

Group 36 Heating System

GENERAL: This group contains information on the "Domestic" heating and cooking systems, including range, oven, furnace, and all ducts and vents.

SPECIFICS: As applicable

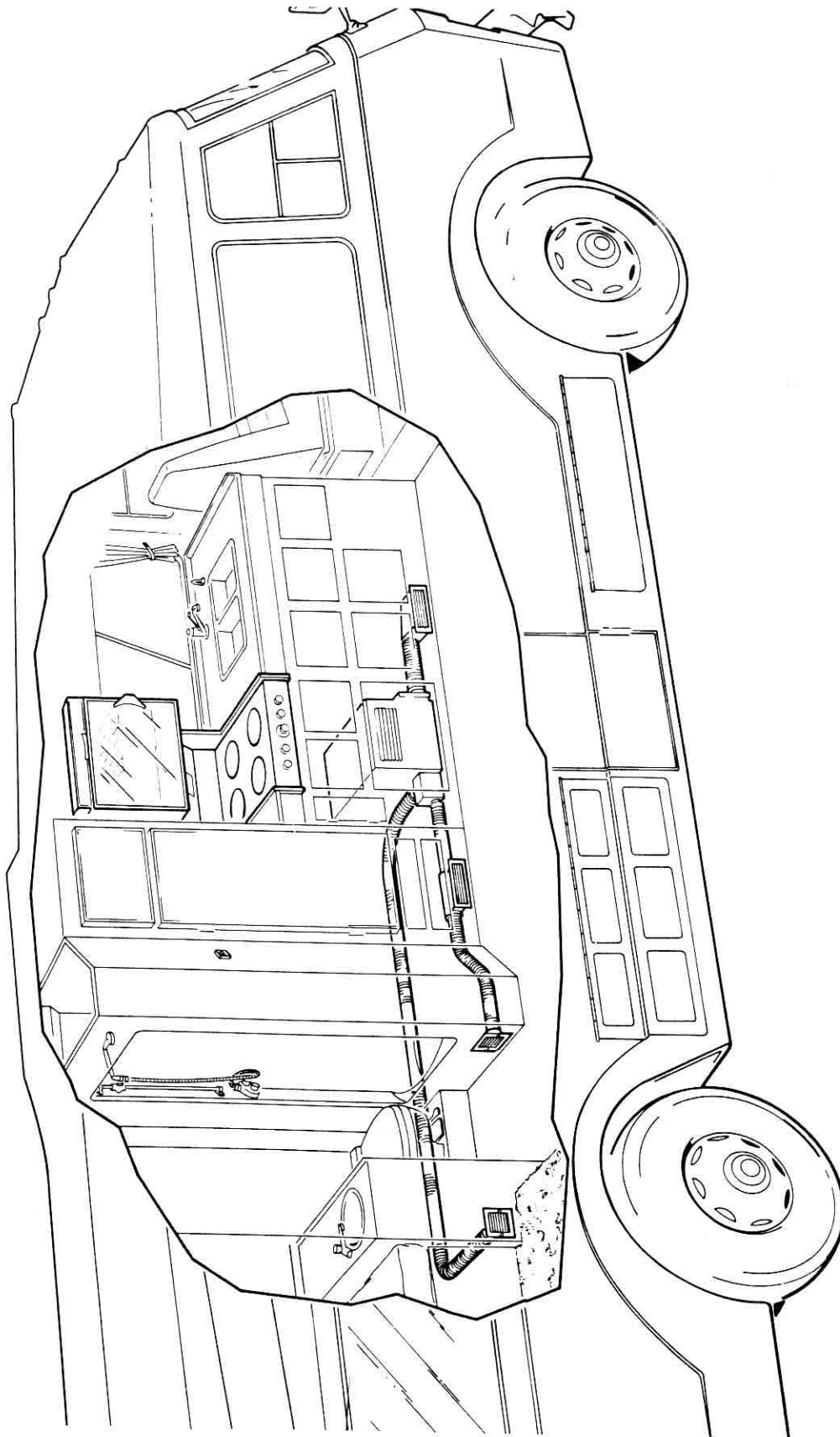
- ...Furnace Assembly
- ...Insulated Tubing
- ...Lines and Fittings to LPG Source
- ...Oven Assembly
- ...Ventilation Pipes and Fittings
- ...Wall Thermostats (also see Group 39)
- ...Range Assembly
- ...Range Hood Assembly



GROUP 36
HEATING SYSTEM

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Figure 36-1. Heating System

GROUP 36
HEATING SYSTEM

36-1. DESCRIPTION

a. General (fig. 36-1). The Heating System consists of a furnace with a wall thermostat and an oven/range with a ventilating hood.

b. Furnace. When the coach temperature drops below the selected temperature point at the wall thermostat, its contacts close and starts the main blower. The air flow created by the blower closes an air-actuated switch which in turn 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, then routed around the heat exchanger and out the exhaust side of the vent. The exhaust/intake vent is located on the left side of coach as shown in figure 36-2.

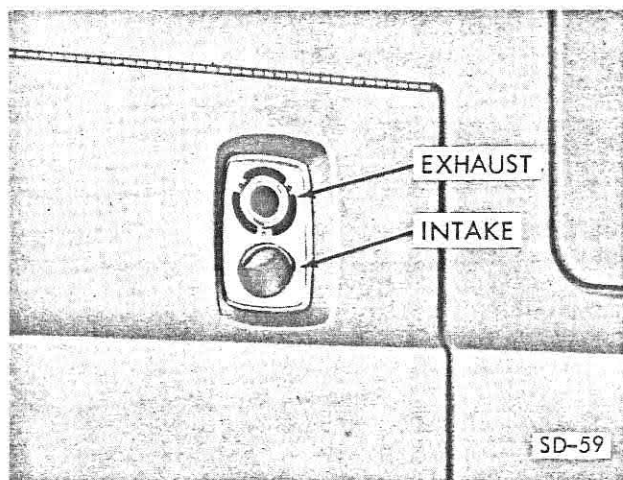


Figure 36-2. Exhaust/Intake Vent

c. Oven/Range. The interior of the oven and cooking areas is 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. The oven temperature is controlled by the thermostat dial, which is operated merely

by pushing it down and turning it 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.

The thermostat dial permits total gas shutoff for both oven and range pilot lights. Each burner on the range has its own control. When the range pilot is lit, the range burners operate automatically when each respective control is set.

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 burner ratings are: range burners, 5200 BTU/hour; oven burner, 10,500 BTU/hour.

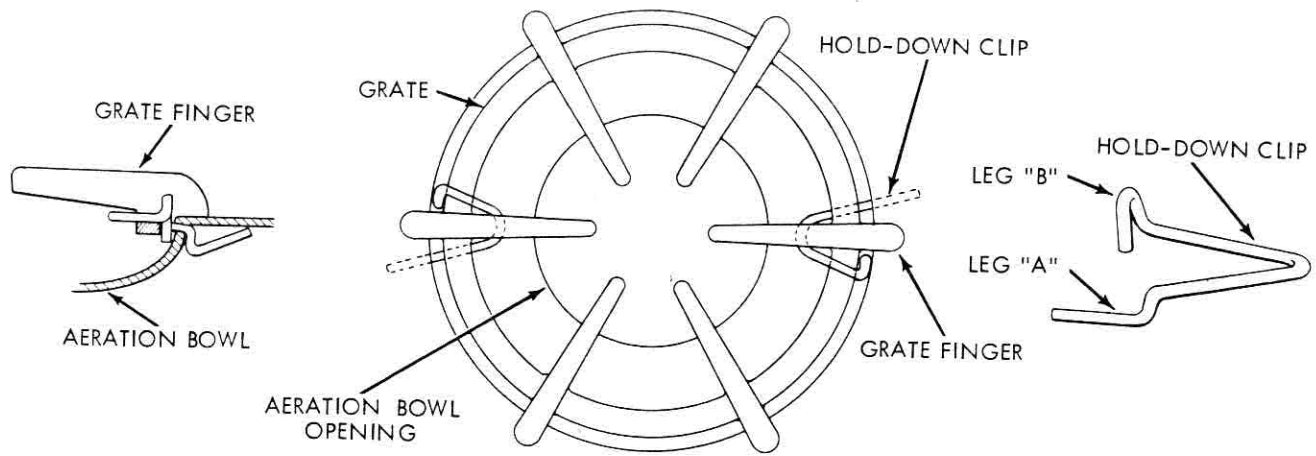
Opening the hinged door at the front of the ventilating hood will turn on the exhaust fan. Opening the power vent door just enough to release the ON-OFF switch will start the fan and draw most of the exhaust air to the rear vent and up through the back flue. Setting the vent door fully open will vent the area for both the range and oven. The fan operates from the 12-volt domestic supply.

The hold-down clips for the burner grates, used when traveling, may be left in place even when operating the range. 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; refer to figure 36-3.

d. Vents. Each heating appliance has an exhaust vent that routes burned gases to the coach exterior.

Warning

Do not park coach in an enclosed area during extended operation of LPG appliances; do not park coach so any exhaust vent is obstructed; do not allow damage or foreign matter (such as mud, snow, or ice) to constrict any exhaust vent. Avoid breathing of LPG fumes.



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Figure 36-3. Grate Hold - Clip

The range is vented to the coach roof. Two exhaust fans are installed in the range hood to increase flow of exhaust air. The furnace exhaust/intake vent is located on the left side of the coach a short distance to the rear of the water heater vents.

36-2. TROUBLESHOOTING

Instructions for troubleshooting in the heating system are contained in Table 36-1. When corrective remedies are referenced, they should be completed in accordance with the step-by-step procedures.

Table 36.1. Troubleshooting the Heating System

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
Furnace "whines" when operating	Spoiler screw in air inlet orifice protruding too far into inlet	Turn spoiler adjustment screw to back out of orifice inlet Check intake/exhaust vent for damage or obstructions
Pilot light will not stay lit	Faulty sight glass or burner door gaskets letting in drafts Defective exhaust/intake vent letting exhaust gas flow back to pilot light area	Repair or replace gaskets Remove vent collar and sleeve and inspect for damaged exhaust support brackets; repair or replace
Furnace pilot light will not light using ignition coil	LPG tank empty Air in LPG lines	Refill tank; refer to Group 38 Purge air from lines; refer to paragraph 36-6a

Table 36.1. Troubleshooting the Heating System (Continued)

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
Furnace pilot light will not light from ignition coil, but lights using a stick match	Low battery voltage	Recharge domestic batteries
Furnace pilot light is lit, but main burner will not light	Domestic batteries too low to operate furnace blower (which sets air-actuated switch)	Recharge domestic batteries
	Air trapped in LPG lines from last fillup	Purge air from lines; refer to paragraph 36-6a
All pilot lights are burning a blue flame (no orange tip)	Excessive air in LPG lines	Purge lines of air; refer to paragraph 36-6a
Pilot light of only one appliance is burning an all blue flame (no orange tip)	Air to gas ratio, at pilot light, out of adjustment	Check and adjust, as required
Main burner remains lit when pilot light is turned off	Inoperative safety valve	Repair or replace
		NOTE
		Only a qualified gas equipment service representative should attempt repair on the safety valve component (s)
Oven or range burners will not light	Empty LPG tank	Refill LPG tank, refer to Group 38
	Pilot light out	Relight pilot light; refer to paragraph 36-6c
One range burner will not light, but all other burners operate satisfactorily	Dirty burner	Remove and clean; refer to paragraph 36-4b
Oven/range pilot light will not stay lit (garlic-like odor present)	Dirty pilot light tube	Clean pilot light burner; refer to paragraph 36-4c (1)
	Pilot light improperly adjusted	Correct adjustment; refer to paragraph 36-6b (1)
	Strong draft over range top	Close windows in immediate area (use only overhead ventilating fans and oven/range power vent for ventilation)
	Empty LPG tank	Refill LPG tank; refer to Group 38
Oven main burner will remain lit when pilot light is extinguished	Inoperative safety valve	Only a qualified gas equipment service representative should attempt repair on the safety valve component (s)

36-3. REMOVAL/INSTALLATION

a. General. Step-by-step instructions for replacement of heating system components are provided herein. Order replacement parts as listed in the 2900R Parts Catalog. When any part of the system is replaced, the system must be leak tested; refer to Group 38. All gas connections should be made by a qualified technician in compliance with current regulations.

b. Furnace Removal. To remove furnace, proceed as follows:

- (1) Open coach doors and windows for ventilation.
- (2) Disconnect 12 volt domestic and automotive batteries.
- (3) Turn off LPG service valve at LPG tank. Evacuate residual LPG from lines by momentarily turning on range burner.
- (4) From inside of coach, remove furnace compartment access panel, then front panel of furnace assembly.
- (5) Remove furnace wire box cover (only one screw).
- (6) Unscrew terminals (4) and disconnect wiring.
- (7) Remove furnace mounting screws.
- (8) Remove forward and aft distribution duct clamps; detach ducts.
- (9) Disconnect LPG supply line.
- (10) Open exterior access door at furnace vent hood assembly, then remove hood by removing four attaching screws.
- (11) Remove attaching screws, then detach vent collar and vent sleeve.
- (12) Remove furnace assembly from mounted position, outward toward aisle.

c. Furnace Installation. To install a new furnace, perform the preliminary procedures beginning with step (1). To reinstall a repaired furnace assembly commence the procedure with step (7).

- (1) Knockout two plugs from distribution duct attachment holes at each end of furnace.

- (2) Insert base of round side adapter sleeves in groove of duct attachment holes and turn (twist) approximately 1/8 inch to lock and seat in position.

- (3) Knockout the two lower plugs from wiring box electrical lead inlet holes and install two hard-rubber grommets provided. (Do not remove upper knockout plug.)

- (4) Apply mastic or permagum (provided with new vent sleeve) sealant to the back of the vent collar assembly (to provide seal between collar and vehicle wall).

- (5) Using vent sleeve removed in step b(11), measure length and cut new sleeve provided to same dimension.

NOTE

In lieu of (5), the old sleeve may be reused if in serviceable condition.

- (6) Remove protective cap from LPG inlet port.
- (7) Place furnace in mount position in coach.
- (8) Open exterior access door and install vent sleeve connecting furnace to outlet in wall.
- (9) Install vent collar, prepared according to instructions in step (4) above, over sleeve end, then secure with two screws.
- (10) Install vent hood assembly, using four screws.
- (11) Secure furnace base to floor mount using two screws.
- (12) Connect forward and aft distribution ducts over adapters at each end of furnace, then secure with clamps.
- (13) Insert electrical leads through holes in grommets installed in step (3) and connect wires to terminals with four screws.
- (14) Install wiring box cover plate using screws.
- (15) Connect LPG supply line to fitting on rear end of furnace.
- (16) Set VOLTAGE SELECTOR switch on wiring box to BATT ONLY position.

(17) Reconnect automotive and domestic batteries.

(18) Install front panel of furnace, then install access cover.

Caution

Be certain that louvered areas on access panel and furnace front panel are at the top of each.

(19) To light furnace, refer to paragraph 36-6b.

d. Wall Thermostat Removal (fig. 36-4). To remove wall thermostat, proceed as follows:

(1) Applying a slight pressure upward, lift cover from thermostat base.

(2) Disconnect gray and black leads from terminals on right side.

(3) Unscrew two mounting screws on left and right sides of base.

(4) Carefully pull base from wall, allowing gray and black leads to slide through holes in base, but not fall back into wall.

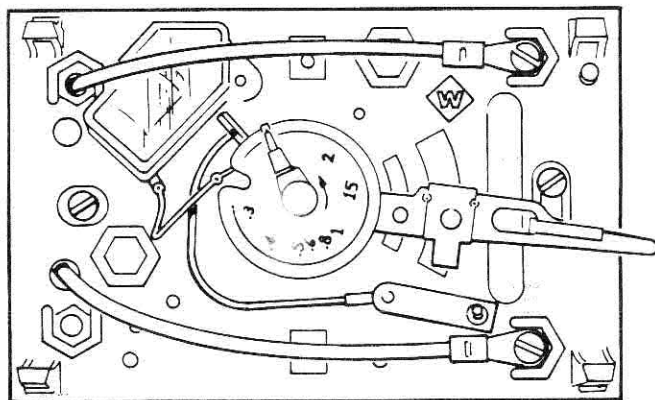


Figure 36-4. Wall Thermostat

e. Wall Thermostat Installation (fig. 36-4). To install wall thermostat, proceed as follows:

(1) Set adjustable heat anticipator at 0.75 amps.

(2) Place thermostat base in position, with UP on left-hand or toward rear of coach.

(3) Insert gray and black leads through holes provided in base and secure at right-hand terminals (gray at top, black at bottom).

(4) Secure base to wall using two screws.

(5) Press cover on base and set wall thermostat to a higher than ambient temperature and check that furnace comes on automatically, then return thermostat to desired setting.

f. Oven/Range Removal. To remove the oven/range, proceed as follows:

(1) Disconnect domestic and automotive batteries.

(2) Close LPG service valve.

(3) Remove top grates and top of range.

(4) Open all windows and doors for ventilation.

(5) Open burners to clear lines.

(6) Disconnect LPG connection, located within range top, left side (toward rear of coach).

(7) Remove three wood screws from cabinet panel above power vent and remove panel.

(8) Remove two screws on each side panel of range.

(9) Pull assembly a short distance from wall and disconnect wiring for light and power hood.

(10) Remove oven/range assembly from recess area.

g. Oven/Range Installation. To install oven/range assembly, proceed as follows:

(1) Place oven/range assembly into position; leave at least one foot clearance from wall.

(2) Connect wiring for oven and range lights, and power hood.

(3) Push assembly completely to wall.

(4) Connect LPG tubing, within range top, left side (toward rear of coach).

(5) Secure assembly with two screws on each side panel.

(6) Open LPG service valve, then apply a soapy solution around the LPG fitting; check for leaks.

(7) Replace top cover of range and range grates.

(8) Connect automotive and domestic batteries and check oven light and fan operation.

(9) Test oven/range operation by lighting pilots and burners; refer to paragraph 36-6b.

Warning

Before lighting oven/range, be sure the coach is well ventilated to ensure that there is no accumulation of LPG.

(10) Install cabinet panel above power vent; secure with three wood screws.

h. Burner Head Removal. To remove one of the burner heads from the range, proceed as follows:

(1) Close LPG service valve.

(2) Remove top grates and range top.

(3) Open doors and windows for ventilation, then open burners to clear lines.

(4) Remove three metal screws holding burner head and gasket to top burner support.

(5) Remove burner by lifting unit up and to the rear of range (coach left side); remove gasket.

i. Burner Head Installation. To install burner head into range top, proceed as follows:

(1) Insert top burner into manifold assembly.

(2) Secure top burner with three metal screws.

(3) Test for leaks, using meter or soapy water solution around gasket.

Warning

Before lighting burners, be sure all doors and windows are open to provide proper ventilation and remove any gas accumulated during test.

(4) Install range top and top grates.

(5) Open LPG service valve and light burner.

(6) Check operation.

j. Power Vent Removal. To remove power ventilating hood from top of oven/range assembly, proceed as follows:

(1) Disconnect domestic and automotive batteries.

(2) Close LPG service valve.

(3) Open doors and windows for proper ventilation, then turn on burners to clear gas lines.

(4) Remove three wood screws from cabinet panel above power vent and remove panel.

(5) Remove two screws on each side panel of range.

(6) Pull oven/range assembly forward (to center of coach) a short distance to allow disconnect of wiring for light and power hood.

(7) Remove oven/range assembly and unscrew metal screws holding power vent at rear of oven/range assembly.

(8) Lift off power vent assembly.

k. Power Vent Installation. To install the ventilating hood above the oven/range assembly, proceed as follows:

(1) If the oven/range assembly is not removed, refer to step f.

(2) Place power vent in position and secure to oven/range assembly with screws.

(3) Reinstall oven/range assembly (with attaching power vent) in accordance with paragraph 36-3g.

l. Power Vent Fan Removal. To remove fan from the power vent assembly, proceed as follows:

(1) Disconnect wiring leads at wire terminal nut.

(2) Remove power vent in accordance with paragraph 36-3j.

(3) Remove two center screws on each end of fan motor support.

(4) Remove fan from motor, then remove motor from support.

m. Power Vent Fan Installation. To install fan into the power vent assembly, proceed as follows:

(1) Install fan motor onto support, then fan onto motor shaft.

(2) Install fan motor support with fan motors into position and secure with two screws on each end.

(3) Connect electrical lead to terminals.

(4) Place power vent in position and secure to oven/range assembly with screws.

(5) Reinstall oven/range assembly with attaching power vent in accordance with paragraph 36-3g.

36-4. INSPECTION/CLEANING

a. General. This section contains inspection and cleaning procedures for the oven/range, furnace, and associated vents.

b. Inspection of Components. Inspection of the heating system requires a visual check for tight connections and/or parts, secure mounting clamps, cleanliness, and absence of components with such damages as cracks, nicks, dents, stripped threads, etc.

c. Cleaning. Regular cleaning with a warm detergent solution and a soft cloth will keep the oven/range in proper condition.

Caution

It is recommended that the porcelain surfaces not be washed when they are warm. Never use cleaning powder containing abrasives or acids.

Cleaning of the heating system usually requires only a soft brush, a vacuum cleaner and/or a damp cloth.

NOTE

Preventive maintenance can eliminate many problems from occurring in the system. For instance, if the burners are allowed to burn with a yellow flame, excessive carbon deposits on the burner elements as well as the exhaust vents.

Warning

Be sure to set the oven and pilot light control thermostat dial 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 which will 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 range top area under the top burners, remove the range cover. The burner heads can be cleaned with a cleaning compound, but be sure to open up all parts with a toothpick and small tube bristle brush afterward to insure proper operation. Use only a toothpick to clean the burner head orifices or parts.

Caution

Do not use a metal instrument because it may distort or enlarge the gas orifices.

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.

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 dishwashing soap. The inside of the vent housings should also be kept free of grease and dirt accumulation by periodic washing.

NOTE

Whenever the central heating system requires shutting down for cleaning or repair, accomplish paragraph 36-3b, steps (1), (2) and (4) to shut off LPG and to gain access.

Wipe and vacuum the furnace casing 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.

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.

Upon completion of furnace cleaning, accomplish turn-on procedures specified in paragraph 36-6b.

36-5. REPAIR

Whenever any repairs are to be made on the oven/range or furnace equipment, be sure to allow ample ventilation for LPG to escape from the lines or damaged component(s).

Warning

Improper use or handling of LPG can result in injury. Besides being highly flammable, breathing of the gas can be lethal and must be avoided. Only qualified service representatives should make repairs or major adjustments to this system.

If the odor of LPG is detected near the oven/range, check pilot light operation first. If the pilot light for the range should go out, there will be a small gas leak. If the oven/range pilot lights are not lit, be sure that the oven and pilot light control thermostat dial is set to PILOTS OFF before beginning repairs. The thermostat dial permits total gas shut off for both oven and range pilot lights. Apply a concentrated solution of soapy water around any LPG fittings, and other areas, suspected of gas leaking.

36-6. GENERAL INFORMATION

a. Purging Air from LPG Lines. After refilling the LPG supply tanks, the gas lines should be purged to remove any trapped air. Before beginning this procedure, open all windows and doors as well as the range top door for thorough ventilation. Turn on one range burner for about thirty seconds, or until the distinct garlic-like odor of propane gas is detected. After this period of time, close the range burner and allow 30 seconds

or more for the accumulated gas to dissipate. Set the oven thermostat dial to OFF and ignite the pilot light.

NOTE

If the pilot light will not ignite within 15 seconds, turn oven thermostat dial to PILOTS OFF and repeat the above procedure.

Allow pilot light to burn for at least 2 minutes with a clean blue flame.

Warning

Do not close range top until pilot light is operating satisfactorily, since an unlit pilot light, over a period of time, can create a dangerous accumulation of gas.

After 5 minutes, if the pilot light is not operating with a steady blue, yellow-tipped flame, adjust the pilot light burner according to paragraph 36-6d; or check the water column pressure of the gas line (which should be 11 inches WC); refer to Group 38.

b. Furnace Turn-On (fig. 36-5). To turn on (light) the furnace proceed as follows:

(1) Preliminary Procedure.

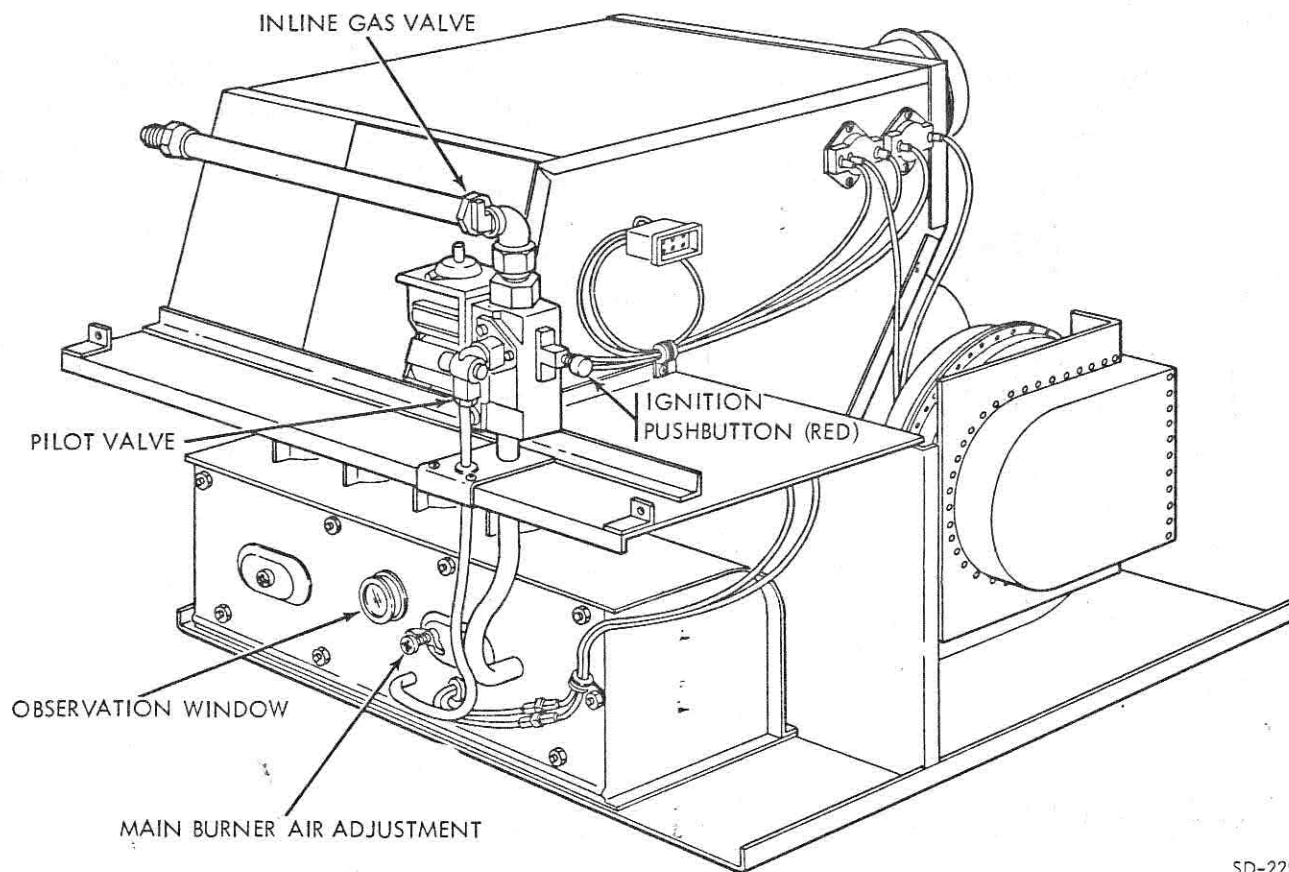
(a) Remove the air intake register panel (below the range).

(b) Remove furnace front panel by turning locking knob 1/2 turn counterclockwise, then pulling the panel slightly out and upward.

(c) Turn inline gas valve off, lever handle crosswise to gas line, then wait 5 minutes to allow any accumulated gas to escape.

(d) While waiting, check that the LPG service valve is on, remove observation window, and set the wall thermostat to OFF; thus the main burner will not light when the pilot light is ignited.

(e) After the 5 minute wait, replace the observation window.



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Figure 36-5. Furnace Adjustment

(2) Electric Ignition. This method utilizes the glow coil pilot ignition system, which operates on the 12-volt domestic electrical power supply. Perform preliminary steps in paragraph 36-6b(1) then proceed as follows:

(a) Turn on inline gas valve and pilot valve.

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

(c) After pilot light is lit, continue holding in pushbutton for about one minute until the pilot light remains lit, even with the pushbutton released. (If pilot light requires adjustment, refer to paragraph 36-6d.

(d) Replace furnace front panel and air intake register panel.

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

c. Oven/Range Turn-On. 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 ratings are: range burners, 5200 BTU/hour; oven burner, 10,500 BTU/hour.

Before opening the LPG service (or outlet) valve, make certain that all range control knobs are set at OFF and that the oven and pilot light control thermostat dial is set at PILOTS OFF.

NOTE

It may require 1 or 2 minutes to start any one of the pilot lights if the gas lines have not been purged of air; refer to paragraph 36-6a.

Turn on the LPG service valve at the tank. Set the oven and pilot light control thermostat dial to PILOTS OFF, lift the range top, and light the range pilot light, using a stick match. After the range pilot is operating satisfactorily, use a second stick match to light the oven pilot light system.

Warning
Be sure the range pilot is lit before turning on any range burner. An unlit range pilot light may create a dangerous accumulation of gas.

The oven pilot light system utilizes a cycling type automatic oven burner. It has two separate pilots, a small constant pilot and a larger heater pilot (refer to fig. 36-6). The constant pilot is the main pilot and once lit will stay lit until the oven thermostat dial is set to PILOTS OFF. The heater pilot, being lit by the constant pilot, will heat the sensing bulb of the mercury control valve located in the rear of the range. Once this sensing bulb is heated, it will open the mercury valve permitting it to release gas to the main burner. When the oven has reached the selected temperature, the thermostat will turn off the supply of gas to

the heater pilot, thus causing the sensing bulb from the mercury control valve to cool. As the mercury valve cools, it will close off the gas to the main burner. When the oven temperature drops below the selected temperature, the same cycle will repeat itself. The only time the oven cycle differs is for the broil operation. Then the main burner flame decreases in size, maintains a steady flame, and will not shut off until the oven control is turned down or set to OFF.

d. Pilot Light Adjustments. Each pilot light has been factory-adjusted and should operate with a blue, orange-tipped flame enveloping the end of the thermocouple sensor located at the end of the pilot burner.

If the pilot flame is completely blue, the pilot light is not getting enough gas. A large full orange flame indicates excessive gas supply, which shortens pilot life. The proper adjustment is made when a small orange-yellow tip appears at the top of the pilot light flame.

(1) **Furnace Pilot.** Observe the pilot light flame through the observation window; the flame should be a pale blue with a yellow tip. If the pilot light requires adjustment, remove the cap

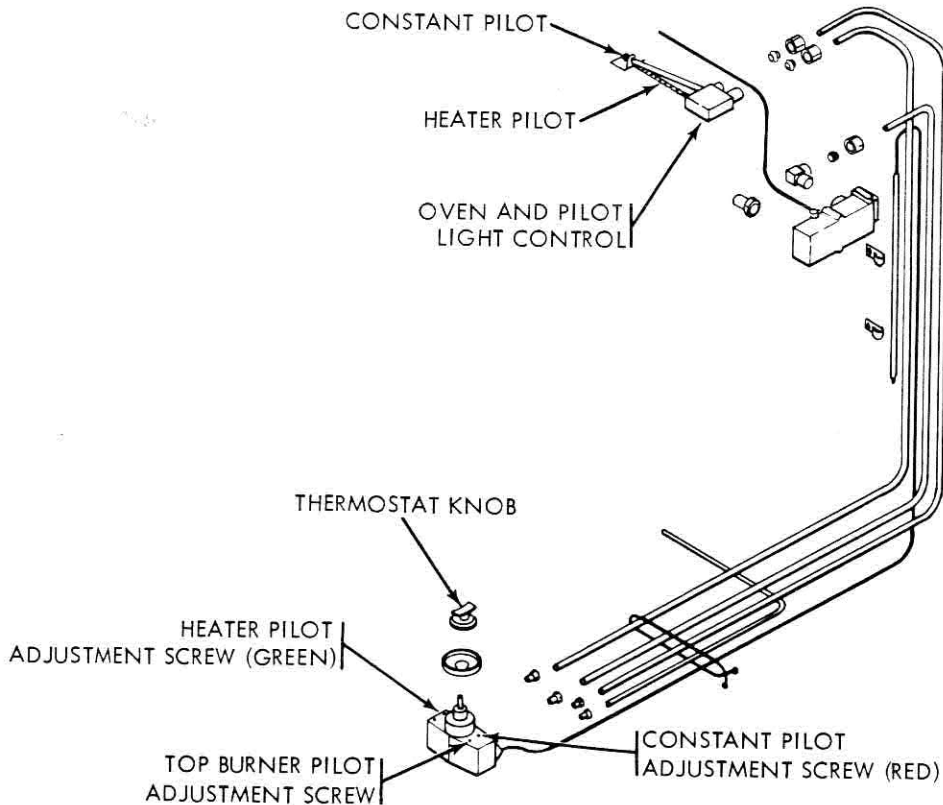


Figure 36-6. Oven/Range Pilot Light System

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screw at the center of the pilot light valve (see fig. 36-5). Turn screw counterclockwise to raise the flame, clockwise to lower.

(2) Oven Pilot. Because gas conditions vary in different localities, two basic pilot adjustments may be required for proper operation. These adjustments are for the constant pilot and the heater pilot (see fig. 36-6). The constant pilot, which is usually burning all the time, ignites the heater pilot and the oven burner.

The following procedure assumes that all oven/range controls are off and the oven and pilot control thermostat dial is set to PILOTS OFF.

- (a) Turn thermostat dial to OFF.
- (b) Light constant pilot (see fig. 36-6).
- (c) Remove the knob and bezel of the oven thermostat dial.
- (d) Using a screwdriver, turn slotted, red-colored constant pilot adjusting cartridge until the pilot flame has no more than a 1/32 inch yellow tip.

NOTE

The adjustment is full open when the slot of the adjusting cartridge is in a vertical position.

(e) Use screwdriver to turn slotted, green-colored heater pilot adjusting cartridge until pilot flame just envelopes the temperature responsive element.

(f) Replace bezel and knob on oven and pilot control thermostat dial.

e. Main Burner Adjustments. For efficient operation, the air and fuel mixture for the main burners should be properly adjusted. A yellow smoky flame indicates a lack of air (or oxygen) and a blue noisy flame an excess of air. If either condition exists, the burners should be adjusted as follows:

(1) Furnace Burner. Observing the main burner in operation (through the observation window), the flames should be blue with slightly yellow tips. Operating the burners with a high yellow flame can cause a carbon deposit build-up. If the main burner requires adjustment, loosen the locknut to the right of the observation window. Turn the air adjustment screw in or out for satisfactory operation, then secure locknut.

(2) Oven Burner. The proper mixture of air is adjusted by an air shutter sleeve. This shutter is located on the burner manifold at the right side of the oven (forward end of coach). It is held in place by a small adjustment screw. Loosen this screw and slide the shutter back and forth along the burner tube for adjustment. Sliding the shutter to the right (front of coach) will add more yellow tipping on the main burner flame; sliding it to the left (rear of coach) reduces yellow tipping. After adjusting for the proper mixture, secure the shutter by tightening the shutter adjustment screw.

f. Heating System Check. This operational check of the heating system assumes that sufficient clean moisture-free propane is in the LPG tank, the LPG regulator is operating correctly, and no leaks are present.

NOTE

If malfunctions are discovered in the LPG system, refer to Group 35.

(1) Check that pilot lights on range (oven and range top) and furnace are on. Light pilot lights as necessary; refer to paragraphs 36-6b and c.

(2) If any pilot light is not opening the appliance LPG supply valve or is not pale blue with a small yellow tip, adjust pilot light; refer to paragraph 36-6d.

(3) Check that each gas burner on range and furnace burns steadily with adequate flame height and proper color through full range of each gas valve operation. If gas flow seems restricted, check burners for clogging or lines for constrictions; such as dents and bends or ruptures such as cracks. To clean clogged burners, refer to paragraph 36-4c; to replace defective LPG lines, refer to Group 35. Adjust air flow to burners as necessary; refer to paragraph 36-6e.

Caution

Do not operate burners with excessive yellow flame, as this can cause excessive carbon deposits to build-up in appliances and their vents and adversely affect their functioning.

(4) On each appliance in succession, light a burner, then close pilot light valve. If burner does not immediately shut off, pilot light safety system is defective and must be replaced or adjusted by a qualified gas-appliance serviceman.



MODELS: 4016, 4023, 4028, 4030

UNDERCOUNTER FURNACE FOR

RECREATIONAL VEHICLES

SERVICE MANUAL

A-308

**Recreational Vehicle Services Inc.
RR2 Box M140 Monterey Highway
Morgan Hill, CA 95037**

Price \$1.00

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SPECIFICATIONS

INTRODUCTION

It is the purpose of this manual to assist the service technician in the installation, operation and service of the 4016 (16,000 Btuh input), 4023 (23,000 Btuh input), 4028 (28,000 Btuh input), and 4030 (30,000 Btuh input) horizontal furnaces for recreational vehicles.

A few of the outstanding features include the elimination of the separate power vent motor used in previous furnaces and its versatility of installation. The 4000 series undercounter furnace may be installed with an under the floor duct system, a side duct system, or as a fan type sealed combustion wall furnace.

This all new undercounter furnace retains some of the all important features used in the older series fur-

naces such as: Manual/electric ignition, 100% safety pilot, forced air circulation and automatic temperature control.

Installation of this furnace is accomplished from inside the vehicle, and requires cutting one small opening through the wall for venting/combustion air purposes.

The comfort control thermostat gives finger tip control of the heat level automatically. When properly sized to the recreational vehicle, the 4000 series undercounter furnace will maintain the indoor comfort conditions as long as desirable no matter what the outside temperature or weather conditions might be.

SPECIFICATIONS

MODEL NO.	CODE NO.	ELECTRICAL SUPPLY	A.G.A. RATING AT SEA LEVEL, Btuh*		C.G.A. RATING 0-4500 FT. Btuh		GAS CONN. SIZE	VOLTS	AMPS	AIR DELIVERY CFM	APPROVAL
			INPUT	OUTPUT	INPUT	OUTPUT					
4016	789 889	115VAC/12VDC 12VDC	16,000	12,800	16,000	12,800	3/8 SAE	115	.65	140†	A.G.A. C.G.A.
								12	3.2		
								12	3.2		
4023	789 889	115VAC/12VDC 12VDC	23,000	18,400	23,000	18,400	3/8 SAE	115	.70	200†	A.G.A. C.G.A.
								12	4.1		
								12	4.1		
4028	789 889	115VAC/12VDC 12VDC	28,000	22,400			3/8 SAE	115	1.1	240†	A.G.A.
								12	5.9		
								12	5.9		
4030	789 889	115VAC/12VDC 12VDC	30,000	24,000	28,500	22,800	3/8 SAE	115	1.3	195††	A.G.A. C.G.A.
								12	7.1		
								12	7.1		

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

†At 85°F. air temperature rise.

††At 115°F. air temperature rise.

A.G.A. and C.G.A. authorized output ratings for installation as a wall furnace are 5 per cent under figures shown.

INSTALLATION INSTRUCTIONS

RECREATIONAL VEHICLE UNDER-COUNTER FURNACE MODELS 4016-4023-4028-4030

DESCRIPTION

These furnaces have been listed for safety and performance by the American Gas Association for installation in mobile homes and travel trailers. Primarily, they are designed for use in motor homes and recreational vehicles. They are of sealed combustion system design with sectional-type heat exchangers consisting of drawn steel sections welded

together. The burner, designed for use with LP gas, is of cast iron construction with slotted ports and a means of air adjustment provided.

These units feature 100% safety shut-off gas controls and manual electric ignition. Depending on the model code, they may be operated either from 115V A.C. or 12V D.C. power sources. See specifications.

Model	DIMENSIONS (See Figures 1 and 2)											CLEARANCES			
	A	B	C	D	E	F	G	H	J	K	L	Sides	Top	Bottom**	Rear
4016	15	15	23	3/4	1-1/4	1-1/4	1-1/4	7/8	3-7/16	3-7/8	4-15/16	0"	0"	0"	0"
4023	15	15	23	3/4	1-1/4	1-1/4	1-1/4	7/8	3-7/16	3-7/8	4-15/16	0"	0"	0"	0"
4028	15	15	23	3/4	1-1/4	1-1/4	1-1/4	7/8	3-7/16	3-7/8	4-15/16	0"	0"	0"	0"
4030	15	17	23	3/4	1-1/4	1-1/4	1-1/4	1-1/8	3-5/16	3-7/8	4-15/16	0"	0"	0"	0"

**When installed on in-floor duct systems, use special connector 4023-5331.

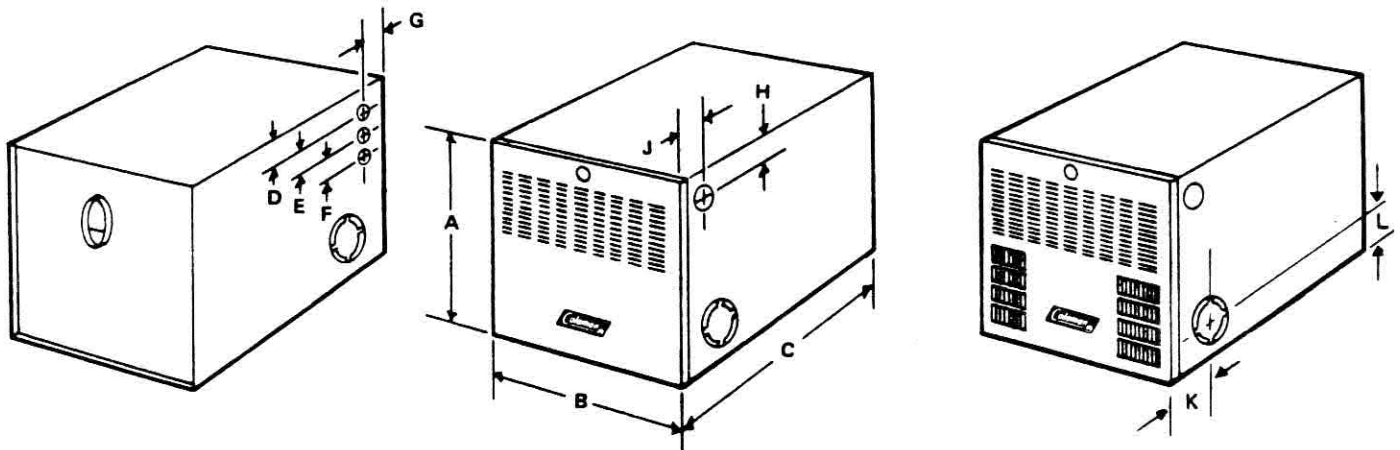


Figure 1

Reference Figure for Models 4016, 4023 and 4028

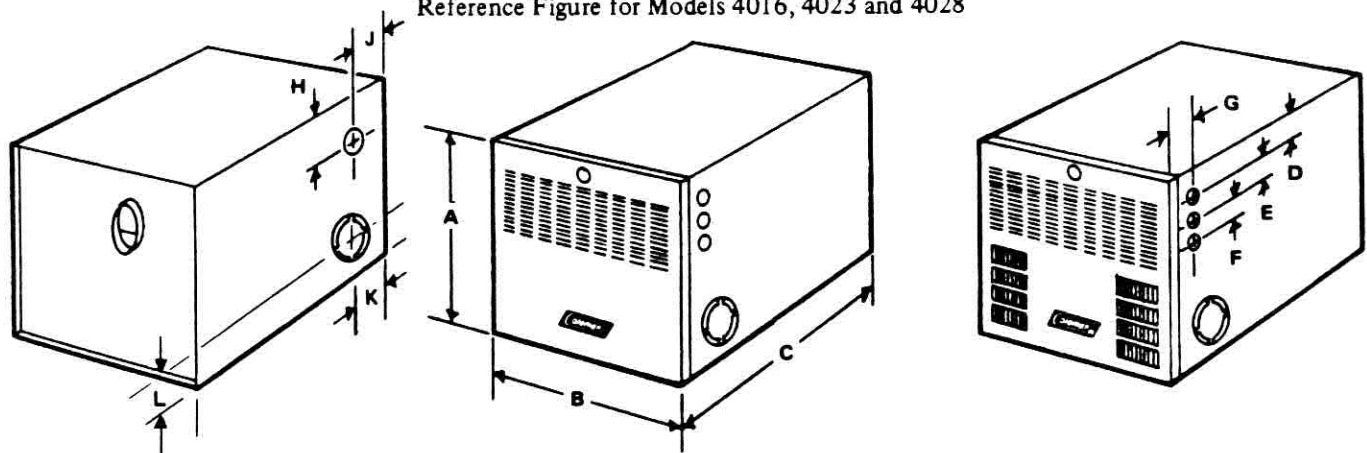


Figure 2

Reference Figure for Model 4030

INSTALLATION INSTRUCTIONS

A small flush vent has been developed for these furnaces and can be installed through walls ranging in thickness from 1 inch to 4 inches. See figure 11.

Provisions have been made for installation on any one of the following air distribution systems:

1. Side duct system,
2. Floor duct system, and
3. Front discharge system (no ducts).

For side and floor duct systems, the units have been listed by the American Gas Association for use as Horizontal Sealed Combustion System Forced Air Furnaces. For a front discharge system (no ducts), the units have been listed for use as Fan Type Sealed Combustion System Wall Furnaces.

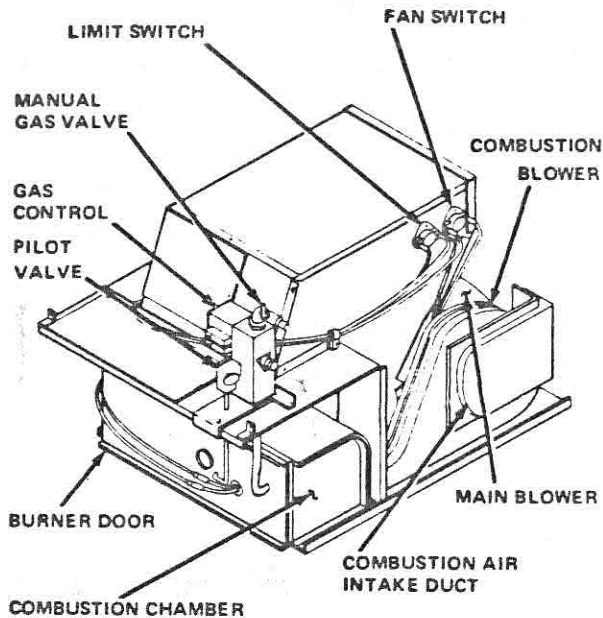


Figure 3

Heat Unit Assembly for Models 4016, 4023 and 4028

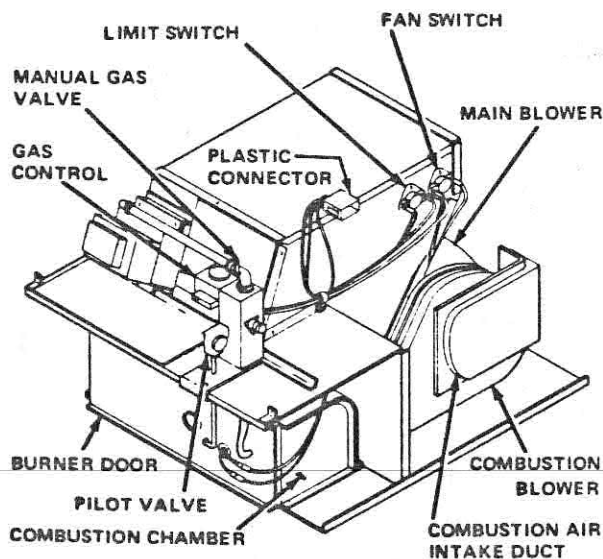


Figure 4

Heat Unit Assembly for Model 4030

The type of front louvered panel that is used is the distinguishing factor in determining whether the unit is a forced air furnace or a wall furnace. For example, for a forced air furnace application see the following table:

Model Number	Front Panel Number
4016	4023-5871
4023	4023-5871
4028	4023-5871
4030	4030-5871

TABLE 1 — Front Louvered Panels Required for Forced Air Furnace Applications

When the unit is installed for use as a wall furnace, the following front panels are used:

Model Number	Front Panel Number
4016	4023-5881
4023	4023-5881
4028	4023-5881
4030	4030-5881

TABLE 2 — Front Louvered Panels Required for Wall Furnace Applications. Order these panels separately when installing as a wall furnace.

For ducted systems, return air is admitted to the furnace through the louvers at the top of the furnace door as shown, see figure 5.

When the 4000 series undercounter furnace is used as a forced air sealed combustion wall furnace air circulation is as shown in figure 6.

Basically, all models described herein are similar and the method of installation generally is the same.

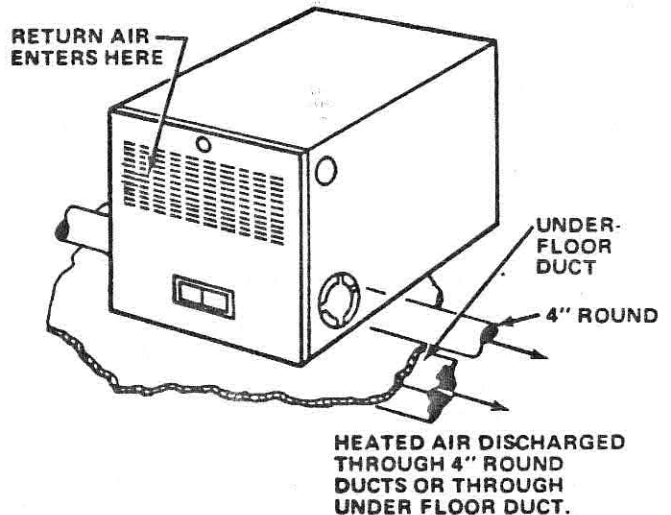


Figure 5

The compact design of the unit will permit installation in minimum space requirements; for example, under cabinets or built-in appliances. The working parts of the furnace, called the heat unit assembly, have been mounted on a sliding tray which allows easy

INSTALLATION INSTRUCTIONS

removal of the entire heat unit for ease of servicing. See figure 7.

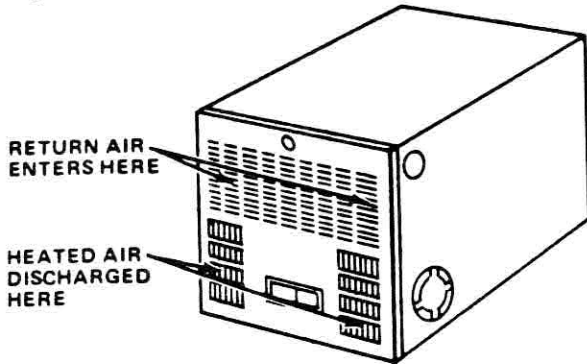


Figure 6

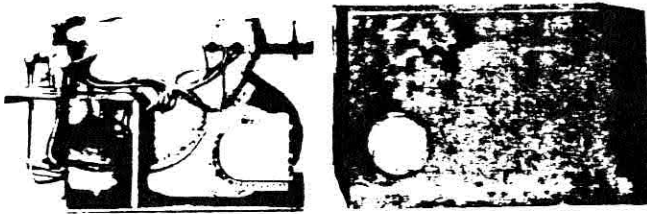


Figure 7

INSTALLATION INSTRUCTIONS

Basically, there are three possible methods of installation. These methods differ only in the type of air distribution system used (for example; side ducts, floor duct, or front discharge with no ducts). The minimum space requirement, regardless of type of air distribution system, for installation of the various models of furnaces are as follows:

Model No.	Height	Width	Depth
4016	15	15	23
4023	15	15	23
4028	15	15	23
4030	15	17	23

A. PROCEDURE FOR SIDE DUCT INSTALLATION:

1. When a side discharge installation is desired, the minimum recommended duct size is 4 inches inside diameter. Select a location for the furnace on an outside wall as near the center of the vehicle as possible.

NOTE: If the furnace must be located at one end of the supply duct (do not use the side duct installation) use the bottom discharge so that a minimum duct size of 3 1/2" x 12" can be maintained.

2. Refer to Figure 8 and cut a 4" x 6" opening through the inner and outer walls of the vehicle.

NOTE: Do not cut oversize.

3. Remove the two round side knockouts from the furnace inner casing.
4. Position the heater inside the vehicle so that the elliptical connector on the back of the furnace

aligns with the 4" x 6" opening made in step 2 above. Secure the unit to the floor, as shown in Figure 9.

NOTE: Do not remove bottom knockout.

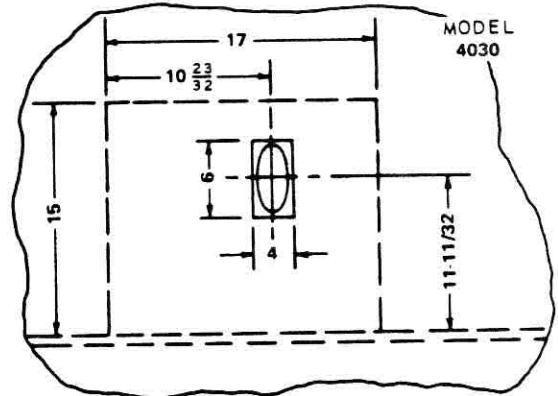
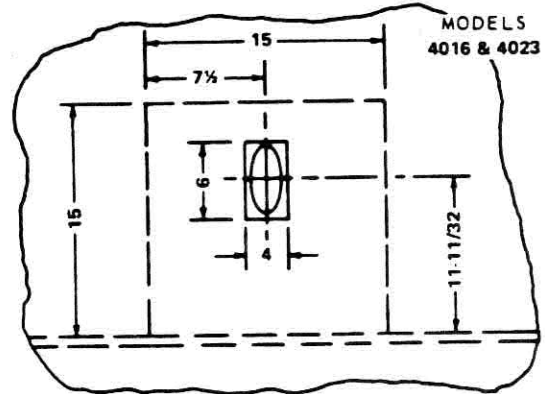


Figure 8
Location of Vent Opening

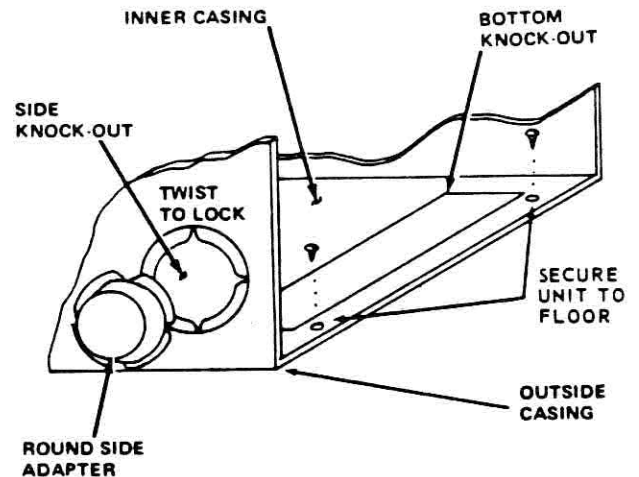


Figure 9
Installation of Round Side Adapters

5. When the unit is installed for side discharge operation, it is recommended that the duct size be no smaller than 4 inches in diameter. Provision has been made for a quick-connect round side adapter for ease in connecting the 4-inch diameter ducting to the furnace. The quick-connect adaptor is a twist-on device and is installed as demon-

INSTALLATION INSTRUCTIONS

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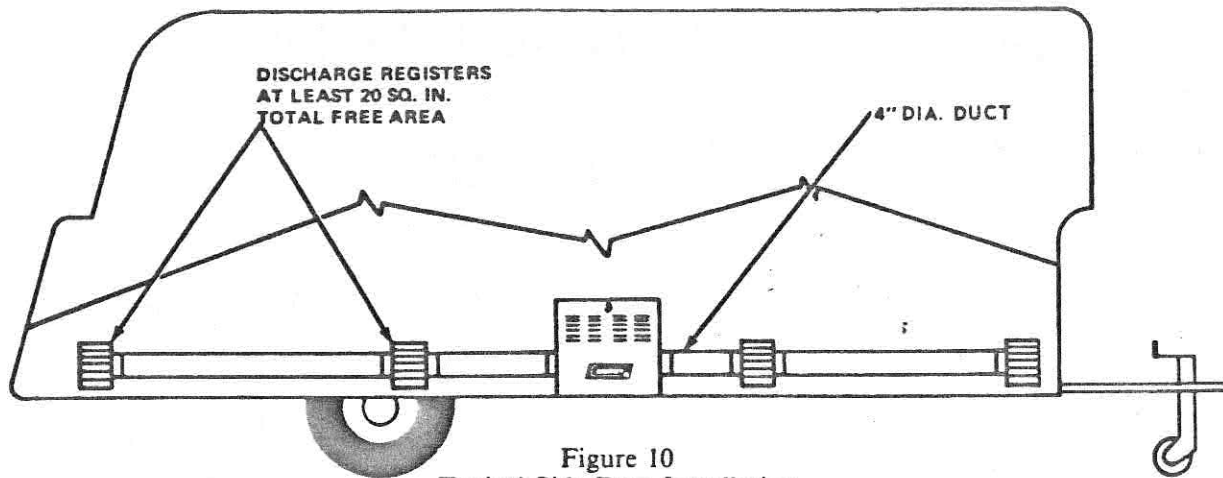


Figure 10
Typical Side Duct Installation

strated in Figure 9. Only 1/8 of a turn is required for locking and sealing. Openings in combustible panels with in one inch of casing shall be 6 inches in diameter.

6. Refer to Figure 10 for an illustration of a typical side duct installation complete. Be sure to use discharge registers having a minimum of 20 square inches total free area.
7. Install the vent terminal on the outside wall of the vehicle as shown in Figure 11.

NOTE: The rubber seal at bottom of combustion air chute on casing.

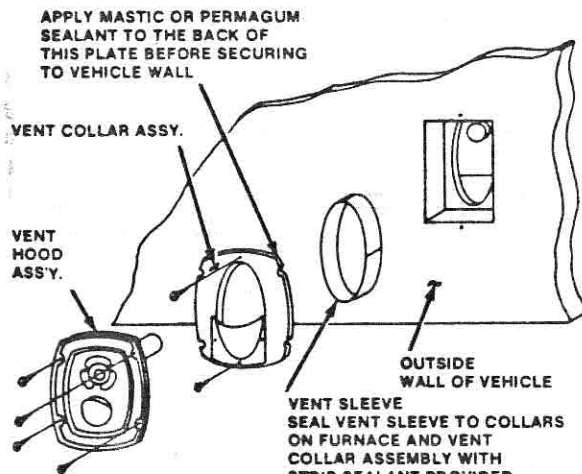


Figure 11
Exploded View of Vent Assembly

All furnaces are provided with a vent sleeve to fit standard wall thickness. Optional sleeves are available for wall thicknesses of one (1) inch and four (4) inches.

CAUTION: If it is necessary to trim vent sleeve, TRIM CAREFULLY to avoid making vent sleeve too small. Be sure cut is square with sleeve.

COMBUSTION AIR

Combustion air is brought into the furnace through the vent sleeve into the combustion air chute welded to rear of furnace casing, figure 12, to combustion air blower.

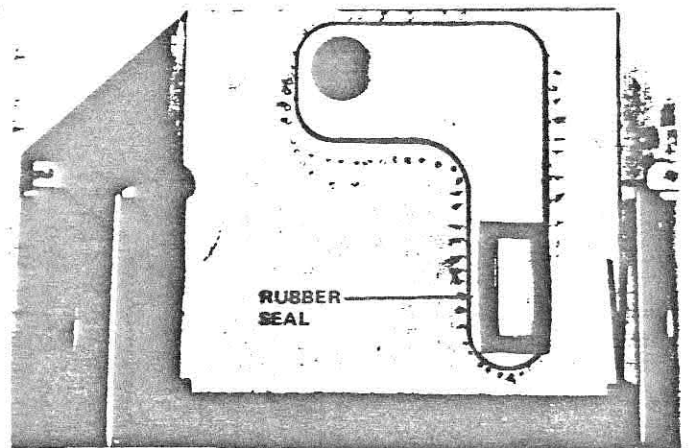


Figure 12
Combustion Air Chute

B. PROCEDURE FOR FLOOR DUCT INSTALLATION:

1. Select a location for the furnace on an outside wall as near the center of the vehicle as possible.
2. Refer to Figure 8 and cut a 4" x 6" opening through the inner and outer walls of the vehicle.

NOTE: Do not cut oversize.

3. Remove the bottom knockout from the furnace inner casing.

NOTE: Do not remove side knockouts.

4. Position the heater inside the vehicle so that the elliptical connector on the back of the furnace aligns with the 4" x 6" opening made in step 2 above.

5. With the unit in this position, remove the front louvered panel and mark the location of the front edge and sides of the knockout on the floor. Remove the furnace, and using the floor lines as a guide, complete the back edge of the rectangle

INSTALLATION INSTRUCTIONS

making it $3\frac{1}{2}$ " x 12". Before cutting through the floor, enlarge this marked opening by 1" all around, making it $5\frac{1}{2}$ " x 14". Cut through the floor at this point.

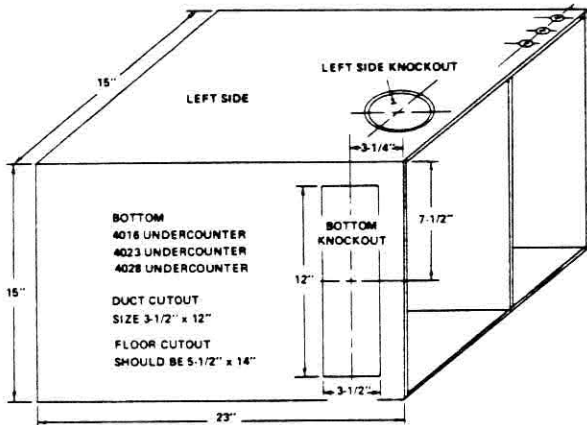


Figure 13a

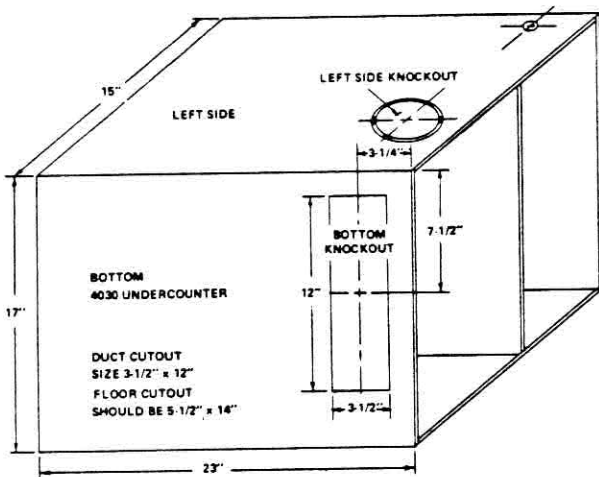


Figure 13b

No. 6 x 1/4 SHEET METAL SCREWS (4 REQ'D)

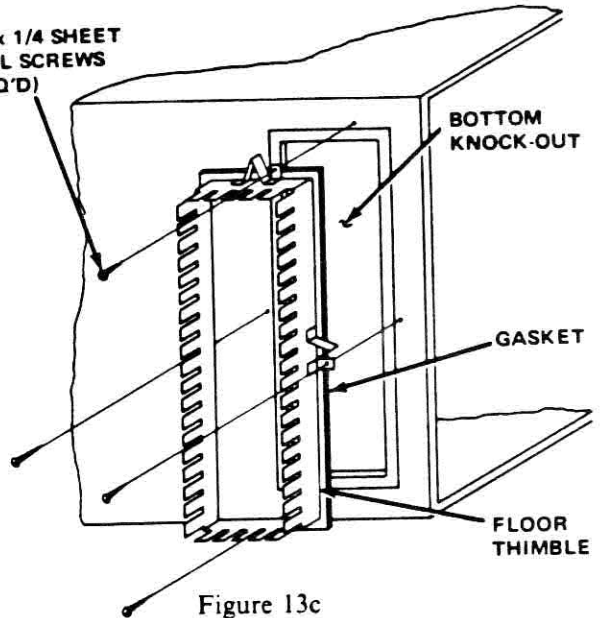


Figure 13c

Installation of Floor Thimble

6. Cut a $3\frac{1}{2}$ " x 12" hole in the metal duct under the floor, centered in the floor opening.
7. Lay furnace on side and install the floor thimble. Installation of the floor thimble is demonstrated in Figure 13c.
8. Place the furnace with floor thimble attached over the floor opening and position so that the tabs on the thimble extend downward into the under-floor duct. From inside the furnace bend tabs under to secure the thimble to the duct. (The unit must be secured to the floor. (See Figure 9). Furnace may be secured to vehicle thru side panels if necessary.
9. Refer to Figure 14 for an illustration of a typical floor duct installation complete. Be sure to use discharge registers having a minimum of 20 square inches total free area.
10. Install the vent terminal on the outside wall of the vehicle as shown in Figure 11.

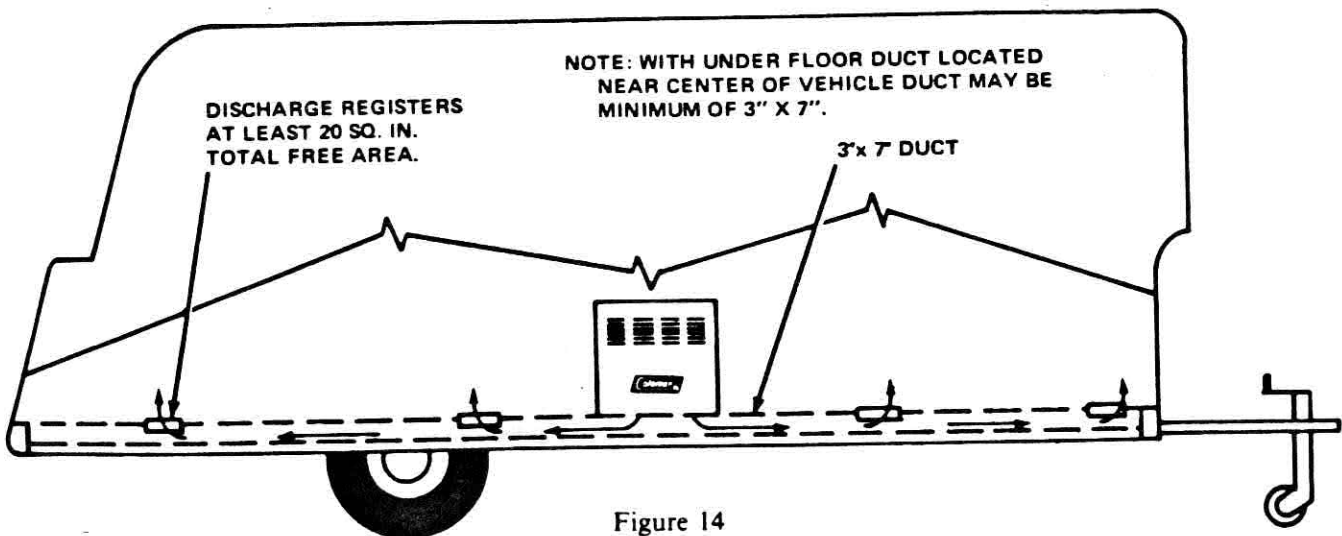


Figure 14
Typical Floor Duct Installation

INSTALLATION INSTRUCTIONS

C. PROCEDURE FOR DUCTLESS INSTALLATION (FRONT DISCHARGE)

1. Select a location for the furnace on an outside wall as near the center of the vehicle as possible.
2. Refer to Figure 8 and cut a 4" x 6" opening through the inner and outer walls of the vehicle.

NOTE: Do not cut oversize.

3. Position the heater inside the vehicle so that the elliptical connector on the back of the furnace aligns with the 4" x 6" opening made in step 2 above. Refer to Figure 15 and make certain that the minimum clearances to ceiling and side walls are maintained as shown. Secure the unit to the floor. See Figure 9.
4. **DO NOT REMOVE ANY KNOCKOUTS FROM THE INNER CASING.** Note that the top louvered section of the door is for return air flow and the louvers in the bottom section of the door are for warm air discharge.
5. Install the vent terminal on the outside wall of the vehicle as demonstrated in Figure 11.

D. GENERAL INSTALLATION PROCEDURES PERTAINING TO ALL MODELS

1. Gas Piping — The gas supply line to the furnace must be of adequate size to provide 11" water column gas pressure. This pressure must be maintained under maximum flow conditions with all gas appliances in operation. Tubing may be type "K" for LP gas (Bottle Gas). However, be sure to check with local authorities for any other requirements concerning gas piping. See note below.

Gas line hook-up on Models 4016, 4023 and 4028 furnaces is made through a hole provided at the top right side of the furnace casing. This connection is made at the top left side on Model 4030 furnace. Actual hook-up normally is accomplished inside the furnace casing immediately ahead of the manual shut-off valve. A 3/8 flare connection is provided for ease of installation.

CAUTION: Do not twist gas valve during piping.

NOTE: Local codes may require installation of an external manual shut-off valve. If required, the manual valve must be located outside the confines of the furnace casing.

After connections have been made, be sure all joints are checked with soap solution to detect leaks. This also should include a check of the furnace controls and piping. NEVER CHECK FOR LEAKS WITH A LIGHTED MATCH.

2. Electrical Connections —

WIRING CAUTION: POLARITY must be observed when connecting a battery or external converter to the furnace terminal board.

Connect PLUS (+) of battery or external converter to PLUS (+) on terminal board. Connect NEGA-

TIVE (-) of battery or external converter to NEGATIVE (-) on terminal board.

If polarity is reversed, the blower will turn BACKWARD and the furnace WILL NOT heat.

The furnace wiring box contains provisions for all wiring connections. The wiring box is located directly behind the return air grille in either the top left front or top right front of the furnace casing, depending on model number. (See Figure 16). The same terminal board is used on both multivoltage and D.C. models. On straight D.C. models the 115V A.C. terminals are not used.

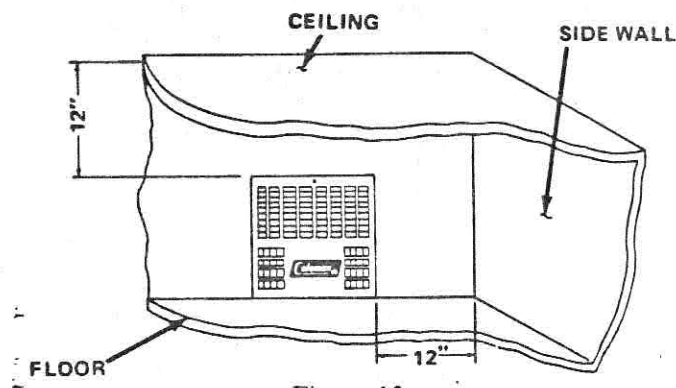


Figure 15
View Showing Minimum Clearance in inches.
to Side Walls and Ceiling for Wall Furnace
Application

Knockouts for A.C. wiring, D.C. wiring, and the thermostat wiring are provided at the wiring boxes.

CAUTION: Do not perform any high potential test on this furnace. Testing has been done before leaving the factory. If vehicle Hi-Pot testing is required, disconnect the furnace before testing. If the furnace contains a power converter, DO NOT ATTEMPT TO CHECK IT OUT BY SHORTING TO GROUND. DO NOT DISCONNECT ANY POWER LEAD AND SHORT TO GROUND. Any shorting or arcing of the leads may damage the furnace components.

Circuit breakers, where applicable, shall be sized in accordance with the National Electrical Code. Local codes, where applicable, take precedence over these recommendations. Route the supply wiring and thermostat wiring through the knockouts and secure to the terminal board. Use a suitable connector to secure supply wires at the knockouts. Do not use wire size smaller than that indicated in Table 3.

CIRCUITRY	RECOMMENDED WIRE SIZE
115V A.C.	No. 14 AWG
12V D.C.	No. 14 AWG
Thermostat	18 gauge solid or stranded copper with 2/64 insulation.

TABLE 3 — Recommended Wire Sizes

INSTALLATION INSTRUCTIONS

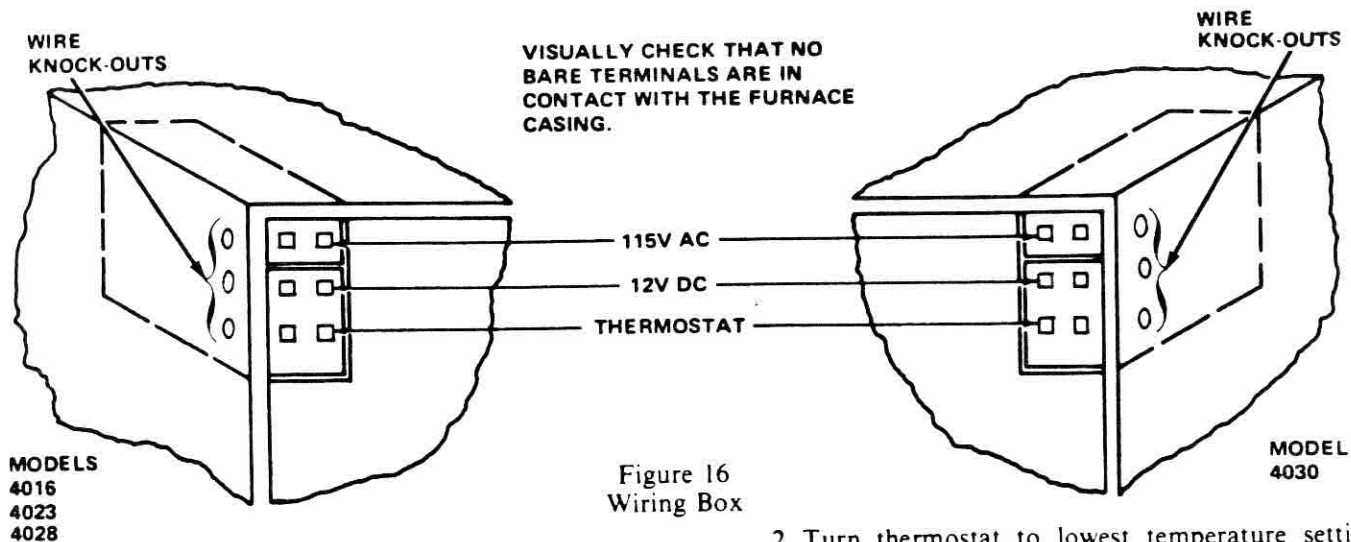


Figure 16
Wiring Box

If the chassis of the vehicle is used as a ground return path for the D.C. supply circuit, all metal components must be bonded or electrically connected to allow current flow. Grounding should be made only through the negative (-) side of the D.C. circuit.

3. Thermostat Installation — Your furnace is equipped with room thermostat. Locate the thermostat on an inside wall at least four feet from the floor. Select a location where the air circulation is good. Do not locate on an outside wall, near a door or window, near heat source such as lamps, etc., in direct sunlight, or on any surface subject to vibration during operation.

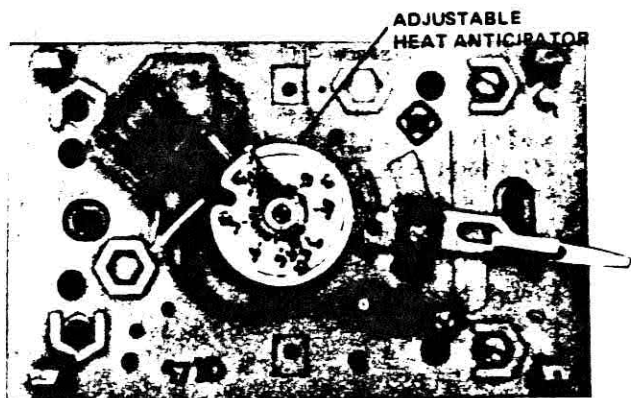


Figure 17
Thermostat

NOTE: Thermostat packed with 4000 series undercounter furnace contains an adjustable heat anticipator. Set heat anticipator at .75 amps. for 4016, 4023, 4028 and 4030 undercounter furnace.

LIGHTING INSTRUCTIONS

ELECTRIC IGNITION

1. Remove front panel on furnace by turning knob counterclockwise. Pull out and up to remove.

2. Turn thermostat to lowest temperature setting.
3. Turn manual gas valve to "OFF" position (Figure 18a).
4. Remove observation window (Figure 18b) and allow furnace to set five (5) minutes to dissipate any gas that may have accumulated in combustion chamber.
5. Turn manual gas valve to the "ON" position.
6. Replace the observation window.
7. Depress RED button (Figure 18a) on right side of control body as far as possible. (Glow coil will be visible through observation window).
8. Continue to "hold in" the RED button for one (1) minute after pilot flame is established or until pilot flame remains lighted after RED button is released. To adjust pilot flame, remove the cap screw from the center of the pilot shut off valve, and turn the underlying screw counter-clockwise for higher flame or clockwise for lower flame.
9. Replace front panel.
10. Set wall thermostat to desired temperature setting.

Furnace will now operate automatically.

NOTE: If the igniter coil should fail for any reason, the pilot may be lighted manually as follows:

MANUAL IGNITION

- a. Turn thermostat to lowest temperature setting.
- b. Turn manual gas valve to "OFF" position.
- c. Remove observation window and allow furnace to set 5 minutes to dissipate any gas that may have accumulated in the combustion chamber.
- d. Turn manual gas valve to "ON" position.
- e. Fix match in lighter rod provided with the furnace.
- f. Light match and insert into pilot area through window while depressing red button.
- g. Hold in red button for one minute after pilot is ignited.

INSTALLATION INSTRUCTIONS

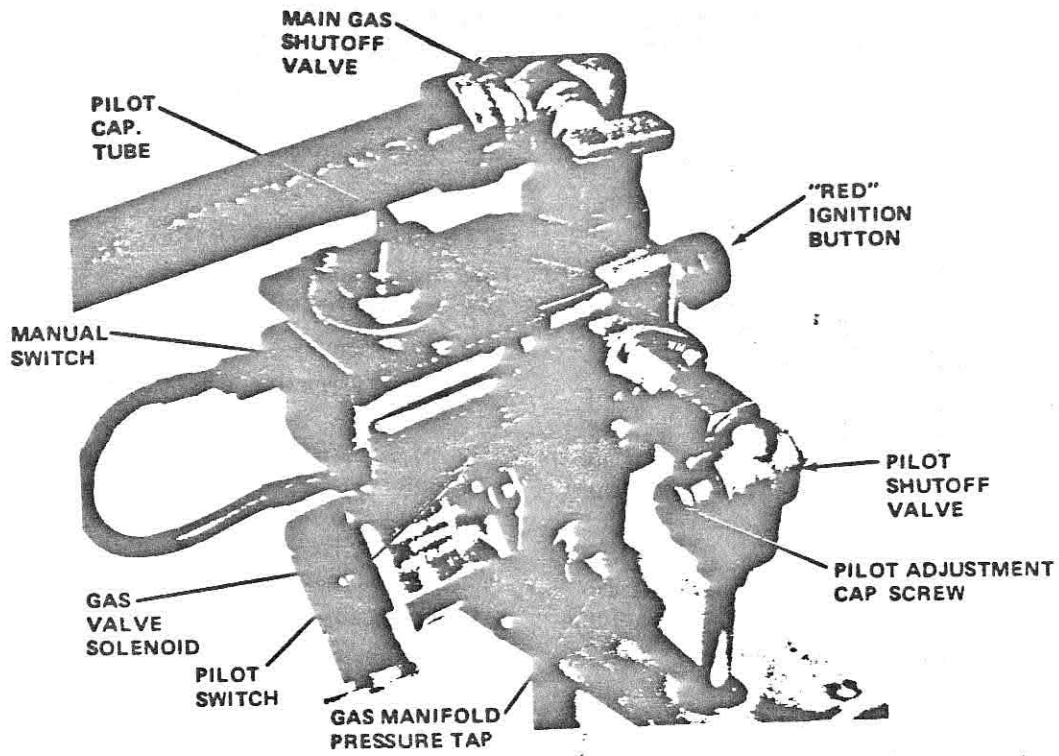


Figure 18a
Gas Control Valve
(4030 Assembly Shown)

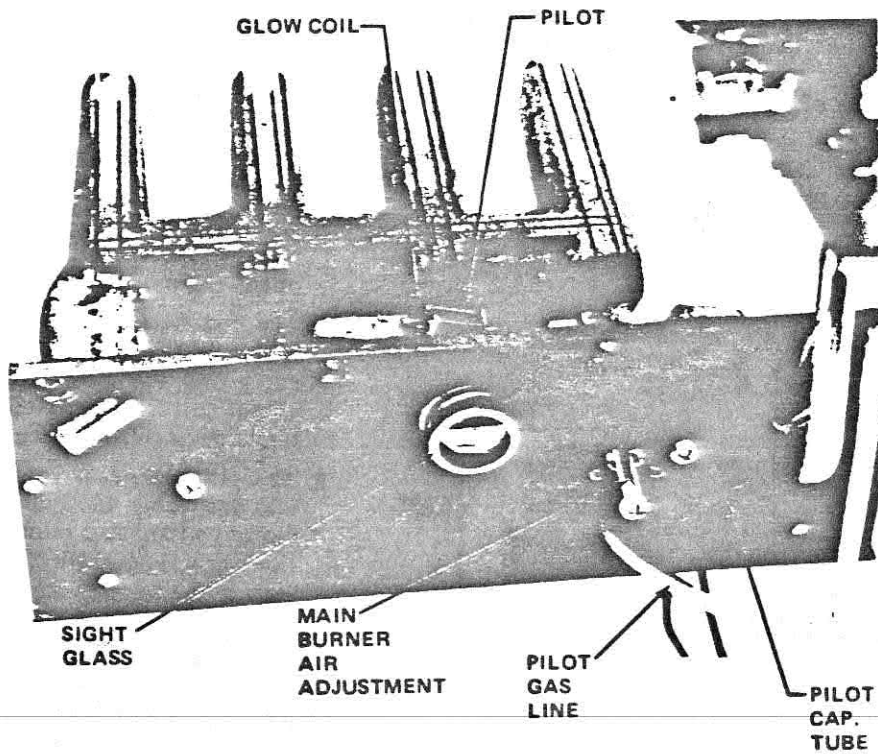


Figure 18b
Burner Assembly
(4030 Burner Assembly Shown)

SEQUENCE OF OPERATION

- h. Replace window.
- i. Replace front door.
- j. Set thermostat to desired temperature setting. Furnace now will operate automatically.

SHORT CIRCUIT CHECKOUT

If fuses are blown either in the furnace or vehicle, a short is indicated and should be checked.

1. Turn off all appliances including furnace.
2. Install an ammeter on the positive (+) lead of the battery. Amperage reading should be 0. If an amperage reading is noted, a short exists in the vehicle electrical system.
3. Disconnect the red (+) D.C. lead at the furnace. If the amperage continues, the short is exterior to the furnace. If the amperage reading ceases, the furnace electrical system is shorted and should be checked.

4. Refer to the Operation and Service Instructions for a complete checkout.

OPERATIONAL CHECKOUT

Turn thermostat up to allow main burner to come "ON". Check the following points.

1. Burner ignites with a minimum of noise.
2. Blower is running. Check for excessive or abnormal noise.
3. Allow furnace to operate 5 minutes to set fan control.
4. Check the furnace off cycle. With main burner "OFF", blower should continue to run until furnace has cooled down.
5. Repeat above cycle.
6. Explain operation to owner.
7. Fill out owner's registration card.

SEQUENCE OF OPERATION

MCQUAY-NORRIS 566-1A PILOT BURNER WITH GLOW COIL IGNITION SYSTEM

Models 4016, 4023, 4028 and 4030 furnaces are equipped with glow coil pilot ignition systems. The ignition system is designed to operate from a 12V DC power source. The sequence of operation is as follows:

1. Immediately upon depressing the red button on the control valve, several functions are initiated — Refer to Figure 19.

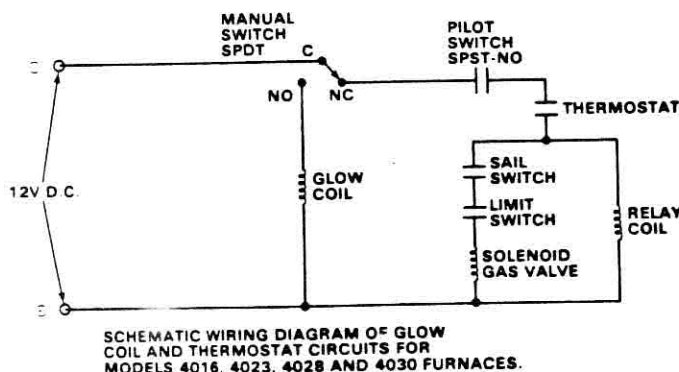


Figure 19

- a. The manual switch is transferred from NC to NO thereby energizing the glow coil and opening the electrical circuit through the pilot switch and thermostat.
- b. At the same time, the pilot switch contacts are closed completing a circuit from manual switch NC to the thermostat.
- c. In addition, a mechanical gas valve is opened

thereby introducing gas to the pilot burner. A mechanical flow interruptor prevents the flow of gas to the main solenoid as long as the red button is depressed.

2. The glow coil ignites the pilot gas which, in turn, heats a hydraulic mercury element located at the pilot burner.
3. After being sufficiently heated, the mercury element serves the purpose of automatically "holding open" the mechanical gas valve.
4. The red button then is released and the manual switch is transferred from NO to NC thereby de-energizing the glow coil and closing the electrical circuit to the pilot switch and thermostat. Also, gas flow now is introduced up to the main solenoid valve.
5. The pilot switch is coupled directly to the mechanical gas valve so that the switch contacts remain closed as long as a pilot flame exists. Furnace operation then is controlled automatically by the thermostat. If the pilot flame should become extinguished, the pilot switch contacts are opened automatically rendering the furnace inoperative until a pilot flame is again re-established.

FURNACE SEQUENCE OF OPERATION AFTER COMPLETING STEPS 1 THRU 5 ABOVE:

6. After lighting the pilot, the electrical circuit is completed up to the thermostat. (See Figure 20 and Figure 21). When the thermostat calls for heat (closes contacts), the relay coil is energized and the relay contacts are closed.
7. Upon closing of the relay contacts, the blower motor is energized which creates the air flow to close the sail switch.

COMPONENT PARTS

8. Closing of the sail switch completes the electrical circuit through the limit switch (normally closed) and the solenoid gas valve is energized.
9. The unit is now in normal operation with the burner on and the blower operating. After about 2 to 4 minutes of continuous operation, the fan switch will be heated sufficiently to close its contacts. This provides an electrical circuit to the blower motor so it will continue to operate for a time after the thermostat is satisfied.
10. When the thermostat is satisfied, its contacts are opened, and the gas valve and the relay coil are de-energized thereby shutting off the gas supply to the burner and opening the relay contacts.
11. Blower operation will continue until the residual heat in the heat exchanger is removed and the fan switch is cooled sufficiently to open its contacts.

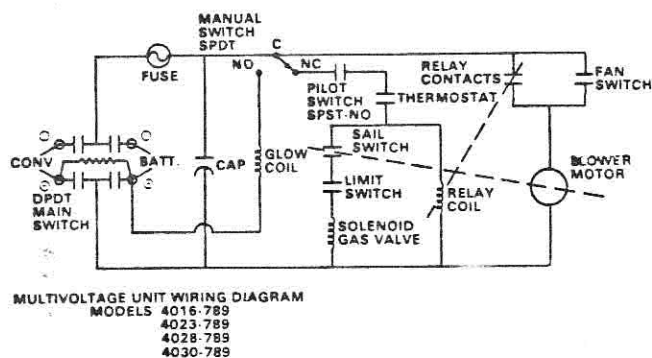


Figure 20

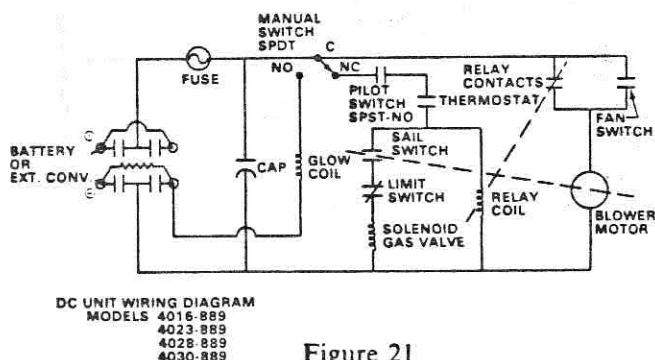


Figure 21

CONVERTER

All the undercounter furnaces, regardless of whether they are 115V. A.C./12V D.C. combination models or 12 volt only models, are designed with internal 12 volt circuits and components.

The converter transforms the 115 volt A.C. electrical power supply to 12 volts D.C. and is used only on the combination 115 volt A.C./12 volt D.C. models (789 series). When operating the combination models on 12 volt power source, the converter is out of the circuit.

SELECTOR SWITCH

The selector switch is a double pole, double throw switch located on the outside of the wiring box. (See Figure 22).

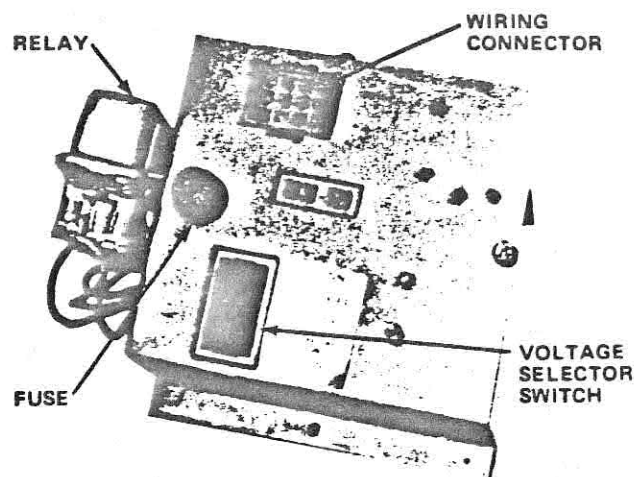


Figure 22
Wiring Box

Its function is to switch the furnace to the type of power being supplied — either 115 volt or 12 volt.

FUSE

The furnace is equipped with an automotive type fuse which protects the wiring internal to the furnace. Should the fuse blow, the furnace will be inoperative, with all 12 volt circuits de-energized.

Fusing requirements are 6 amp. for the 4016 and 4023 undercounter furnaces, and 9 amp. for the 4028 and 4030. Fuses must be Buss or equivalent slow blow type.

BURNER ASSEMBLY COMPLETE

The burner and controls assembly are mounted on a removable panel located in the lower portion of the vestibule area. The manual shut off valve, gas control valve, and pilot shut off valve are located in the return air compartment. The entire assembly is removable as shown in figure 18b.

The burner assembly is made up of the following parts:

1. Manual gas valve,
2. Pilot and ignition assembly.
3. Main burner gas control valve,
4. Cast iron burner.
5. Mounting plate.

MANUAL GAS VALVE

The manual gas valve serves to shut off gas supply to the main burner, control valve, and pilot. (Figure 18a).

PILOT ASSEMBLY

The pilot assembly consists of the pilot burner, thermal bulb (for pilot flame detection), and ignitor coil. The assembly is located just back of the venturi, opposite the observation port. (Figure 18b).

When the RED button on the side of the gas control valve (Figure 18a) is depressed, the manual switch in the gas control valve is switched to the N.O. (normally open) contacts. This permits current to flow from C (common) terminal through N.O. (normally

COMPONENT PARTS

open) terminal to the GLOW COIL located at the pilot burner. At the same time the safety shut-off valve, in the gas control, is being held open permitting gas to flow to pilot only. If gas is available the pilot will light. With the pilot flame established it is then necessary to hold the RED button for an additional 60 seconds. This heats the thermal bulb, which contains mercury. The mercury expands against a diaphragm in the gas control valve, which in turn pushes a rod or plunger out. When the RED button is released this plunger catches the safety valve of the gas control and holds the valve open. This allows gas to flow through the valve as long as the pilot is burning. If the pilot flame is extinguished for any reason, the mercury pressure on the diaphragm is reduced. The plunger on the diaphragm is pulled away from the safety shut-off valve allowing it to close, cutting off the flow of gas to the main burner and pilot burner.

PILOT ADJUSTMENT

Observe the pilot flame through the observation window. The pilot flame should be blue or blue with slightly yellow tips.

To adjust the pilot, remove cap screw from the center of the pilot shut-off valve. Rotate the underlying screw counter-clockwise for more flame or clockwise for less flame. (Figure 18a)

To remove and replace the electric ignitor:

1. Remove the burner assembly from the furnace.
2. Remove two wire clips from the bottom of the ignitor assembly.
3. Remove bracket holding the mercury filled thermal bulb and bracket.
4. Remove the screw at the top of the ignitor assembly.
5. Replace the ignitor assembly using reverse procedure.

MAIN BURNER GAS CONTROL VALVE

The main burner gas control valve is a solenoid operated valve. When the thermostat calls for heat, the gas valve opens permitting the flow of gas to the main burner.

The gas pressure may be checked by turning off the main gas valve, and removing the 1/8" pipe plug from the front side of the gas valve. (Just under the pilot shut off valve). Screw in the adapter and connect the manometer. The gas pressure should be 11" water column on L.P. gas with all appliances "ON" in the vehicle.

NOTE: Adjust at bottle regulator.

Adjust the main burner flame, at the primary air adjustment screw located on the burner plate to the left of the manifold. Loosen the wing nut and turn the screw in or out as necessary. The main burner flame should be blue or blue with slightly yellow tips.

CAST IRON BURNER

The main burner was designed to burn L.P. gas. It is a clean burning cast iron burner of the sawed-slot type. Using controlled draft, it resists wind gusts and burns efficiently.

WALL THERMOSTAT

The wall thermostat supplied with the furnaces is a White-Rodgers thermostat Coleman Part No. 4023-322, with adjustable heat anticipation from .15 to 1.0 amps. (See Figure 17).

The thermostat is activated by the movement of the bimetal element in response to temperature. In warm temperatures, the bimetal element tends to unwind, moving the contact arm to break contact. In cool temperatures the element contracts, moving the contact arm to make contact.

The use of a bimetal type thermostat is more desirable than the mercury filled types, since the bimetal element is not as sensitive to external vibrations, yet at the same time gives quite satisfactory temperature control.

The temperature at which the contact arm makes contact and breaks contact is determined by setting the temperature dial.

Heat anticipation is accomplished by running electrical current through a small portion of the bimetal element. When the contacts are closed, establishing a circuit, the current traveling through the bimetal element causes it to heat up and break contact just before the desired inside temperature is reached. The furnace blower continues to run and deliver heat until the furnace cools down. By the time the blower shuts off, the inside temperature reaches the thermostat setting. If no heat anticipation occurred, there would be a tendency to overheat due to the length of blower on time after the thermostat shuts off. The thermostat incorporates differential control established by the setting of the differential.

Differential is simply the difference in temperature at which the thermostat turns on and off. A differential of four degrees means that once the desired temperature is reached, a drop of four degrees in room temperature will occur before the thermostat turns back on. If there were no differential, a slight change in temperature would activate the thermostat, causing extremely short cycling of the furnace burner.

The differential is factory set and no attempt should be made to adjust the differential screw.

To calibrate the thermostat, set the thermostat dial at the inside temperature of the living space, as measured by a thermometer. Holding the thermostat dial firmly, turn the adjusting dial so that the contacts make — if they are not already made.

Then turn the dial counter-clockwise until the contacts just break. The thermostat will then be calibrated. Be careful not to touch or breathe directly on the bimetal element while adjusting since it is very sensitive to heat.

The thermostat should never be located near sources of heat, such as lamps, TV sets, or directly over warm air registers.

FAN LIMIT SWITCH

The fan switch and limit switch are located toward the back of the heat unit case, on the right side. (See figure 3 and figure 4).

COMPONENT PARTS

To remove the fan or limit switch or if the occasion calls for a check on either of these switches, the heat unit must be removed from the case.

Both the fan and limit switches are disc type switches. They are not adjustable. The limit switch senses the temperature of the air inside the furnace and shuts off the burner if the furnace gets too hot (200°F. or over).

The fan switch also senses the temperature of the air inside the furnace, and locks the blower "ON" for delayed shutdown.

One important aspect of the new 4000 series under-counter furnace is that the fan switch does not control the "ON" cycle.

Since the circulating air blower motor is also the motor used to supply combustion air it is necessary to have both in operation at the call for heat.

Consequently, when the thermostat calls for heat the blower will start to circulate air. This air will be cool for approximately one to two minutes, but should heat up rapidly. The fan switch will close to provide a parallel hook-up to the furnace blower motor.

When the thermostat is satisfied the relay will be de-energized, however the blower motor will continue to operate until the residual heat in the combustion area has been dissipated. The fan switch will then open and the blower motor will stop.

BLOWER ASSEMBLY

The blower assembly is located at lower rear portion of the heat unit. Access to the blower assembly is obtained by removing the heat unit from the casing.

To remove the blower assembly:

1. Carefully remove 2 yellow wires from sail switch.
2. Disconnect the black lead of the motor at splice.
3. Remove orange motor wire from fan switch.
4. Remove 4 screws holding blower assembly to heat unit. (See figure 23.)

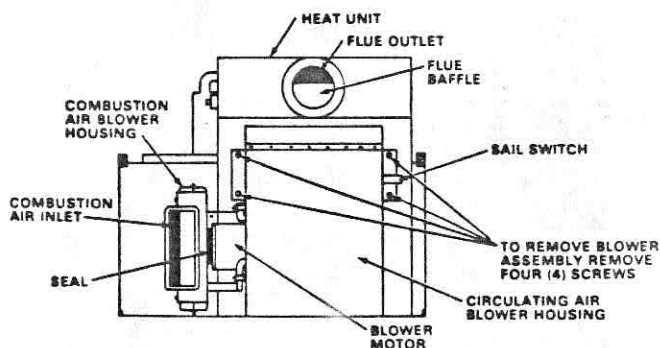


Figure 23

Blower assembly may now be removed from the heat unit.

To remove motor,

1. Loosen set screw on blower wheel.
2. Remove 3 nuts holding motor mount to blower housing. Combustion blower and motor assembly may now be removed from blower.

3. Remove combustion air chute.

- a. Remove 3 screws from combustion blower housing.
- b. Carefully remove combustion air chute and gasket.

4. Loosen set screw and remove combustion blower wheel.
5. Loosen bolt of motor clamp, and slide motor out of motor mounting clamp.

To replace motor,

1. Install new motor into motor mounting clamp.
NOTE: Make sure that the rubber gasket seal is between motor end bell and combustion air blower housing.
2. Tighten bolt of motor mount clamp.
3. Replace combustion blower wheel and tighten set screw on flat of motor shaft.
4. Replace combustion air chute over blower inlet with 3 screws removed above.
5. Mount the combustion blower and motor assembly on blower housing and replace 3 nuts removed above.
6. Tighten set screw of blower wheel on flat of motor shaft.
7. Replace blower assembly in heat unit and secure with 4 screws.
8. Connect two yellow wires to sail switch.
9. Connect orange wire to the double terminal of fan switch.
10. Connect black wire at splice.
11. Install the heat unit in furnace case.

POWER SUPPLY CAPACITOR

On all models, a capacitor is included in the power supply. This capacitor is used to smooth out the full wave rectified D.C. voltage from the converter by eliminating high peak voltages, thus prolonging motor life.

The capacitor is located inside the wiring box. To gain access to the capacitor, the wiring box must be removed.

Should the capacitor short out, the furnace fuse will blow.

IGNITION RESISTOR

Located in the ignitor circuit, the ignitor resistor protects the pilot against high voltage burn-out on converter operation.

It is located inside the wiring box, attached to the selector switch. If the resistor fails, the ignitor coil will not operate on converter operation.

ELECTRICAL CIRCUITS

There are four basic electrical circuits in the furnace.

1. The power supply circuit.
2. Pilot ignition circuit.
3. Gas valve circuit.
4. Blower motor circuit.

ELECTRICAL CIRCUITS

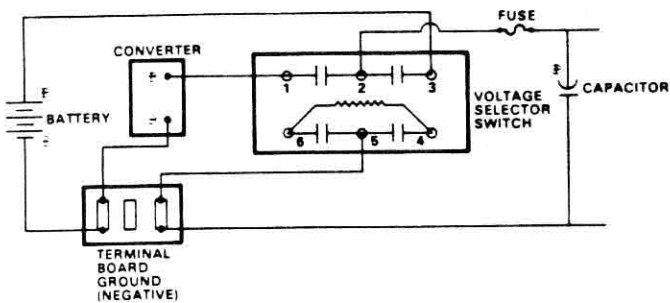


Figure 24a
Power Supply for 789 Series A.C., D.C. Units

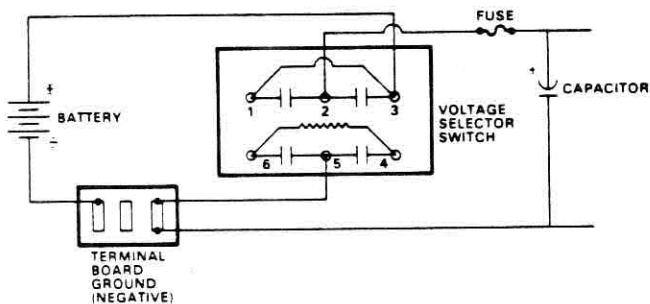


Figure 24b
Power Supply D.C. Units

POWER SUPPLY

There are two basic models of furnaces, one for combination 115 volt A.C. 12 volt D.C. (789 series) and one for 12 volt D.C. only (889 series). The basic difference is the 12 volt D.C. model has no converter.

COMBINATION 115 VOLT/12 VOLT MODEL

These models incorporate a converter which converts the 115 volt A.C. power to 12 volts D.C. for use in the furnace. By setting the selector switch the converter can be by-passed for use on direct battery supply.

1. 115 volt operation.

115 volt power is brought into the converter where it is converted to 12 volts D.C. The negative side of the converter is brought into the terminal board ground and from there to terminal #5 on the voltage selector switch. The positive side of the converter is brought into #1 on the voltage selector switch, through the switch to terminal #2, on to the fuse and then to the rest of the furnace circuits. See Figure 24a.

2. 12 volt operation.

On 12 volt operation, the negative side of the 12 volt power supply is brought into the terminal board ground, and from there to terminal #5 on the voltage selector switch. The positive side runs to terminal #3 on the voltage selector switch, to terminal #2, on to the fuse and then to the rest of the furnace circuits. See Figure 24a.

3. 12 volt only models.

These models are for use when the power supply to the furnace is 12 volts. This 12 volt supply may be from a battery or from a converter in the recreational vehicle remote from the furnace. See Figure 24b.

The circuit is the same as for the combination units

except that no furnace converter is used. Terminals #1 and #3 on the voltage selector switch are jumpered together.

a. Battery operation

When using a 12 volt battery as a power source, the selector should be set at "battery only" position. When the switch is set in this position the positive side of the 12 volt supply will pass through the switch between terminals #3 and #2 to the fuse.

The negative side as previously explained goes to the terminal board ground and from there to terminal #5 on the voltage selector switch.

b. Vehicle converter operation

When using a converter of the recreational vehicle as the power source instead of a battery, the connections are the same as for the battery.

Connect the external converter to the battery terminals observing polarity. The voltage to the furnace circuits is the same as in (a. Battery operation).

SERVICING

If the heat unit must be removed from the furnace casing, remove two (2) screws (figure 25), disconnect gas supply, disconnect the electric supply leads. Disconnect the electrical wire connector (plastic plug) on the side of the junction box. See figure 25. Slide the heat unit out of the furnace casing.

CAUTION: Be sure that electrical power has been turned off and that the gas supply has been turned off before working on the unit.

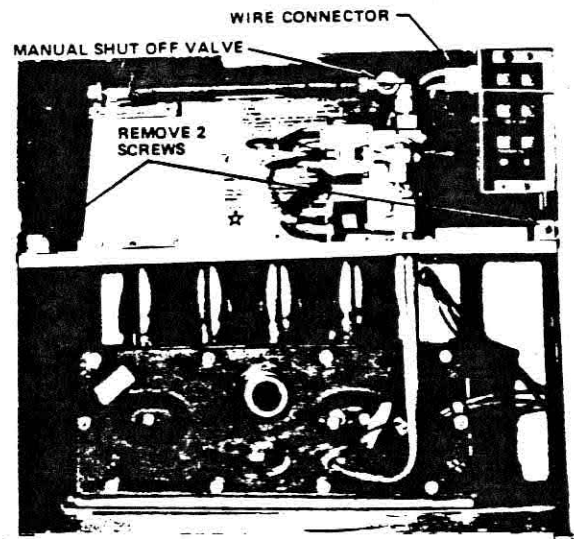


Figure 25

All the furnace parts are then available for easy and convenient servicing.

SYSTEMATIC CHECK OF COMPONENTS — ELECTRICAL

Service charts are available at the back of this book to guide the service technician in locating the possible solution to a particular complaint or mal-function.

It is the purpose of this section to guide the technician in a step by step analysis of the circuits used in the 4000 series undercounter furnace.

A. PILOT WILL NOT LIGHT

1. Check that the voltage selector switch is set for the voltage to be used. Check for voltage at the wiring box terminal board.
2. Be sure that gas is available to the gas valve.
3. Depress the RED button on the side of the gas valve. If the ignitor coil does not glow, check for voltage to the ignitor as follows:
 - a. Clip one probe onto the BLACK wire at the gas valve solenoid coil (negative side of the circuit), place the other probe at "C" (common) on the manual switch. See figure 26c. If voltage is **not** indicated, check the fuse in the wiring box. If fuse is defective replace fuse.

If 12 volts is indicated,

- b. Leave the probe on the BLACK wire at the gas valve solenoid coil (negative side of the circuit). Move the other probe to "N.O." on the manual switch, figure 26b, depress the RED button on the side of the gas valve. If voltage is **not** indicated, the manual switch is defective and the gas valve must be replaced.

If voltage is indicated and ignitor coil still does not glow, disconnect the BLACK (ignitor coil) wires from the RED wires and check the ignitor coil with a continuity meter. No reading indicates an open circuit, and the ignitor coil must be replaced.

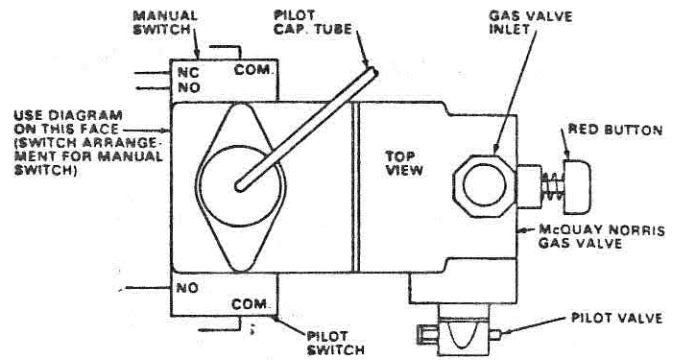


Figure 26b
Top View of Gas Valve

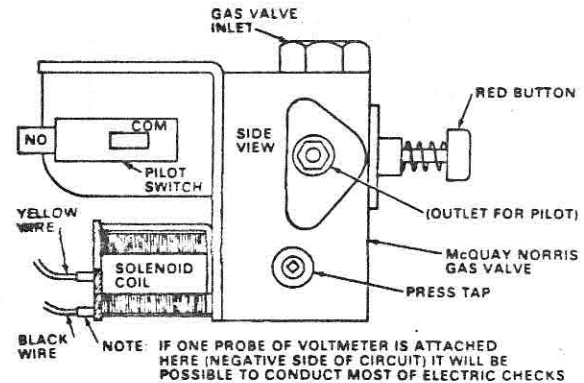


Figure 26c
Side View of Gas Valve

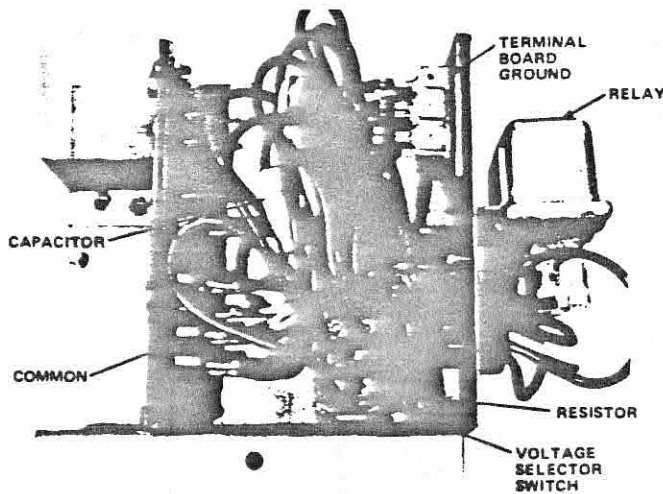


Figure 26a
Inside View of Wiring Box

B. PILOT BURNING... MAIN BURNER WILL NOT LIGHT

To check this circuit it should be remembered that it is not possible to check the sail switch and limit switch individually without removing the furnace from its case. However, a check of the wiring diagram figure 27, will indicate that they can be checked together. If the circuit is not completed, then it will be necessary to check these parts individually.

1. Attach one lead of the voltmeter to the BLACK

wire (negative side of the circuit) on the gas valve solenoid coil.

2. Touch the other probe to C (common) of the manual switch, located on the gas valve. 12 volts should be indicated at this point. Next, move the probe from C (common) to N.C. (normally closed) terminal.

No reading indicates that we do not have a circuit from C to N.C. The manual switch is defective and the gas valve must be replaced.

If 12 volts is indicated,

3. Move the probe from the manual switch on the gas valve to the C or (common) terminal of the pilot switch. This switch is located on the other side of the gas valve.

Note that there is a RED jumper from N.C. on the manual switch to one side of the pilot switch.

Place the probe of the voltmeter on the other terminal (C or common terminal) of the pilot switch. If voltage is **not** indicated, the pilot switch is defective and the gas valve must be replaced.

If 12 volts is indicated,

4. Move the probe from the pilot switch to the thermostat terminal #1 (right side of terminal board). If voltage is **not** indicated, check (1) for a broken wire, or (2) check the plastic connector for a bad connection.

ELECTRICAL SERVICE PROCEDURES

If voltage is indicated,

5. Move the probe to the thermostat terminal #2 (left side of terminal board). Turn the thermostat up to its highest setting. If no voltage is indicated

check the thermostat wires for broken wires. Check the thermostat.

If voltage is indicated, the blower should be running. If not, a quick check of the wiring diagram

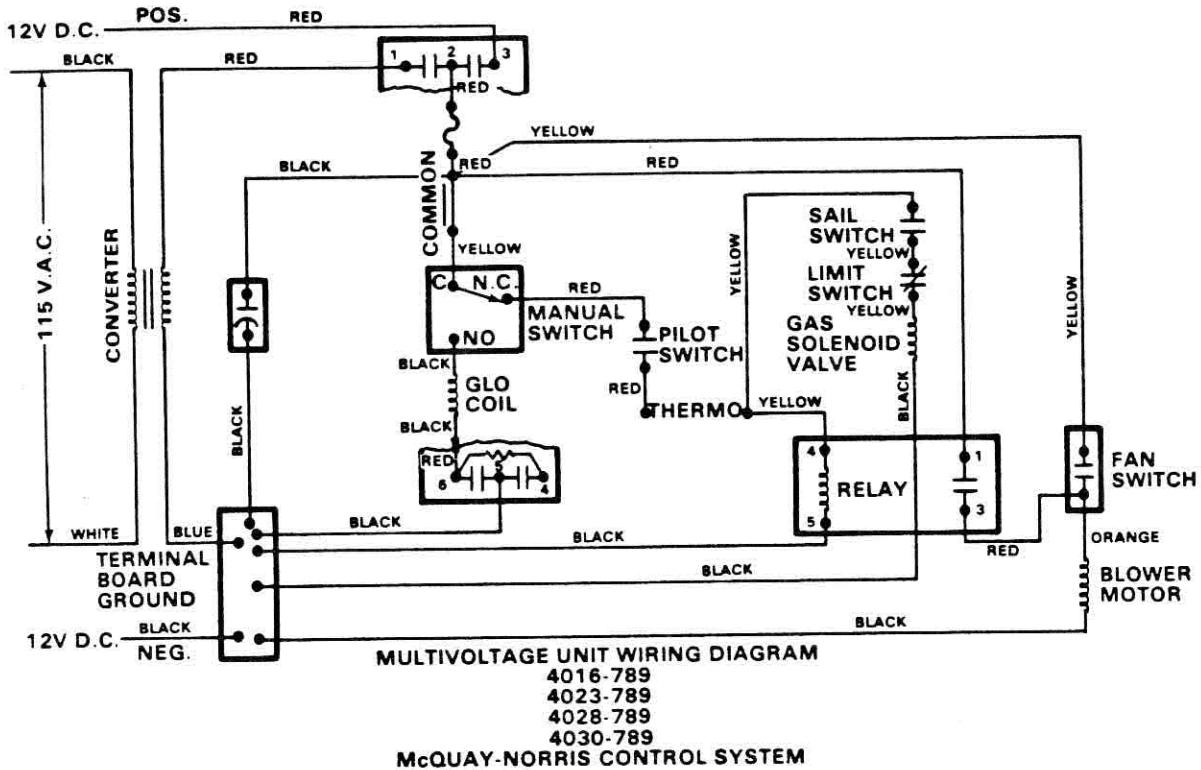


Figure 27

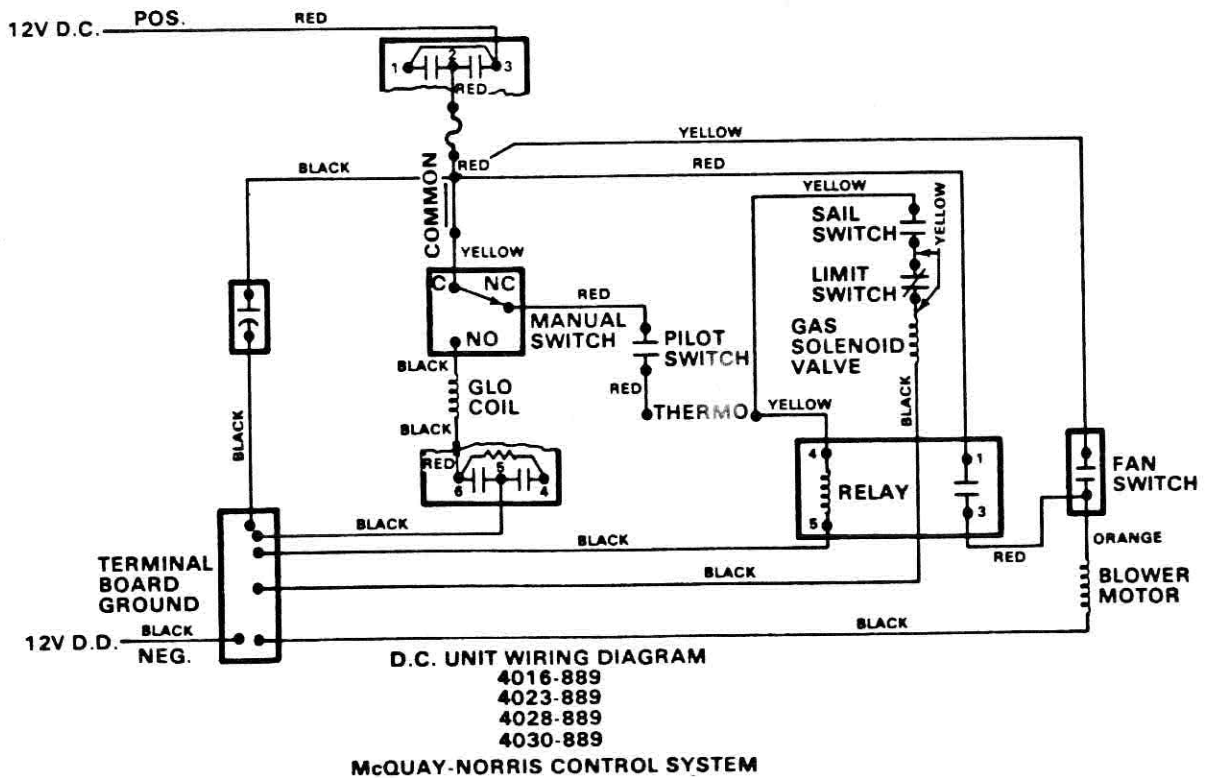


Figure 28

figure 28, shows that with voltage at the thermostat terminal #2 (left side of terminal board) we should also have voltage up to terminal #4 on the relay coil.

If the blower is not running it will then be necessary to remove the wiring box from the furnace in order to get to this relay which is located on the back side of the wiring box.

- a. Disconnect the leads from terminal #4 and terminal #5 of the relay. (These are the terminals of the relay coil). Using a continuity meter check the coil resistance. If no reading, the relay coil must be replaced.

If a reading is indicated, connect the wires to their proper terminals i.e., yellow wire to terminal #4 and the black wire to terminal #5.

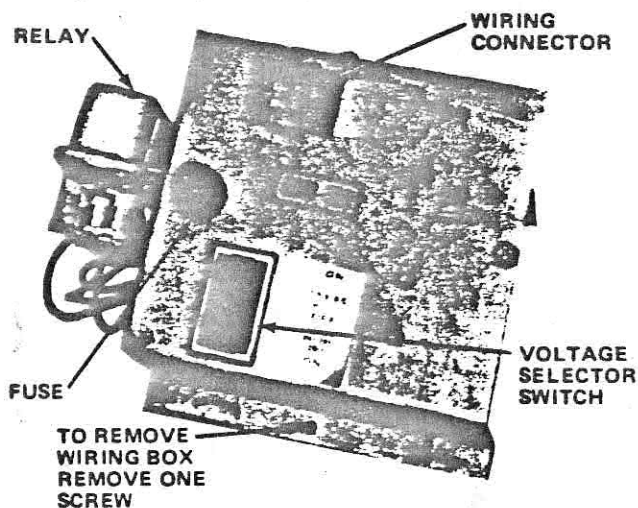


Figure 29

With voltage to the relay coil, the contacts should close and the blower motor should run.

- b. If the blower motor does not run, check for voltage at #3 terminal of the relay. If voltage (12 volts) is not indicated the relay is defective and must be replaced.

If the relay coil is good, and the contacts on the relays are closed, the blower should run.

If the blower motor does not run,

6. Then, the next test is to jump around the sail switch and limit switch. Remember, we have determined,
 - a. There is voltage at the thermostat terminal #2 (left side of the wiring terminal board),
 - b. That there is voltage to the relay, and that the relay coil is energized, and switch contacts are closed,
 - c. That one probe is still on the **BLACK** wire at the gas valve solenoid coil.

Move the other probe to the other side of the gas valve solenoid (**YELLOW** wire). If voltage (12 volts) is not indicated at this point, the furnace must

be removed from the case in order to check the sail switch and the limit switch.

If voltage (12 volts) is indicated at this point, the gas valve solenoid is defective and must be replaced.

7. If it has been necessary to remove the furnace from the case in order to check the limit switch, or sail switch, turn off all power to the unit. (electrical power).

Turn off the gas supply and disconnect the gas line.

Remove the two (2) screws holding the furnace, and slide the furnace from the casing.

8. Limit

To check the limit disconnect the wires from the terminals, and check for continuity across the switch. The limit switch is a normally closed switch. If continuity is not indicated the limit switch is open and must be replaced.

9. Sail switch

The sail switch is a normally open switch. To check for continuity across this switch, disconnect the wires from the switch terminals. Manually close the switch. A reading on the continuity meter indicates that the switch contacts will close. Next, connect power to the furnace. 12 volts D.C. or if the converter in the furnace is being used connect to 115 volts A.C.

Jumper the fan switch, this will allow the furnace blower to operate. Next jumper the thermostat terminals at the wiring box, also, jumper the pilot switch. After the blower has come up to speed, check the voltage at both terminals of sail switch. If 12 volts is read at only one contact, the switch is not closing. Check the sail to be sure that it is not binding or caught in some way. If the sail is free, then the switch is defective and must be replaced.

CAUTION: Be sure that the blower motor is running up to speed.

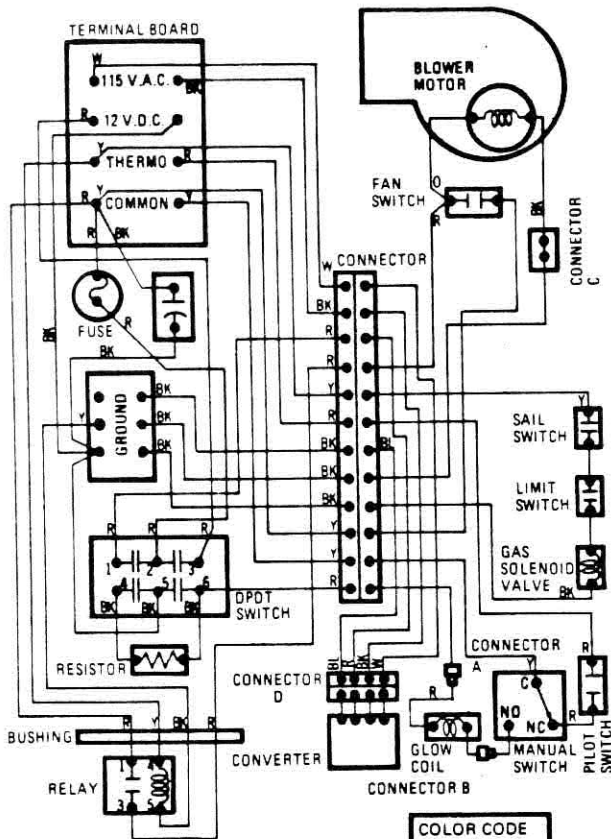
This completes the step by step check of the 4000 series undercounter furnace. It is recommended that the service technician become thoroughly familiar with the construction and wiring of this furnace before attempting to perform service on it.

It is hoped that the pictures and wiring diagrams accompanying this description will be of some value in analyzing any problems which might be encountered with this furnace.

C. BLOWER MOTOR

Turn off all electrical power to the unit. Disconnect wire connector on side of junction box. Turn off the gas supply, and disconnect the gas line to the furnace. Remove the two (2) screws securing the furnace to the casing and slide the furnace out of the casing. Remove the orange wire from the fan switch. Disconnect the black motor lead at the splice. Using a continuity meter check the motor. No reading indicates that the motor is open and must be replaced.

WIRING DIAGRAMS



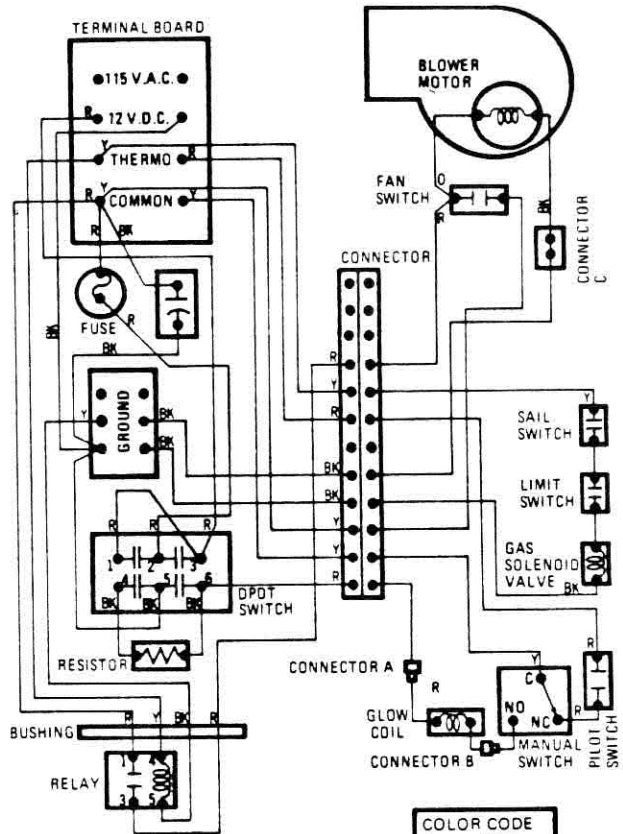
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COLOR CODE	
R	- RED
BL	- BLUE
Y	- YELLOW
O	- ORANGE
BK	- BLACK
W	- WHITE

Replacement Fuses
 4016 } MDL 6 Must Be Buss
 4023 } or Equivalent
 4028 } MDL 9 Slow Blow Type
 4030 }

MULTIVOLTAGE UNIT WIRING DIAGRAM

MODELS
 4016-789
 4023-789
 4028-789
 4030-789



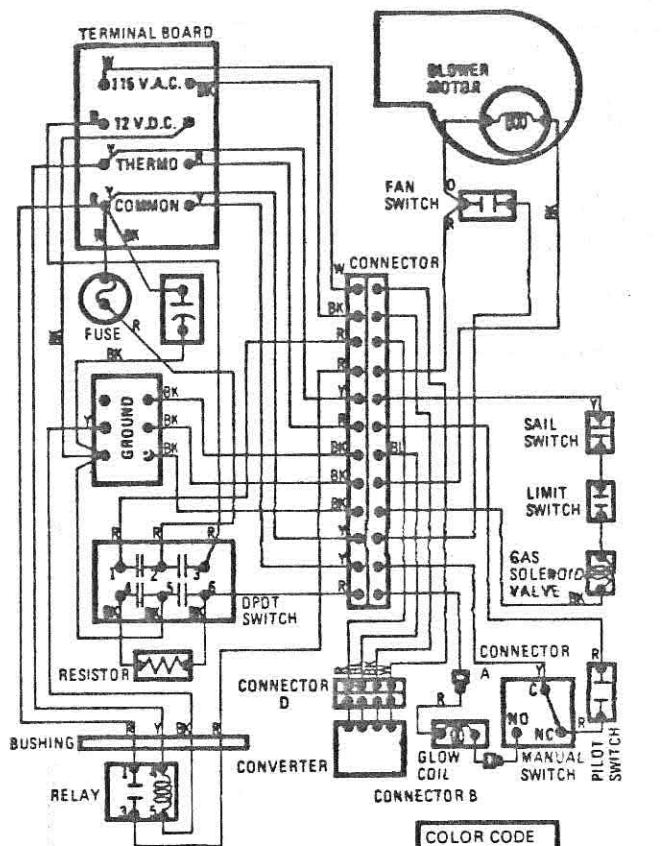
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R	- RED
BL	- BLUE
Y	- YELLOW
O	- ORANGE
BK	- BLACK
W	- WHITE

Replacement Fuses
 4016 } MDL 6 Must Be Buss
 4023 } or Equivalent
 4028 } MDL 9 Slow Blow Type
 4030 }

DC UNIT WIRING DIAGRAM

MODELS
 4016-889
 4023-889
 4028-889
 4030-889



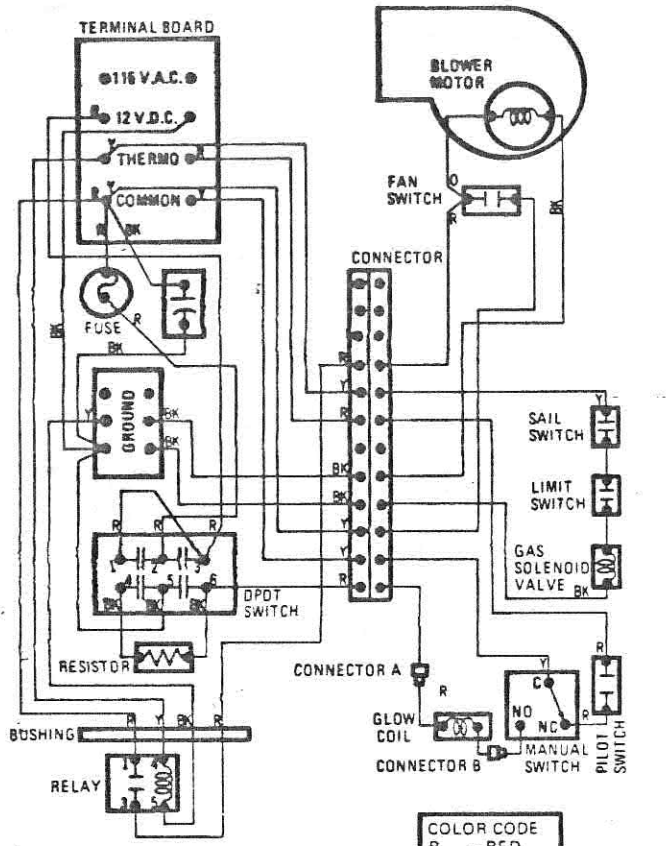
ALL FACTORY INSTALLED WIRING IS STRANDED 16 AND 18 GA. SINGLE CONDUCTOR, 105 C THERMOPLASTIC INSULATED WIRE U.L. AND C.S.A. APPROVED IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE AWM 105 C WIRE OR ITS EQUIVALENT.

COLOR CODE	
R	- RED
BL	- BLUE
Y	- YELLOW
O	- ORANGE
BK	- BLACK
W	- WHITE

Replacement Fuses		
4016	} MDL 6	Must Be Buss or Equivalent
4023		
4028	} MDL 9	Slow Blow Type
4030		

MULTIVOLTAGE UNIT WIRING DIAGRAM

- MODELS
4016-789
4023-789
4028-789
4030-789



ALL FACTORY INSTALLED WIRING IS STRANDED 16 AND 18 GA. SINGLE CONDUCTOR, 105 C THERMOPLASTIC INSULATED WIRE U.L. AND C.S.A. APPROVED IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE AWM 105 C WIRE OR ITS EQUIVALENT.

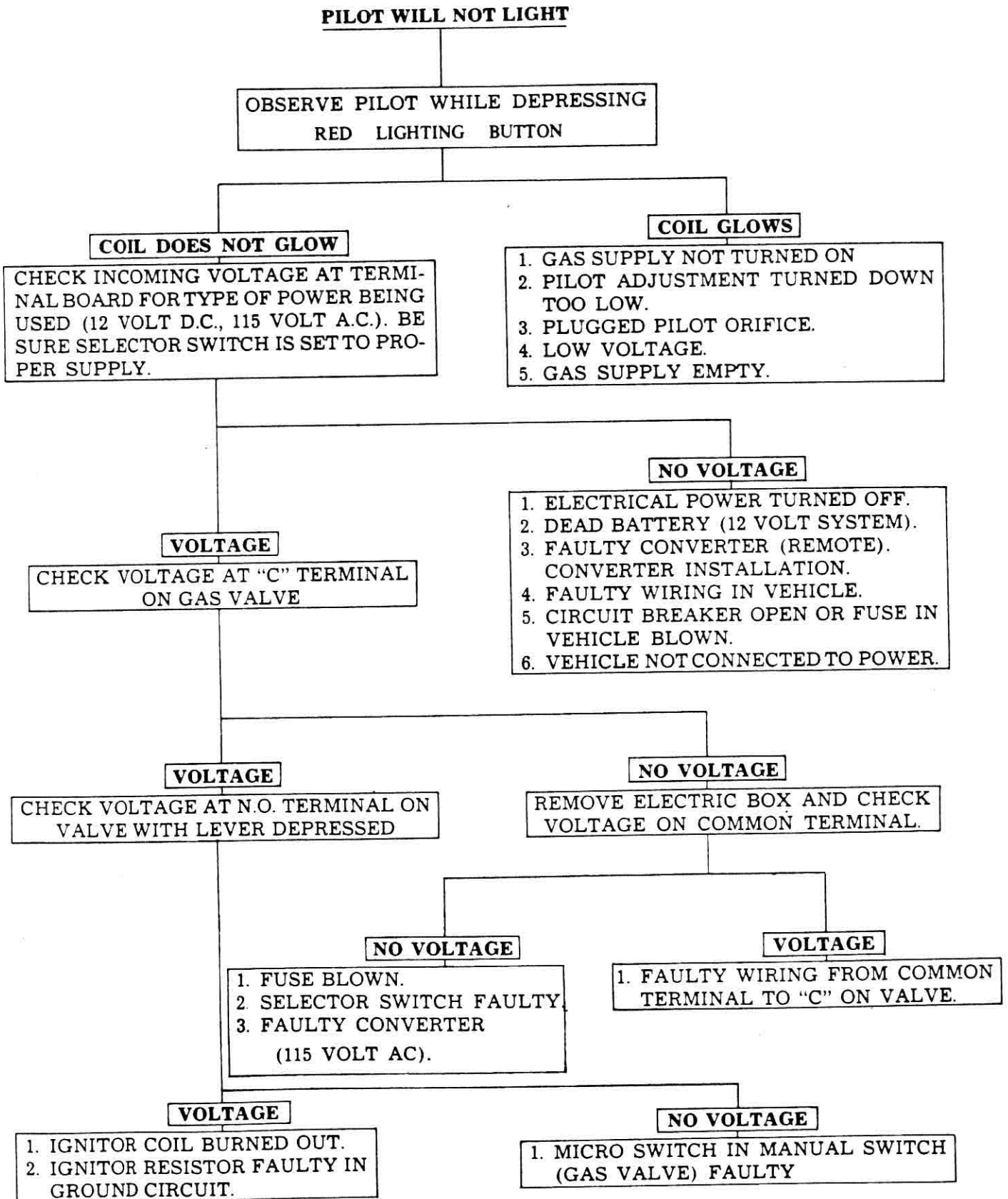
COLOR CODE	
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BL	- BLUE
Y	- YELLOW
O	- ORANGE
BK	- BLACK
W	- WHITE

Replacement Fuses		
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4023		
4028	} MDL 9	Slow Blow Type
4030		

DC UNIT WIRING DIAGRAM

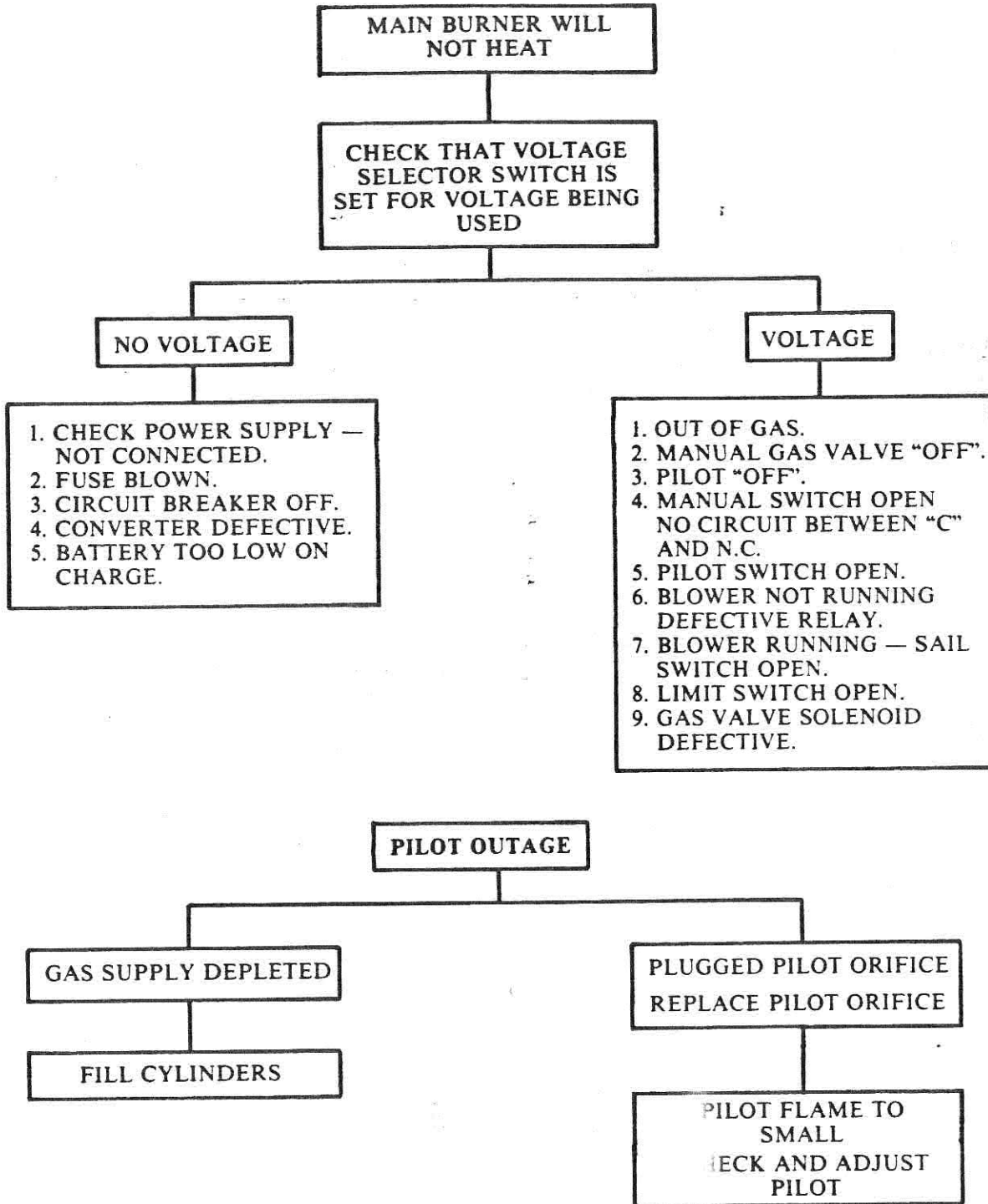
- MODELS
4016-889
4023-889
4028-889
4030-889

SERVICE CHARTS

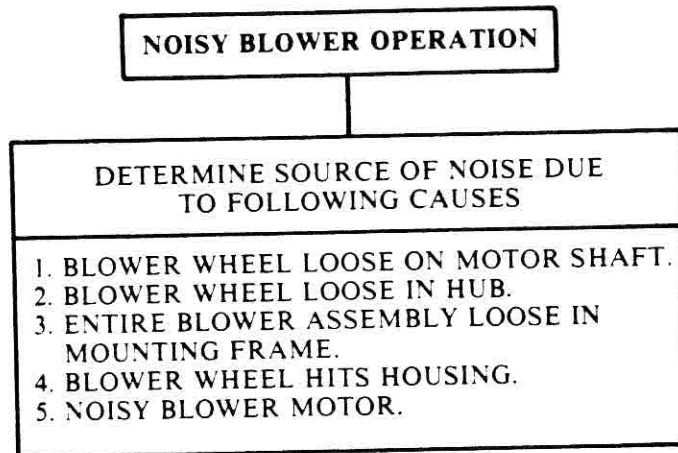
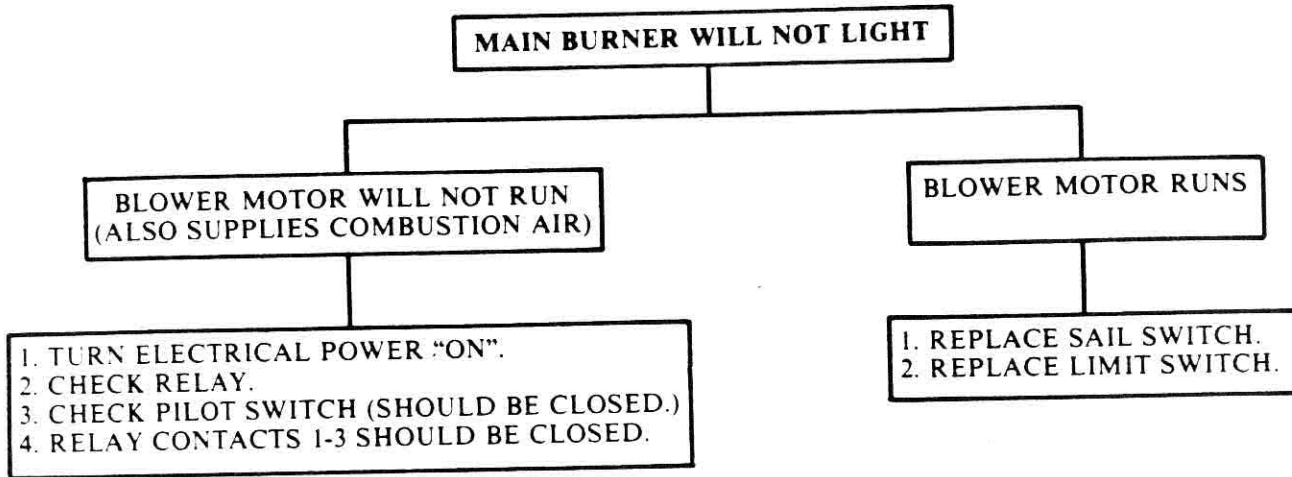


SERVICE CHARTS

PROBLEM



SERVICE CHARTS



The Coleman Company, Inc.

SPECIAL PRODUCTS DIVISION
WICHITA, KANSAS 67201

4232A6211 CONVERSION KIT (Eaton Valve to General Controls Valve)

NOTICE

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

Installation and Service personnel are required by some States to be licensed. Persons not qualified should not attempt to install this equipment nor interpret these instructions.

The purpose of this kit is to convert the following under-counter furnaces to General Controls components.

Models	4016-&A	4219-&A	*8623
	4023-&A	4225-&A	*8630
	4028-&A	4230-&A	9216
	4030-, A&B	4232	9223
		4235A	9230

NOTE

*This does "Not" include furnaces equipped with Stemco Pilot Burners (three wires coming from pilot burner). Order complete burner assembly to update these furnaces.

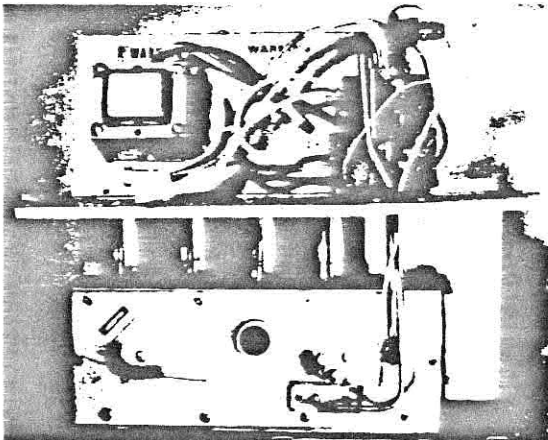


Figure 1
"GENERAL CONTROLS"

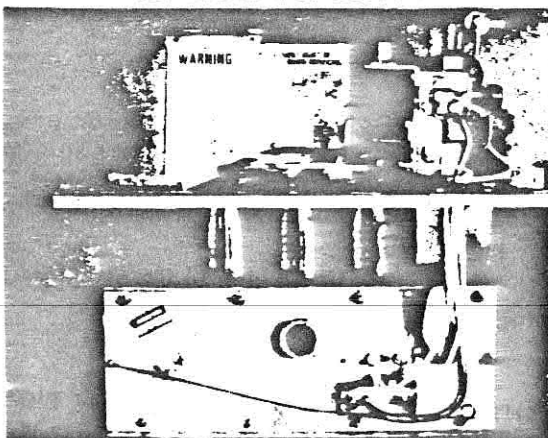


Figure 2
"EATON CONTROLS"

The General Control Gas Valve is an electrical type safety control and the Eaton Gas Valve is a mechanical type safety control, otherwise, the operation of the furnace is the same. See Figure 1 and Figure 2 for both types of burners.

THE KIT CONSISTS OF THE FOLLOWING PARTS

1. 2631-347 Thermocouple
2. 4023-133 Pilot Bracket
3. 4023B134 Pilot Tube
4. 4232-325 Pilot Burner
5. 4232A321 Gas Valve (General Control)
6. 1210A027 1/4 IPS Street Elbow
7. 1215-415 1/4 IPS X 3/8 Flare Union
8. 1971A148 Installation Instructions
9. 1971-149 Lighting Instructions
10. 1143B1008 Screw X 1
11. 1016B1004 Screw X 2
12. 4225-155 Pilot Tube

REMOVAL OF "EATON" GAS VALVE AND COMPONENTS

WARNING

DISCONNECT ALL ELECTRICAL POWER SUPPLY TO THE FURNACE, BOTH 12 VDC AND 115 VAC IF USED.

1. Disconnect the wires to the gas valve solenoid and glow coil microswitch.
2. Remove burner assembly (save sheet metal screws and brass nuts for reuse).
3. Remove pilot tube and glow coil wires from gas valve, burner door assembly and closure plate.
4. Remove gas valve capillary tube through burner door assembly (save all parts removed except cap tube for reuse).
5. Remove Eaton Gas Valve from manifold pipe.
6. Remove elbow fittings on inlet side of Eaton Gas Valve.

INSTALLATION OF "GENERAL CONTROL" GAS VALVE AND COMPONENTS

1. Peel the backing paper from the lighting instructions and place on the specification plate over the old lighting instructions for the "Eaton" Gas Valve.
2. Clean pipe dope from manifold pipe where valve was removed and reapply new pipe dope to threads. "USE PIPE DOPE SPARINGLY MAKING SURE THAT DOPE DOES NOT GET INTO INSIDE PORTION OF PIPE".
3. Assemble General Controls Gas Valve with "Outlet" end assembled on manifold pipe, and on "inlet" end assemble street elbow and union supplied in kit. See Figure 3.

INSTALLATION INSTRUCTIONS

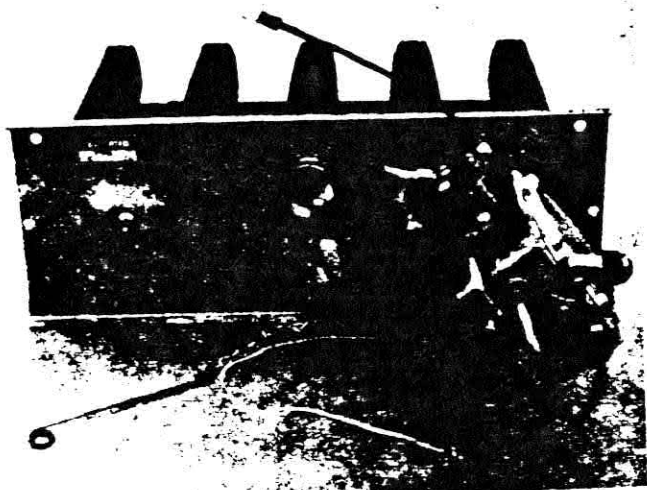


Figure 3

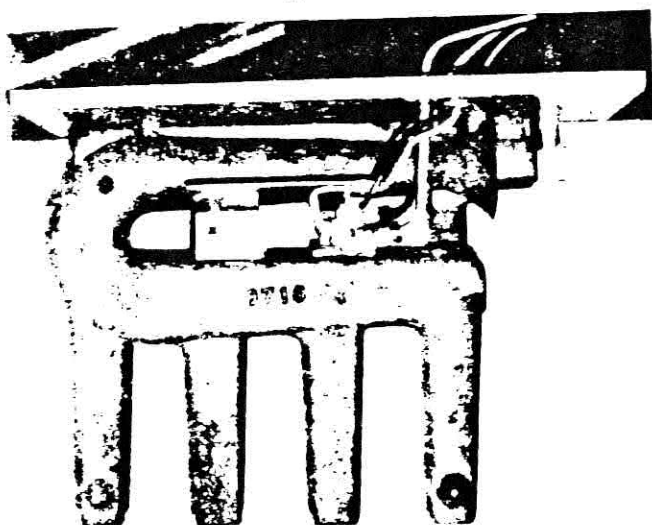


Figure 4
"GENERAL CONTROLS"

4. Clean pipe dope from elbow fitting, redope and install in "Inlet" side of valve. "USE PIPE DOPE SPARINGLY AND MAKE SURE THAT IT DOES NOT ENTER GAS VALVE PORTING."

5. Install pilot burner and attaching bracket to burner casting using screws provided in kit. See Figure 4.

NOTE

Earlier models such as 4000 Series, the opening in the burner door for the pilot tube and capillary tube has a red or black rubber grommet to prevent chafing. This grommet will have to be removed and the hole enlarged to accept the pilot tube and thermocouple. Use Permatex #2 gasket compound to seal the enlarged hole. Do not use Permatex #1 as this material "sets-up" in a rock-like state.

6. Insert pilot tube and thermocouple through closure plate then through burner door.

7. Install new glow coil wire or wires which are attached to the pilot assembly in a reverse direction as to the installation of the pilot tube and thermocouple. Insert these items from inside the burner area through the burner plate and up through the closure plate. Attach one lead corresponding to the wiring diagram on furnace and the other lead to the "N.O." terminal on the glow coil microswitch attached to the side of gas valve.

NOTE

On older models such as the 4000 Series reinstall the "Heyco" fitting around glow coil wire and insert into hole in burner door as the original wires were secured. The glow coil wire that is not attached to "N.O." Terminal on gas valve will have to be attached to the existing glow coil wire by clipping connector and splicing with wire nut.

8. You are now ready to install the wiring. In this operation, follow the wiring diagram now with your furnace. The "General Controls" gas valve is wired exactly the same as the "Eaton" gas valve.

NOTE

Through the various model changes the wiring diagrams have changed, not as to operation but as to where wires attach to conserve wire and for convenience on our production assembly line. If help is needed, contact the Service Department at the Coleman Company.

IMPORTANT

FOLLOW WIRING DIAGRAM ATTACHED TO FURNACE BEING CONVERTED.

WARNING

AVOID GAS LEAKS — DO NOT TWIST GAS VALVE DURING PIPING.

9. After electrical connections are made, thoroughly check all pipe joints with a soapy solution to detect gas leaks. This should also include a check for furnace controls and piping. NEVER CHECK FOR LEAKS WITH AN OPEN FLAME.

10. Air will get in gas line in changing gas valves, therefore, it will take longer to light pilot.

WARNING

DO NOT BREAK GAS LINE CONNECTIONS TO BLEED GAS AS A FIRE HAZARD MAY RESULT.