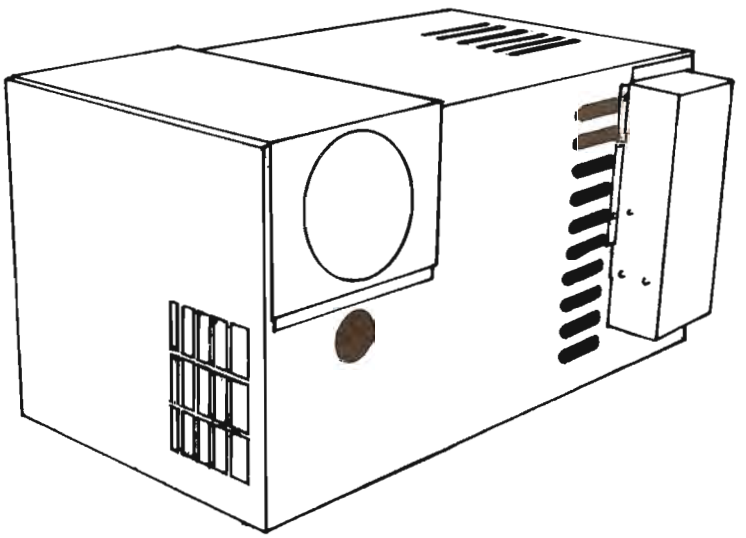
Coleman®

RECREATIONAL VEHICLE DIVISION



4300 SERIES UNDERCOUNTER FURNACES

MATCH LIGHT AND PIEZO LIGHT MODELS

SERVICE GUIDE

FORM A329

NOTICE

These instructions are intended for the use of qualified individuals specially trained and experienced in servicing this type of equipment and related system components.

Service personnel are required by some states to be licensed. Persons not qualified should not attempt to install or service this equipment. Improper service or installation may damage the equipment, can create a hazard and may invalidate the warranty.

This is not a basic heating manual and does not, therefore, cover the basic principles of heating. The user of this manual should have already accomplished a thorough study of heating and should use this manual as an advanced text to apply only to Coleman Furnace Models listed in Table 1.

Being service oriented, this guide also does not cover all the details of the furnace installation. Installation instructions are packed with each furnace and copies are available upon request.

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TABLE 1

Model No.	Pilot Type	Electrical Supply	Rating At Sea Level, BTUH*		Gas Conn. Size	Amps
			Input	Bonnet Capacity		
4316-719	Match	12VDC	16,000	12,800	3/8 SAE	3.2
4316-729	Piezo	12VDC				3.2
4316-829	Piezo	115VAC/12VDC				.65
4319-729	Piezo	12VDC	19,000	15,200	3/8 SAE	3.9
4319-829	Piezo	115VAC/12VDC				.70
4322-729	Piezo	12VDC	22,000	17,600	3/8 SAE	3.9
4322-829	Piezo	115VAC/12VDC				.70
4325-729	Piezo	12VDC	25,000	20,000	3/8 SAE	5.2
4325-829	Piezo	115VAC/12VDC				1.1
4328-729	Piezo	12VDC	28,000	22,400	3/8 SAE	5.2
4328-829	Piezo	115VAC/12VDC				1.1
4332-729	Piezo	12VDC	32,000	25,600	3/8 SAE	5.9
4332-829	Piezo	115VAC/12VDC				1.2

*ANSI For elevations above 2,000 feet, reduce input rate by 4% for each 1,000 feet of elevation above sea level.

Example of Furnace Derate:

Input = 20,000 BTU
Elevation = 5,000 ft.

20,000 x 20% = 4,000 BTU
20,000 – 4,000 = 16,000 BTU Input for 5,000 ft.

*Canada — Approved for elevations 0 - 4500 ft.

CLEARANCES

Sides = Zero (0) inches
Top = Zero (0) inches
Front = One (1) inch (Closet)
Bottom = Zero (0) inches
Rear = Zero (0) inches
Vent = Zero (0) inches

FURNACE DESIGN

The 4300 Series furnaces are small L.P. Gas forced air Recreational Vehicle furnaces utilizing a sealed forced draft combustion air system. The furnaces are designed to operate on 12 volt D.C. current, supplied either from a single D.C. source remote from the furnace, or on combination A.C./D.C. models, by also converting 115 volt A.C. current to 12 Volt D.C. current through the converter located on the furnace.

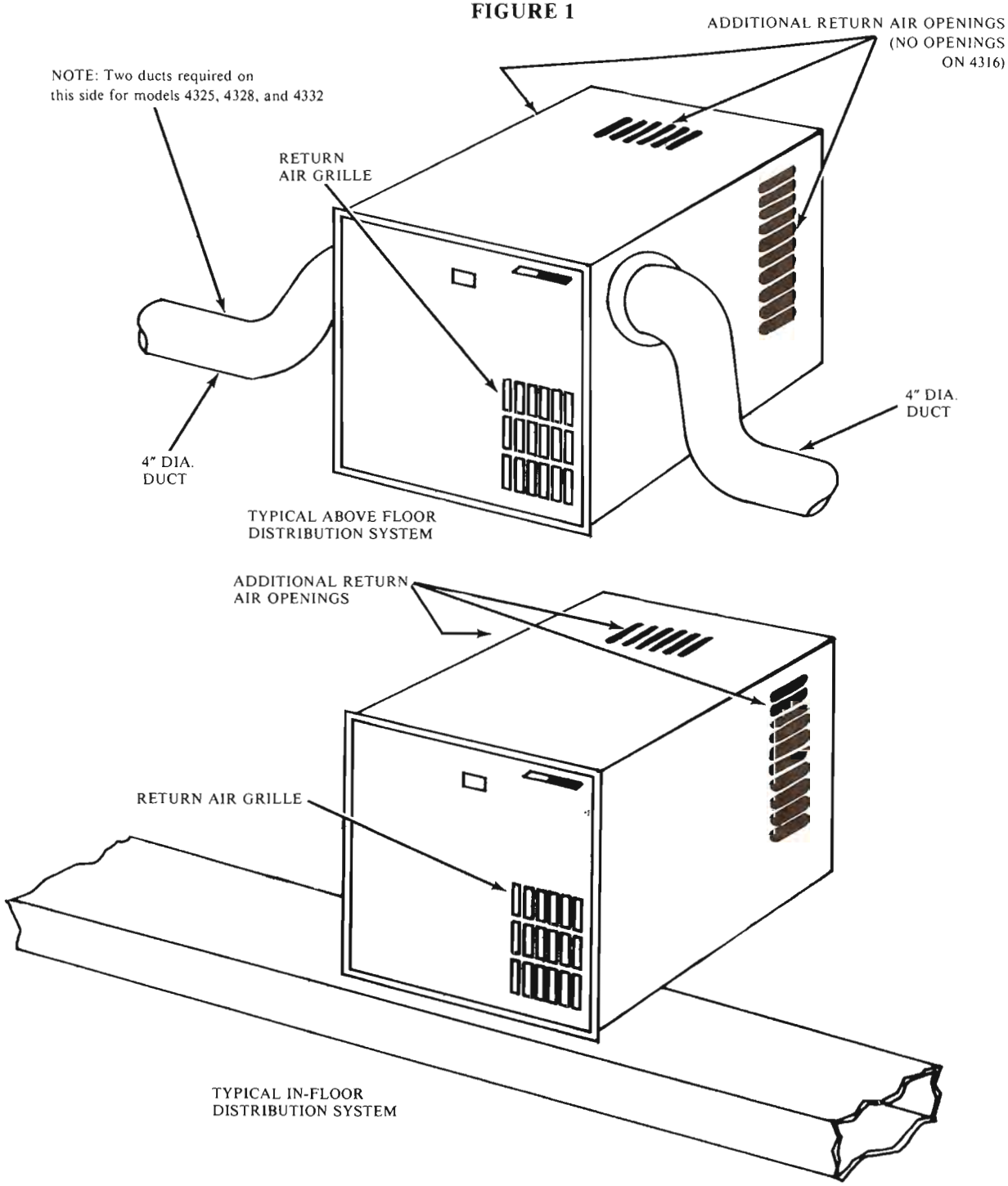
Furnace Specifications are shown in Table 1.

A. Distribution System

Except for the 4316, all models must use a ducted warm air distribution system. However, by installing a "self trim" door on the model 4316, warm air can be discharged directly from the front of the furnace, without the use of a ducted system.

Ducts may be above floor, utilizing the round duct connector openings on the sides of the furnace, or an in-floor duct system (except for Model 4316) can be used by connecting the duct to the bottom warm outlet on the furnace. See Figure 1.

FIGURE 1



B. Return Air

Except for the Model 4316, return air is brought back into the furnace through several openings: (1) the grille in furnace door, (2) openings in the top casing rear, (3) openings in the left casing rear side, (4) openings in the right casing rear side. See Figure 1. On the Model 4316, return air is brought back only through the grille in the furnace door.

NOTE

Except for the Model 4316, the grille in the furnace door **does not** *bring in the total amount of return air required. In addition to the grille, return air must also be admitted through at least the openings in two sides of the casing, or the casing top and one casing side. Therefore, provisions must be made so that return air can enter the furnace enclosure to provide air to these openings.*

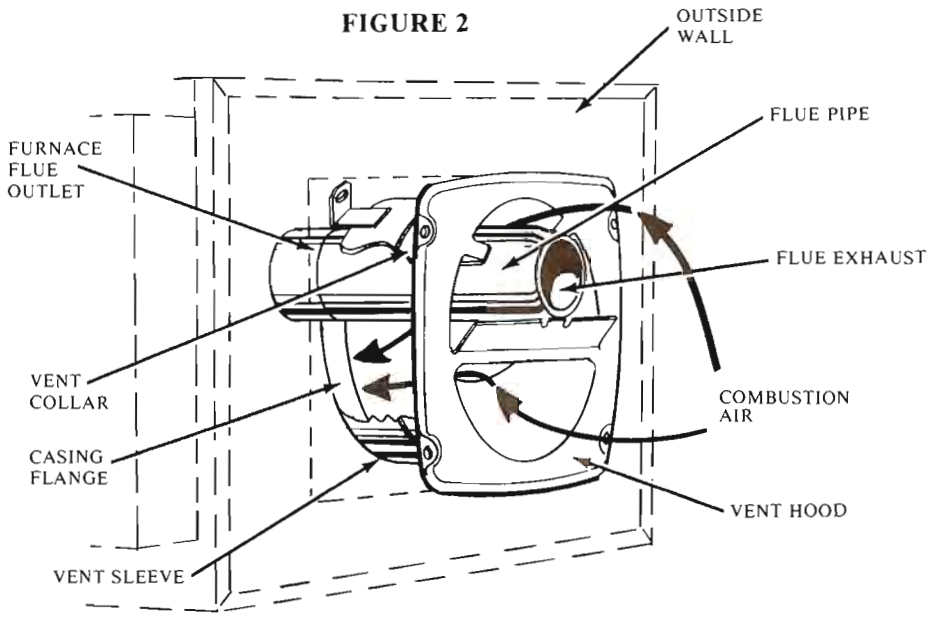
Failure to provide enough return air or failure to provide adequately sized warm air ducts will cause the furnace to overheat and the burner to cycle on and off on the limit switch.

C. Venting

The vent assembly is constructed so that it vents products of combustion to the outside and also draws in outside combustion air. Different length vent assemblies are available to accommodate distances from the back of the furnace to the outside of the side wall ranging from 1″ to 6″.

As noted in Figure 2, the proper overlap between the flue pipe and furnace flue outlet, as well as the proper overlap between the flue collar and sleeve, is essential. Any air leakage at these joints may cause improper combustion or pilot outage.

FIGURE 2



NOTE:

(1) Vent collar and vent sleeve must overlap no less than ½″.

(2) Flue pipe must overlap furnace flue outlet no less than 1¼″.

(3) Vent sleeve not required when distance from back of furnace to outside of outside wall is one inch to 2″ since vent collar will overlap casing flange.

D. Lighting Pilot (also refer to lighting instructions on furnace name plate.)

1. Set thermostat to highest setting (motor will run to purge heat exchanger).
2. Turn gas valve knob to "off" position. Wait **5 minutes.**
3. Reset thermostat to lowest setting.
4. Turn gas valve knob to "pilot" position. Depress knob and light pilot.
5. Hold the reset button in for approximately 10 seconds or until the pilot remains lighted when the reset button is released. **IF PILOT GOES OUT, REPEAT FROM STEP 1.**

WARNING

Purging the heat exchanger for 5 minutes prior to attempting to relight the pilot is extremely important. This provides the means to remove any gas accumulation and avoids ignition of any accumulated gas. Failure to follow instructions can result in an explosion and possible damage to the furnace or injury to the operator.

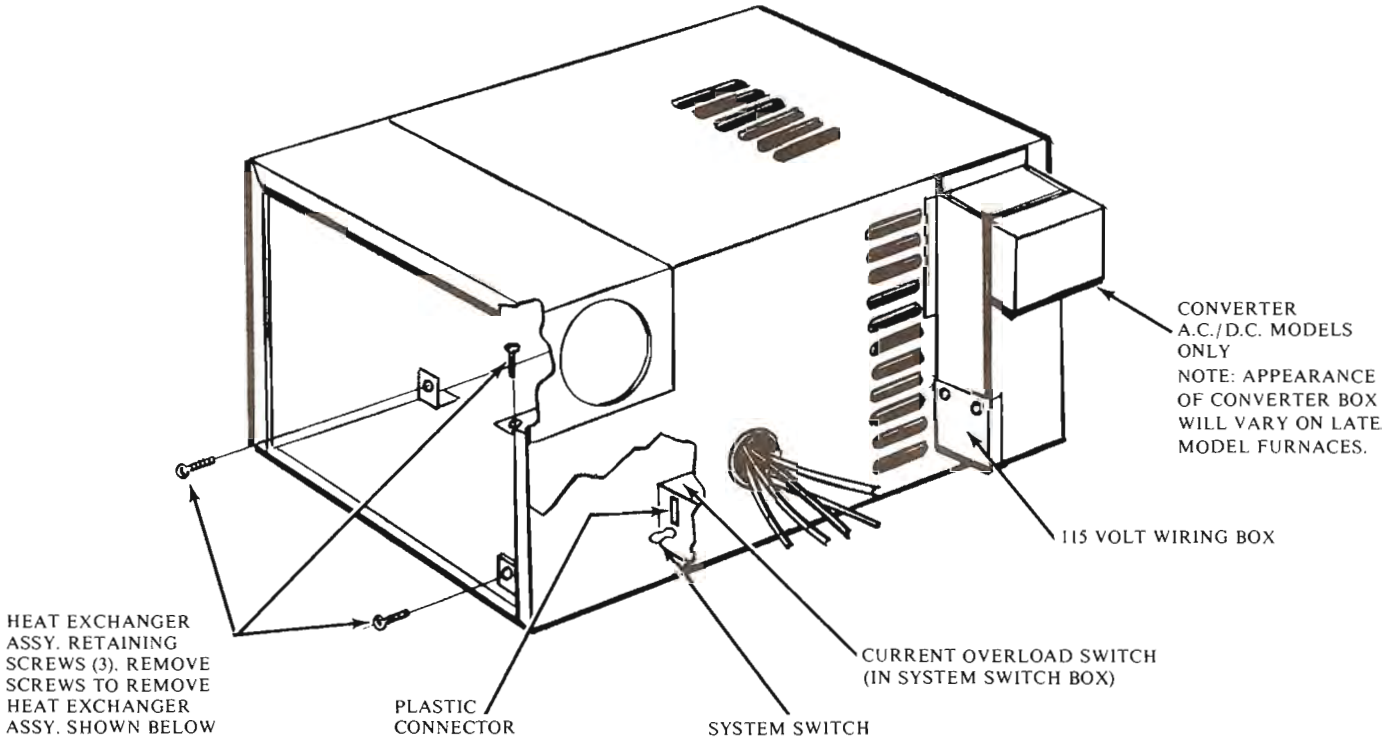
NOTE

For detailed instructions on the installation of the furnaces, including duct sizing, return air, and venting, refer to the separate installation instructions packed with the furnace. Copies of these instructions are available upon request.

FURNACE COMPONENTS

Furnace components and their locations are shown in Figures 3 and 4. All switches, relays and the gas valve are conventional types, commonly found on this type of equipment. Operation of the electrical components is described under the "Sequence of Operation" section.

FIGURE 3



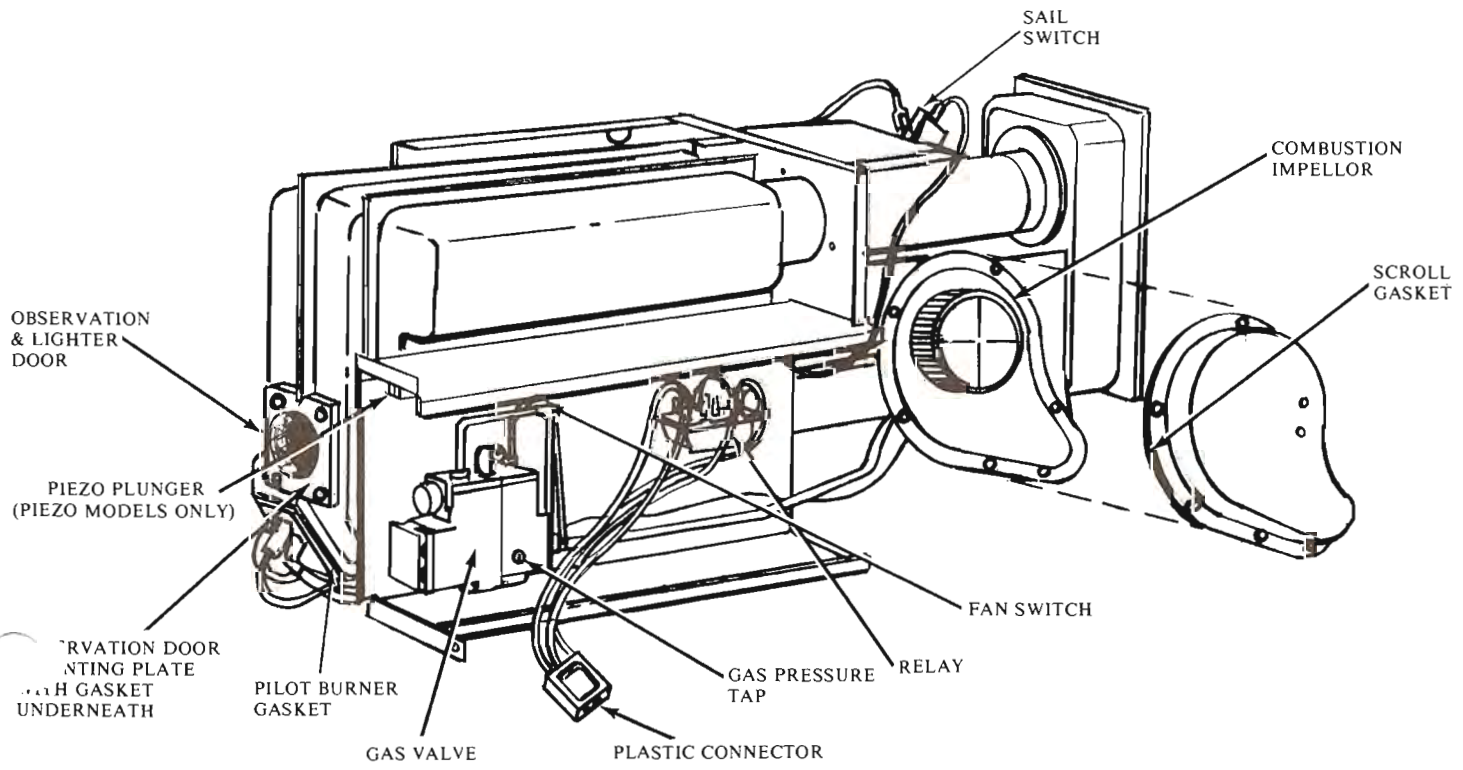
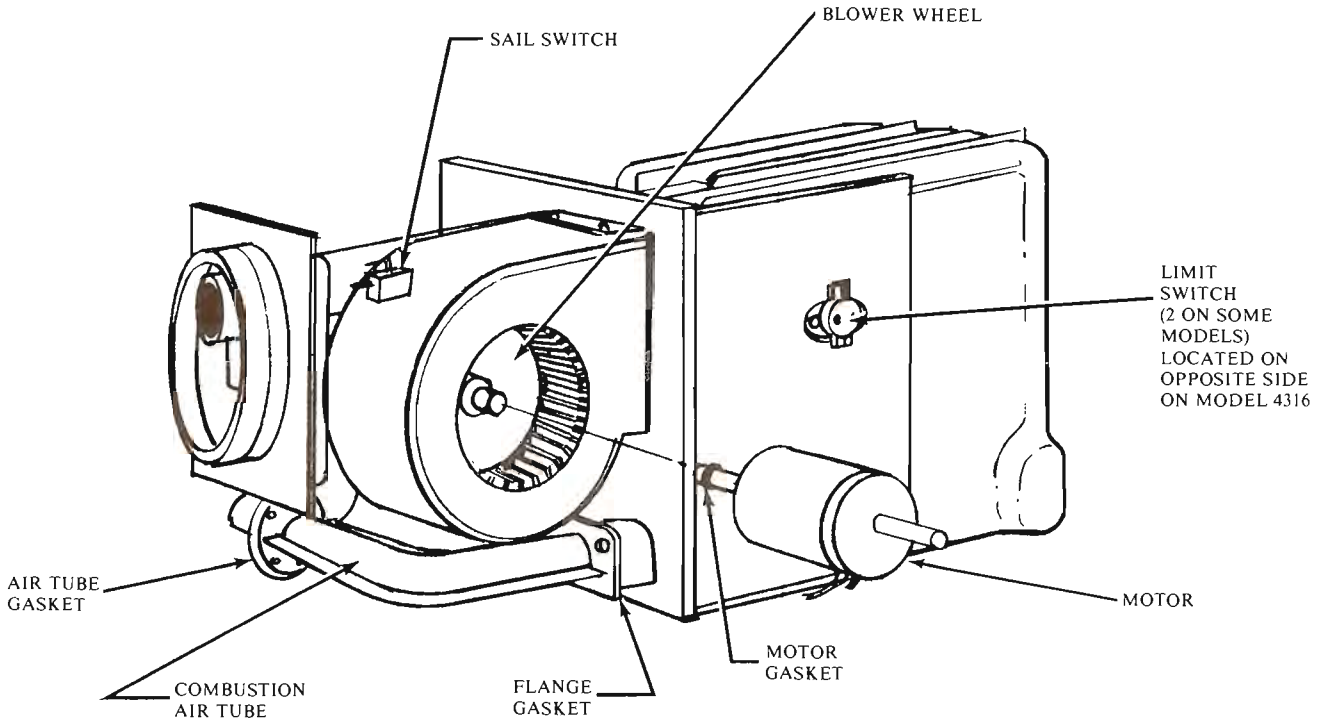


FIGURE 4



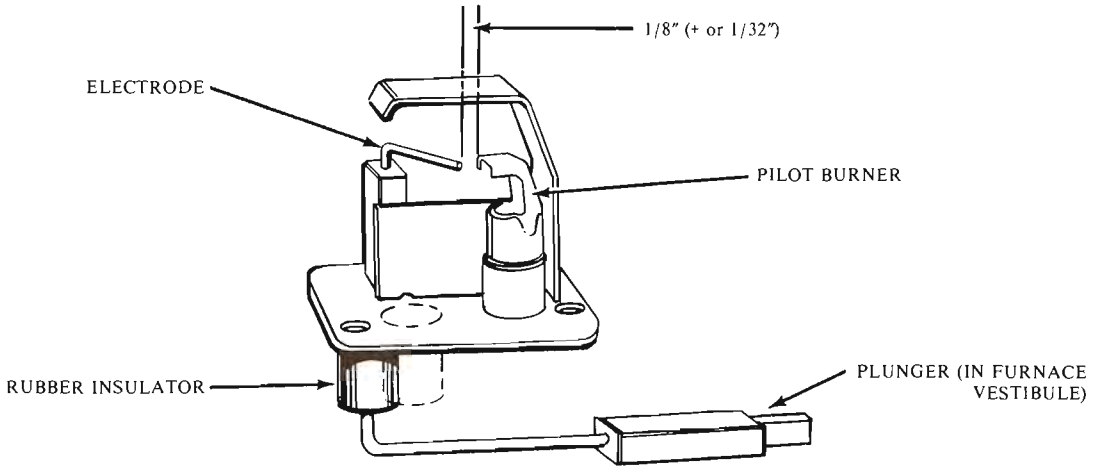
A. Blower Assembly — The blower assembly is powered by a 12 Volt D. C. motor. Two impellors are used, one for circulating warm air, and the other for providing combustion air. Note that the combustion air impellor is installed with the closed end out. If the combustion impellor is installed with the open end out, very little combustion air will reach burner, causing improper combustion. See Figure 3. **WARNING: If the combustion air impellor is installed with the open end out, very little combustion air will reach the burner creating carbon monoxide caused by improper combustion. This will cause the furnace to not heat properly and if leakage should occur in the heat exchanger or gasket joints, carbon monoxide could be drawn through the circulating air blower and distributed into the home or recreational vehicle and the possibility of asphyxiation.**

B. Piezo Igniter — Most models are equipped with a Piezo Igniter. When the Piezo plunger is depressed, a spark is created by an electrode located at the pilot. This spark then ignites the pilot flame if the gas valve knob is depressed in the pilot position. The piezo igniter is "self-generating" and requires no outside power supply in order to operate.

NOTE

The electrode must be positioned so that there is 1/8 of an inch (plus or minus 1/32") gap between the electrode and the pilot burner deflector. See Figure 5.

FIGURE 5



C. Burner Assembly — The burner is constructed of sheet metal and differs between models. For proper burner for a particular model furnace, refer to the separate repair parts list available upon request.

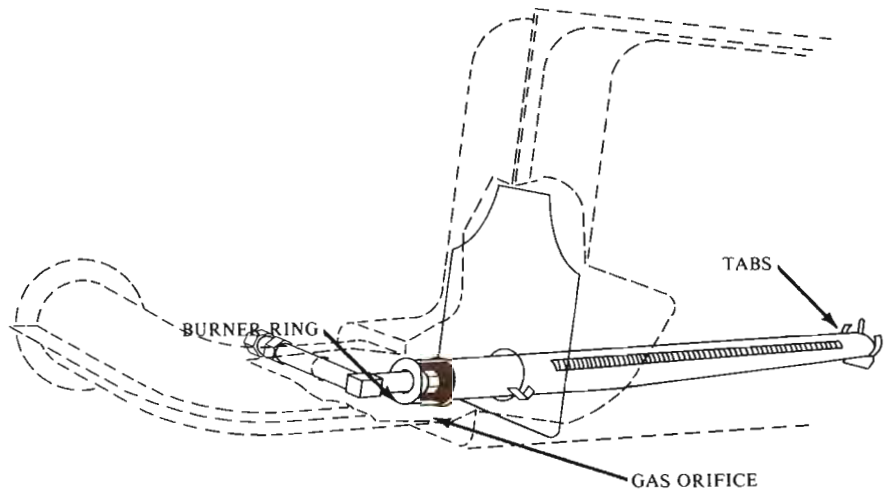
To remove the burner, first remove the observation door mounting plate and gasket. Reach through the opening to bend up the tabs securing the front of the burner to the heat exchanger. NOTE: On later models, tabs will not be bent since a retaining backet on the observation door mounting plate holds the burner down.

Lift the front of the burner up and pull burner out through observation door opening.

CAUTION

When reinstalling burner, make sure the orifice slips into the opening in the burner ring. See Figure 6.

FIGURE 6



D. Air Seal Gaskets — In order to prevent leakage of combustion air from the sealed system built into the furnace, the gaskets listed below must be undamaged and firmly in place. **WARNING: Failure of the gaskets to be undamaged and firmly in place could result in leakage of products of combustion which could be drawn through the circulating air blower and distributed into the home or recreational vehicle and the possibility of asphyxiation.** (See Figures 3 and 4 for location of gaskets):

1. Scroll Gasket
2. Burner Observation Door Gasket
3. Air Tube Gasket
4. Motor Gasket
5. Flange Gasket
6. Pilot Burner Gasket

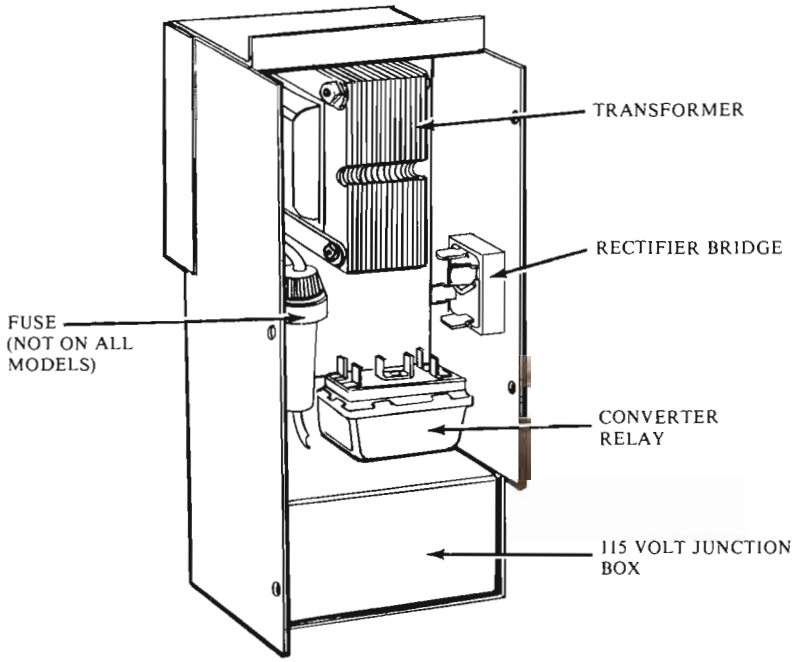
E. Converter (A.C./D.C. Models Only) — The converter is located at the right rear of the furnace, and protrudes through the casing side. See Figures 3 and 7. It consists of a transformer, rectifier assembly, and relay. When 115 volt electrical supply is used, the relay automatically switches the converter into the 115 Volt circuit, supplying 12 volts to the furnace. When no 115 volt is present, the relay closes and switches the furnace to 12 VDC battery operation.

The rectifier bridge is not sold by itself as a repair item. The complete transformer assembly, which includes the rectifier bridge, must be ordered.

The operation of the converter is explained in detail in the "Sequence of Operation" Section.

FIGURE 7

FURNACE CONVERTER (WIRING NOT SHOWN)



The converter can be removed for service by following the procedure outlined in Paragraph F, "Heat Exchanger Assembly".

F. Heat Exchanger Assembly

The heat exchanger assembly can be removed in order to service components which are not accessible for service from the front of the furnace. See Figure 3.

To remove the heat exchanger assembly:

1. Turn off the gas to the furnace at the L.P. Tank
2. Disconnect the fuel line at the gas valve.

WARNING

FIRE OR EXPLOSION MAY RESULT WHEN GAS LINE IS DISCONNECTED AT FURNACE AND GAS BLEEDS OUT. CHECK ALL APPLIANCES WHICH HAVE PILOTS STILL BURNING AND EXTINGUISH THEM AND ANY OTHER FLAME SOURCE IN THE VICINITY.

3. Unplug the plastic disconnect plug located just above the furnace "Off-On" switch.
4. Remove the 3 screws holding heat exchanger assembly in the furnace casing. Two screws are located at the top right and bottom right front corners of the furnace control compartment. The third screw is located in the lower left corner of the furnace casing and about a third of the way back. See Figure 3.
5. Slide the heat exchanger assembly out of the casing. The system switch box will remain attached to the casing side, where it will be available for service.
6. To remove converter on A.C./D.C. Models, disconnect the 110 Volt power supply to the furnace at the service panel.

   Reach into the casing and take out the four screws holding the converter to the mounting brackets.

   Pull the converter in through the opening in the casing side as far as the slack in the 115 Volt power supply will allow. Disconnect the 115 Volt power supply at the junction box in the bottom of the converter assembly and withdraw the converter to the front of the casing.

   Remove Hayco fitting at the system switch box where wires from converter enter. Disconnect blue wire at wire nut where it is connected to blue wire from negative side of battery and to blue wire from white plastic disconnect plug. (This connection may be outside furnace casing.)

   Disconnect brown wire from the overload switch. Disconnect red wire at wire nut connecting to red + VDC side of battery. Withdraw wires from junction box and remove converter.

CAUTION

When reinstalling heat exchanger assembly, be sure vent is properly assembled as shown in Figure 2. Improper assembly of the vent will cause equipment malfunction and can create a fire, explosion or asphyxiation hazard.

SEQUENCE OF OPERATION

A. On combination 12 VDC/115 VAC models, the furnace converter is designed to automatically switch from 12 VDC supply to 115 Volt supply whenever the R.V. is connected to 115 VAC.

The converter consists of a rectifier/transformer assembly and a relay. Some early models may also contain an automotive type fuse protecting the transformer. See Figures 7 and 8.

On 115 VAC power supply, the transformer energizes and the secondary current is rectified to 12 VDC. The current from the rectifiers energizes the coil between terminals 5 and 4.

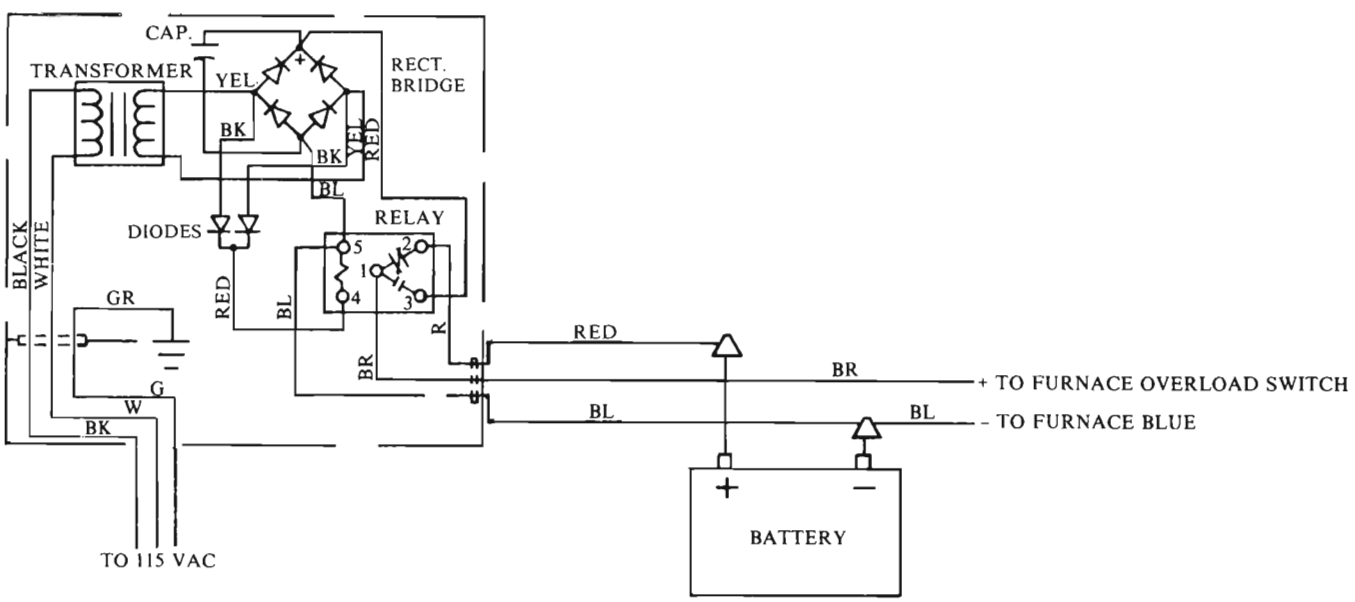
When the coil energizes, the contacts between terminals 3 and 1 close and the contacts between 2 and 1 open. The + VDC then flows from the red wire of the rectifier to terminal No. 3 on the relay through the contacts to terminal No. 1, through the brown wire to the overload switch in the furnace. The ground side of the circuit is established from terminal 5 on the converter relay through the blue wire to terminal No. 5 on the furnace fan relay.

When no 115 Volt supply is present, the transformer is de-energized, causing the contacts between terminal No. 2 and terminal No. 1 to close. At the same time, the contacts between terminals No. 3 and No. 1 open.

The + VDC current then flows from the battery to terminal No. 2 on the relay, through the contacts to terminal No. 1, through the brown wire to the overload switch in the furnace. The – VDC circuit is estabished from the – VDC post on the battery through the blue wire to terminal No. 5 on the furnace fan relay.

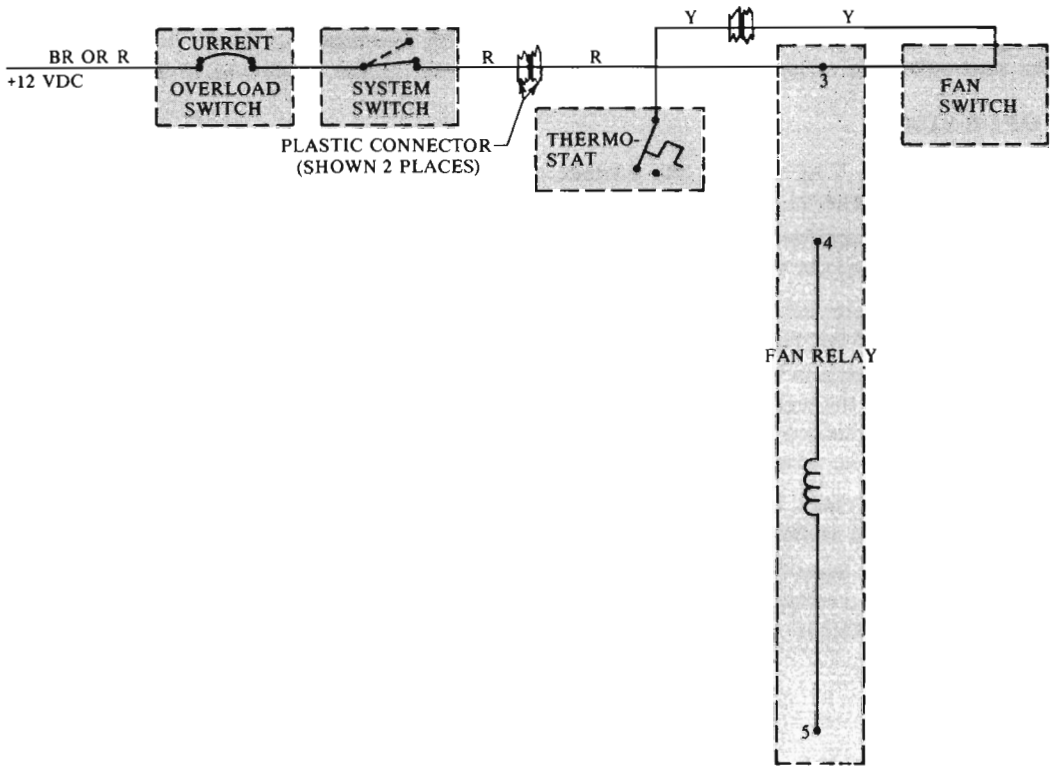
FIGURE 8

CONVERTER



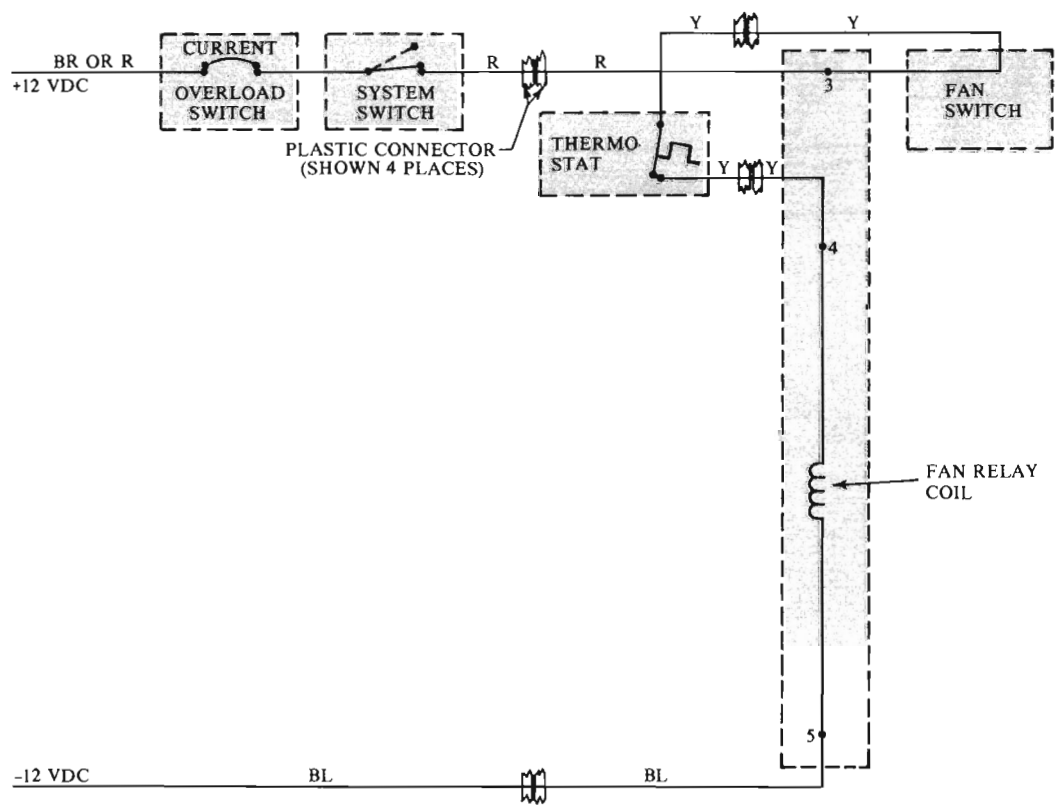
B. The + VDC is connected to the current overload switch and through it to the system switch. When the system switch is closed, the voltage will extend (1) through the system switch, (2) through the red wire to terminal No. 3 on the fan relay, (3) through another red wire to one terminal of the open fan switch, (4) through the yellow wire to the open thermostat. See Figure 9.

FIGURE 9



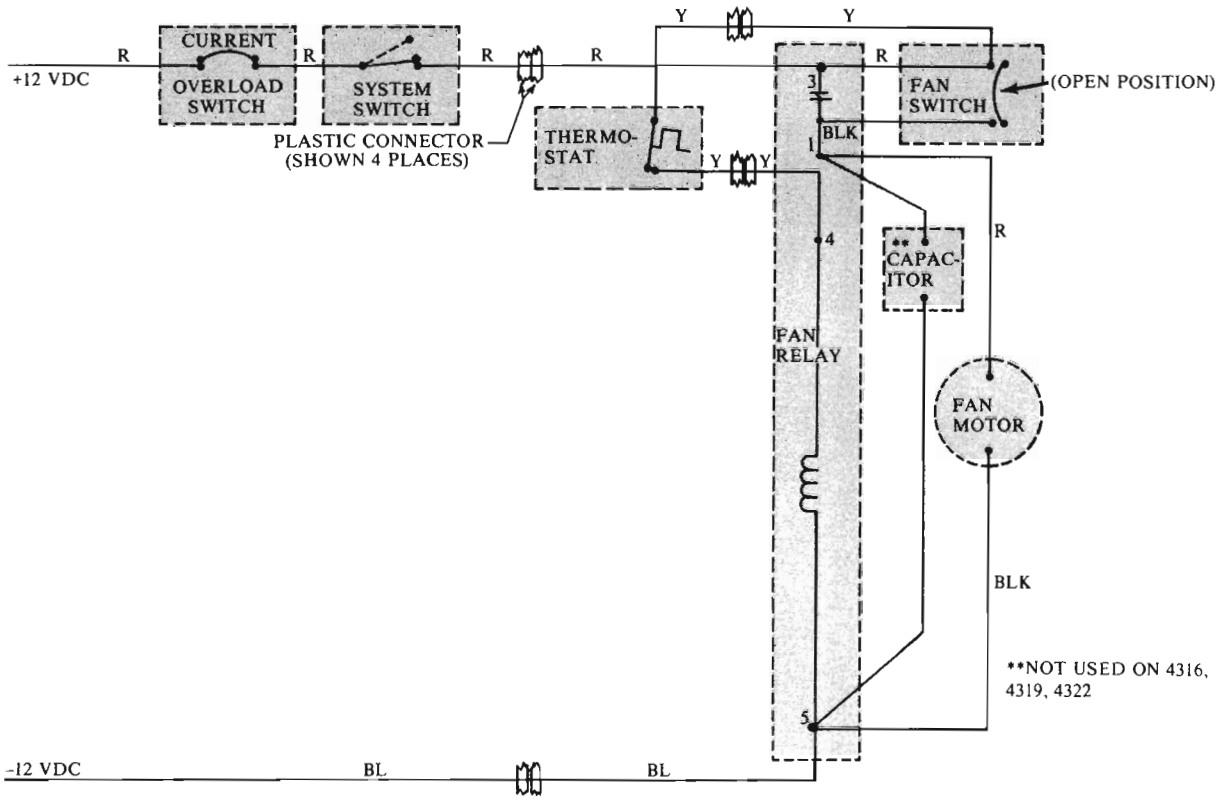
C. When the wall thermostat calls for heat, the thermostat contacts close to (1) switch the +12 VDC to terminal 4 on the fan relay, (2) through the coil of the fan relay to terminal 5, (3) through the blue wire to -12VDC, thus energizing the fan relay coil. See Figure 10.

FIGURE 10



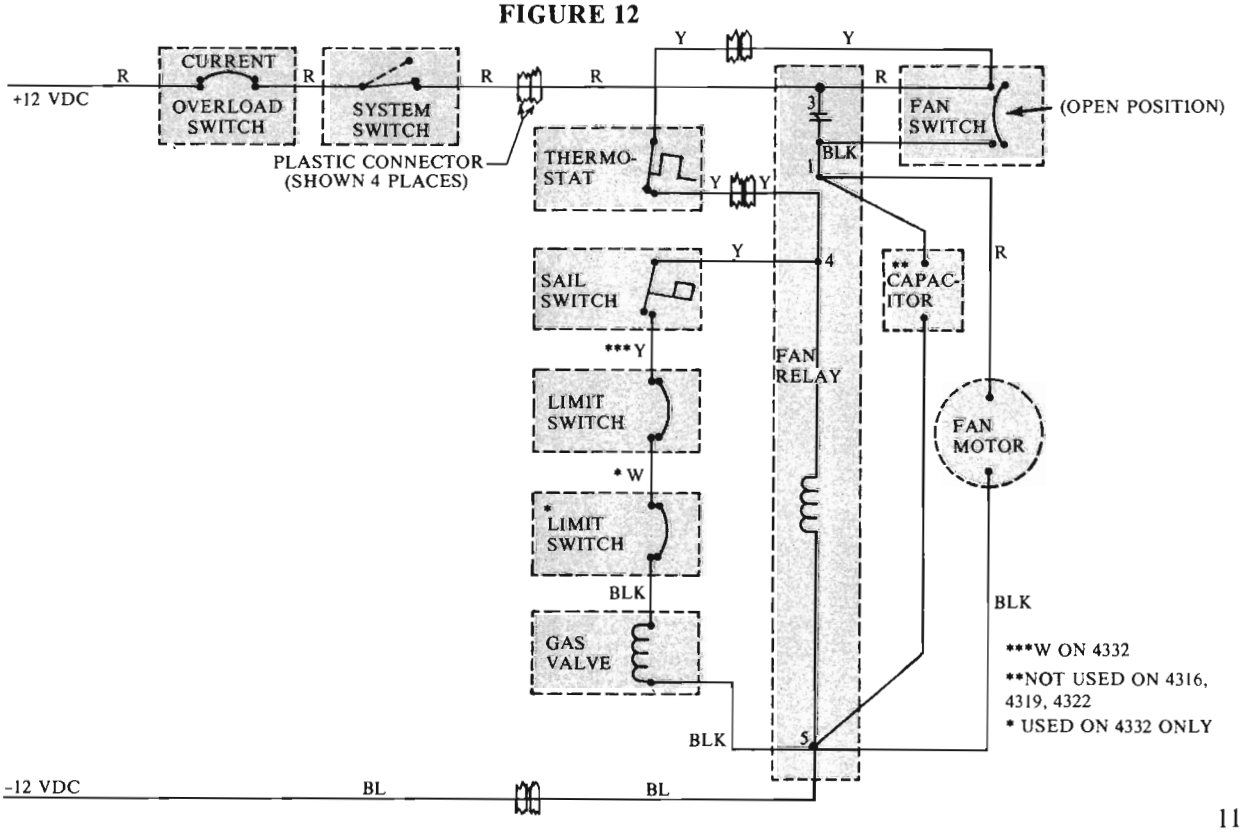
D. With the fan relay coil energized, the contacts of the fan relay will close and the + VDC will pass (1) through the relay contacts from terminals No. 3 and No. 1, (2) from terminal No. 1 on the fan relay through the red wire to the fan motor, (3) through the fan motor, (4) through the black wire to terminal No. 5 of the fan relay to -12 VDC causing the fan motor to run. See Figure 11.

FIGURE 11



E. As the fan comes up to speed, the air current will close the sail switch and the + VDC will pass from terminal No. 4 on the fan relay (1) through the yellow wire to the sail switch, (2) through the sail switch, (3) through the yellow wire to the limit switch (there will be two limit switches on model 4332), (4) through the limit switch through the black wire to the gas valve, (5) through the coil in the gas valve, (6) through the other black wire to terminal No. 5 on the fan relay to -12 VDC. The gas valve is then energized and the main burner will ignite. See Figure 12.

FIGURE 12

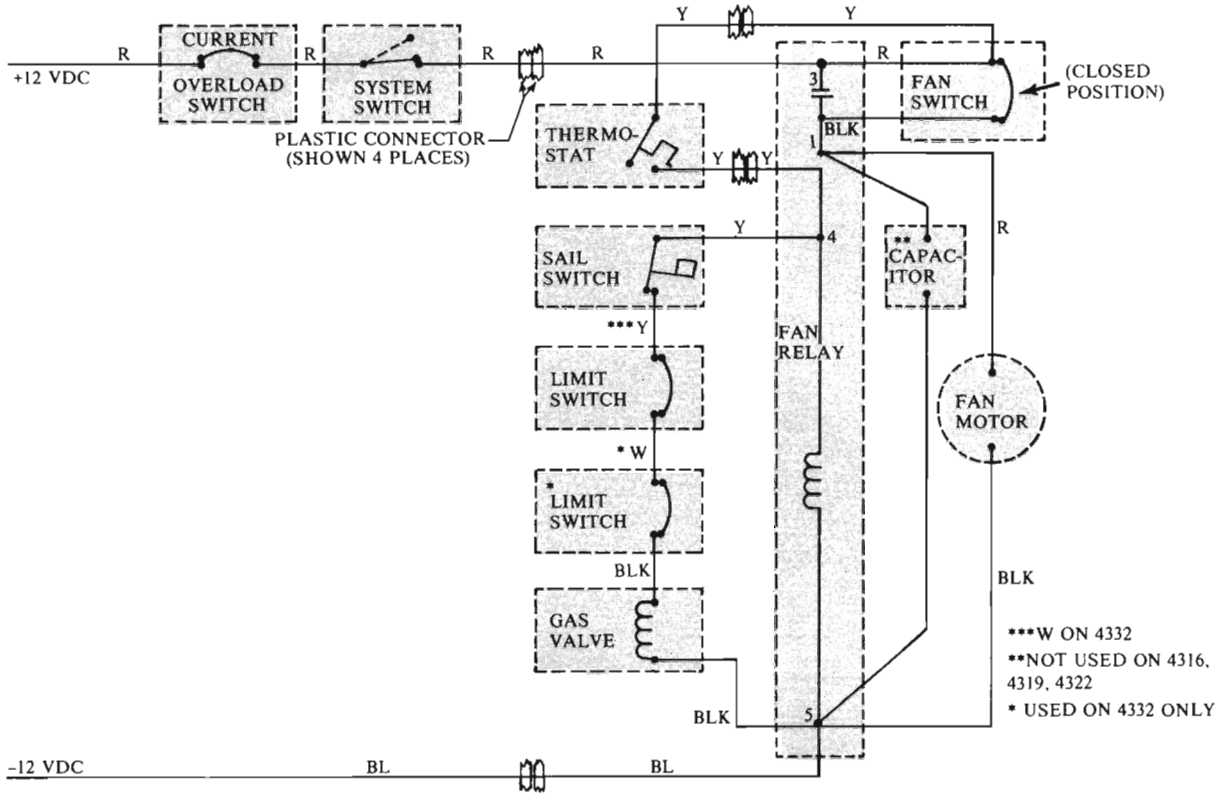


F. After a few minutes of operation, the heat from the heat exchanger will cause the fan switch to close, but that will have no effect on the fan motor because it is already receiving power through the closed fan relay contacts.

When the temperature of the RV rises above the thermostat set temperature, the thermostat will open and disconnect the +12 VDC to terminal No. 4 of the fan relay. Then the gas valve will close and the fan relay contacts will open, but the fan motor will continue to receive current through the fan switch. See Figure 13.

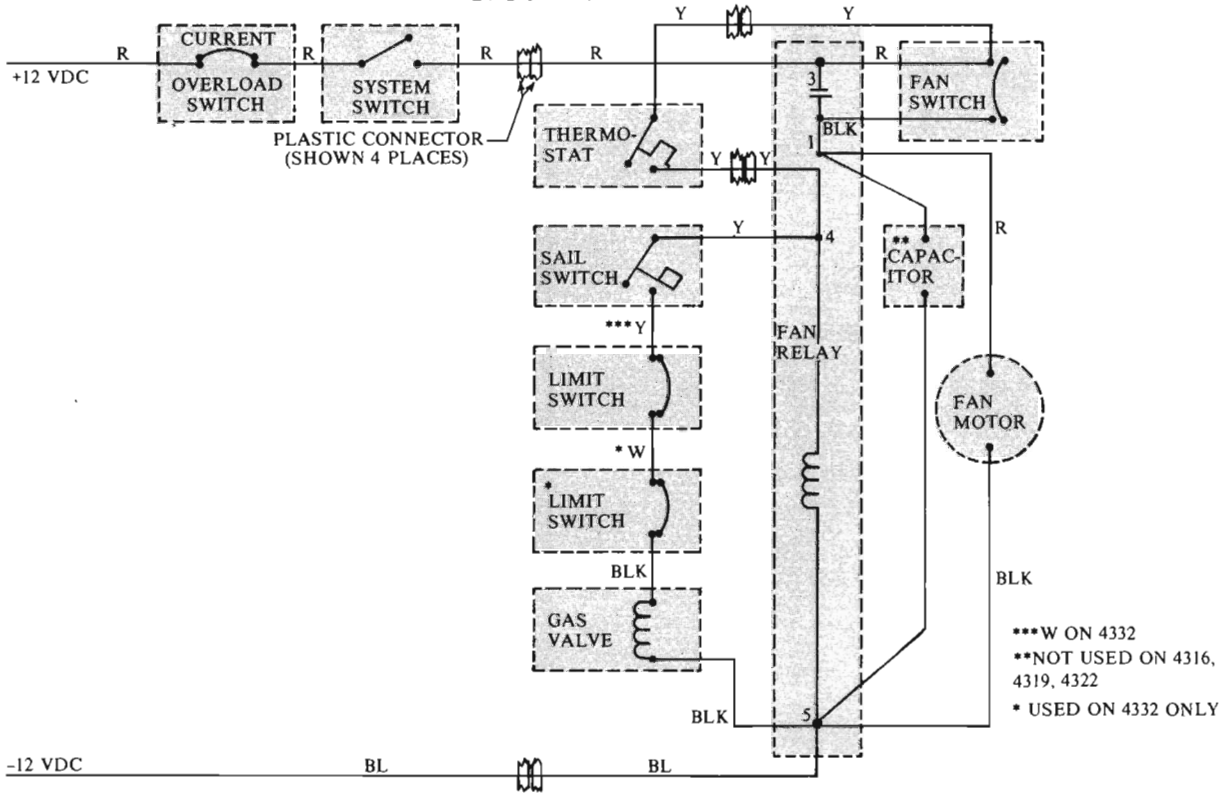
After the fan has extracted the residual heat from the furnace, the fan switch will open; and the fan motor will stop.

FIGURE 13



G. The complete wiring diagram with all the switches in their normal positions is shown in Figure 14.

FIGURE 14



SERVICE PROBLEMS

WARNING

Before attempting replacement of any part on the furnace, be sure to turn system switch inside of furnace to "OFF". Also, if furnace is equipped for dual voltage, be sure the electrical power is turned off to the converter. Failure to do so can result in damage to the furnace and a shock hazard injury may occur.

In order to analyze service problems, it is essential to understand the sequence of operation of the furnace and the wiring as explained in the previous section. Read the section thoroughly before attempting service.

The more common service problems are listed below. To solve a particular problem, identify it according to the description given then refer to the cause shown opposite the problem. In some cases, the cause will be referenced to one of the service charts.

NOTE

When bench testing a furnace for combustion problems, the vent assembly must be installed to accurately test the furnace.

Service Problem	Cause
1. Burner Fails to ignite but pilot stays lighted.	Follow procedure outlined in service chart No. 1 to determine cause.
2. Pilot will not light	Follow procedure outlined in service chart No. 2 to determine cause.
3. Pilot outage	Follow procedure outlined in service chart No. 3 to determine cause.
4. Yellow sooty flame	Follow procedure outlined in service chart No. 4 to determine cause.
5. Insufficient heat	Follow procedure outlined in service chart No. 5 to determine cause.
6. On AC/DC Models, furnace runs down battery when used on 115 VAC supply.	Faulty converter or converter wiring. See Section IV, "Converter Check" under Electrical Check Out.
7. Blower cycles when wall thermostat is in "off" position.	In mild weather, heat from the pilot may energize fan switch, causing blower to operate. If pilot properly adjusted the correction is to turn system switch to "off" during mild weather.
8. Furnace blower shuts off immediately when furnace shuts off.	Faulty fan switch
9. Blower runs smoothly on 12 volts but vibrates (makes noise) on 115 volts	Faulty capacitor in furnace
10. Furnace burns continuously	Thermostat wires shorted together
11. Blower vibrates on either 12 volt operation or 115 volt operation	Blower impellor out of balance, motor mounts deteriorated, or motor shaft bent
12. Metallic "scraping" noise when blower operates	Either combustion or blower impellor improperly centered on motor shaft causing impellor to hit blower housing

CAUTION

When completing service, always make a final check as follows:

A. Check for gas leaks at all joints in the furnace piping and at the valve inlet of the furnace. Use soap suds to check. **Never use a lighted match since explosion, fire and injury may occur.**

B. Light furnace (see caution below) and cycle furnace several times to make certain furnace operates properly; i.e., proper combustion, smooth ignition, furnace turns on and off at call of thermostat.

CAUTION

Before lighting furnace turn gas valve to "off" then set the thermostat to above room temperature so that furnace blower operates for five minutes. In case any unburned gas might be in the combustion chamber, the air from the combustion blower will purge the gas to the outside.

C. Check thermocouple millivoltage if not done during the course of servicing.

D. Check gas pressure at the inlet of the gas valve. Pressure for L.P. gas should be 11" W.C. to 11½" W.C. Do not use the kitchen range pressure reading as an indication of the pressure at the furnace.

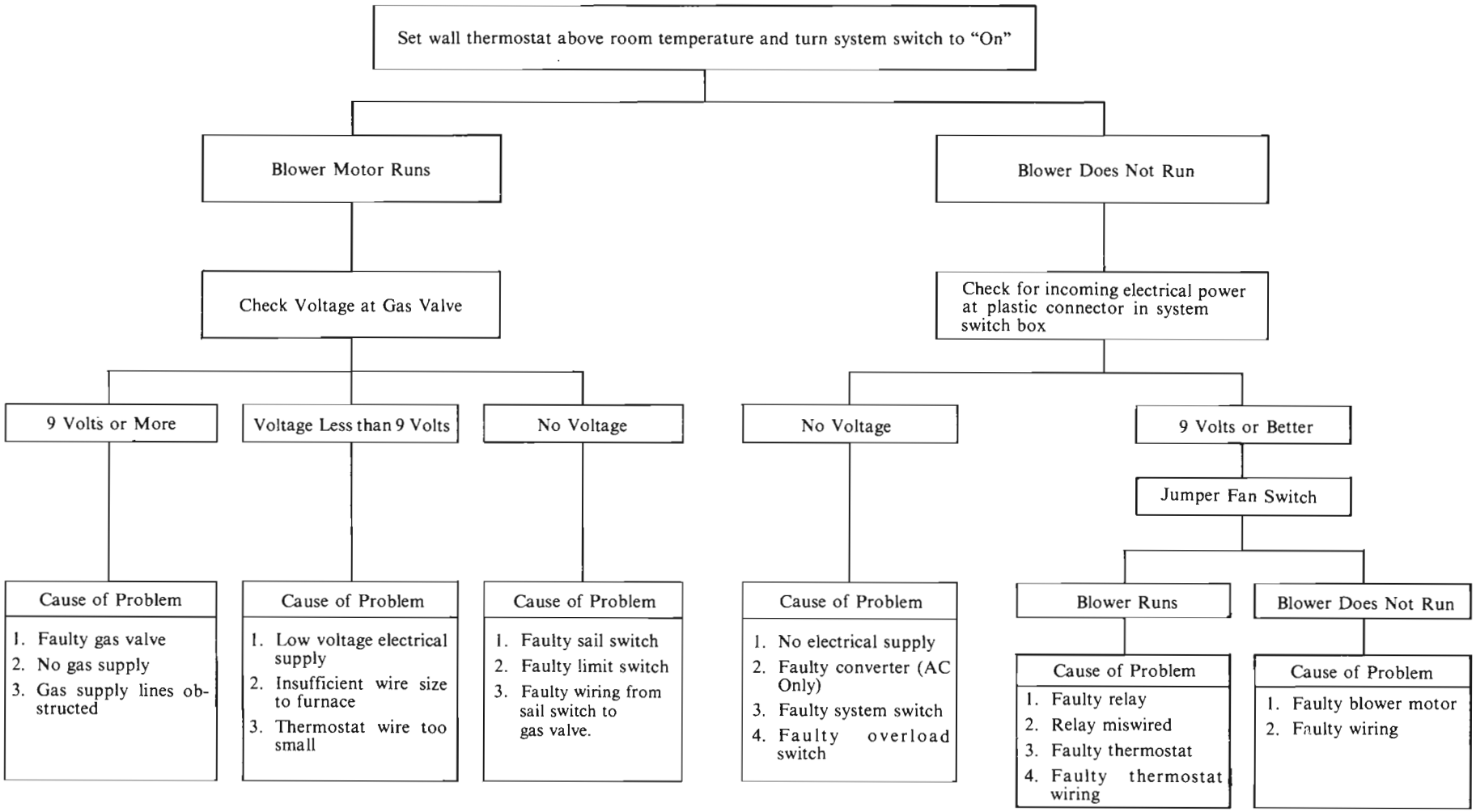
E. Check to make sure vent assembly is properly assembled.

F. Make sure operating booklet is with furnace, and that the customer understands the operation of the furnace. Operating booklets can be obtained from the Customer Service Department, 410 East 37th Street North, Wichita, Kansas 67219. Be sure to state model number and serial number of furnace.

SERVICE CHART I

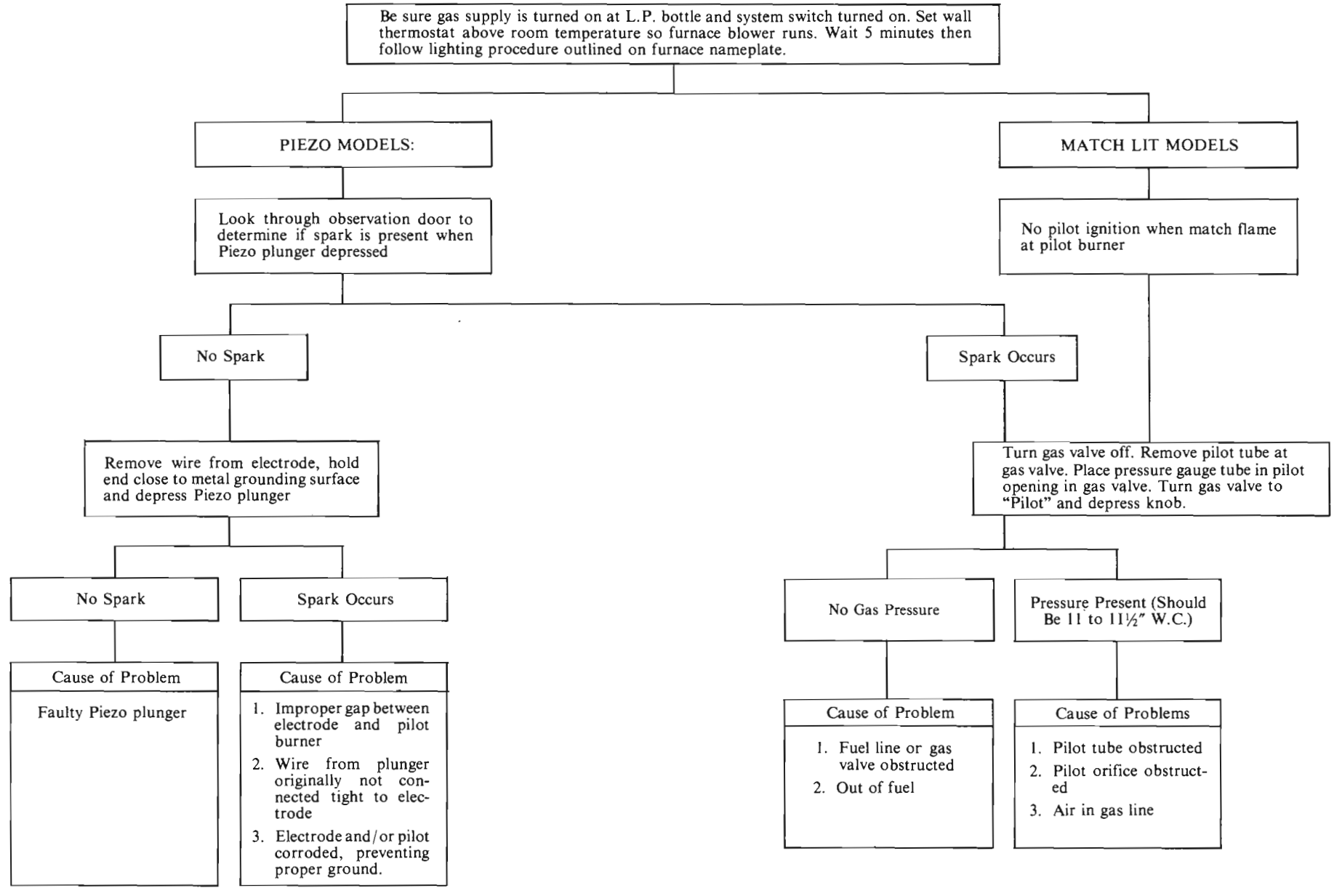
PROBLEM: BURNER FAILS TO IGNITE BUT PILOT STAYS LIGHTED

Note: For details of electrical check out procedure see "Electrical Check Out" Section



SERVICE CHART 2

PROBLEM: PILOT WILL NOT LIGHT



SERVICE CHART 3
PROBLEM: PILOT OUTAGE

Set wall thermostat above room temperature so furnace blower runs. Follow lighting procedure outlined on furnace nameplate

Pilot Goes Out as soon as Gas Valve Knob Is Released

Check Thermocouple Millivoltage (Open Circuit Check)

No Millivoltage	25 Millivolts or More
Cause of Problem	Cause of Problem
1. Faulty thermocouple 2. Pilot flame not striking thermocouple	1. Thermocouple connection in gas valve not tight 2. Faulty gas valve

Pilot Lights but Goes Out Intermittently

Check Thermocouple Millivoltage (Open Circuit Check)

Less Than 25 Millivolts	25 Millivolts or More
Cause of Problem	Cause of Problem
1. Weak thermocouple 2. Pilot flame out of adjustment 3. Low gas pressure	1. Weak electromagnet in gas valve 2. Vent assembly not installed properly 3. Air seal gaskets not sealing properly

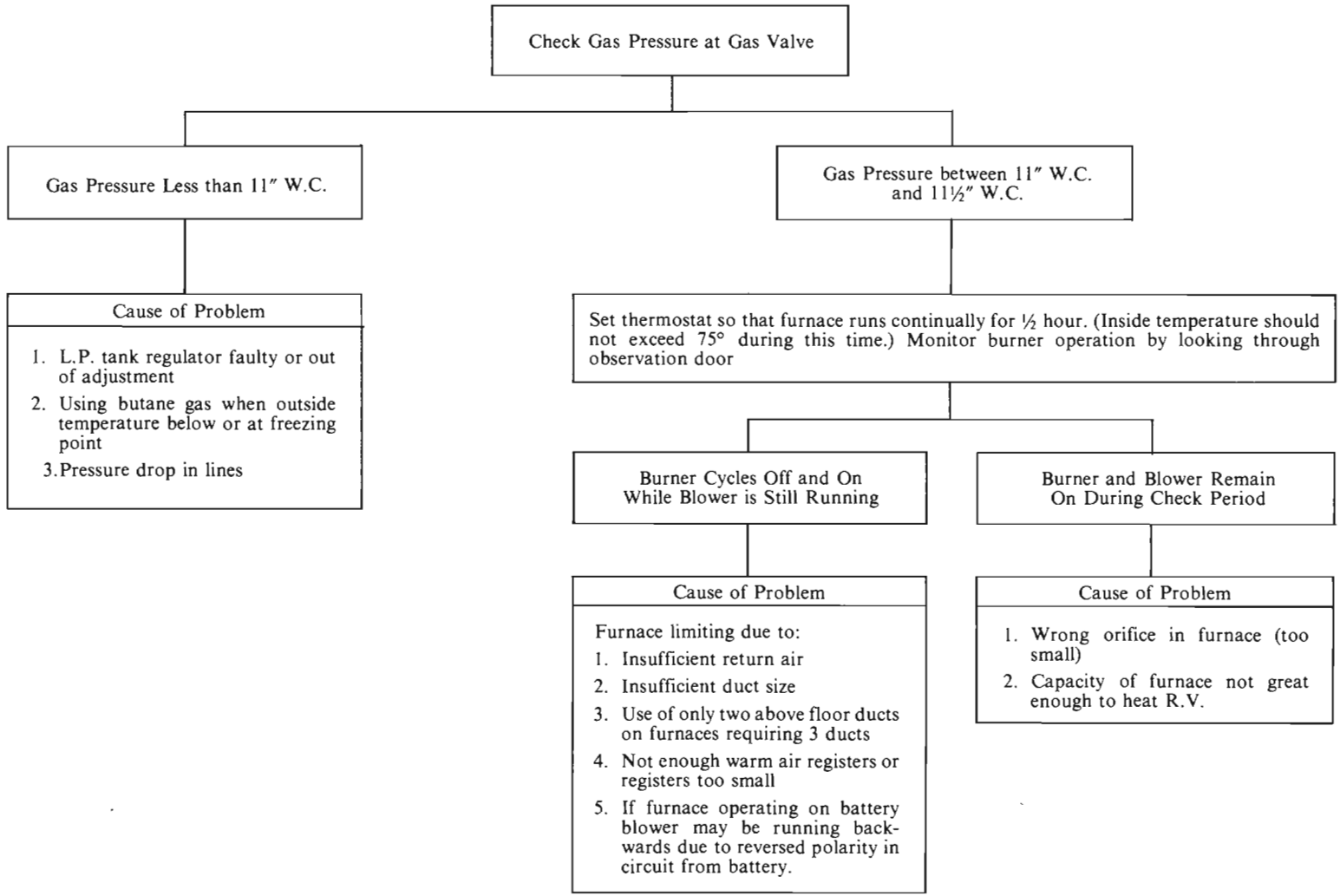
SERVICE CHART 4

PROBLEM: YELLOW SOOTY FLAME

Check Gas Pressure at Gas Valve

Gas Pressure between 11" W.C. and 11½" W.C.	Gas Pressure Less than 11" W.C. or More than 11½" W.C.
Cause of Problem	Cause of Problem
1. Wrong burner in furnace 2. Burner not mounted properly or loose 3. Burner mounting ring not in line with burner 4. Vent improperly installed 5. Air seal gaskets not sealing properly 6. Wrong size orifice in furnace 7. If furnace operating on battery, blower may be running backwards due to reversed polarity in circuit from battery. 8. Combustion impellor installed backwards	1. Faulty L.P. gas tank regulator or regulator out of adjustment 2. Pressure drop in lines 3. Using butane in cold weather

SERVICE CHART 5
PROBLEM: INSUFFICIENT HEAT



ELECTRICAL CHECK-OUT

The following is the recommended procedure for checking each component of the electric power and control system in case the burner fails to ignite. This basic procedure follows the same steps as outlined in Service Chart No. 1 "Burner Fails to Ignite" when the cause of the problem is electrical.

The only electrical checks which can be made with the heat exchanger assembly in the furnace are (1) voltage at gas valve terminals (2) ohm reading through thermostat circuit (3) incoming voltage at plastic connector (4) jumpering the fan switch.

The electrical voltage checks listed below which will require removal of the heat exchanger assembly are marked with an asterisk (*).

Remove the heat exchanger according to the procedure outlined in Paragraph F, "Heat Exchanger Assembly" under Furnace Component section.

If the furnace is flush mounted to the wall panel, the heat exchanger assembly can be placed near the front of the casing, close enough to plug the plastic connector together from the heat exchanger to the system switch box. This will establish the necessary circuit to all working components.

If the location of the furnace is such that an electrical connection cannot be made between the heat exchanger assembly and the system switch box, then the furnace may require removal and electrical hook up made to an alternate power source.

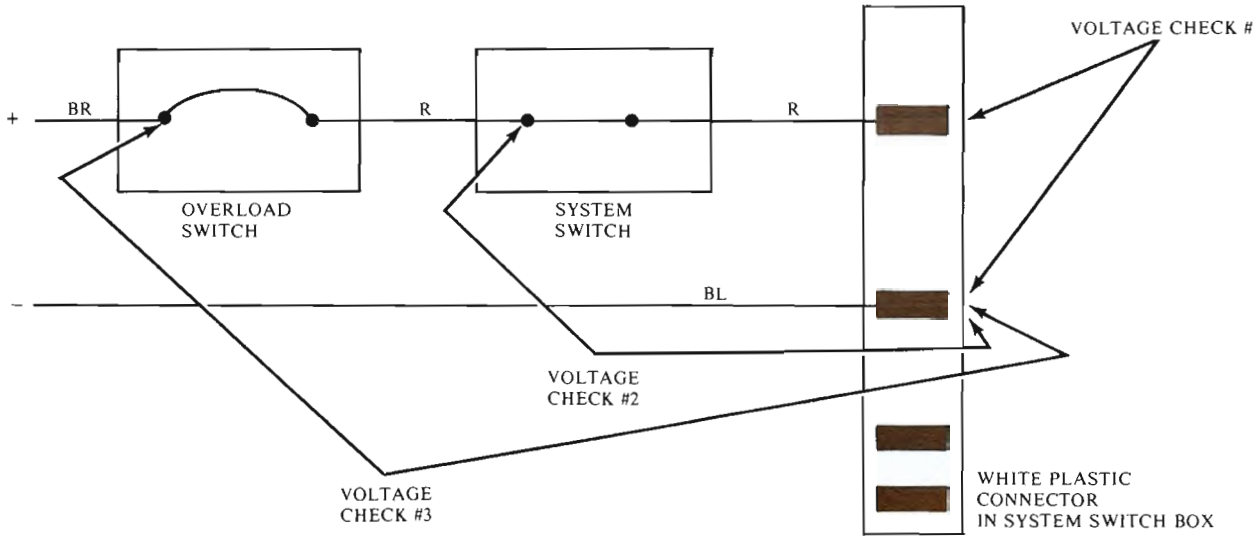
If necessary, components can also be checked by an ohm meter for continuity without electrical power being supplied to the furnace. However, such checks are more difficult to perform than voltage checks where the furnace is in the electrical operating mode.

First, turn the wall thermostat to a setting above room temperature and observe the operation of the furnace blower. Be sure system switch is turned on.

If blower does not run, start electrical check beginning with Section A. If blower runs, start electrical check beginning with Section C.

A. If blower does not run, check power circuit: (See Figure 15)

FIGURE 15



POWER CIRCUIT CHECK

1. Check incoming voltage at white plastic connector. The power supply can be checked with the furnace in its casing in the RV. To do so, disconnect the white plastic connector from the junction box. With the system switch closed, check the voltage between the two upper posts (the one to which the black and the red wires were connected) of the connector's mating part on the junction box. There should be 12 VDC (10 VDC minimum) if the furnace is operating on battery power. If the furnace is operating on converter power (115 volt models) the voltage may read over 20 VDC. Over 20 VDC is normal, and it will reduce to 12 VDC when the connector is replaced and a load is drawn from the converter.

   If proper voltage is present, then check Thermostat Circuit, Section "B", Paragraph 1 below. If no voltage, proceed to check power supply, including on-off switch, overload switch, and power converter on A.C./D.C. models.

NOTE

If 12 VDC power is present on 12 volt operation but not on 115 volt operation (AC/DC Models only) then the converter is probably faulty and should be checked according to Section D.

2. Check System Switch*

   Remove system switch box cover so terminals on on-off switch and overload switch are accessible. Check for voltage between terminal on system switch where red wire from overload switch (circuit breaker) is attached and the -VDC post in the plastic connector where the blue wire is attached. If voltage, either the system switch, red wire to plug or connection to plug is faulty. If no voltage, check overload switch.

3. Check Overload Switch*

   Check voltage between the terminal where the brown wire is attached to the overload and the -VDC post in the plastic connector. If power is present, then the overload is faulty. If power is not present, then the problem is in the electrical supply source at or from the battery on the 12 volt only models. If combination A.C./D.C. model, and no power is present on either 12 volt or 115 volt operation then the converter is probably miswired and should be checked.

4. Check Furnace Converter (A.C./D.C. Models Only)*

   As described previously, the converter assembly contains a relay which automatically switches from 12 VDC supply to 115 volt supply when the R.V. is connected to 115 volts.

   When no 115 volt supply is present, the +VDC from the battery feeds from terminal No. 2 on the relay through the normally closed contacts to terminal No. 1, then to the circuit breaker in the furnace.

   When 115 volt supply is present, the transformer energizes, the current is rectified to 12 VDC and the relay is activated. The + VDC current then feeds from the rectifier to terminal No. 3 on the relay through the closed contacts to terminal No. 1 and then to the circuit breaker in the furnace.

   If no current is being supplied to the circuit breaker on either 12 volt or 115 volt operation, then either the brown wire from terminal No. 1 on the relay is broken or disconnected, or the wire from the rectifier may be on terminal No. 2 and the wire from the battery on terminal No. 3. With these wires on the wrong terminals, the relay contacts will be in the open position on either battery or 115 volt operation, preventing current flow from the relay. If the converter is wired properly then the problem is in the power circuit from both the 12 VDC and 115 VAC source. The wiring must then be checked from the furnace to the power source for broken wires, miswiring, etc. To remove the converter, refer to "Heat Exchanger Assembly" under Furnace Components, Section F. Converter wiring is shown in Figure 8.

B. If blower does not run when wall thermostat is set above room temperature, but proper voltage is present at white disconnect plug when checked according to Section "A", Paragraph 1, then check thermostat circuit, blower motor and fan relay.

FIGURE 16

1. Check Fan Motor

   Use an insulated jumper and jumper across the fan switch.

NOTE

Fan switch terminals are covered with clear plastic on the terminal connections. Be sure ends of jumper contact metal surface of terminals where clearance exists between the plastic and terminals.

If motor does not run, then either the motor or wiring to motor is faulty. Heat exchanger assembly must be removed to check wiring and motor.

If motor runs, the thermostat, thermostat wiring, relay or wiring to relay is faulty and must be checked.

2. Check Thermostat Circuit (See Figure 16)

   Turn the wall thermostat above room temperature. With the disconnect plug disconnected, check for continuity with an Ohm meter between the two lower posts (the ones to which the yellow wires were connected) of the connectors mating parts in the junction box. The meter should indicate 0 to 2.5 Ohms resistance. If the resistance is greater than 2.5 Ohms, then the thermostat or thermostat wires are faulty.

   As an alternate check, the two yellow wires from the furnace to the thermostat circuit can be disconnected from the thermostat wires and wired together, by-passing the thermostat.

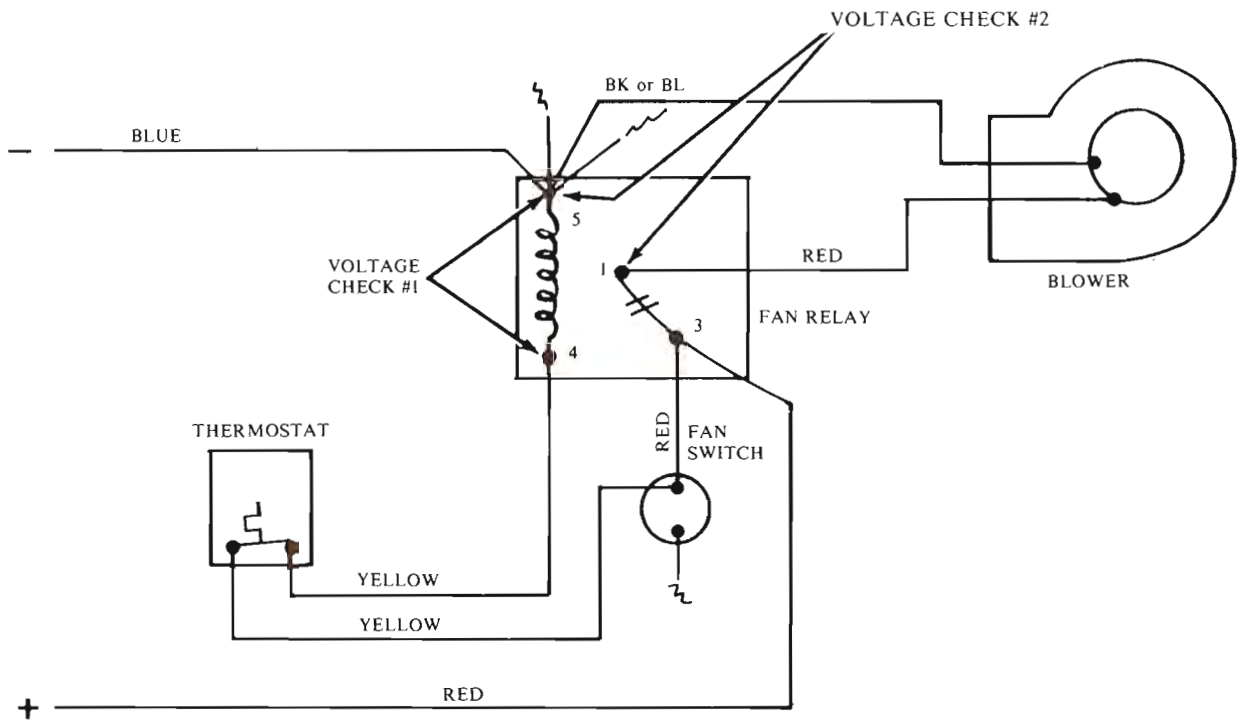
   Connection of the two yellow wires to the thermostat wires may either be inside the system switch box or on the outside of the casing. Therefore, access to the yellow wires, if there is insufficient clearance from the casing side, will require removal of the heat exchanger in order to reach the yellow wires inside the switch box cover.

   If the blower runs with the yellow wires wired together, then the problem is in the thermostat or thermostat wiring.

   If the blower does not run, the problem is in the fan relay.

3. Check Fan Relay* (See Figure 17)

FIGURE 17



For better access to the fan relay, remove the relay from the side of the furnace and place it out to one side so the terminal numbers are clearly visible and enough clearance is available to perform the voltage checks.

Check for voltage between terminals 4 and 5 on the fan relay. If no voltage, then the blue or yellow wires from the relay are broken or not making proper connection.

If voltage is present between terminals 4 and 5, then check for voltage between terminals 5 and 1.

If no voltage is present between 5 and 1, then either the coil or contacts in the relay are faulty or the red wire to terminal 3 is faulty.

C. If blower runs when wall thermostat is set above room temperature, check gas valve circuit, including gas valve, sail switch, and limit switch.

1. Check Gas Valve

   Check for voltage across the two thermostat terminals on the gas valve. Voltage must be at least 9 volts. The red cover cap on gas valve must be removed for access to the terminals.

   If voltage is present, gas valve is faulty.

   If no voltage is present, then check limit switch and sail switch.

   If voltage is low, check battery 115 volt power source (AC/DC Models) and size of thermostat and supply wiring. Supply wiring should be a minimum of 14 AWG. Thermostat wire should be no less than 18 gauge solid or 16 gauge stranded.

2. Check Limit Switch*

   Place a jumper wire across the two terminals on the limit switch. If voltage at gas valve, limit switch is faulty and must be replaced. If voltage is not present at gas valve terminals, then wiring from the gas valve to the limit or the sail switch may be faulty.

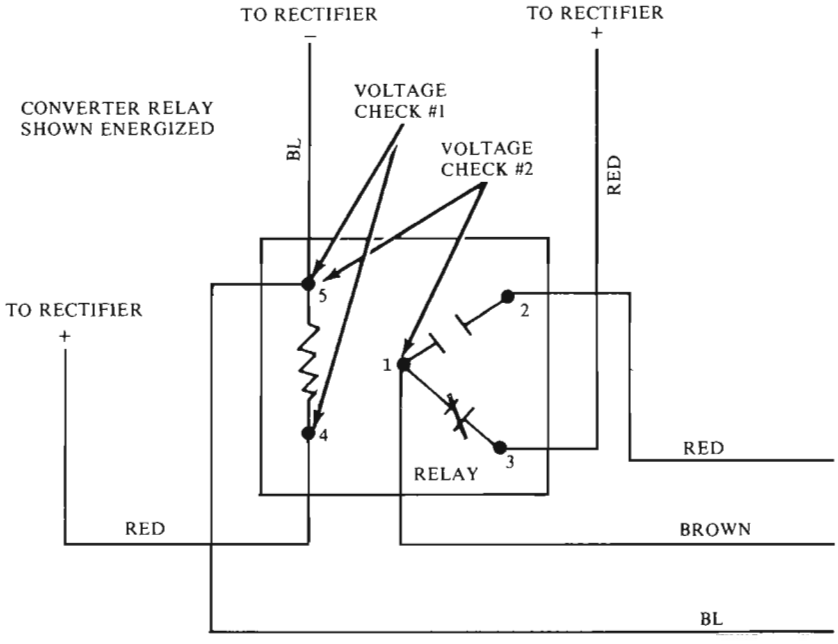
3. Check Sail Switch*

   Jumper the two terminals on the sail switch. If voltage is present at the gas valve terminals, either the sail switch is faulty or the blower may be running backwards due to reversed polarity on the 12 volt supply so not enough air is being delivered to activate the sail switch.

   If there is no voltage at the gas valve, then the wiring from the limit switch to the sail switch or the wiring from the sail switch to terminal No. 4 on the relay is faulty.

D. Converter Check (AC/DC Models Only)* (See Figure 18)

FIGURE 18



If the furnace operates on battery only but not on 115 volts, the converter is probably inoperative or the 115 volt supply is faulty.

Remove the converter according to Paragraph F, "Heat Exchanger Assembly" under Furnace Component Parts section.

With 115 volt being supplied to the converter, check for voltage across terminals 4 and 5 on the converter relay.

If no voltage is present, the transformer/rectifier assembly is faulty and must be replaced.

If voltage is present between terminals 4 and 5, then check across terminals 1 and 5. If no voltage across terminals 1 and 5, then relay or wiring from relay to rectifier is faulty.

If voltage is present across 1 and 5, then converter is good and problem is in wiring from converter to furnace.