fuel for all the appliances which require heat, such as the water heater, furnace, range, oven, and absorption-type refrigeration. LP gas is economical and effective for these purposes; when proper precautions are taken, it is a safe form of energy. There are two types of LP gas in common usage, propane and butane. If the temperature is below 32°F, butane will not vaporize. It can be used only in warm climates. Propane, on the other hand, will vaporize at any temperature above –40°F. Most LP gas used in motorhomes is propane.

Storage Tanks for LP Gas – LP gas is stored in cylindrical-shaped welded steel or aluminum tanks, having hermispherical-shaped ends. These tanks are designed to withstand the high pressure necessary to contain the LP gas in liquid form.

All LP-gas tanks are mounted to the underside of the floor of the coach and vented freely to the atmosphere so that in the case of leakage the gas will not be discharged into the interior of the coach where it might be ignited by a pilot flame and cause an explosion.

All LP-gas systems have a pressure regulator mounted in the vicinity of the tank outlet.

When any appliance is not being used, the gas shut-off valve controlling that appliance should be placed in the "OFF" position. When the motorhome is to be stored for any period of time the main shut-off valve at each tank should be closed. For maximum safety, all LP-gas valves should be turned off when the motor home is traveling on the highway.

LP Gas Leak Detector – A standard feature in all REVCON motorhomes is the LP-gas leak detector. It is designed to quickly detect leakage in any LP-gas (vapor phase) piping and appliance system. The device does not prevent leaks. It will visibly show that LP gas is leaking in the system, when the red plunger is actuated in the proper test sequence. The test is conducted as often as seems necessary. The operator should be encouraged to use it before a trip is undertaken, after arrival, and after returning home.

Checking for Leaks – The LP-gas distribution system should be checked for leaks at frequent intervals. An oily substance having a pungent odor is always mixed with LP gas so that if there is a leak, you will be able to smell it.

There are a wide assortment of gas leak-detecting instruments available, but one of the best methods to determine where the gas is leaking is to use a soap solution. Such a solution can be made by mixing ordinary liquid dishwashing detergent with water. This can be applied with a small paint brush to gas lines and connections. Bubbles will appear at any place where gas is leaking out of the system. Most leaks occur at fittings and the leak can usually be stopped by tightening the fitting. Where such tightening fails to stop the leak, the fitting must be replaced.

WARNING: No flammable material should ever be used to check for leaks in an LP-gas system.

Occasionally water may find its way into an LP-gas system and if this water freezes, the operation of the system is impaired. The injection of anhydrous methanol into the LP-gas system, using approximately one ounce for each 20 lbs. of fuel, will usually eliminate this problem. The anhydrous methanol ab-

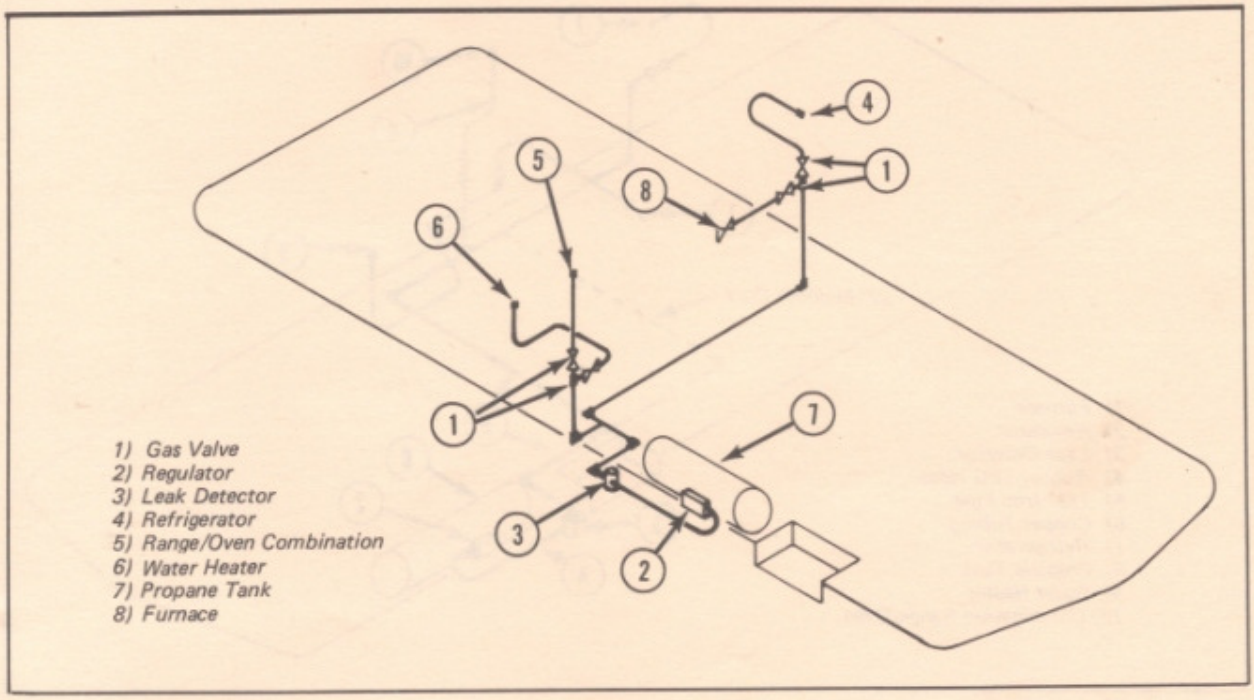

Figure 167 – 27' Rear Bath LP Gas System

LP GAS SYSTEM (Continued)

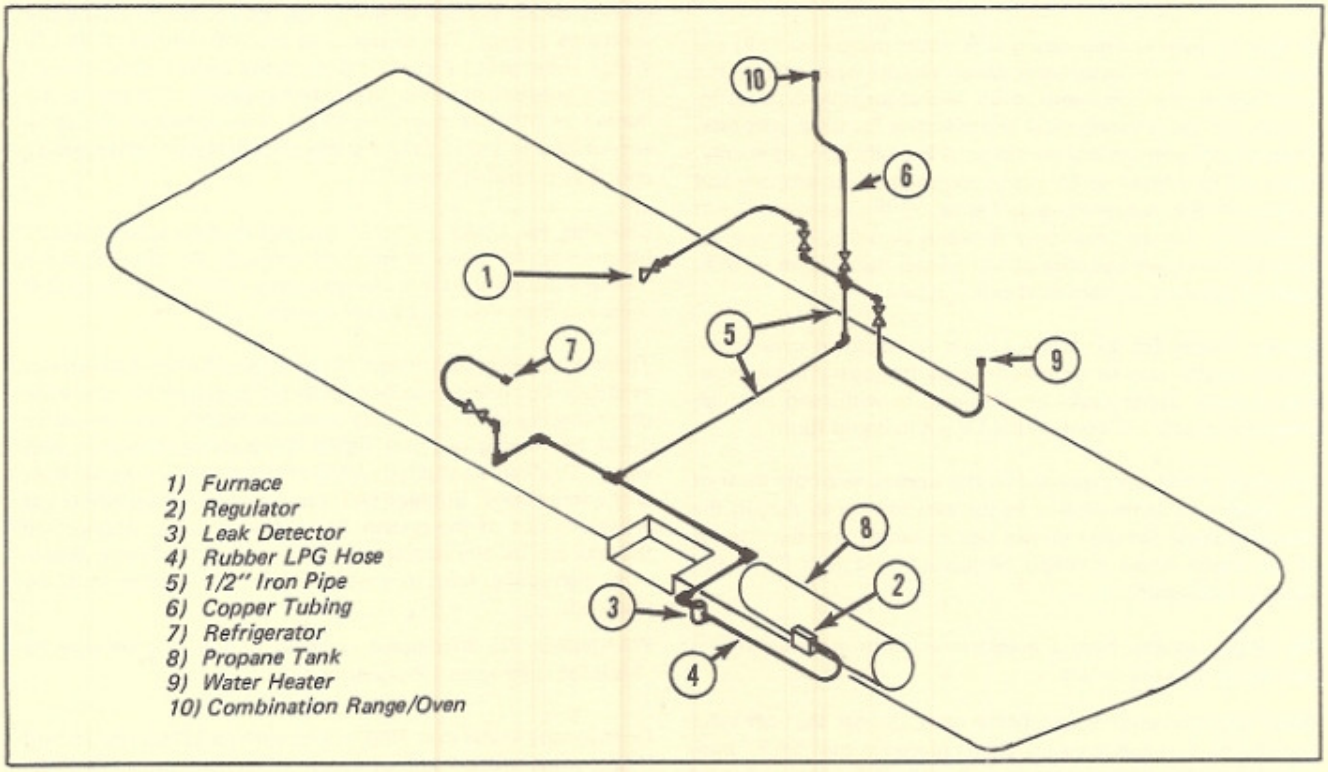

Figure 168 – 30' Rear Bath; 30' Mid-Bath; 33' Island Bath LP Gas System

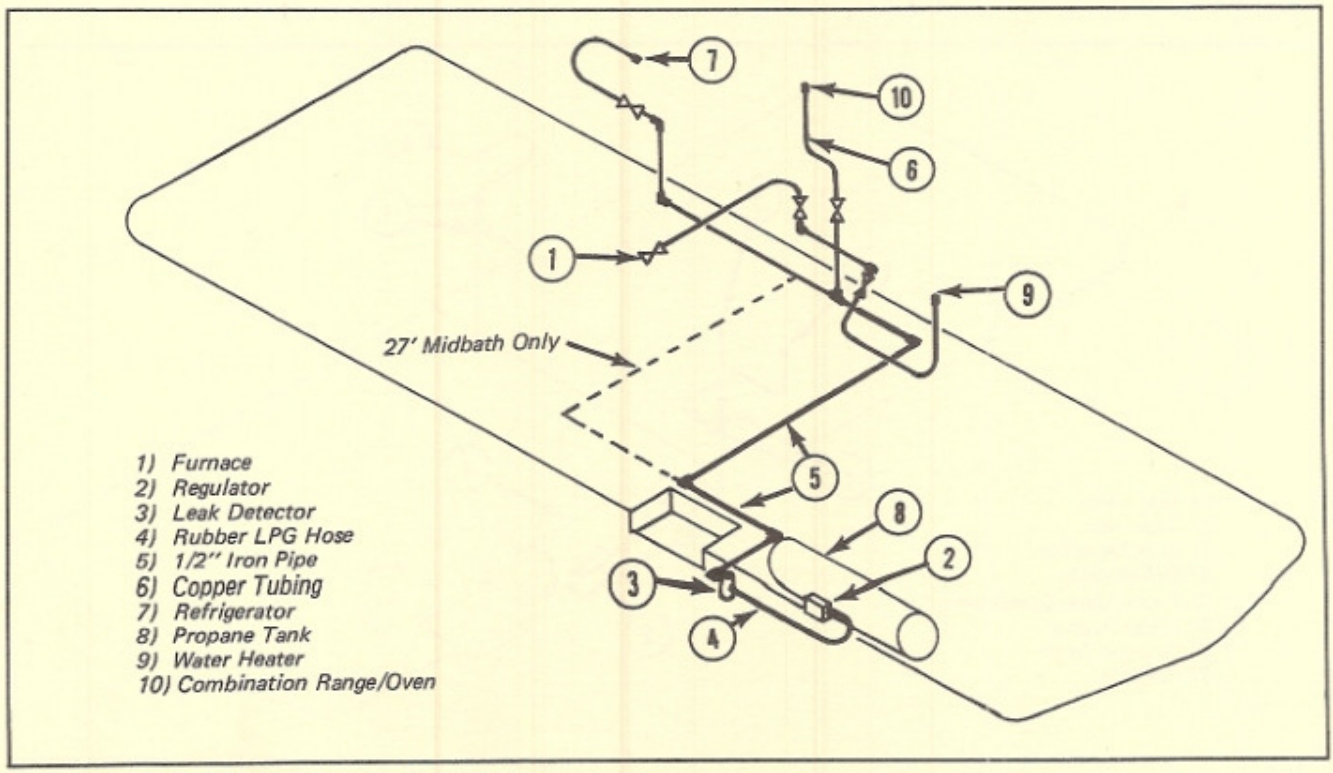

Figure 169 – 27' Mid-Bath; 33' Mid-Bath LP Gas System

LP GAS SYSTEM (Continued)

sorbs the water and it then passes out of the system as the gas is used.

Most of the gas appliances which have a continuously operating pilot light, and which go on and off intermittently and automatically, are required to have a safety device which minimizes the possibility of explosion in case one pilot light should accidently become extinguished. The appliances which usually have this device include the furnace, hot-water heater, refrigerator, and oven. Without such a device, an explosion would be likely to result if one pilot light went out and it continued to emit propane.

Lighting Gas Appliances – The water heater, furnace, and refrigerator all have automatic or built-in pilots and do not require a flame to light the pilot.

Maintenance of LP-Gas Systems – LP-gas systems normally operate for periods of time with a minimum of maintenance. However, a few tips on maintenance will be useful.

After an extended period of use, the safety devices which are actuated by pilot lights will sometimes become inoperative. If difficulty is encountered getting a main burner to ignite, the safety device should be replaced.

One of the worst enemies of LP-gas systems is the spider. Spiders are attracted to tunnels and holes. They frequently spin webs across or through the orifices of gas-fired appliances. These webs restrict the air flow and produce a weak yellow flame which typically deposits carbon. If a defective flame is observed, spider webs should be suspected, and all parts of the burner should be wiped clean and orifices should be blown clear with compressed air.

If spider webs are not present and the flame is still too yellow and filled with carbon, it is probably that the air adjustment of the burner should be modified. This can be done by trial and error until the bluishness of the flame is maximized.

FURNACE

FURNACE – The Suburban Dynatrail furnace in your Revcon is a direct vent system furnace design certified by the American Gas Association and the Canadian Gas Association for safety and performance. The Suburban NT-34L Furnace operates on LP gas only. The blower uses 12 volts DC, and the furnace is rated at 34,000 BTU per hour input.

NOTE: Preventive maintenance to the furnace is recommended at least once a year.

FURNACE OPERATING INSTRUCTIONS –

1. To light the furnace, turn the manual valve to the "OFF" position and wait five (5) minutes with blower running. (Set thermostat above actual temperature to operate blower.)
2. After five (5) minutes, set the thermostat to the "OFF" position.
3. Open manual valve. (Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.)
4. Set thermostat on desired temperature.
5. Allow 30 seconds for main burner to light.
6. If burner does not light, set thermostat on "OFF" and repeat steps 1 through 5.
7. After three (3) attempts with no ignition, go to shutdown and determine cause.

   NOTE: Do not continue to cycle furnace through thermostat in an attempt to get ignition.

TO SHUT DOWN FURNACE –

1. Turn manual valve to the "OFF" position.
2. Set thermostat on "OFF."

FURNACE BURNER ADJUSTMENT – To adjust primary air to the main burner, the small sheet metal cover found just below and to the right of the electrode must be removed. Behind the cover is a slotted screwhead. With a screwdriver, turn screwhead counterclockwise for less primary air and clockwise for more primary air. A symptom of too much primary air will be a howling or screeching noise when the burner is on (reduce air to correct). A symptom of too little air will be sooting on the exterior vent and a distinct yellow and floating flame (increase air to correct). A hard blue flame is the sign of correct adjustment.

NOTE: If a sooting condition cannot be corrected by the air adjustment on the burner, discontinue use of furnace until problem can be corrected by a qualified service agency.

SEQUENCE OF NORMAL FURNACE OPERATION –

1. When the thermostat calls for heat, the blower motor is energized immediately.
2. As the blower motor reaches approximately 75% of the normal rpm (within 3 to 5 seconds) the microswitch, in response to the air flow, will engage, allowing current flow to the module board.
3. After a 12-to-18 second delay, current will pass through the board to the solenoid valve.

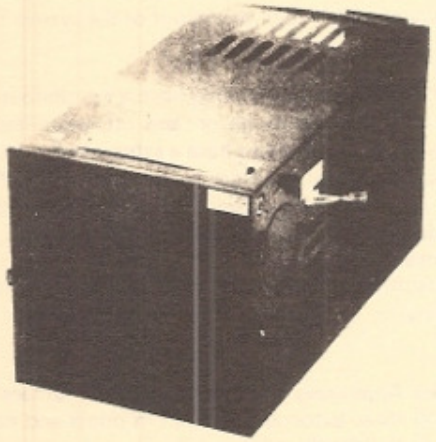

Figure 170 – Suburban Dynatrail Heater

4. The current to the valve opens it and allows gas to the main burner. The spark at the electrode then ignites the main burner.
5. After main burner ignition (usually within 18 to 25 seconds), the flame detector will sense the presence of main burner flame and de-energize the lockout feature within the board. After the 12-18 second delay, if the main burner does not ignite or the flame detector does not de-energize the lockout feature within seven (7) seconds, the unit will go into lockout. At this time, it will be necessary to set the thermostat on "OFF" and repeat steps 1 through 6 of the lighting instructions.
6. After three (3) attempts with no ignition, or main burner continues to go off within 30 seconds, go to shutdown and determine cause (see Service Hints, page 145).
7. If within a period of approximately two (2) minutes after the main burner is lit, the thermostat is turned back, both the blower motor and the solenoid valve are de-energized. However, if the furnace continues to run longer than two (2) minutes, which it normally should, a slight snap can be heard from within the casing. The snap is caused by the fan switch as it changes its position. After this occurs, if the thermostat is satisfied or turned back, the solenoid valve will close, the flame on the main burner will go out, but the blower will continue to run for a short period of time and will then shut off. The purpose of this is to remove most of the remaining gases from the heat exchanger. Be assured that this period of blower override is a part of the unit's normal operation.

FURNACE FAN SWITCH – The purpose of the fan switch is to control the sequence of the blower operation. The fan switch is a two-pole switch. When the bimetal disc of the fan switch is heated to the operating temperature, the switch closes. This completes a circuit through the motor from a direct source. The blower will continue to run as long as the chamber is hot even though the thermostat is satisfied and the main burner is off. When the chamber cools, the fan switch changes back to its original position and shuts the blower off. If blower and burner shut off simultaneously after thermostat is satisfied,

FURNACE (Continued)

then the fan switch failed to change over. This is a symptom of a faulty switch – replace it.

FURNACE LIMIT SWITCH – The purpose of the limit control is to turn off the gas to the main burner if for any reason the furnace becomes hotter than that which is safe. Improper operation of the furnace due to the limit control does not always indicate a defective control. If the circulating air is blocked or only partially so, the limit control will function and cause the main burner to cycle. Cycling on the limit is not always undesirable – if it happens only occasionally. This is a good indication of safe operation and will most likely happen on a warm day. If cycling happens too often or for an extended period, the circulating air system should be thoroughly cleaned.

If for any reason the limit control is found to be defective, there is no recommended method of repairing it. Because of its importance for safety reasons, it should be replaced with a new one.

CAUTION: Never shunt the limit control even for only temporary operation.

FURNACE MICROSWITCH – The microswitch has two purposes:

1. It is an air prover. It operates in response to the flow of air generated by the blower. Hence, if for any reason the air from the blower is not sufficient, the switch will not operate. This may be caused by a slow motor due to low voltage, restricted return air, inadequate duct discharge area, or lint accumulation on the blower wheel.
2. The switch allows time for the blower to pull in a sufficient amount of air to support combustion before it engages. Once it engages, the circuit is completed through the limit switch and module board to the gas valve. The valve opens, gas flows to the burner, and ignition occurs.

FURNACE BLOWER ASSEMBLY – Although one motor drives all wheels, the blowers are separate. The combustion-air blower is sealed so as to allow no passage of air between it and the circulating room-air blower. The combustion-air blower draws air from the outside atmosphere, discharges it into the combustion chamber, and forces the combustion products out the exhaust tube. The circulating room-air blower pulls return air in and forces it across the heat chamber, discharging into the area to be heated.

FURNACE MAINTENANCE AND CLEANING – Your furnace should be inspected annually by a professional service person. A careful inspection of all gaskets should be made and if any gaskets show signs of leakage or deterioration, they should be replaced. It is imperative that the control compartment, burner, and circulating air passageways of the furnace be kept clean. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc.

Periodic examination of the venting system should be maintained. It is important that the flow of combustion air entering from the rear of the furnace not be obstructed. Periodic visual checks of the burner in operation should be made. Adjust the primary air of the burner for a proper flame, if required.

Cleaning of the chamber and main burner will be required if the furnace has been allowed to operate with a high yellow flame. The yellow flame is due to incomplete combustion (lack of air) and will deposit a soot formation inside the chamber and on the main burner. The furnace is equipped with an oiled, sealed blower motor and requires no oiling.

NOTE: To service the furnace, the combustion chamber assembly must be removed from the furnace cabinet (see instructions for removing chamber following).

FURNACE COMBUSTION CHAMBER REMOVAL

1. Shut off gas bottle.
2. Disconnect power supply (quick disconnect plug on right side of cabinet).
3. Disconnect gas line from manual shutoff valve.
4. Remove shutoff valve from side of furnace.
5. Remove shipping screw securing chamber shield to cabinet (lower right corner).
6. Remove the vent cap screws (outside) to free exhaust tube.
7. Remove kickboard from cabinet.
8. Pull chamber forward and out of cabinet.
9. To reinstall; reverse above procedure.

FURNACE SERVICE HINTS, DIAGNOSIS, AND CORRECTIVE MEASURES

NOTE: To service, furnace must be removed from cabinet.

CONDITION – NO HEAT

1. **Thermostat Off** – Check to be sure thermostat is calling for heat. Wire to thermostat could be off terminal.
2. **Gas Supply** – Be sure manual gas valve is in the open position (level parallel to gas line).
3. **Electrical Connections and Power** – Battery must be charged. If battery is low, there will be sufficient power to run the blower, but not enough to run the blower at full speed. If blower doesn't run at its prescribed speed, the mircroswitch cannot be engaged and gas will not flow to the main burner nor will the spark begin. Be sure the connection of the voltage lines in the terminals are tight.
4. **Malfunctioning Microswitch** – Be sure the microswitch is moving in far enough to open the solenoid valve and

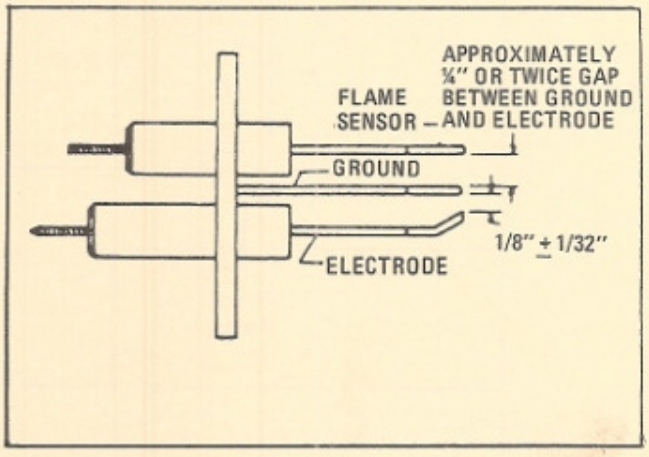

Figure 171 – Electrode Assembly

FURNACE (Continued)

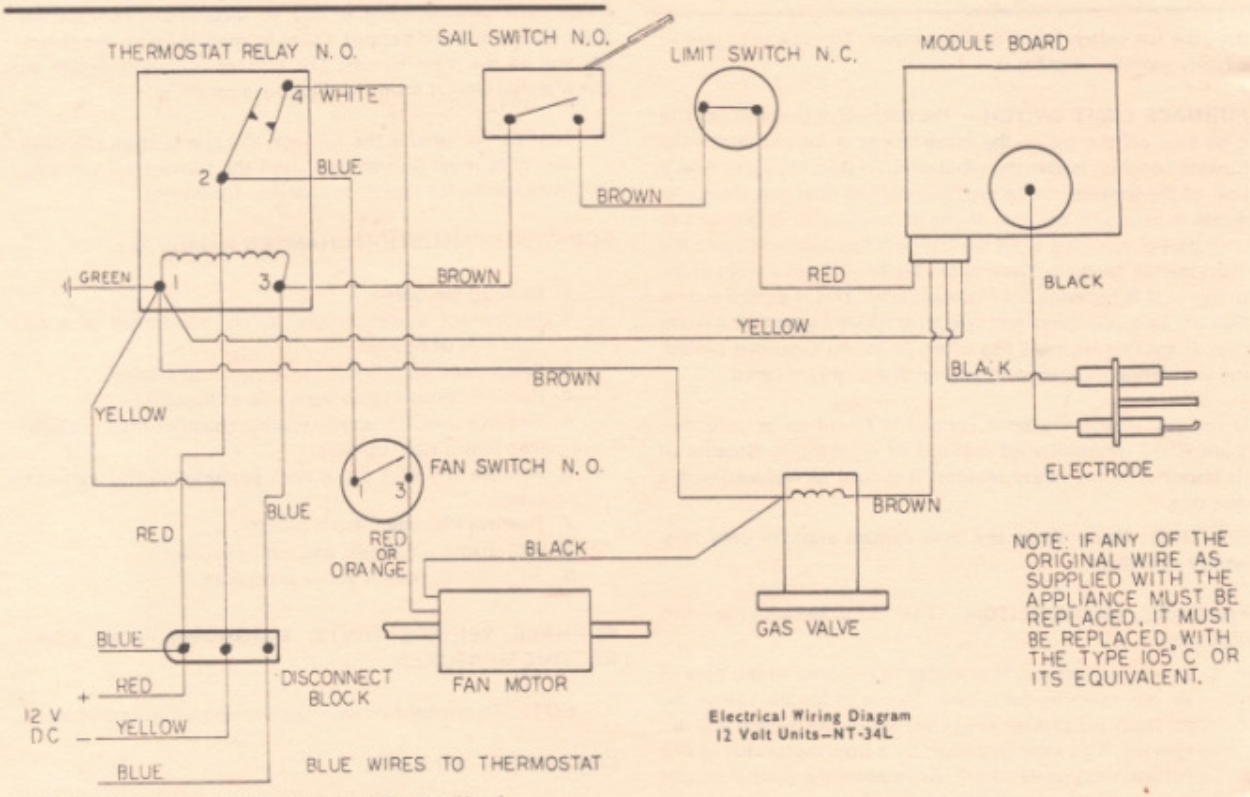

Figure 172 – Furnace Electric Wiring Diagram No. 1

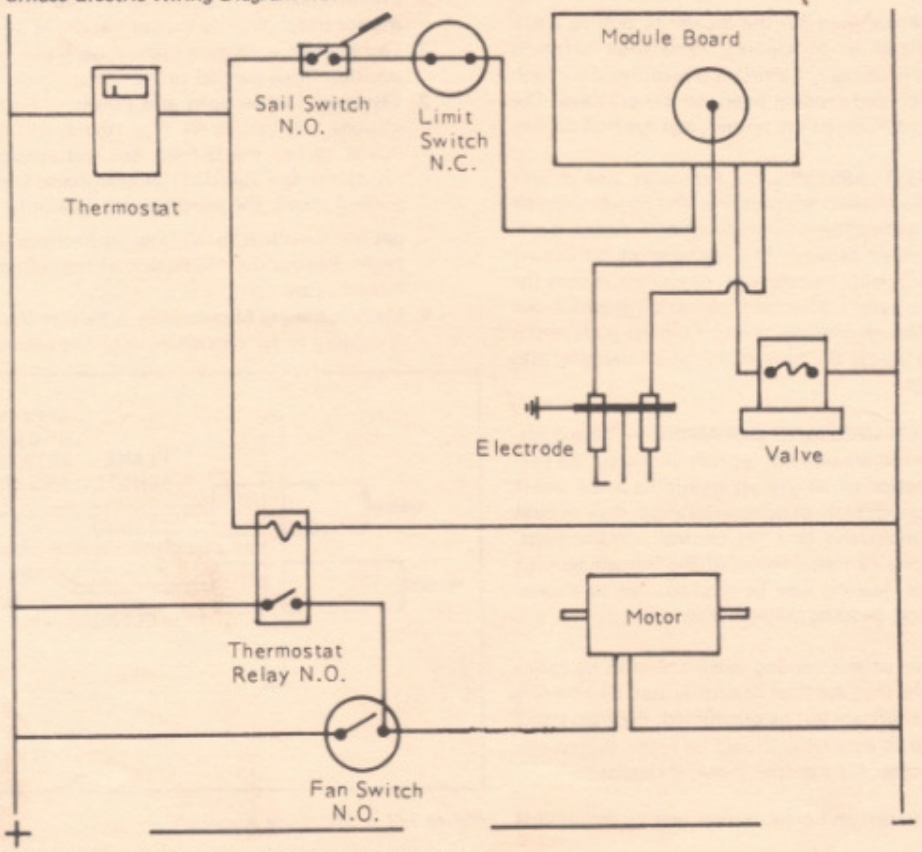

Figure 173 – Furnace Electric Wiring Diagram No. 2

FURNACE (Continued)

to energize the spark module board. If the switch is not moving in, clean any dust or dirt from the actuator pin. Other reasons for the switch not moving in are:

a. Insufficient blower speed (slow motor due to low charged battery, faulty motor, lint and dust accumulation on the blower wheels, or restriction of return air to furnace). Check wiring in accordance with unit's wiring diagram to assure the proper polarity of the 12-volt DC power supply is observed. This polarity must be observed so the motor will run the proper direction of rotation to insure correct air delivery.

b. Faulty microswitch – Replace switch if valve does not open when switch is manually engaged. Switch should also be replaced if battery is fully charged and blower motor running at top speed fails to engage switch within 6 to 7 seconds.

NOTE: To service switch, combustion chamber must be pulled out.

5. **Gas Valve** -- Within 30 seconds after motor reaches 75% of its rpm and microswitches engage, check the following:
   a. Voltage at valve – If voltage is present but valve is not opening check wire connections in valve circuit.
   b. If wire connections are okay, replace the valve.
   c. If no voltage at the valve, check circuit completion through mircroswitch, limit switch, and module board.

6. **Blower Not Operating** – Possible causes:
   a. Check power supply to furnace (blown fuse).
   b. Check electrical connections at furnace.
   c. With thermostat points closed, check for circuit completion across terminals 2 and 4 of thermostat relay. if there is continuity across terminals 2 and 4 and wiring to motor is OK, replace motor.
   d. No circuit across terminal 2 and 4 and wiring to relay is OK, replace relay.

7. **Short cycling (fan switch)** – If burner and fan shut off simultaneously when the thermostat is satisfied, it indicates a defective fan switch. Replace switch (chamber must be removed).

8. **Defective relay** – Relay may be faulty if motor fails to start when thermostat calls for heat. This will be evidenced by a click when the thermostat is raised and motor fails to operate.

9. **Ignition failures – Cautions:**
   Never operate the furnace with the electrode wire disconnected nor with the electrode assembly removed from the furnace.
   Never use a battery charger to check out an electronic ignition furnace.
   Never use a screwdriver on any part of the electrode assembly while furnace is in operation.
   Be certain that the spark from the electrode never reaches the flame sensor portion of the electrode assembly.
   Be sure the electrode assembly screws are snug at all times, especially after the electrode has been removed and reinstalled.
   Discharge Module Board Before Removing From Furnace. This is accomplished by placing a screwdriver on the terminal coming out of the coil (where electrode wire connects) and grounding it to some portion of the furnace.
   If the module board is found to be defective, it must be replaced – it is not field repairable. Any attempts to repair the board may alter the board and cause it to operate in an unsatisfactory manner.
   Insure that the gap between electrode and ground is always 1/8". The gap between the ground and the flame sensor should be approximately twice the gap between electrode and ground to insure no sparking to sensor. Sparking to sensor will damage module board.

10. **Electronic Ignition System** – The electronic ignition system is made up of three main parts. The module board, the electrode assembly and the electrode wire. The module board is the brain of the electronic ignition system and it has four functions:
    a. When the blower reaches full rpm, a circuit is completed to the module board.
    b. After a 12-18 second delay, a circuit is completed to the solenoid valve.
    c. At the same instant, the elctrode produces a spark as indicated by the small neon bulb on the board as it flashes.
    d. The module board also performs the lockout function in cases where the spark fails to light the burner.When lockout occurs, the spark stops and the voltage from the module board to the gas valve is discontinued and the valve closes. The unit will remain in lockout and the blower will continue to run until the thermostat is turned off.

FURNACE PROBLEMS – It is important to determine the type of problem being experienced and then the proper checkout procedure can be made. The following is a list of problems, how to identify in which area the problem is located, and how to correct it.

1. **Electrode Not Sparking** – With blower running and microswitch engaged, check the following:
   a. Check for proper voltage at spark module board after the blower motor reaches full rpm. If no voltage, check back through circuit to determine cause.
   b. Voltage is present but no spark at electrode after 12-18 second delay. Check electrode wire connections.
   c. Wire connections OK by electrode wire does not show continuity through it; replace electrode wire.
   d. Electrode wire does show continuity through it; check electrode gap.
   e. Electrode gap OK; check electrode assembly for possible cracks or carbon on tip of electrode.
   f. Electrode OK; replace module board.

2. **Electrode Sparking But Gas Not Coming Through Burner:**
   a. Check to see if voltage is coming out of module board to gas valve after 12-18 second delay. If no voltage and wire connections are OK, replace module board.
   b. Voltage is coming out of module board to gas valve but gas valve does not open; replace gas valve.

3. **Electrode Sparking and Gas Valve Opening But Burner Will Not Light:**
   a. Check to see if gas is coming through burner. If no gas is coming through the burner, check for obstruction in gas line, in main burner orifice, or in main burner.

FURNACE (Continued)

b. Gas is coming through the burner but spark will still not ignite burner; check gas pressure to be certain that it is 11 inches water column at furnace.
c. Gas pressure OK; check for obstruction on main burner. Check to be sure that air shutter is not completely closed and be sure electrode is positioned approximately 1/4" above and directly over one of the sawed slots on the main burner.
d. Check all gaskets to be sure they are tight and forming a good seal.

4. **Burner Ignites But Goes Off and Into Lockout:**
   a. Check to be certain that flame sensor is over one of the slots on the main burner and that the main burner flame is burning against the tip of the flame sensor. Adjust by sliding burner in direction necessary.
   b. Burner still goes off and into lockout; check wire connections at flame sensor and at module board.
   c. Wire connections OK; check continuity through flame sensor wire.
   d. Continuity of flame sensor wire OK; check with micro amp meter in series with flame sensor wire to be certain that the flame sensor is generating at least seven (7) micro amps within seven (7) seconds after the burner is ignited. Replace electrode assembly if test is negative.
   e. Flame sensor OK but burner still goes off and into lockout; replace module board.

5. **Repeated Module Board Failures:**
   a. Check to be certain that the electrode spark is not sparking against the flame sensor portion of the electrode assembly.
   b. Check to be sure module board is not shorted to the chamber wrapper.
   c. Be sure fish paper insulator covering the electrode wire connection on the coil of the module board is in place.

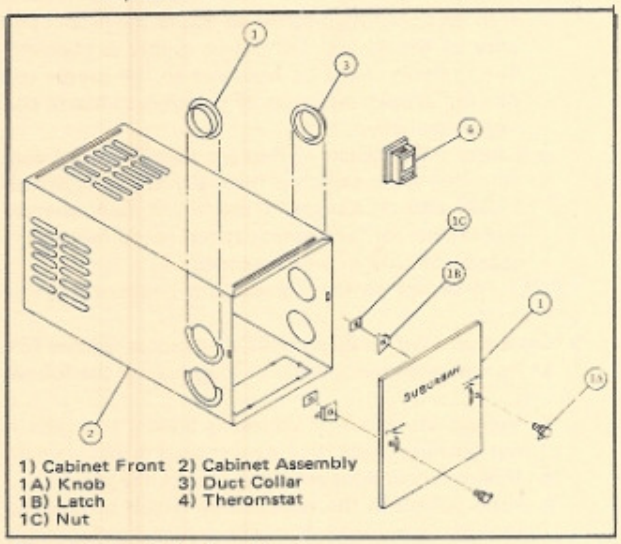

Figure 175 – Suburban Heater

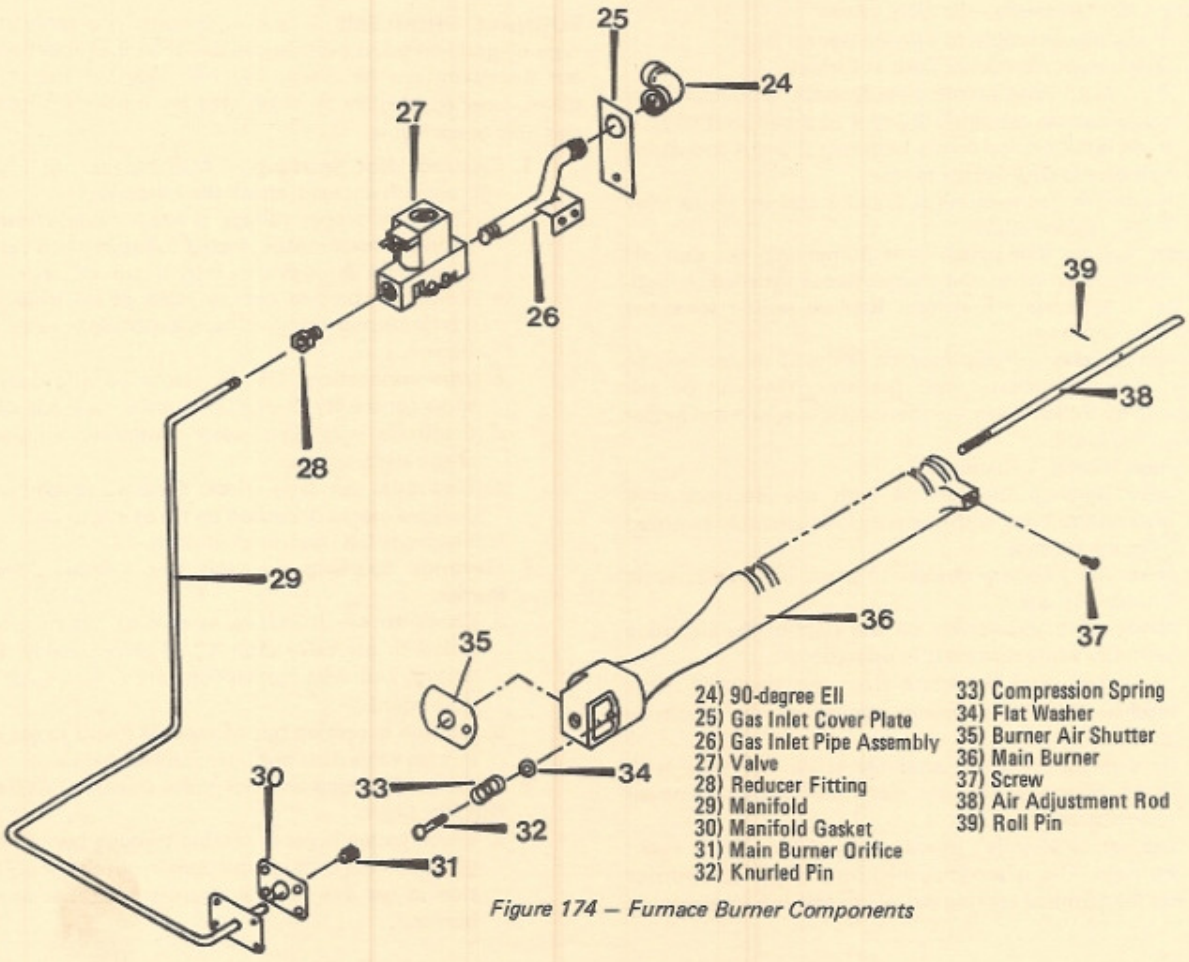

Figure 174 – Furnace Burner Components

FURNACE (Continued)

d. High voltage – 14.5 volts DC maximum.

6. **Customer Complains of Unit Going Into Lockout Only Once In A While:**
   a. We have found that lockout can occur if the gas pressure fluctuates at the time the thermostat calls for heat. Pressure fluctuations can be caused by a malfunctioning gas bottle regulator, an obstruction or a kink in the gas bottle regulator or in the gas lines.

FURNACE ISOLATION PROCEDURE – It is difficult to check for these fluctuations that will not noticeably affect any other appliance in the coach. However, isolating the furnace from the coach gas system will determine if the gas system is responsible. This isolation procedure can be done by connecting a separate upright bottle, regulator, and gas line directly to the furnace, eliminating the coach gas system. If the occasional lockout still exists, then the furnace should be thoroughly tested to determine the cause; however, if the furnace works properly on this separate system, then the coach gas system should be checked.

When moisture in the gas system is suspected as being the problem, especially where the horizontal-type gas bottle is being used, the following steps should be taken to prepare the gas system against further moisture problems:

Corrective Measures to Eliminate Moisture:

1. Disconnect gas bottle and drain it completely dry of all gas and moisture.
2. Disconnect and blow out all gas lines completely dry.
3. Install a new pressure regulator on the gas bottle.
4. Add the drying agent: 1/2 pint of methanol alcohol per 100-lb. bottle capacity is recommended.

NOTE: Never fill the gas bottle over 80%. Do not use gas bottle completely dry to avoid using up the drying agent. The above procedures are effective in over 95% of the cases of all occasional lockout problems. All of these steps should be performed as described for the preparation of a contaminated gas system to be 100% effective.

CONDITION – EXCESSIVE NOISE

1. Blower out of balance; replace blower.
2. Motor hum; replace blower.
3. Air adjustment – a screeching or howling noise while burner is on due to excessive primary air. Adjust the burner to provide less air.

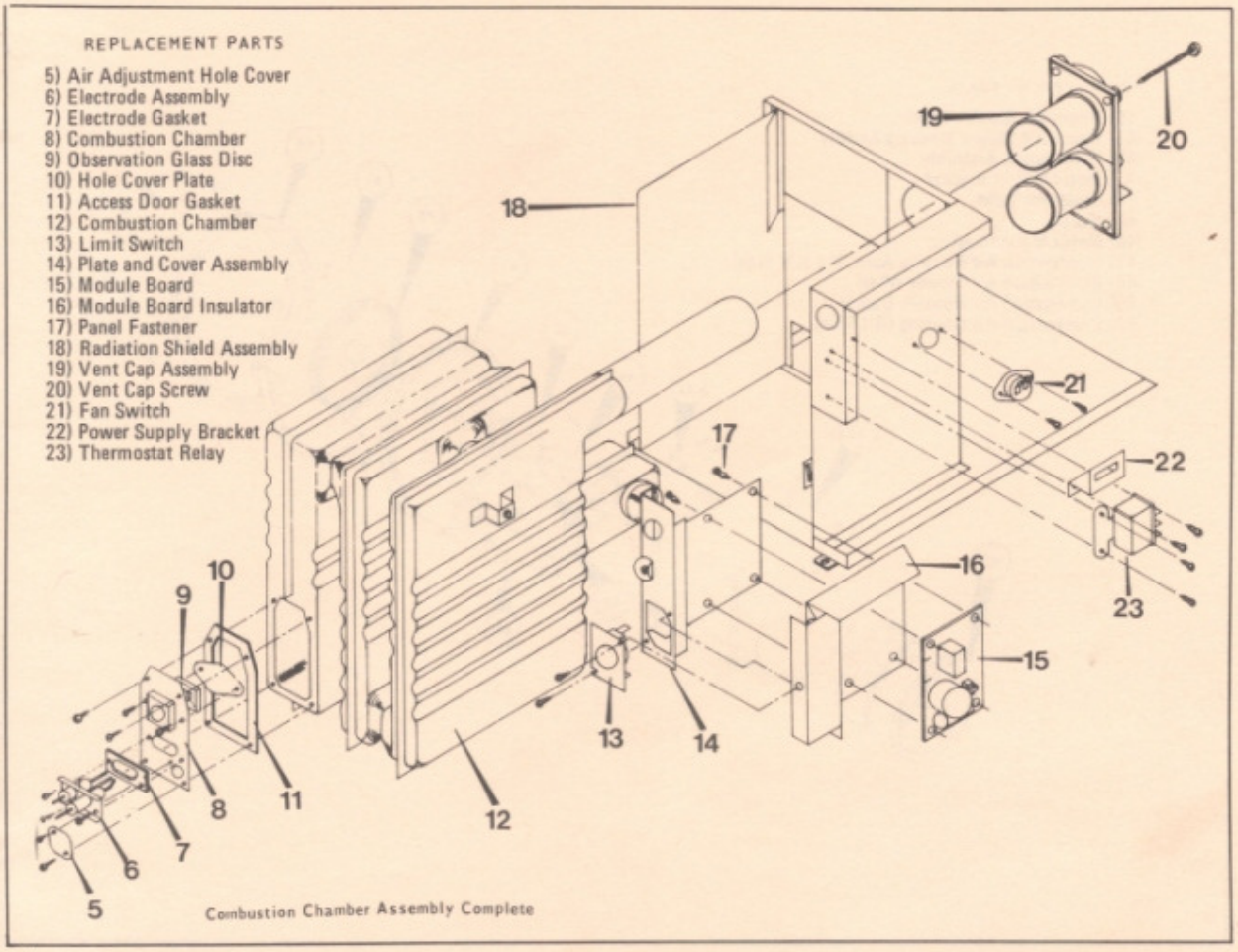

Figure 176 – Heater Combustion Chamber Assembly

FURNACE (Continued)

CONDITION – ERRATIC BLOWER OPERATION

1. If blower is going off and on, check the following:
   a. Thermostat points – if points are remaining open or closed, the internal overload switch in the motor is defective; replace motor.
   b. If thermostat points are observed opening and closing rapidly when furnace first starts, check the following:
   The quick disconnect plug on the side of the furnace. The plug must be wired as shown on the electrical diagram.
   Miswiring at thermostat relay. Check the wiring diagram.
   Shorted gas valve. If furnace runs properly with wires at gas valve disconnected, replace gas valve.
   Short in wiring. Check all connections including thermostat.

CONDITION – MAIN BURNER WILL NOT CYCLE OFF

1. Check thermostat points. The points should break cleanly.
2. Check solenoid valve; valve may be stuck open. If so, replace valve. Do not attempt to repair valve.

CONDITION – UNIT WILL NOT OPERATE

1. Check all wiring to assure connections or detect possible shorts.

REPLACEMENT PARTS

40) Room Air Blower Wheel
41) Room Air Blower Housing Assebly
42) Microswitch Assembly
43) Motor Mount Bracket
44) Crossover Tube
45) Motor
46) Motor Mount Gasket
47) Combustion Air Housing Assembly (LH Side)
48) Combustion Air Blower Wheel
49) Combustion Air Housing Gasket
50) Combustion Air Housing (RH Side)

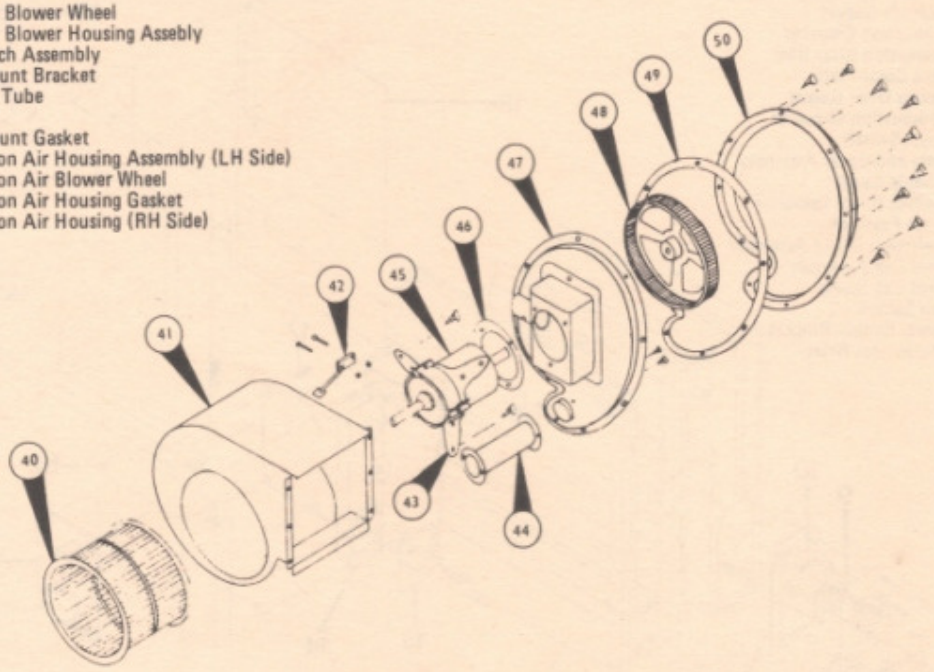

Figure 177 – Heater Fan Assembly

REFRIGERATOR

GAS/ELECTRIC REFRIGERATOR – Your Dometic gas-electric refrigerator will operate on LP gas, 12-volts DC, or 120-volt electrical source. This results in a wide range of operating modes. The unit is the continuous-absorption type, which operates by the application of a small amount of heat. No moving parts are employed. If the motor home is connected to a 110-volts AC electrical source, 12-volts DC will be supplied to the refrigerator through the power converter.

WARNING –
If the refrigerator is used intermittently, it should be checked at least once a year.

HOW TO START THE REFRIGERATOR –

Leveling –

In the boiler, ammonia vapor is distilled from an ammonia-water mixture and carried to the finned condenser, where it liquifies. The liquid flows to the evaporator, where it creates cold by evaporating into a circulating flow of hydrogen gas. If the evaporator coil is not level, the liquid readily accumulates, forming pockets which can impair the gas circulation or even block it, in which case, of course, the cooling will stop.

When the recreational vehicle is stationary it must be level for the refrigerator to perform well. A bubble level should be placed on the freezer shelf. When the vehicle is in use, the continuous rolling and pitching movement will not affect the refrigerator as long as the movement passes either side of level, but when the vehicle is temporarily parked, this sensitivity of the refrigerator should be remembered. So, once more, before you try to start the refrigerator, make sure it is level.

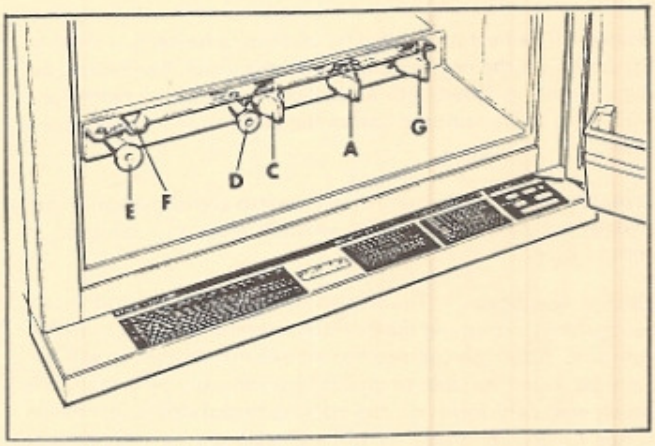

Figure 178 – Refrigerator Controls

Gas operation – (See figure 178.)

1. To start the refrigerator, turn the knob "A" to position "Gas." The gas valve is now opened and the electric circuits are broken.
2. Turn the gas thermostat knob "C" to setting 4.
3. Pull the knob "D" of the flame failure safety device and press the button "E" of the piezo lighter. The pressing of the button "E" has to be repeated until the gas is lit at the burner. Through the reflector "F" it can be observed that the burner is lit.
4. After the gas is lit, keep the knob "D" in pulled out position for 15 seconds. Then release the knob and check through the reflector that the burner flame stays burning.

NOTE: After a replacement of the gas container or a long shut-off period the gas line is likely to be filled with air. In such a case the lighting procedure has to be repeated until the air is pushed out of the line and the gas has reached the burner.

Electric Operation – (See figure 178.)

1. Check that the attachment plug of the flexible cord is correctly connected to the main supply. The refrigerator is equipped also for 12-volt DC operation; the low voltage operates the refrigerator.
2. Turn the knob "A" to "Off" position, then press the knob to the bottom and turn to desired electric position.
3. Turn the thermostat knob "G" to setting 4.

NOTE: In GAS OFF position the knob "A" is pressed and turned clockwise to position 12-volts. If 110-volts operation is desired, press once more and continue the clockwise turning to position 110-volts.

HOW TO USE THE REFRIGERATOR –

Food Storage Compartment –The food storage compartment is completely closed and unventilated, which is necessary to maintain the required low temperature for food storage. Consequently foods having a strong odor (or liable to absorb odors) should be covered. Vegetables, salads, etc., should be covered to retain their crispness. The coldest positions in the refrigerator are underneath the cooling evaporator and at the bottom of the refrigerator, and the least cold positions are on the upper door shelves. This should be considered when different types of food are placed in the refrigerator.

Defrosting – Since ice and frost are poor heat conductors, a frost build-up of 1/4-inch or more should be avoided. It decreases overall cooling capacity and increases power consumption. To lessen frost accumulation, avoid putting hot or steaming food in the refrigerator. To defrost the refrigerator, turn the thermostat to the lowest position. When accumulated ice has melted, the water can be removed from the drip pan under the freezer compartment.

Frozen Food Storage Compartment – The ice trays should be placed in direct contact with the freezer shelf for fastest ice making. Quick frozen soft fruits and ice cream should be placed in the coldest part of the compartment which is at the bottom of the aluminum liner or, in models with a shelf, on this or just below it. Frozen vegetables, on the other hand, may be stored in any part of the compartment. The compartment is not designed for the deep or quick freezing of foodstuffs. Meat or fish foods, whether raw or prepared, and provided they are precooled in the refrigerator, can, however, also be stored in the frozen food storage compartment. They can then be stored about three times as long as in the normal temperature compartment. To prevent drying out, keep food in covered dishes, in plastic bags, or wrapped in aluminum foil.

Ice Making – Ice cubes can be made in the ice trays which should be filled with water to within 1/4" from the top. To release the ice cubes, the handle should be pulled upwards. Cubes not required should be replaced in the tray. Refill the tray with water, dry the outside, and replace it in the frozen storage compartment.

REFRIGERATOR (Continued)

Ice making is accelerated if the thermostat is set to MAX. It is a good idea to do this a few hours before an anticipated need for ice, but be sure to turn the thermostat back to its original setting when the ice is formed, or the foodstuffs in the cabinet may become frozen hard. The ice making time is also reduced if unused cubes are left in the ice trays when they are refilled with water.

To Shut Down the Refrigerator – To shut down the cabinet temporarily, set the thermostat to zero and turn off the gas tap. If the cabinet is not to be in operation for a period of weeks, it should be emptied and cleaned, and the door left ajar. The ice trays should also be dried and kept outside the cabinet.

Cleaning – To clean the interior lining of the cabinet, use a lukewarm, weak soda solution. The evaporator, ice trays and shelves must, however, be cleaned with warm water only. Never use strong chemicals or abrasives to clean these parts or the protective surface will be spoiled. It is important, always, to keep the cabinet clean.

CAUTION: Do not store explosive substances in the refrigerator, such as cigarette lighter gas, petrol, ether or the like.

REFRIGERATOR GAS EQUIPMENT –

Flue Top and Baffle – The flue baffle is suspended from the top and must be in position in the central tube of the cooling unit.

The Burner and the By-pass Screw – The burner must be centrally located under the boiler tube. To change or clean the burner jet, first loosen the gas pipe from the burner, then unscrew the jet from the burner base. The burner is normally fitted with a jet for propane gas so when using butane, fit another jet size, for butane. Sizes are stamped on the jet.

The orifice in the jet is very small. It must never be cleaned by means of a pin or similar instrument, as this would enlarge or damage the orifice. If, for some reason, the jet should require cleaning, it should be blown through or washed in alcohol. The by-pass screw is accessible at the top of the thermostat.

The Gas Thermostat – The refrigerator is equipped with a thermostat which is regulated by turning the knob to different settings in order to obtain the desired controlled cabinet temperature.

At zero (indicated by a dot) – Under normal operating conditions the thermostat valve remains closed and the burner is running continuously at the by-pass rate, just enough to keep the burner lit.

At "MAX" – The thermostat valve remains open and the burner is running continuously at full gas rate. Lowest cabinet and freezer temperatures are obtained at this setting.

Between these two extremes is a numbered portion of the dial over which various controlled temperatures can be obtained, the higher the number, the lower the temperature.

As soon as the required cold temperature inside the cabinet is reached, the thermostat cuts the burner main flame leaving the by-pass flame to keep the safety valve open.

Flame Blow Out – If trouble is encountered with the flame blowing out under specially windy conditions, try to avoid the wind blowing against the wall where vent outlets are located. If the trouble persists, set the thermostat to "MAX." This later measure can, of course, only be temporary, for after a day or so at this setting, the foodstuffs in the cabinet will freeze.

Periodic Maintenance –

NOTE: Before working on the refrigerator make sure that 120-volt AC and 12-volt DC leads are disconnected.

Once or twice a year depending on use, it is necessary to clean and adjust the burner assembly. Proceed as follows:

1. Disconnect the gas pipe from the burner assembly.
2. Remove the burner bracket.
3. Remove the burner housing.
4. Clean the jet with alcohol and compressed air ONLY.
5. Clean the burner tube and especially the gauze with a brush. Blow with compressed air.
6. Reassemble.
7. Check the burner with full flame (turn thermostat to "MAX" and with by-pass flame (if the refrigerator has been working for a few hours and the thermostat bulb is colder than about 6°C or 43°F the transition from full flame to by-pass can be observed if one turns the thermostat knob slowly from "MAX" to zero.

At the same time, check the flue baffle. It should be clean and reasonably free from soot. Heavy soot formation indicates improper functioning of the burner. Clean baffle and flue. The entire gas installation should be checked for leaks at intervals. Test all pipe connections with soapy water, not with an open flame.

REFRIGERATOR ELECTRIC EQUIPMENT

Heater – The heat is supplied by an electric heater mounted in the boiler on the cooling unit inside the cover. The boiler casing normally is fitted with a blow-out protection arrangement which has to be removed before the boiler cover is fully accessible.

Switch – The electric control device also comprises an on-off switch operated by the fuel selector from the refrigerator control panel.

Electric thermostat – The temperature in the refrigerator can be regulated by turning the thermostat knob to higher or lower numbers. Although the exact setting is not critical, it will usually be found suitable to choose a setting at which the frost, which gradually forms on the cooling evaporator is just maintained in dry condition. It will be necessary to set the thermostat knob one or two numbers higher when the ambient temperature becomes higher or the load unusually heavy. If less cooling is required, a lower setting should be chosen. No attempts at adjusting the thermostat should be made.

REFRIGERATOR DIAGNOSIS –

Refrigerator Does Not Freeze Satisfactorily:

1. Jet Orifice clogged. Disengage gas pipe from burner. Unscrew nipple with jet and blow clear and wash in alcohol. Do not use wire or pin to clean orifice.
2. Check the leveling of the refrigerator.

REFRIGERATOR (Continued)

3. Flame has gone out. Remedy:
   a. Gas in bottle is used up; refill.
   b. Feeler point of the flame failure-safety-device is not heated enough by flame; clogged by-pass screw; clean or exchange it.
4. Air circulation around cooling unit is restricted. Be sure that refrigerator is properly ventilated.
5. The evaporator is heavily coated with frost; defrost.
6. Flue baffle not inserted into the central tube of the cooling unit.
7. The thermostat is incorrectly used. In hot weather the setting should be one or two numbers "colder" than usual.
8. Gauze in burner head clogged; clean.
9. Burner damaged; replace.
10. Burner may be dislocated; relocate.
11. Wrong gas pressure at the burner. Have pressure checked at burner and at gas bottle. Pressure at burner must not fall below 11" W.G. when thermostat is set on "MAX."
12. Improper operation of the thermostat. Check the position of the capillary tube between the evaporator fins. The end of the capillary tube must be in proper direct contact with the evaporator. This contact is achieved in two different ways: 1) The capillary tube is inserted in a spring-clip which is fastened between two fins. 2) The capillary tube is fastened between two fins with a sheet brace and two screws. If the position of the capillary tube end is not correct, adjust accordingly. If no improvement is obtained, exchange the thermostat.

Odor From Fumes –

1. The flame may touch side of the boiler due to dislocation of the burner; relocate. Burner dislocation may also cause smoke and discoloring of walls and ceiling.
2. Burner damaged; replace.
3. The flame touches flue baffle. Remedy: 1) Burner damaged; replace. 2) Flue baffle too low; correct the position of the baffle.
4. The flue tube is dirty. Clean flue as follows: Cover burner and jet. Remove flue top and baffle. Clean flue with special flue brush. Clean baffle before putting back in place.

All the above instructions are to be followed closely. The refrigerator is quality-guaranteed.