

**OWNER'S MANUAL**

**CONTINUOUS PILOT  
MODEL NO.**

**KWX - 3V  
KWX - 4V  
KWX - 5V  
KWX - 6V  
KWX - 7V  
KWX - 8V  
KWX - 9V**

**CAUTION**

**Read all instructions  
carefully before starting  
the installation.**

**Save this manual  
for future reference.**

**These instructions must  
be affixed on or adjacent  
to the boiler.**



**Gas - Fired  
Cast Iron  
HOT WATER  
BOILER**

- Installation
- Operation
- Repair Parts

**WARNING:** Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

**Sears, Roebuck and Co., Hoffman Estates, IL 60179 U.S.A**

# SEARS

## KENMORE CAST IRON BOILERS

### FULL ONE YEAR WARRANTY ON HOT WATER AND GAS STEAM CAST IRON BOILERS

For one (1) year from the date of installation, when this boiler is installed and maintained in accordance with our instructions. Sears will repair defects in material or workmanship in the boiler, free of charge.

### LIMITED 12 YEAR WARRANTY ON STEAM CAST IRON BOILERS

After one (1) year and through twelve (12) years from the date of installation, Sears will furnish a replacement heat exchanger, if the heat exchanger in the boiler is defective. **YOU PAY FOR LABOR.**

### LIMITED 20 YEAR WARRANTY ON HOT WATER CAST IRON BOILERS

After one (1) year and through twenty (20) years from the date of installation, Sears will furnish a replacement heat exchanger if the heat exchanger in the boiler is defective. **YOU PAY FOR LABOR.**

### SEARS INSTALLATION WARRANTY

In addition to any warranty extended to you on the Sears merchandise involved, which warranty becomes effective the date the merchandise is installed, should the workmanship of any Sears arranged installation prove faulty within one year, Sears will, upon notice from you, cause such faults to be corrected at no additional cost to you.

**FOR WARRANTY SERVICE, SIMPLY CONTACT THE NEAREST SEARS STORE OR SERVICE CENTER THROUGHOUT THE UNITED STATES.** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

### IMPORTANT

The following are the responsibilities of the user and are not covered by the Warranty.

1. Filter clearing or replacement.
2. Damage to unit or unsatisfactory operation due to improper cleaning or use of unit in corrosive atmosphere.
3. Damage to unit or unsatisfactory operation due to blown fuses or inadequate or interrupted electrical protective devices.
4. Damage to unit caused by the use of components or other accessories not compatible with the unit.
5. If the unit is removed from the place it was originally installed, this Warranty becomes void.
6. Damage to the unit caused by accident, abuse, negligence, misuse, riot, fire, flood, or acts of God.

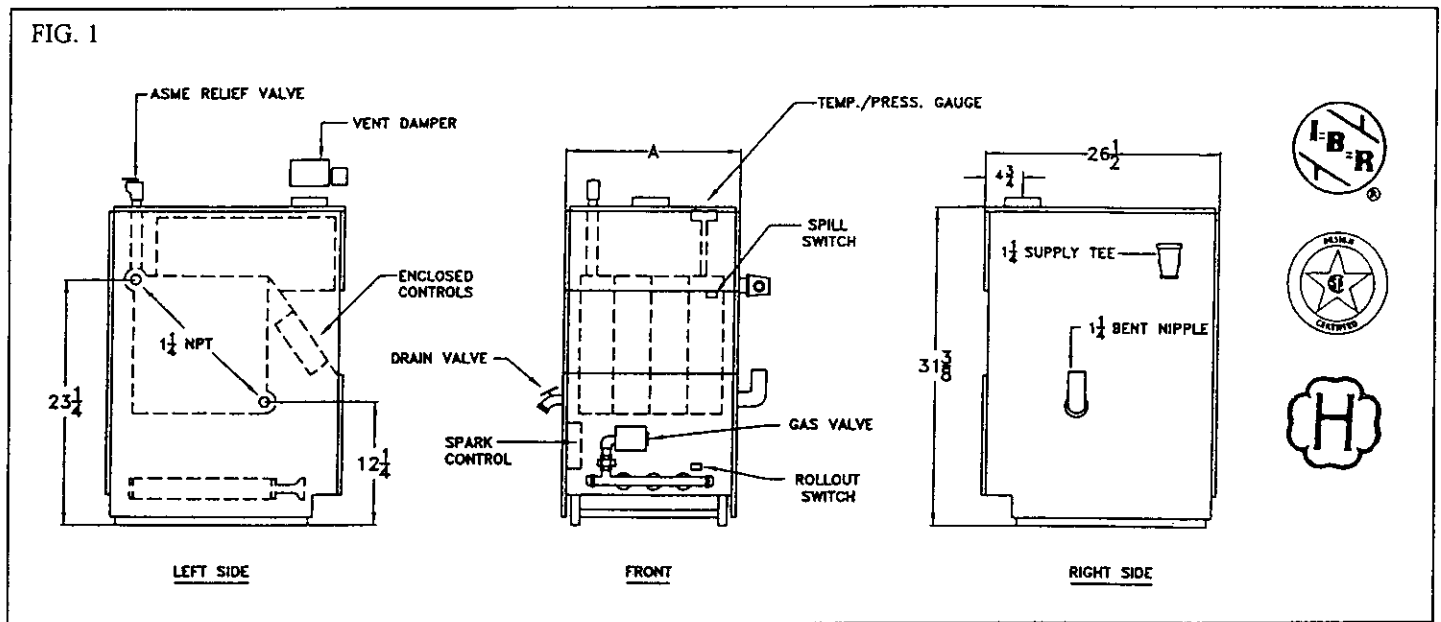
SEARS ROEBUCK AND COMPANY  
D/817WA  
Hoffman Estates, IL 60179

## Rules for Safe Installation and Operation

1. Read the Owner's Manual for Safe Operation carefully. Failure to follow the rules for safe operation and the instructions can cause a malfunction of the boiler and result in death, serious bodily injury, and/or property damage.
2. Check your local codes and utility requirements before installation. The installation must be in accordance with their directives.
3. Before servicing, allow boiler to cool. Always shut off any electricity and gas to boiler when working on it. This will prevent any electrical shocks or burns.
4. Never test for gas leaks with an open flame. Use soap and check all connections. This will avoid any possibility of fire or explosion.
5. Be certain your new boiler will be using the correct gas. Overfiring will result in premature failure of the boiler sections and cause dangerous operation.
6. Never vent this boiler into an enclosed space. Always vent to the outside. Never vent to another room or inside a building.
7. Be sure there is adequate air supply for complete combustion.
8. Follow a regular service and maintenance schedule for efficient and safe operation.

# Boiler Ratings and Capacities

FIG. 1



| BASIC BOILER MODEL NO.<br>Continuous Pilot<br>With<br>Vent Damper | NO. OF<br>SECTIONS | NATURAL GAS              |                             |                            | DIMENSIONS (INCHES) |              |
|---|--------------------|--------------------------|-----------------------------|----------------------------|---------------------|--------------|
|   |                    | AGA/CGA<br>INPUT<br>*MBH | HEATING<br>CAPACITY<br>*MBH | NET<br>I=B=R<br>Rating*MBH | FLUE<br>DIAMETER    | "A"<br>WIDTH |
| KWX-3V  | 3                  | 70                       | 57                          | 50                         | 5                   | 11 1/4       |
| KWX-4V  | 4                  | 105                      | 85                          | 74                         | 6                   | 14 1/2       |
| KWX-5V  | 5                  | 140                      | 113                         | 98                         | 6                   | 17 3/4       |
| KWX-6V  | 6                  | 175                      | 142                         | 123                        | 7                   | 21           |
| KWX-7V  | 7                  | 210                      | 170                         | 148                        | 7                   | 24 1/4       |
| KWX-8V  | 8                  | 245                      | 198                         | 172                        | 7                   | 27 1/2       |
| KWX-9V  | 9                  | 280                      | 226                         | 197                        | 7                   | 30 3/4       |

\* MBH = 1,000 Btuh      Btuh = British Thermal Unit Per Hour  
 For altitudes above 2,000 ft. ratings should be reduced at the rate of 4% for each 1,000 ft. above sea level.  
 Heating Capacity is based on D.O.E. (Department of Energy) test procedure.  
 \*\*Add 5 1/2" to height for Vent Damper.

The Ratings marked "Net I=B=R Ratings" indicate the amount of remaining heat input that can be used to heat the radiation or terminal Units. The net I=B=R Ratings shown are based on an allowance of 1.15 in accordance with the factors shown on the I=B=R Standard as published by the Hydronics Institute. Selection of boiler size should be based upon "Net I=B=R Rating" being equal to or greater than the calculated heat loss of the building. The Manufacturer should be consulted before selecting a boiler for installations having unusual piping and pickup requirements. These boilers must stand on a non-combustible floor. If installed on a combustible floor, use Combustible Floor Base Number 42135-1 or 146-14-031 (3-6 section boilers) or 42135-2 or 146-14-032 (7-9 section boilers).

## BOILERS FOR USE AT HIGH ALTITUDE

This boiler is factory equipped for use at altitudes of 0-2,000 feet above sea level. For use at altitudes above sea level, the input ratings are reduced by a change in main orifice size.

For altitudes above 2,000 feet above sea level, input ratings should be reduced at the rate of 4% for each 1,000 feet above sea level. Consult the National Fuel Gas Code (NFPA54/ANSI Z223.1-latest edition), or the manufacturer for correct orifice sizing information. High altitude orifices are available from the boiler manufacturer.

# Before You Start

Check to be sure you have the right size boiler before starting the installation. See rating and capacity table on previous page. Also be sure the new boiler is for the type of gas you are using. Check the rating plate on the right side of the boiler.

You must see that the boiler is supplied with the correct type of gas, fresh air for combustion, and a suitable electrical supply. Also, the boiler must be connected to a suitable venting system and an adequate piping system. Finally, a thermostat, properly located, is needed for control of the heating system. If you have any doubts as to the various requirements, check with local authorities and obtain professional help where needed. Take the time to complete all of the steps for SAFE and PROPER operation of the heating system.

If this boiler is installed in a building under construction, special care must be taken to insure a clean combustion air supply during the construction process. Airborne particulates such as from drywall dust and from fiberglass insulation can clog the burner ports and cause incomplete combustion and sooting.

Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1.

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1-latest revision.

Installers - Follow local regulations with respect to installation of CO detectors. Follow maintenance recommendations in this instruction manual.

Techniciens - Veuillez vous conformer à la réglementation en vigueur concernant l'installation des détecteurs d'oxyde de carbone. Suivre les consignes d'entretien figurant dans le manuel d'instruction cijoint.

**KEEP BOILER AREA CLEAN AND FREE FROM COMBUSTIBLE MATERIALS, GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS**

## Locating the Boiler

1. Select level location as centralized with piping system, and as near chimney, as possible.
2. Place crated boiler at selected location, remove crate by pulling crate sides from top and bottom boards. Combustible floors: When boiler is to be installed on a combustible floor, a Special Base Plate must be used - 146-14-031 (2-6 Section) or 146-14-032 (7-9 Section). This boiler must not be installed on carpeting.
3. Boiler is to be level. Metal shims may be used under base legs for final leveling.
4. Additional clearances for service may exceed clearances for fire protection. Always comply with the minimum fire protection clearances shown on the boiler. An 18 inch clearance should be maintained on any side where passage is required to access another side for cleaning, servicing, inspection or replacement of any part that may need attention.

7. The boiler shall be installed such that the automatic gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (condensate trap, control replacement, etc.).

Figure 2 shows minimum clearances to combustible construction. Rooms that are large in comparison with the size of the boiler are defined as rooms having a volume equal to or greater than 16 times the volume of the boiler. Where the actual ceiling height of a room is greater than 8', the volume of a room shall be figured on the basis of a ceiling height of 8'. Determination of room size should be based on the total volume of all gas fired equipment installed in the room. Consult section 6.3.1 of the National Fuel Gas Code for further information, including approved methods for reducing clearances in large rooms.

5. Equipment shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas, proper venting, and maintenance of ambient temperature at safe limits under normal conditions of use. Equipment shall be located so as not to interfere with proper circulation of air. When normal infiltration does not provide the necessary air, outside air shall be introduced (See Page 4 - "Fresh Air for Combustion").
6. Advise owner to keep air passages free of obstructions. Ventilating and combustion air must enter boiler room without restrictions.

**FIG. 2 - MINIMUM CLEARANCE DIMENSIONS**

|                     | Alcove, or Room not Large in Comparison with Boiler |  | Room Large Comparison With Boiler |
|---------------------|---|--|-----------------------------------|
|                     | 3-5 SECT.   | 6-9 SECT.  | 3-9 SECT.                         |
| TOP                 | 6"  | 6"   | 6"                                |
| REAR                | 6"  | 6"   | 6"                                |
| RIGHT SIDE          | 6"  | 24"  | 6"                                |
| LEFT SIDE           | 6"  | 24"  | 6"                                |
| FRONT               | 18"   | 18"  | 18"                               |
| FLUE/VENT CONNECTOR | 6"  | 6"   | 6"                                |
| NEAR BOILER PIPING  | 1"  | 1"   | 1"                                |
| BOILER SIZE         | BOILER VOLUME (Cu.Ft.)                              | MINIMUM ROOM VOLUME REQUIRED TO BE LARGE ROOM (Cu. Ft.)* |                                   |
| 3 SECT.             | 5.4   | 86.6   |                                   |
| 4 SECT.             | 7.0   | 111.6  |                                   |
| 5 SECT.             | 8.5   | 136.6  |                                   |
| 6 SECT.             | 10.1  | 161.7  |                                   |
| 7 SECT.             | 11.7  | 186.7  |                                   |
| 8 SECT.             | 13.2  | 211.7  |                                   |
| 9 SECT.             | 14.8  | 236.7  |                                   |

\* FOR ROOM WITH SINGLE BOILER ONLY

**THIS UNIT MUST BE SET ON A CONCRETE OR OTHER NON-COMBUSTIBLE MATERIAL BASE OR FLOOR.**

# Fresh Air for Combustion

Provision for combustion and ventilation air must be in accordance with Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1-latest revision, or applicable provisions of the local building codes.

## WARNING

Be sure to provide enough fresh air for combustion. Enough air insures proper combustion and **assures that no hazard will develop due to the lack of oxygen.**

You must provide for enough fresh air to assure proper combustion. The fire in the boiler uses oxygen. It must have a continuous supply. The air in a house contains only enough oxygen to supply the burner for a short time. Outside air must enter the house to replace that used by the burner. Study following examples 1 and 2 to determine your fresh air requirements.

### EXAMPLE 1: Boiler Located in Unconfined Space

An unconfined space is defined as a space whose volume is not less than 50 cubic feet per 1,000 Btu per hour of the total input rating of all appliances installed in that space.

If your boiler is in an open area (unpartitioned basement) in a conventional house, the air that leaks through the cracks around doors and windows will usually be adequate to provide air for combustion. The doors should not fit tightly. Do not caulk the cracks around the windows.

Equipment located in buildings of unusually tight construction shall be provided with air for combustion, ventilation, and dilution of flue gases using the methods described in example 2B or shall be specially engineered. The authority having jurisdiction must approve specially engineered installations.

### EXAMPLE 2: Boiler Located in Confined Space

**A. All Air from Inside the Building:** The confined space shall be provided with two permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Each opening shall have a minimum free area of one square inch per 1,000 Btu per hour of the total input rating of all gas utilization equipment in the confined space, but not less than 100 square inches. One opening shall be within 12 inches of the top and one within 12 inches of the bottom of the enclosure. The minimum dimension of air openings shall not be less than 3 inches.

**B. All Air from Outdoors:** The confined space shall communicate with the outdoors in accordance with methods 1 or 2. The minimum dimension of air openings shall not be less than 3 in. Where ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect.

1. Two permanent openings, one commencing within 12 inches of the top, and one commencing within 12 inches of the bottom, of the enclosure shall be provided. The openings shall communicate directly, or by the ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

a) Where directly communicating with the outdoors or where communicating to the outdoors through vertical ducts, each opening shall have a minimum free area of 1 sq. in. per 4000 Btu per hour of total input rating of all equipment in the enclosure. (See Figure 3A.)

b) Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 sq. in. per 2000 Btu per hour of total input rating of all equipment in the enclosure. (See Figure 3B.)

2. One permanent opening commencing with 12 inches of the top of the enclosure, shall be permitted where the equipment has clearance of at

## NOTE

If you use a fireplace or a kitchen or bathroom exhaust fan, you should install an outside air intake. These devices will rob the boiler and water heater of combustion air.

least 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors, and shall have a minimum free area of:

- 1 sq. inch per 3000 Btu per hour of the total input of all equipment located in the enclosure (See Figure 4), and
- Not less than the sum of the areas of all vent connectors in the confined space.

**Figure 3A - FRESH AIR DUCT CAPACITIES (Btuh)**

1 Square Inch per 4,000 Btuh

|                     | 100% Free Area | 75% Free Area | 25% Free Area |
|---------------------|----------------|---------------|---------------|
| Fresh Air Duct Size | ¼" Wire Mesh   | Metal Louvers | Wood Louvers  |
| 3" x 12"            | 144,000        | 108,000       | 36,000        |
| 8" x 8"             | 256,000        | 192,000       | 64,000        |
| 8" x 12"            | 384,000        | 288,000       | 96,000        |
| 8½" x 16"           | 512,000        | 384,000       | 128,000       |

**Figure 3B - FRESH AIR DUCT CAPACITIES (Btuh)**

1 Square Inch per 2,000 Btuh

|                     | 100% Free Area | 75% Free Area | 25% Free Area |
|---------------------|----------------|---------------|---------------|
| Fresh Air Duct Size | ¼" Wire Mesh   | Metal Louvers | Wood Louvers  |
| 3" x 12"            | 72,000         | 54,000        | 18,000        |
| 8" x 8"             | 128,000        | 96,000        | 32,000        |
| 8" x 12"            | 192,000        | 144,000       | 48,000        |
| 8½" x 16"           | 256,000        | 192,000       | 64,000        |

**Figure 4 - FRESH AIR DUCT CAPACITIES (Btuh)**

1 Square Inch per 3,000 Btuh

|                     | 100% Free Area | 75% Free Area | 25% Free Area |
|---------------------|----------------|---------------|---------------|
| Fresh Air Duct Size | ¼" Wire Mesh   | Metal Louvers | Wood Louvers  |
| 3" x 12"            | 108,000        | 81,000        | 27,000        |
| 8" x 8"             | 192,000        | 144,000       | 48,000        |
| 8" x 12"            | 288,000        | 216,000       | 72,000        |
| 8½" x 16"           | 384,000        | 288,000       | 96,000        |

# Installation - System Piping

1. Place boiler in the selected location (as near chimney as possible.) Your boiler is shipped assembled. You need only to install the Relief Valve and a drain line to carry any water or steam to a drain.
2. Install Relief Valve into the 3/4" pipe on the top of the boiler. See Figure 5. Use 3/4" Pipe and an elbow (not furnished) to carry the water or steam to a nearby drain. Do not connect directly to a drain but leave an air gap. No shutoff of any description shall be placed between the safety relief valve and the boiler, or on discharge pipes between such safety valves and the atmosphere. Installation of the safety relief valve shall conform to the requirements of the ANSI/ASME Boiler and Pressure Vessel Code, Section IV. The manufacturer is not responsible for any water damage. Install Drain Valve in lower left side of boiler as marked.
3. Connect Supply and Return Lines to boiler. The connections may require certain additional fittings and parts, as shown on diagram (Figs. 5 and 6).
4. This boiler is equipped with 1 1/4" supply and return connections on both the left and right sides of the boiler.

In connecting the cold water supply to the water inlet valve, make sure that a clean water supply is available. When the water supply is from a well or pump, a sand strainer should be installed at the pump.

A hot water boiler installed above radiation level must be equipped with a low water cutoff device. A periodic inspection is necessary, as is flushing of float type devices, per manufacturers specific instruction.

## FOR USE WITH COOLING UNITS

- A. This boiler, when used in connection with chilled water systems, must be installed so that the chilled water is piped in parallel with the heating boiler. Appropriate valves must be used to prevent the chilled water from entering the heating boiler (Fig. 6).
- B. When this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, the piping system shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

## LOW DESIGN WATER TEMPERATURE SYSTEMS (BELOW 140°)

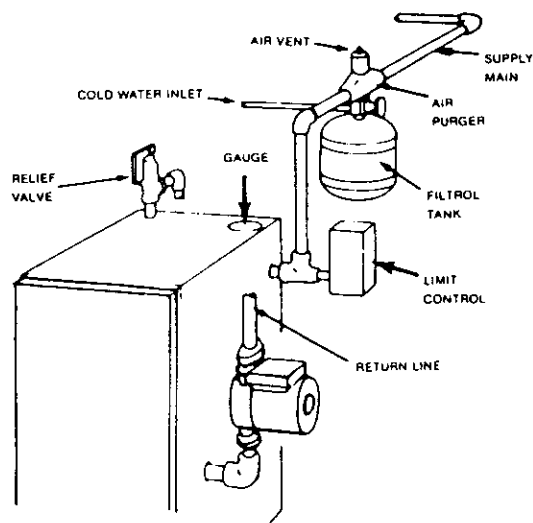
If the boiler is to be used in a heating system where design water temperatures below 140° F are desired (e.g. radiant floor heating), a 3-way or 4-way mixing valve or suitable alternative is required to prevent low temperature return water from entering the boiler. Follow the mixing valve manufacturer's

installation instructions.

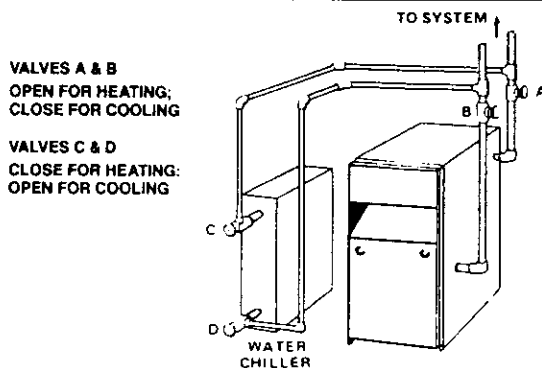
The minimum design return water temperature to the boiler to prevent condensation in the boiler and venting is 120° F. The minimum high limit setting is 140° F.

**CAUTION**  
**THE ISOLATION BALL VALVES CONTAIN TEFLON SEATS AND SEALS. OVERHEATING THIS VALVE MAY CAUSE PREMATURE FAILURE.**

**FIG. 5 - TYPICAL HOT WATER PIPING**



**FIG. 6 - CHILLED WATER PIPING**



# Chimney and Vent Pipe Connection

**For boilers for connection to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1-latest revision and applicable provisions of the local building codes.**

## CHECK YOUR CHIMNEY

This is a very important part of your heating system. It must be clean, the right size, properly constructed and in GOOD CONDITION. No boiler can function properly with a bad chimney. Fig. 7 gives typical chimney sizes. Fig. 8 gives you an idea how a boiler might be vented to a chimney. Note that the height (HT) is measured from the vent pipe to the top.

## CHIMNEY SIZING

Chimney sizing, and all other aspects of the vent installation must be in accordance with Part 7 of the National Fuel Gas Code, ANSI Z223.1 - latest revision, and applicable provisions of the local building codes. In Canada, follow CSA B149.1 and B149.2, Installation Codes for Gas Burning Appliances and Equipment.

## CONNECTING THE VENT DAMPER AND VENT CONNECTOR

Refer to Fig. 1 flue diagram for the size and location of the vent (flue opening). Use a 28 gauge (minimum) galvanized pipe to connect to the chimney.

**IMPORTANT** - The damper blade on the furnished vent damper has a ½ square inch hole (approximately ¾" diameter). On boilers equipped with standing pilot, the hole **must** be left open. On boilers equipped with intermittent ignition, the hole should be plugged by using the plug supplied with the vent damper.

1. Position furnished vent damper on top of flue outlet collar. Fasten damper securely to flue outlet collar with sheet metal screws. Make sure damper blade has clearance to operate inside of diverter.

On 2 section boilers equipped with vent damper, the supplied 4-inch vent damper is equipped with a 3- to 4-inch adapter so that the 4-inch vent damper may be installed on the boiler's 3-inch flue outlet collar. Fasten all fittings securely.

### As An Option

The damper may be installed in any horizontal or vertical position, closer to the flue outlet collar preferred. Follow the diagrams - Figures 9, 10 and 11.

2. Install the vent damper to service only the single boiler for which it is intended. The damper position indicator shall be in a visible location following installation. Locate the damper so that it is accessible for servicing.
3. The damper must be in the open position when appliance main burners are operating.
4. The boiler is equipped with a factory wired harness that plugs into the vent damper.
5. Vent pipe must be same size as the flue outlet collar, except 2 section boilers with vent damper as noted above.
6. Slope pipe up from boiler to chimney not less than ¼" per foot.
7. Run pipe as directly as possible with as few elbows as possible.
8. Do not connect to fireplace flue.
9. End of vent pipe must be flush with inside face of chimney flue. Use a sealed-in thimble for the chimney connection.
10. Horizontal run should not be longer than ¾ the chimney height (HT) (Fig. 8).

The sections of vent pipe should be fastened with sheet metal screws to make the piping rigid. Horizontal portions of the vent system must be supported to prevent sagging. Use stovepipe wires every 5' to support the pipe from above. If the vent pipe must go through a crawl space, double wall vent pipe should be used. Where vent pipe passes through a combustible wall or partition, use a ventilated metal thimble. The thimble should be 4 inches larger in diameter than the vent pipe.

**FIG. 7 - TYPICAL CHIMNEY SIZES**

| Boiler Input<br>Btuh | FLUE AREA IN INCHES |                   |                   |
|----------------------|---------------------|-------------------|-------------------|
|                      | *HT.<br>10-15 Ft.   | *HT.<br>15-25 Ft. | *HT.<br>25 Ft. Up |
| Up to 100,000        | 6 × 6               | 6 × 5             | 5 × 5             |
| Up to 155,000        | 6 × 7               | 6 × 6             | 6 × 5             |
| Up to 230,000        | 7 × 8               | 7 × 7             | 6 × 7             |
| Up to 350,000        | 9 × 9               | 8 × 9             | 8 × 8             |

\*HT - top of thimble to top of flue. See Fig. 8.

For boiler input refer to table, page 2.

For information only - not meant to imply minimum sizes.

## MINIMUM VENT PIPE CLEARANCE

Wood and other combustible materials must not be closer than 6" from any surface of single wall metal vent pipe. Listed Type B vent pipe or other listed venting systems shall be installed in accordance with their listing.

## REMOVING EXISTING BOILER FROM COMMON VENTING SYSTEM

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it.

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

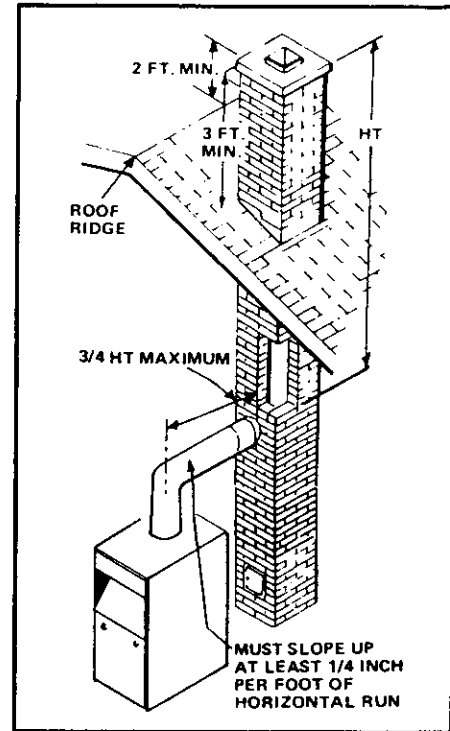
1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.

7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1-latest revision. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 in the National Fuel Gas Code, ANSI Z223.1-latest revision.

**For boilers for connection to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1-latest revision and applicable provisions of the local building codes.**

**Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.**

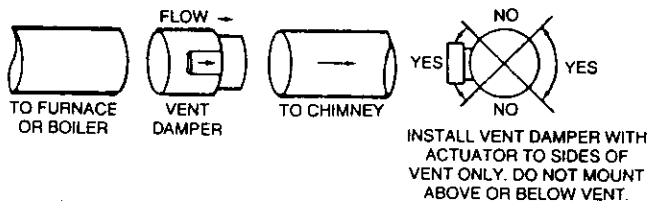
**FIG. 8  
TYPICAL MASONRY CHIMNEY REQUIREMENTS**



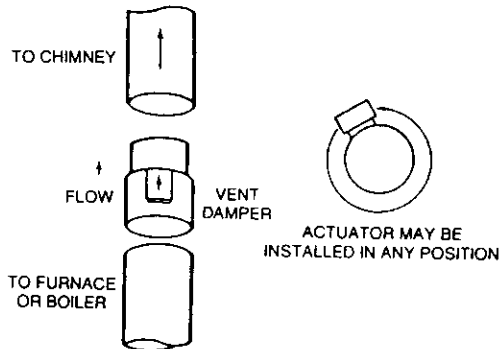
## Vent Damper Operation

**FIG. 9**

### HORIZONTAL INSTALLATION

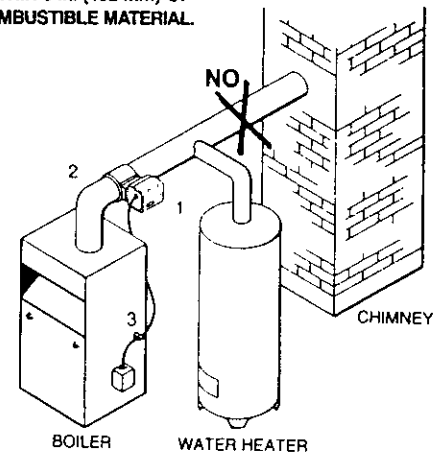


### VERTICAL INSTALLATION



**FIG. 10**

**CAUTION: DO NOT INSTALL THE VENT DAMPER WITHIN 6 in. (152 mm) OF COMBUSTIBLE MATERIAL.**



### TYPICAL INSTALLATION FOR VENT DAMPER NOTE CAUTION AND FOOTNOTES

1. Install the vent damper to service only the single appliance for which it is intended. If improperly installed, a hazardous condition, such as an explosion or carbon monoxide poisoning, could result.
2. Do not install the vent damper on vent pipe curve.
3. Do not run wires near high temperature surfaces. Use stand-off brackets if necessary.



For safe, efficient operation, the vent damper and all flue product carrying areas of the appliance must be checked annually by you, with particular attention given to deterioration from corrosion or other sources. If you see corrosion or other deterioration, contact your heating contractor for repairs. Check vent damper operation as follows:

1. When the boiler is off, check that the vent damper position indicator points to the closed position, Fig. 11.
2. Turn the thermostat or controller up to call for heat and check that the vent damper indicator points to the open position, Fig. 11.
3. Turn the thermostat or controller down again and check that the vent damper position indicator returns to the closed position.

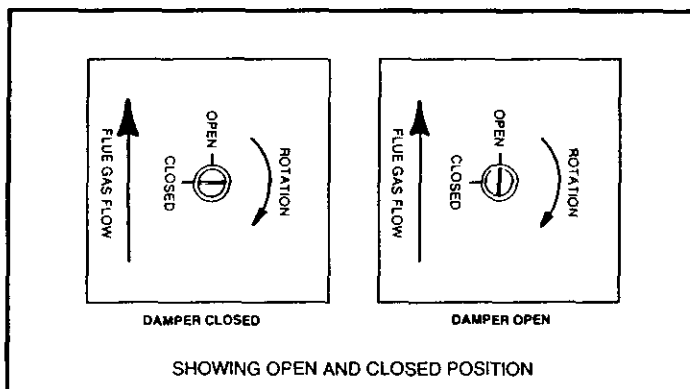
### MANUAL OPERATION OF THE VENT DAMPER

The Effikal vent damper may be placed in the open position to permit burner operation by using the "HOLD DAMPER OPEN" switch, located on the damper controller. The thermostat will control the burner firing as before, while the damper will remain open. **DO NOT** turn damper open manually or motor damage will result. Set switch to "AUTOMATIC OPERATION" to close vent damper during burner off cycle.

For further information, and for a vent damper troubleshooting guide, refer to the Effikal manual that was packaged with the vent damper.

**The vent damper must be inspected at least once a year by a trained, experienced service technician. The name of the person who originally installed your vent damper is shown on the installation label.**

**FIG. 11**  
**EFFIKAL VENT DAMPER POSITION INDICATOR**



# Gas Supply Piping

## CHECK GAS SUPPLY

The gas pipe to your boiler must be the correct size for the length of the run and for the total Btu per hour input of all gas utilization equipment connected to it. See Fig. 12 for the proper size. Be sure your gas line complies with local codes and gas company requirements.

The boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of ½ psig (3.5 kPa).

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psig (3.5 kPa).

## CONNECTING THE GAS PIPING

Refer to Fig. 13 for the general layout at the boiler. It shows the basic fittings you will need. The gas line enters the boiler from the right side.

The following rules apply:

1. Use only those piping materials and joining methods listed as acceptable by the authority having jurisdiction, or in the absence of such requirements, by the National Fuel Gas Code, ANSI Z223.1-latest revision.
2. Use pipe joint compound suitable for LP gas on male threads only.
3. Use ground joint unions.
4. Install a sediment trap upstream of gas controls.
5. Use two pipe wrenches when making the connection to the gas valve to keep it from turning.
6. Install a manual shut-off valve in vertical pipe about 5 feet above floor.
7. Tighten all joints securely.

## CHECKING THE GAS PIPING

Upon completion of piping, check immediately for gas leaks. Open the manual shut-off valve. Test for leaks by applying soap suds (or a liquid detergent) to each joint. Bubbles forming indicate a leak. **CORRECT EVEN THE SMALLEST LEAK AT ONCE.**

### WARNING

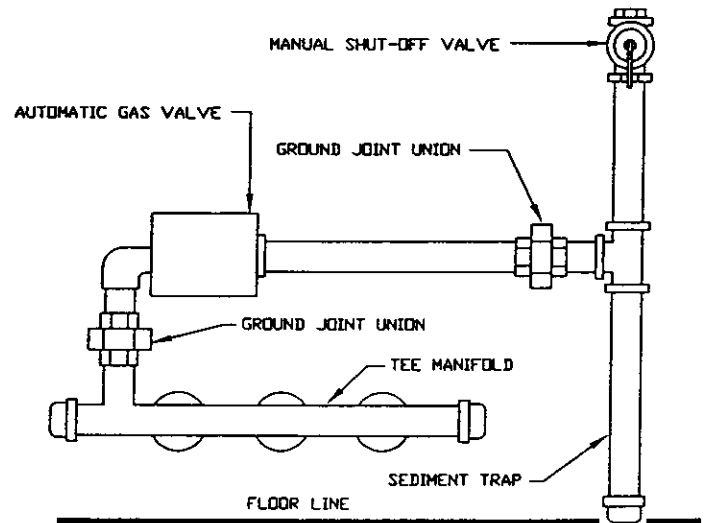
Never use a match or open flame to test for leaks.

FIG. 12 - GAS PIPE SIZES

| Length of Pipe - Ft. | NATURAL GAS  |         |         |         |
|----------------------|--|---------|---------|---------|
|                      | Pipe Capacity - BTU Per Hour Input Includes Fittings |         |         |         |
|                      | ½"   | ¾"      | 1"      | 1¼"     |
| 20                   | 92,000   | 190,000 | 350,000 | 625,000 |
| 40                   | 63,000   | 130,000 | 245,000 | 445,000 |
| 60                   | 50,000   | 105,000 | 195,000 | 365,000 |

The length of pipe or tubing should be measured from the gas meter.

FIG. 13 - GAS PIPING AT BOILER



# ELECTRICAL WIRING

## WARNING

**TURN OFF ELECTRICAL POWER AT FUSE BOX BEFORE MAKING ANY LINE VOLTAGE CONNECTIONS. FOLLOW LOCAL ELECTRICAL CODES.**

All electrical work must conform to local codes as well as the National Electrical Code, ANSI/NFPA-70, latest revision. In Canada, electrical wiring shall comply with the Canadian Electrical Codes, CSA-C22.1 and .2.

## **ELECTRIC POWER SUPPLY**

Prior to making any line voltage connections, service switch at boiler should be in the off position and the power turned off at the fuse box.

Run a separate 120 volt circuit from a separate over current protection device in the electrical service entrance panel. This should be a 15 ampere circuit. A service switch has been provided and should be mounted to the Junction box located on the exterior boiler jacket. See Fig.13-1 for diagram showing power supply connection points.

The boiler, when installed, must be electrically grounded in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA-70, latest revision. In Canada, electrical wiring shall comply with the Canadian Electrical Codes, CSA-C22.1 and .2.

Run a 14 gauge or heavier copper wire from the boiler to a grounded connection in the service panel or a properly driven and electrically grounded ground rod.

## **INSTALL YOUR THERMOSTAT**

The thermostat location has an important effect on the operation of your boiler system. **BE SURE TO FOLLOW THE INSTRUCTIONS INCLUDED WITH YOUR THERMOSTAT.**

Locate the thermostat about five feet above the floor on an inside wall. It may be mounted directly on the wall or on a vertical mounted outlet box. It should be sensing average room temperature. Avoid the Following:

### DEAD SPOTS:

Behind doors  
Corners and alcoves

### COLD SPOTS:

Concealed pipes or ducts  
Stairwells - drafts  
Unheated rooms on  
other side of wall

### HOT SPOTS:

Concealed pipes      Lamps  
Fireplace              Direct sunlight  
TV sets                  Kitchens  
Radios

Set heat anticipator at 0.1 amps. Connect 24 volt thermostat leads to the two(2) yellow wires located in service switch junction box, located on outer jacket of boiler. See Fig.13-1 for service switch junction box and thermostat field wiring connections.

## **VENT DAMPER WIRING**

The boiler is equipped with a factory wired harness with 4 pin molex plug, that plugs into a 4 pin molex receptacle inside the vent damper operator. The vent damper must be connected for the boiler to operate. Wiring diagrams follow for the various different models.

## CAUTION

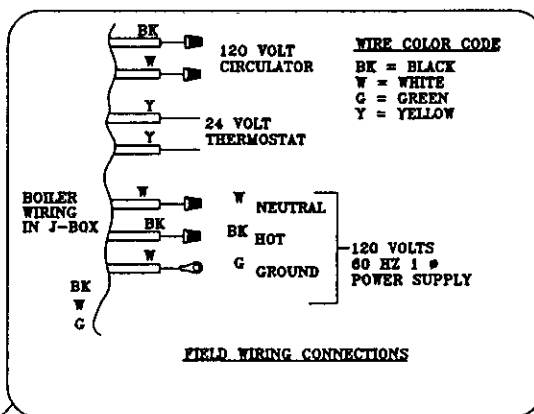
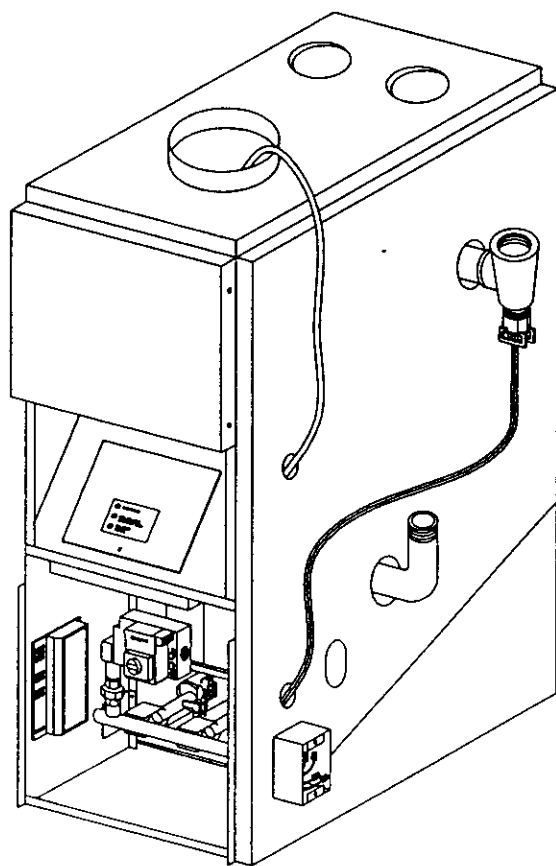
**Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

## Connect Circulator Pump Wiring

See Fig.13-1 for line voltage, thermostat and circulator pump field wiring connections. A 5 foot wiring harness with flexible metal conduit is supplied to connect the circulator pump to the service switch junction box. If the two 120 volt circulator wire terminals inside the junction box are not used, please leave the two wire nuts to prevent the short circuit.

# FIELD WIRING CONNECTIONS

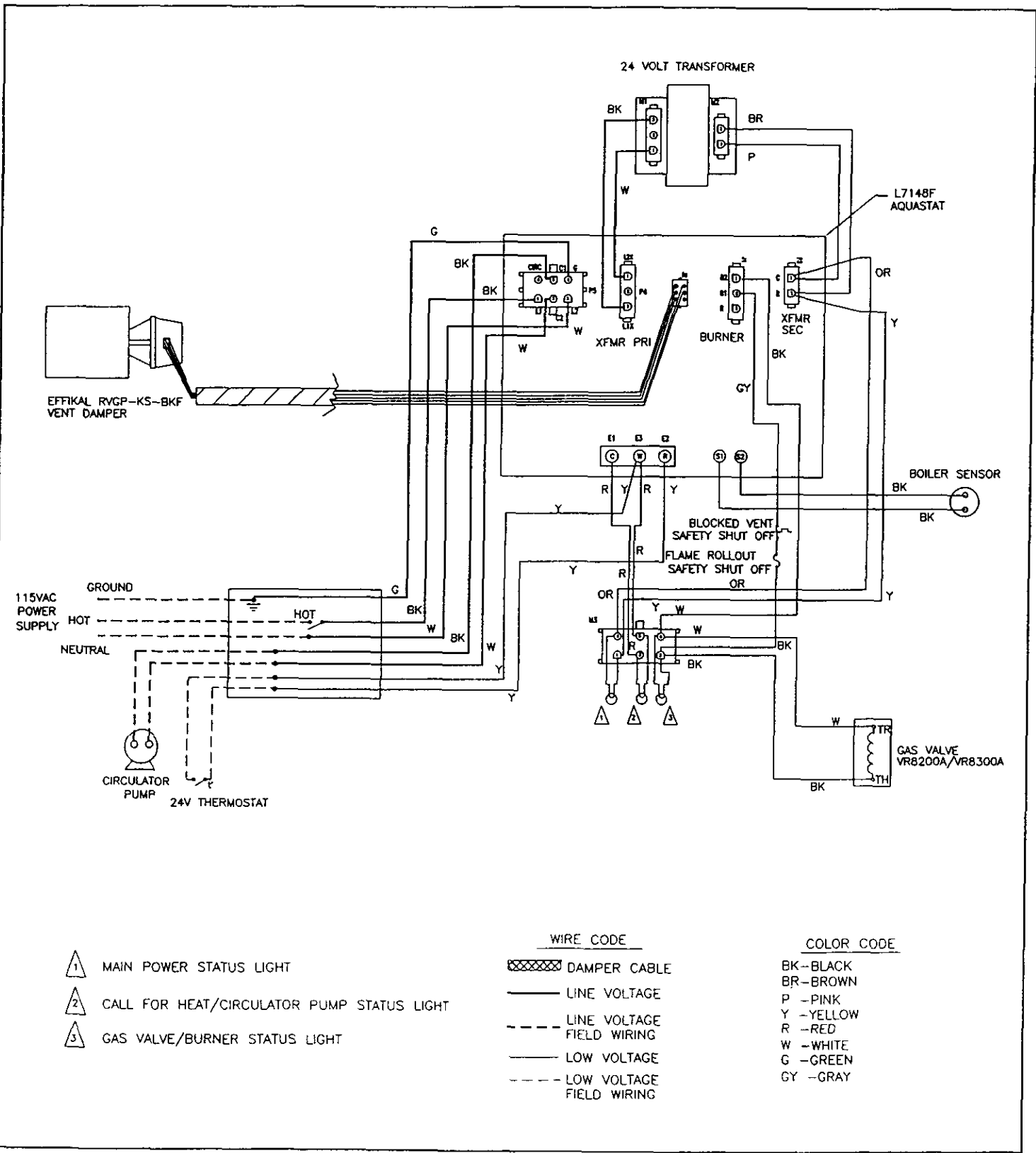
FIG. 13-1



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# SCHEMATIC WIRING DIAGRAM STANDING PILOT



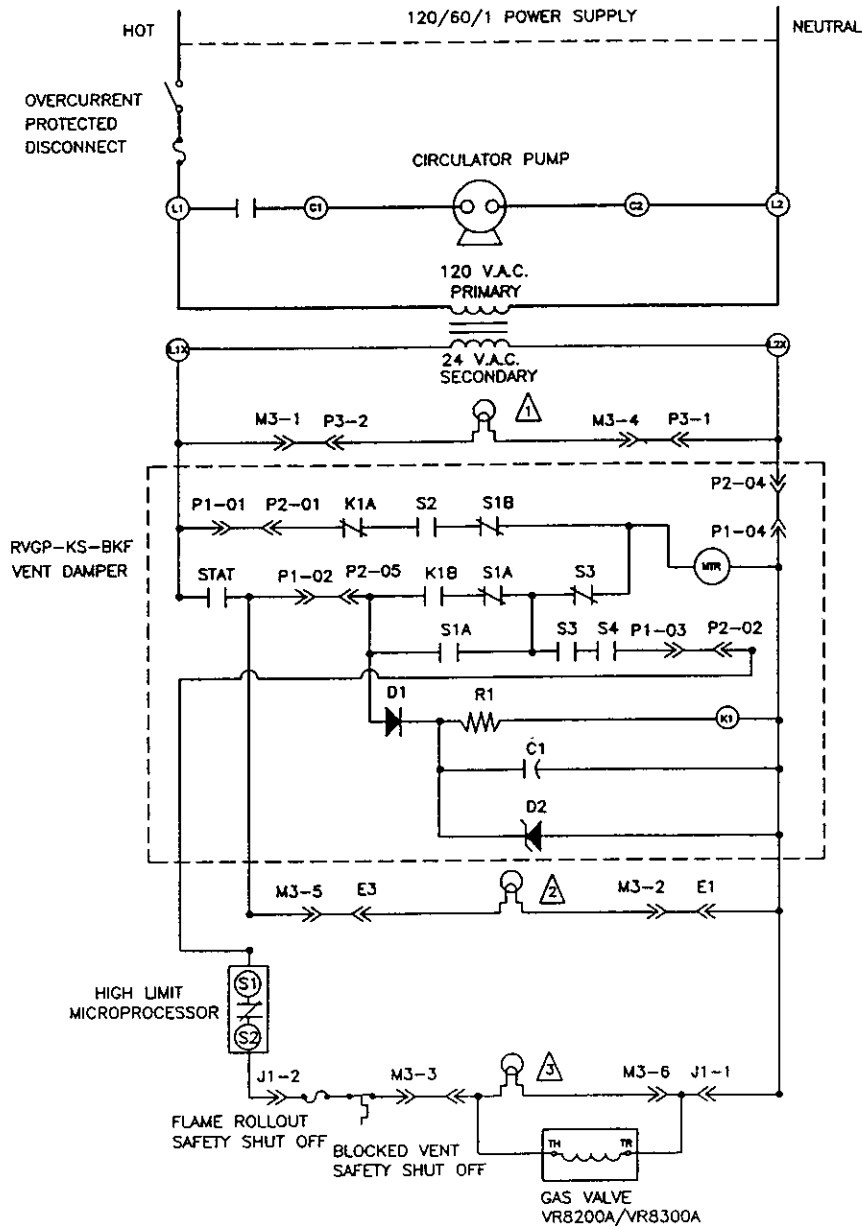
- 1 MAIN POWER STATUS LIGHT
- 2 CALL FOR HEAT/CIRCULATOR PUMP STATUS LIGHT
- 3 GAS VALVE/BURNER STATUS LIGHT

- WIRE CODE
- DAMPER CABLE
  - LINE VOLTAGE
  - LINE VOLTAGE FIELD WIRING
  - LOW VOLTAGE
  - LOW VOLTAGE FIELD WIRING

- COLOR CODE
- BK - BLACK
  - BR - BROWN
  - P - PINK
  - Y - YELLOW
  - R - RED
  - W - WHITE
  - G - GREEN
  - GY - GRAY

**IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THIS APPLIANCE MUST BE REPLACED, IT MUST BE REPLACE WITH TYPE 105° C THERMOPLASTIC WIRE OR IT'S EQUIVALENT**

# LADDER WIRING DIAGRAM STANDING PILOT



**NOTE:**

S1A AND S1B ARE THE AUTOMATIC OPERATION / HOLD DAMPER OPEN SWITCH. SWITCH SHOWN IN AUTOMATIC POSITION.  
S2, S3, AND S4 ARE CAM ACTUATED SNAP SWITCHES.

- 1 MAIN POWER STATUS LIGHT
- 2 CALL FOR HEAT/CIRCULATOR PUMP STATUS LIGHT
- 3 GAS VALVE/BURNER STATUS LIGHT

**IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THIS APPLIANCE MUST BE REPLACED, IT MUST BE REPLACE WITH TYPE 105° C THERMOPLASTIC WIRE OR IT'S EQUIVALENT**



# EQUIPMENT AND OPTIONAL ACCESSORIES

## RELIEF VALVE

You must have a relief valve on your boiler. Water expands as it is heated. If there is no place for the water to expand into, water pressure will build up inside the boiler and system. Should this happen, the relief valve will automatically open at a pre-determined pressure. This will relieve the strain on the boiler and system. Run a pipe from the relief valve outlet (pipe must be same size as outlet and the open end must not be threaded) to an open drain, tub or sink, or other suitable drainage point not subject to freezing. Failure to do so may cause water damage or injury should relief valve release.

## EXPANSION TANK

In a properly assembled system, the expanding water flows into a expansion tank. This tank should be of the correct size. The tank is filled with air. As the water expands it compresses the air in the tank to form an air pressure cushion. This "spring-like" cushion serves to maintain correct operating water pressure regardless of water temperature. This assures a "full measure" of a water, even in the highest radiation unit of the system. It also prevents blowing off of the relief valve. The air in the tank in the beginning (with system filled with cold water) is sufficient for proper operation. The tank also serves as a trap for excess air in the system. The air would cause gurgling in the pipes and inefficient circulation in the radiators if left in the system. It is possible for a tank to become "water-logged" (filled with water). It can also become overfilled with air. This can happen after filling the system with new water. Fittings provided on the tank and in the line to the tank are for bleeding off excess water or air. When installing this tank, it is important: 1) That the tank be higher than the boiler top. 2) That the pipe to the tank continuously rises up to the tank (so that air can "bubble" up to it).

## DIAPHRAGM TYPE EXPANSION TANK

The diaphragm type expansion tank (EX-TROL) takes the place of the conventional expansion tank. Carefully read the instructions packed with your EX-TROL tank assembly. The EX-TROL tank comes to you with a 10-12 pounds per square inch air charge. This is the same as the pressure produced in the system by the automatic fill valve. When the system is first filled, the EX-TROL tank will contain little or no water. As the water is heated its pressure increases. It expands into the EX-TROL tank, compressing the air in the tank. This compressed air cushion permits the water in the system to expand as the temperature changes. The diaphragm type tank can be mounted on the air purger fitting or at any convenient place in the supply or return line.

## AIR ELIMINATING FITTING (AIR PURGER)

An air purger is used to remove excess air from the system. It is installed in the supply line. It will eliminate air from the water before it reaches the radiators and bleed off this air.

## MAIN AIR VENT FOR DOWN FLOW SYSTEMS OR DIAPHRAGM TYPE EXPANSION TANK

Before a system is filled with water, there is air in the pipes and radiation units. Some of it will be trapped as the system is filled. It is possible to eliminate most of this air through the air vent on the radiation units. A main air vent will speed and simplify this. It should be installed on the highest point in the supply main when all radiation is below top of boiler.

## AUTOMATIC FILL VALVE

For safe, efficient operation, a hot water system must be **completely filled** with water. Adding new water, when needed can be done manually (by use of a hand valve in the water supply line). This requires regular attention to the system's needs. An automatic fill valve accomplishes this without attention. It is installed in the supply line on hot water boilers only. The valve operates through water pressure differentials. It does not require an electrical connection.

## DRAIN VALVE

This manual valve Provides a means of draining all water from the boiler and system. It is often installed in the 3/4" tapping at the bottom of the end boiler section. Or it can be installed in a tee where the return line enters the boiler.

## **CIRCULATING PUMP**

Every forced hot-water system requires a circulating pump. A separate pump or zone valve is required for each zone, if you have a two or more zone system. This pump must have the capacity to provide the circulation required by your system. The pump is connected into the return main just ahead of the boiler. It is also wired to the electrical system.

## **VENT DAMPER**

This product is an automatic, motorized stack damper that has been developed to increase the efficiency of heating systems by reducing standby losses from the heating apparatus and the conditioned air space. The damper closes the chimney vent when the burner is off and fully opens it when combustion is required.

## **L7148F ELECTRONIC AQUASTAT CONTROL**

The L7148F Electronic Aquastat Control is an immersion type hydronic controller that provides high limit protection and controls the circulator, gas valve and vent damper. The L7148F Control does not provide a low limit function. An external transformer (AT150-B), appropriately sized for this application; a sensor (209659A) and an immersion well are required for aquastat operation. The L7148F Electronic Aquastat Control has three states of operation: Normal, High-Limit, and Reset: (The control moves back and forth between the normal and high-limit states, as needed. However, the control only enters the reset state when there is an abnormal condition such as an internal error or shorted sensor). In the L7148F system, the circulator and burner are on any time there is a thermostat call for heat, unless the boiler water temperature exceeds the high limit setting. (The high-limit switch shuts off the burner (B1, B2 output) when the boiler water temperature exceeds the high limit setting). The water temperature limit control is adjustable and may be set as necessary. Turn the High-Limit dial on the control to the desired setting. It may be set as low as 130° F., 140° F. is recommended (refer to page 5 for "LOW DESIGN WATER TEMPERATURE SYSTEMS BELOW 140° F.") or as high as 240° F. (we recommend not to exceed 220° F., refer to page 19 "ADJUST LIMIT CONTROLS"). This depends on the type and amount of radiation involved and weather conditions.

## **ROLLOUT SWITCH (FLAME ROLLOUT SAFETY SHUTOFF)**

The rollout switch is a temperature-sensitive fuse link device. It is located on the boiler base just outside the fire box. In the event of heat exchanger flueway blockage causing flame to roll out of the fire box, the fuse does not change in appearance when blown. If the rollout switch blows, it must be replaced with an exact replacement. Check heat exchanger flueways for blockage when restoring system to operating condition. **DO NOT** operate system without a rollout switch.

## **SPILL SWITCH (BLOCKED VENT SAFETY SHUTOFF)**

The spill switch is a manual reset disc thermostat with a fixed setpoint (340° F), and normally closed contacts. It is located at the relief opening of the integral draft diverter. In the event of chimney or venting system blockage causing products of combustion to spill out of the relief opening, the spill switch disc heats up and the spill switch contacts open, shutting down the flow of gas to the main burners by removing power to the gas valve. In the event that the spill switch contacts open, the reset button on the back of the switch will pop up. The spill switch must be reset manually, after the switch has cooled off, by pushing the reset button down. Check the venting system and chimney for blockage when restoring the system to operating condition. **DO NOT** operate the boiler without a spill switch.

# STARTING YOUR BOILER

## HOW A HOT-WATER SYSTEM OPERATES

Your entire heating system (boiler, piping and radiation units) is filled with water. As the water in the boiler is heated, it is pumped from the top of the boiler through the supply main to the radiation units. The cooler water in them flows back through the return main to the boiler. This provides positive and rapid response to the thermostat.

## FILLING SYSTEM WITH WATER

Close the air vents on all radiation units. Open the valves to these units. Make sure the boiler and expansion tank drain cocks are closed. The air bleed screw on the tank drain fitting should be closed. Open the valve in the line from the boiler to the expansion tank. Open the water inlet to your boiler and leave it open. Start with the lowest radiation unit. Open the air vent on this unit. When all the air has escaped and water starts to flow from the vent, close it. Go to the next radiation unit, and repeat this process. Repeat until you have covered every radiation unit in the system (ending up at the highest unit in the system). If your units have automatic vents, this manual venting is unnecessary but it will speed up the proper filling of your system. If your system is a closed expansion tank system, you may leave it open to refill the system automatically as needed. Check the temperature pressure gauge. Note the position of the hand indicating pressure. This should be between 10 and 15 lbs. Any lowering of this movable hand below 10 lbs. will indicate loss of water due to leakage. The automatic fill valve should compensate for this. Instructions are packages with the valve.

**WARNING – Never run water into a hot empty boiler.**

# For Your Safety Read Before Operating

**WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.**

- A. Some boilers are equipped with an intermittent ignition device which automatically lights the pilot. Do **not** try to light the pilot by hand.

Some boilers are equipped with a continuous pilot and must be manually lighted. (See lighting instructions on page 21.) A match holder is included in the parts bag.

- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

#### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.

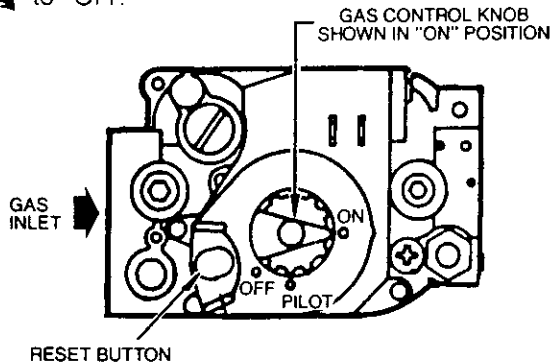
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

## Continuous Pilot Boiler – VR8200A/VR8300A Gas Valve Operating Instructions

1. STOP! Read the safety information on page 20
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. Remove lower front panel.
5. Rotate gas control knob slightly and turn clockwise to "OFF."



6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information on page 20. If you don't smell gas, go to next step.
7. Find pilot – follow metal tube from gas control. The pilot is between two burner tubes as shown in Fig. 14.
8. Turn knob on gas control counterclockwise to "PILOT."

9. Rotate the gas control knob counterclockwise to "PILOT." Push down and hold the red reset button while you light pilot burner with a match.

After about one minute, release reset button. Pilot should remain lit. If it goes out, turn gas control knob clockwise to OFF. To relight, repeat steps 5-9.

- If button does not pop up when released, stop and immediately call your service technician or gas supplier.
- If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.

10. After pilot remains lit when red reset button is released, turn gas control knob counterclockwise to "ON."
11. Replace lower front panel.
12. Turn on all electric power to the appliance.
13. Set thermostat to desired setting.

### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Push in gas control knob slightly and turn clockwise to "OFF." Do not force.

## Operating Your Boiler

### AUTOMATIC GAS VALVE

The Automatic Gas Valve opens or closes according to the heat requirements of the thermostat and temperature limit control. It closes if the pilot goes out. Each individual control must be operating correctly before any gas can pass to the burners. Any one control can hold the gas supply from burner regardless of the demand of any other control.

### SAFETY PILOT

Safety Pilot prevents the flow of gas to burner if the pilot goes out, or will not ignite.

### GAS VALVE SAFETY SHUTDOWN TEST

1. For boilers equipped with continuous pilot, with main burners firing, disconnect the thermocouple from the gas valve. The gas valve should immediately shut off the main burners and the pilot.
2. For boilers equipped with intermittent ignition, with main burners firing, disconnect the ignition cable from the intermittent pilot control box. The gas valve should shut off the main burners. TURN OFF ELECTRIC POWER to boiler before reconnecting ignition cable, to prevent electric shock.

### RELIGHT

The electric and gas shall be off for 5 minutes before relighting.

### THERMOSTAT

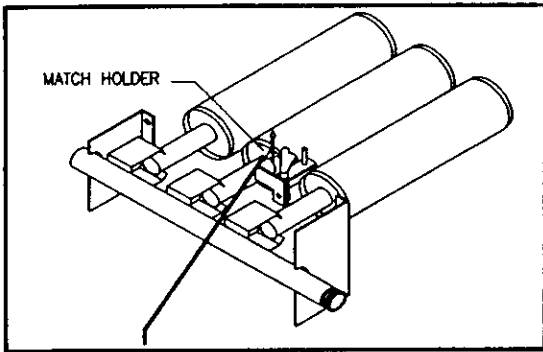
Keep it set at a desired room temperature. If windows are to be opened or heat is not needed, move thermostat pointer to a lower setting.

#### NOTE

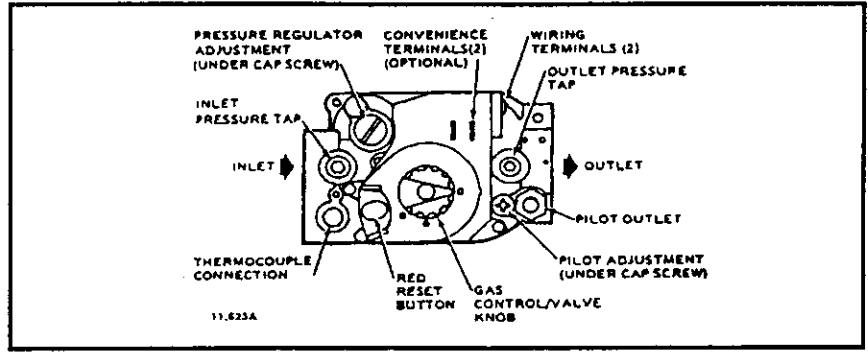
In the event of failure of any component, the system will not operate or will go into safety lockout. The system is completely self-checking. On every call for heat, each component must be functioning properly to permit operation. On safety lockout the system has to be reset by turning the thermostat to the lowest setting for one minute, then back to the normal setting.

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler when the boiler underwent tests specified in ANSI Z21.13 – latest revision.

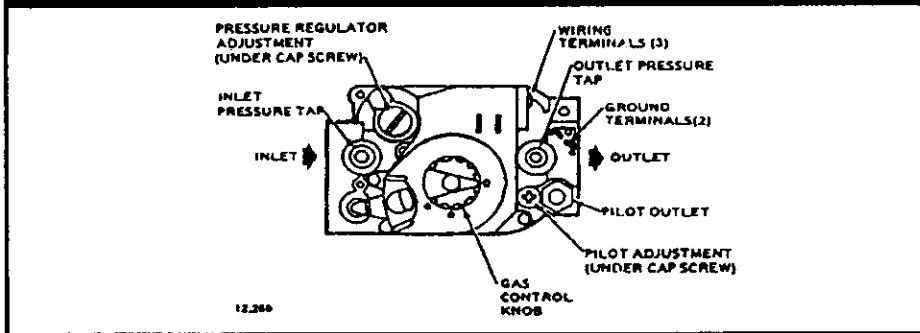
**FIG. 14 - LIGHTING PILOT**



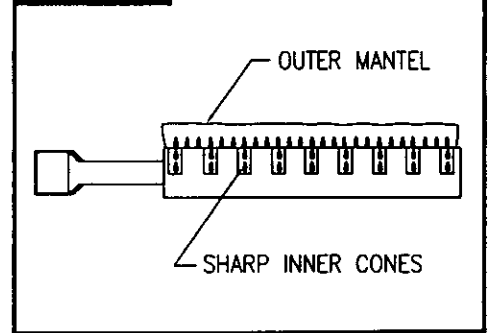
**FIG. 15 - VR8200A/VR8300A AUTOMATIC GAS VALVE**



**FIG. 16 - VR8204A/VR8304M AUTOMATIC GAS VALVE**



**FIG. 17**



## Checking and Adjusting

### ADJUST PILOT BURNER

Pilot flame should surround 3/8" to 1/2" of the pilot sensor. Refer to Fig. 18. If flame needs adjusting, do it as follows:

1. Remove screw cover over pilot adjusting screw.
2. Insert small screwdriver and adjust flame as needed. Turn screw counterclockwise to increase flame, clockwise to decrease.
3. Replace screw cover over pilot adjusting screw.

### MAIN BURNER(S)

The main burners do not require primary air adjustment and are not equipped with primary air shutters. Main burner flames should form sharp blue inner cones in a softer blue outer mantel, with no yellow. Puffs of air from blowing on the flame or stamping on the floor will cause the flames to turn orange momentarily. This is not unusual. Remain still when observing the main burner flames. If the flame appearance is not correct, check main burner orifices and the burner throat and flame ports for dust and lint obstruction. It may be necessary to remove the rollout shield to observe the main burner flames. Replace rollout shield after observation. Refer to Figure 17.

### ADJUST LIMIT CONTROLS

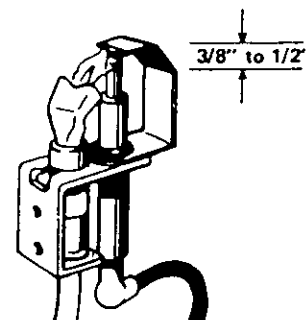
Instructions for each control are included with the controls. These settings can be changed after you have had some

idea how the system works. Example: If your system does not give quite enough heat in very cold weather, you can raise the limit setting to 220° F. Use the boiler gauge to check your settings. Make the adjustments according to its readings. Check thermostat operation. When set above temperature indicated on the thermometer, boiler should ignite. Make certain the thermostat turns off the boiler when room temperature reaches the selected setting and starts the boiler operating when room temperature falls a few degrees.

After setting limit control to limit setting, check to see if it shuts off the gas supply to the burners. Turn your thermostat up to call for heat and let your boiler run until the temperature of the water reaches the limit setting. The gas valve should shut off and the circulator keep running until the thermostat is satisfied, or the water cools enough to restart the burners through the limit control.

Finally, set the thermostat for the desired temperature. Special conditions in your home and the location of the thermostat will govern this setting.

**FIG. 18**



### RECOMMENDED BOILER WATER TEMPERATURES

| Type of Heating Unit              | Limit Control Setting |
|-----------------------------------|-----------------------|
| Standing Radiators                | 180° F.               |
| Baseboard and Convector Radiators | 200° F.               |

# Maintaining Your Boiler

## BURNERS

A visual check of the pilot and main burner flames should be made at least once each year, preferably at the beginning of the heating season. See page 22

## RELIEF VALVE

This valve should open automatically if the system pressure exceeds the pressure rating (usually 30 psi) of the relief valve. Should it ever fail to open under this condition, shut down your system. Drain the system until system pressure is reduced below the relief valve pressure rating. If valve discharge occurs, or if valve fails to open as described above, contact an authorized contractor or qualified service technician to replace the relief valve and inspect the heating system to determine the cause, as this may indicate an equipment malfunction.

This valve should be tested every month during periods of boiler operation, and at the beginning and end of any extended non-service period. Prior to testing, make certain discharge pipe is properly connected to valve outlet and arranged so as to contain and safely dispose of boiler discharge. Test at normal system operating pressure. Hold the trip lever fully open for at least five seconds in order to flush free any sediment that may lodge on the valve seat. Then permit the valve to snap shut.

## EXPANSION TANK

As previously noted, this tank may become waterlogged, or may receive an excess of air. Frequent automatic opening of the relief valve indicates water logging. A high boiler temperature accompanied by unusually low radiation unit temperature (and "knocking") indicates excess air in tank.

To correct either condition, close the valve between the boiler and the tank. Drain the tank until it is empty. Check all the tank plugs and fittings. Tighten as necessary. Open the valve between the boiler and tank. Water will rise to the normal height in the tank if you have an automatic fill valve (otherwise, manually refill the system).

## BOILER FLUE PASSAGES

Under normal operating conditions, with the burners properly adjusted, it should not be necessary to clean the boiler flue gas passages. However, to assure trouble-free operation, we recommend that you have the flue passages, burner adjustment, and operation of the controls checked *once each year* by a competent Service Technician.

*Before the start of each season* (or whenever system has been shut down for some time) recheck the whole system for leaks . . . and recheck the boiler and vent pipe for leaks. Replace or patch any boiler seals that are faulty.

## VENT PIPE

**The venting of this unit is very important and the piping should be checked at least once a season. If the vent piping shows any sign of leaking, replace it immediately.**

## WATER SYSTEM

If system is to remain out of service during freezing weather, always **drain it** completely (water left in to freeze will crack the pipes and/or boiler).

## CLEANING YOUR BOILER AND BURNERS

Flue passages between sections should be examined yearly and cleaned if necessary. To clean, remove burners, pilot, and vent pipe. Remove top and front jacket panels. Remove the two screws attaching the intermediate front panel to the left and right side jacket panels. Remove the draft diverter and intermediate front panel as a unit. Carefully remove the cerafelt gasket strips. Clean passageways between sections with a flexible handle wire brush. Remove dirt from bottom of boiler and from between sections by vacuuming. Make sure all flame ports in burners are open and clear. Shake out or blow out all loose dirt in burners. Reseal seams between adjacent sections as necessary with 400 F RTV silicone sealant. Reassemble all parts. Be sure to check tightness of pilot connections and condition of burner flames after reassembly (see Figures 17 and 18). Be sure vent pipe connections to chimney are secure and no obstructions are present.

## SEQUENCE OF OPERATION

### PWX WITH STANDING PILOT:

Thermostat calls for heat, completing the circuit to the aquastat and gas valve. The sequence is as follows: The LED light indicating a call for heat and circulator, in the control panel, will illuminate. The automatic vent damper will begin to open. When the vent damper is completely open and the end switches are made, the gas valve / burner LED light will illuminate and the main valve will open, lighting all the burners. The burners will continue to fire until either the thermostat or high limit, in the aquastat, is satisfied. If the high limit is satisfied and a call for heat remains from the thermostat, the main valve will close, shutting off gas supply to the burners and the associated LED light in the control panel. The circulator will continue to operate and circulator LED light will remain on until the thermostat is satisfied.

Please note the main power LED light, in the control panel, will remain on until line voltage to the boiler is turned off or disconnected.

## TROUBLE SHOOTING

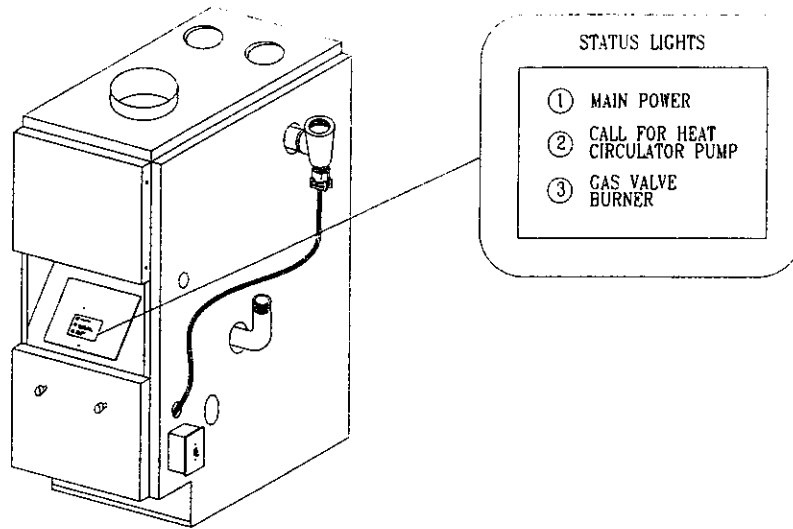
### INITIAL SERVICE CHECKS

1. BEFORE TROUBLESHOOTING:
  - A. MAKE SURE THAT CIRCUIT BREAKER IS ON OR FUSE IS OK AT ELECTRICAL PANEL.
  - B. MAKE SURE THAT SERVICE SWITCH IS ON.
  - C. MAKE SURE THAT GAS IS ON AT THE GAS METER, AND THAT ALL APPROPRIATE MANUAL SHUTOFF VALVES AND GAS CONTROL VALVE ARE OPEN.
  - D. MAKE SURE THAT THE THERMOSTAT IS CALLING FOR HEAT.
  - E. CHECK THAT WIRE CONNECTORS AT THE L7148F CONTROL, TRANSFORMER AND S8600 CONTROL (IF USED) ARE SECURELY PLUGGED IN OR CONNECTED.
  
2. TROUBLESHOOTING TOOLS:
  - A. VOLTMETER TO CHECK 120 VAC AND 24 VAC.
  - B. CONTINUITY TESTER.
  - C. U-TUBE MANOMETER OR DIFFERENTIAL PRESSURE GAUGE WITH 0-14" RANGE (0.1" SCALE) FOR MEASURING INLET AND MANIFOLD GAS PRESSURES.
  
3. WHAT IS SYSTEM STATUS ?
  - A. CONSULT THE CHART ON THE FOLLOWING PAGE.
  - B. FIGURE 19 ON PAGE 25 SHOWS THE LOCATION ON THE BOILER OF THE SYSTEM STATUS LIGHTS.



# TROUBLE SHOOTING

FIG.19



### SYSTEM STATUS

| LIGHT                             | STATUS | INDICATES  |
|-----------------------------------|--------|--|
| POWER                             | ON     | L7148F CONTROL ENERGIZED THROUGH 24 VOLT TRANSFORMER.        |
|                                   | OFF    | L7148F CONTROL NOT ENERGIZED.                                |
| CALL FOR HEAT/<br>CIRCULATOR PUMP | ON     | L7148F CONTROL ENERGIZING CIRCULATOR PUMP CIRCUIT.           |
|                                   | OFF    | CIRCULATOR PUMP IS NOT ENERGIZED.                            |
| GAS VALVE / BURNER                | ON     | L7148F CONTROL ENERGIZING GAS CONTROL VALVE (GAS VALVE OPEN) |
|                                   | OFF    | GAS VALVE NOT ENERGIZED (GAS VALVE CLOSED)                   |

### L7148F CONTROL LED ERROR CODES

| LIGHT                          | STATUS     | INDICATES   |
|--------------------------------|------------|---|
| <b>L7148F LED STATUS LIGHT</b> | ON         | L7148F CONTROL ENERGIZED FULLY FUNCTIONAL.        |
|                                | OFF        | L7148F CONTROL NOT ENERGIZED.                     |
|                                | (2) BLINKS | SENSOR ERROR (SHORTED OR OPEN SENSOR).            |
|                                | (3) BLINKS | ANALOG TO DIGITAL ERRORS (SET-POINT POT FAILURE). |
|                                | (4) BLINKS | RELAY FAILURE (CONTROL FAILURE)                   |

## TROUBLE SHOOTING

| SYMPTOM   | POSSIBLE CAUSE  | ACTION   |
|---|---|--|
| Boiler is cold.   | No Power.   | Check for 120V at L1X, L2X   |
|   |   | Check all wiring and cable connections.  |
|   |   | Check the circuit breaker or fuse and, if necessary, reset or replace.   |
|   | Defective Thermostat or thermostat wiring.                                    | Short the W, R terminals on the L7148F Aquastat Control. If the system starts, check the thermostat and low voltage wiring.  |
|   | Defective transformer.  | Check for 24V at R, C. If no voltage, replace the transformer.   |
|   | Defective Ignition module.  | Check for 24V at the ignition system and vent damper and check all wiring connections. If voltage is present at the ignition system, replace the ignition system. If no voltage is present at the ignition system, but 24V is present at the vent damper, replace the vent damper. |
| L7148F Aquastat Control malfunction when used with vent damper.   | Vent damper is not connected.   | Verify proper connection at the vent damper and L7148F Aquastat control.   |
| L7148F Aquastat Control in reset mode.  | L7148F Aquastat Control detects an error.                                     | Verify proper Sensor connections at the immersion well and L7148F Aquastat Control.  |
|   |   | Check if the boiler water temperature is below the limit setting.  |
|   |   | NOTE: The L7148F Aquastat Control may remain in reset mode 30 minutes after the error condition is corrected. To reset immediately, remove power, and then restore power.  |
| L7148F Aquastat Control high limit switch shuts off the boiler before the water temperature reaches the high limit setting. | Incorrect sensor location.  | Follow the boiler manufacturer recommendations for proper location.  |
|   | L7148F Aquastat Control temperature setting is below the desired temperature. | Reset the potentiometer to the correct temperature.  |
|   | Defective sensor.   | Check for shorted or open sensor and/or leads.   |
|   |   | Temporarily replace existing sensor with new sensor. If system starts, replace the sensor.   |
|   | Defective L7148F Aquastat Control.  | Replace the L7148F Aquastat Control.   |
| Boiler is too hot   | Incorrect temperature setting.  | Adjust the potentiometer to the proper temperature setting.  |
|   | Sensor not fully inserted into well.  | Reinsert the sensor fully into the well.   |
|   | Defective L7148F Aquastat Control.  | Replace the L7148F Aquastat Control.   |

# Service Hints

You may avoid inconvenience and service calls by checking these points before you call for service.

## FOR YOUR SAFETY WHAT TO DO IF YOU SMELL GAS

1. Do Not try to light any appliance.
2. Do not touch any electric switch, do not use the phone.
3. Leave the building immediately, then call your gas supplier.
4. If you cannot reach the gas supplier, call the fire department.

### IF YOUR SYSTEM IS NOT HEATING OR NOT GIVING ENOUGH HEAT . . .

| Possible Cause  | What to do  |
|---|---|
| Thermostat is not set correctly<br>Burner is not operating properly             | Reset thermostat above room temperature.<br>Check flame. If it is yellow, the burner is not getting enough air. Or, if flame is blue and noisy and seems to lift off the burner, the burner is getting too much air. Contact your service technician. |
| No electric power to boiler   | Check overcurrent protection. Check to be sure electric power supply circuit is "ON."   |
| Controls out of adjustment<br>Radiators not heating                             | Reset according to instructions.<br>Open radiator vents to vent excess air. Check flow control valve (if used). It may be in closed position.   |
| Circulating pump not running<br>Poor electrical contact<br>Rollout switch blown | Check overcurrent protection. Check relay operation.<br>Check all control terminals and wire joints.<br>Have your service technician check heat exchanger for blockage. Replace rollout switch with exact replacement.                                |
| Spill switch blown  | Have your service technician check venting system and chimney for blockage, or down draft condition. Reset spill switch.  |
| Vent damper not operating   | Consult troubleshooting guide in Effikal manual, packaged with vent damper.   |

### IF BURNER IS NOISY . . .

| Possible Cause                | What to do                       |
|-------------------------------|----------------------------------|
| Gas input amount is incorrect | Contact your service technician. |

### RELIEF VALVE LEAKING . . .

| Possible Cause                              | What to do   |
|---|--|
| Dirt on seat<br>Water logged expansion tank | Open valve manually. Allow water to run and clear valve seat.<br>Drain tank, see instructions. |

**HAVE YOUR SERVICE TECHNICIAN CHECK ANY PROBLEM YOU ARE UNABLE TO CORRECT.**

# REPAIR PARTS

## GAS-FIRED HOT WATER BOILERS

### - IMPORTANT - READ THESE INSTRUCTIONS BEFORE ORDERING

All parts listed in the following Parts List may be ordered through your nearest supplier. When ordering parts, first obtain the model number from the data plate on your boiler, then determine the Part Number (not the Key No.) and the Description of each part from the following illustrations and list. Be sure to give us all this information:

The Part No. – The Part Description – The Boiler Model No.

### JACKET – SECTION AND BASE PARTS

#### THIS IS A REPAIR PARTS LIST – NOT A PACKING LIST

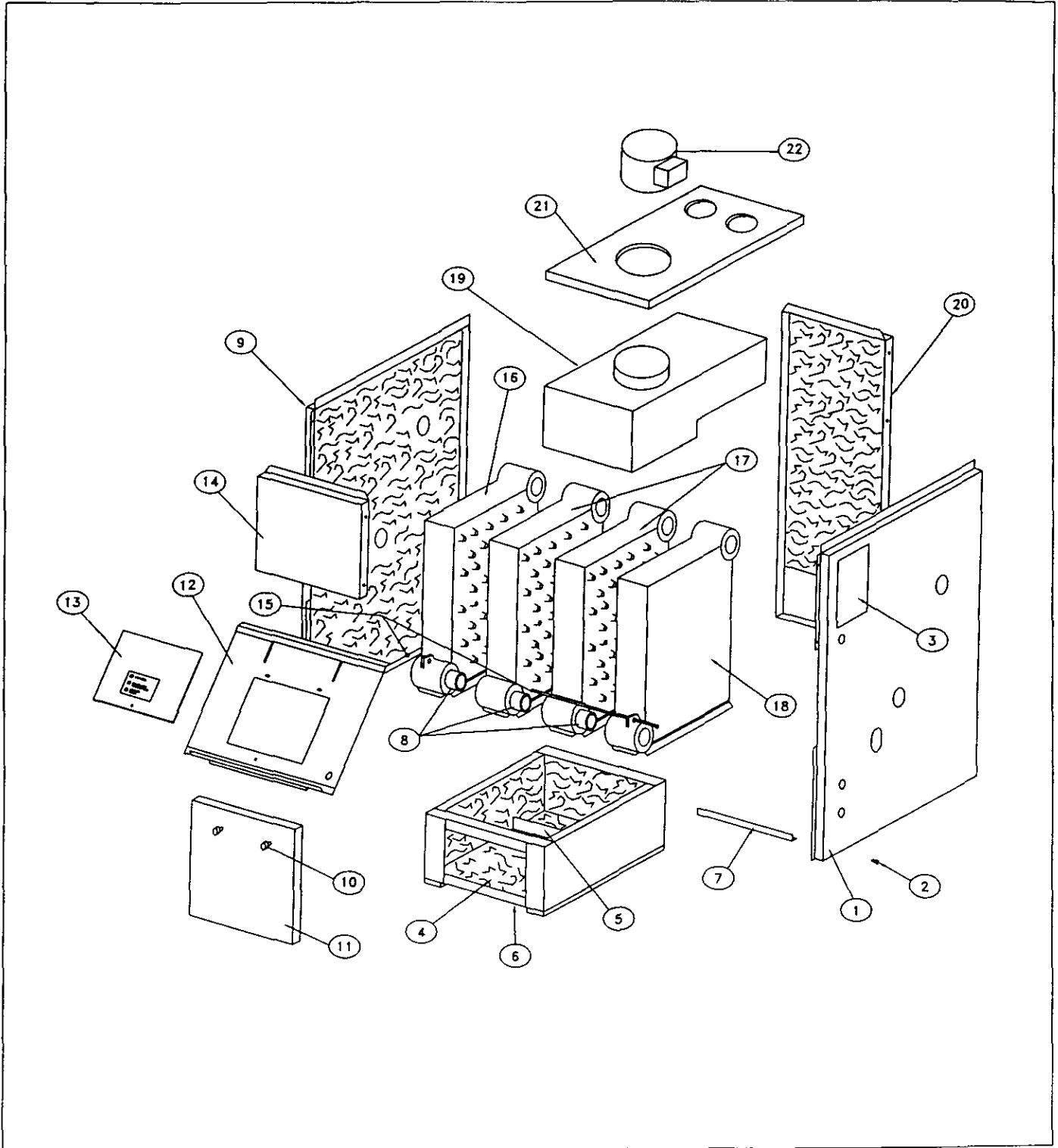
| KEY NO. | DESCRIPTION                      | NATURAL GAS           |                       |                       |                       |                       |                       |                       |
|---------|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|         |                                  | 3 SECTION<br>PART NO. | 4 SECTION<br>PART NO. | 5 SECTION<br>PART NO. | 6 SECTION<br>PART NO. | 7 SECTION<br>PART NO. | 8 SECTION<br>PART NO. | 9 SECTION<br>PART NO. |
| 1       | Jacket, Right Side Panel         | 735001050             | 735001050             | 735001050             | 735001050             | 735001050             | 735001050             | 735001050             |
| 2       | #10 x 1/2" Sheet Metal Screw     | 14695074              | 14695074              | 14695074              | 14695074              | 14695074              | 14695074              | 14695074              |
| 3       | Rating Plate                     | 14694016              | 14694016              | 14694016              | 14694016              | 14694016              | 14694016              | 14694016              |
| 4       | Base Insulation - Base Sides (2) | 14614130              | 14614130              | 14614130              | 14614130              | 14614130              | 14614130              | 14614130              |
|         | - Base Front                     | 14614113              | 14614114              | 14614115              | 14614116              | 14614117              | 14614118              | 14614119              |
|         | - Base Rear                      | 14614123              | 14614124              | 14614125              | 14614126              | 14614127              | 14614128              | 14614129              |
| 5       | Base Baffle                      | 42500643              | 42500644              | 42500645              | 42500646              | 42500647              | 42500648              | 42500649              |
| 6       | Base                             | 42500663              | 42500664              | 42500665              | 42500666              | 42500667              | 42500668              | 42500669              |
| 7       | Jacket Tie Bar                   | 42500653              | 42500654              | 42500655              | 42500656              | 42500657              | 42500658              | 42500659              |
| 8       | Push Nipple                      | 43300976              | 43300976              | 43300976              | 43300976              | 43300976              | 43300976              | 43300976              |
| 9       | Jacket, Left Side Panel          | 735001040             | 735001040             | 735001040             | 735001040             | 735001040             | 735001040             | 735001040             |
| 10      | Knob, Service Door (pair)        | 13702153              | 13702153              | 13702153              | 13702153              | 13702153              | 13702153              | 13702153              |
| 11      | Jacket Service Door              | 42500913              | 42500914              | 42500915              | 42500916              | 42500917              | 42500918              | 42500919              |
| 12      | Jacket Intermediate Panel        | 735001073             | 735001074             | 735001075             | 735001076             | 735001077             | 735001078             | 735001079             |
| 13      | Jacket Cover Panel               | 735001070             | 735001070             | 735001070             | 735001070             | 735001070             | 735001070             | 735001070             |
| 14      | Jacket Front Panel               | 42500811              | 42500804              | 42500805              | 42500806              | 42500807              | 42500808              | 42500809              |
| 15      | 1/4" Tie Rod and Nut             | 14605001              | 14605002              | 14605051              | 14605053              | 14605005              | 14605007              | 14605009              |
| 16      | Boiler Section, Left End         | 41000020              | 41000020              | 41000020              | 41000020              | 41000020              | 41000020              | 41000020              |
| 17      | Boiler Section, Middle           | 41000022              | 41000022              | 41000022              | 41000022              | 41000022              | 41000022              | 41000022              |
| 18      | Boiler Section, Right End        | 41000021              | 41000021              | 41000021              | 41000021              | 41000021              | 41000021              | 41000021              |
| 19      | Draft Diverter                   | 42500673              | 42500674              | 42500675              | 42500676              | 42500677              | 42500678              | 42500679              |
| 20      | Jacket Back Panel                | 42500903              | 42500904              | 42500905              | 42500906              | 42500907              | 42500908              | 42500909              |
| 21      | Jacket Top Panel                 | 42500843              | 42500844              | 42500845              | 42500846              | 42500847              | 42500848              | 42500849              |
| 22      | Vent Damper                      | 14628001              | 14628002              | 14628002              | 14628003              | 14628003              | 14628003              | 14628003              |
| ++      | Jacket Complete                  | 42500943              | 42500944              | 42500945              | 42500946              | 42500947              | 42500948              | 42500949              |
| ++      | Block Assembly                   | 41000313              | 41000413              | 41000513              | 41000613              | 41000713              | 41000813              | 41000913              |
| ++      | Combustible Floor Plate          | 14614031              | 14614031              | 14614031              | 14614031              | 14614032              | 14614032              | 14614032              |
| ++      | Base Assembly                    | 41000313              | 41000413              | 41000513              | 41000613              | 41000713              | 41000813              | 41000913              |
| **      | Cerafelt Gasket                  | 14614018              | 14614018              | 14614018              | 14614018              | 14614018              | 14614018              | 14614018              |

++ NOT ILLUSTRATED

\*\* LOCATED AT THE BASE AND BLOCK ASSEMBLY TOP

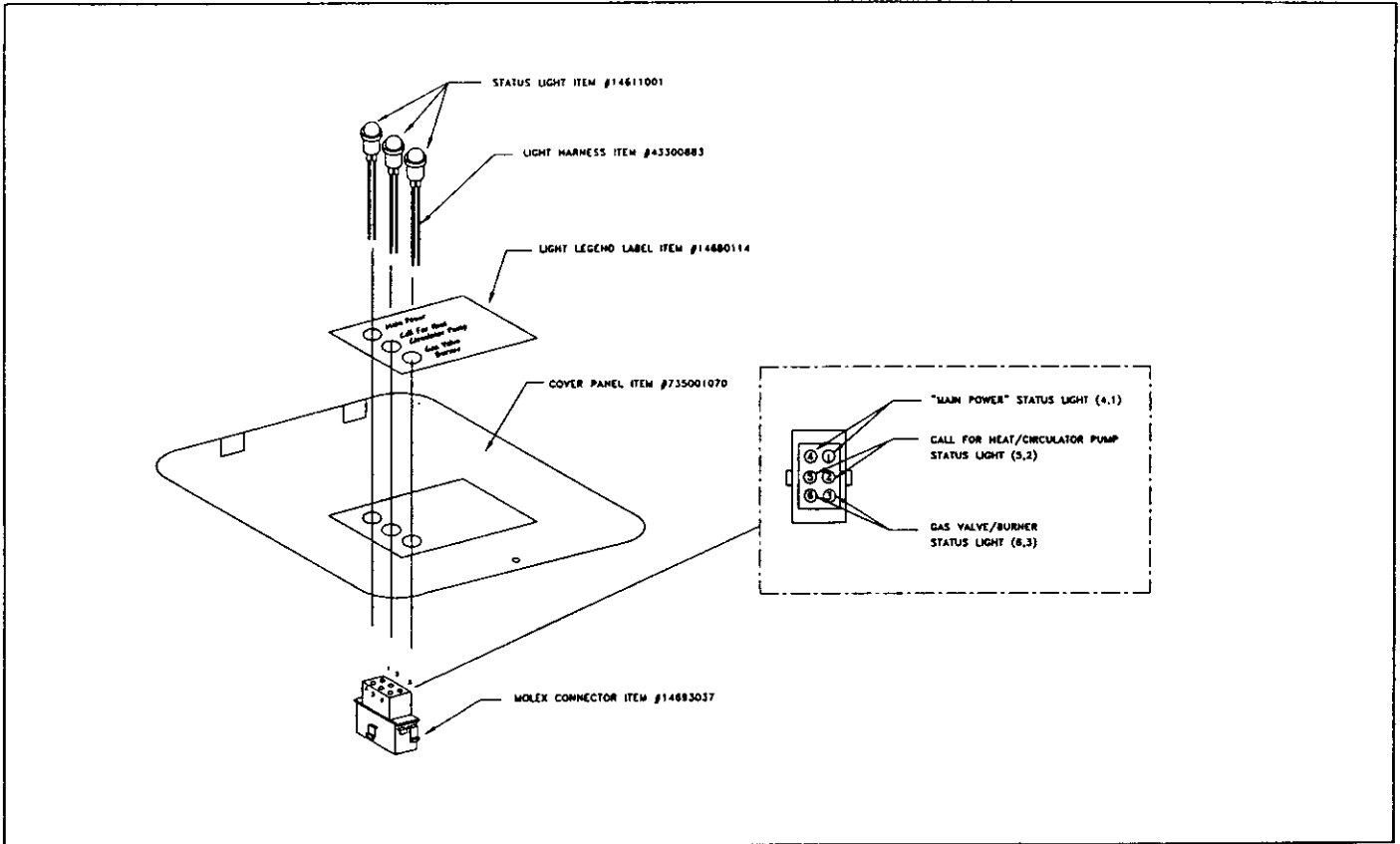
# REPAIR PARTS CONTINUED

## JACKET - SECTION AND BASE PARTS

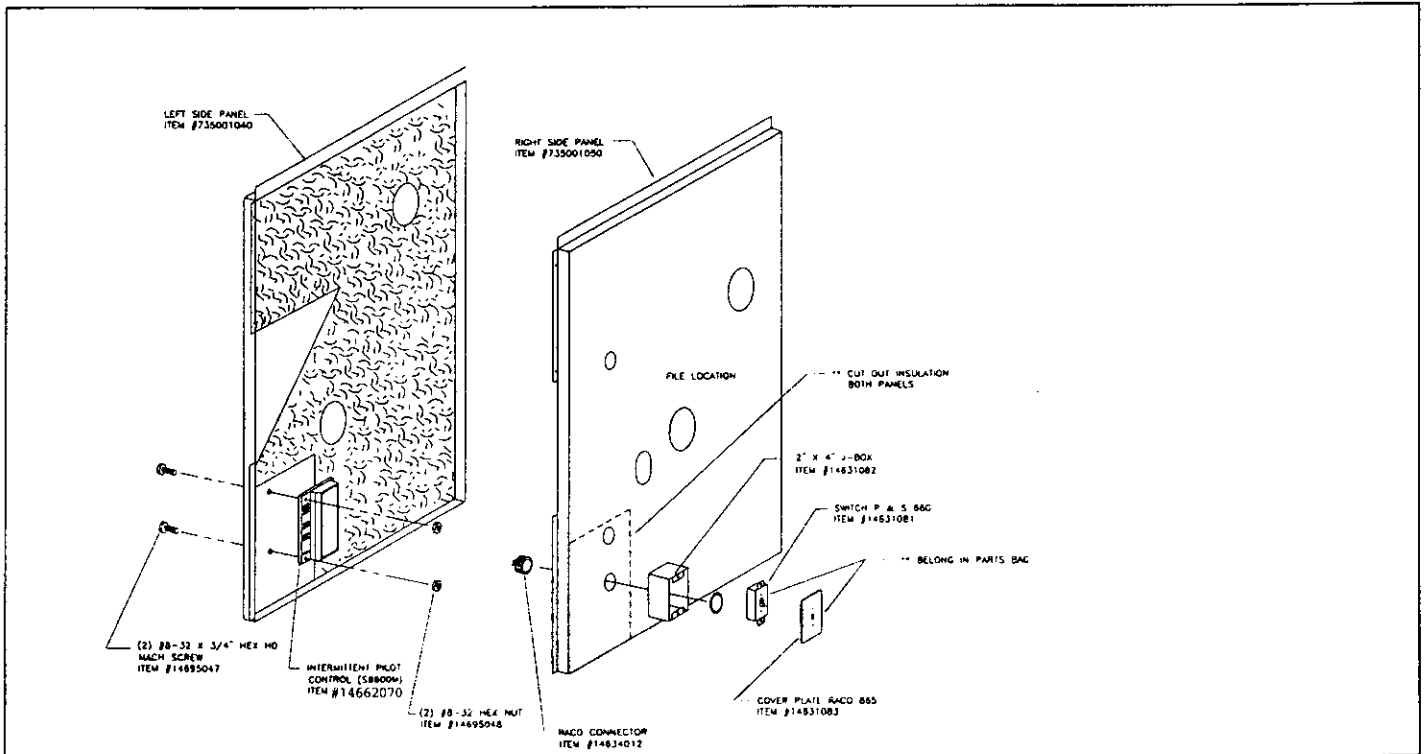


# REPAIR PARTS CONTINUED

## LED & COVER PANEL ASSEMBLY

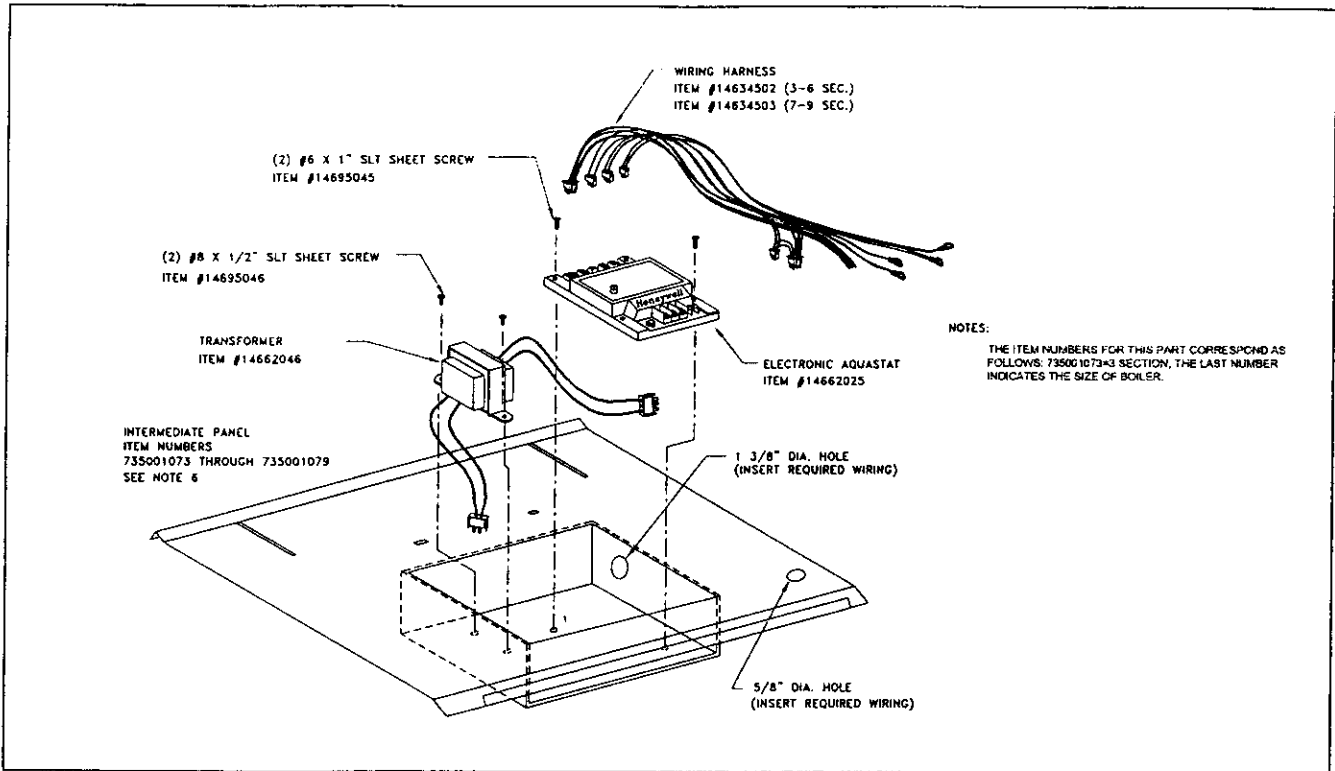


## JACKET PARTS

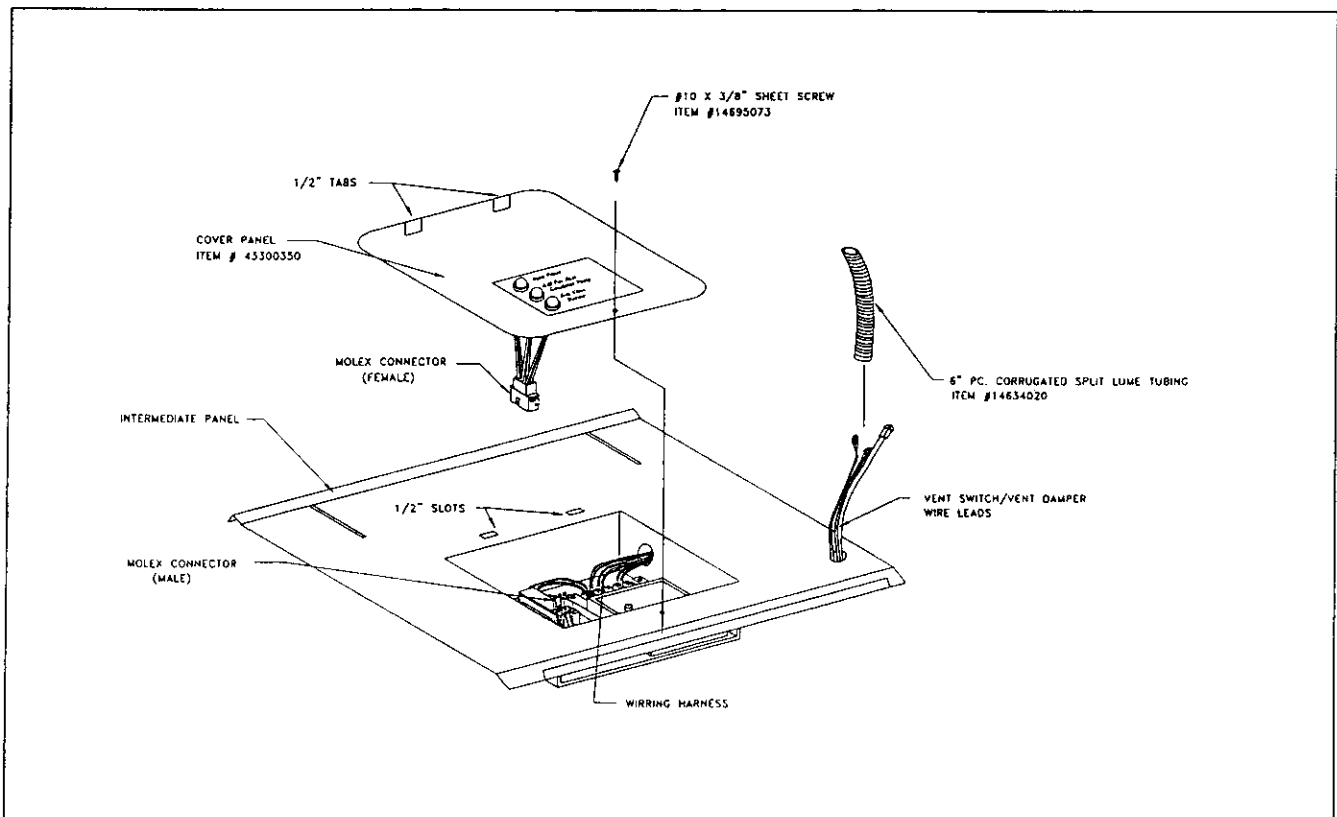


# REPAIR PARTS CONTINUED

## CONTROL BOX ASSEMBLY

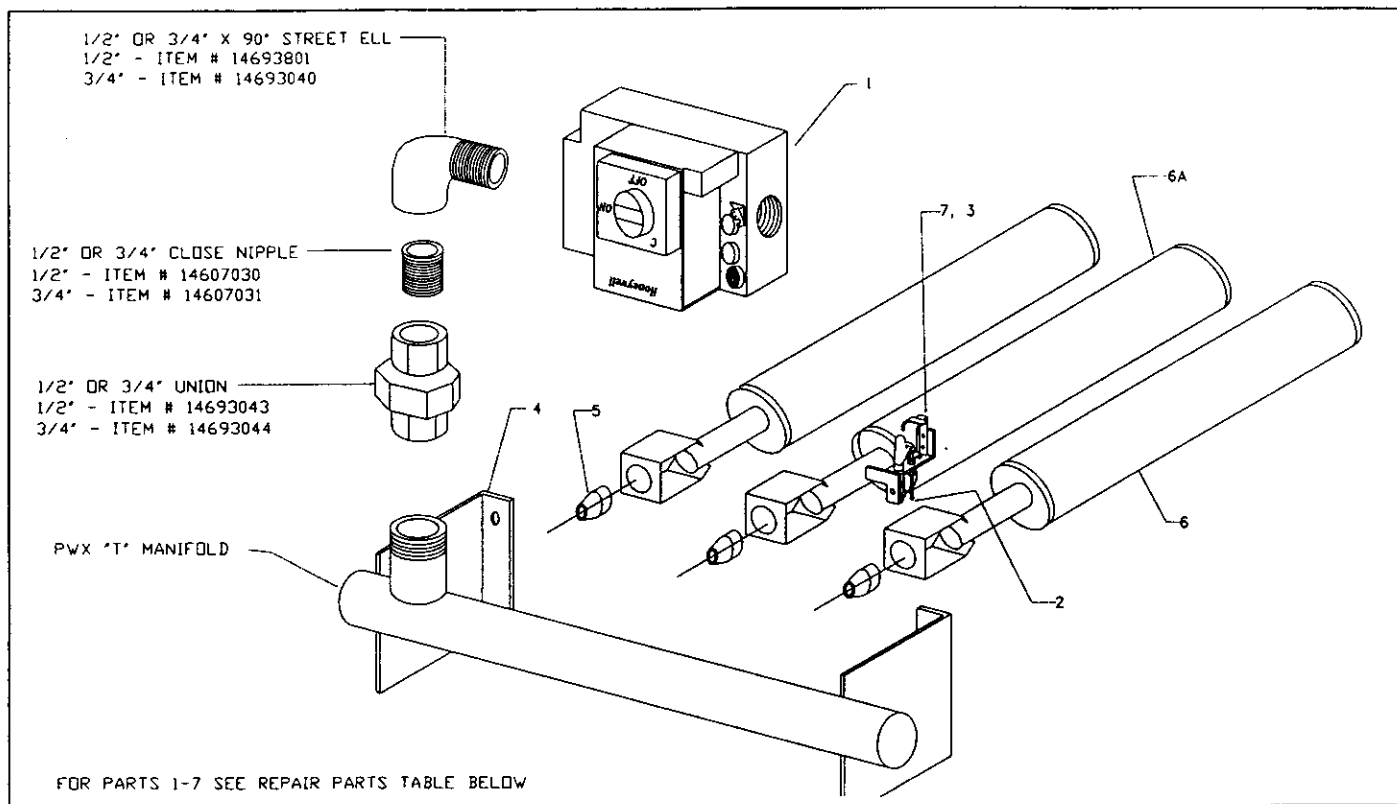


## COVER PANEL / CONTROL BOX ASSEMBLY



# REPAIR PARTS CONTINUED

## GAS TRAIN - NATURAL



## NATURAL GAS BURNER AND MANIFOLD ASSEMBLY

| KEY NO. | DESCRIPTION                          | NATURAL GAS |            |            |            |            |            |            |            |
|---------|--------------------------------------|-------------|------------|------------|------------|------------|------------|------------|------------|
|         |                                      | 3 SECTION   | 4 SECTION  | 5 SECTION  | 6 SECTION  | 7 SECTION  | 8 SECTION  | 9 SECTION  |            |
|         |                                      | Part No.    | Part No.   | Part No.   | Part No.   | Part No.   | Part No.   | Part No.   | Part No.   |
| 1       | Gas Valve                            | 146-62-051  | 146-62-051 | 146-62-051 | 146-62-060 | 146-62-060 | 146-62-060 | 146-62-060 | 146-62-060 |
| 2       | Pilot Tube                           | 146-15-005  | 146-15-005 | 146-15-005 | 146-15-005 | 146-15-005 | 146-15-006 | 146-15-006 | 146-15-006 |
| 3       | 10-32 x 1/2" Hex HD. Screw (2 req'd) | 146-95-307  | 146-95-307 | 146-95-307 | 146-95-307 | 146-95-307 | 146-95-307 | 146-95-307 | 146-95-307 |
| 4       | Gas Manifold                         | 146-16-100  | 146-16-101 | 146-16-102 | 146-16-103 | 146-16-104 | 146-16-105 | 146-16-106 | 146-16-106 |
| 5       | Main Burner Orifice**                | 146-15-031  | 146-15-031 | 146-15-031 | 146-15-035 | 146-15-035 | 146-15-035 | 146-15-035 | 146-15-035 |
| 6       | Main Burner Less Pilot Bracket*      | 146-15-532  | 146-15-532 | 146-15-532 | 146-15-532 | 146-15-532 | 146-15-532 | 146-15-532 | 146-15-532 |
| 6A      | Main Burner With Pilot Bracket       | 146-15-531  | 146-15-531 | 146-15-531 | 146-15-531 | 146-15-531 | 146-15-531 | 146-15-531 | 146-15-531 |
| 7       | Pilot Burner                         | 146-62-098  | 146-62-098 | 146-62-098 | 146-62-098 | 146-62-098 | 146-62-098 | 146-62-098 | 146-62-098 |
| ++      | Rollout Shield                       | 425-00-933  | 425-00-934 | 425-00-935 | 425-00-936 | 425-00-937 | 425-00-938 | 425-00-939 | 425-00-939 |
| ++      | Thermocouple                         | 146-62-037  | 146-62-039 | 146-62-039 | 146-62-039 | 146-62-039 | 146-62-036 | 146-62-036 | 146-62-036 |

Note: \* Quantity required = 2 less than the number of sections.

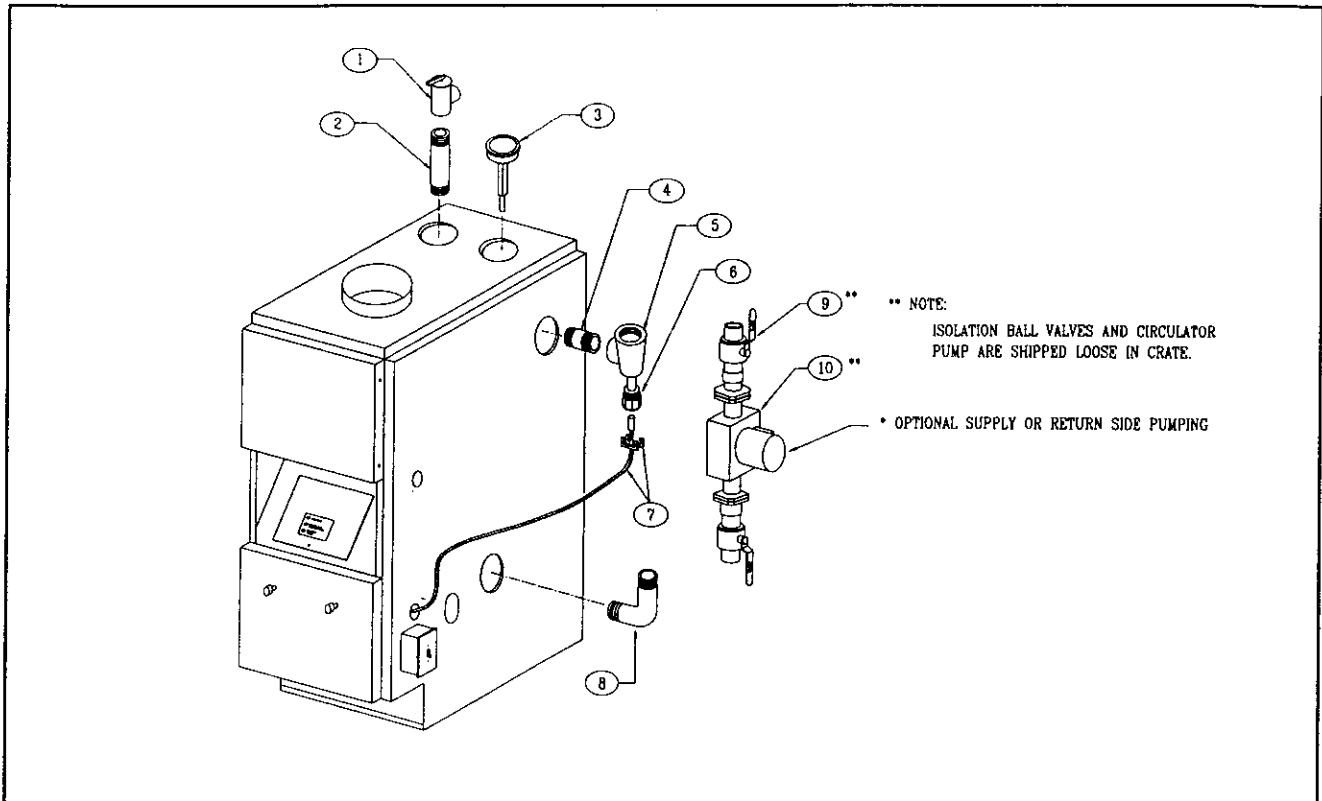
\*\* Quantity required = 1 less than the number of sections.

++ Not illustrated



# REPAIR PARTS CONTINUED

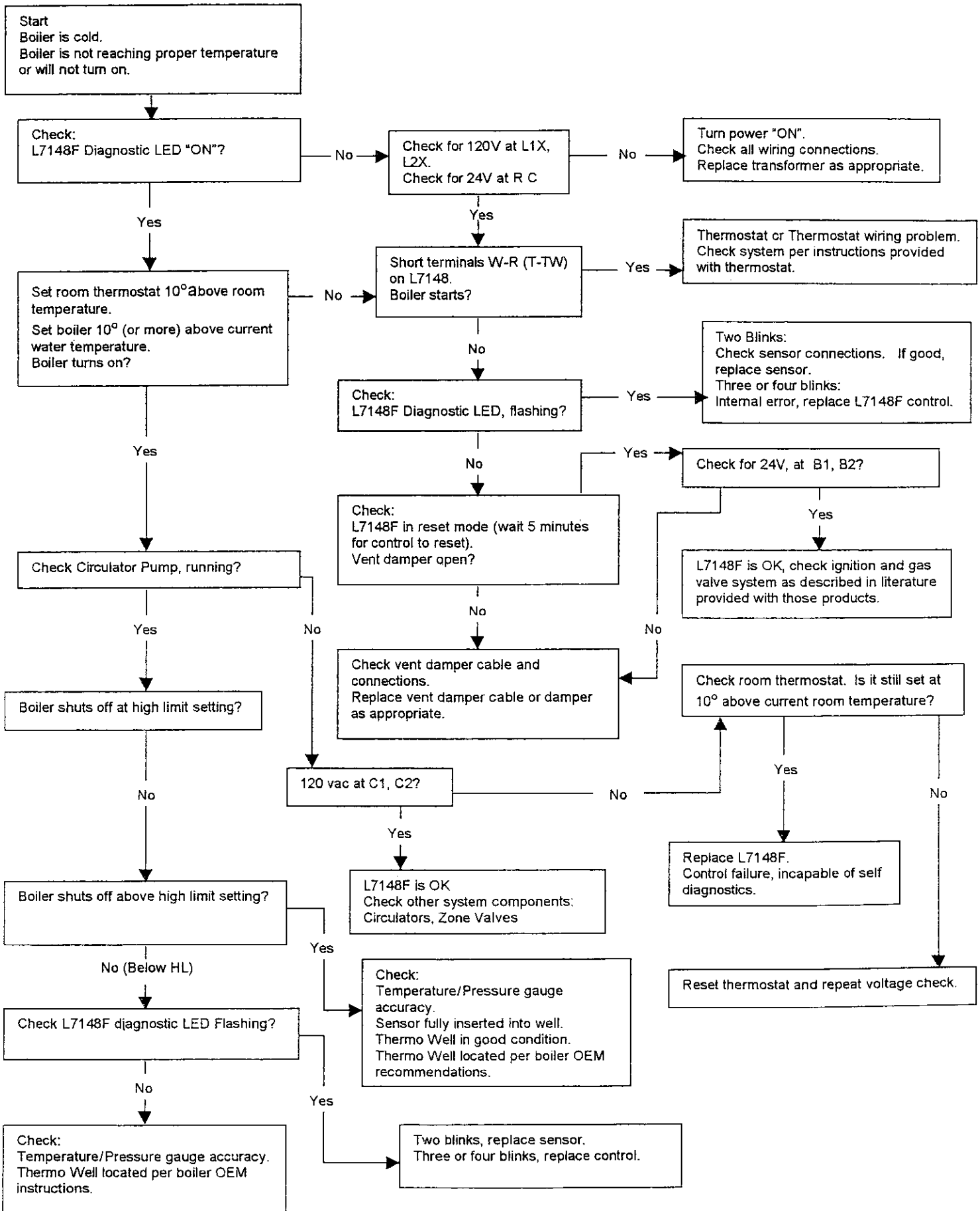
## BOILER CONTROLS AND PIPING



| KEY NO. | DESCRIPTION                           | Part Number |
|---------|---------------------------------------|-------------|
| 1       | 3/4" ASME Relief Valve                | 146-22-011  |
| 2       | 3/4" x 7 1/2" Nipple                  | 146-07-041  |
| 3       | Temperature Pressure Gauge – 5" Stem  | 146-23-009  |
| 4       | 1 1/4" x 2 1/2" Nipple                | 146-07-044  |
| 5       | 1 1/4" x 3/4" x 1 1/4" Tee            | 146-93-049  |
| 6       | Well 3/4" NPT 123870A                 | 146-62-017  |
| 7       | Sensor 209659A with Mounting Clip     | 146-62-400  |
| 8       | 1 1/4" x 6" x 6" Bent Nipple          | 146-07-003  |
| 9       | Isolation Ball Valve                  | 146-26-043  |
| 10      | Taco 007 Circulator                   | 146-26-047  |
| ++      | Grundfos UP15-42F Circulator          | 146-26-045  |
| ++      | 400° F Black Silicone Rubber Adhesive | 146-06-020  |
| ++      | Fuse Link G4AM0600 144C               | 146-29-002  |
| ++      | Spill Switch Water 36TX16-6281        | 146-60-001  |
| ++      | Wiring Harness Vent Damper            | 146-34-501  |
| ++      | Sealant (10.3 oz. Cartridge)          |             |

++ NOT ILLUSTRATED

# HONEYWELL L7148F TROUBLE SHOOTING GUIDE







## OWNER'S MANUAL

## CONTINUOUS PILOT MODEL NO.

**KWX - 3V**

**KWX - 4V**

**KWX - 5V**

**KWX - 6V**

**KWX - 7V**

**KWX - 8V**

**KWX - 9V**

# Gas - Fired Cast Iron HOT WATER BOILER

Now that you have purchased your Boiler, should a need ever exist for repair parts or service, simply contact any Sears Service Center. Be sure to provide all pertinent facts when you call or visit.

The model number of your Boiler will be found on the model plate on the side of the Boiler.

**WHEN ORDERING REPAIR PARTS, ALWAYS GIVE THE FOLLOWING INFORMATION:**

- PART NUMBER
- MODEL NUMBER
- PART DESCRIPTION
- NAME OF ITEM

All parts listed may be ordered from any Sears Service Center.

If the parts you need are not stocked locally, your order will be electronically transmitted to a Sears Repair Parts Distribution Center for handling.

When Sears arranges the installation, you can be sure the Job is done right. We will arrange for professional workmanship...and we'll take care of the entire project. What's more, during installation you get insured protection against property damage and also against accidents to workmen. All you have to do is talk to your nearest Sears store today for detailed information.

**Sears, Roebuck and Co., Hoffman Estates, IL 60179 U.S.A**

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